

# ROADWAY AND TRAFFIC DESIGN STANDARDS

FOR DESIGN, CONSTRUCTION, MAINTENANCE AND UTILITY  
OPERATIONS ON THE STATE HIGHWAY SYSTEM

JANUARY 2000

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Approved For Use On Federal Aid Projects

A handwritten signature in cursive script, appearing to read "Robert M. Callan".

For James E. St. John, Division Administrator

A handwritten signature in cursive script, appearing to read "Billy J. Hollaway".  
Sept. 13, 1999

A handwritten signature in cursive script, appearing to read "Billy J. Hollaway".

State Roadway Design Engineer

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## INTRODUCTION

### METRIC ROADWAY AND TRAFFIC DESIGN STANDARDS, JANUARY 2000

The 2000 Metric Roadway And Traffic Design Standards booklet was developed in concert with the development of the Department's roadway "Plans Preparation Manual", "Metric", current as of January 1999, (including "FDOT Metric Practice", and "FDOT Metric Symbols", under Appendices B and C respectively); the 1999 "FDOT Standard Specifications For Road And Bridge Construction"; the FDOT "English & Metric Combined Edition" of the "Basis Of Estimate Handbook, 1999"; and, in reference to the 1993 AASHTO "Interim Selected Metric Values For Geometric Design"; the AASHTO metric "A Policy On Geometric Design Of Highways And Streets, 1994"; the AASHTO "Roadside Design Guide", 1996; the USDOT (FHWA) "Manual On Uniform Traffic Control Devices, 1988" and revisions; the USDOT rules implementing the Americans With Disabilities Act (ADA) and its proposed amendments to the rules, June 20, 1994; the "Florida Accessibility Code For Building Construction" (10/97 Edition); and, with express reference to ASTM E621 "Standard Practice for the Use of Metric (SI) Units in Building Design and Construction"; ASTM E380 "Standard Practice For Use Of The International System Of Units (SI) (the Modernized Metric System)"; ASTM and AASHTO specifications with assigned metric designations; and, obtainable industry established interim and proposed metric specifications and trade indentifications.

The Department has adopted a standard practice for use of the m and mm designations and the use of the decimal that applies to the standards of this booklet, metric contract plans and other metric documents. That practice along with applied symbology are as follows:

- (a) Meter shall be indicated in decimal form without the m designation unless needed for clarity; for example: 30.0, 0.1 and 4.53.
- (b) Millimeter shall be a whole number without the mm designation unless the designation is needed for clarity. Anytime a fractional millimeter is required, the decimal form shall be labeled with mm; for example: 0.0400 mm. Whenever the whole number may be misinterpreted for the number of items required, then the mm designation is to be added; for example: 10 mm joints or 150 mm spaces.
- (c) Designations m or mm are not applied to dimensional information on dimension lines with line terminators unless needed for clarity. Designations m or mm are applied to dimensional information when tagged directly to a drawing feature by a leader line.
- (d) Designations m or mm are not applied to radii unless needed for clarity; for example: 15.0 R (without the m) and 10 R (without the mm).
- (e) In notations the m and mm designation are not to be used when the terms depth, thick, length, width, slopes, ctrs., height, slot, corrugation, timber and similar terms follow the number unless needed for clarity.
- (f) All general and design notes and other notation should show the m and mm after any numbers for clarification.

(g) For round holes, diameter may be specified in one of the following forms:

Example: 15 mm  $\emptyset$  Hole (Preferable);  
15  $\emptyset$  Hole or 15 Dia. Hole (Acceptable)  
15 mm  $\emptyset$  Hole (2 Reqd.) (Preferable);  
2-15 mm  $\emptyset$  Holes (Acceptable)  
15.3 mm  $\emptyset$  Hole (mm required with fractional mm)

- (h) Designations m or mm are not applied to established trade sizes or identifiers unless indicated by the trade or where needed for clarity; for example: L127 x 89 x 7.9 for a steel shape; #13 for steel reinforcing bars; No. 15 for reinforcing strands; and, pipe size 750, since the diameter is understood by the industry to be in millimeters.
- (i) All tables should be labeled m and mm in the headings of columns including tabulations for those items where the industry has specified a single designation.
- (j) Pay items units are labeled with upper case letters as shown in the 1999 English & Metric Combined Edition of the Basis Of Estimates Handbook; and duplicated on Index No. 001.
- (k) For drawings and description information use the small superscript; for example: m<sup>2</sup> not m2.
- (l) All items shall be described with their specific designations except as outlined above. SI units and symbols (ASTM's E380 and E621) must be adhered to; for example: kPa not KPa.

The 1994 Appropriations Act was signed into law on October 27, 1993. This act forbids the expenditure of Federal Funds for highway signs displaying speed limits, distance or other measurements using the metric system. Therefore, all speeds and all distances will be displayed in English units.

The equations for determining taper lengths, flare lengths and lane transition lengths "L", (for example  $L = WS/1.6$  and  $L = WS^2/150$ ) are for metric values. Design speed in kilometers per hour (km/h) will be substituted for "S" in the equations unless other assumed values are to be applied. On those standard indexes where the assumed value is the posted speed (English), conversion tables for English to metric speeds have been included on the indexes.

This booklet is the fourth publication of metric roadway and traffic design standards by the Department. Users of these standards are encouraged to suggest improvements to the standards. Suggestions should be submitted only after thorough study has been made and supporting background data can be furnished with the suggestion. Suggestions should be submitted to the State Roadway Design Engineer, Florida Department Of Transportation, 605 Suwannee St. MS 32, Tallahassee, FL. 32399-0450. The Department will make changes to the standards by special provisions, or where necessary by interim standards, until the next regular publication of metric standards is implemented.

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**COMPREHENSIVE CHANGES (These changes are not listed in the index tabulations below)**

**Speeds:**

Where posted speeds in miles per hour (mph) are effective in determining the application of certain features in the standard drawings of this booklet (indexes), and the relationship between metric speed in kilometers per hour (km/h) and (mph) needs to be correlated, both values are given; e.g.,  $\leq 70$  km/h ( $\leq 45$  mph) and  $\geq 80$  km/h ( $\geq 50$  mph). Speed designations shown in the indexes are not to be used for establishing project design speed, nor used to override any criteria for project design speed set forth in the Department's 'Plans Preparation Manual' or other Department approved source documents.

**Reinforcing Steel For Concrete:**

Bar sizes conform to the designations of ASTM A615M-96, using the prefix symbol '\*'; e.g. the previous designations 10M, 15M and 20M bars are now \*10, \*16 and \*22 bars respectively.

Welded wire fabric is now designated smooth or deformed identification, wire spacing in millimeters and wire area in square millimeters; e.g., 75 x 75-MW22 x MW22 and 100 x 100-MD29 x MD29.

**Signs:**

Sign shields with the legend 'SPEEDING FINES DOUBLED WHEN WORKERS PRESENT' have been posted on all Series 600 indexes where signs applicable.

**TABULATED CHANGES**

The changes tabulated below principally address functional changes in the standard drawings (indexes) since publication of the 1998 metric 'Roadway and Traffic Design Standards' booklet. The items below are keyed to what is shown on the index sheets of this 2000 booklet, and do not necessarily correlate directly by cross reference between this booklet and the 1998 booklet. This approach is taken to diminish complexities that can arise when trying to compare line items of the two booklets and those of the multiple issues of special provisions and interim indexes that were produced to update the 1998 booklet.

Where a change has been applied to a feature that is common on more than one of the sheets within the same index, or within a series of indexes with a common function, the change will not be repeated in most cases; however, such sheets will indicate a 2000 revision date.

Index Number	Sheet Number	Description	Index Number	Sheet Number	Description
002	1 of 3	'GENERAL NOTE' - Text revised.	252	1 of 2	'GENERAL NOTES' - Note 1 added.
	2 of 3	Updated to match most commonly used CADD cell library symbols.	253	1 of 2	'GENERAL NOTES' - Note 1 added.
101	1 of 1	'SECTION AA' - PVC outlet pipe size corrected from '50 mm' to '150 mm'.	255	1 of 1	'GENERAL NOTES' - Note 1 added.
102	1-3 of 3	Sheets replaced.	258	1 of 1	'GENERAL NOTES' added.
104	1 of 1	Table 'SEEDING RATE (kg/ha) FOR NEW SHOULDERS AND SLOPES*' - Seeding rates revised.	264	1 of 1	'GENERAL NOTES' - Note 1 added.
105	1 of 1	Table 'SEEDING RATE (kg/ha)' - Seeding rates revised.	266	1 of 1	'GENERAL NOTES' - Note 1 added.
106	1 of 1	'GENERAL NOTES' - Note 4 revised.	268	1 of 1	'GENERAL NOTES' added.
199	1 of 1	Table 'STANDARD CRITERIA' and 'Table 1' - Tables replaced.	272	6 of 6	'GENERAL NOTES' - Note 11 revised.
200	1 of 2	'TOP SLAB REINFORCING STEEL DIAGRAM' - Note added.	280	4 of 4	'EXTRA BASE FOR CROSS BOX CULVERTS UNDER FLEXIBLE PAVEMENT', 'FRIABLE BASE' - Changed words Frangible to Friable.
	2 of 2	'WALL DESIGNS-RECTANGULAR STRUCTURES' - Size '2134 (1200)' corrected to '2134 (2100)'.	281	1 of 2	Table 'DITCH PAVEMENT', 'Riprap (Ditch Lining)' - Revised unit of payment and estimate. 'GENERAL NOTES' - Note 8 added.
201	3 of 6	'UTILITY PIPES THRU STORM SEWER STRUCTURES' - Added 'SECTION AA'. 'MINIMUM DIMENSIONS FOR BOX AND RISER SEGMENTS' - Revised drawings and notes for clarification.	284	1 of 1	Spillway on old Sheet 1 of 2 deleted and spillway on old Sheet 2 of 2 moved to this sheet.
	4 of 6	'INDEX 231', 'DITCH BOTTOM INLET TYPE B' - Revised drawing to agree with Index 231. 'INDEX 221 & 234', 'GUTTER INLET TYPE J & V' - subheading revised to read 'GUTTER INLET TYPE V AND DITCH BOTTOM INLET TYPE J'.	286	1 of 2	'TYPE V' section transferred to new Sheet 2 of 2. 'GENERAL NOTES' - Notes 5, 7, 8, 9 and 10 revised. 'DESIGN NOTES' - Note 6 revised.
205	1 of 5	'MINIMUM COVER FOR CONCRETE, STEEL, ALUMINUM, POLYETHYLENE, AND POLYVINYL CHLORIDE PIPE', - Former table labeled 'UNPAVED W/O SELECT BEDDING' deleted. 'UNPAVED' table - Former table labeled 'UNPAVED WITH SELECT BEDDING' relabeled 'UNPAVED'; former sectional drawing with select bedding deleted. 'GENERAL NOTES' - Note 2 revised and Note 6 added. 'EXTRA BASE FOR CROSS CULVERTS UNDER FLEXIBLE PAVEMENTS', 'FRIABLE BASE' and 'ASPHALTIC CONCRETE BASE' - All tag notations removed and 'Note:' revised.	287	2 of 3	New Sheet. Type V underdrain sections transferred from old Sheet 1 of 1 to this sheet. 'CLEANOUT FOR TYPE V UNDERDRAIN' - New detail. Sections 'TYPE Va' and 'TYPE Vb' - Internal Filter Fabric added.
	2 of 5	'MAXIMUM COVER FOR REINFORCED CONCRETE PIPE ROUND AND ELLIPTICAL', 'ROUND PIPE INSTALLATIONS' - Table 'Note:' revised.	305	1 of 5	Table 'DOWELS (LENGTH 450 mm)' - Table expanded.
209	1 of 1	Index deleted.	310	1 of 2	'GENERAL NOTES' - Retitled to 'NOTES FOR CONCRETE SIDEWALK ON CURBED ROADWAYS', Note No. 5 Revised.
210	1 of 1	Identified 'Theoretical Gutter'.		2 of 2	New Sheet Titled 'CONCRETE SIDEWALKS FOR UNCURBED ROADWAYS'.
211	1 of 2	'SECTION AA' and 'SECTION QQ' - Identified 'Theoretical Gutter' and 'Theoretical Depression Elevation'.	400	1-31 of 31	All sheets are replacement sheets. The restructuring and expansion of this index was necessitate by the following imposing features: (a) Approach slabs on new construction that will typically be nine (9) meters in length (b) Bridge traffic railing ends that are integral with and equal in length to the approach slabs on new construction (c) bridge traffic railings ends on existing bridges with Test Level 4 railings, modified to accept three-beam guardrail anchorage (d) three-beam transitions for guardrail to bridge connections (e) elimination of standard steel offset blocks, and (f) the addition of new end terminal designs.
217	1 of 1	'INSET A' - Inset enlarged for clarity.	401	1 of 9	'ELEVATION' - Drawing added. 'GENERAL NOTES' - Note 2 revised.
220	1 of 1	'STEEL GRATE', - Out to out dimensions revised.		2 of 9	'CONCRETE SAFETY BARRIER', 'SCHEME 1' and 'CAST IN PLACE PANELS', 'SCHEME 2' - Bonding material notation revised.
229	1 of 1	Index deleted.		4 of 9	'CAST IN PLACE TRANSITION WALL', 'SCHEME 9' - Bonding material notation revised.
231	1 & 2 of 2	Sheets replaced; inlets top replaced with traversable design top.		6 of 9	'BRIDGE WITH APPROACHING ROADWAY CURB', 'CONCRETE ANCHOR POST', 'SCHEME 17' and 'STEEL ANCHOR POST AT RADIAL WING WALL', 'SCHEME 15' - Bonding material notation revised.
232	1 of 5	Combination structure bottom and riser drawing transferred to sheet 5 of 5. 'INLETS', 'TYPE C', 'TYPE D', 'TYPE E' and 'TYPE H' all sectional views - Structure depth notation revised.		9 of 9	'CONCRETE BRIDGE ANCHORAGE TRANSITION WALL', 'SCHEME 29', 'Note (Scheme 29)' - Bonding material notation revised. 'END POST WITH SPECIAL END SHOE RECESS', 'SCHEME 30' - Rubrail requirement added by notation and sketch.
	5 of 5	New sheet for round bottom with opening centered in top.			
240	1 & 2 of 2	New index for skimmers on outlet control structures.			
249	1 of 1	Index deleted.			
251	1 of 2	'GENERAL NOTES' - Note 1 added.			

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Index Number	Sheet Number	Description	Index Number	Sheet Number	Description
410	2 of 22	Former 'DETAIL I' transferred to other sheet. 'SHOULDER TREATMENT WHEN CRASH CUSHION SHIELDING CONCRETE BARRIER WALL APPROACH ENDS LOCATED INSIDE CLEAR ZONE OR INSIDE HORIZONTAL CLEARANCE' - Drawing added to 'DETAIL A'.	520	2 of 2	'CONCRETE STEPS NOTES' - Note 1 revised. 'ALUMINUM PIPE HANDRAIL ON GRAVITY WALLS FOR DROPOFFS, DROPOFFS >250mm AND ≤760 mm' - Subheading revised; 'TYPICAL SECTIONS AT POST', adhesive anchor notation - Epoxy bonding deleted and Adhesive Material System bonding substituted, and former drop off notation deleted.
	3 of 22	'BRIDGE PIERS' - Former 'DETAIL I' moved to this sheet. 'COMBINATION BARRIER AND SIGN PEDESTAL' and 'INDEPENDENT BARRIER AND SIGN PEDESTAL' - New drawings.	540	1 of 1	'STEM AND PLATE OPTIONS', 'STEEL PLATES' - Plate dimension corrected.
	4 of 22	'PICTORIAL' view - Revised to include pole recess.	560	1 of 5	'RURAL' - Shoulder pavement revised. 'TYPICAL FLEXIBLE PAVEMENT AT RR CROSSINGS' - Notations revised.
	7 of 22	Subscripts '*' and 'Ø' - Reference to Detail E deleted.	600	2 of 11	'INTERSECTING ROAD SIGNING' - Note revised
	20 of 22	All details - Thrie-beam transitions substituted for W-beam transitions. Steel offset block option deleted.		3 of 11	'CHANNELIZING AND LIGHTING DEVICES' - Note revised. 'WARNING LIGHTS' - Note revised.
	21 of 22	'LIGHT POLE MOUNTING IN TRAPEZOIDAL SECTIONS' - Chamfer dimension added.		4 of 11	'CLEAR ZONE WIDTHS' - Note revised.
	22 of 22	All details - Thrie-beam transitions substituted for W-beam transitions.		5 of 11	'MANHOLES' - deleted; 'MANHOLES/CROSSWALK TREATMENT' - added. 'SPEEDING FINES DOUBLE SIGN' - deleted; 'SPEEDING FINES DOUBLED WHEN WORKERS PRESENT' - added.
415	1 of 4	'BRIDGE DECK AND APPROACH INSTALLATIONS' - Footnote revised to substitute 'Adhesive Material System' bonding for chemical bonding. 'WALL UNIT', 'SECTION (F-SHAPE)' and 'SECTION (N.J. SHAPE)' - Single section for both wall types replaced by individual sections.		6 of 11	'TRAVEL LANE TREATMENT FOR MILLING OR RESURFACING', note 3 - Text deleted and the following text substituted: 'If D is 40 mm or less, no treatment is required.'
	2 of 4	'FDOT SNAKE PIN' - Added. 'CONNECTING PIN ASSEMBLY' - Added (Former 'STEEL PIPE KEEPER' discontinued).		8 of 11	'CHANNELIZING AND LIGHTING DEVICE NOTES' - Note 4 & 9 revised.
	3 of 4	Original drawings - Inertial crash cushion removed (transferred to new Index 417); other drawings transferred to Sheet 4 of 4. This sheet is the lead sheet for applications of optional redirective crash cushions detailed on Sheet 4 of 4.	602	1 of 1	Sign MOT 14 & 15 replaced former sign FTP 56 & 57. Sign MOT 16 added.
	4 of 4	Replacement sheet - All current optional redirective crash cushions included on this sheet; (GREAT <sub>cz</sub> ) discontinued and new TRACC added.	603	2 of 2	'GENERAL NOTES' - Notes revised.
417	1 of 1	New Index - Temporary inertial crash cushions (formerly two arrays on Index No. 415)	609	1 of 1	New sheet.
432	1 and 2 of 2	'C-A-T 350' - Former C-A-T upgraded to NCHRP 350 criteria. Steel offset blocks deleted. 'GENERAL NOTES' - Note 5 added. Old Notes 5 and 6 combined. 'PLAN', 'Departure Line' - Speed notation revised.	614	1 of 2	Signs added. 'GENERAL NOTES' - Note added.
433	1 of 4	'GENERAL NOTES' - Note 5 added. Old Notes 5 and 6 combined.	615	1 of 1	'GENERAL NOTE' - Note added.
	2 of 4	'BIDIRECTIONAL SYSTEM' - Steel offset blocks deleted. 'PLAN', 'Departure Line' - Speed notation changed.	616	1 of 2	Signs changed.
	3 of 4	'UNIDIRECTIONAL SYSTEM' - Steel offset blocks deleted. 'PLAN', 'Departure Line' - Speed notation changed.	622	2 of 2	Sign added.
434	1 of 1	'GENERAL NOTES' - Note 6 added. Note 8 revised. 'PICTORIAL VIEW', 'Departure Line' - Speed notation changed.	623	1 of 1	Signs added.
435	1 of 6	'GENERAL NOTES' - Notes 10 and 11 revised. 'BAY SELECTION TABLE' - Cartridge combination revised. 'QuadGuard SYSTEM 1755/2285 FOR WIDE HAZARDS' and 'QuadGuard SYSTEM 610/760/915 FOR NARROW HAZARDS', 'Departure Line' both - Speed notations revised.	628	2 of 2	Note changed.
	4 of 6	'SECTION AA (POSTS #1 AND #2)', 'SPECIAL STEEL POST Δ WITH TIMBER OFFSET BLOCKS' and 'SECTION BB (POSTS #3 THRU #9)', 'SPECIAL STEEL POSTS Δ WITH TIMBER OFFSET BLOCKS', '760 mm SYSTEM WIDTHS' - Single post configuration substituted for double post configuration. ≥915 mm SYSTEM WIDTH' - Double post configuration retained.	623	1 of 1	Barricades and sign added.
	6 of 6	'*Transition Flare Rates' - Speed notations revised.	628	1 of 1	New Index.
436	1 of 1	'GENERAL NOTES' - Notes 6 added. Notes 11 and 13 revised. 'Departure Line' - Speed notation revised. 'DESIGN AND MAINTENANCE NOTES AND GUIDELINES' - Note 2 revised.	631	1 & 2 of 2	New Index.
439	1-6 of 6	Index deleted.	640	2 of 2	Signs added.
440	1-2 of 2	New Index.	650	1 of 2	Signs added.
451	1 of 2	'GENERAL NOTES' - Note 15 corrected.	651	1 of 2	Signs added.
452	1 of 2	'GENERAL NOTES' - Notes 4.A.(6) and (7), 4.B.(4) and 4.C.(4) specification reference 'ASTM F1234' deleted and 'ASTM F1043' substituted. Elevations - Tension bars and tension straps revised.	665	1 of 1	New Index.
	2 of 2	'BASE PLATE AND ANCHOR NOTES' - Note 3 anchor epoxy bonding deleted and Adhesive Material System bonding substituted.	5000	1 of 1	New index.
505	1 of 3	'GENERAL NOTES', Note 5, 2nd paragraph - Word 'topsoil' replaced with words 'finished soil layer'.	5005	1-12 of 12	New index.
513	1 of 1	Index deleted.	5010	1-20 of 20	New index.
517	1 of 1	'GENERAL NOTES' - Note 4 added.	5011	1-21 of 21	New index.
518	1 of 2	'GENERAL NOTES' - Note 4 revised. 'SECTION AA • FOR THERMOPLASTIC AND ASPHALT RUMBLE STRIP SETS', 'THERMOPLASTIC SET' - Footnote added. 'STRUCTURES WITH LESS THAN FULL WIDTH SHOULDERS', 'INSET B' added; 'PLAN • TWO-WAY' - Rumble strips on trailing side deleted; and, 'PLAN • ONE-WAY' - 'Inset B' tag added. 'INTERSECTIONS', 'PLAN', 'INSET C' and 'Inset C' tag - Inset designation changed from 'B' to 'C'.	5012	1-20 of 20	New index.
			5015	1-9 of 9	New index.
			5016	1-8 of 8	New index.
			5021	1-13 of 13	New index.
			5025	1-8 of 8	New index.
			5105	1-3 of 3	New index.
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			5130	1-4 of 4	New index.

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9535	1 of 3	'GENERAL NOTES', 'STRUCTURAL STEEL' and 'ALTERNATE MATERIAL' - Note revised. 'BACKING STRIP DETAIL', 'Notes:' - Note revised.	17890	2 of 3	Clearance above roadway '5.1 Min.' revised to '5.35 Min.'
11037	1 of 1	Sheet replaced.	17900	1-8 of 8	New index.
11860	1-3 of 3	All sheets are replacement sheets.			
11861	1-2 of 2	All sheets are replacement sheets.			
11862	1-2 of 2	All sheets are replacement sheets.			
11863	1-2 of 2	All sheets are replacement sheets.			
11864	1-2 of 2	All sheets are replacement sheets.			
17328	1 of 1	Sheet replaced.			
17344	5 of 6	'FRONT VIEW' and 'REAR VIEW' - Clearance above roadway '5.1 Min.' revised to '5.35 Min.'			
17346	4 of 9	'ONE-WAY SIGNS ON DIVIDED HIGHWAY INTERSECTIONS', 'FIGURE 1' and 'FIGURE 2' - R6-3 signs added; and 'FIGURE 1' - Notation of R6-1 signs added.			
	6 of 9	'NOTES:' - Speed table revised to include 65 mph data.			
	9 of 9	'PAVEMENT MARKING FOR PUBLIC SIDEWALK CURB RAMPS IN REST AREAS' - Chevron color notations revised.			
117349	1 of 1	R6-3a sign added to intersection detail for 'median greater than 9 m' and notation added to intersection detail for 'median less than 9 m'.			
117352	1 of 2	'MULTI-LANE' - New detail. 'SKIP LINE WITH TWO WAY LEFT TURN LANE' and 'ALTERNATING SKIP LINE WITH TWO WAY LEFT TURN LANE', 'Bi-Directional Colorless/Red pavement markers' - Replaced former 'Mono- Directional Colorless' pavement markers.			
17355	1-12 of 12	Signs dimensional sizes corrected.			
	3 of 12	'FTP-30' - Legend and border color revised to black.			
	4 of 12	'FTP-28' and 'FTP-29' - Sign dimensions "A" and "B" corrected and tables revised.			
	8 of 12	'FTP-62' - Sign added.			
	10 of 12	'MOT 14' and 'MOT 15' - Signs added.			
17356	1-2 of 2	'TYPICAL SPAN WIRE INSTALLATION' - Clearance above roadway '5.1 Min.' revised to '5.35 Min.'			
17359	1 of 1	Sheet replaced.			
17500	2 of 3	Size of welded wire changed and 'NOTES:' - Note 5 added.			
	3 of 3	Size of welded wire changed and 'NOTES:' - Note 7 added.			
17501	1 of 1	Note 1 revised.			
17502	3 of 4	Surge arrester moved inside pole and ground rod notations added.			
	4 of 4	Welded wire size changed and 'NOTES:' - Note 7 added.			
17503	1 of 1	Diameter of foundation corrected and table, 'BOLT CIRCLE (m)' - Units corrected.			
17600	1 & 2, of 2	New index.			
17721	1 of 2	Trench width dimensions revised, backfill notations revised and conduit notation revised.			
17725	1 of 1	New Index.			
17727	1 & 2 of 2	All ground wire notations revised and clearance above roadway '5.1 Min.' revised to '5.35 Min.'. 'Notes:' - Note 4 revised.			
17733	1 of 1	All ground wire notations revised. 'Notes:' - Note 6 added.			
17736	1 of 1	'NOTES' - Note 4 added.			
17764	1 of 1	Ground rod notations revised. Pedestrian signal head height - '2.4 Min.' revised to '2.5 Min.'			
17784	1 of 2	Mounting height dimension of push button revised. Horizontal dimension from the pole to the sidewalk revised. 'NOTES:' - Notes 3 and 4 revised.			
17841	1 of 1	All cabinet mounting height dimension revised. 'Notes:' - Notes 2 and 3 revised.			
17882	1 & 2 of 4	Clearance above roadway '5.1 Min.' revised to '5.35 Min.'. 'SIGNAL PLACEMENT AT RAILROAD CROSSING (2-LANE DESIGN)' and 'SIGNAL PLACEMENT AT RAILROAD CROSSINGS (4-LANE DESIGN)' - Shoulder Pavement revised.			

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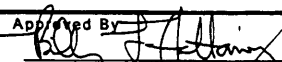
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A	Area or Amperes	CM	Concrete Monument	FAP	Federal Aid Project	km	Kilometer
AAA	American Automobile Association	CMB	Concrete Median Barrier	FC	Friction Course	km/h	Kilometer Per Hour
AASHTO	American Association Of State Highway Officials	CMP	Corrugated Metal Pipe	FD	French Drain	kn	Knot
AASHTO	American Association Of State Highway And Transportation Officials	CMPA	Corrugated Metal Pipe Arch	Fdn.	Foundation	kPa	Kilopascal
ABC	Asphalt Base Course	Co.	County or Company	FDOT	Florida Department Of Transportation	ksi	Kips Per Square Inch
Abd.	Abandoned	Col.	Column	FE	Floor Elevation	kV	Kilovolt
ABS	Acrylonitrile-Butadiene-Styrene Pipe	Com.	Commercial or Common	Fed.	Federal	kVA	Kilovolt Ampere
AC, Ac.	Acres	COMM	Committee or By Committee	Fert.	Fertilizer	kWh	Kilowatt Hour
AC or Asph. Conc.	Asphaltic Concrete	Comp.	Composite	FES	Flared End Section	L	Length, Length Of Curve, Liter, Left
Accel.	Acceleration	Con.	Connect or Connection	FETS	Flared End Terminal Section	2-L	Two-Lane
Act.	Actuated	Conc.	Concrete	FH	Fire Hydrant	2LW	Two-Lane One-Way
ADA	The Americans With Disabilities Act	Contrl.	Construct or Construction	FHWA	Federal Highway Administration	2L2W	Two-Lane Two-Way
Adj.	Adjust	Cont.	Continuation	Fig.	Figure	LA or L/A	Limited Access
ADT	Average Daily Traffic	Contr.	Contractor	Fin.	Finish	lane km	Lane Kilometer
AADT	Annual Average Daily Traffic	Coord.	Coordinate	FL	Flow Line	Lat.	Lateral or Latitude
Agg.	Aggregate	Car.	Corner	FL, Fl. or Fla.	Florida	Lb.	Pound
Ah.	Ahead	Carr.	Corrugated	Flex.	Flexible	LBR	Limerack Bearing Ratio
AISC	American Institute Of Steel Construction	CP	Concrete Pipe	FNO	Fuse (Type Slow Burn)	LC	Long Chord
Alt.	Alternate	CPE	Corrugated Polyethylene Pipe	FOC	Fiber Optics Cable	Lgth.	Length
Al.	Aluminum	CR	Control Radius or County Road	FPM or fpm	Feet Per Minute	Ltn.	Linear
AM	12:00 Midnight Until 11:59 Noon	CRA	Clear Recovery Area	FPS or fps	Feet Per Second	Im	Lumen
ANSI	American National Standards Institute	Crs. or Cse.	Course	FR or Fr.	Frame	Lmrk.	Limerack
AOS	Apparent Opening Size	CS	Curve To Spiral	Frang.	Frangible	Loc., LO	Location
Appl.	Applied, Application	CSP	Corrugated Steel Pipe	Freq.	Frequency	LS	Length Of Spiral
Apprh.	Approach	CT	Clear Trunk	FS	Far Side	LT	Left Turn
Approx.	Approximate	Ctlvr.	Canilever	ft.	Foot or Feet	Lt.	Left
ARTBA	American Road & Transportation Builders Association	Ctr.	Center	FTB	Floating Turbidity Barrier	Ltd.	Lighted or Limited
Artf.	Artificial	CU or Cu	Copper	FTBA	Florida Transportation Builder Association	Lum.	Luminaire
Asph.	Asphalt	Culv.	Culvert	Furn.	Furnish	L/W	Lightweight
Assem.	Assembly	Cwt.	Hundredweight	Fut.	Future	lx	Lux
Assn.	Association	CY	Cubic Yard	G	Giga or Gauss	M	Mass, Middle Ordinate Length or Mega
Assoc.	Associate, Association	Cyl.	Cylindrical	g	Gram or Gravity	m	Meter or Milli
ASTM	American Society For Testing Materials	CZ	Clear Zone	Galv.	Galvanized	m <sup>2</sup>	Square Meter or Meter Square
Attn.	Attention	D	Degree Of Curvature, Depth, Density, Distance, Diameter or Directional Distribution	Ga. or Gal.	Gauge or Gage	m <sup>3</sup>	Cubic Meter or Meter Cubed
Attuatr.	Attenuator	DA	Drainage Area or Deflection Angle	Gar.	Gallon	m <sup>3</sup> /m	Cubic Meter Per Meter
Aux. or Auxil.	Auxiliary	DBH	Diameter At Breast Height	Garage	Garage	m/s	Meters Per Second
Ave.	Avenue	DBI	Ditch Bottom Inlet	GD	Gutter Drain	Mach.	Machine
AWG	American Wire Gauge	Dbl.	Double	GIP	Galvanized Iron Pipe	Maint.	Maintenance
AWS	American Welding Society	DCS	Degree Of Curvature (Spiral)	GM	Gas Main	Matl.	Material
Az.	Azimuth	DD	Dry Density	GP	Grade Point	Max.	Maximum
B to B	Back to Back	DDHV	Directional Design Hour Traffic	Gr.	Grade, Guardrail or Grate	MB	Median Barrier
Bascul.	Bascule	Decel.	Deceleration	Gr. or Gro.	Grass	MBM	Thousand (Feet) Board Measure
Bbl.	Barrel	Deg.	Degree	GRC	Rigid Steel Conduit	Med.	Median
BC	Bottle Cap or Bolt Circle	Delin.	Delineators	Grd.	Ground	Mega	One Million
B/C, B.C.	Back Of Curb	Demobl.	Demobilization	gross km	Grass Kilometer	Membr.	Member
BCCMP	Bituminous Coated Corrugated Metal Pipe Culvert	Dept.	Department	Gr. wt. or gr. wt.	Grass Weight	MES	Mitered End Section
BCPA	Bituminous Coated Pipe Arch Culvert	Det.	Detour	Gtr.	Gutter	Mess.	Message
BCPCMP	Bituminous Coated And Paved Corrugated Metal Pipe Culvert	DGN or Dgn.	Design	Gy	Gray	Mfg.	Manufactured or Manufacturer
BCPPA	Bituminous Coated And Paved Pipe Arch Culvert	DHW	Design Hourly Volume	H	Henry	MG	1000 Gallons
BCT	Breakaway Cable Terminal	DT	Ditch	h	Hour or Hecto	MH	Manhole
BE	Buried Electric	DI	Ditch Inlet	ha	Hectare	MHW	Mean High Water
Beg.	Begin	Dia. or D	Diameter	HB	Hay Boles	µ	Micro
Bil.	Bituminous	Dim.	Dimension	HC	Horizontal Clearance	Mi.	Mile
Bk.	Back	Dist.	Distance	HD	High Density or Heavy Duty	Micro	One-Millionth
BL, BLC	Base Line, Base Line Control	Disp.	Disposal	HD or Hd.	Head	Mid.	Middle
Bldg.	Building	DLS	District Location Surveyor	Hawl.	Headwall	Mil	One-Thousandth Of An Inch
Bldhd.	Bulkhead	DMM	Domestic Mail Manual	HH	Heavy Hex	Mil.	Military
Bldv.	Boulevard	DOT	Department Of Transportation	Hndrl	Handrail	Milli	One-Thousandth
BM	Bench Mark	DPI	Ditch Point Intersection	HOA	Hand/Off/Automatic	Min.	Minimum or Minute
Bndry.	Boundary	Dr. or DR	Drain, Drive or Design Review	Horiz. or Hor.	Horizontal	Misc.	Miscellaneous
Bdr.	Border	Driv.	Driven	HP	High Pressure or Horsepower	ml	Milliliter
.Bot.	Bottom	Drwy.	Driveway	Hr.	Hour	MLW	Mean Low Water
BP	Borrow Pit	DS	Design Speed	HS	High Strength	mm	Millimeter
.Bq.	Bequerel	DSL	Design Service Life	Hse.	House	Mobl.	Mobilization
Br.	Bridge	Dwg.	Drawing	Ht.	Height	Mod.	Modify or Modified
Brg.	Bearing	E	East or External Distance	HW	High Water or Hot Water	Mol	Mole
Brkwy.	Breakaway	e	Rate Of Superelevation	Hwy.	Highway	Mon.	Monument
BT	Buried Telephone Cable or Duct	E to E	End to End	Hyd.	Hydrant or Hydraulic	MOT	Maintenance Of Traffic
Btfly.	Butterfly	EA or Ea.	Each	HZ	Hertz	MP	Mile Post
BW	Barbed Wire, Bottom Width or Both Ways	EB	Eastbound	I	External Angle (Delta), Interstate	MPa	Megapascal
BO	Basin Outlet	EI. or Elev.	Elevation	Intchg. or Ichg.	Interchange	MPH or mph	Miles Per Hour
C	Cantilever Length, Cut, Colorless, Coulomb or Cycle Length	Elast.	Elastomeric	IES	Illuminating Engineering Society	MSL	Mean Sea Level
°C	Degree Celsius	Elec.	Electric	ID	Inside Diameter or Identification	Mtd.	Mounted
C & G	Curb And Gutter	Ellip.	Elliptical	IMC	Intermediate Metal Conduit	MUTCD	Manual On Uniform Traffic Control Device
CA	Coarse Aggregate	Embk.	Embankment	In.	Inch	MUTS	Manual On Uniform Traffic Studies
Cap.	Capacity	Emul.	Emulsified	Inc.	Incorporated or Including	N	North or Newton
CAP	Corrugated Aluminum Pipe	Encl.	Enclosure	Incl. or Inc.	Included	N/m	Newtons Per Meter
Caps.	Capital Letters	Engr.	Engineer	Ind.	Industry or Industrial	N/m <sup>2</sup>	Newtons Per Square Meter
CASP	Corrugated Aluminized Steel Pipe	EOS	End Of Survey or Equivalent Opening Size	IP	Iron Pipe	N/m <sup>3</sup>	Newtons Per Cubic Meter
CATV	Cable Television	Eq.	Equation or Equal	Install.	Installed		
CB	Catch Basin	Equip.	Equipment	Isect.	Intersection		
CBC	Concrete Box Culvert	Esmt.	Easement	Isl.	Island		
CBS	Concrete Box Structure	Est. or Estm.	Estimate	ITE	Institute Of Transportation Engineers		
CC, C/C, or C to C	Center to Center	Est.	Establish or Established	J	Joule		
CCEW	Center to Center Each Way	Etc. or etc.	Et Cetera (And So Forth)	JB	Junction Box		
CD	Cross Drain	EW	Endwall	Jct.	Junction		
cd	Candela	Exc. or Excav.	Excavation	Jt.	Joint		
Cem.	Cement or Cemetery	Exist.	Existing	K	Design Hour Factor or Kelvin		
Cem'd.	Cemented	Exp.	Expansion	k	Kilo (prefix)		
CFS	Cubic Feet Per Second	Ext.	Extension	kg	Kilogram		
Ch.	Channel	Exwy.	Expressway	kg/m	Kilogram Per Meter		
Chchg.	Channel Change	F	Fill, Farad	kg/m <sup>2</sup>	Kilogram Per Square Meter		
Chg.	Changeable	F & I	Furnish & Install	kg/m <sup>3</sup>	Kilogram Per Cubic Meter		
CI	Cast Iron	F to F	Face to Face	Kilo	One Thousand		
CIP	Cast Iron Pipe	FA	Federal Aid or Fine Aggregate	Kip	1000 Pounds		
CIPL	Cast In Place	FAC	Florida Administrative Code				
cir. or circ.	Circle or Circular						
circ.	Circumference						
Ckt.	Circuit						
Cl. or Clear	Clearance						
CL, C/L or £	Center Line						

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN			
<b>STANDARD ABBREVIATIONS</b>			
Names	Dates	Approved By 	
Designed By		State Roadway Design Engineer	
Drawn By		Revision	Sheet No. 1 of 2
Checked By		00	001

N/mm<sup>2</sup> Newtons Per Square Millimeter  
 NA or N/A Not Available or Not Applicable  
 N & C Nail & Cap  
 NB Northbound  
 NC National Course  
 NDCBU Neighborhood Delivery And Collection Box Unit  
 NE Northeast  
 net km Net Kilometer  
 NEMA National Electrical Manufacturers Association  
 NGVD National Geodetic Vertical Datum of 1929  
 NGS National Geodetic Survey  
 NHW Normal High Water  
 NIC Not In Contract  
 NJ New Jersey  
 N-m Newton Meter  
 No. Number  
 Nom. Nominal  
 Norm. Normal  
 NS Non Stress, Not Suitable or Near Side  
 NT, N&T Non Traffic, Nail & Tin  
 NTS Not To Scale  
 NW Northwest

Opass Overpass  
 O to O or o to o Out to Out  
 OA Overall  
 OC On Center  
 OD Outside Diameter  
 OE Overhead Electric  
 OH, OHD or Ohd. Overhead  
 Opt. Option, Optional or Optically  
 OT Overhead Telephone  
 Oz. Ounce  
 Ω Ohm

P Passenger Car & Light Delivery Truck  
 P or Plan Plan Quantity  
 Pa-s Pascal  
 Par. Parallel  
 Pas Pascal Second  
 Part. Participation or Partition  
 Pavt. Pavement  
 PC Point Of Curvature  
 PCBC Precast Concrete Box Culvert  
 PCC Point Of Compound Curvature or Plain Cement Concrete  
 PCE Permanent Construction Easement  
 PE Professional Engineer  
 Ped Pedestrian or Pedestal  
 Pen. Penetration  
 PG Profile Grade  
 PGL Profile Grade Line  
 Ph. Phase  
 pH Measure Of Acidity or Alkalinity  
 PI Point Of Intersection  
 Pkg. Parking  
 Pkwy. Parkway  
 PL or P Property Line or Plate  
 PM 12:00 Noon Until 11:59 Midnight  
 POC Point On Curve  
 POST Point On Semi-Tangent  
 POT Point On Tangent  
 PP Power Pole  
 Pr. Pair  
 PRC Point Of Reverse Curvature  
 Prct. Precast  
 Prest. Prestressed  
 Prob. Probability  
 Prod. Product, Production, Producer or Produced  
 Prog. Program or Progression  
 Proj. Project or Projection  
 PRM Permanent Reference Monument  
 Prov. Provisions  
 PS & E Plans, Specifications And Estimates  
 PSF or psf Pounds Per Square Foot  
 PSI or psi Pounds Per Square Inch  
 PT Point Of Tangency  
 PVC Polyvinyl Chloride  
 PW Pressure Water

Q Peak Discharge or Flow Volume (m<sup>3</sup>/s)

R or Rad. Radius  
 R or Rng. Range  
 rad Radian  
 rad/s Radian Per Second  
 RBAC Rock Base Asphaltic Concrete  
 RBST Rock Base Surface Treatment  
 RCP Reinforced Concrete Pipe  
 RCPA Reinforced Concrete Pipe Arch  
 Rd. Road or Round  
 Rsd. Roadside  
 Rdwy. Roadway  
 Rec. Recovery  
 Rect. Rectiline or Rectangular

Ref. Reference  
 Refl. Reflective  
 Reg. Region, Regular, Registered or Regulation  
 Reinf. Reinforced or Reinforcing  
 Rejuv. Rejuvenation  
 Reloc. Relocated  
 Rem. Removal  
 Repl. Replace  
 Req. or Reqd. Required  
 Res. Residence or Residential  
 RHW Insulation (Moisture & Heat Resistant Rubber)  
 RM Reference Monument  
 r/min Revolution Per Minute  
 RP Reference Point  
 rpm Revolution Per Minute  
 RPM Raised Reflective Pavement Markers  
 r/s Revolution Per Second  
 RR Railroad  
 Rsf. Resurface  
 Rt. Right  
 R/W, ROW Right Of Way

S or s Speed, South, Seimens, Or Second  
 SAHM Sand-Asphalt Hot Mix  
 SAN or San. Sanitary  
 SB Southbound  
 SBAC Shell Base Asphaltic Concrete  
 SBRM Sand Bituminous Road Mix  
 SBST Shell Base Surface Treatment  
 SC Seal Coat or Spiral To Curve  
 Sch. Schedule  
 SCST Sand-Clay Surface Treatment  
 SD Side Drain  
 SE Southeast  
 Sec. Second  
 Sect. Section  
 Sed. Sediment  
 Sep. Separator  
 Seq. Sequential  
 Serv. Service  
 SF Adjustment Factor In Percent, Silt Fence  
 SG Subgrade  
 SG or Sp.Gr. Specific Gravity  
 Sh. or Sht. Sheet  
 Shldr. Shoulder  
 SHW Seasonal High Water  
 Spa. Space  
 Spag. or Sp. Spacing  
 Spec. Specification  
 Sq. Ft. or SF Square Foot  
 Sq. In. Square Inch  
 Sq. Yd. or SY Square Yard  
 SR or S.R. State Road  
 SRAP Spiral Rib Aluminum Pipe  
 SRASP Spiral Rib Aluminized Steel Pipe  
 SRSP Spiral Rib Steel Pipe  
 SS Storm Sewer, Sanitary Sewer  
 SSMD Solid State Modular Design  
 ST Surface Treatment or Spiral To Tangent  
 St. or ST. Street  
 Sta. Station  
 Stab. Stability or Stabilization  
 STB Staked Turbidity Barrier  
 Std. Standard  
 Stg. Strong  
 Stge. Storage  
 Stl. Steel  
 Str. Structure  
 Sty. Story  
 SU Single Unit Trucks  
 Sub. or Subs. Subsoil  
 Sub. or Subst. Substitute  
 Subgr. Subgrade  
 Suppts. Supports  
 SUR or Sur. Survey  
 Surf. Surface  
 SW Southwest  
 SW or Swk. Sidewalk  
 Sys. or Syst. System  
 Sv Sievert

T Tangent, Length Of Curve, Percent Trucks, Tesla,  
 T, TWP or Twp. Township  
 t Metric Ton  
 tan. Tangent  
 TBM Temporary Bench Mark  
 TC Tangent To Curve  
 TCB Temporary Concrete Barrier  
 TCE Temporary Construction Easement  
 TCP Terra Cotta Pipe  
 TCZ Traffic Control Zone  
 Tel. Telephone

Temp. Temperature or Temporary  
 Traf. Traffic  
 Theo. Theoretical  
 THRMPLSTC Thermoplastic  
 THW or THWN Insulation (Flame Retardant, Moisture And Heat Resistant Thermoplastic)  
 Thick. Thickness  
 Tk. Thick, Thickness or Truck  
 Tn. Ton  
 Trans. Transition, Transverse, Translate or Transportation  
 Treat. Treatment  
 TS Tangent To Spiral  
 TSC Length Of Tangent (Spiral Curve)  
 Typ. Typical

Upass. Underpass  
 UG Underground  
 UL Underwriters Laboratories  
 Ult. Ultimate  
 Unld. Unlimited  
 Unddr. Underdrains  
 Undrdwy. Underroadway  
 UNL or Undl. Unloaded  
 Untr. Untreated  
 USC & GS US Coast and Geodetic Survey (now National Geodetic Survey)  
 USGS US Geological Survey  
 USPS United States Postal Service  
 Util. Utilities

V Volt, Velocity, Volume or Hourly Volume  
 Var. Varies, Variable or Variance  
 VC Vertical Curve  
 VCP Vitrified Clay Pipe  
 VECP Value Engineering Change Proposal  
 Veh. Vehicle  
 Vert. Vertical  
 VF Vertical Foot  
 Vh Verified Horizontal Location  
 VMS Variable Message Sign  
 Vol. Volume  
 VP Vertical Panel  
 VPD or Vpd. Vehicles Per Day  
 VPH or Vph. Vehicles Per Hour  
 VPHPL or Vphpl. Vehicles Per Hour Per Lane  
 VRMS Volts Root Mean Square  
 Vv Verified Vertical Elevation  
 Vvh Verified Vertical Elevation And Horizontal Location  
 VW Variable Width

W Width, Wide, West or Watt  
 W/C Water-Cement Ratio  
 WB Westbound  
 Wb. Weber  
 WB40 Intermediate Semi Trailer  
 WB50 Large Semi Trailer  
 WB60 Tandem Semi Trailer  
 WM Water Main  
 W.P.I. Work Program Item  
 WT Water Table Or Weight  
 WWF Welded Wire Fabric

X Coordinate Value (East-West Direction) or Extra  
 X Rd. Cross Road  
 Xing. Crossing  
 Xsec. Cross Section

Y Coordinate Value (North-South Direction)  
 Yr. Year

### UNITS OF MEASURE

#### US MEASUREMENT

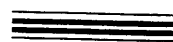




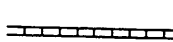
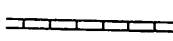
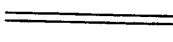
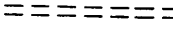
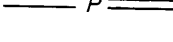
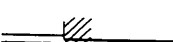
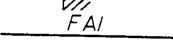
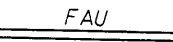

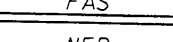
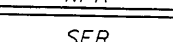







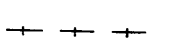
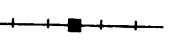
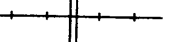
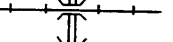
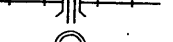








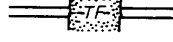
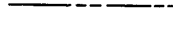




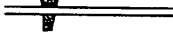







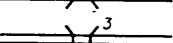
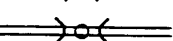


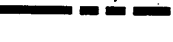


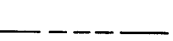
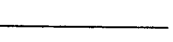
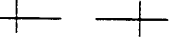
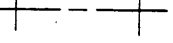

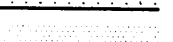



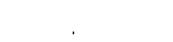




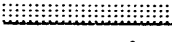












































AC Acre  
 AS Assembly  
 BU Bushel  
 CF Cubic Foot  
 CO Cleanout  
 CY Cubic Yard  
 EA Each  
 ED Each Day  
 GA Gallon  
 GM Grass Mile  
 LB Pound  
 LF Linear Foot  
 LM Lane Mile  
 LO Per Location  
 LS Lump Sum  
 LU Luminaire  
 MB Thousand Board Measure  
 MG Thousand Gallons  
 MH Man Hour  
 NM Net Mile  
 PA Per Analysis  
 PB Per Building  
 PE Pile  
 PI Per Intersection  
 PL Plant  
 PM Per Mile  
 PS Per Set  
 PW Per Well  
 SF Square Foot  
 SY Square Yard  
 TN Ton

#### METRIC MEASUREMENT

AS Assembly  
 CO Cleanout  
 DA Day  
 EA Each  
 ED Each Day  
 GK Gross Kilometer  
 HA Hectare  
 HR Hour  
 KG Kilogram  
 KL Kiloliter  
 KM Kilometer  
 L Liter  
 LK Lane Kilometer  
 LO Per Location  
 LS Lump Sum  
 LS/AS Lump Sum Per Assembly  
 LS/DA Lump Sum Per Day  
 LS/EA Lump Sum Per Each  
 LS/HA Lump Sum Per Hectare  
 LS/KG Lump Sum Per Kilogram  
 LS/LS Lump Sum Per Lump Sum  
 LS/MT Lump Sum Per Metric Ton  
 LS/MI Lump Sum Per Linear Meter  
 LS/M2 Lump Sum Per Square Meter  
 LU Luminaire  
 MH Man Hour  
 MO Month  
 MT Metric Ton  
 MI Meter  
 M2 Square Meter  
 M3 Cubic Meter  
 NK Net Kilometer  
 PA Per Analysis  
 PB Per Building  
 PI Per Intersection  
 PL Plant  
 PW Per Well

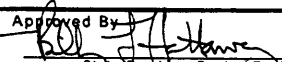
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>STANDARD ABBREVIATIONS</b>				
Designed By	Names	Dates	App. And By	Index No.
Drawn By			State Roadway Design Engineer	001
Checked By			Revision	Sheet No.
			98	2 of 2

## STANDARD SYMBOLS FOR KEY MAP

 Highway With Full Control of Access  Highway With Frontage Roads  Highway Interchange  Proposed Controlled Access Highway  Divided Highway  Hard Surfaced Road  Soil, Gravel Or Shell Surfaced Road  Graded And Drained Road  Unimproved Road  Primitive Road  Private Road  Streets In Inset Or Delimited Areas  Extension Of Local Roads Within Cities  Federal Aid Interstate Highway  Federal Aid Urban Highway  Federal Aid Primary Highway  Federal Aid Secondary Highway  National Forest Road  State Forest Road  State Park Road  Interstate Highway  US Numbered Highway  State Highway  County Road   Railroad  Double Track Railroad  Abandoned Railroad  Railroad Station  Grade Crossing  Railroad Above  Railroad Below  Military Field  Commercial Or Municipal Airport  Landing Area Or Strip  Runways	 Free Ferry  Toll Ferry  Canal Or Drainage Ditch  Intracoastal Waterway  Narrow Stream  Wide Stream  Dam  Dam Or Spillway With Lock  Dam With Road  Flood Control Structure  Lake, Reservoir Or Pond  Intermittent Pond  Meandered Lake  Marsh Or Swamp  Mangroves  Levee Or Dike  Levee Or Dike With Road  Highway Bridge  Small Bridges Closely Spaced  Drawbridge  Highway Grade Separation  Tunnel  State Boundary Line  County Boundary Line  Civil Township Boundary  Extended Township Line  Land Grant Line  Land Section Line  State Survey Section Line  Survey By Others  Location Of Inset Boundary Within Map  Military Reservation Boundary  College Or University Boundary  Corporate Limits  Delimited Area, Population Est.  Reservation, Forest Or Park Boundary  Wildlife Refuge Boundary	 Residential Area Under Development  Lighthouse  State Capital  County Seat  Other City Or Village  Seminole Indian Village  Welcome Station  Wayside Park Or Small Park  Park With Boat Ramp  Boat Ramp  Museum  Recreational Area Or Historic Site  Scenic Site  Post Office  School  Church  Cemetery  Church And Cemetery  Hospital, Health Center Or Rest Home  Toll House, Port Of Entry Or Weight Station  Fair Grounds, Race Course Or Rodeo Arena  Mine Or Strip Mine  Governmental Research Station	 Agricultural Inspection Station  Farmers Market  Game Preserve  Game Checking Station  Bird Sanctuary  Fire Control Headquarters  Lookout Tower  Fire Station  Patrol Or Police Station  Correctional Institution Or Road Camp  Department of Transportation Facility  Coast Guard Station  Armory  Junkyard  Sanitary Fill  Sewage Disposal Plant  Incinerator  Power Plant  Power Substation  Communications Facility  Locked Gate Or Fence  Triangulation Station
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**GENERAL NOTE**

1. Symbols on this Index are intended for use on all Roadway, Signing And Marking, Signalization, and Lighting projects. For work zone traffic control symbols refer to Index 600. When additional or similar symbols are used, legends or notations may be required for clarity.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>STANDARD SYMBOLS</b>				
Designed By	Names	Dates	Approved By 	
Drawn By			State Roadway Design Engineer	Revision
Checked By			Sheet No.	Index No.
			00	1 of 3
				002

# STANDARD SYMBOLS FOR PLAN SHEETS

## GENERAL SYMBOLS

	State Line
	County Line
	Township Line
	Section Line
	City Line
	Base Or Survey Line
	Right-Of-Way
	Easement Line
	Limited Access Line
	Fence Line
	National Or State Park Or Forest
	Grant Line
	Railroad (Drainage Maps)
	Railroad (Detail Plans)
	Fence (Limited Access)
	Box Culvert
	Bridge
	Pipe Culvert-Mitered End Section
	Pipe Culvert-Straight Endwall
	Pipe Culvert-U-Type Endwall
	Pipe Culvert-Median Drain
	Pipe Culvert-Other End Treatments
	Storm Sewer
	Inlet
	Manhole
	Tied Longitudinal Joint
	Keyed Longitudinal Joint
	Doweled Transverse Expansion Joint
	Doweled Transverse Contraction Joint
	Transverse Contraction Joint Without Dowels
	Survey Reference Point
	Triangulation Station
	Bench Mark
	Point Of Intersection
	North Arrow
	Edges Of Existing Pavement And Sidewalk
	Guardrail
	Crash Cushion (Attenuator)
	Piling Pier Column
	Concrete Monument
	Base Line
	Centerline
	Property Line
	Delta Angle
	Approximate
	Round Or Diameter

	Curb
	Curb And Gutter
	Water Well, Spring
	Levee
	Railroad Mile Post
	Railroad Signal With Gate
	Railroad Switch
	Gate
	Pump Island
	Storage Tank (Surface)
	Storage Tank (Underground)
	Mine Or Quarry
	Borrow Pit
	Church
	Store
	Residence
	Barn
	School
	Hay Bales
	Silt Fence
	Floating Turbidity Barrier
	Staked Turbidity Barrier
	Stream
	Shore Line
	Marsh
	Wetland Boundary
	Hedge
	Trees
	Edge Of Wooded Area
	Shrubbery
	Grove Or Orchard
	Definition Of Skew For Cross Drains And Barrels Of Concrete Box Culverts
	Concrete
	Wood
	Rate Of Superelevation

## UTILITY ADJUSTMENT SYMBOLS

EXISTING	PROPOSED	
		Power Pole
		Telephone Pole
		Combination Pole
		Guy Wire And Anchor Pin
		Guy Pole Deadman
		Tower
		Light Pole
		Transformer
		Overhead Electric
		Overhead Telephone Cable
		Overhead Cable Television
		Manhole
		Fire Hydrant
		Meter (Type)
		Valve (Type)
		Valve Box (Type)
		Valve Cover (Type)
		Vent (Type)
		Pump Station
		Sewage Pump Station
		Cleanout
		Cable TV Service Box
		Gas Main
		Water Main
		Sanitary Sewer
		Buried Electric
		Buried Electric Duct
		Buried Telephone Cable
		Buried Telephone Duct
		Underground Cable Television
		Fiber Optic Duct

See General Note Sheet 1 Of 3.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
STANDARD SYMBOLS					
Designed By	Names	Dates	Approved By	State Roadway Design Engineer	
Drawn By	CDP	08/72	Revision	Sheet No.	Index No.
Checked By	COR	08/72	00	2 of 3	002

# STANDARD SYMBOLS FOR PLAN SHEETS

## TRAFFIC SIGNALS SYMBOLS

EXISTING	PROPOSED	
		Traffic Signal Head (Span Wire Mounted)
		Traffic Signal Head (Pedestal Mounted)
		Traffic Signal Head (Mast Arm Mounted)
		Traffic Signal Pole (Concrete, Wood, Metal)
		Vehicle Detector (Loop)
		Signal Cable (On Messenger Wire)
		Conduit
		Vehicle Detector (Points)
		Pedestrian Detector
		Pedestrian Signal Head (Pole Or Pedestal Mounted)
		Controller Cabinet (Base Mounted)
		Controller Cabinet (Pole Mounted)
		Walk - Dont Walk
		Flashing Dont Walk
		Signal Face Number
		Signal Lens
		Programmed Signal Head
		Messenger Wire
		Pole Tabulation Cross Reference
		Pole Tabulation Cross Reference (Joint Use Pole)
		Signal Phase

## LIGHTING SYMBOLS

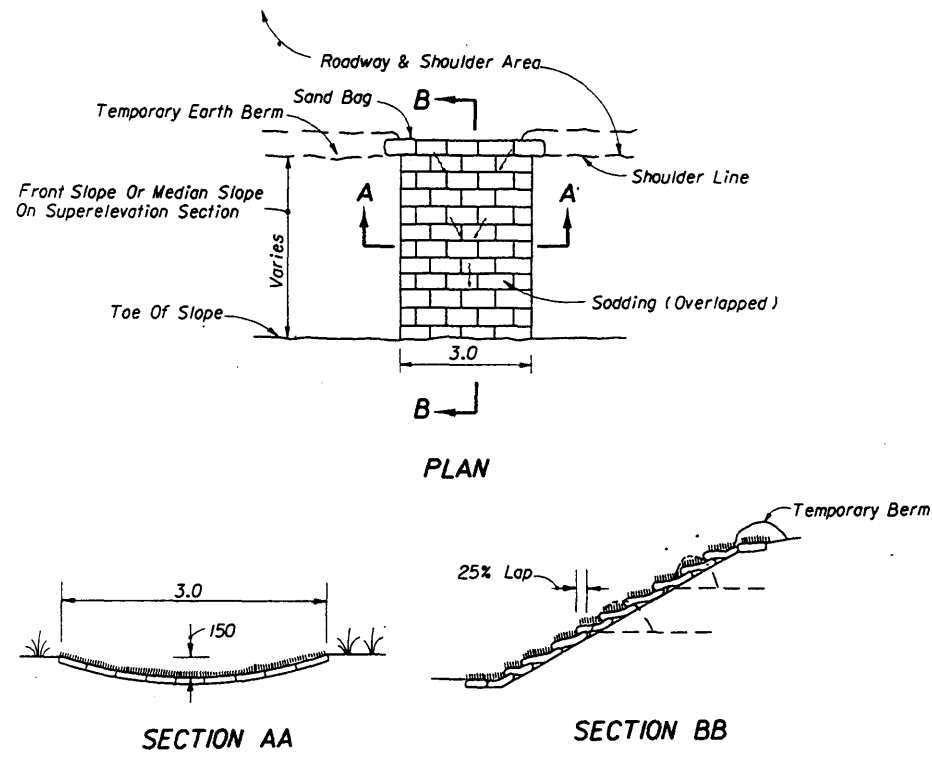
EXISTING	PROPOSED	
		Pole & Luminaire
		Existing Pole & Luminaire To Be Removed
		Final Position Of Relocated Or Adjusted Pole & Luminaire
		High Mast Lighting Tower
		City Or Utility Owned Luminaire & Pole
		PVC (Polyvinyl Chloride) Lighting Conduit And Conductors
		Rigid Galvanized Lighting Conduit And Conductors
		Lighting Pull-Box
		Light Distribution Point
		Joint Use Pole
		Pier Cap Underdeck Luminaire
		Pendant Hung Underdeck Luminaire

## SIGNING AND PAVEMENT MARKING SYMBOLS

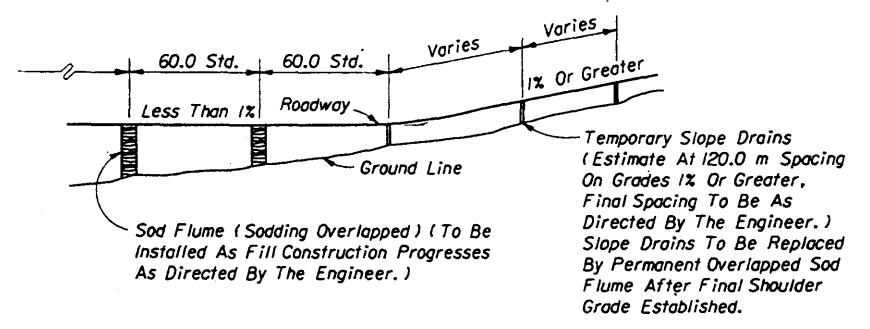
	Pavement Arrow
	Single Solid Line
	Double Solid Line
	Skip Line
	Stop Bar
	Traffic Sign (Post Mounted)
	Traffic Sign (Overhead)
	Sign Number
	Sign Item Number
	Traffic Flow Arrow

See General Notes, Sheet 1 of 3

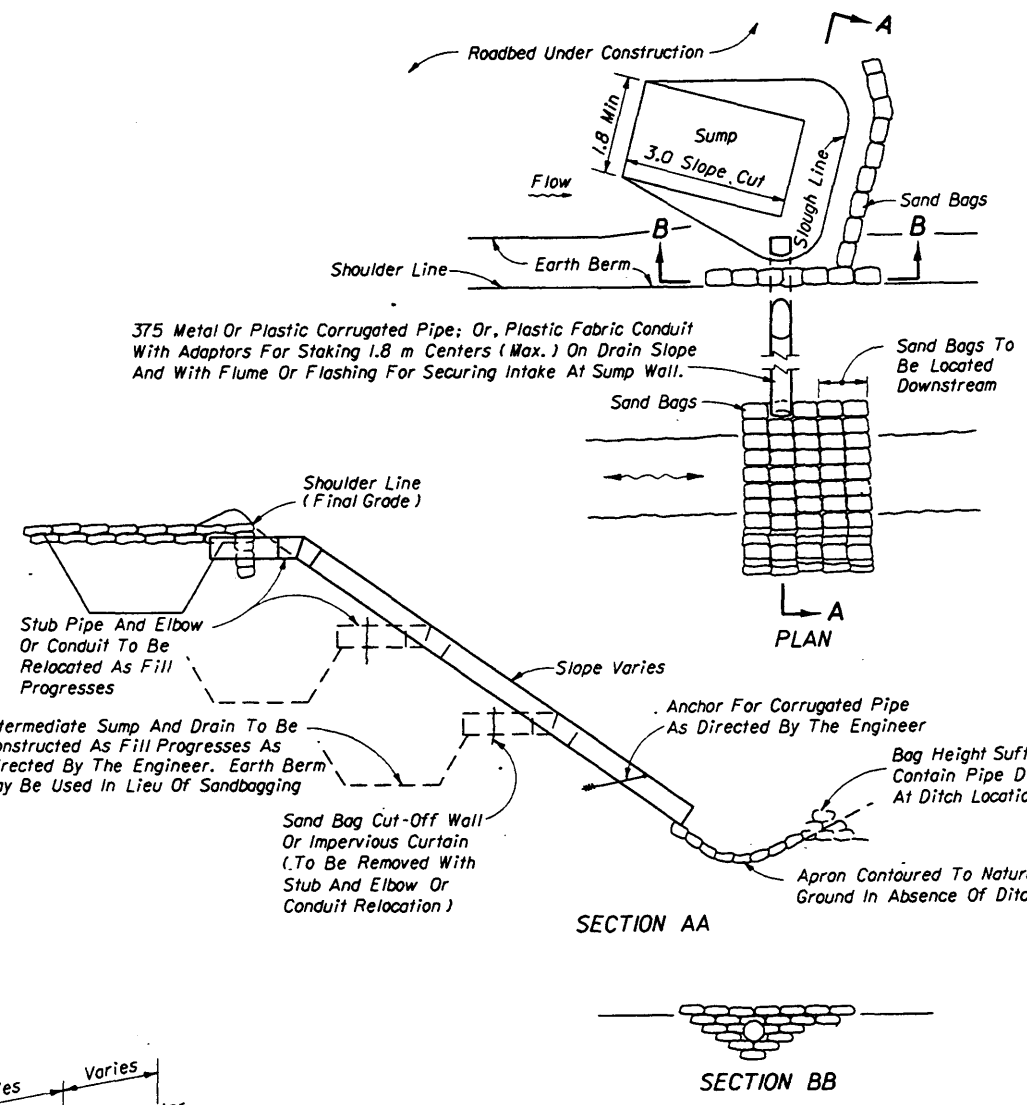
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STANDARD SYMBOLS					
Names	Dates	Approved By			
Designed By					
Drawn By	CDP 08/72	Revision	Sheet No.	Index No.	
Checked By	COR 08/72	96	3 of 3	002	



**SOD FLUME (SODDING OVERLAPPED)**



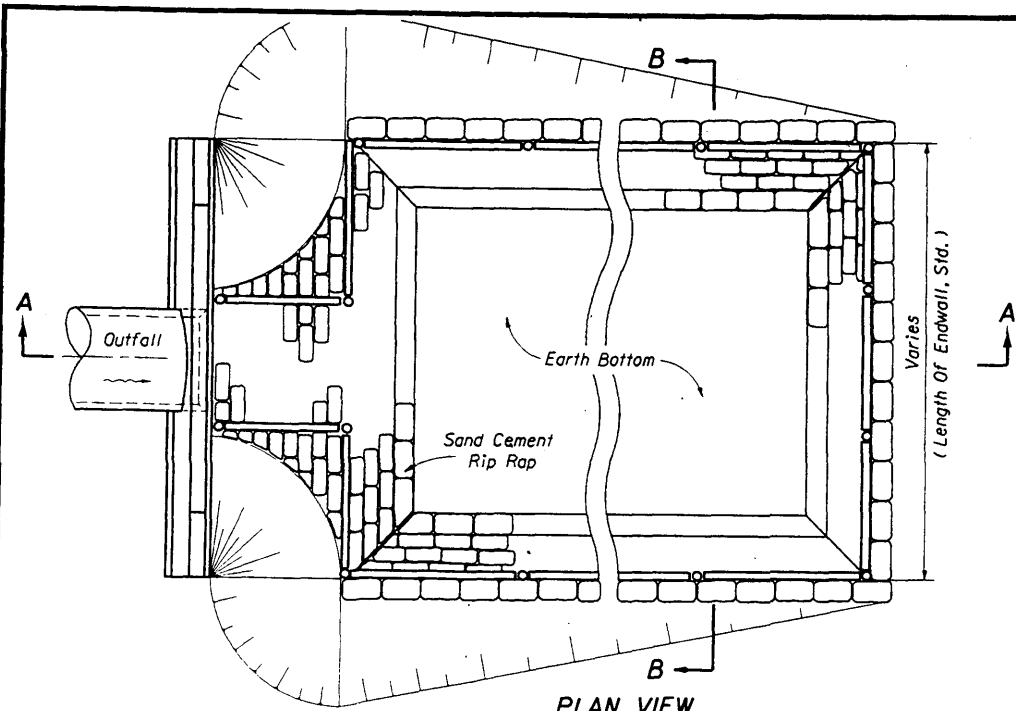
**ELEVATION**  
**SLOPE DRAIN APPLICATION**



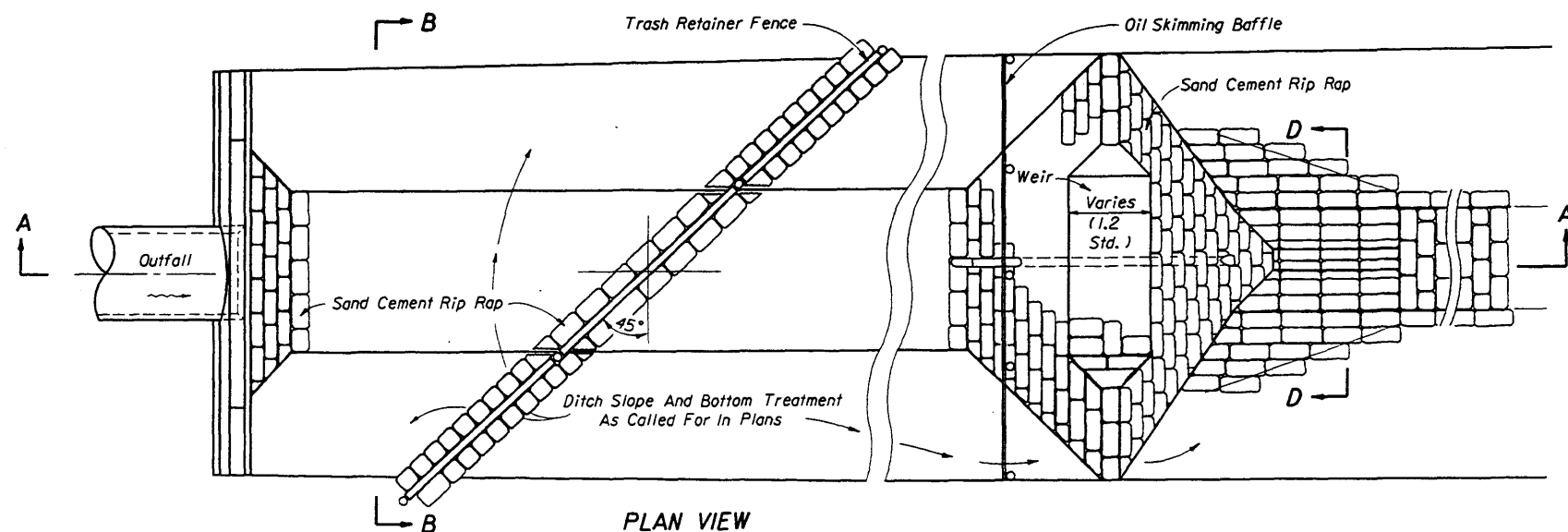
**TEMPORARY SLOPE DRAIN**

Note:  
 Slope drain pipe to be paid for as Slope Drains (Temporary), M1, based on linear meters of pipe or conduit installed. Payment to be made for one installation per site, including one stub and elbow or one intake flume or flashing. Sump construction and maintenance and curtains to be included in cost for Slope Drains (Temporary). Sand bags to be paid for as Sandbagging, M3.

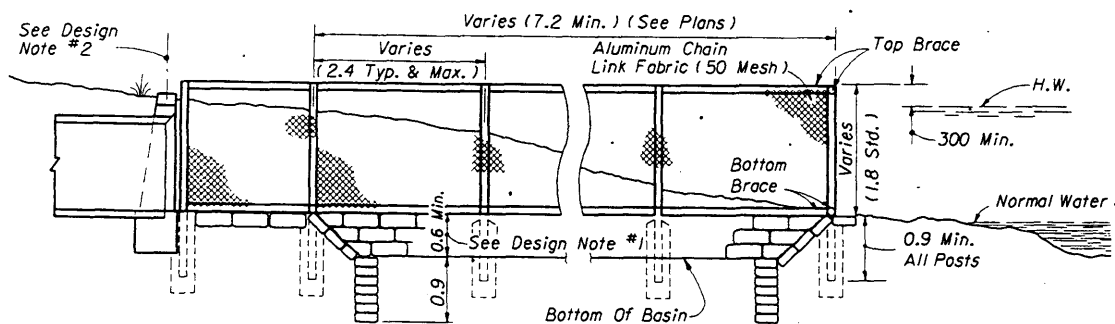
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>TEMPORARY SLOPE DRAIN AND SOD FLUME</b>				
Designed By	Names	Dates	Approved By <i>A. M. Lemore</i> State Drainage Engineer	
Drawn By	Revision	Sheet No.	Index No.	
Checked By	94	1 of 1	100	



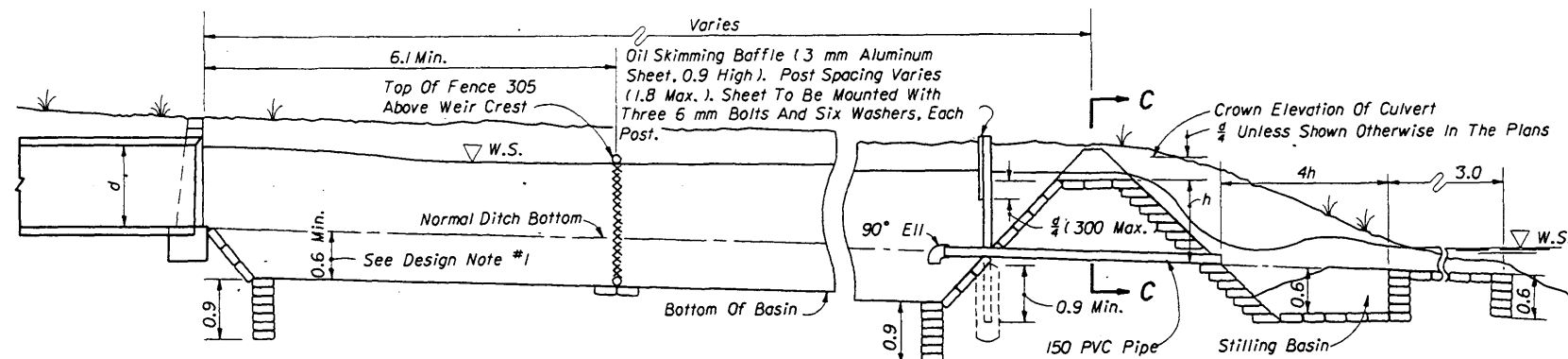
PLAN VIEW



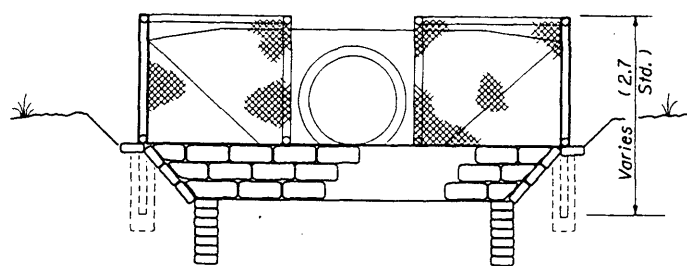
PLAN VIEW



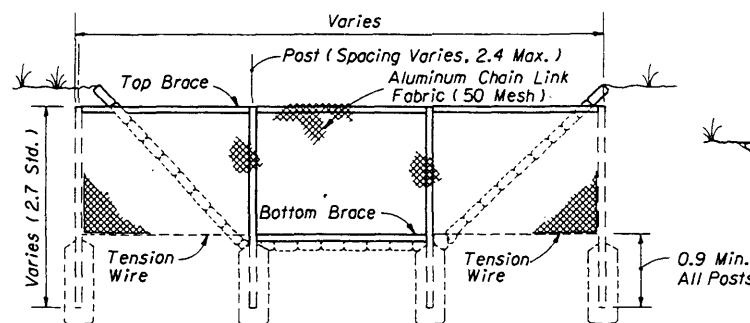
SECTION AA



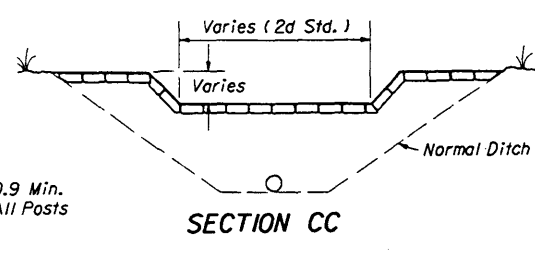
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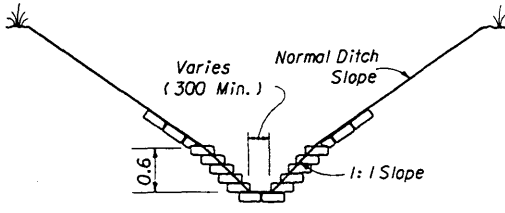
SECTION BB



SECTION BB



SECTION CC



SECTION DD

INTENDED FOR USE WHEN THE STORM SEWER OUTFALLS ADJACENT TO A SHORE LINE  
**TYPE A**

INTENDED FOR USE WHEN THE STORM SEWER OUTFALLS IN AN OPEN DITCH  
**TYPE B**

**DESIGN NOTES**

1. Basins should be as deep as practical with a minimum depth of 0.6 meter.
2. In Type A, when the top of endwall is below high water, fence also will be required along the top of the endwall.
3. In Type B, the weir shall be located as far from the endwall as practical. On steep ditch grades two or more weirs may be required. Intermediate weirs shall be constructed without stilling basins.
4. In Type B, the 150 mm PVC pipe shall be constructed unless shown otherwise in the plans.

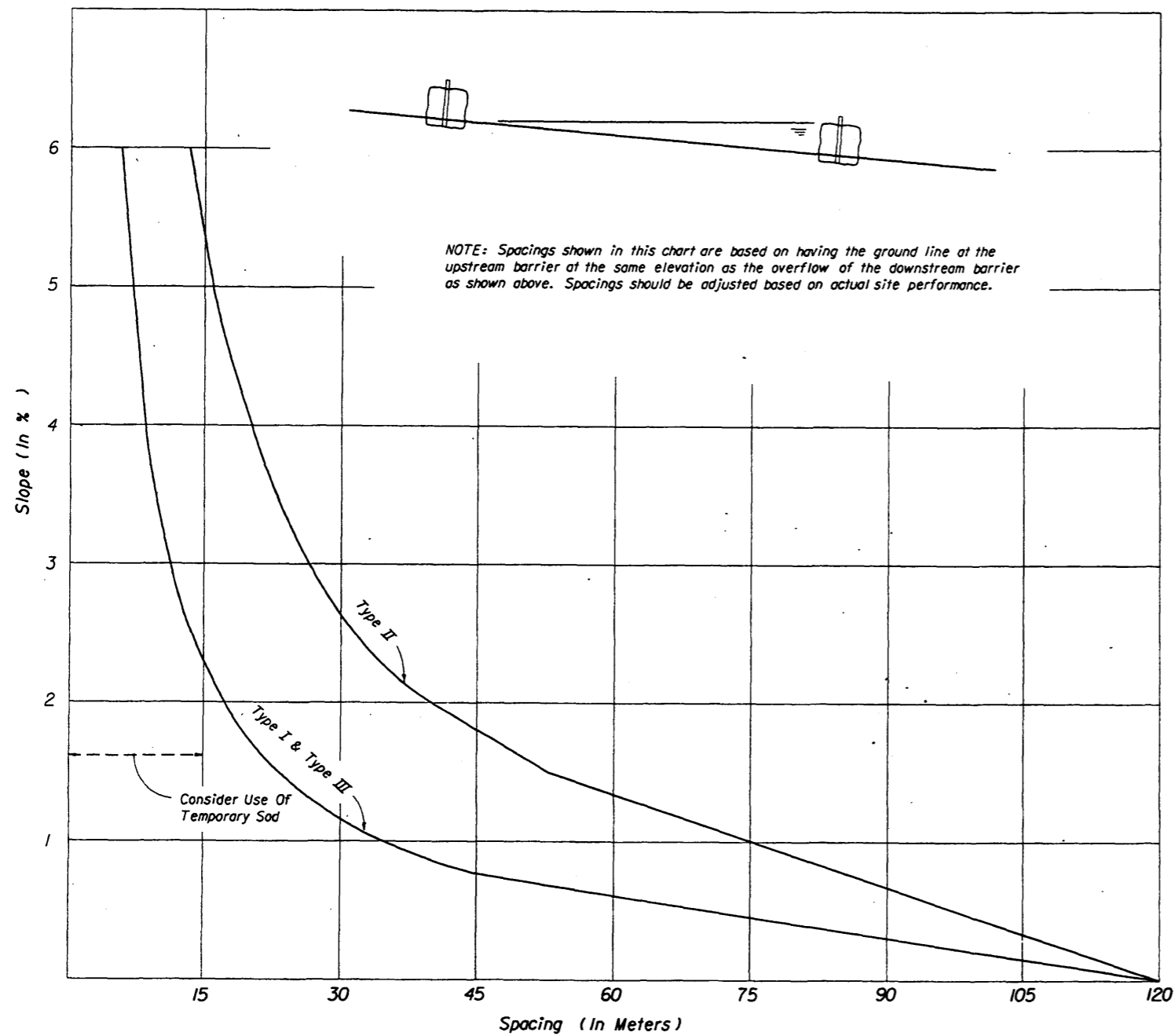
**GENERAL CONSTRUCTION NOTES**

1. Fence materials shall be aluminum or concrete only.
2. Aluminum posts shall be 75 mm diameter minimum. Aluminum rail braces shall be in accordance with Index 452. Concrete posts and rail braces shall be in accordance with Index 451. All posts to be set in concrete.
3. Fabric shall be installed to inside of posts and rail braces, and tied to posts and braces at 150 mm centers.
4. For additional details on fencing, see Index Nos. 451 and 452.
5. All basin slopes to be 1:1 unless detailed otherwise in the plans.
6. Sediment basins to be constructed prior to commencement of upland construction. Maintenance and clean out to be by the Contractor until acceptance of project by the Engineer.

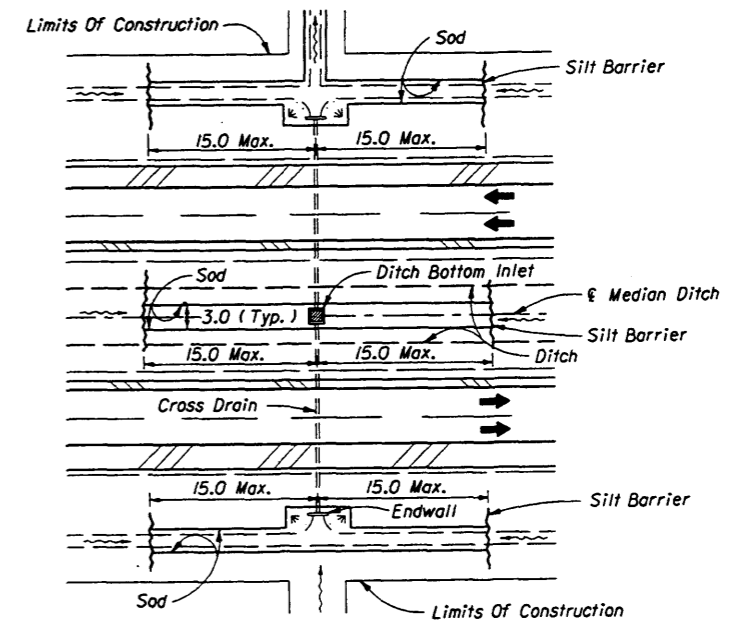
**GENERAL NOTES**

1. The cost for Type A and Type B trash retainer and sediment basins shall include the cost for riprap, fencing, baffles, piping and for sump and weir earthwork over and above ditch excavation called for in the plans. Payment for both Type A Type B shall be under the contract unit price for Sediment Basins, Each. Cleanouts as called for in the plans shall be paid for under the contract unit price for Sediment Basin Cleanouts, CO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>TRASH RETAINER AND SEDIMENT BASIN</b>				
Names	Dates	Approved By		
Designed By	WJR	05/74	 State Drainage Engineer	
Drawn By				
Checked By	HLB	06/74	Revision	Sheet No.
			94	1 of 1
				101



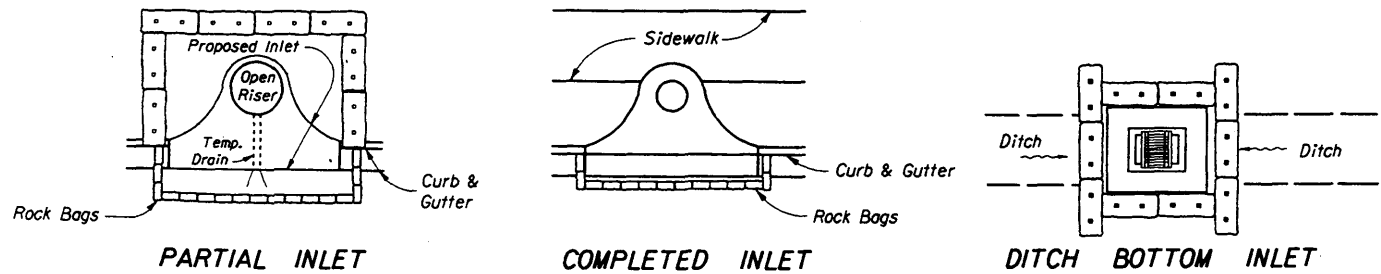
**CHART I**  
**RECOMMENDED SPACING FOR BALED HAY BARRIERS AND TYPE III SILT FENCE**



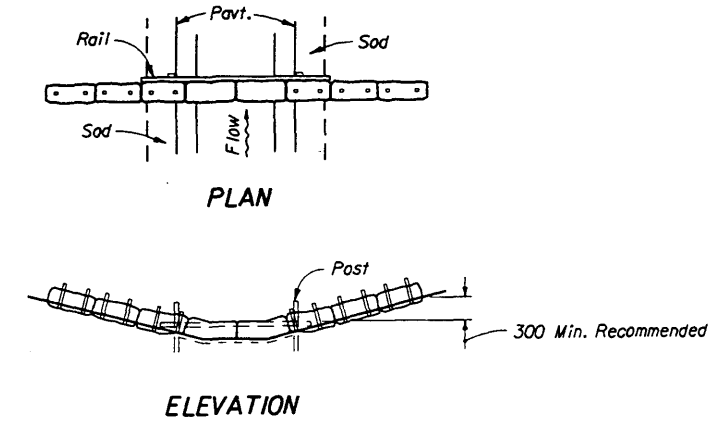
**DITCH INSTALLATIONS AT DRAINAGE STRUCTURES**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>BALED HAY OR STRAW BARRIERS AND SILT FENCES</b>				
Designed By	EGR	02/80	Approved By <i>S. A. McLemore</i> State Drainage Engineer	
Drawn By	HSD	09/82	Revision	Sheet No.
Checked By	JVC	08/82	00	1 of 3
				Index No. <b>102</b>

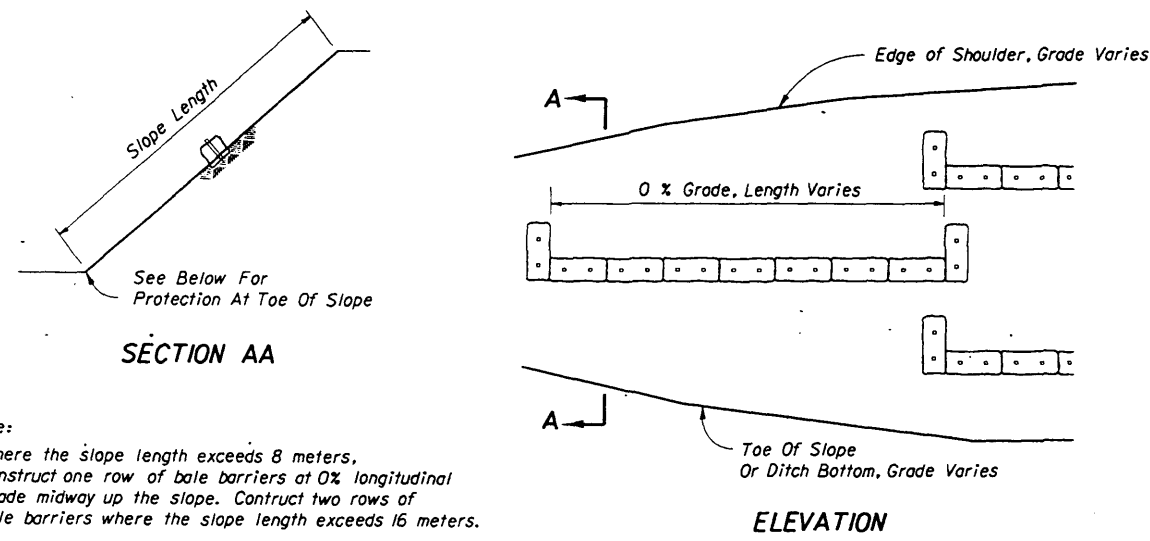




PROTECTION AROUND INLETS OR SIMILAR STRUCTURES

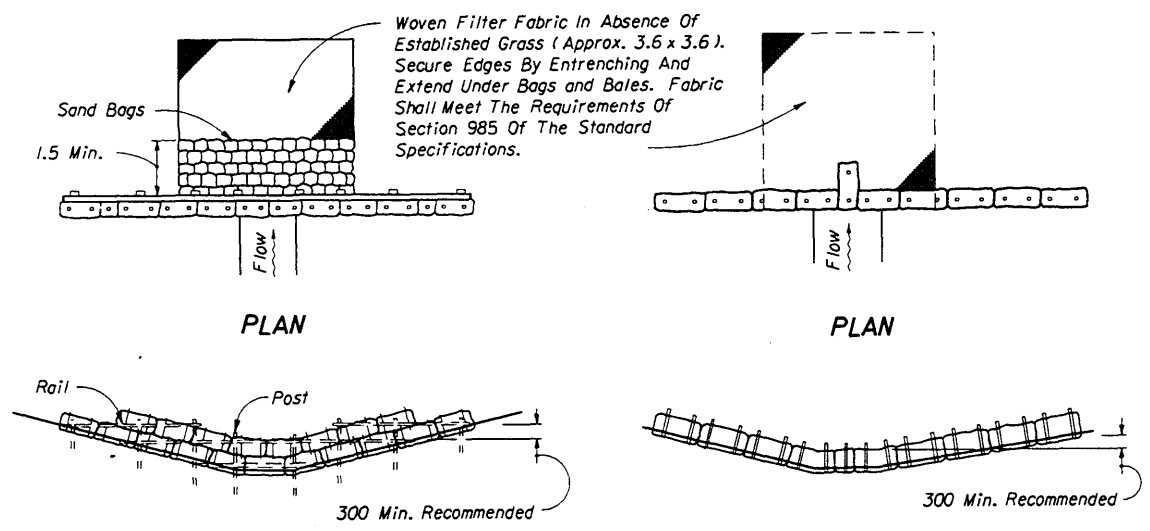


BARRIER FOR PAVED DITCH



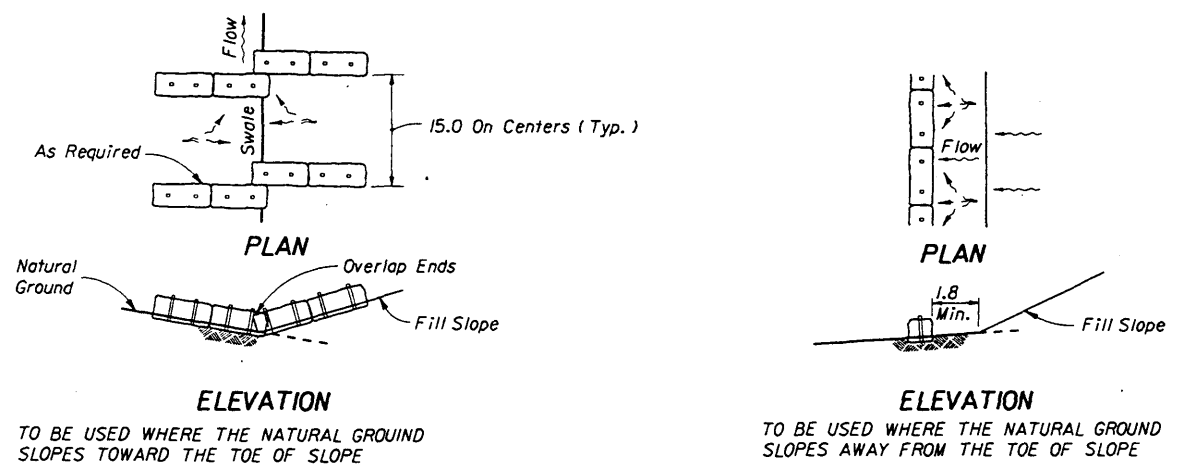
ALONG FILL SLOPE

Note: Where the slope length exceeds 8 meters, construct one row of bale barriers at 0% longitudinal grade midway up the slope. Construct two rows of bale barriers where the slope length exceeds 16 meters.



BARRIERS FOR UNPAVED DITCHES

Anchor Top Bales To Lower Bales With 2 Stakes Per Bale.

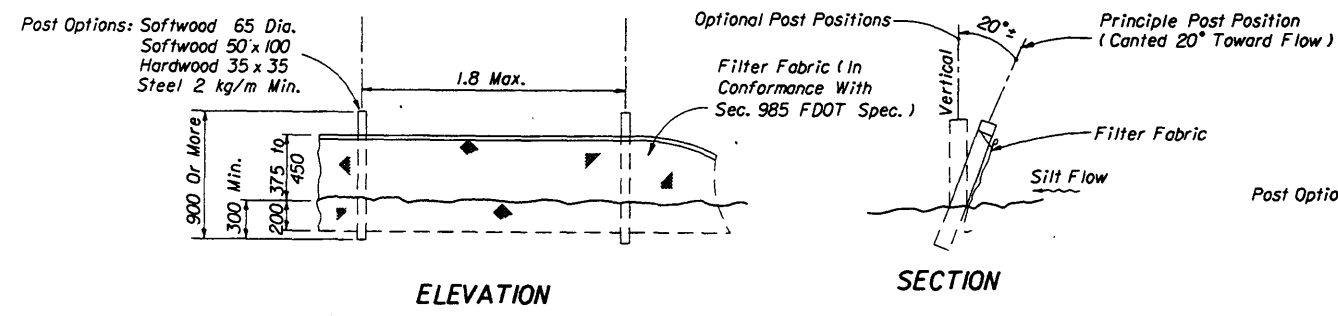


BARRIERS FOR FILL SLOPES

NOTES FOR BAILED HAY OR STRAW BARRIERS

- Type I and II Barriers should be spaced in accordance with Chart I, Sheet I.
- Hay bales shall be trenched 75 to 100 mm and anchored with 2 - 20 x 40 (or 25 dia.) x 1.2 wood stakes. Stakes of other material or shape providing equivalent strength may be used if approved by the Engineer. Stakes other than wood shall be removed upon completion of the project.
- Rails and posts shall be 50 x 100 wood. Other materials providing equivalent strength may be used if approved by the engineer.
- Adjacent bales shall be butted firmly together. Unavoidable gaps shall be plugged with hay or straw to prevent silt from passing.
- Where used in conjunction with silt fence, hay bales shall be placed on the upstream side of the fence.
- Bales to be paid for under the contract unit price for Baled Hay or Straw, EA. The unit price shall include the cost of filter fabric for Type I and II Barriers. Sand bags shall be paid for under the unit price for Sandbagging, M3. Rock bags to be paid for under the contract unit price for Rock Bags, EA.

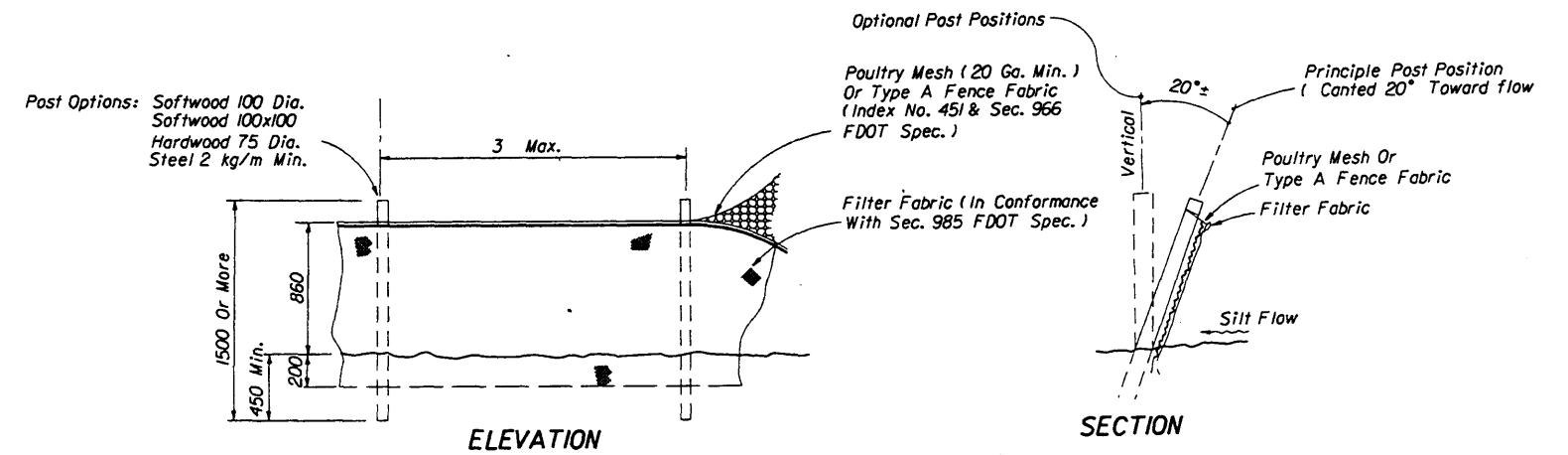
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>BALED HAY OR STRAW BARRIERS AND SILT FENCES</b>				
Designed By	Names	Dates	Approved By	
Drawn By	HLB	6/74	S.A. McLemore State Drainage Engineer	
Checked By	HLB	6/74	Revision	Sheet No.
			00	2 of 3
				102



ELEVATION

SECTION

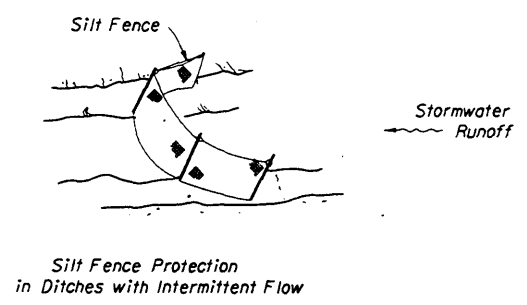
TYPE III SILT FENCE



ELEVATION

SECTION

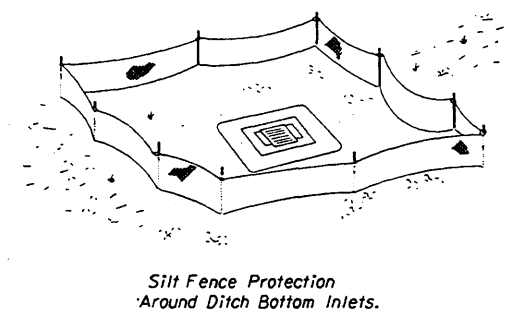
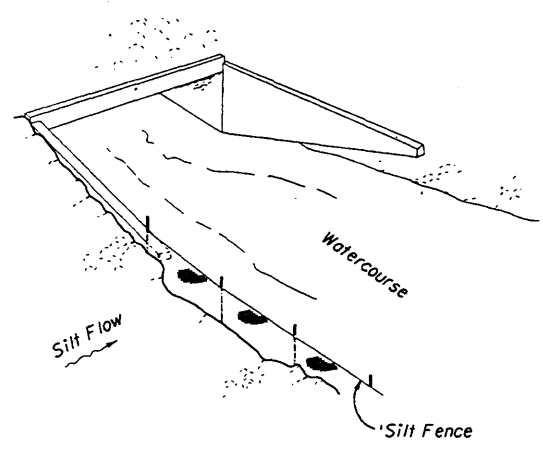
TYPE IV SILT FENCE



Silt Fence Protection in Ditches with Intermittent Flow

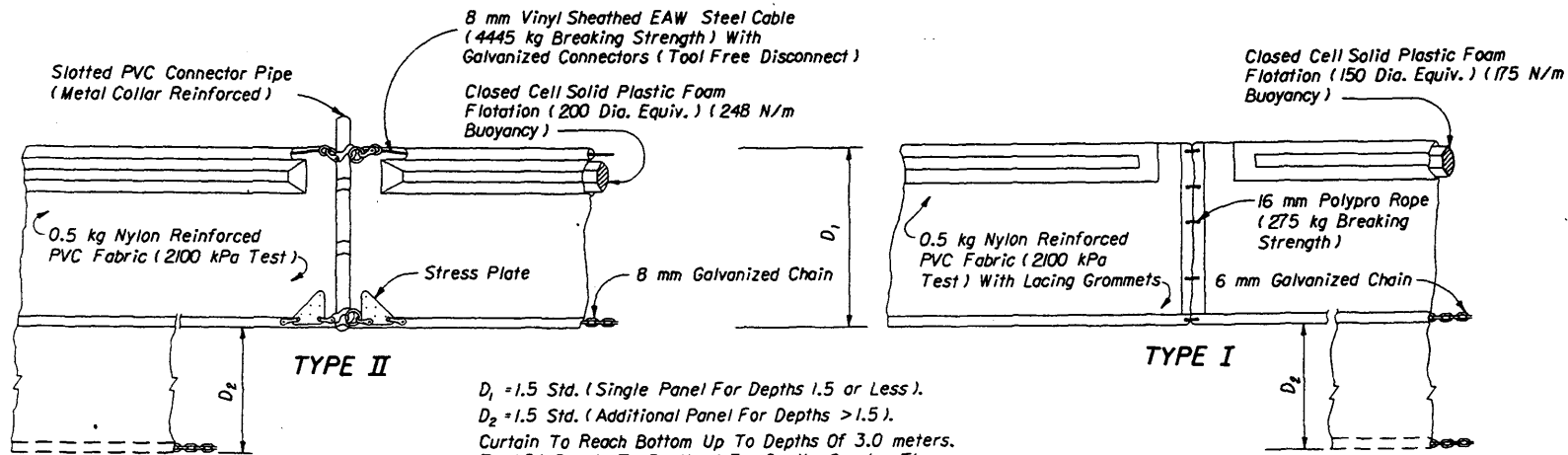
NOTES FOR SILT FENCES

1. Type III Silt Fence to be used at most locations. Where used in ditches, the spacing for Type III Silt fence shall be in accordance with Chart 1, Sheet 1.
2. Type IV Silt Fence to be used where large sediment loads are anticipated. Suggested use is where fill slope is 1:2 or steeper and length of slope exceeds 8 meters. Avoid use where the detained water may back into travel lanes or off the right of way.
3. Do not construct silt fences across permanent flowing watercourses. Silt fences are to be at upland locations and turbidity barriers used at permanent bodies of water.
4. Where used as slope protection, Silt Fence is to be constructed on 0% longitudinal grade to avoid channelizing runoff along the length of the fence.
5. Silt Fence to be paid for under the contract unit price for Staked Silt Fence (M).



SILT FENCE APPLICATIONS

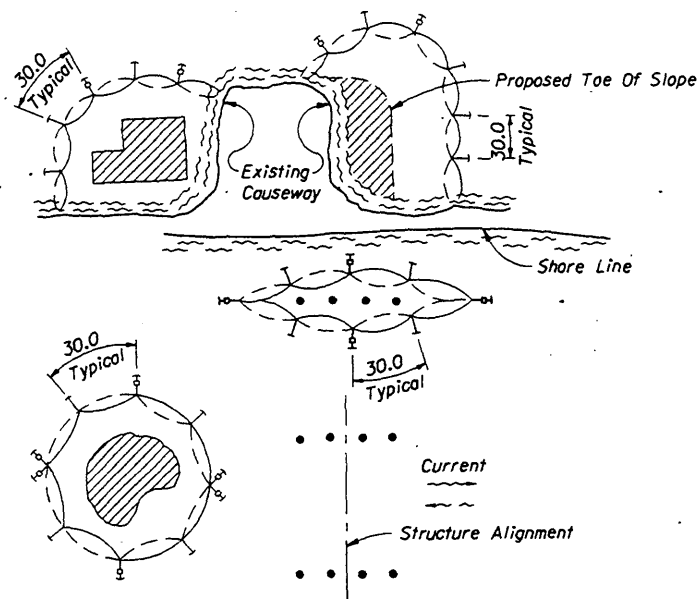
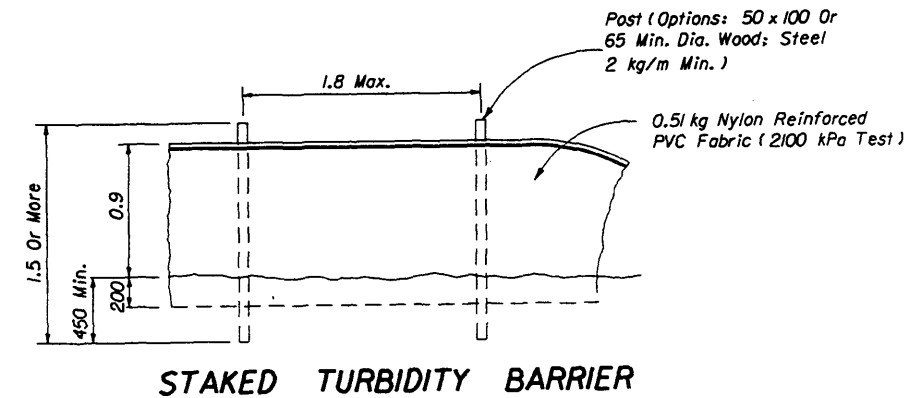
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>BALED HAY OR STRAW BARRIERS AND SILT FENCES</b>					
Designed By	Names	Dates	Approved By <i>A. M. Lemore</i> State Drainage Engineer		
Drawn By	LRE	09/85	Revision	Sheet No.	Index No.
Checked By	RAA	10/85	00	3 of 3	102



$D_1$  = 1.5 Std. (Single Panel For Depths 1.5 or Less).  
 $D_2$  = 1.5 Std. (Additional Panel For Depths >1.5).  
 Curtain To Reach Bottom Up To Depths Of 3.0 meters.  
 Two (2) Panels To Be Used For Depths Greater Than 3.0 meters Unless Special Depth Curtains Specifically Called For In The Plans Or As Determined By The Engineer.

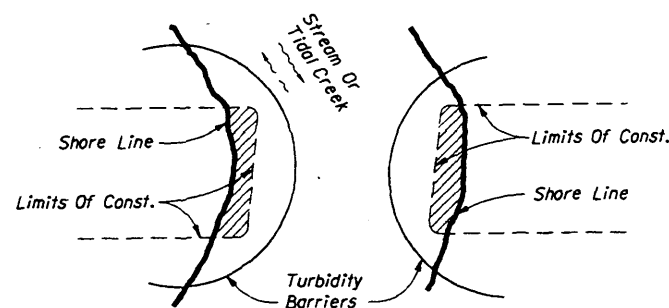
NOTICE: COMPONENTS OF TYPES I AND II MAY BE SIMILAR OR IDENTICAL TO PROPRIETARY DESIGNS. ANY INFRINGEMENT ON THE PROPRIETARY RIGHTS OF THE DESIGNER SHALL BE THE SOLE RESPONSIBILITY OF THE USER. SUBSTITUTIONS FOR TYPES I AND II SHALL BE AS APPROVED BY THE ENGINEER.

**FLOATING TURBIDITY BARRIERS**



**LEGEND**

- Pile Locations
- ▨ Dredge Or Fill Area
- Mooring Buoy w/Anchor
- ⊥ Anchor
- Barrier Movement Due To Current Action



Note: Turbidity barriers for flowing streams and tidal creeks may be either floating, or staked types or any combinations of types that will suit site conditions and meet erosion control and water quality requirements. The barrier type(s) will be at the Contractor's option unless otherwise specified in the plans, however payment will be under the pay item(s) established in the plans for Floating Turbidity Barrier and/or Staked Turbidity Barrier. Posts in staked turbidity barriers to be installed in vertical position unless otherwise directed by the Engineer.

**NOTES:**

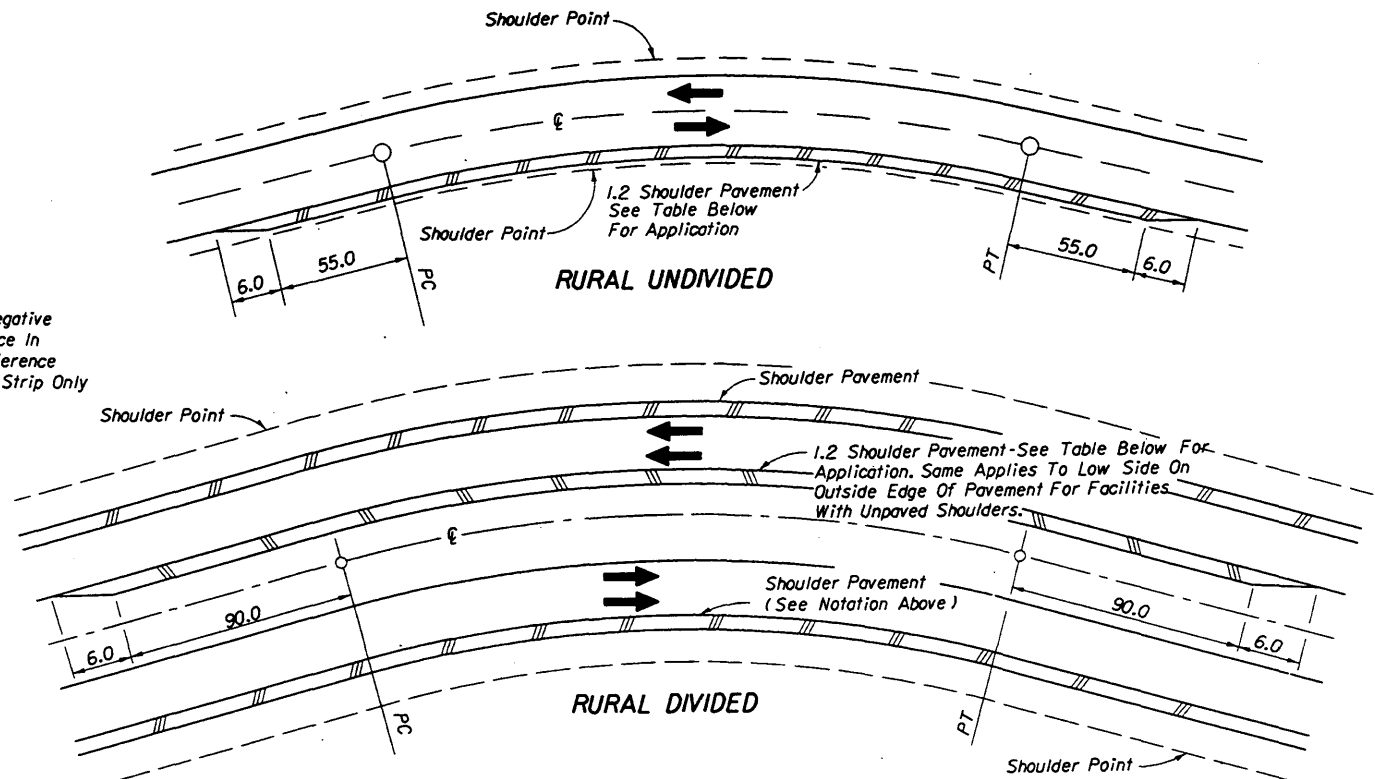
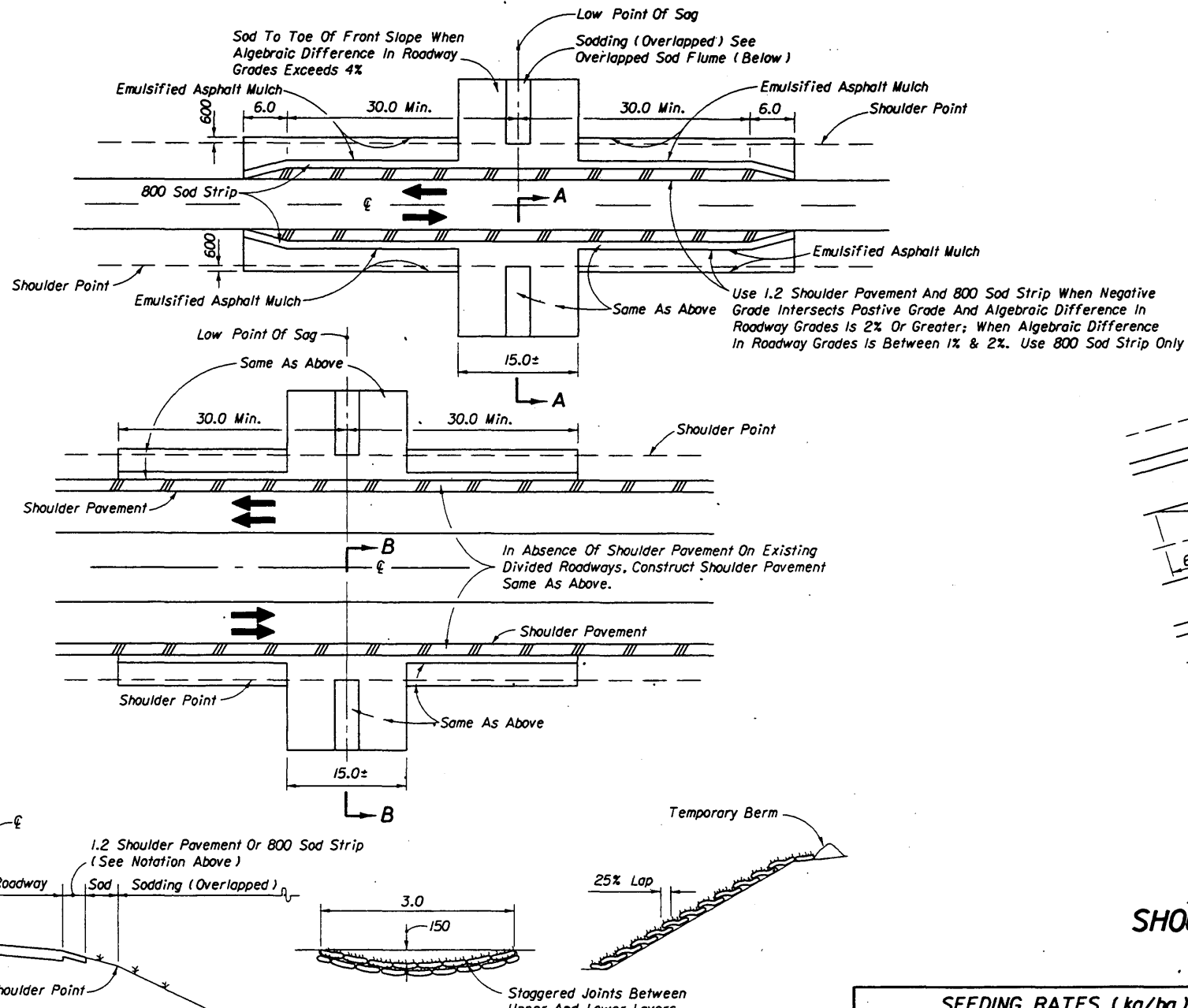
1. Turbidity barriers are to be used in all permanent bodies of water regardless of water depth.
2. Number and spacing of anchors dependent on current velocities.
3. Deployment of barrier around pile locations may vary to accommodate construction operations.
4. Navigation may require segmenting barrier during construction operations.
5. For additional information see Section 104 of the Standard Specifications.

**GENERAL NOTES**

1. Floating turbidity barriers are to be paid for under the contract unit price for Turbidity Barrier Floating, MI.
2. Staked turbidity barriers are to be paid for under the contract unit price for Turbidity Barrier Staked, MI.

**TURBIDITY BARRIER APPLICATIONS**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>TURBIDITY BARRIERS</b>					
Designed By	RAA/CJA	9/85	Approved By		<i>SA McLemore</i>
Drawn By	LRE	9/85	State Drainage Engineer		
Checked By	RAA	10/85	Revision	94	Sheet No. 1 of 1
					Index No. 103



CRITERIA FOR PAVING SHOULDER ON DIVIDED AND UNDIVIDED FACILITIES		
Design Speed ( km/h )	Radius Of Curve	Notes:
50	250.0 Or Less	(1) Shoulder Pavement is required on all curves meeting the criteria tabulated. For curves not meeting the criteria, shoulders are to be paved where erosion of the shoulder is evident or anticipated.
60	350.0 Or Less	
80	435.0 Or Less	
100	580.0 Or Less	
105	580.0 Or Less	
110	875.0 Or Less	
		(2) If outside shoulder is paved as designated bike lane, the paved width within curves shall match the bike lane width.

**SHOULDER AND SLOPE TREATMENT FOR SUPERELEVATED ROADWAYS**

SEEDING RATES ( kg/ha ) FOR NEW SHOULDERS AND SLOPES*								
TYPE OF SEED	ZONE I				ZONE II			
	COASTAL		INLAND		COASTAL		INLAND	
	Mar. to Nov.	Nov. to Mar.	Mar. to Oct.	Oct. to Mar.	Feb. to Dec.	Dec. to Feb.	Feb. to Dec.	Dec. to Feb.
<b>PERMANENT GRASSES</b>								
Unhulled Bermuda	22	22	22	22	22	22	22	22
Bahia Argentina Or Pensacola Bahia			90	90			90	90
<b>QUICK GROWING GRASS</b>								
Annual Rye		22		22		22		22
<b>TOTAL kg PER HECTARE</b>	<b>22</b>	<b>44</b>	<b>112</b>	<b>134</b>	<b>22</b>	<b>44</b>	<b>112</b>	<b>134</b>

Note: The seeding rates shown in this table apply only when seed is spread by an approved mechanical spreader meeting the requirements of Section 570 and 577 of the Standard Specifications.

\*See Index No. 105 for zone boundaries and seeding rates for shoulder reworking.

- GENERAL NOTES**
- Erosion control details are applicable to new construction, reconstruction and RRR projects. Project requirements for shoulder pavement and sodding that exceed the limits of this standard take precedence.
  - For sodding adjacent to ditches and at headwalls, see Index No. 281.
  - All front slopes steeper than 1:3 are to be sodded.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

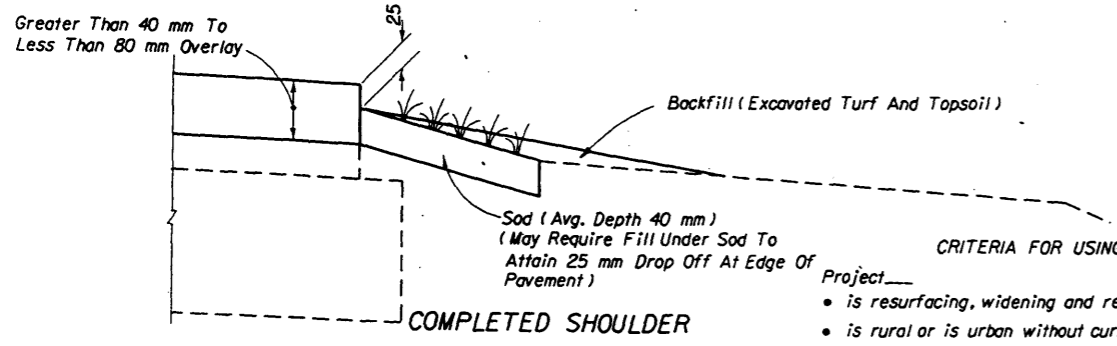
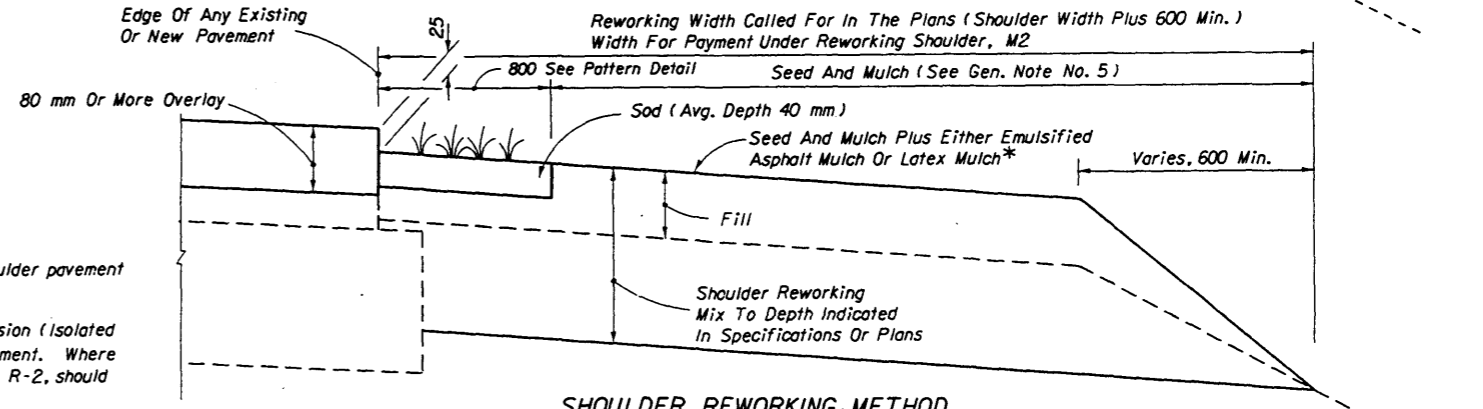
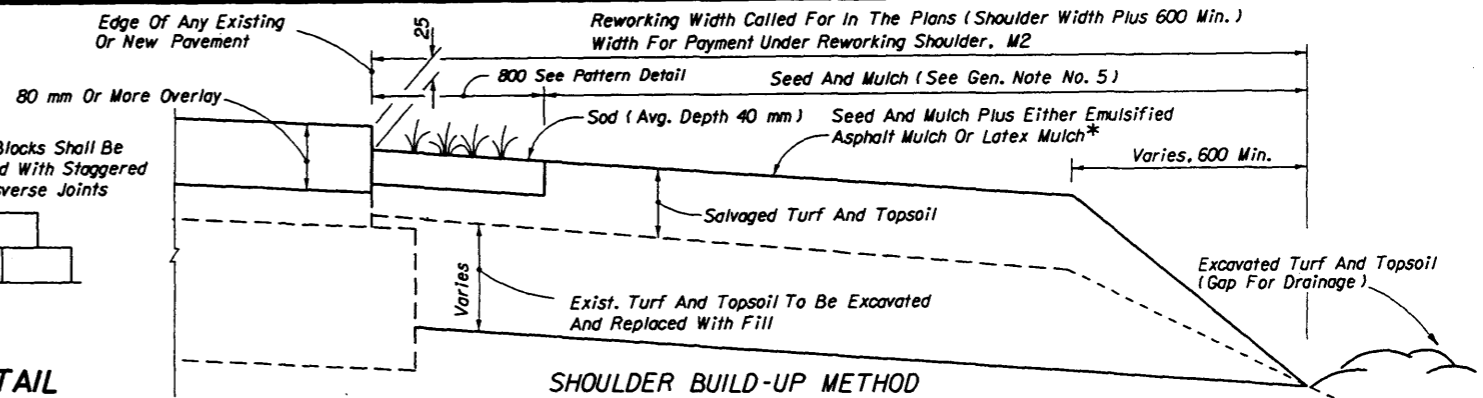
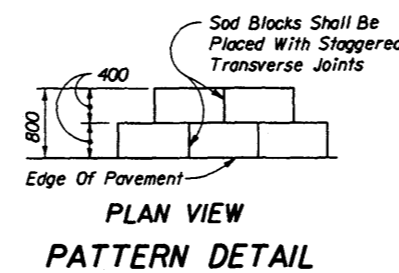
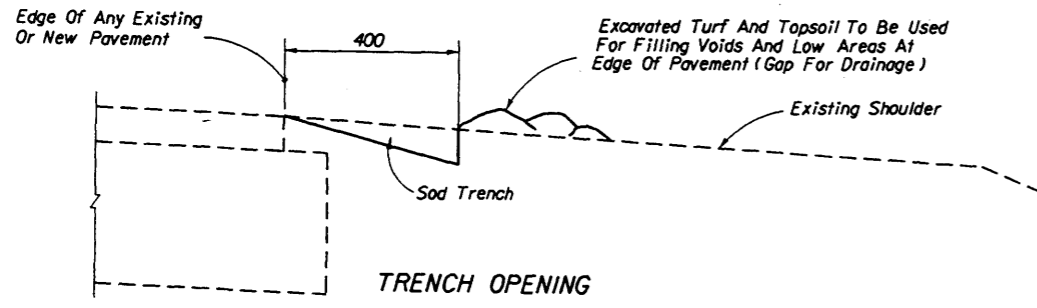
**EROSION CONTROL DETAILS FOR PERMANENT CONSTRUCTION**

Designed By	HLG	Date	04/75	Approved By	<i>A. M. Clemente</i>
Drawn By		Revision		Sheet No.	104
Checked By	DCB	Date	04/75	Index No.	104

**SECTION AA (Symmetrical About E)**

**SECTION BB (Symmetrical About E)**

**SHOULDER AND SLOPE TREATMENT IN SAG VERTICAL CURVES.**

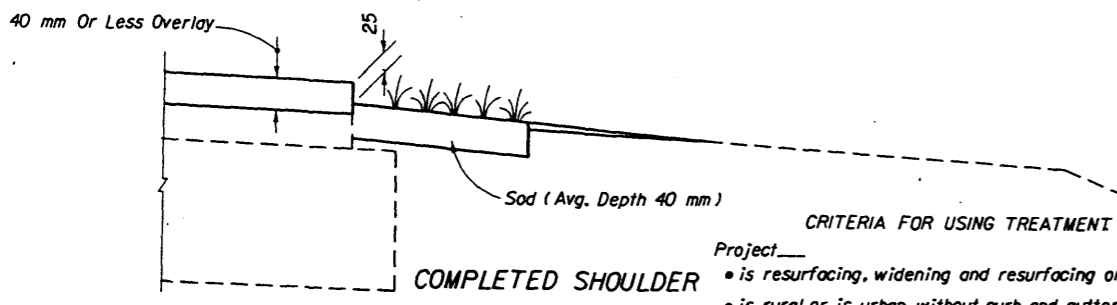
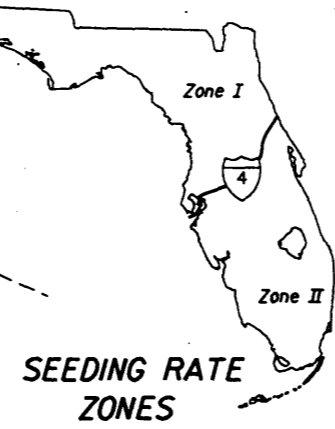
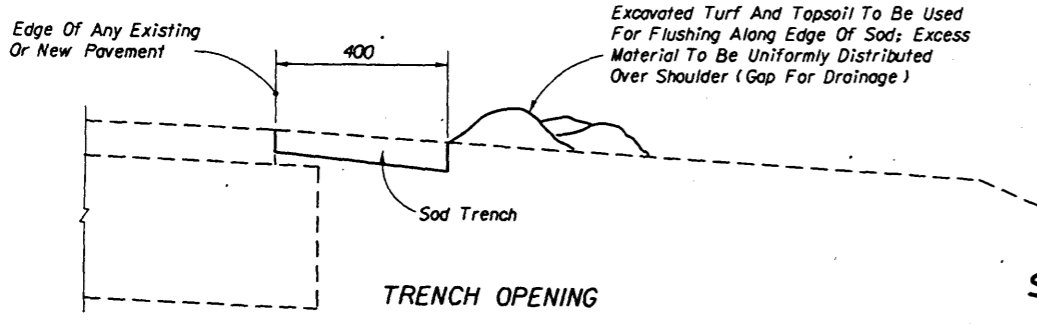


- CRITERIA FOR USING TREATMENT TYPE R-1**
- Project—
- is resurfacing, widening and resurfacing or construction of shoulder pavement
  - is rural or is urban without curb and gutter
  - has good existing soil and turf with no significant shoulder erosion (isolated areas of significant erosion will require additional special treatment. Where poor soil and/or turf conditions exist shoulder reworking, Type R-2, should be applied.)
  - resurfacing build-up is greater than 40 mm to less than 80 mm

- CRITERIA FOR USING TREATMENT TYPE R-2**
- Project—
- is resurfacing or construction of shoulder pavement
  - is rural or is urban without curb and gutter
  - has good existing soil and turf
  - resurfacing build-up is 80 mm or more

\*Emulsified Asphalt Mulch Or Latex Mulch May Be Deleted For Low Volume Roadways (ADT Less Than 1600) Or Where Shoulder Pavement Is Constructed.

A SIMILAR TREATMENT MAY BE USED FOR PROJECTS THAT REQUIRE SHOULDER WIDENING. DETAILS ARE TO BE SHOWN IN THE PLANS.



- CRITERIA FOR USING TREATMENT TYPE R-3**
- Project—
- is resurfacing, widening and resurfacing or construction of shldr. part.
  - is rural or is urban without curb and gutter
  - has good existing soil and turf with no significant shoulder erosion (isolated areas of significant erosion will require additional special treatment. Where poor soil and/or turf conditions exist shoulder reworking, Type R-2, should be applied.)
  - resurfacing build-up is 40 mm or less

**TYPE R-2**

**GENERAL NOTES**

1. Special attention is to be directed to the construction of the required 25 mm drop-off at edge of pavement.
2. Fertilize entire unpaved shoulder and front slope to toe of slope or bottom of ditch.
3. Topsoil obtained from borrow pits or other sources may be used in lieu of excavated turf and topsoil when economically feasible. No additional payment will be made for substituting topsoil for excavated turf or topsoil.
4. Payment for excavation of turf and topsoil and for backfill of this material under Types R-1 and R-3, is to be included in the contract unit price for Sodding, M2.
5. Payment for reworking shoulders, shall include the cost for those seeding and mulching operations within the limits for reworking shoulders. Materials (Seed, Mulch, Fertilizer and Water) and Sodding shall be paid for as separate items. Reworking shoulders shall be paid for under the contract unit price for Reworking Shoulders, M2.

TYPE OF SEED	SEEDING RATES (kg/ha)							
	ZONE I				ZONE II			
	COASTAL		INLAND		COASTAL		INLAND	
	Mar. to Nov.	Nov. to Mar.	Mar. to Oct.	Oct. to Mar.	Feb. to Dec.	Dec. to Feb.	Feb. to Dec.	Dec. to Feb.
<b>PERMANENT GRASSES</b>								
Unhulled Bermuda	22	22	22	22	22	22	22	22
Bahia Argentina Or Pensacola Bahia			90	90			90	90
<b>QUICK GROWING GRASS</b>								
Annual Rye Grass		22		22		22		22
<b>TOTAL kg PER HECTARE</b>	22	44	112	134	22	44	112	134

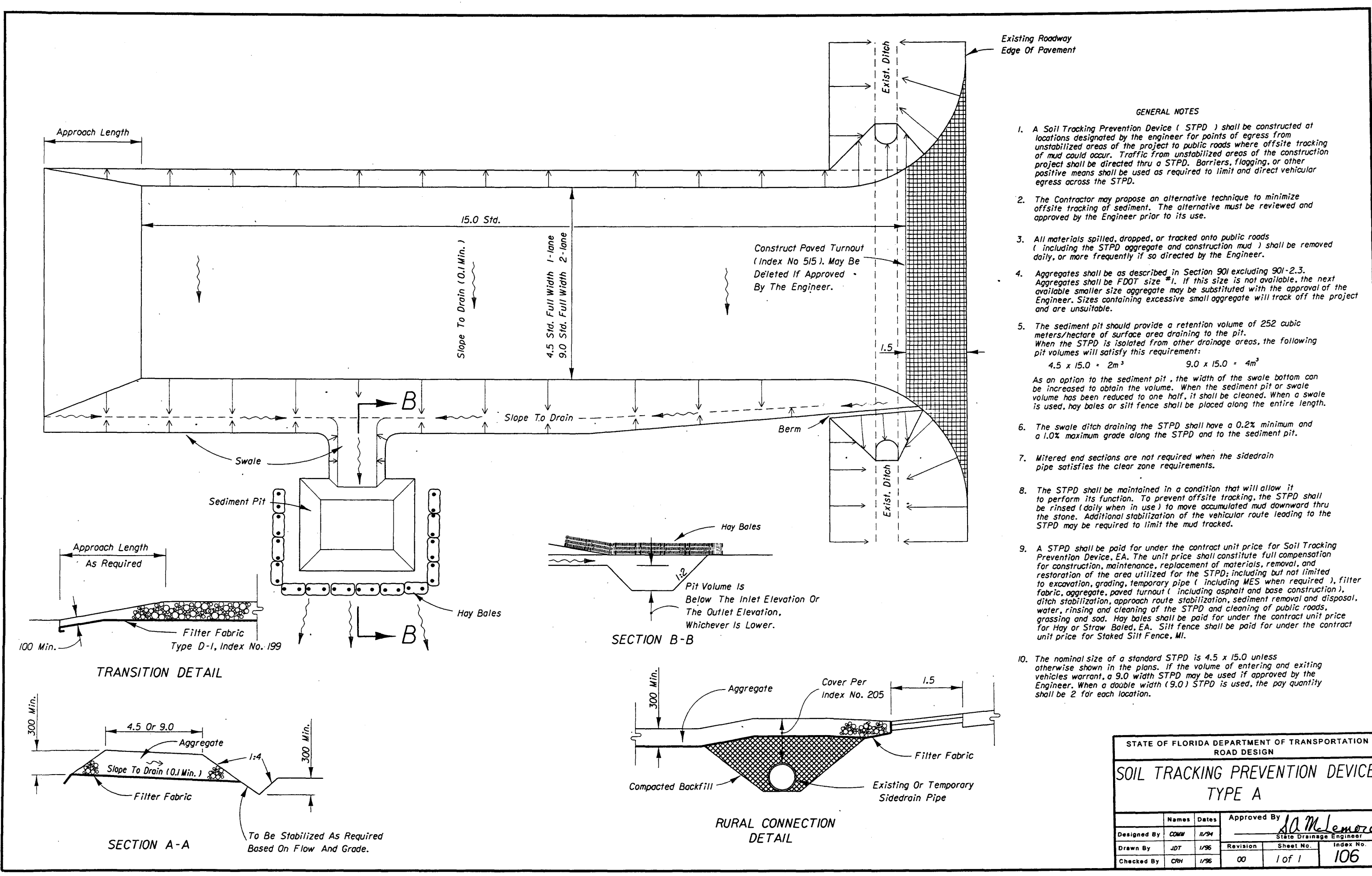
Note: The seeding rates shown in this table apply only when seed is spread by an approved mechanical spreader meeting the requirements of Section 570 and 571 of the Standard Specifications.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**SHOULDER SODDING AND REWORKING ON EXISTING FACILITIES**

Names	Dates	Approved By		
Designed By	EGR 09/07/84	A. M. C. Moore State Drainage Engineer	Revision	Sheet No.
Drawn By	HSD 09/07/84		00	1 of 1
Checked By	EGR 09/07/84		Index No.	105

**TYPE R-3**



**GENERAL NOTES**

1. A Soil Tracking Prevention Device ( STPD ) shall be constructed at locations designated by the engineer for points of egress from unstabilized areas of the project to public roads where offsite tracking of mud could occur. Traffic from unstabilized areas of the construction project shall be directed thru a STPD. Barriers, flagging, or other positive means shall be used as required to limit and direct vehicular egress across the STPD.
2. The Contractor may propose an alternative technique to minimize offsite tracking of sediment. The alternative must be reviewed and approved by the Engineer prior to its use.
3. All materials spilled, dropped, or tracked onto public roads ( including the STPD aggregate and construction mud ) shall be removed daily, or more frequently if so directed by the Engineer.
4. Aggregates shall be as described in Section 901 excluding 901-2.3. Aggregates shall be FDOT size #1. If this size is not available, the next available smaller size aggregate may be substituted with the approval of the Engineer. Sizes containing excessive small aggregate will track off the project and are unsuitable.
5. The sediment pit should provide a retention volume of 252 cubic meters/hectare of surface area draining to the pit. When the STPD is isolated from other drainage areas, the following pit volumes will satisfy this requirement:  
 $4.5 \times 15.0 = 2m^3$        $9.0 \times 15.0 = 4m^3$   
 As an option to the sediment pit , the width of the swale bottom can be increased to obtain the volume. When the sediment pit or swale volume has been reduced to one half, it shall be cleaned. When a swale is used, hay bales or silt fence shall be placed along the entire length.
6. The swale ditch draining the STPD shall have a 0.2% minimum and a 1.0% maximum grade along the STPD and to the sediment pit.
7. Mitered end sections are not required when the sidedrain pipe satisfies the clear zone requirements.
8. The STPD shall be maintained in a condition that will allow it to perform its function. To prevent offsite tracking, the STPD shall be rinsed ( daily when in use ) to move accumulated mud downward thru the stone. Additional stabilization of the vehicular route leading to the STPD may be required to limit the mud tracked.
9. A STPD shall be paid for under the contract unit price for Soil Tracking Prevention Device, EA. The unit price shall constitute full compensation for construction, maintenance, replacement of materials, removal, and restoration of the area utilized for the STPD; including but not limited to excavation, grading, temporary pipe ( including MES when required ), filter fabric, aggregate, paved turnout ( including asphalt and base construction ), ditch stabilization, approach route stabilization, sediment removal and disposal, water, rinsing and cleaning of the STPD and cleaning of public roads, grassing and sod. Hay bales shall be paid for under the contract unit price for Hay or Straw Baled, EA. Silt fence shall be paid for under the contract unit price for Staked Silt Fence, MI.
10. The nominal size of a standard STPD is 4.5 x 15.0 unless otherwise shown in the plans. If the volume of entering and exiting vehicles warrant, a 9.0 width STPD may be used if approved by the Engineer. When a double width ( 9.0 ) STPD is used, the pay quantity shall be 2 for each location.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>SOIL TRACKING PREVENTION DEVICE TYPE A</b>				
Names	Dates	Approved By <i>A. M. Lemoze</i>		
Designed By <i>COM</i>	<i>11/94</i>	State Drainage Engineer		
Drawn By <i>JDT</i>	<i>1/96</i>	Revision	Sheet No.	Index No.
Checked By <i>CRH</i>	<i>1/96</i>	<i>00</i>	<i>1 of 1</i>	<i>106</i>

## STANDARD CRITERIA

CLASS	TYPE (1)	APPLICATION DESCRIPTION	STANDARD INDEX NO.	PERMITTIVITY SEC <sup>-1</sup>		A. O. S. mm	GRAB TENSILE STRENGTH N	SEWN STRENGTH N	PUNCTURE N	TRAPEZOIDAL TEAR N	U V RESISTANCE (Min. Allowed)		COMMENTS	
				%	Time (Hrs.)						%	Time (Hrs.)		
DRAINAGE (D)	D-1	Revetment (Special)		(See D-2)		(See D-2)	1400	1260	500	500	50	500	Woven Monofilament Geotextiles only (Elongation < 50%) Provide 150mm thick aggregate bedding layer.	
	D-2	Revetment (Standard)		% SOIL PASSING 0.075MM		% SOIL PASSING 0.075MM	Woven Monofilament	Woven Monofilament	Woven Monofilament	Woven Monofilament	50	500	Woven Geotextiles only. No Slit Film Geotextiles allowed. Provide 150 mm thick aggregate bedding layer for revetment (standard). The bedding layer may be omitted if a D-1 fabric is used with revetment (standard). * For cohesive soils with a plasticity index > 7, maximum average role value for AOS is 0.30mm.	
		Articulating Block		< 15%	0.7	< 15%	0.43	1100	990	400				250
		Gabions		15% to 50%	0.2	15% to 50%	0.25	Other Geotextiles: Elongation < 50% 1400 > 50% 900						
		Rock, Rubble, Broken Concrete	281	> 50%	0.1	> 50%	0.22*	Other Geotextiles: Elongation < 50% 1200 > 50% 810						
	D-3	Underdrain * * *	286	% SOIL PASSING 0.075MM		% SOIL PASSING 0.075MM	Elongation	Elongation	Elongation	Elongation	50	500	No woven slit film fabrics allowed. * For cohesive soils with a plasticity index > 7, maximum average role value for AOS is 0.30mm. ** Required Trapezoidal tear for woven monofilament is 250. *** See Index No. 286 for the permittivity and AOS values of the internal filter fabric of type V underdrain.	
		French Drain	285	< 15%	0.5	< 15%	0.43	< 50% 1100	< 50% 990	< 50% 400				< 50% 400 **
		Sheet Piling Filter		15% to 50%	0.2	15% to 50%	0.25	> 50% 700	> 50% 630	> 50% 250				> 50% 250
		Filter Fabric Jacket (Culvert)	280	> 50%	0.1	> 50%	0.22*							
		Concrete Pavement Subdrainage	287											
	D-4	Slope Pavement (Sand-Cement)									50	500	Nonwoven only. Min. Thickness 90 Mils Elongation ≥ 50%	
		Ditch Pavement (Sand-Cement)	281		0.5		0.43	800	720	220				155
D-5	Mechanical Stabilized Retaining Wall									50	500			
	Cast-In-Place Retaining Wall			0.5		0.43	400	360	220				175	
D-6	Slope Pavement (Concrete)									50	500	Nonwoven only. Min. Thickness 120 Mils Elongation ≥ 50%		
	Ditch Pavement (Concrete)	281		0.5		0.43	800	720	220				155	
EROSION (E)	E-1	Staked Silt Fence	102	0.5		NA	400	360	NA	155	80	500	Minimum Filtration Efficiency of 75% and minimum flow rate of 1.136 L <sup>3</sup> /Min.	
	E-2	Wind Screen		0.5		NA	400	360	NA	NA	80	150		
STABILIZATION (R)	R-1	Reinforcement		0.05		0.600	880	800	400	400	80	150		
	R-2	Separation		0.05		0.600	800	720	355	220				

(1) Type refers to FDOT class and application.

TABLE 1

Test	Unit	Test Method
Permittivity	sec <sup>-1</sup>	ASTM-D-4491
AOS	mm	ASTM-D-4751
Elongation	%	ASTM-D-4632
Grab Tensile Strength	N	ASTM-D-4632
Sewn Strength	N	ASTM-D-4884
Puncture	N	ASTM-D-4833
Trapezoidal Tear	N	ASTM-D-4533
Ultra Violet Resistance	% Retained In Strength	ASTM-D-4355
Filtration Efficiency	%	ASTM-D-5141
Flow Rate	L <sup>3</sup> /min.	ASTM-D-5141

### GENERAL NOTES

1. Specifications for geotextiles are in Section 985. Physical criteria for each application is provided by this standard, in conjunction with those sections.
2. All values except AOS are MINIMUM AVERAGE ROLL values in the weakest principal direction. Values for AOS are MAXIMUM AVERAGE ROLL values.
3. Test soil or fill material adjacent to the geotextile for gradation to select values for permittivity and AOS.
4. Unless specifically restricted in COMMENTS column, any type of material may be used.

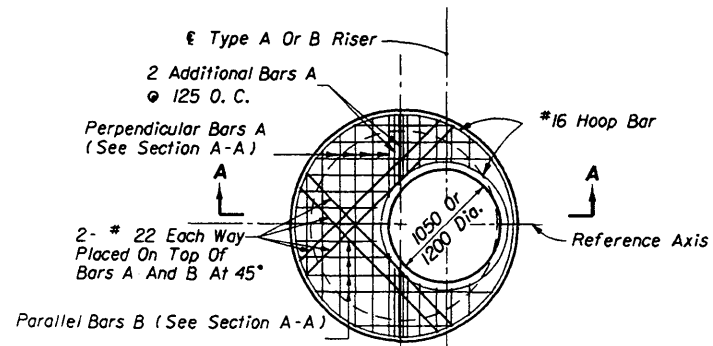
### DESIGN NOTES

1. The Designer shall review this criteria and adjust the values as necessary to satisfy project requirements. These adjustments shall be called for in the plans or contained in the project special provisions.
2. U V Resistance: The value represents the percent of minimum textile strength retained (ASTM-D-4632) after weathering per ASTM-D-4355 for the test period (hours).

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

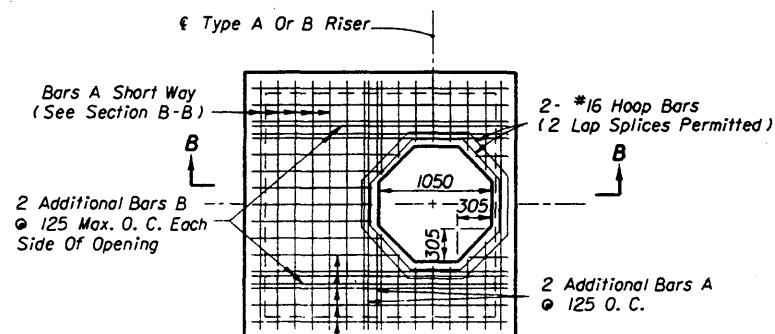
## GEOTEXTILE CRITERIA

Names	Dates	Approved By	
Designed By	CONM 8/91	<i>A. M. Lewis</i> State Drainage Engineer	
Drawn By	DLD 8/91	Revision	Sheet No.
Checked By	RHH 8/91	00	1 of 1
		Index No. <b>199</b>	

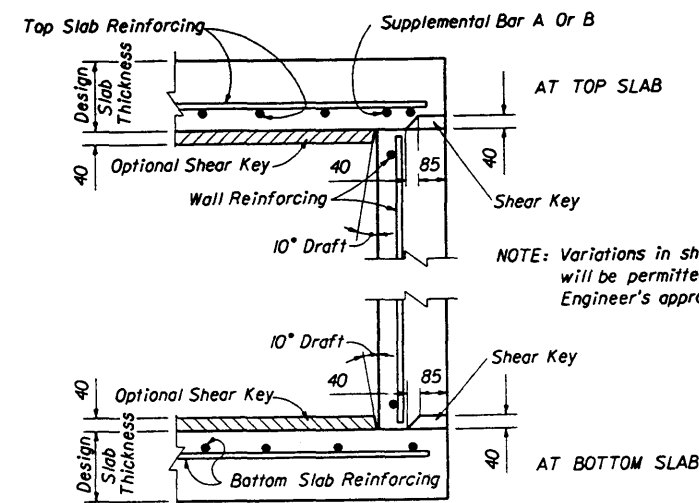


Note: Not Applicable For Type C, D & E  
Ditch Bottom Inlets. See Index No. 232.

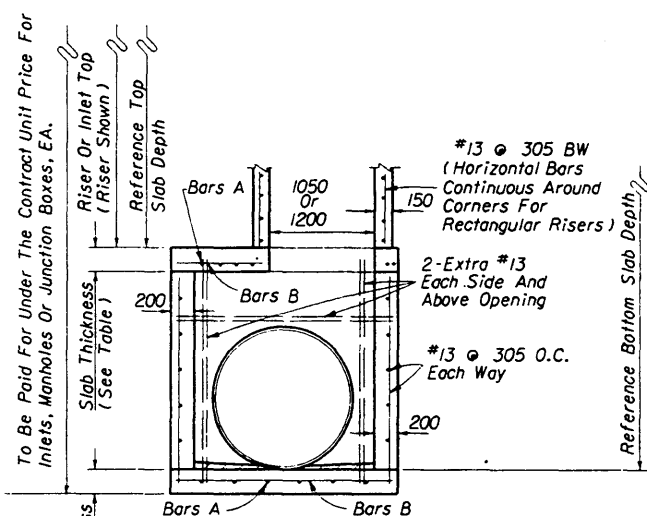
TOP SLAB REINFORCING STEEL DIAGRAM



TOP SLAB REINFORCING STEEL DIAGRAM

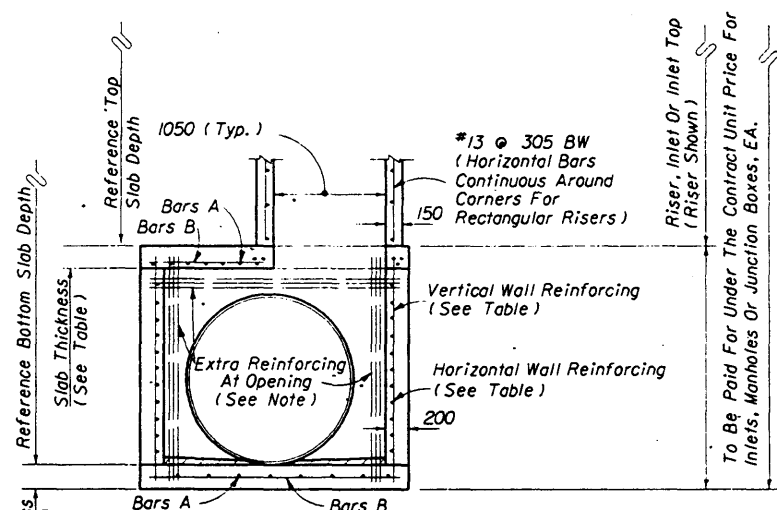


SLAB TO WALL DETAILS FOR PRECAST ALTERNATE WITH 200 WALLS



ALTERNATE A SECTION A-A

\* NOTE: When the inside diameter of a round structure is not more than 450 larger than the opening in the riser or top slab, the top of the structure or riser shall be constructed according to the "Special Top Slab" details on this sheet.

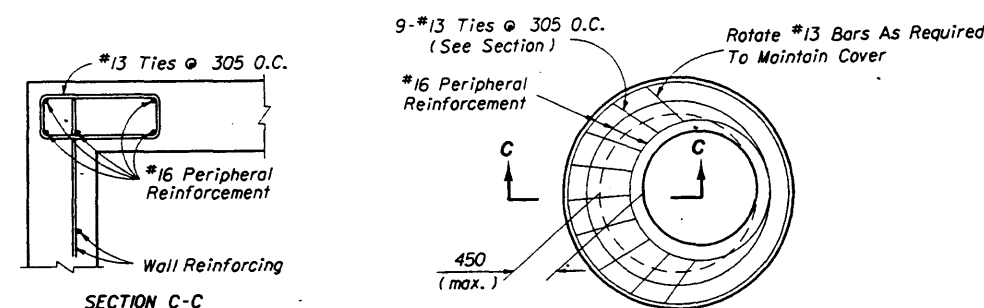


ALTERNATE B SECTION B-B

NOTE: Provide extra reinforcement each side of each opening at 75 mm maximum spacing equal to half the area of vertical reinforcement removed by the opening and provide the same area of reinforcement above each opening at 75 mm maximum spacing as removed by the opening.

GENERAL NOTES

- Standard structure bottoms 1200 mm diameter and smaller (Alt. A) and 1050 mm square (Alt. B) are designated Type P. Larger standard structure bottoms are designated Type J. Risers are permitted for all structures.
- Walls of circular structures (Alternate A) constructed in place may be of non-reinforced concrete or brick or reinforced concrete. Precast and rectangular structures (Alternate B) shall be constructed of reinforced concrete only.
- Wall thickness and reinforcement are for either reinforced cast-in-place or precast concrete units except that precast circular units may be furnished with walls in accordance with either A.S.T.M. C-478M (up to 2400 mm diameter) or A.S.T.M. C-76M, Class III, B Wall, modified where the elliptical steel cage area is placed in the center one-third of the wall.
- Top and floor slab thickness and reinforcement are for precast and cast in place construction. Top and floor slabs shall be of Class II concrete. Concrete as specified in A.S.T.M. C-478M (27 579 kPa) may be used in lieu of Class I and Class II concrete in precast items manufactured in plants which are under the "Standard Operating Procedures" for the inspection of precast drainage products.
- All reinforcement shown is A.S.T.M. A615M, 420 MPa steel, either smooth or deformed. Equivalent area 300 MPa steel or 450 MPa welded wire fabric may be substituted according to Index No. 201.
- Structure bottoms may be used in conjunction with curb inlet tops Types 1, 2, 3, 4, 5, 6, 9, and 10, and any manhole or junction box unless otherwise shown in the plans or other standard drawings. Alt. B structure bottoms may be used in conjunction with curb inlet Types 7 & 8, or any ditch bottom inlet unless otherwise shown in the plans or other standard drawings.
- Rectangular structures may be rotated as directed by the Engineer in order to facilitate connections between the structure walls and storm sewer pipes.
- Except when ACI hooks are specifically required, reinforcement top and slab shall be straight embedment.
- All steel bars shall have 40 mm minimum cover unless otherwise shown except for precast circular units manufactured under ASTM C-76 or ASTM C-478. Horizontal steel in rectangular structures shall be lapped a minimum of 24 bar diameters at corners.
- The corner fillets shown are necessary for rectangular structures used with circular risers and inlet throats and used on skew with rectangular risers, inlet and inlet throats. Fillets will be required in lieu of the bottom slab of the Alt. B riser when used with the Alt. A box. Each fillet shall be reinforced with 2-#16M bars.
- Inlet throats, riser or manhole tops shall be secured to structures as shown on Index No. 201.
- Structures with depths over 4.25 m are to be checked for floatation by designer of project drainage.
- Units larger than specified standard may be substituted at the contractor's option when these units will not cause or increase the severity of utility conflicts. Such larger units shall be furnished at no additional cost to the Department. Larger Alternate A units cannot replace Alternate B units without approval of the Engineer. This note applies to this Index only.
- For manhole and junction box tops, for frames and covers, and, for supplementary details see Index No. 201.



SPECIAL TOP SLAB\*

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN			
<b>STRUCTURE BOTTOMS TYPE J AND P</b>			
Designed By	Names	Dates	Approved By <i>L. M. Lemire</i> State Drainage Engineer
Drawn By			Revision 00
Checked By			Sheet No. 1 of 2
			Index No. 200



**SLAB DESIGNS - SQUARE AND RECTANGULAR STRUCTURES**  
( ALL SLABS 200 THICK - REINFORCING PARALLEL TO SHORT WAY AND LONG WAY )

SHORT-WAY		LONG-WAY	
SLAB DEPTH	SCHEDULE	SLAB DEPTH	SCHEDULE
<b>SIZE: 1067 x UNLIMITED (1050 x UNLIMITED)</b>			
≥0.15 <8.85	B	≥0.15-12.20	B
8.85-12.20	C		
<b>SIZE: 1219 x UNLIMITED (1200 x UNLIMITED)</b>			
≥0.15 <5.80	B	≥0.15 <10.35	B
5.80 <8.85	C	10.35-12.20	C
8.85-12.20	D		
<b>SIZE: 1524 x 1524 (1500 x 1500)</b>			
≥0.15 <0.90	C	≥0.15 <0.90	C
0.90 <5.80	B	0.90 <5.80	B
5.80 <8.55	C	5.80 <8.55	C
8.55 <11.60	D	8.55 <11.60	D
11.60-12.20	F	11.60-12.20	F
<b>SIZE: 1524 x 1829 (1500 x 1800)</b>			
≥0.15 <0.90	C	≥0.15 <0.90	C
0.90 <4.90	B	0.90 <6.10	B
4.90 <7.30	C	6.10 <8.85	C
7.30 <10.35	D	8.85-12.20	D
10.35-12.20	F		
<b>SIZE: 1524 x 2134 (1500 x 2100)</b>			
≥0.15 <0.90	C	≥0.15 <0.90	C
0.90 <4.25	B	0.90 <6.70	B
4.25 <6.40	C	6.70 <10.05	C
6.40 <11.90	D	10.05-12.20	D
11.90-12.20	F		
<b>SIZE: 1524 x 2438 (1500 x 2400)</b>			
≥0.15 <0.90	C	≥0.15 <11.90	B
0.90 <2.45	B	11.90-12.20	C
2.45 <5.20	C		
5.20 <7.00	D		
7.00-12.20	F		
<b>SIZE: 1524 x 2743 (1500 x 2700)</b>			
≥0.15 <0.90	C	≥0.15 <9.75	B
0.90 <2.45	B	9.75-12.20	C
2.45 <5.20	C		
5.20 <7.00	D		
7.00-12.20	F		

SHORT-WAY		LONG-WAY	
SLAB DEPTH	SCHEDULE	SLAB DEPTH	SCHEDULE
<b>SIZE: 1829 x 1829 (1800 x 1800)</b>			
≥0.15 <0.90	D	≥0.15 <0.90	D
0.90 <1.20	C	0.90 <1.20	C
1.20 <4.25	B	1.20 <4.25	B
4.27 <6.40	C	4.27 <6.40	C
6.40 <8.55	D	6.40 <8.55	D
8.55-12.20	F	8.55-12.20	F
<b>SIZE: 1829 x 2134 (1800 x 2100)</b>			
≥0.15 <0.90	D	≥0.15 <0.90	D
0.90 <1.20	C	0.90 <1.20	C
1.20 <3.65	B	1.20 <4.55	B
3.65 <5.80	C	4.55 <6.40	C
5.80 <7.90	D	6.40 <9.15	D
7.90-12.20	F	9.15-12.20	F
<b>SIZE: 1829 x 2438 (1800 x 2400)</b>			
≥0.15 <0.90	D	≥0.15 <0.90	D
0.90 <1.20	C	0.90 <1.20	C
1.20 <2.15	B	1.20 <4.90	B
2.15 <4.90	C	4.90 <7.00	C
4.90 <7.00	D	7.00 <9.75	D
7.00-12.20	F	9.75-12.20	F
<b>SIZE: 1829 x 2743 (1800 x 2700)</b>			
≥0.15 <0.90	D	≥0.15 <0.90	D
0.90 <4.55	C	0.90 <1.20	C
4.55 <6.40	D	1.20 <5.50	B
6.40 <8.25	E	5.50 <8.25	C
8.25-12.20	G	8.25 <11.30	D
		11.30-12.20	E
<b>SIZE: 2134 x 2134 (2100 x 2100)</b>			
≥0.15 <0.90	E	≥0.15 <0.90	E
0.90 <1.20	D	0.90 <1.20	D
1.20 <4.90	C	1.20 <4.90	C
4.90 <6.70	D	4.90 <6.70	D
6.70 <8.55	E	6.70 <8.55	E
8.55-12.20	G	8.55-12.20	G
<b>SIZE: 2134 x 2438 (2100 x 2400)</b>			
≥0.15 <0.90	E	≥0.15 <0.90	E
0.90 <1.20	D	0.90 <1.20	D
1.20 <4.55	C	1.20 <5.20	C
4.55 <6.40	D	5.20 <7.00	D
6.40 <8.25	E	7.00 <8.85	E
8.25-12.20	G	8.85-12.20	G
<b>SIZE: 2134 x 2743 (2100 x 2700)</b>			
≥0.15 <0.90	E	≥0.15 <0.90	E
0.90 <1.20	D	0.90 <1.20	D
1.20 <3.65	C	1.20 <5.50	C
3.65 <5.50	D	5.50 <7.30	D
5.50 <7.30	E	7.30 <9.75	E
7.30-12.20	G	9.75-12.20	G

SHORT-WAY		LONG-WAY	
SLAB DEPTH	SCHEDULE	SLAB DEPTH	SCHEDULE
<b>SIZE: 2438 x 2438 (2400 x 2400)</b>			
≥0.15 <0.90	D	≥0.15 <0.90	D
0.90 <1.20	C	0.90 <1.20	C
1.20 <2.75	B	1.20 <2.75	B
2.75 <5.20	C	2.75 <5.20	C
5.20 <9.45	D	5.20 <9.45	D
9.45-12.20	G	9.45-12.20	G
<b>SIZE: 2438 x 2743 (2400 x 2700)</b>			
≥0.15 <0.90	D	≥0.15 <0.90	E
0.90 <1.20	C	0.90 <1.20	D
1.20 <4.90	B	1.20 <5.50	C
4.90 <6.70	C	5.50 <7.60	D
6.70 <8.85	D	7.60 <9.75	F
8.85-12.20	F	9.75-12.20	G
<b>SIZE: 2743 x 2743 (2700 x 2700)</b>			
≥0.15 <0.90	F	≥0.15 <0.90	F
0.90 <4.25	C	0.90 <4.25	C
4.25 <6.10	D	4.25 <6.10	D
6.10 <7.90	E	6.10 <7.90	E
7.90-12.20	G	7.90-12.20	G

**SLAB DESIGNS - ROUND STRUCTURES**

SLAB DEPTH	SLAB THICKNESS	REINFORCING (2 WAYS) SCHEDULE
<b>SIZE: 1067 (1050)</b>		
≥0.15-12.20	200	C
<b>SIZE: 1219 (1200)</b>		
≥0.15-12.20	200	C
<b>SIZE: 1524 (1500)</b>		
≥0.15 <9.15	200	C
9.15-12.20	200	D
<b>SIZE: 1829 (1800)</b>		
≥0.15 <2.45	200	B
2.45 <5.50	200	C
5.50 <9.10	200	D
9.10 <11.30	200	E
11.30-12.20	200	G
<b>SIZE: 2438 (2400)</b>		
≥0.15 <2.75	250	C
2.75 <4.55	250	D
4.55 <7.00	250	E
7.00 <10.05	300	E
10.05-12.20	300	G
<b>SIZE: 3048 (3000)</b>		
≥0.15 <1.85	250	C
1.85 <3.35	250	D
3.35 <5.20	250	E
5.20 <7.00	300	E
7.00-12.20	300	G
<b>SIZE: 3658 (3600)</b>		
≥0.15 <1.85	300	C
1.85 <3.35	300	D
3.35 <4.90	300	E
4.90 <6.10	350	E
6.10-12.20	350	G

**WALL DESIGNS - RECTANGULAR STRUCTURES**

VERTICAL REINFORCING		HORIZONTAL REINFORCING	
WALL DEPTH	SCHEDULE	WALL DEPTH	SCHEDULE
<b>SIZE: 1067 (1050) * SEE NOTE BELOW</b>			
≥0.35-12.20	A	≥0.35-12.20	B
<b>SIZE: 1219 (1200)</b>			
≥0.35-12.20	A	≥0.35-12.20	B
<b>SIZE: 1524 (1500)</b>			
≥0.35-12.20	A	≥0.35 <10.05	B
		10.05-12.20	C
<b>SIZE: 1829 (1800)</b>			
≥0.35-12.20	A	≥0.35 <6.70	B
		6.70-12.20	C
<b>SIZE: 2134 (2100)</b>			
≥0.35-12.20	A	≥0.35 <4.55	B
		4.55 <7.60	C
		7.60-12.20	D
<b>SIZE: 2438 (2400)</b>			
≥0.35-12.20	A	≥0.35 <3.35	B
		3.35 <5.80	C
		5.80 <8.85	D
		8.85-12.20	F
<b>SIZE: 2743 (2700)</b>			
≥0.35-12.20	A	≥0.35 <4.55	C
		4.55 <6.70	D
		6.70-12.20	F

SIZE is the inside length of a structure wall.  
\* Precast structures 1067 x 1067 may be cast with 150 walls to depths of 4.55 meters.  
See Index 20!

**GENERAL NOTES**

- Slab reinforcement is appropriate for top, intermediate, and bottom slabs.
- Slab depth is measured from finished grade to top of slab.
- Wall design depth is measured to the top of the bottom slab for boxes and to the top of the intermediate slab for risers.
- Wall height is the distance between top of lower slab to bottom of upper slab.
- Size shown in parentheses ( ) is the nominal size as shown on the plans.
- Wall sizes exceeding 2700 require a special design.

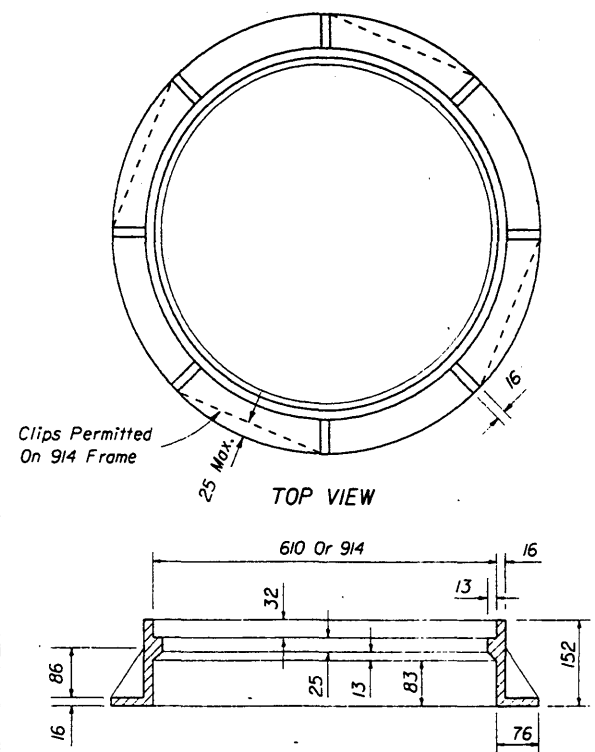
**REINFORCING SCHEDULE**

SCHEDULE	400 MPa STEEL OR 450 MPa ( WIRE FABRIC ) mm <sup>2</sup> / m
A	420
B	505
C	780
D	1120
E	1545
F	2240
G	3070

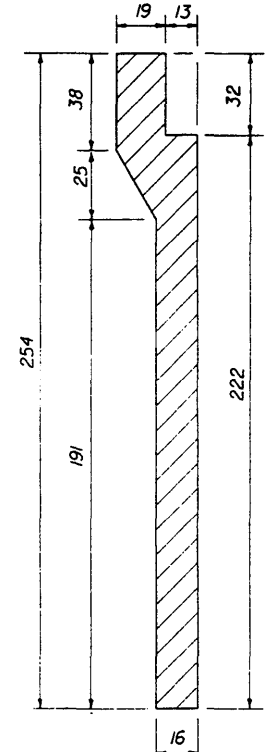
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**STRUCTURE BOTTOMS  
TYPE J AND P**

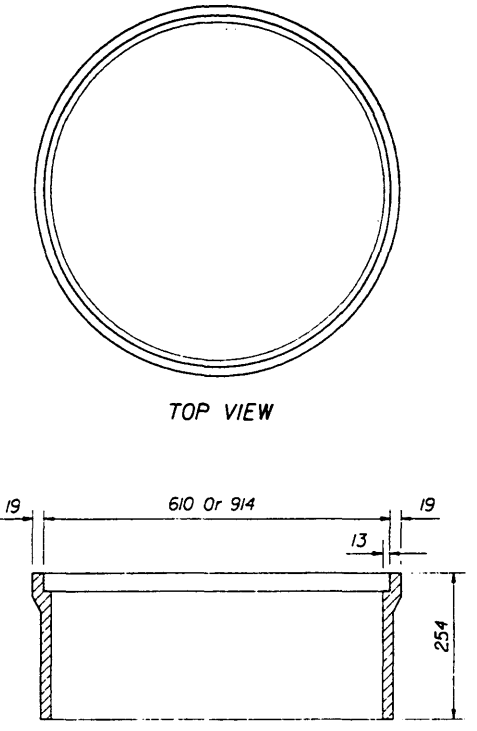
Designed By	Names	Dates	Approved By
Drawn By	ds	05/86	<i>A. M. Lemore</i> State Drainage Engineer
Checked By	JBW	05/86	Revision
		00	Sheet No. 2 of 2
			Index No. 200



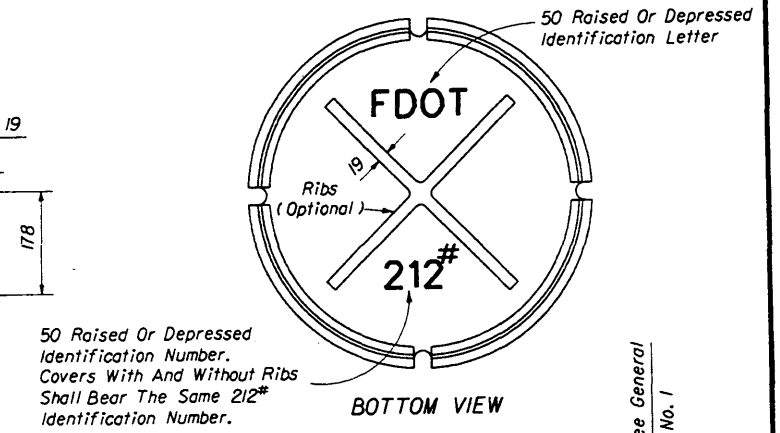
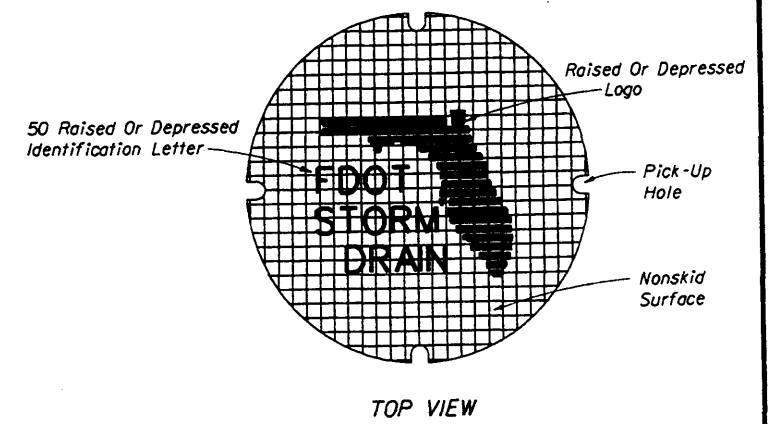
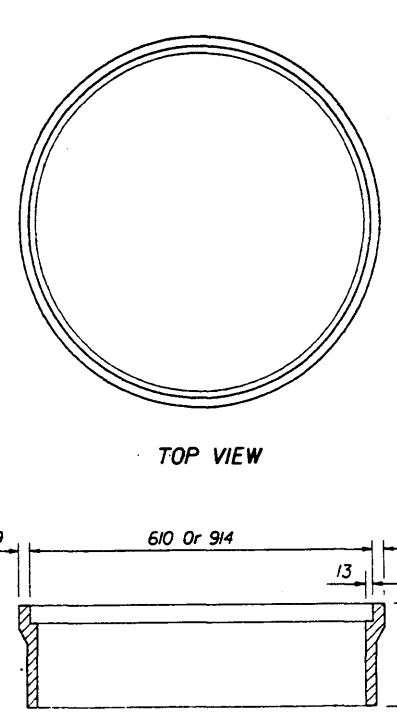
**SECTION TYPE I**  
For Manholes



**WALL SECTION TYPE II**  
For Curb Inlets Types 1, 2, 3, & 4

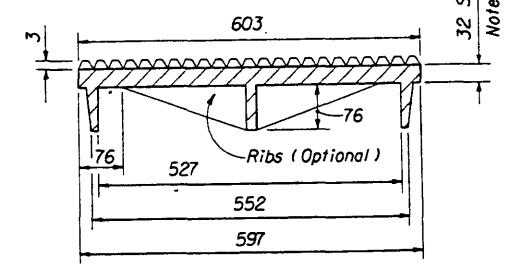


**WALL SECTION TYPE III**  
For Curb Inlets Types 7 & 8

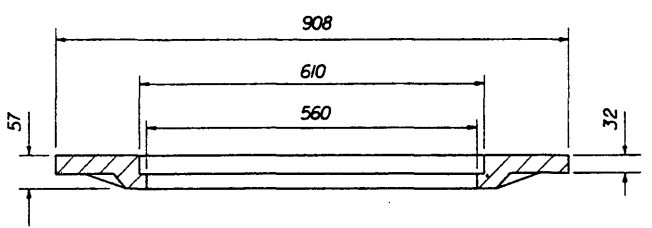


50 Raised Or Depressed Identification Number. Covers With And Without Ribs Shall Bear The Same 212# Identification Number.

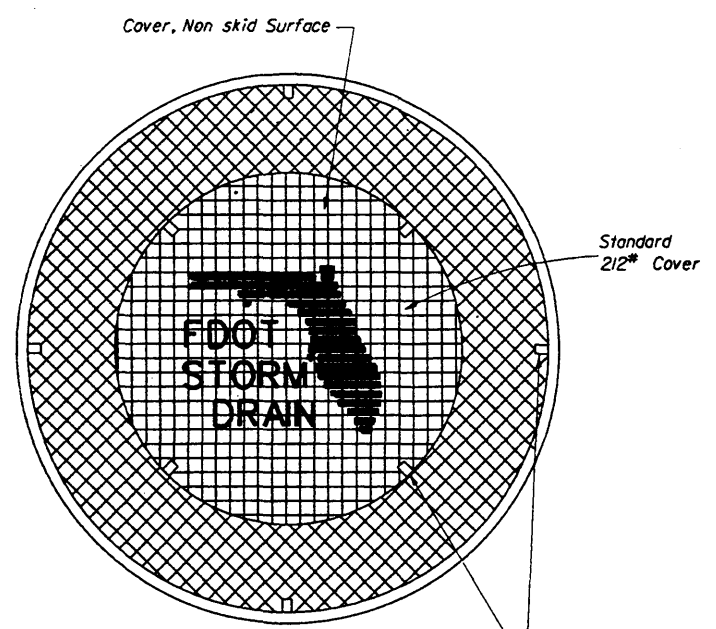
32 See General Note No. 1



**COVER FOR ALL FRAMES**



**2-PIECE COVER**



For Use With Types I, II And III Frames With 914 mm Opening

**2-PIECE COVER**

**CAST IRON FRAMES**

Frame Type	WEIGHT OF CASTINGS					
	610 OPENING		914 OPENING			
	Frame	Cover (Std.)	Frame	2-Piece Cover		
			Inside	Outside	Total	
I	70 kg	85 kg	100 kg	85 kg	100 kg	185 kg
II	65 kg	85 kg	115 kg	85 kg	100 kg	185 kg
III	40 kg	85 kg	80 kg	85 kg	100 kg	185 kg

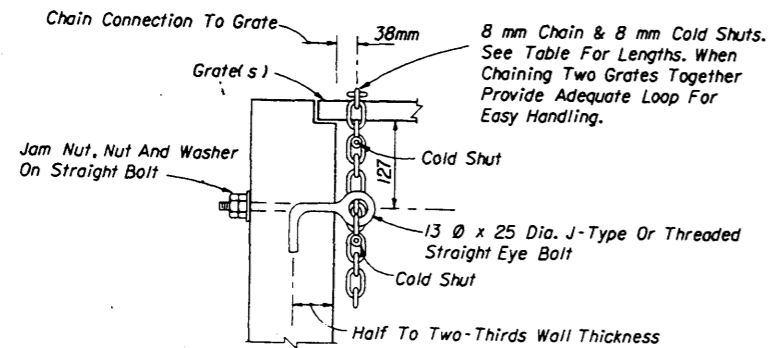
**NOTES (FRAMES, AND COVER)**

- The 212# cover is to be used for all frames Types I, II, III and the 2-Piece Cover, and is the replacement cover for all previous frames with 38 mm deep seats (traffic type). The 80 kg cover (non-traffic type), 1984 Roadway and Traffic Design Standards Index No. 201, is the replacement cover for existing frames with 13 mm deep seats. Installation of frames with 13 mm deep seats is not permitted. The 80 kg covers are to be placed in existing 13 mm deep seated frames only when specifically called for in the plans or as specifically directed by the Engineer.
- Use the 603mm cover, unless the 2-piece cover is call for in the plans.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

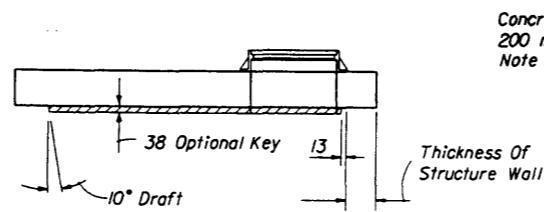
**SUPPLEMENTARY DETAILS FOR MANHOLES AND INLETS**

Designed By	Names	Dates	Approved By		
Drawn By	HSO	06/82	A. M. Lemire State Drainage Engineer		
Checked By	JBW	06/82	Revision	Sheet No.	Index No.
			98	1 of 6	201

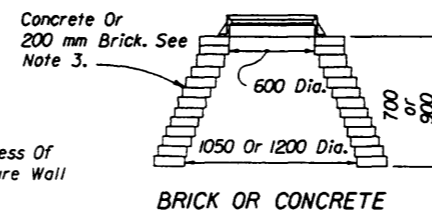


Note: When Alternate G grate is specified, the chain, bolt, nuts, washer and cold shuts shall be galvanized in accordance with the specifications for the grate.

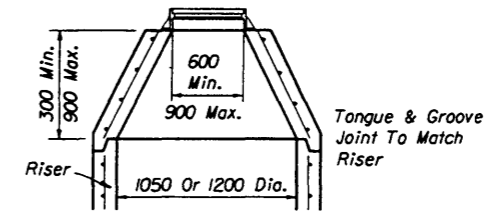
Cost of eye bolt and chain to be included in the contract unit price for inlets.



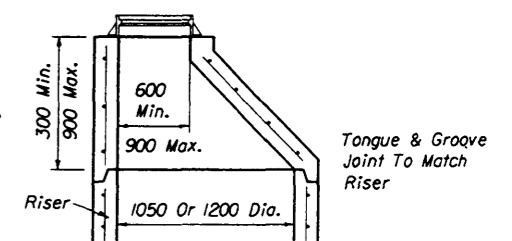
SECTION  
Note: See Slab Designs Index 200.  
TYPE 7



BRICK OR CONCRETE



PRECAST CONCENTRIC CONE  
TYPE 8



PRECAST ECCENTRIC CONE

## MANHOLE TOPS

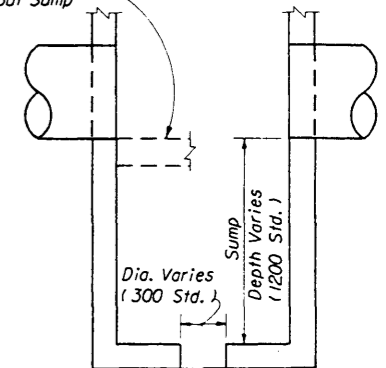
### NOTES (TOPS)

- Manhole top Type 7 slabs shall be of Class II concrete. Concrete as specified in ASTM C-478M may be used for precast units; see General Note No. 3.
- Manhole top Type 7 slabs may be of cast-in-place or precast construction. The optional key is for precast tops and in lieu of dowels. Frame and slab openings are to be omitted when top is used over a junction box. Frames can be adjusted with from one to six courses of brick.
- Manhole top Type 8 may be of cast-in-place or precast concrete construction or brick construction. For concrete construction, the concrete and steel reinforcement shall be the same as the supporting wall unit. An eccentric cone may be used.
- Manhole tops shall be secured to structures by optional construction joints as shown on Sheet 3 of 6.
- Substitution of manhole top Type 8 for manhole top Type 7 is allowed provided that minimum dimensions shown above are not reduced.

### DESIGN NOTES

- Manhole top Type 8 should be specified in the plans when depths shown above can be maintained.

Typical Location For Bottom Slab Without Sump



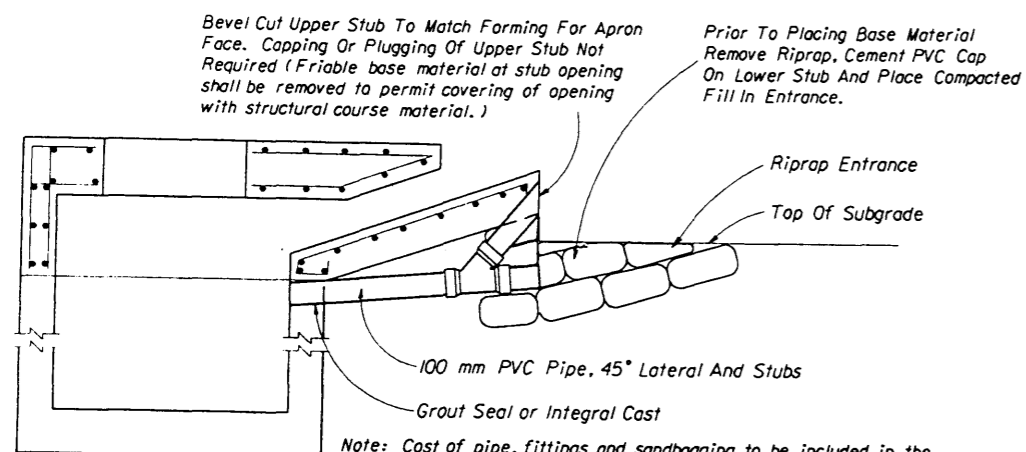
6 mm Galvanized Hardware Cloth  
No. 4 Coarse Aggregate 600 x 600 x 600  
Filter Fabric

NOTE: Sump bottom appropriate for all manhole and inlet types. Cast for sump bottom to be included in the contract unit price for inlet or manhole.

## SUMP BOTTOM

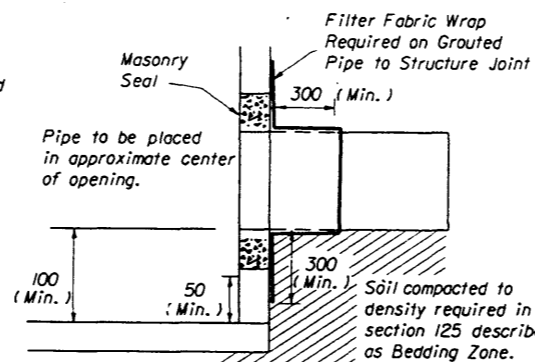
EYE BOLT AND CHAIN REQUIREMENTS				
Index Number	Inlet Type	Eye Bolts	Length Of Chain (mm)	Handling & Remarks
217	(MB) 1	1	1220	Slide & Spin
	(MB) 2	1	1220	Slide & Spin
	(MB) 3	2	2 @ 1220	Slide & Spin
	(MB) 4	2	2 @ 1220	Slide & Spin
	(MB) 5	2	2 @ 1220	Slide & Spin
218	(BW)	1	1118	Slide Or Slide & Spin
219	(BW, RGD)	1	1220	Slide & Spin
220	S	1	1220	Slide & Spin
221	V	1	1220	Slide & Spin
230	A	1	915	Slide
231	B	1	1520	Slide & Spin
232	C	1	760	Slide & Spin
	D	1	760	Slide & Spin
	E	2	2 @ 760	Slide & Spin
	H	2	2 @ 760	Flip Ctr. Grate and Slide & Spin Single Free Grate
233	F	1	1065	Flip Or Slide & Spin
	G	1	1830	Slide
			610	Lifting Loop
234	J	1	1220	Slide & Spin

## EYE BOLT AND CHAIN FOR LOCKING GRATES TO INLETS



Note: Cost of pipe, fittings and sandbagging to be included in the contract unit price for inlets. See Index No. 102 for bale barrier protection at inlet.

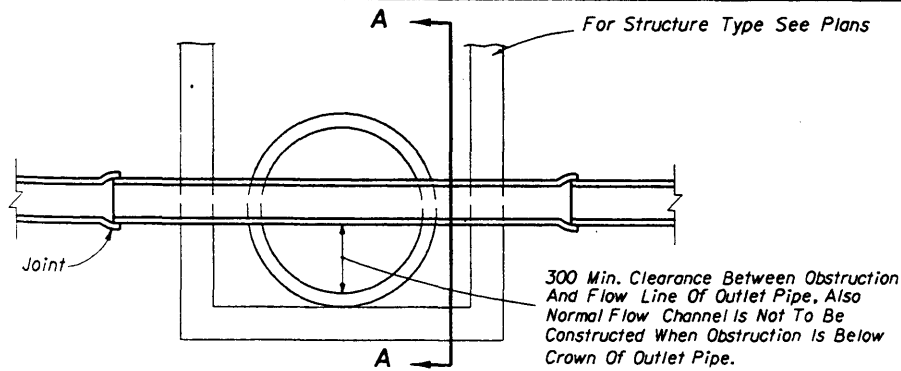
## TEMPORARY DRAINS FOR SUBGRADE AND BASE



Note: Grout to consist of 3:1 Sand-Cement Mixture or any Class Concrete. FOR ALL STRUCTURES UNLESS EXCLUDED BY SPECIAL DETAIL

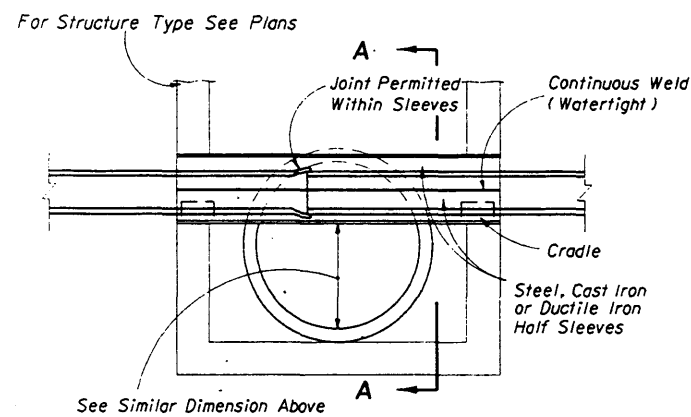
## ALL PIPE TYPES DRAINAGE STRUCTURE INVERT

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
SUPPLEMENTARY DETAILS FOR MANHOLES AND INLETS				
Names	Dates	Approved By		
Designed By	HLB	04/75	S. A. McLenore State Drainage Engineer	
Drawn By			Revision	Sheet No.
Checked By	LMF	04/75	98	2 of 6
				201



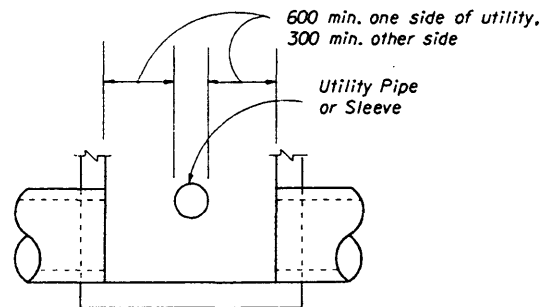
NOTE: No joints allowed inside the Condition I structure.

**CONDITION I**



NOTE: Only water mains will be allowed to pass through a Condition II structure.

**CONDITION II**

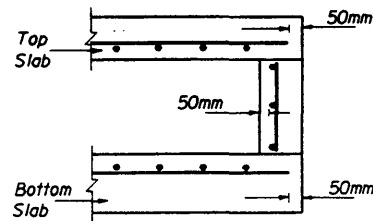


**SECTION AA**

**DESIGNERS NOTE**

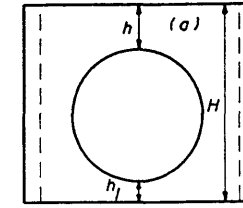
"Sumped" conflict manholes shall not be used unless the system is hydraulically designed to take in account the headloss generated if the sump is completely blocked. "Sumped" conflict manholes must be larger than those normally provided.

**UTILITY PIPES THRU STORM SEWER STRUCTURES**

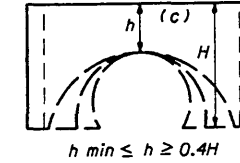


(NOTE: NOT APPLICABLE AROUND MANHOLE AND RISER OPENINGS)

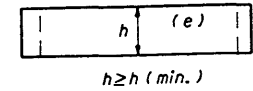
**REBAR STRAIGHT END EMBEDMENT FOR TOP AND BOTTOM SLABS**



When  $h_1 < 0.75h$  (min.)  
 Then (Reg'd)  $h \geq 0.4H$   
 When  $h_1 \geq 0.75h$  (min.)  
 Then (Reg'd)  $h \geq h$  (min.)

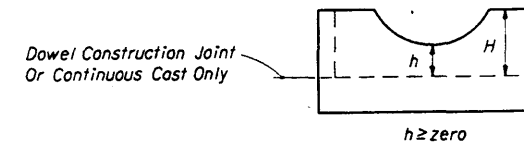


Segments may be inverted. Maximum opening for pipe shall be the pipe O.D. plus 150. If h can not be attained, then a top or bottom slab must be attached to the segment as shown below.



Minimum Value For h	
h (min.)	Box Or Riser Diameter
300	1050 & 1200
450	1500 & 1800
600	>1800

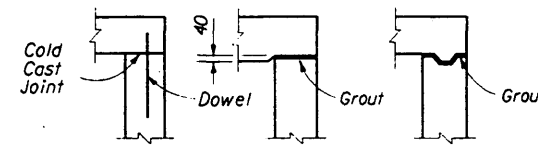
**SEPARATE RISER SEGMENTS WITH CONSTRUCTION JOINTS OTHER THAN DOWEL OPTION**



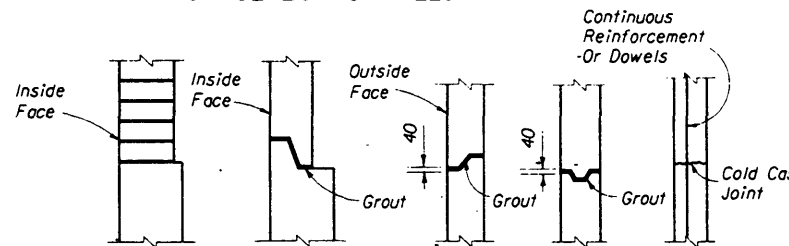
(h min Tabulated Above Do Not Apply)

**TOP OR BOTTOM SEGMENT FOR DOWEL CONSTRUCTION JOINTS OR CONTINUOUS CAST SEGMENTS**

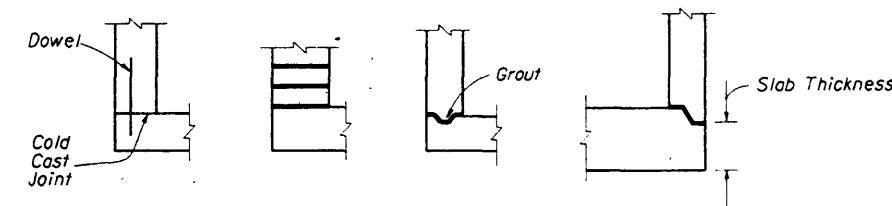
**COMPARATIVE SIDE VIEWS MINIMUM DIMENSIONS FOR BOX AND RISER SEGMENTS**



**TOP SLABS TO WALLS**



**WALL JOINTS**



**BOTTOM SLABS TO WALLS**

**GENERAL NOTES**

- For square or rectangular precast drainage structures, either deformed or smooth welded wire fabric may be used provided:
  - The smooth welded wire fabric shall comply with ASTM A-185, and deformed welded wire fabric shall comply with ASTM A-497.
  - Width and length of the unit is four times the spacing of the cross wires.
  - Wire fabric shall be continuous around the box, spliced at quarter-points with overlap of not less than the spacing of the cross wires plus 50 mm.
- For equivalent steel areas for precast drainage structures, see Sheet 4.
- Horizontal steel in the walls of rectangular structures shall be lapped a minimum of 24 bar diameter at corners.
- Welding of splices and laps is permitted. The requirements and restrictions placed on welding in AASHTO M-259 shall apply.
- Rebar straight end embedment or peripheral reinforcement may be used in lieu of ACI standard hooks for top and bottom slabs except when hooks are specifically called for in plans or standard drawings.
- Concrete as specified in ASTM C-478M, (27579 kPa) may be used in lieu of Class I and Class II concrete in precast items manufactured in plants which are under the 'Standard Operating Procedures For The Inspection Of Precast Drainage Products'.
- Maximum opening for pipe shall be the pipe o.d. plus 150 mm. Mortar used to seal the pipe into the opening will be of such a mix that shrinkage will not cause leakage into or out of the structure.
- For pay item purposes, the height used to determine if a drainage structure is less than or greater than 3.0 m shall be computed using (a) the elevation of the top of the manhole lid, (b) the grate elevation or the theoretical gutter grade elevation of an inlet, or (c) the outside top elevation of a junction box less the flow line elevation of the lowest pipe or to top of sump floor.

- One or more types of joints may be used in a single structure, except brick wall structure. Brick wall construction is permitted on circular units only.
- All grouted joints are to have a maximum thickness of 25 mm.
- Keyways are to be a minimum of 40 mm deep.
- Joint dowels are to be #13 bars, 300 mm long with a minimum of 6 bars per joint approximately evenly spaced for circular structures or 2 bars per side at approximate quarter points for rectangular. Bars are to be placed approximately 150 mm into fresh concrete leaving the remainder to extend into the secondary cast. Welded wire fabric may be substituted for the dowels bar in accordance with the equivalent steel area table on Index 201, Sheet 4.
- Minimum cover on reinforcing bars is 40 mm.
- Joints between wall segments and between wall segments and top or bottom slabs may be sealed either by preformed plastic gasket material using the procedures given in Section 430-7.3 or by grout.
- Approved product inserts may be used in lieu of dowel embedment.

**OPTIONAL CONSTRUCTION JOINTS**

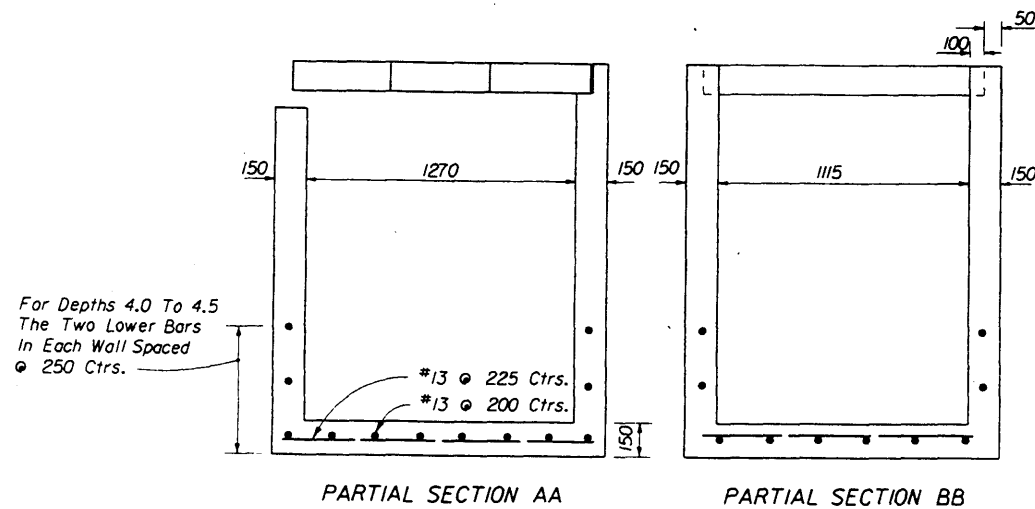
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
SUPPLEMENTARY DETAILS FOR MANHOLES AND INLETS					
Names	Dates	Approved By			
Designed By	HLB	04/75	A. M. Leonard State Drainage Engineer		
Drawn By			Revision	Sheet No.	Index No.
Checked By	LMF	04/75	00	3 of 6	201

**NOTES FOR THIN-WALL PRECAST OPTIONS**

- The details on Sheets 4, 5 & 6 are optional for precast inlet construction up to depths of 4.5 m. These inlets can be used with Alt. "B" Bottoms, Index 200. Cast-in-place construction must adhere to the details contained on the referenced indexes.
- Only the dimensions and reinforcement changes or other modifications are indicated. For all other dimensions and details, the referenced index drawings apply. When these precast units are used in conjunction with Alt "B" Structure Bottoms, Index 200, the interior dimensions of an Alt. "B" Bottom can be adjusted to reflect these inlet interior dimensions.
- Concrete which meets the requirements of ASTM C-478M shall be used for structures constructed to these details.
- Reinforcement can be either deformed bar reinforcement or welded wire fabric. Bar reinforcement other than 300 MPa may be used, however only two grades are recognized; 300 MPa and 420 MPa. Welded wire fabric, including deformed welded wire fabric, will be recognized as having a design strength of 450 MPa. The area of reinforcement required may be reduced in accordance with the Equivalent Steel Area Table provided. For bars and spacings not given, the steel area required can be determined by the following equations:

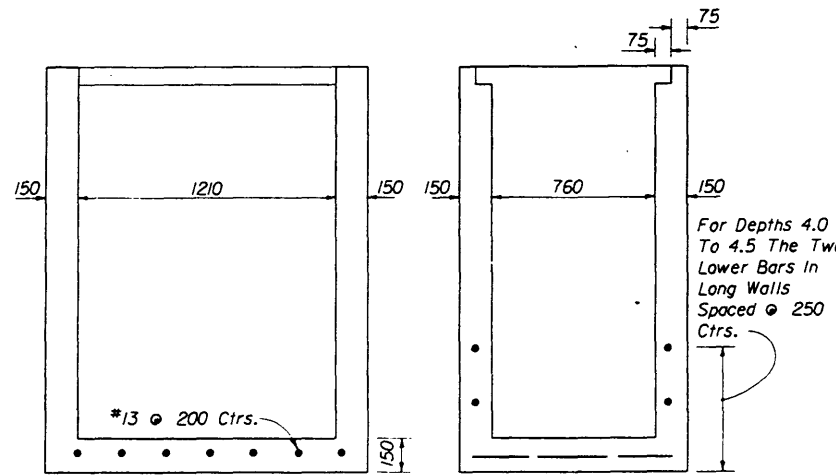
Grade 420 MPa Area required:  $A_s 420 = A_s 300 \times 300/420 \text{ mm}^2/\text{m}$   
 Grade 450 MPa Area required:  $A_s 450 = A_s 300 \times 300/450 \text{ mm}^2/\text{m}$

In no case will fabric with wires smaller than MD20 or spacings greater than 200 mm be permitted. Bar reinforcement shall show the minimum yield designation grade mark of either the number 420 or one (1) grade mark line to be acceptable at the higher value. Maximum bar spacing shall not be greater than two (2) times the slab thickness with a maximum spacing of 300 mm or three (3) times the wall thickness, with a maximum spacing of 455 mm.



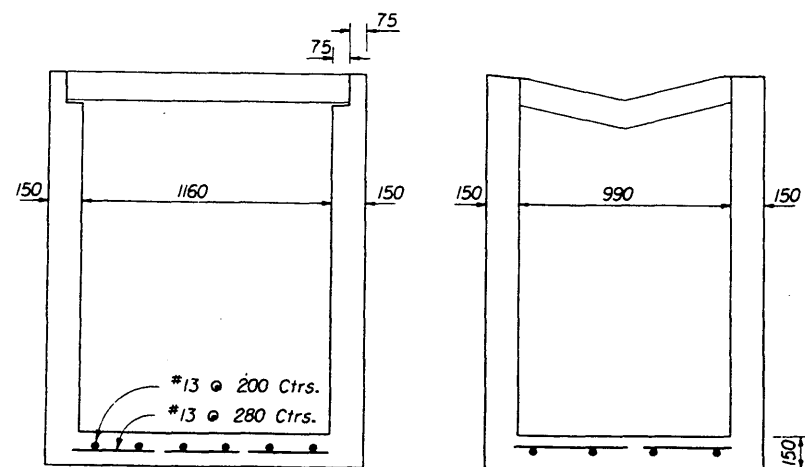
PARTIAL SECTION AA PARTIAL SECTION BB

**DITCH BOTTOM INLET TYPE B**  
**INDEX 231**



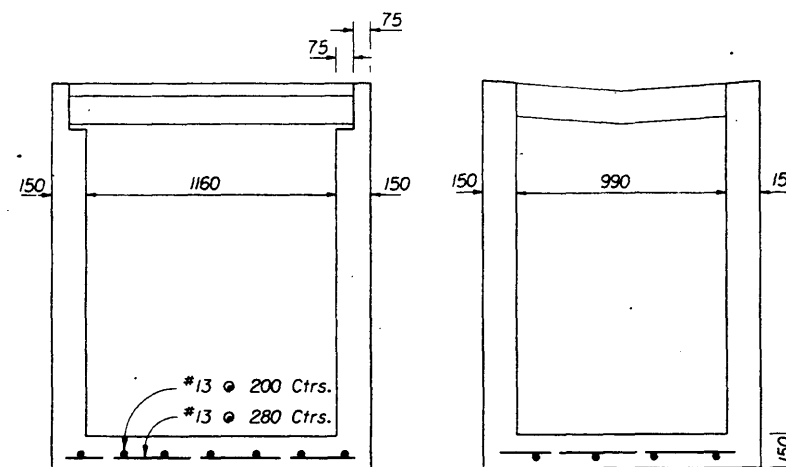
PARTIAL SECTION AA PARTIAL SECTION BB

**DITCH BOTTOM INLET TYPE F**  
**INDEX 233**



PARTIAL SECTION AA PARTIAL SECTION BB

**GUTTER INLET TYPE S**  
**INDEX 220**

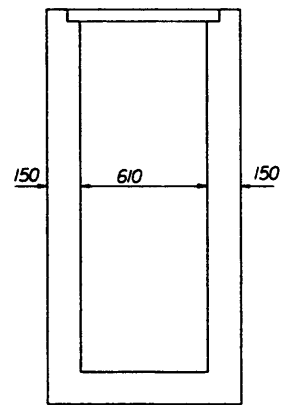


PARTIAL SECTION AA PARTIAL SECTION BB

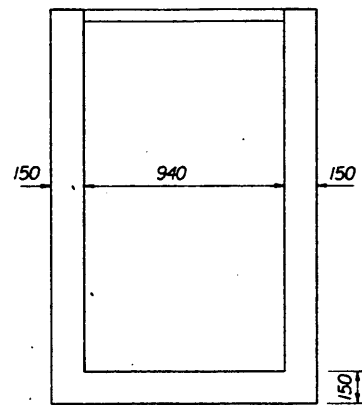
**GUTTER INLET TYPE V**  
**AND DITCH BOTTOM INLET TYPE J**  
**INDEX 221 & 234**

EQUIVALENT STEEL AREA TABLE					
GRADE 300 MPa		GRADE 420 MPa		GRADE 450 MPa	
Bar Size & Spacing	A Req'd mm <sup>2</sup> /m	Bar Size & Spacing	A Req'd mm <sup>2</sup> /m	Bar Size & Spacing	A Req'd mm <sup>2</sup> /m
*13 @ 300 CCEW	430	*10 @ 230 CCEW *13 @ 420 CCEW	310	75 x 75 - MD22 x MD22 100 x 100 - MD29 x MD29 150 x 150 - MD43 x MD43	285
*13 @ 225 CCEW	575	*10 @ 170 CCEW *13 @ 315 CCEW	410	75 x 75 - MD29 x MD29 100 x 100 - MD39 x MD39 150 x 150 - MD58 x MD58	385
*19 @ 150 CCEW	1895	*16 @ 145 CCEW *19 @ 210 CCEW	1355	75 x 75 - MD95 x MD95 100 x 100 - MD126 x MD126 150 x 150 - MD190 x MD190	1265
*22 @ 150 CCEW	2580	*19 @ 150 CCEW *22 @ 210 CCEW	1845	75 x 75 - MD129 x MD129 100 x 100 - MD172 x MD172	1720

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>SUPPLEMENTARY DETAILS FOR MANHOLES AND INLETS</b>					
Names	Dates	Approved By			
Designed By	EGR/JGW 09/86	A. D. McEmore State Drainage Engineer			
Drawn By	WPH/dss 09/86	Revision	Sheet No.	Index No.	
Checked By	EGR 09/86	00	4 of 6	201	

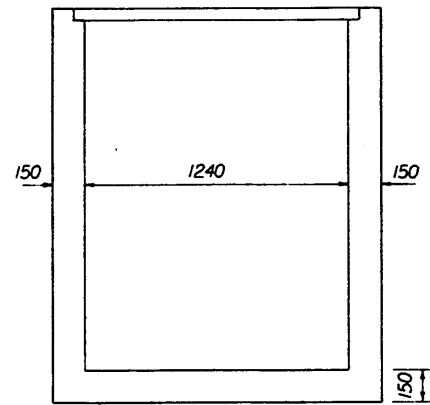


PARTIAL SECTION BB

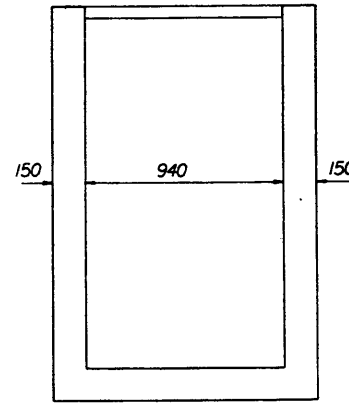


PARTIAL SECTION CC

DITCH BOTTOM INLET C  
INDEX 232

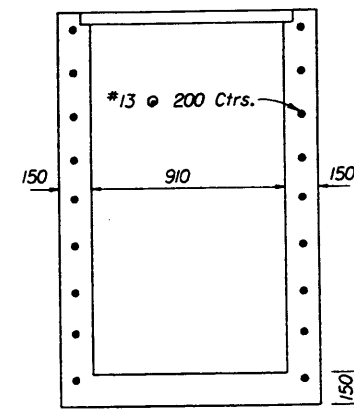


PARTIAL SECTION BB

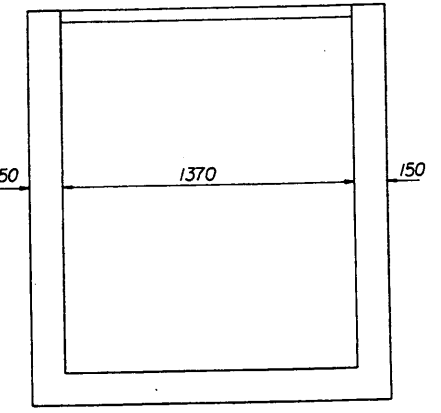


PARTIAL SECTION CC

DITCH BOTTOM INLET D  
INDEX 232

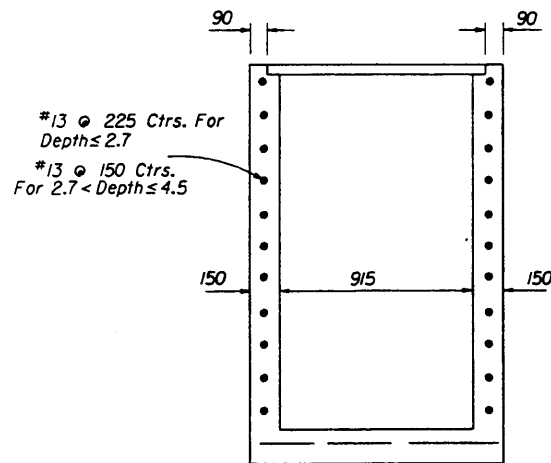


PARTIAL SECTION BB

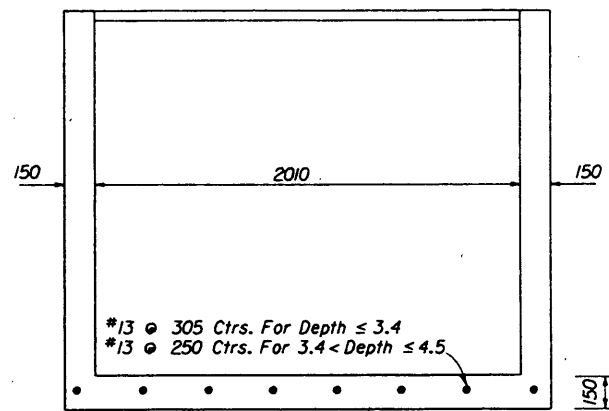


PARTIAL SECTION CC

DITCH BOTTOM INLET E  
INDEX 232

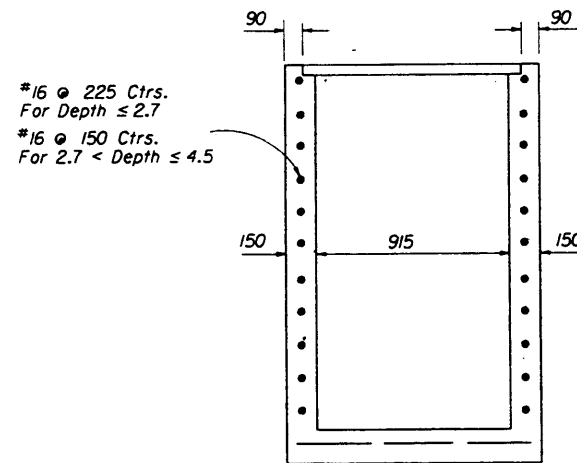


PARTIAL SECTION BB

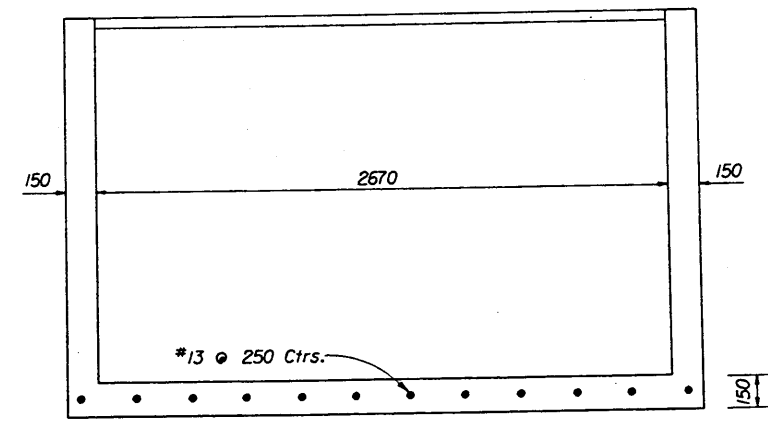


PARTIAL SECTION CC

DITCH BOTTOM INLET H (3-GRATE)  
INDEX 232



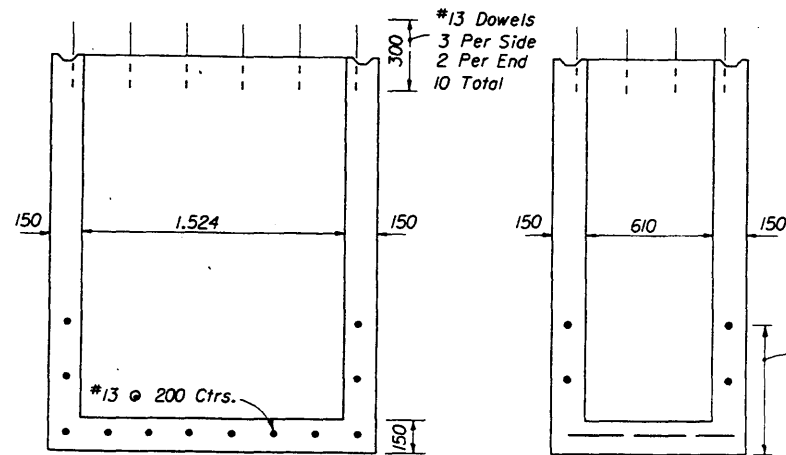
PARTIAL SECTION BB



PARTIAL SECTION CC

DITCH BOTTOM INLET H (4-GRATE)  
INDEX 232

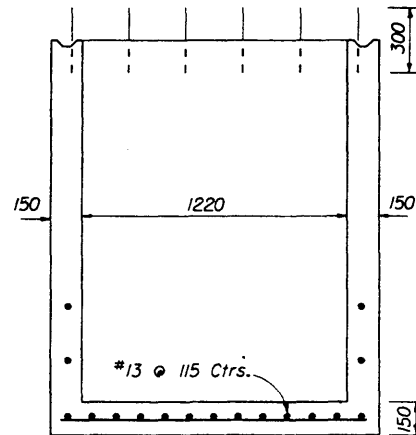
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
SUPPLEMENTARY DETAILS FOR MANHOLES AND INLETS				
Names	Dates	Approved By		
Designed By	EGR/JGW	09/86	S. M. Lemire State Drainage Engineer	
Drawn By	WPH/dss	09/86	Revision	Sheet No.
Checked By	EGR	09/86	98	5 of 6
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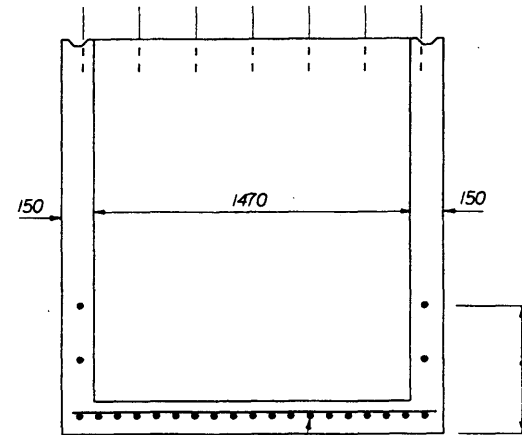
PARTIAL SECTION AA

PARTIAL SECTION BB

MEDIAN BARRIER INLET TYPES 1 & 2



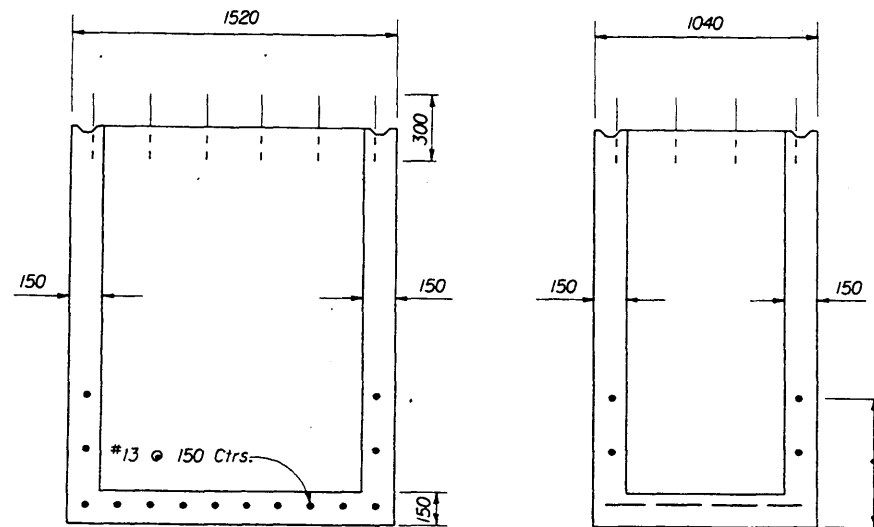
PARTIAL SECTION AA



PARTIAL SECTION BB

MEDIAN BARRIER INLET TYPES 3, 4, & 5

**INDEX 217**

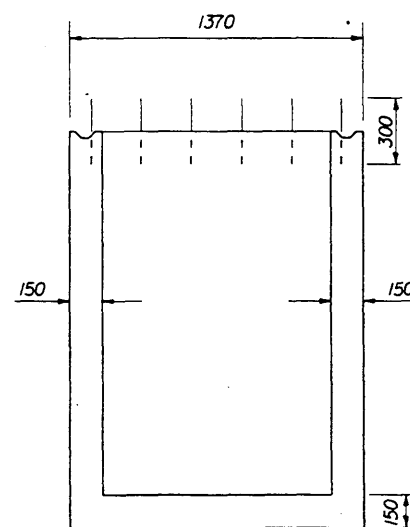


PARTIAL SECTION AA

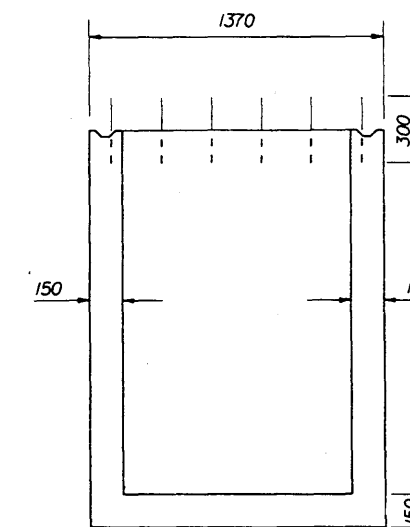
PARTIAL SECTION BB

BARRIER WALL (RIGID) (C & G)

**INDEX 219**



PARTIAL SECTION AA



PARTIAL SECTION BB

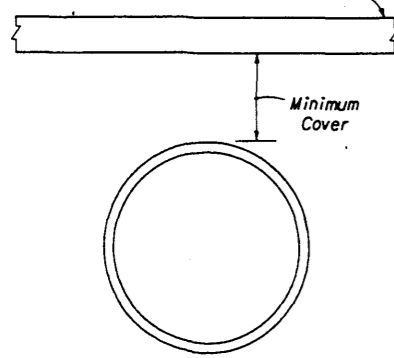
STRUCTURE BOTTOM TYPE P

SIZE 1067 x 1067

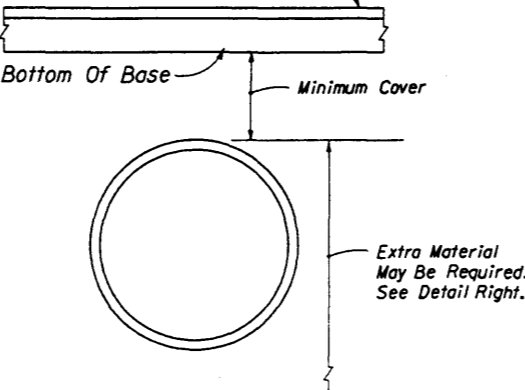
**INDEX 200**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>SUPPLEMENTARY DETAILS FOR MANHOLES AND INLETS</b>				
Designed By	Names	Dates	Approved By <i>J. M. Lemire</i> State Drainage Engineer	
Drawn By			Revision	Sheet No. Index No.
Checked By			98	6 of 6 201

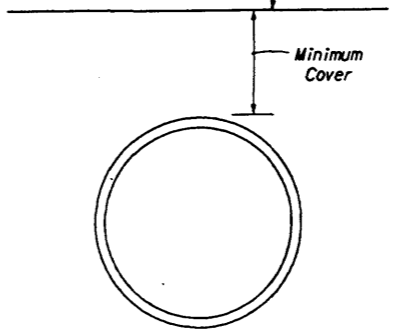
Rigid Pavement  
(Doweled Joints And Good Condition)



Flexible Pavement Or  
Rigid Pavement [ Joints Not Doweled  
Or Poor Condition (Fractured) ]



Unpaved



**RIGID PAVEMENT**

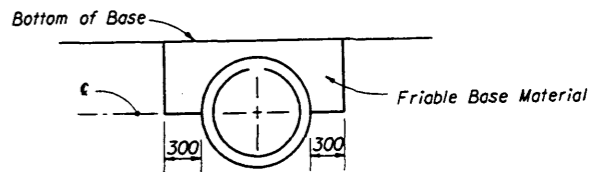
PIPE TYPE/SIZE & SHAPE	MINIMUM COVER (mm)
CONCRETE (See Note 6)	
Round & Elliptical	150
CORRUGATED STEEL	
375-1800 Round & Arch Equiv.	225
1950 & Larger Round & Arch Eq.	375
CORRUGATED ALUMINUM	
375-1800 Round & Arch Equiv.	225
1950-2550 Round & Arch Equiv.	375
2700 & Larger Round	450
CORRUGATED POLYETHYLENE	
375-1200 Round	225
POLYVINYL CHLORIDE	
375-1200 Round	225

**FLEXIBLE PAVEMENT**

PIPE TYPE/SIZE & SHAPE	MINIMUM COVER (mm)
CONCRETE (See Note 6)	
Round & Elliptical	150
CORRUGATED STEEL	
300-750 Round	300 [300]
900-1200 Round	450 (300) [375]
1350-1800 Round	525 (375) [450]
1950-2400 Round	(450) [675]
2550 & Larger Round	(600) [825]
375-750 Arch Equivalent	450 [450]
900-1200 Arch Equivalent	600 (300) [450]
1350-1800 Arch Equivalent	675 (375) [600]
1950-2400 Arch Equivalent	(450) [750]
2550 & Larger Arch Equivalent	(600)
CORRUGATED ALUMINUM	
300-600 Round	375 [300]
750-1200 Round	450 (300) [450]
1350-1800 Round	600 (450) [600]
1950-2550 Round	(600) [750]
2700 & Larger	(750)
375-600 Arch Equivalent	600 [525]
750-1200 Arch Equivalent	675 (375) [600]
1350-1800 Arch Equivalent	750 (450) [675]
1950-2250 Arch Equivalent	(600) [750]
2400-2550 Arch Equivalent	(750)
CORRUGATED POLYETHYLENE	
375-1200 Round	375
POLYVINYL CHLORIDE	
375-1200 Round	375

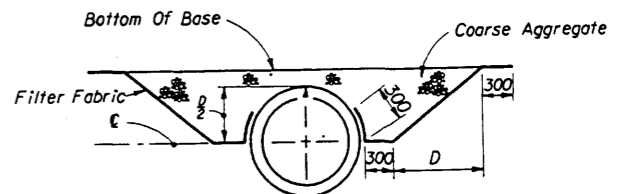
**UNPAVED**

PIPE TYPE/SIZE & SHAPE	MINIMUM COVER (mm)	
	COMM	NON COMM
CONCRETE (See Note 6)		
Round & Elliptical	225	150
CORRUGATED STEEL		
300-750 Round	450 [375]	300 [300]
900-1200 Round	450 (300) [375]	300 (300) [300]
1350-1800 Round	450 (300) [375]	375 (300) [300]
1950-2400 Round	(450) [675]	(300) [300]
2550 & Larger Round	600 [825]	450 [525]
375-750 Arch Equivalent	450 [450]	300 [300]
900-1200 Arch Equivalent	600 (300) [525]	450 (300) [375]
1350-1800 Arch Equivalent	720 (450) [600]	600 (300) [450]
1950-2400 Arch Equivalent	(600) [675]	(450) [525]
2550 & Larger Arch Equivalent	(760)	(600)
CORRUGATED ALUMINUM		
300-600 Round	525 [525]	375 [375]
750-1200 Round	600 (450) [525]	450 (300) [375]
1350-1800 Round	750 (600) [675]	600 (450) [525]
1950-2550 Round	(750) [825]	(600) [675]
2700 & Larger	900	750
375-600 Arch Equivalent	675 [600]	600 [525]
750-1200 Arch Equivalent	825 (525) [675]	675 (375) [525]
1350-1800 Arch Equivalent	900 (600) [750]	750 (450) [600]
1950-2250 Arch Equivalent	(750) [900]	(600) [750]
2400-2550 Arch Equivalent	(900)	(750)
CORRUGATED POLYETHYLENE		
375-1200 Round	525	375
POLYVINYL CHLORIDE		
375-1200 Round	525	375



The cost of furnishing and installing the extra base material shall be included in the cost of the culvert.

**FRIABLE BASE**



The coarse aggregate shall be placed in 150 mm lifts and compacted sufficiently as to be firm and unyielding. The coarse aggregate shall be gravel or stone meeting the requirements of Section 901-2 or 901-3 respectively. The gradation shall meet Section 901-6, Grades 4, 467, 5, 56, or 57 unless restricted in the plans. The filter fabric shall be Type D-3 (See Index 199). The cost of furnishing and installing the coarse aggregate and filter fabric shall be included in the cost of the culvert.

**ASPHALTIC CONCRETE BASE**

Note: Extra material is required when cross culverts are located on facilities subject to high speed traffic ( $\geq 90$  km/h) or high traffic volumes ( $> 1600$  ADT) and the cover is less than 300 mm For Concrete Pipe, 375 For Corrugated Steel Pipe And 450 mm For Corrugated Aluminum Pipe, Corrugated Polyethylene And Corrugated Polyvinyl Chloride Pipe.

**EXTRA MATERIAL FOR CROSS CULVERTS UNDER FLEXIBLE PAVEMENTS**

**GENERAL NOTES**

- The tabulated values are recommended minimum dimensions to withstand anticipated highway traffic loads. Additional cover may be required to support construction equipment loads or highway traffic loads before pavement is completed. Some size thickness combinations may require minimum cover greater than those listed above. See Sheets 2, 3, & 4.
- Less than the tabulated minimum cover may be used provided suitable method (s) are detailed in the plans.
- Values shown in parentheses ( ) are for 75 mm x 25 mm corrugations which must be specified to utilize the lesser cover.
- The tabulated values in the brackets [ ] apply to Type I-R (Spiral Rib) pipe which must be specified to utilize the lesser cover.
- Commercial and noncommercial refers to typical vehicular utilization of unpaved roads and drives where rutting and cover displacement may occur.
- For Pipe Class S with diameters of 300 to 750 mm, the minimum height of fill measured from top of finished grade to outside top of pipe is 0.9 m.

**MINIMUM COVER FOR CONCRETE, STEEL, ALUMINUM, POLYETHYLENE AND POLYVINYL CHLORIDE PIPE**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>COVER HEIGHT</b>				
Names	Dates	Approved By <i>J. M. Penzo</i>		
Designed By EGR	09/84	State Drainage Engineer		
Drawn By DAE	09/84	Revision	Sheet No.	Index No.
Checked By EGR	09/84	00	1 of 5	205



ROUND PIPE DIMENSIONS				
Equiv. Dia. (mm)	Area (m <sup>2</sup> )	Wall Thickness (mm)* Classes II, III, IV, V		
		A WALL	B WALL	C WALL
300	0.07	44	50	NA
375	0.11	47	57	NA
450	0.17	50	63	NA
600	0.29	63	75	94
750	0.46	69	88	107
900	0.66	76	100	119
1050	0.89	88	113	132
1200	1.17	100	125	144
1350	1.48	113	138	157
1500	1.82	125	150	167
1650	2.21	138	163	182
1800	2.65	150	175	194
1950	3.08	163	190	207
2100	3.58	175	203	219
2250	4.12	190	215	234
2400	4.67	203	228	247
2550	5.27	215	241	260
2700	5.92	228	254	273
2850	6.59	241	—	—
3000	7.29	254	—	—

\* For Informational Purposes Only  
Do Not Specify Wall Thickness  
Option B Wall Is Industry Standard

ROUND PIPE INSTALLATIONS						
PIPE DIAMETER	Class S	Class I	Class II	Class III	Class IV	Class V
300-750	2.75	4.00	5.25	7.25	11.00	16.75
900-1350	2.50	3.75	4.75	6.75	10.50	16.00
1500-1950	2.00	3.25	4.50	6.50	10.00	15.50
2100-2400	1.75	3.00	4.25	6.25	9.75	15.00
Pipe Class S	D-Load=30 N/m/mm (0.3 mm Crack) D-Load=45 N/m/mm (Ultimate)					
Pipe Class I	D-Load=40 N/m/mm (0.3 mm Crack) D-Load=60 N/m/mm (Ultimate)					
Pipe Class II	D-Load=50 N/m/mm (0.3 mm Crack) D-Load=75 N/m/mm (Ultimate)					
Pipe Class III	D-Load=65 N/m/mm (0.3 mm Crack) D-Load=100 N/m/mm (Ultimate)					
Pipe Class IV	D-Load=100 N/m/mm (0.3 mm Crack) D-Load=150 N/m/mm (Ultimate)					
Pipe Class V	D-Load=150 N/m/mm (0.3 mm Crack) D-Load=175 N/m/mm (Ultimate)					

Note: At the option of the pipe supplier or the contractor, a Pipe Class with greater strength may be substituted for the Pipe Class designated in the plans.

ELLIPTICAL PIPE DIMENSIONS						
Nominal Dimensions				Equiv. Dia. (mm)	Area (m <sup>2</sup> )	Wall Thickness (mm) Classes HE II, III, IV VE II, III, IV
Horiz.		Vert.				
Rise (mm)	Span (mm)	Rise (mm)	Span (mm)			
NA	NA	NA	NA	300	NA	NA
300	450	450	300	375	0.12	63
365	575	575	365	450	0.17	69
490	770	770	490	600	0.31	82
610	960	960	610	750	0.47	94
730	1150	1150	730	900	0.69	113
855	1345	1345	855	1050	0.95	125
975	1535	1535	975	1200	1.20	138
1095	1730	1730	1095	1350	1.54	150
1220	1920	1920	1220	1500	1.90	163
1340	2110	2110	1340	1650	2.30	175
1465	2305	2305	1465	1800	2.74	190
1585	2495	2495	1585	1950	3.21	203
1705	2690	2690	1705	2100	3.72	215
1830	2880	2880	1830	2250	4.28	228
1950	3070	3070	1950	2400	4.87	241
2075	3265	3265	2075	2550	5.50	254
2195	3455	3455	2195	2700	6.17	266
2315	3648	3648	2315	2850	6.87	279
2440	3840	3840	2440	3000	7.61	292

For Informational Purposes Only

ELLIPTICAL PIPE INSTALLATIONS (All Sizes)			
Installation	Height Of Fill (m)	Pipe Class	Bedding Class
Horizontal	0.3-1.9*	HE II*	C
	2.0-3.1	HE III	C
	3.2-4.8	HE IV	C
	5.0+	Special Design	Modified
Vertical	0.3-1.9*	VE II*	C
	2.0-3.1	VE III	C
	3.2-4.9	VE IV	C
	5.0+	Special Design	Modified
Pipe Class HE II D-Load=50.0 N/m/mm (0.3 mm Crack) And VE II D-Load=75.0 N/m/mm (Ultimate)			
Pipe Class HE III D-Load=65.0 N/m/mm (0.3 mm Crack) And VE III D-Load=100.0 N/m/mm (Ultimate)			
Pipe Class HE IV D-Load=100.0 N/m/mm (0.3 mm Crack) And VE IV D-Load=175.0 N/m/mm (Ultimate)			

\*HE III and VE III pipe required for depths of cover less than 0.6 for 375, 450 and 600 equivalent.

MAXIMUM COVER FOR REINFORCED CONCRETE PIPE ROUND AND ELLIPTICAL

POLYETHYLENE PIPE	
DIAMETER	HEIGHT OF FILL
300-1200	5

POLYVINYL CHLORIDE PIPE	
DIAMETER	HEIGHT OF FILL
300-1200	5

MAXIMUM COVER FOR PLASTIC PIPE

Note: Height of fill (maximum cover) is measured from top of finished grade to outside top of pipe.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
COVER HEIGHT				
Designed By	EGR	09/85	Approved By <i>A.M. Leore</i> State Drainage Engineer	
Drawn By	HSD	09/85	Revision	Sheet No.
Checked By	EGR	09/85	00	2 of 5
				Index No. 205

**ROUND PIPE - 68 x 13 CORRUGATION**

D (mm)	Area (m <sup>2</sup> )	Maximum Height Of Fill (m)					Min. Cover (m)
		Sheet Thickness In Millimeters (Gage)					
		1.63 mm (16)	2.01 mm (14)	2.77 mm (12)	3.51 mm (10)	4.27 mm (8)	
300	0.07	30.5+	30.5+	NA	NA	NA	See Sheet 1 of 5
375	0.11	30.5+	30.5+	NA	NA	NA	
450	0.16	30.5+	30.5+	30.5+	NA	NA	
525	0.22	30.5+	30.5+	30.5+	NA	NA	
600	0.29	30.5+	30.5+	30.5+	NA	NA	
750	0.45	25.9	30.5+	30.5+	NA	NA	
900	0.65	21.6+	26.8	30.5+	30.5+	NA	
1050	0.88	18.3+	23.2	30.5+	30.5+	NA	
1200	1.16	16.1	20.1	28.3	30.5+	30.5+*	
1350	1.47	NS	18.0	25.0	30.5+	30.5+*	
1500	1.80	NS	NS	22.6	29.0	30.5+*	
1650	2.19	NS	NS	NS	26.5	30.5+*	
1800	2.60	NS	NS	NS	24.1	29.6*	
1950	3.05	NS	NS	NS	NS	27.4*	
2100	3.54	NS	NS	NS	NS	25.3*	

**ROUND PIPE - 75 x 25 CORRUGATION**

D (mm)	Area (m <sup>2</sup> )	Maximum Height Of Fill (m)					Min. Cover (m)
		Sheet Thickness In Millimeters (Gage)					
		1.63 mm (16)	2.01 mm (14)	2.77 mm (12)	3.51 mm (10)	4.27 mm (8)	
900	0.66	24.7	30.5+	30.5+	NA	NA	See Sheet 1 of 5
1050	0.89	21.3	26.5	30.5+	NA	NA	
1200	1.17	18.6	23.2	30.5+	30.5+	NA	
1350	1.48	16.5	20.7	29.0	30.5+	NA	
1500	1.82	14.6	18.6	25.9	30.5+	NA	
1650	2.21	13.4	16.8	23.8	30.5	30.5+*	
1800	2.63	12.2	15.5	21.6	27.7	30.5+*	
1950	3.08	11.3	14.3	20.1	25.6	30.5+*	
2100	3.58	10.7	13.1	18.6	23.8	30.5+*	
2250	4.11	9.8	12.2	17.4	22.3	27.4*	
2400	4.67	NS	11.6	16.2	20.7	25.6*	
2550	5.27	NS	11.0	15.2	19.5	24.1*	
2700	5.91	NS	NS	14.3	18.6	22.9*	
2850	6.59	NS	NS	13.7	17.7	21.6*	
3000	7.20	NS	NS	12.8	16.8	20.4*	
3300	8.83	NS	NS	NS	15.2	18.6*	

**ROUND PIPE - 125 x 25 CORRUGATION<sup>③</sup>**

D (mm)	Area (m <sup>2</sup> )	Maximum Height Of Fill (m)					Min. Cover (m)
		Sheet Thickness In Millimeters (Gage)					
		1.63 mm (16)	2.01 mm (14)	2.77 mm (12)	3.51 mm (10)	4.27 mm (8)	
900	0.66	21.9	27.4	30.5+	NA	NA	See Sheet 1 of 5
1050	0.89	18.9	23.5	30.5+	NA	NA	
1200	1.17	16.5	20.7	29.0	30.5+	NA	
1350	1.48	14.6	18.3	25.6	30.5+	NA	
1500	1.82	13.1	16.5	23.2	29.9	NA	
1650	2.21	11.9	14.9	21.0	27.1	30.5+*	
1800	2.63	11.0	13.7	19.2	24.7	30.5*	
1950	3.08	10.1	12.5	17.7	22.9	28.0*	
2100	3.58	9.4	11.6	16.5	21.3	25.9*	
2250	4.11	8.8	11.0	15.2	19.8	24.4*	
2400	4.67	NS	10.4	14.3	18.6	22.9*	
2550	5.27	NS	9.8	13.4	17.4	21.3*	
2700	5.91	NS	NS	12.8	16.5	20.1*	
2850	6.59	NS	NS	12.2	15.5	19.2*	
3000	7.20	NS	NS	11.6	14.9	18.3*	
3300	8.83	NS	NS	NS	13.4	16.5*	

Notes:

Increase the minimum cover values shown on Sheet 1 of 5 by 150 mm for gage and size combinations below the heavy lines.

Height of fill (maximum cover) is measured from top of finished grade to outside top of pipe.

\*Recorrugated end not available. May be considered for cross drain and side drain applications only.

NA - Not Available

NS - Not Suitable (For Highway H-20 Loadings)

① Limited availability of this product. Check availability before specifying (generally limited to 75 mm x 25 mm corrugation pipe arch fabricated from 1500 and smaller diameter round pipe in 12 ga. and thicker material).

② 360° perforated pipe arch (french drain pipe) is not recommended. Do not specify without checking suitability and availability.

③ 125 mm x 25 mm corrugated pipe is currently not manufactured for the Florida market. Check availability before specifying.

④ 2.77 mm (12 gage) for spiral rib, 2.4 m maximum cover, 19 mm x 25 mm x 292 mm rib spacing (2 rib) only.

PIPE ARCH: SPIRAL RIB: 19 x 19 x 191 RIB SPACING  
 PIPE ARCH: SPIRAL RIB: 19 x 25 x 292 RIB SPACING  
 PIPE ARCH - 68 x 13 CORRUGATION

Span (mm)	Rise (mm)	Equiv. Round Pipe (mm)	Area (m <sup>2</sup> )	Minimum Sheet Thickness Required (mm) (Ga)	Maximum Height Of Fill (m)		Min. Cover (m)
					Maximum Corner Pressure kg/m <sup>2</sup>		
					19530	29295	
450	340	375	0.10	1.63 (16)	3.7	4.3	See Sheet 1 of 5
510	380	450	0.15	1.63 (16)	3.1	4.3	
560	420	525	0.20	1.63 (16)	2.1	4.0	
680	500	600	0.25	1.63 (16)	1.5	3.4	
910	660	750	0.40	1.63 (16)	NS	2.1	
1030	740	900	0.60	1.63 (16)	NS	2.1	
1150	820	1050	0.80	2.01 (14)	NS	1.8	
1390	970	1200	1.04	2.77 (12)	NS	2.4	
1630	1120	1350	1.30	2.77 (12)	NS	2.7	
1880	1260	1500	1.60	3.51 (10) ④	NS	3.0 ④	
1960	1330	1650	2.00	3.51 (8)* ④	1.5	3.0 ④	
2130	1400	1800	2.30	3.51 (8)* ④	1.5	3.0 ④	

PIPE ARCH-75 x 25<sup>① ② ③</sup> and 125 x 25<sup>② ③</sup> CORR.

Span (mm)	Rise (mm)	Equiv. Round Pipe (mm)	Area (m <sup>2</sup> )	Minimum Sheet Thickness Required (mm) (Ga)	Maximum Height Of Fill (m)		Min. Cover (m)
					Maximum Corner Pressure kg/m <sup>2</sup>		
					191520	287281	
1000	700	900	0.65	2.01 (14)	2.4	3.7	See Sheet 1 of 5
1100	850	1050	0.87	2.01 (14)	2.4	4.0	
1320	1030	1200	1.14	2.01 (14)	2.4	4.0	
1550	1200	1350	1.44	2.01 (14)	2.4	4.0	
1650	1270	1500	1.78	2.01 (14)	2.7	4.0	
1830	1370	1650	2.13	2.01 (14)	3.4	4.9	
2030	1530	1800	2.52	2.01 (14)	3.4	5.2	
2230	1700	1950	2.95	2.01 (14)	3.1	4.9	
2500	1830	2100	3.40	2.01 (14)	3.4	5.2	
2650	1880	2250	3.90	2.77 (12)	3.1	4.6	
2800	1950	2400	4.42	2.77 (12)	3.1	4.9	
2972	2010	2550	5.00	2.77 (12)	3.1	4.6	
3300	2080	2700	5.57	3.51 (10)	2.7	4.3	
3480	2220	2850	6.20	3.51 (10)	2.4	4.0	
3650	2280	3000	6.85	4.27 (8)	2.1	3.7	

ROUND PIPE - SPIRAL RIB  
 RIB SPACING (19 x 19 x 190) or (19 x 25 x 292)

D (mm)	Area (m <sup>2</sup> )	Maximum Height Of Fill (m)					Min. Cover (m)
		Sheet Thickness In Millimeters (Gage)					
		1.63 mm (16)	2.01 mm (14)	2.77 mm (12)	3.51 mm (10)	4.27 mm (8)	
300	0.07	NA	NA	NA	NA	NA	See Sheet 1 of 5
375	0.11	NA	NA	NA	NA	NA	
450	0.16	20.7	21.9	NA	NA	NA	
525	0.22	17.6	18.8	30.5+	NA	NA	
600	0.29	15.5	21.9	30.5+	NA	NA	
750	0.45	12.4	17.6	29.5	NA	NA	
900	0.65	10.3	14.6	24.6	NA	NA	
1050	0.88	8.8	12.4	21.0	NA	NA	
1200	1.16	7.9	10.9	18.5	NA	NA	
1350	1.47	7.0	9.7	16.4	NA	NA	
1500	1.80	NS	8.8	14.9	NA	NA	
1650	2.19	NS	7.9	13.4	NA	NA	
1800	2.60	NS	7.3	12.1	NA	NA	
1950	3.05	NS	NS	11.2	NA	NA	
2100	3.54	NS	NS	10.6	NA	NA	
2250	4.07	NS	NS	9.7	NA	NA	
2400	4.63	NS	NS	9.1	NA	NA	
2550	5.22	NS	NS	8.8	NA	NA	
2700	5.85	NS	NS	8.2 <sup>Ⓐ</sup>	NA	NA	

Ⓐ = 19 x 25 x 292 Only.

**MAXIMUM COVER FOR CORRUGATED  
STEEL PIPE ROUND AND PIPE ARCH**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>COVER HEIGHT</b>					
Designed By	EGR	Dates	09/85	Approved By	<i>S. A. McLeure</i> State Drainage Engineer
Drawn By	HSD	Revision	09/85	Sheet No.	3 of 5
Checked By	EGR	98	09/85	Index No.	205

ROUND PIPE - 68 x 13 CORRUGATION							
D (mm)	Area (m <sup>2</sup> )	Maximum Height Of Fill (m)					Min. Cover (m)
		Sheet Thickness In mm (Gage)					
		1,524 (16)	1,905 (14)	2,667 (12)	3,429 (10)	4,166 (8)	
300	0.07	27.4	30.4+	NA	NA	NA	See Sheet 1 of 5
375	0.11	21.9	27.4	NA	NA	NA	
450	0.17	17.9	22.8	30.4+	NA	NA	
525	0.22	15.8	19.8	28.0	NA	NA	
600	0.29	13.4	17.0	24.0	NA	NA	
750	0.46	10.6 DR	13.4	19.2	NA	NA	
900	0.66	NS	10.9 DR	15.8	20.73	NA	
1050	0.89	NS	NS	13.4 DR	17.6	NA	
1200	1.17	NS	NS	11.5 DR	15.2 DR	18.5	
1350	1.48	NS	NS	10.3 DR	13.7 DR	16.4 DR	
1500	1.82	NS	NS	NS	11.8 DR	14.9 DR	
1650	2.21	NS	NS	NS	NS	13.4 DR	
1800	2.63	NS	NS	NS	NS	12.1 DR	

ROUND PIPE - 75 x 25 CORRUGATION							
D (mm)	Area (m <sup>2</sup> )	Maximum Height Of Fill (m)					Min. Cover (m)
		Sheet Thickness In mm (Gage)					
		1,524 (16)	1,905 (14)	2,667 (12)	3,425 (10)	4,166 (8)	
900	0.66	10.0	12.8	18.2	NA	NA	See Sheet 1 of 5
1050	0.89	8.5	10.9	15.5	NA	NA	
1200	1.17	7.3	9.4	13.7	17.6	NA	
1350	1.48	6.4	8.5	11.8	15.5	NA	
1500	1.82	5.7	7.3	10.6	14.0	NA	
1650	2.21	4.5 DR	6.7	9.7	12.8	15.5	
1800	2.63	NS	6.1 DR	8.8	11.5	14.3	
1950	3.08	NS	4.57 DR	8.2	10.6	13.1	
2100	3.58	NS	NS	7.3 DR	9.7	12.1	
2250	4.11	NS	NS	7.0 DR	9.1	11.2	
2400	4.67	NS	NS	6.4 DR	8.5 DR	10.3	
2550	5.27	NS	NS	NS	7.9 DR	9.7	
2700	5.91	NS	NS	NS	7.3 DR	9.1 DR	
2850	6.59	NS	NS	NS	NS	8.5 DR	
3000	7.29	NS	NS	NS	NS	8.2 DR	

ROUND PIPE - SPIRAL RIB RIB SPACING (19 x 19 x 191)							
D (mm)	Area (m <sup>2</sup> )	Maximum Height Of Fill (m)					Min. Cover (m)
		Sheet Thickness In mm (Gage)					
		1,524 (16)	1,905 (14)	2,667 (12)	3,425 (10)	4,166 (8)	
300	0.07	NA	NA	NA	NA	NA	See Sheet 1 of 5
375	0.11	19.0 ①	26.5 ①	NA	NA	NA	
450	0.16	16.7	23.1	NA	NA	NA	
525	0.22	14.3	19.8	NA	NA	NA	
600	0.29	12.5	17.3	NA	NA	NA	
750	0.46	10.0 DR	13.7	22.2	NA	NA	
900	0.66	8.2 ④	11.5 DR	18.5	NA	NA	
1050	0.89	NS	④	15.8	NA	NA	
1200	1.17	NS	NS9.7	14.02	19.8	NA	
1350	1.49	NS	NS	12.1 DR	17.3	NA	
1500	1.82	NS	NS	10.0 ④	15.8	NA	
1650	2.21	NS	NS	NS	14.3 DR	NA	
1800	2.63	NS	NS	NS	13.1 ④	NA	
1950	3.08	NS	NS	NS	11.8 ④	NA	
2100	3.58	NS	NS	NS	10.8 ④	NA	
2250	4.11	NS	NS	NS	9.1 ① ③ ④	NA	
2400	4.67	NS	NS	NS	8.2 ① ③ ④	NA	

Special installation required.  
Refer to AASHTO Standard Specifications  
for Highway Bridges or ASTM B788-88  
and manufacturer's recommendations.

PIPE ARCH - 68 x 13 CORRUGATION ②							
Span (mm)	Rise (mm)	Equiv. Round Pipe (mm)	Area (m <sup>2</sup> )	Minimum Sheet Thickness Required (mm) (Ga)	Maximum Height Of Fill (m)		Min. Cover (m)
					Maximum Corner Pressure - kg/m <sup>2</sup>		
					19530	29295	
450	340	375	0.10	1,524 (16)	3.6	4.5	See Sheet 1 of 5
510	380	450	0.15	1,524 (16)	3.0	4.2	
560	420	525	0.20	1,524 (16)	2.1	3.9	
680	500	600	0.42	1,905 (14)	1.5	3.3	
910	660	750	0.42	1,905 (14)	NS	2.1	
1030	740	900	0.60	2,667 (12)	NS	2.1	
1150	820	1050	0.83	2,667 (12)	NS	1.8	
1390	970	1200	1.08	3,429 (10)	NS	2.4	
1630	1120	1350	1.37	3,429 (10)	NS	2.7	
1880	1260	1500	1.68	4,166 (8)	NS	3.0	
1960	1330	1650	2.03	4,166 (8)	NS	3.0	
2130	1400	1800	2.42	4,166 (8)	NS	3.0	

PIPE ARCH - 75 x 25 CORRUGATION ① ②							
Span (mm)	Rise (mm)	Equiv. Round Pipe (mm)	Area (m <sup>2</sup> )	Minimum Sheet Thickness Required (mm) (Ga)	Maximum Height Of Fill (m)		Min. Cover (m)
					Maximum Corner Pressure - kg/m <sup>2</sup>		
					19530	29295	
1000	700	900	0.65	1,524 (16)	2.4	3.6	See Sheet 1 of 5
1100	850	1050	0.87	1,524 (16)	2.4	3.9	
1330	1030	1200	1.14	1,524 (16)	2.4	3.9	
1550	1200	1350	1.45	1,905 (14)	2.4	3.9	
1650	1270	1500	1.79	1,905 (14)	2.4	3.9	
1830	1370	1650	2.16	2,667 (12)	3.3	4.8	
2030	1530	1800	2.55	2,667 (12)	3.3	5.1	
2230	1700	1950	2.98	2,667 (12)	3.0	4.8	
2500	1830	2100	3.44	2,667 (12)	3.3	5.1	
2650	1880	2250	3.94	3,425 (10)	3.0	4.5	
2800	1950	2400	4.46	3,425 (10)	3.0	4.8	
2980	2010	2550	5.04	4,166 (8)	3.0	4.5	

PIPE ARCH - SPIRAL RIB RIB SPACING (19 x 19 x 191)							
Span (mm)	Rise (mm)	Equiv. Round Pipe (mm)	Area (m <sup>2</sup> )	Minimum Sheet Thickness Required (mm) (Ga)	Maximum Height Of Fill (m)		Min. Cover (m)
					Maximum Corner Pressure - kg/m <sup>2</sup>		
					19530	29295	
405	355	375	0.11	1,524 (16)	3.6	3.9	See Sheet 1 of 5
510	405	450	0.16	1,524 (16)	3.0	3.6	
585	485	525	0.21	1,524 (16)	2.1	3.3	
685	535	600	0.28	1,524 (16)	1.5	3.0	
840	660	750	0.44	1,905 (14)	NS	2.7	
1015	785	900	0.65	1,905 (14)	NS	2.4	
1170	915	1050	0.87	2,667 (12)	NS	2.4	
1345	1040	1200	1.14	2,667 (12)	NS	2.4	
1525	1170	1350	1.45	2,667 (10)	NS	2.4	
1675	1295	1500	1.79	3,425 (10) ④	NS	2.4	
1855	1395	1650	2.16	3,425 (10) ④	NS	2.4	
2055	1500	1800	2.55	3,425 (10) ④	NS	2.4	

Notes:

Increase the minimum cover values shown on  
Sheet 1 of 5 by 150 mm for gage and size combinations  
below the heavy lines.

Height of fill (maximum cover) is measured from  
top of finished grade to outside top of pipe.

NA - Not Available

NS - Not Suitable (For Highway H-20 Loadings)

DR - Design Review is recommended for each specific application. The review  
should identify any special handling, installation, backfill procedures, and  
construction load restrictions which may be required. (The review  
performed by the designer does not relieve the contractor from analyzing  
and taking any necessary precautions required to protect partially or  
completely constructed pipe from the equipment used during construction.)  
(NOTE: The DESIGNER may use a thicker gage in lieu of the Design Review.)

① Limited availability of this product. Check availability  
before specifying.

② 360° perforated pipe (french drain pipe) is not  
recommended in the pipe arch shape. Do not specify  
without checking both for suitability and availability.

③ This size and gage combination must be strutted during installation per  
manufacturer's recommendations. Extra care will be required during handling  
and installation.

④ Use of this size and gage combination must be approved by the State Drainage Engineer.

MAXIMUM COVER FOR  
CORRUGATED ALUMINUM ALLOY  
ROUND PIPE AND PIPE ARCH

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

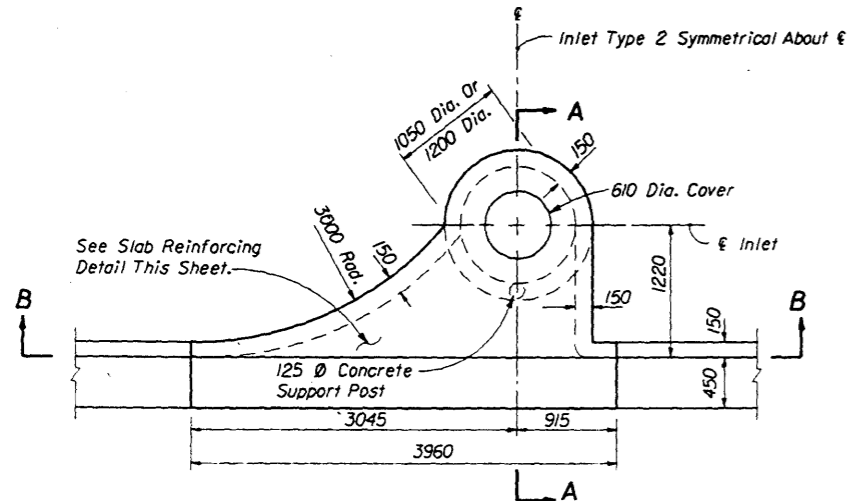
COVER HEIGHT

Designed By	EGR	09/85	Approved By	S. M. L. [Signature]	
Drawn By	HSD	09/85	Revision	Sheet No.	Index No.
Checked By	EGR	09/85	98	4 of 5	205

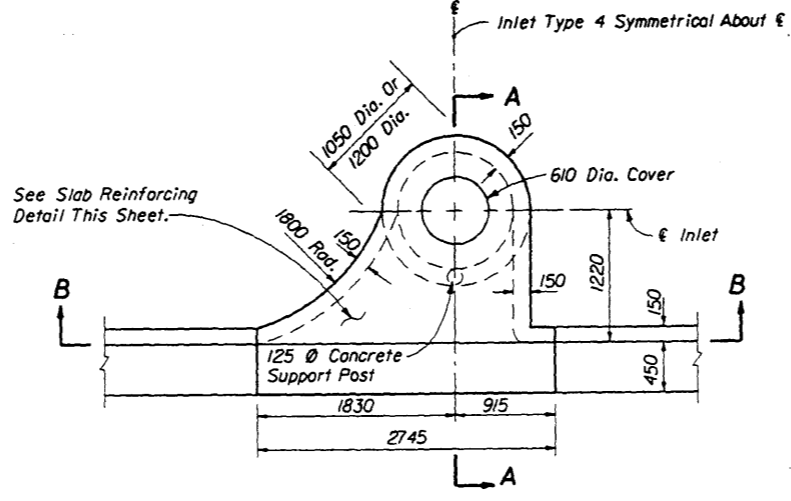
Aluminum Structural Plate Height of Cover Limits*							
Combination Metal Thickness, Reinforcing Rib Type, and Rib Spacing Round Shape - HS 20 Live Load							
Span (mm)	Area (m <sup>2</sup> )	Minimum Height of Cover					
		300 mm	450 mm	600 mm	750 mm	900 mm	1050 mm
1500	1.77	3.2 (13.7)	2.5 (9.4)	2.5 (9.4)	2.5 (9.4)	2.5 (9.4)	2.5 (9.4)
1655	2.14	3.2/II/450 (11.2)	2.5 (7.6)	2.5 (7.6)	2.5 (7.6)	2.5 (7.6)	2.5 (7.6)
1810	2.51	3.2/II/450 (11.2)	2.5 (7.6)	2.5 (7.6)	2.5 (7.6)	2.5 (7.6)	2.5 (7.6)
1965	2.97	3.2/II/450 (9.7)	2.5 (6.7)	2.5 (6.7)	2.5 (6.7)	2.5 (6.7)	2.5 (6.7)
2120	3.53	3.2/II/450 (9.7)	2.5 (6.7)	2.5 (6.7)	2.5 (6.7)	2.5 (6.7)	2.5 (6.7)
2275	4.09	3.2/II/225 (8.5)	3.8 (11.2)	2.5 (5.7)	2.5 (5.7)	2.5 (5.7)	2.5 (5.7)
2430	4.65	3.2/II/225 (8.5)	3.8 (11.2)	2.5 (5.7)	2.5 (5.7)	2.5 (5.7)	2.5 (5.7)
2585	5.20	3.2/II/225 (7.6)	3.2/II/450 (7.6)	2.5 (5.1)	2.5 (5.1)	2.5 (5.1)	2.5 (5.1)
2740	5.85	3.2/II/225 (7.6)	3.2/II/450 (7.6)	2.5 (5.1)	2.5 (5.1)	2.5 (5.1)	2.5 (5.1)
2895	6.60	3.2/II/225 (6.7)	3.2/II/450 (6.7)	3.2 (6.7)	2.5 (4.5)	2.5 (4.5)	2.5 (4.5)
3050	7.34	3.2/II/225 (6.7)	3.2/II/450 (6.7)	3.2 (6.7)	2.5 (4.5)	2.5 (4.5)	2.5 (4.5)
3205	8.08	4.4/II/225 (9.7)	3.2/II/450 (6.0)	3.2/II/675 (6.0)	2.5 (4.2)	2.5 (4.2)	2.5 (4.2)
3360	8.83	4.4/II/225 (9.7)	3.2/II/450 (6.0)	3.2/II/675 (6.0)	2.5 (4.2)	2.5 (4.2)	2.5 (4.2)
3515	9.66	3.2/II/450 (5.4)	3.2/II/675 (5.4)	3.2 (5.4)	2.5 (3.6)	2.5 (3.6)	2.5 (3.6)
3670	10.59	3.2/II/450 (5.4)	3.2/II/675 (5.4)	3.2 (5.4)	2.5 (3.6)	2.5 (3.6)	2.5 (3.6)
3825	11.52	3.8/II/450 (7.0)	3.2/II/675 (5.1)	3.8 (7.0)	3.2 (5.1)	3.2 (5.1)	3.2 (5.1)
3980	12.45	3.8/II/450 (7.0)	3.2/II/675 (5.1)	3.8 (7.0)	3.2 (5.1)	3.2 (5.1)	3.2 (5.1)
4135	13.42	3.2/II/225 (4.8)	3.2/II/675 (4.8)	3.2/II/675 (4.8)	3.8 (6.4)	3.8 (6.4)	3.8 (6.4)
4290	14.49	3.2/II/225 (4.8)	3.2/II/675 (4.8)	3.2/II/675 (4.8)	3.8 (6.4)	3.8 (6.4)	3.8 (6.4)
4445	15.58	3.2/II/225 (4.5)	3.2/II/675 (4.5)	3.2/II/675 (4.5)	3.2/II/1350 (4.5)	3.2/II/1350 (4.5)	3.2/II/1350 (4.5)
4600	16.68	3.2/II/225 (4.5)	3.2/II/675 (4.5)	3.2/II/675 (4.5)	3.2/II/1350 (4.5)	3.2/II/1350 (4.5)	3.2/II/1350 (4.5)
4755	17.74	3.2/II/225 (5.4)	3.2/II/450 (4.2)	3.2/II/675 (4.2)	3.8/II/1350 (5.4)	3.8/II/1350 (5.4)	3.8/II/1350 (5.4)
4910	18.95	3.2/II/225 (5.4)	3.2/II/450 (4.2)	3.2/II/675 (4.2)	3.8/II/1350 (5.4)	3.8/II/1350 (5.4)	3.8/II/1350 (5.4)
5065	20.85	5.7/II/225 (8.2)	3.8/II/450 (5.1)	3.8/II/675 (5.1)	3.8/II/675 (5.1)	3.8/II/675 (5.1)	3.8/II/675 (5.1)
5220	21.46	5.7/II/225 (8.2)	3.8/II/450 (5.1)	3.8/II/675 (5.1)	3.8/II/675 (5.1)	3.8/II/675 (5.1)	3.8/II/675 (5.1)
5375	22.76	4.4/II/450 (5.7)	4.4/II/675 (5.7)	4.4/II/675 (5.7)	4.4/II/675 (5.7)	4.4/II/675 (5.7)	4.4/II/675 (5.7)
5530	24.06	4.4/II/450 (5.7)	4.4/II/675 (5.7)	4.4/II/675 (5.7)	4.4/II/675 (5.7)	4.4/II/675 (5.7)	4.4/II/675 (5.7)
5685	25.46	4.4/II/225 (5.4)	4.4/II/675 (5.4)	4.4/II/675 (5.4)	4.4/II/675 (5.4)	4.4/II/675 (5.4)	4.4/II/675 (5.4)
5840	26.85	4.4/II/225 (5.4)	4.4/II/675 (5.4)	4.4/II/675 (5.4)	4.4/II/675 (5.4)	4.4/II/675 (5.4)	4.4/II/675 (5.4)
6005	28.34	5.1/II/225 (6.0)	5.1/II/675 (6.0)	5.1/II/675 (6.0)	5.1/II/675 (6.0)	5.1/II/675 (6.0)	5.1/II/675 (6.0)

Aluminum Structural Plate Height of Cover Limits*								
Combination Metal Thickness, Reinforcing Rib Type, and Rib Spacing Arch Shape - HS 20 Live Load								
Span (mm)	Rise (mm)	Area (m <sup>2</sup> )	Minimum Height of Cover					
			300 mm	450 mm	600 mm	750 mm	900 mm	1050mm
1530	530	0.65 (13.7)	3.2 (13.7)	2.5 (9.4)	2.5 (9.4)	2.5 (9.4)	2.5 (9.4)	2.5 (9.4)
1690	690	0.84 (18.2)	3.2/II/450 (11.2)	2.5 (7.6)	2.5 (7.6)	2.5 (7.6)	2.5 (7.6)	2.5 (7.6)
1830	560	0.74 (15.8)	3.2/II/450 (11.2)	2.5 (7.6)	2.5 (7.6)	2.5 (7.6)	2.5 (7.6)	2.5 (7.6)
1990	710	1.11 (23.8)	3.2/II/450 (9.7)	2.5 (6.7)	2.5 (6.7)	2.5 (6.7)	2.5 (6.7)	2.5 (6.7)
2130	860	1.39 (30.1)	3.2/II/450 (9.7)	2.5 (6.7)	2.5 (6.7)	2.5 (6.7)	2.5 (6.7)	2.5 (6.7)
2270	990	1.67 (36.4)	3.2/II/450 (9.7)	2.5 (6.7)	2.5 (6.7)	2.5 (6.7)	2.5 (6.7)	2.5 (6.7)
2410	1120	1.86 (40.7)	3.2/II/450 (9.7)	2.5 (6.7)	2.5 (6.7)	2.5 (6.7)	2.5 (6.7)	2.5 (6.7)
2440	890	1.58 (34.4)	3.2/II/225 (8.5)	3.8 (11.2)	2.5 (5.7)	2.5 (5.7)	2.5 (5.7)	2.5 (5.7)
2600	1020	1.86 (40.7)	3.2/II/225 (8.5)	3.8 (11.2)	2.5 (5.7)	2.5 (5.7)	2.5 (5.7)	2.5 (5.7)
2740	1270	2.42 (52.5)	3.2/II/225 (7.6)	3.2/II/450 (7.6)	2.5 (5.1)	2.5 (5.1)	2.5 (5.1)	2.5 (5.1)
2890	890	1.77 (39.1)	3.2/II/225 (7.6)	3.2/II/450 (7.6)	2.5 (5.1)	2.5 (5.1)	2.5 (5.1)	2.5 (5.1)
3050	1170	2.42 (52.5)	3.2/II/225 (7.6)	3.2/II/450 (7.6)	2.5 (5.1)	2.5 (5.1)	2.5 (5.1)	2.5 (5.1)
3200	1420	3.07 (68.1)	3.2/II/225 (7.6)	3.2/II/450 (7.6)	2.5 (5.1)	2.5 (5.1)	2.5 (5.1)	2.5 (5.1)
3350	1070	2.32 (50.5)	3.2/II/225 (6.7)	3.2 (6.7)	3.2 (6.7)	2.5 (4.5)	2.5 (4.5)	2.5 (4.5)
3510	1350	3.07 (66.8)	3.2/II/225 (6.7)	3.2 (6.7)	3.2 (6.7)	2.5 (4.5)	2.5 (4.5)	2.5 (4.5)
3670	1570	3.81 (83.4)	3.2/II/225 (6.7)	3.2 (6.7)	3.2 (6.7)	2.5 (4.5)	2.5 (4.5)	2.5 (4.5)
3820	1070	2.60 (56.1)	4.4/II/225 (9.7)	3.2/II/450 (6.0)	3.2/II/675 (6.0)	2.5 (4.2)	2.5 (4.2)	2.5 (4.2)
3980	1370	3.44 (74.8)	4.4/II/225 (9.7)	3.2/II/450 (6.0)	3.2/II/675 (6.0)	2.5 (4.2)	2.5 (4.2)	2.5 (4.2)
4130	1730	4.65 (100.4)	4.4/II/225 (9.7)	3.2/II/450 (6.0)	3.2/II/675 (6.0)	2.5 (4.2)	2.5 (4.2)	2.5 (4.2)
3660	1240	3.25 (70.4)	3.2/II/450 (5.4)	3.2/II/675 (5.4)	3.2 (5.4)	2.5 (3.6)	2.5 (3.6)	2.5 (3.6)
3820	1520	4.18 (90.1)	3.2/II/450 (5.4)	3.2/II/675 (5.4)	3.2 (5.4)	2.5 (3.6)	2.5 (3.6)	2.5 (3.6)
3980	1910	5.48 (118.4)	3.2/II/450 (5.4)	3.2/II/675 (5.4)	3.2 (5.4)	2.5 (3.6)	2.5 (3.6)	2.5 (3.6)
3960	1240	3.53 (76.1)	3.8/II/450 (7.0)	3.2/II/675 (5.1)	3.8 (7.0)	2.5 (3.3)	2.5 (3.3)	2.5 (3.3)
4120	1550	4.65 (100.4)	3.8/II/450 (7.0)	3.2/II/675 (5.1)	3.8 (7.0)	2.5 (3.3)	2.5 (3.3)	2.5 (3.3)
4270	1800	5.48 (118.4)	3.8/II/450 (7.0)	3.2/II/675 (5.1)	3.8 (7.0)	2.5 (3.3)	2.5 (3.3)	2.5 (3.3)
4420	2060	6.50 (141.8)	3.8/II/450 (7.0)	3.2/II/675 (5.1)	3.8 (7.0)	2.5 (3.3)	2.5 (3.3)	2.5 (3.3)
4270	1420	4.37 (93.8)	3.2/II/225 (4.8)	3.2/II/675 (4.8)	3.2/II/675 (4.8)	2.5 (3.3)	2.5 (3.3)	2.5 (3.3)
4420	1700	5.39 (116.4)	3.2/II/225 (4.8)	3.2/II/675 (4.8)	3.2/II/675 (4.8)	2.5 (3.3)	2.5 (3.3)	2.5 (3.3)
4570	1960	6.50 (141.8)	3.2/II/225 (4.8)	3.2/II/675 (4.8)	3.2/II/675 (4.8)	2.5 (3.3)	2.5 (3.3)	2.5 (3.3)
4720	2210	7.53 (163.8)	3.2/II/225 (4.8)	3.2/II/675 (4.8)	3.2/II/675 (4.8)	2.5 (3.3)	2.5 (3.3)	2.5 (3.3)
4570	1420	4.65 (100.4)	3.2/II/225 (4.5)	3.2/II/675 (4.5)	3.2/II/675 (4.5)	3.2 (4.5)	3.2 (4.5)	3.2 (4.5)
4720	1730	5.85 (127.1)	3.2/II/225 (4.5)	3.2/II/675 (4.5)	3.2/II/675 (4.5)	3.2 (4.5)	3.2 (4.5)	3.2 (4.5)
4870	2010	6.97 (149.4)	3.2/II/225 (4.5)	3.2/II/675 (4.5)	3.2/II/675 (4.5)	3.2 (4.5)	3.2 (4.5)	3.2 (4.5)
5020	2260	8.08 (175.8)	3.2/II/225 (4.5)	3.2/II/675 (4.5)	3.2/II/675 (4.5)	3.2 (4.5)	3.2 (4.5)	3.2 (4.5)
5170	2510	9.19 (198.1)	3.2/II/225 (4.5)	3.2/II/675 (4.5)	3.2/II/675 (4.5)	3.2 (4.5)	3.2 (4.5)	3.2 (4.5)
4880	1600	5.57 (120.8)	3.8/II/225 (5.4)	3.2/II/450 (4.2)	3.2/II/675 (4.2)	3.8 (5.4)	3.2 (4.2)	3.2 (4.2)
5040	1910	6.78 (145.4)	3.8/II/225 (5.4)	3.2/II/450 (4.2)	3.2/II/675 (4.2)	3.8 (5.4)	3.2 (4.2)	3.2 (4.2)
5200	2180	7.99 (172.8)	3.8/II/225 (5.4)	3.2/II/450 (4.2)	3.2/II/675 (4.2)	3.8 (5.4)	3.2 (4.2)	3.2 (4.2)
5360	2440	9.20 (201.4)	3.8/II/225 (5.4)	3.2/II/450 (4.2)	3.2/II/675 (4.2)	3.8 (5.4)	3.2 (4.2)	3.2 (4.2)
5520	2700	10.41 (226.8)	3.8/II/225 (5.4)	3.2/II/450 (4.2)	3.2/II/675 (4.2)	3.8 (5.4)	3.2 (4.2)	3.2 (4.2)
5180	1600	5.95 (128.1)	5.7/II/225 (8.2)	3.8/II/450 (5.1)	3.2/II/675 (3.9)	4.4 (6.0)	3.8 (5.1)	3.8 (5.1)
5340	1910	7.25 (156.8)	5.7/II/225 (8.2)	3.8/II/450 (5.1)	3.2/II/675 (3.9)	4.4 (6.0)	3.8 (5.1)	3.8 (5.1)
5500	2180	8.55 (185.4)	5.7/II/225 (8.2)	3.8/II/450 (5.1)	3.2/II/675 (3.9)	4.4 (6.0)	3.8 (5.1)	3.8 (5.1)
5660	2440	9.75 (212.8)	5.7/II/225 (8.2)	3.8/II/450 (5.1)	3.2/II/675 (3.9)	4.4 (6.0)	3.8 (5.1)	3.8 (5.1)
5820	2700	11.06 (240.4)	5.7/II/225 (8.2)	3.8/II/450 (5.1)	3.2/II/675 (3.9)	4.4 (6.0)	3.8 (5.1)	3.8 (5.1)
5490	1750	6.97 (150.4)	4.4/II/450 (5.7)	3.2/II/675 (3.6)	3.2/II/675 (3.6)	5.1 (6.7)	4.4 (5.7)	4.4 (5.7)
5650	2060	8.36 (181.4)	4.4/II/450 (5.7)	3.2/II/675 (3.6)	3.2/II/675 (3.6)	5.1 (6.7)	4.4 (5.7)	4.4 (5.7)
5810	2340	9.75 (212.8)	4.4/II/450 (5.7)	3.2/II/675 (3.6)	3.2/II/675 (3.6)	5.1 (6.7)	4.4 (5.7)	4.4 (5.7)
5970	2590	11.06 (240.4)	4.4/II/450 (5.7)	3.2/II/675 (3.6)	3.2/II/675 (3.6)	5.1 (6.7)	4.4 (5.7)	4.4 (5.7)
6130	2720	12.37 (268.1)	4.4/II/450 (5.7)	3.2/II/675 (3.6)	3.2/II/675 (3.6)	5.1 (6.7)	4.4 (5.7)	4.4 (5.7)
5790	1930	8.08 (175.8)	3.2/II/225 (3.3)	3.2/II/675 (3.3)	3.2/II/1350 (3.3)	3.2/II/1350 (3.3)	3.2/II/1350 (3.3)	3.2/II/1350 (3.3)
5950	2240	9.57 (207.4)	3.2/II/225 (3.3)	3.2/II/675 (3.3)	3.2/II/1350 (3.3)	3.2/II/1350 (3.3)	3.2/II/1350 (3.3)	3.2/II/1350 (3.3)
6110	2490	10.96 (237.4)	3.2/II/225 (3.3)	3.2/II/675 (3.3)	3.2/II/1350 (3.3)	3.2/II/1350 (3.3)	3.2/II/1350 (3.3)	3.2/II/1350 (3.3)
6270	2740	12.36 (268.1)	3.2/II/225 (3.3)	3.2/II/675 (3.3)	3.2/II/1350 (3.3)	3.2/II/1350 (3.3)	3.2/II/1350 (3.3)	3.2/II/1350 (3.3)
6430	2990	13.75 (298.1)	3.2/II/225 (3.3)	3.2/II/675 (3.3)	3.2/II/1350 (3.3)	3.2/II/1350 (3.3)	3.2/II/1350 (3.3)	3.2/II/1350 (3.3)

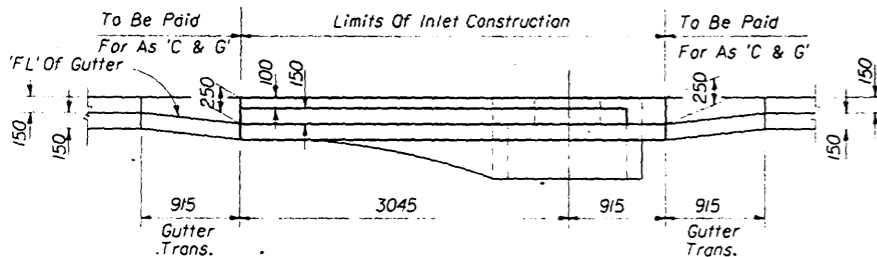
Aluminum Structural Plate Height of Cover Limits*								
Combination Metal Thickness, Reinforcing Rib Type, and Rib Spacing Underpass Shape - HS 20 Live Load								
Span (mm)	Rise (mm)	Area (m <sup>2</sup> )	Minimum Height of Cover					
			300 mm	450 mm	600 mm	750 mm	900 mm	1050mm
1850	1750	2.60 (56.1)	3.2/II/450 (8.8)	2.5 (7.6)	2.5 (7.6)	2.5 (7.6)	2	



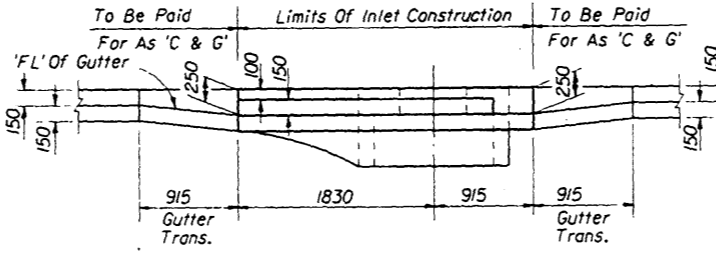
PLAN (INLET TYPE 2 SYMMETRICAL ABOUT €)



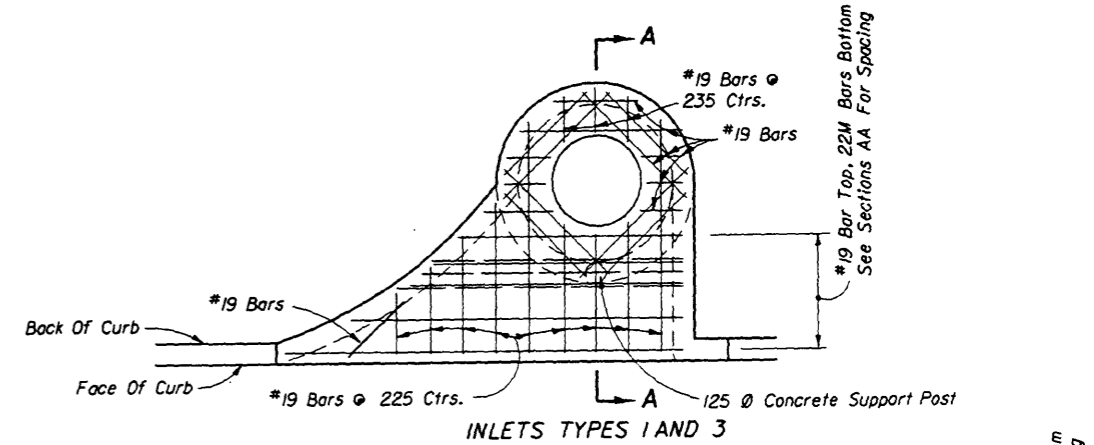
PLAN (INLET TYPE 4 SYMMETRICAL ABOUT €)



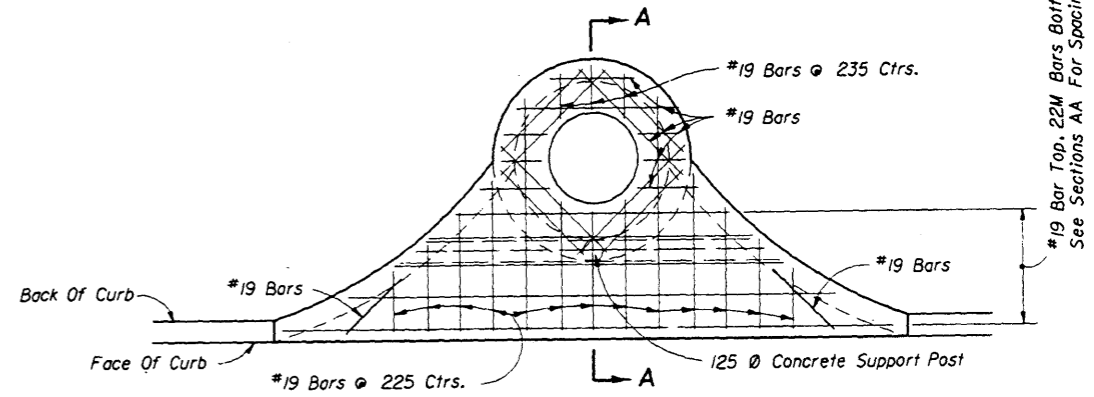
SECTION BB (INLET TYPE 2 SYMMETRICAL ABOUT €)



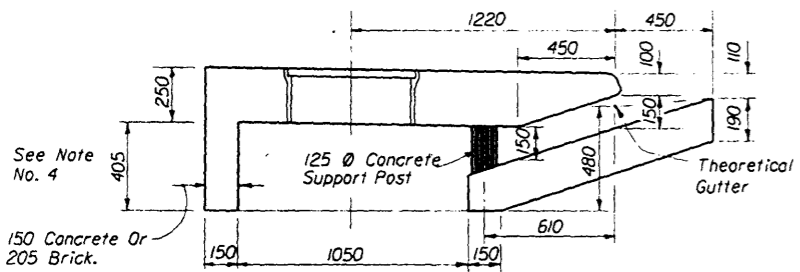
SECTION BB (INLET TYPE 4 SYMMETRICAL ABOUT €)



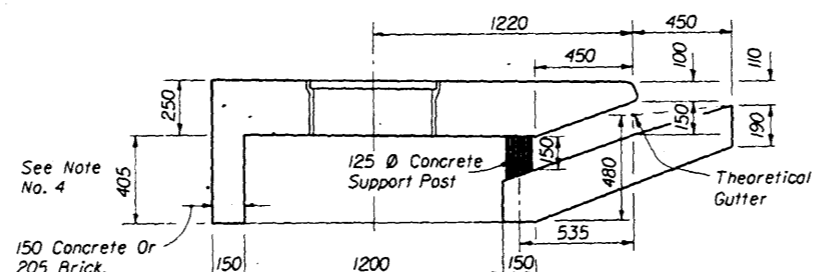
INLETS TYPES 1 AND 3



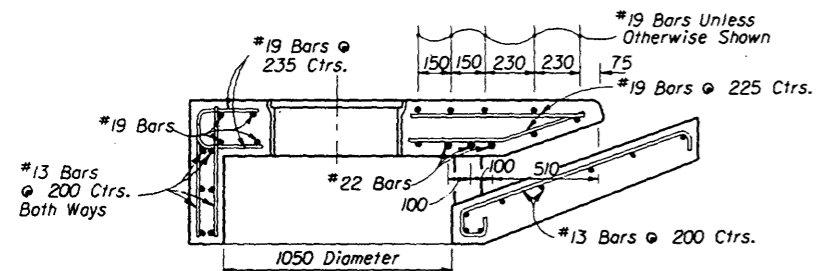
INLETS TYPES 2 AND 4  
SLAB REINFORCING



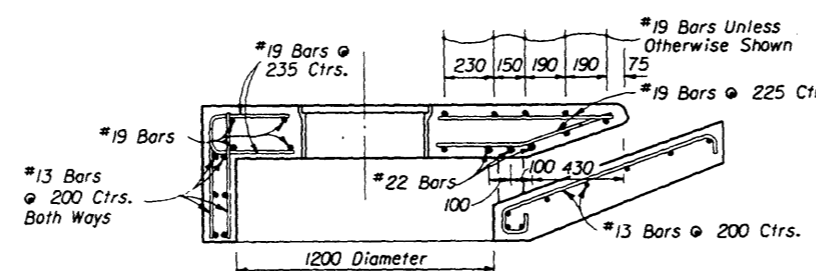
DIMENSIONAL SECTION CURB TYPE F SHOWN  
INLETS TYPES 1 AND 2



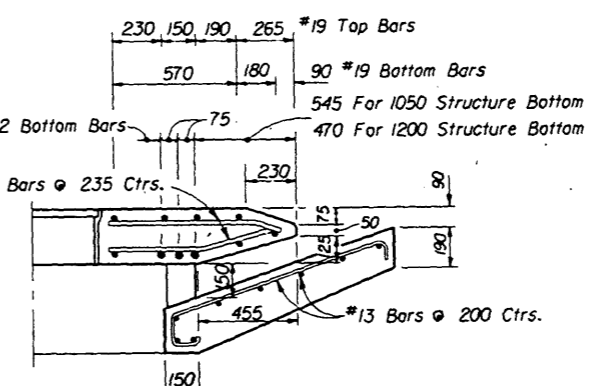
DIMENSIONAL SECTION CURB TYPE F SHOWN  
INLETS TYPES 3 AND 4



REINFORCING SECTION  
1050 DIA. STRUCTURE BOTTOM (SECTION AA)



REINFORCING SECTION  
1200 DIA. STRUCTURE BOTTOM (SECTION AA)



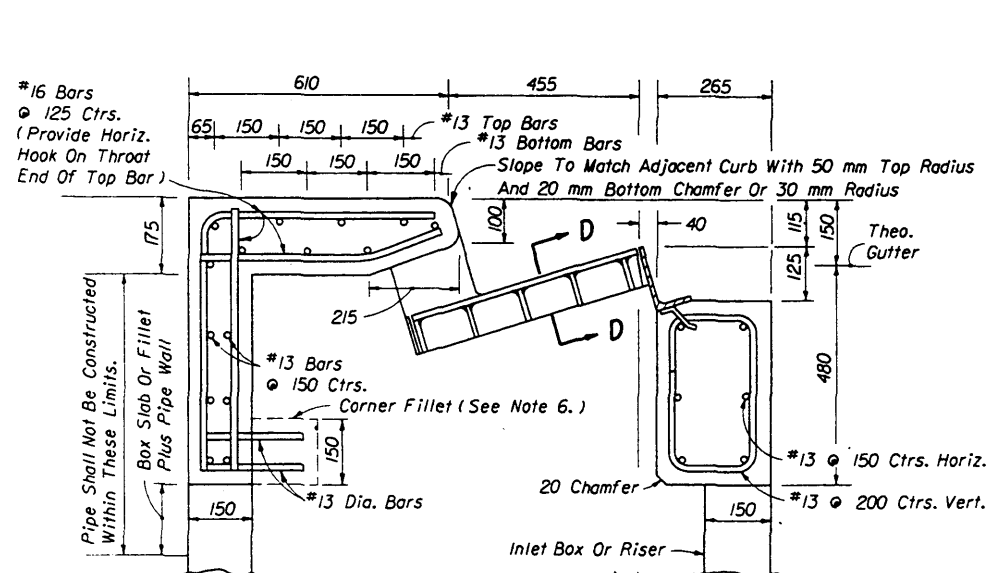
DIMENSION & REINFORCING HALF SECTION  
TYPES A & E CURB (HALF SECTION AA)  
(TYPE E GUTTER SHOWN)

GENERAL NOTES

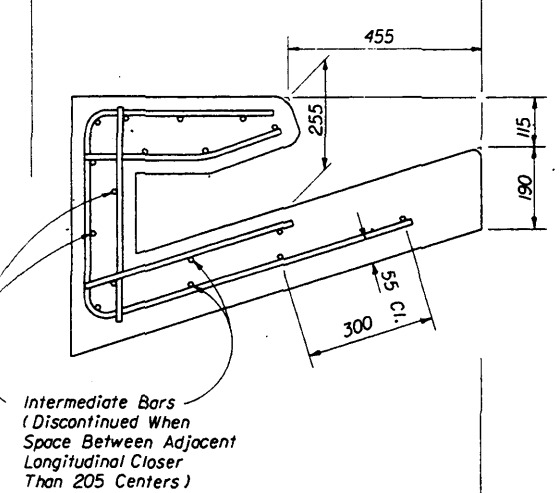
1. The finished grade and slope of the inlet tops are to conform with the finished cross slope and grade of the proposed sidewalk and/or border.
2. When inlets are to be constructed on a curve, refer to the plans to determine the radius and, where necessary, modify the inlet details accordingly. Bend steel when necessary.
3. All steel in inlet top shall have 30 mm minimum cover unless otherwise shown. Inlet tops shall be either cast-in-place or precast concrete.
4. The rear wall portion of inlet tops Types 1, 2, 3 & 4 may be constructed with brick. Dowels to top slab required.
5. For supplemental details see Index No. 201.
6. Only round concrete support post will be acceptable.
7. These inlets are to be used with Curb and Gutter Types E and F and Curb Type A. Locate outside of pedestrian crosswalk where practical.
8. For structure bottoms see Index No. 200.
9. Inlet to be paid for under the contract unit price for Inlets (Curb) (Type —), EA.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN			
<b>CURB INLET TOPS TYPES 1, 2, 3, &amp; 4</b>			
Names	Dates	Approved By <i>S. M. Lewis</i>	
Designed By		State Drainage Engineer	
Drawn By		Revision	Sheet No. Index No.
Checked By		98	1 of 1 210

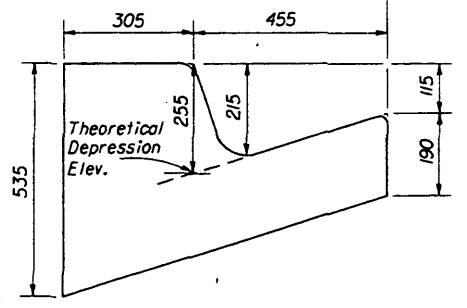
TRANSVERSE SECTIONS FOR INLETS TYPES 1, 2, 3 & 4



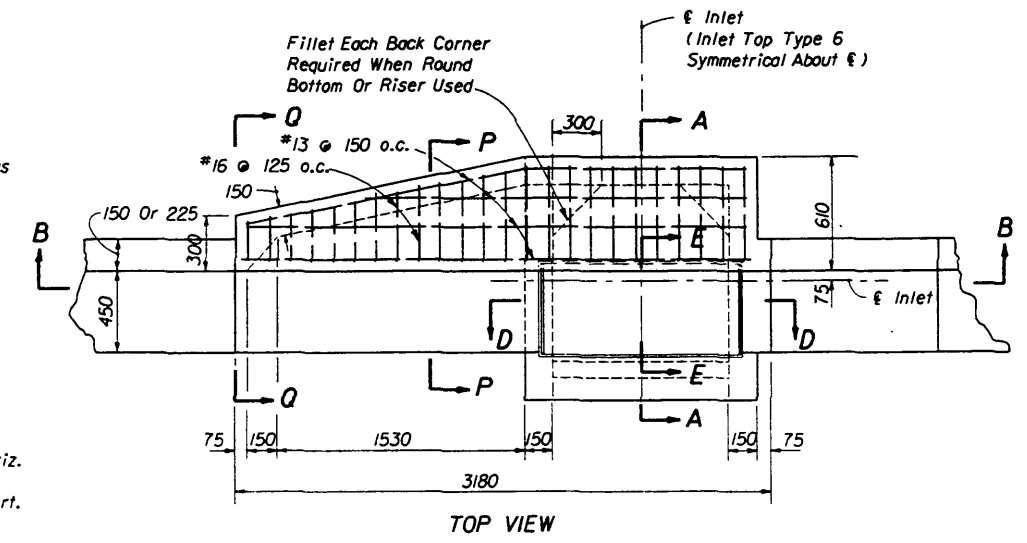
(Steel Cover Shown)  
SECTION AA



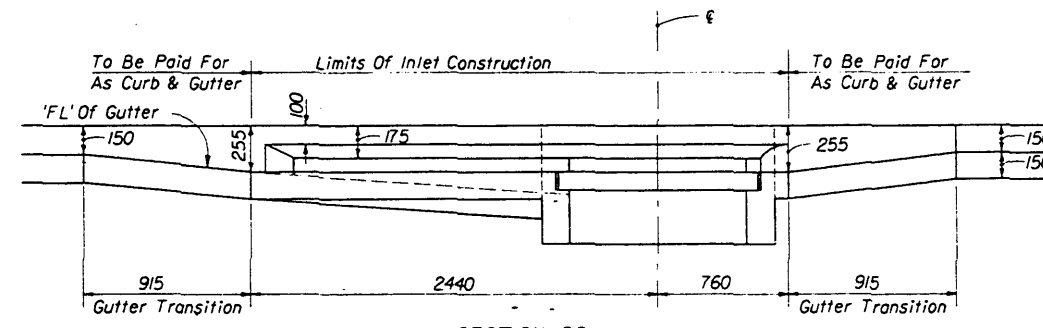
SECTION PP



SECTION QQ



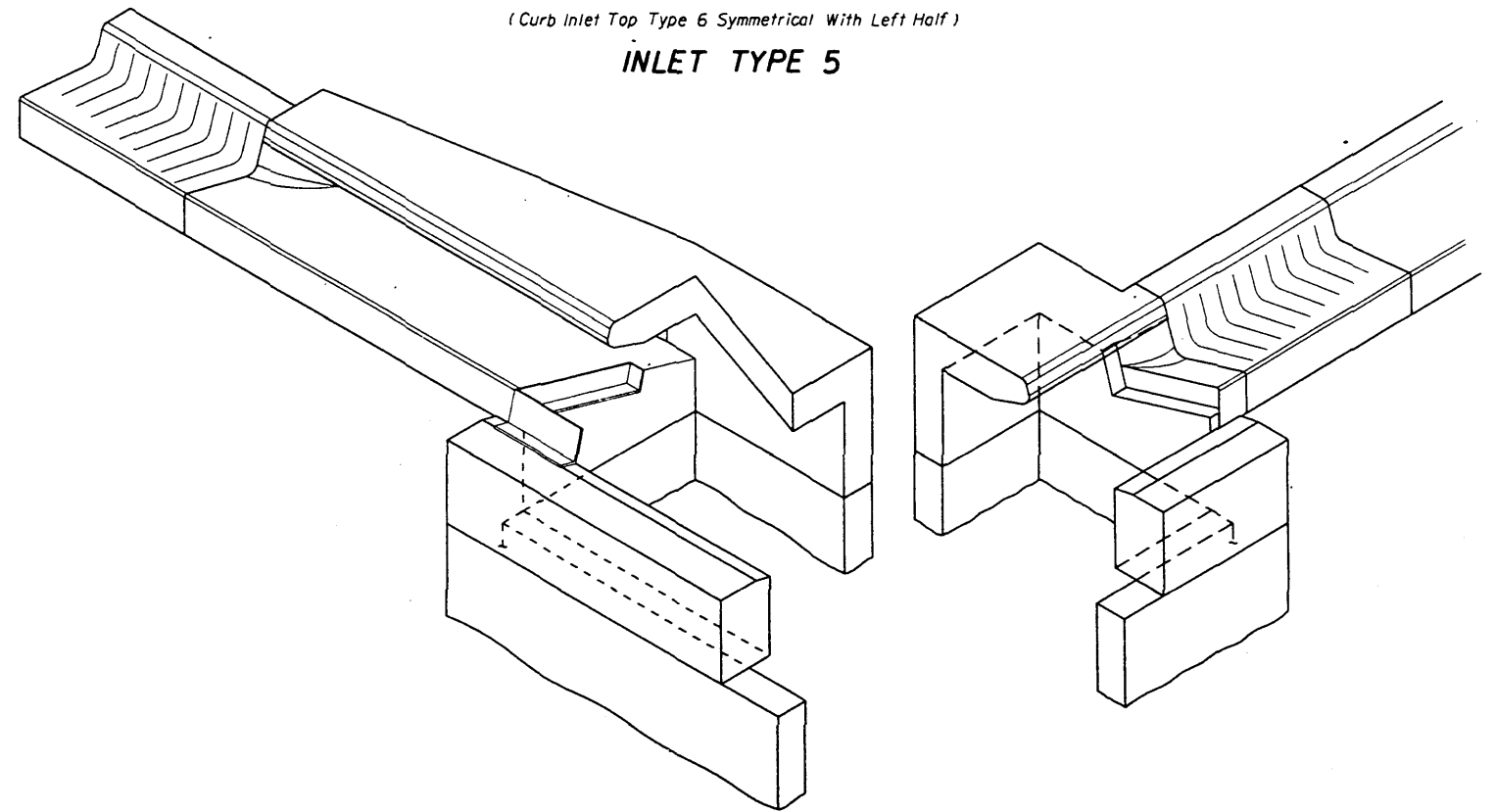
TOP VIEW



SECTION BB

(Curb Inlet Top Type 6 Symmetrical With Left Half)

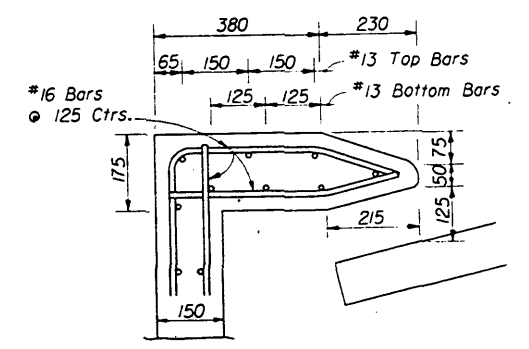
**INLET TYPE 5**



SKETCHES SHOWING FRAME SEAT AND THROAT RECESS

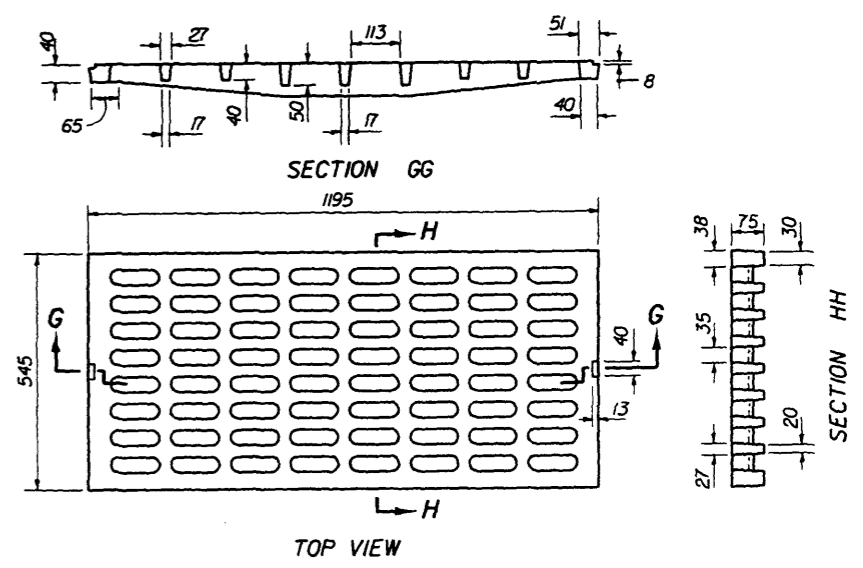
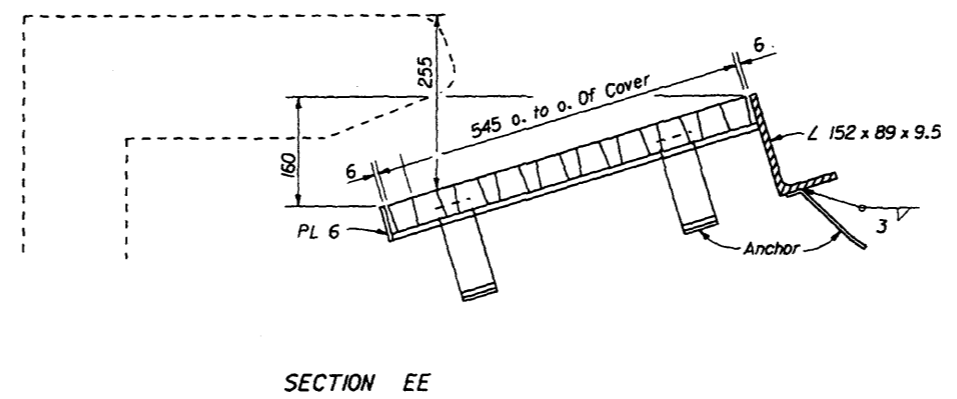
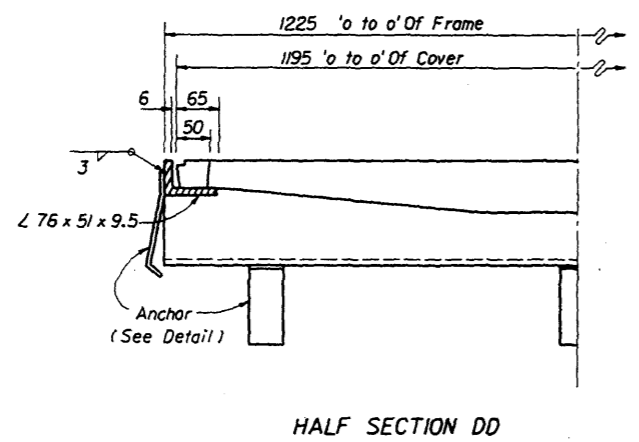
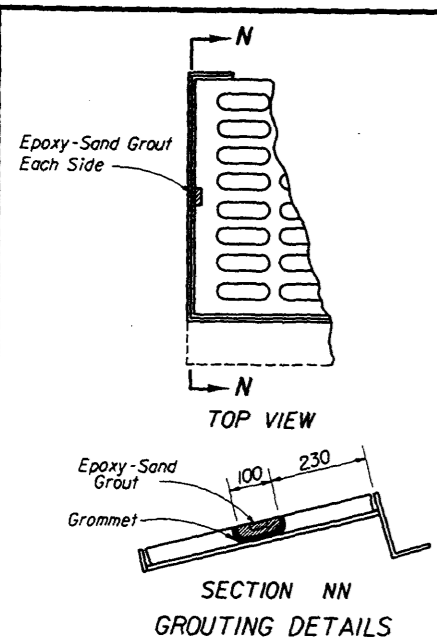
**GENERAL NOTES**

1. The finished grade and slope of the inlet tops are to conform with the finished cross slope and grade of the proposed sidewalk and/or parkway.
2. When inlets are to be constructed on a curve, refer to the plans to determine the radius and, where necessary, modify the inlet details accordingly. Bend steel when necessary.
3. All reinforcing steel shall have 30 mm minimum cover unless otherwise shown. Inlet tops shall be either cast-in-place or precast concrete.
4. Precasting of this inlet top will be permitted. Precast units shall conform to the dimensions shown or in accordance with approved shop drawings. Request for shop drawing approval shall be directed to the State Drainage Engineer.
5. Concrete meeting the requirements of A.S.T.M. C 478M (27579 kPa) may be used in lieu of Class I concrete for precast units, manufactured in plants which are under the Standard Operating Procedures for the inspection of precast drainage products.
6. The corner fillets shown for rectangular throats are necessary only when throats are to be used in conjunction with circular inlet bottoms or when used on skew with rectangular inlet boxes.
7. For inlet bottoms see Index No. 200.
8. These inlet tops are designed for use with standard curb and gutter Type E and Type F. Locate outside of pedestrian crosswalk where practical.
9. See Index 201 for supplemental details.
10. All steel used for frame and cover shall meet the requirements of ASTM A-36M.
11. Either cast iron covers or steel covers may be used. Iron covers shall be Class No. 30 castings in accordance with ASTM A-48M.
12. When Alternate "G" Cover is specified in plans either the cast iron cover and galvanized steel frame or the galvanized steel cover and frame must be used. Covers are to be grouted in accordance with the grouting detail shown on sheet 2 of 2, in lieu of tack welding.
13. Inlet to be paid for under the contract unit price for Inlets (Curb) (Type—), EA.

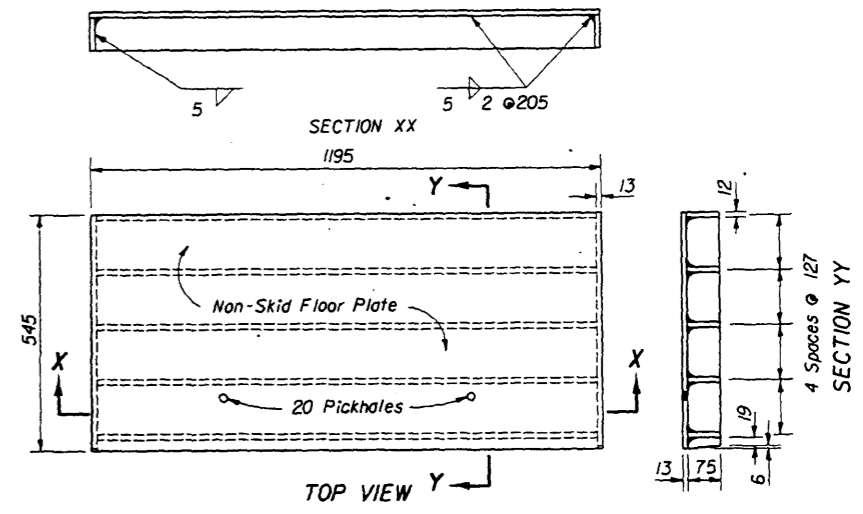
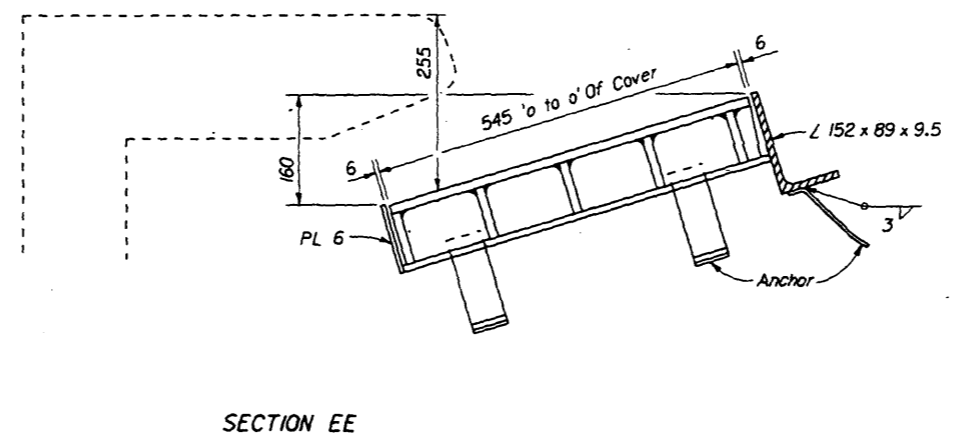
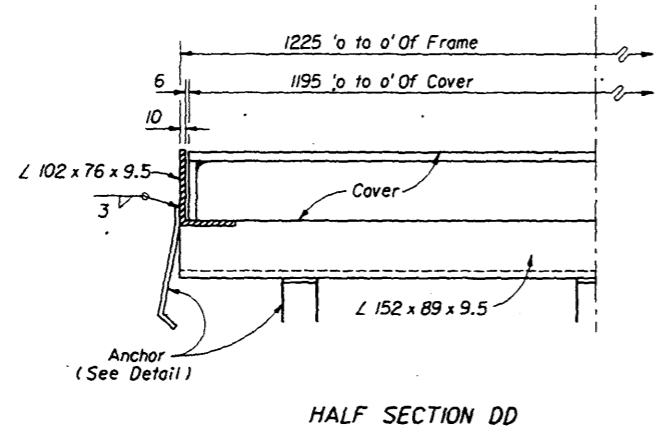
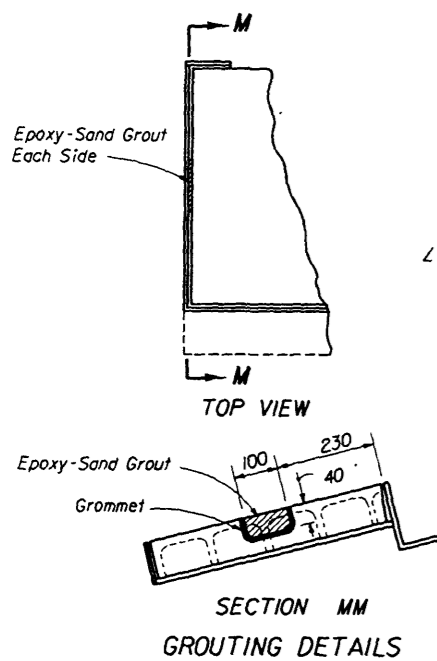


TOP MODIFICATION FOR TYPE E CURB

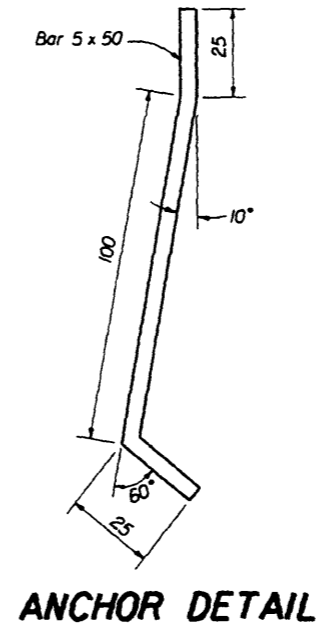
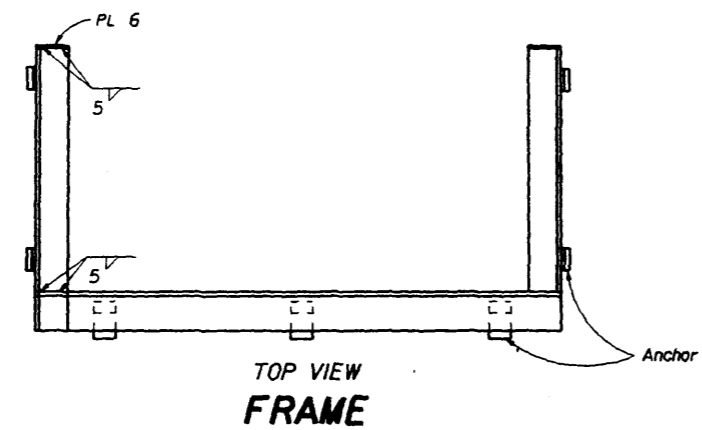
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CURB INLET TOPS TYPES 5 &amp; 6</b>				
Designed By	Names	Dates	Approved By <i>A. M. Lenoir</i> State Drainage Engineer	
Drawn By			Revision	Sheet No. 1 of 2
Checked By			98	211



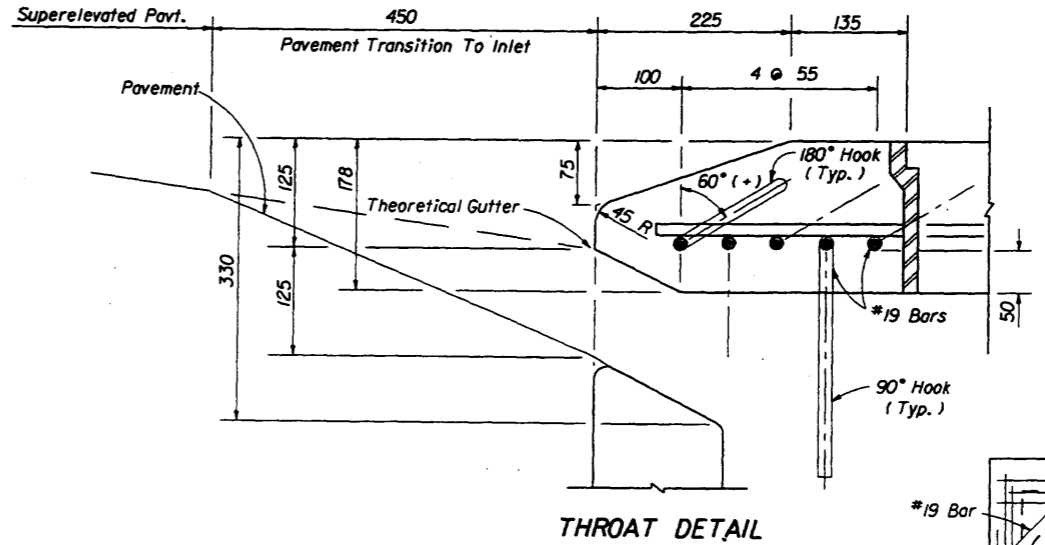
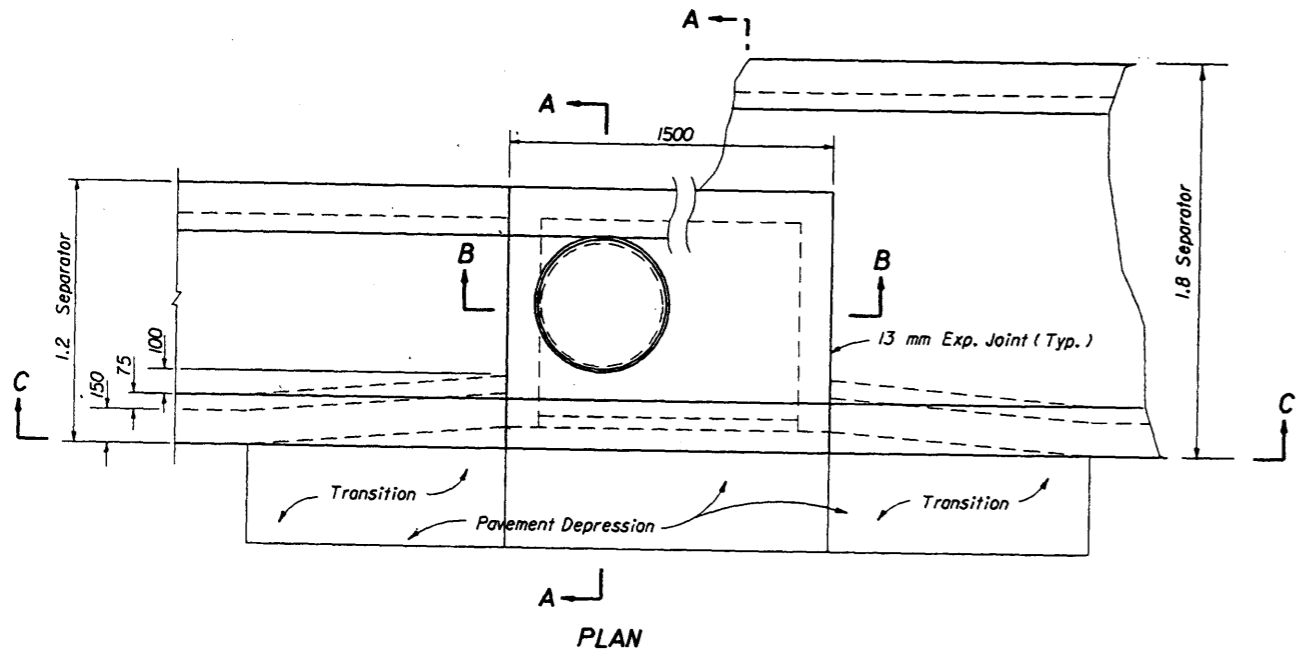
**CAST IRON COVER**



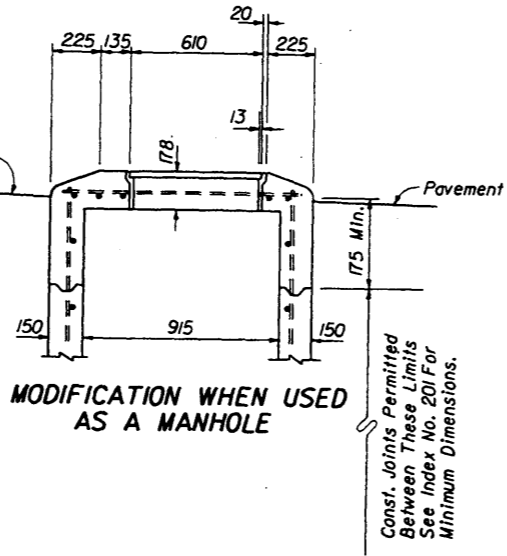
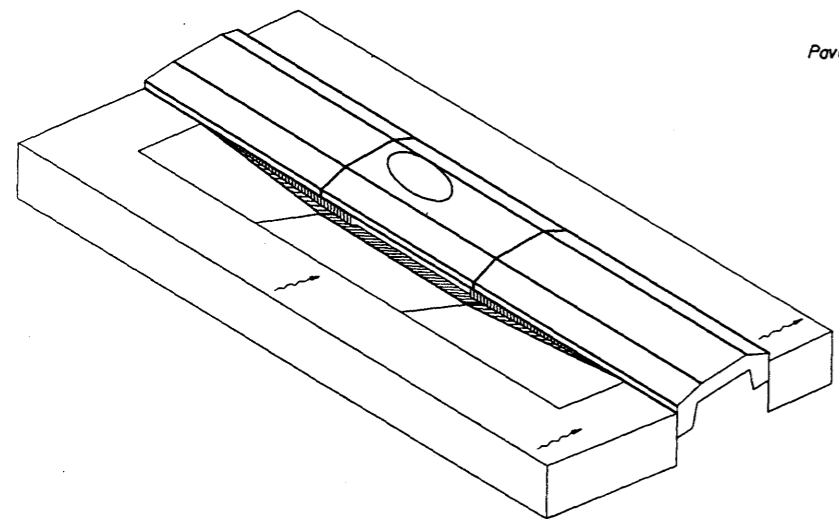
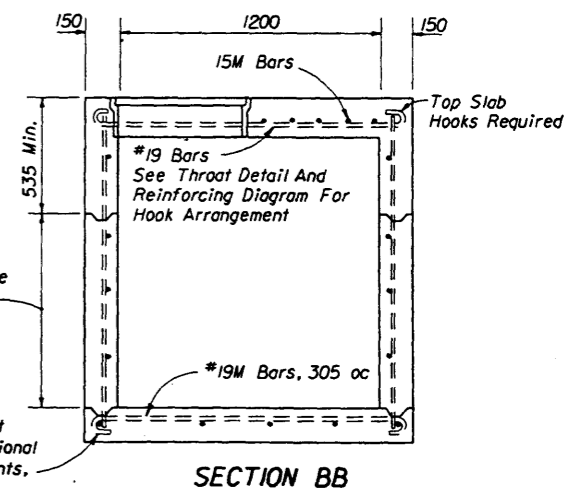
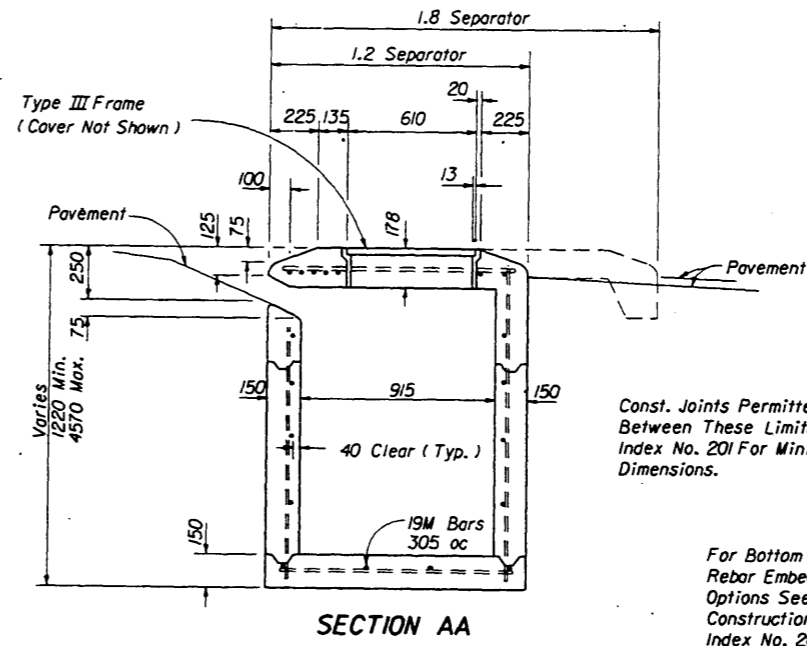
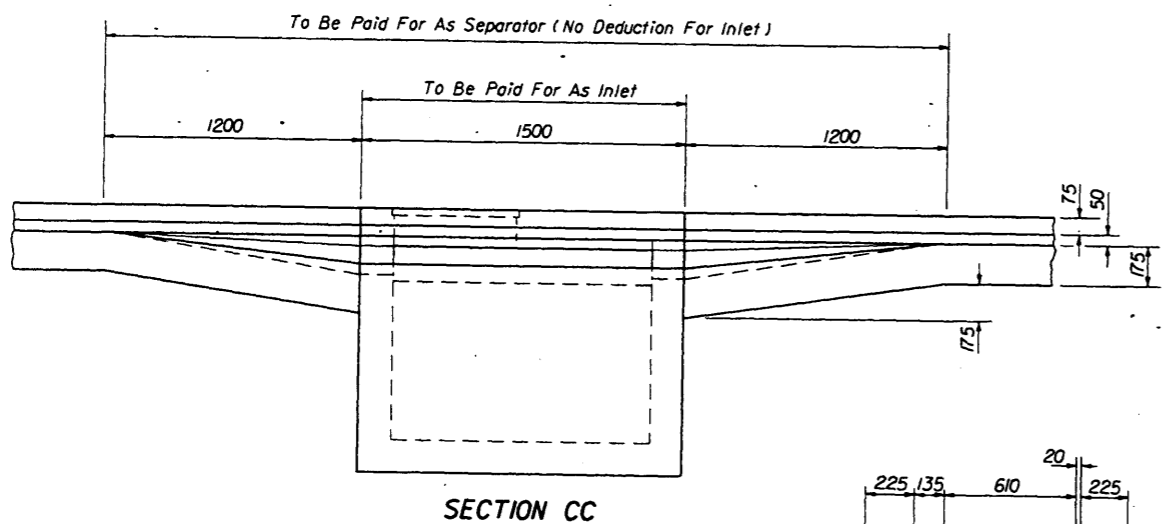
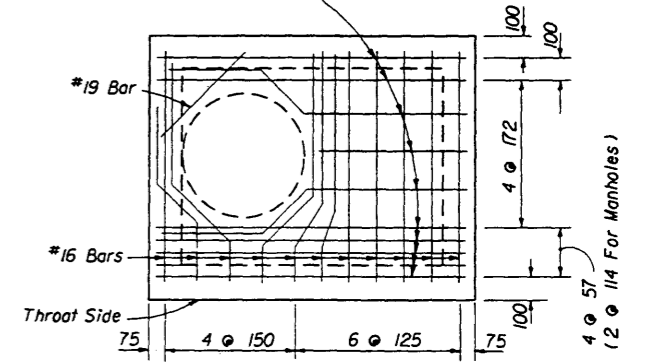
**STEEL COVER**



STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN			
<b>CURB INLET TOPS TYPES 5 &amp; 6</b>			
Names	Dates	Approved By <i>S. M. Lewis</i> State Drainage Engineer	
Designed By		Revision	Sheet No. Index No.
Drawn By		94	2 of 2 211
Checked By			



\*19 Bars  
 ACI Std. Hooks Required Each End Of  
 Straight Bars And Right End Of Bent  
 Bars: 180° Hooks, Canted 60° (+), On  
 Odd Bars; 90° Hooks, Down, On Even  
 Bars Numbered From Throat Side.



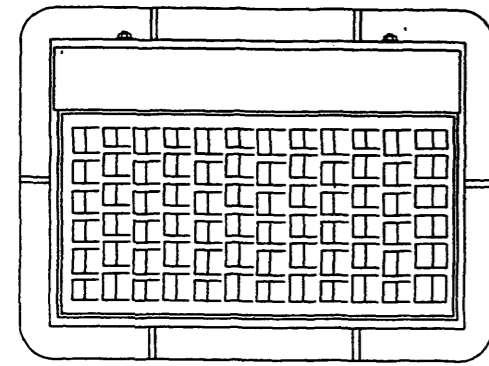
**GENERAL NOTES**

1. This inlet is used in Traffic Separators Types I and II; or, in separators constructed with Curbs Types A, B and E and sidewalk paving, which cannot accommodate Inlets Types 1, 2, 3, 4, 5 or 6. Use of this Inlet on through traffic side of the separator is not permitted in medians with Curbs Types A and B. Locate inlet outside of pedestrian cross traffic.
2. Reinforcing- #13 bars @ 455 mm centers unless otherwise noted. Cut or bend bars out of way of pipe when necessary. Bars to clear pipe by 40 min.
3. Recommended maximum pipe sizes are 600 mm longitudinal and 750 mm transverse. For larger pipe, inlets with Alt. B bottoms, Index No. 200 are recommended.
4. For supplementary details see Index No. 201.
5. Inlet to be paid for under the contract unit price for Inlets (Curb Type 7), EA.

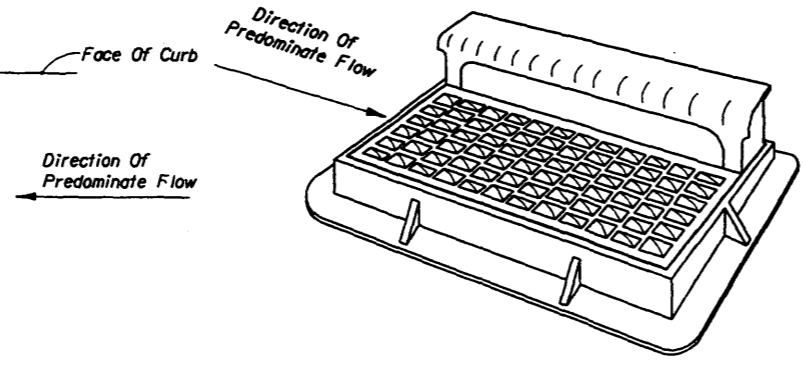
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CURB INLET TYPE 7</b>				
Designed By	EGR	08/01	Approved By	<i>J. M. Lewis</i> State Drainage Engineer
Drawn By	HSD	08/01	Revision	Sheet No. Index No.
Checked By	JC	08/01	98	1 of 1 212



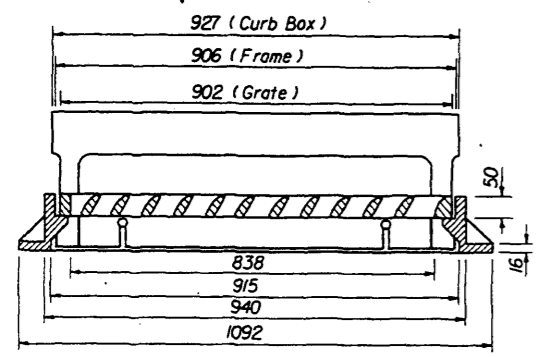




TOP VIEW

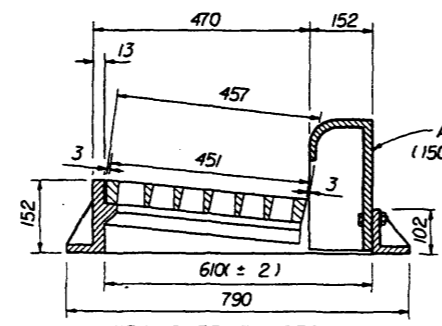


Direction Of Predominate Flow

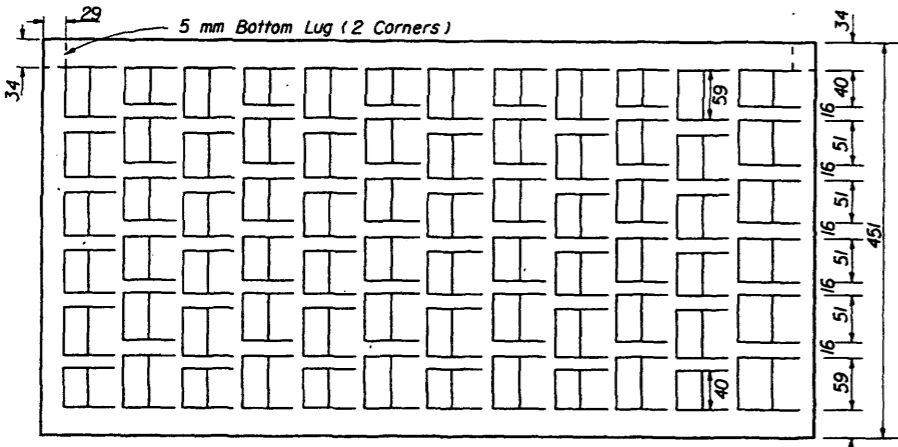


LONGITUDINAL SECTION

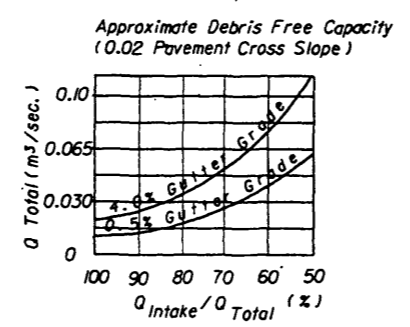
FRAME AND GRATE



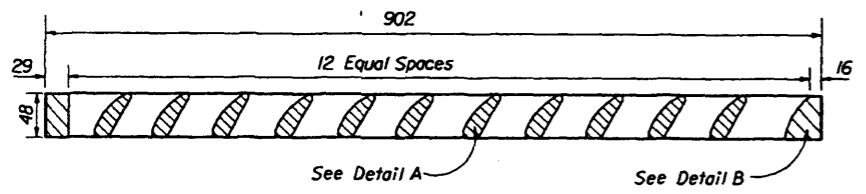
TRANSVERSE SECTION



TOP VIEW

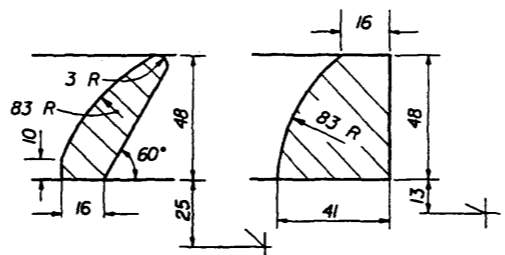


EFFICIENCY CURVE



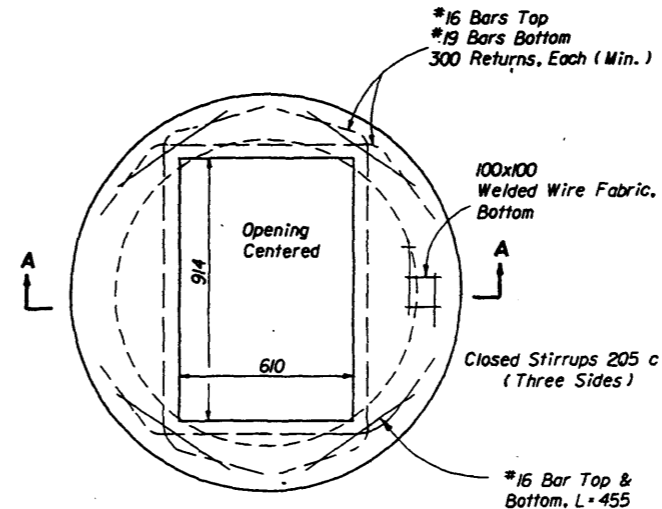
SECTION

GRATE DETAIL

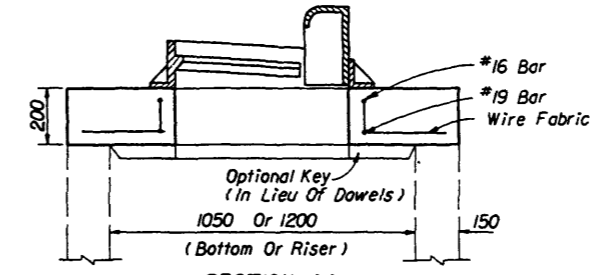


DETAIL A

DETAIL B

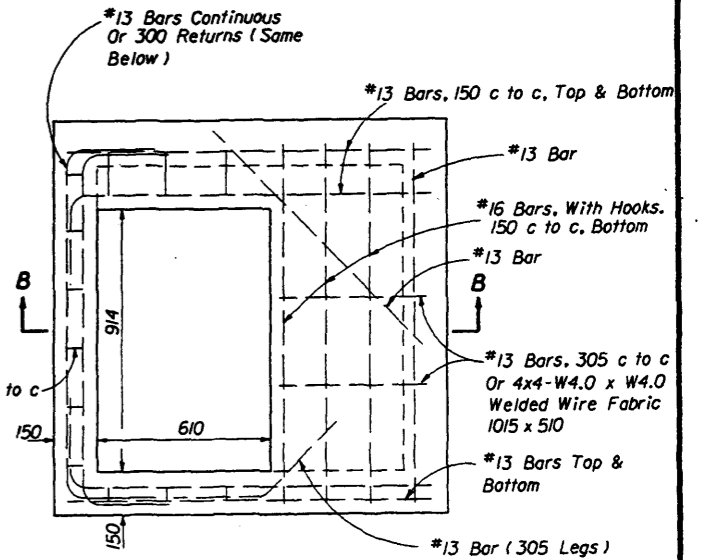


TOP VIEW

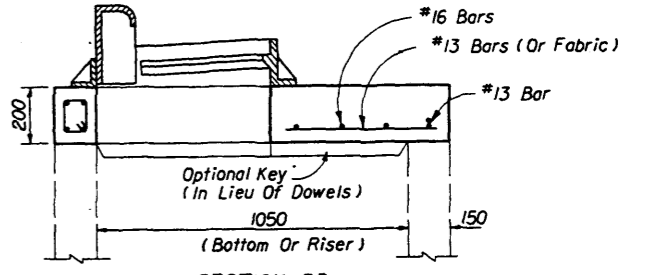


SECTION AA

(SEE NOTE 6 BELOW)



TOP VIEW



SECTION BB

(SEE NOTE 6 BELOW)

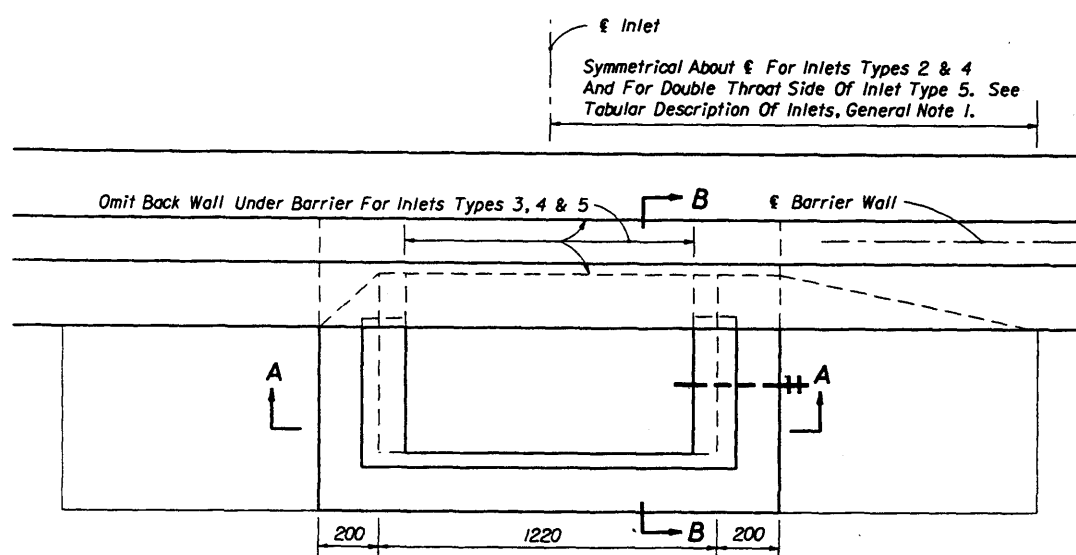
TOP SLABS

GENERAL NOTES

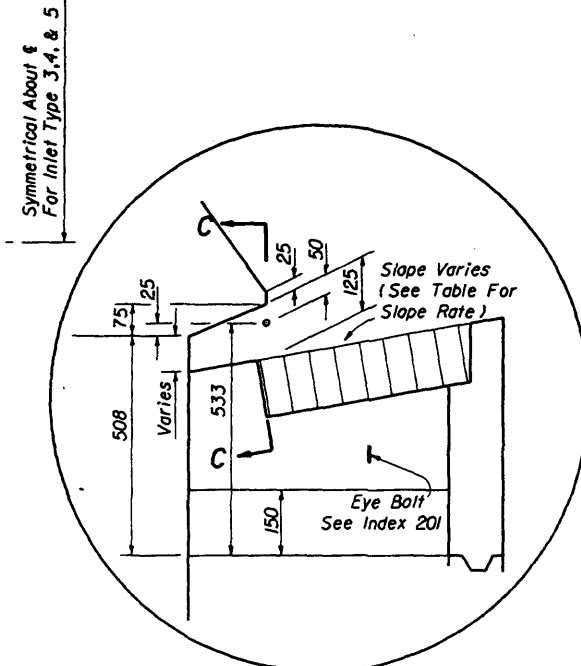
1. This inlet is primarily intended for locations with light to moderate flows where right of way does not permit the use of throated Curb Inlets Types 1 through 6. The typical application is on curb returns to city streets. The inlet grate is suitable for pedestrian and bicycle traffic.
2. This inlet to be located in vertical faced curbs such as Curb and Gutter Type F. Grate shall be oriented with vanes directed toward predominate flow. Inlet to be located outside pedestrian crosswalk where practical.
3. For structure bottoms see Index No. 200. For supplemental details see Index No. 201.
4. All steel in slab tops shall have 30 mm minimum cover unless otherwise shown. Tops shall be either cast-in-place or precast concrete.
5. For Alternate B applications, top slab openings shall be placed such that 2 edges of inlet frame will be located directly above bottom wall or riser wall.
6. When used on a structure with dimensions larger than those detailed above and risers are not applied, the top slab shall be constructed using Index 200 with the slab opening adjust to 610 mm x 915 mm. The "Special Top Slab" on Index 200 is not permitted.
7. Frame may be adjusted with one to six courses of brick.
8. Inlet and grate detail shown is U.S. Foundry USF 5130-6016. Vaned grates with approximately equal openings will be permitted that satisfy AASHTO H-20 loading. Inlet and grate shall be Class 30 castings in accordance with ASTM A 48M. Grates shall be reversible, right or left.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
CURB INLET TOP TYPE 9					
Names	Dates	Approved By			
Designed By	EGR	 State Drainage Engineer			
Drawn By	HSD				
Checked By	JVC	Revision	98	Sheet No.	1 of 1
				Index No.	214



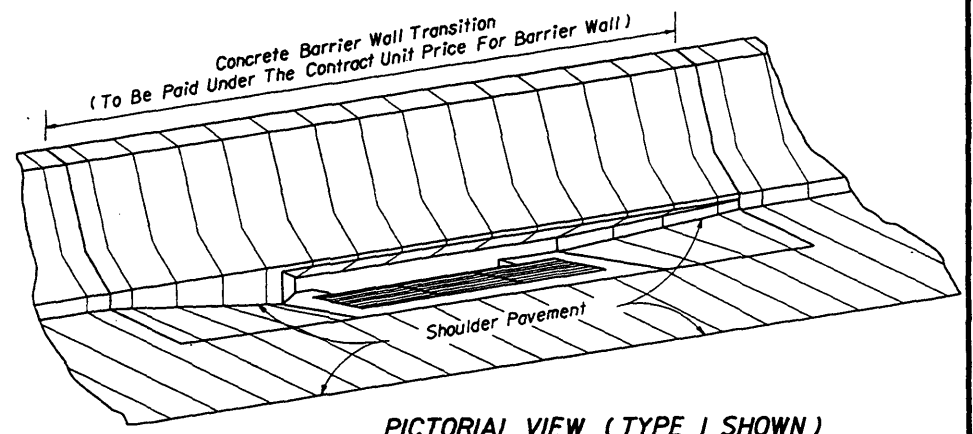


PLAN (INLETS TYPES 1 THRU 5)

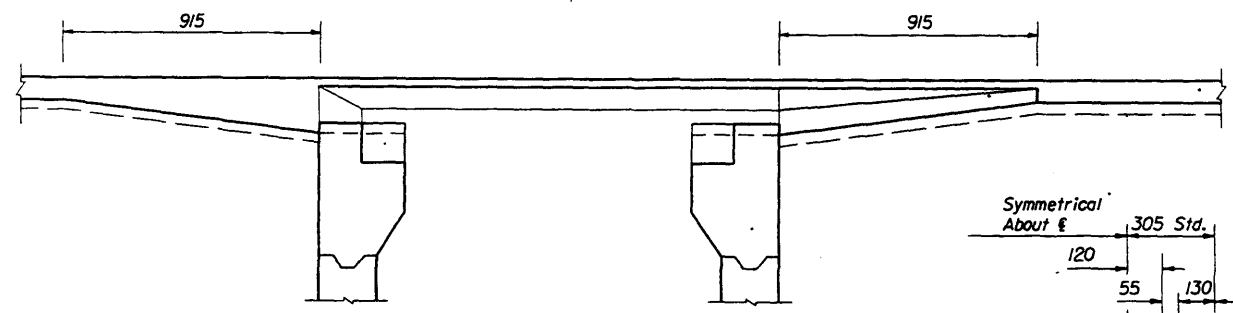


INSET A

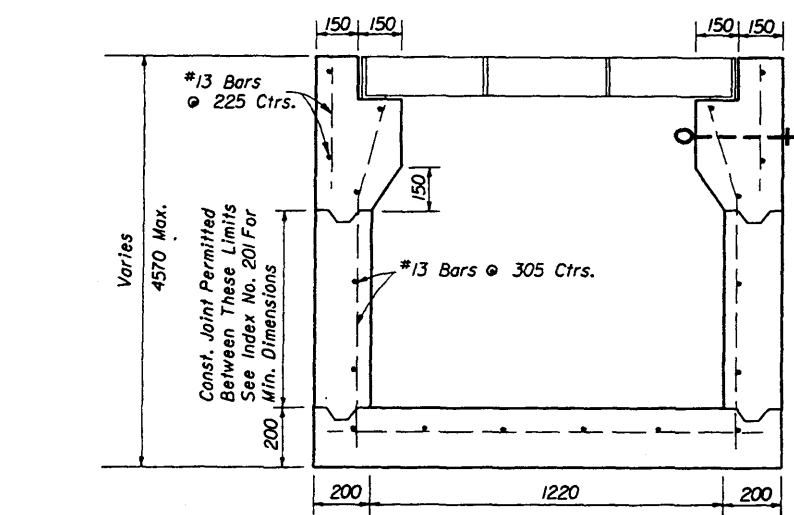
GRATE SLOPE		
Shoulder Slope	Grate Slope Rate	Remarks
	0.03	1: 6.7 Std. Med. Conc. Shldr.
	0.05	1: 6 Std. Med. Flex. Shldr.
	0.06	1: 5.6
	0.07	1: 5.2
	0.08	1: 5
	0.09	1: 4.7
	0.10	1: 4.5 e (max)



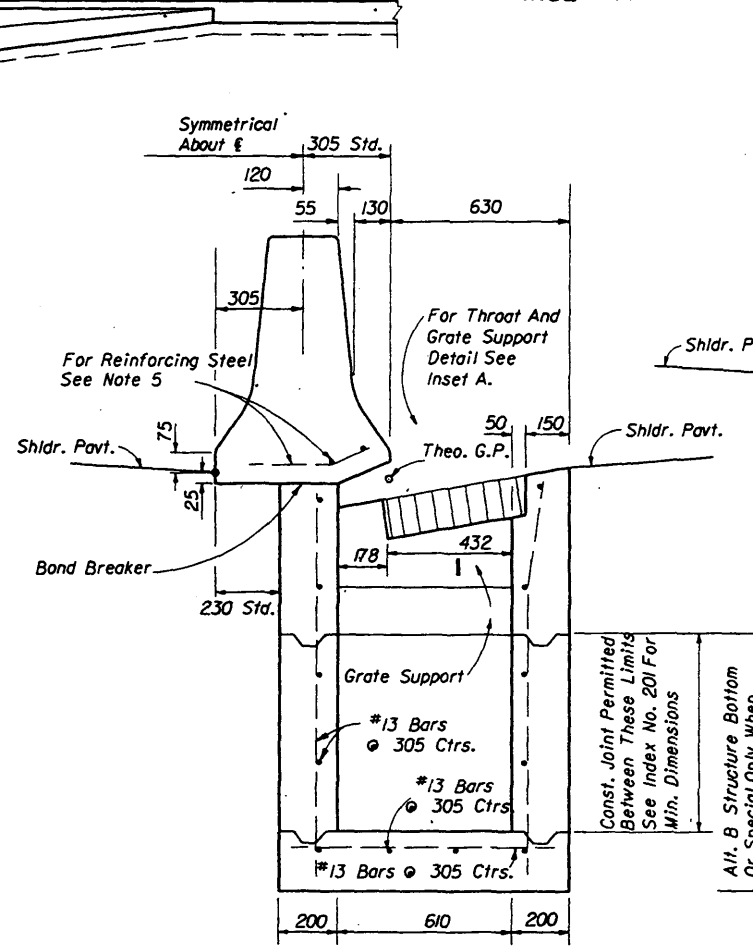
PICTORIAL VIEW (TYPE 1 SHOWN)



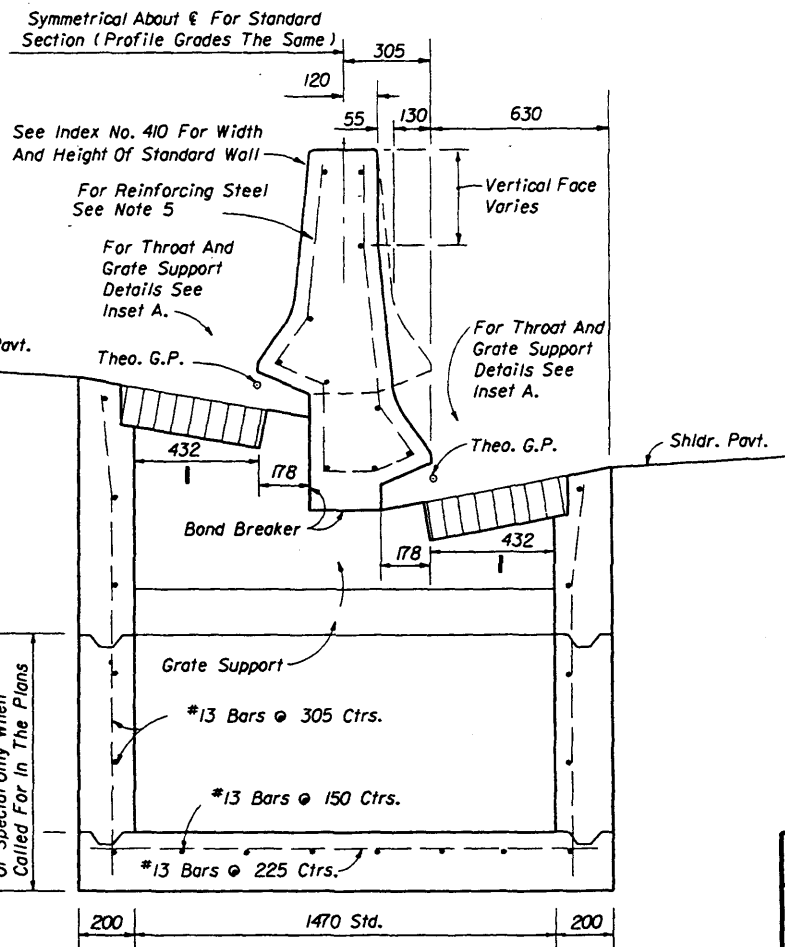
SECTION CC



SECTION AA



SECTION (INLETS TYPES 1 & 2)



SECTION (INLETS TYPES 3, 4 & 5) (NON-SYMMETRICAL SECTION SHOWN)

GENERAL NOTES

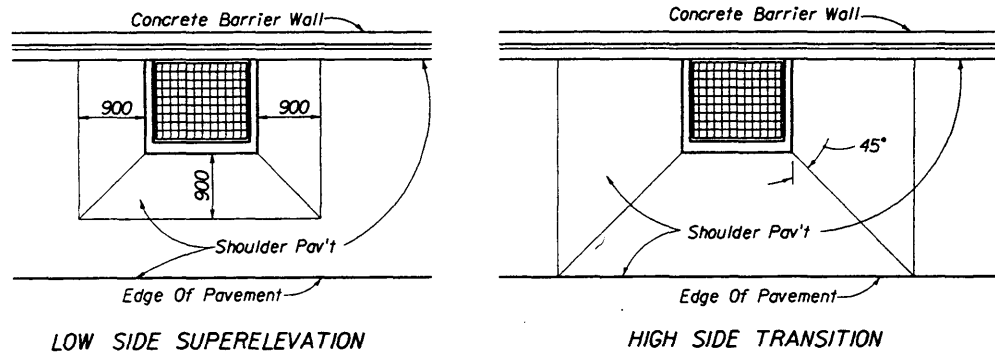
- Inlet Descriptions:  
 Type 1 Single throat, one side of barrier wall.  
 Type 2 Double throats, one side of barrier wall.  
 Type 3 Two single throats, opposite sides of barrier wall.  
 Type 4 Two double throats, opposite sides of barrier wall.  
 Type 5 Double throats, one side of barrier wall, and single throat other side of barrier wall.
- For grate details see Index No. 220. The parallel bar grate shall be used unless the reticuline grate is called for in the plans. The reticuline grate shall be specified where bicycle traffic is anticipated.
- For standard concrete barrier wall dimensions, and for dimensions of concrete barrier wall incorporating light standards within the wall, see Index No. 410.
- Reinforcing steel shall have 50 mm minimum cover.
- All reinforcing steel #13 bars. Longitudinal steel bars extend over full length of concrete barrier wall transition. Tie bars @ 305 mm ctrs. Reinforcing to be paid for under the contract unit price for Barrier Wall Conc., MI.
- For supplemental details see Index No. 201.
- Inlets to be paid for under the contract unit price for Inlets (Median Barrier Type \_\_\_) EA. Barrier wall to be paid for under the contract unit price for Barrier Wall Conc., MI.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

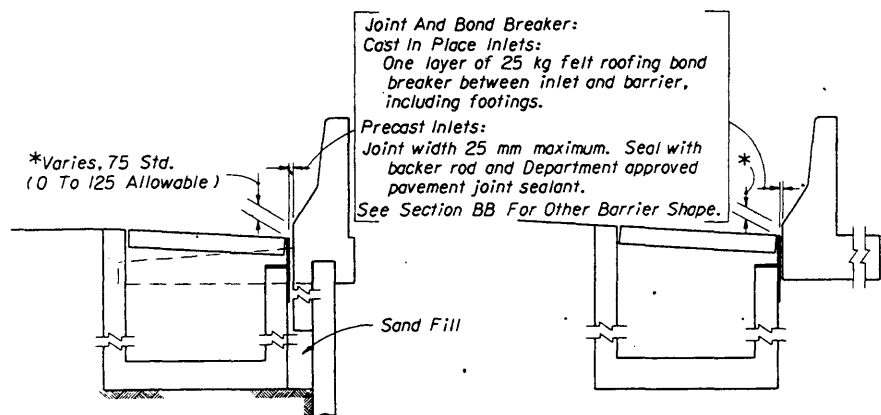
MEDIAN BARRIER INLETS  
TYPES 1, 2, 3, 4 & 5

Designed By	Names	Dates	Approved By		
Drawn By	HSD	06/83	A. W. Lemoine State Drainage Engineer	Revision	Sheet No.
Checked By	JMG/JBW	07/83		98	1 of 1

SECTION BB

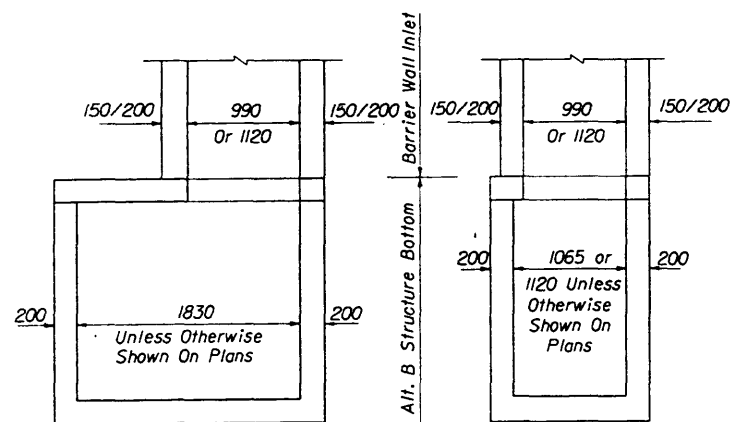


**PAVEMENT WARP FOR SHOULDERS IN SUPERELEVATION**



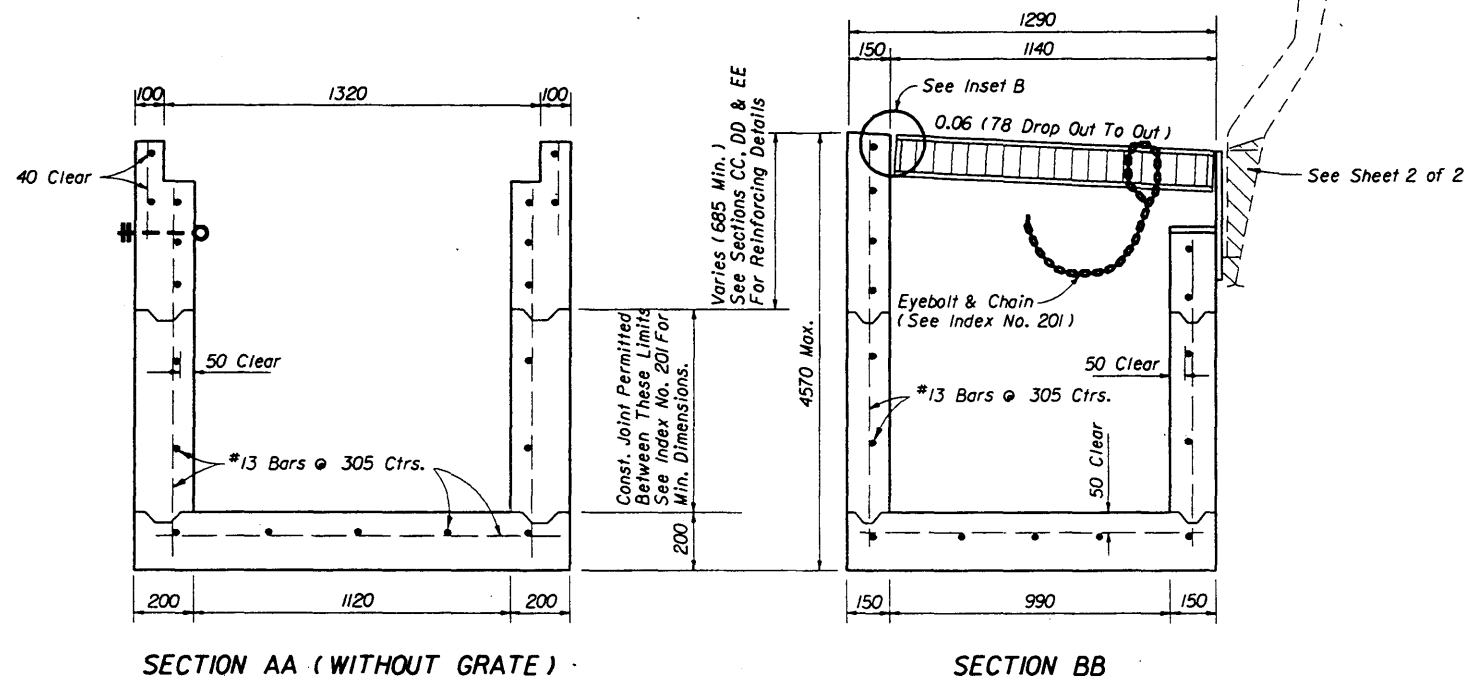
**BARRIER WALL / RETAINING WALL SINGLE FACE ROADWAY BARRIER**

**INLET SECTION AT WALLS**



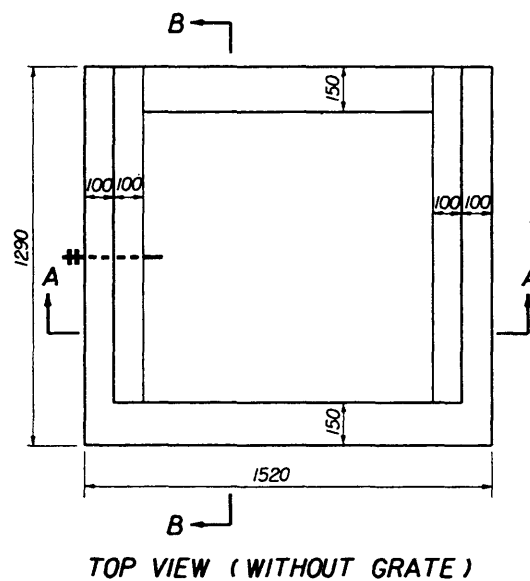
Note: Alt. B Structure Bottom Only. See Index No. 200. See index no. 200 for structure bottom details and hole reinforcement.

**INLET WITH STRUCTURE BOTTOM**

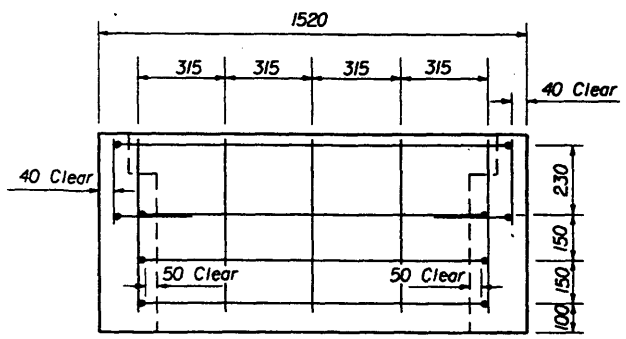


**GENERAL NOTES**

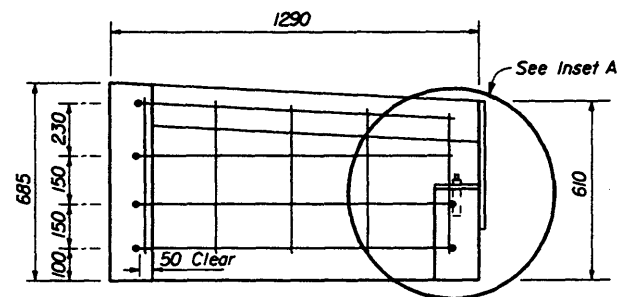
1. This inlet is primarily intended for use adjacent to concrete barrier walls on paved shoulders. Use of the inlet adjacent to other wall types shall be approved by the Drainage Engineer. The inlet is suitable for bicycle and occasional pedestrian traffic. It is not intended for use in curb and gutter or other areas where throated inlets are required, nor areas subject to high debris.
2. Inlets located in embankments constructed with earth anchored retaining wall shall be designed with minimum depths to reduce adverse impact on the anchorage system. Runs of pipe parallel to and near anchored wall shall be avoided wherever practical. Special coordination must be exercised during the design and construction of storm water systems within anchored wall systems.
3. Inlet bottoms and/or tops may be either precast or cast-in-place. Whether cast as a single unit or as multiple segments, and whether precast or cast-in-place, the upper 685 mm of the inlet shall be reinforced in accordance with sections CC, DD and EE.
4. Exposed edges shall be chamfered 20 mm.
5. When Alternate G grate is specified in the plans, the grate is to be hot dipped galvanized after fabrication. Field installation of the filler bar called for in Inset B will not be permitted, thereby requiring tolerance adjustment during fabrication and/or casting, or, matching grate to structure prior to galvanizing.
6. For supplemental details see Index Nos. 200 and 201.
7. Inlets to be paid for under the contract unit price for Inlets (Barrier Wall), EA.



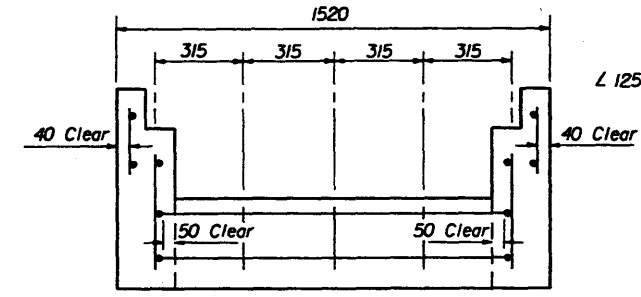
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>BARRIER WALL INLET</b>					
Names	Dates	Approved By <i>A.M. Lemoine</i>			
Designed By JVG/EGR	09/86	State Drainage Engineer			
Drawn By MSD	09/86	Revision	Sheet No.	Index No.	
Checked By JVG	09/86	98	1 of 2	218	



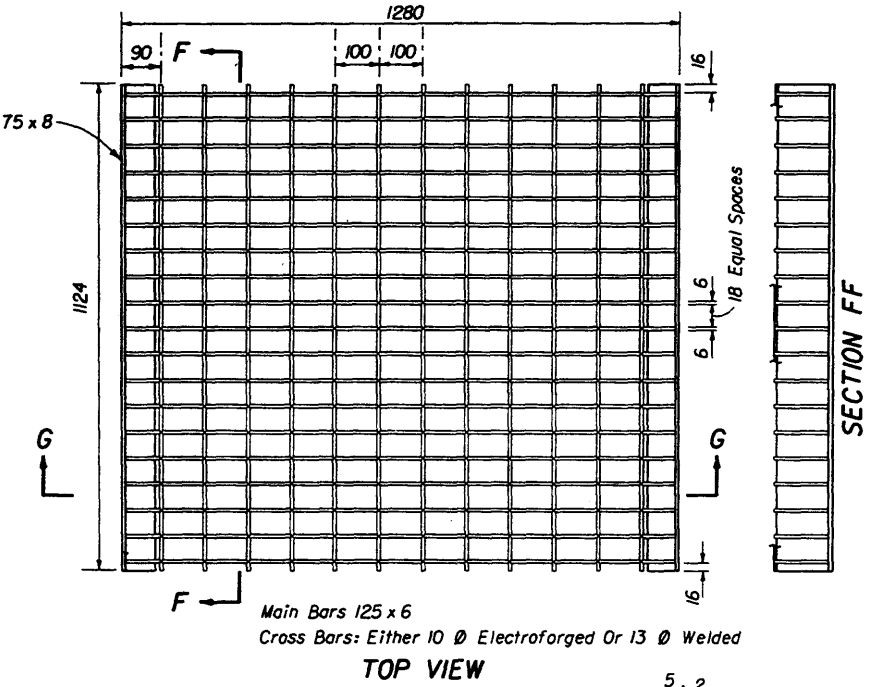
SECTION CC



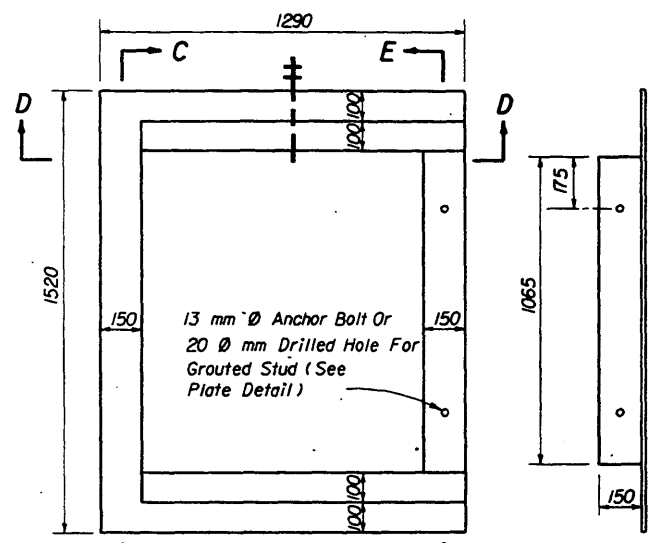
SECTION DD



SECTION EE

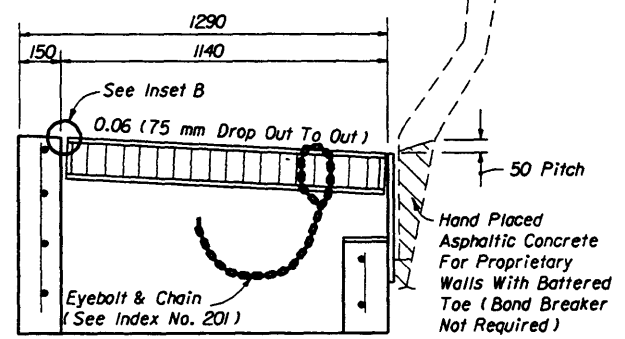


TOP VIEW

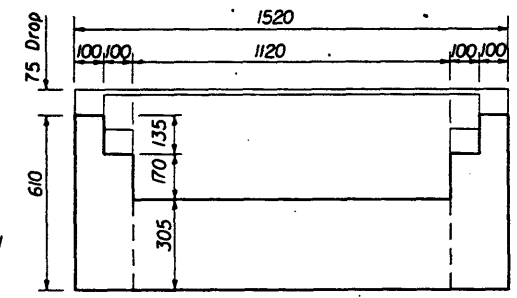


TOP VIEW OF INLET WITHOUT GRATE

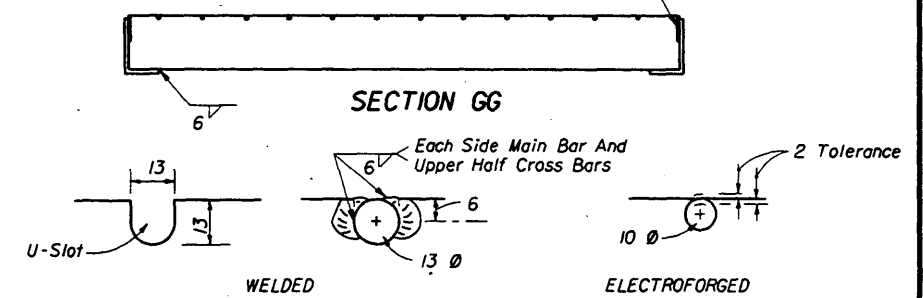
TOP VIEW OF METAL PLATE



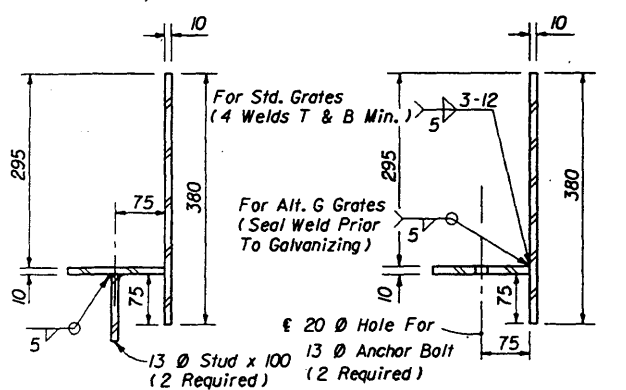
TRANSVERSE SECTION WITH GRATE & PLATE



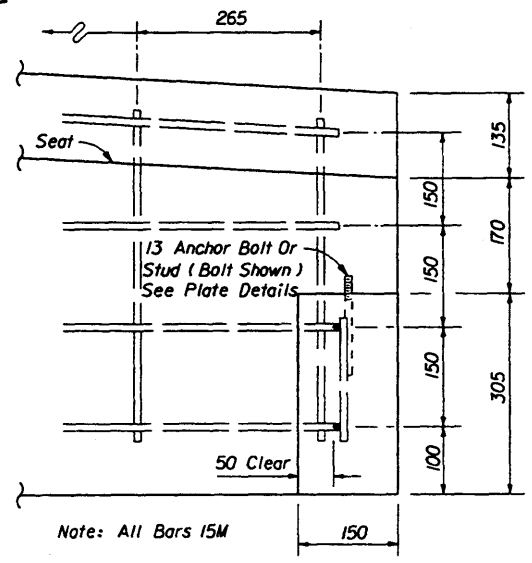
BACK VIEW WITHOUT BACK PLATE



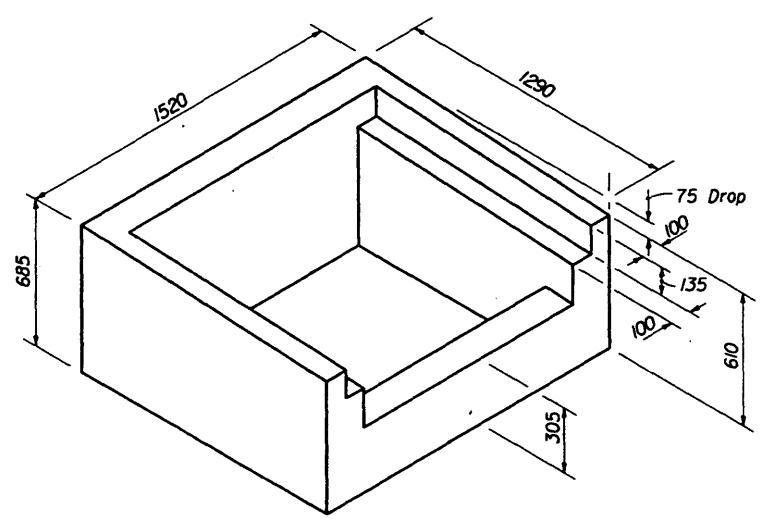
CROSS BAR OPTIONS STEEL GRATE



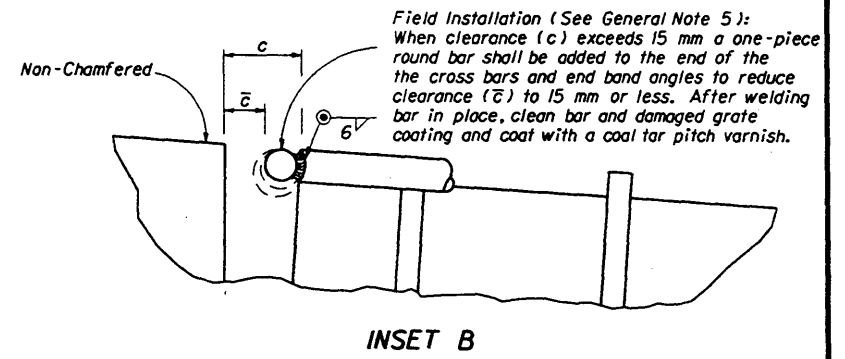
TRANSVERSE SECTIONS THRU BACKWALL PLATE



INSET A

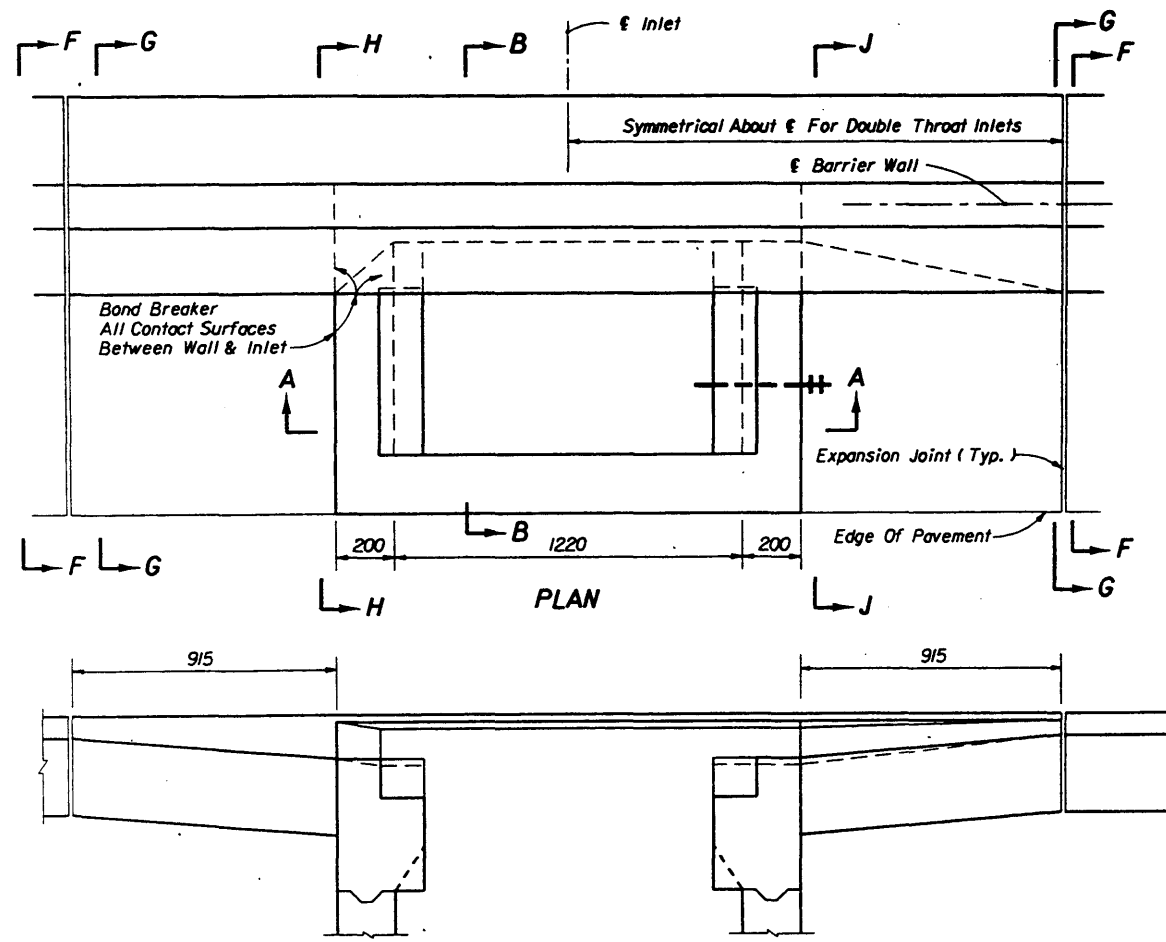


PICTORIAL VIEW

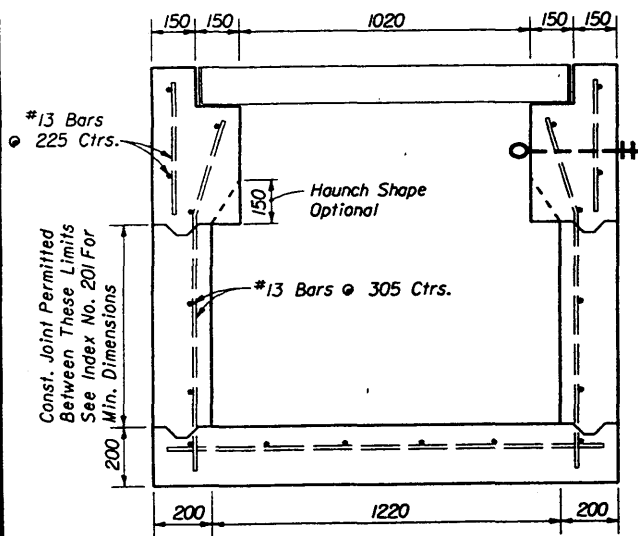


INSET B

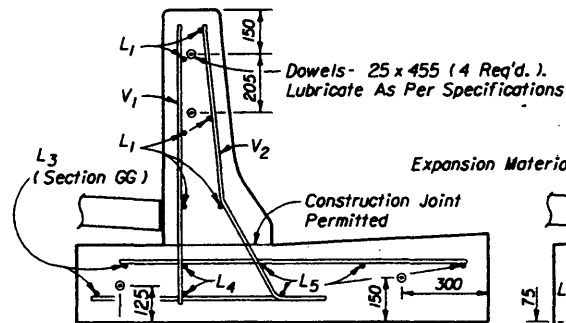
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>BARRIER WALL INLET</b>				
Designed By	JMG/EGR	09/06	Approved By	<i>A.D. McE Moore</i>
Drawn By	HSD	09/06	Revision	98
Checked By	JMG	09/06	Sheet No.	2 of 2
			Index No.	218



SECTION CC

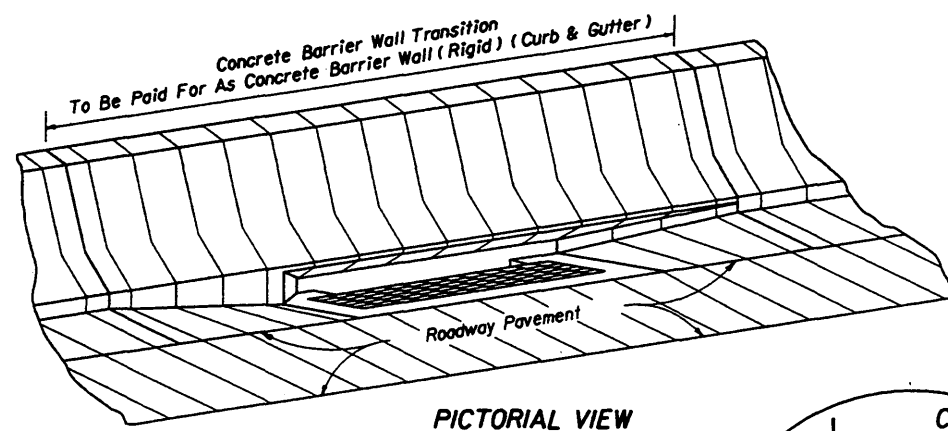


SECTION AA

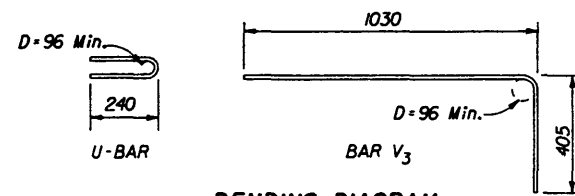


Note: For SECTION FF and additional details see Index No. 410, 'CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER)'

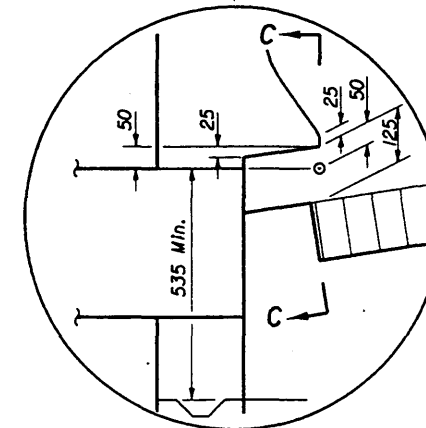
SECTION FF & GG



PICTORIAL VIEW

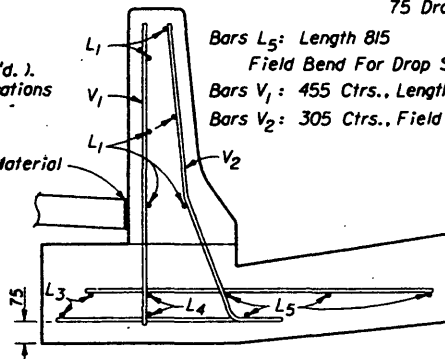


BENDING DIAGRAM

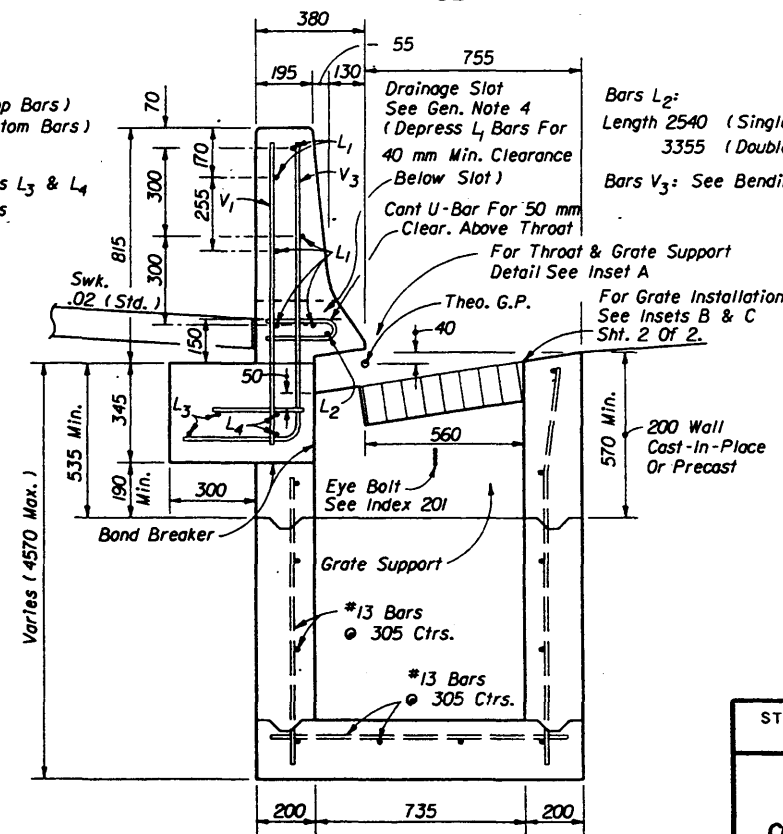


INSET A

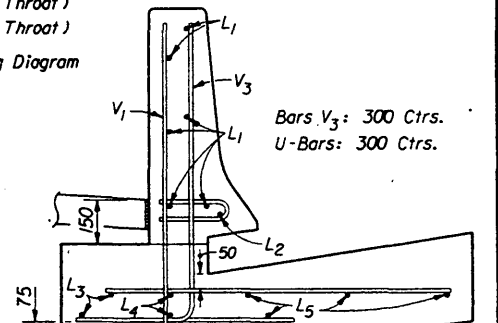
Bars L<sub>1</sub>: Length 13380, Straight  
 Bars L<sub>3</sub> & L<sub>4</sub>: Length 3380  
 Field Bend For 100 Drop (Top Bars)  
 75 Drop (Bottom Bars)  
 Bars L<sub>5</sub>: Length 815  
 Field Bend For Drop Same As L<sub>3</sub> & L<sub>4</sub>  
 Bars V<sub>1</sub>: 455 Ctrs., Length Varies  
 Bars V<sub>2</sub>: 305 Ctrs., Field Bend



SECTION HH



SECTION BB



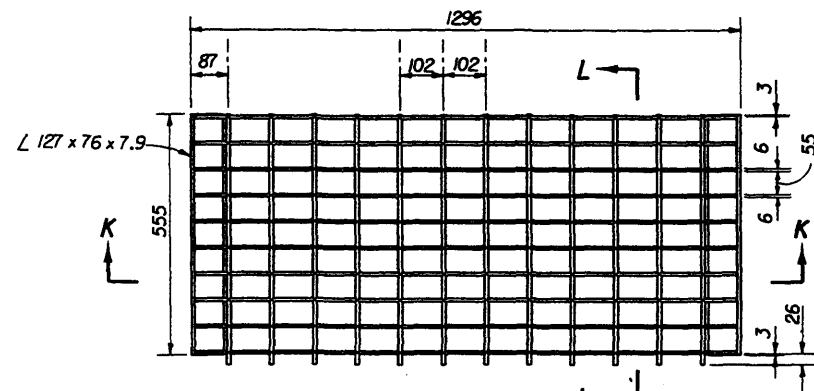
SECTION JJ

Note: Replaces Section HH for double throat inlet.

GENERAL NOTES

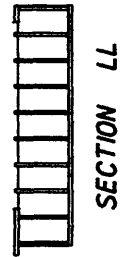
1. This inlet to be used in conjunction with Concrete Barrier Wall (Rigid) (Curb & Gutter), Index No. 410.
2. All Concrete Barrier Wall reinforcing steel #13 bars. Reinforcing shall have 50 mm min. cover unless otherwise shown. Cast to be included in the cast for barrier wall.
3. Barrier wall shall be Class II concrete, finished in accordance with Index No. 410.
4. A flat 455 mm x 65 mm drainage slot shall be constructed at the inlet centerline when the inlet is located in a curb sag. No more than one V<sub>1</sub> bar, one V<sub>3</sub> bar and one U-bar are to be deleted for construction of the drainage slot.
5. For supplemental details see Index Nos. 201, 209 and 410.
6. Recommended maximum pipe sizes are 450 mm longitudinal and 750 mm transverse. For larger pipe, use Alt. B bottoms, Index No. 200.
7. Grates can be fabricated with reticuline bars or with either 10 mm Ø electroforged or 73 mm Ø welded cross bars and full depth bars as detailed.
8. When Alternate G grate is specified in plans, the grate is to be hot dipped galvanized after fabrication.
9. For pay item purposes the height of the structure shall be computed using the theoretical gutter elevation, less the flow line elevation of the lowest pipe or to top of sump floor.
10. Inlets to be paid for under the contract unit price for Inlets (Barrier Wall Rigid Curb & Gutter), EA.  
 Barrier wall to be paid for under the contract unit price for Barrier Wall Conc. (Rigid-Curb & Gutter), MI.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>BARRIER WALL INLET</b> CONCRETE BARRIER WALL (RIGID) (C & G)				
Designed By	EGR/JMG	9/89	Approved By	<i>A. McSweeney</i> State Drainage Engineer
Drawn By	JBW	9/89	Revision	Sheet No.
Checked By	EGR/JMG	9/89	98	1 of 2
				Index No. <b>219</b>

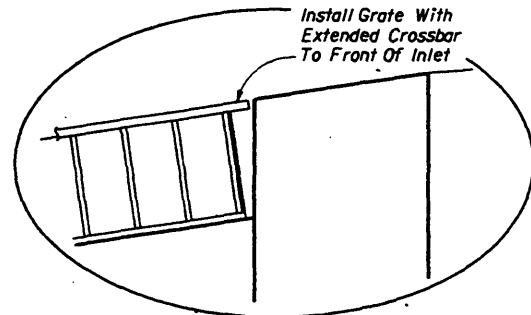


Main Bars 125 x 6  
 Cross Bars = Either 10 Ø Electroforged Or 13 Ø Welded

PLAN

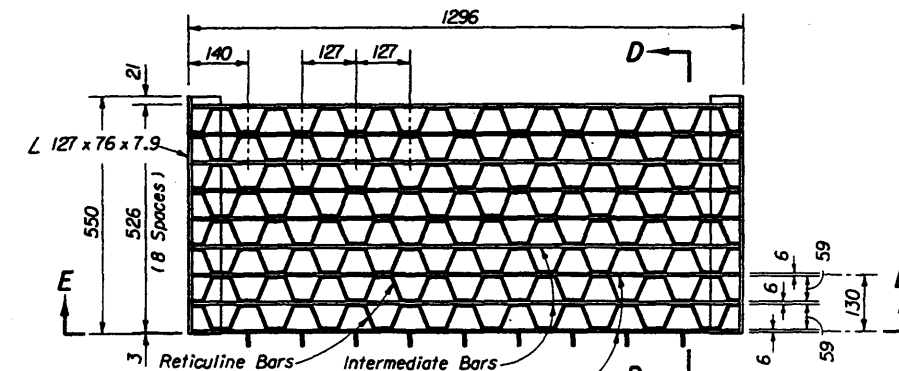


SECTION LL



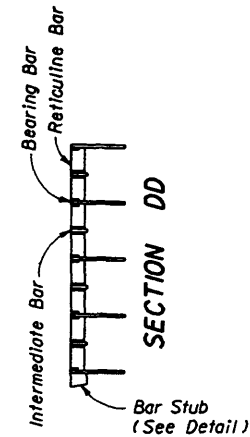
INSET B

Install Grate With  
 Extended Crossbar  
 To Front Of Inlet

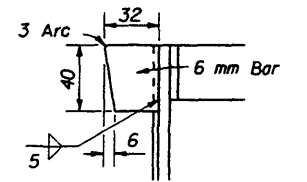


Reticuline Bars 30 x 5  
 Intermediate Bars 40 x 6  
 Bearing Bars 125 x 6

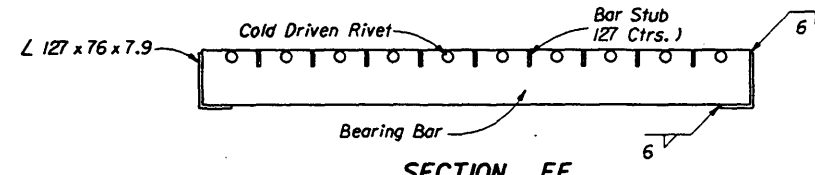
PLAN



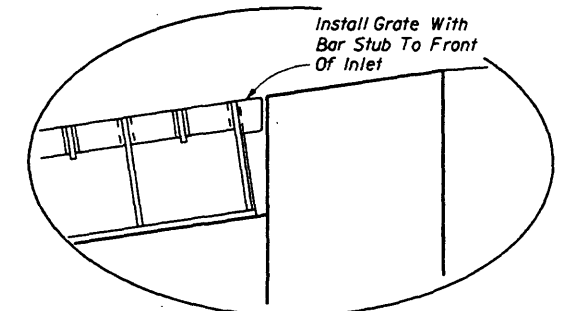
SECTION DD



BAR STUB

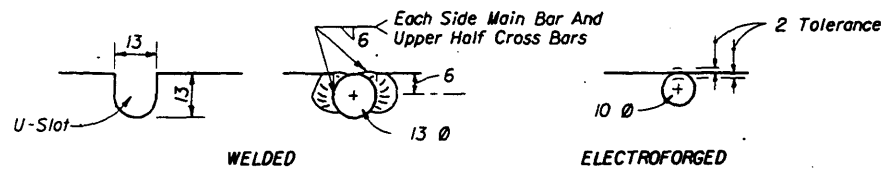


SECTION EE



INSET C

Install Grate With  
 Bar Stub To Front  
 Of Inlet



CROSS BAR OPTIONS

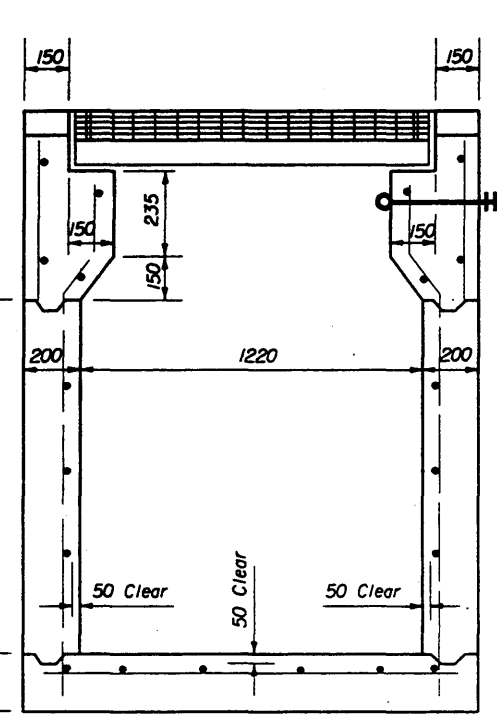
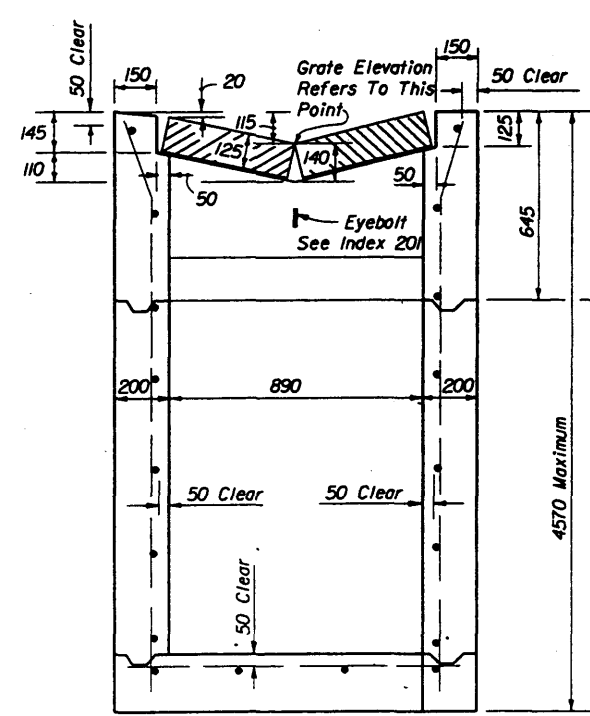
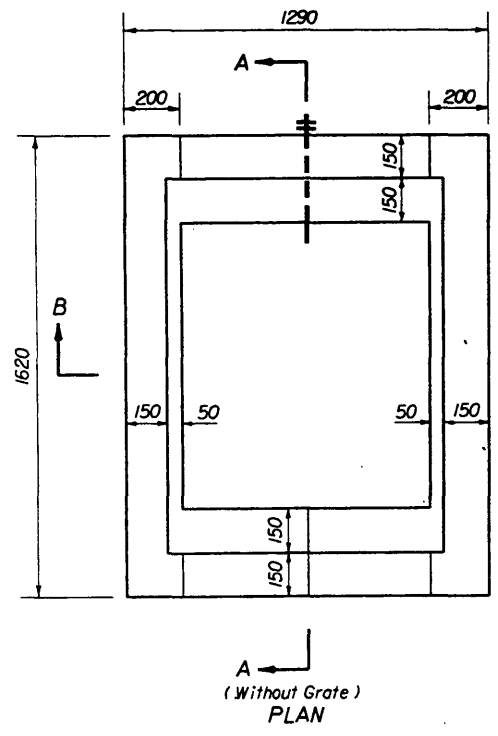
CROSS BAR

RETICULINE

OPTIONAL STEEL GRATES

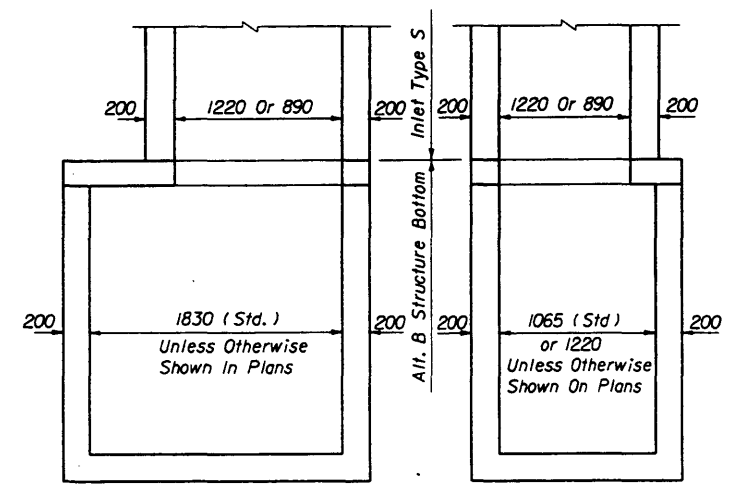
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>BARRIER WALL INLET</b> CONCRETE BARRIER WALL (RIGID) (C & G)				
Designed By	EGR/MC	9/89	Approved By	<i>A. D. McLenore</i> State Drainage Engineer
Drawn By	JBW	9/89	Revision	Sheet No. Index No.
Checked By	EGR/MC	9/89	94	2 of 2 219



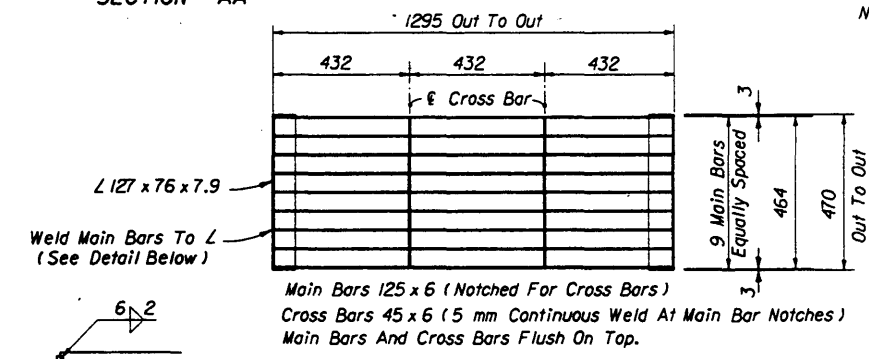
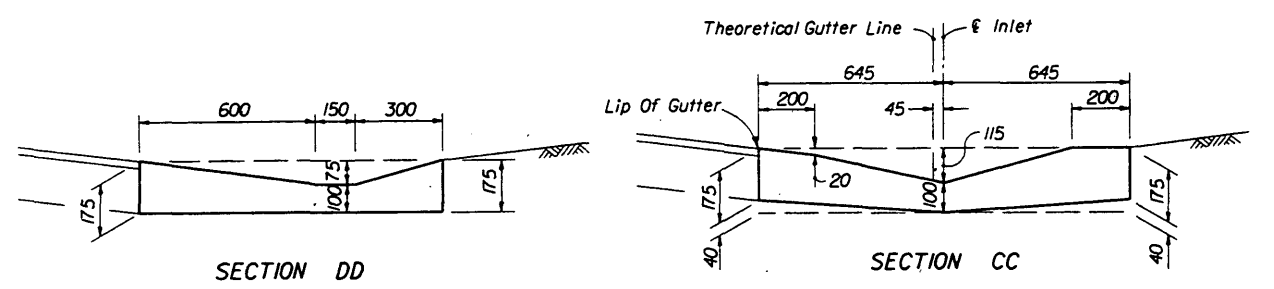


RECOMMENDED MAXIMUM PIPE SIZES	
INLET INSIDE WIDTH (mm)	PIPE SIZE (mm)
890	600
1220	900

Note: Recommended sizes are for concrete pipe. Sizes for other types of pipe must be verified for fit in accordance with Index No. 201. For larger pipe see bottom detail right and Index No. 200.



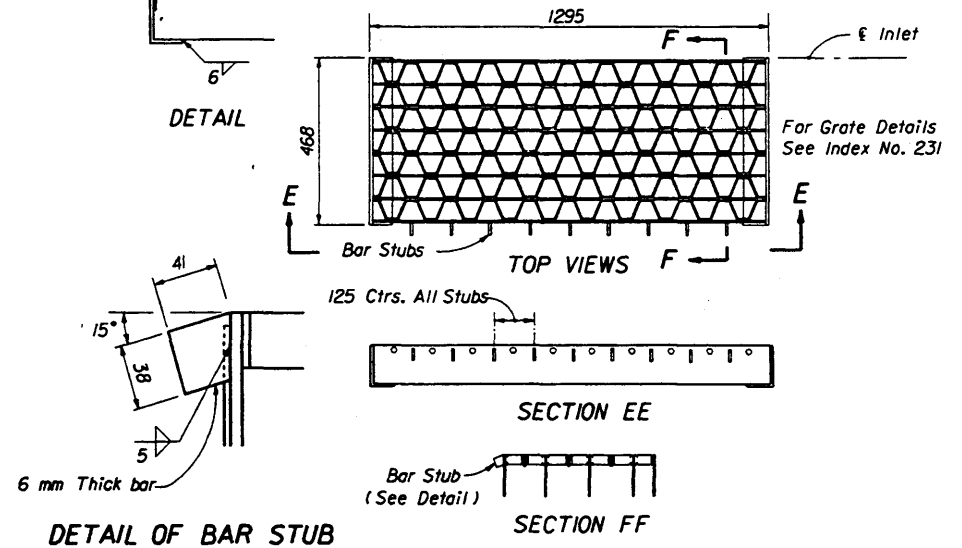
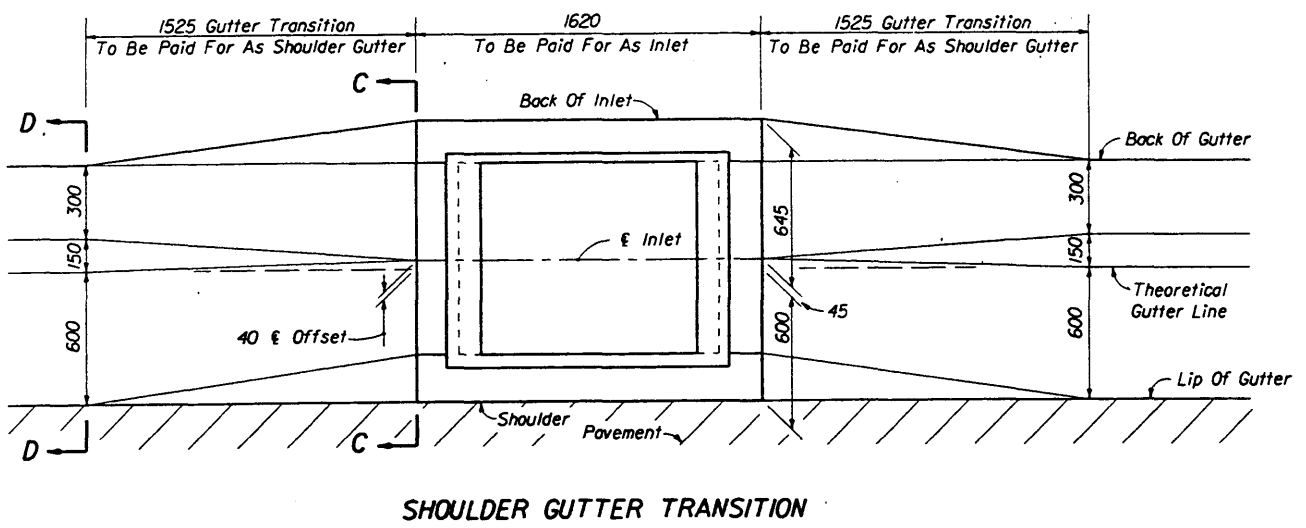
NOTE: Alt. B Structure Bottom Only. See Index No. 200 for structure bottom details and hole reinforcement.



INLET WITH STRUCTURE BOTTOM

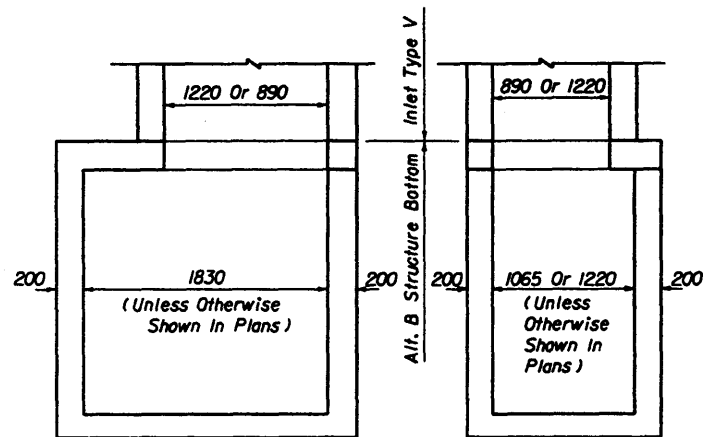
GENERAL NOTES

1. This inlet with parallel bar grate shall be used for limited access facilities and other bicycle restricted facilities subject to heavy loads; and, may be used in locations where inlets Type A and B, with wide grate openings, are unacceptable. On limited access facilities with designated bicycle access and on all other facilities, including roads overpassing limited access highways, the reticulate grate shall be used.
2. All reinforcing steel #13 bars at 305 mm centers both ways with 50 mm clearance to inside of walls and bottom. Bars to be cut or bent for 40 mm minimum clearance around pipe.
3. All exposed edges and corners shall be tooled to 20 mm radius.
4. When Alternate G grate is specified in plans, the grate is to be hot dipped galvanized after fabrication.
5. For supplementary details see Index Nos. 200 and 201.



STEEL GRATE

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>GUTTER INLET TYPE S</b>				
Names	Dates	Approved By <i>S. M. Moore</i>		
Designed By		State Drainage Engineer		
Drawn By		Revision	Sheet No.	Index No.
Checked By		98	1 of 1	220

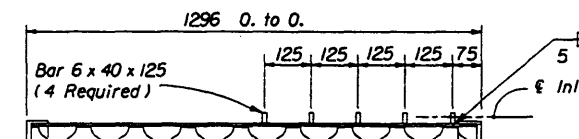


NOTE: Alt. B Structure Bottom Only. See Index No. 200 for structure bottom details and hole reinforcement. (For Pipes 750 Dia. And Larger)

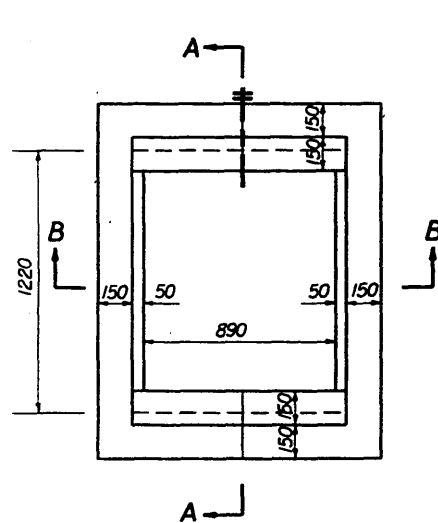
**INLET WITH STRUCTURE BOTTOM**

**GENERAL NOTES**

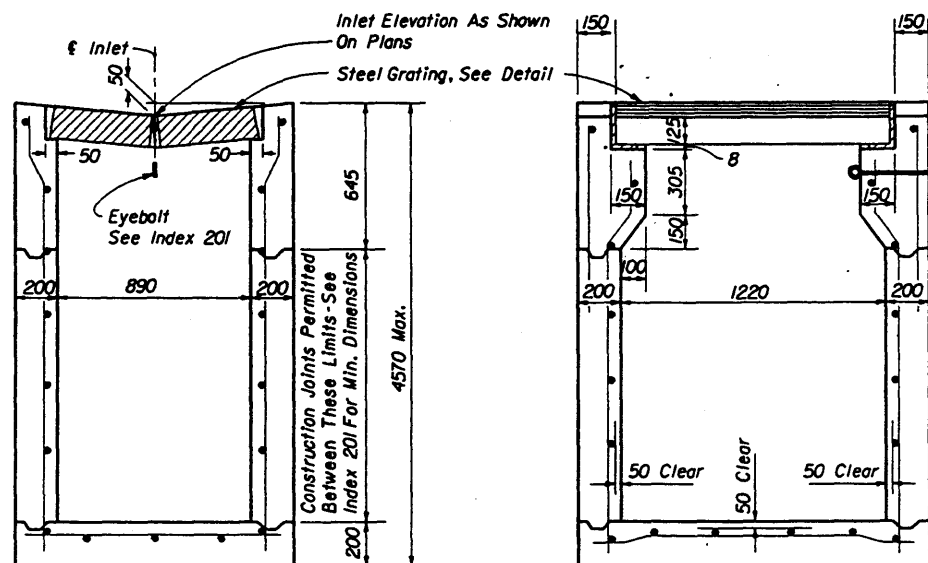
1. This inlet is designed for village swales, ditches, or other areas subject to heavy wheel loads, minimum debris and subject to pedestrian and/or bicycle traffic.
2. When alternate "G" grate is specified in plans, the grate is to be hot dipped galvanized after fabrication.
3. Reinforcing - \*13 bars at 305 mm ctrs. both ways. Cut or bend bars out of way of pipe to clear pipe 40.
4. All exposed edges and corners shall be tooled to 6 mm radius.
5. Recommended maximum pipe sizes shown are for concrete pipe.
6. For supplementary details see Index No. 201.



**OPTIONAL BAR SPACING**



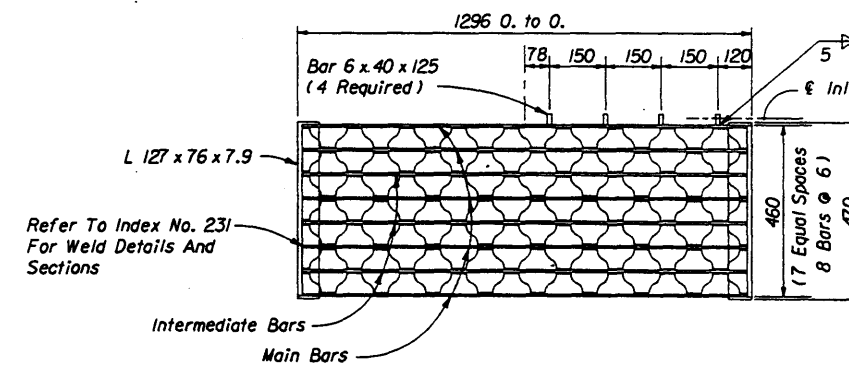
**PLAN**



**SECTION BB**

Recommended Maximum Pipe Size:  
890 Wall - 600 Size  
1220 Wall - 900 Size

**SECTION AA**



**STEEL GRATE**


TWO REQUIRED PER INLET

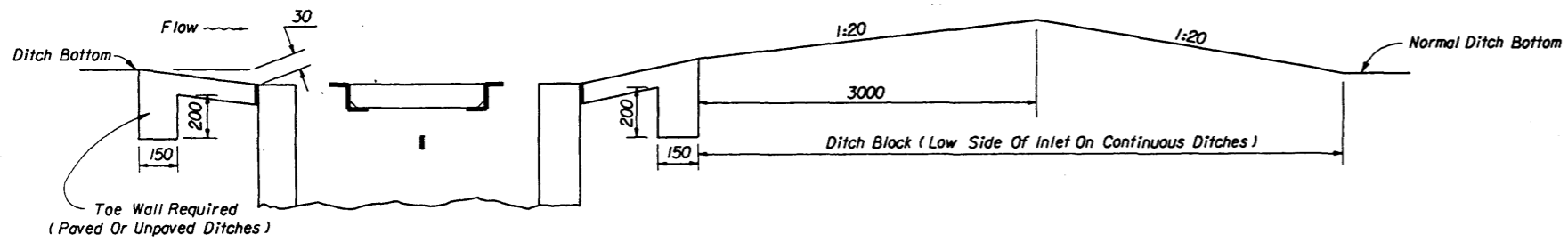
125 mm Steel Grate Main Bars 125 mm x 6 mm  
Intermediate Bars 40 mm x 6 mm Reticuline Bars 30 mm x 5 mm

Steel Grate : Manufactured By Borden, Florida Steel, U.S. Foundry Irving, Reliance, Greulich (Or Equal).

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**GUTTER INLET  
TYPE V**

Designed By	Names	Dates	Approved By	
Drawn By	WHW	4/51	 State Drainage Engineer	
Checked By	RMM	4/51		
	Revision	98	Sheet No.	Index No.
			1 of 1	221

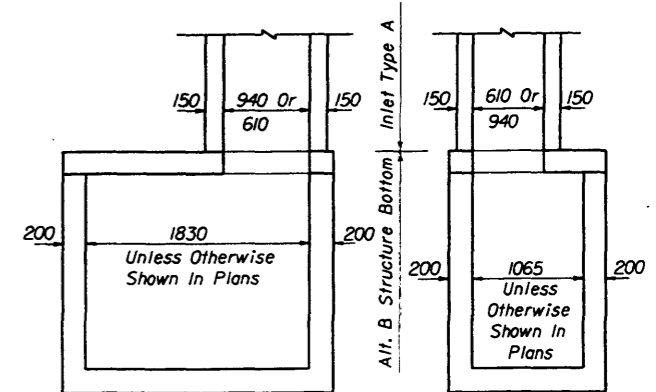


SECTION DD

**RECOMMENDED MAXIMUM PIPE SIZES**

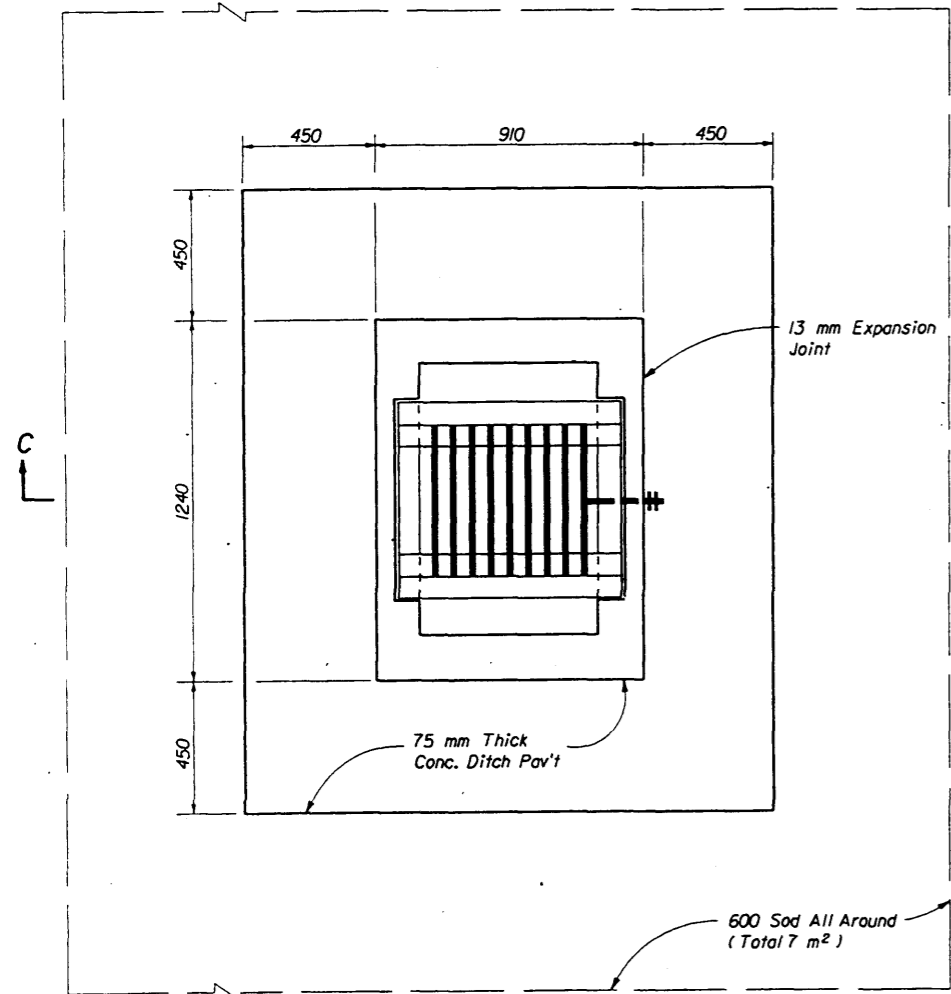
INLET INSIDE WIDTH (mm)	PIPE SIZE (mm)
610	450
940	600

Note: Recommended sizes are for concrete pipe. Sizes for other types of pipe must be verified for fit in accordance with Index No. 201. For larger pipe see bottom detail right and Index No. 200.

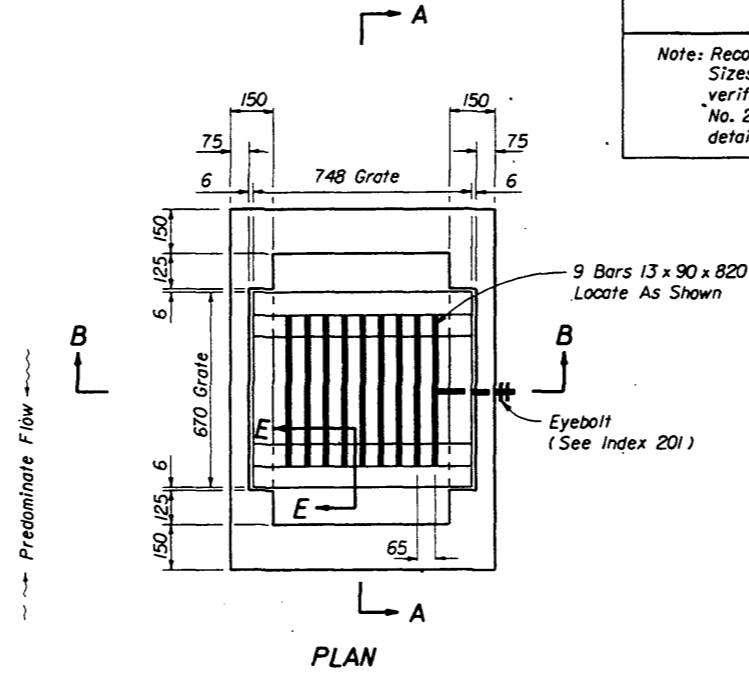


NOTE: Alt. B Structure Bottom Only. See Index No. 200 for structure bottom details and hole reinforcement.

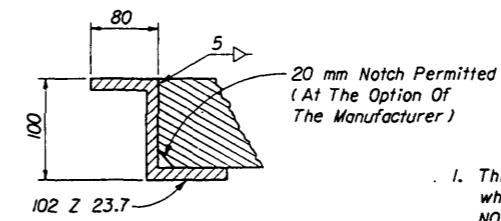
INLET WITH STRUCTURE BOTTOM



Predominate Flow



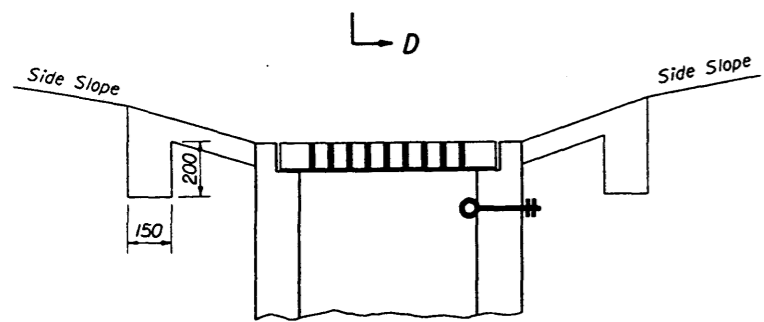
PLAN



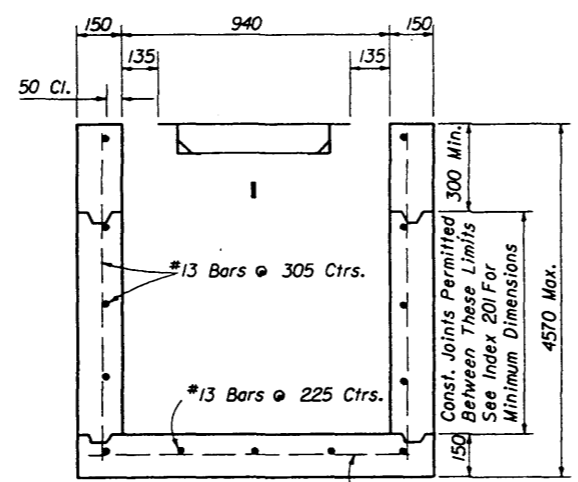
SECTION EE

**GENERAL NOTES**

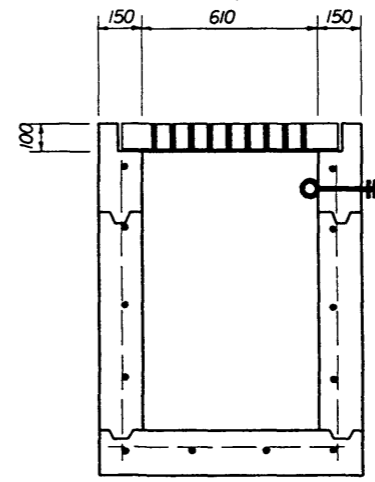
1. This inlet is designed for ditches, medians, or other areas subject to heavy wheel loads on limited access facilities where debris may be a problem. NOTICE: This inlet is not for use in areas subject to pedestrian and/or bicycle traffic.
2. Reinforcing - 50 mm clearance to inside face. Cut or bend bars out of way of pipe to clear pipe by 40 mm.
3. Chamfer exposed edges (20 mm Chamfer).
4. When alternate "G" grate is specified in plans, the grate is to be hot dipped galvanized after fabrication.
5. Cost of ditch paving to be included in the cost of Inlet. Sodding to be paid for under contract unit price for Sodding, M2.
6. For supplemental details see Index No. 201.



SECTION CC

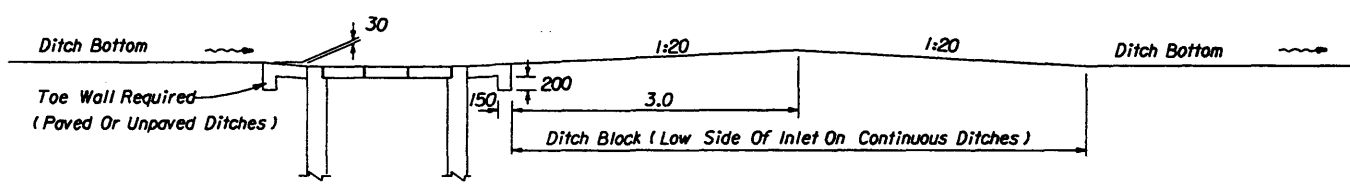


SECTION AA



SECTION BB

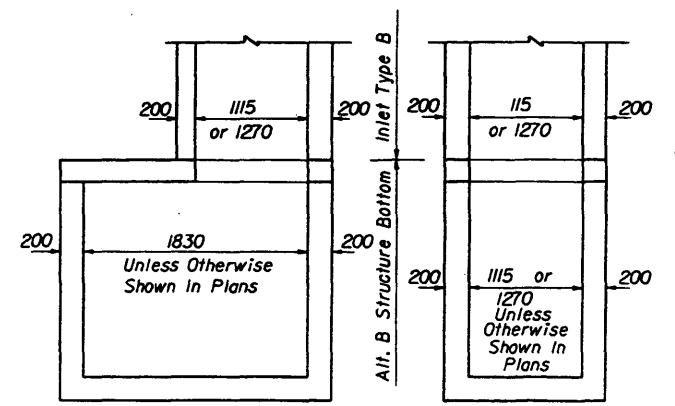
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN			
<b>DITCH BOTTOM INLET TYPE A</b>			
Designed By	Names	Dates	Approved By <i>SA McEnroe</i> State Drainage Engineer
Drawn By			Revision 98
Checked By			Sheet No. 1 of 1
			Index No. 230



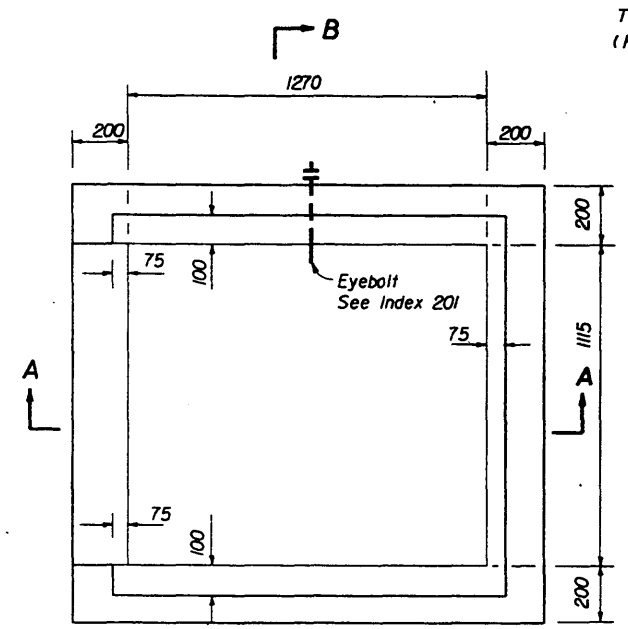
**SECTION EE  
DITCH BLOCK**

RECOMMENDED MAXIMUM PIPE SIZES	
INLET INSIDE WIDTH	PIPE SIZE
1115	750
1270	900

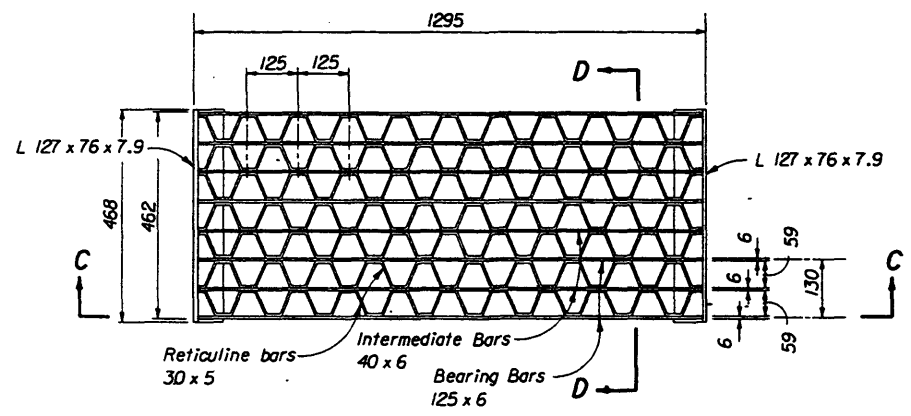
Note: Recommended sizes are for concrete pipe. Sizes for other types of pipe must be verified for fit in accordance with Index No. 201. For larger pipe see bottom detail above and Index No. 200.



NOTE: Alt. B Structure Bottom Only. See Index No. 200 for structure bottom details and hole reinforcement.  
**INLET WITH STRUCTURE BOTTOM**

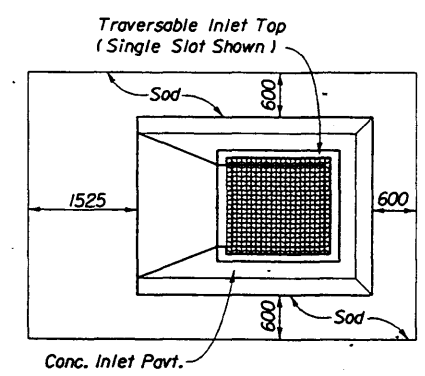


**PLAN**

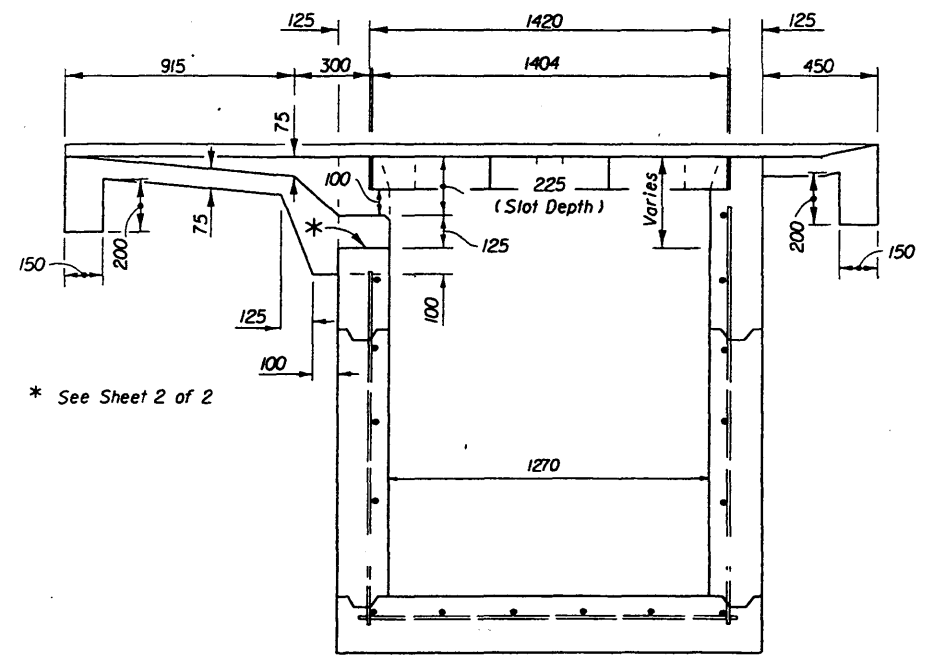


**PLAN**

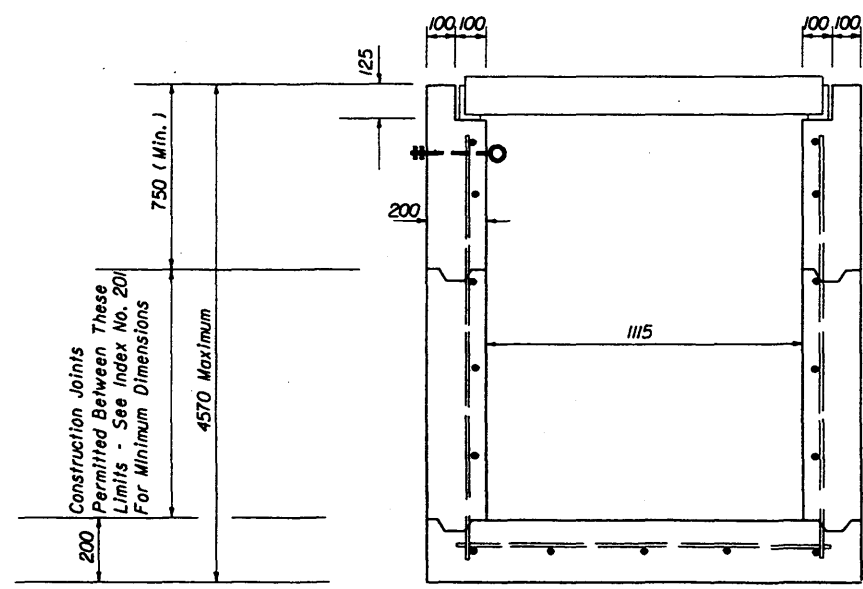
SLOT TYPE	PAVEMENT		SOD
	m <sup>2</sup>	m <sup>3</sup>	
Single Slot	5.22	0.71	11.53
Double Slot	6.77	0.87	15.65



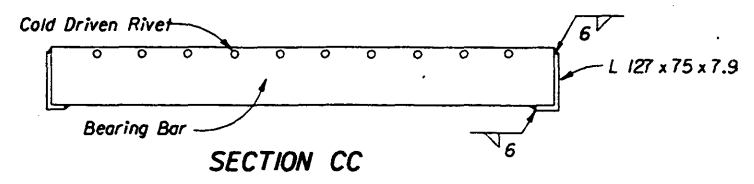
**CONCRETE INLET PAVEMENT AND SODDING**



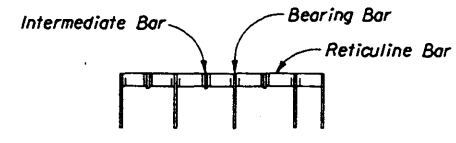
**SECTION AA**



**SECTION BB**



**SECTION CC**



**SECTION DD**

**STEEL GRATE**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>DITCH BOTTOM INLET TYPE B</b>				
Names	Dates	Approved By		
Designed By	HAB 04/67	State Drainage Engineer		
Drawn By	RWR 05/82			
Checked By	JAC 05/82	Revision	Sheet No.	Index No.
		00	1 of 2	231

\* See Sheet 2 of 2

**GENERAL NOTES**

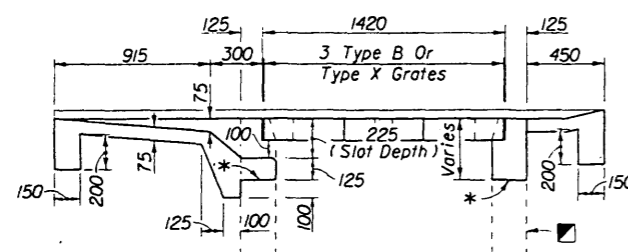
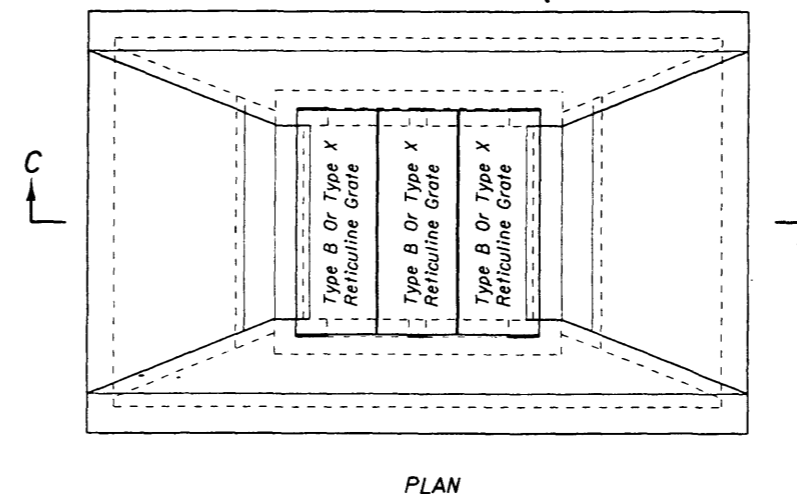
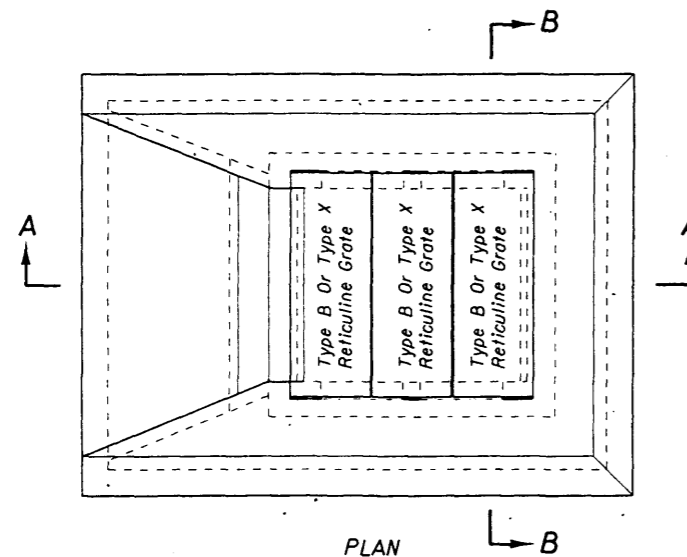
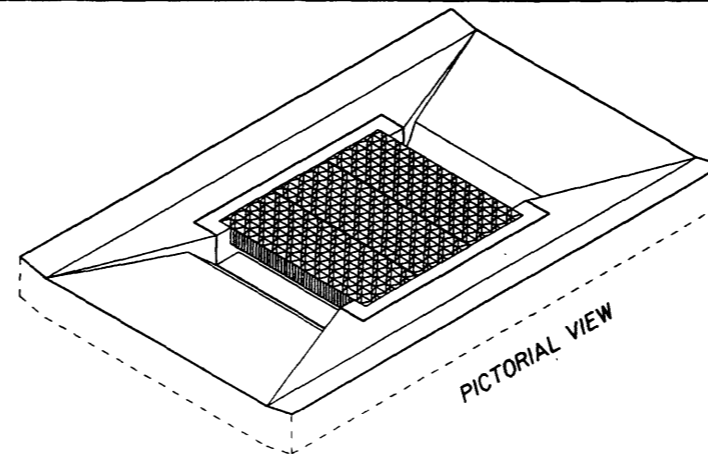
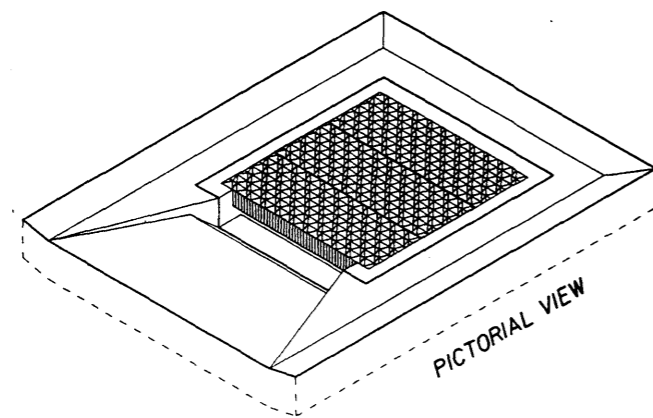
1. The general purpose of the inlet top designs are:
  - a. For ditches, medians or other areas subject to heavy wheel loads accommodating minimal debris locations and debris impinged locations.
  - b. Provide full grate and horizontal slot designs for new construction.
  - c. Provide full grate and horizontal slot designs for replacing the verticle slot tops on existing Inlets Type B and Type X that are in locations which have become pedestrian active.
2. Box, walls and bottoms reinforcing steel all # 13 bars at 305 mm centers both ways with 50 mm clearance to inside of walls and bottom. Bars to be cut or bent for 40 mm minimum clearance around pipe.
3. When Alternate G grates are specified in the plans, the grates are to be hot-dipped galvanized after fabrication.
4. Cost for constructing traversable tops on new inlet boxes shall be included in the contract unit price for Inlets (DT BOT) (Type B), EA., and shall include the cost for surrounding pavement.  
Existing Inlets Type B and Inlets Type X that are converted to traversable inlet tops shall be paid for under the contract unit price for Inlets (DT BOT) (Type B) (Partial), EA. Unit price and payment shall be full compensation for inlet conversion and shall include the removal and disposal of any existing inlet pavement; the removal and stockpiling or disposal of sufficient material from the existing inlet box to facilitate construction of the required inlet top; construction of the required inlet conversion; backfill construction; construction of inlet pavement; reusing, supplementing transferring or replacing grate (s) as required by plans or as directed by the Engineer; any required earthwork for ditch restoration within 10.0 m of the inlet; and, seeding and mulching disturbed grasses.
5. Ditch pavement shall be paid for separate from the inlet by pavement type (\$) and unit (s) as called for in the plans.
6. Sod will be paid for under the contract unit price for Sodding, M2.
7. Underdrain called for in the plans in conjunction with storm water detention shall be paid for as Underdrain, Type 1, M2.
8. For supplementary details see Index No. 201.

**DESIGN NOTES**

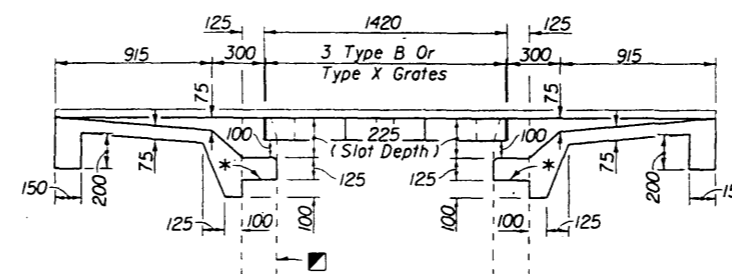
1. The type of top (single or double slots) depends on the approach ditch configuration and the hydraulic requirements of the site. The designer will stipulate in the plans the type of top to be constructed at each individual inlet location.  
  
On existing inlets conversion grates shall be constructed at the original grate elevations unless other elevations are called for in the plans. When plans call for the inlet top to be constructed to support storm water detention, details for ditch modifications and underdrains shall be shown in the plans.

**MAINTENANCE NOTES**

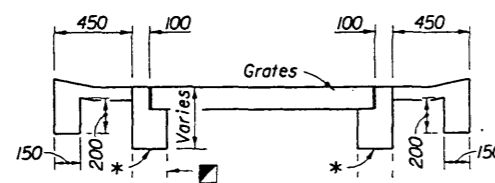
1. Traversable inlet tops that are constructed by maintenance contract or by maintenance forces may reuse the existing grates that are determined by the Maintenance Engineer to be functionally sound, and their reuse is so directed by the Maintenance Engineer. Existing grates approved for reuse and new grates may be mixed, matched or replaced as directed by the Maintenance Engineer.



**SECTION AA  
SINGLE SLOT**



**SECTION CC  
DOUBLE SLOT**



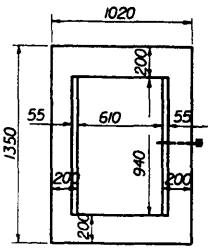
**SECTION BB**

■ Inlet Box (Line Type Indicates Existing Box To Facilitate Depiction Of Partial Construction On Existing Inlets)

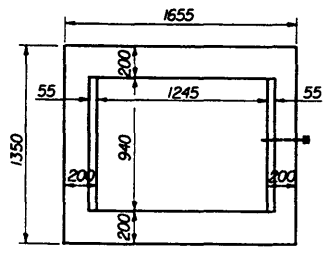
\* On new boxes the traversable top may be cast as a monolithic unit or cast in segments, and the location of this line may be lower to facilitate handling and placement; however, the slot depth is to remain at 225 mm. See Index No. 201 for top to wall connection. For converting to traversable tops on existing inlets remove concrete to this line and expose the existing reinforcement. Reshape or splice in reinforcement to penetrate the rim and returns of the grate seat, and bend the reinforcement into the slot shelf to extend into the abutting throat pavement.

**TRAVERSABLE TOPS FOR INLETS TYPE B AND  
FOR CONVERSIONS OF EXISTING INLETS TYPE B AND TYPE X**

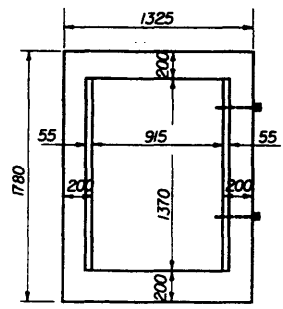
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>DITCH BOTTOM INLETS TYPE B</b>				
Names	Dates	Approved By		
Designed By	02/98	 State Drainage Engineer		
Drawn By	02/98			
Checked By		Revision	Sheet No.	Index No.
		00	2 of 2	231



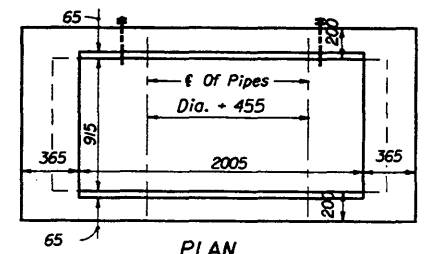
PLAN



PLAN



PLAN



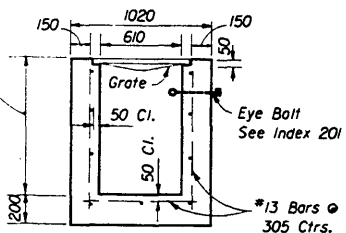
PLAN

Varies 4570 Max.

Varies 4570 Max.

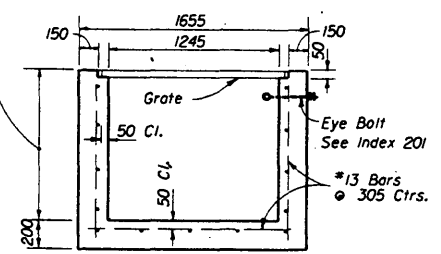
Varies 4570 Max.

Varies 4570 Max.



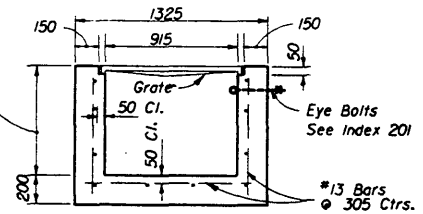
SECTION TYPE C

Recommended Maximum Pipe Size:  
610 Wall-450 Pipe  
940 Wall-600 Pipe



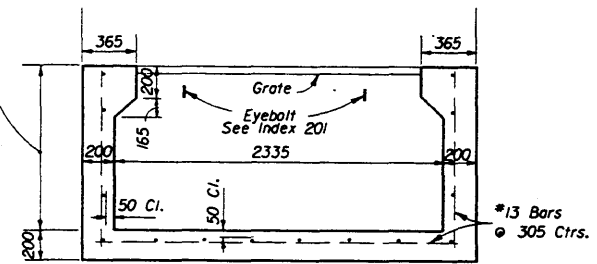
SECTION TYPE D

Recommended Maximum Pipe Size:  
940 Wall-600 Pipe  
1245 Wall-900 Pipe



SECTION TYPE E

Recommended Maximum Pipe Size:  
915 Wall-600 Pipe  
1370 Wall-1050 Pipe



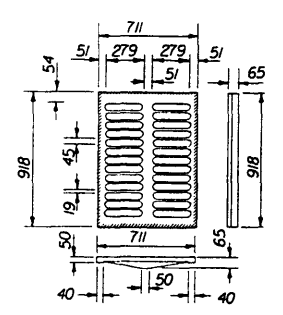
SECTION TYPE H

Recommended Maximum Pipe Size:  
915 Wall-600 Pipe  
2335 Wall-1-1650 Pipe  
2-750 Pipe

GENERAL NOTES

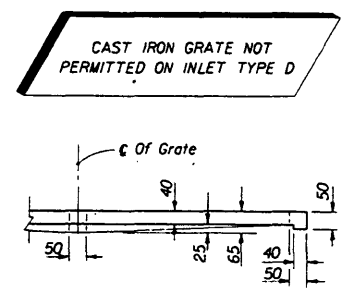
1. These inlets are suitable for bicycle and pedestrian areas and are to be used in ditches, medians and other areas subject to infrequent traffic loadings but are not to be placed in areas subject to any heavy wheel loads.
2. Inlets subject to minimal debris should be constructed without slots. Where debris is a problem inlets should be constructed with slots. Slotted inlets located within roadway clear zones and in areas accessible to pedestrians shall have traversable slots. The traversable slot modification is not adaptable to inlet Type H. Slots may be constructed at either or both ends as shown on plans.
3. Steel grates are to be used on all inlets where bicycle traffic is anticipated. Steel grates are to be used on all inlets with traversable slots. Either cast iron or steel grates may be used on inlets without slots where bicycle traffic is not anticipated. Either cast iron or steel grates may be used on all inlets with non-traversable slots. Subject to the selection described above, when Alternate G grate is specified in the plans, either the steel grate, hot dipped galvanized after fabrication, or the cast iron grate may be used, unless the plans stipulate the particular type.
4. Recommended maximum pipe sizes shown are for concrete pipe. Pipe sizes larger than those recommended must be checked for fit.
5. All exposed corners and edges of concrete are to be chamfered 20 mm.
6. Pavement to be used on inlets without slots and inlets with non-traversable slots only when called for in the plans; but required on all traversable slot inlets. Cost to be included in contract unit price for inlets. Quantities shown are for information only.
7. Traversable slots constructed in existing inlets shall be paid for as inlets partial, and shall include the cost for slot openings, paving and any required replacement grates.
8. Sodding to be used on all inlets not located in paved areas and paid for under contract unit price for Sodding, M2.
9. For supplementary details see Index No. 201.

INLETS

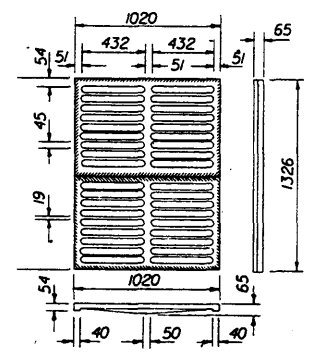


TYPE C

Approx. Weight 107 kg.

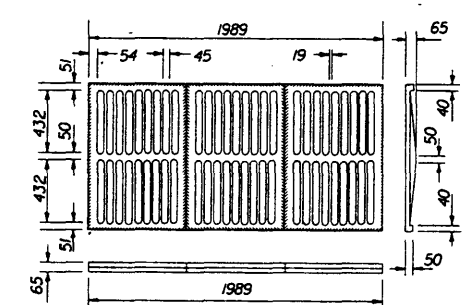


HALF SECTION CAST IRON GRATES



TYPE E

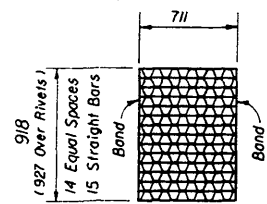
Approx. Weight 211 kg.



TYPE H

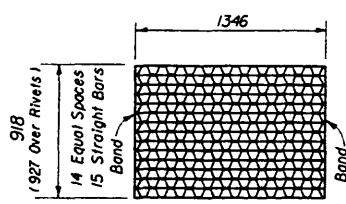
Approx. Weight 329 kg.

CAST IRON GRATES



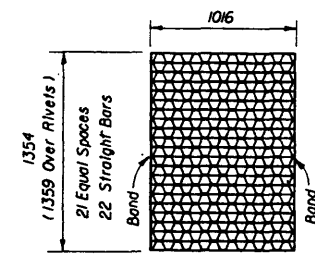
TYPE C

Straight Bars 50 x 6  
Reticuline Bars 30 x 5  
Bands 50 x 6  
Approx. Weight 47 kg.



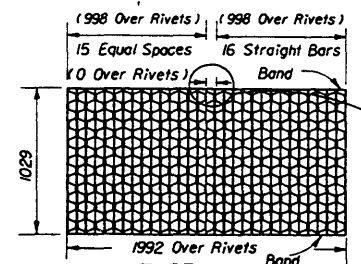
TYPE D

Straight Bars 50 x 6  
Reticuline Bars 30 x 5  
Bands 50 x 6  
Approx. Weight 85 kg.



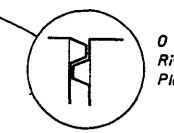
TYPE E

Straight Bars 50 x 6  
Reticuline Bars 30 x 5  
Bands 50 x 6  
Approx. Weight 98 kg.



TYPE H

Straight Bars 50 x 6  
Reticuline Bars 30 x 5  
Bands 50 x 6  
Approx. Total Weight 140 kg.



0 Clearance Over Rivets  
Rivet To Be Offset At Placement.

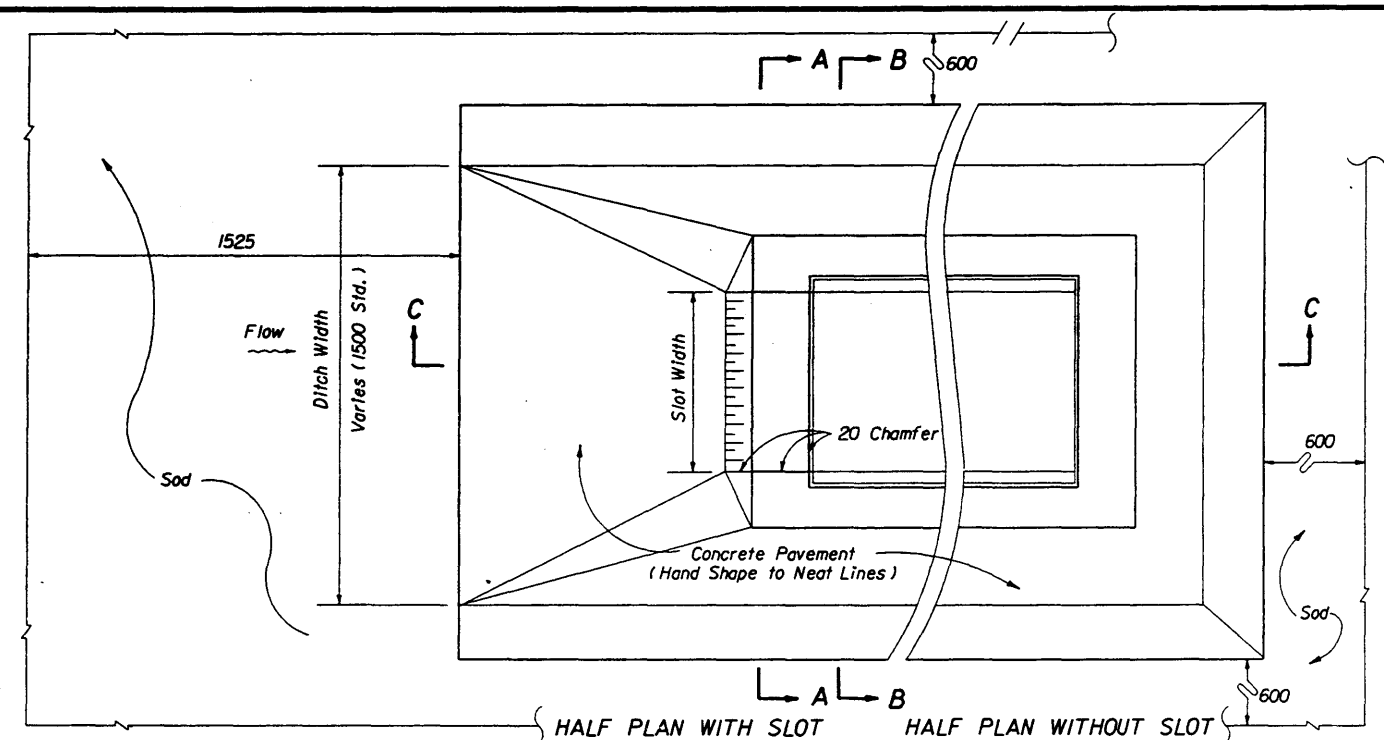
NOTICE: Steel Grates Are Required On Inlets With Traversable Slots And On Inlets where Bicycle Traffic Is Anticipated.

STEEL GRATES

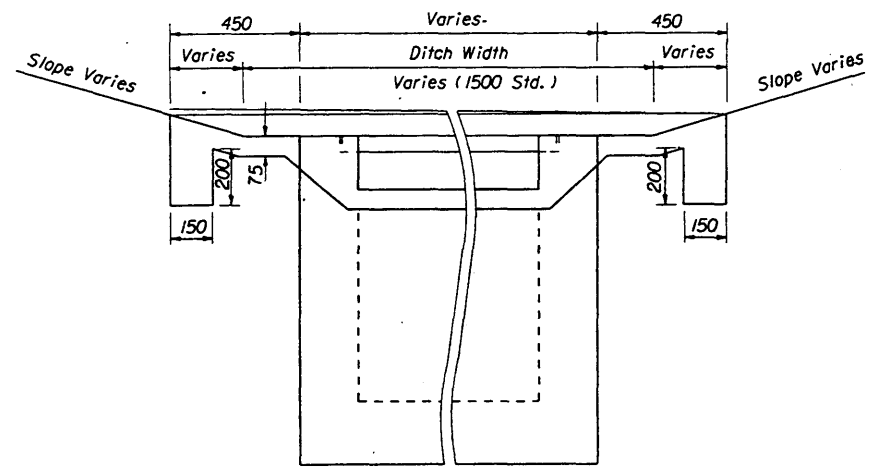
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

DITCH BOTTOM INLETS  
TYPES C, D, E & H

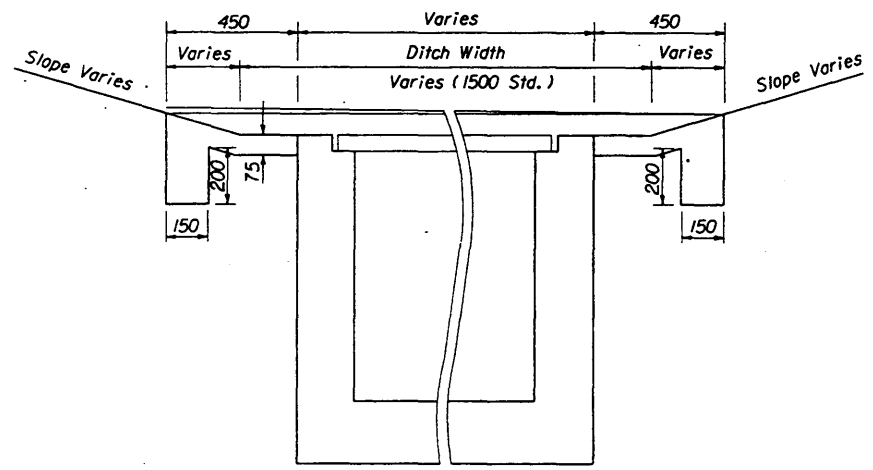
Names	Dates	Approved By		
Designed By		S. M. Lemire State Drainage Engineer	Revision	Sheet No.
Drawn By	EGR/JG 07/81		00	1 of 5
Checked By				232



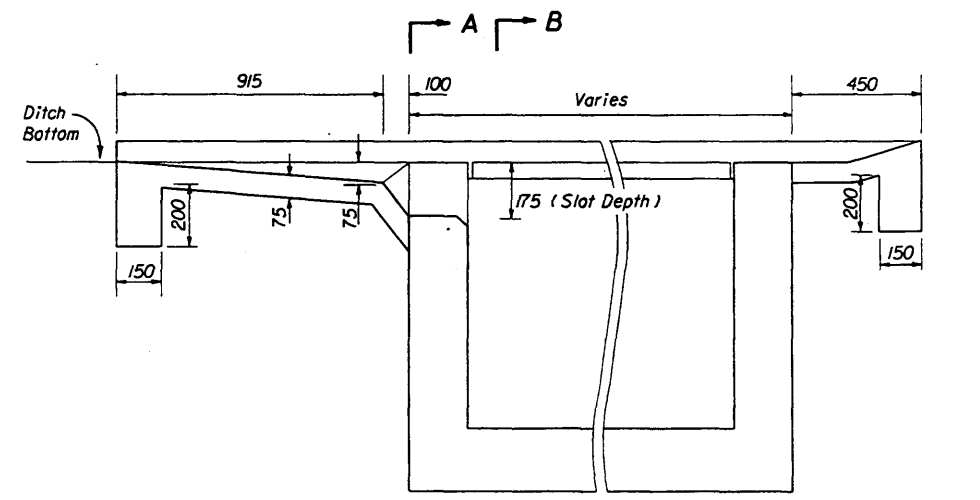
HALF PLAN WITH SLOT      HALF PLAN WITHOUT SLOT  
PLAN VIEW



SECTION AA



SECTION BB



HALF PLAN WITH SLOT      HALF PLAN WITHOUT SLOT  
SECTION CC

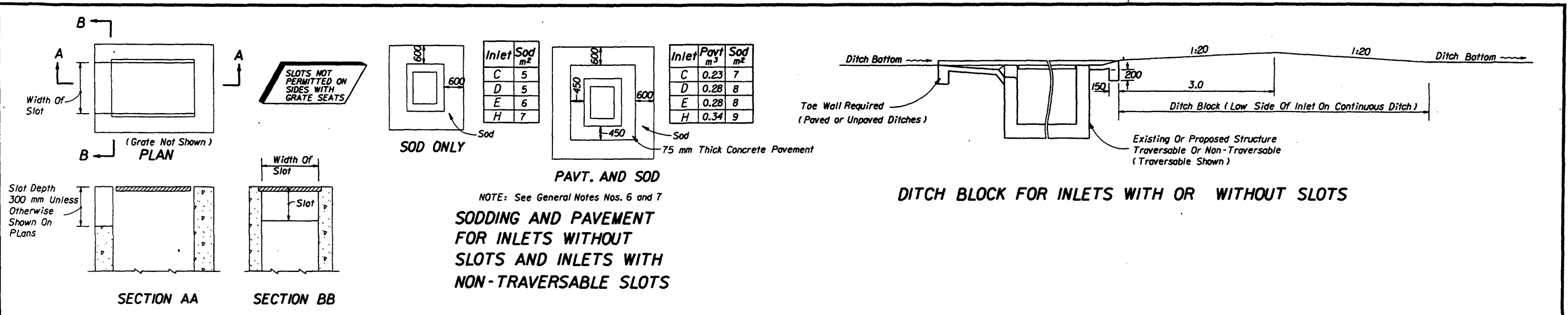
PAVEMENT AND SODDING QUANTITIES FOR TRAVERSABLE SLOTS						
Inlet	Pavement				Sod	
	Single Slot		Double Slot		Single Slot	Double Slot
	m <sup>2</sup>	m <sup>3</sup>	m <sup>2</sup>	m <sup>3</sup>	m <sup>2</sup>	m <sup>2</sup>
C	4.07	0.59	5.15	0.71	10	14
D	5.01	0.70	6.44	0.84	12	16
E	4.92	0.70	6.16	0.83	12	15

TRAVERSABLE SLOTS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**DITCH BOTTOM INLETS  
TYPES C, D, E, & H**

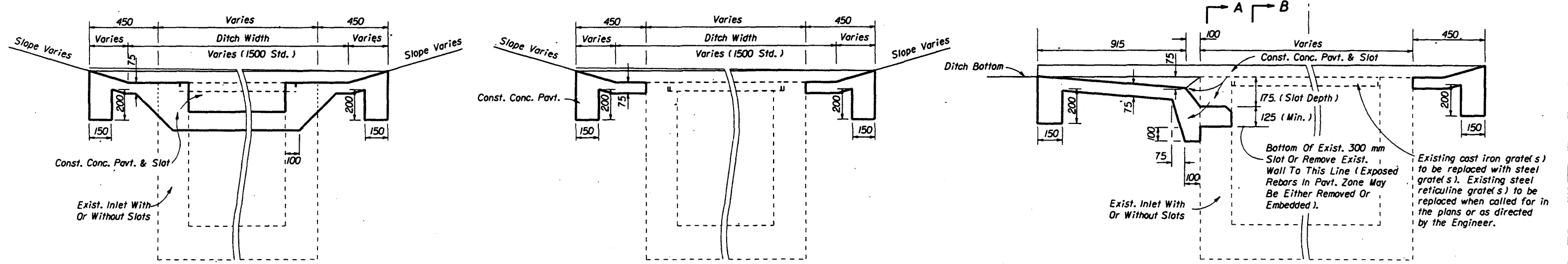
Names	Dates	Approved By <i>A. M. Lawrence</i> State Drainage Engineer		
Designed By EGR	02/80	Revision	Sheet No.	Index No.
Drawn By JM	02/80	00	2 of 5	232
Checked By JVC	02/80			



NOTE: See General Notes Nos. 6 and 7  
**SODDING AND PAVEMENT FOR INLETS WITHOUT SLOTS AND INLETS WITH NON-TRAVERSABLE SLOTS**

**DITCH BLOCK FOR INLETS WITH OR WITHOUT SLOTS**

NOTE: See Index No. 229 For Application Guidelines  
**NON-TRAVERSABLE SLOTS**



**PAVEMENT AND SODDING QUANTITIES FOR TRAVERSABLE SLOTS**

Inlet	Pavement		Sod	
	Single Slot	Double Slot	Single Slot	Double Slot
	m <sup>2</sup>	m <sup>3</sup>	m <sup>2</sup>	m <sup>2</sup>
C	4.07	0.59	5	0.71
D	5.01	0.70	6	0.84
E	4.92	0.70	6	0.83

NOTE: For plan view and additional details see sheet 2 of 4.  
 For payment see General Notes Nos. 6 and 7.

**TRAVERSABLE SLOTS FOR EXISTING INLETS**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
 ROAD DESIGN

**DITCH BOTTOM INLETS  
 TYPES C,D,E & H**

Names	Dates	Approved By	
Designed By	EGR 07/84	J.A. McLenzie State Drainage Engineer	
Drawn By	DAE 07/84	Revision	Sheet No.
Checked By	JBW/JG 07/84	00	3 of 5
			Index No. 232



**DESIGN NOTES FOR TRAVERSABLE SLOT INLETS (PARTIAL) FOR EXISTING INLETS**

1. The general purpose of these conversions is to remove the hazard of the protruding inlet top, while not creating a hazard by depressing the top too deeply.
2. The corrective procedure depends on the approach ditch grade and hydraulic requirements of the site. The selection of the appropriate case depends on the relationship between inlet top and ditch elevation, and, on the vertical clearance between the top of the uppermost pipe (s) and the grate. The purpose for the Case 1 conversion is to add the traversable slot to an existing inlet where top removal, change in grate elevation and ditch transitions are not required. Case 2 will normally be applicable to ditches with flatter grades adjoining the inlet. Case 3 will normally be applicable to ditches with steeper grades adjoining the inlet where buildup of the existing ditch is acceptable.
3. The designer shall stipulate in the plans which case is to be constructed at each individual inlet location.

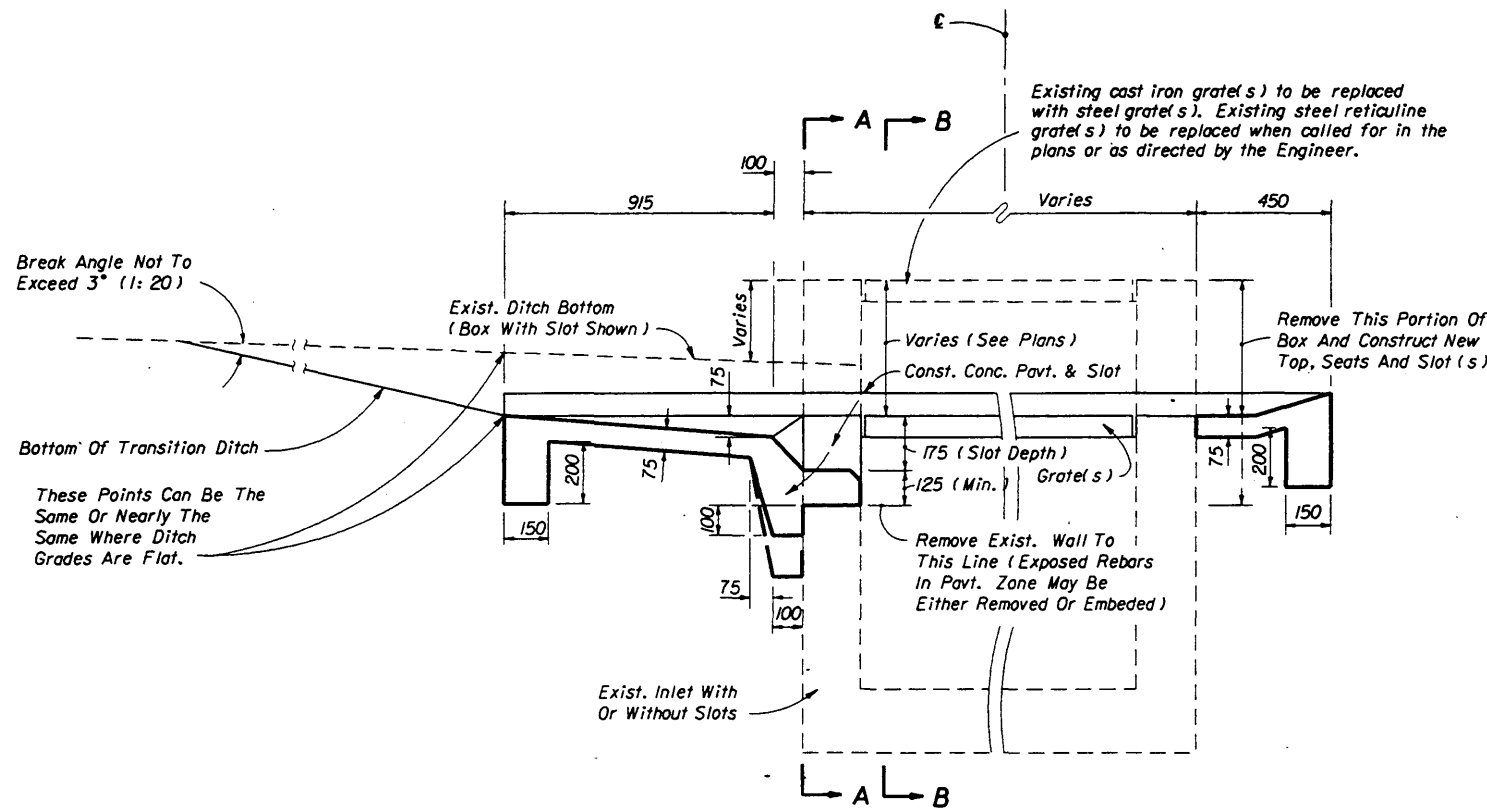
Where the existing inlet top is above the existing ditch (Case 2) but borrow material will be required to adjust the ditch (Case 3), and vertical clearance or other conditions do not prevent removal of the inlet top, the designer should call for Case 2. The designer shall determine if ditch reconstruction is required more than 10.7 meters beyond any traversable slot side and shall include separate pay items in the plans to cover the cost for that portion of required ditch reconstruction exceeding the 10.7 meter limit. The designer shall also determine whether ditch pavement is required for ditch restoration within the 10.7 meter limit and include that pavement under a pay item separate from the inlets partial.

When the detention ditch concept is to be used with Case 3, the designer shall stipulate 'Case 3 (Detention)' in the plans.

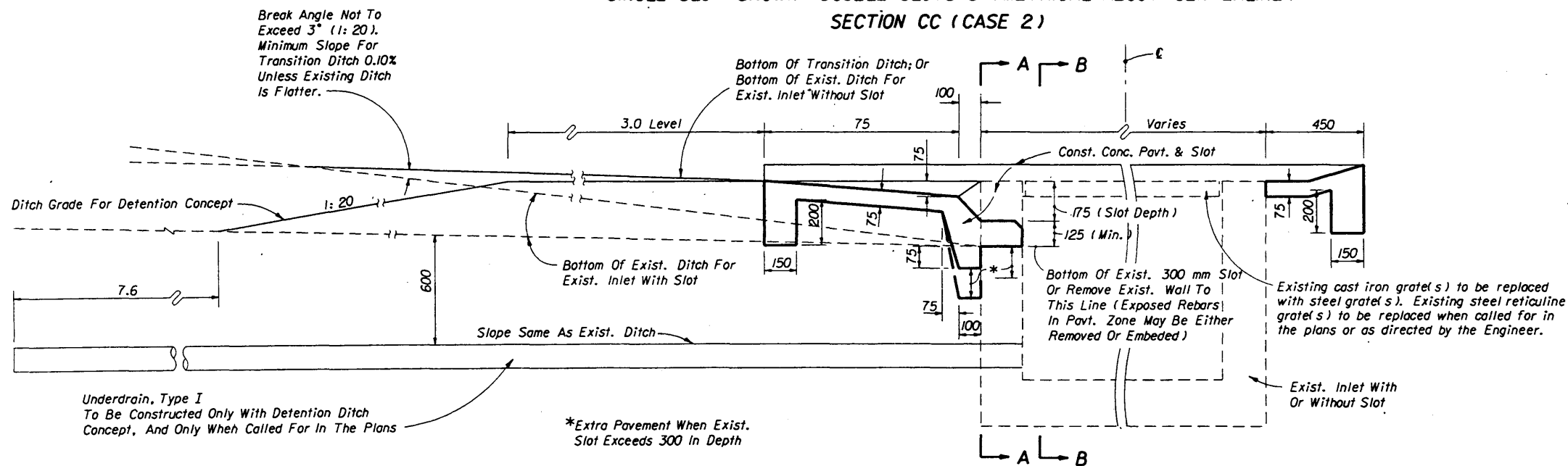
The designer shall determine whether tight soil or other conditions at each individual inlet indicates the need for underdrain in Case 3 conversions and shall call for Underdrain, Type I in the plans.

**METHOD OF PAYMENT FOR TRAVERSABLE SLOT INLETS (PARTIAL) FOR EXISTING INLETS**

1. Existing inlets converted to traversable slot tops under Cases 1, 2 and 3 shall be paid for as inlets partial, EA. Case shall not be included in the pay item description.
  2. All ditch reconstruction work within 10.7 meters of each traversable slot conversion, whether required by these details or as a direct result of the conversion, shall be included as a part of the partial cost. Reconstruction work shall include excavation and removal of surplus materials or borrow materials in place, grading, compaction, shaping and seeding and mulching. Sodding, ditch pavement and underdrain are not included as part of the inlet partial cost and are to be paid for separately.
  3. Inlet pavement and sodding shall be in accordance with the sections on this detail and with the Plan on Sheet 2 of 4 and Sections AA, BB and CC (as Case 1) and tabular quantities on Sheet 3 of 4.
  4. Unit price and payment shall constitute full compensation for inlet conversion, replacement grate(s) ditch reconstruction, seeding and mulching, and shall be paid for under the contract unit price for inlets (DT Bot Type \_\_) (Partial), EA.
- Sodding shall be paid for under the contract unit price for Sodding, M2.
- Ditch pavement shall be paid for separate from the inlet by pavement type(s) and unit(s) as called for in the plans.
- Underdrain called for in the plans for Case 3 conversions shall be paid for as Underdrain, (Type I), Ml.



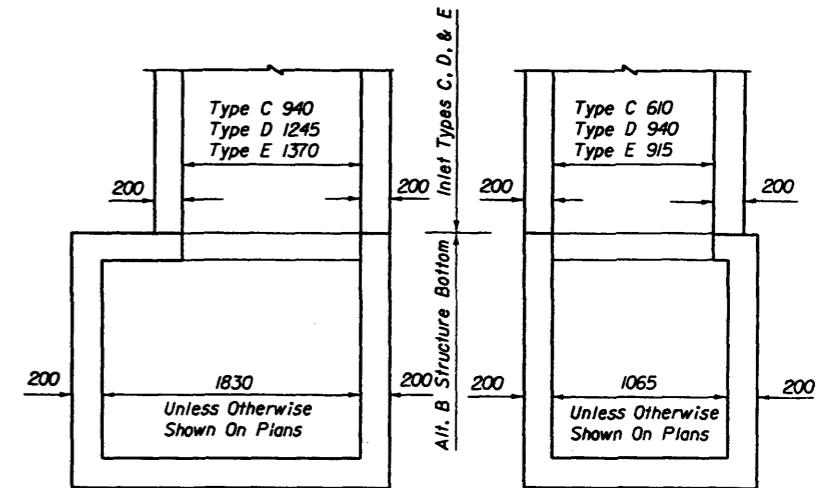
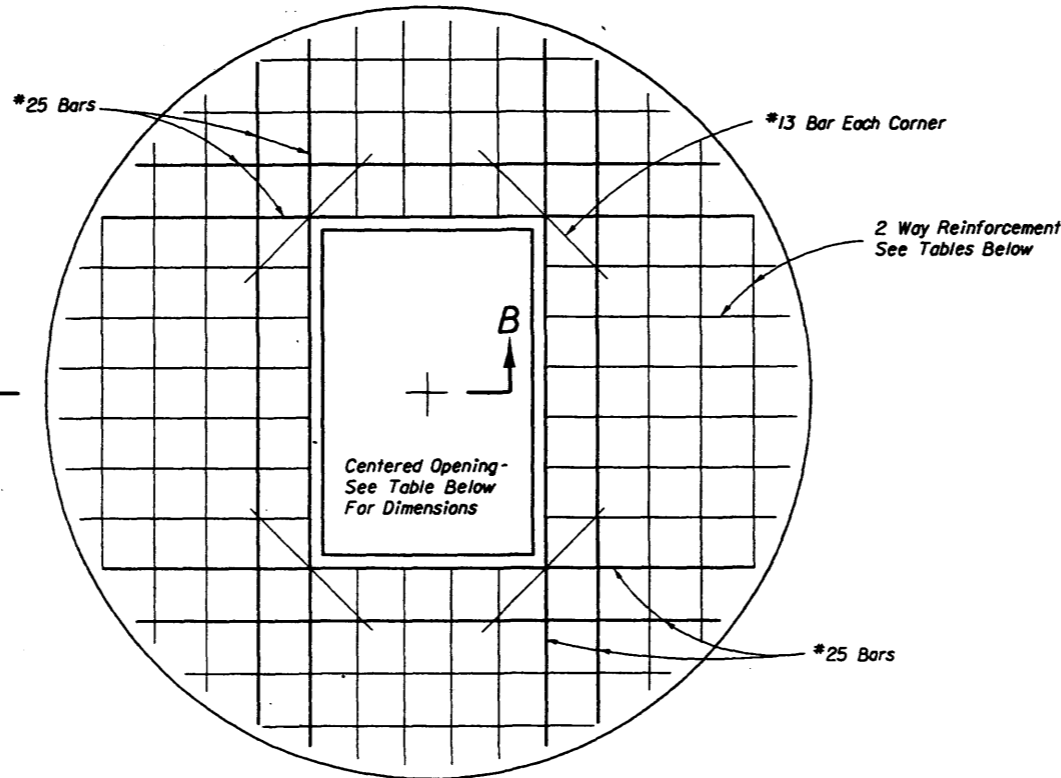
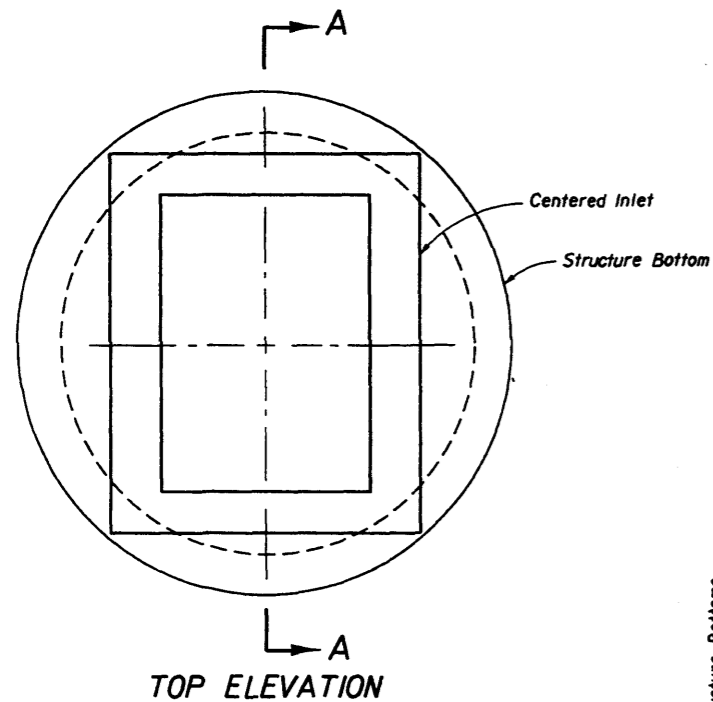
**SINGLE SLOT SHOWN (DOUBLE SLOTS SYMMETRICAL ABOUT CENTERLINE)  
SECTION CC (CASE 2)**



**SINGLE SLOT SHOWN (DOUBLE SLOTS SYMMETRICAL ABOUT CENTERLINE)  
SECTION CC (CASE 3)**

**TRAVERSABLE SLOT INLETS (PARTIAL) FOR EXISTING INLETS**

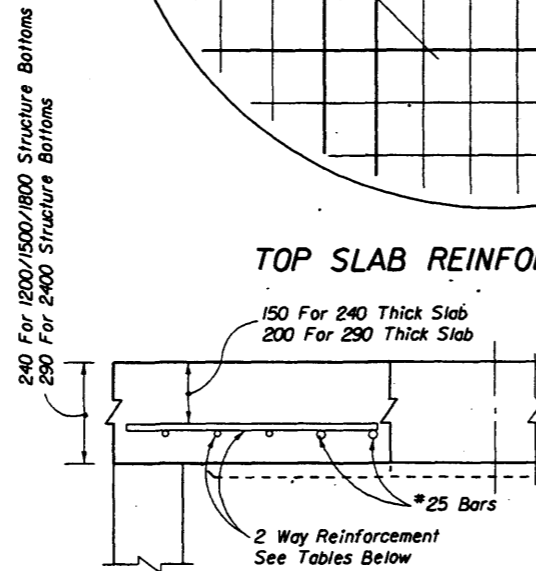
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>DITCH BOTTOM INLETS TYPES C, D, E &amp; H</b>				
Names	Dates	Approved By <i>J.A. McLemore</i>		
Designed By JVG/EGR	03/10/06	State Drainage Engineer		
Drawn By HSD/dss	05/20/06	Revision	Sheet No.	Index No.
Checked By JVG/EGR	05/22/06	00	4 of 5	232



See Index No. 200 for structure bottom details and hole reinforcement.  
**ALT. B STRUCTURE BOTTOM FOR INLETS TYPE C, D & E**

TOP SLAB OPENINGS		
DIAMETER	OPENING SIZE	
	MIN.	MAX.
1200	600 x 925	600 x 925
1500	600 x 925	925 x 1225
1800	600 x 925	900 x 1350
2400	600 x 925	900 x 1350

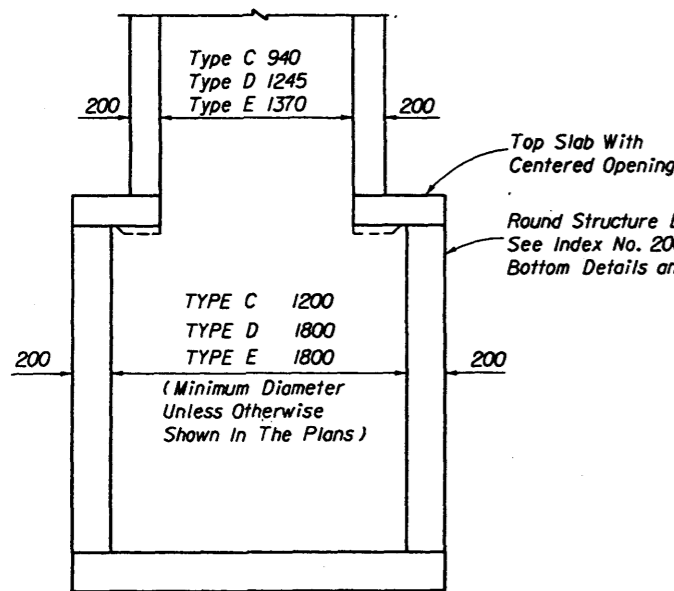
**TOP SLAB REINFORCING DIAGRAM**



**SECTION BB**

TOP SLAB WITH CENTERED OPENING		
SLAB DEPTH	SLAB THICKNESS	REINFORCING (2 WAYS) SCHEDULE
SIZE: 1219 (1200)		
≥ 0.15 - 12.20	240	C
SIZE: 1524 (1500)		
≥ 0.15 < 9.15	240	C
9.15 - 12.20	240	D
SIZE: 1829 (1800)		
≥ 0.15 < 2.45	240	B
2.45 < 5.50	240	C
5.50 < 9.10	240	D
9.10 < 11.30	240	E
11.30 - 12.20	240	G
SIZE: 2438 (2400)		
≥ 0.15 < 2.75	290	C
2.75 < 4.55	290	D
4.55 < 7.00	290	E
7.00 < 10.05	290	E
10.05 - 12.20	290	G

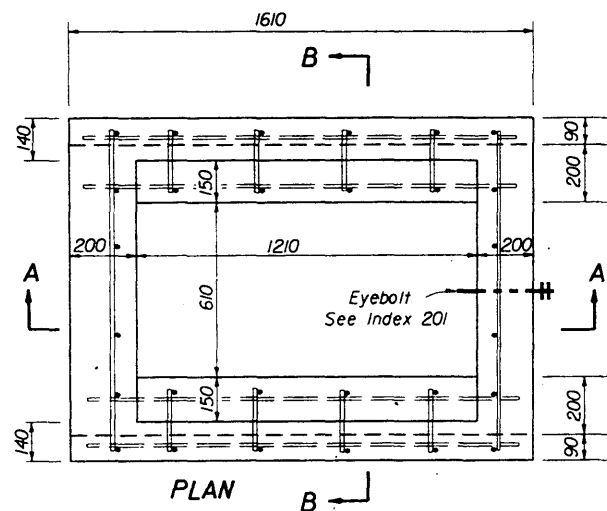
TOP SLAB REINFORCING SCHEDULE	
SCHEDULE	400 MPa STEEL OR 450 MPa (WIRE FABRIC) mm <sup>2</sup> /m
A	420
B	505
C	780
D	1120
E	1545
F	2240
G	3070



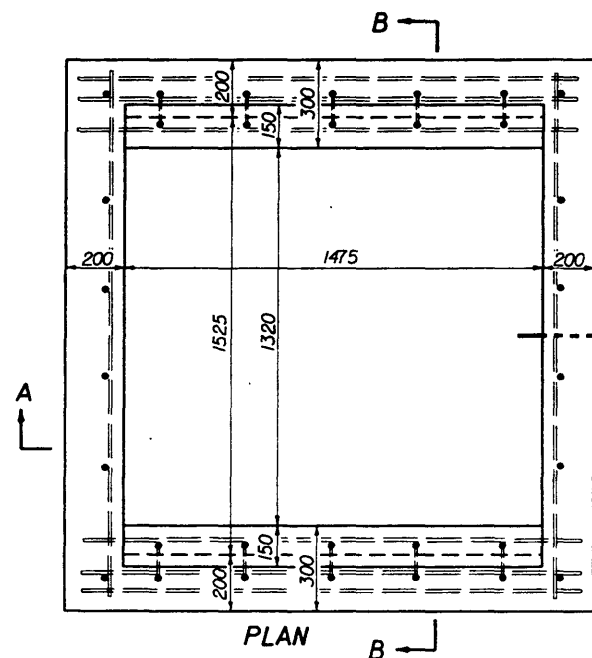
**SECTION AA**

**ALT. A STRUCTURE BOTTOM FOR INLETS TYPE C, D AND E**

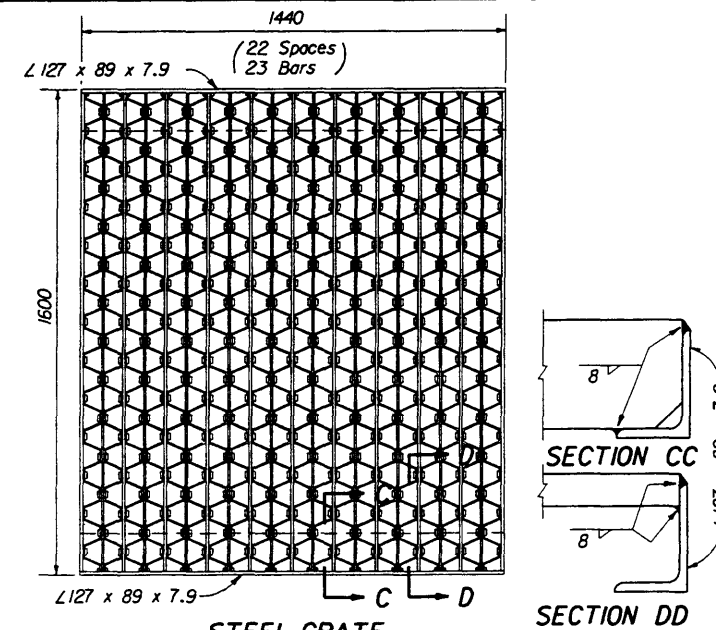
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>DITCH BOTTOM INLETS TYPES C, D, E &amp; H</b>					
Designed By	Names	Dates	Approved By <i>A. M. Lawrence</i> State Drainage Engineer		
Drawn By	JDT	02/99	Revision	Sheet No.	Index No.
Checked By			00	5 of 5	232



PLAN

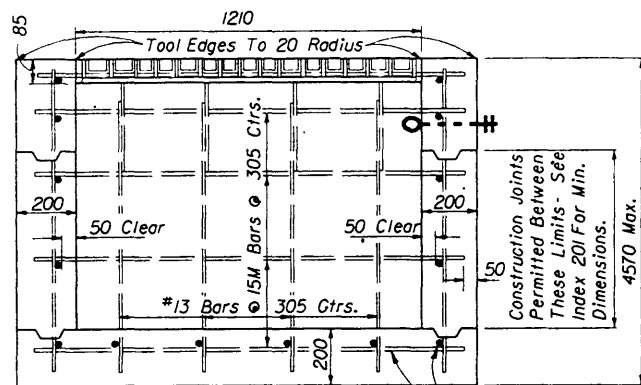


PLAN



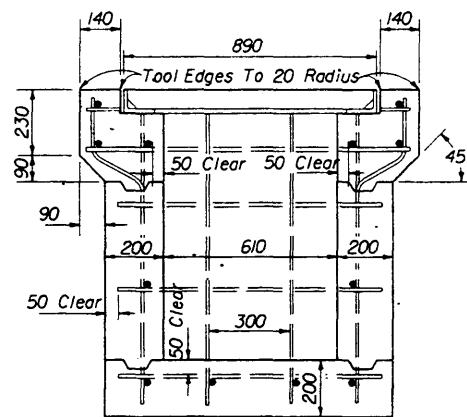
STEEL GRATE

125 mm Steel Decking, Weight 285 kg Main Bars 125 x 6 Intermediate Bars 40 x 6, Reticuline Bars 30 x 5

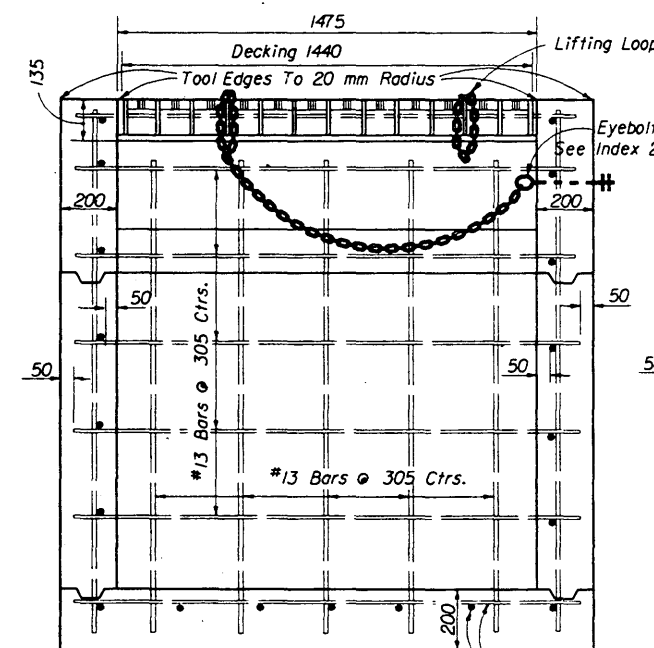


SECTION AA

15M Bars @ 455 Ctrs.

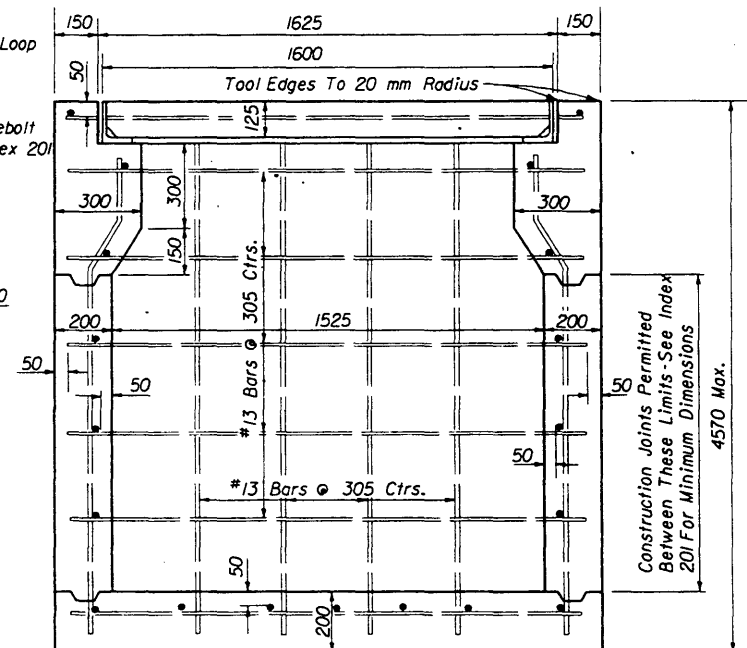


SECTION BB

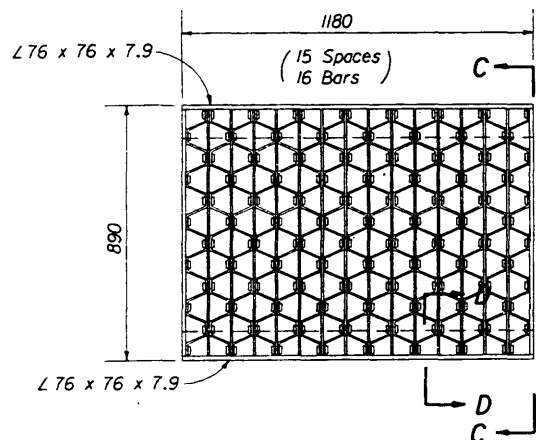


SECTION AA

15M Bars @ 300 Ctrs.



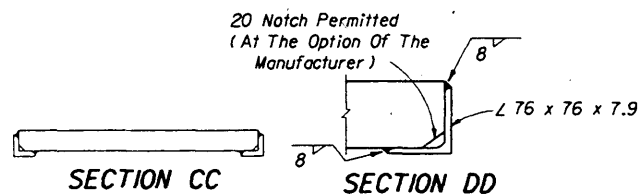
SECTION BB



STEEL GRATE

Steel Grating, Straight Bars 75 x 6 Reticuline Bars 50 x 5

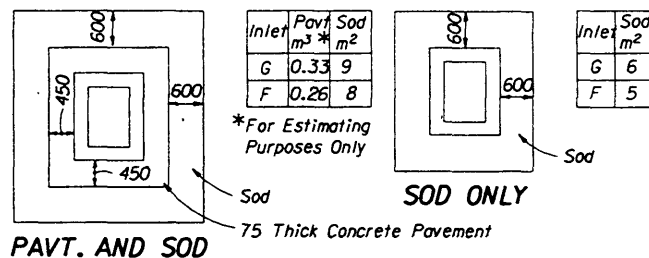
TYPE F



SECTION CC

SECTION DD

20 Notch Permitted (At The Option Of The Manufacturer)



PAVT. AND SOD

Notes: 1. Pavement and/or sod to be used only where called for in the plans.  
2. Cost of paving to be included in cost of inlet.

PAVEMENT AND SODDING

TYPE G

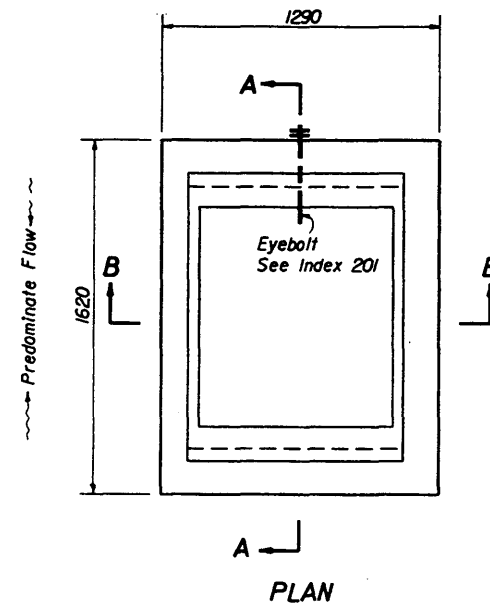
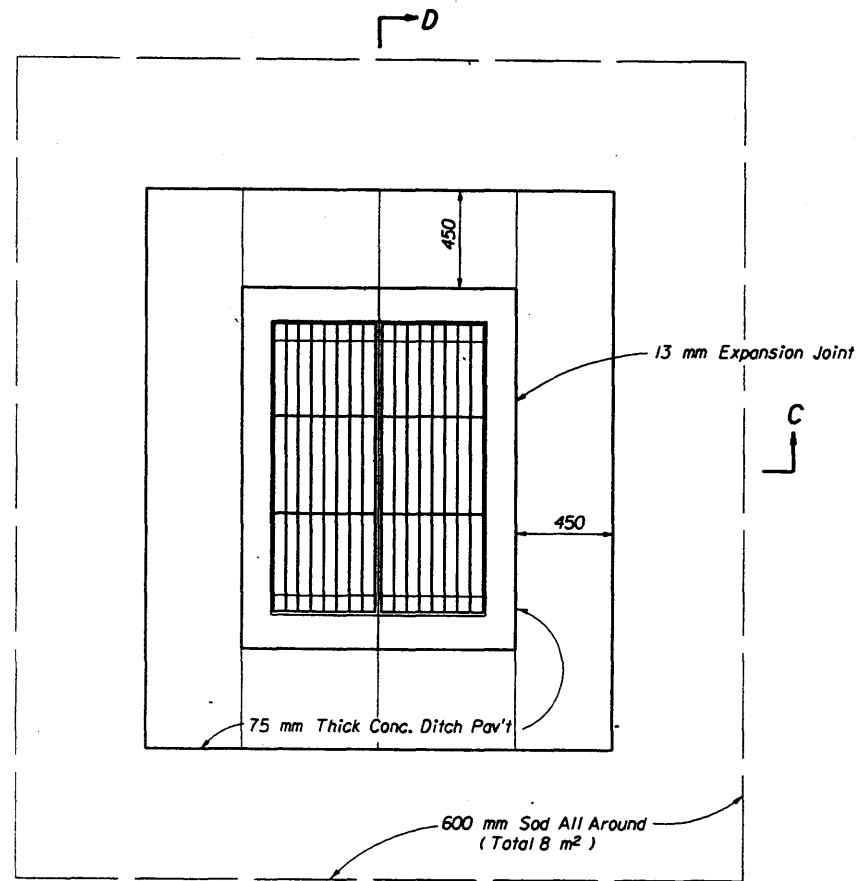
GENERAL NOTES

- These inlets are designed for use in ditches, medians, pavement areas, or other areas subject to heavy wheel loads where debris is minimal and is subject to pedestrian and/or bicycle traffic.
- When alternate G grate is specified in plans, the grate is to be hot dipped galvanized after fabrication.
- These inlets may be used with Alt. B structure bottoms, Index 200. The inlet and bottom combinations are to be paid for under the contract unit price for inlets (DT Bot, Type F (or G)) (J Bot, Depth), EA.
- For supplemental details (Type F only) see index 201.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

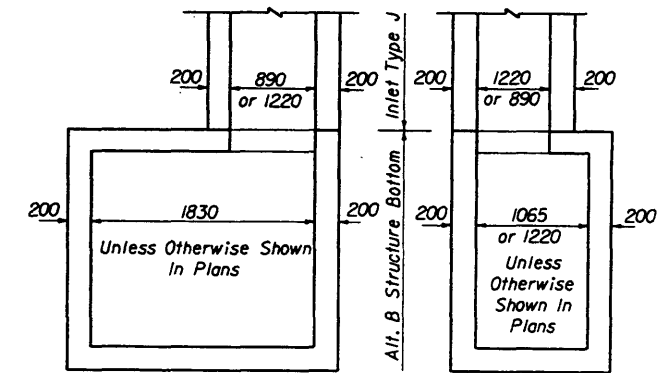
DITCH BOTTOM INLETS  
TYPES F & G

Names	Dates	Approved By	
Designed By	TWJ	01/50	J. A. McLenroe State Drainage Engineer
Drawn By	MEF	01/50	
Checked By	WHM	01/50	
Revision	98	Sheet No.	Index No.
		1 of 1	233

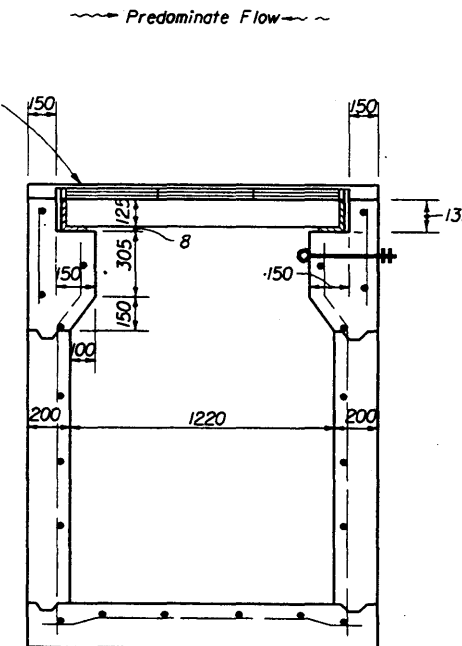
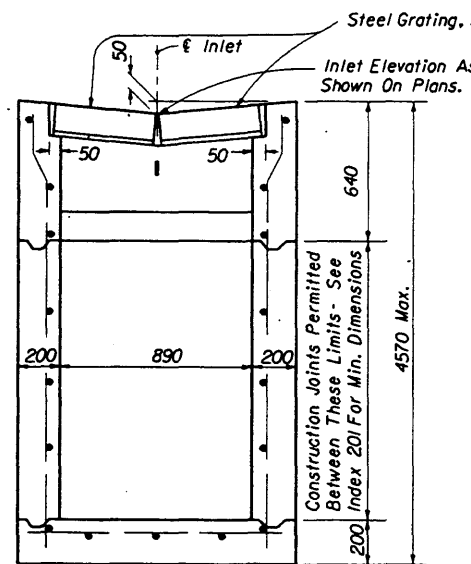
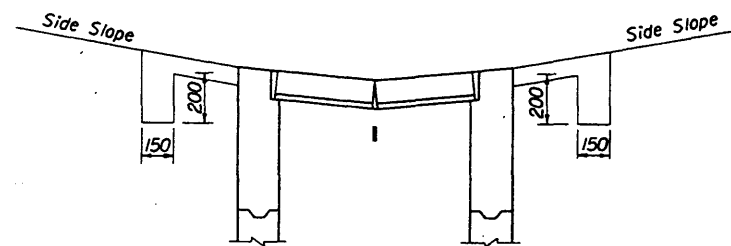


RECOMMENDED MAXIMUM PIPE SIZES	
Inlet Inside Width (mm)	Pipe Size (mm)
890	600
1220	900

Note: Recommended sizes are for concrete pipe. Sizes for other types of pipe must be verified for fit in accordance with Index No. 201. For larger pipe see bottom detail right and Index No. 200.

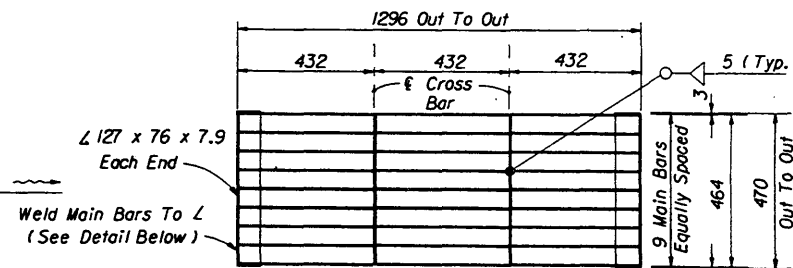
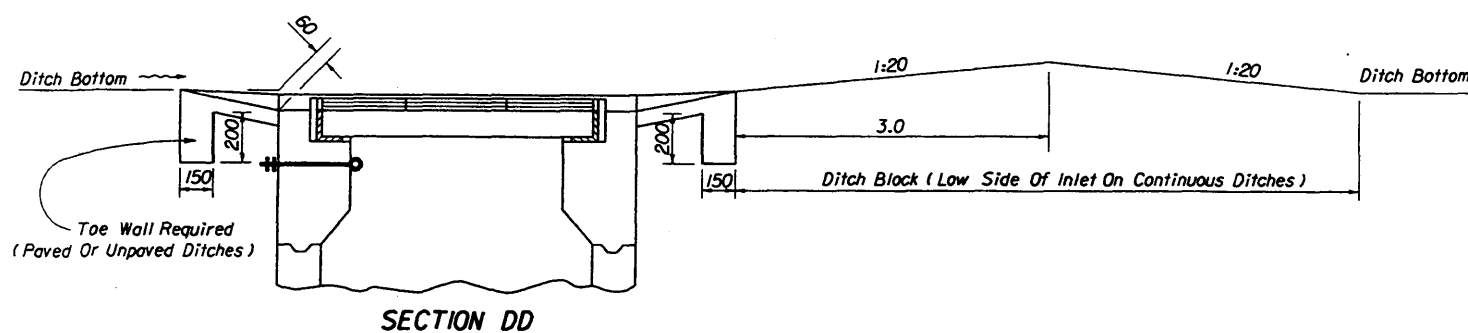


NOTE: Alt. B Structure Bottom Only. See Index 200 for structure bottom details and hole reinforcement.



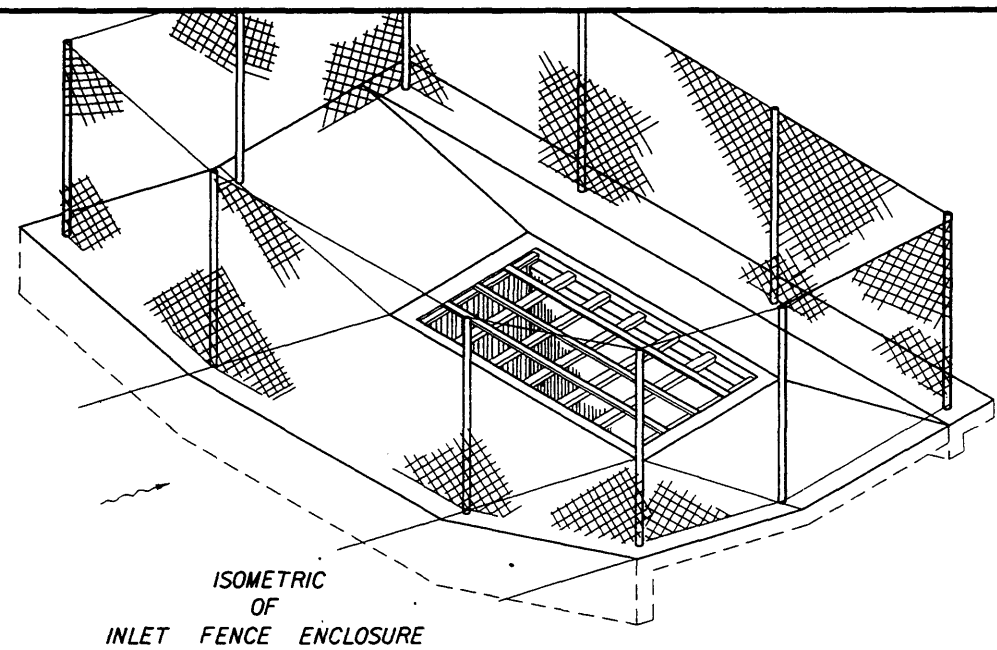
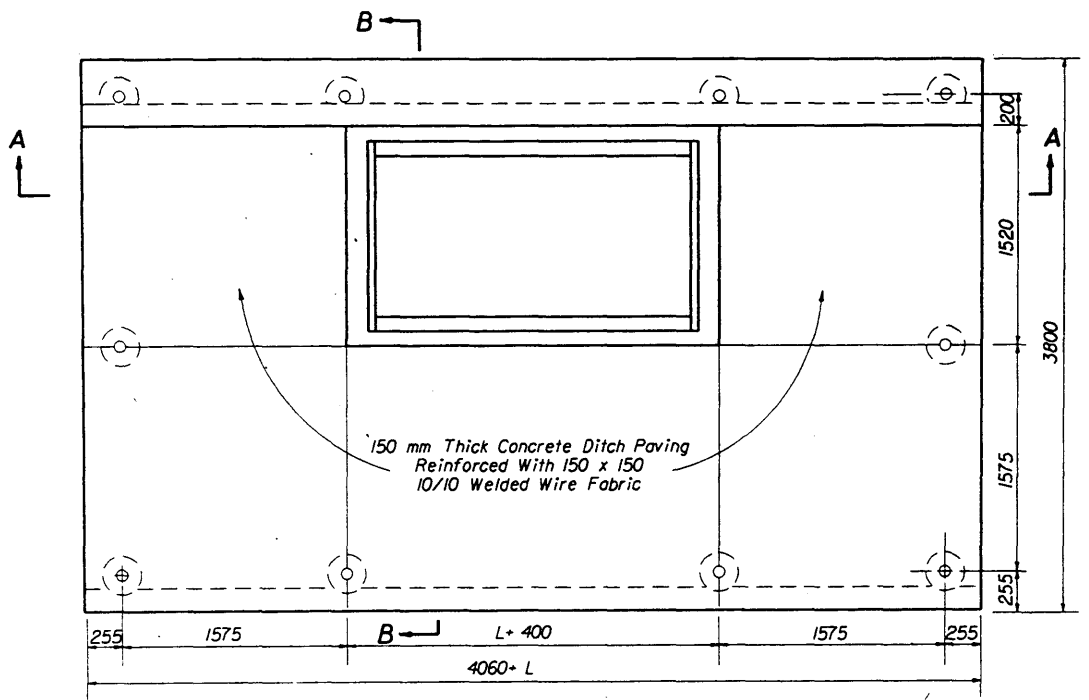
GENERAL NOTES

- This inlet is designed for ditches, medians or other areas subject to heavy wheel loads, where only light debris is expected and pedestrian traffic is anticipated. NOTICE: Inlet not for use in areas subject to bicycle traffic.
- Reinforcing- #13 bars at 305 mm centers both ways with 50 mm clearance to inside face. Cut or bend bars out of way of pipe when necessary; bars to clear pipe by 40 mm.
- When alternate G grate is specified in plans the grate is to be hot dipped galvanized after fabrication.
- For supplemental details, see Index 201.
- Cost of ditch paving to be included in cost of inlet. Sodding to be paid for under contract unit price for Sodding, M2.

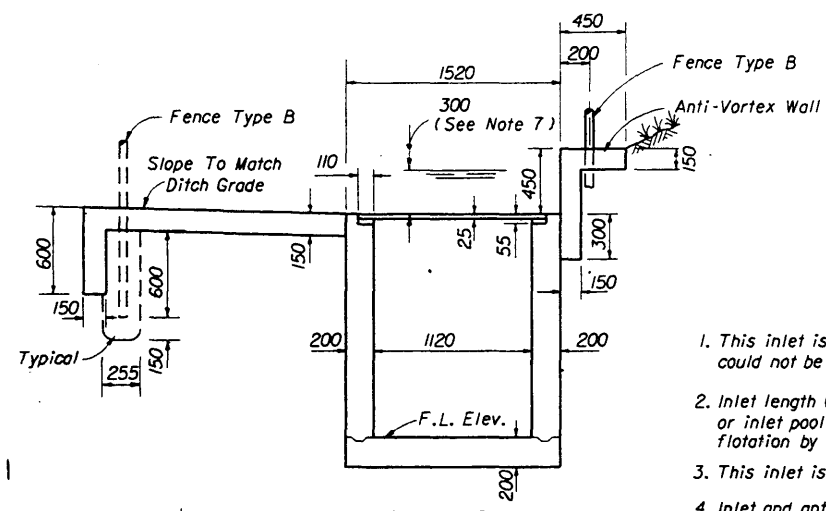
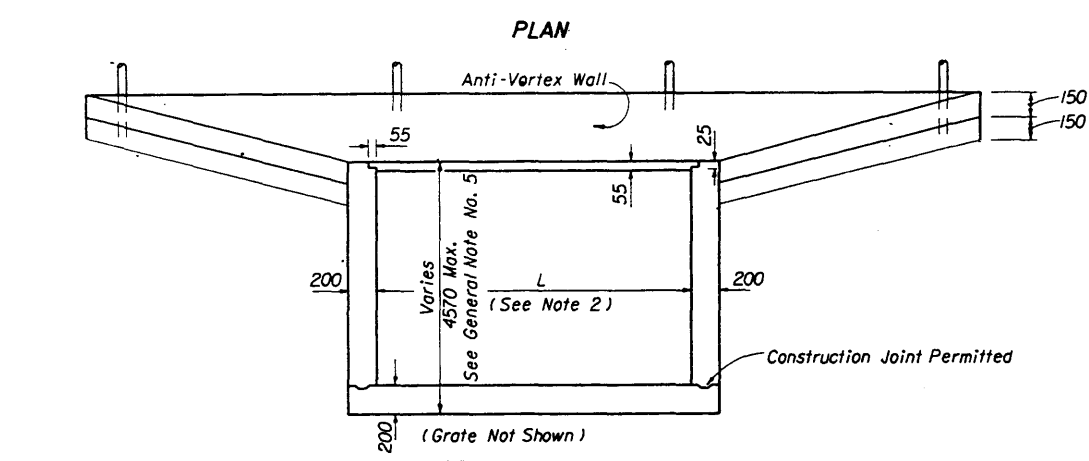


STEEL GRATING  
 Note: Two Required Per Inlet  
 Main Bars 125 x 6 (Notched For Cross Bars).  
 Cross Bars 45 x 6 (Continuously Welded At Main Bar Notches).  
 Main Bars And Cross Bars Flush On Top.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN			
<b>DITCH BOTTOM INLET TYPE J</b>			
Names	Dates	Approved By	
Designed By	LMF	08/76	 State Drainage Engineer
Drawn By			
Checked By	SRL	08/76	
Revision		98	Index No.
		1 of 1	234

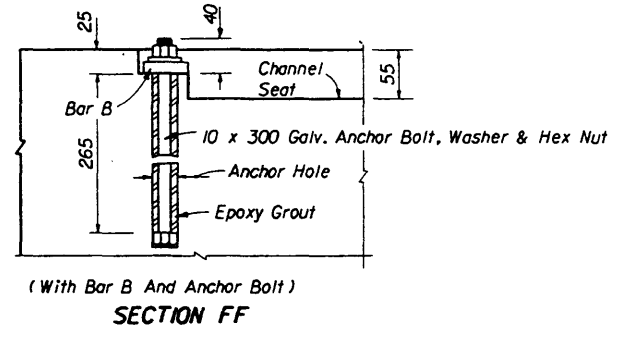
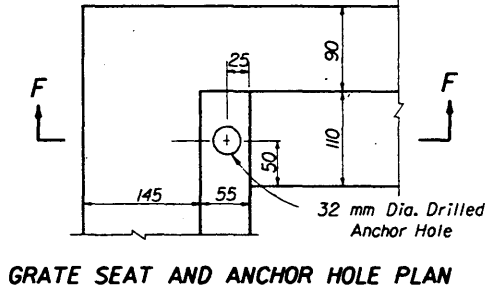
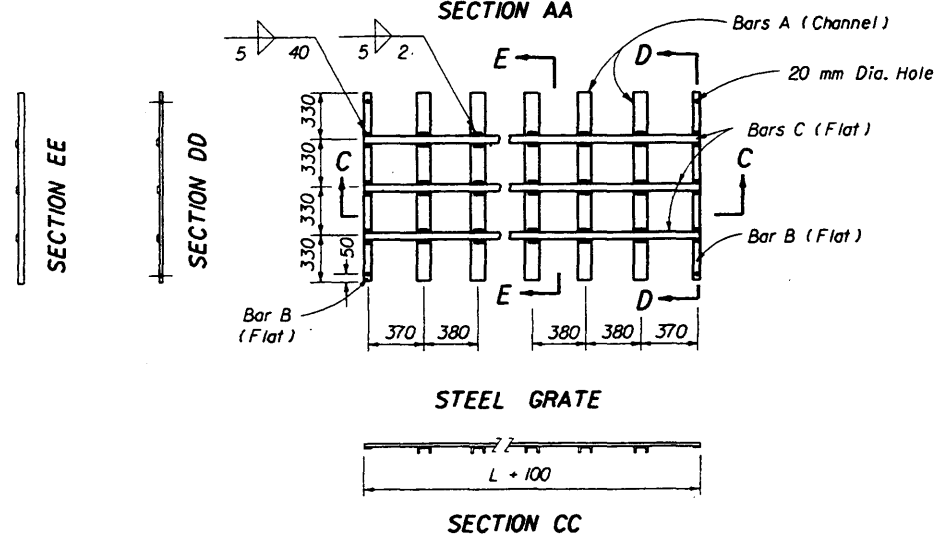


PIPE SIZE	L	BILL OF STEEL			STEEL WEIGHT	
		BAR	No. REQ'D.	LENGTH	CHANNEL	FLAT
					100 x 8 (kg)	50 x 14 (5.5kg)
750 & 900	1450	A	3	1320	32	15
		B	2	1320		26
		C	3	1550		
1050 & 1200	1830	A	4	1320	43	15
		B	2	1320		32
		C	3	1930		
1350 & 1500	2210	A	5	1320	53	15
		B	2	1320		38
		C	3	2310		
1650 & 1800	2590	A	6	1320	64	15
		B	2	1320		45
		C	3	2690		
SPECIAL	2970	A	7	1320	74	15
		B	2	1320		51
		C	3	3070		
SPECIAL	3350	A	8	1320	85	15
		B	2	1320		57
		C	3	3450		
SPECIAL	3730	A	9	1320	96	15
		B	2	1320		63
		C	3	3830		
SPECIAL	4110	A	10	1320	106	15
		B	2	1320		70
		C	3	4210		
SPECIAL	4490	A	11	1320	117	15
		B	2	1320		76
		C	3	4590		
SPECIAL	4870	A	12	1320	127	15
		B	2	1320		82
		C	3	4970		
SPECIAL	5250	A	13	1320	138	15
		B	2	1320		89
		C	3	5350		
SPECIAL	5630	A	14	1320	148	15
		B	2	1320		95
		C	3	5730		



GENERAL NOTES

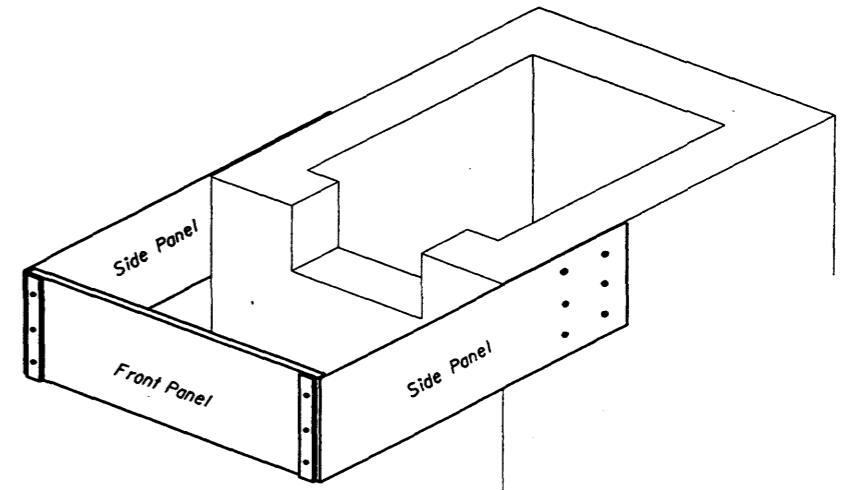
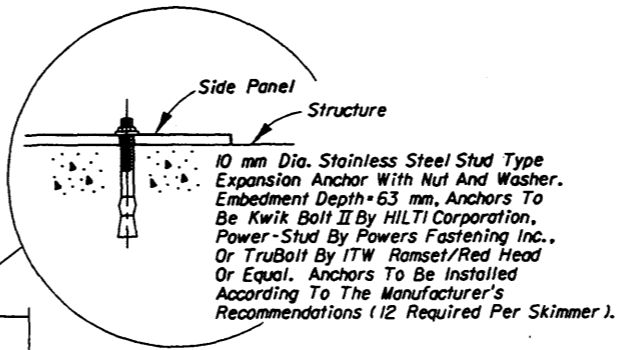
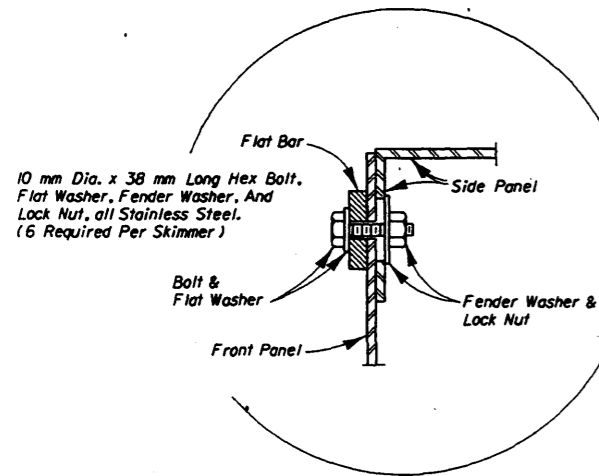
- This inlet is to be used at locations having high flow rates, usually where an endwall could not be utilized without hazardous intake.
- Inlet length (L) shall be set by the designer for the greater of either culvert requirement or inlet pool not to exceed 300 mm depth. Structures over 1830 mm in depth are to be checked for flotation by the designer of project drainage.
- This inlet is not intended for use with Alternate B structure bottoms.
- Inlet and anti-vortex wall to be Class I Concrete.
- Reinforcing - #13 bars at 305 mm centers both ways for pipe sizes up to 1800 mm diameter; 40 mm clearance to inside face and bottom of Inlet. See Index No. 201, Sh. 4 & 5 for reinf. steel modification for depths 3960 mm to 4570 mm. Bend top and corner bars to clear anchor holes. Inlets for special size pipe require special reinforcement design and design approval by the project design engineer.
- Channel section C 75 x 150 may be used as an alternate for the C 100 x 135 channel.
- Channels and bars shall be ASTM A 242M, A 572M or A 588M, 425 MPa steel, galvanized in accordance with Section 962-7 of the Standard Specifications.
- Fence enclosure shall be Fence Type B (Index No. 452). All posts to be set in concrete. A minimum of 10 posts required. Corner and approach side posts to be 75 mm nominal diameter.
- Cost of ditch paving, anti-vortex wall, grate, concrete, reinforcing steel and fence enclosure to be included in the cost of inlet. Inlet to be paid for under the contract unit price for Inlets (DT Bot Type K), EA.



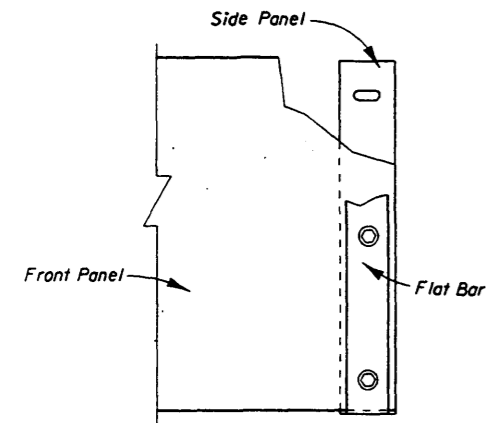
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**DITCH BOTTOM INLET  
TYPE K**

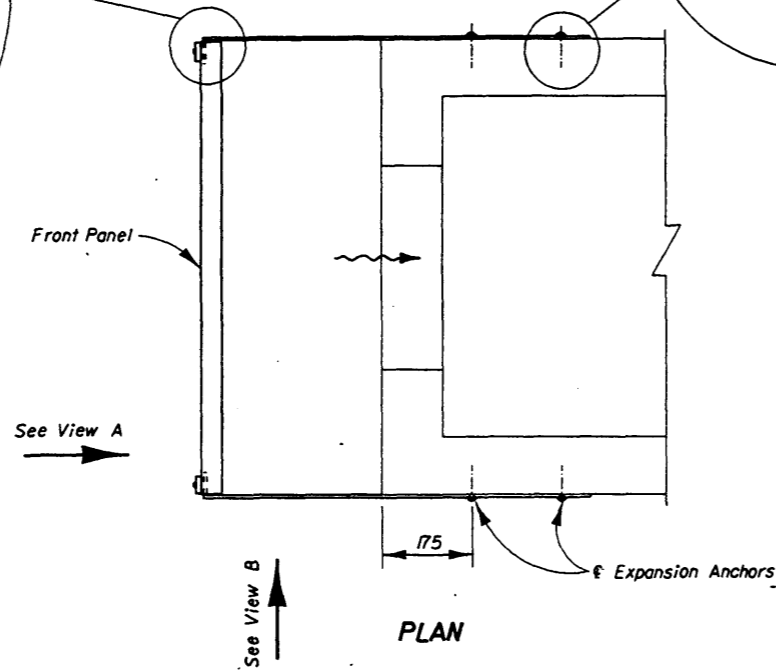
Designed By	Names	Dates	Approved By <i>R. McLenore</i>		
Drawn By	SM	6/79	State Drainage Engineer		
Checked By	JC	6/79	Revision	Sheet No.	Index No.
			00	1 of 1	235



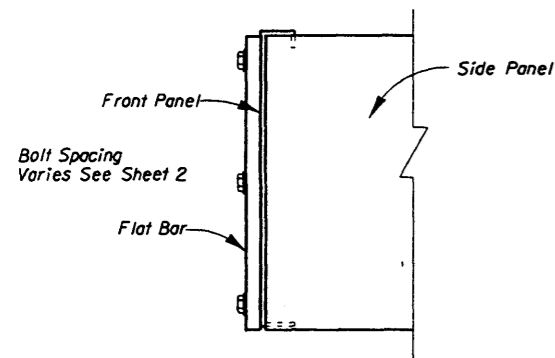
PICTORIAL VIEW



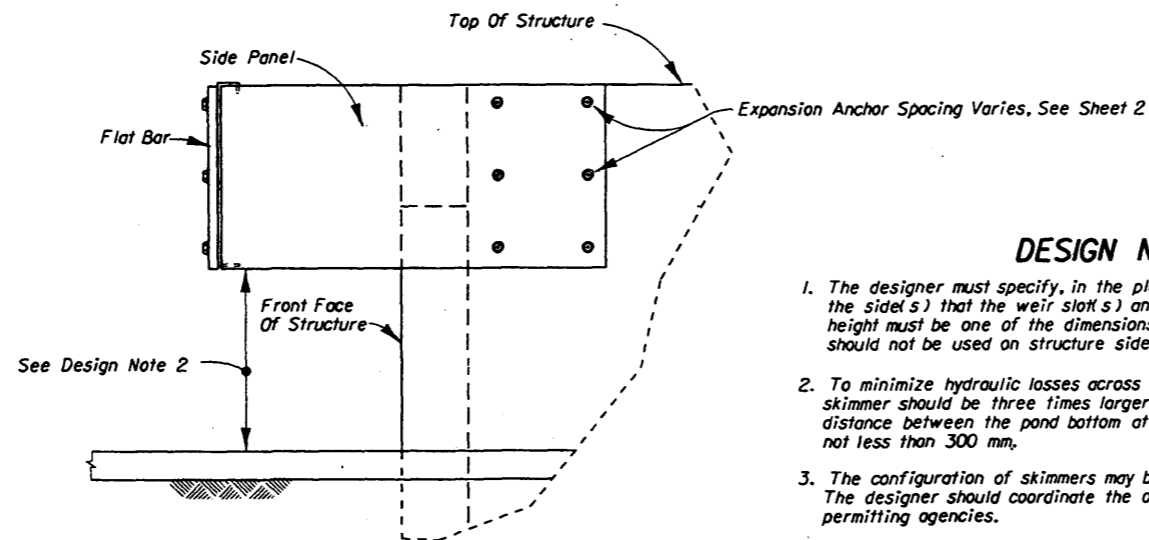
VIEW A



PLAN



VIEW B




SIDE VIEW

GENERAL NOTES

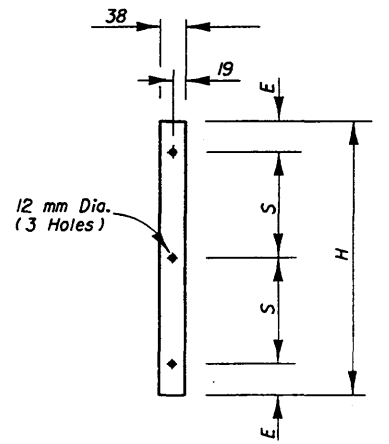
1. This skimmer is intended for use on Type C, D, or E Ditch Bottom Inlets that are used as outlet control structures of stormwater management facilities.
2. The side panels are dimensionally symmetric, therefore they may be used on either side of the structure.
3. Two (2) skimmers may be constructed on one structure provided they are on opposite ends.
4. The width of the front panel (dimension W) shall be the same as the outside dimension across the front of the structure.
5. The front panel, side panels, and flat bars are to be hot dipped galvanized after fabrication.
6. The location of the reinforcing steel in these structures must conform to the applicable standards to avoid conflict with the expansion anchors used to attach the skimmer.
7. Gates to be used on the inlets unless otherwise specified in the plans.
8. A skimmer consists of two (2) side panels, one front panel, two (2) flat bars, and accessory hardware. The cost of skimmers is to be included in the cost of the inlet.

DESIGN NOTES

1. The designer must specify, in the plans, the skimmer height (dimension H) and the side(s) that the weir slot(s) and skimmer(s) are located. The skimmer height must be one of the dimensions shown in the table on Sheet 2. The skimmer should not be used on structure sides with outside dimensions greater than 1900 mm.
2. To minimize hydraulic losses across the skimmer, the flow area under the skimmer should be three times larger than the flow area of the weir slot. The distance between the pond bottom at the structure and the skimmer shall be not less than 300 mm.
3. The configuration of skimmers may be subject to regulatory requirements. The designer should coordinate the outlet control structure details with the permitting agencies.
4. Where this skimmer is used, the designer should reference this index with the outlet control structure details. Where a different skimmer design is needed, the designer should provide skimmer details in the plans.
5. The designer shall evaluate if a grate is needed for safety reasons. Where a grate is not needed for safety reasons and is not desirable for hydraulic or other reasons, the designer may omit the grate by stating so in the outlet control structure details.
6. The designer must show the configuration of the weir slot(s) in the outlet control structure detail.

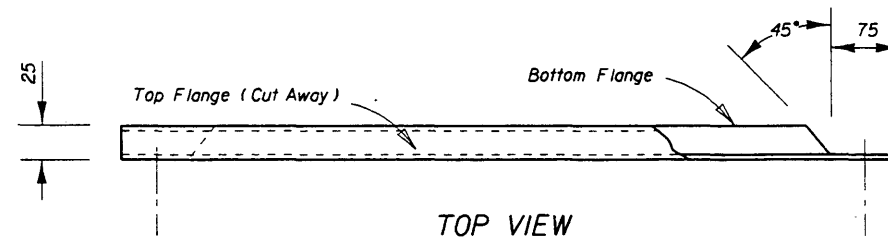
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
SKIMMER FOR OUTLET CONTROL STRUCTURES				
Names	Dates	Approved By		
Designed By	CPH	02/99	 State Drainage Engineer	
Drawn By	JT	02/99	Revision	Sheet No.
Checked By	WPH	02/99	00	1 of 2
				Index No. 240

DIMENSIONS				
Skimmer Height as specified in the plans				Bolt Spacing
H	D	E	L	S
Millimeters				
300	80	75	700	75
350	80	75	700	100
400	80	75	700	125
450	80	75	700	150
500	105	100	775	150
550	105	100	775	175
600	105	100	775	200
650	105	100	775	225
700	105	100	775	250
750	130	125	775	250
800	130	125	775	275
850	130	125	775	300
900	155	150	775	300
950	155	150	775	325
1000	155	150	775	350

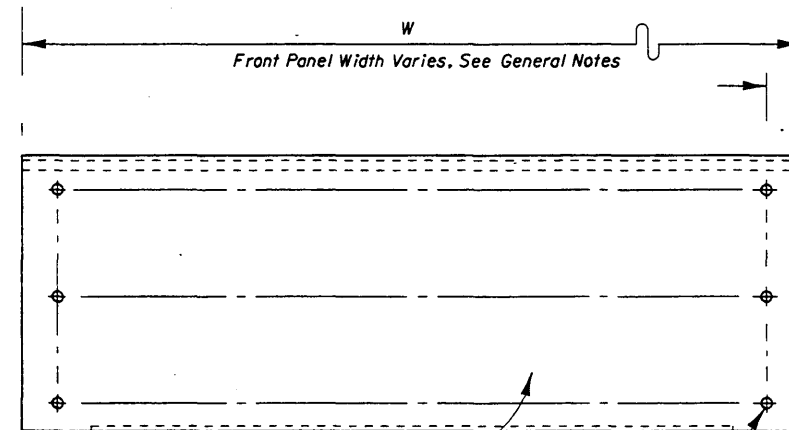


6.4 mm Thick x 38 mm Wide

FLAT BAR

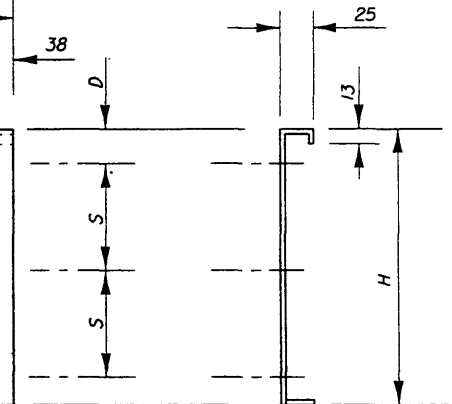


TOP VIEW

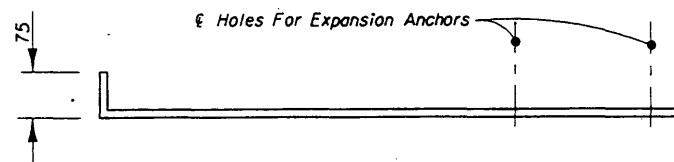


FRONT VIEW

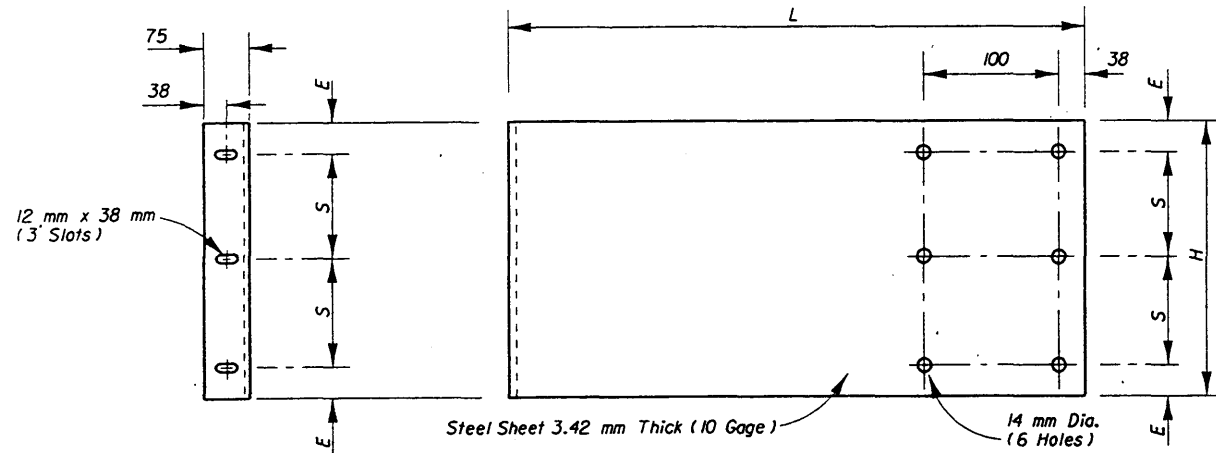
FRONT PANEL



END VIEW



TOP VIEW



END VIEW (FRONT)

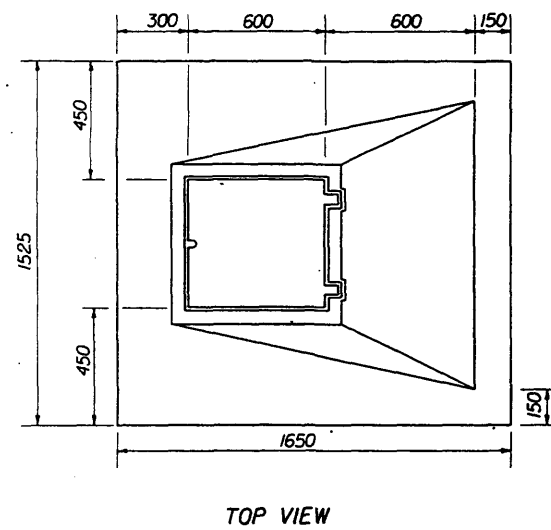
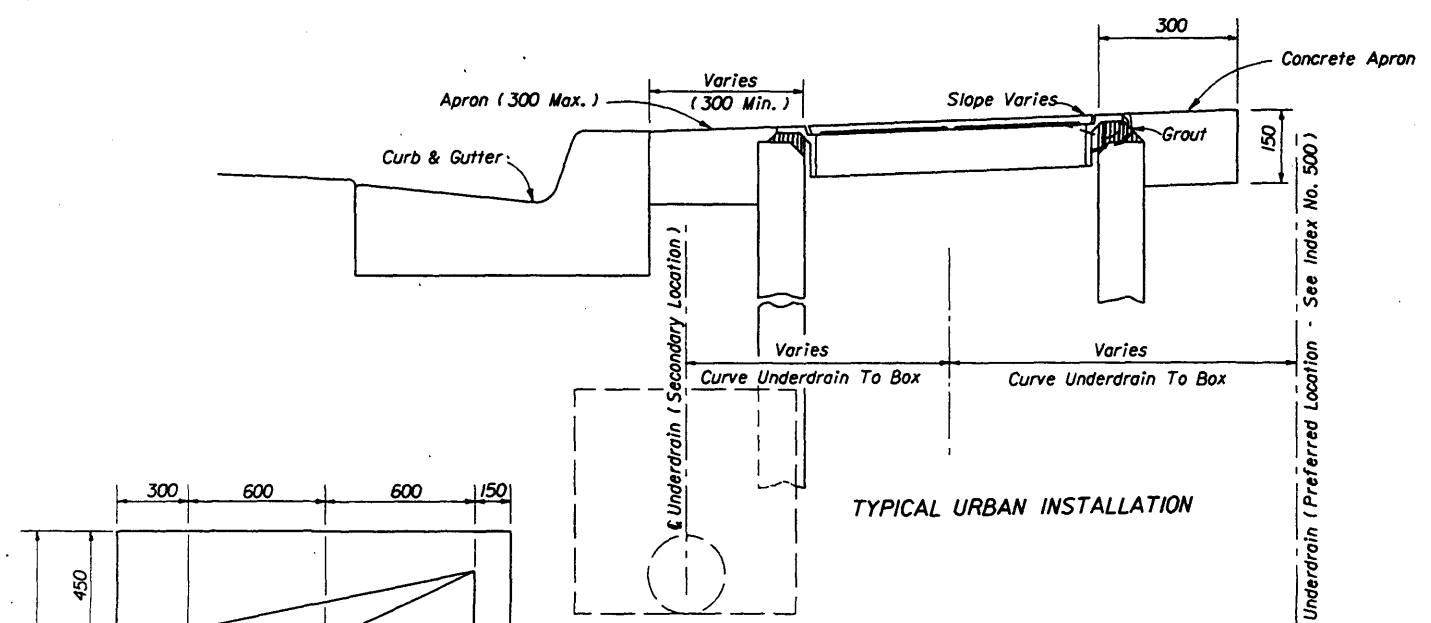
SIDE VIEW

SIDE PANEL

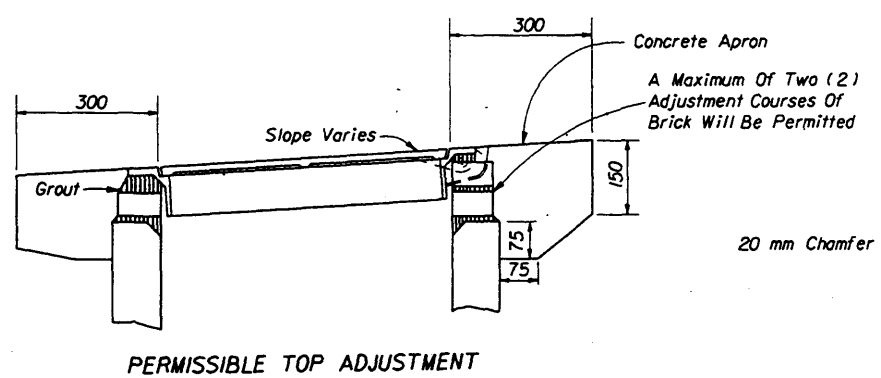
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

SKIMMER FOR  
OUTLET CONTROL STRUCTURES

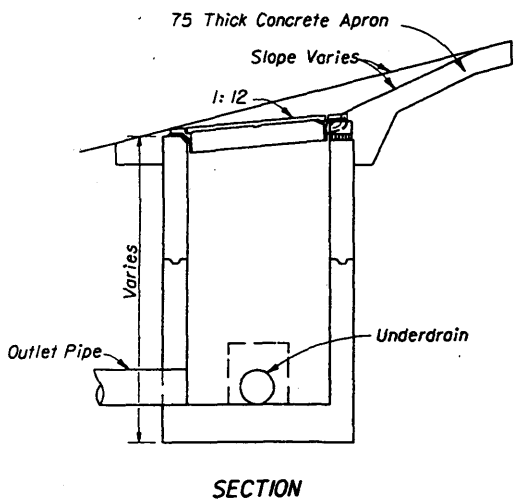
Names	Dates	Approved By		
Designed By	CRH	02/99	State Drainage Engineer	
Drawn By	JT	02/99	Revision	Sheet No.
Checked By	WPH	02/99	00	2 of 2
				Index No.
				240



TYPICAL URBAN INSTALLATION

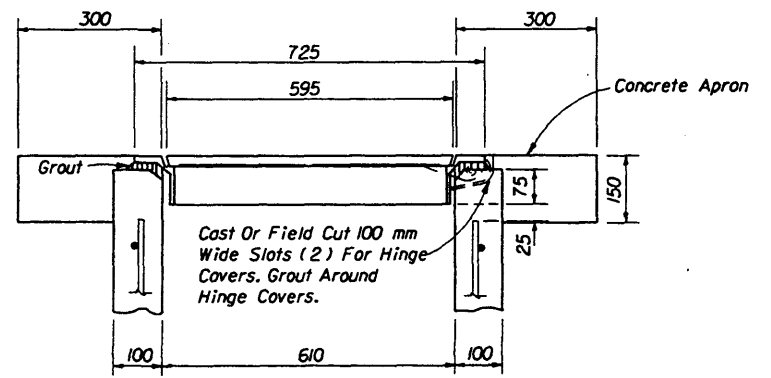


PERMISSIBLE TOP ADJUSTMENT

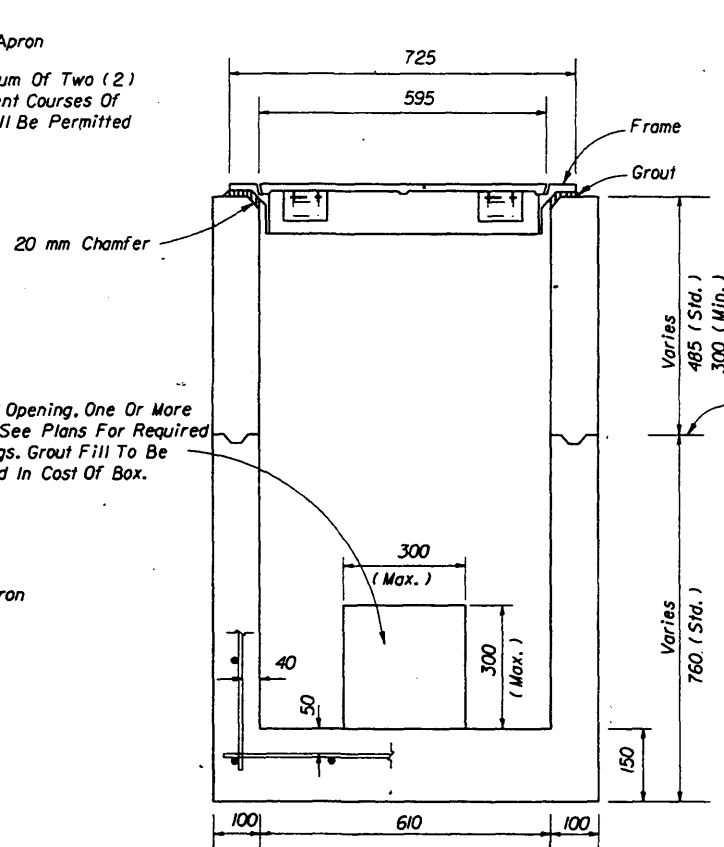


SECTION

TYPICAL INSTALLATION ON SLOPES

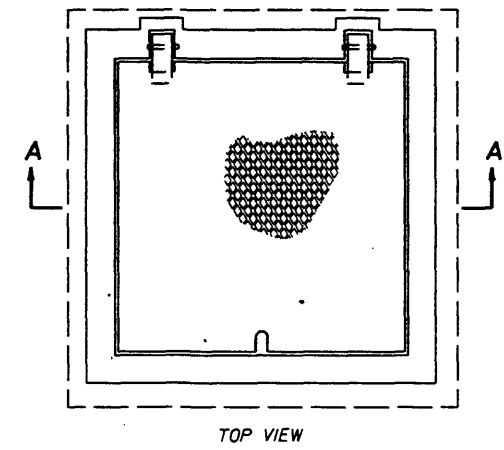


TYPICAL TOP AND APRON

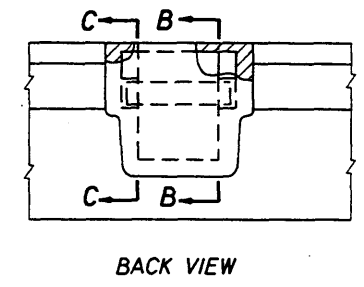


SECTION AA

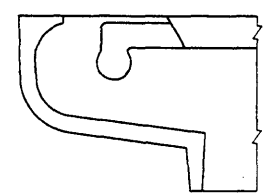
BOX AND TOP



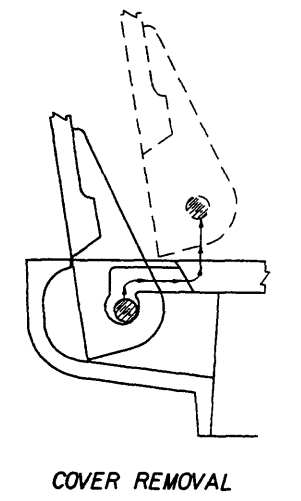
TOP VIEW



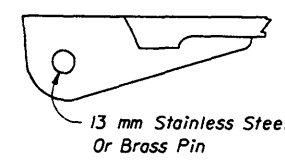
BACK VIEW



SECTION CC



COVER REMOVAL



SECTION BB

HINGE DETAIL

GENERAL NOTES

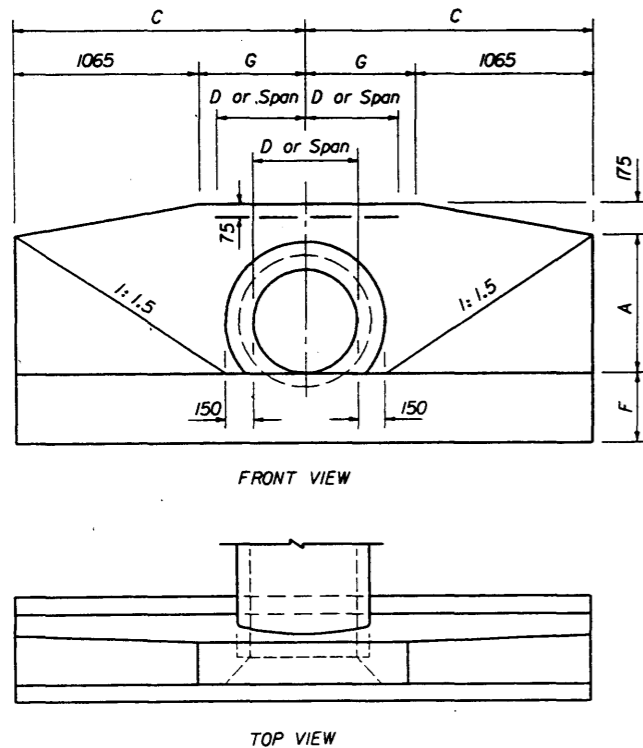
1. Cast iron cover and frame to be Neenah Foundry Company R-6660-JH, U.S. Foundry Manufacturing Corporation No. A-632 or equal. Neenah R-6660-JH detailed this index.
2. Box to be Class I Concrete, reinforced with #10 bars on 275 mm centers both ways, sides and bottom.
3. Concrete apron to be included in the contract unit price for Underdrain Inspection Box, EA.
4. All covers shall be furnished with pick holes. Fitted lifts or handles are not permitted.
5. Manhole Type P Alternate A, Index 200, with Type I Frame and Cover, Index 201, may be used in lieu of the box detailed on this sheet, and is recommended when high ADT increases chance of the repeated vehicle loadings.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

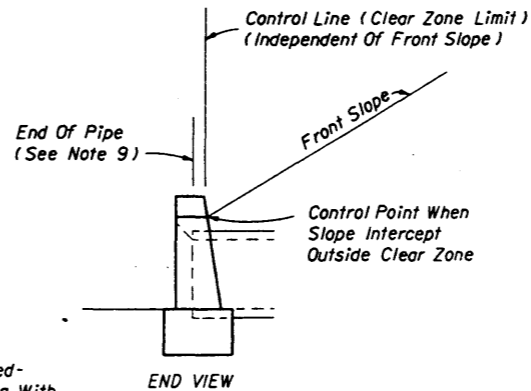
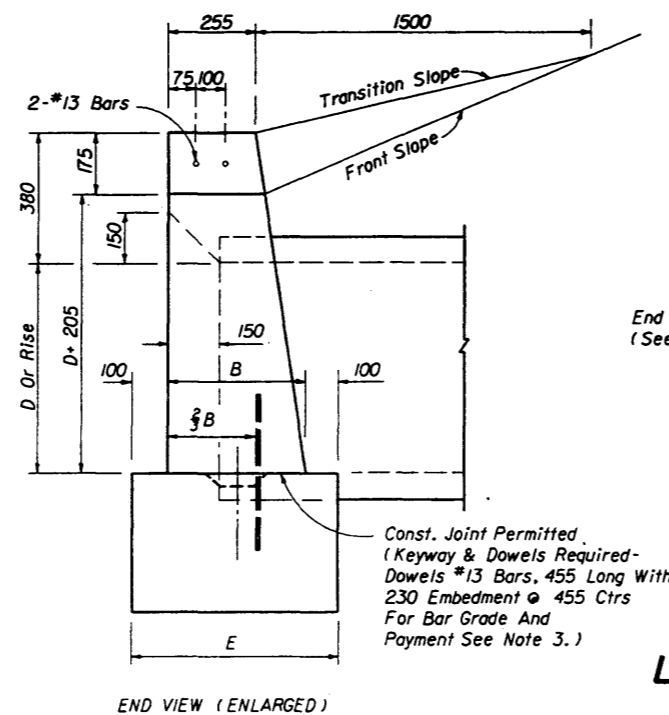
UNDERDRAIN  
INSPECTION BOX

Names	Dates	Approved By		
Designed By	WS	05/81	 State Drainage Engineer	
Drawn By	JM	05/81		
Checked By	JVC	05/81		
Revision		98	Sheet No.	Index No.
			1 of 1	245



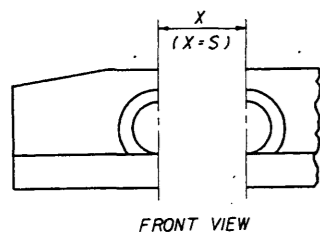


Const. Joint Permitted See End View (Enlarged)

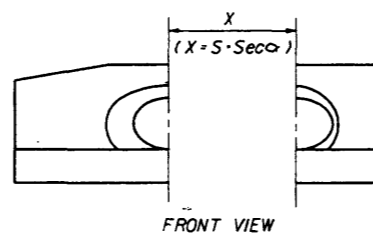


### STANDARD LOCATION CONTROL

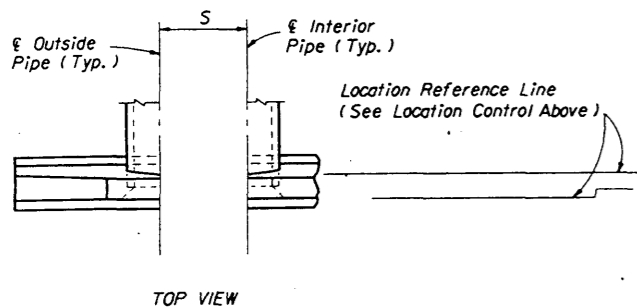
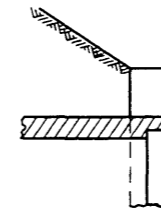
### ENDWALL DIMENSIONS (EXCLUSIVE OF MULTIPLE PIPE SPACING)



FRONT VIEW

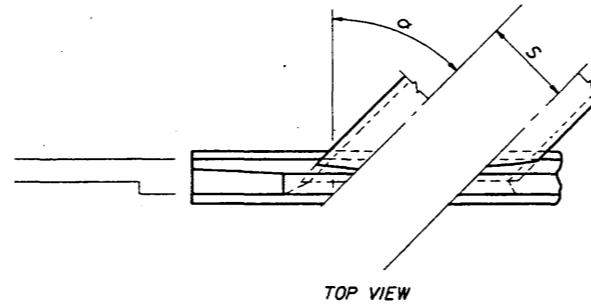


FRONT VIEW



TOP VIEW

### NORMAL PIPE



TOP VIEW

### SKewed PIPE

#### LEGEND

- $\alpha$  Pipe Skew
- S Center To Center Pipe Spacing
- X Centerline To Centerline Dimension At Face Of Headwall

### GENERAL NOTES

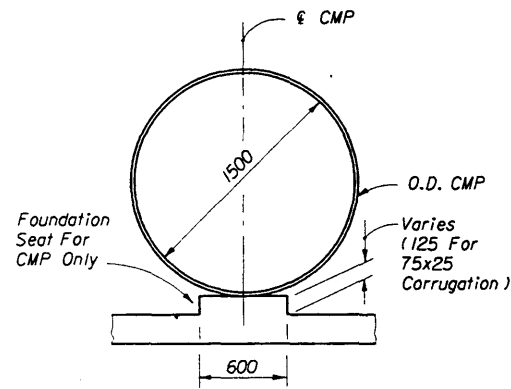
1. Endwall dimensions, locations and positions are for round and elliptical concrete pipe and for round and pipe-arch corrugated metal pipe. Round concrete pipe shown.
2. Front slope and ditch transitions shall be in accordance with Index No. 280.
3. Endwalls may be cast in place or precast concrete. Reinforcing steel shall be 300 MPa or 400 MPa. Additional reinforcement necessary for handling precast units shall be determined by the Contractor or the supplier. Cost of reinforcement shall be included in the contract unit price for Concrete, (Endwalls).
4. All exposed corners and edges of concrete are to be chamfered 20 mm.
5. Concrete meeting the requirements of ASTM C-478M (27 579 kPa) may be used in lieu of Class I concrete in precast items manufactured in plants which are under the Standard Operating Procedures for the inspection of precast drainage products.
6. On outfall ditches with side slopes flatter than 1:1.5, provide 6.0 m transitions from the endwall to the flatter side slopes, right of way permitting.
7. For sodding around endwalls see Index No. 281.
8. Payment for concrete quantities for endwalls skewed to the pipe shall be made on the following basis:
 

Endwall Skew To Pipe	Use Tabulated Value
0° to 5°	0°
6° to 15°	15°
16° to 30°	30°
31° or over	45°
9. Pipe length plan quantities shall be based on the pipe end locations shown in the standard location control end view, or lengths based on special endwall locations called for in the plans.
10. Payment for pipe in pipe culverts shall be based on plan quantities, adjusted for endwall locations subsequently established by the Engineer.
11. Endwalls to be paid for under the contract unit price for Concrete Class I (Endwalls), M3.

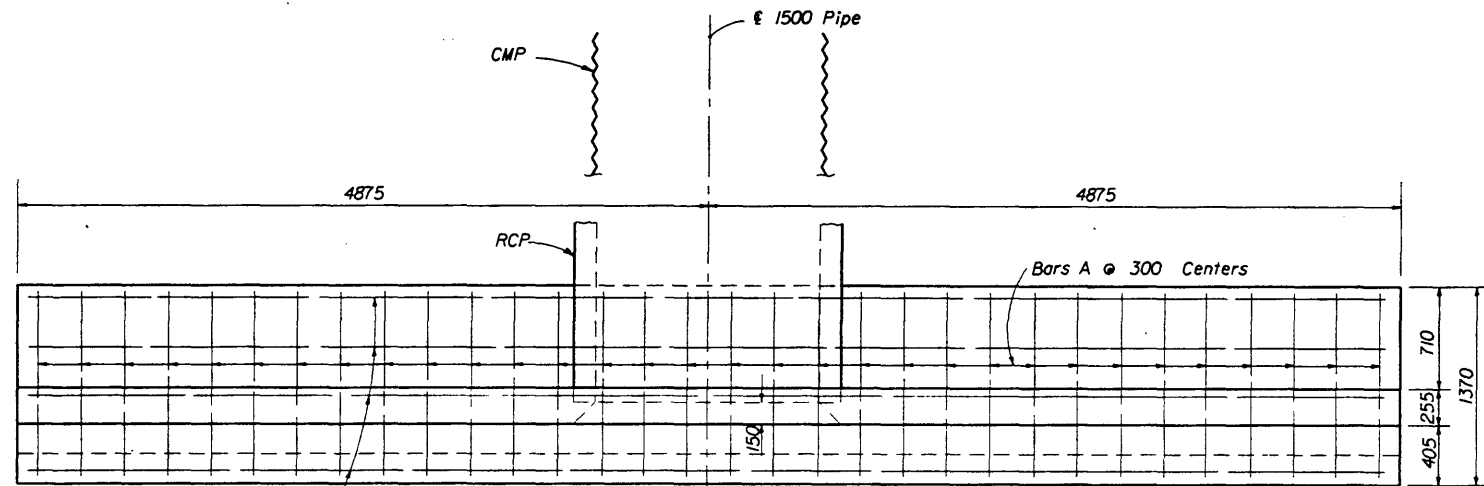
### ENDWALL POSITIONS FOR SINGLE AND MULTIPLE PIPE AND SPACING FOR MULTIPLE PIPE

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>STRAIGHT CONCRETE ENDWALLS SINGLE AND MULTIPLE PIPE</b>					
Designed By	HAB/EGR	7/3/83	Approved By <i>J. M. Lemire</i> State Drainage Engineer		
Drawn By	RWR/HSD	83	Revision	Sheet No.	Index No.
Checked By	JBW/JMG	83	98	1 of 2	250

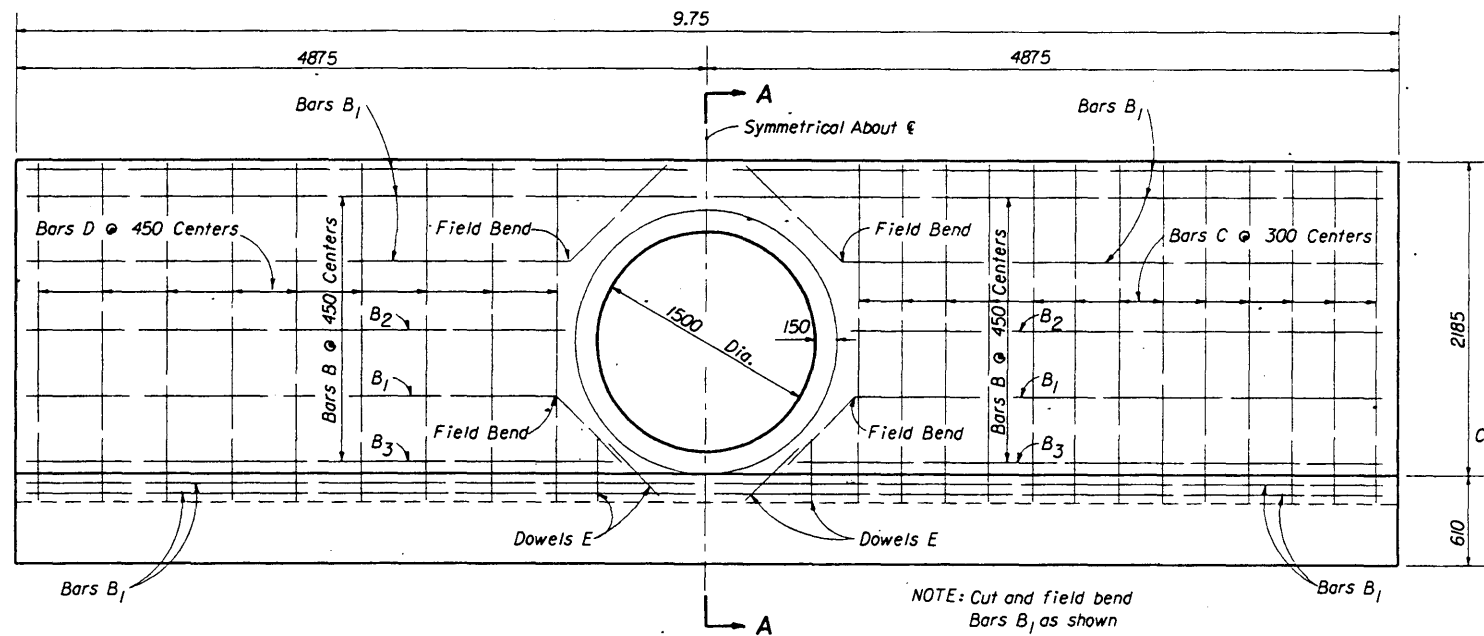




SECTION BB

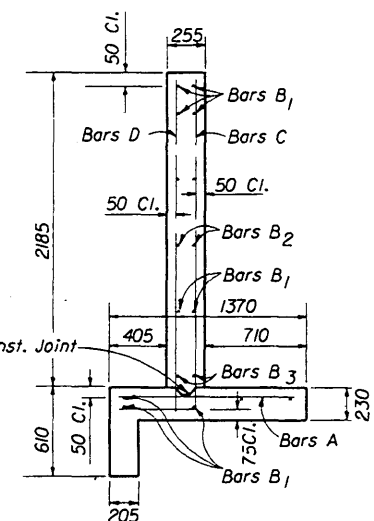


PLAN  
(Showing Bar In Footing)



HALF ELEVATION  
(Showing Bars In Front Face Of Wall)

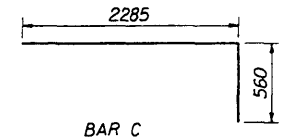
HALF ELEVATION  
(Showing Bars In Back Face Of Wall)



TYPICAL SECTION  
THRU ENDWALL

BILL OF REINFORCING STEEL					
MARK	SIZE	NO. REQ'D	LENGTH	LOCATION	BENDING
A	#13	32	1270	Footing	Straight
B <sub>1</sub>	#13	13	9650	Footing And Wall	Straight
B <sub>2</sub>	#13	4	3760	Wall	Straight
B <sub>3</sub>	#13	4	4190	Wall	Straight
C	#13	26	2845	Wall	Bend
D	#13	18	2285	Wall	Straight
E	#13	8	510	Footing And Wall	Straight

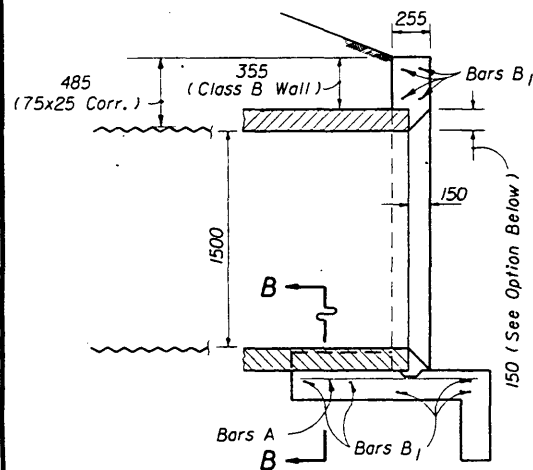
BENDING DIAGRAM



NOTE: All bar dimensions are out to out

ESTIMATED QUANTITIES

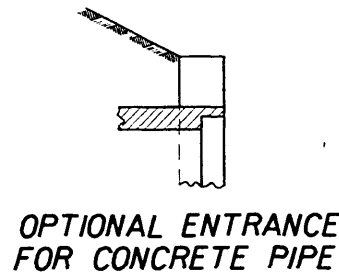
ITEM	UNIT	RCP	CMP
Concrete Class II	m <sup>3</sup>	8.60	8.70
Reinforcing Steel	kg	495	495



SECTION AA

GENERAL NOTES

1. Straight concrete endwalls are intended for use outside the clear zone.
2. Endwalls may be cast-in-place or precast construction. Cast-in-place endwalls shall conform to the details on this index and design specifications AASHTO 1989. Precast construction which adheres to this index, including any additional reinforcement required for handling which shall be determined by the Contractor or supplier, does not require additional approvals. Deviations from this index, for precast units, shall require the approval of the State Drainage Engineer prior to construction. For precast construction, see Index No. 201 for opening and grouting details.
3. Reinforcing steel shall be either 420 MPa or 450 MPa.
4. Concrete shall be Class II except concrete meeting the requirements of ASTM C 478M (27 579 kPa) may be used in lieu of Class II concrete in precast units manufactured in plants which are under the Standard Operating Procedures for the inspection of precast drainage products.
5. Chamfer: All exposed edges and corners to be chamfered 20 mm unless otherwise shown.
6. Metal pipe shall be bituminous coated on all surfaces in contact with concrete and 300 mm beyond the boundary of contact. Any suitable bituminous material may be field applied.
7. Sodding shall be in accordance with Index No. 281 and paid for under the contract unit price for Sodding, M2.
8. Basis of payment for either cast-in-place or precast construction shall be the estimated quantities tabulated on the Index. Concrete and reinforcing steel shall be paid for under the contract unit prices for Conc. Class II (Endwalls), M3 and Reinf. Steel (Roadway), KG.

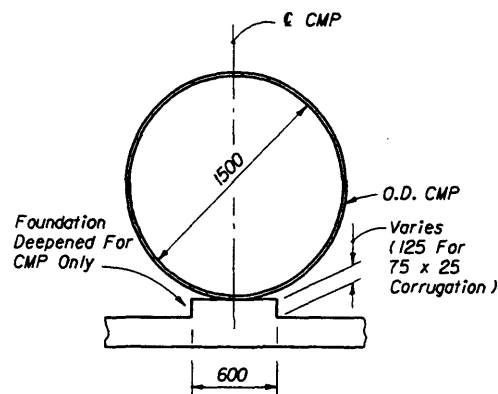


OPTIONAL ENTRANCE  
FOR CONCRETE PIPE

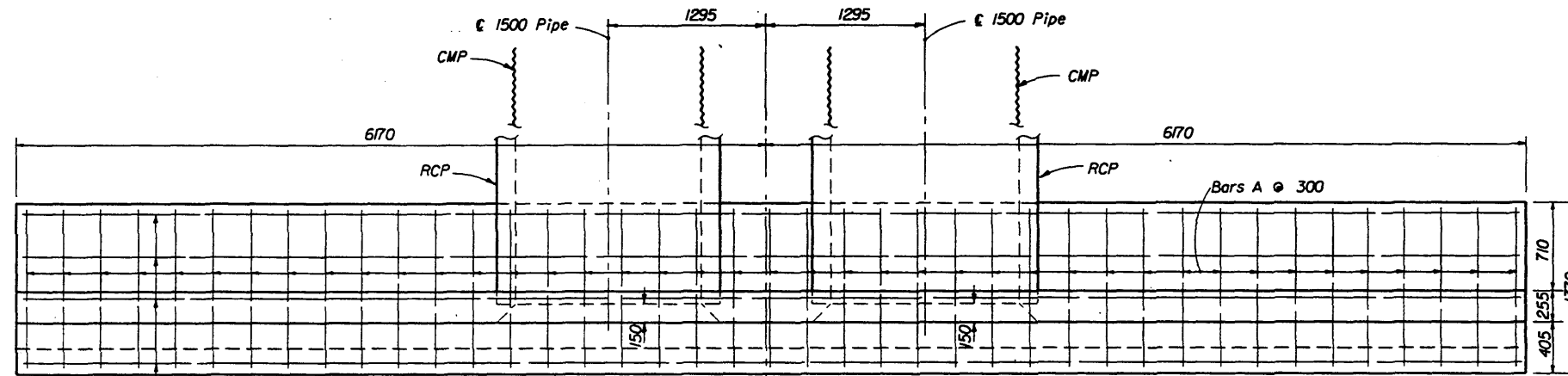
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

STRAIGHT CONCRETE ENDWALLS  
SINGLE AND DOUBLE 1500 PIPE

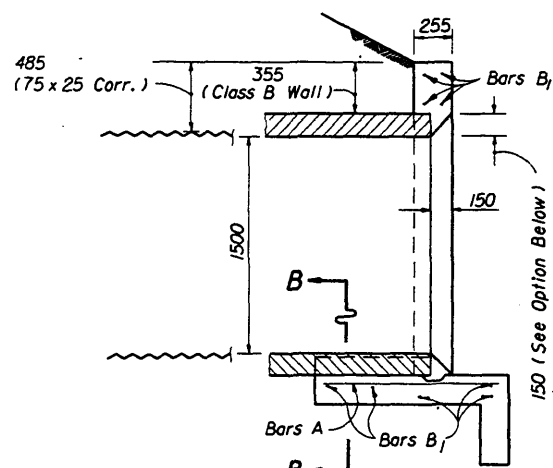
Names	Dates	Approved By <i>J. M. Lewis</i>		
Designed By		State Drainage Engineer		
Drawn By	TWJ 11/49	Revision	Sheet No.	Index No.
Checked By	WHM 11/49	00	1 of 2	251



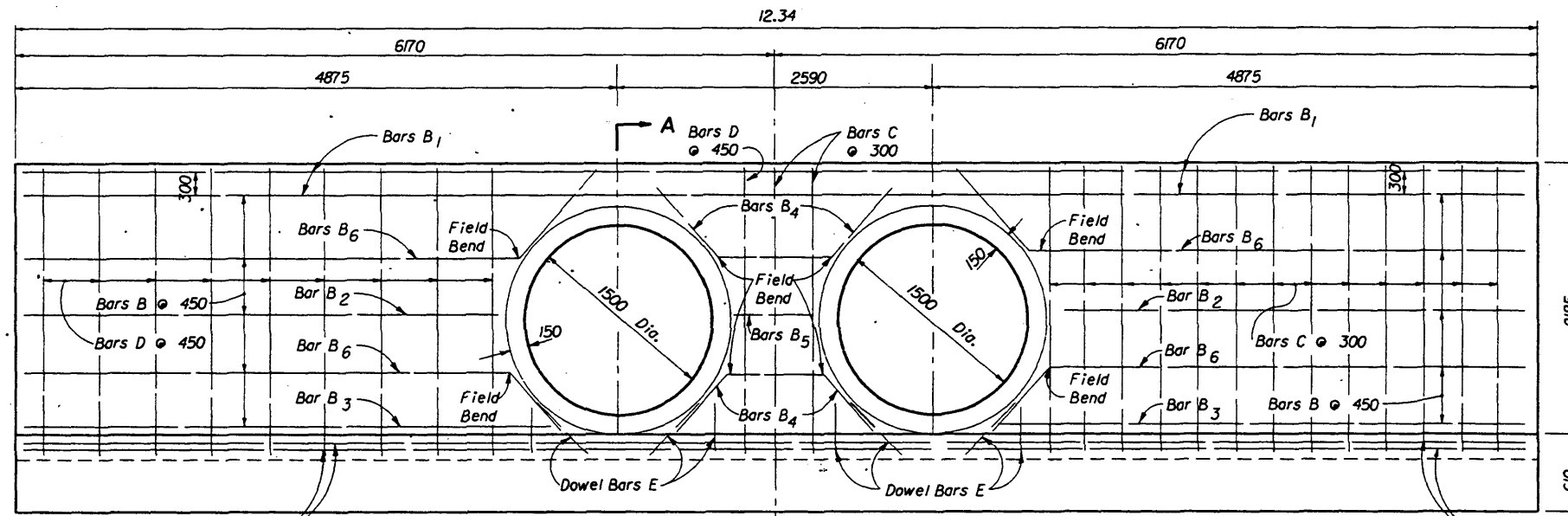
SECTION BB



PLAN  
(Showing Bar In Footing)

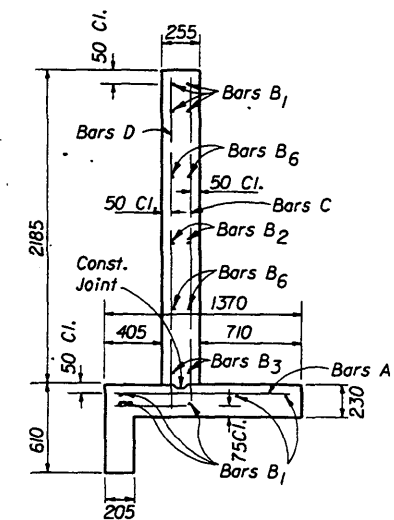


SECTION AA

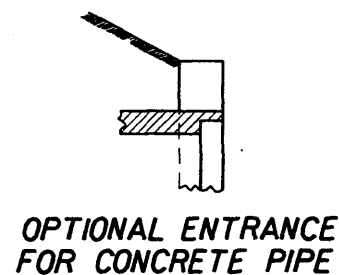


HALF ELEVATION  
(Showing Bars In Front Face Of Wall)

HALF ELEVATION  
(Showing Bars In Back Face Of Wall)



TYPICAL SECTION THRU ENDWALL

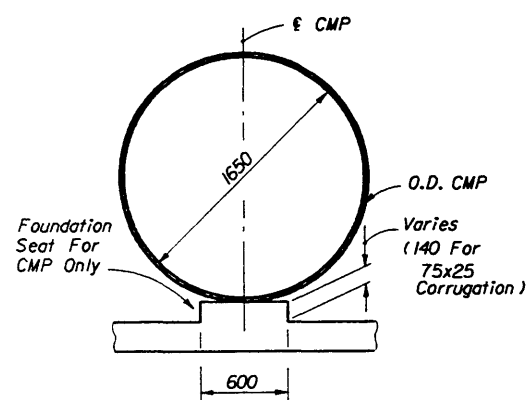


OPTIONAL ENTRANCE FOR CONCRETE PIPE

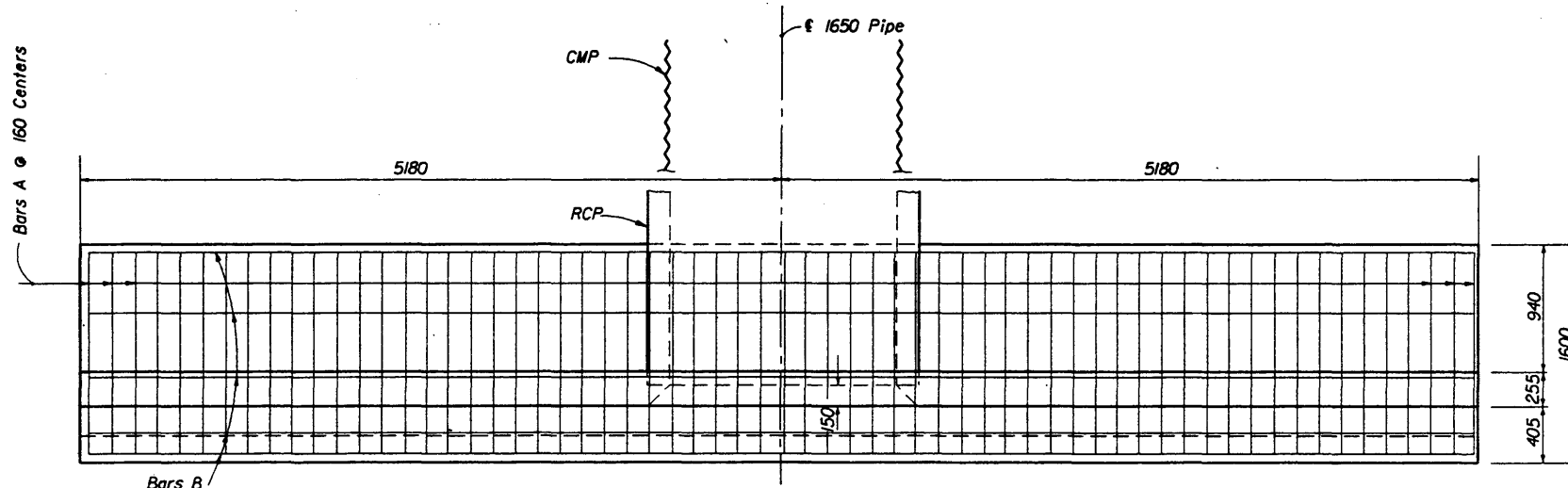
BILL OF REINFORCING STEEL						BENDING DIAGRAM			
MARK	SIZE	NO. REQ'D	LENGTH	LOCATION	BENDING	2285			
A	#13	41	1270	Footing	Straight	560			
B1	#13	9	12240	Footing & Wall	Straight	NOTE: All bar dimensions are out to out			
B2	#13	4	3810	Wall	Straight	ESTIMATED QUANTITIES			
B3	#13	4	4190	Wall	Straight	ITEM	UNIT	RCP	CMP
B4	#13	4	1830	Wall	Field Bend	Concrete Class II	m <sup>3</sup>	10.50	10.60
B5	#13	2	660	Wall	Straight	Reinforcing Steel	kg	587	587
B6	#13	8	4570	Wall	Field Bend				
C	#13	29	2845	Footing & Wall	Bend				
D	#13	20	2285	Footing & Wall	Straight				
E	#13	16	510	Footing & Wall	Straight				

NOTE: See Sheet 1 of 2 For General Notes.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>STRAIGHT CONCRETE ENDWALLS</b> SINGLE AND DOUBLE 1500 PIPE				
Designed By	Names	Dates	Approved By	
Drawn By	TWJ	11/49	 State Drainage Engineer	
Checked By	WHM	11/49	Revision	Sheet No.
			98	2 of 2
				Index No. 251



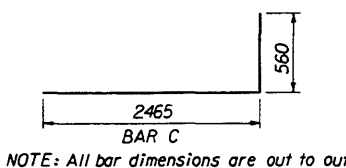
SECTION BB



PLAN  
(Showing Bars In Footing)

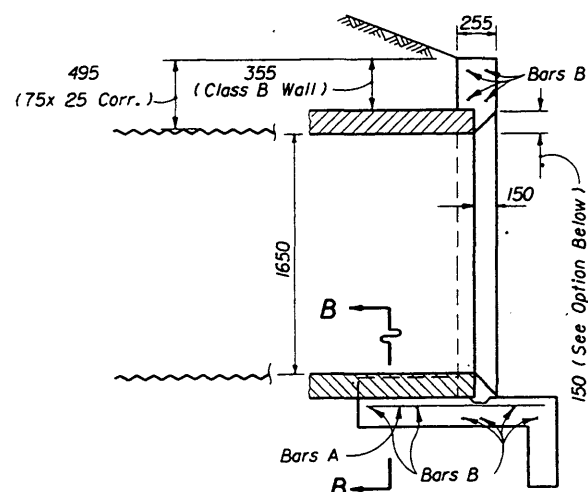
BILL OF REINFORCING STEEL					
MARK	SIZE	NO. REQ'D	LENGTH	LOCATION	BENDING
A	#16	63	1500	Footing	Straight
B	#13	17	10260	Footing & Wall	Straight
C	#16	34	3020	Wall	Bend
D	#13	20	2465	Wall	Straight
E	#13	4	510	Wall	Straight

BENDING DIAGRAM

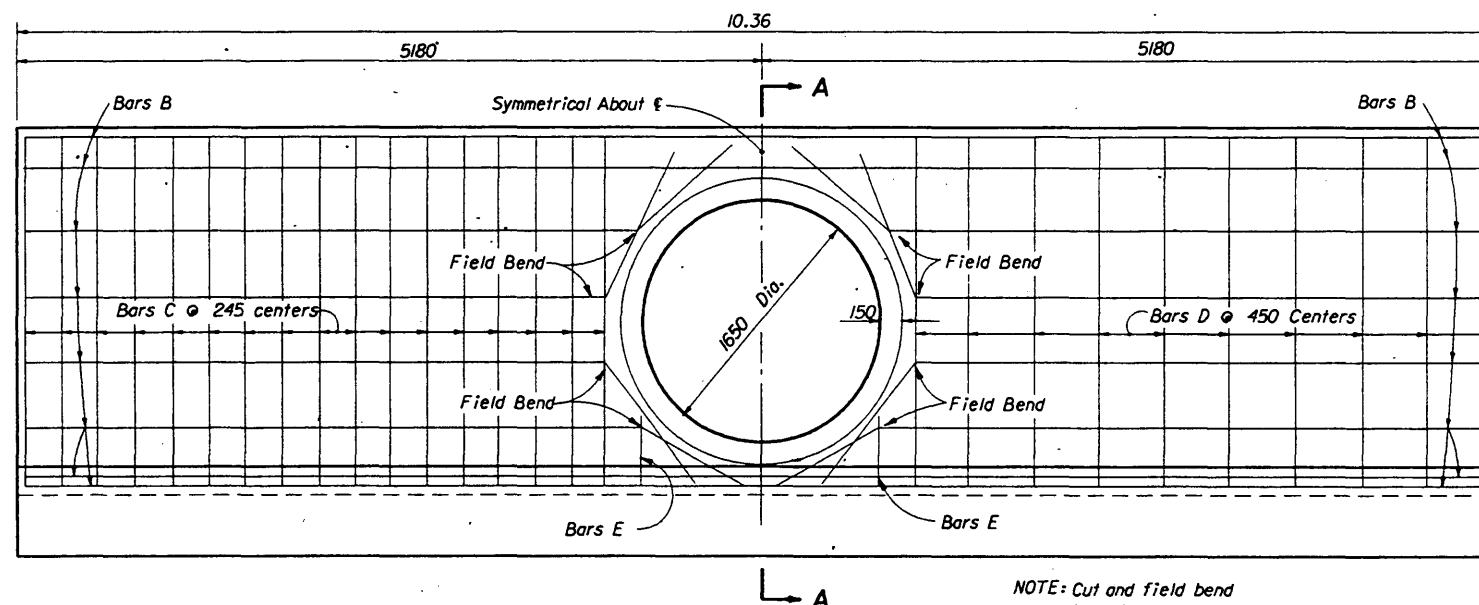


ESTIMATED QUANTITIES

ITEM	UNIT	RCP	CMP
Concrete Class II	m <sup>3</sup>	10.10	10.20
Reinforcing Steel	kg	660	660



SECTION AA



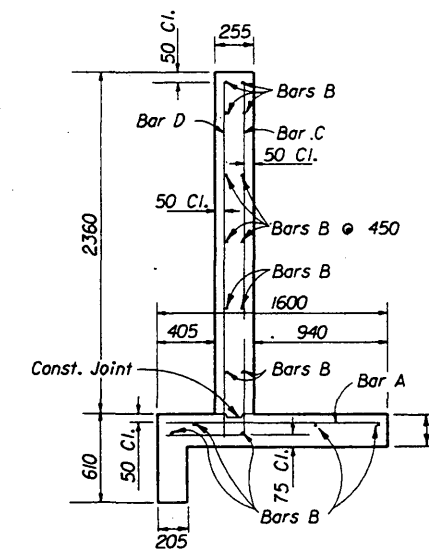
HALF ELEVATION

(Showing Bars In Back Face Of Wall)

NOTE: Cut and field bend  
Bars B as shown

HALF ELEVATION

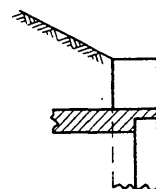
(Showing Bars In Front Face Of Wall)



TYPICAL SECTION  
THRU ENDWALL

GENERAL NOTES

1. Straight concrete endwalls are intended for use outside the clear zone.
2. Endwalls may be cast-in-place or precast construction. Cast-in-place endwalls shall conform to the details on this index and design specifications AASHTO 1989. Precast construction which adheres to this index, including any additional reinforcement required for handling which shall be determined by the Contractor or supplier, does not require additional approvals. Deviations from this index, for precast units, shall require the approval of the State Drainage Engineer prior to construction. For precast construction, see Index No. 201 for opening and grouting details.
3. Reinforcing steel shall be either 420 MPa or 450 MPa.
4. Concrete shall be Class II except concrete meeting the requirements of ASTM C 478 (27 579 kPa) may be used in lieu of Class II concrete in precast units manufactured in plants which are under the Standard Operating Procedures for the inspection of precast drainage products.
5. Chamfer: All exposed edges and corners to be chamfered 20 mm unless otherwise shown.
6. Metal pipe shall be bituminous coated on all surfaces in contact with concrete and 300 mm beyond the boundary of contact. Any suitable bituminous material may be field applied.
7. Sodding shall be in accordance with Index No. 281 and paid for under the contract unit price for Sodding, M2.
8. Basis of payment for either cast-in-place or precast construction shall be the estimated quantities tabulated on the index. Concrete and reinforcing steel shall be paid for under the contract unit prices for Conc. Class II (Endwalls), M3 and Reinf. Steel (Roadway), KG.



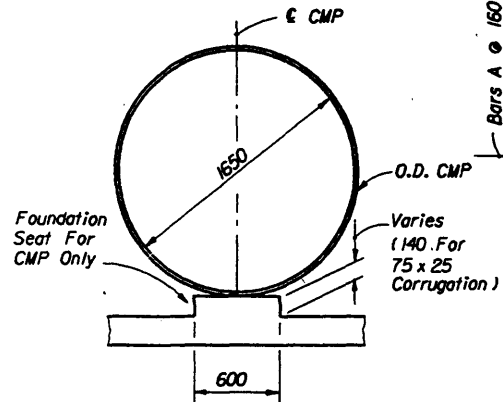
OPTIONAL ENTRANCE  
FOR CONCRETE PIPE

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

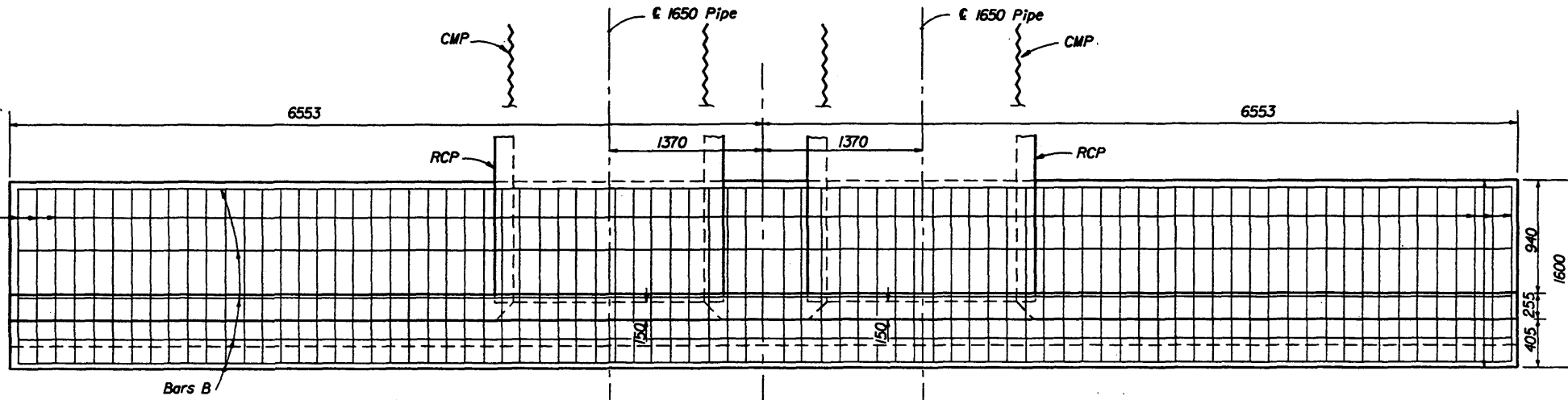
STRAIGHT CONCRETE ENDWALLS  
SINGLE AND DOUBLE 1650 PIPE

Names	Dates	Approved By		
Designed By	JLW	03/54	A.M. Lenzel State Drainage Engineer	
Drawn By		Revision	Sheet No.	Index No.
Checked By	RCB	03/54	00	1 of 2

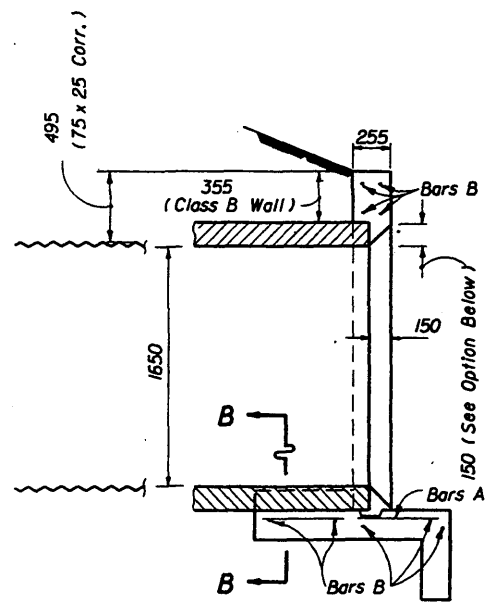
252



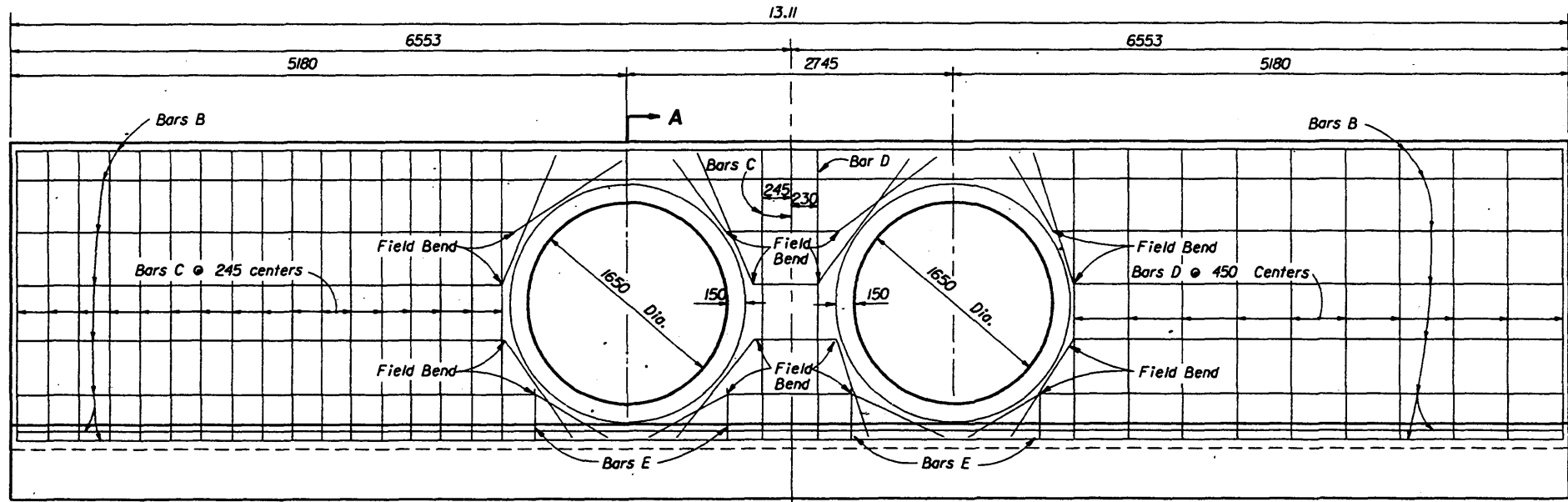
**SECTION BB**



**PLAN**  
(Showing Bars In Footing)

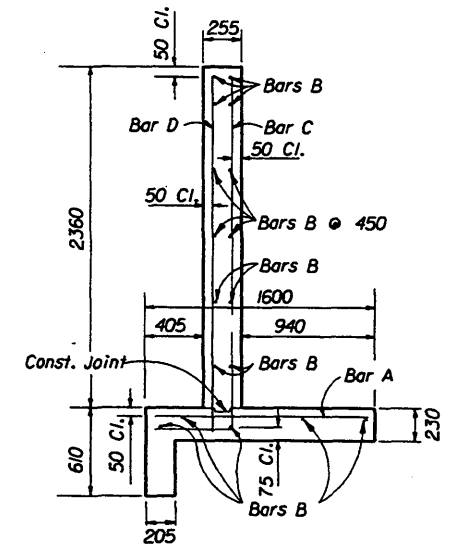


**SECTION AA**

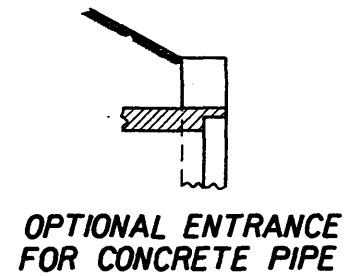


**HALF ELEVATION**  
(Showing Bars In Back Face Of Wall)

**HALF ELEVATION**  
(Showing Bars In Front Face Of Wall)



**TYPICAL SECTION THRU ENDWALL**



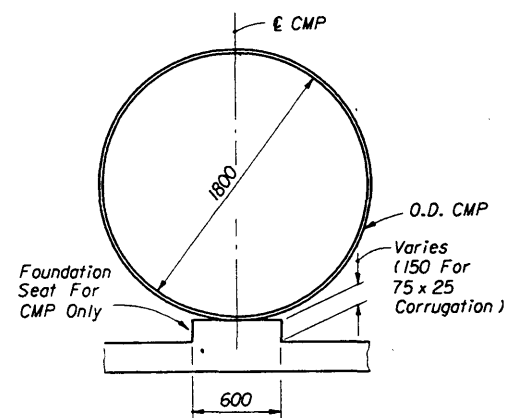
**OPTIONAL ENTRANCE FOR CONCRETE PIPE**

BILL OF REINFORCING STEEL						BENDING DIAGRAMS		ESTIMATED QUANTITIES			
MARK	SIZE	NO. REQ'D	LENGTH	LOCATION	BENDING	BENDING DIAGRAMS		ITEM	UNIT	RCP	CMP
A	*16	80	1500	Footing	Straight			Concrete Class II	m <sup>3</sup>	5.00	5.10
B	*13	17	13000	Footing & Wall	Straight			Reinforcing Steel	kg	797	797
C	*16	37	3020	Wall	Bend						
D	*13	22	2465	Wall	Straight						
E	*13	8	510	Wall	Straight						

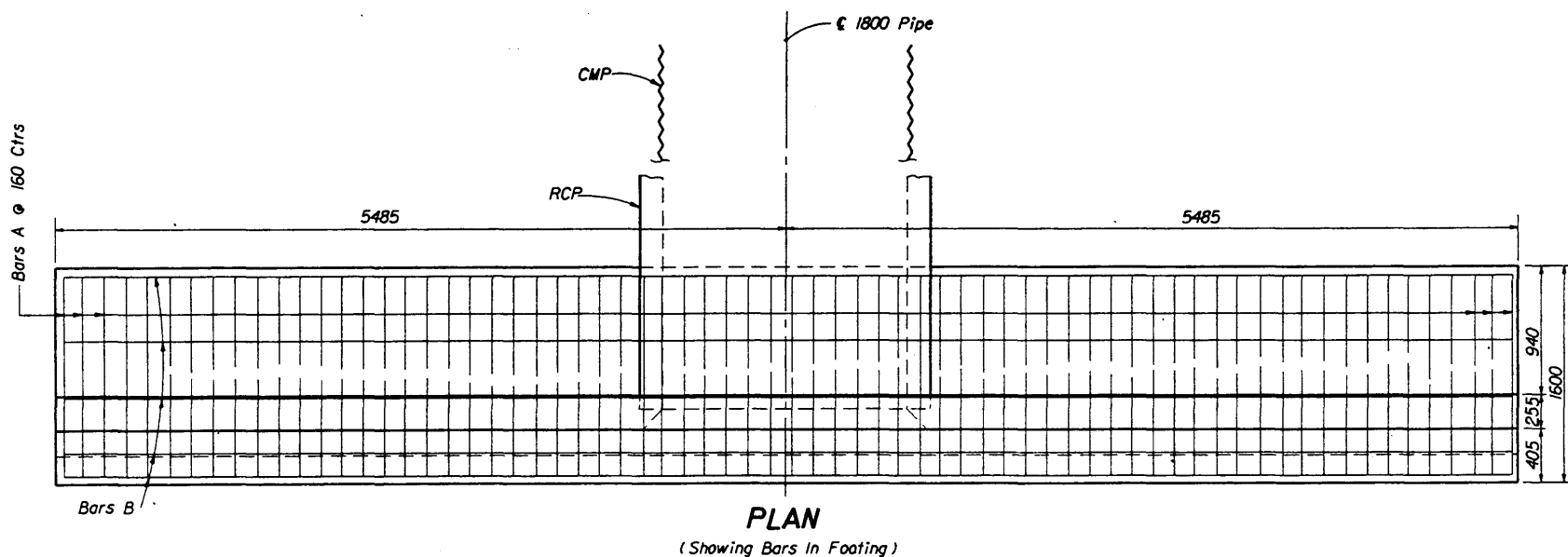
NOTE: All bar dimensions are out to out

NOTE: See Sheet 1 of 2 for General Notes.

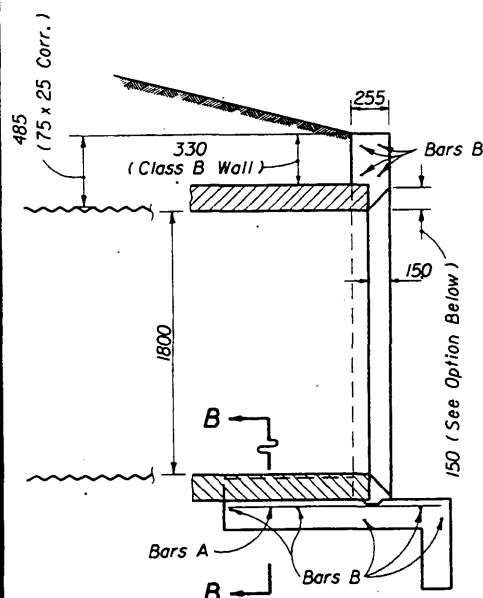
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>STRAIGHT CONCRETE ENDWALLS</b> SINGLE AND DOUBLE 1650 PIPE					
Designed By	JSP	Dates	11/79	Approved By	<i>A.M. Leno</i>
Drawn By	FWT	Revision	11/79	Sheet No.	2 of 2
Checked By		Index No.	98		252



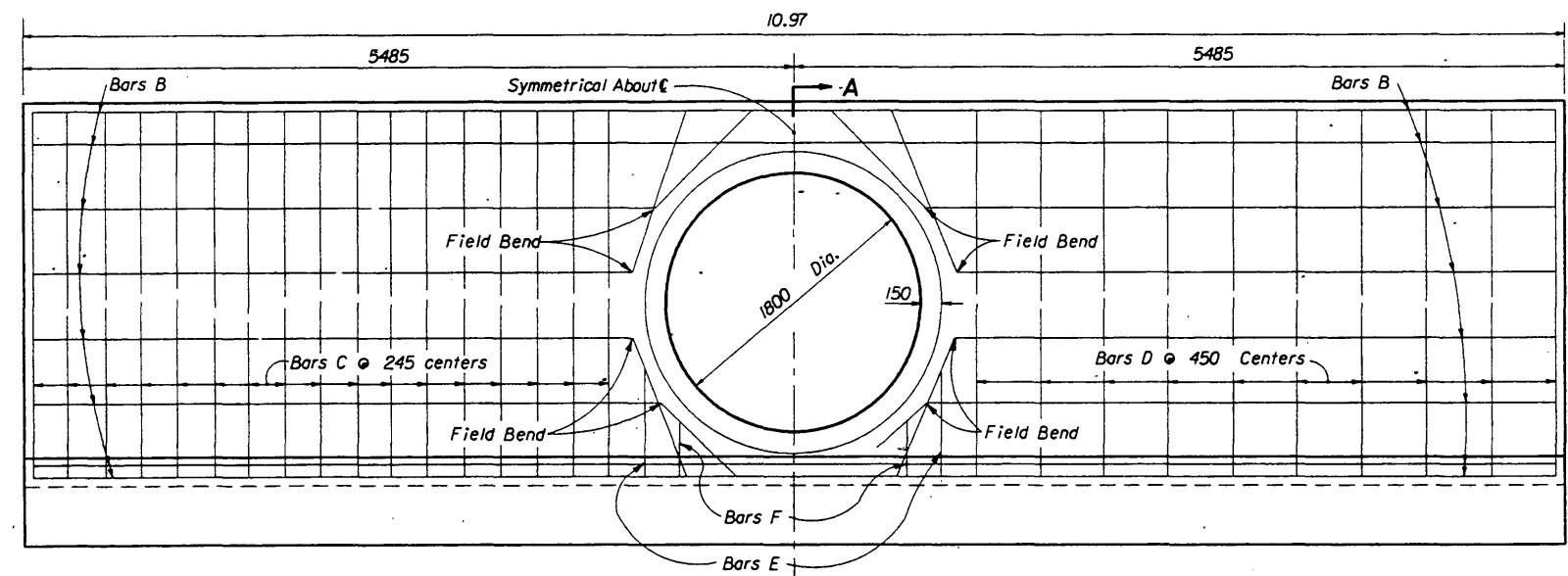
**SECTION BB**



**PLAN**  
(Showing Bars In Footing)

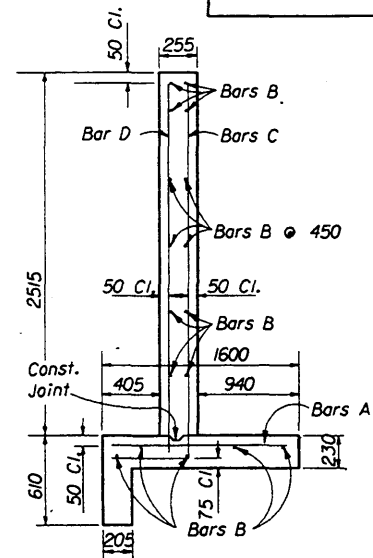


**SECTION AA**



**HALF ELEVATION**  
(Showing Bars In Back Face Of Wall)

**HALF ELEVATION**  
(Showing Bars In Front Face Of Wall)



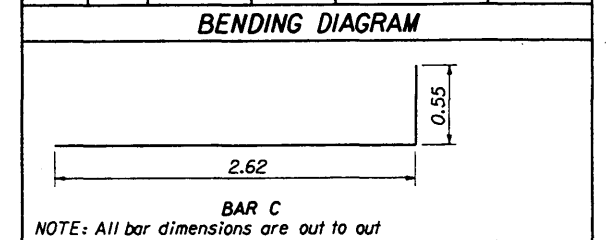
**TYPICAL SECTION THRU ENDWALL**

NOTE: Cut and field bend Bars B as shown

**GENERAL NOTES**

1. Straight concrete endwalls are intended for use outside the clear zone.
2. Endwalls may be cast-in-place or precast construction. Cast-in-place endwalls shall conform to the details on this index and design specifications AASHTO 1989. Precast construction which adheres to this Index, including any additional reinforcement required for handling which shall be determined by the Contractor or supplier, does not require additional approvals. Deviations from this Index, for precast units, shall require the approval of the State Drainage Engineer prior to construction. For precast construction, see Index No. 201 for opening and grouting details.
3. Reinforcing steel shall be either 420 MPa or 450 MPa.
4. Concrete shall be Class II except concrete meeting the requirements of ASTM C 478M (27579 kPa) may be used in lieu of Class II concrete in precast units manufactured in plants which are under the Standard Operating Procedures for the inspection of precast drainage products.
5. Chamfer: All exposed edges and corners to be chamfered 20 mm unless otherwise shown.
6. Metal pipe shall be bituminous coated on all surfaces in contact with concrete and 300 mm beyond the boundary of contact. Any suitable bituminous material may be field applied.
7. Sodding shall be in accordance with Index No. 281 and paid for under the contract unit price for Sodding, M2.
8. Basis of payment for either cast-in-place or precast construction shall be the estimated quantities tabulated on the Index. Concrete and reinforcing steel shall be paid for under the contract unit prices for Conc. Class II (Endwalls), M3 and Reinf. Steel (Roadway), KG.

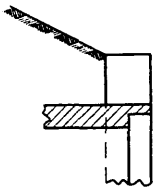
BILL OF REINFORCING STEEL					
MARK	SIZE	NO. REQ'D	LENGTH	LOCATION	BENDING
A	#16	68	1.50	Footing	Straight
B	#13	17	10.87	Footing & Wall	Straight
C	#16	34	3.17	Wall	Bend
D	#13	20	2.62	Wall	Straight
E	#13	4	0.76	Wall	Straight
F	#13	4	0.46	Wall	Straight



NOTE: All bar dimensions are out to out

ESTIMATED QUANTITIES			
ITEM	UNIT	RCP	CMP
Concrete Class II	m <sup>3</sup>	11.00	11.10
Reinforcing Steel	kg	704	704

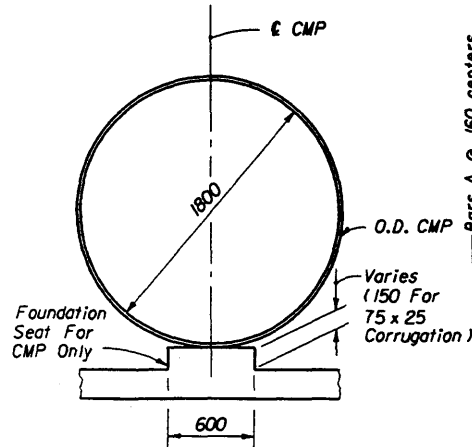
**OPTIONAL ENTRANCE FOR CONCRETE PIPE**



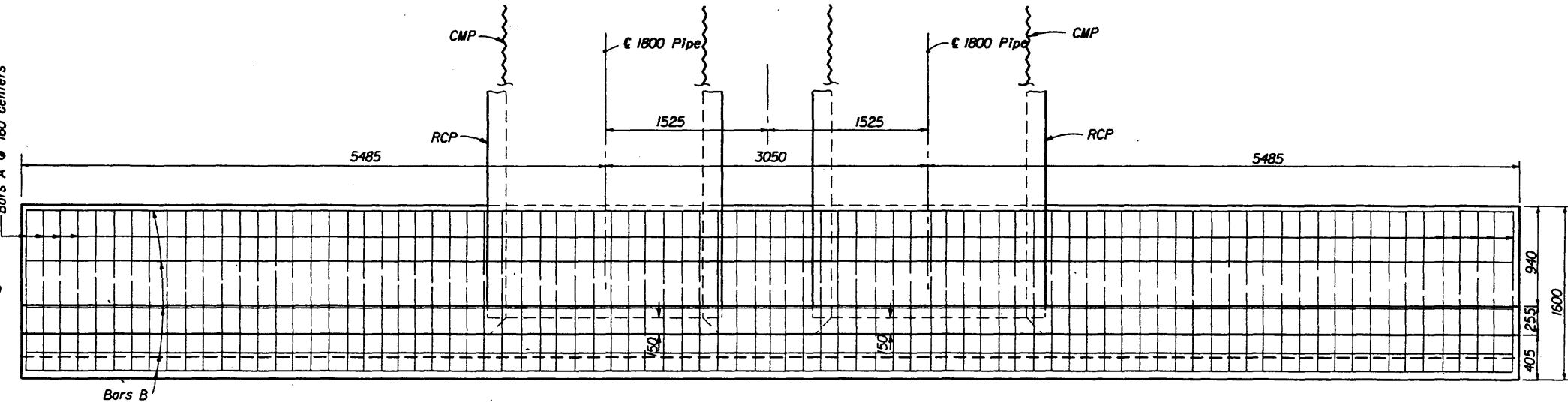
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**STRAIGHT CONCRETE ENDWALLS**  
SINGLE AND DOUBLE 1800 PIPE

Names	Dates	Approved By	
Designed By	EVC	10/55	<i>A.D. McLeister</i> State Drainage Engineer
Drawn By		Revision	Sheet No.
Checked By	www	00	1 of 2
			253

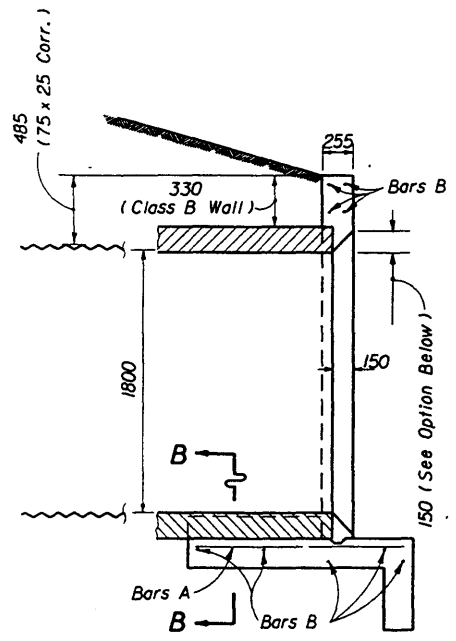


**SECTION BB**

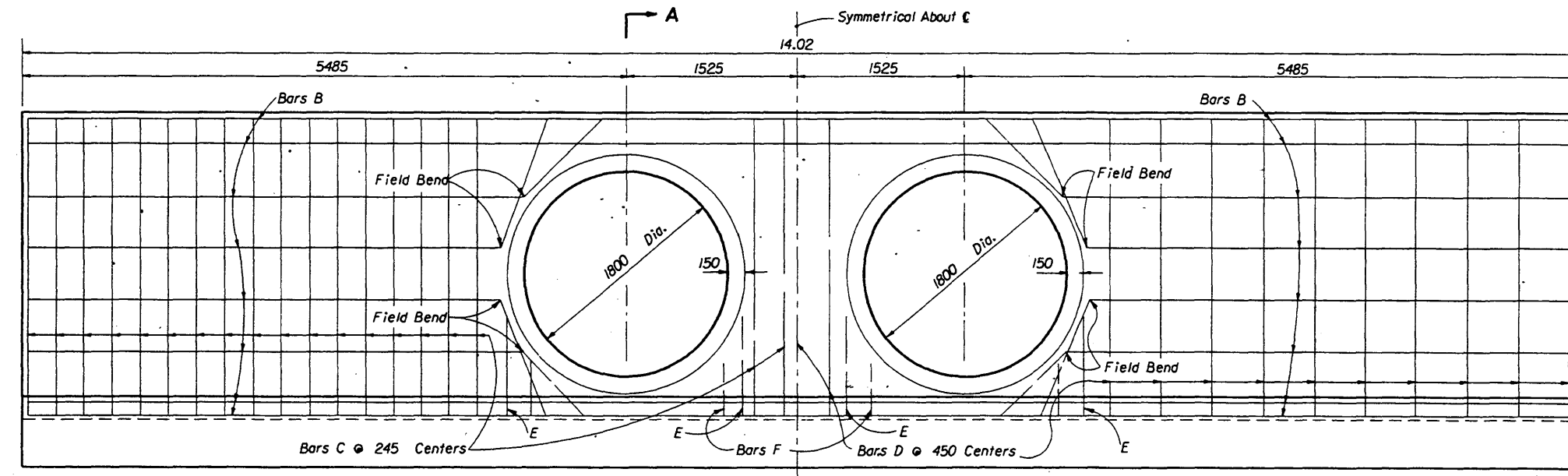


**PLAN**

(Showing Bars In Footing)



**SECTION AA**

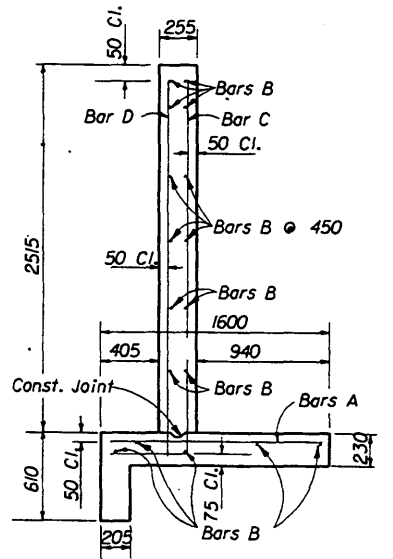


**HALF ELEVATION**

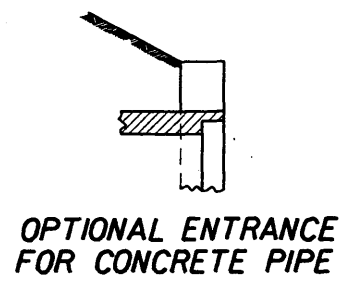
(Showing Bars In Back Face Of Wall)

**HALF ELEVATION**

(Showing Bars In Front Face Of Wall)

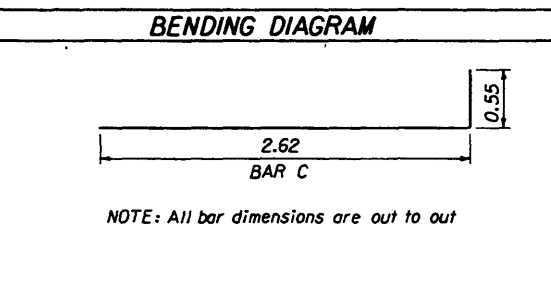


**TYPICAL SECTION THRU ENDWALL**



**OPTIONAL ENTRANCE FOR CONCRETE PIPE**

BILL OF REINFORCING STEEL					
MARK	SIZE	NO. REQ'D	LENGTH	LOCATION	BENDING
A	#16	85	1.50	Footing	Straight
B	#13	17	13.92	Footing & Wall	Straight
C	#16	38	3.17	Wall	Bend
D	#13	23	2.62	Wall	Straight
E	#13	8	0.76	Wall	Straight
F	#13	8	0.46	Wall	Straight



ESTIMATED QUANTITIES			
ITEM	UNIT	RCP	CMP
Concrete Class II	m <sup>3</sup>	13.40	13.60
Reinforcing Steel	kg	864	864

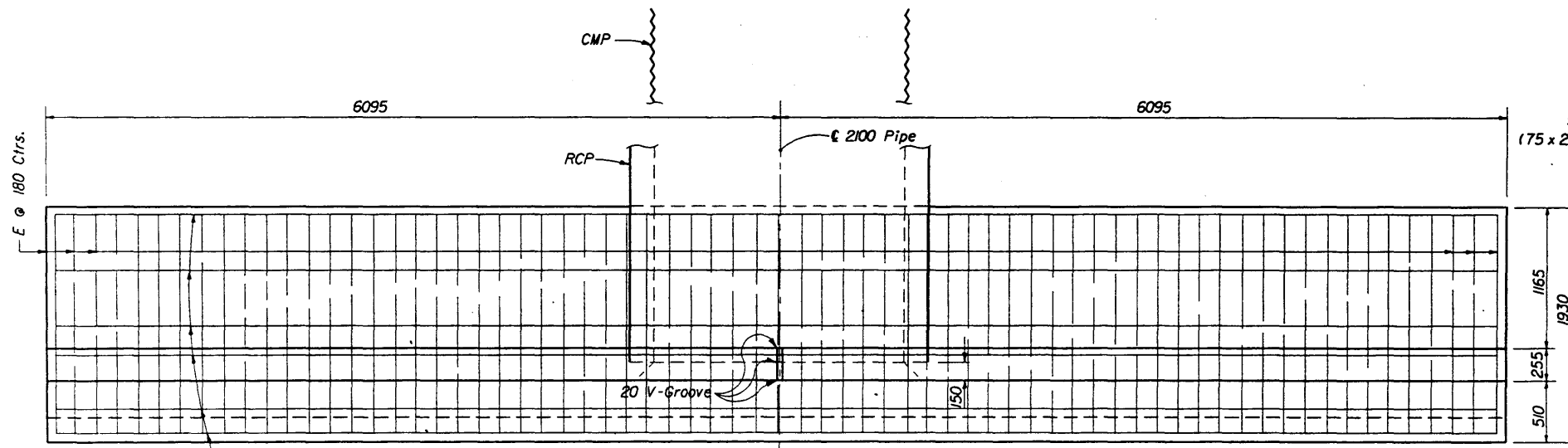
NOTE: See Sheet 1 of 2 for General Notes.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

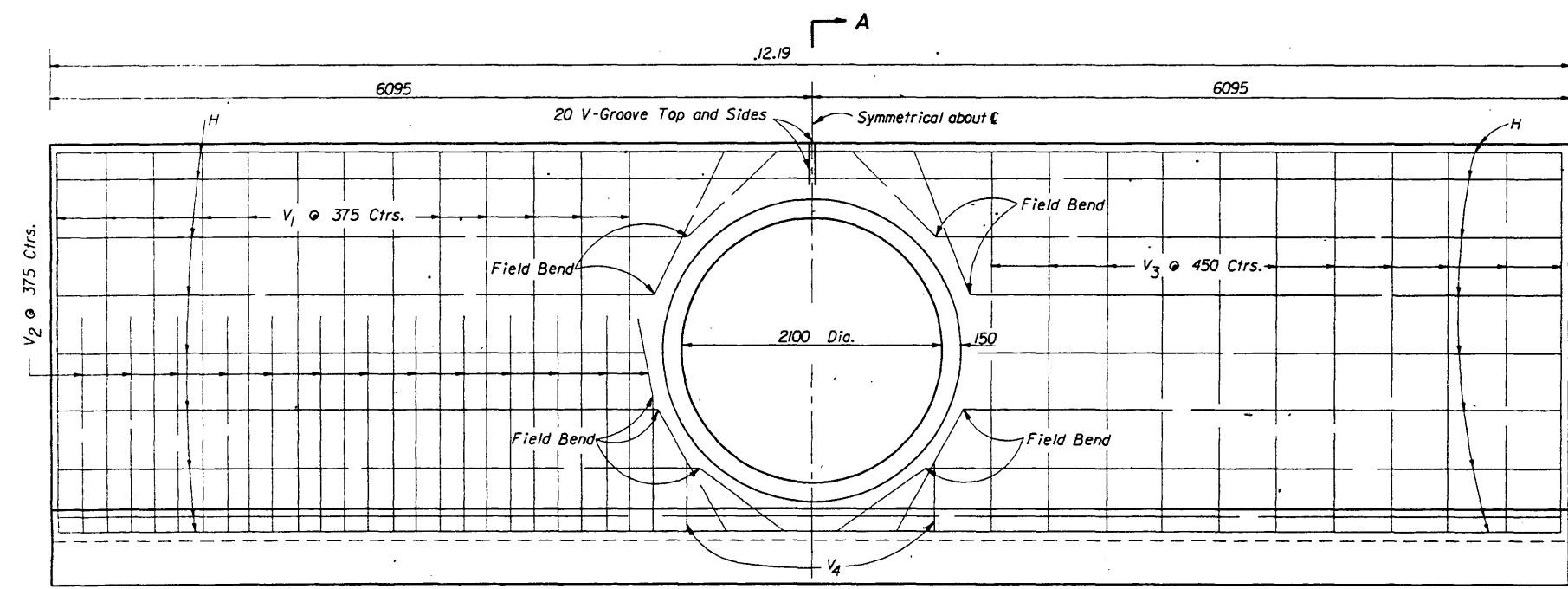
**STRAIGHT CONCRETE ENDWALLS**  
SINGLE AND DOUBLE 1800 PIPE

Designed By	EVC	Date	10/55	Approved By	<i>J. McLenzie</i>
Drawn By		Revision		State Drainage Engineer	
Checked By	WHW	Date	10/55	Sheet No.	2 of 2
				Index No.	253





**PLAN**  
(Showing Bars In Footing)

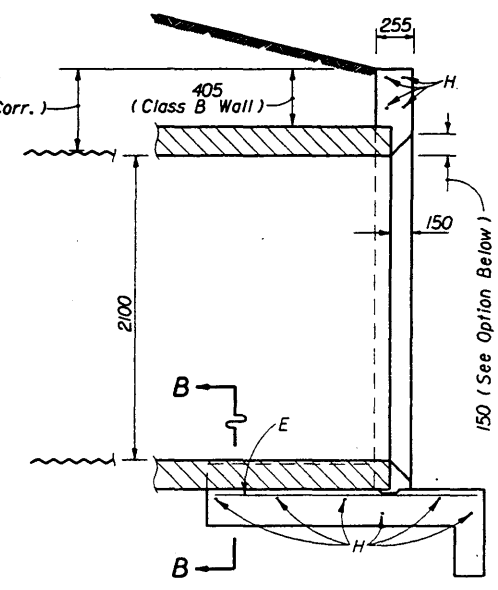


**HALF ELEVATION**  
(Showing Bars In Back Face Of Wall)

**GENERAL NOTES**

1. Straight concrete endwalls are intended for use outside the clear zone.
2. Endwalls may be cast-in-place or precast construction. Cast-in-place endwalls shall conform to the details on this index and design specifications AASHTO 1989. Precast construction which adheres to this index, including any additional reinforcement required for handling which shall be determined by the Contractor or supplier, does not require additional approvals. Deviations from this index, for precast units, shall require the approval of the State Drainage Engineer prior to construction. For precast construction, see Index No. 201 for opening and grouting details.
3. Reinforcing steel shall be either 420 MPa or 450 MPa.
4. Concrete shall be Class II except concrete meeting the requirements of ASTM C 478M (27 579 028 Pa) may be used in lieu of Class II concrete in precast units manufactured in plants which are under the Standard Operating Procedures for the inspection of precast drainage products.
5. Chamfer: All exposed edges and corners to be chamfered 20 mm unless otherwise shown.
6. Metal pipe shall be bituminous coated on all surfaces in contact with concrete and 300 mm beyond the boundary of contact. Any suitable bituminous material may be field applied.
7. Sodding shall be in accordance with Index No. 281 and paid for under the contract unit price for Sodding, M2.
8. Basis of payment for either cast-in-place or precast construction shall be the estimated quantities tabulated on the index. Concrete and reinforcing steel shall be paid for under the contract unit prices for Conc. Class II (Endwalls), M3 and Reinf. Steel (Roadway), KG.

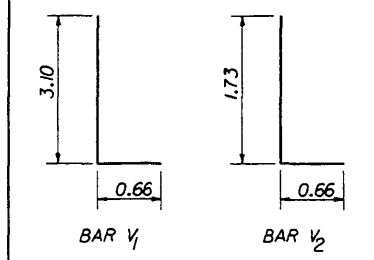
**HALF ELEVATION**  
(Showing Bars In Front Face Of Wall)



**SECTION AA**

BILL OF REINFORCING STEEL			
MARK	SIZE	NO. REQ'D	LENGTH
E	#19	69	1.83
H	#13	20	12.09
V <sub>1</sub>	#19	26	3.76
V <sub>2</sub>	#19	26	2.39
V <sub>3</sub>	#13	22	3.10
V <sub>4</sub>	#13	4	0.61

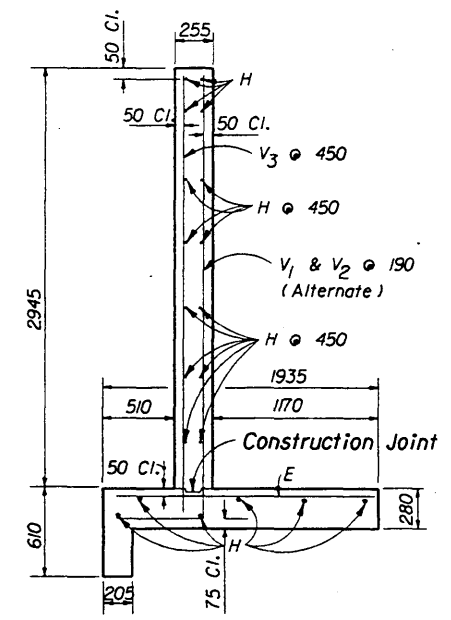
**BENDING DIAGRAM**



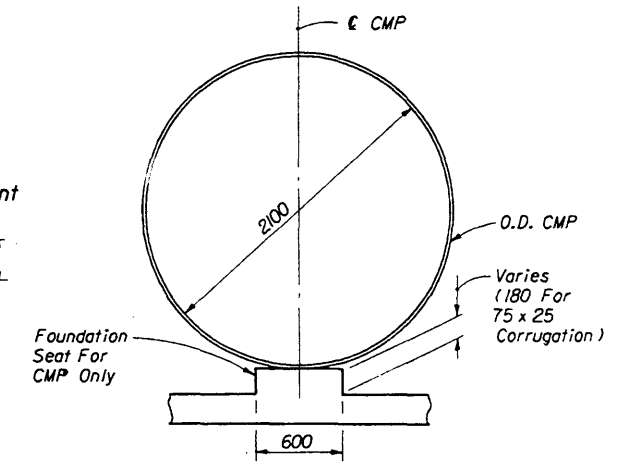
NOTE: All bar dimensions are out to out

**ESTIMATED QUANTITIES**

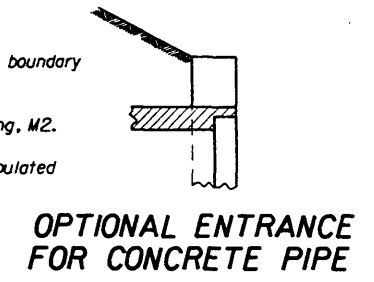
ITEM	UNIT	RCP	CMP
Concrete Class II	m <sup>3</sup>	15.30	15.50
Reinforcing Steel	kg	1130	1130



**TYPICAL SECTION THRU ENDWALL**

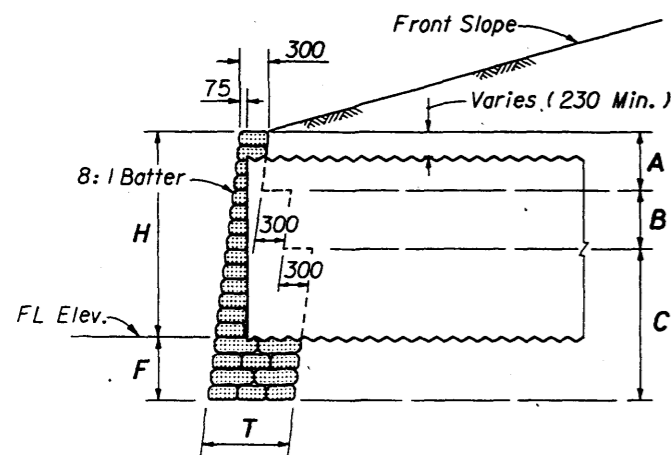


**SECTION BB**

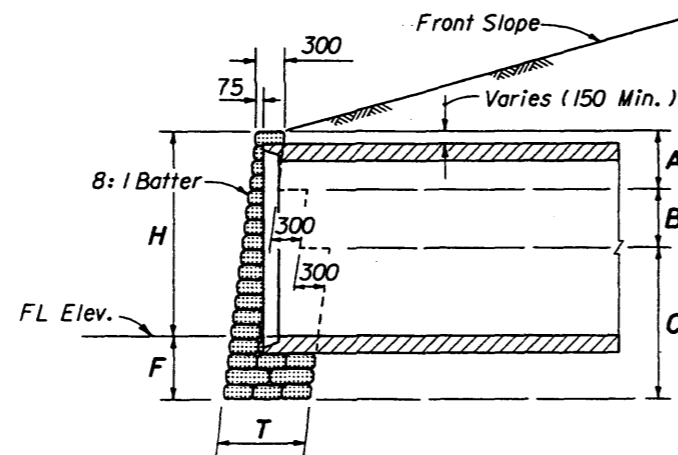


**OPTIONAL ENTRANCE FOR CONCRETE PIPE**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
STRAIGHT CONCRETE ENDWALL SINGLE 2100 PIPE					
Designed By	Names	Dates	Approved By	State Drainage Engineer	
Drawn By	WHW	07/58	Revision	Sheet No.	Index No.
Checked By	HCC	07/58	00	1 of 1	255

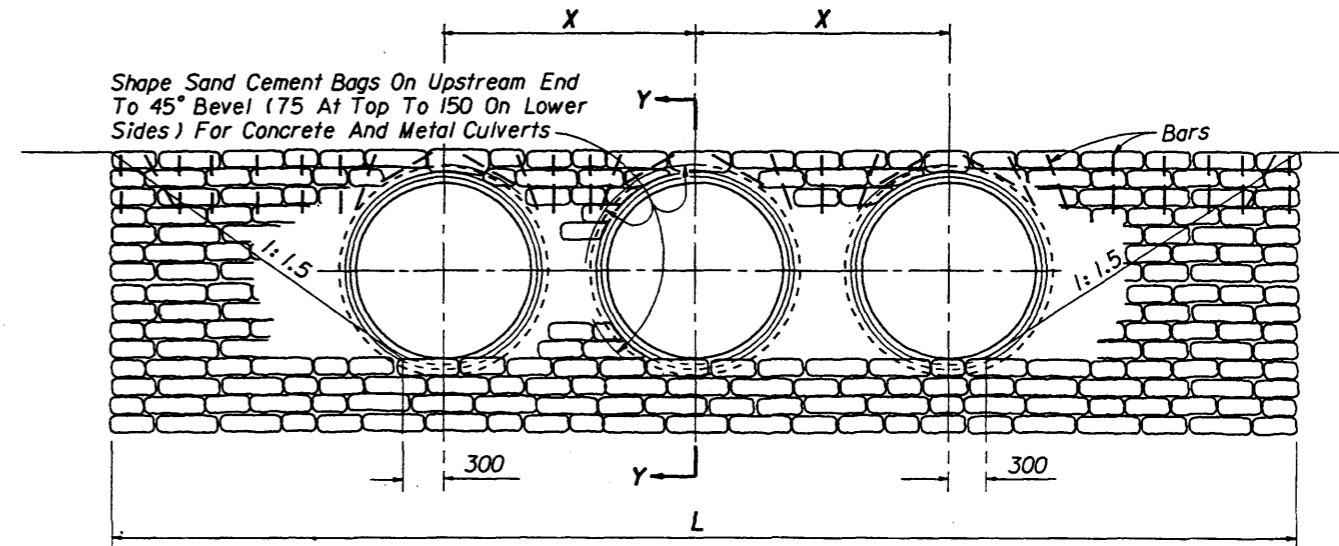


CORRUGATED METAL PIPE



CONCRETE PIPE

SECTION YY



- Note: (1) For concrete and corrugated metal pipes. Concrete pipe shown.  
 (2) The top row of riprap bags shall be secured by pinning, using #13 reinforcing bars 455 mm in length, as follows:  
 (a) The end bags shall be secured using two bars per bag, one vertical and one diagonal as shown.  
 (b) The next to last bag on each end shall be secured with two bars vertically.  
 (c) Bags located over the pipe shall be secured by a bar which is driven diagonally except that for concrete pipe two bars shall be used for single bags above the pipe.  
 (d) Intermediate bags shall be secured with a single bar.  
 Bars shall be driven to one inch below the surface of the bag.  
 The cost of furnishing and installing the bars shall be included in the cost of the riprap.

FRONT ELEVATION

TABLE OF DIMENSIONS AND QUANTITIES FOR ONE ENDWALL


SIZE OF PIPE	H	T	A	B	C	F	X	ONE PIPE CULVERTS		TWO PIPE CULVERTS		THREE PIPE CULVERTS		FOUR PIPE CULVERTS					
								L	RIPRAP m <sup>3</sup>		L	RIPRAP m <sup>3</sup>		L	RIPRAP m <sup>3</sup>		L	RIPRAP m <sup>3</sup>	
									CP	CMP		CP	CMP		CP	CMP		CP	CMP
450	0.69	0.30	1.22	0	0	0.53	0.86	2.67	0.9	0.9	3.53	1.1	1.2	4.39	1.4	1.5	5.25	1.6	1.8
600	0.84	0.61	0.61	0.76	0	0.53	1.04	3.12	1.8	1.9	4.16	2.3	2.4	5.20	2.8	3.1	6.24	3.3	3.6
750	1.02	0.61	0.61	0.97	0	0.56	1.30	3.66	2.5	2.6	4.96	3.2	3.4	6.26	3.9	4.2	7.56	4.6	5.0
900	1.17	0.61	0.61	1.12	0	0.56	1.55	4.11	3.1	3.2	5.66	4.0	4.4	7.21	4.8	5.3	8.76	5.7	6.3
1050	1.35	0.91	0.61	0.61	0.71	0.58	1.83	4.65	4.9	5.1	6.48	6.3	6.8	8.31	7.8	8.6	10.14	9.4	10.2
1200	1.50	0.91	0.61	0.61	0.86	0.58	2.06	5.10	5.9	6.2	7.16	7.6	8.3	9.22	9.4	10.3	11.28	11.1	12.4
1350	1.68	0.91	0.61	0.61	1.07	0.61	2.34	5.64	7.3	7.7	7.98	9.5	10.3	10.32	11.7	13.0	12.66	13.9	15.6
1500	1.83	0.91	0.61	0.61	1.22	0.61	2.59	6.09	8.4	8.9	8.68	11.0	12.1	11.27	13.6	15.1	13.86	16.1	18.2
1650	2.01	0.91	0.61	0.61	1.43	0.64	2.82	6.63	10.1	10.8	9.45	13.2	14.5	12.27	16.2	18.1	15.09	19.2	21.8
1800	2.16	0.91	0.61	0.61	1.58	0.64	3.05	7.08	11.5	12.2	10.13	14.8	16.4	13.18	18.3	20.5	16.23	21.6	24.7
1950	2.34	0.91	0.61	0.61	1.78	0.66	3.28	7.62	13.4	14.3	10.90	17.3	19.1	14.18	21.3	23.9	17.46	25.2	28.7
2100	2.49	0.91	0.61	0.61	1.93	0.66	3.56	8.07	14.9	16.0	11.63	19.3	21.5	15.19	23.8	26.9	18.75	28.2	32.4

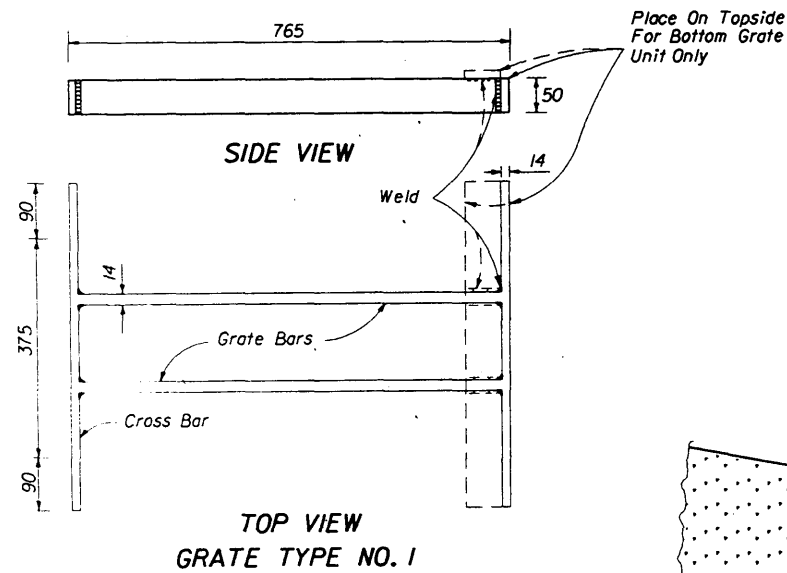
GENERAL NOTES

1. Straight sand-cement endwalls are intended for use outside the clear zone.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

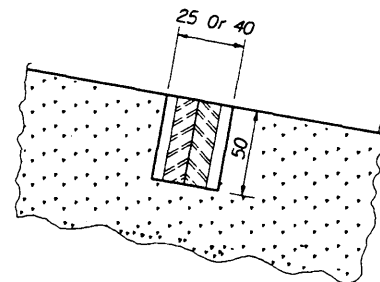
STRAIGHT SAND-CEMENT  
ENDWALLS

Names	Dates	Approved By		
Designed By		 State Drainage Engineer	Revision	Sheet No.
Drawn By	JWB 07/88		00	1 of 1
Checked By	JVG/EGR 08/88			Index No. 258

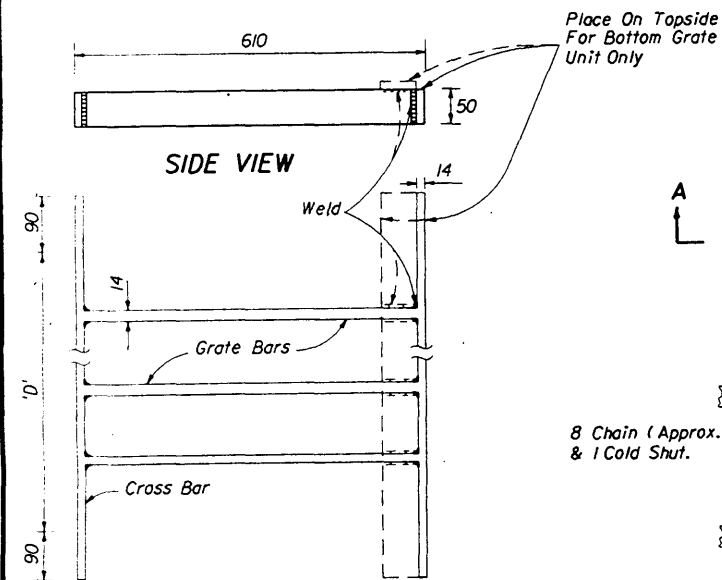


Pipe Size	Grate Bars Req'd.	Grate Wt.
375	2	14.2

Bars to be evenly spaced across dimension 'D'.  
All bars 13 x 25.

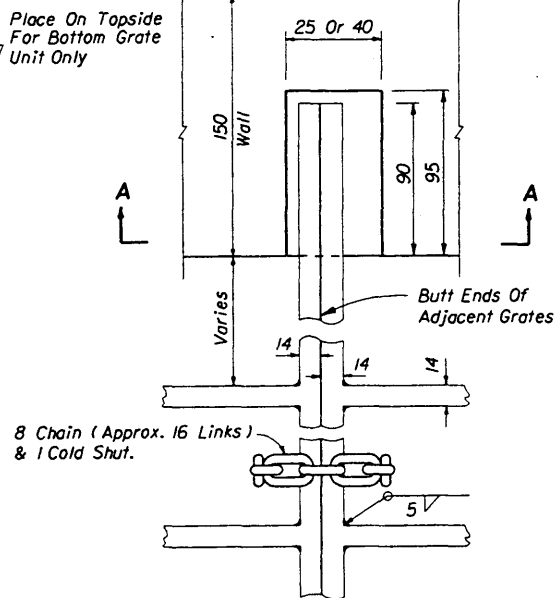


SECTION AA

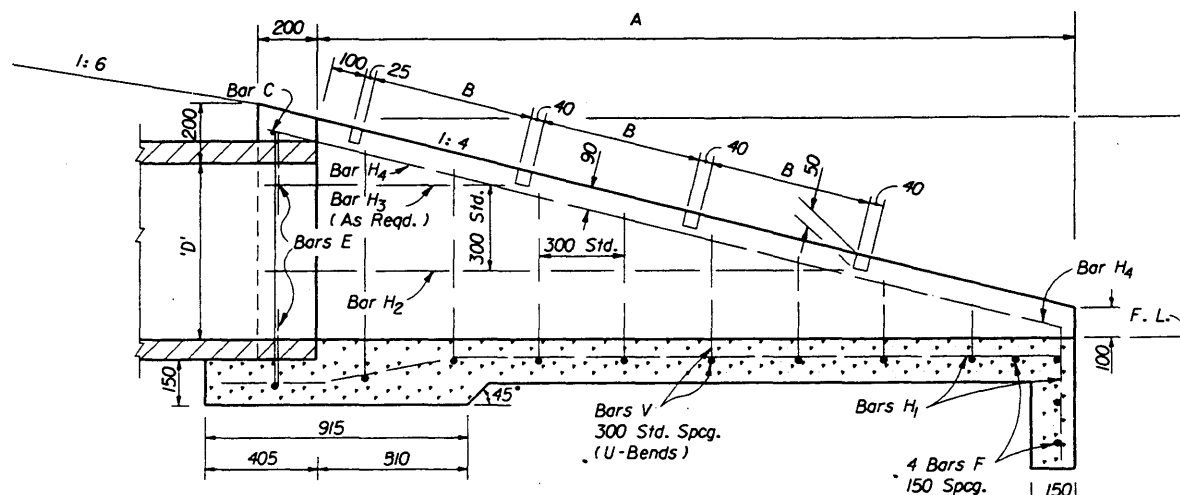


Pipe Size	Grate Bars Req'd.	Grate Wt. kg
450	3	16.52
600	4	21.37
750	5	26.22

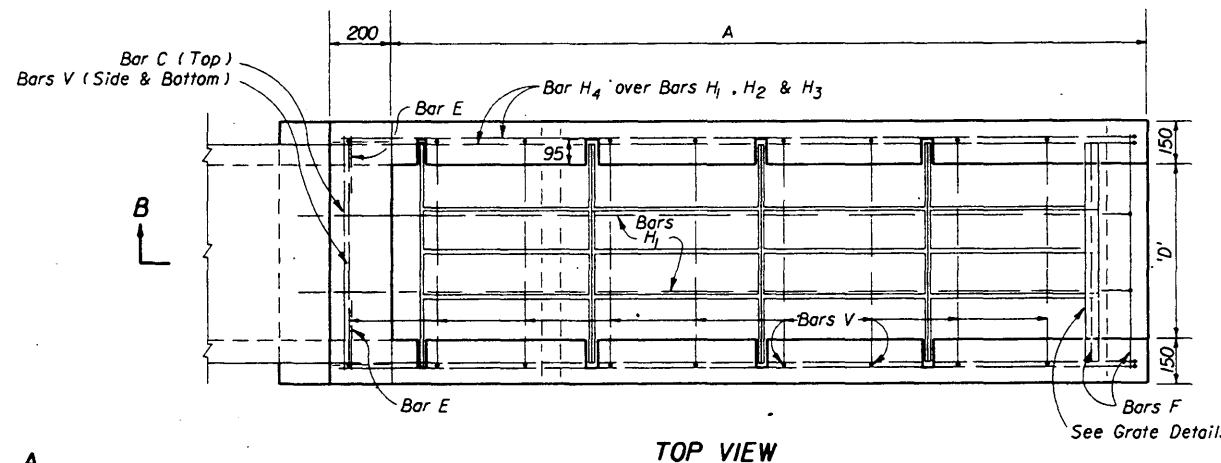
Bars to be evenly spaced across dimension 'D'.  
All bars 14 x 50.



TOP VIEW  
GRATE, SEAT, WELD & CHAIN DETAIL



SECTION BB

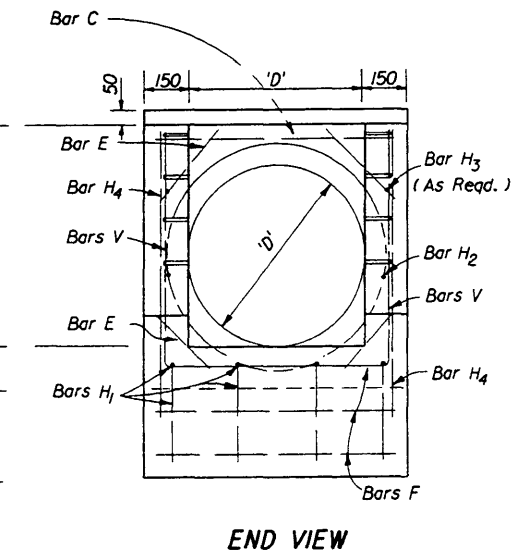


TOP VIEW

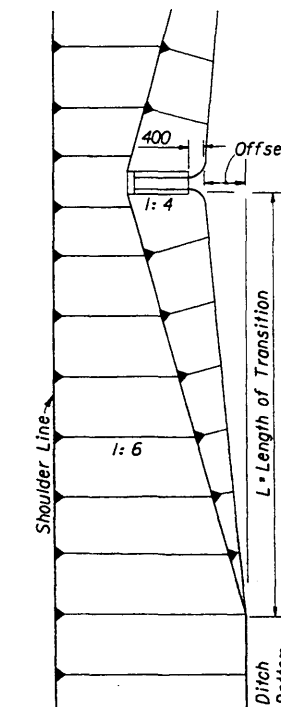
Slope	Pipe Size D	Dimensions		Conc. Class I (m <sup>3</sup> )	Reinf. Steel (kg)	Number Of Grates Req'd		Total Grate Wt. (kg)	Sodding (m <sup>2</sup> )	Slope Transition	
		A	B			Type No. 1	Type No. 2			Offset	L (m)
1:4	375	1700	725	0.65	39	2	0	28.40	13	1150	11.5
	450	2000	570	0.77	52	0	3	49.56	14	1300	13.0
	600	2600	570	1.26	69	0	4	85.48	16	1600	16.0
	750	3200	570	1.78	93	0	5	131.10	18	1900	19.0

GENERAL NOTES

- This endwall is to be used only in the clear zone for the drainage of medians and other areas having low design velocities and negligible debris. Grates exposed to salt water shall be designated in the plan as Alternate G.
- Reinforcing steel: All bars are size #13. Spacings shown are center to center. Laps to be 300 mm minimum. Clearance is 50 mm except as noted.  
Square welded wire fabric (two cages max.) having an equivalent cross sectional area (130 mm<sup>2</sup>) may be substituted for bar reinforcement.
- Grates shall be ASTM A 242M, A 572M or A 588M, 425 MPa steel, and galvanized in accordance with Section 962-7 of the Standard Specifications.
- Endwall to be paid for under the contract unit price for U-Endwall With Grate, EA. Payment shall include cost of concrete, reinforcing steel, grate, and accessories. Quantities shown are for estimating purposes only.
- Sod slopes 1.5 m each side and above endwall. Sodding to be paid for under contract unit price for 'sodding, M2'.
- Precasting of this endwall will be permitted. Precast units shall conform to the dimensions shown or in accordance with approved shop drawings. Request for shop drawing approval shall be directed to the State Drainage Engineer. Use Index No. 201 for opening and grouting details.
- Concrete meeting the requirements of A.S.T.M. C 478M (27 579 kPa) may be used in lieu of Class I concrete for precast units manufactured in plants which are under the Standard Operating Procedures for the inspection of precast drainage products.

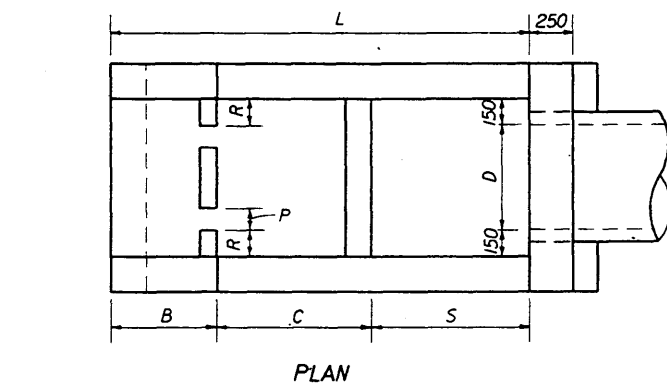
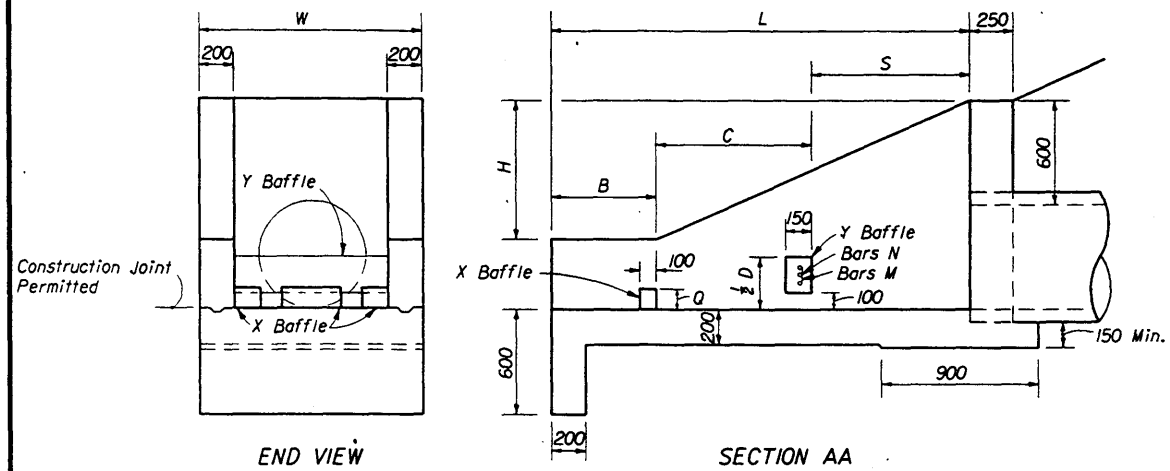


END VIEW

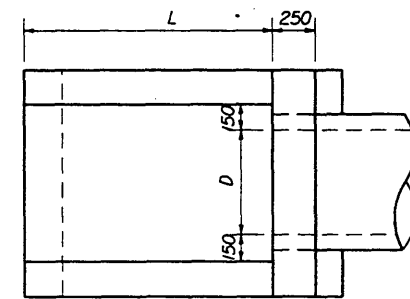
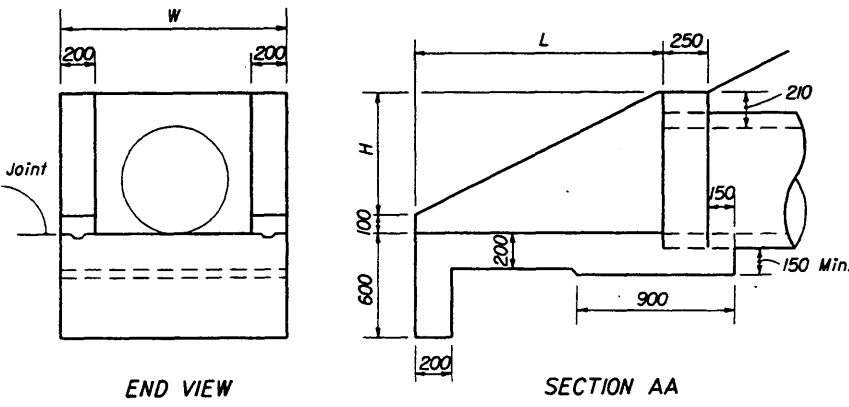


FRONT SLOPE TRANSITION AT ENDWALL

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN			
U-TYPE CONCRETE ENDWALLS WITH GRATES 375 TO 750 PIPE			
Names	Dates	Approved By	
Designed By	EGR 06/77	A. M. Lenoir State Drainage Engineer	
Drawn By	HKH 06/77	Revision	Sheet No. Index No.
Checked By	JVC 06/77	00	1 of 1 260



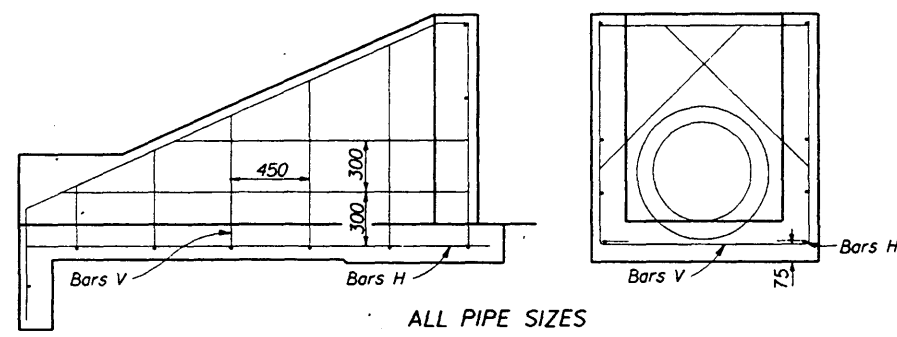
DIMENSIONAL DETAILS



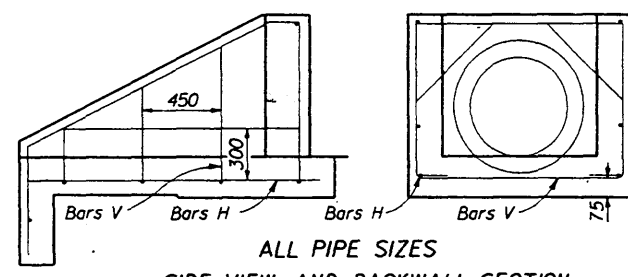
DIMENSIONAL DETAILS

GENERAL NOTES

- Baffles to be constructed only when called for in plans.
- When steel grating is required on endwall see Sheet 3 of 3 for details.
- All reinforcing #13 bars with 50 mm clearance except as noted.
- All angles, channels and bars shall be ASTM A 242M, A 572M or A 588M, 425 MPa steel, when designated Alternate G in the plans galvanize in accordance with Section 962-7 of the Standard Specifications.
- Channel section C 75 x 8.9 may be substituted for C 100 x 8 channel.
- Precasting of this endwall will be permitted. Precast units shall conform to the dimensions shown or in accordance with approved shop drawings. Request for shop drawing approval shall be directed to the State Drainage Engineer. Use Index No. 20I for opening and grouting details.
- Concrete meeting the requirements of ASTM C-478M (27 579 kPa) may be used in lieu of Class I concrete in precast units manufactured in plants which are under the Standard Operating Procedures for the inspection of precast drainage products.
- Sodding shall be in accordance with Index No. 28I, and paid for under the contract unit price for Sodding, M2.
- Endwall to be paid for under the contract unit price for Conc. Class I (Endwalls), M3 and Reinf. Steel (Roadway), KG. Cost of grates to be paid for under the contract unit price for Endwall Grate, KG, plan quantity. Cost of galvanized bolts and nuts to be included in the bid price for the grate.



ALL PIPE SIZES  
SIDE VIEW AND BACKWALL SECTION  
REINFORCING DETAIL



ALL PIPE SIZES  
SIDE VIEW AND BACKWALL SECTION  
REINFORCING DETAIL

DIMENSIONS AND QUANTITIES FOR ONE U-ENDWALL														
Pipe Size		X Baffle							Y Baffle Reinf. Steel		Concrete Class I m <sup>3</sup>	Reinf. Steel kg		
D	Area m <sup>2</sup>	L	H	W	S	B	C	P	Q	R			Bar M	Bar N
375	0.11	1740	700	1075	680	380	680	100	100	100	2-15M	1-15M	1.23	50
450	0.16	1975	730	1150	760	455	760	100	100	125	3-15M	2-15M	1.44	61
600	0.29	2400	800	1300	900	600	900	125	125	150	4-15M	3-15M	1.93	77
750	0.46	2880	880	1450	1060	760	1060	125	125	175	4-15M	4-15M	2.55	98

WITH BAFFLES

DIMENSIONS AND QUANTITIES FOR ONE U-ENDWALL						
Pipe Size		L	H	W	Concrete Class I m <sup>3</sup>	Reinf. Steel kg
D	Area m <sup>2</sup>	L	H	W	Concrete Class I m <sup>3</sup>	Reinf. Steel kg
375	0.11	970	485	1075	0.68	28
450	0.16	1120	560	1150	0.80	30
600	0.29	1420	710	1300	1.07	39
750	0.46	1720	860	1450	1.44	46

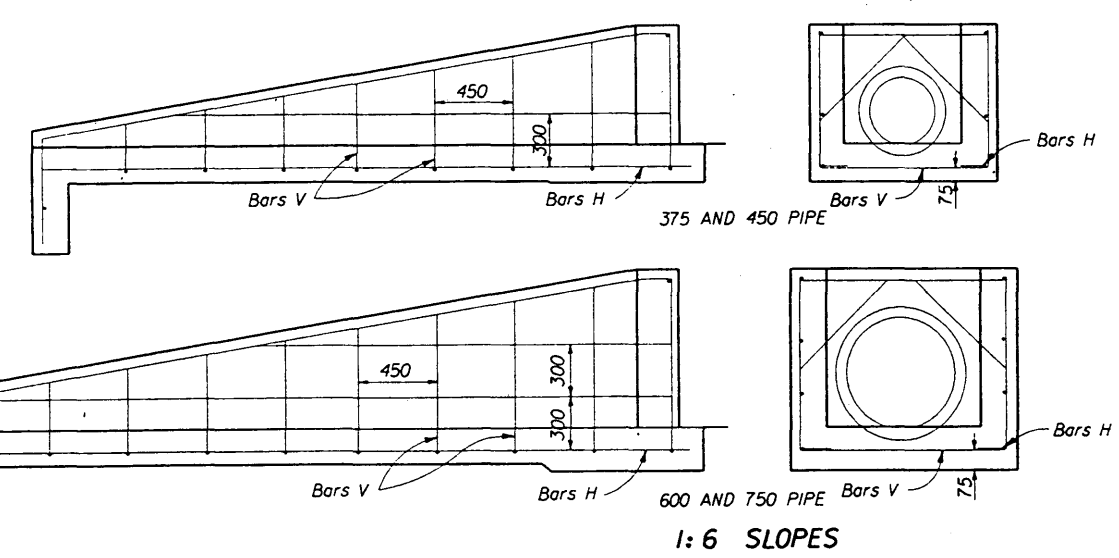
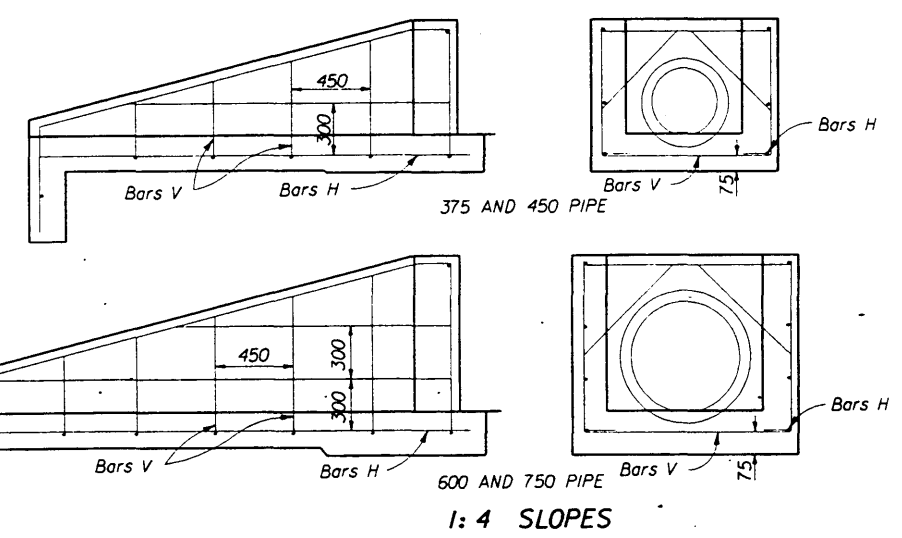
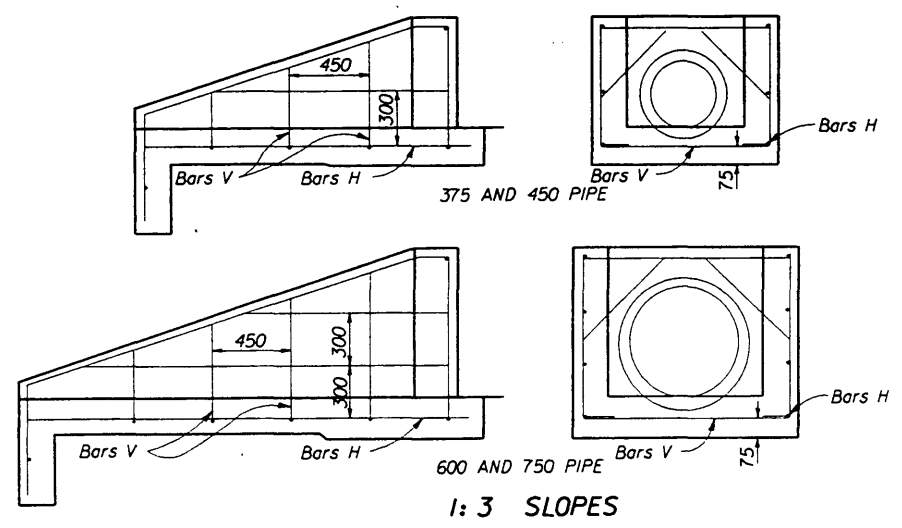
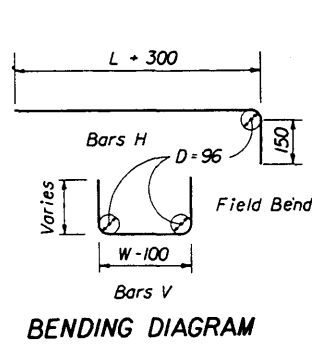
WITHOUT BAFFLES

ENDWALLS FOR 1:2 SLOPES

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

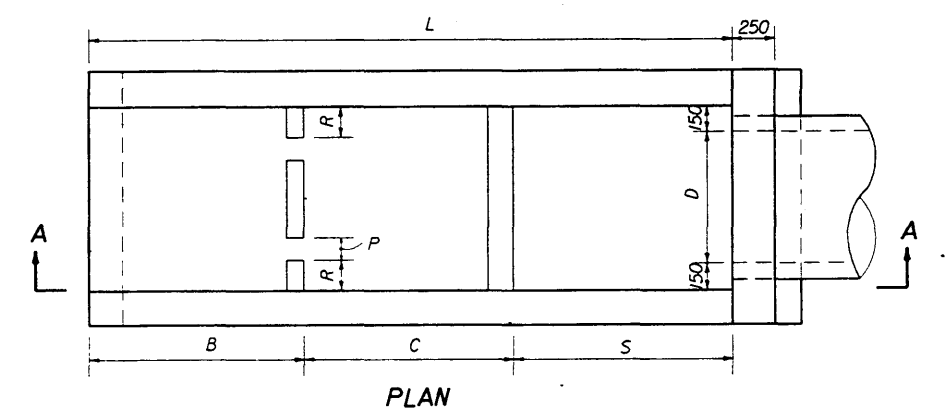
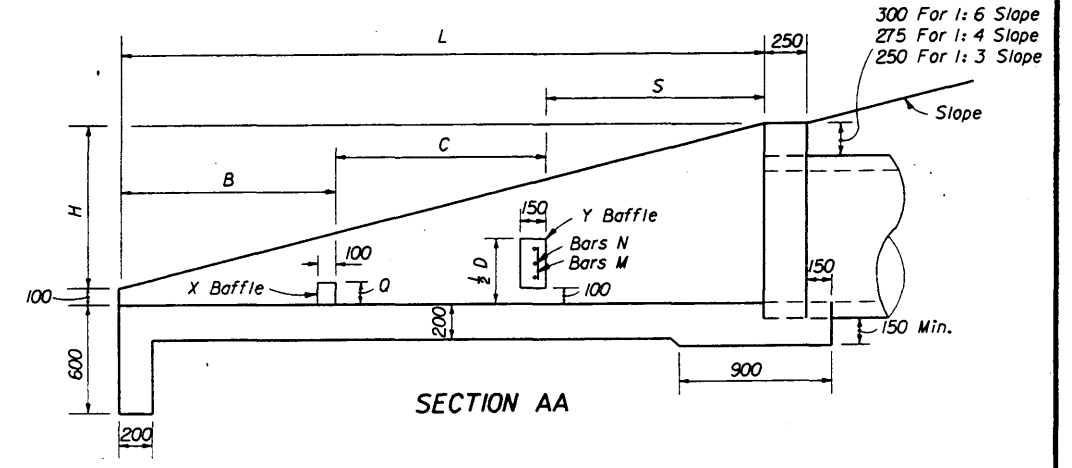
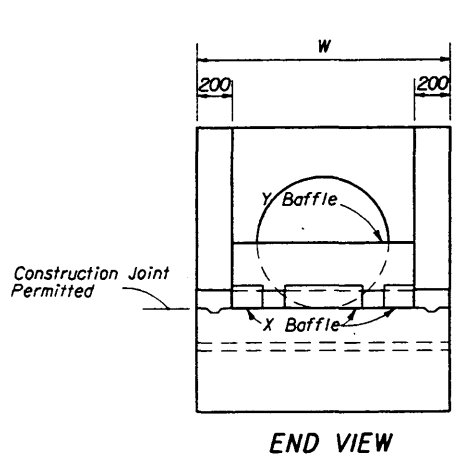
**U-TYPE CONCRETE ENDWALLS  
BAFFLES AND GRATE OPTIONAL  
375 TO 750 PIPE**

Names	Dates	Approved By	State Drainage Engineer	
Designed By				
Drawn By	dds	09/85	Revision	Sheet No. 1 of 3
Checked By			00	261



SIDE VIEWS AND BACKWALL SECTIONS REINFORCING DETAILS

**ENDWALLS WITH AND WITHOUT BAFFLES FOR 1:3, 1:4 AND 1:6 SLOPES**



**DIMENSIONAL DETAILS**

**DIMENSIONS AND QUANTITIES FOR ONE U-ENDWALL**

Rate Of Slope	Pipe Size		Dimensions			Baffle Locations (When Required)			Concrete Class I m <sup>3</sup>	Reinf. Steel kg
	D	Area m <sup>2</sup>	L	H	W	S	B	C		
1:3	375	0.11	1746	582	1075	582	582	582	0.91	36
	450	0.16	1992	664	1150	664	664	664	1.08	39
	600	0.29	2478	826	1300	826	826	826	1.47	55
	750	0.46	2967	989	1450	989	989	989	1.93	68
1:4	375	0.11	2428	607	1075	809	810	809	1.17	46
	450	0.16	2756	689	1150	919	918	919	1.40	50
	600	0.29	3404	851	1300	1135	1134	1135	1.92	64
	750	0.46	4056	1014	1450	1352	1352	1352	2.54	88
1:6	375	0.11	3792	632	1075	1264	1264	1264	1.66	63
	450	0.16	4284	714	1150	1428	1428	1428	2.00	72
	600	0.29	5256	876	1300	1752	1752	1752	2.73	100
	750	0.46	6234	1039	1450	2078	2078	2078	3.66	127

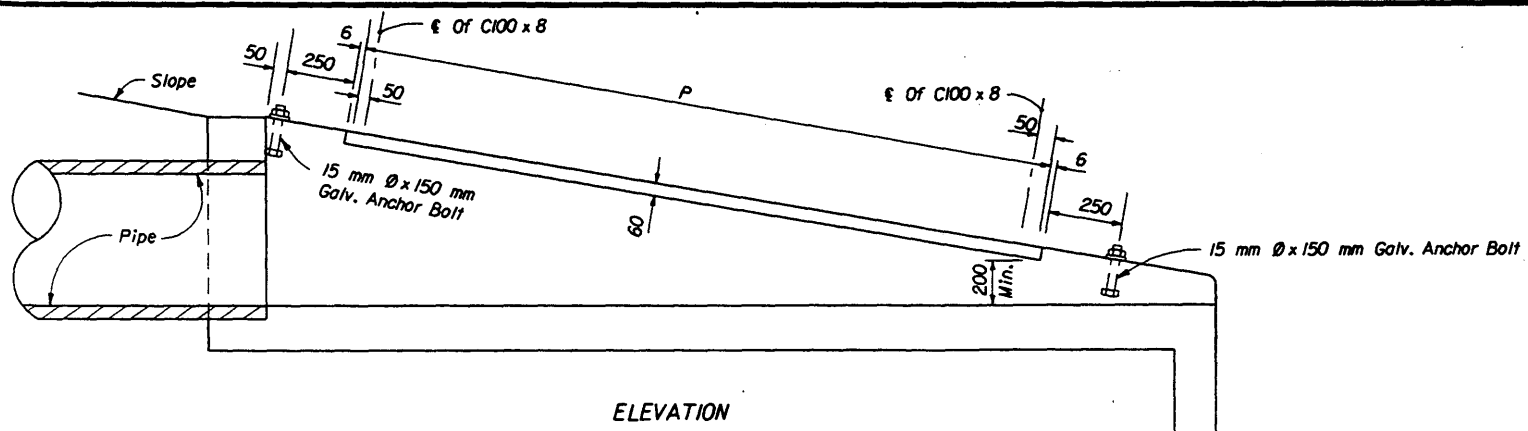
**DIMENSIONS AND QUANTITIES FOR BAFFLES**

Pipe Size D	X Baffle			Y Baffle Reinf. Steel		Concrete Class I m <sup>3</sup>	Reinf. Steel kg
	P Width	Q Height	R Length	Bar M	Bar N		
375	100	100	100	2-15M	1-15M	0.014	2.8
450	100	100	125	3-15M	2-15M	0.02	5.7
600	125	125	150	4-15M	3-15M	0.035	8.5
750	125	125	175	4-15M	4-15M	0.066	11.4

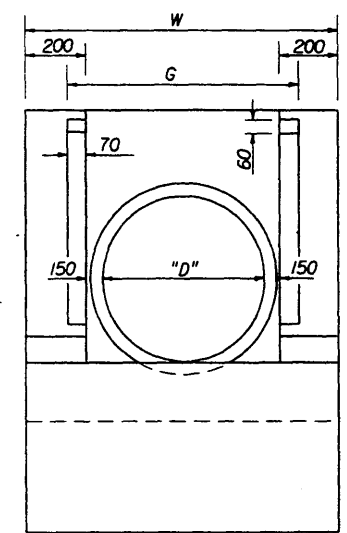
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**U-TYPE CONCRETE ENDWALLS  
BAFFLES AND GRATE OPTIONAL  
375 TO 750 PIPE**

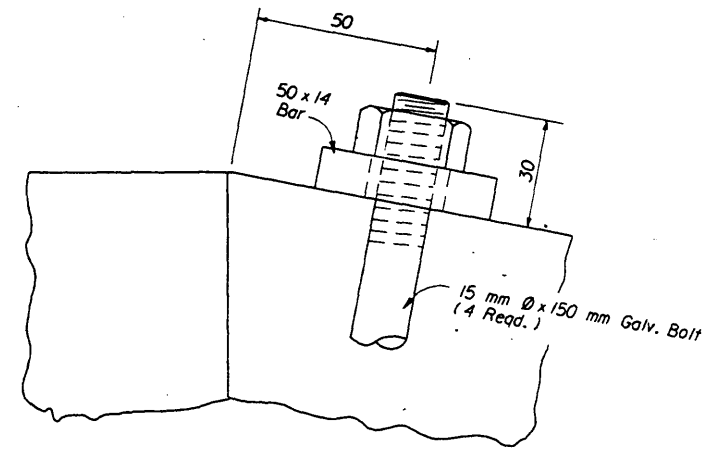
Designed By	Names	Dates	Approved By	State Drainage Engineer	
Drawn By	gcs	9/05	Revision	Sheet No.	Index No.
Checked By			94	2 of 3	261



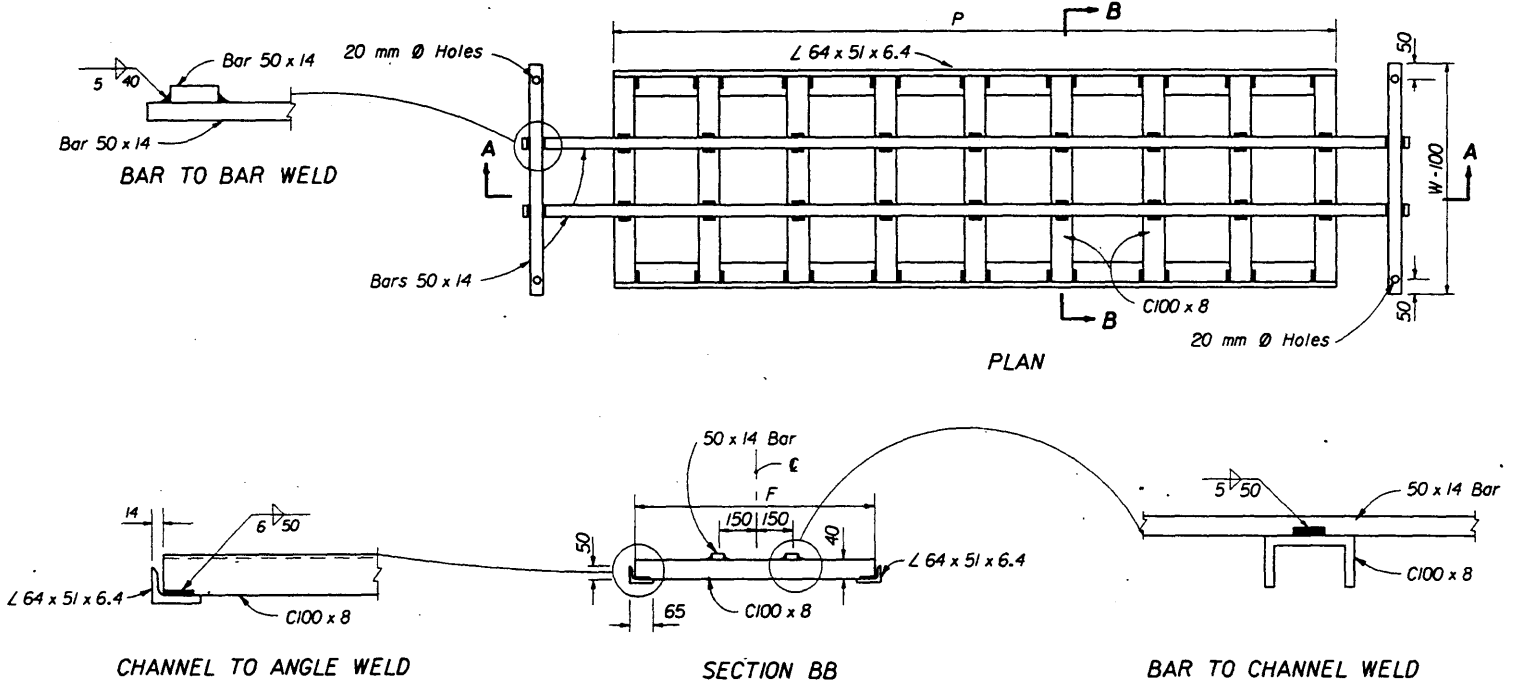
ELEVATION



END VIEW



ANCHOR BOLT DETAIL



STEEL GRATE

**MOUNTING FOR STEEL GRATE**

**STEEL GRATING USE CRITERIA**

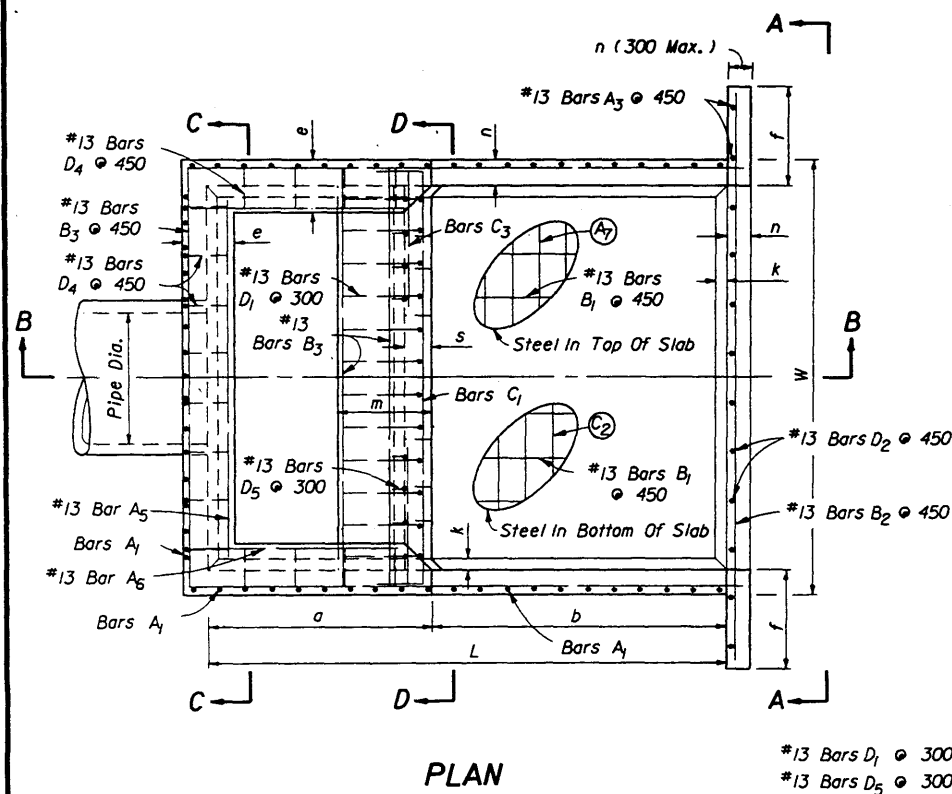
1. Grates to be used on pipe culvert endwalls located within the designated clear zone. Positive debris control shall be provided at all upgradient openings. Grates shall not be used unless one or more of the following conditions exist:
  - A. Drainage area to culvert consists of median or infield areas or areas where debris and/or drift is negligible.
  - B. Runoff to culvert is by sheet flow or in such ill defined channels that debris transport is not considered a major problem.
  - C. Runoff to culvert is minor except on an infrequent basis (10 to 15 year frequency); for example a drainage basin in flat sandy terrain with normally low ground water table.
  - D. Areas where culvert blockage with resultant backwater would not seriously affect roadway embankment, traffic operation or upland property.
2. Steel grating to be used only where called for in plans.

TABLE OF DIMENSIONS AND QUANTITIES FOR ONE GRATE											
Rate Of Slope	Size Pipe "D"	G	2 Each Bars @ 5.5 kg/m			(X) Channels @ 8.0 kg/m			2 Angles @ 5.4 kg/m		Total Weight kg
			L	W-100	kg	(X)	F	kg	P	kg	
1:6	375	815	2821	975	42	8	775	50	2235	25	117
	450	890	3126	1050	46	9	850	62	2540	28	136
	600	1040	4041	1200	58	12	1000	96	3455	38	192
	750	1190	4956	1350	70	15	1150	138	4370	48	256
1:4	375	815	1906	975	36	5	775	31	1320	15	78
	450	890	2211	1050	36	6	850	41	1625	18	95
	600	1040	2821	1200	45	8	1000	64	2235	25	134
	750	1190	3431	1350	53	10	1150	92	2845	31	176
1:3	375	815	1296	975	25	3	775	19	710	8	52
	450	890	1601	1050	30	4	850	28	1015	11	69
	600	1040	1906	1200	35	5	1000	40	1320	15	90
	750	1190	2516	1350	43	7	1150	65	1930	21	129

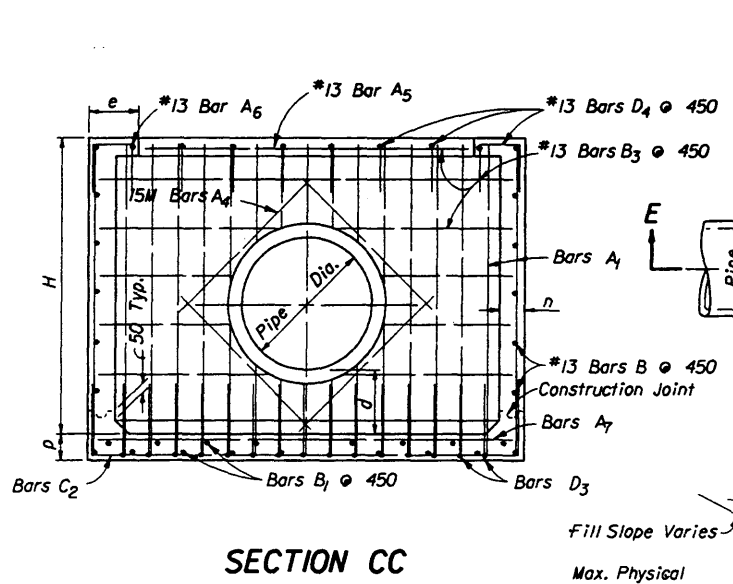
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**U-TYPE CONCRETE ENDWALLS  
BAFFLES AND GRATE OPTIONAL  
375 TO 750 PIPE**

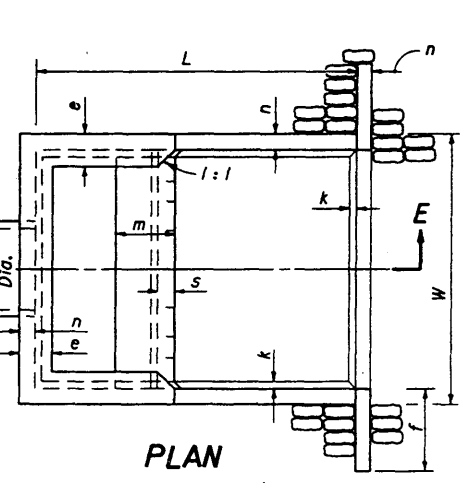
Designed By	Names	Dates	Approved By	State Drainage Engineer	
Drawn By	CDP	07/71	Revision	Sheet No.	Index No.
Checked By			94	3 of 3	261



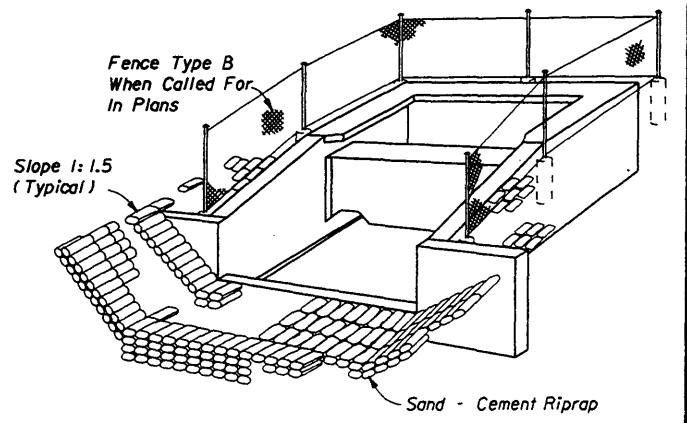
PLAN



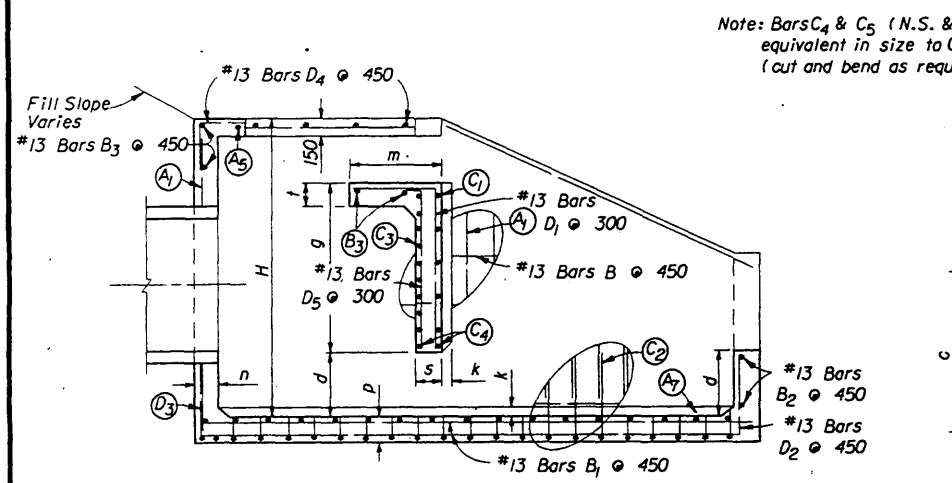
SECTION CC



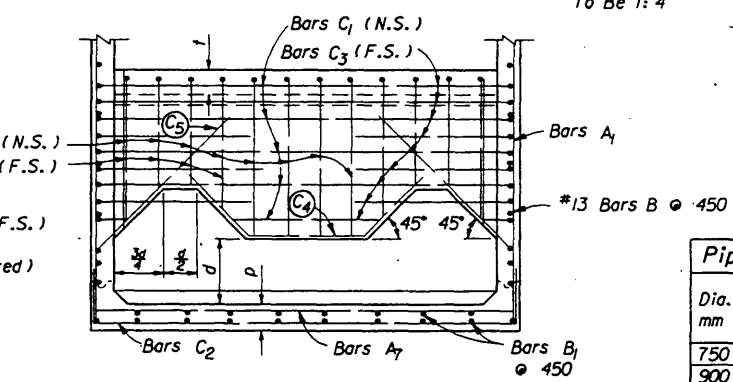
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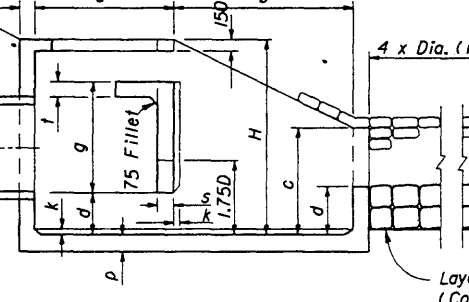
PERSPECTIVE



SECTION BB

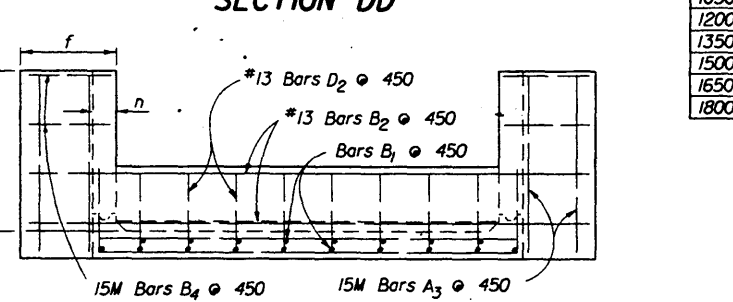


SECTION DD



SECTION EE

Note: Bars C<sub>4</sub> & C<sub>5</sub> (N.S. & F.S.) equivalent in size to C<sub>3</sub> (cut and bend as required)



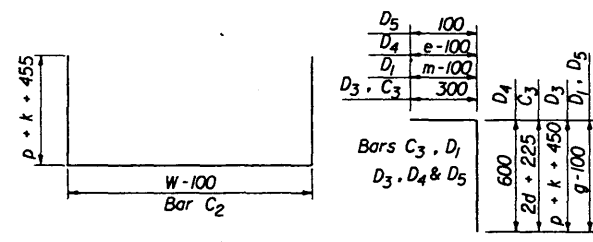
VIEW AA

Pipe Size Dia. mm	Area m <sup>2</sup>	Q (Max.) (m <sup>3</sup> /m)	Dimensions Millimeters													Concrete Class I m <sup>3</sup>	Reinf. Steel kg	Sand Cement Riprap m <sup>3</sup> (Nom.)			
			W	H	L	a	b	c	d	e	f	g	m	n	p				s	t	k
750	0.46	100	2745	1905	3250	1395	1855	1015	405	355	760	915	585	150	190	180	180	75	5.14	400	8.1
900	0.66	145	3175	2210	3760	1600	2160	1070	485	380	915	1065	685	175	190	205	205	75	7.91	580	10.4
1050	0.89	195	3605	2440	4265	1830	2435	1345	535	455	915	1195	760	200	215	230	205	100	11.33	780	13.4
1200	1.17	257	4040	2745	4775	2055	2720	1500	610	485	915	1345	865	225	240	255	205	100	15.57	1090	16.9
1350	1.48	325	4470	2970	5285	2235	3050	1650	660	560	915	1500	915	250	265	255	205	100	20.79	1450	20.8
1500	1.82	401	4900	3275	5790	2440	3350	1805	735	585	915	1625	1015	275	290	280	205	150	26.37	1930	24.9
1650	2.20	484	5260	3505	6250	2640	3610	1955	785	635	915	1750	1090	300	315	305	205	150	32.74	2430	29.3
1800	2.63	576	5640	3735	6705	2820	3885	2110	840	685	915	1880	1145	300	315	305	205	150	38.75	2950	34.0

GENERAL NOTES

- U-type concrete endwall energy dissipator are intended for use outside the clear zone.
- Chamfer all exposed edges 20 mm.
- Concrete meeting the requirements of ASTM C-478M (27 579 kPa) may be used in lieu of Class I Concrete in precast items manufactured in plants which are under the Standard Operating Procedures for the inspection of precast drainage products.
- Reinforcing steel shall have 50 mm min. cover.
- Endwall to be paid for under the contract unit price for Conc. Class I (Endwalls), M3 and Reinf. Steel (Roadway), KG. Riprap to be paid for under the contract unit price for Riprap (Sand-Cement), M3. Cost of plastic filter fabric to be included in the contract unit price for riprap.
- Fencing, when called for in the plans, to be paid for under the contract unit price for Fencing, Type B. MI. Corner posts and end posts to be paid for under the contract unit price for Corner Post Assembly (Type B Fence), EA. and End Post Assembly (Type B Fence), EA. respectively. See Index No. 452 for details of Type B fencing.

Pipe Size	A <sub>1</sub>		A <sub>7</sub>		C <sub>1</sub>		C <sub>2</sub>		C <sub>3</sub>		D <sub>3</sub>	
	Size (No.)	Spacing (mm)	Size (No.)	Spacing (mm)	Size (No.)	Spacing (mm)	Size (No.)	Spacing (mm)	Size (No.)	Spacing (mm)	Size (No.)	Spacing (mm)
750	*13	360	*13	685	*16	270	*13	360	*16	135	*13	360
900	*16	295	*13	685	*16	245	*16	295	*16	125	*16	295
1050	*16	270	*13	685	*19	335	*16	270	*19	170	*16	270
1200	*16	235	*13	455	*19	310	*16	235	*19	155	*16	235
1350	*16	210	*13	380	*22	410	*16	210	*22	205	*16	210
1500	*19	260	*16	320	*22	380	*19	260	*22	190	*19	260
1650	*19	220	*16	280	*22	350	*19	220	*22	175	*19	220
1800	*19	195	*16	245	*22	315	*19	195	*22	160	*19	195



Note: All bar dimensions are out to out.

BENDING DIAGRAM

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**U-TYPE CONCRETE ENDWALL  
ENERGY DISSIPATOR  
750 TO 1800 PIPE**

Names	Dates	Approved By
Designed By	HAB 10/69	J. A. McLenore State Drainage Engineer
Drawn By	RWR 02/84	Revision
Checked By	JVC 02/84	00
		Sheet No.
		1 of 1
		Index No.
		264

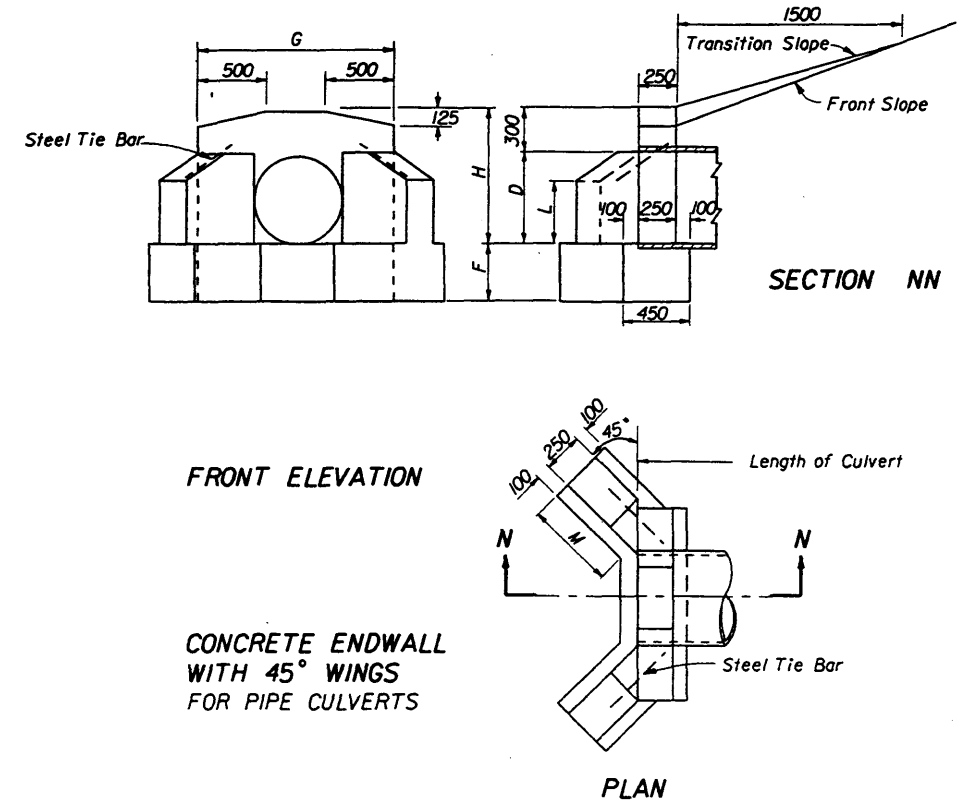
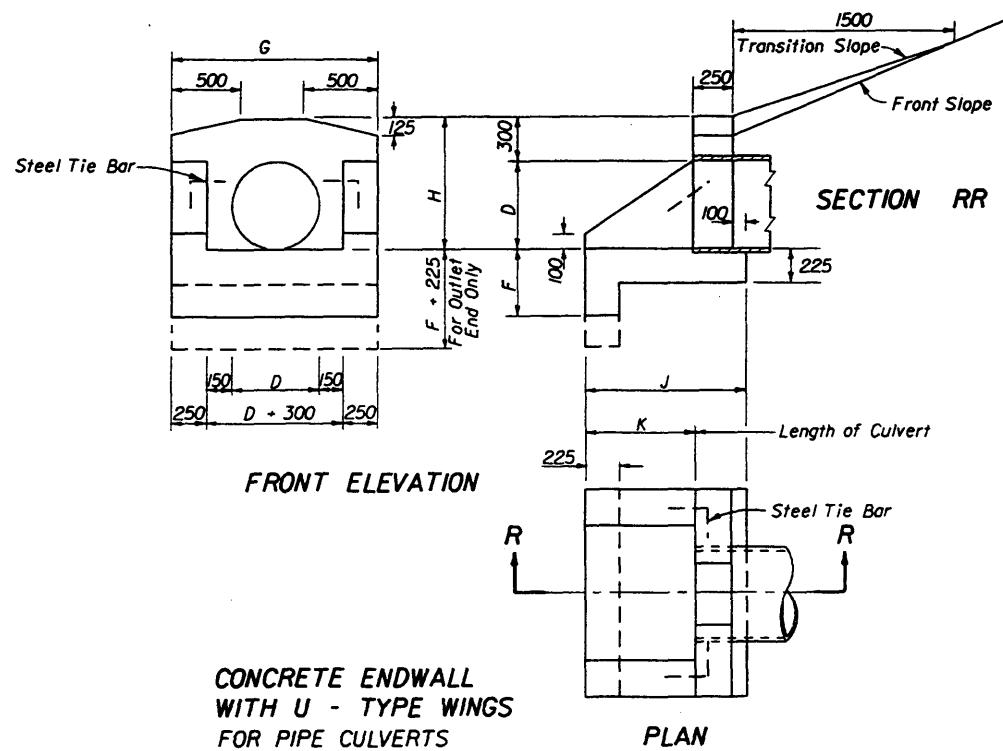


TABLE OF DIMENSIONS AND ESTIMATED QUANTITIES  
PIPE CULVERT ENDWALLS WITH U - TYPE WINGS

Opening D	Area m <sup>2</sup>	DIMENSIONS					QUANTITIES IN ONE ENDWALL						
		Wall			Footing		Total m <sup>3</sup> Concrete, Class I				Steel Tie Bars		
		G	H	K	F	J	Conc. Pipe		C.I. Pipe				
300	0.07	1100	600	305	380	655	0.37	0.42	0.37	0.44	0.37	0.44	none
375	0.11	1175	975	430	380	780	0.45	0.51	0.47	0.54	0.47	0.54	none
450	0.16	1250	750	535	380	885	0.54	0.60	0.57	0.63	0.57	0.63	none
600	0.28	1400	900	760	455	1110	0.77	0.85	0.81	0.89	0.81	0.89	2 - #19 x 600
750	0.44	1550	1050	990	455	1344	1.02	1.10	1.08	1.15	1.07	1.15	2 - #19 x 600
900	0.64	1700	1200	1220	535	1570	1.32	1.41	1.41	1.50	1.39	1.48	2 - #19 x 750
1050	0.87	1850	1350	1450	610	1800	1.67	1.77	1.77	1.87			2 - #19 x 750
1200	1.13	2000	1500	1675	610	2025	2.02	2.13	2.15	2.26			2 - #19 x 900

TABLE OF DIMENSIONS AND ESTIMATED QUANTITIES  
PIPE CULVERT ENDWALLS WITH 45° WINGS

Opening D	Area m <sup>2</sup>	DIMENSIONS					QUANTITIES IN ONE ENDWALL				
		Wall			Footing		Concrete, Class I			Steel Tie Bars	
		H	G	L	M	F	Total m <sup>3</sup>				
375	0.07	675	1090	305	380	380	0.43	0.45	0.45	none	
450	0.16	750	1170	355	485	380	0.57	0.59	0.59	none	
600	0.28	900	1320	430	635	405	0.77	0.81	0.81	2 - #19 x 600	
750	0.44	1050	1475	535	735	455	1.01	1.07	1.06	2 - #19 x 600	
900	0.64	1200	1625	610	890	510	1.32	1.40	1.39	2 - #19 x 900	
1050	0.87	1350	1780	685	1065	610	1.79	1.89		2 - #19 x 900	
1200	1.13	1500	1930	760	1220	610	2.09	2.22		2 - #19 x 900	

GENERAL NOTES

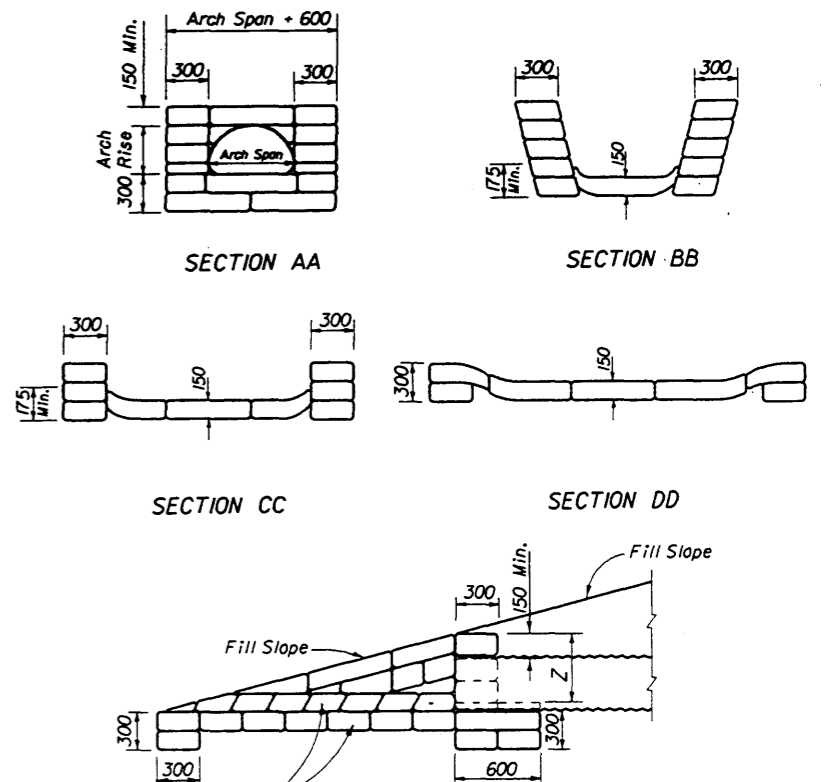
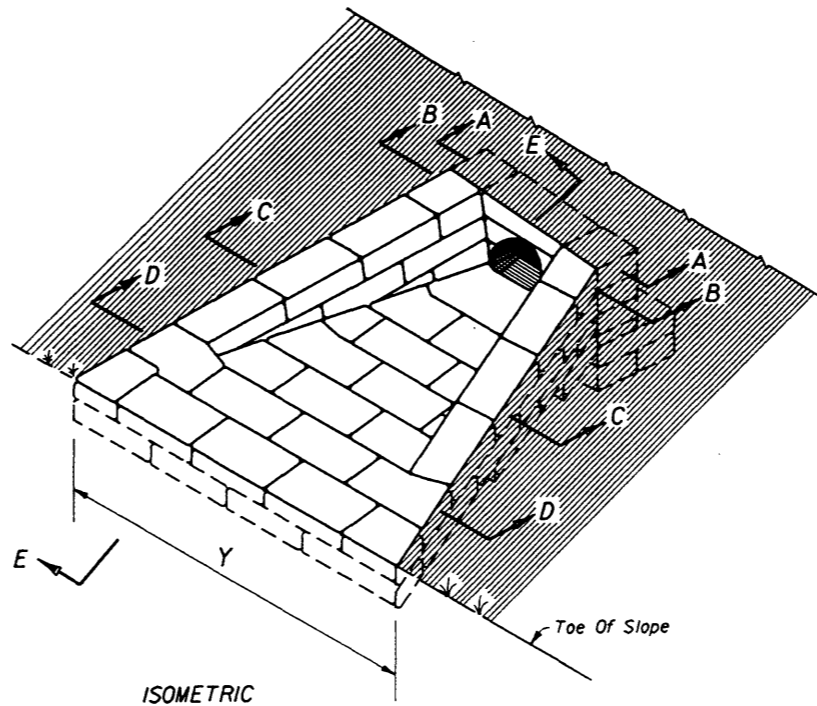
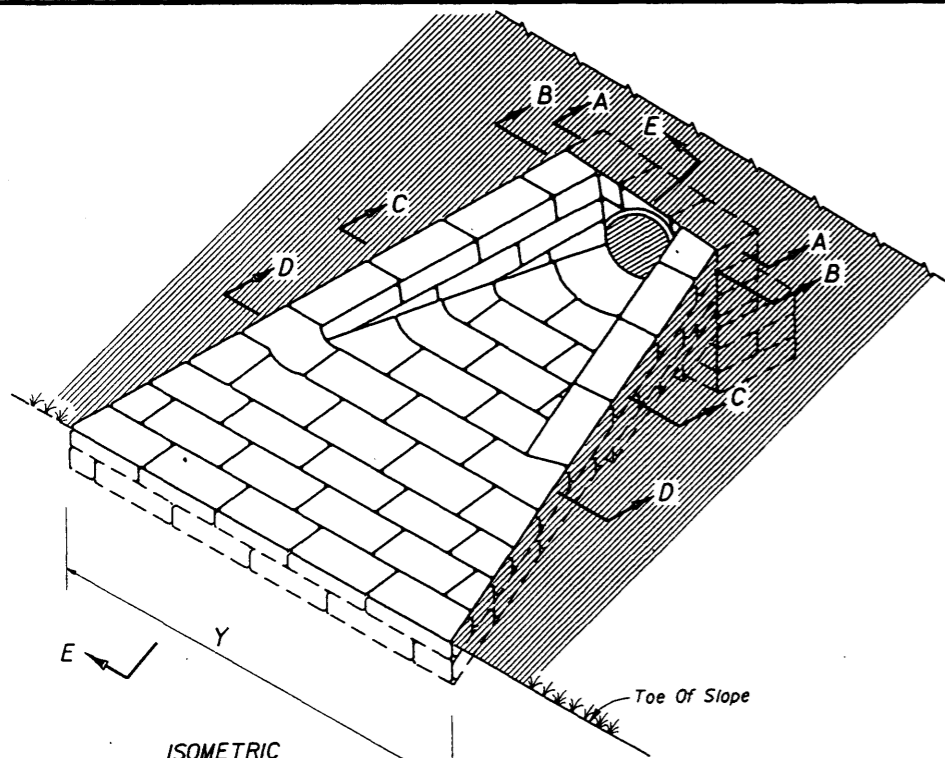
1. Winged concrete endwalls are intended for use outside the clear zone.
2. Chamfer all exposed edges 20 mm.
3. Concrete meeting the requirements of ASTM C-478M (27 579 kPa) may be used in lieu of Class I concrete in precast units manufactured in plants which are under the Standard Operating Procedures for the inspection of precast drainage products.
4. Endwall to be paid for under the contract unit price for Conc. Class I (Endwalls), M3. Cost of steel tie bars to be included in the contract unit price for Class I Concrete.
5. Sodding to be in accordance with Index No. 281, and paid for under the contract unit price for Sodding, M2.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**WINGED CONCRETE ENDWALLS  
SINGLE ROUND PIPE**

Names	Dates	Approved By		
Designed By		<i>J. A. McLemore</i>	State Drainage Engineer	
Drawn By	TJK 12/31	Revision	Sheet No.	Index No.
Checked By	GEF 03/32	00	1 of 1	266

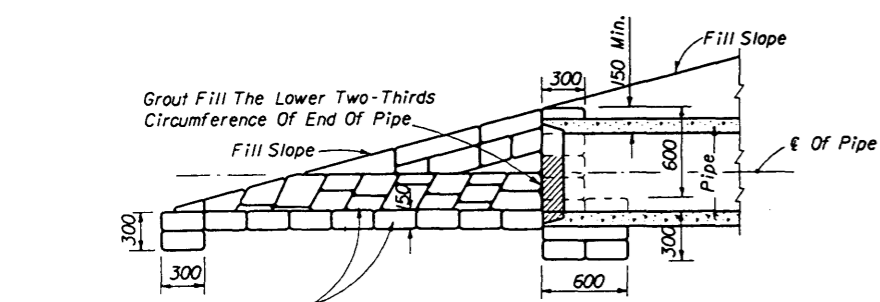
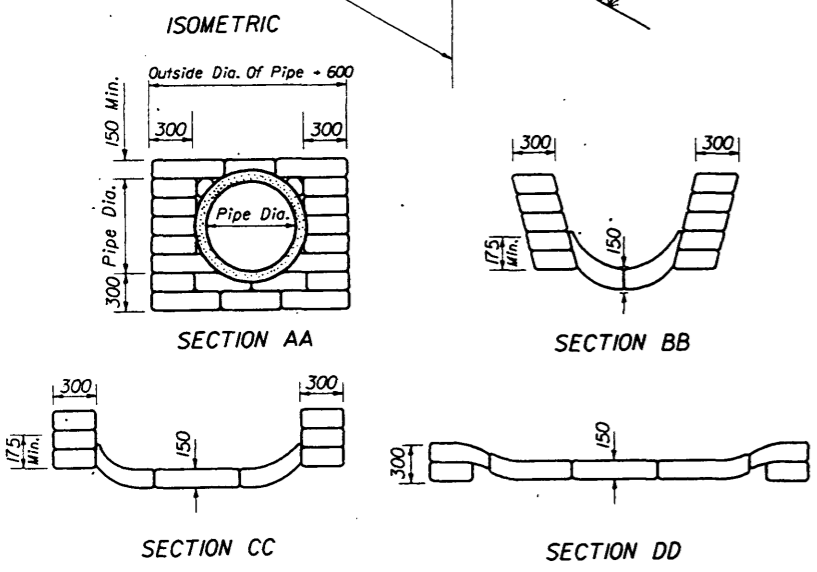




Place Plastic Filter Fabric Type D-4 (See Index 199) Around And Below Sand-Cement Riprap. Cost Of Fabric To Be Included In Cost Of Sand-Cement Riprap

**DETAILS FOR SINGLE METAL PIPE ARCH CULVERTS**

NOTE: For multiple metal pipe arch culverts, spacing between arch centers = X



Place Plastic Filter Fabric Type D-4 (See Index 199) Around And Below Sand-Cement Riprap. Cost Of Fabric To Be Included In Cost Of Sand-Cement Riprap

**DETAIL FOR SINGLE PIPE CULVERT**  
Note: For multiple pipe culverts, spacing between pipe centers = X

Span Rise		DIMENSIONS AND QUANTITIES FOR METAL PIPE ARCH CULVERTS															
		Dimensions								Quantity of Sand-Cement Riprap in m <sup>3</sup> for One Endwall							
		Y				Z	For 1:2 Slopes				For 1:4 Slopes				For 1:6 Slopes		
X	1-Arch	2-Arch	3-Arch	4-Arch	1-Arch		2-Arch	3-Arch	4-Arch	1-Arch	2-Arch	3-Arch	4-Arch	1-Arch	2-Arch	3-Arch	4-Arch
410	310	760	1980	2740	3500	4260	485	0.8	1.1	1.5	1.9	1.1	1.7	2.2	2.8		
510	360	865	2285	3150	4015	4880	535	0.9	1.4	1.8	2.3	1.5	2.1	2.7	3.3		
690	480	1040	2820	3860	4900	5940	610	1.3	1.9	2.5	3.1	2.0	2.8	3.7	4.5		
860	580	1220	3355	4575	5795	7015	610	1.7	2.4	3.1	3.7	2.6	3.6	4.6	5.6		
1040	710	1450	3885	5335	6785	8235	610	2.2	3.1	4.1	5.0	3.4	4.7	5.9	7.1		
1220	810	1675	4420	6095	7770	9445	610	2.7	3.7	4.8	5.9	4.2	5.7	7.1	8.6		
1420	940	1930	5030	6960	8890	10820	610	3.3	4.7	6.0	7.3	5.3	7.0	8.8	10.6		
1600	1060	2160	5565	7725	9885	12045	610	3.9	5.4	6.8	8.3	6.2	8.2	10.2	12.2		
1770	1160	2390	6095	8485	10875	13265	610	4.5	6.2	7.9	9.6	7.3	9.5	11.7	13.9		

Pipe Dia.		DIMENSIONS AND QUANTITIES FOR ROUND PIPE CULVERTS															
		Dimensions								Quantity of Sand-Cement Riprap in m <sup>3</sup> for One Endwall							
		X	Y				For 1:2 Slopes				For 1:4 Slopes				For 1:6 Slopes		
	1-Pipe	2-Pipes	3-Pipes	4-Pipes	1-Pipe	2-Pipes	3-Pipes	4-Pipes	1-Pipe	2-Pipes	3-Pipes	4-Pipes	1-Pipe	2-Pipes	3-Pipes	4-Pipes	
375	785	2135	2920	3705	4490	0.9	1.2	1.6	2.0	1.3	1.8	2.3	2.8				
450	865	2440	3305	4170	5035	1.1	1.5	2.0	2.4	1.6	2.2	2.8	3.4				
600	1040	3050	4090	5130	6170	1.5	2.1	2.7	3.3	2.2	3.1	3.9	4.8				
750	1295	3660	4955	6250	7545	1.9	2.8	3.7	4.5	2.9	4.1	5.4	6.6				
900	1550	4265	5815	7365	8915	2.4	3.5	4.7	5.9	3.7	5.4	7.0	8.7				
1050	1830	4875	6705	8535	10365	2.9	4.4	5.9	7.4	4.6	6.7	8.9	11.1				
1200	2055	5485	7540	9595	11650	3.4	5.4	7.2	9.0	5.5	8.3	10.9	13.7				
1350	2335	6095	8430	10765	13100	4.1	6.3	8.6	10.9	6.5	9.9	13.2	16.6				
1500	2590	6705	9295	11885	14475	4.7	7.4	10.2	12.9	7.6	11.7	15.7	19.8				

**GENERAL NOTES**

1. U-type sand-cement endwalls are intended for use outside the clear zone.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**U-TYPE SAND-CEMENT ENDWALLS**

Names	Dates	Approved By	
Designed By	JEP 12/48	A. McEwen	State Drainage Engineer
Drawn By	NW 03/54		Revision
Checked By	CDD 03/54	00	1 of 1

Index No. 268

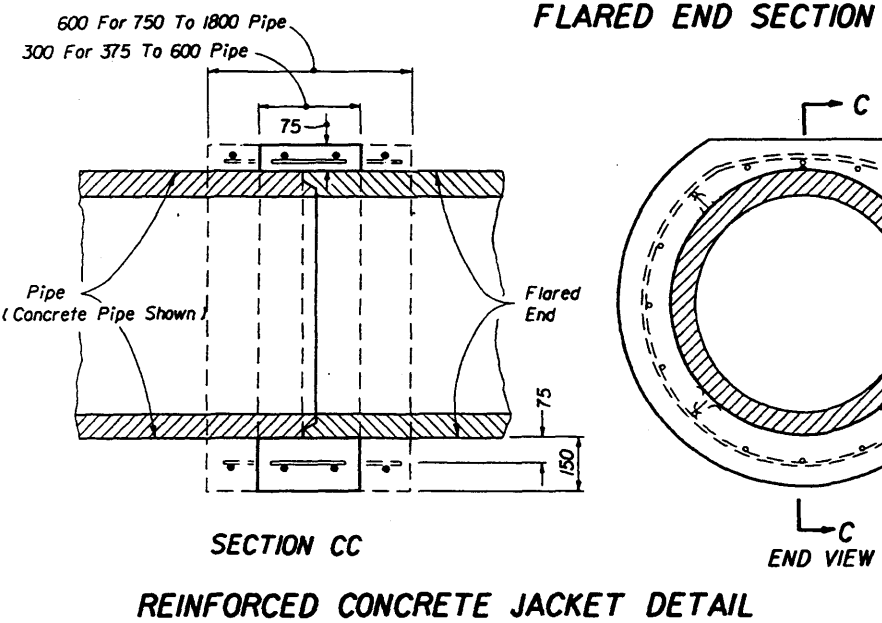
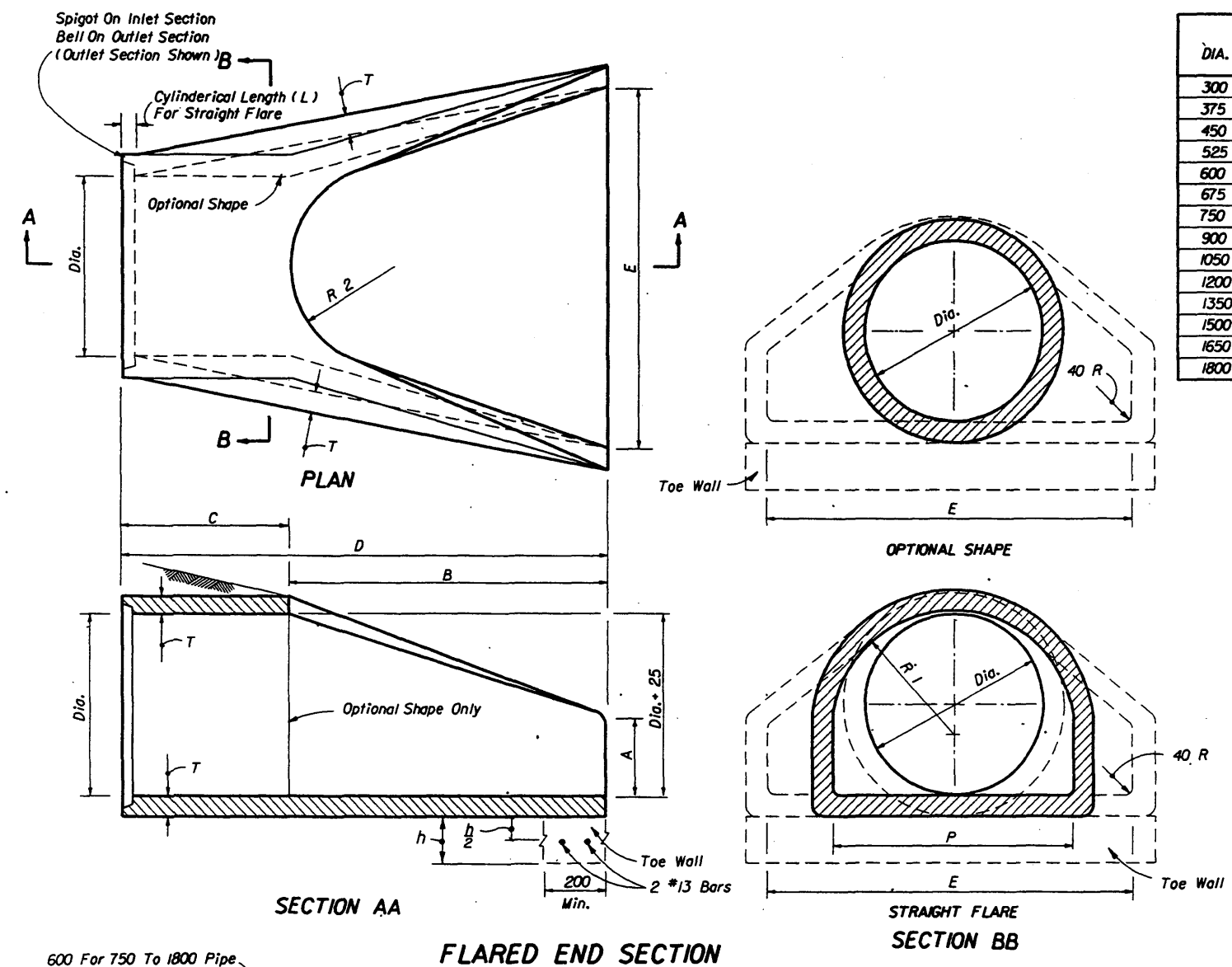
DIA.	T	REINF. mm <sup>2</sup> /m	BELL OR SPIGOT	A	B	C	D	E	P	R 1	R 2	L	WEIGHT (kg)	h	TOE WALL
															CLASS I CONC (Misc.) M <sup>3</sup>
300	50	148	40	100	610	1240	1850	610	505	255	230	90	240	305	.05
375	55	148	50	150	685	1170	1855	760	615	315	280	90	335	305	.05
450	65	148	65	230	685	1170	1855	915	735	395	305	100	450	380	.08
525	70	148	55	230	890	965	1855	1065	805	410	330	100	580	380	.09
600	75	148	65	240	1105	760	1865	1220	845	425	355	115	690	455	.13
675	80	313	65	265	1220	645	1865	1370	915	470	370	115	875	455	.15
750	90	313	75	305	1370	500	1870	1525	940	470	380	125	993	535	.18
900	100	313	90	380	1600	880	2480	1830	1215	620	510	140	1860	535	.22
1050	115	313	95	535	1600	890	2490	1980	1370	700	560	140	2440	610	.28
1200	125	313	110	610	1830	660	2490	2135	1435	725	560	140	2970	610	.30
1350	140	368	120	685	1650	890	2540	2285	1665	840	610	160	3645	610	.32
1500	150	368	125	760	1525	990	2515	2440	1840	930	610	170	3970	610	.34
1650	165	368	140	610	1980	535	2515	2590	1830	915	610	185	4820	610	.36
1800	180	368	150	610	1980	535	2515	2745	1975	990	610	195	5680	610	.38

**GENERAL NOTES**

- Flared end sections shall conform to the requirements of ASTM C-76M with the exception that dimensions and reinforcement shall be as prescribed in the table above. Circumferential reinforcement may consist of either one cage or two cages of steel. Compressive strength of concrete shall be 27 579 kPa. Shop drawings for flared end sections having dimensions other than above must be submitted for approval to the State Drainage Engineer.
- Connections between the flared end section and the pipe culvert may be any of the following types unless otherwise shown on the plans.
  - Joints meeting the requirements of Section 941-1.5 of the Standard Specifications (O-Ring Gasket). Flared end section joint dimensions and tolerances shall be identical or compatible to those used in the pipe culvert joint. When pipe culvert and flared end section manufacturers are different, the compatibility of joint designs shall be certified to by the manufacturer of the flared end sections.
  - Joints sealed with preformed plastic gaskets. The gaskets shall meet the requirements of Section 942-2 of the Standard Specifications and the minimum sizes for gaskets shall be as that specified for equivalent sizes of elliptical pipe.
  - Reinforced concrete jackets, as detailed on this drawing. Cost of the reinforced concrete jacket to be included in the contract unit price for the flared end section. When non-coated corrugated metal pipe is called for in the plans, the pipe shall be bituminous coated in the jacketed area as specified on Index No. 280. Bituminous coating to be included in the contract unit price for the pipe culvert. Concrete jacket shall be as specified on Index No. 280. Cost of concrete and reinforcement shall be included in the contract unit price for the pipe culvert.
- Toe walls shall be constructed when shown on the plans or at locations designated by the Engineer. Toe walls are to be cast-in-place with Class I Concrete and paid for under the contract unit price for Conc. Class I (Miscellaneous), M3. Reinforcing steel to be included in cost of toe wall.
- On skewed pipe culverts the flared end sections shall be placed in line with the pipe culvert. Side slopes shall be warped as required to fit the flared end sections.
- Flared End Section to be paid for under the contract unit price for Flared End Section (Concrete), EA. Sodding shall be in accordance with Index No. 281, and paid for under the contract unit price for Sodding, M2.

**DESIGN NOTES**

- Flared end sections are intended for use outside the clear zone on median drain and cross drain installation, except that flared end sections for pipe sizes 300 mm and 375 mm are permitted within the clear zone. When the slope intersection permits, these flared end sections may be located with the culvert opening as close as 2.4 m beyond the outside edge of the shoulder.  
Flared end sections are not intended for side drain installations.
- Reinforced concrete jackets shall be used at all locations where high velocities and/or highly erosive soils may cause disjuncting. These locations are to be shown on the plans.
- Toe walls shall be used whenever the anticipated velocity of discharge and soil type are such that erosive action would occur. Toe walls are not required where ditch pavement is provided, except when disjuncting would occur if the ditch pavement should fail.



Any Wire Mesh Arrangement Which Provides 81 Square millimeters Of Steel Area Per Linear Meter Both Ways May Be Used; Provided The Wires Are Spaced A Minimum Of 50 mm And/Or A Maximum Of 150 mm On Centers.

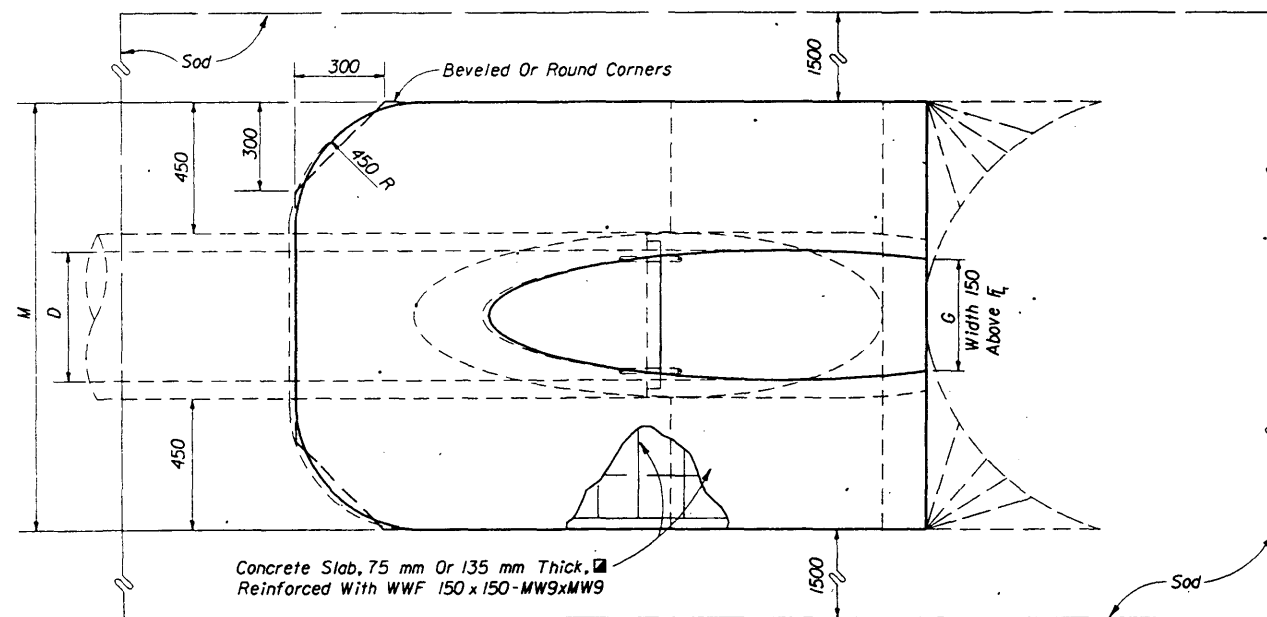
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>FLARED END SECTION</b>				
Designed By	EGR	08/77	Approved By <i>J. M. Lemore</i> State Drainage Engineer	
Drawn By	NKH	08/77	Revision	Sheet No.
Checked By	JG	08/77	98	1 of 1
				Index No. <b>270</b>

**DIMENSIONS AND QUANTITIES**

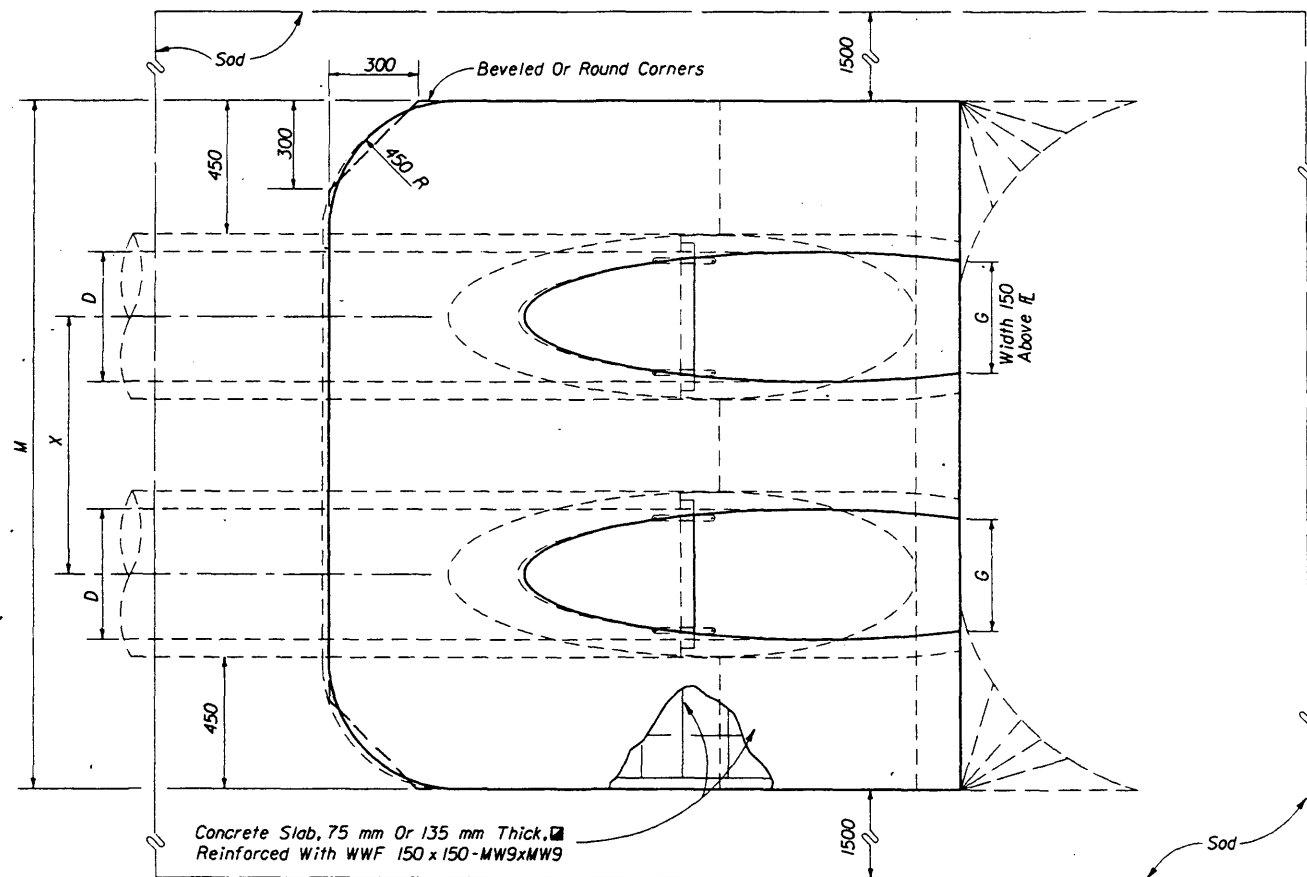
	D	X	A	B	C	E	F	G	M				N	135 CONCRETE SLAB (m <sup>3</sup> )				SODDING (m <sup>2</sup> )			
									Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe		Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe	Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe
1: 2 Slope	375	0.79	0.59	0.66	1.25	0.63	1.52	0.37	1.41	2.20	2.98	3.77	0.37	0.29	0.44	0.59	0.73	18	20	23	25
	450	0.86	0.60	0.84	1.44	0.78	1.83	0.43	1.50	2.36	3.23	4.09	0.37	0.34	0.50	0.67	0.83	17	20	23	26
	600	1.04	0.63	1.17	1.80	1.09	2.13	0.53	1.68	2.72	3.76	4.80	0.38	0.41	0.63	0.86	1.09	20	23	27	29
	750	1.30	0.66	1.51	2.16	1.39	2.44	0.61	1.85	3.15	4.44	5.74	0.40	0.50	0.83	1.15	1.46	22	26	29	33
	900	1.55	0.69	1.85	2.54	1.70	2.74	0.68	2.03	3.58	5.13	6.68	0.41	0.62	1.06	1.50	1.92	23	28	33	38
	1050	1.83	0.71	2.20	2.91	2.00	3.05	0.75	2.21	4.04	5.87	7.70	0.42	0.74	1.30	1.87	2.44	25	33	36	42
	1200	2.06	0.74	2.94	3.28	2.30	3.35	0.81	2.30	4.44	6.50	8.56	0.44	0.86	1.56	2.24	2.94	27	35	39	45
	1350	2.34	0.77	2.88	3.65	2.61	3.66	0.86	2.57	4.90	7.24	9.58	0.45	1.00	1.87	2.74	3.61	28	38	43	49
	1500	2.59	0.80	3.22	4.02	2.91	4.27	0.91	2.74	5.33	7.93	10.52	0.46	1.15	2.21	3.27	4.34	30	38	46	54
1650	2.79	0.83	3.56	4.39	3.22	4.57	0.97	2.92	5.72	8.51	11.30	0.47	1.28	2.48	3.70	4.92	32	40	49	57	
1800	3.05	0.85	3.90	4.76	3.52	4.88	1.01	3.10	6.15	9.19	12.24	0.48	1.45	2.86	4.27	5.70	33	43	52	61	
1: 4 Slope	375	0.79	0.69	1.25	1.94	1.23	2.44	0.37	1.41	2.20	2.98	3.77	0.37	0.44	0.67	0.88	1.10	19	22	24	27
	450	0.86	0.72	1.56	2.28	1.53	2.74	0.43	1.50	2.36	3.23	4.09	0.37	0.50	0.76	1.00	1.26	21	23	26	29
	600	1.04	0.77	2.18 Δ	2.96	2.14 Δ	3.35	0.53	1.68	2.72	3.76	4.80	0.38	0.65	0.99	1.34	1.68	23	27	30	33
	750	1.30	0.82	2.82	3.64	2.75	3.96	0.61	1.85	3.15	4.44	5.74	0.40	0.84	1.33	1.83	2.33	26	30	34	38
	900	1.55	0.88	3.45 ◇	4.32	3.36 ◇	4.57	0.68	2.03	3.58	5.13	6.68	0.41	1.00	1.69	2.35	3.03	28	33	38	44
	1050	1.83	0.93	4.08	5.01	3.97	5.18	0.75	2.21	4.04	5.87	7.70	0.42	1.21	2.11	2.99	3.89	32	37	43	49
	1200	2.06	0.98	4.70	5.68	4.58	5.79	0.81	2.30	4.44	6.50	8.56	0.44	1.41	2.52	3.62	4.72	34	40	47	53
	1350	2.34	1.03	5.33	6.36	5.19	6.40	0.86	2.57	4.90	7.24	9.58	0.45	1.64	3.02	4.41	5.80	37	43	51	58
	1500	2.59	1.09	5.96	7.04	5.80	7.01	0.91	2.74	5.33	7.93	10.52	0.46	1.87	3.56	5.25	6.93	39	47	55	63
	1650	2.79	1.14	6.59	7.73	6.41	7.62	0.97	2.92	5.72	8.51	11.30	0.47	2.20	4.24	6.25	8.29	41	49	58	67
1800	3.05	1.19	7.22	8.41	7.02	8.23	1.01	3.10	6.15	9.19	12.24	0.48	2.71	5.05	7.55	10.04	43	53	62	71	

See General Note No. 3.  
See Sheet 5 Of 6 For 75 mm Slab Quantities

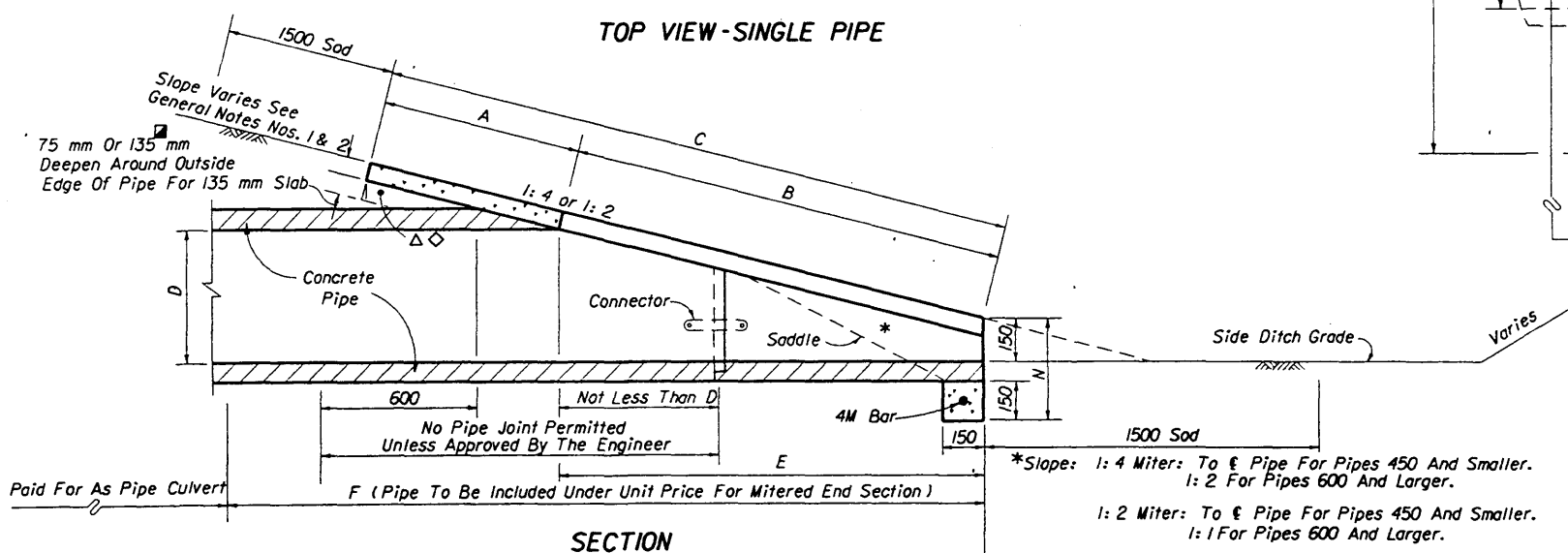
B E  
 Δ 1.95 Δ 1.90 Dimensions permitted to allow use of 2.44 standard pipe lengths.  
 ◇ 3.17 ◇ 3.10 Dimensions permitted to allow use of 3.66 standard pipe lengths.  
 ◇ Concrete slab shall be deepened to form bridge across crown of pipe. See section below.



TOP VIEW-SINGLE PIPE



TOP VIEW-MULTIPLE PIPE



SECTION

NOTE: See sheet 6 for details and notes.

\*Slope: 1: 4 Miter: To 6 Pipe For Pipes 450 And Smaller.  
 1: 2 For Pipes 600 And Larger.  
 1: 2 Miter: To 6 Pipe For Pipes 450 And Smaller.  
 1: 1 For Pipes 600 And Larger.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

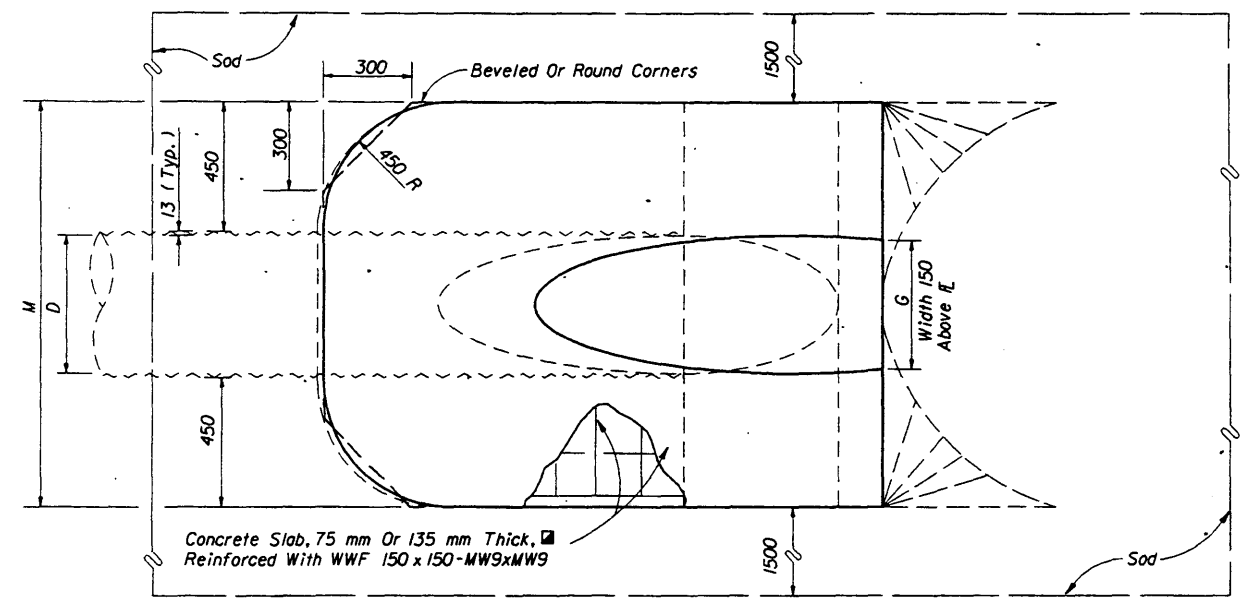
**CROSS DRAIN  
MITERED END SECTION**  
SINGLE AND MULTIPLE ROUND CONCRETE PIPE

Designed By	DCS	Dates	06/78	Approved By	<i>A. McLe...</i>
Drawn By		Revision		Sheet No.	1 of 6
Checked By	KNU	06/78	98	Index No.	272

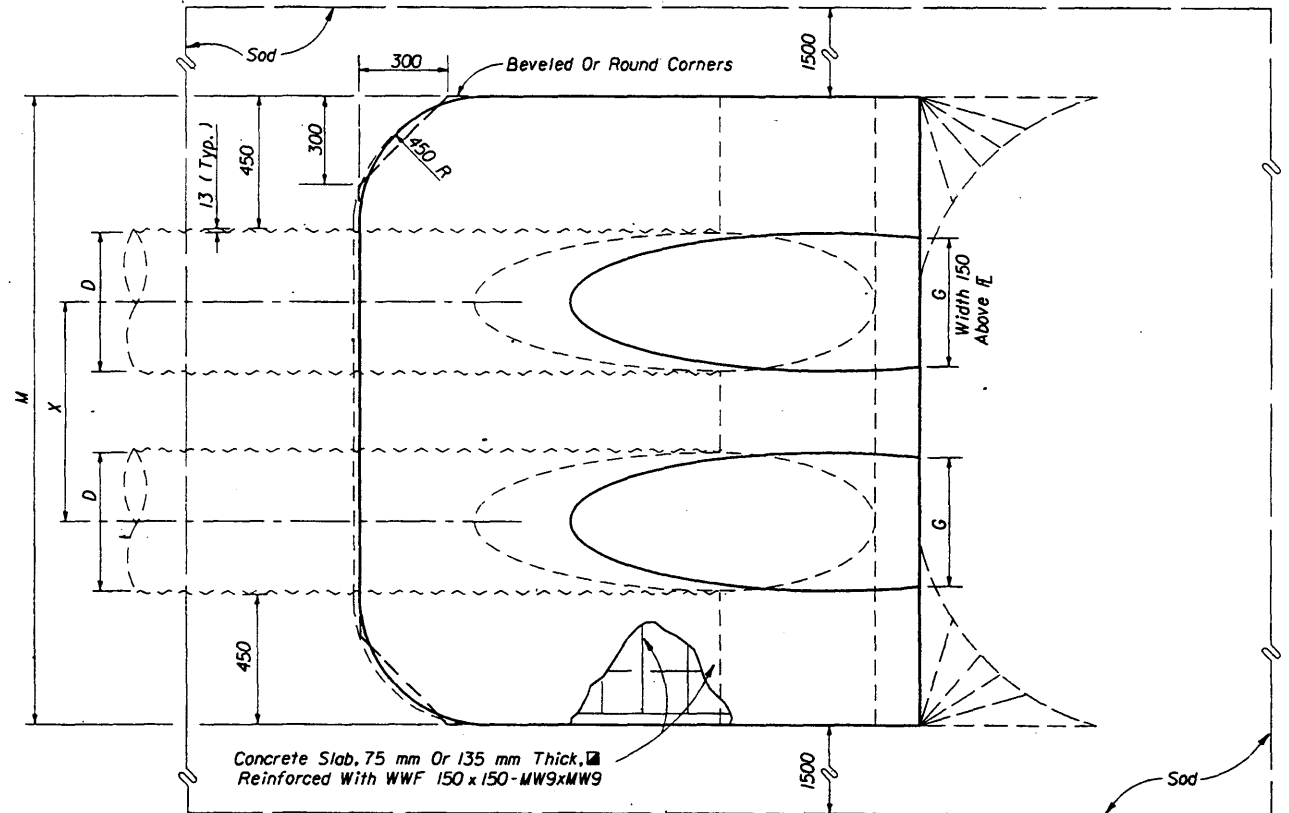
Paid For As Pipe Culvert

DIMENSIONS AND QUANTITIES																					
	D	X	A	B	C	E	F	G	M				N	135 CONCRETE SLAB (m <sup>3</sup> )				SODDING (m <sup>2</sup> )			
									Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe		Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe	Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe
1: 2 Slope	375	0.78	0.76	0.51	1.27	0.45	1.52	0.37	1.31	2.11	2.89	3.68	0.31	0.27	0.41	0.57	0.72	18	20	23	24
	450	0.86	0.76	0.68	1.44	0.61	1.83	0.43	1.39	2.26	3.12	3.97	0.31	0.29	0.47	0.67	0.86	18	21	23	26
	600	1.04	0.76	1.02	1.78	0.91	2.13	0.52	1.55	2.59	3.63	4.67	0.31	0.36	0.58	0.80	1.02	19	23	26	29
	750	1.29	0.76	1.36	2.12	1.22	2.44	0.61	1.70	2.99	4.29	5.59	0.31	0.44	0.73	1.05	1.35	21	25	30	33
	900	1.55	0.76	1.70	2.46	1.52	2.74	0.68	1.85	3.40	4.95	6.50	0.31	0.51	0.91	1.32	1.73	23	28	32	37
	1050	1.83	0.76	2.04	2.81	1.83	3.05	0.74	2.00	3.83	5.65	7.49	0.31	0.60	1.13	1.66	2.16	24	30	35	41
	1200	2.05	0.76	2.38	3.15	2.13	3.35	0.81	2.15	4.21	6.27	8.33	0.31	0.68	1.31	1.94	2.57	26	32	38	44
	1500	2.33	0.76	2.72	3.48	2.44	3.66	0.86	2.31	4.64	6.98	9.32	0.31	0.78	1.57	2.37	3.17	28	34	42	49
1: 4 Slope	375	0.78	0.76	0.94	1.70	0.91	2.13	0.37	1.32	2.11	2.89	3.68	0.31	0.34	0.52	0.70	0.88	18	21	23	26
	450	0.86	0.76	1.25	2.02	1.22	2.44	0.43	1.39	2.26	3.12	3.97	0.31	0.37	0.59	0.79	1.00	20	23	25	28
	600	1.04	0.76	1.88	2.64	1.83	3.05	0.52	1.55	2.59	3.63	4.67	0.31	0.50	0.83	1.06	1.35	23	25	28	32
	750	1.29	0.76	2.51	3.27	2.44	3.66	0.61	1.70	2.99	4.29	5.59	0.31	0.62	1.02	1.45	1.87	24	28	33	37
	900	1.55	0.76	3.14	3.90	3.05	4.26	0.68	1.85	3.40	4.95	6.50	0.31	0.74	1.28	1.84	2.40	27	32	37	41
	1050	1.83	0.76	3.77	4.53	3.66	4.87	0.74	2.00	3.83	5.65	7.49	0.31	0.86	1.59	2.34	3.07	29	35	40	46
	1200	2.05	0.76	4.40	5.16	4.26	5.48	0.81	2.15	4.21	6.27	8.33	0.31	0.99	1.90	2.82	3.73	32	38	44	50
	1500	2.33	0.76	5.02	5.79	4.87	6.09	0.86	2.31	4.64	6.98	9.32	0.31	1.13	2.28	3.42	4.57	34	41	49	55
1500	2.59	0.76	5.65	6.41	5.48	6.70	0.91	2.46	5.05	7.64	10.23	0.31	1.27	2.67	4.06	5.45	37	44	53	60	

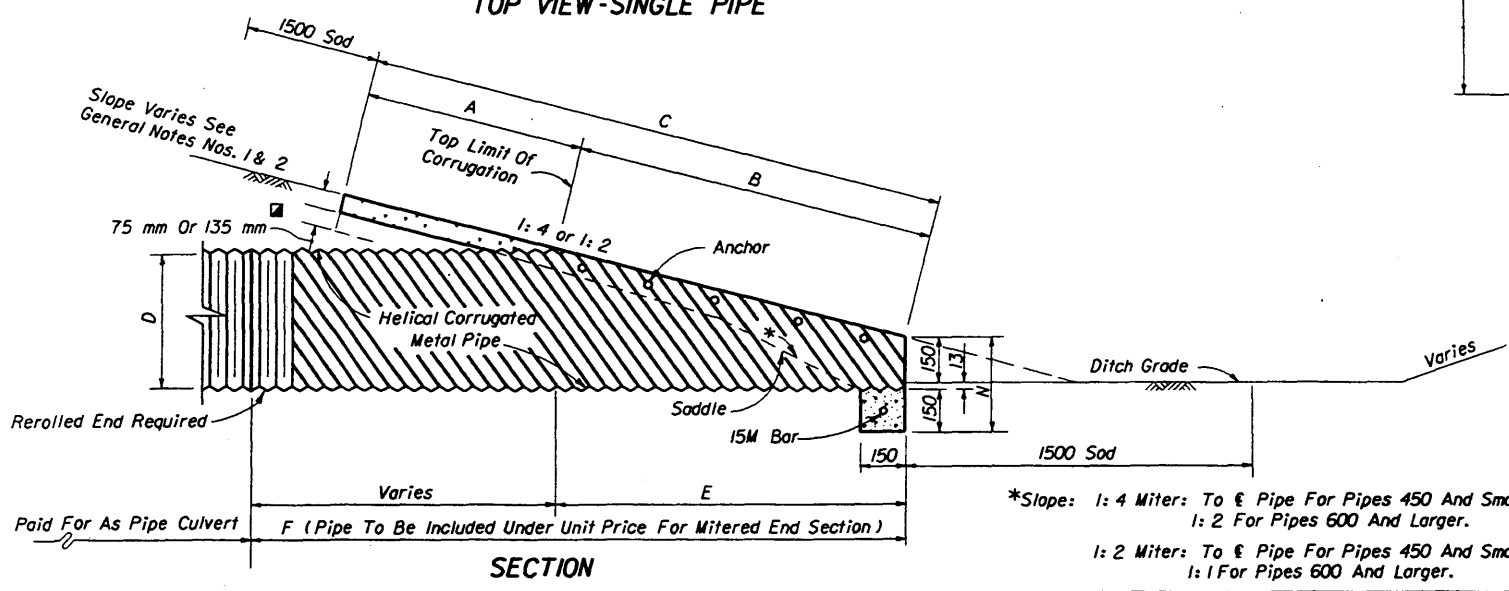
See General Note No. 3.  
See Sheet 5 Of 6 For 75 mm Slab Quantities



TOP VIEW-SINGLE PIPE



TOP VIEW-MULTIPLE PIPE



SECTION

NOTE: See Sheet 6 For Details And Notes.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**CROSS DRAIN  
MITERED END SECTION**  
SINGLE AND MULTIPLE ROUND CORRUGATED METAL PIPE

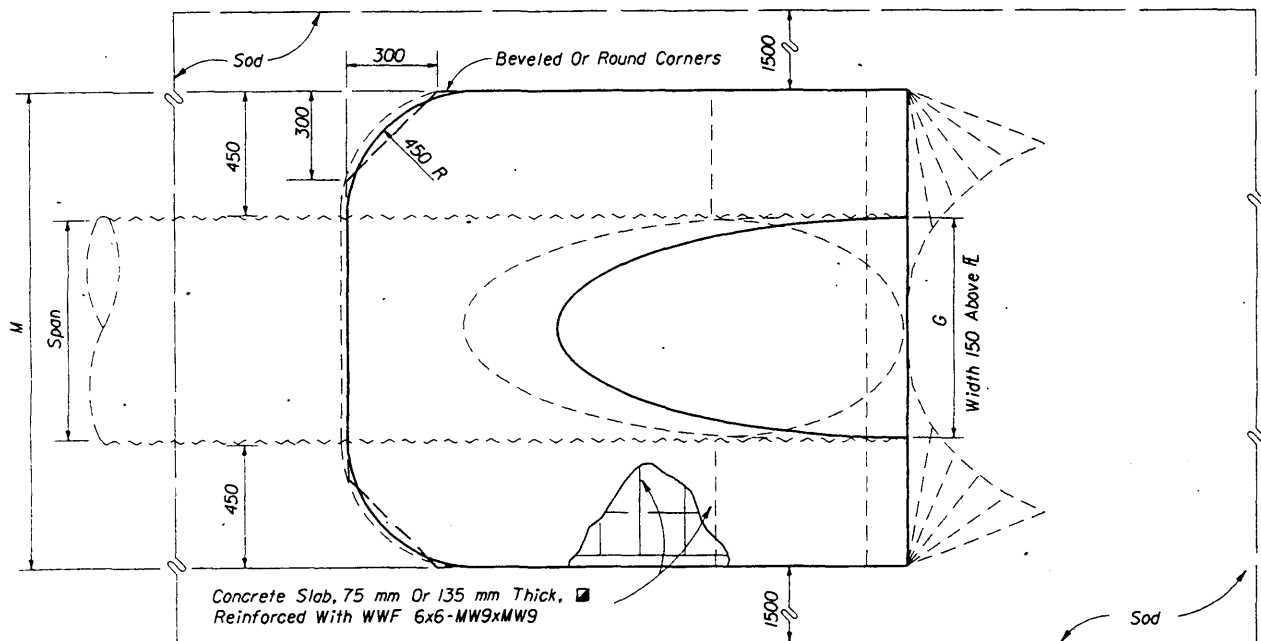
Names	Dates	Approved By	
Designed By	DCB 06/78	L.A. McLenore State Drainage Engineer	
Drawn By		Revision	Sheet No.
Checked By	KMM 06/78	98	2 of 6
			272

1974 AASHTO

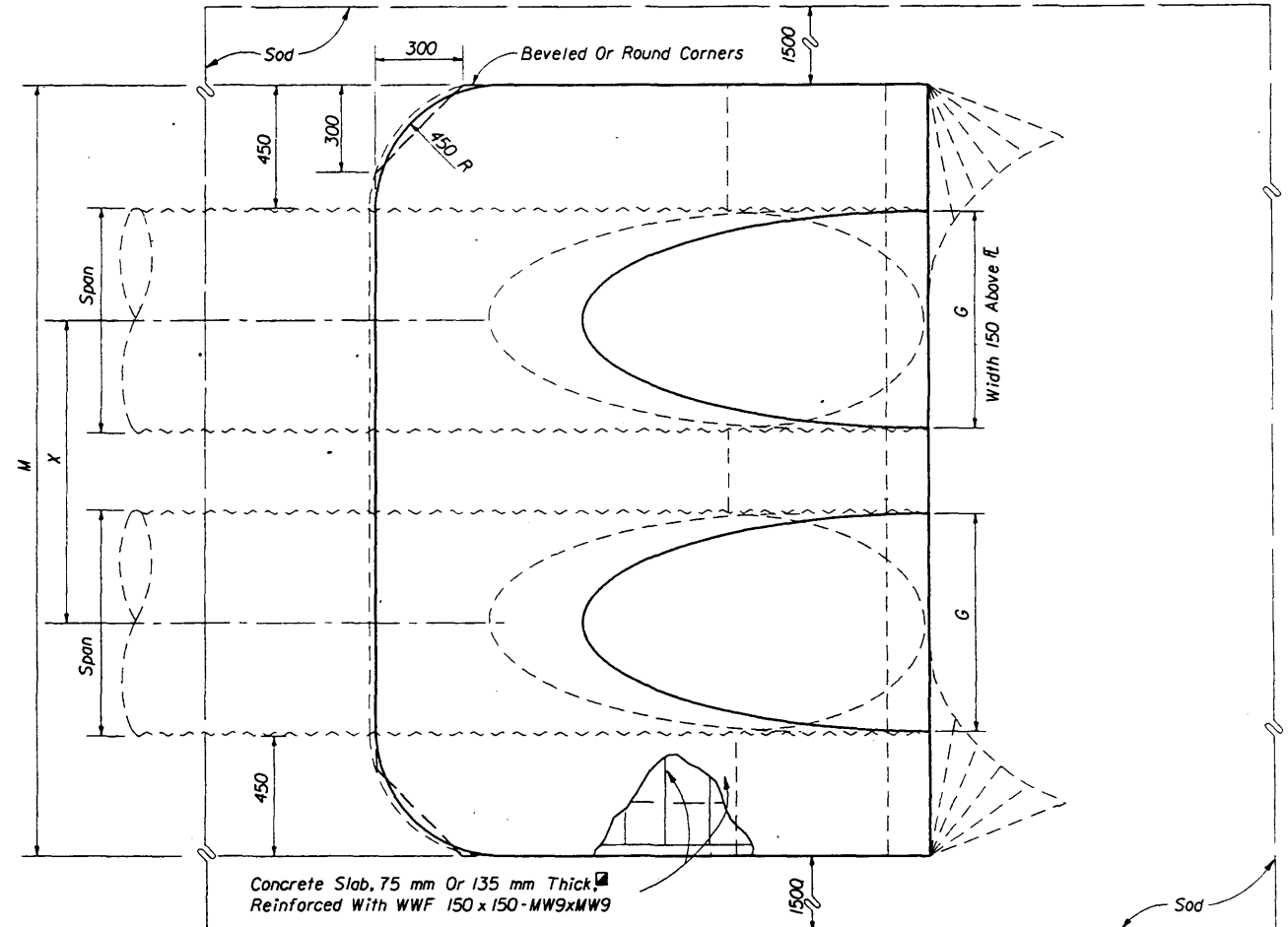
**DIMENSIONS AND QUANTITIES**

SPAN	RISE	X	A	B	C	E	F	G	M				N				135 CONCRETE SLAB (m <sup>3</sup> )				SODDING (m <sup>2</sup> )			
									Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe	Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe	Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe	Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe
1: 2 Slope	410 310	0.76	0.76	0.41	1.17	0.36	1.22	0.42	1.37	2.13	2.90	3.66	0.31	0.31	0.47	0.62	0.78	18	19	22	24			
	510 360	0.86	0.76	0.53	1.29	0.46	1.52	0.54	1.47	2.34	3.20	4.06	0.31	0.33	0.50	0.67	0.84	18	21	23	26			
	690 480	1.04	0.76	0.81	1.57	0.71	1.83	0.68	1.65	2.69	3.73	4.78	0.31	0.39	0.60	0.81	1.02	19	23	25	28			
	860 580	1.22	0.76	1.04	1.80	0.91	2.13	0.78	1.83	3.05	4.27	5.49	0.31	0.44	0.69	0.93	1.19	20	24	28	32			
	1040 710	1.45	0.76	1.32	2.08	1.17	2.44	0.91	2.01	3.45	4.90	6.35	0.31	0.49	0.80	1.12	1.43	22	26	31	35			
	1220 810	1.68	0.76	1.55	2.31	1.37	2.74	1.02	2.19	3.86	5.54	7.22	0.31	0.56	0.94	1.32	1.70	23	28	33	38			
	1420 940	1.93	0.76	1.83	2.59	1.63	3.05	1.11	2.39	4.32	6.25	8.18	0.31	0.63	1.10	1.56	2.02	24	30	37	43			
	1600 1060	2.16	0.76	2.12	2.88	1.88	3.35	1.19	2.57	4.72	6.88	9.04	0.31	0.73	1.28	1.83	2.38	26	33	39	46			
1770 1160	2.39	0.76	2.34	3.10	2.08	3.66	1.26	2.74	5.13	7.52	9.91	0.31	0.80	1.45	2.09	2.73	28	34	42	49				
1: 4 Slope	410 310	0.76	0.76	0.76	1.52	0.71	2.13	0.42	1.37	2.13	2.90	3.66	0.31	0.37	0.54	0.73	0.90	18	21	23	25			
	510 360	0.86	0.76	0.96	1.72	0.91	2.44	0.54	1.47	2.34	3.20	4.06	0.31	0.40	0.61	0.83	1.00	19	22	24	27			
	690 480	1.04	0.76	1.46	2.22	1.42	2.74	0.68	1.65	2.69	3.73	4.78	0.31	0.47	0.70	0.97	1.22	21	24	28	31			
	860 580	1.22	0.76	1.91	2.67	1.83	3.35	0.78	1.83	3.05	4.27	5.49	0.31	0.56	0.87	1.19	1.51	23	27	31	34			
	1040 710	1.45	0.76	2.43	3.19	2.34	3.66	0.91	2.01	3.45	4.90	6.35	0.31	0.67	1.06	1.47	1.87	25	29	34	38			
	1220 810	1.68	0.76	2.85	3.61	2.74	4.27	1.02	2.19	3.86	5.54	7.22	0.31	0.76	1.27	1.76	2.26	27	32	38	43			
	1420 940	1.93	0.76	3.37	4.13	3.25	4.88	1.11	2.39	4.32	6.25	8.18	0.31	0.90	1.53	2.16	2.78	29	35	41	47			
	1600 1060	2.16	0.76	3.90	4.66	3.76	5.18	1.19	2.57	4.72	6.88	9.04	0.31	1.04	1.83	2.58	3.32	32	38	44	51			
1770 1160	2.39	0.76	4.32	5.08	4.17	5.79	1.26	2.74	5.13	7.52	9.91	0.31	1.15	2.03	2.91	3.80	33	40	48	55				

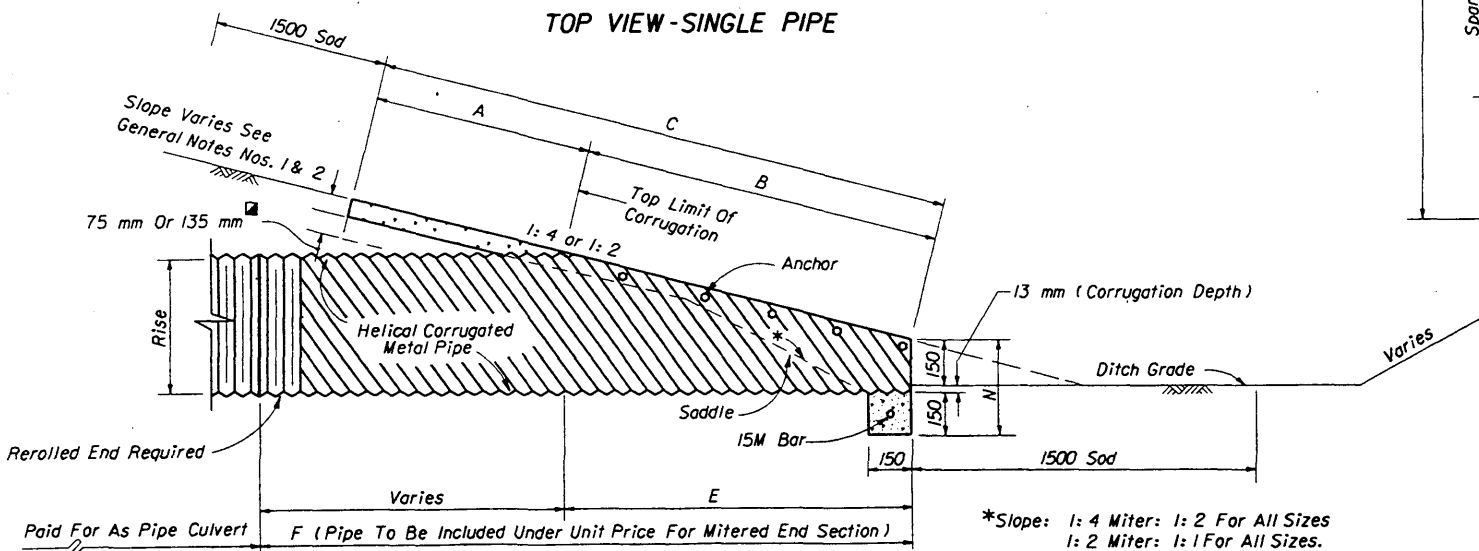
See General Note No. 3.  
See Sheet 5 Of 6 For 75 mm Slab Quantities



TOP VIEW-SINGLE PIPE



TOP VIEW-MULTIPLE PIPE



SECTION

\*Slope: 1: 4 Miter: 1: 2 For All Sizes  
1: 2 Miter: 1: 1 For All Sizes.

NOTE: See Sheet 6 For Details And Notes.

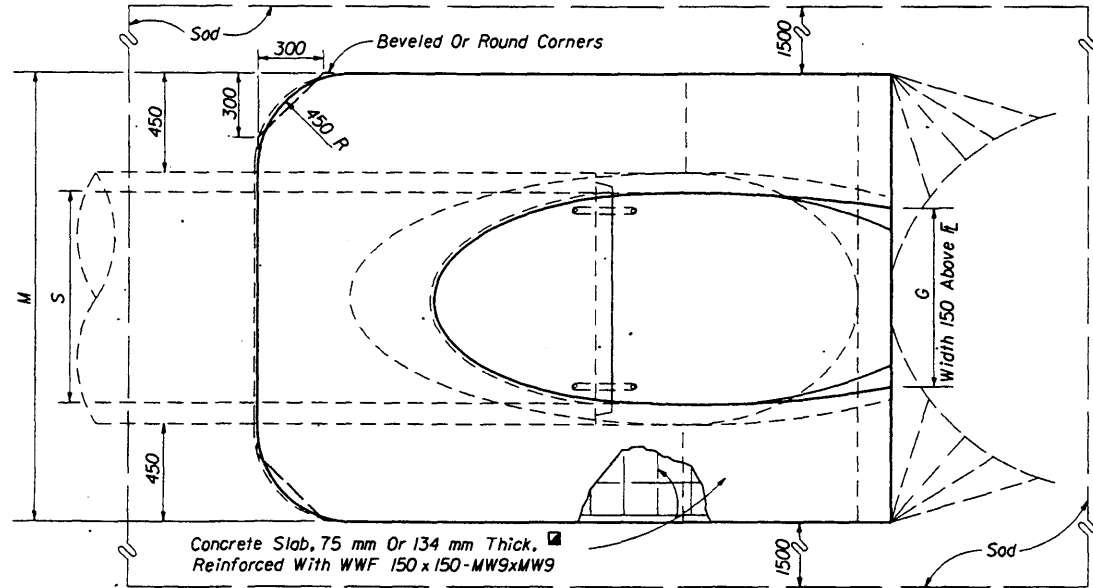
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**CROSS DRAIN  
MITERED END SECTION**  
SINGLE AND MULTIPLE CORRUGATED METAL PIPE-ARCH

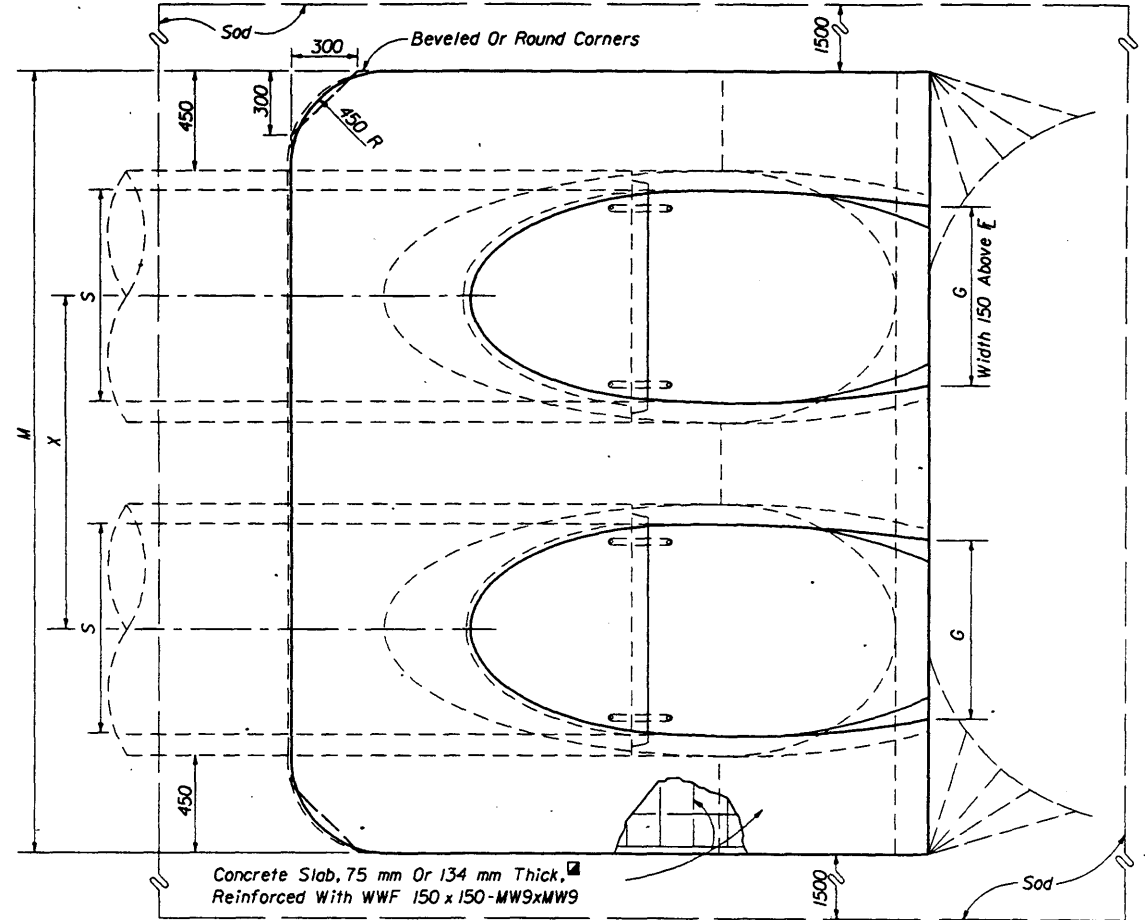
Names	Dates	Approved By		
Designed By	DCB 06/78	SAW. Lemire State Drainage Engineer	Revision	Sheet No.
Drawn By			98	3 of 6
Checked By	KNM 06/78			272

DIMENSIONS & QUANTITIES																					
Rise R	Span S	X	A	B	C	E	F	G	N	135 mm CONC. SLAB (m <sup>3</sup> )				SODDING (m <sup>2</sup> )							
										Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe	Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe				
305	460	0.86	0.60	0.49	1.09	0.48	1.22	0.46	1.50	2.36	3.22	4.09	0.37	0.23	0.37	0.51	0.65	18	20	23	25
365	575	1.02	0.61	0.61	1.22	0.58	1.52	0.58	1.64	2.56	3.67	4.69	0.38	0.28	0.45	0.62	0.78	18	22	24	28
490	770	1.22	0.62	0.89	1.53	0.83	1.83	0.72	1.84	3.06	4.28	5.50	0.39	0.38	0.61	0.83	1.06	20	23	28	31
610	960	1.53	0.67	1.18	1.84	1.00	2.13	0.87	2.07	3.59	5.12	6.64	0.40	0.47	0.79	1.11	1.42	22	26	31	35
730	1150	1.80	0.71	1.46	2.17	1.34	2.44	0.97	2.29	4.09	5.86	7.70	0.42	0.57	0.99	1.41	1.83	23	28	34	39
855	1345	2.14	0.74	1.74	2.48	1.59	2.74	1.09	2.51	4.65	6.78	8.92	0.43	0.69	1.23	1.77	2.32	25	31	38	44
975	1535	2.39	0.77	1.97	2.74	1.80	2.74	1.20	2.75	5.11	7.49	9.88	0.45	0.79	1.45	2.09	2.75	26	33	41	48
1095	1730	2.72	0.80	2.25	3.05	2.05	3.05	1.30	2.95	5.66	8.38	11.10	0.46	0.91	1.73	2.55	3.36	28	36	44	53
1220	1920	3.03	0.83	2.54	3.36	2.30	3.35	1.40	3.18	6.20	9.22	12.24	0.47	1.06	2.03	3.00	3.98	29	38	48	57
1340	2110	3.25	0.85	2.82	3.68	2.56	3.66	1.45	3.38	6.63	9.88	13.13	0.48	1.19	2.32	3.44	4.56	31	41	51	61
1465	2305	3.56	0.88	3.11	3.99	2.81	3.96	1.53	3.61	7.16	10.72	14.27	0.50	1.34	2.65	3.98	5.30	33	43	54	65
305	460	0.86	0.72	0.92	1.65	0.92	1.52	0.46	1.50	2.36	3.22	4.09	0.37	0.34	0.52	0.70	0.87	19	22	24	27
365	575	1.02	0.74	1.14	1.89	1.13	1.83	0.58	1.64	2.56	3.67	4.69	0.38	0.41	0.63	0.86	1.09	20	23	27	29
490	770	1.22	0.80	1.67	2.47	1.63	2.44	0.72	1.84	3.06	4.28	5.50	0.39	0.57	0.88	1.20	1.51	23	27	30	33
610	960	1.53	0.85	2.19	3.04	2.14	3.05	0.87	2.07	3.59	5.12	6.64	0.40	0.74	1.20	1.67	2.15	25	30	34	39
730	1150	1.80	0.93	2.71	3.64	2.65	3.66	0.97	2.29	4.09	5.86	7.70	0.42	0.93	1.58	2.23	2.88	28	33	38	44
855	1345	2.14	0.98	3.24	4.22	3.16	3.96	1.09	2.51	4.65	6.78	8.92	0.43	1.13	2.00	2.88	3.76	30	37	43	49
975	1535	2.39	1.03	3.65	4.69	3.57	4.57	1.20	2.75	5.11	7.49	9.88	0.45	1.32	2.39	3.46	4.53	32	39	47	54
1095	1730	2.72	1.09	4.18	5.26	4.07	5.18	1.30	2.95	5.66	8.38	11.10	0.46	1.54	2.89	4.25	5.60	34	43	51	59
1220	1920	3.03	1.14	4.70	5.84	4.58	5.79	1.40	3.18	6.20	9.22	12.24	0.47	1.79	3.43	5.08	6.72	37	46	55	64
1340	2110	3.25	1.19	5.23	6.42	5.09	6.10	1.45	3.38	6.63	9.88	13.13	0.48	2.03	3.95	5.86	7.77	39	49	59	69
1465	2305	3.56	1.25	5.75	7.00	5.60	6.71	1.53	3.61	7.16	10.72	14.27	0.50	2.31	4.57	6.84	9.10	42	53	63	74

See General Note No. 3.  
See Sheet 5 Of 6 For 75 mm Slab Quantities

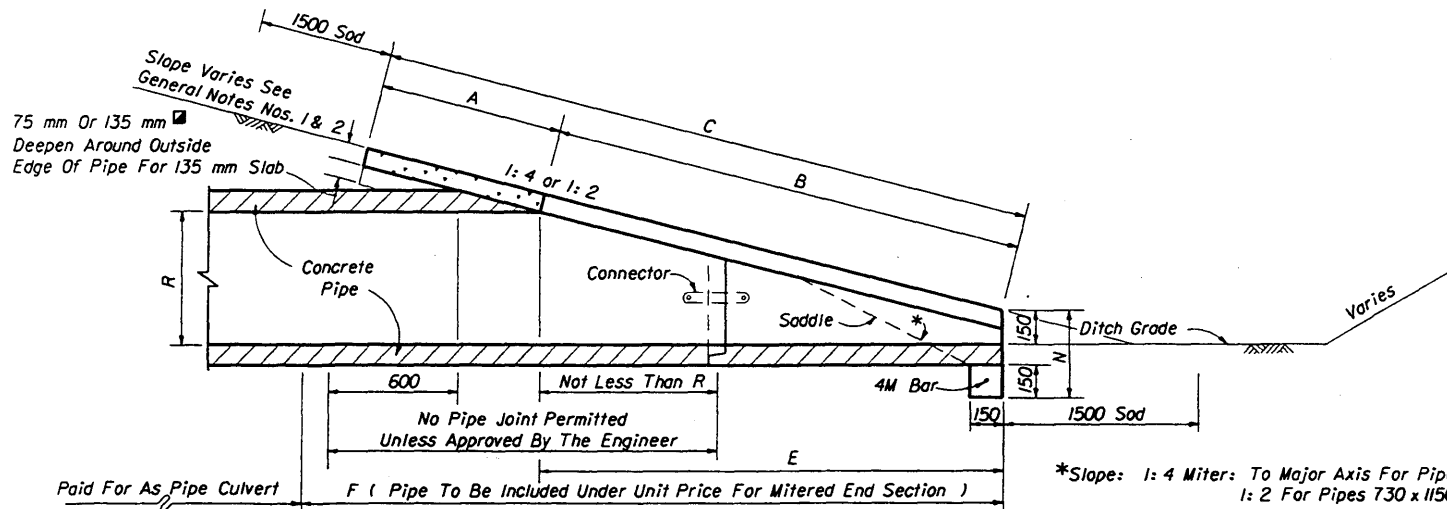


TOP VIEW-SINGLE PIPE



TOP VIEW-MULTIPLE PIPE

NOTE: See Sheet 6 For Details And Notes.



SECTION

\*Slope: 1:4 Miter: To Major Axis For Pipes 610 x 960 And Smaller.  
1:2 For Pipes 730 x 1150 And Larger.  
1:2 Miter: To Major Axis For Pipes 730 x 1150 And Smaller.  
1:1 For Pipes 855 x 1345 And Larger.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CROSS DRAIN MITERED END SECTION</b>				
SINGLE AND MULTIPLE ELLIPTICAL CONCRETE PIPE				
Designed By	EGR	06/8	Approved By <i>SA McLenore</i> State Drainage Engineer	
Drawn By	HSD	06/8	Revision	Sheet No.
Checked By	JMG/ABW	06/8	98	4 Of 6
				Index No. <b>272</b>

QUANTITIES FOR 75 mm THICK CONCRETE SLABS (m<sup>3</sup>)

	D	ROUND-CONCRETE			
		Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe
1: 2 Slope	375	0.21	0.31	0.41	0.51
	450	0.24	0.34	0.46	0.57
	600	0.30	0.45	0.60	0.76
	750	0.35	0.58	0.80	1.01
	900	0.42	0.72	1.02	1.31
	1050	0.50	0.88	1.27	1.64
	1200	0.58	1.05	1.50	1.96
	1350	0.67	1.24	1.82	2.40
	1500	0.76	1.45	2.15	2.85
	1650	0.85	1.64	2.45	3.26
1800	0.95	1.88	2.81	3.75	
1: 4 Slope	375	0.31	0.47	0.61	0.76
	450	0.36	0.53	0.70	0.87
	600	0.46	0.69	0.93	1.16
	750	0.58	0.91	1.25	1.58
	900	0.68	1.13	1.57	2.01
	1050	0.80	1.39	1.96	2.55
	1200	0.93	1.64	2.35	3.06
	1350	1.06	1.95	2.84	3.73
	1500	1.22	2.31	3.39	4.48
	1650	1.46	2.80	4.13	5.47
1800	1.62	3.20	4.77	6.35	

	D	ROUND-CMP			
		Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe
1: 2 Slope	375	0.18	0.28	0.39	0.49
	450	0.20	0.33	0.47	0.60
	600	0.24	0.40	0.55	0.70
	750	0.29	0.49	0.70	0.90
	900	0.34	0.60	0.86	1.13
	1050	0.39	0.73	1.08	1.43
	1200	0.44	0.83	1.25	1.64
	1350	0.50	1.01	1.52	2.03
	1500	0.54	1.14	1.74	2.35
	1800				
1: 4 Slope	375	0.24	0.36	0.48	0.60
	450	0.26	0.41	0.54	0.69
	600	0.34	0.53	0.70	0.90
	750	0.41	0.67	0.96	1.22
	900	0.47	0.82	1.17	1.53
	1050	0.54	0.99	1.47	1.93
	1200	0.61	1.18	1.75	2.31
	1350	0.70	1.40	2.09	2.81
	1500	0.78	1.64	2.50	3.36
	1800				

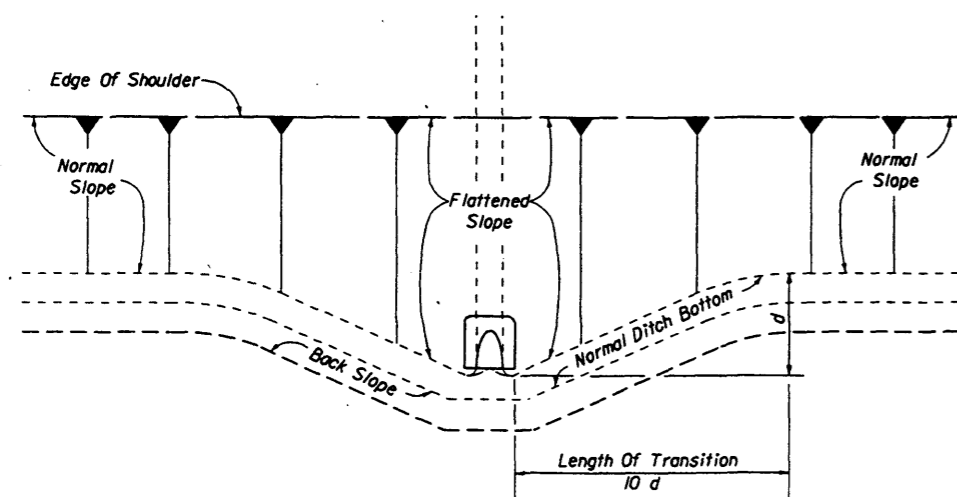
	Span	Rise	CMP-ARCH			
			Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe
1: 2 Slope	450	340	0.25	0.37	0.50	0.62
	510	380	0.25	0.38	0.51	0.63
	680	500	0.28	0.43	0.58	0.73
	910	660	0.31	0.47	0.64	0.82
	1030	740	0.33	0.54	0.75	0.96
	1150	820	0.37	0.63	0.88	1.13
	1390	970	0.42	0.73	1.03	1.34
	1630	1120	0.47	0.84	1.20	1.57
	1880	1260	0.53	0.95	1.38	1.80
	1800					
1: 4 Slope	450	340	0.29	0.43	0.57	0.72
	510	380	0.30	0.45	0.61	0.73
	680	500	0.33	0.49	0.67	0.84
	910	660	0.37	0.59	0.80	1.02
	1030	740	0.44	0.70	0.97	1.24
	1150	820	0.50	0.83	1.15	1.48
	1390	970	0.58	0.99	1.40	1.81
	1630	1120	0.67	1.19	1.67	2.16
	1880	1260	0.73	1.28	1.86	2.42
	1800					

	Rise	Span	ELLIPTICAL-CONCRETE			
			Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe
1: 2 Slope	305	460	0.14	0.25	0.34	0.44
	365	575	0.19	0.31	0.42	0.53
	490	770	0.26	0.42	0.57	0.73
	610	960	0.33	0.54	0.76	0.98
	730	1150	0.40	0.69	0.97	1.26
	855	1345	0.47	0.85	1.22	1.60
	975	1535	0.54	0.99	1.43	1.88
	1095	1730	0.62	1.18	1.73	2.29
	1220	1920	0.71	1.37	2.03	2.70
	1340	2110	0.80	1.56	2.32	3.07
1465	2305	0.89	1.78	2.67	3.56	
1: 4 Slope	305	460	0.23	0.34	0.47	0.58
	365	575	0.28	0.43	0.58	0.73
	490	770	0.39	0.60	0.83	1.04
	610	960	0.52	0.84	1.17	1.50
	730	1150	0.66	1.11	1.56	2.01
	855	1345	0.78	1.38	1.99	2.59
	975	1535	0.90	1.64	2.37	3.10
	1095	1730	1.06	1.97	2.90	3.82
	1220	1920	1.22	2.33	3.45	4.56
	1340	2110	1.38	2.68	3.97	5.26
1465	2305	1.56	3.09	4.63	6.15	

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>CROSS DRAIN MITERED END SECTION</b>					
Names	Dates	Approved By <i>A. D. McLeary</i> State Drainage Engineer			
Designed By					
Drawn By	dds	05/86	Revision	Sheet No.	Index No.
Checked By	JBW	05/86	94	5 of 6	272

## GENERAL NOTES

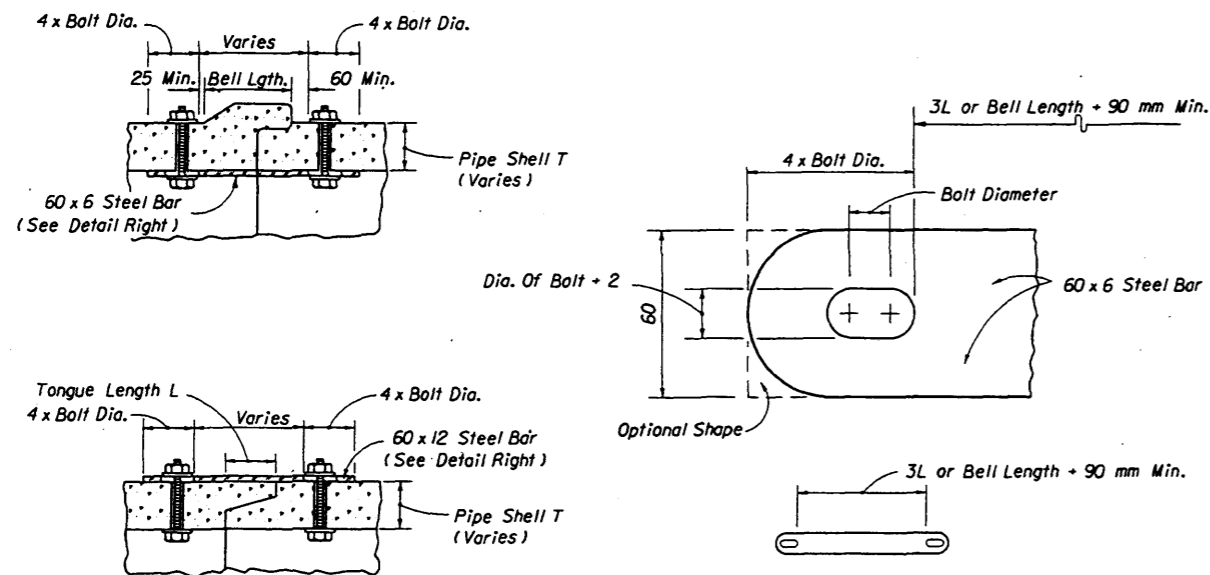
- Mitered end sections for pipe sizes 375 mm, 450 mm and 600 mm round or equivalent pipe arch or elliptical pipe are permitted within the clear zone. When the slope intersection permits, the mitered end section may be located with the culvert opening as close as 2.5 m beyond the outside edge of the shoulder.
- Slope and ditch transitions shall be used when the normal roadway slope must be flattened to place end section outside clear zone. See detail left.
- The reinforced concrete slab shall be constructed for all sizes of cross drain pipe and cast in place with Class I concrete. Slabs shall be 135 mm thick unless 75 mm thickness called for in plans.
- Concrete pipe used in the assembly of mitered end sections shall be selective lengths to avoid excessive connections.
- Corrugated metal pipe galvanizing that is damaged during beveling and perforating for mitered end section shall be repaired.
- That portion of corrugated metal pipe in direct contact with the concrete slab shall be bituminous coated prior to placing of the concrete.
- Unless otherwise designated in the plans, concrete pipe mitered end sections may be used with any type of cross drain pipe; corrugated steel pipe mitered end sections may be used with any type of cross drain pipe except aluminum pipe; and, corrugated aluminum mitered end sections may be used with any type of cross drain pipe except steel pipe. When bituminous coated metal pipe is specified for cross drain pipe, mitered end sections shall be constructed with like pipe or concrete pipe.
- When the mitered end section pipe is dissimilar to the cross drain pipe, a concrete jacket shall be constructed in accordance with Standard Index 280.
- When existing multiple cross drain pipes are spaced other than the dimensions shown in this detail, or have non-parallel axes, or have non-uniform sections, the mitered end sections will be constructed either separately as single pipe mitered end sections or collectively as multiple pipe end sections as directed by the Engineer; however, mitered end sections will be paid for each based on each independent pipe end.
- The cost of all pipe(s), fasteners, reinforcing, connectors, anchors, concrete, sealants, jackets, and coupling bands shall be included in the cost for the mitered end section. Sodding shall be paid for separately under the contract unit price of Sodding, M2.
- Mitered end sections shall be paid for under the contract unit price for Mitered End Section (CD), EA, based on each independent pipe end.



PLAN

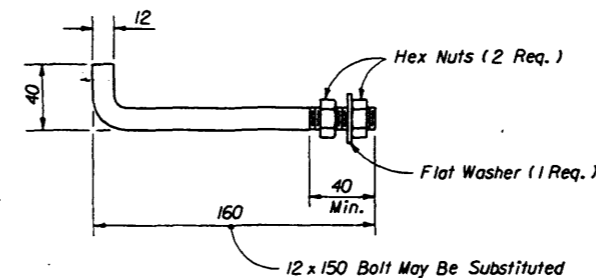
NOTE: See General Note 2

## SLOPE AND DITCH TRANSITIONS



All bars, bolts, nuts and washers are to be galvanized steel.  
Bolt diameters shall be 10 mm for 375 mm to 900 mm pipe and 15 mm for 1050 mm to 1800 mm pipe.  
Two connectors required per joint, located 60° right and left of bottom center of pipe.  
Bolt holes in pipe shell are to be drilled.

## CONCRETE PIPE CONNECTOR



Anchors required for CMP only.

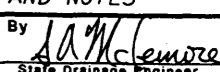
Anchor, washer and nuts to be galvanized steel.

Bend anchor where required to center in concrete slab. Damaged surfaces to be repaired after bending. Anchors are to be spaced a distance equal to four (4) corrugations. Place the anchors in the outside crest of corrugation.

Flat washers to be placed on inside wall of pipe.

Holes in the mitered end pipe are to be drilled or punched; burning not permitted.

## ANCHOR DETAIL

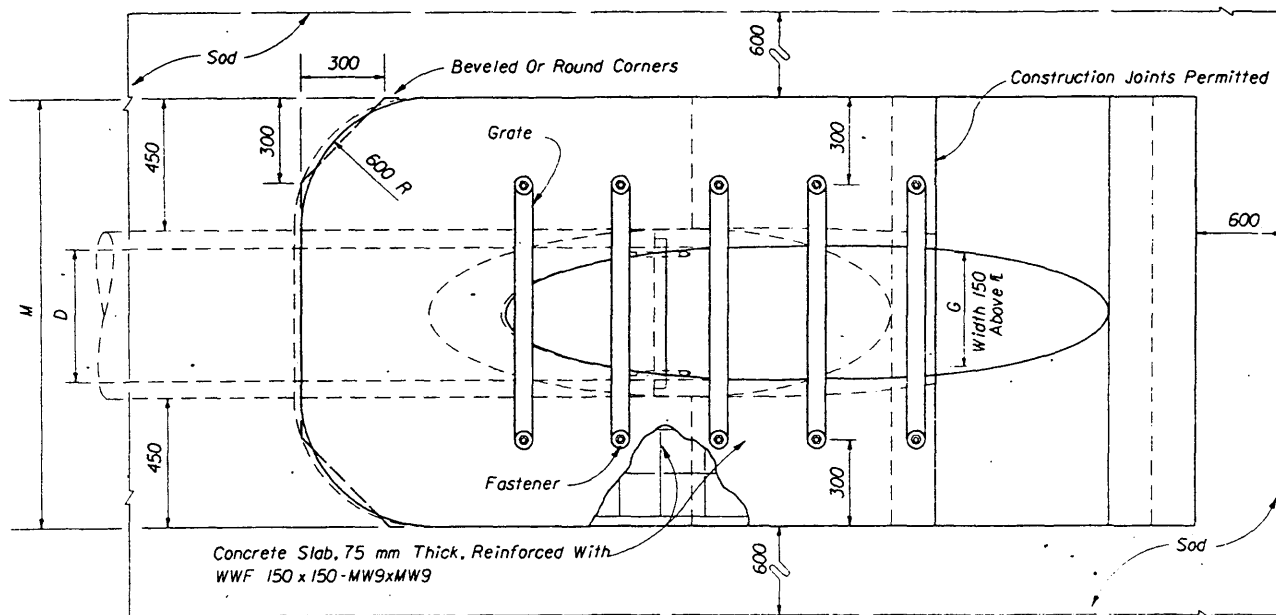
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CROSS DRAIN MITERED END SECTION SPECIAL DETAILS AND NOTES</b>				
Names	Dates	Approved By		
Designed By	DCB	06/78	 State Drainage Engineer	
Drawn By			Revision	Sheet No.
Checked By	KMM	06/78	00	6 of 6
				272



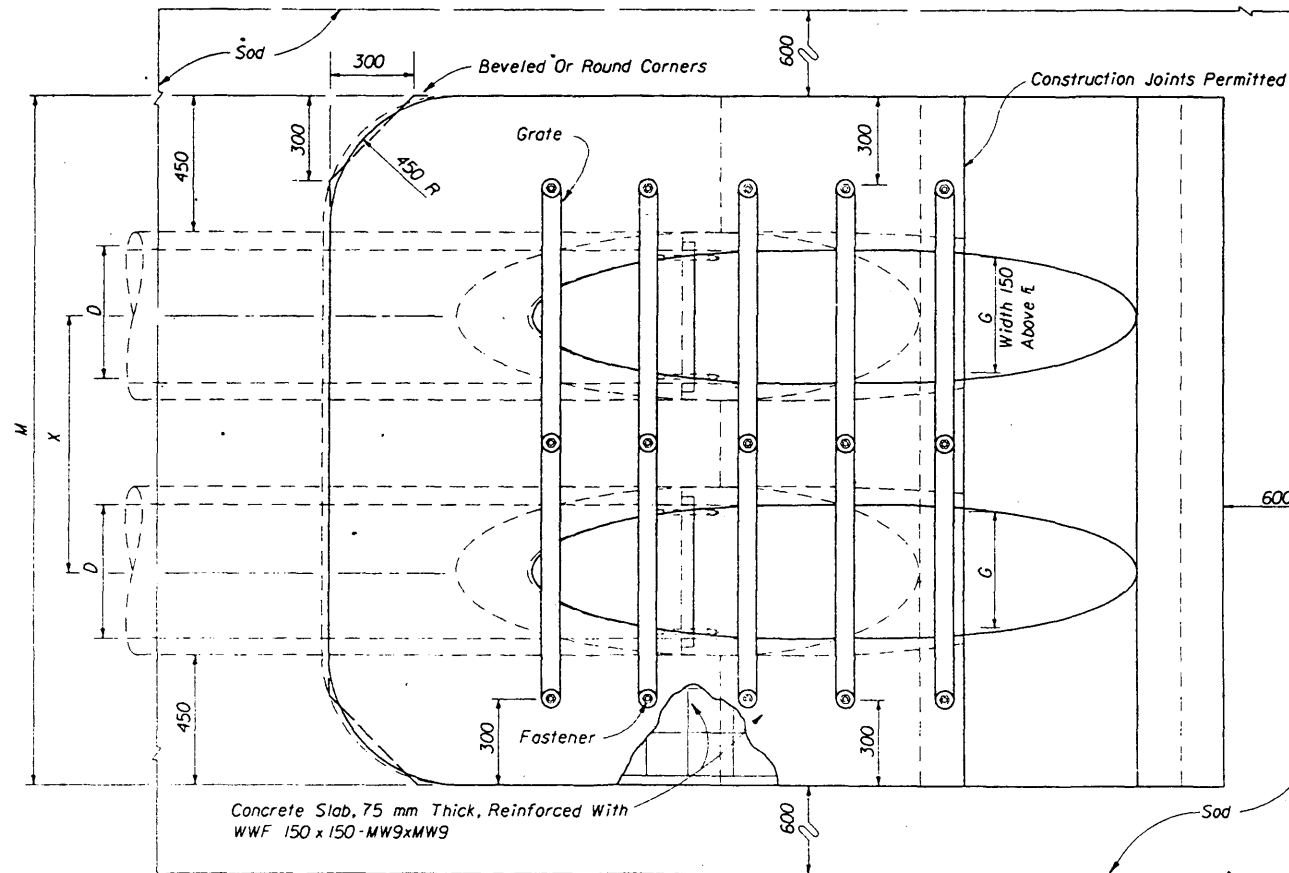
**DIMENSIONS & QUANTITIES**

D	X	A	B	C	E	F	G	M				N	GRATE SIZES		CONCRETE (m <sup>3</sup> )				SODDING (m <sup>2</sup> )			
								Single Pipe	Double Pipe	Triple Pipe	Quad Pipe		Standard Weight Pipe	Extra Strong Pipe	Single Pipe	Double Pipe	Triple Pipe	Quad Pipe	Single Pipe	Double Pipe	Triple Pipe	Quad Pipe
375	0.79	0.67	1.27	1.94	1.23	2.44	0.37	1.41	2.20	2.98	3.77	0.36			0.58	0.89	1.18	1.48	7	8	9	10
450	0.86	0.74	1.54	2.28	1.53	2.74	0.43	1.50	2.36	3.22	4.09	0.37			0.65	0.98	1.31	1.66	8	8	10	11
600	1.04	0.75	2.21 Δ	2.96	2.14 Δ	3.35	0.53	1.68	2.72	3.76	4.80	0.38			0.78	1.21	1.64	2.10	8	10	11	13
750	1.30	0.80	2.84	3.64	2.75	3.96	0.61	1.85	3.15	4.44	5.74	0.39	65	75	0.94	1.51	2.09	2.68	10	12	13	14
900	1.55	0.85	3.47 ◇	4.32	3.36 ◇	4.57	0.68	2.03	3.58	5.13	6.68	0.41	65	75	1.07	1.82	2.55	3.24	11	13	14	17
1050	1.83	0.90	4.10	5.00	3.97	5.18	0.75	2.21	4.04	5.87	7.70	0.42	65	87	1.22	2.16	3.09	4.02	12	14	16	18
1200	2.06	0.95	4.73	5.68	4.58	5.79	0.81	2.37	4.44	6.50	8.56	0.43	65	87	1.38	2.49	3.59	4.69	13	15	18	20
1350	2.34	1.00	5.36	6.36	5.19	6.40	0.86	2.57	4.90	7.24	9.58	0.45	75	100	1.55	2.89	4.24	5.57	14	17	19	23
1500	2.59	1.06	5.98	7.04	5.80	7.01	0.91	2.74	5.33	7.92	10.52	0.46	75	100	1.74	3.33	4.92	6.50	15	18	21	24

Δ 1.96 m      Δ 1.91 m Dimensions permitted to allow use of 2.44 m standard pipe lengths.  
 ◇ 3.17 m      ◇ 3.08 m Dimensions permitted to allow use of 3.66 m standard pipe lengths.  
 Δ ◇ Concrete slab shall be deepened to form bridge across crown of pipe. See section below.

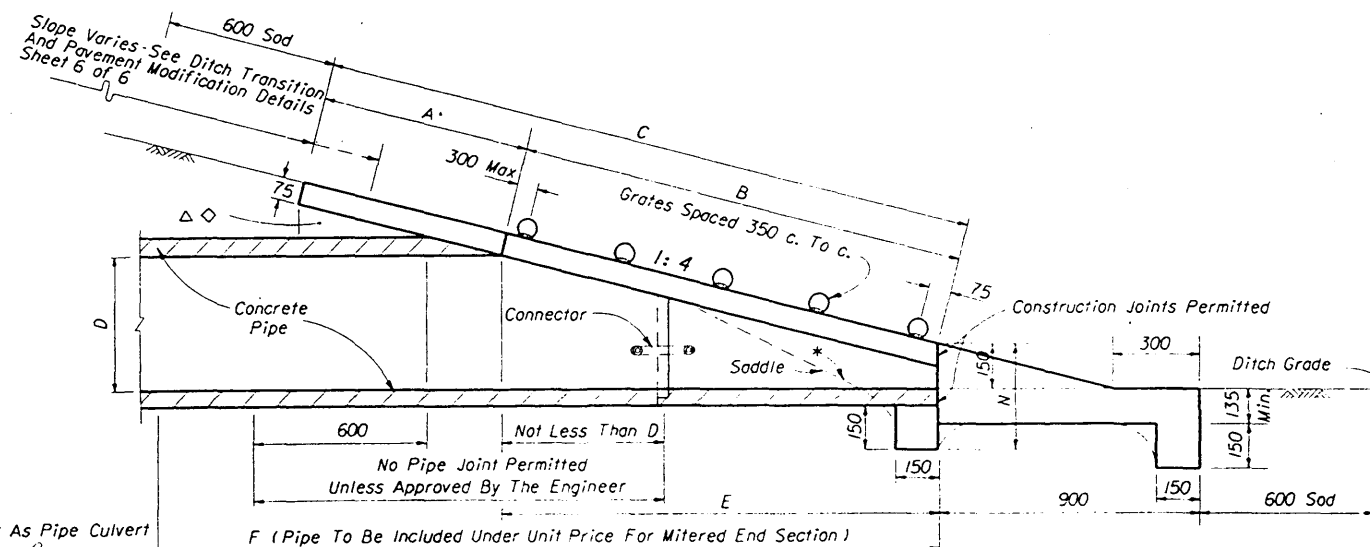


**TOP VIEW - SINGLE PIPE**



**TOP VIEW - MULTIPLE PIPE**

Note: See Sheets 5 and 6 for details and general notes.



**SECTION**

Paid For As Pipe Culvert

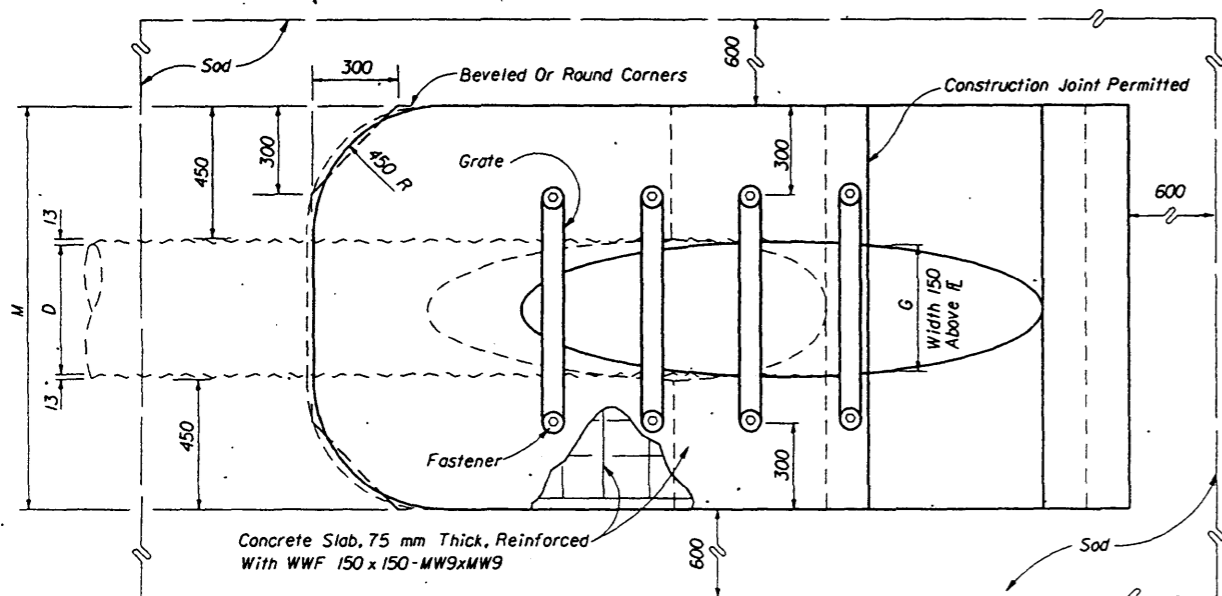
F (Pipe To Be Included Under Unit Price For Mitered End Section)

\*Slope:  
 To 6 Pipe For Pipes 450 And Smaller.  
 1: 2 For Pipes 600 And Larger.

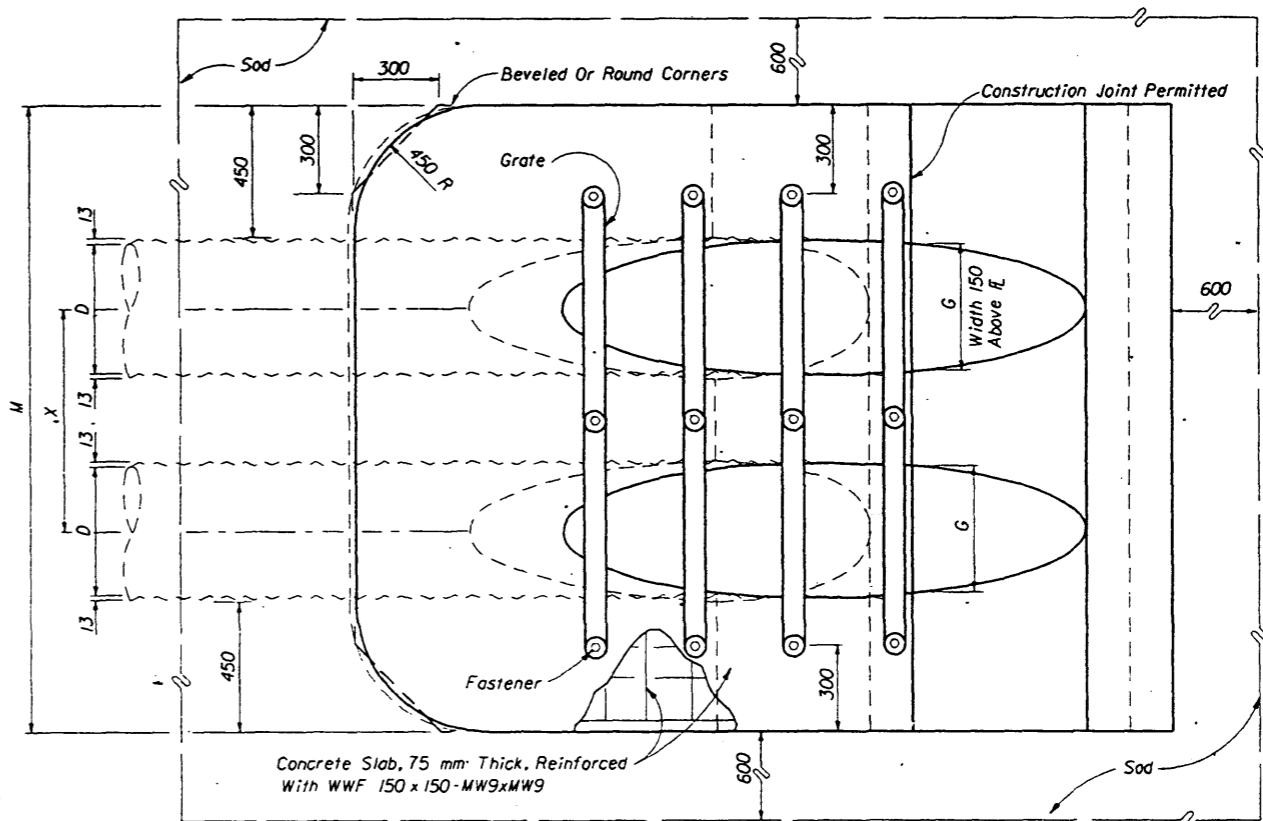
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
SIDE DRAIN MITERED END SECTION SINGLE AND MULTIPLE ROUND CONCRETE PIPE				
Names	Dates	Approved By		
Designed By	EGR 06/78	S. M. Lemire State Drainage Engineer		
Drawn By	HKH 06/78	Revision	Sheet No.	Index No.
Checked By	JVG 06/78	98	1 of 6	273

## DIMENSIONS & QUANTITIES

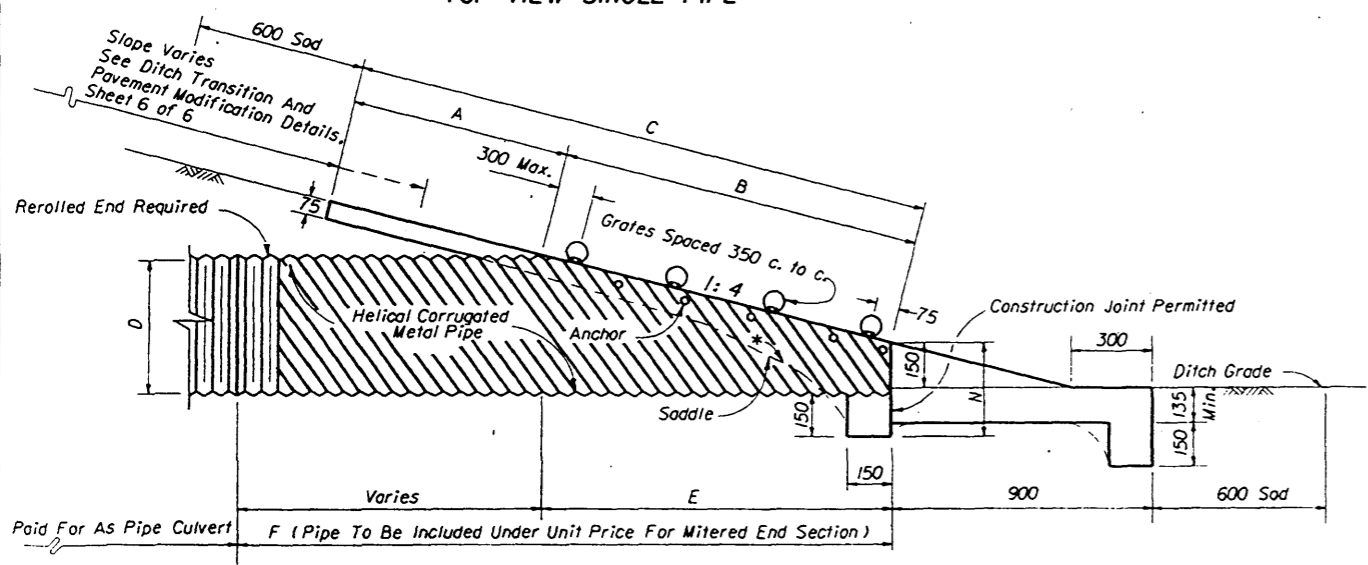
D'	X	A	B	C	E	F	G	M				GRATE SIZES		CONCRETE (m <sup>3</sup> )				SODDING (m <sup>2</sup> )				REMARKS	
								Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe	N	Standard Weight Pipe	Extra Strong Pipe	Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe	Single Pipe	Double Pipe	Triple Pipe		Quad. Pipe
200	0.61	0.76	0.22	0.98	0.21	1.22	0.18	1.14	1.75	2.36	2.97	0.32			0.40	0.69	0.93	1.18	6	7	7	8	These sizes are restricted to inlet and outlet treatment for water management systems or similar applications.
250	0.66	0.76	0.43	1.19	0.40	1.52	0.25	1.20	1.85	2.52	3.17	0.32			0.49	0.76	1.02	1.30	6	7	8	8	
300	0.71	0.76	0.64	1.40	0.61	1.83	0.31	1.24	1.96	2.67	3.38	0.32			0.52	0.83	1.13	1.44	6	7	8	9	
375	0.79	0.76	0.95	1.71	0.91	2.13	0.38	1.32	2.11	2.90	3.68	0.32			0.49	0.76	1.03	1.31	7	8	8	9	
450	0.86	0.76	1.27	2.03	1.22	2.44	0.43	1.40	2.26	3.12	3.99	0.32			0.53	0.83	1.14	1.45	8	8	9	10	
600	1.04	0.76	1.89	2.65	1.83	3.05	0.53	1.55	2.59	3.63	4.67	0.32			0.64	1.02	1.39	1.79	8	9	11	12	
750	1.30	0.76	2.52	3.28	2.44	3.66	0.61	1.70	2.30	4.29	5.59	0.32	65	75	0.73	1.25	1.77	2.29	9	11	13	14	
900	1.55	0.76	3.15	3.91	3.05	4.27	0.68	1.85	3.41	4.95	6.50	0.32	65	75	0.83	1.47	2.12	2.77	10	12	14	16	
1050	1.82	0.76	3.78	4.54	3.66	4.88	0.75	2.01	3.83	5.66	7.49	0.32	65	87	0.92	1.73	2.55	3.52	11	13	15	18	
1200	2.06	0.76	4.41	5.17	4.27	5.49	0.81	2.16	4.22	6.27	8.33	0.32	65	87	1.22	2.38	3.53	4.68	12	14	17	19	
1350	2.34	0.76	5.04	5.80	4.88	6.10	0.86	2.30	4.65	6.99	9.32	0.32	75	100	1.35	2.72	4.08	5.46	13	14	18	22	
1500	2.59	0.76	5.67	6.43	5.49	6.71	0.91	2.46	5.05	7.64	10.24	0.32	75	100	1.48	3.08	4.68	6.27	14	17	20	23	



TOP VIEW-SINGLE PIPE



TOP VIEW-MULTIPLE PIPE



SECTION

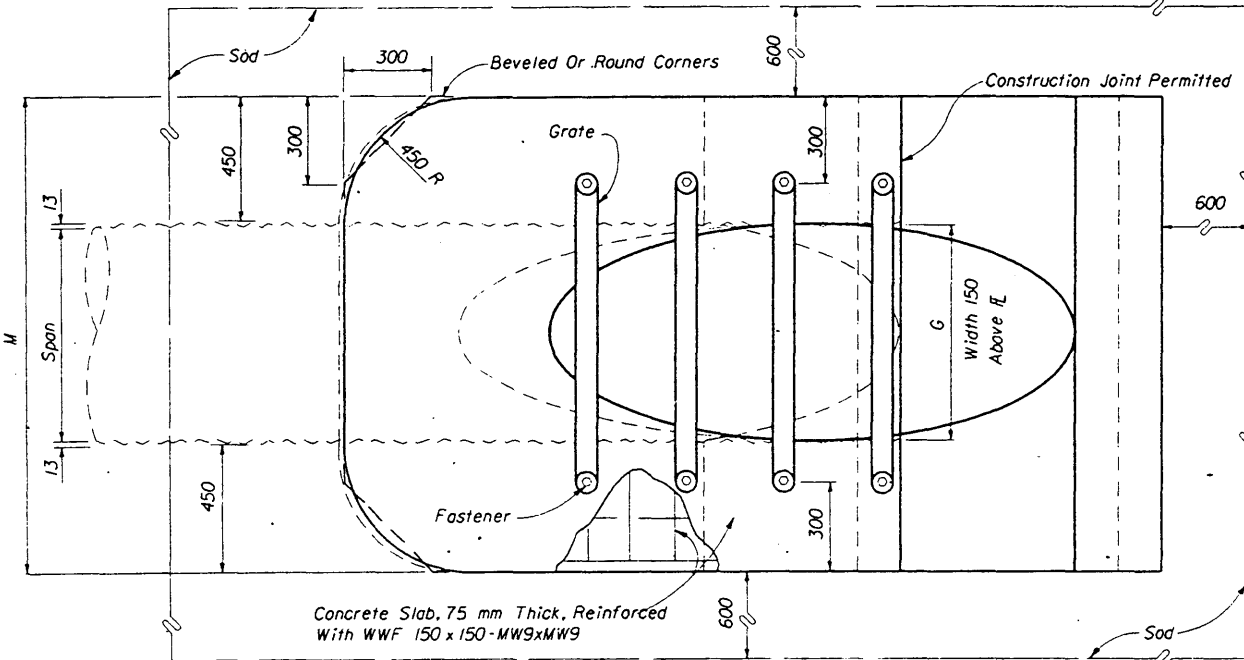
NOTE: See Sheets 5 and 6 for details and general notes.

\*Slope:  
To & Pipe For Pipe 450 And Smaller.  
1: 2 For Pipe 600 And Larger.

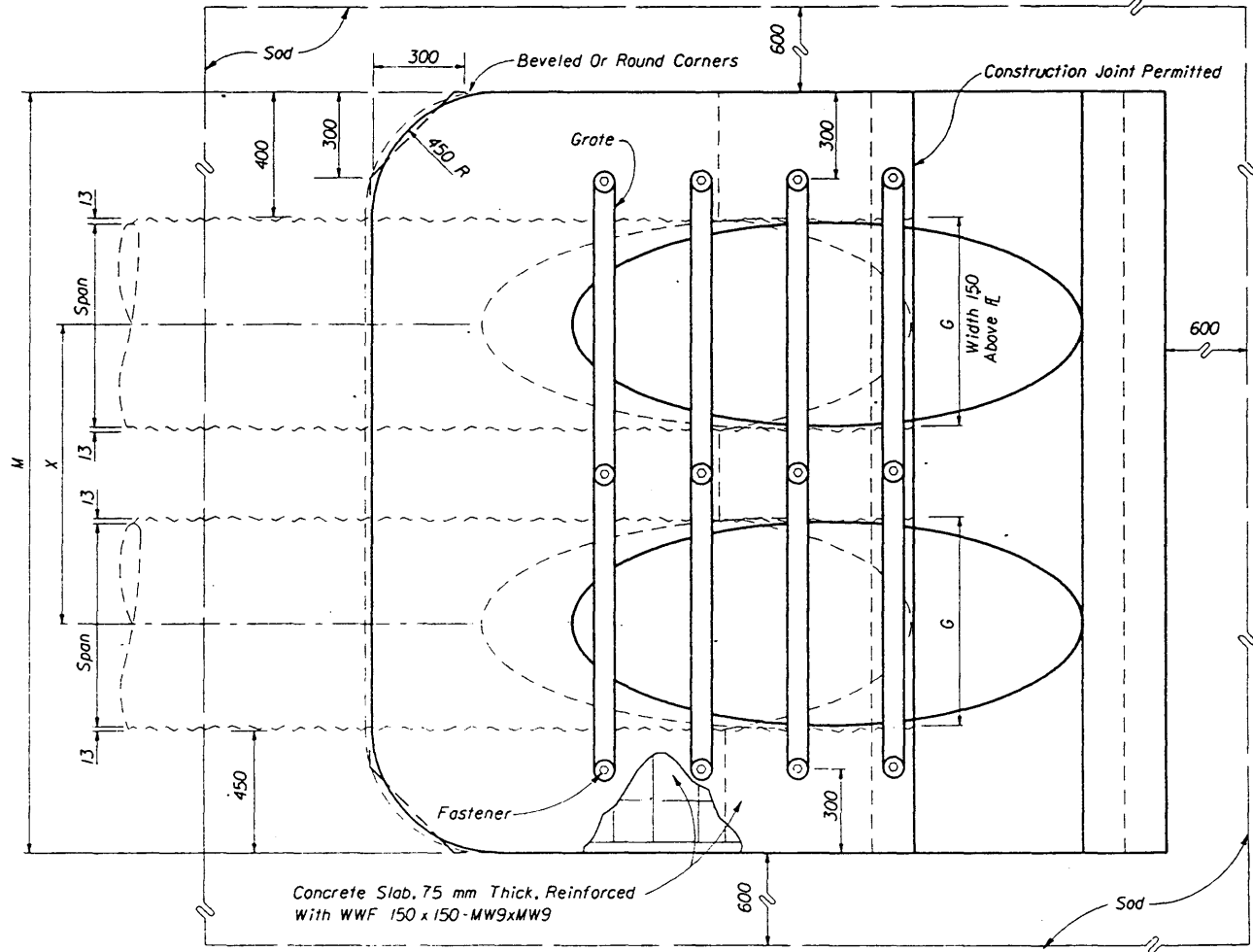
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN			
<b>SIDE DRAIN MITERED END SECTION</b>			
SINGLE AND MULTIPLE ROUND CORRUGATED METAL PIPE			
Designed By	EGR	08/77	Approved By <i>A. M. Penon</i> State Drainage Engineer
Drawn By	HKH	08/77	
Checked By	JVC	08/77	
		Revision	98
		Sheet No.	2 of 6
		Index No.	273

# DIMENSIONS & QUANTITIES

1974 AASHTO		X	A	B	C	E	F	G	M				N	GRATE SIZES		CONCRETE (m <sup>3</sup> )				SODDING (m <sup>2</sup> )			
Span	Rise								Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe		Standard Weight Pipe	Extra Strong Pipe	Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe	Single Pipe	Double Pipe	Triple Pipe	Quad. Pipe
450	340	0.76	0.76	0.74	1.50	0.71	2.13	0.42	1.37	2.13	2.90	3.66	315			0.47	0.73	0.97	1.22	7	8	9	9
510	380	0.86	0.76	0.95	1.71	0.91	2.44	0.54	1.47	2.34	3.20	4.06	315			0.53	0.81	1.10	1.35	7	8	9	10
680	500	1.07	0.76	1.48	2.24	1.42	2.74	0.68	1.65	2.69	3.73	4.78	315			0.62	0.96	1.32	1.67	8	9	10	12
910	660	1.22	0.76	1.89	2.65	1.83	3.35	0.78	1.83	3.05	4.27	5.49	315	65	75	0.72	1.15	1.60	2.03	9	10	12	13
1030	740	1.45	0.76	2.42	3.18	2.33	3.66	0.91	2.01	3.45	4.91	6.35	315	65	87	0.81	1.35	1.88	2.42	9	11	13	14
1150	820	1.68	0.76	2.84	3.60	2.74	4.27	1.02	2.19	3.86	5.54	7.21	315	65	87	0.91	1.54	2.17	2.58	10	12	14	16
1390	970	1.93	0.76	3.36	4.12	3.25	4.88	1.11	2.39	4.32	6.25	8.18	315	75	100	1.03	1.80	2.56	3.33	11	14	16	18
1630	1120	2.16	0.76	3.88	4.64	3.76	5.18	1.19	2.57	4.72	6.88	9.04	315	75	100	1.15	2.06	2.95	3.85	12	14	17	20
1880	1260	2.39	0.76	4.30	5.06	4.17	5.79	1.26	2.74	5.13	7.52	9.91	315	75	100	1.25	2.25	3.26	4.27	13	15	18	21

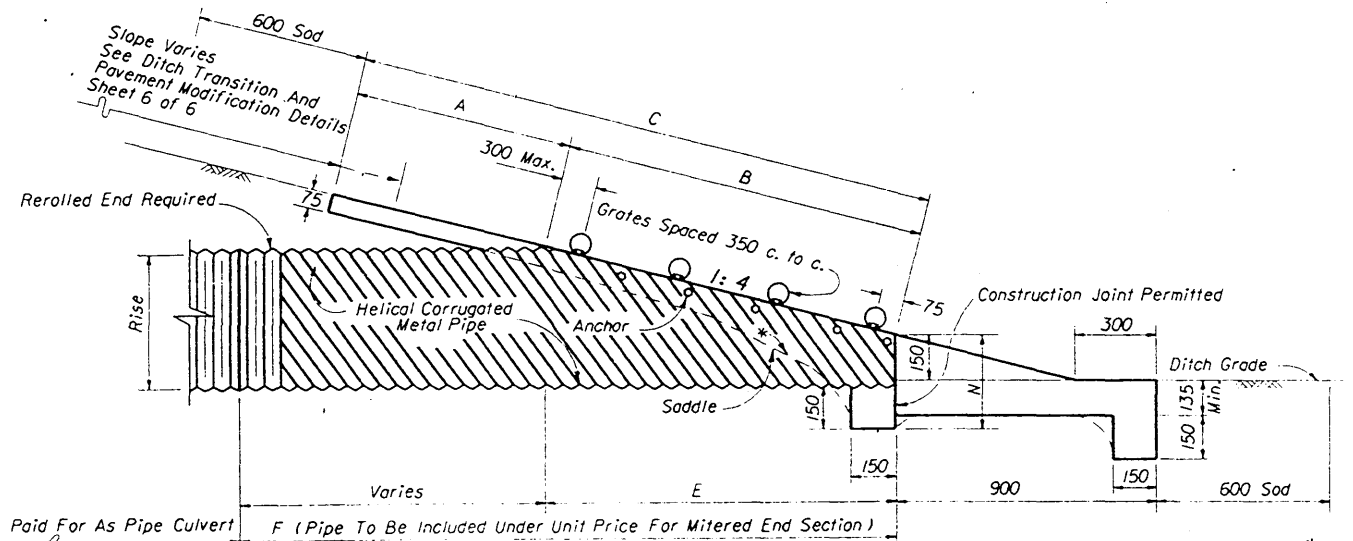


TOP VIEW - SINGLE PIPE



TOP VIEW - MULTIPLE PIPE

NOTE: See Sheets 5 and 6 for details and general notes.

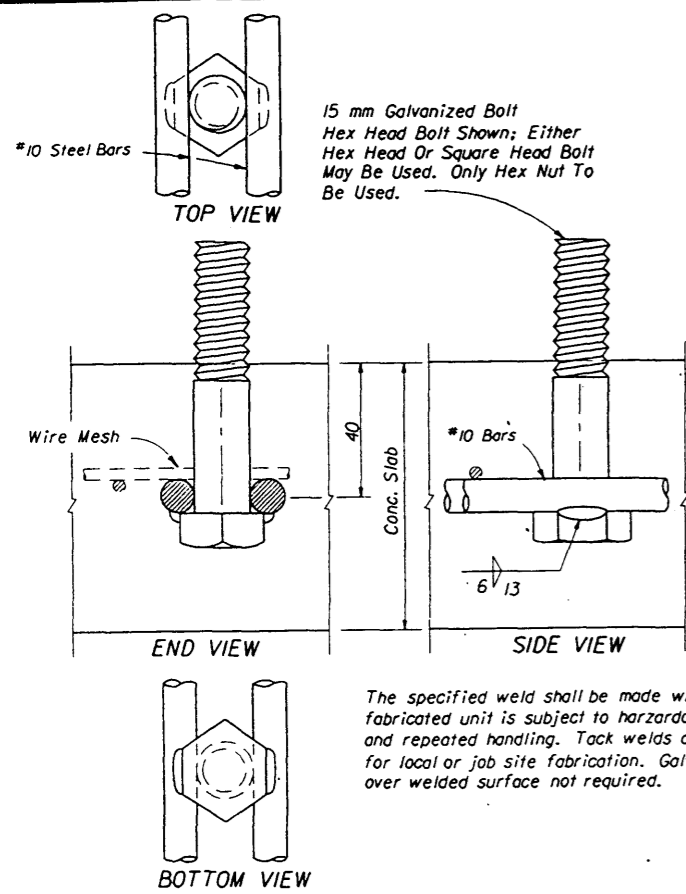


SECTION

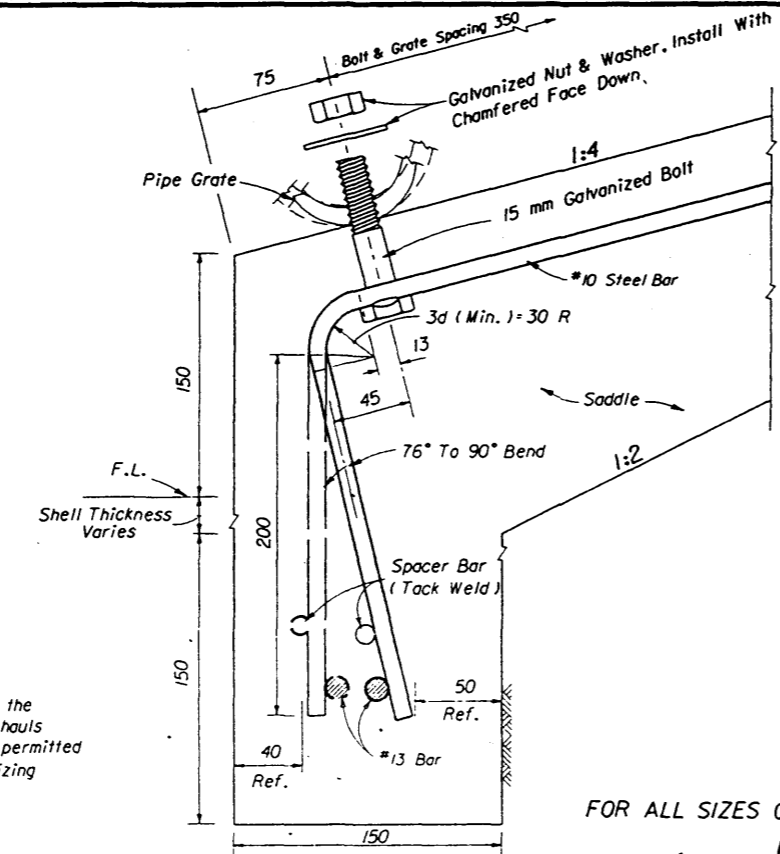
\*Slope:  
 1: To Span Line For Pipe Arch 680 x 500 And Smaller.  
 1: 2 For Pipe Arch 910 x 660 And Larger.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>SIDE DRAIN MITERED END SECTION</b>				
SINGLE AND MULTIPLE CORRUGATED METAL PIPE - ARCH				
Designed By	EGR	08/77	Approved By	<i>S. A. McNamee</i> State Drainage Engineer
Drawn By	HKH	08/77	Revision	Sheet No.
Checked By	JMG	08/77	98	3 of 6
				Index No. <b>273</b>

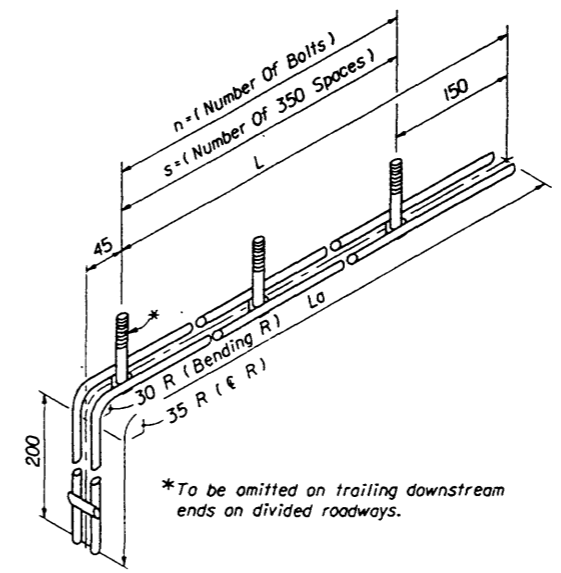




The specified weld shall be made when the fabricated unit is subject to hazardous hauls and repeated handling. Tack welds are permitted for local or job site fabrication. Galvanizing over welded surface not required.



FOR ALL SIZES OF SINGLE AND MULTIPLE DRAIN PIPE  
FASTENER UNIT



Drain Size	s	n	L	La
CONCRETE PIPE (ROUND)				
375	3	4	1.22	1.52
450	4	5	1.57	1.87
600	6	7	2.29	2.59
750	7	8	2.64	2.94
900	9	10	3.35	3.65
1050	11	12	4.06	4.36
1200	13	14	4.78	5.08
1350	14	15	5.13	5.43
1500	16	17	5.84	6.14

Drain Size	s	n	L	La
ELLIPTICAL CONCRETE PIPE				
305 x 460	2	3	0.86	1.16
365 x 575	3	4	1.22	1.52
490 x 770	4	5	1.57	1.87
610 x 960	5	6	1.93	2.23
730 x 1150	7	8	2.64	2.94
855 x 1345	8	9	3.00	3.30
975 x 1535	10	11	3.71	4.01
1095 x 1730	11	12	4.06	4.36
1220 x 1920	13	14	4.78	5.08
1340 x 2110	14	15	5.13	5.43
1465 x 2305	15	16	5.49	5.79

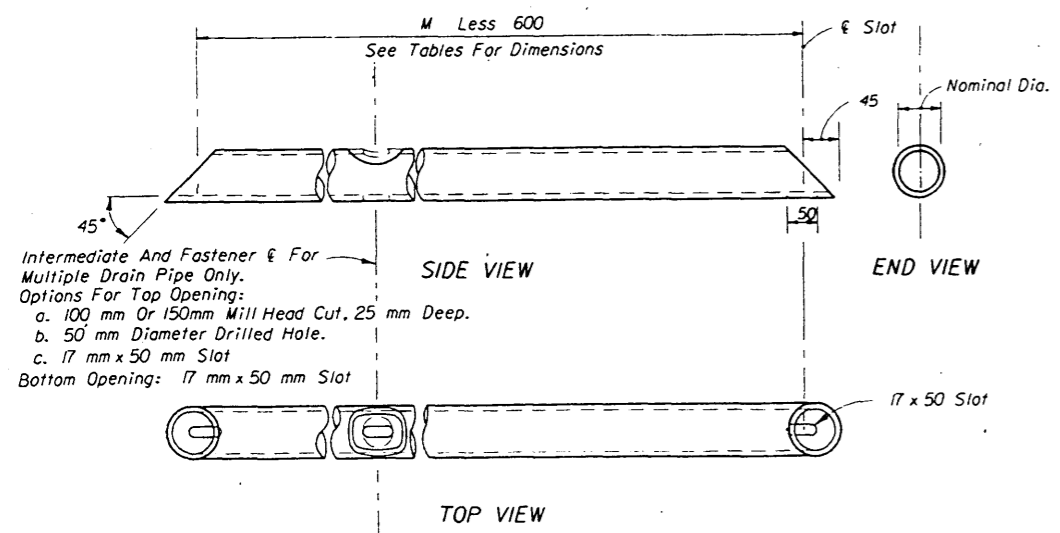
Drain Size	s	n	L	La
CORRUGATED METAL PIPE (ROUND)				
375	2	3	0.86	1.16
450	3	4	1.22	1.52
600	5	6	1.93	2.23
750	7	8	2.64	2.94
900	8	9	3.00	3.30
1050	10	11	3.71	4.01
1200	12	13	4.42	4.72
1350	14	15	5.13	5.43
1500	15	16	5.49	5.79

Drain Size	s	n	L	La
CORRUGATED METAL PIPE (ARCH) ***				
450 x 340	1	2	0.51	0.81
510 x 380	2	3	0.86	1.16
680 x 500	4	5	1.57	1.87
910 x 660	5	6	1.93	2.23
1030 x 740	6	7	2.29	2.59
1150 x 820	7	8	2.64	2.94
1390 x 970	9	10	3.35	3.65
1600 x 1060	10	11	3.71	4.01
1880 x 1260	12	13	4.42	4.72

Note: 15 x 75 bolts are standard for all grate fasteners, except when the contractor elects to use the slotted upper holes for the intermediate fasteners on multiple drain pipe, which will require the following bolt lengths:

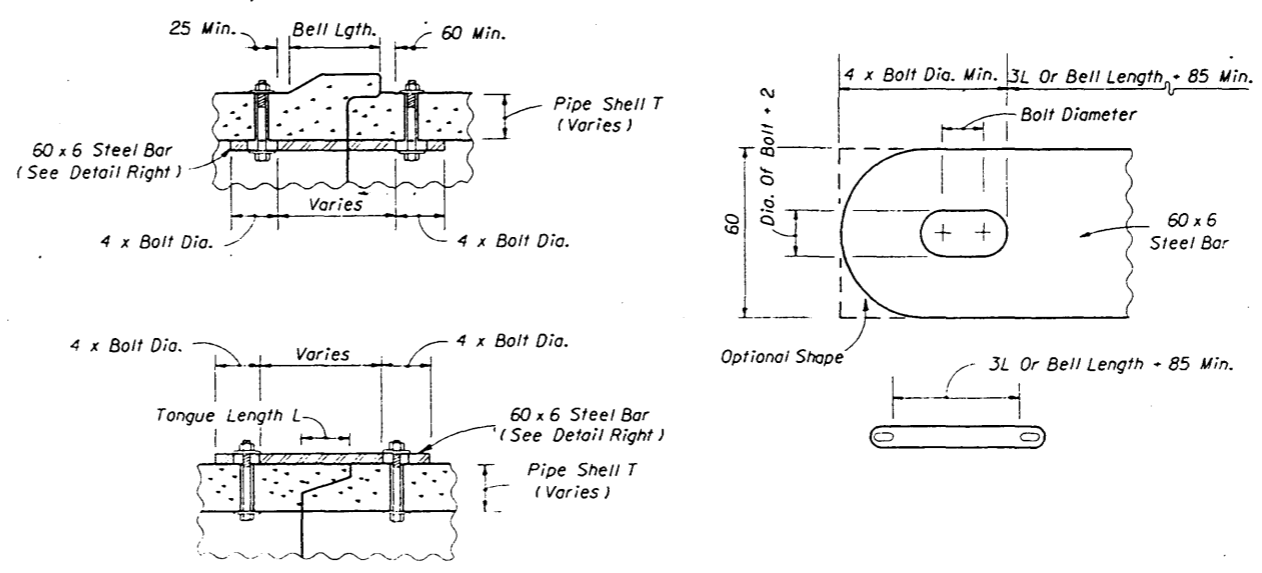
Grate Size (Std. & X-Stg.)	Bolt Length
65	140
75	150
90	165
100	180

\*\*To be used only when grates are called for in the plans.  
\*\*\*1974 AASHTO Pipe Arch Sizes.



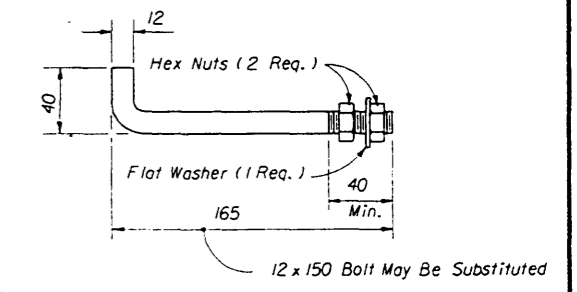
GRATE DETAIL  
FOR SINGLE & MULTIPLE DRAIN PIPE

See General Notes, Sheet 6.



All bars, bolts, nuts and washers are to be galvanized steel. Bolt diameters shall be 10 mm for 375 mm to 900 mm pipe and 15 mm for 1050 mm to 1500 mm pipe. Two connectors required per joint, located 60° right and left of bottom center of pipe. Bolt holes in pipe shell are to be drilled.

CONCRETE PIPE CONNECTOR DETAIL



Anchor, washer and nuts to be galvanized steel. Bend anchor where required to center in concrete slab. Damaged surfaces to be repaired after bending. Anchors are to be spaced a distance equal to four (4) corrugations. Place the anchors in the outside crest of corrugation. Flat washer to be placed on inside wall of pipe.

Holes in the mitered end pipe are to be drilled or punched; burning not permitted.

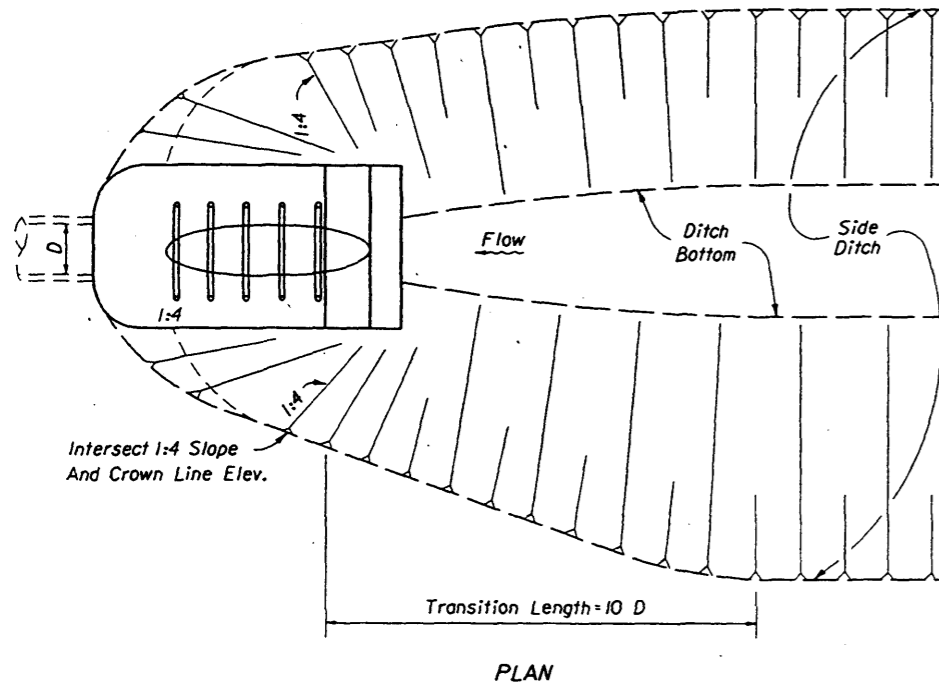
ANCHOR DETAIL

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**SIDE DRAIN  
MITERED END SECTION**  
DETAILS FOR CONCRETE & CORRUGATED METAL PIPE

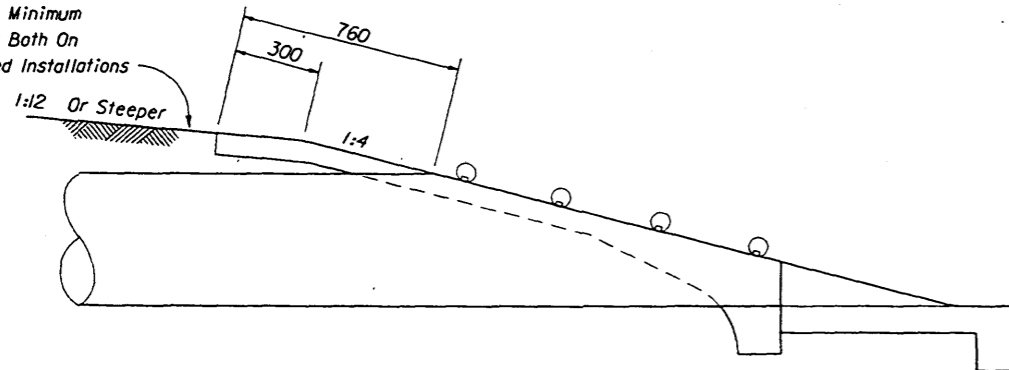
Names	Dates	Approved By		
Designed By	EGR	08/77	S. M. Lewis	
Drawn By	HKH	08/77	Revision	Sheet No
Checked By	JVC	08/77	98	5 of 6
			Index No	273

## GENERAL NOTES



**DITCH TRANSITION**

Modified Slope When Minimum Cover Or Less Occurs Both On Existing And Proposed Installations



**PERMISSIBLE PAVEMENT MODIFICATION**

1. Unless otherwise designated in the plans, concrete pipe mitered end sections may be used with any type of side drain pipe; corrugated steel pipe mitered end sections may be used with any type of side drain pipe except aluminum pipe; and, corrugated aluminum mitered end sections may be used with any type of side drain pipe except steel pipe. When bituminous coated metal pipe is specified for side drain pipe, mitered end sections shall be constructed with like pipe or concrete pipe. When the mitered end section pipe is dissimilar to the side drain pipe, a concrete jacket shall be constructed in accordance with Index No. 280.
2. Concrete pipe used in the assembly of mitered end sections shall be of selective lengths to avoid excessive connections.
3. Corrugated metal pipe galvanizing that is damaged during beveling and perforating for mitered end section shall be repaired.
4. That portion of corrugated metal pipe in direct contact with the concrete slab shall be bituminous coated prior to placing of the concrete.
5. Corrugated polyethylene pipe (CPE) for side drain application of 375 mm, 450 mm or 600 mm diameter shall utilize either corrugated metal or concrete mitered end sections. When used in conjunction with corrugated metal mitered end sections, connection shall be by either a formed metal band specifically designated to join CPE pipe and metal pipe or other coupler approved by the State Drainage Engineer. When used in conjunction with a concrete mitered end section, connection shall be by concrete jacket constructed in accordance with Index No. 280.
6. When existing multiple side drain pipes are spaced other than the dimensions shown in this detail, or have non-parallel axes, or have non-uniform sections, the mitered end sections will be constructed either separately as single pipe mitered end sections or collectively as multiple pipe end sections as directed by the Engineer; however, mitered end sections will be paid for each, based on each independent pipe end.
7. In addition to the requirements of Section 430-4, side drain culverts shall comply with the cover requirements shown on Index No. 205.
8. The reinforced concrete slab shall be constructed for all sizes of side drain pipe and cast in place with Class I concrete.
9. Round pipe size 750 mm or greater, pipe-arch size 910 mm x 660 mm or greater and elliptical pipe 490 mm x 770 mm or greater shall be grated unless excepted in the plans. Smaller sizes of pipe shall be grated only when called for in plans. The lower grate on trailing downstream ends on divided highways shall be omitted.
10. Grates are to be fabricated from steel ASTM A 53, Grade B, pipe. The lower grate on all traffic approach ends shall be Schedule 80 and all remaining grates shall be Schedule 40.  
Grates subject to salt free and corrosive free environment may be fabricated from galvanized pipe, with base metal exposed during fabrication repaired as specified in Section 562, Standard Specifications; or, fabricated from black pipe and hot dipped galvanized after fabrication in accordance with ASTM A 123.  
Grates subject to salt water or highly corrosive environment shall be hot dipped galvanized after fabrication in accordance with ASTM A 123.
11. Ditch transitions shall be used on all grades in excess of 3% as directed by the Engineer.
12. The project engineer shall contact the District Drainage Engineer for possible alternate treatment prior to constructing side drain mitered end sections where a minimum spacing of 9.14 m will not result between the toe points of the mitered end sections.
13. The cost of all pipe (s), grates, fasteners, reinforcing, connectors, anchors, concrete, sealants, jackets and coupling bands shall be included in the cost for the mitered end section. Sodding shall be paid for separately under the contract unit price for Sodding, M2.
14. Mitered end sections shall be paid for under the contract unit price for Mitered End Section (SD), EA., based on each independent pipe end.

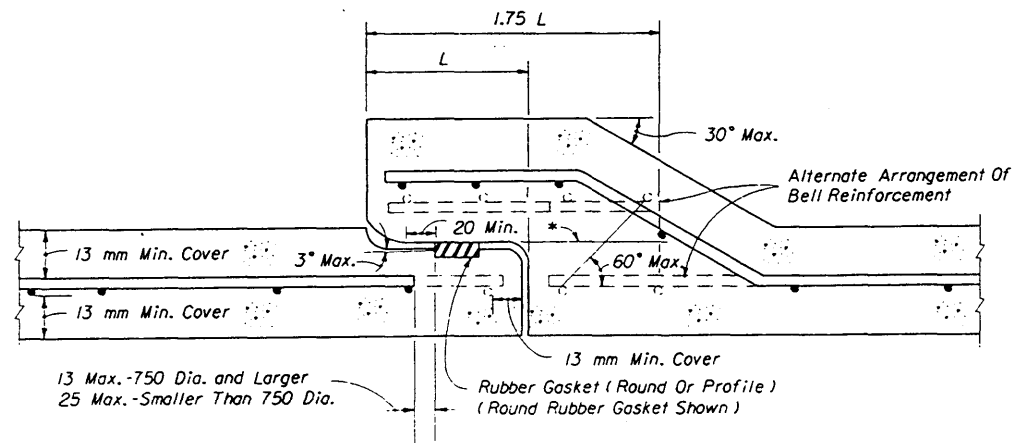
## DESIGN NOTES

1. In critical hydraulic locations, grates shall not be used until potential debris transport has been evaluated by the drainage engineer and appropriate adjustments made. Ditch grades in excess of 3% or pipe with less than 450 mm of cover and grades in excess of 1% will require such an evaluation (General Note 9).
2. The design engineer shall determine highly corrosive locations and specify in the plans when the grates shall be hot-dipped galvanized after fabrication (General Note 10).
3. The design engineer shall determine and designate in the plans which alternate types of mitered end section will not be permitted. The restriction shall be based on corrosive or structural requirements.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>SIDE DRAIN MITERED END SECTION</b> NOTES & INFORMATION				
Names	Dates	Approved By		
Designed By	EGR 08/77	 SA McLenore State Drainage Engineer		
Drawn By	HKH 08/77	Revision	Sheet No	Index No
Checked By	JVK 08/77	94	6 of 6	273

**SCHEDULE OF BELL REINFORCEMENT**  
Classes II, III, IV, V; Wall A, B, C

Nominal Pipe Diameter	Design Bell Reinforcement mm <sup>2</sup> /m	Maximum Reinforcement Under Tolerance mm <sup>2</sup> /m
375	148	21
450	148	21
600	190	21
750	254	21
900	296	21
1050	338	21
1200	402	23
1350	444	25
1500	487	29
1650	550	32
1800	593	35
1950	635	38
2100	698	41
2250	741	44
2400	783	48
2550	847	51
2700	889	54

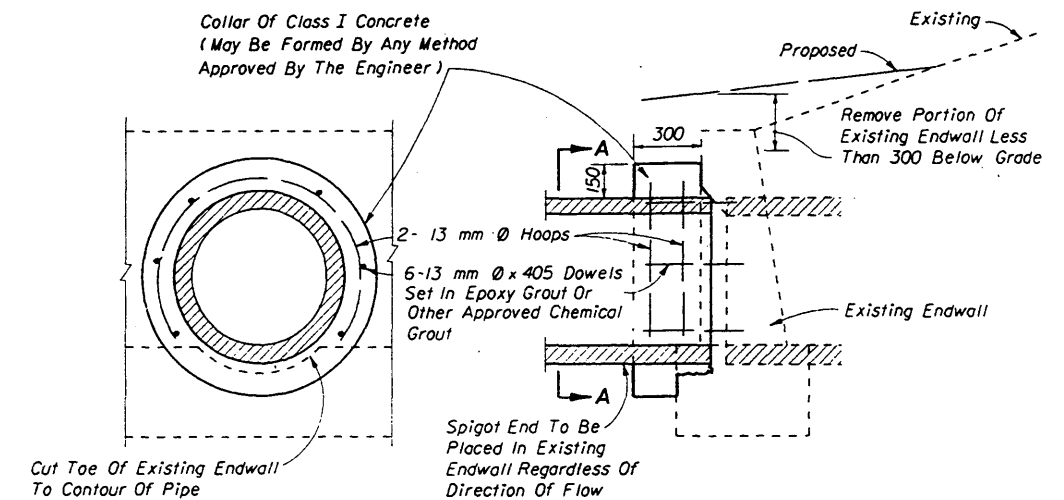


\*All circumferential steel located above this line within 1.75 L is defined as bell reinforcement.

ROUND RUBBER GASKET SHOWN

**DETAIL OF BELL & SPIGOT CONCRETE PIPE JOINT USING ROUND OR PROFILE RUBBER GASKET**

Collar Of Class I Concrete (May Be Formed By Any Method Approved By The Engineer)



SECTION AA

LONGITUDINAL SECTION

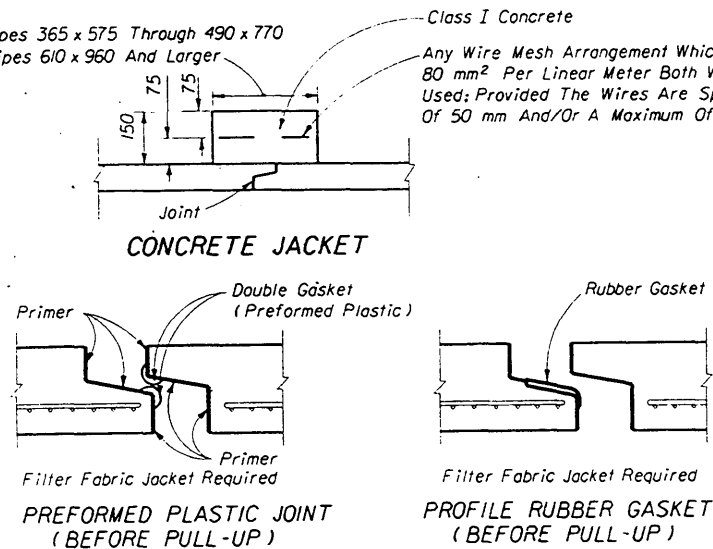
Note: Cost for removal and disposal of portions of top and toe of existing endwall and cost of concrete, reinforcing steel and construction of collar to be included in the contract unit price for pipe culvert.

**CONCRETE COLLAR FOR EXTENSION OF EXISTING PIPE CULVERTS**

300 For Pipes 365 x 575 Through 490 x 770  
600 For Pipes 610 x 960 And Larger

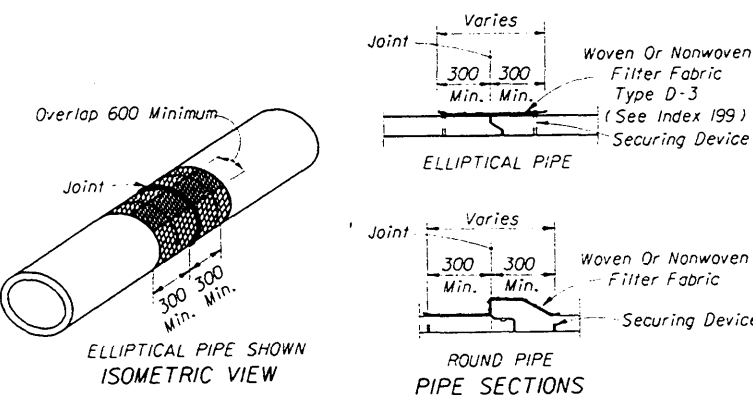
Class I Concrete

Any Wire Mesh Arrangement Which Provides 80 mm<sup>2</sup> Per Linear Meter Both Ways May Be Used; Provided The Wires Are Spaced A Minimum Of 50 mm And/Or A Maximum Of 150 mm On Centers



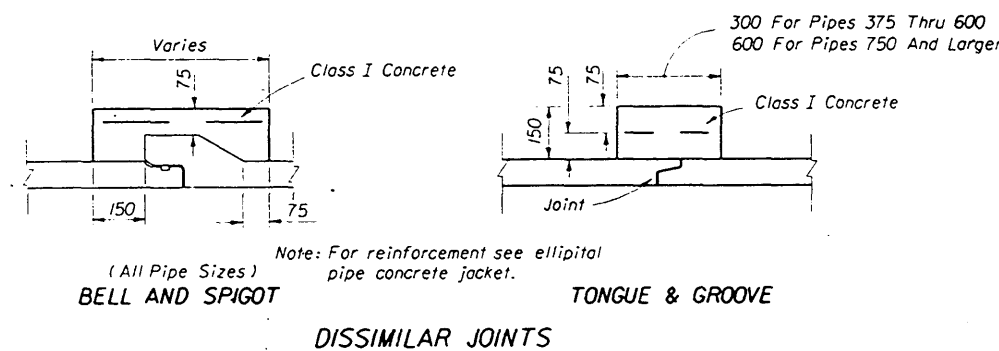
**ELLIPTICAL CONCRETE PIPE JOINTS**

Cost of concrete jacket or filter fabric jacket to be included in cost of elliptical concrete pipe culverts.



Cost of filter fabric jacket to be included in cost of pipe culverts.

FOR ALL PIPE TYPES - CONCRETE PIPE SHOWN  
FILTER FABRIC JACKET

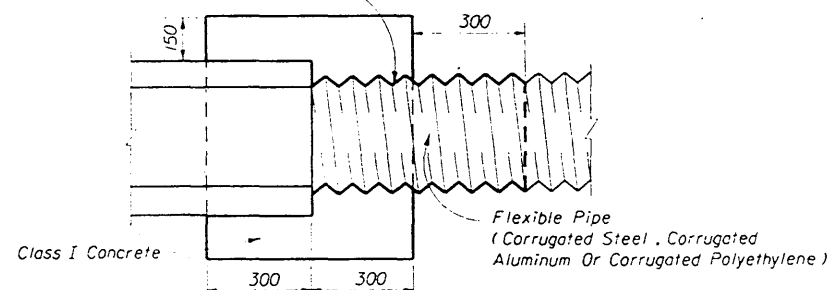


(All Pipe Sizes)  
**BELL AND SPIGOT**

**TONGUE & GROOVE**

**DISSIMILAR JOINTS**

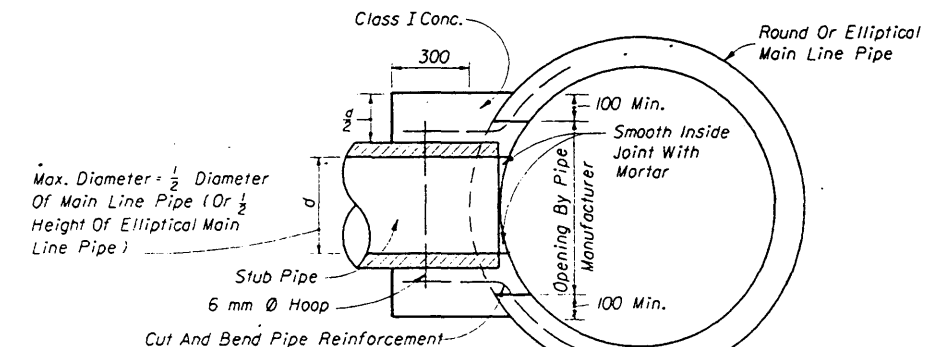
Bituminous Coating Required For CMP (Any Suitable Bituminous Material May Be Field Applied)



Note: Cost of concrete and bituminous coating to be included in contract unit price for either new pipe or Mitered End Section. A concrete jacket shall not be used to join:  
(a) metal pipe of dissimilar materials.  
(b) flexible pipe when the minimum cover required in accordance with Index No. 205 cannot be obtained.

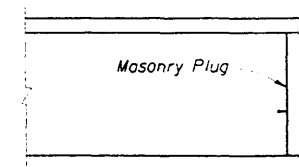
DISSIMILAR TYPES

**CONCRETE JACKET FOR CONNECTING DISSIMILAR TYPES OF PIPE AND CONCRETE PIPES WITH DISSIMILAR JOINTS**



Cost of concrete and steel to be included in contract unit price for pipe culvert.

**CONCRETE COLLAR FOR JOINING MAINLINE PIPE AND STUB PIPE**



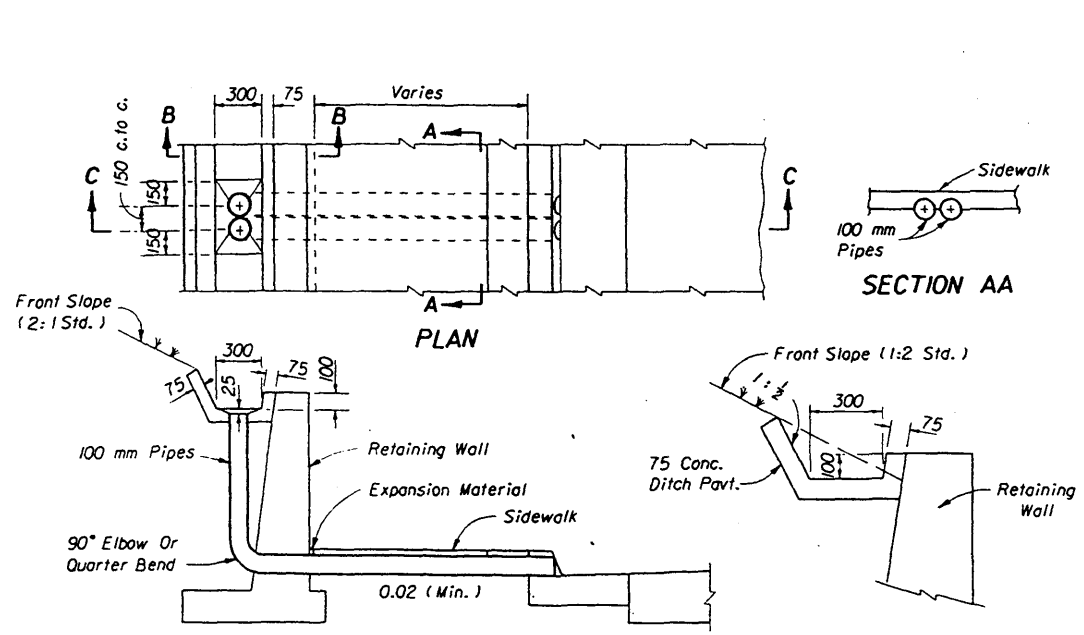
Note: Unless otherwise called for in the plans, the cost of plugging pipes to be included in contract unit price for new pipe.

**PIPE PLUG**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

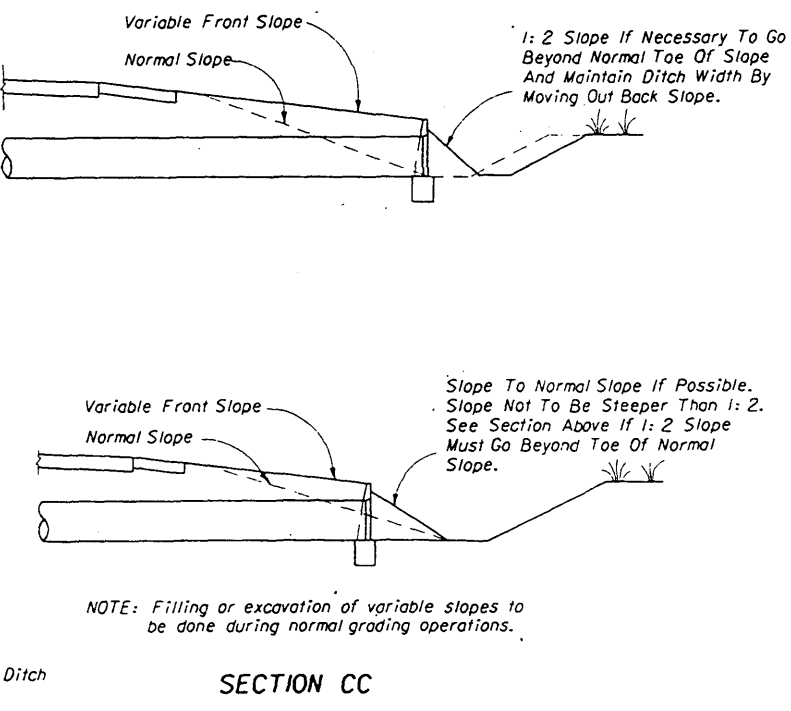
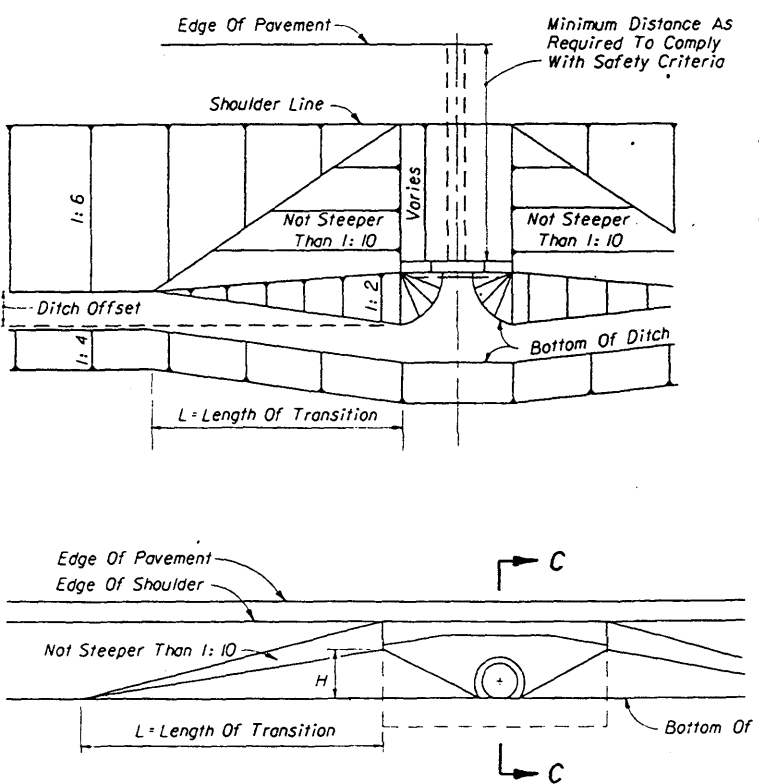
**MISCELLANEOUS DRAINAGE DETAILS**

Names	Dates	Approved By	
Designed By		A. M. G. [Signature]	
Drawn By	HSD 01/85	Revision	Sheet No.
Checked By	JBW/JG 09/85	94	1 of 4
			Index No.
			280



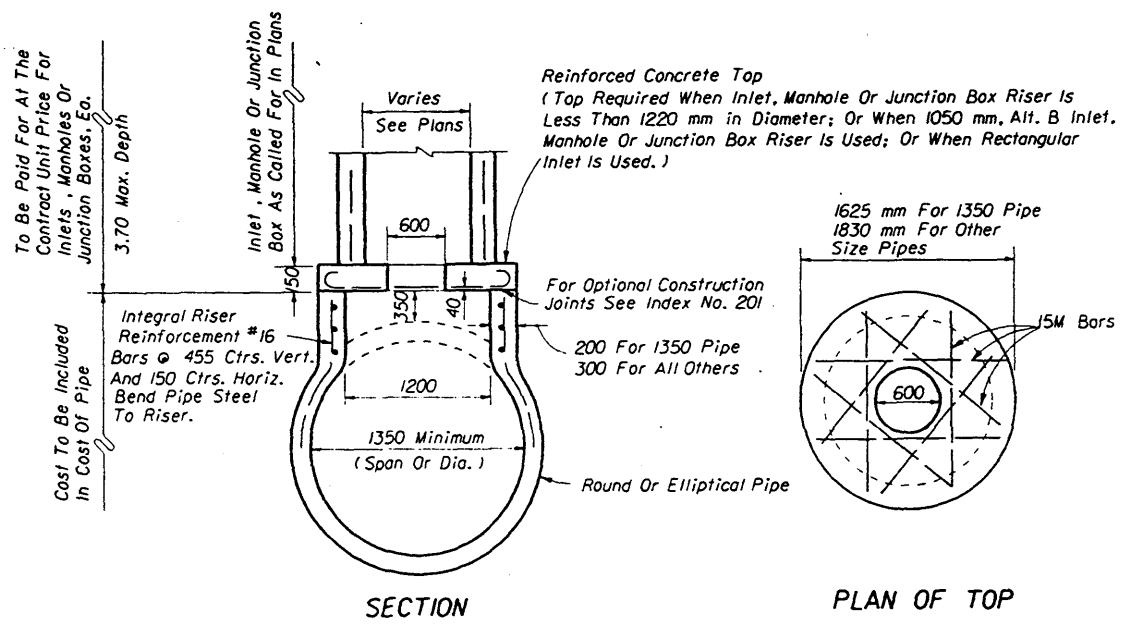
**CONCRETE GUTTER AND DRAINS AT RETAINING WALLS**

Note: Either cast iron pipe or PVC pipe, Schedule 40, may be used. Pipe to be paid for under the contract unit price for either Cast Iron Pipe For Roof Drains (100 mm), MI, or Polyvinyl Chloride Pipe Culvert (100 mm), MI.



**METHOD FOR SETTING LIMITS OF VARIABLE FRONT SLOPES AT DRAINAGE STRUCTURES**

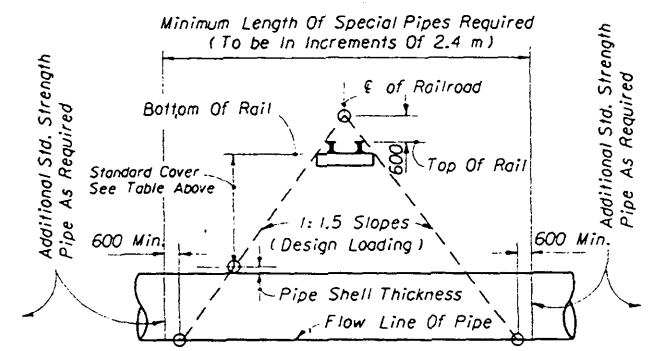
Use Larger Value Of Either:  
 1.  $L = 10 \times H$  (No Maximum)  
 2.  $L = 10 \times \text{Ditch Offset}$  (Maximum  $L = 30.00$ )



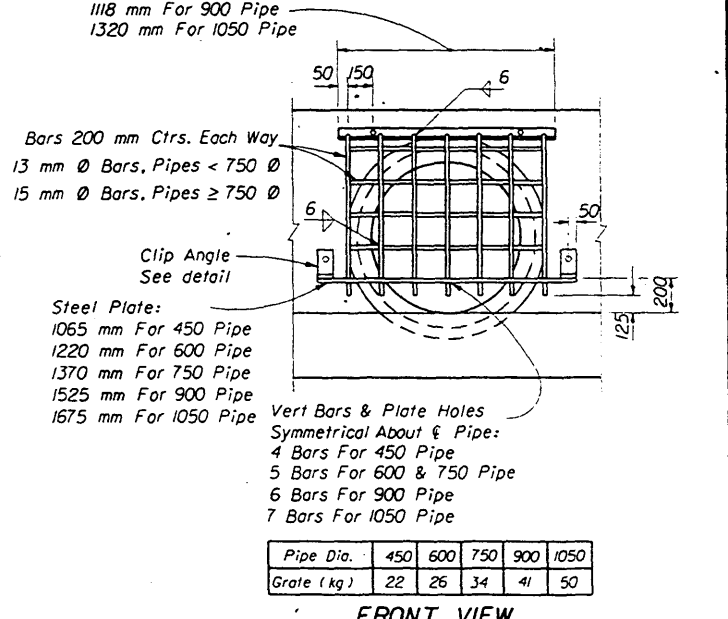
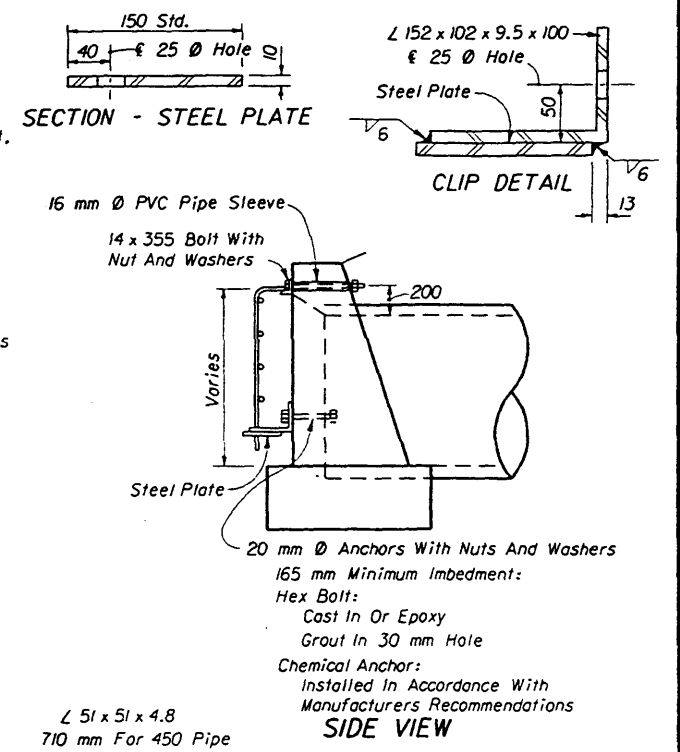
**INLETS, MANHOLES OR JUNCTION BOXES ON INTEGRAL PRECAST CONCRETE RISER FOR CONCRETE PIPE**

RAILROAD COMPANY	CLEARANCE BELOW BOTTOM OF RAIL (mm)	STRENGTH CLASS
Apalachicola Northern	1200	IV
Atlanta And St. Andrews Bay	1200	IV
Florida East Coast	1650*	IV
Burlington Northern Railroad	S-TRK M/L 1350 1650	IV
CSX Transportation, Inc.	1650	IV
Southern Railway System		
Georgia Southern And Florida	1650	V
Live Oak Ferry And South Georgia	1650	V
St. Johns River Terminal	1650	V

\*Clearance is for casing pipe. All subgrade carrier pipelines and wirlines will be installed within a casing pipe which will extend from Right-of-Way line to Right-of-Way line.



**METHOD FOR DETERMINING THE LENGTH OF SPECIAL PIPE REQUIRED UNDER RAILROADS**



**GUARD AT PIPE ENDS**

Note: Guards to be constructed only at locations specifically called for in plans. Guard, plate & clips, bolts, nuts and sleeves to be included in the contract unit price for Endwall Grate, KG.

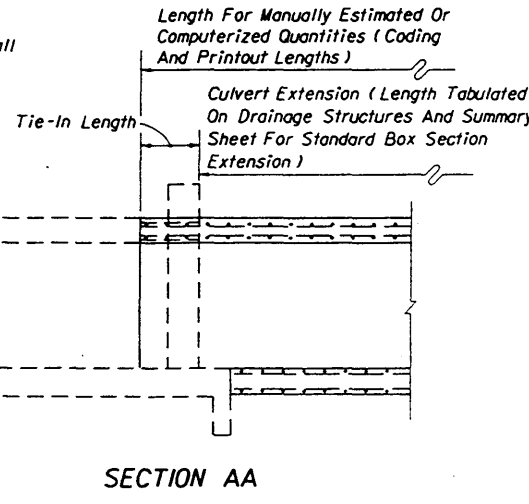
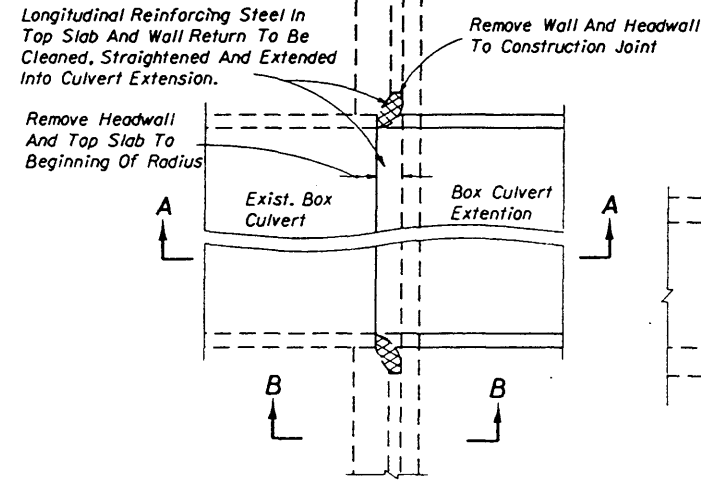
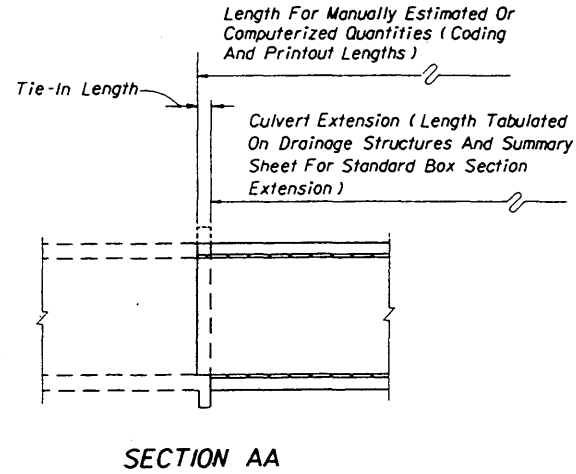
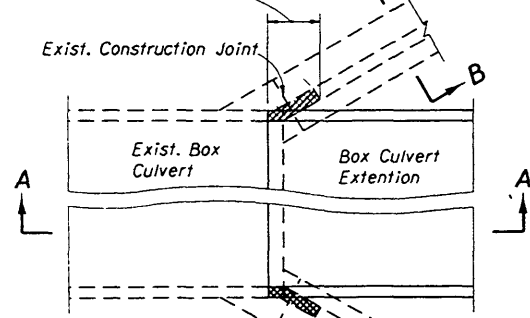
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**MISCELLANEOUS DRAINAGE DETAILS**

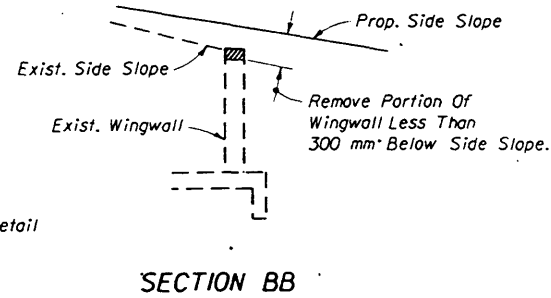
Names	Dates	Approved By
Designed By		<i>A. M. Semore</i> State Drainage Engineer
Drawn By		Revision
Checked By		Sheet No. 2 of 4
		Index No. 280



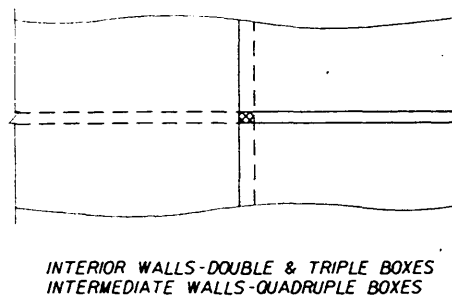
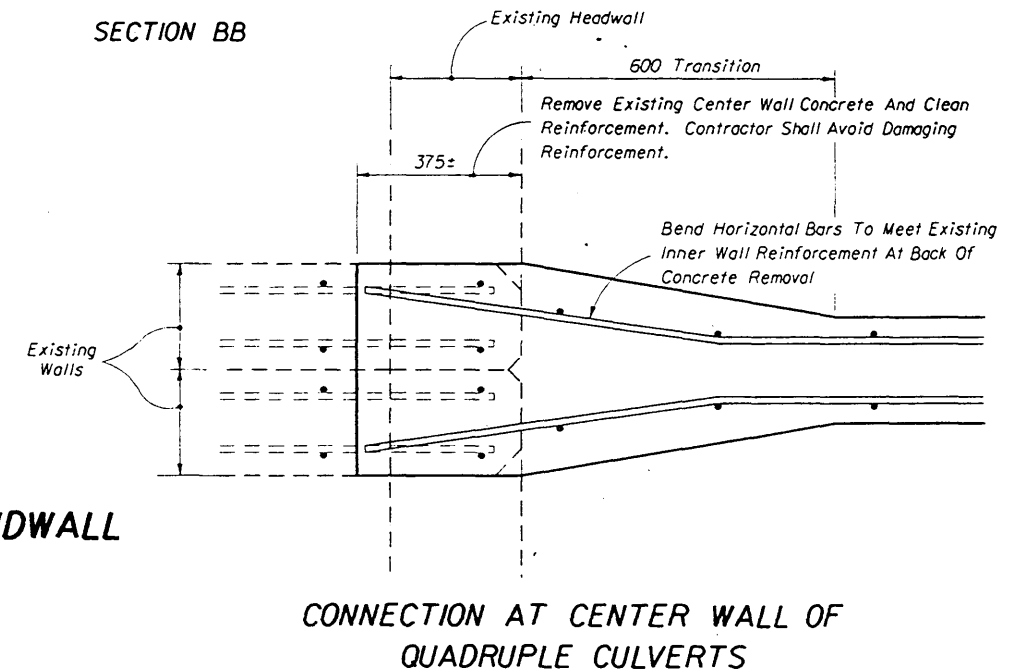
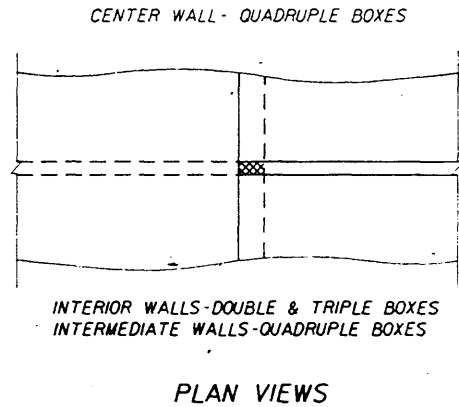
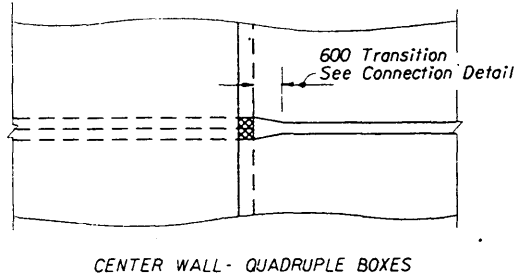
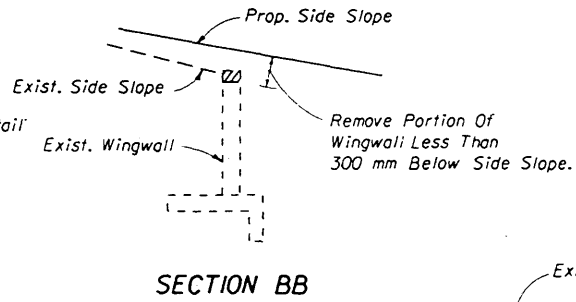
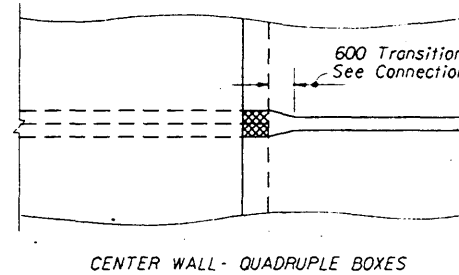
Remove Headwall, Outside Wall And Wingwall From Inside Face Of Headwall Sufficient To Construct Culvert Extension. Longitudinal Reinforcing Steel To Be Cleaned, Straightened And Extended Into Culvert Extension.



OUTSIDE WALLS-SINGLE, DOUBLE, TRIPLES, & QUADRUPLE BOXES



OUTSIDE WALLS-SINGLE, DOUBLE, TRIPLES, & QUADRUPLE BOXES



PLAN VIEWS

FLARED ENDWALL

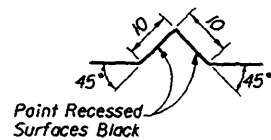
NOTE: The computerized printout for reinforcing steel does not include the additional lengths needed for extension and overlaps or connections to the horizontal reinforcement in the interior walls of double, triple and quadruple existing concrete box culverts; the cost for additional reinforcement and the thickened concrete wall in the transitional area shall be included in the costs for constructing the tie-in.

Cost for removal and disposal of material from existing headwalls, wingwalls and the top slab, and cost of cleaning, straightening and extending longitudinal reinforcing steel shall be included in the cost for concrete and steel of the culvert extension.

For concrete box culvert details, see Index No. 290.

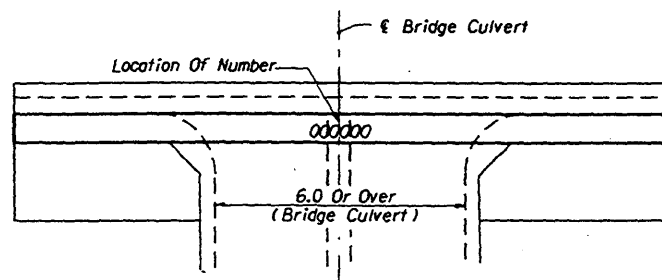
CONNECTION DETAILS FOR CONCRETE BOX CULVERT EXTENSIONS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
MISCELLANEOUS DRAINAGE DETAILS				
Designed By	Names	Dates	Approved By <i>S.A. McLenore</i> State Drainage Engineer	
Drawn By			Revision	Sheet No. 3 of 4
Checked By			94	Index No. 280



Black Plastic Figures 75 mm in height as approved by the Engineer may be used in lieu of numbers formed by 10 mm "V" Grooves. "V" Grooves shall be formed by preformed figures.

**SECTION THRU RECESSED "V" GROOVE TO FORM INSCRIBED FIGURES**

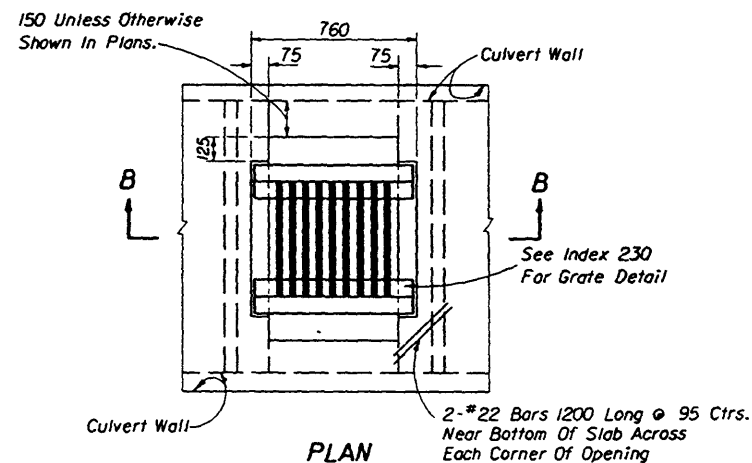
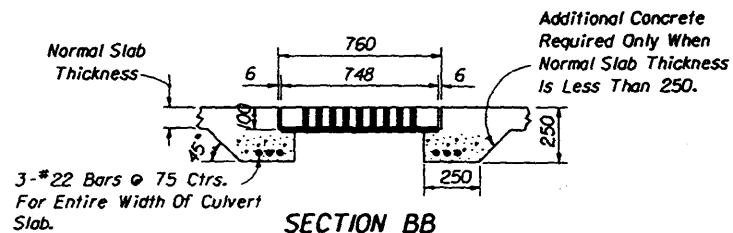


The number is to be placed in the center of the top surface of all bridge culvert headwalls.

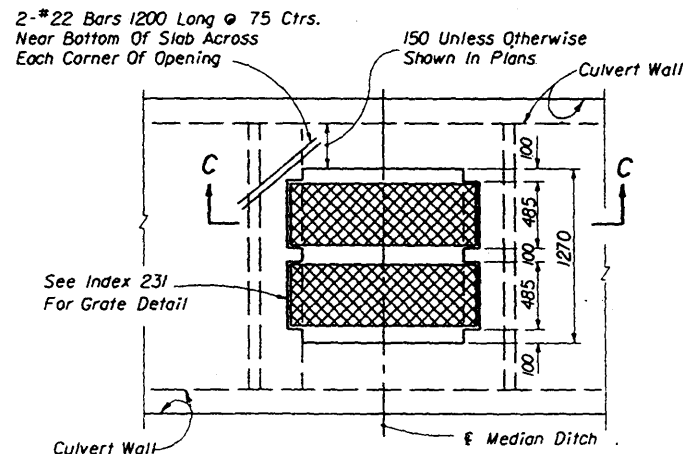
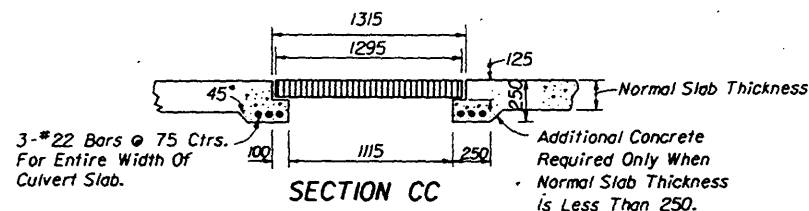
For Bridge Number See Plan-Profile Sheet(s).

**TOP VIEW OF HEADWALL**

**BRIDGE CULVERT NUMBER LOCATION**



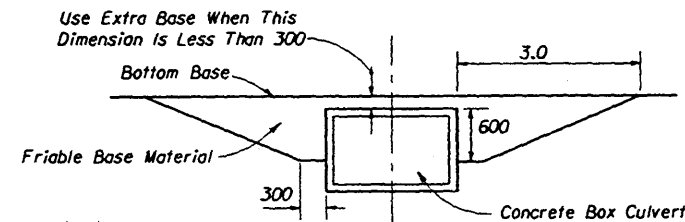
**INLET TYPE A GRATE**



**PLAN  
INLET TYPE B GRATE**

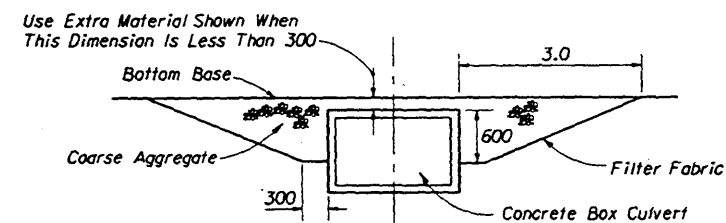
NOTE: 1. Cost of Steel Grating to be included in cost of Box Culvert.  
2. All steel shall be 30 mm clear.

**INLET IN TOP OF BOX CULVERT**



The cost of furnishing and installing extra friable base material shall be included in the cost of the Box Culvert.

**FRIABLE BASE**



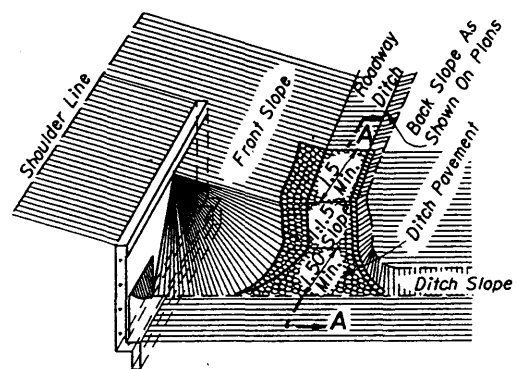
The coarse aggregate shall be placed in 150 mm lifts and compacted sufficiently as to be firm and unyielding. The coarse aggregate shall be gravel or stone meeting the requirements of Section 901-2 or 901-3 respectively. The gradation shall meet Section 901-6, Grades 4, 467, 5, 56, or 57 unless restricted in the plans. The filter fabric shall be Type D-3 (See Index 199). The cost of furnishing and installing the coarse aggregate and filter fabric shall be included in the cost of the Box Culvert.

**ASPHALTIC CONCRETE BASE**

NOTE: Extra base is required when cross box culverts are located on facilities subject to high speed traffic (>80 km/h) or high traffic volumes (>1600 ADT) and the cover is within the range specified in the notation above.

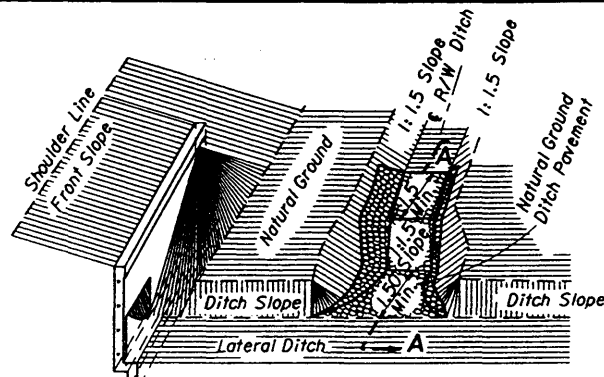
**EXTRA MATERIAL FOR CROSS BOX CULVERTS UNDER FLEXIBLE PAVEMENT**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>MISCELLANEOUS DRAINAGE DETAILS</b>				
Names	Dates	Approved By <i>A.M. Lemuel</i> State Drainage Engineer		
Designed By		Revision	Sheet No.	Index No.
Drawn By		00	4 of 4	280
Checked By				

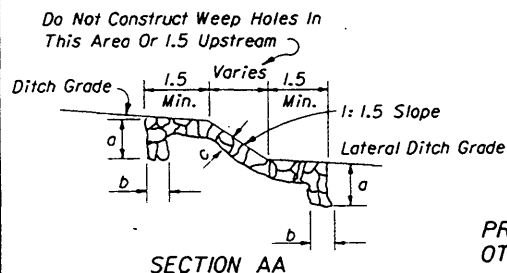


JUNCTION OF ROADWAY DITCH\* AND LATERAL DITCH

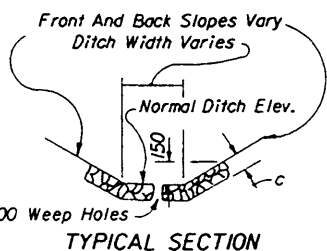
\* Soil-cement or misc. asphalt will not be permitted for this type of construction



JUNCTION OF R/W DITCH\* AND LATERAL DITCH

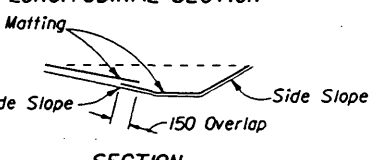
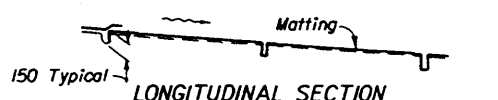
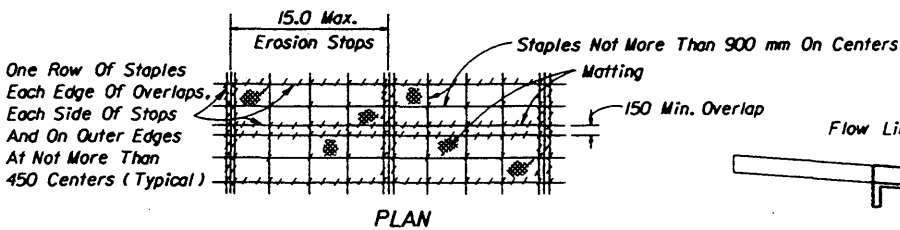


PROFILE OF DITCH PAV'T AT LOCATIONS OTHER THAN JUNCTION WITH LATERAL DITCH

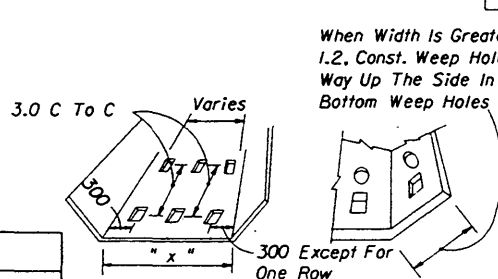


TYPICAL SECTION

Pavement Type	Dimensions			Payment Unit	Basis Of Estimate	Filter Fabric Type	Velocity Range	References & Remarks
	a	b	c					
Concrete	600	150	75	M2	m <sup>2</sup>	D-5	Low-High	Section 524 of the Standard Specifications.
Miscellaneous Asphalt	600	300	100	MT	217 kg/m <sup>2</sup>	None	Low-Moderate	Section 339.
Soil-Cement	600	300	100	M2	m <sup>2</sup>	None	Low	Section 170.
Riprap (Sand-Cement)	600	300	100	M3	0.10 m <sup>3</sup> /m <sup>2</sup>	D-4	Low-Moderate	Section 530. Grouting of joints required.
Riprap (Ditch Lining)				MT	MT	D-2	Moderate-High	Section 530

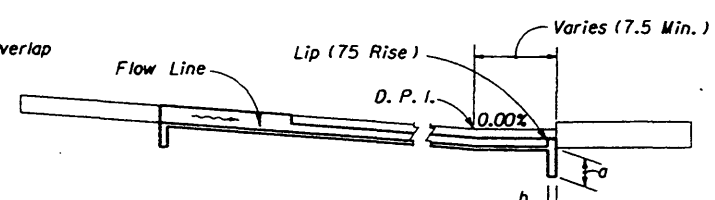


MATTING FOR DITCH

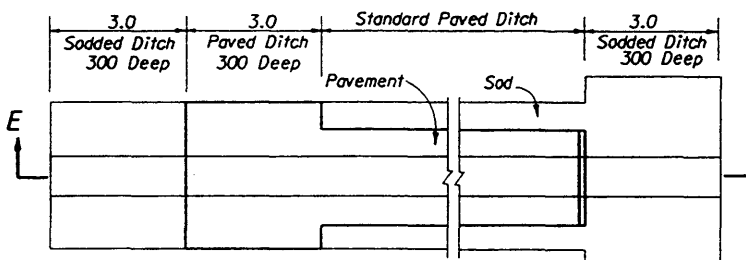


Notes: All weep holes to be 75 x 100 rectangle or 100 or 125 dia. circular hole. 0.014 m<sup>3</sup> (300 x 300 x 150) of No. 6 aggregate to be placed under each hole. 0.10 m<sup>2</sup> of galvanized wire mesh (6 mm openings) shall be placed between the aggregate and the concrete. Cost of holes, aggregate and wire mesh to be included in the cost of ditch pavement.

WEEP HOLE ARRANGEMENT



SECTION EE

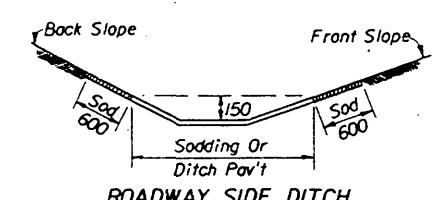
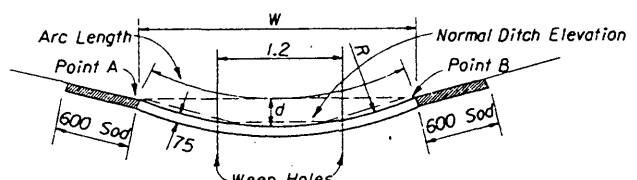


PLAN

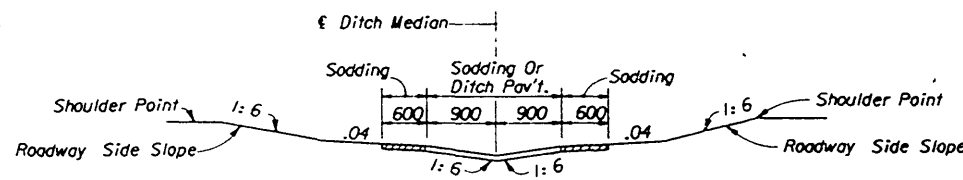
PAVED DITCH END TREATMENT

GENERAL NOTES

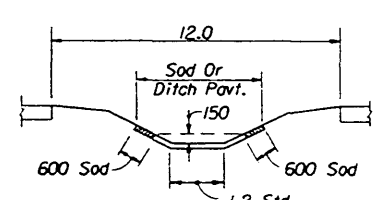
- Type of ditch pavement shall be as shown on plans.
- In concrete ditch pavement, contraction joints are to be spaced at 7.5 meters maximum intervals, or as directed by the Engineer. Contraction joints may be either formed (construction joint) or tooled. No open joints will be permitted. Expansion joints with 13 mm preformed joint filler shall be constructed at all intets, endwalls, and at intervals of not more than 60.0 meters.
- Lip at end of ditch pavement shall normally be located downstream of D.P.I. or on flatter grades where there is a decrease in ditch velocity.
- Toewalls are to be used with all ditch paving. A toewall is not required adjacent to drainage structures.
- When directed by the Engineer, weep hole spacing may be reduced to 1.5 meters minimum.
- For junction of R/W ditch spillway and lateral ditch, sides of paving to be 300 mm high minimum.
- For ditch pavements requiring filter fabric the fabric shall be placed directly beneath the pavement for the entire length and width of the pavement. When weep holes with aggregate are used the filter fabric shall be placed below the aggregate to form a mat continuous with or overlapping the pavement fabric. (See Index 199 for fabric type and application).
- Ditch pavement requiring reinforcement shall be detailed in the plans.
- Cost of plastic filter fabric to be included in the contract unit price for ditch pavement.



ROADWAY SIDE DITCH



SWALED MEDIAN (No Weep Holes)



12.0 MEDIAN

TO REPLACE:	W (m)	d (mm)	R (m)	No. Of Rows Of Weep Holes	Arc Length (m)
1:8 Median Swale	1.8	70	5.8	0	1.81
1:6 Front Slopes; 1:4 Back Slope	3.0	200	5.8	2	3.03
1.5 B.W. Ditch	2.7	160	5.8	2	2.72
1:4 Front Slopes & Back Slope	2.7	220	4.25	2	2.75
1.5 B.W. Ditch	2.4	175	4.25	1 (in center)	2.43

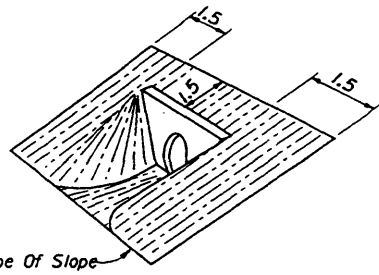
ALTERNATE DITCH PAVEMENT

For use only where side slopes are 1:4 or flatter. Point "A" and "B" are to be the same elevation and should be used to locate the paved section.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

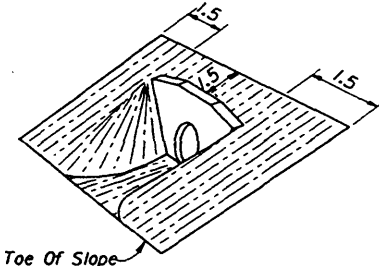
## DITCH PAVEMENT & SODDING

Designed By	Names	Dates	Approved By	<i>J. M. Lewis</i>
Drawn By			State Drainage Engineer	
Checked By			Revision	Sheet No.
			00	1 of 2
				281

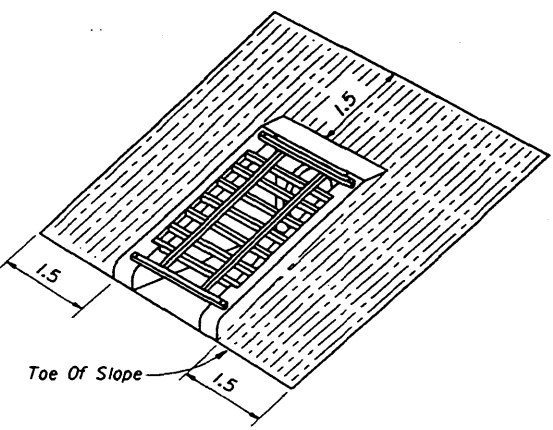


Note: Sodding quantities for each endwall to be determined by the designer from this detail.

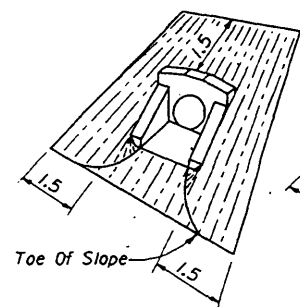
(EXCEPT INDEX 250)  
STRAIGHT ENDWALL



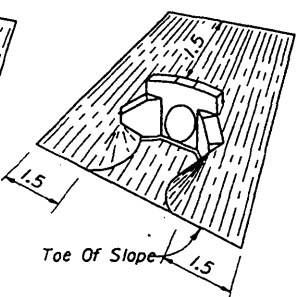
STRAIGHT ENDWALL  
INDEX 250



U - TYPE ENDWALL  
INDEX 261

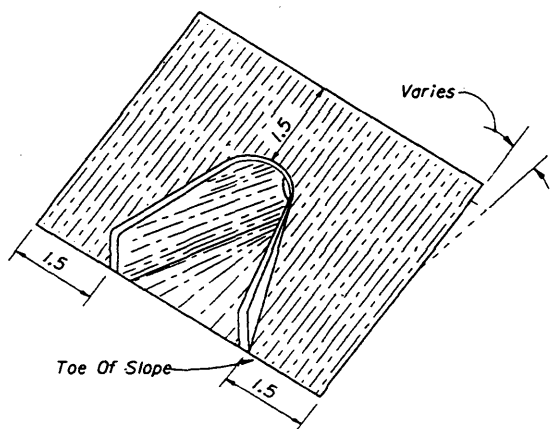


U - TYPE WINGS

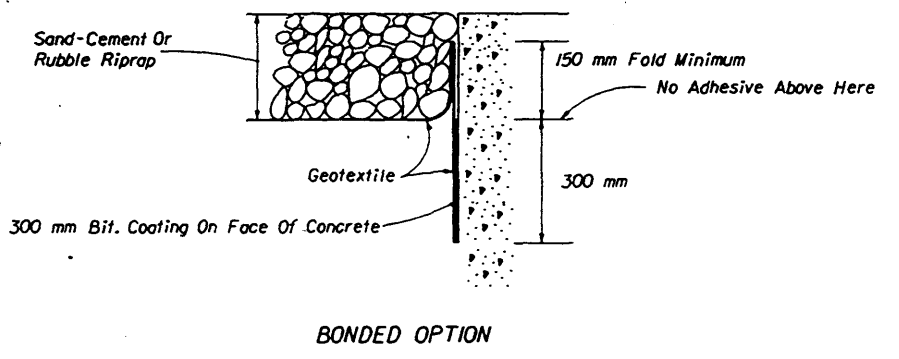


45° WINGS

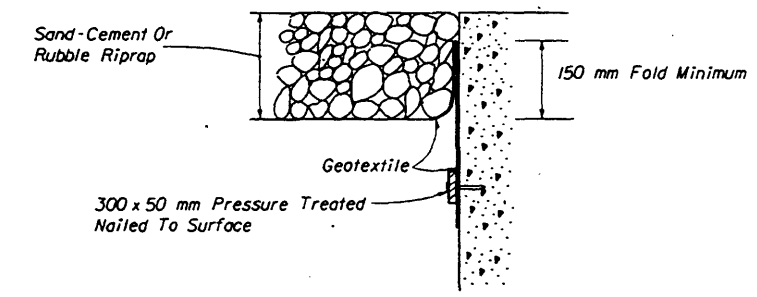
WINGED ENDWALLS  
INDEX 266



FLARED END SECTION  
INDEX 270



BONDED OPTION



NAILED OPTION

Note: Either option may be used unless otherwise called for in the plans.

GEOTEXTILE PLACEMENT AT CONCRETE STRUCTURE

		SODDING QUANTITIES (m <sup>2</sup> )																				
PIPE SIZE	INDEX 250												INDEX 261				INDEX 266				INDEX 270	
	SLOPE												SLOPE				SLOPE					ALL SLOPES
	1:2			1:3			1:4			1:6			1:2		1:3		1:4		1:6			
	PIPES												PIPES				PIPES					
	1	2	3	1	2	3	1	2	3	1	2	3	1	1	1	1	1	1	1	1	1	
300																	12	13	15	19	9	
375	16	18	20	19	22	25	22	25	28	29	32	36	11 (13)	14	15	20	13	15	17	21	10	
450	18	20	23	21	25	28	25	29	32	33	37	42	12 (14)	15	16	21	14	15	19	24	10	
525																					10	
600	22	25	29	27	31	36	32	37	42	42	49	56	13 (15)	16	18	24	16	19	22	29	12	
675																					13	
750	26	31	36	33	39	45	39	46	53	52	62	71	15 (15)	18	20	27	18	21	25	34	14	
900	31	37	44	39	47	55	47	56	66	64	76	90					20	25	30	40	15	
1050	36	45	52	46	56	66	56	69	81	76	93	111					23	27	33	46	16	
1200	42	52	61	54	66	78	66	82	97	91	112	133					25	30	37	51	18	
1350	48	60	71	62	77	92	76	95	114	106	132	158									18	
1500																					19	
1650																					21	
1800																					22	

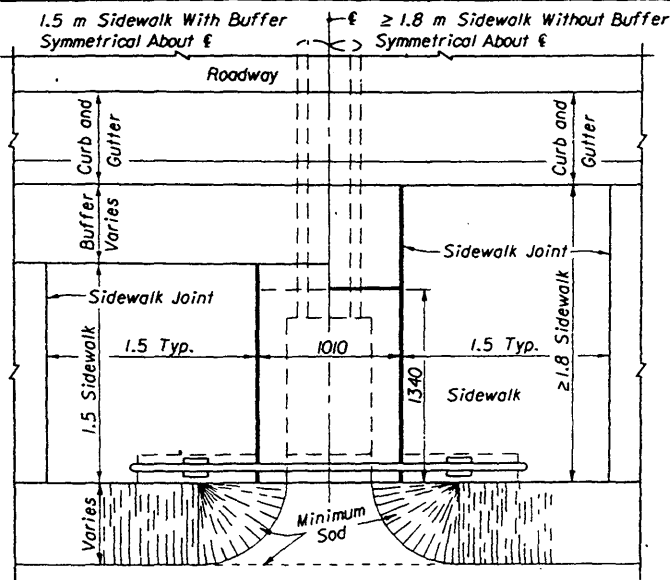
( ) Endwall With Baffles

SODDING

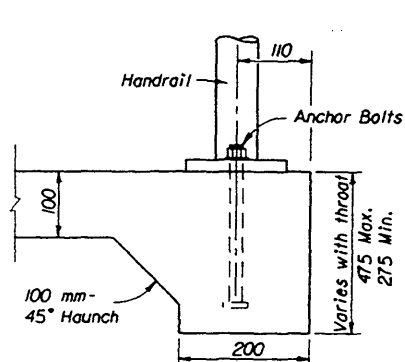
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

DITCH PAVEMENT & SODDING

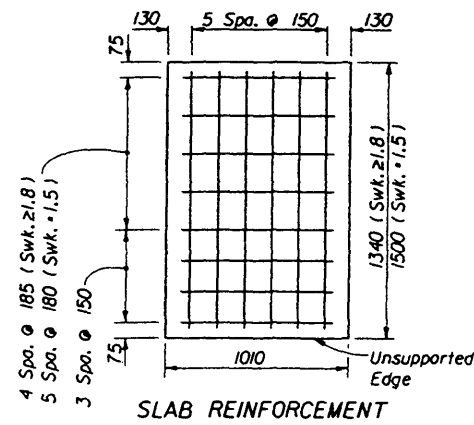
Names	Dates	Approved By		
Designed By		<i>J. A. McLenore</i>	State Drainage Engineer	
Drawn By	HSD 08/85	Revision	Sheet No.	Index No.
Checked By	JBW/JG 09/85	94	2 of 2	281



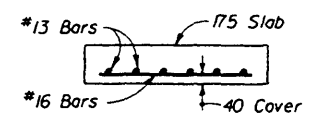
PLAN



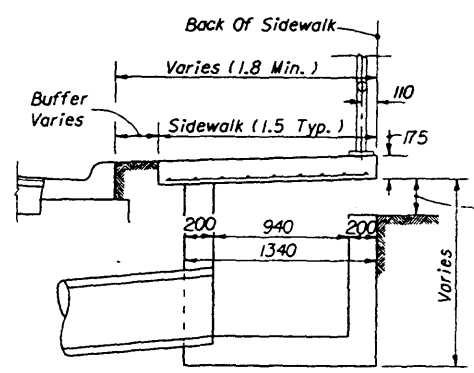
SECTION BB



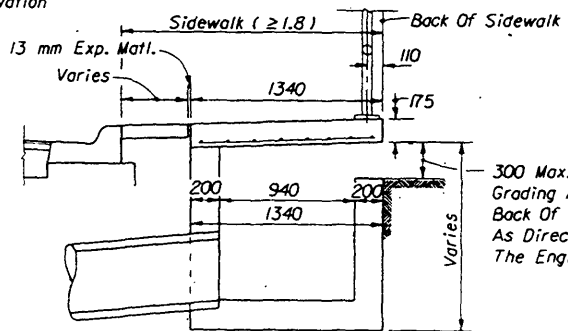
SLAB REINFORCEMENT



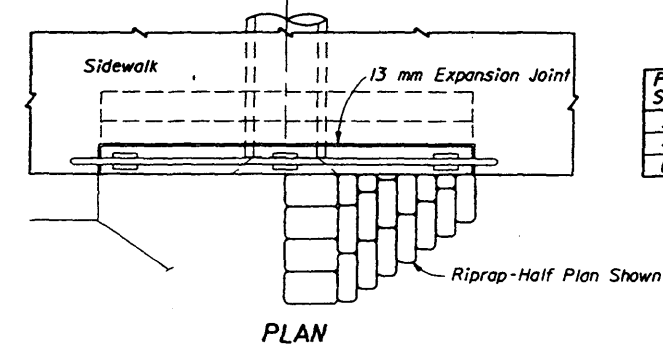
SLAB SECTION



1.5 m SIDEWALK SECTION AA

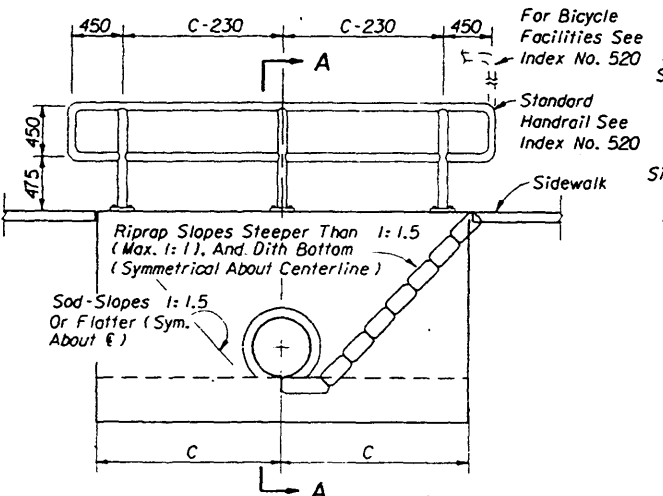


≥ 1.8 m SIDEWALK SECTION AA

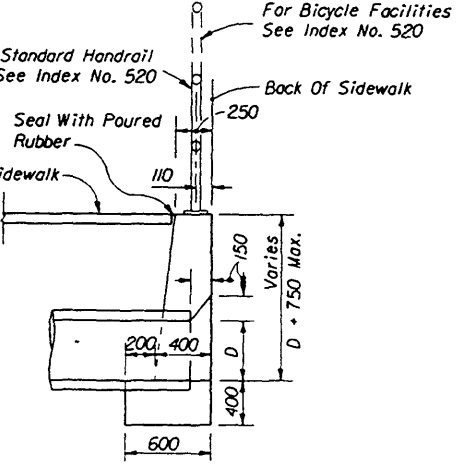


PLAN

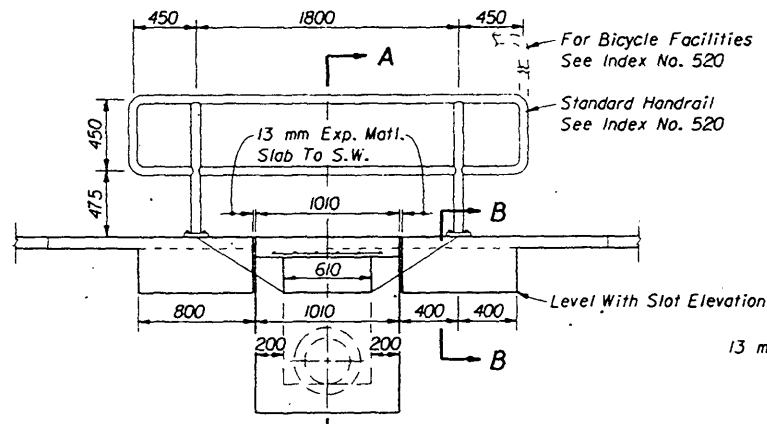
Pipe Size	C	Conc. -m <sup>3</sup>	Riprap -m <sup>3</sup> (Sand-Cement)
375	1450	1.74	0.84
450	1600	1.98	1.00
600	1905	2.49	1.38



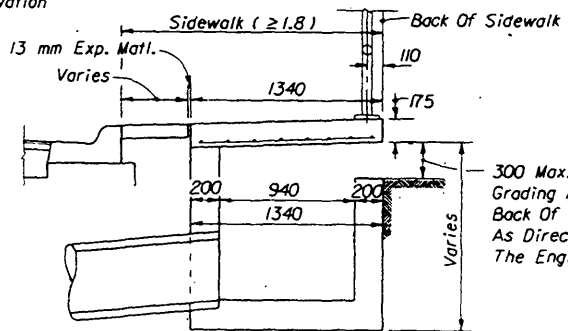
FRONT ELEVATION



SECTION AA

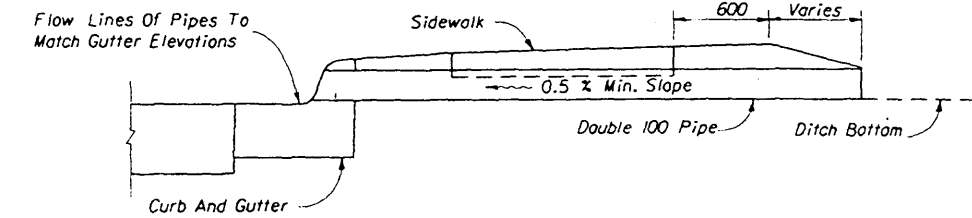


FRONT ELEVATION



SECTION AA

INLET TYPE C (MODIFIED)



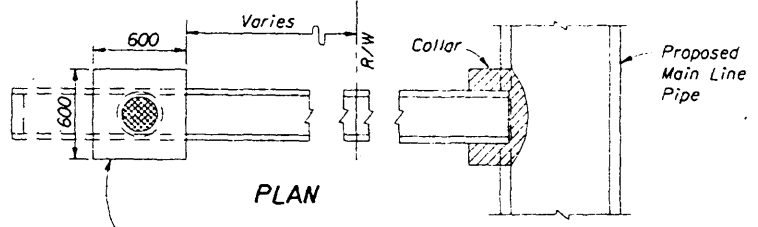
SHALLOW DITCHES

Notes: 1. For additional details see Index No. 232.  
2. Inlet to be paid for under the contract unit price for Inlets (Ditch Bottom Type C Modified), EA. Handrail to be paid for under the contract unit price for Pipe Handrail, (Material), MI.

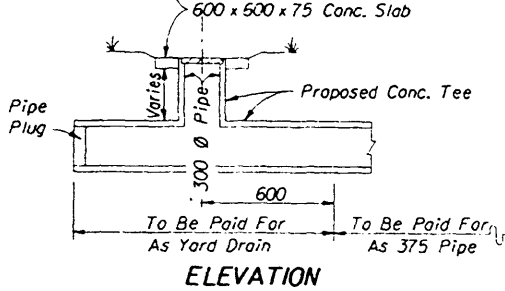
Notes: 1. To be constructed at locations as directed by the Engineer.  
2. Either cast iron pipe or PVC rigid conduit, U.L. listed for direct sunlight exposure, Schedule 40, may be used.  
3. Pipe to be paid for under the contract unit price for either Cast Iron Soil Pipe (Standard) (100 mm), MI or Polyvinyl Chloride Pipe Culvert (100 mm), MI.

Notes: 1. Maximum pipe size shall be 600 mm diameter.  
2. Grading back of sidewalk varies and shall be done as directed by the Engineer.  
3. Concrete quantities shown are for maximum wall heights, and shall be basis for estimate and payment.  
4. Riprap quantities shown are for estimate purposes only. Cost of riprap to be included in cost of the endwall.  
5. Endwalls to be paid for under the contract unit price for Conc. Class I (Endwalls), M3. Handrail to be paid for under the contract unit price for Pipe Handrail, (Material), MI.

SPECIAL CONCRETE ENDWALL



PLAN



ELEVATION

YARD DRAIN ITEM INCLUDES :

- 375 mm x 375 mm x 300 mm Conc. Tee 1220 mm long.
- One (1) Gate-Neenah No. R-4030, Phoenix No. P-1058, U.S. Foundry No. 5605 or equivalent.
- 300 mm Conc. pipe as necessary.
- 0.03 m<sup>3</sup> conc. for slab.

Notes: 1. Yard drains to be located outside the R/W. Drainage area should not exceed 70 m<sup>2</sup> (grate flow 0.003 m<sup>3</sup>/s).  
2. Yard drains may be constructed at the option of the property owner as shown on the plans.  
3. Cost of plugs and collars to be included in the cost for 375 mm concrete pipe. For collar and plug details see Index No. 280.  
4. Yard drains to be paid for under the contract unit price for Yard Drains, EA.

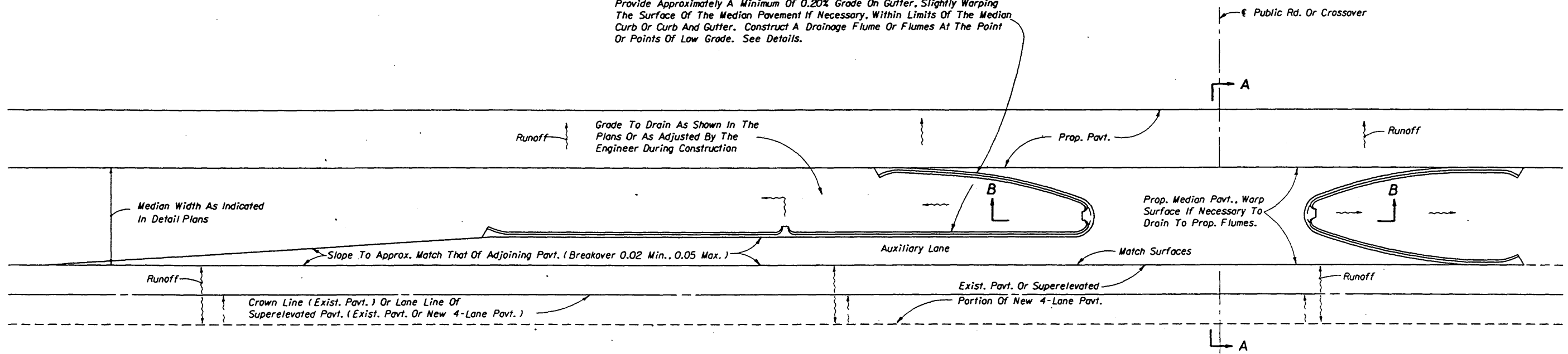
YARD DRAINS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

BACK OF SIDEWALK DRAINAGE

Names	Dates	Approved By		
Designed By		A. M. Lewis State Drainage Engineer		
Drawn By				
Checked By				
		Revision	Sheet No.	Index No.
		98	1 of 1	282

Provide Approximately A Minimum Of 0.20% Grade On Gutter, Slightly Warping The Surface Of The Median Pavement If Necessary, Within Limits Of The Median Curb Or Curb And Gutter. Construct A Drainage Flume Or Flumes At The Point Or Points Of Low Grade. See Details.



Median Width As Indicated In Detail Plans

Runoff  
Grade To Drain As Shown In The Plans Or As Adjusted By The Engineer During Construction

Prop. Median Pavt., Warp Surface If Necessary To Drain To Prop. Flumes.

Slope To Approx. Match That Of Adjoining Pavt. (Breakover 0.02 Min., 0.05 Max.)

Auxiliary Lane

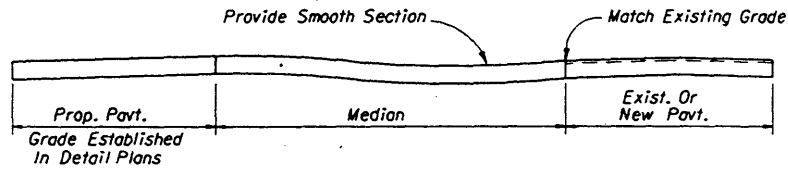
Match Surfaces

Runoff

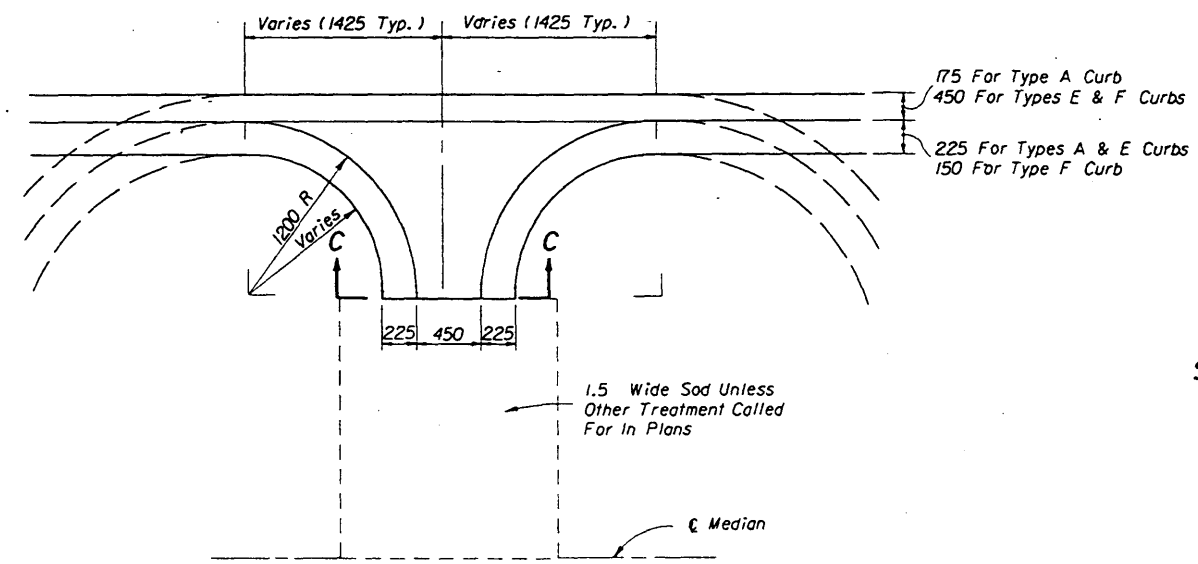
Crown Line (Exist. Pavt.) Or Lane Line Of Superelevated Pavt. (Exist. Pavt. Or New 4-Lane Pavt.)

Exist. Pavt. Or Superelevated Portion Of New 4-Lane Pavt.

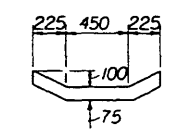
Runoff



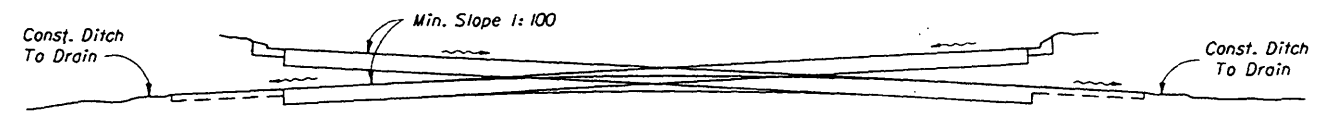
SECTION AA



FLUME DETAIL



SECTION CC



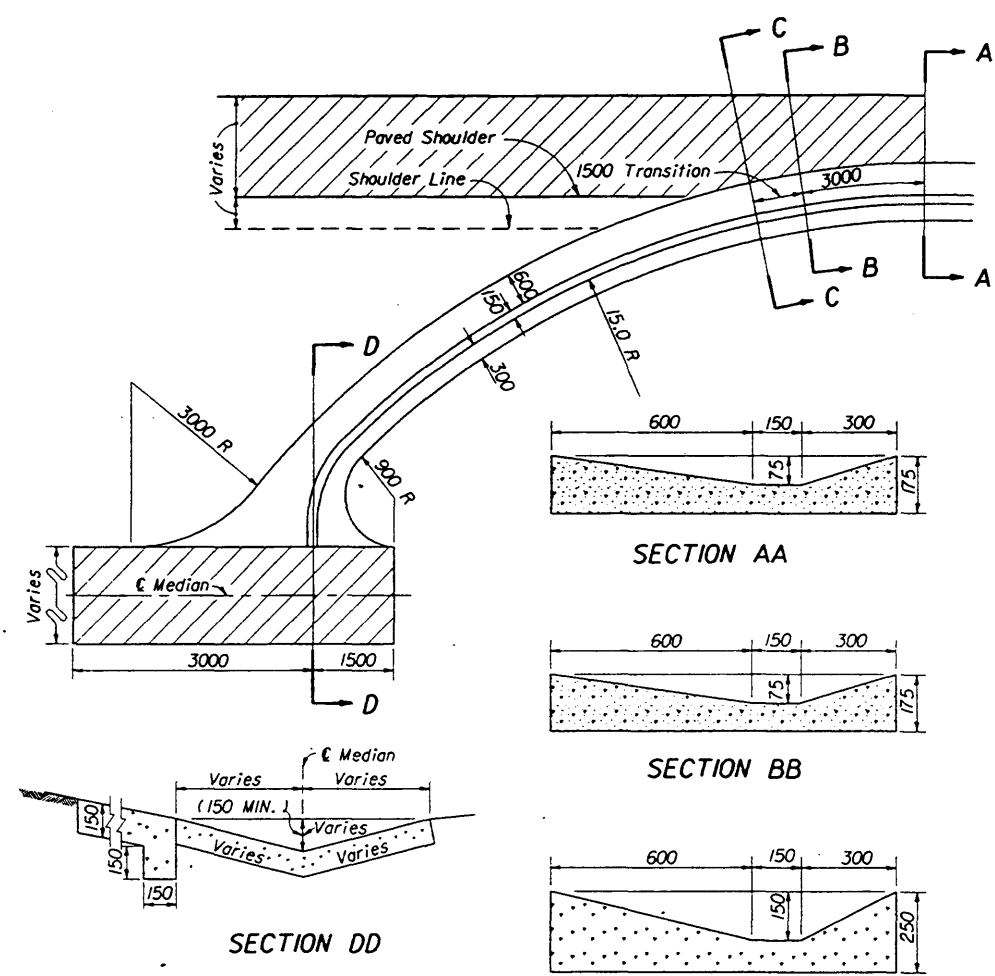
SECTION BB

(May Drain From Any Point Designated In The Plans Or As Adjusted By The Engineer During Construction)

GENERAL NOTES

1. These details are to apply to projects which provide for the conversion of 2-lane sections to 4-lane divided highway sections and for superelevated sections of new 4-lane divided highways. Layout above is illustration only. Cost of flumes to be included in the contract price for Curb or Curb and Gutter. Sod to be paid for under the contract unit price for Sodding, M2.
2. Flumes to be located in low point of noses and at other points as designated in the plans. The locations may be adjusted by the Engineer during construction.

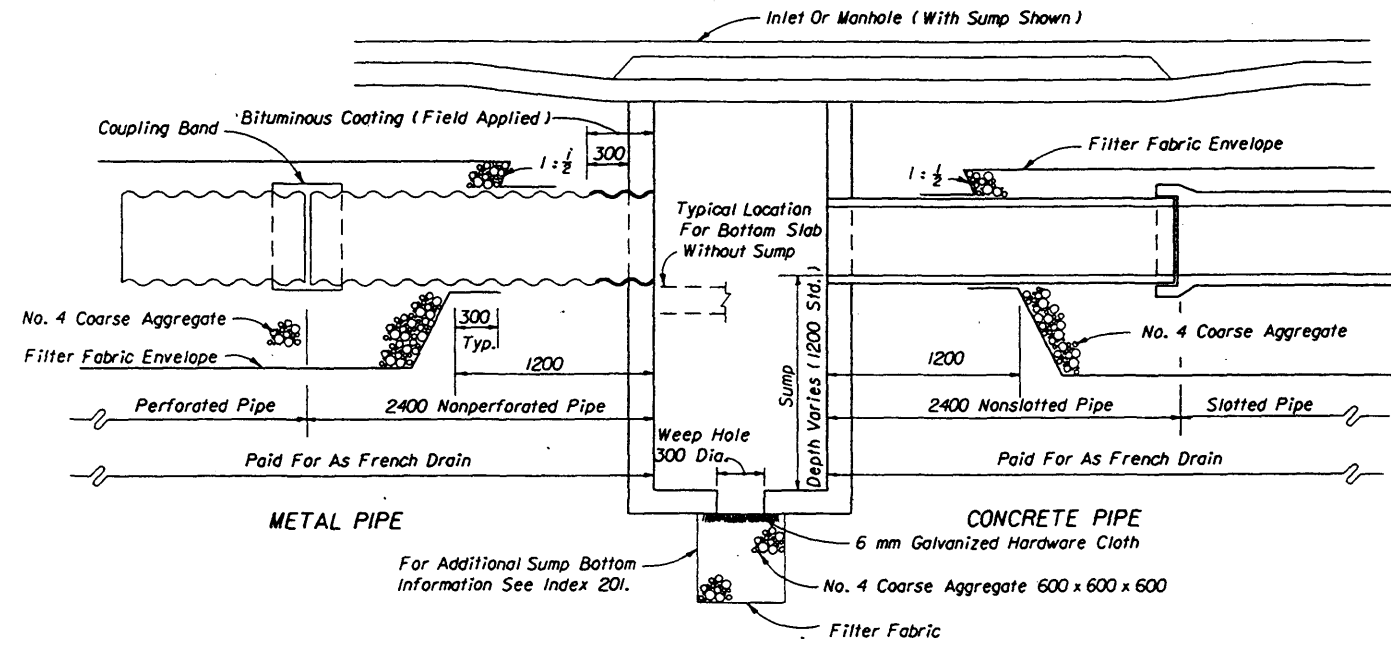
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>MEDIAN OPENING FLUME</b>				
Designed By	CHR	Dates	03/59	Approved By
Drawn By		Revision		 State Drainage Engineer
Checked By	CDD	03/59	94	
			Sheet No.	Index No.
			1 of 1	283



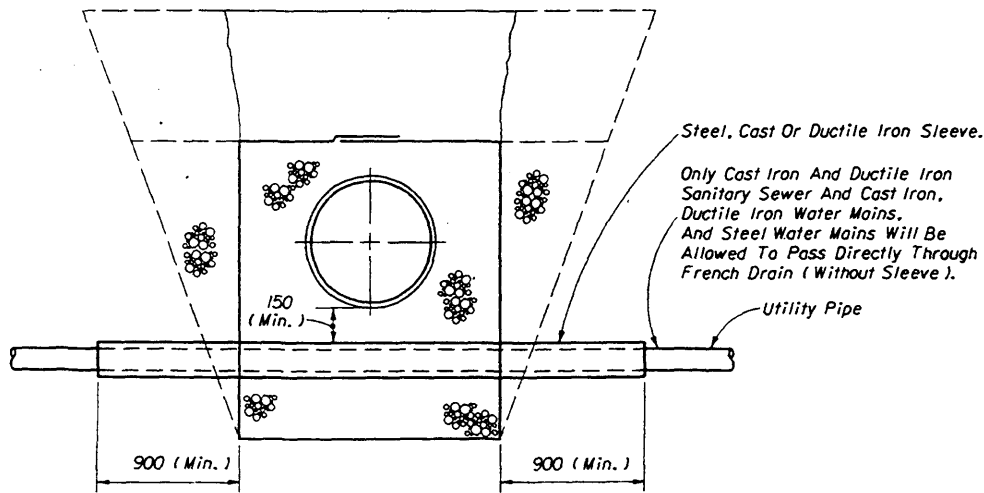
1. Spillway to be paid for as shoulder gutter.
2. If spillway empties into a shallow or median ditch, the detail should be modified as necessary.

**DETAIL OF CONC. SPILLWAY AT END OF SHOULDER GUTTER**  
 ( TO BE USED WHERE INLETS, PIPES & ENDWALLS ARE IMPRACTICAL )

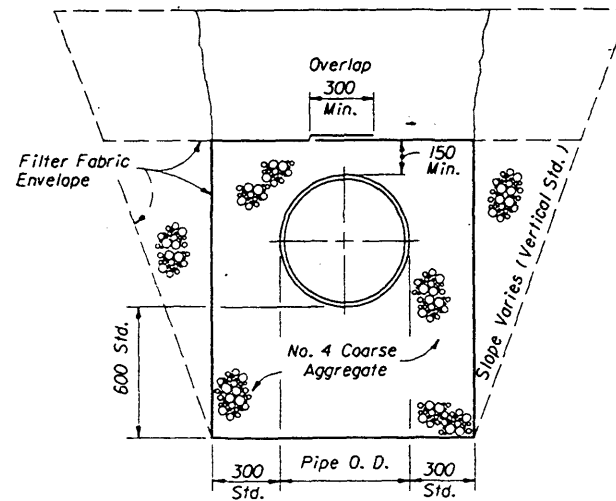
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CONCRETE SPILLWAYS</b> <b>SHOULDER GUTTER SPILLWAY</b>				
Names	Dates	Approved By <i>A. M. Lewis</i> State Drainage Engineer		
Designed By		Revision	Sheet No.	Index No.
Drawn By		00	1 of 1	284
Checked By				



LONGITUDINAL SECTION



ROUND PIPE SHOWN  
UTILITY PIPES THRU FRENCH DRAIN



ROUND PIPE SHOWN  
MINIMUM CROSS SECTION (ENLARGED)

FRENCH DRAIN SYSTEM

GENERAL NOTES

1. Pipe shall be any of the optional types permitted in Section 443 of the Specifications unless otherwise restricted in the plans. Dissimilar types of pipe will not be permitted in a continuous run of pipe.
2. Concrete pipe shall be placed with the slots positioned on sides.
3. Alignment joints are standard (gaskets not required). Recurrugation of metal pipe ends not required.
4. The contractor may submit other methods of providing slots having equal or greater area of opening, for approval by the Engineer.
5. Filter fabric shall be Subsurface Drainage type meeting the requirements of Section 985. All filter fabric joints shall lap a minimum of 300 millimeters.
6. The standard cross section shall be constructed unless other section(s) described or detailed in the plans.
7. For supplemental details see Index No. 280.
8. The contractor shall take the necessary precautions to prevent contamination of the trench with sand, silt and foreign materials.
9. The 300 mm diameter weep hole shall be eliminated, when the bottom of the inlet is below the normal water table, unless otherwise shown in the plans.
10. French drains following the typical cross section shall be paid for under the contract unit price for French Drains, M1. The unit price shall include the cost of pipe, pipe plugs, pipe fittings, coarse aggregate and filter fabric in place, and the cost for trench excavation, backfill and compaction. The unit price shall also include the cost for disposal of surplus excavated materials and cost for restoration of pavement removed or damaged by french drain construction, but shall not include payments for items paid for elsewhere.

French drains with a significantly different cross section shall be paid for under the contract unit prices for separate items as follows:

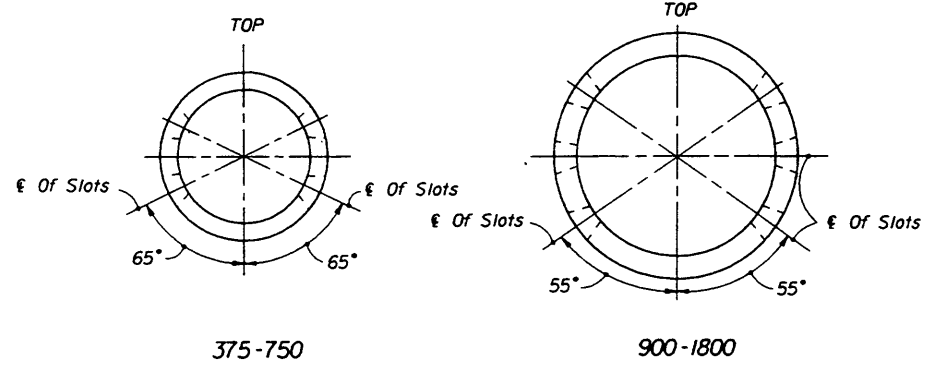
- (a) Slotted or Perforated Pipe Culvert, M1. Unit price shall include cost for pipe, pipe plugs and fittings in place.
- (b) Ballast Rock (French Drain Aggregate), M3. Unit price shall include cost for coarse aggregate in place, and cost for trench excavation, backfill and compaction. The unit price shall also include the cost for disposal of surplus excavated materials and cost for restoration of pavement removed or damaged by french drain construction, but shall not include payment for items paid for elsewhere.
- (c) Plastic Filter Fabric (Subsurface), M2. Unit price shall be for cost of fabric in place. Quantity shall be determined by plan net dimensions of the fabric envelope.

DESIGN NOTES

1. Pipe invert should be at or above the water table whenever possible.
2. French drains with minor dimensional changes or otherwise different from the standard cross section shall be either described or detailed in the plans. French drains with significantly different cross sections shall be detailed in the plans.

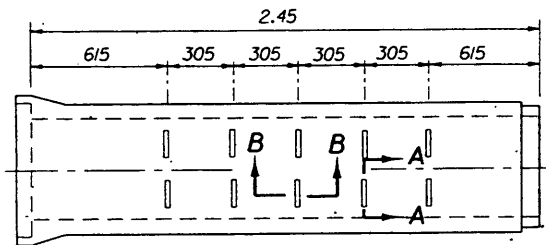
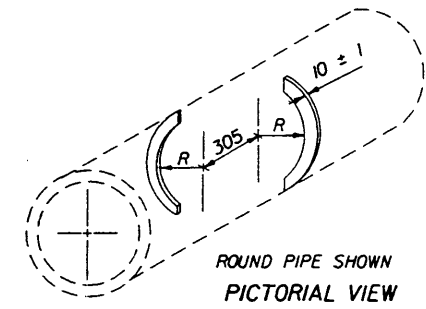
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>FRENCH DRAIN</b>				
Names	Dates	Approved By <i>A. M. Lemore</i>		
Designed By	MPS	09/83	State Drainage Engineer	
Drawn By	RWR	09/83	Revision	Sheet No.
Checked By	EGR	09/83	96	1 of 2
				Index No. <b>285</b>





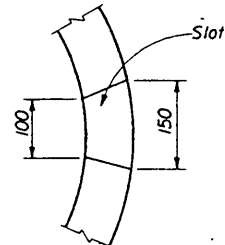
ELLIPTICAL PIPE		
Pipe Size	Slot Cut	
	Opening c	
	Min.	Max.
365 x 575	250	300
490 x 770	350	400
610 x 960	350	400
730 x 1150	500	550
855 x 1345	500	550
975 x 1535	500	550

ROUND PIPE		
Pipe Size	Slot Cut	
	Opening c	
	Min.	Max.
375	300	350
450	300	350
600	400	450
750	400	450
900	550	600
1050	550	600
1200	550	600
1350	600	650
1500	600	650
1650	600	650
1800	600	650

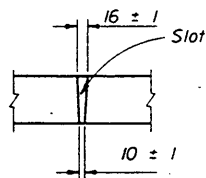


SIDE VIEW

OPTION A - ROUND PIPE

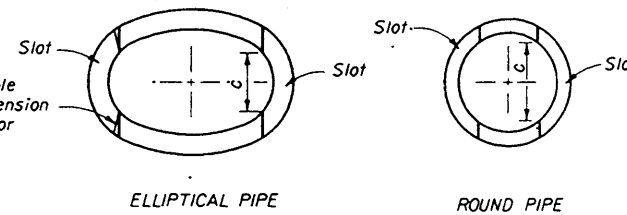


SECTION AA



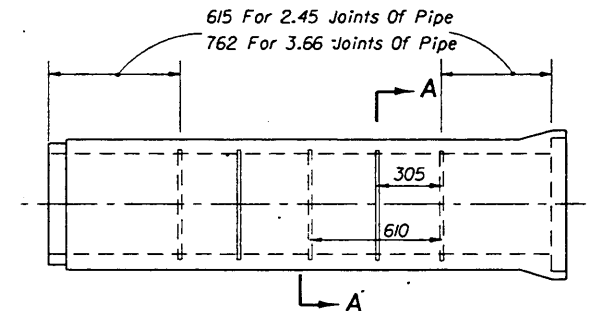
SECTION BB

A curved cut is acceptable provided the control dimension is maintained (Typical For Elliptical & Round Pipe)



SECTION AA

OPTION B - ROUND OR ELLIPTICAL PIPE



SIDE VIEW

**SLOTTED PIPE OPTIONS**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>FRENCH DRAIN</b>				
Designed By	Names	Dates	Approved By <i>A.A. McLenore</i> State Drainage Engineer	
Drawn By	Revision	Sheet No.	Index No.	
Checked By	94	2 of 2	285	

## GENERAL NOTES

- The underdrain pipe shall be either 100 mm smooth or 125 mm corrugated tubing unless otherwise shown in the plans. The size to be furnished will be based on the nominal internal diameter of a pipe with a smooth interior wall. Except when prohibited by the plans, the special provisions or this standard, pipe with a corrugated interior wall may be provided based on the following size equivalency.
  - 100 mm smooth interior equivalent to 125 mm corrugated interior
  - 125 mm smooth interior equivalent to 150 mm corrugated interior
  - 150 mm smooth interior equivalent to 200 mm corrugated interior
  - 200 mm smooth interior equivalent to 250 mm corrugated interior
- Fine aggregate shall be quartz sand meeting the requirements of Sections 902-4 of the Standard Specifications.
- Coarse aggregate shall be gravel or stone meeting the requirements of Sections 901-2 or 901-3. The gradation shall meet Section 901, Grades 4, 467, 5, 56 or 57 stone unless otherwise shown restricted in the plans.
- Underdrain Type I, II, III and V shall be in accordance with Section 440.
- Filter fabric shall be Type D-3 (See Index No. 199). The internal filter fabric of Type V underdrain shall have a permittivity of 0.7 /sec and an AOS of 0.43 mm.
- When corrugated polyethylene tubing with slots or 360° perforations is used in conjunction with fine aggregate, a filter fabric sock meeting Section 948 is required.
- See Index no. 500 for the standard location of Type I, II, and III underdrain. The location of Type V underdrain and non standard locations of Type I, II, and III underdrain will be as detailed in the plans.
- All Filter fabric joints shall overlap a minimum of 300 millimeters. The internal filter fabric of Type V underdrain shall overlap into the coarse aggregate or the fine aggregate a minimum of 300 mm.
- Underdrain outlet pipes shall be non-perforated and all bends shall be made using 1/8 (45 deg.) elbows. 90 deg. bends shall be constructed with two 1/8 elbows separated by at least 300 mm of straight pipe. Outlet pipes stubbed into inlets or other drainage structures shall be not less than 150 mm above the structure flow line. Outlet pipes discharging to grassed areas shall have concrete aprons, hardware cloth, and bordering sod as shown in Index no. 287 for Edgedrain outlets.
- Pay Item shall be based on the size of the smooth interior products. The contract unit price for Underdrain, MI, shall include the cost of Underdrain Cleanout Structures, fittings, filter fabric and the following components for each underdrain type as follows:

Type I: Pipe, sock, and aggregate.

Type II: Pipe, aggregate, and filter fabric envelope.

Type III: Pipe, aggregates, and internal filter fabric envelope.

Type V: Pipe, aggregates, external filter fabric envelope, and internal filter fabric.

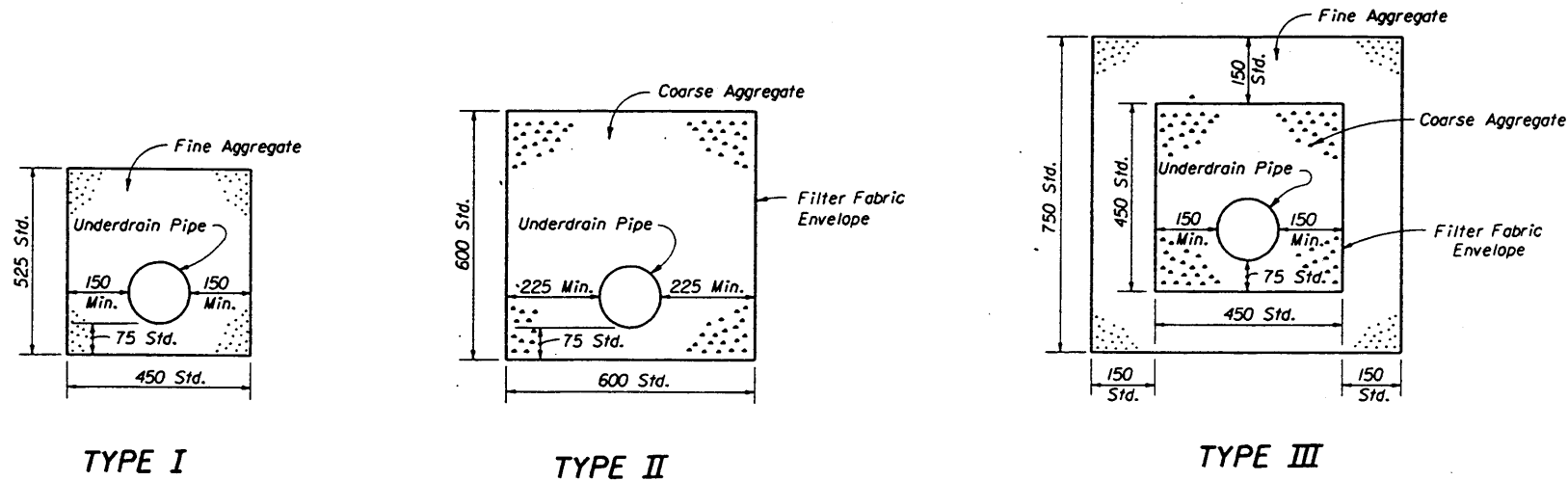
The contract unit price for Underdrain Outlet Pipe, MI, shall be full compensation for trench excavation, pipe and fittings, hardware cloth for concrete aprons, stubbing into drainage structures, backfill in place and disposal of excess materials.

The contract unit price for Underdrain Inspection Box, EA, shall be for the number completed and accepted.

External filter fabric envelopes, when specified for Underdrain Types I and III shall be paid for separately under the contract unit price for Plastic Filter Fabric (M2).

Concrete apron shall be paid for under the contract unit price for conc. Class I (Miscellaneous), M3.

Sodding shall be paid for under the the contract unit price for Sodding, M2.



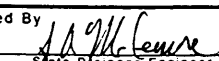
TYPE I

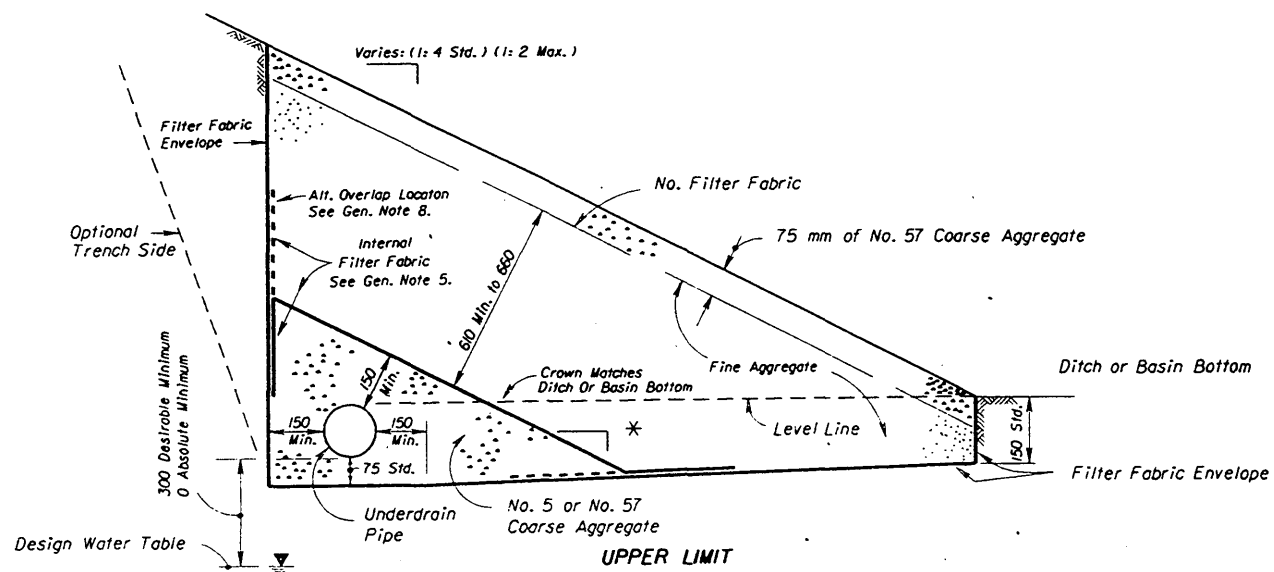
TYPE II

TYPE III

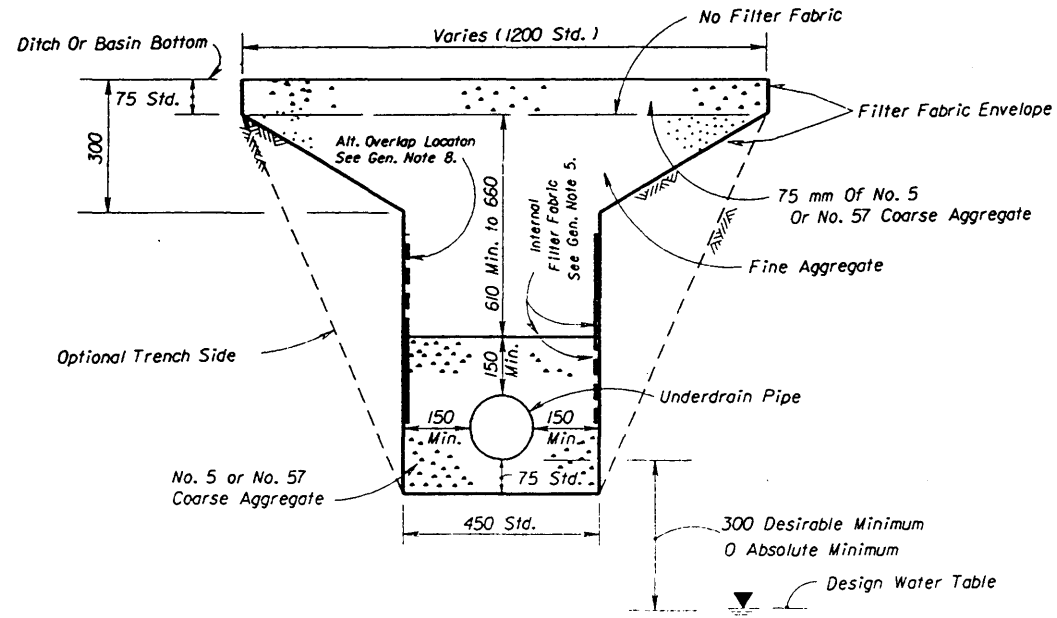
## DESIGN NOTES

- The type of underdrain should be selected to meet design water removal rate and soil conditions. Caution is prescribed in the use of these typical sections since special designs may be required to satisfy project conditions.
- Type I underdrain is intended for minimum water removal conditions.
- Type II underdrain is intended for moderate water removal conditions. Where reactive conditions may create chemical clogging, the use of an inert material and/or elimination of the filter fabric may be necessary.
- Type III underdrain is intended for maximum water removal conditions. Filter fabric is required between the coarse aggregate or fine aggregate including those described in general notes 2 and 3. Design note 3 applies for reactive conditions.
- Type V underdrain is intended for use in detention basins and other locations which require a filtration system. The standard fine aggregate specified for Type V underdrain conforms to filtration gradation requirements of Chapter 62-25 F.A.C..
- The designer should detail in the plans, the location of Type V underdrain and non-standard locations of Type I, II, and III underdrain.
- The designer should evaluate whether an external filter fabric envelope is required around underdrain Types I and III. When required, fabric shall be specified in the plans. Fabric to be paid for separately.

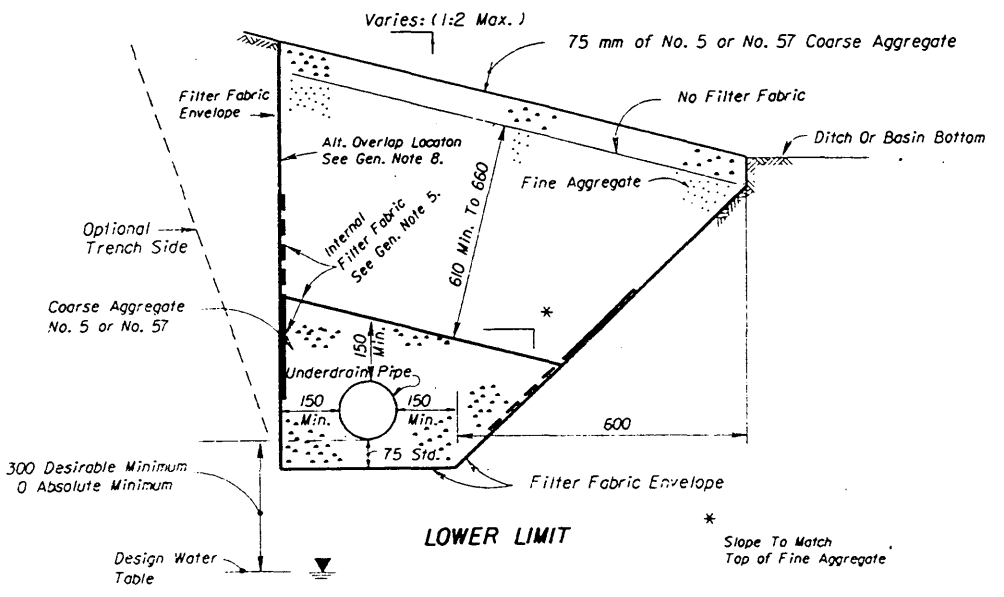
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN						
UNDERDRAIN						
		Names	Dates	Approved By		
Designed By	EGR		10/85	 State Drainage Engineer		
Drawn By	HSD		10/85			
Checked By	EGR		10/85	Revision	Sheet No.	Index No.
				00	1 of 2	286



\* Slope To Match Top of Fine Aggregate

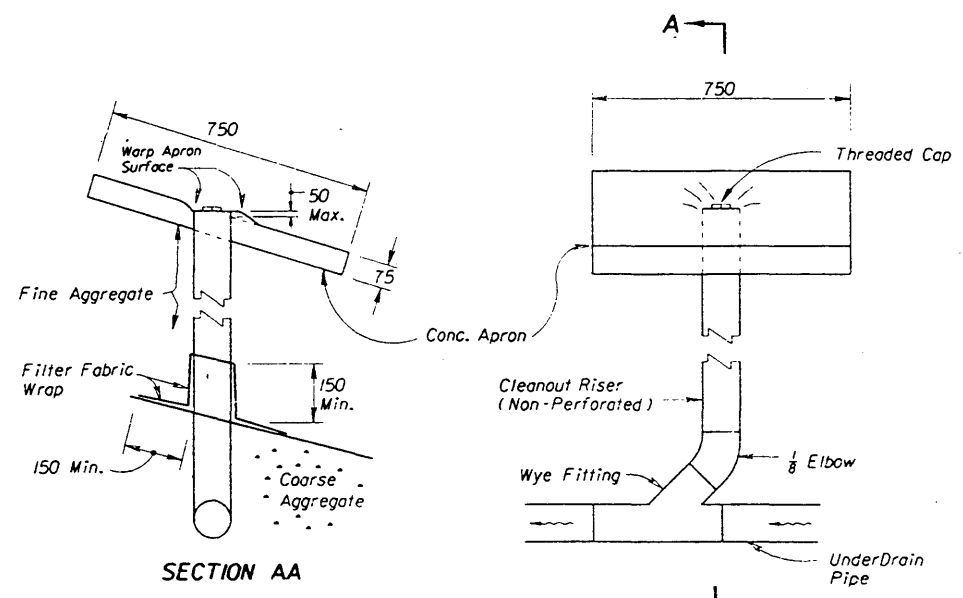


TYPE V b



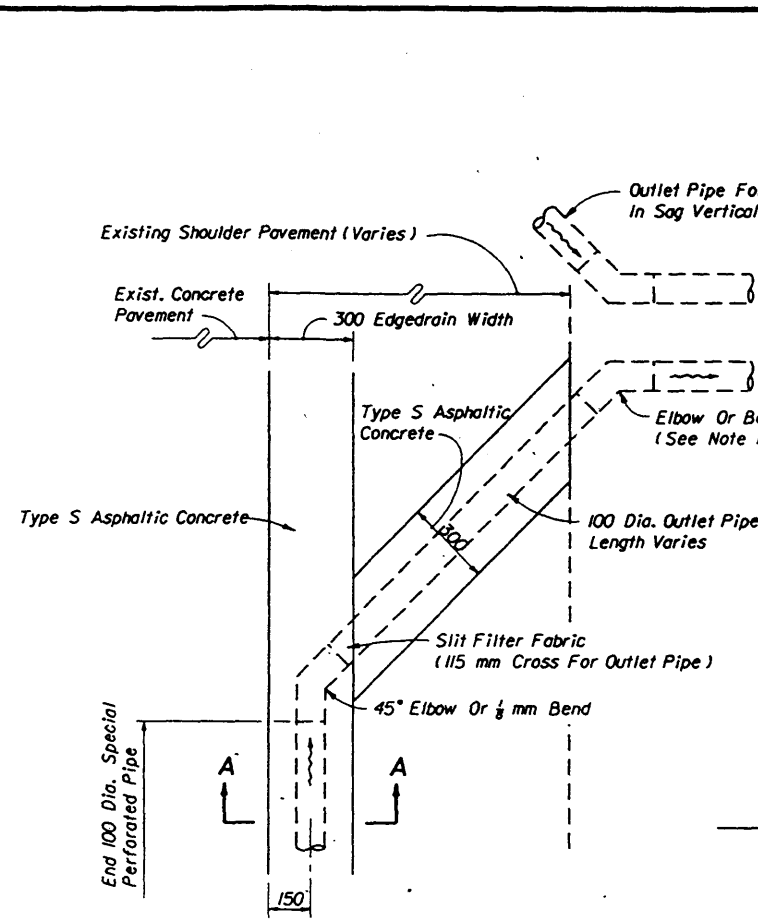
\* Slope To Match Top of Fine Aggregate

TYPE V a

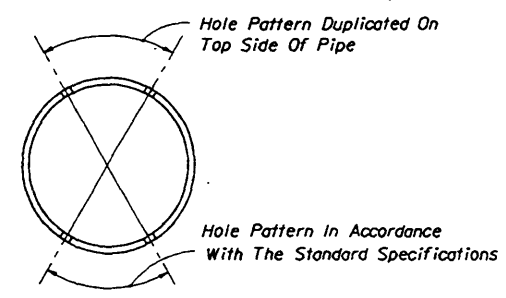


SECTION AA  
CLEANOUT FOR TYPE V UNDERDRAIN

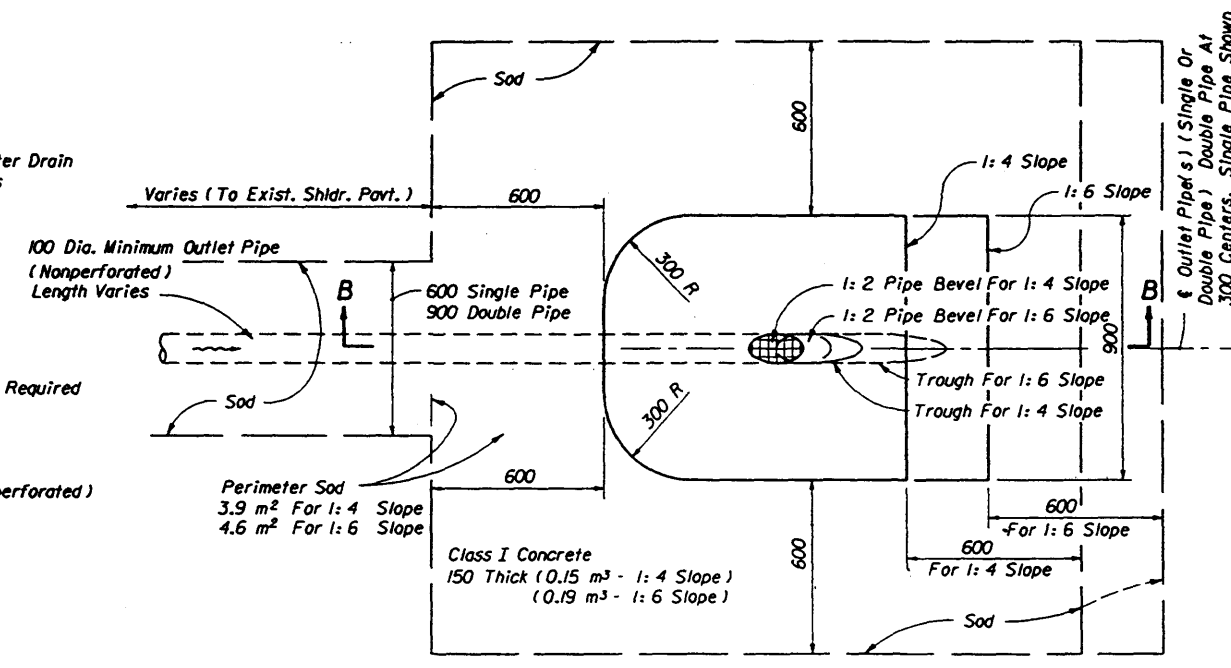
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>UNDERDRAIN</b>				
Designed By	Names	Dates	Approved By <i>J. A. McLenore</i> State Drainage Engineer	
Drawn By	JD?	Revision	Sheet No.	Index No.
Checked By		00	2 of 2	286



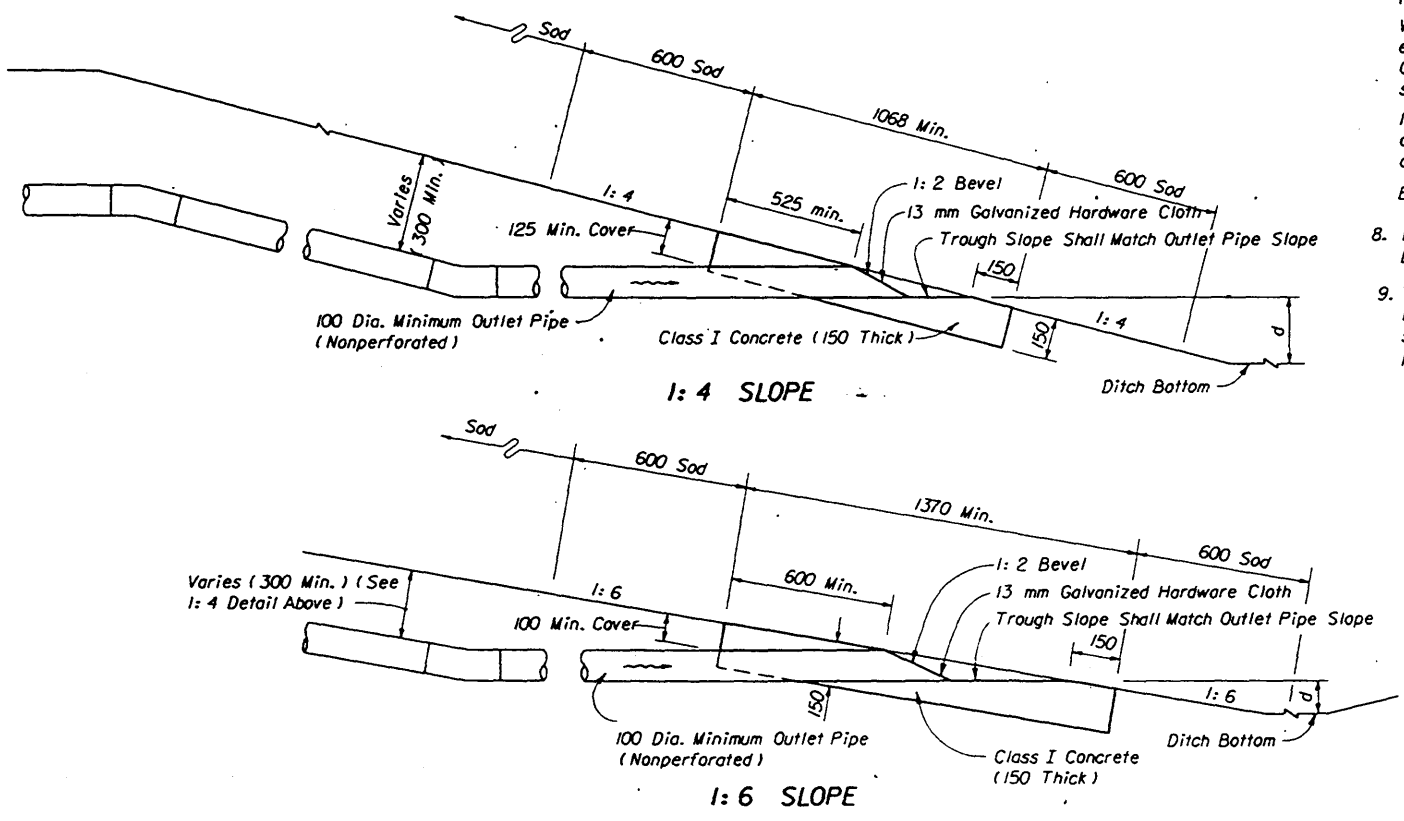
ALIGNMENT OF OUTLET PIPE



HOLE PATTERN SUBDRAINAGE PIPE



PLAN - OUTLET PIPE APRON



SECTIONS BB

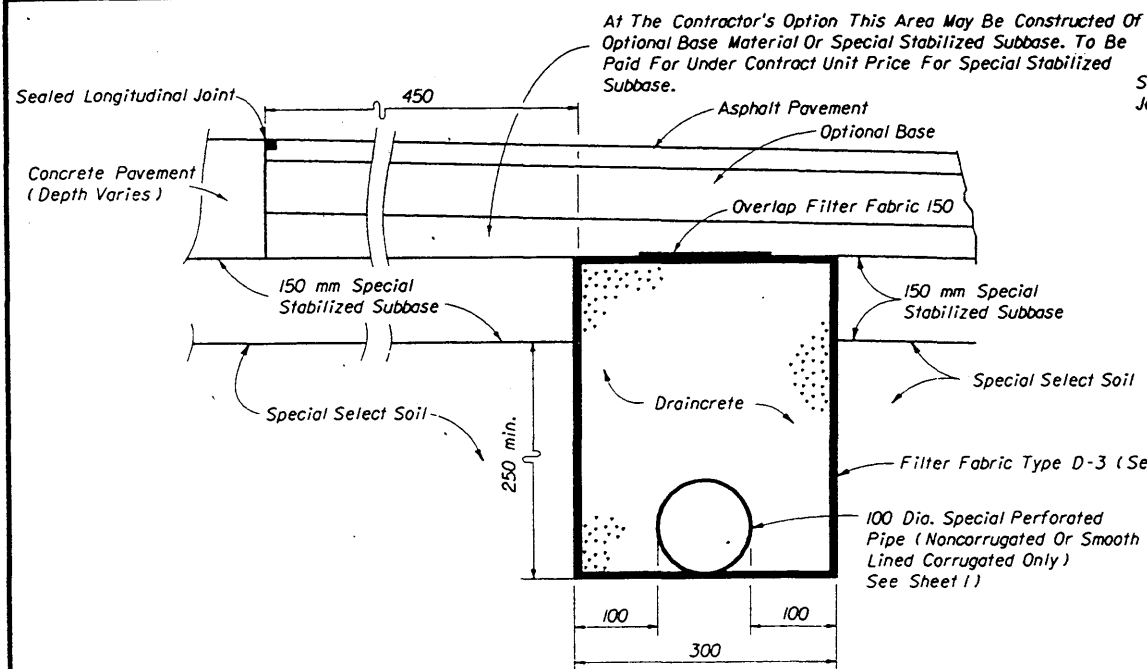
100mm EDGEDRAIN EDGEDRAIN OUTLET

d : 535 mm std. for grassed ditches [less is acceptable to provide minimum 0.1% outlet pipe slope]  
 150 mm std. for paved ditches

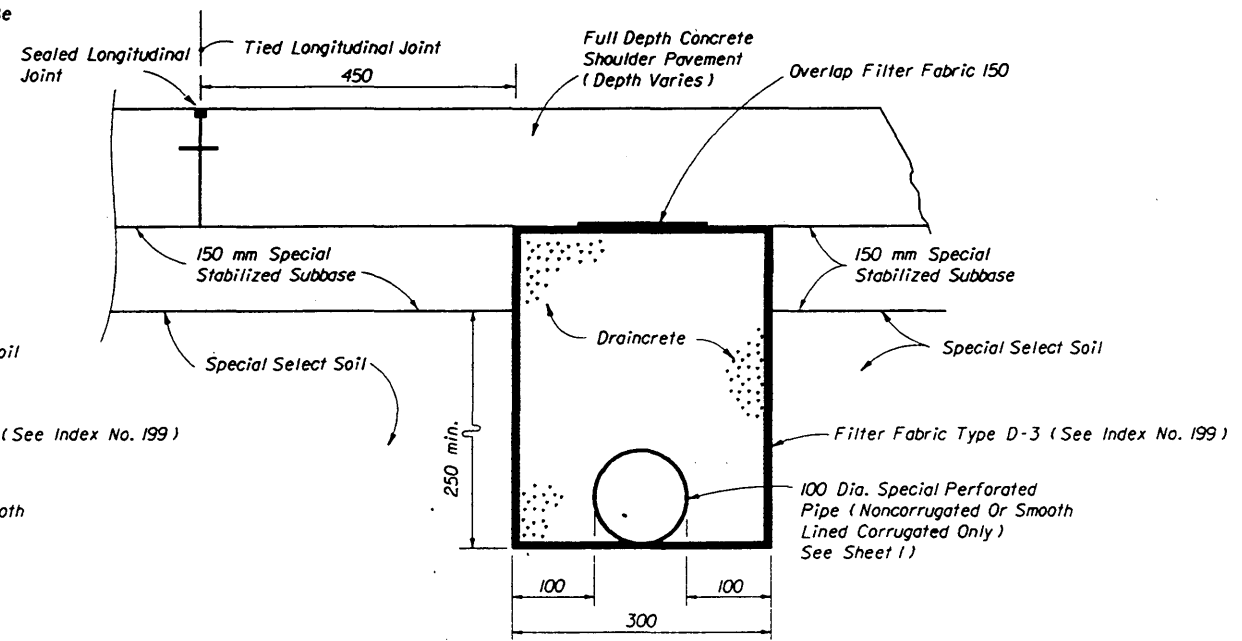
GENERAL NOTES FOR CONCRETE PAVEMENT SUBDRAINAGE

- No trench greater than 610 mm in depth will be allowed overnight. Trenches shall be barricaded at all times.
- Concrete pavement subdrainage shall be constructed adjacent to the low edge of the roadway pavement and under travel lanes, auxiliary pavement and shoulders, as called for in the plans. When the low edge shifts between outside and inside edges of pavement the concrete pavement subdrainage shall extend 15.0 m beyond and begin 15.0 m before the flat point (30.0 m overlap). Concrete pavement subdrainage shall be placed on the low side of ramps of crossroad terminals.
- Concrete pavement subdrainage shall be constructed on a grade parallel with the edge of pavement profile, except on profiles flatter than one-tenth percent (0.10%) the concrete pavement subdrainage shall be constructed on a grade of one-tenth percent (0.10%).
- Immediately prior to placing the filter fabric the entire vertical face of the concrete pavement shall be cleaned to remove adhering base material and soil.
- The Contractor shall devise a procedure for holding the filter fabric in position on the vertical face of the trench. The procedure must be approved by the Engineer prior to placement of the draincrete.
- The upper end of each separate run of the concrete pavement subdrainage pipe shall be capped.
- Outlet pipes shall be constructed at a maximum of 150.0 m intervals. Elbows or 1/4 bends shall be used to connect the outlet pipe to the concrete pavement subdrain pipe. The elbows or bends shall be of the same material as the outlet pipe but compatible with the pipe. When directed by the Engineer, outlet pipes shall be stubbed into existing inlets or into existing ditch pavements at an elevation 150 mm above the inlet flowline or ditch bottom. Concrete apron and bordering sod are not required for stubbed outlets, but replacement sodding will be required at trenches for pipes stubbed into paved ditches. In sag vertical curves separate outlet pipes for concrete pavement subdrains from opposite directions shall use a single apron unless otherwise shown in the plans or otherwise directed by the Engineer. Backfill around outlet pipes shall be of cohesive soils, draincrete will not be permitted.
- Existing paved shoulder that is removed for the construction of outlet pipes shall be replaced with Type S asphaltic concrete at the rate of 271 kg per square meter.
- The contract unit price for Edgedrain Outlet Pipe (100 mm) MI, shall be full compensation for removal of existing shoulder pavement, trench excavation, pipe and fittings, hardware cloth, stubbing into existing inlets and paved ditches, restoration of ditch pavement, backfill in place and disposal of excess materials.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CONCRETE PAVEMENT SUBDRAINAGE</b>				
Names	Dates	Approved By		
Designed By	HMD	10/94	 State Drainage Engineer	
Drawn By	DLG	10/94		
Checked By	HMD/WPH	10/94		
Revision		98	Sheet No.	Index No.
			1 of 3	287



ASPHALT SHOULDERS



CONCRETE TRAVEL LANES, SHOULDERS, AND AUXILIARY PAVEMENT

NEW CONSTRUCTION

NOTES FOR DRAINCRETE PAVEMENT SUBDRAINAGE

1. The edgdrain sections for DRAINCRETE SUBDRAINAGE are applicable to pavement construction identified as RIGID PAVEMENT Alteration #1 on Index No. 505 (sheet 2 of 3)
2. The contractor shall confine the construction of draincrete edgdrain to an area in which the entire operation can be carried out in five (5) work days, unless another construction period is called for in the plans, with sufficient time allowed for the draincrete to set before placement of pavement.

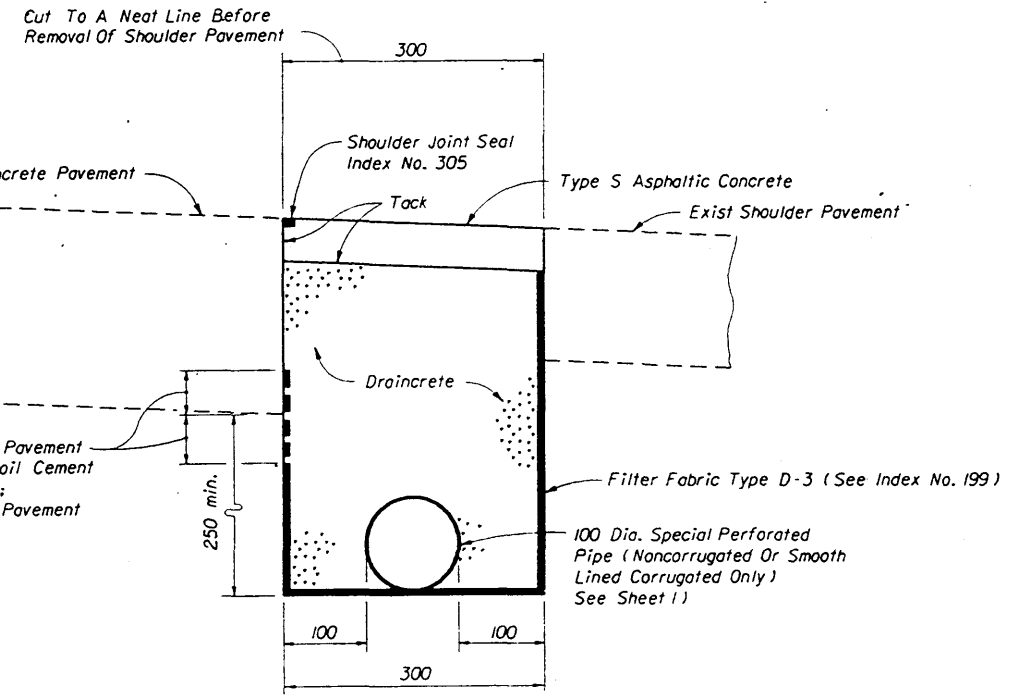
METHOD OF PAYMENT

NEW CONSTRUCTION:

1. The contract unit price for Edgdrain (Draincrete) MI shall be full compensation for trench excavation disposal of excess material, filter fabric, draincrete edgdrain pipe and fittings and draincrete.
- Payment for outlet pipe shall be, in accordance with General Note 9, Sheet 1 of 3.

FOR REHABILITATION:

1. The contract unit price for Edgdrain (Draincrete) MI, shall be full compensation for removal of existing shoulder pavement, trench excavation, disposal of excess materials, filter fabric, draincrete edgdrain pipe and fittings, draincrete, and barricades necessary for edgdrain construction.
- Payment for outlet pipe shall be in accordance with General Note 9, Sheet 1 of 3.
- Concrete apron shall be paid for under the contract unit price for Class I Concrete (Miscellaneous), M3.
- Sodding shall be paid for under the contract unit price for Sodding, M2.
- Shoulder pavement shall be paid for under the contract unit price for Type S, Asphaltic concrete Type S, KG.
- Tack coat shall be paid for under the contract unit price for Bit Matl (Tack Coat), LI.
- Shoulder joint seal shall be paid for under the contract unit price for Pavement joint or, MI.

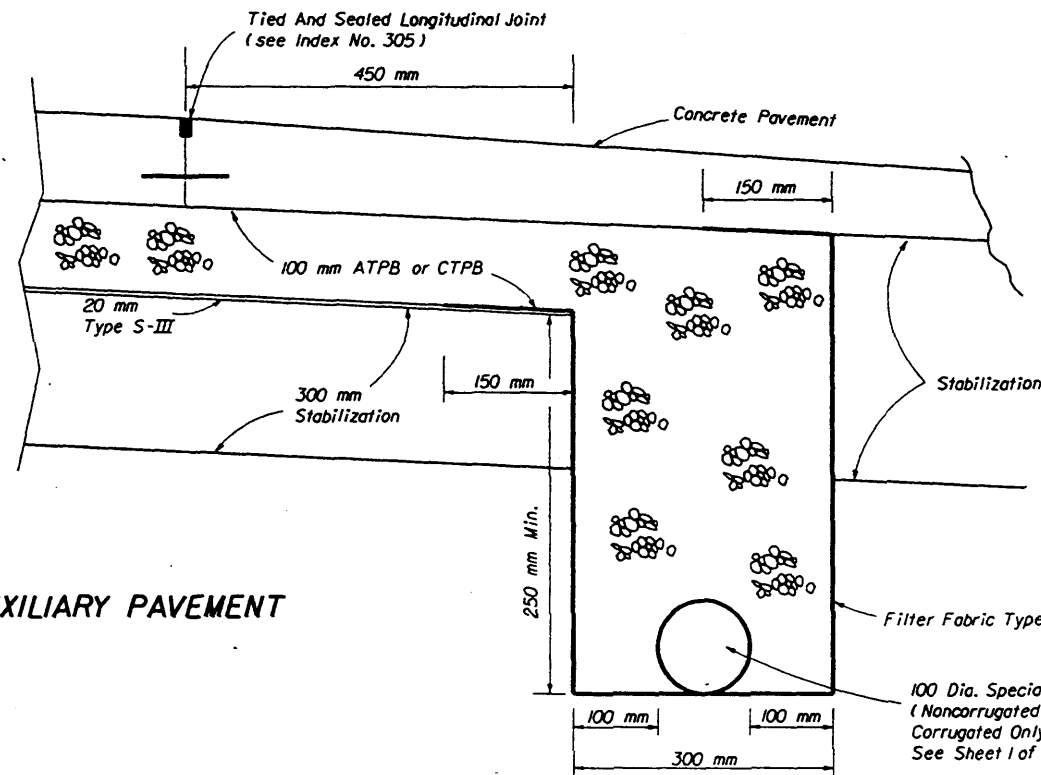
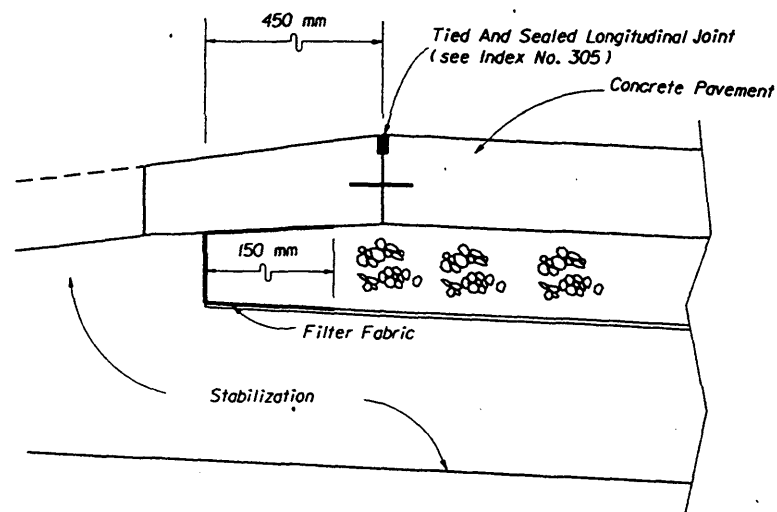


REHABILITATION

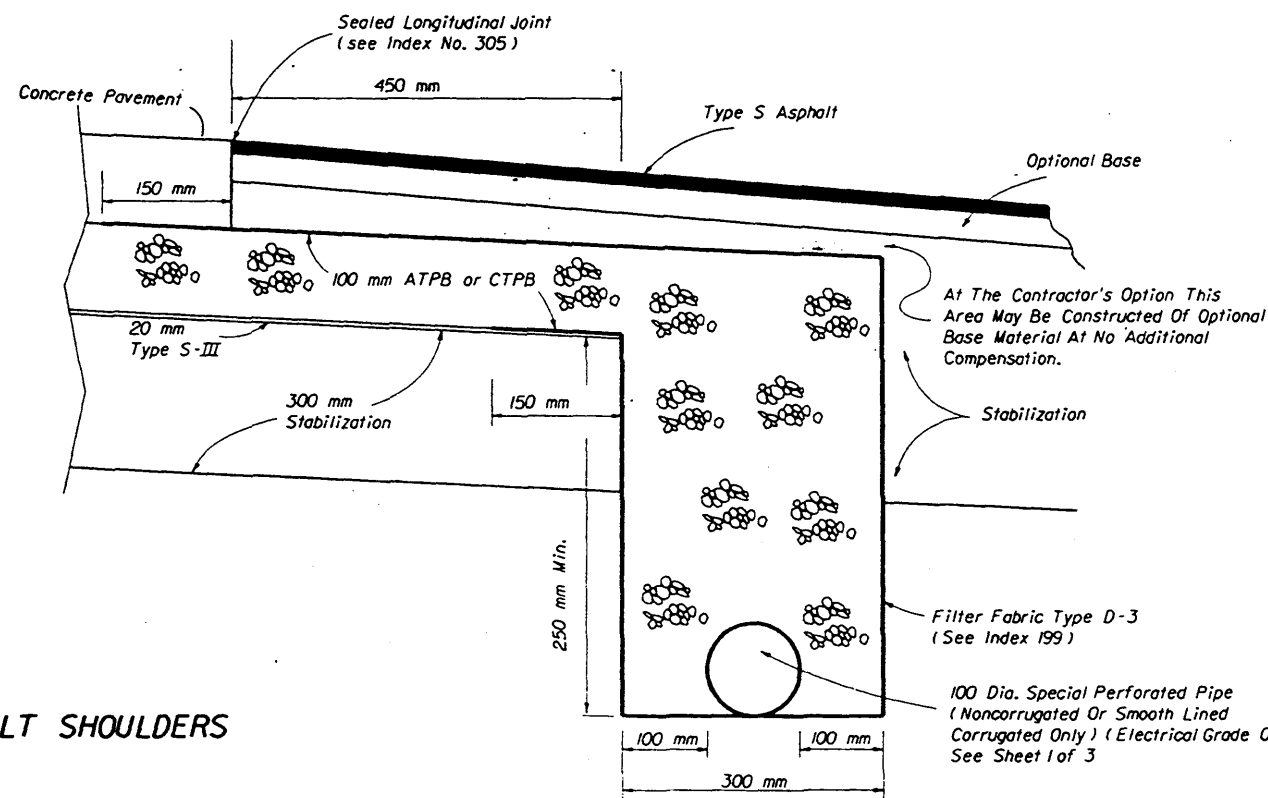
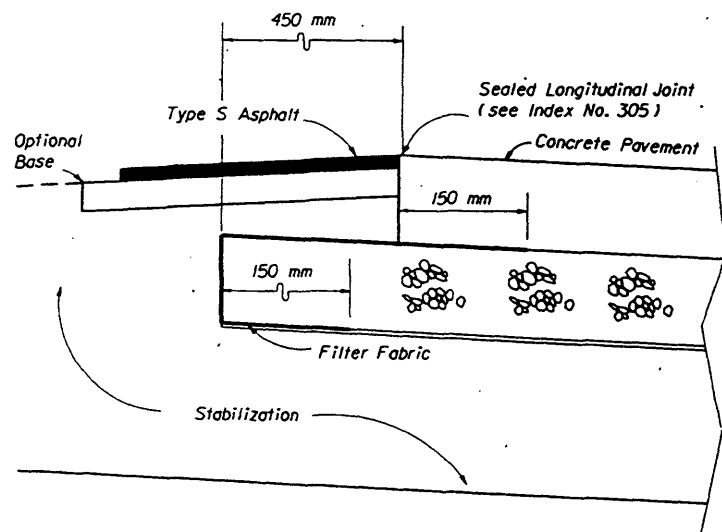
DRAINCRETE SUBDRAINAGE

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CONCRETE PAVEMENT SUBDRAINAGE</b>				
Names	Dates	Approved By		
Designed By HMD	10/94	A. D. McLenore State Drainage Engineer		
Drawn By DLD	10/94	Revision	Sheet No.	Index No.
Checked By HMD/WPH	10/94	00	2 of 3	287

Not to scale



**CONCRETE TRAVEL LANE, SHOULDERS, AND AUXILIARY PAVEMENT**



**ASPHALT SHOULDERS**

**TREATED PERMEABLE BASE SUBDRAINAGE**

**GENERAL NOTES FOR TREATED PERMEABLE BASE EDGEDRAIN (NEW CONSTRUCTION)**

- The contractor shall confine the construction of monolithic edgedrain to an area in which the entire operation can be carried out in (5) work days, unless another construction period is called for the plans.

**METHOD OF PAYMENT**

**NEW CONSTRUCTION**

- Payment shall be full compensation for trench excavation, disposal of excess materials, filter fabric, pipe and fittings, and barricades necessary for concrete pavement subdrainage construction. Payment shall be included in the cost for Asphalt Treated Permeable base, M3 or Cement Treated Permeable Base M3.

Payment for outlet pipe shall be in accordance with General Note 9, Sheet 1 of 3.

Not To Scale

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CONCRETE PAVEMENT SUBDRAINAGE</b>				
Names	Dates	Approved By <i>S. A. McLenore</i> State Drainage Engineer		
Designed By	HWD	10/94	Revision	Sheet No.
Drawn By	DLD	10/94	3 of 3	Index No.
Checked By	HWD/WPH	10/94	98	287

**GENERAL NOTES**

DESIGN SPECIFICATIONS: A.A.S.H.T.O. 1983.

LOADING: HS20-44, Modified for Military Loading as Required

SURFACE FINISH: The Class Surface Finish for all concrete surfaces shall be a general surface finish.

SKewed CONSTRUCTION JOINTS: Construction joints in barrels of culverts with skewed wingwalls may be placed parallel to the headwalls and the reinforcing steel. In the slabs may be cut provided that the cut reinforcing steel extends beyond the construction joint enough for splices to be made in accordance with the table (lower right) this sheet. The cost of construction joints shall be at the expense of the contractor.

CULVERT EXTENTIONS: For cut backs and ties into existing concrete box culverts see Index No. 280

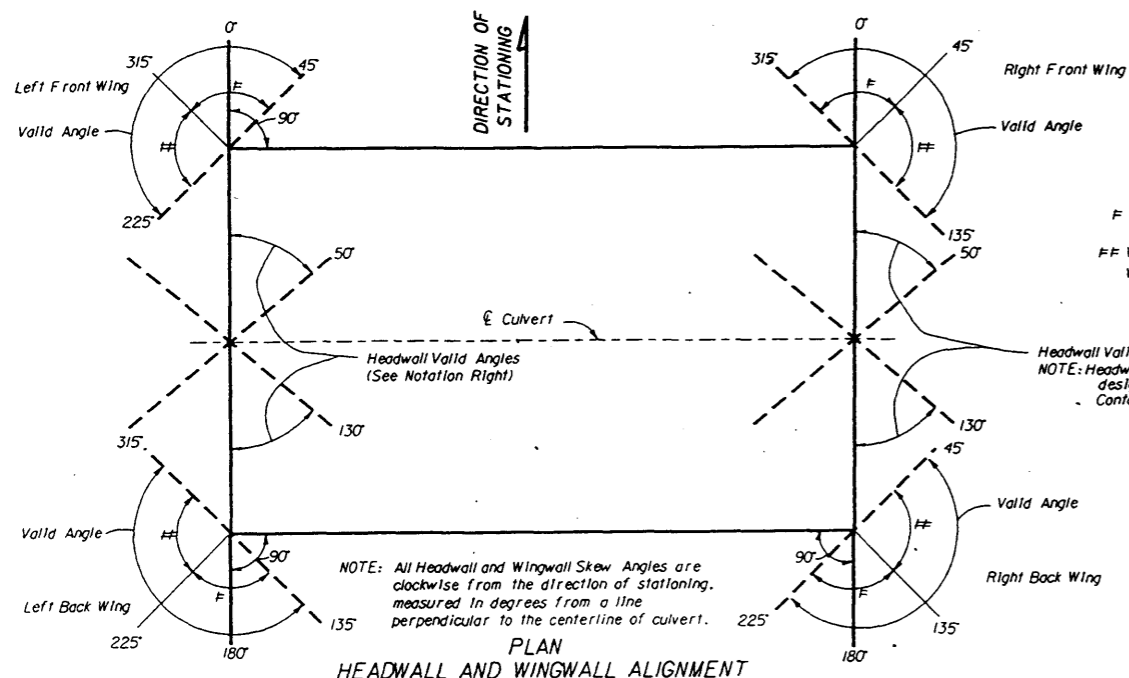
**\* REINFORCING BAR SCHEDULE:**

- A. When the depth is less than or equal to 600 mm, Bars C2 are utilized in the bottom of the top slab. In all other cases, Bars C2 are replaced with Bars C1 spaced at 450 mm on centers.
- B. When the skew angle for a headwall equals 0 degrees plus or minus 11 degrees the respective S Bars (S2 or S3) will not be utilized.
- C. When the barrel height is less than 1.8 m, Bars B2 will be eliminated as shown in Detail J.
- D. If the span is less than 1.5 m, Bars A1 and A2 will be Type II Bars.
- E. The portions of Bars "N" that extend thru construction joints into wingwalls above footings shall be given one coat of approved zinc rich paint and shall be encased in approved capped plastic (PVC) pipes filled with approved durable lubricant or cut back asphalt. The length and inside diameter of the plastic pipe shall be approximately 5mm larger than those of the bar.
- F. For culvert extensions Bar C1 is redesignated Bar C3 in the bottom slab.

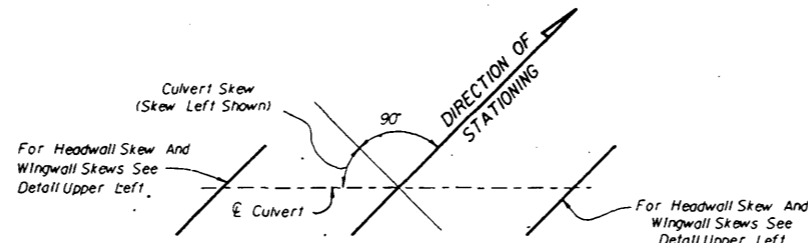
NOTE: Designs for box culverts under this Index are to be produced only by computer analysis, utilizing the program named PSTDN55. Designs under this Index are to be limited to the live loads and dimensional restraints shown in the General Notes of this Index and to the fill on the barrels as shown in the roadway plans. It is the construction Contractors responsibility to provide for supporting construction loads that exceed the above loadings.

F Within these limits the top surface of the Wingwalls shall be level.  
 FF Within these limits the top surface of the Wingwalls shall be sloped.

Headwall Valid Angles  
 NOTE: Headwalls with skew angles between 5° and 129° require special design authorization. Other design options should be considered. Contact the District Drainage Engineer to obtain authorization.



NOTE: All Headwall and Wingwall Skew Angles are clockwise from the direction of stationing, measured in degrees from a line perpendicular to the centerline of culvert.



NOTE: For Culvert Skew see Roadway Plans.  
 SKETCH "A"  
 CULVERT ALIGNMENT

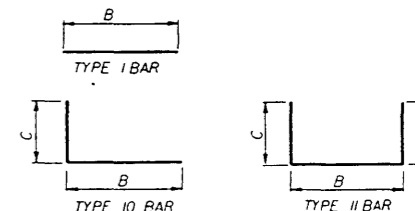
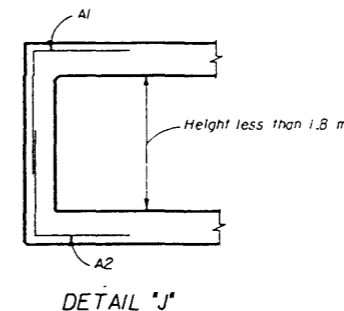
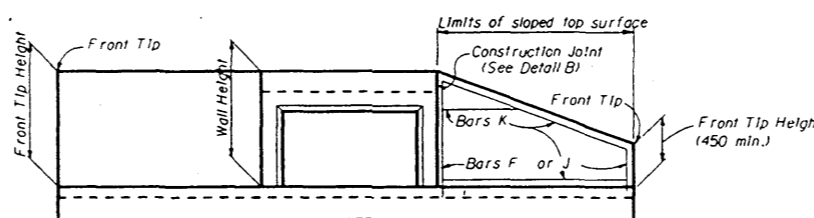
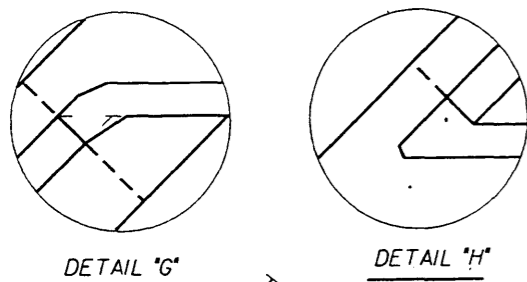


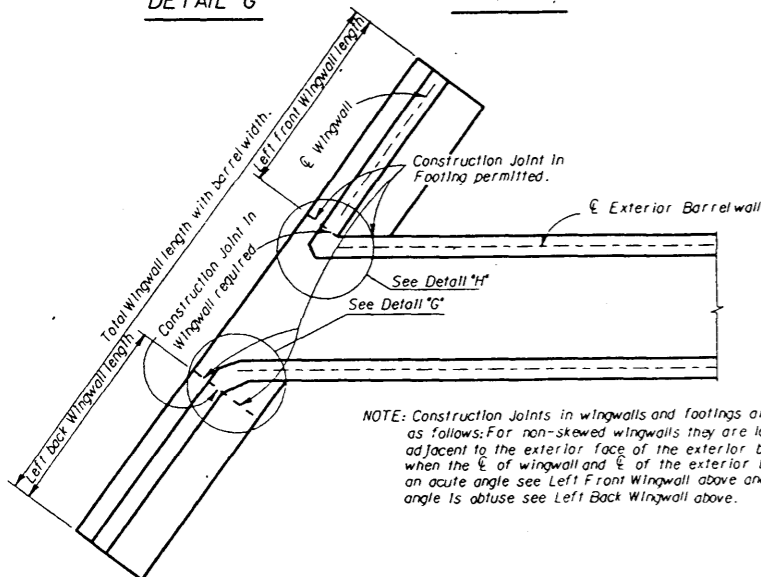
TABLE OF MINIMUM BAR SPLICE LENGTHS

BAR SIZE	SPLICE	BAR SIZE	SPLICE
15M	650	30M	1.55
20M	830	35M	2.23
25M	1.17	45M	3.35



END ELEVATION OF CULVERT

NOTE: Cut the vertical bars F as required for the longest bar and use the remainder for the shortest bar in the wingwall. The vertical bars J and the horizontal bars K shall be constructed likewise. The lengths shown in the reinforcing steel bar schedule for bars F, J and K require cutting for sloped top wingwalls only.

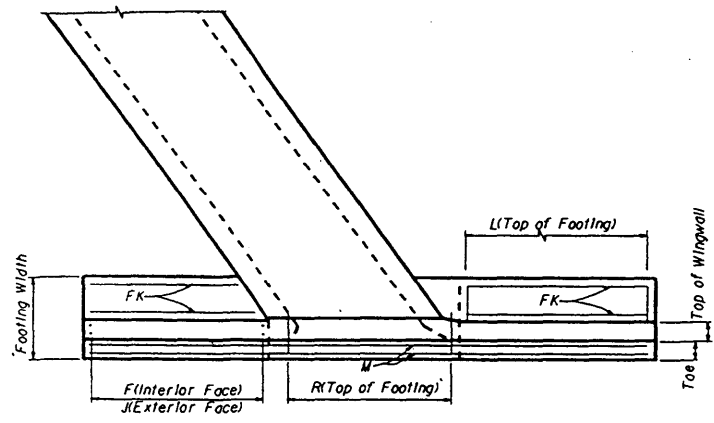


PART PLAN SHOWING WINGWALLS AND THE LOCATION OF CONSTRUCTION JOINTS

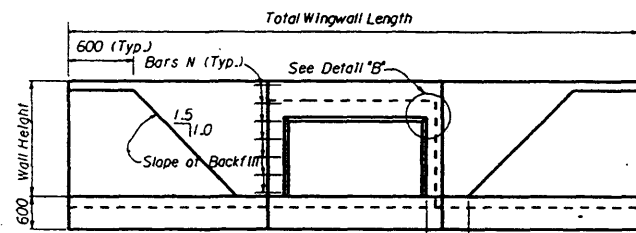
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
 ROAD DESIGN

**CONCRETE BOX CULVERT  
 CULVERT DETAILS**

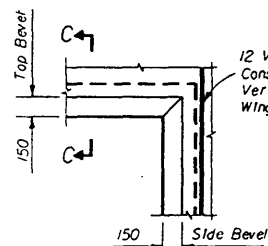
Designed By	Names	Dates	Approved By		
Drawn By	GFG	1-86	 State Drainage Engineer	Revision	Sheet No.
Checked By	RCB	1-86		98	1 of 5



PART PLAN AT END OF CULVERT



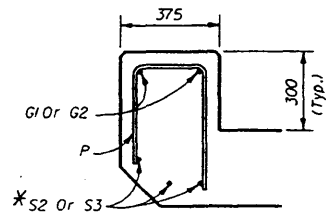
END ELEVATION



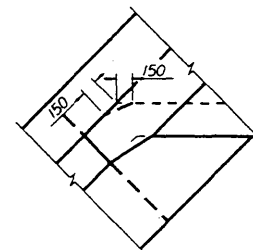
DETAIL 'B'



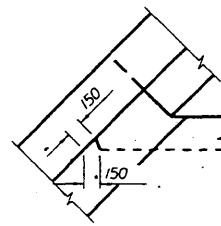
SECTION C-C



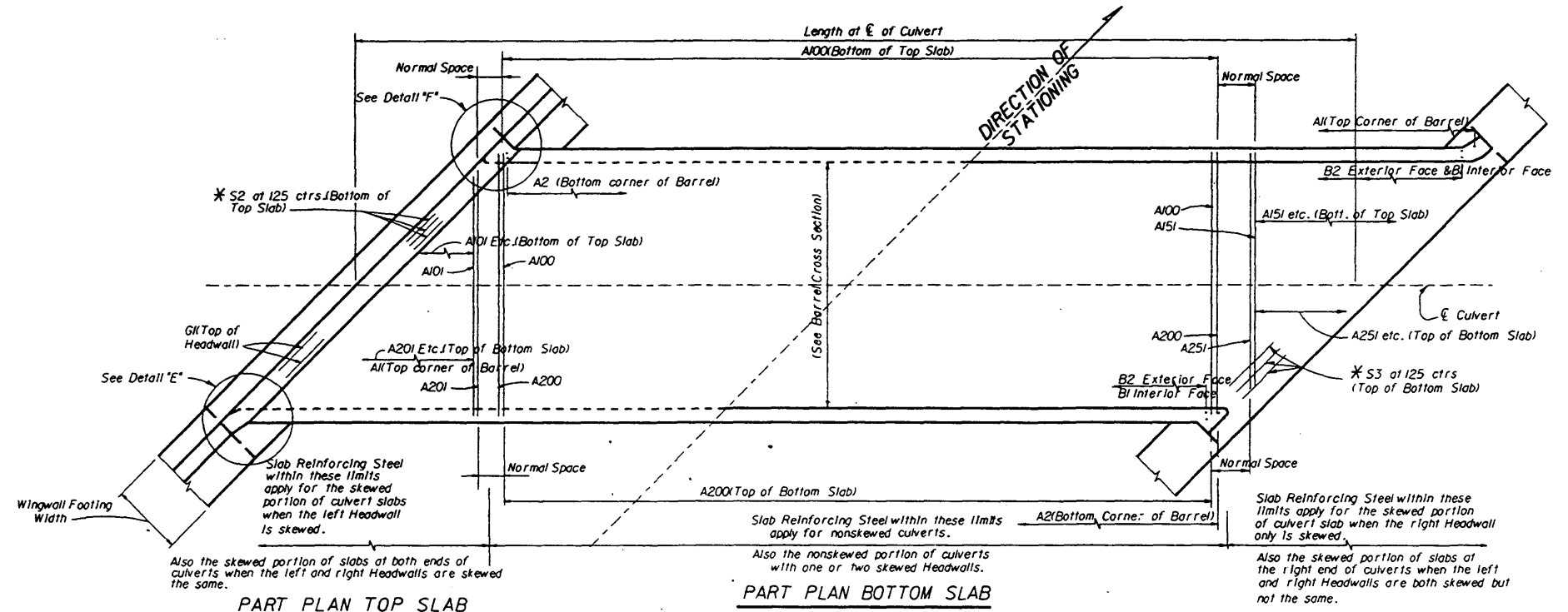
DETAIL 'D'



DETAIL 'E'

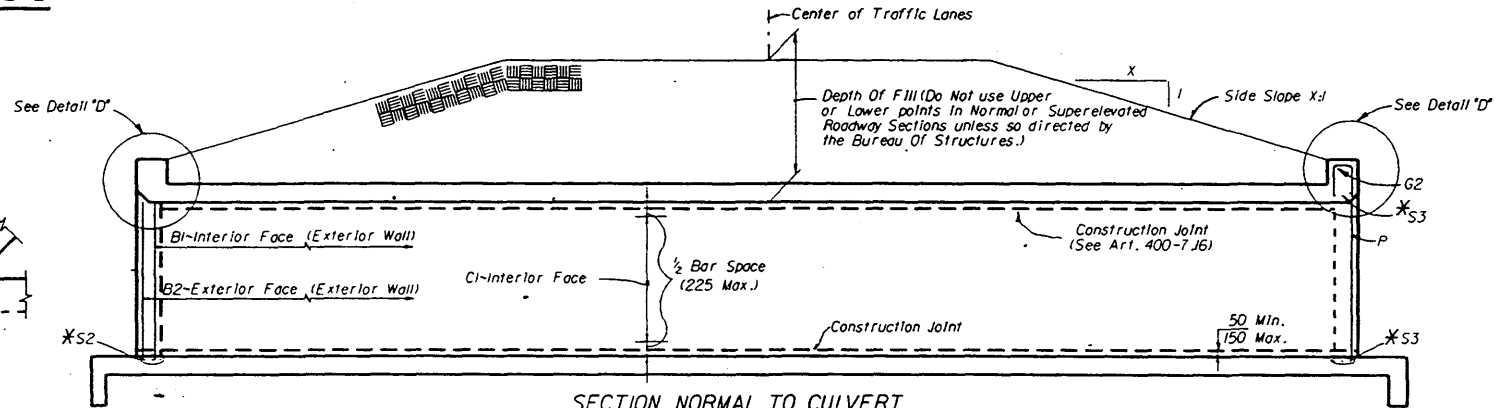


DETAIL 'F'

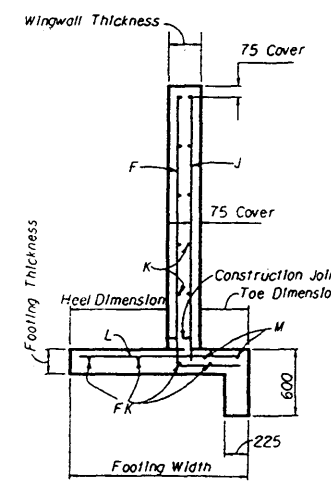


PART PLAN TOP SLAB

PART PLAN BOTTOM SLAB

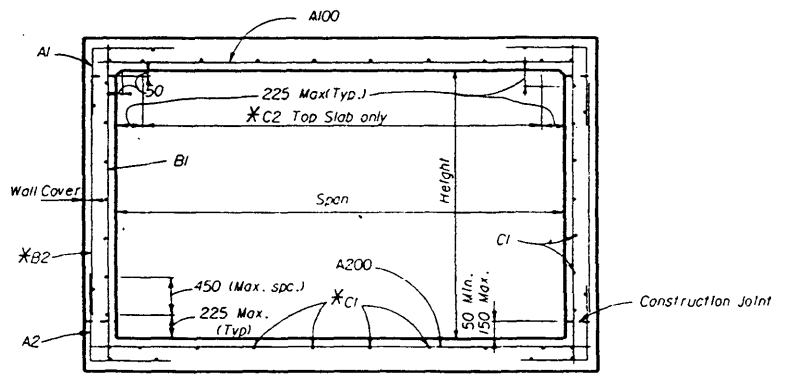


SECTION NORMAL TO CULVERT



SECTION THRU WINGWALL

NOTE: For Bars F, J, K, L and or FK in the Wingwalls, the subscripts 1 thru 4 apply as follows:  
 1-Left Front  
 2-Left Back  
 3-Right Front  
 4-Right Back



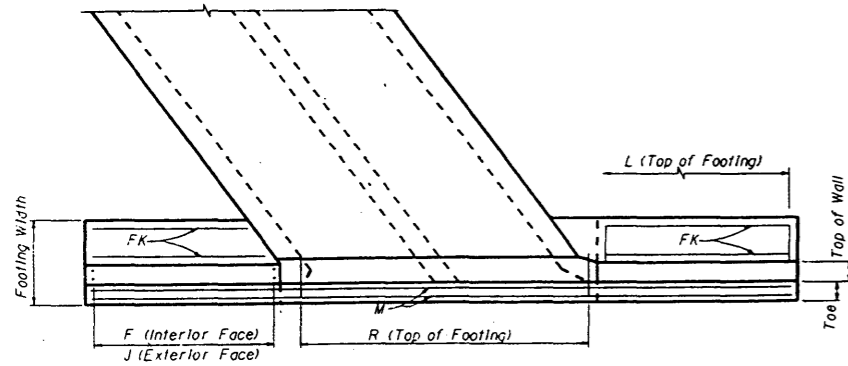
SECTION THRU BARREL

NOTE: The location of the first bar from the ends of the culvert shall not be less than 75, but not greater than one half the bar spacing.

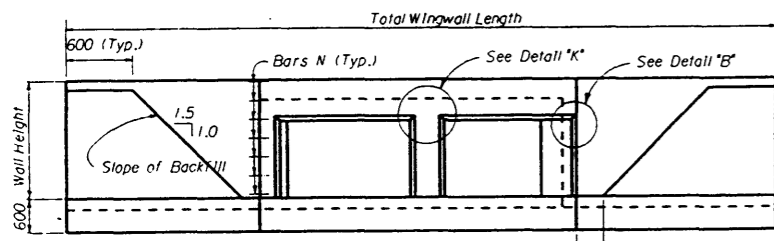
\* See Culvert Details and Reinforcing Bar Schedule, Sheet 1 of 5

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CONCRETE BOX CULVERT SINGLE BARREL</b>				
Designed By	Names	Dates	Approved By	
Drawn By	GFC	1-86	S. D. McEnroe State Drainage Engineer	
Checked By	RCB	1-86	Revision	Sheet No.
			94	2 of 5
				Index No. 290

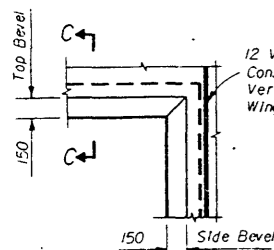




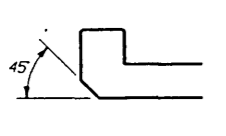
PART PLAN AT END OF CULVERT



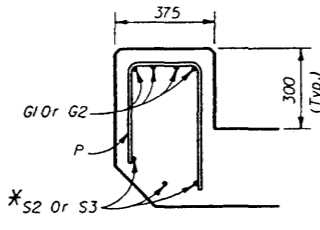
END ELEVATION



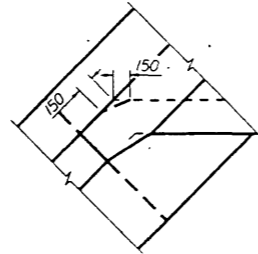
DETAIL "B"



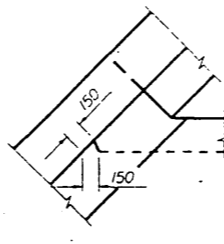
SECTION C-C



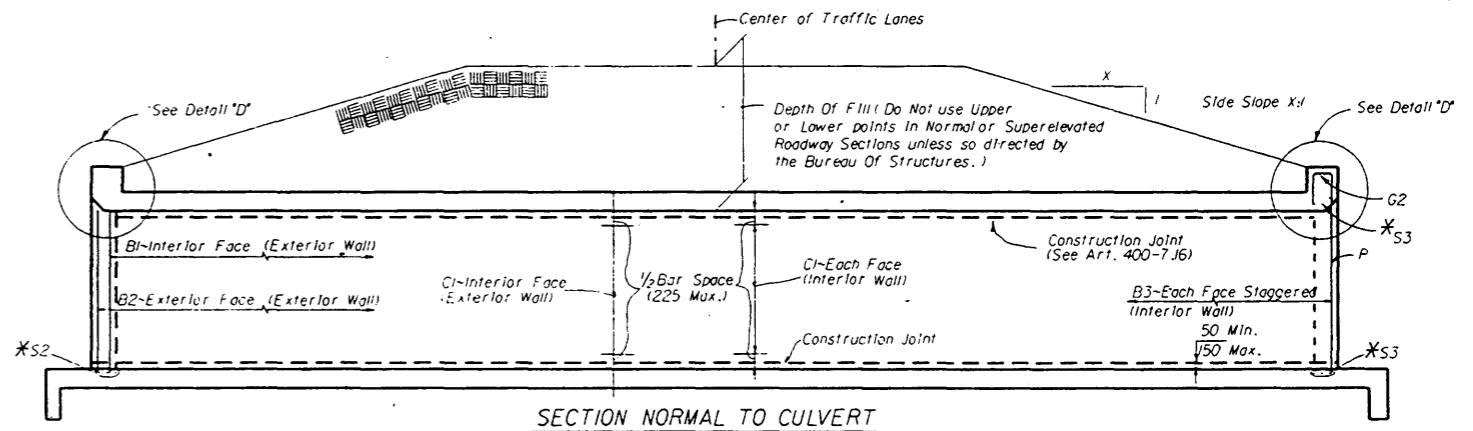
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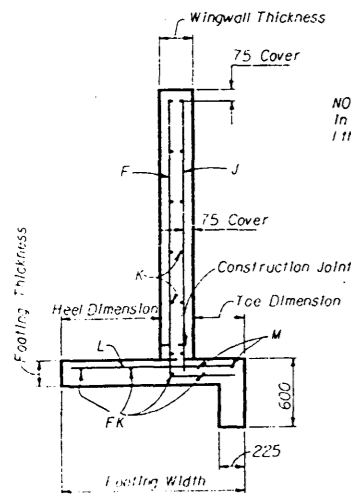
DETAIL "E"



DETAIL "F"

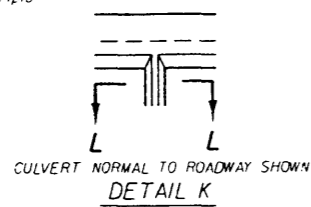


SECTION NORMAL TO CULVERT

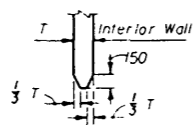


SECTION THRU WINGWALL

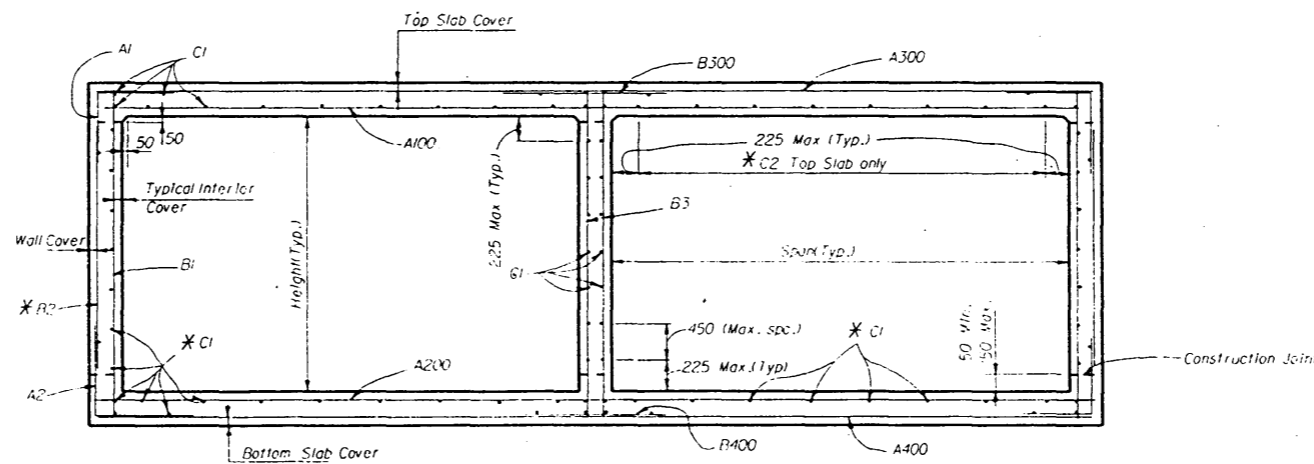
NOTE: For Bars F, J, K, L and/or FK in the Wingwalls, the subscripts 1 thru 4 apply as follows:  
 1-Left Front  
 2-Left Back  
 3-Right Front  
 4-Right Back



CULVERT NORMAL TO ROADWAY SHOWN  
DETAIL K

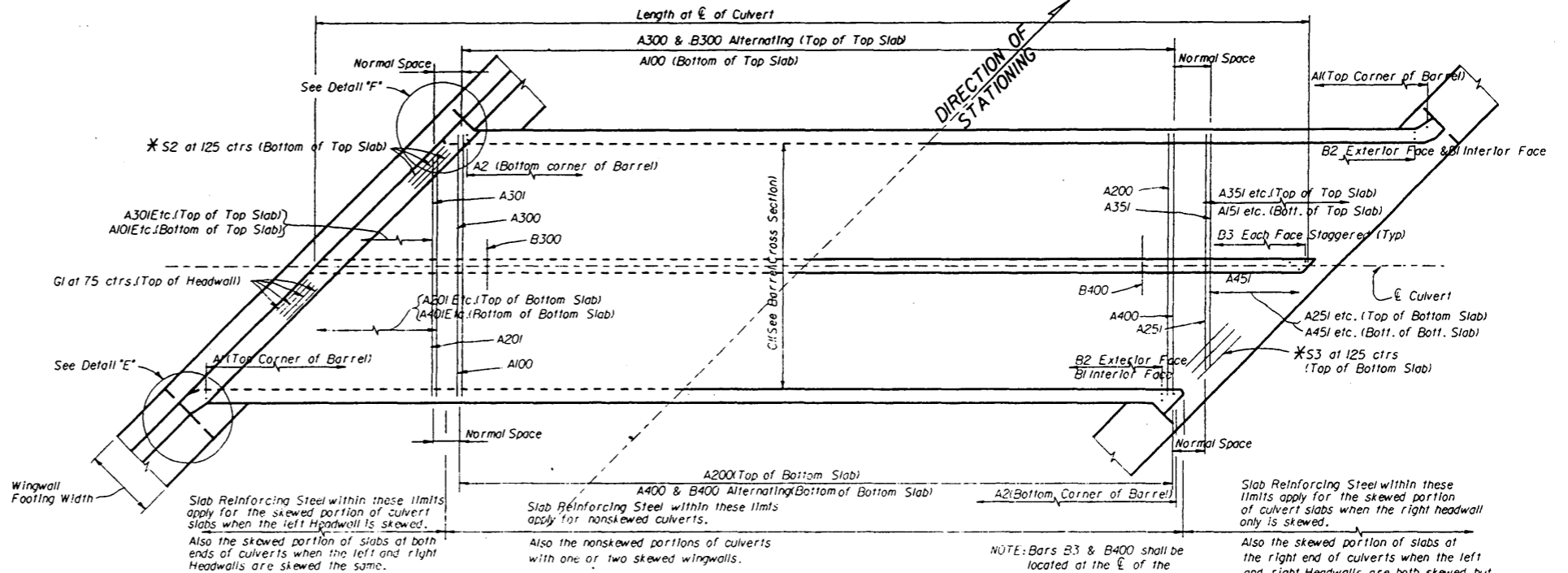


SECTION LL



SECTION THRU BARREL

NOTE: The location of the first bar from the ends of the culvert shall not be less than 75, but not greater than one half the bar spacing.



PART PLAN TOP SLAB

PART PLAN BOTTOM SLAB

Slab Reinforcing Steel within these limits apply for the skewed portion of culvert slabs when the right headwall only is skewed.  
 Also the skewed portion of slabs at the right end of culverts when the left and right headwalls are both skewed but not the same.

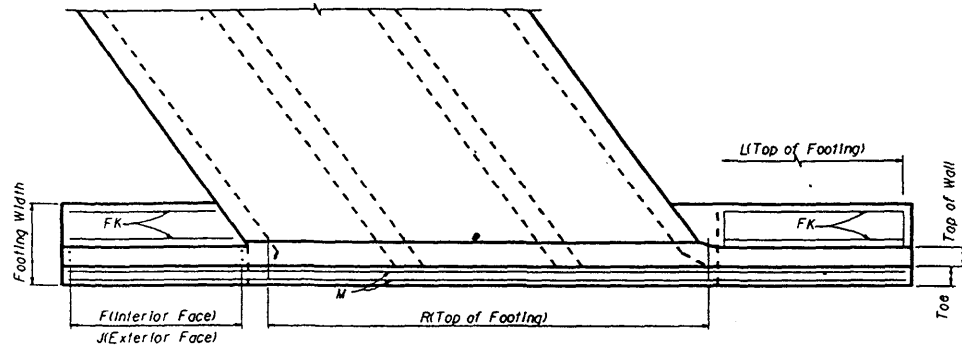
Slab Reinforcing Steel within these limits apply for the skewed portion of culvert slabs when the left headwall is skewed.  
 Also the skewed portion of slabs at both ends of culverts when the left and right headwalls are skewed the same.

Slab Reinforcing Steel within these limits apply for non-skewed culverts.  
 Also the non-skewed portions of culverts with one or two skewed wingwalls.

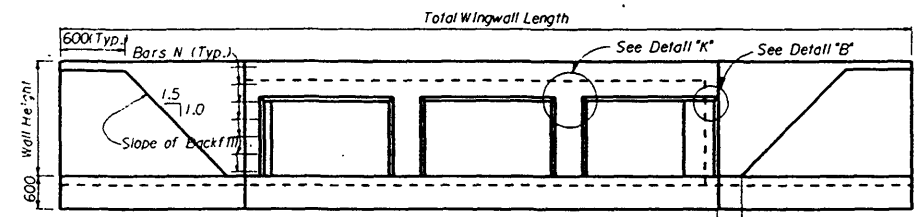
NOTE: Bars B3 & B400 shall be located at the centerline of the interior walls.

\* See Culvert Details and Reinforcing Bar Schedule, Sheet 1 of 5

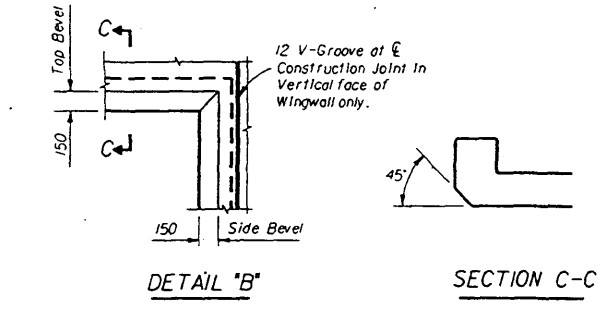
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
CONCRETE BOX CULVERT DOUBLE BARREL				
Names	Dates	Approved By		
Designed By		State Drainage Engineer		
Drawn By	GFG 1-86			
Checked By	RCB 1-86	Revision	94	Index No.
		Sheet No.	3 of 5	290



PART PLAN AT END OF CULVERT

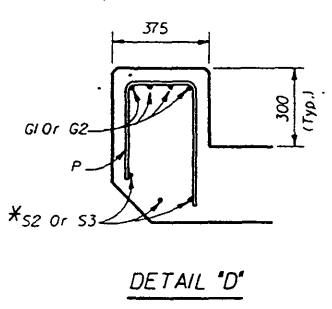


END ELEVATION

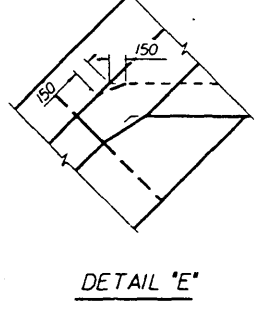


DETAIL 'B'

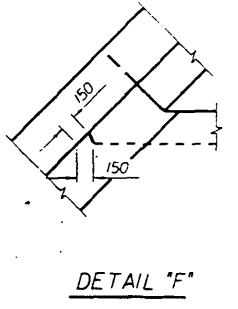
SECTION C-C



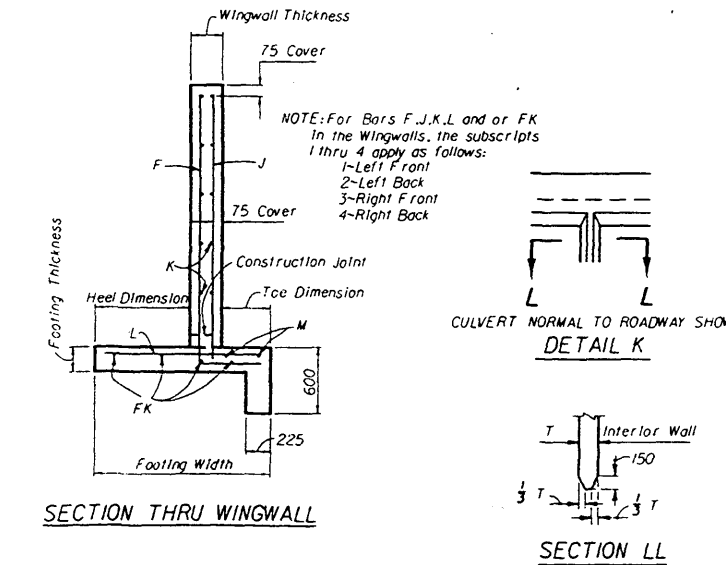
DETAIL 'D'



DETAIL 'E'

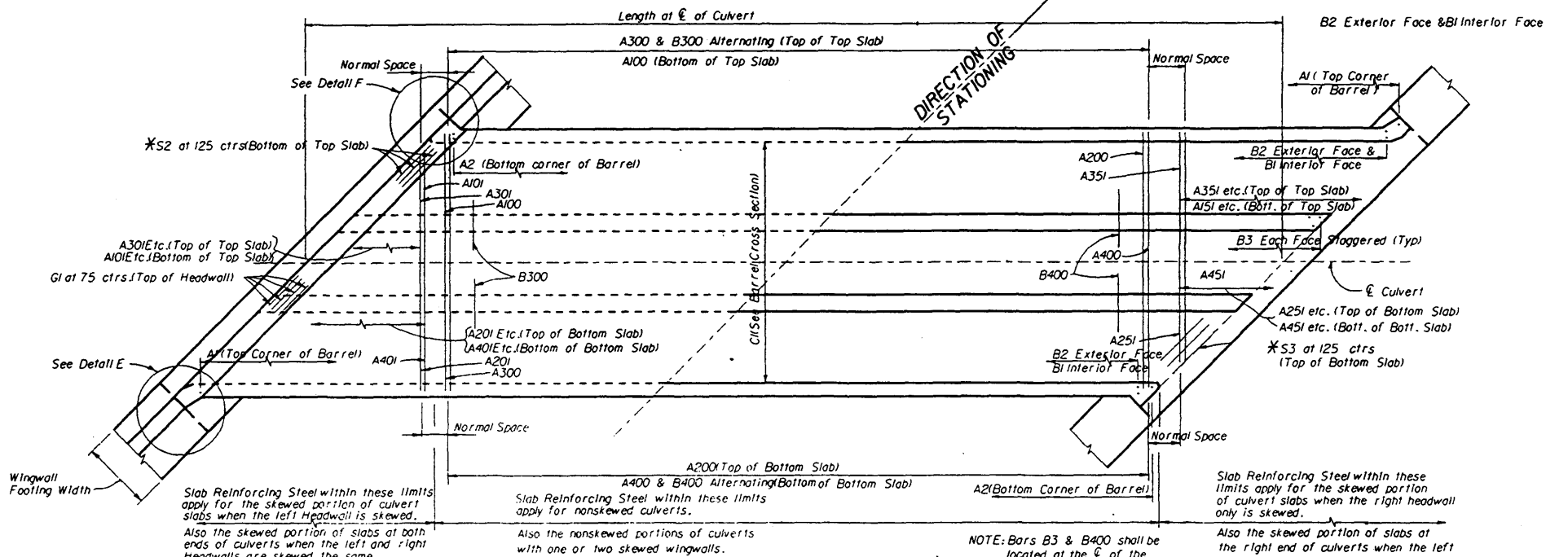


DETAIL 'F'



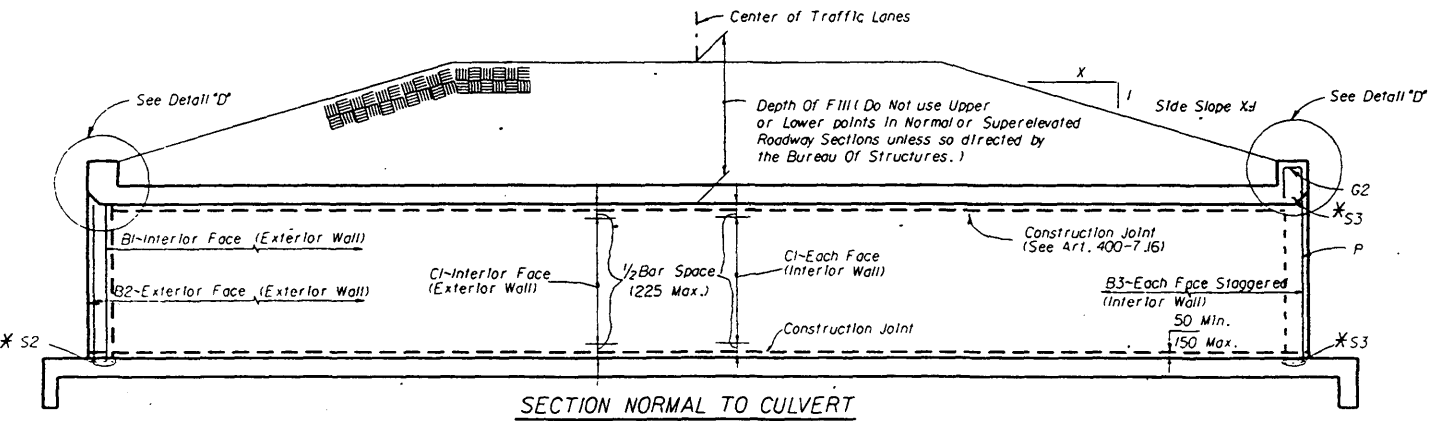
SECTION THRU WINGWALL

SECTION LL

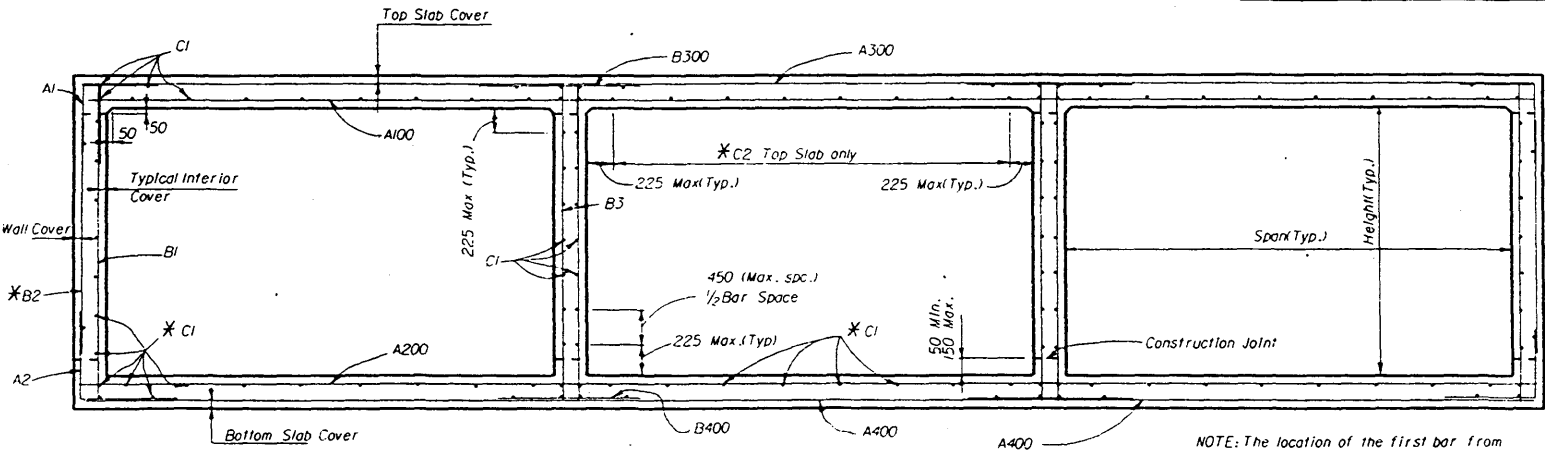


PART PLAN TOP SLAB

PART PLAN BOTTOM SLAB



SECTION NORMAL TO CULVERT

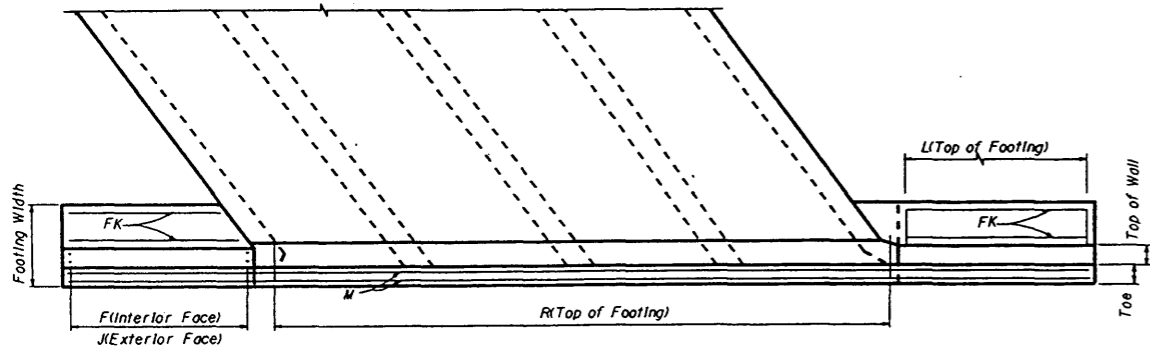


SECTION THRU BARREL

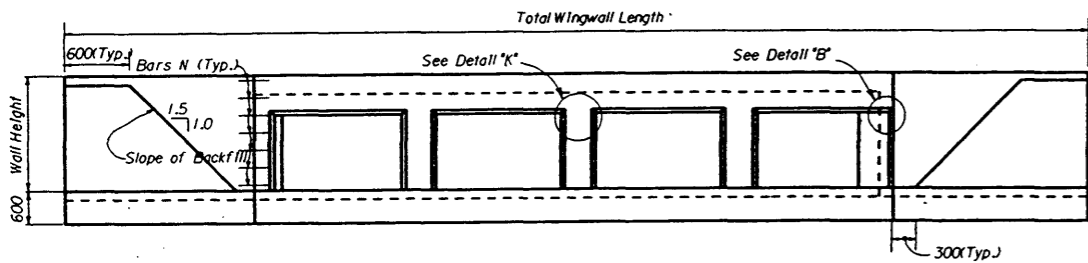
NOTE: The location of the first bar from the ends of the culvert shall not be less than 75, but not greater than one half the bar spacing.

\* See Culvert Details and Reinforcing Bar Schedule, Sheet 1 of 5

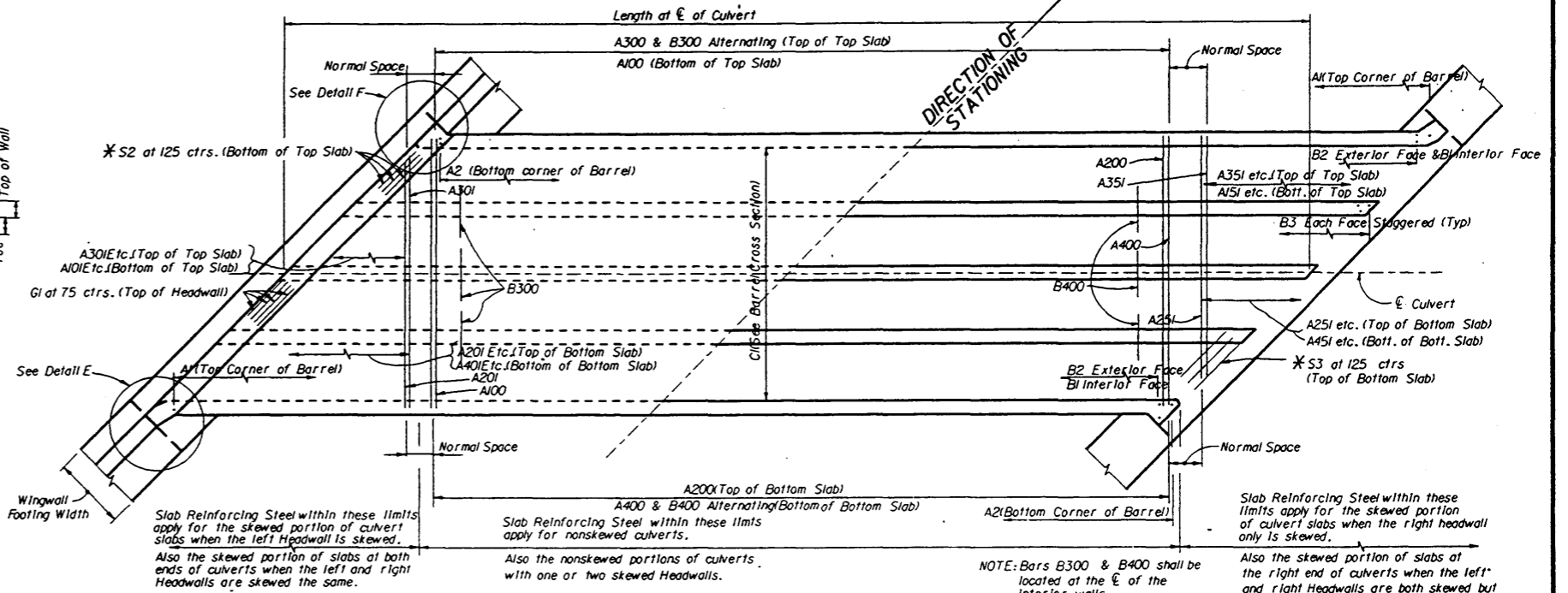
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CONCRETE BOX CULVERT TRIPLE BARREL</b>				
Designed By	Names	Dates	Approved By <i>S. M. L...</i> State Drainage Engineer	
Drawn By	GFG	1-86	Revision	Sheet No. 4 of 5
Checked By	RCB	1-86	94	Index No. 290



PART PLAN AT END OF CULVERT

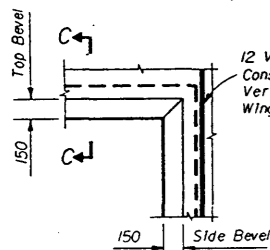


END ELEVATION



PART PLAN TOP SLAB

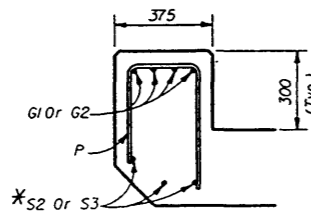
PART PLAN BOTTOM SLAB



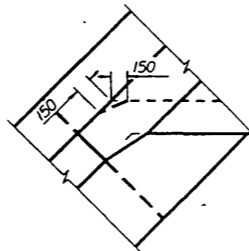
DETAIL B



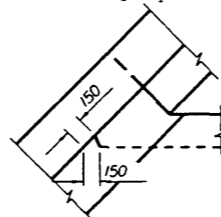
SECTION C-C



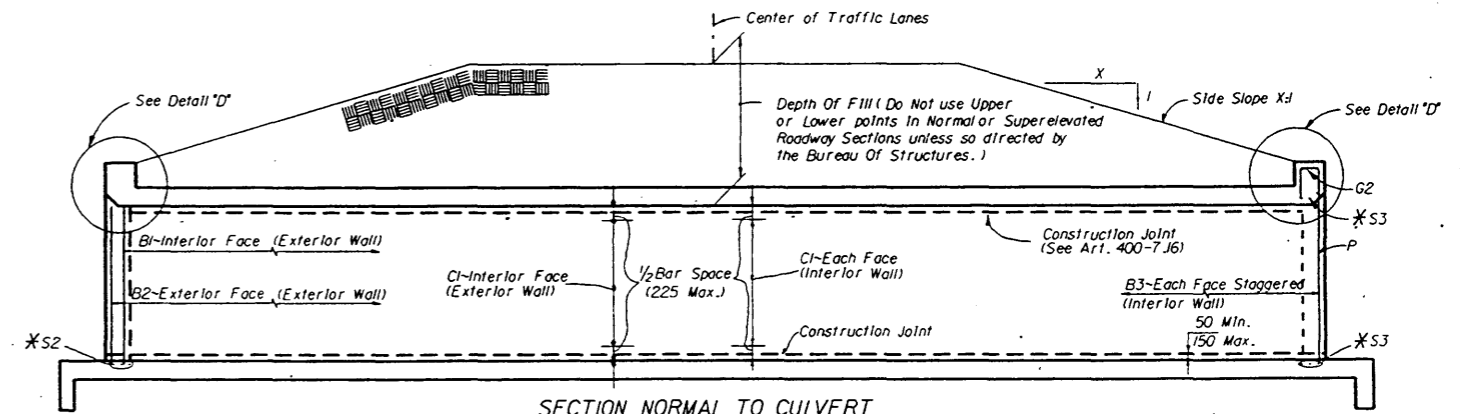
DETAIL D



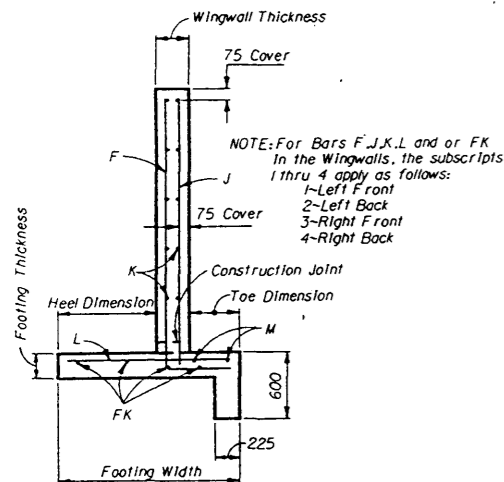
DETAIL E



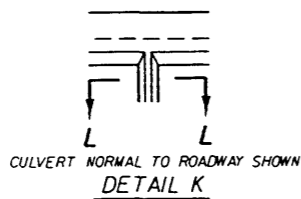
DETAIL F



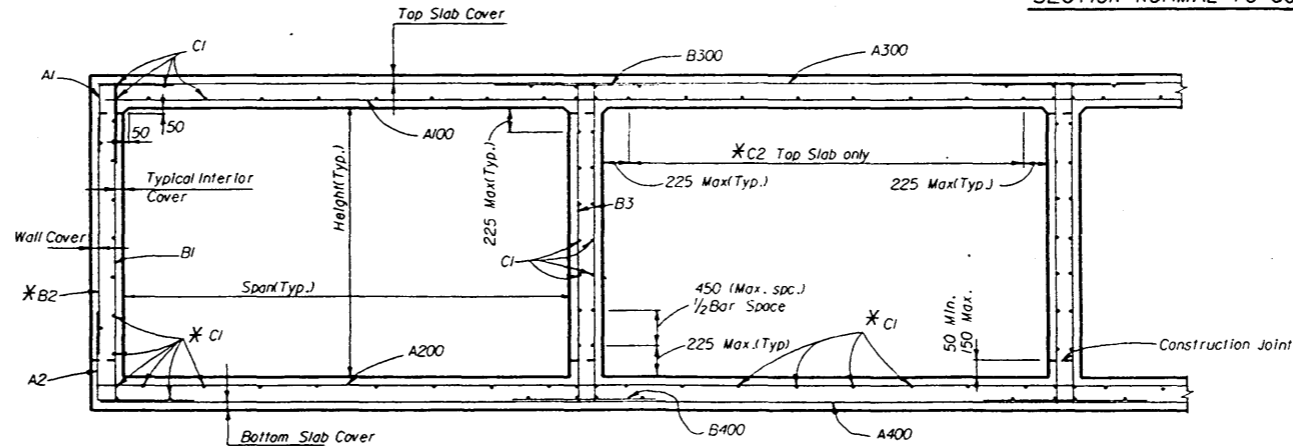
SECTION NORMAL TO CULVERT



SECTION THRU WINGWALL



SECTION LL

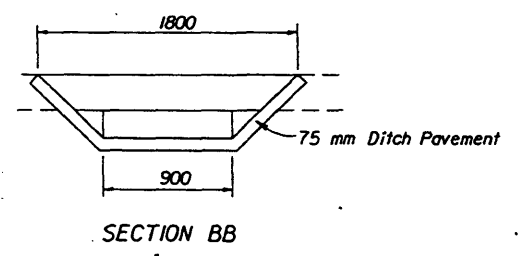
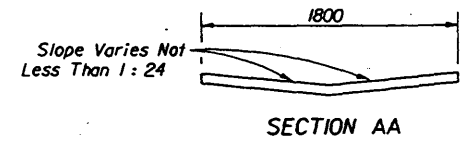
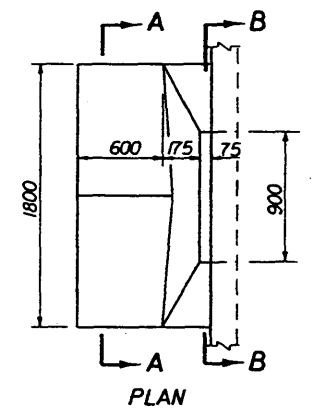
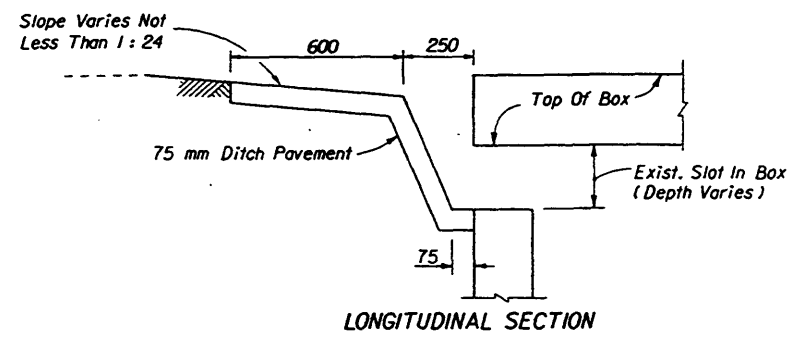


SECTION THRU BARREL

NOTE: The location of the first bar from the ends of the culvert shall not be less than 75, but not greater than one half the bar spacing.

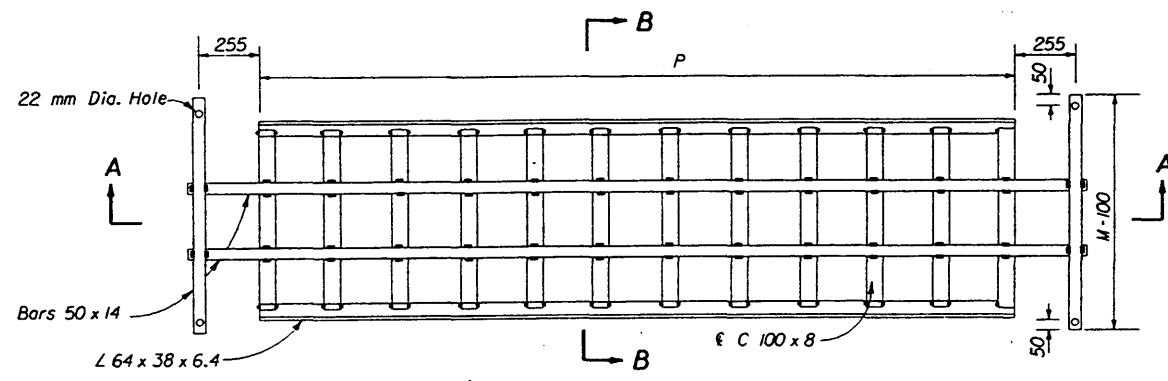
\* See Culvert Details and Reinforcing Bar Schedule, Sheet 1 of 5

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CONCRETE BOX CULVERT QUADRUPLE BARREL</b>				
Names	Dates	Approved By		
Designed By		 State Drainage Engineer		
Drawn By	GFG 1-86			
Checked By	RCB 1-86	Revision	94	5 of 5
				290

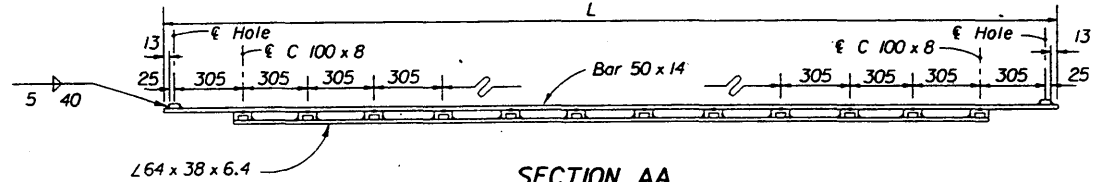


**SAFETY MODIFICATION FOR INLETS IN BOX CULVERTS**

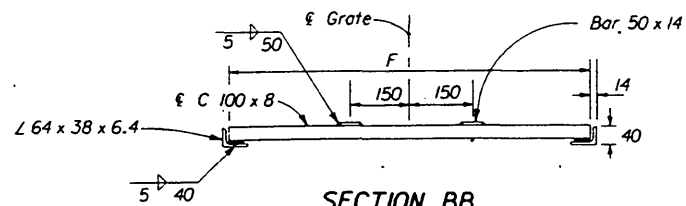
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>SAFETY MODIFICATIONS FOR INLETS IN BOX CULVERTS</b>				
	Names	Dates	Approved By <i>A. M. Lemora</i> State Drainage Engineer	
Designed By	HAB	07/67		
Drawn By	MJT	07/67	Revision	Sheet No.
Checked By	DWS	07/67	94	1 of 1
				293



PLAN

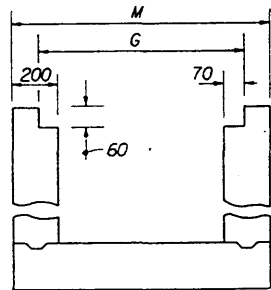


SECTION AA

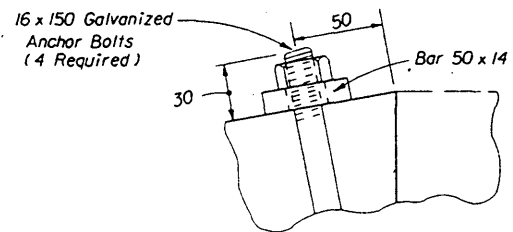


SECTION BB

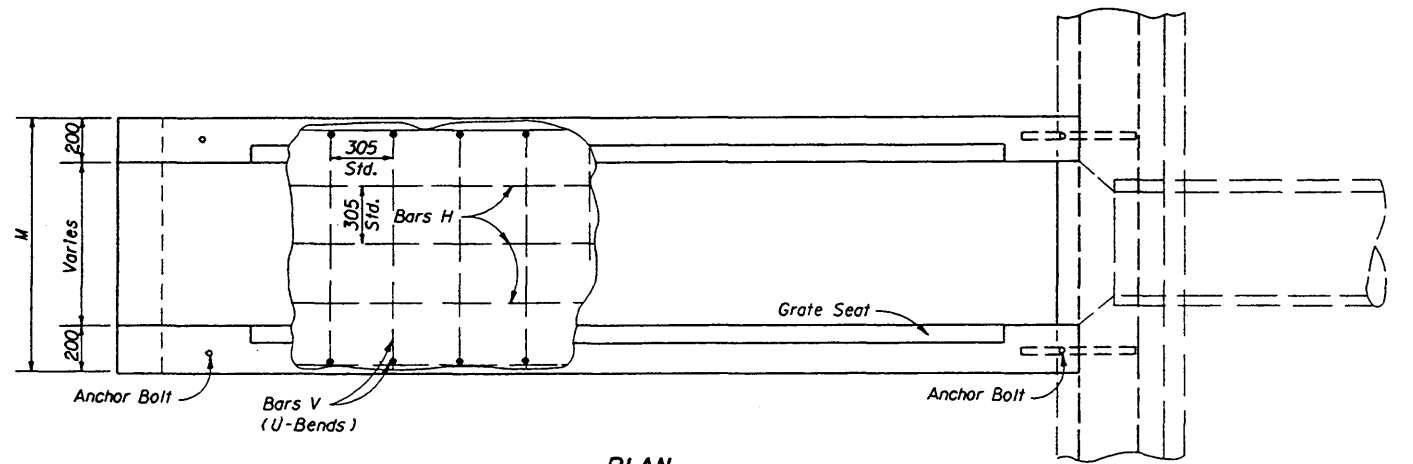
GRATE DETAIL



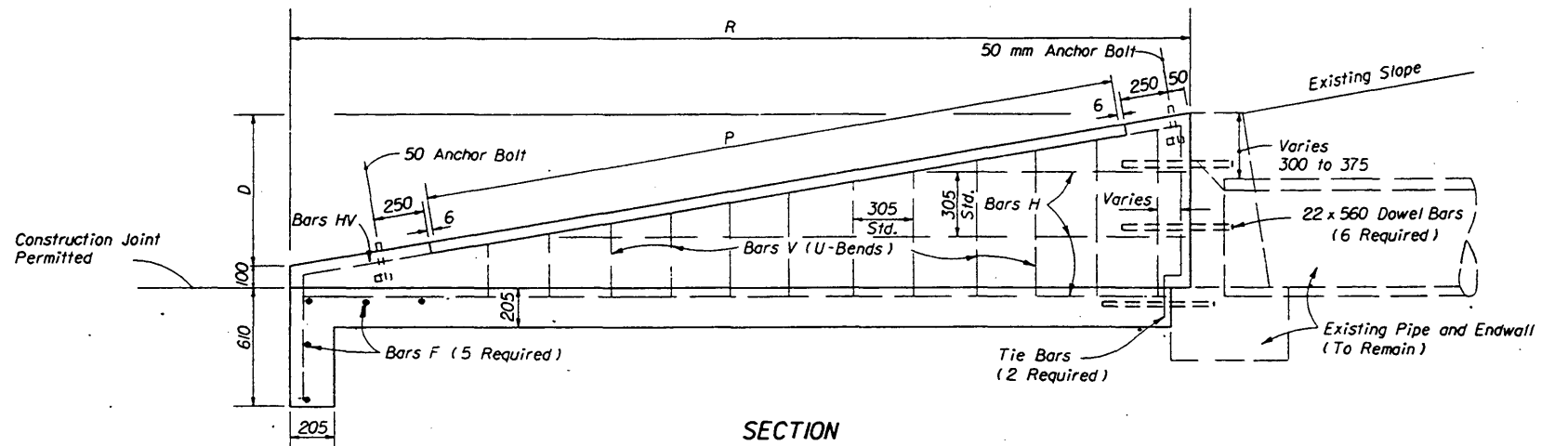
GRATE SEAT DETAIL



ANCHOR BOLT DETAIL



PLAN



SECTION

GENERAL NOTES

1. For use criteria see "Steel Grating Use Criteria" Index No. 261.
2. Grates shall be ASTM A 242M, A 441M, A 572M or A 588M, 425 MPa steel, and galvanized in accordance with Section 962-7 of the Standard Specifications.
3. Channel section C 75 x 8.9 may be substituted for the C 100 x 8 channel.
4. All reinforcing #13 bars with 50 mm clearance except as noted. Spacings shown are center to center. Laps to be 400 mm minimum. Welded wire fabric (two cages max.) having an equivalent cross section area (130 mm<sup>2</sup>) may be substituted for bar reinforcement.
5. Drill 45 mm holes 200 mm deep with a rotary drill in existing endwall for dowel bars. Holes shall be thoroughly cleaned prior to placing dowel bars and epoxy.
6. Endwall to be paid for under the contract unit price for Conc. Class I (Endwalls), M3 and Reinforcing Steel (Roadway), KG. Cost of dowel bars and epoxy mortar to be included in the contract unit price for reinforcing steel. Cost of grates to be paid for under the contract unit price for Endwall Grate, KG, plan quantity. Cost of galvanized bolts and nuts to be included in the contract unit price for the grate.
7. Sod slopes 1.5 mm each side and above endwall. Sodding to be paid for under the contract unit price for Sodding, M2.

DIMENSIONS AND QUANTITIES PER GRATE.

Slope	Pipe Size	Channels @ 8.00 kg/m			Bars @ 5.50 kg/m (2 ea.)			Angles @ 5.40 kg/m (2)		Total Weight - kg
		Quantity	F	kg	L	M-0.10	kg	P	kg	
1: 6	375	10	0.78	62.40	3.431	0.98	48.52	2.85	30.73	141.65
	450	12	0.86	82.56	4.041	1.06	56.11	3.45	37.31	175.98
	600	15	1.01	121.20	4.956	1.21	67.83	4.37	47.20	236.23
	750	18	1.16	167.04	5.871	1.36	79.54	5.29	57.08	303.66
1: 4	375	6	0.78	37.44	2.211	0.98	35.10	1.62	17.55	90.09
	450	7	0.86	48.16	2.516	1.06	39.34	1.93	20.84	108.34
	600	9	1.01	72.72	3.126	1.21	47.70	2.54	27.43	147.85
	750	11	1.16	102.08	3.736	1.36	56.06	3.15	34.02	192.16

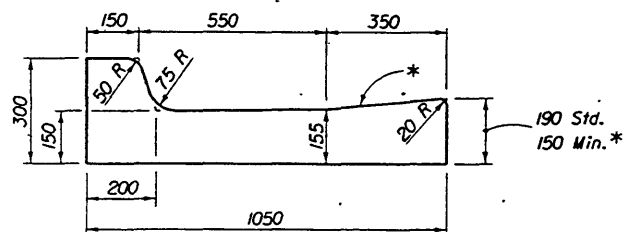
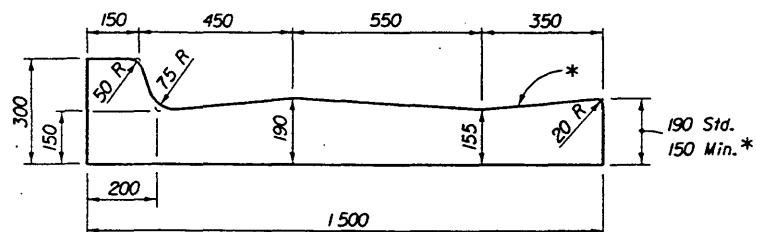
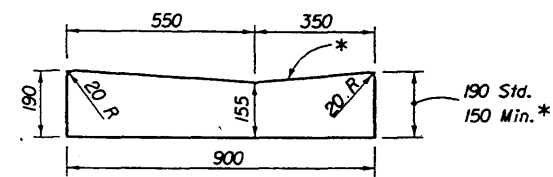
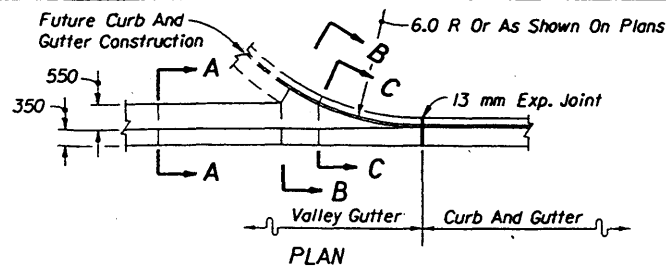
DIMENSIONS AND QUANTITIES PER U-ENDWALL

Pipe Size	G	M	D	R	P	Class I Concrete - m <sup>3</sup>	Reinforcing Steel - kg	Sodding m <sup>2</sup>
375	0.82	1.08	0.66	3.96	2.85	1.62	75.75	19.23
450	0.90	1.16	0.74	4.44	3.45	1.93	78.47	20.90
600	1.05	1.31	0.89	5.34	4.37	2.66	107.96	24.25
750	1.20	1.46	1.04	6.24	5.29	3.49	142.88	26.76
375	0.82	1.08	0.66	2.64	1.62	1.10	54.43	15.89
450	0.90	1.16	0.74	2.96	1.93	1.32	58.97	16.72
600	1.05	1.31	0.89	3.56	2.54	1.80	75.75	18.39
750	1.20	1.46	1.04	4.16	3.15	2.36	102.06	20.90

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**SAFETY MODIFICATIONS  
FOR ENDWALLS**

Names	Dates	Approved By
Designed By		A. M. Lemoine State Drainage Engineer
Drawn By		
Checked By		Revision
		98
		Sheet No.
		1 of 1
		Index No.
		295



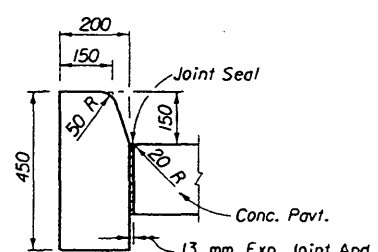
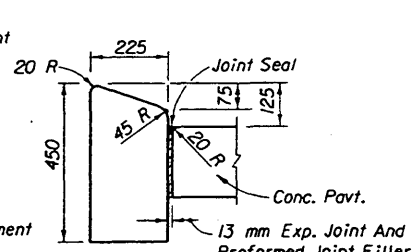
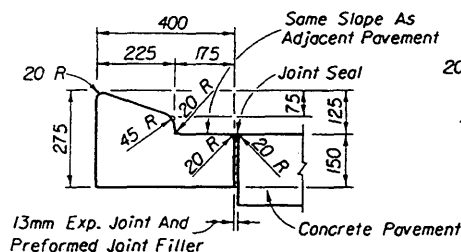
SECTION CC  
VALLEY GUTTER

\* When used on high side of roadways, the cross slope of the gutter shall match the cross slope of the adjacent pavement. The thickness of the lip shall be 150 mm, unless otherwise shown on plans.

□ Rotate entire section so that gutter cross slope matches slope of adjacent circulating roadway pavement.

Note: For use adjacent to concrete or flexible pavement. For details depicting usage adjacent to flexible pavement, see diagram right. Expansion joint, preformed joint filler and joint seal are required between curb & gutter and concrete pavement only, see diagram right.

**CONCRETE CURB AND GUTTER**



For details depicting usage adjacent to flexible pavement, see diagram right.

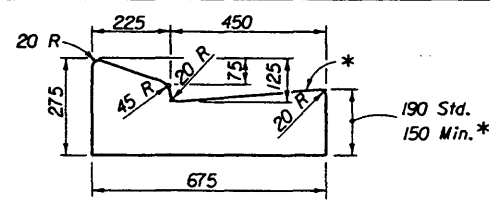
TYPE A

TYPE B

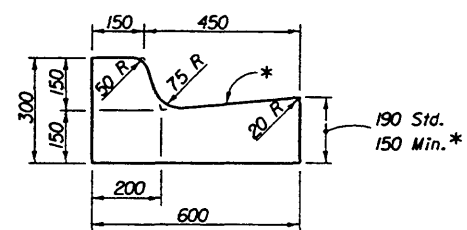
TYPE D

Note: For use adjacent to concrete or flexible pavement, concrete shown. Expansion joint, preformed joint filler and joint seal are required between curbs and concrete pavement only, see diagram right.

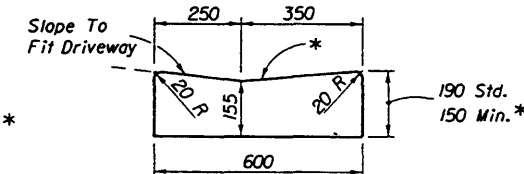
**CONCRETE CURB**



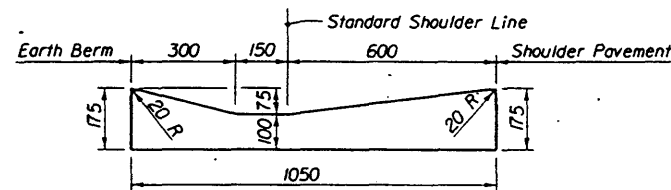
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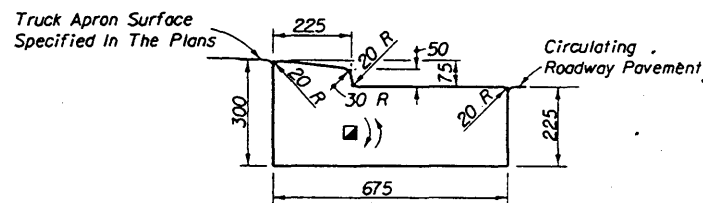
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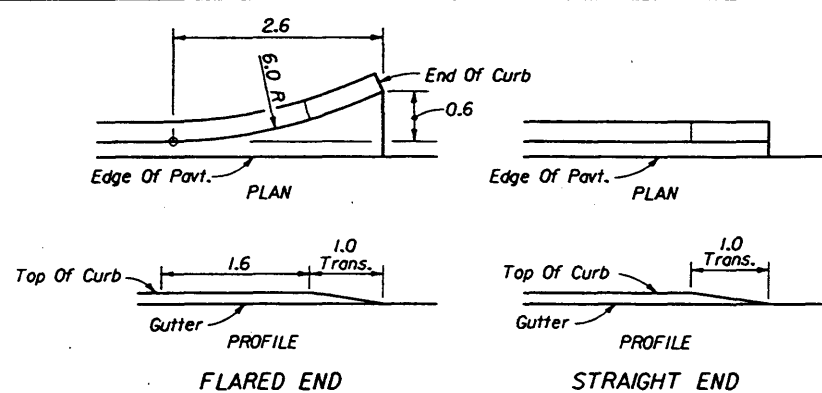
DROP CURB



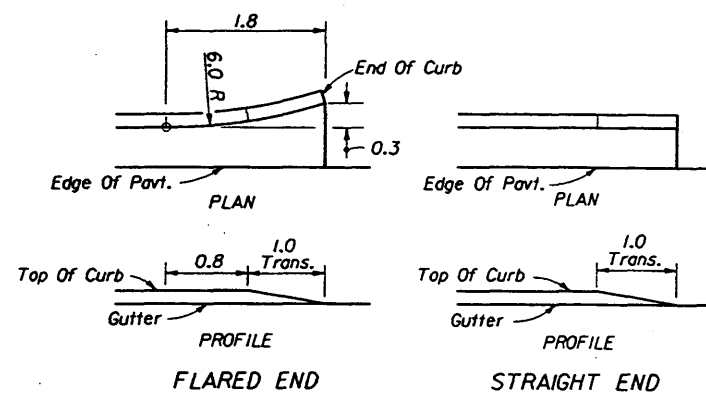
SHOULDER GUTTER



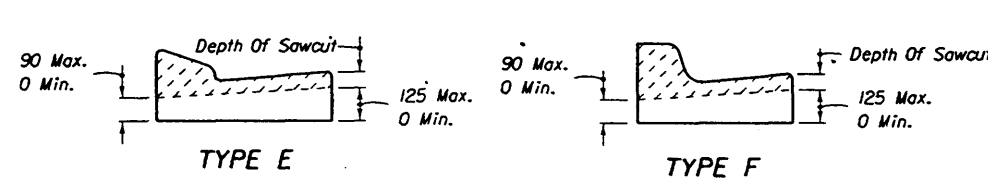
TRAFFIC BEARING SECTION FOR USE IN ROUNDABOUT CENTRAL ISLAND CONSTRUCTION  
TYPE RA



CURB TYPE A

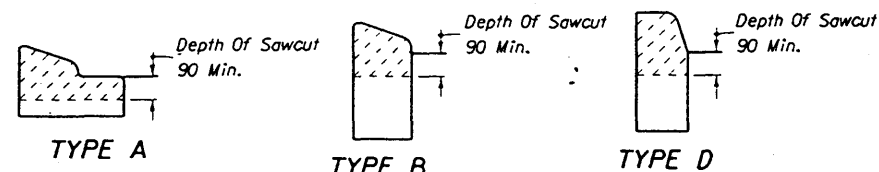


CURB AND GUTTER TYPES E & F

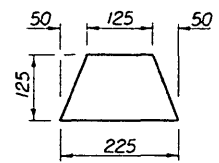


SHOULDER GUTTER

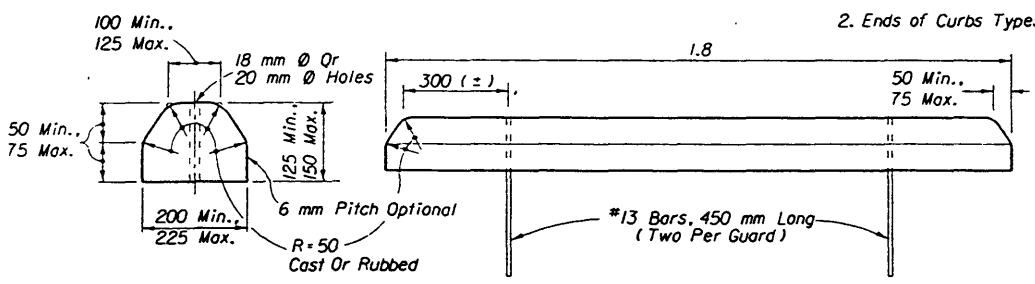
Sawcuts should be avoided within valley gutter and within curb and gutter endings.  
**CONTRACTION JOINT IN CURB AND GUTTER**



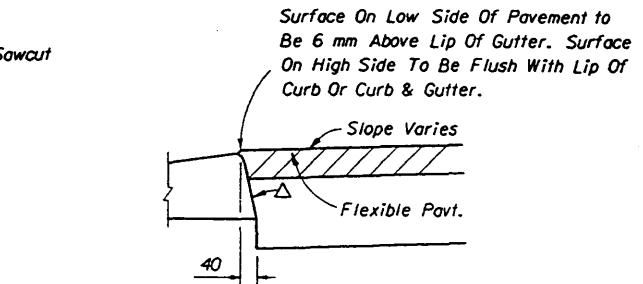
CONTRACTION JOINT IN CURB



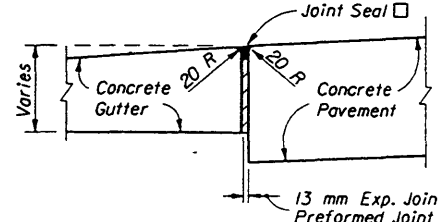
ASPHALTIC CONCRETE CURB



CONCRETE BUMPER GUARD



△ Applies to both high and low sides of pavement, low side shown. Applies to shoulder gutter only where adjoining traffic lanes.  
**CURB AND GUTTER AND TYPE A CURB ADJACENT TO FLEXIBLE PAVEMENT**

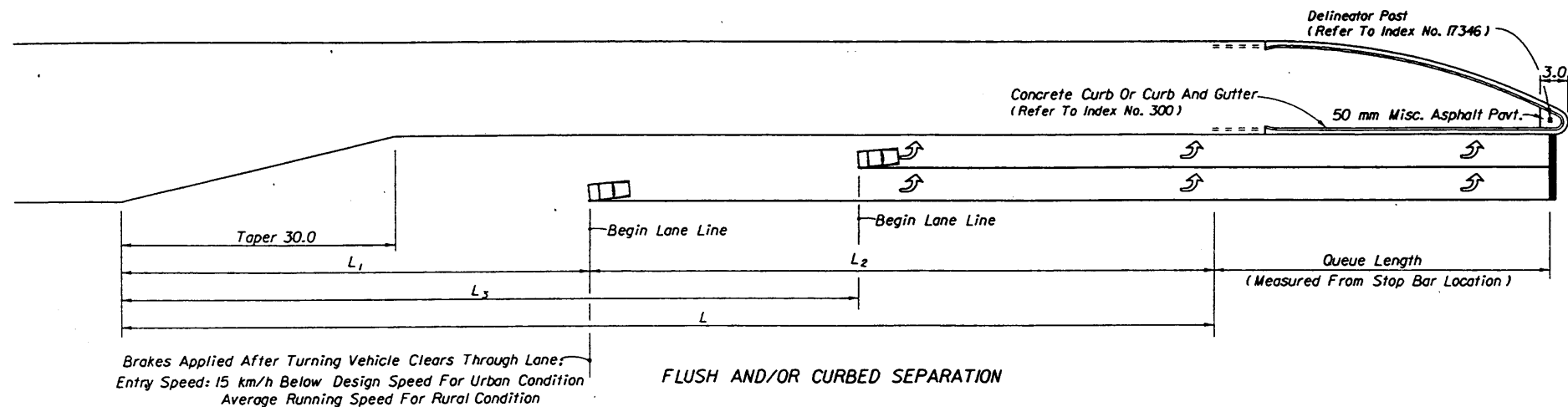


□ Applies to both high and low sides of pavement, low side shown.  
**EXPANSION JOINT BETWEEN GUTTER AND CONCRETE PAVEMENT**

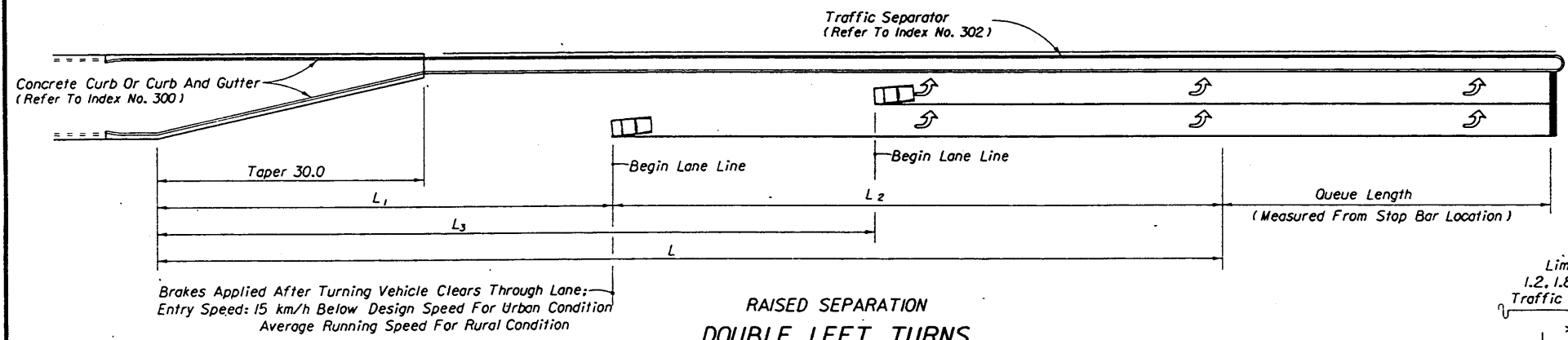
**GENERAL NOTES**

- For curb, gutter and curb & gutter provide 3 mm to 6 mm contraction joints at 3.0 m centers (max.). Contraction joints adjacent to concrete pavement on tangents and flat curves are to match the pavement joints, with intermediate joints not to exceed 3.0 m centers. Curb, gutter and curb & gutter expansion joints shall be located in accordance with Section 520 of the standard specifications.
- Ends of Curbs Types B and D shall transition from full to zero heights in 1.0 m.

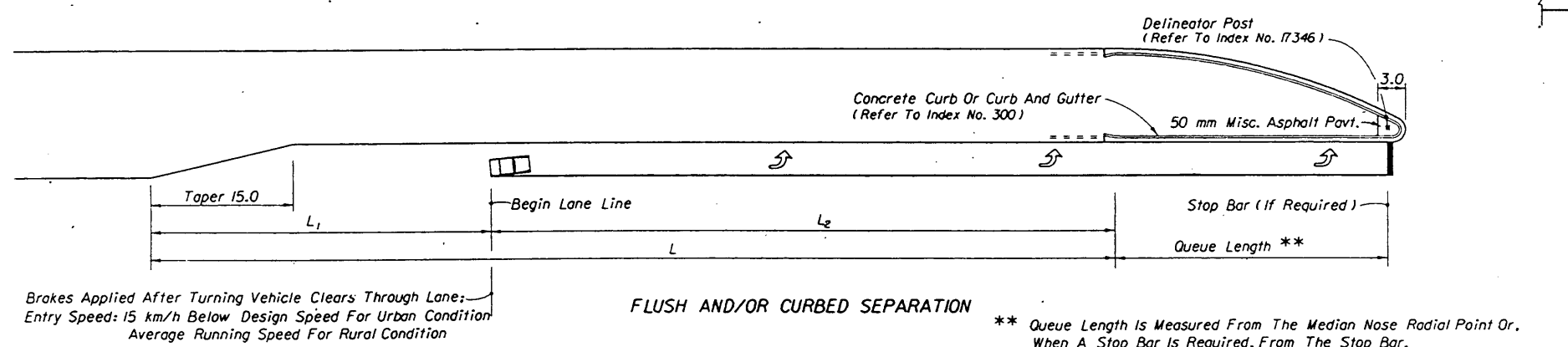
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN			
<b>CURB &amp; CURB AND GUTTER</b>			
Designed By	Names	Dates	Approved By
Drawn By	Revision	Sheet No.	Index No.
Checked By	96	1 of 1	300



FLUSH AND/OR CURBED SEPARATION

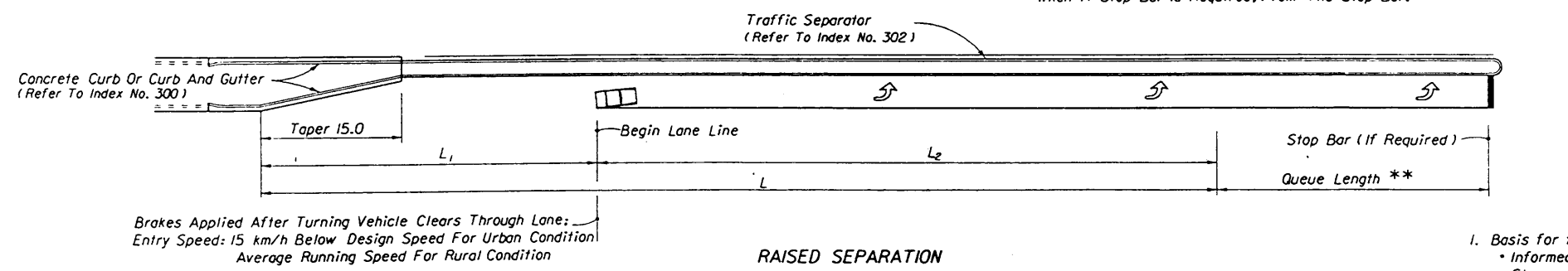


RAISED SEPARATION  
DOUBLE LEFT TURNS



FLUSH AND/OR CURBED SEPARATION

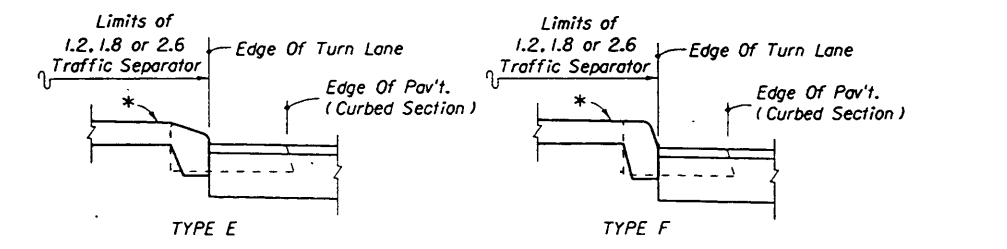
\*\* Queue Length Is Measured From The Median Nose Radial Point Or, When A Stop Bar Is Required, From The Stop Bar.



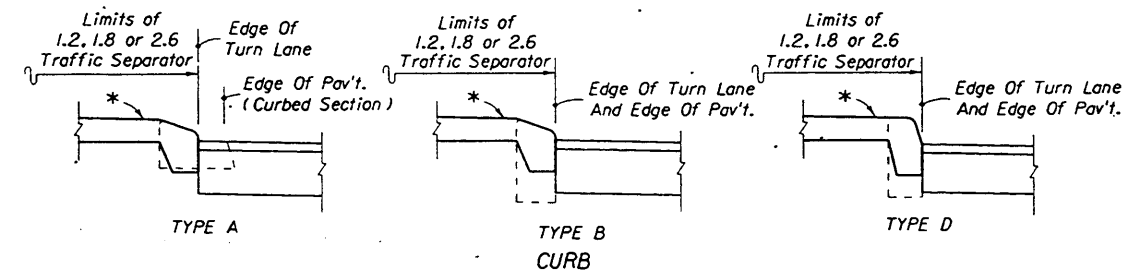
RAISED SEPARATION  
SINGLE LEFT TURNS

# TURN LANES

TURN LANES • CURBED AND UNCURBED MEDIANS								
Design Speed (km/h)	Entry Speed (km/h)	Clearance Distance $L_1$ (m)	URBAN CONDITIONS			RURAL CONDITIONS		
			Brake To Stop Distance $L_2$ (m)	Total Decel. Distance $L$ (m)	Clearance Distance $L_3$ (m)	Brake To Stop Distance $L_2$ (m)	Total Decel. Distance $L$ (m)	Clearance Distance $L_3$ (m)
50	35	21.0	23.0	44.0	34.0	---	---	---
60	45	24.0	23.0	47.0	37.0	---	---	---
70	55	26.0	29.0	55.0	41.0	---	---	---
80	65/70	32.0	42.0	74.0	49.0	64.0	96.0	49.0
90	77	38.0	---	---	---	78.0	116.0	59.0
100	85	44.0	---	---	---	98.0	142.0	70.0
110	91	52.0	---	---	---	116.0	168.0	82.0



CURB AND GUTTER



MEDIAN CURB AND TRAFFIC SEPARATOR  
JUNCTURE DETAILS

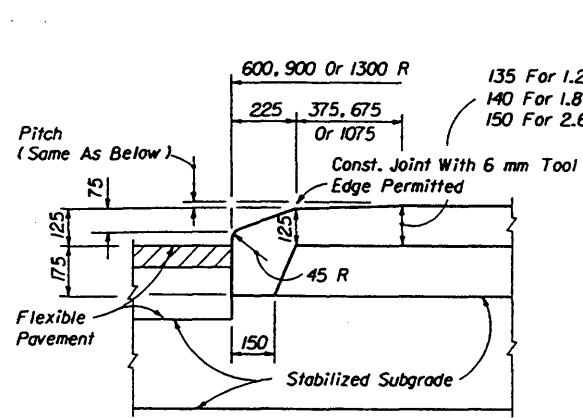
GENERAL NOTES

- The plan views shown are for turn lane taper shapes and dimensional purposes only, they do not prescribe the use of curb, curb and gutter, shoulders nor separators specifically to either rural or urban conditions.
- Total deceleration distances must not be reduced except where lesser values are imposed by unrelocatable control points.
- Right turn lane tapers and distances identical to left turn lanes under stop control conditions. Right turn lane tapers and/or distances are site specific under free flow or yield conditions.
- These left turn configurations apply to continuous left turn lanes only where specifically called for in the plans.
- For pavement markings see Index No. 17346.

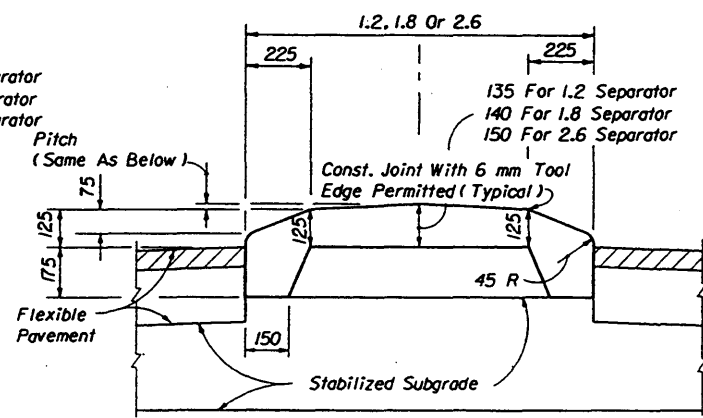
DESIGN NOTES

- Basis for turn lane configurations:
  - Informed Driver.
  - Stop condition (With Or Without Stop Control).
  - Wet Pavement.
  - Reaction preceding entry point.
  - Maximum safe deceleration rates for urban conditions.
  - Comfortable deceleration rates for rural conditions.

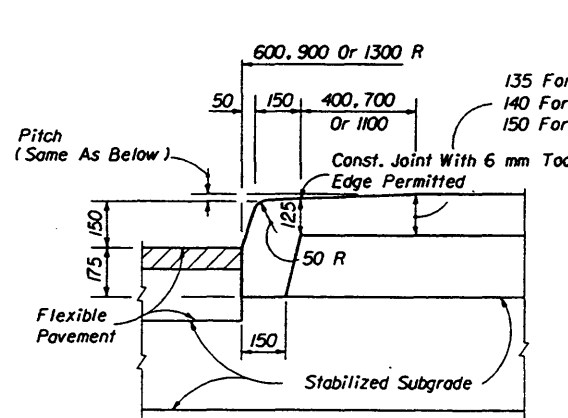
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<h2>TURN LANES</h2>				
Designed By	RER	05/91	Approved By	<i>[Signature]</i>
Drawn By	HSD/HKH	05/91	Revision	Sheet No.
Checked By	JVC/RER	05/91	94	1 of 1
				Index No. <b>301</b>



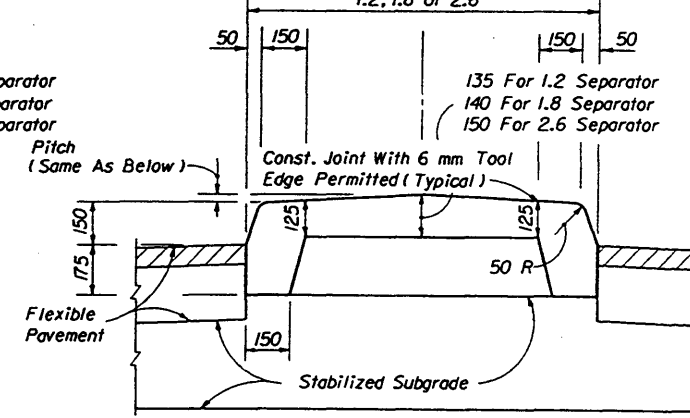
LONGITUDINAL SECTION (NOSE)



TRANSVERSE SECTION



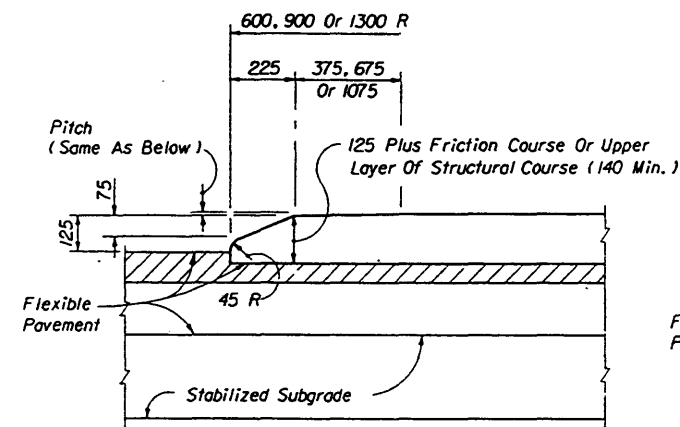
LONGITUDINAL SECTION (NOSE)



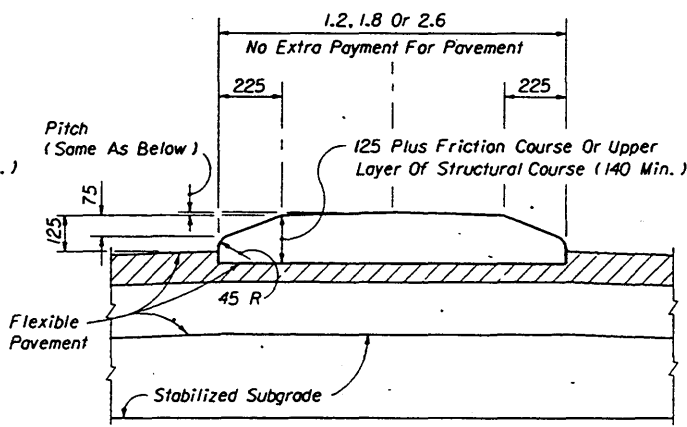
TRANSVERSE SECTION

OPTION I

OPTION I

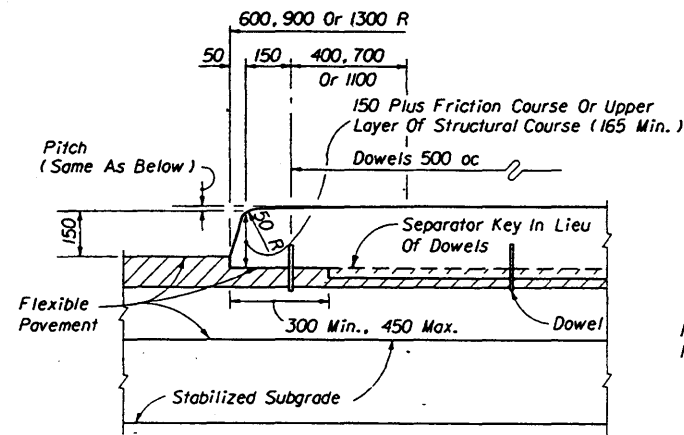


LONGITUDINAL SECTION (NOSE)

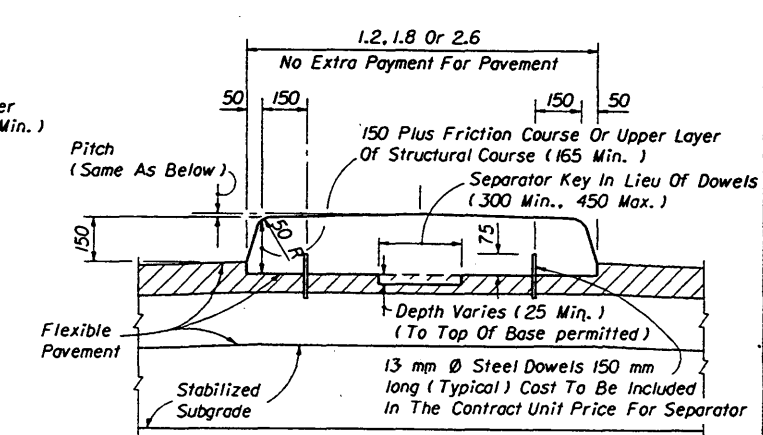


TRANSVERSE SECTION

OPTION II



LONGITUDINAL SECTION (NOSE)

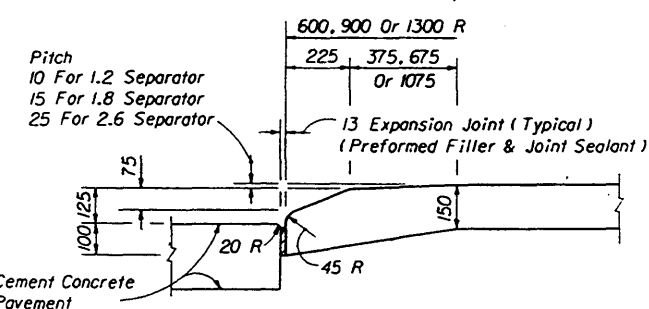


TRANSVERSE SECTION

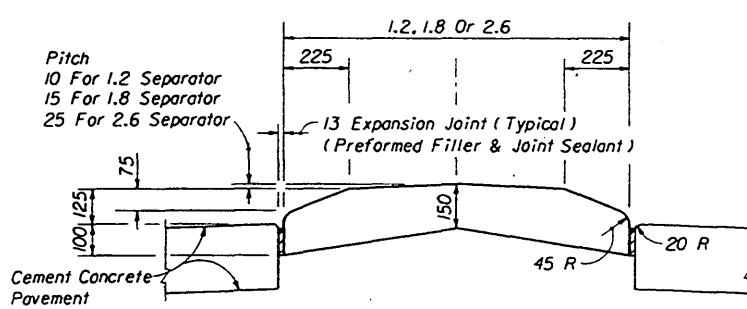
OPTION II

**TYPE I CONCRETE TRAFFIC SEPARATOR**

**TYPE IV CONCRETE TRAFFIC SEPARATOR**

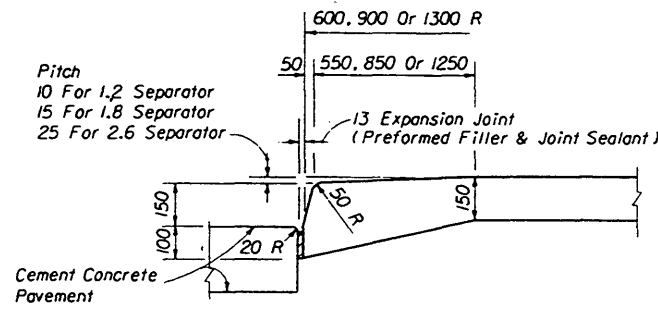


LONGITUDINAL SECTION (NOSE)

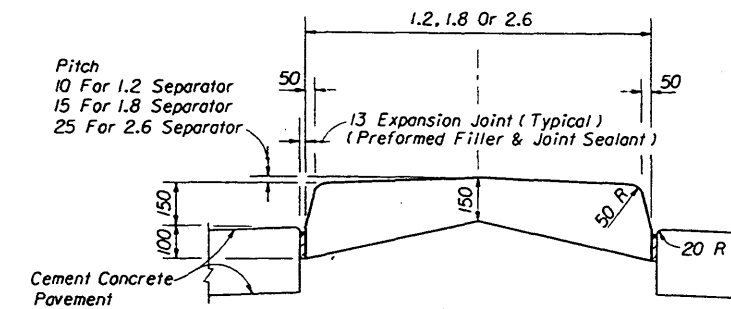


TRANSVERSE SECTION

**TYPE II CONCRETE TRAFFIC SEPARATOR**



LONGITUDINAL SECTION (NOSE)



TRANSVERSE SECTION

**TYPE V CONCRETE TRAFFIC SEPARATOR**

NOTES

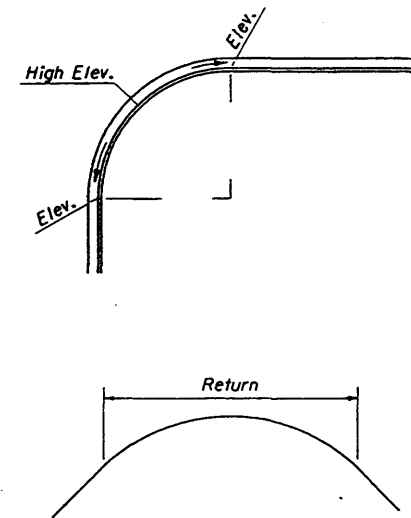
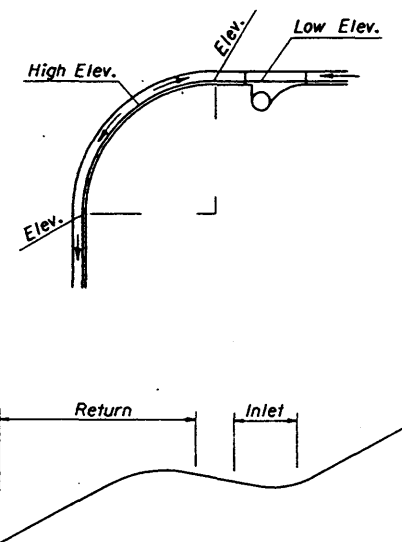
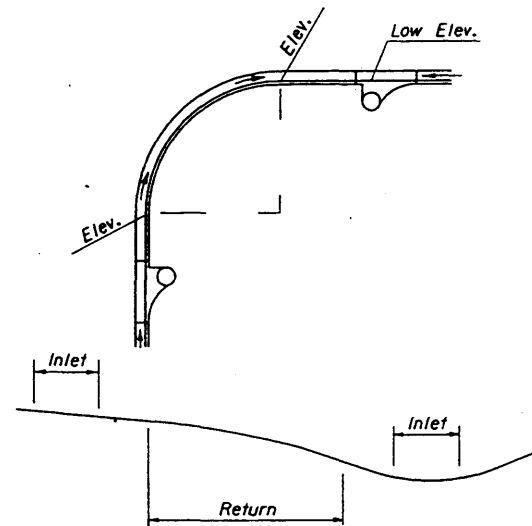
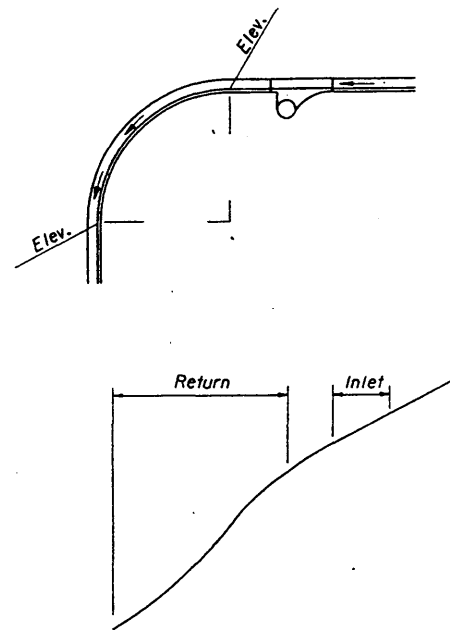
- Separators Type I and IV are to be used with flexible pavement. Separators Types II and V are to be used with rigid pavement.
- Either Option I or Option II may be used for Types I and IV separators except when a specific option is called for in the plans.
- For all separators provide 3 mm - 6 mm contraction joints at 3.0 m centers (max.). Contraction joints adjacent to concrete pavement on tangents and flat curves are to match the pavement joints, with intermediate joints not to exceed 3.0 m centers.
- Separators having widths of 1.2 m, 1.8 m or 2.6 m shall be paid for under the contract unit price for Traffic Separator Concrete (Type --) ( -- m Wide), M1. Separators having widths other than 1.2 m, 1.8 m or 2.6 m shall be detailed in the plans as special separators and paid for under the contract unit price for Traffic Separator Concrete (Special), M2.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**TRAFFIC SEPARATORS**

Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By					
Drawn By	HSD 09/81				
Checked By	JVG 09/81		98	1 of 1	302




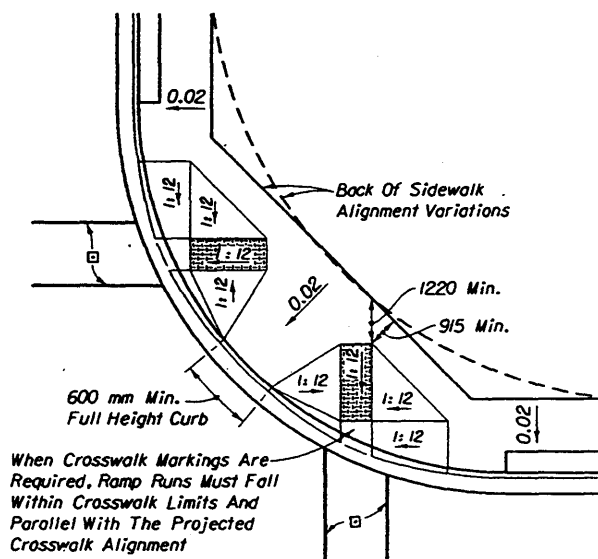
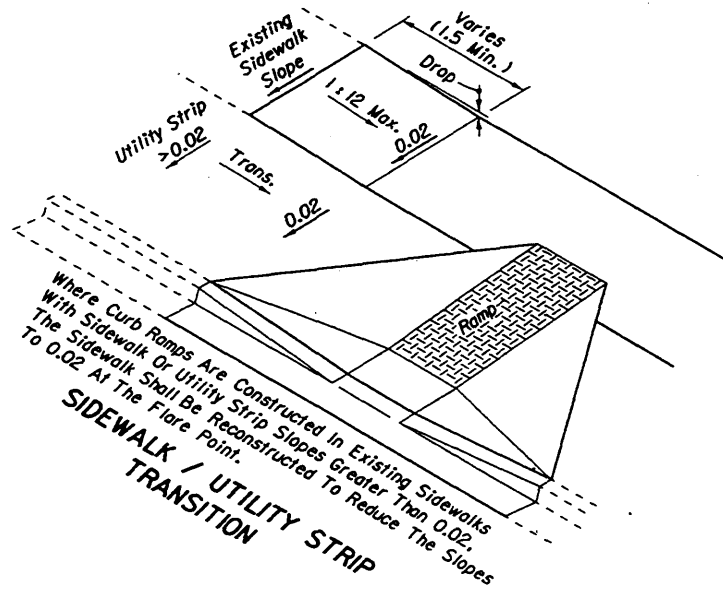
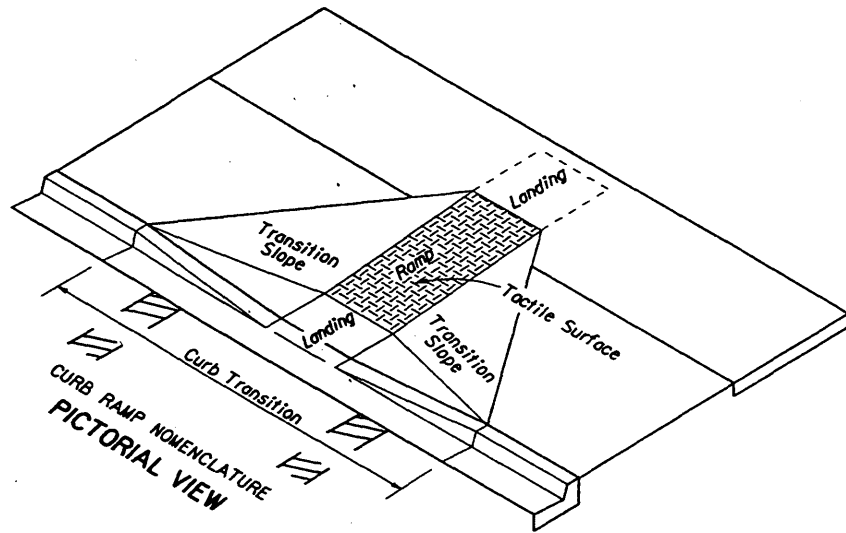


**Note:**

Profile grades should be established that will allow Inlets to be located outside the return whenever practical. Inlets should be located to avoid conflict with pedestrian movement. Special care must be exercised to prevent conflict with public sidewalk curbed ramps for the disabled. For information on public sidewalk curbed ramps refer to Index No. 304.

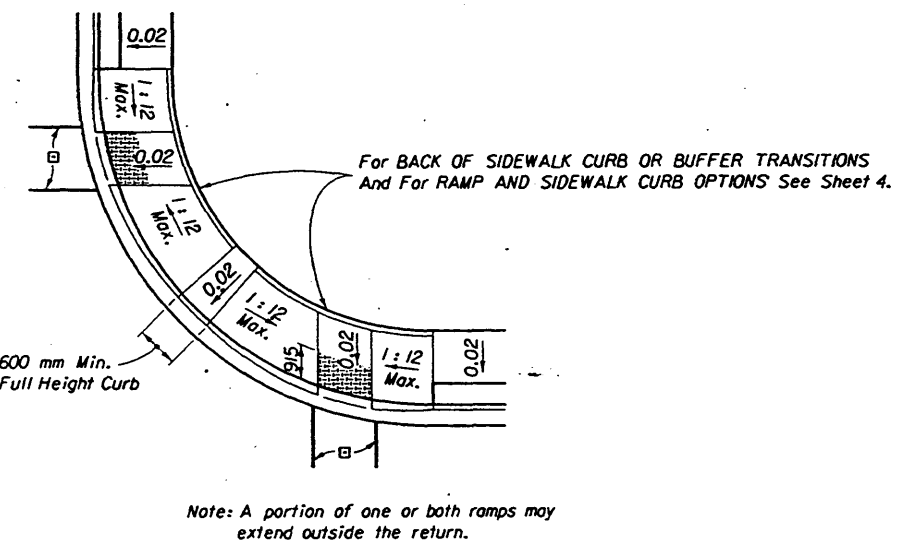
**SHOWING LOCATION OF INLETS ON RETURN  
TYPICAL RETURN PROFILES**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
CURB RETURN PROFILES				
	Names	Dates	Approved By	
Designed By			 State Roadway Design Engineer	
Drawn By			Revision	Sheet No. Index No.
Checked By			94	1 of 1 303



When Crosswalk Markings Are Required, Ramp Runs Must Fall Within Crosswalk Limits And Parallel With The Projected Crosswalk Alignment

□ Crosswalk widths and configuration vary; must conform to Traffic Design Standards.



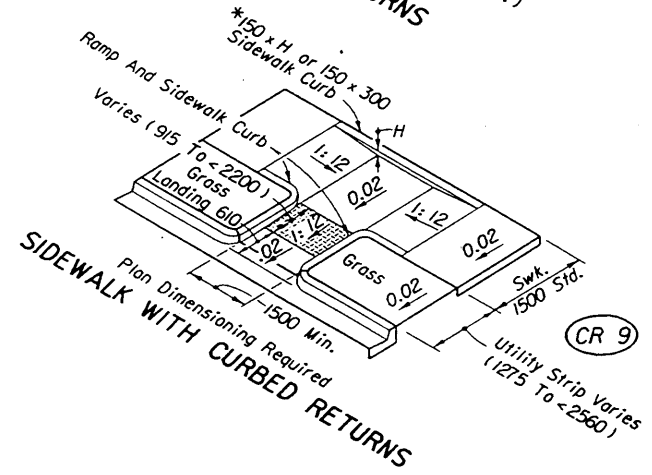
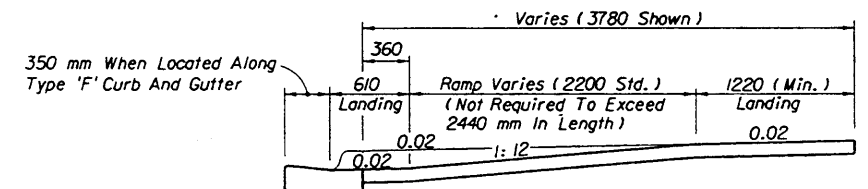
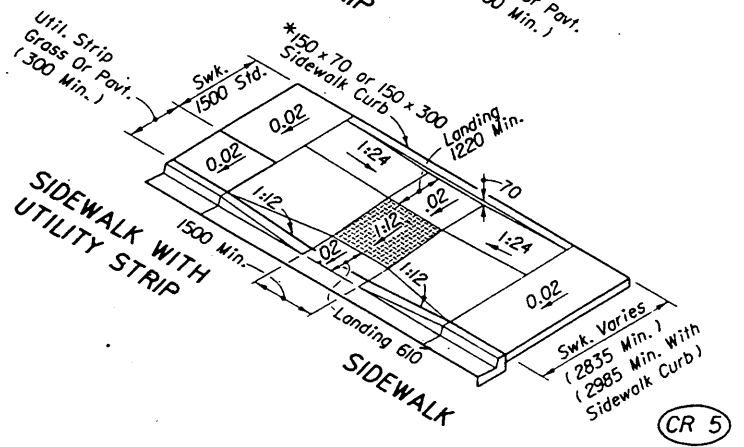
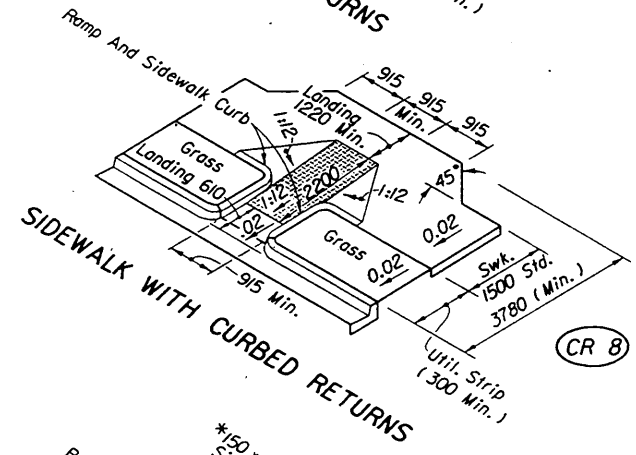
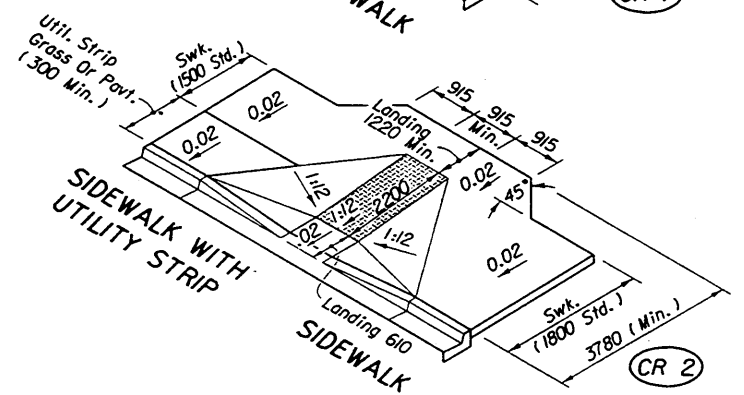
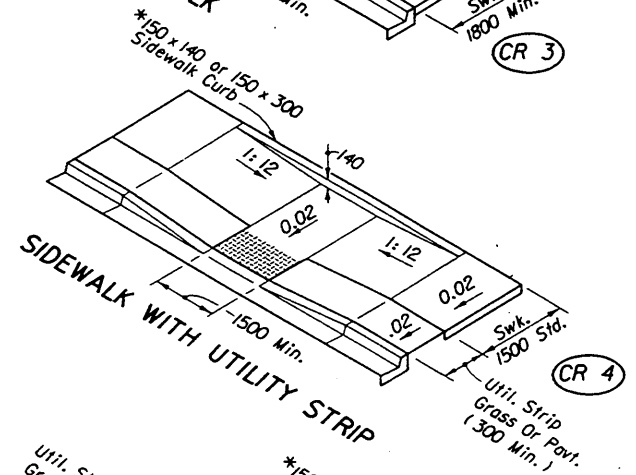
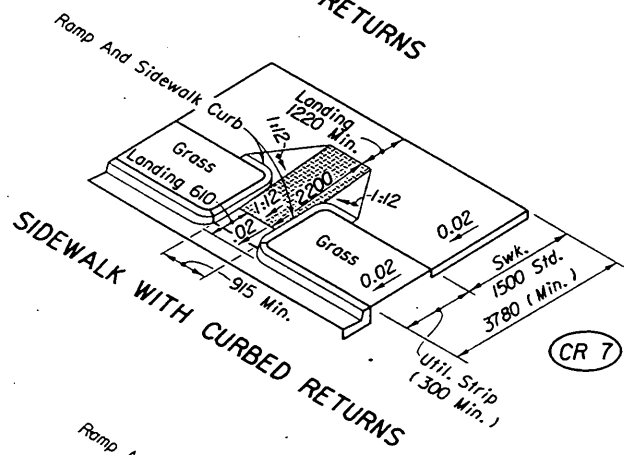
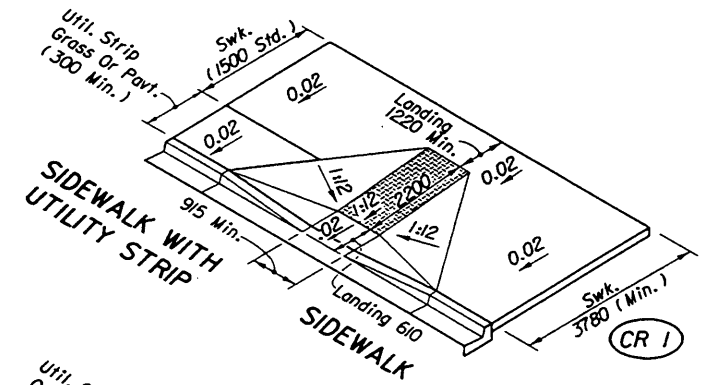
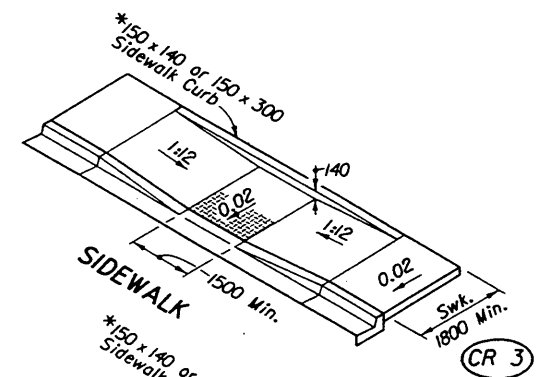
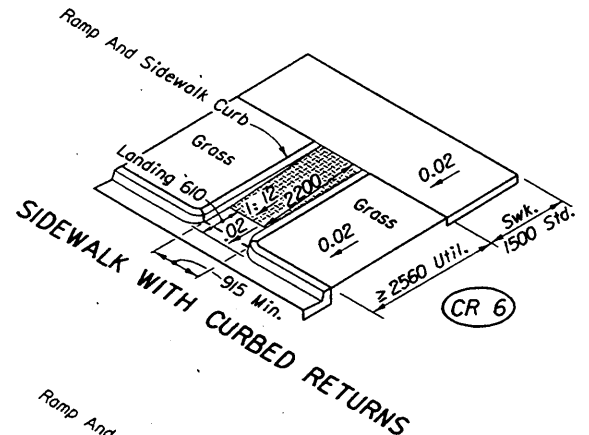
For BACK OF SIDEWALK CURB OR BUFFER TRANSITIONS And For RAMP AND SIDEWALK CURB OPTIONS See Sheet 4.

**GENERAL NOTES**

- Public sidewalk curb ramps shall be constructed in the public right of way at locations that will provide continuous unobstructed pedestrian circulation paths to pedestrian areas, elements and facilities in the public right of way and to accessible pedestrian routes on adjacent sites. Curbed facilities with sidewalks and those without sidewalks are to have curb ramps constructed at all street intersections and at turnouts that have curbed returns. Partial curb returns shall extend to the limit prescribed by Index No. 515 to accommodate curb ramps. Ramps constructed at locations without sidewalks shall have a landing constructed at the top of each ramp, see Sheet 5.
- The location and orientation of curb ramps shall be as shown in the plans.
- Curb ramp running slopes at unrestrained sites shall not be steeper than 1:12 and cross slope shall be 0.02 or flatter.  
  
When altering existing pedestrian facilities where existing site development precludes the accommodation of a ramp slope of 1:12, a running slope between 1:12 and 1:10 is permitted for a rise of 150 mm maximum and a running slope of between 1:10 and 1:8 is permitted for a rise of 75 mm maximum. Where compliance with the requirements for cross slope cannot be fully met, the minimum feasible cross slope shall be provided.  
  
Ramp running slope is not required to exceed 2440 mm in length, except at sites where the plans specify a greater length.
- If a curb ramp is located where pedestrians must walk across the ramp, then the walk shall have transition slopes to the ramp; the maximum slope of the transitions shall be 1:12. Ramps with curb returns may be used at locations where other improvements provide guidance away from that portion of curb perpendicular to the sidewalk; improvements for guidance are not required at curb ramps for linear pedestrian traffic.
- When perpendicular curb ramps abut the back of curb a tactile surface shall be applied to the full width and length of the ramp. When landings of parallel curb ramps abut the back of curb the tactile surface shall extend full width and 915 mm back of the curb. The tactile surfaces on curb ramps for linear pedestrian traffic and for diagonal ramps are to conform with the details in this Index for those specific ramp types. Tactile surfaces shall be constructed by texturing to a depth not exceeding 3 mm by use of a tamp or roller fabricated with an imprinting surface of either 25 mm mesh 6 mm wire cloth (plain weave, conventional crimp) #6 expanded metal (standard) or 1.4 kg expanded metal grating. Transition slopes are not to have tactile surfaces. Detectable surface requirements have been suspended; if reinstated the detectable surface requirements will replace the tactile surface requirements and notice will be by special provision.
- Where a curb ramp is constructed within existing curb, curb and gutter and/or sidewalk, the existing curb or curb and gutter shall be removed to the nearest joint beyond the curb transitions or to the extent that no remaining section of curb or curb and gutter is less than 1.5 m long. The existing sidewalk shall be removed to the nearest joint beyond the transition slope or walk around or to the extent that no remaining section of sidewalk is less than 1.5 m long.
- Alpha-numeric identifications are for reference (plans, permits, etc.).
- Public sidewalk curb ramps are to be paid for as follows:  
Ramps, reconstructed sidewalks, walk around sidewalks, sidewalk landings and sidewalk curbs are to be paid for under the contract unit price for Sidewalk Concrete, (Type M2), M2. Curb transitions and reconstructed curbs are to be paid for under the contract unit price for the parent curb, i.e., Curb Conc., (Type M1), M1 or Curb and Gutter Conc., (Type M1), M1.  
  
When a separate pay item for the removal and disposal of existing curb, curb and gutter, and/or sidewalk is not provided in the plans, the cost of removal and disposal of these features shall be included in the contract unit price for new curb, curb and gutter and/or sidewalk respectively.

**TYPICAL PLACEMENT OF PUBLIC SIDEWALK CURB RAMPS AT CURBED RETURNS**

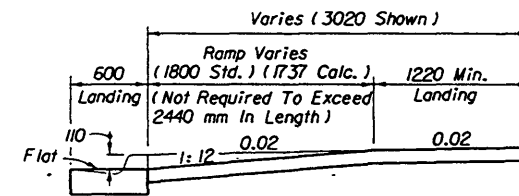
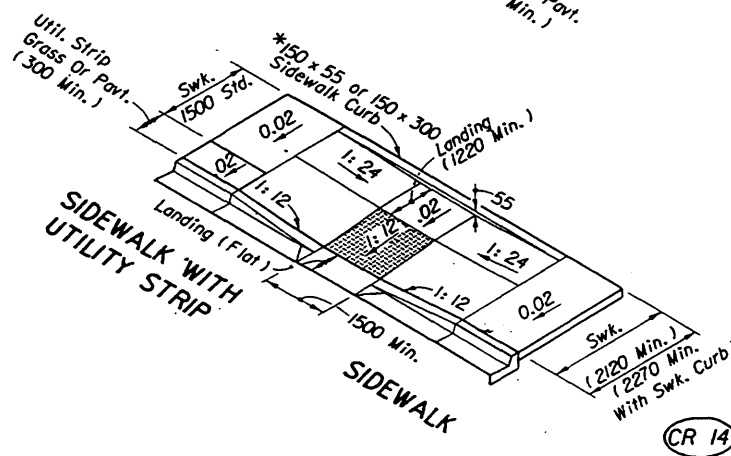
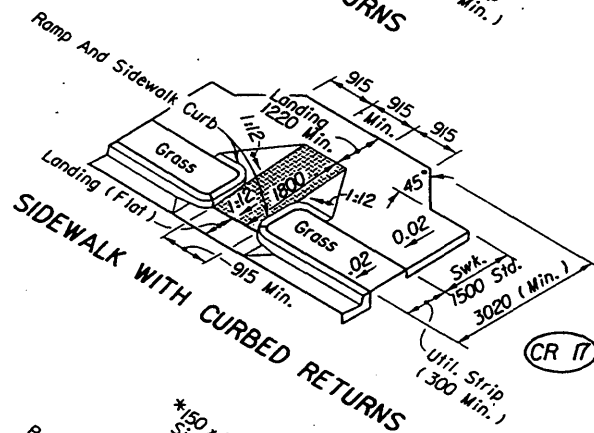
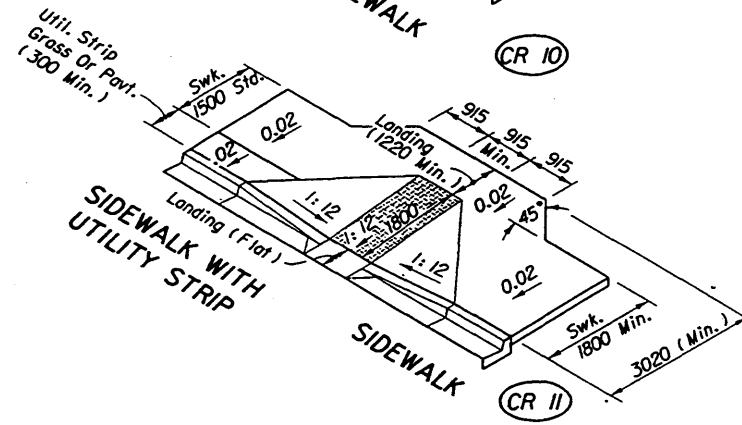
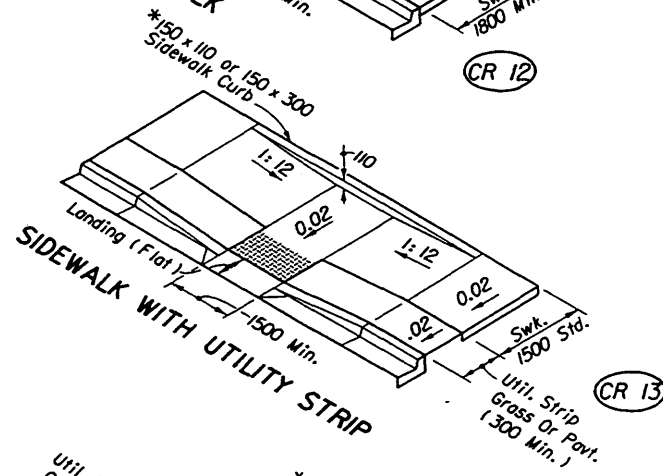
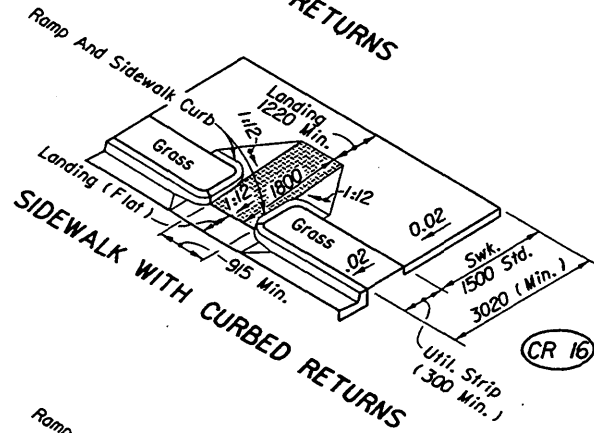
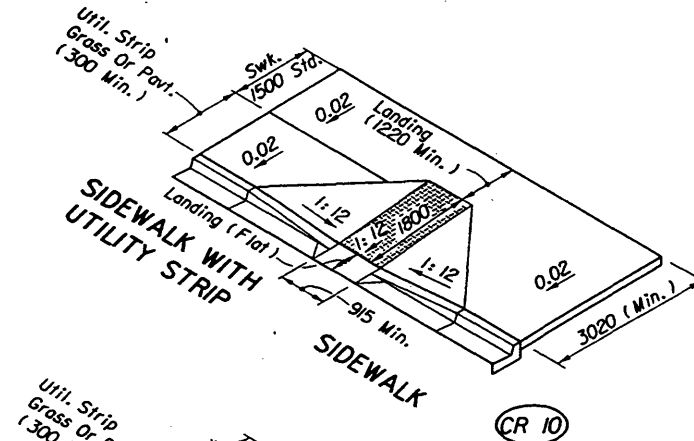
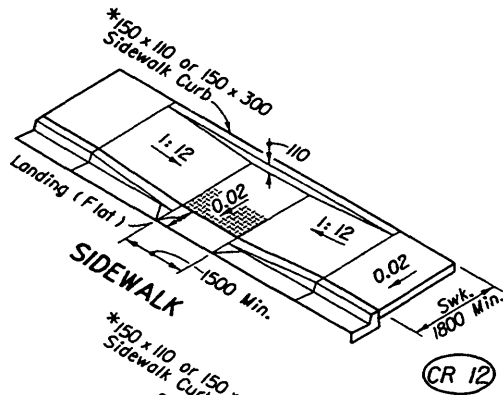
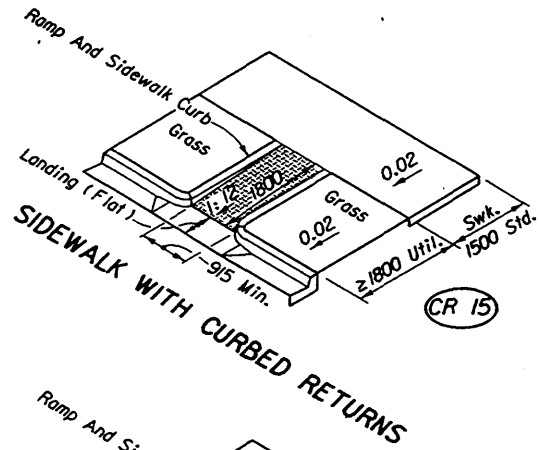
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>PUBLIC SIDEWALK CURB RAMPS</b>				
Names	Dates	Approved By		
Designed By STAFF	10/94	<i>[Signature]</i>	State Roadway Design Engineer	
Drawn By HGI	10/94	Revision	Sheet No.	Index No.
Checked By JVG	10/94	96	1 of 5	304



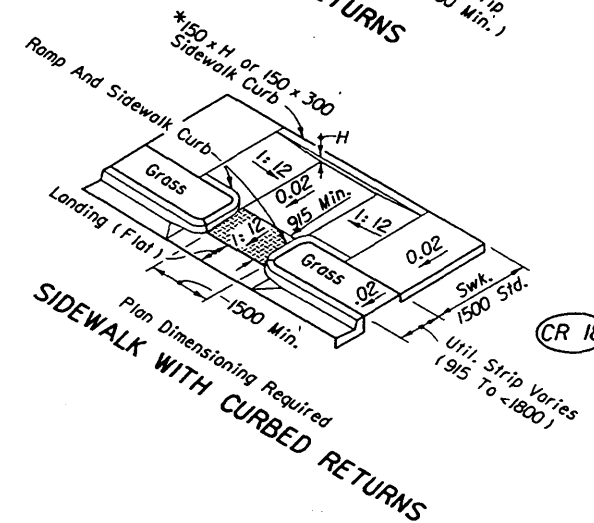
\* For BACK OF SIDEWALK CURB OR BUFFER TRANSITION And For RAMP AND SIDEWALK CURB OPTIONS See Sheet 4.

**DIMENSIONAL FEATURES FOR PUBLIC SIDEWALK CURB RAMPS WHERE RAMP AND LANDING DEPTH ARE NOT RESTRICTED BY RIGHT OF WAY**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>PUBLIC SIDEWALK CURB RAMPS</b>				
Names	Dates	Approved By <i>[Signature]</i>		
Designed By	STAFF	10/94	State Roadway Design Engineer	
Drawn By	HRH	10/94	Revision	Sheet No. 2 of 5
Checked By	JVG	10/94	96	Index No. 304



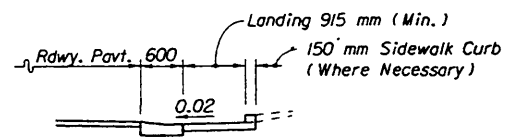
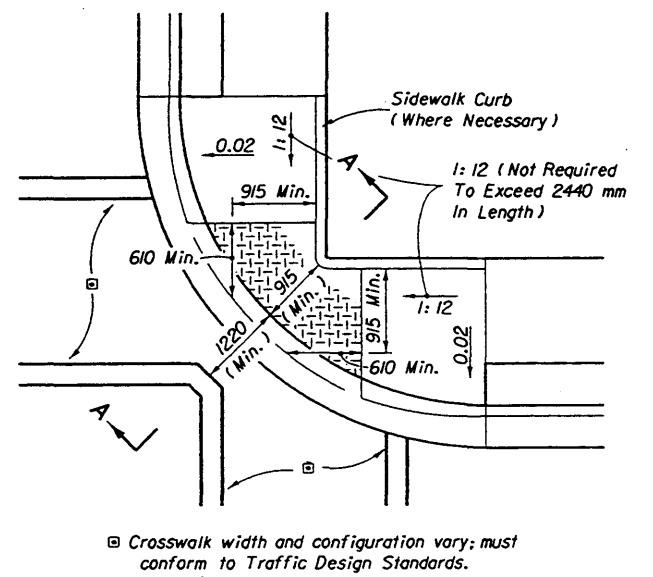
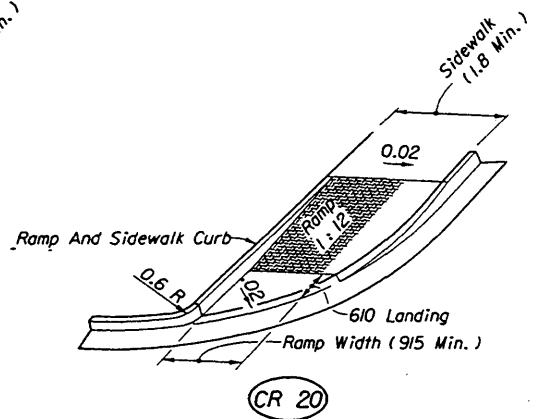
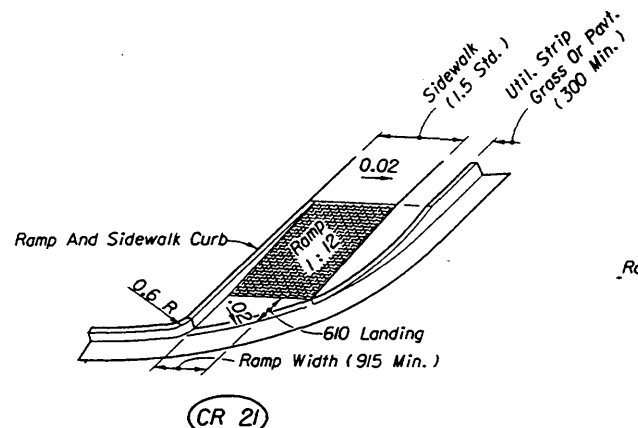
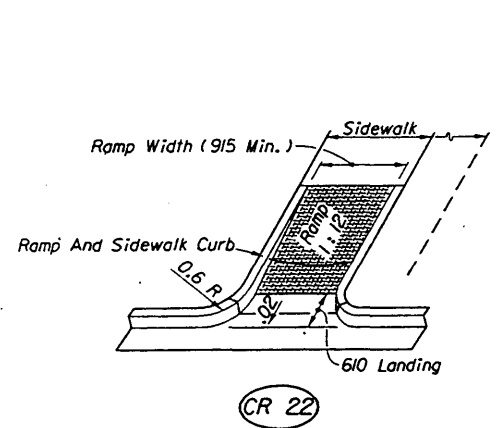
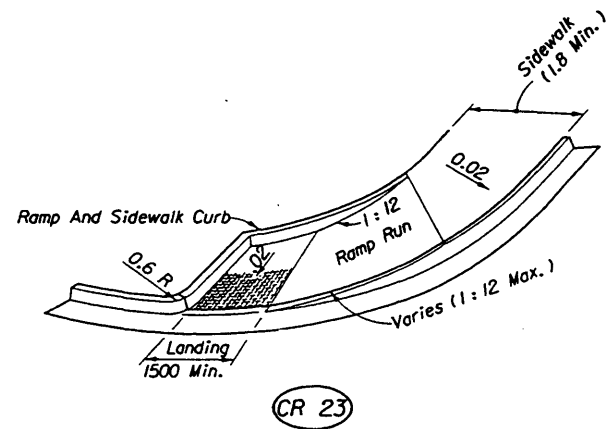
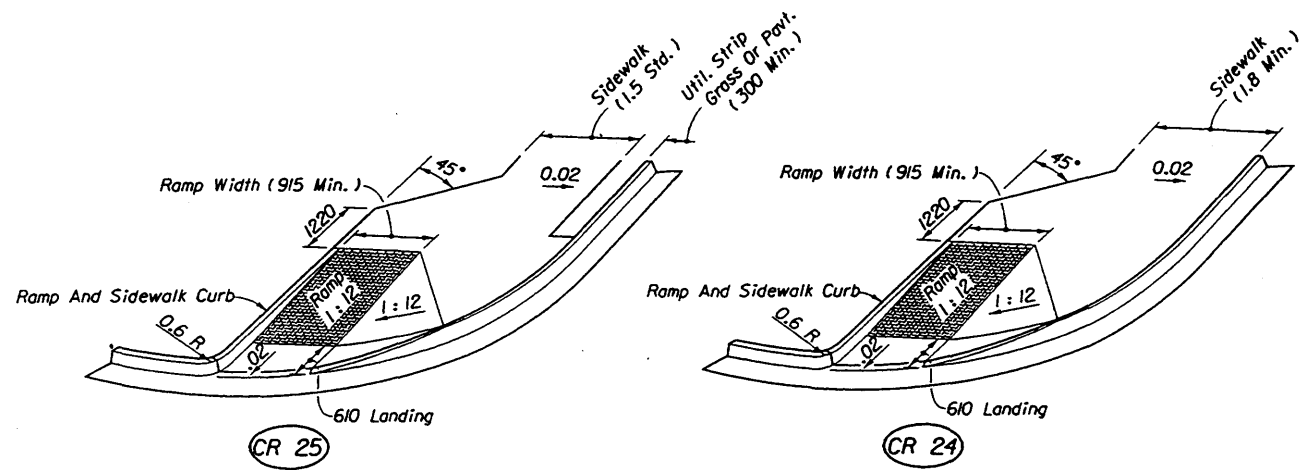
SECTION THROUGH RAMP RUN AND LANDINGS WITH UPPER LANDING AT NORMAL SIDEWALK ELEVATION



\* For BACK OF SIDEWALK CURB OR BUFFER TRANSITION And For RAMP AND SIDEWALK CURB OPTIONS See Sheet 4.

**DIMENSIONAL FEATURES FOR PUBLIC SIDEWALK CURB RAMPS WHERE RAMP AND LANDING DEPTH ARE RESTRICTED BY RIGHT OF WAY**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>PUBLIC SIDEWALK CURB RAMPS</b>				
Names	Dates	Approved By		
Designed By	STAF	10/94	 State Roadway Design Engineer	
Drawn By	ENR	10/94		
Checked By	JVG	10/94		
Revision		Sheet No.	Index No.	
96		3 of 5	304	

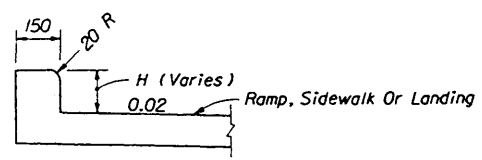


**DIMENSIONAL FEATURES FOR PUBLIC SIDEWALK CURB RAMPS FOR LINEAR PEDESTRIAN TRAFFIC**

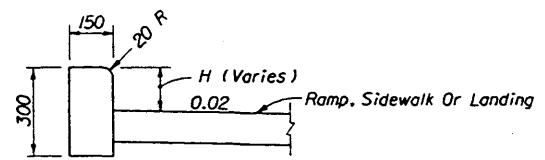
SECTION AA

CR 26

**DIAGONAL RAMPS FOR CONDITION OF INFEASIBILITY**

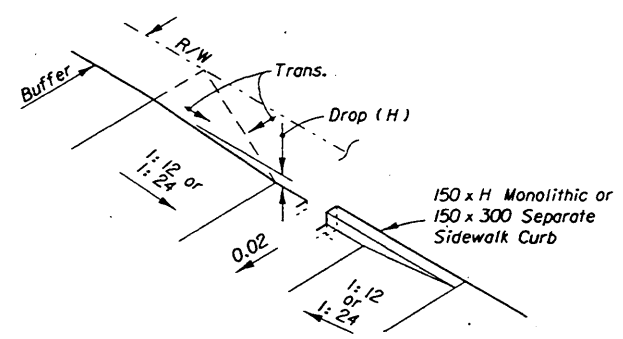


MONOLITHIC CAST CURB



SEPARATELY CAST CURB

**RAMP AND SIDEWALK CURB OPTIONS**

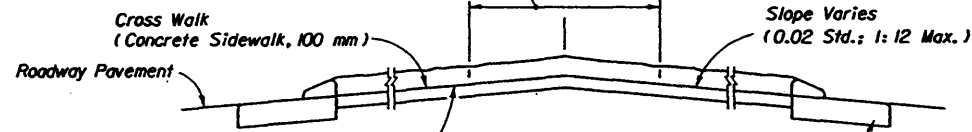


Construct Sidewalk Curb In Absence Of Adequate Buffer, Maintainable Surface Contour, Abutting Structure, Or When Called For In The Plans Or Standards

**BACK OF SIDEWALK CURB OR BUFFER TRANSITION**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>PUBLIC SIDEWALK CURB RAMPS</b>				
Names	Dates	Approved By		
Designed By	STAFF	10/94	[Signature]	
Drawn By	EKR	10/94	Revision	Sheet No.
Checked By	JVG	10/94	96	4 of 5
				Index No. 304

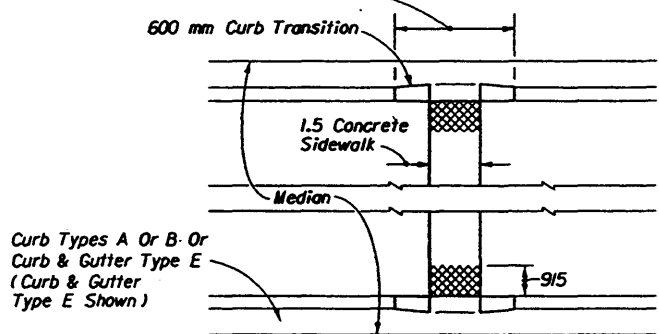
1.5 m Refuge With Maximum Slope Of 0.02 Must Be Provided When Slopes Of 0.05 Or Flatter And 1.5 m In Length Is Not Available On Crosswalk; The Refuge Can Be Constructed At Any Location Within The Crosswalk; Or, A 1.5 m x 1.5 m Concrete Landing With Maximum Slope Of 0.02 Can Be Constructed Adjacent To The Crosswalk.



Slopes Shall Intersect At Centerline Of Median On The 0.02 Rate When The Edge Of Pavement Elevations Are Equal. The Slopes May Intersect Off The Centerline For Variable Edge Of Pavement Elevations Or To Accommodate Other Construction In The Median; However, Slopes Shall Not Be Steeper Than 1:12.

SECTION CC

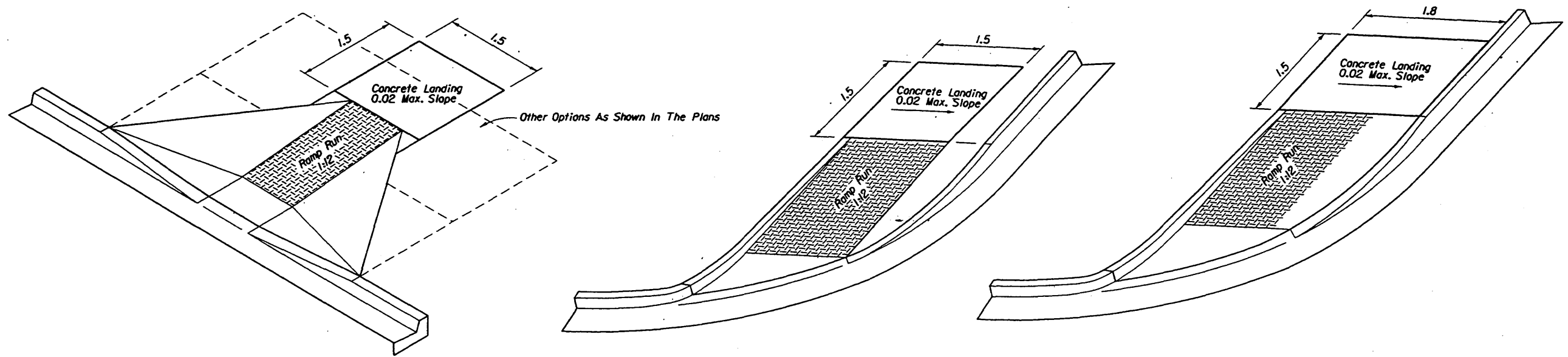
Curb Transition (On Existing Facilities Remove And Reconstruct Curb Or Curb & Gutter) For Payment See General Note 8.



Curb Types A Or B Or Curb & Gutter Type E (Curb & Gutter Type E Shown)

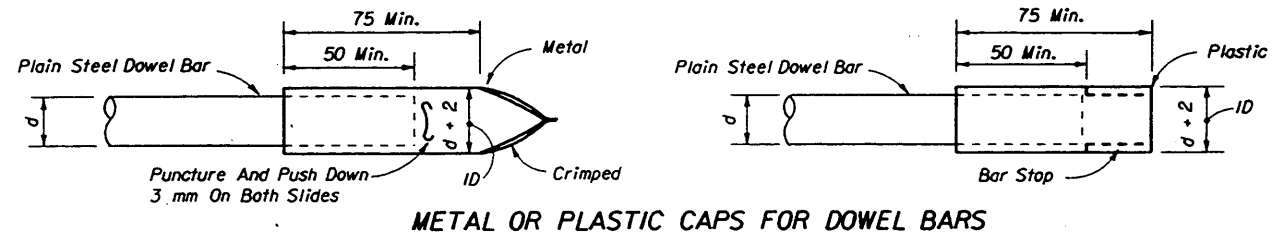
PLAN

**MEDIAN CROSSWALKS**

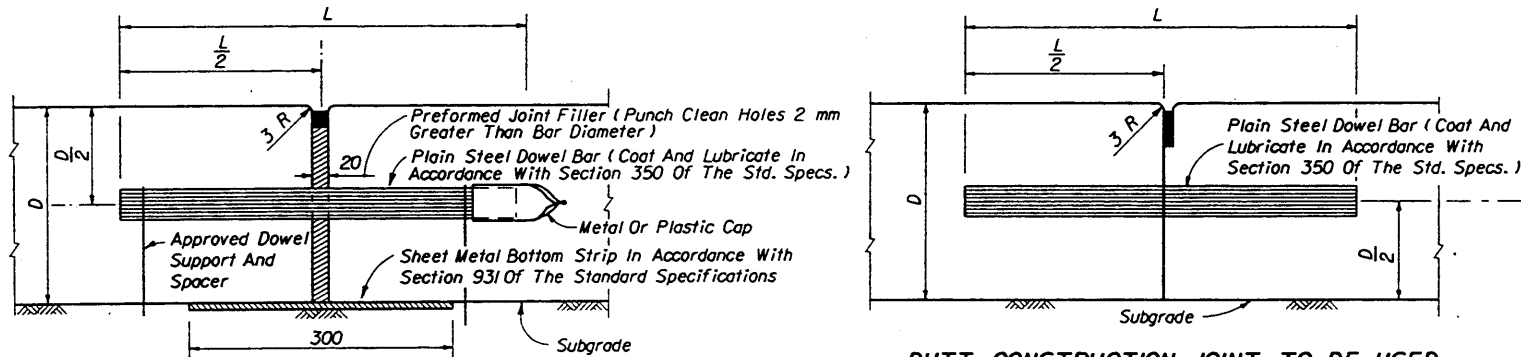


**LANDINGS FOR RAMPS WITHIN PUBLIC RIGHT OF WAY CONSTRUCTED AT LOCATIONS WHERE FUTURE SIDEWALKS ARE PROPOSED, WHERE STABLE SURFACES OTHER THAN SIDEWALKS ARE PART OF A CONTINUOUS PASSAGE OR WHERE A CURB FALLS ALONG THE CIRCULATION PATH TO PEDESTRIAN ROUTES ON ADJACENT SITES**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>PUBLIC SIDEWALK CURB RAMPS</b>				
Names	Dates	Approved By		
Designed By	STAFF	10/94	[Signature]	
Drawn By	RKB	10/94	Revision	Sheet No.
Checked By	JVC	10/94	96	5 of 5
				304



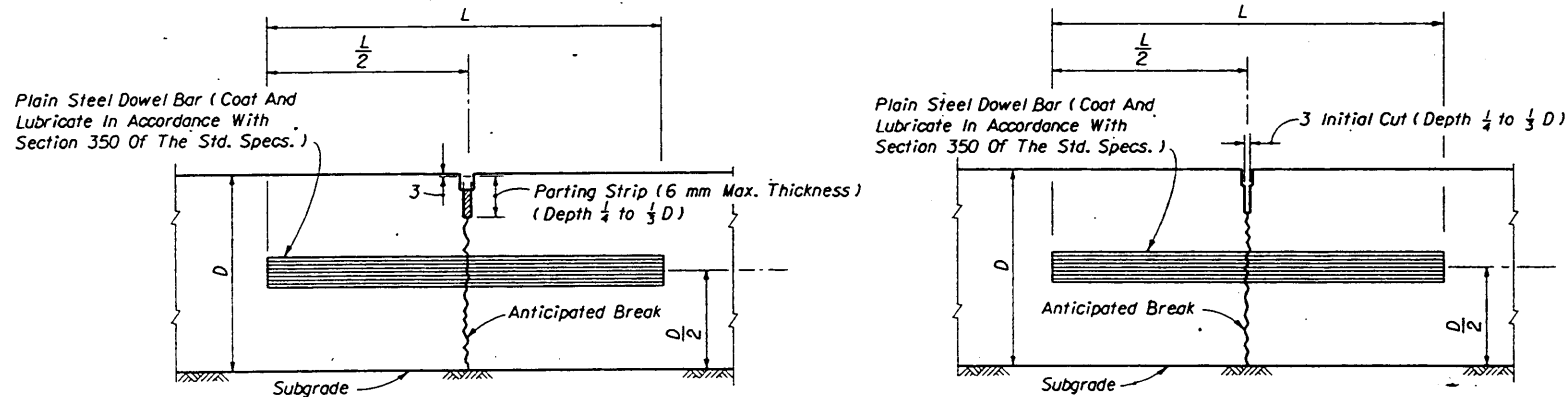
METAL OR PLASTIC CAPS FOR DOWEL BARS



BUTT CONSTRUCTION JOINT TO BE USED AT DISCONTINUANCES OF WORK

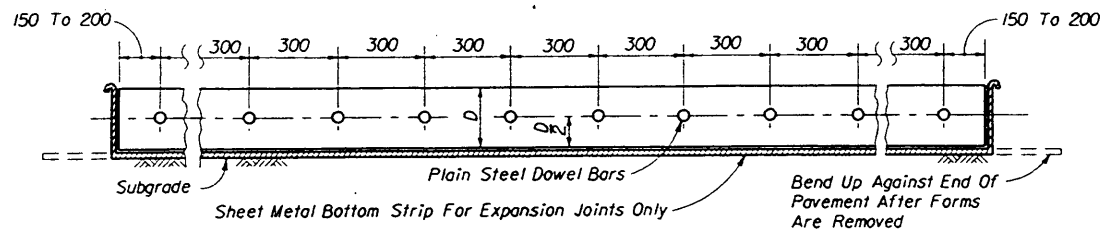
Note: Expansion joints to be placed on approaches to bridges, at street intersections and other locations indicated in detail plans.

TRANSVERSE EXPANSION JOINT



TRANSVERSE CONTRACTION JOINT, VIBRO CAST METHOD

TRANSVERSE CONTRACTION JOINT, SAWED METHOD

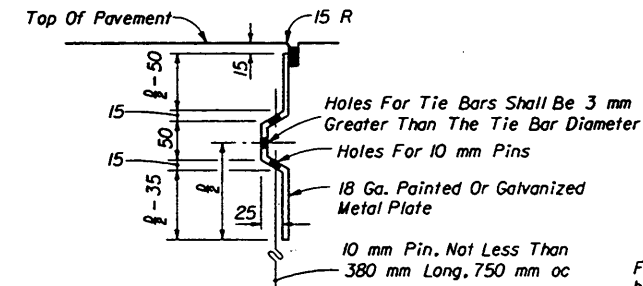


DOWEL BAR LAYOUT

DOWELS (LENGTH 450 mm)	
Pavement Thickness "D" (mm)	Diameter (mm)
150 - 170	20
180 - 190	25
200 - 210	30
> 210	35

TRANSVERSE JOINTS ARE TO BE SPACED AT A MAXIMUM OF 5.0 m. DOWELS ARE REQUIRED AT ALL TRANSVERSE JOINTS UNLESS OTHERWISE NOTED IN PLANS.

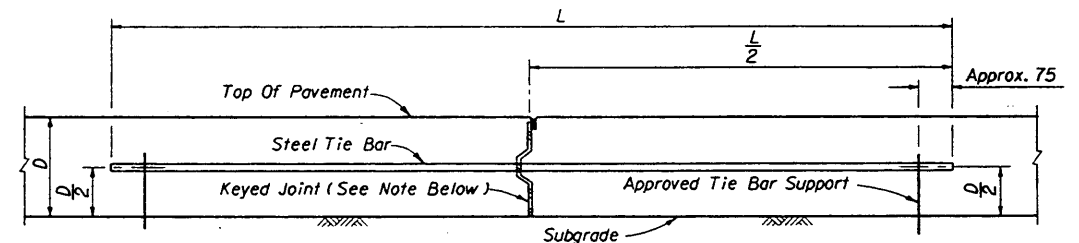
TRANSVERSE JOINTS



DEFORMED METAL PLATE

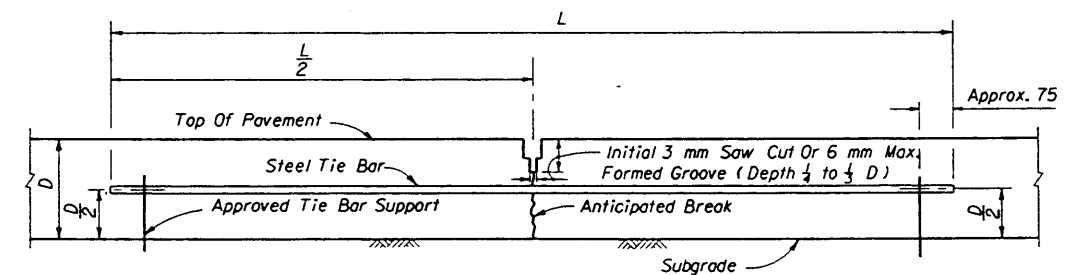
Pavement Thickness "D" (mm)	TIE BAR SPACING WITH MAXIMUM DISTANCE TO FREE EDGE 3.6 m	
	Maximum Spacing	
	*13 Bars Length 600 mm	*16 Bars Length 850 mm
150	1.2	1.2
160	1.1	1.2
170, 180	1.0	1.2
190, 200	0.9	1.2
210 To 230	0.8	1.2
240 To 270	0.7	1.2
280 To 300	0.6	1.2
310 To 330	0.6	1.1
340 To 350	0.5	1.0

For pavement thickness or for joint spacings not covered herein refer to FDOT Rigid Pavement Design Manual. Tie bars are deformed #13 or #16 reinforcing steel bars meeting the requirements of Section 931 of the Standard Specifications.



Note: Keyed longitudinal construction joints are required on all concrete pavement 220 mm thick or greater. The keyed joint may be formed by either the metal plate detailed above; by bolting shaped timber to the side form; or, by extrusion from slip-form paver. Alternate keyway shape and tie bar details may be approved by the Engineer.

LONGITUDINAL CONSTRUCTION JOINT



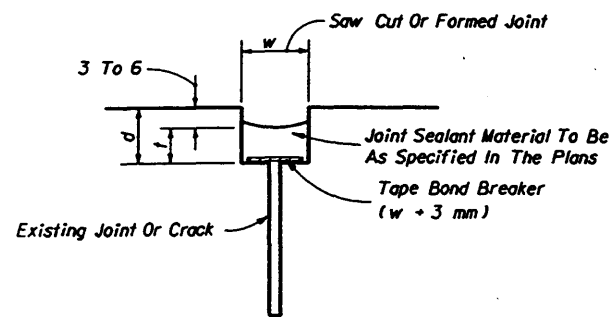
Note: Slabs poured simultaneously. Tie bars may be inserted in the plastic concrete by means approved by the Engineer.

LONGITUDINAL LANE-TIE JOINT

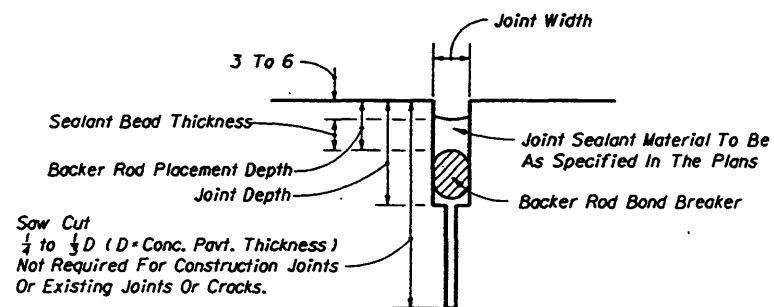
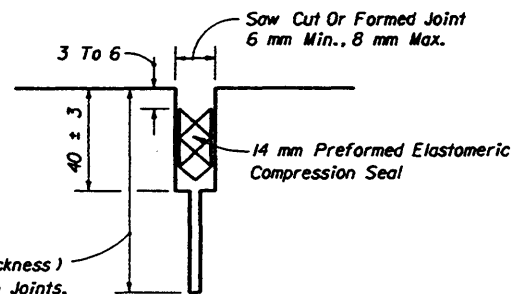
LONGITUDINAL JOINTS

Note: For joint seal dimensions see Sheet 2.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
CONCRETE PAVEMENT JOINTS				
Names	Dates	Approved By		
Designed By		Bruce Dietrich State Pavement Design Engineer		
Drawn By	HW 08/57	Revision	Sheet No.	Index No.
Checked By	HEC 08/57	00	1 of 5	305



Saw Cut Or Parting Strip  
 $\frac{1}{4}$  to  $\frac{1}{2}$  D (D = Conc. Part. Thickness)  
 Not Required For Construction Joints.



Saw Cut  
 $\frac{1}{4}$  to  $\frac{1}{2}$  D (D = Conc. Part. Thickness)  
 Not Required For Construction Joints  
 Or Existing Joints Or Cracks.

Note: Dimension w will be shown in the plans or established by the Engineer based on field conditions. Dimension d will be constructed so that the shape factor  $\frac{d}{w}$  has a maximum value of 2 and a minimum value of 1.

FOR REHABILITATION OF EXISTING JOINTS  
**TAPE BOND BREAKER**

FOR NEW JOINTS  
**PREFORMED ELASTOMERIC COMPRESSION SEAL**

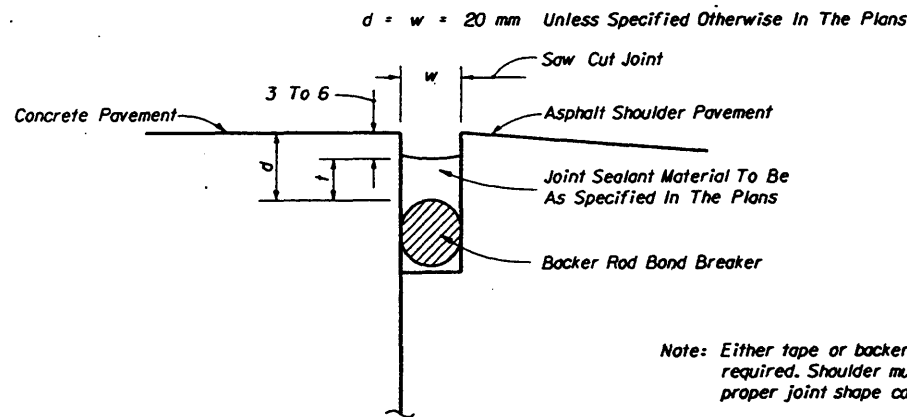
FOR NEW JOINTS AND REHABILITATION OF EXISTING JOINTS  
**BACKER ROD BOND BREAKER**

BACKER ROD BOND BREAKER (CONCRETE-CONCRETE JOINTS)				
JOINT DIMENSIONS (mm)				
JOINT WIDTH	SEALANT BEAD THICKNESS	BACKER ROD DIAMETER	MINIMUM JOINT DEPTH	BACKER ROD PLACEMENT DEPTH
6	6	10	25	13
10	6	13	31	13
13	6	16	31	13
16	8	20	38	14
20	10	25	45	16
23	12	28	45	17
25	12	31	50	20
>25	12	31+	50+	20

Unless otherwise indicated on the plans the joint width for new construction will be 6 mm for construction joints, 10 mm for all other joints.

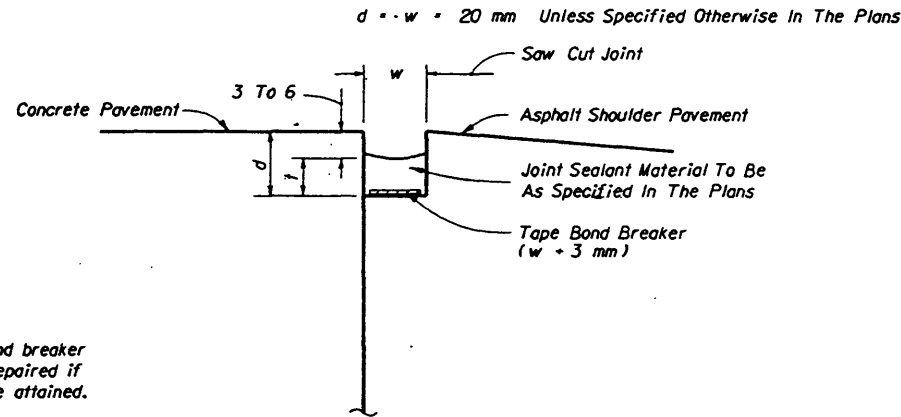
For rehabilitation projects the joint width will be shown on the plans or established by the Engineer based on field conditions.

### CONCRETE-CONCRETE JOINTS



**BACKER ROD BOND BREAKER**

Note: Either tape or backer rod bond breaker required. Shoulder must be repaired if proper joint shape can not be attained.



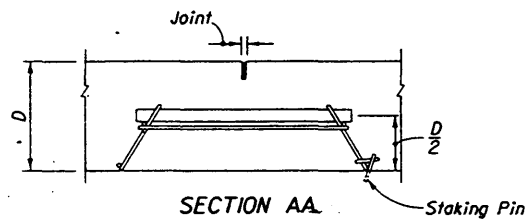
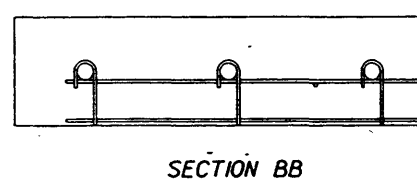
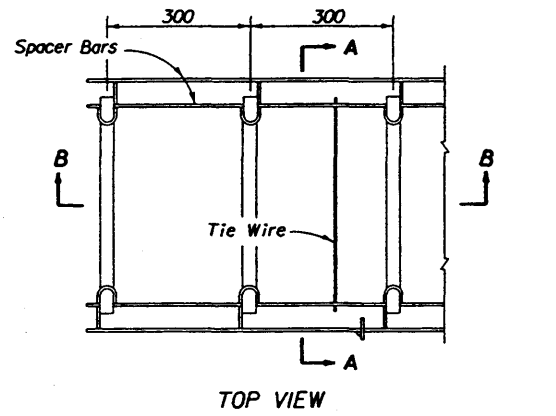
**TAPE BOND BREAKER**

FOR NEW JOINTS AND REHABILITATION OF EXISTING JOINTS  
**CONCRETE-ASPHALT SHOULDER JOINTS**

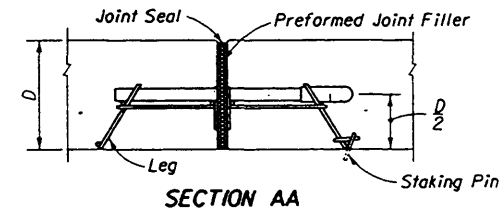
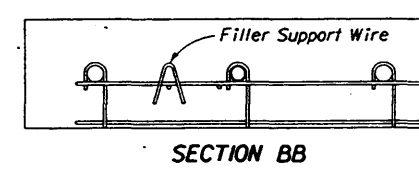
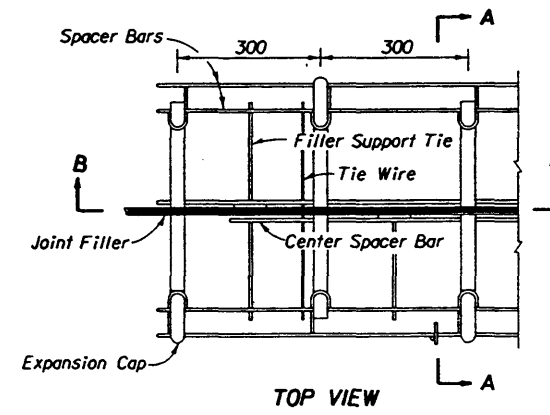
### JOINT SEAL DIMENSIONS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CONCRETE PAVEMENT JOINTS</b>				
Designed By	WNL	05/86	Approved By <i>Bruce Dietrich</i> State Pavement Design Engineer	
Drawn By	USD	05/86	Revision	Sheet No.
Checked By	JVG	05/86	94	2 of 5
				Index No. 305





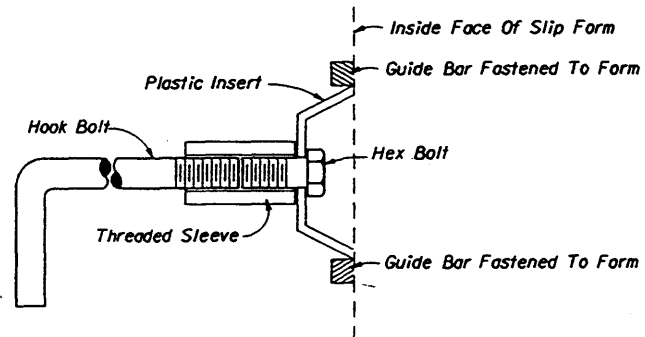
CONTRACTION ASSEMBLY



EXPANSION ASSEMBLY

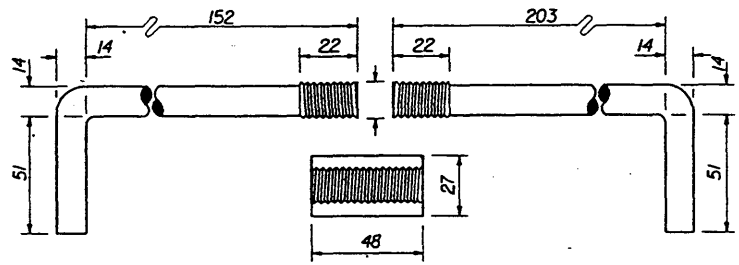
Note:  
Proprietary contraction and expansion assemblies may be used.  
Products shall be introduced to the State Construction Office in  
accordance with section (C) of the Product Evaluation Procedure.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
CONCRETE PAVEMENT JOINTS				
	Names	Dates	Approved By	
Designed By	BPD	07/97	Bene Dietrich State Pavement Design Engineer	
Drawn By	BSD	07/94	Revision	Sheet No. Index No.
Checked By	BPD	07/97	96	3 of 5 305



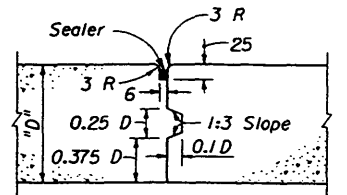
NOTE: After the concrete has set to the extent that the keyway will retain its shape, the hex bolt and plastic insert shall be removed. The remaining portion of the hook bolt assembly shall be installed immediately prior to placing of concrete in the adjacent lane.

ALTERNATE KEYWAY AND HOOK BOLT

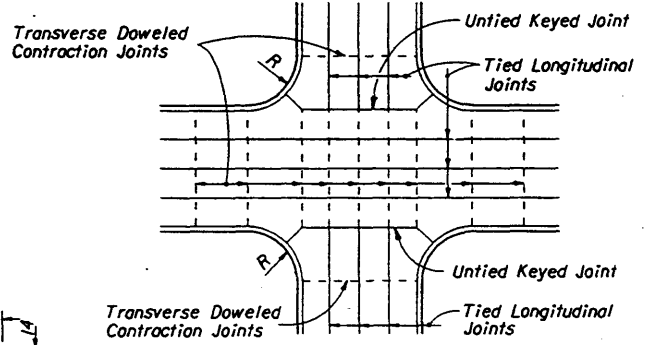


Anchor bolts shall be Grade C in accordance with ASTM A 307.  
Threaded sleeves shall develop the full strength of the bolt and meet the material and thread requirements of ASTM A 563.

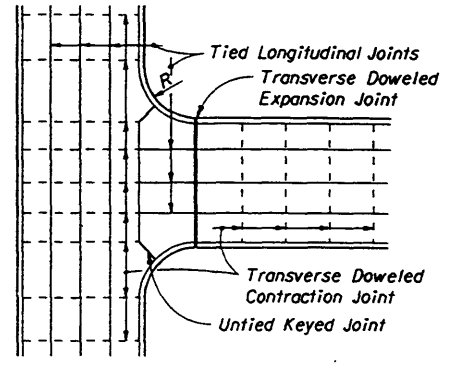
STEEL HOOK BOLT ASSEMBLY



DETAIL OF KEYED JOINT



JOINT LAYOUT AT THRU INTERSECTION



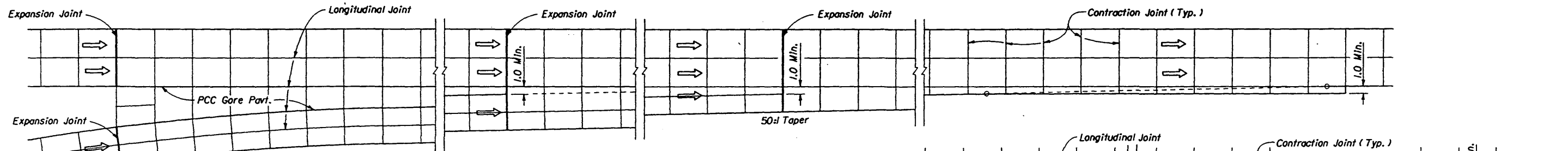
JOINT LAYOUT AT 'T' INTERSECTIONS

NOTES

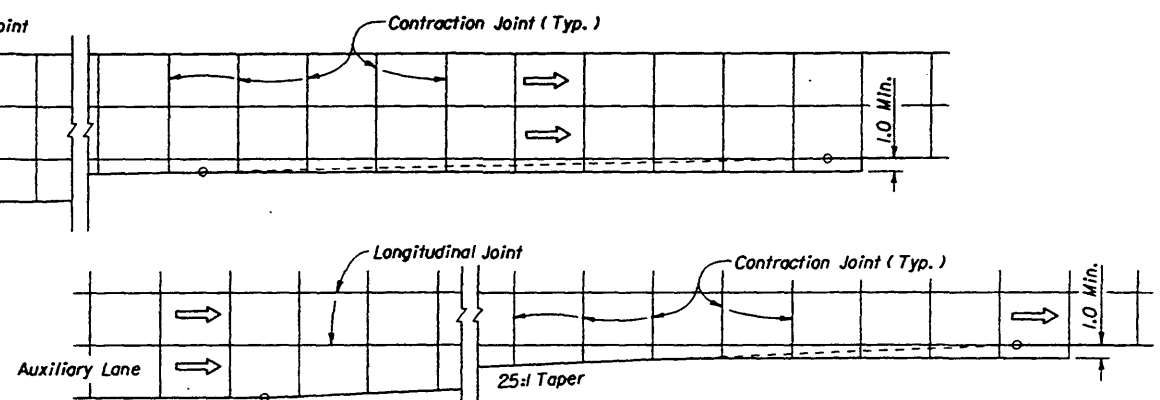
1. Longitudinal joints will not be required for single lane pavement 4.2 m or less in width. For entrance and exit ramp joint details, see sheet 5 of 5.
2. When pavement width necessitates five or more longitudinal joints which would normally be tied, provide one or more untied but keyed joints. No joint shall be tied that is more than 7.2 m from a free edge or free joint including tied rigid shoulders.
3. Arrangement of longitudinal joints are to be as directed by the Engineer.
4. All manholes, meter boxes and other projections into the pavement shall be boxed-in with 13 mm preformed expansion joint material.

DETAIL OF JOINT ARRANGEMENT

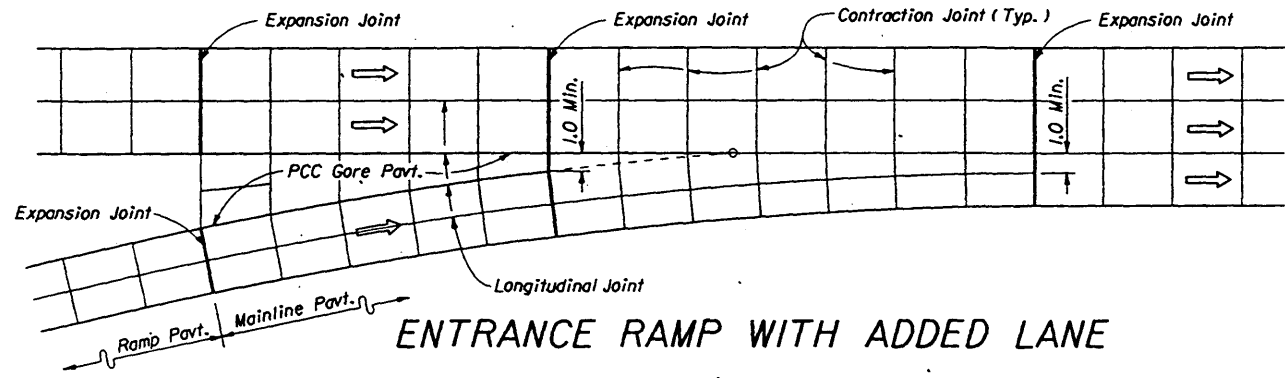
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CONCRETE PAVEMENT JOINTS</b>				
Designed By	Names	Dates	Approved By	
Drawn By	ESD	07/94	 State Pavement Design Engineer	
Checked By	HPD	07/94		
	Revision	Sheet No.	Index No.	
	94	4 of 5	305	



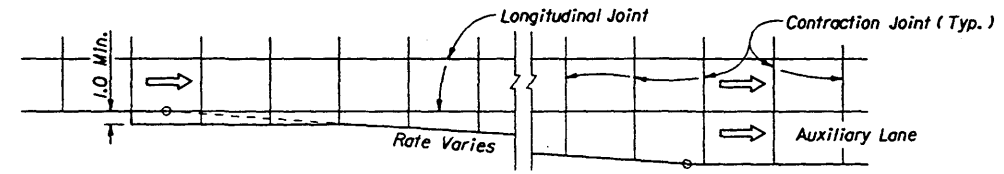
2-THRU LANES WITH SINGLE LANE ENTRANCE RAMP



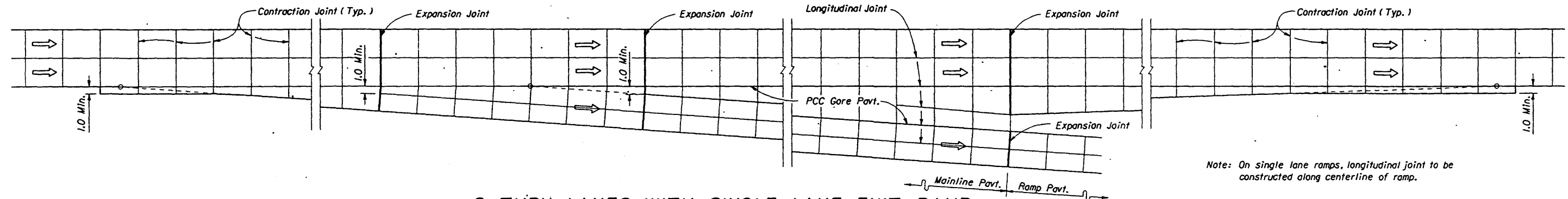
ENTRANCE TAPER WITH AUXILIARY LANE



ENTRANCE RAMP WITH ADDED LANE

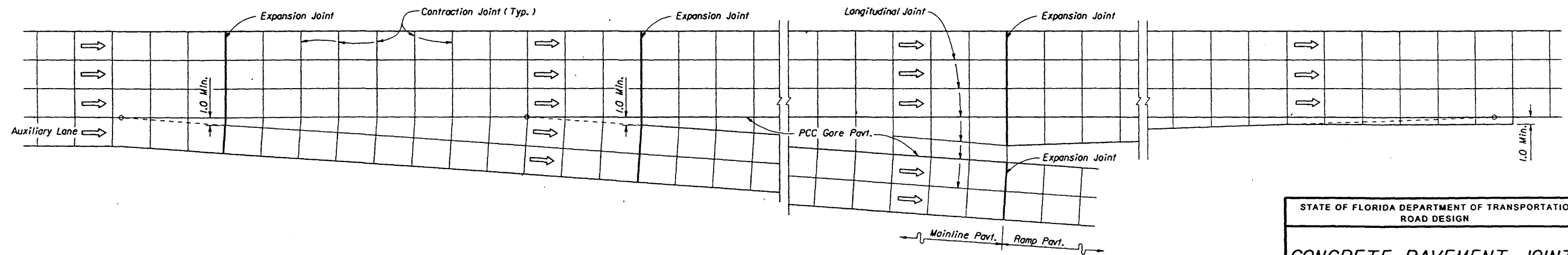


EXIT TAPER WITH AUXILIARY LANE



2-THRU LANES WITH SINGLE LANE EXIT RAMP

Note: On single lane ramps, longitudinal joint to be constructed along centerline of ramp.

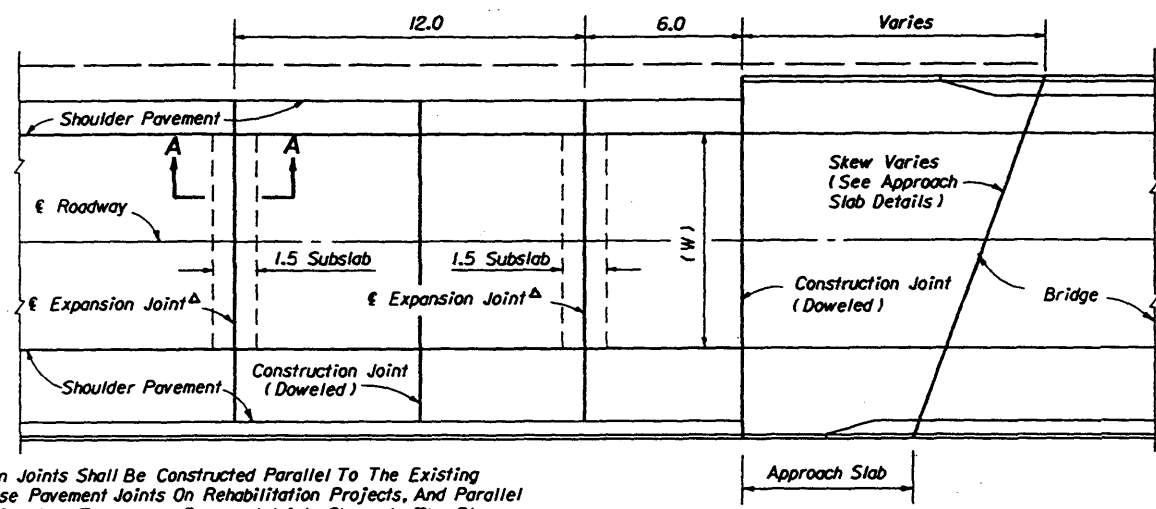


3-THRU LANES WITH AUXILIARY LANE AND 2-LANE EXIT RAMP

JOINT LAYOUT AT ENTRANCE AND EXIT RAMP TERMINALS

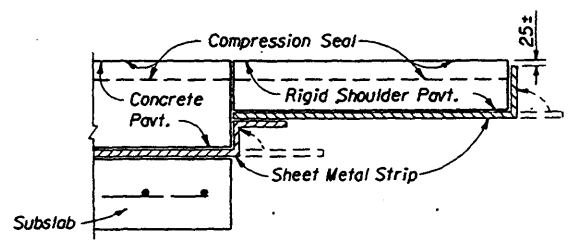
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
CONCRETE PAVEMENT JOINTS				
Designed By	Names	Dates	Approved By	
Drawn By	Checked By	Revision	Sheet No.	
Index No.				

Designed By: MKL/STD 11/91  
 Drawn By: MKL 11/91  
 Checked By: MKL 11/91  
 Approved By: *Bruce Dittich*  
 State Pavement Design Engineer  
 Revision: 94  
 Sheet No.: 5 of 5  
 Index No.: 305

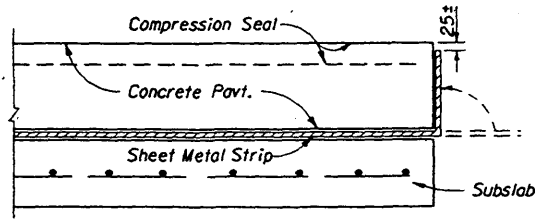


△ Expansion Joints Shall Be Constructed Parallel To The Existing Transverse Pavement Joints On Rehabilitation Projects, And Parallel To The Standard Transverse Pavement Joints Shown In The Plans For New Construction.

PLAN



WITH RIGID SHOULDER PAVEMENT



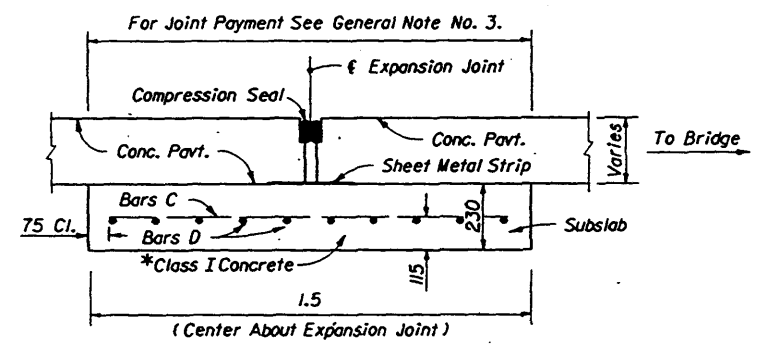
WITH GRASSED SHOULDER OR FLEXIBLE SHOULDER PAVEMENT

Note: Immediately prior to placing the seal, the joint shall be thoroughly cleaned of all foreign material. Immediately after the seal is placed, sheet metal strip shall be bent up against the pavement edge.

The sheet metal strip shall be a minimum 16 gage steel, 0.3 m wide and shall be galvanized in accordance with ASTM A-526, Coating Designation G90.

Rigid shoulder pavement shall be concrete or econcrete as called for in the plans.

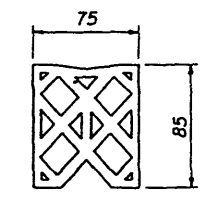
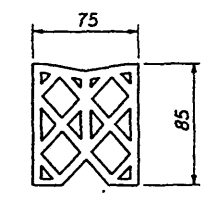
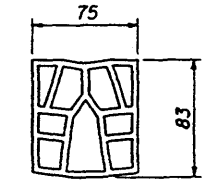
DETAIL SHOWING SHEET METAL STRIP



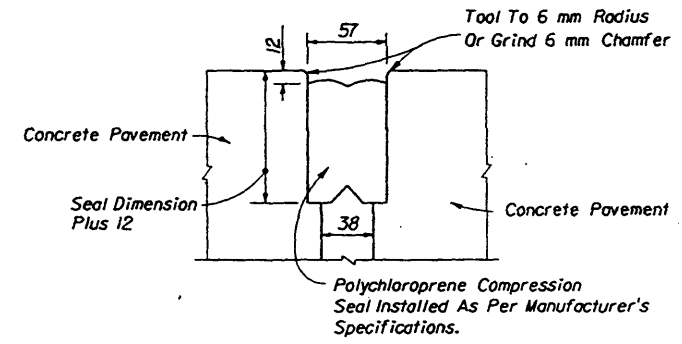
REINFORCING STEEL				
Mark	Size	Spac.	No. Req.	Lgth.
C	#16	150	Varies	1.35 m
D	#16	150	10	W Minus 150 mm

\*Finish surface smooth. Cure with heavy coating of wax base white pigmented curing compound. Apply second application immediately prior to placing pavement.

SECTION AA EXPANSION JOINT



OPTIONAL SEALS



Note: All contacting surfaces between the compression seal and concrete shall be thoroughly coated with a lubricant-adhesive.

JOINT DIMENSIONS COMPRESSION SEAL DETAIL

DESIGN NOTES

- For rehabilitation projects, the designer must indicate in the plans the number of slabs to be removed, the number of sub slabs to be constructed/reconstructed, and the location of expansion joints.
- Pay quantity of expansion joint to be calculated across pavement at right angles to the centerline of the roadway pavement. Shoulder pavement joint included.

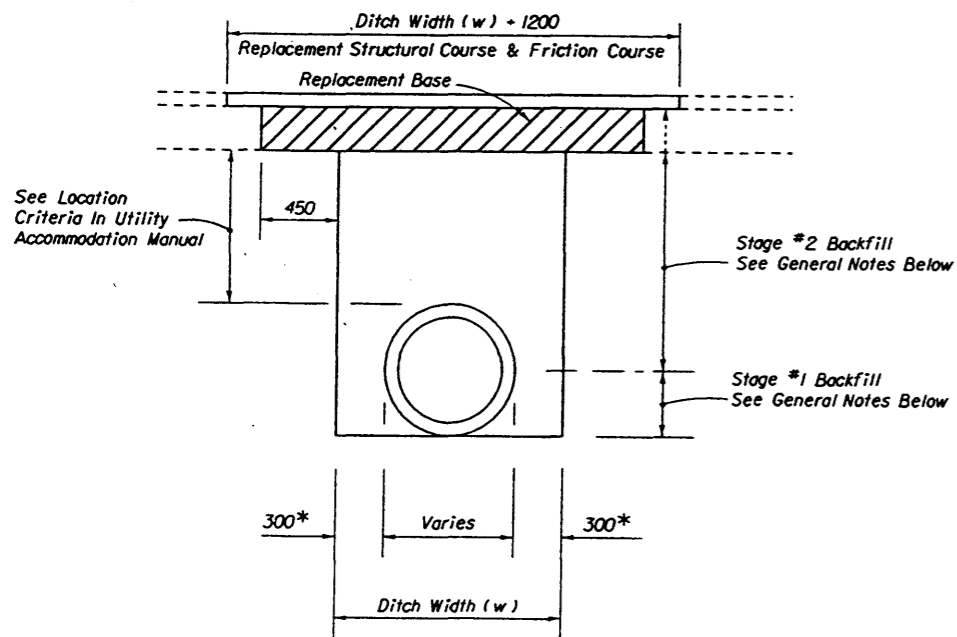
GENERAL NOTES

- The centerline of roadway and the centerline of bridge do not necessarily coincide. Prior to the placement of the expansion joint, the centerline of the roadway pavement shall be determined.
- For information on other types of concrete pavement joints see Index No. 305.
- Pay quantity for expansion joint is the length of joint to be constructed across the roadway and shoulder pavements, measured at right angles to the centerline of the roadway. Payment for expansion joint shall be full compensation for joint construction, including reinforced concrete subslab, sheet metal strip and compression seal, but, not including roadway pavement reconstruction associated with joint replacement or reconstruction. Expansion joint to be paid for under the contract unit price for Bridge Approach Expansion Joint, MI.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN

BRIDGE APPROACH EXPANSION JOINT - CONCRETE PAVEMENT

Names	Dates	Approved By				
Designed By		 State Pavement Design Engineer				
Drawn By	IMF 06/75				Revision	Sheet No.
Checked By	SFA 06/75				98	1 of 1
				Index No.		
				306		



\* If mechanical compaction is difficult to achieve, then flowable fill shall be used. When flowable fill is used, this dimension may be reduced to 100 mm.

#### FLEXIBLE PAVEMENT NOTES

##### PAVEMENT REMOVAL AND REPLACEMENT

Pavement shall be mechanically sawed.

The replacement friction course shall match the existing friction course, except Type S Structural course may be used in lieu of dense graded friction course. The thickness of the replacement asphalt pavement shall match the thickness of the existing asphalt pavement.

The new base materials shall be either of the same type and composition as the materials removed or of equal or greater structural adequacy (See Index No. 514).

##### BACKFILL

###### COMPACTED AND STABILIZED FILL OPTION

Backfill material shall be placed in accordance with Section 125 of the Standard Specifications.

In Stage #1, construct compacted fill beneath the haunches of the pipe, using mechanical tamps suitable for this purpose. This compaction applies to the material placed beneath the haunches of the pipe and above any bedding.

In Stage #2, construct compacted fill along the sides of the pipe and up to the bottom of the base, with the upper 300 mm receiving Type B Stabilization. In lieu of Type B Stabilization, the Contractor may construct using Optional Base Group 3.

###### FLOWABLE FILL OPTION

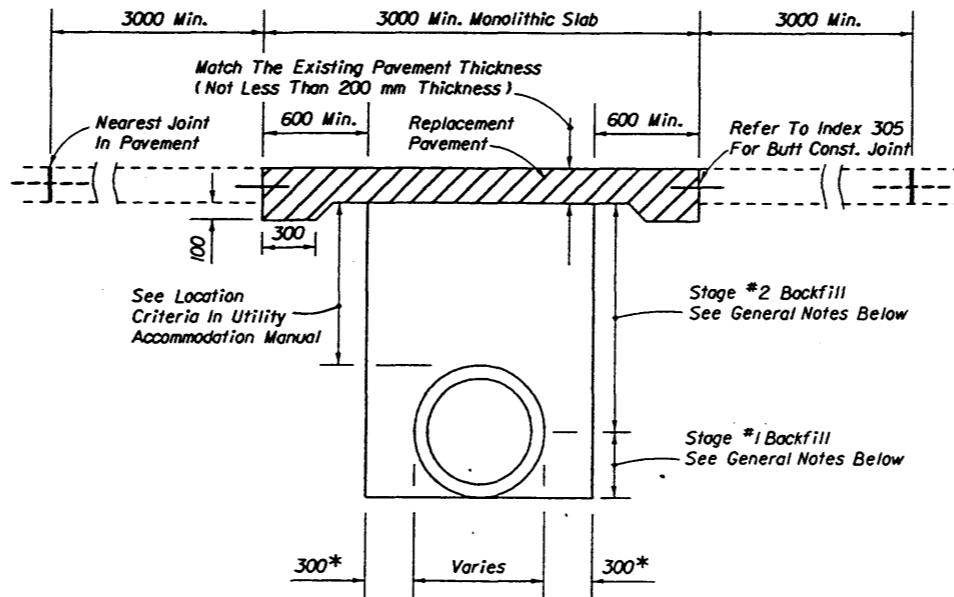
Flowable fill is to be placed in accordance with Section 121 of the Specifications.

If forms are used to temporarily contain flowable fill, the forms shall be in accordance with the Standard Specifications.

In Stage #1, place flowable fill midway up on both sides of the utility. Allow to harden before placing Stage #2.

In Stage #2, place flowable fill to the bottom of the existing asphaltic structural course. Do not allow the utility being installed to float. If a method is provided to prevent floatation from occurring, Stages #1 and #2 can be combined, if approved by the Engineer.

#### FLEXIBLE PAVEMENT CUT



#### RIGID PAVEMENT NOTES

##### PAVEMENT REMOVAL AND REPLACEMENT

High early strength cement concrete (21,000 kPa) shall be used for rigid pavement replacement.

Pavement shall be mechanically sawed and restored to conform with existing pavement joints within 12 hours. (See Index No. 305)

##### GRANULAR BACKFILL

Any edg drain system that is removed shall be replaced with the same type materials. Any edg drain system that is damaged shall be repaired with methods approved by the Engineer.

Fill material shall be placed in accordance with the Standard Specifications. Fill material shall be special select soil in accordance with Index No. 505.

In Stage #1, construct compacted fill beneath the haunches of the pipe, using mechanical tamps suitable for this purpose. This compaction applies to the material placed beneath the haunches of the pipe and above any bedding.


In Stage #2, construct fill along the sides of the pipe and up to the bottom of replacement pavement.

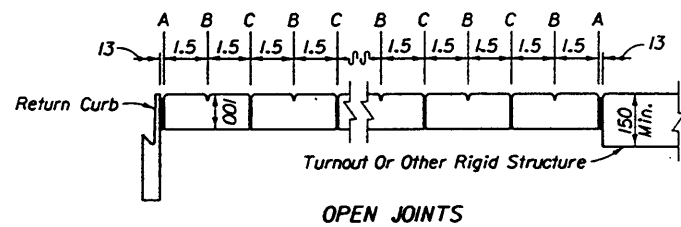
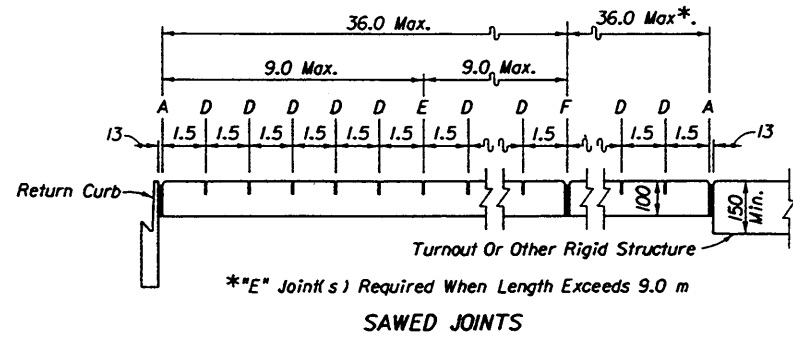
#### RIGID PAVEMENT CUT

#### GENERAL NOTES

- The details provided in this standard index apply to cases in which jack and bore or directional boring methods are not feasible.
- These details should not apply to utility cuts longitudinal to the centerline of the roadway which may require the additional use of geotextiles, special bedding and backfill, or other special requirements.
- Method of construction must be approved by the Engineer.
- Some pipe may require special granular backfill up to 150 mm above top of pipe. Geotextiles may be required to encapsulate the special granular material.
- Where asphalt concrete overlays exist over full slab concrete pavement, the replacement pavement shall have an overlay constructed over the replacement slab. The overlay shall match the existing asphalt pavement thickness. The replacement friction course shall match the existing friction course, except Type S Structural course may be used in lieu of dense graded friction course.  
Existing broken and seated pavements shall be treated as flexible pavements.
- All shoulder pavement, curb and curb and gutter and their substructure disturbed by utility trench cut construction shall be restored in kind.
- Approved permanent patch materials may be used in lieu of Type S structural courses. Refer to the Department's Qualified Products List.

## TRENCH CUT AND RESTORATION WITHIN ROADWAY LIMITS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
UTILITY CUT				
Names	Dates	Approved By		
Designed By	JCM/BND	12/95	 State Utilities Engineer	
Drawn By	HSD	12/95		
Checked By	BND/JVG	12/95	Revision	Sheet No.
			98	1 of 1
				Index No. 307



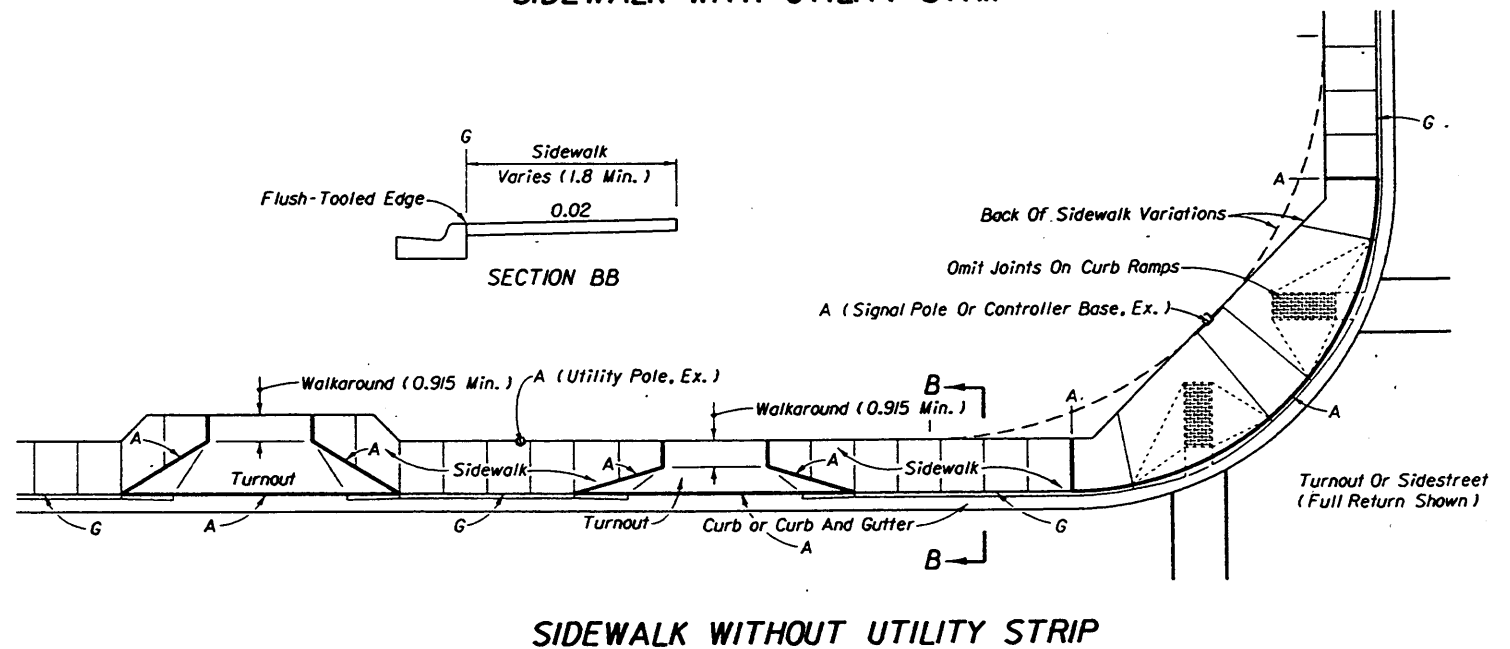
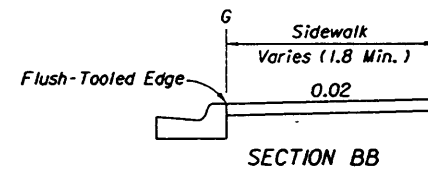
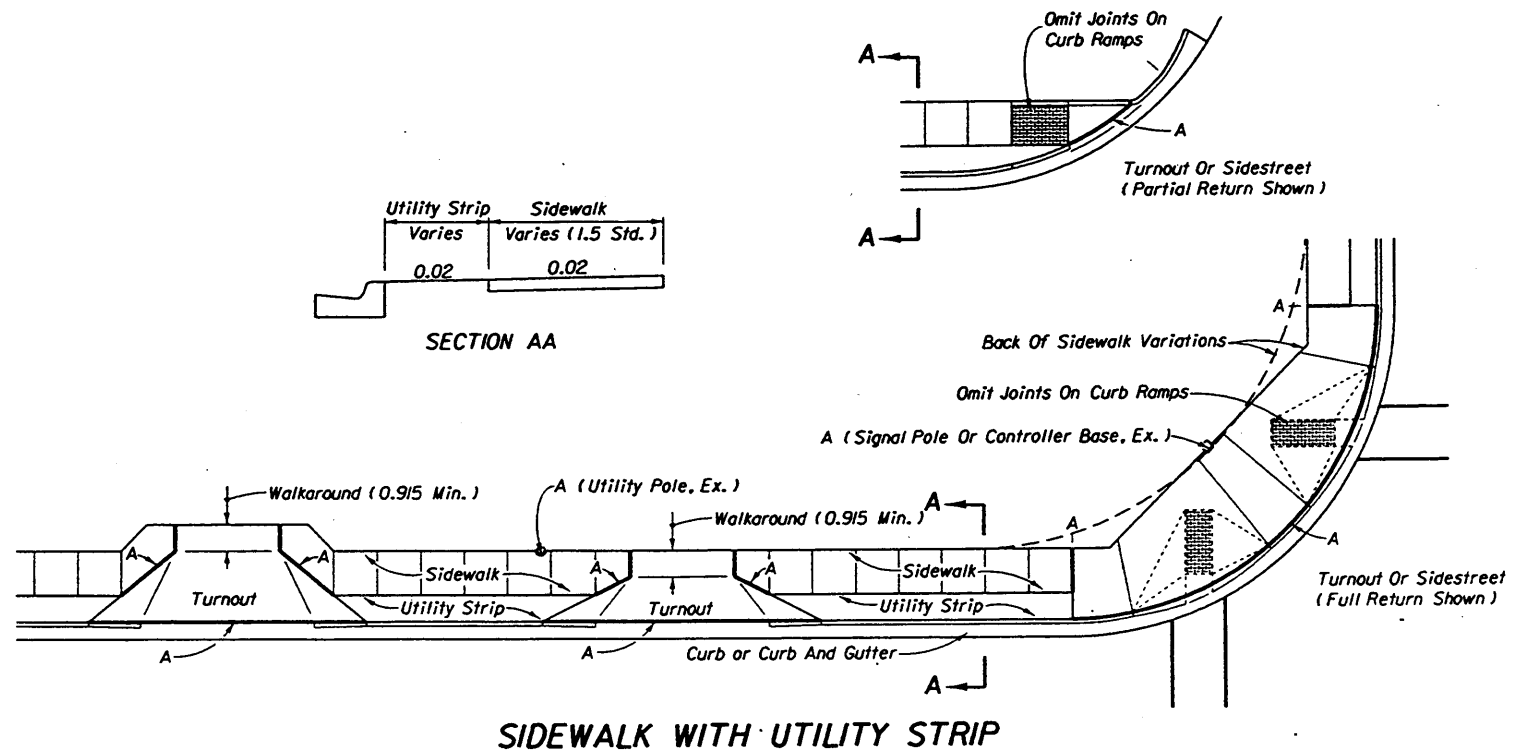
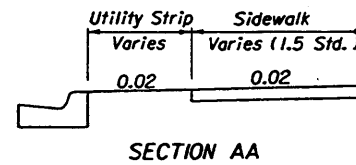
**LONGITUDINAL SECTIONS  
SIDEWALK JOINTS**

**JOINT LEGEND**

- A- 13 mm Expansion Joints (Preformed Joint Filler)
- B- 3 mm Dummy Joints, Tooled
- C- 3 mm Formed Open Joints
- D- 5 mm Saw Cut Joints, 40 mm Deep (96th Hour) Max. 1.5 m Centers
- E- 5 mm Saw Cut Joints, 40 mm Deep (12th Hour) Max. 9.0 m Centers
- F- 13 mm Expansion Joint When Run Of Sidewalk Exceeds 36.0 m
- G- Cold Joint With Bond Breaker, Tooled

**NOTES FOR CONCRETE SIDEWALK ON CURBED ROADWAYS**

1. Sidewalks shall be constructed in accordance with Section 522 of the FDOT Standard Specifications except for public sidewalk curb ramp runs which shall be finished in accordance with Index No. 304.
2. Bond breaker material can be any impermeable coated or sheet membrane or preformed material having a thickness of not less than 6 mils nor more than 13 mm.
3. For public sidewalk curb ramps see Index No. 304.
4. For turnouts see Index No. 515.
5. Sidewalk shall be paid for under the contract unit price for Sidewalk Concrete ( \_\_\_ mm Thick ), M2 .



**CONCRETE SIDEWALK FOR CURBED ROADWAYS**

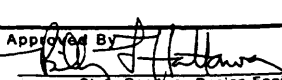
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CONCRETE SIDEWALK</b>				
Designed By	SPCS	Dates	Approved By	[Signature]
Drawn By	RKR	11/93	Revision	Sheet No. 1 of 2
Checked By	JVG	11/93	00	Index No. 310



## GENERAL NOTES

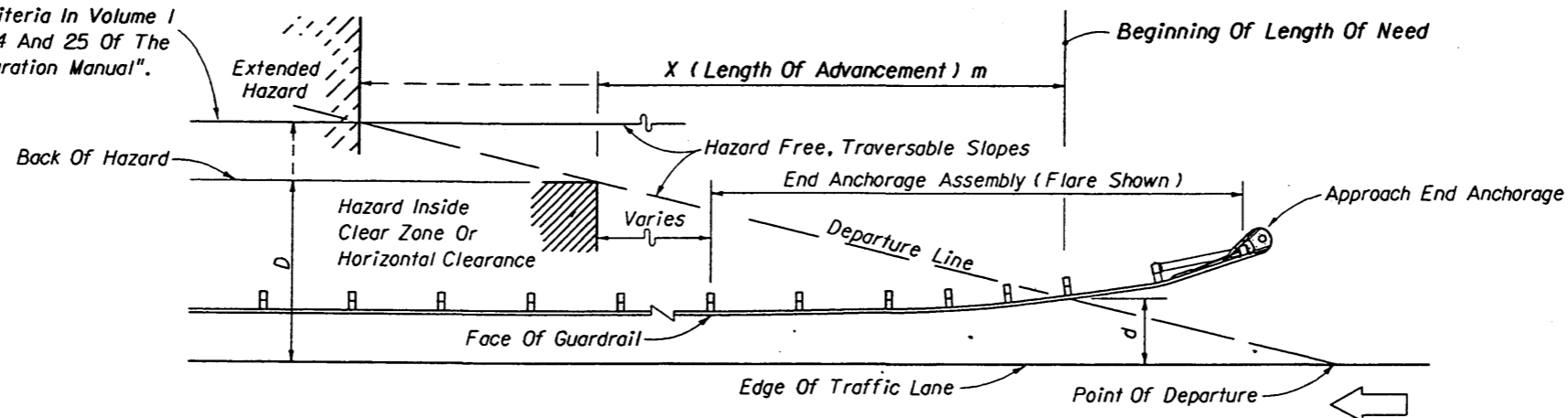
1. The illustrations for guardrail applications are standard configurations; adjustments are to be made as required by site specific condition to attain optimum design for function, economy and serviceability.
2. The beginning of guardrail need shall be at the greatest of the upstream distances from the hazard, as determined from Figure 1, and other application details of this index.
3. One Panel equals 3.810 m. Guardrail shall be constructed with rail elements 3.810 m in length except where 7.620 m elements are called for by this and other standards (indexes) or specifically called for in the plans.  
  
Post spacings shall be 1.905 m except that reduced spacings shall be used for (a) transitions to anchorages at rigid structures such as bridges (See Details E and J) and transitions to redirective crash cushions, (b) the conditions in No. 7 below, (c) special post applications, (d) the specific posts spacing shown in Index No. 401, (e) reduced post spacing required for specific end anchorage assemblies, and, (f) specific spacings called for in the plans.
4. Guardrail mounting height for the W-beam without rubrail and for thrie-beam is 550 mm to the center of beam, and for W-beam with rubrail 610 mm to center of beam. Modified thrie-beam shall be mounted at a height of 610 mm to center of beam. The height is critical and shall be attained in all cases; a tolerance of 75 mm above and 25 mm below the standard mounting heights is permissible over necessary surface irregularities (e.g., across shoulder gutters, inlets and roadway surface break lines).
5. All guardrail panels, end sections and special end shoes shall be lapped in the direction of adjacent traffic.
6. Flared end anchorage assemblies providing 1.2 m offset are the standard end treatments for single face free standing guardrail approach ends. Parallel end anchorage assemblies for guardrail approach end treatments will be constructed only when restraints prevent construction of flared end anchorages.
7. At above ground rigid hazards where the face of guardrail is offset from the hazard less than the 1.2 m minimum for standard W-beam, other guardrail configurations may be applicable; see General Note No. 10 and the minimum offset table on Sheet 18. For guardrail with post spacing less than 1.905 m the reduced spacing should extend a minimum of one panel in advance of the hazard. When minimum offset cannot be attained safety shape concrete barrier shall be used unless other shielding is approved by the Engineer of record. See Index No. 410 for safety shape concrete barriers and typical applications, and the plans for special barrier shapes and applications.
8. In addition to use at conventional roadside hazards, guardrail will be required on flush shoulder sections where fill slopes are steeper than 1:3 within the clear zone, and on curved sections where fill slopes are steeper than 1:3 within 1.2 m of the face of curb. However, when fill heights are less than 1.8 m the guardrail may be omitted, unless in the opinion the Engineer its use is deemed necessary due to other roadside features.
9. The guardrail to bridge connections contained in this index are for bridges with Test Level 4 safety shaped traffic rails. For guardrail to bridge connections on existing bridges with less than Test Level 4 rails see Index No. 401. For guardrail to concrete barrier wall connections see Index No. 410.
10. Thrie-beam guardrail panels shall be used in guardrail transitions to bridge traffic rail barriers, to concrete safety shaped barriers, to temporary detour bridges and as a continuous barrier when called for in the plans. For additional information on rail attachment, post spacings, nested rails, location of thrie-beam transition panels and offset block configurations see details elsewhere in this Index, Index Nos. 410 and 435. The use of thrie-beam guardrail with standard offset blocks may be considered where one or more of the conditions listed below or similar conditions are anticipated or exist:
  - a. W-beam deflection is marginal,
  - b. W-beam with rubrail considered functionally deficient,
  - c. Overriding W-beam is probable,
  - d. Drainage will be impeded or blocked by the use of concrete barrier wall,
  - e. High frequency of repairs to W-beam,
  - f. Spandrel beam with low deflection needed around unrelocatable structure, and,
  - g. Accomodating passenger vehicles heavier or larger than the standard passenger car (e.g. passenger vans and small buses)
11. Median guardrail for bridges located on divided roadways shall be constructed the same as outer roadway guardrail under the following conditions:
  - (a) Wide medians where approach end anchor is located outside of opposing roadway clear zone.
  - (b) Medians of uniform width that are occupied by other transportation and joint use facilities.
  - (c) Medians of uniform or variable widths with independent vertical alignments not suited to normal median guardrail installations.
  - (d) Medians of bifurcated roadways.
12. Straight rail sections may be used to construct radii of 38.0 m or greater. For radii less than 38.0 m the rail must be fabricated (shop-bent) to fit.
13. Crash cushions may be required in lieu of or in conjunction with guardrail at locations where space does not permit development of sufficient guardrail length, offset or crashworthiness at terminals. Crash cushions shall be constructed at or in lieu of Type II assemblies located in the approach clear zones.
14. Corrugated sheet steel beams, end shoes, end sections and back-up plates shall conform to the current requirements of AASHTO M180, Class A, Type II (zinc) coating. Aluminum guardrail elements will not be permitted unless specifically called for in the plans. All other metallic components, hardware and accessories shall be in conformance with the appropriate current AASHTO requirements.  
  
Recycled beams: Used Class A guardrail beams that have been refurbished to condition new (AASHTO M180) may be used for both construction of new guardrail and maintenance of existing guardrail. Refurbishing shall include stripping of the existing galvanizing, restoration of the base metal in section and straightness free of warp and deformation, and, regalvanizing to AASHTO Type II specifications. Refurbished beams that retain ruptured holes, gashes or tears will not be accepted.
15. Permissible post and offset block combinations are tabulated on Sheet 16.
16. Where necessary to enlarge or add holes to galvanized guardrail, the work will be done by drilling or reaming. Damaged galvanized guardrail will be metalized in accordance with Sections 562 and 971 of the Standard Specifications. No burning of holes will be permitted.
17. Guardrail reflector color (white or yellow) shall conform to the color of the near lane edgeline.
18. Any run of guardrail with existing concrete posts that is being reset under a consturction or maintenance contract shall be reset using timber or steel posts. Repair within a run of guardrail with existing concrete posts can be made with either steel, timber, sound salvaged concrete posts; replacement in kind of damaged posts is to be made when like posts are on hand at time of repair.
19. Substitutions between thrie-beam guardrail and concrete barrier wall are not eligible for V.E.C.P. consideration.

The modified thrie-beam guardrail may have application to accomodate large buses.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
GUARDRAIL					
Designed By	Names	Dates	Approved By	Revision	Sheet No.
					
Drawn By	RSD	8/83			
Checked By	JVC	8/83	00	1 of 31	400



Clear Zone Limit Or Horizontal Clearance Limit In Accordance With The Criteria In Volume I Chapters 2, 4 And 25 Of The "Plans Preparation Manual".



Design Speed km/h (mph)	X (Length Of Advancement) m
≤70 (≤45)	= 16 (D-d)
≥80 (≥50)	= 13 (D-d)

Length of advancement determined from the diagram and equations above establishes the location of the upstream beginning of need for guardrail, however, the length of advancement can be no less than that required by other details of this index.

The flared end anchorage with 1.2 m nose offset is shown in the diagram above, however, the diagram applies to other configurations that may occur at the beginning of need, such as, other flare designs; upstream returns; and, other upstream deflected, tangent and curvilinear conditions.

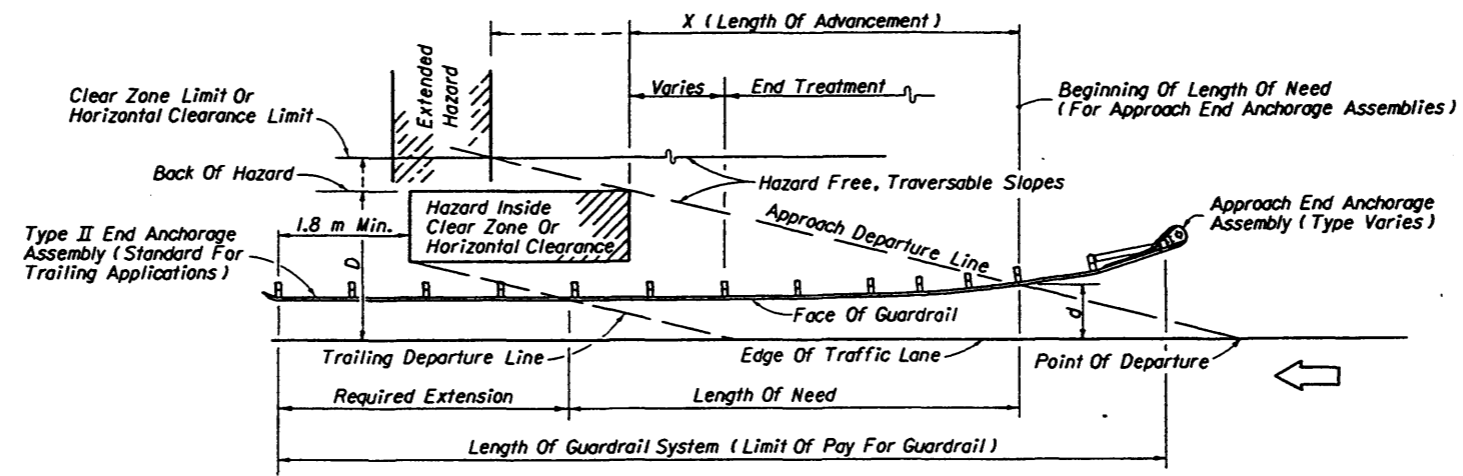
Equation Variables:

D=Distance in meters from near edge of the near approach traffic lane to either (a) the back of hazard, when the hazard is located inside the clear zone or horizontal clearance or (b) the clear zone or horizontal clearance outer limit, when the hazard extends to or goes beyond the clear zone or horizontal clearance limit. For left side hazards on two-way undivided facilities, D is measured from the inside edge of the near approach traffic lane (see Figure 2).

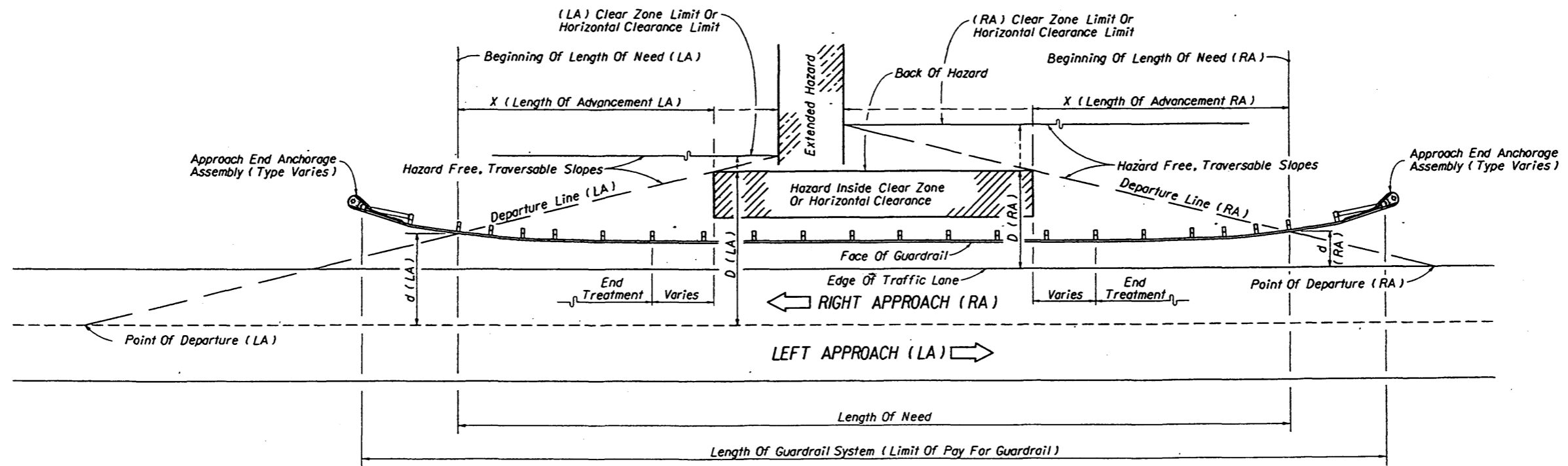
d=Distance in meters from the near edge of the near approach traffic lane to the face of guardrail at its intersection with the departure line. For left side hazards on two-way undivided facilities, d is measured from the inside edge of the near approach traffic lane (see Figure 2).

LENGTH OF ADVANCEMENT - FIGURE 1

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>GUARDRAIL</b>				
Designed By	Names	Dates	Approved By	State Roadway Design Engineer
Drawn By	ESD	8/83	Revision	Sheet No. 2 of 31
Checked By	JVC	8/83	00	Index No. 400



ONE WAY SYSTEM

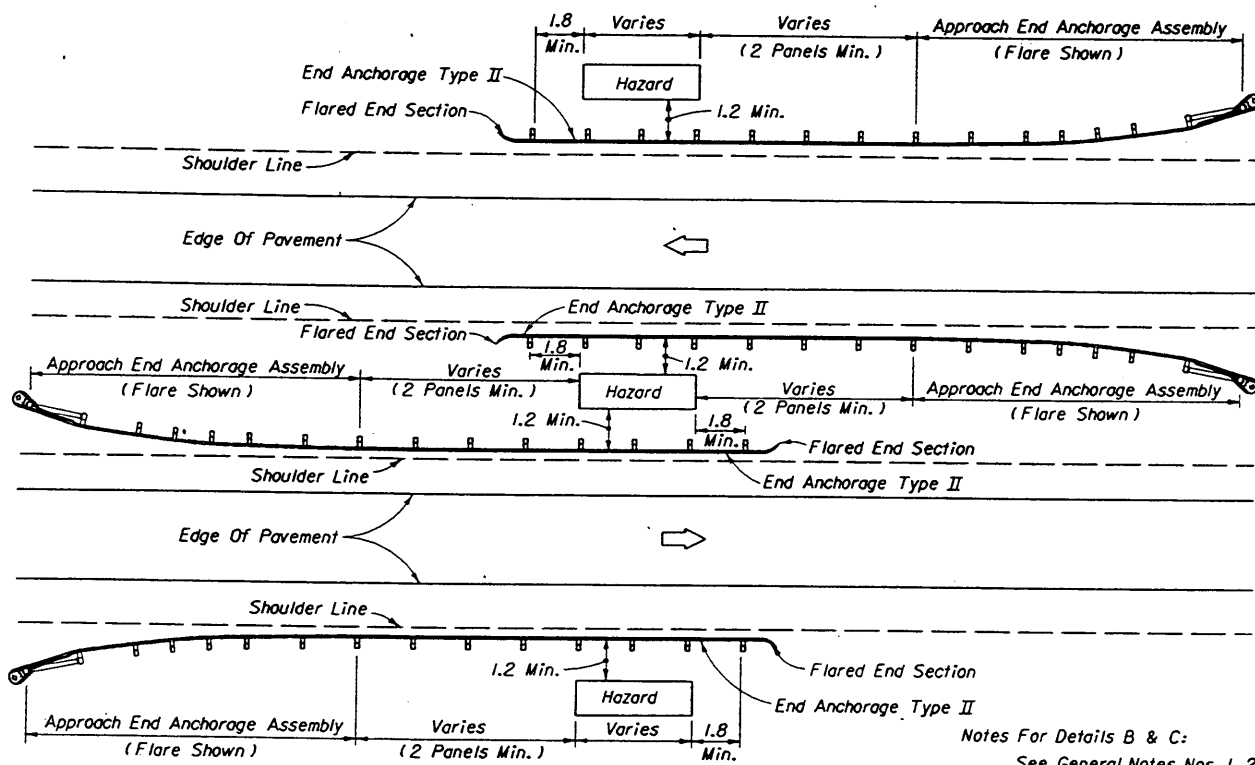


TWO LANE-TWO WAY SYSTEM

For description of the dimensions  $D$ ,  $d$  and  $X$ , see Length of Advancement - Figure 1.  
For additional shoulder guardrail information, see Details B and C.

LOCATING TERMINALS ON SHOULDER GUARDRAILS - FIGURE 2

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
GUARDRAIL				
Designed By	Names	Dates	Approved By	
			State Roadway Design Engineer	
Drawn By	RSD	8/83	Revision	Sheet No. Index No.
Checked By	JVG	8/83	00	3 of 31 400



Median Guardrail Applications Shown Are For Locations Where Approach End Anchorage Assemblies Are Outside Of The Opposing Roadway Clear Zone.

**DIVIDED ROADWAY- DETAIL B**

Notes For Details B & C:

See General Notes Nos. 1, 2, 3, 4, 5, 6, 7 and 8.

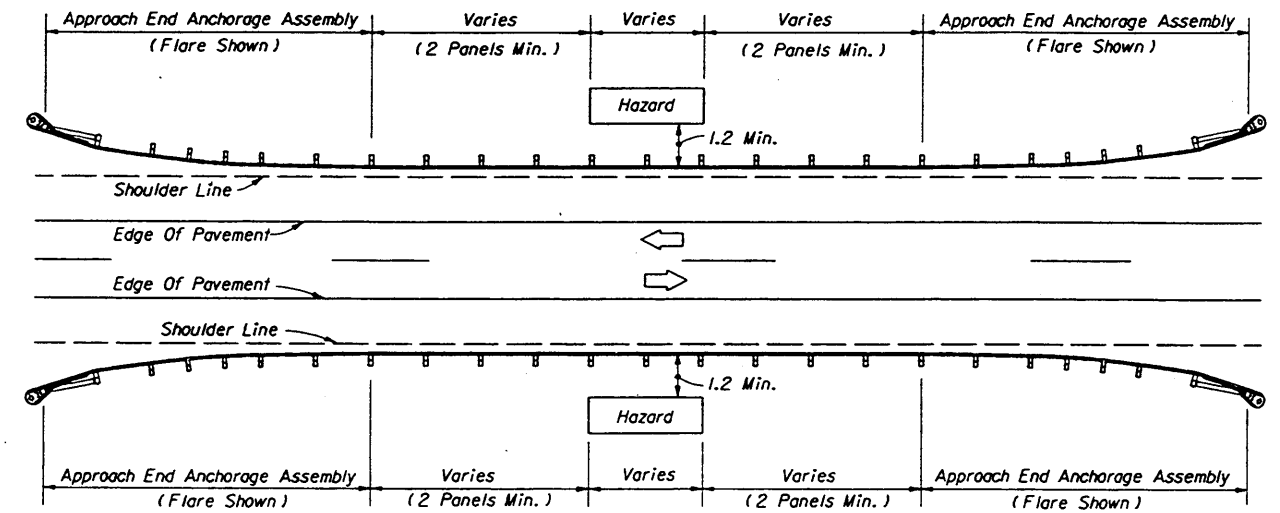
See Details K and L for guardrail offsets.

For end anchorage assemblies see sheets elsewhere in this Index or refer to the Qualified Products List.

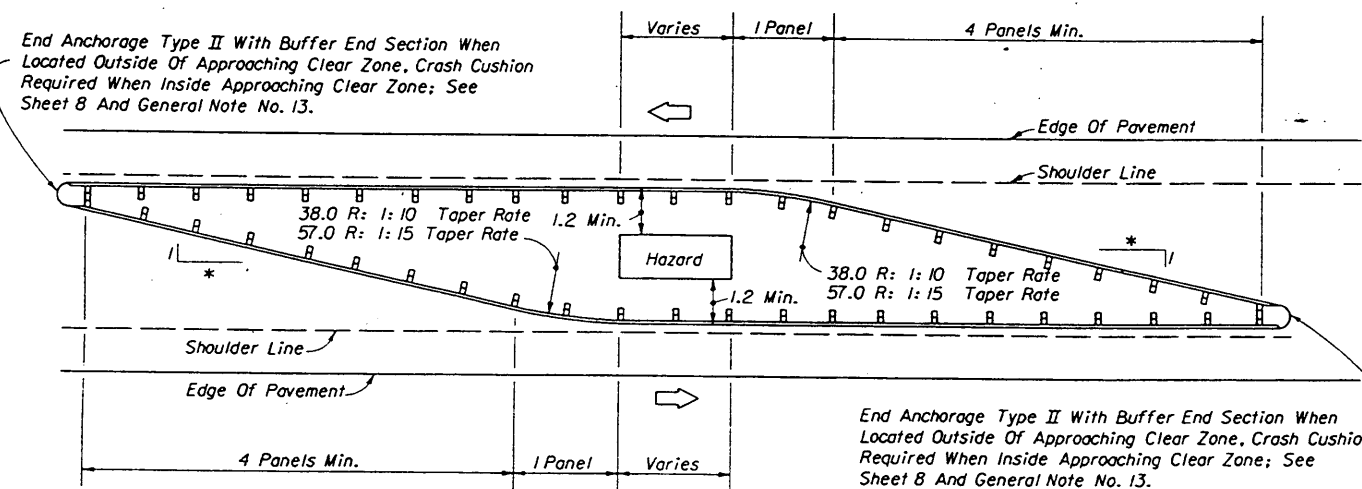
For hazards that require shielding and are located back of curb see other sheets of this index, and where rigid barrier is required see Index No. 410.

When divided roadways are designated evacuation routes, approach end anchorage assemblies should be used for trailing end anchorage.

**GUARDRAIL APPLICATION FOR ROADSIDE HAZARDS**



**UNDIVIDED ROADWAY- DETAIL C**



This Guardrail Configuration Applies Where Approach End Anchorage Assemblies Cannot be Located Outside Of The Opposing Roadway Clear Zone.

**OPPOSING TRAFFIC- DETAIL D**

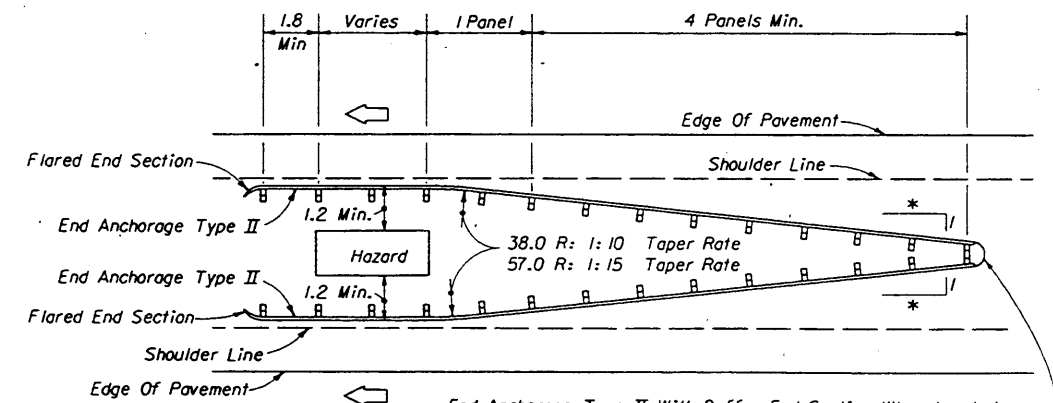
Notes For Details D & G:

See General Notes Nos. 1, 2, 3, 4, 5, 7, and 12.

See Details K and L for guardrail offsets.

For hazards that require shielding and are located back of curb see other sheets of this index, and where rigid barrier is required see Index No. 410.

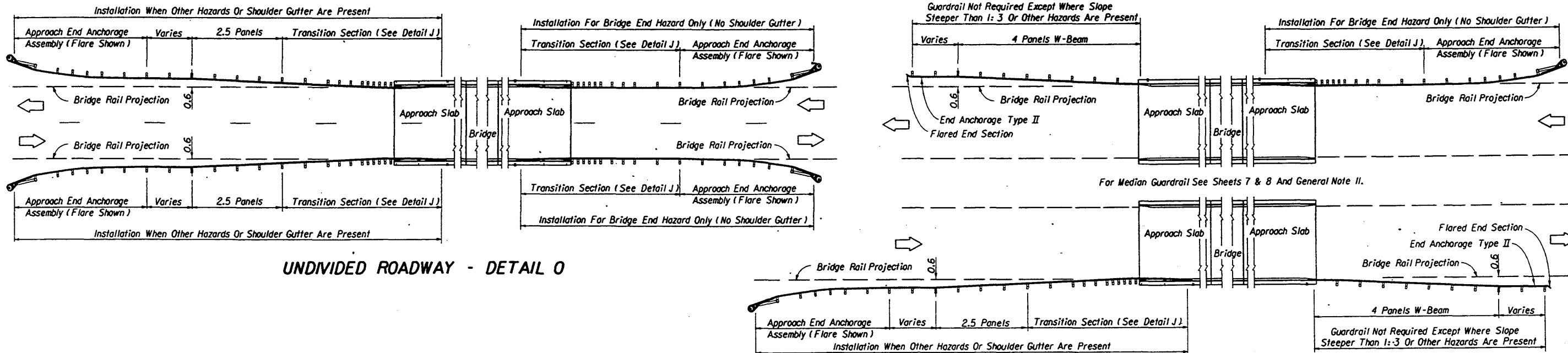
**GUARDRAIL APPLICATION FOR NARROW MEDIAN AND GORE HAZARDS**



End Anchorage Type II With Buffer End Section When Located Outside Of Approaching Clear Zone, Crash Cushion Required When Inside Approaching Clear Zone. See General Note No. 13

**ONE-WAY TRAFFIC- DETAIL G**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>GUARDRAIL</b>				
Designed By	Names	Dates	Approved By	
Drawn By	EJD	09/81	Revision	Sheet No.
Checked By	JBW/JVG	09/81	00	4 of 31
			Index No.	400



UNDIVIDED ROADWAY - DETAIL O

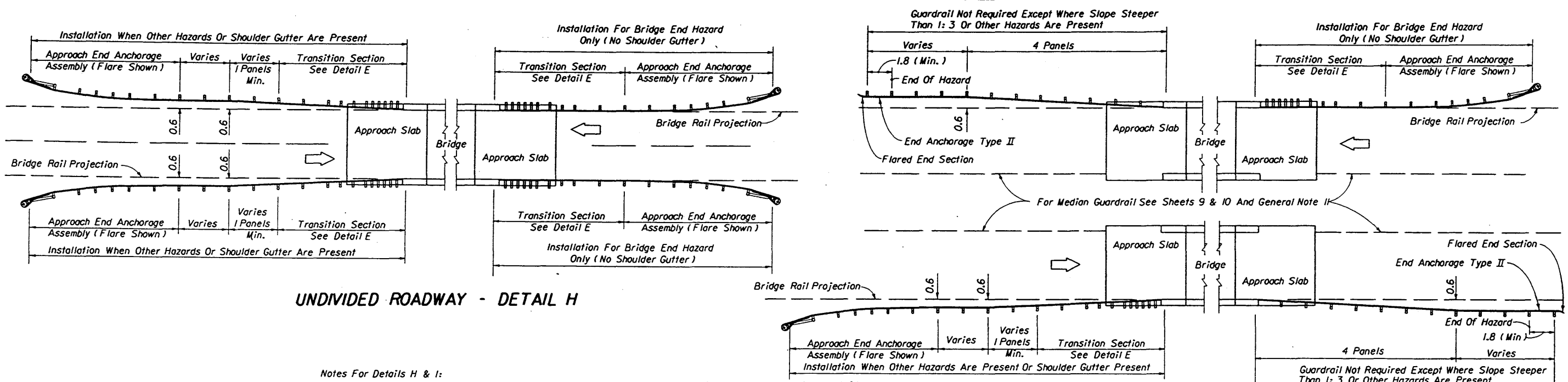
DIVIDED ROADWAY - DETAIL P

Notes For Details O & P:

- See General Notes Nos. 1, 2, 3, 4, 5, 6, 8 and 9. See Detail J for connections to bridges.
- For end anchorage assemblies see sheets elsewhere in this Index or refer to the Qualified Products List.
- When divided roadways are designated evacuation routes, approach end anchorage assemblies should be used for trailing end anchorage.
- Shoulder gutter in itself does not require the installation of guardrail.

**GUARDRAIL APPLICATIONS FOR BRIDGES WITH FULL WIDTH SHOULDERS AND SAFETY SHAPE TRAFFIC RAILING BARRIER EXTENDING FULL LENGTH OF APPROACH SLAB**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>GUARDRAIL</b>				
Designed By	Names	Dates	Approved By <i>[Signature]</i> State Roadway Design Engineer	
Drawn By	BSD	08/83	Revision	Sheet No. 5 of 31
Checked By	JBN/JVC	08/83	00	Index No. 400

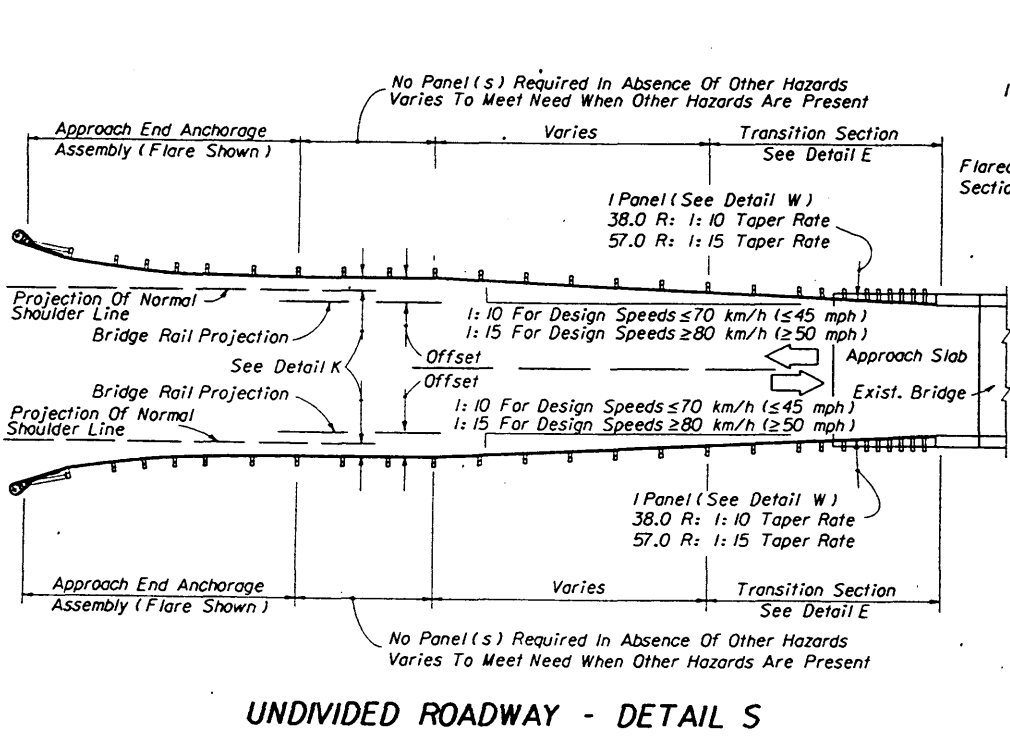


UNDIVIDED ROADWAY - DETAIL H

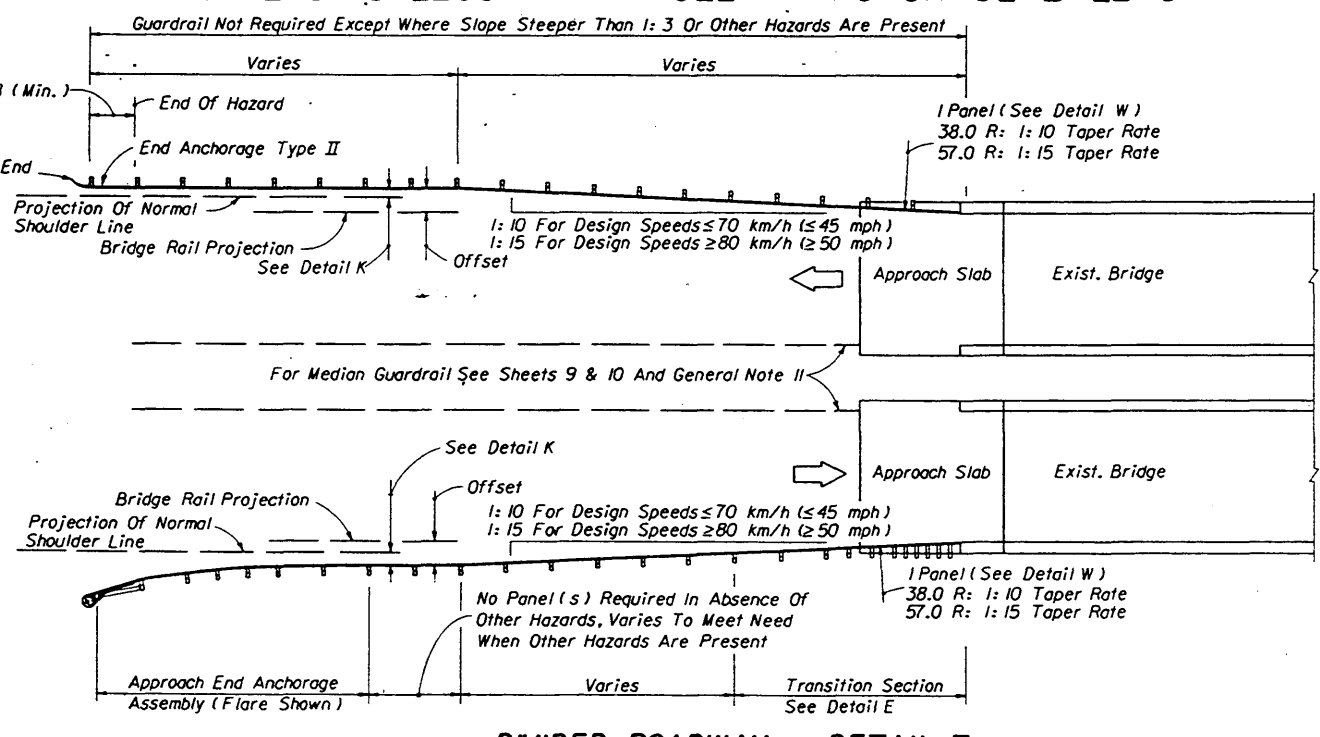
DIVIDED ROADWAY - DETAIL I

Notes For Details H & I:  
 See General Notes Nos. 1, 2, 3, 4, 5, 6, 8, and 9. See Details E and N for approach connections to bridges.  
 For end anchorage assemblies see sheets elsewhere in this Index or refer to the Qualified Products List.  
 When divided roadways are designated evacuation routes, approach end anchorage assemblies should be used for trailing end anchorage.  
 Shoulder gutter in itself does not require the installation of guardrail.

**GUARDRAIL APPLICATIONS FOR BRIDGES WITH FULL WIDTH SHOULDERS AND SAFETY SHAPE TRAFFIC RAILING BARRIER EXTENDING LESS THAN FULL APPROACH SLAB LENGTH**



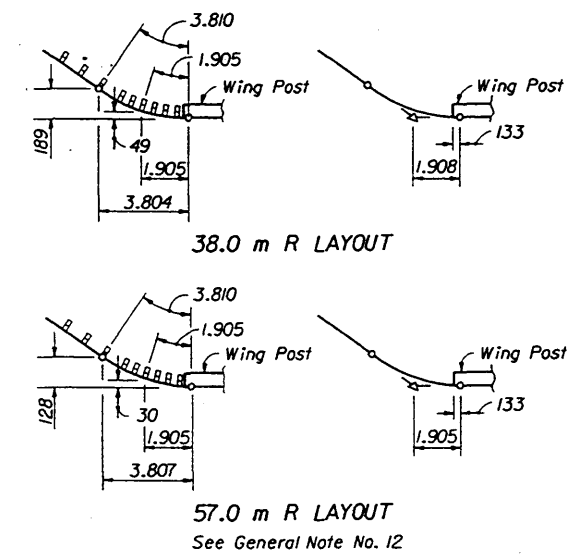
UNDIVIDED ROADWAY - DETAIL S



DIVIDED ROADWAY - DETAIL T

Notes for Details S & T:  
 See General Notes Nos. 1, 2, 3, 4, 5, 6, 8 and 9. See Details E and N for approach connections to bridges.  
 For end anchorage assemblies see sheets elsewhere in this Index or refer to the Qualified Products List.  
 When divided roadways are designated evacuation routes, approach end anchorage assemblies should be used for trailing end anchorage.

**GUARDRAIL APPLICATIONS FOR BRIDGES WITH LESS THAN FULL WIDTH SHOULDERS AND SAFETY SHAPE TRAFFIC RAILING BARRIER EXTENDING LESS THAN FULL APPROACH SLAB LENGTH**

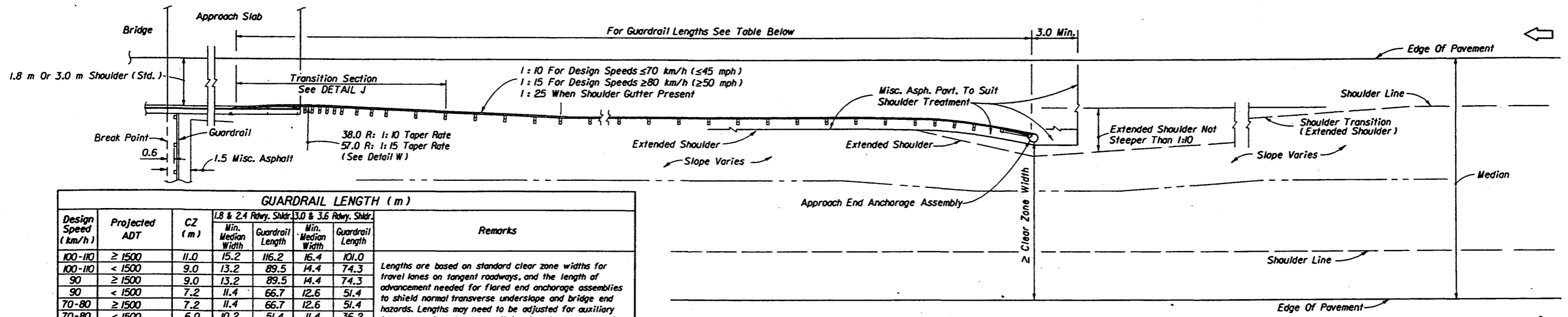


STANDARD PANELS SET TO RADIALS ADJOINING BRIDGES  
 DETAIL W

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
 ROAD DESIGN

**GUARDRAIL**

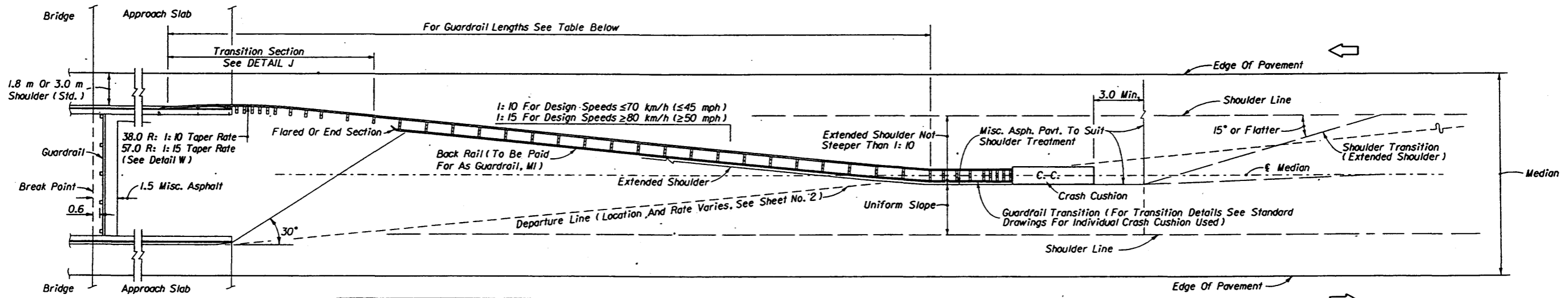
Designed By	Name	Date	Approved By
Drawn By	HSD	08/83	Revision
Checked By	JBW/JVG	08/83	00
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GUARDRAIL LENGTH (m)							Remarks
Design Speed (km/h)	Projected ADT	CZ (m)	1.8 & 2.4 Rdwy. Shldr. Min. Median Width	3.0 & 3.6 Rdwy. Shldr. Min. Median Width	Guardrail Length	Guardrail Length	
100-110	≥ 1500	11.0	15.2	116.2	16.4	101.0	Lengths are based on standard clear zone widths for travel lanes on tangent roadways, and the length of advancement needed for flared end anchorage assemblies to shield normal transverse underslope and bridge end hazards. Lengths may need to be adjusted for auxiliary lanes, curved roadways, parallel end anchorage assemblies, skewed crossings and other hazards present.
100-110	< 1500	9.0	13.2	89.5	14.4	74.3	
90	≥ 1500	9.0	13.2	89.5	14.4	74.3	
90	< 1500	7.2	11.4	66.7	12.6	51.4	
70-80	≥ 1500	7.2	11.4	66.7	12.6	51.4	
70-80	< 1500	6.0	10.2	51.4	11.4	36.2	
70-80	Urban % Curb	7.2	11.4	66.7	12.6	51.4	
70-80	Urban % Curb	5.4	9.6	51.4	10.8	32.4	

Note: For approach end anchorage assemblies see sheets elsewhere in this Index or refer to the Qualified Products List.

**WHEN END TERMINAL IS OUTSIDE OF OPPOSING ROADWAY CLEAR ZONE**



Median Width (m)	1:10 TAPER RATE								1:15 TAPER RATE							
	1.8 m Bridge Shoulder				3.0 m Bridge Shoulder				1.8 m Bridge Shoulder				3.0 m Bridge Shoulder			
	Panels (No.)		Length (m)		Panels (No.)		Length (m)		Panels (No.)		Length (m)		Panels (No.)		Length (m)	
9.8 & 10.0	9.5	6	15.5	59.1	6.5	4	10.5	40.0	13.5	10	23.5	89.5	8.5	6	14.5	55.2
10.4	10.5	7	17.5	66.7	7.5	5	12.5	47.6	14.5	11	25.5	97.2	9.5	7	16.5	62.9
11.0	10.5	7	17.5	66.7	7.5	5	12.5	47.6	15.5	12	27.5	104.8	10.5	8	18.5	70.5
11.6	11.5	8	19.5	74.3	8.5	6	14.5	55.2	16.5	13	29.5	112.4	11.5	9	20.5	78.1
12.0	12.5	9	21.5	81.9	9.5	7	16.5	62.9	17.5	13	30.5	116.2	12.5	9	21.5	81.9
12.2	12.5	9	21.5	81.9	9.5	6	15.5	59.1	17.5	13	30.5	116.2	13.5	11	24.5	93.3
12.8	13.5	9	22.5	85.7	10.5	7	17.5	66.7	19.5	15	34.5	131.4	14.5	11	25.5	97.2
13.4	14.5	10	24.5	93.3	10.5	7	17.5	66.7	20.5	16	36.5	139.1	15.5	12	27.5	104.8
14.0	14.5	10	24.5	93.3	11.5	8	19.5	74.3	21.5	17	38.5	146.7	16.5	13	29.5	112.4
14.6	15.5	11	26.5	101.0	12.5	9	21.5	81.9	22.5	17	39.5	150.5	17.5	13	30.5	116.2

The lengths shown on this table are typical for roadways with standard width shoulders. Length requirements for both standard width and narrow bridge shoulders and end anchorage or end shielding requirements shall be determined on a site specific basis.

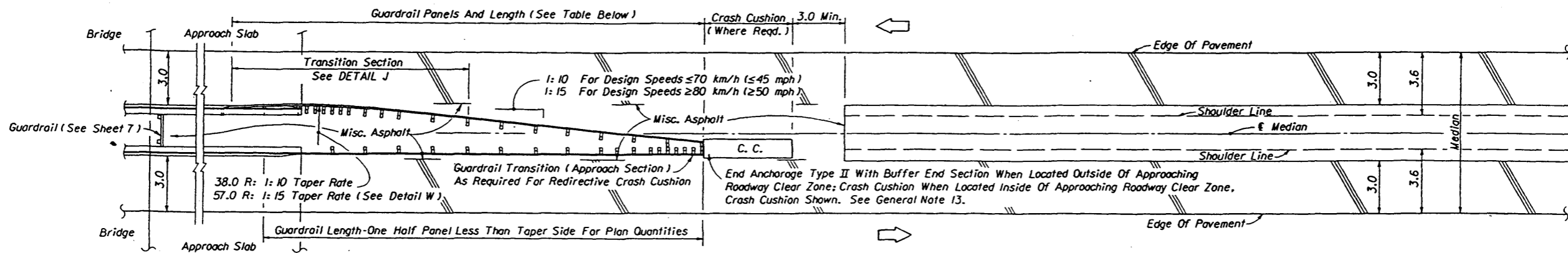
**WHEN END TERMINAL CANNOT BE LOCATED OUTSIDE OF OPPOSING ROADWAY CLEAR ZONE**

**APPROACH GUARDRAIL TREATMENTS FOR BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING EXTENDING FULL APPROACH SLAB LENGTH IN WIDE MEDIANS WITH FLUSH SHOULDERS**

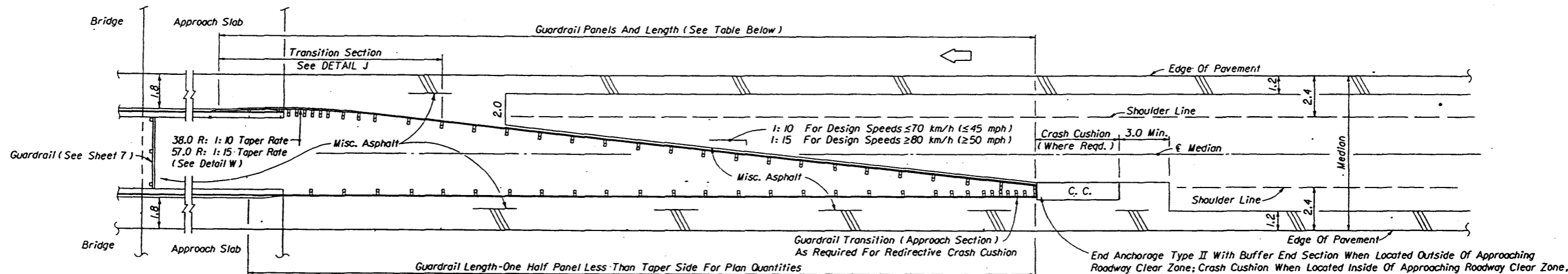
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**GUARDRAIL**

Names	Dates	Approved By	State Roadway Design Engineer
Designed By	BSD	09/81	Revision
Drawn By	JBM/JVG	09/81	Sheet No. 7 of 31
Checked By			Index No. 400



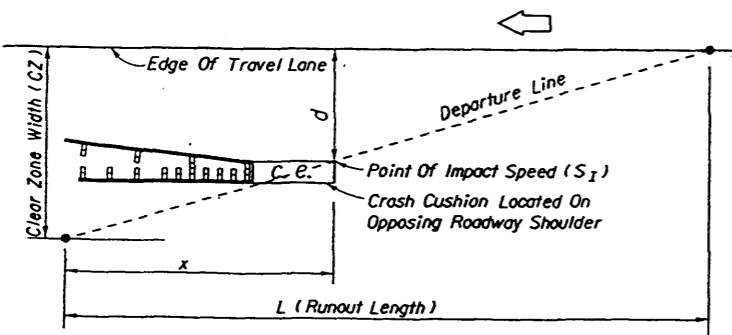
MEDIANS WITH 3.0 m BRIDGE SHOULDERS



MEDIANS WITH 1.8 m BRIDGE SHOULDERS

Note: The guardrail configurations shown apply only to parallel or near parallel bridges with open medians.

Design Speed (km/h)	CZ (m)
<70	5.4
70	7.2
80	7.2
90	9.0
>90	11.0



Speed ( $S_1$ ) For Determining Crash Cushion Size:  

$$S_1 = \frac{x}{L} (\text{Design Speed}) = \frac{(CZ-d)}{CZ} [\text{Design Speed}]$$

**SIZING CRASH CUSHIONS LOCATED ON OPPOSING ROADWAY SHOULDERS**

MEDIAN WIDTH (m)	1.8 METER BRIDGE SHOULDERS				3.0 METER BRIDGE SHOULDERS			
	1:10 TAPER RATE		1:15 TAPER RATE		1:10 TAPER RATE		1:15 TAPER RATE	
	PANELS (No.)	LENGTH (m)	PANELS (No.)	LENGTH (m)	PANELS (No.)	LENGTH (m)	PANELS (No.)	LENGTH (m)
9.0	14.5	55.2	20.5	78.1	7.5	28.6	10.5	40.0
8.5	12.5	47.6	18.5	70.5	6.5	24.8	8.5	32.4
7.9	11.5	43.8	15.5	59.1	4.5	17.1	6.5	24.8
7.3	9.5	36.2	13.5	51.4	4.5*	17.1	4.5*	17.1

The lengths shown in this table are based on standard widths for roadway and bridge median shoulders. Length requirements for both standard width and narrow bridge shoulders and end anchorage or end shielding requirements shall be determined on a site specific basis. When crash cushions are required on opposing roadway shoulders, their sizes may be determined by the residual speeds ( $S_1$ 's) along the runouts from the approach roadways; however, when calculated speeds ( $S_1$ 's) are less than 50 km/h; crash cushions shall be no less in size than for 50 km/h, see speed diagram left.

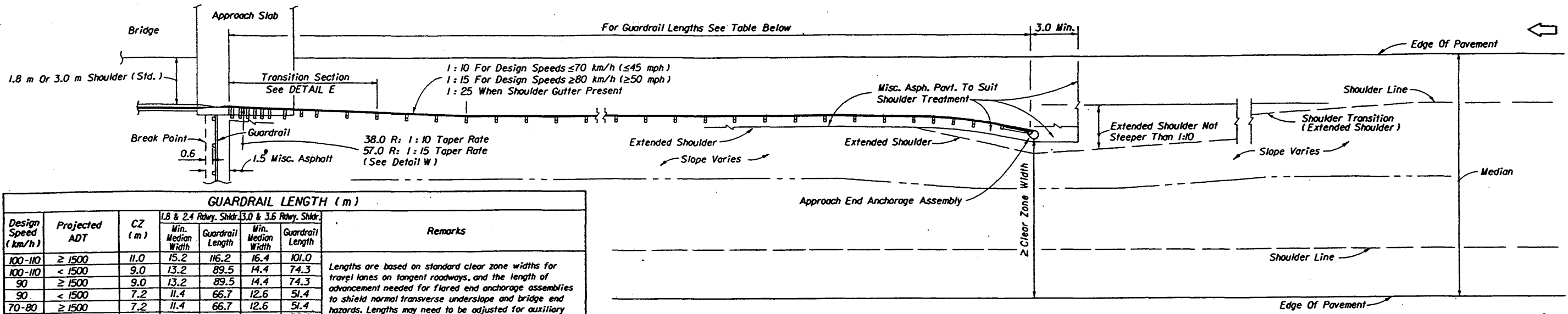
\* Number shown is the minimum number of panels on the approach side for the installation of a Type II end anchorage assembly. The number of panels may be reduced when installing a crash cushions more than 760 mm in width.

**APPROACH GUARDRAIL TREATMENTS FOR BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING  
 EXTENDING FULL APPROACH SLAB LENGTH IN NARROW MEDIANS WITH FLUSH SHOULDERS**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
 ROAD DESIGN

**GUARDRAIL**

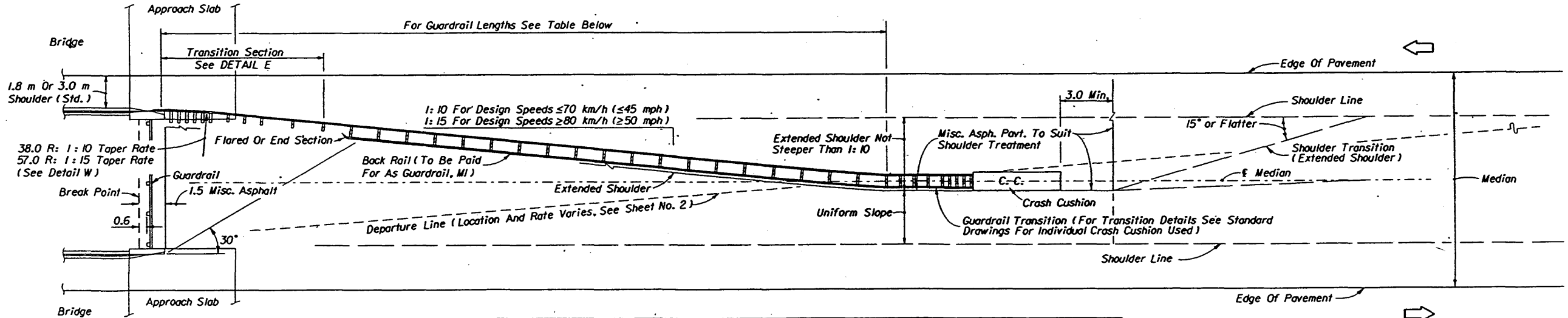
Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By					
Drawn By	AKK 08/82				
Checked By	JVC/JBW 08/82		00	8 of 31	400



GUARDRAIL LENGTH (m)							Remarks
Design Speed (km/h)	Projected ADT	CZ (m)	1.8 & 2.4 Rwy. Shldr. Min. Median Width	3.0 & 3.6 Rwy. Shldr. Guardrail Length	3.0 & 3.6 Rwy. Shldr. Min. Median Width	Guardrail Length	
100-110	≥ 1500	11.0	15.2	116.2	16.4	101.0	Lengths are based on standard clear zone widths for travel lanes on tangent roadways, and the length of advancement needed for flared end anchorage assemblies to shield normal transverse underslope and bridge end hazards. Lengths may need to be adjusted for auxiliary lanes, curved roadways, parallel end anchorage assemblies, skewed crossings and other hazards present.
100-110	< 1500	9.0	13.2	89.5	14.4	74.3	
90	≥ 1500	9.0	13.2	89.5	14.4	74.3	
90	< 1500	7.2	11.4	66.7	12.6	51.4	
70-80	≥ 1500	7.2	11.4	66.7	12.6	51.4	
70-80	< 1500	6.0	10.2	51.4	11.4	36.2	
70-80	Urban % Curb	7.2	11.4	66.7	12.6	51.4	
50-<70	Urban % Curb	5.4	9.6	51.4	10.8	32.4	

Note: For approach end anchorage assemblies see sheets elsewhere in this Index or refer to the Qualified Products List.

**WHEN END TERMINAL IS OUTSIDE OF OPPOSING ROADWAY CLEAR ZONE**



GUARDRAIL LENGTHS																
Median Width (m)	1:10 TAPER RATE								1:15 TAPER RATE							
	1.8 m Bridge Shoulder				3.0 m Bridge Shoulder				1.8 m Bridge Shoulder				3.0 m Bridge Shoulder			
	Panels (No.)		Length (m)		Panels (No.)		Length (m)		Panels (No.)		Length (m)		Panels (No.)		Length (m)	
	Front	Back	Total	Front	Back	Total	Front	Back	Total	Front	Back	Total	Front	Back	Total	
9.8 & 10.0	7.5	6	13.5	51.4	4.5	3	7.5	28.6	11.5	9	20.5	78.1	7.5	6	13.5	51.4
10.4	8.5	6	14.5	55.2	5.5	4	9.5	36.2	12.5	10	22.5	85.7	7.5	6	13.5	51.4
11.0	9.5	7	16.5	62.9	6.5	5	11.5	43.8	13.5	11	24.5	93.3	8.5	7	15.5	59.1
11.6	10.5	8	18.5	70.5	7.5	6	13.5	51.4	14.5	12	26.5	101.0	10.5	9	19.5	74.3
12.0	10.5	8	18.5	70.5	7.5	6	13.5	51.4	15.5	13	28.5	108.6	10.5	9	19.5	74.3
12.2	10.5	8	18.5	70.5	7.5	6	13.5	51.4	16.5	13	29.5	112.4	11.5	9	20.5	78.1
12.8	11.5	8	19.5	74.3	8.5	6	14.5	55.2	17.5	14	31.5	120.0	12.5	10	22.5	85.7
13.4	12.5	9	21.5	81.9	9.5	7	16.5	62.9	18.5	15	33.5	127.6	13.5	11	24.5	93.3
14.0	12.5	9	21.5	81.9	10.5	8	18.5	70.5	19.5	16	35.5	135.3	14.5	12	26.5	101.0
14.6	14.5	11	25.5	97.2	11.5	9	20.5	78.1	20.5	16	36.5	139.1	16.5	13	29.5	112.4

The lengths shown on this table are typical for roadways with standard width shoulders. Length requirements for both standard width and narrow bridge shoulders and end anchorage or end shielding requirements shall be determined on a site specific basis.

**WHEN END TERMINAL CANNOT BE LOCATED OUTSIDE OF OPPOSING ROADWAY CLEAR ZONE**

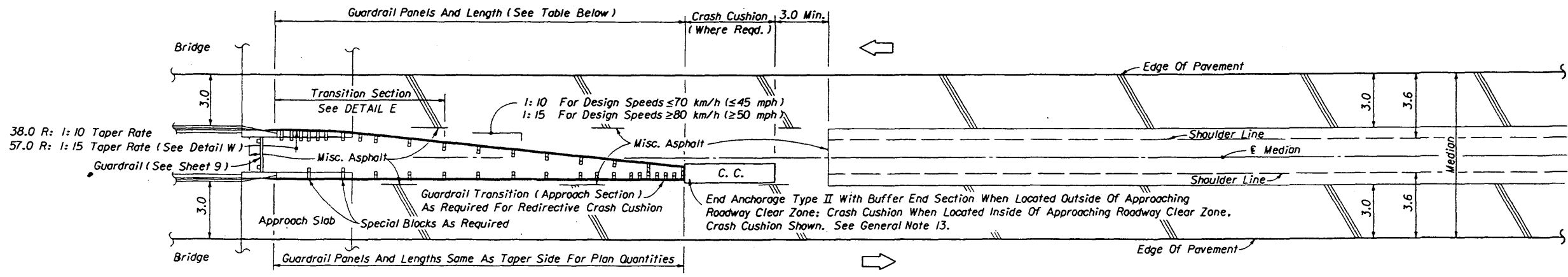
**APPROACH GUARDRAIL TREATMENTS FOR BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING EXTENDING LESS THAN FULL APPROACH SLAB LENGTH IN WIDE MEDIANS WITH FLUSH SHOULDERS**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

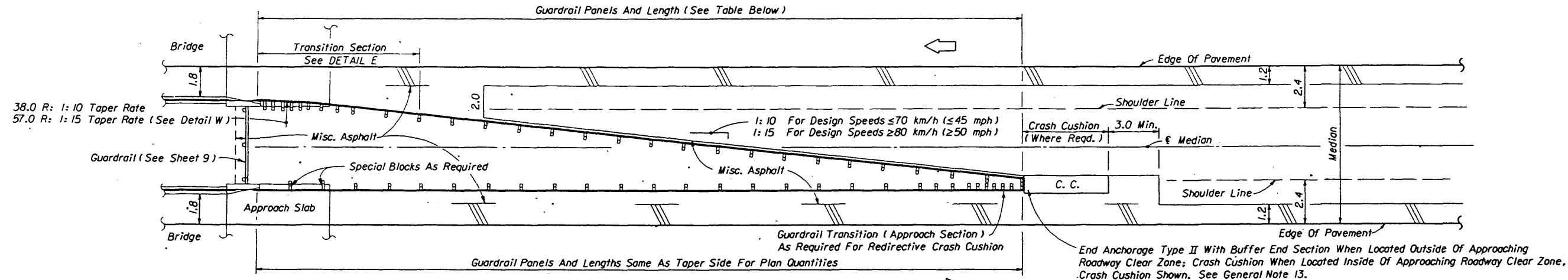
**GUARDRAIL**

Designed By	ESD	09/81	Revision	00	Sheet No.	9 of 31	Index No.	400
Checked By	JBN/JVG	09/81	Approved By	[Signature]				





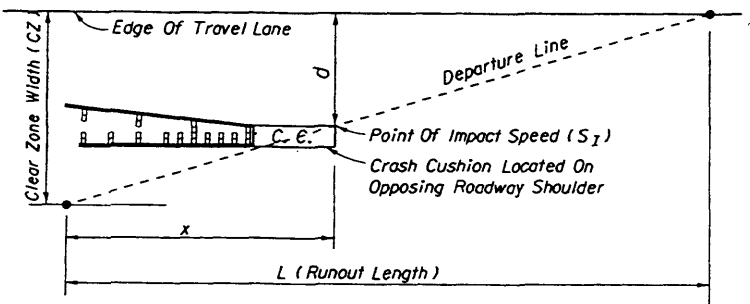
**MEDIANS WITH 3.0 m BRIDGE SHOULDERS**



**MEDIANS WITH 1.8 m BRIDGE SHOULDERS**

Note: The guardrail configurations shown apply only to parallel or near parallel bridges with open medians.

Design Speed (km/h)	CZ (m)
<70	5.4
70	7.2
80	7.2
90	9.0
>90	11.0



Speed ( $S_1$ ) For Determining Crash Cushion Size:

$$S_1 = \frac{x}{L} (\text{Design Speed}) + \frac{(CZ-d)}{CZ} [\text{Design Speed}]$$

**SIZING CRASH CUSHIONS LOCATED ON OPPOSING ROADWAY SHOULDERS**

MEDIAN WIDTH (m)		1.8 METER BRIDGE SHOULDERS				3.0 METER BRIDGE SHOULDERS			
		1:10 TAPER RATE		1:15 TAPER RATE		1:10 TAPER RATE		1:15 TAPER RATE	
		PANELS (No.)	LENGTH (m)	PANELS (No.)	LENGTH (m)	PANELS (No.)	LENGTH (m)	PANELS (No.)	LENGTH (m)
9.0	12.5	47.6	18.5	70.5	6.5	24.8	9.5	36.2	
8.5	11.5	43.8	16.5	62.9	5.5	21.0	7.5	28.6	
7.9	9.5	36.2	14.5	55.2	3.5*	13.3	4.5	17.1	
7.3	8.5	32.4	11.5	43.8	3.5*	13.3	3.5*	13.3	

The lengths shown in this table are based on standard widths for roadway and bridge median shoulders. Length requirements for both standard width and narrow bridge shoulders and end anchorage or end shielding requirements shall be determined on a site specific basis. When crash cushions are required on opposing roadway shoulders, their sizes may be determined by the residual speeds ( $S_1$ 's) along the runouts from the approach roadways; however, when calculated speeds ( $S_1$ 's) are less than 50 km/h crash cushions shall be no less in size than for 50 km/h; see speed diagram left.

\* Number shown is the minimum number of panels on the approach side for the installation of a Type II end anchorage assembly. The number of panels may be reduced when installing a crash cushions more than 760 mm in width.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

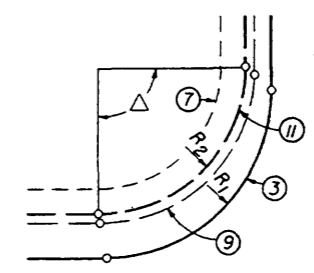
**GUARDRAIL**

Designed By	Names	Dates	Approved By
Drawn By	RNR	08/82	State Roadway Design Engineer
Checked By	JVC/JBW	08/82	Revision
		00	Sheet No. 10 of 31
			Index No. 400

**APPROACH GUARDRAIL TREATMENTS FOR BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING  
EXTENDING LESS THAN FULL APPROACH SLAB LENGTH IN NARROW MEDIANS WITH FLUSH SHOULDERS**

RADIAL GUARDRAIL						
Normal Turnouts						
R <sub>1</sub> (m)	Taper			Simple Curve		
	R <sub>2</sub> (m)	Panels Required	Δ	R <sub>2</sub> (m)	Panels Required	Δ
5	7.5	3	87° 19'	7.5	3	87° 19'
6	7.5	3	87° 19'	7.5	3	87° 19'
8	7.5	3	87° 19'	7.5	3	87° 19'
9	7.5	3	87° 19'	7.5	3	87° 19'
11	7.5	3	87° 19'	7.5	3	87° 19'
12	12.0	5	90° 57'	12.0	5	90° 57'
14	12.0	5	90° 57'	12.0	5	90° 57'
15	12.0	5	90° 57'	12.0	5	90° 57'

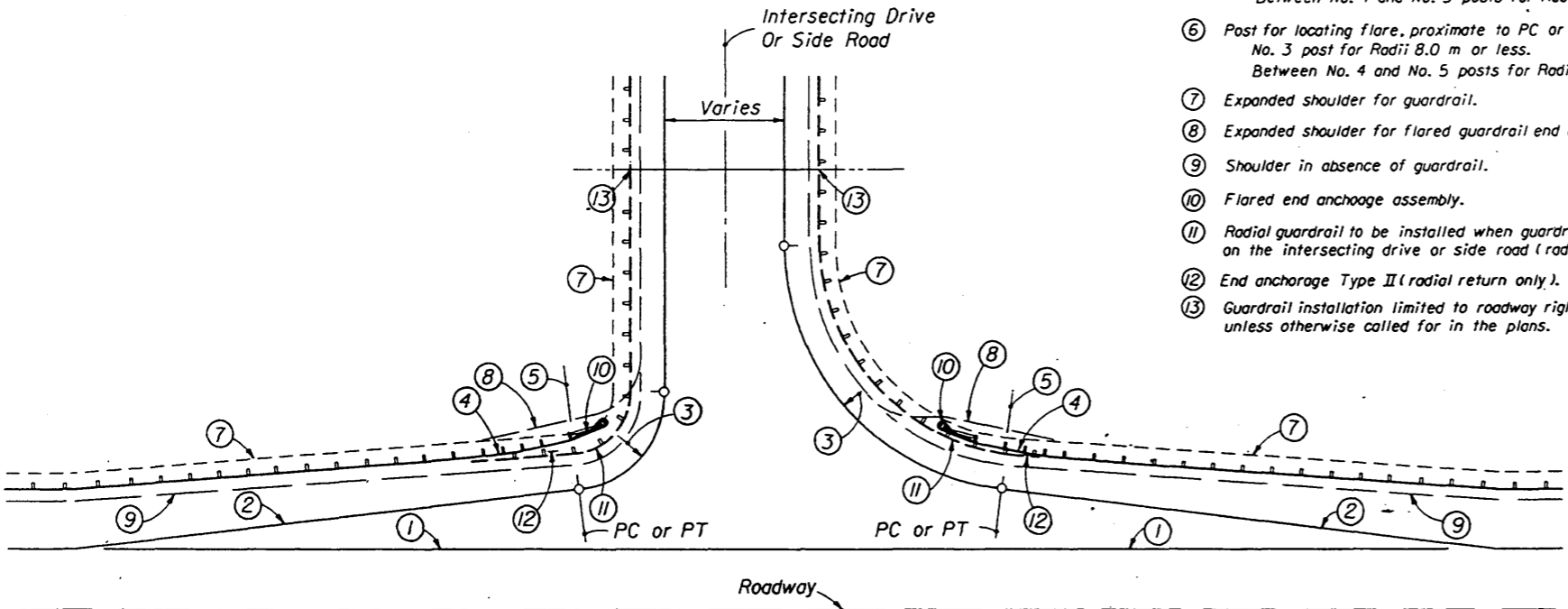
Note: Only 7.5 m and 12.0 m radius panels are to be used for return guardrail on normal turnouts. On skewed turnouts the number of panels used and their arrangement with straight panels will be as shown in the plans or as directed by the Engineer.



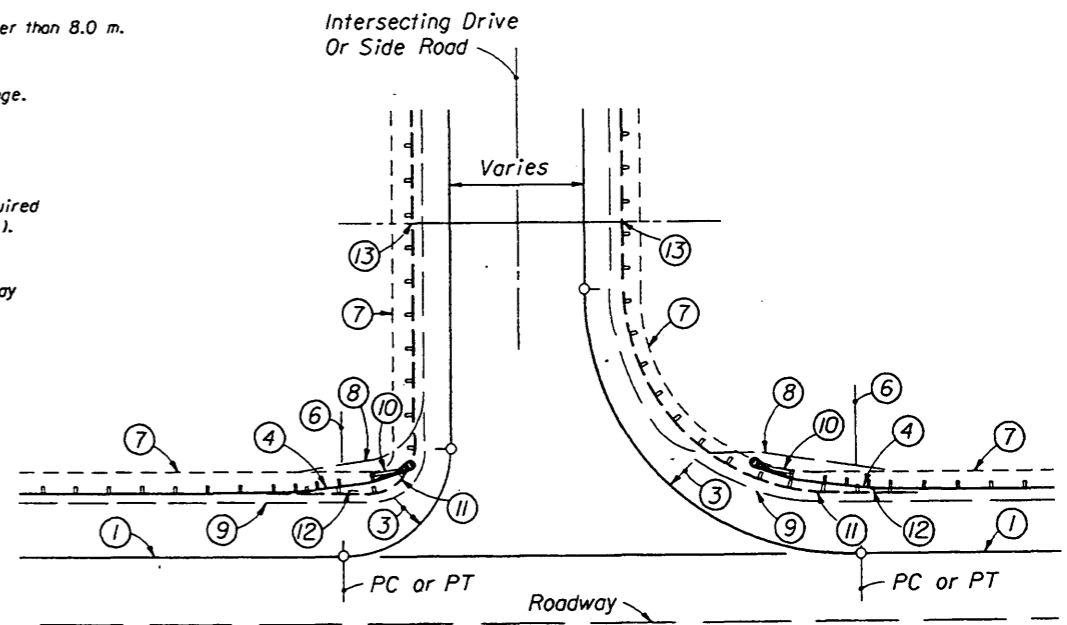
RADIAL GUARDRAIL

LEGEND

- ① Edge of roadway pavement.
- ② Taper.
- ③ Pavement return (radius R<sub>1</sub>).
- ④ Flared end anchorage to be installed except when existing guardrail on intersecting drive or side road adjoins the project.
- ⑤ Post for locating flare, proximate to PC or PT:  
No. 2 post for Radii 8.0 m or less.  
No. 3 post for Radii > 8.0 m and < 15 m.  
Between No. 4 and No. 5 posts for Radii 15 m or greater.
- ⑥ Post for locating flare, proximate to PC or PT:  
No. 3 post for Radii 8.0 m or less.  
Between No. 4 and No. 5 posts for Radii greater than 8.0 m.
- ⑦ Expanded shoulder for guardrail.
- ⑧ Expanded shoulder for flared guardrail end anchorage.
- ⑨ Shoulder in absence of guardrail.
- ⑩ Flared end anchorage assembly.
- ⑪ Radial guardrail to be installed when guardrail required on the intersecting drive or side road (radius R<sub>2</sub>).
- ⑫ End anchorage Type II (radial return only).
- ⑬ Guardrail installation limited to roadway right of way unless otherwise called for in the plans.



TAPER TURNOUTS



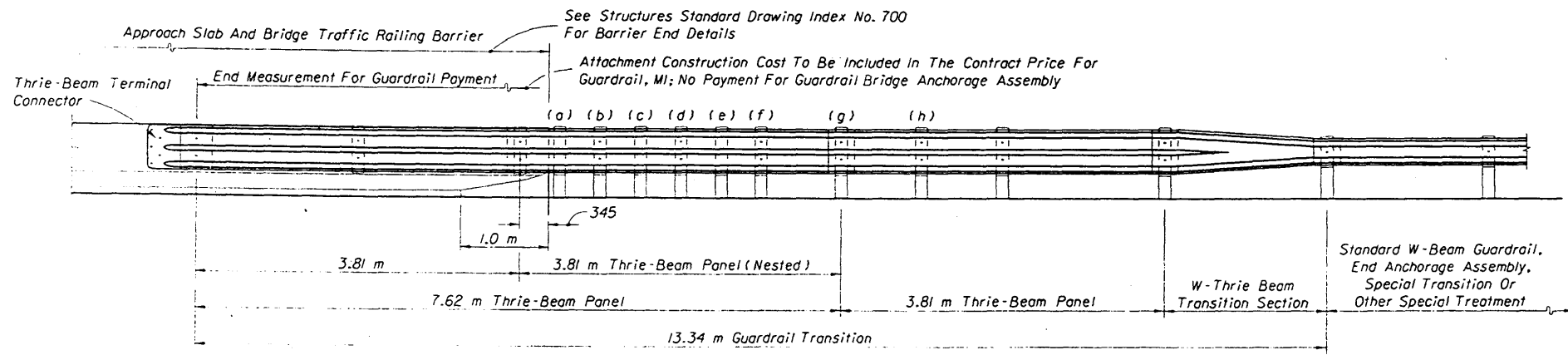
SIMPLE CURVE TURNOUTS

Note: The guardrail application shown on this sheet are for highways with flush shoulders and no restraints for constructing flared end anchorages and minimum lengths of guardrail. For highways with flush shoulders and restraints to constructing flared anchorages, see General Note No. 6.

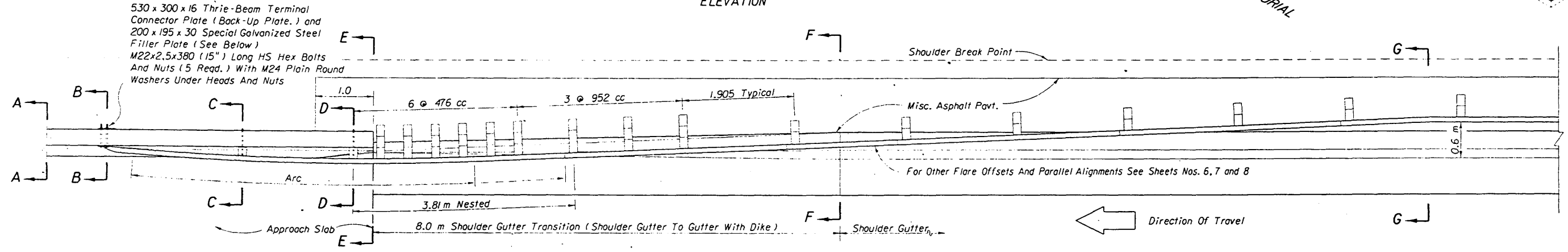
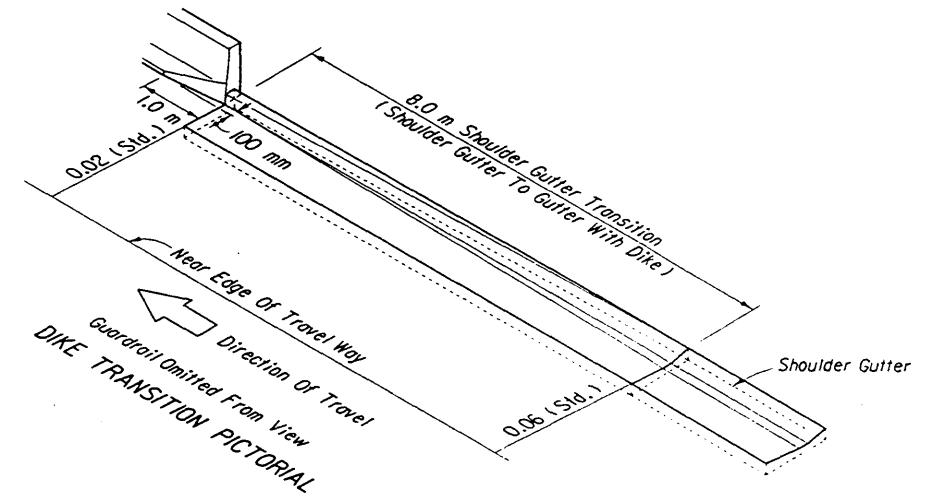
Where openings in guardrail are required in close proximity to bridge traffic rails or ends of concrete barrier walls, and minimum length guardrail with flared end anchorages can not be applied, either controlled release returns or energy absorbing terminals are to be applied.

GUARDRAIL APPLICATIONS FOR INTERSECTING DRIVES AND SIDE ROADS ON RURAL FACILITIES

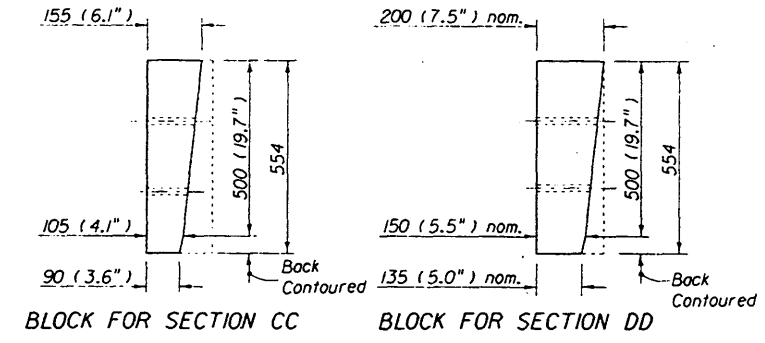
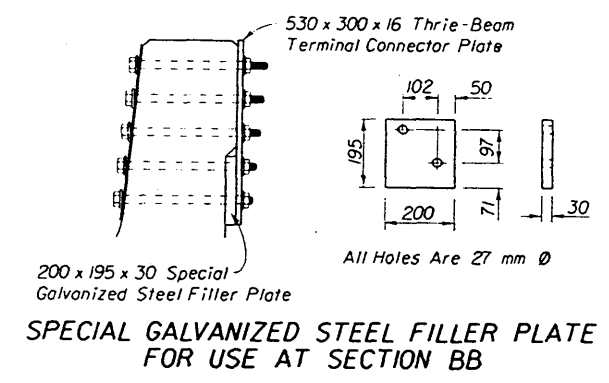
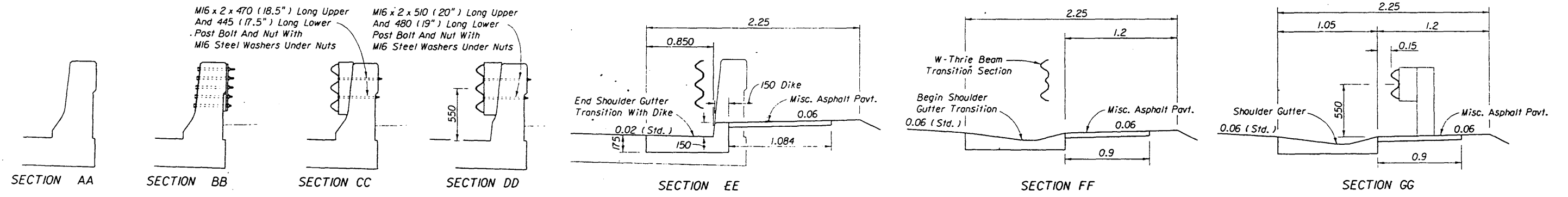
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
GUARDRAIL				
Designed By	Names	Date	Approved By	
Drawn By	ESD	09/83	 State Roadway Design Engineer	
Checked By	JVG	09/83		
	Revision	Sheet No.	Index No.	
	00	11 of 31	400	



ELEVATION



PLAN - GUARDRAIL, SHOULDER GUTTER AND SHOULDER TRANSITIONS



**GUARDRAIL TRANSITION NOTE**  
 When shoulder gutter is required, the 8.0 m long dike transition, shown in the 'PLAN' and 'PICTORIAL' above, is required. Double offset blocks are shown for guardrail installations adjacent to shoulder gutter/dike transitions; single offset blocks shall be installed in absence of shoulder gutter. Nested rails shall not be bolted to the blocks and posts at posts (a), (c), and (e). One 16d galvanized nail shall be driven between each post and block, and between double blocks, in order to prevent block rotation, see '16d NAIL FOR PREVENTION OF OFFSET BLOCK ROTATION', this Index.

**GUARDRAIL APPROACH TRANSITION AND CONNECTION FOR BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING BARRIERS EXTENDING FULL LENGTH OF APPROACH SLAB**  
**DETAIL J**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>GUARDRAIL</b>				
Designed By	Names	Date	Approved By	<i>[Signature]</i>
Drawn By	FKR	9-98	Revision	Sheet No. 12 of 31
Checked By	JVE	9-98	00	Index No. 400

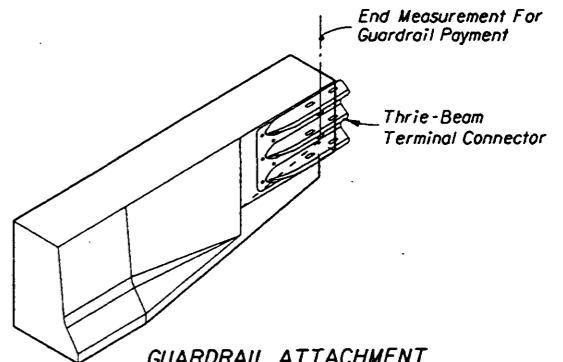
**APPROACH POSTS AND SPECIAL OFFSET BLOCKS**

Block assemblies for special offsets can be made up of one special block plus one standard size block or of three standard size blocks field dressed to approximately equal size, with the pieces secured for relative position by 16d galvanized nails. 'see '16d NAIL FOR PREVENTION OF OFFSET BLOCK ROTATION'. The nested rails shall not be bolted to the blocks and posts at posts (a), (c) and (e). The details shown are for approach slabs with internal edge dike extending beyond parapet type traffic railing termini.

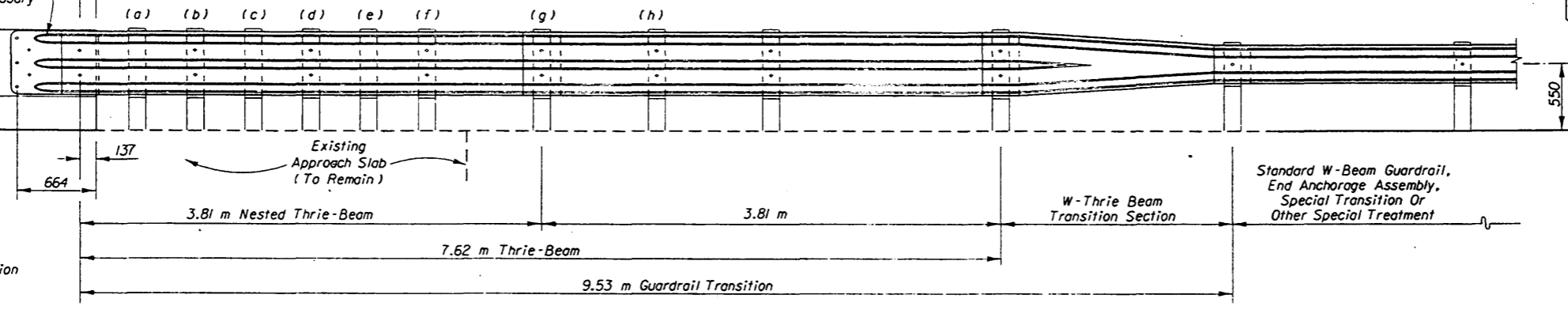
Modified Or Reconstructed Bridge Traffic Railing Barrier End

Thrie-Beam Terminal Connector; Attachment Construction To Be Paid For Under The Contract Unit Price For Bridge Anchorage Assembly, EA., And Shall Be Full Compensation For Bolt Hole Construction, Terminal Connector, Terminal Connector Plate(s) And Bolts With Necessary Hardware.

For Bridge Traffic Railing End Modification Or Reconstruction See The Plans And Structures Standard Drawing Index No. 705. (Note: For Guardrail Anchorage On Existing Bridges With Traffic Railings Not Meeting NCHRP 350 Test Level 4, See Index No. 401. For New Construction Bridges, Approach Slabs And Guardrail Transition Connections, See Detail J This Index.)



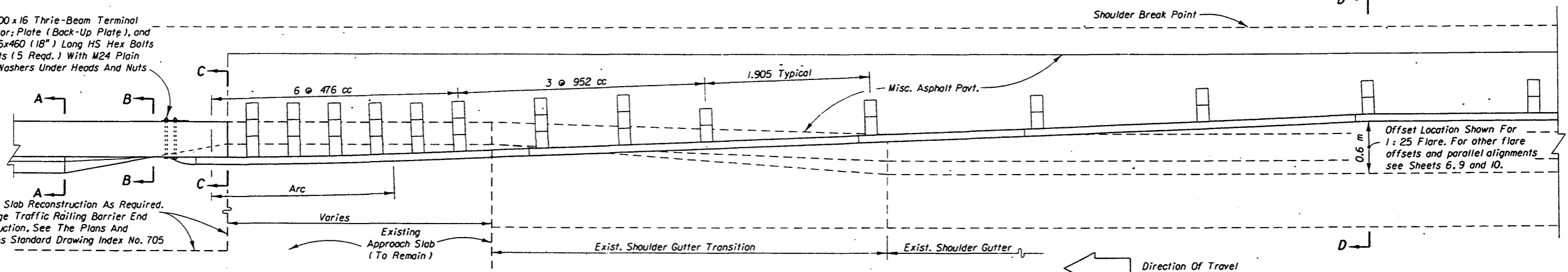
**GUARDRAIL ATTACHMENT AT TRAFFIC RAILING BARRIER END  
DETAIL N**



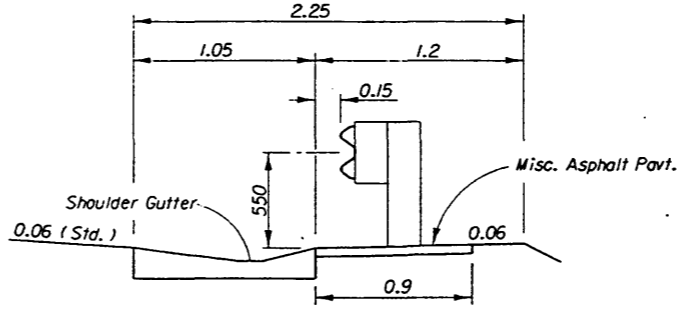
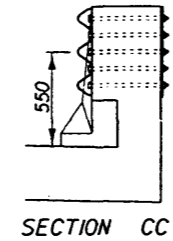
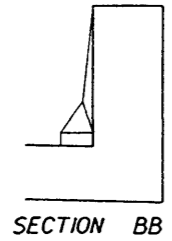
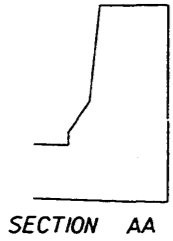
**ELEVATION**

530 x 300 x 16 Thrie-Beam Terminal Connector; Plate (Back-Up Plate), and M22x2.5x460 (18") Long HS Hex Bolts And Nuts (5 Reqd.) With M24 Plain Round Washers Under Heads And Nuts

Approach Slab Reconstruction As Required. For Bridge Traffic Railing Barrier End Reconstruction, See The Plans And Structures Standard Drawing Index No. 705

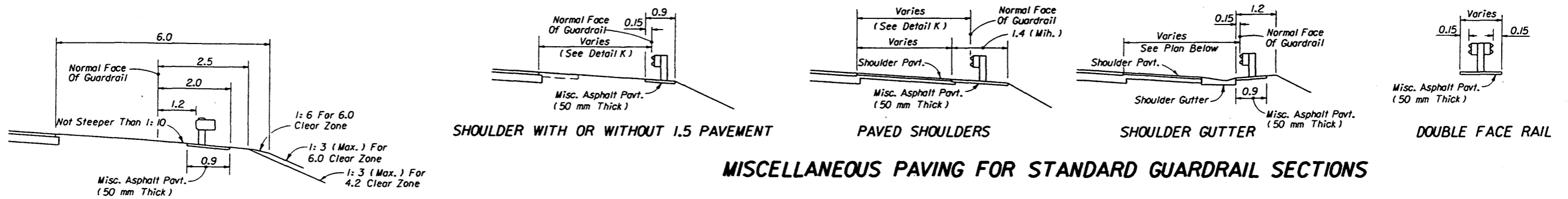


**PLAN**



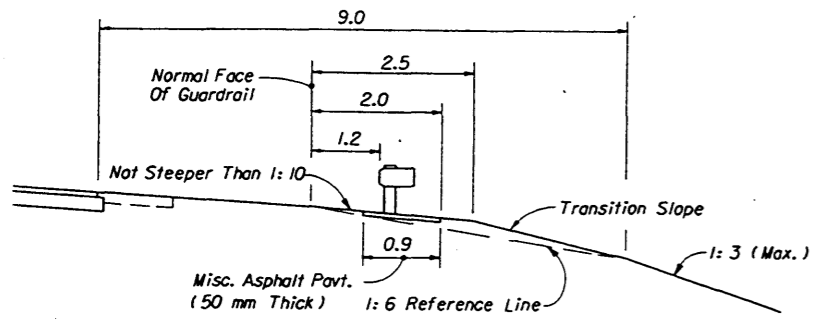
**GUARDRAIL APPROACH TRANSITION AND CONNECTION FOR EXISTING BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING BARRIER (NCHRP TL4) EXTENDING LESS THAN FULL APPROACH SLAB LENGTH  
DETAIL E**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>GUARDRAIL</b>				
Designed By	Names	Dates	Approved By	
Drawn By	HXR	9-98	Revision	Sheet No. Index No.
Checked By	JVC	9-98	00	13 of 31 400

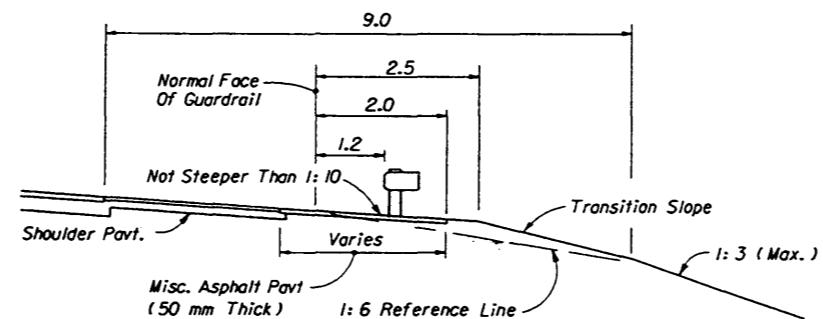


**MISCELLANEOUS PAVING FOR STANDARD GUARDRAIL SECTIONS**

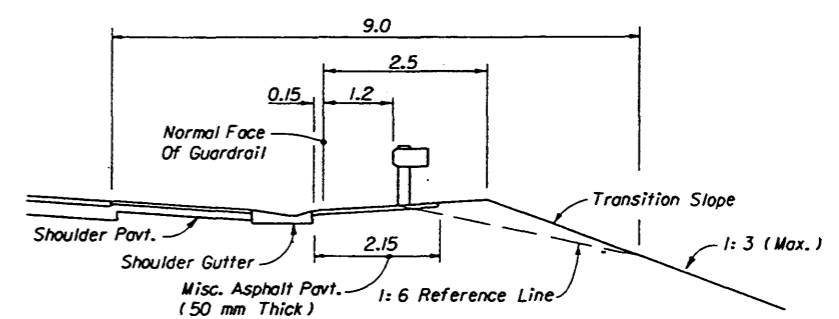
SECTION AA (EXAMPLE FOR 6.0 CLEAR ZONE)



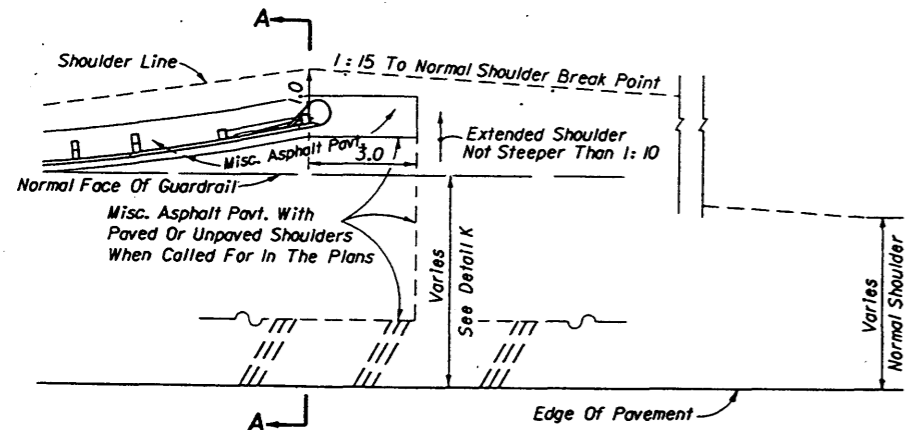
SECTION AA (EXAMPLE FOR 9.0 CLEAR ZONE)



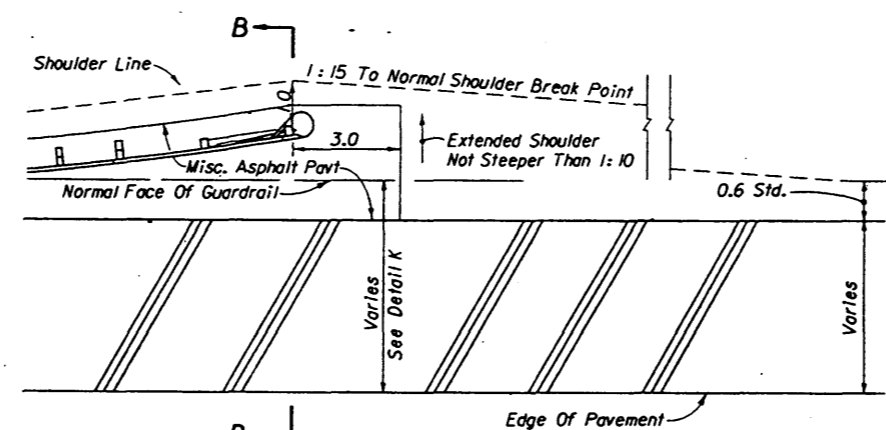
SECTION BB (EXAMPLE FOR 9.0 CLEAR ZONE)



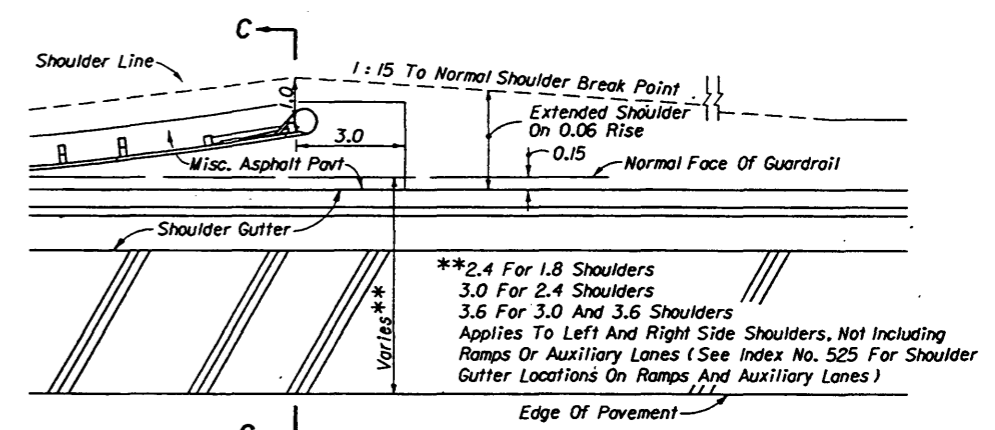
SECTION CC (EXAMPLE FOR 9.0 CLEAR ZONE)



SHOULDER WITH OR WITHOUT 1.5 PAVEMENT

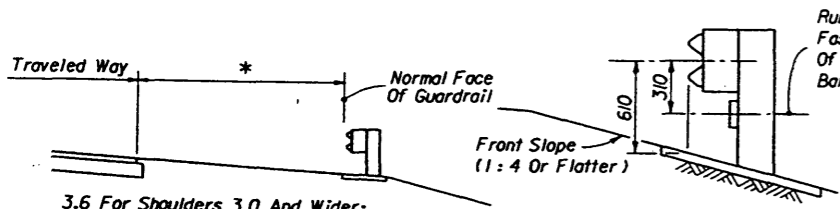


PAVED SHOULDERS



SHOULDER GUTTER

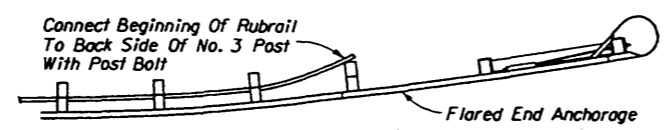
**SHOULDERS, SLOPES AND MISCELLANEOUS PAVING FOR FLARED END ANCHORAGE ASSEMBLIES**



3.6 For Shoulders 3.0 And Wider;  
2.4 For Median Shoulders 2.4 Or Less In Width; and,  
Shoulder Width Plus 0.6 For All Others Shoulders.

STANDARD LOCATIONS

Rubrail (C 150 x 12.2, Plates And Fasteners or Bent Plate And Fasteners In Accordance With Standards RLROI And REROI Of AASHTO-AGC-ARTBA "A Guide To Standardized Highway Barrier Hardware")



LOCATIONS ON FRONT SLOPES

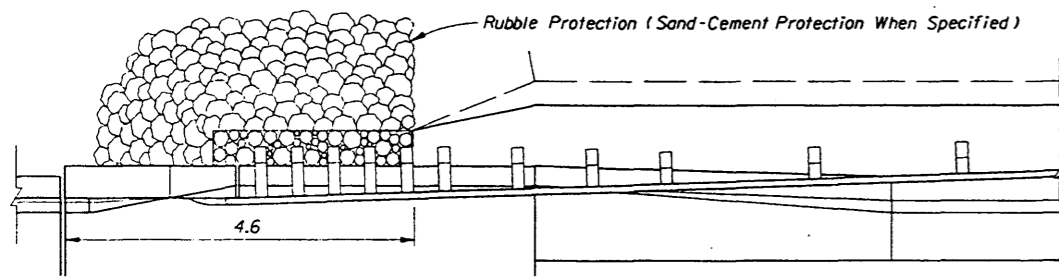
**GUARDRAIL LOCATION-DETAIL K**

LATERAL PLACEMENT (m) ON FRONT SLOPES (FROM EDGE OF TRAVELED WAY)			
SLOPE	NOT RECOMMENDED	ACCEPTABLE WITH RUBRAIL	Notes:
1:4	4.3 to 8.2	8.5 to 13.7	For shoulders less than 3.6 m in width the tabulated values will be reduced by the difference between 3.6 m and the shoulder width. Placement of guardrail on front slopes steeper than 1:4 not recommended. Cost of rubrail to be included in the contract unit price for guardrail.
1:5	4.6 to 7.6	7.9 to 13.7	
1:6	5.2 to 6.7	7.0 to 13.7	
1:7	6.4 to 7.3	7.6 to 13.7	
1:8	Acceptable to 7.6	7.9 to 13.7	
1:9	Acceptable to 7.9	8.2 to 13.7	
1:10	Acceptable to 8.2	8.5 to 13.7	

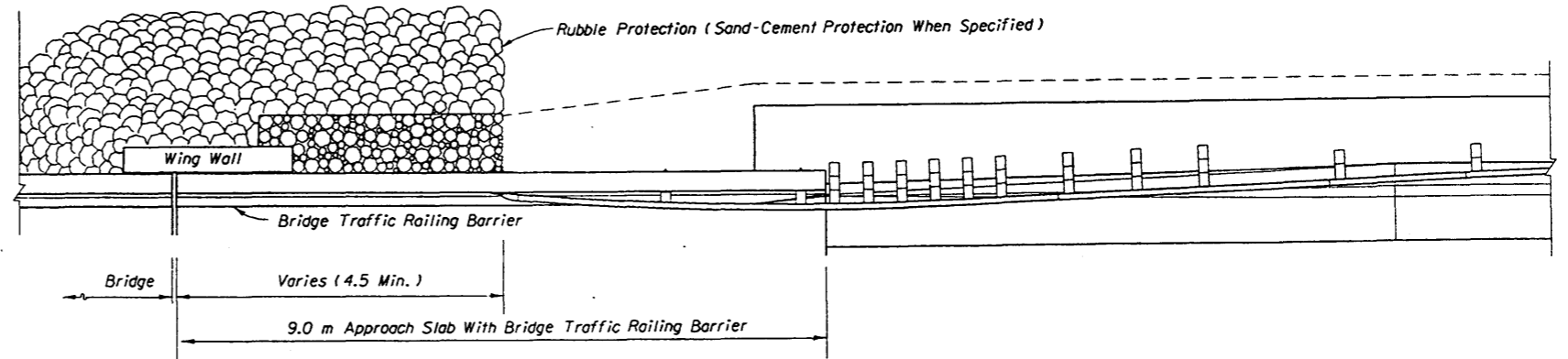
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**GUARDRAIL**

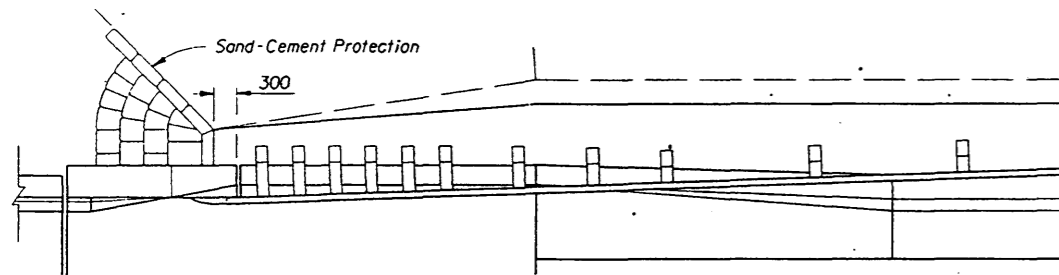
Names	Dates	Approved By	State Roadway Design Engineer
Designed By			
Drawn By	JM	07/81	Revision
Checked By	JSW/MC	07/81	00
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			400



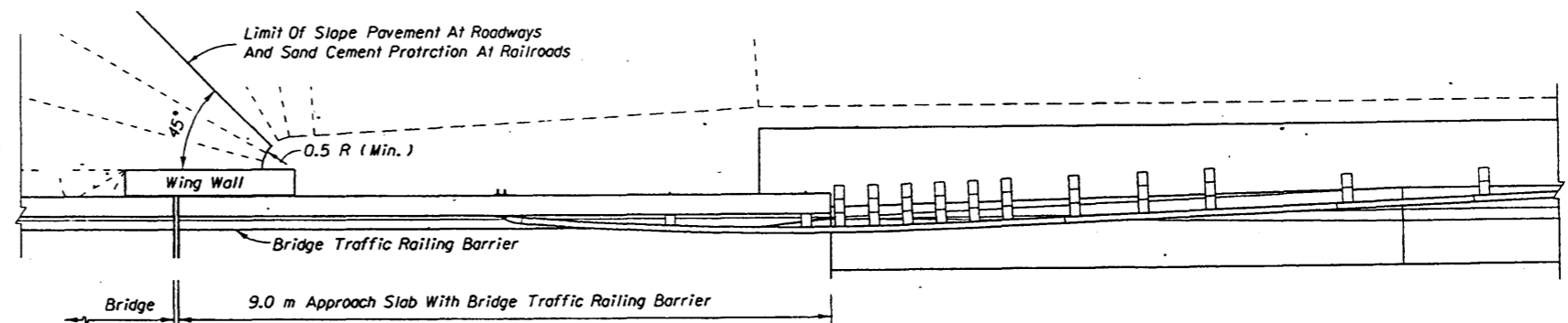
BRIDGES OVER STREAMS



BRIDGES OVER STREAMS



BRIDGES OVER RAILROADS



BRIDGES OVER ROADWAYS OR RAILROADS

For Additional Information See Sheet 13

For Additional Guardrail Information See Sheet 12

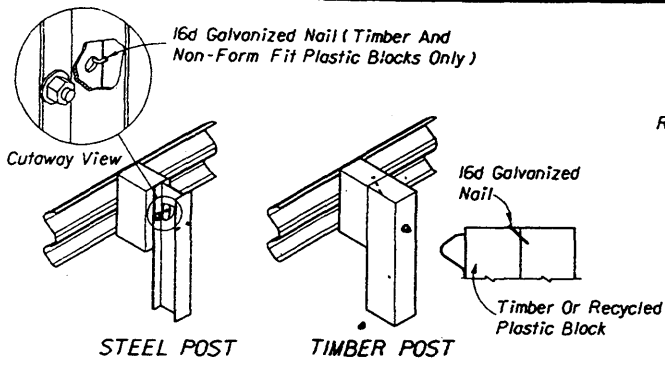
SKETCHES - BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING BARRIER EXTENDING LESS THAN FULL APPROACH SLAB LENGTH

SKETCHES - BRIDGES WITH SAFETY SHAPE TRAFFIC RAILING BARRIER EXTENDING FULL APPROACH SLAB LENGTH

SKETCH NOTES

1. These sketches are for showing shoulder interface between roadways and bridges where crossings are normal to other roadways, railroads and streams. For site specific applications and details see the plans and the FDOT Structures Design Office "Detailing Manual" and "Design Guidelines".
2. Shoulder treatments shown in these sketches are for locations with shoulder gutter; shoulder hinge location will vary for facilities without shoulder gutter.

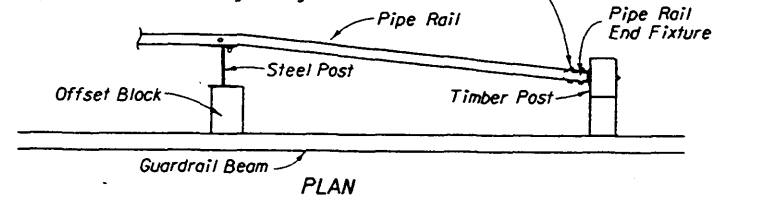
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
GUARDRAIL				
	Names	Dates	App/By	
Designed By			[Signature] State Roadway Design Engineer	
Drawn By			Revision	Sheet No. Index No.
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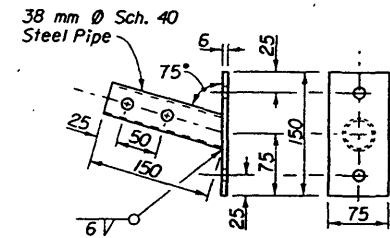
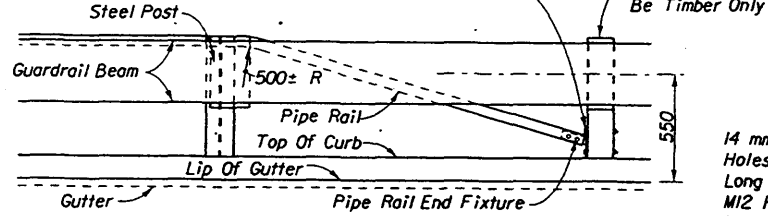
16d Galvanized Nail Driven After Post Bolt Pull-Up, Single And Double Face Guardrail, Single Face Guardrail Shown (16d Nail Between Blocks For Multiple Offset Blocks).

**16d NAIL FOR PREVENTION OF OFFSET BLOCK ROTATION**

Install Pipe Rail Over Pipe Rail End Fixture And Thru-bolt With M12 x 1.75 x 90 Long Hex Bolts And Nuts With M12 Plain Round Washers Under Heads And Nuts (2 Reqd.) (Upset Threads After Tightening)

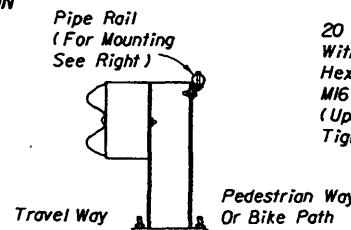


Attach Pipe Rail End Fixture To Post With M12 x 1.75 x 180 mm Long Hex Bolts And Nuts With M12 Plain Round Washers Under Heads And Nuts (2 Reqd.) (Upset Threads After Tightening)



All Holes Shall Be 14 mm Ø Galvanize After Drilling And Welding

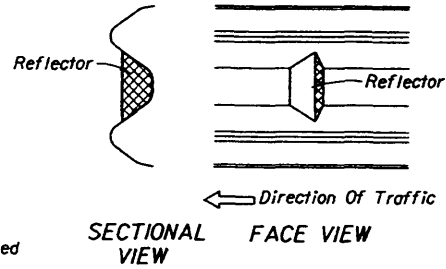
**PIPE RAIL END FIXTURE**



**PIPE RAIL NOTES**

- Special Safety Pipe Rail required on steel guardrail posts when pedestrian ways and bikeways are located 1.2 m or less from back of the posts. Begin and end the pipe rail in accordance with this detail.
- When guardrails with timber posts are located with the back of posts 1.2 m or less from the near edge of the pedestrian way or bikeway, the bolt ends will require one of the following treatments:
  - Trimming back flush with the face of nut and metalizing or
  - Use of post bolts 380 mm in length with the washers and nuts counter sunk into sinks 25 to 40 mm deep or
  - Use of post bolts 380 mm in length with sleeve nuts and washers.
- The cost for Special Safety Pipe Rail, mounting components and installation shall be included in the contract unit price for Guardrail.

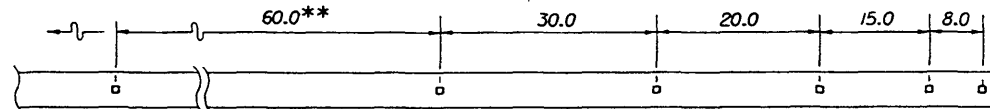
FOR LOCATIONS USED BY PEDESTRIANS OR CYCLISTS  
**SPECIAL SAFETY PIPE RAIL**



**REFLECTOR MOUNTING**

**REFLECTOR NOTES**

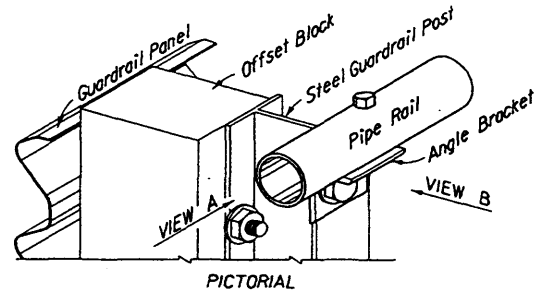
- Reflectors shall conform to Section 993 of the Standard Specifications.
- Reflector color (white or yellow) shall conform to the color of the near lane edgeline.
- Face of rail bolt, screw, rivet or bracket mounted reflectors shall not be used in lieu of adhesive mounted reflectors.
- Post mounted reflectors approved on the 'Qualified Products List' may be used by FDOT Maintenance to replace damaged or missing reflector in a continuous run of existing post mounted reflectors. Adhesive and post mounted reflectors shall not be intermixed in a continuous run of guardrail.
- The cost for reflectors shall be included in the contract unit price for Guardrail.



Note: Adjustment in spacing may be required to fit exact guardrail lengths as directed by the Engineer. For minimum installations (length 19.05 m) provide one reflector at each end and at approximate center.

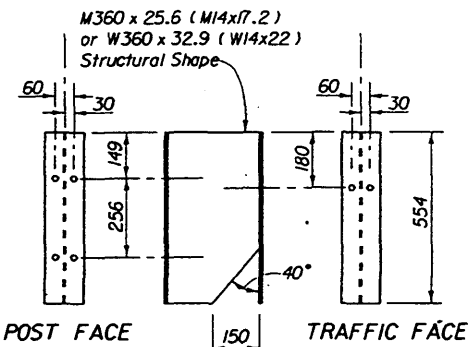
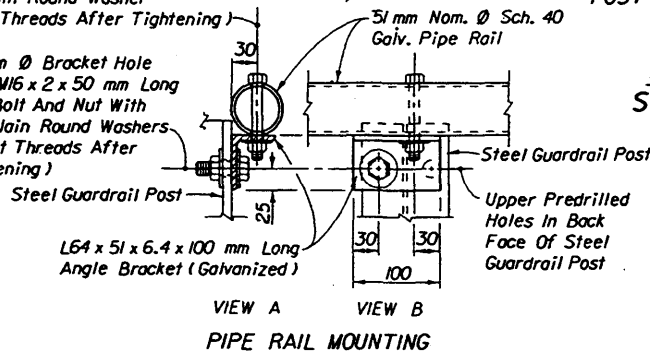
\*\*For curves with radii less than 875.0 m the spacing shall be reduced to 30.0 m through the curve.

**REFLECTOR SPACING  
ADHESIVE REFLECTORS-DETAIL M**



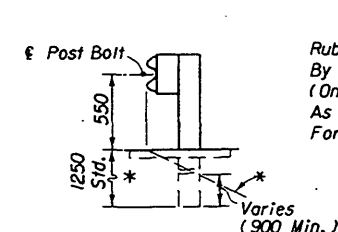
14 mm Ø Bracket And Pipe Holes With M12 x 1.75 x 90 mm Long Hex Bolt And Nut With M12 Plain Round Washer (Upset Threads After Tightening)

20 mm Ø Bracket Hole With M16 x 2 x 50 mm Long Hex Bolt And Nut With M16 Plain Round Washers (Upset Threads After Tightening)



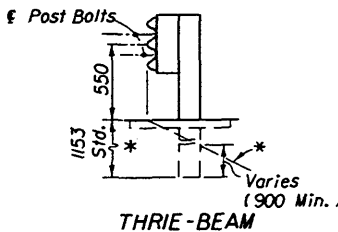
**STEEL MODIFIED THRIE-BEAM  
OFFSET BLOCK**

All Holes Are 20 mm Ø

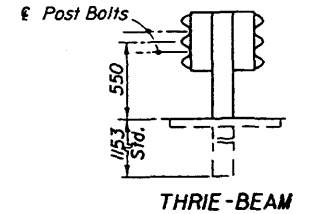
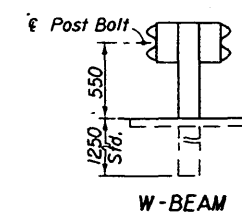


**W-BEAM WITH RUBRAIL**

**MODIFIED THRIE-BEAM**



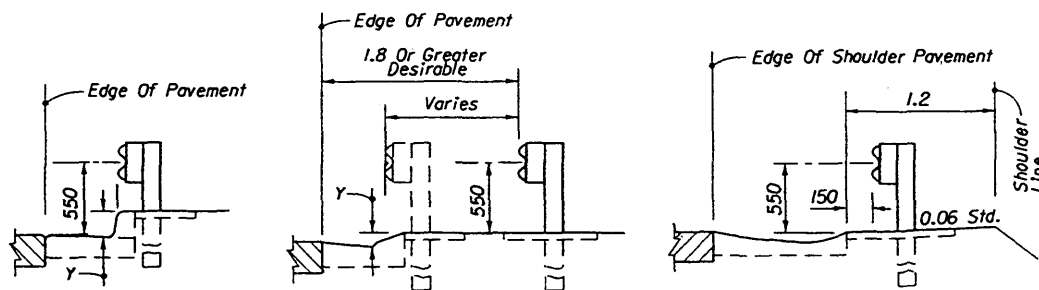
**THRIE-BEAM**



**DOUBLE FACED GUARDRAIL**

**SINGLE FACED GUARDRAIL**

**MOUNTING HEIGHTS ON SHOULDERS AND IN MEDIANS**



(Maximum Speed 80 km/h)  
Y = 150 Or Greater

Y = Less Than 150

Shoulder Gutter

**LOCATION AT CURB & GUTTER SECTIONS-DETAIL L**

POST	OFFSET BLOCK	REMARKS
Timber	150 x 200 x 360 Timber (Nominal) 150 x 200 x 360 Recycled Plastic	Post bolt hole in timber and plastic blocks to be centered ( $\pm 6$ mm) All timber offset blocks shall be dressed on all four sides (S4S). See Note 1 below. One 16d galvanized nail per block is to be used to prevent rotation of block (see detail left).
Steel W150 x 13.5 Or 152 C	150 x 200 x 360 Timber (Nominal) Or 150 x 200 x 360 Recycled Plastic	Same as above for timber and plastic blocks. Form fit plastic block holes align with holes in steel posts and do not require nails.
Steel W150 x 13.5 Or 152 C	M360 x 25.6 x 554 Or W360 x 32.9 x 554 Steel Modified Thrie-Beam Offset Block	M16 x 2 x 40 mm long hex head bolts with full length thread and nuts (2 Reqd.) and M16 plain round washers (4 Reqd.) for mounting steel block to post. Bolts are to be installed in opposite holes, top and bottom.

Notes: 1. Thrie-beam offset blocks are 554 in length.  
2. Timber and recycled plastic offset blocks of equal size can be intermixed within a run of rail.  
3. Rubber offset blocks are not to be used on moderate or high volume facilities and used only on low volume facilities when specifically called for in the plans.

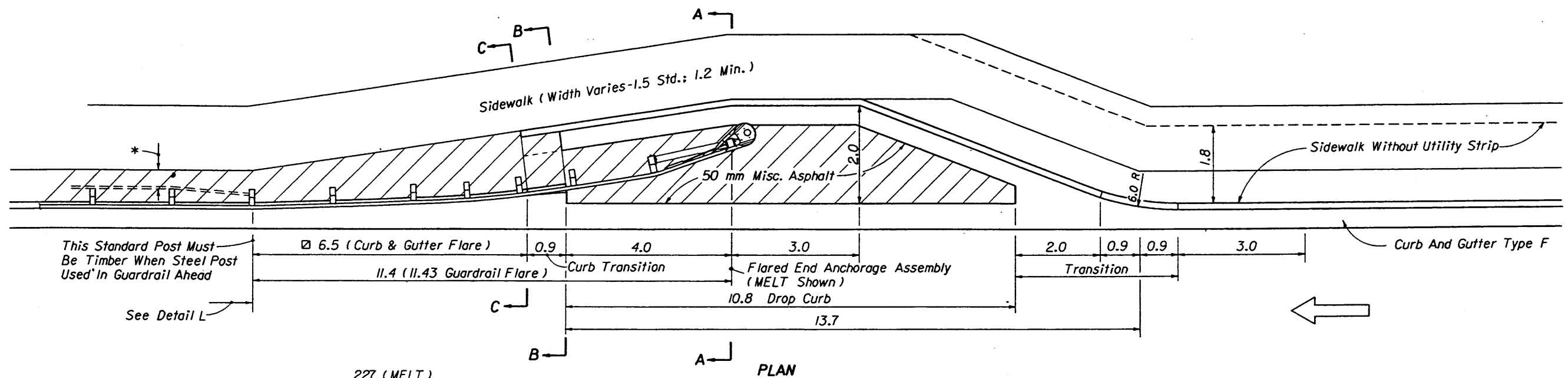
**PERMISSIBLE POST AND OFFSET BLOCK COMBINATIONS**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

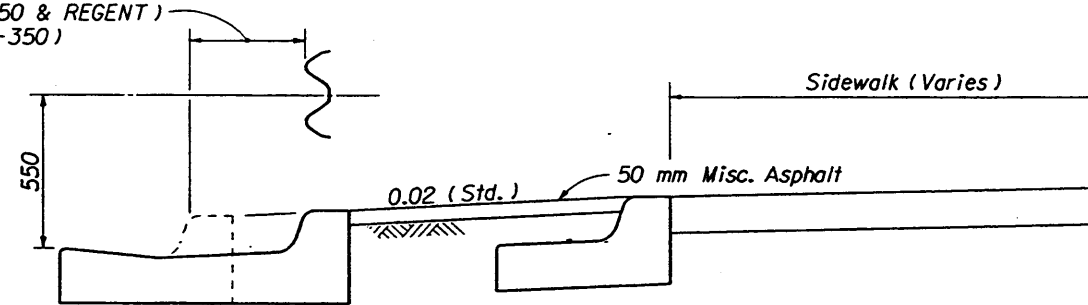
**GUARDRAIL**

Designed By	Names	Dates	App. By	State Roadway Design Engineer
Drawn By	HSD	09/81	Revision	Sheet No.
Checked By	JBW/JVC	09/81	00	16 of 31

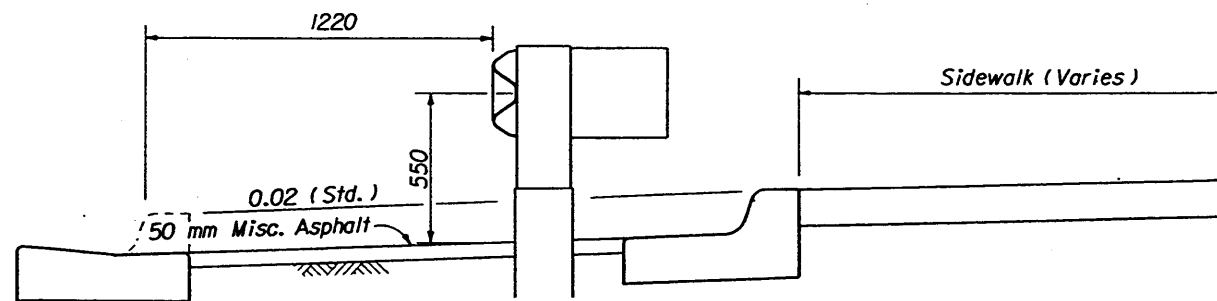
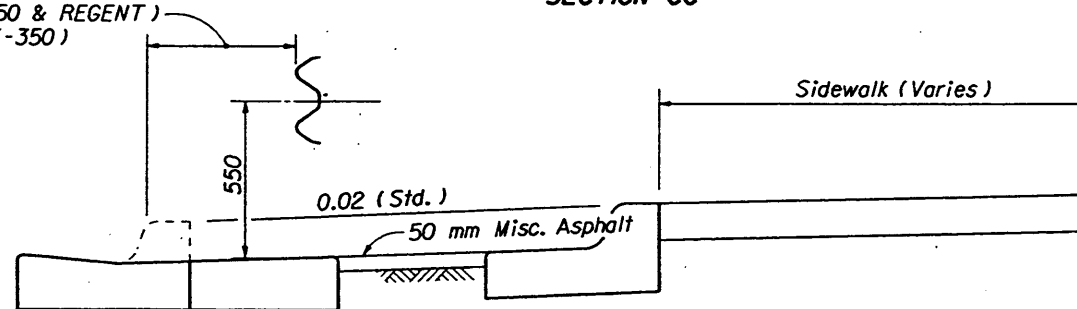
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227 (MELT)  
390 (SRT-350 & REGENT)  
697 (FLEAT-350)



334 (MELT)  
510 (SRT-350 & REGENT)  
793 (FLEAT-350)



APPROACH TREATMENT FOR CURB AND GUTTER

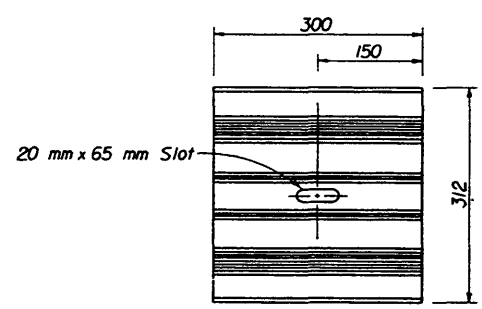
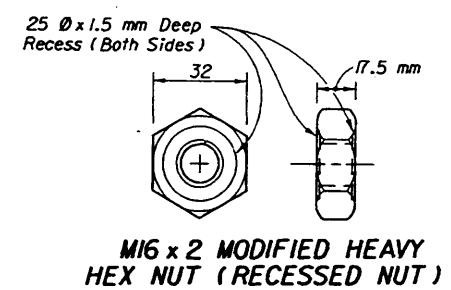
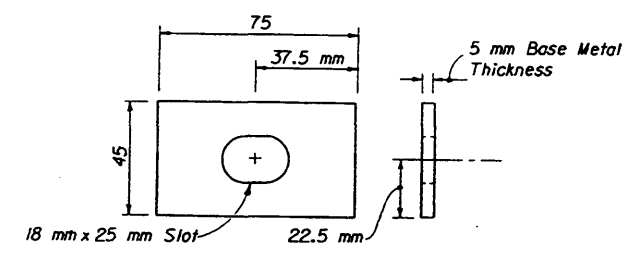
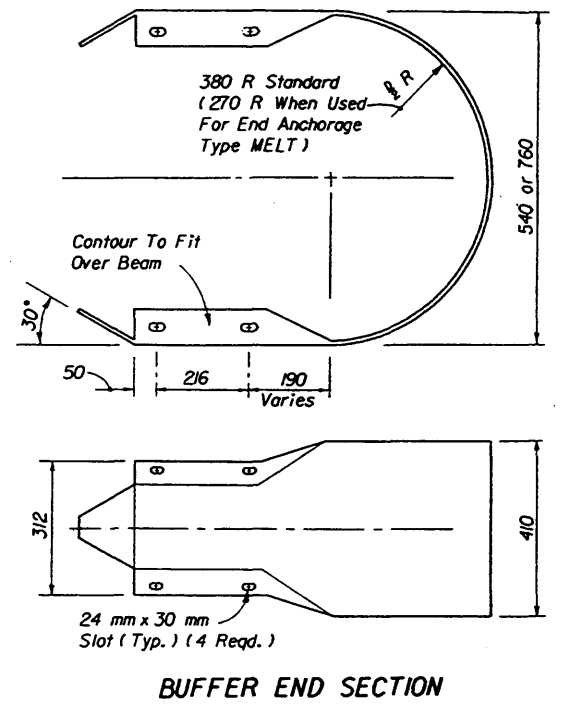
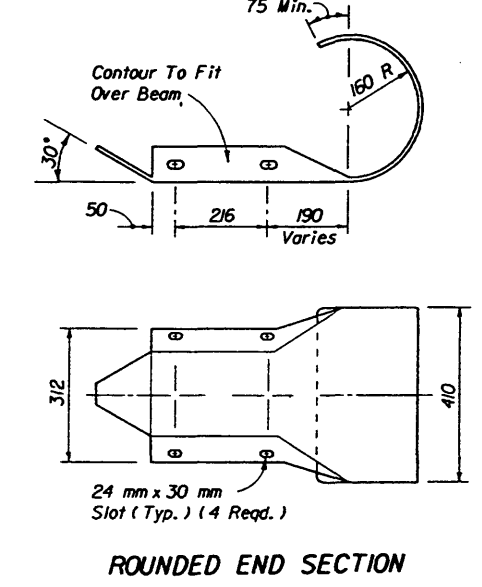
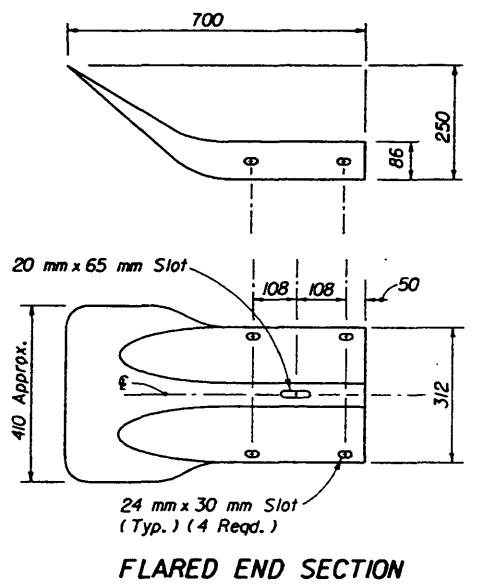
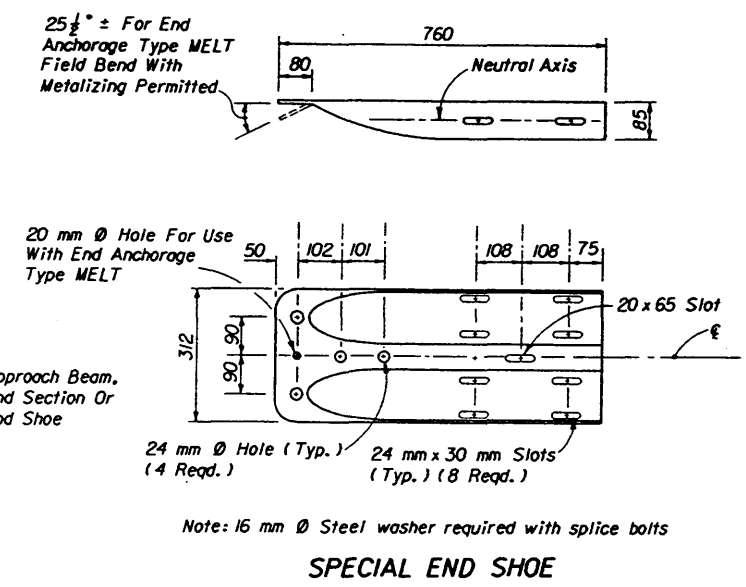
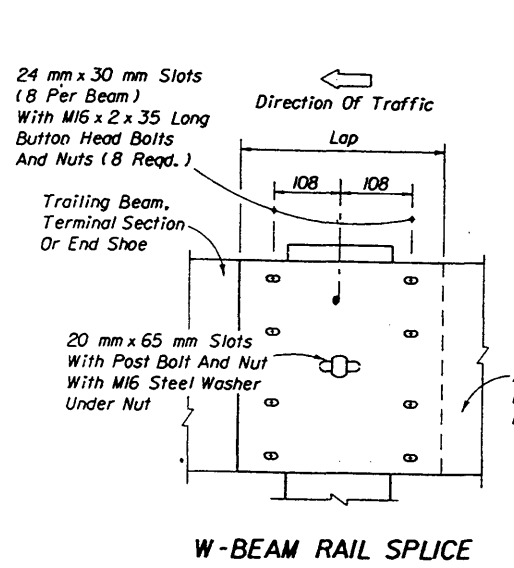
DETAIL Q

\*Safety Pipe Rail Required When Back Of Steel Guardrail Posts 1.2 m Or Less From Near Edge Of Pedestrian Way Or Bikeway And Post Bolt Treatment Required When Back Of Timber Post 1.2 m Or Less From Near Edge Of Pedestrian Way Or Bikeway; See 'SPECIAL SAFETY PIPE RAIL'

☑ Curb flare shall follow guardrail flare, see elsewhere in this Index for additional guardrail flare information.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
GUARDRAIL				
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Checked By	JC	10/87		
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Note: For beam washer requirements on end terminals, see individual end anchorage assembly details. Washers are to be used where necessary to accomplish alignment or where the post bolt head shows tendency to pull through the rail slot. Washers installed on guardrail, between end anchorages, prior to July 1, 1990 may remain in place until the guardrail is relocated or until repairs require removal and reinstallation of a post bolt.

Note: For application information see individual end anchorage assembly details.

(RECTANGULAR PLATE WASHER)  
**BEAM WASHER**

**W-BEAM BACK-UP PLATE**

Hex bolts shall conform to the requirements of ASTM F568M and hex nuts to the requirements of ASTM A563M. Heavy hex nuts may be used in lieu of hex nuts and hex nuts used for jam nuts.

**HEX BOLTS AND NUTS**

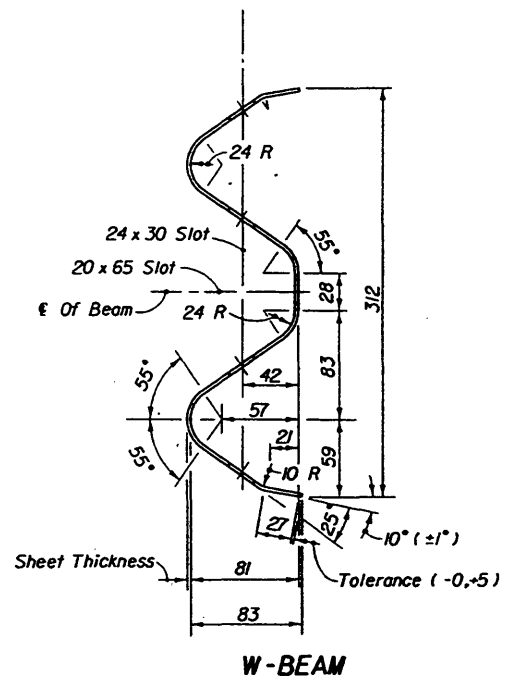
L (mm)	THREAD LENGTH (Min.) (mm)	APPLICATION
35	30	Rail Splice Bolt
255	100	Post Bolt - Single Or Double Faced Guardrail Timber Or Recycled Plastic Offset Block(s) On Steel Post
460	100	Post Bolt - Single Faced Guardrail Timber Posts
640*	100	Post Bolt - Double Faced Guardrail Timber Posts

Special bolts having lengths of 255 mm or greater shall have a thread length of not less than 100 mm.

\* Use of the 640 mm AASHTO-AGC-ARTBA standard length post bolt on double faced guardrail that results in the bolt projecting more than 20 mm beyond the face of the nut after pull-up shall be trimmed to 20 mm reveal and metalized with organic zinc-rich coating.

POST SPACING (m)	OFFSETS (m) Measured From Face Of Guardrail To Front Of Above Ground Rigid Hazard			
	SINGLE BEAM		NESTED BEAMS	
	W-Beam	Thrie-Beam	W-Beam	Thrie-Beam
1.905	1.2	1.0	N/A	N/A
.952	0.9	0.8	0.8	0.7
.476	N/A	N/A	0.7	0.6

Note: The values shown should be utilized unless changes are supported by imperial validation. Those desiring to develop offset values from the simulated deflection values shown in Table 5.3 of the AASHTO Roadside Design Guide are cautioned to proceed only if back-ground in the table development is understood.



Note: The round washer is not intended for use under the recess nut for the beam to beam rail splice. The washer is required under the recess nut for connecting the beam to the special end shoe; under the post bolt nut for connecting the beam to the timber post and offset blocks; for connecting the beam to steel posts with timber offset blocks; under the hex bolt head for securing the beam anchor plate to the beam; and, for general guardrail connections by 16 mm Ø hex bolts and nuts. For supplemental information see BEAM ANCHOR PLATE, PERMISSIBLE POST AND OFFSET BLOCK COMBINATIONS, individual end anchorage assembly details, SPECIAL STEEL GUARDRAIL POSTS, SPECIAL END SHOE, W-BEAM RAIL SPLICE, THRIE-BEAM RAIL SPLICE, and THRIE-BEAM TERMINAL CONNECTOR details.

Note: Specifications same as for hex bolts.

**M16 STEEL WASHER**

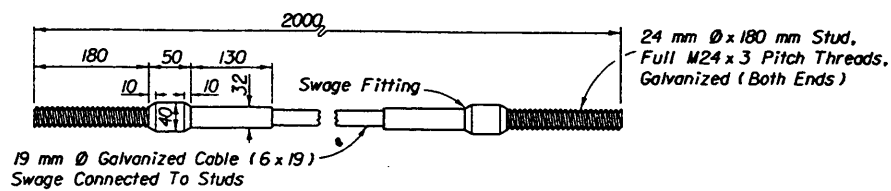
**M16 OVAL SHOULDER BUTTON HEAD BOLT**

**MINIMUM OFFSET FOR SINGLE FACED GUARDRAIL (m)**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

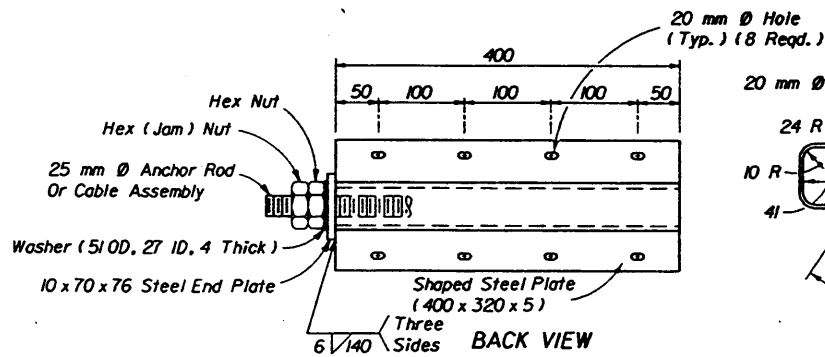
**GUARDRAIL**

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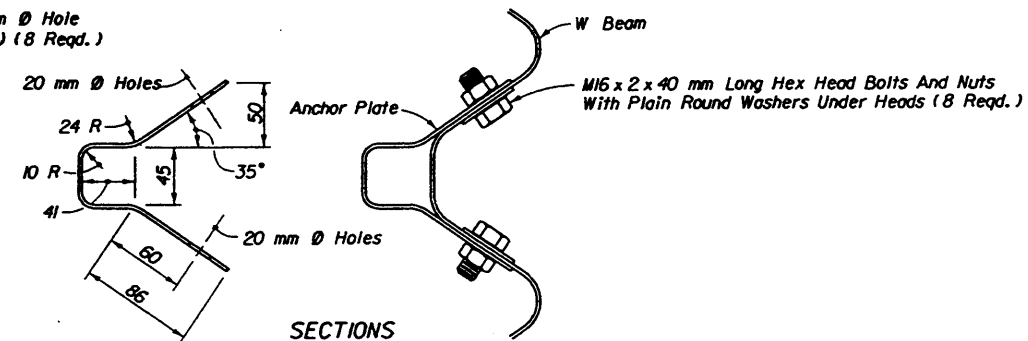
Note: Cable assemblies shall be in accordance with the specifications of AASHTO-AGC-ARTBA 'A Guide To Standardized Highway Barrier Hardware' Cable Anchor Assembly FCA01. Cable assemblies as detailed above are required as a part of end anchorage assemblies Type II (Cable Option), MELT, SRT-350, CRT, ET-2000, BEST, LET, SKT-350, FLEAT-350 and REGENT. An additional cable assembly 2750 mm in length with a swaged fitting on one (1) end is required for each end anchorage assembly Type CRT.

**CABLE ASSEMBLY**

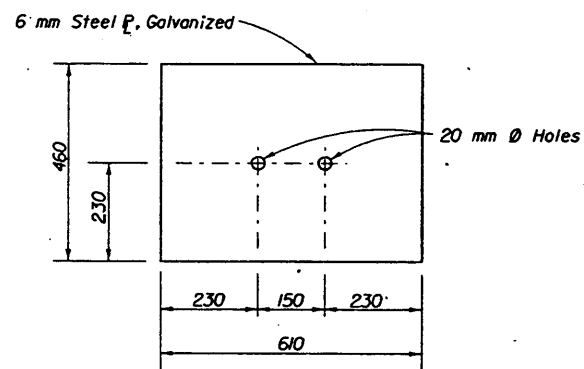


Note: Beam anchor plates are required for use as a part of end anchorage assemblies Type II, MELT, SRT-350, CRT and REGENT.

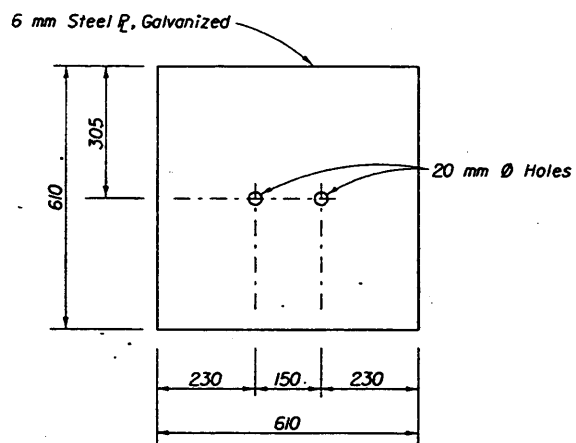
**BEAM ANCHOR PLATE**



**SECTIONS**

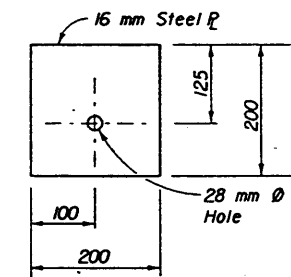


Note: This soil plate is required for use as a part of end anchorage assemblies Type II (Cable Option), CRT, SRT-350, ET-2000 and REGENT.



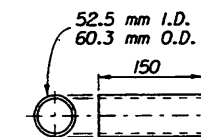
Either soil plate is approved for use as a part of end anchorage assembly Type MELT.

**SOIL PLATES**



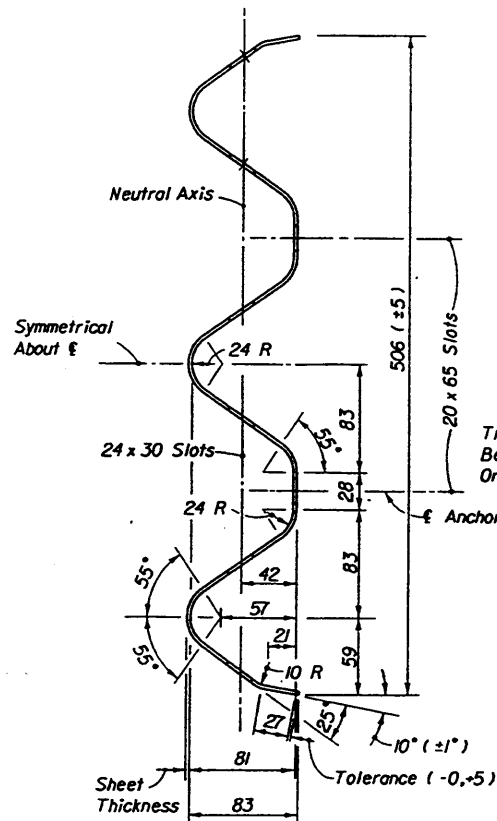
Note: This bearing plate is required for use as a part of end anchorage assemblies Type II (Cable Option), MELT, CRT, ET-2000, BEST, LET, SKT-350 and FLEAT-350.

**BEARING PLATE**

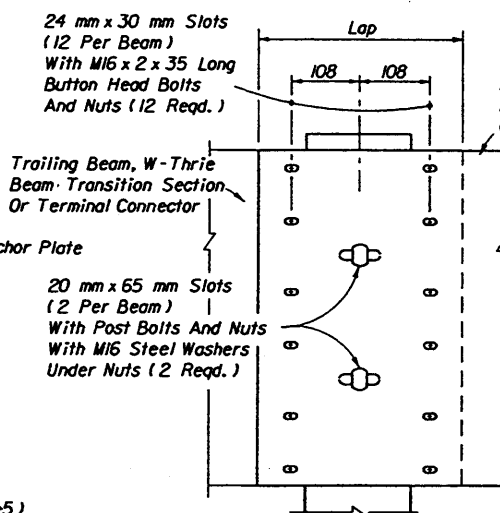


Note: This breakaway terminal post sleeve is required for use as a part of end anchorage assemblies Type II (Cable Option), MELT, CRT, SRT-350, ET-2000, BEST, LET, SKT-350 and FLEAT-350.

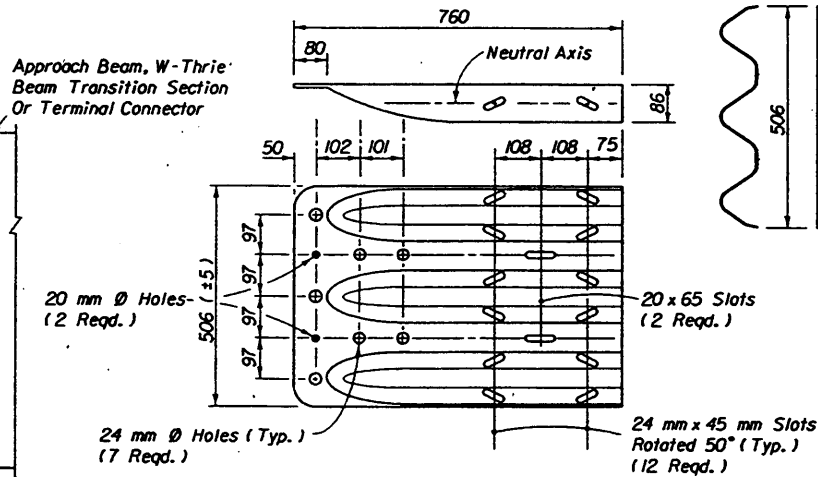
**BREAKAWAY TERMINAL POST SLEEVE**



**THRIE-BEAM**

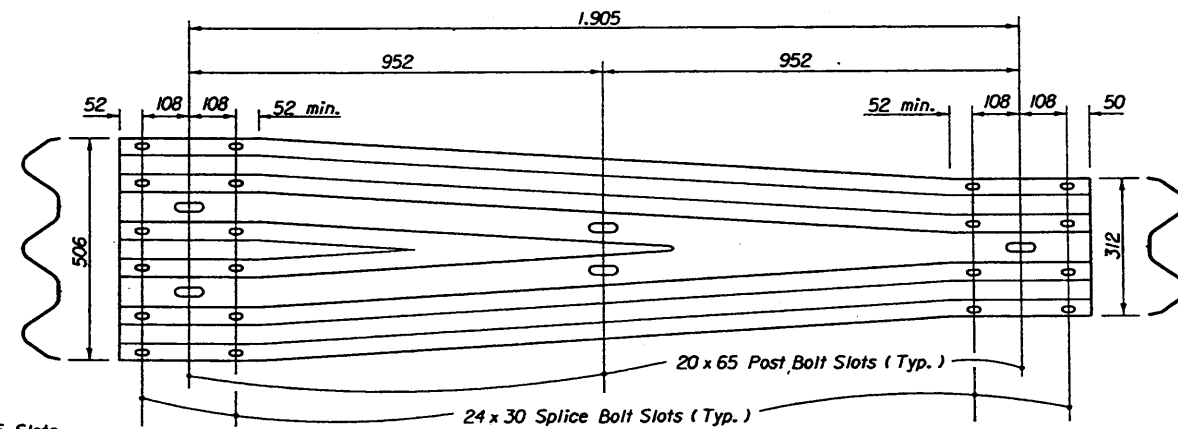


**THRIE-BEAM RAIL SPLICE**



Note: 16 mm diameter steel washer required with splice bolts

**THRIE-BEAM TERMINAL CONNECTOR**

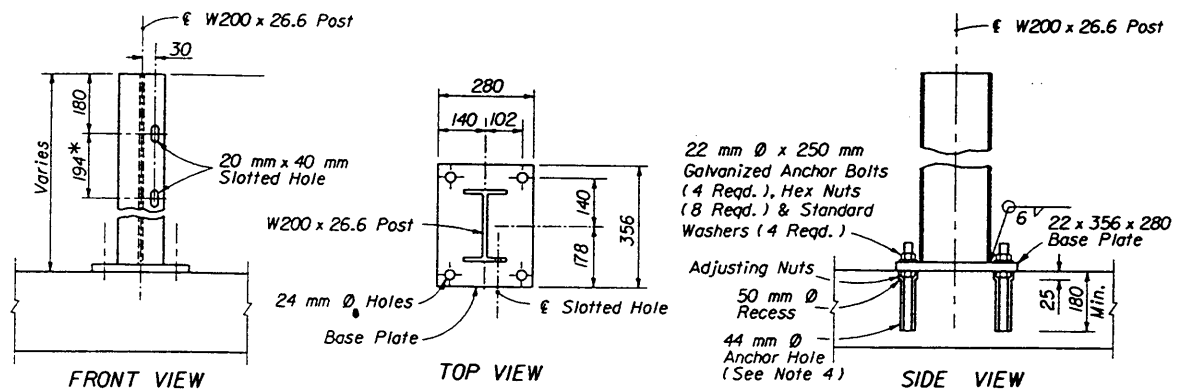


**W-THRIE BEAM TRANSITION SECTION**

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ROAD DESIGN

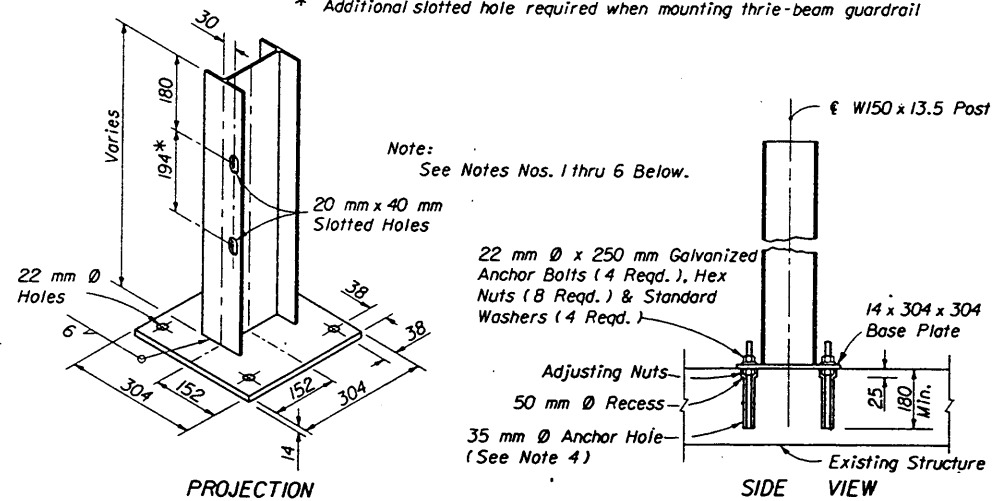
**GUARDRAIL**

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**FOR MOUNTING GUARDRAIL ON EXISTING APPROACH SLABS AND BRIDGE SIDEWALKS**

\* Additional slotted hole required when mounting thrie-beam guardrail

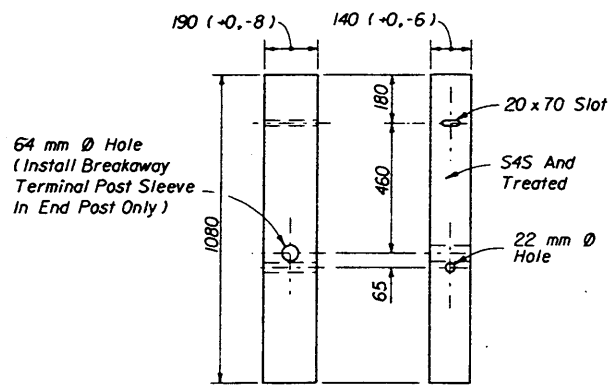


**FOR CONSTRUCTION OF GUARDRAIL WHERE CULVERT, PIER FOOTING OR OTHER STRUCTURE PRECLUDES NORMAL POST INSTALLATION**

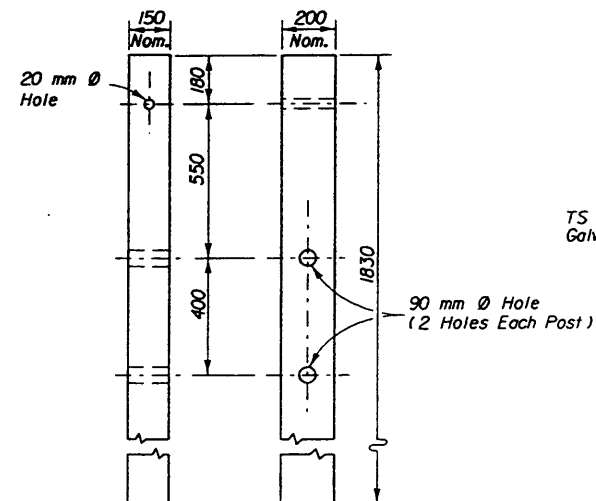
**NOTES: (SPECIAL STEEL POST)**

1. Either anchor bolts, concrete wedge anchors or approved Adhesive-Bonded Anchors for Structural Applications may be used.  
Anchor bolts, wedge anchors and adhesive anchors shall have a minimum tensile strength of 400 MPa and galvanized in accordance with ASTM A153 (stainless steel components may be substituted but components plated in accordance with ASTM B-633 are not acceptable). Adhesive anchor rods shall be equal in diameter to that detailed for anchor bolts. Wedge anchors are to be installed in accordance with the manufacturers recommendations, assuming 21 MPa compressive strength for concrete. Wedge anchors shall also meet the following requirements: (a) tensile load each anchor: approach slabs 62.3 kN; other structures 35.6 kN (b) shear load each anchor: approach slabs 66.7 kN; other structures 34.7 kN.
2. Posts are to be plumbed by adjusting nuts or mortar seating. Posts installed using anchor bolts and adhesive anchors are to be set with adjusting nuts as detailed, unless the Engineer approves the use of mortar seating in lieu of adjusting nuts. Posts installed using wedge anchors are to be set with mortar seating. Base plates shall be grouted with neat finish.
3. Anchor bolts shall be set in approved epoxy mortar.
4. Adhesive-Bonded Anchors for Structural Applications shall comply with Section 937 and be installed in accordance with Section 416. Drilled hole diameter shall be in accordance with the manufacturer's instructions.
5. Anchor holes and recesses shall be drilled; wedge anchor holes are to be drilled in accordance with the manufacturers specifications. Encountered reinforcing steel shall be drilled through. Holes shall be thoroughly cleaned when setting bolts and anchors and dry when setting wedge anchors.
6. Steel post and base units shall be galvanized in accordance with ASTM A123. Any damaged galvanized areas are to be metalized in accordance with Section 562 of the Standard Specifications.

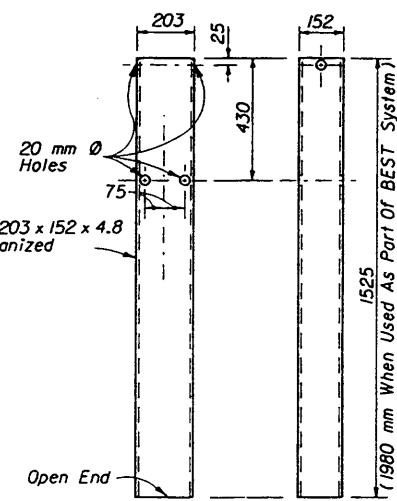
**SPECIAL STEEL GUARDRAIL POSTS**



**SHORT TIMBER BREAKAWAY POST**  
For Use In Combination With Steel Tube

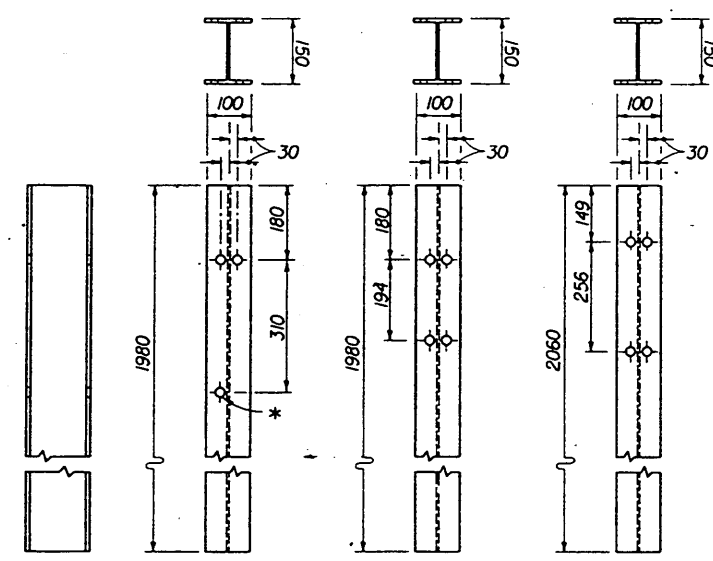


**CRT TIMBER POST**



**STEEL TUBE**  
For Use In Combination With Short Timber Breakaway Post

**SPECIAL TIMBER GUARDRAIL POSTS**



**W-BEAM**  
**THRIE-BEAM WITH STANDARD OFFSET BLOCKS**  
**THRIE-BEAM WITH STEEL MODIFIED THRIE-BEAM OFFSET BLOCKS**

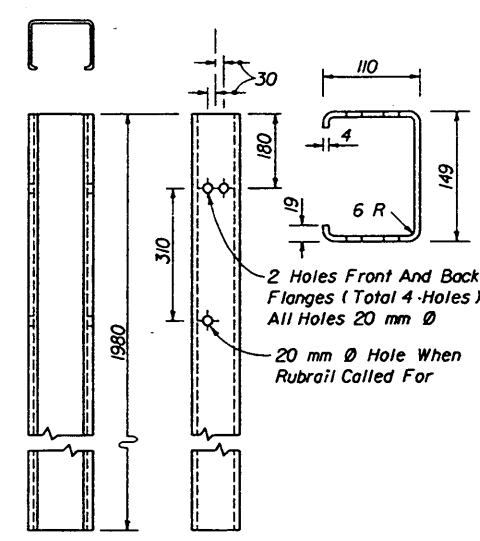
All Holes Shall Be 20 mm Ø Identical Front And Back Flanges

Note: W150 x 13.5 steel posts may be either rolled or welded structural shapes conforming to or exceeding the design properties of ASTM A6/A6M. Welding shall be in accordance with the requirements of ASTM A769/A769M. Posts shall be cut to length and the ends seal welded between web and flange before galvanizing. Posts to be galvanized in accordance with ASTM A123.

**W150 X 13.5 STEEL POST**

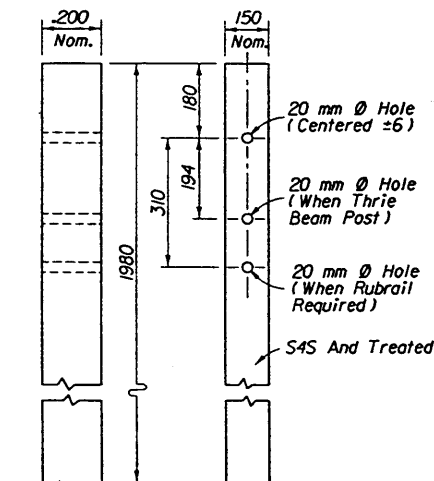
**STANDARD TIMBER AND STEEL GUARDRAIL POSTS**

**GUARDRAIL POSTS**



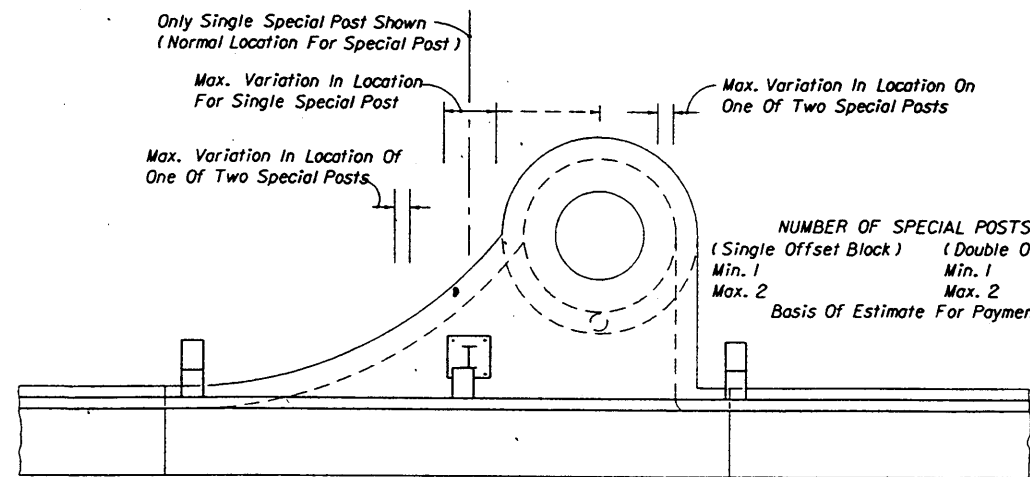
**152-C STEEL POST**

Note: 152-C steel posts are to face the same direction in any continuous run of guardrail. Posts to be galvanized in accordance with ASTM A123.

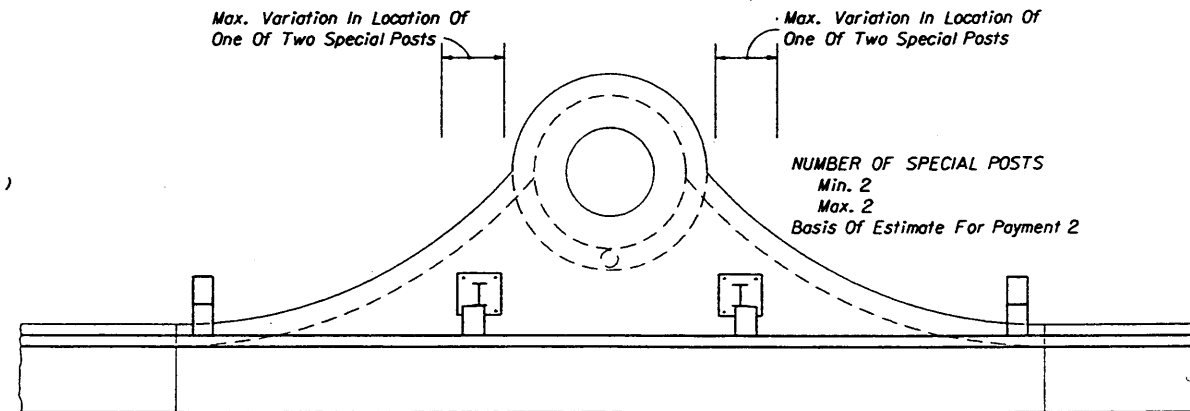


**TIMBER POST**

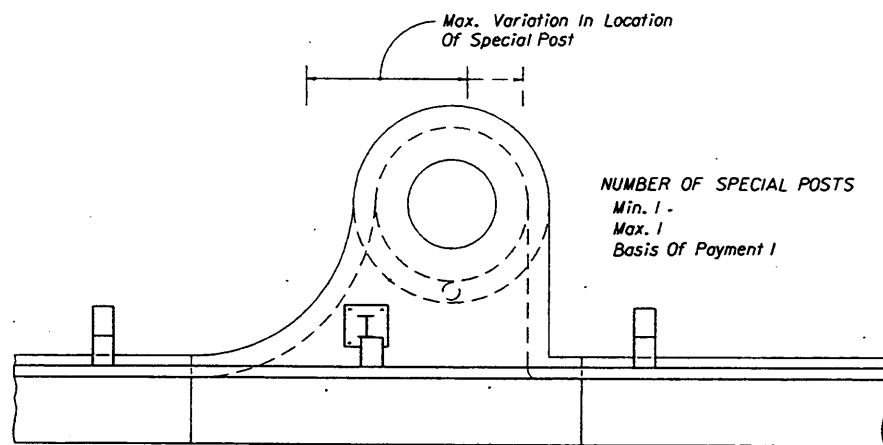
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>GUARDRAIL</b>				
Designed By	Names	Dates	Approved By	
Drawn By	JM	08/21	State Roadway Design Engineer	
Checked By	JMG/JBW	08/21	Revision	00
			Sheet No.	20 of 31
			Index No.	400



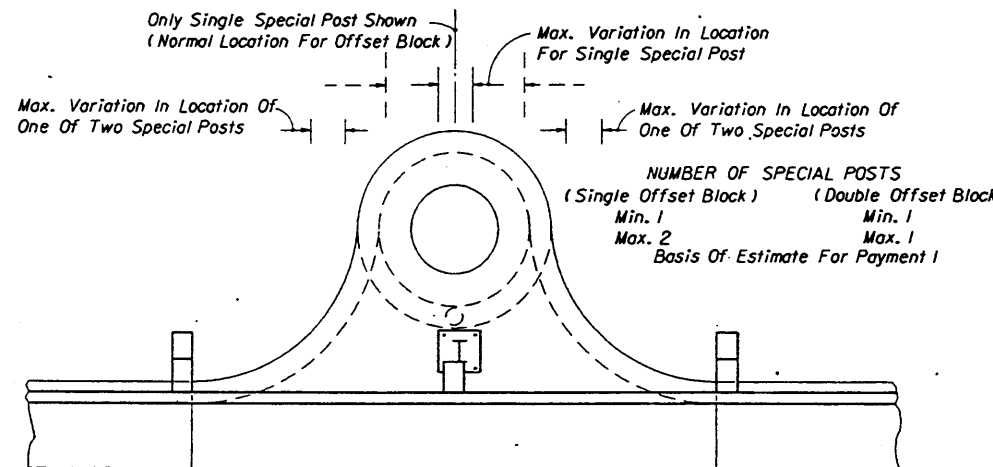
**CURB INLET TYPE 1**



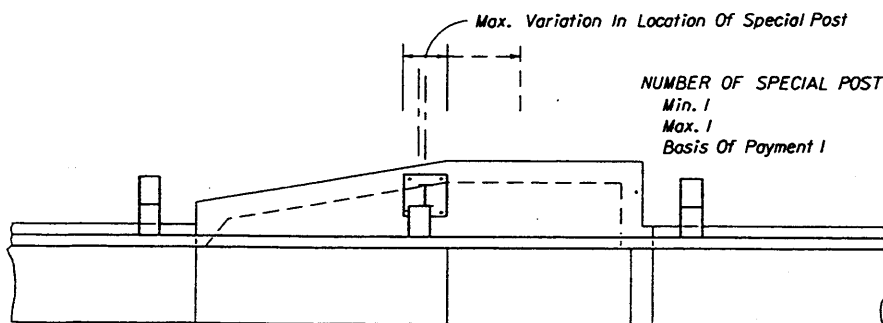
**CURB INLET TYPE 2**



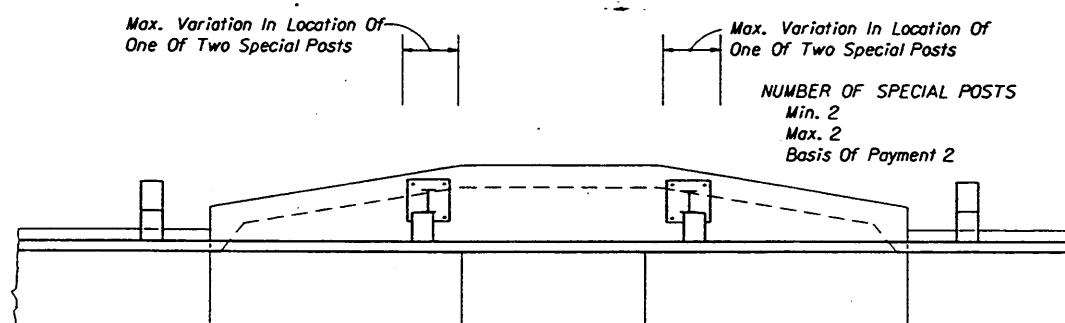
**CURB INLET TYPE 3**



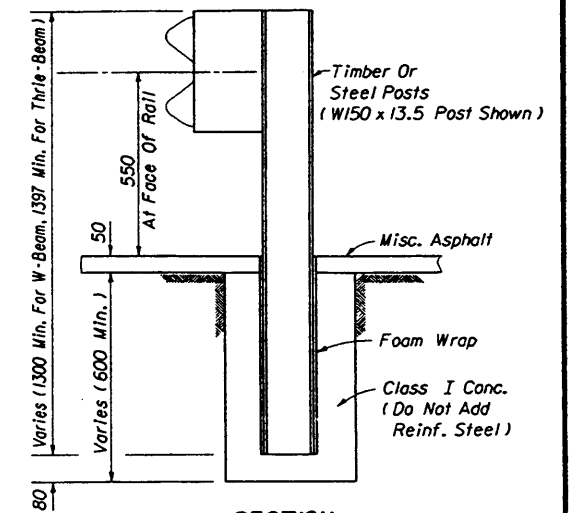
**CURB INLET TYPE 4**



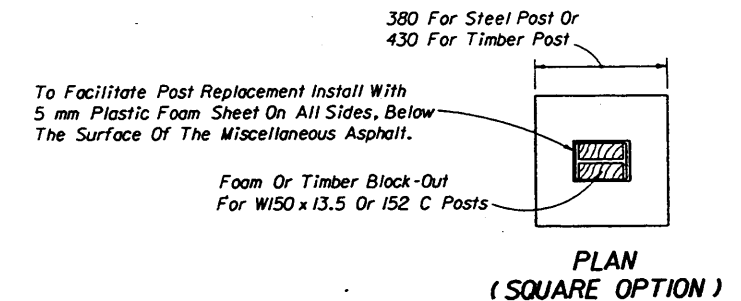
**CURB INLET TYPE 5**



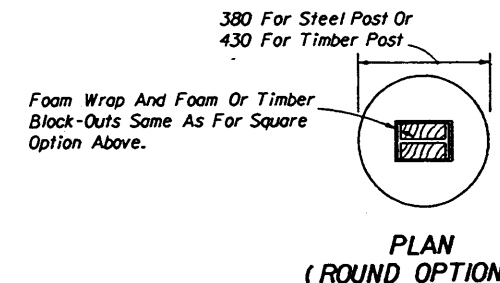
**CURB INLET TYPE 6**



**SECTION**



**PLAN (SQUARE OPTION)**



**PLAN (ROUND OPTION)**

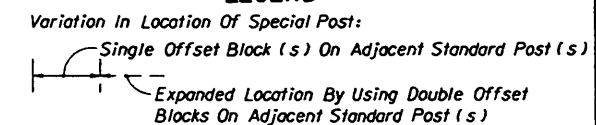
Note: For line post applications only, i.e. not to be used with breakaway post applications nor be used to modify End Anchorage Assemblies Type II

TO BE USED PRINCIPALLY OVER SHALLOW UTILITIES  
**ENCASED GUARDRAIL POST**

**Notes:**

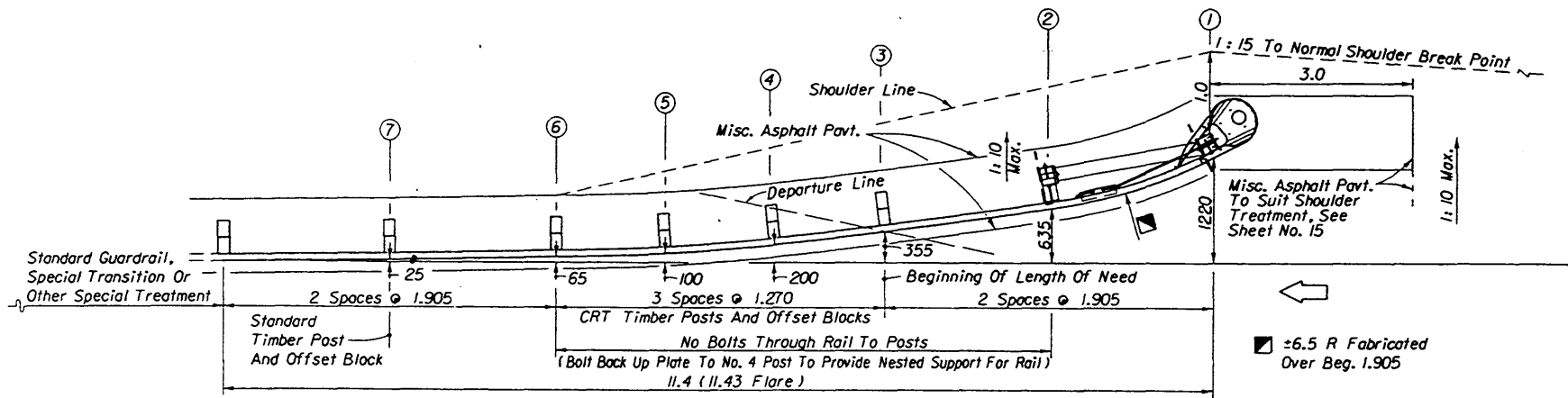
- The locations shown for special posts mounted on inlets are to be used as guidelines for positioning the posts and for estimating the number of required posts.
- Special posts and their anchorages mounted on curb inlets shall be in accordance with special steel guardrail posts Sheet 20, and paid for under the contract unit price for Special Guardrail Post, EA.
- Variations shown for the locations of special posts mounted on inlets are established from standard post spacing (1.905 m); clearance of standard posts from inlets (100 mm min.); use of single and double offset blocks on standard posts adjacent to the inlets; optional flange mountings; and, concrete anchor edge distances (50 mm for grouted and 95 mm for expansion anchors). The number of posts and their locations may vary by reducing post spacing and adjusting the length of rail panel(s).
- Encased guardrail posts shall conform in section to standard timber and steel posts, and be paid for under the contract unit price for Special Guardrail Post, EA. Payment shall include cost of foam wrap and concrete encasement.

**LEGEND**

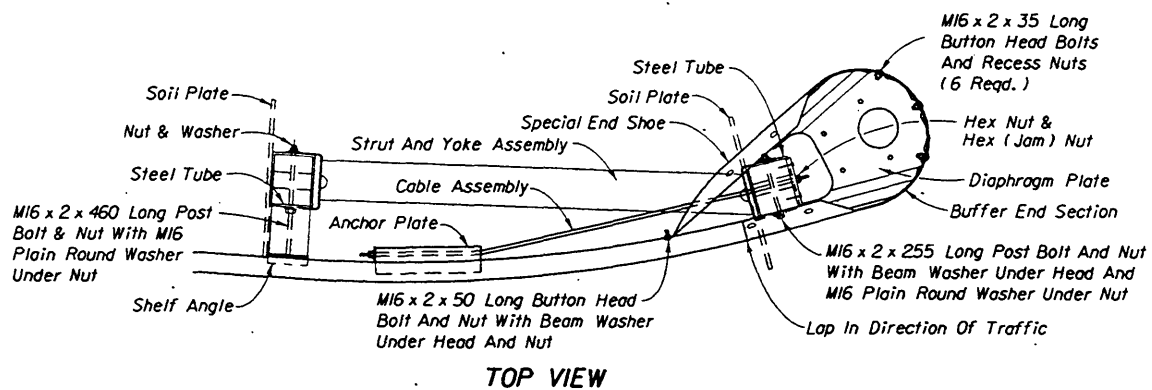


**SPECIAL POST LOCATIONS ON CURB INLETS**

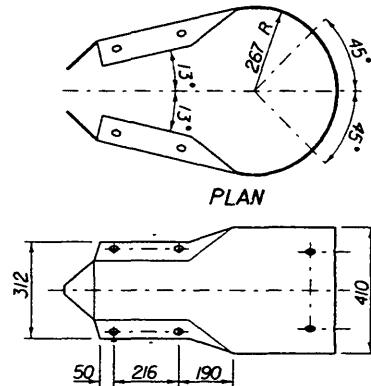
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<b>GUARDRAIL</b>					
Designed By	Names	Dates	Approved By	State Roadway Design Engineer	
Drawn By	HSD	08/83	Revision	Sheet No.	Index No.
Checked By	JG	08/83	00	21 of 31	400



PLAN  
MODIFIED ECCENTRIC LOADER TERMINAL (MELT)

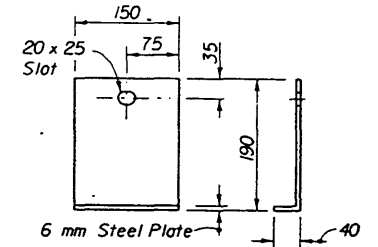


TOP VIEW

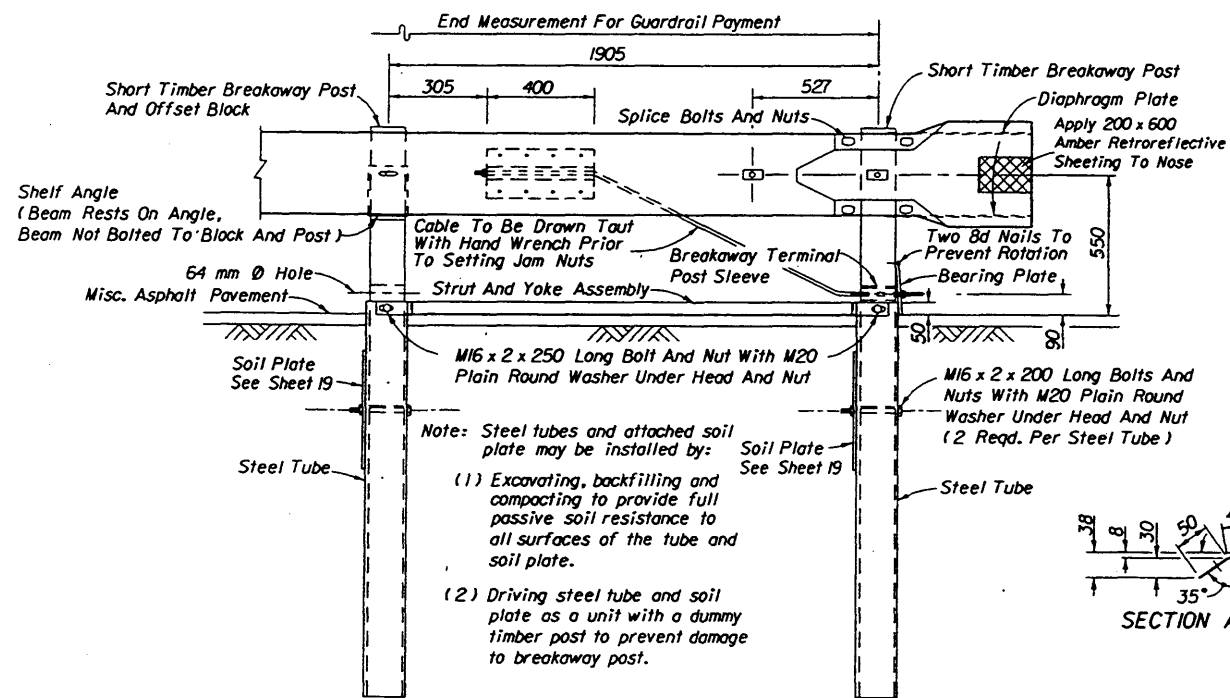


ELEVATION

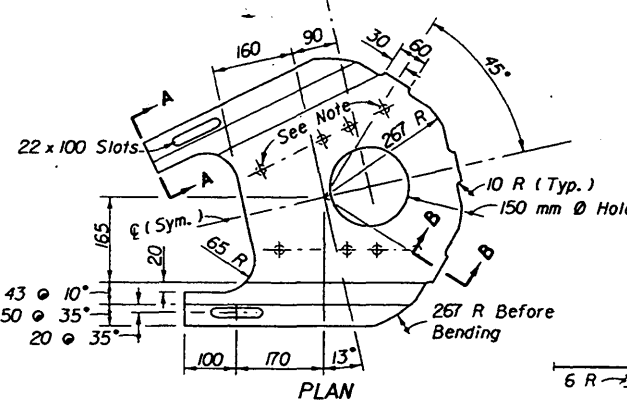
FLAT PLATE LAYOUT  
All Slots Shall Be 24 x 30  
BUFFERED END SECTION



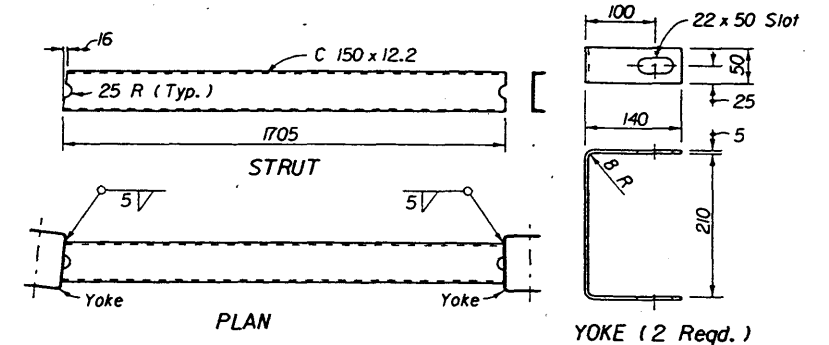
SHELF ANGLE



FRONT VIEW



DIAPHRAGM PLATE (2 Req'd.)



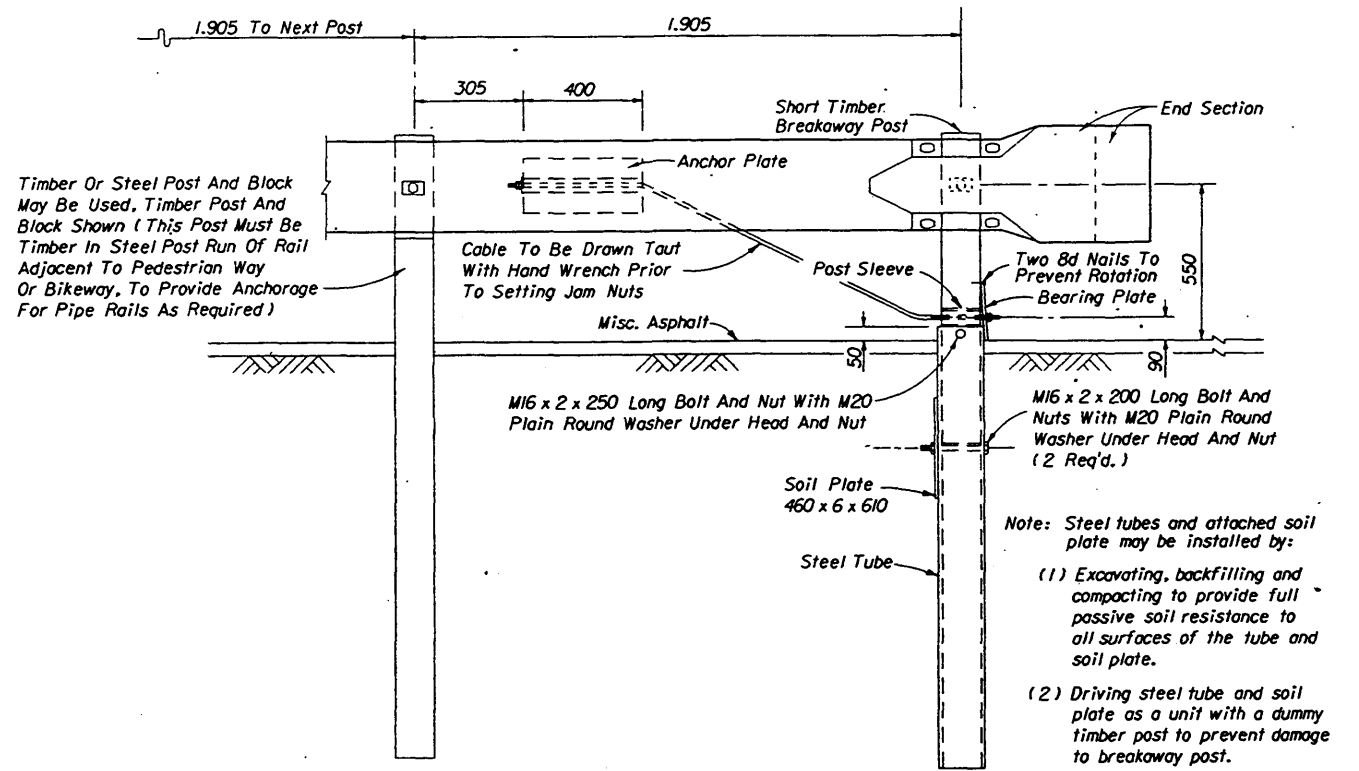
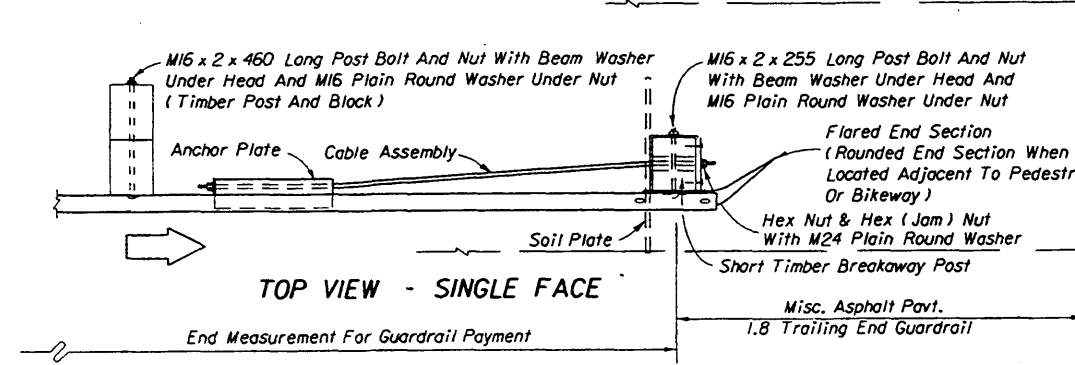
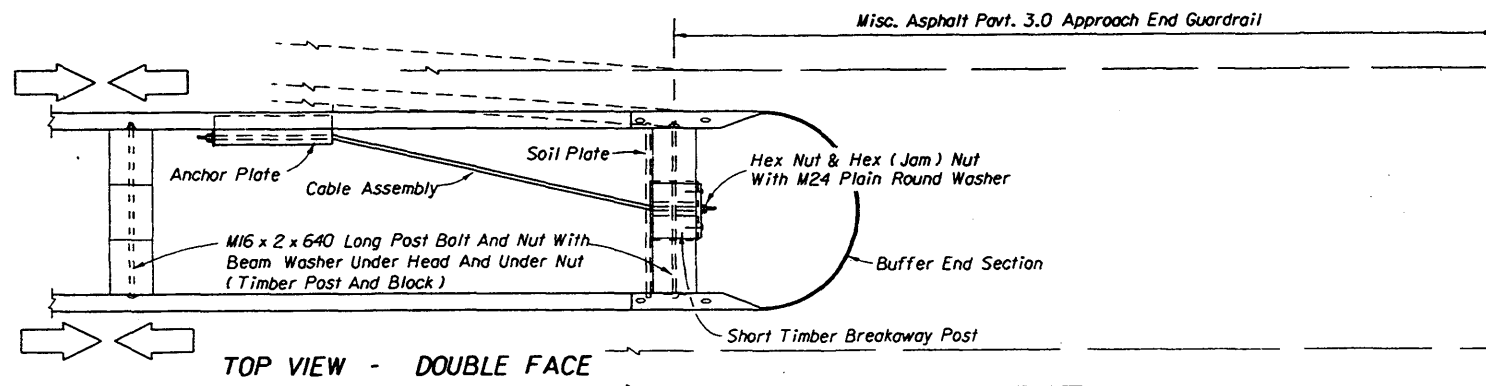
STEEL STRUT AND YOKE ASSEMBLY

END ANCHORAGE ASSEMBLY TYPE MELT

MODIFIED ECCENTRIC LOADER TERMINAL NOTES

1. The MELT is applicable for design speeds up to 70 km/h (45 mph). The MELT is intended for use as an approach end guardrail anchorage for shoulder guardrail. Its alignment is a flare from the normal guardrail alignment with an effective length of 11.43 m including three standard W-beam panel outside of any standard guardrail, guardrail transitions or other special treatments.
2. This standard drawing is produced by the Florida Department Of Transportation solely for use by the Department and its assignees. This standard drawing provides the general graphics and information necessary to field identify component parts of the MELT and their incorporation into a whole system.
3. This standard drawing is sufficient for plan details for the MELT when installed in connection with shoulder guardrail and precludes the requirement for shop drawing submittals unless the plans otherwise call for such submittals. The MELT shall be assembled in accordance with the distributor's detailed drawings, procedures and specifications.
4. The first two post must be short timber breakaway posts with steel foundation tubes and soil plates, post Nos. 3 thru 6 must be CRT timber posts and post No. 7 must be a standard timber post.
5. The MELT can not be used in medians where horizontal clearance requires the use of a backrail.
6. See the General Notes for galvanizing requirements of metallic components.
7. If the plans call for the MELT at a specific location, substitutions with other end anchorage assemblies will not be permitted unless approved by the Engineer. If the plans call for end anchorage assembly 'flared' at a specific location, the contractor has the option to construct any FDOT approved flared assembly that meet the applications for that location. Where a flared end anchorage is called for in the plans, any approved substitution with a parallel end anchorage will not be eligible for VECP consideration.
8. The MELT shall be paid for under the contract unit price for Guardrail, End Anchorage Assembly (Flared), EA and shall be full compensation for furnishing and installing all components in accordance with the plans; the distributor's detailed drawings, procedures and specifications and this Index.

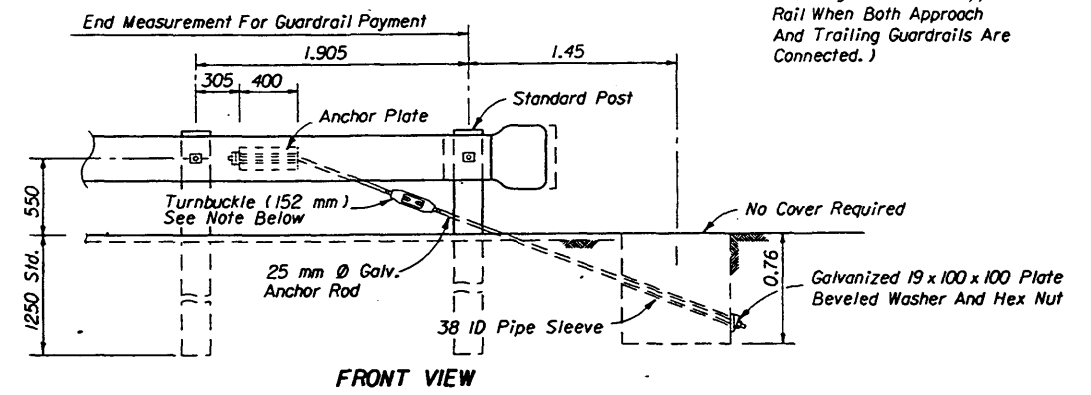
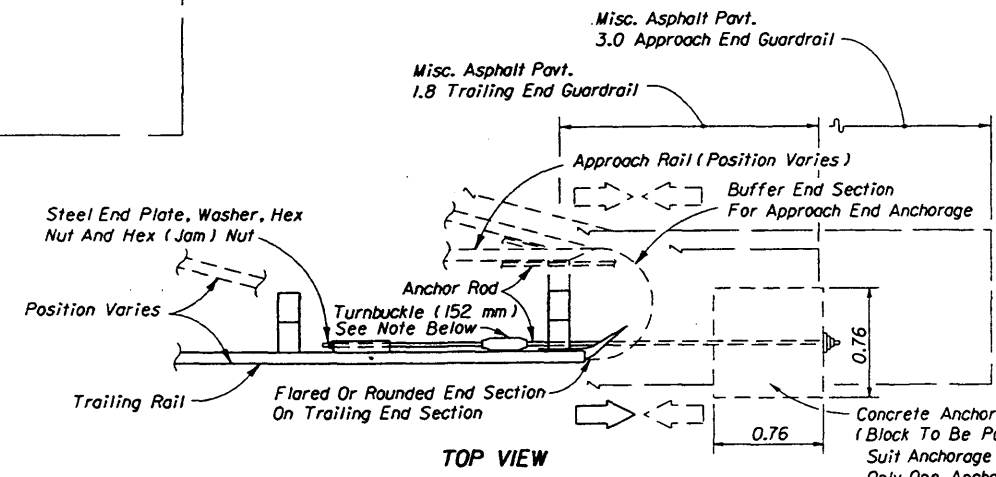
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
GUARDRAIL				
Designed By	Name	Date	Approved By	Index No.
Drawn By	HW	3/95	 State Roadway Design Engineer	Sheet No.
Checked By	JG	3/95		00
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The payment for the items of End Anchorage Assembly Type II (Cable Option) shall be full compensation for furnishing and installing either the Round or the Buffer End Section, the Beam Anchor Plate, Cable Assembly, Pipe Sleeve, Soil Plate, Steel Tube, Bearing Plate, Short Timber Breakaway Post, Offset Blocks and the necessary hardware.

**CABLE ANCHOR OPTION**

- Note: Steel tubes and attached soil plate may be installed by:
- (1) Excavating, backfilling and compacting to provide full passive soil resistance to all surfaces of the tube and soil plate.
  - (2) Driving steel tube and soil plate as a unit with a dummy timber post to prevent damage to breakaway post.



Turnbuckle to be used only for guardrail that is reset vertically. The existing anchor rod (25 mm or 32 mm Dia.) shall be field cut, threaded 100 mm on each end, and metalized in accordance with Sections 562 and 971 of the Standard Specifications. The cost for cutting, threading, metalizing and the turnbuckle shall be included in the contract unit price for Reset Guardrail, MI.

The payment for the items of End Anchorage Assembly Type II (Concrete Anchor Block Option) shall be full compensation for furnishing and installing the Beam Anchor Plate, Anchor Rod, Pipe Sleeve, Anchor Block, either Flared, Rounded or Buffer End Section, and the necessary hardware.

**CONCRETE ANCHOR BLOCK OPTION**

**TYPE II NOTES**

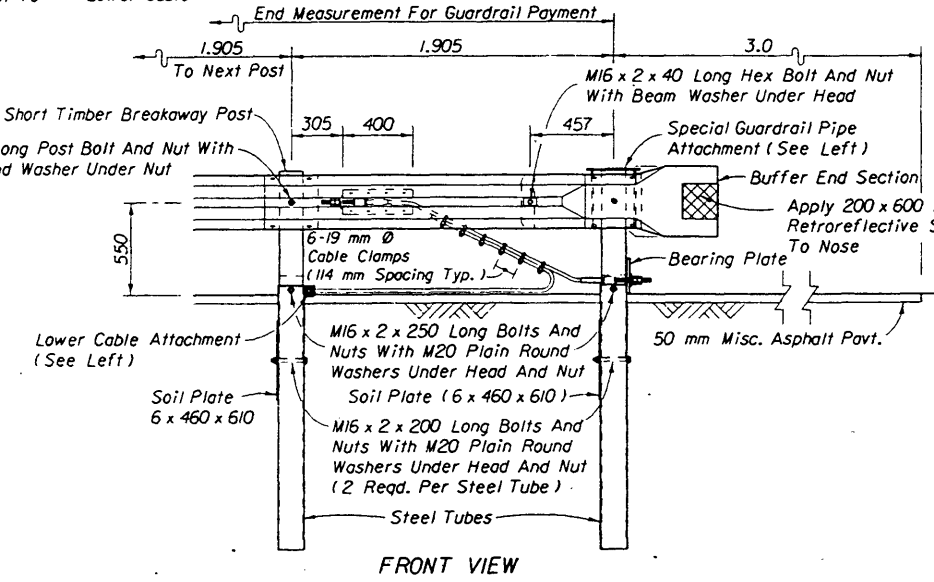
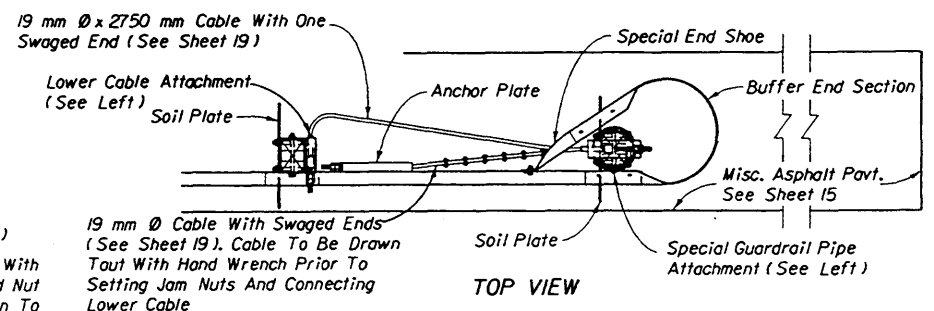
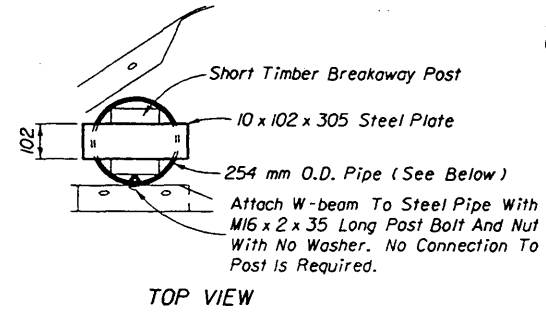
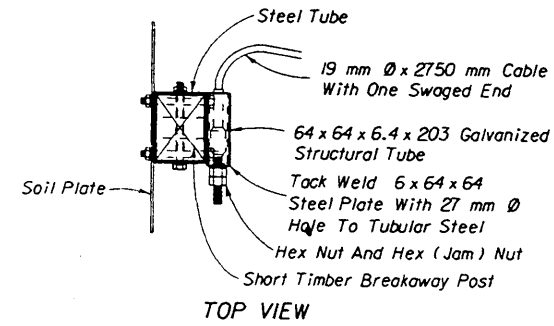
1. Unless specified in the plans, the contractor can supply either the cable anchor option or the concrete anchor block option.
2. Type II end anchorage assemblies are approved for all speeds and are intended for use as:
  - (a) trailing end anchorages for single face free standing guardrail systems;
  - (b) approach end anchorages for single face free standing guardrail systems when end anchorage is located outside of the clear zone; and,
  - (c) both approach and trailing ends of double face guardrail systems.
 Crash cushions shall be constructed at or in lieu of approach Type II end anchorages located inside the clear zone.
3. These end anchors are to be paid for under the contract unit price for Guardrail, End Anchorage Assembly (Type II) EA as called for in the plans or by permit.

**END ANCHORAGE ASSEMBLY TYPE II**

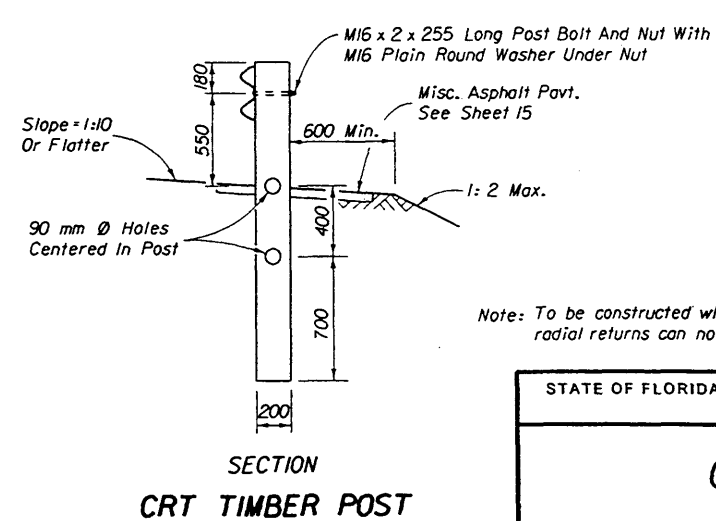
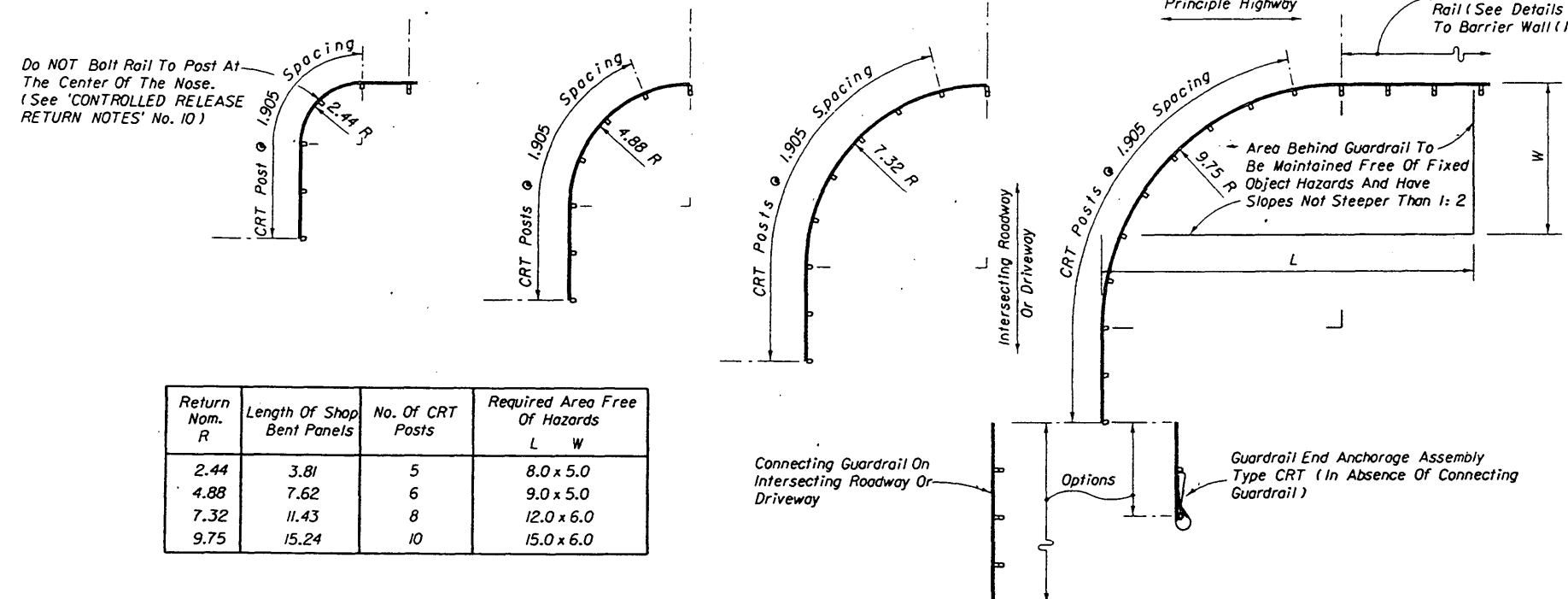
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION				
ROAD DESIGN				
<b>GUARDRAIL</b>				
Designed By	Names	Dates	Approved By	Index No.
Drawn By	JW	01/81	State Highway Design Engineer	400
Checked By	JW	01/81	00	22 of 31

**CONTROLLED RELEASE RETURN NOTES**

- Controlled release returns are intended for use in openings in continuous guardrail for driveway and side road access, and, for shielding the ends of bridge traffic rails and barrier walls where the driveway and side road access is in close proximity to the structure and space does not permit the proper use of Guardrail End Anchorage Assemblies Type II, MELT, SRT-350, ET-2000, BEST, LET, FLEAT-350 or REGENT.
- Controlled release returns are not intended as a substitute or replacement for the appropriate use of approved vehicle impact attenuators.
- Controlled release returns with either 2.44, 4.88 or 7.32 radii are designed for highway speeds of 100 km/h or less ( $\leq 60$  mph); the 9.75 radius return is to be used only for highway speeds of 70 km/h or less ( $\leq 45$  mph).
- The controlled release returns shown are designed as full returns based on an intersection angle of 90°. The return can be terminated with the Guardrail End Anchorage Assembly Type CRT or connected to standard guardrail as shown or as otherwise detailed in the plans.
- The Guardrail End Anchorage Assembly Type CRT is to be used only for the controlled release returns with 2.44, 4.88, 7.32 and 9.75 radii as shown; the assembly is not to be used in any tangent rail or flared rail applications. Other types of end anchorage assemblies are not to be used in the controlled release returns.
- The area immediately behind the control release return shall have slopes not steeper than 1:2 and be maintained free of fixed objects in accordance with the area limits tabulated in the plan below.
- The surface approaching the controlled release return shall have a transverse slope not exceeding 1:10. The effective width of the transverse surface is to be based on standard vehicle departure, return radii and preceding shielding; the width (beyond shoulder) shall be not greater than the corresponding 5.0 m and 5.0 m 'W' values tabulated below.
- The curved guardrail portion of the controlled release return shall be full section shop bent panels (3.81 m or 7.62 m panels).
- Washers are not to be used between the guardrail beam and the head of the button head post bolts at any controlled release terminal (CRT) post or at any Guardrail End Anchorage Assembly Type CRT breakaway timber post.
- The guardrail beam of the 2.44 radius return is not bolted to the center control release post.
- See the General Notes for galvanizing requirements of metallic components.
- Controlled release return systems shall be paid for under the contract unit prices for Guardrail (Roadway), MI, Guardrail (Shop-bent Panels), MI, and Guardrail, End Anchorage Assembly (Type CRT), EA as called for in the plans or by permit and shall be full compensation for furnishing and installing all components in accordance with the plans and with this index. CRT posts are included in the cost for guardrail.



**GUARDRAIL END ANCHORAGE ASSEMBLY TYPE CRT**

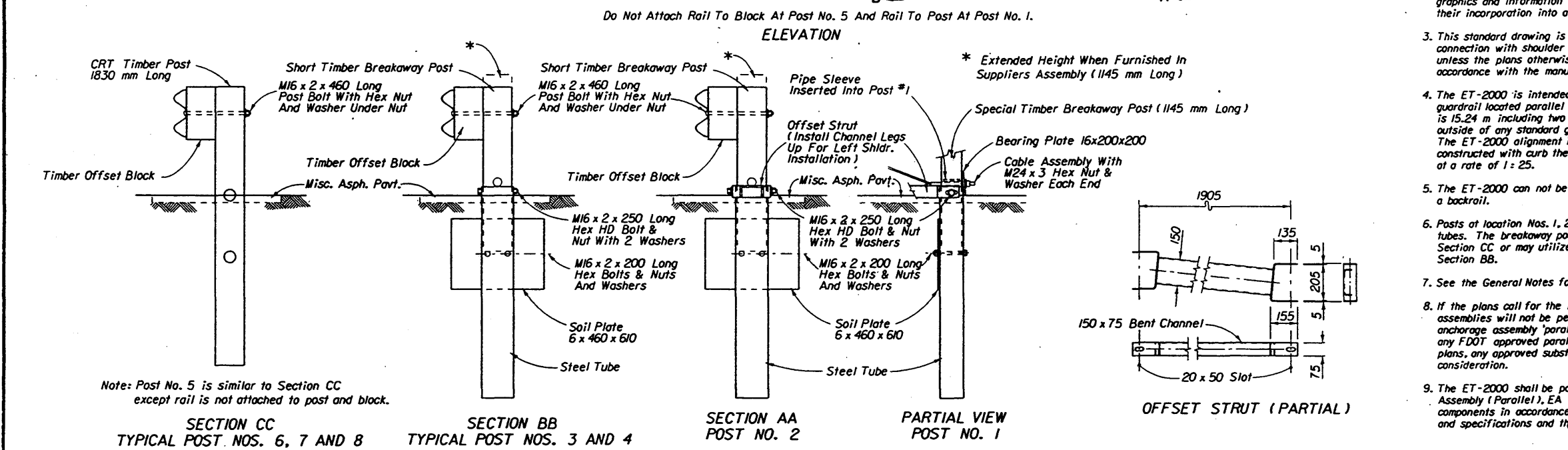
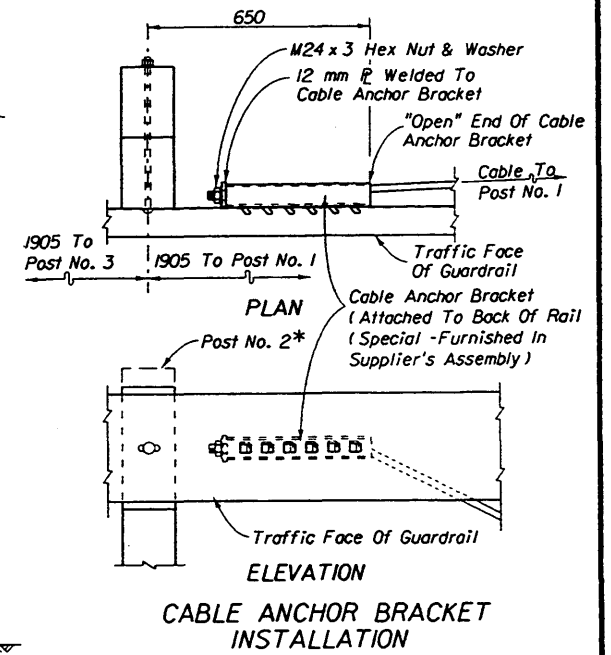
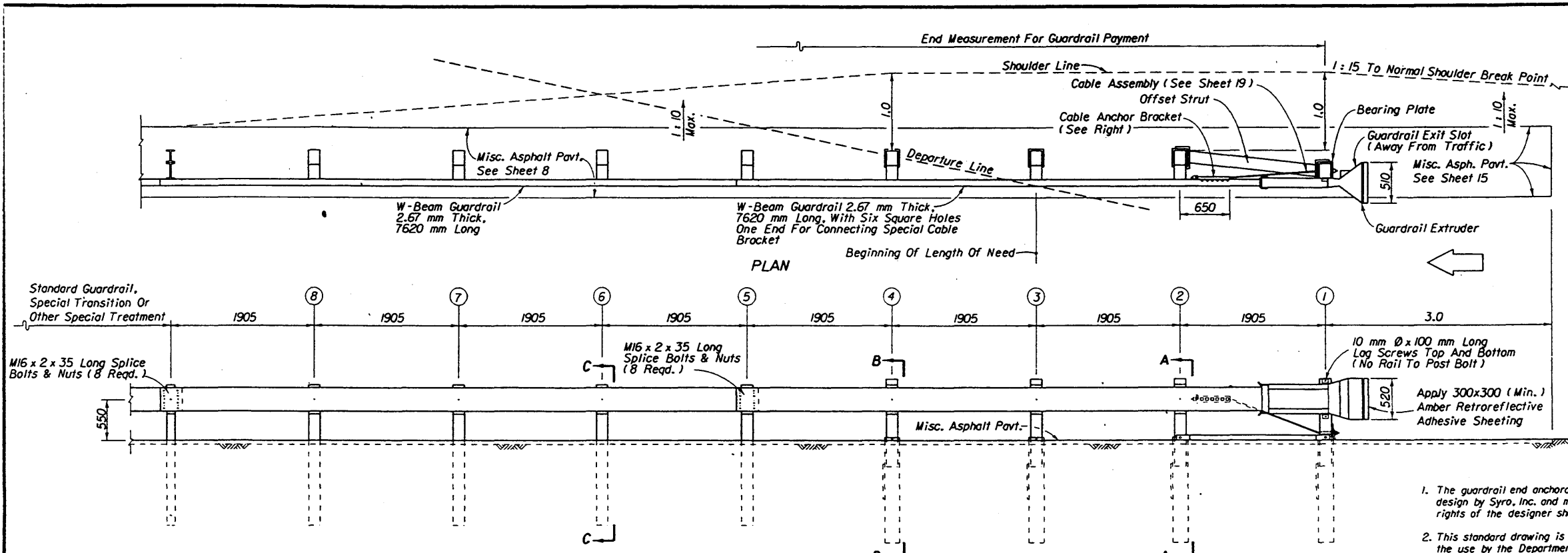


Return No. R	Length Of Shop Bent Panels	No. Of CRT Posts	Required Area Free Of Hazards	
			L	W
2.44	3.81	5	8.0	5.0
4.88	7.62	6	9.0	5.0
7.32	11.43	8	12.0	6.0
9.75	15.24	10	15.0	6.0

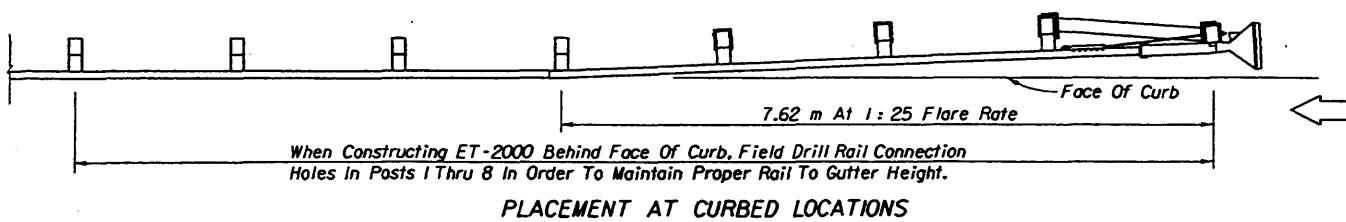
Note: To be constructed when flares and transitions or standard radial returns can not be applied. See Sheet II.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION				
ROAD DESIGN				
<b>GUARDRAIL</b>				
Names	Dates	Approved By		
Designed By	FHWA		State Roadway Design Engineer	
Drawn By	HSD	1/93	Revision	Sheet No. 24 of 31
Checked By	JG	1/93	00	Index No. 400

**CONTROLLED RELEASE RETURN FOR SIDE ROAD AND DRIVEWAY ACCESS**



- ET-2000 NOTES**
- The guardrail end anchorage system represented on this standard drawing is a proprietary design by Syro, Inc. and marketed under the trade name ET-2000. Any infringement on the rights of the designer shall be the sole responsibility of the user.
  - This standard drawing is produced by the Florida Department Of Transportation solely for the use by the Department and its assignees. This standard drawing provides the general graphics and information necessary to field identify component parts of the ET-2000 and their incorporation into a whole system.
  - This standard drawing is sufficient for plan details for the ET-2000 when installed in connection with shoulder guardrail and precludes the requirement for shop drawing submittals unless the plans otherwise call for such submittals. The ET-2000 shall be assembled in accordance with the manufacturer's detailed drawings, procedures and specifications.
  - The ET-2000 is intended for use as an approach end guardrail anchorage for shoulder guardrail located parallel to travel or auxiliary lanes. The effective length of the ET-2000 is 15.24 m including two 7.62 m W-Beam panels of guardrail. The effective length is outside of any standard guardrail, guardrail transitions or other special treatments. The ET-2000 alignment is an extension of the normal guardrail alignment, except when constructed with curb the alignment of the ET-2000 will be flared over the first 7.62 m at a rate of 1:25.
  - The ET-2000 can not be used in medians where horizontal clearance requires the use of a backrail.
  - Posts at location Nos. 1, 2, 3 and 4 must be timber breakaway posts with steel foundation tubes. The breakaway posts at location Nos. 5, 6, 7 and 8 may be constructed as shown in Section CC or may utilize timber breakaway posts with steel foundation tubes as shown in Section BB.
  - See the General Notes for galvanizing requirements of metallic component.
  - If the plans call for the ET-2000 at a specific location, substitutions with other end anchorage assemblies will not be permitted unless approved by the Engineer. If the plans call for end anchorage assembly 'parallel' at a specific location the contractor has the option to construct any FDOT approved parallel assembly. Where a flared end anchorage is called for in the plans, any approved substitution with a parallel end anchorage will not be eligible for VECP consideration.
  - The ET-2000 shall be paid for under the contract unit price for Guardrail, End Anchorage Assembly (Parallel), EA and shall be full compensation for furnishing and installing all components in accordance with the plans; the manufacturer's detail drawings, procedures and specifications and this index.



- DESIGN NOTES**
- A special site evaluation should be considered prior to using the ET-2000 where there is less than 7.62 m clear area on the extrusion side (back side) of the ET-2000.
  - The ET-2000 is suitable for all design speeds.

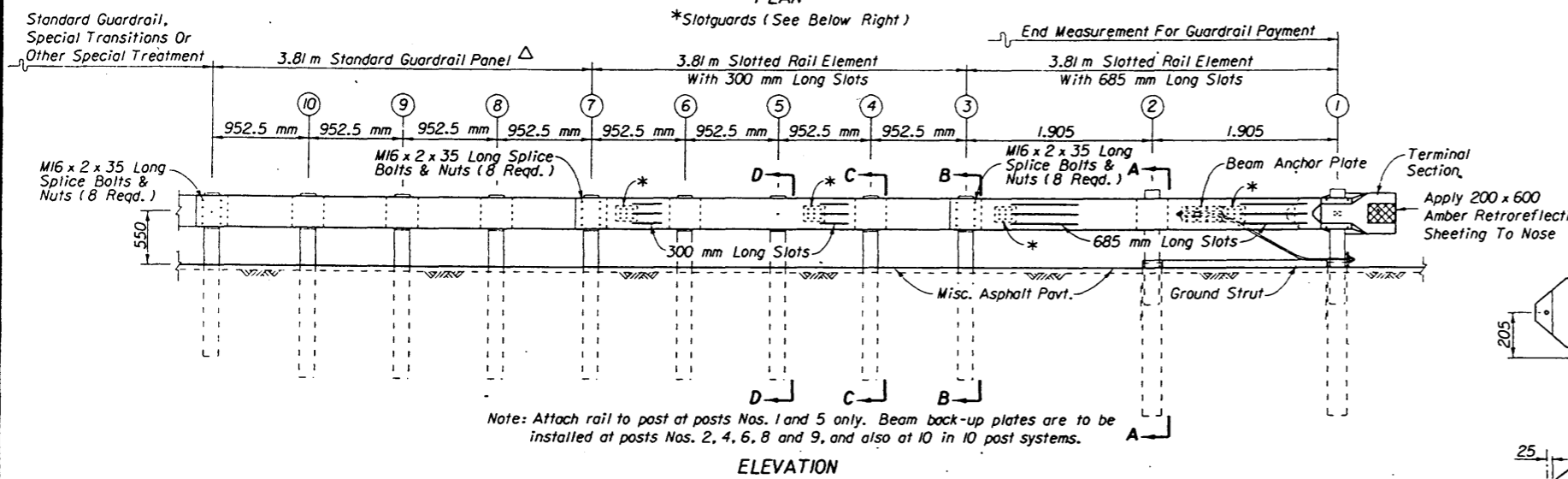
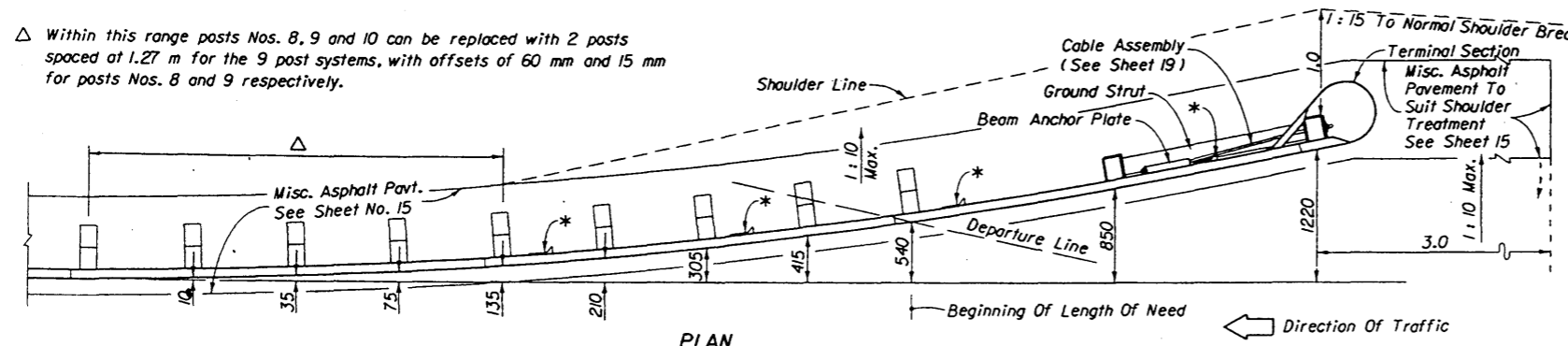
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<b>GUARDRAIL</b>				
Designed By	MFG	8/95	Approved By	<i>[Signature]</i>
Drawn By	MKH	8/95	Revision	Sheet No.
Checked By	JVC	8/95	00	25 of 31
				Index No. <b>400</b>

**END ANCHORAGE ASSEMBLY TYPE ET-2000**

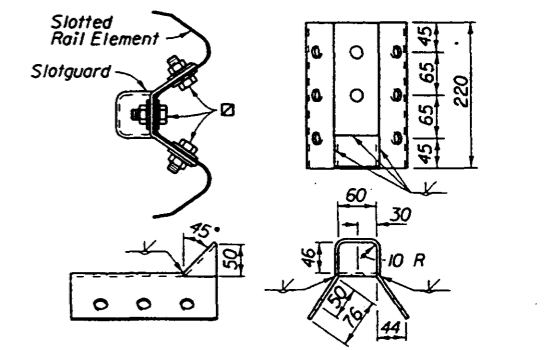
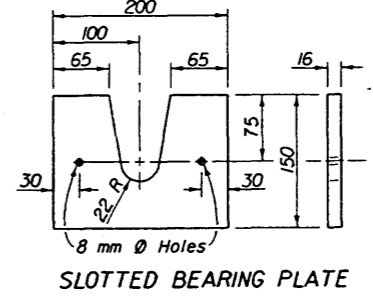
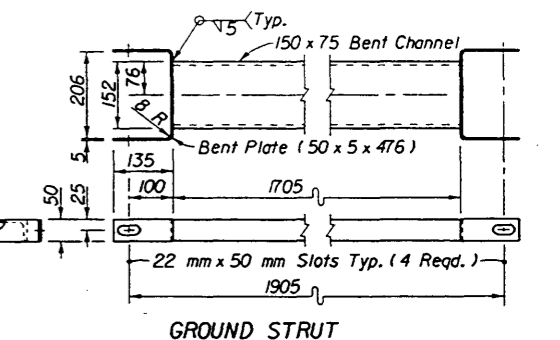
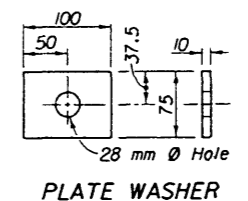
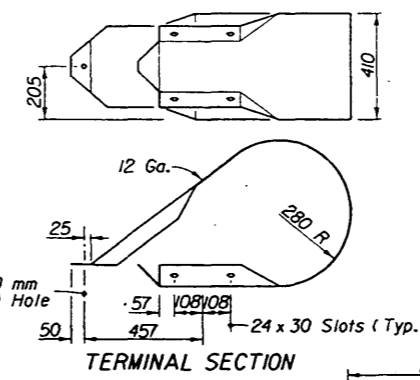
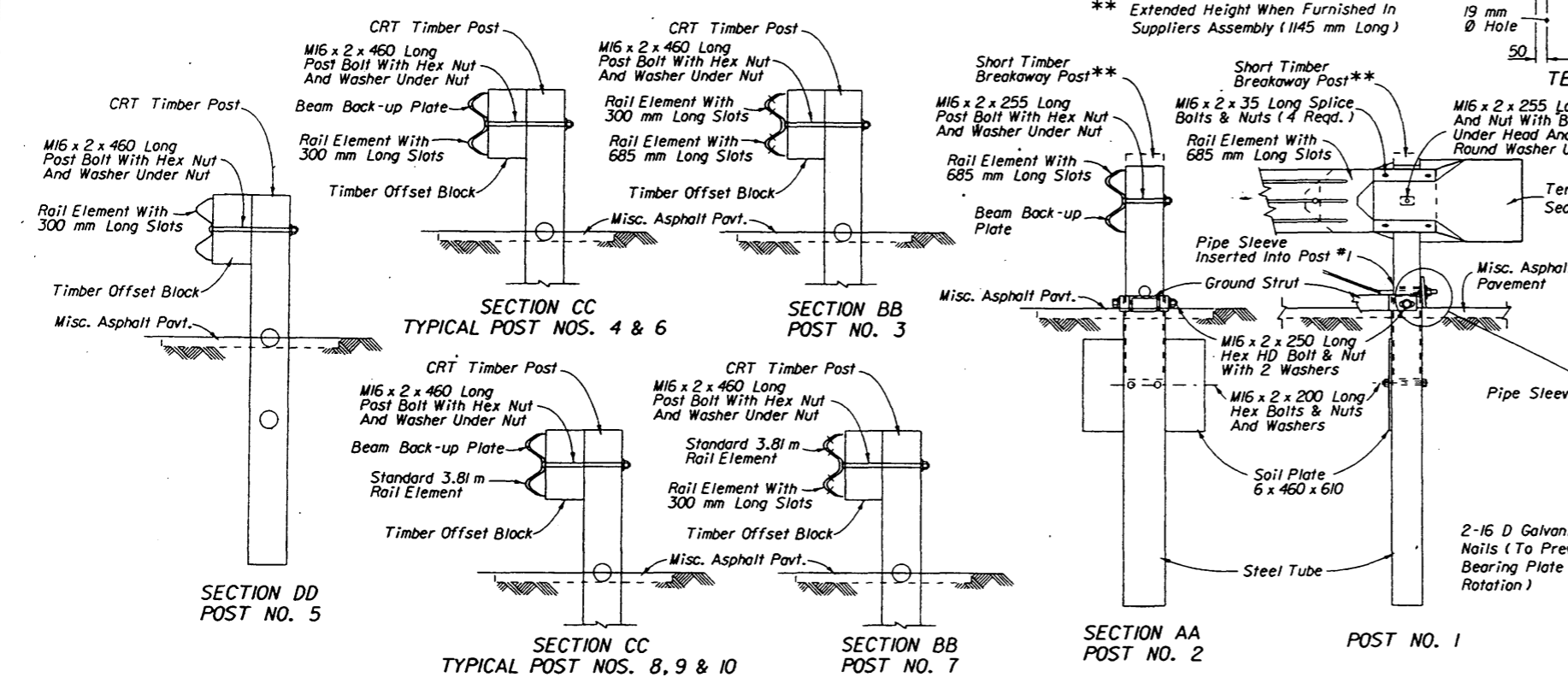


△ Within this range posts Nos. 8, 9 and 10 can be replaced with 2 posts spaced at 1.27 m for the 9 post systems, with offsets of 60 mm and 15 mm for posts Nos. 8 and 9 respectively.

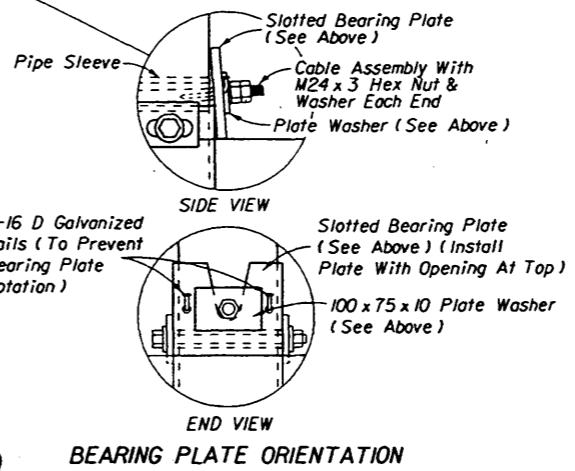
1. The guardrail end anchorage system represented on this drawing is a proprietary design by Syro, Inc. and marketed under the trade name SRT-350, short for Slotted Rail Terminal. Any infringement on the rights of the designer shall be the sole responsibility of the user.
2. This standard drawing is produced by the Florida Department Of Transportation solely for use by the Department and its assignees. This standard drawing provides the general graphics and information necessary to field identify component parts of the SRT-350 and their incorporation into a whole system.
3. This drawing is sufficient for plan details for the SRT-350 when installed in connection with shoulder guardrail and precludes the requirement for shop drawing submittals unless called for elsewhere in the plans. The SRT-350 shall be assembled in accordance with the manufacturer's detailed drawings, procedures and specifications.
4. The SRT-350 can not be used in medians where horizontal clearance requires the use of a backrail.
5. The SRT-350 is suitable for all design speeds. The SRT-350 is intended for use as an approach end anchorage for shoulder guardrail. Its alignment is a parabolic flare from the normal guardrail alignment with an effective length of 11.43 m including two special slotted W-Beam panels and one standard W-Beam panel outside of any standard guardrail, guardrail transitions or other special treatments. The SRT-350 is available as either a 9 or 10 post system and unless the plans specify a particular system, either system can be installed.
6. Posts 1 and 2 must be timber breakaway posts with steel foundation tubes. CRT breakaway posts shall be used at all other locations within the system.
7. See the General Notes for galvanizing requirements of metallic component.
8. If the plans call for the SRT-350 at a specific location, substitutions with other end anchorage assemblies will not be permitted unless approved by the Engineer. If the plans call for end anchorage assembly 'Flared' at a specific location, the contractor has the option to construct any FDOT approved flared assembly. Where a flared end anchorage is called for in the plans, any approved substitution with a parallel end anchorage will not be eligible for VECP consideration.
9. The SRT-350 shall be paid for under the contract unit price for Guardrail, End Anchorage Assembly (Flared), EA and shall be full compensation for furnishing and installing all components in accordance with the plans; the manufacturer's detail drawings, procedures and specifications and this Index.



Note: Attach rail to post at posts Nos. 1 and 5 only. Beam back-up plates are to be installed at posts Nos. 2, 4, 6, 8 and 9, and also at 10 in 10 post systems.

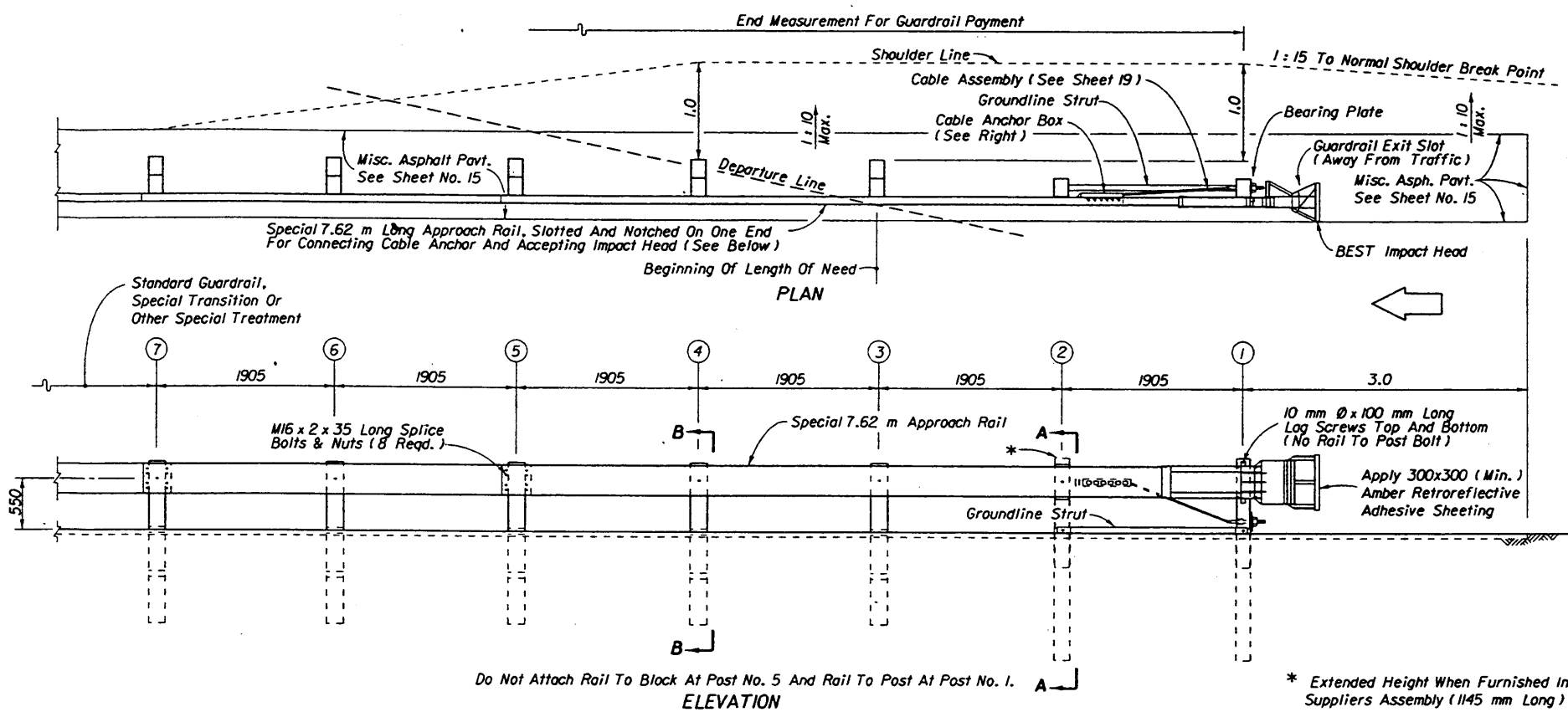


□ When Slotguard And Rail Are Furnished With 19 mm Dia. Mounting Holes Assemble With M16 x 2 x 40 mm Long Hex Bolts And Nuts With Plain Round Washers Under Heads And Nuts. When Furnished With Slotted Mounting Holes Assemble With M16 x 2 x 35 mm Oval Shoulder Button Head Bolts And Nuts With Plain Round Washers Under Nuts (8 Reqd.).

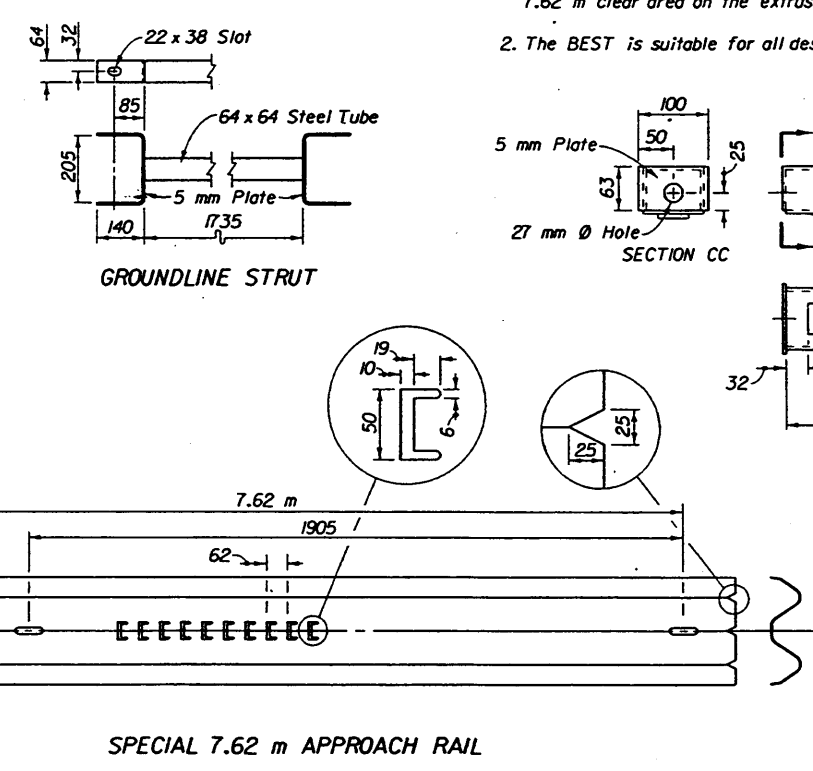
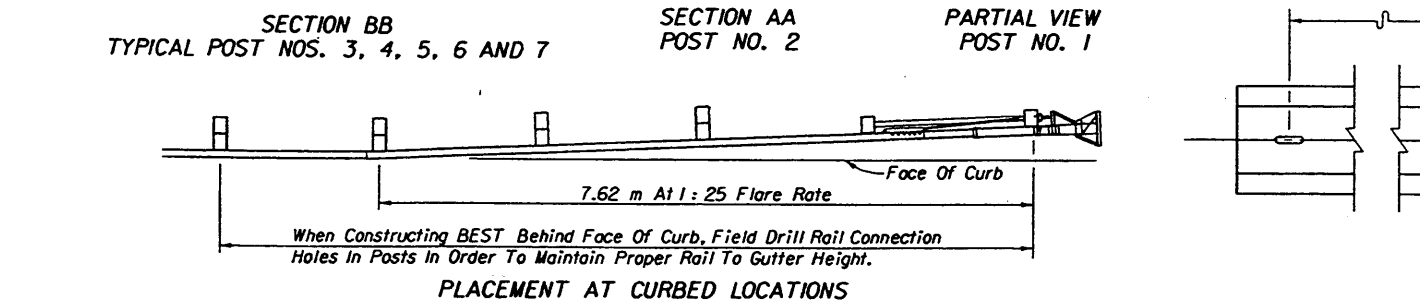
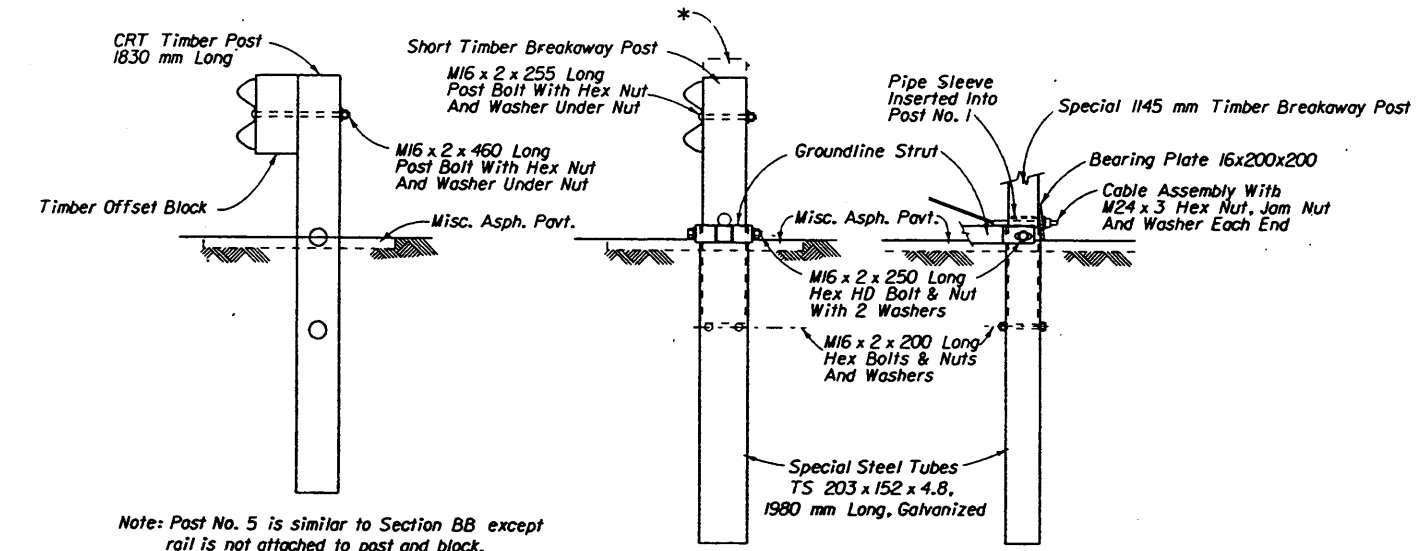
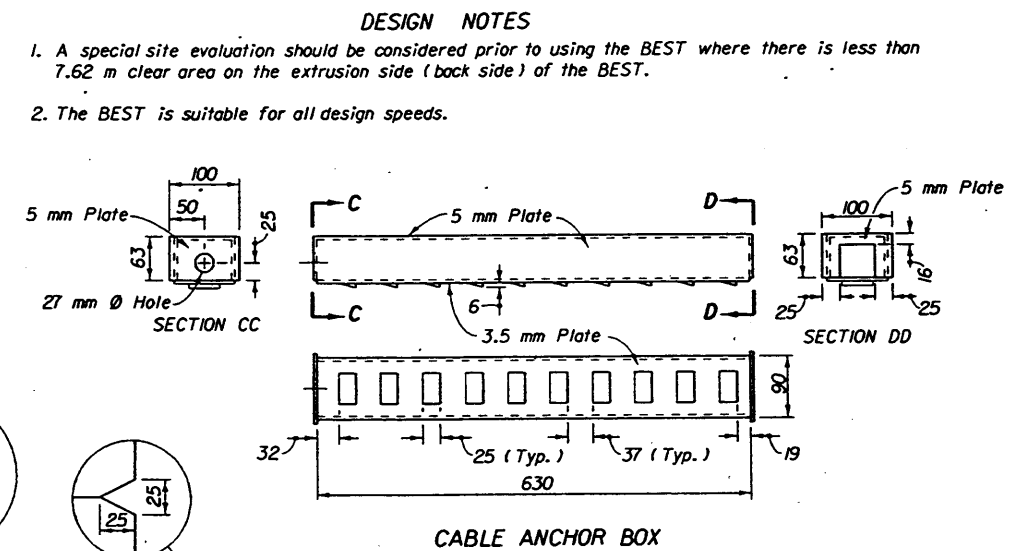


END ANCHORAGE ASSEMBLY TYPE SRT-350 BEARING PLATE ORIENTATION

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>GUARDRAIL</b>				
Designed By	MFG	2/96	Approved By	<i>[Signature]</i> State Roadway Design Engineer
Drawn By	MKH	2/96	Revision	Sheet No. Index No.
Checked By	JG	2/96	00	26 of 31 400

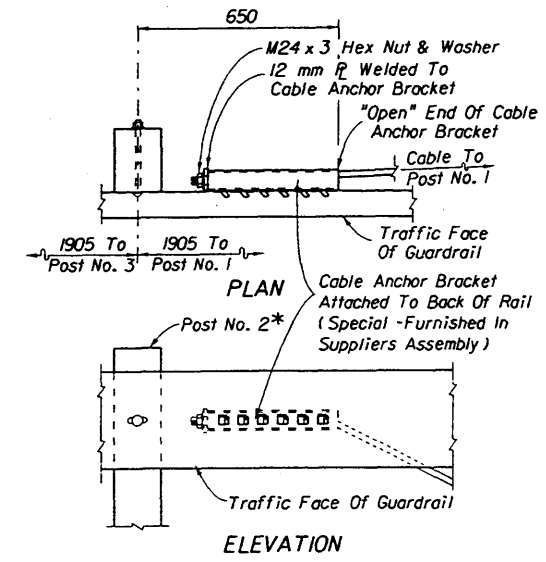
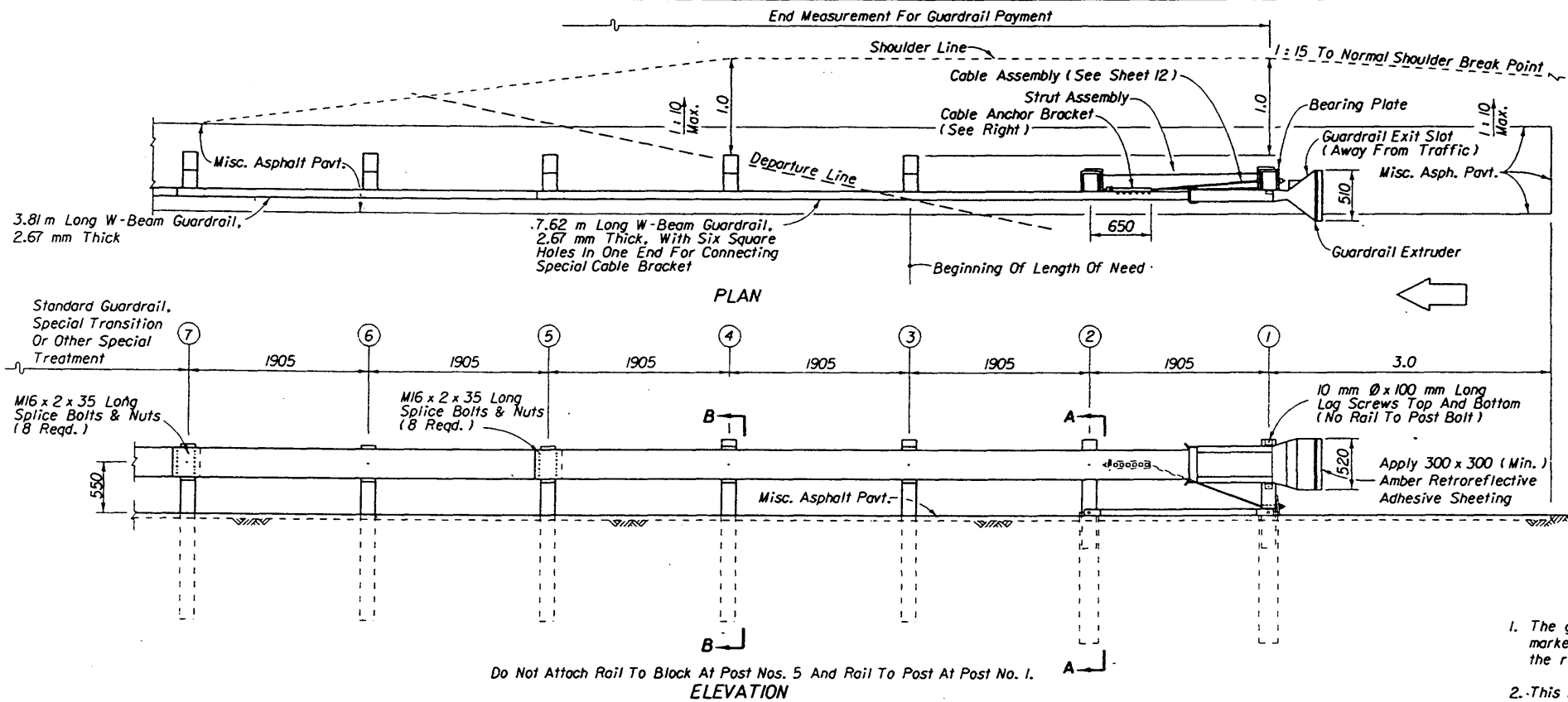


- 'BEST' NOTES**
1. The guardrail end anchorage system represented on this standard drawing is a proprietary design by Interstate Steel Corporation and marketed under the trade name BEST. Any infringement on the rights of the designer shall be the sole responsibility of the user.
  2. This standard drawing is produced by the Florida Department Of Transportation solely for the use by the Department and its assignees. This standard drawing provides the general graphics and information necessary to field identify component parts of the BEST and their incorporation into a whole system.
  3. This standard drawing is sufficient for plan details for the BEST when installed in connection with shoulder guardrail and precludes the requirement for shop drawing submittals unless the plans otherwise call for such submittals. The BEST shall be assembled in accordance with the manufacturer's detailed drawings, procedures and specifications.
  4. The BEST is intended for use as an approach end guardrail anchorage for shoulder guardrail located parallel to travel or auxiliary lanes. The effective length of the BEST is 11.43 m including a 7.62 m special W-Beam panel plus one 3.81 m standard W-Beam panel outside of any other standard guardrail, guardrail transitions or other special treatments. The alignment of the BEST is an extension of the normal guardrail alignment, except when constructed with curb the alignment of the BEST will be flared over the first 7.62 m at a rate of 1:25.
  5. The BEST can not be used in medians where horizontal clearance requires the use of a backrail.
  6. Posts at location Nos. 1 and 2 must be timber breakaway posts with special length steel foundation tubes without soil plates. The posts at location Nos. 3, 4, 5, 6 and 7 shall be CRT timber posts.
  7. See the General Notes for galvanizing requirements of metallic components.
  8. If the plans call for the 'BEST' at a specific location, substitutions with other end anchorage assemblies will not be permitted unless approved by the Engineer. If the plans call for end anchorage assembly 'parallel' at a specific location, the contractor has the option to construct any FDOT approved parallel assembly. Where a flared end anchorage is called for in the plans, any approved substitution with a parallel end anchor will not be eligible for VECP consideration.
  9. The BEST shall be paid for under the contract unit price for Guardrail, End Anchorage Assembly (Parallel), EA and shall be full compensation for furnishing and installing all components in accordance with the plans; the manufacturer's detail drawings, procedures and specifications and this Index.



**END ANCHORAGE ASSEMBLY TYPE BEST**

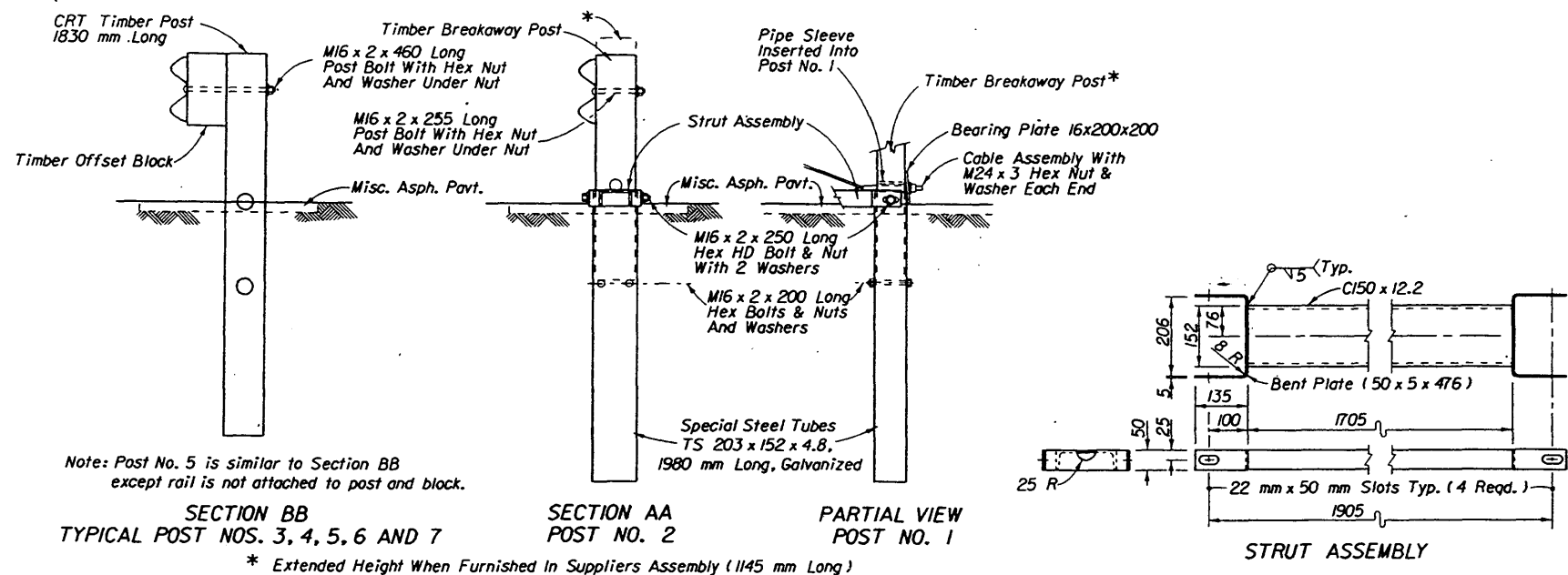
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>GUARDRAIL</b>				
Designed By	MFG	8/95	Approved By	<i>[Signature]</i>
Drawn By	MKH	8/95	Revision	Sheet No. Index No.
Checked By	JMC	8/95	00	27 of 31 400



CABLE ANCHOR BRACKET INSTALLATION

LET NOTES

1. The guardrail end anchorage system represented on this standard drawing is a proprietary design by Syro, Inc. and marketed under the trade name ET-2000 LET hereafter referred to and identified as LET. Any infringement on the rights of the designer shall be the sole responsibility of the user.
2. This standard drawing is produced by the Florida Department Of Transportation solely for use by the Department and its assignees. This standard drawing provides the general graphics and information necessary to field identify component parts of the LET and their incorporation into a whole system.
3. This standard drawing is sufficient for plan details for the LET when installed in connection with shoulder guardrail and precludes the requirement for shop drawing submittals unless the plans otherwise call for such submittals. The LET shall be assembled in accordance with the manufacturer's detailed drawings, procedures and specifications.
4. The LET is intended for use as an approach end guardrail anchorage for shoulder guardrail located parallel to travel or auxiliary lanes. The effective length of the LET is 11.43 m including one 7.62 m special W-Beam panel and one 3.81 m standard W-Beam panel. The effective length is outside of any other standard guardrail, guardrail transitions or other special treatments. The LET alignment is an extension of the normal guardrail alignment, except when constructed with curb the alignment of the LET will be flared over the first 7.62 m at a rate of 1:25.
5. The LET can not be used in medians where horizontal clearance requires the use of a backrail.
6. Posts at location Nos. 1 and 2 must be timber breakaway posts with special length steel foundation tubes without soil plates. Posts at location Nos. 3, 4, 5, 6 and 7 must be CRT timber posts.
7. See the General Notes for galvanizing requirements of metallic component.
8. If the plans call for the 'LET' at a specific location, substitutions with other end anchorage assemblies will not be permitted unless approved by the Engineer. If the plans call for end anchorage assembly 'parallel' at a specific location, the contractor has the option to construct any FDOT approved parallel assembly. Where a flared end anchorage is called for in the plans, any approved substitution with a parallel end anchor will not be eligible for VECP consideration.
9. The LET shall be paid for under the contract unit price for Guardrail, End Anchorage Assembly (Parallel), EA and shall be full compensation for furnishing and installing all components in accordance with the plans; the manufacturers detailed drawings, procedures and specifications and this Index.



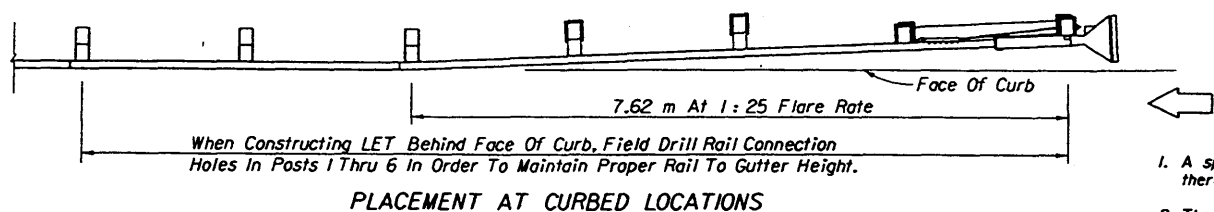
SECTION BB  
TYPICAL POST NOS. 3, 4, 5, 6 AND 7

SECTION AA  
POST NO. 2

PARTIAL VIEW  
POST NO. 1

STRUT ASSEMBLY

\* Extended Height When Furnished In Suppliers Assembly (1145 mm Long)



DESIGN NOTES

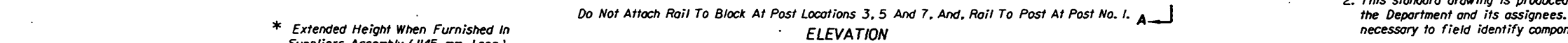
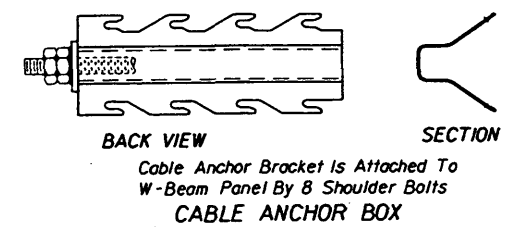
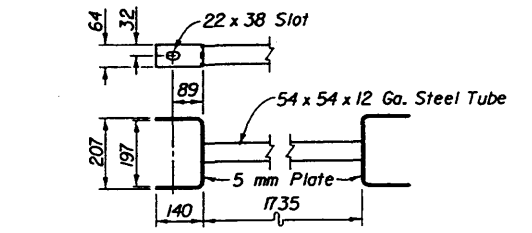
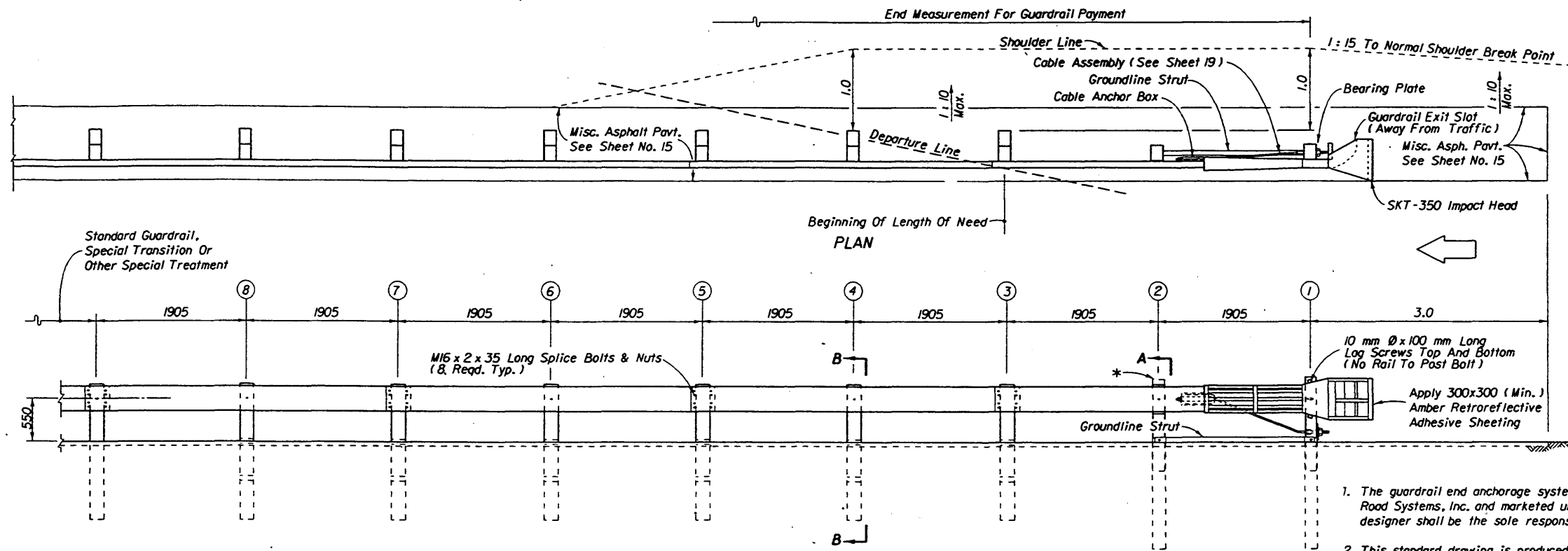
1. A special site evaluation should be considered prior to using the LET where there is less than 7.62 m clear area on the extrusion side (back side) of the LET.
2. The LET is suitable for all design speeds.

END ANCHORAGE ASSEMBLY TYPE LET

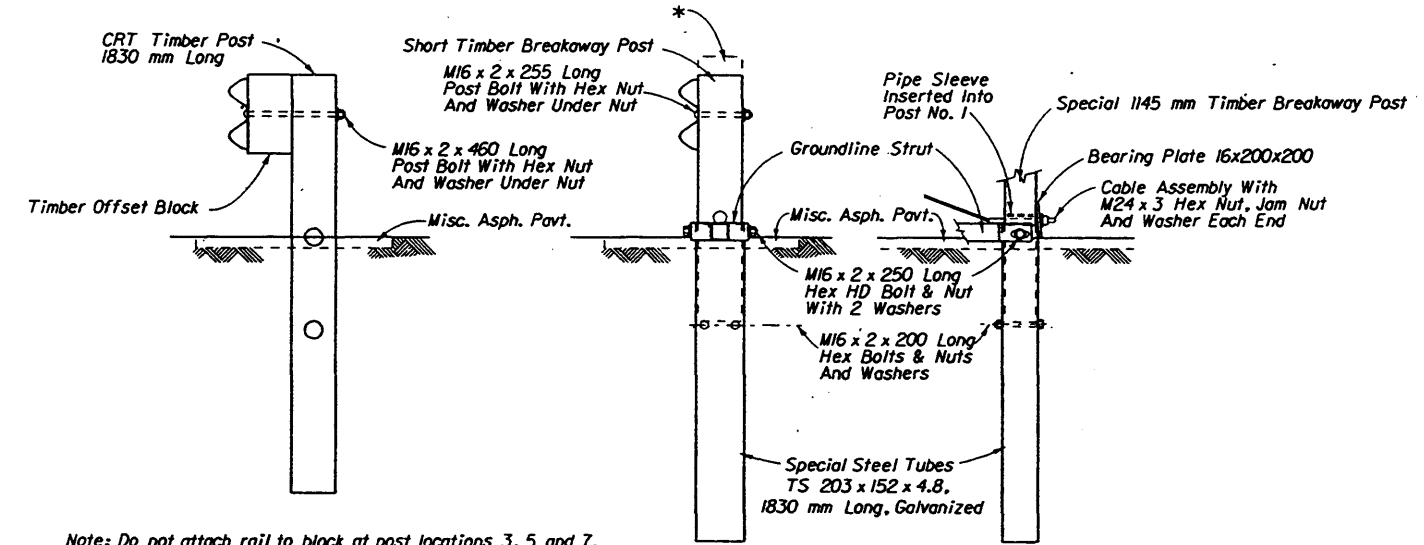
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

GUARDRAIL

Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By	STAFF	10/97			
Drawn By	HKH	10/97			
Checked By	JVC	10/97	00	28 of 31	400



\* Extended Height When Furnished In Suppliers Assembly (1145 mm Long)



Note: Do not attach rail to block at post locations 3, 5 and 7.

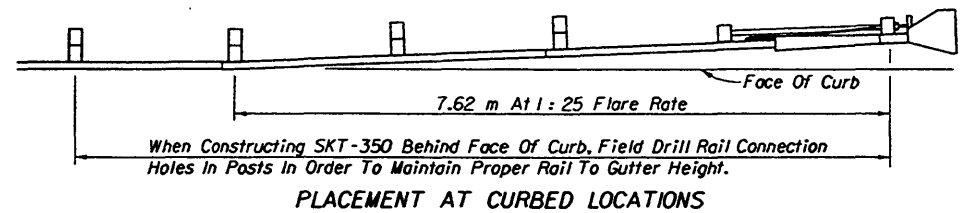
SECTION BB  
TYPICAL POST NOS. 3, 4, 5, 6, 7 AND 8

SECTION AA  
POST NO. 2

PARTIAL VIEW  
POST NO. 1

'SKT-350' NOTES

1. The guardrail end anchorage system represented on this standard drawing is a proprietary design by Road Systems, Inc. and marketed under the trade name SKT-350. Any infringement on the rights of the designer shall be the sole responsibility of the user.
2. This standard drawing is produced by the Florida Department Of Transportation solely for the use by the Department and its assignees. This standard drawing provides the general graphics and information necessary to field identify component parts of the SKT-350 and their incorporation into a whole system.
3. This standard drawing is sufficient for plan details for the SKT-350 when installed in connection with shoulder guardrail and precludes the requirement for shop drawing submittals unless the plans otherwise call for such submittals. The SKT-350 shall be assembled in accordance with the manufacturer's detailed drawings, procedures and specifications.
4. The SKT-350 is intended for use as an approach end guardrail anchorage for shoulder guardrail located parallel to travel or auxiliary lanes. The effective length of the SKT-350 is 15.24 m. The alignment of the SKT-350 is an extension of the normal guardrail alignment, except when constructed with curb the alignment of the SKT-350 will be flared over the first 7.62 m at a rate of 1:25.
5. The SKT-350 can not be used in medians where horizontal clearance requires the use of a backrail.
6. Posts at location Nos. 1 and 2 must be timber breakaway posts with special length steel foundation tubes without soil plates. The posts at location Nos. 3, 4, 5, 6, 7 and 8 shall be CRT timber posts.
7. See the General Notes for galvanizing requirements of metallic components.
8. If the plans call for the 'SKT-350' at a specific location, substitution with other end anchorage assemblies will not be permitted unless approved by the Engineer. If the plans call for end anchorage assembly 'parallel' at a specific location, the contractor has the option to construct any FDOT approved parallel assembly. Where a flared end anchorage is called for in the plans, any approved substitution with a parallel end anchor will not be eligible for VECP consideration.
9. The SKT-350 shall be paid for under the contract unit price for Guardrail, End Anchorage Assembly (Parallel), EA and shall be full compensation for furnishing and installing all components in accordance with the plans; the manufacturer's detail drawings, procedures and specifications and this Index.



PLACEMENT AT CURBED LOCATIONS

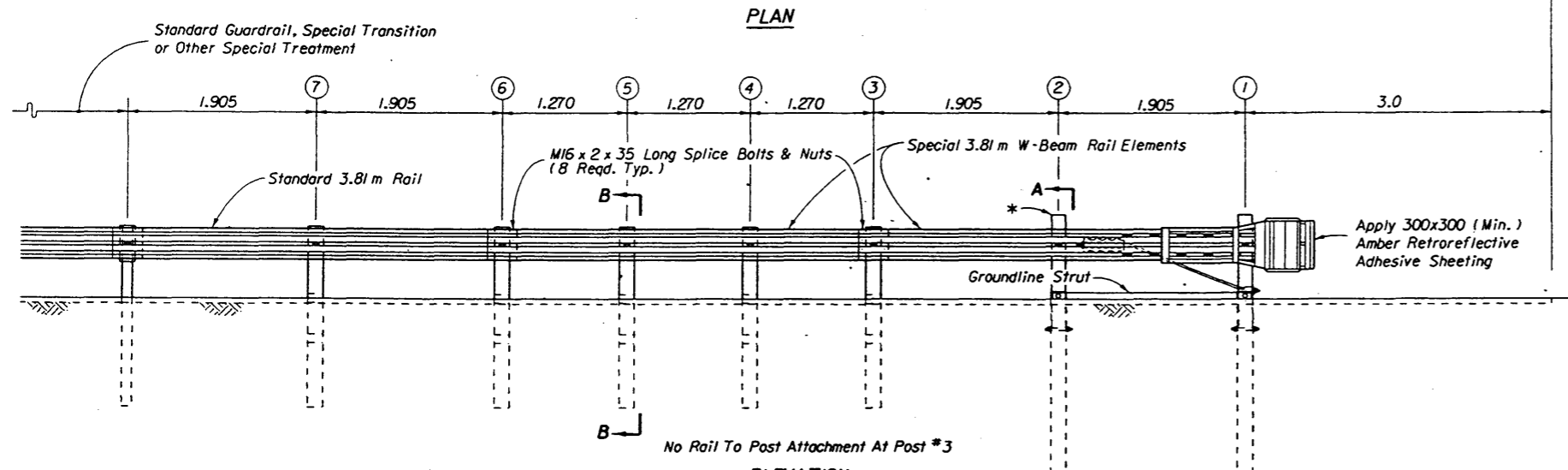
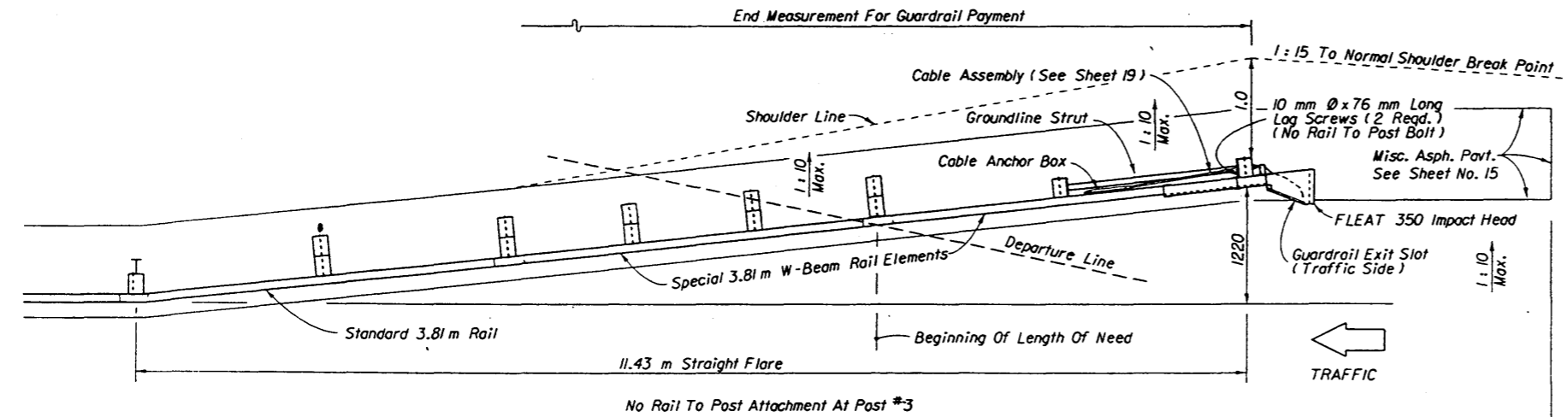
DESIGN NOTES

1. A special site evaluation should be considered prior to using the SKT-350 where there is less than 7.62 m clear area on the extrusion side (back side) of the SKT-350.
2. The SKT-350 is suitable for all design speeds.

END ANCHORAGE ASSEMBLY TYPE SKT-350

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN						
GUARDRAIL						
Designed By	Names	Dates	Approved By			
MFG	MFG	8/95	 State Roadway Design Engineer			
Drawn By	MKH	8/95			Revision	Sheet No.
Checked By	JG	8/95			00	29 of 31
			Index No.	400		

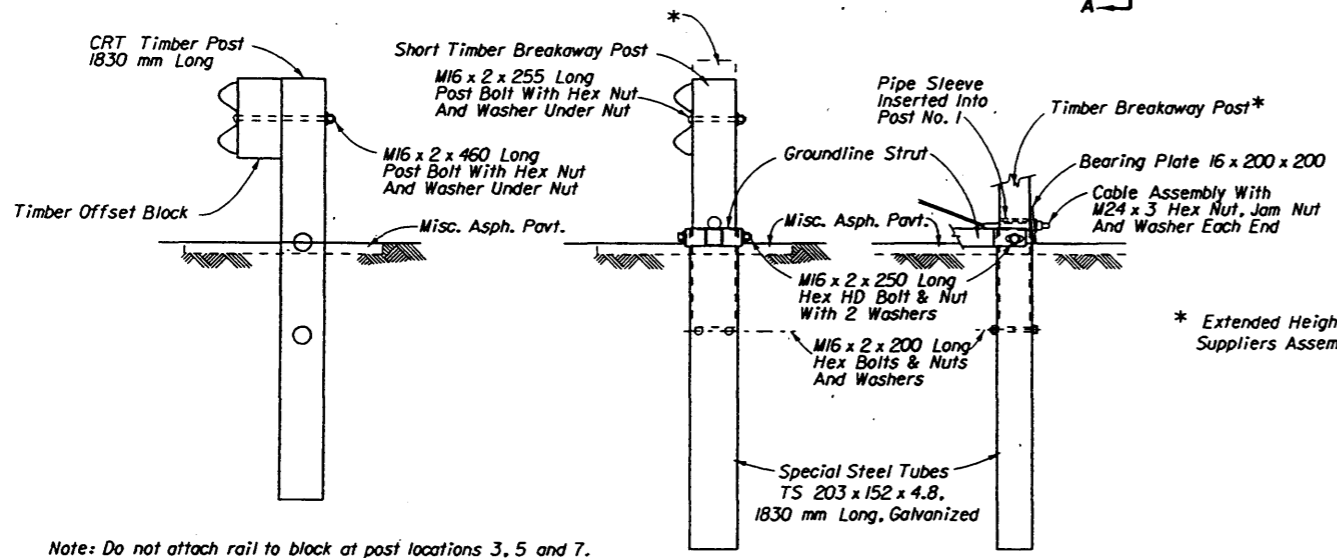
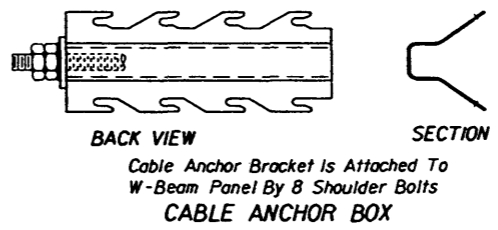
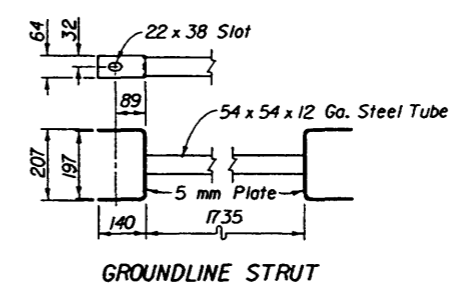
'FLEAT-350' NOTES



1. The guardrail end anchorage system represented on this standard drawing is a proprietary design by Road Systems, Inc. and marketed under the trade name FLEAT-350. Any infringement on the rights of the designer shall be the sole responsibility of the user.
2. This standard drawing is produced by the Florida Department Of Transportation solely for the use by the Department and its assignees. This standard drawing provides the general graphics and information necessary to field identify component parts of the FLEAT-350 and their incorporation into a whole system.
3. This standard drawing is sufficient for plan details for the FLEAT-350 when installed in connection with shoulder guardrail and precludes the requirement for shop drawing submittals unless the plans otherwise call for such submittals. The FLEAT-350 shall be assembled in accordance with the manufacturer's detailed drawings, procedures and specifications.
4. The FLEAT-350 is intended for use as an approach end guardrail anchorage for shoulder guardrail. The effective length of the FLEAT-350 is 11.43 m including two 3.81 m special W-Beam panels plus one 3.81 m standard W-Beam panel outside of any other standard guardrail, guardrail transitions or other special treatments. The alignment of the FLEAT-350 is a straight flare with end offset of 1.2 m from the normal guardrail alignment.
5. The FLEAT-350 can not be used in medians where horizontal clearance requires the use of a backrail.
6. Posts at location Nos. 1 and 2 must be timber breakaway posts with special length steel foundation tubes without soil plates. The posts at location Nos. 3, 4, 5, 6, and 7 shall be CRT timber posts.
7. See the General Notes for galvanizing requirements of metallic components.
8. If the plans call for the 'FLEAT-350' at a specific location, substitution with other end anchorage assemblies will not be permitted unless approved by the Engineer. If the plans call for end anchorage assembly 'flared' at a specific location, the contractor has the option to construct any FDOT approved flared assembly. Where a flared end anchorage is called for in the plans, any approved substitution with a parallel end anchorage will not be eligible for VECP consideration.
9. The FLEAT-350 shall be paid for under the contract unit price for Guardrail, End Anchorage Assembly (Flared), EA and shall be full compensation for furnishing and installing all components in accordance with the plans; the manufacturer's detail drawings, procedures and specifications and this Index.

DESIGN NOTES

1. The FLEAT-350 is suitable for all design speeds.



\* Extended Height When Furnished In Suppliers Assembly (1145 mm Long)

Note: Do not attach rail to block at post locations 3, 5 and 7.

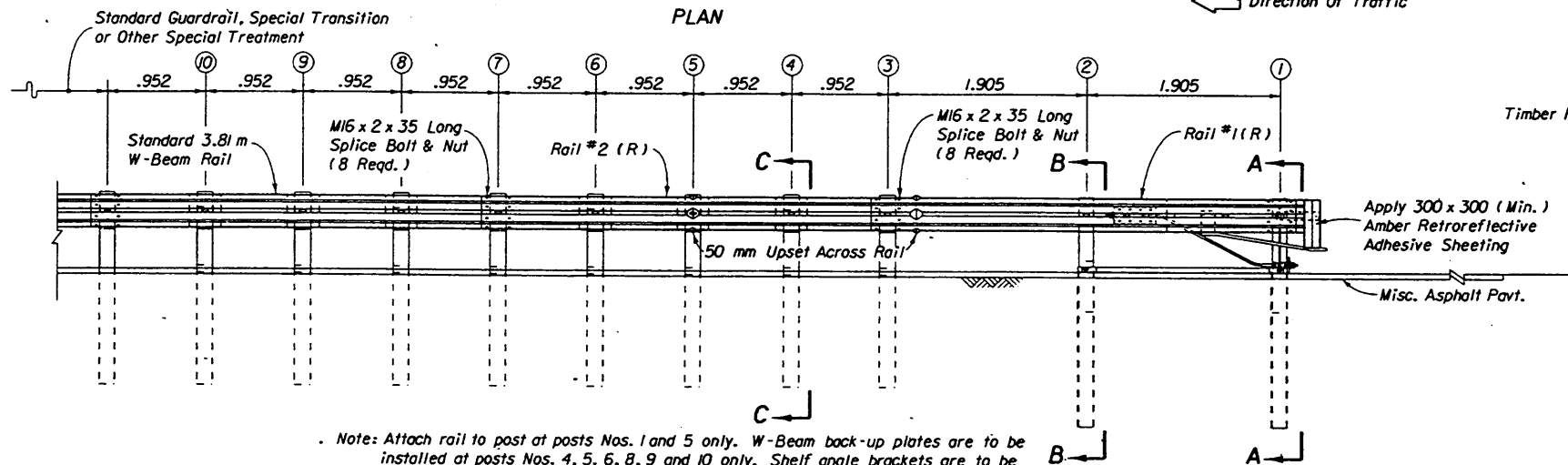
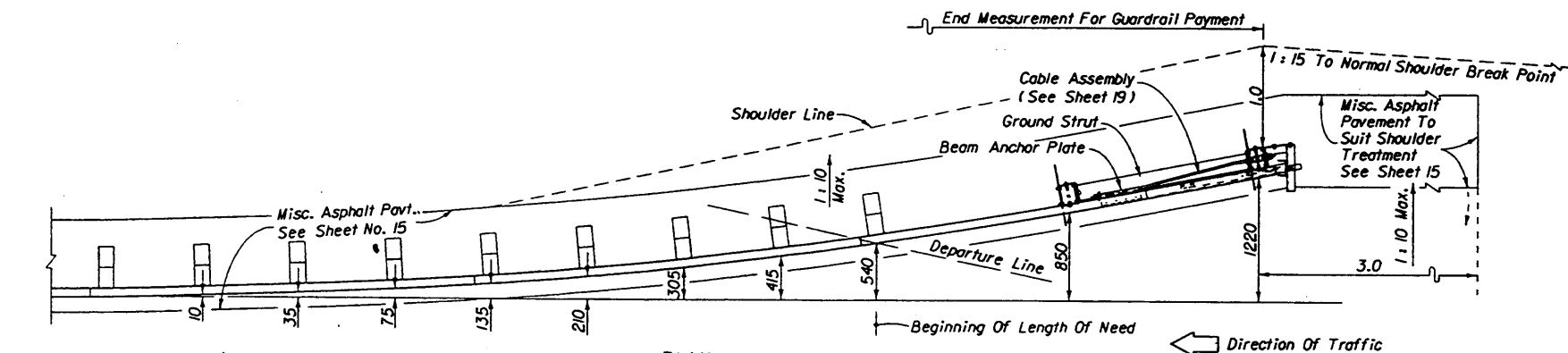
SECTION BB  
TYPICAL POST NOS. 3, 4, 5, 6 AND 7

SECTION AA  
POST NO. 2

PARTIAL VIEW  
POST NO. 1

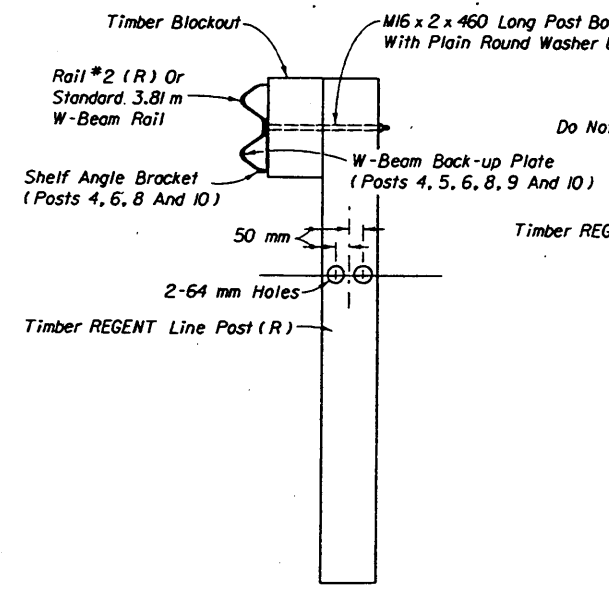
END ANCHORAGE ASSEMBLY TYPE FLEAT-350

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>GUARDRAIL</b>				
Designed By	MFG	07/98	Approved By	<i>[Signature]</i>
Drawn By	MKH	07/98	Revision	00
Checked By	JVC	07/98	Sheet No.	30 of 31
			Index No.	400



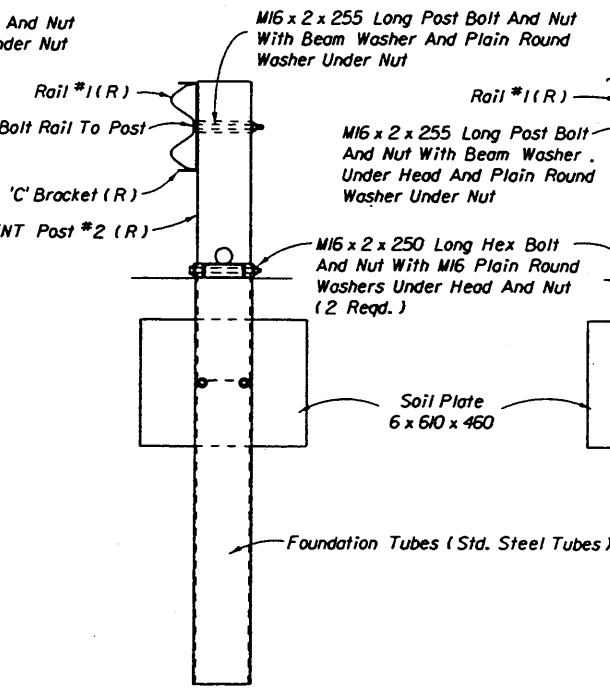
Note: Attach rail to post at posts Nos. 1 and 5 only. W-Beam back-up plates are to be installed at posts Nos. 4, 5, 6, 8, 9 and 10 only. Shelf angle brackets are to be installed at posts Nos. 4, 6, 8 and 10 only.

ELEVATION

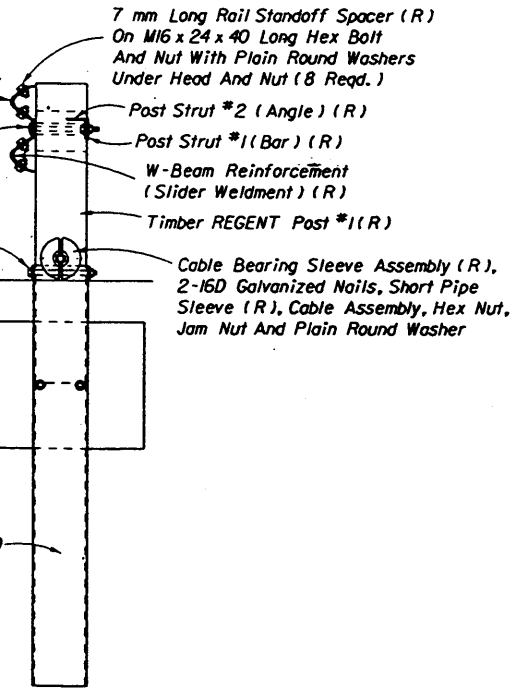


Note: Attach Rail To Post At Post No. 5 Only

SECTION CC  
TYPICAL POST NOS. 3 THRU 10

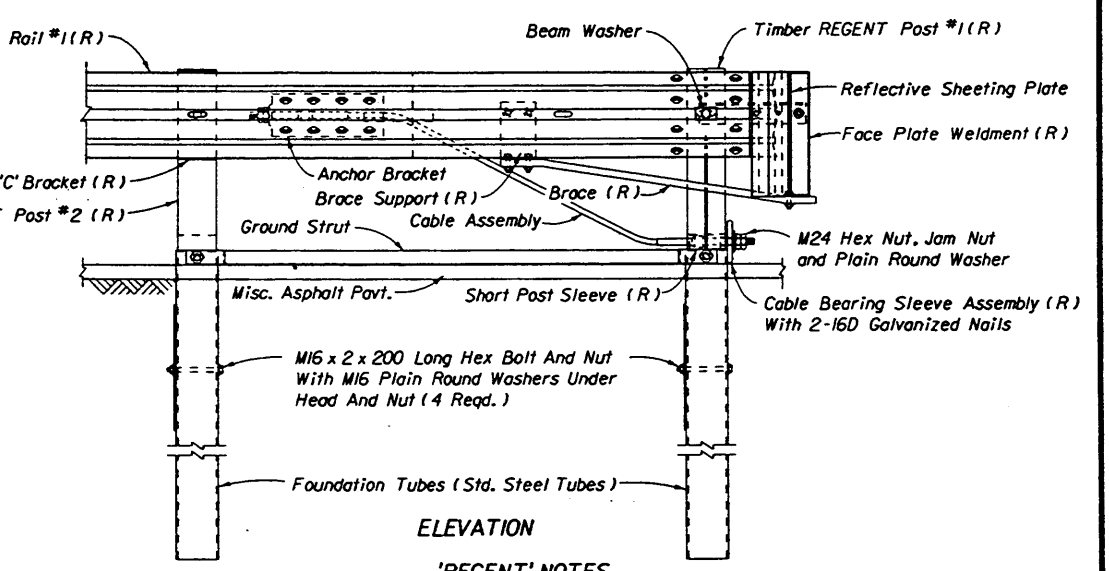
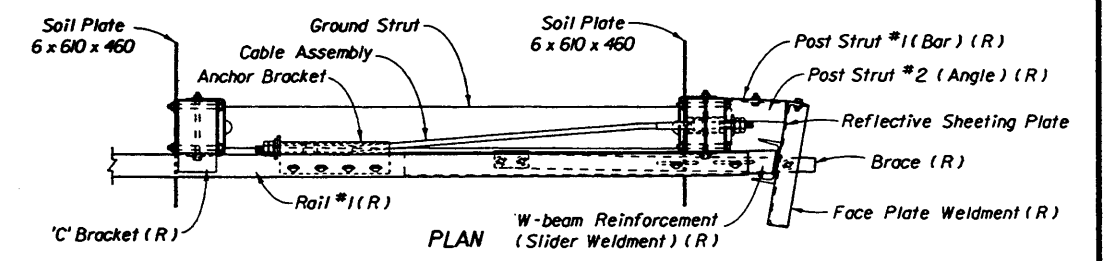


SECTION BB  
POST NO. 2



SECTION AA  
POST NO. 1

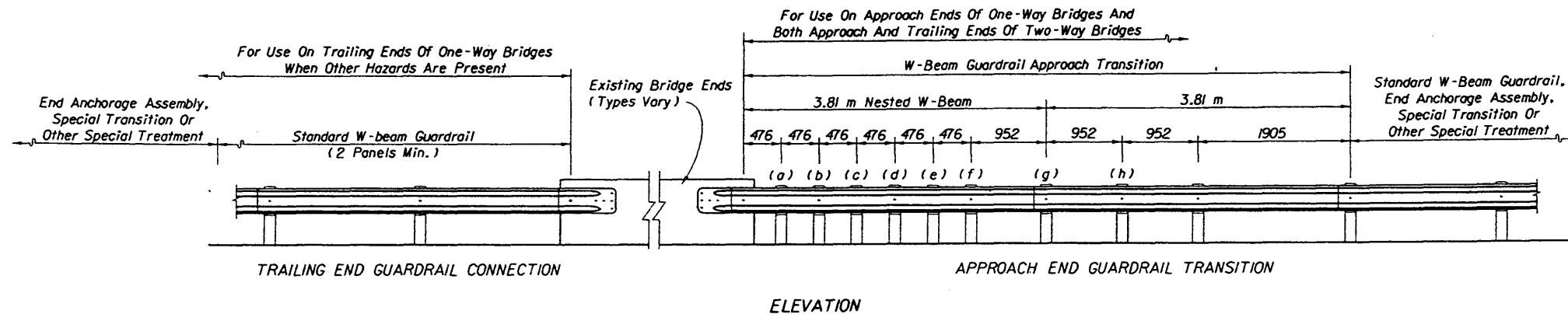
END ANCHORAGE ASSEMBLY TYPE REGENT



'REGENT' NOTES

1. The REGENT is suitable for all design speeds. The REGENT is intended for use as an approach end guardrail anchorage for shoulder guardrail. Its alignment is a parabolic flare from the normal guardrail alignment with an effective length of 11.43 m including two special W-Beam panels and one standard W-Beam panel outside of any standard guardrail, guardrail transitions or other special treatments.
2. This standard drawing is produced by the Florida Department Of Transportation solely for use by the Department and its assignees. This standard drawing provides the general graphics and information necessary to field identify component parts of the REGENT and their incorporation into a whole system.
3. This standard drawing is sufficient for plan details for the REGENT when installed in connection with shoulder guardrail and precludes the requirement for shop drawing submittals unless the plans otherwise call for such submittals. The REGENT shall be assembled in accordance with the distributor's detailed drawings, procedures and specifications.
4. The first post must be a timber REGENT Post #1 with a steel foundation tube and soil plate; the second post must be a timber REGENT Post #2 with a steel foundation tube and soil plate; and, posts Nos. 3 thru 10 must be timber REGENT Line Posts.
5. The suffix (R) indicates components unique to the REGENT System, these components along with bolts, nuts and washers not labeled are to be furnished in the distributor's package.
6. The REGENT can not be used in medians where horizontal clearance requires the use of a backrail.
7. See the General Notes for galvanizing requirements of metallic components.
8. If the plans call for the 'REGENT' at a specific location, substitutions with other end anchorage assemblies will not be permitted unless approved by the Engineer. If the plans call for end anchorage assembly 'flared' at a specific location, the contractor has the option to construct any FDOT approved flared assembly. Where a flared end anchorage is called for in the plans, any approved substitution with a parallel end anchorage will not be eligible for VECP consideration.
9. The REGENT shall be paid for under the contract unit price for Guardrail, End Anchorage Assembly (Flared), EA and shall be full compensation for furnishing and installing all components in accordance with the plans; the distributor's detailed drawings, procedures and specifications and this Index.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>GUARDRAIL</b>				
Designed By	MFG	07/98	Approved By	<i>[Signature]</i>
Drawn By	HKH	07/98	Revision	State Roadway Design Engineer
Checked By	JMG	07/98	00	31 of 31 400



**GENERAL NOTES**

- Whether an existing bridge handrail is to remain in place, be retrofitted or be replaced, is a determination that must be made independent of any information contained on this index.  
Only after it has been established that an existing bridge handrail is to remain in place is this index to be used to analyze guardrail to bridge connections.
- The schemes on this index are not to be used for new bridge construction, bridge widening, bridge barrier wall or handrail replacement, or, for existing bridges that have safety shape traffic barrier.
- The schemes on this index are divided into two general categories, representing curbed and uncurbed roadway approaches. A scheme selection guide is provided below for curbed and uncurbed roadway approaches. Approach slabs with curbs or wing walls with radial safety curbs will be treated as curbed roadway approaches.
- Existing bridge features shown in these schemes are example configurations only. The principle key to scheme selection is bridge curb or sidewalk width. Location control is keyed to bridge face of curb, except for certain trailing conditions.
- Details that are repetitive on the schemes and features that are detailed on Index No. 400 have been purposely deleted to produce clarity and simplification in the schemes, and to emphasize proper location and positioning of the anchorage and connecting guardrail.
- All schemes are right side or right hand details for traffic flow right to left. Left side applications are opposite hand.
- For undivided two-way bridges 'trailing end', as used in this index, is in relation to the direction of travel of near lane traffic, but it is always considered as an approach for opposing lane traffic.

- All connections of guardrail special end shoes to concrete anchorage posts, panels and walls shall have a 16 x 300 x 300 galvanized steel back-up plate for gang tightening of hex nuts on 22 mm diameter galvanized anchor bolts. Special end shoe anchor bolts shall have a nominal length equal to the thickness of the concrete anchorage plus 50 mm.

When thru bolts would penetrate existing bridge rails, 22 mm diameter bolt clusters and chemical anchor bolts meeting the manufacturers recommendation may be substituted as approved by the Engineer.

- Unless otherwise called for in the plans exposed concrete surfaces shall have a Class 3 surface finish and Class 5 Applied Finish Coating in accordance with Section 521 and 400 respectively of the Standard Specifications.

- The guardrail end anchorage schemes on this index do not include cost for payment of guardrail. See Index 400 Detail N for limit of guardrail measurement.

Each independent anchorage described in these schemes shall be paid for as a bridge end anchorage assembly under the contract unit price for Bridge Anchorage Assembly, EA. The unit price shall be full compensation for the following:

- Each concrete anchor post, panel or transition wall including reinforcing steel, existing rail or rail and post removal, socket filling, bond breaker, post beveling, drilling, dowels, grouting, excavation, backfill, special end shoe and accessory items.
- Each guardrail steel terminal post, including flared end section, anchorage and accessory items (optional use not included).
- Each special end shoe anchored directly to an existing bridge end post or wing post, including back-up plate and accessory items.

Continuous concrete safety barrier (Schemes 1 & 19) shall be paid for as a roadway item under the contract unit price for Concrete Handrail (Retrofit Barrier) (Vert. Face), MI.

Continuous guardrail across bridges shall be paid for as a roadway item under the contract unit price for Guardrail (Bridge) MI, and Special Guardrail Post, EA. The unit price for guardrail shall include the cost for all accessories prescribed under Index No. 400 and the unit price for special posts shall include the cost for all accessories and anchorage prescribed in Index 400 and in Scheme 16 of this Index.

**GUARDRAIL NOTE**

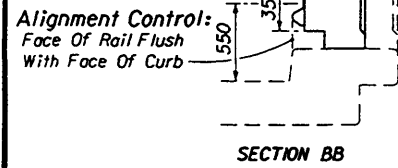
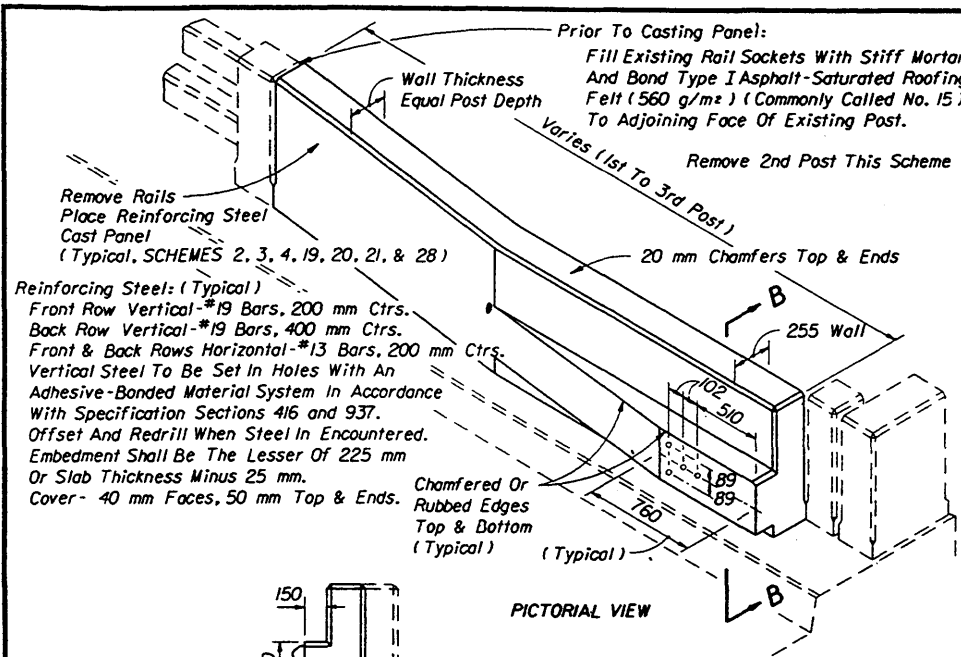
Approach end guardrail transitions shall be constructed on the approach ends of one-way bridges, and both the approach and trailing ends of undivided two-way bridges. Nested rails shall not be bolted to the blocks and posts at posts (a), (c), and (e). Trailing end guardrail connections shall be constructed on the trailing ends of one way bridges when other hazards are present. One 16d galvanized nail shall be driven between each timber post and block, and between double blocks, in order to prevent block rotation, see Index No. 400 '16d NAIL FOR PREVENTION OF OFFSET BLOCK ROTATION'. All posts are standard guardrail posts except where special circumstances require the use of guardrail steel terminal posts, special steel guardrail posts or encased guardrail posts. Refer to Index No. 400 for additional guardrail details.

**DESIGN NOTES**

- The details in this index are intended to be used for existing bridges that have end and approach slab configurations constructed under former Department standards; and, are not intended to preclude special design details more suited to bridges with unusual handrail or wingpost configurations, or, when there is conflict with drainage structures or other features that can not be adjusted.
- The schemes provide the designer with a convenient method of providing standardized information on the plans. In the selection and assignment of schemes the designer must predetermine existing bridge handrail, curb, sidewalk and approach slab conditions, particularly the location of embedded conduit. Special attention must be directed to the presence or absence of curbed approaches on each independent corner of the bridge.
- Each corner of the bridge that requires a guardrail connection should be labeled independently by scheme number, and, where continuous barrier is required across a bridge the scheme number should be labeled independently on the side(s) of the bridge. When continuous guardrail is called for, bridge end anchorage assemblies will be omitted, but, when continuous concrete safety barrier is called for, one or more bridge end anchorage assemblies will be labeled on the plans.
- The scheme selection guide below is to be used as a quick reference for determining anchorages and continuous barriers that are applicable to specific conditions for existing bridges. When appropriate, special details are to be used in lieu of schemes or to supplement or complement the scheme details. In selecting schemes the width of curb, safety curb and sidewalk is the distance from the face of curb to the nearest face of post, rail or parapet.

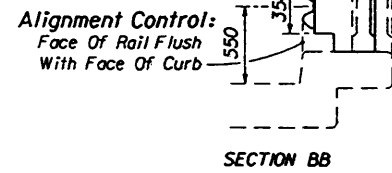
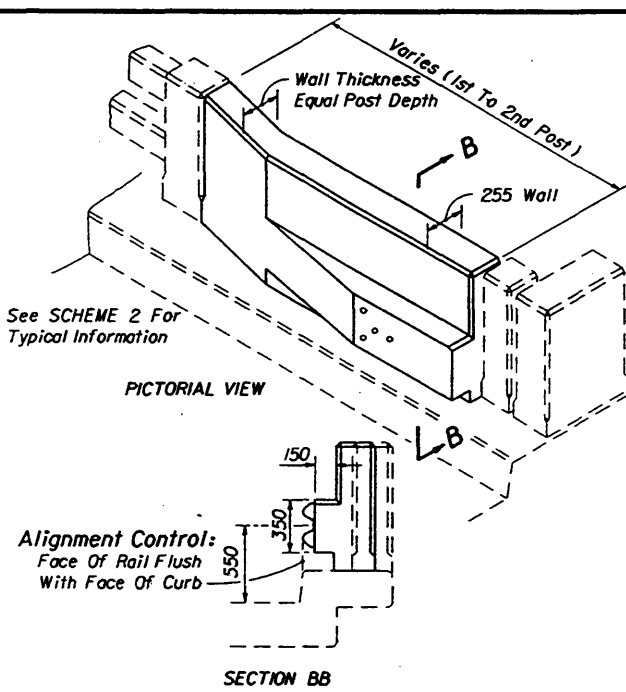
SCHEME SELECTION GUIDE ( NUMBERS )				
	WITH ROADWAY CURBS APPROACHING BRIDGES Sheets 2 thru 6		WITHOUT ROADWAY CURBS APPROACHING BRIDGES Sheets 7 thru 9	
ONE-WAY BRIDGES	APPROACH END	TRAILING END	APPROACH END	TRAILING END
Handrail Curb	3, 4, 18	3, 4, 18	21, 22, 27, 30	23, 27, 30
Narrow Curb	2, 3, 8, 9, 10, 11, 12, 13, 14	2, 3, 8, 15	20, 21, 27, 29	23, 27, 29
Wide Safety Curb	1, 2, 8, 11, 12, 13, 14, 15, 16, 17	1, 2, 8, 11, 12, 13, 14, 15, 16	19, 20, 28, 29	19, 23, 29
Sidewalks	1, 16	1, 16	19	19
TWO-WAY BRIDGES	APPROACH AND TRAILING ENDS		APPROACH AND TRAILING ENDS	
Handrail Curb	3, 4, 9, 10, 18		21, 22, 26, 30	
Narrow Curb	2, 3, 6, 7, 9, 10, 11, 12, 13, 14		20, 21, 25, 29	
Wide Safety Curb	1, 2, 5, 6, 9, 10, 11, 12, 13, 14, 16		19, 20, 24, 25, 29	
Sidewalks	1, 16		19	

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>GUARDRAIL ANCHORAGE AND CONTINUOUS BARRIER FOR EXISTING BRIDGES</b>				
Designed By	JVC	Date	09/86	Approved By
Drawn By	HSD	Date	09/86	State Roadway Design Engineer
Checked By	JVC	Date	09/86	Revision
			00	Sheet No.
				1 of 9
				Index No. <b>401</b>



**APPLICATIONS**  
 SAFETY CURB 330 mm TO 610 mm WIDE  
 POST AND DISCONTINUOUS BEAM RAILING  
 APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES  
 APPROACH END OF ONE-WAY BRIDGES  
 TRAILING END OF ONE-WAY BRIDGES WHEN OTHER HAZARDS PRESENT.

**SCHEME 2**

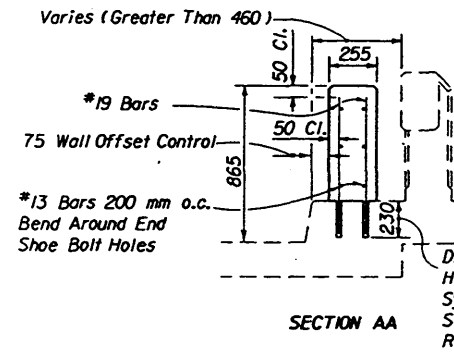
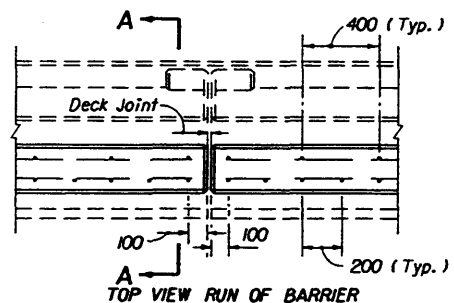


**APPLICATIONS**  
 SAFETY CURB 305 mm OR LESS IN WIDTH  
 POST AND DISCONTINUOUS BEAM RAILING  
 APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES  
 APPROACH END OF ONE-WAY BRIDGES  
 TRAILING END OF ONE-WAY BRIDGES WHEN OTHER HAZARDS PRESENT

**SCHEME 3**

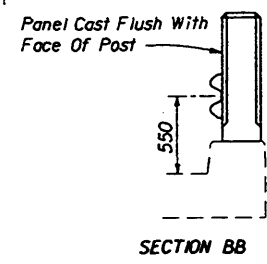
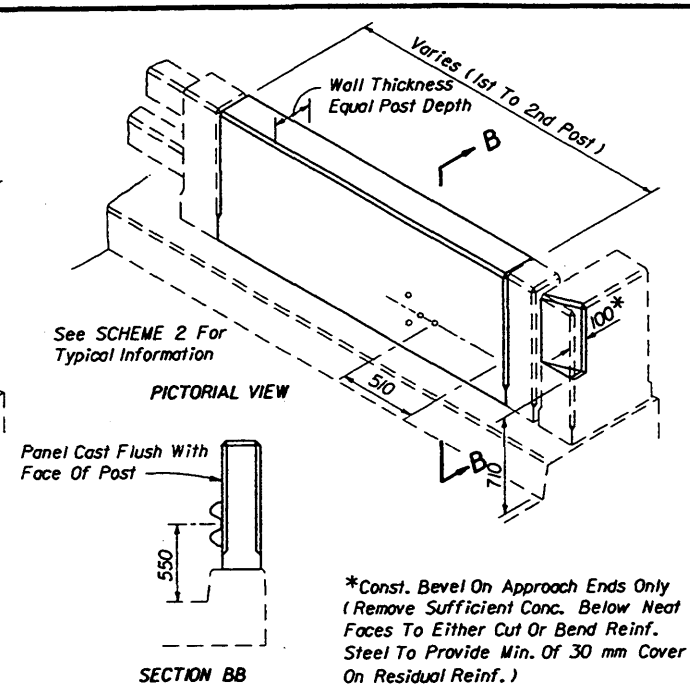
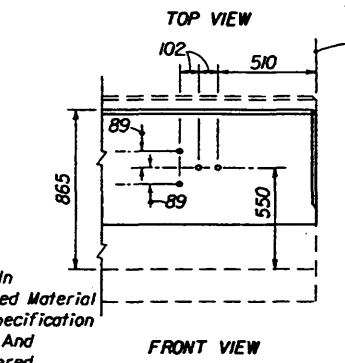
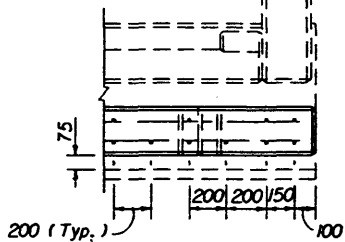
**CAST IN PLACE PANELS**

Estimated Quantities (Per MI)  
 Class II Concrete 0.17 m<sup>3</sup>  
 Reinforcing Steel 20 kg



**APPLICATIONS**  
 SAFETY CURB WIDER THAN 460 mm AND  
 SIDEWALKS CONTINUOUS BARRIER ACROSS BRIDGE

**SCHEME 1**  
**CONCRETE SAFETY BARRIER**



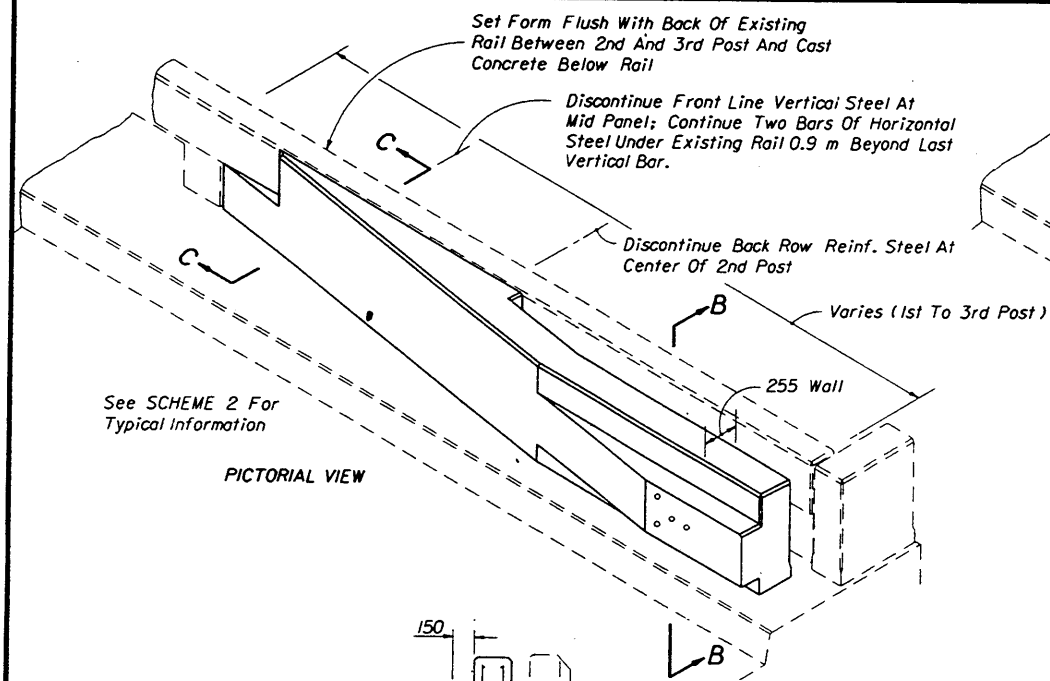
**APPLICATIONS**  
 HANDRAIL CURB  
 POST AND DISCONTINUOUS BEAM RAILING  
 APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES  
 APPROACH END OF ONE-WAY BRIDGES  
 TRAILING END OF ONE-WAY BRIDGES WHEN OTHER HAZARDS PRESENT

**SCHEME 4**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
GUARDRAIL ANCHORAGE AND CONTINUOUS BARRIER FOR EXISTING BRIDGES				
Names	Date	Approved By		
Designed By	JVC	9/86	[Signature]	
Drawn By	BSD	9/86	Revision	Sheet No.
Checked By	JVC	9/86	00	2 of 9
				Index No. 401

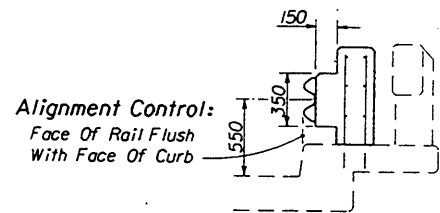
**BRIDGES WITH APPROACHING ROADWAY CURB**





See SCHEME 2 For Typical Information

PICTORIAL VIEW

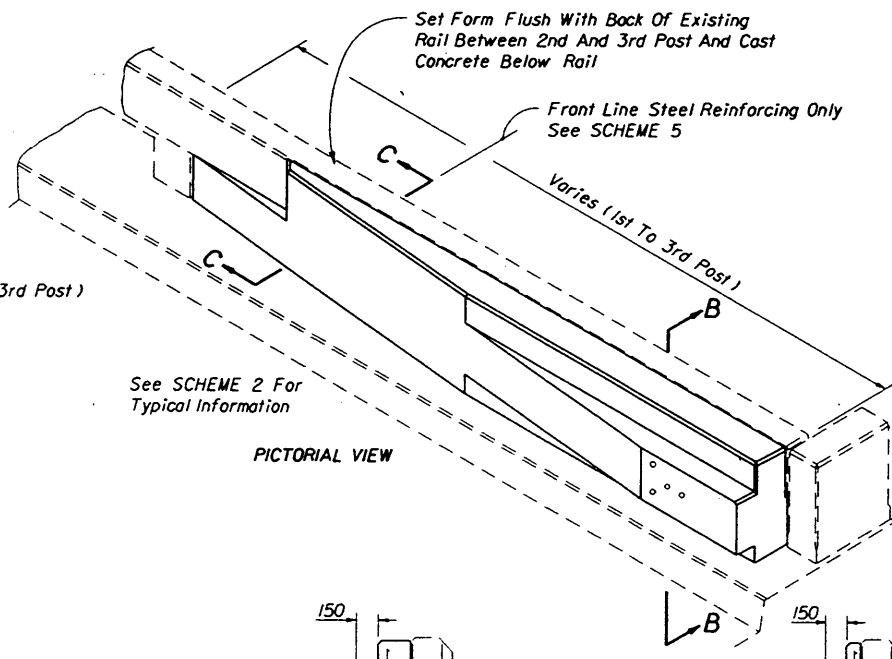


SECTION BB

APPLICATIONS

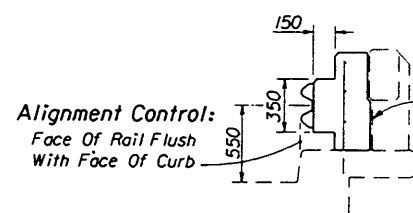
SAFETY CURB 610 mm WIDE  
 CONCRETE CONTINUOUS BEAM RAILING  
 APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES  
 TRAILING END OF ONE-WAY BRIDGES WHEN OTHER HAZARDS PRESENT

SCHEME 5



See SCHEME 2 For Typical Information

PICTORIAL VIEW



SECTION BB

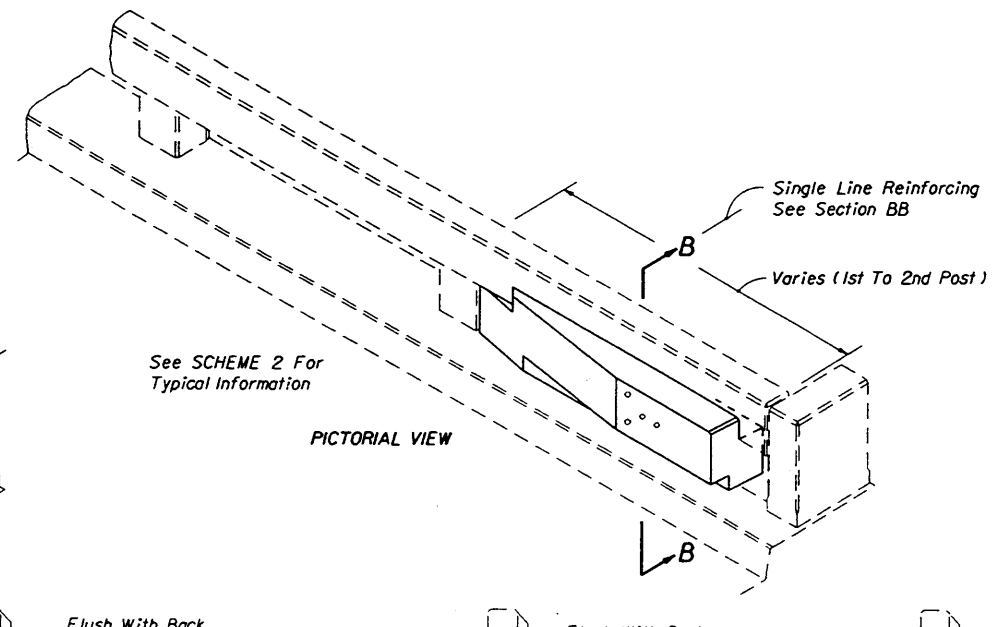
CURBS 460 mm TO 585 mm WIDE (460 mm SHOWN) CURBS 330 mm TO 430 mm WIDE (330 mm SHOWN)

APPLICATIONS

SAFETY CURB 330 mm TO 585 mm WIDE  
 CONCRETE CONTINUOUS BEAM RAILING  
 APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES (CURBS 330 mm TO 585 mm WIDE)  
 TRAILING END OF ONE-WAY BRIDGES WHEN OTHER HAZARDS PRESENT (CURBS 510 mm TO 585 mm WIDE)

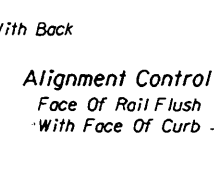
SCHEME 6

CAST IN PLACE PANELS



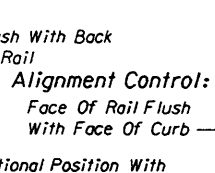
See SCHEME 2 For Typical Information

PICTORIAL VIEW



SECTION BB

(305 mm CURBS SHOWN)



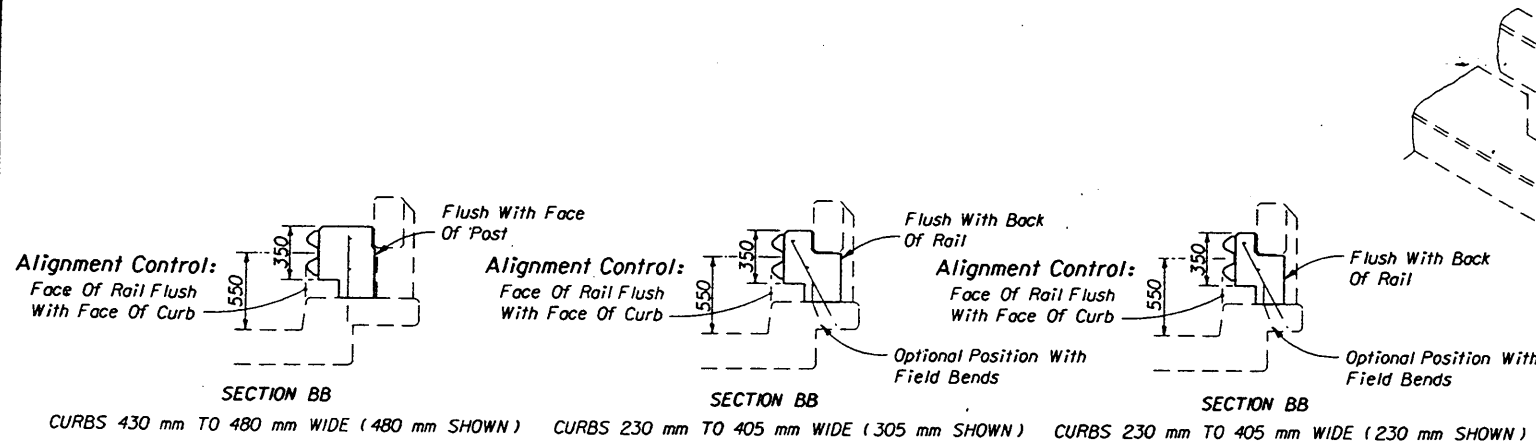
SECTION BB

(230 mm CURBS SHOWN)

APPLICATIONS

SAFETY CURB 230 mm TO 305 mm WIDE  
 CONCRETE CONTINUOUS BEAM RAILING  
 APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES

SCHEME 7



SECTION BB

CURBS 430 mm TO 480 mm WIDE (480 mm SHOWN)

SECTION BB

CURBS 230 mm TO 405 mm WIDE (305 mm SHOWN)

SECTION BB

CURBS 230 mm TO 405 mm WIDE (230 mm SHOWN)

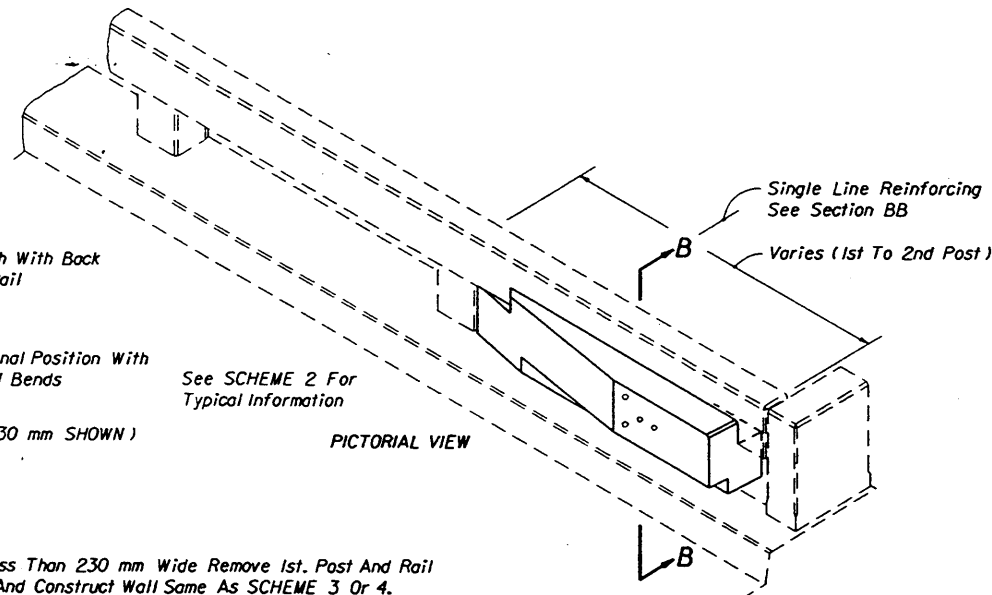
APPLICATIONS

SAFETY CURB 230 mm TO 480 mm WIDE  
 CONCRETE CONTINUOUS BEAM RAILING  
 APPROACH END OF ONE-WAY BRIDGES  
 TRAILING END OF ONE-WAY BRIDGES WHEN OTHER HAZARDS PRESENT

SCHEME 8

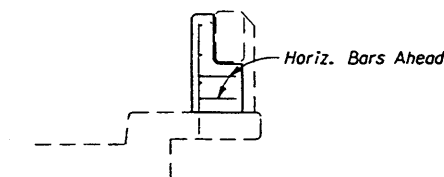
CAST IN PLACE PANELS

BRIDGES WITH



See SCHEME 2 For Typical Information

PICTORIAL VIEW



SECTION CC (SCHEMES 5, 6 & 8)

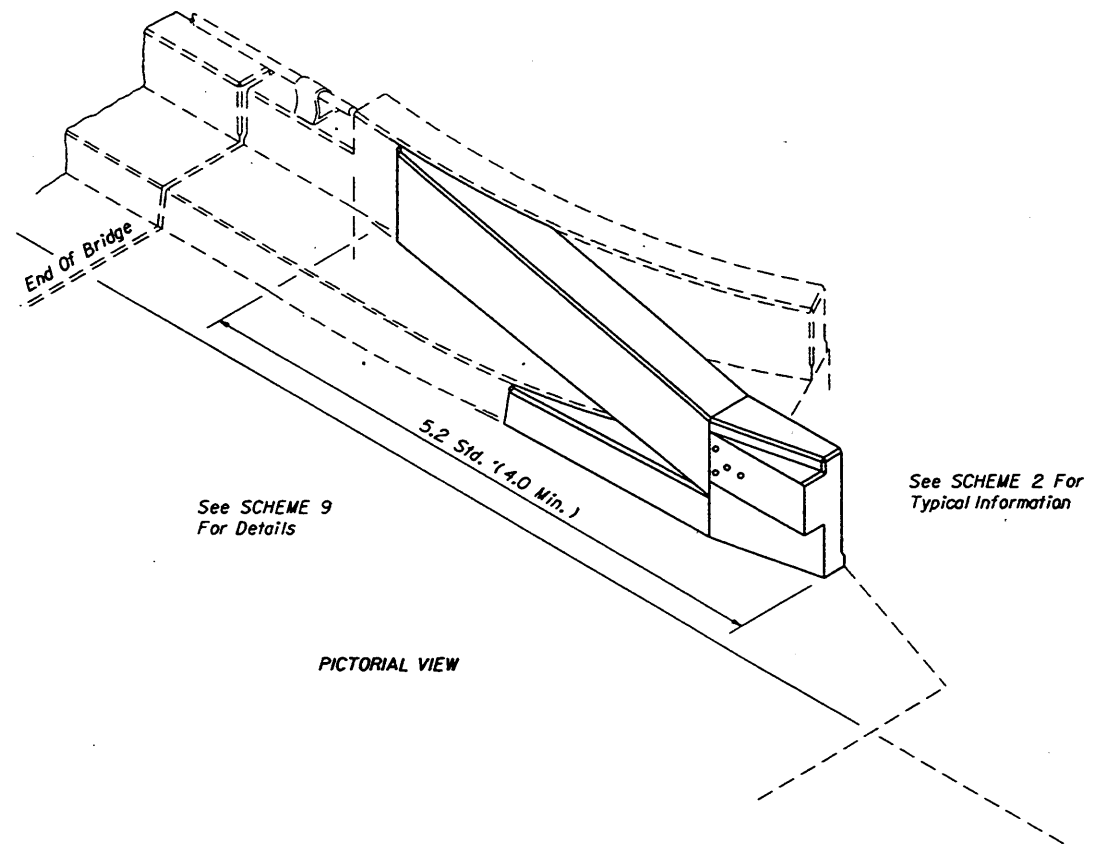
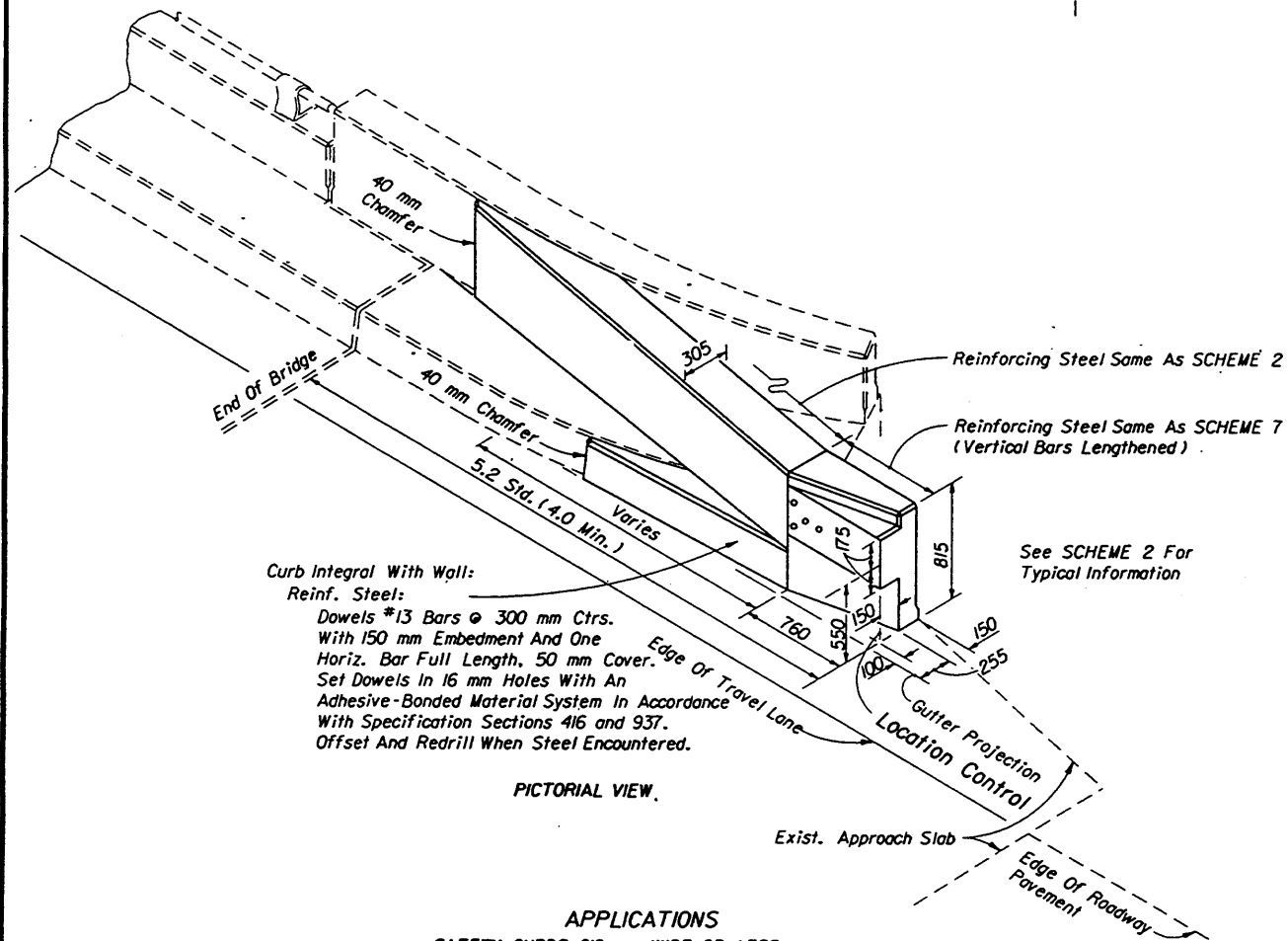
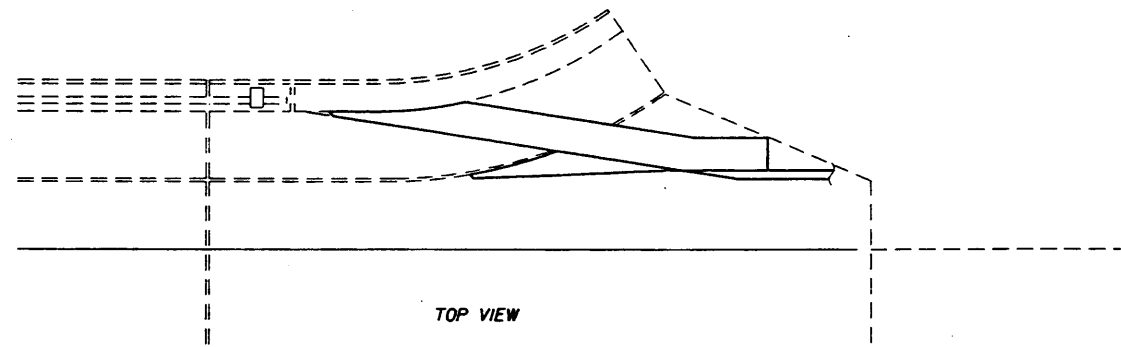
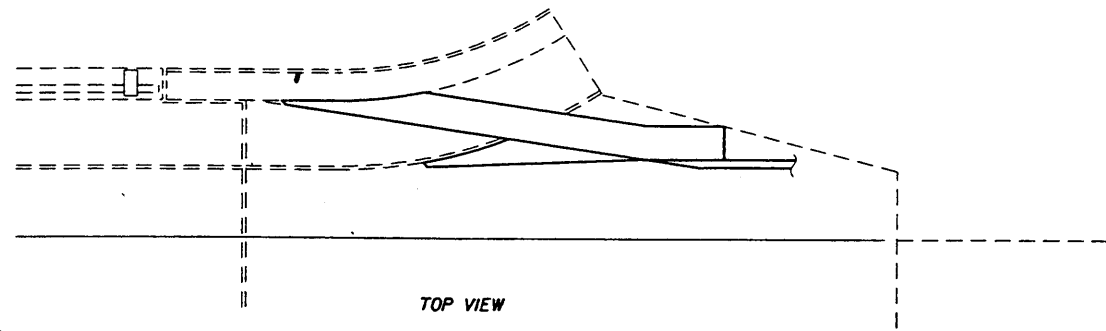
Note: For Curbs Less Than 230 mm Wide Remove 1st. Post And Rail To 2nd Post And Construct Wall Same As SCHEME 3 Or 4.

For Safety Curbs Wider Than 480 mm See SCHEME 5, 6 & 9.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
 ROAD DESIGN

GUARDRAIL ANCHORAGE AND  
 CONTINUOUS BARRIER FOR  
 EXISTING BRIDGES

Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By	JVC	09/86			
Drawn By	HSD	09/86			
Checked By	JVC	09/86	96	3 of 9	401



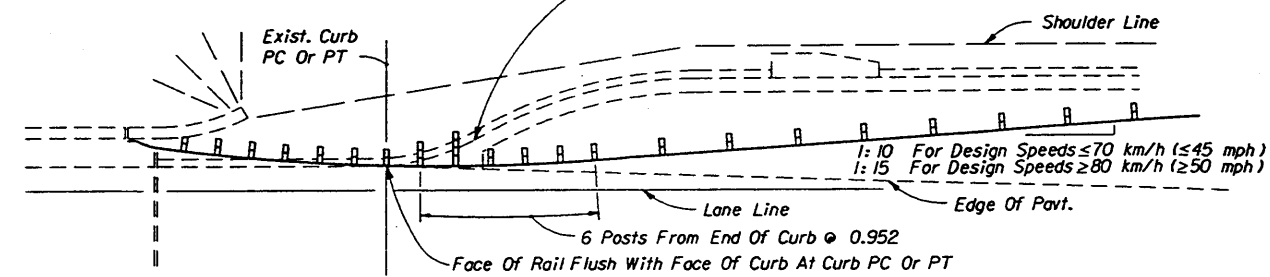
**APPLICATIONS**  
 SAFETY CURBS 610 mm WIDE OR LESS  
 CONCRETE PARAPET WITH METAL PIPE RAILING  
 APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES  
 APPROACH END OF ONE-WAY BRIDGES  
 APPROACH SLAB FOUNDATION  
**SCHEME 9**

**APPLICATIONS**  
 SAFETY CURBS 610 mm WIDE OR LESS  
 CONCRETE PARAPET WITH METAL PIPE RAILING  
 APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES  
 APPROACH END OF ONE-WAY BRIDGES  
 APPROACH SLAB FOUNDATION  
**SCHEME 10**

CAST IN PLACE TRANSITION WALL  
**BRIDGE WITH APPROACHING ROADWAY CURB**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>GUARDRAIL ANCHORAGE AND CONTINUOUS BARRIER FOR EXISTING BRIDGES</b>				
Names	Dates	Approved By <i>[Signature]</i>		
Designed By JVC	09/86	State Roadway Design Engineer		
Drawn By HSD	09/86	Revision	Sheet No.	Index No.
Checked By JVC	09/86	00	4 of 9	401

Portions Of Curb And Gutter May Be Removed And Reconstructed As Necessary To Locate Posts In This Zone. Post May Be Located Within The Curb Or Within The Lip Of The Gutter, But Not Closer Than 305 mm From Face Of Curb.

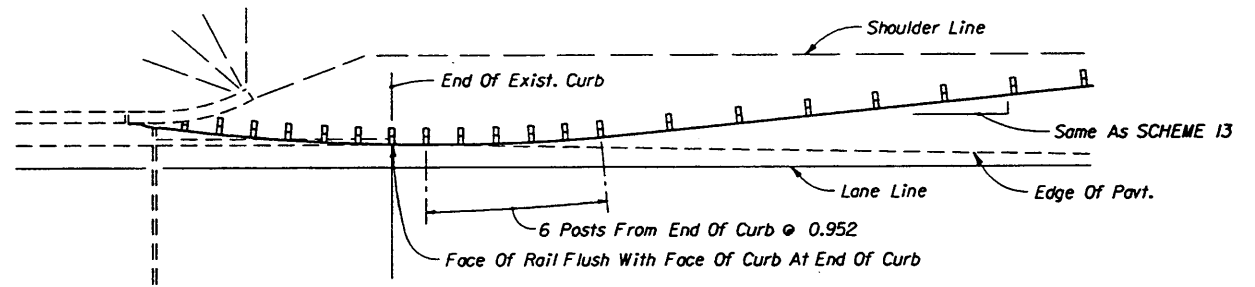


See SCHEMES 11 & 12 For Additional Information

**APPLICATIONS**

- SAFETY CURB 610 mm WIDE OR LESS
- APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES
- APPROACH END OF ONE-WAY BRIDGES
- TRAILING END OF ONE-WAY BRIDGES WHEN OTHER HAZARDS PRESENT

**SCHEME 13**

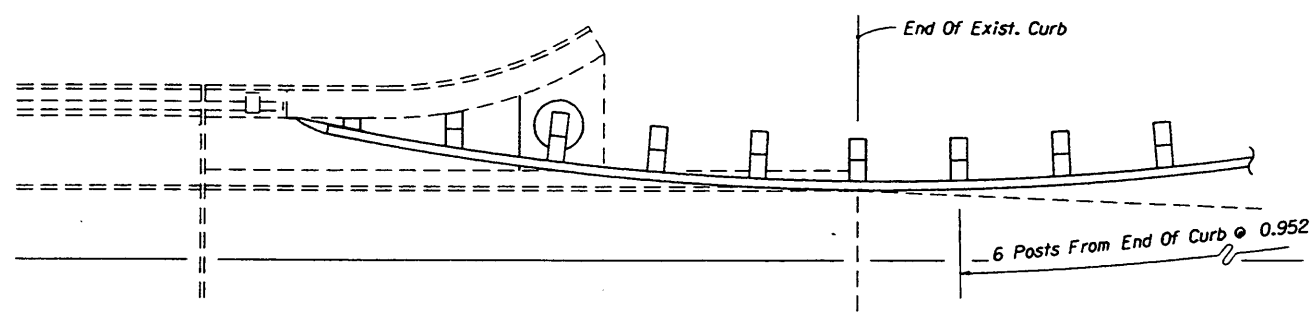


See SCHEMES 11 & 12 For Additional Information

**APPLICATIONS**

- SAFETY CURB 610 mm WIDE OR LESS
- APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES
- APPROACH END OF ONE-WAY BRIDGES
- TRAILING END OF ONE-WAY BRIDGES WHEN OTHER HAZARDS PRESENT

**SCHEME 14**

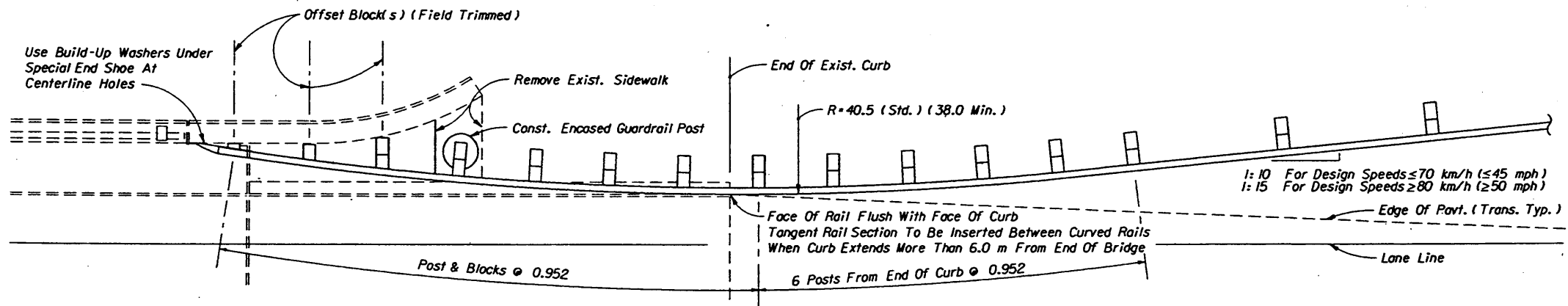


See SCHEME 11 For Additional Information

**APPLICATIONS**

- SAFETY CURB 610 mm WIDE OR LESS
- APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES
- APPROACH END OF ONE-WAY BRIDGES
- TRAILING END OF ONE-WAY BRIDGES WHEN OTHER HAZARDS PRESENT

**SCHEME 12**



**APPLICATIONS**

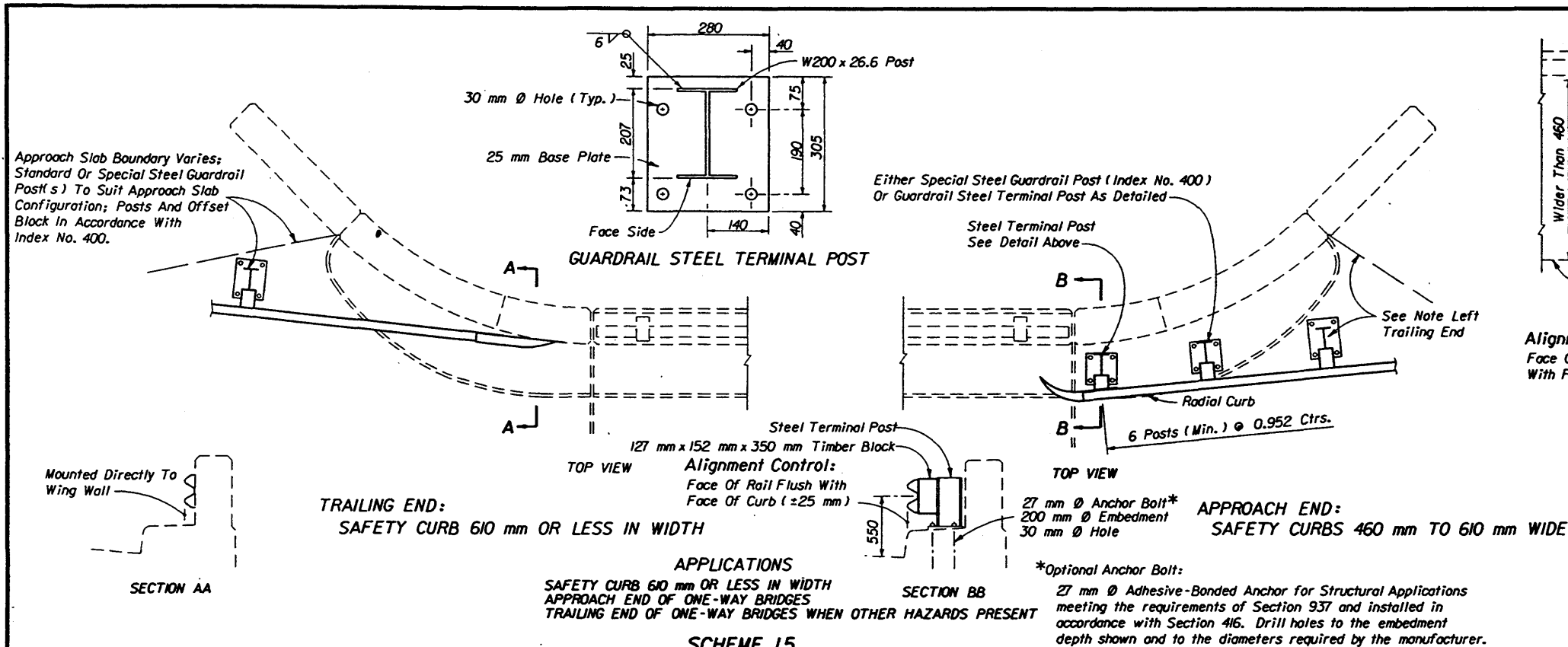
- SAFETY CURB 610 mm WIDE OR LESS
- APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES
- APPROACH END OF ONE-WAY BRIDGES
- TRAILING END OF ONE-WAY BRIDGES WHEN OTHER HAZARDS PRESENT

**SCHEME 11**

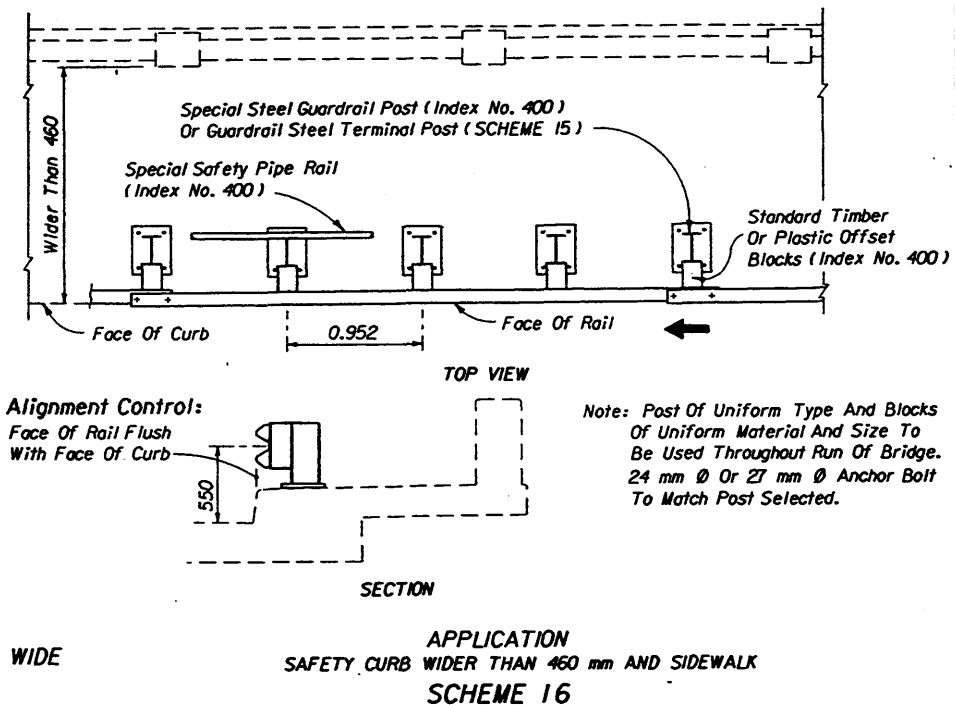
**CURVILINEAR GUARDRAIL**

**BRIDGES WITH APPROACHING ROADWAY CURB**

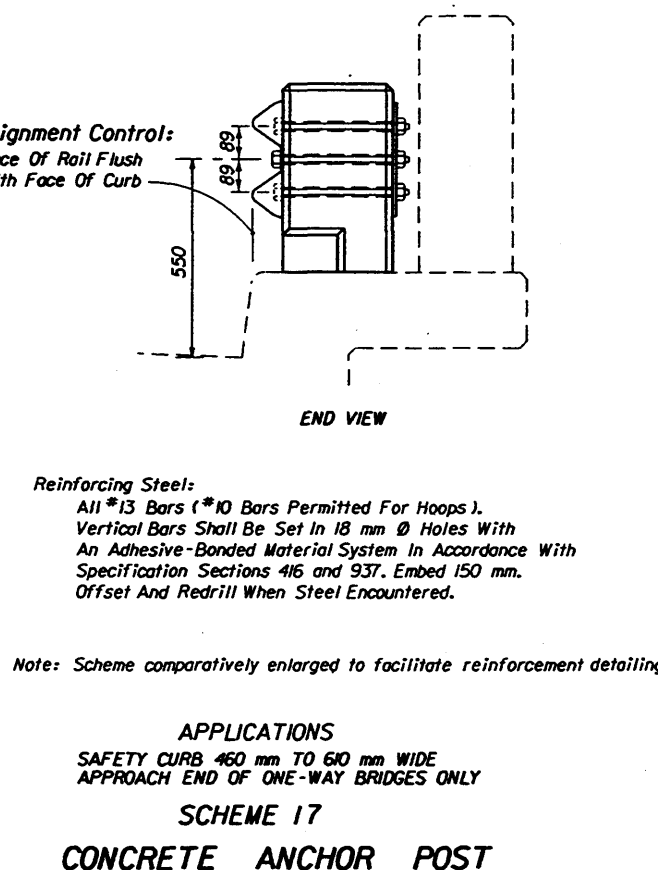
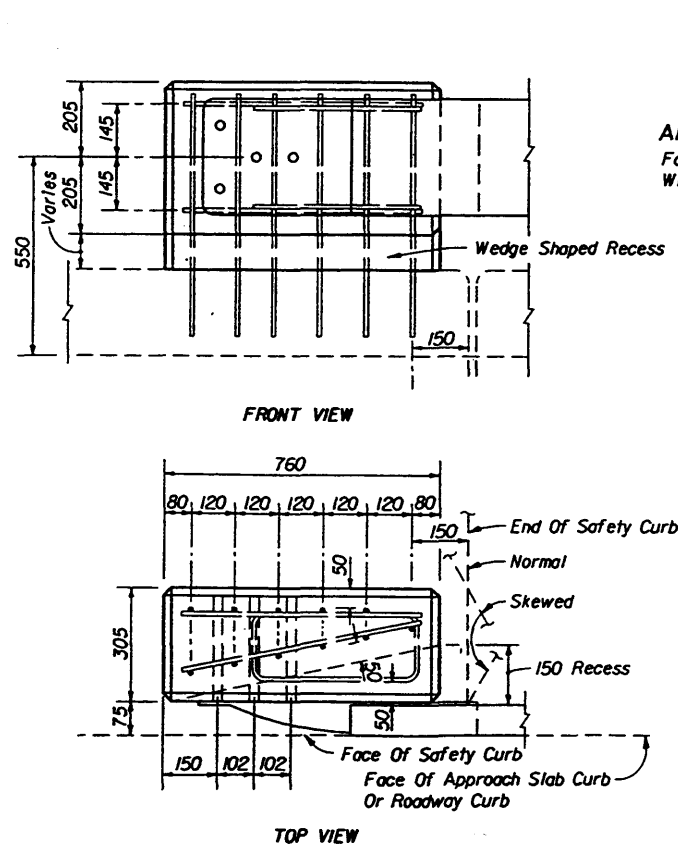
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>GUARDRAIL ANCHORAGE AND CONTINUOUS BARRIER FOR EXISTING BRIDGES</b>				
Designed By	JMG	09/85	Approved By	<i>[Signature]</i>
Drawn By	HSD	09/85	Revision	Sheet No.
Checked By	JMG	09/85	94	5 of 9
				Index No. 401



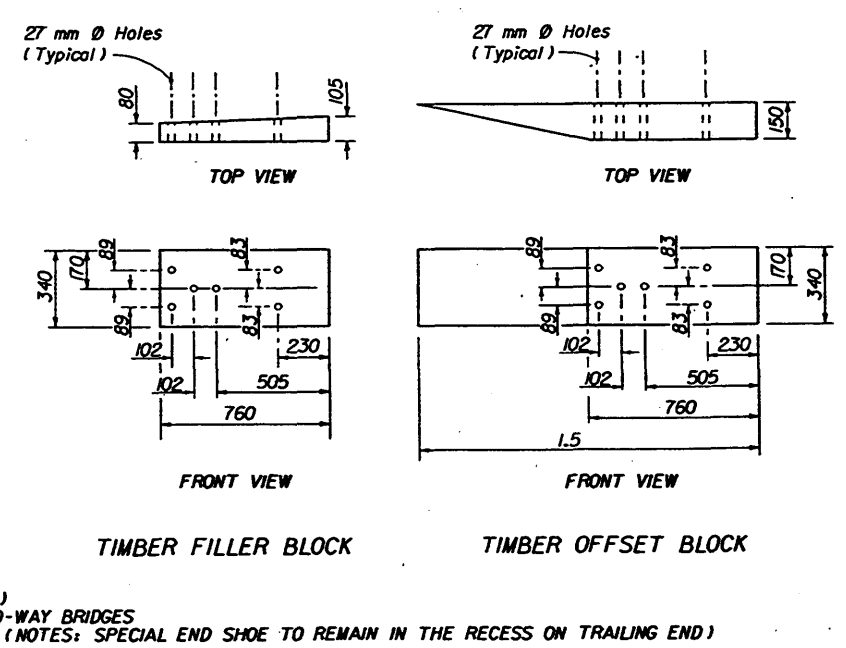
**SCHEME 15**  
**STEEL ANCHOR POST AT RADIAL WING WALL**



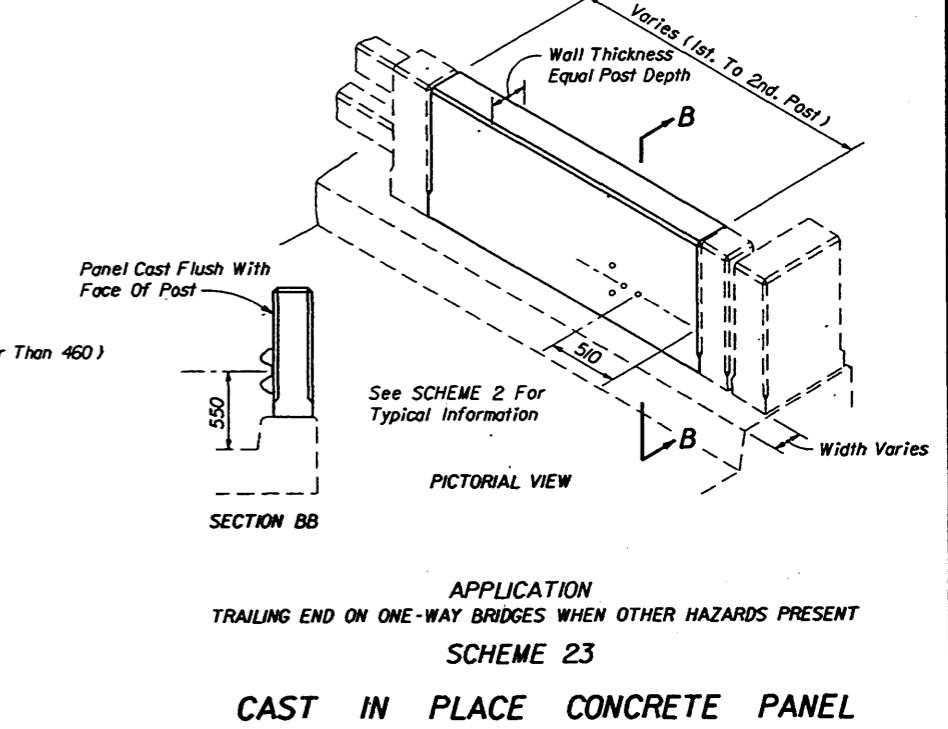
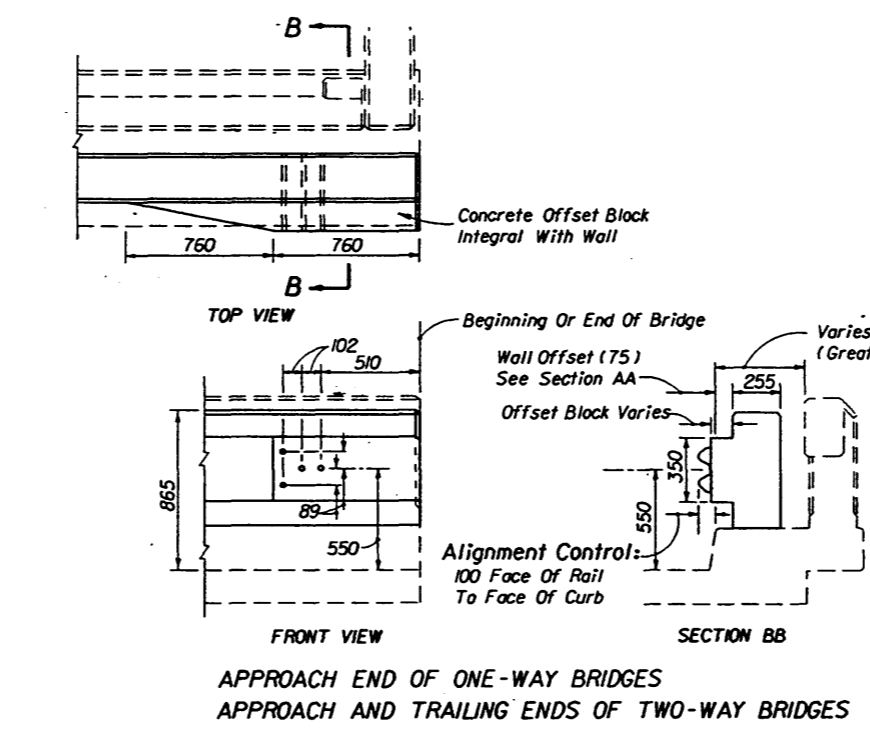
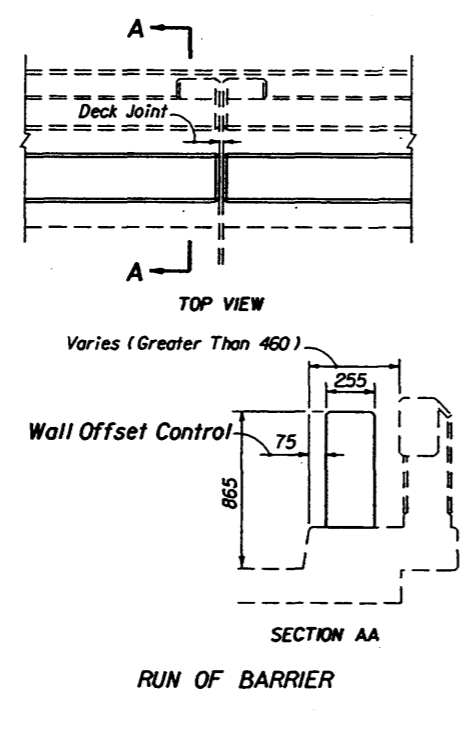
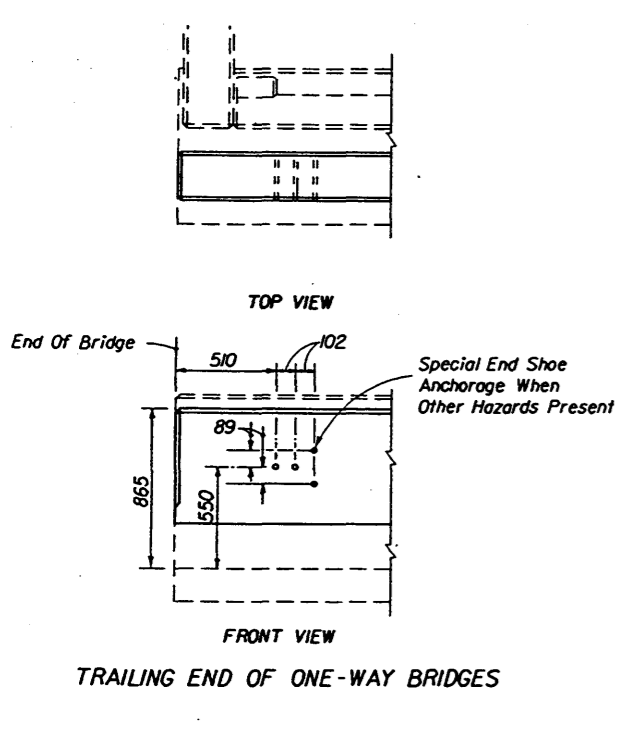
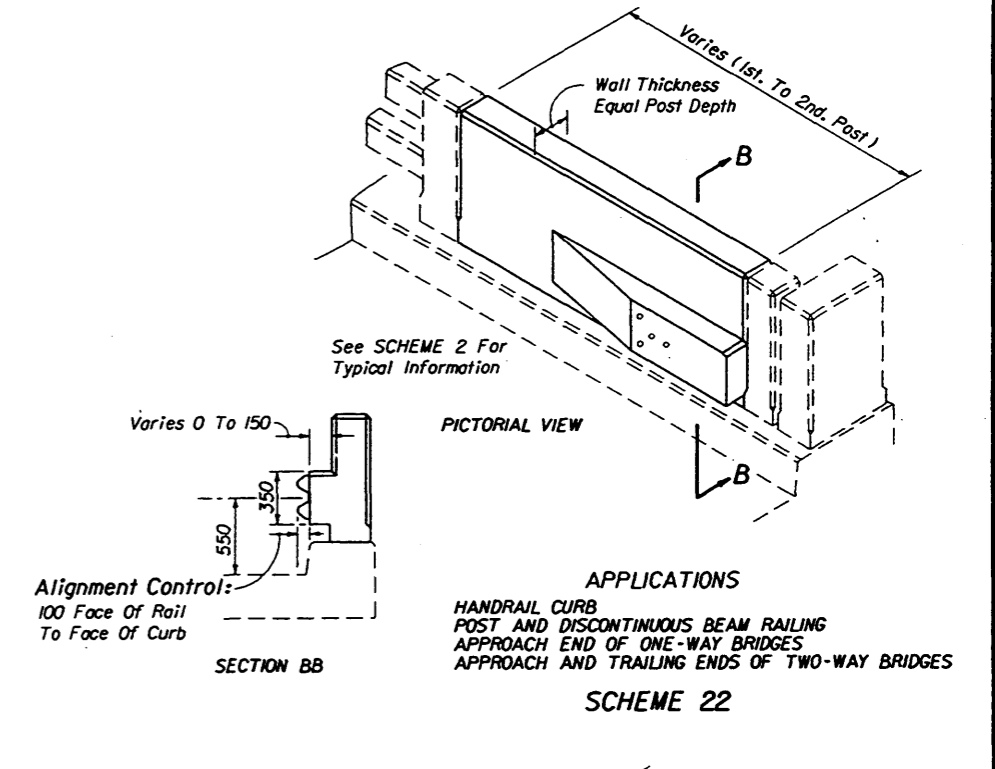
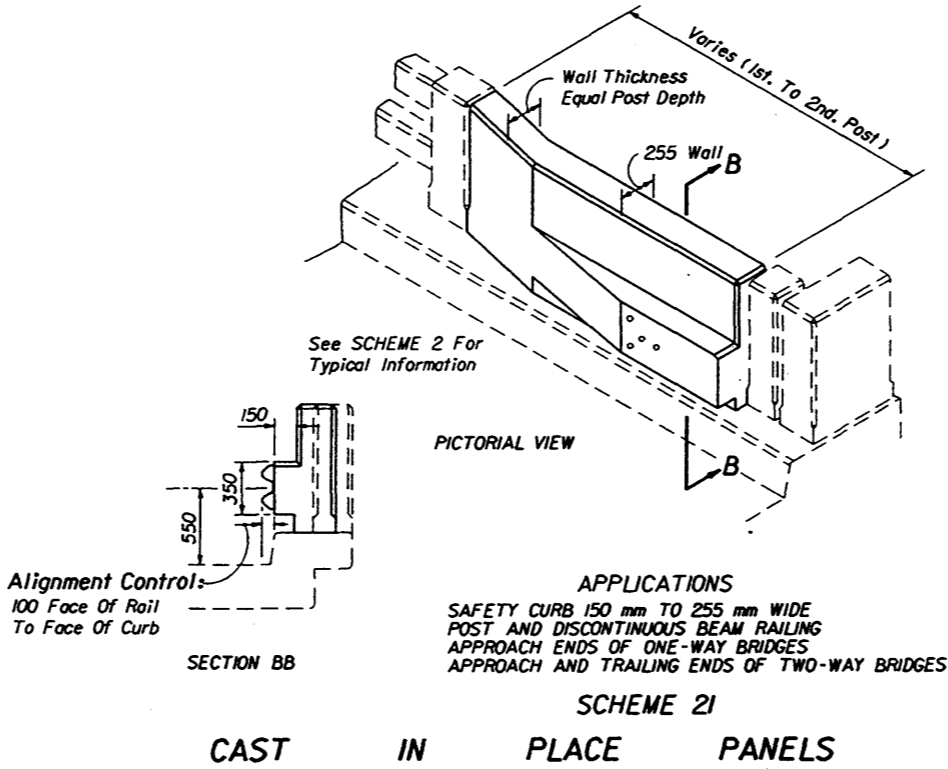
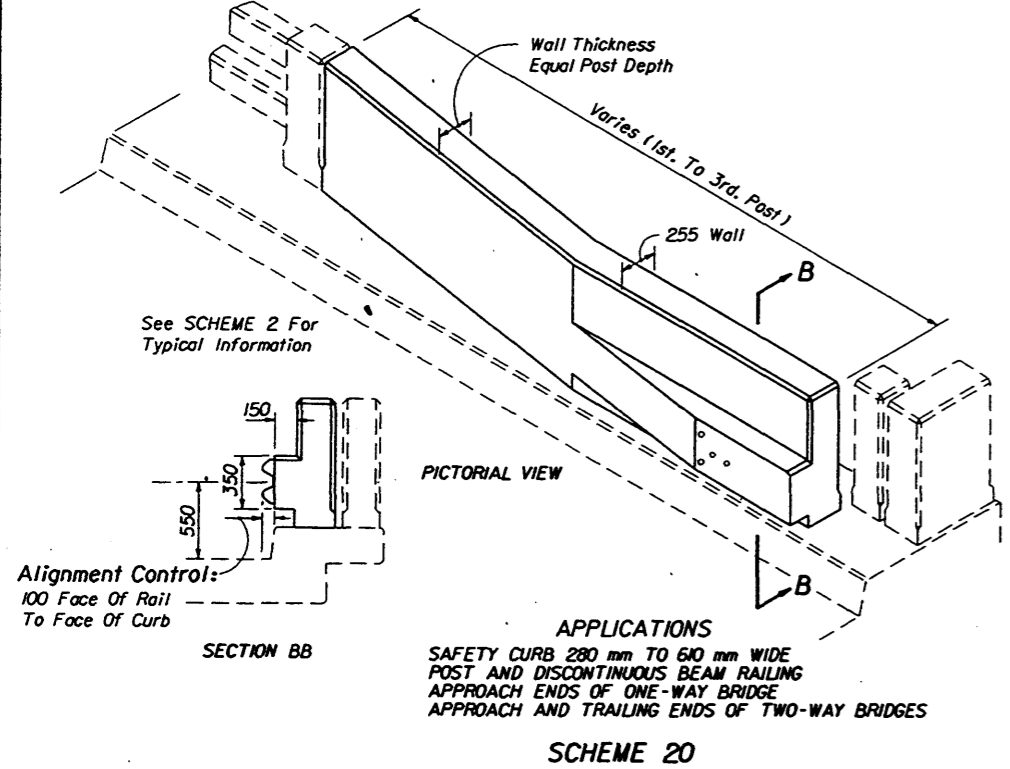
**GUARDRAIL CONTINUOUS ACROSS BRIDGE**



**SCHEME 17**  
**CONCRETE ANCHOR POST**  
**BRIDGES WITH APPROACHING ROADWAY CURB**



STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
GUARDRAIL ANCHORAGE AND CONTINUOUS BARRIER FOR EXISTING BRIDGES				
Names	Dates	Approved By		
Designed By	JAG 08/86	[Signature]		
Drawn By	HSD 08/86			
Checked By	JAG 08/86	Revision	00	Sheet No. 6 of 9
				Index No. 401



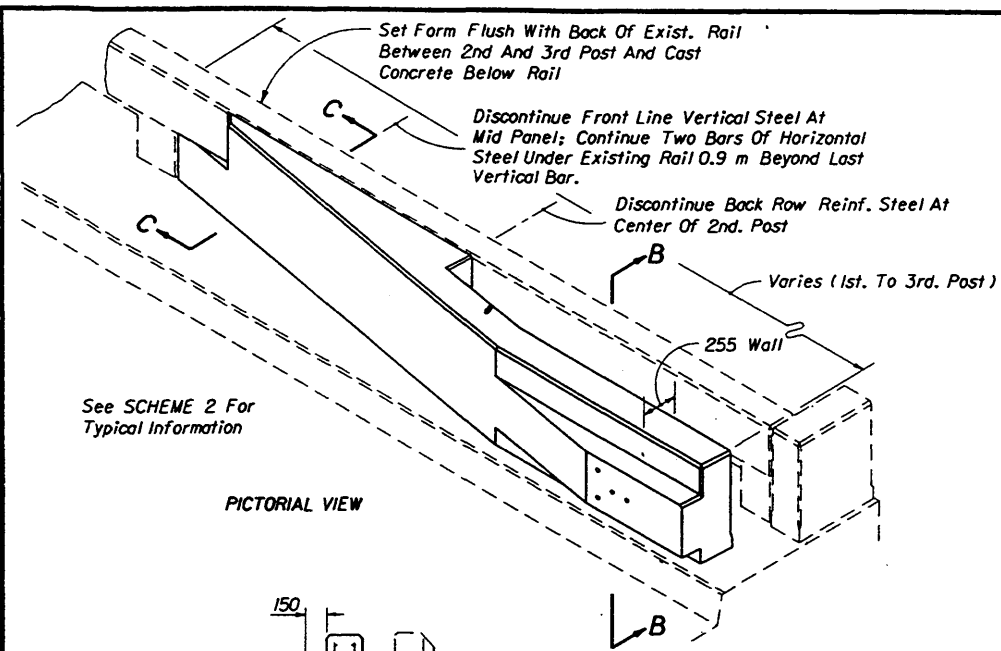
See SCHEME 1 For Reinforcing Details And Estimated Quantities

APPLICATIONS  
SAFETY CURB WIDER THAN 460 mm, AND  
SIDEWALKS CONTINUOUS BARRIER ACROSS BRIDGE

SCHEME 19  
CONCRETE SAFETY BARRIER

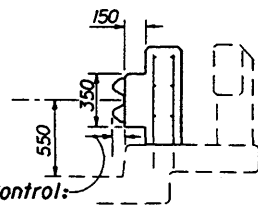
# BRIDGE WITHOUT APPROACHING ROADWAY CURB

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>GUARDRAIL ANCHORAGE AND CONTINUOUS BARRIER FOR EXISTING BRIDGES</b>				
Designed By	JAC	09/86	Approved By	<i>[Signature]</i>
Drawn By	HSD	09/86	Revision	Sheet No. Index No.
Checked By	JAC	09/86	96	7 of 9 401



See SCHEME 2 For Typical Information

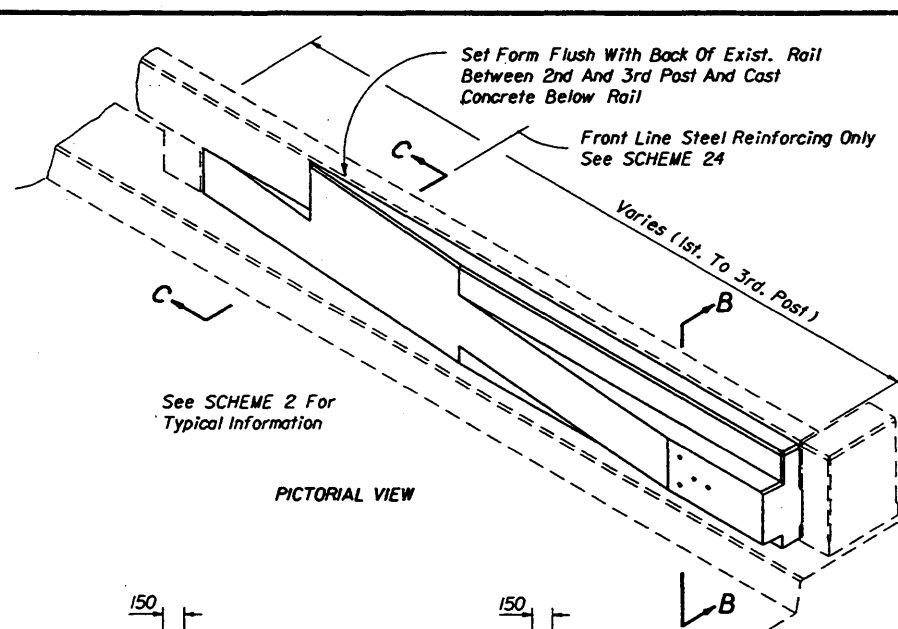
PICTORIAL VIEW



SECTION BB  
(610 mm Shown)

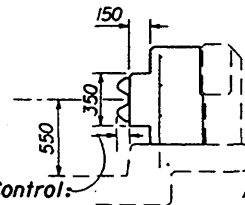
**APPLICATIONS**  
SAFETY CURBS 510 mm TO 610 mm WIDE  
CONCRETE CONTINUOUS BEAM RAILING  
APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES

**SCHEME 24**



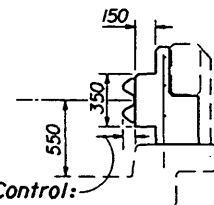
See SCHEME 2 For Typical Information

PICTORIAL VIEW



Alignment Control:  
100 Face Of Rail  
To Face Of Curb

SECTION BB  
Curbs 355 mm To 485 mm  
(485 mm Shown)

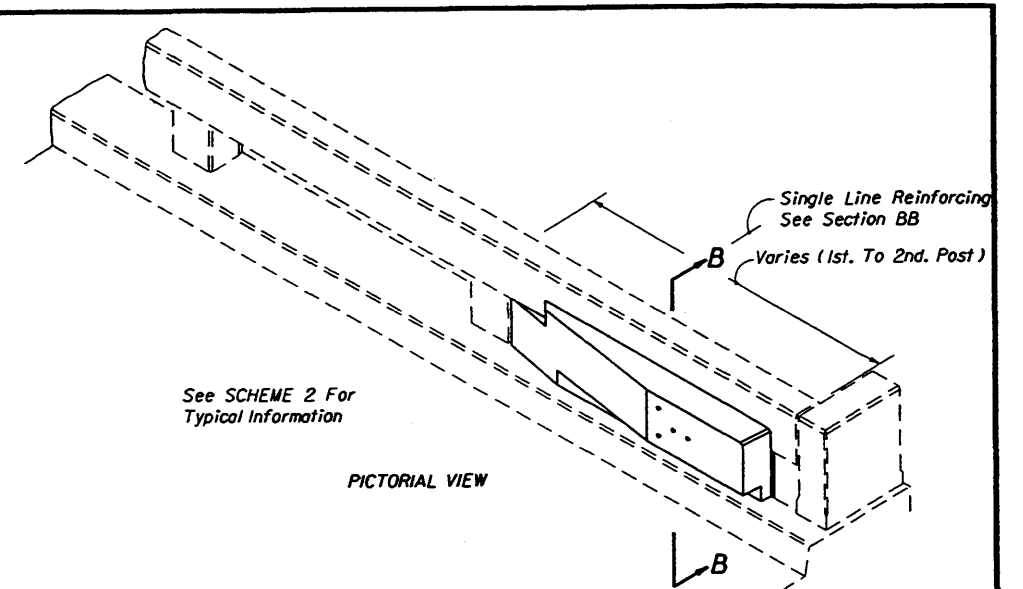


Alignment Control:  
100 Face Of Rail  
To Face Of Curb

SECTION BB  
Curbs 230 mm To 330 mm  
(230 mm Shown)

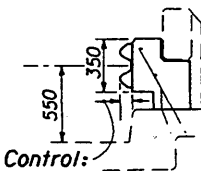
**APPLICATIONS**  
SAFETY CURBS 230 mm TO 485 mm WIDE  
CONCRETE CONTINUOUS BEAM RAILING  
APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES

**SCHEME 25**



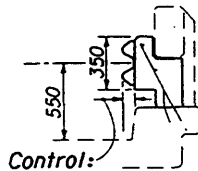
See SCHEME 2 For Typical Information

PICTORIAL VIEW



Alignment Control:  
100 Face Of Rail  
To Face Of Curb

SECTION BB  
(205 mm Shown)



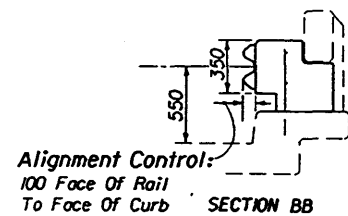
Alignment Control:  
100 Face Of Rail  
To Face Of Curb

SECTION BB  
(125 mm Shown)

**APPLICATIONS**  
SAFETY CURBS 125 mm TO 205 mm WIDE  
CONCRETE CONTINUOUS BEAM RAILING  
APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES

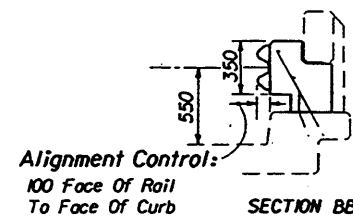
**SCHEME 26**

**CAST IN PLACE PANELS**



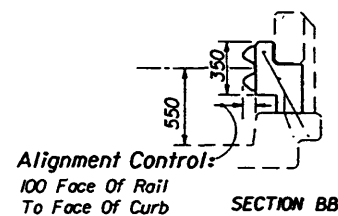
Alignment Control:  
100 Face Of Rail  
To Face Of Curb

SECTION BB  
CURBS 230 mm TO 380 mm WIDE  
(330 mm SHOWN)  
APPROACH ENDS



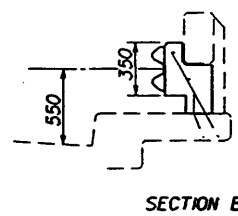
Alignment Control:  
100 Face Of Rail  
To Face Of Curb

SECTION BB  
CURBS 125 mm TO 205 mm WIDE  
(205 mm SHOWN)  
APPROACH ENDS



Alignment Control:  
100 Face Of Rail  
To Face Of Curb

SECTION BB  
CURBS 125 mm TO 205 mm WIDE  
(125 mm SHOWN)  
APPROACH ENDS



SECTION BB

CURB WIDTHS VARY  
TRAILING END WHEN OTHER HAZARDS PRESENT

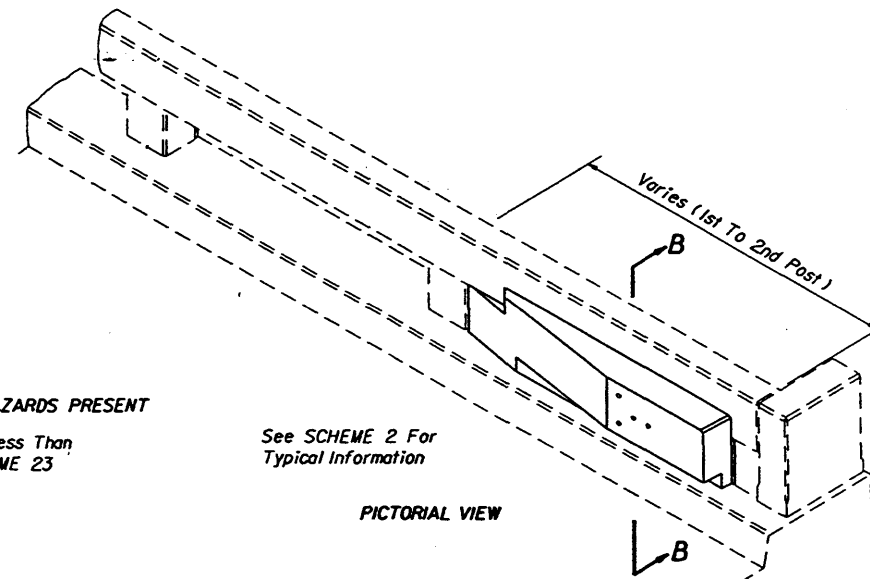
Note: For Trailing End Curb Less Than 125 mm Wide See SCHEME 23

**APPLICATIONS**  
SAFETY CURB 125 mm TO 380 mm WIDE  
CONCRETE CONTINUOUS BEAM RAILING  
APPROACH END OF ONE-WAY BRIDGES  
TRAILING END OF ONE-WAY BRIDGES WHEN OTHER HAZARDS PRESENT

**SCHEME 27**

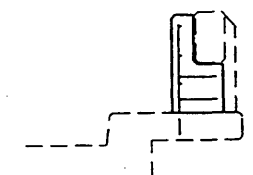
**CAST IN PLACE PANELS**

**BRIDGES WITHOUT APPROACHING ROADWAY CURB**



See SCHEME 2 For Typical Information

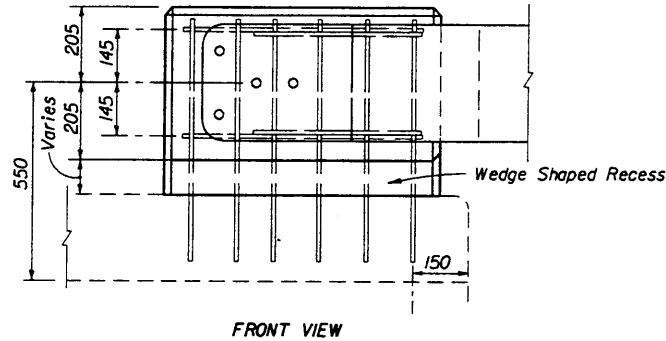
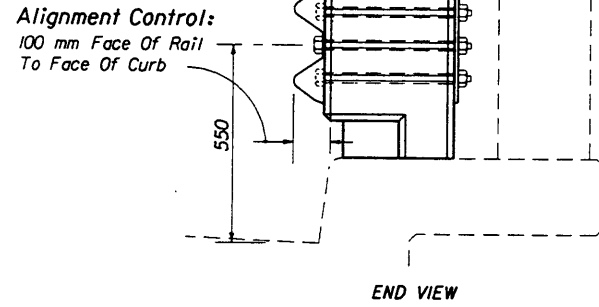
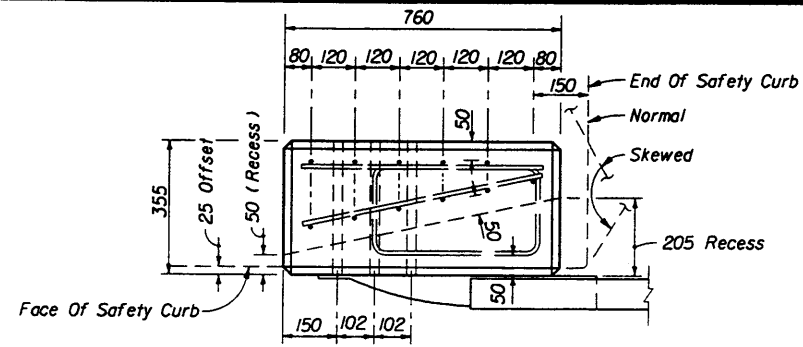
PICTORIAL VIEW



SECTION CC (SCHEMES 24 & 25)

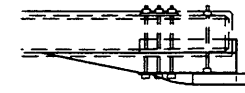
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
GUARDRAIL ANCHORAGE AND CONTINUOUS BARRIER FOR EXISTING BRIDGES				
Names	Dates	Approved By		
Designed By	JC	09/85	[Signature]	
Drawn By	HSD	09/85	Revision	Sheet No.
Checked By	JC	09/85	96	8 of 9
				Index No. 401

Reinforcing Steel: See SCHEME 17.  
 Note: Scheme comparatively enlarged to facilitate reinforcement detailing.



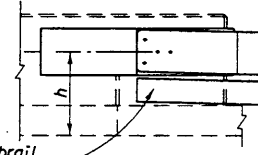
APPLICATIONS  
 SAFETY CURB WIDER THAN 405 mm AND UP TO 610 mm  
 APPROACH END OF ONE-WAY BRIDGES ONLY

SCHEME 28  
 CONCRETE ANCHOR POST

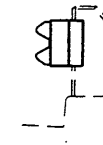


TOP VIEW

See SCHEME 18 For Complete Detailing



FRONT VIEW



END VIEW

When  $h \geq 610$  mm Install Rubrail Back To Post (g). Flare Rubrail From Front Of Post (f) To Back Of Post (g). See Index 400, Detail K For Rubrail Materials.

APPLICATIONS

HANDRAIL CURB  
 SPECIAL END SHOE RECESS (EXISTING)  
 APPROACH AND TRAILING END OF TWO-WAY BRIDGES  
 APPROACH END OF ONE-WAY BRIDGES (NOTE: SPECIAL END SHOE TO REMAIN IN THE RECESS ON TRAILING END)

SCHEME 30  
 END POST WITH SPECIAL END SHOE RECESS

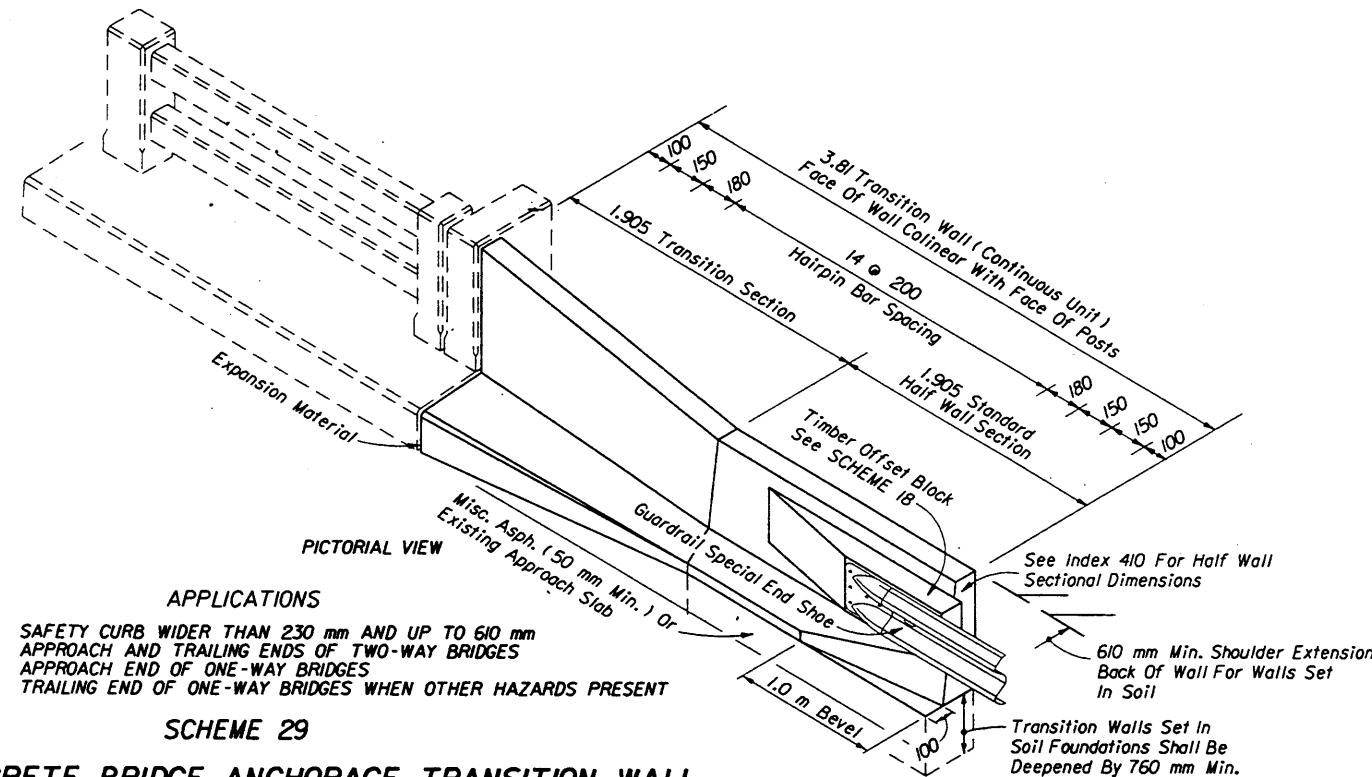
Note (Scheme 29):

Portions of existing approach slab curbing, wingwalls, shoulder gutter, flumes and etc. may have to be revamped or removed.

Transition walls shall be reinforced in accordance with the 'Free End Reinforcement' detail of Index No. 410 with the hairpin bars spaced as shown in this pictorial. Walls mounted on existing approach slabs shall be anchored into the slabs with the front line of the hairpin reinforcement embedded 150 mm in the slab with an Adhesive-Bonded Material System in accordance with Specification Section 416 and 937. Offset and redrill when steel encountered.

Transition walls mounted on soil foundation shall have footings deepened 760 mm and the walls doweled into the end of the existing bridge in the following manner:  
 Four 32 mm diameter holes 150 mm deep shall be drilled in the end post of the existing bridge and #19 bars 380 mm long set in epoxy mortar. The holes shall be located as near as practical to the vertical center of the end of the transition wall and equally spaced to provide cover of 75 mm minimum. The ends of the dowels extending into the transition wall shall be wrapped with one layer of Type I asphalt-saturated roofing felt (560 g/m<sup>2</sup>) (Commonly Called No. 15) with the ends crimped.

Approaching guardrail shall have approach post spacings, offset blocks and double W-beams in accordance with Details H, I, S & T, Index No. 400.

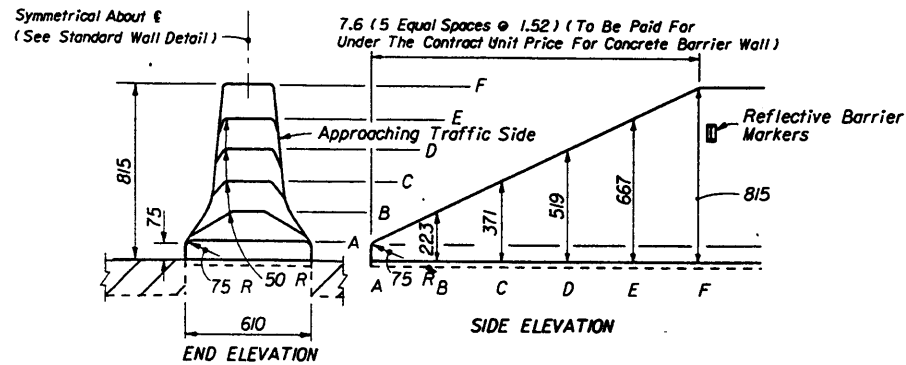


APPLICATIONS  
 SAFETY CURB WIDER THAN 230 mm AND UP TO 610 mm  
 APPROACH AND TRAILING ENDS OF TWO-WAY BRIDGES  
 APPROACH END OF ONE-WAY BRIDGES  
 TRAILING END OF ONE-WAY BRIDGES WHEN OTHER HAZARDS PRESENT

SCHEME 29  
 CONCRETE BRIDGE ANCHORAGE TRANSITION WALL

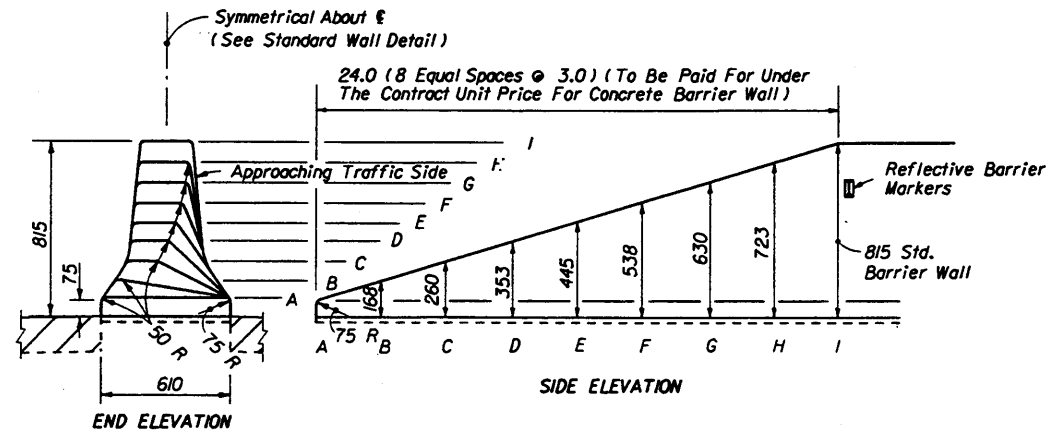
BRIDGES WITHOUT APPROACHING ROADWAY CURB

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>GUARDRAIL ANCHORAGE AND CONTINUOUS BARRIER FOR EXISTING BRIDGES</b>				
Names	Dates	Approved By		
Designed By	JVC 09/06	State Roadway Design Engineer		
Drawn By	HSD 09/06			
Checked By	JVC 09/06	Revision	00	Sheet No. 9 of 9
				Index No. 401



TO BE USED ONLY WHERE TERMINAL LOCATED CLEAR ZONE WIDTH FROM EDGE OF THE NEAR APPROACH TRAFFIC LANE.

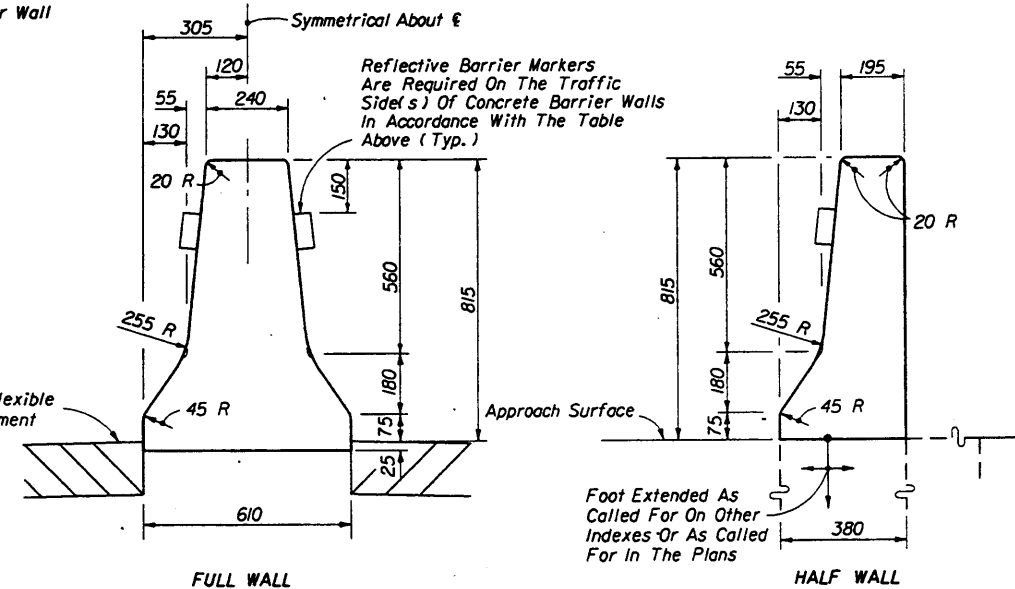
**CONCRETE BARRIER WALL TERMINAL  
DETAIL II**



DESIGN SPEED 70 km/h (45 mph) OR LESS

**CONCRETE BARRIER WALL TERMINAL FOR NARROW MEDIAN  
DETAIL III**

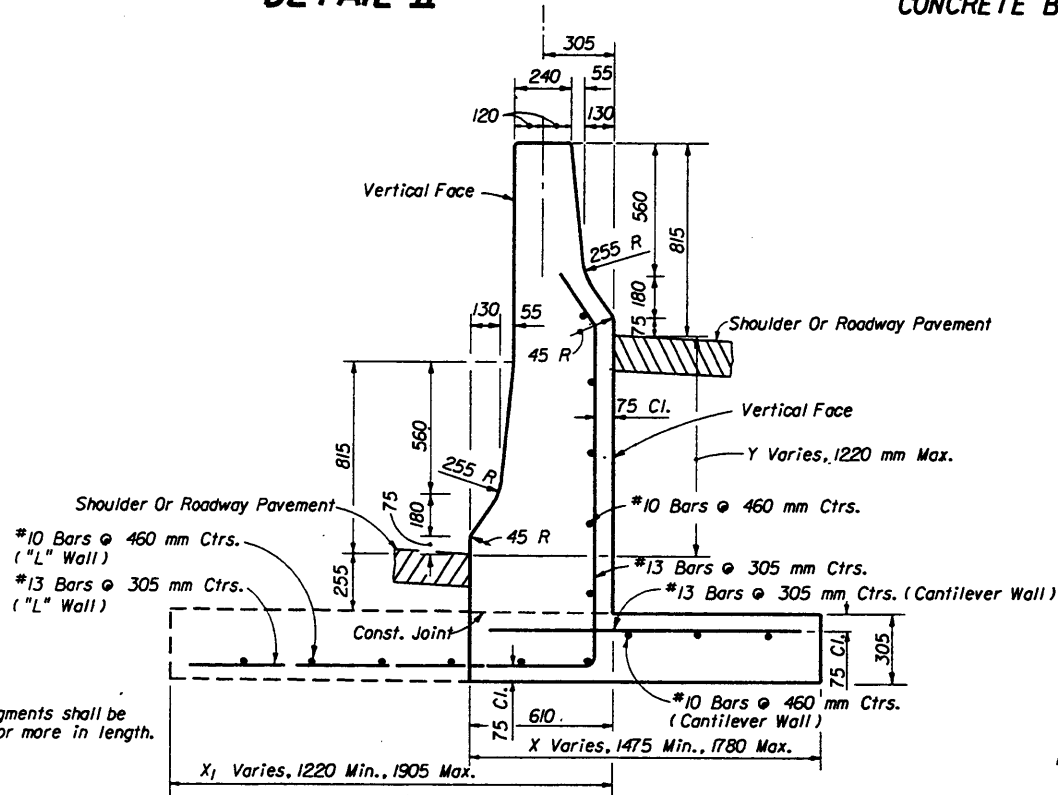
REFLECTIVE BARRIER MARKER SPACING ON WALL		REMARKS
Distance - Edge of Travel Lane to Barrier Wall. (m)	Spacing (m)	
<1.2	12.0	1. Reflectors shall conform to Section 993-5 of the Standard Specifications. 2. Reflector color (white or yellow) shall conform to the color of the near edge line.
1.2 to 2.4	24.0	
> than 2.4	none required	



For concrete barrier wall details at piers, highway lighting and guardrail connections, see other sheets of this Index.

Standard barrier to be paid for under the contract unit price for Concrete Barrier Wall, MI.

**STANDARD BARRIER WALL SECTIONS**



Note: Wall segments shall be 6.0 m or more in length.

**Design Criteria:**

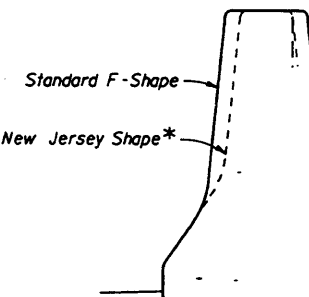
Vehicle: 1815 kg, 100 km/h, 25° Avg. Lat. Impact Deceleration Force- 76's (124.55 kN)  
 Vehicle Force Applications: 4448 N Vert. At Top of Toe; 124.55 kN Horiz. At 140 mm Above Pavt.

Unless the plans stipulate a specific wall type, either the cantilever wall or the "L" wall may be constructed at the Contractor's option.

Steel not required in walls of heights Y=0 To 150 mm when footing and stem cast as one unit. When footing and stem cast separately by construction joint, the footing joint surface shall be roughened and #13 dowels 610 mm long installed at the centerline of the stem on 610 mm centers with 230 mm embedment in the footing.

Cost of the steel and concrete footing to be included in the contract unit price for Barrier Wall Concrete, MI.

	Height Y (mm)	0	150	305	460	610	760	915	1065	1220
Cantilever Wall	Width X (mm)	1475	1525	1575	1600	1650	1675	1700	1750	1780
"L" Wall	Width X <sub>1</sub> (mm)	1220	1320	1425	1525	1600	1675	1750	1830	1905



\*Existing New Jersey shaped walls that are to remain in place or be modified as called for in the plans; or walls that are to be repaired, modified or constructed as directed by the Engineer. Wall dimensions shall be in accordance with Index No. 410 of the 1988 Roadway and Traffic Design Standards.

Where standard F-Shape walls abut existing NJ Shape walls, face transitions of not less than 1.5 m in length shall be constructed at the end of the F-Shape wall.

**WALL FACE SAFETY SHAPES**

**GENERAL NOTES**

- Class II concrete shall be used for all reinforced and plain (nonreinforced) concrete barrier walls; except, in moderately and extremely aggressive environments, Class IX concrete shall be used. Exposed concrete surfaces shall have a Class 3 surface finish in accordance Section 521 of the Standard Specifications, unless other finish called for in the plans. The surfaces shall have a Class 5 Applied Finish Coating in accordance with Section 400 only when called for in the plans.
- Concrete barrier wall terminal notes for design speeds  $\geq 80$  km/h ( $\geq 50$  mph).
  - Terminated outside clear zone of the approach traffic with 'DETAIL II' end treatment.
  - Terminated within a shielded location.
  - Terminal protection by the use of a crash cushion system.
  - Terminated in conjunction with a suitably designed transition to another barrier.
- Expansion joints in wall required only at bridge ends and/or at locations where wall is an integral part of existing or proposed concrete slab; wall joints are to match an existing or proposed expansion joint.
- When the barrier is installed adjacent to the pavement the top 305 mm of the subgrade shall be compacted to at least 100% of the density as defined in the AASHTO T-99 specifications.
- Cast-in-place barrier wall normally will be a continuous pour without transverse contraction joints. Cast-in-place segments with a length  $< 12.0$  m shall be joined to adjacent sections by doweling. See Detail B.
- Precast construction is allowed as an alternate to cast-in-place construction.
  - Wall segments  $< 12.0$  m in length shall be joined by a transverse joint in accordance with Details C & D. The minimum segment length is 6.0 m.
  - Bedding of the precast sections shall be facilitated by the use of sand-cement grout or equal method to assure uniform bearing.
  - Reinforcement may be required for handling stresses.
- Cost of reinforcing steel and reflective barrier markers shall be included in the contract unit price for concrete barrier wall. See individual details for pay item information.
- For barrier wall inlet details see Indexes Nos. 217, 218 and 219.

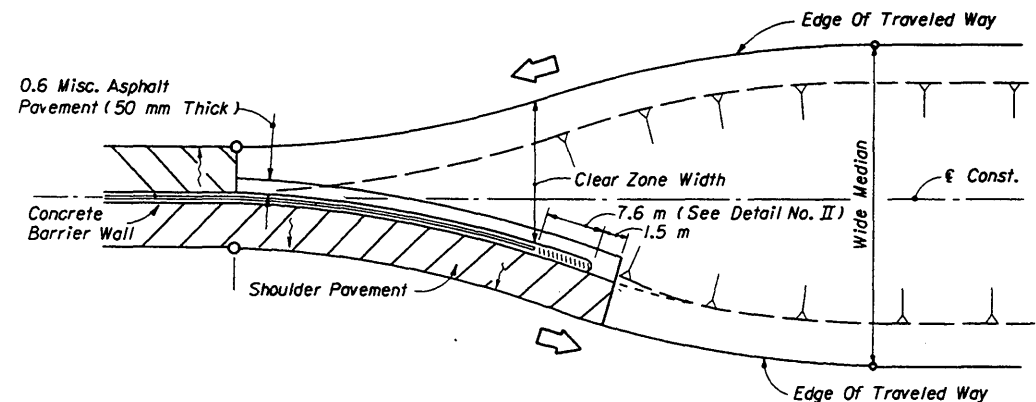
**MEDIAN BARRIER WALL FOR SUPERELEVATED SECTIONS  
OR FOR VARIABLE ROADWAY PROFILE GRADES**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

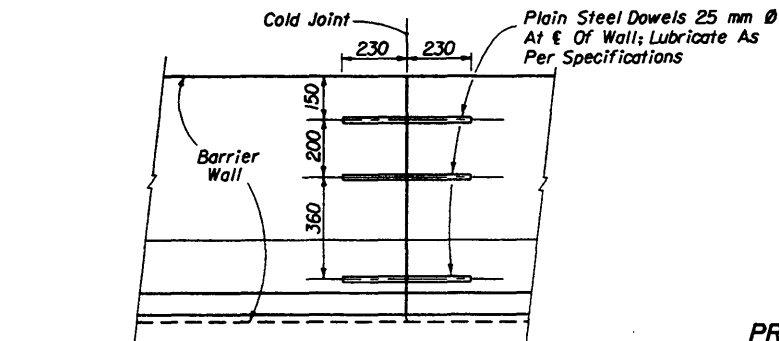
**CONCRETE BARRIER WALL**

Names	Dates	Approved By	State Roadway Design Engineer
Designed By			
Drawn By	AF/HSD 73/91	Revision	Sheet No. 1 of 22
Checked By	LMF/JG 73/91	98	Index No. 410



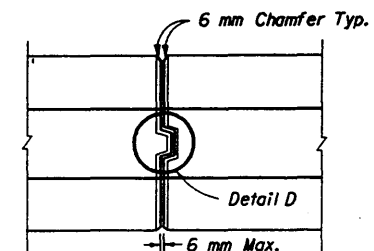


**CONCRETE BARRIER WALL TRANSITION BETWEEN WIDE AND NARROW MEDIANS WHEN BARRIER WALL END LOCATED OUTSIDE APPROACH CLEAR ZONE OR HORIZONTAL CLEARANCE**

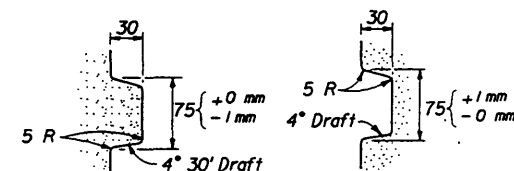


**DOWELED TRANSVERSE CONSTRUCTION JOINT WHEN ABUTTING SEGMENT(S) LESS THAN 12 m IN LENGTH**

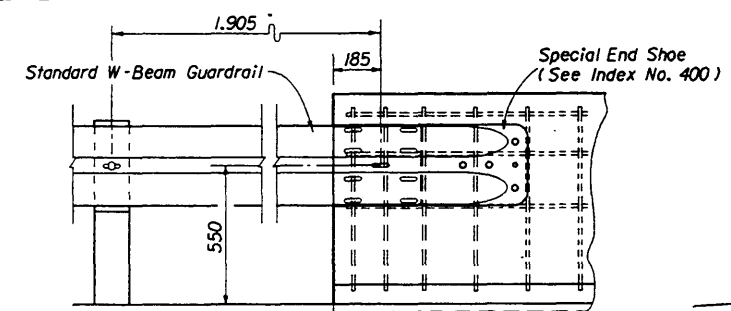
**DETAIL B**



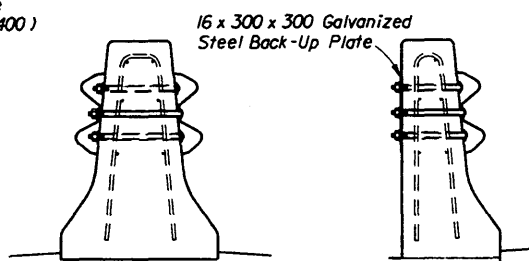
**PRECAST BARRIER TRANSVERSE JOINTS  
DETAIL C**



**STRAIGHT TONGUE AND GROOVE  
DETAIL D**



**FRONT VIEW**



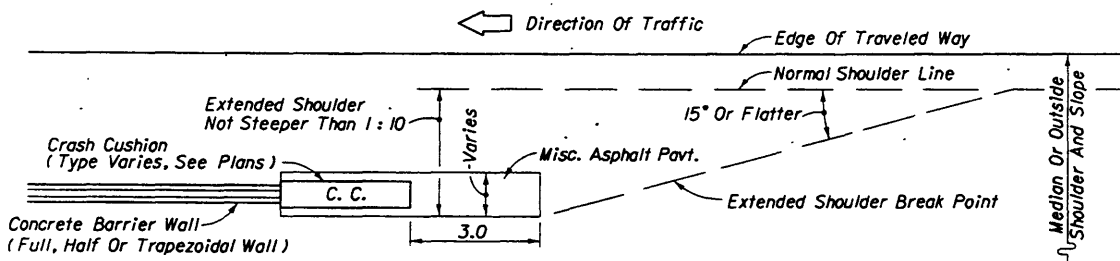
**END VIEW**

**END VIEW**

**NOTES**

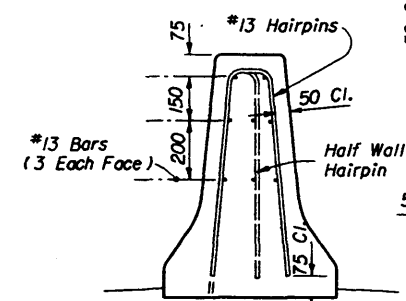
- End of wall flush mounted connections are not applicable to two-lane two-way facilities. See Sheets 18 and 20 for trailing end connections on two-lane two-way facilities and for approach guardrail connections.
- Trailing guardrail connections to double face safety shaped walls will be under one of the following traffic conditions and mounting methods:
  - One-way traffic trailing condition one side only - flush mount with flat steel back-up plate on back side.
  - One-way traffic trailing condition both sides - flush mount both sides.
  - For trailing condition one side and approach traffic condition opposite side - see "Median Barrier Wall" mounting, Sheet 20.

**W-BEAM GUARDRAIL CONNECTION TO CONCRETE BARRIER WALL TRAILING ENDS**

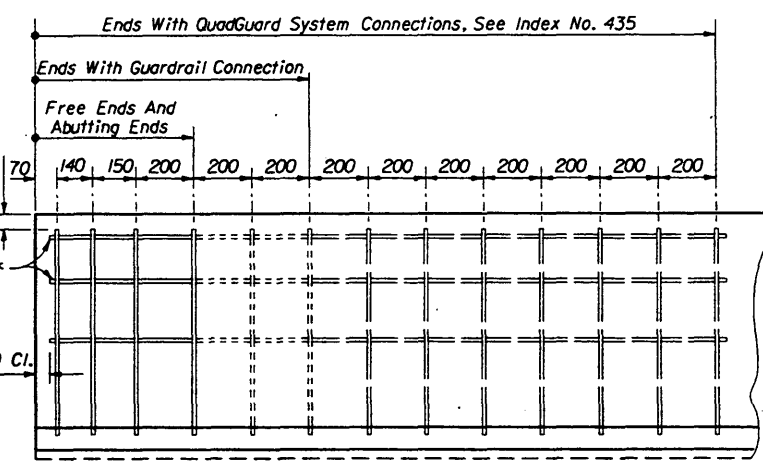


**SHOULDER TREATMENT WHEN CRASH CUSHIONS SHIELDING CONCRETE BARRIER WALL END LOCATED INSIDE APPROACH CLEAR ZONE OR HORIZONTAL CLEARANCE**

**DETAIL A**



**END VIEW**



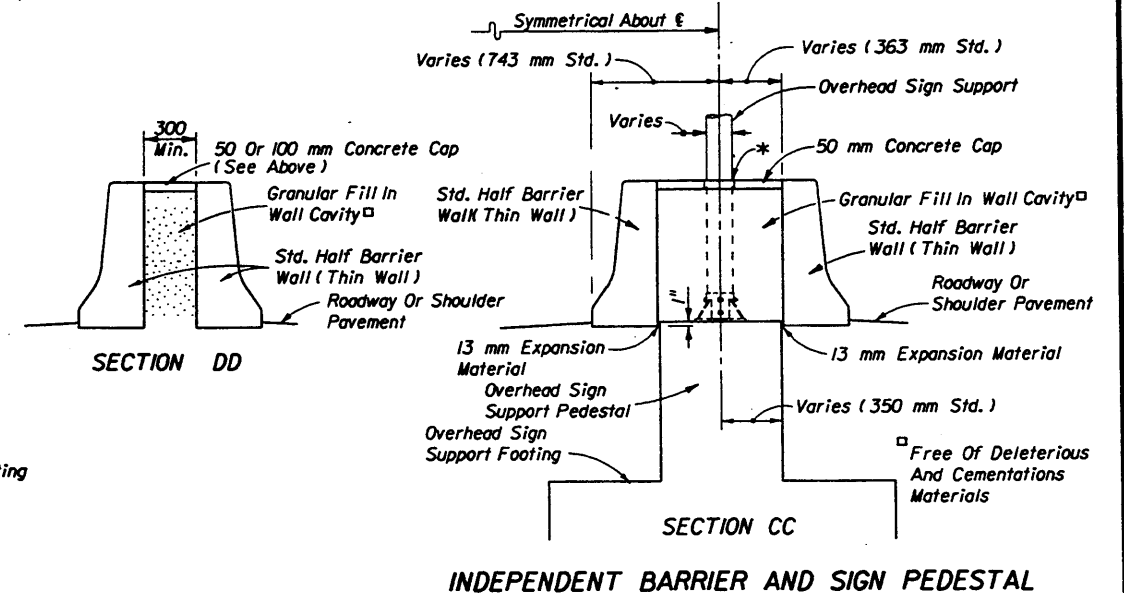
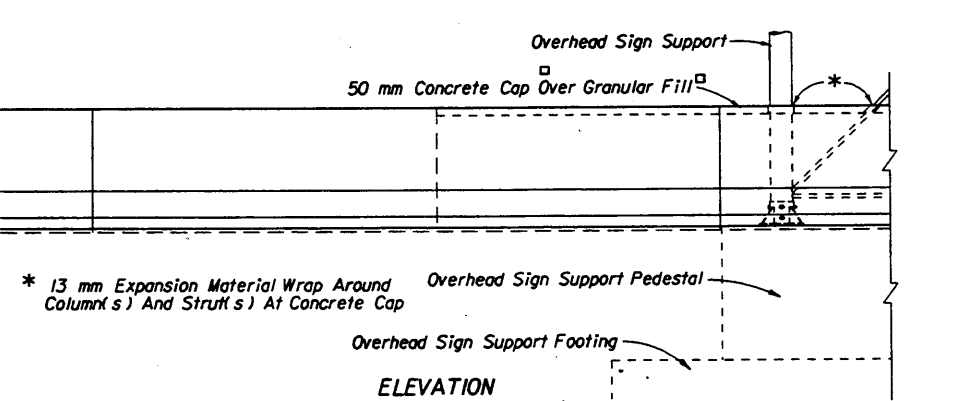
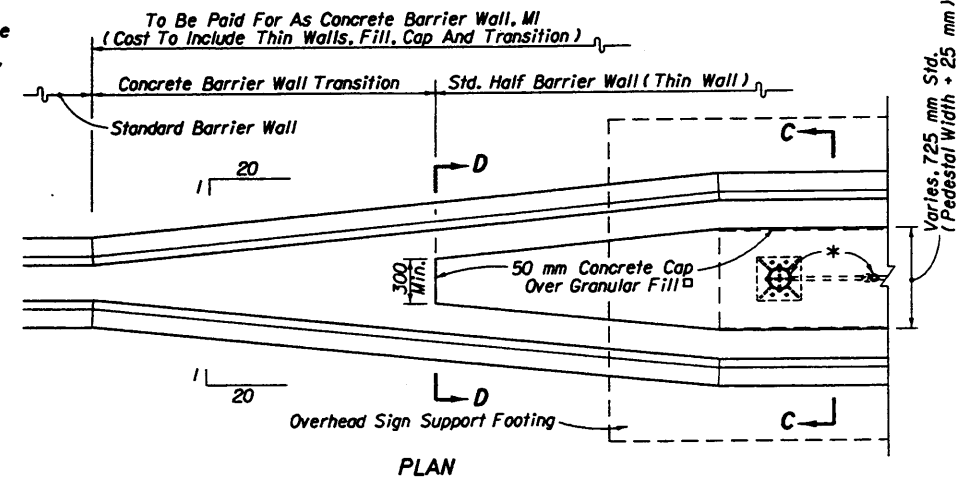
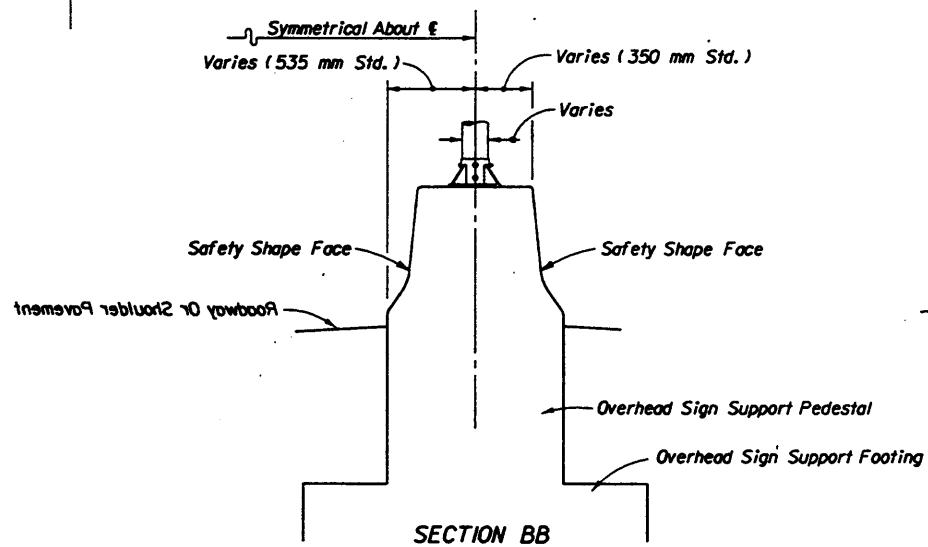
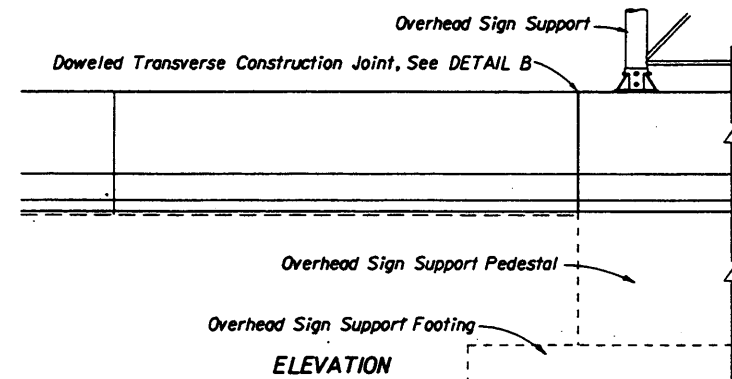
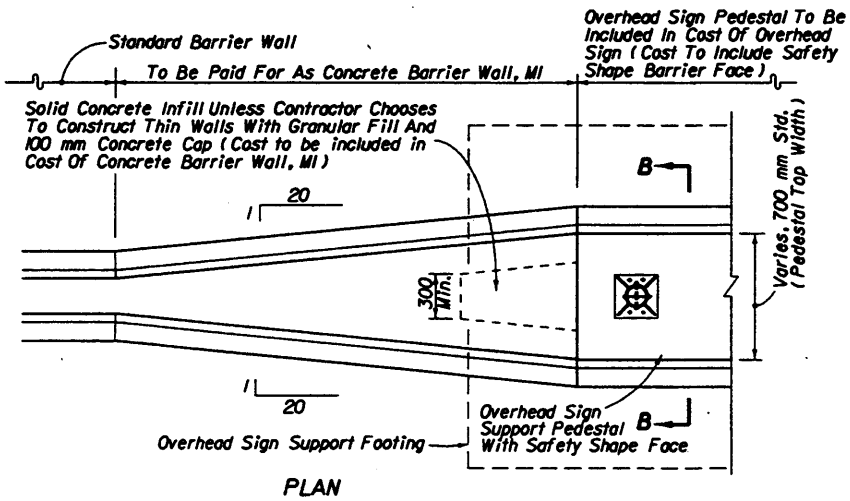
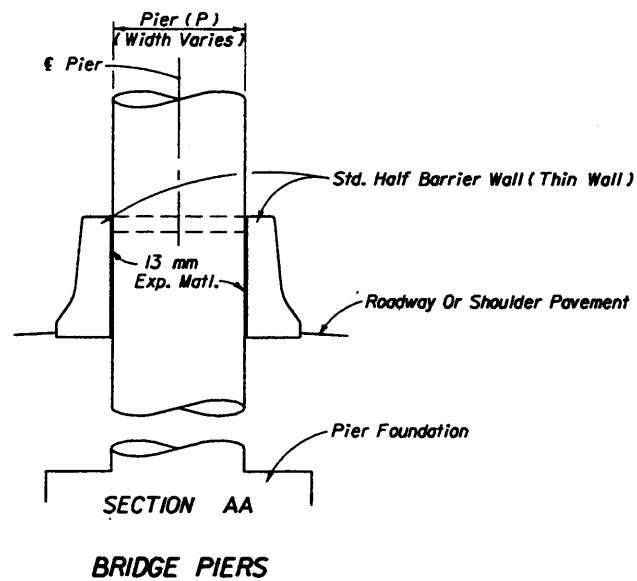
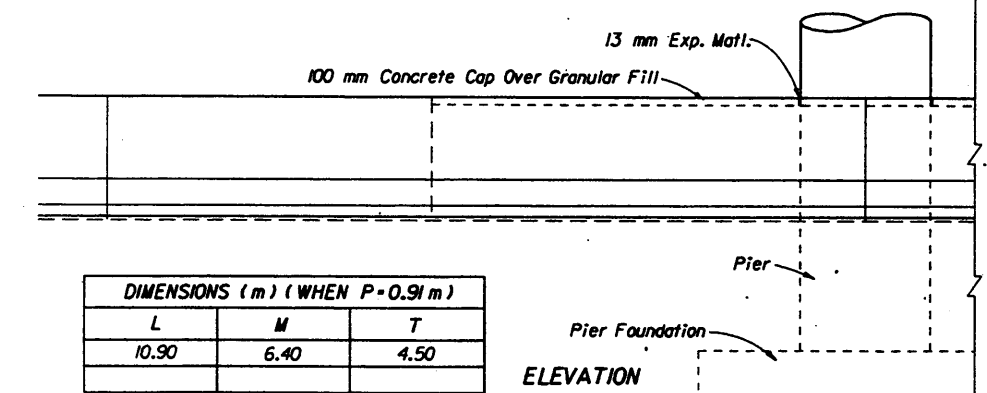
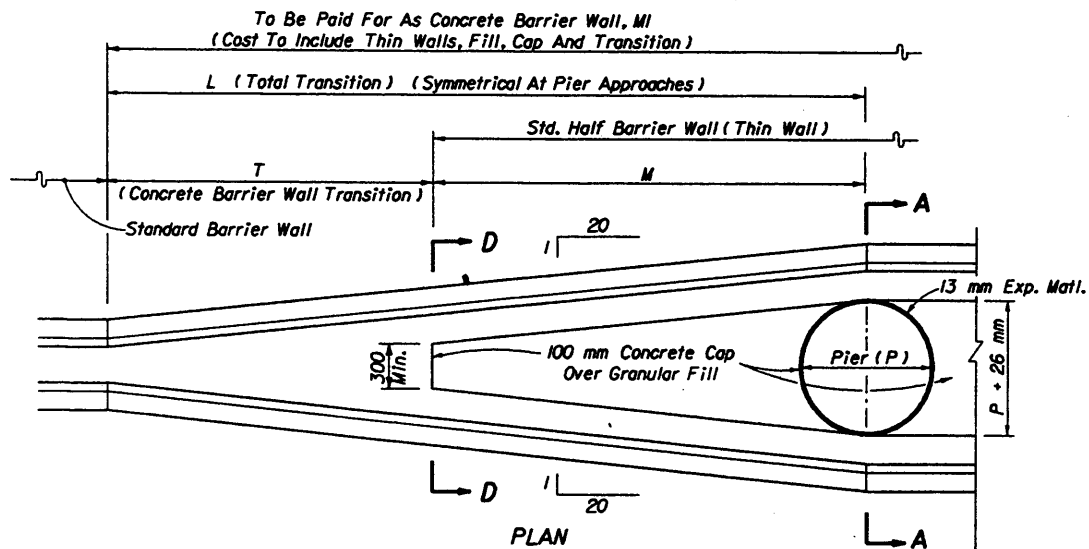
**SIDE VIEW**

Hairpin Front Face Bend Extended As Required By Other Indexes For Mounting Half Walls On Rigid Concrete Surfaces

Note: Free end reinforcement required for nonreinforced walls at all exposed ends; abutting ends of true joints; ends with guardrail connections; ends with QuadGuard System connections; and, ends connecting to bridge traffic rails or other rigid barrier walls.

**FREE END REINFORCEMENT**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CONCRETE BARRIER WALL</b>				
Designed By	Name	Date	Approved By	Index No.
Drawn By	AF/MSD	73/9	State Roadway Design Engineer	
Checked By	LUF/AG	73/9	00	2 of 22
				410

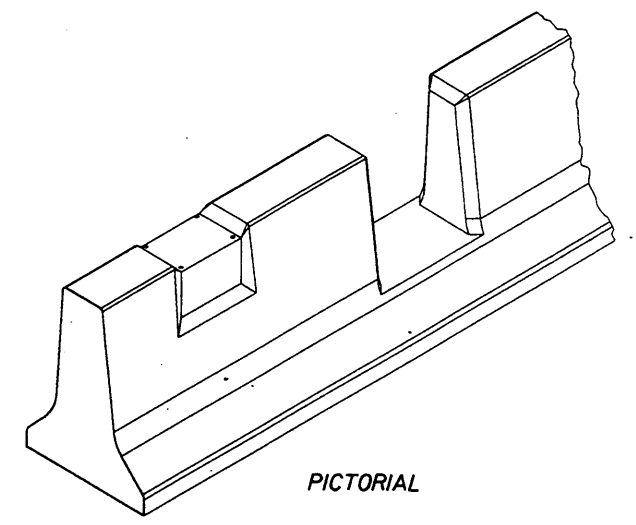
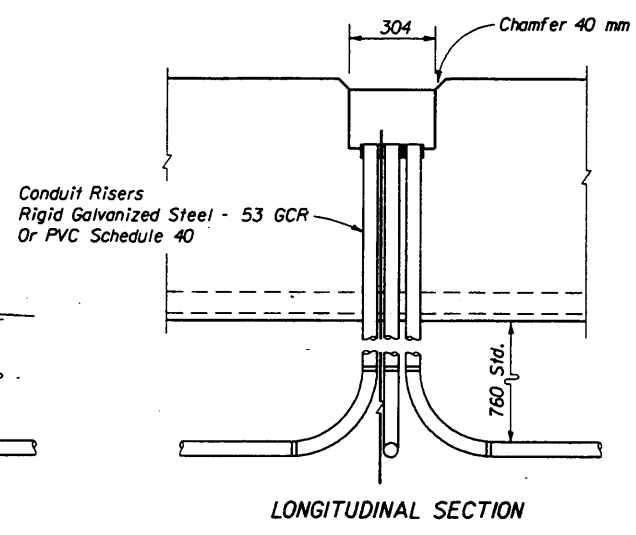
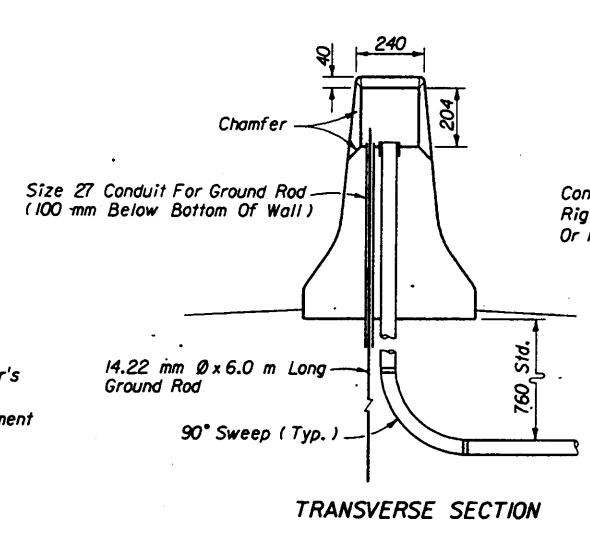
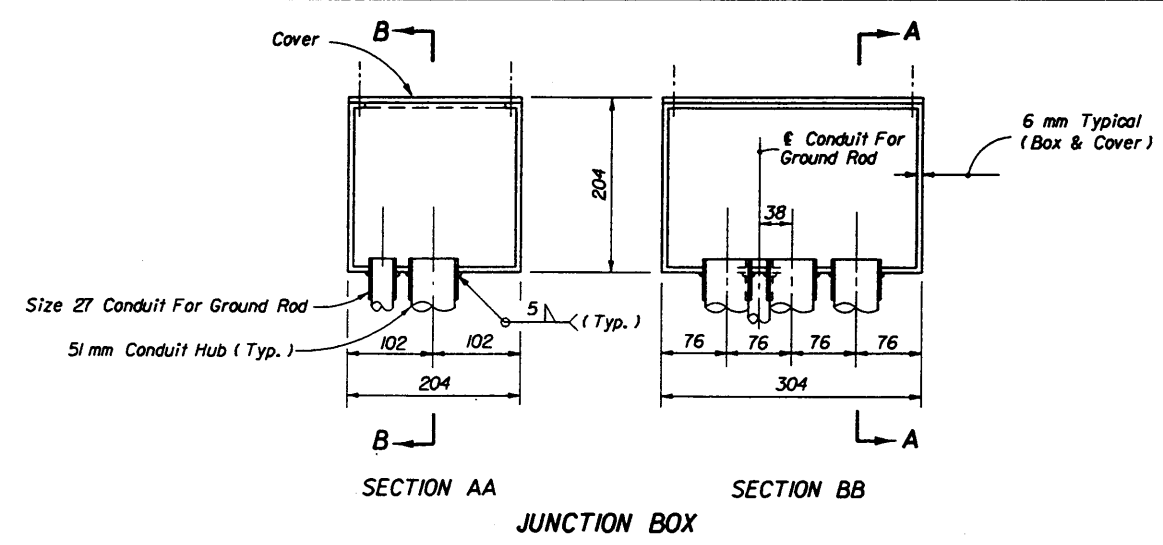
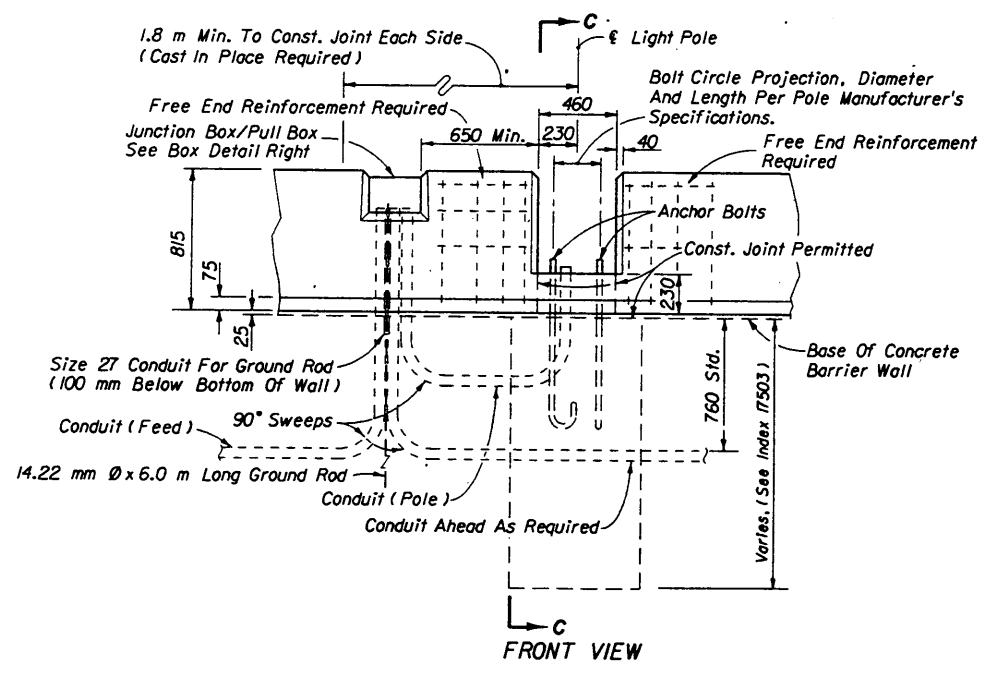
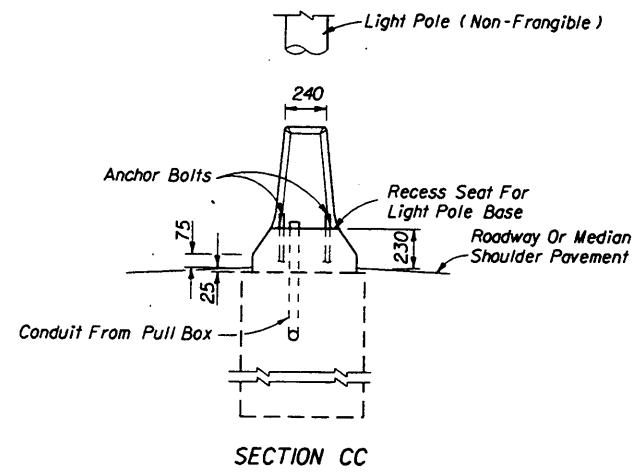
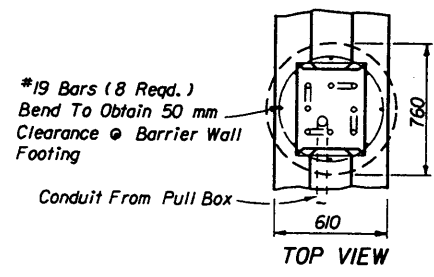


CONCRETE MEDIAN BARRIER WALL TRANSITIONS AT BRIDGE PIERS AND OVERHEAD SIGN SUPPORTS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

CONCRETE BARRIER WALL

Names	Dates	App/Rev'd By
Designed By		State Roadway Design Engineer
Drawn By		Revision Sheet No. Index No.
Checked By		00 3 of 22 410

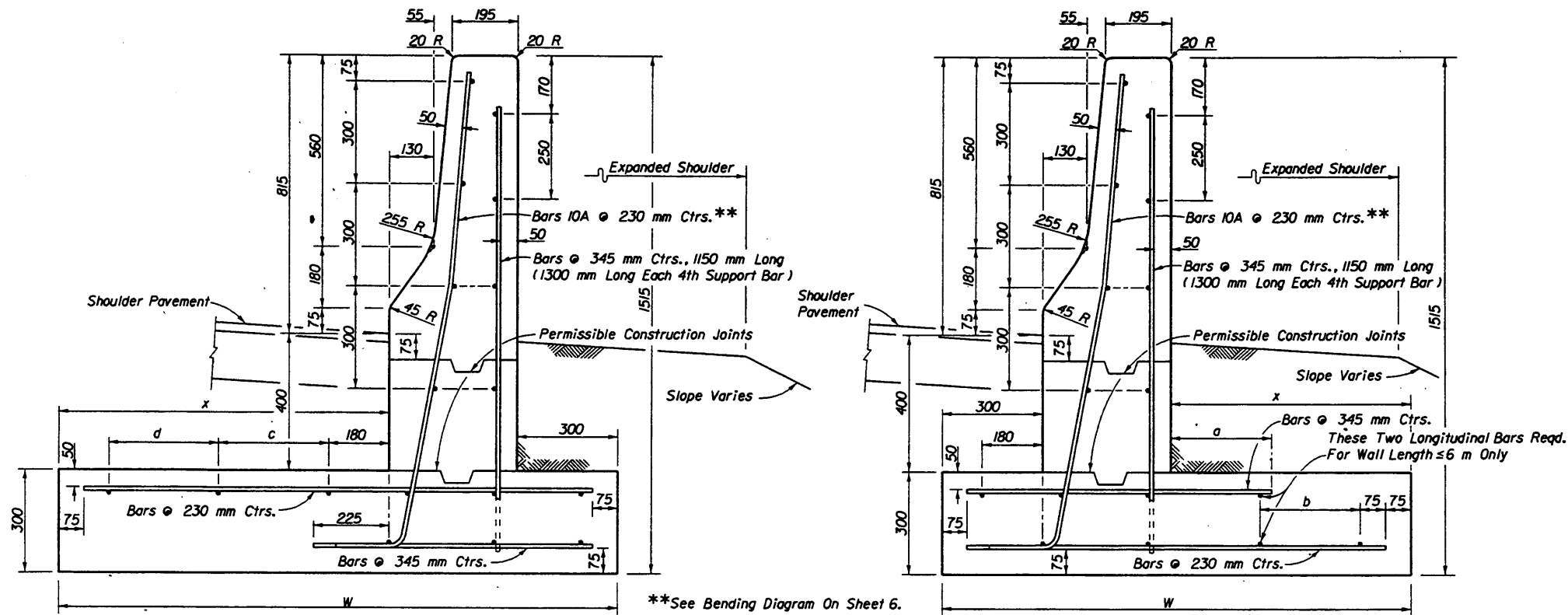


- JUNCTION BOX NOTES**
1. Junction boxes are to be fabricated from steel conforming to ASTM A36 and be hot dipped galvanized after fabrication. All seams shall be continuously welded and ground smooth. A neoprene gasket shall be attached to the box to provide a watertight cover. The cover screws shall be fully galvanized.
  2. Remove excess concrete while green and hand form chamfers.
  3. Junction box complete and conduit risers are incidental to the construction and cast of the barrier wall; there is to be no separate compensation for the box, risers or installation unless specifically called for in the plans.

**JUNCTION BOX - ELECTRICAL**

**LIGHT POLE MOUNTING IN MEDIAN BARRIER WALL**

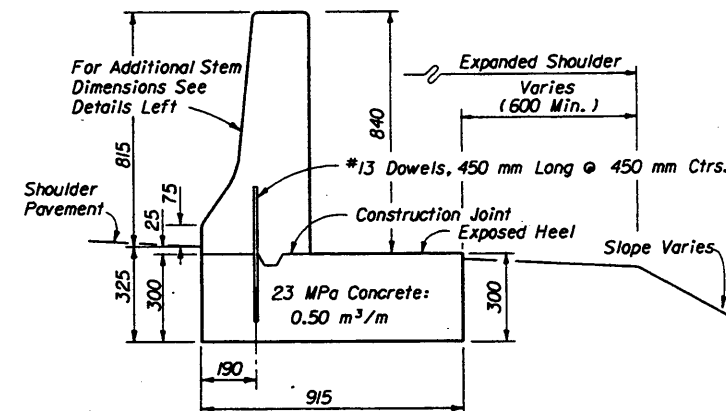
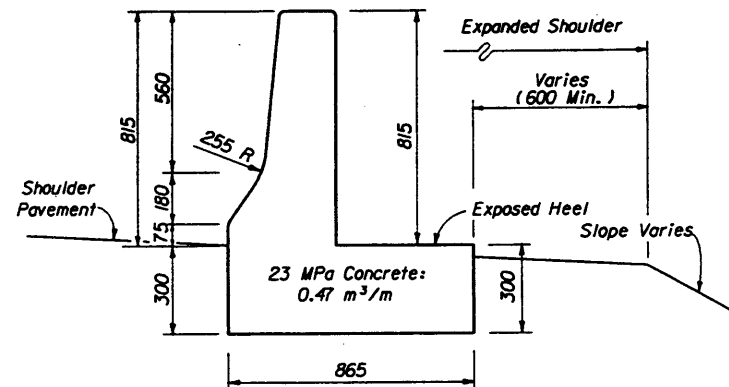
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CONCRETE BARRIER WALL</b>				
Designed By	Names	Dates	Approved By	Index No.
Drawn By	HSD	3/85	Revision	Sheet No.
Checked By	JMG	3/85	00	4 of 22
				410



CANTILEVER WALL

L-WALL

\*\*See Bending Diagram On Sheet 6.  
All reinforcement #13 bars.

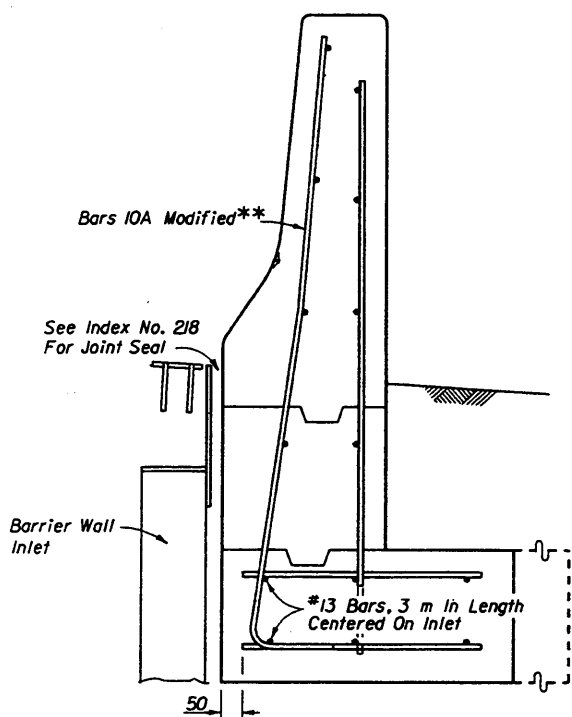


WALL OPTIONS

NOTE:  
Wall to be paid for under the contract unit price for Barrier Wall, Concrete (Plain-Shoulder), MI.

DESIGN NOTE:  
Wall shall have a length of 12.0 m or greater. Wall of 12.0 m or more in length may be made up of segments of 6.0 m or more in length provided the segments are joined by a transverse joint in accordance with Detail B, Sheet 2; segments shall have dimensions same as wall shown above.

PLAIN CONCRETE BARRIER WALL (SHOULDER)



REINFORCING STEEL MODIFICATIONS AT BARRIER WALL INLETS (INDEX NO. 218)

DIMENSIONS AND QUANTITIES													
CANTILEVER WALL						L-WALL							
Length* Of Barrier Wall (m)	W (mm)	x (mm)	c (mm)	d (mm)	23 MPa Concrete m³/m	Reinforcing Steel kg/m	Length* Of Barrier Wall (m)	W (mm)	x (mm)	a (mm)	b (mm)	23 MPa Concrete m³/m	Reinforcing Steel kg/m
≥12	1000	320	NA	NA	0.66	25.41	≥12	1000	320	245	NA	0.66	25.57
11	1050	370	NA	NA	0.68	25.58	11	1050	370	295	NA	0.68	25.86
10	1100	420	NA	NA	0.69	25.75	10	1100	420	300	NA	0.69	26.04
9	1200	520	200	NA	0.72	26.88	9	1150	470	300	NA	0.71	26.21
8	1300	620	300	NA	0.75	27.22	8	1200	520	300	NA	0.72	26.38
7	1400	720	400	NA	0.78	27.56	7	1300	620	300	NA	0.75	26.72
6	1550	870	275	275	0.83	29.07	6	1400	720	300	320	0.78	28.63
5.5	1650	970	325	325	0.86	29.41	5.5	1450	770	330	340	0.80	36.61
5	1800	1120	400	400	0.90	29.92	5	1500	820	360	360	0.81	36.85
4.5	1950	1270	475	475	0.95	30.44	4.5	1600	920	410	410	0.84	37.31
4	2100	1420	550	550	0.99	38.95	4	1700	1020	460	460	0.87	37.76

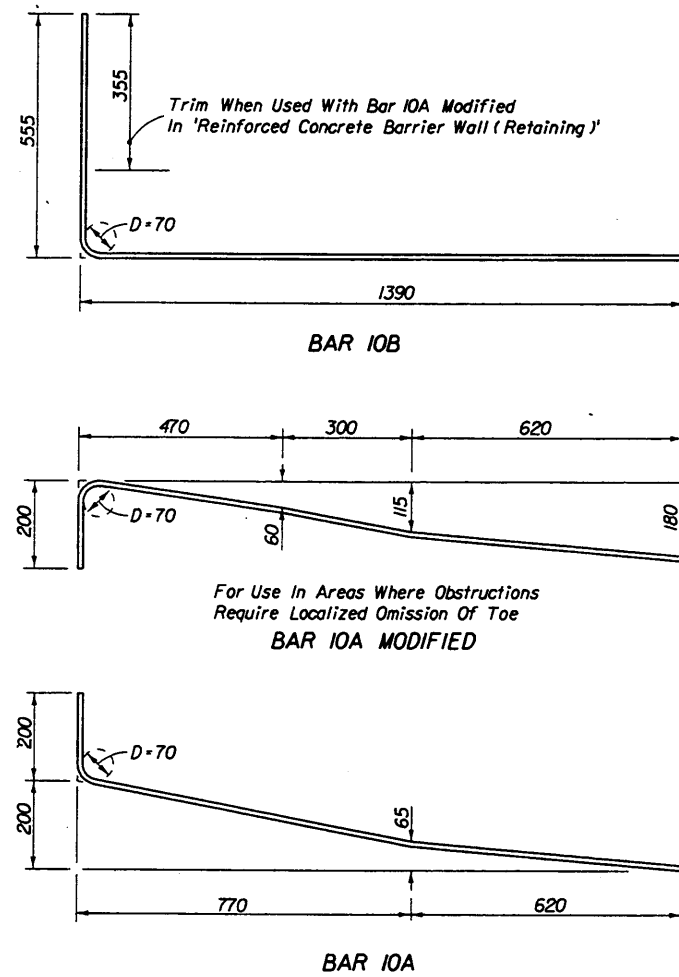
Quantities shown are for information only. For method of payment see payment note below.  
Barrier wall inlets (Index 218) shall be isolated from the barrier wall stem and footing by 25 mm expansion material.  
\*Any length less than 12.0 m must be a continuous (non-jointed) segment. Walls of 12.0 m or more in length may be made up of segments of 6.0 m or more in length provided the segments are joined by a transverse joint in accordance with Detail B, Sheet 2; segments shall have dimensions same as wall ≥ 12.0 m above.

PAYMENT:  
Wall to be paid for under the contract unit price for Concrete Barrier Wall (Rigid-Shoulder), MI.

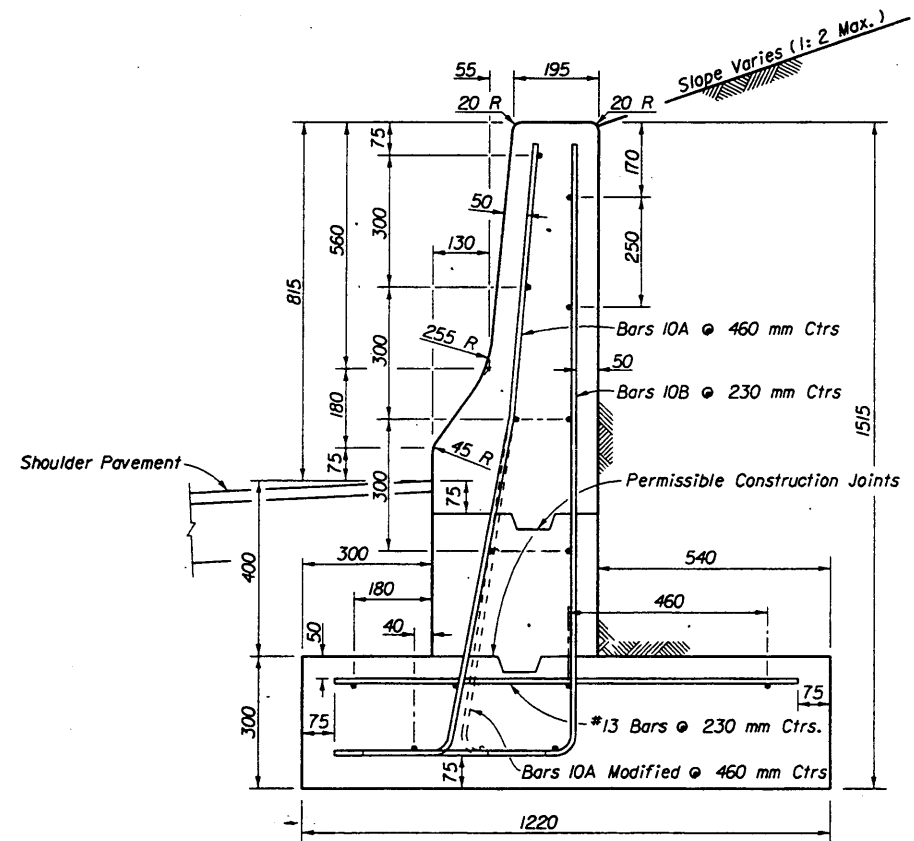
DESIGN NOTES:  
Use of this barrier wall should be limited to special applications such as hazard encroachment into the clear zone where barrier wall deflection, rotation or translation cannot be tolerated; example hazards to consider are as follows:  
(a) Structure supporting piers, bents and pylons (b) Pumping, metering, control or other similar critical stations (c) Quarries (d) Intolerable vertical drops (e) Historic structures or monuments (f) Rail transit travel way or passenger station (g) Other similar occupancies

REINFORCED CONCRETE BARRIER WALL (SHOULDER)

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>CONCRETE BARRIER WALL</b>					
Designed By	Names	Dates	Approved By	State Roadway Design Engineer	
Drawn By	HSD	9/85	Revision	Sheet No.	Index No.
Checked By	JG	9/85	98	5 of 22	410



**BENDING DIAGRAMS**



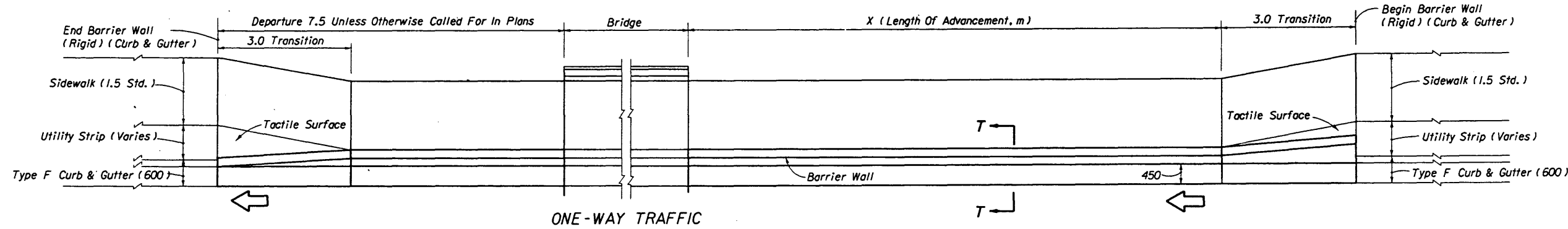
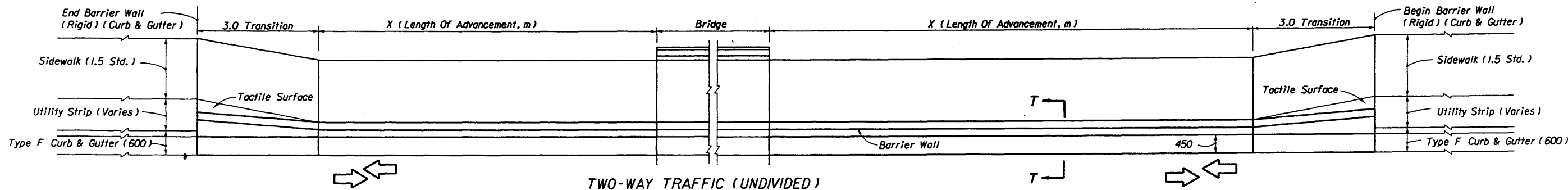
NOTE: All reinforcement #13 bars.  
Minimum segment length for this wall is 6.0 m.  
Wall to be paid for under the contract unit price  
for Barrier Wall Concrete (Rigid-Retaining), MI.

QUANTITIES (For Estimating Purposes Only):  
Class II Concrete 0.73 m<sup>3</sup>/m  
Reinforcing Steel 24 kg/m

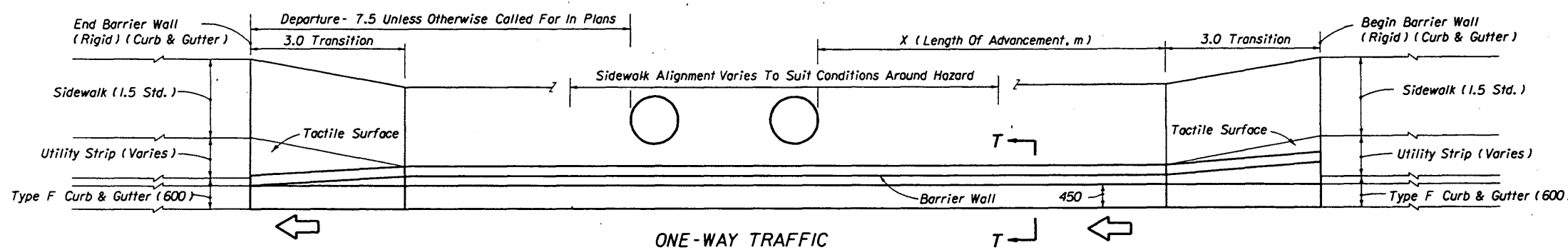
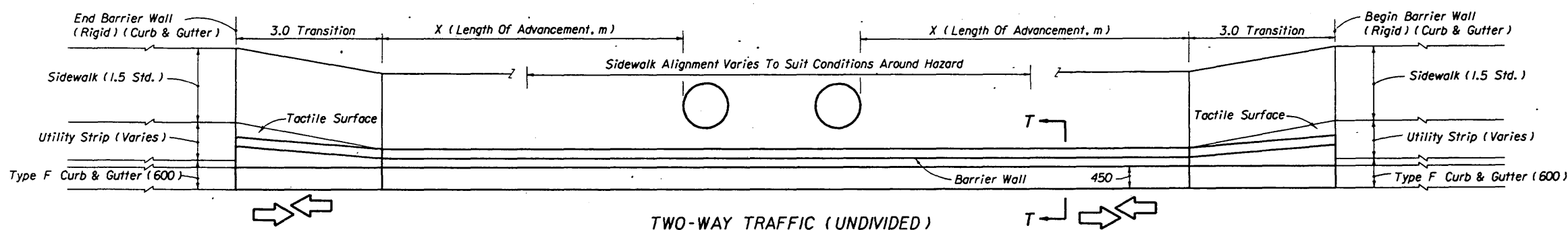
**REINFORCED CONCRETE BARRIER WALL (RETAINING)**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CONCRETE BARRIER WALL</b>				
Designed By	Names	Dates	Approved By	
Drawn By			State Roadway Design Engineer	
Checked By			Revision	Sheet No. Index No.
			98	6 of 22 410





**BRIDGE END HAZARD**

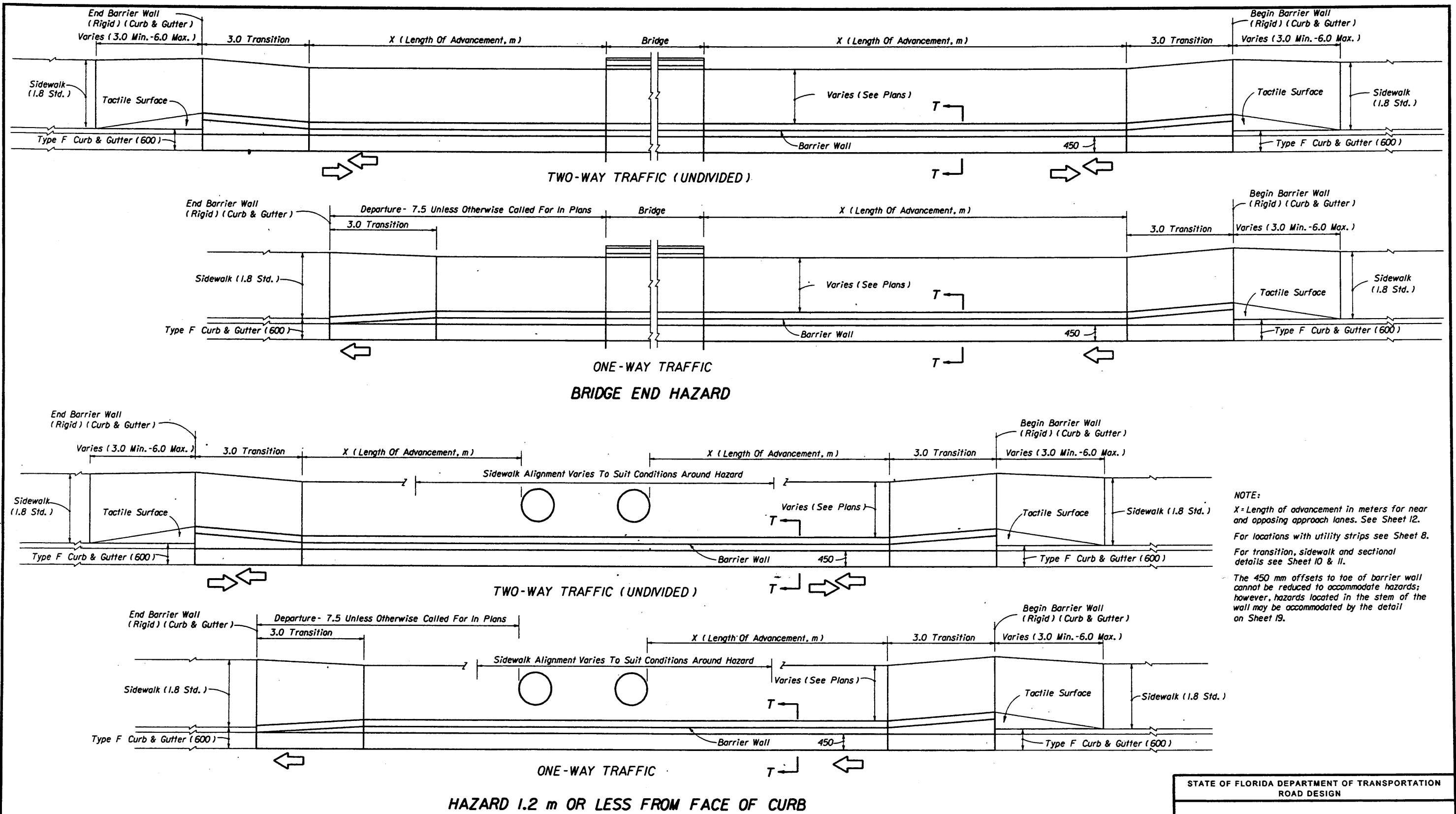


**HAZARD 1.2 m OR LESS FROM FACE OF CURB**

**CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER)  
CURB AND GUTTER WITH UTILITY STRIP AND WITH ADJACENT BICYCLE LANE**

**NOTE:**  
 X = Length of advancement in meters for near and opposing approach lanes. See Sheet 12.  
 For locations without utility strips see Sheet 9.  
 For transition, sidewalk and sectional details see Sheets 10 & 11.  
 The 450 mm offsets to toe of barrier wall cannot be reduced to accommodate hazards; however, hazards located in the stem of the wall may be accommodated by the detail on Sheet 19.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
CONCRETE BARRIER WALL				
Names	Dates	Approved By		
Designed By	STAFF	10/97	State Roadway Design Engineer	
Drawn By	NKH	10/97	Revision	Sheet No.
Checked By	JMG	10/97	98	8 of 22
				Index No. 410

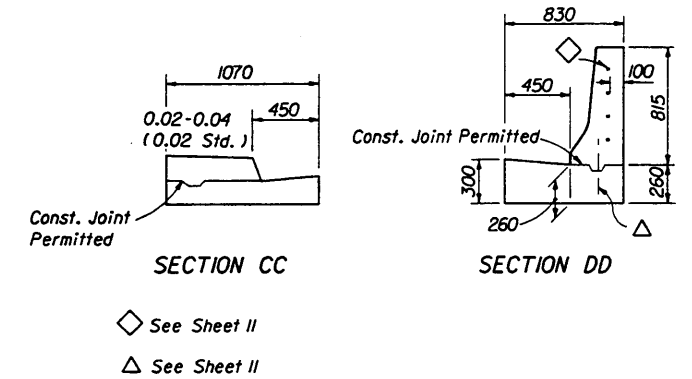
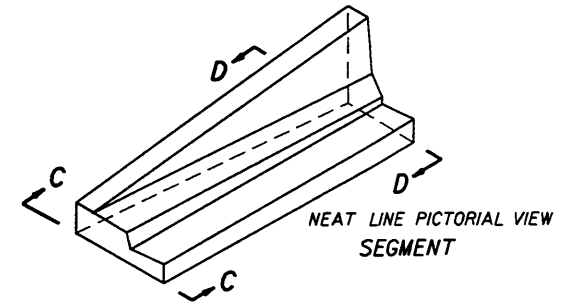
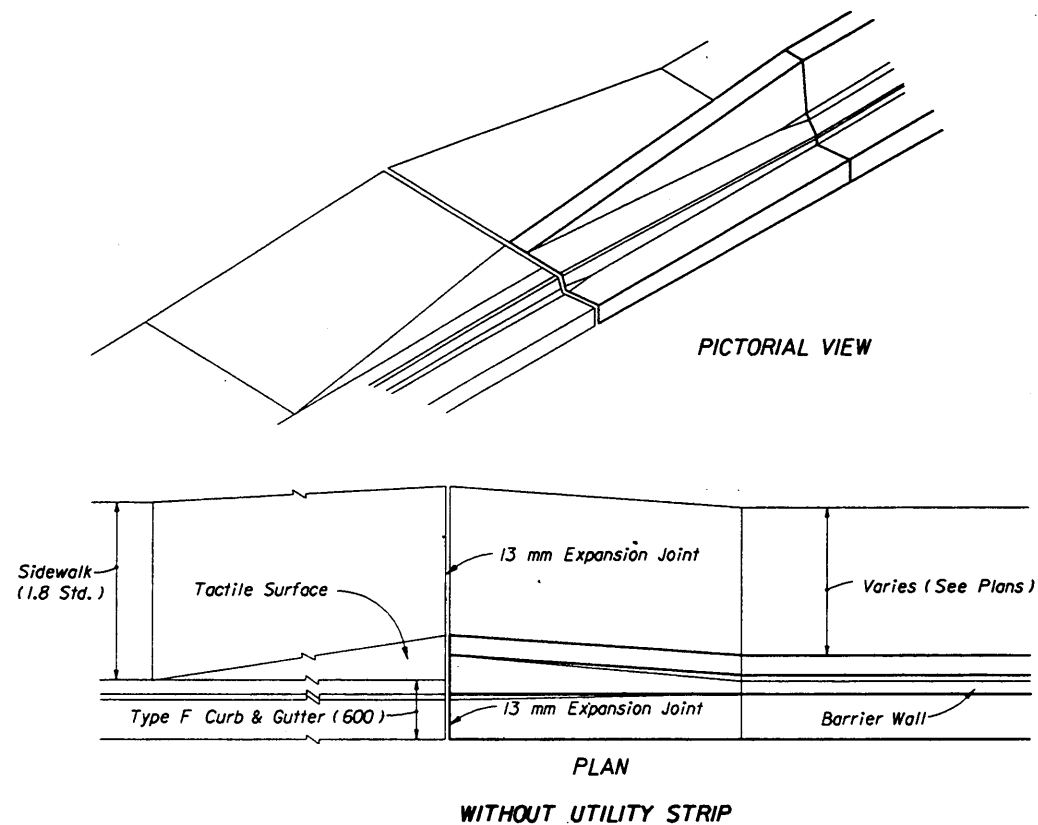
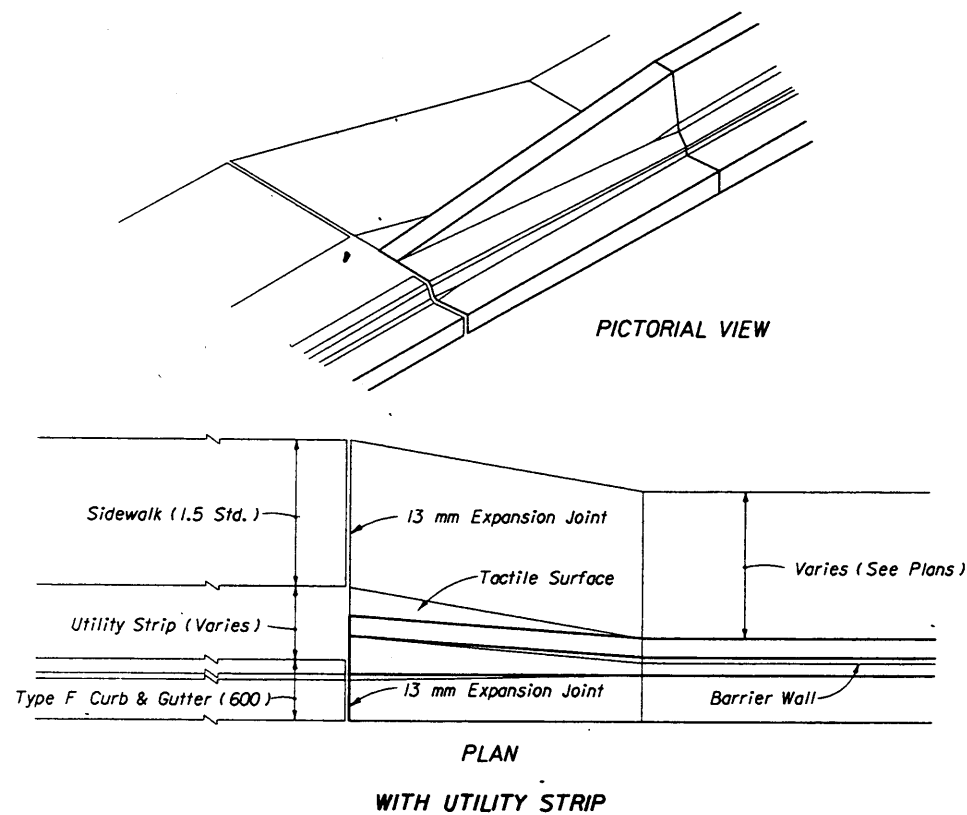


**NOTE:**  
 X = Length of advancement in meters for near and opposing approach lanes. See Sheet 12.  
 For locations with utility strips see Sheet 8.  
 For transition, sidewalk and sectional details see Sheet 10 & 11.  
 The 450 mm offsets to toe of barrier wall cannot be reduced to accommodate hazards; however, hazards located in the stem of the wall may be accommodated by the detail on Sheet 19.

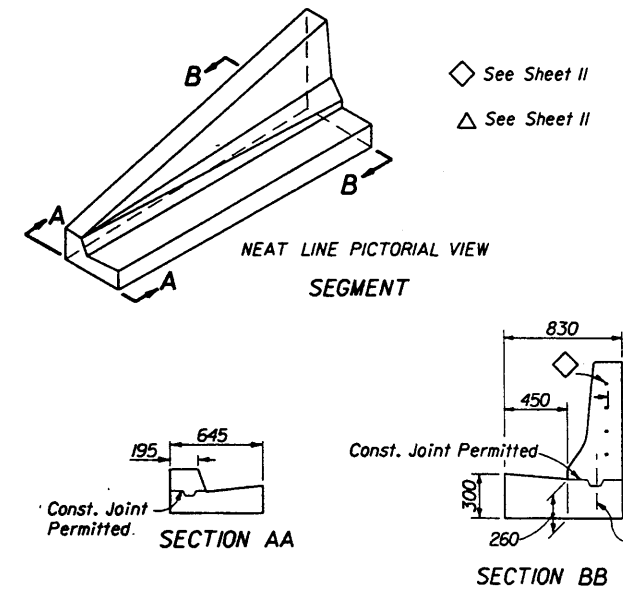
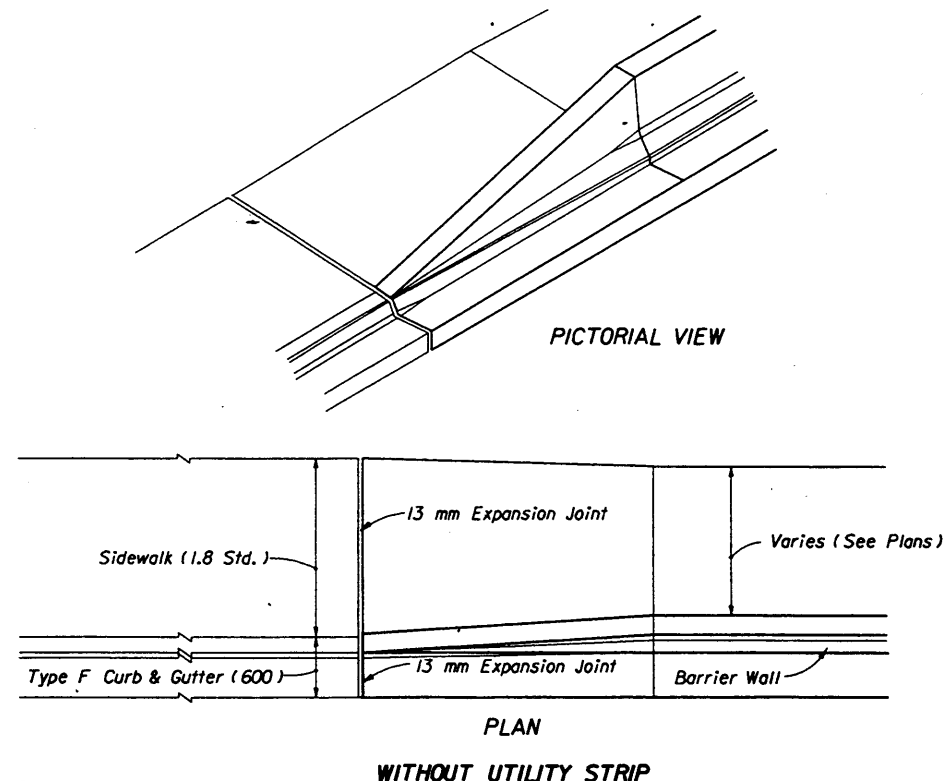
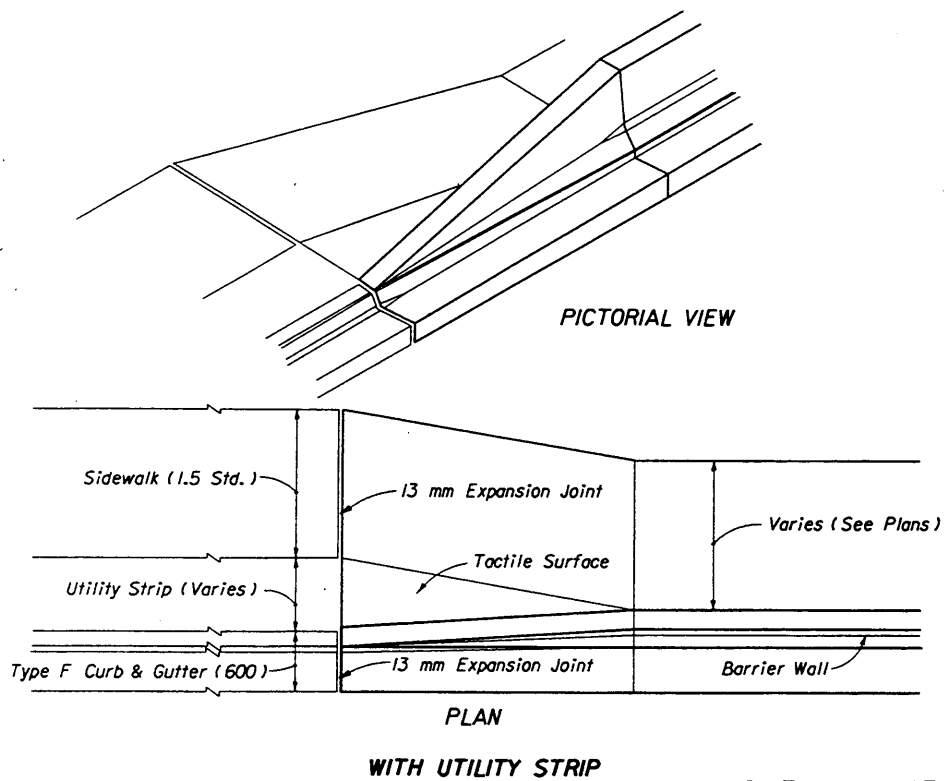
**CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER)  
 CURB AND GUTTER WITHOUT UTILITY STRIP AND WITH ADJACENT BICYCLE LANE**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CONCRETE BARRIER WALL</b>				
Designed By	STAFF	Date	10/97	Approved By
Drawn By	MKH	Date	10/97	State Roadway Design Engineer
Checked By	JVG	Date	10/97	Revision
			98	Sheet No.
				9 of 22
				410





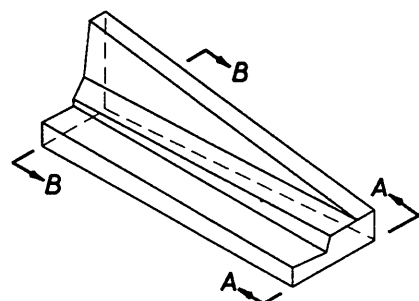
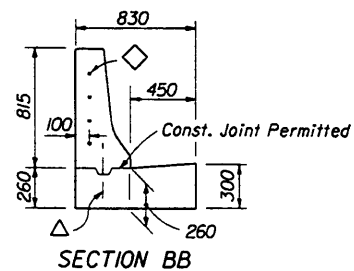
TWO-WAY TRAFFIC (OPPOSING LANE APPROACH)



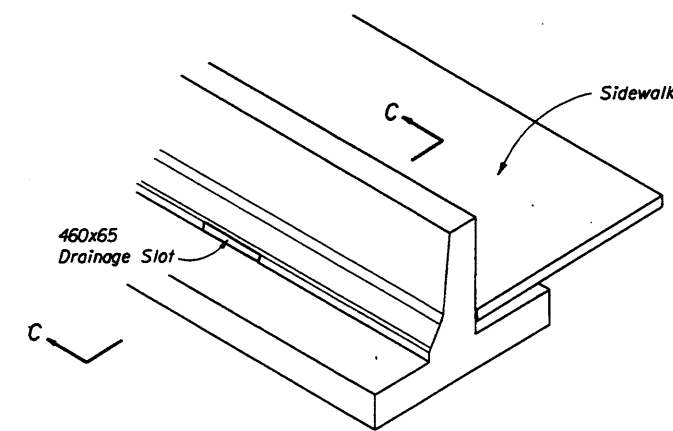
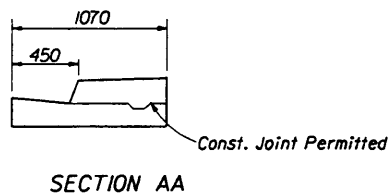
ONE-WAY TRAFFIC (TRAILING END)

CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER) • TRANSITION SEGMENTS • WITH ADJACENT BICYCLE LANE

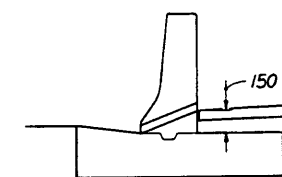
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CONCRETE BARRIER WALL</b>				
Designed By	STAFF	Date	10/97	Approved By <i>[Signature]</i> State Roadway Design Engineer
Drawn By	HKH	Date	10/97	Revision
Checked By	JG	Date	10/97	Sheet No. 10 of 22 Index No. 410



WITH OR WITHOUT UTILITY STRIP  
NEAT LINE PICTORIAL VIEW



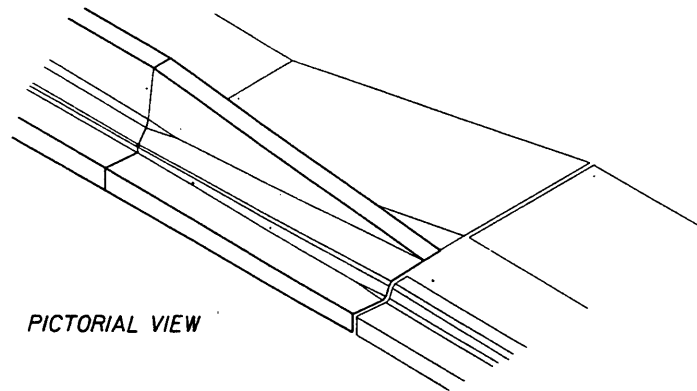
NEAT LINE PICTORIAL VIEW



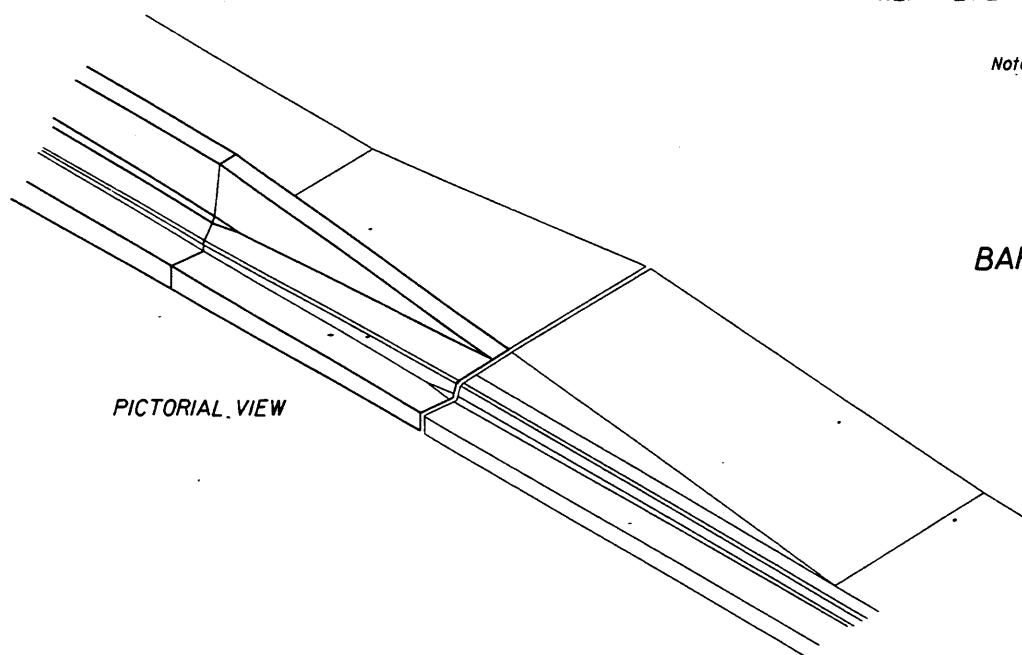
SECTION CC

Note: Drainage slots shall be located at all low points along the sidewalk, and, unless otherwise shown in the plans, slots shall be spaced at intervals not exceeding 15 m in fill sections and 6 m in cut sections. Slots shall be located such that only one bar is cut away or deleted in front and back lines of vertical reinforcement.

**SIDEWALK DRAINAGE SLOT FOR BARRIER WALL (RIGID) (CURB & GUTTER)**



PICTORIAL VIEW

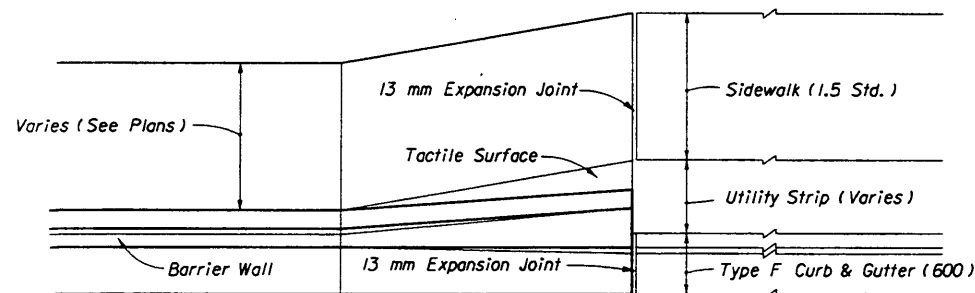


PICTORIAL VIEW

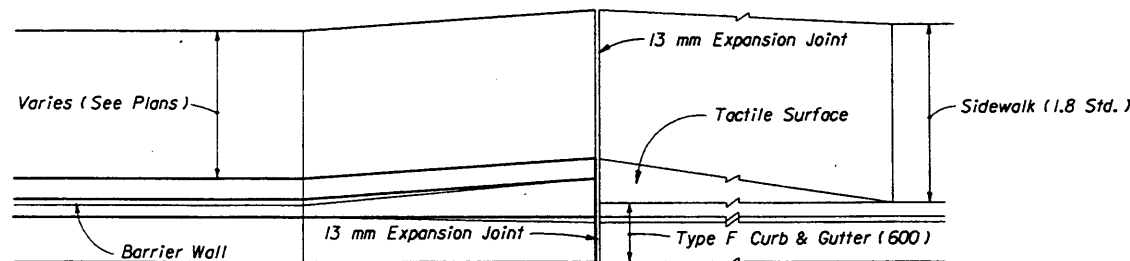
NOTE:

◆ Transition Segments Shall Be Doweled Into The End Of The Barrier Wall In The Following Manner:  
Four 32 mm diameter holes 150 mm deep on 150 mm centers shall be drilled in the end of the barrier and #19 bars 380 mm long set in epoxy mortar. The ends of the dowels extending into the transition segment shall be wrapped with one layer of Type I asphalt-saturated roofing felt (560 g/m<sup>2</sup>) (commonly called No. 15) with the ends crimped.

△ When Construction Joints Are Utilized For Transition Segment Construction The Stem Shall Be Doweled To The Footing In The Following Manner:  
Five #16 bars 380 mm long shall be embedded 180 mm into the footing. The dowels shall be spaced 380 mm on centers with the first dowel located 300 mm from the barrier wall. Dowels may be placed within or adjacent to the keyway.



PLAN  
WITH UTILITY STRIP



PLAN  
WITHOUT UTILITY STRIP

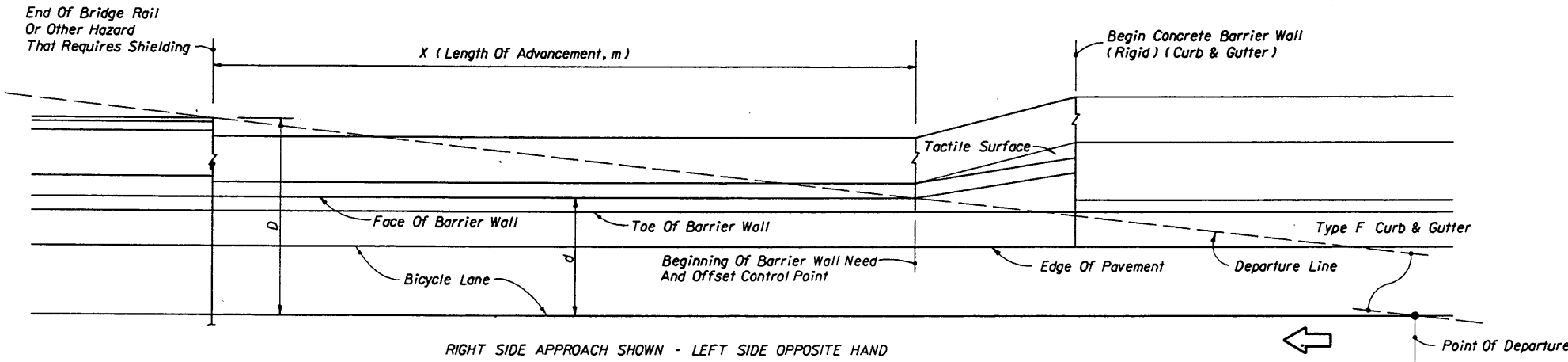
RIGHT SIDE SHOWN, LEFT SIDE OPPOSITE HAND  
ONE-WAY AND TWO-WAY TRAFFIC (NEAR LANE APPROACH)

**CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER) • TRANSITION SEGMENT • WITH ADJACENT BICYCLE LANE**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

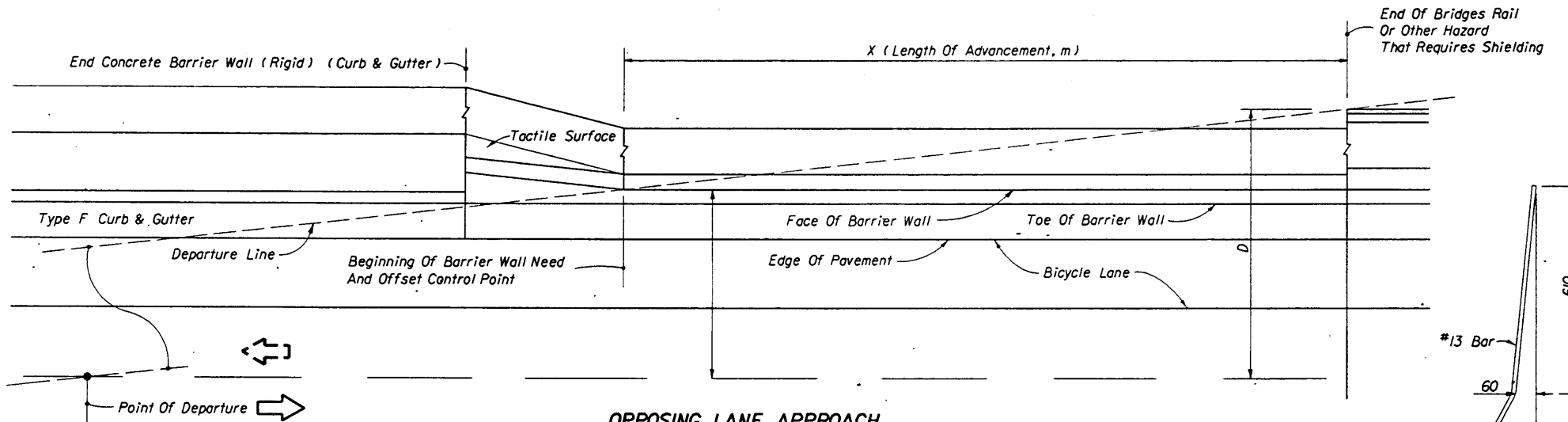
**CONCRETE BARRIER WALL**

Names	Dates	Approved By	Index No.
Designed By	STAFF 10/97	<i>[Signature]</i>	410
Drawn By	HRH 10/97		
Checked By	JMG 10/97	Revision	Sheet No.
		98	11 of 22



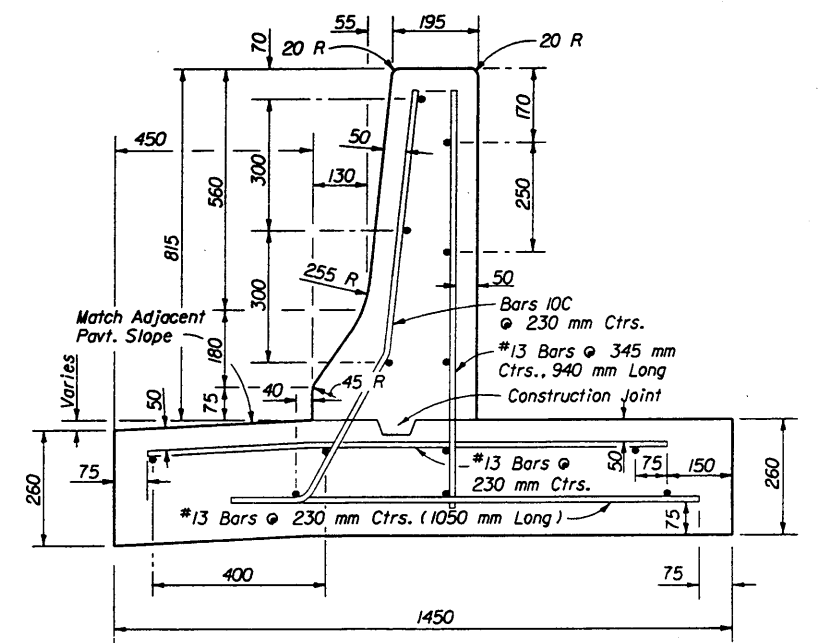
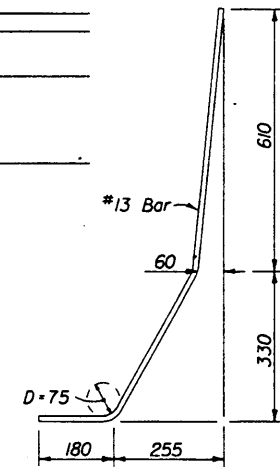
RIGHT SIDE APPROACH SHOWN - LEFT SIDE OPPOSITE HAND

**NEAR LANE APPROACH**

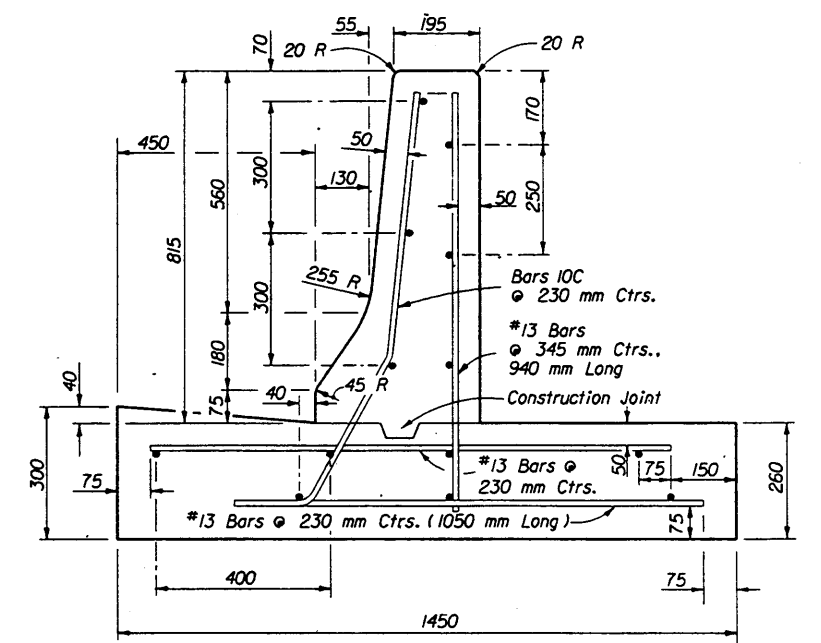


**OPPOSING LANE APPROACH**

WITH OR WITHOUT UTILITY STRIP - UTILITY STRIP SHOWN - SEE SHEET 8 & 9 FOR APPLICATIONS



**FOR HIGH SIDE**



**FOR LOW SIDE**

Note: All longitudinal reinforcement #13 bars. Minimum segment length for this wall is 12.0 m. Shorter segments due to construction or expansion joint shall be dowled in the manner described for 'Transition Segments' on Sheet 11. Transverse expansion joints are to be constructed at the juncture of wall transitions and curb and gutter, and at intervals so that spacing will not exceed 30.0 m. For barrier wall inlet details see Index No. 219. Inlet extends into bicycle lane 305 mm. Wall to be paid for under the contract unit Price for Concrete Barrier Wall (Rigid-Curb & Gutter), MI.

Estimated Quantities Per Linear Meter Of Wall:  
Class II Concrete: 0.60 m<sup>3</sup>  
Reinforcing Steel: 24.7 kg

Design Speed km/h (mph)	Length Of Advancement, m (X)
≤70 (≤45)	= 16 (D-d)

Note: The minimum length of advancement for both near and opposing lane approaches is 12 m.

Equation Variables:

D= Distance in meters from near edge of the near approach traffic lane to back of hazard or clear zone width whichever is lesser. For left side hazards and clear zones on two-way undivided facilities D is measured from the inside edge of the near approach traffic lane.

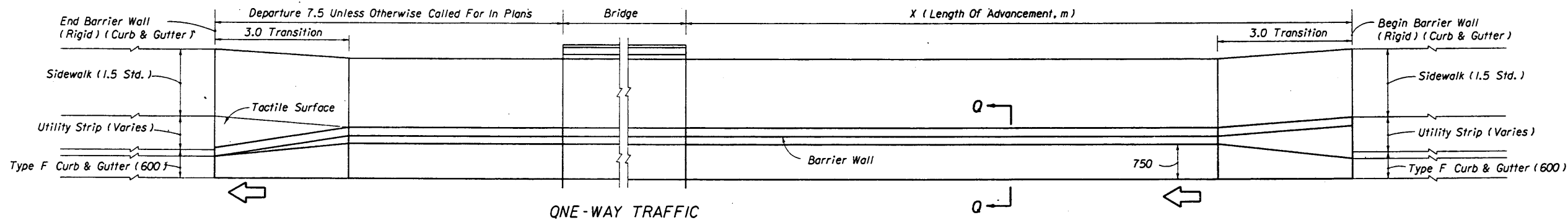
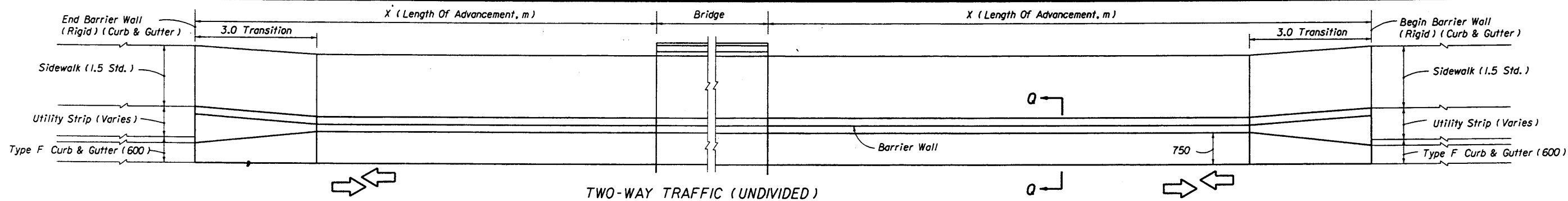
d= Distance in meters from the near edge of the near approach traffic lane to the face of barrier (at offset control point). For left side hazards on two-way undivided facilities d is measured from the inside edge of the nearest opposing traffic lane.

**LENGTH OF ADVANCEMENT**

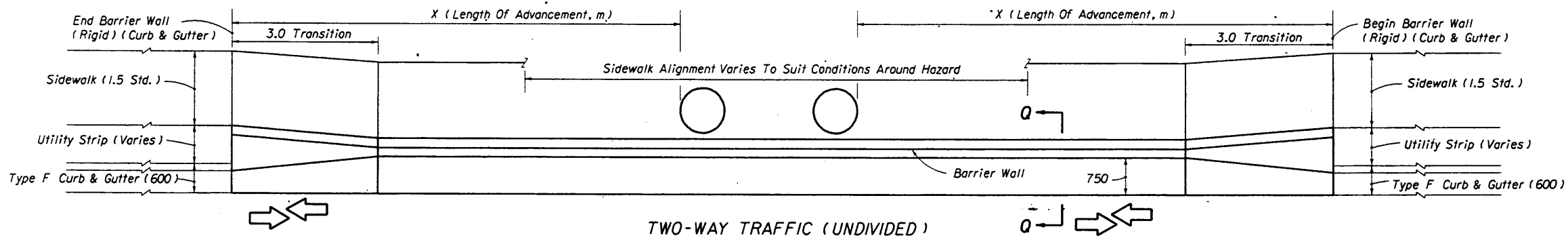
**SECTION TT**

**CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER) • WITH ADJACENT BICYCLE LANE**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CONCRETE BARRIER WALL</b>				
Designed By	STAFF	Date	10/97	Approved By <i>[Signature]</i> State Roadway Design Engineer
Drawn By	HKH	Date	10/97	Revision
Checked By	JVG	Date	10/97	Sheet No. 98 Index No. 12 of 22 410

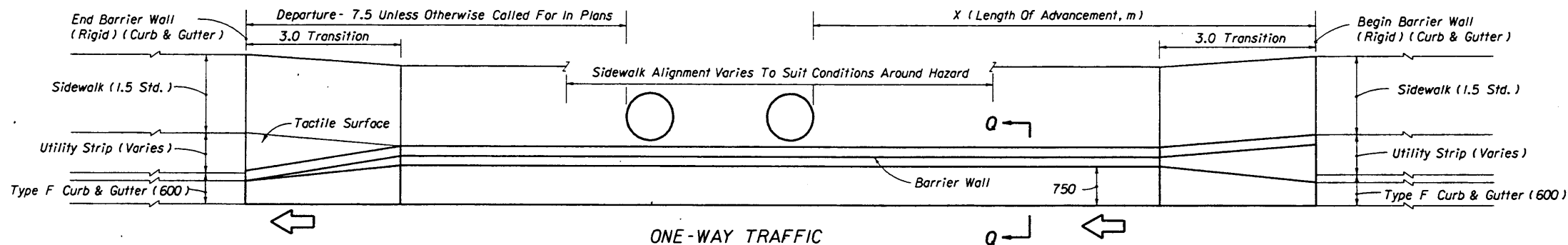


**BRIDGE END HAZARD**



**NOTE:**  
 X = Length of advancement in meters for near and opposing approach lanes. See Sheet 17.  
 For locations without utility strips see Sheet 14.  
 For transition, sidewalk and sectional details see Sheets 15 & 16.

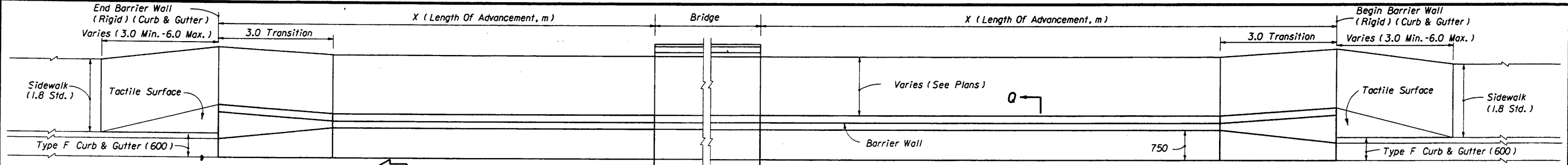
The 750 mm offsets to toe of barrier wall cannot be reduced to accommodate hazards; however, hazards located in the stem of the wall may be accommodated by the detail on Sheet 19.



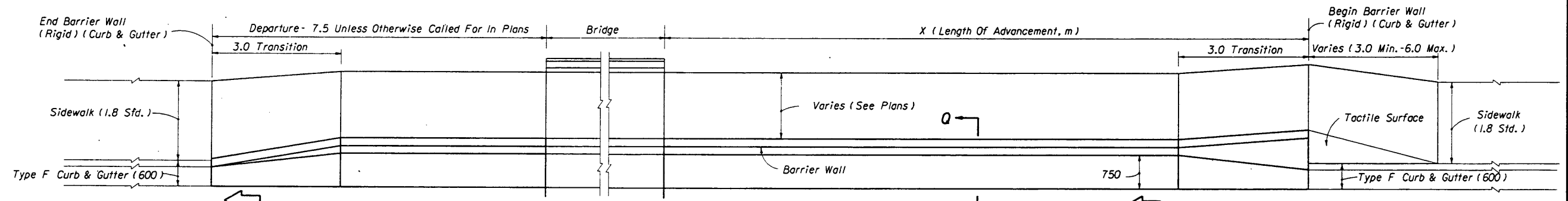
**HAZARD 1.2 m OR LESS FROM FACE OF CURB**

**CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER)  
 CURB AND GUTTER WITH UTILITY STRIP AND WITHOUT ADJACENT BICYCLE LANE**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CONCRETE BARRIER WALL</b>				
Designed By	Names	Date	Approved By	Index No.
Drawn By	MSD	10/85	State Roadway Design Engineer	410
Checked By	JBW/MG	10/85	Revision	Sheet No.
			98	13 of 22

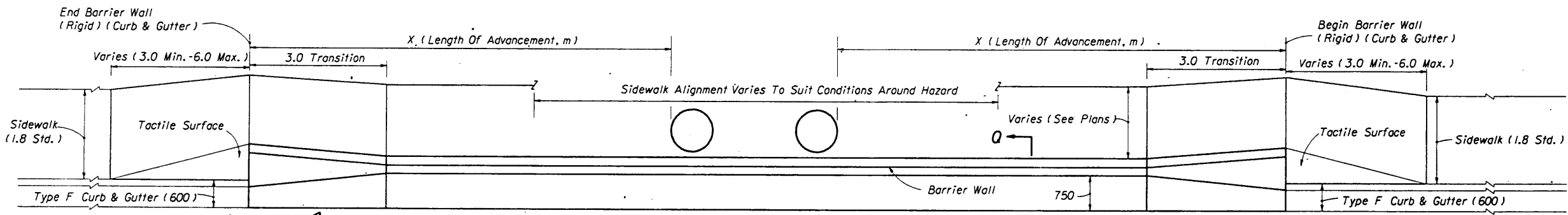


TWO-WAY TRAFFIC (UNDIVIDED)

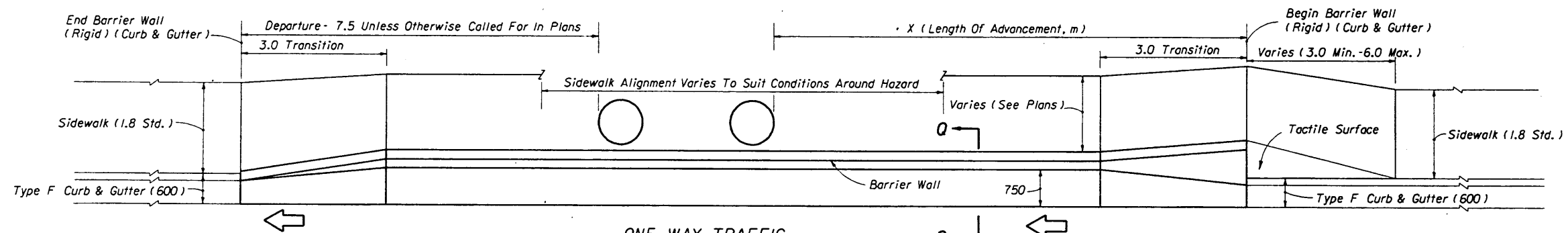


ONE-WAY TRAFFIC

BRIDGE END HAZARD



TWO-WAY TRAFFIC (UNDIVIDED)



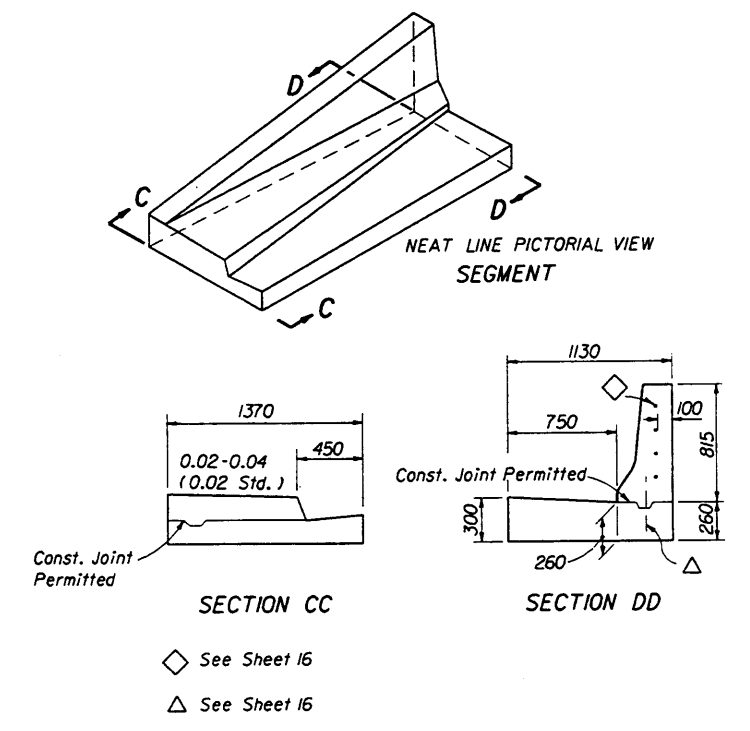
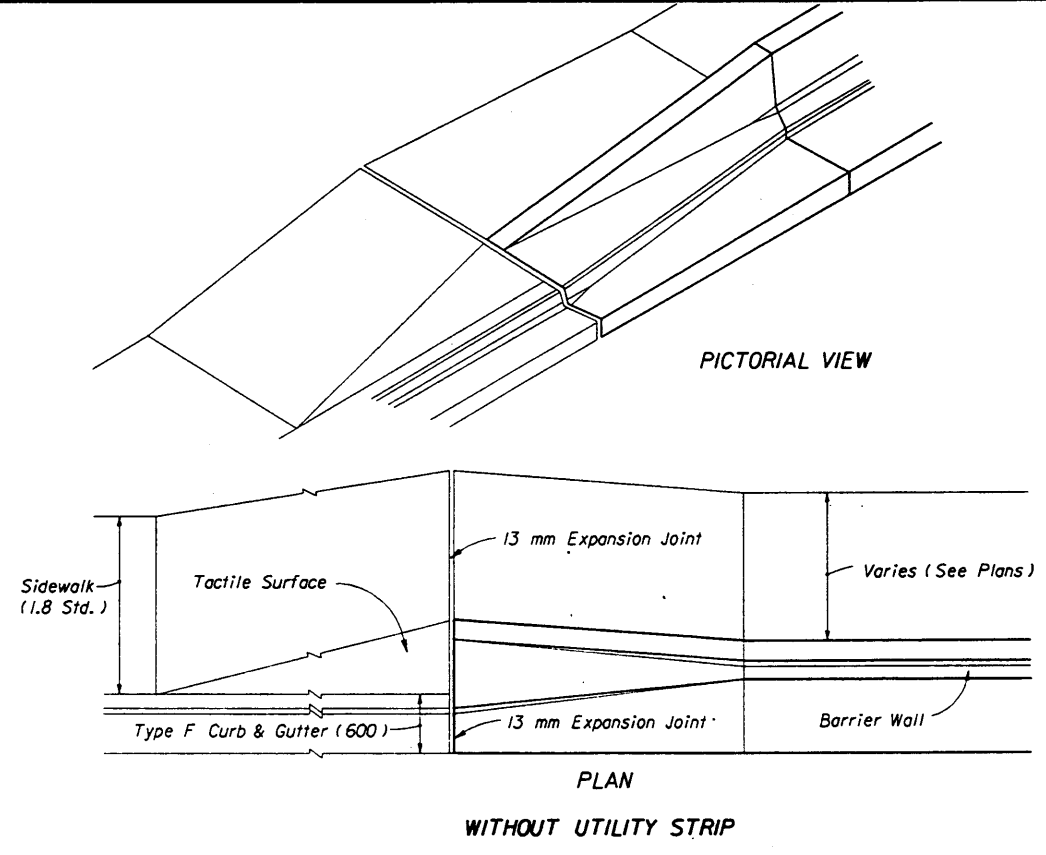
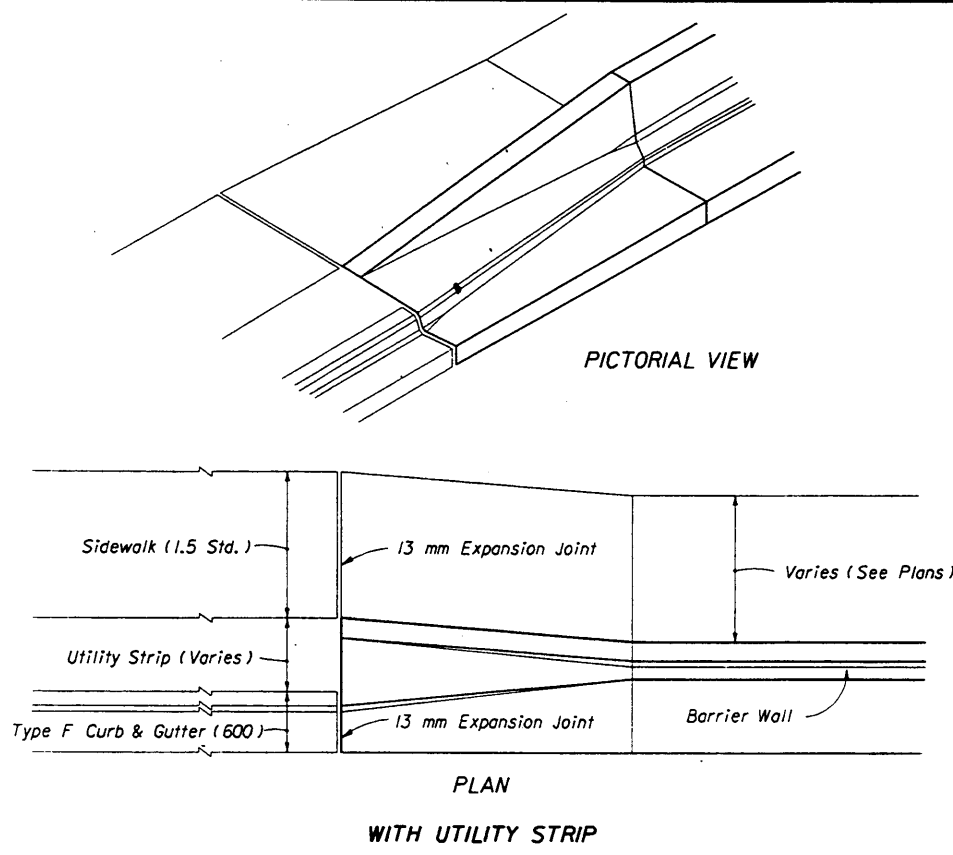
ONE-WAY TRAFFIC

HAZARD 1.2 m OR LESS FROM FACE OF CURB

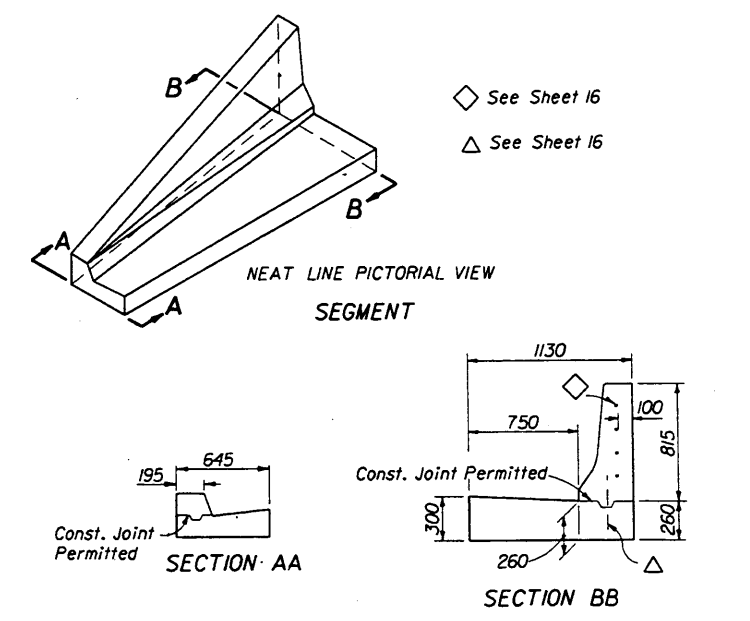
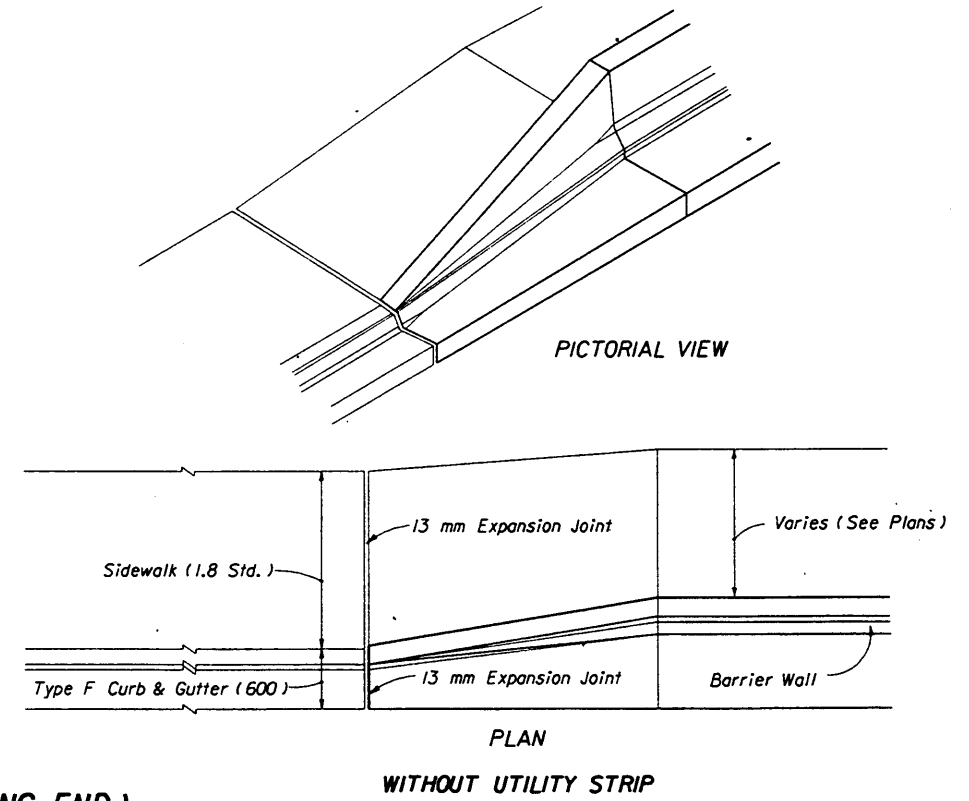
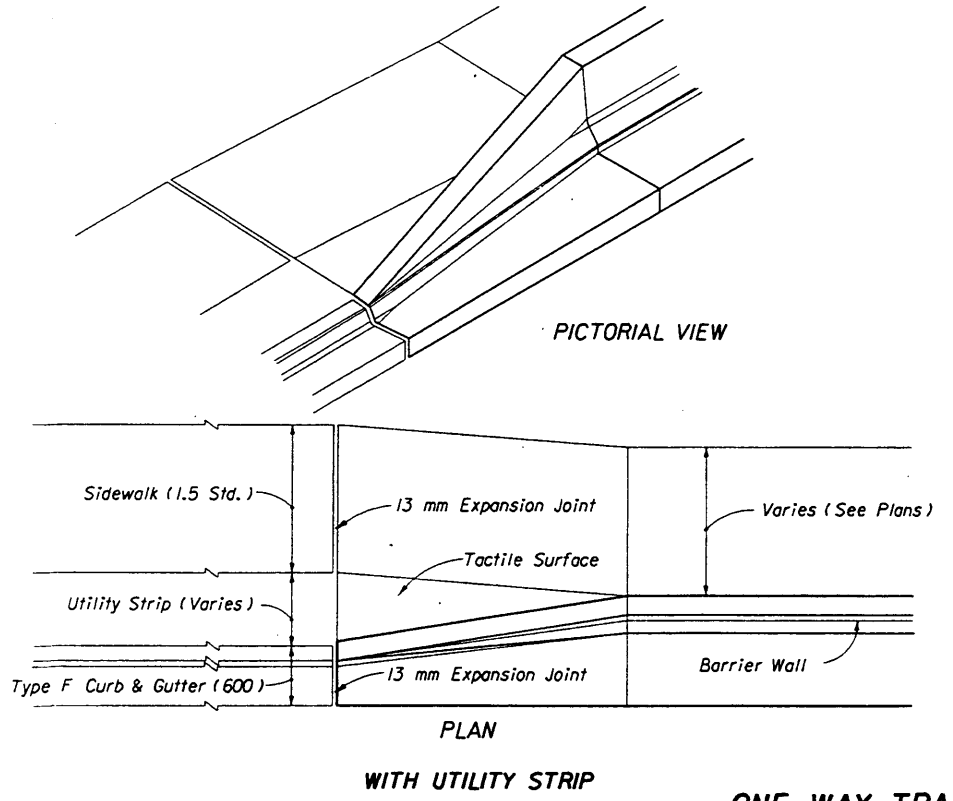
NOTE:  
 X = Length of advancement in meters for near and opposing approach lanes. See Sheet 17.  
 For locations with utility strips see Sheet 13.  
 For transition, sidewalk and sectional details see Sheet 15 & 16.  
 The 750 mm offsets to toe of barrier wall cannot be reduced to accommodate hazards; however, hazards located in the stem of the wall may be accommodated by the detail on Sheet 19.

CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER)  
 CURB AND GUTTER WITHOUT UTILITY STRIP AND WITHOUT ADJACENT BICYCLE LANE

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CONCRETE BARRIER WALL</b>				
Designed By	Names	Dates	Approved By	
Drawn By	HSD	10/85	Revision	Sheet No.
Checked By	JBW/JVG	10/85	98	14 of 22
				410



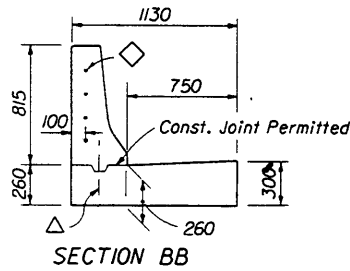
TWO-WAY TRAFFIC (OPPOSING LANE APPROACH)



ONE-WAY TRAFFIC (TRAILING END)

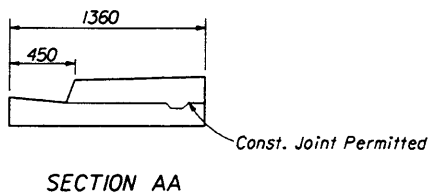
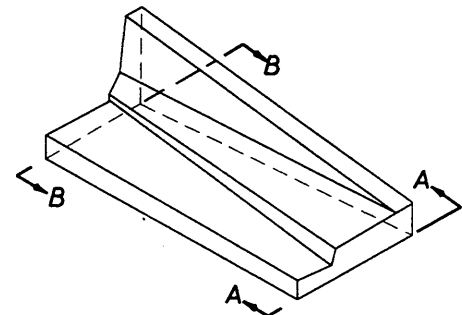
CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER) • TRANSITION SEGMENTS • WITHOUT ADJACENT BICYCLE LANE

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CONCRETE BARRIER WALL</b>				
Designed By	Names	Dates	Approved By	<i>[Signature]</i>
Drawn By	HSD	10/85	Revision	Sheet No. Index No.
Checked By	JBW/MG	10/85	98	15 of 22 410

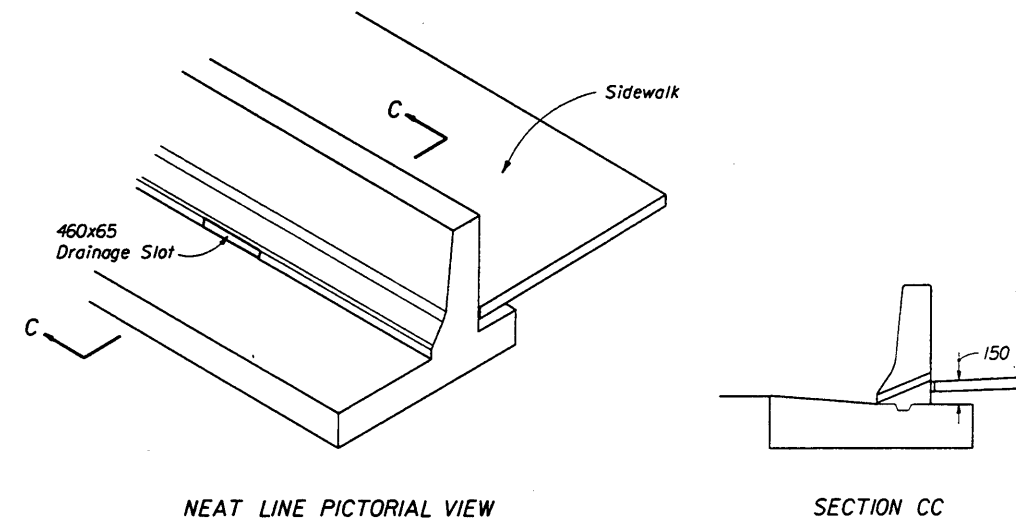


◇ See Notes This Sheet  
 △ See Notes This Sheet

WITH OR WITHOUT UTILITY STRIP  
 NEAT LINE PICTORIAL VIEW



SECTION AA

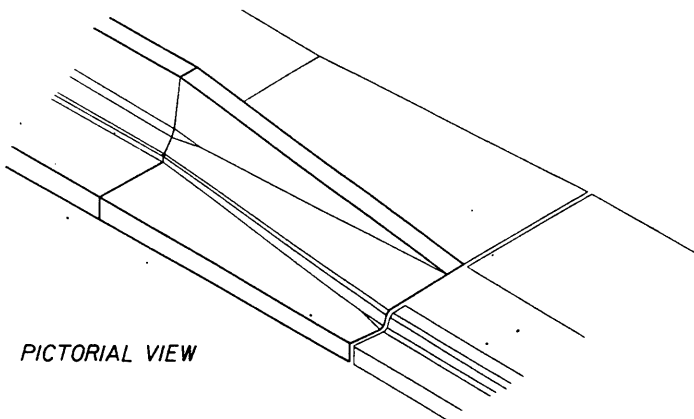


NEAT LINE PICTORIAL VIEW

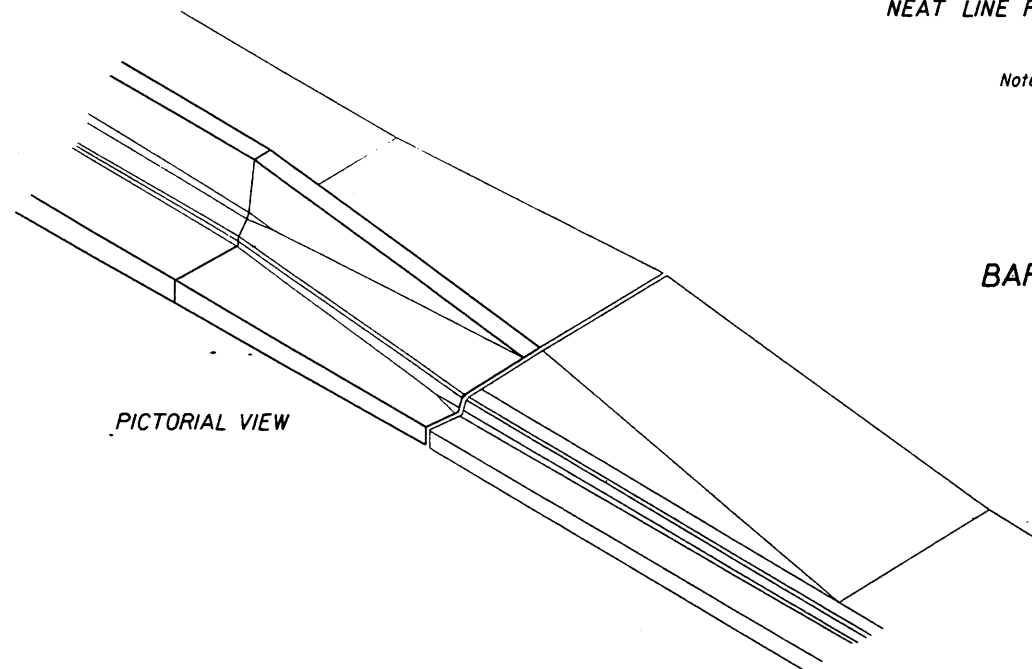
SECTION CC

Note: Drainage slots shall be located at all low points along the sidewalk, and, unless otherwise shown in the plans, slots shall be spaced at intervals not exceeding 15 m in fill sections and 6 m in cut sections. Slots shall be located such that only one bar is cut away or deleted in front and back lines of vertical reinforcement.

**SIDEWALK DRAINAGE SLOT FOR BARRIER WALL (RIGID) (CURB & GUTTER)**



PICTORIAL VIEW

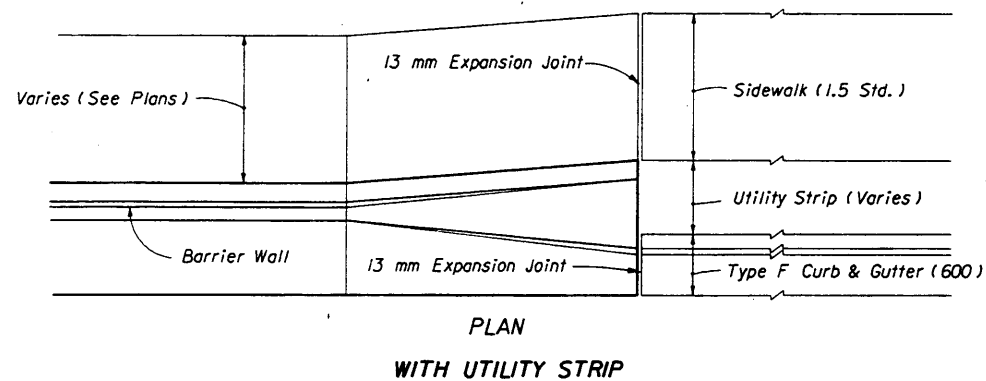


PICTORIAL VIEW

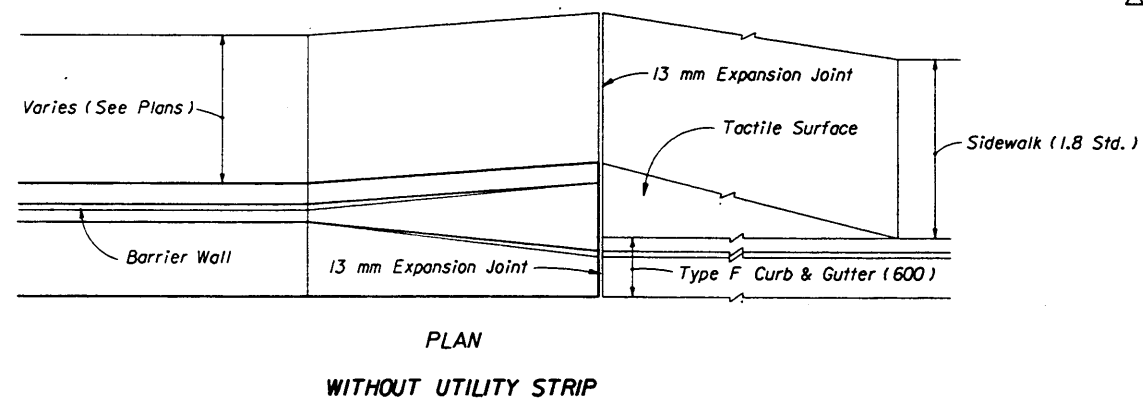
NOTE:

◇ Transition Segments Shall Be Doweled Into The End Of The Barrier Wall In The Following Manner:  
 Four 32 mm diameter holes 150 mm deep on 150 mm centers shall be drilled in the end of the barrier and #19 bars 380 mm long set in epoxy mortar. The ends of the dowels extending into the transition segment shall be wrapped with one layer of Type I asphalt-saturated roofing felt (560 g/m<sup>2</sup>) (commonly called No. 15) with the ends crimped.

△ When Construction Joints Are Utilized For Transition Segment Construction The Stem Shall Be Doweled To The Footing In The Following Manner:  
 Five #16 bars 380 mm long shall be embedded 180 mm into the footing. The dowels shall be spaced 380 mm on centers with the first dowel located 300 mm from the barrier wall. Dowels may be placed within or adjacent to the keyway.



PLAN  
 WITH UTILITY STRIP



PLAN  
 WITHOUT UTILITY STRIP

RIGHT SIDE SHOWN, LEFT SIDE OPPOSITE HAND  
 ONE-WAY AND TWO-WAY TRAFFIC (NEAR LANE APPROACH)

**CONCRETE BARRIER WALL (RIGID) (CURB & GUTTER) • TRANSITION SEGMENT • WITHOUT ADJACENT BICYCLE LANE**

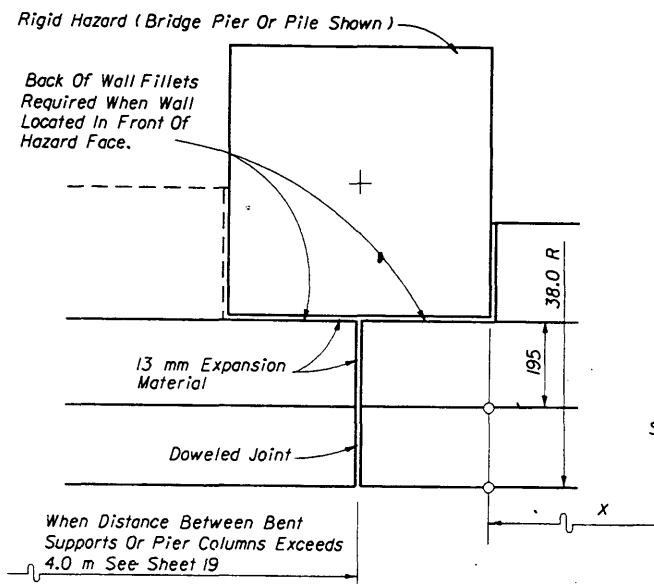
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
 ROAD DESIGN

**CONCRETE BARRIER WALL**

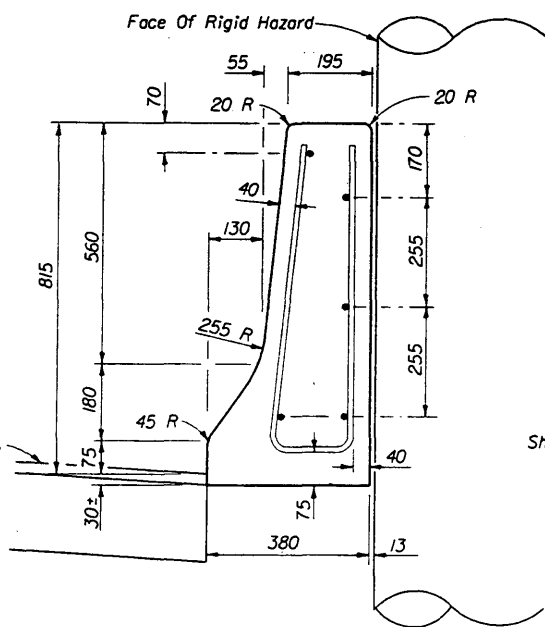
Names	Dates	Approved By	State Roadway Design Engineer
Designed By		<i>John J. Holloway</i>	
Drawn By	HSD 10/85	Revision	Sheet No. 16 of 22
Checked By	JBW/JG 10/85	98	Index No. 410



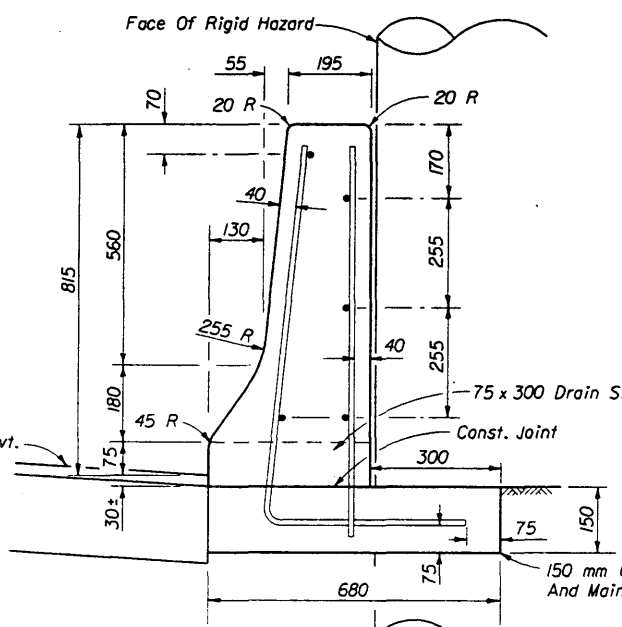




BARRIER WALL AT SQUARE OR RECTANGULAR SHAPED HAZARD  
PARTIAL PLAN

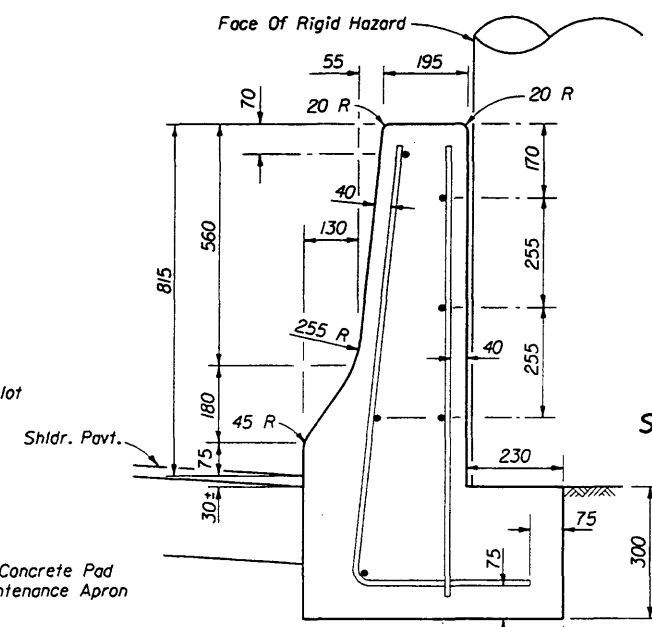


SECTION AA

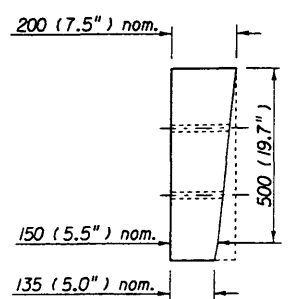


TO BE CONST. IN LIEU OF SECTION AA WHEN THRU DRAINAGE REQUIRED

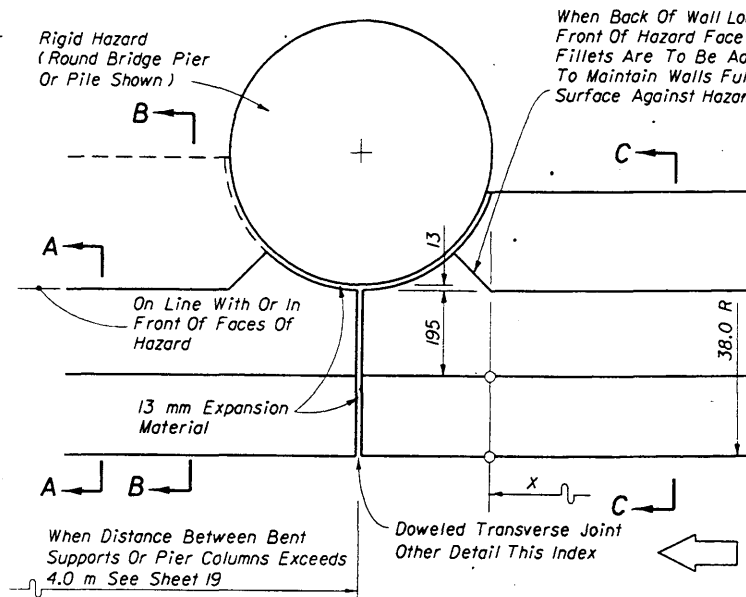
SECTION BB



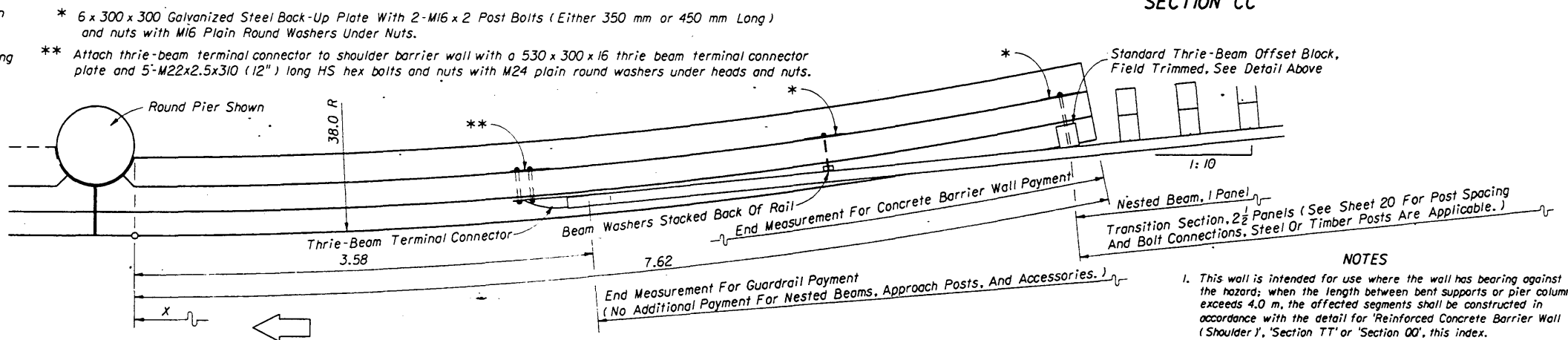
SECTION CC



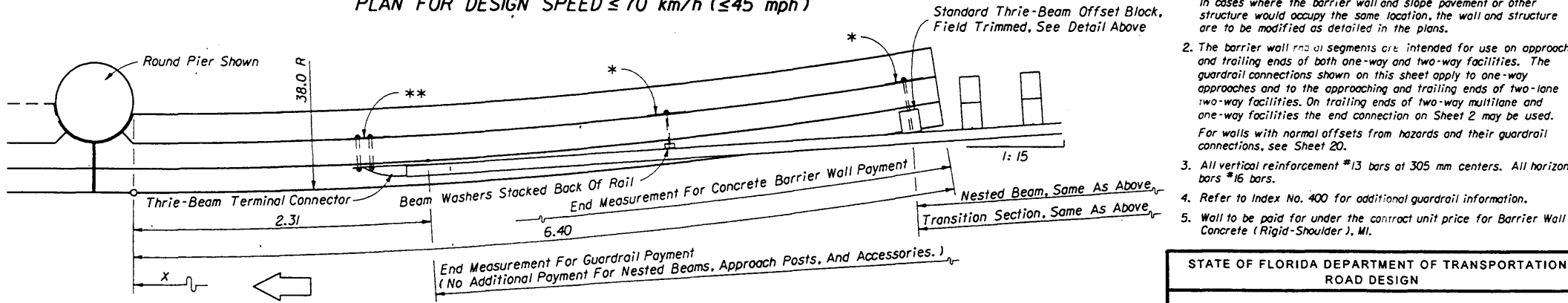
FOR USE WITH EITHER  
1:10 OR 1:15  
GUARDRAIL TRANSITIONS  
STANDARD THRIE-BEAM  
OFFSET BLOCK  
(FIELD TRIMMED)



BARRIER WALL AT ROUND HAZARD  
PARTIAL PLAN



PLAN FOR DESIGN SPEED ≤ 70 km/h (≤ 45 mph)



PLAN FOR DESIGN SPEED ≥ 80 km/h (≥ 50 mph)

ARC LENGTH (m)	DISTANCE "X" (m)	OFFSETS "Y" (m)
1.22	1.22	0.018
2.44	2.44	0.079
3.66	3.65	0.177
4.88	4.86	0.311
6.10	6.07	0.488
6.40	6.37	0.536
7.32	7.27	0.701
7.62	7.57	0.759

Note: Wall may be constructed in chords having lengths ≤ 1.22 m.

- NOTES
- This wall is intended for use where the wall has bearing against the hazard; when the length between bent supports or pier columns exceeds 4.0 m, the affected segments shall be constructed in accordance with the detail for 'Reinforced Concrete Barrier Wall (Shoulder)', 'Section TT' or 'Section QQ', this index. In cases where the barrier wall and slope pavement or other structure would occupy the same location, the wall and structure are to be modified as detailed in the plans.
  - The barrier wall end segments are intended for use on approach and trailing ends of both one-way and two-way facilities. The guardrail connections shown on this sheet apply to one-way approaches and to the approaching and trailing ends of two-lane two-way facilities. On trailing ends of two-way multilane and one-way facilities the end connection on Sheet 2 may be used. For walls with normal offsets from hazards and their guardrail connections, see Sheet 20.
  - All vertical reinforcement #13 bars at 305 mm centers. All horizontal bars #16 bars.
  - Refer to Index No. 400 for additional guardrail information.
  - Wall to be paid for under the contract unit price for Barrier Wall Concrete (Rigid-Shoulder), MI.

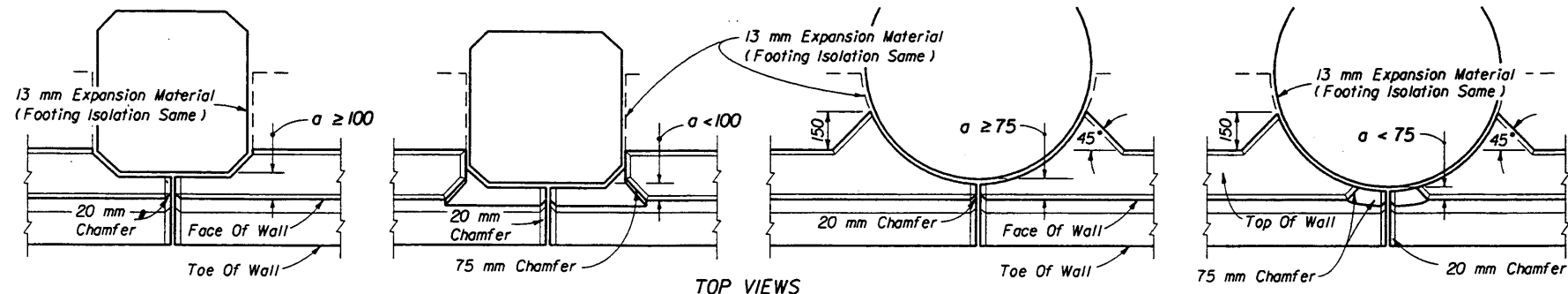
Note: For continuous barrier between independent bents or single pier columns see Sheet 19.

## SHOULDER BARRIER WALL AT ABOVE GROUND RIGID HAZARDS WHEN GUARDRAIL OFFSET FROM HAZARD LESS THAN 0.9 METERS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

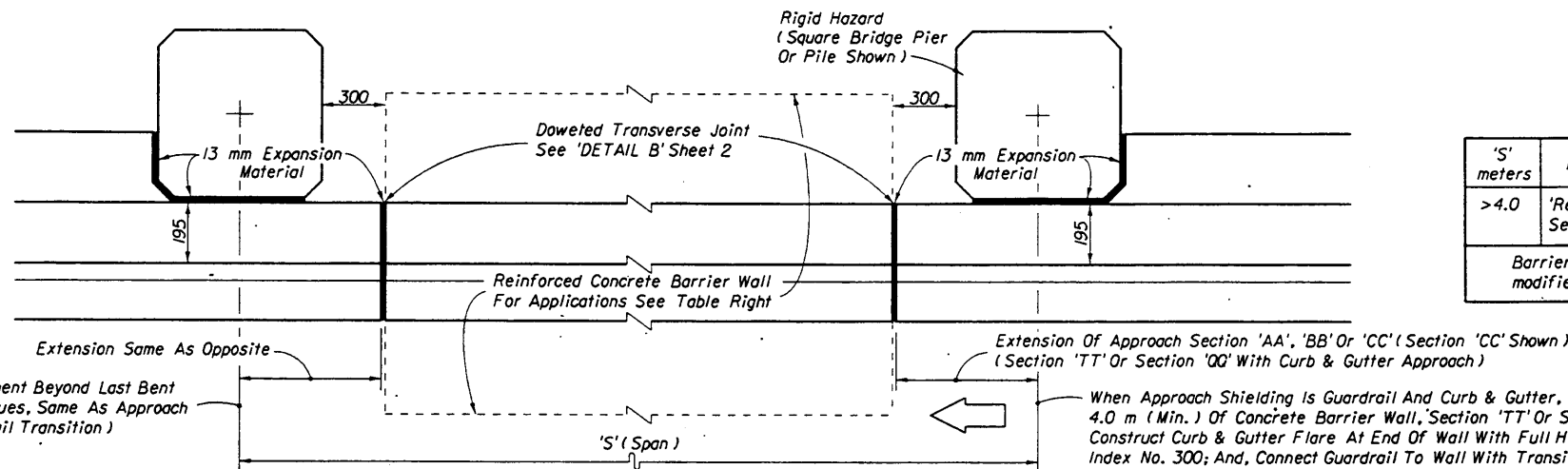
### CONCRETE BARRIER WALL

Designed By	Names	Dates	Approved By
Drawn By	HSD	11/89	State Roadway Design Engineer
Checked By	JVG/KNM	11/89	Revision
			Sheet No.
			Index No.
		00	18 of 22
			410



'a' Varies (Circular Or Octagonal Hazard Not More Than 50 mm In Front Of Face Of Wall)  
 Applicable To Sections 'AA' And 'BB' With Spans Of  $\leq 4.0$  m, And To Section 'CC', Sheet No. 18.  
 Applicable To Other Rigid Walls Of This Index For Spans  $> 4.0$  m Unless Otherwise Shown In The Plans.

### HAZARD PENETRATING STEM OF RIGID CONCRETE BARRIER WALLS

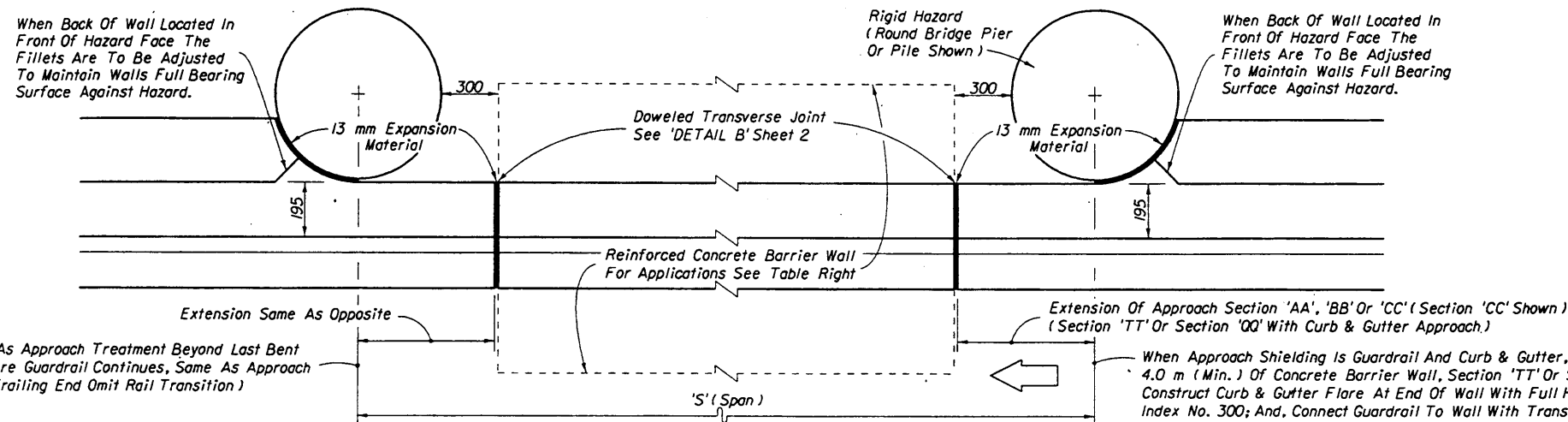


'S' meters	REINFORCED CONCRETE BARRIER WALL APPLICATIONS
$> 4.0$	'Reinforced Concrete Barrier Wall (Shoulder)' With Flush Shoulders; Or, Section 'TT' Or Section 'QQ' With Curb & Gutter
Barrier wall footings that conflict with bent or pier foundations shall be modified as described in the plans.	

Construct Wall Same As Approach Treatment Beyond Last Bent Support Or Pier (Where Guardrail Continues, Same As Approach Except On One Way Trailing End Omit Rail Transition)

When Approach Shielding Is Guardrail And Curb & Gutter, Construct 4.0 m (Min.) Of Concrete Barrier Wall, Section 'TT' Or Section 'QQ'; Construct Curb & Gutter Flare At End Of Wall With Full Height Curb, Index No. 300; And, Connect Guardrail To Wall With Transition Rails In Accordance With Sheet No. 20.

TOP VIEW  
BARRIER WALL AT SQUARE PIER



When Back Of Wall Located In Front Of Hazard Face The Fillets Are To Be Adjusted To Maintain Walls Full Bearing Surface Against Hazard.

When Back Of Wall Located In Front Of Hazard Face The Fillets Are To Be Adjusted To Maintain Walls Full Bearing Surface Against Hazard.

Construct Wall Same As Approach Treatment Beyond Last Bent Support Or Pier (Where Guardrail Continues, Same As Approach Except On One Way Trailing End Omit Rail Transition)

When Approach Shielding Is Guardrail And Curb & Gutter, Construct 4.0 m (Min.) Of Concrete Barrier Wall, Section 'TT' Or Section 'QQ'; Construct Curb & Gutter Flare At End Of Wall With Full Height Curb, Index No. 300; And, Connect Guardrail To Wall With Transition Rails In Accordance With Sheet No. 20.

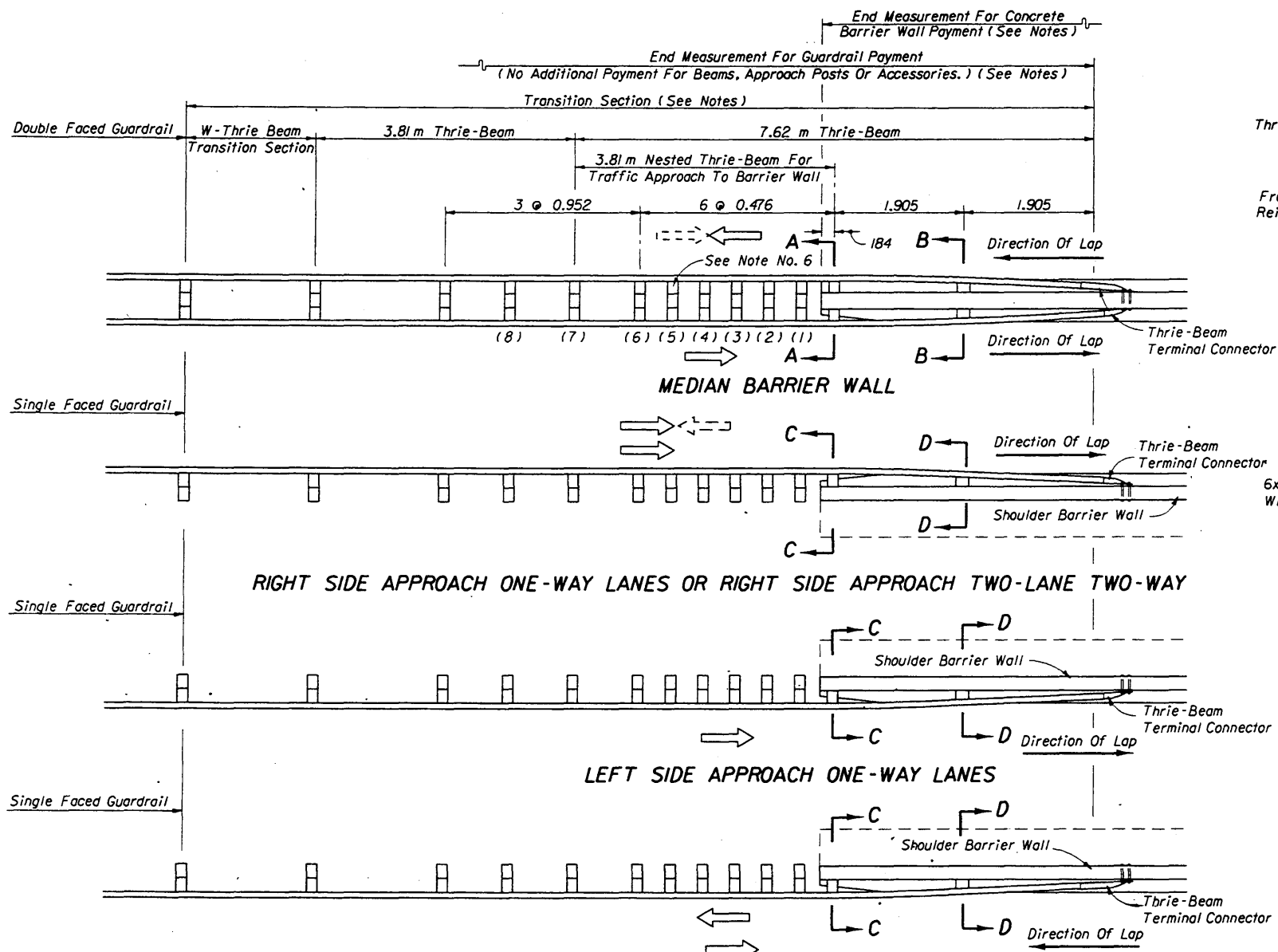
TOP VIEW  
BARRIER WALL AT ROUND PIER

CONCRETE BARRIER WALL WHEN SPAN BETWEEN BENT SUPPORTS OR PIER COLUMNS EXCEEDS 4.0 m

CONCRETE BARRIER WALL WHEN GUARDRAIL OFFSET FROM BENT OR PIER LESS THAN 0.9 METER OR WHERE WALL STEM ABUTTS SUPPORTS OR PIER COLUMN

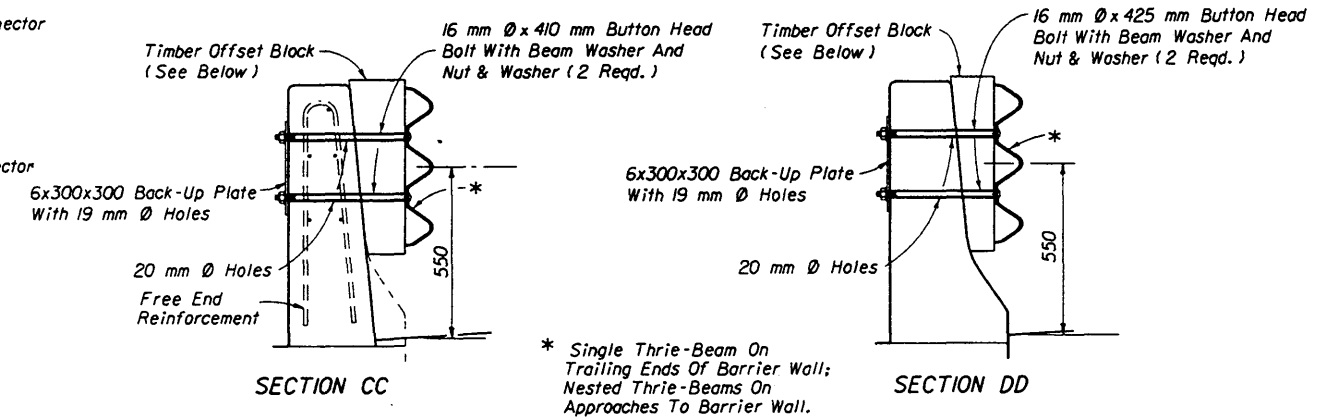
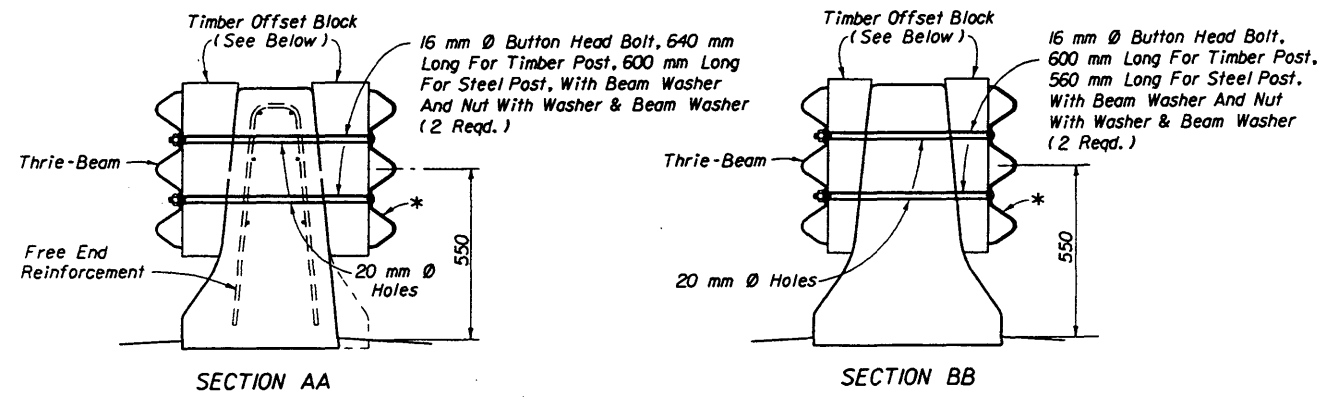
The details on this sheet are treatments to the F-shape concrete barrier walls depicted on Sheet Nos. 8 through 18, where site conditions impose reduced clearances between above ground hazards and the walls. Bridge bent supports and piers are shown. These treatments are not applicable to hazards that cannot provide lateral support for the walls. See the plans for limits of wall sections applied and other associated wall treatments.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
CONCRETE BARRIER WALL				
Names	Dates	Approved By		
Designed By	STAFF	10/97	State Roadway Design Engineer	
Drawn By	HKH	10/97	Revision	Sheet No.
Checked By	JVG	10/97	98	19 of 22
				410

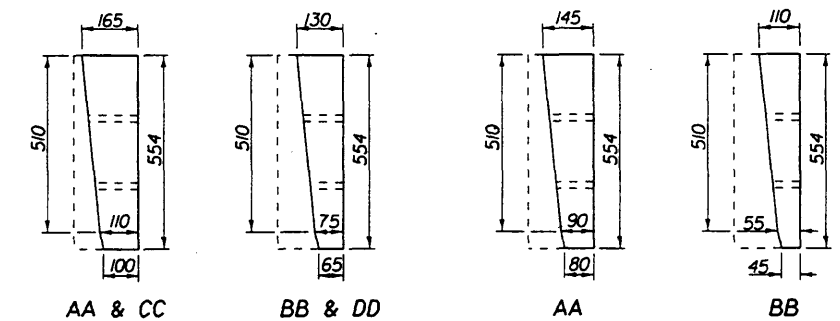


Attach thrie-beam terminal connector to median barrier wall with 5-M22 x 2.5 x 380 (15") long HS hex bolts and nuts with M24 plain round washers under heads and nuts. Attach to shoulder barrier wall with a 530 x 300 x 16 thrie-beam terminal connector plate and 5-M22x2.5x310 (12") long HS hex bolts and nuts with M24 plain round washers under heads and nuts.

LEFT SIDE OF TWO-LANE TWO-WAY (APPROACH FOR FAR LANE)

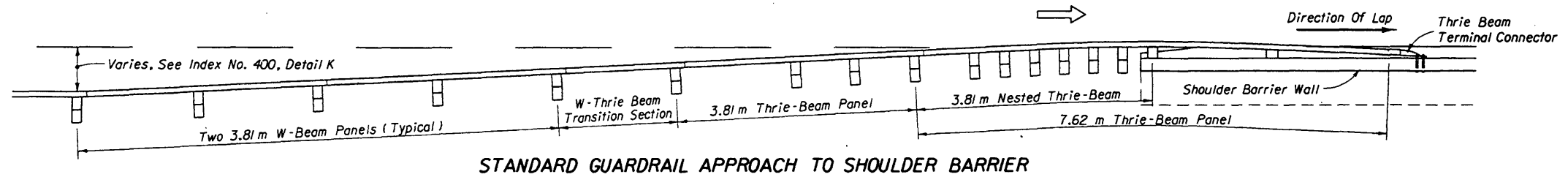


\* Single Thrie-Beam On Trailing Ends Of Barrier Wall; Nested Thrie-Beams On Approaches To Barrier Wall.



FOR DOUBLE FACED GUARDRAIL USING TIMBER POSTS AND FOR SINGLE FACED GUARDRAIL USING EITHER TIMBER OR STEEL POSTS

STANDARD TIMBER OR PLASTIC OFFSET BLOCKS • FIELD TRIMMED FOR USE AT SECTIONS AA, BB, CC & DD



STANDARD GUARDRAIL APPROACH TO SHOULDER BARRIER

NOTES

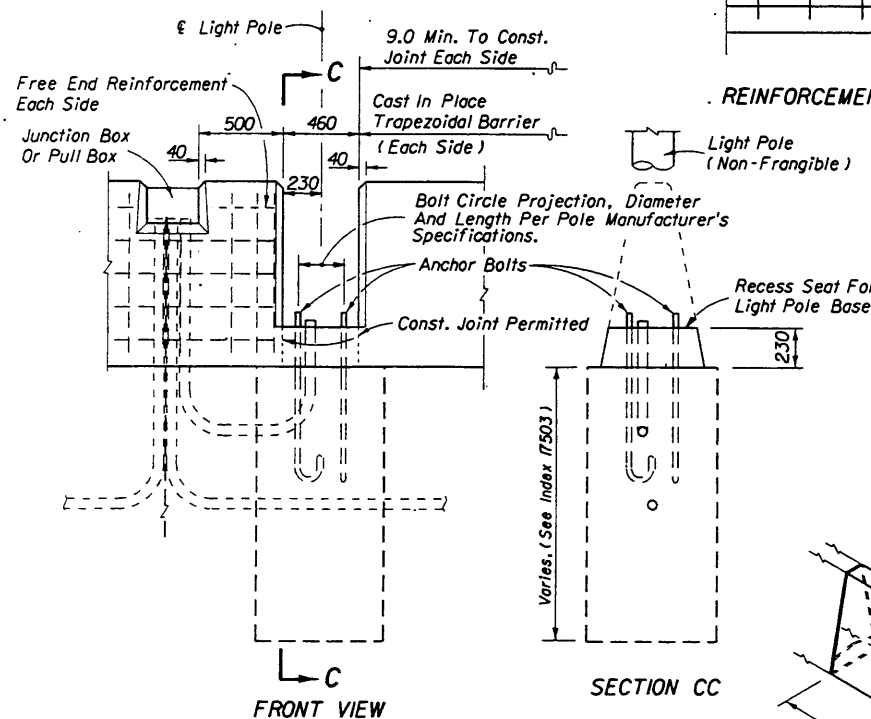
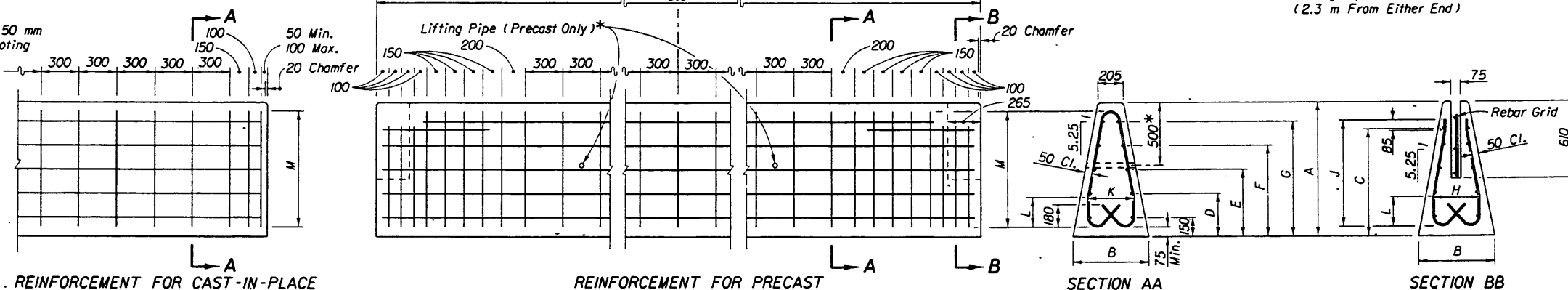
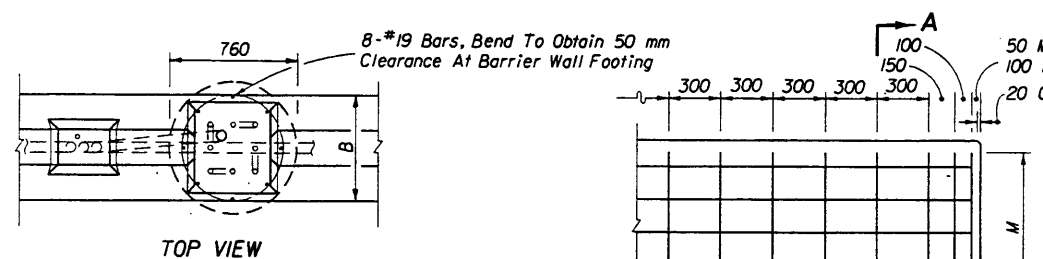
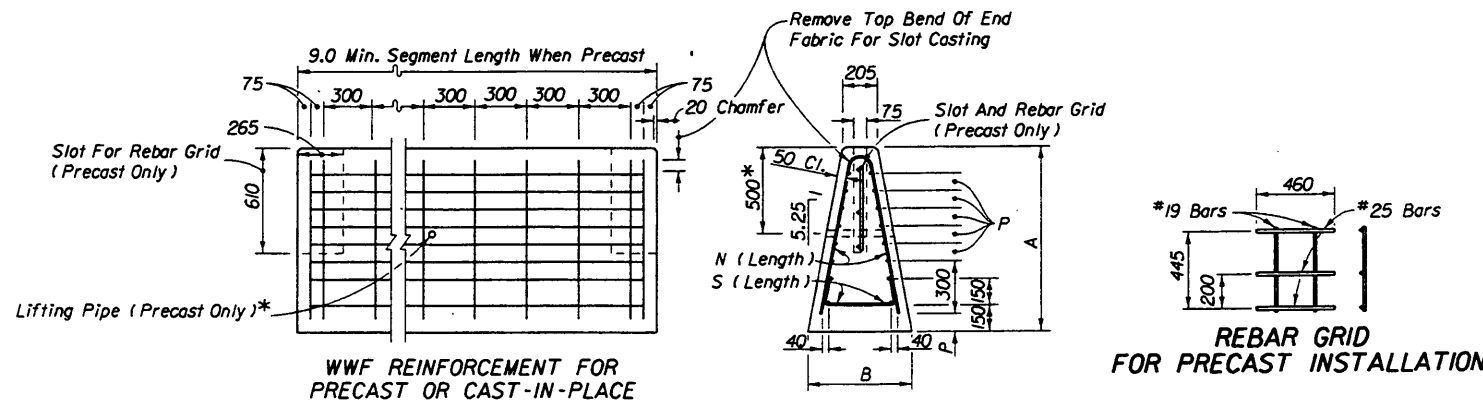
- The longitudinal dimensions and payment limits shown for median concrete barrier wall also apply to shoulder concrete barrier walls.
- W-beam elements do not apply to these transition schemes. For barrier wall trailing end guardrail connections for one-way lanes, see Sheet 2.
- Where reaming is necessary to fit nested beams the reamed surfaces shall be metalized in accordance with Index No. 400.
- Either steel or timber guardrail post may be used, timber posts shown.
- The nested beams shall not be bolted to blocks and posts at posts numbers (1), (3) and (5).
- On the trailing side of MEDIAN BARRIER WALL, offset blocks may be omitted at posts numbers 1, 2, 3, 5, 6 and 8.
- For additional guardrail information refer to Index No. 400.

GUARDRAIL CONNECTION TO CONCRETE BARRIER WALL APPROACH ENDS

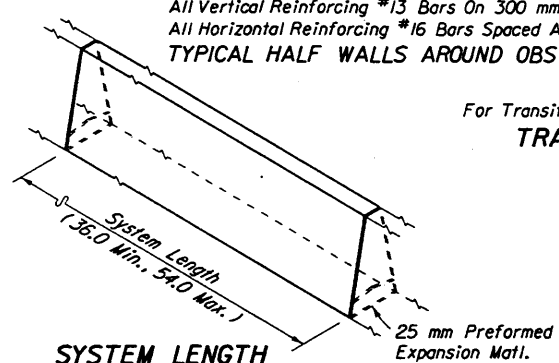
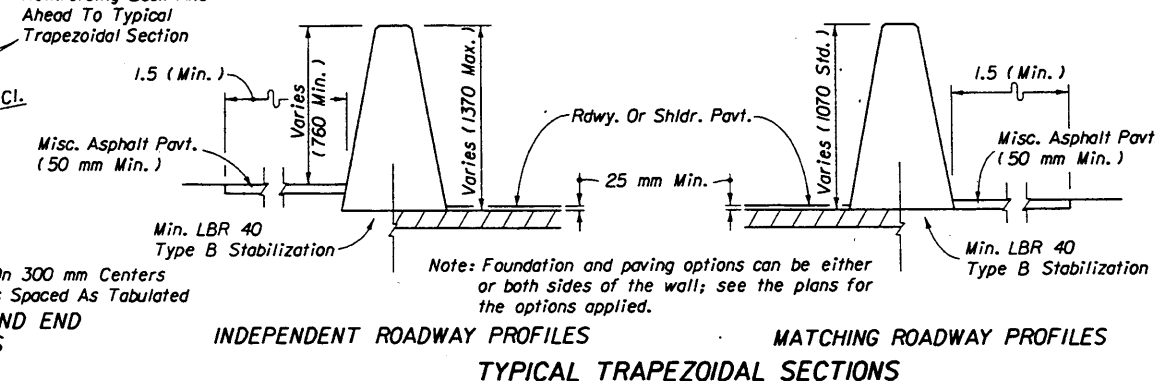
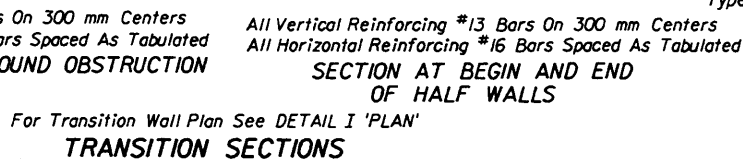
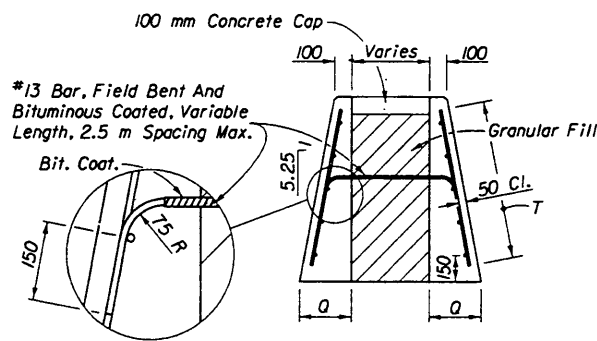
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
CONCRETE BARRIER WALL				
Names	Date	Applied By	Index No.	
Designed By JMG	05/91	<i>[Signature]</i>	State Roadway Design Engineer	
Drawn By HSD	05/91	Revision	Sheet No.	Index No.
Checked By JMG	05/91	00	20 of 22	410

**GENERAL NOTES FOR TRAPEZOIDAL BARRIER WALL**

- Concrete trapezoidal barrier wall can be either precast or cast in place. The wall is designed for zero deflection and shall have a minimum system length of 36.0 m.
- Where concrete trapezoidal barrier wall height changes from 1070 mm to 1220 mm or from 1220 mm to 1370 mm, height change will be uniform for each 150 mm of height change per 27.0 m of wall. Steel placement shall meet the dimensional positioning requirements of 1070 mm, 1220 mm and 1370 mm high barriers at the respective points along the vertical transition, with the vertical steel uniformly lengthened and the horizontal steel uniformly splayed throughout.
- Welded wire fabric (WWF) made in accordance with ASTM A497 may be used as an option to the conventional reinforcement for precast or cast in place barrier wall, with the exception that only conventional reinforcement shall be used for horizontal transition and half wall sections. These sections shall be cast in place with length, shape and reinforcement as shown in this index.
- To attain system length, precast segments shall be interconnected with rebar grids placed in the preformed slots and grouted into place. Segment length shall be not less than 9.0 m unless otherwise specified in the plans.
- The centerline axis of the barrier shall be vertical except where the roadway is superelevated in which case it shall be normal to the cross slope unless otherwise shown in the plans or directed by the Engineer.
- For reflective barrier marker requirements see 'STANDARD BARRIER WALL SECTIONS' and the GENERAL NOTES, Sheet 1.
- The concrete trapezoidal barrier wall is considered by the Federal Highway Administration to be innovative and may be used as such on Federal-Aid projects.
- The concrete trapezoidal barrier wall is to be paid for under the contract unit price for Barrier Wall Concrete (Trapezoidal), MI. This price will include full payment for transitions, half walls, fill and concrete caps.



**LIGHT POLE MOUNTING IN TRAPEZOIDAL SECTIONS**



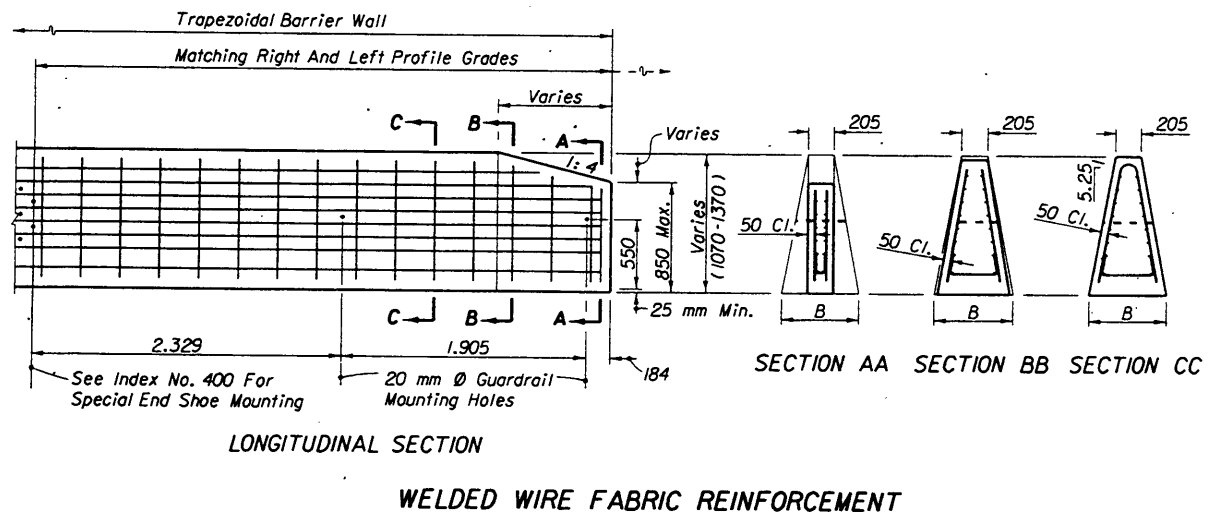
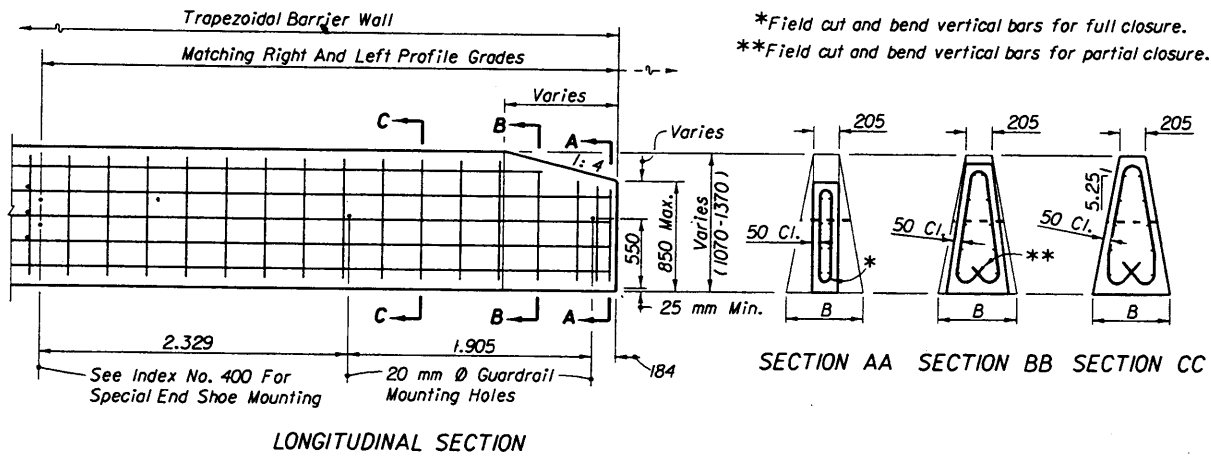
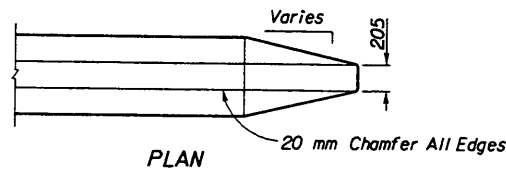
Barrier Height (mm)	DIMENSIONS (mm)															
	A	B	C	D	E	F	G	J	K	L	M	N	P	Q	S	T
1070	1070	610	850	345	535	725	915	845	380	235	915	1830	103	305	710	915
1220	1220	670	1005	380	610	840	1065	995	440	275	1065	2135	128	335	800	1065
1370	1370	725	1155	420	685	955	1220	1150	495	310	1220	2440	153	360	885	1220

**TRAPEZOIDAL BARRIER WALL**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
 ROAD DESIGN

**CONCRETE BARRIER WALL**

Designed By	FHWA	Date	11/93	Approved By	[Signature]
Drawn By	HKH	Revision	11/93	State Roadway Design Engineer	
Checked By	JVG	00	21 of 22	Sheet No.	410

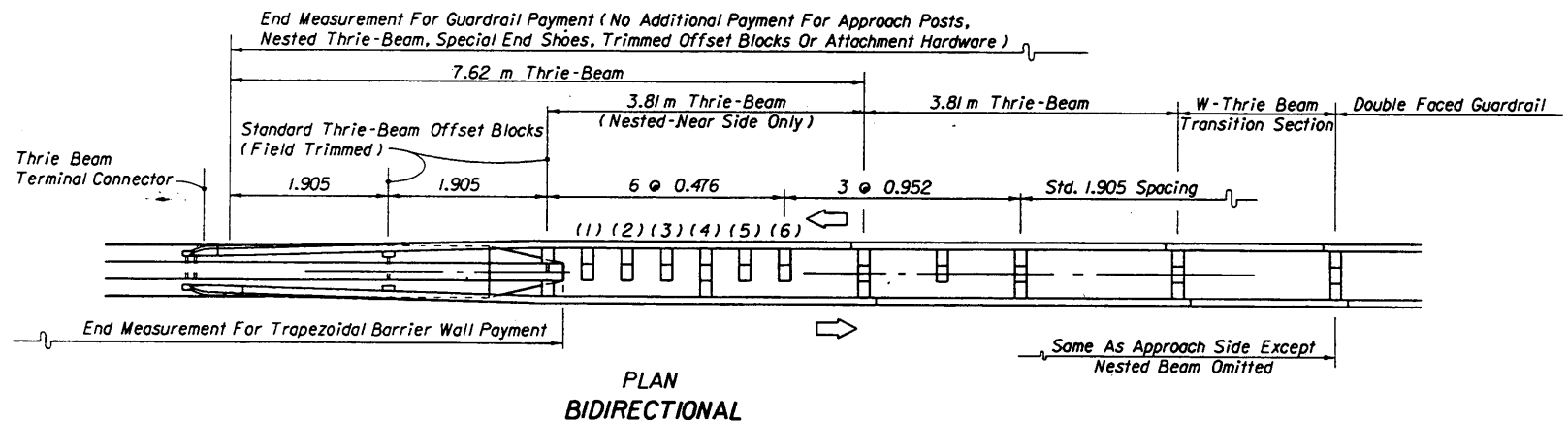
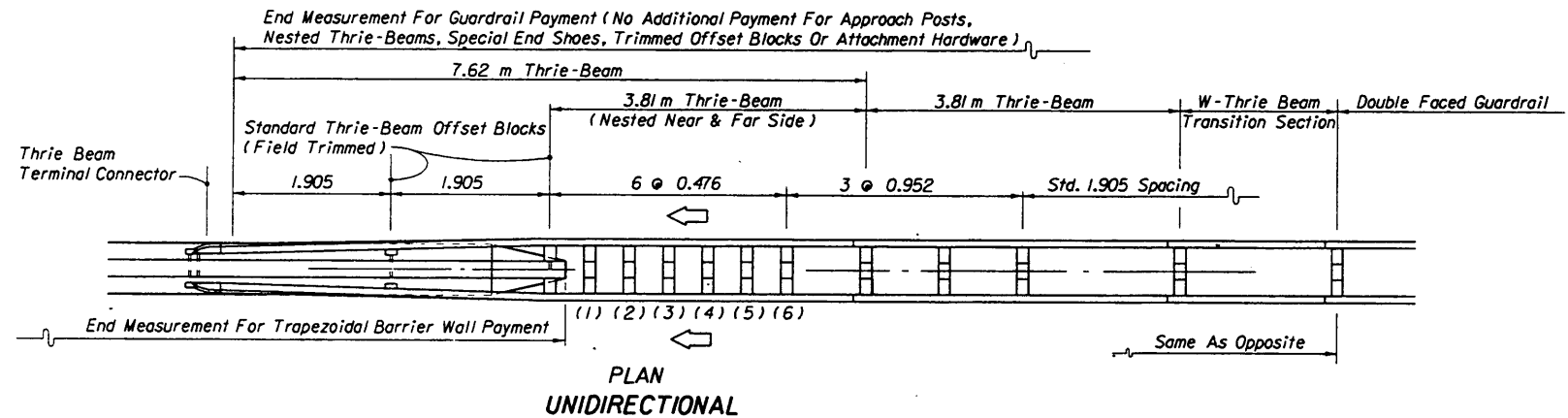
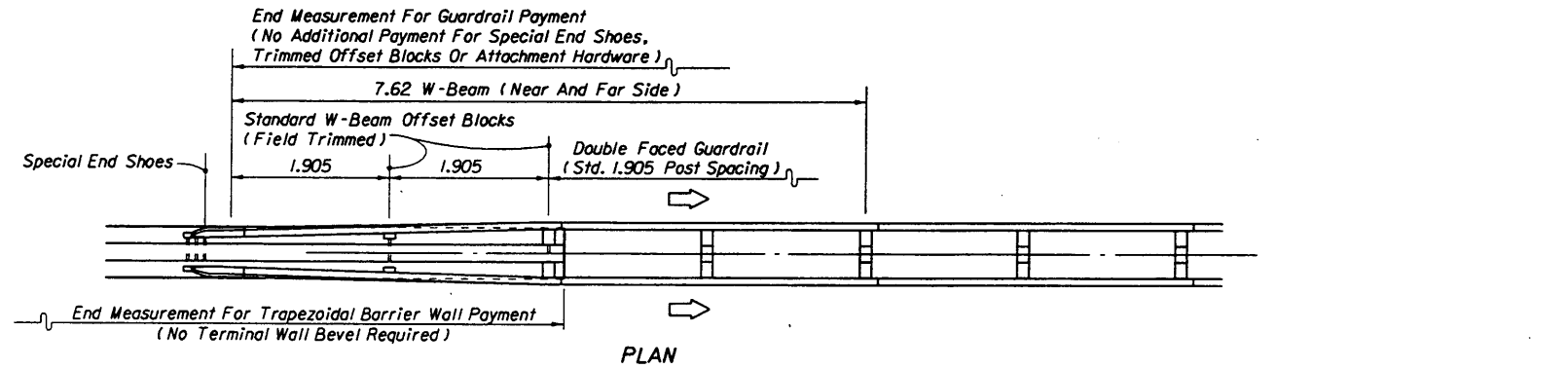


END TREATMENT FOR PRECAST OR CAST-IN-PLACE WALLS

NOTES

1. Where reaming is necessary to fit nested beams the reamed surface shall be metalized in accordance with Index No. 400.
2. The nested beams shall not be bolted to the posts and blocks at post numbers (1), (3) and (5).
3. For additional wall details, see Sheet 21.
4. For additional guardrail information refer to Index No. 400.

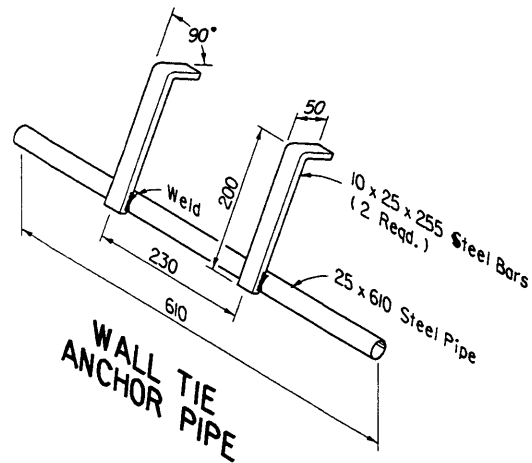
GUARDRAIL CONNECTION TO TRAPEZOIDAL BARRIER WALL



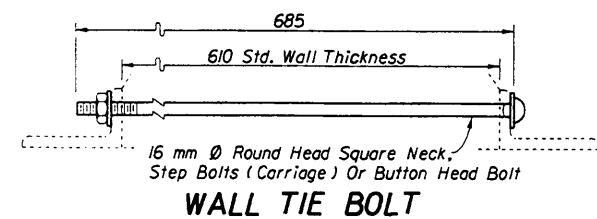
Note: Timber or steel posts may be used, timber posts shown.

GUARDRAIL TRANSITIONS AND CONNECTIONS

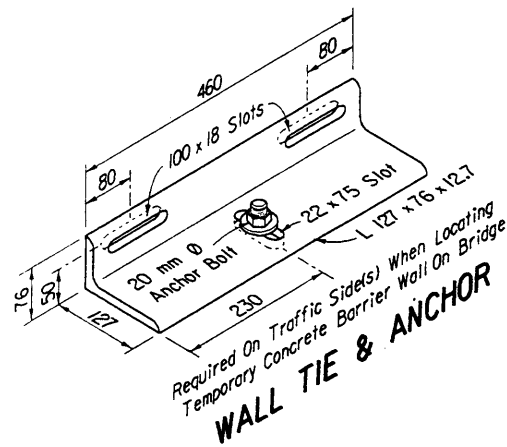
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>CONCRETE BARRIER WALL</b>				
Designed By	JMG/HRH	Date	7/96	Approved By
Drawn By	MKH	Date	7/96	State Roadway Design Engineer
Checked By	JVG	Date	7/96	Revision
			00	Sheet No.
				22 of 22
				Index No.
				410



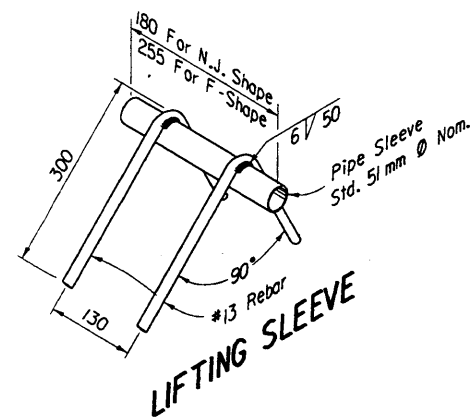
**WALL TIE PIPE ANCHOR**



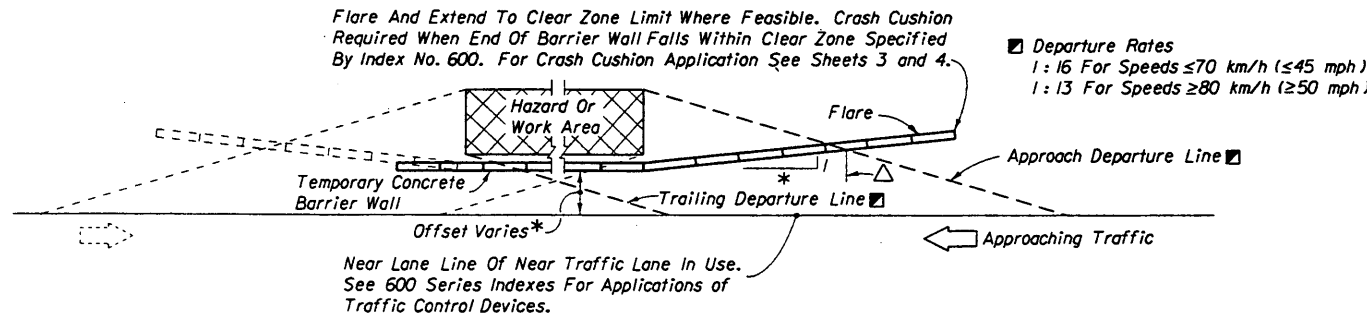
**WALL TIE BOLT**



**WALL TIE & ANCHOR**  
Required On Traffic Sides When Locating Temporary Concrete Barrier Wall On Bridge



**LIFTING SLEEVE**



**PLAN  
TEMPORARY CONCRETE BARRIER WALL ALIGNMENT**

Flare And Extend To Clear Zone Limit Where Feasible. Crash Cushion Required When End Of Barrier Wall Falls Within Clear Zone Specified By Index No. 600. For Crash Cushion Application See Sheets 3 and 4.

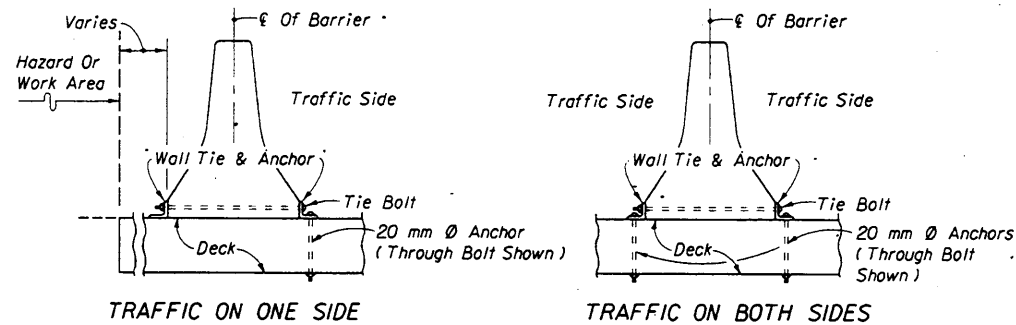
Departure Rates  
 1:16 For Speeds  $\leq 70$  km/h ( $\leq 45$  mph)  
 1:13 For Speeds  $\geq 80$  km/h ( $\geq 50$  mph)

Offset Varies\*

Near Lane Line Of Near Traffic Lane In Use. See 600 Series Indexes For Applications of Traffic Control Devices.

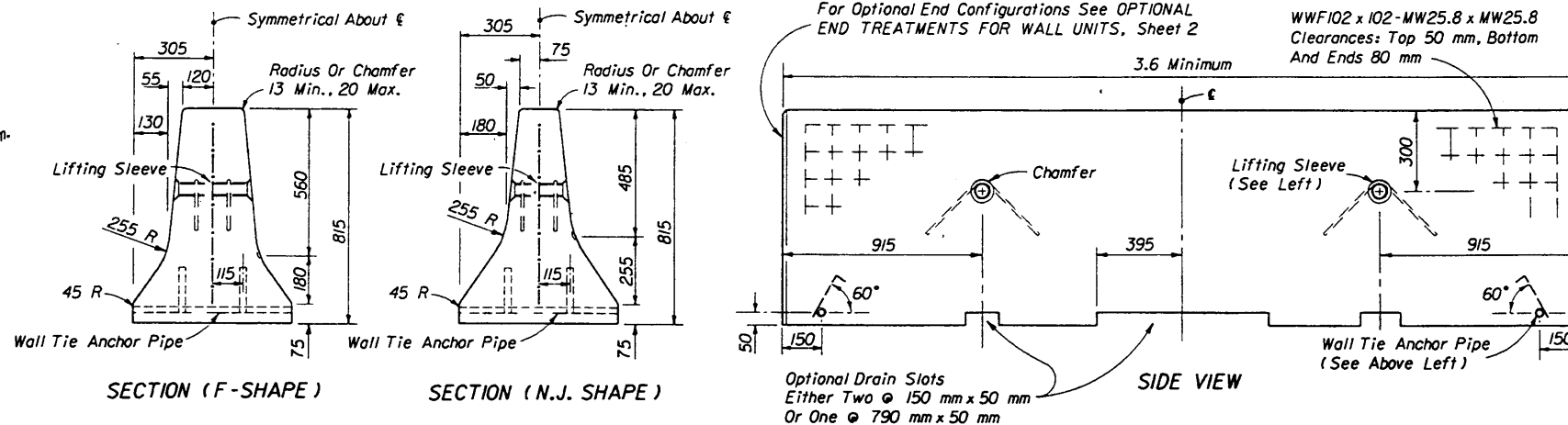
The length of temporary concrete barrier wall is determined by the intersect point between the departure lines and the traffic side toe of wall. The approach departure line location is determined by the line intersect with the back of the hazard, and, the trailing departure line location is determined by the line intersect with the front side of the hazard. For unanchored approach and trailing ends of temporary concrete barrier walls with standard length units, a minimum of two and one-half ( $2\frac{1}{2}$ ) units is required outside the length of need to provide wall end anchorage. Where a redirective crash cushion is used to shield an approach end of a temporary concrete barrier wall, the crash cushion may be located by the departure line intersect point indicated on the standard drawing for the crash cushion used; the wall beginning unit will be positioned relative to the crash cushion position and the beginning unit anchored; and, interconnections between the end unit and crash cushion made as required for the specific crash cushion type.

\* The wall offset from the near traffic lane, wall flare rate and wall flare length are to be in accordance with the alignment called for in the plans and the alignments called for by other department Roadway And Traffic Design Standards specified in the plans; in absence of either plan requirement, the offset shall be as determined by the Engineer, and, unless other flare rates are approved by the Engineer the flare rates to be applied are 1:10 or flatter for speeds  $\leq 70$  km/h ( $\leq 45$  mph) and 1:15 or flatter for speeds  $\geq 80$  km/h ( $\geq 50$  mph); see Index No. 600 for other flare rates on expressway facilities.



Anchor bolts shall have a pullout and shear capacity of 62 kN. Expansion or chemical anchor bolts will be used to secure walls to approach slabs. Expansion or chemical anchor bolts or through bolts with washers and nuts will be used to secure walls to bridge decks. Core drills shall be used to construct through bolt holes, and, drills specified by the manufacturer shall be used to construct expansion and chemical anchor bolt holes. Chemical anchorage shall be an Adhesive Material System in accordance with Specification Sections 416 and 937. After removal of walls, anchors shall be removed to 25 mm min. below deck surface and holes filled with epoxy grout.

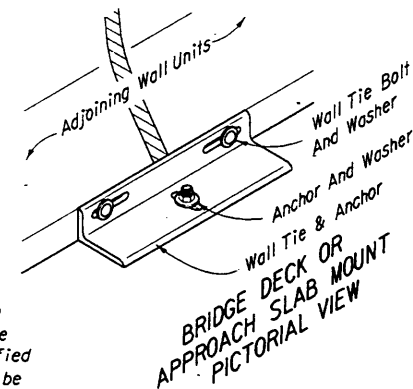
**BRIDGE DECK AND APPROACH SLAB INSTALLATIONS**



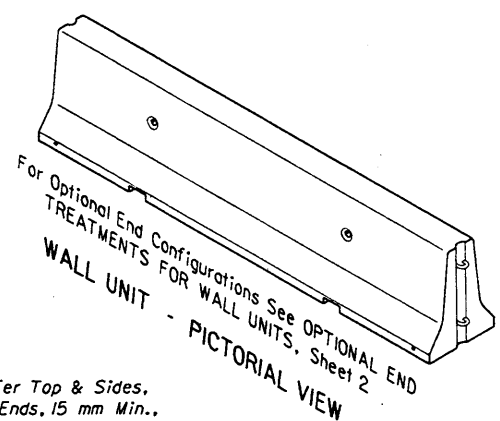
**WALL UNIT**

**GENERAL NOTES**

- Temporary concrete barrier wall units may be either the New Jersey shape or the F-Shape configuration, unless the plans specify other types of temporary concrete barrier wall; however, intermixing of units with different shapes in a continuous run of barrier will not be permitted.
  - For temporary concrete barrier wall and associated temporary crash cushion applications, 70 km/h or less applies to 45 mph or less, and 80 km/h or greater applies to 50 mph or greater.
  - Material and workmanship for the wall shall meet the requirements of Sections 400 and 521 of the Standard Specifications, except the bottom of the unit can be finished to a dense uniform surface by floating in lieu of the Class 3 finish. Concrete shall be Class II.
  - Type C Steady-Burn Lights are to be mounted on top of temporary concrete barrier walls that are used as barriers along travel ways in work zones. The lights are to be spaced at 15.0 m centers in transitions, 30.0 m centers on curves and 60.0 m centers on tangent roadways. For additional information refer to 'Warning Lights' on Index No. 600.
  - Wall units shall not be used for permanent barrier wall construction regardless of unit length, unless specifically permitted by the plans.
  - The temporary concrete barrier wall units with the optional end connections shown on this index are the standard optional units for Florida Department of Transportation projects. Standard optional end units can be intermixed in a run of wall, and interconnected with other barrier systems as specified on other standard drawings or with appropriate transitions as detailed in the plans.
- Temporary concrete barrier wall units with end configurations that are on the 'Qualified Products' listing may be substituted for the standard optional end units when approved by the Engineer; however, substitution units cannot be intermixed with dissimilar units in a run of wall. Substitution units shall have positive interconnections between each adjoining unit; wall units with plain ends will not be permitted regardless of ties or anchorages.
- Wall units may be reused provided they have the structural integrity and surface qualities of new units.
  - Wall units shall be furnished by the Contractor except when the plans stipulate the availability of Department owned units. Regardless of unit source the Contractor shall furnish all hardware and shall be responsible for all handling including loading, transport, unloading, stockpiling, installation, removal and return.
- When the plans stipulate that temporary concrete barrier wall(s) are to become property of the Department at completion of the project, only the standard optional end treatment units are to be used, except as otherwise specified in the plans.
- If the plans specify Barrier (Temporary) Optional, the Contractor has the option to furnish either concrete or water filled barriers. If the plans specify Barrier (Temporary) Concrete, substitution with water filled barriers will not be permitted.
  - Wall units used for work zone traffic control and other temporary applications shall be paid for under the contract unit price for Barrier (Temporary) Concrete, MI, or Barrier (Temporary) Optional, MI. Type C Steady-Burn Lights shall be paid for under the contract unit price for Lights, Temp. Barrier Wall Mount (Type C, Steady-Burn), ED.



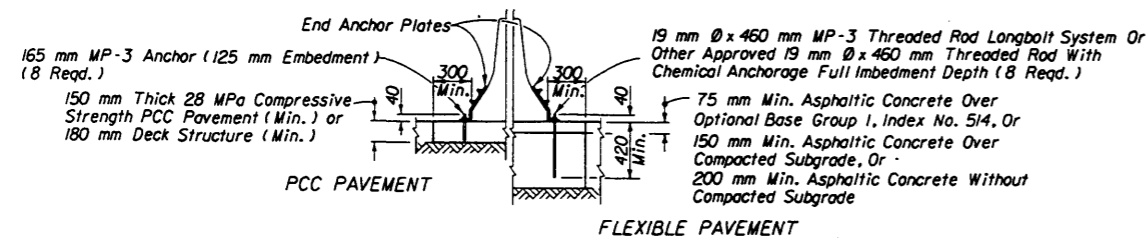
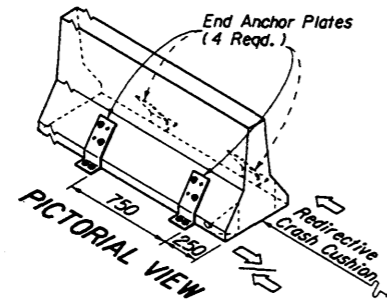
**BRIDGE DECK OR APPROACH SLAB MOUNT PICTORIAL VIEW**



For Optional End Configurations See OPTIONAL END TREATMENTS FOR WALL UNITS, Sheet 2  
**WALL UNIT - PICTORIAL VIEW**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>PRECAST CONCRETE TEMPORARY BARRIER WALL</b>				
Designed By	Names	Dates	Approved By	
Drawn By	HSD	04/82	Revision	Sheet No.
Checked By	JVG	04/82	00	1 of 4
				415





**SURFACE ANCHORAGE REQUIREMENTS**

**END ANCHORAGE NOTES**

1. For temporary barrier wall end anchorage applications, see 'TEMPORARY CONCRETE BARRIER WALL ALIGNMENT' and 'NOTES FOR TEMPORARY CONCRETE BARRIER WALL END SHIELDING'.
2. The temporary concrete barrier wall anchor plate depicted above is a proprietary design by Energy Absorption Systems, Inc. Other temporary anchorage methods can be substituted when wall rigidity is assured by any of the following:
  - (a) proven by associated crash test of redirective crash cushions, or
  - (b) meet anchorage prescribed in 'A Guide To Standardized Highway Barrier Hardware', or
  - (c) crash cushion manufacturer's engineered design, or
  - (d) approved shop drawings on a case by case basis.
3. The cost for anchoring the wall segment will be included in the cost for the adjoining redirective crash cushion.

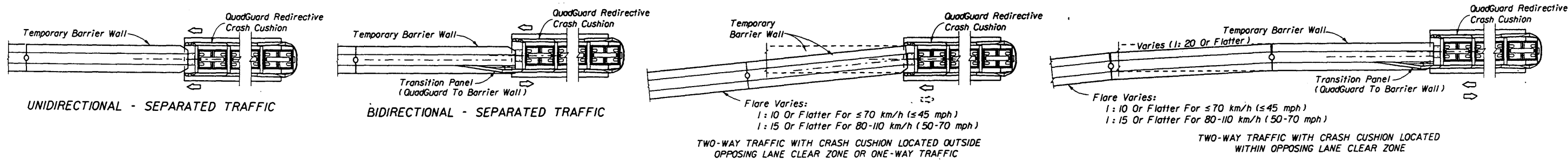
**BARRIER WALL END ANCHORAGE**

**NOTES FOR TEMPORARY CONCRETE BARRIER WALL END SHIELDING**

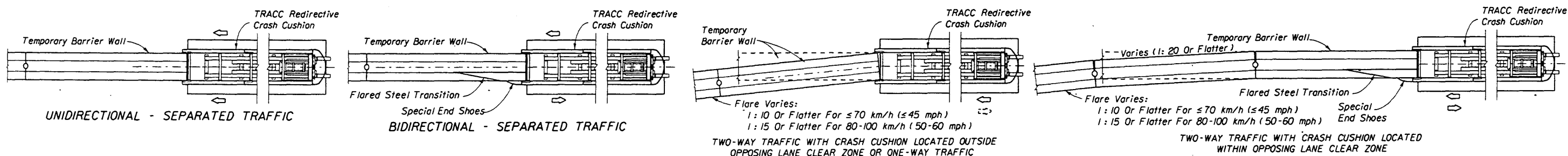
1. Redirective crash cushions are the principal (standard) device to be used for shielding approach ends of temporary concrete barrier walls. Except where the plans designate a particular type of redirective crash cushion for a specific location, the contractor has the option to construct either the REACT 350, QuadGuard, ADIEM 350 or TRACC crash cushions subject to the uses and limitations described on Index Nos. 434, 435, 436 and 440 respectively. The barrier wall end segment must be anchored to a paved surface in accordance with 'BARRIER WALL END ANCHORAGE'.
2. Temporary redirective crash cushions shall be installed in accordance with the manufacturer's specifications and recommendations. Temporary crash cushions can be either new or functionally sound used devices. Performance of intended function is the only condition for acceptance, whether the crash cushion is new, used, refurbished, purchased, leased, rented, on loan, shared between projects, or made up of mixed new and used components.
3. Inertial crash cushions are not optional systems for locations designated for redirective crash cushions by the plans; can not be substituted for redirective crash cushions without expressed approval by the Engineer; and, such substitutions are not eligible for VECP consideration.
4. A yellow post mounted Type I Object Marker shall be centered 1.0 m in front of the nose of all temporary crash cushions. Mounting hardware shall be in accordance with Index Nos. 11860 and 11865.
5. Optional temporary redirective crash cushions are to be paid for per location under the contract unit price for Vehicular Impact Attenuator (Temporary) (Redirective Option), LO.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
PRECAST CONCRETE TEMPORARY BARRIER WALL					
Names	Dates	Approved By			
Designed By		<i>[Signature]</i>	State Roadway Design Engineer		
Drawn By	MKH	03/99	Revision	Sheet No.	Index No.
Checked By	JVC	03/99	00	3 of 4	415

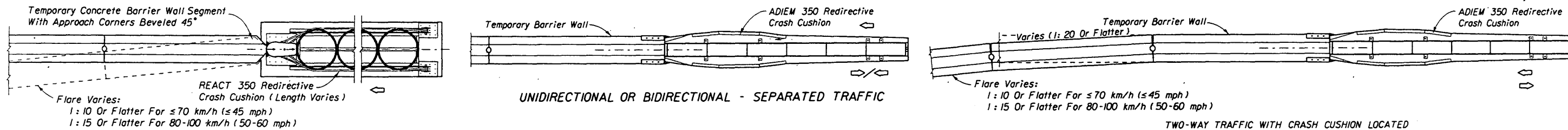




SHOULDER - RIGHT OR LEFT (RIGHT SIDE SHOWN)  
**TEMPORARY CONCRETE BARRIER WALL END TREATMENT WHEN SHIELDED BY A QuadGuard CRASH CUSHION**



SHOULDER - RIGHT OR LEFT (RIGHT SIDE SHOWN)  
**TEMPORARY CONCRETE BARRIER WALL END TREATMENT WHEN SHIELDED BY A TRACC CRASH CUSHION**



FOR ANY APPROACH CONDITION IN ACCORDANCE WITH INDEX NO. 434  
**TEMPORARY CONCRETE BARRIER WALL END TREATMENT WHEN SHIELDED BY A REACT 350 CRASH CUSHION**

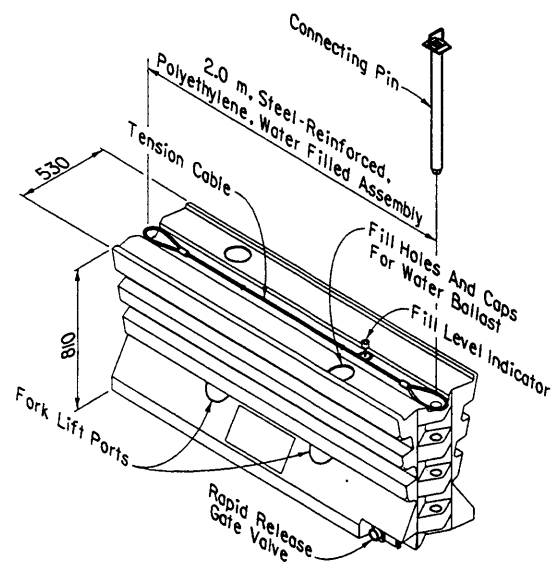
**TEMPORARY CONCRETE BARRIER WALL END TREATMENT WHEN SHIELDED BY AN ADIEM 350 CRASH CUSHION**

See 'TEMPORARY CONCRETE BARRIER WALL ALIGNMENT', 'BARRIER WALL END ANCHORAGE' and 'NOTES FOR TEMPORARY CONCRETE BARRIER WALL END SHIELDING' for additional information.

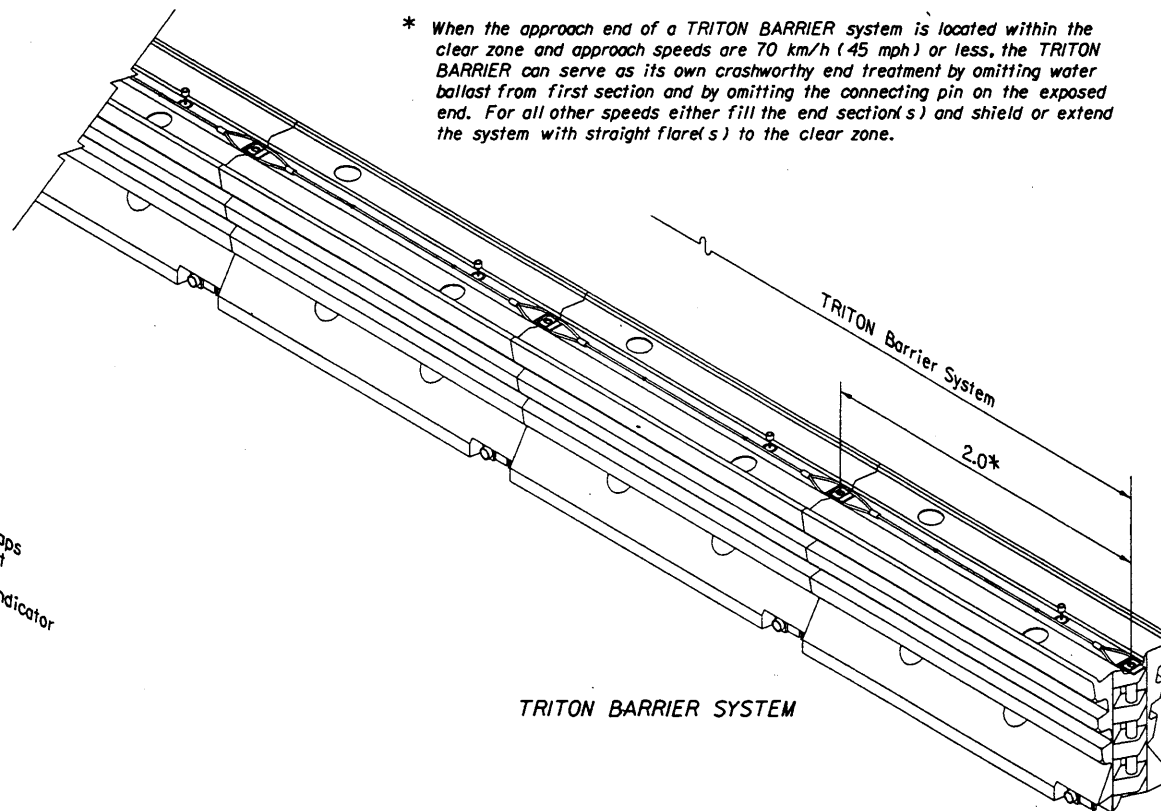
**SHIELDING TEMPORARY CONCRETE BARRIER WALL ENDS WITH REDIRECTIVE CRASH CUSHIONS (REDIRECTIVE OPTION)**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>PRECAST CONCRETE TEMPORARY BARRIER WALL</b>				
Designed By	Names	Dates	Approved By	
Drawn By	HKH	3/99	Revision	Sheet No. Index No.
Checked By	JG	3/99	00	4 of 4 415

\* When the approach end of a TRITON BARRIER system is located within the clear zone and approach speeds are 70 km/h (45 mph) or less, the TRITON BARRIER can serve as its own crashworthy end treatment by omitting water ballast from first section and by omitting the connecting pin on the exposed end. For all other speeds either fill the end section(s) and shield or extend the system with straight flare(s) to the clear zone.



TRITON BARRIER SECTION



TRITON BARRIER SYSTEM

SUPPLEMENTAL GENERAL NOTES FOR THE TRITON BARRIER

1. The system presented on this standard drawing (index) under the label TRITON BARRIER is a proprietary design by Energy Absorption Systems, Inc. and is marketed under the trade name TRITON BARRIER.
2. This index provides the general graphics and information necessary to field identify component parts of the TRITON BARRIER and their incorporation as a whole system for Department standard applications.
3. The TRITON BARRIER system can be installed as a free standing system or in combination with other Department temporary and permanent barrier systems, exclusive of other proprietary water filled barrier systems.
4. Connections between the TRITON BARRIER and other barrier systems shall be as shown in the 'TRITON BARRIER TRANSITION HARDWARE ASSEMBLIES'. Variation from these connections shall be as detailed in the plans or as prescribed by the manufacturer.
5. The TRITON BARRIER section or sections are not to be used as perpendicular road closure blocks, whether connected, unconnected, filled or unfilled.
6. Sections shall be installed in alternating white and work zone safety orange colors.
7. The TRITON BARRIER systems shall be paid for under the contract unit price for Barrier (Temporary) (Water Filled), MI, or Barrier (Temporary) (Optional), MI and shall be full compensation for furnishing and installing TRITON BARRIER in accordance with this index, with the plans and with the manufacturers detailed drawings, procedures and specifications. The cost for transition hardware detailed in this index shall be included in the contract unit price for the barrier. TRITON modules considered a part of the systems crashworthy end treatment shall be included in the linear measure; other crashworthy end terminals, crash cushions or other shielding required for use of the TRITON barrier will not be included in the contract unit price for the barrier.

SUPPLEMENTAL DESIGN NOTES AND GUIDELINES FOR THE TRITON BARRIER

1. The longitudinal system can be used for work zone speeds of 100 km/h (60 mph) or less. Transition hardware can be used in areas where speeds are limited to 70 km/h (45 mph) or less.
2. Currently the Department does not recognize other proprietary items as being equally suitable alternatives to the TRITON BARRIER, and until such alternatives are available, the TRITON BARRIER need not be bid against other proprietary items.

TRITON BARRIER

GENERAL NOTES

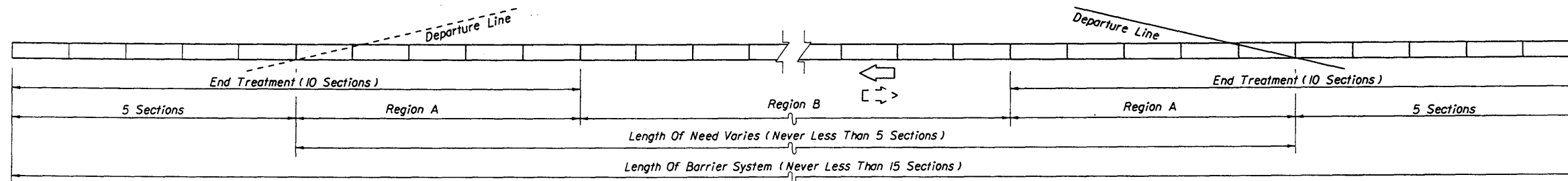
1. This standard drawing (index) presents proprietary temporary water filled barrier designs and is produced by the Florida Department Of Transportation solely for use by the Department and its assignees.
2. Any system presented on this index can be used as a temporary barrier in traffic control work zones and other Department permitted traffic control zones but cannot be constructed as a permanent barrier.
3. All systems shall be assembled and installed in accordance with the manufacturer's detailed drawings, procedures and specifications; however, installation will be limited to the applications shown on this index, except when otherwise detailed in the plans or approved by shop drawings or approved by the Engineer.
4. Water filled barrier systems are to be used only as longitudinal systems. A longitudinal system may include encapsulating work space barriers within low speed intersections only where the approach longitudinal system deflects the traffic alignment around the work space enclosure.
5. One type proprietary water filled barrier system is not to be used in conjunction with another type proprietary water filled barrier system, except when specifically called for and detailed in the plans.
6. All water filled barrier system sections shall be interconnected with manufacturer and Department approved crash tested connections, i.e., no individual sections or interconnected sections of substandard length are to stand alone, except when specifically called for and detailed in the plans, or for specific applications of interconnected sections around work spaces shown on this index.
7. Water filled barrier systems are not to be used on surfaces with cross slopes exceeding 0.05 (steeper than 1:20), including the surface within the design deflection space behind the barrier.
8. Water filled barrier systems are not to be used on grades steeper than 5%; nor placed over surface irregularities that cause vertical deflection exceeding 1:20 between connected sections.
9. Water filled barrier systems are not permitted on bridges or approach slabs; however, they can be placed over box culverts, including those of bridge length, where design deflection space is adequate. The system should be used on concrete pavements only where the Engineer determines that the dynamic loading of pavement slabs will not cause the system to crab out of alignment.
10. Temporary water filled barriers are to be paid for under the contract unit price for Barrier (Temporary) (Water Filled), MI, or Barrier (Temporary) (Optional), MI. If the plans specify Barrier (Temporary) (Optional), the Contractor has the option to furnish either concrete or water filled barriers. If the plans specify Barrier (Temporary) Water Filled, substitution with concrete barriers will not be permitted. For additional payment information see the supplemental general notes for the individual barrier systems.

Type C Steady-Burn lights are to be mounted on top of all water filled barriers used along travelways in work zones. The lights are to be spaced at 16.0 m centers on transitions, 30.0 m centers on curves and 60.0 m centers on tangent roadways. Lights shall be paid for under the contract unit price for Lights (Temporary Barrier Wall Mount) (Type C Steady-Burn), ED.

DESIGN NOTES

1. The TRITON and GUARDIAN water filled barriers are considered by the Federal Highway Administration to be innovative temporary barriers, and, may be used as such toward compliance with the percentage of innovative barrier required in the total median barrier on Federal Aid Projects.

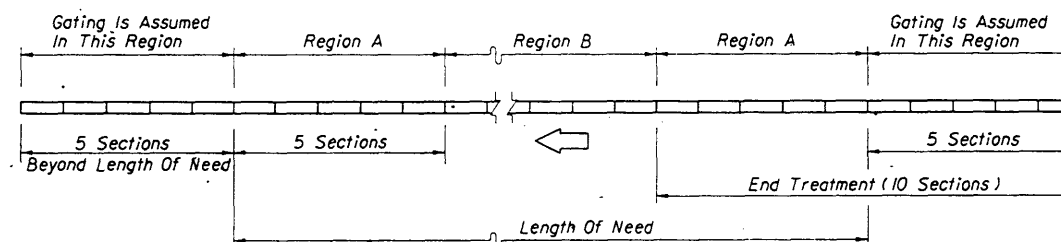
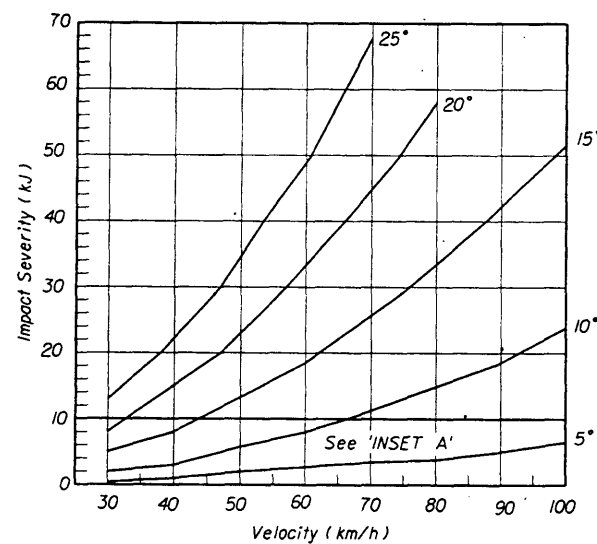
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>TEMPORARY WATER FILLED BARRIERS</b>				
Names	Date	Approved By		
Designed By	MFG/HKH	6/95	State Roadway Design Engineer	
Drawn By	HKH	6/95	Revision	Sheet No.
Checked By	JMG	6/95	96	1 of 5
			Index No.	416



Note: For Departure Line requirements see Index No. 400.

When TRITON BARRIER is used as its own end treatment fill all sections with water ballast except the approach end section(s). Do not use connecting pin on the exposed end of the end section(s).

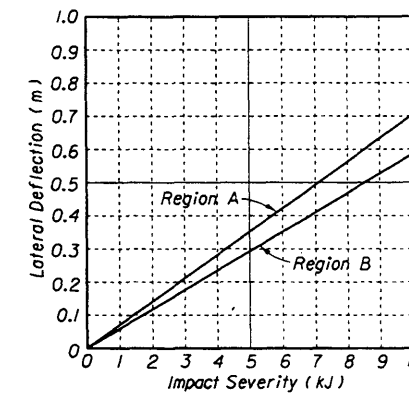
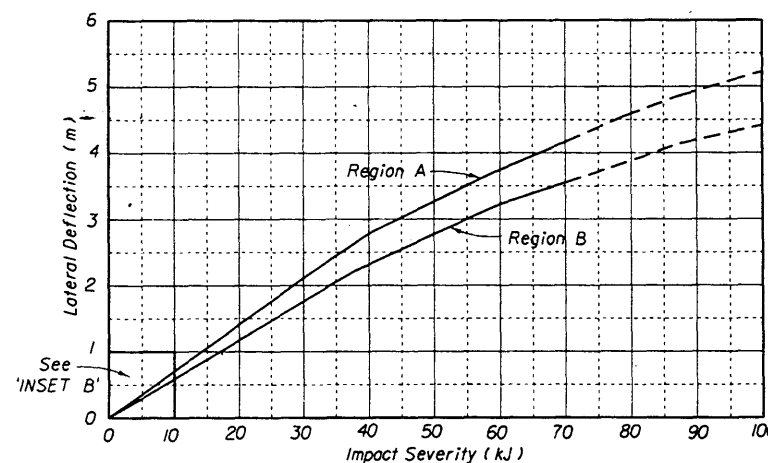
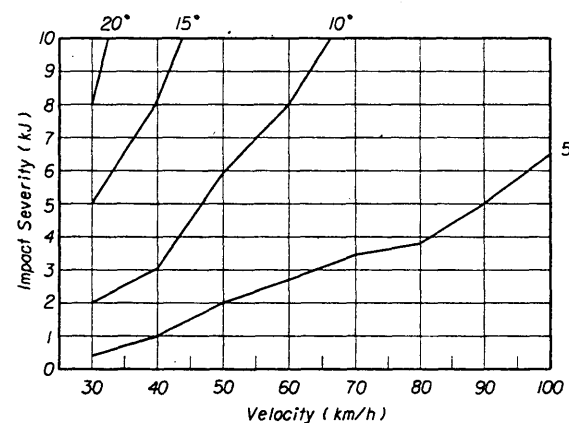
### SYSTEM LENGTHS FOR UNIDIRECTIONAL OR BIDIRECTIONAL TRAFFIC



#### DETERMINING THE IMPACT ANGLE CURVE TO APPLY

Except where the plans call for the use of a certain impact angle curve, or where a certain impact angle is anticipated by site specific conditions, the impact angle curve to be used in determining impact severity will be selected on the following basis:

Barrier Location	Graph Curve
Parallel to tangent roadway	5°
Parallel to and on the inside of roadway curve	5°
Standard lane shift or drop ( $\frac{WS}{1.6}$ & $\frac{WS^2}{150}$ )	5°
Parallel to and on the outside of roadway curve	5° (10°) [15°]
Approach flared end section on inside of roadway curve	10°
Approach flared end section on approach tangent roadway	10°
Approach flared end section on outside of roadway curve	10° (15°) [25°]
( ) Max. Curvature (Min. Radius), High Speed Facilities	
[ ] Max. Curvature (Min. Radius), Low Speed Facilities	



Notes: Curves for Regions 'A' and 'B' apply to vehicles  $\leq 2000$  kg.

-- Indicates impact severity levels created by higher impact angles not anticipated in work zone.

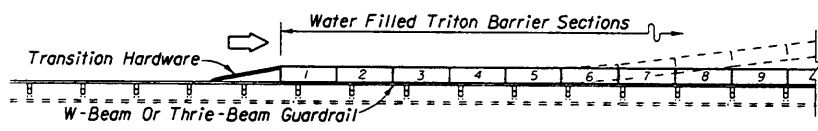
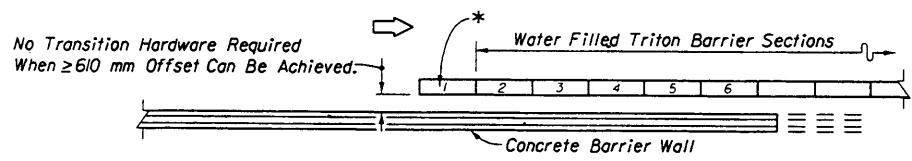
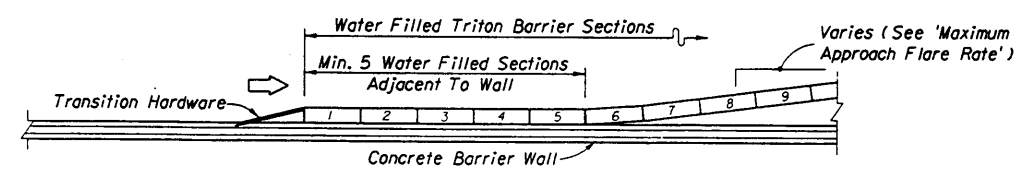
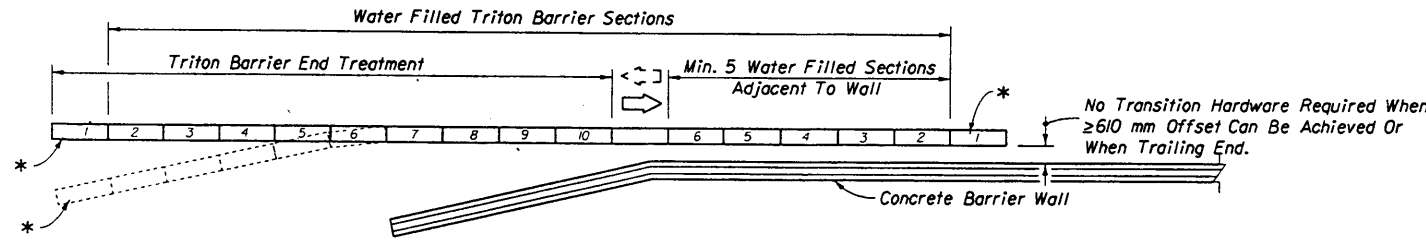
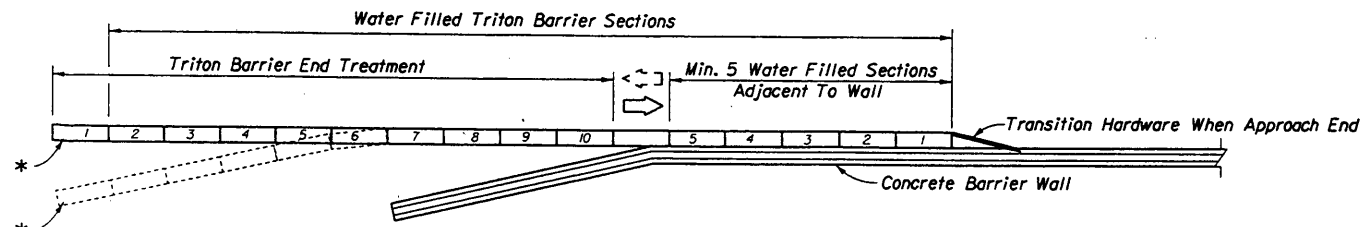
#### SINGLE ROW TRITON BARRIER INSTALLATION DEFLECTION CURVES

#### IMPACT SEVERITY DETERMINATION FOR VEHICLES $\leq 2000$ kg IMPACTING SINGLE ROW TRITON SYSTEM

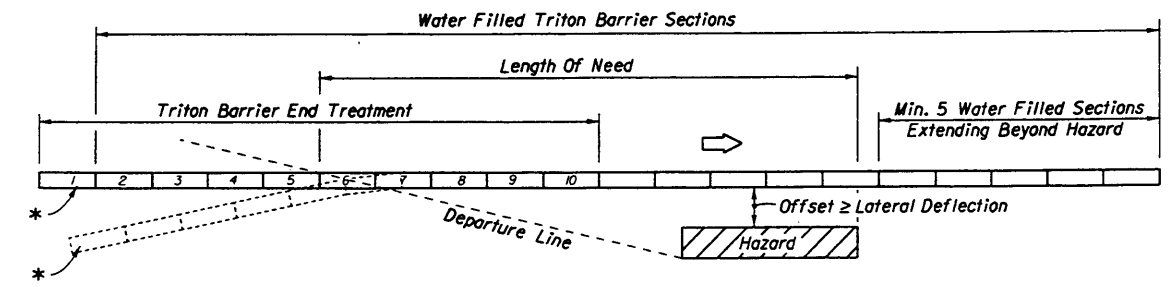
#### IMPACT SEVERITY AND LATERAL DEFLECTION DISTANCES

### TRITON BARRIER SYSTEM LENGTHS AND DEFLECTIONS

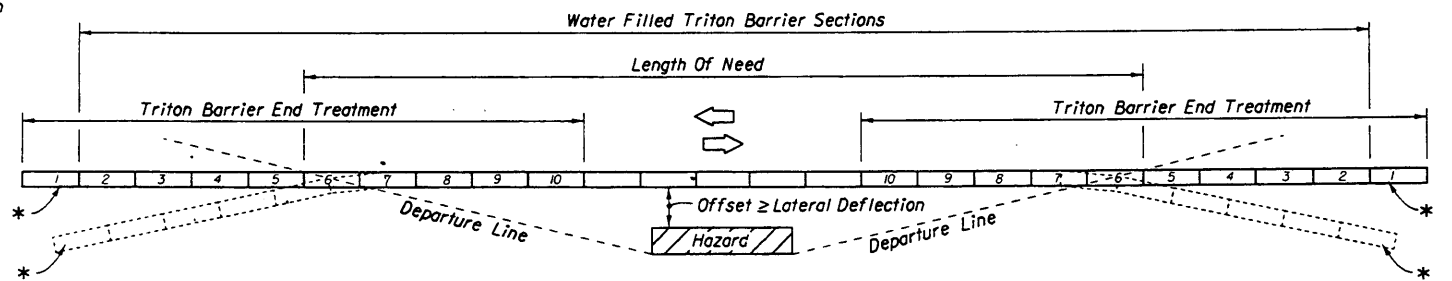
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>TEMPORARY WATER FILLED BARRIERS</b>				
Names	Dates	Approved By		
Designed By	MFG/HKH	6/95	 State Roadway Design Engineer	
Drawn By	HKH	6/95		
Checked By	JVC	6/95	Revision	Sheet No.
			96	2 of 5
				Index No. 416



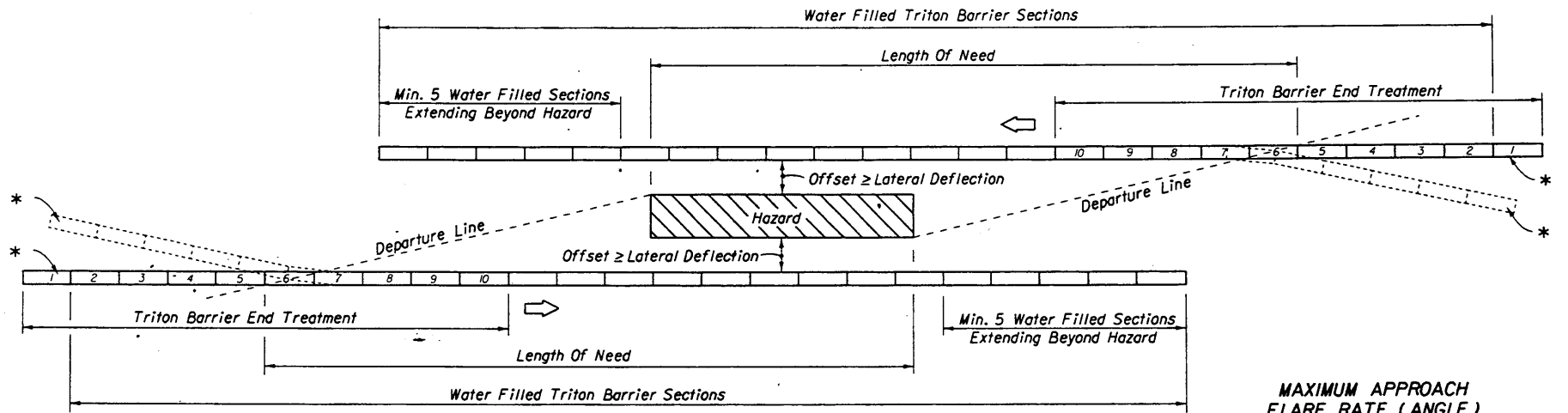
**BARRIER SYSTEM IN COMBINATION WITH OTHER BARRIER SYSTEMS WHEN SPEEDS ARE ≤70 km/h (≤45 mph)**



**TYPICAL UNIDIRECTIONAL SHOULDER LAYOUT**



**TYPICAL BIDIRECTIONAL SHOULDER LAYOUT**

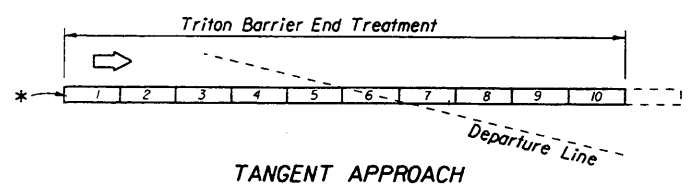


**TYPICAL MEDIAN LAYOUT FREE STANDING BARRIER SYSTEMS**

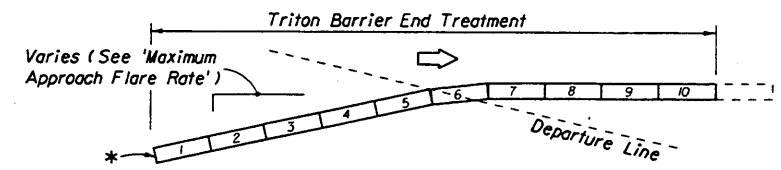
**MAXIMUM APPROACH FLARE RATE (ANGLE)**

≤60 km/h (≤40 mph)	1:9 (6°)
70 km/h (45 mph)	1:10 (5.5°)
80 km/h (50 mph)	1:11 (5°)
90 km/h (55 mph)	1:12 (4.5°)
100 km/h (60 mph)	1:13 (4°)

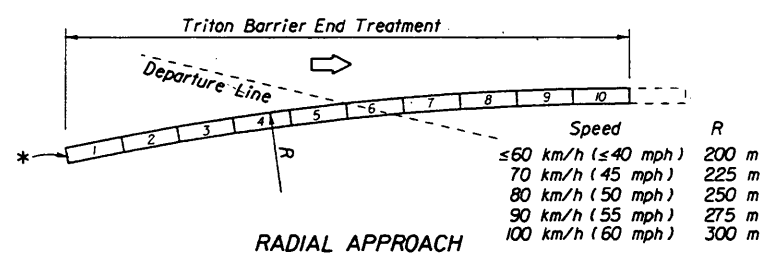
For Departure Line requirements see Index 400.  
When used as an approach end treatment for speeds ≤70 km/h (≤45 mph), omit water ballast from first section and omit connecting pin on exposed end. For speeds ≥80 km/h (≥50 mph) fill and shield or extend with straight flare to CZ.



**TANGENT APPROACH**



**FLARED APPROACH**

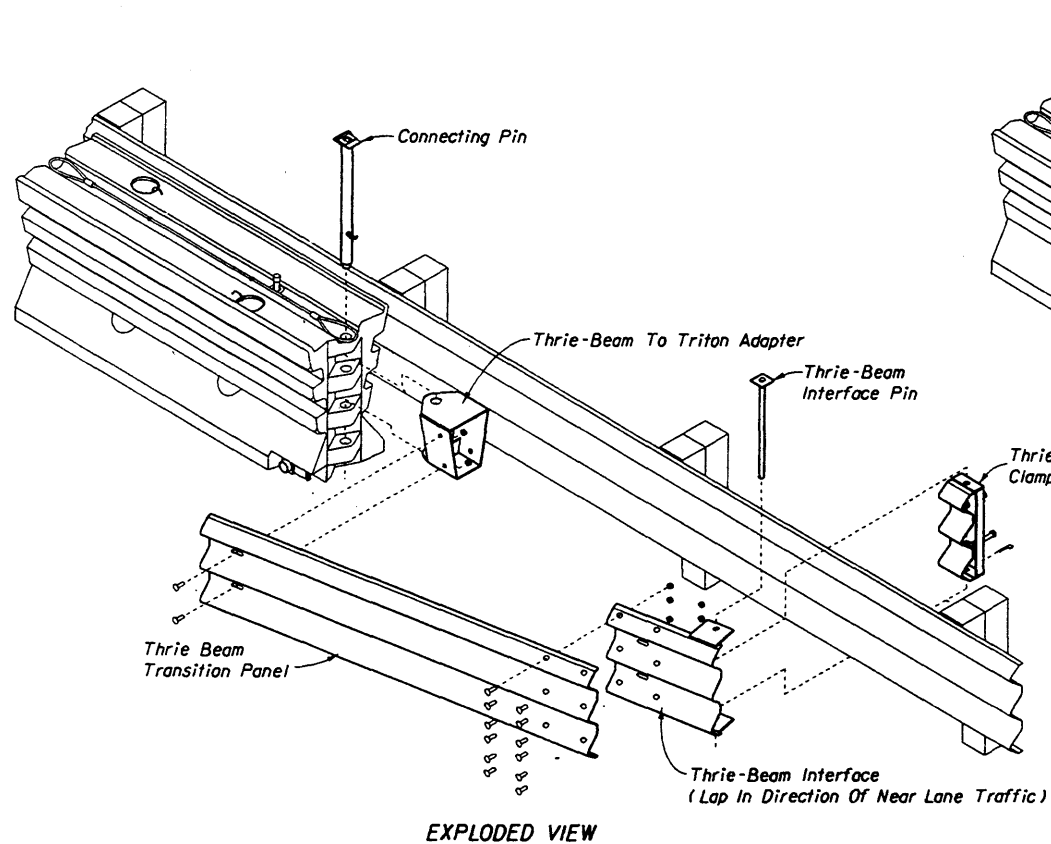


**RADIAL APPROACH**

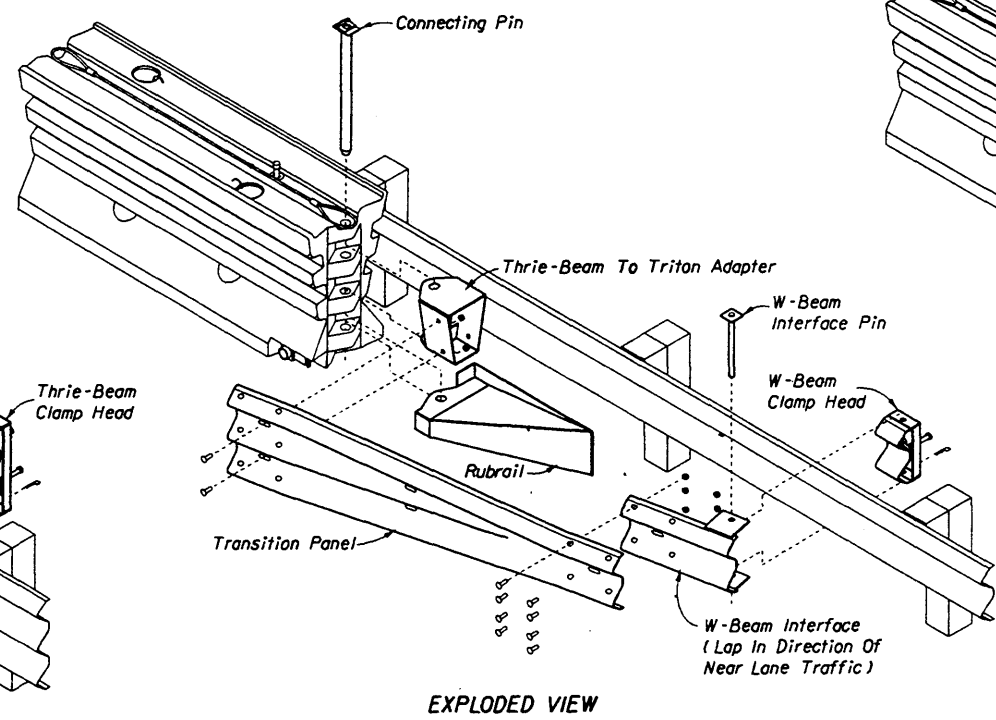
**END TREATMENT CONFIGURATIONS**

**TRITON BARRIER - TYPICAL APPLICATIONS**

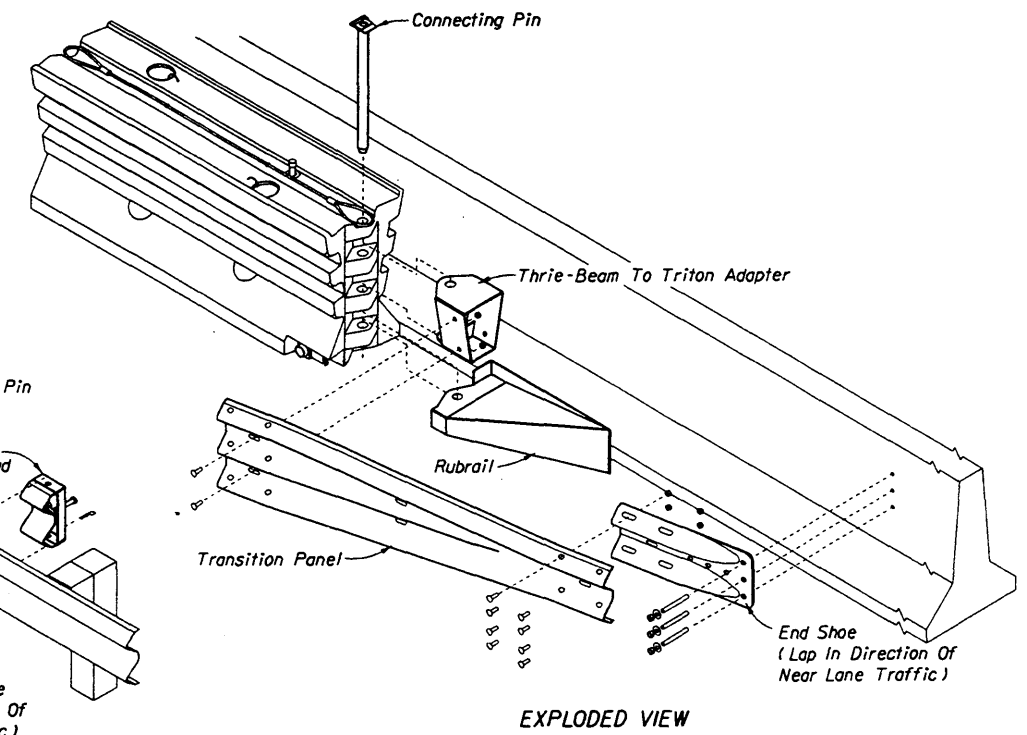
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN			
<b>TEMPORARY WATER FILLED BARRIERS</b>			
Designed By	MFG/HKH	6/95	Approved By
Drawn By	HKH	6/95	State Roadway Design Engineer
Checked By	JVG	6/95	Revision
		98	Sheet No. 3 of 5
			Index No. 416



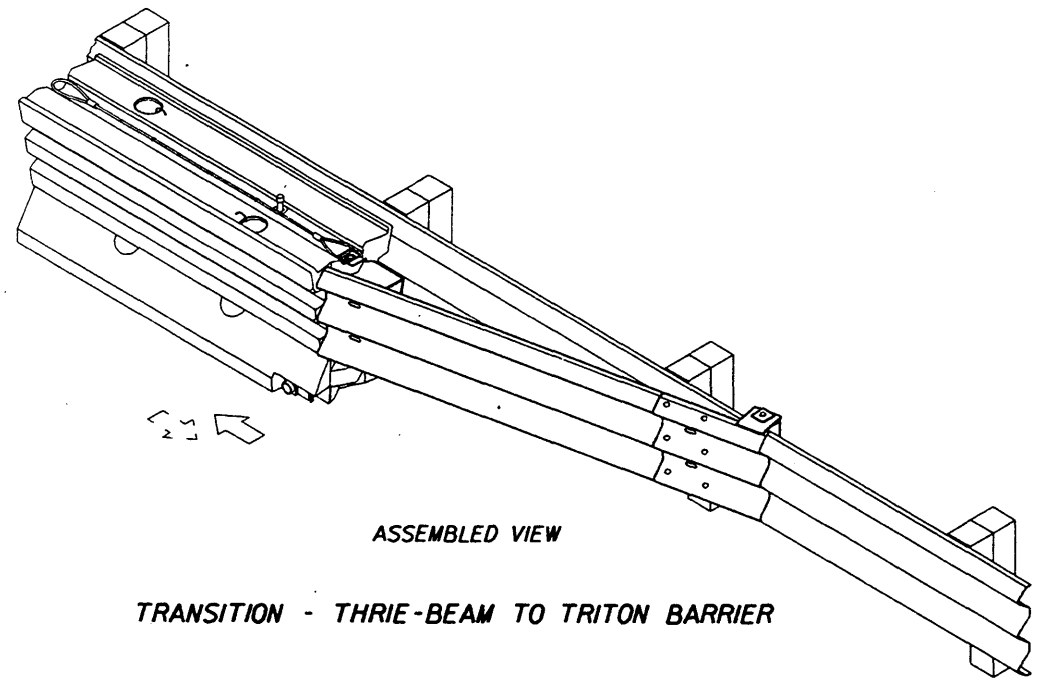
EXPLODED VIEW



EXPLODED VIEW

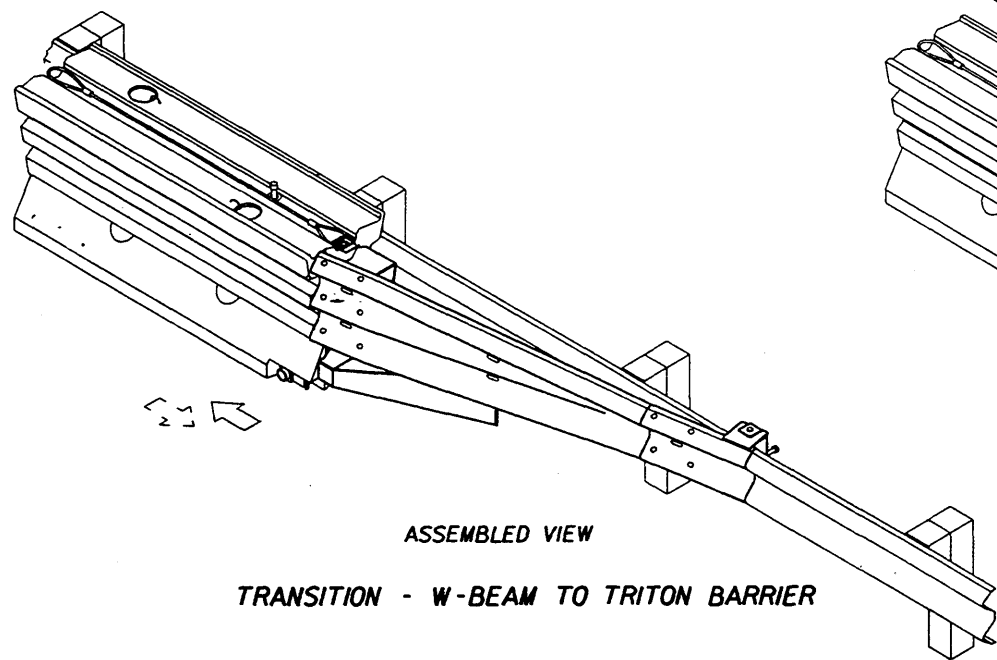


EXPLODED VIEW



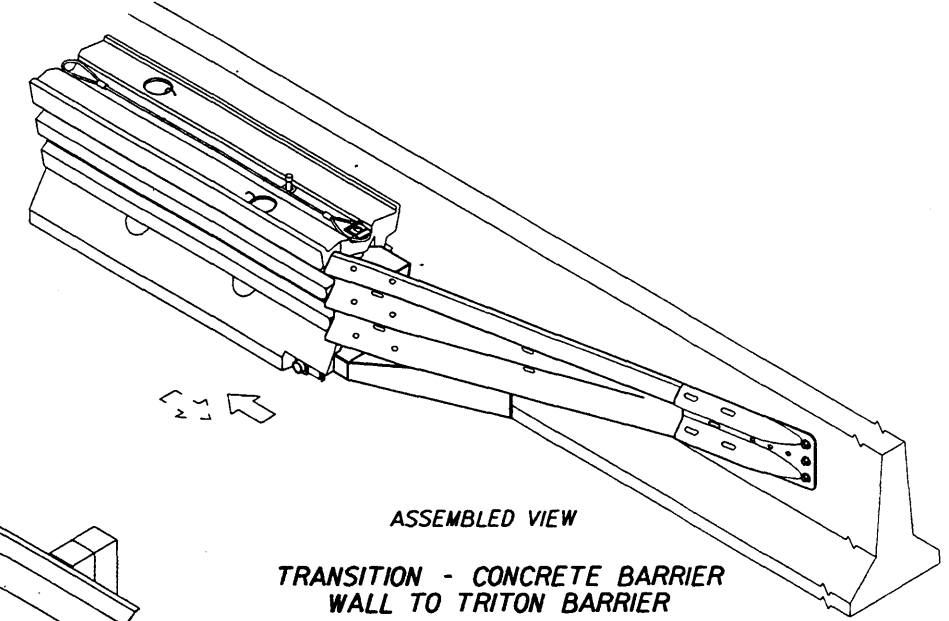
ASSEMBLED VIEW

TRANSITION - THRIE-BEAM TO TRITON BARRIER



ASSEMBLED VIEW

TRANSITION - W-BEAM TO TRITON BARRIER



ASSEMBLED VIEW

TRANSITION - CONCRETE BARRIER WALL TO TRITON BARRIER

**TRANSITION NOTES**

1. Transitions shown on this sheet are limited to speeds of 70 km/h (45 mph) or less.
2. Transition hardware can be placed on either end of TRITON section.
3. Transition hardware can be located on left or right side of roadway, right side shown.
4. TRITON Barrier end sections must be filled with water when using transition hardware assemblies.
5. Install transition hardware in accordance with the manufacturer's recommendations and specifications.

**TRITON BARRIER TRANSITION HARDWARE ASSEMBLIES**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>TEMPORARY WATER FILLED BARRIERS</b>				
Designed By	MFG/HKH	Dates	6/95	Approved By <i>[Signature]</i> Site Roadway Design Engineer
Drawn By	MKH	Revision	6/95	Sheet No. 4 of 5 Index No. 416
Checked By	JMG	Revision	96	

**SUPPLEMENTAL GENERAL NOTES FOR THE GUARDIAN BARRIER**

1. The barrier units presented on this standard drawing (index) and the label GUARDIAN are proprietary designs by Safety Barrier Systems and are marketed under the trade name GUARDIAN Safety Barrier.
2. This index provides general schematics and information necessary to field identify the water filled polyethylene segmental barrier module and the module frame and basic connections, but does not identify the incorporation of the modules and frame connections into a whole system. Any use of the GUARDIAN must be in accordance with the details on the plans, or by shop drawing approval or by the Engineer in absence of plan detail.
3. The GUARDIAN modules are approved for use on highways with all design speeds and only when the "GUARDIAN 350 Highway Kit" is incorporated throughout the system in use.
4. The GUARDIAN modules can be used only in a standalone system. i.e., not connected to other types of barrier systems.
5. The GUARDIAN can be used only as a longitudinal barrier on the State maintained highway system. Any longitudinal system must have a minimum of eleven (11) longitudinally connected modules (20 m) in advance of and following the length of need; in no case can the longitudinal run of barrier be less than 33 modules (60 m).

The approach end of the GUARDIAN must either extend to the outer limit of the clear zone; be shielded by a crash cushion; or, begin behind but not connected to another barrier or shielding feature.

6. The GUARDIAN system must be placed on a cross slope not exceeding 1:10, and located to provide a deflection distance between the system and hazards in accordance with the table below.

GUARDIAN BARRIER WITH 350 HIGHWAY KIT ESTIMATED BARRIER DEFLECTION ( METERS )					
Vehicle Speed km/h ( mph )	Vehicle Impact Angle ( Degrees )				
	25	20	15	10	5
≤70 ( ≤45 )	2.0	1.6	1.2	0.8	0.4
80 ( 50 )	2.5	2.0	1.5	1.0	0.5
90 ( 55 )	2.9	2.4	1.8	1.2	0.6
100 ( 60 )	3.4*	2.8	2.1	1.4	0.7

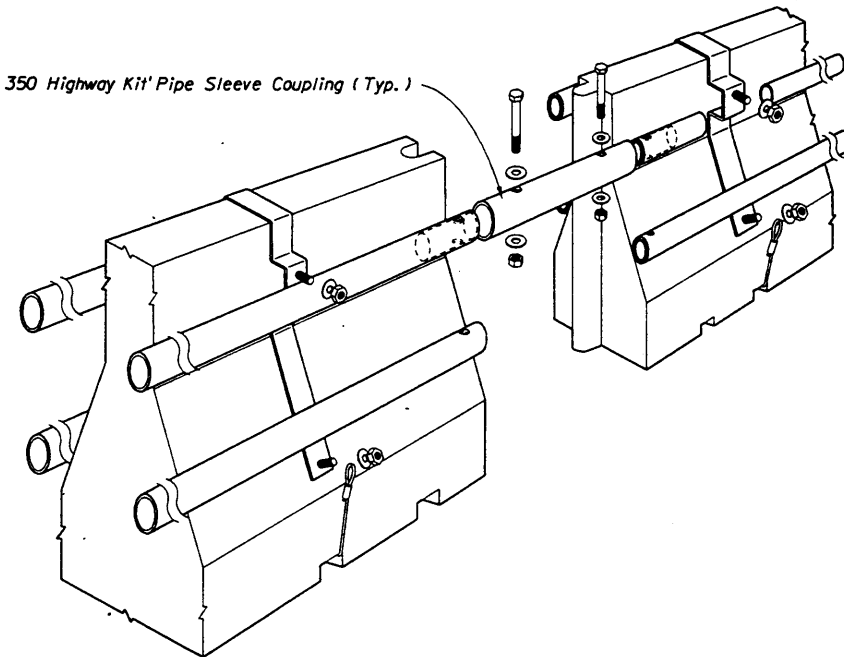
\* Observed Value ( Crash Test Result )  
Other Values Manufacturers Calculated Estimates

7. The GUARDIAN barrier system shall be paid for under the contract unit price for Barrier ( Temporary ) ( Water Filled ), MI, or Barrier ( Temporary ) ( Optional ), MI, and shall be full compensation for furnishing and installing GUARDIAN barrier in accordance with this index, with the plans and with the manufacturer's detailed drawings, procedures and specifications. Any crashworthy end terminal, crash cushion or other shielding required for use of the GUARDIAN barrier will not be included in the contract unit price for the barrier.

**SUPPLEMENTAL DESIGN NOTES FOR THE GUARDIAN BARRIER**

1. At time of publication of this standard no crash test data was available to provide a crashworthy end terminal design using the barrier modules; only the requirement for eleven (11) interconnected modules preceding and following the length of need, based on available crash test data.
2. Systems included in any maintenance of traffic plan will require detailed location and placement information.
3. Currently the Department does not recognize other proprietary items as being equally suitable alternatives to the GUARDIAN barrier, and until such alternatives are available, the GUARDIAN barrier need not be bid against other proprietary items.

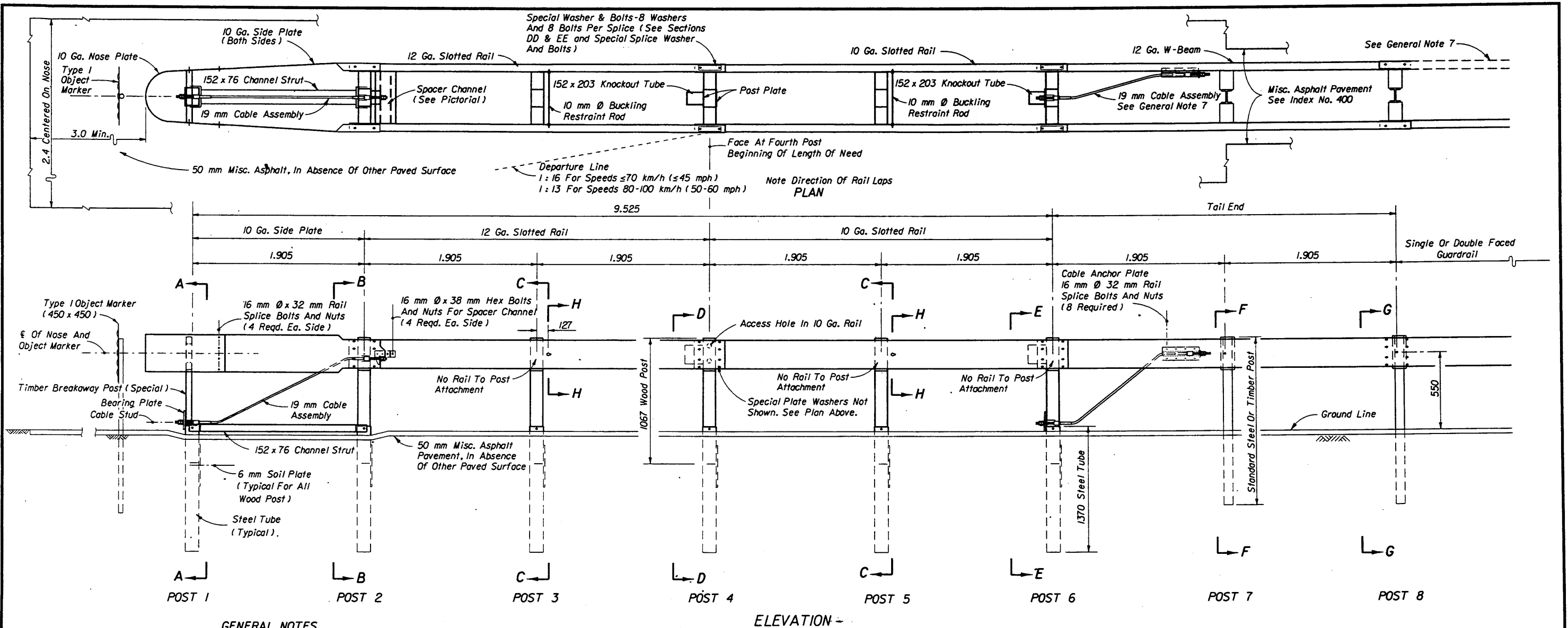
'GUARDIAN 350 Highway Kit' Pipe Sleeve Coupling (Typ.)



**GUARDIAN BARRIER WITH 350 HIGHWAY KIT**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>TEMPORARY WATER FILLED BARRIERS</b>				
Designed By	MFG/MKH	6/95	Approved By	<i>[Signature]</i>
Drawn By	MKH	6/95	State Roadway Design Engineer	
Checked By	JGC	6/95	Revision	5 of 5
			98	416





**GENERAL NOTES**

1. The energy absorbing system represented on this standard drawing is a proprietary design by SYRO Inc. and marketed under the trade name C-A-T 350, short for Crash Cushion/Attenuating Terminal. Any infringement on the rights of the designer shall be the sole responsibility of the user.
2. This standard drawing is produced by the Florida Department Of Transportation solely for use by the Department and its assignees. This standard drawing provides the general graphics and information necessary to field identify component parts of the C-A-T 350 system and their incorporation into a whole system.
3. This standard drawing is sufficient for plan details for the C-A-T 350 system installed in connection with standard single and double faced W-beam guardrail systems, and precludes the requirement for shop drawing submittals unless the plans otherwise call for such submittals.
4. The C-A-T 350 system shall be assembled and installed in accordance with the manufacturer's detailed drawings, procedures and specifications.
5. The C-A-T 350 system is suitable for speeds  $\leq 100$  km/h ( $\leq 60$  mph).
6. The C-A-T 350 system shall be located on slopes of 1:10 or flatter and not closer than 3.3 m to any traffic lane.
7. The 'tail end' section represented on this drawing applies to connections with single and double faced guardrail. The cable anchorage at Post No. 6 is to be used with single faced guardrail connections only.

Where the C-A-T 350 system is installed in conjunction with a rigid structure, a guardrail transition section shall be constructed between the C-A-T 350 system and the structure connection. The transition sections shown on Indexes 400 and 410 shall be constructed for connections to bridge concrete traffic rails and roadway concrete barrier walls; transition sections for connections to other rigid structures shall be as detailed in the plans and/or as approved by shop drawings.

**ELEVATION**

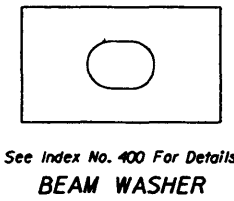
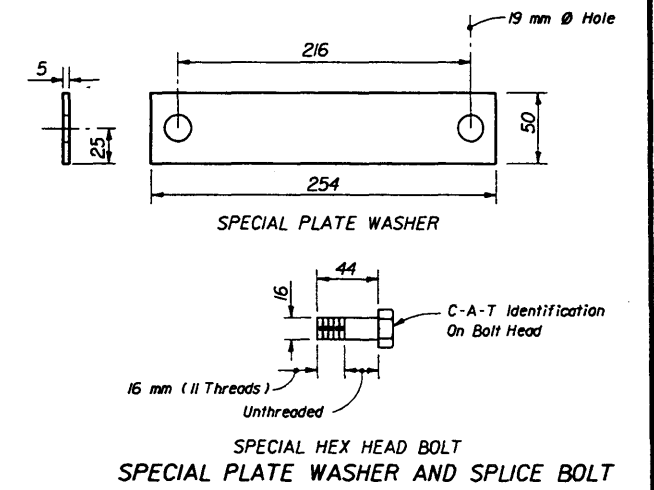
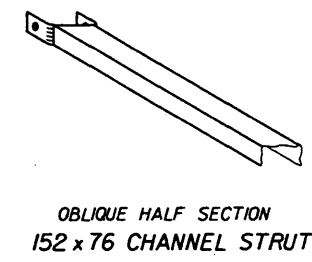
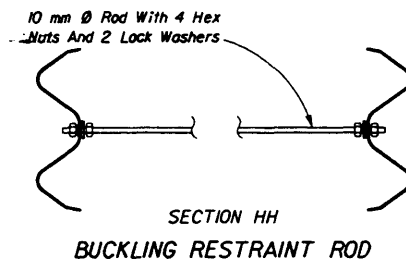
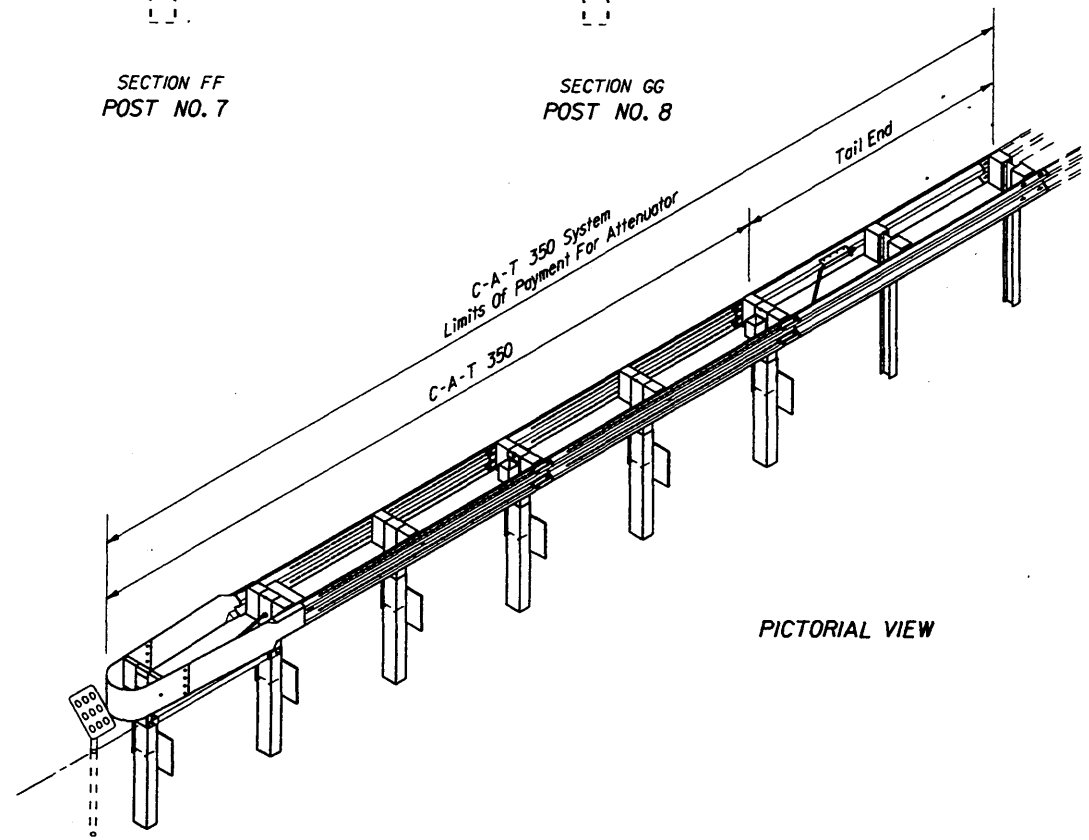
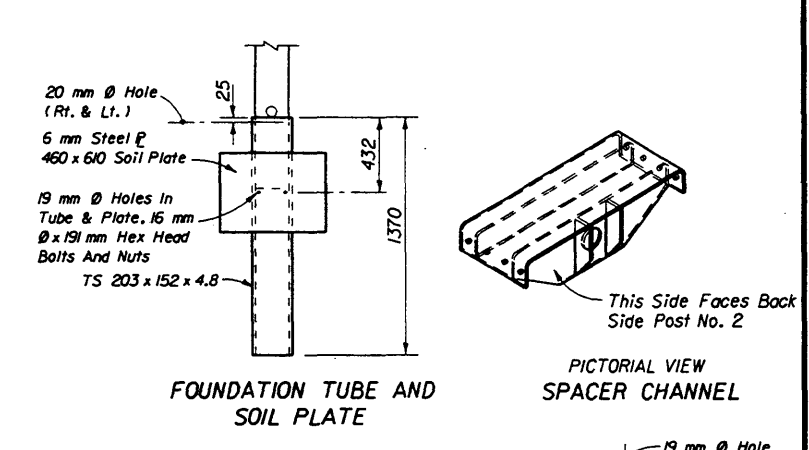
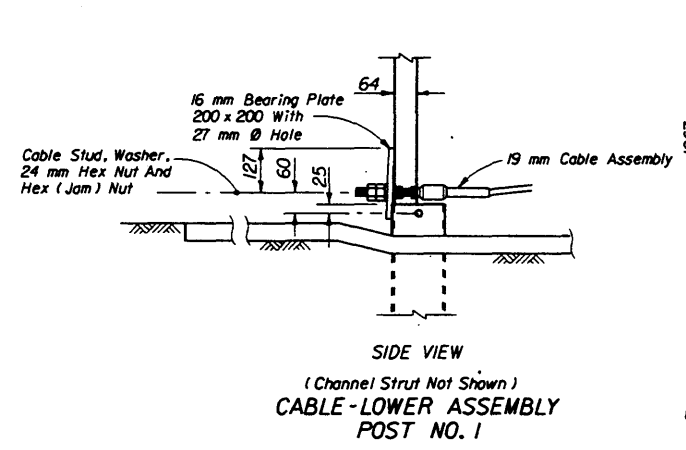
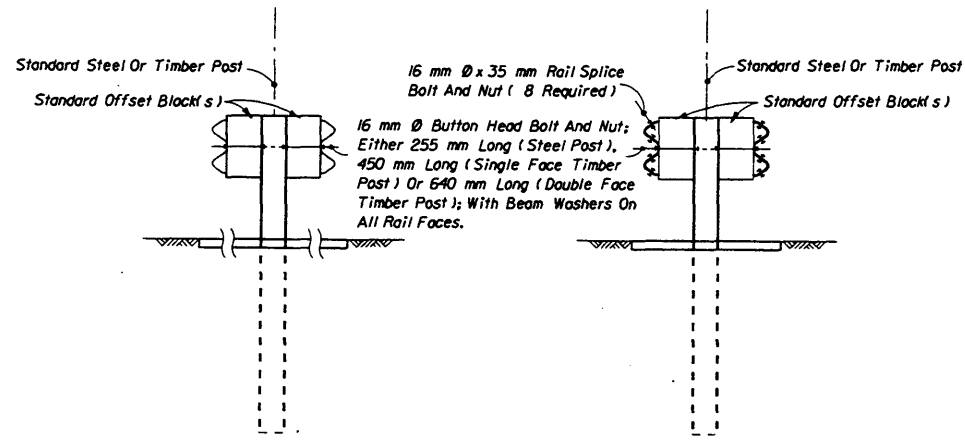
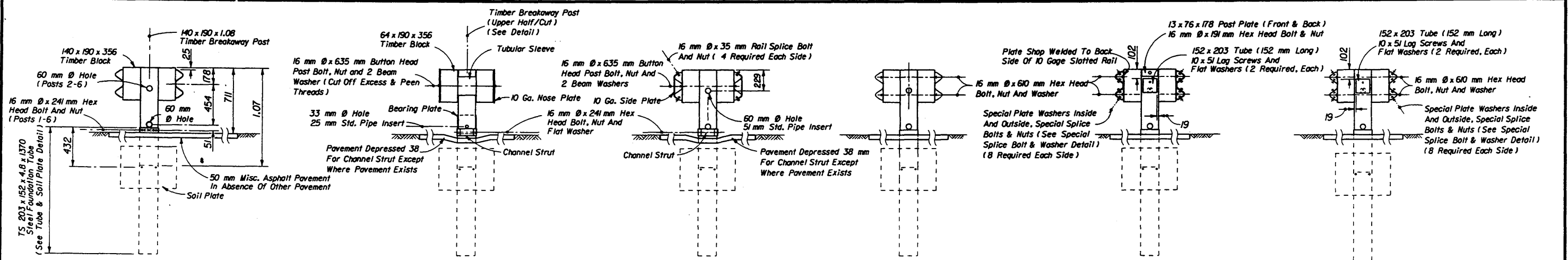
8. Metallic components shall meet the galvanizing requirements for guardrail, Index No. 400.
9. A yellow Type I Object Marker shall be centered 1.0 m in front of the nose of the C-A-T 350 system. Mounting hardware shall be in conformance with Index No. 11860 and 11865. The cost of the Object Marker shall be included in the cost of the C-A-T 350.
10. The C-A-T 350 system for single and double faced guardrail applications will be paid for the under the contract unit price for Impact Attenuator Vehicular (CAT), EA.

**DESIGN NOTES AND GUIDELINES**

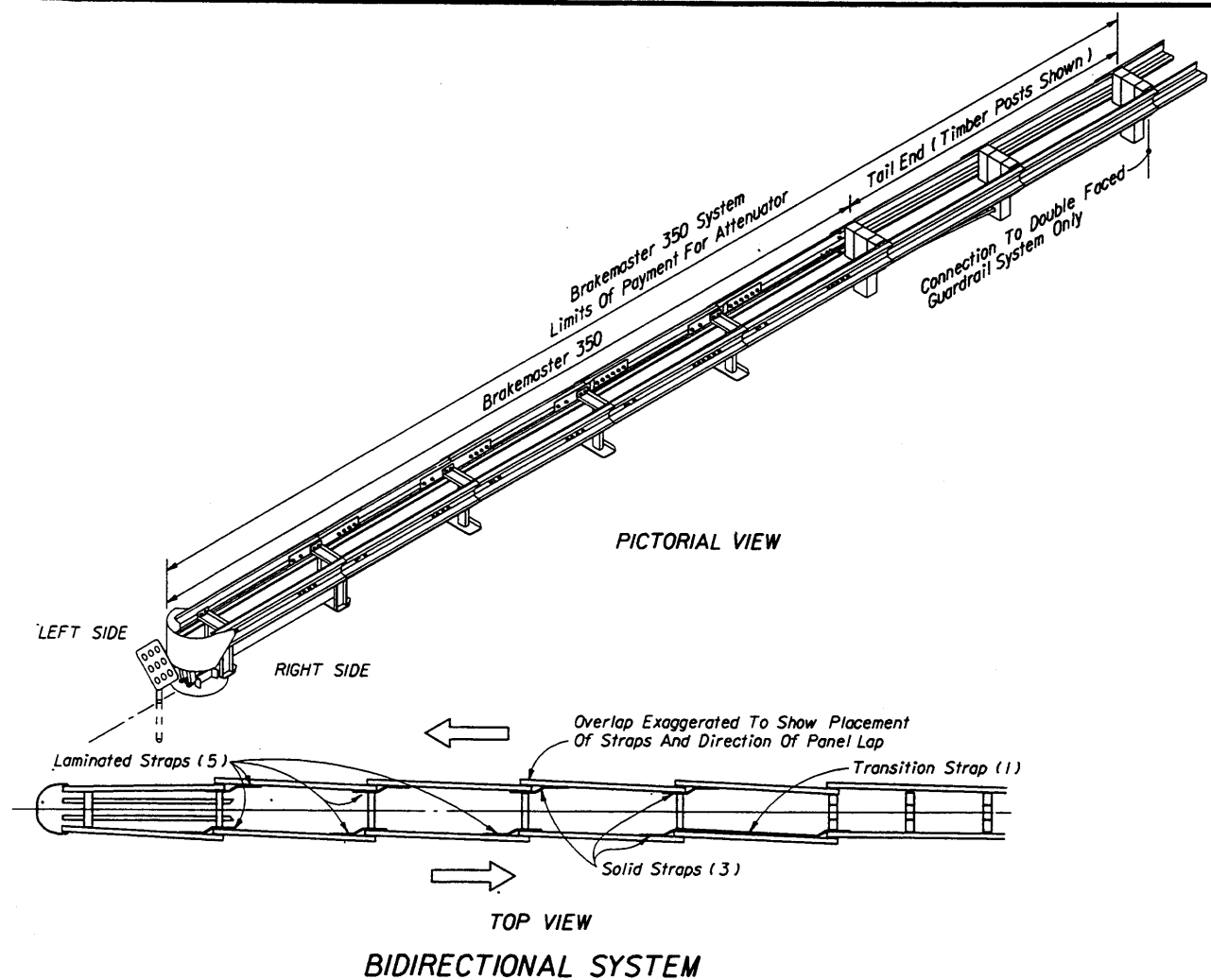
1. The C-A-T 350 system is designed to cushion automobile end-on hits and to redirect automobiles from side hits when impacting at speeds up to and including 100 km/h. The C-A-T 350 system has a singular design for all speeds of 100 km/h or less, and any adjustment to its design will not be permitted except as authorized by the manufacturer.
2. The C-A-T 350 system is not intended for use in gores of freeway and expressway mainline ramp terminals; gores of roadway forks; or other gore locations where there is a history of high frequency vehicle departure from the roadway or the potential exists for such departures. The C-A-T 350 system is not a restorable design and therefore requires complete replacement after having sustained either an end-on or a side vehicular impact. Deformed side rail elements that will inhibit the shearing of lands between the rail slots will be subfunctional and are to be replaced immediately; deformed elements are not to be refurbished for reuse.
3. Currently the Department does not recognize other proprietary items as being equally suitable alternatives to the C-A-T 350, and until such alternatives are available, the C-A-T 350 need not be bid against other proprietary items.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>C-A-T 350</b>				
Designed By	MFG/JMG	7/91	Approved By	<i>[Signature]</i>
Drawn By	HSD	7/91	Revision	00
Checked By	JMG/REB	7/91	Sheet No.	1 of 2
			Index No.	432

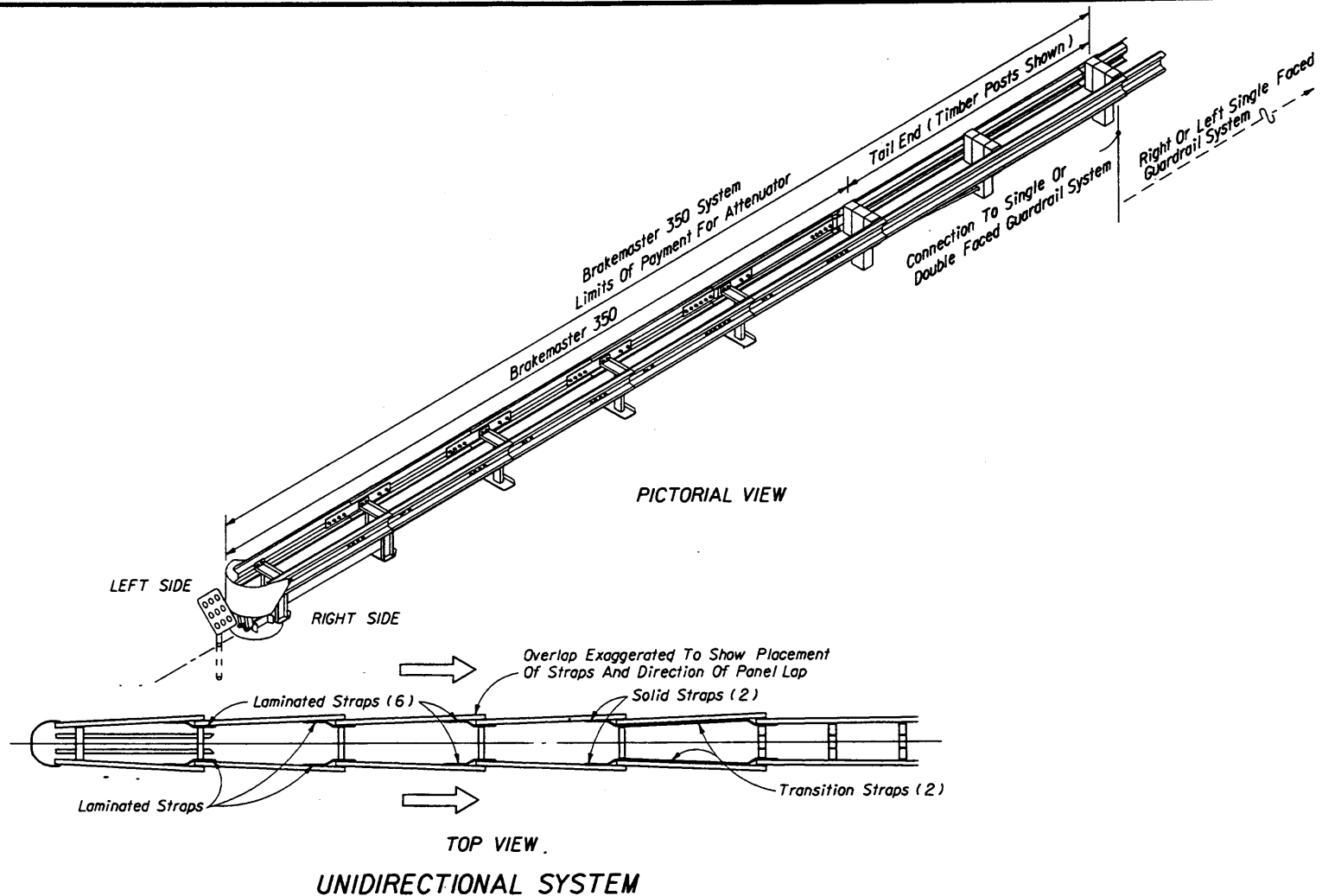




STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>C-A-T 350</b>					
Names	Dates	Approved By: <i>[Signature]</i>			
Designed By: MFG/JG	7/91	State Roadway Design Engineer			
Drawn By: NSD	7/91	Revision	Sheet No.	Index No.	
Checked By: JNG/RER	7/91	00	2 of 2	432	



**BIDIRECTIONAL SYSTEM**



**UNIDIRECTIONAL SYSTEM**

**GENERAL NOTES**

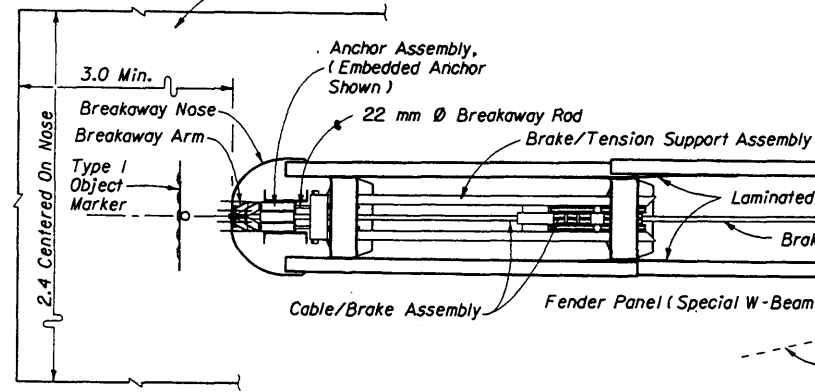
1. The energy absorbing system represented on this standard drawing is a proprietary design by Energy Absorption Systems, Inc. and marketed under the trade name Brakemaster 350. Any infringement on the rights of the designer shall be the sole responsibility of the user.
2. This standard drawing is produced by the Florida Department Of Transportation solely for use by the Department and its assignees. This standard drawing provides the general information and graphics necessary to field identify component parts of the Brakemaster 350 system and their incorporation into a whole system.
3. This standard drawing is sufficient for plan details for the Brakemaster 350 system installed in connection with standard single and double faced W-beam guardrail systems, and precludes the requirement for shop drawing submittals unless the plans otherwise call for such submittals.
4. The Brakemaster 350 system shall be assembled and installed in accordance with the manufacturer's detailed drawings, procedures and specifications.
5. The Brakemaster 350 system is suitable for speeds  $\leq 100$  km/h ( $\leq 60$  mph).
6. The Brakemaster 350 system shall be located on slopes of 1:10 or flatter and not closer than 3.3 meters to any traffic lane.
7. The 'tail end' section represented on this drawing applies to connections with single and double faced guardrail. Where the Brakemaster 350 system is installed in conjunction with safety shaped or vertical faced barrier walls or other rigid structures, a special transitional guardrail section between the Brakemaster 350 and wall or structure shall be as detailed on Index No. 410 or as approved by shop drawings.
8. Metallic components shall meet the galvanizing requirements for guardrail, Index No. 400.
9. A yellow Type I Object Marker shall be centered 1.0 m in front of the nose of the Brakemaster 350 system. Mounting hardware shall be in conformance with Index No. 11860 and 11865. The cost of the Object Marker shall be included in the cost of the BRAKEMASTER 350.
10. The Brakemaster 350 system will be paid for under the contract unit price for Impact Attenuator Vehicular (Brakemaster), EA.

**DESIGN NOTES AND GUIDELINES**

1. The Brakemaster 350 system is designed to cushion automobile end-on hits and to redirect automobiles from side hits when impacting at speeds up to and including 100 km/h. The Brakemaster 350 system has a singular design for all speeds of 100 km/h or less, and any adjustment to its design will not be permitted except as authorized by the manufacturer.
2. The Brakemaster 350 system is specially designed to shield both narrow hazards and the ends of other fixed barriers located in low frequency impact areas. The Brakemaster 350 system is not intended for use in gores of freeways and expressway mainline ramp terminals; gores of roadway forks; and, other gore locations where there is a history of high frequency vehicle departures from the roadway or the potential exists for such departures. The Brakemaster 350 system is not a restorable design and therefore requires complete replacement after having sustained either an end-on or a side vehicular impact. Deformed side rail elements of the Brakemaster 350 will be subfunctional and are to be replaced immediately; deformed elements are not to be refurbished for reuse. When replacing an impacted Brakemaster 350 system the cable/brake assembly is not to be reused, if the cable sleeve is exposed. After vehicle impact on the Brakemaster 350 system the cable/brake assembly can be returned to the manufacturer for credit toward replacement of the cable.
3. Currently the Department does not recognize other proprietary items as being equally suitable alternatives to the Brakemaster 350, and until such alternatives are available, the Brakemaster 350 need not be bid against other proprietary items.

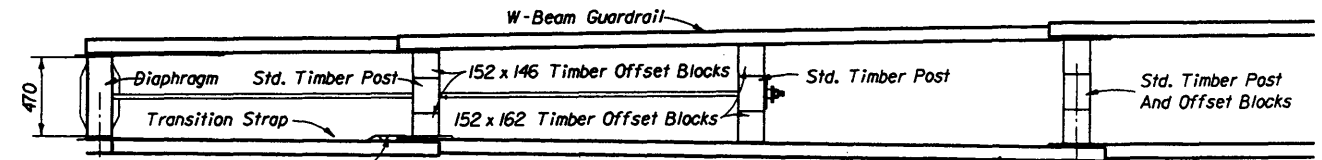
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>BRAKEMASTER 350</b>				
Designed By	MFG/MC	7/91	Approved By	<i>[Signature]</i>
Drawn By	HSD	7/91	Revision	Sheet No. Index No.
Checked By	JVC	7/91	00	1 of 4 433

50 mm Misc. Asphalt, In Absence Of Other Paved Surface



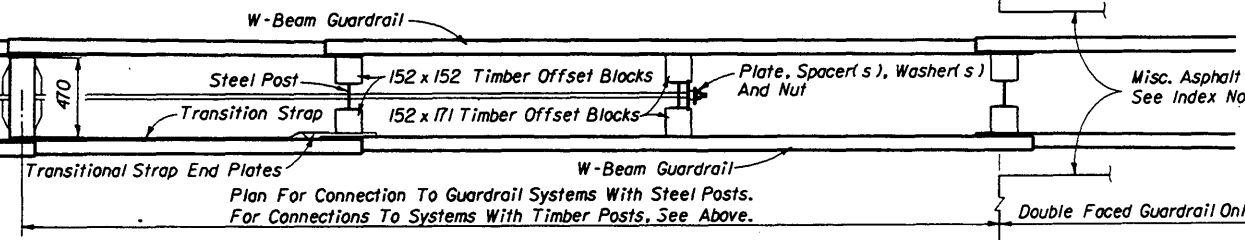
Departure Line  
 1:16 For Speeds ≤70 km/h (≤45 mph)  
 1:13 For Speeds 80-100 km/h (50-60 mph)

PLAN



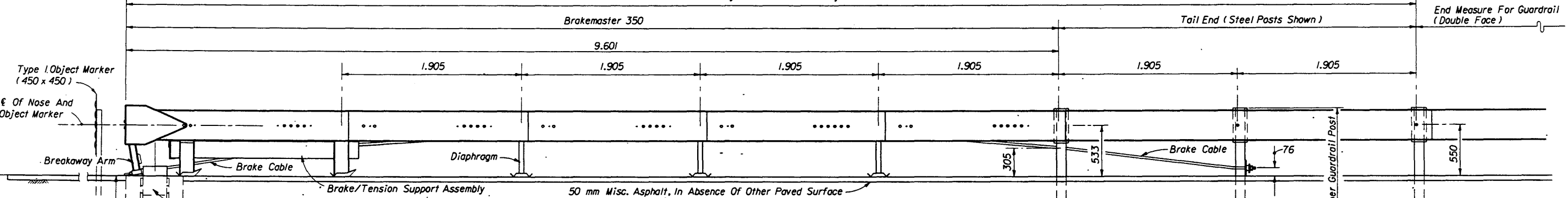
Plan Modification For Connection To Guardrail With Timber Posts (Not Intended For Concrete Barrier Wall Application)

PLAN



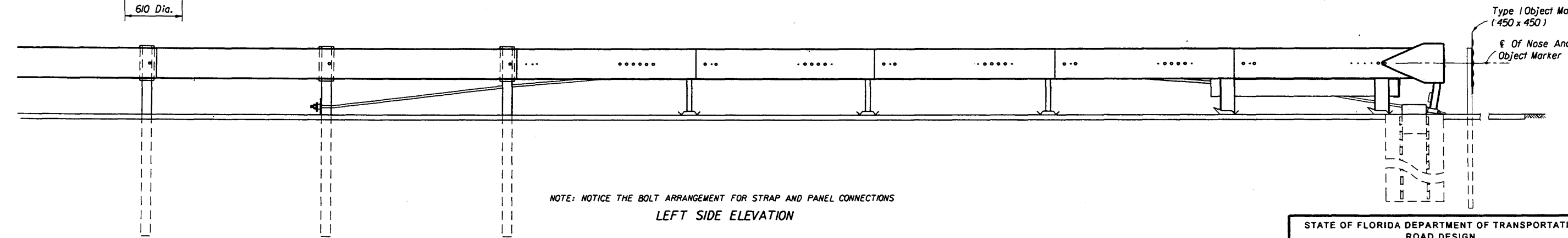
Plan For Connection To Guardrail Systems With Steel Posts. For Connections To Systems With Timber Posts, See Above.

Brakemaster 350 System - Limits Of Payment For Attenuator



NOTE: NOTICE THE BOLT ARRANGEMENT FOR STRAP AND PANEL CONNECTIONS

RIGHT SIDE ELEVATION



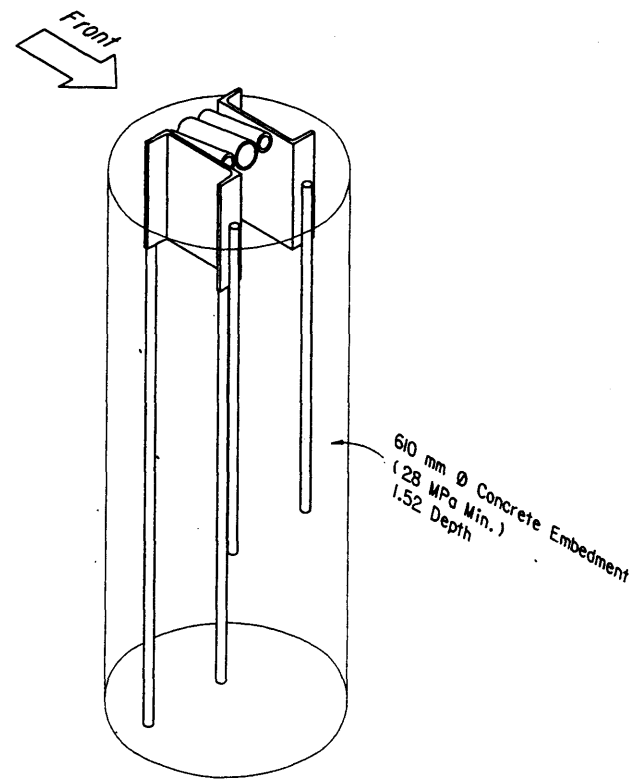
NOTE: NOTICE THE BOLT ARRANGEMENT FOR STRAP AND PANEL CONNECTIONS

LEFT SIDE ELEVATION

**BIDIRECTIONAL SYSTEM**

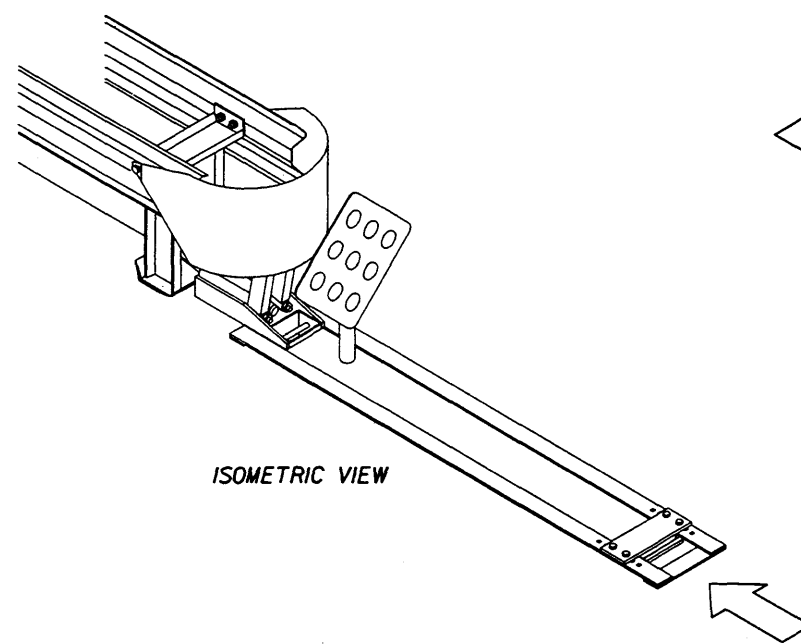
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>BRAKEMASTER 350</b>				
Names	Date	Approved By		
Designed By	MFG/JVG	7/91	 State Roadway Design Engineer	
Drawn By	HSD	7/91		
Checked By	JVG	7/91		
Revision		00	Sheet No.	2 of 4
				Index No.
				433



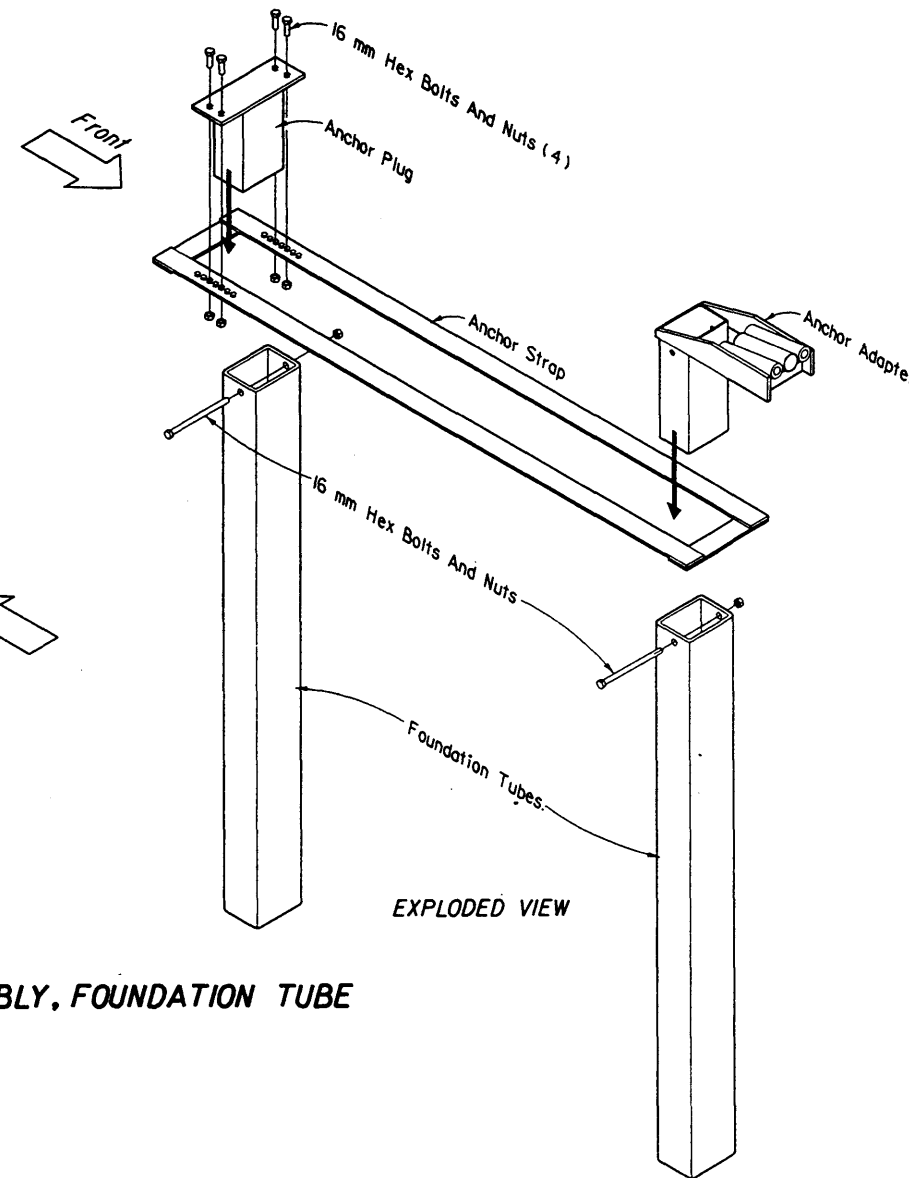


ISOMETRIC VIEW

ANCHOR ASSEMBLY, EMBEDDED BRS

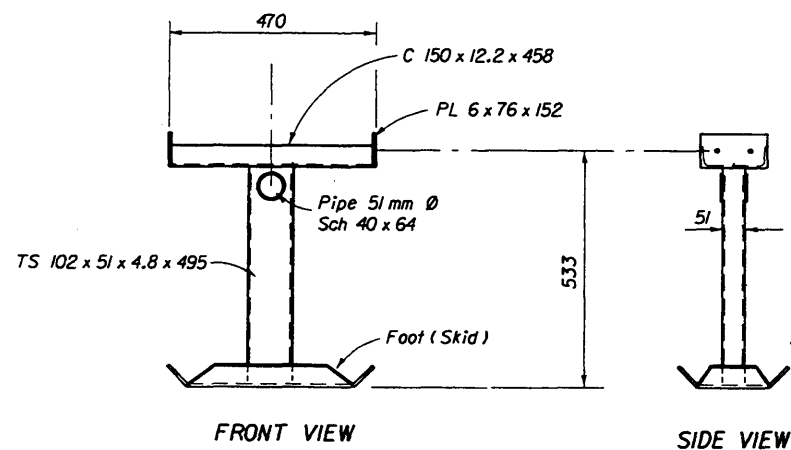


ISOMETRIC VIEW



EXPLODED VIEW

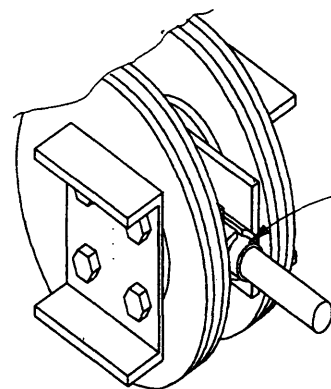
ANCHOR ASSEMBLY, FOUNDATION TUBE



FRONT VIEW

SIDE VIEW

DIAPHRAGM, BRS



Cable Replacement Required When Cable Sleeve Exposed. See "Design Notes And Guidelines", Note No. 2, For Additional Information.

BRAKE/CABLE REPLACEMENT

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>BRAKEMASTER 350</b>				
Names	Date	Adapted By		
Designed By	MFG/JMG	7/91	State Roadway Design Engineer	
Drawn By	MSD	7/91	Revision	Sheet No. (Index No.)
Checked By	JMG	7/91	98	4 of 4 433



## GENERAL NOTES

- The energy absorbing system represented on this standard drawing is a proprietary design by Energy Absorption Systems, Inc. and marketed under the trade name, QuadGuard. Any infringement on the rights of the designer shall be the sole responsibility of the user.
- This standard drawing is produced by the Florida Department Of Transportation solely for use by the Department and its assignees. This standard drawing provides the general graphics and information necessary to field identify component parts of the QuadGuard System and their incorporation into a whole system.
- This standard drawing is sufficient for plan details for the QuadGuard installed as a free standing system or installed in connection with concrete barrier walls and other fixed barrier systems, and precludes the requirement for shop drawing submittals unless the plans otherwise call for such submittals.  
  
The QuadGuard tension strut backup is the primary backup to be used on Florida Department Of Transportation projects. Use of concrete backups will be permitted, but will require call out and detailing in the plans for site specific construction; concrete backups must meet manufacturers specifications, installation guidelines and transition hardware requirements.
- The QuadGuard shall be assembled and installed in accordance with the manufacturers detailed drawings, procedures and specifications.
- The QuadGuard is available in 610, 760, and 915 mm nominal widths for narrow hazards and 1755 and 2285 mm nominal widths for wide hazards. The system width will be as called out in the plans, permit or other contract document for each location.
- Only the QuadGuard Type I and Type II cartridges shall be used in bay and nose locations as described in the 'BAY SELECTION GUIDELINES' table.
- Cement concrete foundations and cement concrete backup assemblies shall be constructed with 28 MPa min. compressive strength concrete.
- The QuadGuard shall be constructed on cross slopes 1 : 10 or flatter.
- All metallic components shall meet the galvanizing requirements for guardrail, Index No. 400.
- A yellow Type I Object Marker shall be centered 1.0 m in front of the nose of the QuadGuard. Mounting hardware shall be in conformance with Index Nos. 11860 and 11865. The cost of the Object Marker shall be included in the cost of the QuadGuard.
- Quantity for payment is based on each independent location as called for in the plans or as directed by the Engineer. The cost for foundations, subgrade preparation and miscellaneous asphalt shown on this index will be included in the cost for the QuadGuard system. The permanent QuadGuard System will be paid for under the contract unit price for Impact Attenuator Vehicular (QuadGuard), EA; temporary units will be paid for under the contract unit price for Vehicular Impact Attenuator (Temporary) (QuadGuard), LO, or when the QuadGuard system is used as an option in accordance with Index No. 415, it will be paid for under contract unit price for Vehicular Impact Attenuator (Temporary) (Redirective Option), LO.

## DESIGN NOTES AND GUIDELINES

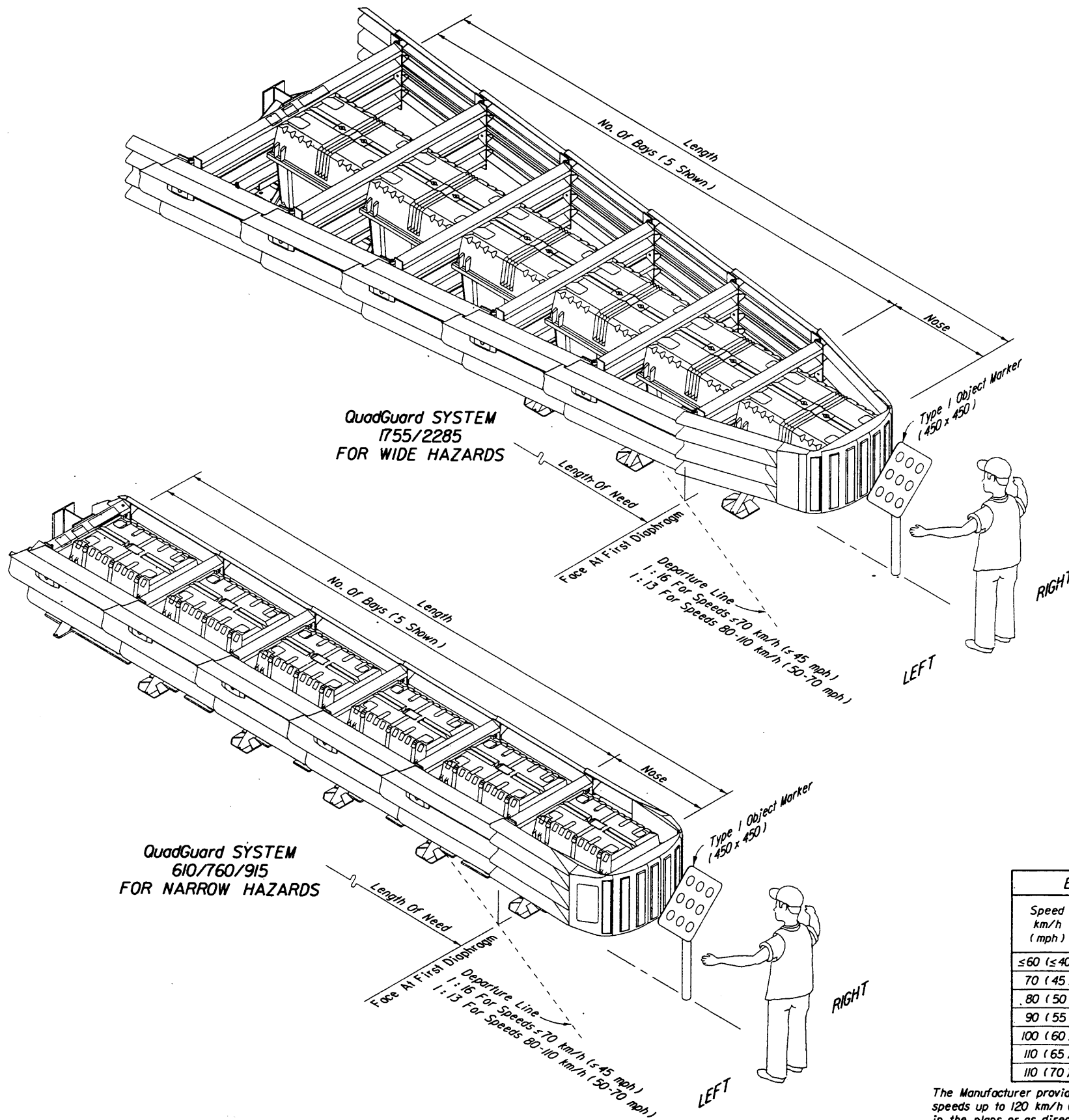
- The QuadGuard System is designed to cushion automobile end-on hits and to redirect automobiles from side hits. The QuadGuard is designed to shield fixed hazards or the ends of other temporary and permanent barrier systems. The number of bays to be used in a specific unit will be determined by the design speed, except where the Engineer determines that another speed is more applicable. The unit width will be determined by the width of the object to be shielded or by the connecting barrier system. The backup assembly for a specific unit will be determined by either (a) the unit standing free of the object to be shielded or (b) the barrier system(s) to which it is connected.
- The QuadGuard is a restorable system that is particularly suited to shielding hazards subject to high speed traffic, high volume traffic, and/or traffic with a history of frequent errant vehicle departures from the roadway or the potential exists for such departures. The QuadGuard is particularly suited to shielding hazards where the approach space is limited; and, is particularly suited to conditions where the terminal must be located close to the traffic lane.
- Currently the Department does not recognize other proprietary items as being equally suitable alternatives to the QuadGuard, and until such alternatives are available, the QuadGuard need not be bid against other proprietary items. However, for temporary use where the QuadGuard and other approved redirective crash cushions meet or exceed the minimum requirements for a specific location, the approved crash cushions will be considered optional systems and paid for as described in General Note 11 above.

## BAY SELECTION GUIDELINES

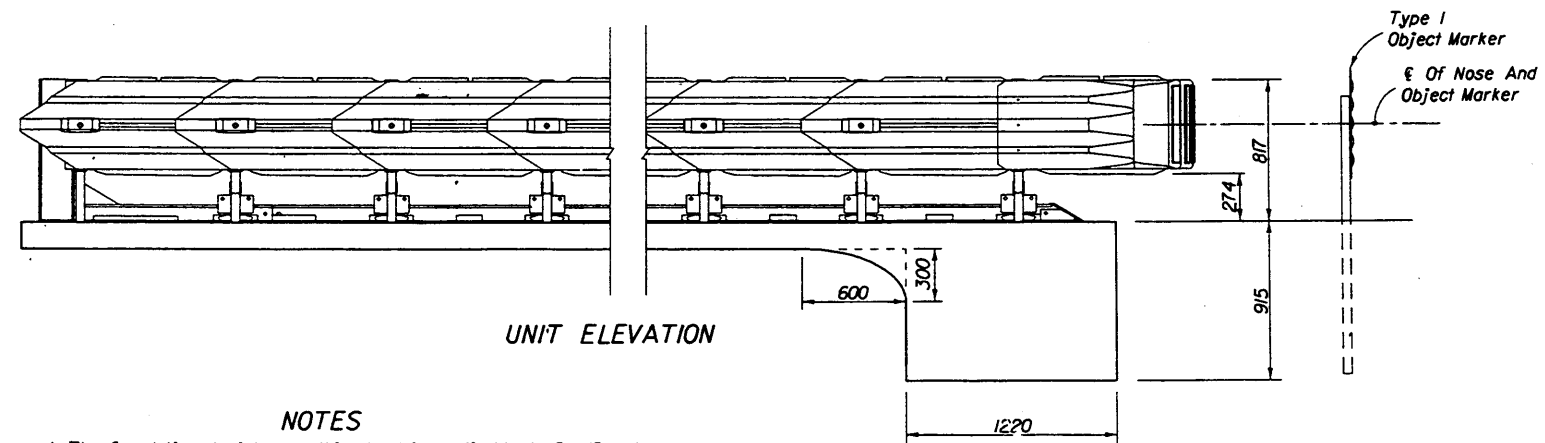
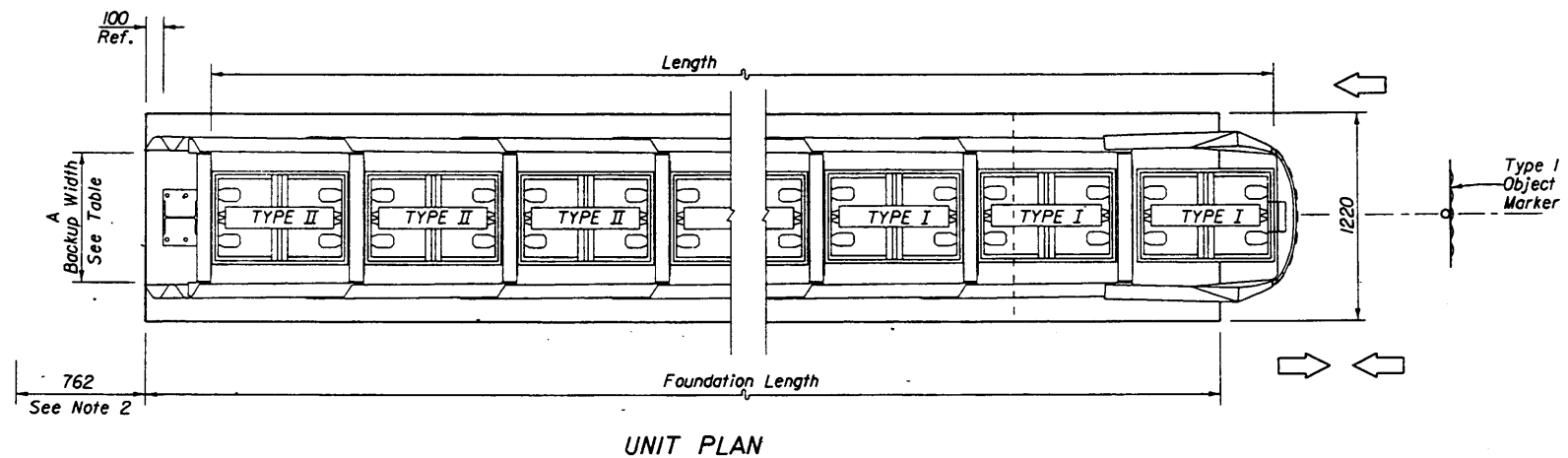
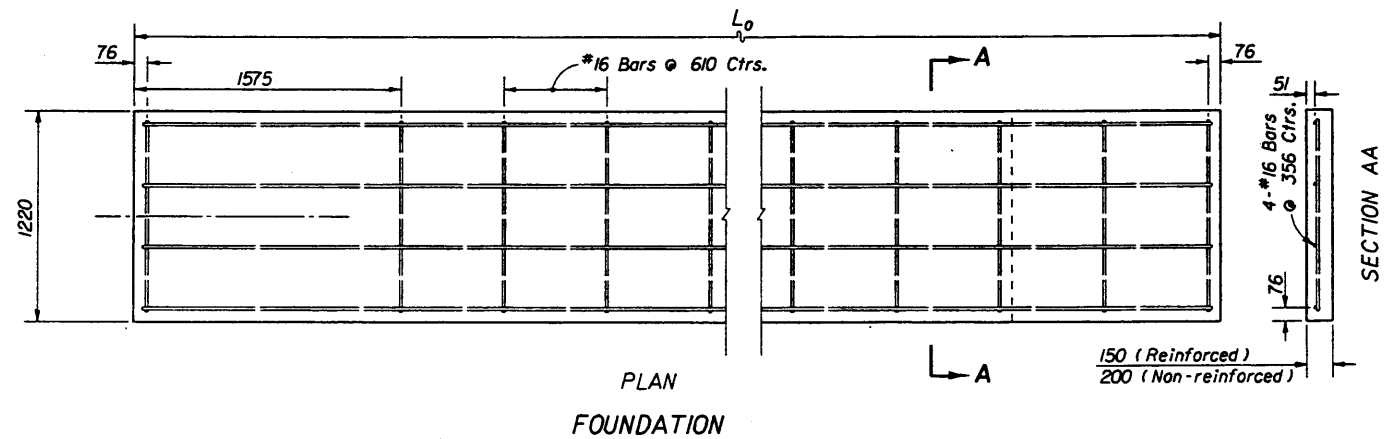
Speed km/h (mph)	No. Of Bays	Number Of Cartridges		Length (m)
		Type I (Front)	Type II (Rear)	
≤60 (≤40)	2	2	1	2.64
70 (45)	3	3	1	3.56
80 (50)	4	3	2	4.47
90 (55)	5	4	2	5.38
100 (60)	6	4	3	6.30
110 (65)	7	4	4	7.23
110 (70)	9	4	6	9.04

The Manufacturer provides QuadGuard units with up to 12 bays designed for use with speeds up to 120 km/h (75 mph). These larger units may be utilized when called for in the plans or as directed by the Engineer.

## GENERAL SYSTEM FEATURES AND BAY SELECTION GUIDELINES



STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>QuadGuard</b>				
Designed By	MFG/STD	Date	Approved By	<i>[Signature]</i>
Drawn By	HKH	Revision	Sheet No.	Index No.
Checked By	JVC	00	1 of 6	435



Nominal System Width	A (mm) (Backup Width)
610	610
760	760
915	915
1755	1620
2285	2100

ESTIMATED FOUNDATION QUANTITIES For Informational Purposes Only				
No. Of Bays	L <sub>0</sub> (m)	REINFORCED		NON-REINFORCED
		Rebar Required (m)	Concrete Required (m <sup>3</sup> )	Concrete Required (m <sup>3</sup> )
2	2.74	14.83	1.59	1.73
3	3.66	20.73	1.82	1.96
4	4.57	25.50	1.97	2.18
5	5.49	31.39	2.12	2.41
6	6.40	36.17	2.35	2.64
8	8.23	46.84	2.66	3.10
9	9.14	52.73	2.81	3.32

Note: Monorail anchorage bolt spacing to be in accordance with the manufacturers installation drawings and specifications.

**NOTES**

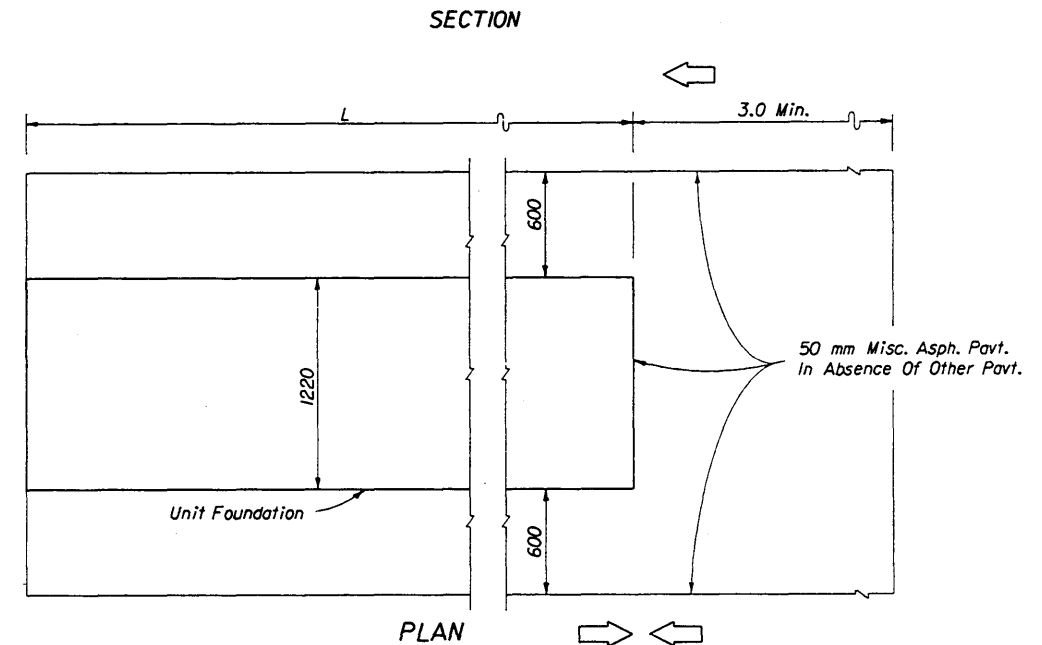
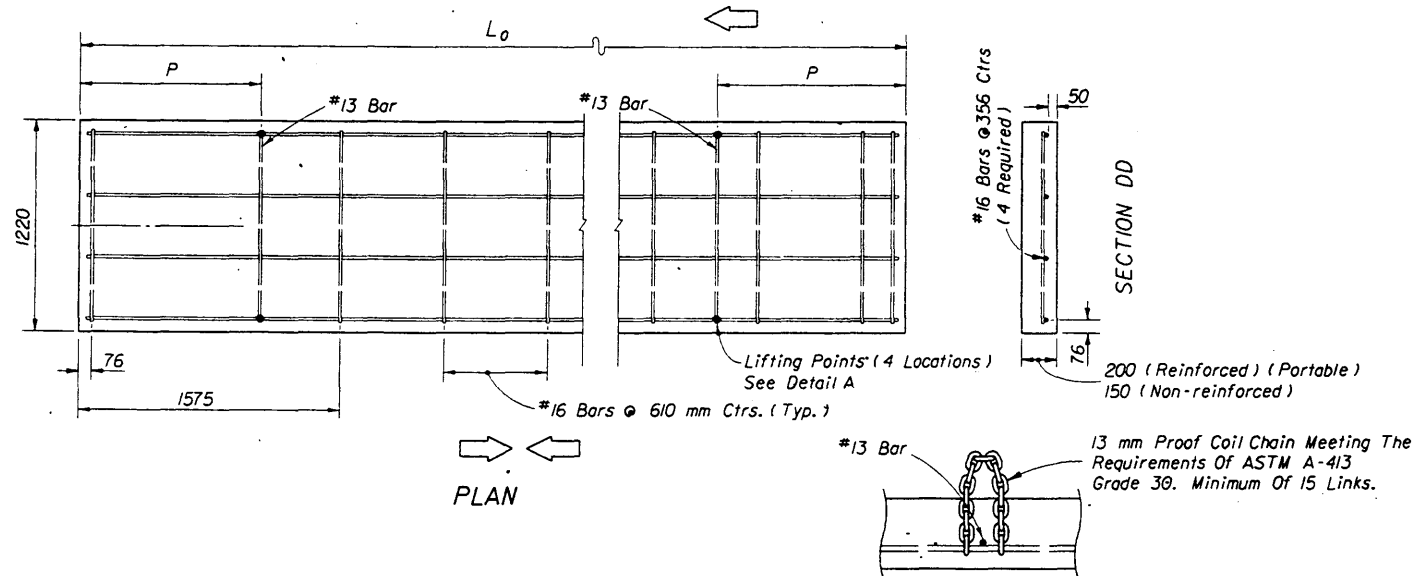
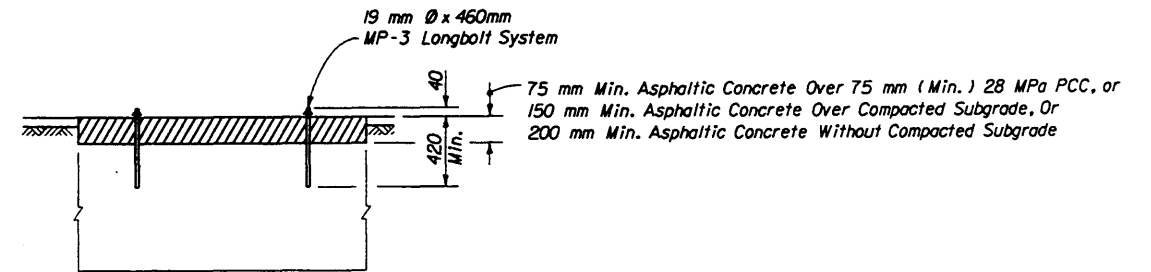
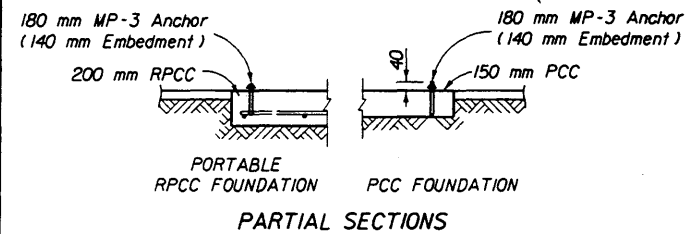
1. The foundation depicted on this sheet is applicable to QuadGuard systems for both narrow and wide hazards, 760 mm system shown.
2. For the number of bays required see table, Sheet 1.
3. Provision shall be made for rear fender panels to slide rearward upon impact 760 mm min.
4. For barrier connections see 'TRANSITIONS', Sheet Nos. 4 and 5.

**PERMANENT FOUNDATION FOR TENSION STRUT BACKUP ASSEMBLY**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
QuadGuard				
Names	Dates	Approved By		
Designed By	MFG/STD		State Roadway Design Engineer	
Drawn By	HKH		Revision	Sheet No.
Checked By	JYG	98	2 of 6	435



ESTIMATED FOUNDATION QUANTITIES For Informational Purposes Only					
No. Of Bays	L <sub>0</sub> (m)	P (m)	REINFORCED		NON-REINFORCED
			Rebar Required (m)	Concrete Required (m <sup>3</sup> )	Concrete Required (m <sup>3</sup> )
3	3.66	0.9	20.73	0.9	0.68
4	4.57	1.1	25.50	1.2	0.85
5	5.49	1.4	31.39	1.4	1.02
6	6.40	1.6	36.17	1.6	1.20
8	8.23	2.0	46.84	2.1	1.53
9	9.14	2.2	52.73	2.3	1.70



**RIGID FOUNDATION NOTES**

1. The reinforced portland cement concrete (RPCC) foundation is designed to make the temporary QuadGuard a transportable system. The slab foundation shall be constructed with 28 MPa min. compressive strength concrete. The slab shall be seated so the top of the slab is flush with the surface intended for approaching vehicles. In absence of other pavement the surrounding surface shall be paved with 50 mm of miscellaneous asphalt pavement as depicted in 'ASPHALTIC CONCRETE FOUNDATIONS'. The QuadGuard shall be anchored exclusively with the 180 mm MP-3 anchor system supplied with the QuadGuard unit, unless another anchor is supplied or approved by the QuadGuard manufacturer.

2. The nonreinforced portland cement concrete (PCC) foundation shall be Class I concrete, having depth equal to or greater than 150 mm. The PCC foundation utilization options are as follows: (a) Poured in place as an expendable slab, having a thickness of not less than 150 mm; disposal of the slab will be as approved by the Engineer, (b) Project constructed roadway PCC pavement, or, (c) Existing 230 mm PCC roadway pavement.

The utilization option applied shall be as approved by the Engineer on a site specific basis. The top of the foundation shall be flush with the surface intended for approaching vehicles. In absence of surrounding pavement the surrounding surface shall be paved as shown on this sheet in 'ASPHALTIC CONCRETE FOUNDATIONS'.

The QuadGuard installed on PCC pavement shall be anchored only with the MP-3 anchor system supplied with the QuadGuard unit. Holes for the 180 mm anchors shall be drilled in both existing and new pavements. When the QuadGuard is removed from the project pavement or from existing pavement that is to remain in place, the anchor shall be cut off flush with the top of the pavement, unless the plans call for other treatment.

3. For additional information see the General Notes.

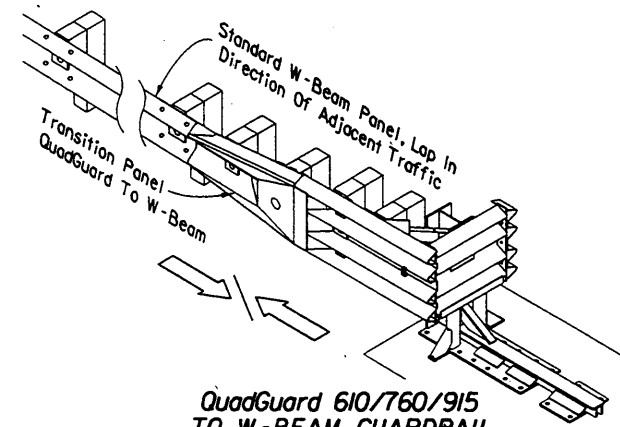
**REINFORCED AND NONREINFORCED CONCRETE PAD SYSTEMS  
CEMENT CONCRETE FOUNDATIONS**

**NOTES**

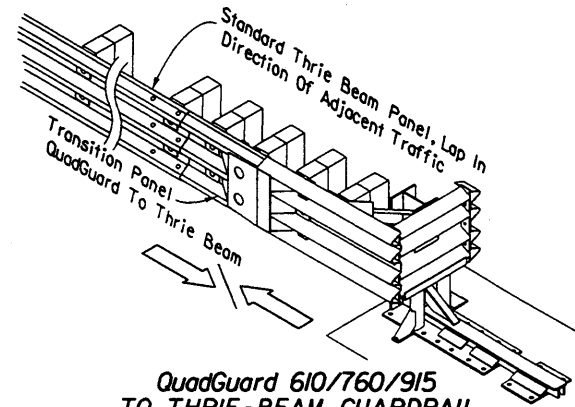
- For the number of bays required see table, Sheet 1.
- For barrier connections see 'TRANSITIONS', Sheet Nos. 4 and 5.

**TEMPORARY FOUNDATIONS**

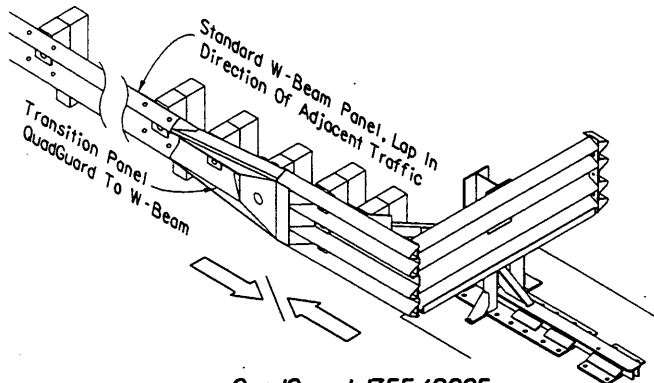
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>QuadGuard</b>				
Names	Dates	Approved By		
Designed By	MFG	[Signature] State Roadway Design Engineer		
Drawn By	HKH	8/97	Revision	Sheet No. / Index No.
Checked By	JVG	8/97	98	3 of 6 / 435



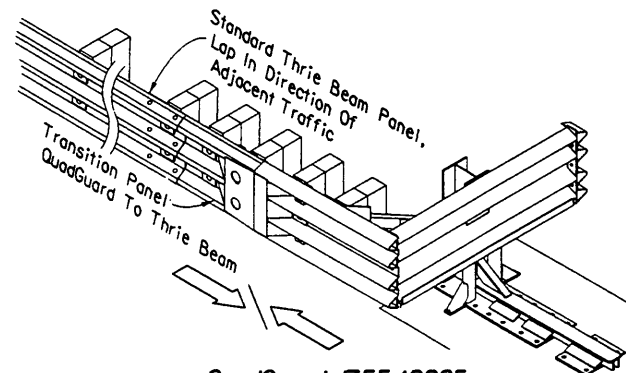
**QuadGuard 610/760/915 TO W-BEAM GUARDRAIL**



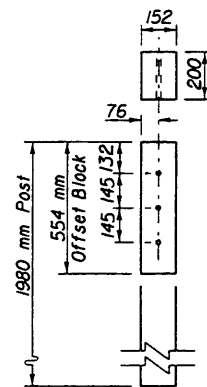
**QuadGuard 610/760/915 TO THRIE-BEAM GUARDRAIL**



**QuadGuard 1755/2285 TO W-BEAM GUARDRAIL**



**QuadGuard 1755/2285 TO THRIE-BEAM GUARDRAIL**

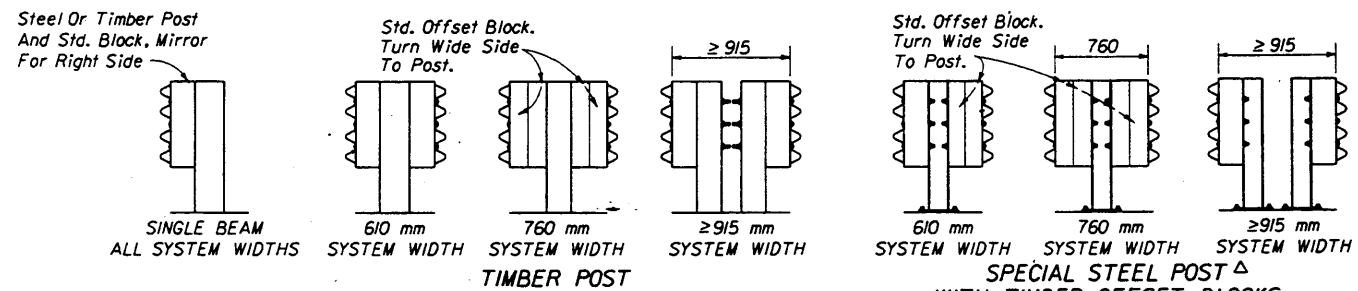


**TIMBER**

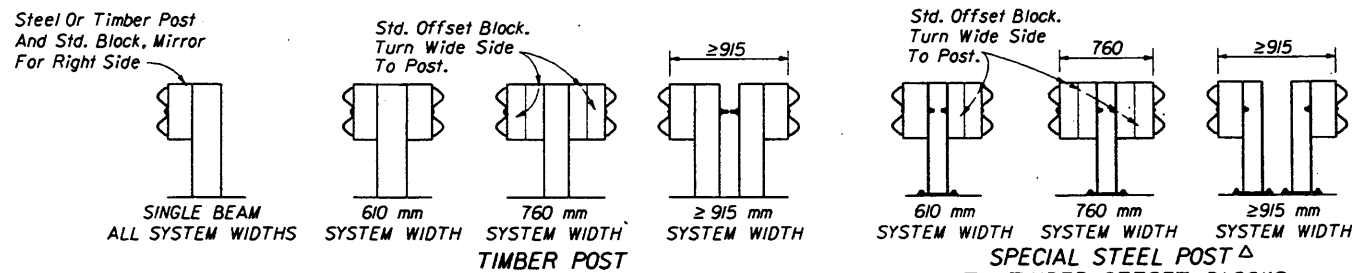
**NOTES**

1. All Holes 20 mm Ø.
2. When using a special steel post with a timber offset block at location #2, field drill matching attachment holes in block and in post flange. When drilling special steel posts metalize holes in accordance with Index No. 400.
3. For double face guardrail applications with special steel posts and 610 or 760 mm system widths, and, with timber posts and 760 mm system widths, turning wide side of standard offset block to post or field trimming will be required, see Sections right.

**POSTS AND OFFSET BLOCKS FOR LOCATIONS #1 AND #2**

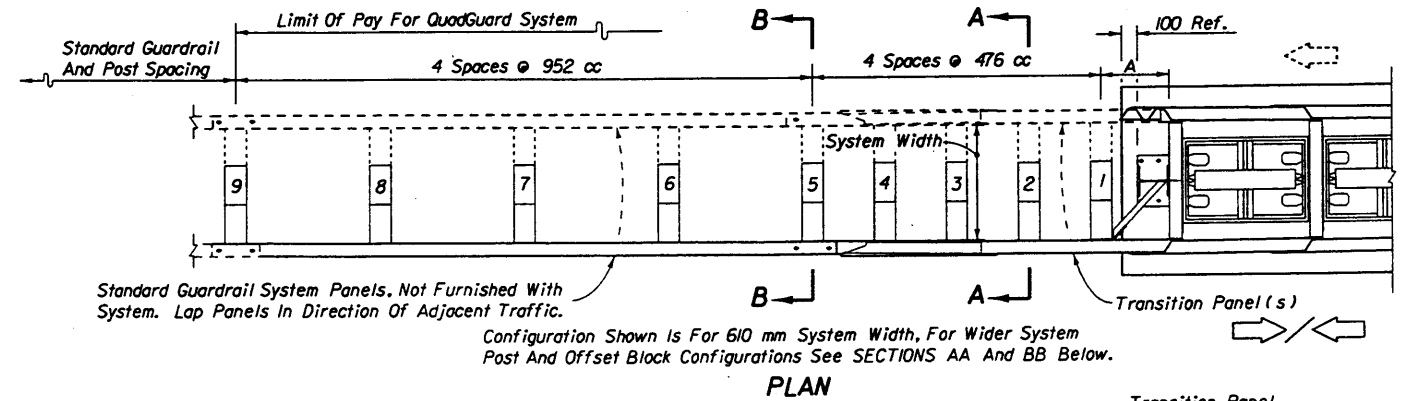


See Post And Offset Block Details Left  
**SECTION AA (POSTS #1 AND #2)**



Post And Offset Block Configurations Are Identical For W-beam Or Thrie-beam, W-beam Shown  
**SECTION BB (POSTS #3 THRU #9)**

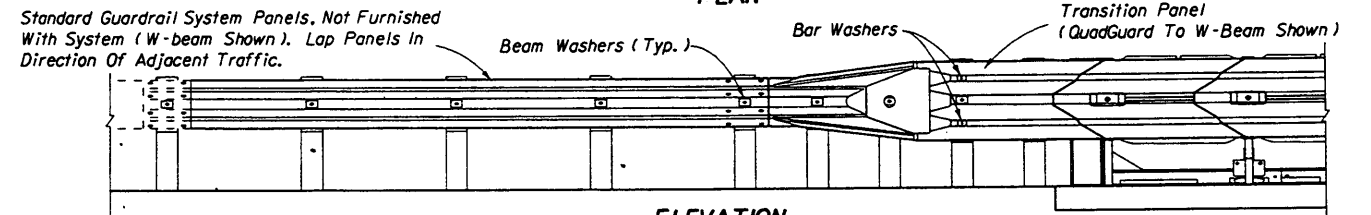
**QuadGuard TO GUARDRAIL TRANSITIONS**



Standard Guardrail System Panels, Not Furnished With System. Lap Panels In Direction Of Adjacent Traffic.

Configuration Shown Is For 610 mm System Width, For Wider System Post And Offset Block Configurations See SECTIONS AA And BB Below.

**PLAN**



**ELEVATION**

**NOTES**

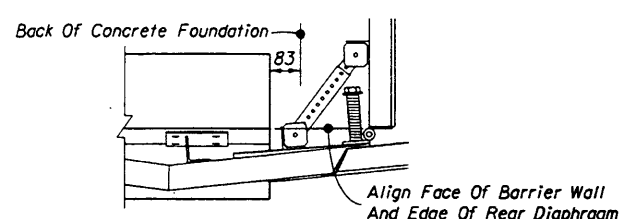
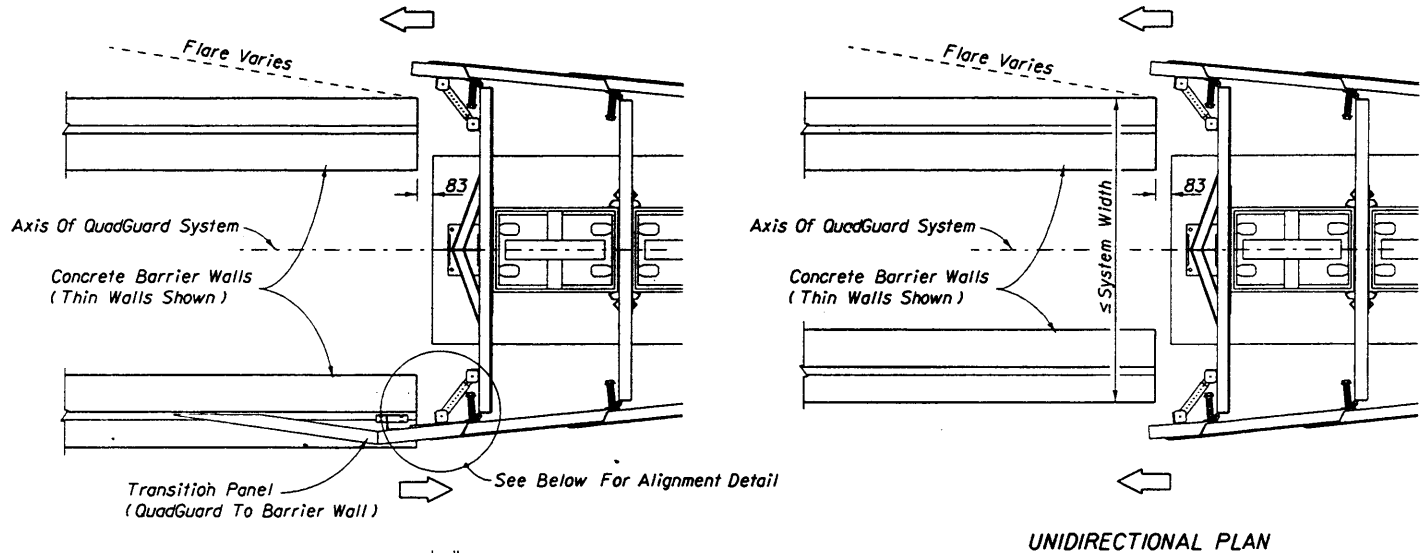
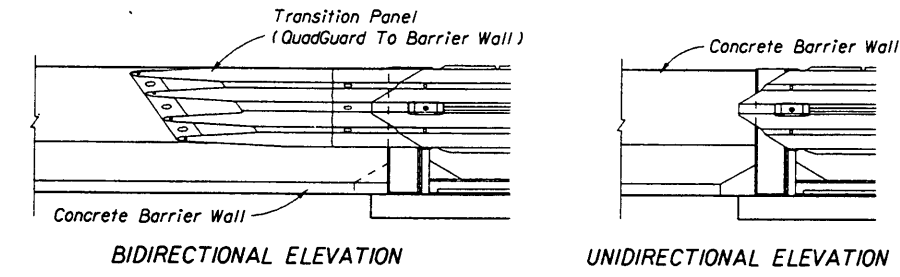
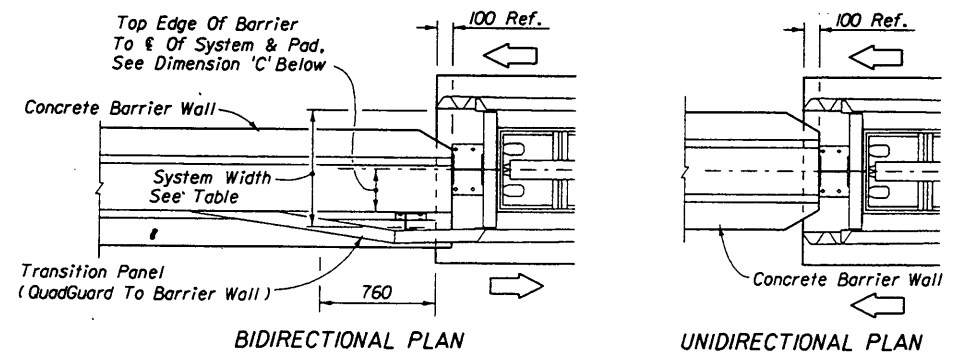
1. Transitions are required when connecting the QuadGuard to any guardrail system.
2. Post spacing identical for W-beam or thrie-beam, W-beam shown.
3. Post #1 is not bolted directly to transition panel(s).
4. Install beam washers on post bolts on posts #2 thru #9, with supplementary bar washers at post #2.
5. W-Beam Transition: Posts #1 and #2 - Posts and offset blocks as shown below. Posts #3 thru #9 - Standard W-beam posts and offset blocks, see Index No. 400.
- Thrie Beam Transition: Posts #1 and #2 - Posts and offset blocks as shown below. Posts #3 thru #9 - Standard thrie beam posts and offset blocks, see Index No. 400.
- Transitions using steel posts: Use limited to rigid surface mounting (decks and slabs). See Index No. 400 for special steel guardrail posts. See section below. Δ

System Width	A (mm)
610/760/915	475
1755/2285	557

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**QuadGuard**

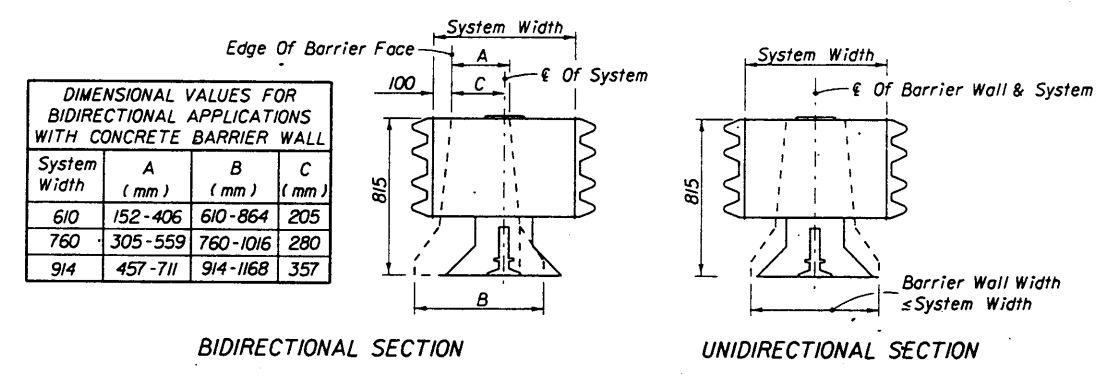
Names	Dates	Approved By	State Roadway Design Engineer
Designed By	MFG/JVG 09/97		Sheet No. 4 of 6
Drawn By	EKE 09/97		
Checked By	JVG 09/97	00	Index No. 435



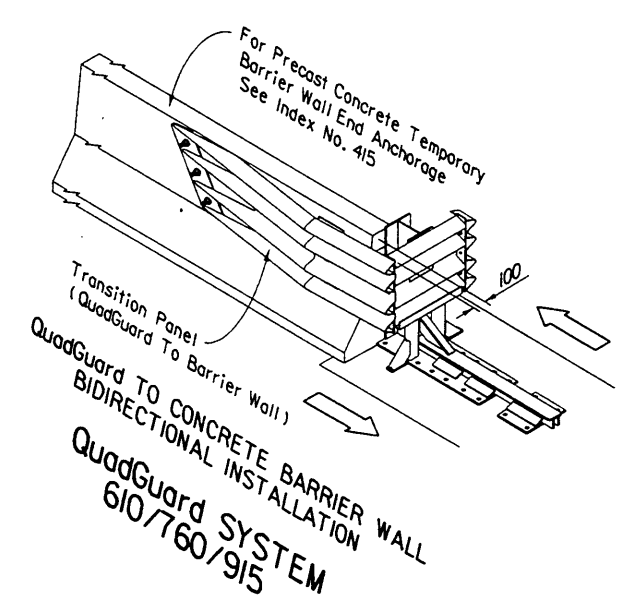
ALIGNMENT DETAIL  
BIDIRECTIONAL PLAN

The axis of the QuadGuard relative to concrete barriers will be established on site specific basis. The QuadGuard supplier shall furnish dimensional data for setback between the barrier wall end and the system foundation, and for the alignment between the face of the barrier wall and the rear diaphragm where dimensions other than those above apply.

QuadGuard SYSTEM  
1755/2285



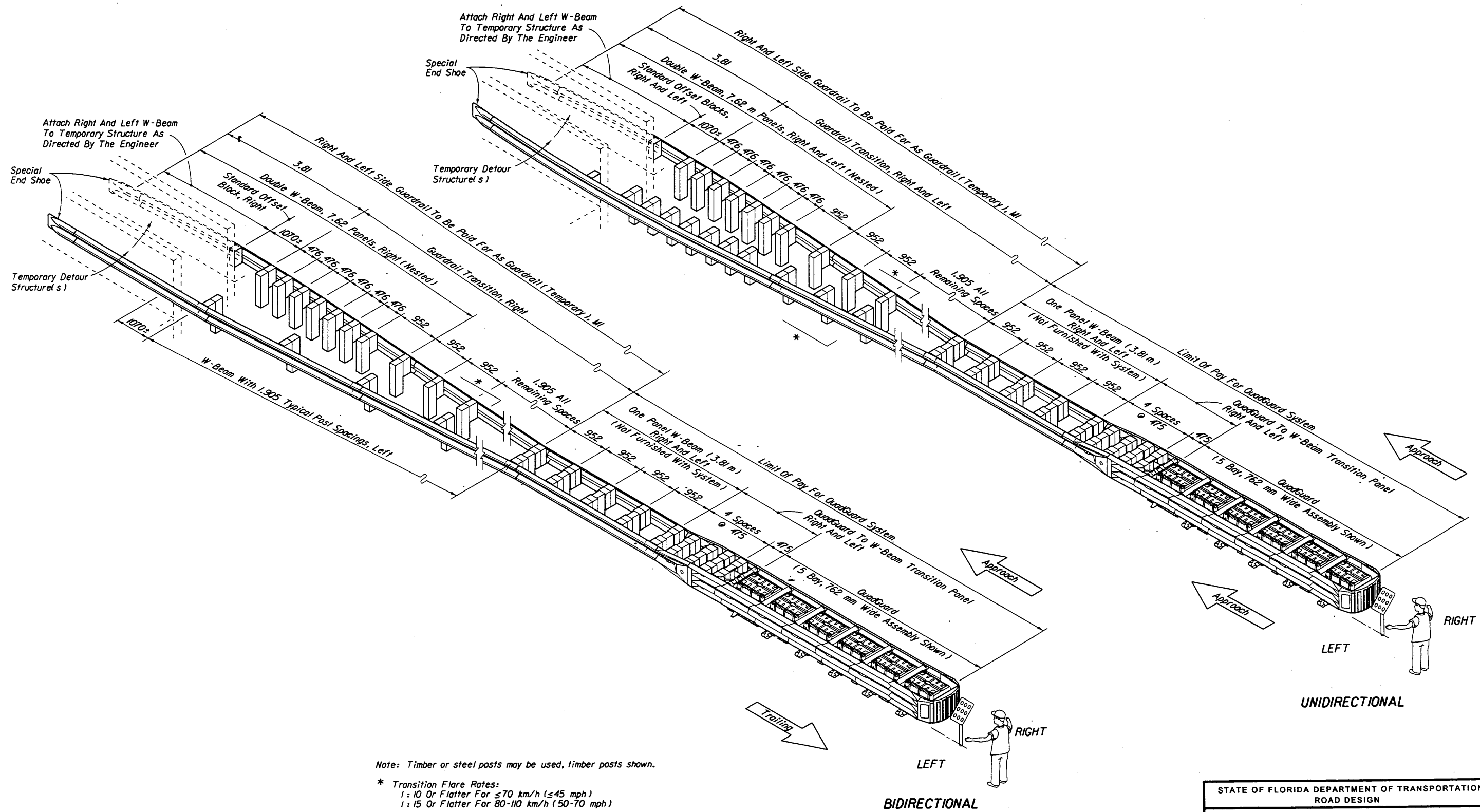
DIMENSIONAL VALUES FOR BIDIRECTIONAL APPLICATIONS WITH CONCRETE BARRIER WALL			
System Width	A (mm)	B (mm)	C (mm)
610	152-406	610-864	205
760	305-559	760-1016	280
914	457-711	914-1168	357



BARRIER WALL TRANSITION NOTE  
Barrier wall free end must be reinforced in accordance with Index No. 410 and temporary walls must be adequately anchored for proper impact performance in accordance with Index No. 415.

QuadGuard TO CONCRETE BARRIER WALL  
TRANSITIONS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
QuadGuard				
Names	Dates	Approved By		
Designed By	MEG/JVG	09/97	State Roadway Design Engineer	
Drawn By	ENH	09/97	Revision	Sheet No.
Checked By	JVG	09/97	98	5 of 6
				Index No. 435



Note: Timber or steel posts may be used, timber posts shown.

\* Transition Flare Rates:  
 1: 10 Or Flatter For  $\leq 70$  km/h ( $\leq 45$  mph)  
 1: 15 Or Flatter For 80-110 km/h (50-70 mph)

# GUARDRAIL TRANSITION TO TEMPORARY DETOUR STRUCTURES

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
QuadGuard				
Names	Dates	Approved By		
Designed By	MEG/STD	<i>[Signature]</i>	State Roadway Design Engineer	
Drawn By	IKR	Revision	Sheet No.	Index No.
Checked By	JVG	98	6 of 6	435

## GENERAL NOTES

1. The energy absorbing system represented on this standard drawing is a proprietary design by SYRO Inc. and marketed under the trade name ADIEM 350. Any infringement on the rights of the designer shall be the sole responsibility of the user.
2. This standard drawing is produced by the Florida Department Of Transportation solely for use by the Department and its assignees. This standard drawing provides the general graphics and information necessary to field identify component parts of the ADIEM 350 and their incorporation into a whole system.
3. This standard drawing is sufficient for plan details for the ADIEM 350 installed in connection with permanent or temporary concrete barrier walls, and precludes the requirement for shop drawing submittals unless the plans otherwise call for such submittals.
4. The ADIEM 350 shall be assembled and installed in accordance with the manufacturers detailed drawings, procedures and specifications.
5. The ADIEM 350 can be located on compacted base, asphalt or concrete. Driving of anchor pins into compacted base or soft asphalt will be permitted while drilling will be necessary for hard asphalt or concrete pavements. See schedule left for anchor pin requirements.
6. The ADIEM 350 is suitable for speeds  $\leq 100$  km/h ( $\leq 60$  mph).
7. The ADIEM 350 shall be located parallel to the approach travel lanes, on 1:10 or flatter cross slopes. Until there is further development in the application of the ADIEM 350, the system is not to be located in narrow medians, gores or locations where frequent side impacts can be expected.
8. All modules are alike in size and mass (interchangeable).
9. Due to the overall unit height of 1.22 m, which exceeds the drivers height of eye, caution is to be exercised in locating the ADIEM 350 to avoid blockage of required sight distance.
10. Attach splice angle (connection bracket) to ADIEM 350 base with 2-30 mm dia. x 635 mm long HD hex bolts. Attach splice angle to barrier wall with 8 field drilled 22 mm dia. x 150 mm long chemical anchors.
11. A yellow Type 1 Object Marker shall be centered 1.0 m in front of the nose of the ADIEM 350. Mounting hardware shall be in conformance with Index Nos. 11860 and 11865. The cost of the Object Marker shall be included in the cost of the ADIEM 350.
12. Temporary ADIEM 350 systems can be reused provided the bases have the structural integrity and surface qualities of new systems, and the modules are condition new. Refurbished systems can be made up of mixed new and used components. New and used systems can be purchased, leased, rented, on loan or shared between projects.
13. The permanent ADIEM 350 will be paid for under the contract unit price for Impact Attenuator Vehicular (ADIEM), EA; temporary units will be paid for under the contract unit price for Vehicular Impact Attenuator (Temporary) (ADIEM), LO, or when the ADIEM 350 is used as an option in accordance with Index No. 415, it will be paid for under the contract unit price for Vehicular Impact Attenuator (Temporary) (Redirective Option), LO.

## DESIGN AND MAINTENANCE NOTES AND GUIDELINES

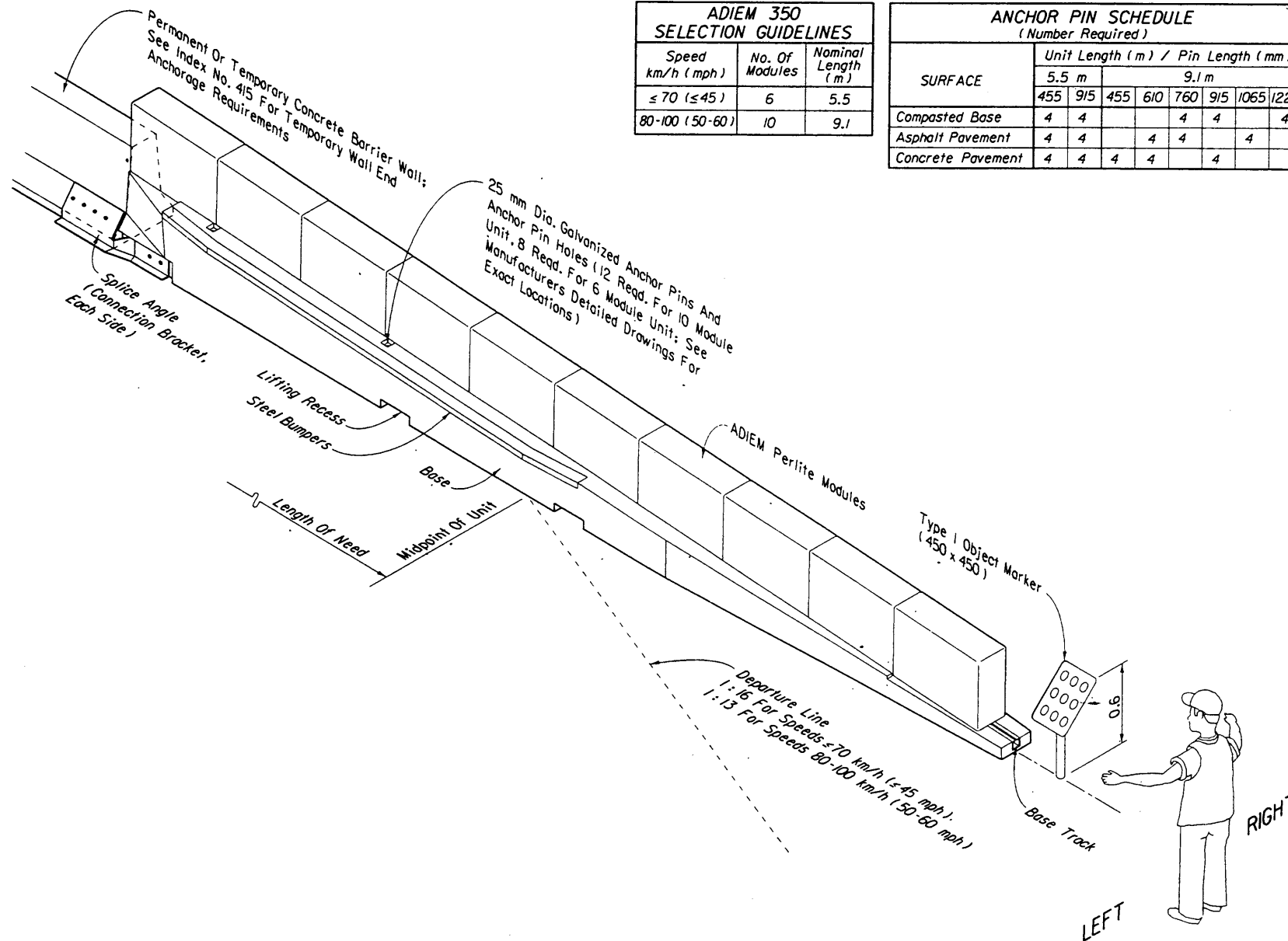
1. The ADIEM 350 is designed to cushion automobile end-on hits and to redirect automobiles from side hits within the length of need while shielding the ends of permanent or temporary concrete barrier walls.
2. The ADIEM 350 is a restorable system that is particularly suited to shielding concrete barrier wall ends. The 5.5 m unit is applicable for speeds of 70 km/h (45 mph) or less, the 9.1 m unit is applicable for speeds of 80-100 km/h (50-60 mph).
3. The upstream half of the system (3 or 5 modules) is a gating design. Each module (cartridge) has a mass of 82 kg (180 lbs). Care must be exercised in locating the system where debris scatter may pose a hazard. Upstream modules or their residual components must be removed to replace damaged downstream modules.
4. The ADIEM 350 will require close monitoring for damage that will open module encasement; immediate repair is essential to prevent moisture absorption into module core.
5. Currently the Department does not recognize other proprietary items as being equally suitable alternatives to the ADIEM 350, and until such alternatives are available, the ADIEM 350 need not be bid against other proprietary items. However, where the ADIEM 350 and other approved temporary redirective crash cushions meet or exceed the minimum requirements for a specific location, the approved crash cushions will be considered optional systems and paid for as described in General Note 12 above.

### ADIEM 350 SELECTION GUIDELINES

Speed km/h (mph)	No. Of Modules	Nominal Length (m)
$\leq 70$ ( $\leq 45$ )	6	5.5
80-100 (50-60)	10	9.1

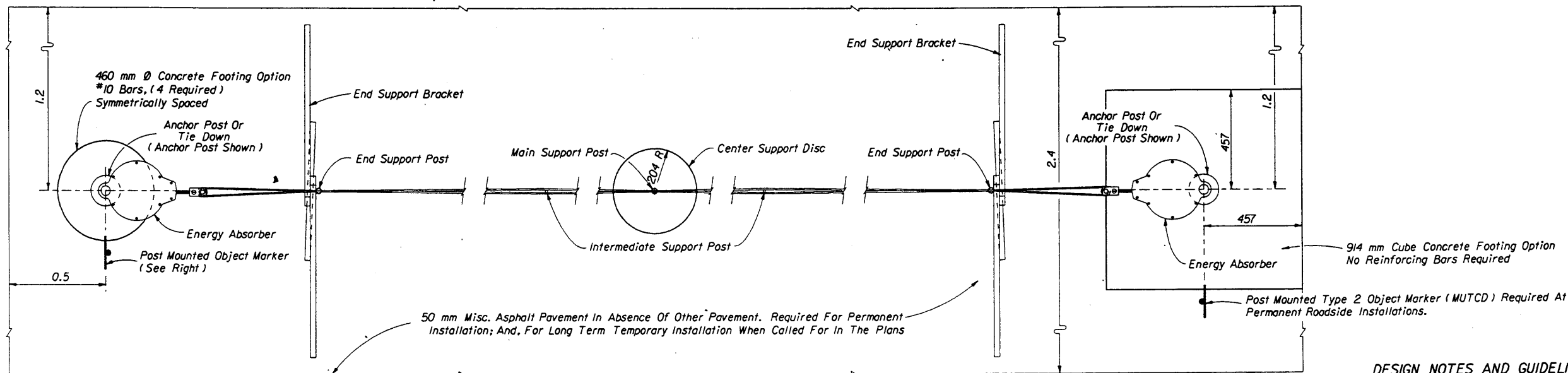
### ANCHOR PIN SCHEDULE (Number Required)

SURFACE	Unit Length (m) / Pin Length (mm)							
	5.5 m		9.1 m					
	455	915	455	610	760	915	1065	1220
Compacted Base	4	4			4	4		4
Asphalt Pavement	4	4		4	4		4	
Concrete Pavement	4	4	4	4		4		



## GENERAL SYSTEM FEATURES AND GUIDELINES

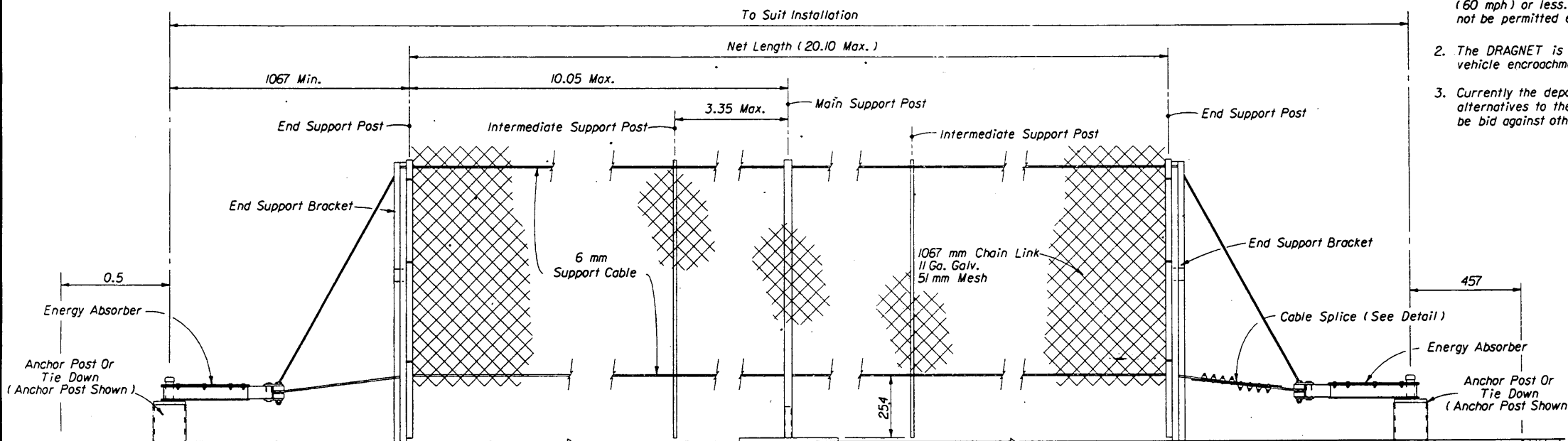
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
ADIEM 350				
	Names	Dates	Approved By	
Designed By	YFG		 State Roadway Design Engineer	
Drawn By	EGR	7/97	Revision	Sheet No.
Checked By	JVG	7/97	00	1 of 1
				Index No. 436



PLAN

DESIGN NOTES AND GUIDELINES

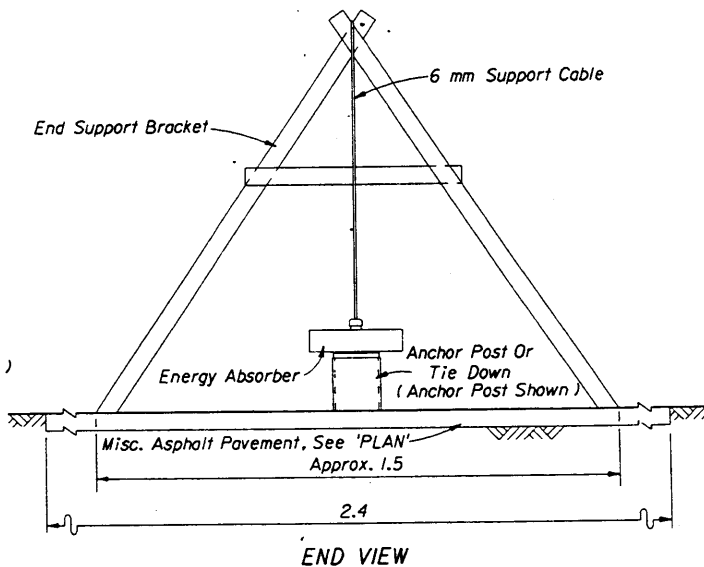
1. The DRAGNET is designed to safely stop automobiles when impacted at speeds of 100 km/h (60 mph) or less. The DRAGNET has a singular design and any adjustment to its design will not be permitted except as authorized by the manufacturer.
2. The DRAGNET is a restorable system that is particularly suited to the prevention of head-on vehicle encroachment into hazardous areas.
3. Currently the department does not recognize other proprietary items as being equally suitable alternatives to the DRAGNET and until such alternatives are available, the DRAGNET need not be bid against other proprietary items.



ELEVATION

GENERAL NOTES

1. The vehicle arresting barrier represented on this standard is a proprietary product of Highway Safety Systems, Inc. and marketed under the trade name DRAGNET. Any infringement on the rights of the designer shall be the sole responsibility of the user.
2. This standard drawing is produced by the Florida Department Of Transportation solely for use by the Department and its assignees. This standard drawing provides the general graphics and information necessary to field identify component parts of the DRAGNET system and their incorporation into a whole system.
3. This standard drawing is sufficient for plan details for the DRAGNET installed as a free standing system and precludes the requirement for shop drawing submittals unless the plans otherwise call for such submittals.
4. The DRAGNET shall be assembled and installed in accordance with the manufacturer's detailed drawings, procedures and specifications.
5. Concrete footings shall be constructed with Class I concrete.
6. Each temporary DRAGNET assembly shall include a spare parts package consisting of two extra arresting tapes and a set of end support brackets. The spare parts package shall be stored on site at locations approved by the Engineer. Damaged attenuators shall be restored within 24 hours. The cost of furnishing and maintaining spare parts packages for each attenuator shall be included in the cost of the attenuator.
7. The cost of the DRAGNET shall include furnishing and installing all components and materials necessary for a complete installation and will be paid for under the contract unit price for Impact Attenuator Vehicular (DRAGNET), EA., for permanent installations or Vehicle Arresting Barrier (Net Type), EA., for temporary installations.



END VIEW

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

DRAGNET

Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By	HKG/ERH	10/91			
Drawn By	ERH	10/91			
Checked By	JVC	10/91	98	1 of 2	438



## GENERAL NOTES

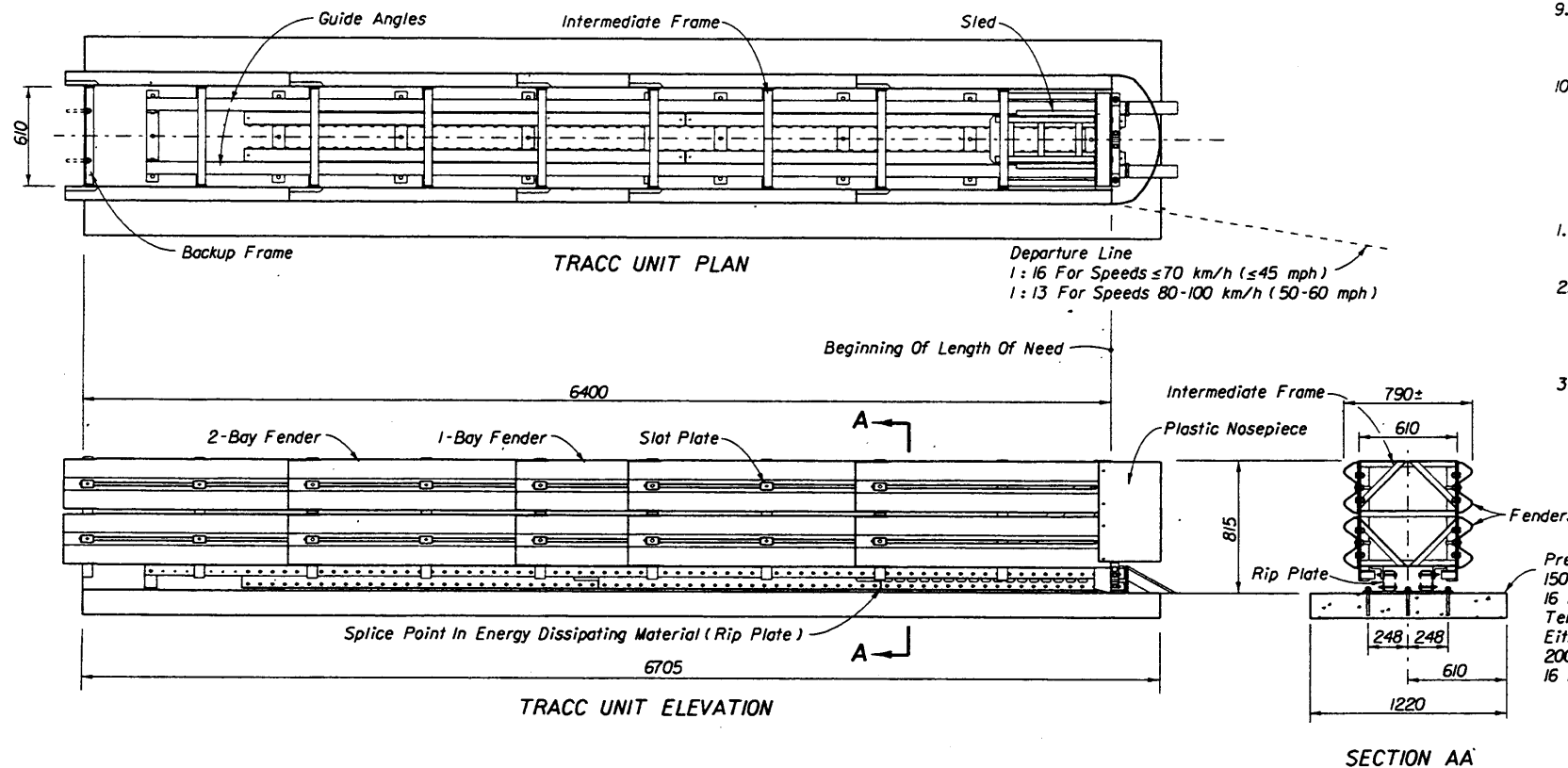
1. The energy absorbing system represented on this standard drawing is a proprietary design by Trinity Industries, Inc. and marketed under the trade name TRACC. Any infringement on the rights of the designer shall be the sole responsibility of the user.
2. This standard drawing is produced by the Florida Department Of Transportation solely for use by the Department and its assignees. This standard drawing provides the general graphics and information necessary to field identify component parts of the TRACC and their incorporation into a whole system.
3. This standard drawing is sufficient for plan details for the TRACC installed in connection with either permanent or temporary concrete barrier walls, or, with double faced guardrails, and precludes the requirement for shop drawing submittals unless the plans otherwise call for such submittals.
4. The TRACC shall be assembled and installed in accordance with the manufacturers detailed drawings, procedures and specifications, except that transition section posts will be set to connect to guardrail at standard W-beam center bolt height (550 mm).
5. The TRACC system is suitable for speeds of  $\leq 100$  km/h ( $\leq 60$  mph).
6. When the TRACC is installed at permanent locations it shall be anchored to either a reinforced 150 mm thick concrete pad or a nonreinforced 200 mm thick concrete pad with twenty seven 190 mm long 16 mm dia. chemical anchor studs, flat and lock washers, and, hex nuts. When the TRACC is installed at temporary locations it shall be anchored to a nonreinforced 200 mm thick concrete pad with the above mentioned anchor hardware, or a 200 mm thick asphalt pad (or a 150 mm thick asphalt over 150 mm of compacted subbase) using twenty seven 460 mm long 16 mm dia. Grade 5 threaded chemical anchor studs, flat and lock washes, and, hex nuts.
7. The TRACC shall be located parallel to the approach travel lane(s), on 1:10 or flatter cross slopes.
8. In-place repairs on the TRACC crash cushion are limited to (a) end on impacts which cause the sled to stroke 1370 mm (54") or less, and (b) side impacts where permanent distortion is limited to a unit's fender panels and where distortion of the intermediate frame(s) can be restored manually. Unit replacement is required when damage exceeds these conditions. Temporary construction units and units under Maintenance responsibility may be shop repaired units utilizing new or salvaged parts which will produce condition new units. All permanent units shall be factory new at completion of construction.
9. A yellow Type I Object Marker shall be centered 1.0 m in front of the nose of the TRACC. Mounting hardware shall be in conformance with Index Nos. 11860 and 11865. The cost of the Object Marker shall be included in the cost of the ADIEM 350.
10. The permanent TRACC will be paid for under the contract unit price for Impact Attenuator Vehicular (TRACC), EA; temporary units will be paid for under the contract unit price for Vehicular Impact Attenuator (Temporary) (TRACC), LO, or when the TRACC is used as an option in accordance with Index No. 415, it will be paid for under the contract unit price for Vehicular Impact Attenuator (Temporary) (Redirective Option), LO.

## DESIGN AND NOTES AND GUIDELINES

1. The TRACC is designed to cushion automobile end-on hits and to redirect automobiles from side hits within the length of need while shielding the ends of permanent or temporary concrete barrier walls, or, double faced guardrails.
2. The TRACC system is not intended for use in gores of freeway and expressway mainline ramp terminals; gores of roadway forks; or other gore locations where there is a history of high frequency vehicle departure from the roadway or the potential exists for such departures. The TRACC system is not a restorable design, and repairs or replacement will be in accordance with GENERAL NOTES note No. 8.
3. Currently the Department does not recognize other proprietary items as being equally suitable alternatives to the TRACC, and until such alternatives are available, the TRACC need not be bid against other proprietary items. However, where the TRACC and other approved temporary redirective crash cushions meet or exceed the minimum requirements for a specific location, the approved crash cushions will be considered optional systems and paid for as described in General Note 10 above.

**Permanent Pad:**  
150 mm Thick Reinforced Concrete Or 200 mm Nonreinforced Concrete With Twenty Seven 16 mm Dia. 190 mm Long Chemical Anchor Studs With Flat And Lock Washers And Hex Nuts

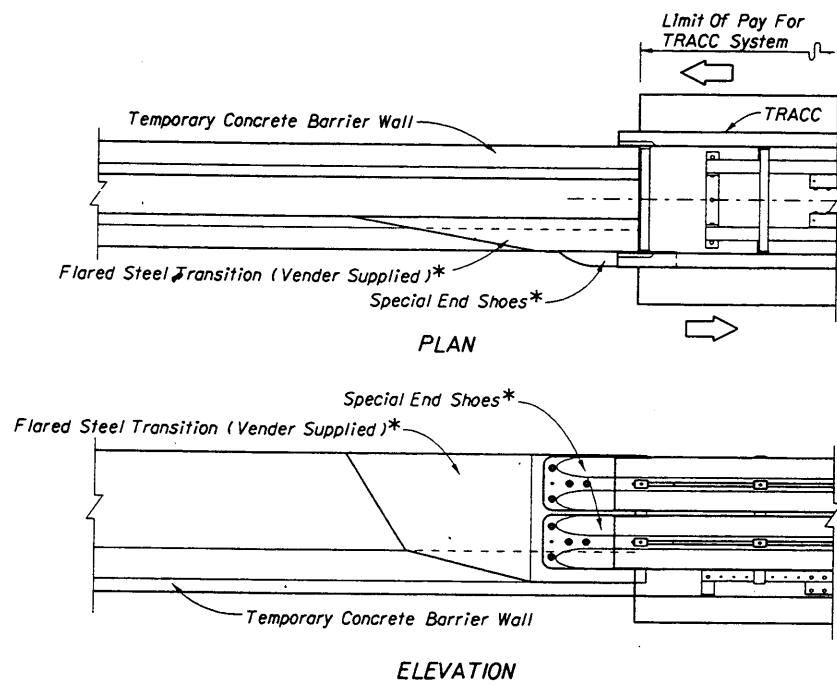
**Temporary Pad:**  
Either 200 mm Nonreinforced Concrete With The Above Anchor Hardware, Or,  
200 mm Asphalt (Or 150 mm Asphalt Over 150 mm Compacted Subbase) With Twenty Seven 16 mm Dia. 460 mm Long Chemical Anchor Studs With Flat And Lock Washers And Hex Nuts.



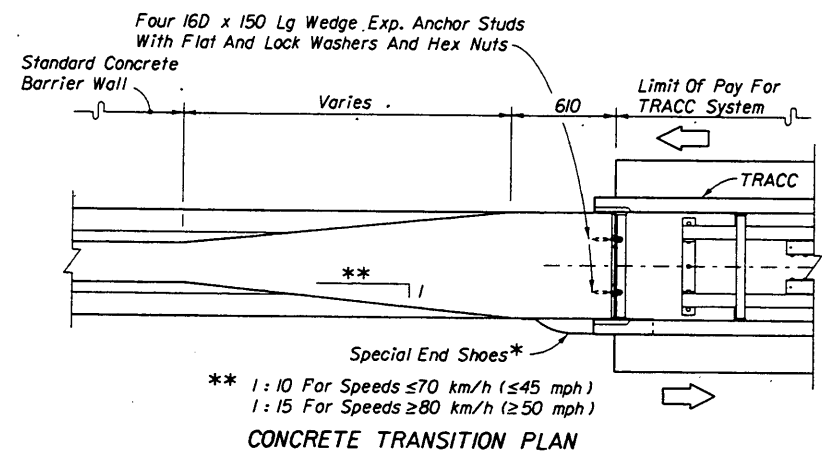
## GENERAL SYSTEM FEATURES AND GUIDELINES

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
TRACC					
Names	Dates	Approved By			
Designed By	MFG	State Roadway Design Engineer			
Drawn By	EKR	7/97	Revision	Sheet No.	Index No.
Checked By	JVG	7/97	00	1 of 2	440



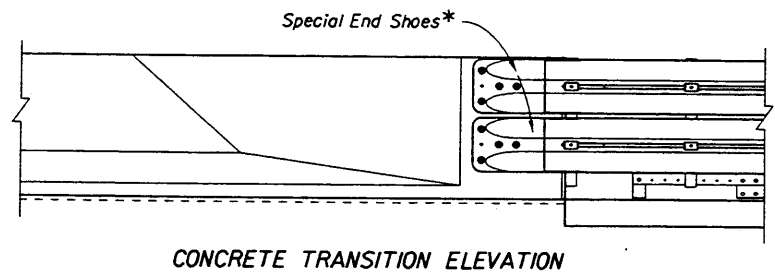


TRACC TO BIDIRECTIONAL EXISTING PERMANENT CONCRETE BARRIER WALL AND TO BIDIRECTIONAL TEMPORARY CONCRETE BARRIER WALL



\*\* 1:10 For Speeds  $\leq 70$  km/h ( $\leq 45$  mph)  
1:15 For Speeds  $\geq 80$  km/h ( $\geq 50$  mph)

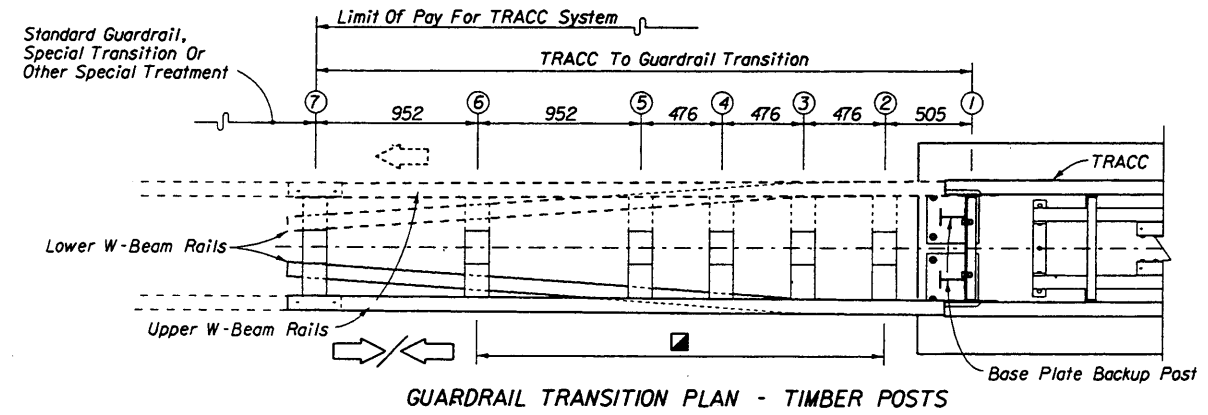
CONCRETE TRANSITION PLAN



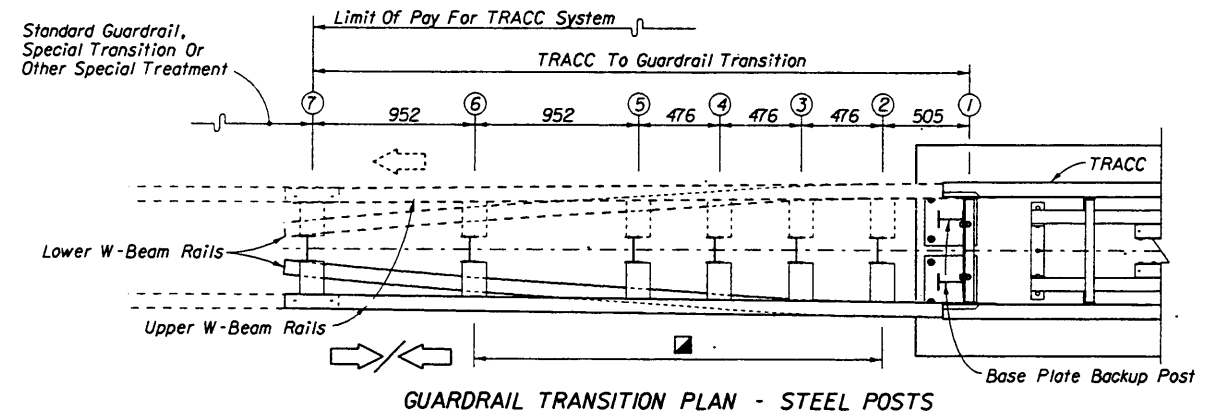
CONCRETE TRANSITION ELEVATION

TRACC TO BIDIRECTIONAL PERMANENT CONCRETE BARRIER WALL

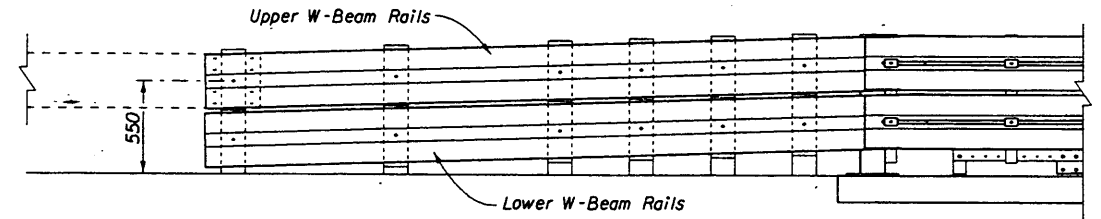
\* To Be Included In Cost Of TRACC



GUARDRAIL TRANSITION PLAN - TIMBER POSTS



GUARDRAIL TRANSITION PLAN - STEEL POSTS



GUARDRAIL TRANSITION ELEVATION

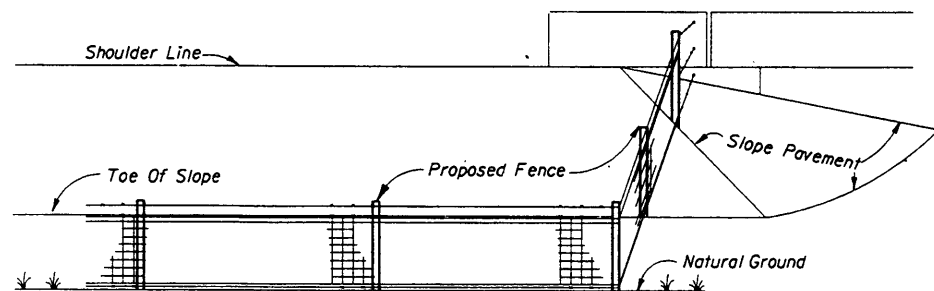
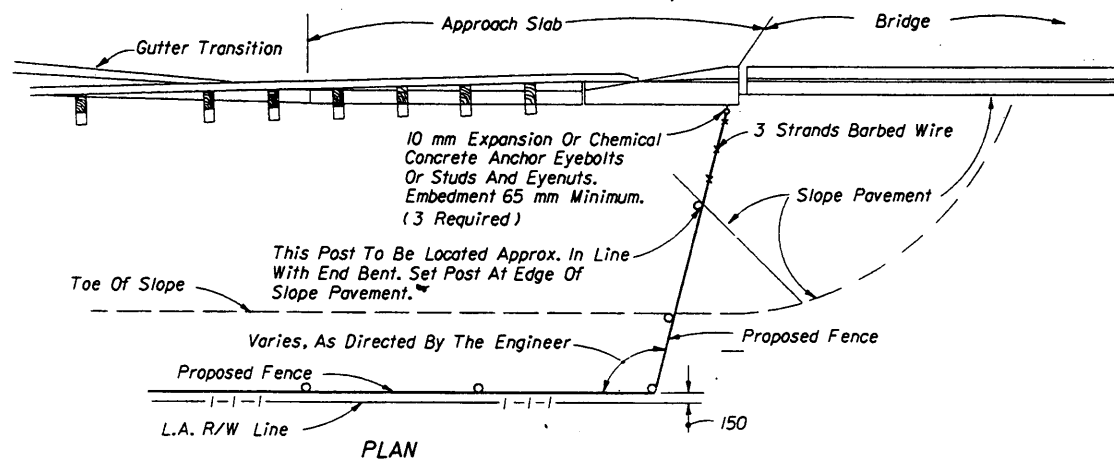
Offset blocks that exceed standard block depth can be made up of blocks of special size or multiple standard blocks field trimmed to approximately equal size to achieve full transition width. Offset blocks for lower W-beam that are less in depth than standard blocks may be field trimmed standard blocks. All blocks are to be secured to plan position by 16d galvanized nails.

Transitions are required when connecting the TRACC to any guardrail system.

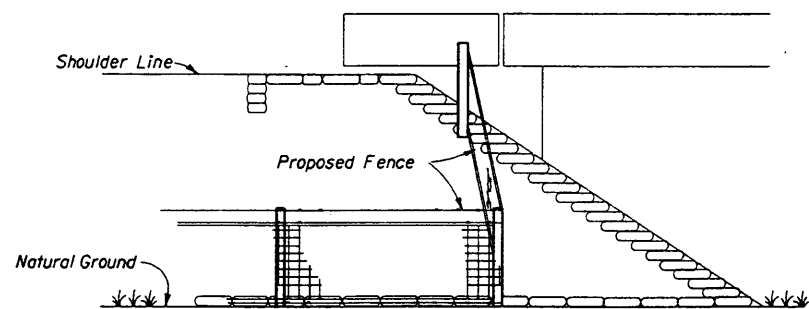
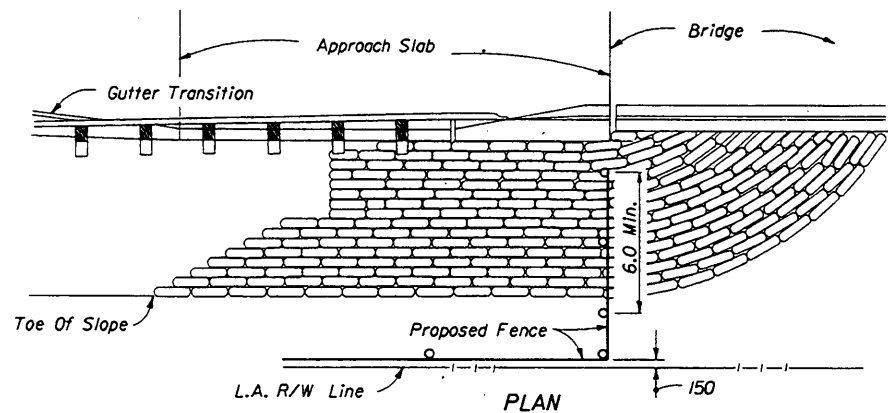
TRACC TO GUARDRAIL

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>TRACC</b>				
Designed By	MFG	Dates	Approved By <i>[Signature]</i> State Roadway Design Engineer	
Drawn By	EKH	7/97	Revision	Sheet No. 2 of 2
Checked By	JVG	7/97	00	Index No. 440

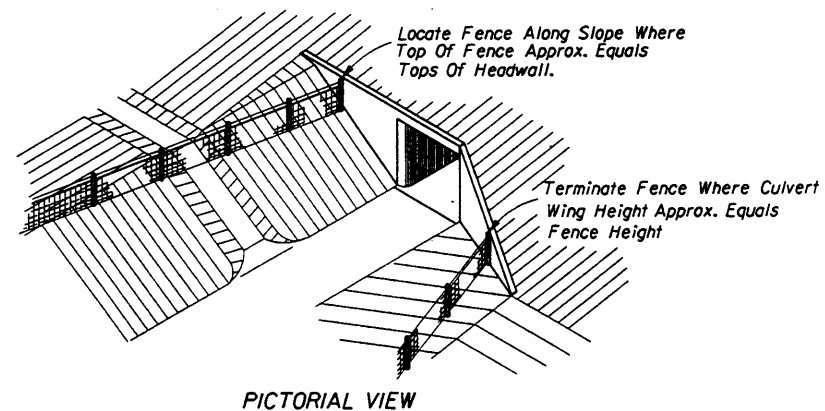
TRACC TRANSITIONS



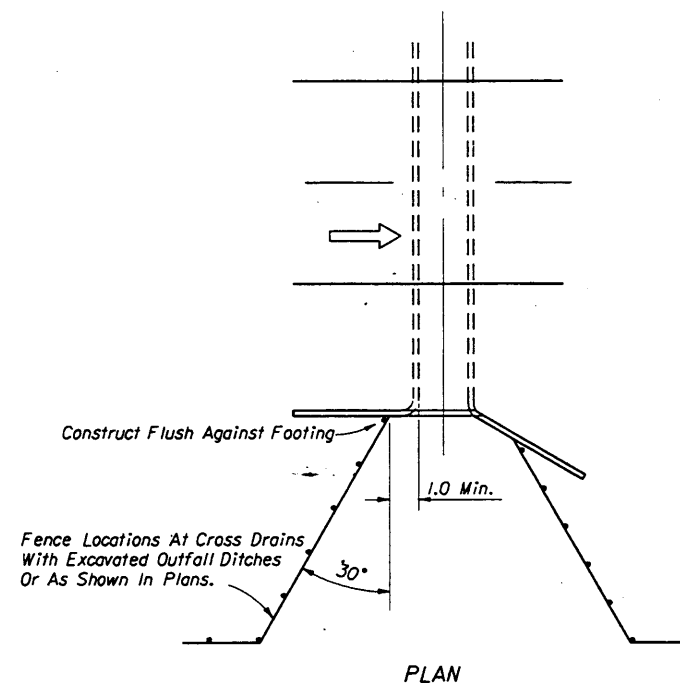
**FENCING TERMINALS AT BRIDGE ENDS (ROADWAY)**



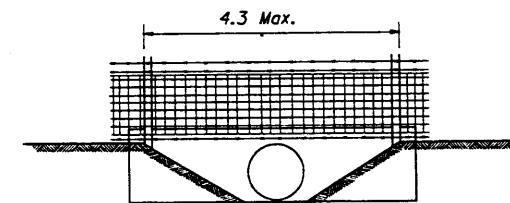
**FENCING TERMINALS AT BRIDGE ENDS (STREAM CROSSING)**



**PICTORIAL VIEW**



**(For Heights Of Headwall Greater Than 1.2 m) FENCING TERMINALS AT BOX CULVERTS**



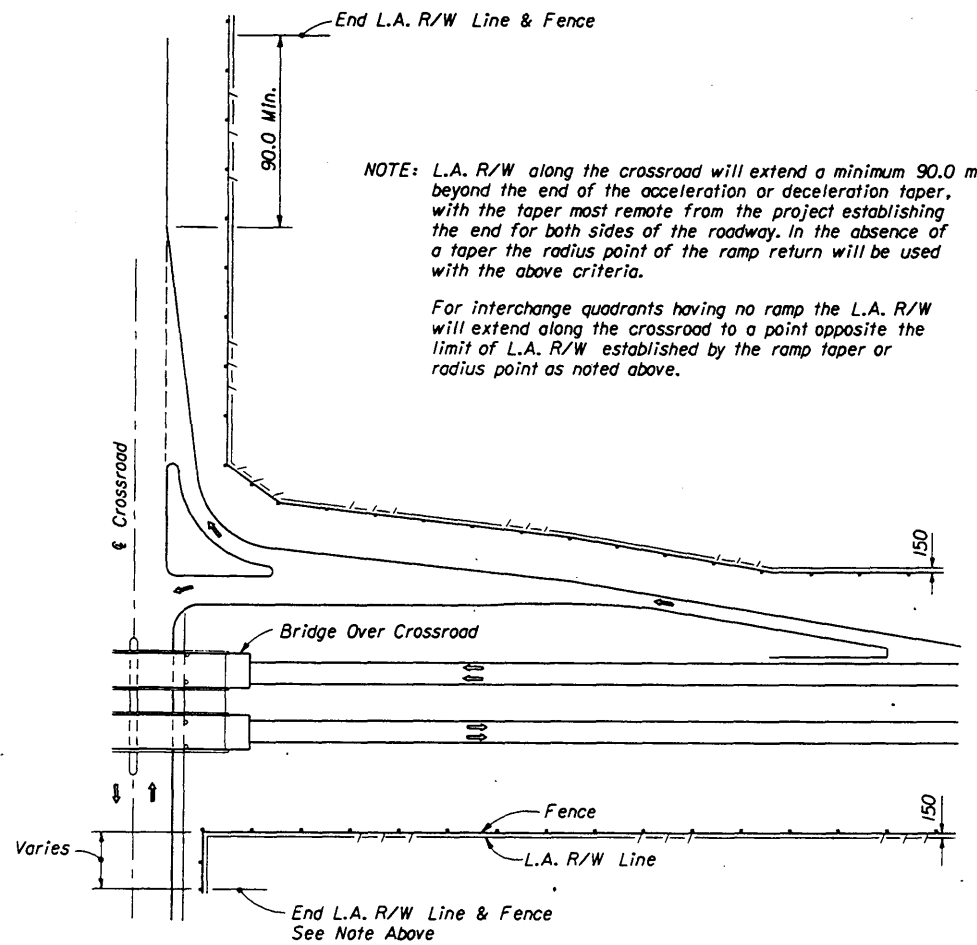
**FENCING DETAIL AT CULVERT (For Heights Of Headwalls 1.2 m Or Less.)**

Note: When height of headwall is 1.2 m or less (drainage pipe 900 mm or less) the fence shall not be tied to the headwall, but shall span the lateral ditch.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

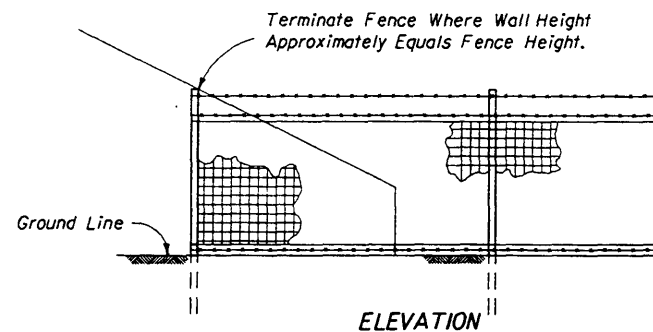
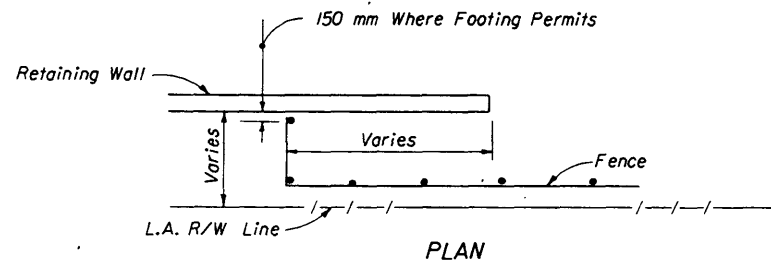
**FENCE LOCATION**

Names	Dates	Approved By	Sheet No.	Index No.
Designed By	RFW 02/65	<i>[Signature]</i> State Roadway Design Engineer	94	450
Drawn By	RFW 02/65		1 of 2	
Checked By	RLO 02/65			

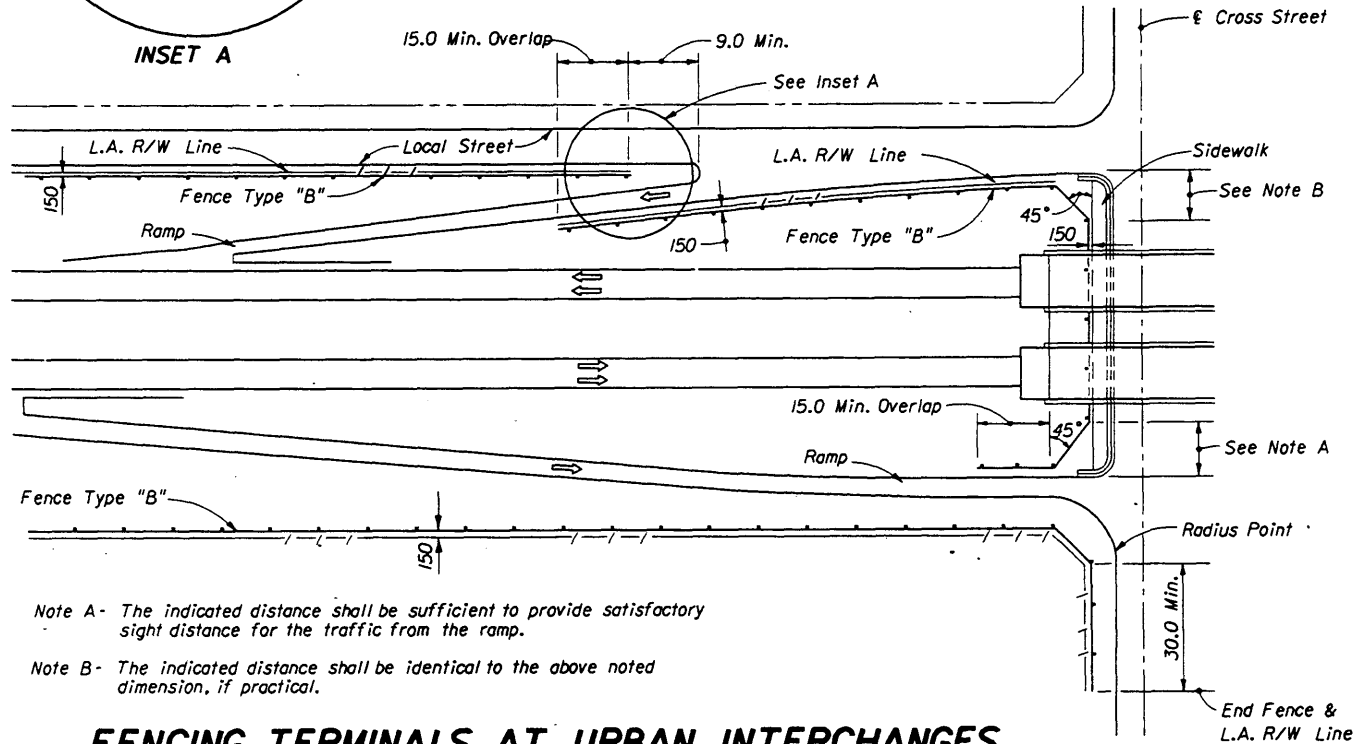
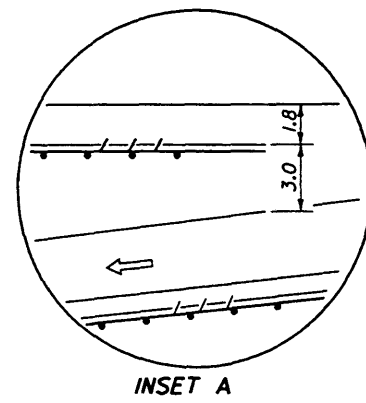


APPLIES TO BRIDGE OVER CROSSROAD AND CROSSROAD OVER FREEWAY (BRIDGE OVER CROSSROAD SHOWN)

### FENCING TERMINALS AT RURAL INTERCHANGES



### FENCING TERMINALS AT RETAINING WALLS




Note A - The indicated distance shall be sufficient to provide satisfactory sight distance for the traffic from the ramp.

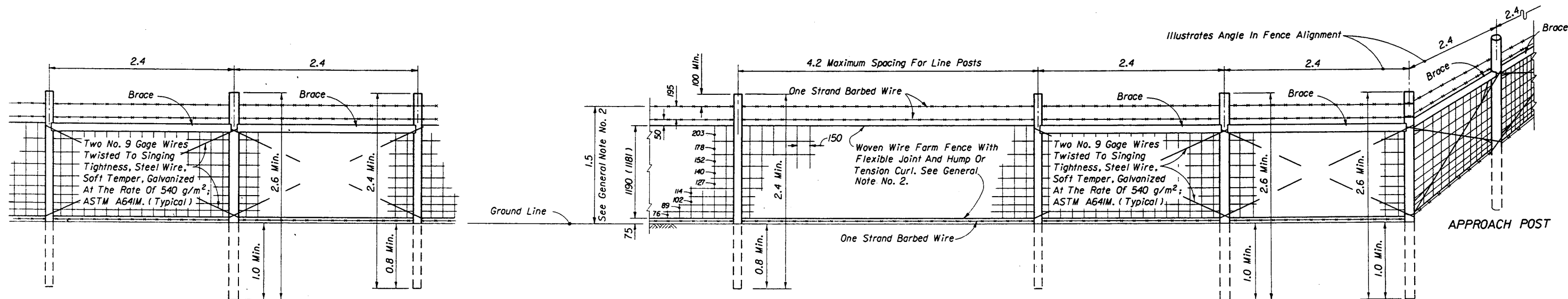
Note B - The indicated distance shall be identical to the above noted dimension, if practical.

### FENCING TERMINALS AT URBAN INTERCHANGES

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

### FENCE LOCATION

Names	Dates	Approved By
Designed By	HFV 02/65	 State Roadway Design Engineer
Drawn By	HFV 02/65	
Checked By	RLD 02/65	
Revision	Sheet No.	Index No.
98	2 of 2	450



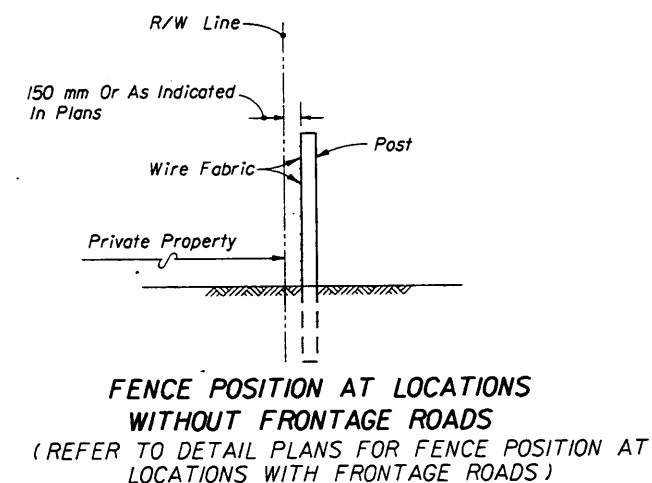
Note: Timber Post Illustrated.

LINE POST      PULL POST      LINE POST      LINE POST      LINE POST      APPROACH POST      CORNER OR END POST

### GENERAL NOTES

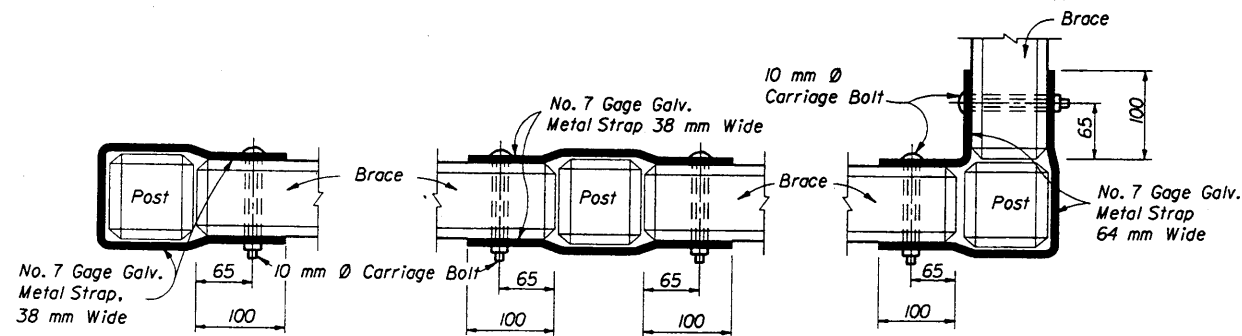
- This fence to be provided generally in rural areas. For supplemental information see Section 550 of the FDOT Specifications.
- Fabric shall be woven wire, either galvanized steel, meeting the requirements of ASTM A116, No. 9 Farm, Design Number 1047-6-9, with Class 3 zinc coating, or aluminum coated steel, meeting the requirements of ASTM A584, No. 9 Farm, Design Number 1047-6-9, with a minimum coating weight of 120 g/m<sup>2</sup>. For additional information see payment note below.
- Fence shall be installed with wire side to private property except on horizontal curves greater than 3° the fence shall be installed so as to pull against all posts.
- Posts may be either timber, steel, recycled plastic or concrete. Unless a specific post material is called for in the plans, the Contractor may elect to use either a single material or a combination of timber, steel, recycled plastic or concrete materials. Line posts of one material may be used with corner, pull and end post assemblies of a different material. Line posts of only one optional material and pull post assemblies of only one optional material will be permitted between corner and end post assemblies. Within individual corner and end post assemblies only one optional material will be permitted.
- Timber line posts are to be minimum 100 mm diameter. Timber corner, pull, approach and end posts are to be minimum 125 mm diameter. Timber braces are to be minimum 100 mm diameter.
  - Staples for line posts to be 32 mm minimum length; for approach, corner and pull posts 38 mm minimum length. At approach, corner and pull posts, staple every line wire. At line posts, staple every line wire in top half and alternate line wires in bottom half. Staples shall be driven diagonally across the line wire with the points in separate grains.
  - Connections between timber posts and braces to be provided by dowels as shown in fastener details.
  - Wire to be wrapped and tied, as shown in the splice details, at the following locations:
    - All end posts
    - Corner post, including the assemblies at vertical breaks of 15° or more.
    - Pull posts where the wire is not spliced and pulled through the assembly; see General Note 16.
- Steel posts and braces shall be standard steel posts, galvanized at the rate of 610 g/m<sup>2</sup>, together with necessary hardware and wire clamps and meeting the following requirements:
  - Line posts: 2.45 m long; 1.98 kg/m; roll formed studding; anchor plate attached (approx. 15,000 mm<sup>2</sup>).
  - Approach posts: 64 x 64 x 6.4 angles, 2.45 m long; fabricated for attaching brace; with necessary hardware, clamps, etc.
  - Pull, end and corner posts: 64 x 64 x 6.4 angles, 2.45 m long; fabricated for attaching brace; with necessary hardware, clamps, etc.
  - Braces: 51 x 51 x 6.4 angles with necessary hardware and fabricated for attaching to post.
  - The pull, corner, approach and end posts are to be set in concrete as per detail. (Also see Note No. 13)
- Recycled plastic posts shall meet the material requirements of specification Section 972 and be one of the products included on the Qualified Products List current at the time of installation. Line posts shall have a minimum section of 100 mm round or 100 mm x 100 mm square. Plastic posts shall not be used as corner, pull, end or approach posts unless such use specifically detailed in the plans. Plastic posts can be set by either digging and tamped backfill or by driving into full depth preformed 90 mm to 95 mm diameter holes. Staples for fabric and barbed wire connection to plastic line posts shall be the same size, count and location as that for timber posts.
- The Contractor, at his option, may use any suitable precast or prestressed concrete posts; however, approval by the Engineer, of posts not shown on this index, will be required prior to construction of the fence. Precast posts shall be Class I concrete. Prestressed posts shall be Class III concrete. Lengths of concrete post to be as indicated for timber posts.
- Aluminum post, braces and accessory framing hardware shall not be used unless the plans specifically detail their application or the Engineer specifically approves their incorporation in fence construction or repair. Aluminum framed gates are permitted as described in General Note 18.

- The woven wire shall be attached to steel and concrete posts by a minimum of five tie wires. The single wire ties shall be applied to the top, bottom and three intermittent line wires. The ends of each tie wire shall have a minimum of two tight turns around the line wire. Tie wires shall be steel wire not less than 3 mm diameter, zinc coating Class 3, soft temper, in accordance with ASTM A641.
- Steel Barbed Wire can be either of the following types:
  - Type I: This type shall conform to the requirements of ASTM A121, with two strands of 2.51 mm wire; four point barbs, wire size 2.03 mm, twisted around both line wires; and, Class 3 coating.
  - Type II: This type same as Type I except the two strand wires are twisted in alternating directions between consecutive barbs.
 Aluminum Barbed Wire shall be fabricated of two strands of 2.79 mm wire with 2.0 mm diameter four-point barbs spaced at approximately 140 mm, and at a maximum spacing of 150 mm. The wire for the strands and for the barbs shall be of ASTM B211M Alloy 5052-H38 or equal.
- The woven wire shall be stretched only until one-half the tension curl has been pulled out of the line wires.
- Posts to be set by driving or digging. If by digging, the posts shall be set at the center of the hole and the soil tamped securely on all sides.
- Longer posts than those indicated above may be required by the plans or for deeper installations.
- Concrete bases for angular steel posts (pull, corner, end and approach) shall be Class I as specified in Section 347 except that the requirements of 347-7 shall not apply. Materials for Class I concrete may be proportioned by volume and/or by weight.
- Pull post assemblies shall be installed at approximately 100 m centers except that this maximum interval may be reduced by the Engineer on curves where the radius is less than 580 m.
- Corner post assemblies are to be installed at all horizontal and vertical breaks in fence of 15° or more.
- A maximum length of 400 m of wire may be installed as a unit. For pulls through a pull post assembly the fabric shall be spliced by crimping sleeves only. Pulls through a corner post assembly will not be permitted.
- Unless otherwise called for in the plans gates shall be commercially available metal swing gates assembled and installed in accordance with the manufacturer's specifications as approved by the Engineer. Chain link swing gates in accordance with Index No. 452 may be substituted for metal swing gates as approved by the Engineer. Gate size is full opening width whether single leaf or double leaves. Payment for gates shall include the gate, single or double, all necessary hardware for installation and any additional length and/or size for posts at the opening. Gates shall be paid for under the contract unit price for Fence Gates, Type A, EA.
- For construction and pay purposes assemblies are defined as follows: End post assemblies shall consist of: one end post, one approach post, two braces, four diagonal tension wires and all necessary fittings and hardware. Pull post assemblies shall consist of: one pull post, two braces, four diagonal tension wires and necessary fittings and hardware. Corner post assemblies shall consist of: one corner post, two approach posts, four braces, eight diagonal tension wires and all necessary fittings and hardware.
- This index details fencing that is constructed with form fabric 1.18 m (1.2 m nominal) in height and with specific ground clearance and specific barbed wire spacings, and, is to be paid for under the contract unit price for Fencing, Type A, M1. When the plans detail other combinations of materials or variation in dimensions, the fence shall be paid for under the contract unit price for Fencing, Type A, ( m Height), M1. Fencing Type A, M1, shall be inclusive of the lengths of pull, end and corner post assemblies but exclusive of gate widths. Assemblies shall be paid for as follows:
  - Corner Post Assemblies, EA.
  - Pull and End Post Assemblies, EA.

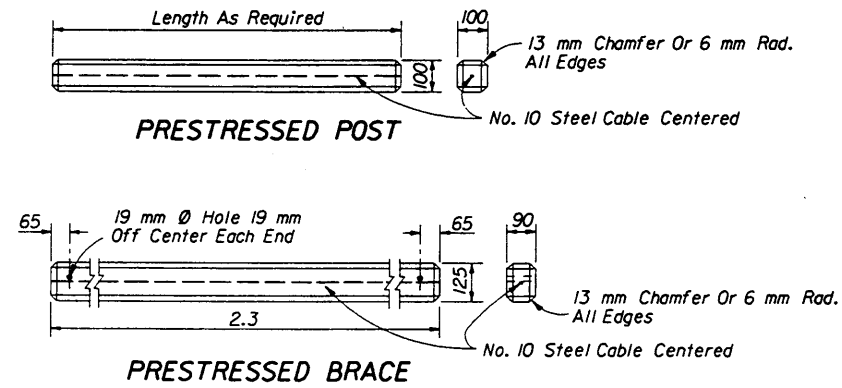


FENCE POSITION AT LOCATIONS WITHOUT FRONTAGE ROADS  
(REFER TO DETAIL PLANS FOR FENCE POSITION AT LOCATIONS WITH FRONTAGE ROADS)

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>FENCE TYPE A</b>				
Designed By	Names	Dates	Approved By	Index/No.
Drawn By			<i>Bill J. Helawa</i>	451
Checked By			State Roadway Design Engineer	Sheet No.
			98	1 of 2

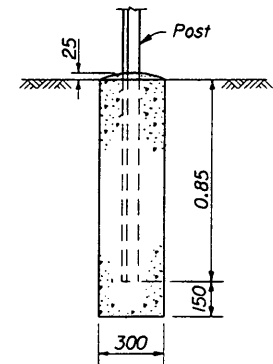


**BRACE AND POST      BRACE TO BRACE ON LINE      BRACE TO BRACE AT CORNER**  
**FASTENER FOR CONCRETE POST AND BRACES**

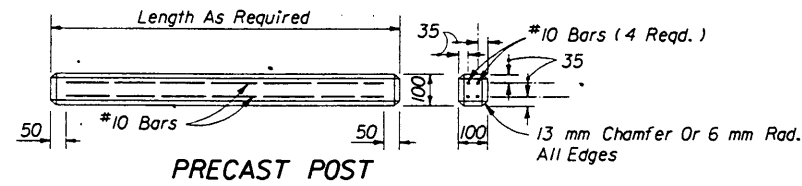


**PRESTRESSED POST**

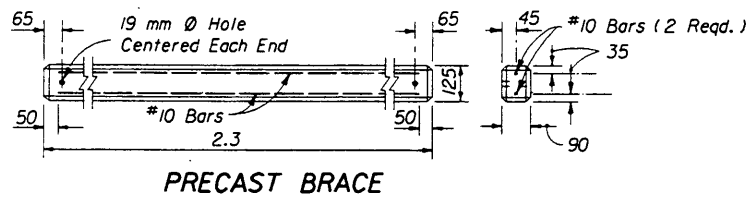
**PRESTRESSED BRACE**



(Pull, Corner, End And Approach Posts)  
**CONCRETE BASE FOR ANGULAR STEEL POST**

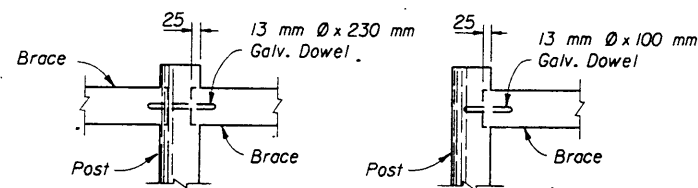


**PRECAST POST**

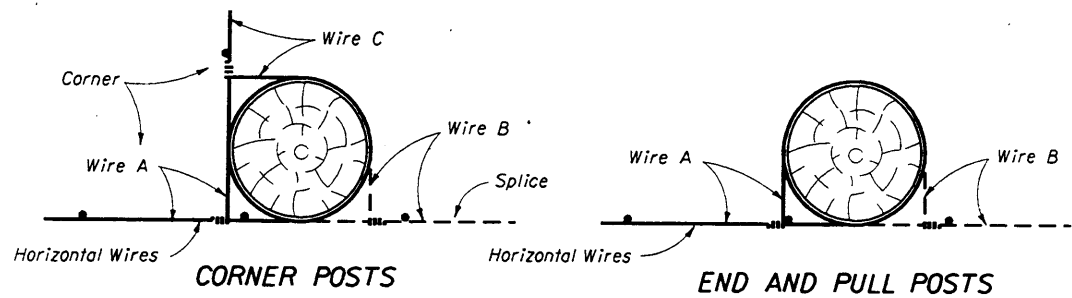


**PRECAST BRACE**

**ALTERNATE CONCRETE POSTS AND BRACES**



**FASTENER FOR TIMBER POST AND BRACE**



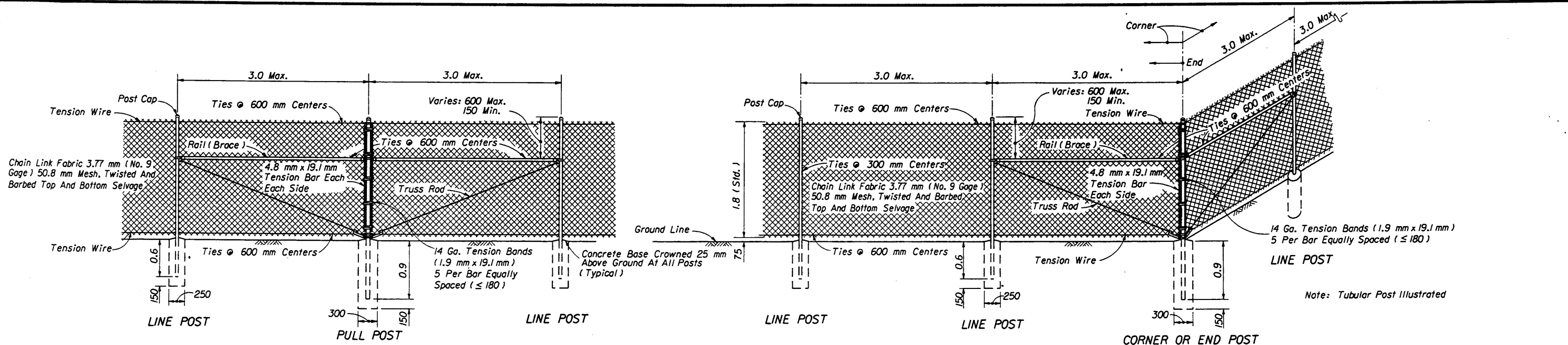
**CORNER POSTS**

**END AND PULL POSTS**

Each horizontal wire to be wrapped around corner, end and pull posts and tied to same wire. See General Notes 5 and 17. Timber post illustrated. These methods also apply to steel and concrete post illustrations.

**SPLICES**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>FENCE TYPE A</b>				
Designed By	Names	Dates	Approved By <i>[Signature]</i>	
Drawn By			State Roadway Design Engineer	
Checked By			Revision	Sheet No. Index No.
			98	2 of 2 451



**GENERAL NOTES**

- This fence to be used generally in urban areas.
- For supplemental information refer to Sections 550 of FDOT Standard Specifications.
- Chain link fabric, posts, rails, truss rods, tension wires, tie wires, stretcher bars, gates and all miscellaneous fittings and hardware shall meet the requirements of AASHTO M181 unless otherwise specified by this index. Stipulated AASHTO and ASTM signify current reference.
- Fence Component Options:
  - Line post options:
    - Galvanized steel pipe, Schedule 40-38 mm nominal dia. zinc galvanized at the rate of 549 g/m<sup>2</sup>: ASTM A53 Table X 2, ASTM F1083, and AASHTO M111.
    - Aluminum coated steel pipe; ASTM A53, X 2 Tables Schedule 40; 38 mm nominal dia., 48.3 mm O.D.; coated at the rate 122 g/m<sup>2</sup>: AASHTO M111.
    - Aluminum alloy pipe- 50 mm nominal dia.: ASTM B241 or B221, Alloy 6063, T6.
    - Steel H-Beam- 48 x 41: Zinc Galv. 549 g/m<sup>2</sup>: AASHTO M111 and Detail.
    - Aluminum alloy H-Beam- 48 x 41: Detail.
    - Steel C- 48 x 41: Galv.: 549 g/m<sup>2</sup> zinc: AASHTO M111; or, 275 g/m<sup>2</sup> zinc- 5% aluminum-mischmetal: ASTM F1043 and Detail.
    - Resistance welded steel pipe; 344 MPa min. yield strength ASTM A569/A569M, A653/A653M or undepleted stock of discontinued A446/A446M base materials; ASTM F669 Group IV (Alternative Design); fence industry 50 mm O.D., 38 mm NPS, 48.26 mm dec. equiv., 3.05 mm min. wall thick. and min. wt. 3.39 kg/m; with ASTM F1043 metric equivalent internal coating Types A, B, C or D and external coating Types A, B, or C; the chromate conversion coating of external Type B shall have a thickness of 20 mg/m<sup>2</sup> min. and the polymer film topcoat shall have a thickness of 7.6 μm min.; internal and external coatings are not restricted to the combinations of Table 2, ASTM F1043.
  - Corner, end, and pull post options:
    - Galvanized steel pipe, Schedule 40- 50 mm nominal dia. zinc galvanized at the rate of 549 g/m<sup>2</sup>: ASTM A53 Table X 2, ASTM F1083, and AASHTO M111.
    - Aluminum coated steel pipe; ASTM A53 steel, X 2 Tables Schedule 40; 50 mm nominal dia., 60.3 mm O.D.; coated at the rate 122 g/m<sup>2</sup>: AASHTO M111.
    - Aluminum alloy pipe- 64 mm nominal dia.: ASTM B241 or B221, Alloy 6063, T6.
    - Resistance welded steel pipe; 344 MPa min. yield strength ASTM A569/A569M, A653/A653M or undepleted stock of discontinued A446/A446M base materials; ASTM F669 Group IV (Alternative Design); fence industry 60 mm O.D., 50 mm NPS, 60.32 mm dec. equiv., 3.30 mm min. wall thick. and min. wt. 4.63 kg/m; with ASTM F1043 metric equivalent internal coating Types A, B, C or D and external coating Types A, B, or C; the chromate conversion coating of external Type B shall have a thickness of 20 mg/m<sup>2</sup> min. and the polymer film topcoat shall have a thickness of 7.6 μm min.; internal and external coatings are not restricted to the combinations of Table 2, ASTM F1043.
  - Rail options:
    - Galvanized steel pipe, Schedule 40- 32 mm nominal dia. zinc galvanized at the rate of 549 g/m<sup>2</sup>: ASTM A53 Table X 2, ASTM F1083, and AASHTO M111.
    - Aluminum coated steel pipe; ASTM A53 steel, X 2 Tables Schedule 40; 32 mm nominal dia., 42.2 mm O.D.; coated at the rate 122 g/m<sup>2</sup>: AASHTO M111.
    - Aluminum alloy pipe- 32 mm nominal dia.: ASTM B241 or B221, Alloy 6063, T6.
    - Resistance welded steel pipe; 344 MPa min. yield strength ASTM A569/A569M, A653/A653M or undepleted stock of discontinued A446/A446M base materials; ASTM F669 Group IV (Alternative Design); fence industry 40 mm O.D., 32 mm NPS, 42.16 mm dec. equiv., 2.82 mm min. wall thick. and min. wt. 2.73 kg/m; with ASTM F1043 metric equivalent internal coating Types A, B, C or D and external coating Types A, B, or C; the chromate conversion coating of external Type B shall have a thickness of 20 mg/m<sup>2</sup> min. and the polymer film topcoat shall have a thickness of 7.6 μm min.; internal and external coatings are not restricted to the combinations of Table 2, ASTM F1043.
- Chain link fabric options (50.8 mm mesh with twisted and barbed selvage top and bottom for all options):
  - AASHTO M181 Type I - Zinc Coated Steel, 3.77 mm (No. 9 gage) (coated wire diameter), coated at the rate of 549 g/m<sup>2</sup> (M181 Class D 610 g/m<sup>2</sup> modified to 549 g/m<sup>2</sup>).
  - AASHTO M181 Type II - Aluminum Coated Steel, 3.77 mm (No. 9 gage) (coated wire diameter), coated at the rate of 122 g/m<sup>2</sup>.
  - AASHTO M181 Type III - Polyvinyl Chloride (PVC) Coated Steel, 3.77 mm (No. 9 gage) (coated core wire diameter), core wire-zinc coated steel. PVC coating: M181 Class A (either extruded or extruded and bonded) or Class B (bonded). See table right.
- Tension wire options:
  - Steel wire 4.5 mm (No. 7 gage) zinc galvanized at the rate of 366 g/m<sup>2</sup>: AASHTO M181.
  - Aluminum alloy wire with a diameter of 4.763 mm or larger conforming to the requirements of ASTM B211, Alloy 5056 Temper H38, or, Alclad Alloy 5056 Temper H192.
  - Aluminum coated steel wire 4.5 mm (No. 7 gage) coated at the rate of 122 g/m<sup>2</sup>: AASHTO M181.
- Tie wire and hog ring options:
  - Steel wire 3.77 mm (No. 9 gage) zinc galvanized at the rate of 366 g/m<sup>2</sup>.
  - Aluminum alloy wire with a diameter of 3.665 mm or larger conforming to the requirements of ASTM B211, Alloy 5056 Temper H38, or, Alclad Alloy 5056 Temper H192.
  - Aluminum coated steel wire 4.5 mm (No. 7 gage) coated at the rate of 122 g/m<sup>2</sup>.
- Unless a specific material is called for in the plans the Contractor may elect to use either a single type of material or a combination of material types from the component options listed above. Combinations of optional materials are restricted as follows: (a) Only one fabric optional material will be permitted between corner and/or end post assemblies. (b) Only one line post optional material will be permitted between corner and/or end post assemblies. (c) Pull post assemblies shall be optional materials identical to either the line post optional material or the corner and end post assembly optional material; but, pull post assemblies shall be the same optional material between any set of corner and/or end post assemblies.
- Concrete for bases shall be either Class I concrete or 'Sackcrete' premix. Class I concrete shall be as specified in Section 347 of the Standard Specifications except the requirements contained in 347-7 shall not apply. Materials for Class I concrete may be proportioned by volume and/or by weight.
- Line posts are to be set in concrete as detailed above or by the following methods:
  - In accordance with special details and/or as specifically described in the contract plans and specifications.
  - In accordance with ASTM F567 Subsections 4.4 through 4.7 and 4.9 and 4.10 as approved by the Engineer.
  - In soils that are firm, well drained and suitable for full stable embedment any of the optional steel posts may be driven in locations approved by the Engineer. Driving will not be permitted in sandy soils. Driven posts shall be set to a minimum depth of 0.9 m for fences up through 1.8 m in height, and, for each 0.3 m of fence height above 1.8 m the posts shall be set an additional 0.15 m in depth. Posts shall be protected to prevent damage from driving. Damaged posts shall be repaired or removed and replaced as directed by the Engineer without additional cost to the Department.
  - Posts mounted on concrete structure or solid rock shall be mounted in accordance with the base plate detail "Fence Mounting On Concrete Endwalls And Retaining Wall", Sheet 2; or, by embedment in accordance with ASTM F567 Subsection 4.5.

End, pull and corner post assemblies shall be set in concrete as detailed above for all soil conditions other than solid rock. Posts within assemblies that are located on concrete structures or solid rock shall be set by base plate or by embedment as prescribed under (b) above for line posts.

Line and assembly posts set in concrete bases shall be set an additional 75 mm in depth for each 0.3 m of fence height greater than 1.8 m.
- Pull posts shall be used at breaks in vertical grades of 15° or more, or at approximately 107 m centers except that this maximum interval may be reduced by the Engineer on curves where the radius is less than 580 m.
- Corner posts are to be installed at all horizontal breaks in fence at 15° or more and as required at vertical breaks over 15° as determined by the Engineer.
- When fence has an installed top of fabric height less than 1.8 m, knuckled top and bottom selvages shall be used unless the plans specifically identify locations for twisted selvage fabrics.
- Unless sliding gates or special gates are called for in the plans, all gates shall be chain link swing gates meeting the material requirements described above as approved by the Engineer. Payment shall include the gates, single or double, all necessary hardware for installation and any additional length and/or size for posts at the opening. Gates shall be paid for under the contract unit price for Fence Gates, Type B, EA.
- Line posts, tension wires, chain link fabric, tie wires, Class I concrete, and all miscellaneous fittings and hardware to be included in the cost for Fencing Type B, MI. The standard 1.8 m high fence shall be paid for under the contract unit price for Fencing Type B, MI. Fence having other height, line components and/or barbed wire attachments shall be paid for under the contract unit price for Fencing Type B (\_\_\_m), MI.

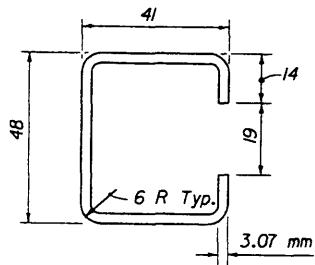
TYPE III VINYL COATED FABRIC								
Specification Section 966 And AASHTO M181 Table 4 Redefined As Follows								
Specified Diameter Of Metallic Coated Core Wire	Minimum Weight Of Zinc Coating	PVC Thickness Range						
		M181 Class A (Extruded Or Extruded And Bonded Coating)		M181 Class B (Bonded Coating)				
mm.	in.	gage	g/m <sup>2</sup>	oz./ft. <sup>2</sup>	mm.	in.	mm.	in.
3.77	0.148	9	92	0.30	0.38 to 0.64	0.015 to	0.15 to 0.25	0.006 to 0.090

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**FENCE TYPE B**

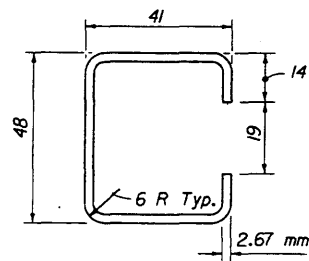
Designed By	Names	Dates	Approved By	Revision	Sheet No.	Index No.
Drawn By			<i>[Signature]</i>		1 of 2	452
Checked By				00		

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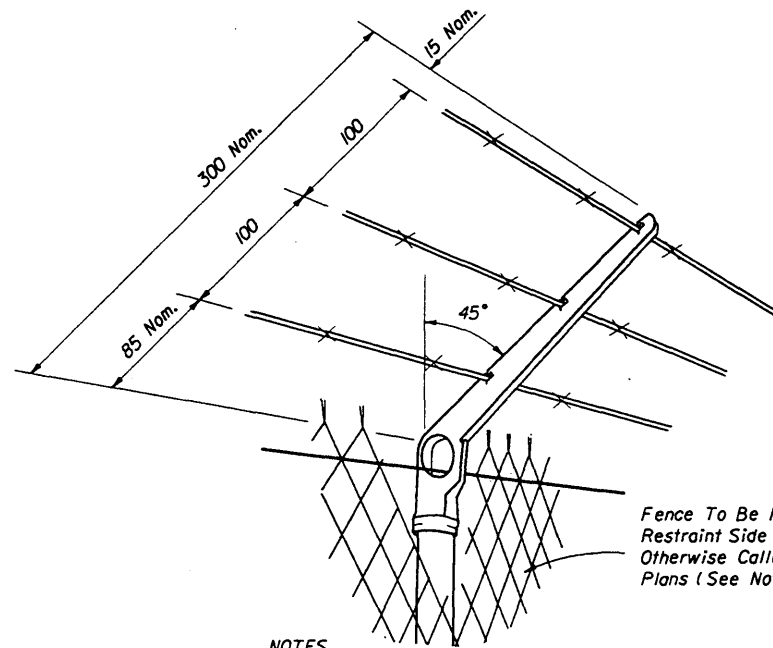
Galv. Wt. = 3.482 kg/m ±5%  
Yield (Min.) 310 MPa

STANDARD WALL



Galv. Wt. = 2.753 kg/m ±5%  
Yield (Min.) 310 MPa

THINWALL

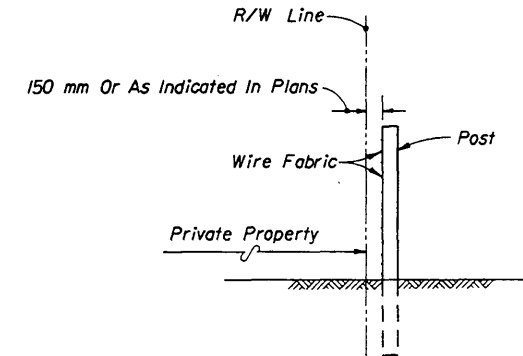


NOTES

- Attachments to be used only when called for in the plans. Attachments to extend in direction of restraint. Unless otherwise called for in plans, direction of restraint will be as follows:
- (a.) Outward on limited access right of way line.
  - (b.) Outward on controlled access right of way line.
  - (c.) Outward from utilities and hazardous facilities located within highway right of way.
  - (d.) Outward from lateral ditches, outfalls, retention basins, canals, borrow areas and similar support facilities.
  - (e.) Inward on pedestrian ways.

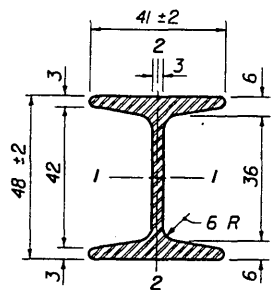
The cap-arm shall be designed to provide a drive fit over the top of posts and to exclude moisture in posts with tubular sections.

Attachments to be paid for under the contract unit price for Fencing, Type B (With Barb Wire Attachment), MI.



FENCE POSITION AT LOCATIONS WITHOUT FRONTAGE ROADS  
(REFER TO DETAIL PLANS FOR FENCE POSITION AT LOCATIONS WITH FRONTAGE ROADS)

OPTIONAL "C" LINE POST FOR TYPE B FENCE



48 mm x 41 mm H-BEAM (STEEL)

Area = 467 mm<sup>2</sup>  
Galv. Wt. = 4.048 kg/m ±5%

(ALUM)

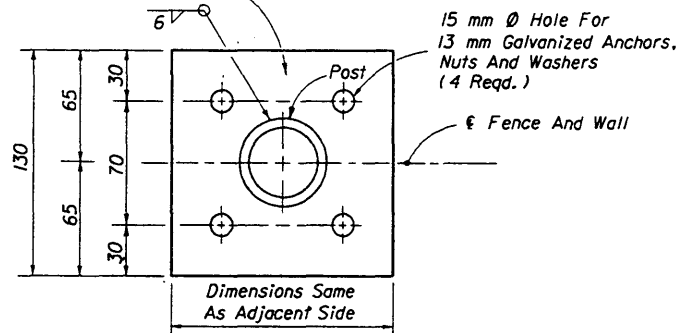
1.354 kg/m ±5%

	Axes		Axes	
	1-1	2-2	1-1	2-2
Moment Of Inertia	.428	.101	.428	.101
Section Modulus	.456	.124	.456	.124
Rad. Of Gyration	.779	.373	.779	.373
Surface Area	.237 m <sup>2</sup> /m		.237 m <sup>2</sup> /m	
Tensile Strength MPa (Min.)	552		207	
Yielding Point MPa (Min.)	331		173	

OPTIONAL H-BEAM LINE POST FOR TYPE B FENCE

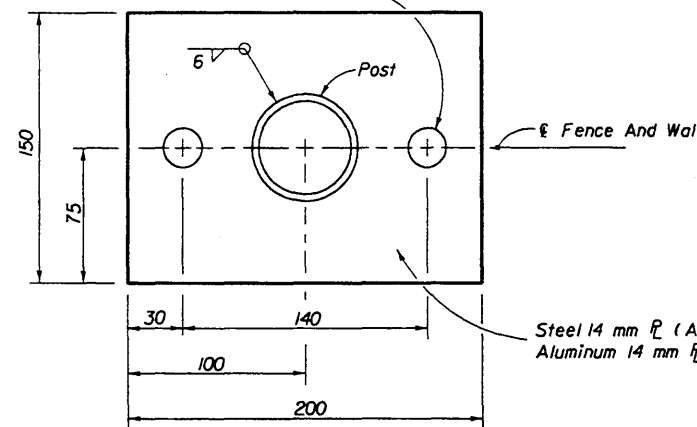
BARB WIRE ATTACHMENT

Steel 10 mm R (ASTM A36) Galvanized or Aluminum 10 mm R Alloy 6061-T6



TOP VIEW  
FOUR ANCHOR OPTION

22 mm Ø Hole For 20 mm Anchors, Nuts And Washers (2 Reqd.)



TOP VIEW  
TWO ANCHOR OPTION

FENCE MOUNTING ON CONCRETE ENDWALL AND RETAINING WALLS

BASE PLATE AND ANCHOR NOTES

1. Base plate identical for line, pull, end and corner posts and shall be considered an integral part of the respective posts for basis of payment.
  2. Post to be plumbed by grout shim under base plate.
  3. Anchors (Galvanized Steel):  
    - 300 mm Long Cast In Place, 265 mm Embedment: Headed Bolts, U-Bolts or Cluster Plates.
    - 200 mm Adhesive Anchors, 150 mm Min. Embedment.\*
- \*Adhesive anchors shall be headless anchor bolts set in drilled holes with an Adhesive Material System in accordance with Specification Sections 416 and 937; drilled holes shall be 2 mm larger in diameter than the anchor bolt. Expansion Bolts Not Permitted.

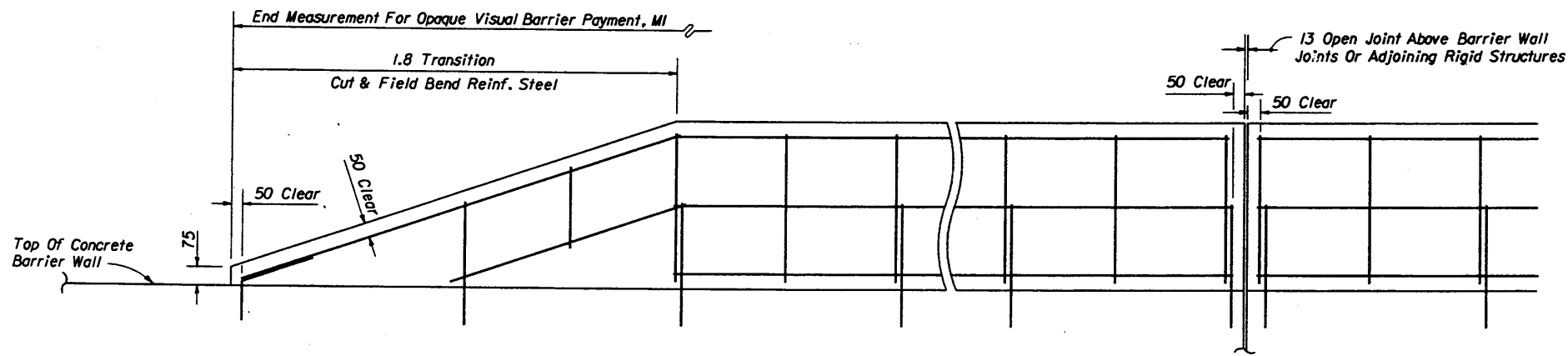
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

FENCE  
TYPE B

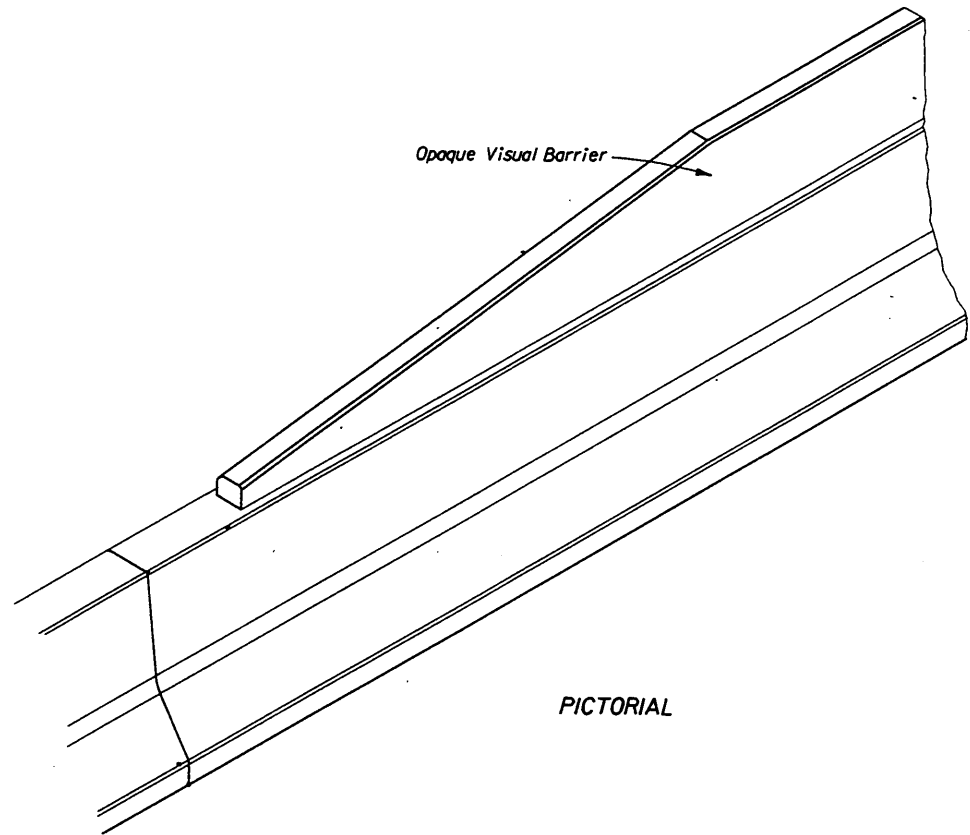
Names	Dates	Approved By
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Drawn By		State Roadway Design Engineer
Checked By		Revision Sheet No. Index No.
	00	2 of 2 452





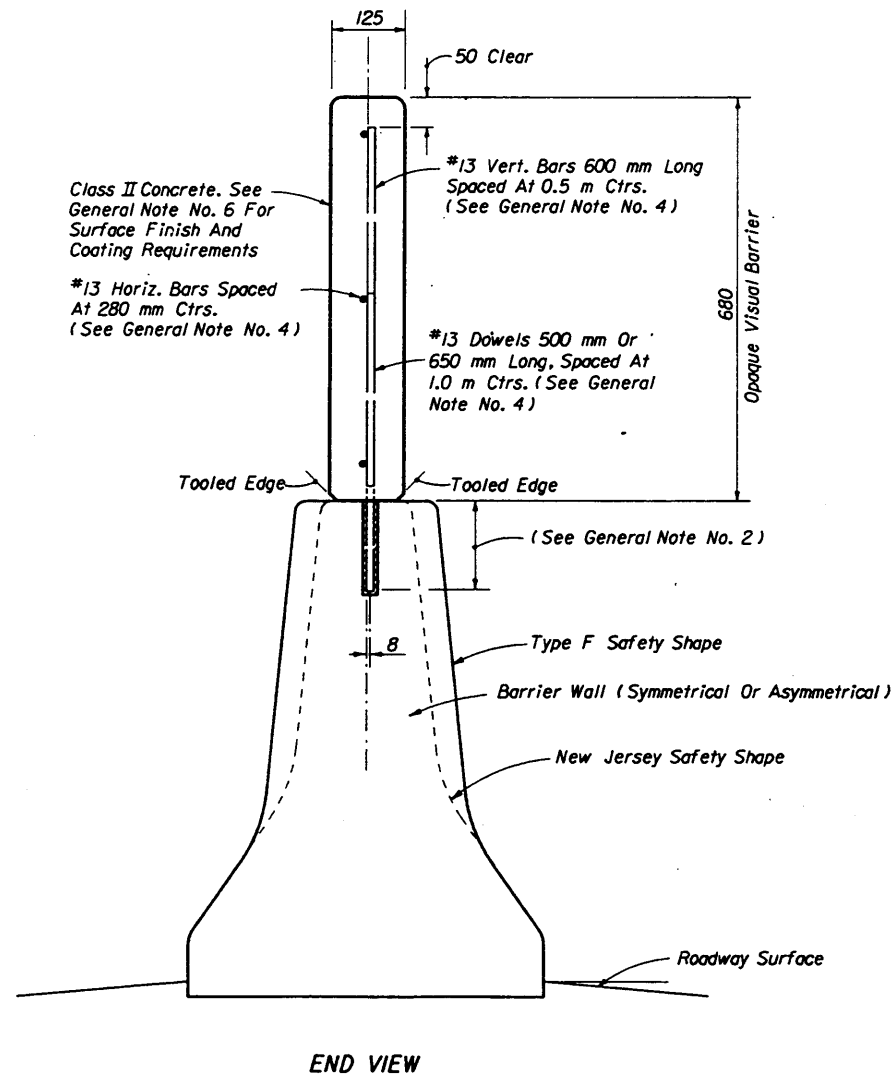


ELEVATION OF REINFORCEMENT AND DOWELING



PICTORIAL

ESTIMATED QUANTITIES (Per Meter)	
Concrete	0.105 m <sup>3</sup>
Reinforcing Steel	7.50 kg*
*7.76 kg With 650 mm Dowels	



END VIEW

GENERAL NOTES

1. The opaque visual barrier is intended to function as a visual screen, and is not intended to resist vehicle impact loads nor to restrain, contain or redirect vehicles or cargo. The barrier is designed to withstand zone wind loading and strikes by light debris; and, designed to yield to exceptional strikes by vehicles or cargo, and to contain ruptured segments of the screen when yielding to such strikes.
2. When the opaque visual barrier is constructed on an existing barrier wall, dowels shall be 500 mm in length, embedded 150 mm into the barrier wall and set with an approved chemical grout. Embedment holes shall be diameter, drilled to a depth 6 mm below the tip of the dowel unless greater depth is required to accept manufactured grout capsules.

When the opaque visual barrier is constructed in conjunction with project concrete barrier walls, dowels may be set as described above, in either the drilled or preformed holes; or, placed when the barrier wall is cast. For dowels that are placed when the wall is cast, the dowel shall be 650 mm in length and embedded to a depth of 300 mm.

3. For both double and single faced concrete barrier walls the opaque visual barrier is to be located in the center of the top of the wall.

For single faced barrier walls that are constructed around other vertical structure, the opaque visual barrier shall follow the alignments of only one of the walls and be centered atop that wall.

For dual median barrier walls that follow differential profiles, the opaque visual barrier shall be constructed atop the wall with the higher elevation, unless conditions dictate otherwise. Lateral transitions or end overlaps for opaque visual barriers that alternate between dual walls shall be detailed in the plans.

For median barrier walls that are divided when connecting to separated bridges, the opaque visual barrier shall be constructed atop the approach side barrier wall, unless differential profiles dictate locating the opaque visual barrier on the departure side barrier wall.

Opaque visual barriers to be located on capped fills between dual barrier walls shall be detailed in the plans.

4. In lieu of the reinforcement shown the Contractor may substitute welded wire fabric equal to or better than that shown, when approved by the Engineer. Details shall be submitted with requests for substitution.

5. The Contractor may construct contiguous precast concrete panels in lieu of the cast-in-place opaque screen when approved by the Engineer. Panel design and method for anchorage to the barrier wall shall be detailed by shop drawings when requesting the Engineer's approval.

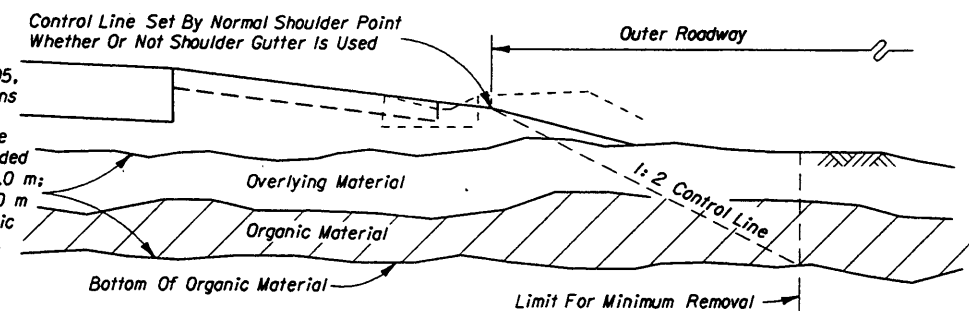
The Contractor may construct the opaque screen monolithically with the barrier wall, however, the screen design shall not be modified so as to cause the wall to be dynamically active from strikes on the screen; see design considerations in Note No. 1 above.

6. Exposed concrete surfaces shall have a Class 3 surface finish in accordance with Section 521 of the Standard Specification, unless another finish is called for in the plans. The surfaces shall have a Class 5 Applied Finish Coating in accordance with Section 400 only when called for in the plans.

7. Payment for opaque visual barrier shall be full compensation for concrete, reinforcement, dowels, casting, placement, drilling, grouting, tooling, finishing and work incidental thereto, and shall be paid for under the contract unit price for Opaque Visual Barrier (Concrete) (680 mm Height), MI.

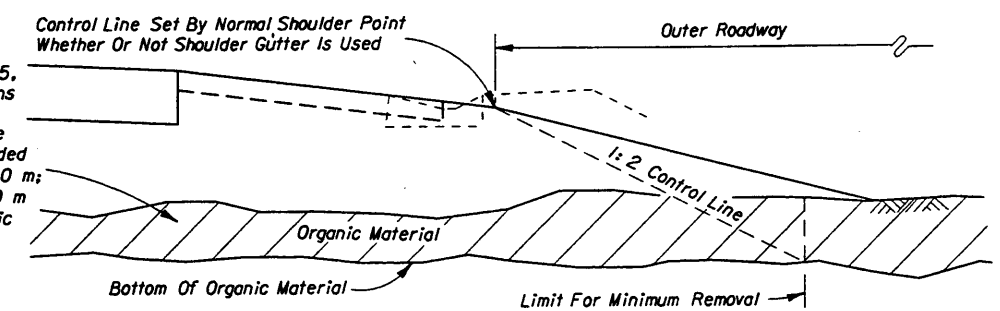
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
OPAQUE VISUAL BARRIER				
Names	Dates	Approved By		
Designed By	DCB/JVG	9/87	[Signature]	
Drawn By	JBW	9/87	Revision	Sheet No.
Checked By	DCB/JVG	9/87	98	1 of 1
			Index No.	461

Remove Overlying Material And Organic Material Within The Limits Shown And Backfill In Accordance With Index No. 505, Unless Otherwise Called For In The Plans Or Directed Otherwise By The District Geotechnical Engineer; The Limits Include Full Median Width When Applied To Divided Facilities With Median Widths Up To 20.0 m; When Median Width Is Greater Than 20.0 m And For Bifurcated Roadways The Organic Material Removal Limits Will Be Set By A 1:2 Control Line Complimentary To The Outer Roadway That Will Accomodate One Future Median Lane On Each Roadway Unless Specified Otherwise By The Plans.



WITH OVERBURDEN - HALF SECTION

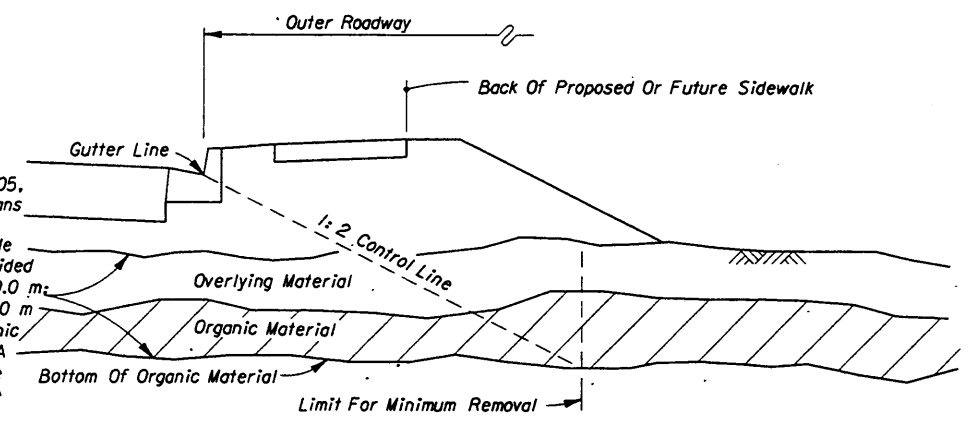
Remove Overlying Material And Organic Material Within The Limits Shown And Backfill In Accordance With Index No. 505, Unless Otherwise Called For In The Plans Or Directed Otherwise By The District Geotechnical Engineer; The Limits Include Full Median Width When Applied To Divided Facilities With Median Widths Up To 20.0 m; When Median Width Is Greater Than 20.0 m And For Bifurcated Roadways The Organic Material Removal Limits Will Be Set By A 1:2 Control Line Complimentary To The Outer Roadway That Will Accomodate One Future Median Lane On Each Roadway Unless Specified Otherwise By The Plans.



WITHOUT OVERBURDEN - HALF SECTION

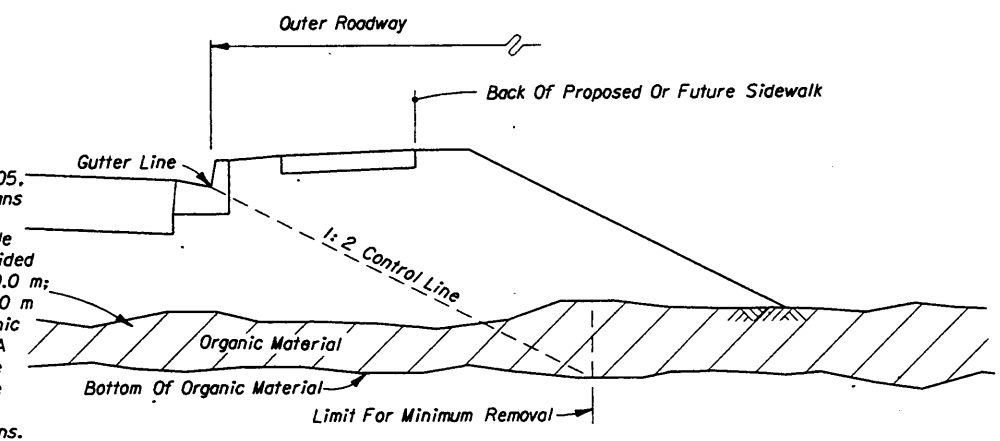
IN RURAL CONSTRUCTION

Remove Overlying Material And Organic Material Within The Limits Shown And Backfill In Accordance With Index No. 505, Unless Otherwise Called For In The Plans Or Directed Otherwise By The District Geotechnical Engineer; The Limits Include Full Median Width When Applied To Divided Facilities With Median Widths Up To 20.0 m; When Median Width Is Greater Than 20.0 m And For Bifurcated Roadways The Organic Material Removal Limits Will Be Set By A 1:2 Control Line Complimentary To The Outer Roadway That Will Accomodate One Future Median Lane On Each Roadway Unless Specified Otherwise By The Plans.



WITH OVERBURDEN - HALF SECTION

Remove Overlying Material And Organic Material Within The Limits Shown And Backfill In Accordance With Index No. 505, Unless Otherwise Called For In The Plans Or Directed Otherwise By The District Geotechnical Engineer; The Limits Include Full Median Width When Applied To Divided Facilities With Median Widths Up To 20.0 m; When Median Width Is Greater Than 20.0 m And For Bifurcated Roadways The Organic Material Removal Limits Will Be Set By A 1:2 Control Line Complimentary To The Outer Roadway That Will Accomodate One Future Median Lane On Each Roadway Unless Specified Otherwise By The Plans.



WITHOUT OVERBURDEN - HALF SECTION

IN URBAN CONSTRUCTION

REMOVAL OF ORGANIC MATERIAL

GENERAL NOTES

- All details shown on this index for removal of organic and plastic materials apply unless otherwise shown on the plans.
- Utilization of excavated materials shall be in accordance with Index No. 505.
- Where organic or plastic material is undercut, backfill shall be made of suitable material in accordance with Index No. 505, unless otherwise shown on the plans.
- The term "Plastic Material" used in this index in conjunction with removal of plastic soil is as defined under soil classifications for Plastic (P) and High Plastic (H) on Index No. 505.
- The term "Organic Material" as used on this index is defined as any soil which has an average organic content greater than five (5.0) percent, or an individual organic content test result which exceeds seven (7.0) percent. Organic material shall be removed as shown on this index and the plans unless directed otherwise by the District Geotechnical Engineer.

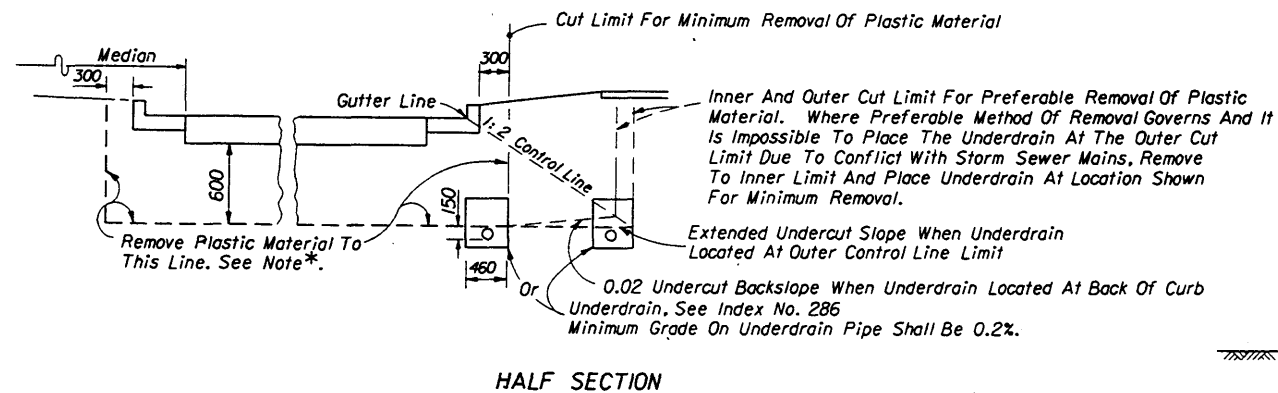
Average organic content shall be determined from the test results from a minimum of three randomly selected samples from each stratum. Tests shall be performed in accordance with FM 1-T267 on the portion of a sample passing the No. 4 sieve.

- The normal depth of side ditches shall be 1.0 m below the shoulder point except in special cases.
- In municipal areas, where underdrain is to be constructed beneath the proposed pavement, the grade of the underdrain filter material will not extend above the bottom of the stabilized section of the subgrade. Gradation of the filter material shall conform to FDOT specifications. Minimum grade on underdrain pipe shall be 0.2%.
- See Index No. 506 for miscellaneous earthwork details.

DESIGN NOTES

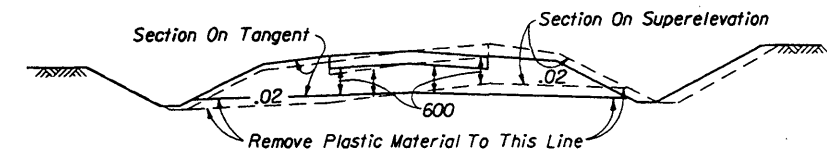
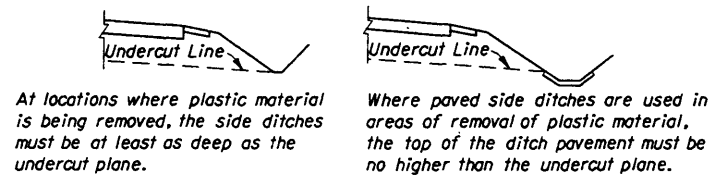
- At locations where organic material or other soft soil deposits persists to such depth that removal is impractical, the construction of a geosynthetic foundation over those soils should be considered. The Engineer of Record should request guidance from the District Geotechnical Engineer and solicit geosynthetic foundation designs from geosynthetic manufacturers when pursuing geosynthetic alternates.
- The designer shall take into consideration the expectancy of roadway widening to the outside, and where widening is anticipated specify in the plans the limits of removal of organic and plastic materials necessary to accommodate anticipated widening.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>REMOVAL OF ORGANIC AND PLASTIC MATERIAL</b>				
Designed By	GEUTBCH	9/93	Approved By <i>[Signature]</i> State Geotechnical Engineer	
Drawn By	HEH	9/93	Revision	Sheet No.
Checked By	BTD/ELS	9/93	96	1 of 2
				Index No. <b>500</b>



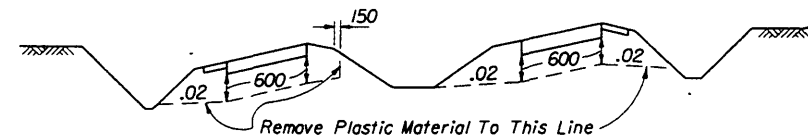
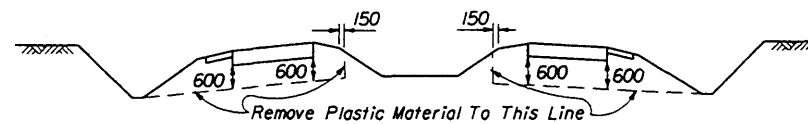
NOTES: Refer to roadway cross sections to determine whether minimum or preferable removal is used.  
 \*Where frequency of median breaks indicates that it is impractical to leave plastic material in the median, the designer may elect to indicate total removal of this material.  
 If during construction it becomes apparent, due to normal required construction procedures, that it is impractical to leave the plastic material in the median, total removal of this material shall be approved by the Engineer.

**REMOVAL OF PLASTIC MATERIAL AND LOCATION OF UNDERDRAIN IN URBAN CONSTRUCTION**



Note: When this detail is applied to minor collectors and local facilities, the undercut may be reduced to 460 mm.

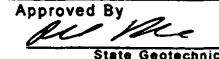
**REMOVAL OF PLASTIC MATERIAL ON DIVIDED FREEWAYS, ARTERIALS AND MAJOR COLLECTORS HAVING FLUSH MEDIANS, AND, ON UNDIVIDED ARTERIALS AND MAJOR COLLECTORS**

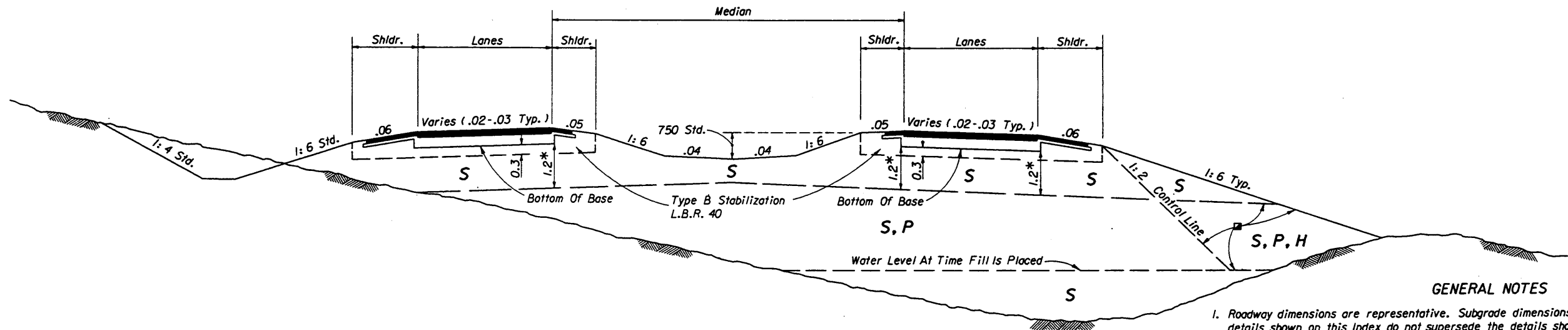


**REMOVAL OF PLASTIC MATERIAL ON INTERSTATE FACILITIES, FREEWAYS, DIVIDED ARTERIALS AND MAJOR COLLECTORS HAVING DEPRESSED MEDIANS**

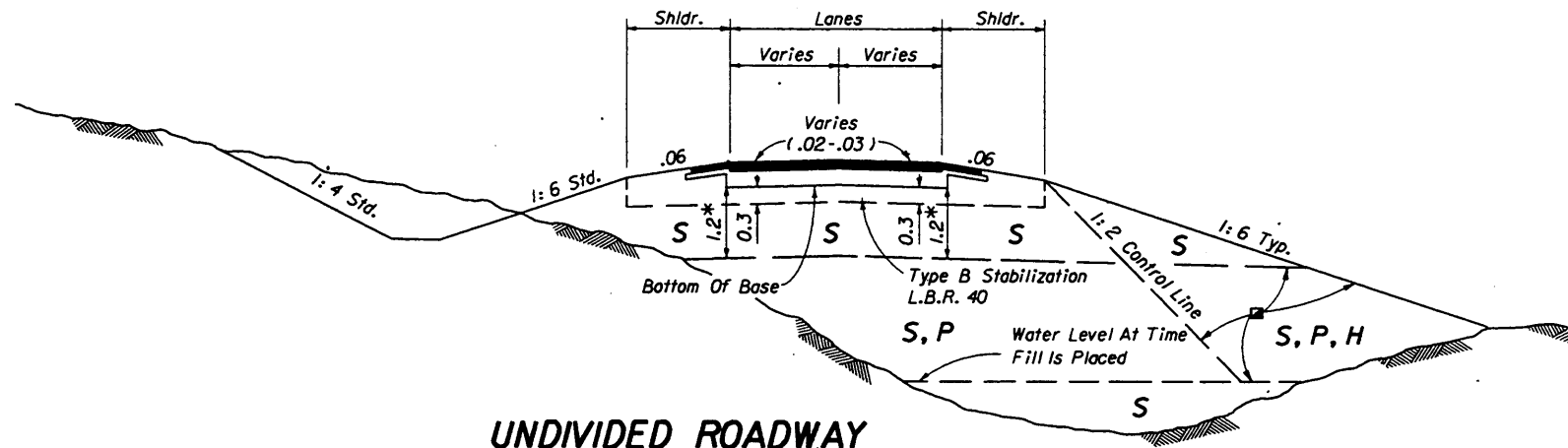
**REMOVAL OF PLASTIC MATERIAL**

Note: For GENERAL NOTES see Sheet 1.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
REMOVAL OF ORGANIC AND PLASTIC MATERIAL				
Names		Dates		Approved By
Designed By	KRE/MNL	05/91	 State Geotechnical Engineer	
Drawn By	HRH	05/91	Revision	Sheet No.
Checked By	JVG/MNL	05/91	94	2 of 2
				Index No. 500



### DIVIDED ROADWAYS



### UNDIVIDED ROADWAY

SYMBOL	SOIL	CLASSIFICATION (AASHTO M-145)
S	Select	A-1, A-3, A-2-4 **
P	Plastic	A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7 (ALL WITH LL < 50)
H	High Plastic	A-2-5, A-2-7, A-5 Or A-7 (ALL WITH LL > 50)
M	Muck	A-8

Classification listed left to right in order of preference.

See General Notes Nos. 4 & 5 for utilization of soils classified as organic material or muck.

\*\* Certain types of A-2-4 material are likely to retain excess moisture and may be difficult to dry and compact. They should be used in the embankment above the water level existing at time of construction. They may be used in the subgrade portion of the roadbed when approved by the District Geotechnical Engineer.

\* For cut sections this dimension may be reduced to 600 mm; see Index No. 500. For minor collectors and local facilities this dimension may be reduced to 450 mm.

### FLEXIBLE PAVEMENT

### GENERAL NOTES

- Roadway dimensions are representative. Subgrade dimensions and control lines are standard. The details shown on this index do not supersede the details shown in the plans or on Index Nos. 500 or 506.
- Plastic (P) soils may be placed above the existing water level (at the time of construction) to within 1.2 m of the proposed base. It should be placed uniformly in the lower portion of the embankment for some distance along the project rather than full depth for short distances.
- High Plastic (H) soils excavated within the project limits may be used in embankment construction as indicated on this index. High Plastic soils are not to be used for embankment construction when obtained from outside the project limits.
- Select (S) soils having an average organic content of more than two and one-half (2.5) percent, or having an individual test value which exceeds four (4) percent, shall not be used in the subgrade portion of the roadbed.

Select (S), Plastic (P), or High Plastic (H) soils having an average organic content of more than five (5) percent, or an organic content individual test result which exceeds seven (7) percent, shall not be used in the portion of embankment inside the control line, unless written authorization is provided by the District Geotechnical Engineer; these soils may be used for embankment construction outside the control line, unless restricted by the plans or otherwise specified in the plans, provided they can be compacted sufficiently to sustain a drivable surface for operational vehicles as approved by the Engineer.

Average organic content shall be determined from the test results from a minimum of three randomly selected samples from each stratum or stockpile of a particular material. Tests shall be performed in accordance with FM 1-T267 on the portion of a sample passing the 4.75 mm sieve.

- Highly organic soils, composed primarily of partially decayed organic matter, often dark brown or black in color with an odor of decay, and sometimes fibrous, shall be designated as muck. Further, any stratum or stockpile of soil which contains pockets of highly organic material may be designated as Muck (M).


Highly organic soils shall not be used within the subgrade or embankment portion of the roadbed, with the exception of muck used as a supplement to construct a finish soil layer as described in Section 162 of the FDOT Standard Specifications.

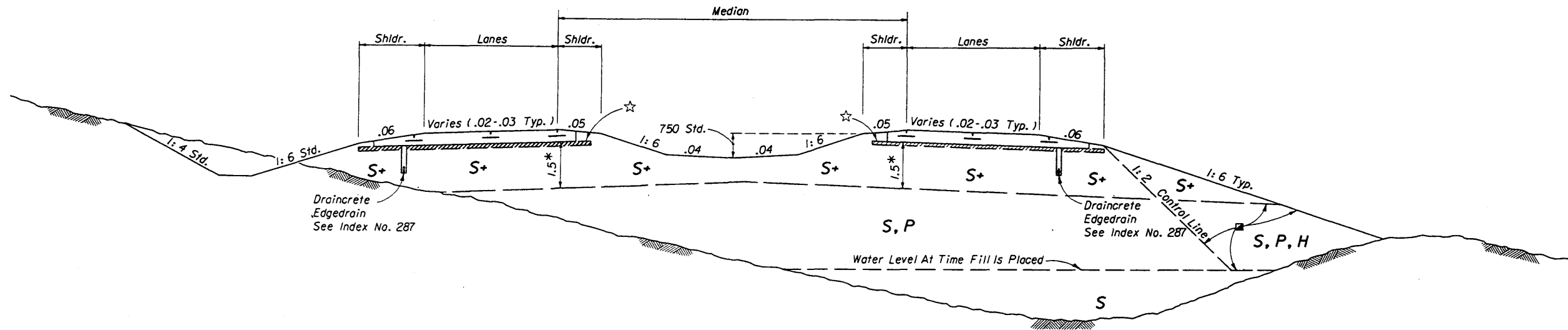
### DESIGN NOTES

- The designer shall take into consideration the expectancy of roadway widening to the outside, and where widening is anticipated, specify in the plans the utilization of Select (S), Plastic (P) and/or High Plastic (H) soils classified as organic material, in the embankment outside the control line.

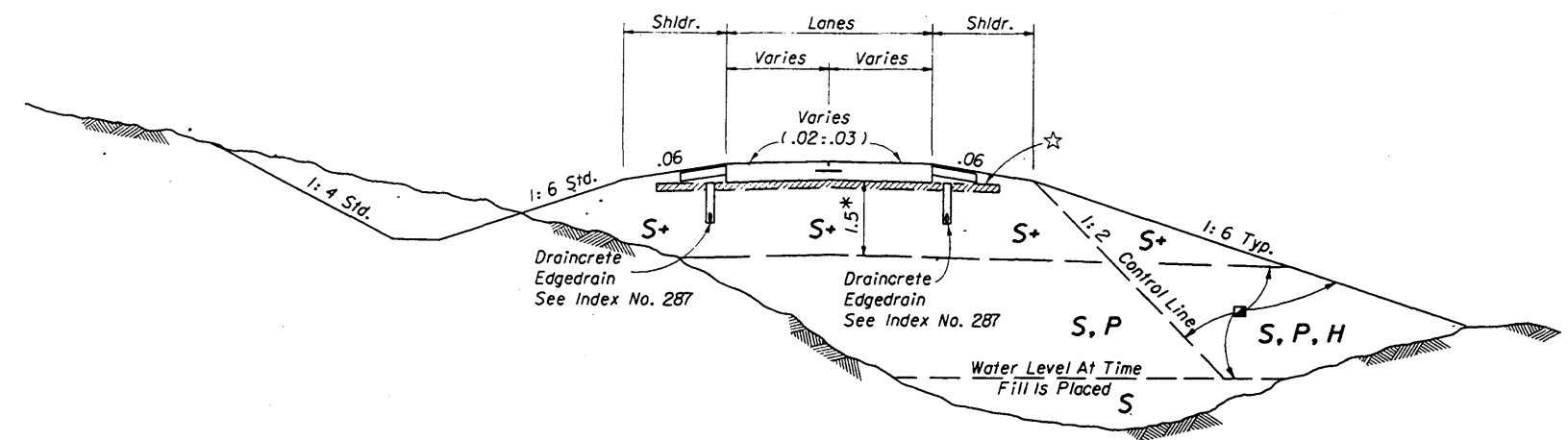
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

### EMBANKMENT UTILIZATION

Names	Dates	Approved By		
Designed By	GEOTECH	09/93	 State Geotechnical Engineer	
Drawn By	HSD	09/93		
Checked By	BTD	09/93		
Revision		00	Sheet No.	Index No.
			1 of 3	505



**DIVIDED ROADWAYS**



**UNDIVIDED ROADWAY**

SYMBOL	SOIL	CLASSIFICATION (AASHTO M-145)
S	Select	A-1, A-3, A-2-4 **
S+	Special Select	A-3 *** With Minimum Average Lab Permeability of $5 \times 10^{-5}$ cm/sec as per FM 1-T215
P	Plastic	A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7 (ALL WITH LL < 50)
H	High Plastic	A-2-5, A-2-7, A-5 Or A-7 (ALL WITH LL > 50)
M	Muck	A-8

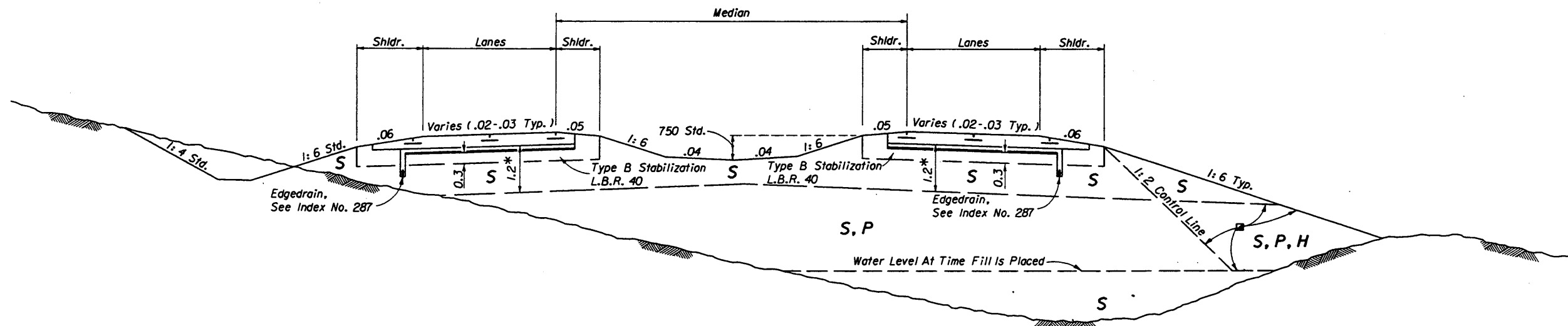
- Classification listed left to right in order of preference.
- See General Notes Nos. 4 & 5 for utilization of soils classified as organic material or muck.
  - \*\*\*When allowed by the plans, some types of A-2-4 material may be approved in writing by the District Materials Engineer. This material must meet the minimum lab permeability requirement, be non-plastic, and not exceed 12% passing the 75  $\mu$ m sieve.
  - \*\* Certain types of A-2-4 material are likely to retain excess moisture and may be difficult to dry and compact. They should be used in the embankment above the water level existing at time of construction.
  - \* For cut sections this dimension may be reduced to 600 mm; see Index No. 500. For minor collectors and local facilities this dimension may be reduced to 450 mm.
  - ☆ 75 mm of #57 Coarse Aggregate Mixed Into Top 150 mm.

**RIGID PAVEMENT - ALTERNATE #1**

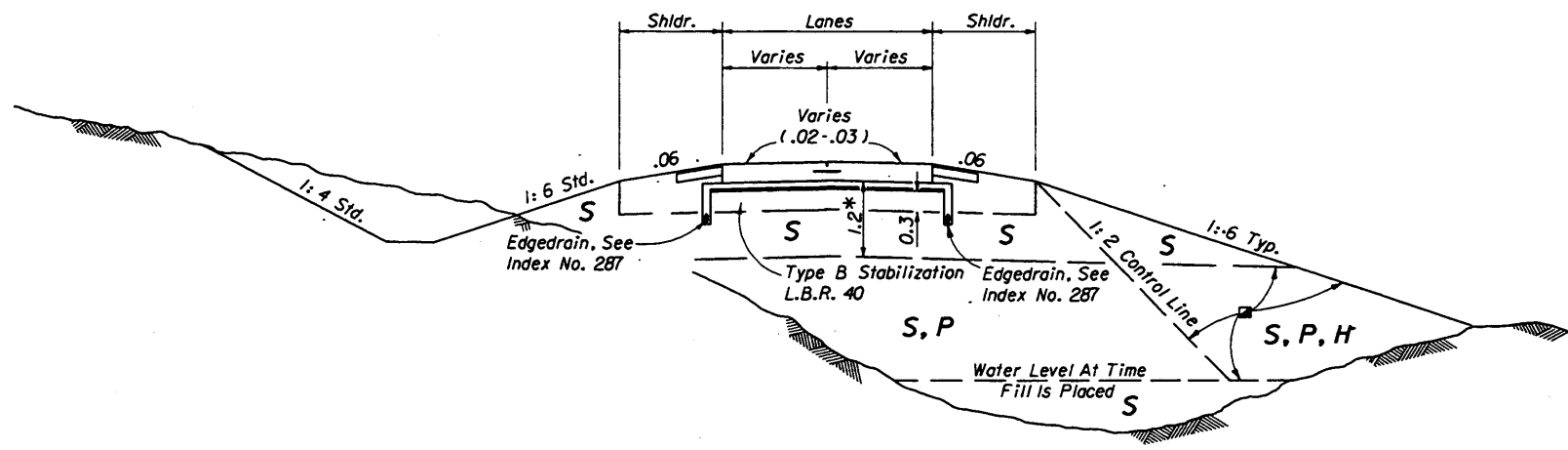
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**EMBANKMENT UTILIZATION**

Names	Dates	Approved By		
Designed By	BMD 09/93	<i>[Signature]</i> State Geotechnical Engineer		
Drawn By	BSD 09/93	Revision	Sheet No.	Index No.
Checked By	BTD 09/93	96	2 of 3	505



**DIVIDED ROADWAYS**



**UNDIVIDED ROADWAY**

**DESIGN NOTE**  
 1. Concrete pavement is to be placed over 100 mm of Asphalt Treated Permeable Base (ATPB) or Cement Treated Permeable Base (CTPB) as identified in the plans. This will be placed on an aggregate separator layer using 20 mm of Type S-III Structural Course. This will be placed on a working platform using 300 mm of Type B Stabilization.

SYMBOL	SOIL	CLASSIFICATION (AASHTO M-145)
S	Select	A-1, A-3, A-2-4 **
P	Plastic	A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7 (ALL WITH LL < 50)
H	High Plastic	A-2-5, A-2-7, A-5 Or A-7 (ALL WITH LL > 50)
M	Muck	A-8

Classification listed left to right in order of preference.

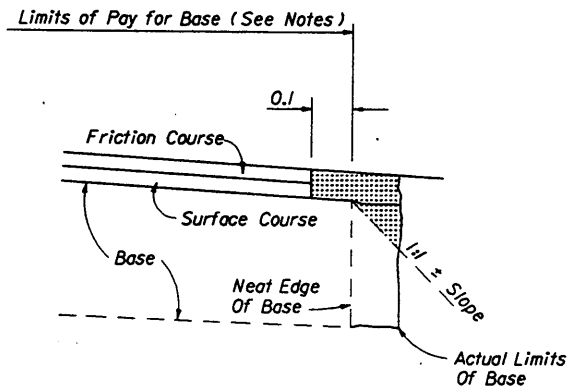
☑ See General Notes Nos. 4 & 5 for utilization of soils classified as organic material or muck.

\*\* Certain types of A-2-4 material are likely to retain excess moisture and may be difficult to dry and compact. They should be used in the embankment above the water level existing at time of construction. They may be used in the subgrade portion of the roadbed when approved by the District Geotechnical Engineer.

\* For cut sections this dimension may be reduced to 600 mm; see Index No. 500. For minor collectors and local facilities this dimension may be reduced to 450 mm.

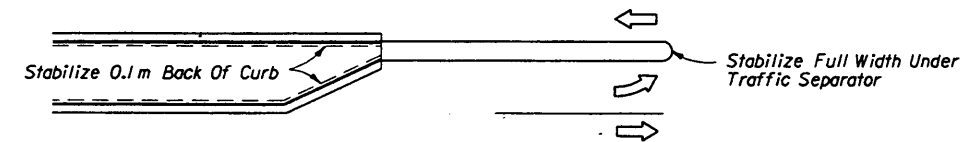
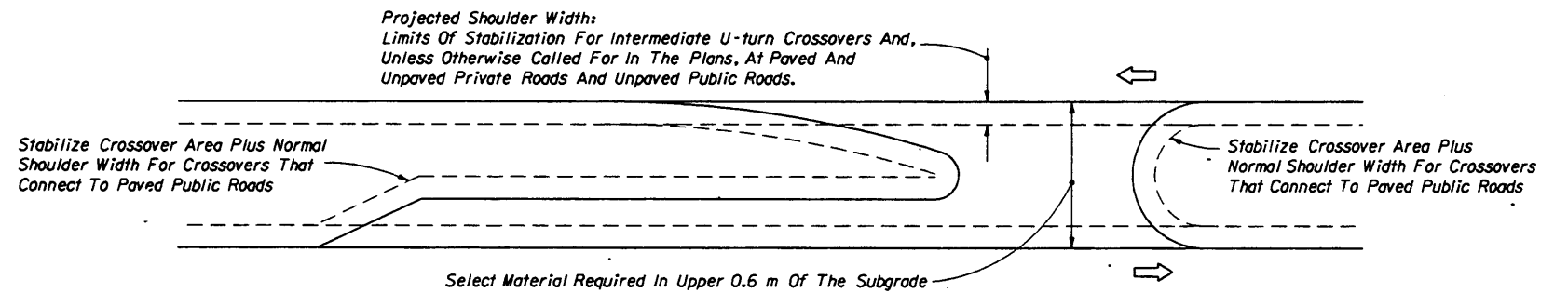
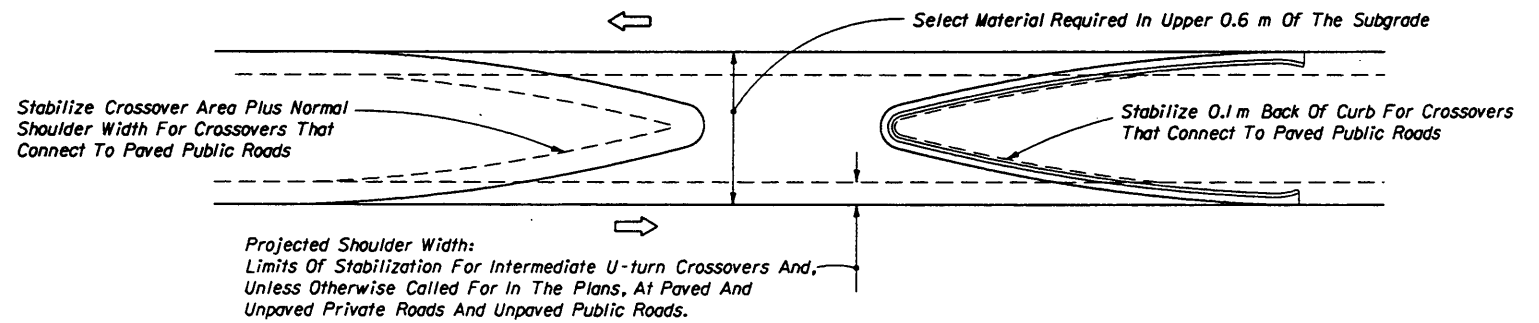
**RIGID PAVEMENT - ALTERNATE #2**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>EMBANKMENT UTILIZATION</b>				
Names	Dates	Approved By		
Designed By	BMD 09/93	<i>[Signature]</i> State Geotechnical Engineer		
Drawn By	BSD 09/93	Revision	Sheet No.	Index No.
Checked By	BTD 09/93	98	3 of 3	505



- NOTES**
1. All material in the shaded area is excess base to be removed.
  2. The cost for removal of excess base material shall be included in the contract unit price for base.
  3. Payment for base shall be calculated using normal width.

**REMOVAL OF EXCESS BASE MATERIAL**



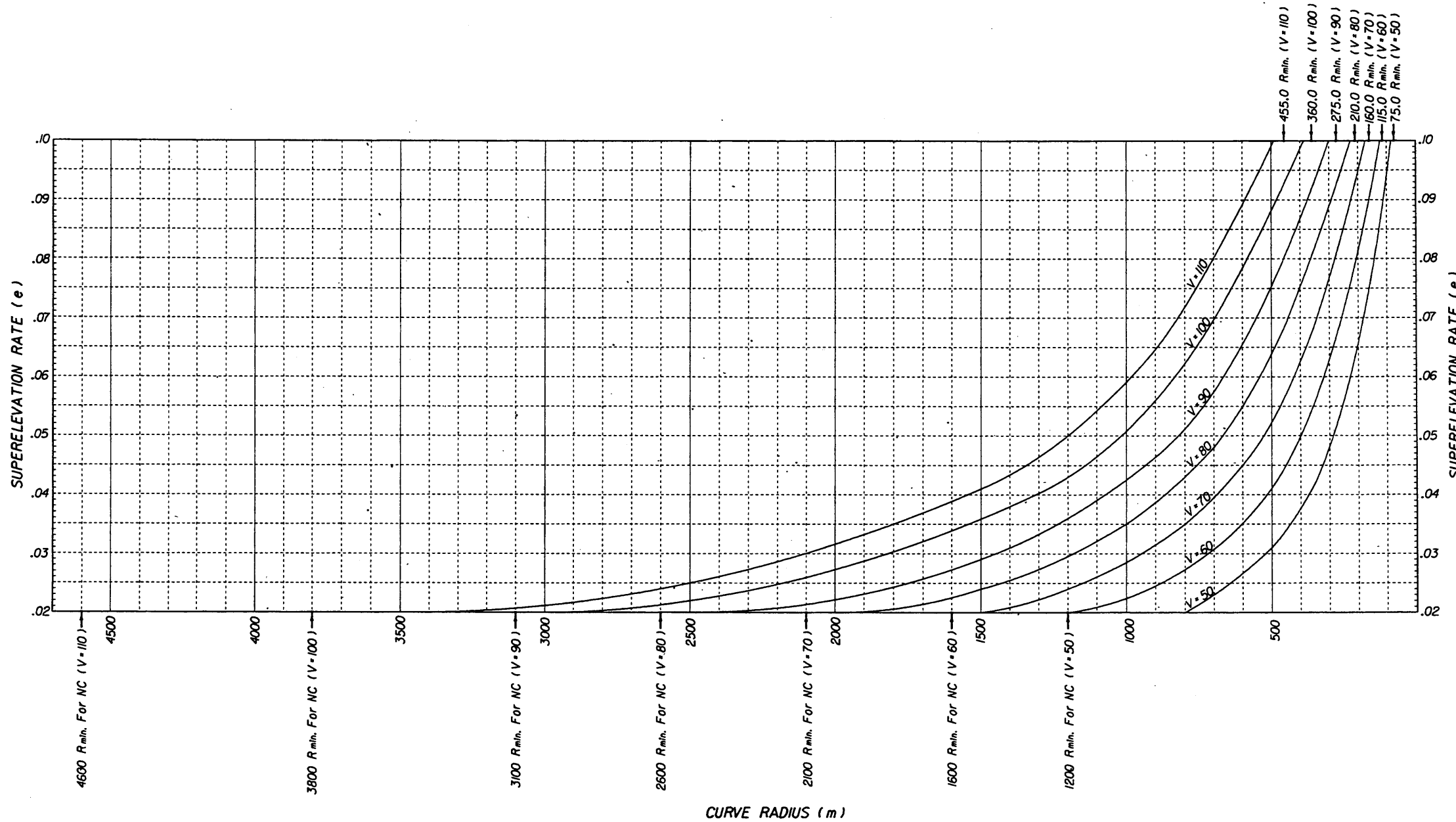
- NOTES**
1. When the median has curb or curb and gutter, stabilize 0.1m back of curb.
  2. When the median has shoulder with no curb or curb and gutter, stabilize to normal shoulder width.
  3. See the details above for stabilizing requirements at crossroads.
  4. Stabilize entire area under all paved traffic islands.
  5. Stabilize full width under all traffic separators.
  6. Select material as defined on Index No. 505. For minor collectors and local facilities the depth of select material thickness may be reduced from 0.6 m to 0.45 m.

**MEDIAN STABILIZING DETAILS**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>MISCELLANEOUS EARTHWORK DETAILS</b>					
Names	Dates	Approved By			
Designed By	RL/MML 05/91	State Roadway Design Engineer			
Drawn By	RKH 05/91				
Checked By	JVG/MML 05/91	Revision	Sheet No.	Index No.	
		94	1 of 1	506	

**SUPERELEVATION RATES (e) FOR RURAL HIGHWAYS, URBAN FREEWAYS AND HIGH SPEED URBAN HIGHWAYS**  
 $e_{max.} = 0.10$

CHARTED VALUES



TABULATED VALUES

Radius (m)	Design Speed (km/h)						
	50	60	70	80	90	100	110
4600	NC	NC	NC	NC	NC	NC	NC
4500							RC
4400							
4300							
4200							
4100							
4000							
3900							
3800						NC	
3700						RC	
3600							
3500							
3400							
3300							
3200							RC
3100							.021
3000					NC	RC	.021
2900							.022
2800						RC	.022
2700						.021	.023
2600				NC		.021	.024
2500				RC		.022	.025
2400						.023	.026
2300					RC	.024	.027
2200					.021	.025	.029
2100			NC		.021	.026	.030
2000			RC		.022	.027	.032
1900				RC	.023	.029	.033
1800				.021	.024	.030	.035
1700				.021	.026	.032	.037
1600		NC		.023	.027	.034	.039
1500		RC	RC	.024	.029	.036	.041
1400			.021	.026	.031	.038	.043
1300			.022	.027	.033	.040	.046
1200	NC	RC	.024	.030	.036	.043	.050
1100	RC	.021	.026	.032	.039	.046	.054
1000		.022	.029	.035	.043	.051	.059
900		.025	.032	.039	.046	.056	.065
800	RC	.027	.035	.043	.051	.062	.072
700	.023	.031	.040	.048	.057	.070	.080
600	.027	.035	.045	.055	.066	.078	.089
500	.031	.041	.052	.064	.075	.088	.099
450	.034	.045	.057	.069	.081	.093	
400	.038	.050	.063	.075	.087	.099	
350	.042	.056	.069	.082	.093		
300	.048	.063	.077	.089	.10		
250	.056	.071	.085	.096			
200	.066	.081	.095				
175	.072	.087	.10				
150	.078	.093					
125	.086	.099					
100	.094						

0.10 R min = 75.0  
 0.10 R min = 115.0  
 0.10 R min = 160.0  
 0.10 R min = 210.0  
 0.10 R min = 275.0  
 0.10 R min = 360.0  
 0.10 R min = 455.0

NC = Normal Crown  
 RC = Reverse Crown (0.02)

$e_{max.} = 0.10$

**SUPERELEVATION FOR RURAL HIGHWAYS, URBAN FREEWAYS AND HIGH SPEED URBAN HIGHWAYS**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

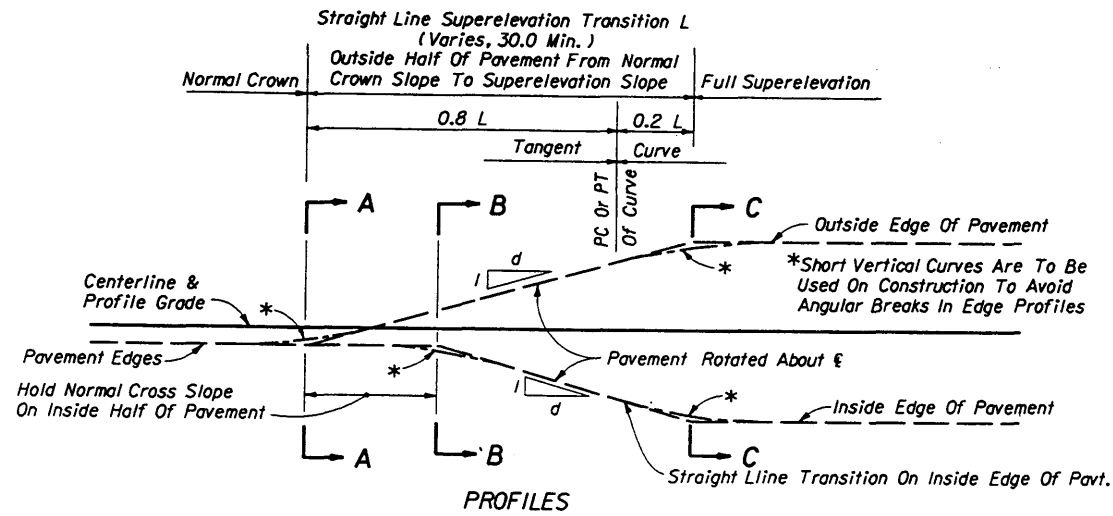
**SUPERELEVATION  
RURAL HIGHWAYS, URBAN FREEWAYS  
AND HIGH SPEED URBAN HIGHWAYS**

Names	Dates	Approved By
Designed By: TLR	7/94	[Signature]
Drawn By: KSK	7/94	
Checked By: JVG	7/94	

State Roadway Design Engineer

Revision	Sheet No.	Index No.
94	1 of 3	510

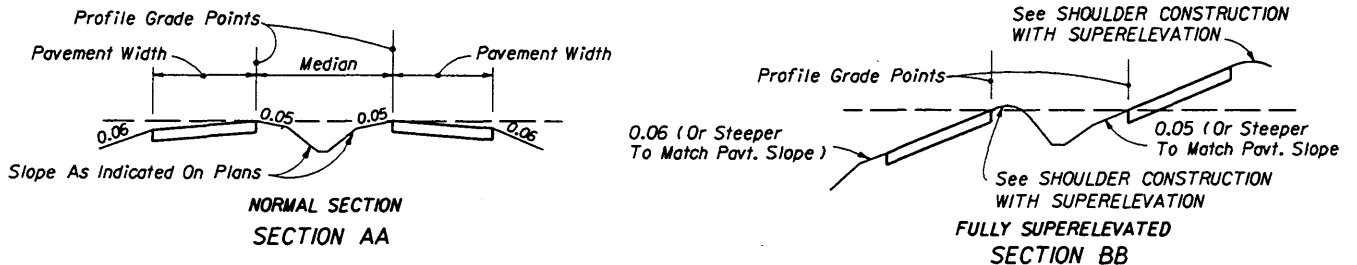
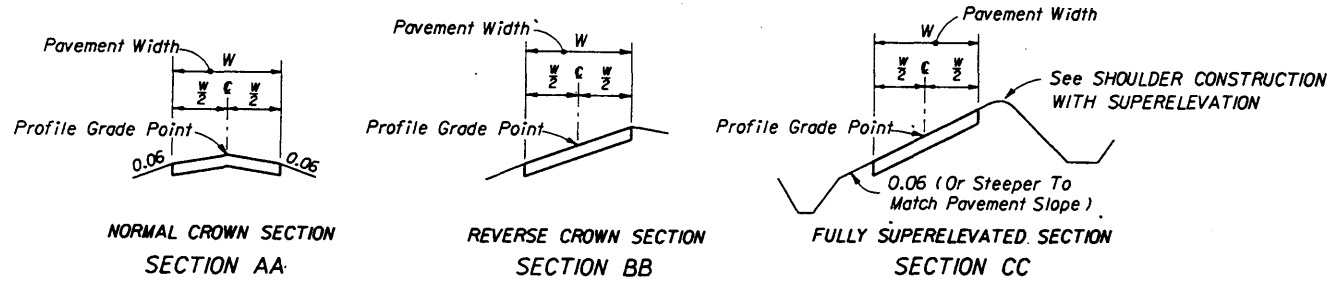
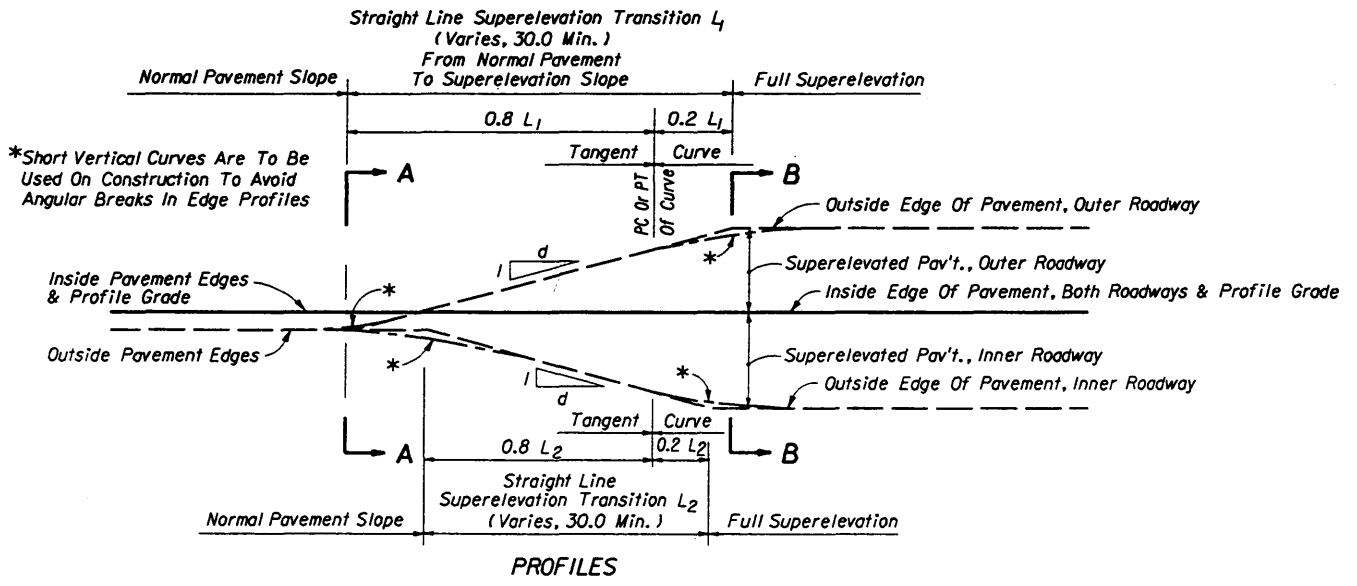




**SLOPE RATIOS FOR SUPERELEVATION TRANSITIONS**

SECTION	DESIGN SPEED, km/h		
	70-80	90-100	110
2 & 4 Lane	1: 200	1: 225	1: 250
6 Lane	1: 160	1: 180	1: 200
8 Lane	1: 150	1: 170	1: 190

The length of superelevation transition is to be determined by the relative slope between the travel way edge of pavement and the profile grade, except that the minimum length of transition shall be 30.0 m.



2-LANE, 4-LANE OR 6-LANE PAVEMENT, NO MEDIAN

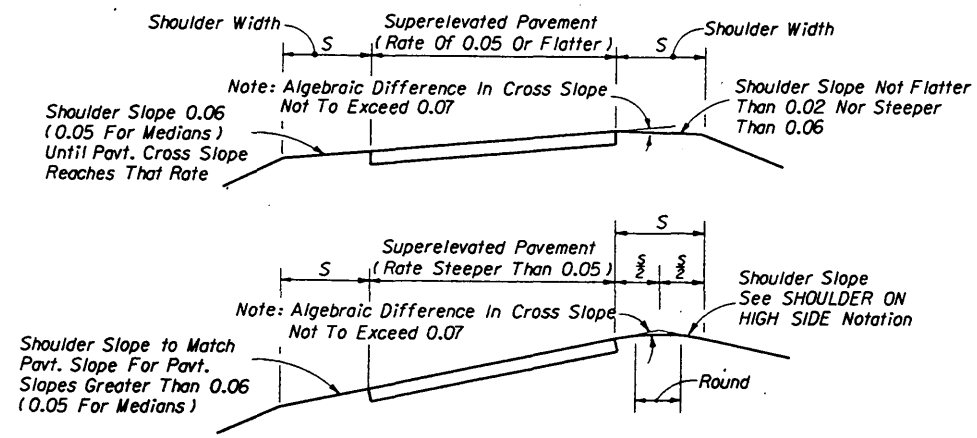
4-LANE OR 6-LANE PAVEMENT WITH MEDIAN

THESE TRANSITION DETAILS ARE TO APPLY IN ALL CASES, EXCEPT UNDER THE FOLLOWING CONDITIONS:

1. Curves of insufficient length.
2. Insufficient tangent length between curves.
3. Deficient transition distance between a curve and other control points.
4. At PCC's or PRC's (Runoff rates are applicable).

Transitions for these exceptions are to be as detailed in the plans.

**SUPERELEVATION TRANSITIONS**



**SHOULDER ON HIGH SIDE:** A shoulder slope of 0.06 downward from the edge of pavement will be maintained until a 0.07 break in slope at the pavement edge is reached due to superelevation of the pavement. As the pavement superelevation increases, the 0.07 break in slope will be maintained and the shoulder flattened until the shoulder slope reaches the minimum of 0.02 downward from the edge of pavement. Any further increase in pavement superelevation will necessitate sloping the inside half of the shoulder toward the pavement and the outer half outward, both at 0.02 for superelevations 0.06-0.09 and both at 0.03 for superelevation 0.10.

These slopes will be held with further increase in pavement superelevation until the maximum break of 0.07 at the pavement edge is again reached. This maximum break will then be held and shoulder slopes steepened with additional superelevation.

**SHOULDER ON LOW SIDE:** Maintain 0.06 drop across inside shoulder until pavement cross slope reaches 0.06. For pavement cross slopes greater than 0.06, shoulder to have same slope as pavement.

**NOTE:** These details apply to both paved and grassed shoulders. For median shoulders use 0.05 in lieu of 0.06.

**SHOULDER CONSTRUCTION WITH SUPERELEVATION**

**SUPERELEVATION SECTIONS AND PROFILES FOR RURAL HIGHWAYS, URBAN FREEWAYS AND HIGH SPEED URBAN HIGHWAYS**

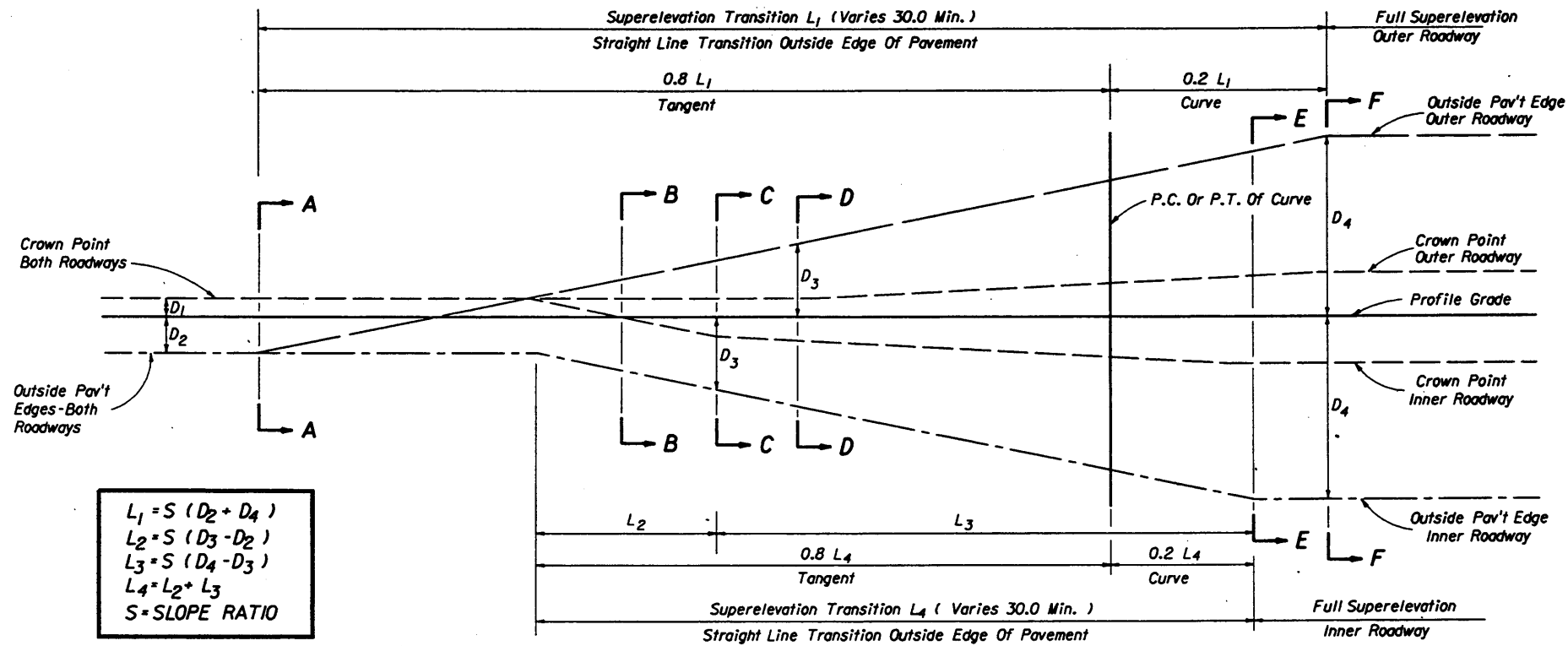
**GENERAL NOTES**

1. For superelevation Urban Highways and High Speed Urban Streets, see Index No. 511.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**SUPERELEVATION**  
RURAL HIGHWAYS, URBAN FREEWAYS  
AND HIGH SPEED URBAN HIGHWAYS

Names	Dates	Approved By	State Roadway Design Engineer
Designed By			
Drawn By	RFW 5/65		
Checked By	LWF 10/74		
Revision		98	2 of 3
Sheet No.			510



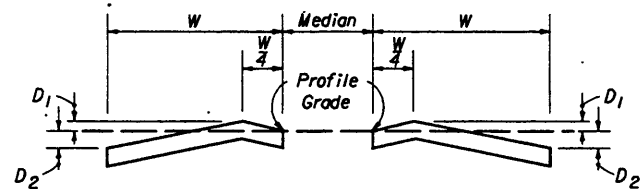
$$L_1 = S (D_2 + D_4)$$

$$L_2 = S (D_3 - D_2)$$

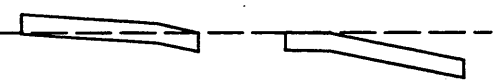
$$L_3 = S (D_4 - D_3)$$

$$L_4 = L_2 + L_3$$

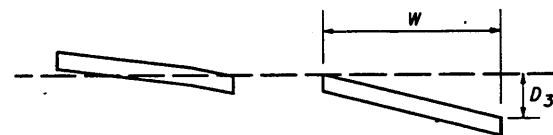
$$S = \text{SLOPE RATIO}$$



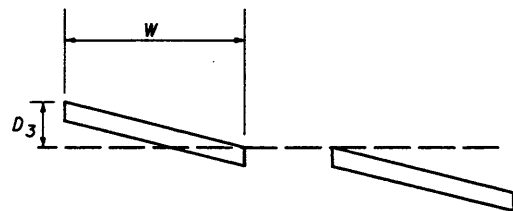
**SECTION A-A**  
NORMAL CROWNED SECTION



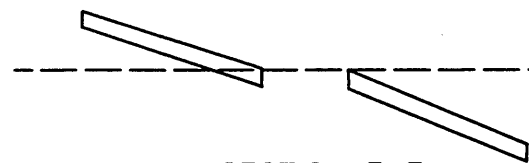
**SECTION B-B**  
SUPERELEVATION SECTION LT. & RT.



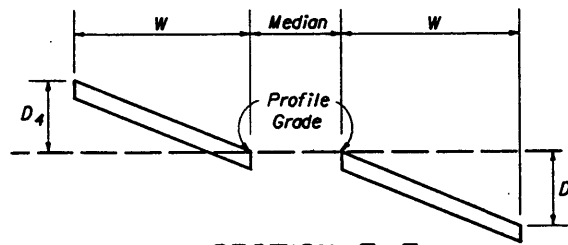
**SECTION C-C**  
SUPERELEVATION SECTION LT.  
PLANE INCLINED SECTION RT.



**SECTION D-D**  
PLANE INCLINED SECTION LT.  
SUPERELEVATION TRANSITION RT.



**SECTION E-E**  
SUPERELEVATION TRANSITION LT.  
FULL SUPERELEVATION RT.



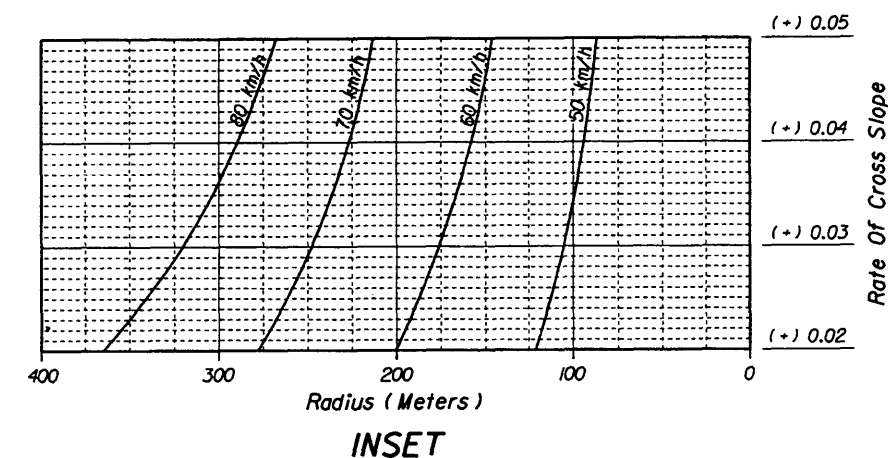
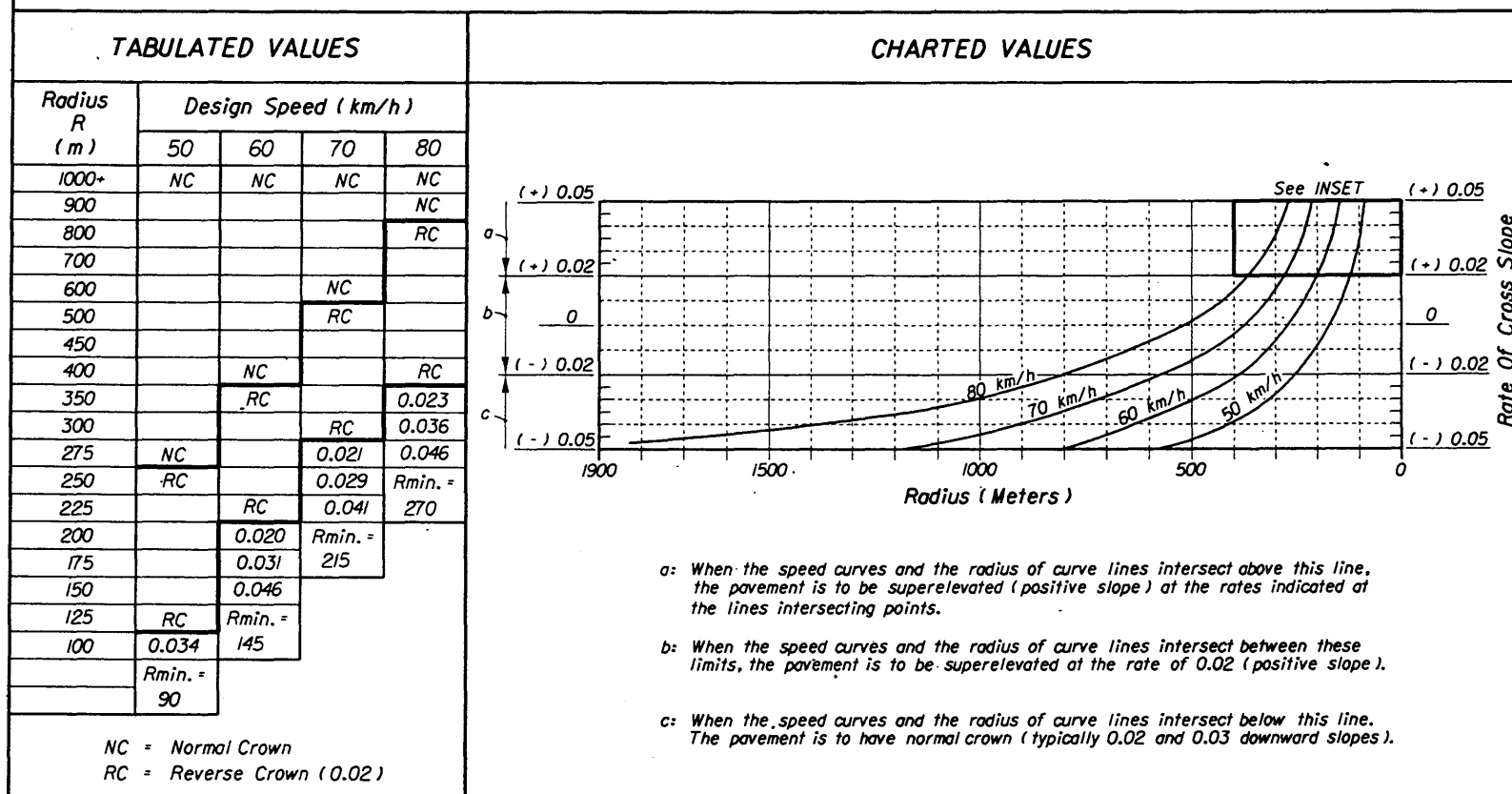
**SECTION F-F**  
FULL SUPERELEVATION LT. & RT.

**8-LANE PAVEMENT WITH ONE LANE SLOPED TO MEDIAN**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>SUPERELEVATION</b>				
RURAL HIGHWAYS, URBAN FREEWAYS AND HIGH SPEED URBAN HIGHWAYS				
Names	Dates	Approved By		
Designed By	WAL	08/77	 State Roadway Design Engineer	
Drawn By	LHF	08/77		
Checked By	WAL	08/77	Revision	Sheet No.
			94	3 of 3
				Index No. 510

**SUPERELEVATION RATES (e) FOR URBAN HIGHWAYS AND HIGH SPEED URBAN STREETS**

$e_{max} = 0.05$



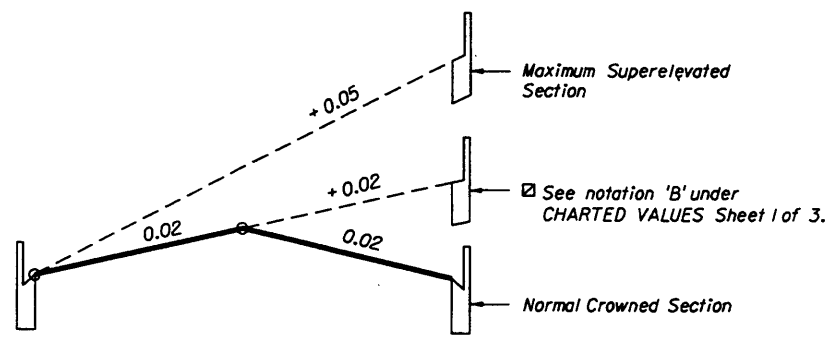
**GENERAL NOTES**

- Maximum rate of superelevation for urban highways and high speed urban streets shall be 0.05.
- Superelevation shall be obtained by rotating the plane successively about the break points of the section until the plane has attained a slope equal to that required by the chart. Should the rotation traverse the entire section and further superelevation be required, the remaining rotation of the plane shall be about the low edge of the inside travel lane.  
Crown is to be removed in the auxiliary lane to the outside of the curve only when the adjoining travel lanes require positive superelevation.
- When positive superelevation is required, the slope of the gutter on the high side shall be a continuation of the slope of the superelevated pavement.
- In construction, short vertical curves shall be placed at all angular profile breaks within the limits of the superelevation transition.
- The variable superelevation transition length "L" shall have a minimum value of 15.0 m for design speeds under 60 km/h and 23.0 m for design speeds of 60 km/h or greater.
- Roadway sections having lane arrangements different from those shown, but composed of a series of planes, shall be superelevated in a similar manner.
- For superelevation of lower speed urban streets, see the FDOT 'Manual Of Uniform Minimum Standards For Design, Construction And Maintenance For Streets And Highways'. For superelevation of curves on rural highways, urban freeways and high speed urban highways, see Index No. 510.

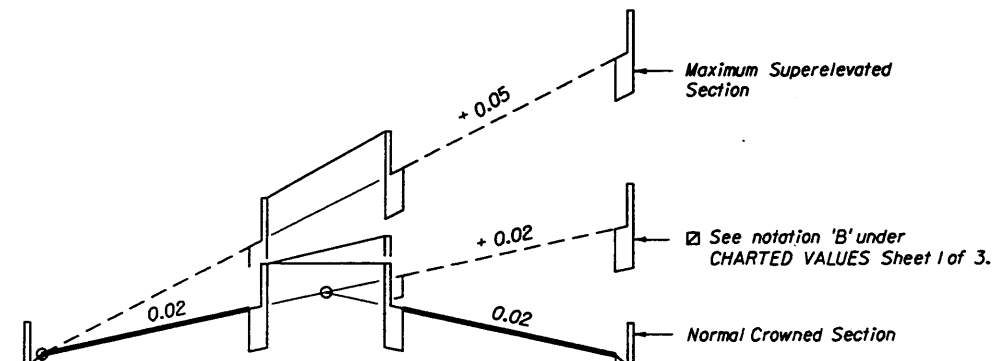
$e_{max} = 0.05$

**SUPERELEVATION FOR URBAN HIGHWAYS AND HIGH SPEED URBAN STREETS**

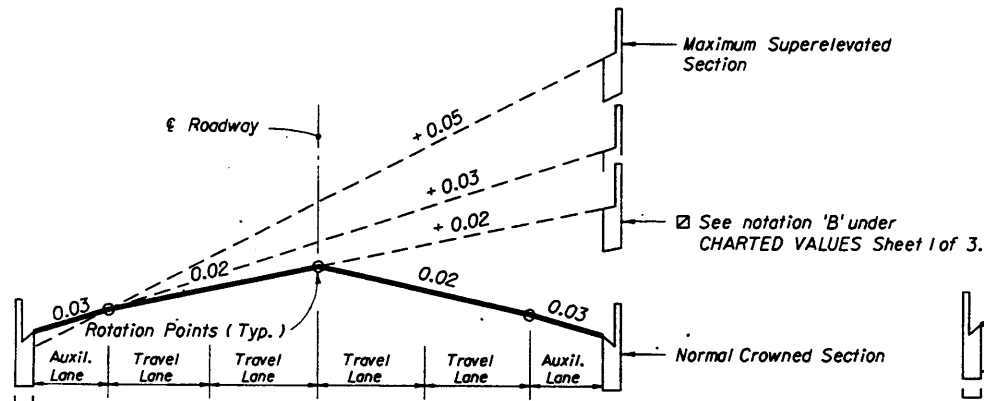
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>SUPERELEVATION</b> URBAN HIGHWAYS AND STREETS				
Names	Dates	Approved By		
Designed By	WLB/JVG 66 & 90	[Signature]		
Drawn By	CDR/ESD 67 & 90	Revision	Sheet No.	Index No.
Checked By	RLO/JVG 67 & 90	98	1 of 3	511



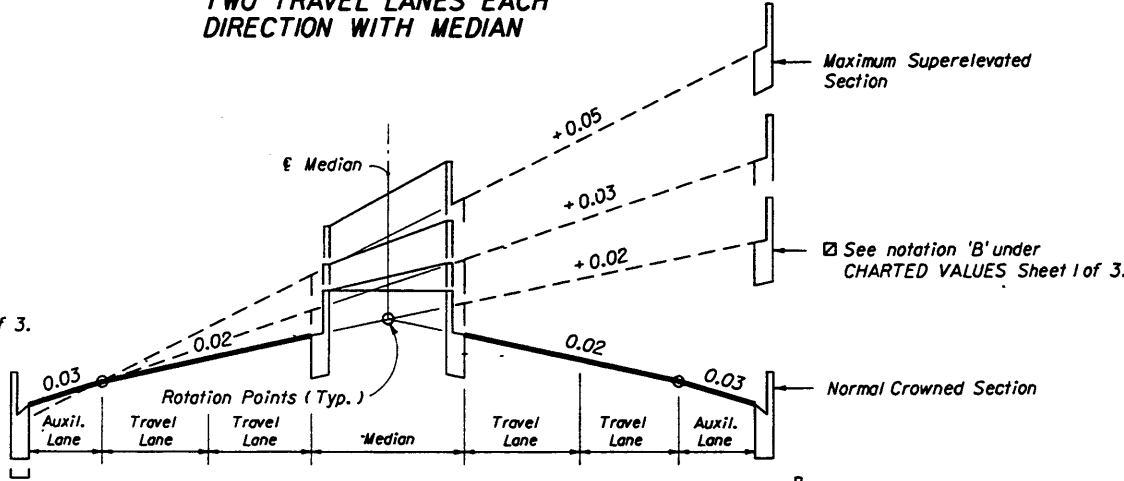
TWO TRAVEL LANES EACH DIRECTION



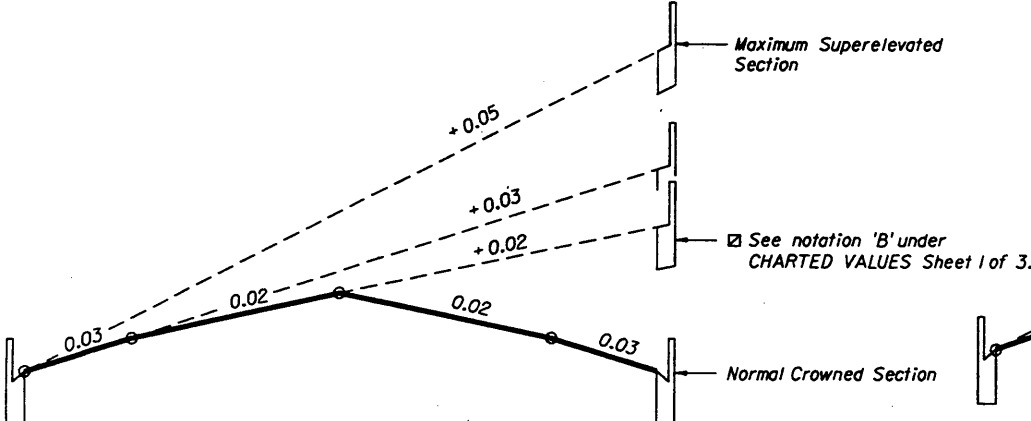
TWO TRAVEL LANES EACH DIRECTION WITH MEDIAN



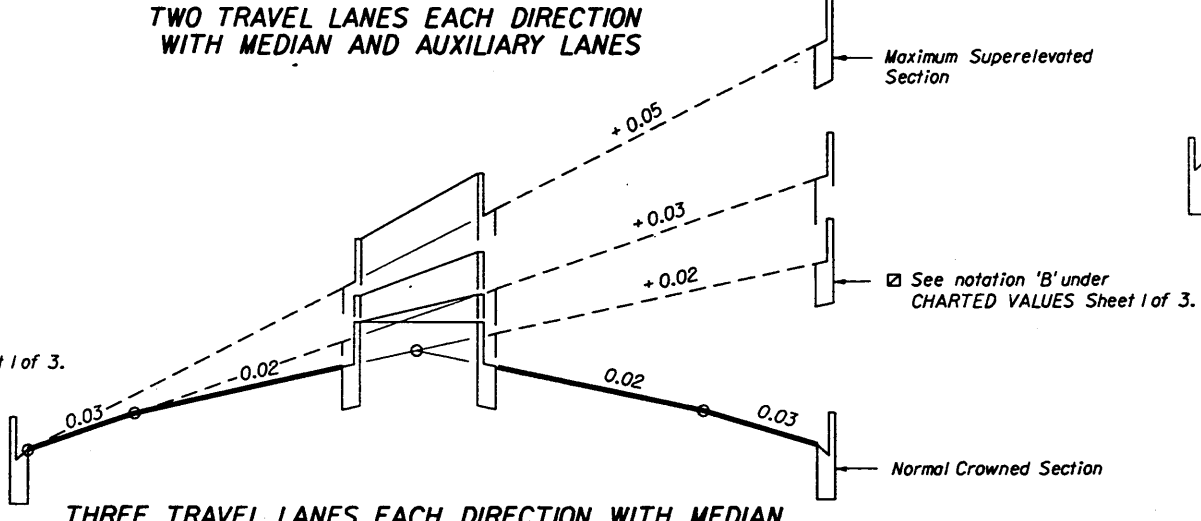
TWO TRAVEL LANES EACH DIRECTION WITH AUXILIARY LANES



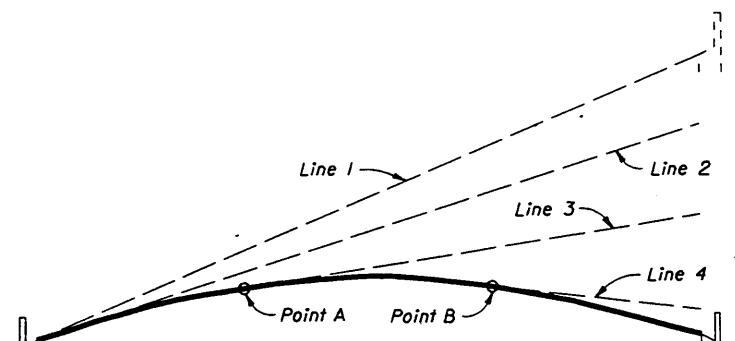
TWO TRAVEL LANES EACH DIRECTION WITH MEDIAN AND AUXILIARY LANES



THREE TRAVEL LANES EACH DIRECTION



THREE TRAVEL LANES EACH DIRECTION WITH MEDIAN



- Line 1 - Max. Superelevation Rate (0.05)
- Line 2 - Slope of Parabola At Inside Edge Of Pavt.
- Line 3 - Positive Superelevation Rate Less Than Max. Slope Of Parabola.
- Line 4 - Adverse Superelevation.

Superelevation rates obtained from the chart or table on Sheet 1 of 3 are also applicable to a parabolic crown section. When this section is used, superelevation is established by rotating a tangent about the arc of the parabolic crown until the desired slope is attained (points A & B on sketch). The normal parabolic crown will be maintained outside the limits of the plane thus formed.

PARABOLIC SECTION

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

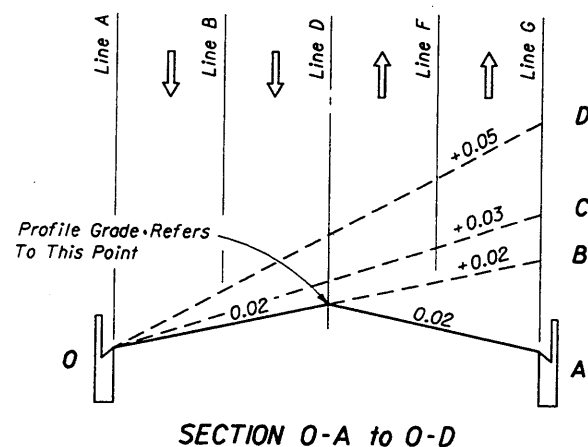
SUPERELEVATION  
URBAN HIGHWAYS AND STREETS

Designed By	MLB/JVG	65 & 90	Approved By	[Signature]
Drawn By	CDR/BSD	67 & 90	Revision	Sheet No.
Checked By	RLQ/JVG	67 & 90	94	2 of 3
				Index No. 511

SUPERELEVATION TRANSITION SECTIONS FOR URBAN HIGHWAYS AND HIGH SPEED URBAN STREETS

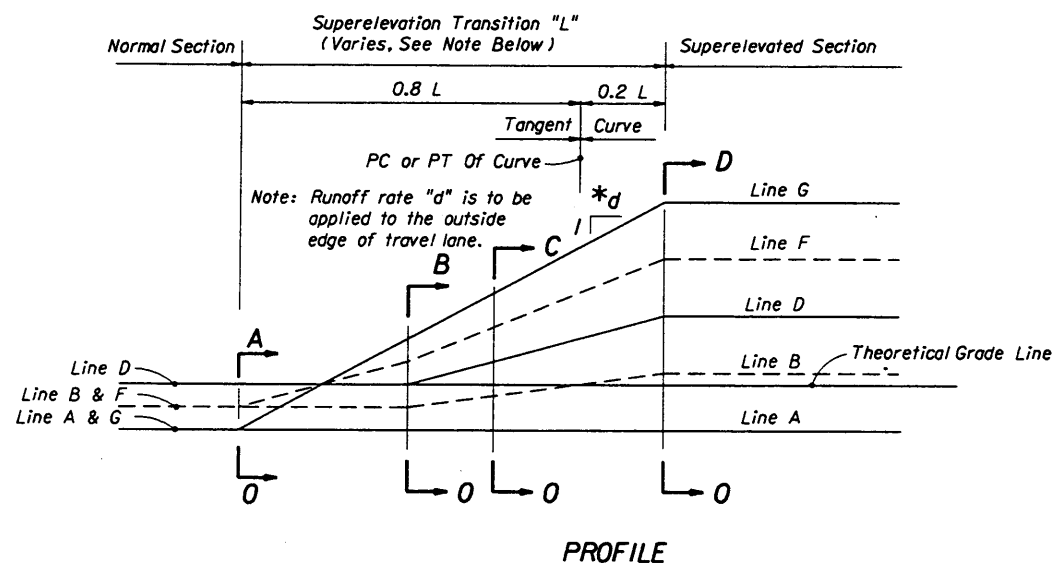
UNDIVIDED FACILITIES

DIVIDED FACILITIES



SECTION O-A to O-D

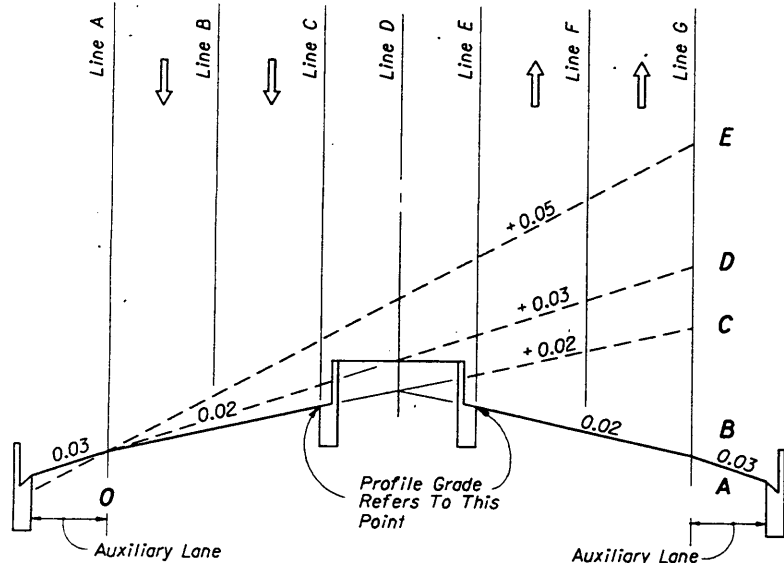
TWO LANES EACH DIRECTION



PROFILE

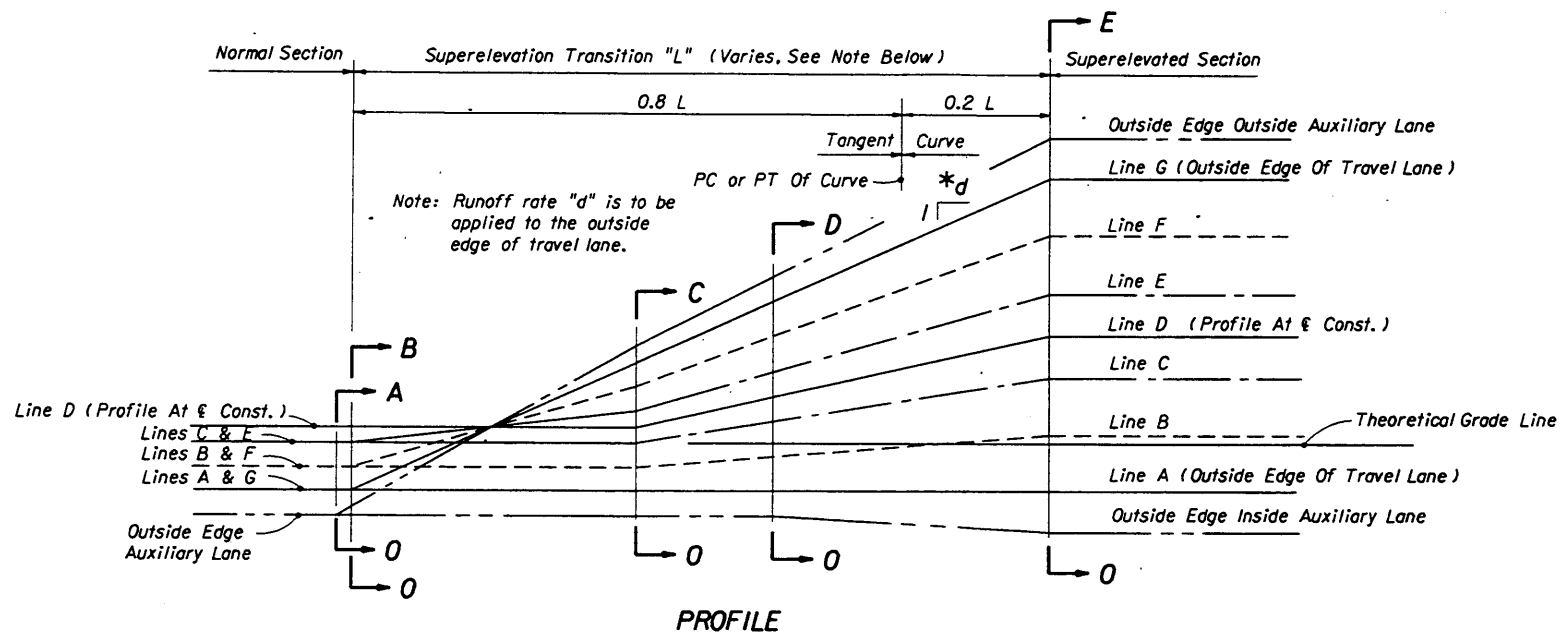
LINE	DESCRIPTION
A	Inside Travel Lane
B	Inside Lane Line
C	Inside Median Edge Pavement
D	℄ Construction
E	Outside Median Edge Pavement
F	Outside Lane Line
G	Outside Travel Lane

Inside And Outside Are Relative To Curve Center



SECTION O-A to O-E

TWO LANES EACH DIRECTION WITH MEDIAN AND AUXILIARY LANE



PROFILE

*d (Slope Ratio)	
50 km/h	1:100
60 km/h	1:125
70-80 km/h $\Delta$	1:150

$\Delta$  1:125 May Be Used For Up To 80 km/h Under Restricted Conditions.

Note: The sections and profiles shown are examples of superelevation transitions. Similar schemes should be used for roadways having other sections.

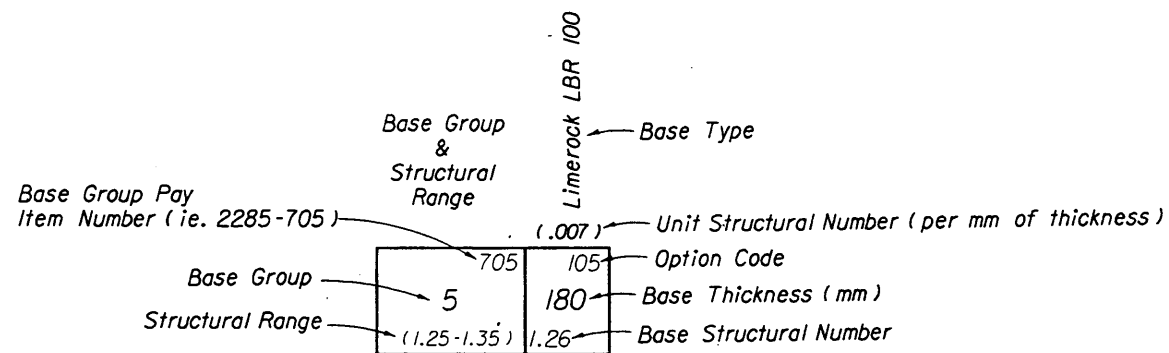
### EXAMPLE SUPERELEVATION SECTIONS AND PROFILES FOR URBAN HIGHWAYS AND HIGH SPEED URBAN STREETS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
SUPERELEVATION URBAN HIGHWAYS AND STREETS				
Names	Dates	Approved By		
Designed By	WLF/JVG 65 & 90	State Roadway Design Engineer		
Drawn By	CDR/BSO 67 & 90	Revision	Sheet No.	Index No.
Checked By	RLQ/JVG 67 & 90	94	3 of 3	511

Base Group & Structural Range	Limerock LBR 100 (.007)	Cemented Coquina LBR 100 (.007)	Shell Rock LBR 100 (.007)	Bank Run Shell LBR 100 (.007)	Graded Aggregate Base LBR 100 (.006)	ABC-3 (Min. Marshall Stability 4500 N) (.012)	ABC-3 And 100 mm Granular Base, LBR 100 (.006)	RAP Base (NA)
1 (.65-.75)	101 .70	201 .70	301 .70	461 .70	501 .60	601 1.20		691 130
2 (.80-.90)	102 .84	202 .84	302 .84	462 .84	502 .84	602 1.20		
3 (.95-1.05)	103 .98	203 .98	303 .98	463 .98	503 .96	603 1.20		
4 (1.05-1.15)	104 1.12	204 1.12	304 1.12	464 1.12	504 1.14	604 1.20		
5 (1.25-1.35)	105 1.26	205 1.26	305 1.26	465 1.26	505 1.26	605 1.32		
6 (1.35-1.45)	106 1.40	206 1.40	306 1.40	466 1.40	506 1.38	606 1.44		
7 (1.50-1.60)	107 1.54	207 1.54	307 1.54	467 1.54	507 1.56	607 1.56		
8 (1.65-1.75)	108 1.68	208 1.68	308 1.68	468 1.68	508 1.68	608 1.68		
9 (1.75-1.85)	109 1.82	209 1.82	309 1.82	469 1.82	509 1.80	609 1.80	629 1.80	
10 (1.90-2.00)	110 1.96	210 1.96	310 1.96	470 1.96	510 1.98	610 1.92	630 1.92	
11 (2.05-2.15)	111 2.10	211 2.10	311 2.10	471 2.10	511 2.10	611 2.16	631 2.16	
12 (2.20-2.30)	112 2.24	212 2.24	312 2.24	472 2.24		612 2.28	632 2.28	
13 (2.35-2.45)	113 2.38	213 2.38	313 2.38	473 2.38		613 2.40	633 2.40	
14 (2.45-2.55)	114 2.52	214 2.52	314 2.52	474 2.52		614 2.52	634 2.52	
15 (2.60-2.70)						615 2.64	635 2.64	

**GENERAL NOTES**

1. On new construction and complete reconstruction projects where an entirely new base is to be built, the design engineer may specify just the Base Group and any of the unrestricted General Use Optional Bases shown in that Base Group may be used. Note, however, that some thick granular bases are limited to widening which prevents their general use.
2. On any type of widening project, the base options to be used must be specified by the designer and shown in the plans.
3. Where base options are specified in the plans, only those options may be bid and used.
4. The designer may require the use of a single base option, for instance ABC-3 in a high water condition. This will still be bid as Optional Base.
5. The contractor will indicate the basis for his bid by designating the three digit option code on the bid blank.



**LEGEND**

- \* For granular base, the construction of both the subbase and ABC-3 will be paid for under the contract unit price for Optional Base. Granular bases include Limerock, Cemented Coquina, Shell Rock, Bank Run Shell and Graded Aggregate Base at LBR 100. The base thickness shown is ABC-3. All subbase thicknesses are 100 mm. The base structural number shown is for the composite base.
- ∅ To be used for widening only, one meter or less.
- △ Base Group I Based on minimum practical thicknesses.
- Restricted to non-Limited Access shoulder base construction.

**GENERAL USE OPTIONAL BASE GROUPS AND STRUCTURAL NUMBERS**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>OPTIONAL BASE GROUP AND STRUCTURAL NUMBERS</b>				
Designed By	Names	Dates	Approved By	
Drawn By	EXE	12/93	<i>Burt Ditch</i> State Pavement Design Engineer	
Checked By	BTD	12/93	Revision	Sheet No.
			96	1 of 2
				Index No. 514

Base Group & Structural Range

Limerock Stabilized LBR 70

Shell LBR 70

Shell Stabilized LBR 70

Sand-Clay LBR 75

ABC-1 (Min. Marshall Stability 2300 N)

ABC-2 (Min. Marshall Stability 3400 N)

SAHM (Min. Marshall Stability 1500 N)

Soil Cement (2.0 MPa) (Plant Mixed)

Soil Cement (2.0 MPa) (Road Mixed)

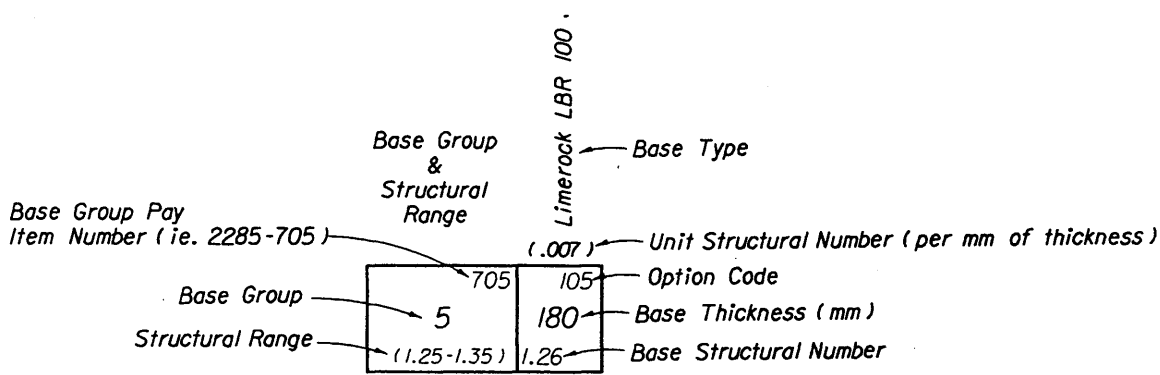
Soil Cement (3.5 MPa) (Plant Mixed)

(.005) (.005) (.004) (.005) (.008) (.010) (.006) (.006) (.006) (.008)

1 (.65-.75)	701 121 130 .65	441 130 160 .65	451 180 210 .71	701 130 160 .65	Δ 631 100 100 .80	Δ 641 100 100 1.00	651 100 140 .60	801 100 140 .60	821 130 140 .78	Δ 811 100 100 .80
2 (.80-.90)	702 122 160 .80	442 160 160 .80	452 210 210 .83	702 160 160 .80	632 100 100 .80	Δ 642 100 100 1.00	652 140 140 .84	802 140 140 .84	822 140 140 .84	812 100 100 .80
3 (.95-1.05)	703 123 200 1.00	443 200 200 1.00	453 240 240 .94	703 200 200 1.00	633 120 120 .96	643 100 100 1.00	653 160 160 .96	803 160 160 .96	823 160 160 .96	813 120 120 .96
4 (1.05-1.15)	703 124 220 1.10	444 220 220 1.10	454 270 270 1.06	704 220 220 1.10	634 140 140 1.12	644 110 110 1.10		804 190 190 1.14	824 190 190 1.14	814 140 140 1.12
5 (1.25-1.35)	705 125 250 1.26	445 250 250 1.26	455 300 300 1.18	705 250 250 1.26	635 160 160 1.28	645 130 130 1.30		805 210 210 1.26	825 210 210 1.26	815 160 160 1.28
6 (1.35-1.45)	706 126 280 1.40	446 280 280 1.40		706 280 280 1.40				806 230 230 1.38		816 180 180 1.44
7 (1.50-1.60)	707 127 310 1.55	447 310 310 1.55		707 310 310 1.55				807 260 260 1.56		817 190 190 1.52
8 (1.65-1.75)	708							808 280 280 1.68		818 210 210 1.68
9 (1.75-1.85)	709									
10 (1.90-2.00)	710									
11 (2.05-2.15)	711									
12 (2.20-2.30)	712									
13 (2.35-2.45)	713									
14 (2.45-2.55)	714									
15 (2.60-2.70)	715									

Not Recommended For 20 Year Design Accumulated 80 kN Equivalent Single Axle (ESAL) Loads Greater Than 1,000,000

Note: These base materials may be used on FDOT projects when approved in writing by the District Materials Engineer and shown in the plans.



LEGEND

Δ Based on minimum practical thickness.

LIMITED USE OPTIONAL BASE GROUPS AND STRUCTURAL NUMBERS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
OPTIONAL BASE GROUP AND STRUCTURAL NUMBERS				
Designed By	Names	Dates	Approved By	
Drawn By	Names	Dates	State Pavement Design Engineer	
Checked By	Names	Dates	Revision	Sheet No.
			96	2 of 2
				514

**GENERAL NOTES**

- For definitions and descriptions of access connection "Categories" and access "Classifications" of highway segments, and for other detailed information on access to the State Highway System, refer to FDOT Rule Chapter 14-96, "State Highway Connection Permits Administrative Process" and Rule Chapter 14-97, "State Highway System Access Management Classification System And Standards"
- For this index the term 'turnout' applies to that portion of driveways, roads or streets adjoining the outer roadway. For this index the term 'connection' encompasses a driveway, street or road and their appurtenant islands, separators, transition tapers, auxiliary lanes, travelway flares, drainage pipes and structures, crossovers, sidewalks, curb cut ramps, signing, pavement marking, required signalization, maintenance of traffic or other means of access to or from controlled access facilities. The turnout requirements set forth in this index do not provide complete intersection design, construction or maintenance requirements.
- The location, positioning, orientation, spacing and number of connections and median openings shall be in conformance with FDOT Rule Chapter 14-97.
- On Department construction projects all driveways not shown on the plans are to be reconstructed at their existing location in conformance to these standards, or, in conformance to permits issued during the construction project.
- Driveways shall have sufficient length and size for all vehicular queuing, stacking, maneuvering, standing and parking to be carried out completely beyond the right of way line. Except for vehicles stopping to enter the highway, the turnout areas and drives within the right of way shall be used only for moving vehicles entering or leaving the highway.
- Connections with expected daily traffic over 4000 vpd are to be constructed as intersecting streets or roads. The design requirement of this index and that of the local government will be used to select appropriate connection widths, radii and intersection design, subject to the approval of the Department.

For connections with expected daily traffic less than 4000 vpd, the Department will determine if drop curbs or radius returns are required in accordance with existing or planned connections. Where radius returns apply, the design requirements of this index and that of the local government will be used to select appropriate connection widths, radii and intersection design, subject to the approval of the Department.

For connections that are intended to daily accommodate either multi-unit vehicles or single unit vehicles exceeding 9.0 m in length, returns with 15.0 m radii are to be used, unless otherwise called for in the plans or otherwise stipulated by permit. Where large numbers of multi-unit vehicles will use the connection, the connection width and radii are to be increased and auxiliary lanes, tapers, lane flares, separators and/or islands constructed, as determined by the Department to be necessary for safe turning movements.

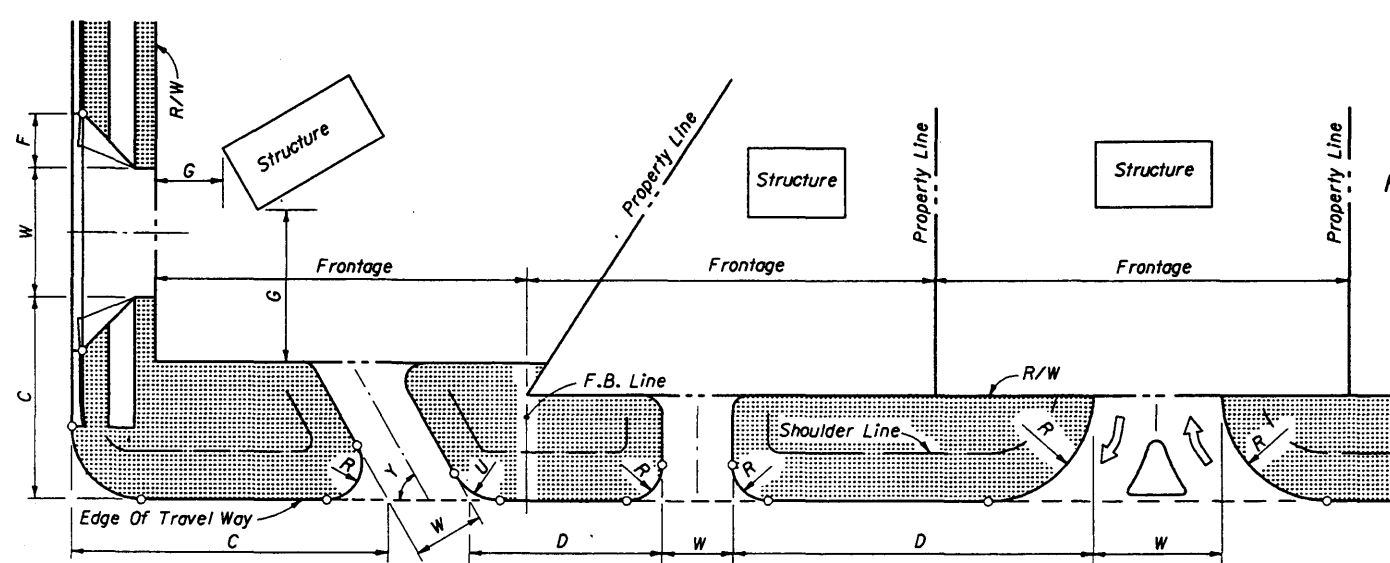
- Any connection on a highway having a posted or operating speed over 70 km/h shall have radial returns. Any connection requiring or having a specified median opening with left turn storage and served directly by that opening shall have radial returns.
- Where a connection is intended to align with a connection across the highway, the through lanes are to align directly with the corresponding through lanes.
- For new connections and for connections on all new construction and reconstruction projects, pavement materials and thicknesses shall meet the requirements applicable to either that detailed for "Urban Flared Turnouts", or, that described in "Table 515-1" for connections with radial returns and/or auxiliary lanes.
- The responsibility for the cost of construction or alteration to an access connection shall be in accordance with FDOT Rule Chapter 14-96.

**DESIGN NOTES**

- Prior to the adoption of FDOT Rules Chapters 14-96 and 14-97, connections to the State Highway System were defined and permitted by Classes. Connections have been redefined by Categories under Rule 14-96; and, the term "Class" has been applied to highway segments of the State Highway System as defined under Rule 14-97.

**LEGEND**

- Return Radius Point Or Flare Point
- Buffer Areas
- F.B. Line Frontage Boundary Line
- W Driveway Width
- Y Driveway Angle
- C Corner Clearance
- G Setback
- R Outside Radius
- U Inside Radius
- D Distance Between Connections
- F Flare



For Additional Information Refer To FDOT Rules Chapters 14-96 And 14-97.

**SKETCH ILLUSTRATING DEFINITIONS**

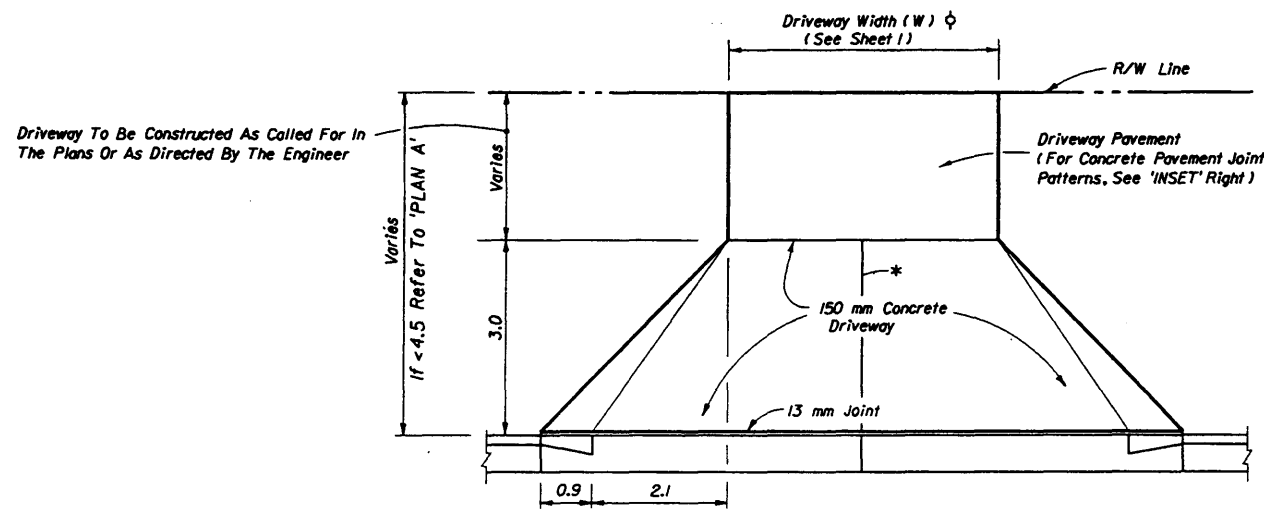
ELEMENT DESCRIPTION	URBAN (CURB & GUTTER)			RURAL		
	1-20 Trips/Day or 1-5 Trips/Hour	21-600 Trips/Day or 6-60 Trips/Hour	601-4000 Trips/Day <sup>Δ</sup> or 61-400 Trips/Hour	1-20 Trips/Day or 1-5 Trips/Hour	21-600 Trips/Day or 6-60 Trips/Hour	601-4000 Trips/Day <sup>Δ</sup> or 61-400 Trips/Hour
		2-Way □	2-Way □		2-Way □	2-Way □
CONNECTION WIDTH W (m)	3.6 Min. 7.2 Max.	7.2 Min. 10.8 Max.	7.2 Min. 10.8 Max.	3.6 Min. 7.2 Max.	7.2 Min. 10.8 Max.	7.2 Min. 10.8 Max.
FLARE (Drop Curb) F (m)	3.0 Min.	3.0 Min.	N/A	N/A	N/A	N/A
RETURNS (Radius) R & U (m)	N/A	Δ	8 Min. 15 Std. 23 Max.	5 Min. 8 Std. 15 Max.	8 Min. 15 Std. 23 Max.	8 Min. 15 Std. (Or 3-Centered Curves)
ANGLE OF DRIVE Y		60°-90°	60°-90°		60°-90°	60°-90°
DIVISIONAL ISLAND (Throat Median) (m)		1.2-7 Wide	1.2-7 Wide		1.2-7 Wide	1.2-7 Wide
SETBACK G (m)	3.6 Min., All categories. See General Note No. 5.					

Street or road intersection design, with possible auxiliary lanes and channelization, may be necessary. Intersection design, with possible auxiliary lanes and channelization, should be considered for connections with more than 4000 trips/days.  
 "2-Way" refers to one "in" movement and one "out" movement i.e. not exclusive left or right turn lanes on the connection.  
 Small radii may be used in lieu of flares as approved by the Department.  
 DESIGN NOTE: 1-Way connections will be designed to effectively eliminate unpermitted movements.

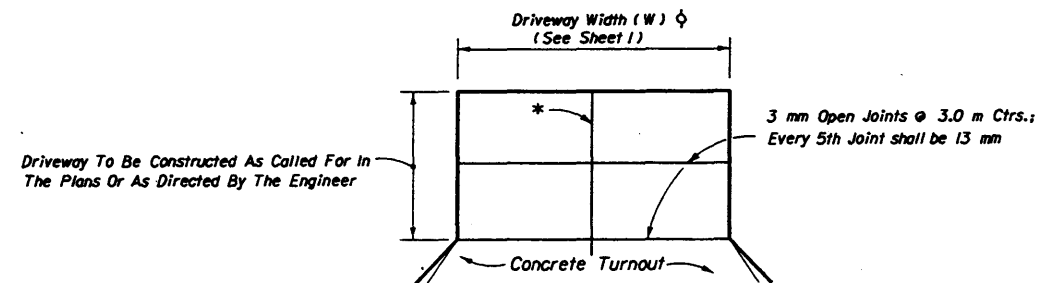
NOT INTENDED FOR FULL INTERSECTION DESIGN  
**SUMMARY OF GEOMETRIC REQUIREMENTS FOR TURNOUTS**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
TURNOUTS					
Designed By	Names	Dates	Approved By		
Drawn By	BSD	03/91	State Roadway Design Engineer		
Checked By	JVG	03/91			
			Revision	Sheet No.	Index No.
			94	1 of 6	515

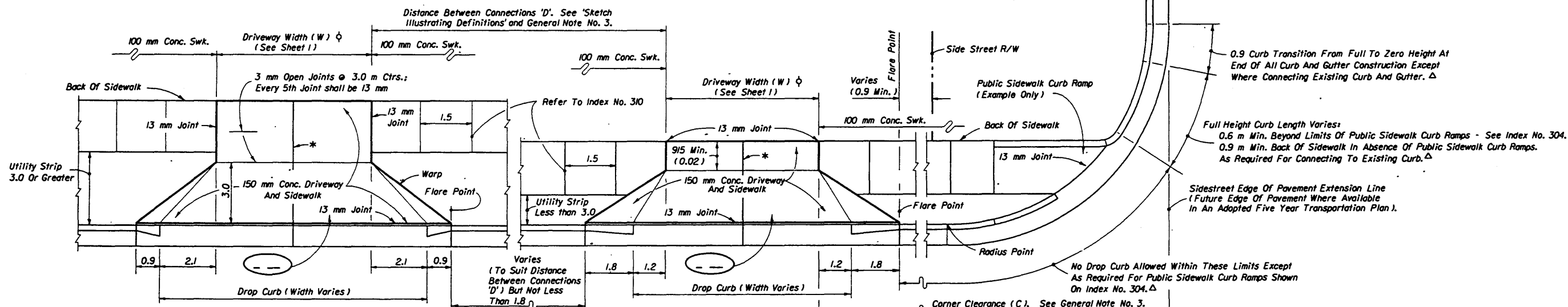




PLAN C  
TURNOUT WITHOUT SIDEWALK



JOINT PATTERN WHEN CONCRETE DRIVE CONSTRUCTED  
INSET



PLAN B  
TURNOUT WITH SIDEWALK AND  
UTILITY STRIP (3.0 m OR GREATER)

PLAN A  
TURNOUT WITH SIDEWALK AND  
UTILITY STRIP (LESS THAN 3.0 m)

Footnotes:

- All 13 mm joints shall be constructed with preformed joint filler.
- \* 3 mm Open Joints placed at equal (6.0 m max.) intervals for driveways over 6.0 m wide. Joints in curb and gutter to match joints in driveways.
- Δ When connecting to sidewalk curb and gutter sections, the no drop curb limits should extend back to the sidewalk radius point. With or without curb and gutter, no driveway should encroach on the corner radius.
- ◇ Driveways (150 mm concrete) shall be of a uniform width (W) to the right of way line.
- Alpha-numeric identification of a flared driveway type specifically called for in the plans, see sheets 3 and 4.

SPECIAL NOTES FOR URBAN FLARED TURNOUTS

1. Driveway 150 mm concrete pavement and drop curb shall meet the material and construction requirements of Sections 522 and 520 respectively of the FDOT Standard Specifications. The driveway foundation shall meet the requirement of Subarticle 522-4.
2. For details of drop curb and public sidewalk curb ramps refer to Index Nos. 300 and 304 respectively.
3. Where turnouts are constructed within existing curb and gutter, the existing curb and gutter shall be removed either to the nearest joint beyond the flare point or to the extent that no remaining section is less than 1.5 m long; and, drop curb constructed in accordance with Notes Nos. 1 and 2.
4. Cast for preformed joint filler shall be included in the cast for the concrete pavement (concrete sidewalk, 150 mm thick).
5. For turnouts with radial returns see the requirements under the "Summary Of Geometric Requirements For Turnouts", the "General Notes", the details of "Rural Turnout Construction" and the detail of "Limits Of Clearing & Grubbing, Stabilization And Base At Intersections".
6. Department maintenance of pavement shall extend out to the right of way or 0.6 m back of sidewalk, whichever distance is less.
7. The maintenance and operation of highway lighting, traffic signals, associated equipment, and other necessary devices shall be the responsibility of a public agency.
8. All pavement markings on the State highways, including acceleration and deceleration lane markings, and signing installed for the operation of the State highway shall be maintained by the Department.
9. All signing and marking installed for the operation of the connection (such as stop bars and stop signs for the connection) shall be the responsibility of the permittee.
10. Turnouts will be paid for under the contract unit price for Sidewalk Concrete (150 mm Thick), M2.

DESIGN NOTES FOR URBAN FLARED TURNOUTS

1. Driveways indicated as 'Adverse Applications' are those with slopes that can cause overhang drag for representative standard passenger vehicles under fully loaded conditions; or, those with slopes that can cause drivers who are leaving the roadway to slow or pause to the extent that traffic demand volumes will be impeded.
  2. The standard flared driveways on this index may not accommodate vehicles with low beds, low undercarriage or low appendage features. Where such vehicles are design vehicles driveways are to have site specific flare designs or Category III designs.
  3. When specific flare type driveways are to be constructed, the type shall be designated in the plans using the assigned alpha-numeric designation.
- Driveways indicated as 'Marginal Applications' are those with slopes that can cause overhang drag for representative standard passenger vehicles under fully loaded conditions when the driveway is located on the low side of fully super-elevated roadways.
- Driveways indicated as 'General Applications' are those with slopes that can readily accommodate representative standard passenger vehicles and those that can accommodate representative standard trucks, vans, buses and recreational vehicles operating under normal crown and super-elevation conditions.

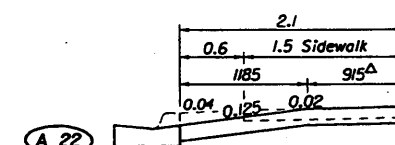
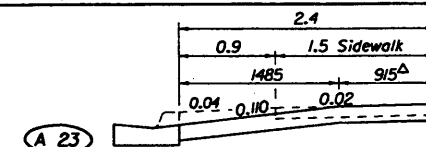
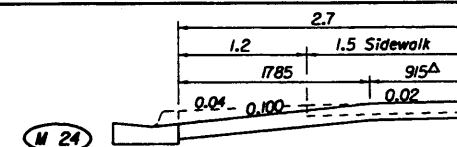
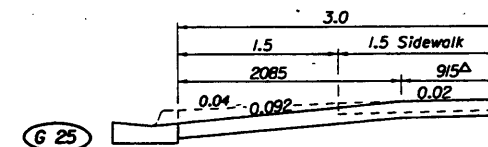
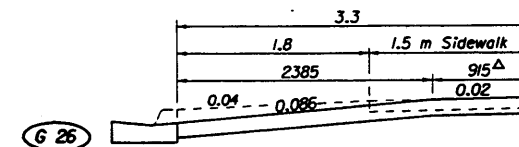
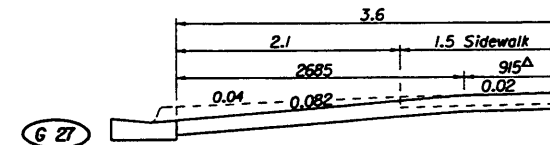
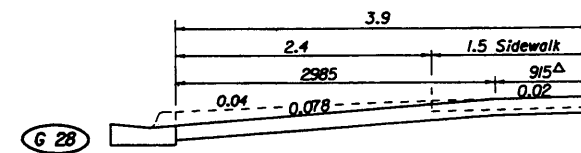
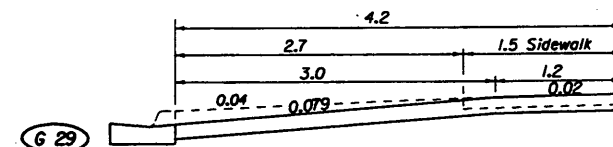
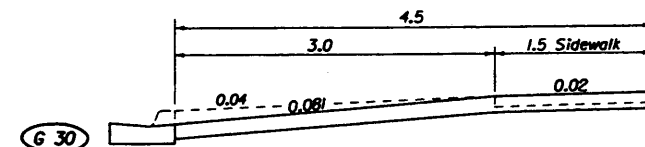
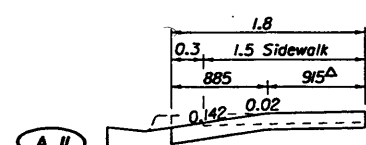
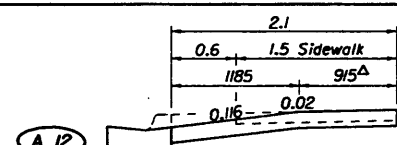
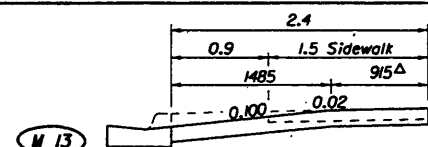
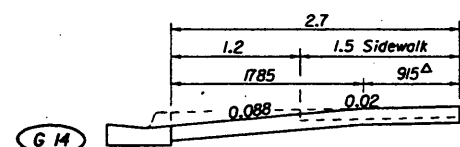
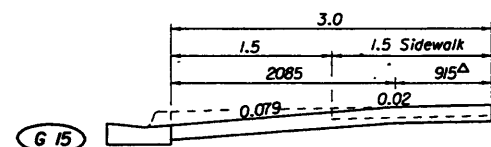
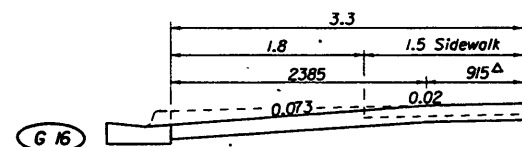
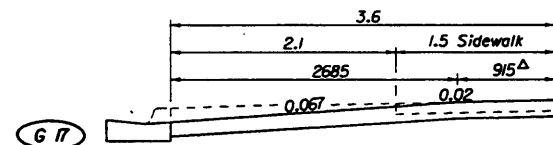
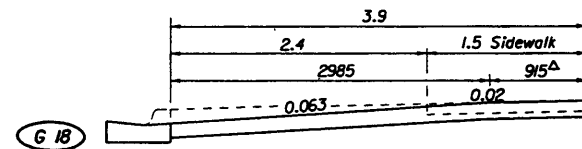
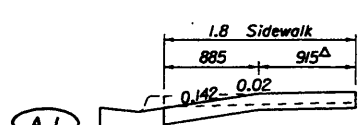
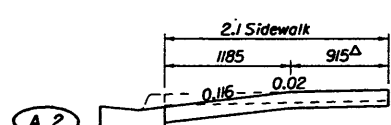
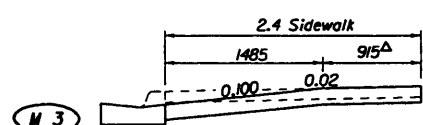
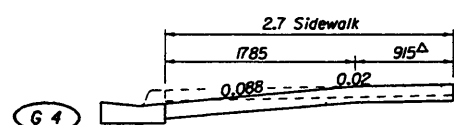
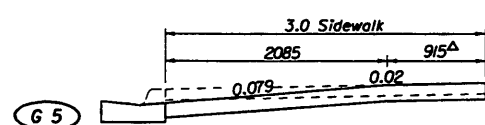
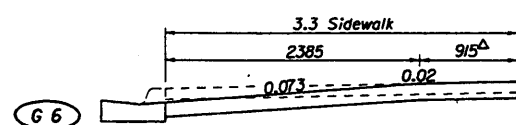
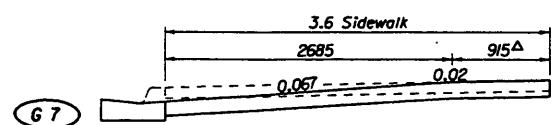
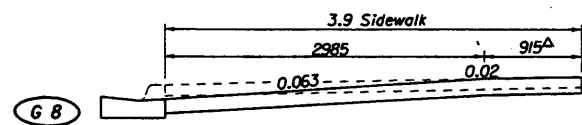
URBAN FLARED TURNOUTS

Note: See sheet 1 for 'GENERAL NOTES'

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

TURNOUTS

Names	Dates	Approved By	State Roadway Design Engineer
Designed By	JVG/BEH 09/93	[Signature]	
Drawn By	BEH 09/93	Revision	Sheet No. Index No.
Checked By	JVG 09/93	96	2 of 6 515



GENERAL\* APPLICATIONS

MARGINAL\* APPLICATIONS ON LOW SIDE OF FULLY SUPERELEVATED ROADWAY (REFER TO MODIFICATIONS ON SHEET 4)

ADVERSE\* APPLICATIONS (REFER TO MODIFICATIONS ON SHEET 4)

\* See 'DESIGN NOTES FOR URBAN FLARED TURNOUTS' On Sheet 2.  
 Δ Maximum Width Attainable Up To 915 With A Finding Of Infeasibility.

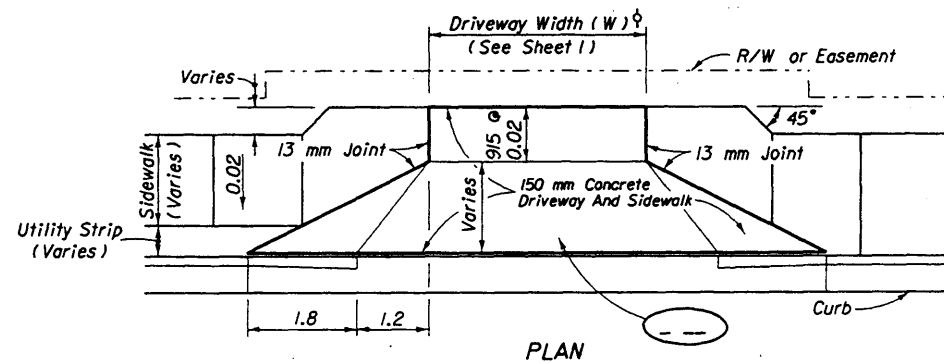
SIDEWALK ADJACENT TO CURB

SIDEWALK WITH UTILITY STRIP ON 0.02 SLOPE

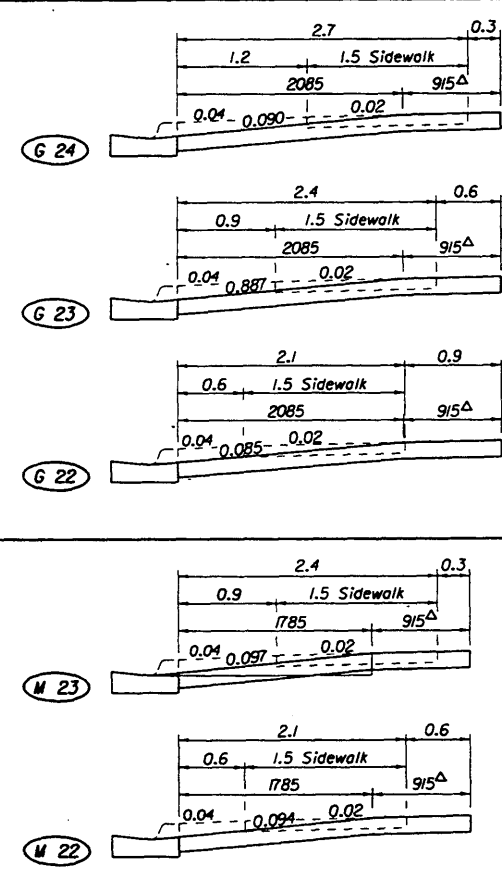
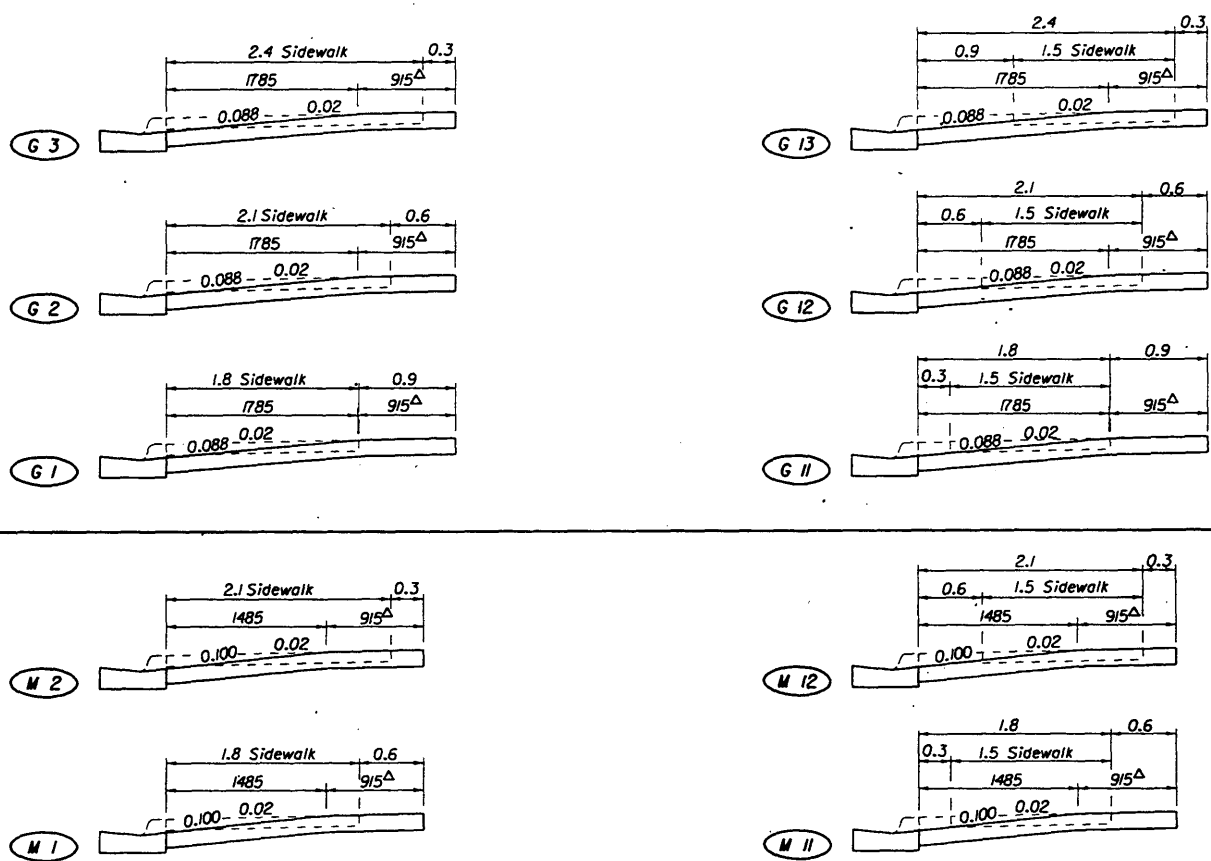
SIDEWALK WITH UTILITY STRIP ON 0.04 SLOPE

**DRIVEWAY SECTIONS ON CURBED FACILITIES WITH SIDEWALKS**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>TURNOUTS</b>				
Designed By	JVG/EKH	9/93	Approved By	<i>[Signature]</i>
Drawn By	EKH	9/93	State Roadway Design Engineer	
Checked By	JVG/FLS	9/93	Revision	Sheet No. Index No.
			94	3 of 6 515



MODIFICATIONS OF 'ADVERSE' AND 'MARGINAL' APPLICATIONS



ADVERSE\* AND MARGINAL\* SECTIONS MODIFIED TO ACHIEVE GENERAL\* APPLICATION

ADVERSE\* SECTIONS MODIFIED TO ACHIEVE MARGINAL\* APPLICATION

\*See 'DESIGN NOTES FOR URBAN FLARED TURNOUTS' On Sheet 2.  
 Δ Maximum Width Attainable Up To 915 With A Finding Of Infeasibility.

SIDEWALK ADJACENT TO CURB

SIDEWALK WITH UTILITY STRIP ON 0.02 SLOPE

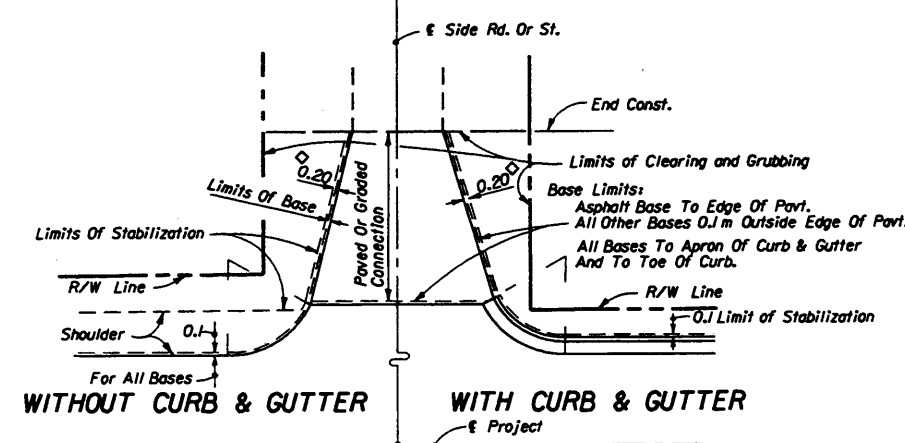
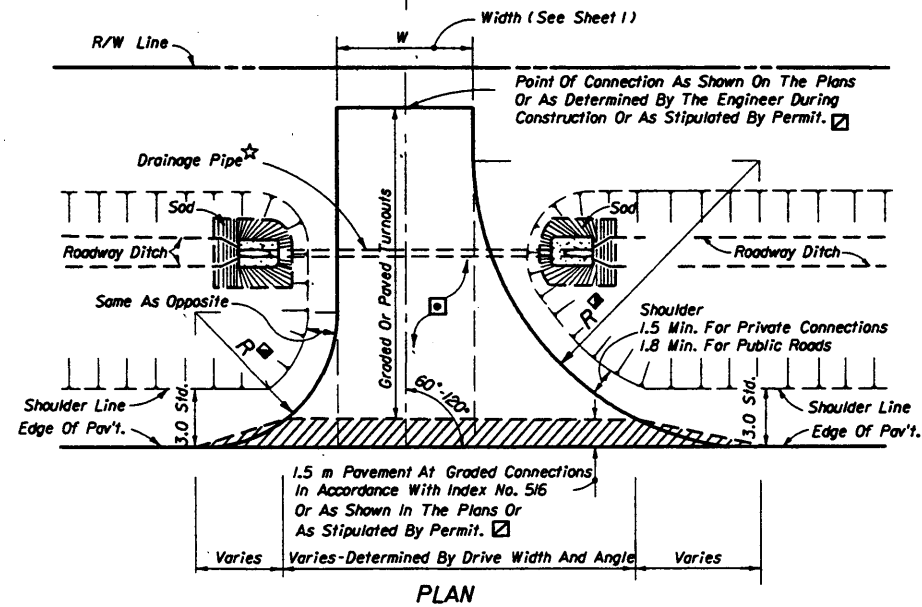
SIDEWALK WITH UTILITY STRIP ON 0.04 SLOPE

MODIFICATIONS TO ADVERSE AND MARGINAL SECTIONS

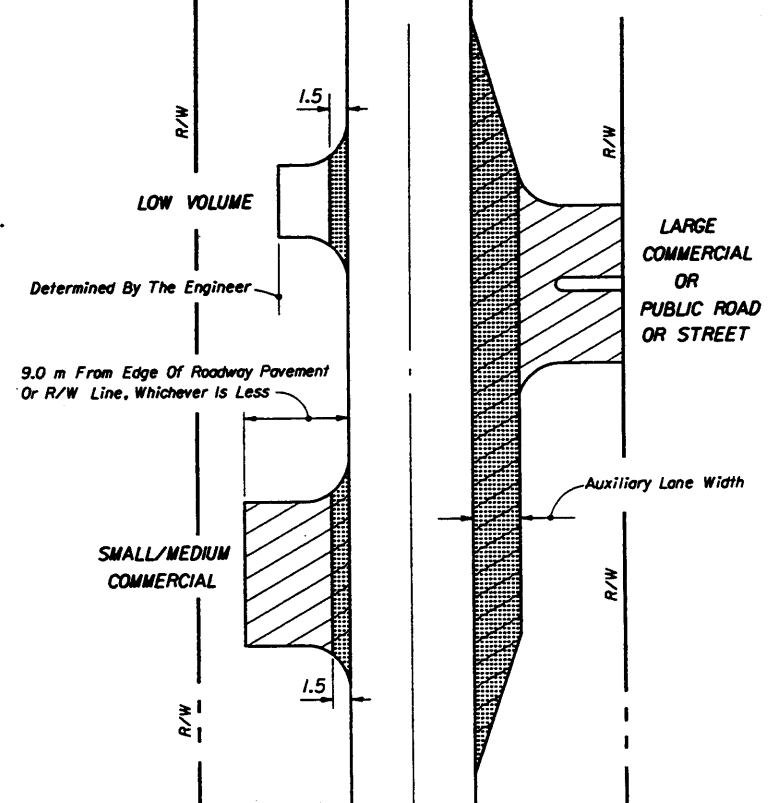
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>TURNOUTS</b>				
Designed By	JVG/EKH	9/93	Approved By	<i>[Signature]</i>
Drawn By	EKH	9/93	State Roadway Design Engineer	
Checked By	JVG/FLS	9/93	Revision	4 of 6
			Sheet No.	515
			Index No.	

**Typical Half Section For Low Volume/Residential Connections**

**Typical Half Section For Higher Volume Connections**



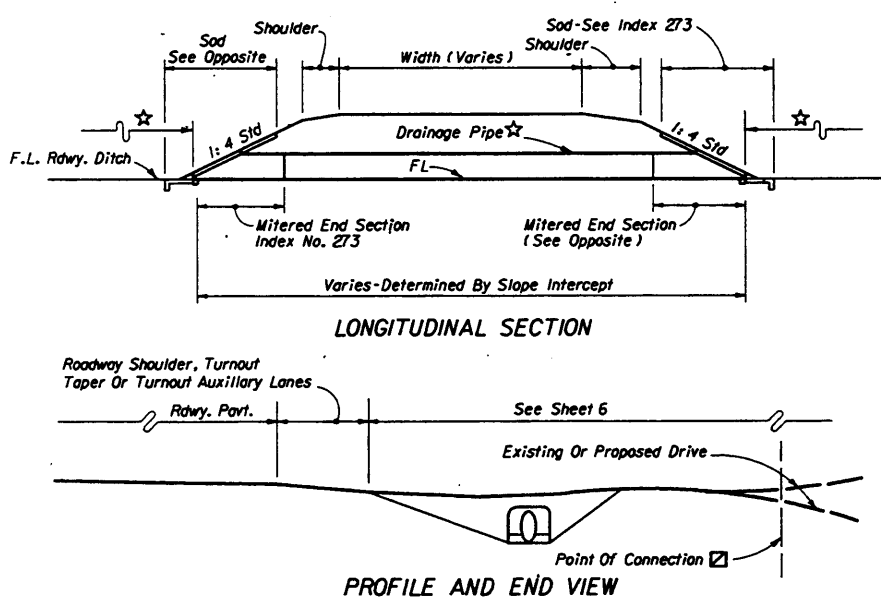
**LIMITS OF CLEARING & GRUBBING, STABILIZING AND BASE AT INTERSECTIONS**



**LEGEND**

[Hatched Box]	Graded Or Paved
[Diagonal Lines Box]	Required Paving
[Dotted Box]	Limits Of Department Maintenance

- NOTES**
- Auxiliary lane pavements and crossover pavements shall be maintained by the Department.
  - Department maintenance of turnout pavement shall extend out to 1.5 m from edge of the travel way or limits of paved shoulders, and, extend to include auxiliary lanes. The remainder of any turnout paved area on the right of way shall be maintained by the owner or his authorized agent. As a function of routinely reworking shoulders, the Department may grade and shape existing material on non-paved areas beyond the maintained pavement.
  - Control and maintenance of drainage facilities within the right of way shall be solely the responsibility of the Department, unless specified differently by Department permit.
  - The maintenance and operation of highway lighting, traffic signals, associated equipment, and other necessary devices shall be the responsibility of a public agency.
  - All pavement markings on the State highways, including acceleration and deceleration lane markings, and signing installed for the operation of the State highway shall be maintained by the Department.
  - All signing and marking installed for the operation of the connection (such as stop bars and stop signs for the connection) shall be the responsibility of the permittee.



**MATERIAL TYPES AND THICKNESSES IN DRIVING AREAS FOR RURAL AND URBAN CONNECTIONS**

Course	Materials	Thickness (mm)	
		Connections	Roadway
Structural	Asphaltic Concrete	30	40
Bases	Optional Base (See Index No. 514)	O.B.G. 1	O.B.G. 3

- Minimum thickness.
- All materials shall be approved by the Department prior to being placed.
- Connection structure other than traffic lanes. See Notes 1 and 2 below.
- Travel way flares (bypass lanes), auxiliary lanes serving more than a single connection, and all median crossovers including their auxiliary lanes and/or transition tapers. See Notes 1 and 2 below.

- NOTES**
- The pavement should be structurally adequate to meet the expected traffic loads and should not be less than that shown above, except as approved by the Department for graded connections. Other Department approved pavement equivalences may be used at the discretion of the Engineer. For additional information see Index No. 514.
  - Auxiliary lanes and their transition tapers shall be the same structure as the abutting roadway pavement or any of the roadway structures tabulated above, whichever is thicker.
  - If an asphalt base course (ABC) is used for a turnout, its thickness may be increased to match the edge of roadway pavement in lieu of a separate structural course. 150 mm of Portland cement concrete will be acceptable in lieu of the asphalt base and structural courses. See Notes 4 and 5 below.
  - A structural course is required for flexible pavements when they are used for auxiliary lanes serving more than a single connection.
  - Connections paved with Portland cement concrete shall be Class I concrete at least 150 mm thick. The Department may require greater thickness when called for in the plans or stipulated by permit. Materials and construction are to conform with FDOT Standard Specifications Sections 346, 350 and 522.
  - The Department may require other pavement criteria where local conditions warrant.

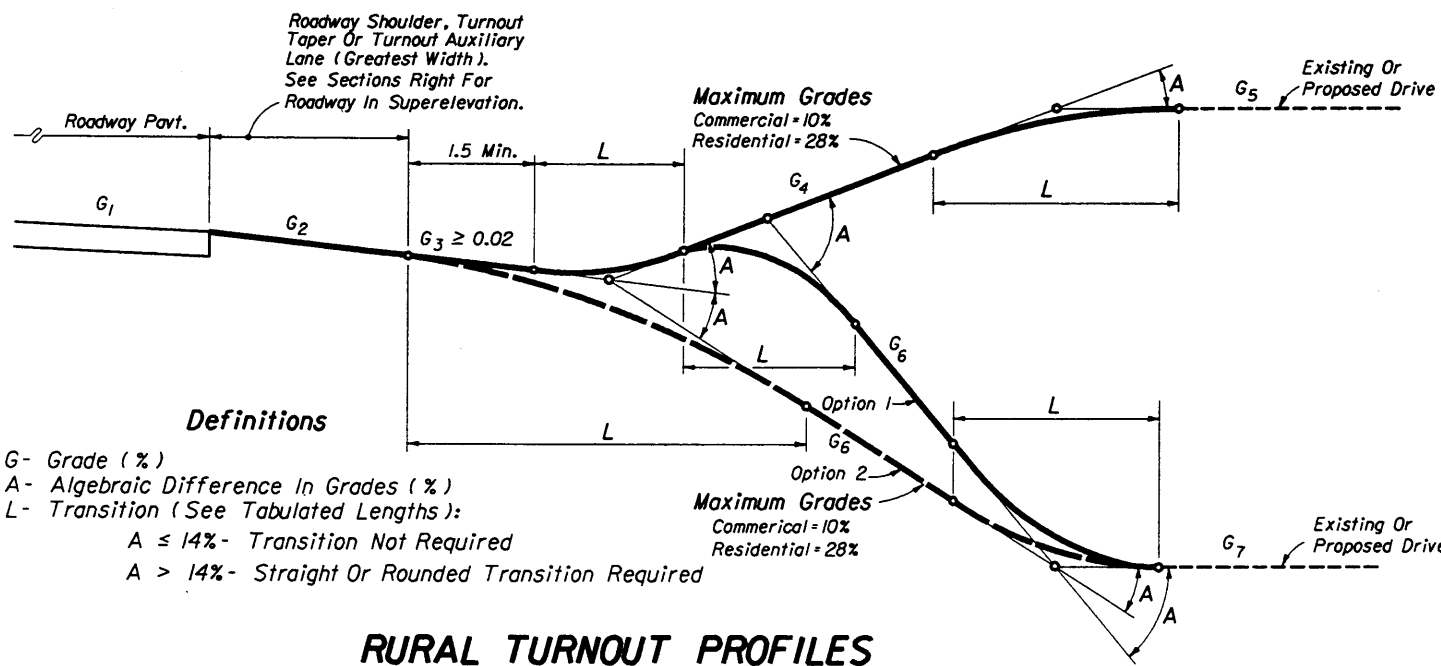
**PAVEMENT STRUCTURE FOR TURNOUTS AND AUXILIARY LANES TABLE 515-1**

- ★ Drainage pipe size and length shall be that shown on the plans, or as stipulated by permit, or, as determined by the Engineer during construction. The size shall be at least that established by the FDOT District, but not less than 375 mm diameter or equivalent. For minimum cover over drainage pipe see Index No. 205. Pipe arch or elliptical pipe may be required to obtain necessary cover. At minimal cover applications a modified pavement apron is permitted. See "PERMISSIBLE PAVEMENT MODIFICATION" Index No. 273. For spacing between adjacent pipe end treatments see Index No. 273.
  - ☐ Stable material may be required for graded turnouts to private property as directed by the Engineer in accordance with Section 102-6 of the Standard Specifications.
  - ☑ The 1.5 m pavement at graded connections is not required where there is paved shoulder 1.2 m or more in width. The 1.5 m pavement requirement may be waived for connections serving one or two homes or field entrances with less than 20 trips per day, or 5 trips per hour as approved by permit or by the Engineer, or when not itemized in the plans.
- Paved turnouts are to be constructed for all paved connecting facilities. The connecting point will be determined by the Engineer.
- Paved turnouts are to be constructed for all business, commercial, industrial or high volume residential graded connecting facilities. The connecting point shall be 9.0 m from edge of roadway pavement or at R/W line, whichever is less.
- Paved turnouts are to be constructed for all connecting facilities over 4000 vehicles per day. The connecting point shall be at the R/W line.
- ☑ See "Summary Of Geometric Requirements For Turnouts" chart for return radii lengths and supplemental information.

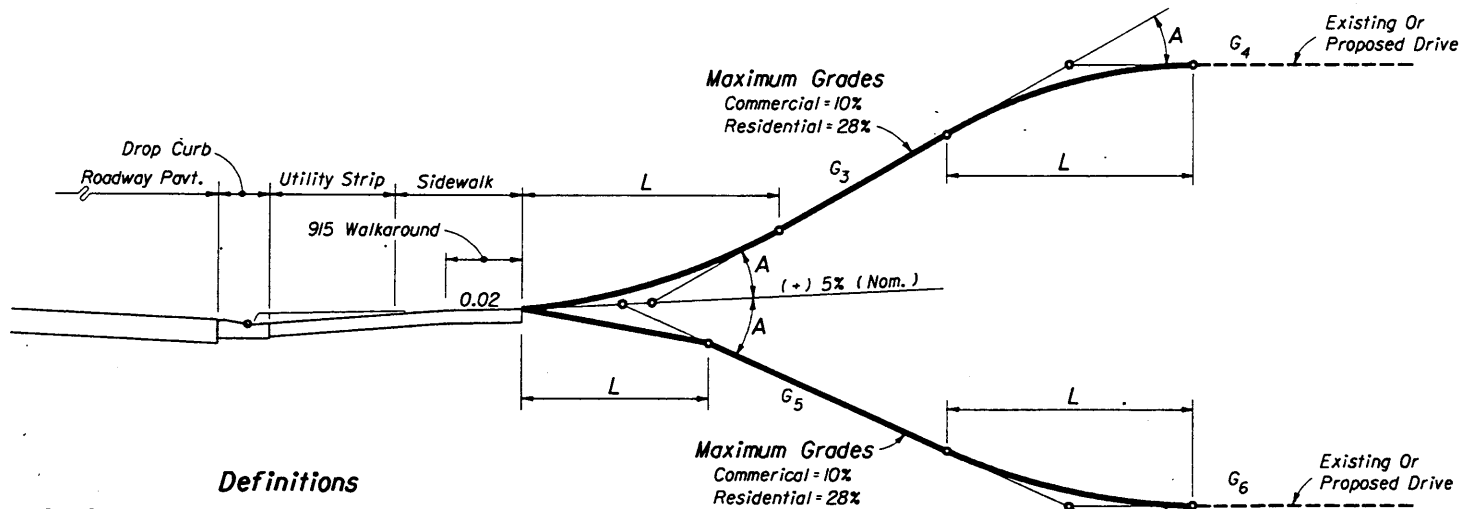
**RURAL TURNOUT CONSTRUCTION**

**LIMITS OF CONSTRUCTION AND MAINTENANCE FOR RURAL CONNECTIONS**

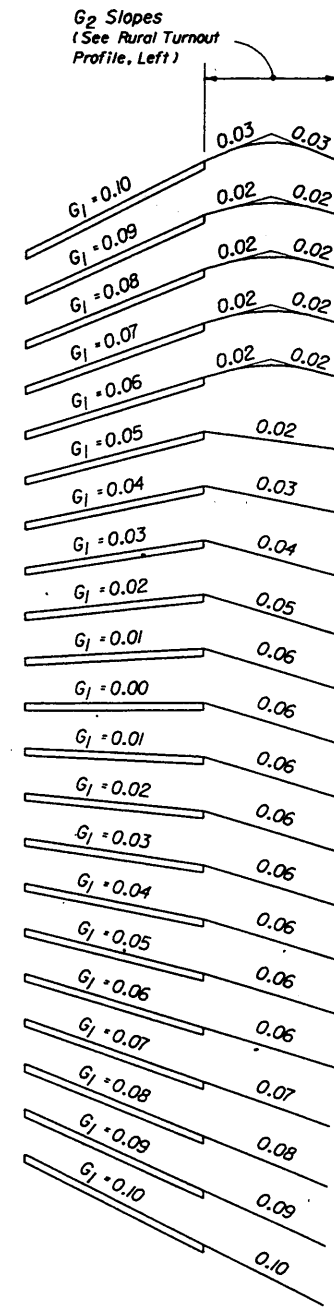
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>TURNOUTS</b>				
Designed By	Names	Date	Approved By	
Drawn By	ESD	3/91	[Signature]	
Checked By	JVG	03/91		
			Revision	Sheet No.
			98	5 of 6
			Index No. 515	



### RURAL TURNOUT PROFILES



### URBAN TURNOUT PROFILES



### ROADWAY PAVEMENT SLOPES AND SLOPES OF ABUTTING RURAL TURNOUT SURFACES (G<sub>2</sub>) SUPERELEVATION SECTIONS

A	LENGTHS (L) (m)							
	CRESTS				SAGS			
	STRAIGHT		ROUNDED		STRAIGHT		ROUNDED	
	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum	Desirable	Minimum
6-13%	0.9	0	1.5	0	0.9	0	1.5	0
14%	0.9	0	3.0	0	0.9	0	3.0	0
15%	0.9	0.8	3.0	0.9	1.5	0.9	3.0	1.5
16%	1.5	0.9	3.0	1.2	1.8	1.2	3.0	1.8
17%	1.8	1.1	3.0	1.5	2.4	1.5	3.0	2.1
18%	1.8	1.2	3.0	1.8	2.7	1.8	3.0	2.4
19%	2.1	1.4	3.0	2.1	3.3	2.1	3.6	2.7
20%	2.4	1.5	3.3	2.4	3.6	2.4	4.0	3.0
21%	2.7	1.7	3.6	2.7	4.0	2.6	4.2	3.3
22%	3.0	1.8	3.9	3.0	4.2	2.7	4.9	3.6
23%	3.0	2.0	4.2	3.2	4.2	2.9	4.9	3.8
24%	3.3	2.1	4.5	3.3	4.5	3.0	5.2	4.0
25%	3.6	2.3	4.5	3.5	4.9	3.2	5.5	4.1
26%	3.6	2.4	4.9	3.6	5.2	3.3	5.5	4.2
27%	4.0	2.6	5.2	3.8	5.2	3.5	5.8	4.4
28%	4.2	2.7	5.2	4.0	5.5	3.6	6.0	4.5
29%	NA	NA	6.7	4.2	NA	NA	6.4	5.2
30-31%	NA	NA	7.0	4.5	NA	NA	6.7	5.5
32-33%	NA	NA	7.3	4.9	NA	NA	7.0	6.0
34-36%	NA	NA	7.9	5.2	NA	NA	7.6	6.4
37-38%	NA	NA	8.2	5.5	NA	NA	7.9	6.7
39-41%	NA	NA	8.8	5.8	NA	NA	8.5	7.3
42-43%	NA	NA	9.1	6.0	NA	NA	8.8	7.6
44-46%	NA	NA	9.7	6.4	NA	NA	9.4	7.9
47-48%	NA	NA	10.0	6.7	NA	NA	9.7	8.2
49-51%	NA	NA	10.4	7.0	NA	NA	10.4	8.5
52-54%	NA	NA	11.0	7.3	NA	NA	10.7	9.1
55-56%	NA	NA	11.2	7.6	NA	NA	11.0	9.4

Rounded: Either circular, parabolic or spline curvature. The plans or the Engineer may specify a particular type of curvature.  
Desirable: Desirable minimum lengths. } Greater lengths than minimum and desirable are recommended where practical for flatter and smoother profile.  
Minimum: Absolute minimum lengths.

### RECOMMENDED TURNOUT PROFILE TRANSITION LENGTHS (L) (m)

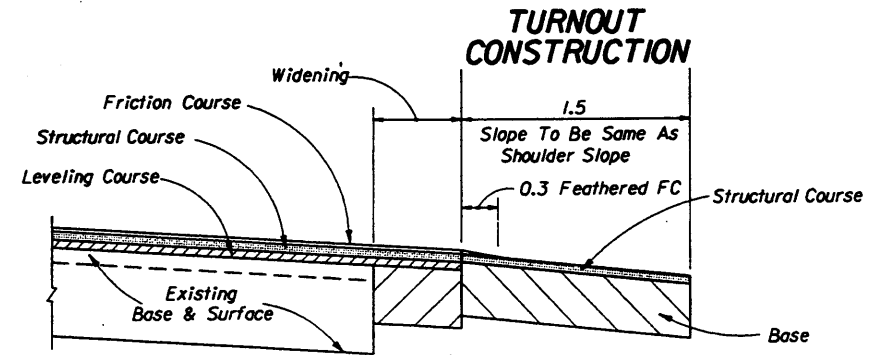
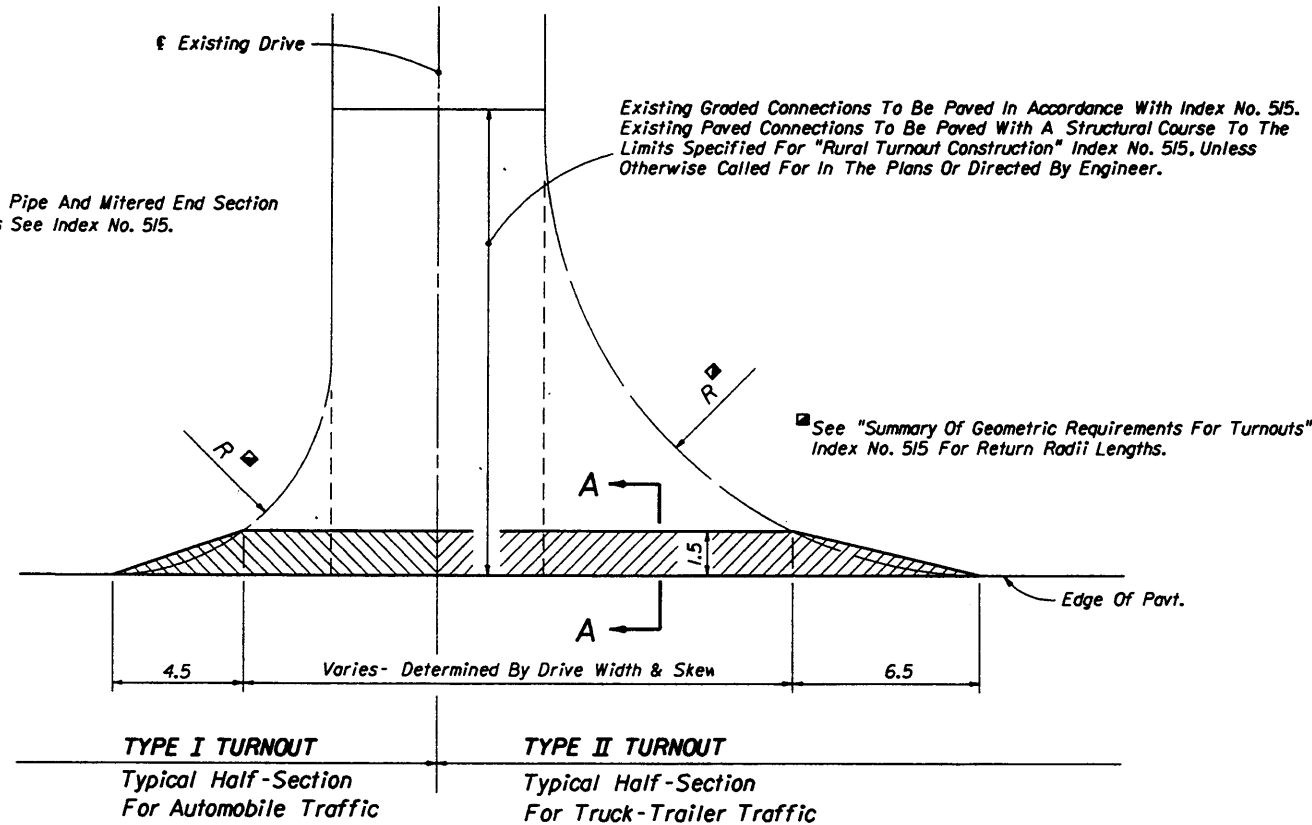
#### PROFILE AND STORMWATER RUNOFF NOTES

1. Turnouts shall neither cause water to flow on or across the roadway pavement, nor cause water ponding or erosion within the State right of way. On all rural turnouts the transition (L) nearest the roadway shall be sloped or crowned to direct stormwater runoff to the roadside ditch. Inlets, flumes or other appropriate runoff control devices shall be constructed when runoff volumes are sufficient to cause erosion of the shoulder. Similar runoff control devices shall be constructed as necessary to properly direct and control the stormwater runoff on urban turnouts.
2. The Option 1 profile is intended for locations where roadway, turnout taper and auxiliary lane stormwater runoff volumes are relatively large. The Option 2 profile is intended for locations where runoff volumes are relatively small and/or where there is no roadside ditch.

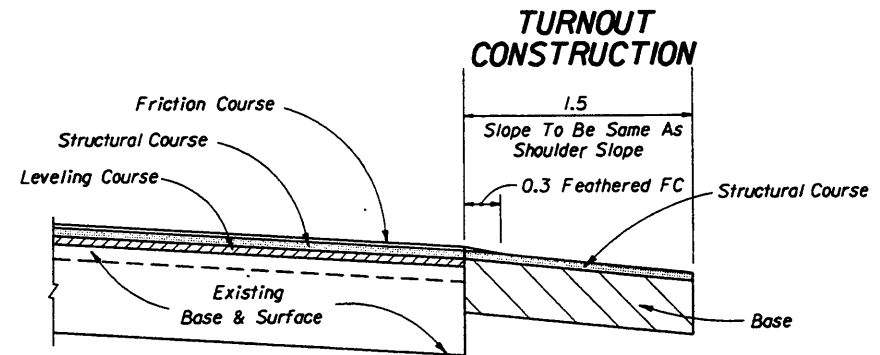
# TURNOUT PROFILES

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TURNOUTS				
Names	Dates	Approved By		
Designed By			State Roadway Design Engineer	
Drawn By	BSD	08/82	Revision	Sheet No.
Checked By	JVG	08/82	94	6 of 6
			Index No.	515

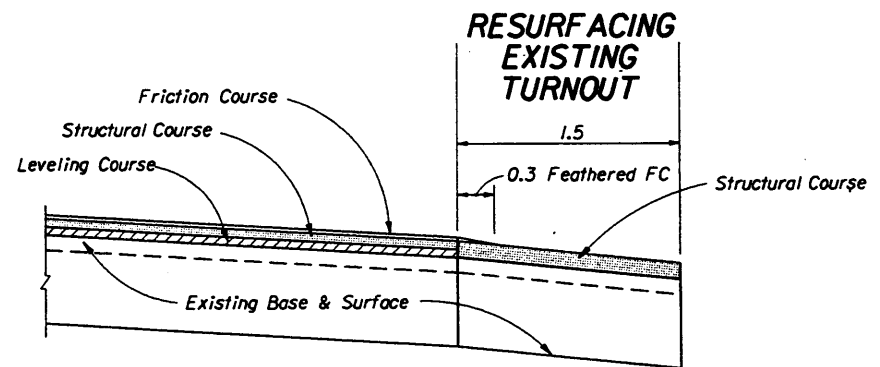
For Drainage Pipe And Mitered End Section Requirements See Index No. 515.



SECTION AA WITH WIDENING



SECTION AA



SECTION AA

Drive Width (m)	AREAS FOR ONE 1.5 m DEEP TURNOUT (m <sup>2</sup> )			
	Intersection			
	Normal		Skewed	
	Type I	Type II	Type I	Type II
3.6	22	41	27	48
4.2	23	42	28	49
4.8	24	42	29	50
5.4	25	43	30	51
6.0	26	44	31	53
6.7	27	45	32	54
7.3	28	46	33	55
7.9	29	47	34	56
8.5	30	48	35	57
9.1	31	49	36	58
9.7	32	50	37	59
10.3	32	51	38	60
10.9	33	52	39	61
11.5	34	53	40	62
12.1	35	53	41	63
12.8	36	54	43	64
13.4	37	55	44	65
14.0	38	56	45	66
14.6	39	57	46	67
15.2	40	58	47	68
15.8	41	59	48	70
16.4	42	60	49	71
17.0	43	61	50	72
17.6	43	62	51	73
18.2	44	63	52	74

PAVEMENT STRUCTURE FOR 1.5 m DEEP TURNOUTS		
Course	Material	Minimum Thickness (mm)
Structural	Asphaltic Concrete	30
Base	Optional Base (See Index No. 514)	O.B.G. 1

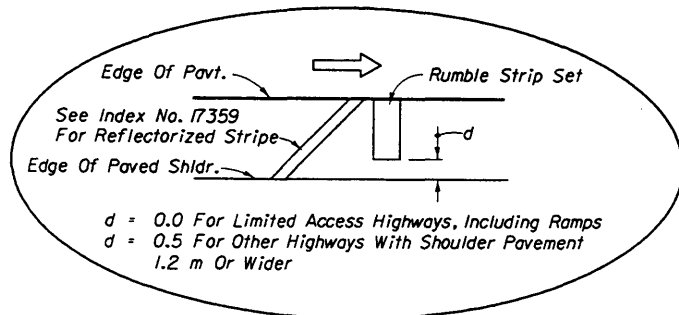
Notes:

- Turnout structural course to be the same material as roadway leveling or structure course. Structural course not required if asphalt base course and its thickness increased to match edge of roadway pavement.
- Any Department approved pavement structure equivalence may be used at the discretion of the Engineer.
- Additional structural strength may be required if heavy truck loads are anticipated.

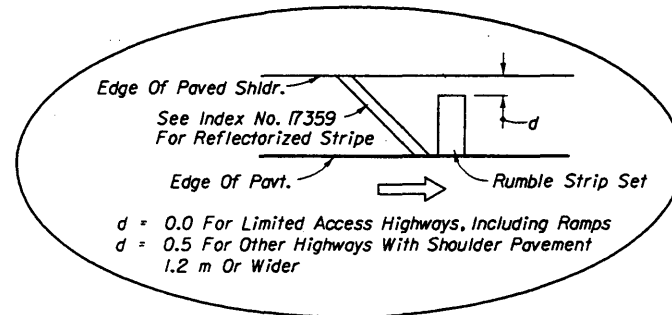
GENERAL NOTES

- Turnouts are to be constructed or resurfaced for low volume (single family, duplex, farm, etc.) residential connections as directed by the Engineer.
- Turnout construction not required for low volume residential connections where roadway shoulders are paved.
- Connections outside the 1.5 m limit are to be constructed as directed by the Engineer.
- The contract unit price for Turnout Construction includes the cost for excavation and base.
- Payment for structural course to be included in roadway resurfacing pay item.
- Payment for feathering friction course to be included in the unit price for Asphaltic Concrete Friction Course placed on the roadway. Feathered areas will not be included in measured quantities. Feathering not required for FC-2 friction course.
- For low volume two-lane facilities without a friction course the structural course will be the final layer.

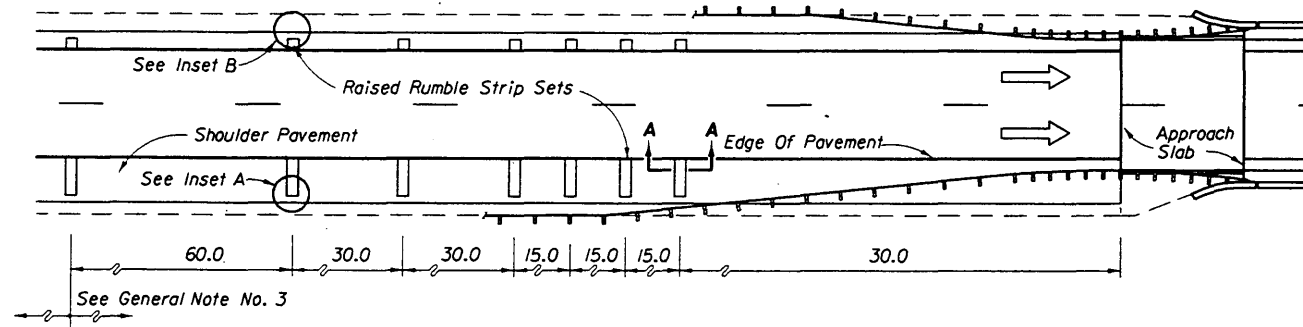
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>TURNOUTS RESURFACING PROJECTS</b>				
Designed By	DCB	Date	11/77	Approved By
Drawn By	BKI	Date	11/77	State Roadway Design Engineer
Checked By	JVC	Date	11/77	Revision
			96	Sheet No.
				1 of 1
				Index No. 516



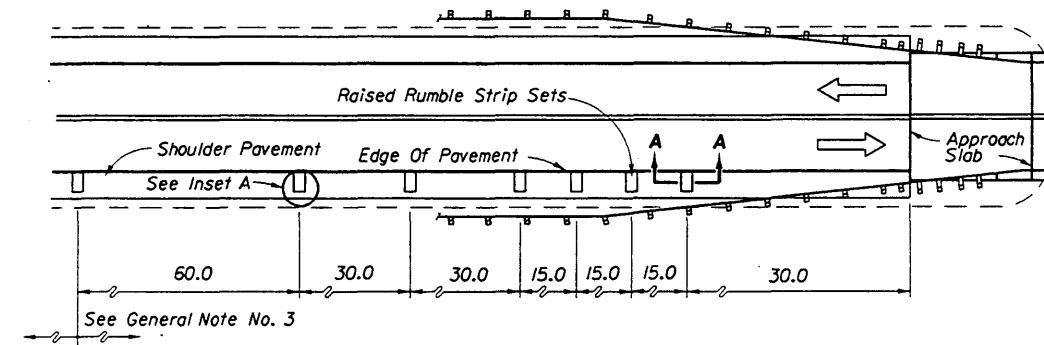
INSET A



INSET B

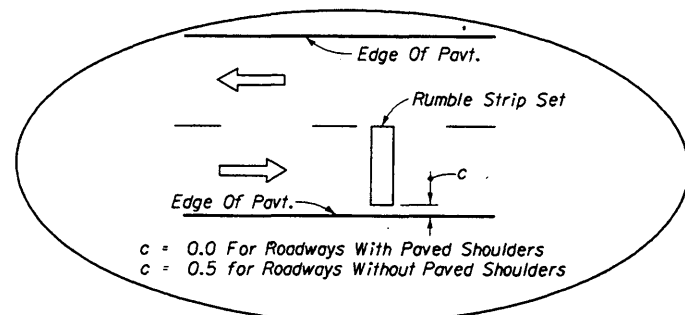


PLAN • ONE-WAY



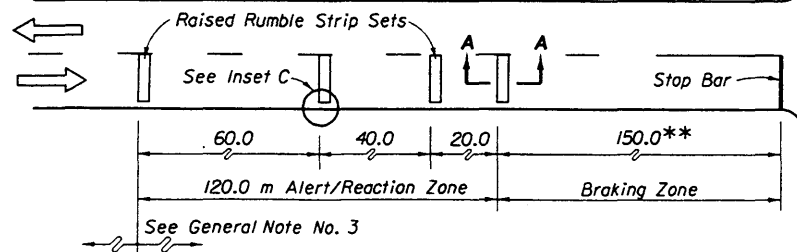
PLAN • TWO-WAY

STRUCTURES WITH LESS THAN FULL WIDTH SHOULDERS



INSET C

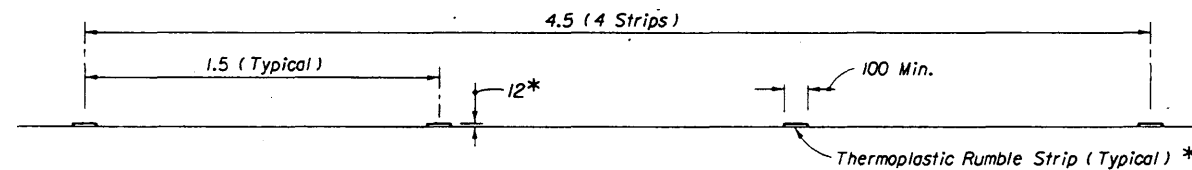
Note: Rumble strips may be required for one or more legs of the intersection (one leg shown for spacing information). Rumble strips shall be constructed only on the legs identified in the plans. See General Note No. 1.



PLAN

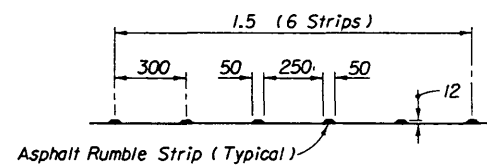
INTERSECTIONS

\*\* May be decreased in urban areas with low operating speeds.



THERMOPLASTIC SET

\* Use multiple applications to achieve desired 12 mm thickness  
 Note: Shoulder thermoplastic rumble strip sets shall match edgeline color. Intersection thermoplastic rumble strip sets shall be white.



ASPHALT SET

SECTION AA • FOR THERMOPLASTIC AND ASPHALT RUMBLE STRIP SETS

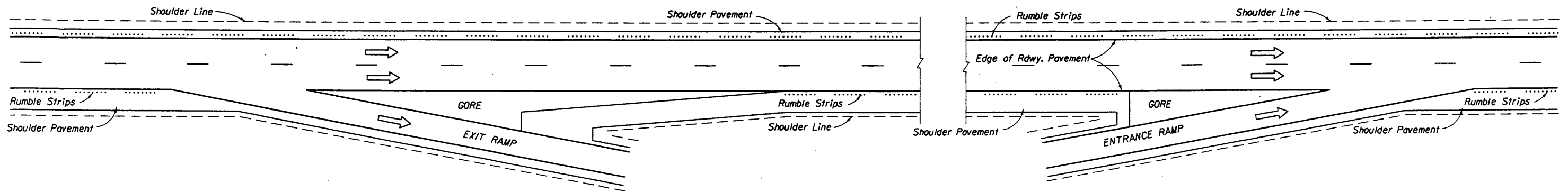
RAISED RUMBLE STRIPS

GENERAL NOTES FOR RAISED RUMBLE STRIPS

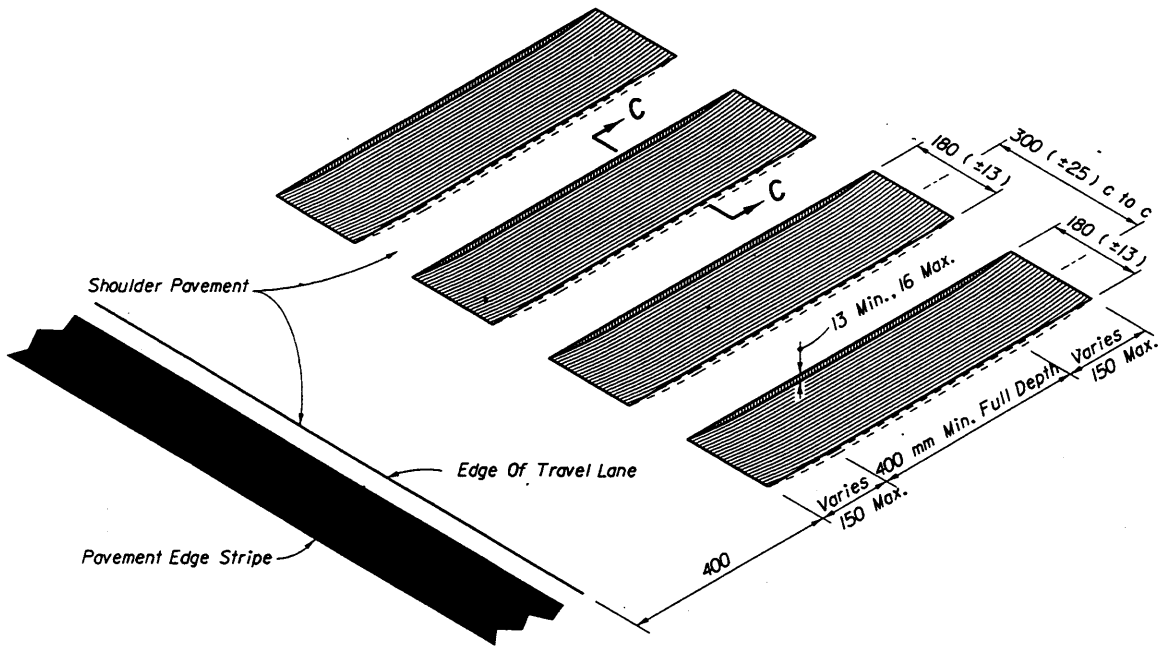
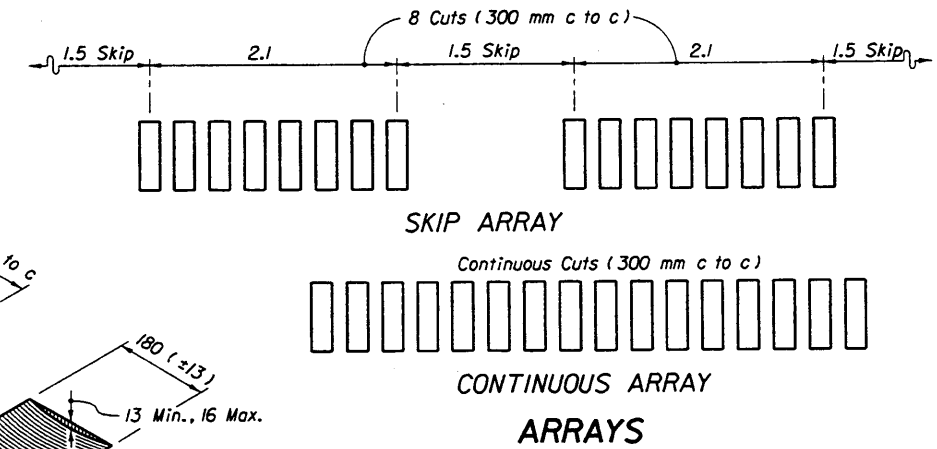
1. Raised rumble strips shall be constructed on all paved shoulders approaching structures, where the structure shoulder width is less than the usable shoulder width of the approach roadway. Raised rumble strips at intersections shall be constructed only when specified in the plans.
2. Raised rumble strips are to be constructed in accordance with Section 546 of the Specifications.
3. When any portion of a curve falls within the limit of rumble strips shown in these details, additional rumble strip sets spaced at 60.0 m centers shall be constructed throughout the remainder of the approaching curve.
4. Raised rumble strips shall be paid for under the contract unit price for Rumble Strips Sets, PS. Such price and payment shall be full compensation for all work and materials required.

Raised rumble strips shall be paid for per set without any adjustment due to width of pavement receiving the strips or length of strips.

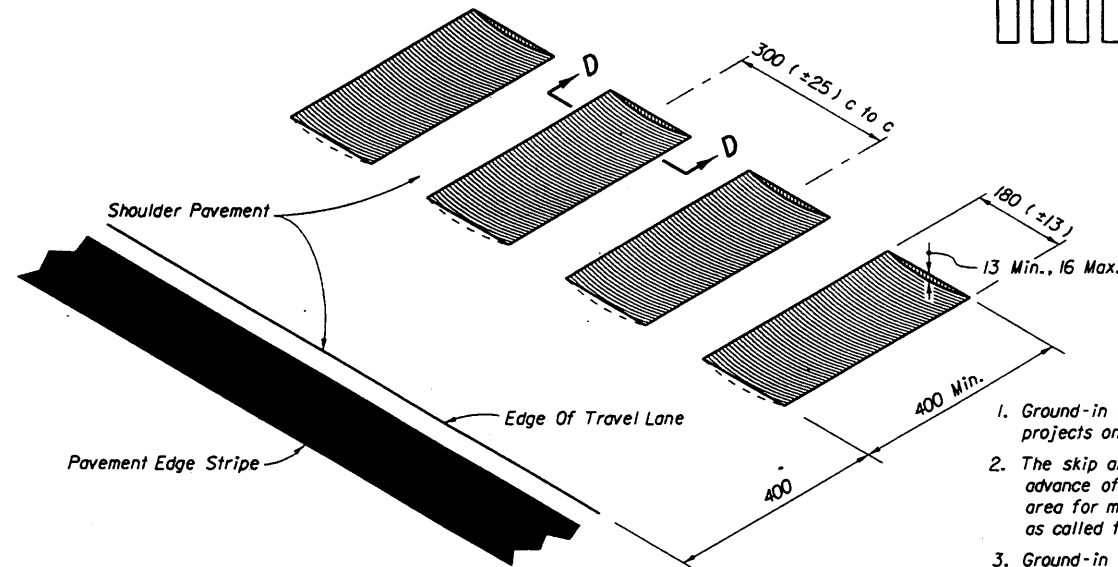
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RUMBLE STRIPS</b>				
Names	Dates	Approved By	State Roadway Design Engineer	
Designed By	KQW/CAS	10/87	[Signature]	
Drawn By	JBR	10/87	Revision	Sheet No.
Checked By	KQW/JVG	10/87	00	1 of 2
				Index No. 518



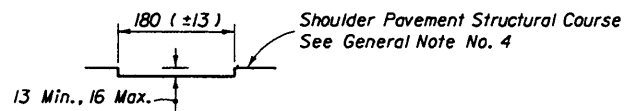
LIMITED ACCESS FACILITIES  
**SHOULDER GROUND-IN RUMBLE STRIP PLACEMENT**



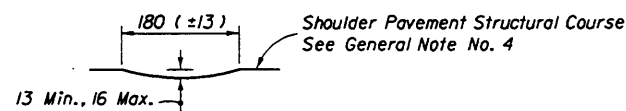
ISOMETRIC - TRANSVERSE CUT



ISOMETRIC - LONGITUDINAL CUT



SECTION CC  
 TRANSVERSE CUT



SECTION DD  
 LONGITUDINAL CUT

**GENERAL NOTES FOR SHOULDER GROUND-IN RUMBLE STRIPS**

1. Ground-in rumble strips shall be constructed on freeway and other limited access projects only, and only when called for in the plans.
2. The skip array is the standard array. The continuous array shall be constructed in advance of bridge ends for a distance of 300 m, or back to the gore recovery area for mainline interchange bridges; and constructed at other specific locations as called for in the plans.
3. Ground-in rumble strips are to be constructed in accordance with Section 546 of the Specifications.
4. When friction course extends more than 0.3 m beyond the edge of the outer traffic lane, the extended friction course shall be bladed off back to the 0.3 m line, prior to rumble strip grinding.
5. Both arrays shall be paid for under the contract unit price for Rumble Strips (Ground-In), KM. Such price and payment shall be full compensation for all work and materials required.

**DESIGN NOTE**

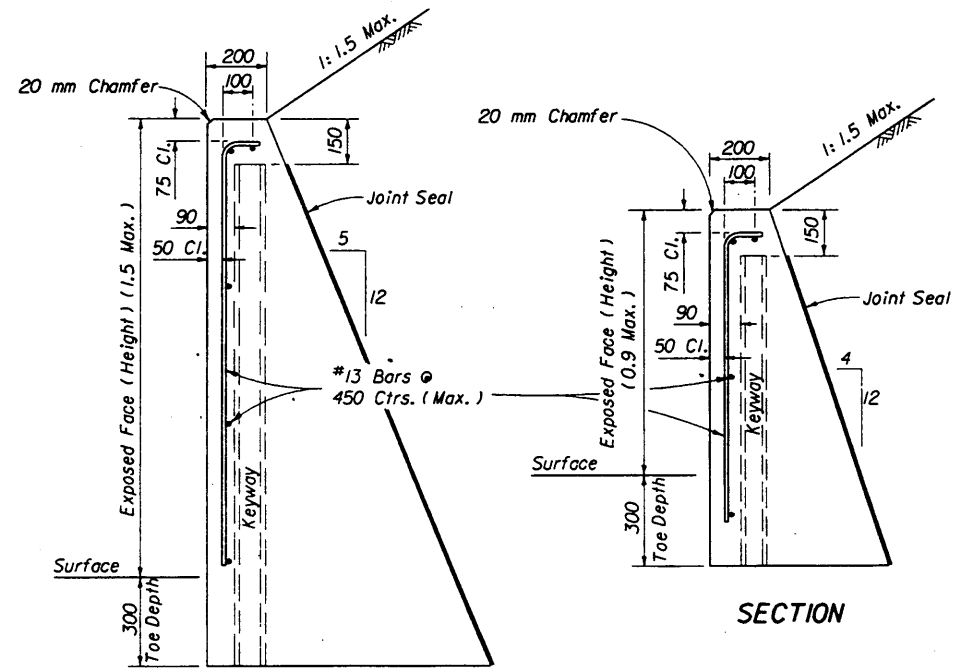
1. The rumble strips described on this sheet are intended for use on flexible pavement shoulders. When constructing ground-in rumble strips on existing rigid (concrete) shoulders, no rumble strips shall be located closer than 150 mm from any pavement joint. When specifying ground-in rumble strips on existing rigid shoulders their location and array shall be detailed in the plans.
2. Other methods and types of applications shall not be used unless approved in writing by the State Roadway Design Engineer. Approval will be considered only with sufficient documented justification for variance from this standard.

**LOCATION ALONG SHOULDER (FLEXIBLE PAVEMENT)**

**SHOULDER GROUND-IN RUMBLE STRIPS**

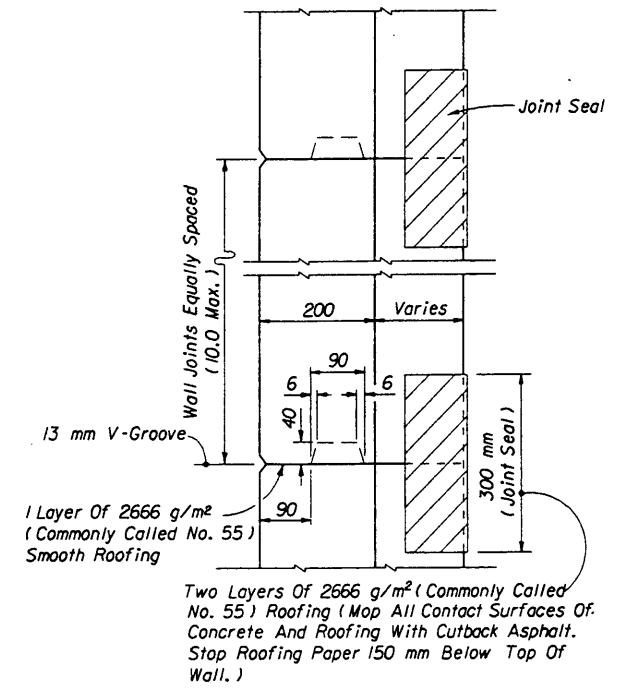
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RUMBLE STRIPS</b>				
Designed By	Names	Dates	Approved By	
Drawn By	EKH	11/93	 State Roadway Design Engineer	
Checked By	FLS/JYG	11/93		
			Revision	Sheet No.
			94	2 of 2
				Index No. 518





SECTION

SECTION



KEY DETAIL (TOP VIEW)

HEIGHT (m) (EXPOSED FACED)	PER LINEAR METER OF WALL	
	CLASS I CONCRETE (m <sup>3</sup> )	STEEL (kg)
0.3	0.180	7
0.6	0.315	7
0.9	0.480	10
1.2	0.769	13
1.5	1.035	13

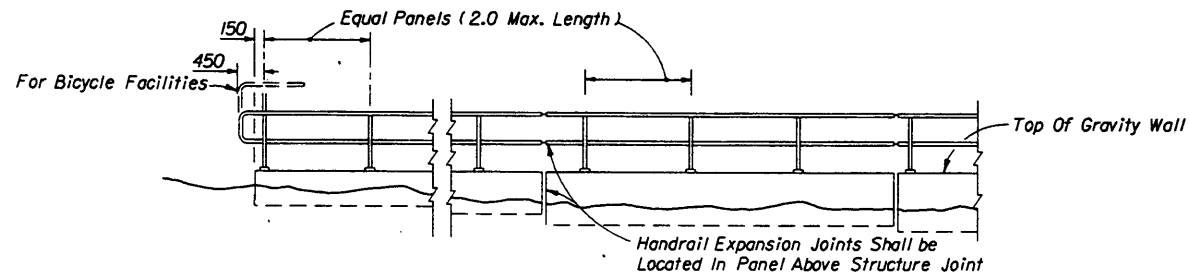
ESTIMATED QUANTITIES FOR WALL

GRAVITY WALL NOTES

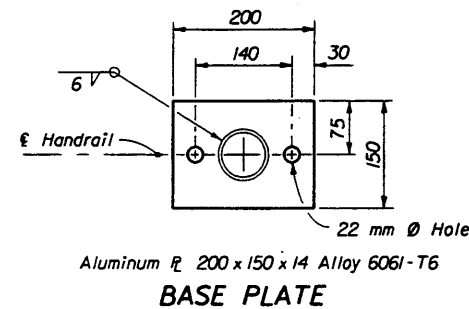
- Gravity walls constructed as extensions of reinforced concrete retaining walls, except walls of proprietary designs, shall have the same face texture and finish as the reinforced concrete retaining wall.
- Cost of reinforcing steel, face texture, finish and joint seal to be included in the contract unit price for Class I Concrete (Retaining Walls), M3.

GRAVITY WALL

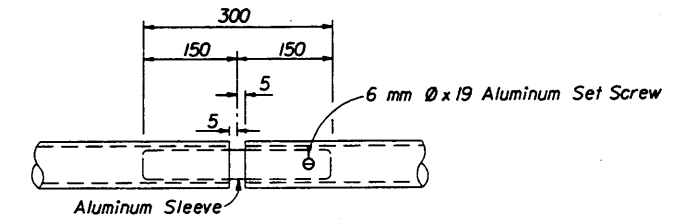
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>ALUMINUM PIPE HANDRAILS, GRAVITY WALLS AND STEPS</b>				
Designed By	Names	Dates	Approved By <i>[Signature]</i>	
Drawn By	CDR	02/68	Revision	Sheet No. 1 of 2
Checked By	RHC	02/68	98	Index No. 520



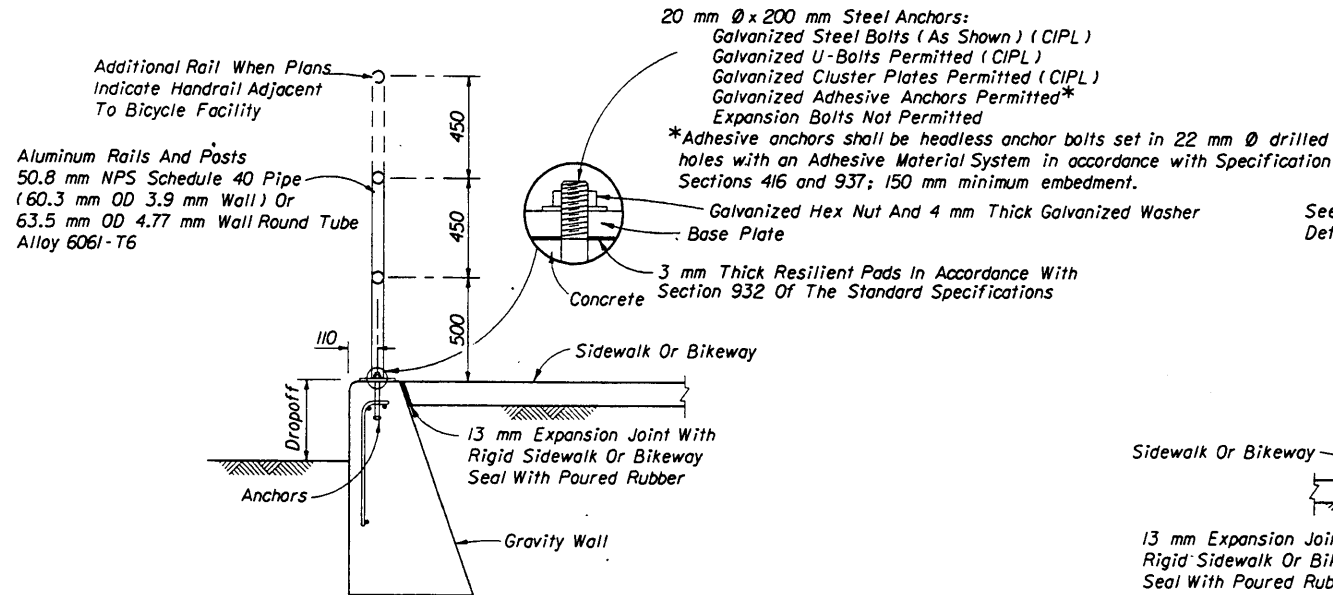
ELEVATION



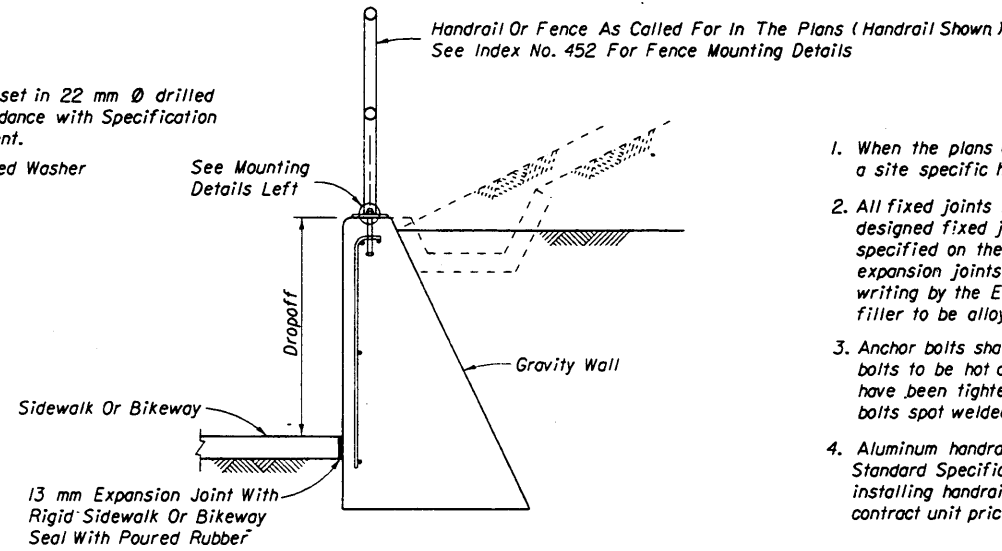
BASE PLATE



EXPANSION JOINT

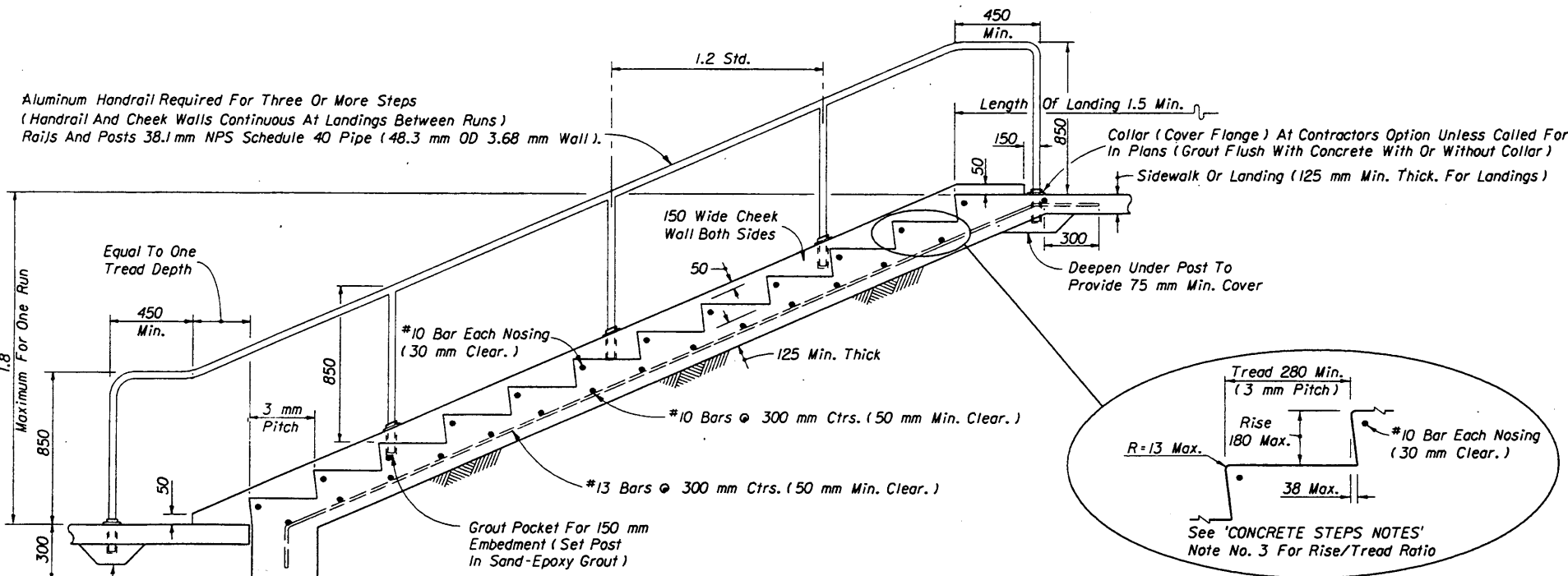


TYPICAL SECTIONS AT POST



ALUMINUM PIPE HANDRAIL ON GRAVITY WALLS FOR DROPOFFS >250 mm AND  $\leq$ 760 mm

- ALUMINUM PIPE HANDRAIL NOTES
- When the plans call for handrails on walls with dropoffs that exceed 760 mm, a site specific handrail design will be required.
  - All fixed joints to be either welded all around and ground smooth; or, commercially designed fixed joint systems (soldered, brazed, fused, bonded or shrink fitted) specified on the plans or approved by the Engineer. Mechanical joints other than expansion joints are not permitted unless specified on the plans or approved in writing by the Engineer. Posts shall be connected to base by weld only. Weld filler to be alloy ER5356, ER5556 or ER5183.
  - Anchor bolts shall be in accordance with ASTM A36 or A307. Nuts, washers, and bolts to be hot dip galvanized in conformance with ASTM A153. After the nuts have been tightened, the anchor bolt threads shall be distorted or the nuts and bolts spot welded and coated with zinc compound.
  - Aluminum handrail shall be constructed in accordance with Section 515 of the Standard Specifications. Payment shall be full compensation for furnishing and installing handrail, including mounting hardware, and shall be paid for under the contract unit price for Pipe Handrail (Aluminum), M1.



CONCRETE STEPS NOTES

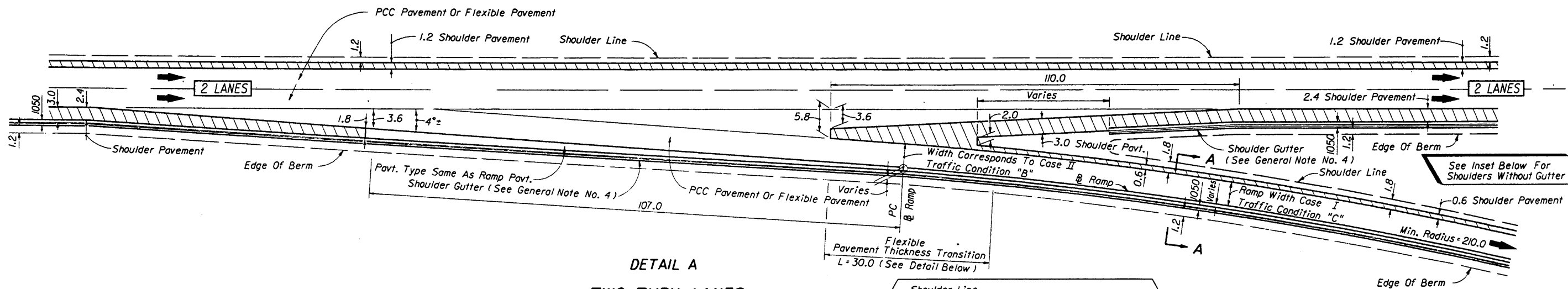
- Step and handrail design shown is for soil supported steps without adjacent dropoffs; do not use for suspended (structural) steps or stairway.
- 12 risers maximum between landings.
- Ratio of riser height to tread depth:  $2R (mm) + T (mm) = 635 mm$ .
- For steps parallel to and adjoining walls, delete adjoining cheek wall and mount handrail to wall at height and length shown.
- Aluminum handrail shall be constructed in accordance with Section 515 of the Standard Specifications. Payment shall be full compensation for furnishing and installing handrail, including mounting hardware, and shall be paid for under the contract unit price for Pipe Handrail (Aluminum), M1.
- Cost of concrete steps, landings and cheek walls shall be paid for under the contract unit price for Class I Concrete (Miscellaneous), M3. Cost of reinforcing steel shall be paid for under the contract unit price for Reinforcing Steel (Miscellaneous), KG.

Deepen Under Post To Provide 75 mm Min. Cover

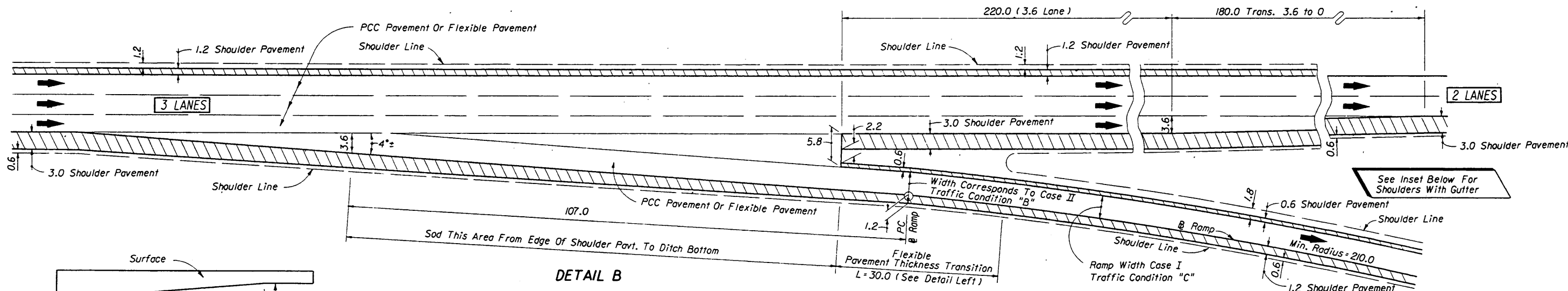
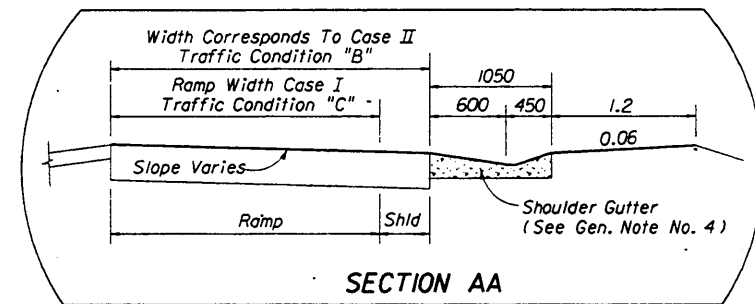
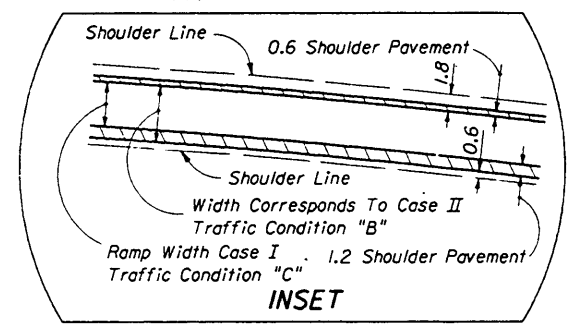
Steps, Including Cheek Walls, Will Be 1.8 m Wide Unless Otherwise Called For In The Plans

CONCRETE STEPS

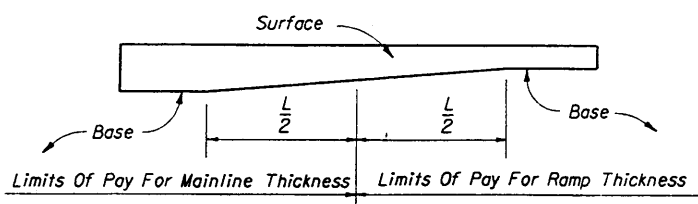
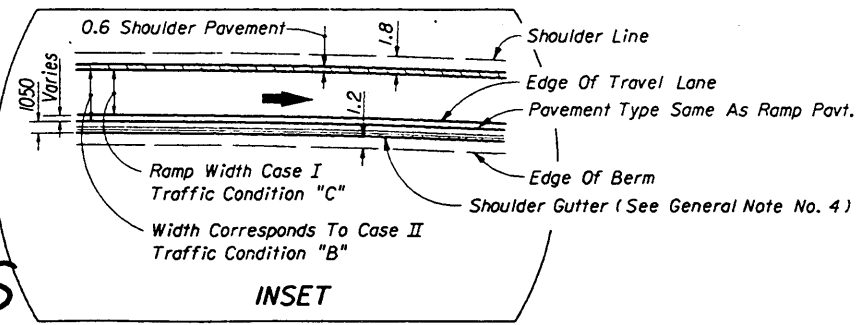
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>ALUMINUM PIPE HANDRAILS, GRAVITY WALLS AND STEPS</b>					
Designed By	Names	Dates	Approved By		
Drawn By	CDR	02/68	Revision	Sheet No.	Index No.
Checked By	RHC	02/68	00	2 of 2	520



**DETAIL A  
TWO THRU LANES**



**DETAIL B  
THREE APPROACH LANES - TWO THRU LANES**



**FLEXIBLE PAVEMENT THICKNESS TRANSITION**

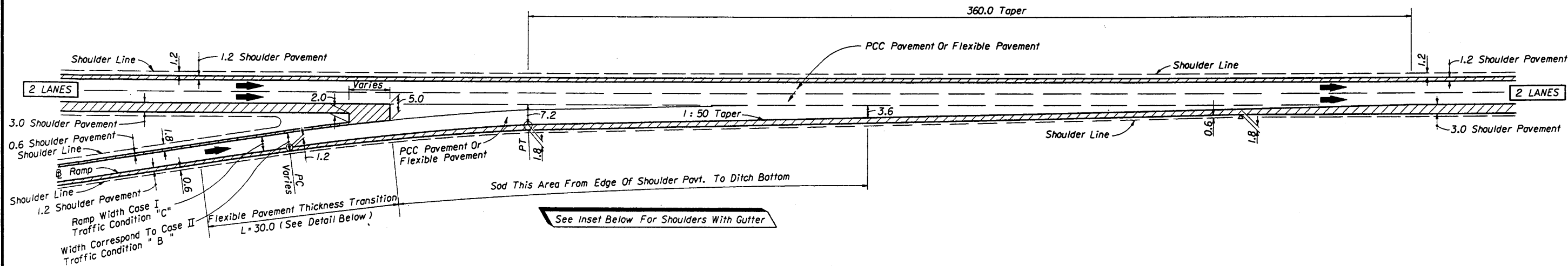
**EXIT TERMINALS  
SINGLE - LANE RAMPS**

NOTE: For General Notes See Sheet No. 2

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

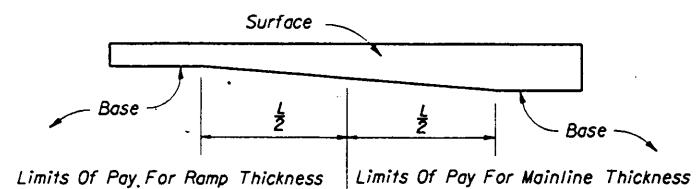
**RAMP TERMINALS**

Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By	EEH 01/65	<i>[Signature]</i>			
Drawn By	FEW 01/65				
Checked By	RLO 06/67		94	1 of 5	525



DETAIL C

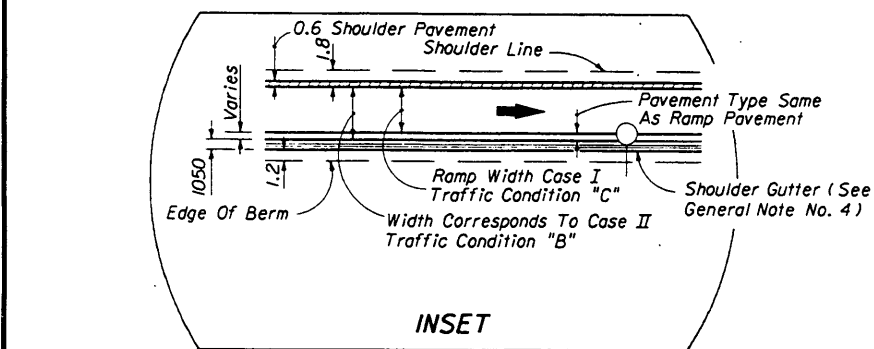
TWO THRU LANES



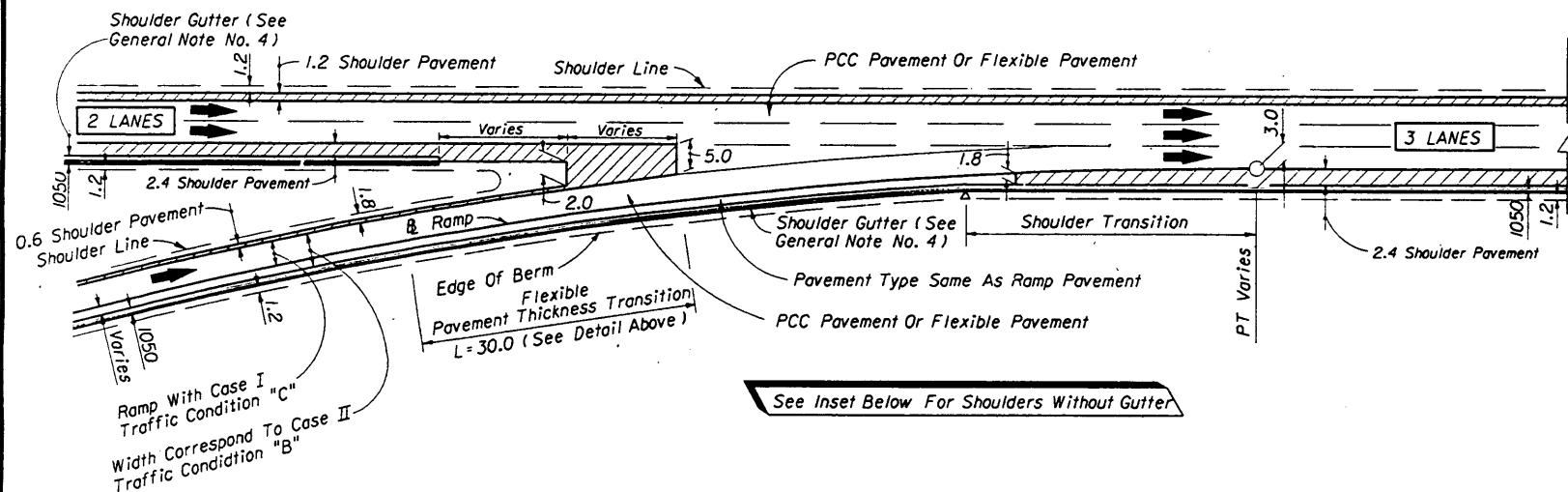
FLEXIBLE PAVEMENT THICKNESS TRANSITION

GENERAL NOTES

- Exit and entrance terminals as detailed shall not be used on ramps for which a speed of 80 km/h or greater cannot be maintained. For such ramps, parallel deceleration and acceleration lanes shall be used in place of tapers with lengths set according to AASHTO.
- (a.) PCC Pavement Projects:  
Where shoulder pavement adjacent to shoulder gutter is less than 1.8 m wide, it shall be identical to the adjacent roadway pavement beginning with the transverse joint nearest the point of 1.8 m width.
- (b.) Flexible Pavement Projects:  
Where shoulder pavement used in conjunction with shoulder gutter is less than 1.8 m uniform width, it shall be identical to the adjacent roadway pavement.
- For concrete pavement joint details and layouts at entrance and exit ramp terminals see Index No. 305.
- Shoulder gutter applications will be determined by drainage design.



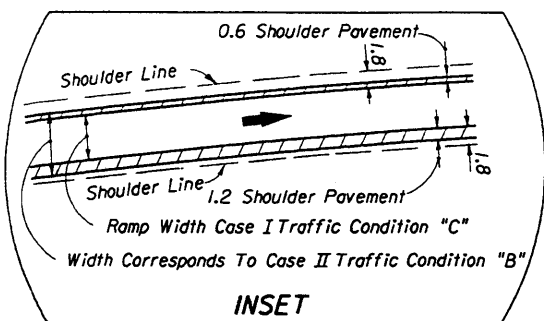
INSET



DETAIL D

WITH ADDED LANE

ENTRANCE TERMINALS  
SINGLE-LANE RAMPS

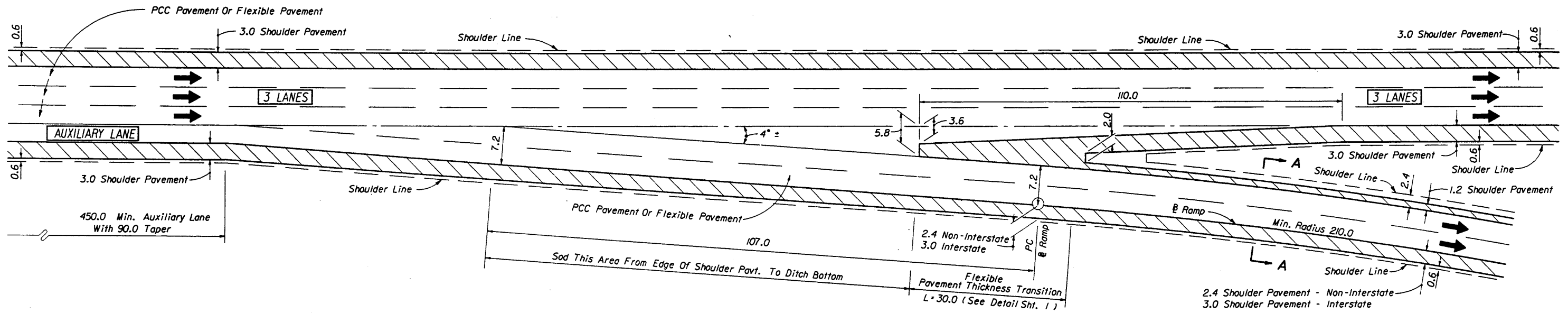


INSET

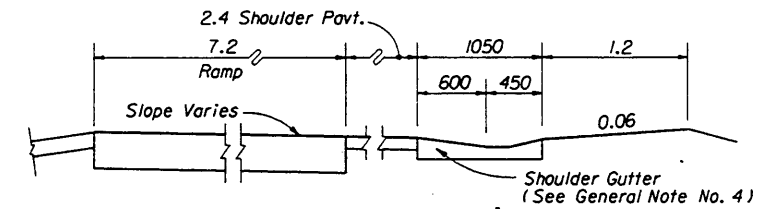
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

RAMP TERMINALS

	Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By	FHR	01/65	<i>John J. [Signature]</i> State Roadway Design Engineer			
Drawn By	EFW	01/65				
Checked By	RLO	06/67			94	2 of 5




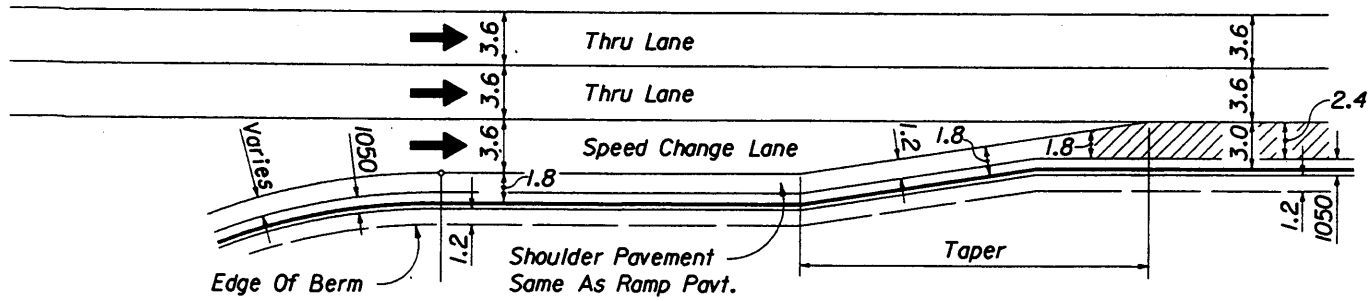
THREE THRU LANES APPROACH AUXILIARY LANE



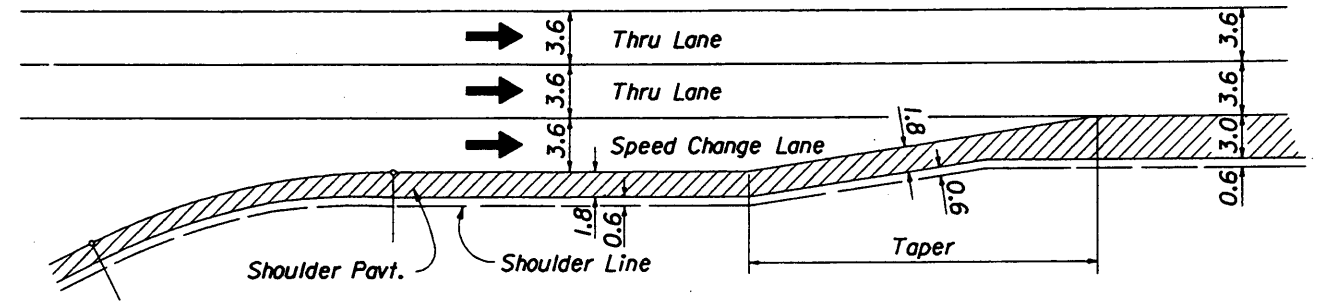
SECTION WHEN SHOULDER GUTTER USED  
SECTION AA

EXIT TERMINALS  
TWO-LANE RAMPS

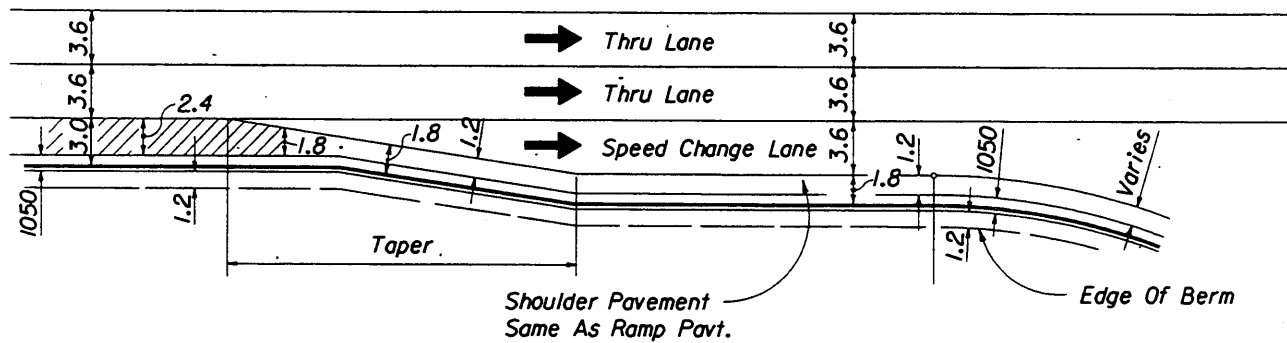
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RAMP TERMINALS				
Names	Dates	Approved By		
Designed By	DCB 07/86	 State Roadway Design Engineer		
Drawn By	DDS 07/86	Revision	Sheet No.	Index No.
Checked By	DCB 07/86	94	3 of 5	525



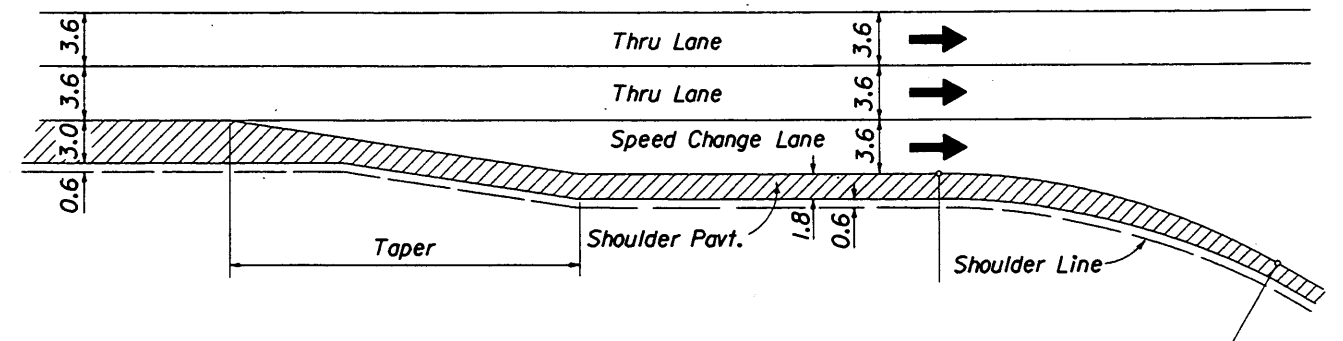
ACCELERATION LANE WITH SHOULDER GUTTER



ACCELERATION LANE WITHOUT SHOULDER GUTTER



DECELERATION LANE WITH SHOULDER GUTTER



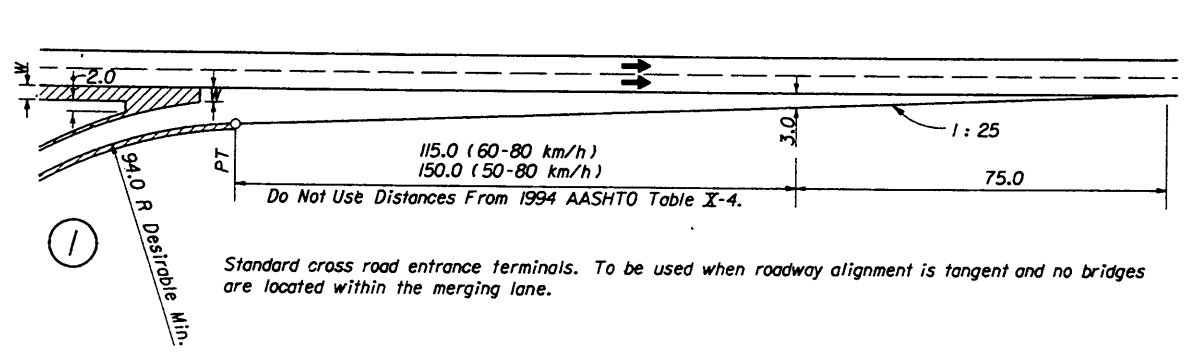
DECELERATION LANE WITHOUT SHOULDER GUTTER

SHOULDER TREATMENT

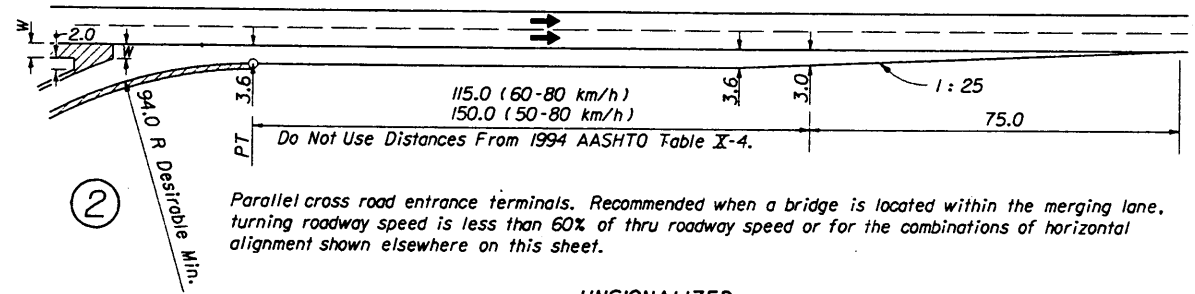
AT SPEED CHANGE LANES AT EXPRESSWAY RAMP TERMINALS

EXPRESSWAY RAMP TERMINALS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RAMP TERMINALS				
Names	Dates	Approved By		
Designed By	EHE 01/65	[Signature] State Roadway Design Engineer		
Drawn By	BEW 01/65	Revision	Sheet No.	Index No.
Checked By	RLO 06/67	94	4 of 5	525

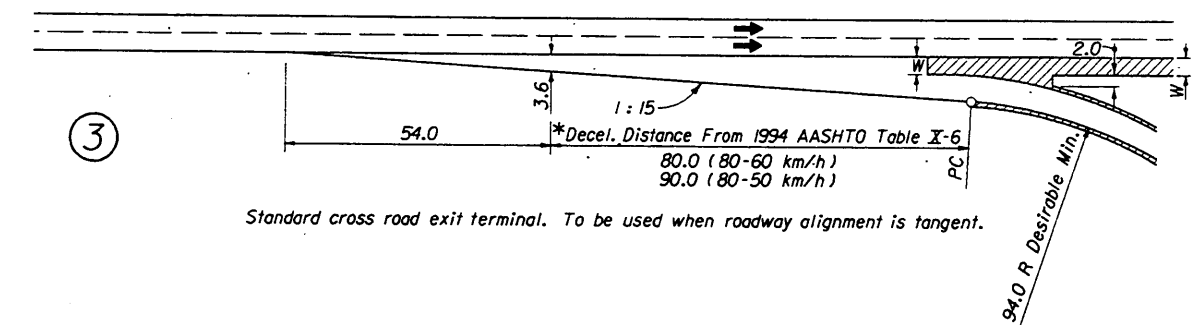


Standard cross road entrance terminals. To be used when roadway alignment is tangent and no bridges are located within the merging lane.

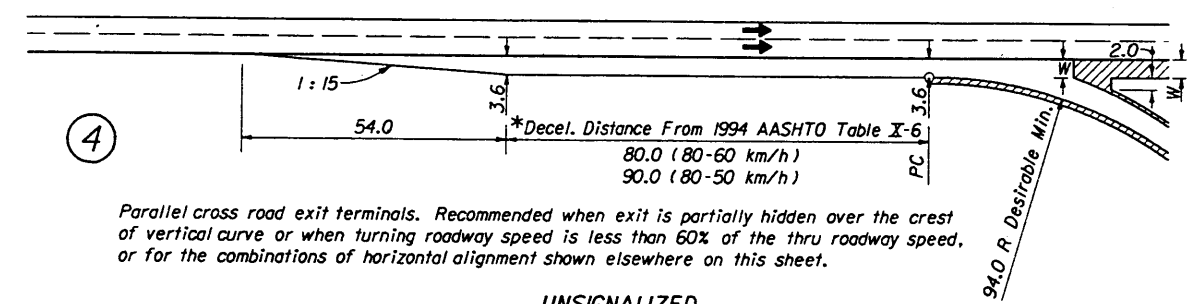


Parallel cross road entrance terminals. Recommended when a bridge is located within the merging lane, turning roadway speed is less than 60% of thru roadway speed or for the combinations of horizontal alignment shown elsewhere on this sheet.

**UNSIGNALIZED ENTRANCES**



Standard cross road exit terminal. To be used when roadway alignment is tangent.



Parallel cross road exit terminals. Recommended when exit is partially hidden over the crest of vertical curve or when turning roadway speed is less than 60% of the thru roadway speed, or for the combinations of horizontal alignment shown elsewhere on this sheet.

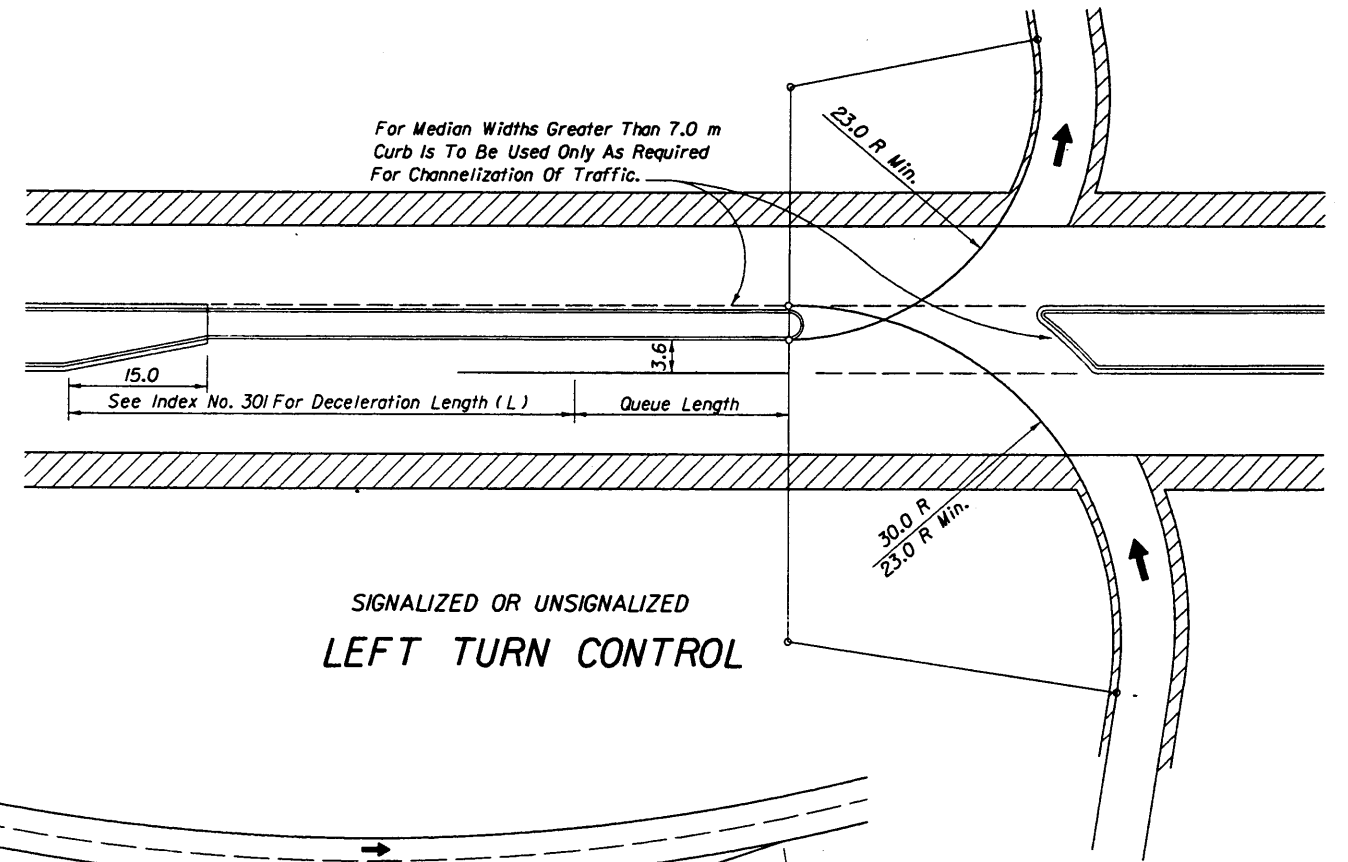
**UNSIGNALIZED EXITS**

**FOOTNOTES:**

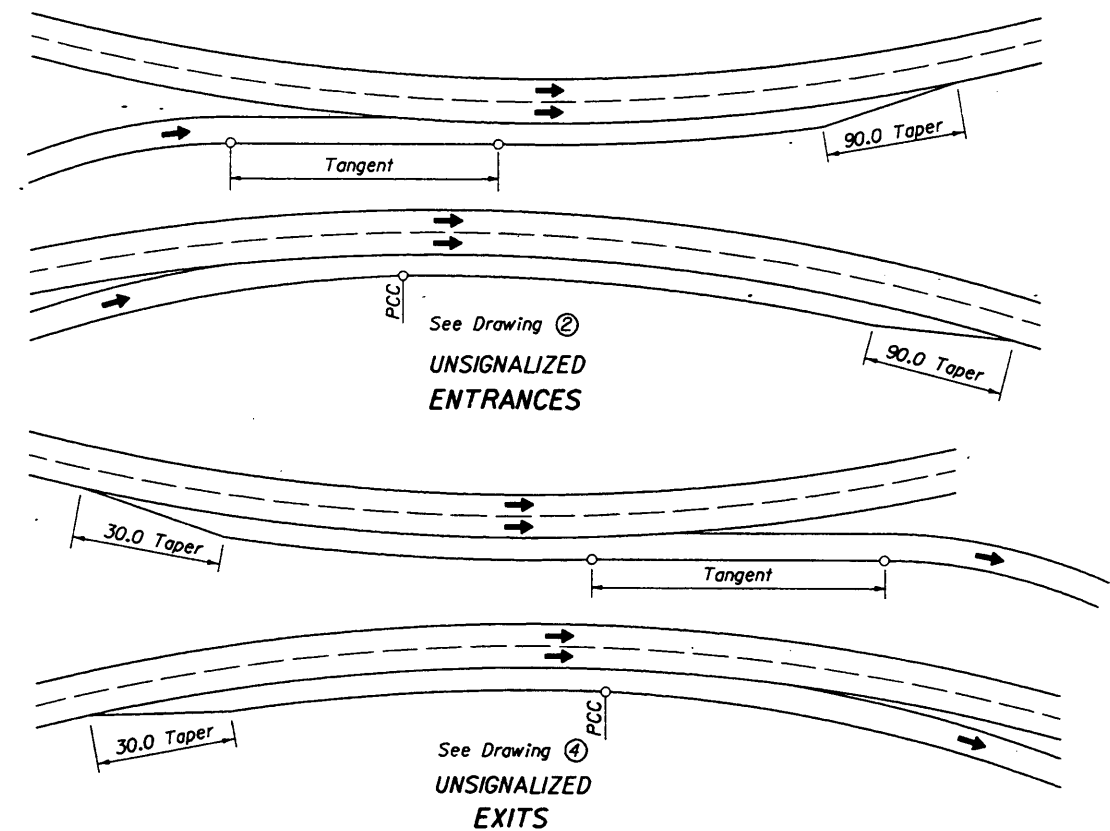
- W Normal shoulder pavement width.
- \* Adjust for grades if greater than 2% (See Table X-5, AASHTO).

**RAMP TERMINALS**

**CROSSROAD TERMINALS**



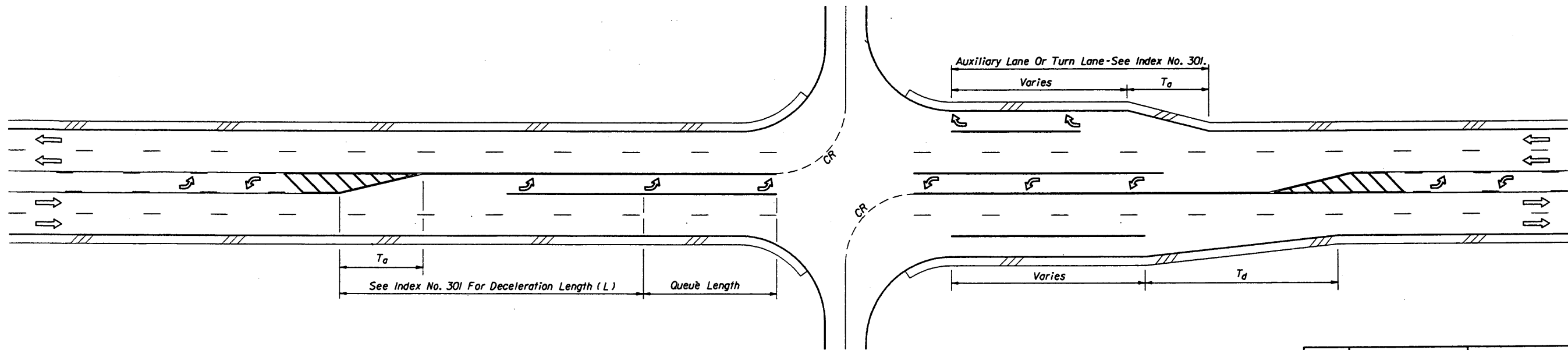
**SIGNALIZED OR UNSIGNALIZED LEFT TURN CONTROL**



**RAMP TERMINALS ON CURVES**

NOTE: Ramp terminals on curves should be avoided when possible.

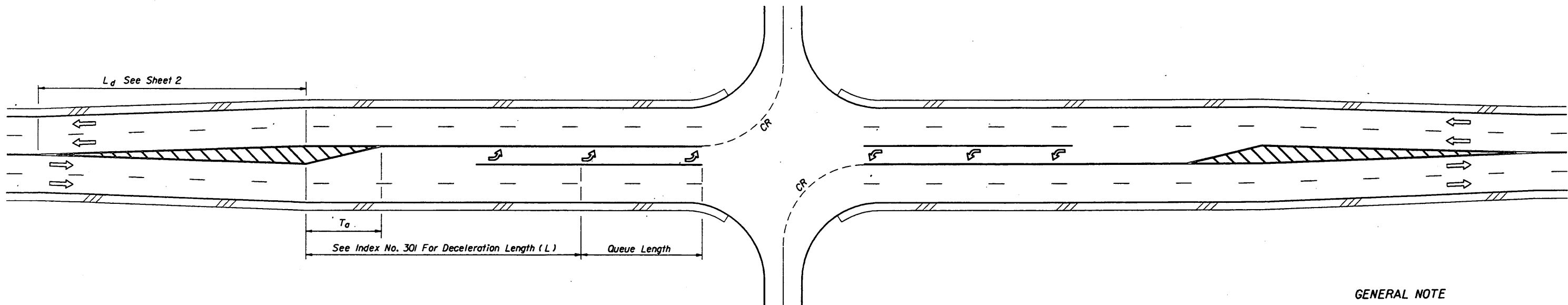
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RAMP TERMINALS</b>				
Designed By	Names	Dates	Approved By	
Drawn By	HW	1/65	State Roadway Design Engineer	
Checked By	RLO	6/67	Revision	Sheet No. 5 of 5
			94	Index No. 525



4-LANE UNDIVIDED WITH OPTIONAL LANE

DESIGN SPEED (km/h)	T <sub>d</sub> (METERS)	T <sub>d</sub>
< 50	ADD LANE	LANE DROP
50-70	15.0 (±1:4)	1:25
> 70		1:30
		1:40

Note: For locations with unrelocatable control points minimum taper rates for lane drop (T<sub>d</sub>) will be 1:20.



4-LANE UNDIVIDED FLARED - SYMMETRICAL

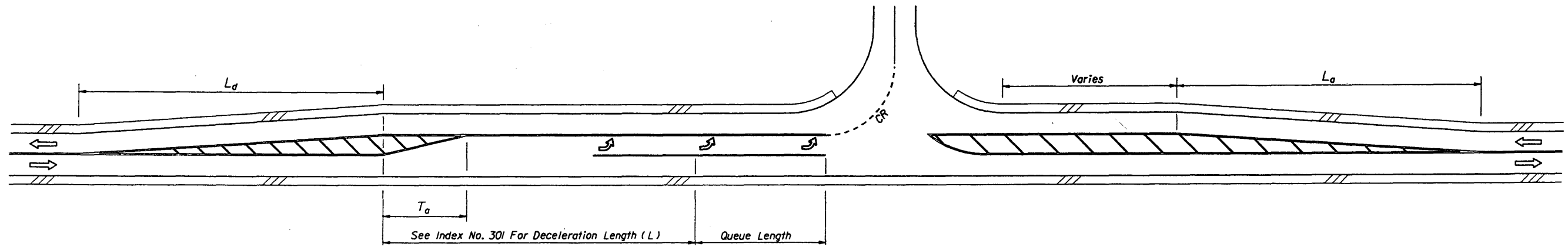
INTERSECTION TURNS AND STORAGE

GENERAL NOTE

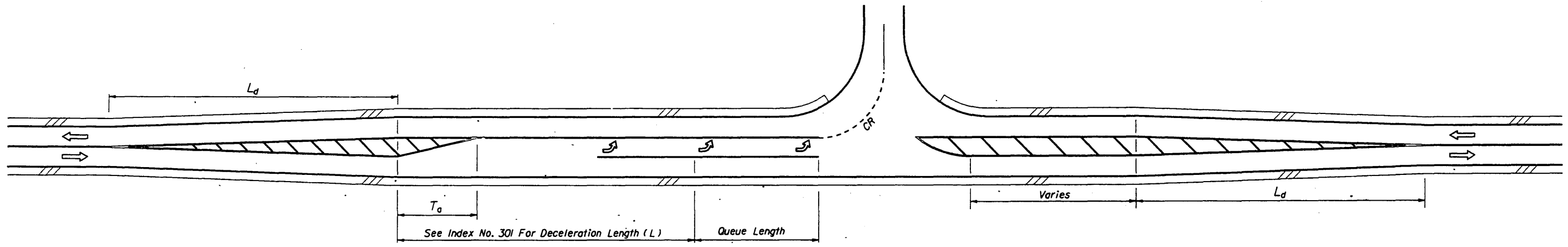
1. For pavement markings refer to Index No. 17346.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>ROADWAY TRANSITIONS</b>					
Designed By	Names	Dates	Approved By		
Drawn By	KRM	9/89	 State Roadway Design Engineer		
Checked By	JBM	9/89			
	KRM/JVG		Revision	Sheet No.	Index No.
			94	1 of 8	526

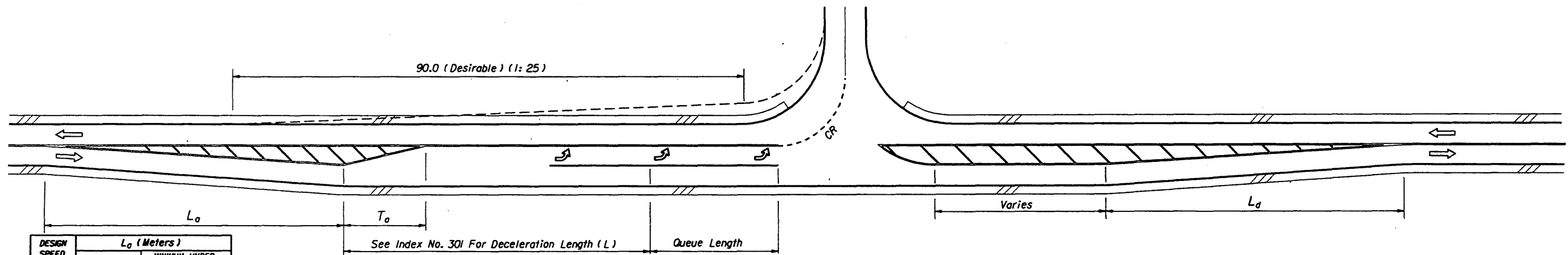




LEFT SIDE WIDENING



CENTERED WIDENING



RIGHT SIDE WIDENING

DESIGN SPEED (km/h)	$L_d$ (Meters)	
	STANDARD	MINIMUM UNDER RESTRAINTS
50	60	40
60	85	45
70	155	50
80	180	55
100	225	75

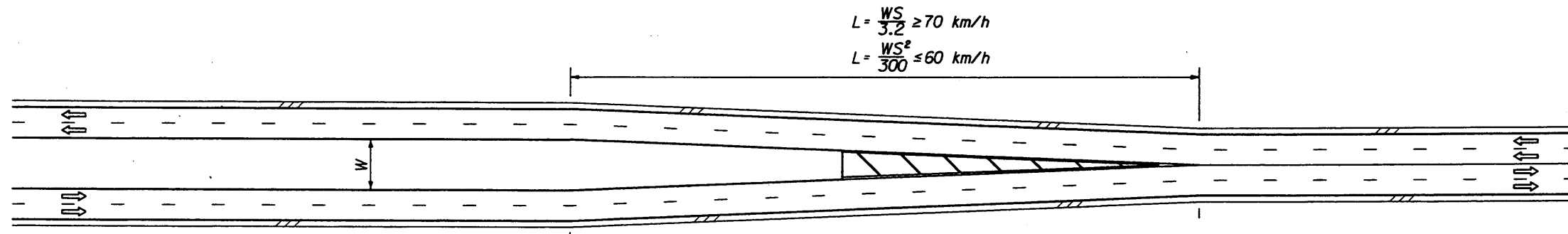
(km/h)	$L_d$ (Meters)	
50	55	40
60	75	45
70	90	50
80	110	55
100	145	75

FLARED & PAINTED LEFT TURNS FOR 2-LANE 2-WAY ROADWAYS

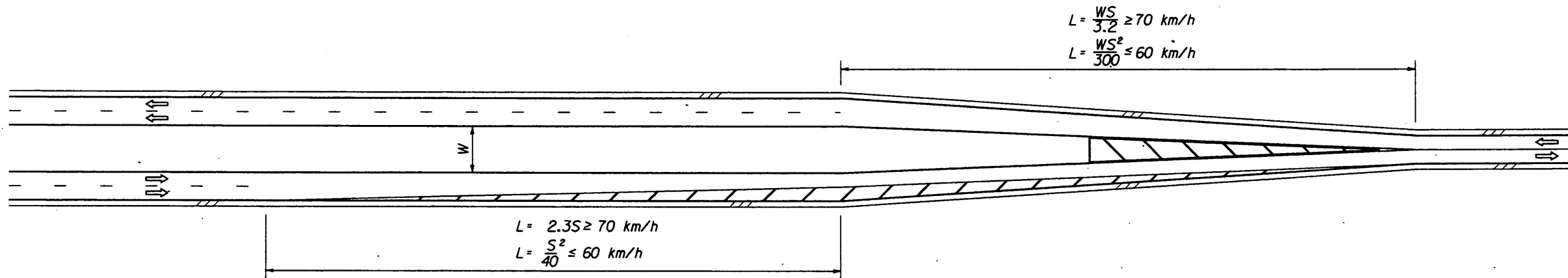
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**ROADWAY TRANSITIONS**

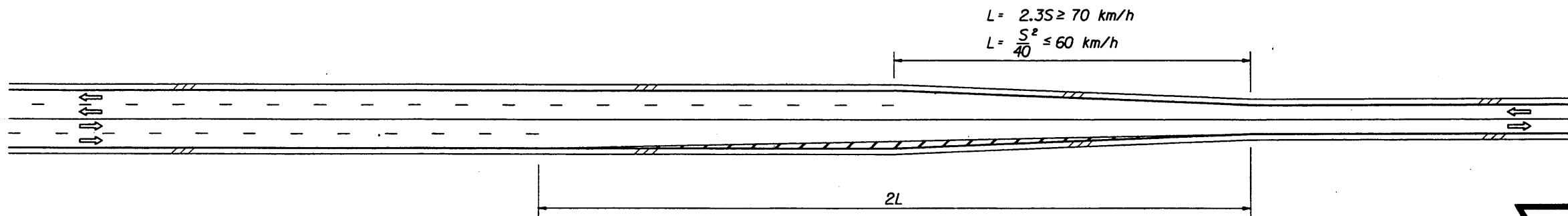
Names	Dates	Approved By
Designed By RER/JVG	9/98	<i>[Signature]</i>
Drawn By JBM	9/98	State Roadway Design Engineer
Checked By RER/JVG	9/98	Revision 94
		Sheet No. 2 of 8
		Index No. 526



4-LANE DIVIDED TO 4-LANE UNDIVIDED



4-LANE DIVIDED TO 2-LANE UNDIVIDED

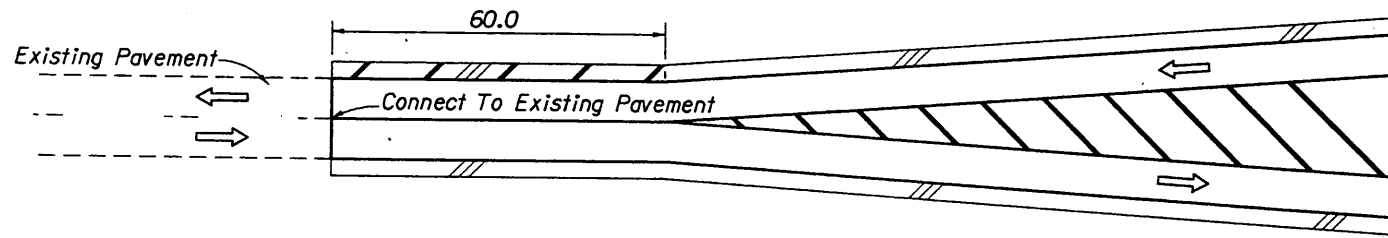


4-LANE UNDIVIDED TO 2-LANE UNDIVIDED

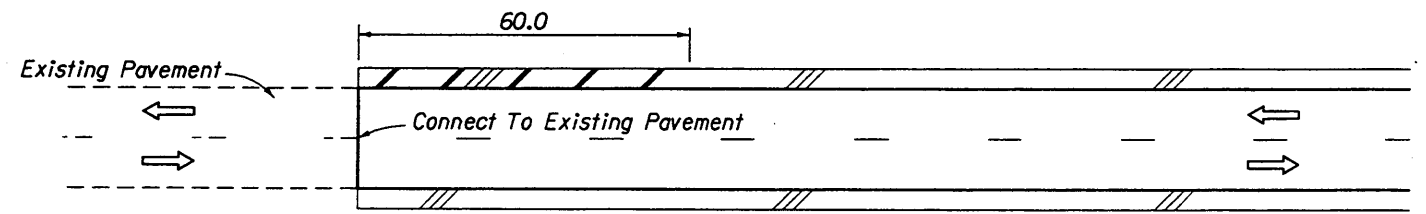
S = Design speed (km/h).

LANE DIVERGENCE AND CONVERGENCE FOR CENTERED ROADWAYS

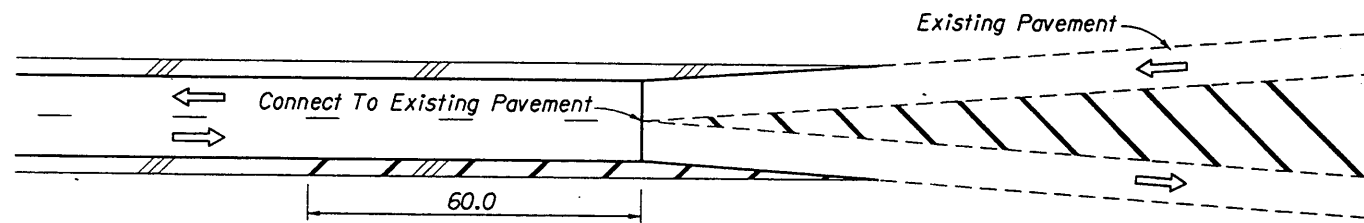
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>ROADWAY TRANSITIONS</b>					
Designed By	KRM	9/89	Approved By	<i>[Signature]</i>	
Drawn By	JRW	9/89	State Roadway Design Engineer	Revision	Sheet No.
Checked By	KRM/JVC	9/89	94	3 of 8	526



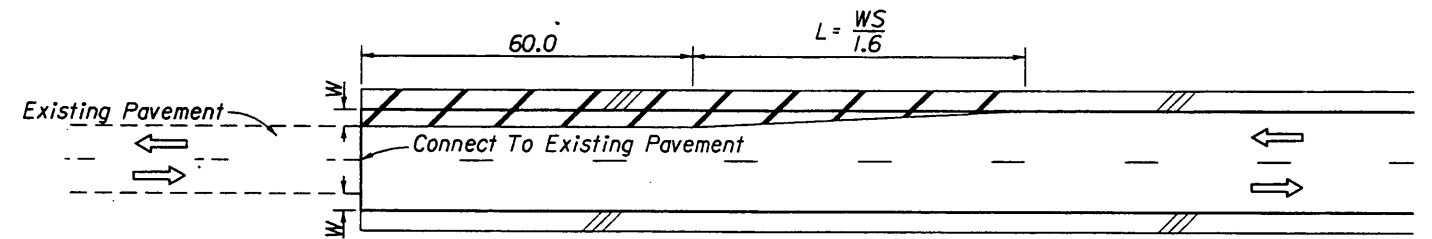
**CONNECTING FLARE WITH PAVED SHOULDERS TO EXISTING ROADWAY WITHOUT PAVED SHOULDERS**



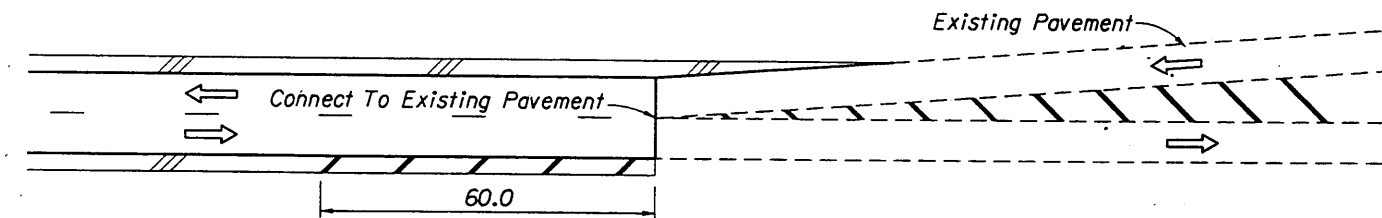
**CONNECTING SIMILAR WIDTH PAVEMENTS**



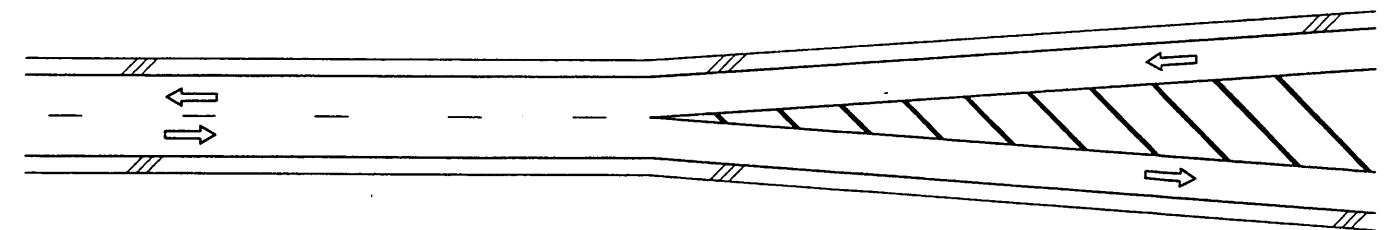
**CONNECTING ROADWAY WITH PAVED SHOULDERS TO EXISTING SYMETRICAL FLARE WITHOUT PAVED SHOULDERS**



**CONNECTING DIFFERENT WIDTH PAVEMENTS**



**CONNECTING ROADWAY WITH PAVED SHOULDERS TO EXISTING ASYMETRICAL FLARE WITHOUT PAVED SHOULDERS**



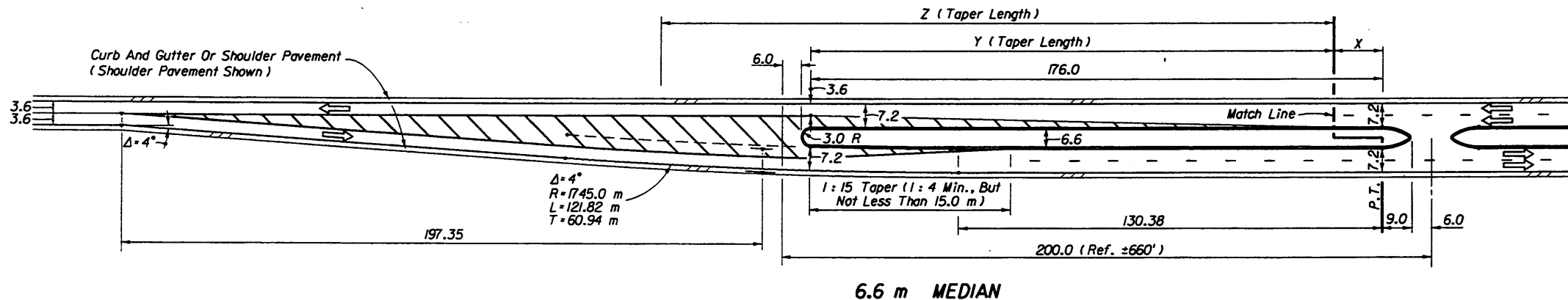
**FLARED - PAVED SHOULDERS**

$S = \text{Design speed (km/h)}$

**PAVED SHOULDER TREATMENT AT TRANSITIONS AND CONNECTIONS**

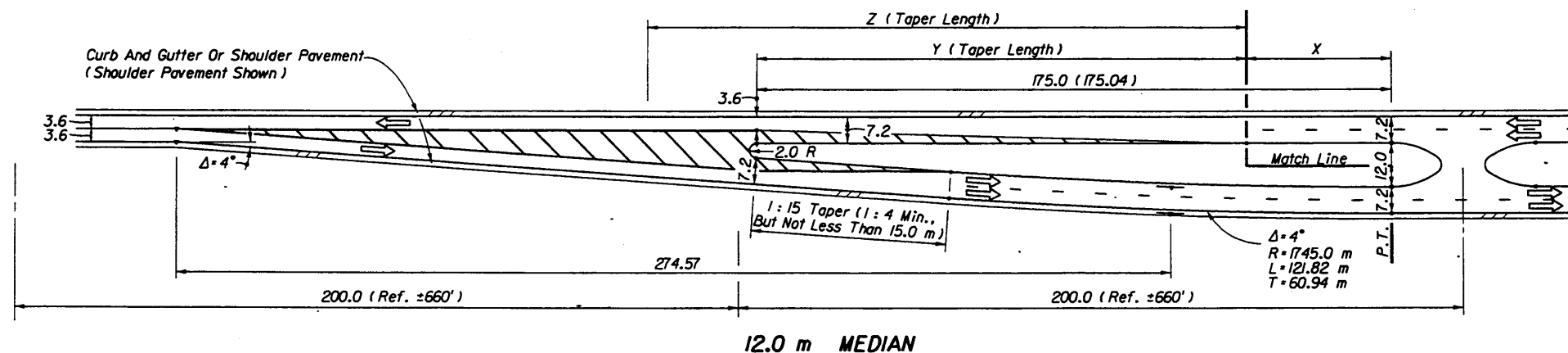
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>ROADWAY TRANSITIONS</b>				
Designed By	KRW	9/89	Approved By <i>[Signature]</i> State Roadway Design Engineer	
Drawn By	JBW	9/89	Revision	Sheet No.
Checked By	KRW/JVG	9/98	94	4 of 8
				526

6.6 m Median			
Design Speed (km/h)	X* (meters)	Y (meters)	Z (meters)
50	116.0	60.0	
60	86.0	90.0	
70	16.0	160.0	
80	15.0		180.0



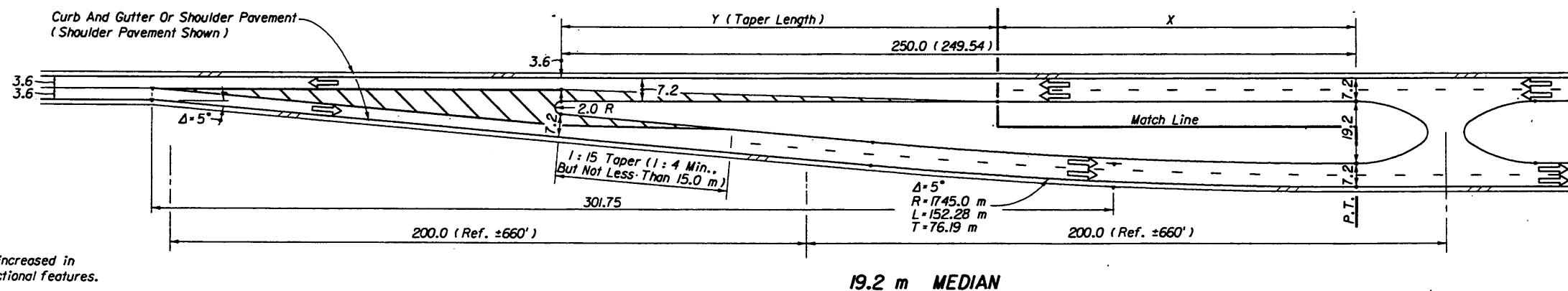
6.6 m MEDIAN

12.0 m Median			
Design Speed (km/h)	X* (meters)	Y (meters)	Z (meters)
50	115.0	60.0	
60	85.0	90.0	
70	15.0	160.0	
80	15.0		180.0



12.0 m MEDIAN

19.2 m Median		
Design Speed (km/h)	X* (meters)	Y (meters)
50	190.0	60.0
60	160.0	90.0
70	90.0	160.0
80	70.0	180.0



19.2 m MEDIAN

\* Dimension 'X' shall not be less than 15.0 m but can be increased in order to make this transitional geometry best fit subsectional features.

**NOTES FOR SHEETS 5 THRU 8**

- The transition geometry shown on sheets 5 thru 8 are applicable to tangent alignments and median widths shown. The geometrics of these schemes are associated with the standard subsectional spacing for side roads, but in any case will require modification to accommodate sideroad location, multilane and/or divided side roads, oblique sideroads, crossover widths, storage and speed change lane requirements, design speeds  $\geq 90$  km/h, and other related features. The match lines are cut lines where the transitions may be moved back on approach roadways and ahead on departing roadways to accommodate intermediate access connections, storage lanes and other related features.
- Approach lane departures ( $\Delta = 5^\circ$ ) are suitable for design speeds up to 80 km/h. Interior curves ( $R = 1745.0$ ) are suitable for normal crown for design speeds up to 80 km/h. Merging curves ( $R \leq 350.0$ ) will require superelevation.

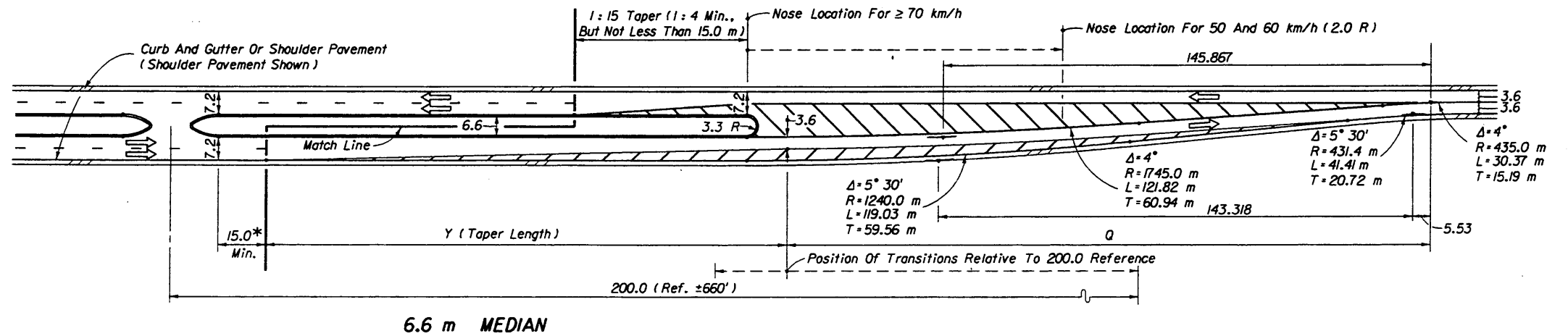
**LEFT ROADWAY CENTERED ON APPROACH ROADWAY  
TWO LANE TO FOUR LANE TRANSITION**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

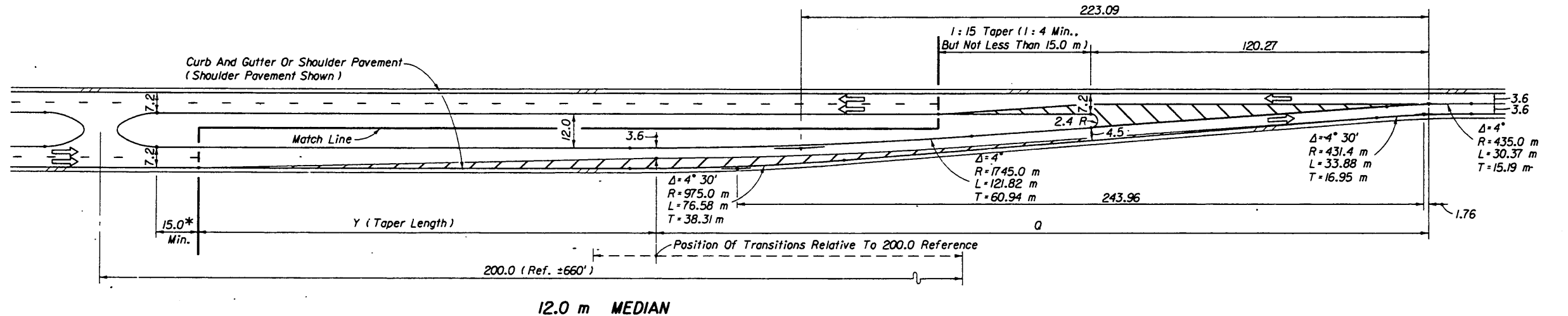
**ROADWAY TRANSITIONS**

Names	Dates	Approved By	State Roadway Design Engineer
Designed By	ZKH 9/89	[Signature]	
Drawn By	ZKH 2/94	Revision	Sheet No. Index No.
Checked By	JVG 2/94	96	5 of 8 526

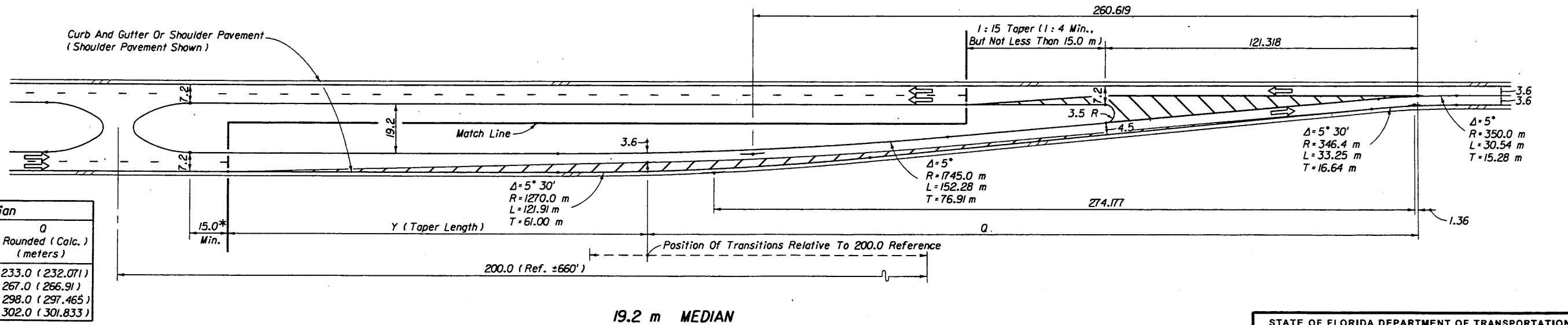
6.6 m Median		
Design Speed (km/h)	Y Rounded (Calc.) (meters)	Q Rounded (Calc.) (meters)
50	113.0 (112.311)	103.0 (102.07)
60	125.0 (124.925)	137.0 (136.914)
70	180.0 (179.644)	168.0 (167.469)
80	198.0 (197.50)	172.0 (171.837)



12.0 m Median		
Design Speed (km/h)	Y Rounded (Calc.) (meters)	Q Rounded (Calc.) (meters)
50	113.0 (112.317)	180.0 (179.298)
60	125.0 (124.925)	215.0 (214.137)
70	180.0 (179.644)	245.0 (244.691)
80	196.0 (195.50)	250.0 (249.06)



19.2 m Median		
Design Speed (km/h)	Y Rounded (Calc.) (meters)	Q Rounded (Calc.) (meters)
50	113.0 (112.317)	233.0 (232.071)
60	125.0 (124.925)	267.0 (266.91)
70	180.0 (179.644)	298.0 (297.465)
80	198.0 (197.50)	302.0 (301.833)

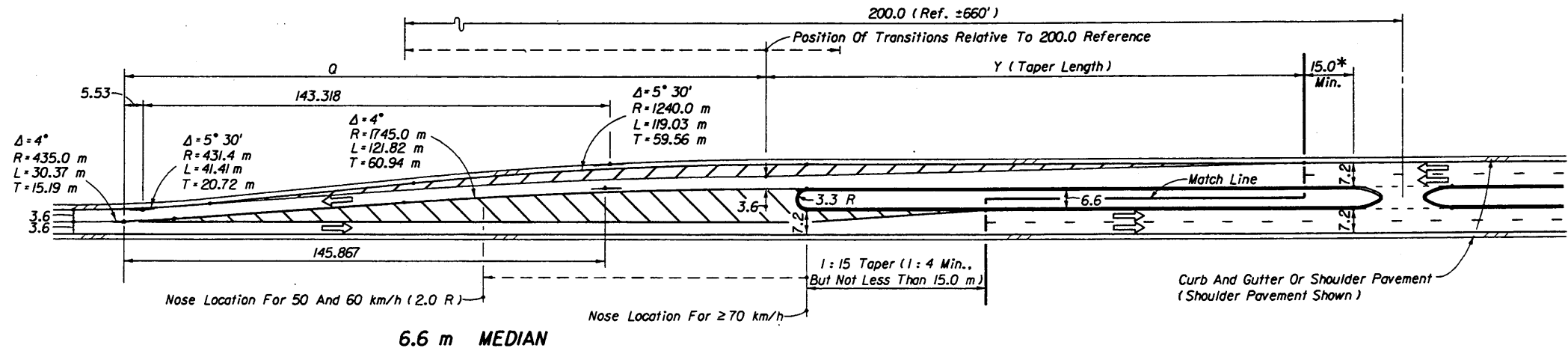


\* This value can be increased in order to make this transitional geometry best fit subsectional features, see note 1 on sheet 5.

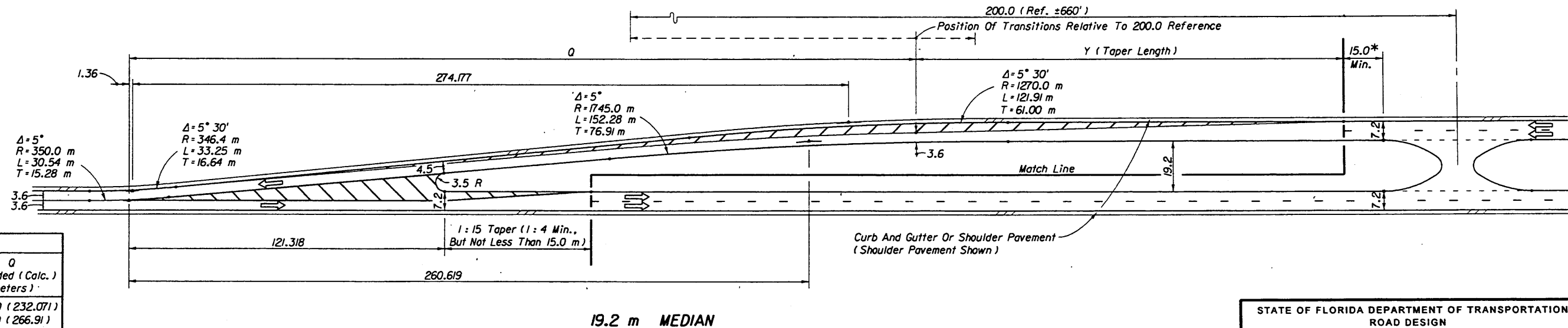
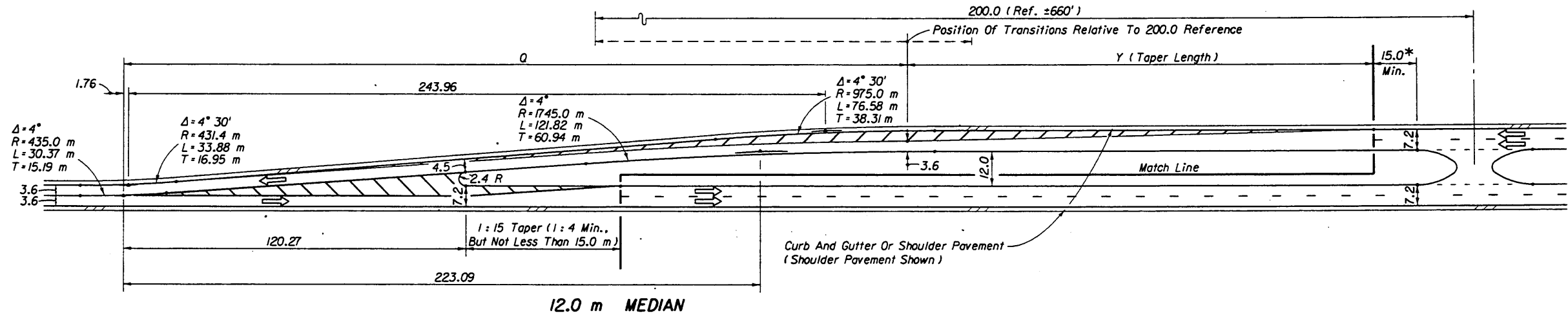
LEFT ROADWAY CENTERED ON THRU ROADWAY  
FOUR LANE TO TWO LANE TRANSITION

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
ROADWAY TRANSITIONS				
Names	Dates	Approved By		
Designed By	JRH 9/89	[Signature]		
Drawn By	EXE 2/94	State Roadway Design Engineer		
Checked By	JVG 2/94	Revision	Sheet No.	Index No.
		96	6 of 8	526

6.6 m Median		
Design Speed (km/h)	Y Rounded (Calc.) (meters)	Q Rounded (Calc.) (meters)
50	113.0 (112.317)	103.0 (102.07)
60	125.0 (124.925)	137.0 (136.914)
70	180.0 (179.644)	168.0 (167.469)
80	198.0 (197.50)	172.0 (171.837)



12.0 m Median		
Design Speed (km/h)	Y Rounded (Calc.) (meters)	Q Rounded (Calc.) (meters)
50	113.0 (112.317)	180.0 (179.298)
60	125.0 (124.925)	215.0 (214.137)
70	180.0 (179.644)	245.0 (244.691)
80	196.0 (195.50)	250.0 (249.06)



19.2 m Median		
Design Speed (km/h)	Y Rounded (Calc.) (meters)	Q Rounded (Calc.) (meters)
50	113.0 (112.317)	233.0 (232.071)
60	125.0 (124.925)	267.0 (266.91)
70	180.0 (179.644)	298.0 (297.465)
80	198.0 (197.50)	302.0 (301.833)

**RIGHT ROADWAY CENTERED ON APPROACH ROADWAY  
TWO LANE TO FOUR LANE TRANSITION**

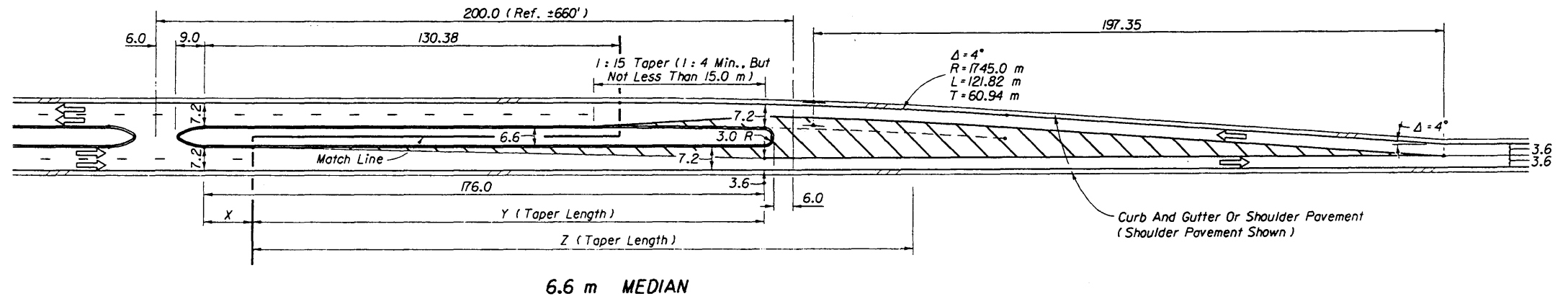
\* This value can be increased in order to make this transitional geometry best fit subsectional features, see note 1 on sheet 5.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

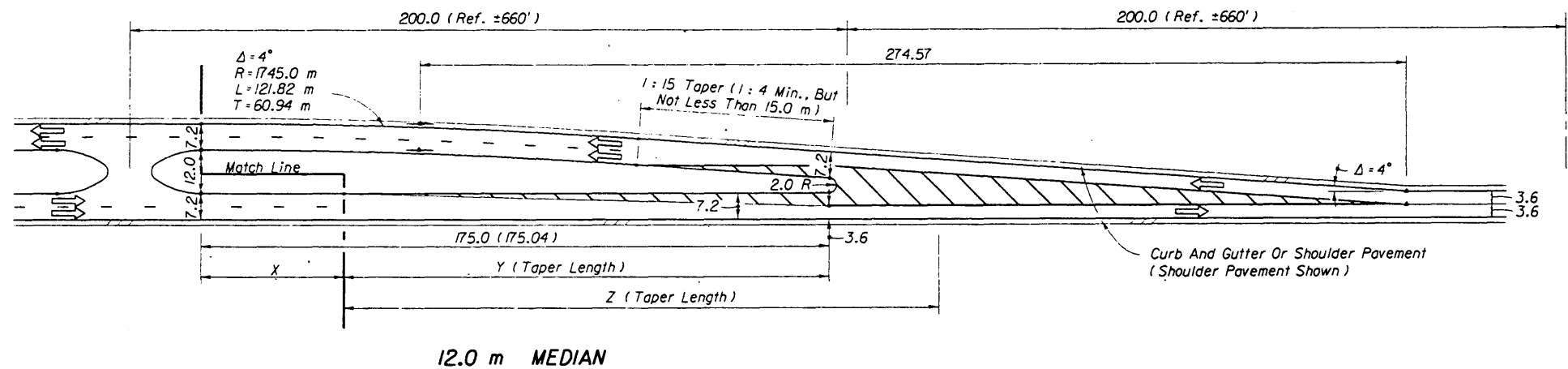
**ROADWAY TRANSITIONS**

Names	Dates	Approved By
Designed By: RWB	9/89	[Signature]
Drawn By: HKE	2/94	State Roadway Design Engineer
Checked By: JVG	2/94	Revision: 96
		Sheet No. 7 of 8
		Index No. 526

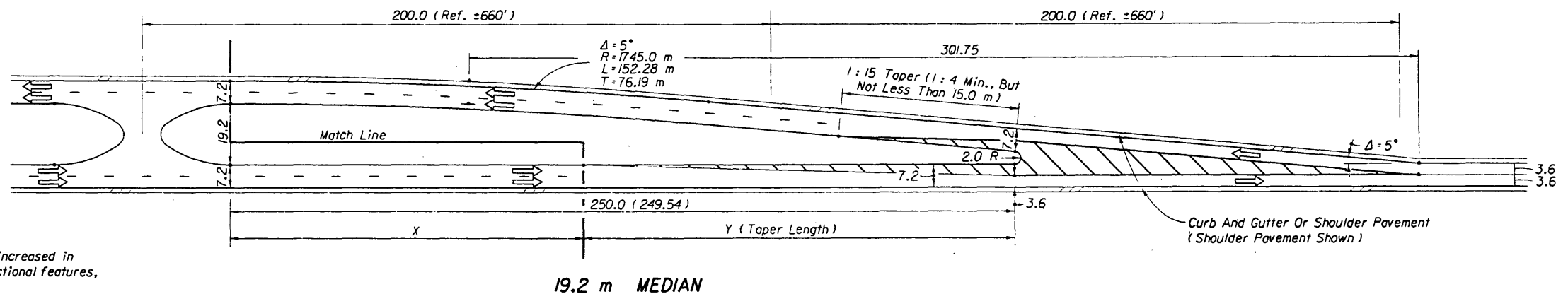
6.6 m Median			
Design Speed (km/h)	x* (meters)	y (meters)	z (meters)
50	116.0	60.0	
60	86.0	90.0	
70	16.0	160.0	
80	15.0		180.0



12.0 m Median			
Design Speed (km/h)	x* (meters)	y (meters)	z (meters)
50	115.0	60.0	
60	85.0	90.0	
70	15.0	160.0	
80	15.0		180.0



19.2 m Median			
Design Speed (km/h)	x* (meters)	y (meters)	z (meters)
50	190.0	60.0	
60	160.0	90.0	
70	90.0	160.0	
80	70.0	180.0	



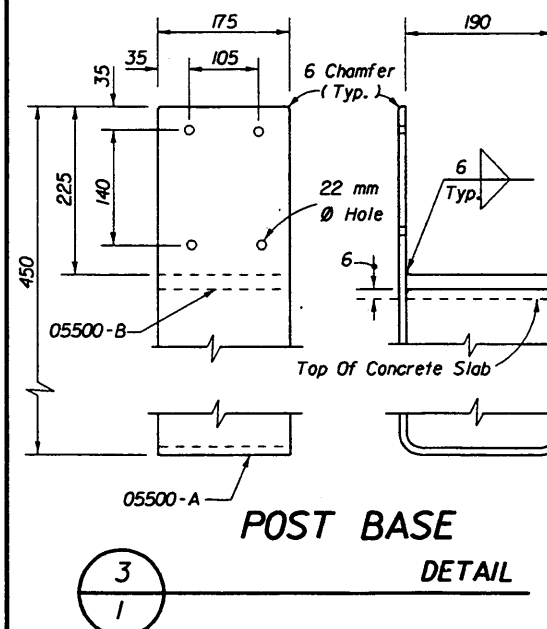
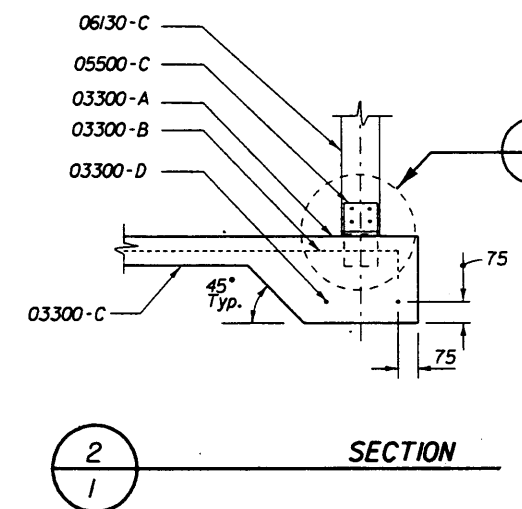
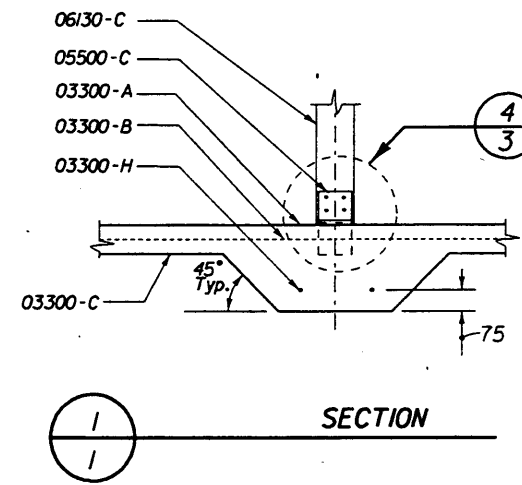
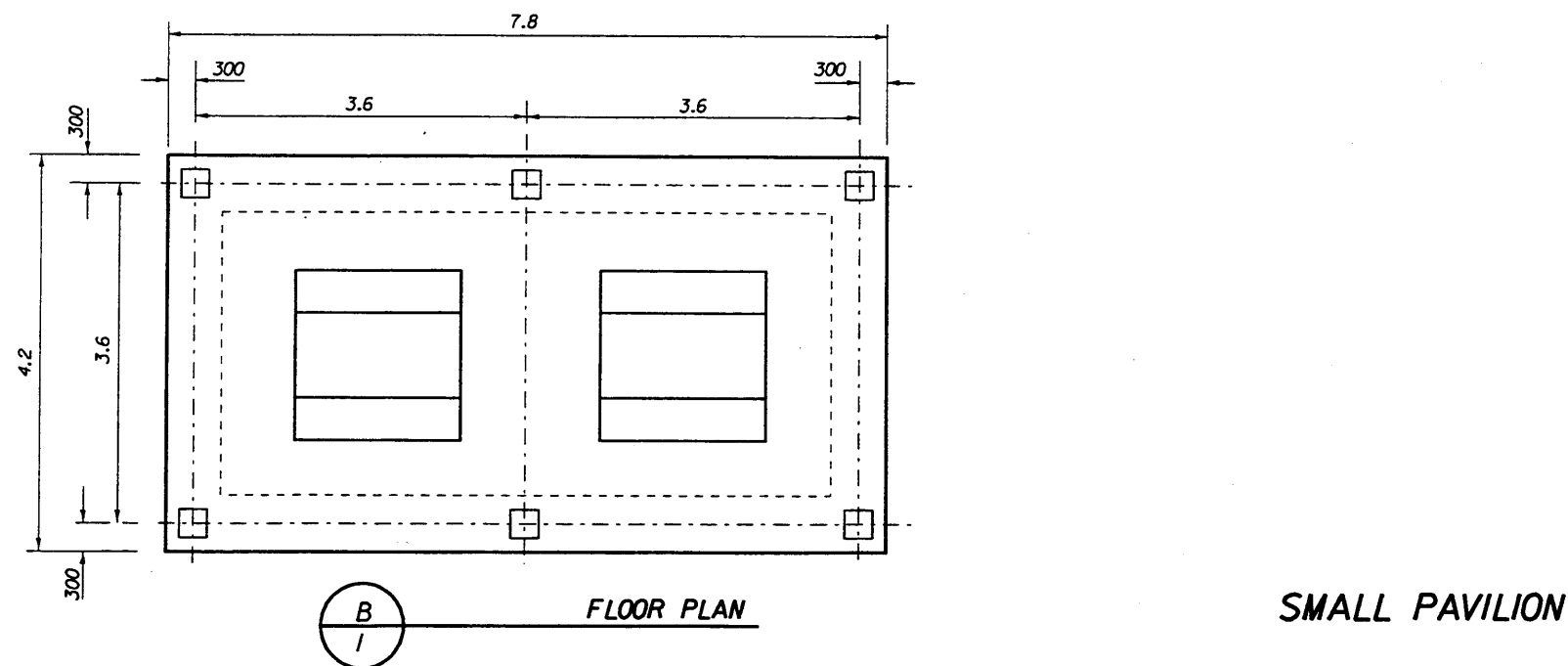
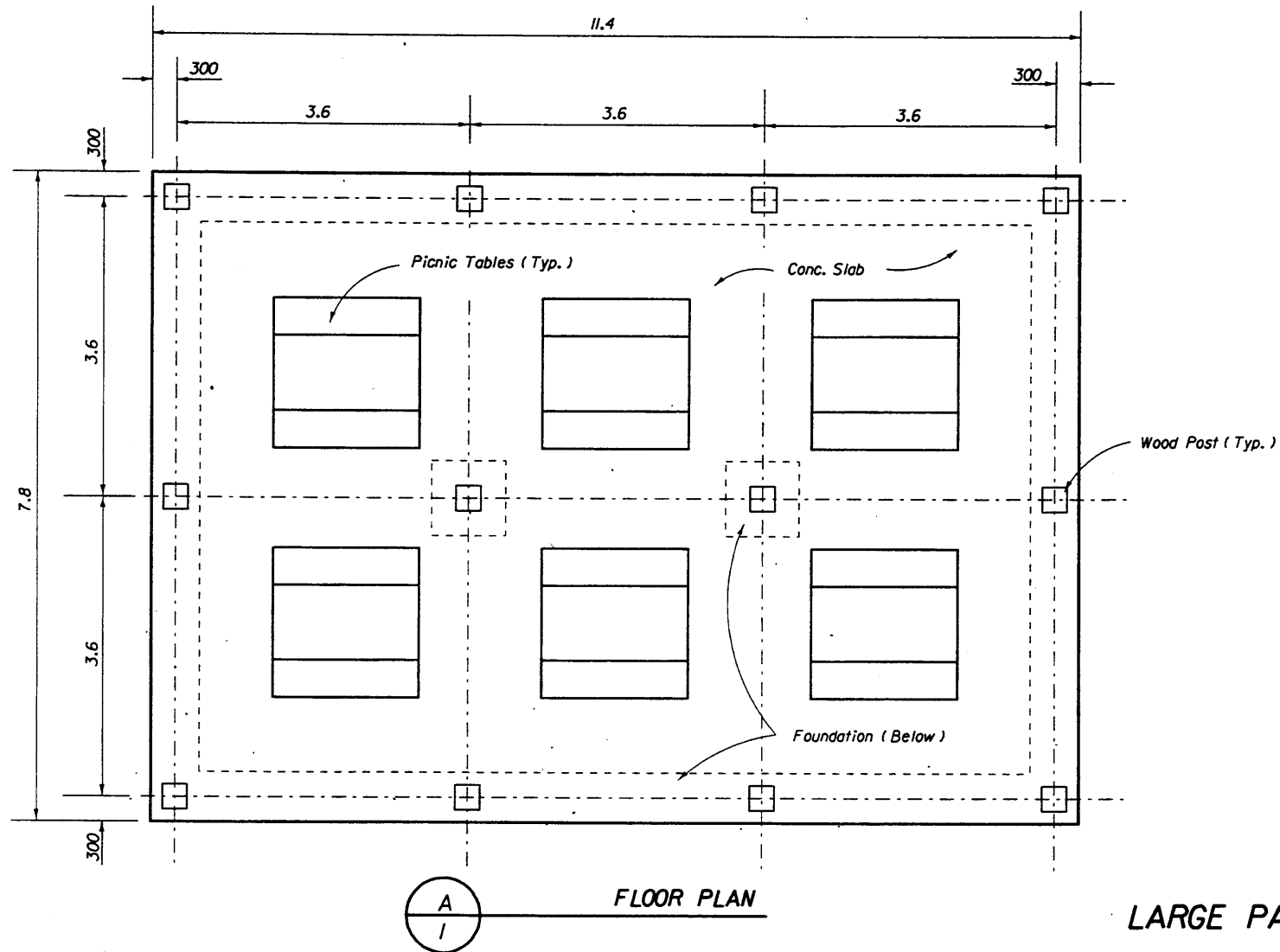
\* Dimension 'x' shall not be less than 15.0 m but can be increased in order to make this transitional geometry best fit subsectional features, see note 1 on sheet 5.

RIGHT ROADWAY CENTERED ON THRU ROADWAY  
FOUR LANE TO TWO LANE TRANSITION

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

ROADWAY TRANSITIONS

Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By	KWH	9/89			
Drawn By	EXH	2/94			
Checked By	JVC	2/94	96	8 of 8	526



**NOTES**

Keynotes On Sheet 2.

**FLOOR**

150 mm Reinf. Concrete Slab  
w/WWF150 mm x 150 mm-W1.4 x W1.4

450 mm x 450 mm Drop Footing At Slab  
Perimeter & Interior Posts.

Harden & Broom Finish Slab Surface.

**STRUCTURE**

Posts: 200 mm x 200 mm PT

Beams: 100 mm x 150 mm PT

Framing: 100 mm x 100 mm PT As Described.

Misc Members: 50 mm x 100 mm As Described.

**ROOF**

75 mm T&G Wood Decking.

Type II Asphalt-Saturated Organic Felt  
(1270 g/m<sup>2</sup>) (Commonly Called No. 30).

Standing Seam Metal Roof (24 GA Steel  
Or 1 mm Alum.) w/ Kynar 500 Finish.

Structure, Decking And Roofing Shall  
Withstand 210 km/h Wind Load.

**BUILDING CODE**

Picnic Pavilions Shall Be Constructed According  
To The Requirements Of The Appropriate Sections  
Of Applicable "Standard Building Code" or "South  
Florida Building Code", Current, Adopted Edition.

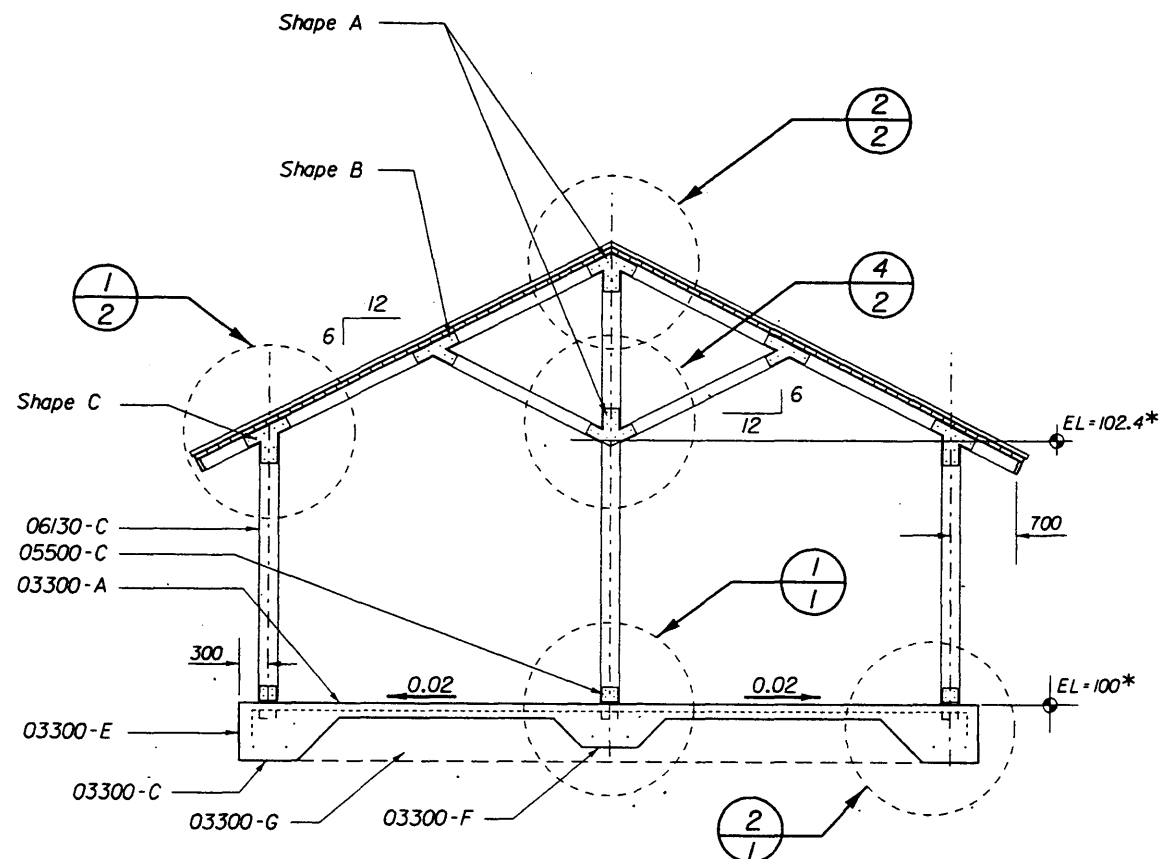
**PICNIC PAVILIONS**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**REST AREA EQUIPMENT**

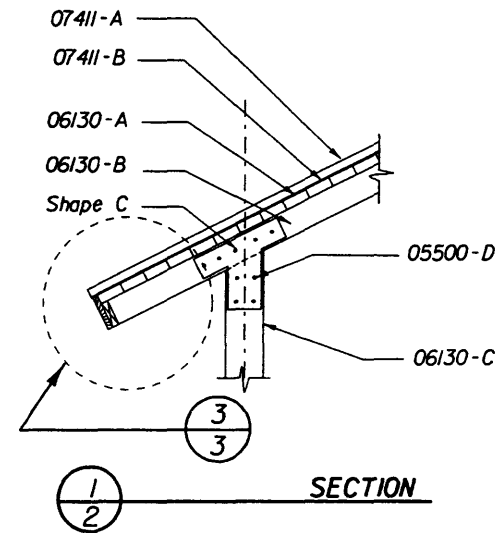
	Names	Dates	Approved By
Designed By	HDP	6/93	<i>[Signature]</i> State Roadway Design Engineer
Drawn By	HDP	6/95	Revision
Checked By	ABK	9/95	94
			Sheet No. 1 of 3
			Index No. 530



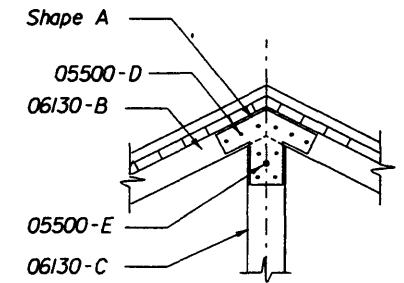


\* REFERENCE ELEVATION ONLY

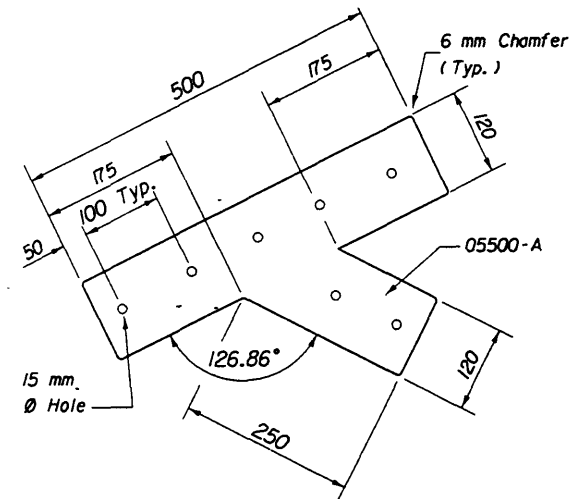
**SECTION A**



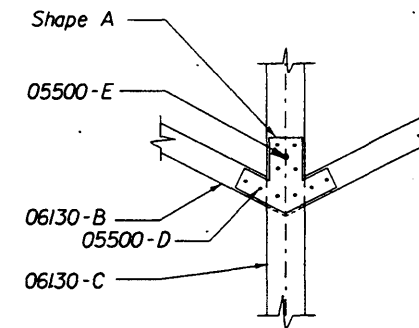
**SECTION 1/2**



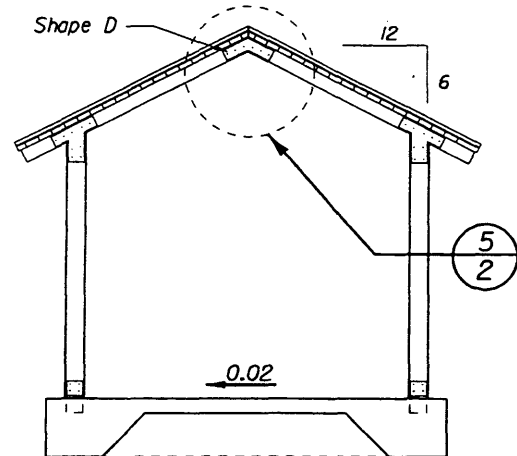
**SECTION 2/2**



**SHAPE B DETAIL 3/2**

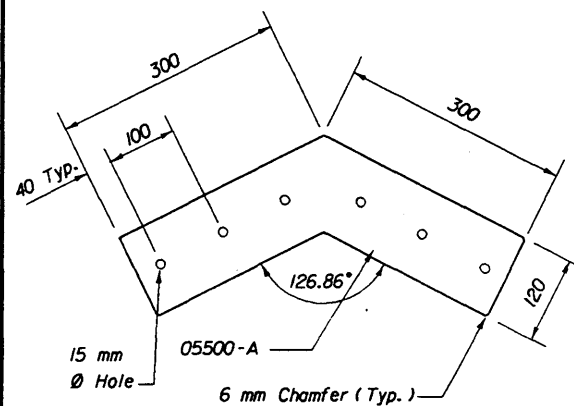


**SECTION 4/2**

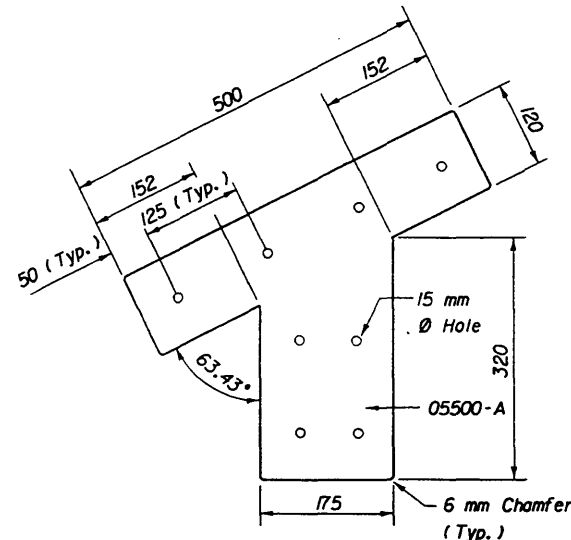


NOTE: DETAILS TO MATCH THOSE OF LARGE PICNIC PAVILION

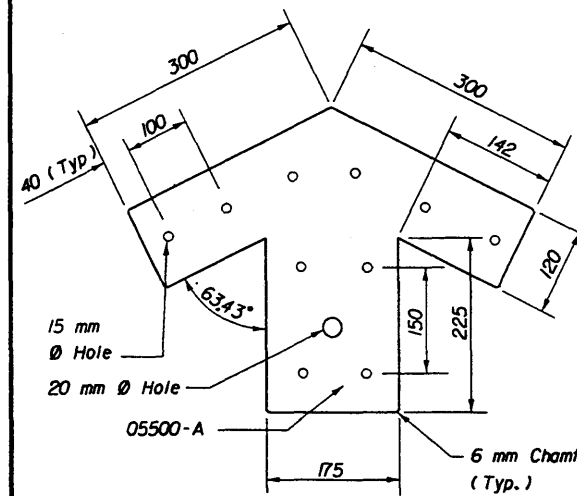
**SECTION B**



**SHAPE D DETAIL 5/2**



**SHAPE C DETAIL 6/2**



**SHAPE A DETAIL 7/2**

**KEYNOTES**

- 03300-A Class II Conc Slab
- 03300-B 150 mm x 150 mm-WI.4 x WI.4  
Ø of Slab
- 03300-C 6 Mil Vapor Barrier
- 03300-D #16 Rebar Cont. (2 Required)
- 03300-E 600 mm x 600 mm Drop Footing
- 03300-F 450 mm x 450 mm Drop Footing
- 03300-G 150 mm Min Comp Sand Fill
- 03300-H #16 x 450 mm Rebar (4 Required)

- 05500-A 10 mm Galv. Steel Plate
- 05500-B 14 mm Galv. Steel Plate
- 05500-C Post Base
- 05500-D 14 mm Ø Bolt, Washer & Nut (Typ)
- 05500-E 19 mm Ø Eyebolt, Washer & Nut  
For Cross Brace Bars
- 05500-F 14 mm Ø Steel Rod w/Turnbuckle

- 06130-A 75 mm x 150 mm T&G Wood Decking
- 06130-B 100 mm x 150 mm PT Wood Frame
- 06130-C 200 mm x 200 mm PT Wood Post
- 06130-D 50 mm x 150 mm PT Wood Fascia
- 06130-E 25 mm x 250 mm PT Wood Fascia
- 06130-F 15 mm± Wood Shim

- 07411-A Standing Seam Metal Roof
- 07411-B Type II Asphalt-Saturated Organic Felt  
(1270 g/m²) (Commonly Called No. 30)

Alternate Material Note:  
These structures are shown with timber frames and decking. Alternate materials (ie. aluminum, steel, etc.) may be used when approved by the Engineer.

**PICNIC PAVILIONS**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**REST AREA EQUIPMENT**

Names	Dates	App'd By	Index No.
Designed By	EDP 6/93	[Signature]	530
Drawn By	EDP 9/95		
Checked By	ABK 9/95	Revision	Sheet No.
		98	2 of 3

**SPECIFICATIONS**

Keynotes On Sheet 2.

**CONCRETE**

Concrete: FDOT Class II.

Reinforcing Bars: ASTM A615/A615M, Grade 400.

Welded Wire Fabric: ASTM A-185.

Vapor Barrier: Black 6-Mil Polyethylene.

**STEEL**

Galvanized Steel Plate: Steel Plate ASTM A36M With A123M Zinc Coating.

Galvanized Fasteners: High-Strength Bolts And Nuts, ASTM A325M With Zinc Coating, ASTM A153.

Galvanize Shapes After Fabrication, Make Field Repairs To Galvanizing With High Zinc Dust Content Paint, Complying With SSPC-Paint-20.

**WOOD**

Comply With American Institute For Timber Construction AITC 108, "Standard For Heavy Timber Construction."

For Solid Wood Decking, Comply With AITC 112, Standard For Tongue And Groove Heavy Timber Standard."

Species: Douglas Fir, Hem-fir, Or Southern Pine, At Fabricator's Option.

Preservative Treatment: Pressure Treat Fabricated Members With Waterborne Solution For Above Ground Use, Complying With AWPA C2.

Wood Decking: Predrill Decking At 750 mm Centers For Lateral Spiking To Adjacent Units.

**PICNIC TABLES**

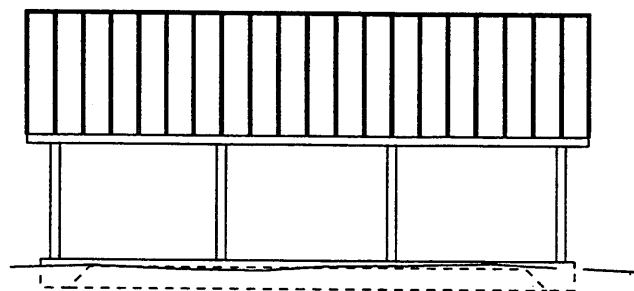
Picnic Tables And Benches Shall Be 1.8 m x 1.8 m w/Heavy Galvanized Pipe Frames And Recycled Plastic Wood Seats And Table Tops. All Tables Shall Be Of Walk Thru Design Suitable For Exterior Locations. Tables At Accessible Pavilions Shall Meet The Requirements Of The Americans With Disabilities Act (ADA) Accessibility Guidelines.

**PICNIC PAVILIONS**

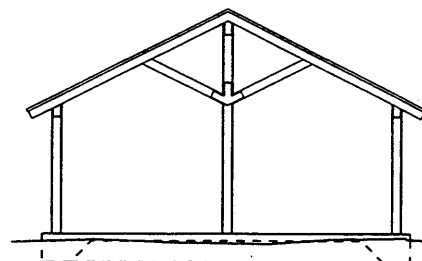
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**REST AREA EQUIPMENT**

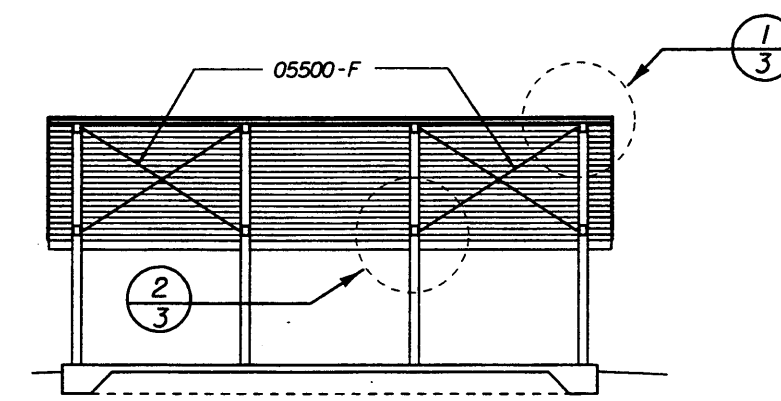
Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By	BDP	6/95			
Drawn By	BDP	9/95			
Checked By	ABK	9/95	98	3 of 3	530



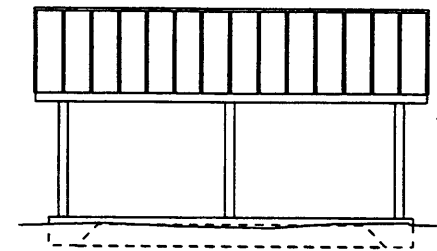
**A**  
3 SIDE ELEVATION



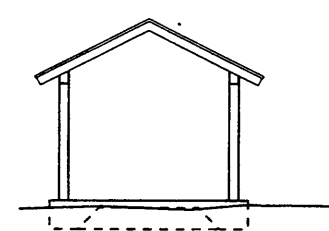
**B**  
3 END ELEVATION



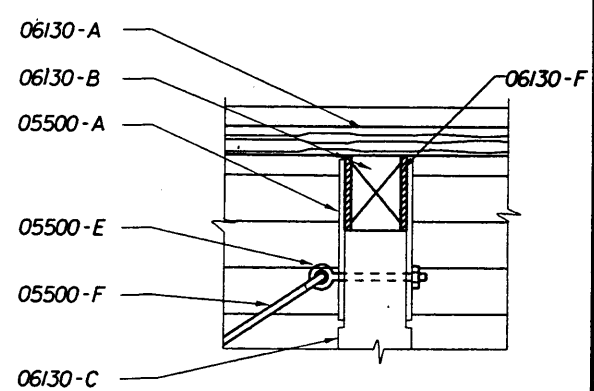
**C**  
3 SECTION



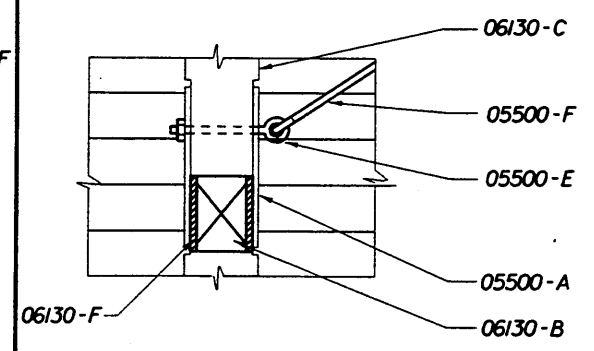
**D**  
3 SIDE ELEVATION



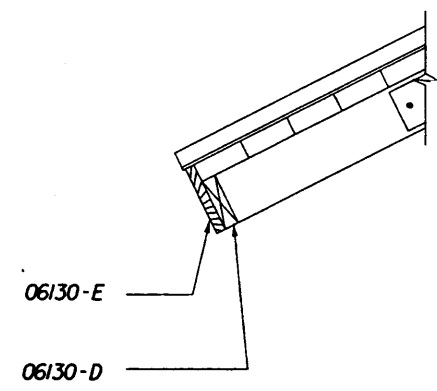
**E**  
3 END ELEVATION



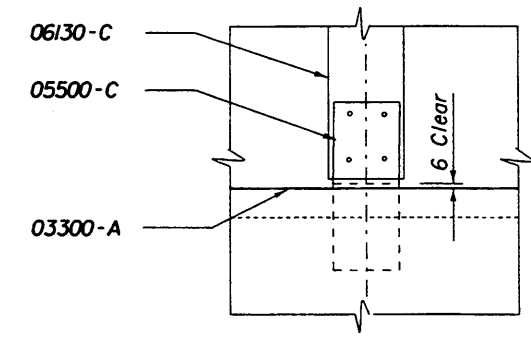
**1**  
3 DETAIL



**2**  
3 DETAIL



**3**  
3 DETAIL  
Similar At Roof Rake



**4**  
3 DETAIL

## GENERAL NOTES

1. The location and construction of mailboxes shall conform to the rules and regulations of the United States Postal Service as modified by this design standard.
2. Mailboxes will not be permitted on Interstate highways, freeways, or other highways where prohibited by law or regulation.
3. The contractor shall give the Postmaster of the delivery route(s) written notice of project construction 7 days prior to the beginning of work, with Saturdays, Sundays and Holidays excluded.

The Contractor shall furnish and install one mailbox in accordance with this design standard at each mail patron delivery location and maintain the box throughout the contract period. The Contractor shall apply box numbers to each patron box in accordance with identification specifications of the Domestic Mail Manual of the U. S. Postal Service; where local street names and house numbers are authorized by the Postmaster as a postal address, the Contractor shall inscribe the house number on the box; if the box is located on a different street from the patrons residence, the Contractor shall inscribe the street name and house number on the box.

The Contractor shall coordinate removal of the patrons existing mailboxes. Immediately after installing the new mailboxes the Contractor must notify each "Mail Delivery Patron" by Certified Mail that removal of the existing mailboxes must be accomplished in 21 days after receipt of notices. Patrons shall have the option of removing their existing mailboxes or leaving the mailboxes in place for removal by the Contractor; removal by the Contractor shall be included in the contract unit price for Mailbox. Each. The Contractor shall dispose of mailboxes and supports in areas provided by him.

Reuse of existing mailboxes by the Contractor will not be a requirement under any construction project; however where an existing mailbox meets the design requirements of this standard and is structurally and functionally sound, the Contractor at his option may elect to reuse the existing mailbox in lieu of constructing a new mailbox. Any use of existing mailboxes must be approved by the Engineer.

4. Mailboxes shall be metal construction only, in traditional style only, and only in Size I as prescribed by the Domestic Mail Manual of the U. S. Postal Service (DMM).

Mailbox production standards, lists of approved manufacturers and suppliers of mailboxes, design approval and guidance may be obtained by writing to the Rural Delivery Division, Delivery Service Department, Operations Group, USPS Headquarters, Washington, DC 20260.

5. Mailboxes shall be located on the right-hand side of the roadway in the direction of the delivery route, except on one-way roads and streets where they may be placed on the left-hand side.

Mailboxes on rural highways shall be set with the roadside face of the box offset from the edge of the traveled way a minimum distance of the greater of the following:

- (a) Shoulder width plus 200 to 300 mm.
- (b) 3.0 m for ADT over 10,000 vpd.  
2.4 m for ADT 100 to 10,000 vpd.  
1.8 m for ADT under 100 vpd.  
0.8 m for low speed and ADT under 100 vpd.

When a mailbox is installed within the limits of guardrail it should be placed behind the guardrail whenever practical.

Mailboxes on curbed highways, roads and streets shall be set with the face of the box between 150 mm and 300 mm back of the face of curb. If the sidewalk abuts the curb or if an unusual condition exists which makes it difficult or impractical to install or serve boxes at the curb, the Contractor with concurrence of the local postal authority may be permitted to install all mailboxes at the back edge of the sidewalk, where they can be served by the carrier from the sidewalk.

6. Mailboxes shall be set with the bottom of the box between 1.0 m and 1.2 m above the mail stop surface, unless the U.S. Postal Service establishes other height restrictions.

7. No more than two mailboxes may be mounted on a support structure unless the support structure and mailbox arrangements have been shown to be safe by crash testing and approved by the State Design Engineer, Roadways.

Neighborhood Delivery and Collection Box Units (NDCBU) are a specialized multiple mailbox installation that must be located outside the highway and street clear zones. The location of NDCBUs is the sole responsibility of the Postmaster for the delivery route under consideration.

8. Lightweight newspaper receptacles may be mounted below the mailbox on the side of the support post in conformance with the USPS Domestic Mail Manual. The mail patron shall be responsible for newspaper receptacle installation and maintenance.

9. Wood and steel support posts for both single and double mailbox mountings shall be embedded no more than 600 mm into the ground.

Concrete, block, brick, stone or other rigid foundation structure or encasement, either above or below the shoulder groundline, will not be permitted for mailboxes on rural highways. On urban roads and streets where mailbox support posts are set within rigid pavement back of curb, the support posts shall be separated from the pavement by a minimum of 25 mm of expansion material.

Support posts shall not be fitted nor installed with surface mount base plates.

10. At driveway entrances mailboxes shall be placed on the far side of the driveway in the direction of the delivery route.

At intersecting roads mailboxes shall be located 30.0 m or more from the centerline of the intersecting road on the far side in the direction of the delivery route, with the distance increased to 60.0 m when the route volume exceeds 400 vehicles per day.

11. Wood support posts shall be in conformance with the material and dimensional requirements of Section 952 and the treatment requirements of Section 955 of the Standard Specifications.

Steel support posts shall have an external finish equal to or better than two coats of weather resistant, air dried or baked, paint or enamel. Surfaces(s) shall be cleaned of all loose scale prior to finishing. The Postal Service prefers that posts be painted white, but other colors may be used when approved by the Engineer. When galvanized posts are used painting is not required.

Mounting brackets, plates, platforms, shelves and accessory hardware surface finishes are to be suited to support post finish.

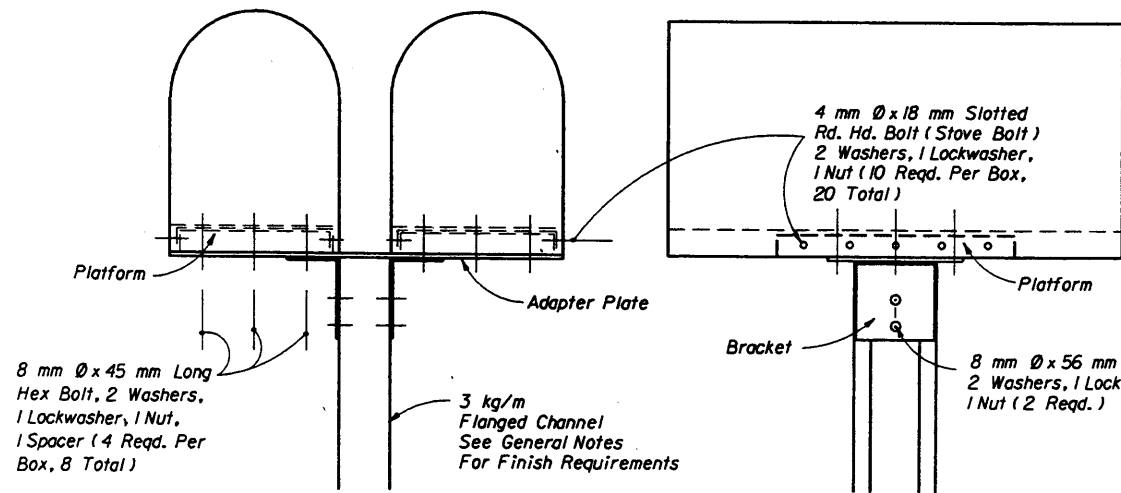
12. Mailboxes shall be paid for under the contract unit price for Mailboxes, EA. Payment shall be full compensation for boxes, posts and accessory items essential for installation in accordance with this standard; erection; adjustments to suit construction needs; and, for identification letters and numbers.

Payment shall be limited to one mailbox per patron address whether the mailbox is new, reused, salvaged, reset or relocated. Payment shall be per mailbox regardless of the number of mailboxes per support or grouping arrangement.

The above compensation shall include any work and cost incurred by the contractor for removal and disposal of existing mailboxes.

There shall be no payment participation for NDCBU furnishing, assembly, installation, resetting or relocation.

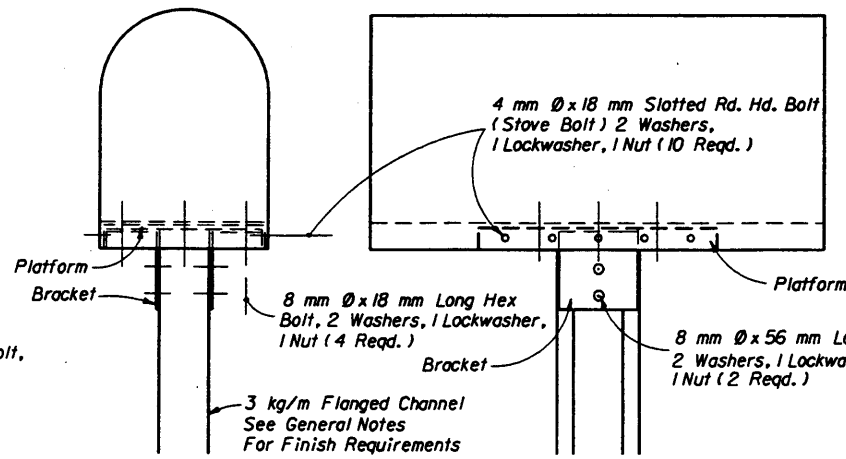
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
MAILBOXES				
Name	Date	Approved By		
Designed By		State Roadway Design Engineer		
Drawn By	BSD	Revision	Sheet No.	Index No.
Checked By	JVG/JBW	94	1 of 3	532



FRONT VIEW

SIDE VIEW

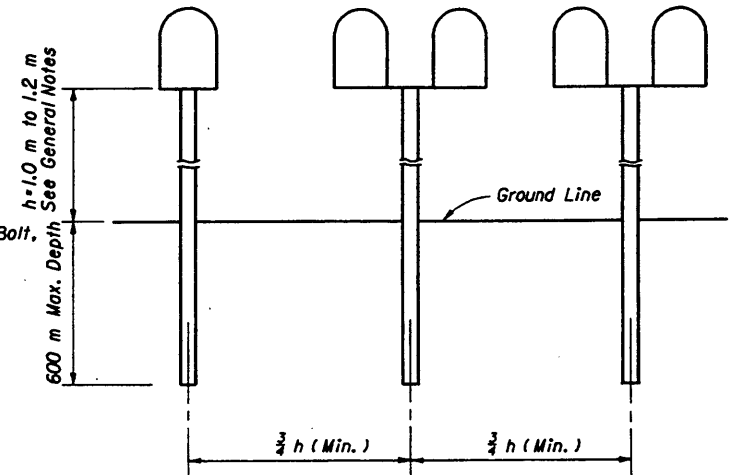
FLANGED CHANNEL



FRONT VIEW

SIDE VIEW

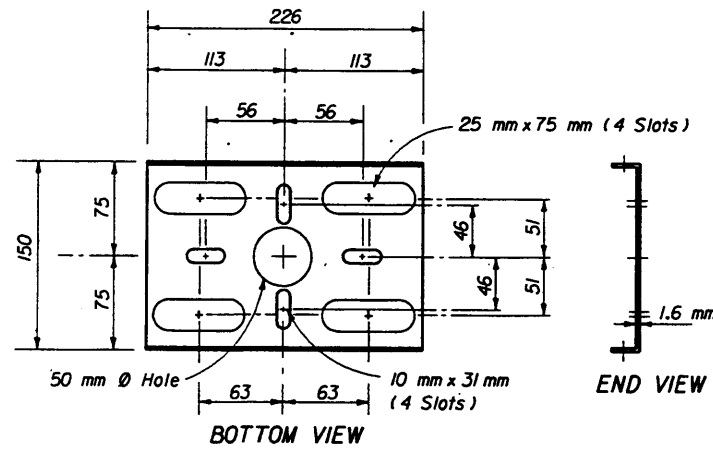
FLANGED CHANNEL



ELEVATION

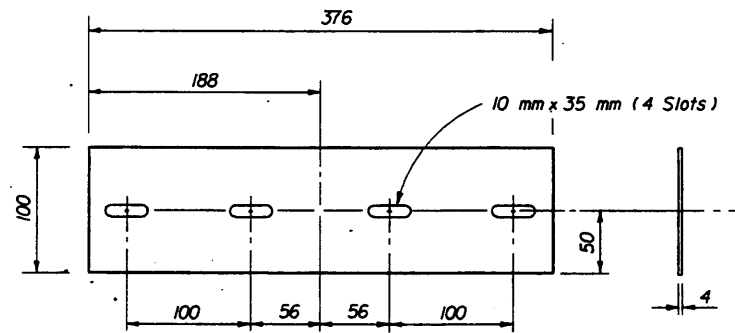
SINGLE OR COMBINED WOOD, FLANGED CHANNEL OR PIPE POST TYPES SHOWN ON THIS INDEX

POST SPACING



BOTTOM VIEW

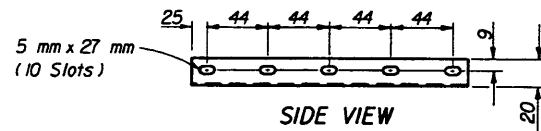
END VIEW



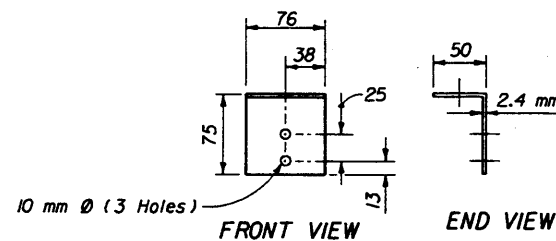
TOP VIEW

END VIEW

STEEL ADAPTER PLATE



STEEL PLATFORM

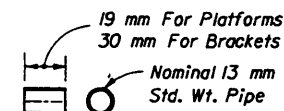


FRONT VIEW

END VIEW

TOP VIEW

STEEL BRACKET



STEEL SPACER

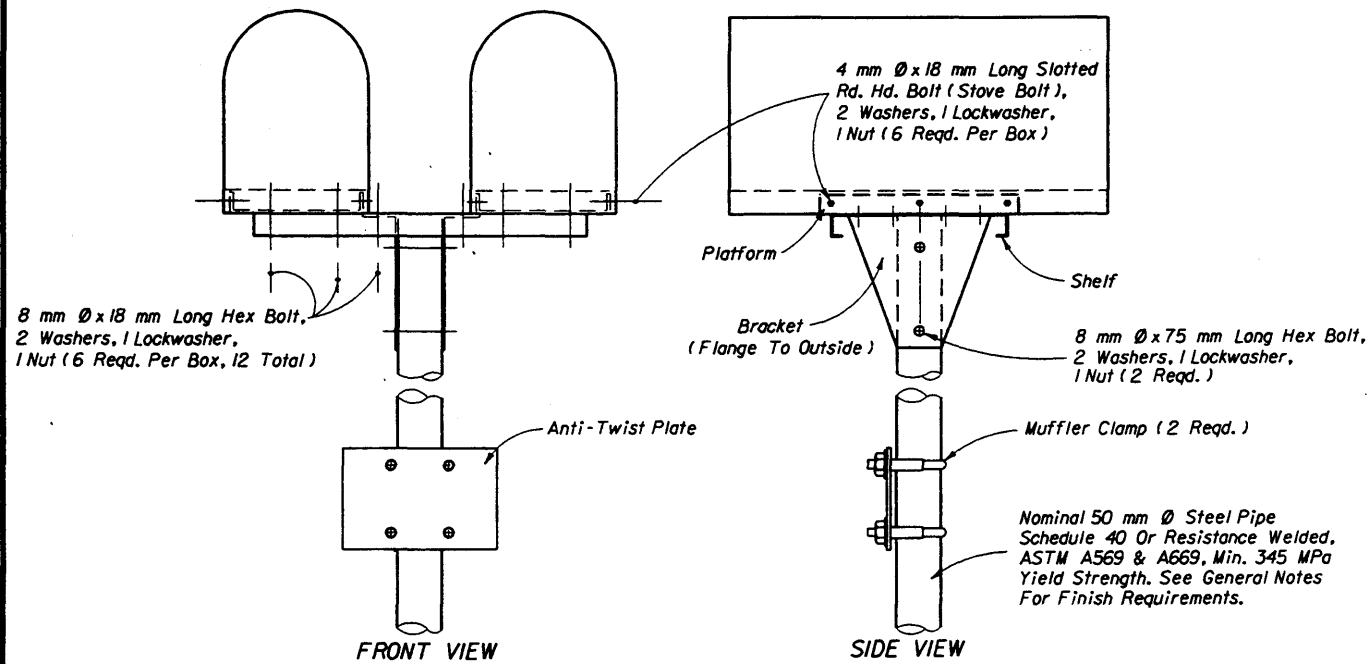
Note: See General Notes for finish requirements.

STEEL FLANGED CHANNEL SUPPORT POSTS

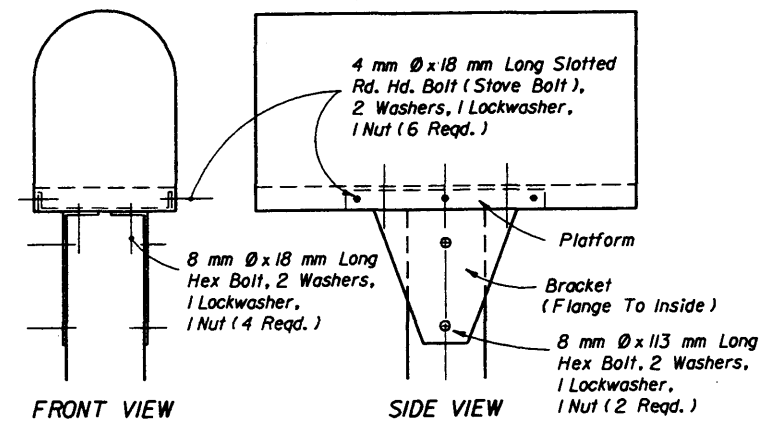
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

MAILBOXES

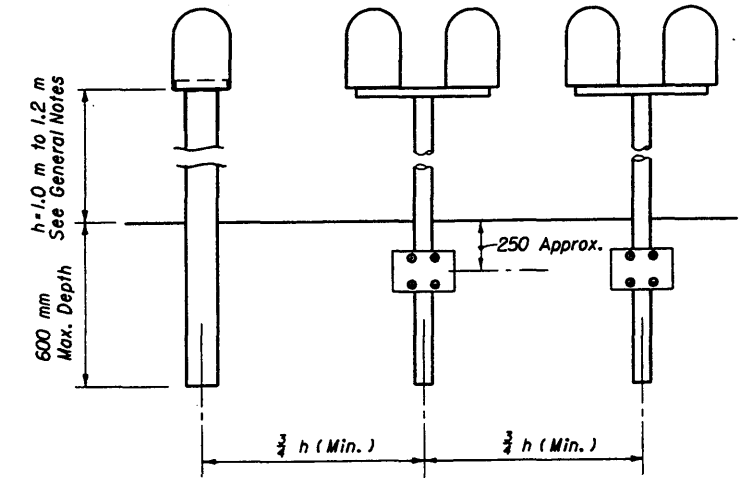
Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By		<i>[Signature]</i>			
Drawn By	BSD 7/87				
Checked By	JVG/JBN 7/87		94	2 of 3	532



50 mm PIPE POST

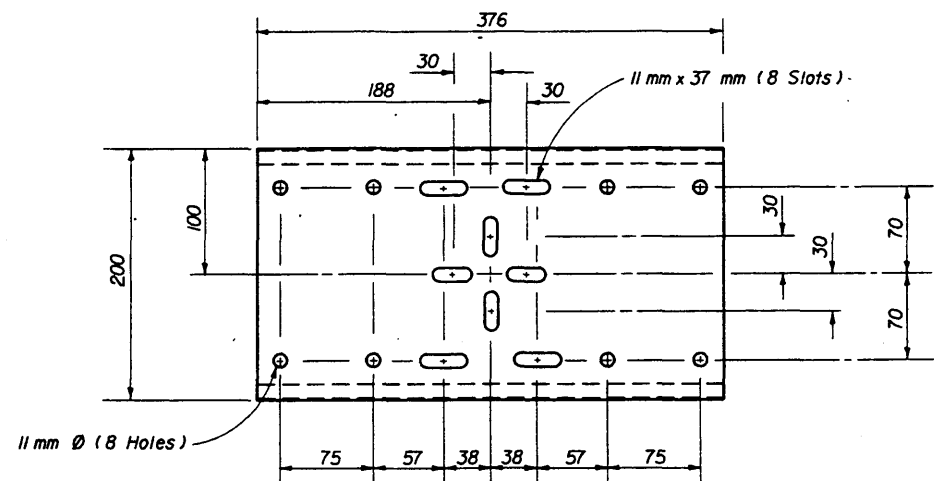


100 mm x 100 mm WOOD POST

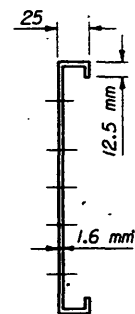


ELEVATION

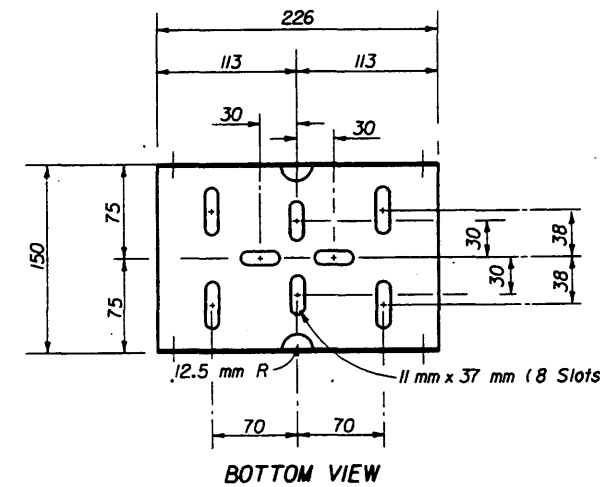
SINGLE OR COMBINED WOOD, FLANGED CHANNEL OR PIPE POST TYPES SHOWN ON THIS INDEX  
POST SPACING



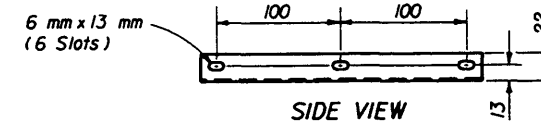
TOP VIEW  
STEEL SHELF



END VIEW

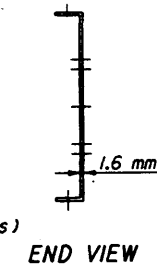


BOTTOM VIEW



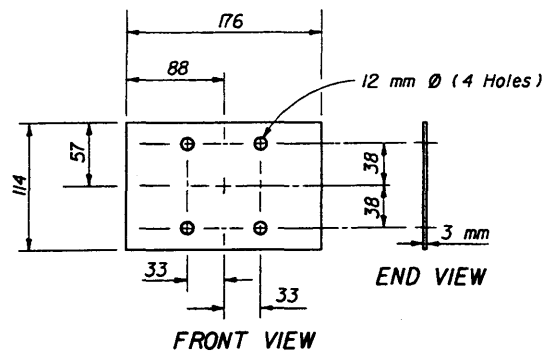
SIDE VIEW

STEEL PLATFORM

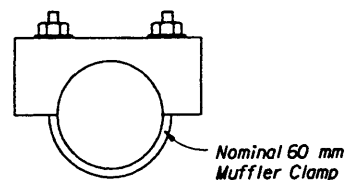


END VIEW

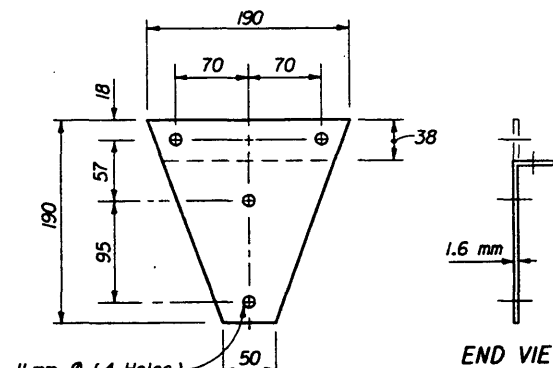
Note: See General Notes for finish requirements



STEEL ANTI-TWIST PLATE



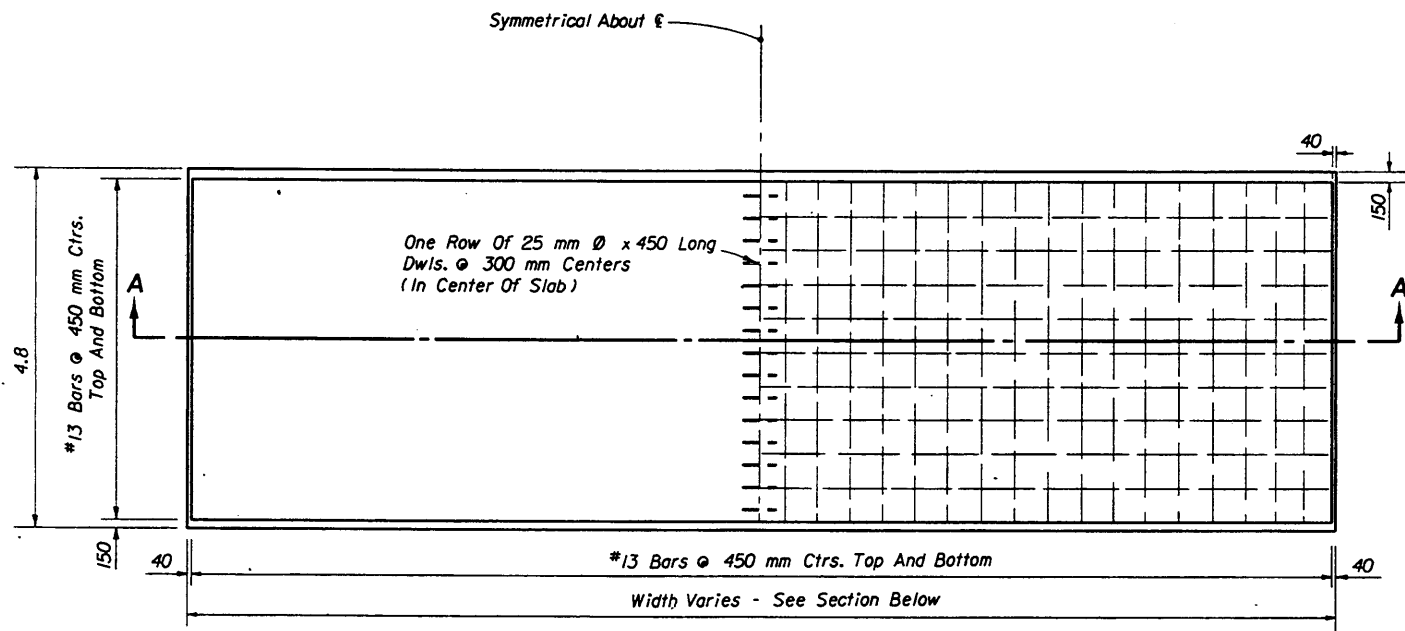
STEEL CLAMP



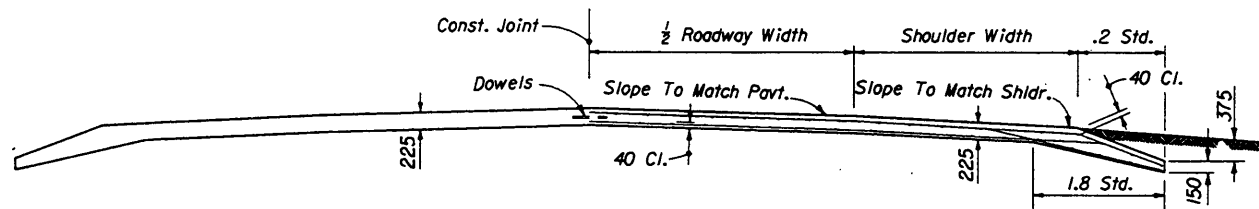
STEEL BRACKET

STEEL PIPE AND WOOD SUPPORT POSTS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
MAILBOXES				
Names	Dates	Approved By		
Designed By		[Signature]		
Drawn By	EJD 7/87	Revision	Sheet No.	Index No.
Checked By	JVG/JBW 7/87	94	3 of 3	532



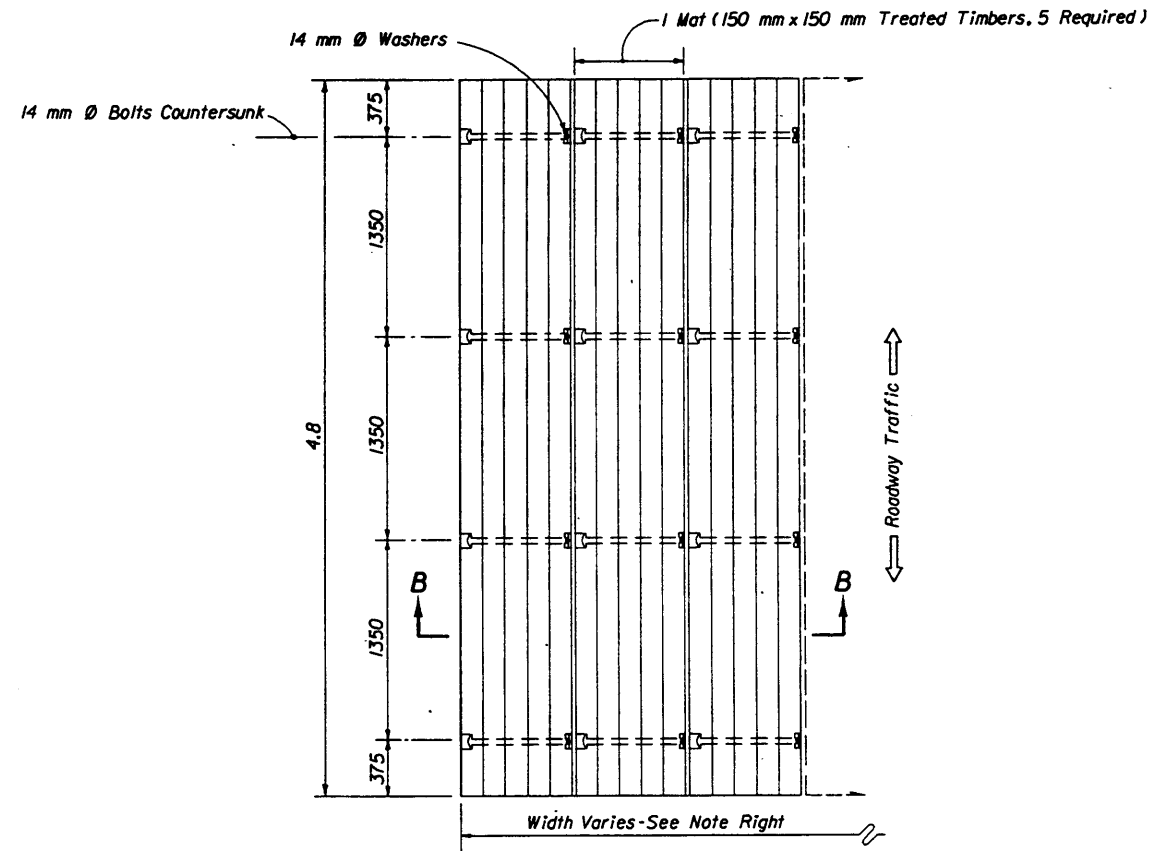
PLAN



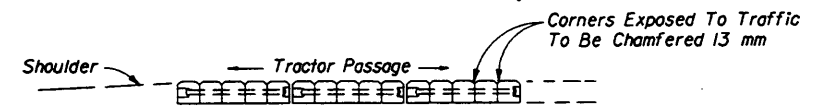
SECTION AA

Note: Class I concrete is to be used unless otherwise noted in plans or special provisions.

**REINFORCED CONCRETE  
TYPE A**



PLAN



SECTION BB

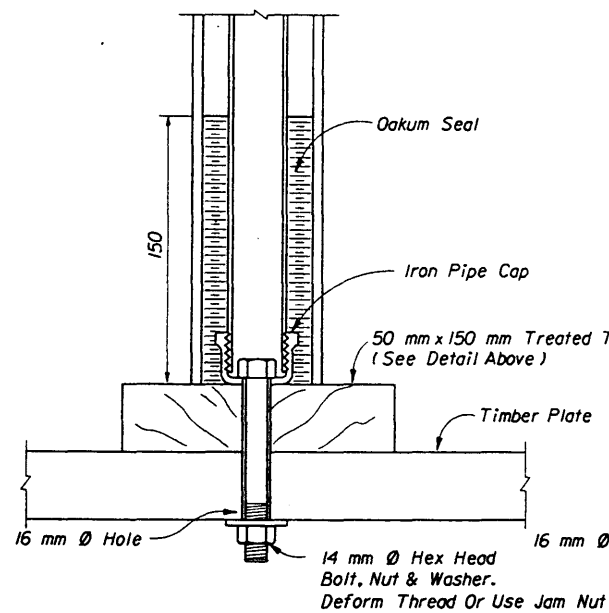
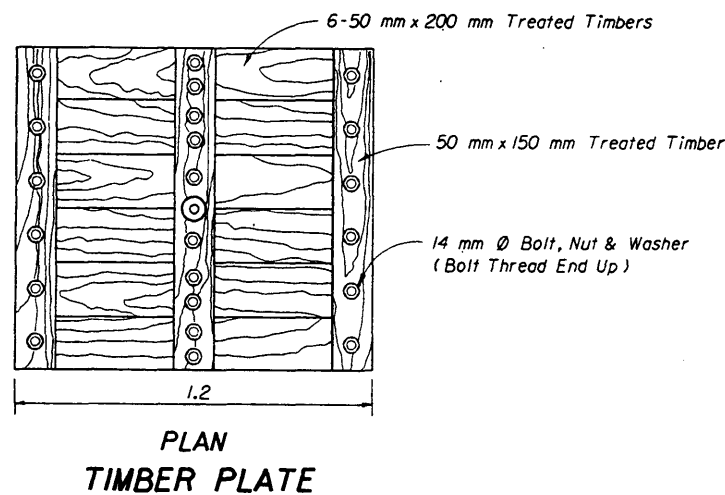
Note: Tractor crossing to be constructed to match pavement cross slope.  
The number of mats required will vary with the pavement width.  
A sufficient number of mats will be used so that the overall width of the tractor crossing will be centered on the centerline.

**TREATED TIMBER  
TYPE B**

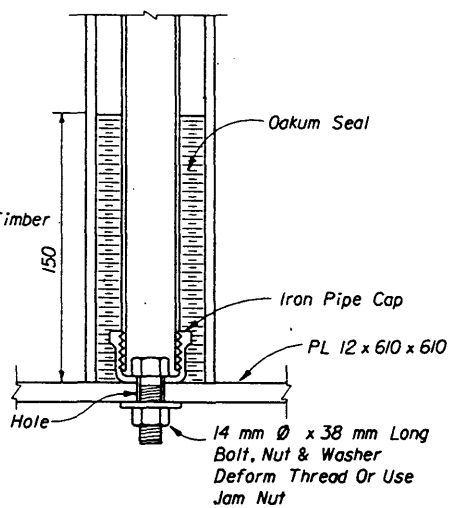
TRACTOR CROSSING SHALL BE PAID FOR UNDER THE CONTRACT UNIT PRICE FOR TRACTOR CROSSING, EA.

**TRACTOR CROSSINGS**

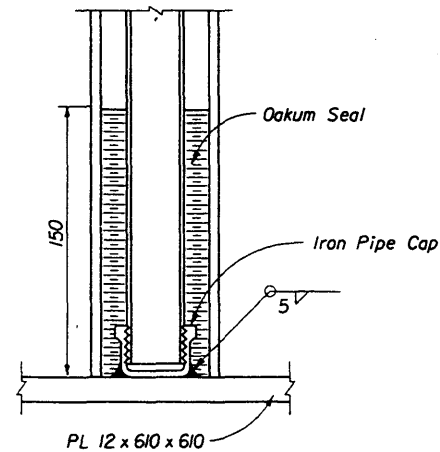
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>TRACTOR CROSSINGS</b>					
Designed By	Names	Date	Approved By	J. H. H. [Signature]	
Drawn By	LH	01/61	Revision	Sheet No.	Index No.
Checked By	CDD	01/61	98	1 of 1	535



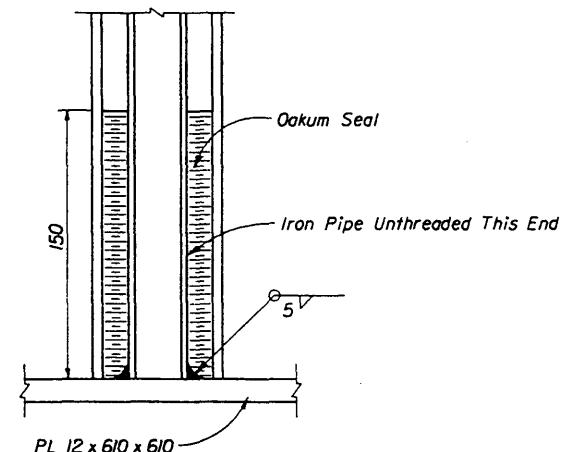
**TIMBER PLATE**



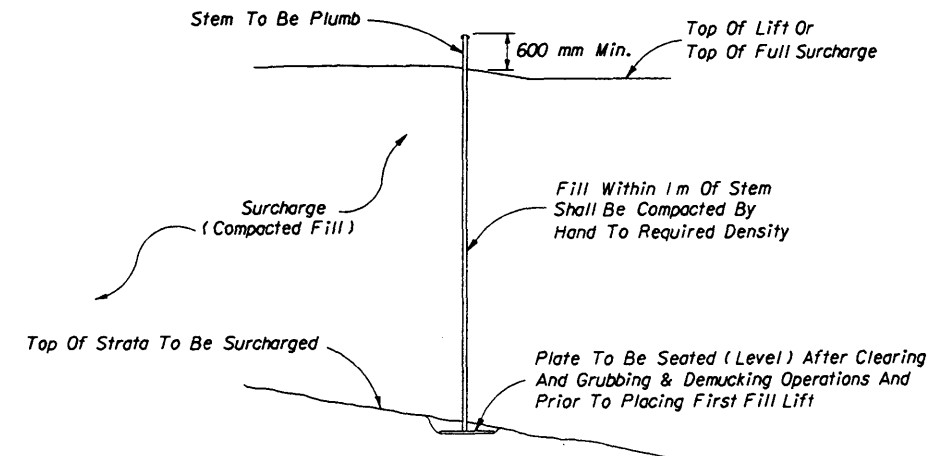
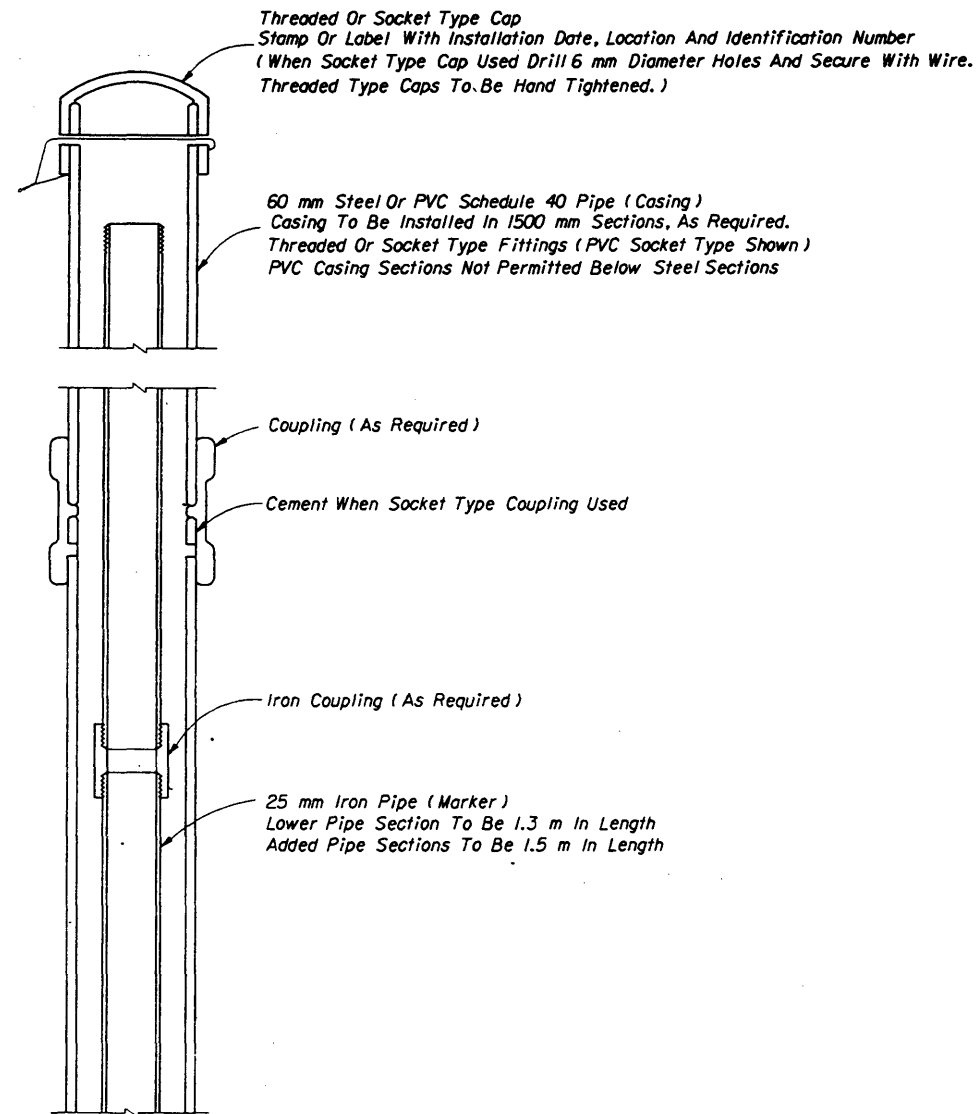
**STEEL PLATE  
STEM AND PLATE OPTIONS**



**STEEL PLATE**



**STEEL PLATE**

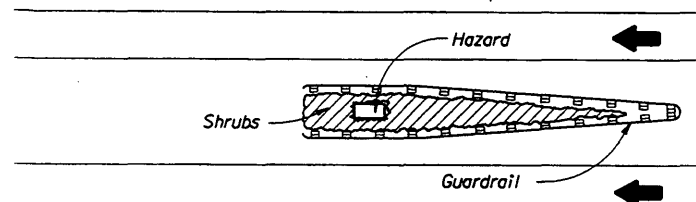


**INSTALLATION**

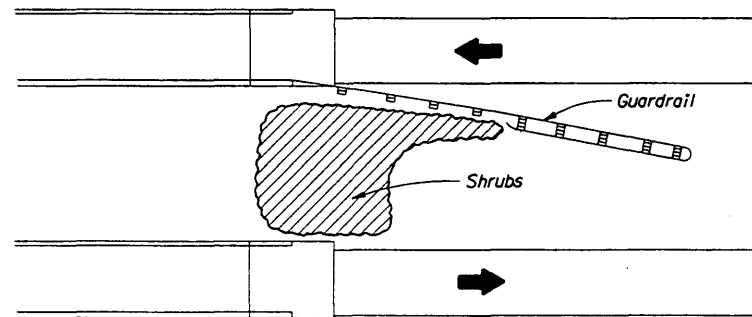
**GENERAL NOTES**

1. Elevation of the top of each length of marker pipe shall be determined as soon as it is installed and also immediately before the next length of marker pipe is added.
2. Settlement plate locations shall be flagged and protected from construction vehicles and equipment. If settlement plates are disturbed, they shall be replaced in kind.
3. Oakum used to construct seal should not have a mesh covering (plastic or other synthetic material).
4. The settlement plates shall be paid for under the contract unit price for Settlement Plate Assembly, AS.

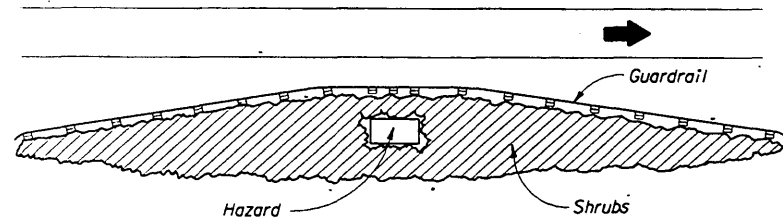
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<b>SETTLEMENT PLATE</b>				
Names	Dates	Approved By		
Designed By	JVC	10/79	 State Roadway Design Engineer	
Drawn By	HSD	10/79		
Checked By	JBW	10/79	Revision	Sheet No.
			94	1 of 1
				Index No. 540



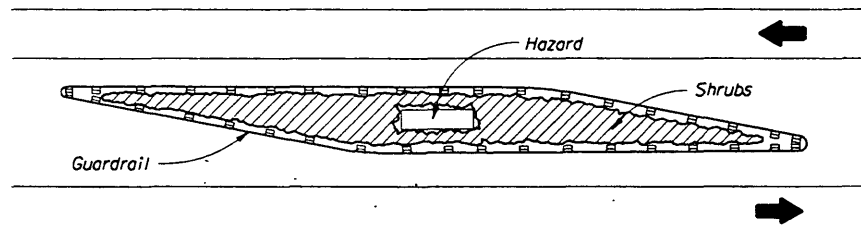
MEDIAN HAZARD - ONE WAY TRAFFIC  
DETAIL A



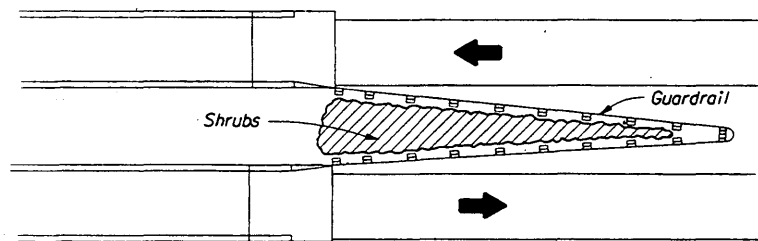
BRIDGE END - WIDE MEDIAN  
DETAIL C



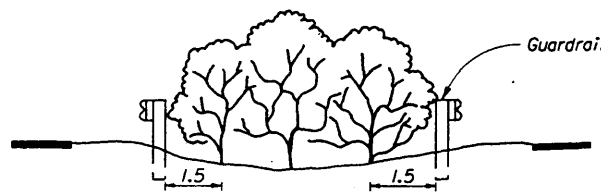
ROADSIDE HAZARD  
DETAIL B



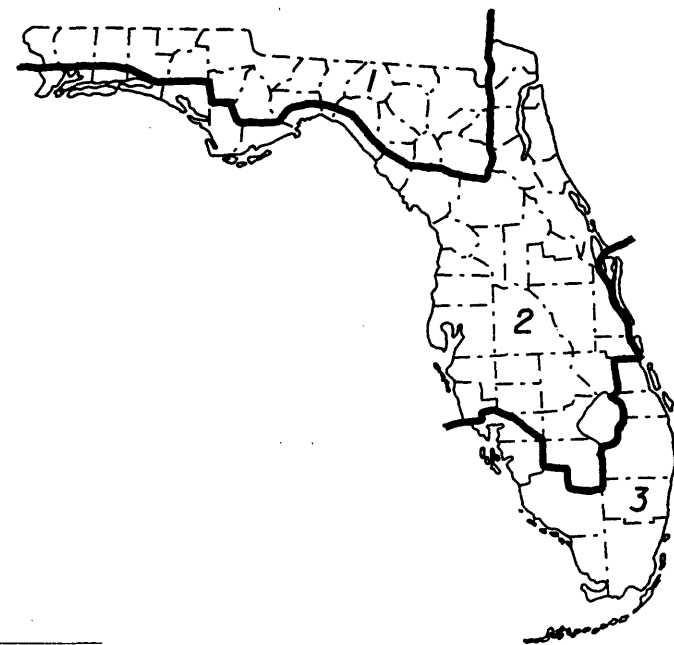
MEDIAN HAZARD - TWO WAY TRAFFIC  
DETAIL D



BRIDGE END - NARROW MEDIAN  
DETAIL E



BACK TO BACK GUARDRAIL  
SECTIONAL VIEW



ZONE MAP

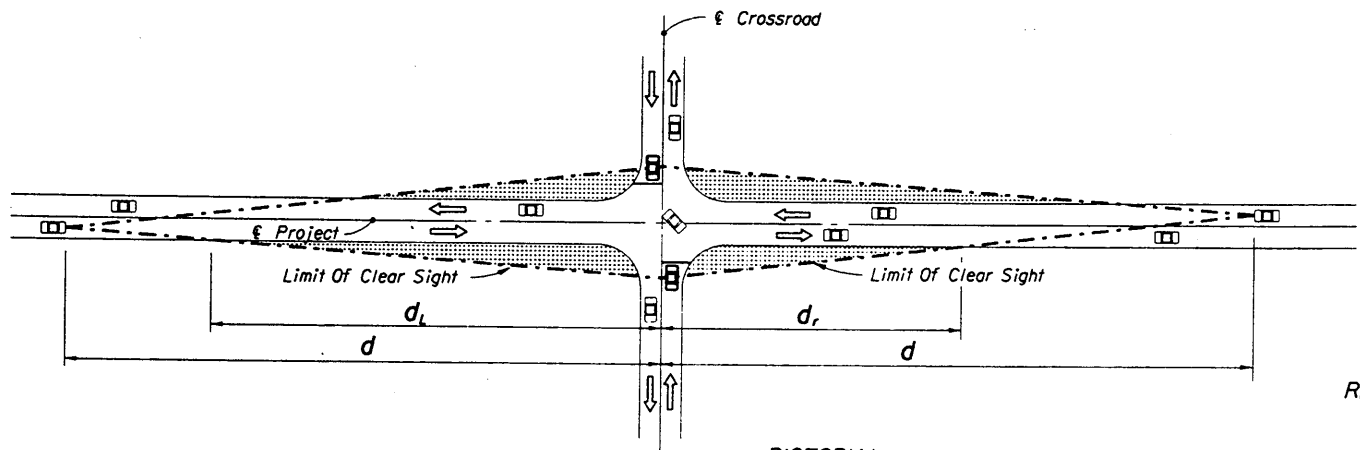
ZONE	SHRUB
1.	Wax Myrtle Pampas Grass Primrose Jasmine Russian Olive
2.	Wax Myrtle Pampas Grass Primrose Jasmine Russian Olive Jasmine Simplic Oleander
3.	Pampas Grass Russian Olive Natal Plum Jasmine Simplic Oleander Dwarf Oleander

GENERAL NOTES

1. The purpose of shrubs in areas back of guardrail is to eliminate hand maintenance in those areas.
2. Shrubs are to be planted approximately 1.5 m back from guardrail posts and hazards. Narrow plant areas are to have at least one row of shrubs, as directed by the Engineer.
3. Shrubs are to be planted approximately 1.5 m on centers in rows with 1.5 m spacings.
4. Shrubs are to be offset in successive rows to create a zig-zag pattern between any two rows.
5. Shrubs shall be specified in the plans by Landscape Material Master Pay Item List numbers.
6. Only one variety of shrub shall be planted within any given contiguous area and no shrub variety is to be repeated within a distance of 1.6 km.
7. When guardrail paving is constructed in conjunction with shrub planting, soil sterilization shall be in accordance with Section 339 of the Standard Specifications.
8. For line of clear sight limits see Index No. 546.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>LANDSCAPING</b>				
<b>BACK OF GUARDRAIL APPLICATION</b>				
Designed By	GLH	Dates	Approved By <i>[Signature]</i> State Roadway Design Engineer	
Drawn By		Revision	Sheet No.	Index No.
Checked By		94	1 of 1	545



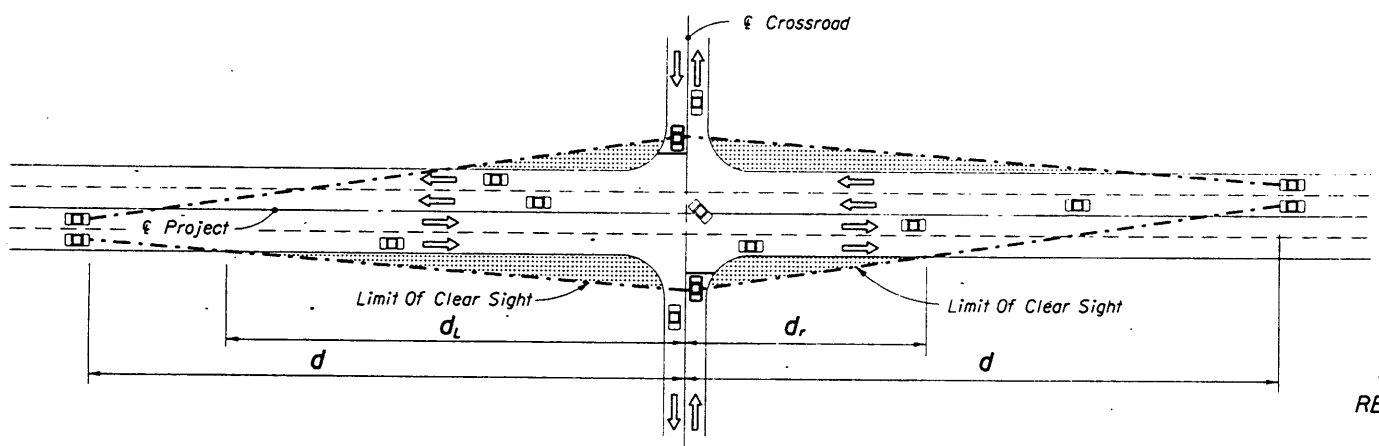


PICTORIAL  
2 LANE UNDIVIDED

km/h	d	d <sub>L</sub>	d <sub>r</sub>
	Meters		
50	120	95	65
60	160	125	85
70	205	160	110
80	255	195	135
90	310	240	165
100	375	290	200

See General Note 2

SIGHT DISTANCE (d) AND  
RELATED DISTANCES (d<sub>L</sub>, d<sub>r</sub>)

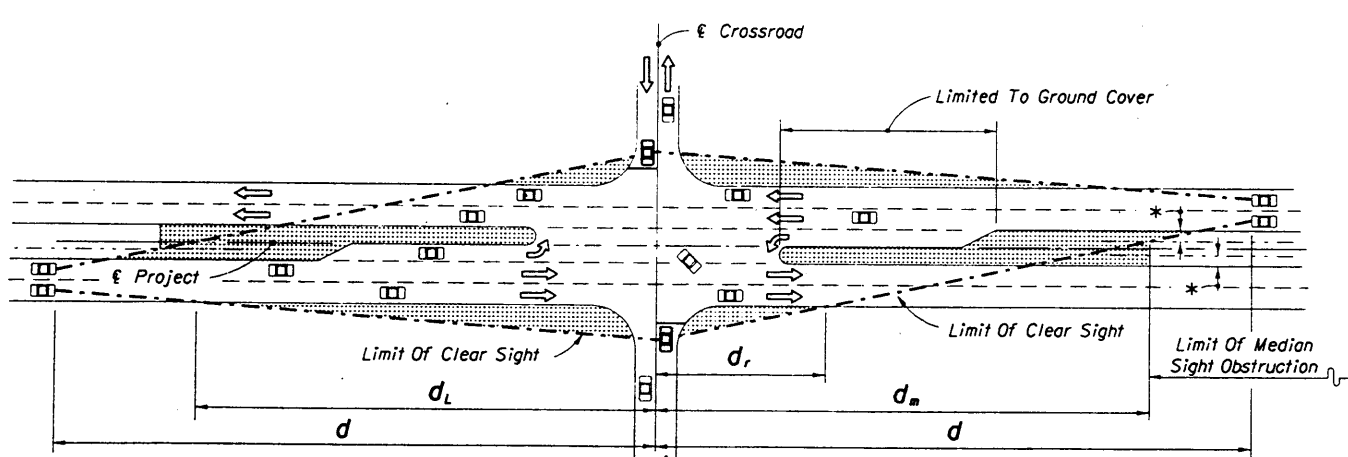


PICTORIAL  
MULTILANE UNDIVIDED

km/h	d	d <sub>L</sub>	d <sub>r</sub>
	Meters		
50	120	95	50
60	160	125	65
70	205	160	85
80	255	195	105
90	310	240	125
100	375	290	150

See General Note 2

SIGHT DISTANCE (d) AND  
RELATED DISTANCES (d<sub>L</sub>, d<sub>r</sub>)



PICTORIAL  
MULTILANE DIVIDED

km/h	d	d <sub>L</sub>	d <sub>r</sub>	d <sub>m</sub>
	Meters			
50	120	95	40	100
60	160	125	50	135
70	205	160	65	170
80	255	195	80	210
90	310	240	95	255
100	375	290	115	310

See General Note 2

SIGHT DISTANCE (d) AND  
RELATED DISTANCES (d<sub>L</sub>, d<sub>r</sub>, d<sub>m</sub>)

**LEGEND**  
 Areas Free Of Sight Obstructions

NOTE: See Sheet 2 for intersecting roadway origin of clear sight and quadrant corner clips.

**GENERAL NOTES**

- Details apply to both rural and urban intersections under stop sign control or flashing beacon control. For full signal controlled intersections see Design Note No. 4 below.
- Sight distance (d) applies to normal and skewed intersections (intersecting angles between 60° and 120°), and where vertical and/or horizontal curves are present. Sight distance (d) is measured along the major roadway from the center of the intersecting roadway. Distances d<sub>L</sub> and d<sub>r</sub> are measured from the centerline of the intersecting roadway to a point on the edge of the near side outer traffic lane on the major roadway. Distance d<sub>m</sub> is measured from the centerline of the intersecting roadway to a point on the median clear zone limit or horizontal clearance limit for the far side roadway of the major roadway.
- The limits of clear sight define a corridor throughout which a clear sight window must be preserved. See WINDOW DETAIL, Sheet 2.
  - Clear sight must be provided between vehicles at intersection stop locations, and vehicles on the major roadway within dimension 'd'.
  - Since observations are made in both directions along the line of sight, the reference datum between roadways is 1070 mm above respective pavements.
- Barrier systems within intersection sight corridors, where penetration into the sight window might occur, shall be located to provide the least adverse affect practical.
- The corridor defined by the limits of clear sight is a restricted planting area. Drivers of vehicles on the intersecting roadway and vehicles on the major roadway must be able to see each other clearly throughout the limits of 'd'. If, in the Engineers judgement landscaping interferes with the line of sight corridor prescribed by these standards the Engineer may rearrange, relocate or eliminate plantings. Plants within the restricted areas are limited to selections as follows:
  - Ground Cover & Trunked Plants (Separate or Combined):
    - Ground Covers- Plant selection of low growing vegetation which at maturity does not attain a height greater than 470 mm below the sight line datum.
    - For ground cover in combination with trees, the following heights below the sight line datum will apply: 620 mm for trees and palms ≤ 290 mm DBH and 470 mm for sabal palms > 290 mm to ≤ 450 mm DBH.
    - Trunked Plants- Plant selection of a mature trunk diameter 100 mm or less measured at 150 mm above the ground. Canopy or high borne foliage shall never be lower than 1500 mm above the sight line datum. These selections shall be spaced no closer than 6.0 m.
  - Trees:
    - Trees can be used with lawn; pavers; pavement; gravel, bark or wood chip beds; ground covers or other Department approved material. The clear sight window must be in conformance with the 'WINDOW DETAIL' modified to attain the height requirements listed in 'Ground Covers' above. Tree size and spacing shall conform to the following tabular values:

Description	Speed (km/h)											
	50		60		70		80		90		100	
Diameter At Breast Height (DBH) (Within Sight Corridor) (mm)	>100- ≤290	>290- ≤450	>100- ≤290	>290- ≤450	>100- ≤290	>290- ≤450	>100- ≤290	>290- ≤450	>100- ≤290	>290- ≤450	>100- ≤290	>290- ≤450
Minimum Spacing (c. to c. Of Trunk) (m)	7.0	29.0	9.0	36.0	12.0	42.0	15.0	50.0	17.0	54.0	20.0	62.0

Sizes and spacings are based on the following conditions:  
 (a) A single line of trees in the median parallel to but not necessarily collinear with the centerline.  
 (b) A straight approaching mainline, within skew limits as described in No. 2 above.  
 (c) 1. Trees and palms ≤ 290 mm in diameter casting a vertical 1.8 m wide shadow band on a vehicle entering at stop bar location when viewed by mainline driver beginning at distance 'd'; see SHADOW DIAGRAM, Sheet 2.  
 2. Sabal palms with diameters > 290 mm - ≤ 450 mm spaced at intervals providing a 2 second full view of entering vehicle at stop bar location when viewed by mainline driver beginning at distance 'd'; see PERCEPTION DIAGRAM, Sheet 2.  
 For any other conditions the tree sizes, spacings and locations shall be detailed in the plans; see Design Note No. 5.

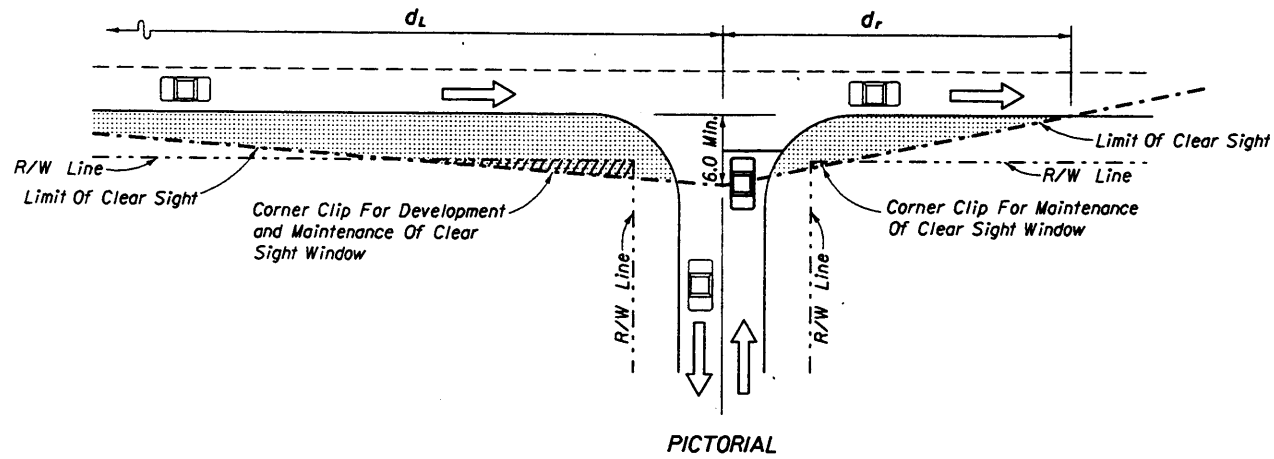
**DESIGN NOTES**

- The information shown on this index is intended solely for the purpose of clear sight development and maintenance at intersecting highways, roads and streets, and is not intended to be used to establish geometric design, speed control, signing, marking, lighting or signalization, or to establish roadway and roadside safety except as related to clear sight corridors. An analysis of sight distance shall be documented for all intersections.
- Details are based on the AASHTO 'A Policy On Geometric Design Of Highways And Streets', Chapter IX, Cases III and IX, and Department practices for channelized median openings (left turns from major roadways).
- The minimum driver eye setback of 6.0 m from the edge of the traffic lane may be adjusted on any intersection leg only when justified by a documented, site specific field study of vehicle stopping position and driver eye position.
- For SIGNALIZED INTERSECTIONS: Due to a variety of standard operational characteristics associated with signal controlled intersections, the sight distances based on Case III procedures should be available to the driver. Unanticipated vehicle conflicts at signalized intersections, such as violation of the signal, turns on red, malfunction of the signal, or use of the flashing red/yellow mode further substantiate the need for incorporation of Case III sight distances. If the proper sight distances can not be attained, other design features such as 'no right-on-red' may be necessary. Where landscaping is incorporated with construction or superimposed on existing facilities, the planting restrictions listed under the General Notes above are to be considered in the sight distance analysis.
- Where curvature, superelevation, adverse split profiles or other conditions preclude the use of standard tree sizes and spacing, proof of view and shadowing restraints must be documented and the size and location of trees in medians detailed in the plans.

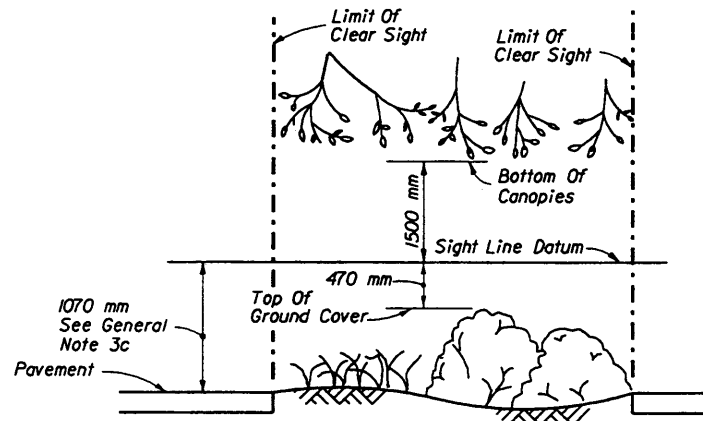
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**SIGHT DISTANCE AT INTERSECTIONS**

Names	Dates	Approved By
Designed By: JKM/JVG	10/89	
Drawn By: HSD	10/89	State Roadway Design Engineer
Checked By: JVG/JKM	10/89	Revision: 98, Sheet No. 1 of 2, Index No. 546

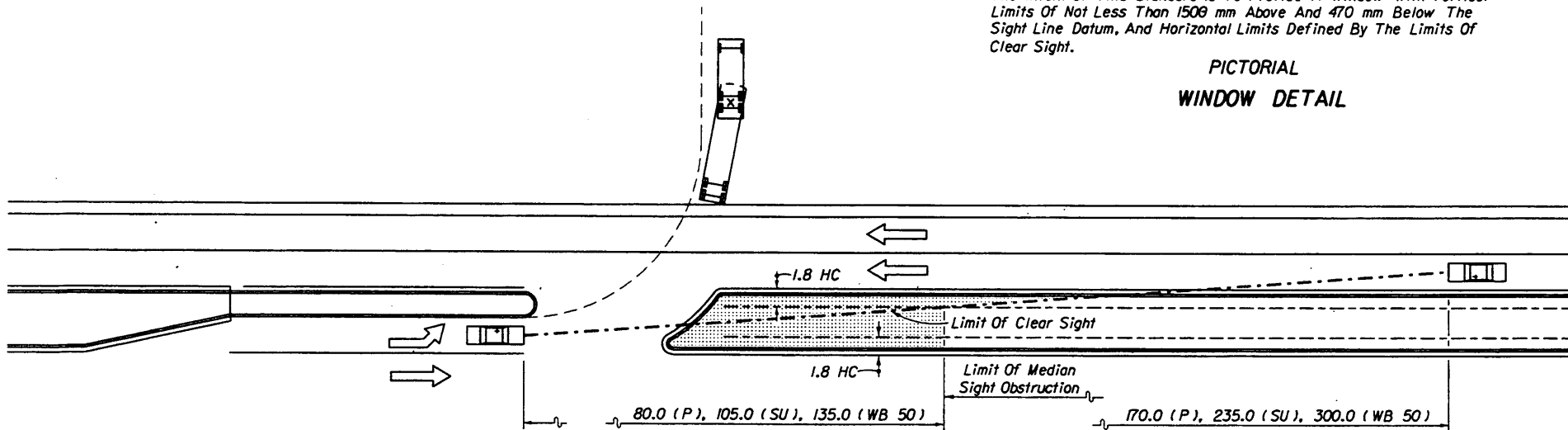


PICTORIAL  
ORIGIN OF CLEAR SIGHT LINE  
AND PROPERTY CORNER CLIPS

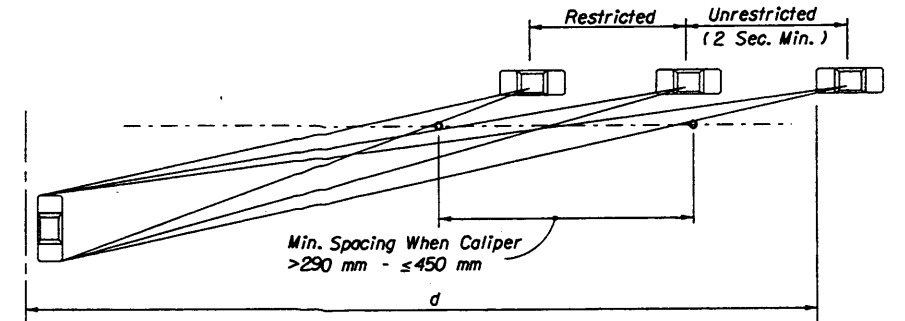


The Intent Of This Standard Is To Provide A Window With Vertical Limits Of Not Less Than 1500 mm Above And 470 mm Below The Sight Line Datum, And Horizontal Limits Defined By The Limits Of Clear Sight.

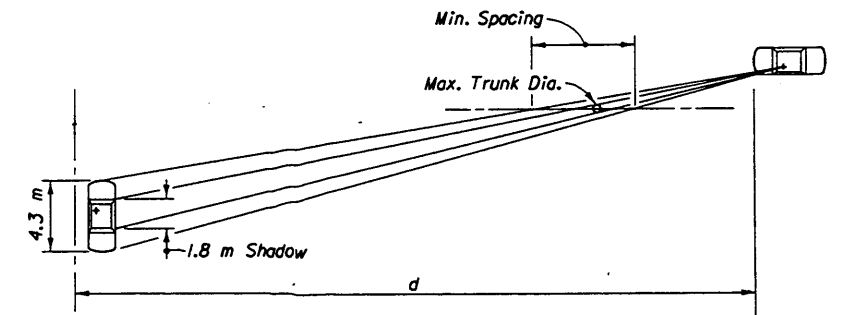
PICTORIAL  
WINDOW DETAIL



PICTORIAL  
CHANNELIZED DIRECTIONAL MEDIAN OPENINGS



PERCEPTION DIAGRAM  
SETTING SABAL PALM (STATE TREE) SPACING



SHADOW DIAGRAM

LEGEND

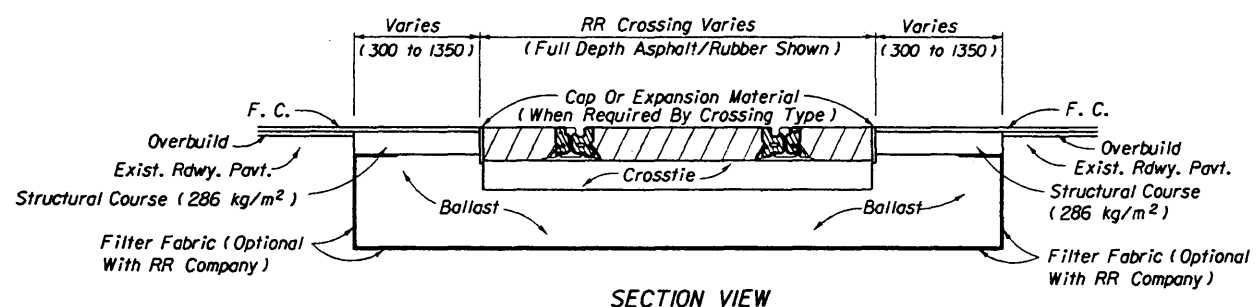
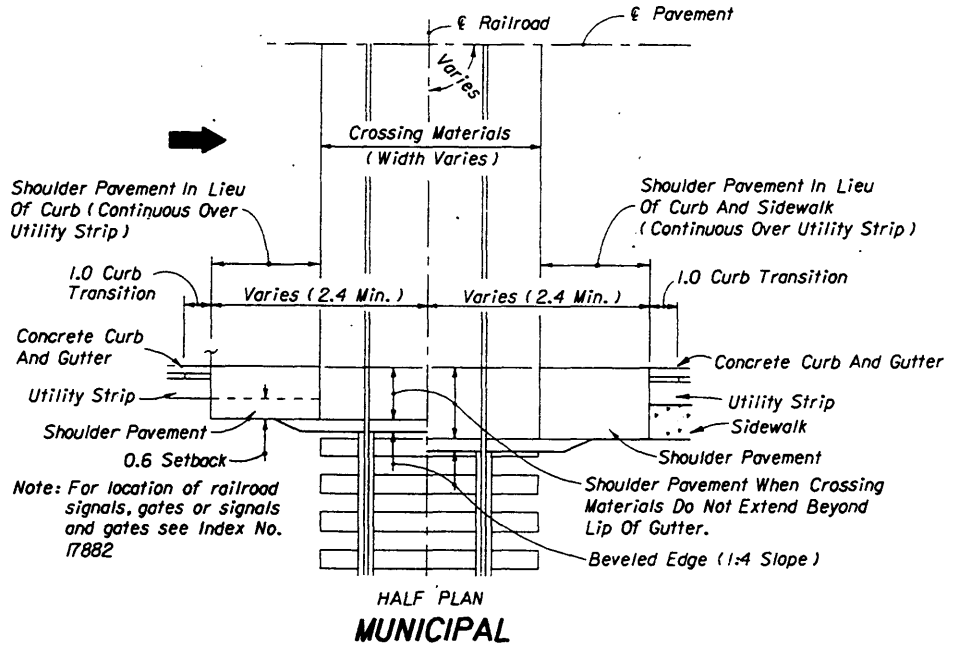
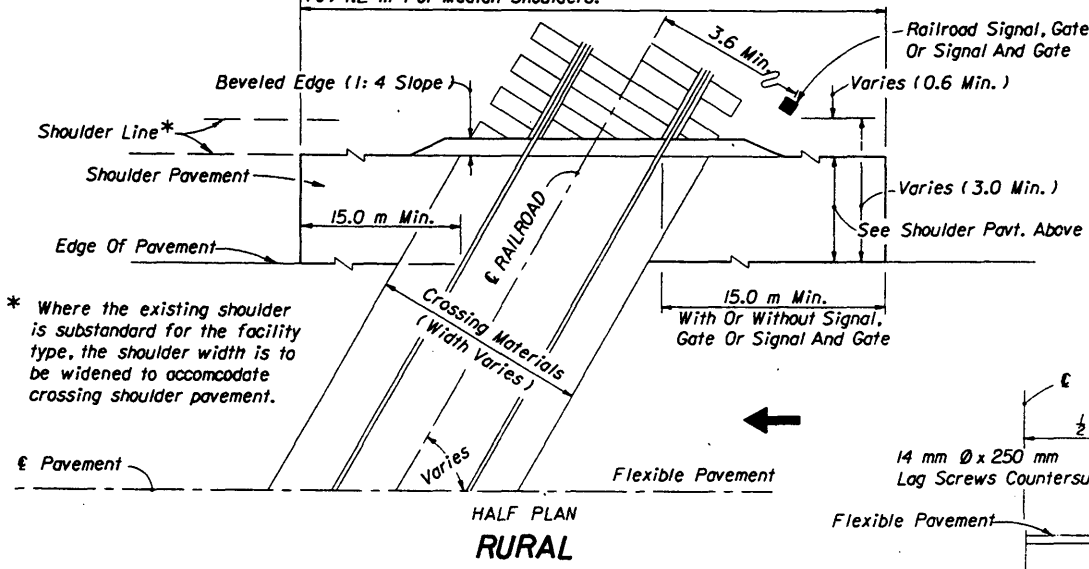
Areas Free Of Sight Obstructions

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

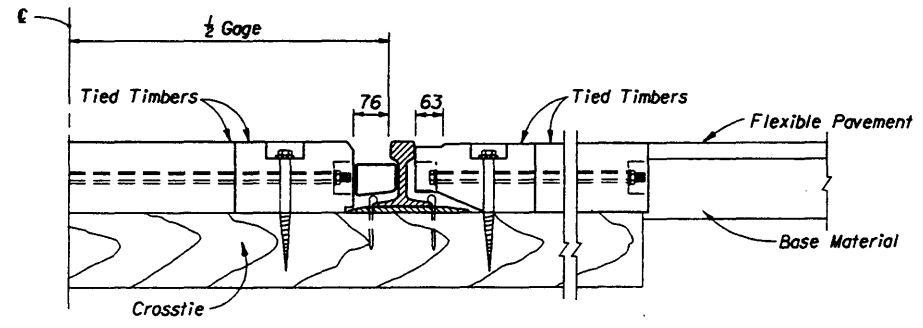
SIGHT DISTANCE  
AT INTERSECTIONS

Names	Date	Approved By		
Designed By	KRM/JVG 10/89		State Roadway Design Engineer	
Drawn By	BSD 10/89		Revision	Sheet No.
Checked By	JVG/KRM 10/89	96	2 of 2	546

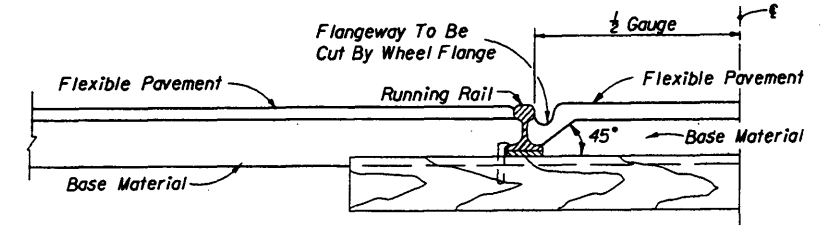
Crossing Shoulder Pavement (Except Area Occupied By Crossing Surfacing Material):  
 (a) To Shoulder Line For Outside Shoulders Less Than 2.4 m Wide.  
 (b) To 2.4 m Maximum Width For Outside Shoulders 2.4 m Or Wider (Regardless Of Approach Shoulder Pavement Width).  
 (c) 1.2 m For Median Shoulders.



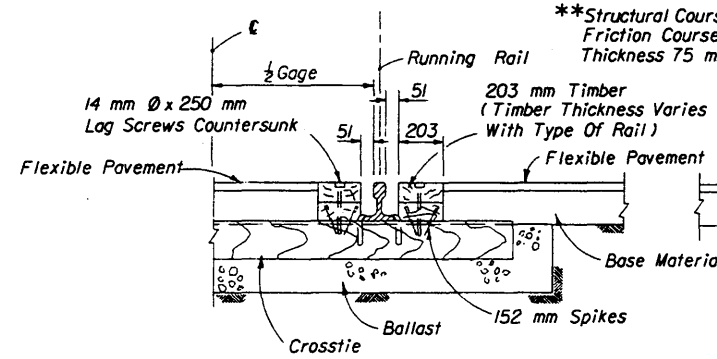
TYPICAL FLEXIBLE PAVEMENT REPLACEMENT AT RR CROSSINGS



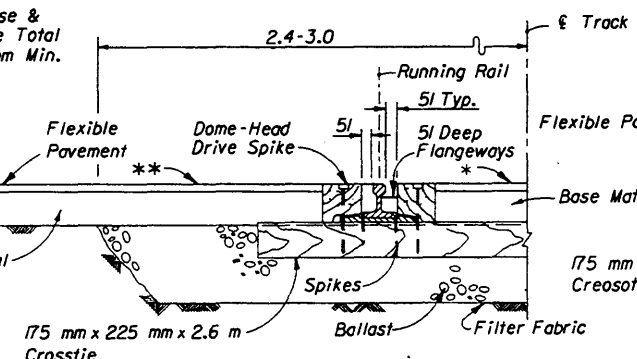
HALF SECTION TYPE D



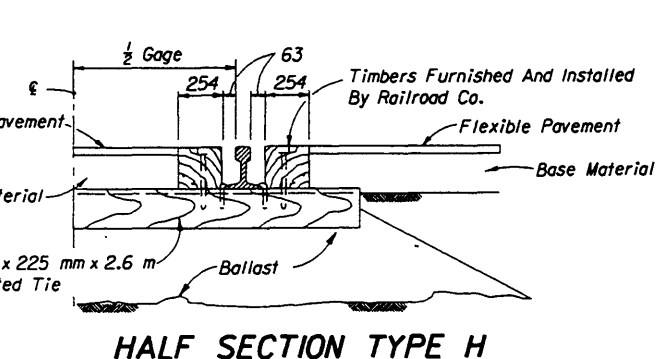
HALF SECTION TYPE E



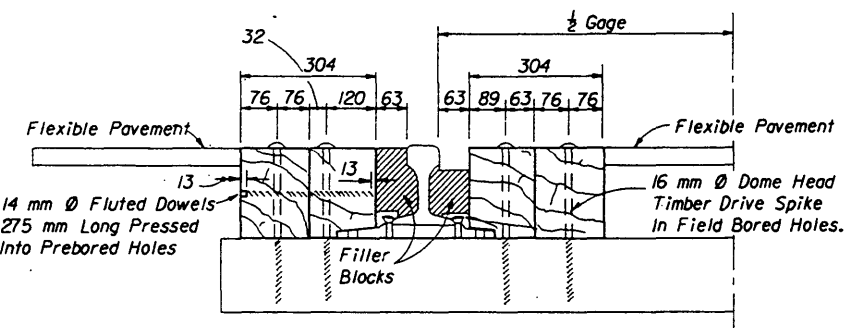
HALF SECTION TYPE G



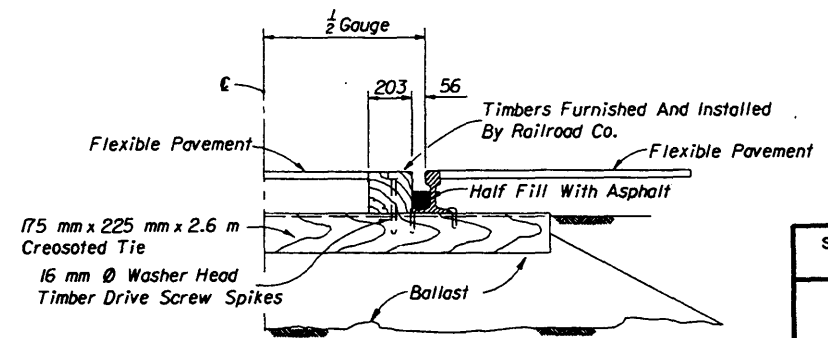
HALF SECTION TYPE G MODIFIED



HALF SECTION TYPE H



HALF SECTION TYPE L



HALF SECTION TYPE S

NOTES

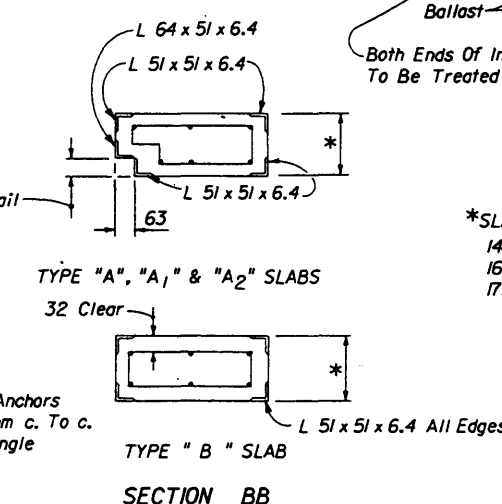
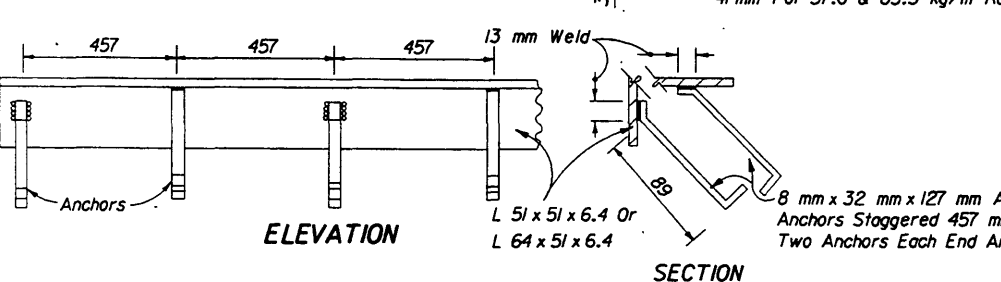
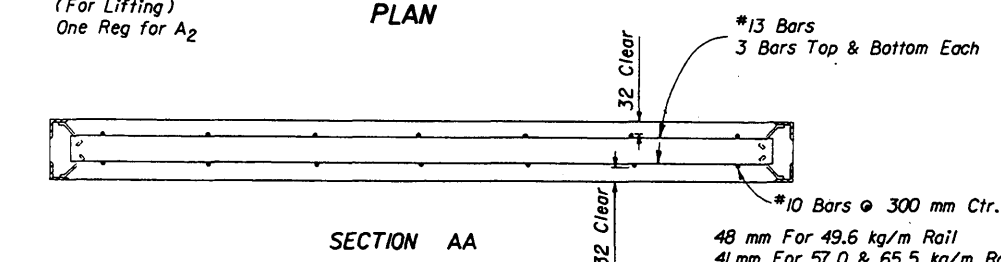
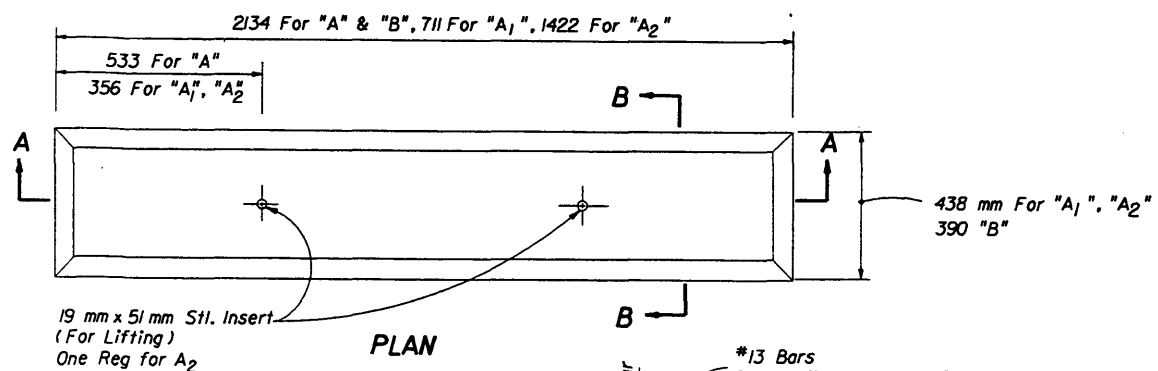
1. The Railroad Company will furnish and install all track bed (ballast), crossties, rails, crossing surface panels and accessory components. All pavement material, including that through the crossing, will be furnished and installed by the Department or its Contractor, unless negotiated otherwise.
2. Gage is standard A.R.E.A. track gage of 1435 mm.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

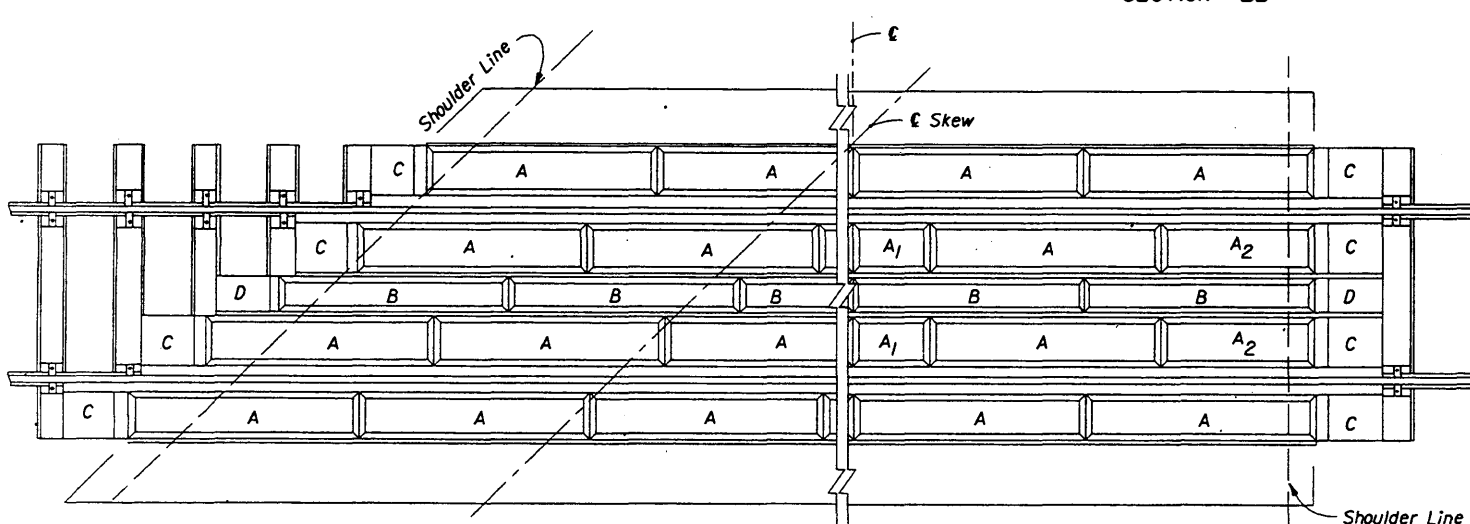
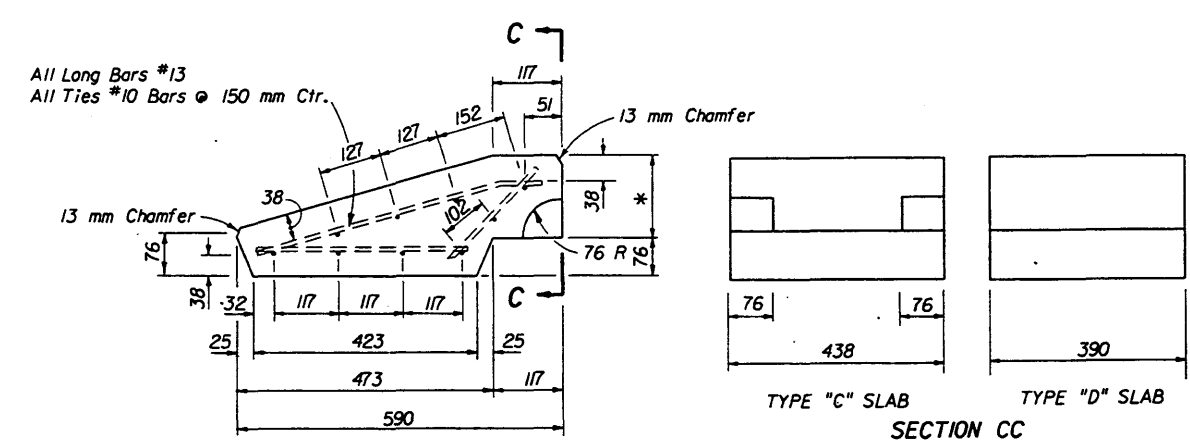
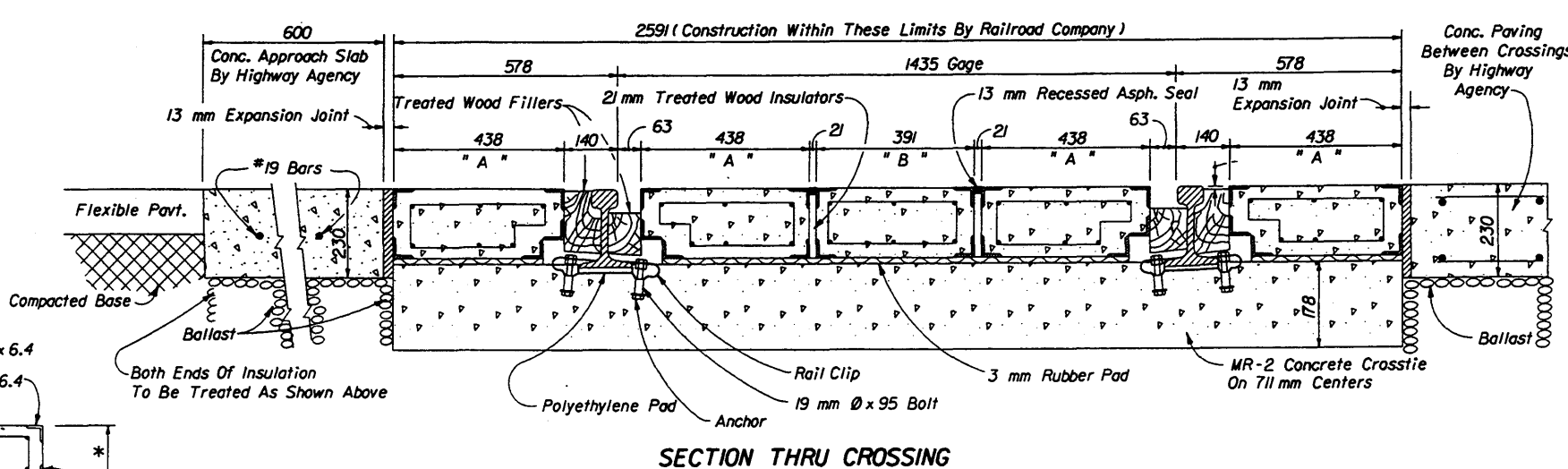
RAILROAD CROSSINGS

Names	Dates	Approved By	State Roadway Design Engineer
Designed By			
Drawn By	BW 08/69	Revision	Sheet No. Index No.
Checked By	JRC 08/69	00	1 of 5 560

TYPE D, E, G, G-MOD., H, L & S



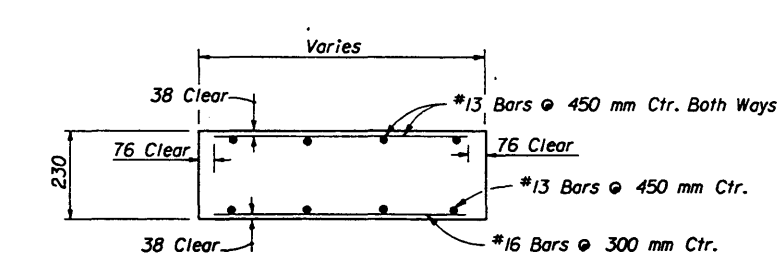
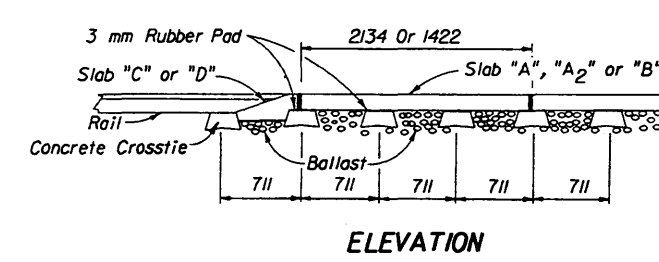
\*SLAB THICKNESS VARIES  
 146 For 49.6 kg/m Rail  
 162 For 57.0 kg/m Rail  
 175 For 65.5 kg/m Rail



TYPE "C" & "D" SLAB DETAILS

NOTES

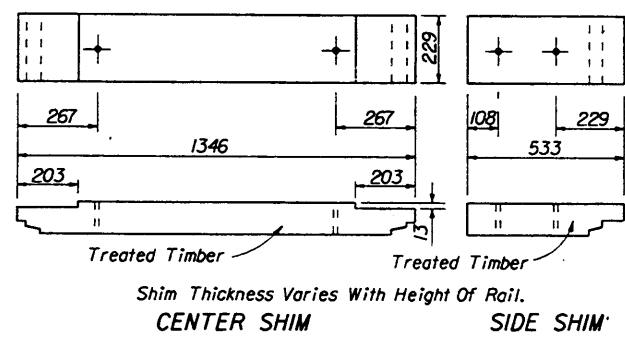
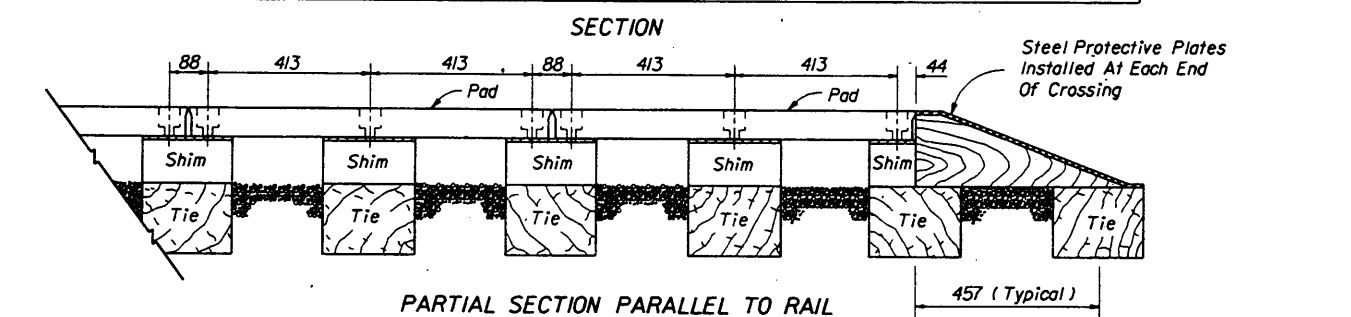
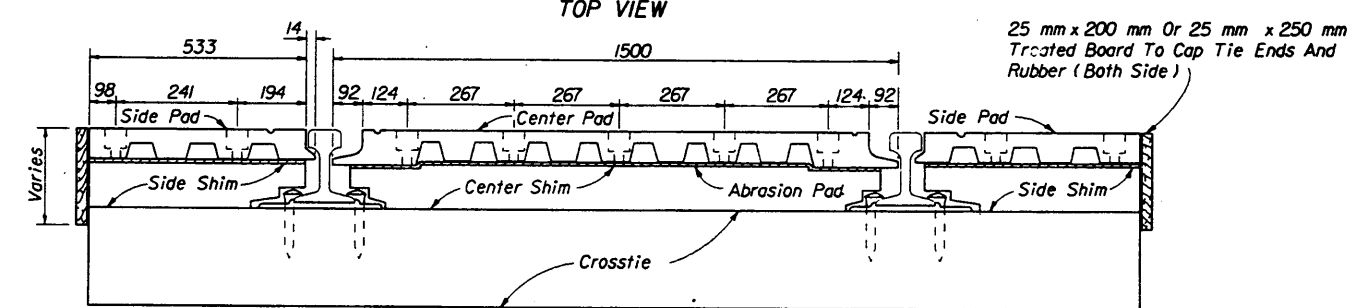
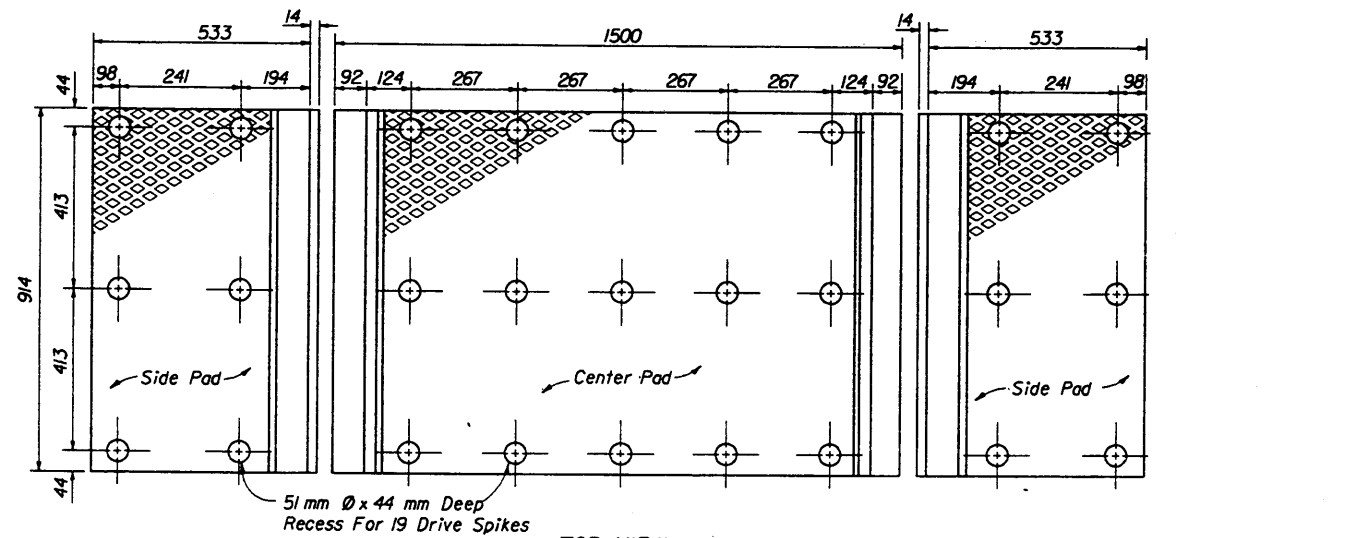
1. The furnishing and installing of concrete crossties together with any necessary re-ballasting, grade adjustment and track alignment shall be done by the Railroad Company without cost to the Contractor or to the Highway Agency.
2. All concrete slabs, rubber pads for tops of ties and wood filler blocks shall be furnished and installed by the Railroad Company.
3. Concrete crossties shall be spaced on 711 mm centers.
4. Rubber pads shall be installed on concrete ties in field using contact cement.
5. Filler blocks shall be pressure treated pine or clear heart redwood and shall be shaped prior to treatment.
6. Cost of concrete and reinforcing steel necessary for approach slabs and paving between multiple crossings shall be paid for by the Highway Agency under the contract unit price for Cement Concrete Pavement Reinforced, (230 mm), M2.



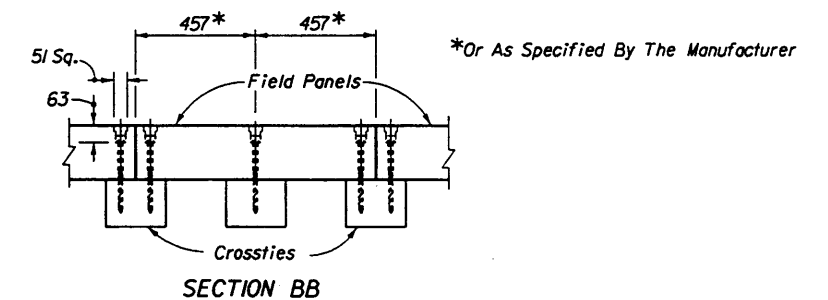
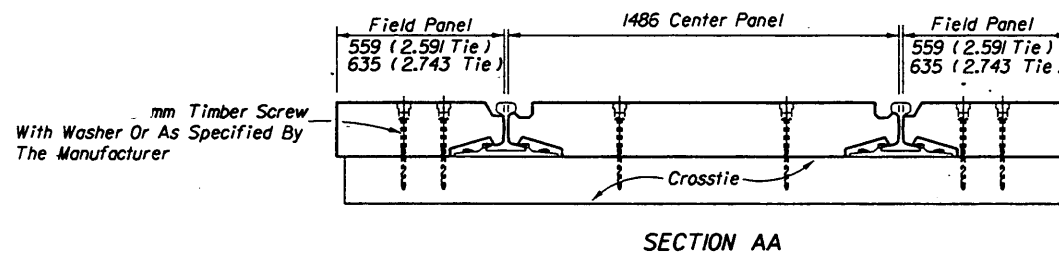
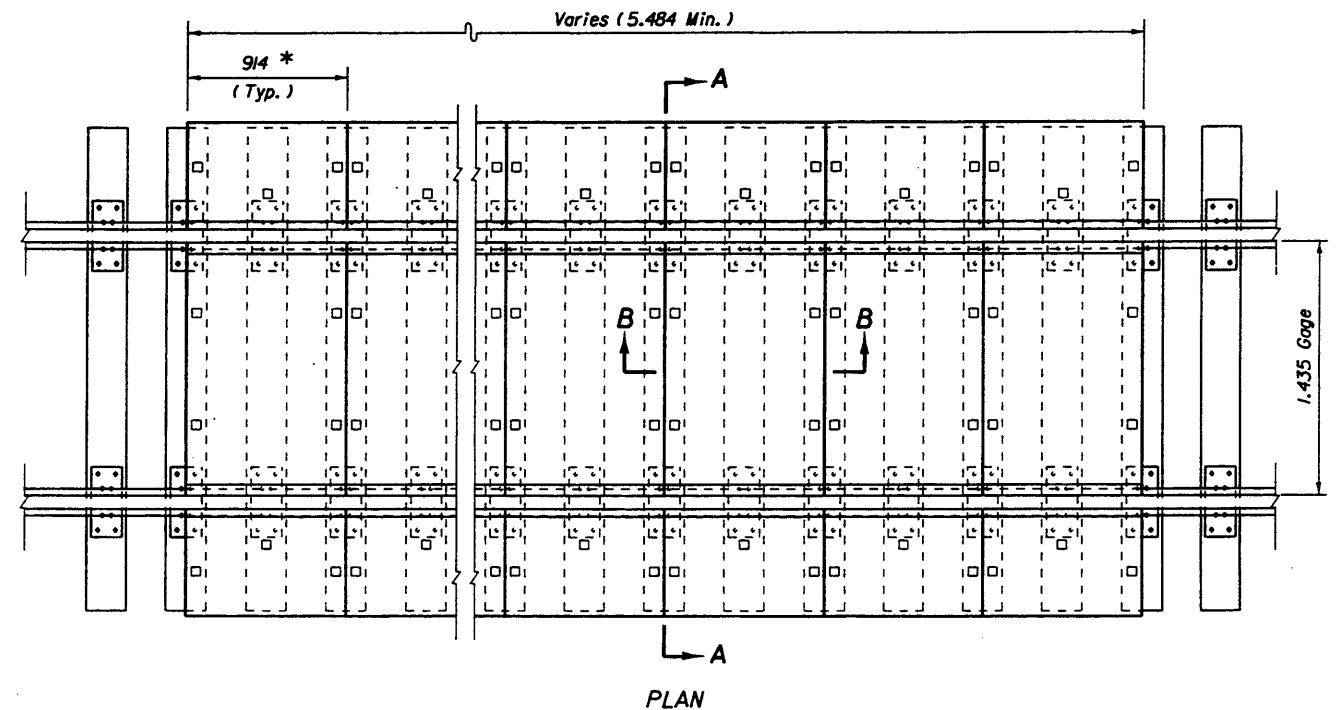
CONCRETE PAVING BETWEEN MULTIPLE CROSSINGS  
 (Cost Of Reinforcing To Be Included In The Cost Of Concrete, See Note No. 6)

TYPE K

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>RAILROAD CROSSINGS</b>					
Designed By	Names	Dates	Approved By	State Roadway Design Engineer	
Drawn By	JW	08/69	Revision	Sheet No.	Index No.
Checked By	JYC	08/69	98	2 of 5	560



**TYPE R**



**HEAVY DUTY - FULL DEPTH RUBBER CROSSING  
TYPE R FULL DEPTH**

STOP ZONE	
Design Speed (km/h)	Zone Length Distance From Stop (m)
70 Or Less	80.0
80-90	110.0
100	150.0
110	180.0

**NOTES**

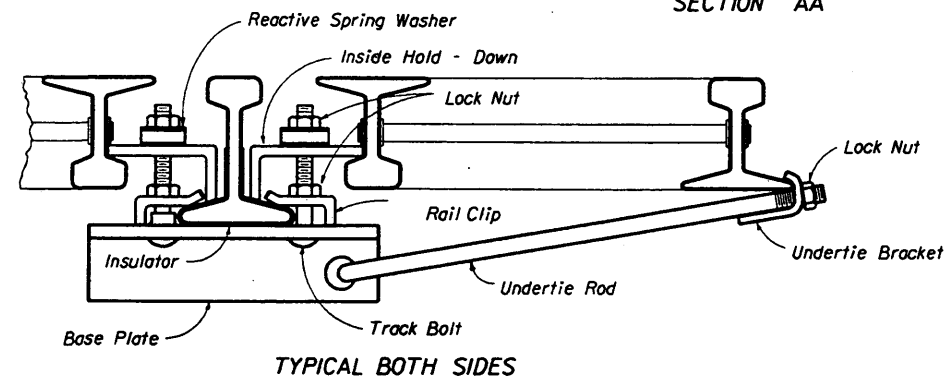
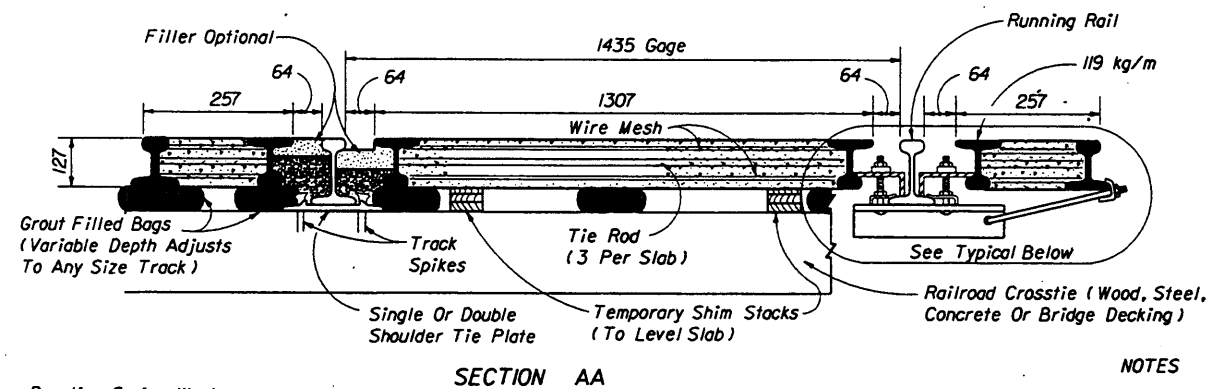
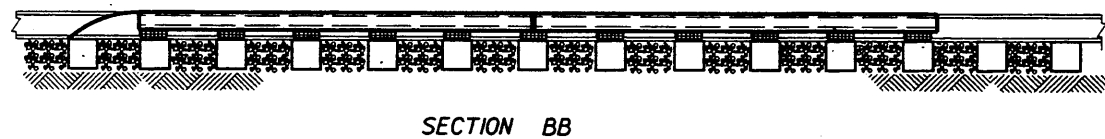
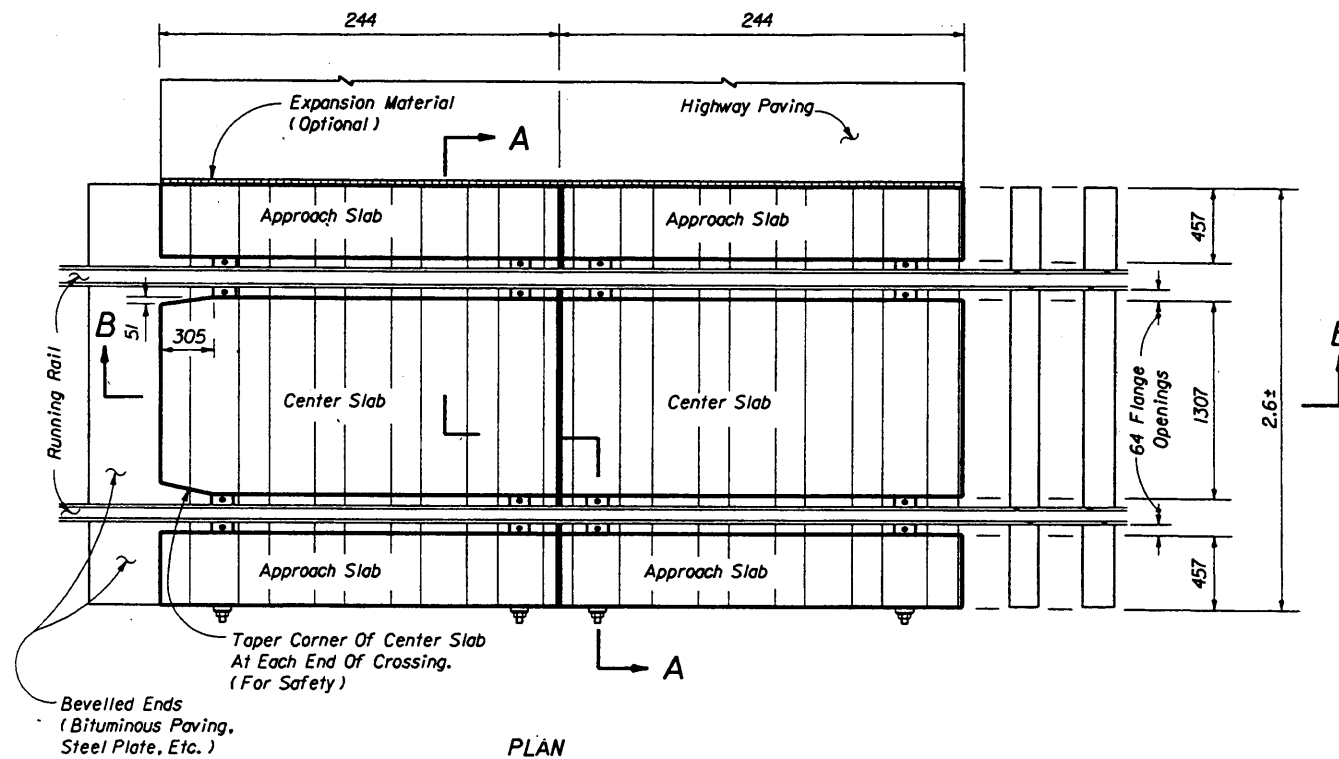
1. The crossings shown on this sheet are NOT to be used for multiple track crossings within zones for an existing or scheduled future vehicular stop. Zone lengths are charted above.
2. Crossings on this sheet may be used for single track crossings within the zones on the chart unless engineering or safety considerations dictate otherwise.
3. Tie spacing is critical, ties shall be spaced in accordance with the manufacturer's specifications.
4. Details shown are for straight track installations. Materials are also available for curved track installations.
5. For additional details, materials required and installation procedures refer to the manufacturer's specifications.

**TYPES R RUBBER & R FULL DEPTH RUBBER**

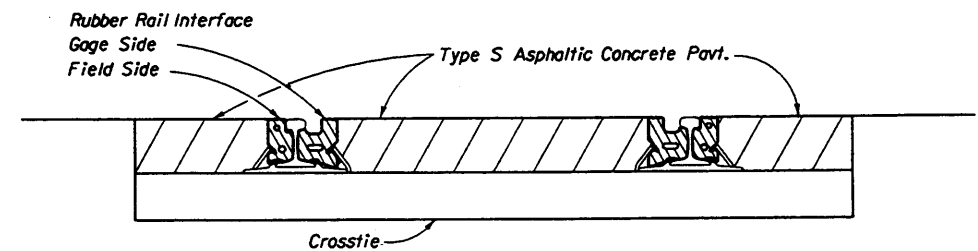
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**RAILROAD CROSSINGS**

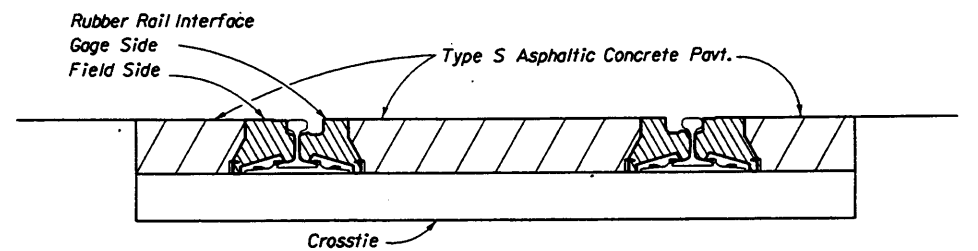
Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By					
Drawn By	LHF	11/75			
Checked By	GSB	11/75	94	3 of 5	560



- NOTES
1. The reinforced concrete slabs are manufactured in 244 mm sections, 127 mm in depth to fit all rail sections 133 mm in height or heavier. Slabs are interchangeable and relocatable.
  2. Center slabs are one piece construction allowing for 64 mm flange opening, 39.7 kg/m rail is used to encase, armor and reinforce slabs and is held to gauge with 3 tie rods per slabs.
  3. Slabs are installed by a "flotation" process, supported on non-shrinkable, non-metallic grout positioned on the ties. Slabs can be placed on wood ties, concrete ties, steel ties, bridge decks or any other type of track support. No re-spacing of ties is necessary.
  4. Slabs are secured to "running rails" with specially designed hardware. Insulation is to be provided for crossing in signal territory.
  5. Curved slabs are fabricated to fit curved track with a minimum radius of 80.0 m. Special slabs are available for diamond crossings, turnouts, multiple tracks, bridge decks and rapid transit systems.
  6. For additional details, materials required and installation procedures refer to the manufacturer's specifications.
  7. All asphalt will be installed in accordance with Index No. 513 and Section 300 of the Standard Specifications.



ALTERNATE INTERFACE SECTION VIEW



ALTERNATE INTERFACE SECTION VIEW

NOTES

1. Rubber rail interface systems are manufactured to fit various rails from 57.0 kg/m to 67.5 kg/m.
2. The Railroad Company will furnish and install all crossing material except as specified in the agreement.
3. For additional details, methods required and installation procedures refer to the manufacturer's specifications.

FULL DEPTH ASPHALT/RUBBER CROSSING

TYPE RS

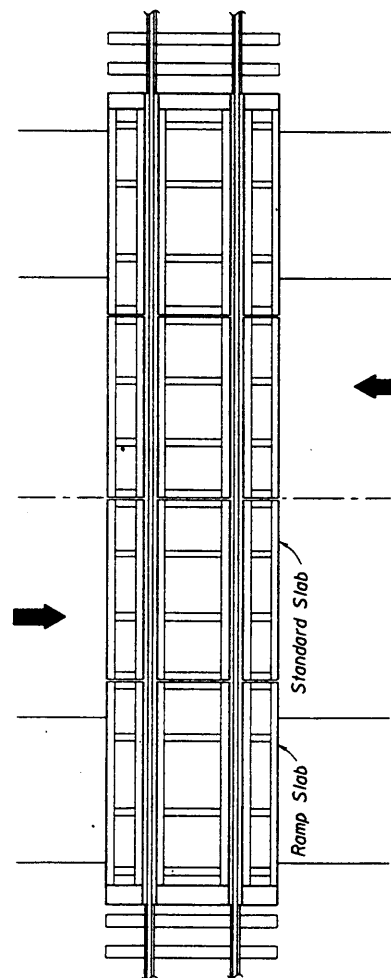
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

RAILROAD CROSSINGS

Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By		<i>[Signature]</i>			
Drawn By	LNF 02/77	State Roadway Design Engineer			
Checked By	GSB 02/77		94	4 of 5	560

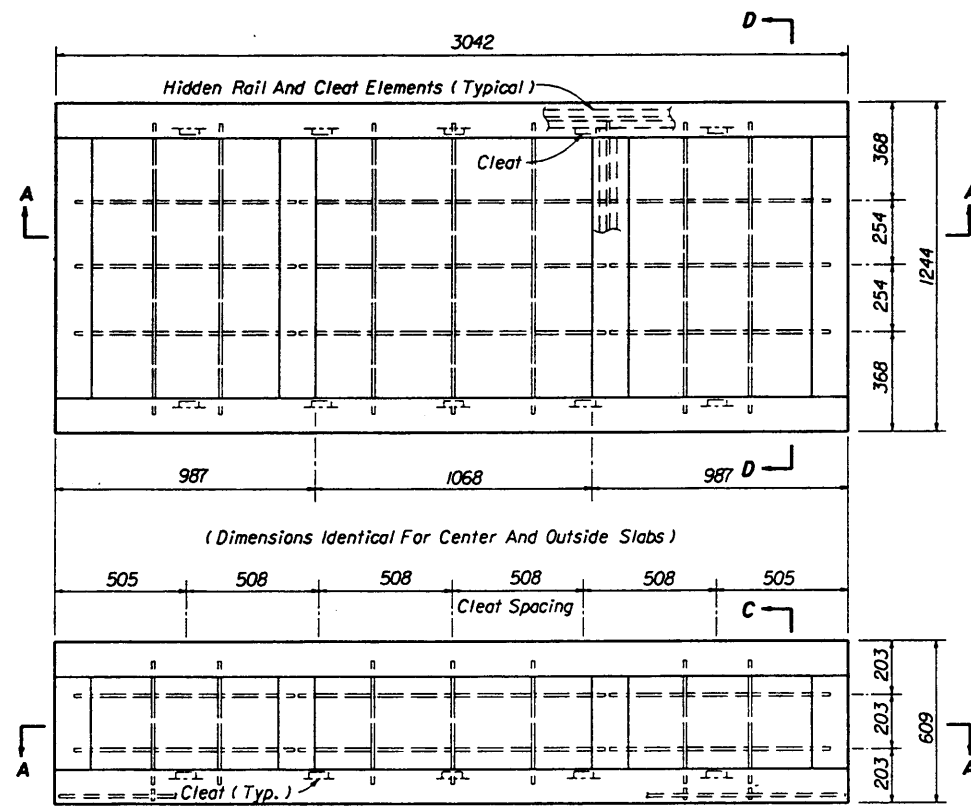
TYPE T

TYPES T & RS

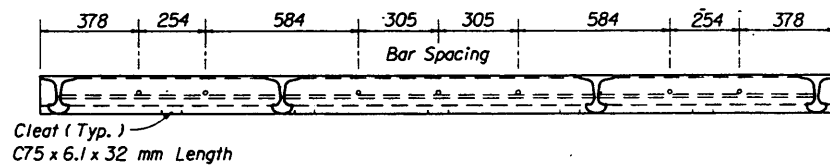


PLAN VIEW

TYPICAL 13.5 CROSSING

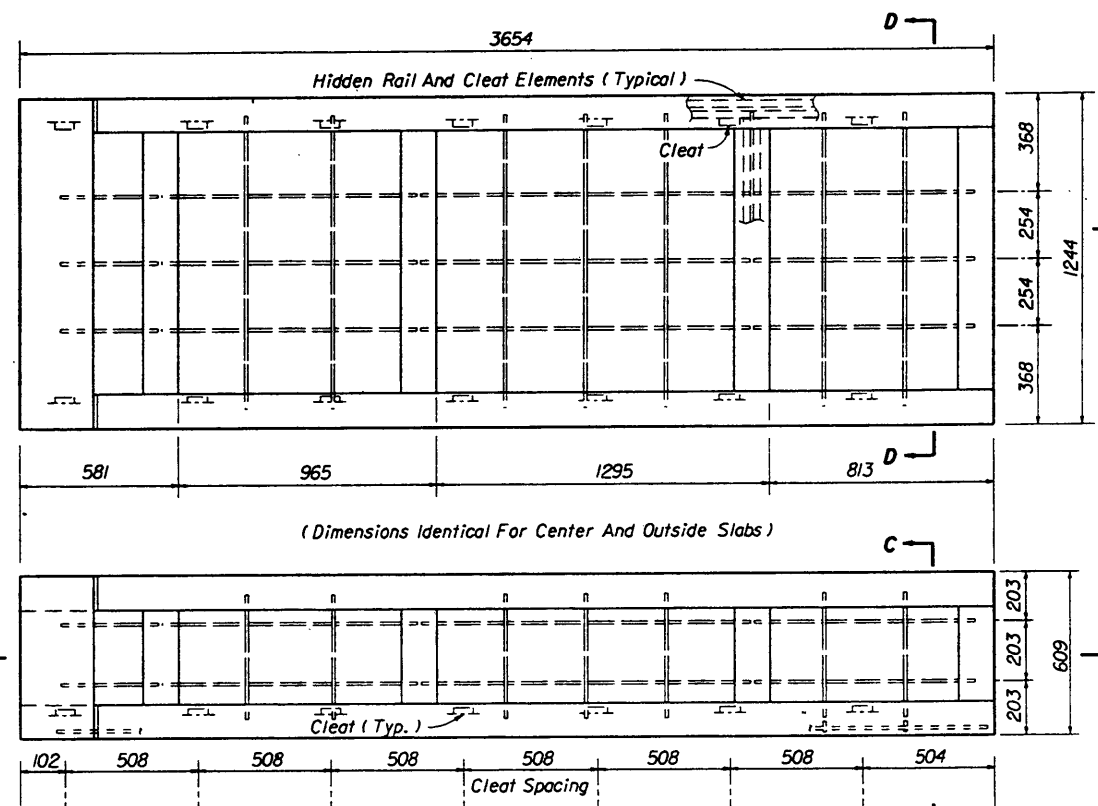


TOP VIEWS-CENTER SLAB AND OUTSIDE SLAB

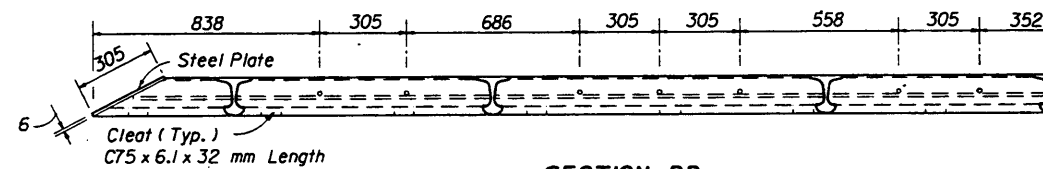


SECTION AA

STANDARD SLABS (PRECAST CONCRETE)

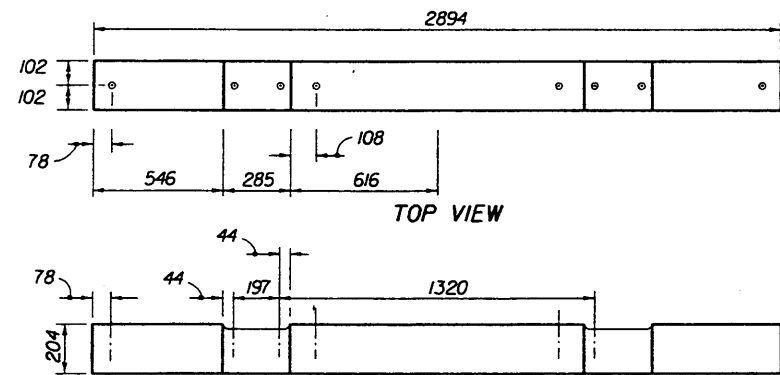


TOP VIEWS - CENTER SLAB AND OUTSIDE SLAB



SECTION BB

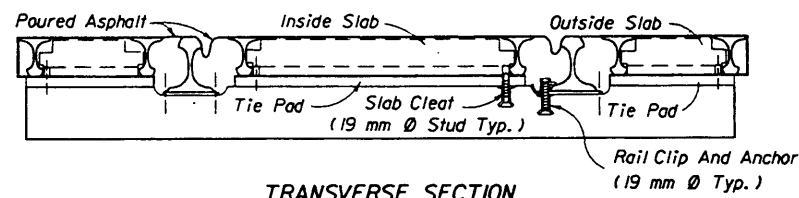
RAMP SLABS (PRECAST CONCRETE)



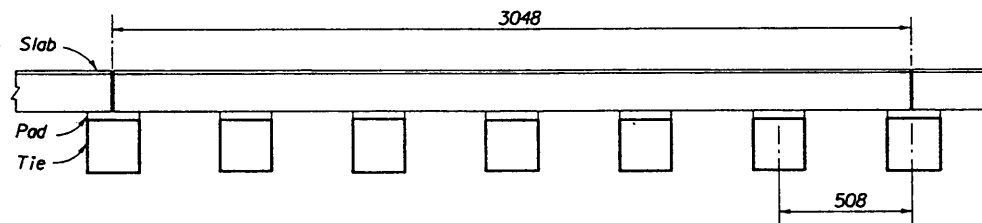
TOP VIEW

SIDE VIEW

PRECAST CONCRETE (CROSSING TIE)

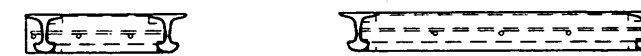


TRANSVERSE SECTION

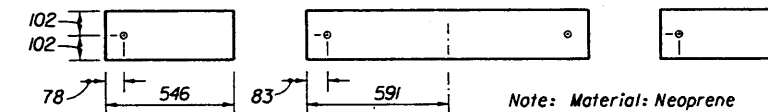


ELEVATION TIE SPACING

TYPE T MODIFIED



SECTION CC SECTION DD  
STANDARD AND RAMP SLAB SECTIONS



TOP VIEW TIE PAD

Note: Material: Neoprene  
Thickness: 25 mm For 65.5 kg/m Rail  
13 mm For 56.9 kg/m Rail

NOTES

- Slab frames are welded 44.6 kg/m rails.
- Slab reinforcement all #13 bars.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

RAILROAD CROSSING

Names	Dates	Approved By	Sheet No.	Index No.
Designed By		<i>Bill Hollaway</i>		
Drawn By	RWR 9/82	Revision	5 of 5	560
Checked By	JVG/JBW 9/82	98		

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# PREFACE

All projects and works on highways, roads and streets shall have a traffic control plan. All work shall be executed under the established plan and Department approved procedures. This index contains information specific to the Federal and State guidelines and standards for the preparation of traffic control plans and for the execution of traffic control in work zones, for construction and maintenance operations and utility work on highways, roads and streets.

Index 600 provides Department policy and standards. Changes are only to be made thru Department approved procedures. Indexes 601 thru 660 provide typical application for various situations. Modification can be made to these indexes as long as the changes comply with the M.U.T.C.D. and Department standards.

The sign spacings shown on the indexes are typical (recommended) distances. These distances may be increased or decreased based on field conditions, in order to avoid conflicts or to improve site specific traffic controls.

# MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES

The Florida Department of Transportation has adopted the "Manual On Uniform Traffic Control Devices For Streets And Highways" (MUTCD) and subsequent revisions and addendums, as published by the U.S. Department of Transportation, Federal Highway Administration, for mandatory use on the State Maintained Highway System whenever there exists the need for construction, maintenance operations or utility work.

# ABBREVIATIONS


























Abbreviations assigned to the 600 series Roadway Design Standards and applicable to traffic control plans, unless otherwise identified in the plans, are as follows:


TCP	Traffic control plan(s)
MUTCD	'Manual On Uniform Traffic Control Devices For Streets And Highways'
TCZ	Traffic control through work zones
L	Taper length, buffer length or taper length plus buffer space
W	Width of taper transition in meters, i.e., lateral offset
S	Posted speed or off-peak 85 percentile speed (converted to km/h)
RPM	Raised reflectorized pavement marker
TMA	Truck mounted attenuator
COMM	Traffic Control Standards Committee

# SYMBOLS

The symbols shown are found in the Traffic Control Zone Cell Library (TCZ.cel) on the CADD system.

Symbols assigned to the 600 series Roadway Design Standards and applicable to traffic control plans, unless otherwise identified in the plans, are as follows:

-  Work Area, Hazard Or Work Phase (Any pattern within a boundary)
-  Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
-  Type I Or Type II Barricade Or Vertical Panel Or Drum
-  Type I Or Type II Barricade Or Vertical Panel Or Drum (With Flashing Light At Night Only)
-  Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only).
-  Type I Or Type II Barricade Or Vertical Panel Or Cone Or Tubular Marker Or Drum
-  Cone Or Tubular Marker
-  Type I, Type II Or Type III Barricade Or Vertical Panel Or Drum
-  Type I, Type II Or Type III Barricade Or Vertical Panel Or Drum (With Flashing Light)
-  Type I, Type II Or Type III Barricade Or Vertical Panel Or Drum (With Steady Burning Light)
-  Type III Barricade
-  Type III Barricade (With Flashing Light)
-  Type III Barricade (With Steady Burning Light)
-  Work Zone Sign
-  Flagger
-  Traffic Signal
-  Advance Warning Arrow Panel
-  Portable Signal
-  Crash Cushion
-  Stop Bar
-  Work Vehicle With Flashing Beacon
-  Shadow (S) Or Advance Warning (AW) Vehicle With Advance Warning Arrow Panel And Warning Sign
-  Truck Mounted Attenuator (TMA)
-  Orange Flag For TCZ Signs
-  Type B Light For TCZ Signs

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES <b>GENERAL INFORMATION FOR TRAFFIC CONTROL THROUGH WORK ZONES</b>				
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## DEFINITIONS

### Regulatory Speed (In Work Zones)

The maximum permitted travel speed posted for the work zone as indicated by the regulatory speed limit signs. The work zone speed must be shown or noted in the plans. This speed should be used as the minimum design speed to determine runout lengths, departure rates, flare rates, lengths of need, clear widths, taper lengths, crash cushion requirements, marker spacings, superelevation and other similar features.

### Advisory Speed

The maximum recommended travel speed through a curve or a hazardous area.

### Travel Way

The intended path for vehicular traffic through or around obstructions in construction, maintenance, utility and other work zones on highways, roads and streets. For traffic control through work zones, travel way includes auxiliary lanes, shoulders and any other permanent or temporary surface intended for the path of vehicular traffic.

### Detour

A detour is the redirection of traffic onto another roadway to bypass the temporary traffic control zone. A lane shift is the redirection of traffic onto a different section of the permanent pavement. A diversion is the redirection of traffic onto a temporary roadway, usually adjacent to the permanent roadway and within the limits of the right-of-way.

### Above Ground Hazard

An above ground hazard is any object, material or equipment other than traffic control devices that encroaches upon the travel way or that is located within the clear zone which does not meet the Department's safety criteria, i.e., anything that is greater than 100 mm in height and is firm and unyielding or doesn't meet breakaway requirements.

## EXTENDED DISTANCE ADVANCE WARNING SIGNS

Advance Warning Signs shall be used at extended distance of one-half mile or more when limited sight distance or the nature of the obstruction may require a motorist to bring their vehicle to a stop. Extended distance Advanced Warning Signs may be required on any type roadway, but particularly be considered on multi-lane divided highways where vehicle speed is generally in the higher range (45 M.P.H. or more).

## REGULATORY SPEEDS IN WORK ZONES

Traffic Control Plans (TCPs) for all projects must include specific regulatory speeds for each phase of work. This can either be the posted speed or a reduced speed. The speed shall be noted in the TCPs; this includes indicating the existing speed if no reduction is to be made. Regulatory speeds are to be uniformly established through each phase.

In general, the regulatory speed should be established to route vehicles safely through the work zone as close to normal highway speed as possible. The regulatory speed should not be reduced more than 10 mph below the posted speed and never below the minimum statutory speed for the class of facility. When a speed reduction greater than 10 mph is imposed, the reduction is to be done in 10 mph per 150 m increments.

Temporary regulatory speed signs shall be removed as soon as the conditions requiring the reduced speed no longer exist. Once the work zone regulatory speeds are removed, the regulatory speed existing prior to construction will automatically go back into effect unless new speed limit signing is provided for in the plans.

On projects with interspaced work activities, speed reductions should be located in proximity to those activities which merit a reduced speed, and not "blanketed" for the entire project. At the departure of such activities, the normal highway speed should be posted to give the motorist notice that normal speed can be resumed.

If the existing regulatory speed is to be used, consideration should be given to supplementing the existing signs when the construction work zone is between existing regulatory speed signs. For projects where the reduced speed conditions exist for greater than 1.6 kilometers in rural areas (non-interstate) and on rural or urban interstate, additional regulatory speed signs are to be placed at no more than 1.6 kilometer intervals. Engineering judgement should be used in placement of the additional signs. Locating these signs beyond ramp entrances and beyond major intersections are examples of proper placement. For urban situations (non-interstate), additional speed signs are to be placed at a maximum of 300.0 meters apart.

When field conditions warrant speed reductions different from those shown in the TCP the contractor may submit to the project engineer for approval by the Department, a signed and sealed study to justify the need for further reducing the posted speed, or, the engineer may request the District Traffic Operations Engineer (DTOE) to investigate the need. It will not be necessary for the DTOE to issue regulations for regulatory speeds in work zones due to the revised provisions of F.S. 316.0745(2)(b). Advisory Speed plates will be used at the option of the field engineer for temporary use while processing a request to change the regulatory speed specified in the plans when deemed necessary. Advisory speed plates cannot be used alone but must be placed below the construction warning sign for which the advisory speed is required.

For additional information refer to the FDOT Roadway Plans Preparation Manual, Volume 1, Chapter 10.

## ADJOINING AND/OR OVERLAPPING WORK ZONE SIGNING

Adjoining work zones may not have sufficient spacing for standard placement of signs and other traffic control devices in their advance warning areas or in some cases other areas within their traffic control zones. Where such restraints or conflicts occur or are likely to occur, one of the following methods will be employed to avoid conflicts and prevent conditions that could lead to misunderstanding on the part of the traveling public as to the intended travel way by the traffic control procedure applied:


- For scheduled projects the engineer in responsible charge of project design will resolve anticipated work zone conflicts during the development of the project traffic control plan. This may entail revision of plans on preceding projects and coordination of plans on concurrent projects.
- Unanticipated conflicts arising between adjoining in progress highway construction projects will be resolved by the Resident Engineer for projects under his residency, and, by the District Construction Engineer for in progress projects under adjoining residencies.
- The District Maintenance Engineer will resolve anticipated and occurring conflicts under the following work zone conditions.
  - Within scheduled maintenance operations.
  - Between scheduled maintenance operations, maintenance construction, permitted works and/or in progress highway construction projects.
- The Unit Maintenance Engineer will resolve conflicts that occur within routine maintenance works; between routine maintenance work, unscheduled work and/or permitted work; and, between unit controlled maintenance works and highway construction projects.

## INTERSECTING ROAD SIGNING

Signing for the control of traffic entering and leaving work zones by way of intersecting highways, roads and streets shall be adequate to make drivers aware of work zone conditions. Under no condition will intersecting leg signing be less than a ROAD WORK AHEAD sign, including light and flag, for approaching vehicles.

## SIGNALS

Existing traffic signal operations that require modification in order to carry out work zone traffic control shall be included in the TCP and be approved by the District Traffic Operations Engineer. The need for temporary signal loops or other methods of actuation shall be determined by the District Traffic Operations Engineer and the designer and included in the TCP.

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## CHANNELIZING AND LIGHTING DEVICES

Channelizing and lighting devices for work zone traffic control shall be as prescribed in Part VI of the MUTCD, subject to supplemental revisions provided in the contract documents.

Primary work zone traffic control devices are shown on Sheet 8 for the purpose of ready identification. Approved devices are listed on the Departments Qualified Product List.

## DROPOFFS IN WORK ZONES

Acceptable warning and barrier devices for traffic control at dropoffs in work areas are detailed on Sheet 6. Unless otherwise specified in the plans, the contractor may use any of the barrier types shown in note 3 on sheet 6.

## WARNING LIGHTS

Warning lights shall be in accordance with Section 6F-7 of the MUTCD except for the application limitations and methods of payment stipulated below:

### Flashing

Type A Low Intensity Flashing Warning Lights are to be mounted on barricades, drums, vertical panels or advance warning signs (except as noted below) and are intended to continually warn drivers that they are approaching or proceeding in a hazardous area. Flashing lights shall not be used to delineate the intended path of travel, and not placed with spacings that will form a continuous line to the drivers eye. The Type A light will be used to mark obstructions that are located adjacent to or in the intended travel way. Type A lights shall not be used in conjunction with the first advance warning sign nor the second such sign when used.

Type B High Intensity Flashing Warning Lights shall be mounted on the first advanced warning sign and on the first and second advanced warning sign where two or more signs are used; this applies to all approaches to any work zone.

### Steady-Burn

Type C Steady-Burn Lights are to be mounted on barricades, drums, concrete barrier walls or vertical panels and used in combination with those devices to delineate the travel way on lane closures, lane changes, detour curves and other similar conditions. Steady-burn lights are intended to be placed in a line to delineate the traveled way through and around obstructions in the transition, buffer, work and termination areas of the traffic control zone. Their intended purpose is not for warning drivers that they are approaching or proceeding through a hazardous area.

## SIGHT DISTANCE TO DELINEATION DEVICES

Transition tapers should be obvious to drivers. If restricted sight distance is a problem (e.g., a sharp vertical or horizontal curve), the taper should begin well in advance of the view obstruction. The beginning of tapers should not be hidden behind curves.

## CHANNELIZING AND LIGHTING DEVICE CONSISTENCY

Barricades, vertical panels, cones, tubular markers and drums shall not be intermixed within either the lateral transition or within the tangent alignment.

## FLAGGING OPERATIONS

When operations are such that signs, signals and barricades do not provide adequate protection on or adjacent to a highway or street, flaggers and /or other appropriate traffic control shall be provided. Flagger station(s) shall be located far enough ahead of the work space so that approaching traffic has sufficient distance to stop before entering the work space.

Stop /Slow Paddles are the primary hand-signaling device. Flag use is limited to Immediate Emergencies, Intersections, and when working on centerline or shared left turn lanes where two (2) flagmen are required and there is opposing traffic in the adjacent traffic lanes. Where Flagmen are used, a FLAGMAN symbol or legend sign must replace the WORKERS symbol or legend sign.

## NIGHTTIME FLAGGING

Nighttime flagging will require proper illumination of the flagger. A well lighted flagging station and/or a reflectorized paddle or reflectorized flag; plus a flashlight, lantern or other lighted signal that will display a red warning light shall be used. Lights, reflectorized paddles, reflectorized flags and reflectorized vests, shirts or jackets approved by the Department must be used to flag traffic at night. The STOP face of paddles shall be reflectorized red with white reflectorized letters and border, and the SLOW face shall be reflectorized orange with black letters and border. Flagger vests, shirts or jackets shall be reflectorized orange.

The flagger must be clearly visible to approaching traffic for a distance sufficient to permit proper response by the motorist to the flagging instructions, and to permit traffic to reduce speed or to stop as required before entering the work site. Flaggers shall be positioned to maintain maximum color contrast between the flaggers reflective garments and equipment and the work area background.

## REMOVING PAVEMENT MARKINGS


Existing pavement markings that conflict with temporary work zone delineation shall be removed by any method approved by the Engineer, where operations exceed one daylight period; however, painting over existing pavement markings will not be permitted. Full pavement width overlays of either asphalt concrete Type III, or FC-3 is a positive means to achieve obliteration.

## SUPERELEVATION

Horizontal curves constructed in conjunction with work zone traffic control should have the required superelevation applied to the design radii. Under conditions where normal cross slope controls curvature, the minimum radii that can be applied are listed in the table below.

MINIMUM RADII FOR NORMAL CROSS SLOPES		
DETOUR DESIGN SPEED		MINIMUM RADIUS R
MPH	km/h	meter
65	110	955.0
60	100	730.0
55	90	560.0
50	80	425.0
45	70	330.0
40	60	250.0
35	60	185.0
30	50	130.0

Superelevate When Smaller Radii Used

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## END ROAD WORK SIGNS

The END ROAD WORK sign (G20-2) should be erected approximately 150 meters beyond the end of a construction or maintenance project, unless other distance called for in the plans. Where other Construction or Maintenance Operations occur within 1.6 kilometers this sign should be omitted and signing coordinated in accordance with Index No. 600, ADJOINING AND/OR OVERLAPPING WORK ZONE SIGNING.

## DETOURS

Detours should be signed clearly over their entire length so that motorists can easily determine how to return to the original roadway. The W1-4r, MOT-2, and MOT-3 warning signs are to be used for the advanced warning for a lane shift. A diversion should be signed as a lane shift.

## VARIABLE MESSAGE SIGNS (VMS)

The VMS can be used to:

- (1) Supplement standard signing in construction/maintenance work zones.
- (2) Reinforce static advance warning messages.
- (3) Provide motorists with updated guidance information.

The message should be visible and legible at a minimum distance of 270.0 meters. All messages should be cycled so that two message cycles are displayed to a driver while approaching the sign from 270.0 meters at 55 mph.

VMS should be placed approx. 150.0 to 240.0 meters in advance of the work zone conflicts or 2.4 to 3.2 kilometers in advance of complex traffic control schemes which require new and/or unusual traffic maneuvers.

If VMS are to be used at night, the intensity of the flashers shall be reduced during darkness when lower intensities are desirable.

For additional information refer to the FDOT Roadway Plans Preparation Manual, Chapter 10.

## ROADSIDE BARRIERS

When connecting temporary concrete barrier wall to guardrail the connection shall be made in accordance with Index No. 410. All guardrail end anchorages to be included in the cost of Temporary Guardrail.

## ABOVE GROUND HAZARD

Above ground hazards (see definitions) are to be considered work areas during working hours and treated with appropriate work zone traffic control procedures. During non-working hours, all objects, materials and equipment that constitute an above ground hazard must be stored/placed outside the travel way and clear zone or be shielded by a barrier or crash cushion.

For above ground hazards within a work zone the clear zone required should be based on the regulatory speed posted during construction.

## WORK ZONE SIGN SUPPORTS

All post mounted Work Zone signs shall be installed on either round aluminum or steel channel post as specified in the table below.

SUPPORTS FOR MAINTENANCE OF TRAFFIC SIGNS					
SIGN SIZE	SIGN BRACKET	ROUND ALUMINUM	DEPTH IN GROUND	STEEL CHANNEL	DEPTH IN GROUND
600 x 900	2-I	NPS 50.8 x 3.2	610	1.13 kg F/M*	900
1200 x 1200 DIAMOND	2-I & 1-II	NPS 88.9 x 4.8	1000	**	900
1500 x 1200	3-I	NPS 88.9 x 4.8	1000	**	900
600 x 750	2-I	NPS 50.8 x 3.2	610	1.13 kg F/M*	900
1200 x 1200	2-II	NPS 76.2 x 3.2	762	**	900
1500 x 600	3-I	NPS 76.2 x 3.2	762	1.36 kg F/M*	900
1500 x 900	3-I	NPS 88.9 x 4.8	1000	1.81 kg F/M*	900

\* F/M Indicates Type F or Type M

\*\* Requires two 1.36 kg/m steel channel (F/M) at 762 mm center to center. All sign brackets shall be Type I. The total number of brackets shall be per post as tabulated, except the "Diamond" sign which shall use two Type I brackets per post.

The 1.81 kg/m steel channel shall be installed with approved breakaway bases. Refer to Design Standard 11860, Sheet 2, for round aluminum sign bracket details, and 11865 Sheet 1 for steel channel breakaway bases; and notes.

## CLEAR ZONE WIDTHS

The term 'clear zone' describes the unobstructed relatively flat area, impacted by construction, extending outward from the edge of the travel lane. The table below gives clear zone widths in work zones for medians and roadside conditions other than for roadside canals; where roadside canals are present, clear zone widths are to conform with the distances to canals as described in Ch. 4, Sec. 4.2 and Exhibit 1-4-B of the Plans Preparation Manual.

CLEAR ZONE WIDTHS FOR WORK ZONES		
WORK ZONE SPEED (MPH)	WORK ZONE SPEED (km/h)	WIDTHS (meters)
60-70	100-110	9.0
55	90	7.2
45-50	70-80	5.4
30-40	50-60	4.2
ALL SPEEDS CURB & GUTTER	ALL SPEEDS CURB & GUTTER	1.2 BEHIND FACE OF CURB

## SIGN MATERIALS

Mesh signs may be used only for Daylight Operations as noted in the standards. Type B Lights and Orange Flags are not required.

Vinyl signs may be used for Day or Night Operations not to exceed 12 hours except as noted in the standards. Type B Lights and Orange Flags are not required.

All signs shall be post mounted if operation exceeds 12 hours except as noted in the standards.

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## SURVEY WORK ZONES

The SURVEY CREW AHEAD symbol or legend sign shall be the principal Advance Warning Sign used for Traffic Control Through Survey Work Zones and may replace the ROAD WORK AHEAD sign when lane closures occur, at the discretion of the Party Chief. Type B Light or dual orange flags shall be used at all times to enhance the SURVEY CREW AHEAD sign, even with mesh signs.

When Traffic Control Through Work Zones is being used for Survey purposes only, the END ROAD WORK sign as called for on certain 600 Series Indexes should be omitted.

### Survey Between Active Traffic Lanes or Shared Left Turn Lanes

The following provisions apply to Main Roadway Traffic Control Workzones. These provisions must be adjusted by the Party Chief to fit roadway and traffic conditions when the Survey Workzone includes Intersections.

- (A) A STAY IN YOUR LANE (MOT-1) sign shall be added to the Advance Warning Sign sequence as the second most immediate sign from the work area.
- (B) Elevation Surveys-Cones may be used at the discretion of the Party Chief to protect prism holder and flagger(s). Cones, if used, may be placed at up to 15m intervals along the break line throughout the workzone.
- (C) Horizontal Control-With traffic flow in the same direction, cones shall be used to protect the backsight tripod and/or instrument. Cones shall be placed at the equipment, and up to 15m intervals for at least 60m towards the flow of traffic.
- (D) Horizontal Control-With traffic flow in opposite directions, cones shall be used to protect the backsight tripod and/or instrument. Cones shall be placed at the equipment, and up to 15m intervals for at least 60 meters in both directions towards the flow of traffic.

## PEDESTRIANS AND BICYCLIST

When an existing pedestrian way or bicycle way is located within a traffic control work zone, accommodation must be maintained and include provision for the disabled.

## RAILROADS

Railroad crossings affected by a construction project should be evaluated for traffic controls to reduce queuing on the tracks. The evaluation should include as a minimum: traffic volumes, distance from the tracks to the intersections, lane closure or taper locations, signal timing, etc.

## SIGN COVERING AND INTERMITTENT WORK STOPPAGE SIGNING

Existing signs that conflict with temporary work zone signing shall be removed or covered as approved by the engineer. Traffic control signs that require covers when no work is being performed in a work area shall be fully covered with a durable opaque sheet material.

Plastic film and woven fabrics including burlap will not be permitted.

Covering of only the legend or symbol will not be permitted.

Reflective coverings will not be permitted.

Hinged signs designed to cover when folded and sign blanks will be permitted.

Covers, blanks, hinged panels and intermittent work stoppage shields and plaques are incidental to work operation signs and are not to be paid for separately.

## LANE WIDTHS

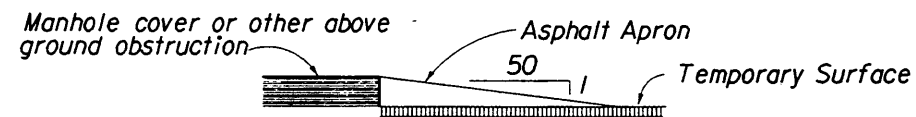
Lane widths of through roadways should be maintained through work zone travel ways wherever practical. The minimum widths for work zone travel lanes shall be as follows: 3.3 meters for Interstate with at least one 3.6 meter lane provided each direction, unless formally excepted by the Federal Highway Administration; 3.3 meters for freeways; and 3.0 meters for all other facilities.

## LENGTH OF ROAD WORK SIGN

The length of road work sign (G20-1) bearing the legend ROAD WORK NEXT \_\_\_\_\_ MILES is required for all projects of more than 3.2 kilometers in length. The number of miles entered should be rounded up to the nearest mile. The sign shall be located at begin construction points

## MANHOLES/CROSSWALKS

Manholes extending 25mm or more above the travel lane and crosswalks having an uneven surface greater than 13mm shall have a temporary asphalt apron constructed as shown in the diagram below.



The apron is to be removed prior to constructing the next lift of asphalt. The cost of the temporary asphalt shall be included in 2102-1, Lump Sum Maintenance of Traffic.

## TRUCK MOUNTED ATTENUATORS

Truck-mounted attenuators (TMA) can be used for moving operations and short-term stationary operations. For moving operations, see Index No. 627. For short term, stationary operations, see Part VI of the MUTCD.

## SPEEDING FINES DOUBLED WHEN WORKERS PRESENT SIGN

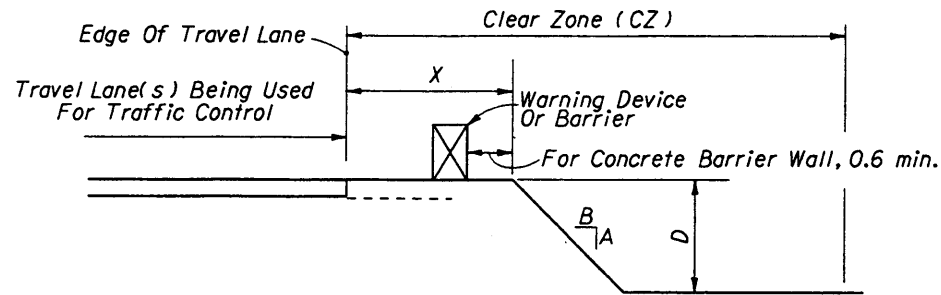
The SPEEDING FINES DOUBLED WHEN WORKERS PRESENT sign should be installed on all projects.

The placement should be 150 m beyond the ROAD WORK AHEAD sign or midway to the next sign whichever is less.

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## DROPOFF CONDITION

1. A dropoff is defined as a drop in elevation, parallel to the adjacent travel lanes, greater than 75 mm with slopes (A:B) steeper than 1:4. When dropoffs occur within the clear zone during construction or maintenance activities, protection devices will be required, see chart.
2. Distance X is to be the maximum practical under project conditions.
3. Distance from the travel lane to the barrier or warning device should be maximum practical for project conditions.
4. Any dropoff condition that is created and restored within the same work period will not be subject to the use of barriers; however, warning devices will be required.
5. When permanent curb heights are  $\geq 150\text{mm}$ , no warning device will be required. For curb heights  $< 150\text{mm}$ , see chart.



DROPOFF PROTECTION REQUIREMENTS ALL SPEEDS NO CURB AND GUTTER		
X (m)	D (mm)	Device Required
0-CZ	$\leq 75$	Sign W8-9AS
0-3.6	$> 75$	Barrier
3.6-CZ	$> 75$ to $\leq 125$	Warning Device
0-CZ	$> 125$	Barrier

For Clear Zone widths, see Index No. 600 sheet 4.

## DROPOFF NOTES

1. These conditions and treatments can be applied only in work areas that fall within a properly signed work zone.
2. The following are defined as acceptable warning devices:
  - a. Vertical Panel
  - b. Type I Or Type II Barricades
  - c. Drum
  - d. Cone (where allowed)
  - e. Tubular Marker (where allowed)
3. Where a barrier is specified any of the types below may be used as shown in the plans:
  - a. Concrete temporary barrier wall;
  - b. Temporary guardrail and end anchorages;
  - c. Temporary Curb;
  - d. Temporary water filled barriers.
4. Warning device spacing shall be as follows:
  - A. On Taper  
Maximum spacing between cones and tubular markers shall be 7.5 m. Maximum spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows:  
5.0 m up to 25 MPH; 10.0 m for 30 MPH - 40 MPH;  
15.0 m for 45 MPH and greater.
  - B. On Alignments  
Maximum spacing between cones or tubular markers shall be 7.5 m. and for Type I or Type II barricades, vertical panels or drums is 15.0 m on center for the first 75.0 m; thereafter, cones or tubular markers at 15.0 on center and Type I or Type II barricades drums or vertical panels at 30.0 m on center.

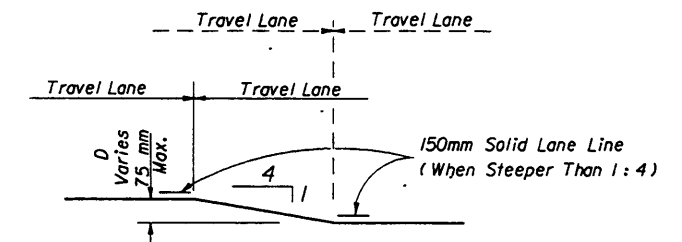
# DROPOFFS IN WORK ZONES



## NOTES

1. The contractor may use shoulder treatment in lieu of barrier. Warning devices are required.
2. Daily inspections shall be conducted to assure that no erosion, excessive slopes, rutting, or other adverse conditions exist. Any deficiencies shall be repaired immediately.
3. Compensation for the placement and removal of the material required for the shoulder treatment shall be included in the cost for Maintenance Of Traffic, LS. Use of shoulder treatment in lieu of a barrier is not eligible for VECP consideration.

## SHOULDER TREATMENT

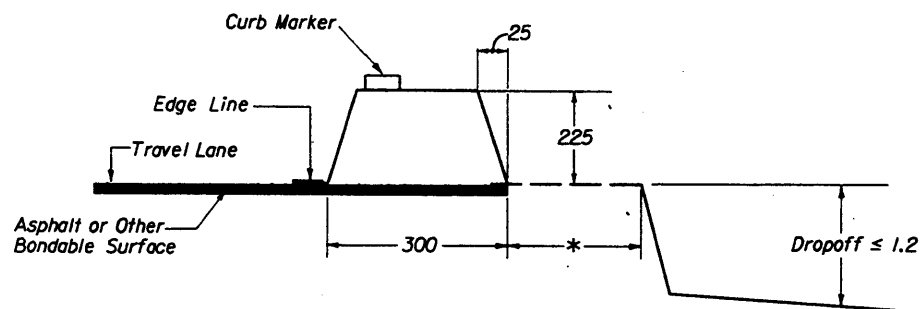


## NOTES

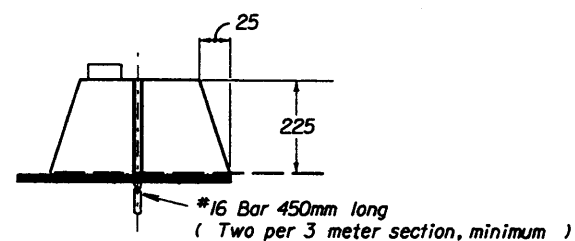
1. This treatment applies to resurfacing or milling operations between adjacent travel lanes.
2. Whenever there is a difference in elevation between adjacent travel lanes, the W8-9A sign with "UNEVEN PAVEMENT" plaque is required at intervals of 0.8km maximum.
3. If D is 40 mm or less, no treatment is required.
4. Treatment allowed only when D is 75 mm or less.
5. If the slope is steeper than 1:4 (not to be steeper than 1:1), the R4-1 and MOT-1 signs shall be used as a supplement to the W8-9A; this condition should never exceed 5 km ( $\pm 3$  miles) in length.

## TRAVEL LANE TREATMENT FOR MILLING OR RESURFACING

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES GENERAL INFORMATION FOR TRAFFIC CONTROL THROUGH WORK ZONES				
Names	Dates	Approved By		
Designed By	12/87	Special Projects Engineer		
Drawn By	12/87	Revision	Sheet No.	Index No.
Checked By	12/87	98	6 of 11	600

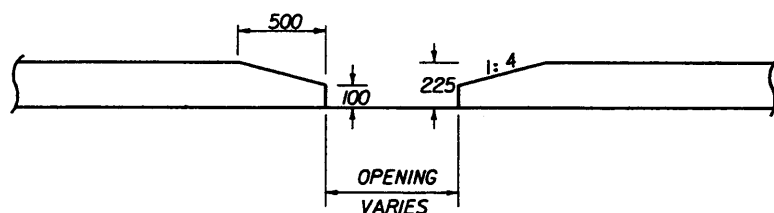


TEMPORARY CURB DETAIL

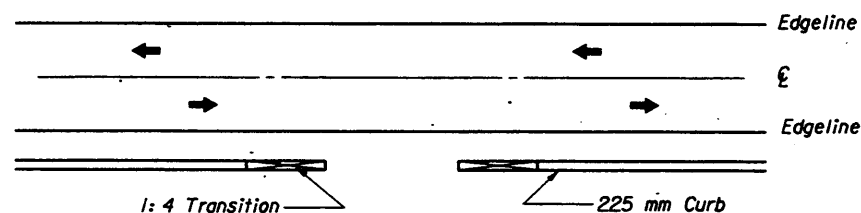


PINNING DETAIL

\* 300 millimeters ( or more ) is desirable in order to enhance/improve stability. However, it is recognized that there may be cases where 300 millimeters ( or more ) is not feasible or obtainable. In these instances, engineering judgement must be used to balance this offset distance with the depth of dropoff, soil type, etc.



LONGITUDINAL SECTION



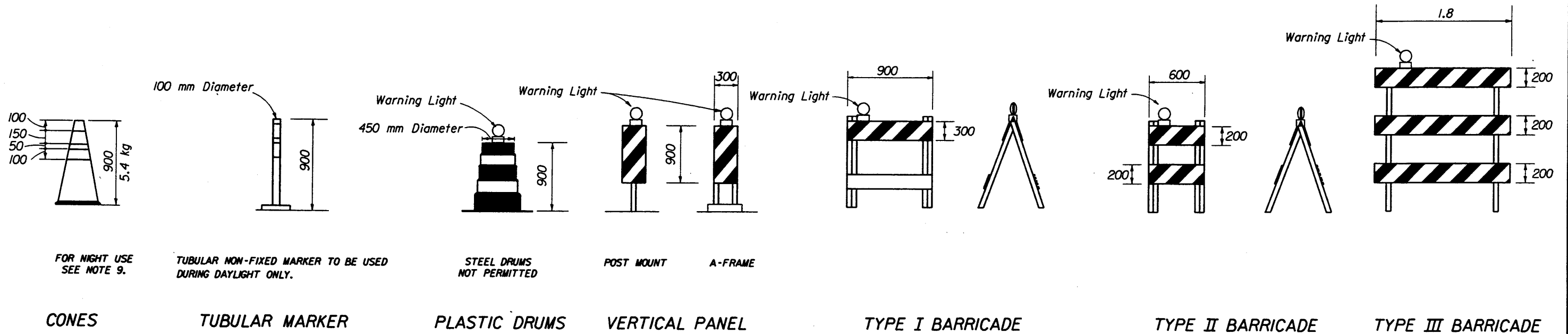
PLAN VIEW

TEMPORARY CURB OPENINGS

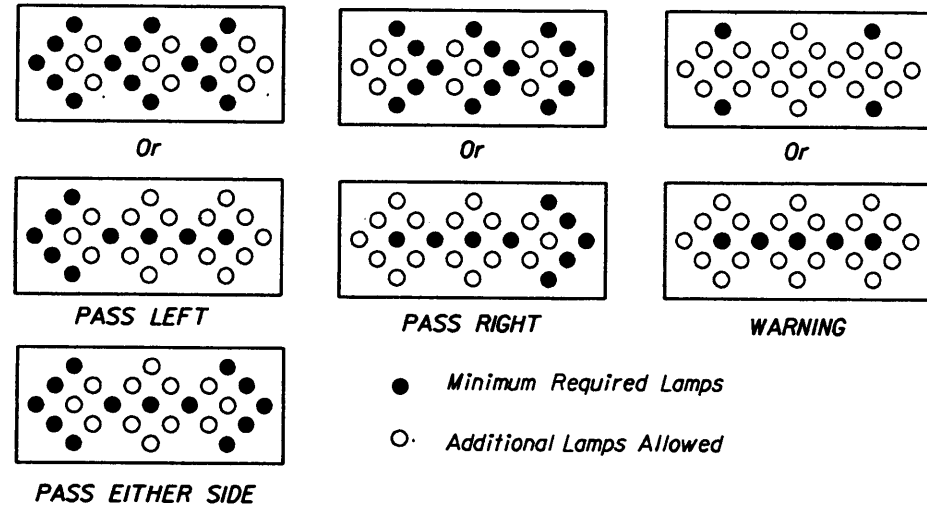
TEMPORARY CURB

1. Application: Temporary curb shall not be used on facilities with posted speeds greater than 45 mph or dropoffs greater than 1.2 meters deep. It shall not be used on Interstate or limited access facilities.
2. Edgelines shall be provided in accordance with the traffic striping specifications, including reflective beads. The face of the curb shall also be painted (white or yellow as appropriate). A Curb Marker shall be placed on the temporary curb every 3.0 meters (Colorless when curb is on the right side of the lane, and amber when the curb is on the left side of the lane).
3. The temporary asphalt curb is to be bonded to the surface by use of a tack coat. It is important that the curb adhere to the surface in order to provide the strength necessary to redirect errant vehicles. Concrete curb and curb of other approved materials shall be pinned to a paved surface as shown in detail.
4. When temporary curb is call for in the plans the contractor has the option to construct temporary curb of asphalt, Class I concrete, or other Department approved material.
5. When concrete is used to construct temporary curb, 13 mm open joints shall be constructed every 3.0 meters in order to control cracking.
6. Drainage needs must be addressed when using temporary curb. If driveways or other accesses are not frequent enough to allow for water runoff, the designer may need to specify the need for "drainage slots" at an appropriate spacing based on grades, number of lanes, etc. Typically, a drainage slot should be 300 millimeters wide (a break in the curb) at 15.0 meter spacings.
7. At openings such as driveways and business accesses, the temporary curb should be transitioned in height from 100 millimeters up to 225 millimeters at a 1:4 slope in order to eliminate a potential hazard at the end points.
8. Temporary curb shall be paid for under the contract unit price for Temporary Curb, MI, and will include all materials (including Curb Markers) and work necessary to construct, maintain and remove the temporary curb. Any damage to existing pavement caused by the removal of temporary curb shall be satisfactorily repaired and the cost of such repairs are to be included in the cost of the temporary curb.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
GENERAL INFORMATION FOR TRAFFIC CONTROL THROUGH WORK ZONES				
Designed By	Names	Dates	Approved By <i>[Signature]</i> Special Projects Engineer	
Drawn By			Revision	Sheet No.
Checked By			98	7 of 11
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### CHANNELIZING AND LIGHTING DEVICE NOTES

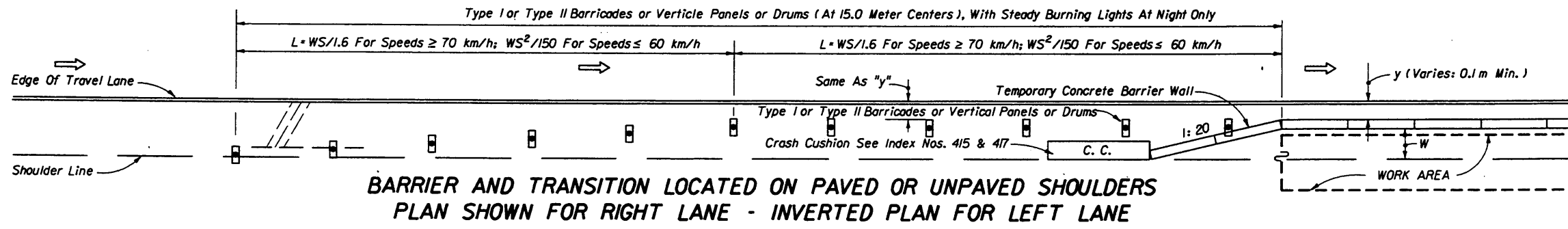


ADVANCE WARNING ARROW PANELS MODES

- Only approved traffic control devices may be used.
- The FDOT approval number shall be engraved on the device at a convenient and readily visible location. Where engraving is not practical a water-resistant type label may be used.
- The details shown on this sheet are for the following purposes: (a) For ease of identification and (b) To provide information that supplements or supersedes that provided by the MUTCD.
- The Type III Barricade shall have a unit length of 1.8 meters only. When barricades of greater lengths are required those lengths shall be in multiples of the 1.8 meter unit. Signs used in conjunction with Type III Barricades may be mounted on or above the Barricade. These Signs should not cover more than 50 percent of the top two rails or 33 percent of the total area of the three rails.
- During hours of darkness, warning lights shall be used on drums, vertical panels, Type I, Type II or Type III barricades.
- Ballast shall not be placed on top rails or any striped rails or higher than 325 millimeters above the driving surface.
- For rails less than 900 millimeters long, 100 millimeter stripes shall be used.
- When Advance Warning Arrow Panels are used at night, the intensity of the flashers shall be reduced during darkness when lower intensities are desirable.
- Cones Shall:
  - Be used only in work zones where workers are present.
  - Not exceed 1.6 km in length of use at any one time nor exceed a 12 hour work period.
  - Have as a minimum, one designated person for the sole purpose of continuous monitoring and maintenance of cones during lane closures.
  - Be reflectorized as per the MUTCD with Department approved reflective collars when used at night.
- The splicing of sheeting is not permitted on either channelizing devices or MOT signs.

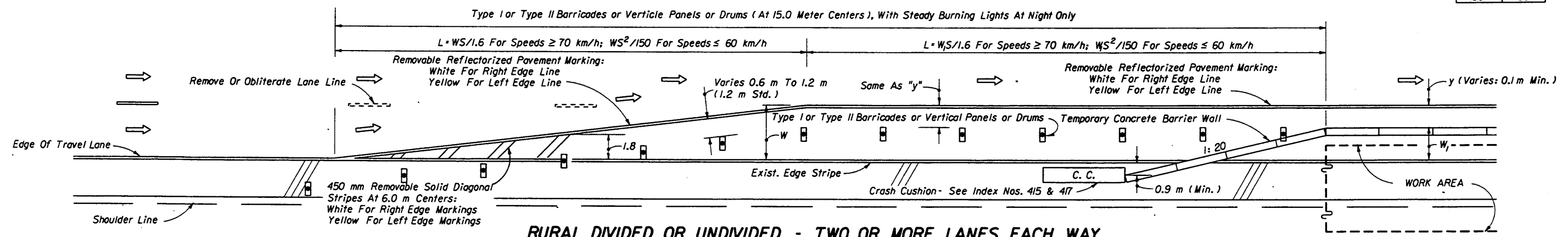
## CHANNELIZING AND LIGHTING DEVICES

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES GENERAL INFORMATION FOR TRAFFIC CONTROL THROUGH WORK ZONES				
Names	Dates	Approved By		
Designed By	12/87	Special Projects Engineer		
Drawn By	12/87	Revision	Sheet No.	Index No.
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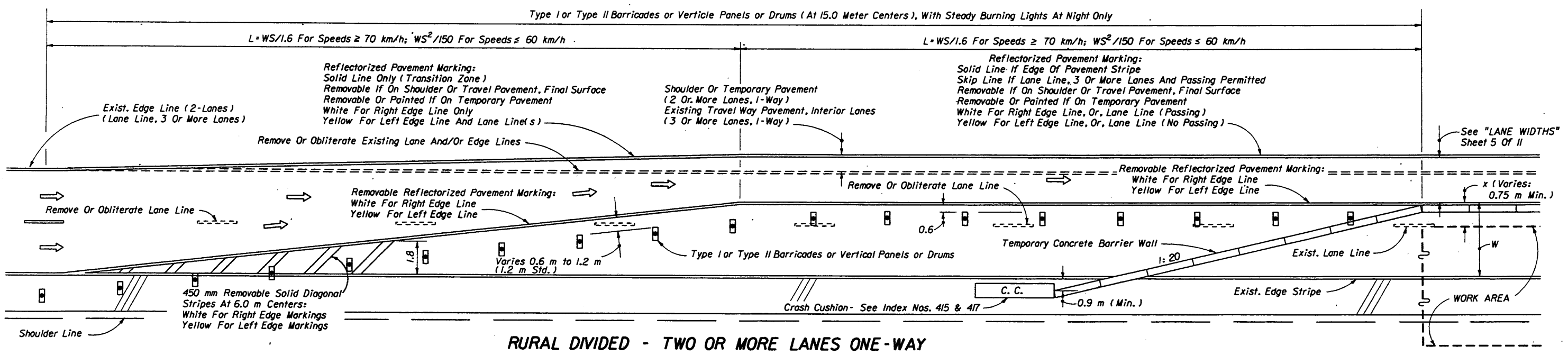


English to Metric Speed Conversion	
MPH	km/h
65	110
60	100
55	90
50	80
45	70
40	60
35	60
30	50

**BARRIER AND TRANSITION LOCATED ON PAVED OR UNPAVED SHOULDERS  
PLAN SHOWN FOR RIGHT LANE - INVERTED PLAN FOR LEFT LANE**



**RURAL DIVIDED OR UNDIVIDED - TWO OR MORE LANES EACH WAY  
LANE DROP • PLAN SHOWN FOR RIGHT LANE MERGE LEFT - INVERTED PLAN FOR LEFT LANE MERGE RIGHT**




**RURAL DIVIDED - TWO OR MORE LANES ONE-WAY  
LANE DROP AND LANE SHIFTS - PLAN SHOWN FOR RIGHT LANE MERGE LEFT - INVERTED PLAN FOR LEFT LANE MERGE RIGHT**

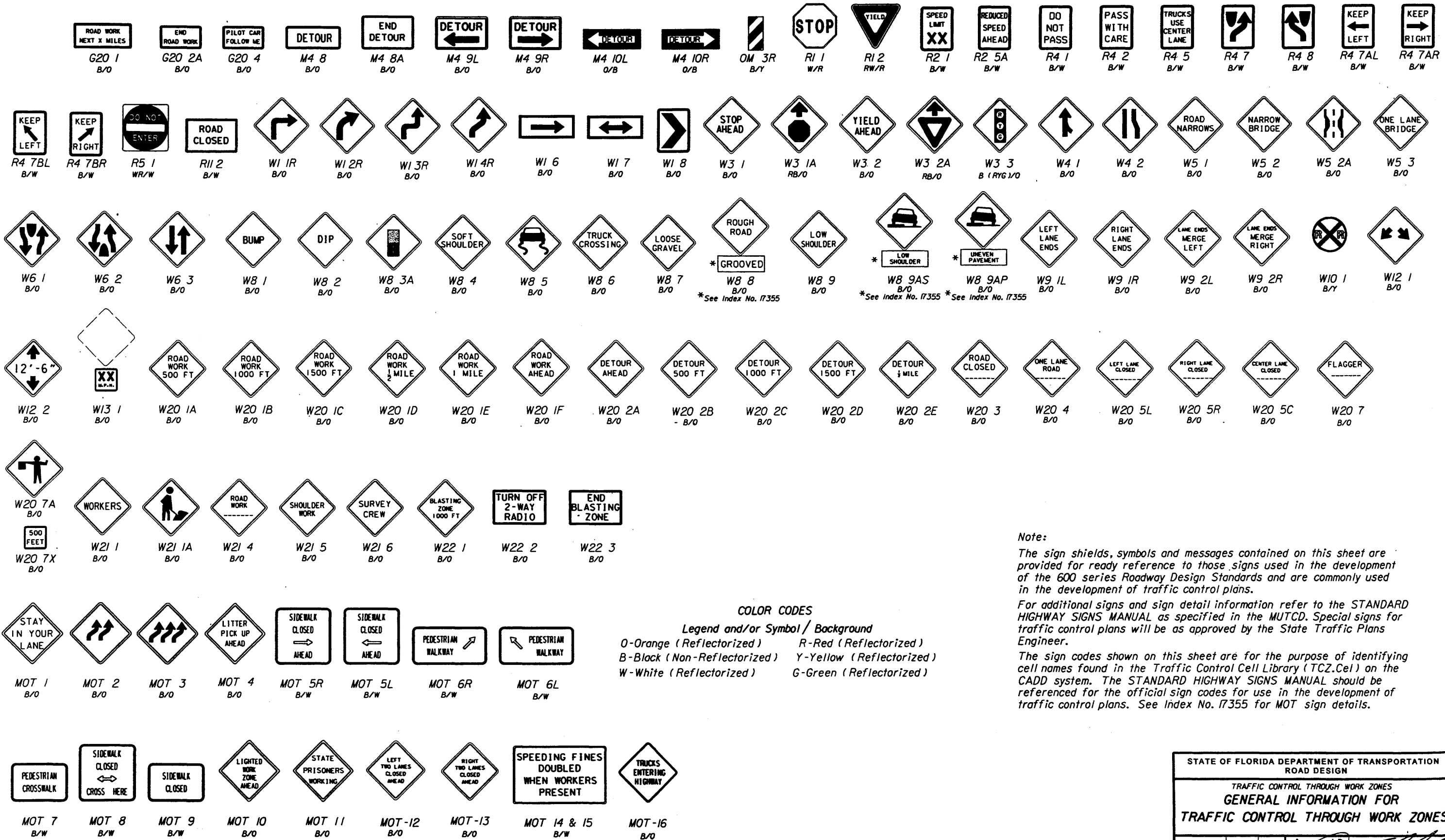
**TRANSITION NOTES**

1. Barrier wall within the transition areas shall have reflective markers mounted on the travel side of the wall, 150 millimeters below the top and on 3.6 meter centers.
2. Arrows denote direction of traffic only and do not reflect pavement markings.
3. For signing information see the Plans, Specifications, MUTCD and other TCZ Standards.

**TRANSITIONS FOR TEMPORARY CONCRETE BARRIER WALL ON FREEWAY FACILITIES**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN			
TRAFFIC CONTROL THROUGH WORK ZONES			
GENERAL INFORMATION FOR TRAFFIC CONTROL THROUGH WORK ZONES			
Names	Dates	Approved By	
Designed By	4/89	 Special Projects Engineer	
Drawn By	4/89		
Checked By	4/89	Revision	Sheet No.
		98	9 of 11
			Index No. 600



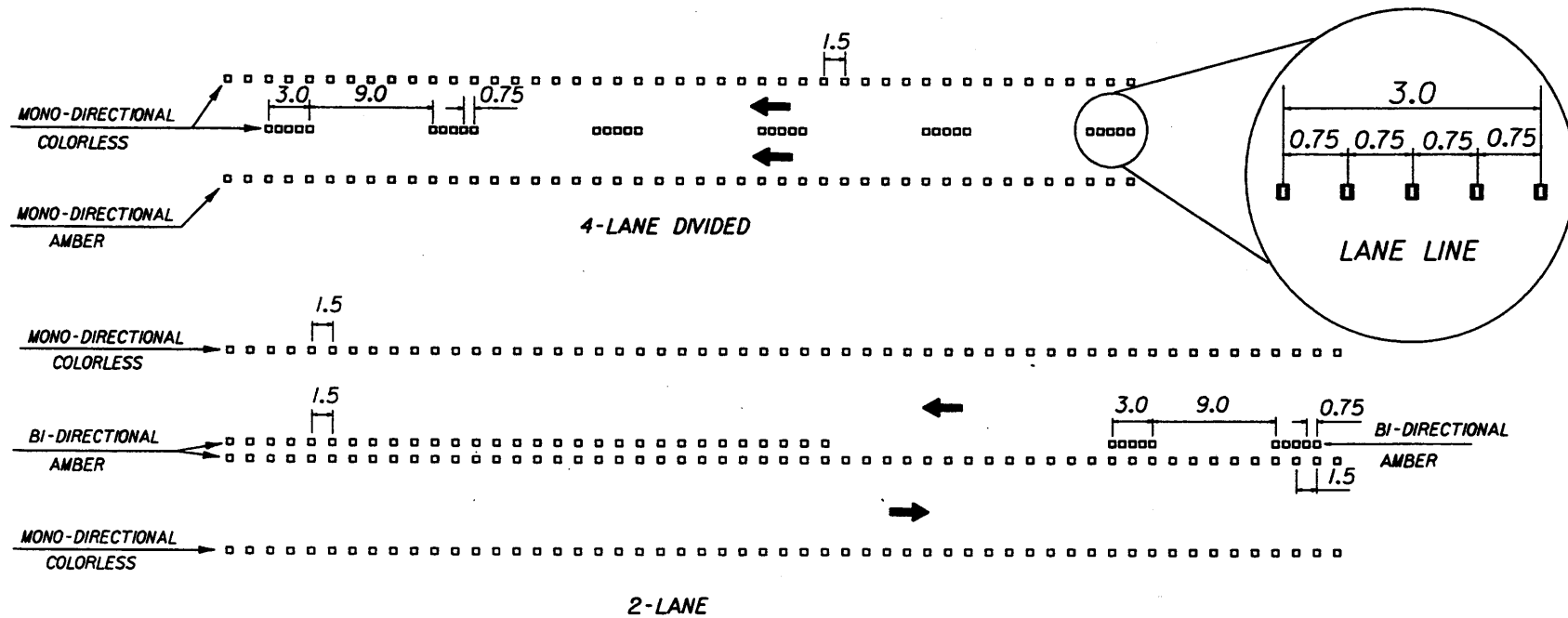


**COLOR CODES**  
 Legend and/or Symbol / Background  
 O-Orange (Reflectorized) R-Red (Reflectorized)  
 B-Black (Non-Reflectorized) Y-Yellow (Reflectorized)  
 W-White (Reflectorized) G-Green (Reflectorized)

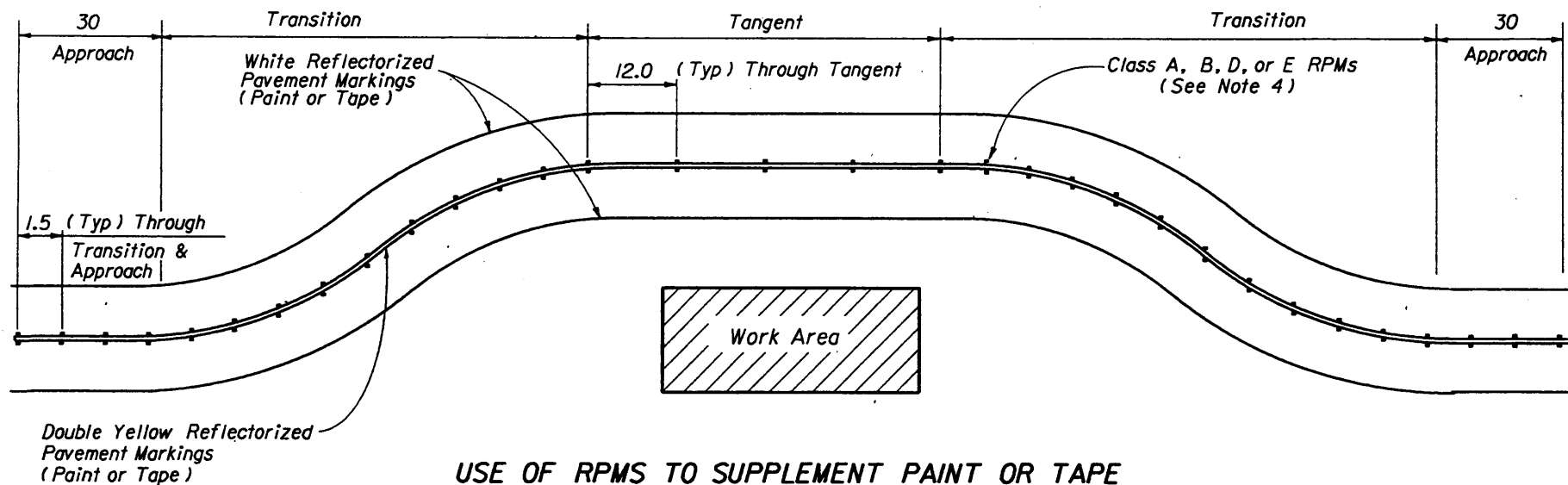
**Note:**  
 The sign shields, symbols and messages contained on this sheet are provided for ready reference to those signs used in the development of the 600 series Roadway Design Standards and are commonly used in the development of traffic control plans.  
 For additional signs and sign detail information refer to the STANDARD HIGHWAY SIGNS MANUAL as specified in the MUTCD. Special signs for traffic control plans will be as approved by the State Traffic Plans Engineer.  
 The sign codes shown on this sheet are for the purpose of identifying cell names found in the Traffic Control Cell Library (TCZ.Cel) on the CADD system. The STANDARD HIGHWAY SIGNS MANUAL should be referenced for the official sign codes for use in the development of traffic control plans. See Index No. 17355 for MOT sign details.

**COMMONLY USED WARNING AND REGULATORY SIGNS IN WORK ZONES**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES GENERAL INFORMATION FOR TRAFFIC CONTROL THROUGH WORK ZONES				
Names	Dates	Approved By		
Designed By	12/87	Special Projects Engineer		
Drawn By	12/87	Revision	Sheet No.	Index No.
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TYPICAL PLACEMENT OF REFLECTIVE PAVEMENT MARKERS  
IN LIEU OF TEMPORARY TAPE OR PAINT IN WORK ZONES



USE OF RPMs TO SUPPLEMENT PAINT OR TAPE

REFLECTIVE PAVEMENT MARKERS

CLASS

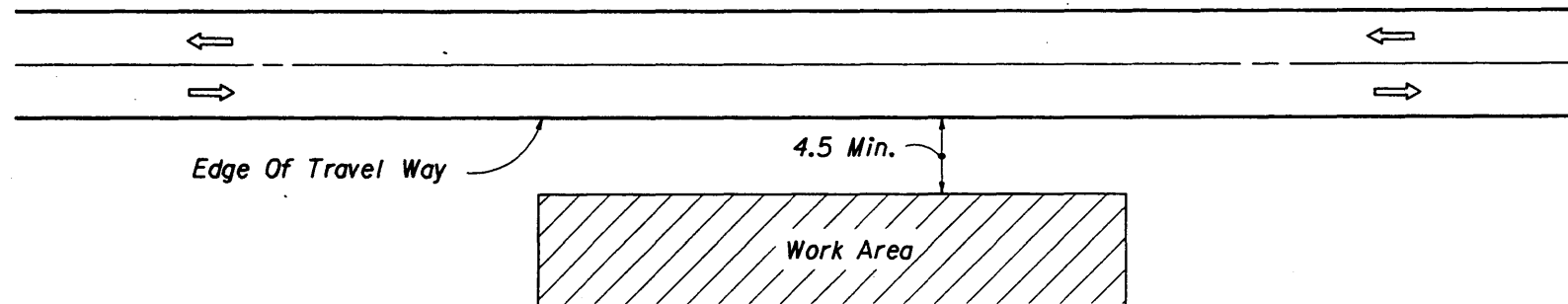
APPLICATION

- A Permanent Applications In Non-Traffic Areas Or Can Be Used In Work Zone Applications For Traffic And Non-Traffic Areas.
- B Permanent Application In Traffic And Non-Traffic Areas Or Can Be Used In Work Zone Applications For Traffic And Non-Traffic Areas.
- D Work Zone Application Only, For Traffic And Non-Traffic Areas.
- E Temporary Work Zone Application Only, Not Exceeding Five (5) Continuous Days, For Traffic And Non-Traffic Areas.

NOTES

1. RPMs shall be installed as a supplement to all lane lines and the edge lines of of gore areas during construction. Placement should be as shown on Index I7352.
2. In work zones, CLASS A, B, or D RPMs may be used to form lane lines edge lines and temporary gore areas, in lieu of tape or paint; however, tape or paint must be used in all transition areas in addition to RPMs. In short term work zones, where the RPMs will be used for five (5) days or less, CLASS "E" RPMs may be used to form lane or edge lines.
3. Basic color rule: colorless reflectors supplement white lines and amber reflectors supplement yellow lines.
4. To provide contrast on concrete pavement, and light asphalt the five (5) colorless RPMs shall be followed by five black RPMs. The spacing between RPMs shall be 0.75 meters. Black RPMs will not be required for contrast with amber RPMs.
5. It shall be the contractors responsibility to replace damaged or missing RPMs.
6. RPMs used to supplement lane lines are to be paid for as Pavement Marker Reflective (Temporary), EA. RPM's used in lieu of temporary tape or paint are to be paid for as Pavement Marking Removable, MI.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES GENERAL INFORMATION FOR TRAFFIC CONTROL THROUGH WORK ZONES				
Names	Dates	Approved By		
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Drawn By		Revision	Sheet No.	Index No.
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**GENERAL NOTES**

1. If the work operation requires that two or more work vehicles cross the 4.5 m zone in any one hour, traffic control will be in conformance with Index No. 602.
2. No special signing is required.
3. Arrows denote direction of traffic only and do not reflect pavement markings.
4. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
5. For general TCZ requirements and additional information refer to Index No. 600.

**TYPICAL APPLICATIONS**


- Landscaping Work
- Utility Work
- Fencing Work
- Cleaning Drainage Structures
- Reworking Ditches

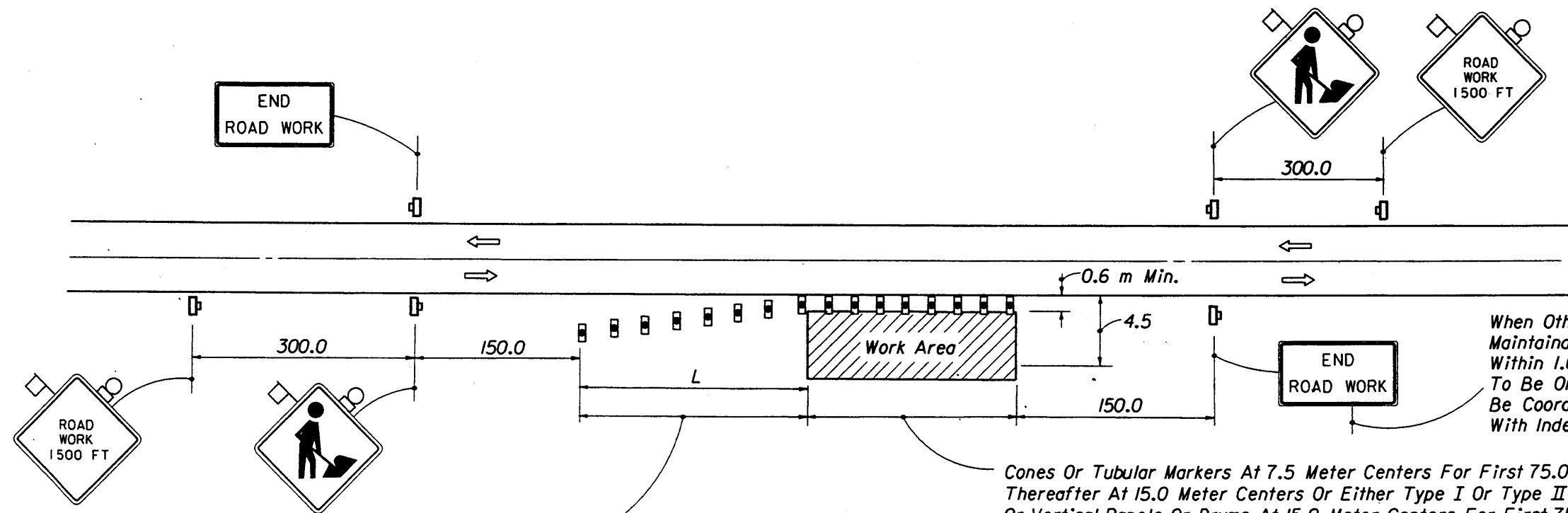
**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS AND THEIR ACTIVITIES ARE MORE THAN 4.5 m FROM THE EDGE OF PAVEMENT

**SYMBOLS**

 Work Area

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>TWO-LANE, TWO-WAY • RURAL DAY OR NIGHT OPERATIONS</b>				
Designed By	Names	Dates	Approved By	
Drawn By		12/87		
Checked By		12/87	Revision	Sheet No.
			94	1 of 1
				Index No. 601



English to Metric Speed Conversion	
MPH	km/h
65	110
60	100
55	90
50	80
45	70
40	60
35	60
30	50

When Other Construction Or Maintenance Operations Occur Within 1.6 kilometers, Sign(s) To Be Omitted And Signing To Be Coordinated In Accordance With Index No. 600.

Maximum spacing between cones and tubular markers shall be 7.5 m.  
 Maximum spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows:  
 5.0 m up to 25 MPH; 10.0 m for 30 MPH - 40 MPH;  
 15.0 m for 45 MPH and greater.

Cones Or Tubular Markers At 7.5 Meter Centers For First 75.0 Meters Thereafter At 15.0 Meter Centers Or Either Type I Or Type II Barricades Or Vertical Panels Or Drums At 15.0 Meter Centers For First 75.0 Meters Thereafter At 30.0 Meter Centers.

### GENERAL NOTES

- All vehicles, equipment, workers (except flaggers) and their activities are restricted at all times to one side of the roadway.
- If the work operation does not exceed 60 minutes, traffic control will be in conformance with Index No. 607.
- When four or more vehicles enter the through traffic lanes in a one hour period or less, the advanced FLAGGER sign shall be substituted for the WORKERS sign. For location of flaggers and FLAGGER signs, see Index No. 603.
- The first two warning signs shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.  
 Mesh signs may be used for (Daylight Only) operations  
 Type B Lights and Orange Flags are not required.
- The WORKERS legend sign may be substituted for the symbol sign.
- All signs shall be post mounted if the closure time exceeds 12 hours.
- $L (min) = \frac{WS}{3.2}$  for speeds  $\geq 70$  km/h  
 $= \frac{WS^2}{300}$  for speeds  $\leq 60$  km/h
- Arrows denote direction of traffic only and do not reflect pavement markings.
- Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
- WORKERS sign to be removed or fully covered when no work is being performed.
- When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
- For general TCZ requirements and additional information refer to Index No. 600.

### TYPICAL APPLICATIONS

- Utility Work
- Culvert Extensions
- Side Slope Work
- Guardrail Work
- Landscaping Work
- Cleaning Drainage Structures
- Reworking Ditches
- Sign Installation And Maintenance
- Shoulder Repair

### CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH THE AREA CLOSER THAN 4.5 m BUT NOT CLOSER THAN 0.6 m TO THE EDGE OF PAVEMENT

### SYMBOLS

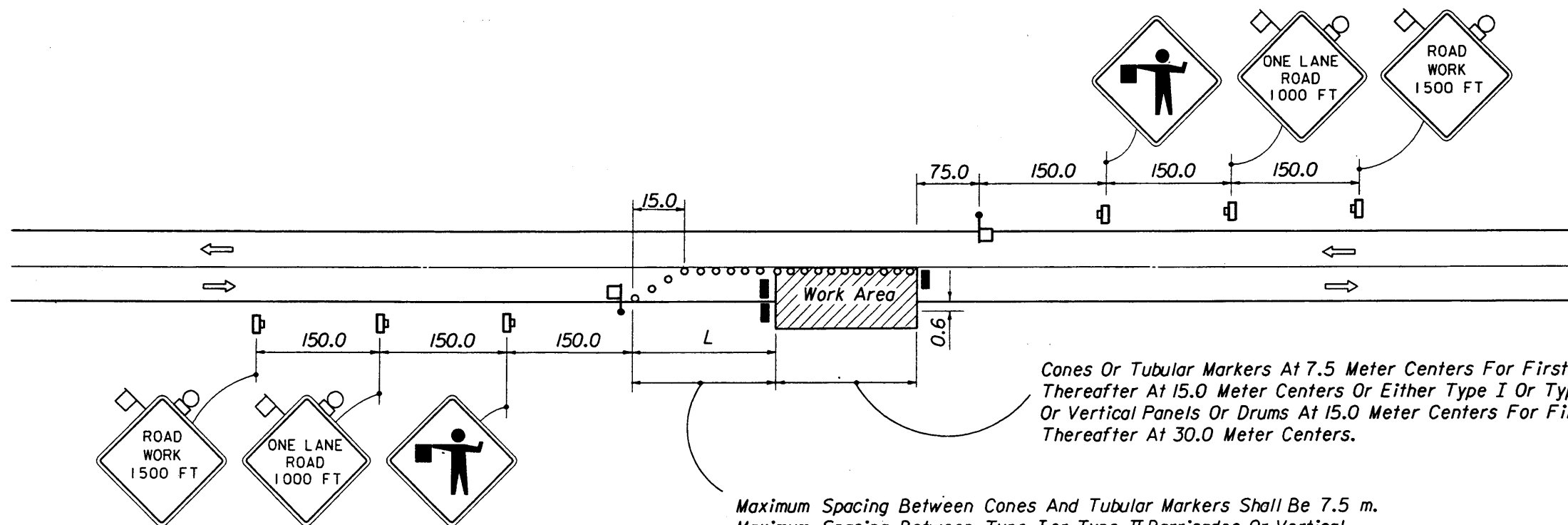
- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used -See Index 600).

Work Zone Sign

Where:  
 W = Width of shoulder in meters, 2.4 m minimum.  
 S = Posted speed limit (converted to km/h).

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION					
ROAD DESIGN					
TRAFFIC CONTROL THROUGH WORK ZONES					
<b>TWO-LANE, TWO-WAY • RURAL</b>					
<b>DAY OR NIGHT OPERATIONS</b>					
Names	Dates	Approved By			
Designed By	12/87				
Drawn By	12/87	Revision	Sheet No.	Index No.	
Checked By	12/87	00	1 of 1	602	

English to Metric Speed Conversion	
MPH	km/h
65	110
60	100
55	90
50	80
45	70
40	60
35	60
30	50



Cones Or Tubular Markers At 7.5 Meter Centers For First 75.0 Meters Thereafter At 15.0 Meter Centers Or Either Type I Or Type II Barricades Or Vertical Panels Or Drums At 15.0 Meter Centers For First 75.0 Meters Thereafter At 30.0 Meter Centers.

Maximum Spacing Between Cones And Tubular Markers Shall Be 7.5 m.  
 Maximum Spacing Between Type I or Type II Barricades Or Vertical Panels Or Drums Shall Be Based On The Speed Limit As Follows:  
 5.0 m Up To 25 MPH; 10.0 m For 30 MPH - 40 MPH;  
 15.0 m For 45 MPH And Greater.

### GENERAL NOTES

1. Work operations shall be confined to one traffic lane, leaving the opposite lane open to traffic.
2. All vehicles, equipment, workers (except flaggers), and their activities are restricted at all times to one side of the pavement.
3. If the work operation does not exceed 60 minutes, traffic control will be in conformance with Index No. 607.
4. Additional one-way control may be effected by the following means:  
 (1) Flag-carrying vehicle (2) Official vehicle (3) Pilot vehicles (4) Traffic signals  
 When flaggers are the sole means of one-way control the flaggers shall be in sight of each other or in direct communication at all times.
5. The first two warning signs shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.  
 Mesh signs may be used for (Daylight Only) operations. Type B Lights and Orange Flags are not required.
6. The FLAGGER legend sign may be substituted for the symbol sign.
7.  $L$  (min) =  $\frac{WS}{3.2}$  for speeds  $\geq 70$  km/h  
 $= \frac{WS^2}{300}$  for speeds  $\leq 60$  km/h  
 Where:  
 W = Width of lateral transition in meters.  
 S = Posted speed limit (converted to km/h).
8. The ONE-LANE ROAD signs are to be fully covered and the FLAGGER signs either removed or fully covered when no work is being performed and the highway is open to two-way traffic.
9. Arrows denote direction of traffic only and do not reflect pavement markings.
10. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
11. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
12. For general TCZ requirements and additional information, refer to Index No. 600.

### TYPICAL APPLICATIONS

- Pavement Resurfacing
- Pavement Repair
- Utility Work
- Bridge Repair
- Guardrail Work

### CONDITIONS

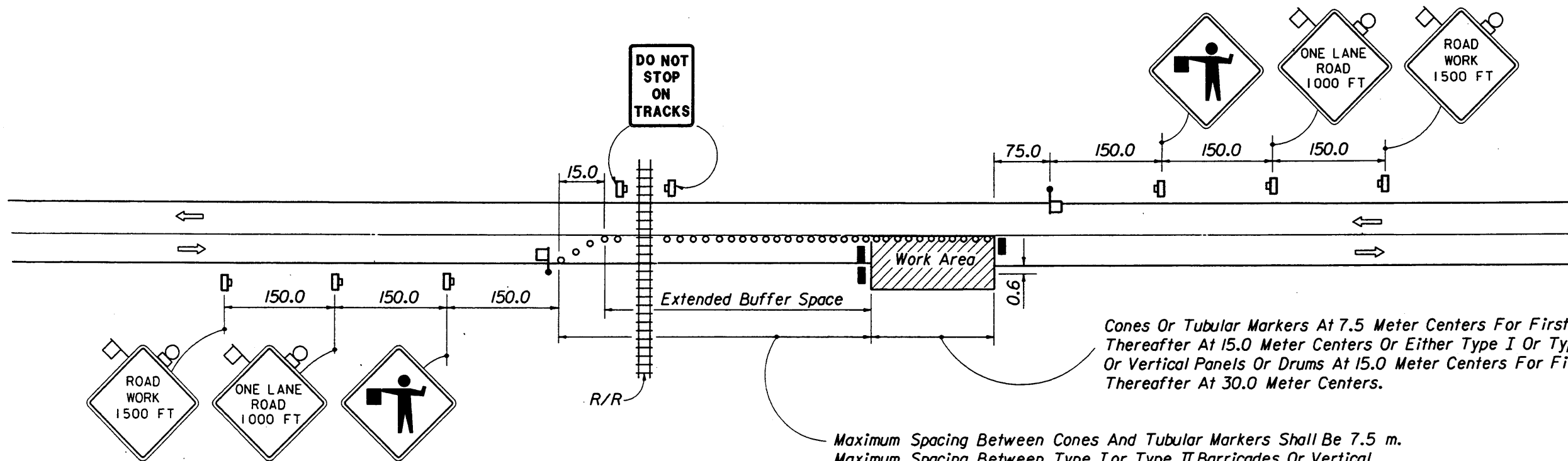
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH THE AREA BETWEEN THE CENTERLINE AND A LINE 0.6 m OUTSIDE THE EDGE OF PAVEMENT

### SYMBOLS

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I, Type II Or Type III Barricade Or Vertical Panel Or Drum
- Type I Or Type II Barricade Or Vertical Panel Or Cone Or Tubular Marker Or Drum
- Work Zone Sign
- Flagger

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
TWO-LANE, TWO-WAY • RURAL OPERATIONS ONE DAYLIGHT PERIOD OR LESS				
Names	Dates	Approved By		
Designed By	12/87			
Drawn By	12/87			
Checked By	12/87	Revision	Sheet No.	Index No.
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English to Metric Speed Conversion	
MPH	km/h
65	110
60	100
55	90
50	80
45	70
40	60
35	60
30	50



Cones Or Tubular Markers At 7.5 Meter Centers For First 75.0 Meters Thereafter At 15.0 Meter Centers Or Either Type I Or Type II Barricades Or Vertical Panels Or Drums At 15.0 Meter Centers For First 75.0 Meters Thereafter At 30.0 Meter Centers.

Maximum Spacing Between Cones And Tubular Markers Shall Be 7.5 m. Maximum Spacing Between Type I Or Type II Barricades Or Vertical Panels Or Drums Shall Be Based On The Speed Limit As Follows:  
5.0 m Up To 25 MPH; 10.0 m For 30 MPH - 40 MPH;  
15.0 m For 45 MPH And Greater.

### GENERAL NOTES

1. Work operations shall be confined to one traffic lane, leaving the opposite lane open to traffic.
2. All vehicles, equipment, workers (except flaggers), and their activities are restricted at all times to one side of the pavement.
3. When flaggers are the sole means of one-way control the flaggers shall be in sight of each other or in direct communication at all times.
4. The first two warning signs shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.  
Mesh signs may be used for (Daylight Only) operations. Type B Lights and Orange Flags are not required.
5. The FLAGGER legend sign may be substituted for the symbol sign.
6. The ONE-LANE ROAD signs are to be fully covered and the FLAGGER signs either removed or fully covered when no work is being performed and the highway is open to two-way traffic.
7. Arrows denote direction of traffic only and do not reflect pavement markings.
8. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
9. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
10. For general TCZ requirements and additional information, refer to Index No. 600.
11. Discontinuing of extended buffer space will not occur until the queue length plus 100 meters is reached.

### SYMBOLS

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I, Type II Or Type III Barricade Or Vertical Panel Or Drum
- Type I Or Type II Barricade Or Vertical Panel Or Cone Or Tubular Marker Or Drum
- Work Zone Sign
- Flagger

### TYPICAL APPLICATIONS

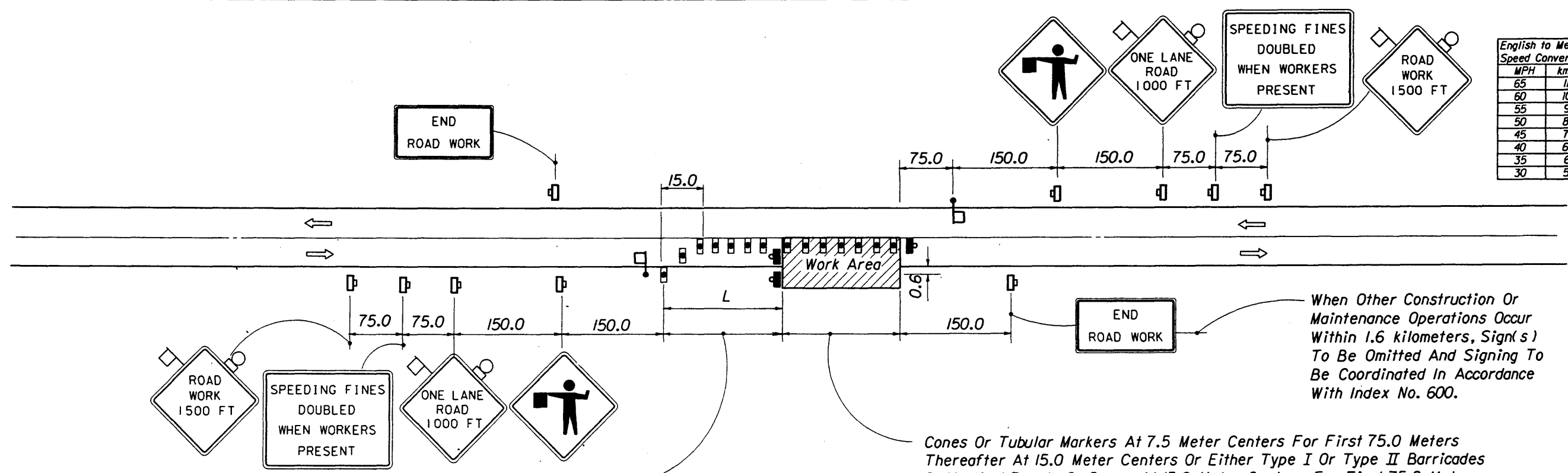
- Pavement Resurfacing
- Pavement Repair
- Utility Work
- Bridge Repair
- Guardrail Work

### CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH THE AREA BETWEEN THE CENTERLINE AND A LINE 0.6 m OUTSIDE THE EDGE OF PAVEMENT THAT REQUIRES A LANE CLOSURE IN THE VICINITY OF A RAILROAD CROSSING.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES <b>TWO-LANE, TWO-WAY • RURAL OPERATIONS ONE DAYLIGHT PERIOD OR LESS</b>				
Names	Dates	Approved By		
Designed By	12/87			
Drawn By	12/87	Revision	Sheet No.	Index No.
Checked By	12/87	00	2 of 2	603

English to Metric Speed Conversion	
MPH	km/h
65	110
60	100
55	90
50	80
45	70
40	60
35	60
30	50



Maximum Spacing Between Cones And Tubular Markers Shall Be 7.5 m.  
 Maximum Spacing Between Type I or Type II Barricades Or Vertical Panels Or Drums Shall Be Based On The Speed Limit As Follows:  
 5.0 m Up To 25 MPH; 10.0 m For 30 MPH - 40 MPH;  
 15.0 m For 45 MPH And Greater.

When Other Construction Or Maintenance Operations Occur Within 1.6 kilometers, Sign(s) To Be Omitted And Signing To Be Coordinated In Accordance With Index No. 600.

Cones Or Tubular Markers At 7.5 Meter Centers For First 75.0 Meters Thereafter At 15.0 Meter Centers Or Either Type I Or Type II Barricades Or Vertical Panels Or Drums At 15.0 Meter Centers For First 75.0 Meters Thereafter At 30.0 Meter Centers.

**GENERAL NOTES**

- Construction operations shall be confined to one traffic lane, leaving the opposite lane open to traffic.
- All vehicles, equipment, workers, (except flaggers) and their activities are restricted at all times to one side of the pavement.
- Additional one-way control may be effected by the following means:  
 (1) Flag-carrying vehicle (2) Official vehicle (3) Pilot vehicles (4) Traffic signals  
 When flaggers are the sole means of one-way control the flaggers shall be in sight of each other or in direct communication at all times.
- The first two warning signs shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.
- The FLAGGER legend sign may be substituted for the symbol sign.
- All signs shall be post mounted if the closure time exceeds 12 hours.
- $L (min) = \frac{WS}{3.2}$  for speeds  $\geq 70$  km/h  
 $\frac{WS^2}{300}$  for speeds  $\leq 60$  km/h  
 Where:  
 W = Width of lateral transition in meters.  
 S = Posted speed limit (converted to km/h).
- The ONE-LANE ROAD signs are to be fully covered and the FLAGGER signs either removed or fully covered when no work is being performed and the highway is open to two-way traffic.
- Arrows denote direction of traffic only and do not reflect pavement markings.
- Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
- When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
- For general TCZ requirements and additional information refer to Index No. 600.

**TYPICAL APPLICATIONS**

- Pavement Repair
- Culvert Construction
- Utility Work
- Bridge Repair

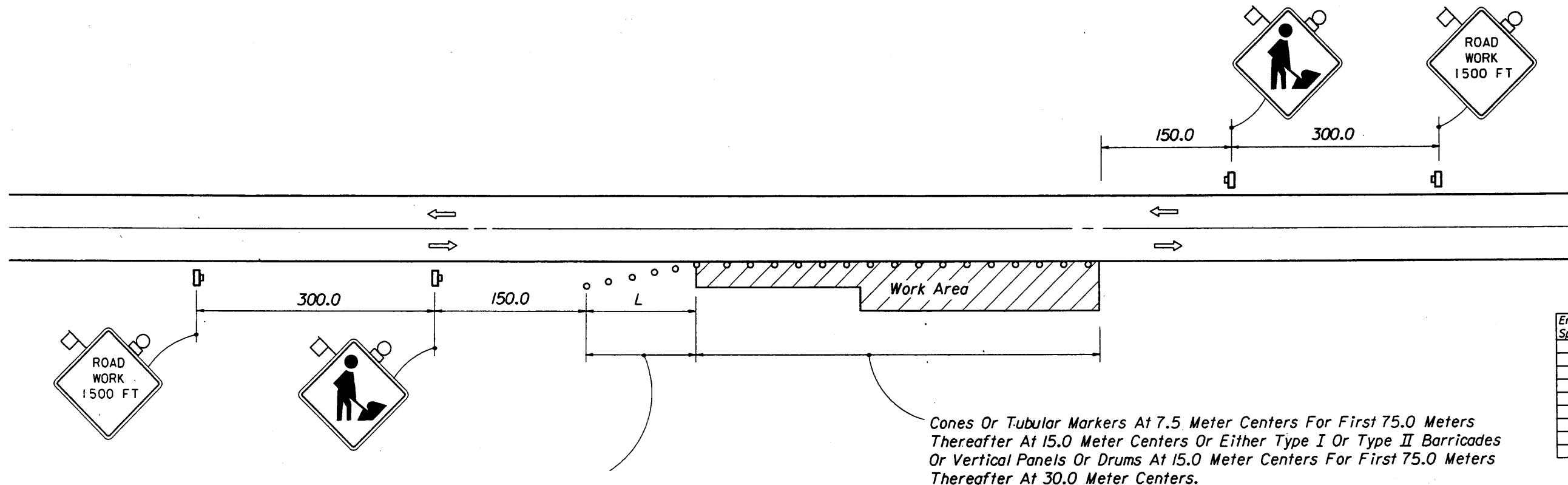
**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT WORKERS OR THEIR ACTIVITIES ENCROACH THE AREA BETWEEN THE CENTERLINE AND A LINE 0.6 m OUTSIDE THE EDGE OF PAVEMENT

**SYMBOLS**

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used -See Index 600).
- Type I, Type II Or Type III Barricade Or Vertical Panel Or Drum (With Flashing Light)
- Work Zone Sign
- Flagger

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION				
ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>TWO-LANE, TWO-WAY • RURAL</b>				
<b>NIGHT OPERATIONS OR OPERATIONS EXCEEDING ONE DAYLIGHT PERIOD</b>				
Names	Dates	Approved By		
Designed By	12/87			
Drawn By	12/87	Revision	Sheet No.	Index No.
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English to Metric Speed Conversion	
MPH	km/h
65	110
60	100
55	90
50	80
45	70
40	60
35	60
30	50

Maximum Spacing Between Cones And Tubular Markers Shall Be 7.5 m.  
Maximum Spacing Between Type I Or Type II Barricades Or Vertical  
Panels Or Drums Shall Be Based On The Speed Limit As Follows:  
5.0 m Up To 25 MPH; 10.0 m For 30 MPH - 40 MPH;  
15.0 m For 45 MPH And Greater.

### GENERAL NOTES

- All vehicles, equipment, workers (except flaggers), and their activities are restricted at all times to one side of the roadway.
- If the work operation does not exceed 60 minutes, traffic control will be in conformance with Index No. 607.
- If the work operation encroaches on the through traffic lanes or when four or more work vehicles enter the through traffic lanes in a one hour period flaggers shall be provided and the advanced FLAGGER sign shall be substituted for the WORKERS sign. For location of flaggers and FLAGGER signs see Index No. 603.
- The first two warning signs shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times. Mesh signs may be used for (Daylight Only) operations. Type B Lights and Orange Flags are not required.
- The WORKERS legend sign may be substituted for the symbol sign.
- Where work activities within 0.6 meters of the edge of pavement are incidental (i.e. Mowing, Litter Removal) the engineer may delete requirements for cones and signs provided a vehicle with flashing warning lights is present.

$$L \text{ (min.)} = \frac{WS}{3.2} \text{ for speeds } \geq 70 \text{ km/h}$$

$$= \frac{WS^2}{300} \text{ for speeds } \leq 60 \text{ km/h}$$

Where:

W = Width of shoulder in meters, 2.4 m minimum.  
S = Posted speed limit (converted to km/h).

- Arrows denote direction of traffic only and do not reflect pavement markings.
- Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
- When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
- For general TCZ requirements and additional information, refer to Index No. 600.

### TYPICAL APPLICATIONS

- Shoulder And Slope Work
- Utility Work
- Guardrail Work
- Landscape Work
- Delineator Installation And Maintenance
- \* Mowing
- \* Litter Removal

### CONDITIONS

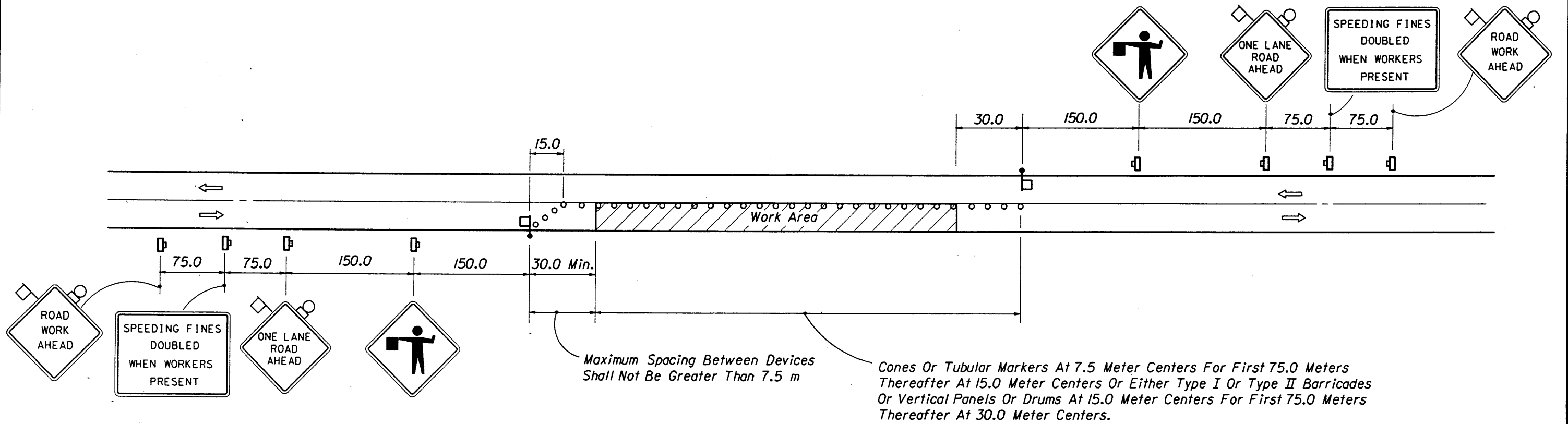
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES REQUIRE AN INTERMITTENT OR CONTINUOUS MOVING OPERATION ON THE SHOULDER OR SHOULDER AND SLOPES

### SYMBOLS

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Cone Or Tubular Marker Or Drum
- Work Zone Sign

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
TRAFFIC CONTROL THROUGH WORK ZONES					
<b>TWO-LANE, TWO-WAY • RURAL MOVING OPERATIONS-DAYLIGHT ONLY</b>					
Names	Dates	Approved By			
Designed By	12/87	Special Projects Engineer			
Drawn By	12/87	Revision	Sheet No.	Index No.	
Checked By	12/87	96	1 of 1	605	





### GENERAL NOTES

- All vehicles, equipment, workers (except flaggers), and their activities are restricted at all times to one side of the pavement.
- Minimum length of work area is 60.0 meters. Maximum length to be determined by the Engineer, but in no case to exceed the length of one-half ( $\frac{1}{2}$ ) days operation or 3.2 kilometers whichever is less.
- If the work operation does not exceed 60 minutes, traffic control will be in conformance with Index No. 607.
- Additional one-way control may be effected by the following means:  
(1) Flag-carrying vehicle (2) Official vehicle  
(3) Pilot vehicles (4) Traffic signals  
When flaggers are the sole means of one-way control the flaggers shall be in sight of each other or in direct communication at all times.
- The first two warning signs shall have a 450 mm x 450 mm orange flag and a Type B light attached and operating at all times. Mesh signs may be used for (Daylight Only) operations. Type B Lights and Orange Flags are not required.
- The FLAGGER legend sign may be substituted for the symbol sign.
- The ONE LANE ROAD AHEAD and FLAGGER signs are to be removed or fully covered when no work is being performed and the highway is open to two-way traffic.
- Arrows denote direction of traffic only and do not reflect pavement markings.
- Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
- When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
- For general TCZ requirements and additional information, refer to Index No. 600.

### TYPICAL APPLICATIONS

Pavement Repair  
 Pavement Surfacing  
 Utility Work  
 Delineator Maintenance  
 Crack Sealing  
 Core Boring

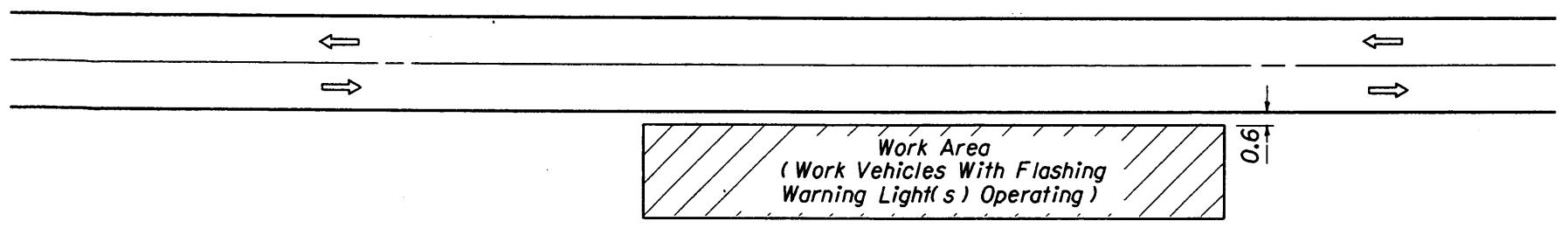
### CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES REQUIRE AN INTERMITTENT OR CONTINUOUS MOVING OPERATION ON THE PAVEMENT WHERE THE AVERAGE SPEED OF MOVEMENT IS LESS THAN 6.4 KILOMETERS PER HOUR

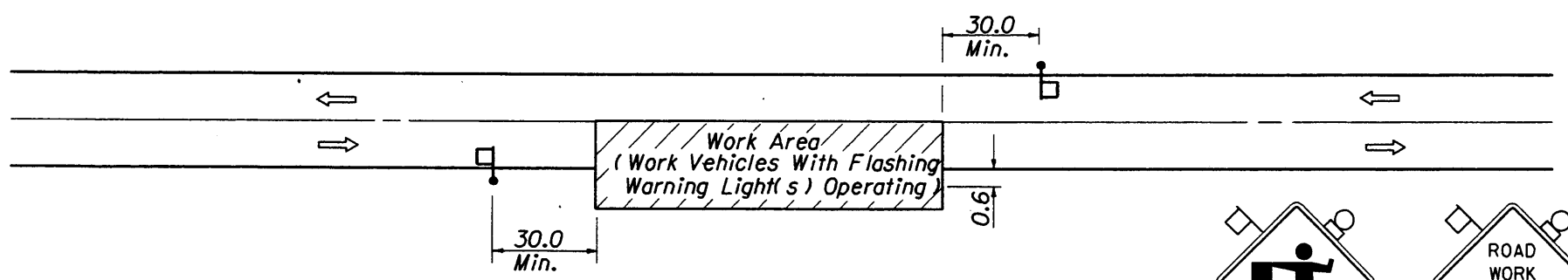
### SYMBOLS

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Cone Or Tubular Marker Or Drum
- Work Zone Sign
- Flagger

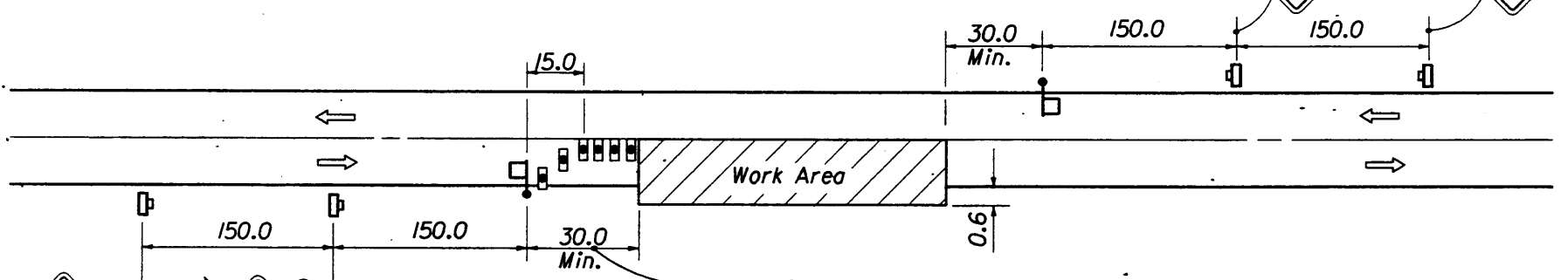
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>MOVING OPERATIONS • RURAL</b>				
<b>TWO-LANE TWO-WAY DAYLIGHT ONLY</b>				
Designed By	Names	Dates	Approved By	
Drawn By		12/87		
Checked By		12/87		
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**CONDITIONS**  
 FOR ANY OPERATION THAT IS 0.6 m OR MORE OUTSIDE THE EDGE OF THE PAVEMENT FOR A PERIOD OF LESS THAN 60 MINUTES.



**CONDITIONS**  
 FOR ANY OPERATION THAT ENCKROACHES IN THE AREA BETWEEN THE CENTERLINE AND A LINE 0.6 m OUTSIDE THE EDGE OF THE PAVEMENT FOR A PERIOD OF 15 MINUTES OR LESS



**CONDITIONS**  
 FOR ANY OPERATION THAT ENCKROACHES IN THE AREA BETWEEN THE CENTERLINE AND A LINE 0.6 m OUTSIDE THE EDGE OF THE PAVEMENT FOR A PERIOD IN EXCESS OF 15 MINUTES BUT LESS THAN 60 MINUTES.



**GENERAL NOTES**

- The maximum length of work area to be determined by the Engineer, but in no case to exceed the length of one-half (1/2) days operation or 3.2 kilometers whichever is less.
- All vehicles, equipment, workers (except flaggers) and their activities are restricted at all times to one side of the pavement.
- Additional one-way control may be effected by the following means:  
 (1) Flag-carrying vehicle (2) Official vehicle (3) Pilot vehicles (4) Traffic signals  
 When flaggers are the sole means of one-way control the flaggers shall be in sight of each other or in direct communication at all times.
- The first two warning signs shall have an 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.  
 Mesh signs may be used for (Daylight Only) operations  
 Type B Lights and Orange Flags are not required.
- The FLAGGER legend sign may be substituted for the symbol sign.
- Arrows denote direction of traffic only and do not reflect pavement markings.
- Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
- When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
- For general TCZ requirements and additional information refer to Index No. 600.

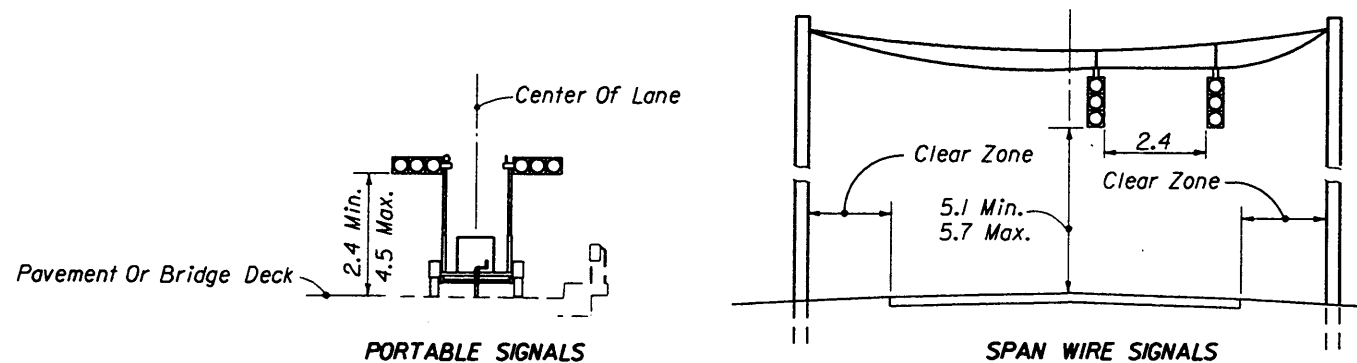
**SYMBOLS**

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used -See Index 600).
- Work Zone Sign
- Flagger

**TYPICAL APPLICATIONS**

- Marking Patches
- Field Patches
- String Line
- Utility Work
- Cleaning Up Debris On Pavement
- Pavement Coring And Straight Edging

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>TWO-LANE TWO-WAY • RURAL SHORTTIME DAY OR NIGHT OPERATIONS</b>				
Designed By		Date	Approved By	
Drawn By		12/87		
Checked By		12/87		
			Revision	Sheet No.
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				<b>607</b>



**SIGNAL MOUNT DETAILS**

**GENERAL NOTES**

1. Work operations shall be confined to one traffic lane, except for haul road crossings, leaving the opposite lane open to traffic.
2. All vehicles, equipment, workers (except flaggers) and their activities are restricted at all times to one side of the pavement, except for haul road crossings.
3. The installation and timing of signals shall be approved by the District Traffic Operations Engineer prior to signals being placed in operation.  
Where sight distance to the signal is limited, the signals may be mounted on span wire at the discretion of the Engineer.  
The maximum distance between portable traffic signals (receiver/controllers) shall be 0.4 kilometers, however, in no case shall the distance exceed the maximum distance at which the remote operator (transmitter) can positively and safely operate both portable signals.
4. Flaggers to supplement the signal operator/flagger shall be used when needed to assure safe movements between traffic and operating equipment, as determined by the Engineer.
5. The first two warning signs shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.
6. When needed, an additional warning sign may be installed in advance of the ROAD WORK AHEAD sign. The distance between successive signs shall be 150.0 meters.
7. The SIGNAL AHEAD legend sign may be substituted for the symbol sign.
8. All signs shall be post mounted if the closure time exceeds 12 hours.
9. SIGNAL AHEAD and EQUIPMENT CROSSING AHEAD signs are to be removed or fully covered when no work is being performed and the highway is open to two-way traffic. Type III Barricades shall be in place to block haul road access when the haul road is not in operation and a flagger/signal operator is not on duty, except when the haul road is an existing properly marked road.
10. Arrows denote direction of traffic only and do not reflect pavement markings.
11. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
12. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
13. For general TCZ requirements and additional information refer to Index No. 600.
14. Span wire signals are to be used only in work zones with workers present, where the contractor can monitor signal operation and maintain traffic with flaggers in the event of a power failure.

**SYMBOLS**

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Work Zone Sign
- Traffic Signal
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only).
- Type III Barricade
- Stop Bar
- Flagger
- Portable Signal

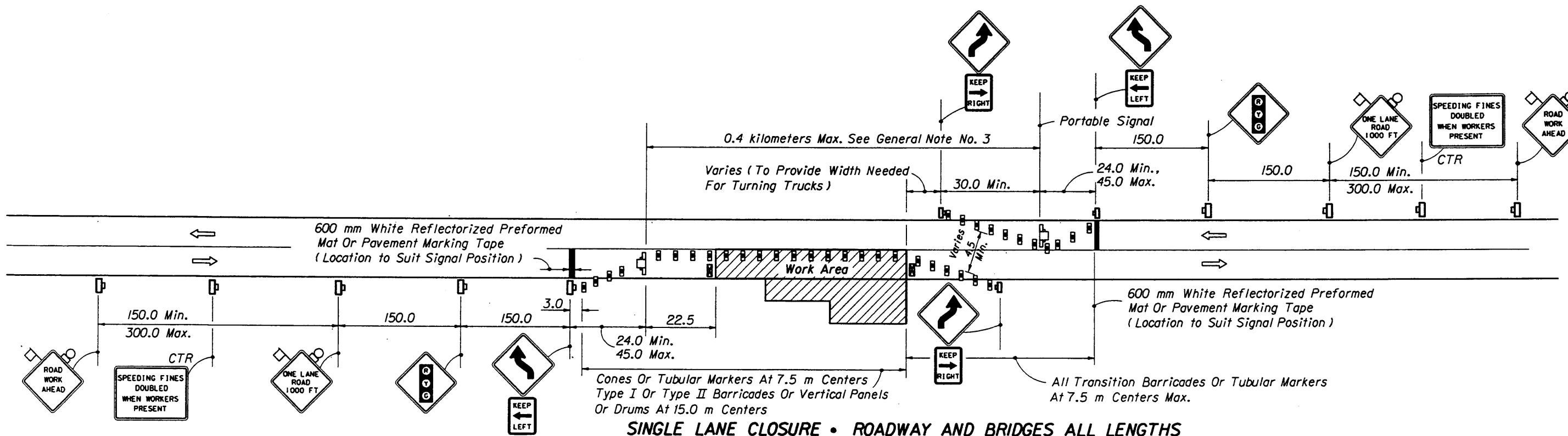
**TYPICAL APPLICATION**

- Pavement Repair
- Shoulder & Roadside Work
- Bridge Work
- Box Culvert Work
- Drainage Work
- Utility Work
- Haul Road Crossing

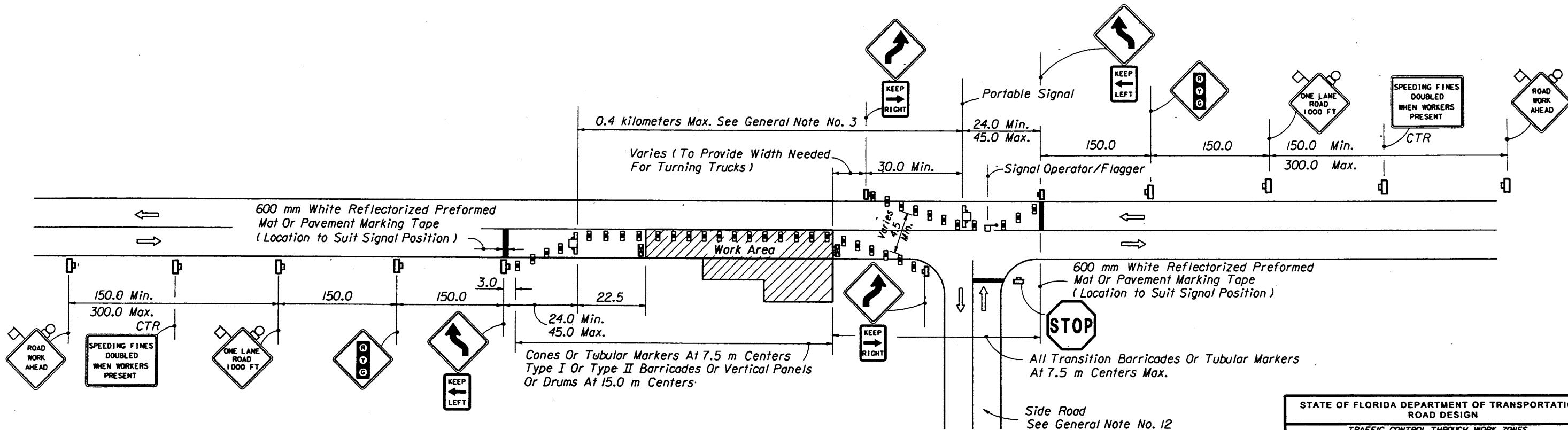
**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES WILL ENCROACH ON ONE LANE OR MOMENTARILY ENCROACH ON BOTH LANES OF A TWO-LANE TWO-WAY ROADWAY AND TRAFFIC SIGNALS ARE NEEDED.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES <b>TWO-LANE, TWO-WAY LANE CLOSURE BY SIGNAL CONTROL DAY OR NIGHT OPERATIONS</b>				
Designed By	Names	Dates	Approved By	
Drawn By		12/87		
Checked By		12/87	Revision	Sheet No.
			98	1 of 4
				608

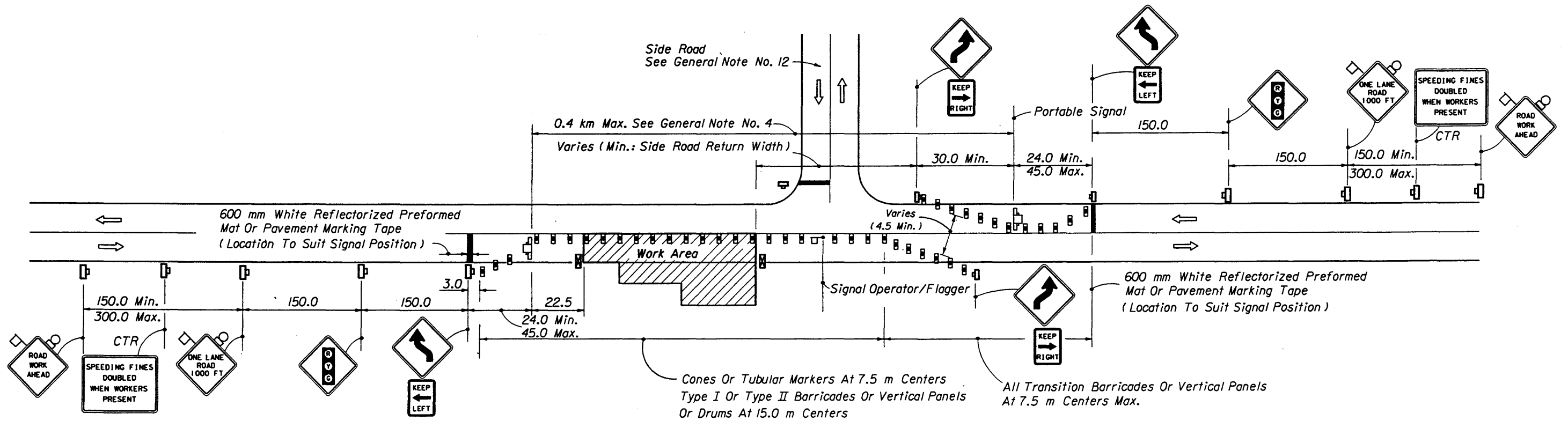


**SINGLE LANE CLOSURE • ROADWAY AND BRIDGES ALL LENGTHS**

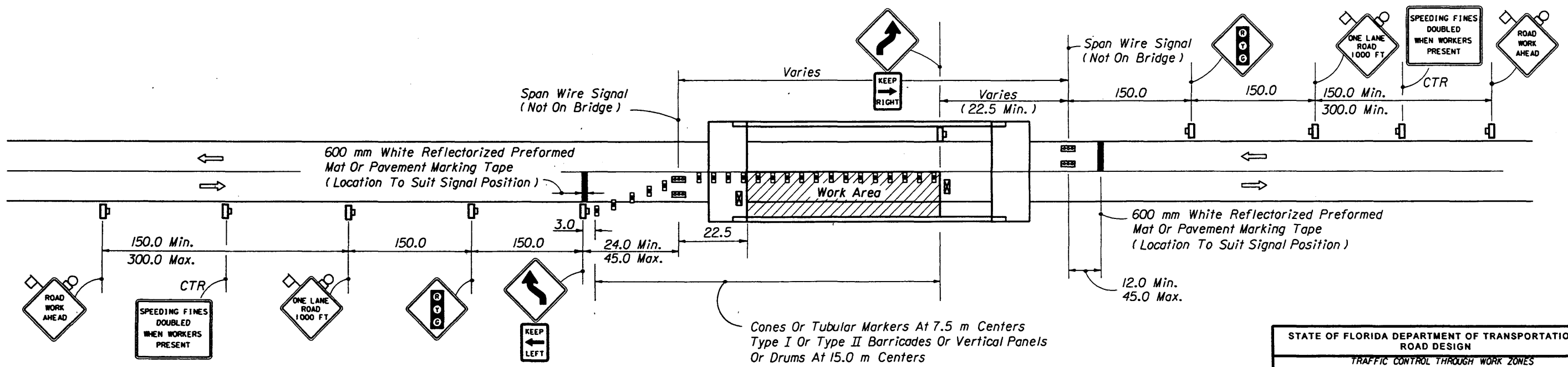


**SINGLE LANE CLOSURE • ROADWAY AND BRIDGES ALL LENGTHS**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION				
ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>TWO-LANE, TWO-WAY</b>				
<b>LANE CLOSURE BY SIGNAL CONTROL</b>				
<b>DAY OR NIGHT OPERATIONS</b>				
Names	Dates	Approved By		
Designed By	5/89	Special Projects Engineer		
Drawn By	5/89	Revision	Sheet No.	Index No.
Checked By	5/89	98	2 of 4	608

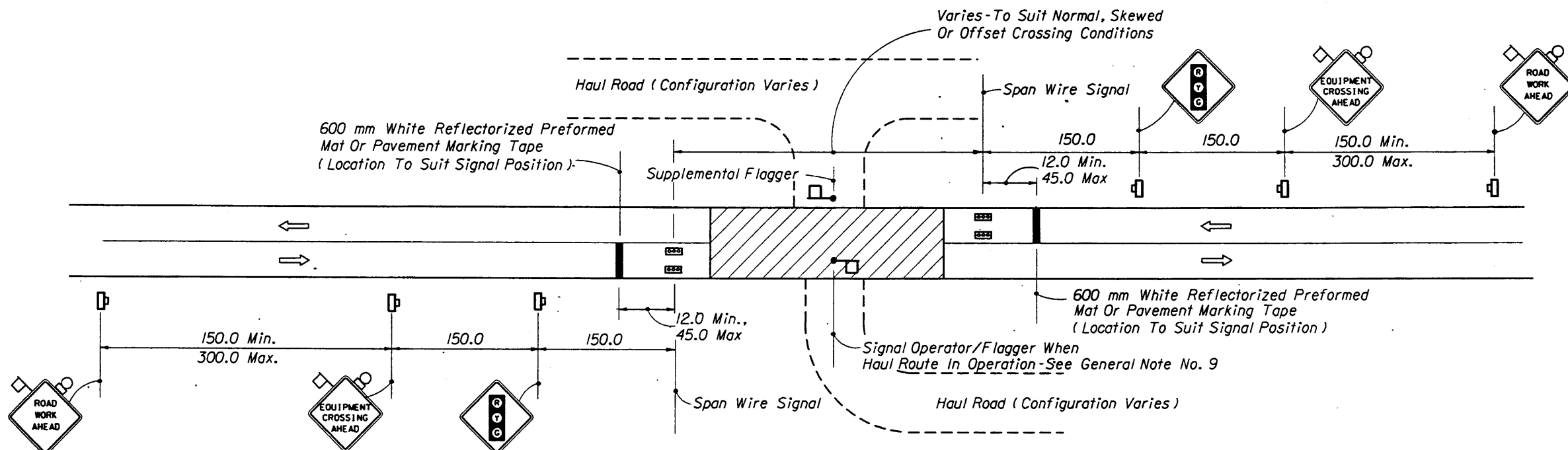


**SINGLE LANE CLOSURE • ROADWAY AND BRIDGES ALL LENGTHS**



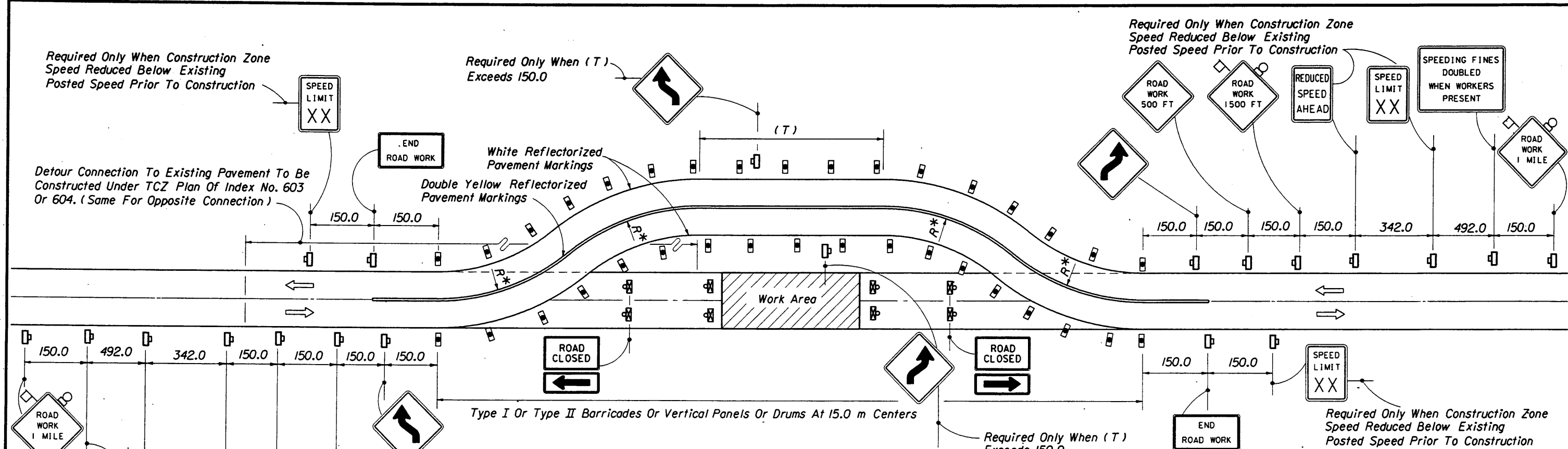
**SINGLE LANE CLOSURE • SHORT BRIDGES**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION				
ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>TWO-LANE, TWO-WAY</b>				
<b>LANE CLOSURE BY SIGNAL CONTROL</b>				
<b>DAY OR NIGHT OPERATIONS</b>				
Designed By	Names	Dates	Approved By	
Drawn By		5/89	Special Projects Engineer	
Checked By		5/89	Revision	Sheet No.
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**MOMENTARY ROADWAY CLOSURE • HAUL ROUTE CROSSING**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES <b>TWO-LANE, TWO-WAY LANE CLOSURE BY SIGNAL CONTROL DAY OR NIGHT OPERATIONS</b>				
Designed By	Names	Dates	Approved By	
Drawn By		5/89	Special Projects Engineer	
Checked By		5/89	Revision	Sheet No.
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Required Only When (T) Exceeds 150.0

Required Only When Construction Zone Speed Reduced Below Existing Posted Speed Prior To Construction

Required Only When Construction Zone Speed Reduced Below Existing Posted Speed Prior To Construction

Detour Connection To Existing Pavement To Be Constructed Under TCZ Plan Of Index No. 603 Or 604. (Same For Opposite Connection)

Type I Or Type II Barricades Or Vertical Panels Or Drums At 15.0 m Centers

Required Only When (T) Exceeds 150.0

Required Only When Construction Zone Speed Reduced Below Existing Posted Speed Prior To Construction

R\*: See SUPERELEVATION Index No. 600.

**GENERAL NOTES**

1. The first two warning signs shall have an 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.
2. For speed sign applications see Index No. 600.
3. Where the tangent distance (T) exceeds 180.0 meters, spacing between cones or tubular markers may be increased to 15.0 meters or spacing between Type I or Type II barricades, or vertical panels or drums may be increased to 30.0 meters within limits of the tangent, or post mounted delineators at 15.0 meter centers may be substituted for the barricades; vertical panels or drums.
4. On the existing pavement all existing markings within the realignment which conflict with the revised traffic pattern are to be removed and removable pavement markings used for marking a new centerline and edge lines.
5. Where the tangent distance (T) exceeds 180.0 meters and no passing or stopping sight distance restrictions exist, the yellow reflectORIZED markings used to indicate the centerline of the traveled way may be replaced with yellow reflectORIZED markings in a broken pattern. For raised pavement marker application see Index No. 600 and Index No. 17352.

6. Arrows denote direction of traffic only and do not reflect pavement markings.
7. Longitudinal dimensions are to be adjusted to fit field Conditions. See Index No. 600.
8. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
9. If temporary structures are required on the detour traffic control will be in conformance with Index No. 650.
10. For general TCZ requirements and additional information refer to Indexes Nos. 600 and 17352.
11. If posted speed for Work Zone is 45 mph or less use "ROAD WORK 1/2 MILE" and space accordingly.

When Other Construction Or Maintenance Operations Occur Within 1.6 kilometers, Sign(s) To Be Omitted And Signing To Be Coordinated In Accordance With Index No. 600.

**SYMBOLS**

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only).
- Type III Barricade (With Flashing Light)
- Work Zone Sign

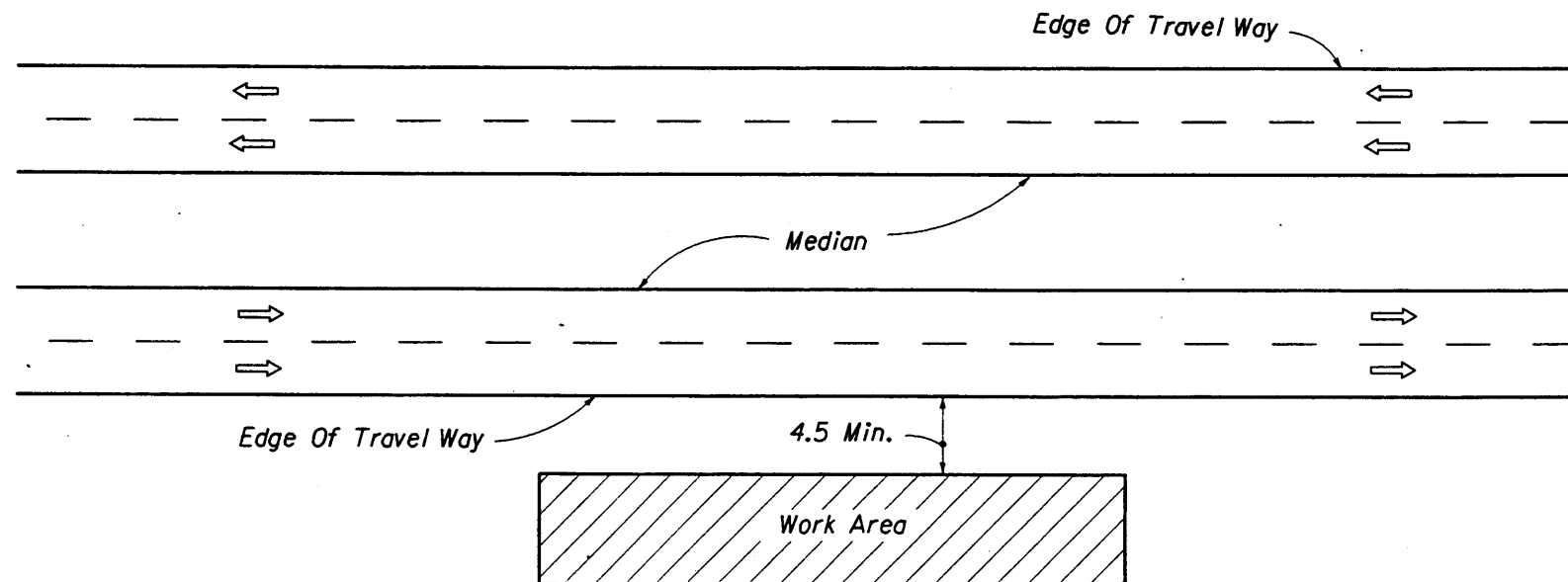
**TYPICAL APPLICATIONS**

- Bridge Construction
- Subgrade Restoration
- Culvert Repair Or Construction

**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES REQUIRE THE CLOSURE OF BOTH LANES AND A TEMPORARY DETOUR IS CONSTRUCTED


STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
TRAFFIC CONTROL THROUGH WORK ZONES <b>TWO-LANE, TWO-WAY • RURAL TEMPORARY CONNECTION DAY OR NIGHT OPERATIONS</b>					
Designed By	Names	Dates	Approved By		
Drawn By		12/87			
Checked By		12/87			
	Revision	00	Sheet No.	1 of 1	Index No.
					609



**GENERAL NOTES**

1. If the work operation requires that two or more work vehicles cross the 4.5 m zone in any one hour, traffic control will be in conformance with Index No. 602.
2. No special signing is required.
3. This index also applies when work is being performed on a multilane undivided highway.
4. This index also applies to work performed in the median more than 4.5 m from edge of travel way, both roadways.
5. Arrows denote direction of traffic only and do not reflect pavement markings.
6. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
7. For general TCZ requirements and additional information refer to Index No. 600.

**SYMBOLS**


 Work Area

**TYPICAL APPLICATIONS**

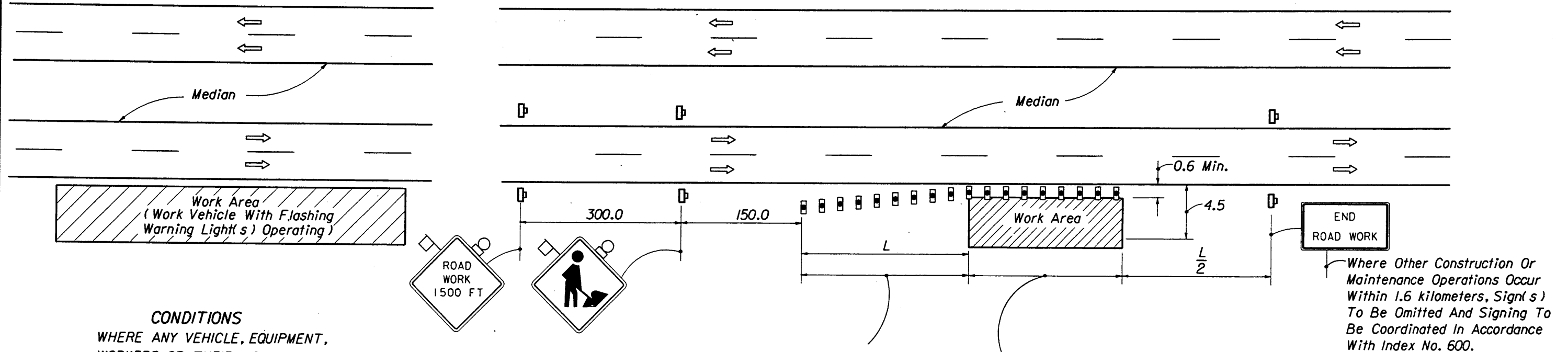
- Landscaping Work
- Utility Work
- Fencing Work
- Cleaning Drainage Structures
- Reworking Ditches

**CONDITIONS**

WHERE ALL VEHICLES, EQUIPMENT, WORKERS AND THEIR ACTIVITIES ARE MORE THAN 4.5 m FROM THE EDGE OF PAVEMENT

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>MULTILANE DIVIDED OR UNDIVIDED RURAL • DAY OR NIGHT OPERATIONS</b>				
	Names	Dates	Approved By	
Designed By		12/81		
Drawn By		12/81	Revision	Sheet No.
Checked By		12/81	94	1 of 1
				Index No. <b>610</b>





**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH THE AREA CLOSER THAN 4.5 m BUT NOT CLOSER THAN 0.6 m TO THE EDGE OF PAVEMENT FOR A PERIOD OF LESS THAN 60 MINUTES

Maximum Spacing Between Cones And Tubular Markers Shall Be 7.5 m. Maximum Spacing Between Type I Or Type II Barricades Or Vertical Panels Or Drums Shall Be Based On The Speed Limit As Follows: 5.0 m Up To 25 MPH; 10.0 m For 30 MPH - 40 MPH; 15.0 m For 45 MPH And Greater.

Cones Or Tubular Markers At 7.5 Meter Centers For First 75.0 Meters Thereafter At 15.0 Meter Centers Or Either Type I Or Type II Barricades Or Vertical Panels Or Drums At 15.0 Meter Centers For First 75.0 Meters Thereafter At 30.0 Meter Centers.

**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH THE AREA CLOSER THAN 4.5 m BUT NOT CLOSER THAN 0.6 m TO THE EDGE OF PAVEMENT FOR A PERIOD OF 60 MINUTES OR GREATER

**GENERAL NOTES**

- All vehicles, equipment, workers and their activities are restricted at all times to one side of the roadway.
- If the work operation encroaches on the through traffic lanes or when four or more work vehicles enter the through traffic lanes in a one hour period a flagger shall be provided and a FLAGGER sign shall be substituted for the WORKERS sign. The flagger shall be positioned at the point of vehicle entry or departure from the work area.
- This TCZ plan also applies to work performed in the median more than 0.6 meters but less than 4.5 meters from the edge of either pavement.
- The first two warning signs, each side, shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.  
Mesh signs may be used for (Daylight Only) operations Type B Lights and Orange Flags are not required.
- The WORKERS legend sign may be substituted for the symbol sign.
- $L (min) = \frac{WS}{3.2}$  for speeds  $\geq 70$  km/h  
 $\frac{WS^2}{300}$  for speeds  $\leq 60$  km/h
- Arrows denote direction of traffic only and do not reflect pavement markings.
- Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
- When work is being performed on a multilane undivided roadway the signs normally mounted in the median (as shown) shall be omitted.
- WORKERS signs to be removed or fully covered when no work is being performed.
- END ROAD WORK signs required only when work exceeds one daylight period.
- When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
- If the work operation does not exceed 15 minutes, signs, barricades, vertical panels, cones, tubular markers, or drums will not be required provided vehicles in the work area have warning light(s) operating.
- For general TCZ requirements and additional information refer to Index No. 600.

Where:  
W = Width of lateral transition in meters.  
S = Posted speed limit (converted to km/h).

English to Metric Speed Conversion	
MPH	km/h
65	110
60	100
55	90
50	80
45	70
40	60
35	60
30	50

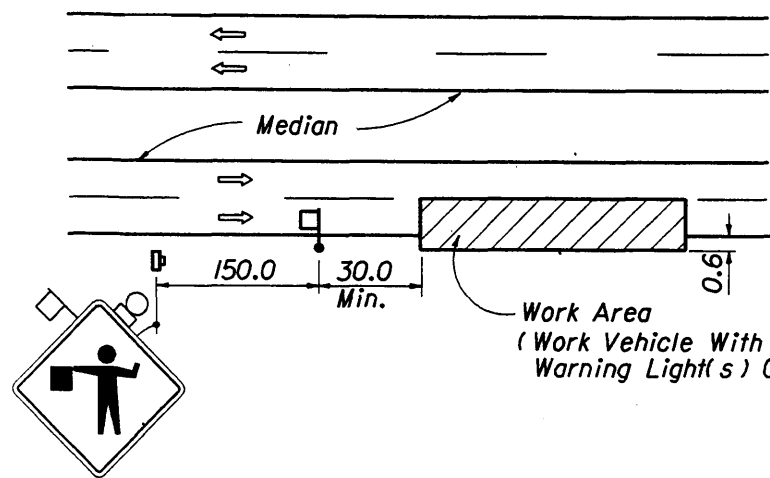
**SYMBOLS**

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used - See Index 600).
- Work Zone Sign

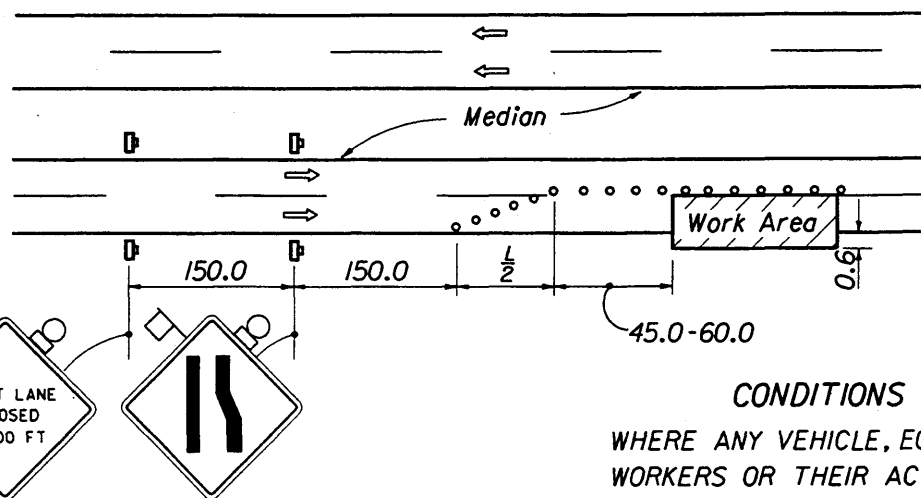
**TYPICAL APPLICATIONS**

- Utility Work
- Culvert Extensions
- Side Slope Work
- Guardrail Work
- Landscaping Work
- Cleaning Drainage Structures
- Reworking Ditches
- Sign Installation And Maintenance
- Shoulder Repair

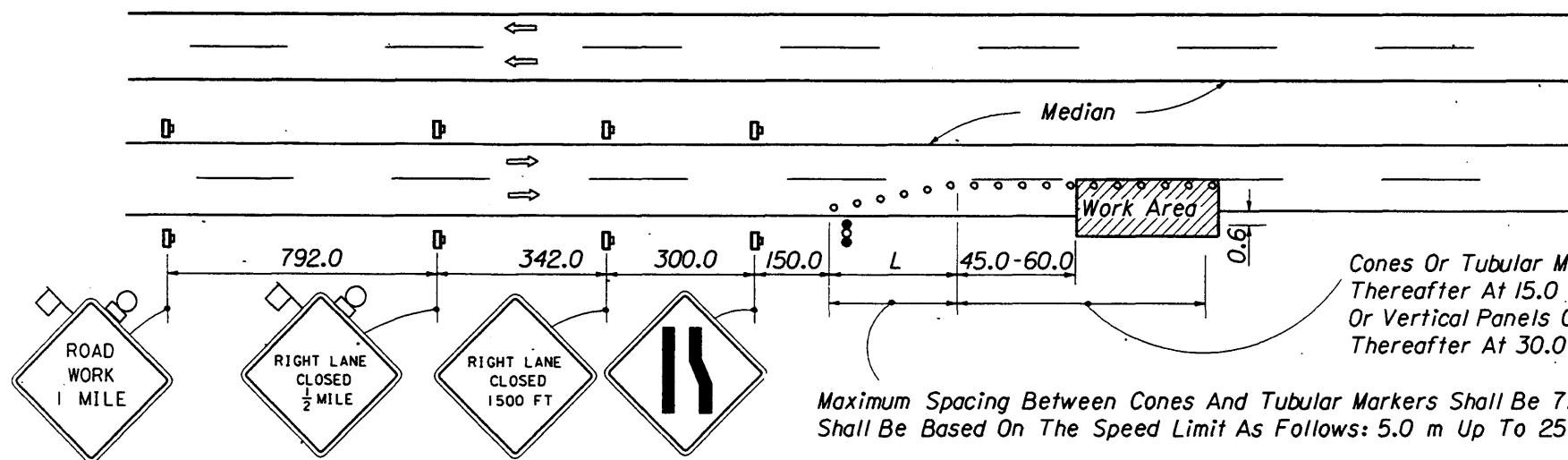
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>MULTILANE DIVIDED OR UNDIVIDED RURAL • DAY OR NIGHT OPERATIONS</b>				
Designed By	Names	Dates	Approved By	
Drawn By		12/87		
Checked By		12/87	Revision	Sheet No.
			98	1 of 1
				611



**CONDITIONS**  
 WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE LANE ADJACENT TO EITHER SHOULDER AND THE AREA 0.6 m OUTSIDE THE EDGE OF PAVEMENT FOR A PERIOD OF 15 MINUTES OR LESS



**CONDITIONS**  
 WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE LANE ADJACENT TO EITHER SHOULDER AND THE AREA 0.6 m OUTSIDE THE EDGE OF PAVEMENT FOR A PERIOD OF MORE THAN 15 MINUTES BUT LESS THAN 60 MINUTES



**CONDITIONS**  
 WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE LANE ADJACENT TO EITHER SHOULDER AND THE AREA 0.6 m OUTSIDE THE EDGE OF PAVEMENT FOR A PERIOD OF 60 MINUTES OR GREATER

English to Metric Speed Conversion	
MPH	km/h
65	110
60	100
55	90
50	80
45	70
40	60
35	60
30	50

Cones Or Tubular Markers At 7.5 Meter Centers For First 75.0 Meters Thereafter At 15.0 Meter Centers Or Either Type I Or Type II Barricades Or Vertical Panels Or Drums At 15.0 Meter Centers For First 75.0 Meters Thereafter At 30.0 Meter Centers.

Maximum Spacing Between Cones And Tubular Markers Shall Be 7.5 m. Maximum Spacing Between Type I Or Type II Barricades Or Vertical Panels Or Drums Shall Be Based On The Speed Limit As Follows: 5.0 m Up To 25 MPH; 10.0 m For 30 MPH - 40 MPH; 15.0 m For 45 MPH And Greater.

**SYMBOLS**

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Cone Or Tubular Marker Or Drum
- Work Zone Sign
- Flagger
- Advance Warning Arrow Panel

**GENERAL NOTES**

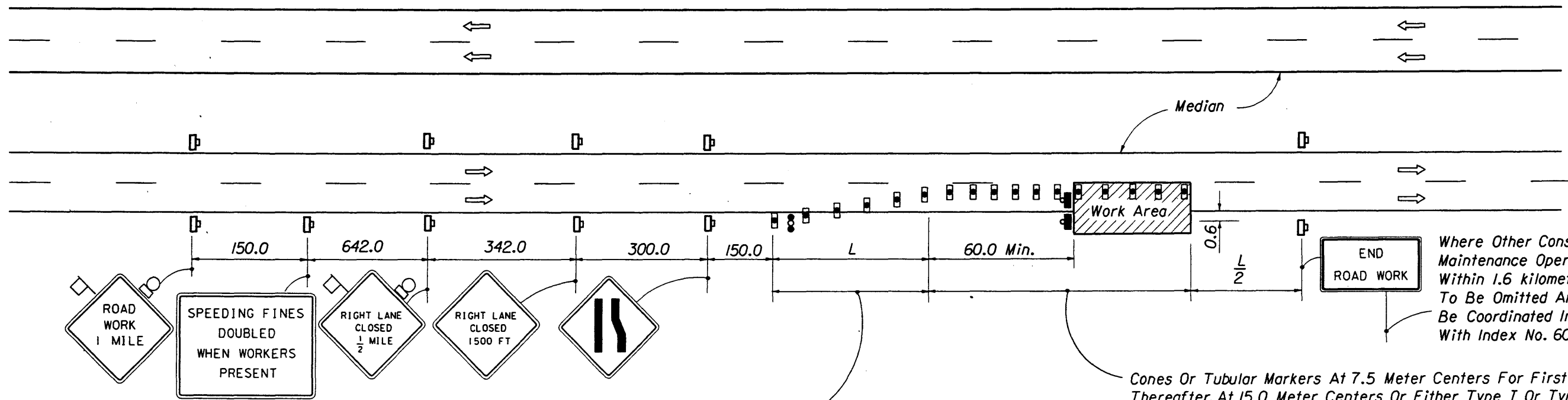
1. Work operations shall be confined to one traffic lane, leaving the adjacent lane open to traffic.
2. All vehicles, equipment, workers, and their activities are restricted at all times to one side of the pavement.
3. The first two warning signs, each side, shall have an 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.  
 Mesh signs may be used for (Daylight Only) operations. Type B Lights and Orange Flags are not required.
4. On undivided highways the median signs as shown are to be omitted.
5. When work is performed in the median lane on divided highways the barricading plan is inverted and left lane closed and lane reduction signs substituted for the right lane closed and lane reduction signs.  
 The same applies to undivided highways with the following exceptions: (a) Work shall be confined within one median lane. (b) Additional barricades, cones, or drums shall be placed along the centerline abutting the work area and across the trailing end of the work area.  
 When work on undivided highways occurs across the centerline so as to encroach on both median lanes, the inverted plan is applied to the approach of both roadways.
6. The RIGHT (LEFT) LANE CLOSED signs are to be removed or fully covered when no work is being performed and the highway is open to traffic.
7.  $L$  (min.) = Length of taper meters :  
 $= \frac{WS}{1.6}$  for speeds  $\geq 70$  km/h  
 $= \frac{WS^2}{150}$  for speeds  $\leq 60$  km/h  
 Where:  
 $W$  = Width of lateral transition in meters.  
 $S$  = Posted speed limit (converted to km/h).
8. Arrows denote direction of traffic only and do not reflect pavement markings.
9. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
10. When work is being performed on a multilane undivided roadway the signs normally mounted in the median (as shown) shall be omitted.
11. This TCZ plan does not apply when work is being performed in the middle or inside lane(s) of a six or more lane highway. See Indexes Nos. 616 and 617.
12. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
13. For general TCZ requirements and additional information, refer to Index No. 600.

**TYPICAL APPLICATIONS**

- Pavement Resurfacing
- Pavement Repair
- Utility Work
- Bridge Repair
- Guardrail Work
- Pavement Coring And Straight Edging

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>MULTILANE, DIVIDED AND UNDIVIDED RURAL OPERATIONS ONE DAYLIGHT PERIOD OR LESS</b>				
Designed By		Dates	Approved By	
Drawn By		12/87		
Checked By		12/87	Revision	Sheet No.
			96	1 of 1
				612

English to Metric Speed Conversion	
MPH	km/h
65	110
60	100
55	90
50	80
45	70
40	60
35	60
30	50



Maximum spacing between cones and tubular markers shall be 7.5 m.  
 Maximum spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows:  
 5.0 m up to 25 MPH; 10.0 m for 30 MPH - 40 MPH;  
 15.0 m for 45 MPH and greater.

Where Other Construction Or Maintenance Operations Occur Within 1.6 kilometers, Signs To Be Omitted And Signing To Be Coordinated In Accordance With Index No. 600

Cones Or Tubular Markers At 7.5 Meter Centers For First 75.0 Meters Thereafter At 15.0 Meter Centers Or Either Type I Or Type II Barricades Or Vertical Panels Or Drums At 15.0 Meter Centers For First 75.0 Meters Thereafter At 30.0 Meter Centers.

**GENERAL NOTES**

1. Work operations shall be confined to one traffic lane, leaving the adjacent lane open to traffic.
2. All vehicles, equipment, workers and their activities are restricted at all times to one side of the pavement.
3. The first two warning signs, each side, shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.
4. All signs shall be post mounted if the closure time exceeds 12 hours.
5. On undivided highways the median signs as shown are to be omitted.
6. When work is performed in the median lane on divided highways the barricading plan is inverted and left lane closed and lane reduction signs substituted for the right lane closed and lane reduction signs.  
  
The same applies to undivided highways with the following exceptions:  
 (a) Work shall be confined within one median lane. (b) Additional barricades, cones, or drums shall be placed along the centerline abutting the work area and across the trailing end of the work area.  
  
When work on undivided highways occurs across the centerline so as to encroach on both median lanes, the inverted plan is applied to the approach of both roadways.
7. Signs and traffic control devices are to be modified in accordance with INTERMITTENT WORK STOPPAGE details (sheet 2 of 2) when no work is being performed and the highway is open to traffic.

8.  $L$  (min.) = Length of taper in meters:  
 =  $\frac{WS}{1.6}$  for speeds  $\geq 70$  km/h  
 =  $\frac{WS^2}{150}$  for speeds  $\leq 60$  km/h

Where:  
 W = Width of lateral transition in meters.  
 S = Posted speed limit (converted to km/h).

9. Arrows denote direction of traffic only and do not reflect pavement markings.
10. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
11. When work is being performed on a multilane undivided roadway the signs normally mounted in the median (as shown) shall be omitted.
12. When a side road intersects the highway on which work is being performed, additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
13. For general TCZ requirements and additional information refer to Index No. 600.

**TYPICAL APPLICATIONS**

- Pavement Resurfacing
- Pavement Repair
- Utility Work
- Bridge Repair
- Guardrail Work

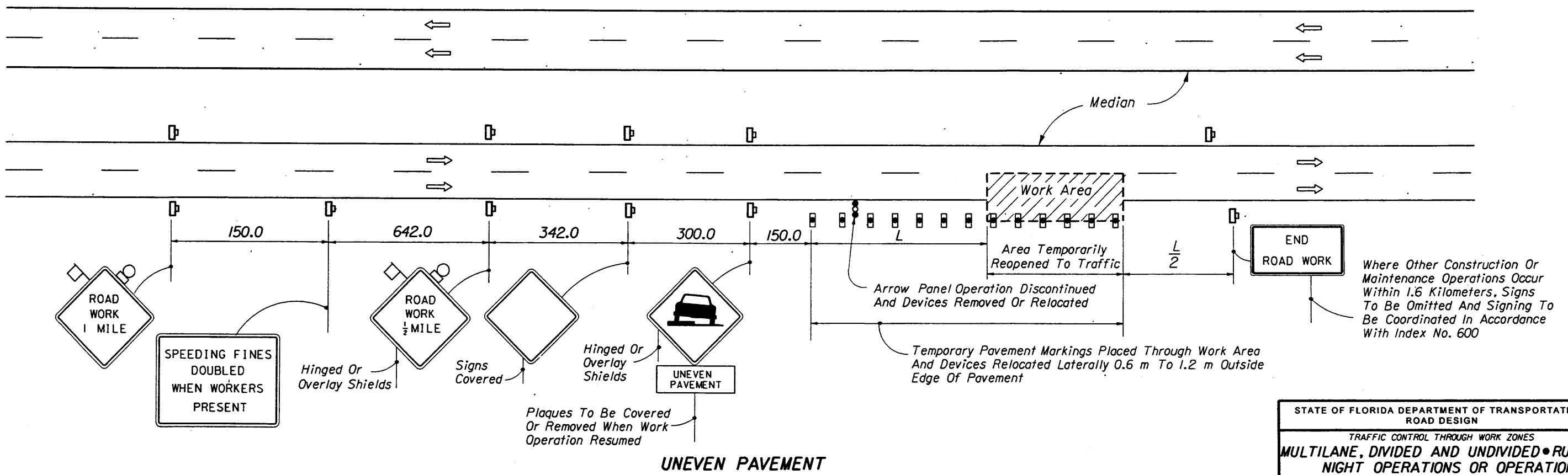
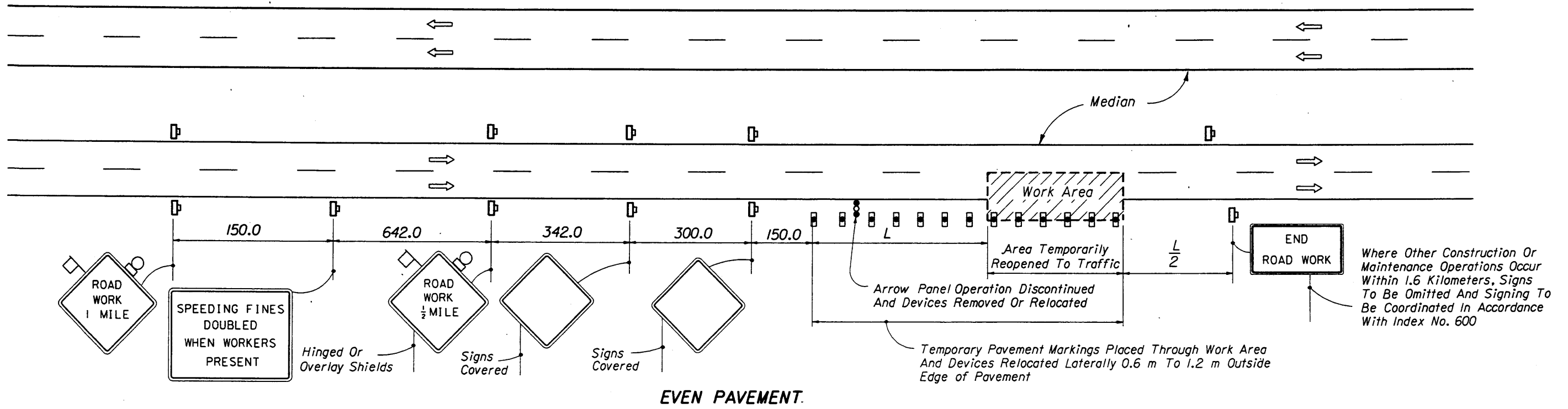
**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE LANE ADJACENT TO EITHER SHOULDER AND THE AREA 0.6 m OUTSIDE THE EDGE OF PAVEMENT

**SYMBOLS**

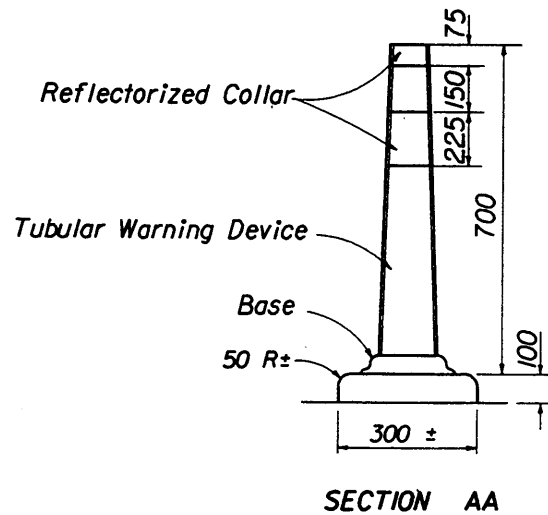
- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used -See Index 600).
- Type I, Type II Or Type III Barricade Or Vertical Panel Or Drum (With Flashing Light)
- Work Zone Sign
- Advance Warning Arrow Panel

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>MULTILANE, DIVIDED AND UNDIVIDED • RURAL NIGHT OPERATIONS OR OPERATIONS EXCEEDING ONE DAYLIGHT PERIOD</b>				
Names	Dates	Approved By		
Designed By	12/87			
Drawn By	12/87	Revision	Sheet No.	Index No.
Checked By	12/87	98	1 of 2	613

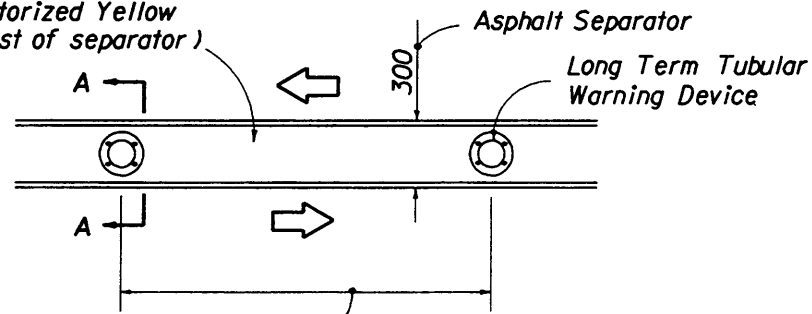


**INTERMITTENT WORK STOPPAGE • RIGHT LANE REOPENED TO TRAFFIC • DAYTIME OR NIGHTTIME**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>MULTILANE, DIVIDED AND UNDIVIDED • RURAL NIGHT OPERATIONS OR OPERATIONS EXCEEDING ONE DAYLIGHT PERIOD</b>				
Names	Dates	Approved By		
Designed By	12/87			
Drawn By	12/87			
Checked By	12/87	Revision	Sheet No.	Index No.
		98	2 of 2	613



Entire Separator Shall Be Painted Reflectorized Yellow (included in cost of separator)



Based On Speed Limit As Follows:  
 5.0 m Up To 25 MPH; 10.0 m For 30 MPH - 40 MPH;  
 15.0 m For 45 MPH And Greater.

PLAN

DETAIL OF TEMPORARY ASPHALT TRAFFIC SEPARATOR

Notes: (a) The tubular device is to be made of a flexible material or have a flexible joint at the base such that it will not cause damage to vehicles upon impact and will return to its original shape after being struck by a 2265 kilogram vehicle at a velocity of 22.5 m/sec..

(b) The tubular device shall be orange with two white reflectorized collars.

(c) The tubular device may be attached by bituminous adhesive or other methods approved by the Engineer.

(d) Reflectorized materials shall have a smooth sealed outer surface which will display the same approximate color day and night.

(e) Three Hundred Millimeter (300 mm) openings for drainage will be constructed in the separator island every 7.5 meters in areas of grades of 1% or less or every 15.0 meters in areas of grades over 1% as directed by the Engineer.

English to Metric Speed Conversion	
MPH	km/h
65	110
60	100
55	90
50	80
45	70
40	60
35	60
30	50

SYMBOLS

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used - See Index 600).
- Work Zone Sign
- Advance Warning Arrow Panel

GENERAL NOTES

1. All vehicles, equipment, workers and their activities are restricted at all times to one side of the highway.
2. The first two warning signs, each side, shall have a 450 mm x 450 mm orange flag and a Type B light attached and operating at all times.
3. All signs shall be post mounted.
4. TWO-WAY TRAFFIC sign(s) shall be repeated every four tenths (0.4) kilometer, in each direction, throughout the tangent distance (T).
5.  $L$  (min.) =  $\frac{WS}{1.6}$  for speeds  $\geq 70$  km/h  
 $= \frac{WS^2}{150}$  for speeds  $\leq 60$  km/h  
 Where:  
 W = Width of lateral transition in meters.  
 S = Posted speed limit (converted to km/h).
6. Where the tangent distance (T) exceeds 75.0 meters, spacing between Type I or II barricades or vertical panels or drums may be increased to 30.0 meters within the limits of the tangent, or post mounted delineators at 15.0 meter centers may be substituted for barricades, vertical panels or drums.
7. All existing pavement markings within the realignment which conflict with the revised traffic pattern are to be removed and removable pavement marking used for marking new edge lines.
8. Arrows denote direction of traffic only and do not reflect pavement markings.
9. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
10. When side roads, cross roads or interchanges are located within the limits for work zone traffic control additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
11. For general TCZ requirements and additional information refer to Index No. 600.
12. The contractor has the option of using temporary traffic separators and tubular type warning devices from the approved products lists in lieu of the temporary asphalt traffic separator and tubular warning device detailed above.

APPLICATIONS

- Scheme 1: Restricted Construction Limits
- Scheme 2: Unrestricted Construction Limits And Light To Moderate Traffic
- Scheme 3: Unrestricted Construction Limits And Moderate To Heavy Traffic
- Where: Construction Limits Are The Outward Beginning Or Ending Of Lane Reductions
- Where: Unless A Specific Scheme Is Called For In The Plans, Scheme Selection Shall Be At The Contractors Option And As Approved By The Engineer

CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES REQUIRE THE CLOSURE OF ONE ROADWAY AND THE OPPOSING ROADWAY IS CONVERTED TO TEMPORARY TWO-WAY TRAVEL BY WAY OF CROSSOVERS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>MULTILANE DIVIDED • RURAL DAY OR NIGHT OPERATIONS</b>				
Designed By	Names	Dates	Approved By	
Drawn By		12/87		
Checked By		12/87	Revision	Sheet No.
			00	1 of 2
				Index No. <b>614</b>

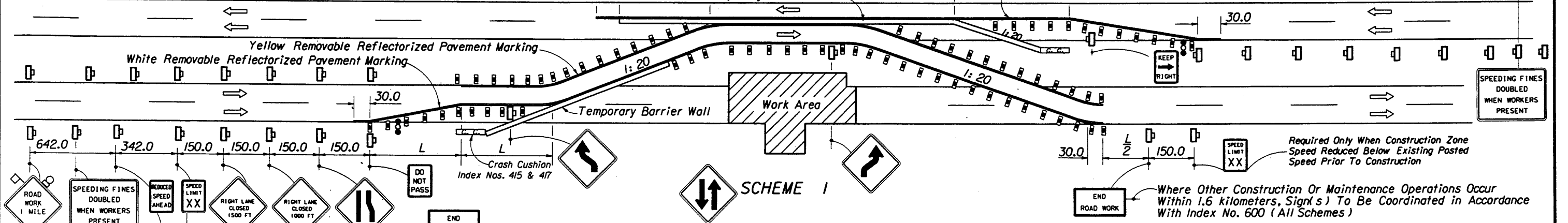
BUFFER LENGTH (METERS)			
Construction Zone Speed MPH	Construction Zone Speed km/h	X (m)	Z (m)
60-70	100-110	170.0	190.0
55	90	110.0	155.0
≤ 50	≤ 80	55.0	115.0

Type I Or Type II Barricades Or Vertical Panels Or Drums At 15.0 m Centers

Same As Left Side

Required Only When Construction Zone Speed Reduced Below Existing Posted Speed Prior To Construction

Yellow Removable Reflectorized Pavement Marking



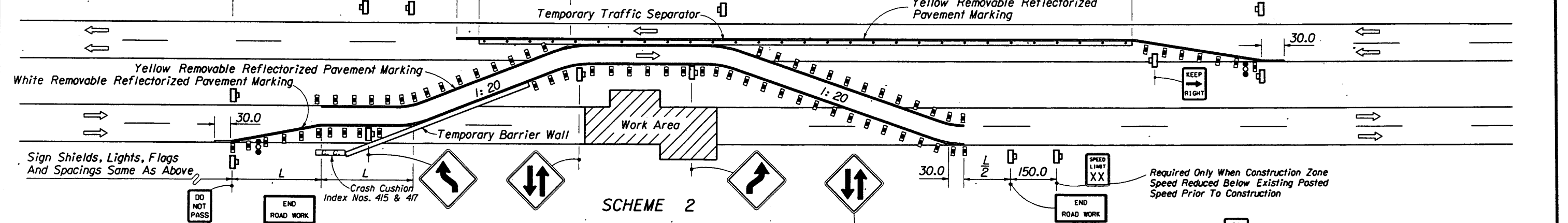
Type I Or Type II Barricades Or Vertical Panels Or Drums At 15.0 m Centers

Where Other Construction Or Maintenance Operations Occur Within 1.6 kilometers, Sign(s) To Be Coordinated In Accordance With Index No. 600 (All Schemes)

Required Only When Construction Zone Speed Reduced Below Existing Posted Speed Prior To Construction

Maximum As Called For In The Plans Or As Approved By The Engineer (2L Minimum)

Sign Shields, Lights, Flags And Spacings Same As Above

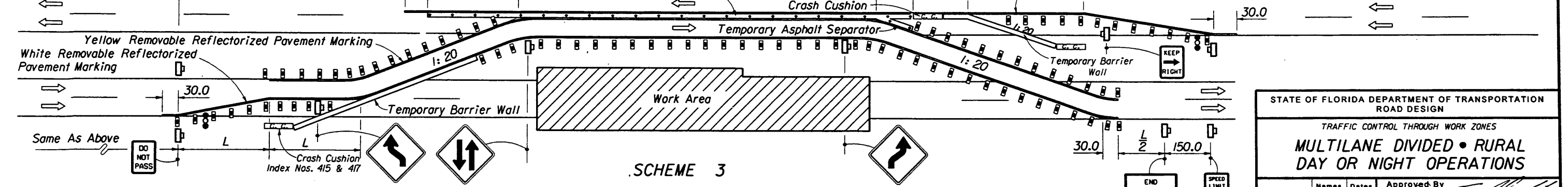


Type I Or Type II Barricades Or Vertical Panels Or Drums At 15.0 m Centers

Same As Above

Required Only When Construction Zone Speed Reduced Below Existing Posted Speed Prior To Construction

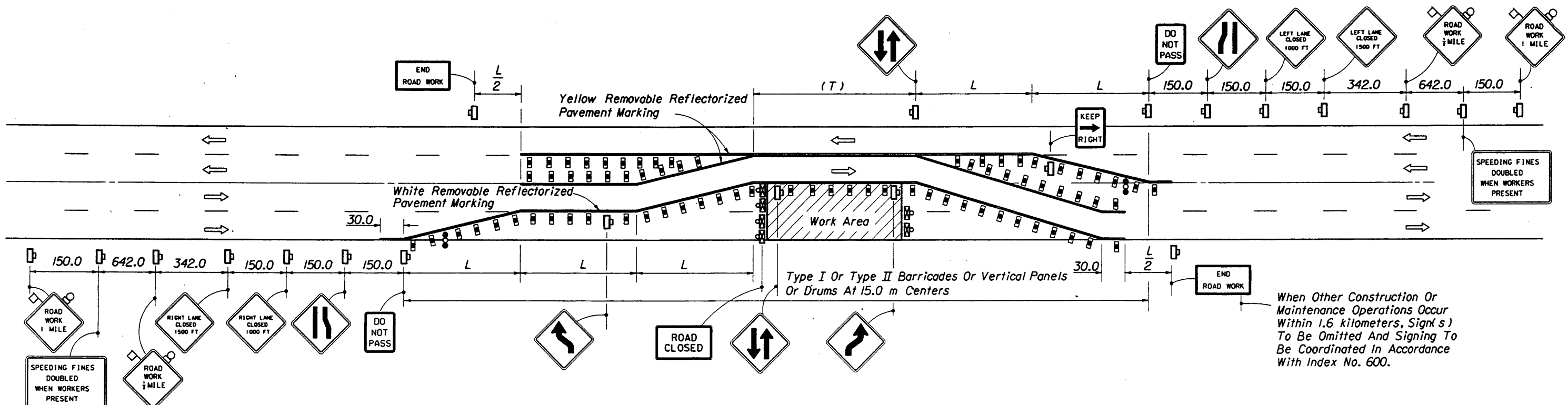
Yellow Removable Reflectorized Pavement Marking



Note: See Sheet 1 of 2 for Scheme Applications

Required Only When Construction Zone Speed Reduced Below Existing Posted Speed Prior To Construction

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN						
TRAFFIC CONTROL THROUGH WORK ZONES						
MULTILANE DIVIDED • RURAL DAY OR NIGHT OPERATIONS						
	Names	Dates	Approved By			
Designed By		12/87	 Special Projects Engineer			
Drawn By		12/87			Revision	Sheet No.
Checked By		12/87			98	2 of 2
				Index No. 614		



When Other Construction Or Maintenance Operations Occur Within 1.6 kilometers, Sign(s) To Be Omitted And Signing To Be Coordinated In Accordance With Index No. 600.

**GENERAL NOTES**

- All vehicles, equipment, workers and their activities are restricted at all times to one side of the pavement.
- The first two warning signs shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.
- All signs, except those required in paved areas, shall be post mounted if the closure time exceeds 12 hours.
- TWO-WAY TRAFFIC signs shall be repeated every four-tenths (0.4) kilometer, in each direction, through the tangent distance (T).
- $L$  (min.) =  $\frac{WS}{1.6}$  for speeds  $\geq 70$  km/h  
 $= \frac{WS^2}{150}$  for speeds  $\leq 60$  km/h  
 Where:  
 W = Width of lateral transition in meters.  
 S = Posted speed limit (converted to km/h).
- Where the tangent distance (T) exceeds 75.0 meters, spacing between cones or tubular markers may be increased to 15.0 meters or spacing between Type I or Type II barricades or vertical panels or drums may be increased to 30.0 meters within the limits of the tangent.
- This index does not apply when work is being performed in the middle lane(s) of a six or more lane highway. Special maintenance of traffic details will be required.
- Arrows denote direction of traffic only and do not reflect pavement markings.
- Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
- When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
- For general TCZ requirements and additional information refer to Index No. 600.

**SYMBOLS**

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only).
- Type III Barricade (With Flashing Light)
- Work Zone Sign
- Advance Warning Arrow Panel

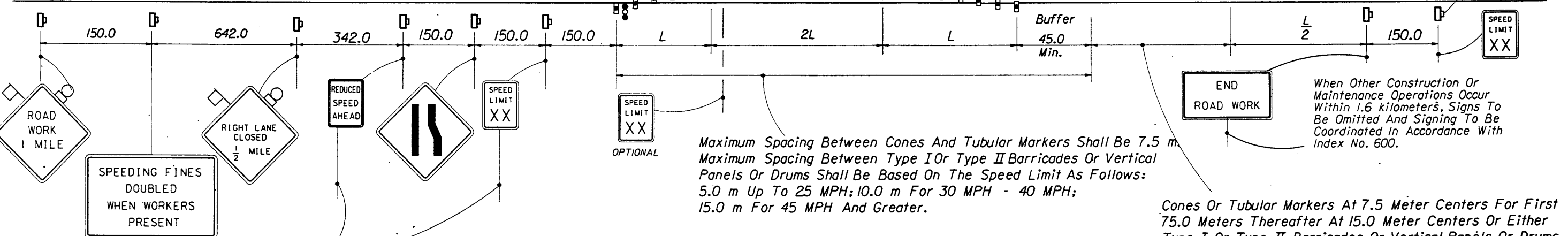
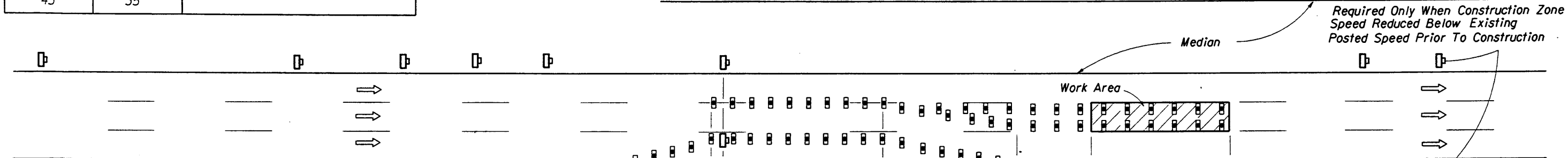
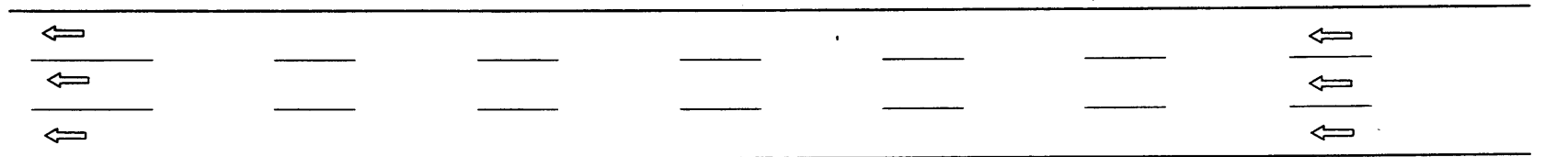
**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES REQUIRE THE CLOSURE OF THE LANES IN ONE DIRECTION AND A DETOUR IS PROVIDED BY UTILIZING ONE LANE OF THE OPPOSING TRAFFIC LANES

MPH	km/h
65	110
60	100
55	90
50	80
45	70
40	60
35	60
30	50

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>MULTILANE UNDIVIDED • RURAL DAY OR NIGHT OPERATIONS</b>				
Names	Dates	Approved By		
Designed By	12/87	Special Projects Engineer		
Drawn By	12/87	Revision	Sheet No.	Index No.
Checked By	12/87	00	1 of 1	615

EXISTING POSTED SPEED	PROPOSED WORK ZONE SPEED	REMARKS
MPH	MPH	The 'Proposed Work Zone Speeds' are recommended speeds for the traffic control plan detailed below; however, where the Engineer deems other speeds are appropriate, the applicable speeds are to be shown on the plans.
65	55	
55	45	
45	35	



Maximum Spacing Between Cones And Tubular Markers Shall Be 7.5 m.  
 Maximum Spacing Between Type I Or Type II Barricades Or Vertical Panels Or Drums Shall Be Based On The Speed Limit As Follows:  
 5.0 m Up To 25 MPH; 10.0 m For 30 MPH - 40 MPH;  
 15.0 m For 45 MPH And Greater.

Cones Or Tubular Markers At 7.5 Meter Centers For First 75.0 Meters Thereafter At 15.0 Meter Centers Or Either Type I Or Type II Barricades Or Vertical Panels Or Drums At 15.0 Meter Centers For First 75.0 Meters Thereafter At 30.0 Meter Centers.

Required Only When Construction Zone Speed Reduced Below Existing Posted Speed Prior To Construction

When Other Construction Or Maintenance Operations Occur Within 1.6 kilometers, Signs To Be Omitted And Signing To Be Coordinated In Accordance With Index No. 600.

Required Only When Construction Zone Speed Reduced Below Existing Posted Speed Prior To Construction

**CONDITION NOTES**

1. Mesh signs may be used for (Daylight Only) operations. Type B Lights and Orange Flags are not required.
2. The RIGHT LANE CLOSED and lane reduction signs are to be removed or fully covered when no work is being performed and the center lane is opened to traffic.
3. For work performed in the outside lane refer to Indexes Nos. 612 and 613.
4. When the lane closure exceeds a continuous 24 hour period all existing pavement markings within the realignment which conflict with the revised traffic pattern are to be removed and removable pavement marking used for marking new edge lines and centerline.

**GENERAL NOTES**

1. All vehicles, equipment, workers, and their activities are restricted at all times to one side of the highway.
2. The first two warning signs each side shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.
3. All signs shall be post mounted if closure time exceeds 12 hours.
4.  $L$  (min.) =  $\frac{WS}{1.6}$  for speeds  $\geq 70$  km/h  
 $= \frac{WS^2}{150}$  for speeds  $\leq 60$  km/h  
 Where:  
 $W$  = Width of lateral transition in meters.  
 $S$  = Posted speed limit (converted to km/h).
5. Arrows denote direction of traffic only and do not reflect pavement markings.
6. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
7. END ROAD WORK signs required only when work exceeds one daylight period.
8. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
9. For general TCZ requirements and additional information refer to Index No. 600.

English to Metric Speed Conversion	
MPH	km/h
65	110
60	100
55	90
50	80
45	70
40	60
35	60
30	50

**SYMBOLS**

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only). Cones May Be Used -See Index 600).
- Work Zone Sign
- Advance Warning Arrow Panel

**TYPICAL APPLICATIONS**

- Pavement Resurfacing
- Pavement Repair

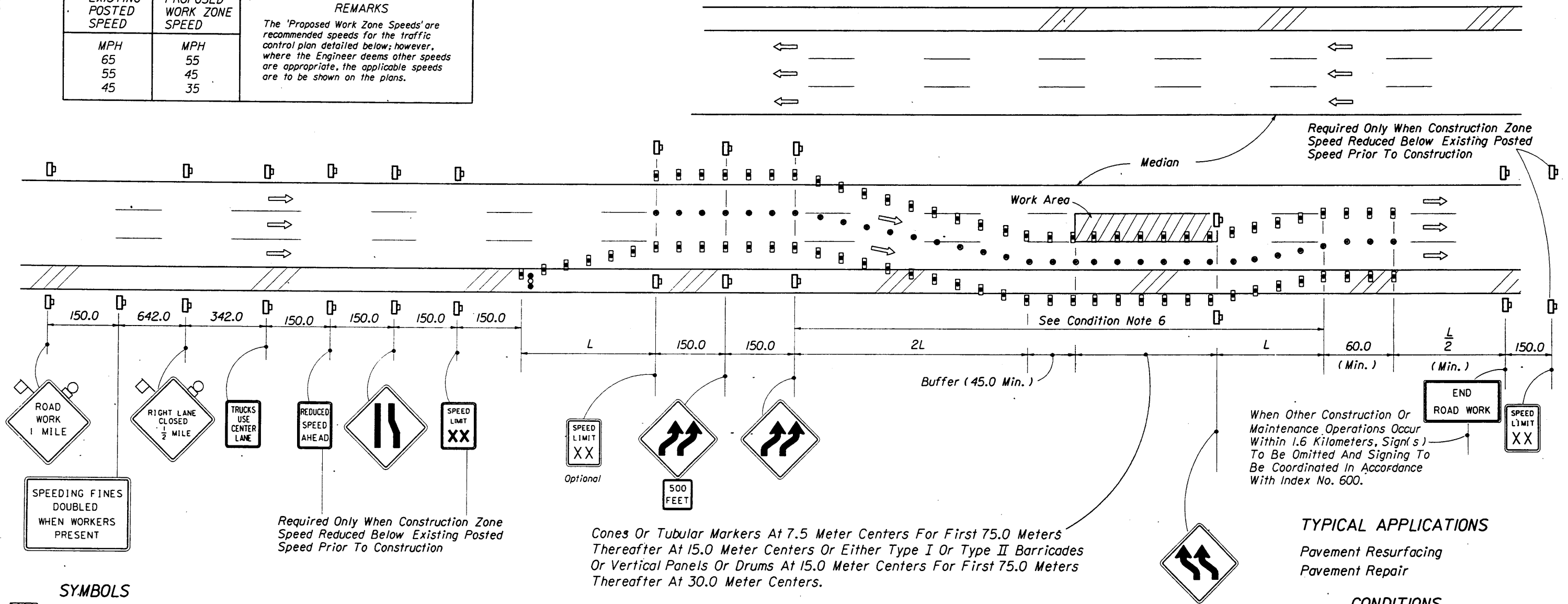
**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON ANY PORTION OF A CENTER LANE OF A MULTILANE HIGHWAY, AND TWO DRIVING LANES ARE MAINTAINED ON THE TRAVEL WAY.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>MULTILANE DIVIDED • RURAL</b>				
Designed By	Names	Dates	Approved By	
Drawn By		12/87		
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				Index No. <b>616</b>



EXISTING POSTED SPEED	PROPOSED WORK ZONE SPEED	REMARKS
MPH	MPH	The 'Proposed Work Zone Speeds' are recommended speeds for the traffic control plan detailed below; however, where the Engineer deems other speeds are appropriate, the applicable speeds are to be shown on the plans.
65	55	
55	45	
45	35	



- SYMBOLS**
- Work Area
  - Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
  - Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used -See Index 600).
  - Work Zone Sign
  - Advance Warning Arrow Panel
  - Cone Or Tubular marker (Except At Night Use Vertical Panels)

Required Only When Construction Zone Speed Reduced Below Existing Posted Speed Prior To Construction

Cones Or Tubular Markers At 7.5 Meter Centers For First 75.0 Meters Thereafter At 15.0 Meter Centers Or Either Type I Or Type II Barricades Or Vertical Panels Or Drums At 15.0 Meter Centers For First 75.0 Meters Thereafter At 30.0 Meter Centers.

**CONDITION NOTES**

1. See General Notes, Sheet 1 of 2.
2. Maximum spacing between devices (m) to be equal to the speed limit (km/h) but not greater than 7.5 m for cones or tubular markers or 15.0 m for Type I or Type II barricades or or vertical panels or drums.  
Barricades, vertical panels or drums shall be used to delineate the edge lines of the transition areas (i.e. L and 2L). Beyond the transition area, any of the above noted devices may be used to delineate the edge lines.  
Cones or tubular markers shall be used to delineate the center line. (Except at night use vertical panels)
3. Length of time that traffic is using shoulder should be minimized. For example, remove lane closure and lane shift at night (unless performing nightwork) if practical.
4. The RIGHT LANE CLOSED, lane reduction and reverse curve signs are to be removed or fully covered when no work is being performed and the travel way is open to traffic.
5. When the lane closure exceeds a continuous 24 hour period all existing pavement markings within the realignment which conflict with the revised traffic pattern are to be removed and removable pavement markings used for marking new edge lines and centerlines.
6. For general TCZ requirements and additional information refer to Index No. 600.

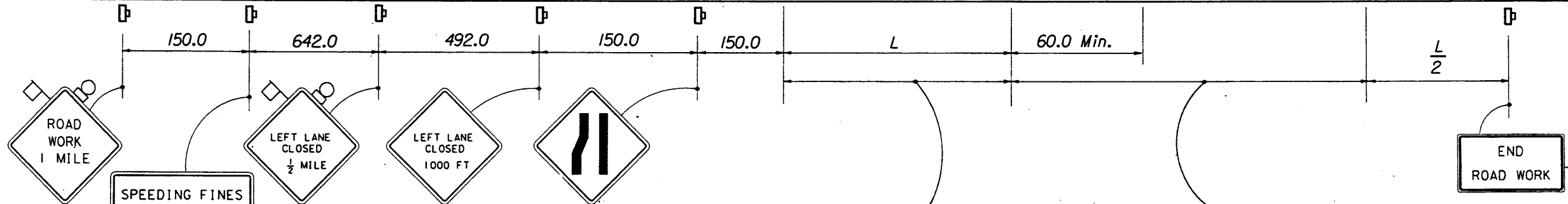
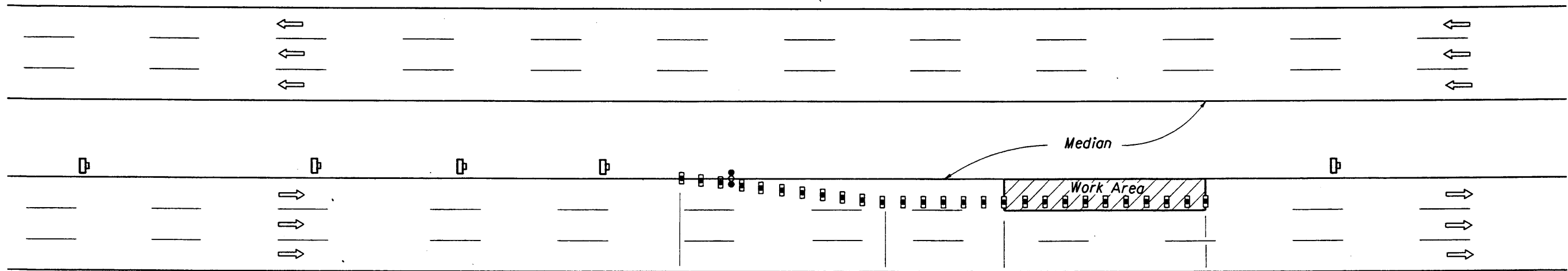
**TYPICAL APPLICATIONS**

Pavement Resurfacing  
Pavement Repair

**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON ANY PORTION OF A CENTER LANE OF A MULTILANE HIGHWAY, AND TWO DRIVING LANES ARE MAINTAINED, AND, THE OUTSIDE SHOULDER PAVEMENT IS TEMPORARILY USED AS A TRAVEL LANE.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>MULTILANE DIVIDED • RURAL</b>				
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When Other Construction Or Maintenance Operations Occur Within 1.6 Kilometers, Sign(s) To Be Omitted And Signing To Be Coordinated In Accordance With Index No. 600.

Cones Or Tubular Markers At 7.5 Meter Centers For First 75.0 Meters Thereafter At 15.0 Meter Centers Or Either Type I Or Type II Barricades Or Vertical Panels Or Drums At 15.0 Meter Centers For First 75.0 Meters Thereafter At 30.0 Meter Centers.

Maximum Spacing Between Cones And Tubular Markers Shall Be 7.5 m.  
 Maximum Spacing Between Type I Or Type II Barricades Or Vertical Panels Or Drums Shall Be Based On The Speed Limit As Follows:  
 5.0 m Up To 25 MPH; 10.0 m For 30 MPH - 40 MPH;  
 15.0 m For 45 MPH And Greater.

English to Metric Speed Conversion	
MPH	km/h
65	110
60	100
55	90
50	80
45	70
40	60
35	60
30	50

**SYMBOLS**

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used - See Index 600).
- Work Zone Sign
- Advance Warning Arrow Panel

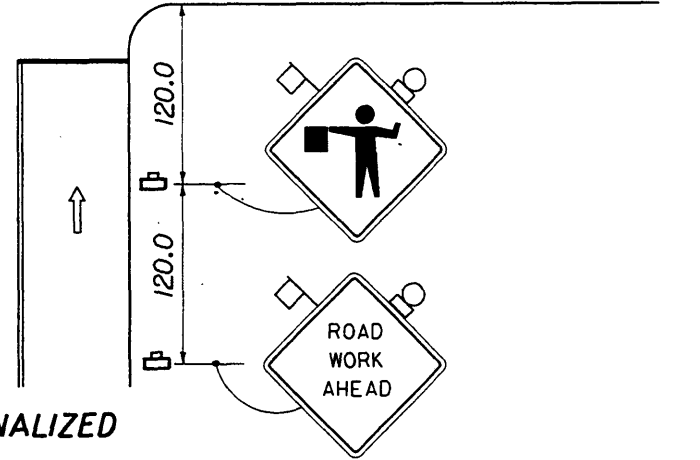
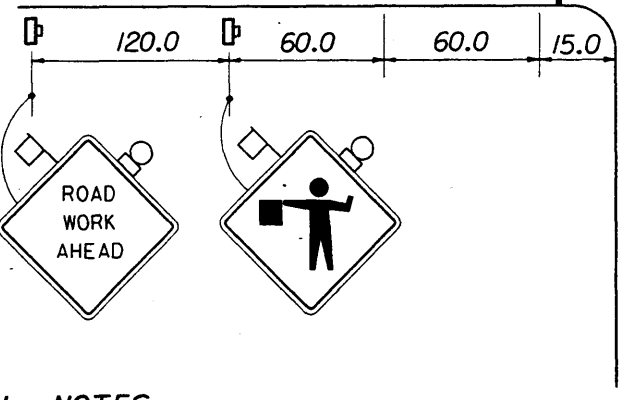
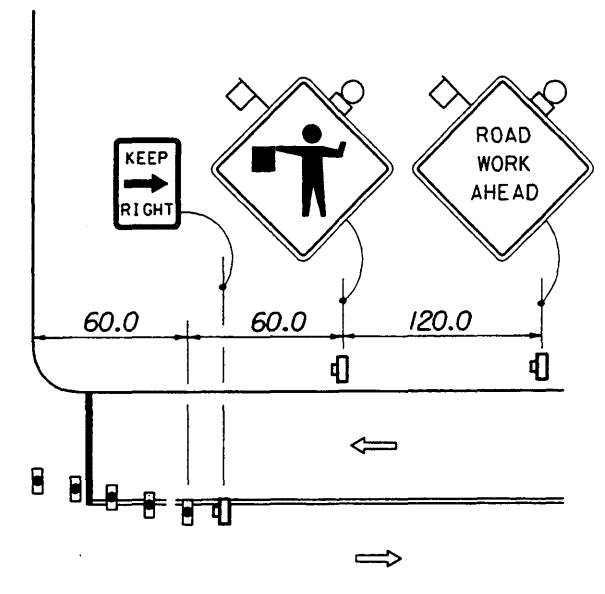
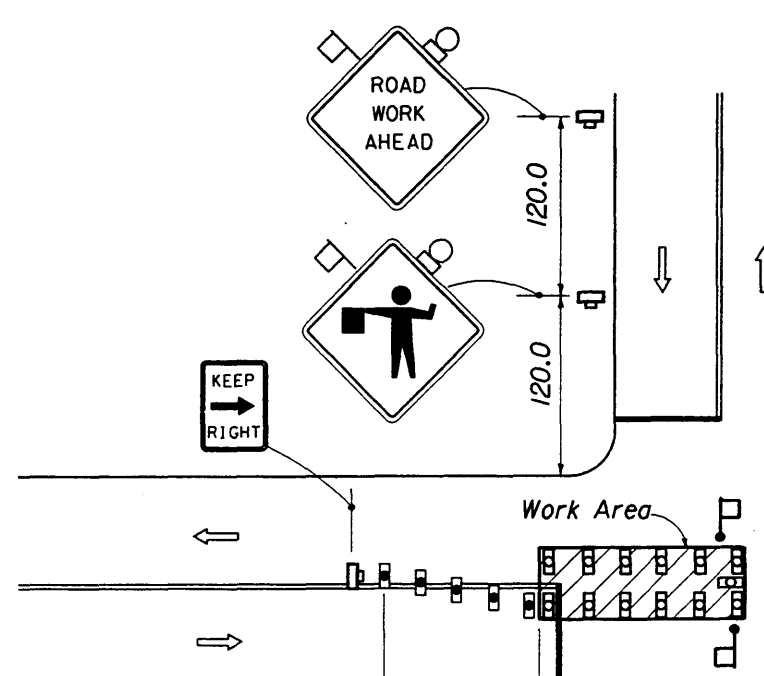
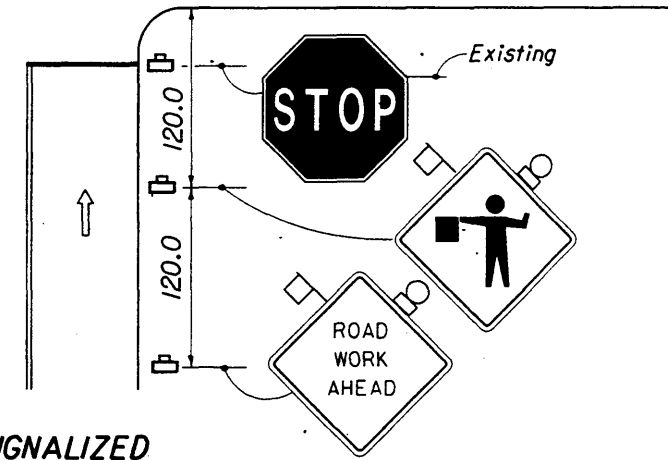
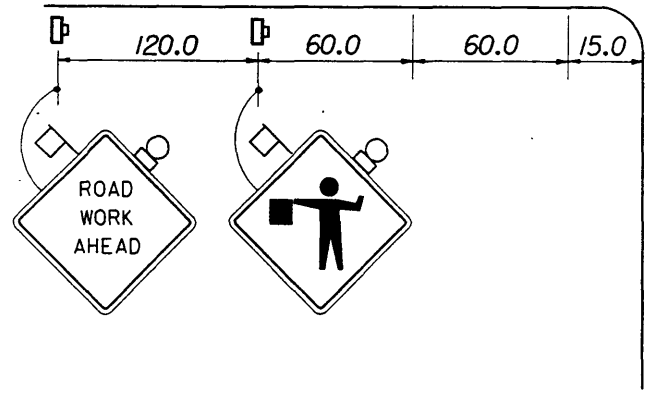
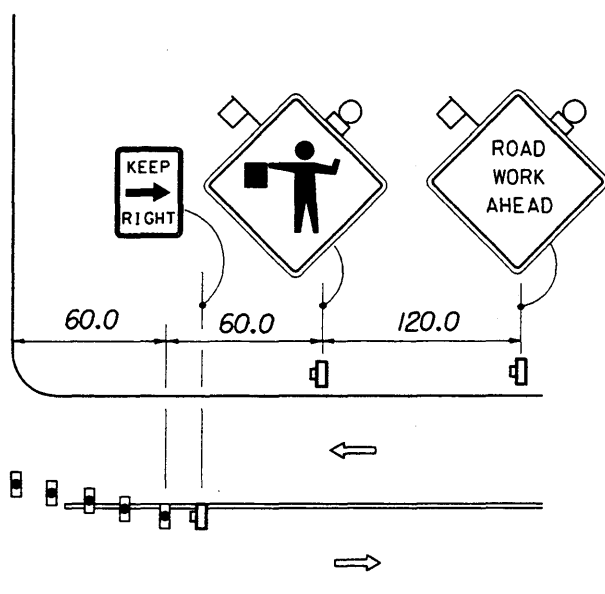
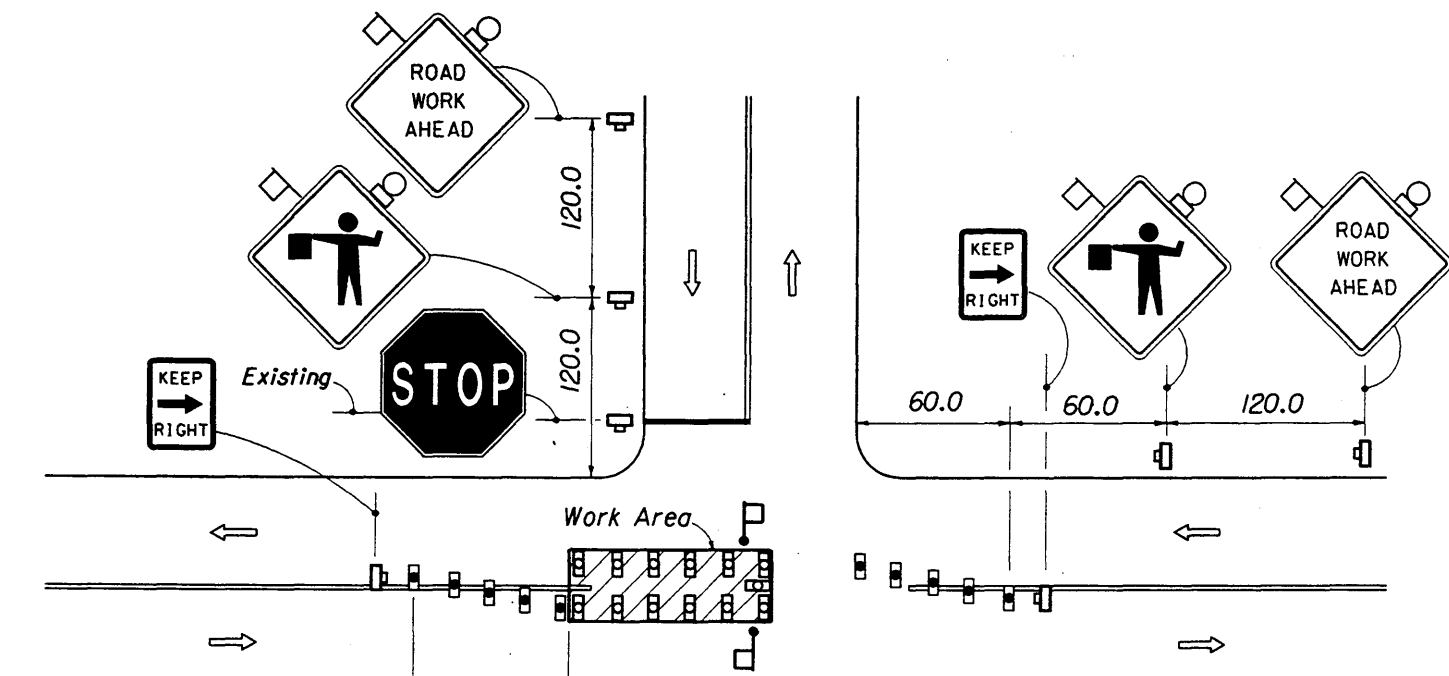
**GENERAL NOTES**

1. All vehicles, equipment, workers and their activities are restricted at all times to one side of the highway.
2. The first two warning signs, each side, shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.  
 Mesh signs may be used for (Daylight Only) operations Type B Lights and Orange Flags are not required.
3. All signs shall be post mounted if closure time exceeds 12 hours.
4.  $L$  (min.) =  $\frac{WS}{1.6}$  for speeds  $\geq 70$  km/h  
 $= \frac{WS^2}{150}$  for speeds  $\leq 60$  km/h  
 Where:  
 W = Width of lateral transition in meters.  
 S = Posted speed limit (converted to km/h).
5. The LEFT LANE CLOSED and lane reduction signs are to be removed or fully covered when no work is being performed and the inside lane is open to traffic.
6. Advance warning arrow panels are required for both day and night operation. Either the right flashing arrow or the right sequential arrow modes may be used; the caution mode shall not be used.
7. Arrows denote direction of traffic only and do not reflect pavement marking.
8. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
9. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
10. For work performed in the outside lane refer to Indexes Nos. 612 and 613.
11. For general TCZ requirements and additional information refer to Index No. 600.

**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES WILL ENCROACH ON ANY PORTION OF THE INSIDE LANE OF A MULTILANE HIGHWAY

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<b>MULTILANE DIVIDED • RURAL</b>				
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**UNSIGNALIZED**

**GENERAL NOTES**

**SIGNALIZED**

**TYPICAL APPLICATIONS**

Utility Work  
Pavement Repair

**CONDITIONS**

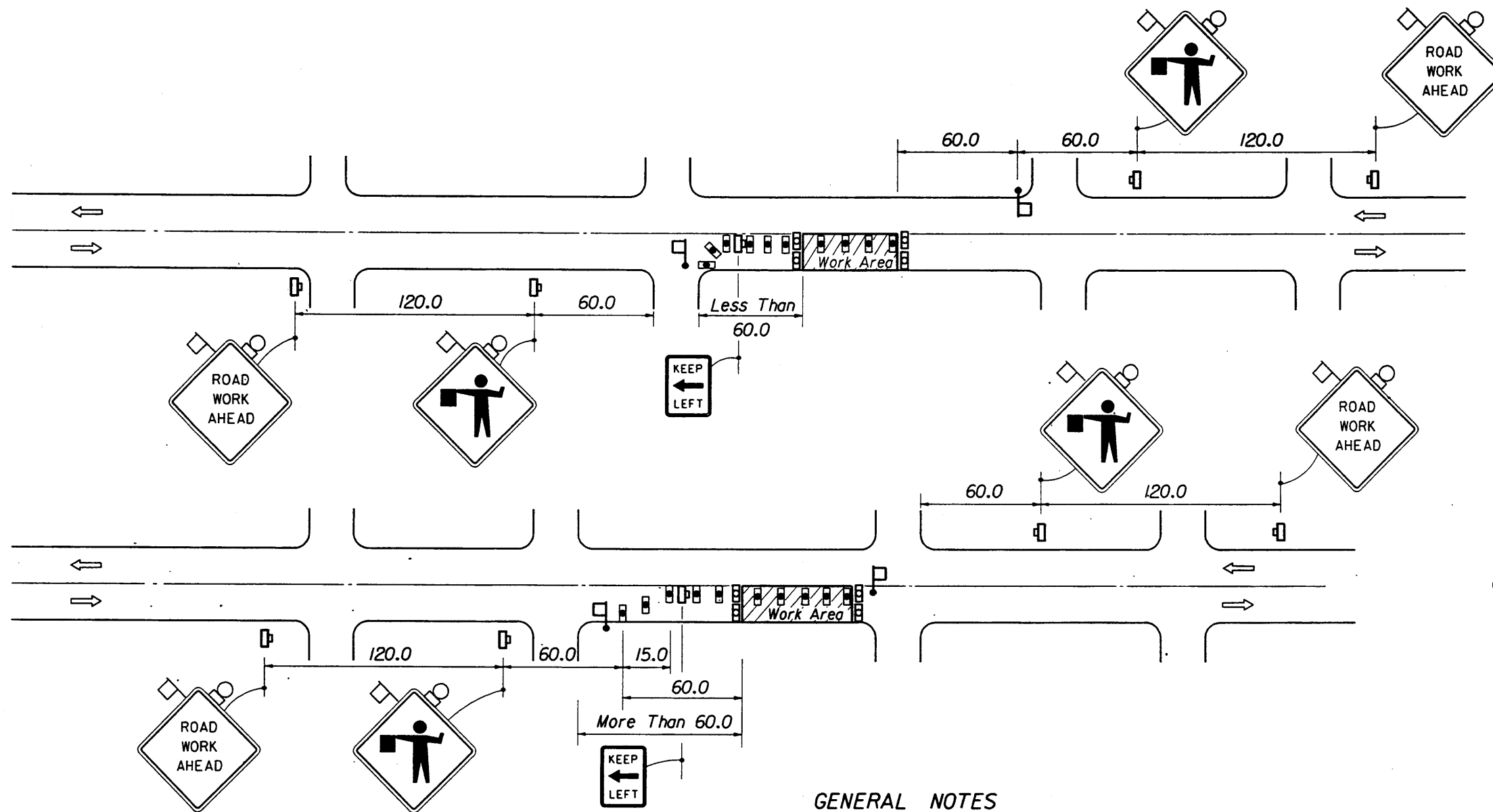
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCR OACH ON THE PAVEMENT REQUIRING THE CLOSURE OF A PORTION OF ONE OR MORE TRAFFIC LANES IN AN INTERSECTION FOR A PERIOD OF MORE THAN 60 MINUTES

**SYMBOLS**

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used -See Index 600).
- Type I Or Type II Barricade Or Vertical Panel Or Drum (with Flashing Light At Night Only)
- Work Zone Sign
- Flagger
- Stop Bar

1. All vehicles, equipment, workers( except flaggers ) and their activities are forbidden in lane and intersection areas reserved for traffic.
2. The first two warning signs shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times. Mesh signs may be used for (Daylight Only) operations Type B Lights and Orange Flags are not required.
3. The FLAGGER legend sign may be substituted for the symbol sign.
4. All signs shall be post mounted if closure time exceeds 12 hours.
5. When vehicles in a parking zone block the line of sight to TCZ signs or when TCZ signs encroach on a normal pedestrian walkway, the signs shall be post mounted and located in accordance with Index No. 17302.
6. Flaggers shall be located where they can control more than one direction of traffic. Flaggers shall be in sight of each other or in direct communication at all times.
7. Maximum spacing between barricades, vertical panels, cones, tubular markers and drums shall be not greater than 7.5 meters.
8. Arrows denote direction of traffic only and do not reflect pavement markings.
9. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
10. Temporary signal phasing modifications are to be approved by the District Traffic Operations Engineer prior to the beginning of work.
11. Work performed for a period of 60 minutes or less is to be conducted in accordance with Index No. 607.
12. For general TCZ requirements and additional information refer to index No. 600.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>TWO-LANE, TWO-WAY • URBAN DAY OR NIGHT OPERATIONS</b>				
Names	Dates	Approved By		
Designed By	12/87			
Drawn By	12/87	Revision	Sheet No.	Index No.
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**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF ONE TRAFFIC LANE, FOR WORK AREA LESS THAN 60.0 m DOWNSTREAM FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF ONE TRAFFIC LANE, FOR WORK AREA 60.0 m OR MORE DOWNSTREAM FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

**GENERAL NOTES**

1. Work operations shall be confined to one travel lane, leaving the opposing travel lane open to traffic.
2. All vehicles, equipment, workers (except flaggers) and their activities are restricted at all times to one side of the pavement.
3. For work operations of 60 minutes or less see Index No. 607
4. When vehicles in a parking zone block the line of sight to TCZ signs or when TCZ signs encroach on a normal pedestrian walkway, the signs shall be post mounted and located in accordance with Index No. 17302.
5. If work area is confined to an outside auxiliary lane the work area shall be barricaded and the FLAGGER signs replaced by ROAD WORK AHEAD signs. Flaggers are not required.
6. Flaggers shall be in sight of each other or in direct communication at all times.
7. The ROAD CONSTRUCTION AHEAD and FLAGGER signs shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.  
Mesh signs may be used for (Daylight Only) operations  
Type B Lights and Orange Flags are not required.
8. The FLAGGER legend sign may be substituted for the symbol sign.
9. All signs shall be post mounted if the closure time exceeds 12 hours.
10. The maximum spacing between devices shall be not greater than 7.5 meters.
11. Arrows denote direction of traffic only and do not reflect pavement markings.
12. Longitudinal dimensions are to be adjusted to fit field conditions See Index No. 600.
13. For general TCZ requirements and additional information refer to Index No. 600.

**SYMBOLS**








- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used - See Index 600).
- Type I Or Type II Barricade Or Vertical Panel Or Drum (with Flashing Light At Night Only)
- Work Zone Sign
- Flagger

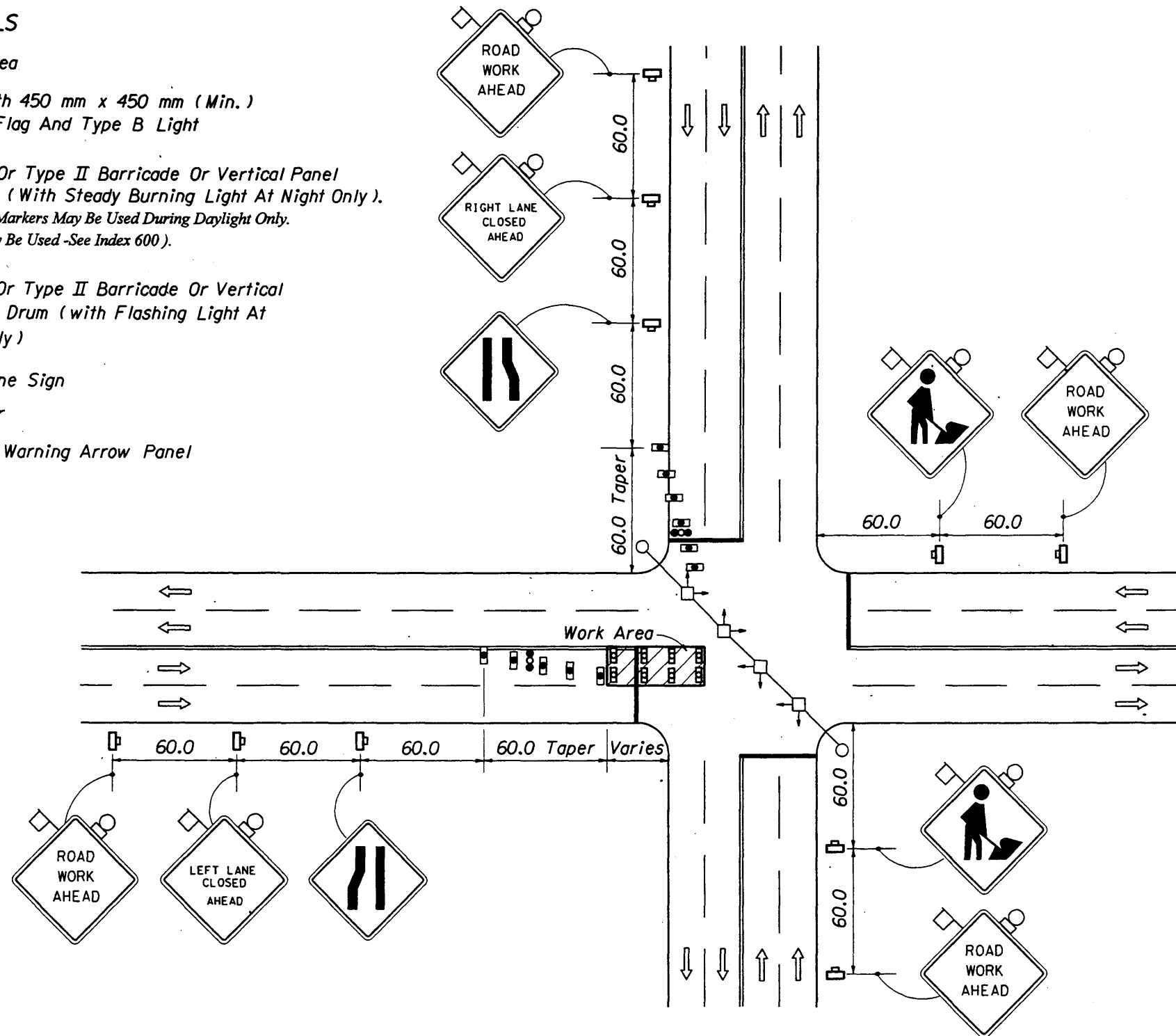
**TYPICAL APPLICATIONS**

- Utility Work
- Pavement Repair
- Structure Adjustments

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>TWO-LANE, TWO-WAY • URBAN DAY OR NIGHT OPERATIONS</b>				
Designed By	Names	Dates	Approved By	
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Checked By		12/87	Revision	Sheet No.
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**SYMBOLS**

-  Work Area
-  Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
-  Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used -See Index 600).
-  Type I Or Type II Barricade Or Vertical Panel Or Drum (with Flashing Light At Night Only)
-  Work Zone Sign
-  Stop Bar
-  Advance Warning Arrow Panel



**SIGNALIZED**

**GENERAL NOTES**


1. All vehicles, equipment, workers (except flaggers) and their activities are forbidden in lane and intersection areas reserved for traffic.
2. For work operations of 60 minutes or less see Index No. 607.
3. The first two warning signs shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times. Mesh signs may be used for (Daylight Only) operations. Type B Lights and Orange Flags are not required.
4. All signs shall be post mounted if closure time exceeds 12 hours.
5. The WORKERS legend sign may be substituted for the symbol sign.
6. Dual signs are required for divided roadways.
7. Arrows denote direction of traffic only and do not reflect pavement markings.
8. Maximum spacing between barricades, vertical panels, cones, tubular markers and drums shall be not greater than 7.5 m.
9. Temporary signal phasing modifications are to be approved by the District Traffic Operations Engineer prior to the beginning of work.
10. Work performed for a period of 60 minutes or less is to be conducted in accordance with Index No. 607.
11. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
12. For general TCZ requirements and additional information refer to Index No. 600.

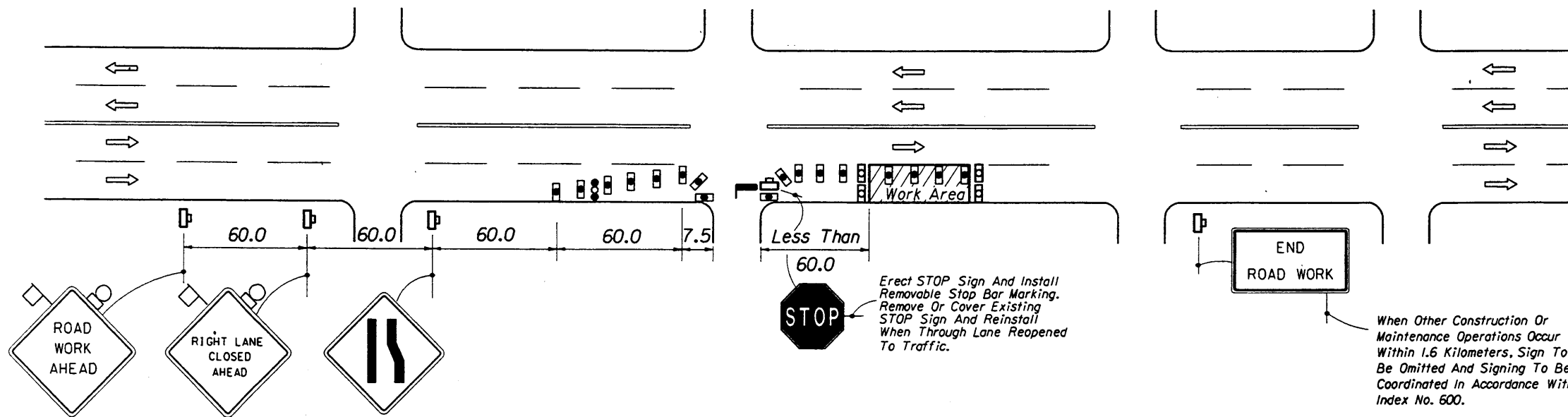
**TYPICAL APPLICATIONS**

- Utility Work
- Pavement Repair
- Structure Adjustments

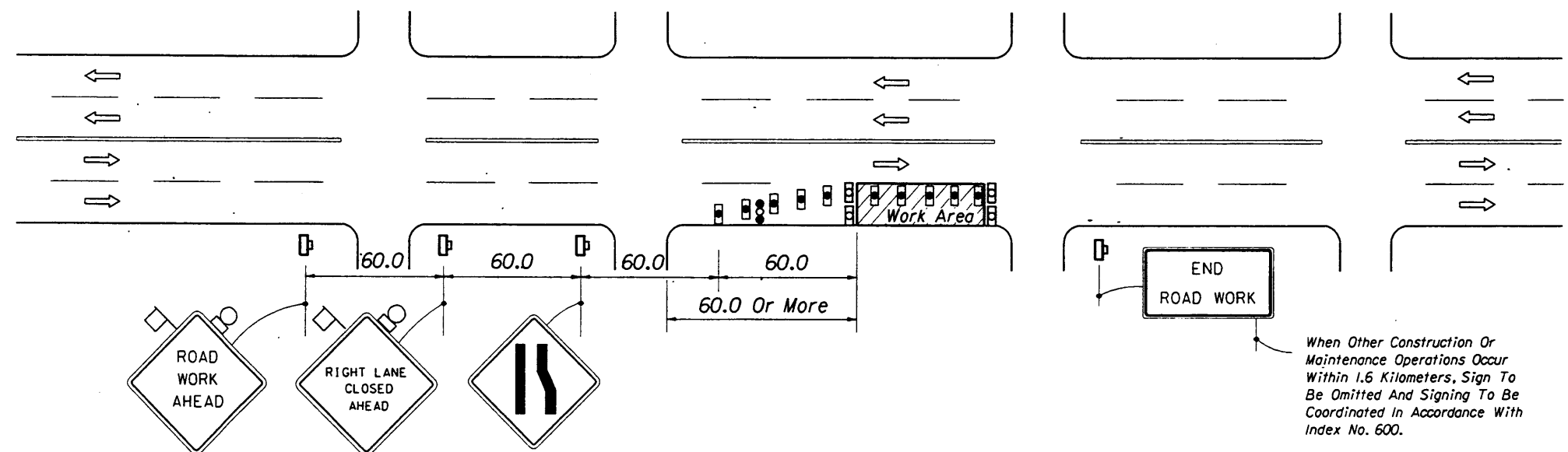
**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF AT LEAST ONE MEDIAN TRAFFIC LANE FOR A PERIOD OF MORE THAN 60 MINUTES

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES <b>MULTILANE, TWO-WAY • URBAN DIVIDED OR UNDIVIDED DAY OR NIGHT OPERATION</b>				
	Names	Dates	Approved By	
Designed By		12/87	 Special Projects Engineer	
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**CONDITIONS**  
 WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF THE OUTSIDE TRAVEL LANE, AND/OR ADJOINING AUXILIARY LANE, FOR WORK AREA LESS THAN 60.0 m FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.



**CONDITIONS**  
 WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF THE OUTSIDE TRAVEL LANE AND/OR ADJOINING AUXILIARY LANE, FOR WORK AREA 60.0 m OR MORE FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

**SYMBOLS**

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used - See Index 600)
- Type I Or Type II Barricade Or Vertical Panel Or Drum (with Flashing Light At Night Only)
- Work Zone Sign
- Advance Warning Arrow Panel
- Stop Bar

**GENERAL NOTES**

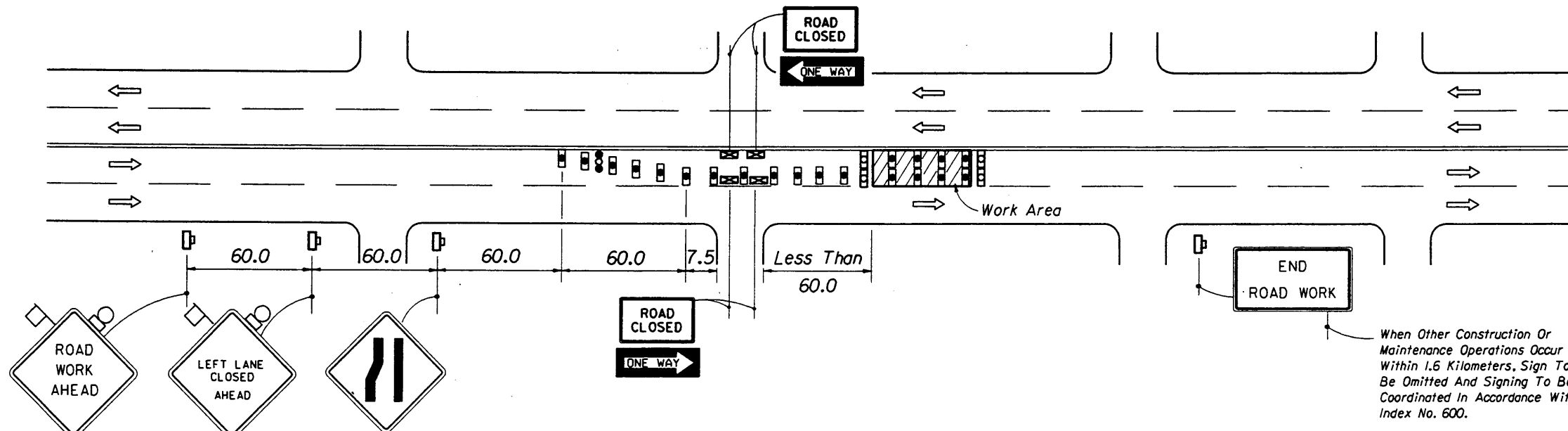
1. All vehicles, equipment, workers (except flaggers) and their activities are restricted at all times to one side of the roadway.
2. Work operations shall be confined to either one lane or lane combinations as follows:
  - (a) Outside travel lane (b) Outside auxiliary lane
  - (c) Outside travel lane and adjoining auxiliary lane
  - (d) Inside travel lane<sup>Δ</sup> (e) Inside auxiliary lane<sup>Δ</sup>
  - (f) Inside travel lane and adjoining auxiliary lane<sup>Δ</sup>
  - <sup>Δ</sup> See Sheet 2 Of 2
 If the work area is confined to an auxiliary lane the work area shall be barricaded and the RIGHT (LEFT) LANE CLOSED AHEAD signs replaced by ROAD WORK AHEAD signs, and the merge symbol signs eliminated.
3. For work operations of 60 minutes or less see Index No. 612.
4. When vehicles in a parking zone block the line of sight to TCZ signs or when TCZ signs encroach on a normal pedestrian walkway, the signs shall be post mounted and located in accordance with Index No. 17302.
5. The first two warning signs shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times. Mesh signs may be used for (Daylight Only) operations. Type B Lights and Orange Flags are not required.
6. All signs shall be post mounted if the closure times exceeds 12 hours.
7. Dual signs are required for divided roadways.

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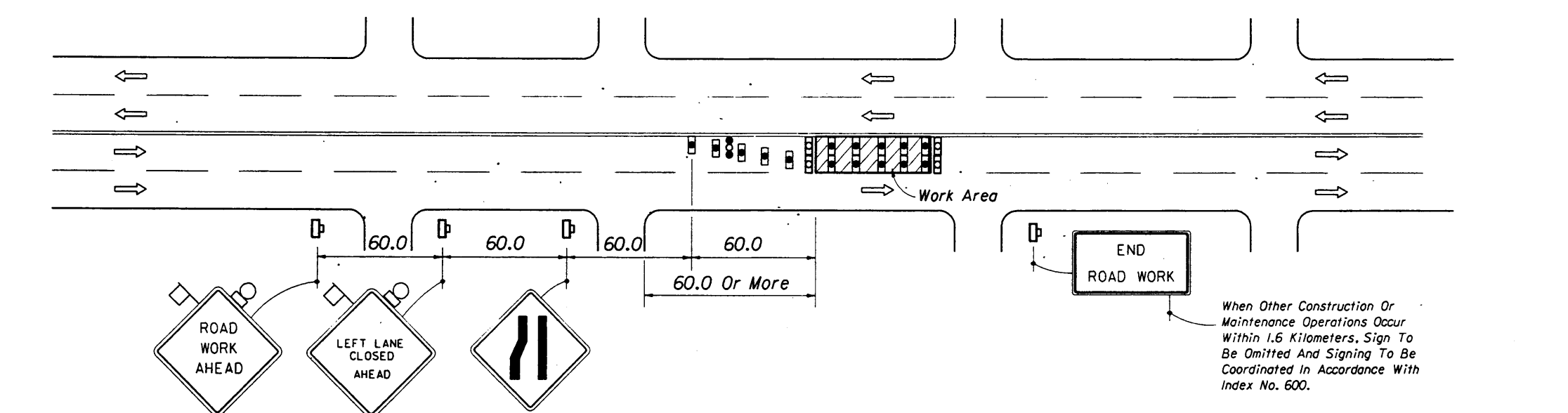
**TYPICAL APPLICATIONS**

- Utility Work
- Pavement Repairs
- Structure Adjustments

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES <b>MULTILANE, TWO-WAY • URBAN DIVIDED OR UNDIVIDED DAY OR NIGHT OPERATIONS</b>				
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**CONDITIONS**  
 WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF THE INSIDE TRAVEL LANE AND/OR ADJOINING AUXILIARY LANE, FOR WORK AREA LESS THAN 60.0 m FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.



**CONDITIONS**  
 WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF THE INSIDE TRAVEL LANE AND/OR ADJOINING AUXILIARY LANE, FOR WORK AREA 60.0 m OR MORE FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

**SYMBOLS**

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used - See Index 600).
- Type I Or Type II Barricade Or Vertical Panel Or Drum (with Flashing Light At Night Only)
- Type III Barricade
- Work Zone Sign
- Advance Warning Arrow Panel

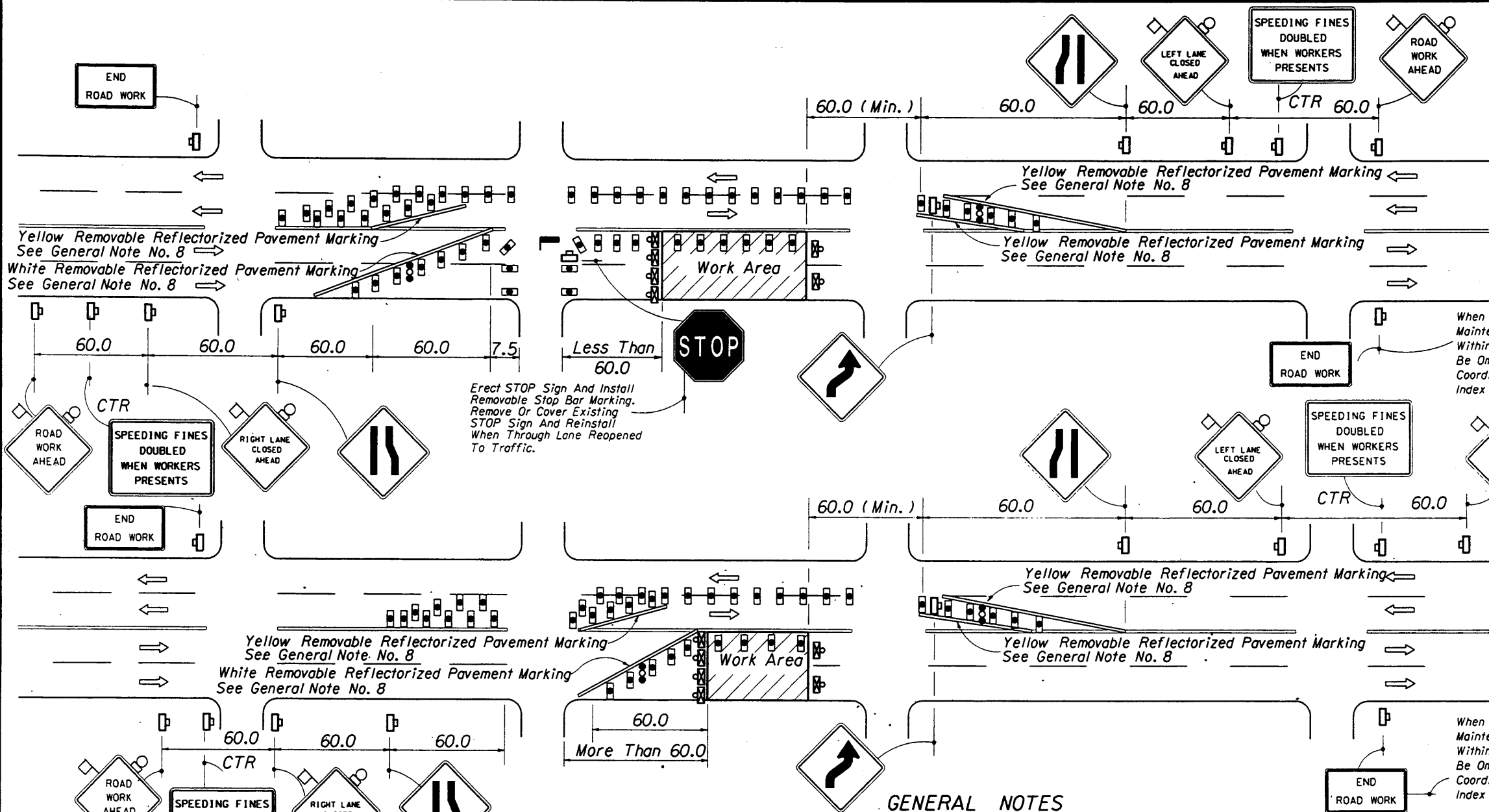
**GENERAL NOTES (CONT.)**

8. Within the lateral transitions, the maximum spacing between cones and tubular markers shall be 7.5 meters. Maximum spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows: 5.0 meters up to 25 MPH; 10.0 meters for 30 MPH-40 MPH; 15.0 meters for 45 MPH or greater. Spacing for devices parallel to the travel lanes shall be 7.5 meter centers for cones or tubular markers and 15.0 meter centers for Type I or Type II barricades or vertical panels or drums for 75.0 meters, thereafter cones or tubular markers at 15.0 meter centers and Type I or Type II barricades or vertical panels or drums at 30.0 meter centers.
9. Arrows denote direction of traffic only and do not reflect pavement markings.
10. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
11. For general TCZ requirements and additional information refer to Index No. 600.

**TYPICAL APPLICATIONS**

- Utility Work
- Pavement Repairs
- Structure Adjustments

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>MULTILANE, TWO-WAY • URBAN DIVIDED OR UNDIVIDED DAY OR NIGHT OPERATIONS</b>				
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**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF TRAFFIC LANES IN ONE DIRECTION AND THE USE OF ONE OPPOSING TRAFFIC LANE TO MAINTAIN TWO-WAY TRAFFIC, FOR WORK AREA LESS THAN 60.0 m FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF TRAFFIC LANES IN ONE DIRECTION AND THE USE OF ONE OPPOSING TRAFFIC LANE TO MAINTAIN TWO-WAY TRAFFIC, FOR WORK AREA 60.0 m OR MORE FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

**GENERAL NOTES**

1. All vehicles, equipment, workers and their activities are restricted at all times to one side of the pavement.
2. For work operations of 60 minutes or less (daylight only) see Index No. 607.
3. When vehicles in a parking zone block the line of sight to TCZ signs or when TCZ signs encroach on a normal pedestrian walkway, the signs shall be post mounted and located in accordance with Index No. 17302. Mesh signs may be used for (Daylight Only) operations Type B Lights and Orange Flags are not required.
4. The first two warning signs shall have a 450 mm x 450 mm (min.) Orange flag and a Type B light attached and operating at all times.
5. All signs shall be post mounted if the closure time exceeds 12 hours.
6. Dual signs are required for divided roadways.
7. Channelizing devices are to be spaced with Type I or Type II barricades or vertical panels or drums at 15.0 meter centers, except in tangent work areas spacing may be increased to 30.0 meters after the first 75.0 meters when approved by the Engineer.
8. Removable reflectorized pavement markings shall be used when closure time exceeds one daylight period.
9. Arrows denote direction of traffic only and do not reflect pavement markings.
10. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
11. For general TCZ requirements and additional information refer to Index No. 600.

- SYMBOLS**
- Work Area
  - Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
  - Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only).
  - Type III Barricade (With Flashing Light)
  - Work Zone Sign
  - Advance Warning Arrow Panel
  - Stop Bar

When Other Construction Or Maintenance Operations Occur Within 1.6 Kilometers, Sign To Be Omitted And Signing To Be Coordinated In Accordance With Index No. 600.

When Other Construction Or Maintenance Operations Occur Within 1.6 Kilometers, Sign To Be Omitted And Signing To Be Coordinated In Accordance With Index No. 600.

**TYPICAL APPLICATIONS**

- Utility Work
- Pavement Repair
- Structure Adjustments

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>MULTILANE DIVIDED WITH TRAVERSABLE MEDIAN OR UNDIVIDED • URBAN DAY OR NIGHT OPERATIONS</b>				
Designed By	Names	Dates	Approved By	
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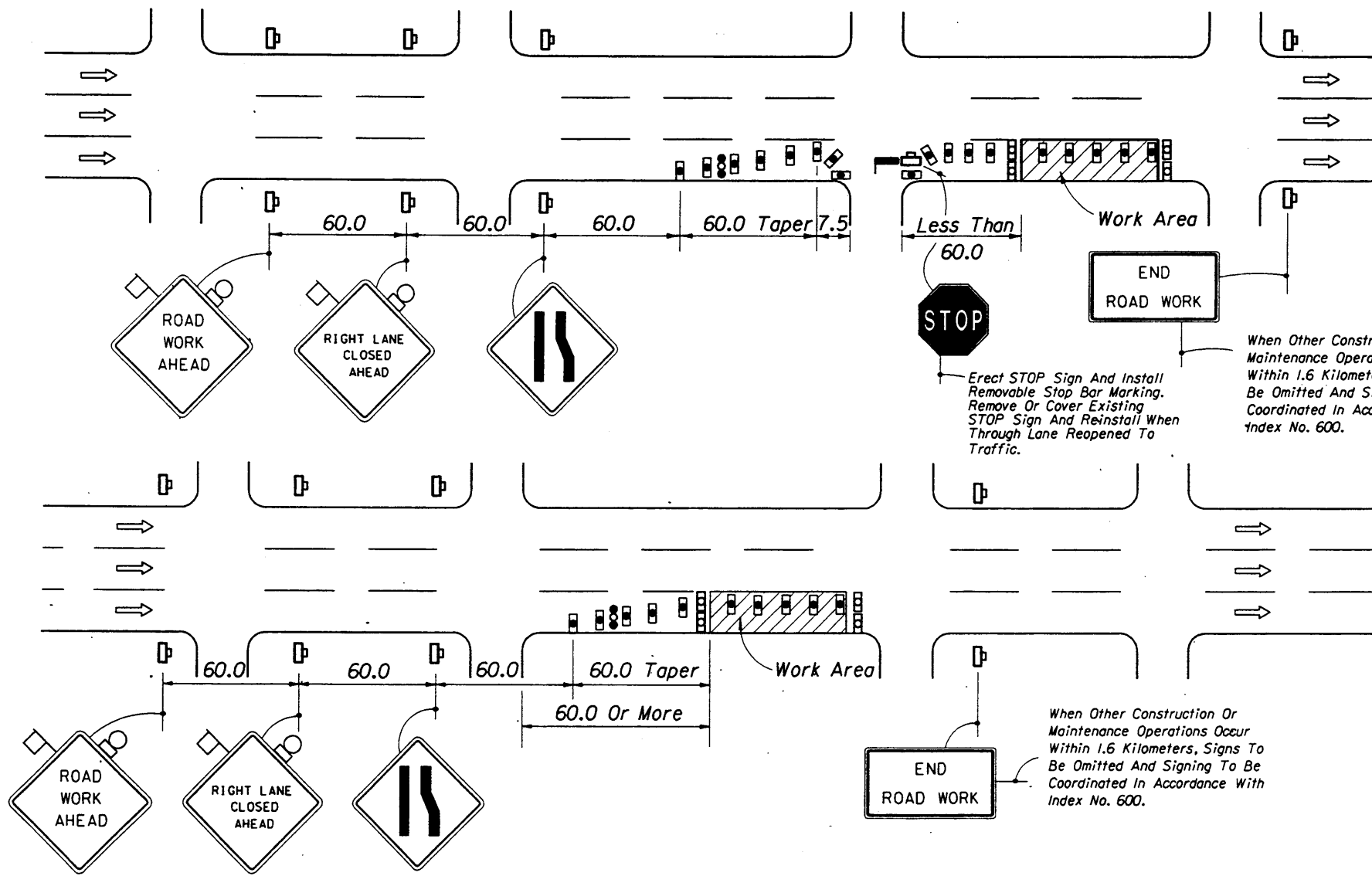


**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF EITHER THE OUTSIDE OR THE MEDIAN TRAVEL LANE AND/OR ADJOINING AUXILIARY LANE, FOR WORK AREA LESS THAN 60.0 m FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF EITHER THE OUTSIDE OR THE MEDIAN TRAVEL LANE AND/OR ADJOINING AUXILIARY LANE, FOR WORK AREA 60.0 m OR MORE FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.



Erect STOP Sign And Install Removable Stop Bar Marking. Remove Or Cover Existing STOP Sign And Reinstall When Through Lane Reopened To Traffic.

When Other Construction Or Maintenance Operations Occur Within 1.6 Kilometers, Signs To Be Omitted And Signing To Be Coordinated In Accordance With Index No. 600.

When Other Construction Or Maintenance Operations Occur Within 1.6 Kilometers, Signs To Be Omitted And Signing To Be Coordinated In Accordance With Index No. 600.

**SYMBOLS**

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used -See Index 600).
- Type I Or Type II Barricade Or Vertical Panel Or Drum (with Flashing Light At Night Only)
- Work Zone Sign
- Advance Warning Arrow Panel
- Stop Bar

**GENERAL NOTES**

1. All vehicles, equipment, workers and their activities are restricted at all times to one side of the pavement.
2. Work operations shall be confined to either one lane or a combination of lanes as follows:
  - (a) Outside travel lane (b) Outside auxiliary lane
  - (c) Outside travel lane and adjoining auxiliary lane
  - (d) Outside travel lane and adjoining center lane
  - (e) Outside travel lane and adjoining auxiliary and center lanes
  - (f) Median travel lane<sup>Δ</sup> (g) Median auxiliary lane<sup>Δ</sup>
  - (h) Median travel lane and adjoining auxiliary lane<sup>Δ</sup>
  - (i) Median travel lane and adjoining center lane<sup>Δ</sup>
  - (j) Median travel lane and adjoining auxiliary and center lanes<sup>Δ</sup>

<sup>Δ</sup> See Sheet 2 Of 2

If the work area is confined to an auxiliary lane the work area shall be barricaded and the RIGHT LANE CLOSED AHEAD signs replaced by ROAD WORK AHEAD signs and the merge left symbol signs eliminated.
3. For work operations, that require a single lane closure only, of 60 minutes or less see Index No. 612.
4. When vehicles in a parking zone block the line of sight to TCZ signs or when TCZ signs encroach on a normal pedestrian walkway, the signs shall be post mounted and located in accordance with Index No. 17302.
5. When work is performed in the median lane or the median and adjoining center lanes the barricading plans are inverted and LEFT LANE CLOSED AHEAD and merge right symbol signs shall be substituted for the RIGHT LANE CLOSED AHEAD and merge left symbol signs.
 

If work is confined to the median auxiliary lane the work area shall be barricaded and the LEFT LANE CLOSED AHEAD signs replaced by ROAD WORK AHEAD signs and the merge right symbol signs eliminated.
6. The first two warning signs, each side, shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.
 

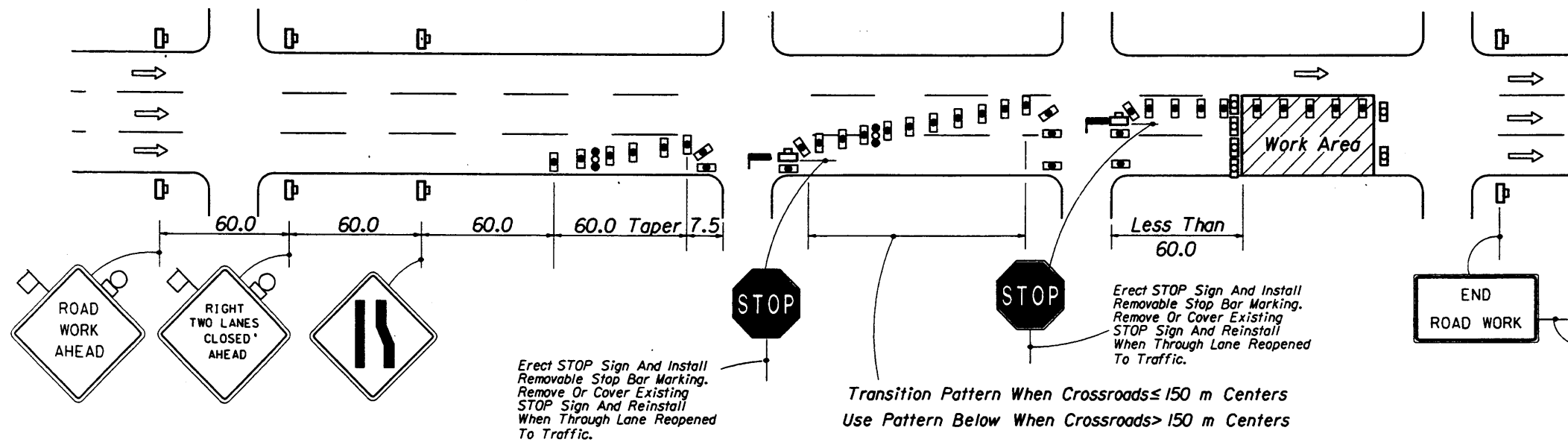
Mesh signs may be used for (Daylight Only) operations Type B Lights and Orange Flags are not required.

**TYPICAL APPLICATIONS**

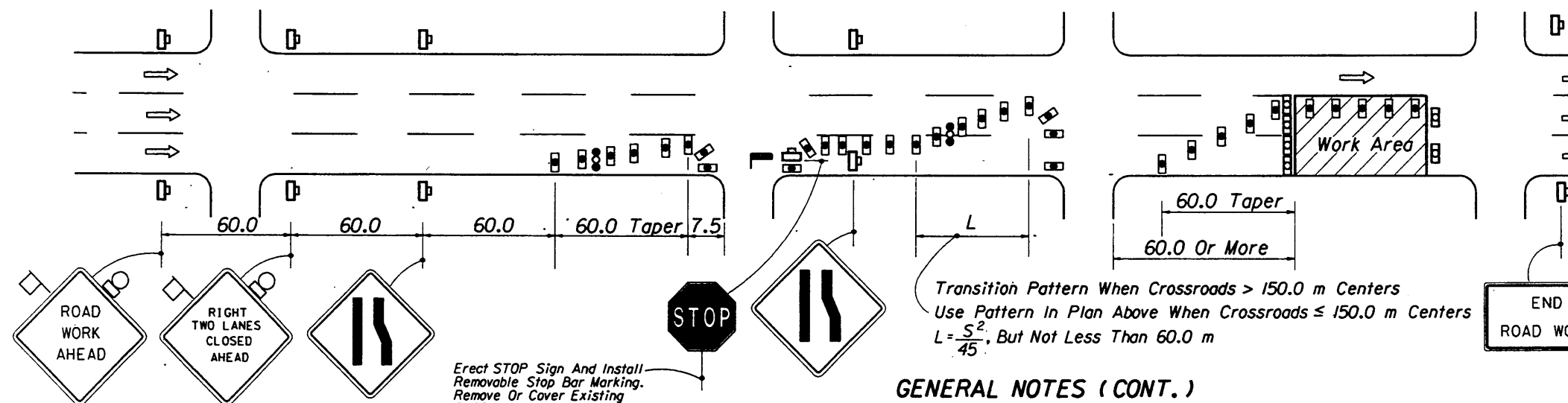
- Utility Work
- Pavement Repair
- Structure Adjustments

(Continued)

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>MULTILANE ONE-WAY OR MULTILANE DIVIDED WITH NON-TRAVERSABLE MEDIAN • URBAN DAY OR NIGHT OPERATIONS</b>				
Names	Dates	Approved By		
Designed By	12/87	Special Projects Engineer		
Drawn By	12/87	Revision	Sheet No.	Index No.
Checked By	12/87	98	1 of 2	625



**CONDITIONS**  
 WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF EITHER THE OUTSIDE AND CENTER TRAVEL LANES OR THE MEDIAN AND CENTER TRAVEL LANES, WITH OR WITHOUT CLOSURE OF ADJOINING AUXILIARY LANES, FOR WORK AREA LESS THAN 60.0 m FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.



**CONDITIONS**  
 WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF EITHER THE OUTSIDE AND CENTER TRAVEL LANES OR THE MEDIAN AND CENTER TRAVEL LANES, WITH OR WITHOUT CLOSURE OF ADJOINING AUXILIARY LANES, FOR WORK AREA 60.0 m OR MORE FROM INTERSECTION, FOR A PERIOD OF MORE THAN 60 MINUTES.

**SYMBOLS**

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used - See Index 600).
- Type I Or Type II Barricade Or Vertical Panel Or Drum (with Flashing Light At Night Only)
- Work Zone Sign
- Advance Warning Arrow Panel
- Stop Bar

Erect STOP Sign And Install Removable Stop Bar Marking. Remove Or Cover Existing STOP Sign And Reinstall When Through Lane Reopened To Traffic.

**GENERAL NOTES (CONT.)**

7. All signs shall be post mounted if closure time exceeds 12 hours.
8. Within the lateral transitions, the maximum spacing between cones and tubular markers shall be 7.5 meters. Maximum spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows: 5.0 meters up to 25 MPH; 10.0 meters for 30 MPH-40 MPH; 15.0 meters for 45 MPH or greater. Spacing for devices parallel to the travel lanes shall be 7.5 m centers for cones or tubular markers and 15.0 m centers for Type I or Type II barricades or vertical panels or drums for 75.0 m thereafter cones or tubular markers at 15.0 m centers and type I or Type II barricades or vertical panels or drums at 30.0 m centers.
9. Arrows denote direction of traffic only and do not reflect pavement markings.
10. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
11. For general TCZ requirements and additional information refer to Index No. 600.

Transition Pattern When Crossroads > 150.0 m Centers  
 Use Pattern In Plan Above When Crossroads ≤ 150.0 m Centers  
 $L = \frac{S^2}{45}$ , But Not Less Than 60.0 m

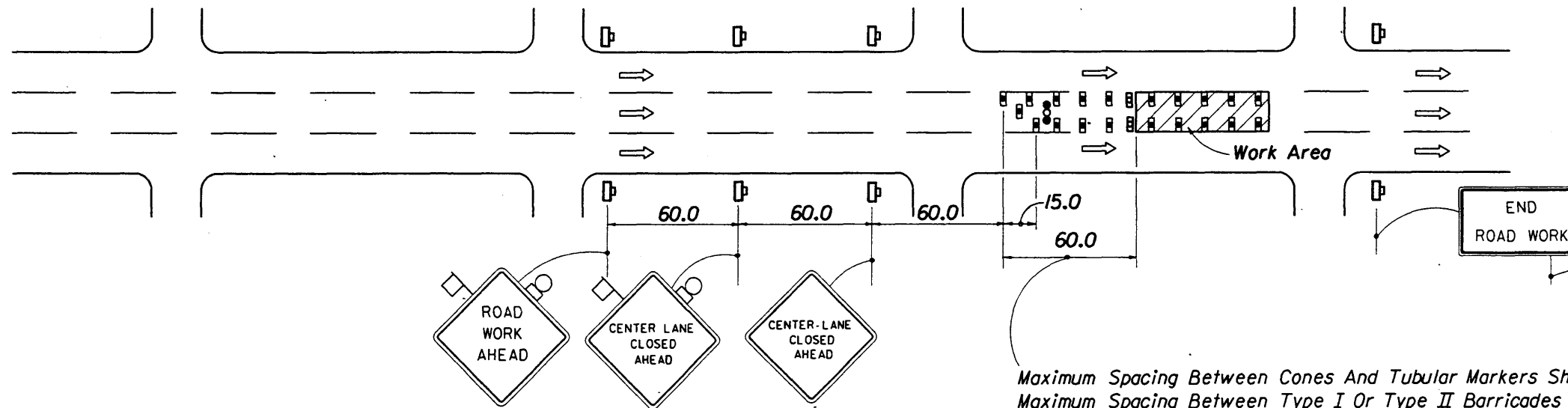
English to Metric Speed Conversion	
MPH	km/h
65	110
60	100
55	90
50	80
45	70
40	60
35	60
30	50

When Other Construction Or Maintenance Operations Occur Within 1.6 Kilometers, Signs To Be Omitted And Signing To Be Coordinated In Accordance With Index No. 600.

**TYPICAL APPLICATIONS**

- Utility Work
- Pavement Repair
- Structure Adjustments

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>MULTILANE ONE-WAY OR MULTILANE DIVIDED WITH NON-TRAVERSABLE MEDIAN • URBAN DAY OR NIGHT OPERATIONS</b>				
Designed By	Names	Dates	Approved By	
Drawn By		12/87		
Checked By		12/87	Revision	Sheet No.
			98	2 of 2
				Index No. 625



When Other Construction Or Maintenance Operations Occur Within 1.5 Kilometers, Signs To Be Omitted And Signing To Be Coordinated In Accordance With Index No. 600.

Maximum Spacing Between Cones And Tubular Markers Shall Be 7.5 Meters. Maximum Spacing Between Type I Or Type II Barricades Or Vertical Panels Or Drums Shall Be Based On The Speed Limit As Follows: 5.0 Meters Up To 25 MPH; 10.0 Meters For 30 MPH-40 MPH; 15.0 Meters For 45 MPH Or Greater.

### GENERAL NOTES

- All vehicles, equipment, workers and their activities are prohibited at all times from the lane areas reserved for traffic.
- Work operations shall be confined to one center travel lane, leaving the adjacent travel lanes open to traffic.
- For work operations of 60 minutes or less see Index No. 612
- When vehicles in a parking zone block the line of sight to TCZ signs or when TCZ signs encroach on a normal pedestrian walkway, the signs shall be post mounted and located in accordance with Index No. 17302.
- The first two warning signs, each side, shall have a 450 mm x 450 mm orange flag and a Type B light attached and operating at all times.  
Mesh signs may be used for (Daylight Only) operations Type B Lights and Orange Flags are not required.
- All signs shall be post mounted if the closure time exceeds 12 hours.
- Advance warning arrow panel is required for both day and night operations.
- Channelizing devices are to be spaced with cones or tubular markers at 7.5 m centers Type I or Type II barricades or vertical panels or drums at 15.0 m centers for the first 75.0 m, thereafter cones or tubular markers at 15.0 m centers and Type I or Type II barricades or vertical panels or drums at 30.0 m centers.
- Arrows denote direction of traffic only and do not reflect pavement markings.
- Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
- For general TCZ requirements and additional information refer to Index No. 600.

### TYPICAL APPLICATIONS

- Utility Work
- Pavement Repair
- Structure Adjustments

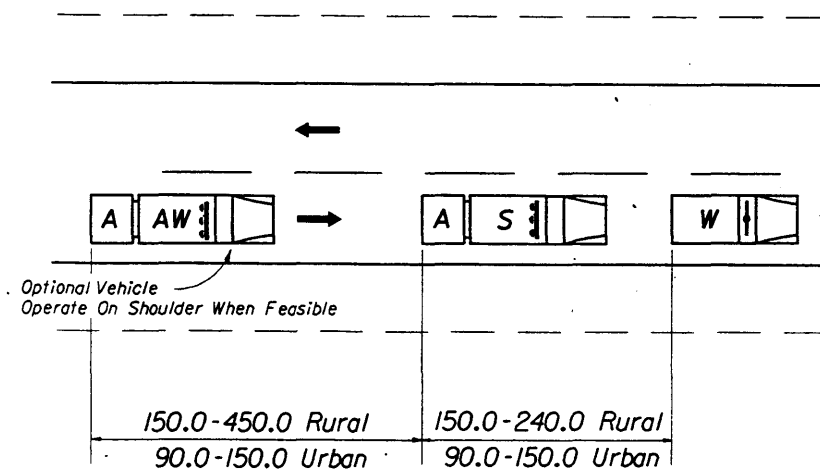
### CONDITIONS

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ENCROACH ON THE PAVEMENT REQUIRING THE CLOSURE OF THE CENTER LANE.

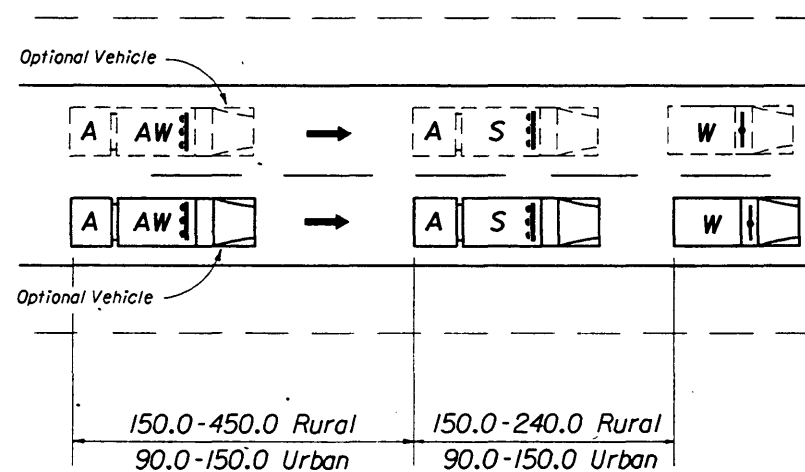
### SYMBOLS

- Work Area
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used -See Index 600).
- Type I Or Type II Barricade Or Vertical Panel Or Drum (with Flashing Light At Night Only)
- Work Zone Sign
- Advance Warning Arrow Panel

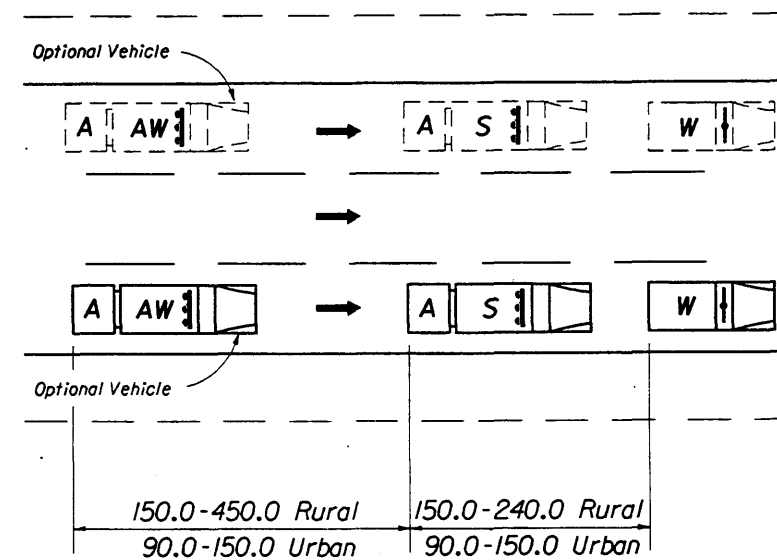
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
MULTILANE ONE-WAY OR MULTILANE DIVIDED WITH NON-TRAVERSABLE MEDIAN • URBAN DAY OR NIGHT OPERATIONS				
Names		Dates		Approved By
Designed By		12/87		
Drawn By		12/87	Revision	
Checked By		12/87	98	Sheet No. 1 of 1
				Index No. 626



MODE • WARNING



MODE • PASS LEFT [RIGHT]



MODE • PASS LEFT [RIGHT]

## MOVING OPERATIONS

### GENERAL NOTES

1. These illustrations are representative of general conditions.
2. The intensity of light and the position of panels shall be as specified in Index No. 600.
3. The Advance Warning Vehicle (Optional) may be used at the direction of the Engineer. If an Advance Warning Vehicle is operated within the travel way, an approved Truck Mounted Attenuator will be required on the Advance Warning Vehicle but not required on the Shadow Vehicle. The Advance Warning Arrow Panel and Warning Sign are required on both the Advance Warning and Shadow Vehicles.
4. For general TCZ requirements and additional information refer to Index No. 600.
5. If the work vehicle speed exceeds the minimum legal speed limit on limited access facilities and one half the posted speed limit on other facilities the engineer in charge may delete requirements for shadow vehicle and attenuators. The work vehicle will be required to have an advance warning arrow panel and sign message.

### SYMBOLS

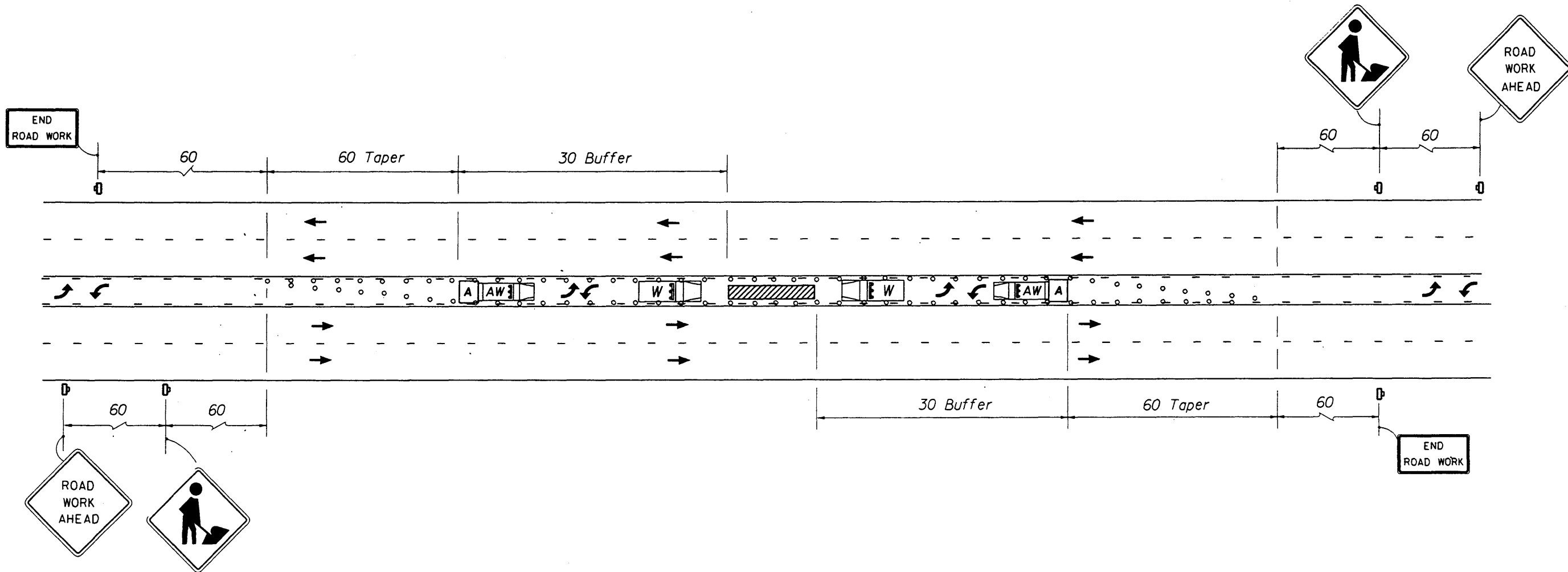
- Work Vehicle With Flashing Beacon
- Shadow (S) Or Advance Warning (AW) Vehicle With Advance Warning Arrow Panel And Sign Message
- Truck Mounted Attenuator (TMA)
- Lane Identification And Direction Of Traffic

### TYPICAL APPLICATIONS

Striping  
RPM Placement  
Vegetation Control

### CONDITIONS MOVING OPERATION

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>MOVING OPERATIONS</b>				
	Names	Dates	Approved By	
Designed By		12/87	 Special Projects Engineer	
Drawn By		12/87		
Checked By		12/87		
	Revision	98	Sheet No.	Index No.
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**GENERAL NOTES**

1. Work operations shall be confined to one traffic lane, leaving the adjacent lanes open to traffic.
2. The first two warning signs, each side, shall have an 450mm x 450mm (min.) Orange Flag and a Type B light attached and operating at all times. Mesh signs may be used for (Daylight Only) operations.
3. Advance Warning Vehicle will have an Advanced Warning Arrow Panel in the Warning Mode.
4. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
5. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
6. For general TCZ requirements and additional information, refer to Index No. 600.

**TYPICAL APPLICATIONS**

Pavement Repair  
Utility Work

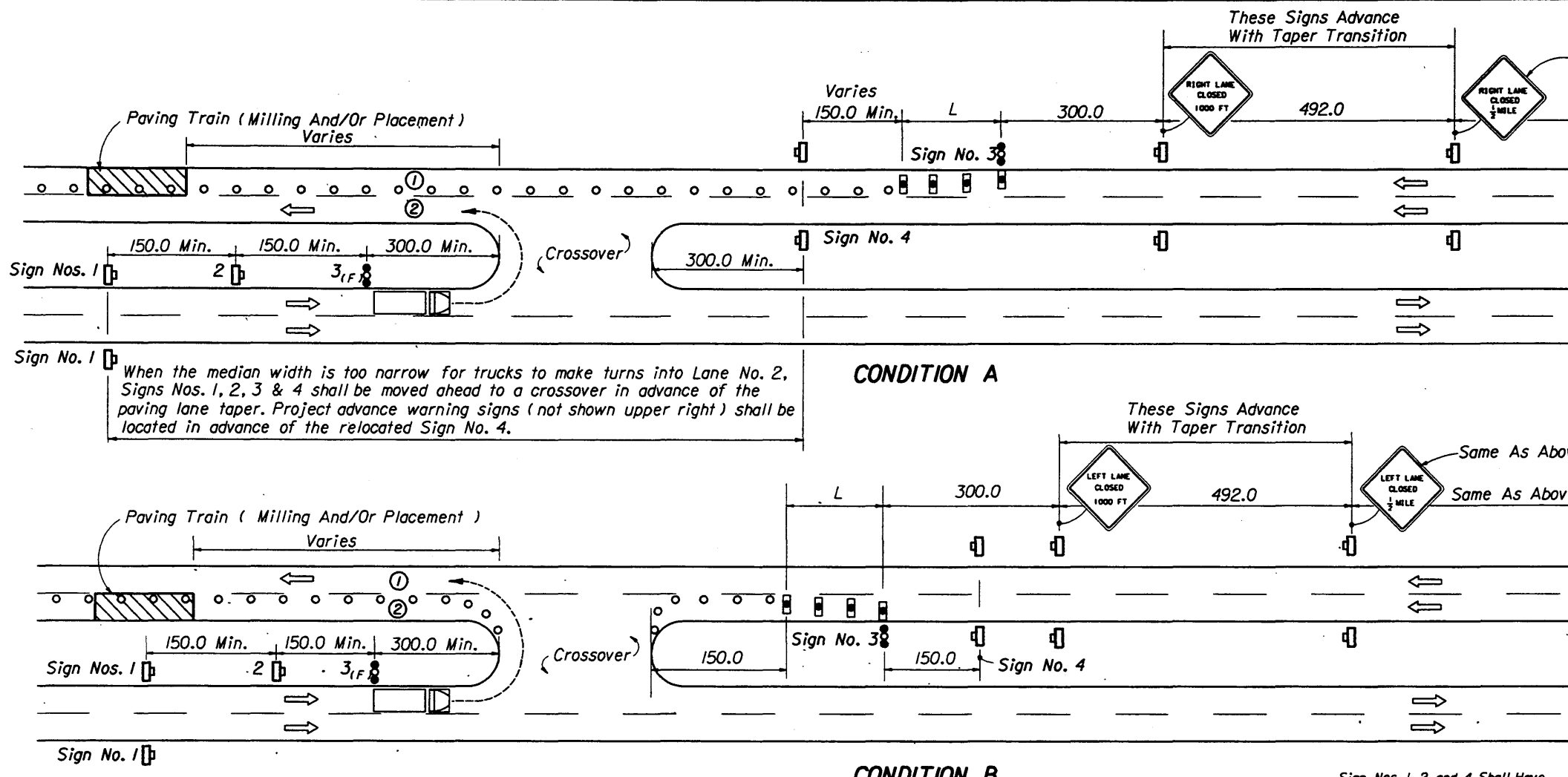
**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES ARE BEING CONDUCTED IN THE TWO WAY LEFT TURN LANE.

**SYMBOLS**

- Work Area
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burn Light At Night Only)
- Type I Or Type II Barricade Or Vertical Panel Or Cone Or Tubular Marker Or Drum
- Work Zone Sign
- Work Vehicle With Flashing Beacon (optional)
- Advance Warning Vehicle Equipped With Advance Warning Arrow Panel And Truck Mounted Attenuator

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>TWO WAY LEFT TURN LANE CLOSURE</b>				
Designed By	Names	Dates	Approved By	
Drawn By			Revision	Sheet No. Index No.
Checked By			00	1 of 1 628



When This Sign Conflicts With ROAD WORK 1/2 MILE Sign, The ROAD WORK 1/2 MILE Sign Shall Be Temporarily Removed And The Orange Flag And Type B Light Attached To This Sign.

**CONDITION A**  
 WHEN THE PAVING TRAIN IS IN LANE ① THE U-TURNING VEHICLE SHALL CAUTIOUSLY TURN INTO LANE ② AND PROCEED IN LANE ② TO THE FRONT OF THE TRAIN

**CONDITION B**  
 WHEN THE PAVING TRAIN IS IN LANE ② THE U-TURNING VEHICLE SHALL CAUTIOUSLY TURN INTO LANE ①, AND PROCEED IN LANE ① TO THE FRONT OF THE PAVING TRAIN

**CONDITION A & B**  
 THE ADVANCE WARNING ARROW PANELS ARE REQUIRED. UNDER NO CIRCUMSTANCES WILL THE TRAFFIC TRANSITION BE LOCATED WITHIN THE LIMITS OF THE CROSSOVER

- SYMBOLS**
- Work Area
  - Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only). Cones May Be Used -See Index 600).
  - Type I Or Type II Barricade Or Vertical Panel Or Cone Or Tubular Marker Or Drum
  - Work Zone Sign
  - Advance Warning Arrow Panel
  - Work Vehicle
  - Lane Number

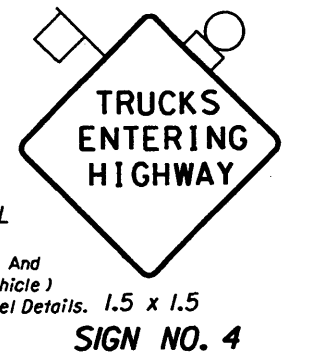
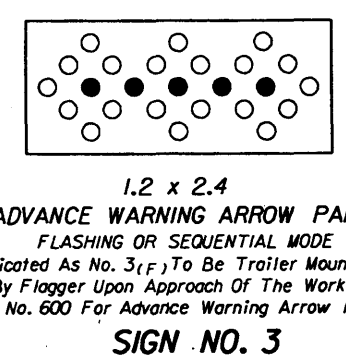
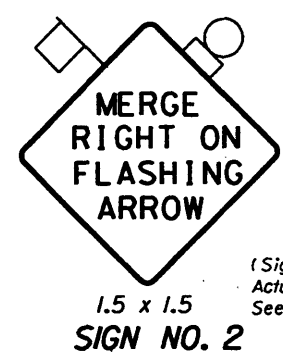
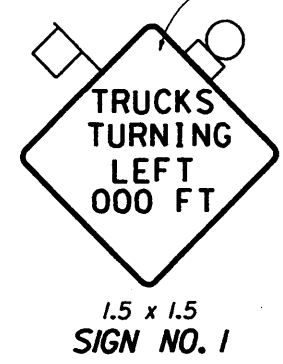
**TRAFFIC TRANSITION AREA UPSTREAM FROM CROSSOVER**

**CASE I**

**GENERAL NOTES**

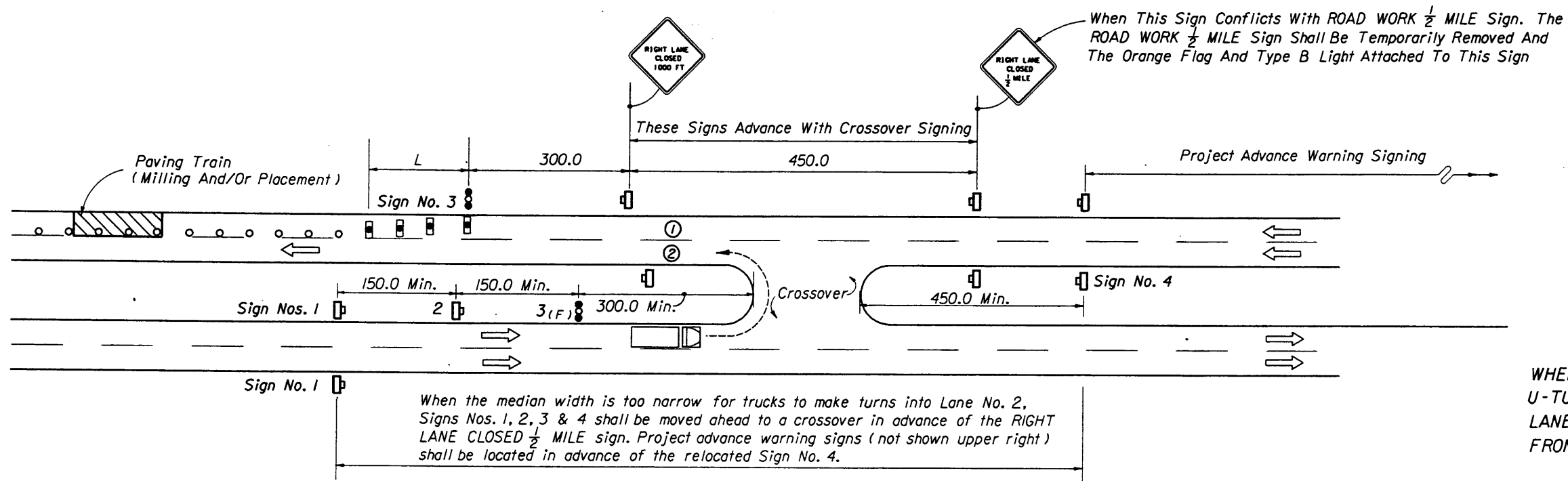
1. When crossovers do not exist, the contractor will construct temporary crossovers in accordance with Index No. 631.
2. L = Length of taper in meters:  
 =  $\frac{WS}{1.6}$  for speeds  $\geq 70$  km/h  
 =  $\frac{WS^2}{150}$  for speeds  $\leq 60$  km/h  
 Where:  
 W = Width of lateral transition in meters.  
 S = Posted speed limit (converted to km/h).
3. Within the lateral transitions, the maximum spacing between cones and tubular markers shall be 7.5 meters. Maximum spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows: 5.0 meters up to 25 MPH; 10.0 meters for 30 MPH-40 MPH; 15.0 meters for 45 MPH or greater. Spacing for devices parallel to the travel lanes shall be 7.5 m centers for cones or tubular markers and 15.0 m for Type I or Type II barricades or vertical panels or drums.
4. Arrows denote direction of traffic only and do not reflect pavement markings.

Sign Nos. 1, 2 and 4 Shall Have Orange Reflective Backgrounds With 150 mm Series D Black Opaque Legends And 25 mm Black Opaque Borders. Orange flags and Type B lights are Required



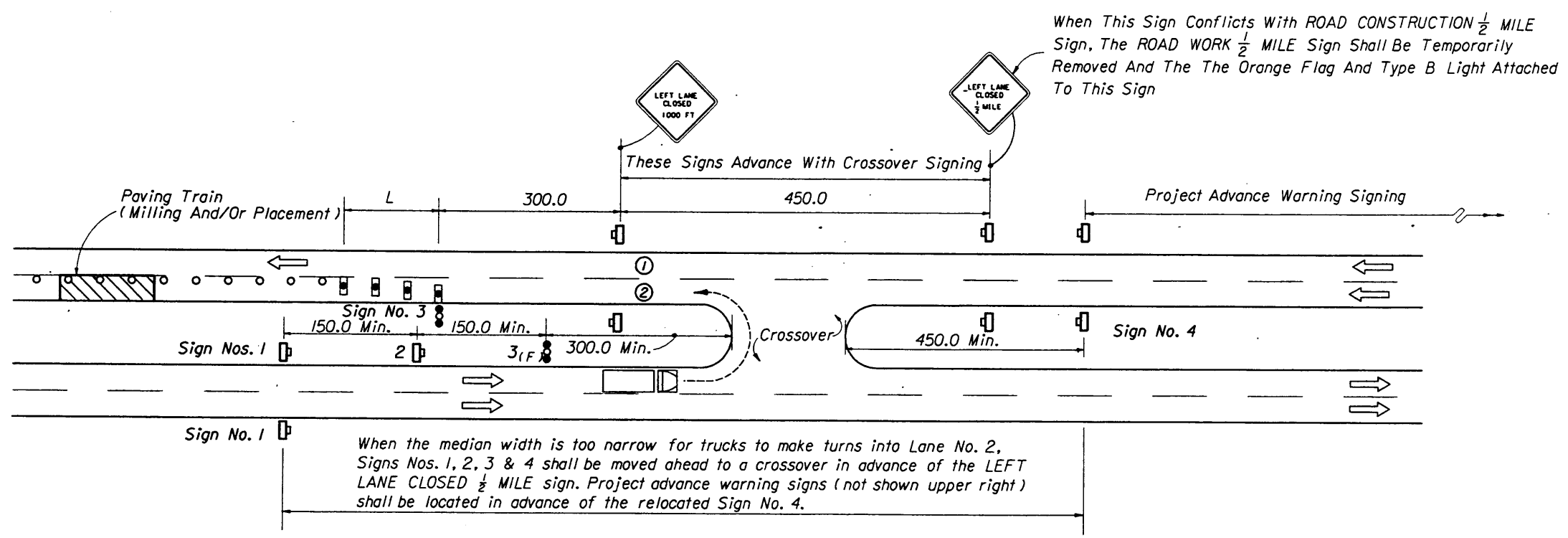
English to Metric Speed Conversion	
MPH	km/h
65	110
60	100
55	90
50	80
45	70
40	60
35	60
30	50

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>CROSSOVER FOR PAVING TRAIN OPERATIONS • RURAL</b>				
Designed By	Names	Dates	Approved By	
Drawn By		12/87		
Checked By		12/87		
	Revision	98	Sheet No.	Index No.
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**CONDITION A**

**CONDITION A**  
 WHEN THE PAVING TRAIN IS IN LANE ① THE U-TURNING VEHICLE SHALL CAUTIOUSLY TURN INTO LANE ② AND PROCEED IN LANE ② TO THE FRONT OF THE TRAIN



**CONDITION B**

**CONDITION B**  
 WHEN THE PAVING TRAIN IS IN LANE ② THE U-TURNING VEHICLE SHALL TURN INTO LANE ②, CAUTIOUSLY MERGE INTO LANE ① AND PROCEED TO THE FRONT OF THE PAVING TRAIN

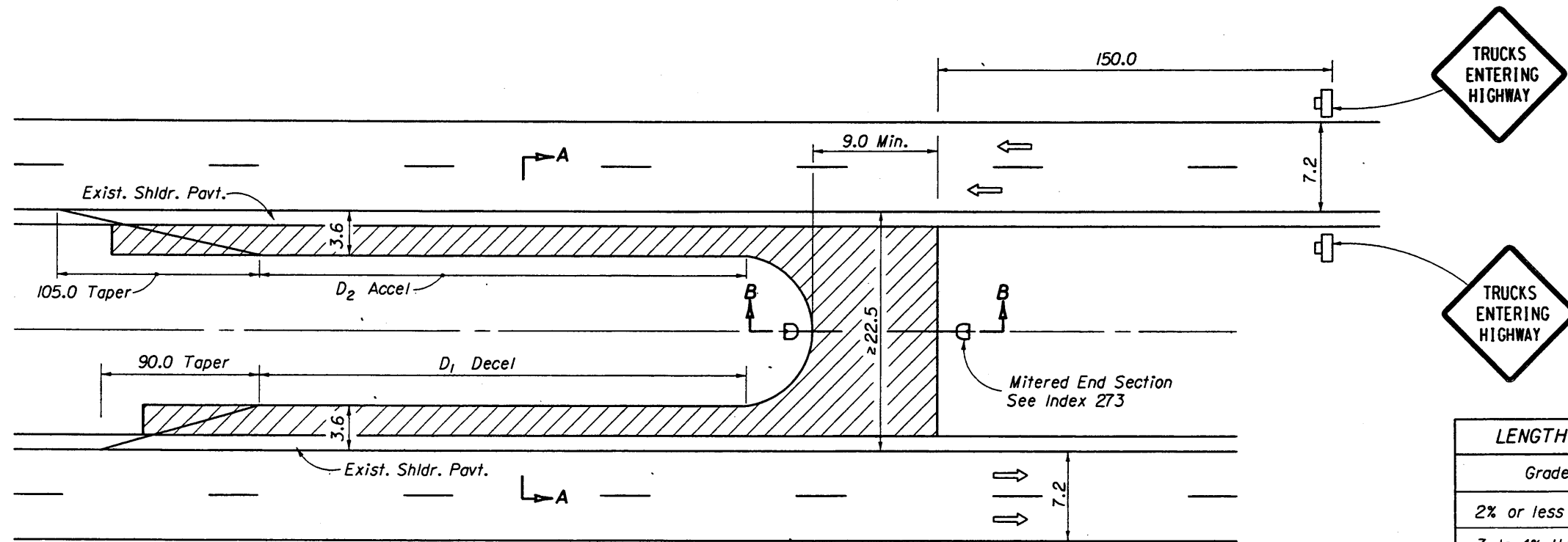
**CONDITION A & B**  
 THE ADVANCE WARNING ARROW PANEL IS REQUIRED. UNDER NO CIRCUMSTANCES WILL THE TRAFFIC TRANSITION BE LOCATED WITHIN THE LIMITS OF THE CROSSOVER

TRAFFIC TRANSITION AREA DOWNSTREAM FROM CROSSOVER

**CASE II**

Note: See Sheet 1 of 2 For General Notes, Sign No. Details, And Conditions.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>CROSSOVER FOR PAVING TRAIN OPERATIONS • RURAL</b>				
Names	Dates	Approved By		
Designed By	12/87	Special Projects Engineer		
Drawn By	12/87	Revision	Sheet No.	Index No.
Checked By	12/87	96	2 of 2	630

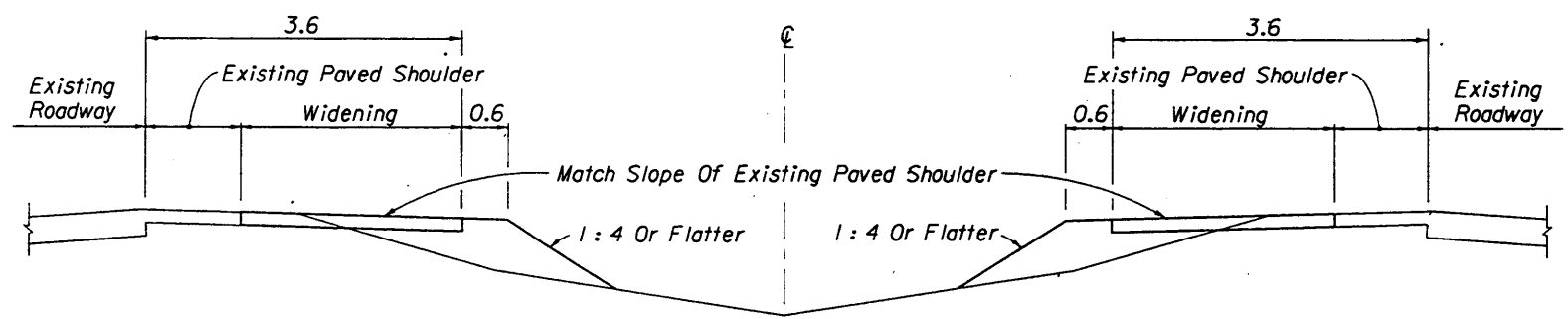


LENGTH OF ACCESS LANES (m)		
Grade	D <sub>1</sub>	D <sub>2</sub>
2% or less	180	470
3 to 4% Upgrade	160	705
3 to 4% Downgrade	215	280

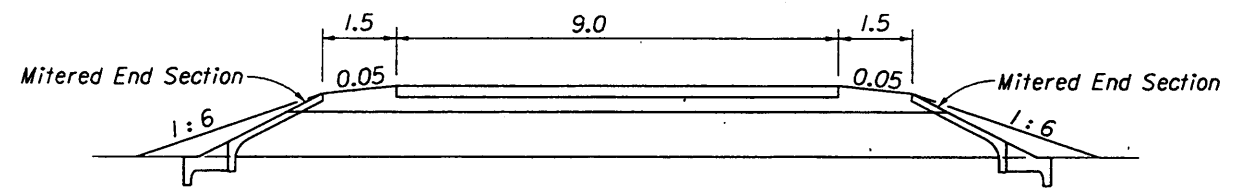
PLAN

GENERAL NOTES

1. Temporary median crossovers shall be within the project limits and shall not be used for transporting materials to or from any other project. The acceleration-deceleration surfaces shall be paved. RAP material is acceptable for crossing surfacing.
2. Temporary median crossovers shall be located only in areas having adequate sight distance. On limited access facilities temporary median crossovers shall not be located within 2.4 km (1.5 miles) of interchanges nor within 600 m (2000 ft.) of acceleration-deceleration lanes at rest areas, other access openings or other highway service areas.
3. For paving train operations at crossovers, see Index 630.
4. All traffic control devices are to be removed when crossover will not be in use for one hour or longer.
5. Trailer mounted advance warning panel may be used in lieu of advance warning vehicle.
6. When a crossover is no longer needed, all temporary construction shall be immediately removed and the area restored to its original condition.
7. Cost of construction, maintenance, removal and restoration work related to temporary crossovers shall be included in the contract unit price for Maintenance of Traffic, LS.

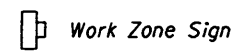


SECTION AA



SECTION BB

SYMBOLS



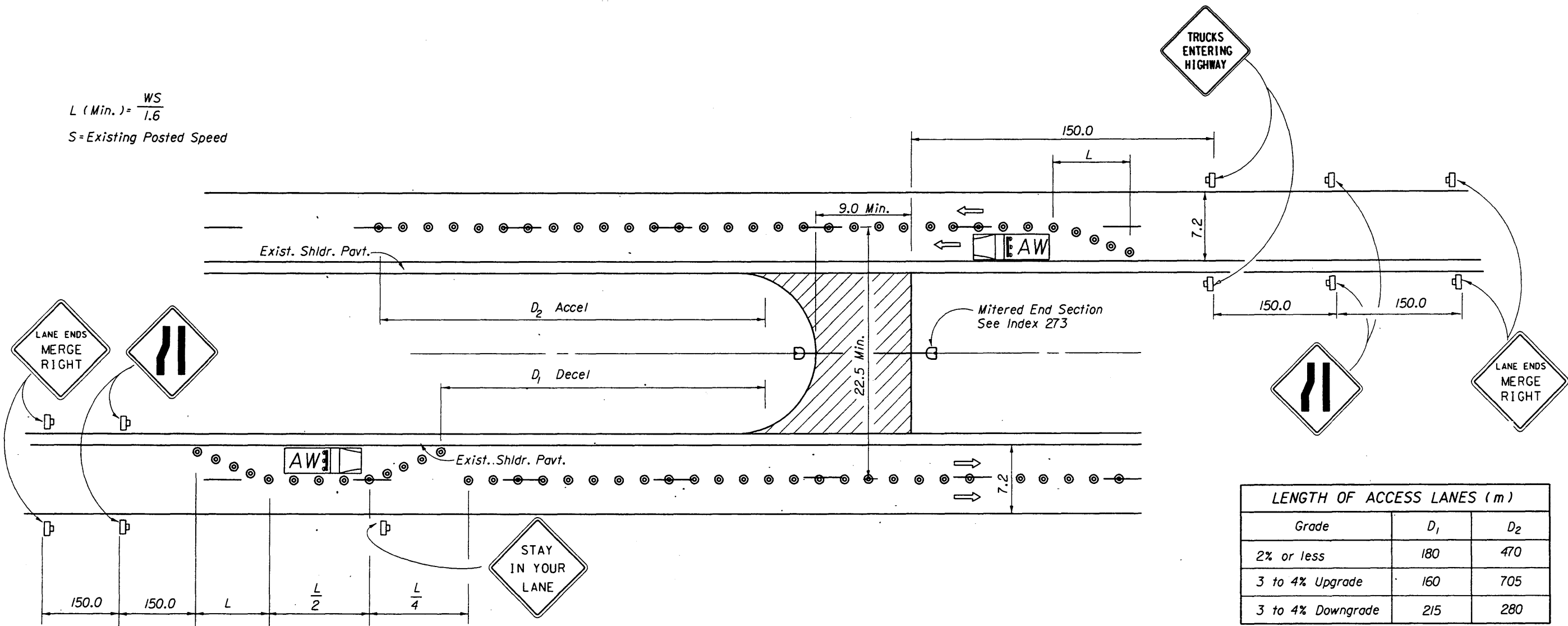
TEMPORARY CROSSOVER FOR MEDIAN WIDTHS  $\geq 22.5$  m

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>TEMPORARY CROSSOVER</b>				
Designed By	Names	Dates	Approved By	
Drawn By			Special Projects Engineer	
Checked By			Revision	Sheet No. Index No.
			∞	1 of 2 631



$$L (\text{Min.}) = \frac{WS}{1.6}$$

S = Existing Posted Speed







LENGTH OF ACCESS LANES (m)		
Grade	D <sub>1</sub>	D <sub>2</sub>
2% or less	180	470
3 to 4% Upgrade	160	705
3 to 4% Downgrade	215	280


**NOTE**

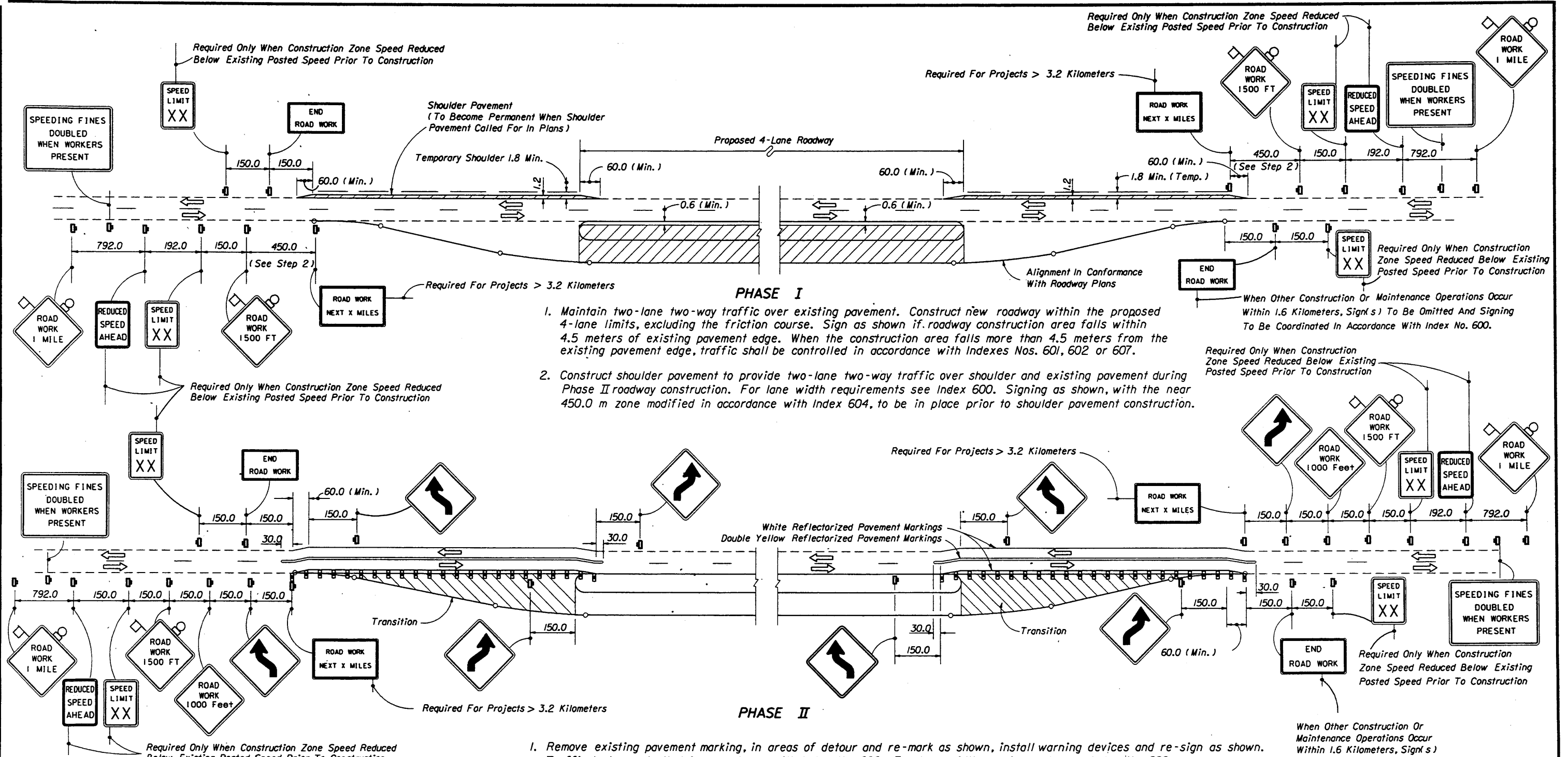
A lane closure analysis will be required to determine the times of day that this crossover can be in operation.

**SYMBOLS**

-  Work Area
-  Work Zone Sign
-  Cone Or Tubular Marker
-  Advance Warning Vehicle

**TEMPORARY CROSSOVER FOR MEDIAN WIDTHS FROM 15.3 m TO < 22.5 m**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>TEMPORARY CROSSOVER</b>				
Designed By	Names	Dates	Approved By	
Drawn By			 Special Projects Engineer	
Checked By			Revision	Sheet No. Index No.
			∞	2 of 2 631



- PHASE I**
- Maintain two-lane two-way traffic over existing pavement. Construct new roadway within the proposed 4-lane limits, excluding the friction course. Sign as shown if roadway construction area falls within 4.5 meters of existing pavement edge. When the construction area falls more than 4.5 meters from the existing pavement edge, traffic shall be controlled in accordance with Index Nos. 601, 602 or 607.
  - Construct shoulder pavement to provide two-lane two-way traffic over shoulder and existing pavement during Phase II roadway construction. For lane width requirements see Index 600. Signing as shown, with the near 450.0 m zone modified in accordance with Index 604, to be in place prior to shoulder pavement construction.

- PHASE II**
- Remove existing pavement marking, in areas of detour and re-mark as shown, install warning devices and re-sign as shown. Traffic to be controlled in accordance with Index No. 606. For lane width requirements see Index No. 600.
  - Route through traffic to temporary and existing pavement.
  - Construct transitions, excluding friction course.

**SYMBOLS**

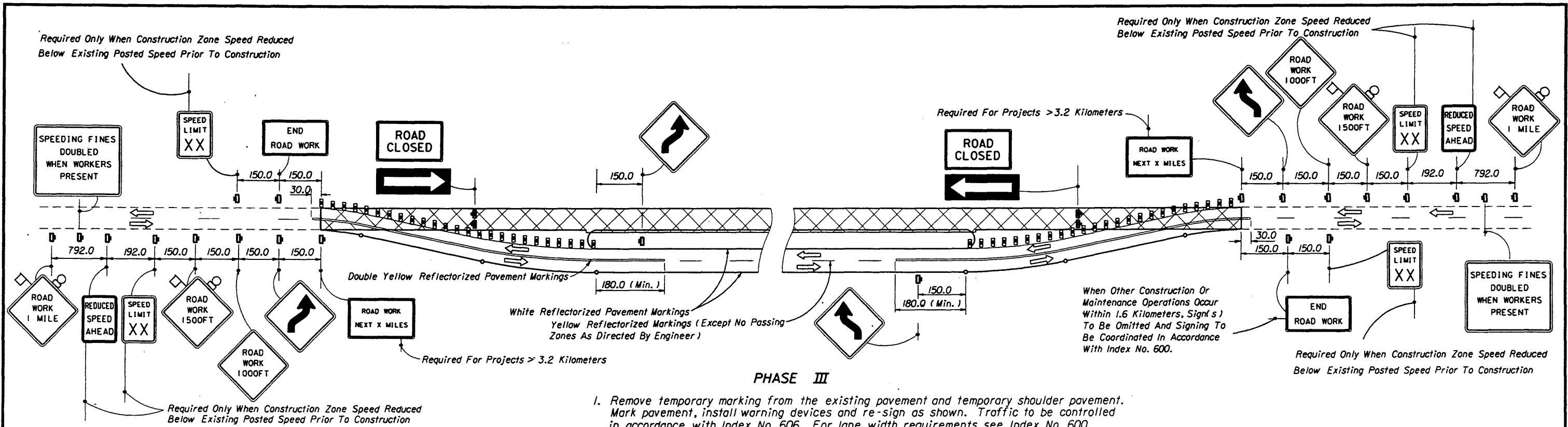
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only).
- Work Zone Sign

**LEGEND**

- Phase I
- Phase II
- Phase III

Note: See Sheet 2 of 2 for General Notes.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>CONVERTING TWO LANES TO FOUR LANES DIVIDED • RURAL</b>				
Names	Dates	Approved By		
Designed By				
Drawn By		Revision	Sheet No.	Index No.
Checked By		00	1 of 2	640



**PHASE III**

1. Remove temporary marking from the existing pavement and temporary shoulder pavement. Mark pavement, install warning devices and re-sign as shown. Traffic to be controlled in accordance with Index No. 606. For lane width requirements see Index No. 600.
2. Route through traffic to newly constructed roadway.
3. Resurface or reconstruct existing pavement including required shoulder pavement and friction course.

**PHASE IV**

1. Reroute through traffic as shown in Phase II. Signing to be as shown in Phase II.
2. Construct friction course over pavement constructed in Phases I and II.

**GENERAL NOTES**

1. The first two warning signs shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.
2. Existing signs and pavement markings that conflict with construction signing and marking shall be obliterated or removed.
3. Lane widths for maintenance of two-way traffic should desirably be equal to lane widths of the existing facility, but lanes shall be not less than 3.0 meters in width. When one-lane one-way operations are necessary, a minimum width of 3.6 meters shall be maintained and traffic controlled in accordance with Index Nos. 603, 604, 606 and 607. Minimum width for the temporary shoulders is 1.8 meters.
4. Within the lateral transitions, the maximum spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows: 5.0 meters up to 25 MPH; 10.0 meters for 30 MPH-40 MPH; 15.0 meters for 45 MPH or greater.  
The maximum spacing between warning devices used for delineation between the travel way and construction area to be 15.0 meters for Type I or Type II barricades or vertical panels or drums.
5. Barricading shall be in conformance with 'Protection Requirement For Dropoffs' Index No. 600.
6. For speed sign applications see Index No. 600.
7. For reflectorized raised pavement marker application see Index No 600 and Index No 17352.
8. Additional barricades, signing, lighting or other traffic controls shall be provided for limited work areas in accordance with other applicable TCZ Indexes.
9. Arrows denote direction of traffic only and do not reflect pavement markings.
10. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
11. When a side road intersects the highway on which work is being performed additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
12. Provisions approved by the Engineer shall be made for the removal of storm water from the roadway(s) during construction.
13. For general TCZ requirements and additional information refer to Index No. 600.

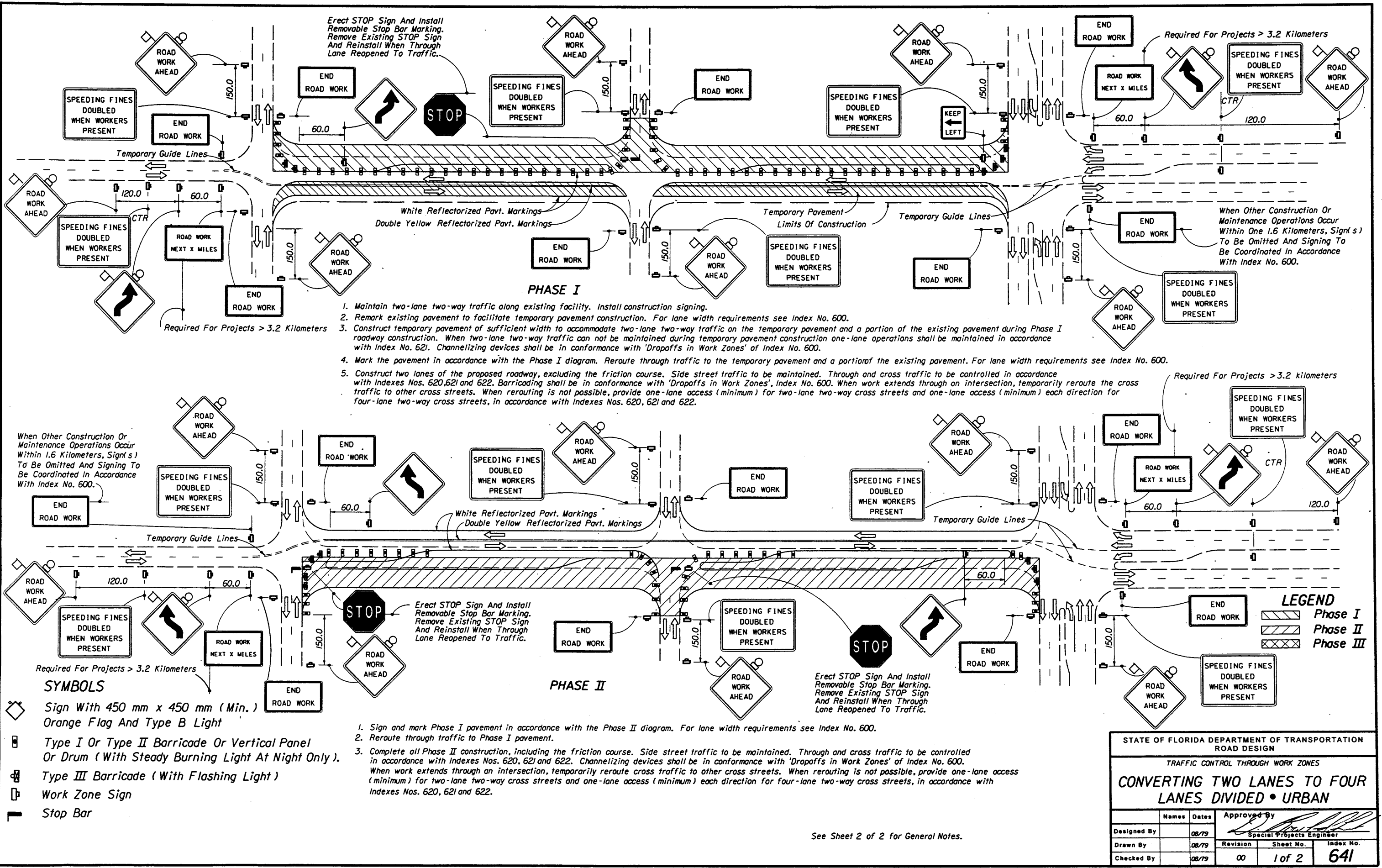
**SYMBOLS**

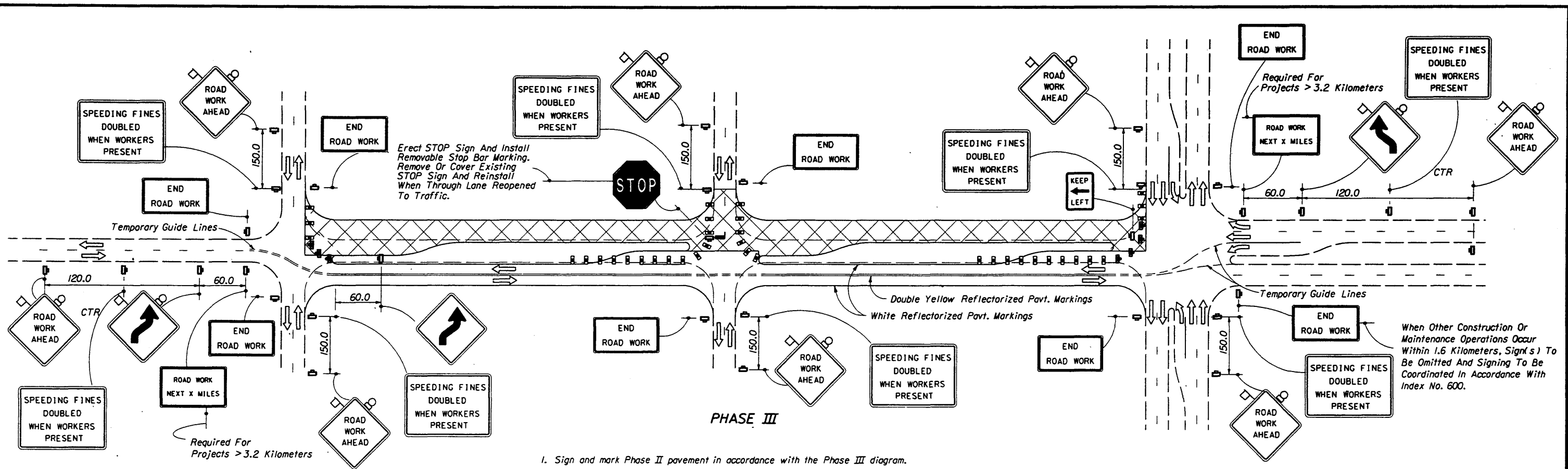
- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only. Cones May Be Used -See Index 600).
- Type III Barricade (With Flashing Light)
- Work Zone Sign

**LEGEND**

- Phase I
- Phase II
- Phase III

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
CONVERTING TWO LANES TO FOUR LANES DIVIDED • RURAL				
Designed By	Names	Dates	Approved By 	
Drawn By			Revision	Sheet No.
Checked By			00	2 of 2
				Index No. 640





**PHASE III**

1. Sign and mark Phase II pavement in accordance with the Phase III diagram.
2. Reroute through traffic to Phase II pavement.
3. Construct friction course over Phase I pavement. Side street traffic to be maintained. Through and cross traffic to be controlled in accordance with Indexes Nos. 620, 621 or 622. When work extends through an intersection, temporarily reroute cross traffic to other cross streets. When rerouting is not possible, provide one-lane access (minimum) for two-lane two-way cross streets and one-lane access (minimum) each direction for four-lane two-way cross streets.

**GENERAL NOTES**

1. All signing, pavement marking, barricades and warning lights necessary for maintenance of traffic shall conform to Index No. 600.
2. The first two warning signs shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.
3. Lane widths for maintenance of two-way traffic should desirably be equal to lane widths of the existing facility, but lanes shall not be less than 3.0 meters in width. When one-lane one-way operations are necessary, a minimum width of 3.6 meters should be maintained and traffic controlled in accordance with Indexes Nos. 620, 621 or 622.
4. At signalized intersections, signals shall be directed or relocated as required to the center of relocated lanes.
5. For reflectORIZED raised pavement marker application see index No. 600 and index No. 17352.
6. Additional barricades, signing, lighting or other traffic controls for limited work areas shall be provided in accordance with other applicable TCZ Indexes as conditions warrant in each phase.
7. Provisions approved by the Engineer shall be made for the removal of storm water from the roadway(s) during construction.
8. Arrows denote direction of traffic only and do not reflect pavement markings.
9. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
10. For general TCZ requirements and additional information refer to Index No. 600.

**SYMBOLS**

- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). Tubular Markers May Be Used During Daylight Only.
- Type III Barricade (With Flashing Light)
- Work Zone Sign
- Stop Bar

**LEGEND**

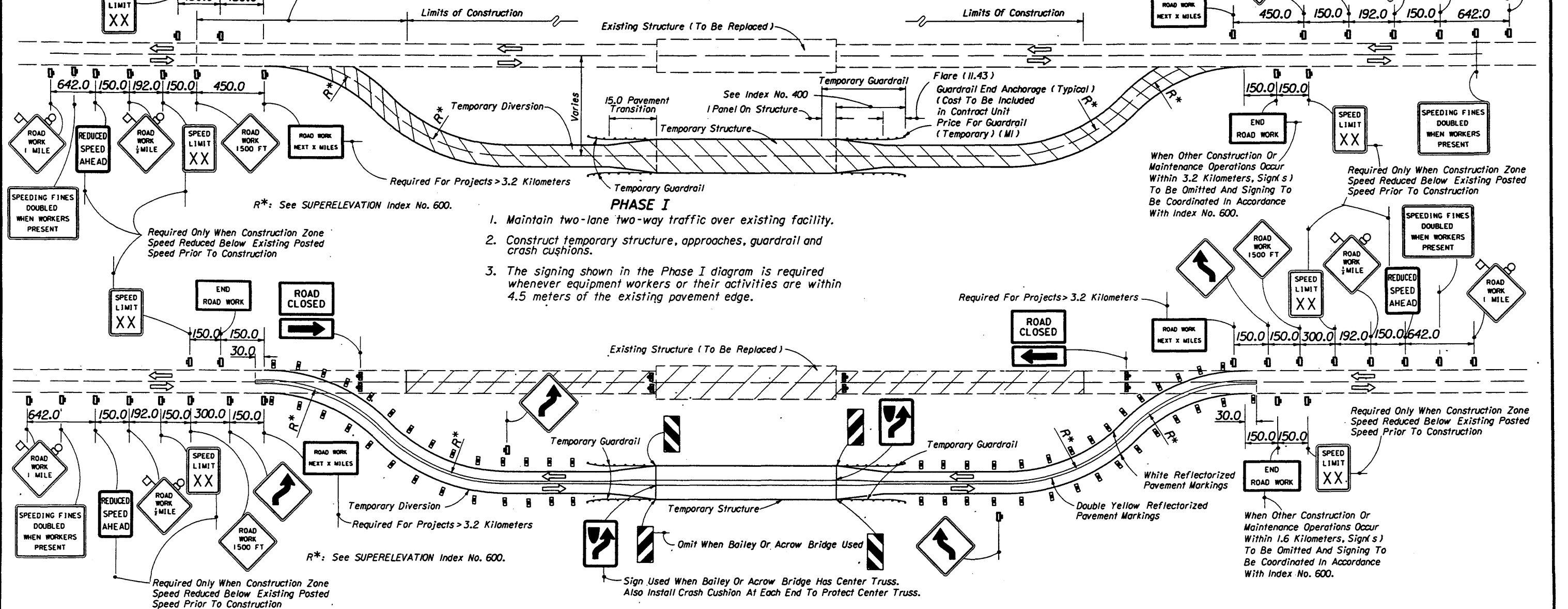
- Phase I
- Phase II
- Phase III

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>CONVERTING TWO LANES TO FOUR LANES DIVIDED • URBAN</b>				
Designed By	Names	Dates	Approved By	
Drawn By		08/79	 Special Projects Engineer	
Checked By		08/79		
	Revision	00	Sheet No.	Index No.
			2 of 2	641

Required Only When Construction Zone Speed Reduced Below Existing Posted Speed Prior To Construction

Required Only When Construction Zone Speed Reduced Below Existing Posted Speed Prior To Construction

Diversion Connection To Existing Pavement To Be Constructed Under TCZ Plan Of Index No. 603 Or 604. (Same For Opposite Connection)



R\*: See SUPERELEVATION Index No. 600.

- PHASE I**
1. Maintain two-lane two-way traffic over existing facility.
  2. Construct temporary structure, approaches, guardrail and crash cushions.
  3. The signing shown in the Phase I diagram is required whenever equipment workers or their activities are within 4.5 meters of the existing pavement edge.

R\*: See SUPERELEVATION Index No. 600.

Sign Used When Bailey Or Acrow Bridge Has Center Truss. Also Install Crash Cushion At Each End To Protect Center Truss.

**SYMBOLS**

- Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only).
- Type III Barricade (With Flashing Light)
- Work Zone Sign

**PHASE II**

1. Re-sign and mark as shown in Phase II plan.
2. Reroute traffic to diversion and maintain two-way traffic on diversion. Install Type III barricades.
3. Construct proposed structure and reconstruct or resurface existing approaches.

**PHASE III** (See Sheet 2 of 2)  
**GENERAL NOTES** (See Sheet 2 of 2)

**LEGEND**

- Phase I
- Phase II


STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>TWO-LANE, TWO-WAY • RURAL STRUCTURE REPLACEMENT</b>				
Designed By	08/79	Approved By		
Drawn By	08/79	Revision	Sheet No.	Index No.
Checked By	08/79	00	1 of 2	650

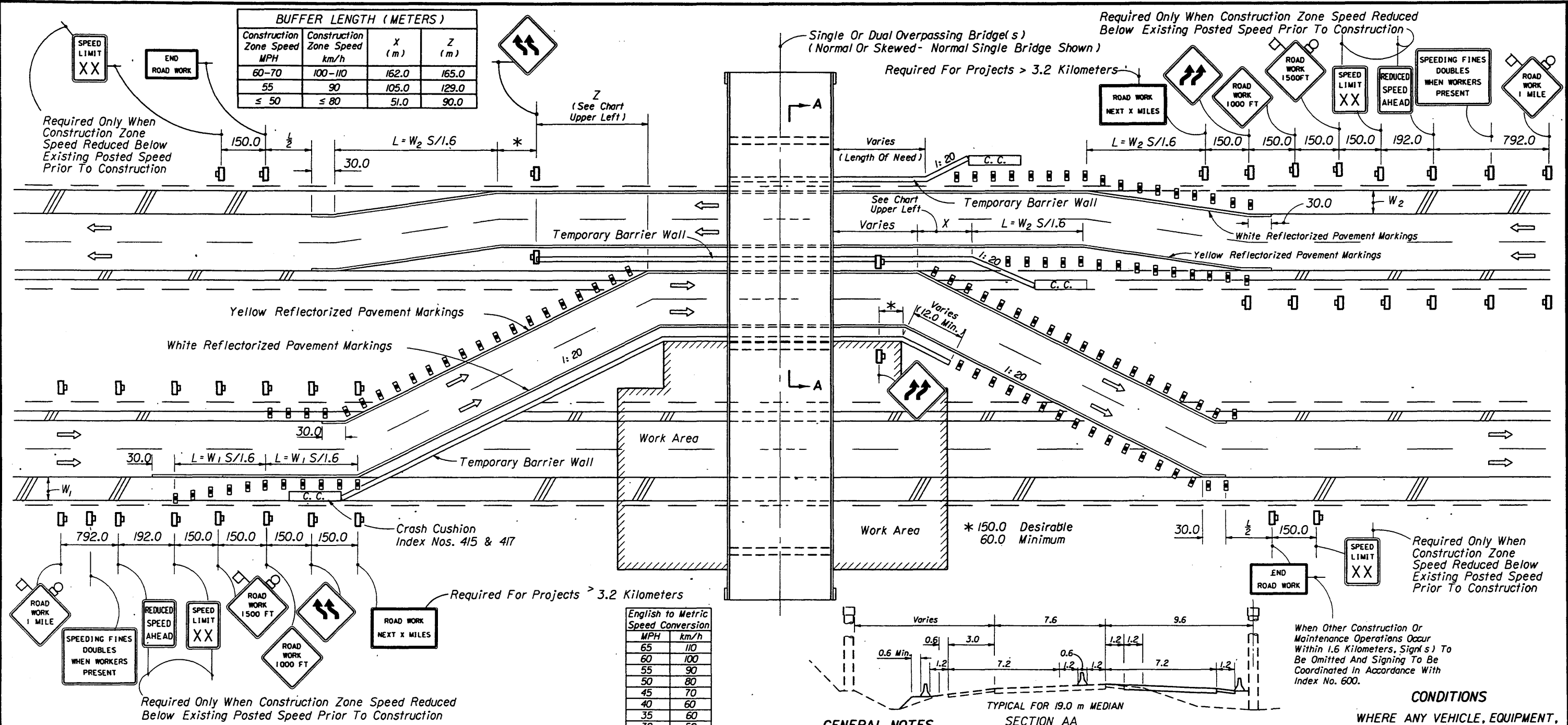
### PHASE III

1. Reroute traffic to existing alignment and maintain two-way traffic.
2. Remove all temporary construction items.

### GENERAL NOTES

1. All signing, pavement marking, barricades and warning lights necessary for maintenance of traffic shall conform to Index No. 600.
2. The first two warning signs shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.
3. For speed sign applications see Index No. 600.
4. For lane width requirements see Index No. 600. When one-way one-lane operations are necessary, a minimum width of 3.6 meters shall be maintained and traffic controlled in accordance with Indexes Nos. 603, 604, 606, 607 or 608. Minimum width for the detour shoulders is 1.8 meters.
5. Method of attaching temporary guardrail to the diversion structure to be approved by the Engineer.
6. Provisions approved by the Engineer shall be made for the removal of storm water from the roadway(s) during construction.
7. Temporary crash cushions shall be in accordance with Index No. 415 or as called for in the plans.
8. Arrows denote direction of traffic only and do not reflect pavement markings.
9. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
10. Where the temporary structure is not required the diversion may be constructed in accordance with Index No. 609, unless otherwise stipulated in the plans.
11. For reflective raised pavement marker application see Index No. 600 and Index No. 17352.
12. For general TCZ requirements and additional information refer to Index No. 600.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES				
<b>TWO-LANE, TWO-WAY • RURAL STRUCTURE REPLACEMENT</b>				
	Names	Dates	Approved By	
Designed By		08/79		
Drawn By		08/87	Revision	Sheet No.
Checked By		08/79	94	2 of 2
				Index No. 650



**BUFFER LENGTH (METERS)**

Construction Zone Speed MPH	Construction Zone Speed km/h	X (m)	Z (m)
60-70	100-110	162.0	165.0
55	90	105.0	129.0
≤ 50	≤ 80	51.0	90.0

**English to Metric Speed Conversion**

MPH	km/h
65	110
60	100
55	90
50	80
45	70
40	60
35	60
30	50

Required Only When Construction Zone Speed Reduced Below Existing Posted Speed Prior To Construction

- SYMBOLS**
- Work Area
  - Sign With 450 mm x 450 mm (Min.) Orange Flag And Type B Light
  - Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only).
  - Work Zone Sign

1. All vehicles, equipment, workers and their activities are restricted at all times to one side of the highway.
2. The first two warning signs, each side, shall have a 450 mm x 450 mm (min.) orange flag and a Type B light attached and operating at all times.
3. All signs shall be post mounted.
4. S = Posted speed limit (converted to km/h).
5. Within the lateral transitions, the maximum spacing between Type I or Type II barricades or vertical panels or drums shall be based on the speed limit as follows: 5.0 meters up to 25 MPH; 10.0 meters for 30 MPH-40 MPH; 15.0 meters for 45 MPH or greater. Barricades, vertical panels, and drums shall not be intermixed in lateral transition.
6. For speed sign applications see Index No. 600.

**GENERAL NOTES**

7. All existing pavement markings within the realignment which conflict with the revised traffic pattern are to be removed and new pavement markings used for marking edge lines and lane lines.
8. Arrows denote direction of traffic only and do not reflect pavement markings.
9. Longitudinal dimensions are to be adjusted to fit field conditions. See Index No. 600.
10. When side roads, cross roads or interchanges are located within the limits for work zone traffic control additional traffic control devices shall be erected in accordance with other applicable TCZ Indexes.
11. For general TCZ requirements and additional information refer to Index No. 600.

When Other Construction Or Maintenance Operations Occur Within 1.6 Kilometers, Signs To Be Omitted And Signing To Be Coordinated In Accordance With Index No. 600.

**CONDITIONS**

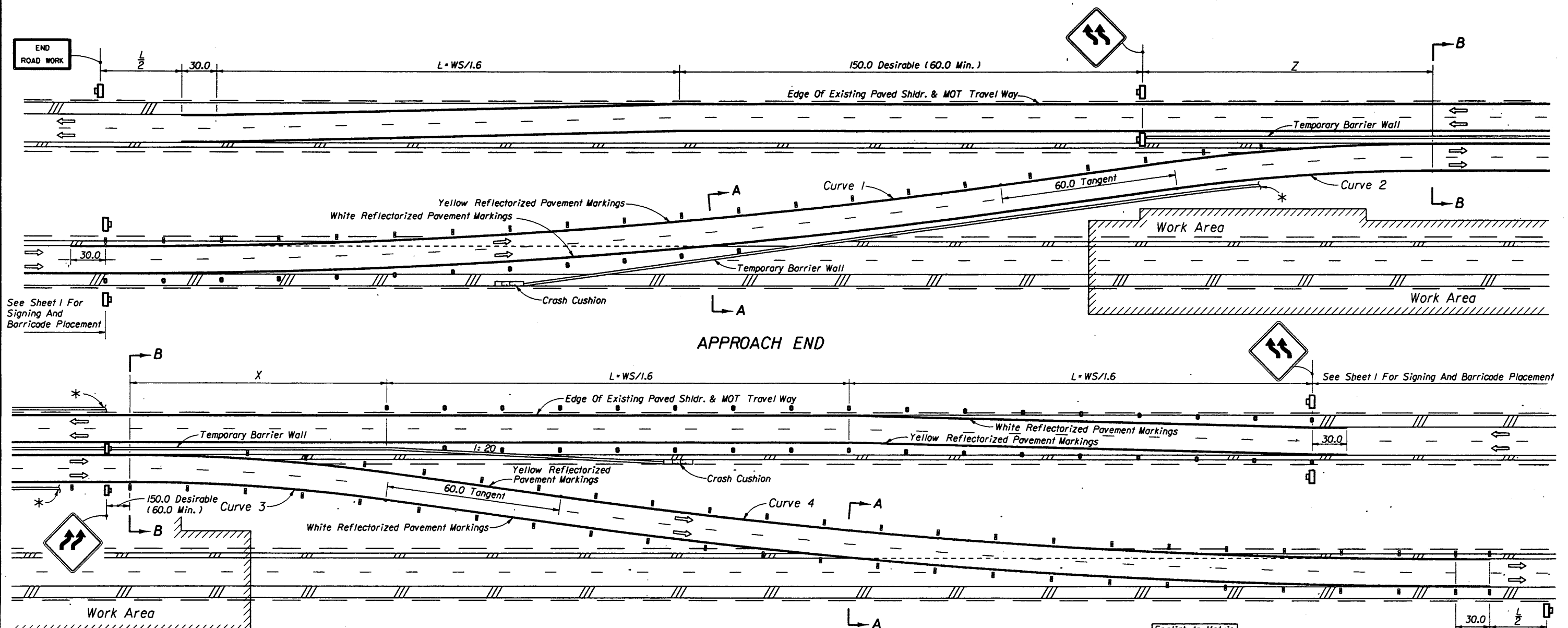
WHERE ANY VEHICLE, EQUIPMENT, WORKERS OR THEIR ACTIVITIES REQUIRE THE CLOSURE OF ONE ROADWAY AND THE OPPOSING ROADWAY IS CONVERTED TO TEMPORARY TWO-WAY TRAVEL BY WAY OF CROSSOVERS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

TRAFFIC CONTROL THROUGH WORK ZONES  
**MULTILANE DIVIDED MAINTENANCE AND CONSTRUCTION**

Designed By	Names	Dates	Approved By
Drawn By		10/89	
Checked By		10/89	Special Projects Engineer
	Revision	00	Sheet No. 1 of 2
			Index No. 651





See Sheet 1 For Signing And Barricade Placement

See Sheet 1 For Signing And Barricade Placement

\* Length of barrier wall needed for protection of work area and/or other hazards to be shown in the plans. For complimentary information on barrier walls and work area see Sheet 1. See Index No. 600 for clear zone requirements.

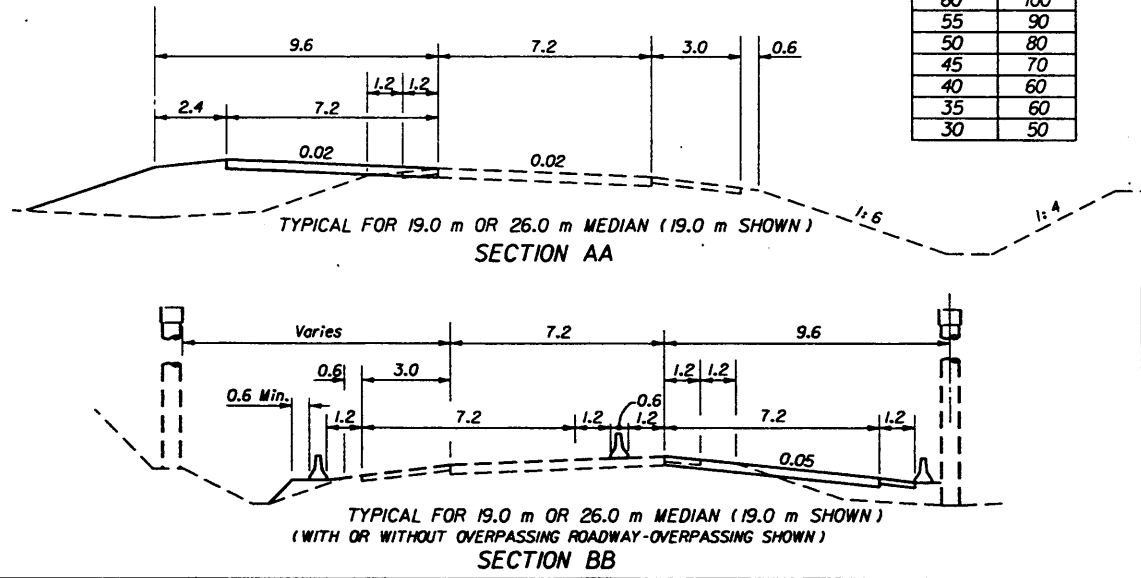
### TRAILING END CURVILINEAR ALIGNMENT CROSSOVER

MPH	km/h
65	110
60	100
55	90
50	80
45	70
40	60
35	60
30	50

When Other Construction Or Maintenance Operations Occur Within 1.6 Kilometers, Signs To Be Omitted And Signing To Be Coordinated In Accordance With Index No. 600.

BUFFER LENGTH (m)					MINIMUM RADII FOR NORMAL CROSS SLOPES				
Construction Zone Speed MPH	Construction Zone Speed km/h	19.0 Median		26.0 Median		Construction Zone Speed MPH	Construction Zone Speed km/h	Minimum Radius (m) R	
		X	Z	X	Z			Curves 1 & 4	Curves 2 & 3
70	110	185.0	179.0	177.0	166.0	70	110	6985.4	1397.2
65	110	177.0	171.0	168.0	156.0	65	110	6985.4	1164.3
60	100	171.0	165.0	162.0	150.0	60	100	6985.4	997.9
55	90	103.0	113.0	100.0	107.0	55	90	3492.7	776.0
50	80	61.0	87.0	61.0	84.0	50	80	3492.7	698.6
45	70	35.0	50.0	35.0	50.0	45	70	329.1	213.3
40	60	31.0	45.0	32.0	45.0	40	60	252.9	167.6
35	60	28.0	41.0	28.0	40.0	35	60	188.9	124.9
30	50	24.0	36.0	24.0	35.0	30	50	137.1	86.8

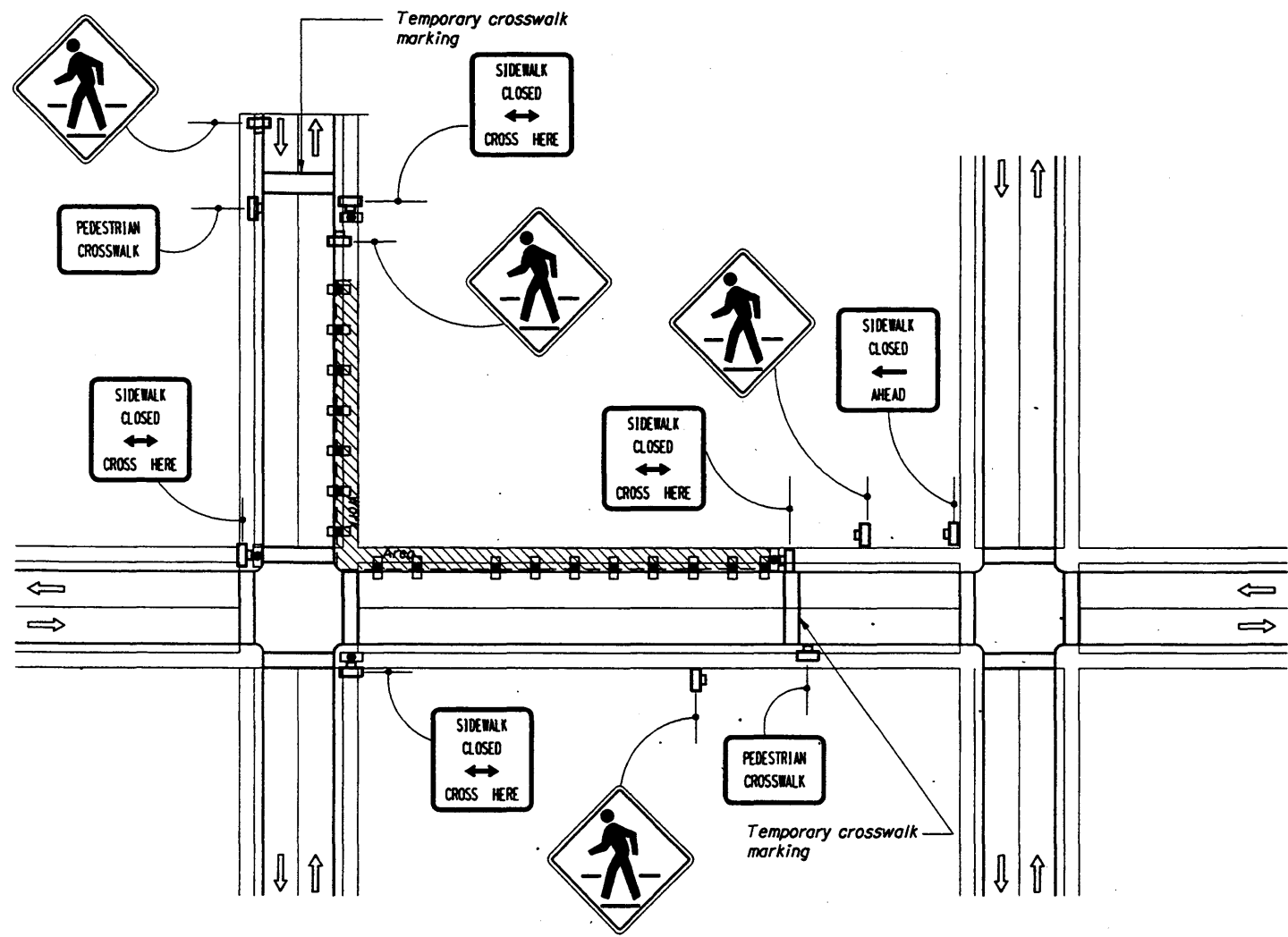
NOTE: Detours with speeds of 80 km/h or greater are considered high speed facilities; curvature and superelevation criteria for open highway conditions apply.



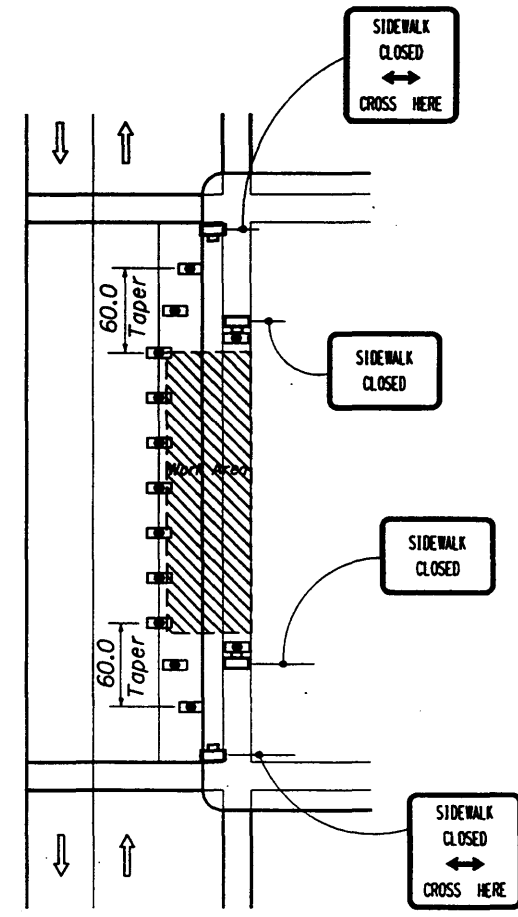
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

TRAFFIC CONTROL THROUGH WORK ZONES  
**MULTILANE DIVIDED  
MAINTENANCE AND CONSTRUCTION**

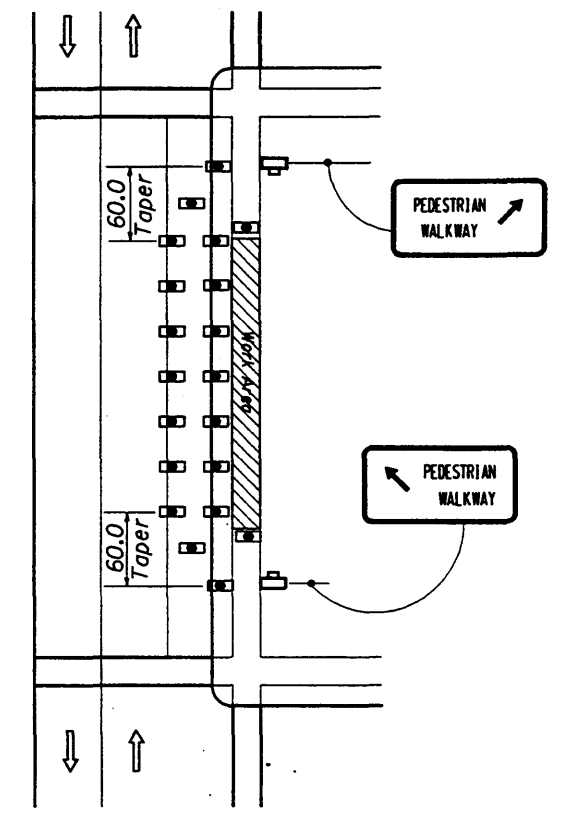
Names	Dates	Approved By
Designed By		<i>[Signature]</i> Special Projects Engineer
Drawn By		Revision
Checked By		Sheet No. 2 of 2
		Index No. 651



**CORNER SIDEWALK CLOSURE WITH TEMPORARY CROSSWALKS**



**MID-BLOCK SIDEWALK CLOSURE**



**MID-BLOCK SIDEWALK CLOSURE WITH TEMPORARY WALKWAY**

**GENERAL NOTES**

1. Arrows denote direction of traffic only and do not reflect pavement markings.
2. Only the signs controlling pedestrian flows are shown. Other work zone signs will be needed to control traffic on the streets.
3. For spacing of traffic control devices and general TCZ requirements refer to Index No. 600. Maximum spacing between barricades, vertical panels, drums or tubular markers shall not be greater than 7.5 m.
4. Street lighting should be considered.
5. For nighttime closures use type A flashing warning lights on barricades supporting signs and closing sidewalks. Use type C steady-burn lights on channelizing devices separating the work area from vehicular traffic.
6. Pedestrian traffic signal display controlling closed crosswalks shall be covered or deactivated.
7. Temporary walkways shall be a minimum of 1.2 m wide and kept free of any obstructions and hazards such as holes, debris, mud, construction equipment, stored materials and etc.
8. Post Mounted Signs located near or adjacent to a sidewalk shall have a 2.1m minimum clearance from the bottom of sign to the sidewalk.
9. When construction activities involve sidewalks on both sides of the street, efforts should be made to stage the construction so that both sidewalks are not out of service at the same time.
10. In the event that sidewalks on both sides of the street are closed, then pedestrians shall be guided around the construction zone.

**SYMBOLS**

- Work Area
- Type I Or Type II Barricade Or Vertical Panel Or Drum (With Steady Burning Light At Night Only). (Tubular Markers May Be Used During Daylight Only). Cones May Be Used -See Index 600).
- Work Zone Sign

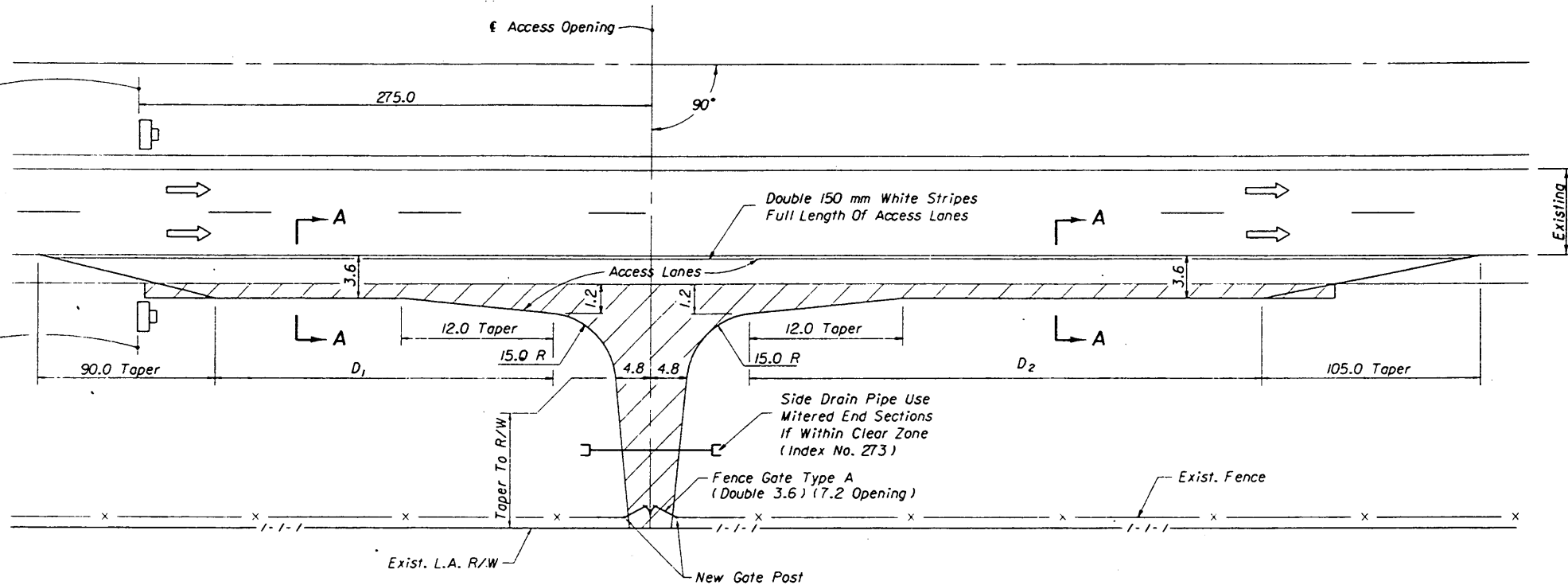
**TYPICAL APPLICATIONS**

- Sidewalk Repair
- Pavement Widening
- Utility Work

**CONDITIONS**

WHERE ANY VEHICLE, EQUIPMENT WORKERS OR THEIR ACTIVITIES ENCROACH ON THE SIDEWALK FOR A PERIOD OF MORE THAN 60 MINUTES

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>PEDESTRIAN CONTROL FOR CLOSURE OF SIDEWALKS</b>				
Designed By	Names	Dates	Approved By	
Drawn By		7/93	Special Projects Engineer	
Checked By		7/93	Revision	Sheet No.
			98	1 of 1
				660

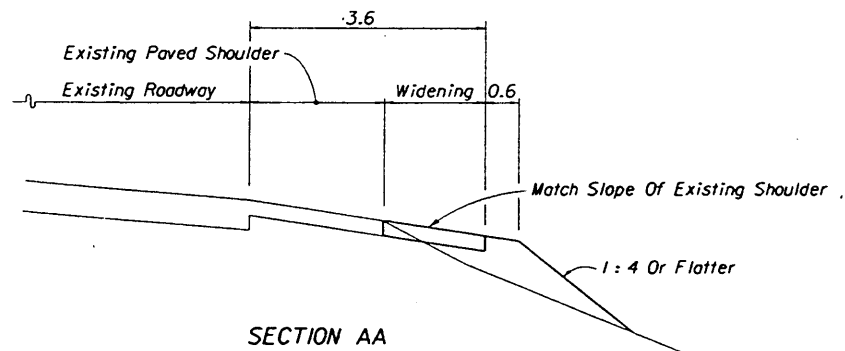


Existing Travel Lanes

SYMBOLS

Work Zone Sign

LENGTH OF ACCESS LANES (m)		
Grade	D <sub>1</sub>	D <sub>2</sub>
2% or less	180	470
3 to 4% Upgrade	160	705
3 to 4% Downgrade	215	280



PLAN

GENERAL NOTES

1. Access openings across limited access right of way and use of this Index are prohibited unless specifically permitted in the Contract Plans or Special Provisions. When permitted in the Contract Plans or Special Provisions and prior to construction of any opening, the Contractor must submit, in writing, a request identifying specific locations for approval by the Engineer.
2. No more than two (2) access openings will be allowed on each project.
3. Access openings shall be located only in areas having adequate sight distance and shall not be located within 2.4 km (1.5 miles) of interchanges nor within 600 m (2000 ft.) of acceleration-deceleration lanes at rest areas, other access openings or other highway service areas.
4. Access openings shall not be constructed directly opposite temporary median crossovers nor within 600 m (2000 ft.) of temporary median crossovers.
5. Access openings shall be within the project limits and shall not be used for transporting materials to or from any other project. The acceleration-deceleration surfaces shall be paved. RAP material is acceptable for driveway surfacing.
6. Any Motorist Aid Call Boxes affected by the temporary access openings shall be relocated outside the limits of access lanes and remain in use during construction. Upon removal of the access lanes, call boxes shall be returned to their previous location. Temporary relocation and restoration of call boxes shall be at the contractor's expense.
7. Access openings in the limited access fence shall have gates which are to be locked during non-work hours or periods when the access is not in active use.
8. The contractor shall take all precautions necessary to insure against entrance by livestock or unauthorized persons or vehicles.
9. The contractor shall not vary from the plan detail without approval of the Engineer.
10. Gates shall be removed and access opening locations shall be restored to pre-construction condition immediately upon completion of activities utilizing the materials being transported through the openings whether or not the project is completed.
11. Failure to comply with any provision of the access opening plan shall be cause for terminating use of all openings. Upon notification by the Engineer, the contractor shall cease hauling and begin restoration of affected areas. Under this condition expense of removal, restoration and of additional hauling distances shall be borne by the contractor.
12. No guardrail or barrier wall will be removed for access openings.
13. Construction and removal of the access and restoring the area to pre-construction condition shall be included in the cost of Maintenance Of Traffic, LS.

LIMITED ACCESS RIGHT OF WAY TEMPORARY OPENING

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC CONTROL THROUGH WORK ZONES <b>LIMITED ACCESS RIGHT OF WAY TEMPORARY OPENING</b>				
Designed By	Names	Dates	Approved/By 	
Drawn By			Revision	Sheet No. Index No.
Checked By			00	1 of 1 665

**NOTES**

1. Walls shall be constructed in accordance with Section 548 and the wall suppliers instructions.

2. Retaining Walls and all cast-in-place appurtenances, i.e., coping, traffic railing barriers, sidewalk parapets, light pillars, integral sign foundations, etc., shall be paid for at the contract unit price per square meter of retaining wall under Pay Item No. 2548-10, Retaining Wall System (Permanent), or 2548-11, Retaining Wall System (Temporary). Payment shall be based on plan quantities.

The related cost of installation of drainage structures (only structures affected by wall) shall be included in the unit cost for retaining wall, Pay Item No. 2548-10 or 2548-11.

3. All exposed surfaces of cast-in-place concrete shall receive a Class 5 Applied Finish Coating in accordance with Construction Specifications Section 400. Refer to Typical Wall Sections and the following notes for limits of applied finish:

- a. The inside, backside and top of Traffic Railing Barriers and Pedestrian/Bicycle Railing Barriers.
- b. Exposed surfaces of coping on top of retaining wall.

4. Other coatings, colors or textures shall be applied as required by the Contract Documents.

5. Piles within the wall volume shall be driven prior to construction of the retaining wall. The portion of the pile within the wall volume shall be wrapped with polyethylene sheeting in accordance with Section 459.

6. A structural extension of the connection of the wall panel to the soil reinforcement shall be used whenever necessary to avoid the cutting or excessive skewing (greater than 15 degrees) of the soil reinforcements around obstructions (i.e., piles, pipes, etc.).

7. For wall systems utilizing footings, the top of footing elevation is the same elevation as top of leveling pad.

8. Steps in leveling pads shall occur at panel interfaces. Panels shall not cantilever past the end of the leveling pad.

9. No cutting of soil reinforcement grids allowed unless shown on shop drawings and approved by the Engineer.

**SHOP DRAWING REQUIREMENTS**

The successful bidder shall submit the final design of the wall for review as shop drawings. The Shop Drawings shall include detailed design computations and all details, dimensions and quantities necessary to construct the wall. The design and fully detailed plans shall be prepared to Department standards current at time of bid and shall include, but not be limited to, presentation of required information as follows:

1. Provide an elevation view of the wall indicating elevations at top of wall at begin and end wall stations, at all breaks in vertical alignment and at whole stations and 10 m increments. Show elevations at top of leveling pad, bottom of footings, locations of all steps in leveling pad, panel designations, and length, size and designation of soil reinforcement in elevation view. Indicate location of the proposed final ground line.

2. Provide a plan view detailing the horizontal alignment and offsets from the horizontal control line(s) to the exterior face of the wall.

3. Show in the plan and elevation all utilities, sign supports, light pole pilasters, drainage structures, drainage pipes, etc. that affect the walls. Locate on the plan all piles within the wall volume including those for future widening as shown on Foundation Layout drawings.

4. Provide general notes and design parameters on the shop drawings, including design soil characteristics, minimum factors of safety, allowable material stresses and all other pertinent notes required for the construction of the walls. Provide the allowable and maximum actual bearing pressure for each wall height increment.

5. Show the limits of the wall volume.

6. Show all details of each concrete panel, slip joint and all other concrete elements incorporated in the wall, including reinforcing bar size and spacing, reinforcing bar bending details and details of all embedments.

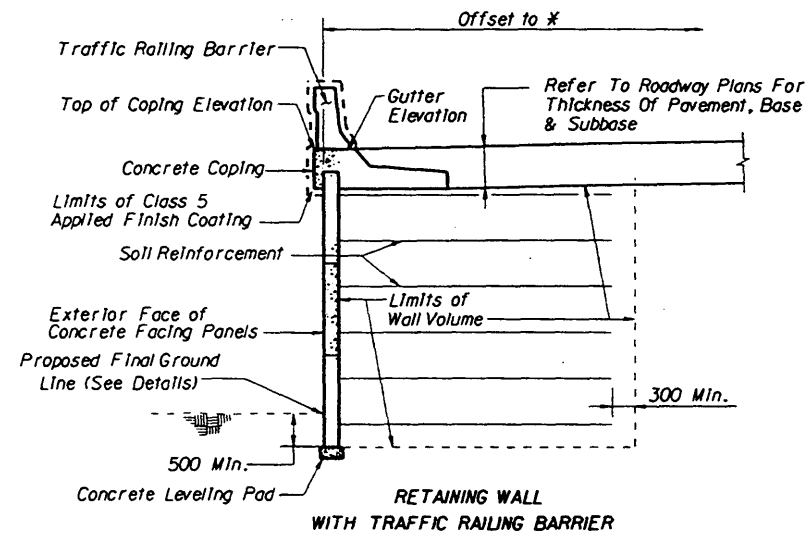
7. Show all details of leveling pads and footings, including steps in leveling pads.

8. Show all details for construction of wall around obstructions. Show details for placement of soil reinforcement at acute corners and at interface with temporary walls.

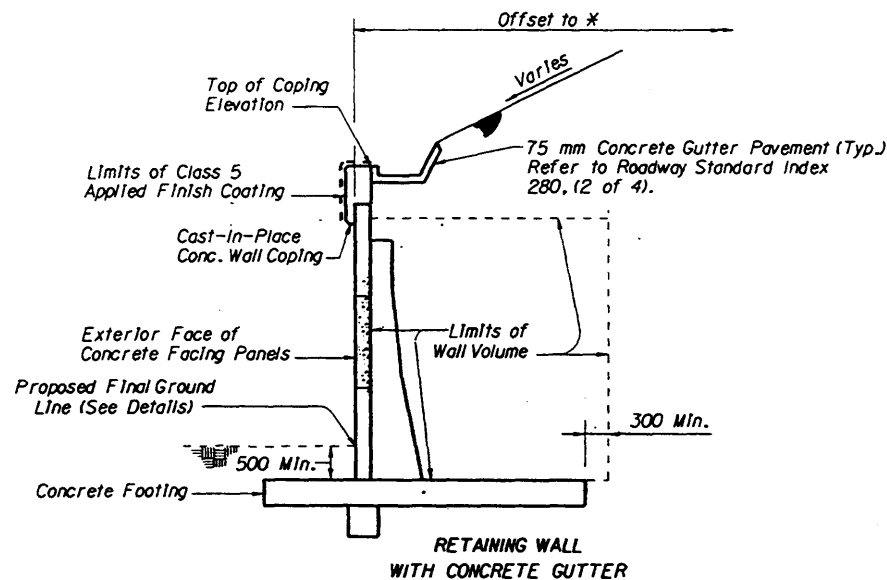
9. Show all details addressing conflicts between soil reinforcement, concrete facing panels and embedments in the wall volume. Provide full details of connections of barriers, coping, sign supports, light pole pilasters, acute corners, etc.

10. Show all details where walls of different types intersect/influence one another.

11. Provide fully detailed design calculations for each wall height increment utilized in the shop drawings. The submitted plans and design calculations shall be signed and sealed by a Professional Engineer registered in the State of Florida.

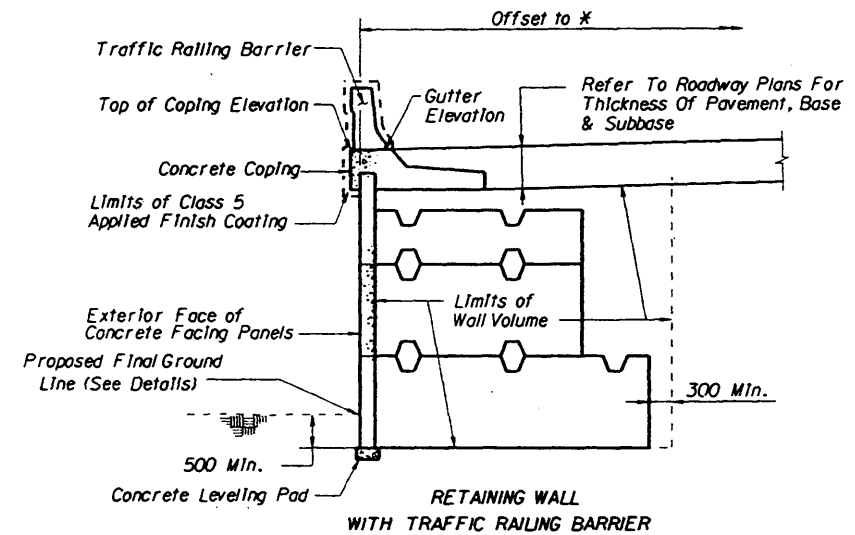


**TYPICAL WALL SECTION - MSE SYSTEM (N.T.S.)**

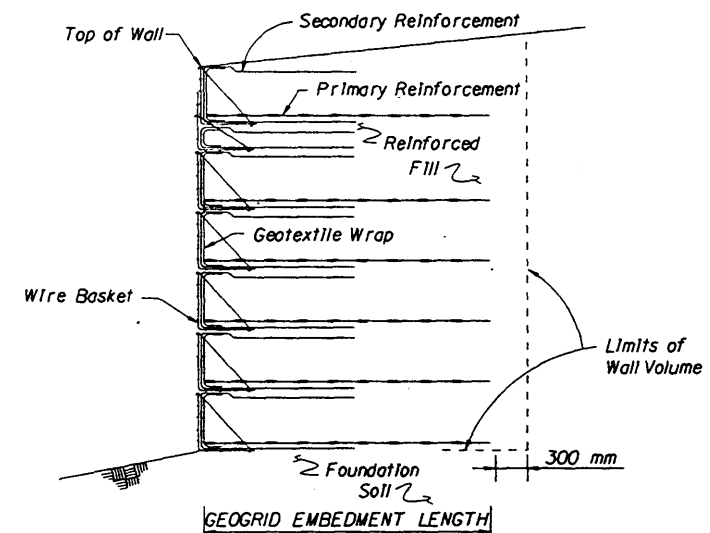


**TYPICAL WALL SECTION - COUNTERFORT SYSTEM (N.T.S.)**

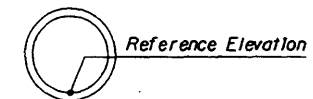
\* Insert control line designation i.e., E, @ etc.



**TYPICAL WALL SECTION - CONCRETE STEM SYSTEM (N.T.S.)**



**TEMPORARY WALL - TYPICAL CROSS-SECTION (N.T.S.)**



NOTE: See Roadway plans for complete drainage details.

**DRAINAGE PIPE DETAIL**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM GENERAL NOTES				
Names	Dates	Approved By		
Designed By	RVR	11-98	 State Structures Design Engineer	
Drawn By	JSP	11-98		
Checked By	DEK	11-98		
Revision	00	Sheet No.	1 of 1	Index No.
				5000

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A Division of L. B. Foster Company

6455 OLD PEACHTREE ROAD  
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Fax: (770) 242-7493

## GENERAL NOTES

### DESIGN CRITERIA

1. DESIGN IS BASED ON THE ASSUMPTION THAT THE MATERIAL WITHIN THE REINFORCED EARTH VOLUME, METHODS OF CONSTRUCTION AND QUALITY OF PREFABRICATED MATERIALS SHALL CONFORM TO THE CONTRACTING AGENCY'S TECHNICAL SPECIFICATIONS FOR RETAINED EARTH WALLS.

2. FACTORS OF SAFETY

OVERTURNING 2.0  
INTERNAL PULLOUT 1.5 (ALLOW DEFORMATION 3/4")  
OVERALL STABILITY 1.5  
SLIDING 1.5  
BEARING 2.5

SOIL REINFORCEMENT MESH 0.47 Fy AT END OF DESIGN LIFE

3. SOIL CHARACTERISTICS ASSUMED FOR DESIGN:

SOIL PARAMETERS:

SEE WALL CONTROL DRAWINGS FOR SOIL CHARACTERISTICS OF FOUNDATION MATERIAL TO BE USED IN THE DESIGN OF THE WALL SYSTEM. THE CONTRACTOR SHALL PROVIDE SOIL DESIGN PARAMETERS FOR BACKFILL MATERIAL BASED ON THE ACTUAL SOIL CHARACTERISTICS UTILIZED AT THE SITE. THE VALUES OF  $\phi$ , C AND  $\gamma$  SHALL BE PROVIDED IN THE SHOP DRAWINGS.

4. THE MAXIMUM APPLIED BEARING PRESSURE AT THE FOUNDATION LEVEL IS AS SHOWN ON THE WALL ELEVATIONS FOR EACH DESIGN CASE. IT IS THE RESPONSIBILITY OF OTHERS TO DETERMINE THAT THIS APPLIED BEARING PRESSURE IS ALLOWABLE FOR THAT LOCATION.

5. ANY UNSUITABLE FOUNDATION MATERIAL BELOW THE REINFORCED EARTH VOLUME, AS DETERMINED BY THE ENGINEER, SHALL BE EXCAVATED AND REPLACED WITH SUITABLE MATERIAL OR OTHERWISE STABILIZED AS DIRECTED BY THE ENGINEER.

### REINFORCING ELEMENTS

6. REINFORCING MESH ELEMENTS SHALL BE SHOP FABRICATED FROM COLD DRAWN STEEL ROD CONFORMING TO THE MINIMUM REQUIREMENTS OF ASTM A-82M AND SHALL BE WELDED AT THE JUNCTIONS BETWEEN LONGITUDINAL AND TRANSVERSE WIRES IN ACCORDANCE WITH ASTM A-185M. GALVANIZATION SHALL BE APPLIED AFTER MESH FABRICATION AND SHALL CONFORM TO THE MINIMUM REQUIREMENTS OF ASTM A-123M.

LOOP EMBEDS SHALL BE FABRICATED FROM COLD DRAWN STEEL ROD CONFORMING TO ASTM A-510M OR ASTM A-82M. LOOP EMBEDS SHALL BE WELDED IN ACCORDANCE WITH ASTM A-185M. LOOP EMBEDS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM B-633M.

### DESIGN:

7. THE DESIGN CONTAINED ON THESE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS. ON THE BASIS OF THIS INFORMATION, THE WALL COMPANY IS RESPONSIBLE FOR INTERNAL STABILITY OF THE STRUCTURE ONLY. EXTERNAL STABILITY DESIGN INCLUDING FOUNDATION AND SLOPE STABILITY IS THE RESPONSIBILITY OF OTHERS.

### WALL CONSTRUCTION

8. RETAINED EARTH WALLS IN CURVES WILL FORM A SERIES OF SHORT CHORDS OF 1.524m EACH TO MATCH DESIRED WALL ALIGNMENT.

9. FOR LOCATION AND ALIGNMENT OF RETAINED EARTH WALLS, SEE RETAINING WALL CONTROL PLANS.

10. IF MANHOLES AND DROP INLETS ARE PRESENT, THEY SHALL BE LOCATED AS SHOWN ON WALL ELEVATIONS.

11. IF PILES ARE LOCATED WITHIN REINFORCED SOIL VOLUME, THEY SHALL BE DRIVEN PRIOR TO CONSTRUCTION OF THE REINFORCED EARTH WALL UNLESS A METHOD TO PROTECT THE STRUCTURE WHICH IS ACCEPTABLE TO THE ENGINEER AND FOSTER GEOTECHNICAL COMPANY AND IS PROPOSED AND APPROVED IN WRITING.

12. BACKFILL MATERIAL SHALL BE COMPACTED IN ACCORDANCE WITH SECTION 548 TO A LEVEL OF 50mm (+/-) ABOVE THE TIE MESH EMBEDDED IN THE PANELS. INSTALLATION OF REINFORCING MESH SHALL BE PERMITTED ONLY AFTER PLACEMENT AND COMPACTION OF THE BACKFILL MATERIAL HAS REACHED THE REQUIRED LEVEL.

13. WALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH SECTION 548.

14. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE LOCATION OF ANY GUARDRAIL POSTS BEHIND RETAINED EARTH PANELS. PRIOR TO PLACEMENT OF THE TOP LAYER OF REINFORCING MESH, INDIVIDUAL REINFORCING MESH MAY BE SKEWED TO AVOID THE POST LOCATIONS IF AUTHORIZED BY THE ENGINEER (NO CUTTING OF SOIL REINFORCEMENT GRIDS ALLOWED UNLESS SHOWN ON SHOP DRAWINGS AND APPROVED BY THE ENGINEER). ANY DAMAGE DONE TO THE REINFORCING MESH DUE TO THE INSTALLATION OF THE GUARDRAIL SHALL BE REPAIRED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE.

15. IF EXISTING OR FUTURE STRUCTURES, PIPES, FOUNDATIONS OR GUARDRAIL POSTS WHICH ARE WITHIN REINFORCED SOIL VOLUME INTERFERE WITH THE NORMAL PLACEMENT OF REINFORCING MESH AND SPECIFIC DIRECTION HAS NOT BEEN PROVIDED ON THE PLANS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER TO DETERMINE WHAT COURSE OF ACTION SHOULD BE TAKEN.

16. TOP PANELS BENEATH CAST-IN-PLACE COPING SHALL HAVE #3 BARS PROTRUDING FROM THEIR TOP EDGE.

17. FOR OTHER INFORMATION PERTAINING TO WALL CONSTRUCTION PLEASE REFER TO FOSTER GEOTECHNICAL CONSTRUCTION MANUAL.

18. THE CONTRACTOR IS RESPONSIBLE FOR GRADUALLY DEFLECTING UPPER REINFORCING MESH DOWNWARD TO AVOID CONFLICTS WITH PAVING AND SUBGRADE PREPARATION. THE CONTRACTOR'S ATTENTION IS DIRECTED ESPECIALLY TO SITUATIONS WHERE ROADWAY SUPER ELEVATION AND/OR SOIL MIXING ARE ANTICIPATED.

### MATERIALS NOTES

19. NOMINAL MESH LENGTHS

THE REINFORCING MESH LENGTH SHOWN ON THE PLANS, MEASURED FROM BACK FACE OF PANEL ARE THE NOMINAL LENGTHS REQUIRED BY CALCULATION. THE ACTUAL FABRICATED MESH LENGTHS ARE OFTEN LONGER (UP TO 150mm) DUE TO MANUFACTURING TOLERANCES. THE REQUIRED HORIZONTAL LIMIT OF GRANULAR BACKFILL IS EQUAL TO THE NOMINAL MESH LENGTH. ADDITIONAL GRANULAR BACKFILL BEYOND THE NOMINAL MESH LENGTH IS NOT REQUIRED BY CALCULATION.

20. REINFORCED BACKFILL QUANTITY

THE REINFORCED BACKFILL QUANTITY INDICATED BY FOSTER GEOTECHNICAL IS CALCULATED BY MULTIPLYING THE NOMINAL MESH LENGTHS SHOWN ON THE PLANS BY THEIR TRIBUTARY WALL SURFACE AREA AND CONVERTING THE RESULT TO A NEATER CUBIC METER QUANTITY. THIS INFORMATION IS FURNISHED FOR THE CONTRACTOR'S INFORMATION ONLY AND IS NOT INTENDED TO PRESENT THE ACTUAL QUANTITIES REQUIRED TO COMPLETE THE WORK. THE CONTRACTOR MUST CALCULATE HIS OWN EXCAVATION AND BACKFILL QUANTITIES BASED UPON THE SPECIFIC CONDITIONS OF THE PROJECT.

21. PANEL FINISH

THE PRECAST PANELS FOR THIS PROJECT SHALL BE A PLAIN STEEL FORM FINISH UNLESS OTHERWISE SPECIFIED ON THE RETAINED EARTH WALL CONTROL PLANS.

22. NOTE TO CONTRACTORS

ONLY THE FOLLOWING MATERIALS ARE SUPPLIED BY FOSTER GEOTECHNICAL

- PRECAST PANEL
- REINFORCING MESH
- LOOP EMBED
- HDPE BEARING PAD (NOMINAL 4.0 MELT/950 DENSITY)
- NON-WOVEN FILTER CLOTH AND ADHESIVE (FOR PANELS JOINTS ONLY) (WEBTECH-TERRATEX NO4 OR EQUAL)

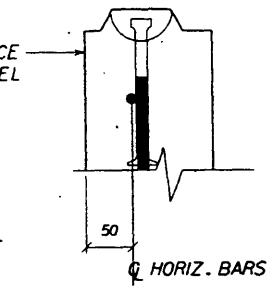
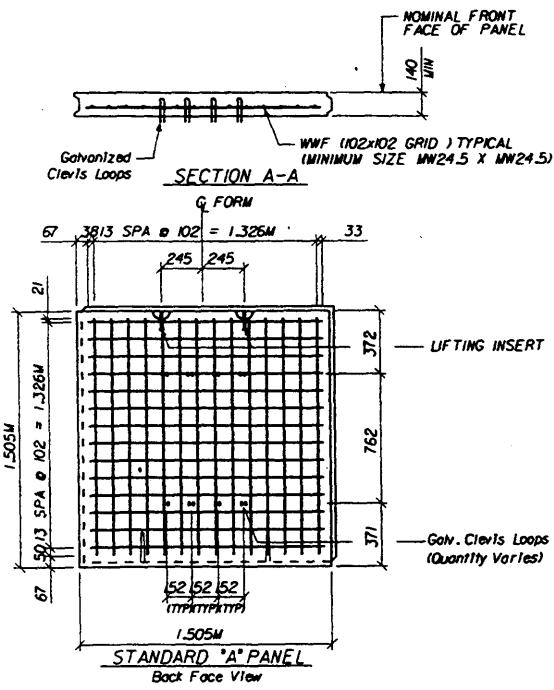
ANY OTHER MATERIALS CALLED FOR IN THE CONTRACT PLANS OR SPECIFICATIONS ARE TO BE SUPPLIED BY THE CONTRACTOR. ANY JOINT MATERIALS SHOWN AT THE INTERFACE OF PRECAST PANELS AND CAST-IN-PLACE CONCRETE STRUCTURES ARE TO BE SUPPLIED BY THE ERECTION CONTRACTOR. ALL SANDBLASTING, PAINTING, SEALERS OR OTHER SPECIAL APPLIED COATINGS ARE ALSO SUPPLIED / INSTALLED BY THE CONTRACTOR IN THE FIELD FOLLOWING PANEL ERECTION.

23. FOSTER GEOTECHNICAL SUPPLIES PRECAST CONCRETE FACING PANELS AND ACCESSORIES TO BE USED IN CONJUNCTION WITH OTHER MATERIALS IN THE CONSTRUCTION OF RETAINED EARTH WALLS DETAILED HEREIN. THE CONSTRUCTION AND QUALITY CONTROL PROCEDURES MANUAL FURNISHED BY FOSTER GEOTECHNICAL IS INTENDED TO PROVIDE A GENERAL EXPLANATION OF THE SYSTEM. IT IS THE CONTRACTOR'S OBLIGATION TO DEVISE AND EXECUTE A PROJECT SPECIFIC ERECTION SEQUENCE, PANEL UNLOADING, HANDLING AND BRACING SYSTEM, AND FALL PROTECTION SYSTEM. THE BRACING SYSTEM SHOWN IN THE CONSTRUCTION AND QUALITY CONTROL PROCEDURES MANUAL IS GENERAL IN NATURE AND DOES NOT ACCOUNT FOR PROJECT SPECIFIC CRITERIA COMPLIANCE WITH THE GUIDELINES IN THIS MANUAL DOES NOT RELIEVE THE CONTRACTOR OF ITS RESPONSIBILITY TO ADHERE TO THE PROJECT PLANS, SPECIFICATIONS AND CONTRACT DOCUMENTS OR COMPLIANCE WITH ALL FALL PROTECTION, SAFETY, LAWS, STANDARDS AND PROCEDURES AT THE JOBSITE. CONTRACTORS SHOULD TAKE SPECIAL PRECAUTIONS TO PREVENT THE PANELS FROM SHIFTING OR FALLING DURING THE ERECTION PROCESS.

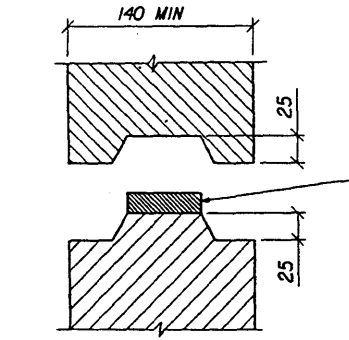
METRIC  
SQUARE PANELS

THIS SYSTEM SHALL BE USED IN MODERATELY OR SLIGHTLY AGGRESSIVE ENVIRONMENTS ONLY.

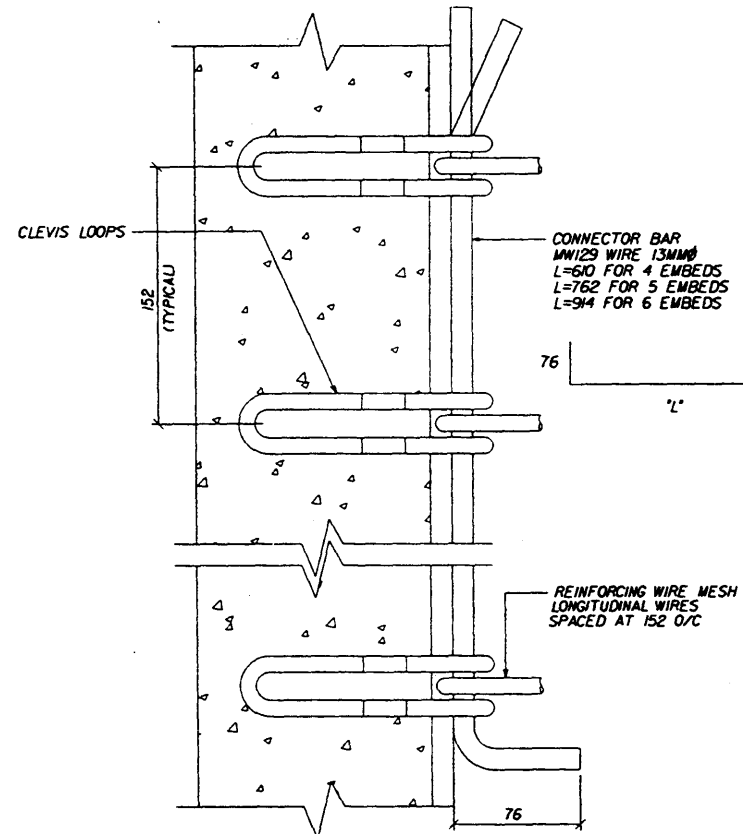
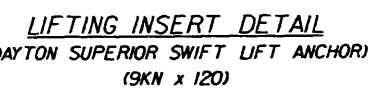
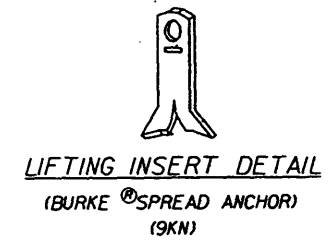
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM FOSTER GEOTECHNICAL RETAINED EARTH WALL				
Designed By	TCNA	11/98	Approved By	
Drawn By	CAD	11/98	Revision	00
Checked By	GEO	11/98	Sheet No.	1 of 12
			Index No.	5005



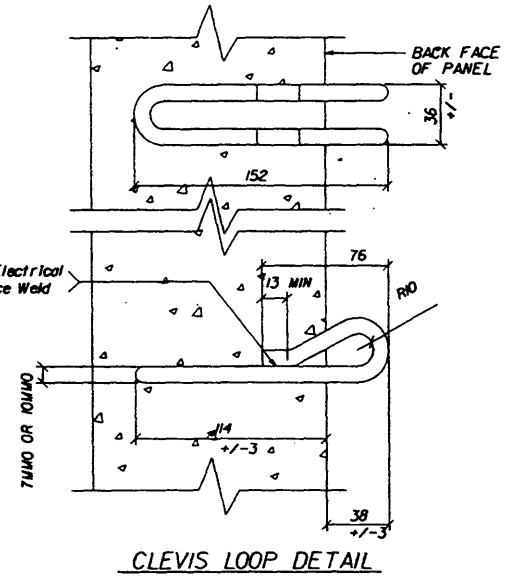
SECTION AT REBAR



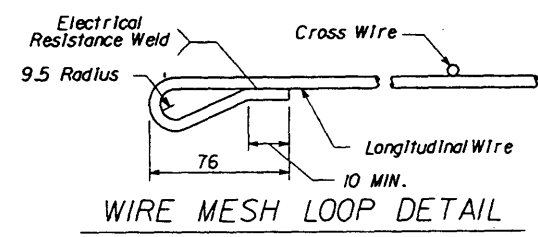
PANEL JOINT DETAIL



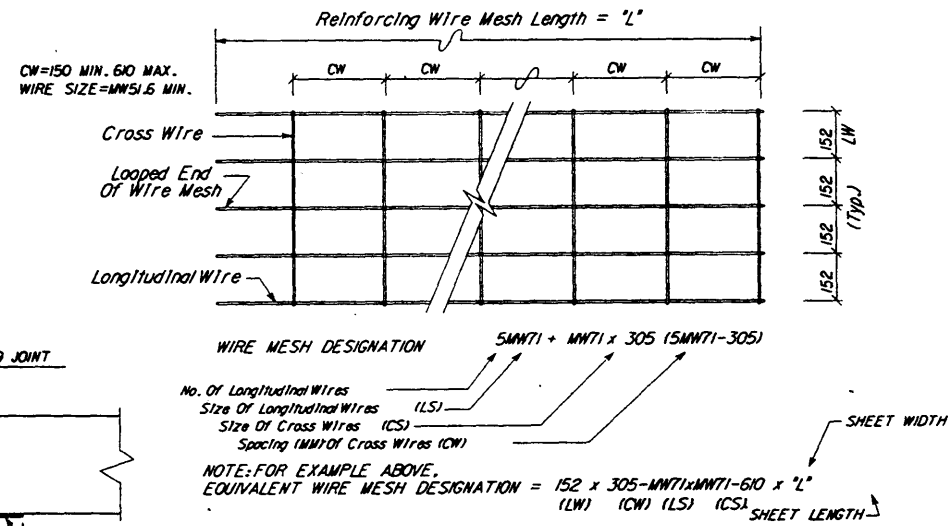
REINFORCING MESH CONNECTION DETAIL



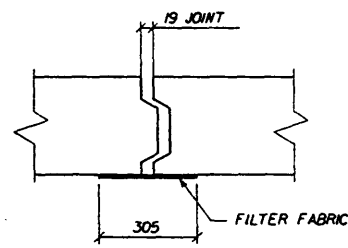
CLEVIS LOOP DETAIL



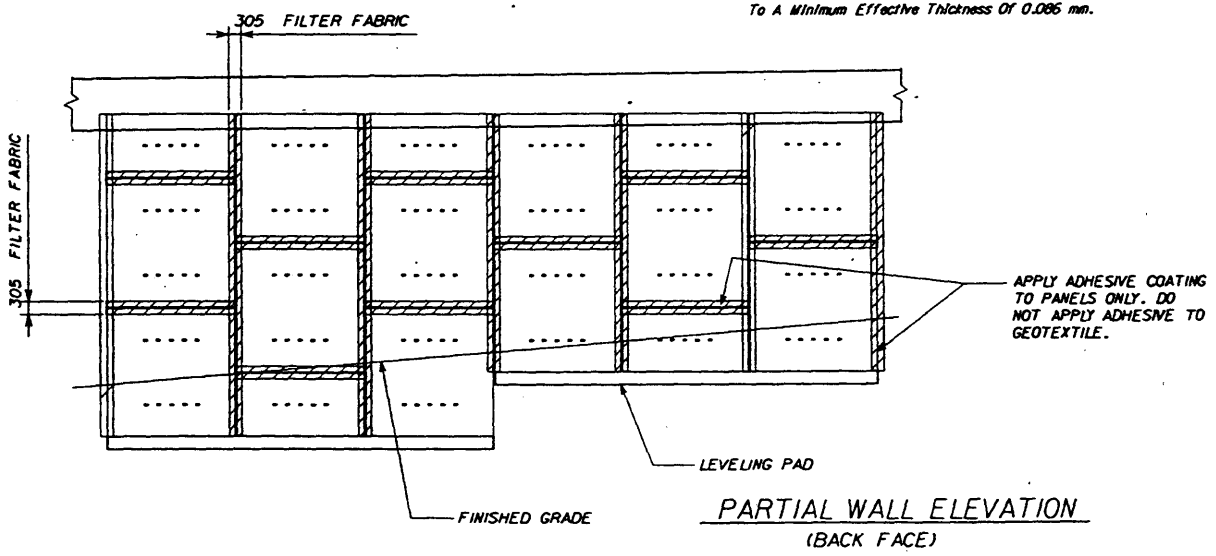
WIRE MESH LOOP DETAIL



REINFORCING MESH DETAIL



HORIZONTAL JOINT DETAIL

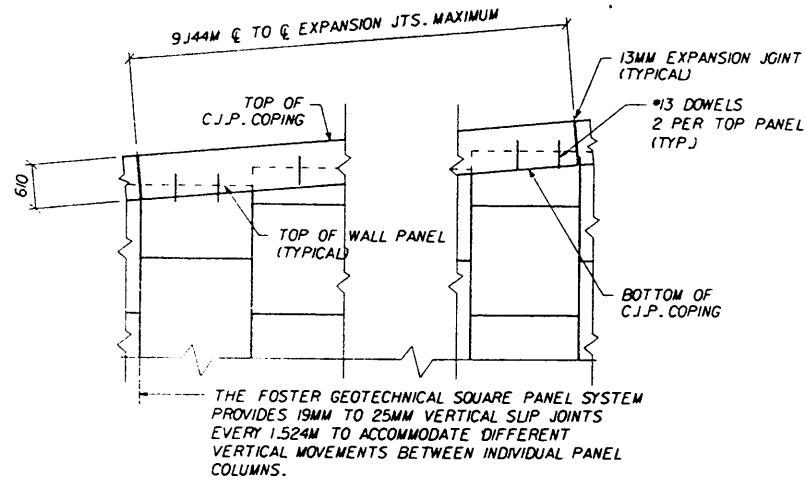


PARTIAL WALL ELEVATION (BACK FACE)

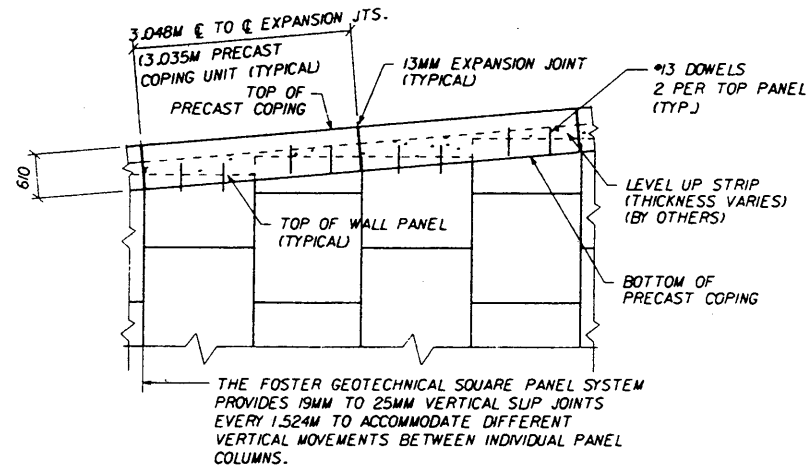
METRIC SQUARE PANELS

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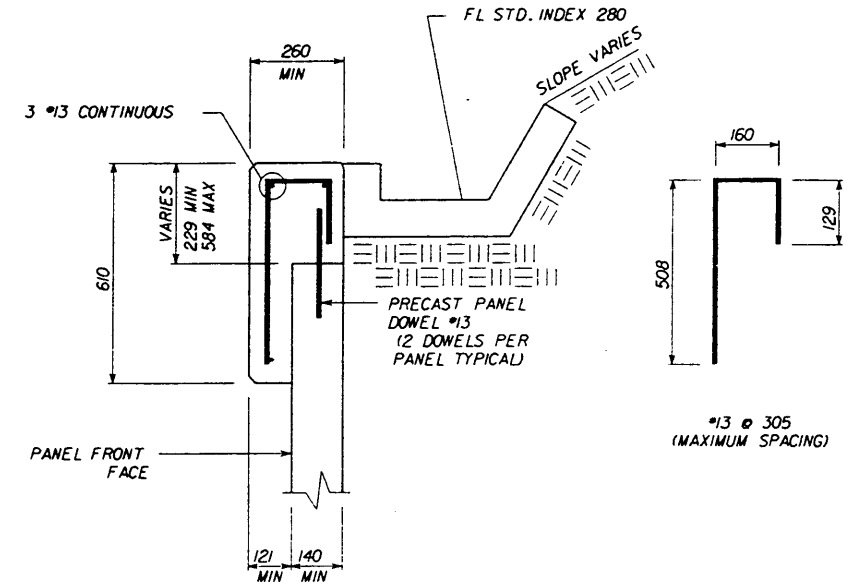
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM FOSTER GEOTECHNICAL RETAINED EARTH WALL</b>				
Designed By	TCMA	11/98	Approved By <i>William H. [Signature]</i> State Structures Design Engineer	
Drawn By	CAD	11/98	Revision	Sheet No.
Checked By	GEO	11/98	00	2 of 12
				Index No. 5005



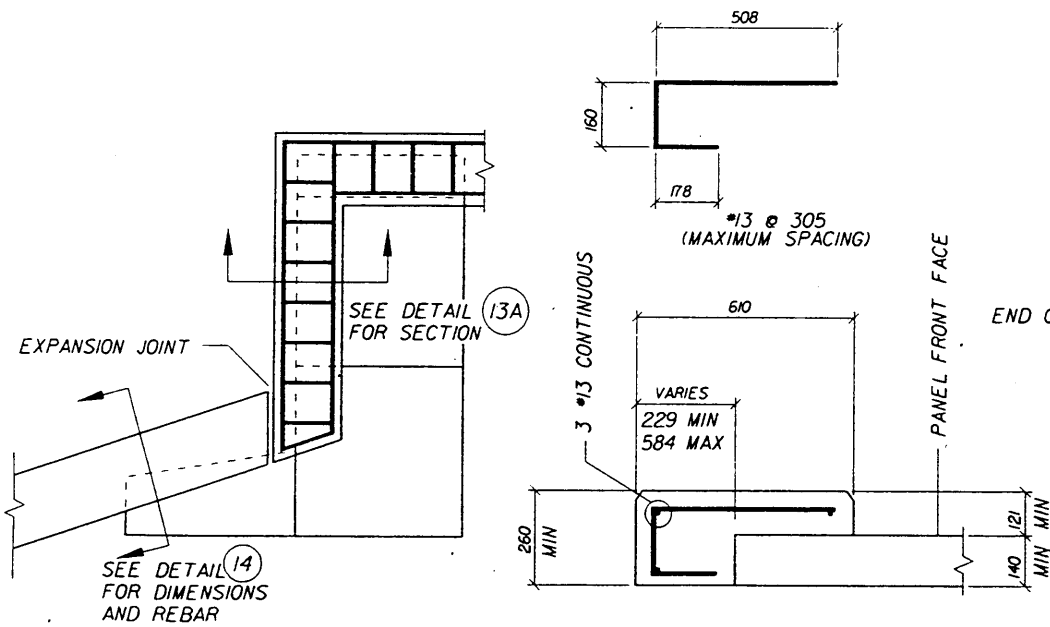
14A PARTIAL ELEVATION C.J.P. COPING  
(SQUARE PANELS SHOWN, HEX PANELS SIMILAR)



20A PARTIAL ELEVATION PRECAST COPING  
(SQUARE PANELS SHOWN, HEX PANELS SIMILAR)

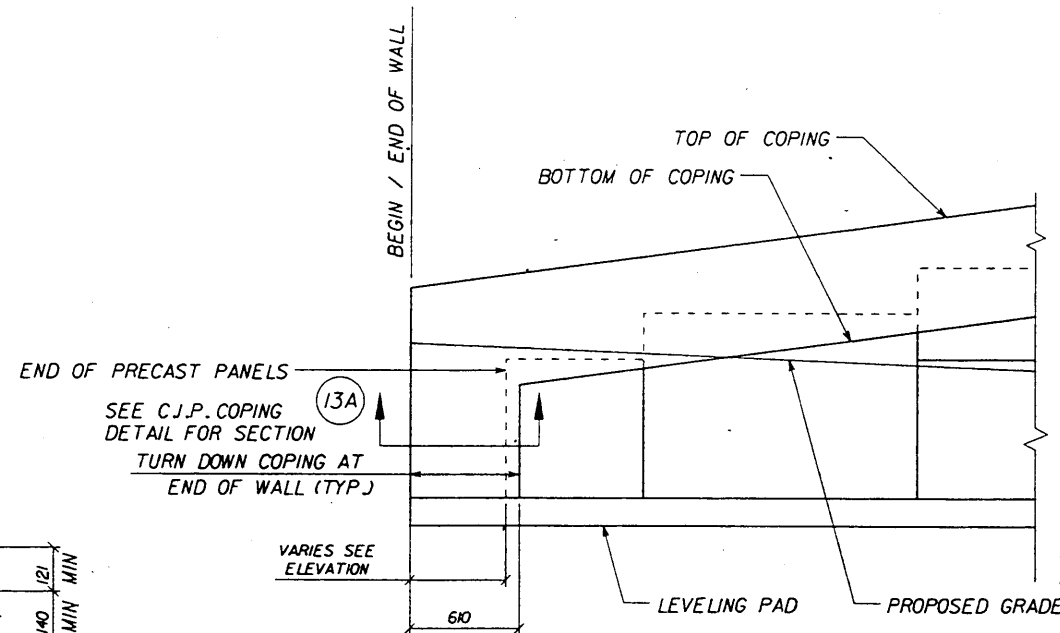


14 C.J.P. COPING W/ DITCH  
(150MM MIN COVER TYP.)

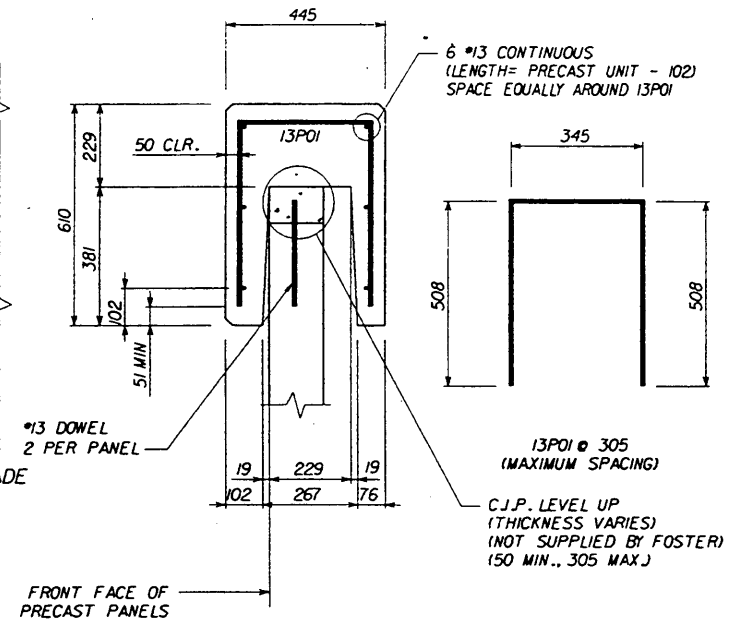


13 VERTICAL COPING (C.I.P.)  
(SQUARE PANELS SHOWN, HEX PANELS SIMILAR)

13A VERTICAL COPING (C.I.P.) SECTION  
(50MM MINIMUM COVER TYP.)



15 COPING ENCLOSURE (C.I.P.)  
(SQUARE PANELS SHOWN, HEX PANELS SIMILAR)

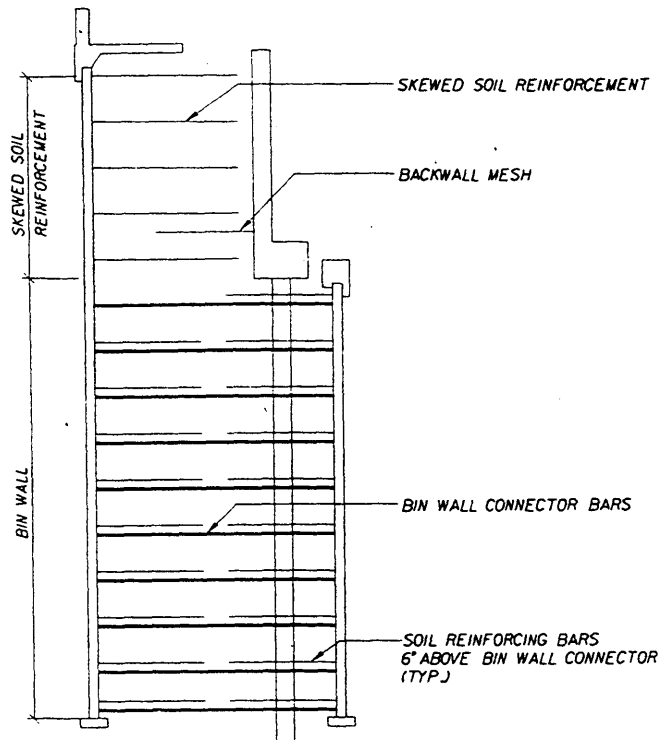


20 TYPE H- PRECAST COPING  
(STANDARD PRECAST COPING, 50MM MIN COVER)

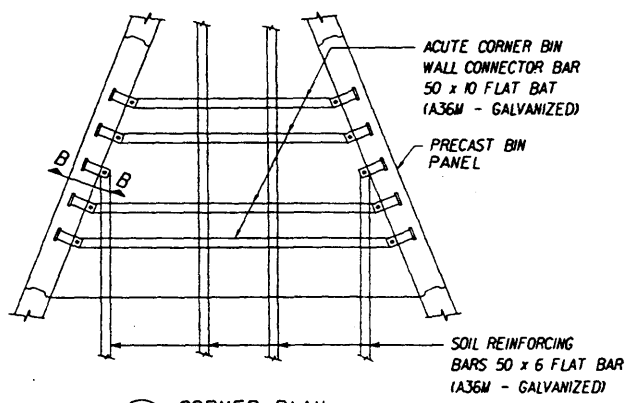
METRIC  
SQUARE/HEX PANELS

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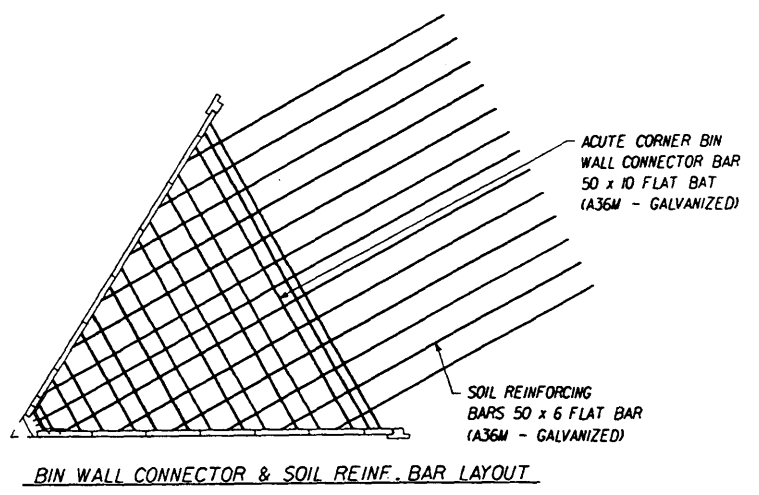
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM FOSTER GEOTECHNICAL RETAINED EARTH WALL				
Names	Dates	Approved By		
Designed By	TCNA	11/98	<i>Walter H. Vukobratovic</i> State Structures Design Engineer	
Drawn By	CAD	11/98		
Checked By	GEO	11/98	Revision	Sheet No.
			00	3 of 12
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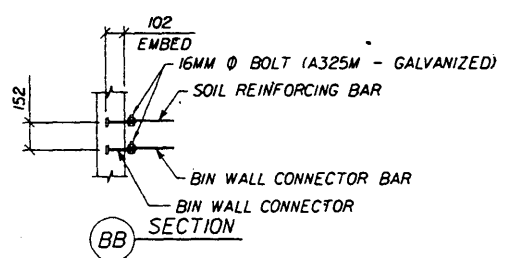
CC TYPICAL SECTION @ BIN WALL



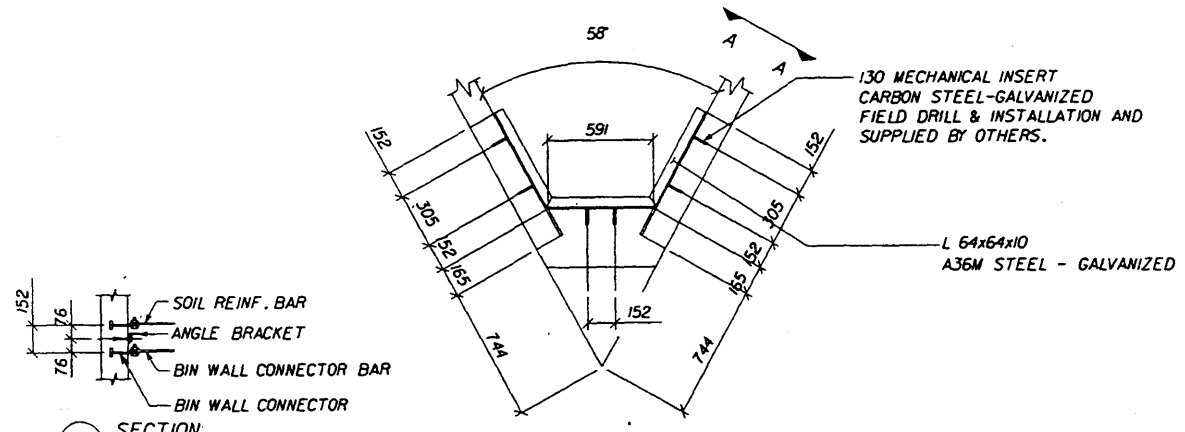
31 CORNER PLAN



BIN WALL CONNECTOR & SOIL REINF. BAR LAYOUT

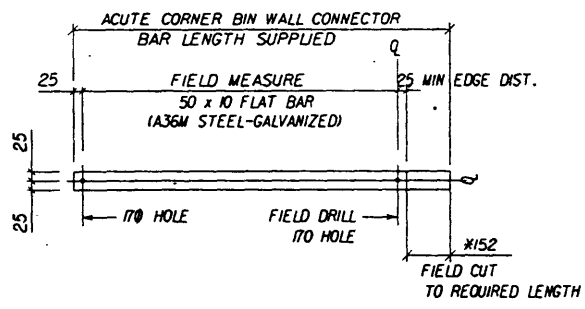


BB SECTION



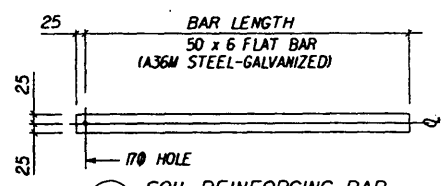
NOTES: BRACKETS TYPICALLY LOCATED IN THE CORNER BETWEEN BIN WALL CONNECTOR & SOIL REINFORCING BAR ELEVATION  
BIN WALL CONNECTOR BARS & SOIL REINF. BARS NOT SHOWN

30 ANGLE BRACKET DETAIL



\* EXPOSED STEEL ON FIELD MODIFIED END SHALL BE COATED WITH ZINC RICH PAINT

32 BIN WALL CONNECTOR BAR



33 SOIL REINFORCING BAR

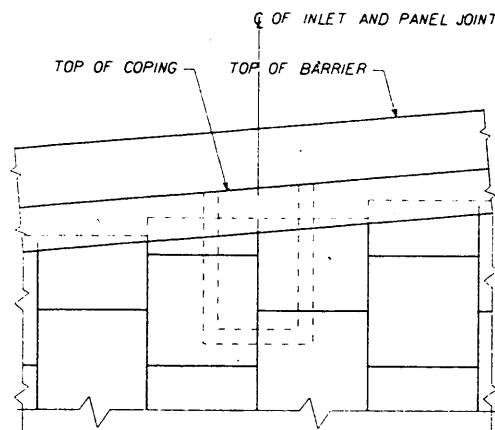
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METRIC  
SQUARE / HEX PANELS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM FOSTER GEOTECHNICAL RETAINED EARTH WALL</b>				
Designed By	TCNA	11/98	Approved By	<i>[Signature]</i> State Structures Design Engineer
Drawn By	CAD	11/98	Revision	Sheet No. Index No.
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65 PARTIAL ELEVATION WALL @ DRAINAGE INLET

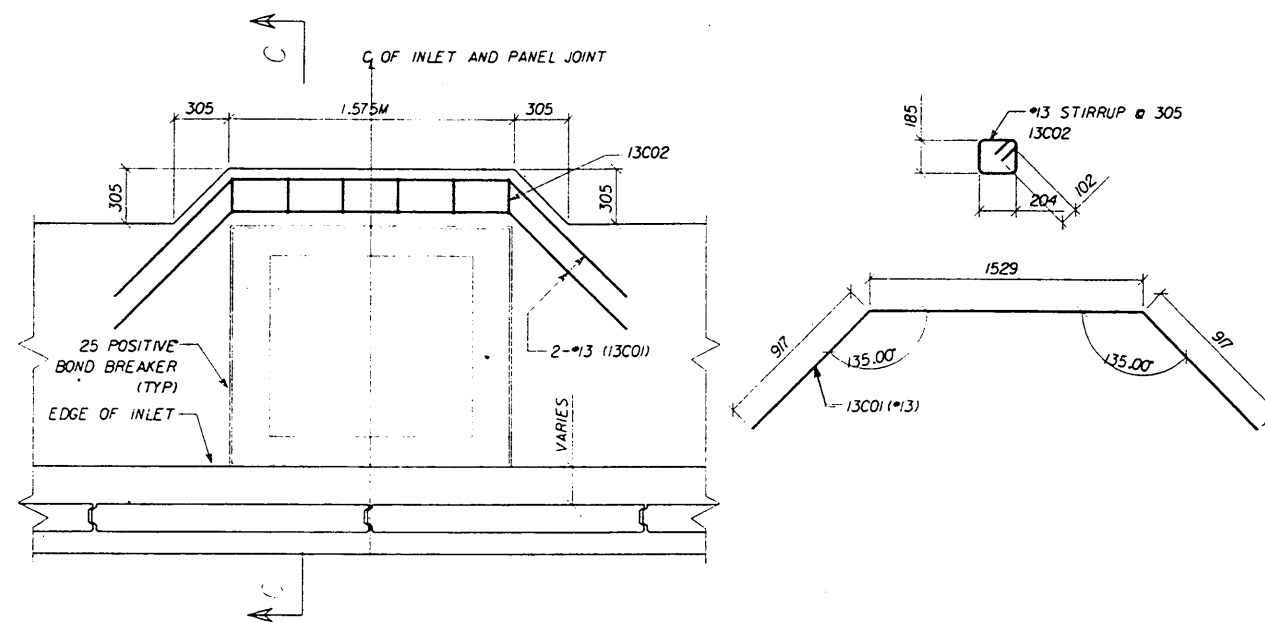
VERTICAL OBSTRUCTION NOTES:

OBSTRUCTION SHALL BE CONSTRUCTED BEFORE WALL INSTALLATION OR VOID FORMER SHALL BE INSTALLED DURING BACKFILL PLACEMENT. VOID FORMER NOT SUPPLIED BY FOSTER GEOTECHNICAL.

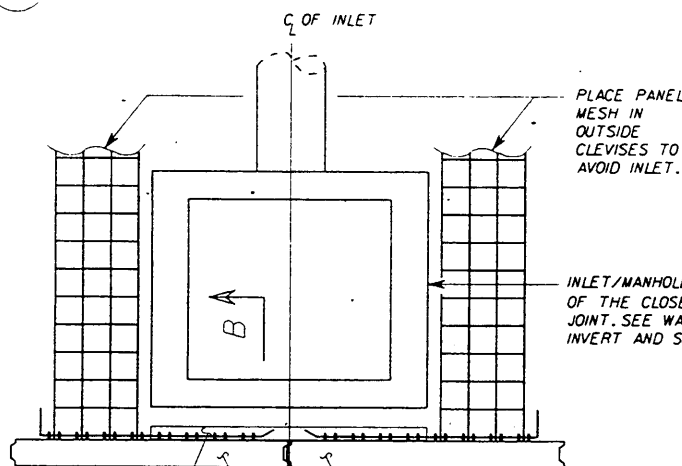
FIELD CUT AND SKEW MESH AROUND OBSTRUCTION AS REQUIRED. THESE AREAS WILL BE CLEARLY INDICATED ON THE RETAINED EARTH SHOP DRAWINGS AND APPROVED BY THE ENGINEER OF RECORD.

CUT MESH/DAMAGED GALV. SHALL BE COATED WITH ZINC RICH PAINT.

NO CUTTING OF SOIL REINFORCEMENT GRIDS ALLOWED UNLESS SHOWN ON SHOP DRAWINGS AND APPROVED BY THE ENGINEER.

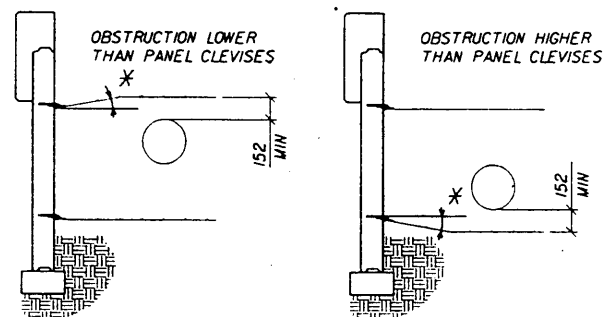


66 PARTIAL PLAN - JUNCTION SLAB AROUND INLET (REBAR NOT SUPPLIED BY FOSTER GEOTECHNICAL)

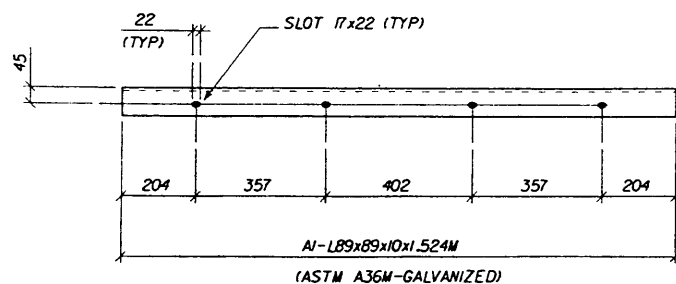


L89x89x6x1.524 (ASTM A36M-GALVANIZED)  
 ONE "A" PER OBSTRUCTED CLEVIS ROW  
 "OBSTRUCTED PANEL" SHALL HAVE EIGHT (8) CLEAVES PER ROW.

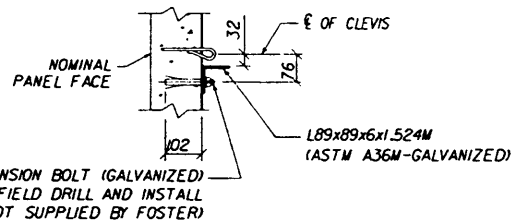
65A OBSTRUCTION DETAIL (VERTICAL) INLETS Ø 1.524M (TYP.)



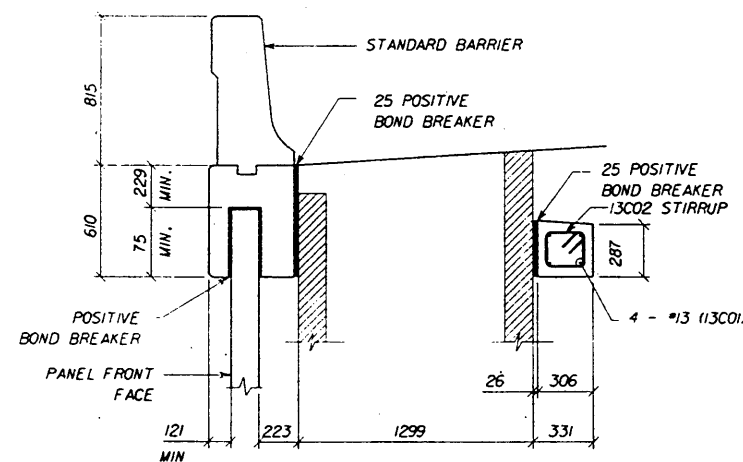
61 OBSTRUCTION (HORIZONTAL) \* 15 DEGREES MAX BEND



65B OBSTRUCTED PANEL CONNECTOR (AI) (ASTM A36M ANGLE - GALVANIZED)



65C CONNECTOR INSTALLATION DETAIL (SECTION B-B)

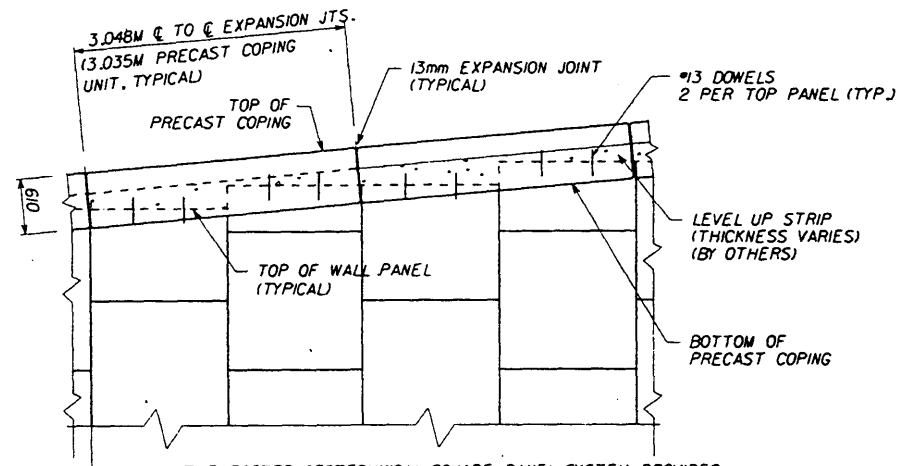


SECTION C-C

METRIC SQUARE / HEX PANELS

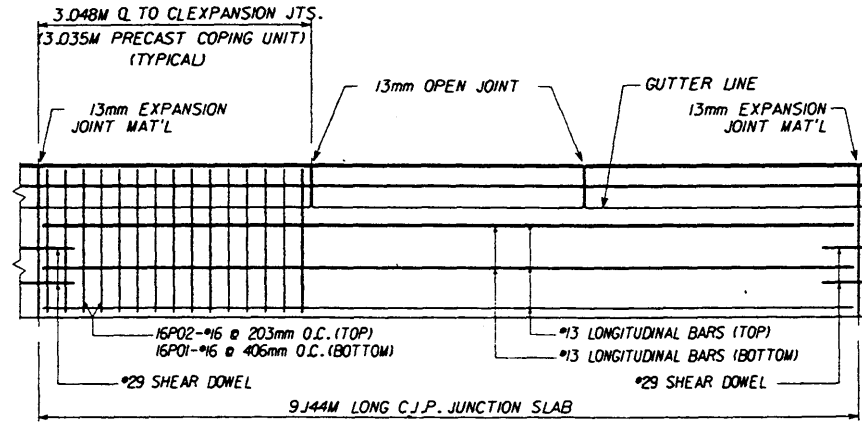
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM FOSTER GEOTECHNICAL SYSTEM EARTH WALL				
Names	Dates	Approved By <i>Walter J. [Signature]</i>		
Designed By	TCNA	11/98	State Structures Design Engineer	
Drawn By	CAD	11/98	Revision	Sheet No.
Checked By	DOT	11/98	00	5 of 12
				Index No. 5005

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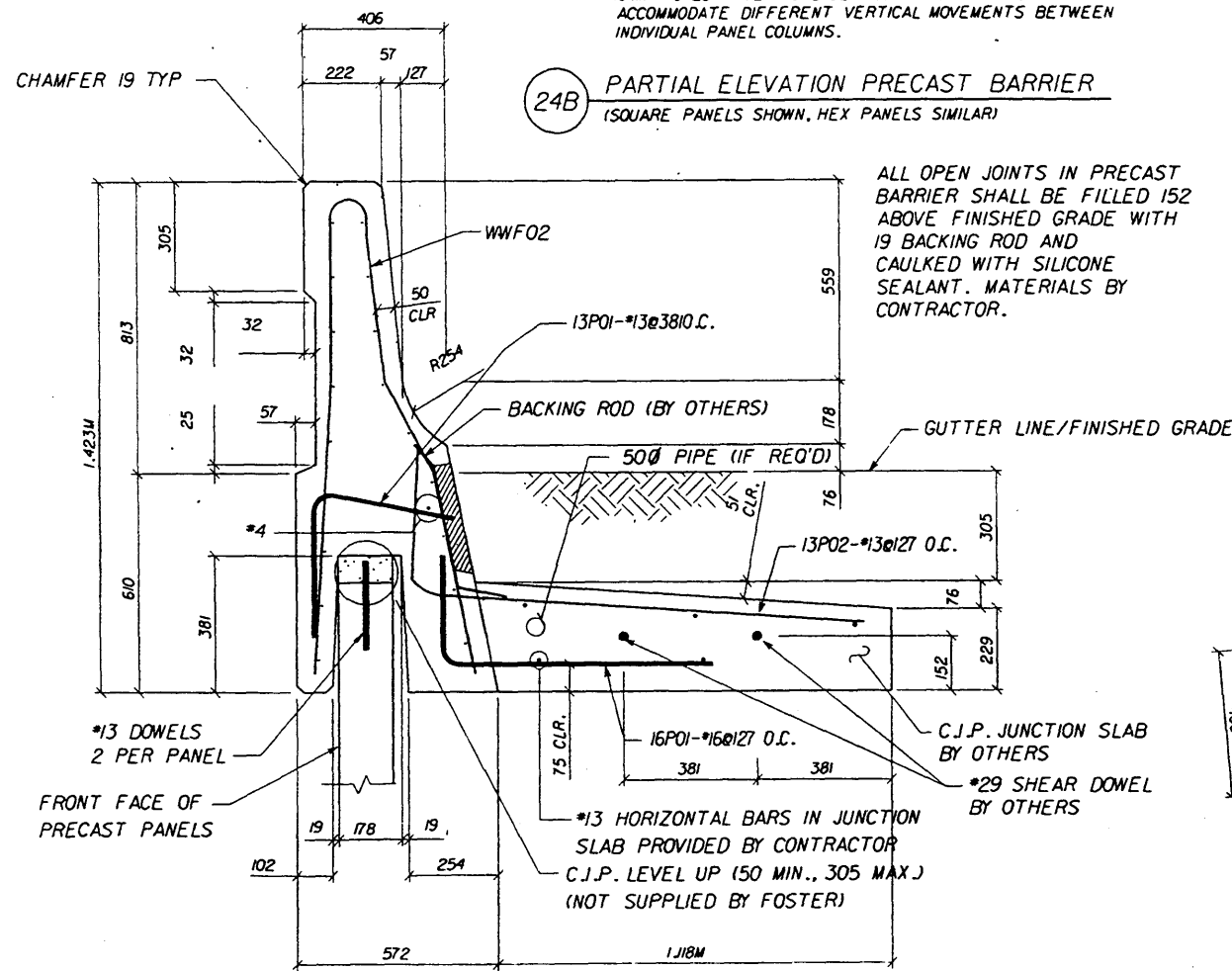


THE FOSTER GEOTECHNICAL SQUARE PANEL SYSTEM PROVIDES 19mm TO 25mm VERTICAL SLIP JOINTS EVERY 1.524M TO ACCOMMODATE DIFFERENT VERTICAL MOVEMENTS BETWEEN INDIVIDUAL PANEL COLUMNS.

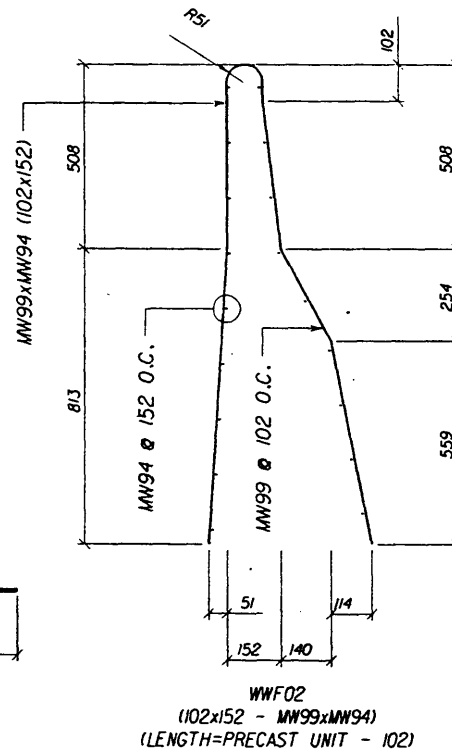
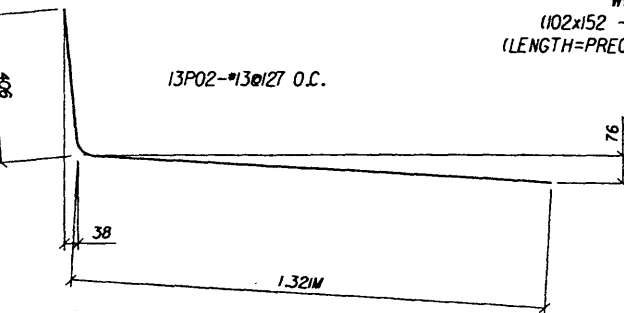
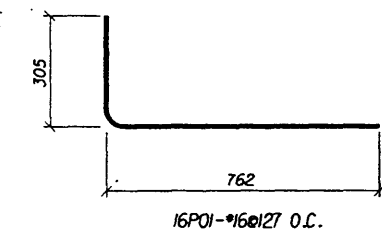
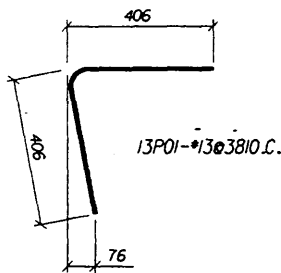
24B PARTIAL ELEVATION PRECAST BARRIER (SQUARE PANELS SHOWN, HEX PANELS SIMILAR)



24A PLAN VIEW - PRECAST TRAFFIC BARRIER (HORIZONTAL BARS IN JUNCTION SLAB & \*29 SHEAR DOWELS, NOT BY VSL)



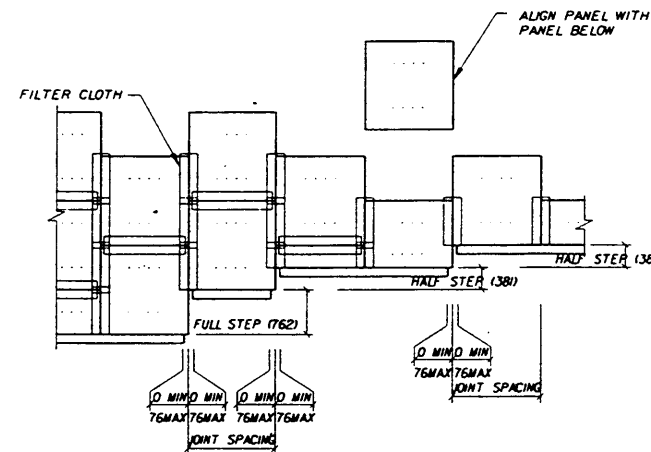
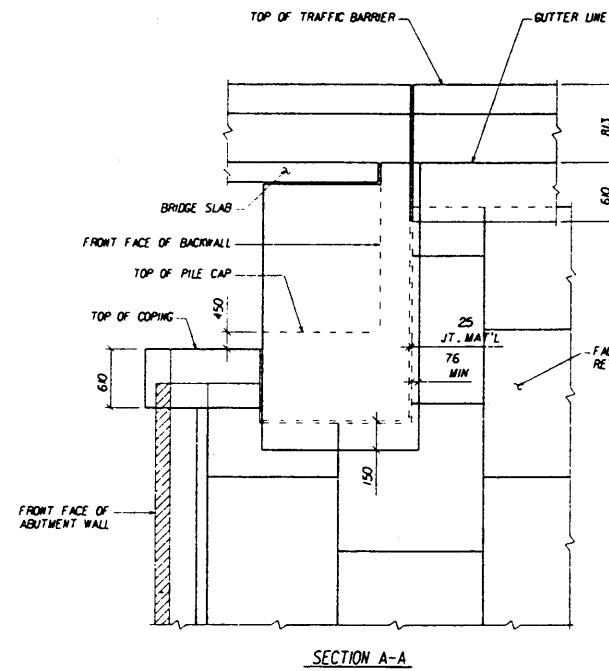
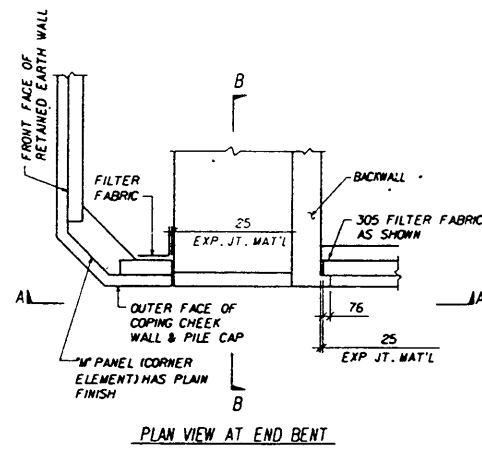
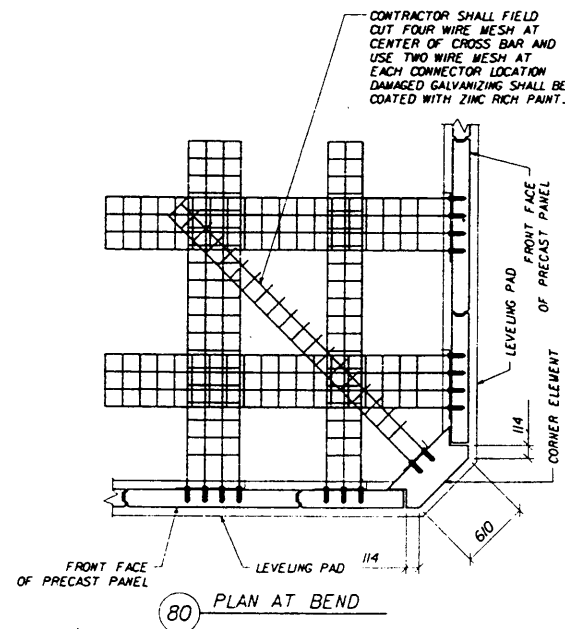
ALL OPEN JOINTS IN PRECAST BARRIER SHALL BE FILLED 152 ABOVE FINISHED GRADE WITH 19 BACKING ROD AND CAULKED WITH SILICONE SEALANT. MATERIALS BY CONTRACTOR.



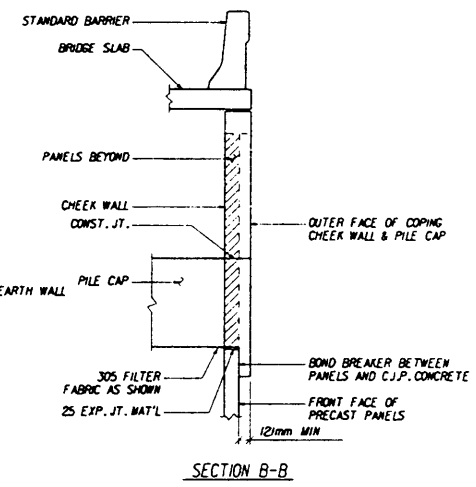
METRIC SQUARE / HEX PANELS

24 TYPE HTB PRECAST BARRIER W/COPING & JUNCTION SLAB U.S. PATENT NO. 4,494,892

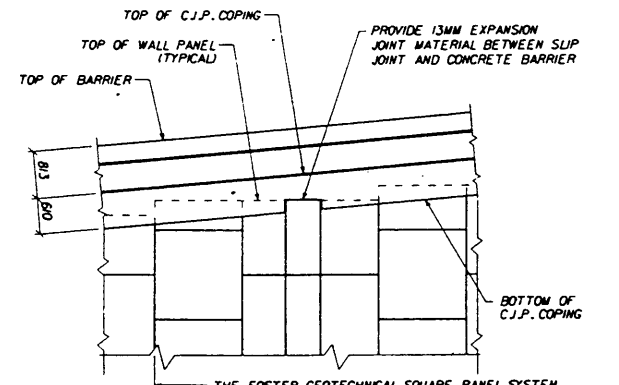
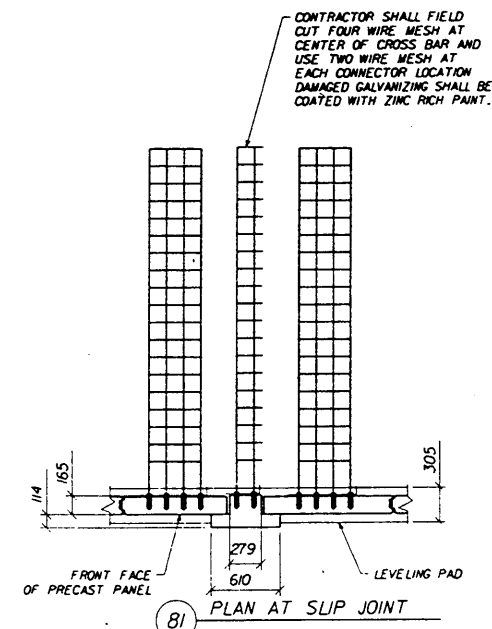
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM FOSTER GEOTECHNICAL RETAINED EARTH WALL				
Names	Dates	Approved By		
Designed By	TCNA	11/98	 State Structures Design Engineer	
Drawn By	CAD	11/98		
Checked By	DOT	11/98		
Revision	00	Sheet No.	6 of 12	Index No.
				5005



5 TYPICAL LEVELING PAD STEPS (BACK FACE SHOWN)



SECTION B-B

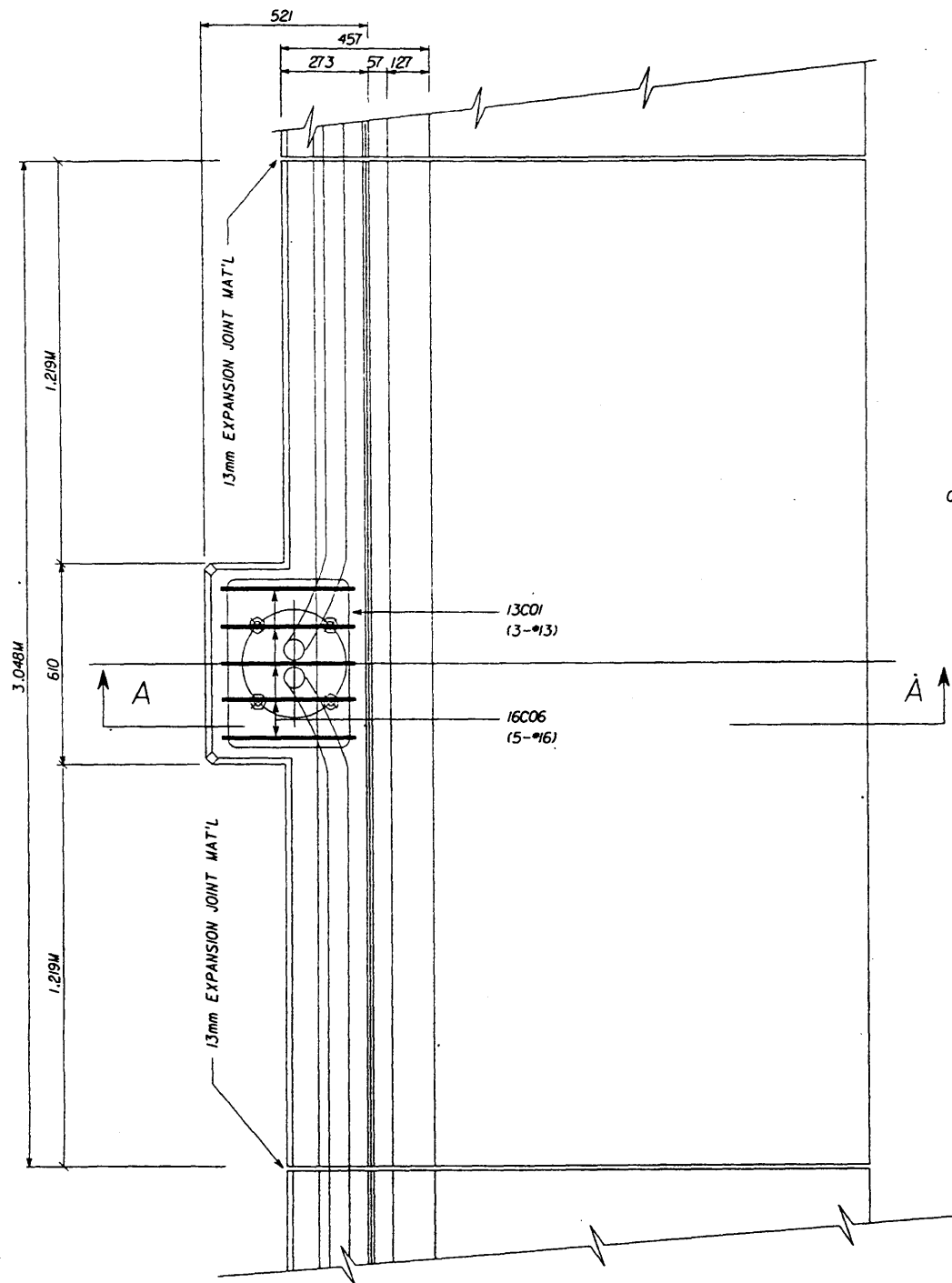


80A PARTIAL ELEVATION C.J.P. BARRIER OVER SLIP JOINT

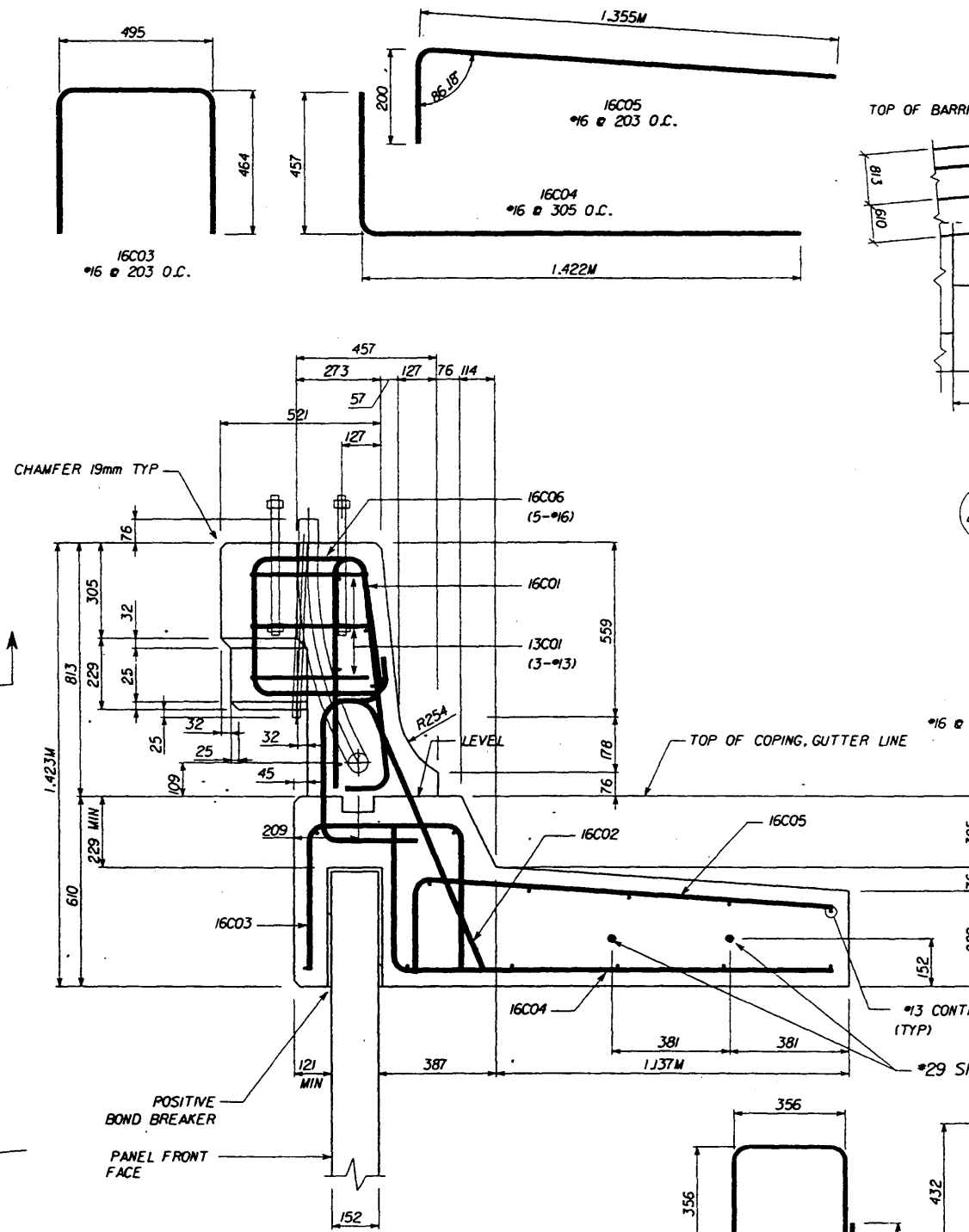
METRIC  
SQUARE / HEX PANELS

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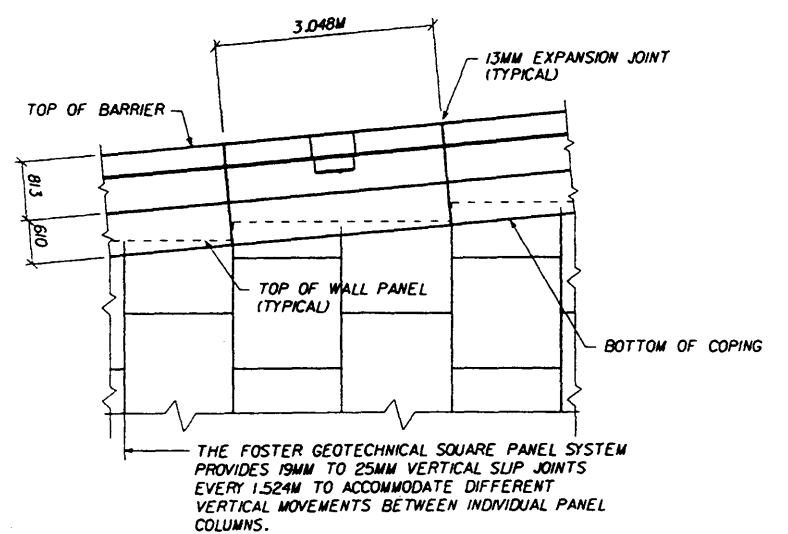
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM FOSTER GEOTECHNICAL RETAINED EARTH WALL				
Names	Dates	Approved By		
Designed By	TCNA	11/98	State Structures Design Engineer	
Drawn By	CAD	11/98	Revision	Sheet No.
Checked By	DOT	11/98	00	7 of 12
				Index No. 5005



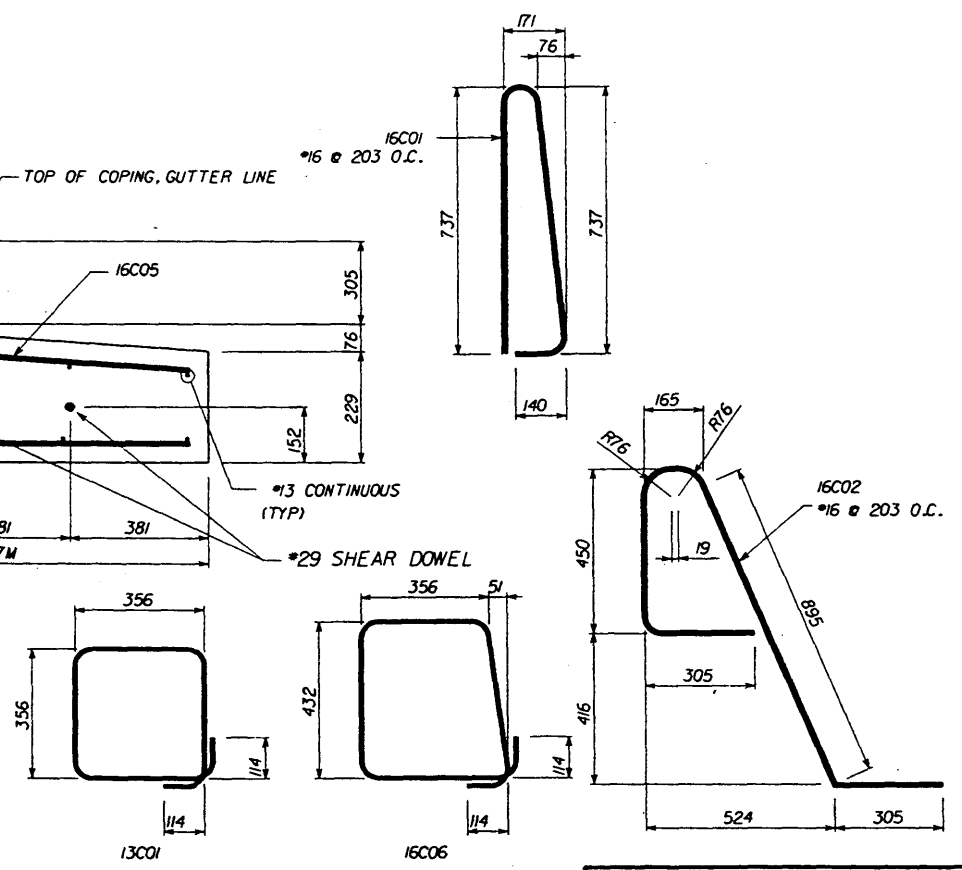
97 CAST IN PLACE LIGHT POLE  
 (ALL REBAR BY OTHERS)  
 (LIGHT POLE/BARRIER COPING)



SECTION A-A  
 (SEE STD. INDEX 500 FOR ADDITIONAL DETAILS)



29A PARTIAL ELEVATION AT LIGHT POLE

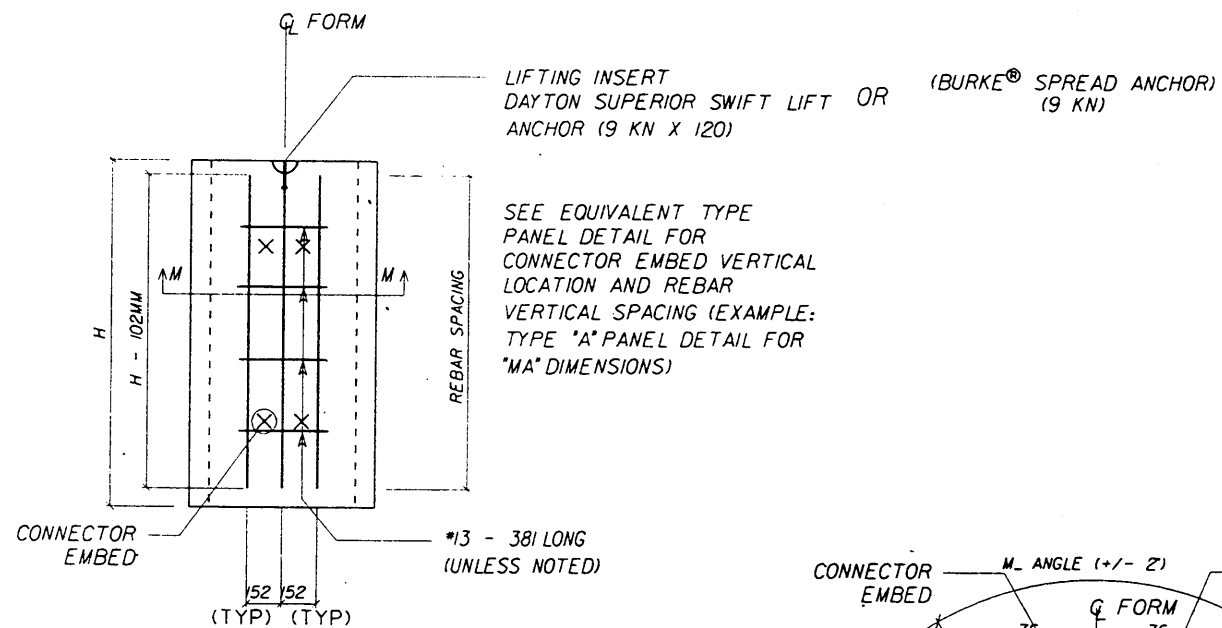


METRIC  
 SQUARE / HEX PANELS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM FOSTER GEOTECHNICAL RETAINED EARTH WALL				
Designed By	TCNA	11/98	Approved	<i>[Signature]</i>
Drawn By	CAD	11/98	Revision	00
Checked By	DOT	11/98	Sheet No.	8 of 12
			Index No.	5005

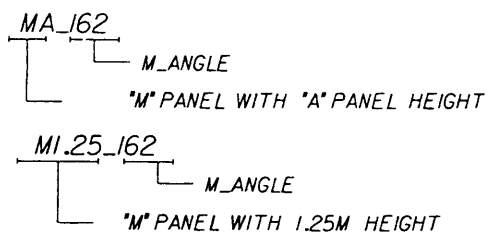
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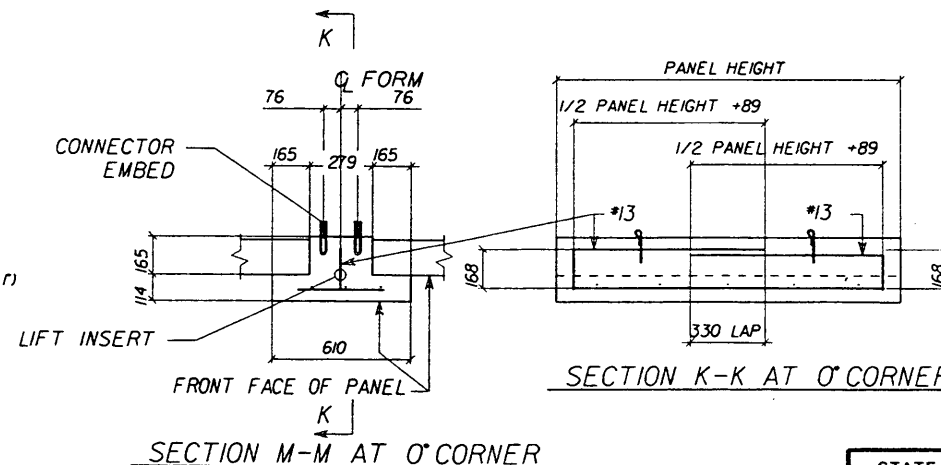
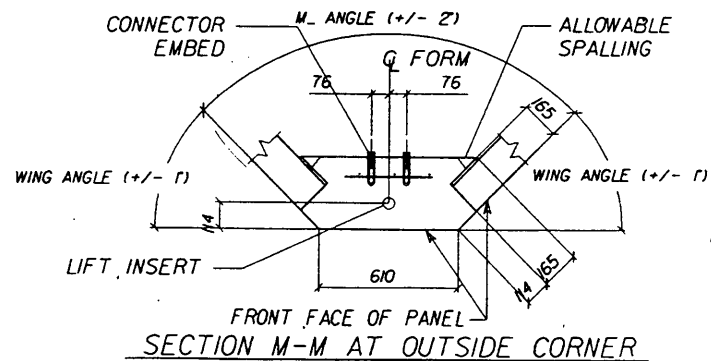
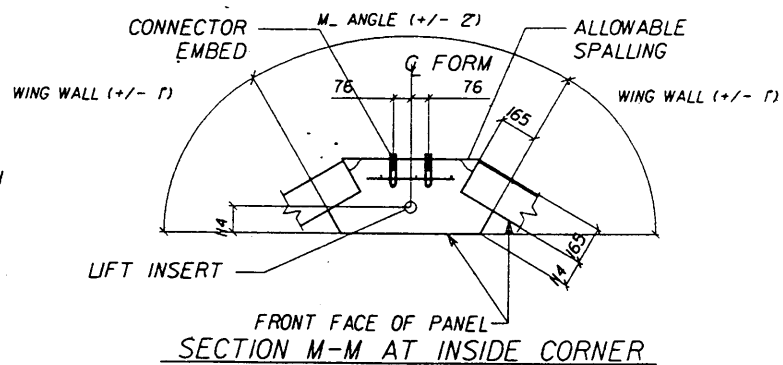


**M** TYPE M REBAR  
"M" PANELS SHALL HAVE A PLAIN SURFACE FINISH

PANEL AREAS	
PANEL NAME	SO. M.
MA	1.27
MD	1.07
MD2	0.85
MC2	0.64
MD4	0.43
MB6	0.96
MB2	0.64
MB4	0.32



TYPICAL PANEL DESIGNATION



METRIC  
SQUARE / HEX PANELS

PANEL REINFORCEMENT NOTES:

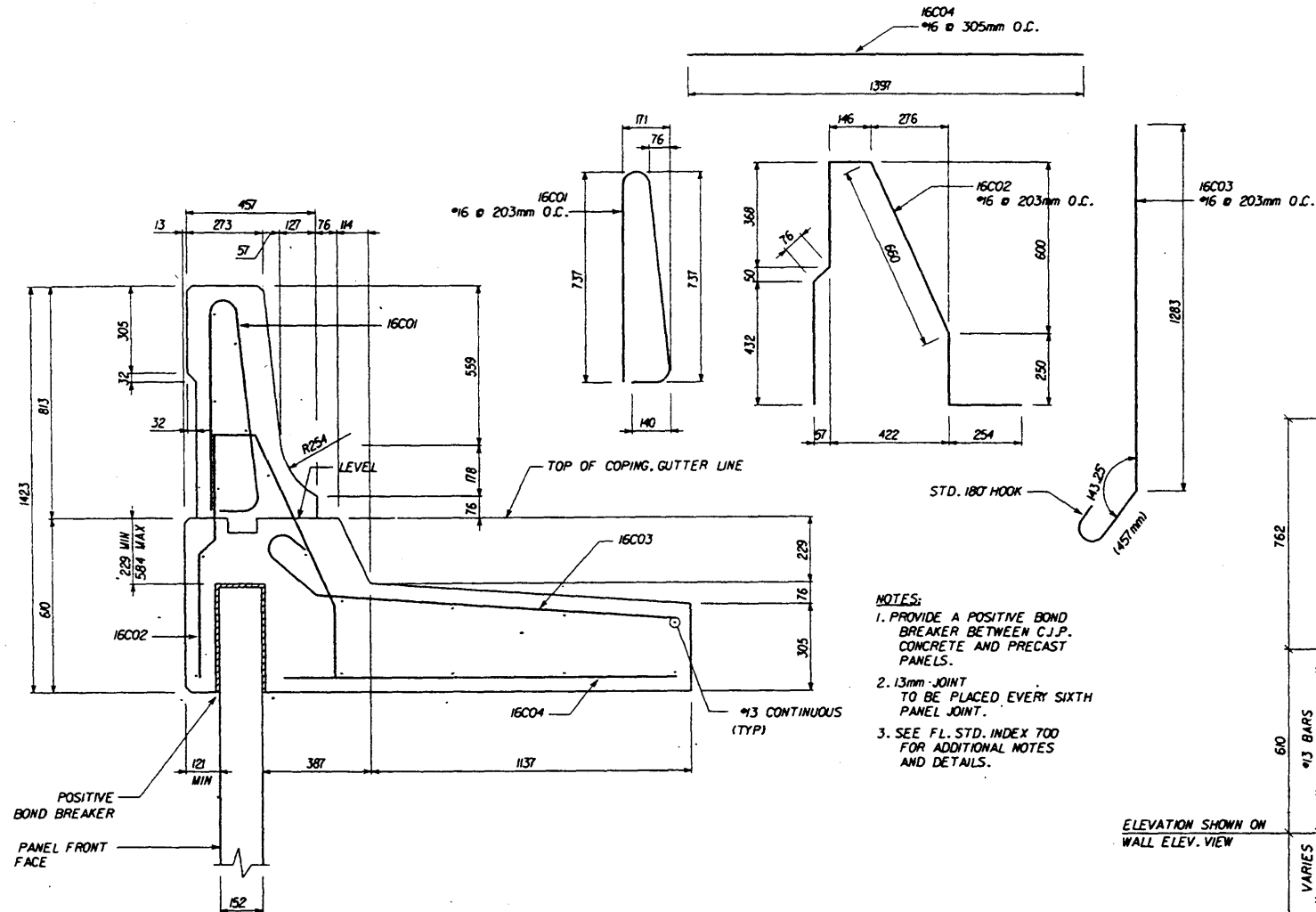
- PANELS ARE SHOWN BACK FACE.
- RIGHT END PANELS ARE OPPOSITE TO LEFT END.
- DIMENSIONS ARE TO FORM INSIDE BACK FACE.
- VERTICAL REINFORCEMENT SHALL HAVE 50 mm MINIMUM COVER TO THE BACK FACE.
- HORIZONTAL REINFORCEMENT SHALL HAVE 38 mm MINIMUM COVER TO THE BACK FACE.
- ALL REINFORCEMENT SHALL HAVE 50 mm MINIMUM COVER TO THE SIDES.
- ALL REINFORCING BARS ARE #13 METRIC. LABELS ON EACH BAR INDICATE LENGTH. EXAMPLE: 1345 IS A #13 BAR 1345 mm LONG.
- REINFORCEMENT SHALL BE GRADE 420Kpa.
- EQUIVALENT WELDED WIRE FABRIC MAY BE USED.
- SEE RETAINED EARTH™ PRECASTING SPECIFICATIONS FOR CONCRETE REQUIREMENTS.
- VSL RETAINED EARTH™ IS PROTECTED UNDER PATENT 4,725,170.
- ALL PANELS TO USE 7mmØ CLEVIS LOOPS, EXCEPT PANELS WITH A "O" SUFFIX WHICH REQUIRE 9.5mmØ CLEVIS LOOPS.
- ALL "M" PANEL (CORNER ELEMENTS) SHALL HAVE A PLAIN FINISH.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

RETAINING WALL SYSTEM  
FOSTER GEOTECHNICAL RETAINED  
EARTH WALL

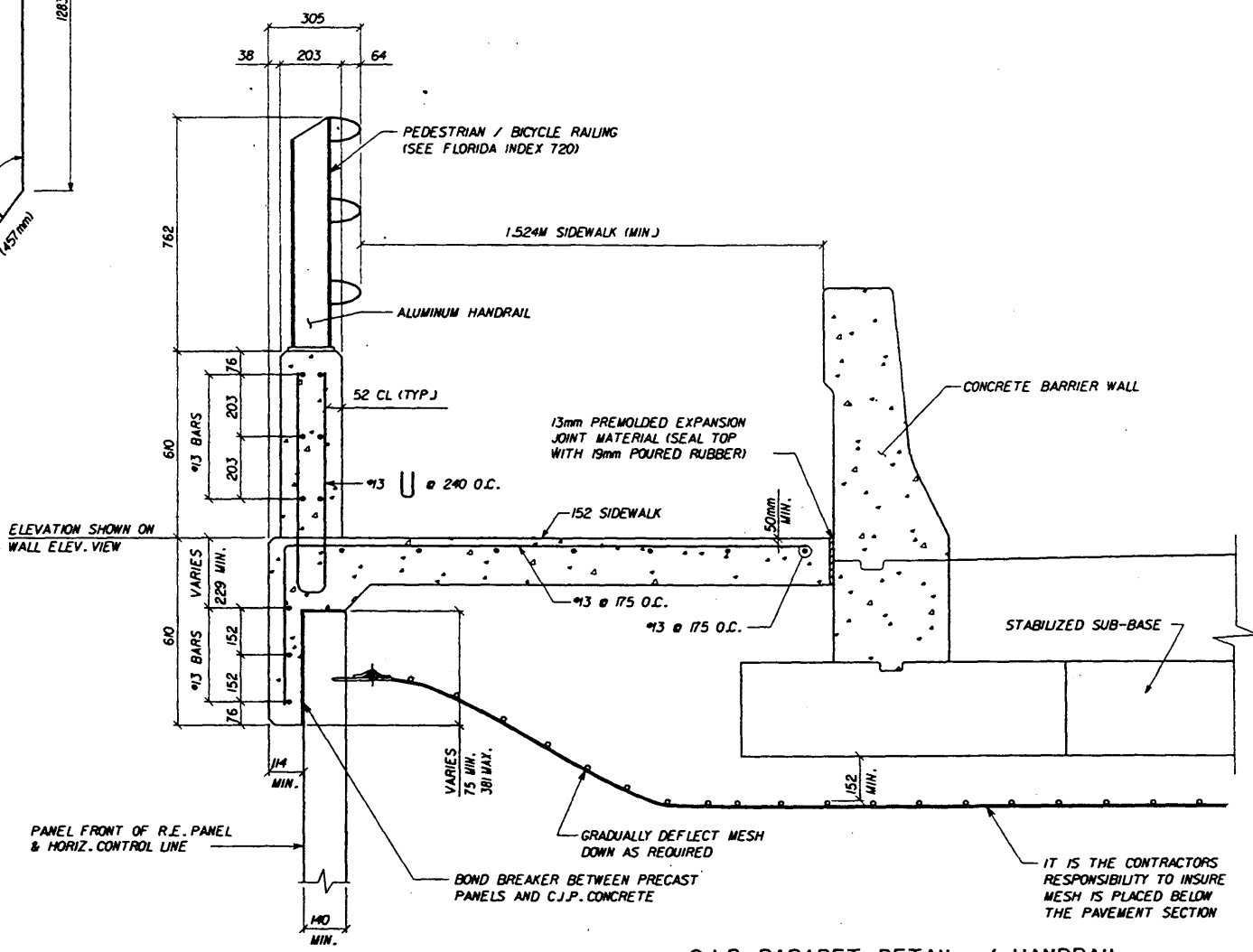
Names	Dates	Approved By	
Designed By	TCNA 11/98		
Drawn By	CAD 11/98		
Checked By	GEO 11/98		
Revision	00	Sheet No.	Index No.
		9 of 12	5005

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- NOTES:
1. PROVIDE A POSITIVE BOND BREAKER BETWEEN C.J.P. CONCRETE AND PRECAST PANELS.
  2. 13mm JOINT TO BE PLACED EVERY SIXTH PANEL JOINT.
  3. SEE FL. STD. INDEX 700 FOR ADDITIONAL NOTES AND DETAILS.

6B C.J.P. BARRIER W/ COPING & JUNCTION SLAB STEEL



C.J.P. PARAPET DETAIL W/ HANDRAIL

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM FOSTER GEOTECHNICAL RETAINED EARTH WALL</b>				
Designed By	TCNA	Date	11/98	Approved By
Drawn By	CAD	Date	11/98	State Structures Design Engineer
Checked By	GEO	Date	11/98	Revision
			00	Sheet No.
			10 of 12	Index No.
				5005

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**NOTES:**

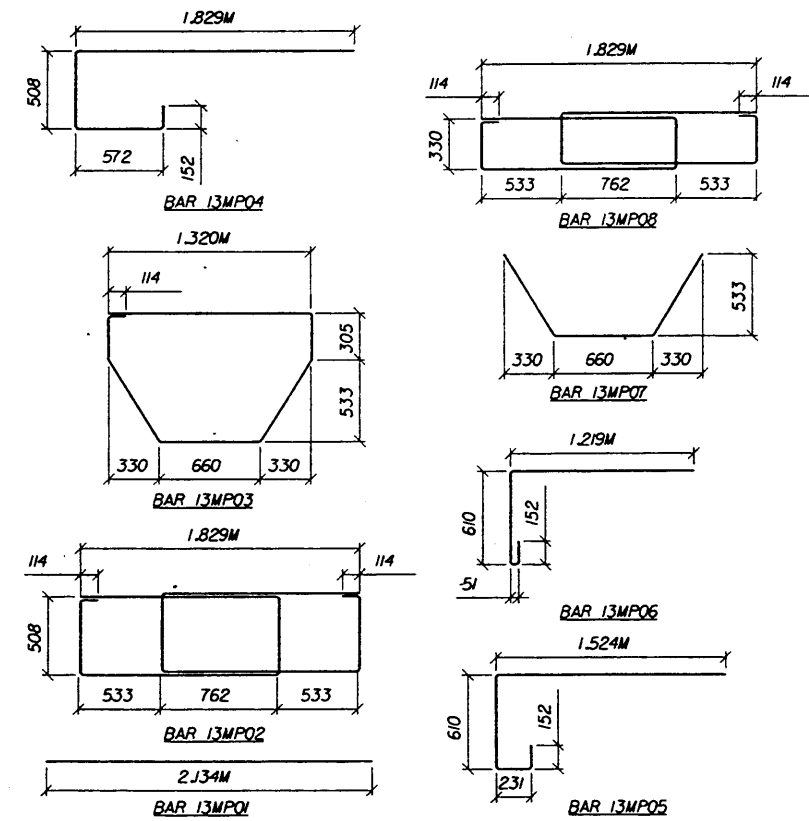
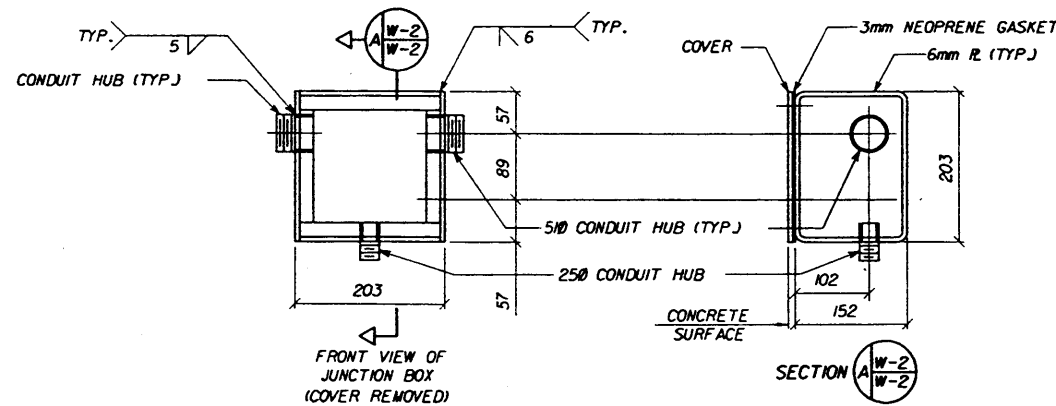
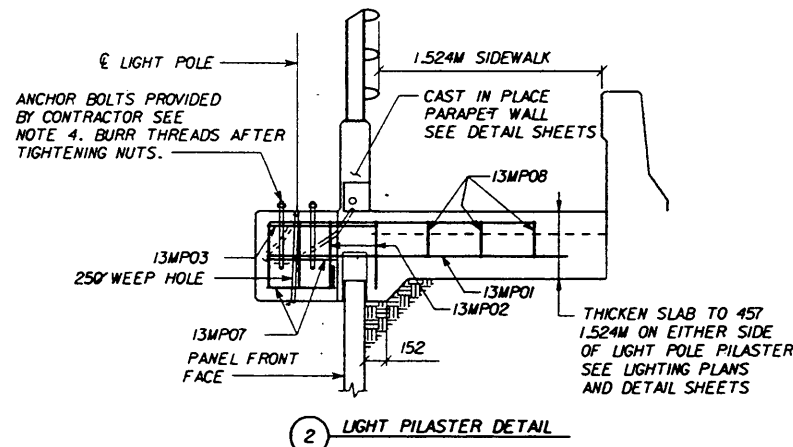
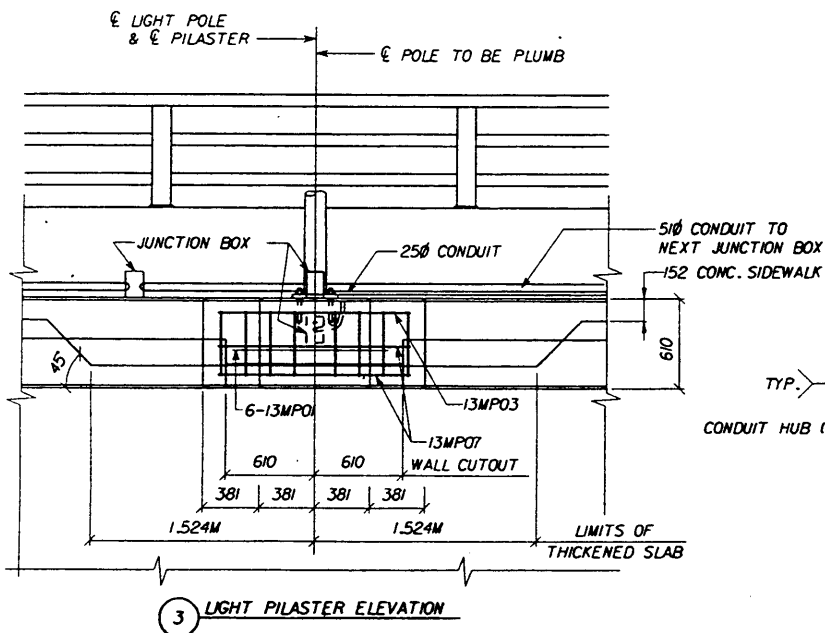
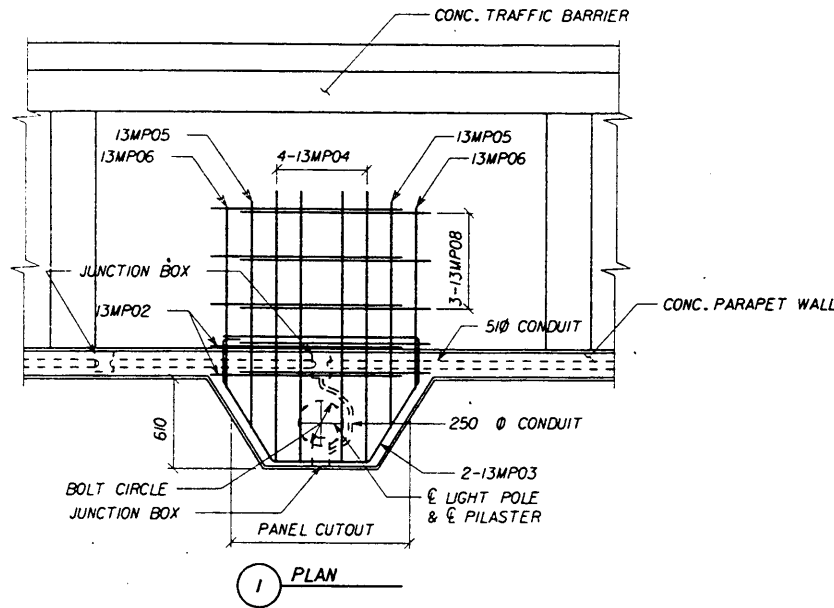
- ADDITIONAL CONCRETE AND REINFORCING STEEL REQUIRED FOR THE CONSTRUCTION OF THE PILASTER SHALL MEET THE SAME REQUIREMENTS AS THAT OF THE PARAPET WALL.
- TOP OF PILASTER SHALL BE FINISHED TO A TRUE LEVEL AREA.
- LIGHT POLE PILASTER IS DESIGNED TO RESIST WORKING LOADS (IN ANY DIRECTION) FROM THE LIGHT POLE APPLIED AT THE TOP OF THE PILASTER AS FOLLOWS:

LONGITUDINAL MOMENT = 40.674 KN-M  
 TRANSVERSE MOMENT = 8.135 KN-M  
 LONGITUDINAL SHEAR = 4.448 KN  
 TRANSVERSE SHEAR = 0.890 KN  
 TORSION = 4.067 KN-M  
 AXIAL = 1.779 KN

IF THE LIGHT POLE PROVIDED APPLIES LOADS THAT ARE IN EXCESS OF THOSE SHOWN ABOVE, THE CONTRACTOR SHALL REDESIGN THE PILASTER AND SUBMIT HIS DESIGN TO THE DEPARTMENT FOR REVIEW. THE CONTRACTOR'S REDESIGN SHALL BE PREPARED, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF FLORIDA, AND QUALIFIED TO PERFORM THE WORK.

- THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ANCHOR BOLTS THAT EFFECTIVELY TRANSMIT THE LIGHT POLE LOADS TO THE PILASTER AND THAT FIT THE REINFORCING CAGE. CALCULATIONS SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF FLORIDA SHALL BE SUBMITTED BY THE CONTRACTOR TO THE DEPARTMENT FOR REVIEW AND APPROVAL SHOWING THAT THESE REQUIREMENTS HAVE BEEN MET PRIOR TO CONSTRUCTION.

- STEEL FOR JUNCTION BOXES SHALL CONFORM WITH ASTM-A36M. THE BOXES SHALL BE HOT DIP GALVANIZED AFTER FABRICATION. IN LIEU OF STEEL BOXES THE CONTRACTOR MAY SUBMIT FOR APPROVAL MOLDED P.V.C. BOXES (SCHEDULE 80).
- ALL CONDUITS SHALL BE RIGID GALVANIZED STEEL OR SCHEDULE 80 P.V.C.
- THE COST OF ANCHOR BOLTS SHALL BE INCLUDED IN THE BID PRICE FOR LIGHT POLES.
- PAYMENT: THE COST OF ALL LABOR, CONCRETE AND REINFORCING STEEL REQUIRED FOR THE CONSTRUCTION OF THE PILASTERS AND ALL CONDUITS, EXPANSION COUPLINGS, JUNCTION BOXES AND MISCELLANEOUS HARDWARE REQUIRED FOR COMPLETION OF THE ELECTRICAL INSTALLATION WITHIN THE LIMITS SHOWN ON THIS SHEET SHALL BE INCLUDED IN THE CONTRACTOR'S BID PRICE FOR THE MSE WALLS.



MARK	SIZE	NO. REQ'D	LENGTH
13MP01	#13	6	2.134M
13MP02	#13	2	7.442M
13MP03	#13	1	3.988M
13MP04	#13	4	3.061M
13MP05	#13	2	2.515M
13MP06	#13	2	2.032M
13MP07	#13	2	1.930M
13MP08	#13	3	6.728M

4 BAR BENDING DETAIL

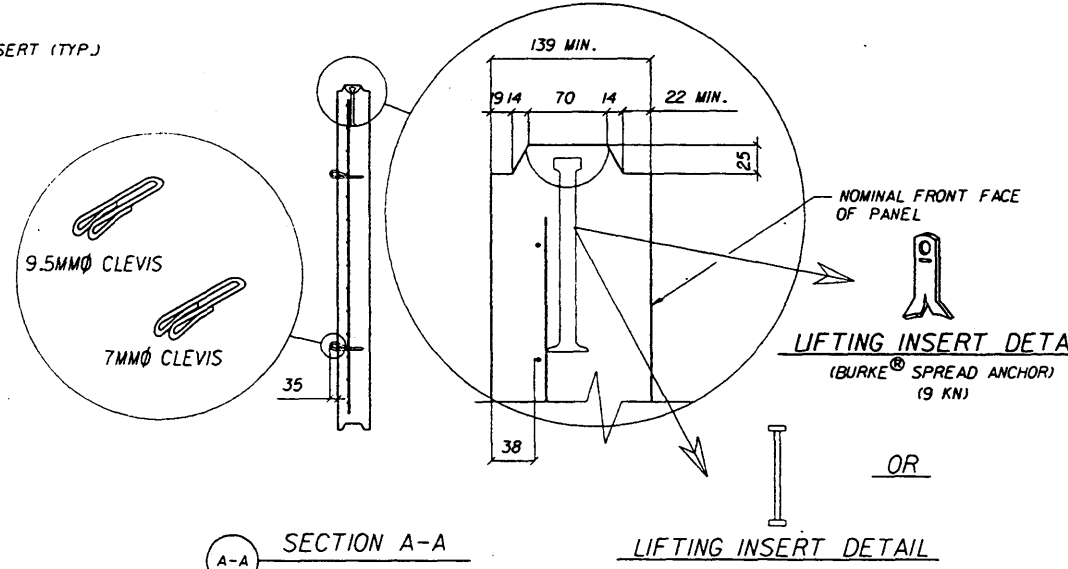
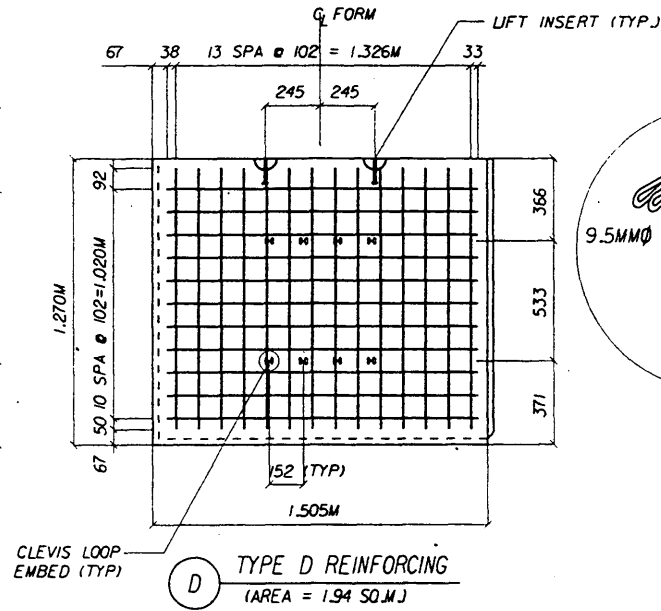
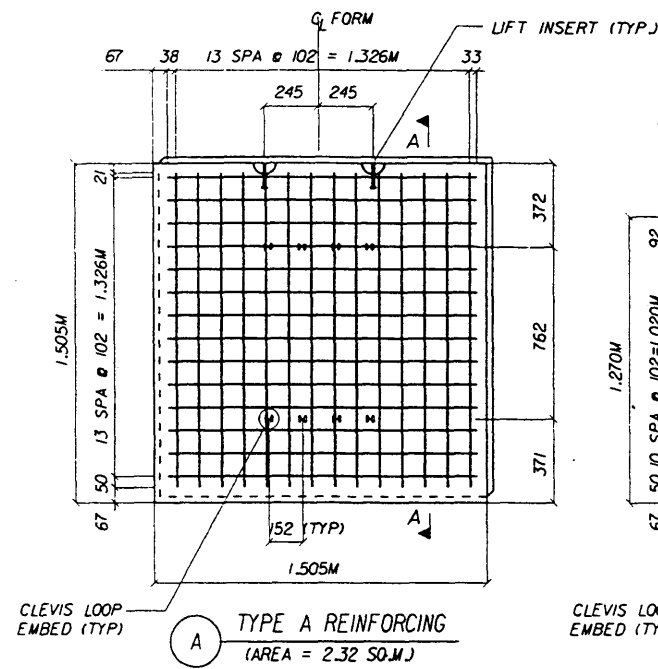
METRIC  
 SQUARE / HEX PANELS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
 ROAD DESIGN

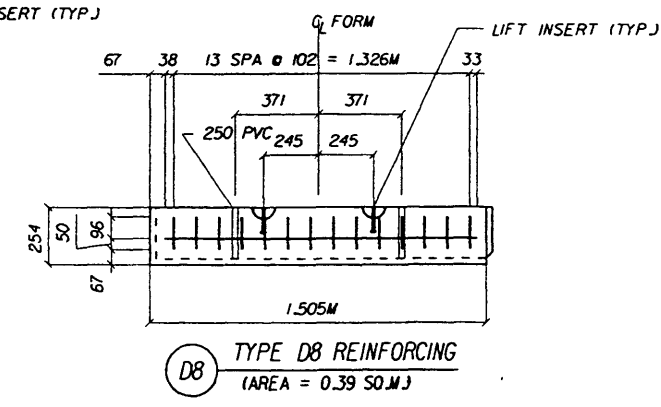
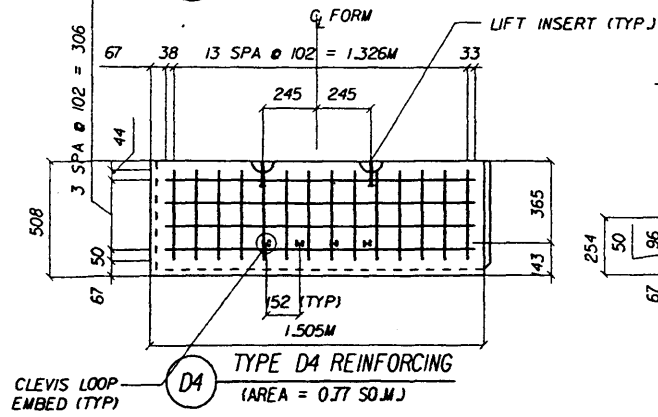
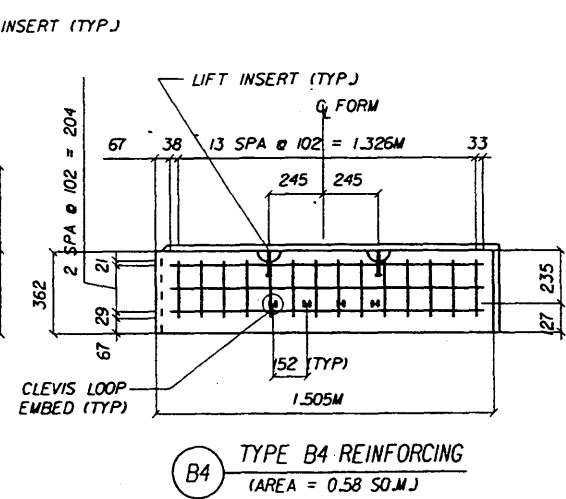
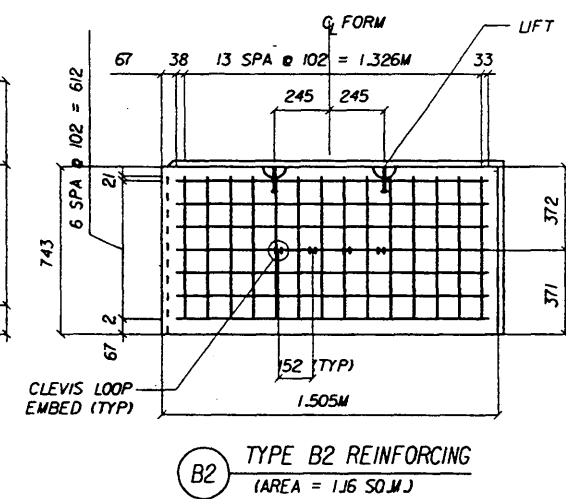
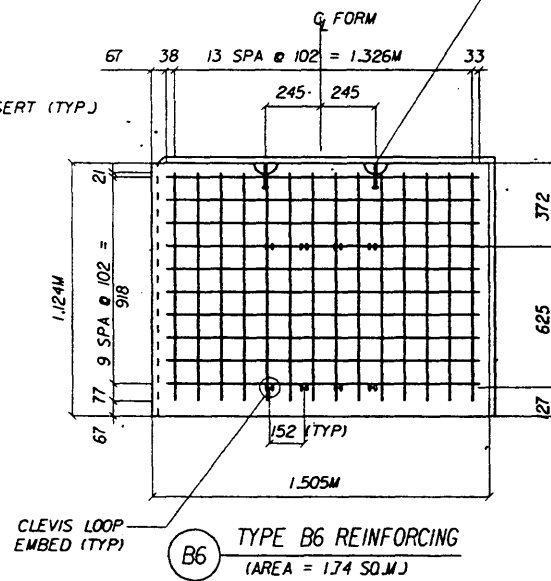
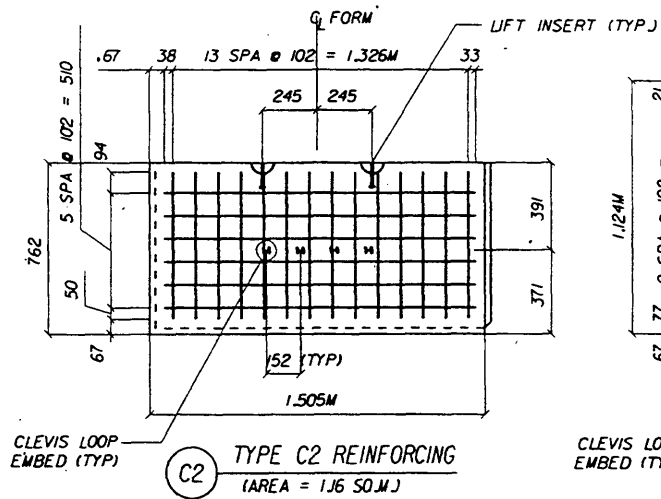
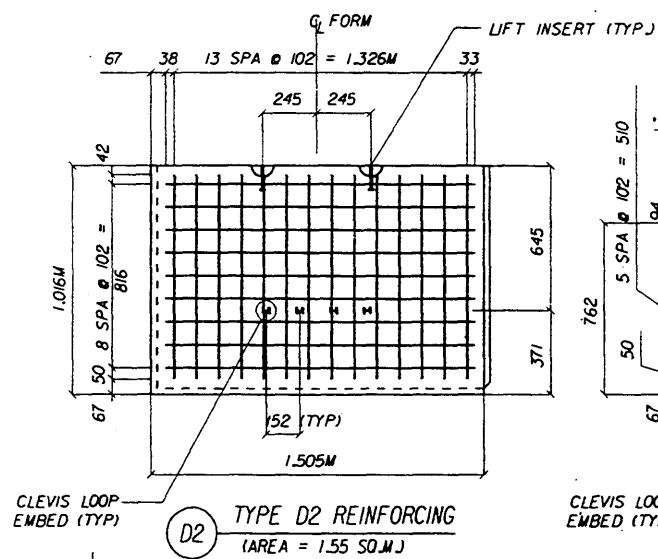
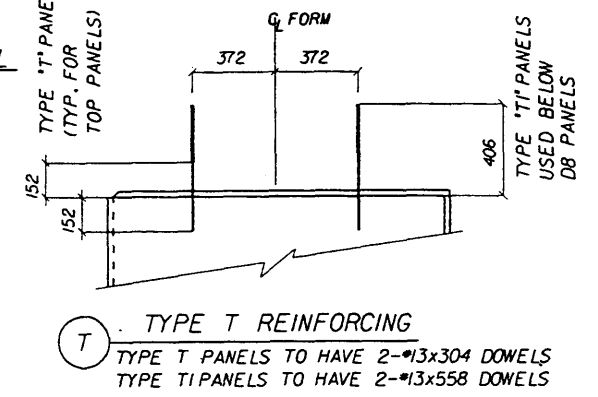
**RETAINING WALL SYSTEM  
 FOSTER GEOTECHNICAL RETAINED  
 EARTH WALL**

Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By	TCNA	11/98			
Drawn By	CAD	11/98			
Checked By	GEO	11/98	00	11 of 12	5005

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- PANEL REINFORCEMENT NOTES:**
1. PANELS ARE SHOWN BACK FACE.
  2. RIGHT END PANELS ARE OPPOSITE TO LEFT END.
  3. DIMENSIONS ARE TO FORM INSIDE BACK FACE.
  4. ALL REINFORCEMENT SHALL HAVE 38MM MINIMUM COVER TO THE SIDES AND BACK OF PANEL.
  5. REINFORCEMENT SHALL BE WELDED WIRE FABRIC MINIMUM W.W.F. MW24.5 x MW24.5 x 102 x 102 GRID.
  6. SEE RETAINED EARTH™ PRECASTING SPECIFICATIONS FOR CONCRETE REQUIREMENTS.
  7. FOSTER RETAINED EARTH™ IS PROTECTED UNDER PATENT 4.725.170.
  8. ALL PANELS TO USE 7MM Ø CLEVIS LOOPS, EXCEPT PANELS WITH A "D" SUFFIX WHICH REQUIRE 9.5" Ø CLEVIS LOOPS.
  9. ALL "M" PANEL (CORNER ELEMENTS) SHALL HAVE A PLAIN FINISH.



STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM FOSTER GEOTECHNICAL RETAINED EARTH WALL</b>				
Designed By	TCNA	Date	11/98	Approved By
Drawn By	CAD	Date	11/98	State Structures Design Engineer
Checked By	GEO	Date	11/98	Revision
			00	Sheet No.
				12 of 12
				Index No.
				5005

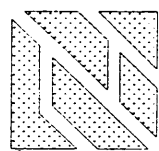
METRIC  
SQUARE PANELS



# STANDARD DETAILS FOR 75 CONCRETE COVER

## T-WALL® RETAINING WALL SYSTEM

### DESIGNER



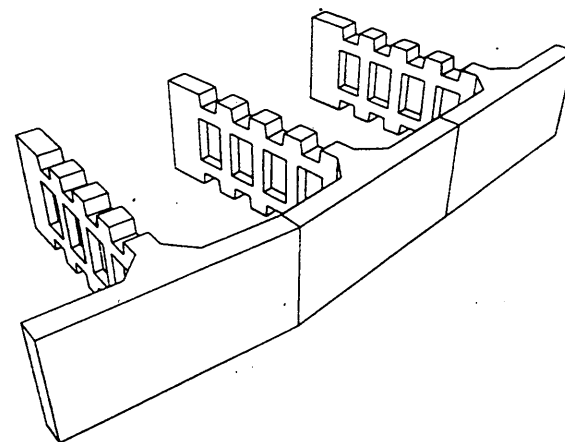
#### THE NEEL COMPANY

8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859

### PRECASTER

#### OLDCASTLE PRECAST, INC.

11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (904) 778-2992



DESIGNER:



THE NEEL COMPANY  
8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859

PRECASTER:

OLDCASTLE PRECAST, INC.  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (904) 778-2992

#### MISCELLANEOUS NOTES:

- DESIGNER:  
THE NEEL COMPANY  
8328-D TRAFORD LANE  
SPRINGFIELD, VA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859
- PRECASTER:  
OLDCASTLE PRECAST INC.  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (904) 778-2992
- MATERIALS SUPPLIED BY PRECASTER:  
-PRECAST T-WALL UNITS  
-PRECAST SHEAR KEYS  
-HORIZONTAL JOINT MATERIAL  
-VERTICAL JOINT MATERIAL AND ADHESIVE  
-SHEAR KEY JOINT MATERIAL

#### DESIGN NOTES:

- DESIGN IS BASED ON THE ASSUMPTION THAT THE MATERIAL WITHIN THE RETAINING WALL VOLUME, METHODS OF CONSTRUCTION, AND QUALITY OF PREFABRICATED MATERIALS SHALL CONFORM TO SPEC SECTION 548 - RETAINING WALL SYSTEMS.
- SOIL PARAMETERS:  
-SEE WALL CONTROL DRAWINGS FOR SOIL CHARACTERISTICS OF FOUNDATION MATERIAL TO BE USED IN THE DESIGN OF THE WALL SYSTEM. THE CONTRACTOR SHALL PROVIDE SOIL DESIGN PARAMETERS FOR BACKFILL MATERIAL BASED ON THE ACTUAL SOIL CHARACTERISTICS UTILIZED AT THE SITE. THE VALUE OF  $\phi$ ,  $c$  AND  $\gamma$  SHALL BE PROVIDED IN THE SHOP DRAWINGS
- FACTORS OF SAFETY:  
-OVERTURNING - 2.0  
-SLIDING - 1.5  
-INTERNAL PULLOUT - 1.5  
-BEARING CAPACITY - 2.5  
-OVERALL STABILITY - 1.5
- DIMENSIONS  
ALL DIMENSIONS ARE IN MILLIMETERS (MM) UNLESS OTHERWISE NOTED.
- THE DESIGN CONTAINED ON THESE DRAWINGS IS BASED ON INFORMATION PROVIDED BY THE OWNER. ON THE BASIS OF THIS INFORMATION, THE NEEL COMPANY IS RESPONSIBLE FOR INTERNAL STABILITY OF THE STRUCTURE ONLY. EXTERNAL STABILITY DESIGN, INCLUDING FOUNDATION AND SLOPE STABILITY, IS THE RESPONSIBILITY OF OTHERS.
- PANELS WITH CANTILEVERED (EXTENDED) FACE SHALL ONLY BE USED TO AVOID OBSTRUCTIONS AS APPROVED ON THE SHOP DRAWINGS.

#### MATERIALS NOTES:

- PRECAST CONCRETE:  
-PRECAST T-WALL UNITS - PER SPEC SECTION 548  
-PRECAST SHEAR KEYS - PER SPEC SECTION 548
- C.I.P. CONCRETE:  
-C.I.P. LEVELING PAD - PER SPEC SECTION 548  
-OTHER C.I.P. CONCRETE - PER SPEC SECTION 548
- REINFORCING STEEL:  
-PER SPEC SECTION 548
- JOINT MATERIAL:  
-HORIZONTAL JOINT FILLER:  
-13 x 101 x 1.524 M  
-PREFORMED EPDM  
-DUROMETER: 80 - 90  
-VERTICAL JOINT COVER:  
-TENSAR DC4205 OR EQUAL  
-305 WIDE x HEIGHT OF JOINT  
-GEOCOMPOSITE MEETING REQUIREMENTS OF SPEC SECTION 548  
-SHEAR KEY WRAP:  
-6 x 203 x 610  
-AVI ASTRO-FOAM AF-250
- BACKFILL:  
-PER SPEC SECTION 548

#### CONSTRUCTION NOTES:

- ALL CONSTRUCTION PROCEDURES SHALL COMPLY WITH SPEC SECTION 548 AND THE "T-WALL CONSTRUCTION MANUAL" (PROVIDED BY THE NEEL COMPANY OR OLDCASTLE PRECAST, INC). IN THE EVENT OF A DISCREPANCY BETWEEN THE SPEC AND THE "T-WALL CONSTRUCTION MANUAL", THE SPEC SHALL CONTROL.
- FOR LOCATION AND ALIGNMENT OF T-WALL STRUCTURE, SEE RETAINING WALL CONTROL PLANS.
- T-WALL STRUCTURES ON CURVES SHALL BE BUILT IN CHORDS AS SHOWN IN THE T-WALL DESIGN DRAWINGS.
- IF MANHOLES OR DROP INLETS ARE PRESENT, THEY SHALL BE LOCATED AS SHOWN IN THE T-WALL DESIGN DRAWINGS.
- IF PILES ARE LOCATED WITHIN THE RETAINING WALL VOLUME, THEY SHALL BE DRIVEN BEFORE CONSTRUCTION OF THE T-WALL STRUCTURE.
- T-WALL UNITS SHALL BE PLACED ONE ROW AT A TIME, AND BACKFILLED BEFORE PLACEMENT OF THE NEXT ROW.
- IF A STRUCTURE EXCEEDS 6.000 M IN HEIGHT, THE FINISH GRADE AT THE FACE OF THE WALL SHALL BE PLACED AND COMPACTED BEFORE WALL CONSTRUCTION EXCEEDS 6.000 M IN HEIGHT.
- THE CONTRACTOR IS RESPONSIBLE FOR CONTROLLING STORM WATER DRAINAGE IN THE VICINITY OF THE WALL DURING CONSTRUCTION. STORMWATER RUNOFF SHALL BE COLLECTED AND DISCHARGED AWAY FROM THE WALL AND THE RETAINING WALL VOLUME.

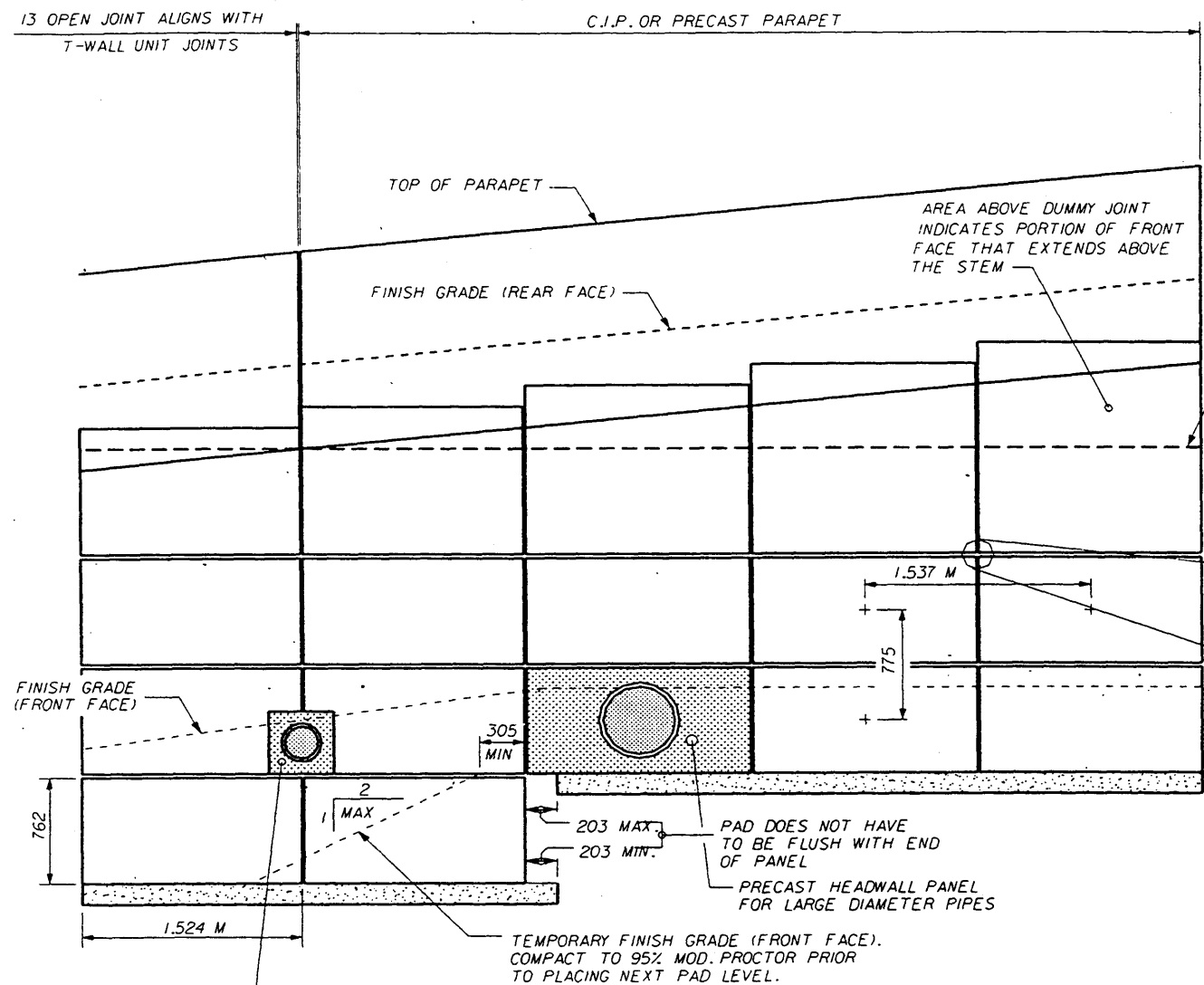
THIS SYSTEM SHALL NOT BE USED FOR WALLS WITH ACUTE INTERIOR CORNERS IN SALT WATER ENVIRONMENTS.

THIS SYSTEM MAY BE USED IN ALL ENVIRONMENTS.

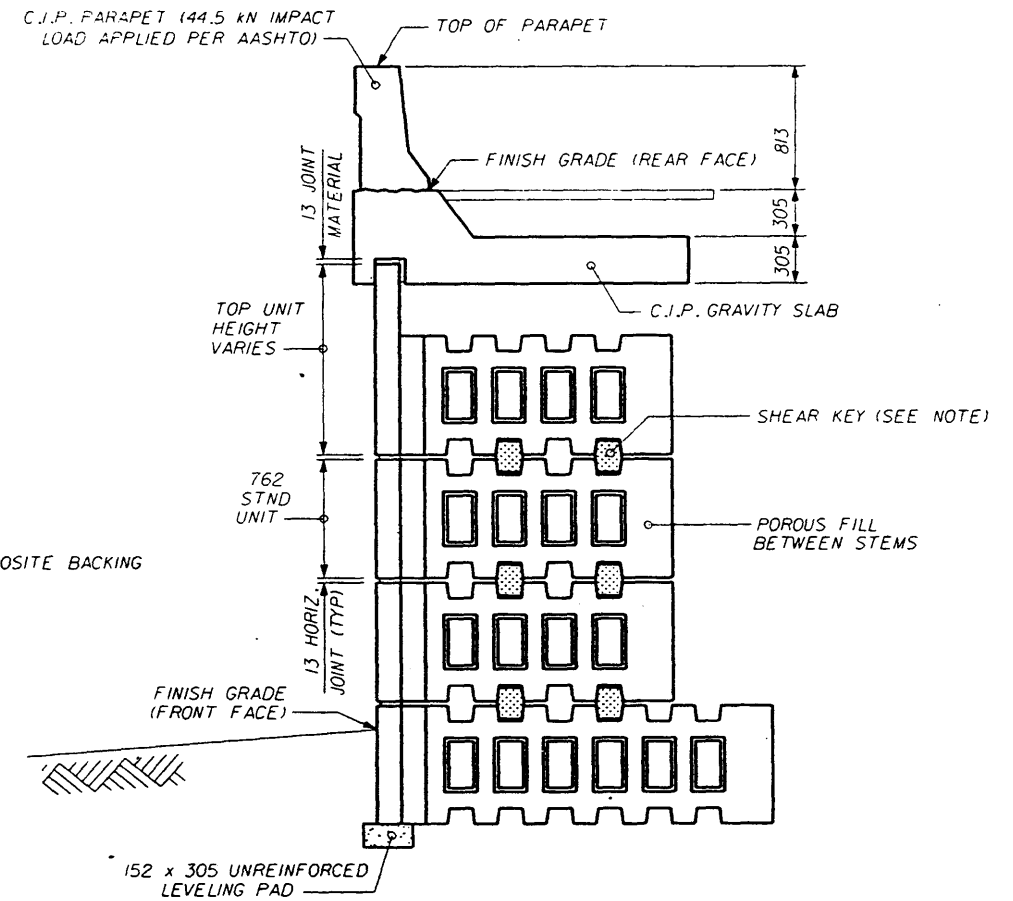
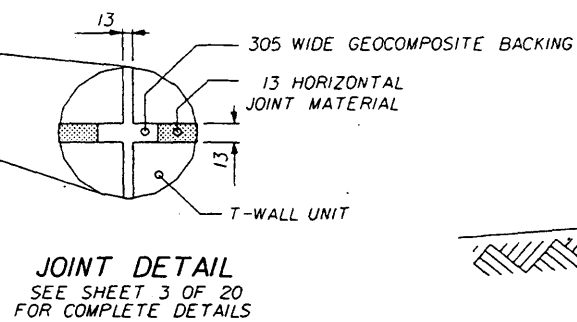
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

RETAINING WALL SYSTEM  
THE NEEL COMPANY T-WALL  
(75 MM COVER)

Names	Dates	Approved By			
Designed By	JMC	10/01/98	 State Structures Design Engineer		
Drawn By	CAA	10/01/98			Revision
Checked By	JMC	10/01/98	00	1 of 20	5010



PART ELEVATION SHOWING TYPICAL DETAILS  
(NO SCALE)



SECTION SHOWING TYPICAL DETAILS  
(NOT ALL DETAILS APPLY TO EACH WALL)

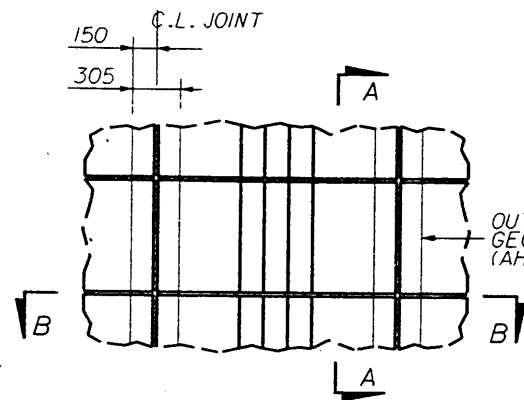
NOTE: ALL EXTENDED FACE TOP UNITS REQUIRE A MINIMUM OF TWO SHEAR KEYS. ALL OTHER UNITS ARE AS SHOWN BELOW:

- TOP UNITS - 2 SHEAR KEYS
- 1.829 M STEM - 2 SHEAR KEYS
- 2.438 M STEM - 2 SHEAR KEYS
- 3.048 M STEM - 2 SHEAR KEYS
- 3.658 M STEM - 2 SHEAR KEYS
- 4.267 M STEM - 3 SHEAR KEYS
- 4.877 M STEM - 3 SHEAR KEYS

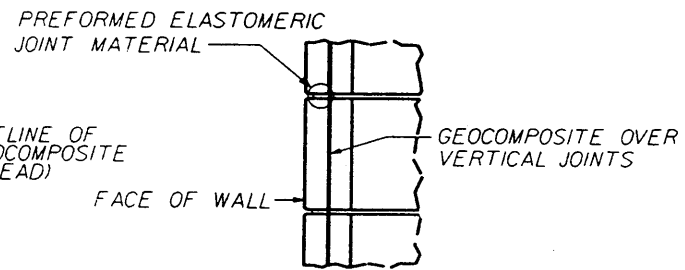
DESIGNER:  
**THE NEEL COMPANY**  
8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
FL: (703) 913-7859

PRECASTER:  
**OLDCASTLE PRECAST, INC**  
11643 103RD STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FL: (904) 778-2992

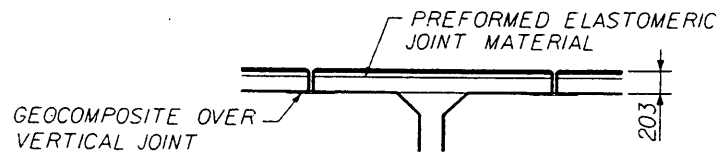
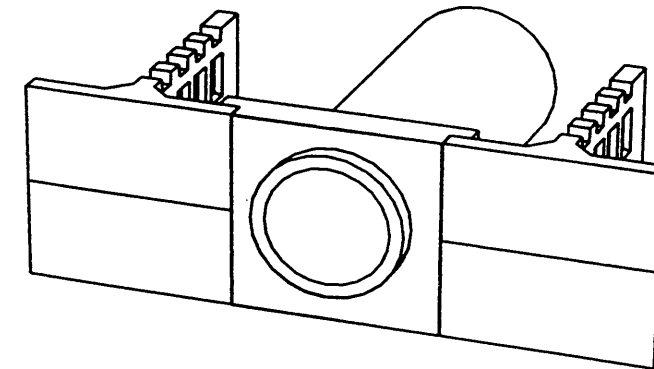
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (75 MM COVER)				
Names	Dates	Approved By		
Designed By	JMC	10/01/98	<i>William J. [Signature]</i> State Structures Design Engineer	
Drawn By	CAA	10/01/98		
Checked By	JMC	10/01/98	Revision	Sheet No.
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				Index No. 5010



PART ELEVATION - REAR FACE



PART SECTION A-A

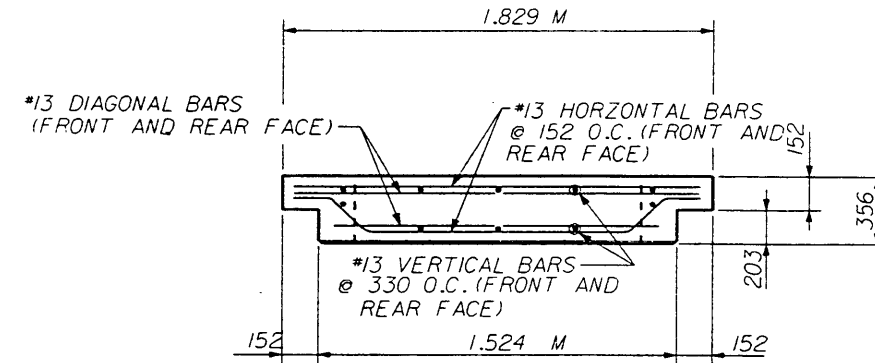


PART SECTION B-B

JOINT MATERIAL DETAILS

NOTES:

1. HORIZONTAL JOINT:  
13 x 101 x 1.524 M PREFORMED ELASTOMERIC JOINT MATERIAL
2. VERTICAL JOINT:  
13 SPACE  
305 WIDE GEOTEXTILE BACKING, CENTERED ABOUT JOINT CENTERLINE.

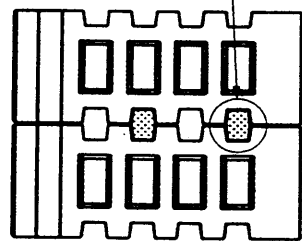


PLAN

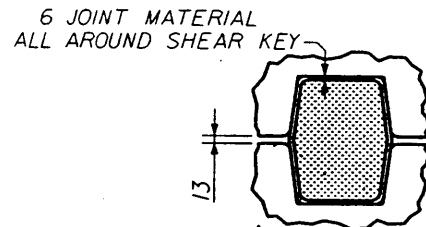
NOTES:

1. HORIZONTAL JOINT:  
13 x 101 x 1.524 M PREFORMED ELASTOMERIC JOINT MATERIAL
2. VERTICAL JOINT:

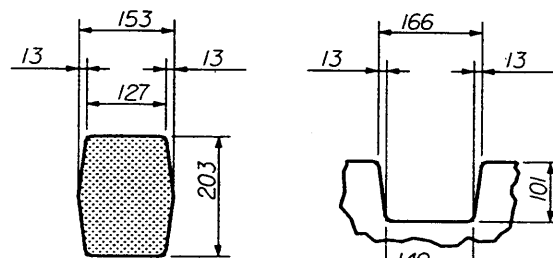
SHEAR KEY WRAPPED IN JOINT MATERIAL. SEE DETAILS THIS SHEET.



PART SECTION



SHEAR KEY / JOINT MATERIAL ARRANGEMENT



SHEAR KEY DIMENSIONS

SHEAR KEY BLOCKOUT DIM'S

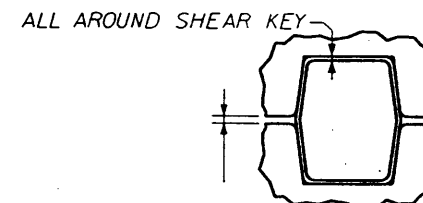
SHEAR KEY DETAILS

NOTES:

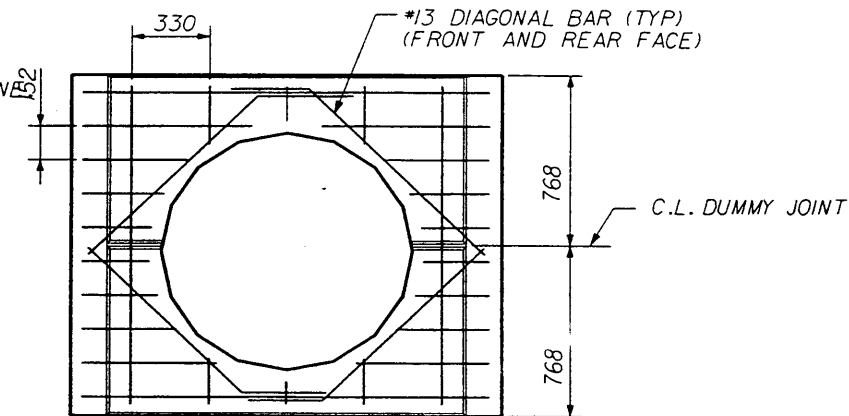
1. SHEAR KEY JOINT MATERIAL:  
MINIMUM OF ONE 6 x 203 x 610 PIECE OF AVI ASTRO-FOAM AF-250 PER SHEAR KEY.
2. JOINT MATERIAL MAY BE ADDED OR REMOVED TO AID IN SHIMMING AND ALIGNING, HOWEVER SHEAR KEY MUST FIT SNUG IN THE SHEAR KEY BLOCKOUT WHEN UNIT IS IN ITS FINAL POSITION.
3. MINIMUM OF 2 SHEAR KEYS REQUIRED PER UNIT. SEE NOTES ON SHEET 2 OF 20, 'TYPICAL DETAILS (I)'.

NOTES:

1. HORIZONTAL JOINT:  
13 x 101 x 1.524 M PREFORMED ELASTOMERIC JOINT MATERIAL
2. VERTICAL JOINT:



SHEAR KEY / JOINT MATERIAL ARRANGEMENT



ELEVATION (FRONT FACE)  
PRECAST HEADWALL PANEL FOR LARGE DIAMETER PIPES

THIS INDEX IS A SUPPLEMENT TO THE 'ROADWAY AND TRAFFIC DESIGN STANDARDS' BOOKLET DATED JANUARY 1998

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (75 MM COVER)				
Designed By	JMC	10/01/98	Revision	00
Drawn By	CAA	10/01/98	Sheet No.	3 of 20
Checked By	JMC	10/01/98	Index No.	5010

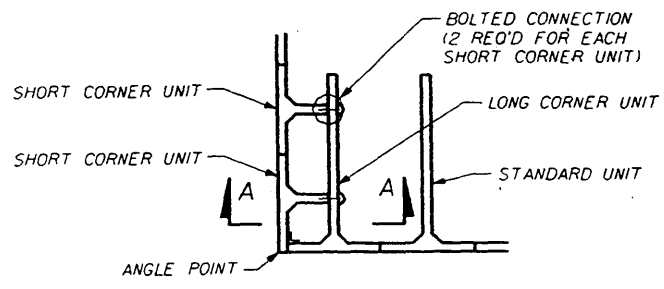
DESIGNER:



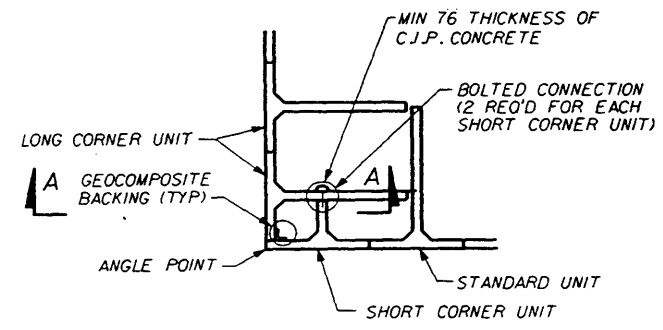
THE NEEL COMPANY  
8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859

PRECASTER:

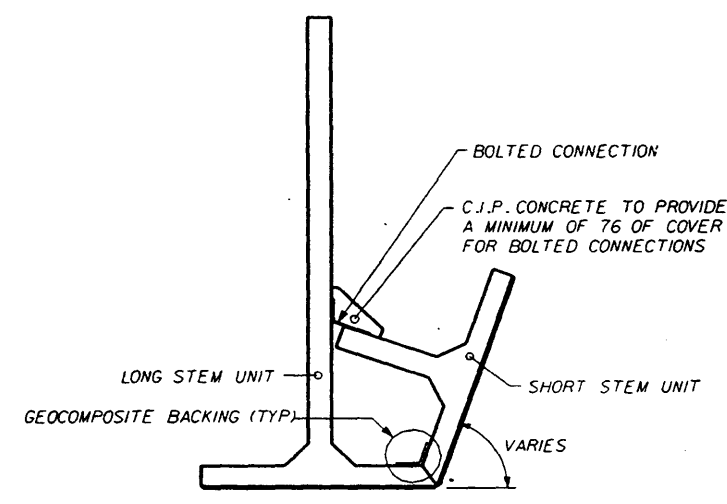
OLDCASTLE PRECAST, INC.  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (904) 778-2992



PART PLAN - FIRST ROW

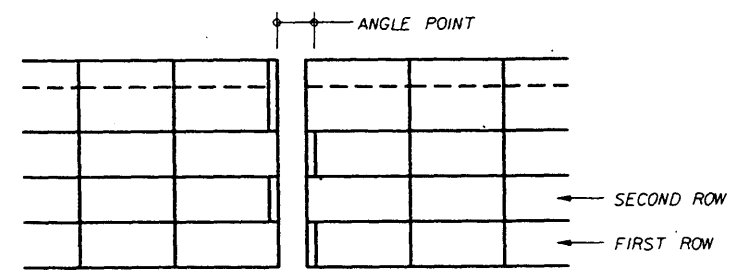


PART PLAN - SECOND ROW

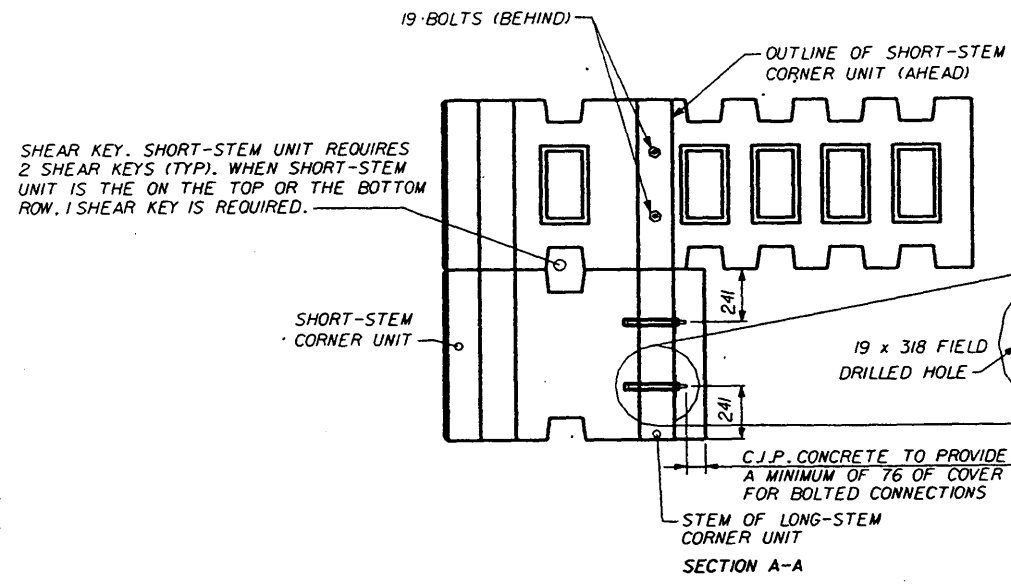


PART PLAN - ANGLE > 90

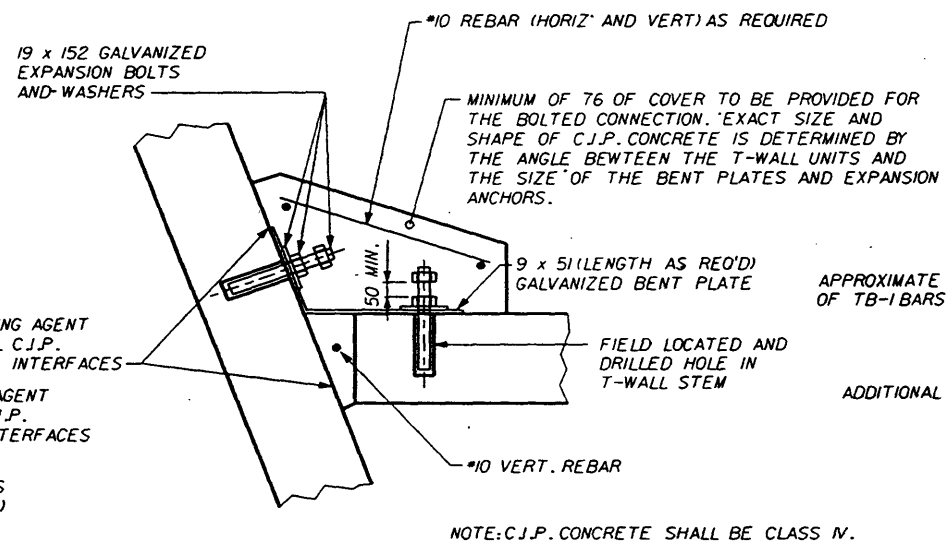
SHORT AND LONG STEMS ALTERNATE PER 90 CORNER DETAIL



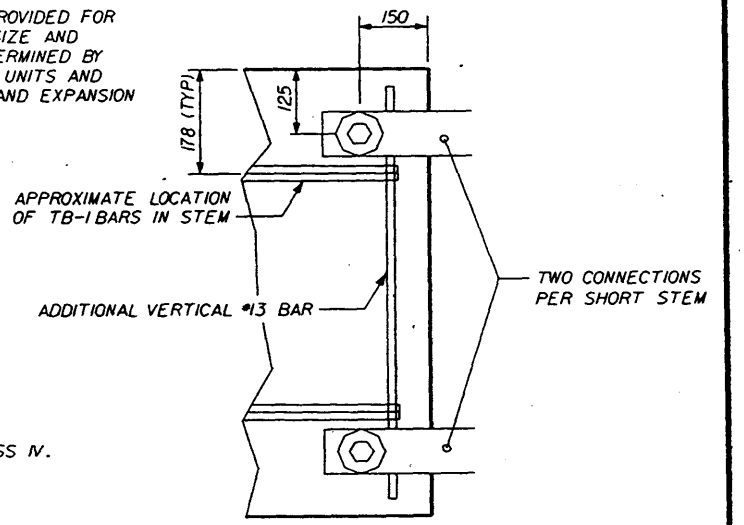
PART ELEVATION



TYPICAL CORNER UNIT ARRANGEMENT  
STEM LENGTHS VARY - SEE SPECIFIC ELEVATIONS FOR PROPER UNITS  
NO SCALE



TYPICAL BOLTED CONNECTION FOR ANGLE POINTS

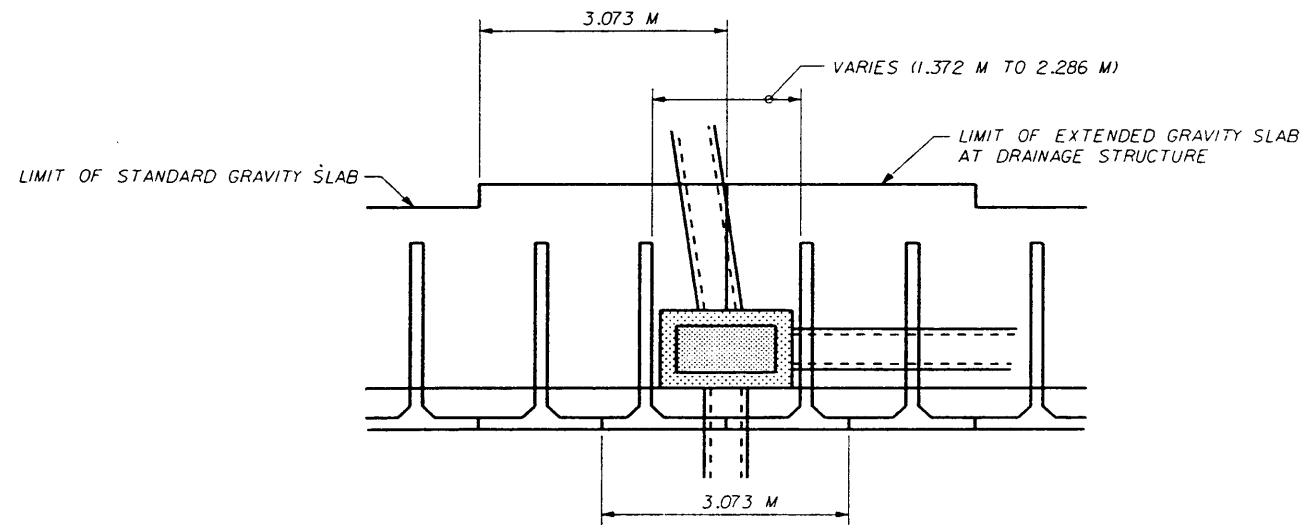


TYPICAL ANGLE POINT DETAIL  
NO SCALE

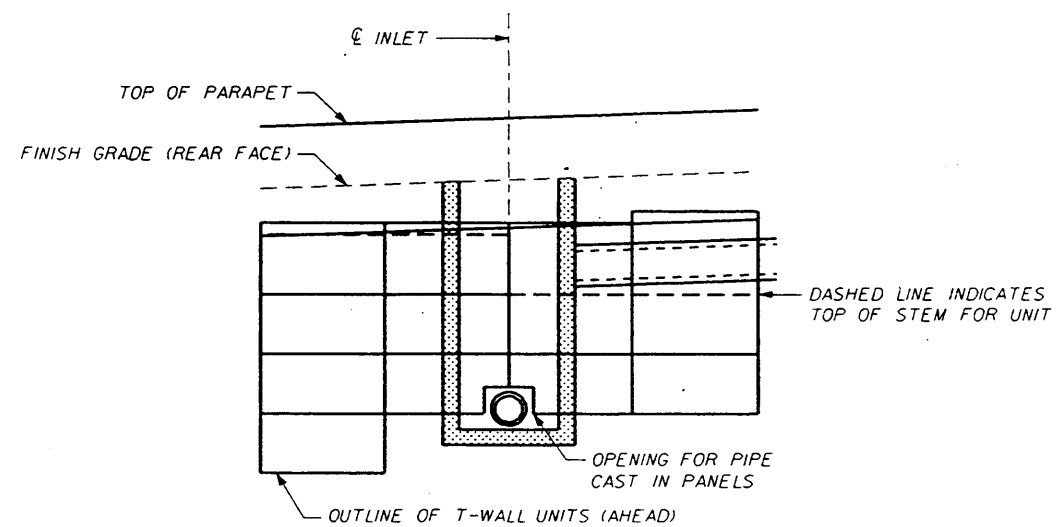
DESIGNER:  
**THE NEEL COMPANY**  
8328-D THORNDIKE LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859

PRECASTER:  
**OLDCASTLE PRECAST, INC**  
11643 18346 STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2998  
FX: (904) 778-2992

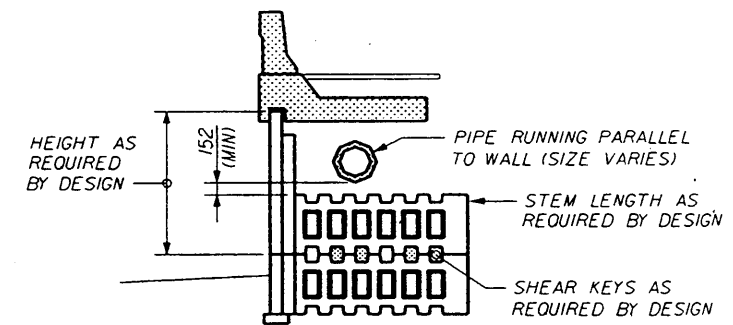
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (75 MM COVER)</b>				
Designed By	JMC	10/01/98	Approved By <i>W. H. [Signature]</i> State Structures Design Engineer	
Drawn By	CAA	10/01/98	Revision	Sheet No.
Checked By	JMC	10/01/98	00	4 of 20
				Index No. 5010



PART PLAN



PART ELEVATION (FRONT FACE)




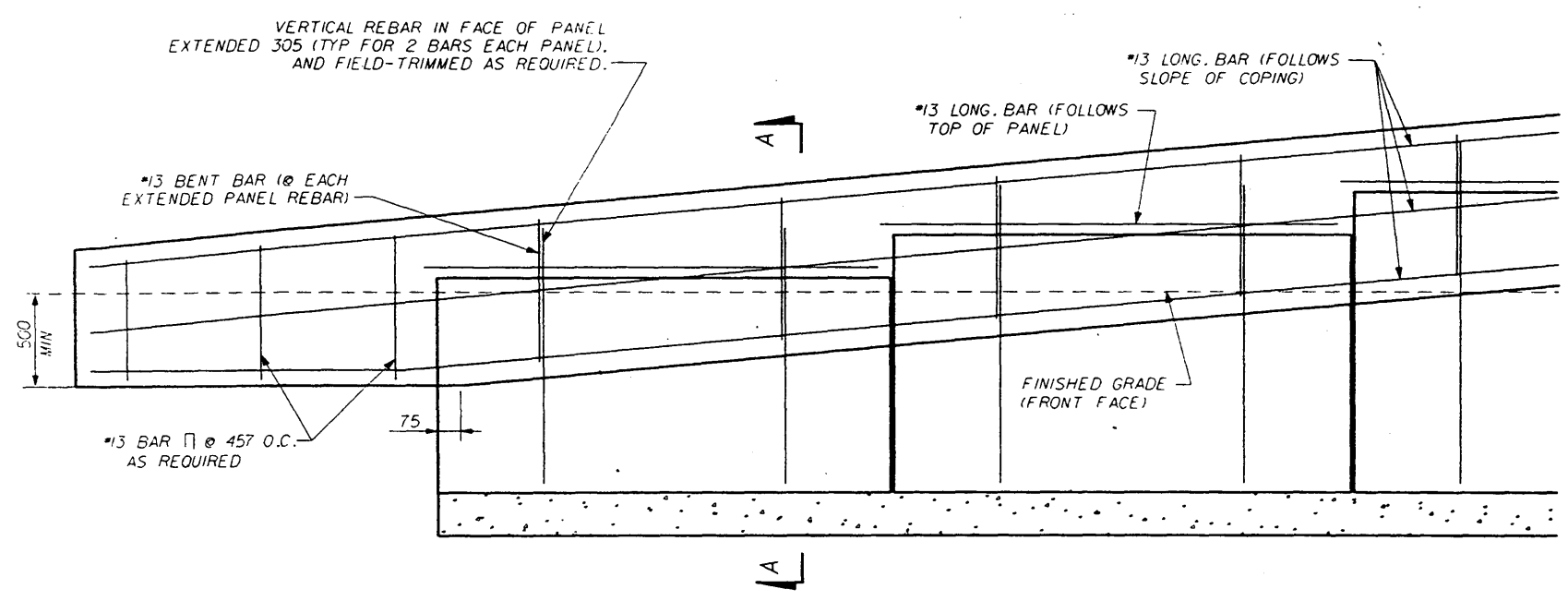
SECTION  
(SHOWING PIPE PARALLEL TO WALL)

DESIGNER:  

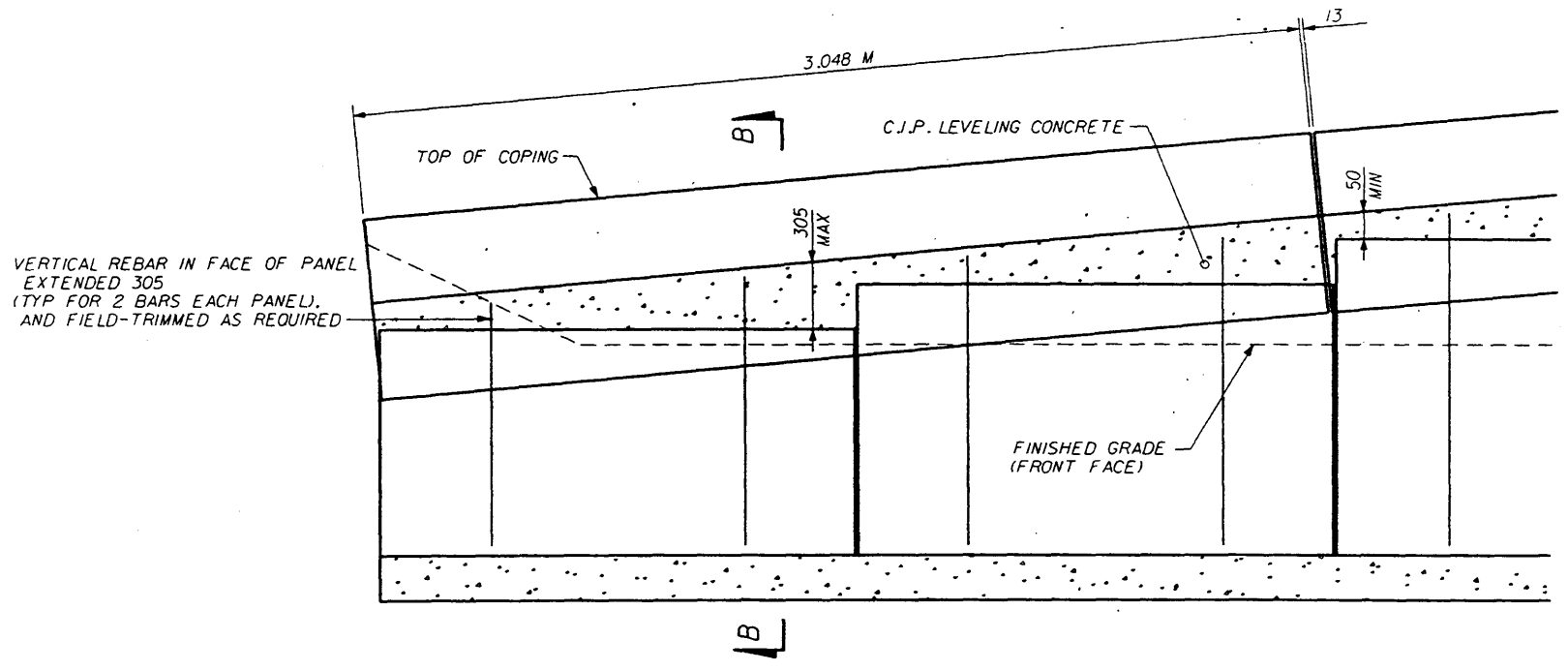
**THE NEEL COMPANY**  
 8328 D TRAFORD LANE  
 SPRINGFIELD, VIRGINIA 22152  
 PH: (703) 913-7858  
 FX: (703) 913-7859

PRECASTER:  
**OLDCASTLE PRECAST, INC**  
 11643 103RD STREET  
 JACKSONVILLE, FL 32210  
 PH: (904) 778-2990  
 FX: (904) 778-2992

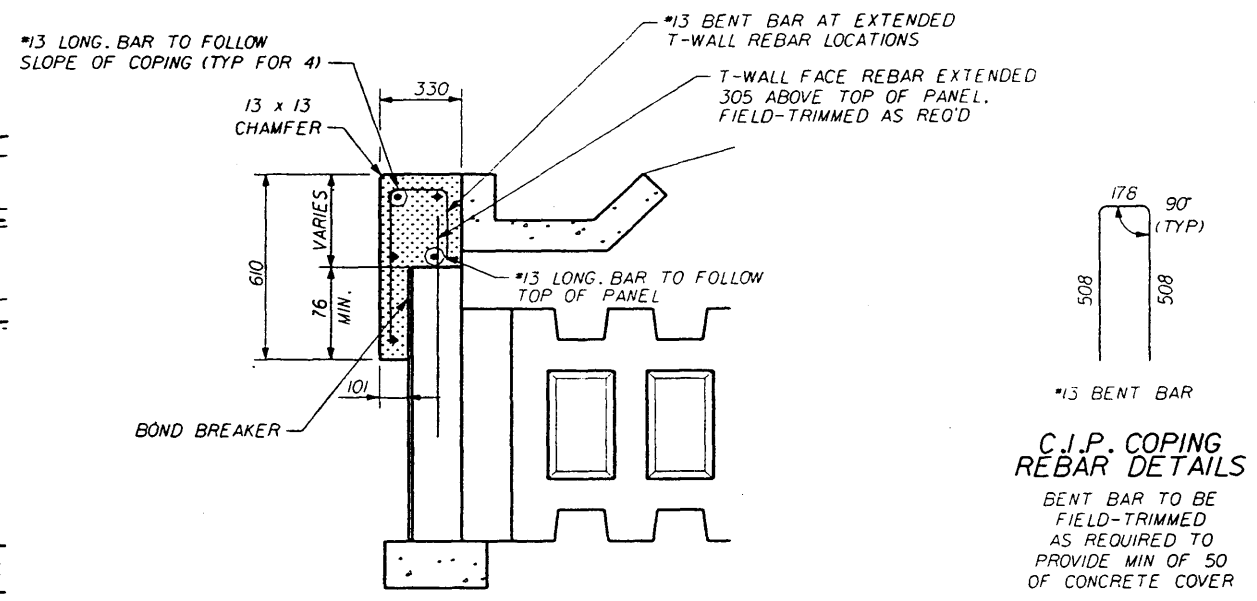
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (75 MM COVER)				
Names	Dates	Approved By		
Designed By	JMC	10/01/98	 State Structures Design Engineer	
Drawn By	CAA	10/01/98		
Checked By	JMC	10/01/98	Revision	Sheet No.
			00	5 of 20
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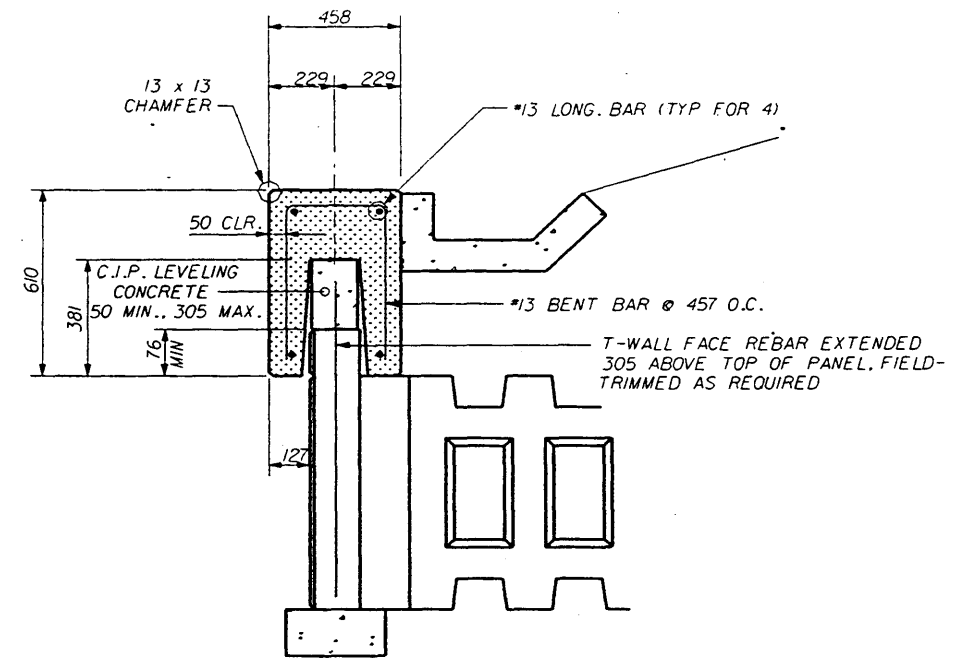
C.I.P. COPING TREATMENT AT BEGINNING/END OF WALLS




PRECAST COPING - PART ELEVATION



SECTION A-A  
C.I.P. COPING

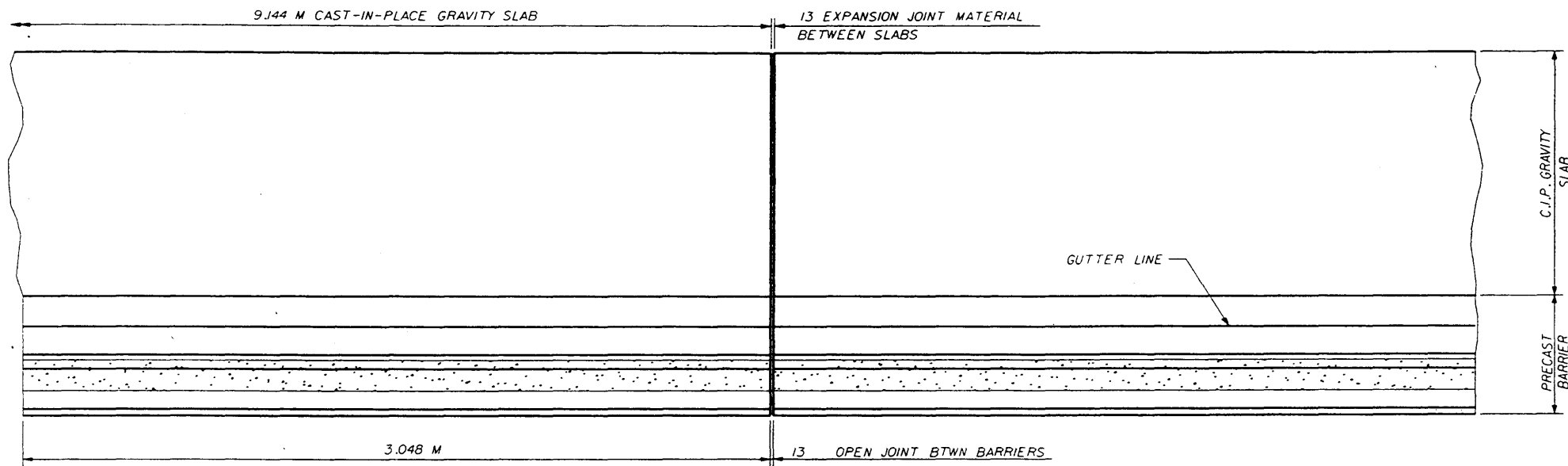


SECTION B-B  
PRECAST COPING

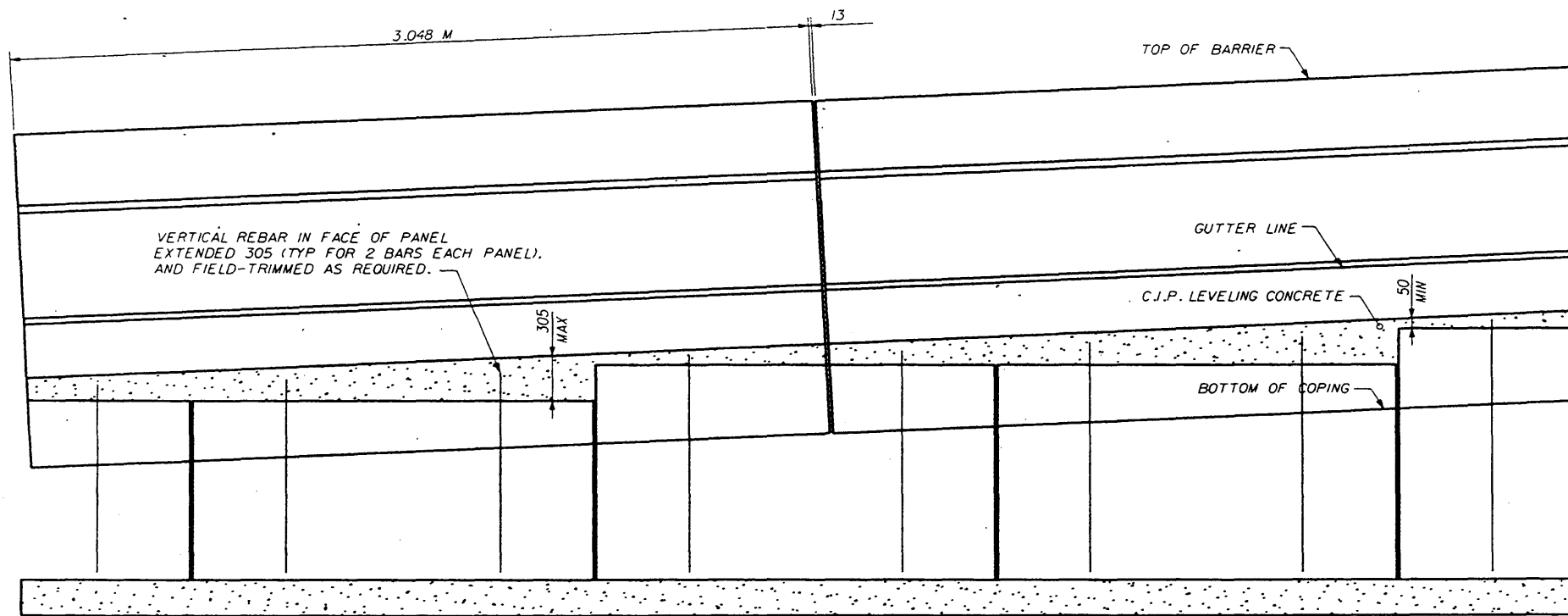
DESIGNER:  

**THE NEEL COMPANY**  
 8275 D TOWNSEND LANE  
 SPRINGFIELD, VIRGINIA 22152  
 PH: (703) 913-7858  
 FX: (703) 913-7859

PRECASTER:  
**OLDCASTLE PRECAST, INC**  
 11643 103rd STREET  
 JACKSONVILLE, FL 32218  
 PH: (904) 778-2990  
 FX: (904) 778-2992

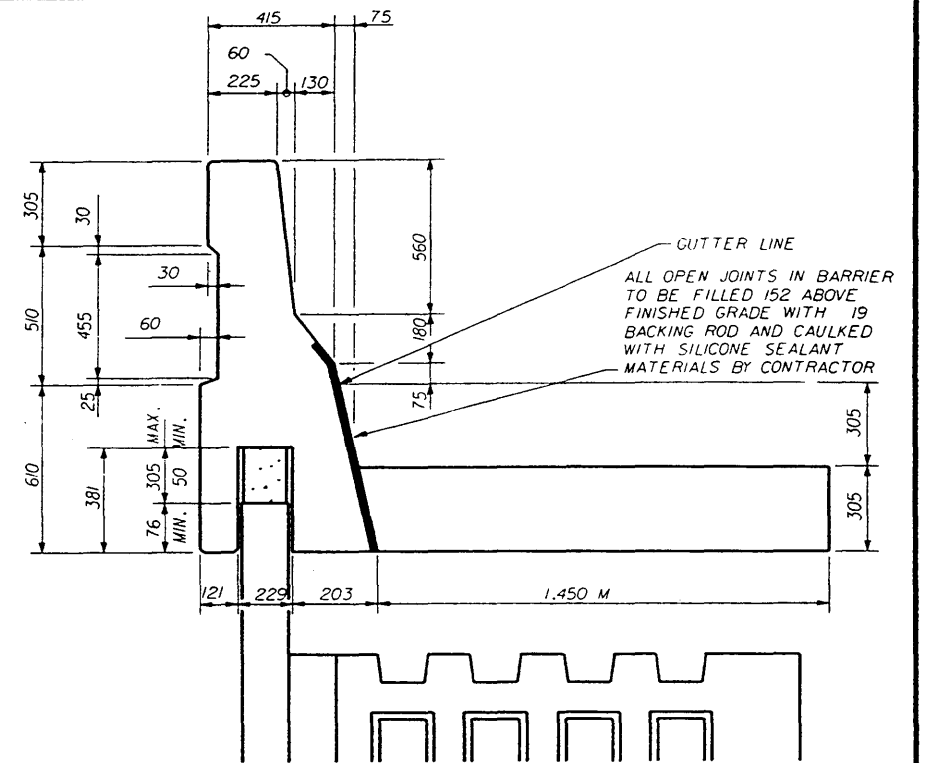
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (75 MM COVER)</b>				
Designed By	JMC	10/01/98	Approved By <i>William J. [Signature]</i> State Structures Design Engineer	
Drawn By	CAA	10/01/98	Revision	Sheet No.
Checked By	JMC	10/01/98	00	6 of 20
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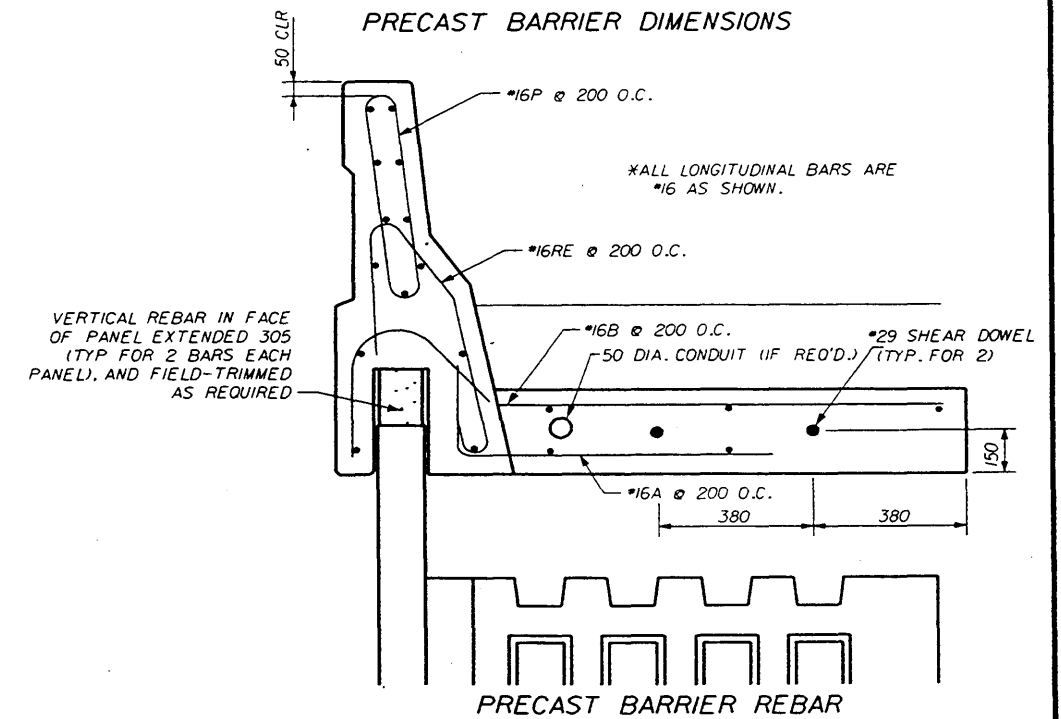
PART PLAN - PRECAST BARRIER



PART ELEVATION - PRECAST BARRIER



PRECAST BARRIER DIMENSIONS



PRECAST BARRIER REBAR

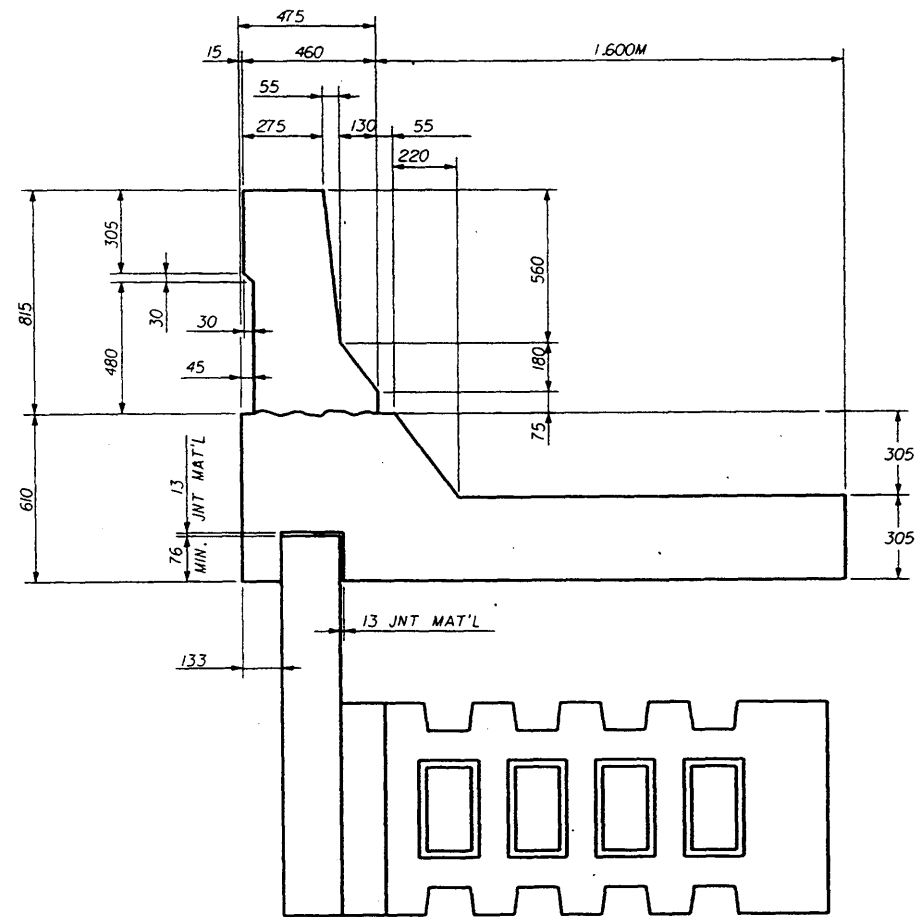
DESIGNER:  
 THE NEEL COMPANY  
 8378-D TRAFORD LANE  
 SPRINGFIELD, VIRGINIA 22152  
 PH: (703) 913-7858  
 FX: (703) 913-7859

PRECASTER:  
 OLDCASTLE PRECAST, INC.  
 11643 103rd STREET  
 JACKSONVILLE, FL 32210  
 PH: (904) 778-2990  
 FX: (904) 778-2992

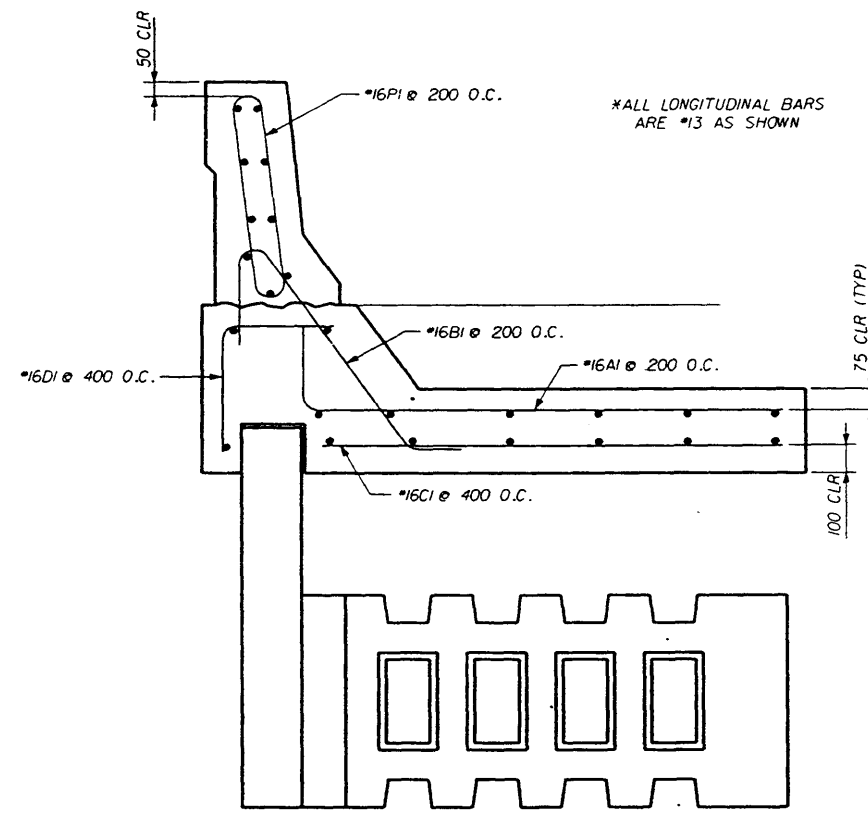
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
 ROAD DESIGN

RETAINING WALL SYSTEM  
 THE NEEL COMPANY T-WALL  
 (75 MM COVER)

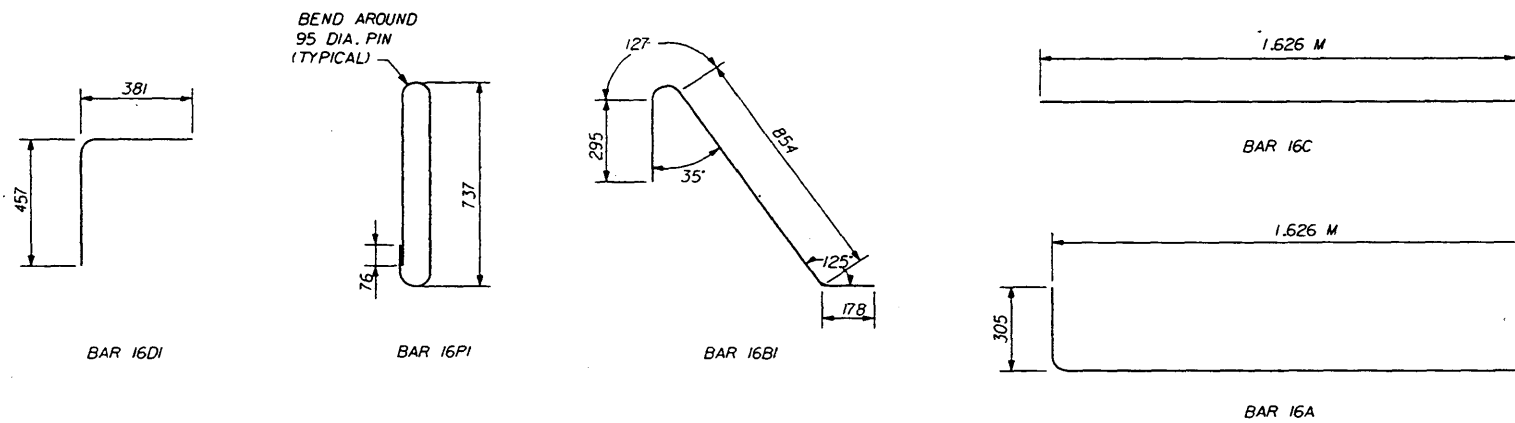
Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By	JMC	10/01/98			
Drawn By	CAA	10/01/98			
Checked By	JMC	10/01/98	00	7 of 20	5010



C.J.P. BARRIER AND C.J.P. JUNCTION SLAB DIMENSIONS



C.J.P. BARRIER AND C.J.P. JUNCTION SLAB REBAR



C.J.P. BARRIER REBAR DETAILS

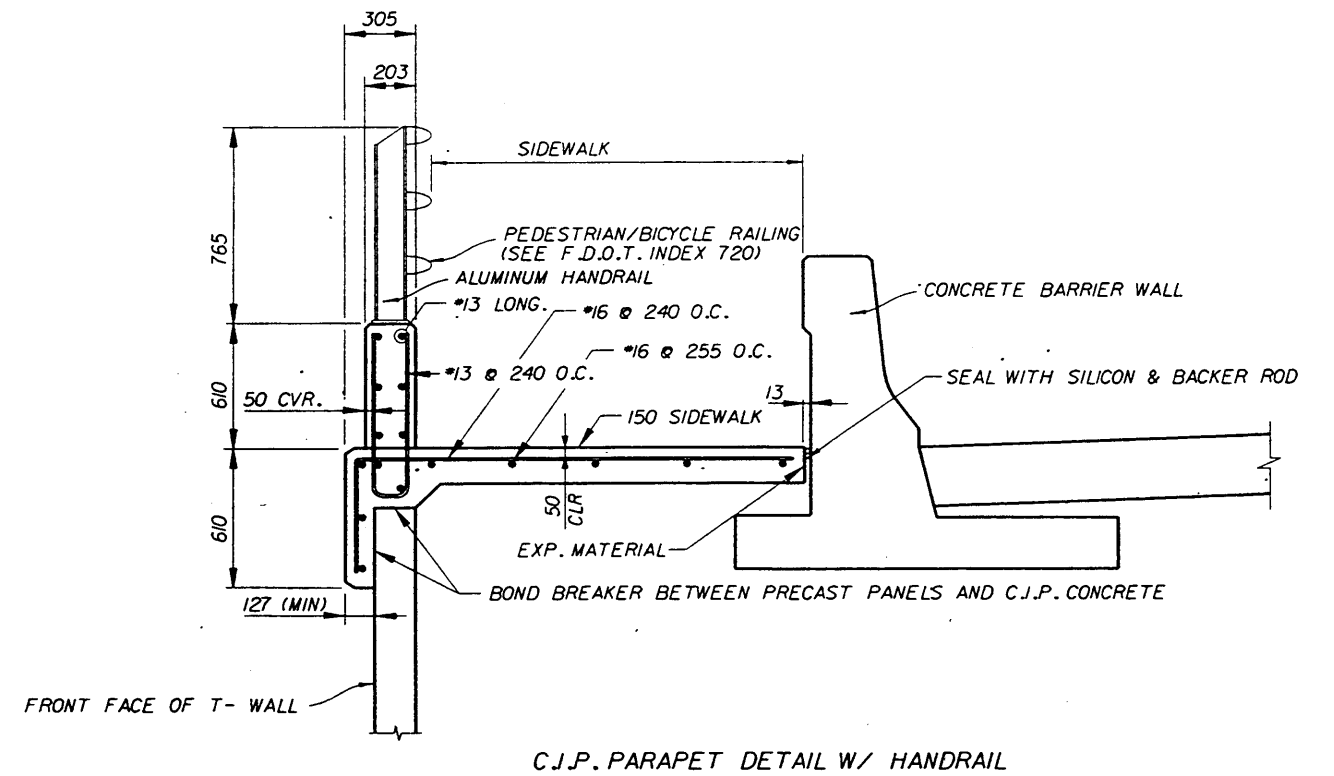
DESIGNER:  

**THE NEEL COMPANY**  
 8328 D RAFORD LANE  
 SPRINGFIELD, VIRGINIA 22152  
 PH: (703) 913-7858  
 FX: (703) 913-7859

PRECASTER:  
**OLDCASTLE PRECAST, INC**  
 11643 103rd STREET  
 JACKSONVILLE, FL 32210  
 PH: (904) 778-2998  
 FX: (904) 778-2992

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (75 MM COVER)				
Names	Dates	Approved By <i>William H. [Signature]</i> State Structures Design Engineer		
Designed By	JMC	10/01/98	Revision	Sheet No.
Drawn By	CAA	10/01/98	00	8 of 20
Checked By	JMC	10/01/98		5010

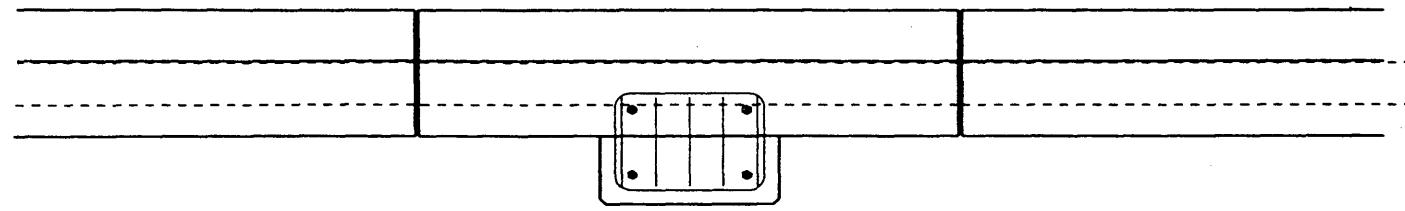




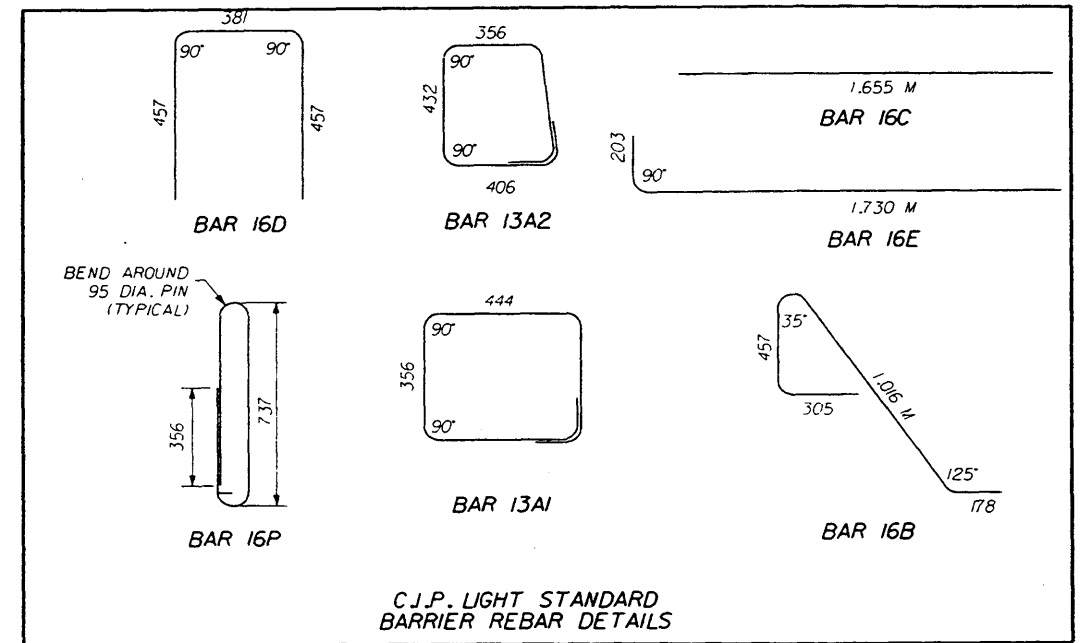
DESIGNER:  
 **THE NEEL COMPANY**  
 8328-D TRAFORD LANE  
 SPRINGFIELD, VIRGINIA 22152  
 PH: 1703/913-7858  
 FX: 1703/913-7859

PRECASTER:  
**OLDCASTLE PRECAST, INC**  
 11643 10344 STREET  
 JACKSONVILLE, FL 32210  
 PH: 904/778-2990  
 FX: 904/778-2992

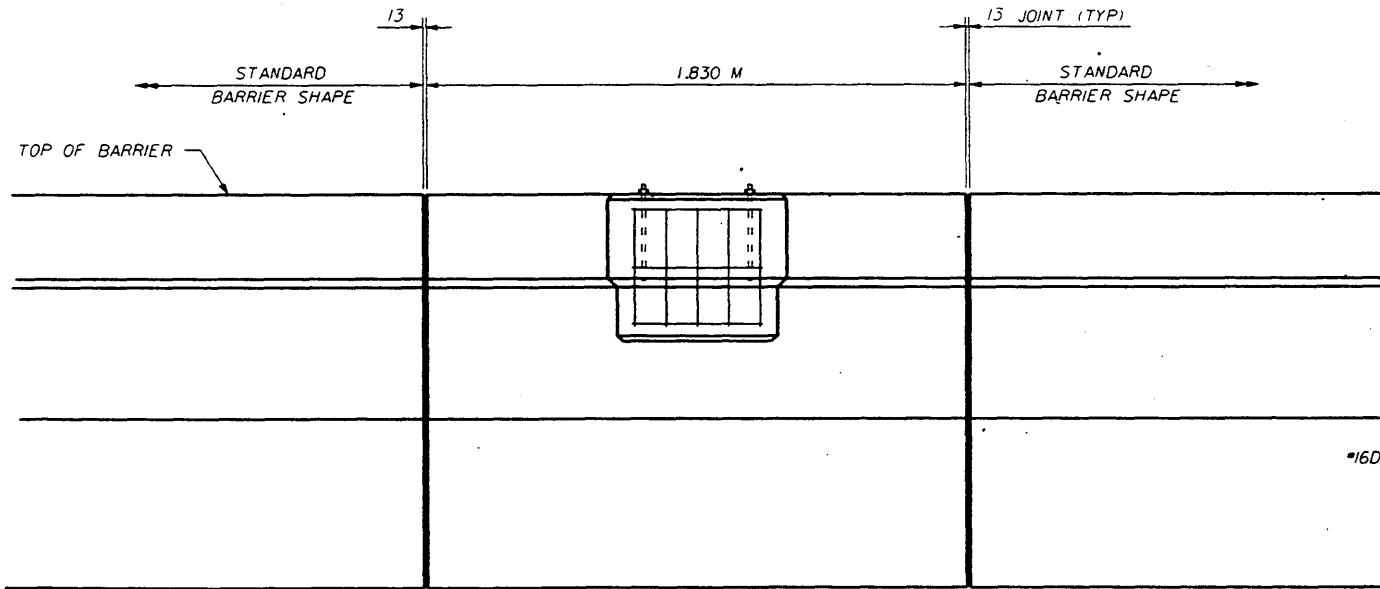
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (75 MM COVER)				
	Names	Dates	Approved By <i>William H. [Signature]</i> State Structures Design Engineer	
Designed By	JMC	10/01/98	Revision	Sheet No.
Drawn By	CAA	10/01/98	00	9 of 20
Checked By	JMC	10/01/98		Index No. 5010



C.J.P. LIGHT STANDARD BARRIER - PART PLAN WITH REBAR  
(BARRIER AND GRAVITY SLAB REBAR OMITTED FOR CLARITY)



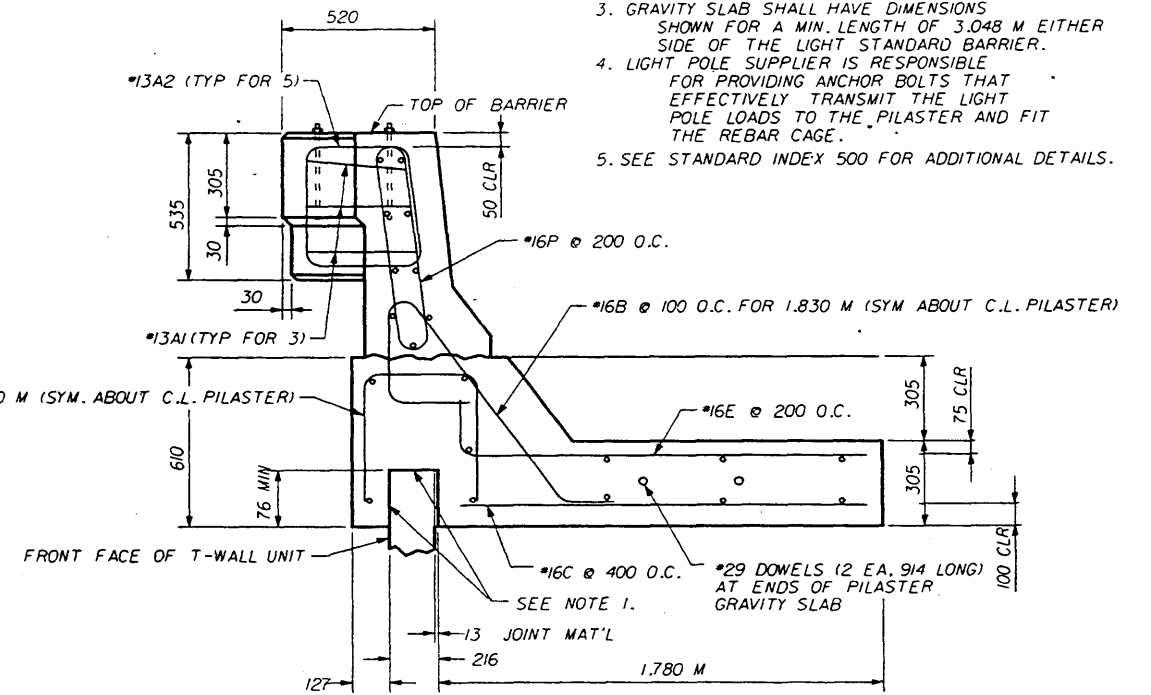
C.J.P. LIGHT STANDARD BARRIER REBAR DETAILS



C.J.P. LIGHT STANDARD BARRIER - PART ELEVATION  
(BARRIER AND GRAVITY SLAB REBAR OMITTED FOR CLARITY)

NOTES

1. POSITIVE BOND BREAKER SHALL BE PROVIDED BETWEEN THE C.J.P. CONC. AND THE PRECAST PANEL.
2. ALL LONGITUDINAL BARS ARE #13 AS SHOWN.
3. GRAVITY SLAB SHALL HAVE DIMENSIONS SHOWN FOR A MIN. LENGTH OF 3.048 M EITHER SIDE OF THE LIGHT STANDARD BARRIER.
4. LIGHT POLE SUPPLIER IS RESPONSIBLE FOR PROVIDING ANCHOR BOLTS THAT EFFECTIVELY TRANSMIT THE LIGHT POLE LOADS TO THE PILASTER AND FIT THE REBAR CAGE.
5. SEE STANDARD INDEX 500 FOR ADDITIONAL DETAILS.



C.J.P. LIGHT STANDARD BARRIER - PART SECTION WITH REBAR

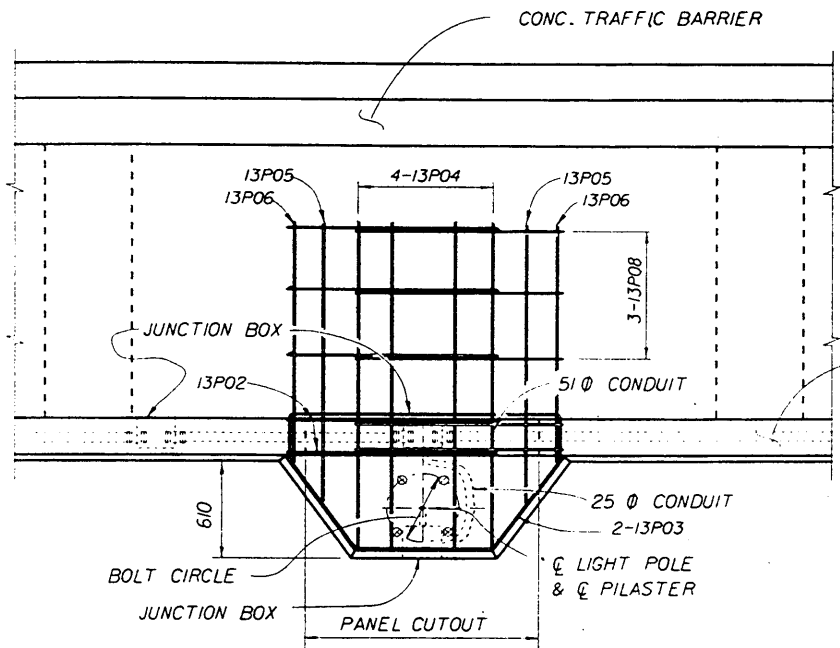
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

RETAINING WALL SYSTEM  
THE NEEL COMPANY T-WALL  
(75 MM COVER)

Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By JMC	10/01/98				
Drawn By CAA	10/01/98				
Checked By JMC	10/01/98		00	10 of 20	5010

DESIGNER:  
 THE NEEL COMPANY  
8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
FX: (703) 913-7825

PRECASTER:  
OLDCASTLE PRECAST, INC.  
11643 JOHNS STREET  
JACKSONVILLE, FL 32219  
PH: (904) 778-2990  
FX: (904) 778-2992



PLAN

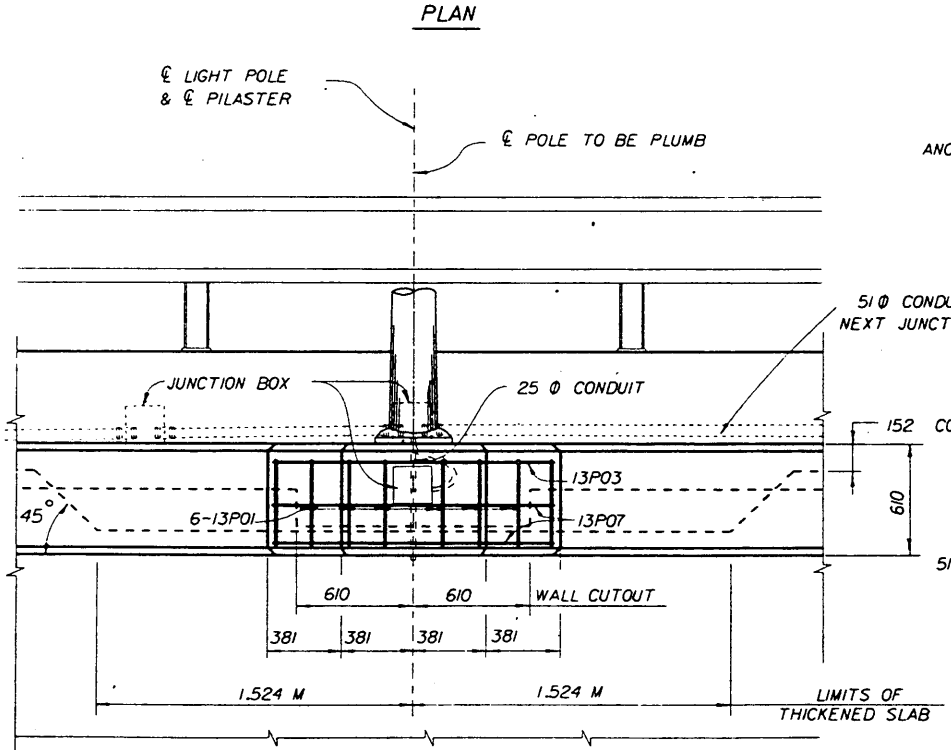
**NOTES**

1. ADDITIONAL CONCRETE AND REINFORCING STEEL REQUIRED FOR THE CONSTRUCTION OF THE PILASTER SHALL MEET THE SAME REQUIREMENTS AS THAT OF THE PARAPET WALL.
2. TOP OF PILASTER SHALL BE FINISHED TO A TRULY LEVEL AREA.
3. LIGHT POLE PILASTER IS DESIGNED TO RESIST WORKING LOADS (IN ANY DIRECTION) FROM THE LIGHT POLE APPLIED AT THE TOP OF THE PILASTER AS FOLLOWS:
 

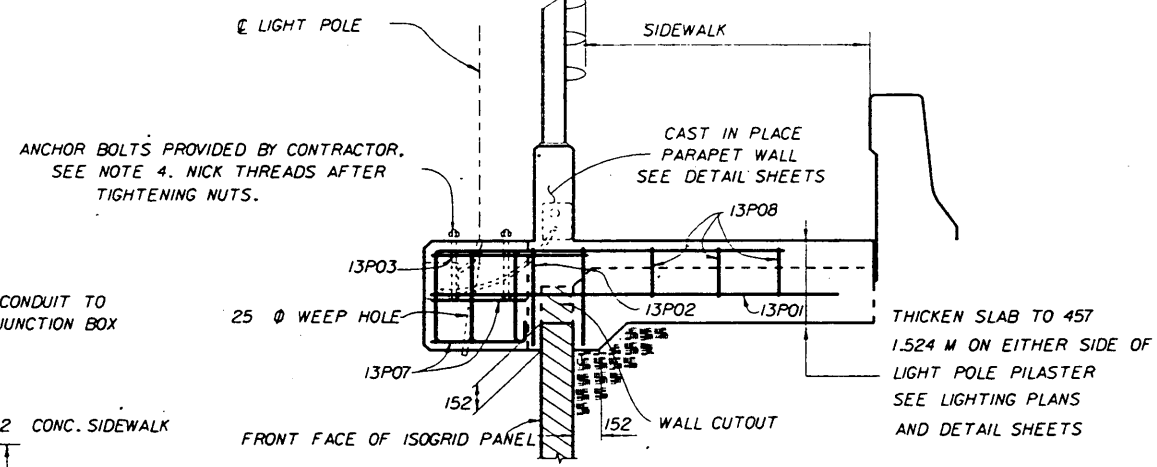
LONGITUDINAL MOMENT	=	437.8 KN-M
TRANSVERSE MOMENT	=	87.6 KN-M
LONGITUDINAL SHEAR	=	4.45 KN
TRANSVERSE SHEAR	=	890 N
TORSION	=	43.8 KN-M
AXIAL	=	1.78 KN

IF THE LIGHT POLE PROVIDED APPLIES LOADS THAT ARE IN EXCESS OF THOSE SHOWN ABOVE, THE CONTRACTOR SHALL REDESIGN THE PILASTER AND SUBMIT HIS DESIGN TO THE DEPARTMENT FOR REVIEW. THE CONTRACTOR'S REDESIGN SHALL BE PREPARED, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF FLORIDA, AND QUALIFIED TO PERFORM THE WORK.
4. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ANCHOR BOLTS THAT EFFECTIVELY TRANSMIT THE LIGHT POLE LOADS TO THE PILASTER AND THAT FIT THE REINFORCING CAGE. CALCULATIONS SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF FLORIDA SHALL BE SUBMITTED BY THE CONTRACTOR TO THE DEPARTMENT FOR REVIEW AND APPROVAL SHOWING THAT THESE REQUIREMENTS HAVE BEEN MET PRIOR TO CONSTRUCTION.

5. STEEL FOR JUNCTION BOXES SHALL CONFORM WITH ASTM-A36. THE BOXES SHALL BE HOT DIP GALVANIZED AFTER FABRICATION. IN LIEU OF STEEL BOXES THE CONTRACTOR MAY SUBMIT FOR APPROVAL MOLDED P.V.C. BOXES (SCHEDULE 80).
6. ALL CONDUITS SHALL BE RIGID GALVANIZED STEEL OR SCHEDULE 80 P.V.C.
7. THE COST OF ANCHOR BOLTS SHALL BE INCLUDED IN THE BID PRICE FOR LIGHT POLES.
8. PAYMENT: THE COST OF ALL LABOR, CONCRETE AND REINFORCING STEEL REQUIRED FOR THE CONSTRUCTION OF THE PILASTERS AND ALL CONDUITS, EXPANSION COUPLINGS, JUNCTION BOXES AND MISCELLANEOUS HARDWARE REQUIRED FOR COMPLETION OF THE ELECTRICAL INSTALLATION WITHIN THE LIMITS SHOWN ON THIS SHEET, SHALL BE INCLUDED IN THE CONTRACTOR'S BID PRICE FOR THE MSE WALLS.

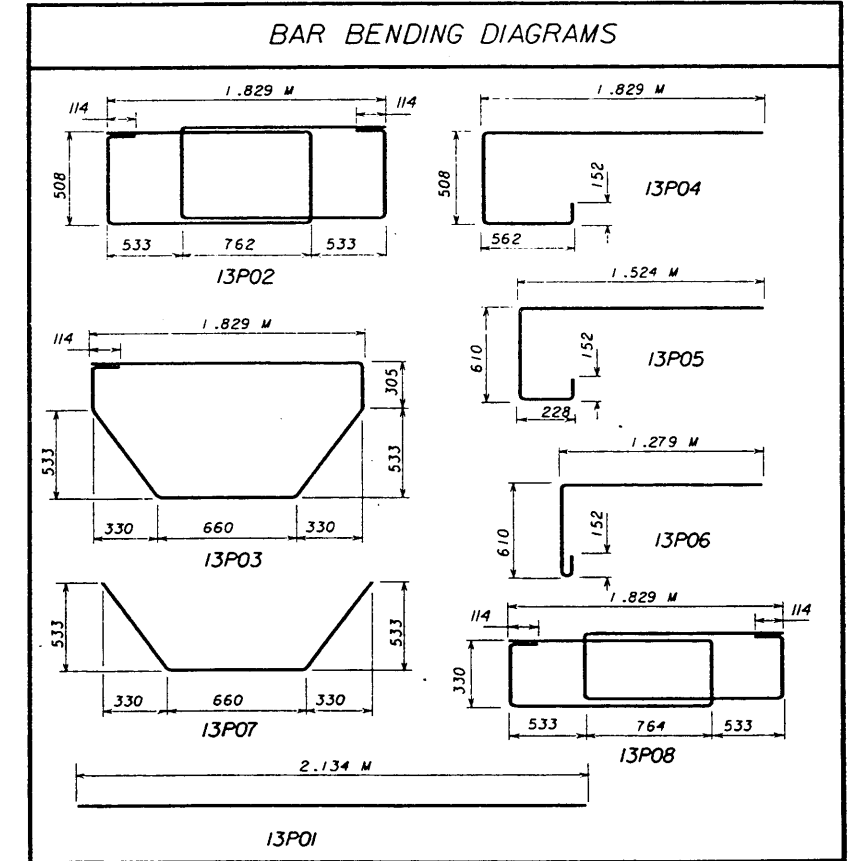


LIGHT PILASTER DETAIL



FRONT VIEW OF JUNCTION BOX (COVER REMOVED)

SECTION A-A



BILL OF REINFORCING STEEL			
MARK	SIZE	NO. REQ'D	LENGTH
13P01	13	6	2.134 M
13P02	13	2	7.442 M
13P03	13	1	4.496 M
13P04	13	4	2.946 M
13P05	13	2	2.413 M
13P06	13	2	1.880 M
13P07	13	2	1.930 M
13P08	13	3	6.731 M

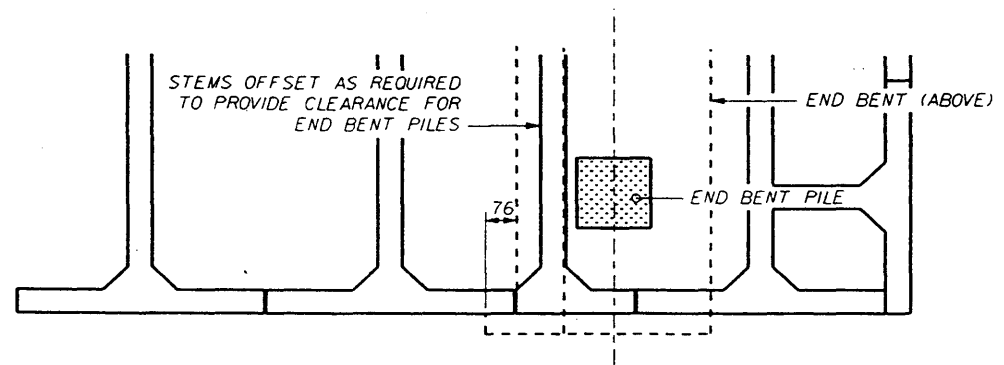
DESIGNER: **THE NEEL COMPANY**  
 8378-D TRAFORD LANE  
 SPRINGFIELD, VIRGINIA 22152  
 PH: 17031 913-7858  
 FX: 17031 913-7859

PRECASTER: **OLDCASTLE PRECAST, INC**  
 11643 103RD STREET  
 JACKSONVILLE, FL 32210  
 PH: 19041 778-2990  
 FX: 19041 778-2992

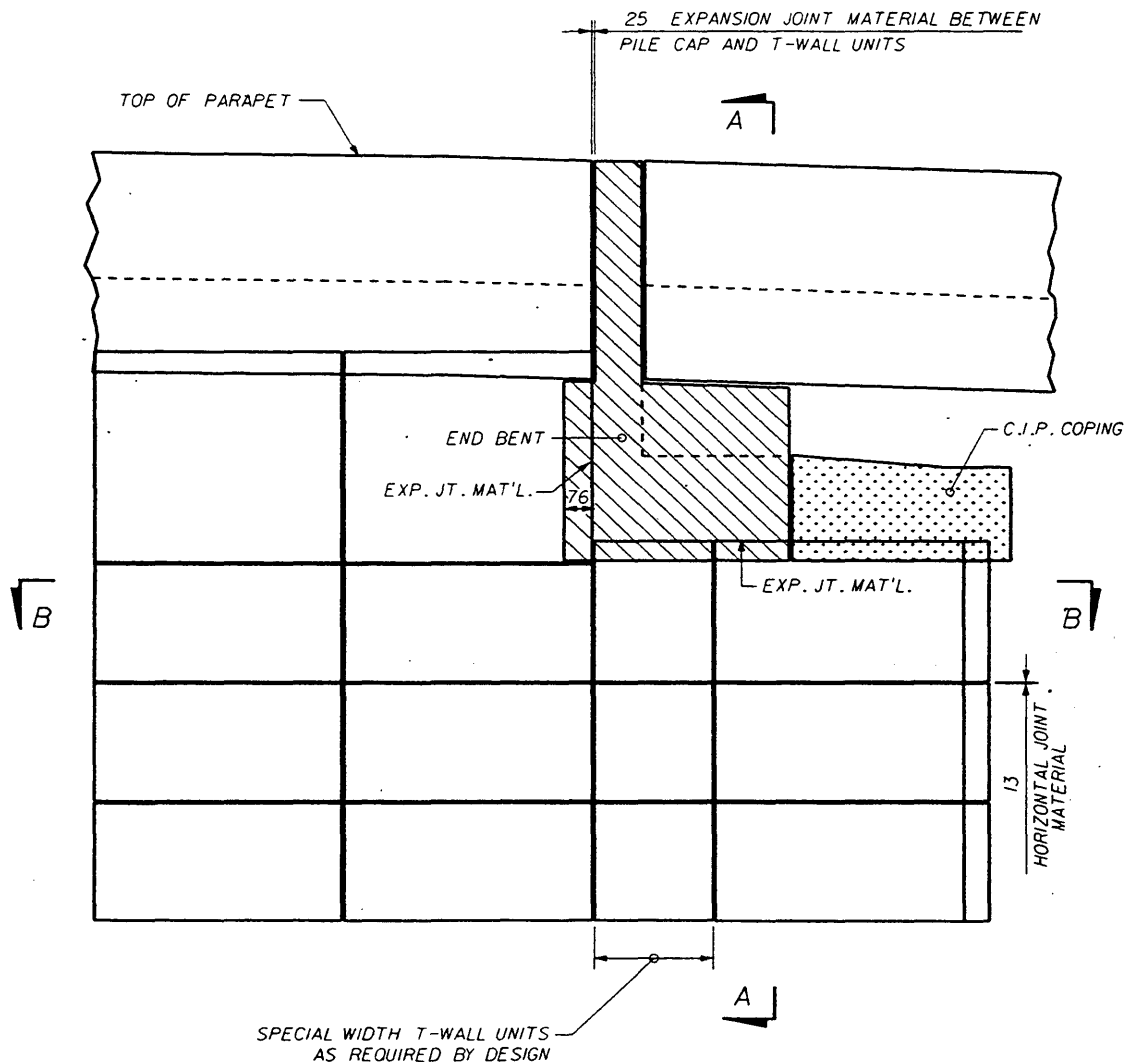
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
 ROAD DESIGN

RETAINING WALL SYSTEM  
 THE NEEL COMPANY T-WALL  
 (75 MM COVER)

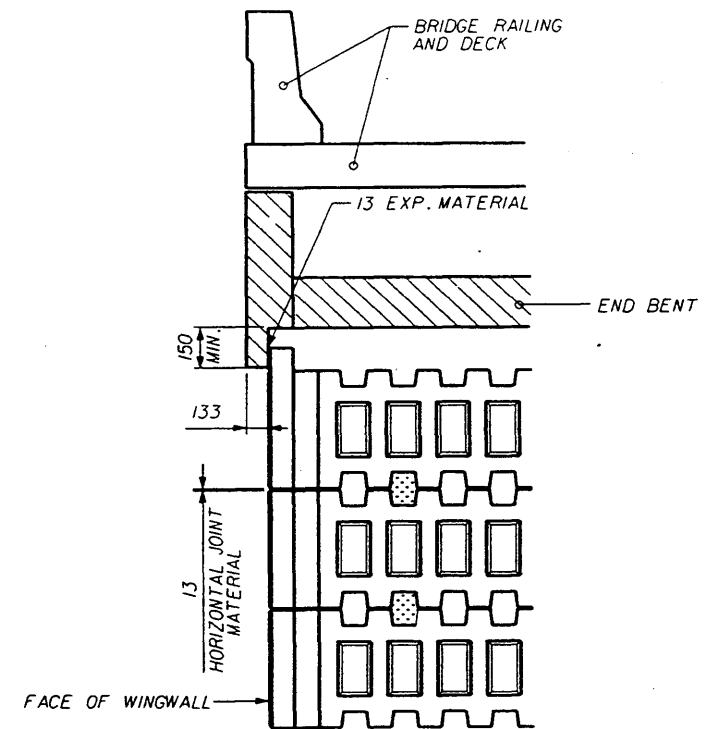
Names	Dates	Approved By		
Designed By	JMC	10/01/98	 State Structures Design Engineer	
Drawn By	CAA	10/01/98		
Checked By	JMC	10/01/98		
Revision	00	11 of 20		



SECTION B-B  
STEM / END BENT PILE INTERFACE



PART ELEVATION SHOWING  
WINGWALL / END BENT INTERFACE

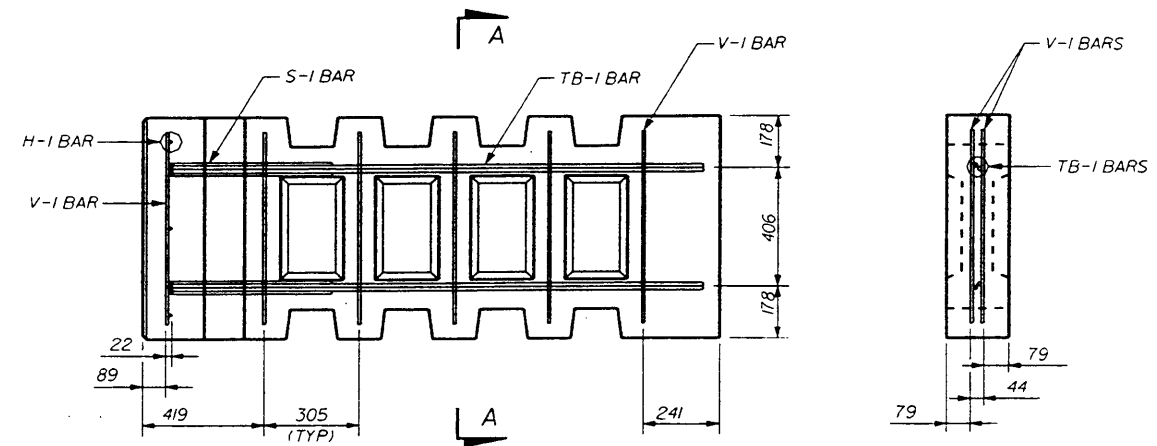
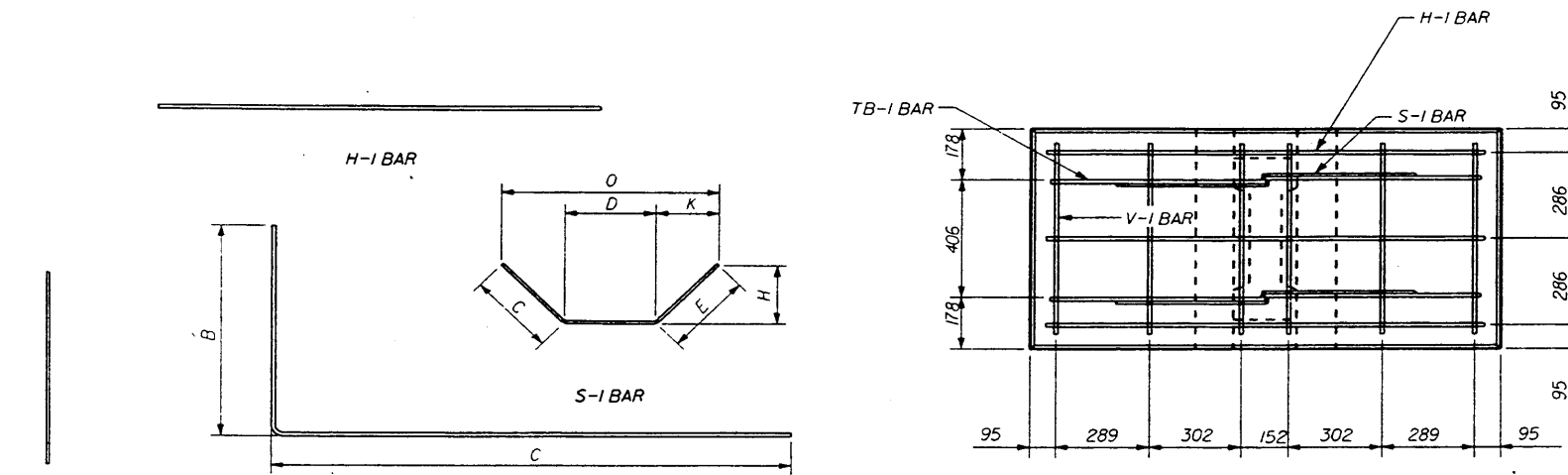


SECTION A-A  
SECTION THRU PILE CAP

DESIGNER:  
**THE NEEL COMPANY**  
8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859

PRECASTER:  
**OLDCASTLE PRECAST, INC**  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (904) 778-2992

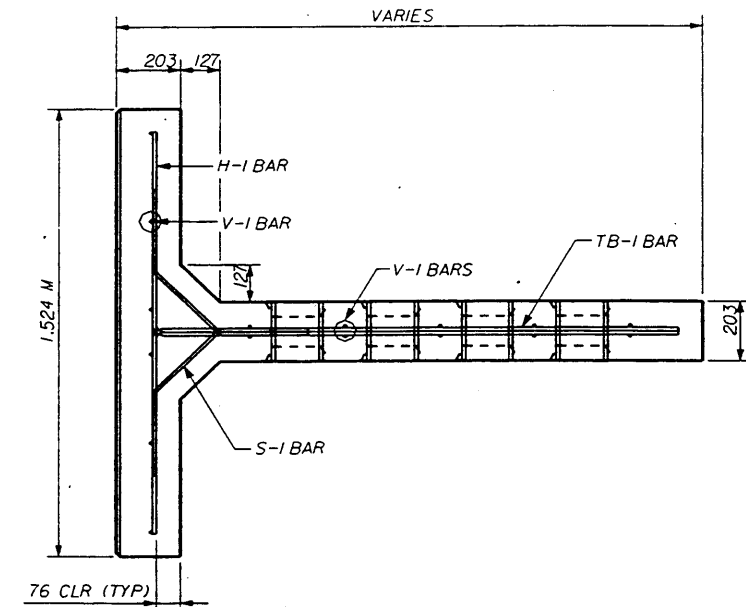
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (75 MM COVER)</b>					
Names	Dates	Approval By: <i>William H. Pate</i>			
Designed By	JMC	10/01/98	State Structures Design Engineer		
Drawn By	CAA	10/01/98	Revision	Sheet No.	Index No.
Checked By	JMC	10/01/98	00	12 of 20	5010



FRONT VIEW  
(V-I BARS IN STEM OMITTED FOR CLARITY)

SIDE VIEW

SECTION A-A



TOP VIEW  
REINFORCING STEEL - STANDARD UNITS

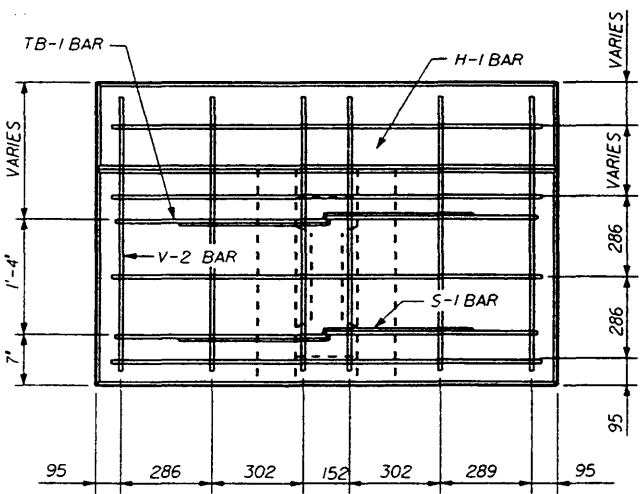
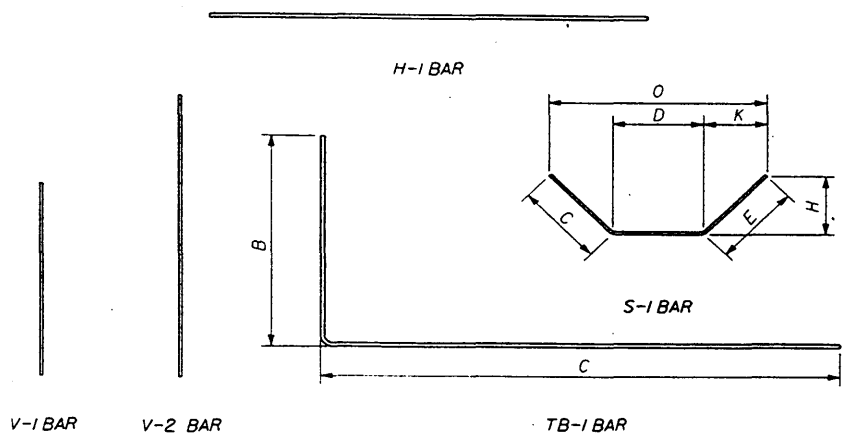
REBAR SCHEDULE - 762 x 1.524 M x 1.219 M STD UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	3	13	-	1.372 M								-	
V-1	12	10	-	.610								-	
S-1	4	10	3	.860		286	286	286	203	203	705	45	
TB-1	4	13	17	1.740 M	699	1,080 M						90	
REBAR SCHEDULE - 762 x 1.524 M x 1.829 M STD UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	3	13	-	1.372 M								-	
V-1	16	10	-	.610								-	
S-1	4	10	3	.860		286	286	286	203	203	705	45	
TB-1	4	13	17	2.350 M	699	1,689 M						90	
REBAR SCHEDULE - 762 x 1.524 M x 2.438 M STD UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	3	13	-	1.372 M								-	
V-1	20	10	-	.610								-	
S-1	4	10	3	.860		286	286	286	203	203	705	45	
TB-1	4	13	17	2.959 M	699	2,299 M						90	
REBAR SCHEDULE - 762 x 1.524 M x 3.048 M STD UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	3	13	-	1.372 M								-	
V-1	24	10	-	.610								-	
S-1	4	10	3	.860		286	286	286	203	203	705	45	
TB-1	4	13	17	3.569 M	699	2,908 M						90	
REBAR SCHEDULE - 762 x 1.524 M x 3.658 M STD UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	3	13	-	1.372 M								-	
V-1	26	10	-	.610								-	
S-1	4	10	3	.860		286	286	286	203	203	705	45	
TB-1	4	13	17	4.178 M	699	3,518 M						90	
REBAR SCHEDULE - 762 x 1.524 M x 4.267 M STD UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	3	13	-	1.372 M								-	
V-1	32	10	-	.610								-	
S-1	4	10	3	.860		286	286	286	203	203	705	45	
TB-1	4	13	17	4.788 M	699	4,128 M						90	
REBAR SCHEDULE - 762 x 1.524 M x 4.877 M STD UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	3	13	-	1.372 M								-	
V-1	36	10	-	.610								-	
S-1	4	10	3	.860		286	286	286	203	203	705	45	
TB-1	4	13	17	5.397 M	699	4,737 M						90	

DESIGNER:  
**THE NEEL COMPANY**  
8326-D TROTT LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859

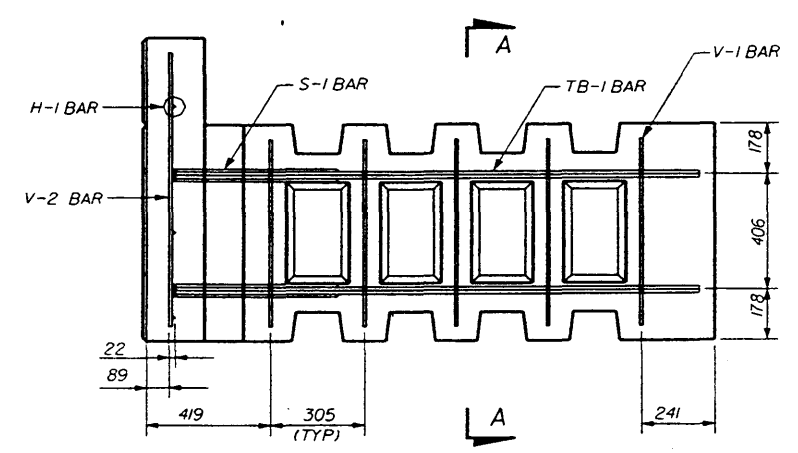
PRECASTER:  
**OLDCASTLE PRECAST, INC.**  
11643 103RD STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (904) 778-2992

NOTE: ALL STEEL REINFORCING BARS SHALL HAVE 75 MIN. CONCRETE COVER

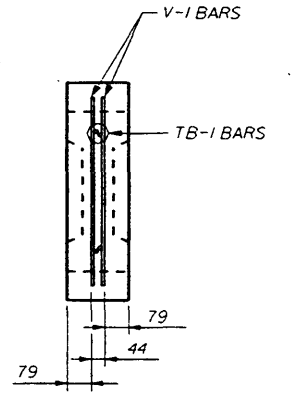
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM THE NEEL COMPANY (75 MM COVER)</b>				
	Names	Dates	Approved By <i>William J. [Signature]</i>	
Designed By	JMC	10/01/98	State Structures Design Engineer	
Drawn By	CAA	10/01/98	Revision	Sheet No.
Checked By	JMC	10/01/98	00	13 of 20
				5010



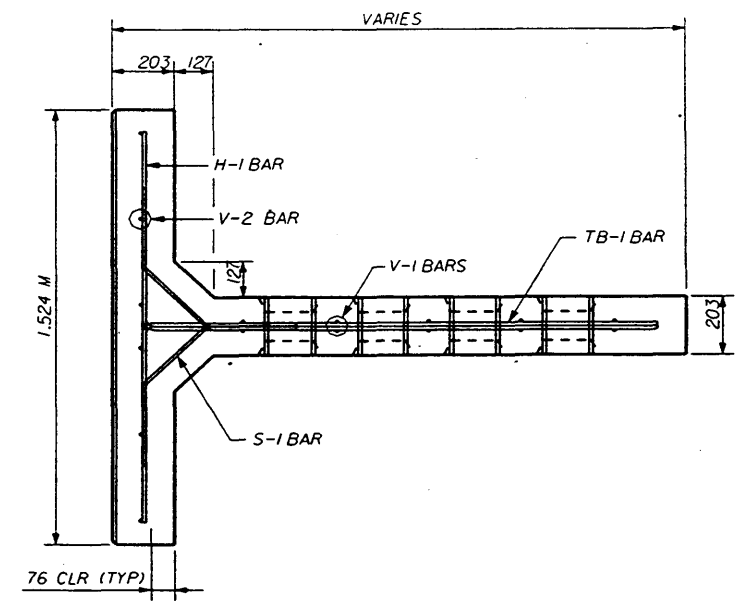
FRONT VIEW  
(V-1 BARS IN STEM OMITTED FOR CLARITY)



SIDE VIEW



SECTION A-A



TOP VIEW

REINFORCING STEEL - TOP UNITS (1)

REBAR SCHEDULE - 914 x 1.524 M x 1.219 M TOP UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	4	13	-	1.372 M								-	-
V-1	6	10	-	610								-	-
V-2	6	16	-	762								-	-
S-1	4	10	3	860			286	286	203	203	705	45	-
TB-1	4	13	17	1.740 M	699	1.080 M						90	-

REBAR SCHEDULE - 914 x 1.524 M x 1.829 M TOP UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	4	13	-	1.372 M								-	-
V-1	10	10	-	610								-	-
V-2	6	16	-	762								-	-
S-1	4	10	3	860			286	286	203	203	705	45	-
TB-1	4	13	17	2.350 M	699	1.689 M						90	-

REBAR SCHEDULE - 1.067 M x 1.524 M x 1.219 M TOP UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	5	13	-	1.372 M								-	-
V-1	6	10	-	610								-	-
V-2	6	16	-	914								-	-
S-1	4	10	3	860			286	286	203	203	705	45	-
TB-1	4	13	17	1.740 M	699	1.080 M						90	-

REBAR SCHEDULE - 1.067 M x 1.524 M x 1.829 M TOP UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	5	13	-	1.372 M								-	-
V-1	10	10	-	610								-	-
V-2	6	16	-	914								-	-
S-1	4	10	3	860			286	286	203	203	705	45	-
TB-1	4	13	17	2.350 M	699	1.689 M						90	-

REBAR SCHEDULE - 1.219 M x 1.524 M x 1.219 M TOP UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	5	13	-	1.372 M								-	-
V-1	6	10	-	610								-	-
V-2	6	16	-	1.067 M								-	-
S-1	4	10	3	860			286	286	203	203	705	45	-
TB-1	4	13	17	1.740 M	699	1.080 M						90	-

REBAR SCHEDULE - 1.219 M x 1.524 M x 1.829 M TOP UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	5	13	-	1.372 M								-	-
V-1	10	10	-	610								-	-
V-2	6	16	-	1.067 M								-	-
S-1	4	10	3	860			286	286	203	203	705	45	-
TB-1	4	13	17	2.350 M	699	1.689 M						90	-

REBAR SCHEDULE - 1.372 x 1.524 M x 1.829 M TOP UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	6	13	-	1.372 M								-	-
V-1	6	10	-	610								-	-
V-2	6	16	-	1.219 M								-	-
S-1	4	10	3	860			286	286	203	203	705	45	-
TB-1	4	13	17	2.350 M	699	1.689 M						90	-

REBAR SCHEDULE - 1.524 M x 1.524 M x 1.829 M TOP UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	6	13	-	1.372 M								-	-
V-1	10	10	-	610								-	-
V-2	6	16	-	1.372 M								-	-
S-1	4	10	3	860			286	286	203	203	705	45	-
TB-1	4	13	17	2.350 M	699	1.689 M						90	-

DESIGNER:  
**THE NEEL COMPANY**  
8328-D THORNTON LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: 1703/913-7858  
FX: 1703/913-7859

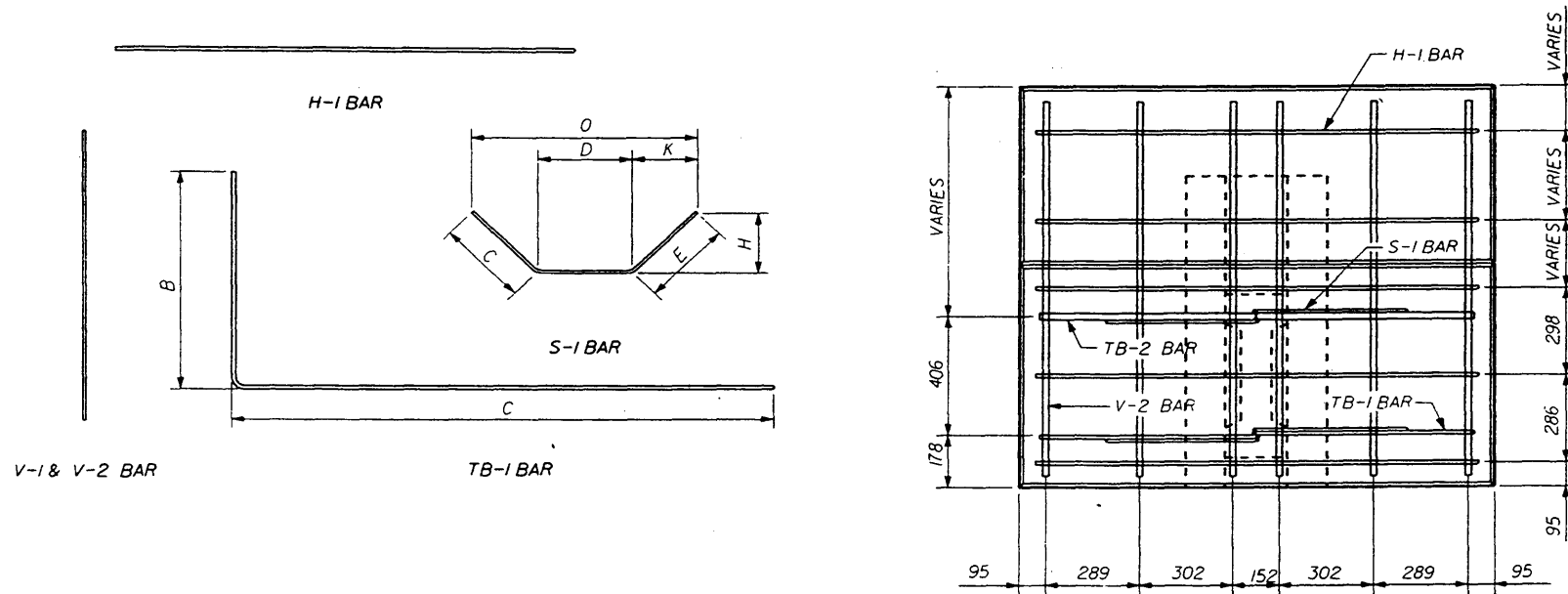
PRECASTER:  
**OLDCASTLE PRECAST, INC.**  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: 1904/778-2990  
FX: 1904/778-2992

NOTE: ALL STEEL REINFORCING BARS SHALL HAVE 75 MIN. CONCRETE COVER

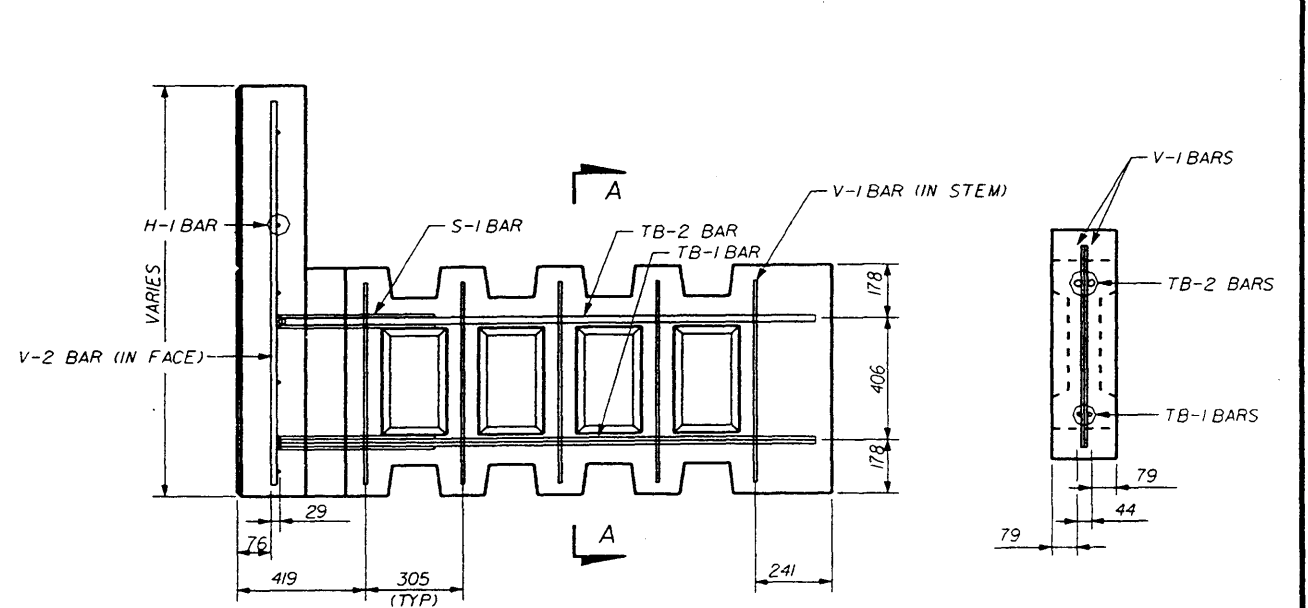
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

### RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (75 MM COVER)

Names	Dates	Approved By
Designed By JMC	10/01/98	<i>William J. Hink</i> State Structures Design Engineer
Drawn By CAA	10/01/98	
Checked By JMC	10/01/98	Revision 00
		Sheet No. 14 of 20
		Index No. 5010



FRONT VIEW  
(V-1 BARS IN STEM OMITTED FOR CLARITY)



SIDE VIEW

SECTION A-A

REBAR SCHEDULE - 1.676 M x 1.524 M x 2.438 M TOP UNIT

MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	6	13	-	1.372 M								-	
V-1	14	10	-	610								-	
V-2	6	19	-	1.524 M								-	
S-1	4	10	3	838		229	381	229	137	137	654	45	
TB-1	4	19	17	2.959 M	699	2.299 M						90	

REBAR SCHEDULE - 1.829 M x 1.524 M x 2.438 M TOP UNIT

MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	7	13	-	1.372 M								-	
V-1	14	10	-	610								-	
V-2	6	19	-	1.676 M								-	
S-1	4	10	3	838		229	381	229	137	137	654	45	
TB-1	4	19	17	2.959 M	699	2.299 M						90	

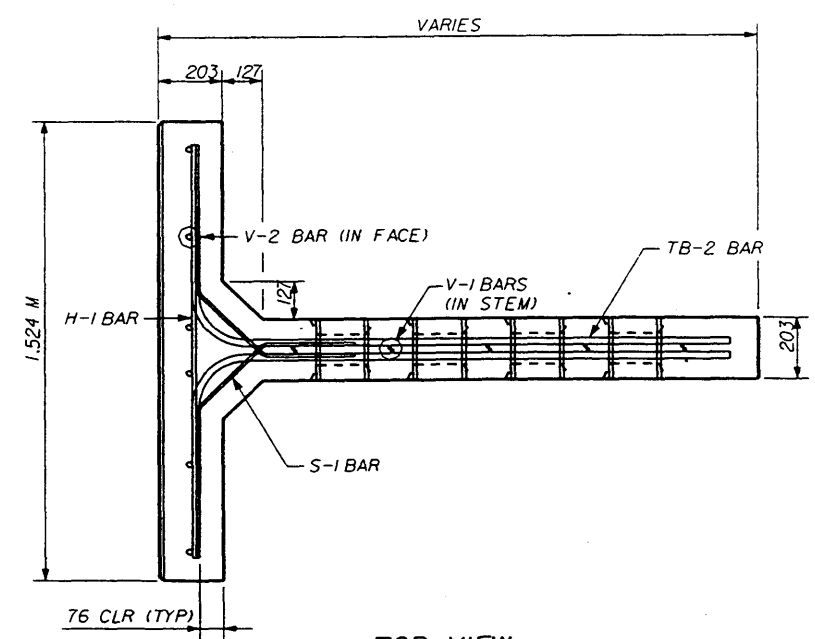
REBAR SCHEDULE - 1.981 M x 1.524 M x 2.438 M TOP UNIT

MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	7	13	-	1.372 M								-	
V-1	14	10	-	610								-	
V-2	6	19	-	1.829 M								-	
S-1	4	10	3	838		229	381	229	137	137	654	45	
TB-1	4	19	17	2.959 M	699	2.299 M						90	

REBAR SCHEDULE - 2.134 M x 1.524 M x 2.438 M TOP UNIT

MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	8	13	-	1.372 M								-	
V-1	14	10	-	610								-	
V-2	6	19	-	1.981 M								-	
S-1	4	10	3	838		229	381	229	137	137	654	45	
TB-1	4	19	17	2.959 M	699	2.299 M						90	

THESE TWO UNITS WILL ONLY BE USED BY APPROVAL OF THE F.D.O.T. STRUCTURES DESIGN OFFICE ON A PROJECT BY PROJECT BASIS.



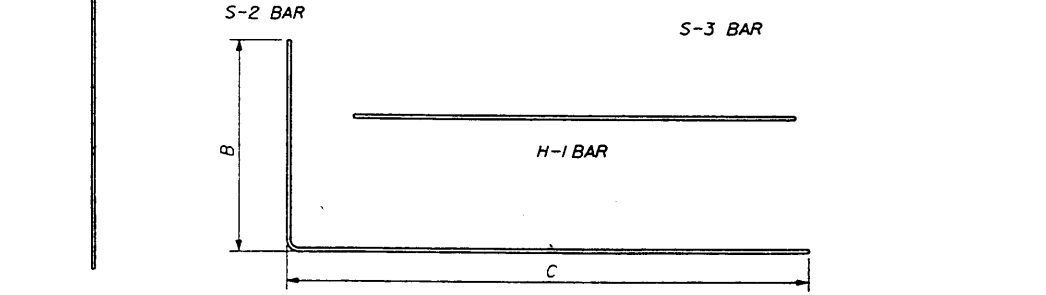
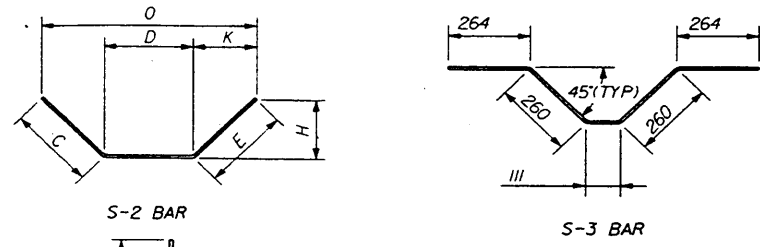
TOP VIEW  
REINFORCING STEEL - TOP UNITS (II)

DESIGNER:  
**THE NEEL COMPANY**  
8320-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7850  
FX: (703) 913-7859

PRECASTER:  
**OLDCASTLE PRECAST, INC**  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (904) 778-2992

NOTE: ALL STEEL REINFORCING BARS SHALL HAVE 75 MIN. CONCRETE COVER

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY (75 MM COVER)				
Designed By	JMC	10/01/96	Approved By	<i>William H. [Signature]</i> State Structures Design Engineer
Drawn By	CAA	10/01/96	Revision	Sheet No. Index No.
Checked By	JMC	10/01/96	00	15 of 20 5010



VI, V-2 & V-3 BAR

REBAR SCHEDULE - 2,286 M x 1,524 M x 3,048 M TOP UNIT

MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	F	H	K	O	ANGLE	REMARKS
H-1	8	13	-	1,372 M								-	-
V-1	18	10	-	610								-	-
V-2	6	19	-	2,134 M								-	-
V-3	4	19	-	1,829 M								-	-
S-2	4	10	3	864	264	365	264	191	191	7.37	45	-	-
S-3	8	10	3	1,006 M								-	SEE BENDING DET
TB-1	4	22	IT	3,534 M	667	2,918 M						90	-

REBAR SCHEDULE - 2,438 M x 1,524 M x 3,048 M TOP UNIT

MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	F	H	K	O	ANGLE	REMARKS
H-1	8	13	-	1,372 M								-	-
V-1	18	10	-	610								-	-
V-2	6	19	-	2,286 M								-	-
V-3	4	19	-	1,981 M								-	-
S-2	4	10	3	864	264	365	264	191	191	7.37	45	-	-
S-3	9	10	3	1,006 M								-	SEE BENDING DET
TB-1	4	22	IT	3,534 M	667	2,918 M						90	-

REBAR SCHEDULE - 2,591 M x 1,524 M x 3,048 M TOP UNIT

MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	F	H	K	O	ANGLE	REMARKS
H-1	8	13	-	1,372 M								-	-
V-1	18	10	-	610								-	-
V-2	6	19	-	2,438 M								-	-
V-3	4	19	-	2,134 M								-	-
S-2	4	10	3	864	264	365	264	191	191	7.37	45	-	-
S-3	10	10	3	1,006 M								-	SEE BENDING DET
TB-1	4	22	IT	3,534 M	667	2,918 M						90	-

REBAR SCHEDULE - 2,743 M x 1,524 M x 3,658 M TOP UNIT

MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	F	H	K	O	ANGLE	REMARKS
H-1	8	13	-	1,372 M								-	-
V-1	22	10	-	610								-	-
V-2	6	19	-	2,591 M								-	-
V-3	4	19	-	2,286 M								-	-
S-2	4	10	3	864	264	365	264	191	191	7.37	45	-	-
S-3	11	10	3	1,006 M								-	SEE BENDING DET
TB-1	4	22	IT	4,143 M	667	3,527 M						90	-

REBAR SCHEDULE - 2,896 M x 1,524 M x 3,658 M TOP UNIT

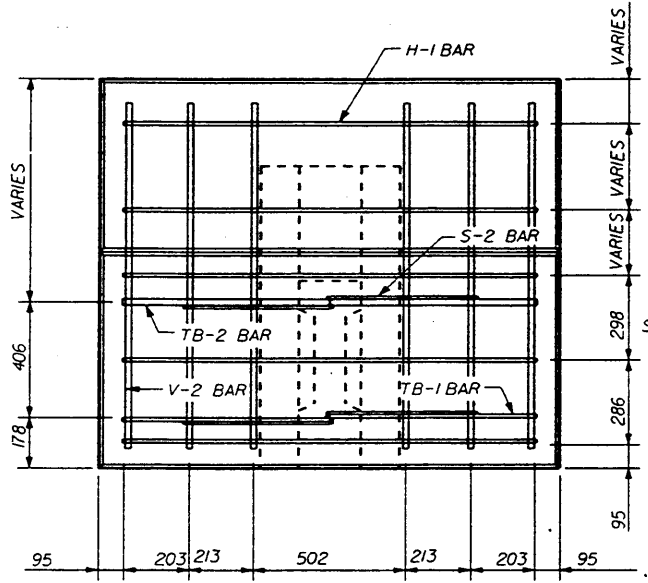
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	F	H	K	O	ANGLE	REMARKS
H-1	8	13	-	1,372 M								-	-
V-1	22	10	-	610								-	-
V-2	6	19	-	2,743 M								-	-
V-3	4	19	-	2,438 M								-	-
S-2	4	10	3	864	264	365	264	191	191	7.37	45	-	-
S-3	12	10	3	1,006 M								-	SEE BENDING DET
TB-1	4	22	IT	4,143 M	667	3,527 M						90	-

REBAR SCHEDULE - 3,048 M x 1,524 M x 3,658 M TOP UNIT

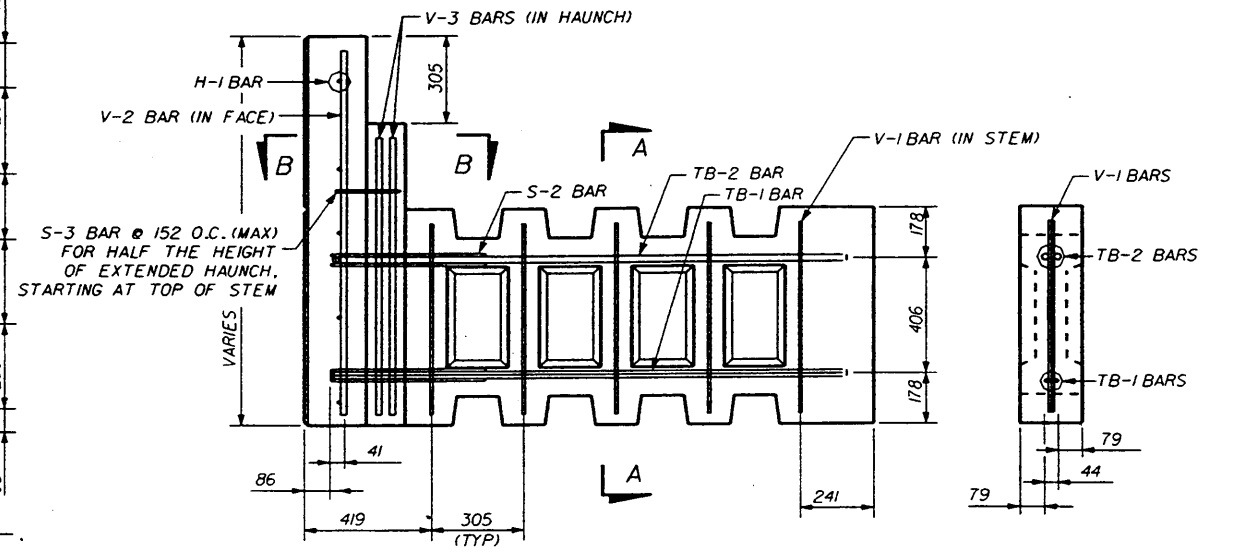
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	F	H	K	O	ANGLE	REMARKS
H-1	8	13	-	1,372 M								-	-
V-1	22	10	-	610								-	-
V-2	6	19	-	2,896 M								-	-
V-3	4	19	-	2,591 M								-	-
S-2	4	10	3	864	264	365	264	191	191	7.37	45	-	-
S-3	13	10	3	1,006 M								-	SEE BENDING DET
TB-1	4	22	IT	4,143 M	667	3,527 M						90	-

REBAR SCHEDULE - 3,200 M x 1,524 M x 3,658 M TOP UNIT

MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	F	H	K	O	ANGLE	REMARKS
H-1	8	13	-	1,372 M								-	-
V-1	22	10	-	610								-	-
V-2	6	19	-	3,048 M								-	-
V-3	4	19	-	2,743 M								-	-
S-2	4	10	3	864	264	365	264	191	191	7.37	45	-	-
S-3	14	10	3	1,006 M								-	SEE BENDING DET
TB-1	4	22	IT	4,143 M	667	3,527 M						90	-

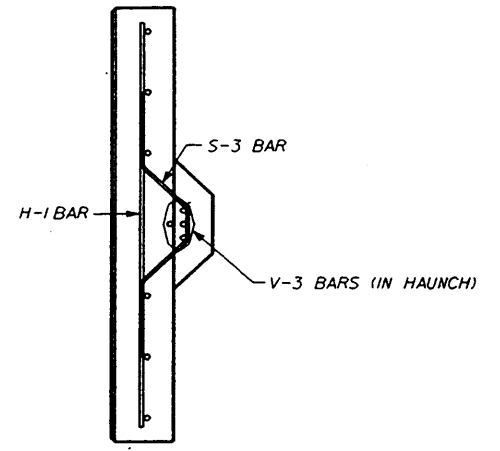


FRONT VIEW  
(V-1 BARS IN STEM AND V-3 BARS IN HAUNCH OMITTED FOR CLARITY)

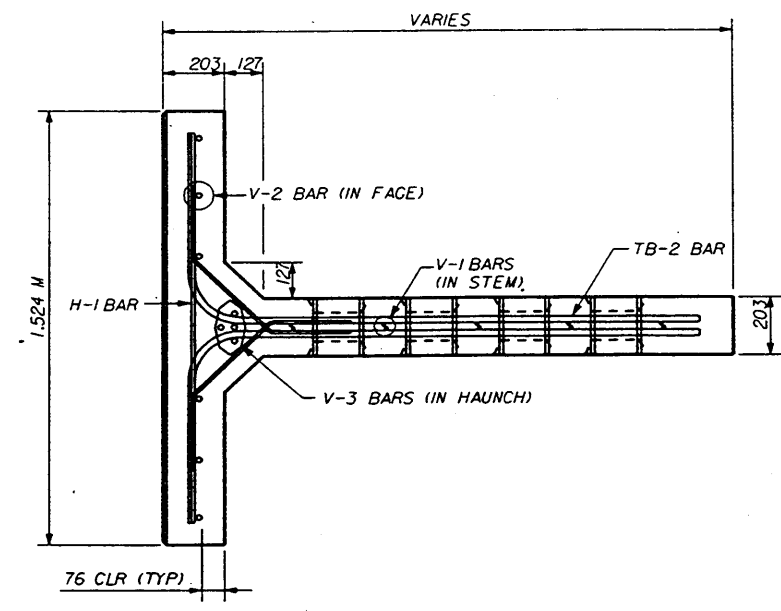


SIDE VIEW

SECTION A-A



SECTION B-B



TOP VIEW  
S-3 BARS IN EXTENDED HAUNCH OMITTED FOR CLARITY

REINFORCING STEEL - TOP UNITS (III)

1. ALL UNITS ON THIS SHEET WILL ONLY BE USED BY APPROVAL OF THE F.D.D.T. STRUCTURES DESIGN OFFICE ON A PROJECT BY PROJECT BASIS.

DESIGNER: **THE NEEL COMPANY**  
8328-D TINDALED LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859

PRECASTER: **OLDCASTLE PRECAST, INC.**  
11643 183rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (904) 778-2992

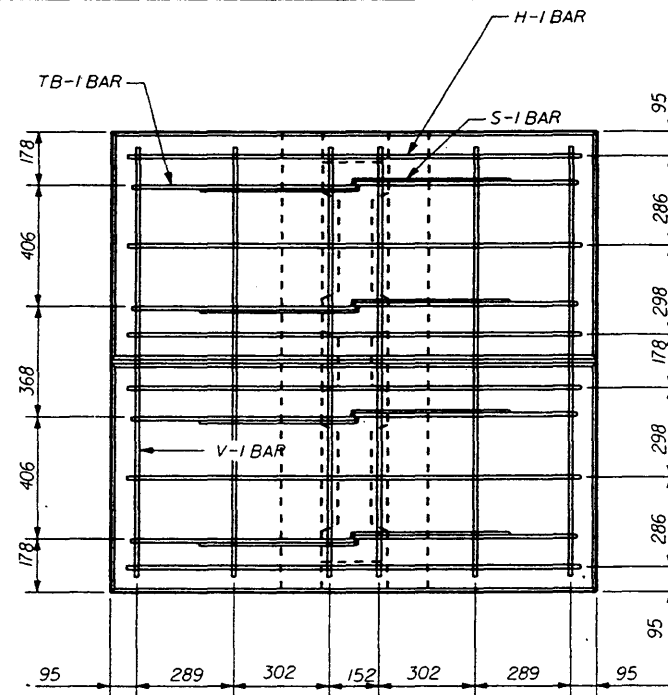
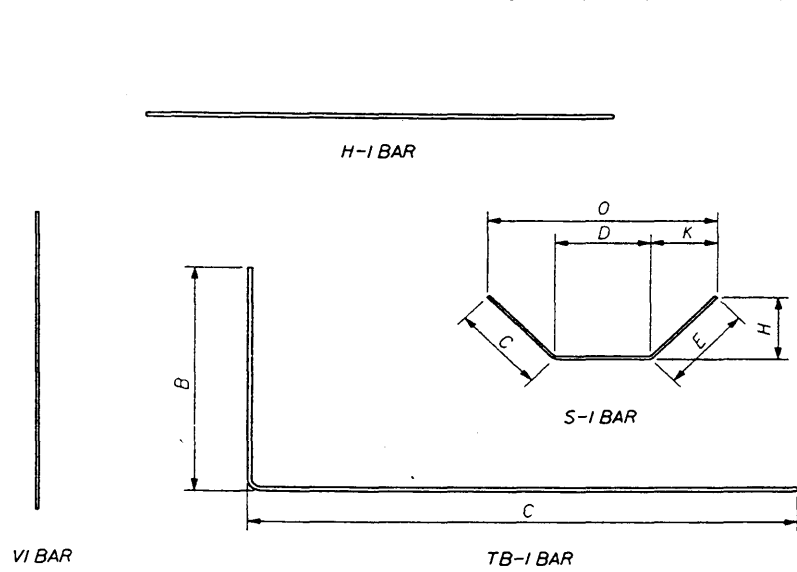
NOTE: ALL STEEL REINFORCING BARS SHALL HAVE 75 MIN. CONCRETE COVER

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

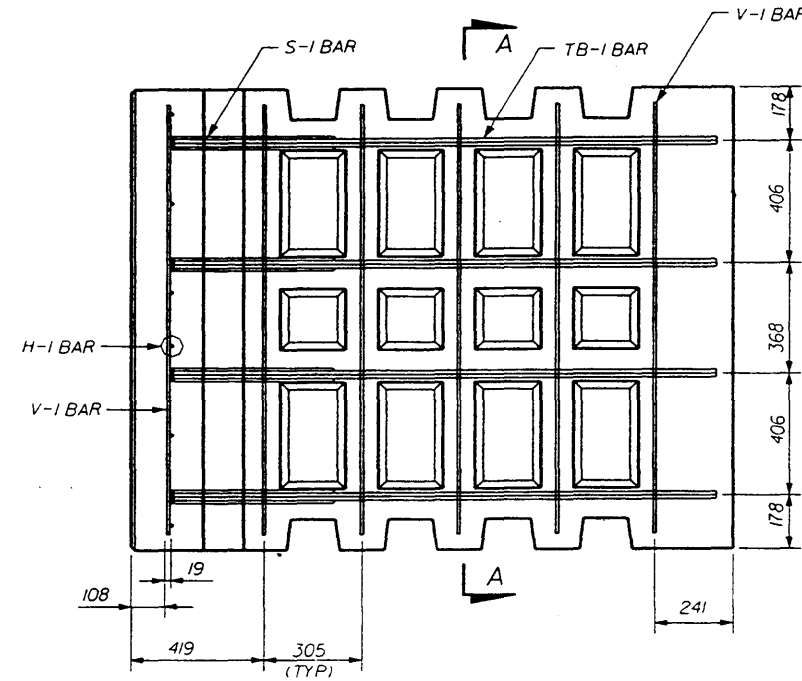
**RETAINING WALL SYSTEM  
THE NEEL COMPANY T-WALL  
(75 MM COVER)**

Designed By	JMC	10/01/98	Approved By	<i>Wilhelm H. Volk</i> State Structures Design Engineer	
Drawn By	CAA	10/01/98	Revision		Sheet No.
Checked By	JMC	10/01/98	00	16 of 20	Index No. 5010

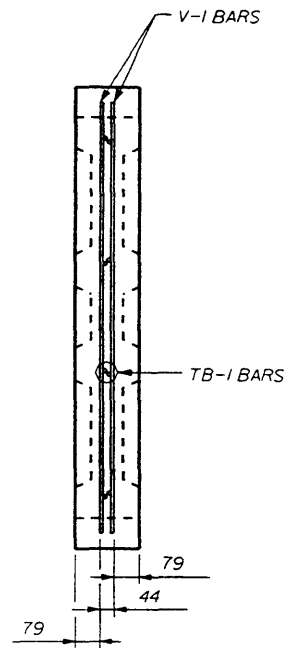




FRONT VIEW  
(V-I BARS IN STEM OMITTED FOR CLARITY)



SIDE VIEW



SECTION A-A

REBAR SCHEDULE - 1.524 M x 1.524 M x 1.219 M DBL UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	6	13	-	1.372 M									
V-1	12	10	-	1.372 M									
S-1	8	10	3	860		286	286	286	203	203	705	45	
TB-1	8	13	17	1,740 M	699	1,080 M						90	

REBAR SCHEDULE - 1.524 M x 1.524 M x 1.829 M DBL UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	6	13	-	1.372 M									
V-1	16	10	-	1.372 M									
S-1	8	10	3	860		286	286	286	203	203	705	45	
TB-1	8	13	17	2,350 M	699	1,689 M						90	

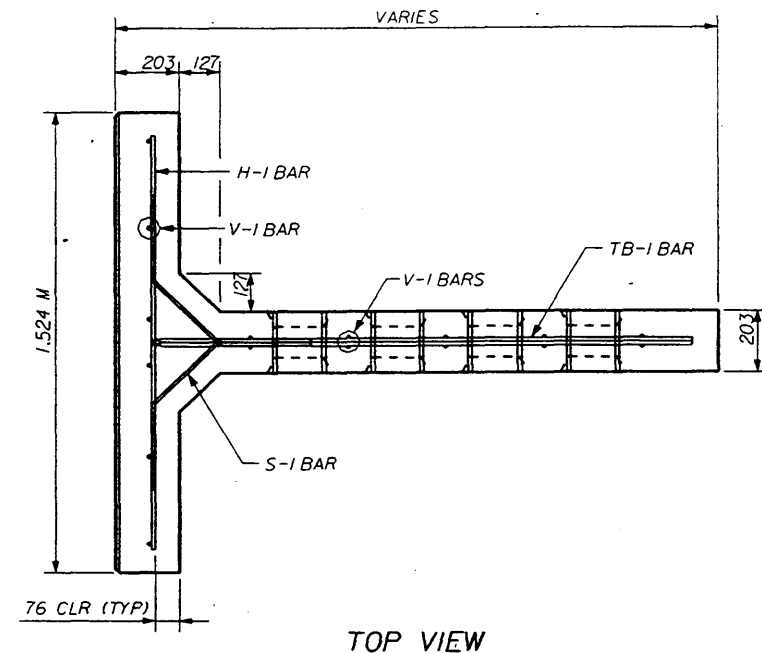
REBAR SCHEDULE - 1.524 M x 1.524 M x 2.438 M DBL UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	6	13	-	1.372 M									
V-1	20	10	-	1.372 M									
S-1	8	10	3	860		286	286	286	203	203	705	45	
TB-1	8	13	17	2,959 M	699	2,299 M						90	

REBAR SCHEDULE - 1.524 M x 1.524 M x 3.048 M DBL UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	6	13	-	1.372 M									
V-1	24	10	-	1.372 M									
S-1	8	10	3	860		286	286	286	203	203	705	45	
TB-1	8	13	17	3,569 M	699	2,908 M						90	

REBAR SCHEDULE - 1.524 M x 1.524 M x 3.658 M DBL UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	6	13	-	1.372 M									
V-1	26	10	-	1.372 M									
S-1	8	10	3	860		286	286	286	203	203	705	45	
TB-1	8	13	17	4,178 M	699	3,518 M						90	

REBAR SCHEDULE - 1.524 M x 1.524 M x 4.267 M DBL UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	6	13	-	1.372 M									
V-1	32	10	-	1.372 M									
S-1	8	10	3	860		286	286	286	203	203	705	45	
TB-1	8	13	17	4,788 M	699	4,128 M						90	

REBAR SCHEDULE - 1.524 M x 1.524 M x 4.877 M DBL UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	6	13	-	1.372 M									
V-1	36	10	-	1.372 M									
S-1	8	10	3	860		286	286	286	203	203	705	45	
TB-1	8	13	17	5,397 M	699	4,737 M						90	



TOP VIEW  
REINFORCING STEEL - DOUBLE UNITS

DESIGNER:



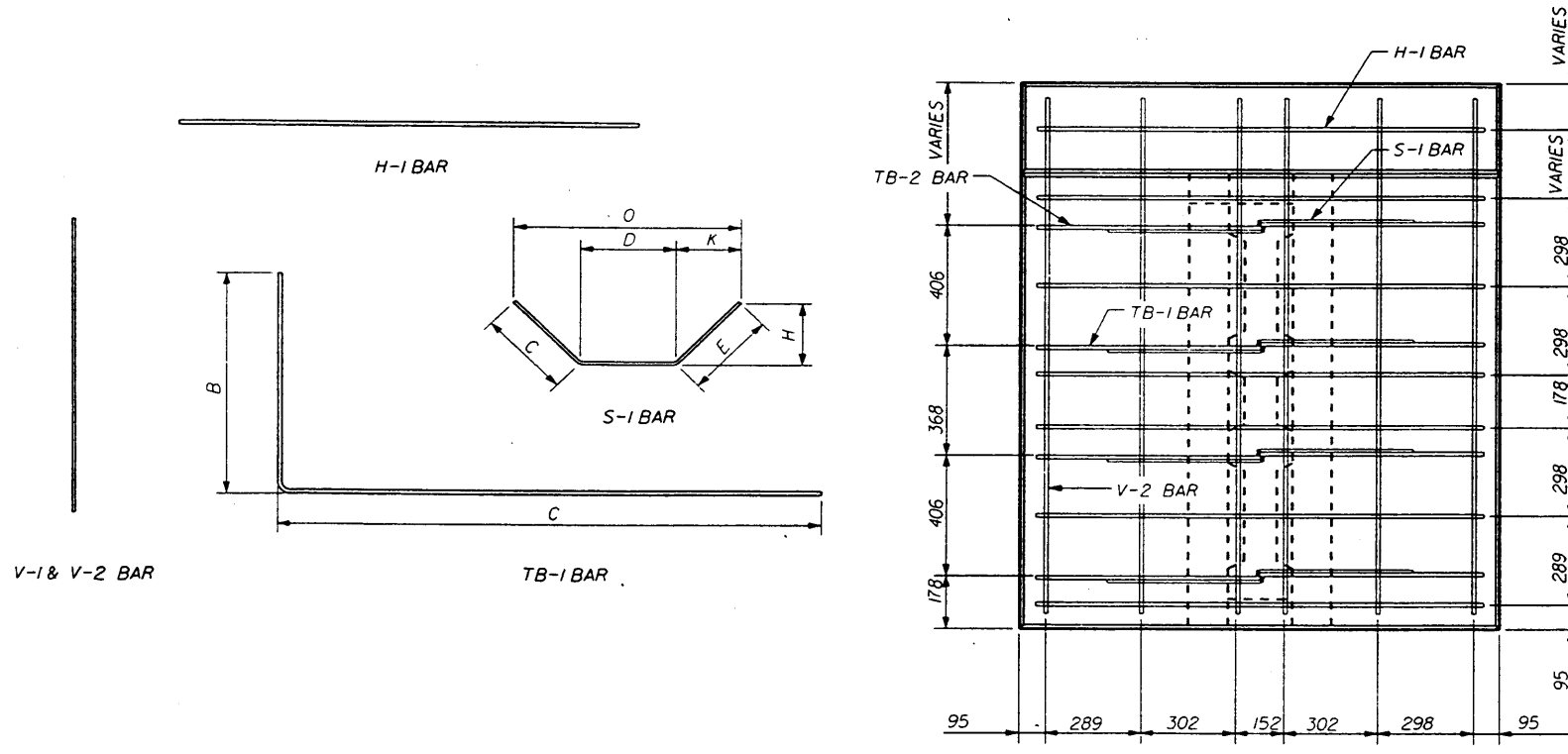
**THE NEEL COMPANY**  
8326-D 104TH LANE  
SPRINGFIELD, VIRGINIA 22152  
Ph: 1783 913-7858  
Fx: 1783 913-7859

PRECASTER:

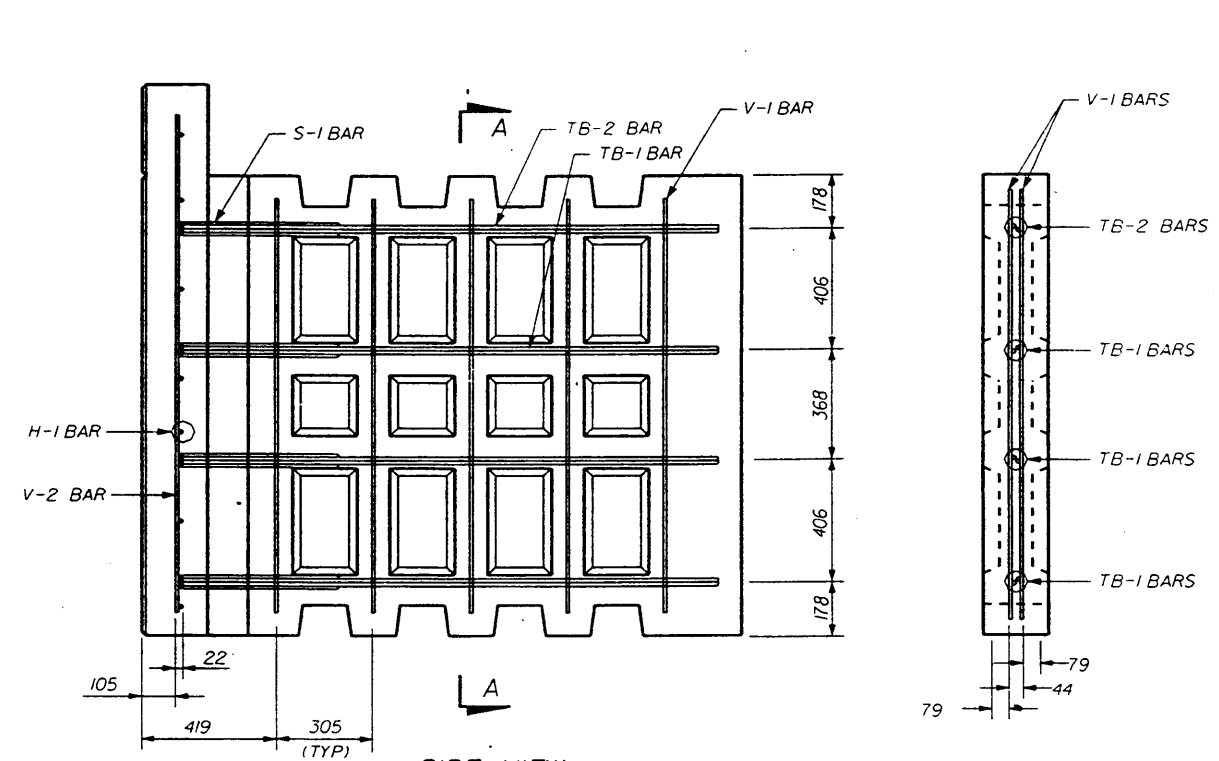
**OLDCASTLE PRECAST, INC.**  
11643 103RD STREET  
JACKSONVILLE, FL 32210  
Ph: 1964 778-2990  
Fx: 1964 778-2992

NOTE: ALL STEEL REINFORCING BARS SHALL HAVE 75 MIN. CONCRETE COVER

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION						
ROAD DESIGN						
RETAINING WALL SYSTEM						
THE NEEL COMPANY T-WALL						
(75 MM COVER)						
Desiged By	Names	Dates	Approved By			
JMC	JMC	10/01/98	<i>William H. [Signature]</i> State Structures Design Engineer			
Drawn By	Checked By	Revision	Sheet No.	Index No.		
CAA	JMC	00	17 of 20	5010		

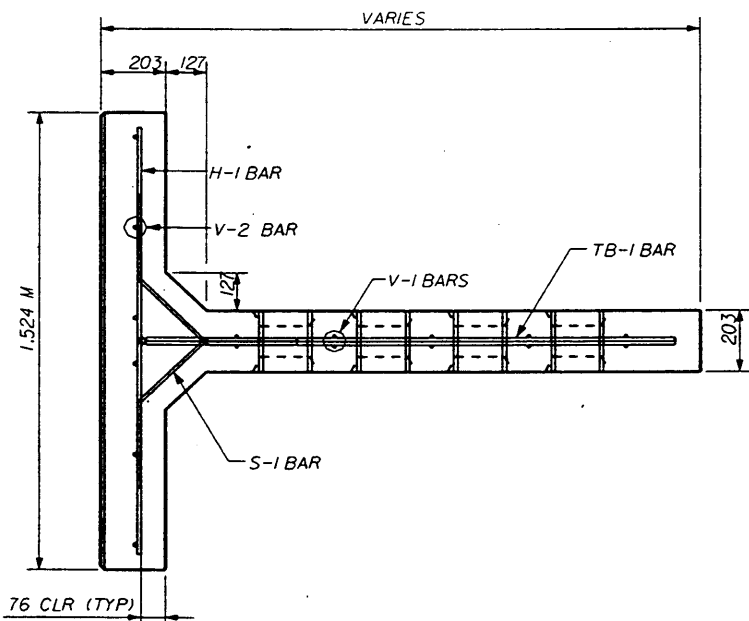


FRONT VIEW  
(V-1 BARS IN STEM OMITTED FOR CLARITY)



SIDE VIEW

SECTION A-A



TOP VIEW

REINFORCING STEEL - DOUBLE TOP UNITS (I)

REBAR SCHEDULE - 1.676 M x 1.524 M x 1.829 M DBL TOP UNIT												
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE REMARKS
H-1	6	13	-	1.372 M								
V-1	10	10	-	1.372 M								
V-2	6	10	-	1.524 M								
S-1	8	3	3	860		286	286	286	203	203	705	45
TB-1	8	16	17	2.350 M	699	1.689 M						90

REBAR SCHEDULE - 1.829 M x 1.524 M x 1.829 M DBL TOP UNIT												
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE REMARKS
H-1	7	13	-	1.372 M								
V-1	10	10	-	1.372 M								
V-2	6	16	-	1.676 M								
S-1	8	10	3	860		286	286	286	203	203	705	45
TB-1	8	16	17	2.350 M	699	1.689 M						90

REBAR SCHEDULE - 1.981 M x 1.524 M x 1.829 M DBL TOP UNIT												
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE REMARKS
H-1	7	13	-	1.372 M								
V-1	10	10	-	1.372 M								
V-2	6	16	-	1.829 M								
S-1	8	10	3	860		286	286	286	203	203	705	45
TB-1	8	16	17	2.350 M	699	1.689 M						90

REBAR SCHEDULE - 2.134 M x 1.524 M x 1.829 M DBL TOP UNIT												
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE REMARKS
H-1	8	13	-	1.372 M								
V-1	10	10	-	1.372 M								
V-2	6	16	-	1.981 M								
S-1	8	10	3	860		286	286	286	203	203	705	45
TB-1	8	16	17	2.350 M	699	1.689 M						90

REBAR SCHEDULE - 2.286 M x 1.524 M x 1.829 M DBL TOP UNIT												
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE REMARKS
H-1	8	13	-	1.372 M								
V-1	10	10	-	1.372 M								
V-2	6	16	-	2.134 M								
S-1	8	10	3	860		286	286	286	203	203	705	45
TB-1	8	16	17	2.350 M	699	1.689 M						90

DESIGNER:  

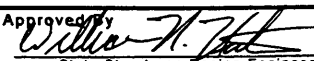
**THE NEEL COMPANY**  
 8328-D TRAFORD LANE  
 SPRINGFIELD, VIRGINIA 22152  
 PH: (703) 913-7858  
 FX: (703) 913-7859

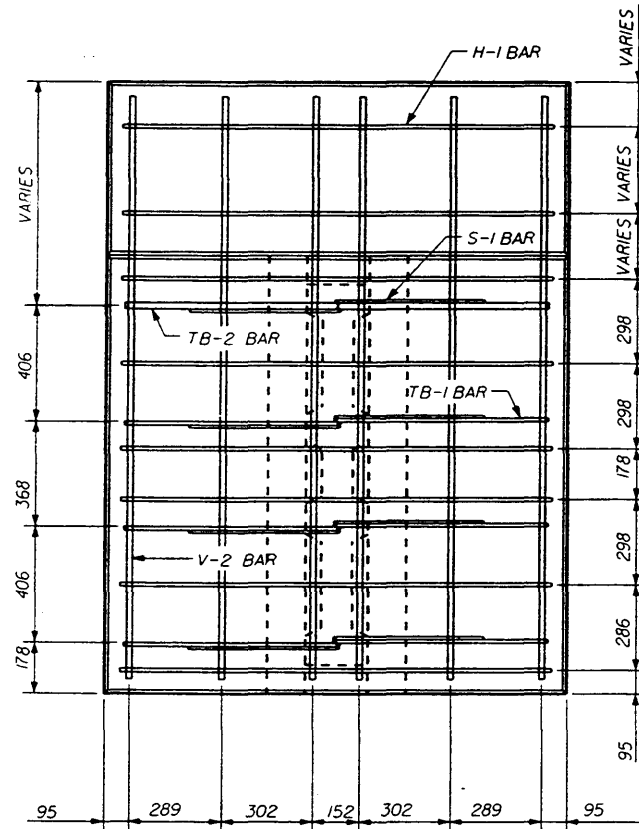
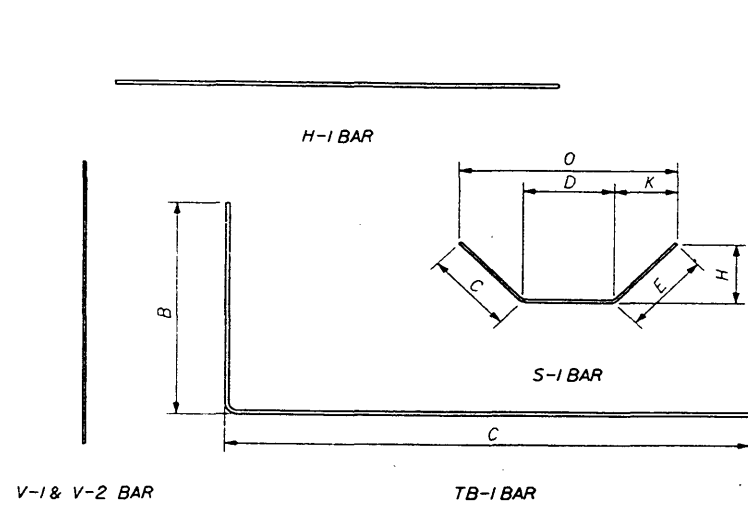
PRECASTER:  
**OLDCASTLE PRECAST, INC.**  
 11643 103rd STREET  
 JACKSONVILLE, FL 32219  
 PH: (904) 778-2990  
 FX: (904) 778-2992

NOTE: ALL STEEL REINFORCING BARS SHALL HAVE 75 MIN. CONCRETE COVER

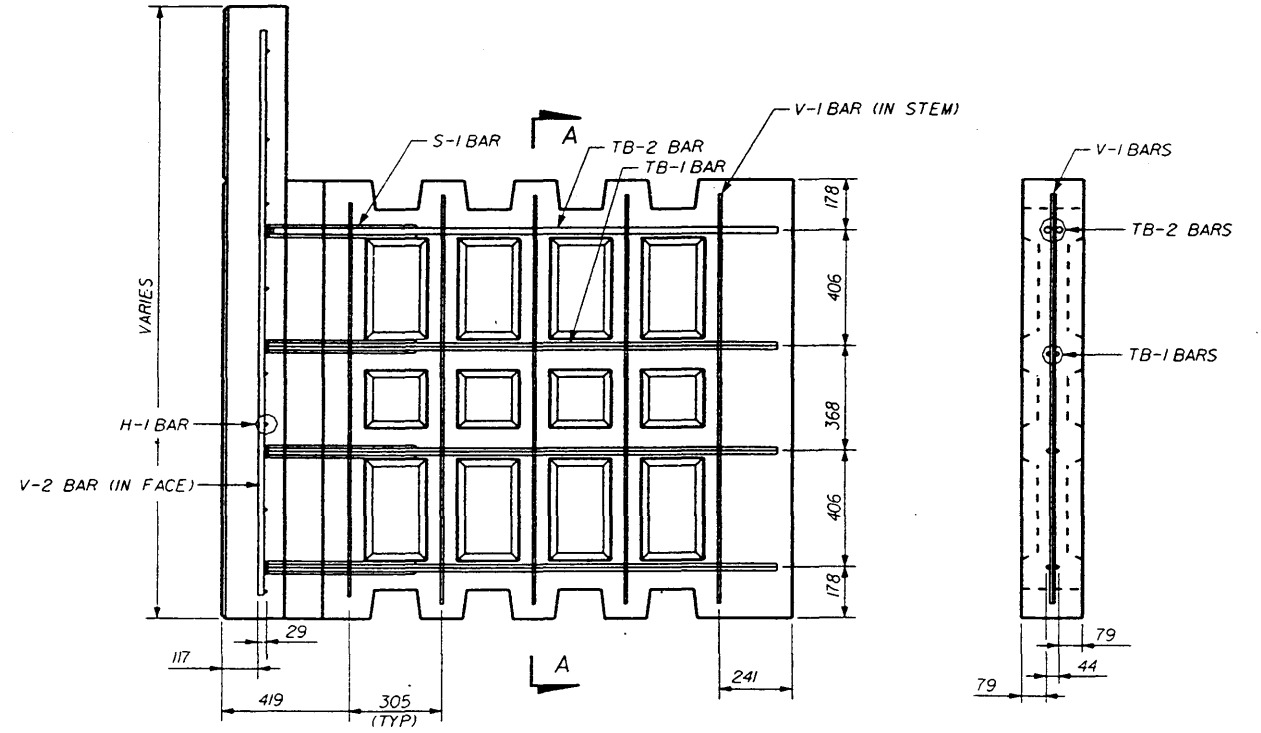
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
 ROAD DESIGN

**RETAINING WALL SYSTEM  
 THE NEEL COMPANY T-WALL  
 (75 MM COVER)**

Designed By	JMC	10/01/98	Approved By		
Drawn By	CAA	10/01/98	Revision	Sheet No.	Index No.
Checked By	JMC	10/01/98	00	18 of 20	5010



FRONT VIEW  
(V-1 BARS IN OMITTED FOR CLARITY)



SIDE VIEW

SECTION A-A

REBAR SCHEDULE - 2.438 M x 1.524 M x 2.438 M DBL TOP UNIT

MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	9	15	-	1.372 M								-	
V-1	14	10	-	1.372 M								-	
V-2	6	19	-	2.286 M								-	
S-1	8	10	3	838			229	381	229	137	137	45	
TB-1	8	19	17	2.959 M	699	2.299 M						90	

REBAR SCHEDULE - 2.591 M x 1.524 M x 2.438 M DBL TOP UNIT

MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	9	15	-	1.372 M								-	
V-1	14	10	-	1.372 M								-	
V-2	6	19	-	2.438 M								-	
S-1	8	10	3	838			229	381	229	137	137	45	
TB-1	8	19	17	2.959 M	699	2.299 M						90	

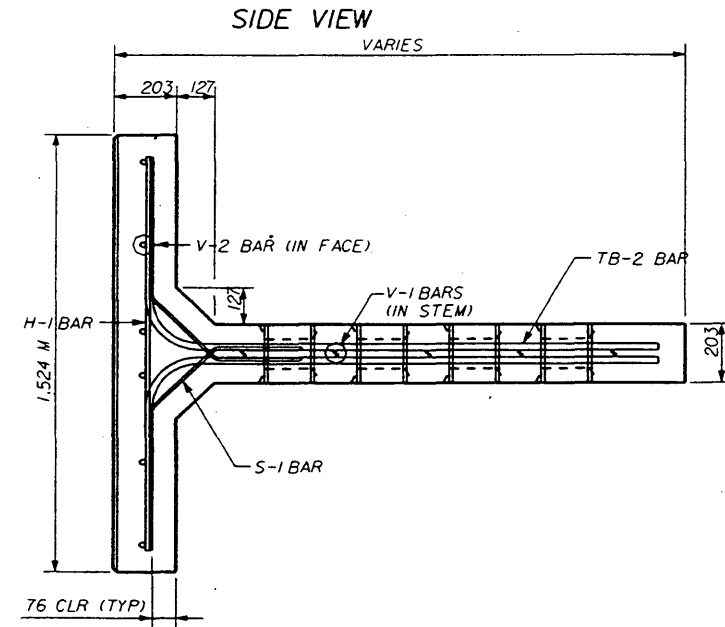
REBAR SCHEDULE - 2.743 M x 1.524 M x 2.438 M DBL TOP UNIT

MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	10	15	-	1.372 M								-	
V-1	14	10	-	1.372 M								-	
V-2	6	19	-	2.591 M								-	
S-1	8	10	3	838			229	381	229	137	137	45	
TB-1	8	19	17	2.959 M	699	2.299 M						90	

REBAR SCHEDULE - 2.896 M x 1.524 M x 2.438 M DBL TOP UNIT

MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	10	15	-	1.372 M								-	
V-1	14	10	-	1.372 M								-	
V-2	6	19	-	2.743 M								-	
S-1	8	10	3	838			229	381	229	137	137	45	
TB-1	8	19	17	2.959 M	699	2.299 M						90	

THESE TWO UNITS WILL ONLY BE USED BY APPROVAL OF THE F.D.O.T. STRUCTURES DESIGN OFFICE ON A PROJECT BY PROJECT BASIS.



TOP VIEW  
REINFORCING STEEL - DOUBLE TOP UNITS (II)

DESIGNER:



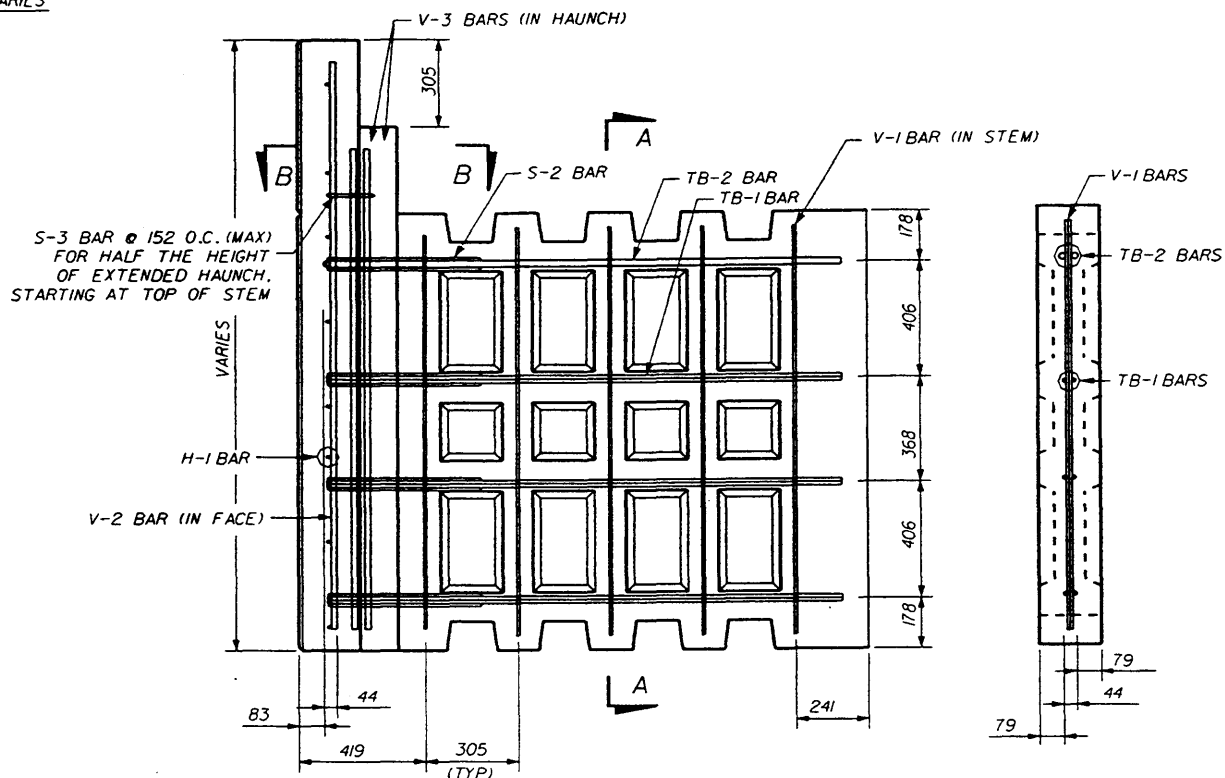
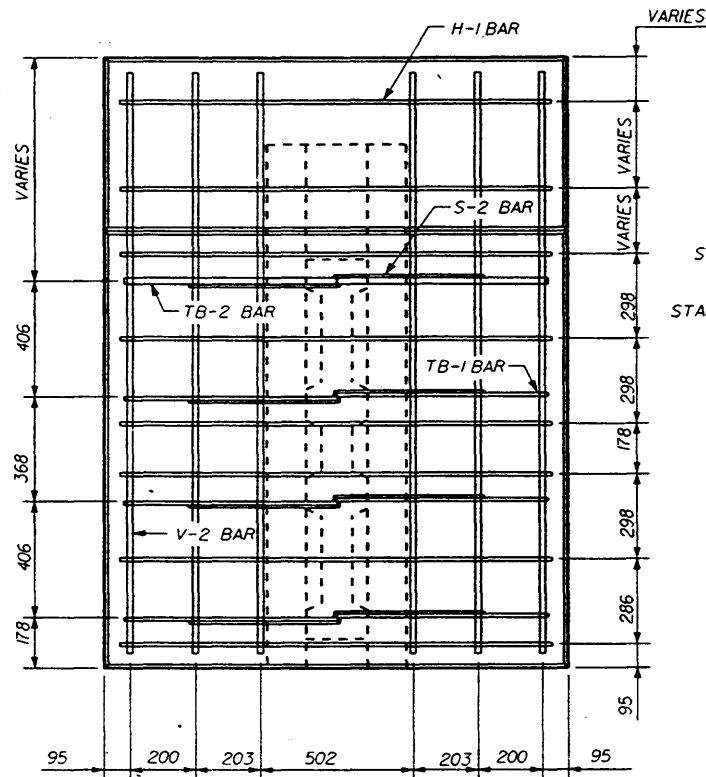
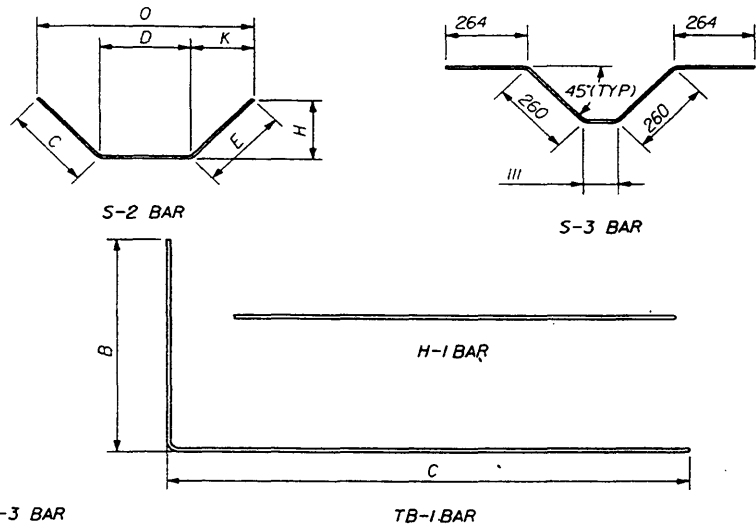
**THE NEEL COMPANY**  
8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859

PRECASTER:

**OLDCASTLE PRECAST, INC**  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (904) 778-2992

NOTE: ALL STEEL REINFORCING BARS SHALL HAVE 75 MIN. CONCRETE COVER

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY (75 MM COVER)				
Designed By	Names	Dates	Approved By	Index No.
JMC	JMC	10/01/98	<i>William J. Neel</i>	5010
Drawn By	Names	Dates	Revision	Sheet No.
CAA	CAA	10/01/98	00	19 of 20
Checked By	Names	Dates	Revision	Sheet No.
JMC	JMC	10/01/98	00	19 of 20



**FRONT VIEW**  
(V-1 BARS IN STEM AND V-3 BARS  
IN HAUNCH OMITTED FOR CLARITY)

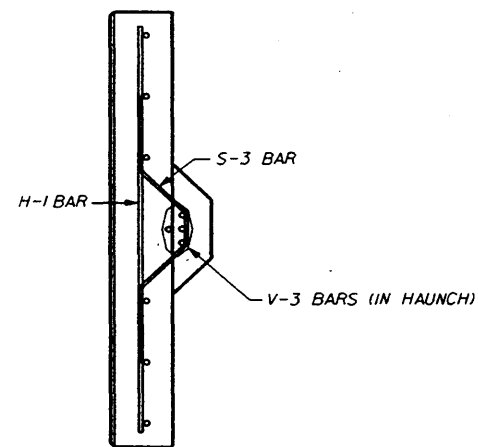
**SECTION A-A**

REBAR SCHEDULE - 3.048 M x 1.524 M x 3.048 M DBL TOP UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	11	13	-	1.372 M									
V-1	18	10	-	1.372 M									
V-2	6	19	-	2.836 M									
V-3	4	19	-	2.591 M									
S-2	8	10	3	864	264	365	264	191	191	7.37	45		SEE BENDING DTL
S-3	8	10	3	1,006 M									
TB-1	8	22	17	3.534	666	2.918 M						90	

REBAR SCHEDULE - 3.200 M x 1.524 M x 3.048 M DBL TOP UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	11	13	-	1.372 M									
V-1	18	10	-	1.372 M									
V-2	6	19	-	3.048 M									
V-3	4	19	-	2.743 M									
S-2	8	10	3	864	264	365	264	191	191	7.37	45		SEE BENDING DTL
S-3	8	10	3	1,006 M									
TB-1	8	22	17	3.534	666	2.918 M						90	

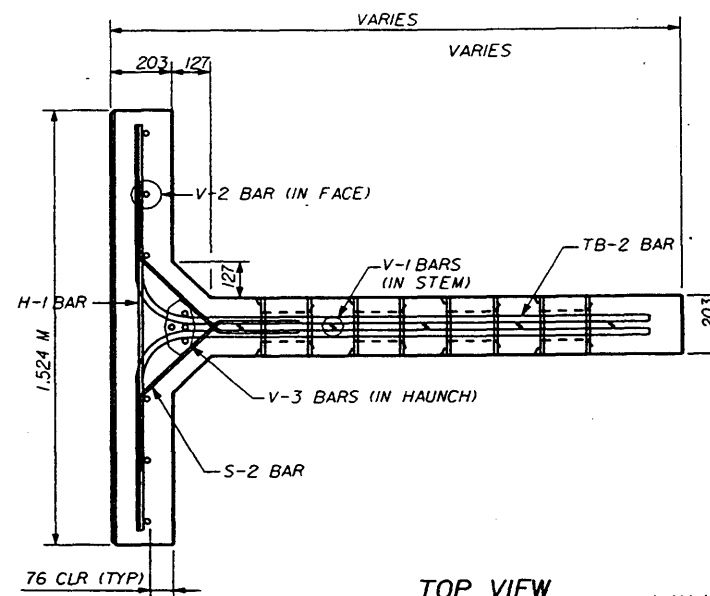
REBAR SCHEDULE - 3.353 M x 1.524 M x 3.048 M DBL TOP UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	12	13	-	1.372 M									
V-1	18	10	-	1.372 M									
V-2	6	19	-	3.200 M									
V-3	4	19	-	2.836 M									
S-2	8	10	3	864	264	365	264	191	191	7.37	45		SEE BENDING DTL
S-3	10	10	3	1,006 M									
TB-1	8	22	17	3.534	666	2.918 M						90	

REBAR SCHEDULE - 3.505 M x 1.524 M x 3.048 M DBL TOP UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	12	13	-	1.372 M									
V-1	18	10	-	1.372 M									
V-2	6	19	-	3.353 M									
V-3	4	19	-	3.048 M									
S-2	8	10	3	864	264	365	264	191	191	7.37	45		SEE BENDING DTL
S-3	11	10	3	1,006 M									
TB-1	8	22	17	3.534	666	2.918 M						90	



**SECTION B-B**

**REINFORCING STEEL - DOUBLE TOP UNITS (III)**



**TOP VIEW**  
S-3 BARS IN EXTENDED HAUNCH  
OMITTED FOR CLARITY

1. ALL UNITS ON THIS SHEET WILL ONLY BE USED BY  
APPROVAL OF THE F.D.O.T. STRUCTURES DESIGN  
OFFICE ON A PROJECT BY PROJECT BASIS.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**RETAINING WALL SYSTEM**  
**THE NEEL COMPANY T-WALL**  
**(75 MM COVER)**

Names	Dates	Approved By			
Designed By	JMC	10/01/98	 State Structured Design Engineer		
Drawn By	CAA	10/01/98			
Checked By	JMC	10/01/98	Revision	Sheet No.	Index No.
			00	20 of 20	5010

**DESIGNER:**  
**THE NEEL COMPANY**  
8320-D TONYOND LAKE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7850  
FX: (703) 913-7859

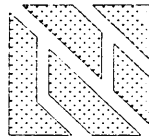
**PRECASTER:**  
**OLDCASTLE PRECAST, INC**  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (904) 778-2992

NOTE: ALL STEEL REINFORCING BARS SHALL HAVE 75 MIN. CONCRETE COVER

# STANDARD DETAILS FOR 50 CONCRETE COVER

## T-WALL® RETAINING WALL SYSTEM

### DESIGNER



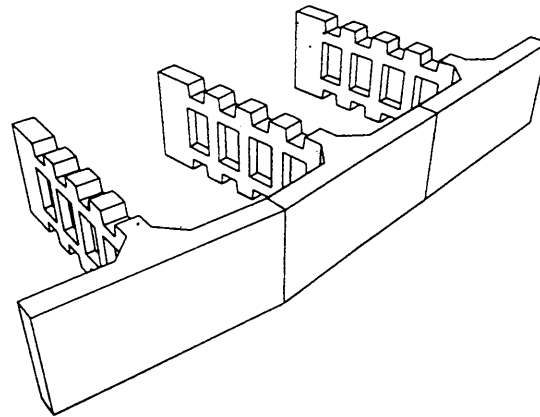
#### THE NEEL COMPANY

8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859

### PRECASTER

#### OLDCASTLE PRECAST, INC.

11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (904) 778-2992



#### MISCELLANEOUS NOTES:

1. DESIGNER:  
THE NEEL COMPANY  
8328-D TRAFORD LANE  
SPRINGFIELD, VA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859
2. PRECASTER:  
OLDCASTLE PRECAST, INC.  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (904) 778-2992
3. MATERIALS SUPPLIED BY PRECASTER:  
-PRECAST T-WALL UNITS  
-PRECAST SHEAR KEYS  
-HORIZONTAL JOINT MATERIAL  
-VERTICAL JOINT MATERIAL AND ADHESIVE  
-SHEAR KEY JOINT MATERIAL

#### DESIGN NOTES:

1. DESIGN IS BASED ON THE ASSUMPTION THAT THE MATERIAL WITHIN THE RETAINING WALL VOLUME, METHODS OF CONSTRUCTION, AND QUALITY OF PREFABRICATED MATERIALS SHALL CONFORM TO SPEC SECTION 548 - RETAINING WALL SYSTEMS.
2. SOIL PARAMETERS:  
-SEE WALL CONTROL DRAWINGS FOR SOIL CHARACTERISTICS OF FOUNDATION MATERIAL TO BE USED IN THE DESIGN OF THE WALL SYSTEM. THE CONTRACTOR SHALL PROVIDE SOIL DESIGN PARAMETERS FOR BACKFILL MATERIAL BASED ON THE ACTUAL SOIL CHARACTERISTICS UTILIZED AT THE SITE. THE VALUE OF  $\phi$ ,  $c$  AND  $\gamma$  SHALL BE PROVIDED IN THE SHOP DRAWINGS.
3. FACTORS OF SAFETY:  
-OVERTURNING - 2.0  
-SLIDING - 1.5  
-INTERNAL PULLOUT - 1.5  
-BEARING CAPACITY - 2.5  
-OVERALL STABILITY - 1.5
4. DIMENSIONS  
ALL DIMENSIONS ARE IN MILLIMETERS (MM) UNLESS OTHERWISE NOTED.
5. THE DESIGN CONTAINED ON THESE DRAWINGS IS BASED ON INFORMATION PROVIDED BY THE OWNER. ON THE BASIS OF THIS INFORMATION, THE NEEL COMPANY IS RESPONSIBLE FOR INTERNAL STABILITY OF THE STRUCTURE ONLY. EXTERNAL STABILITY DESIGN, INCLUDING FOUNDATION AND SLOPE STABILITY, IS THE RESPONSIBILITY OF OTHERS.
6. PANELS WITH CANTILEVERED (EXTENDED) FACE SHALL ONLY BE USED TO AVOID OBSTRUCTIONS AS APPROVED ON THE SHOP DRAWINGS.

#### MATERIALS NOTES:

1. PRECAST CONCRETE:  
-PRECAST T-WALL UNITS - PER SPEC SECTION 548  
-PRECAST SHEAR KEYS - PER SPEC SECTION 548
2. C.I.P. CONCRETE:  
-C.I.P. LEVELING PAD - PER SPEC SECTION 548  
-OTHER C.I.P. CONCRETE - PER SPEC SECTION 548
3. REINFORCING STEEL:  
-PER SPEC SECTION 548
4. JOINT MATERIAL:  
-HORIZONTAL JOINT FILLER:  
-13 x 101 x 1,524 M  
-PREFORMED EPDM  
-DIAMETER: 80 - 90  
-VERTICAL JOINT COVER:  
-TENSAR DC4205 OR EQUAL  
-305 WIDE x HEIGHT OF JOINT  
-GEOCOMPOSITE MEETING REQUIREMENTS OF SPEC SECTION 548  
-SHEAR KEY WRAP:  
-6 x 203 x 610  
-AVI ASTRO-FOAM AF-250
5. BACKFILL:  
-PER SPEC SECTION 548

#### CONSTRUCTION NOTES:

1. ALL CONSTRUCTION PROCEDURES SHALL COMPLY WITH SPEC SECTION 548 AND THE "T-WALL CONSTRUCTION MANUAL" (PROVIDED BY THE NEEL COMPANY OR OLDCASTLE PRECAST, INC.) IN THE EVENT OF A DISCREPANCY BETWEEN THE SPEC AND THE "T-WALL CONSTRUCTION MANUAL", THE SPEC SHALL CONTROL.
2. FOR LOCATION AND ALIGNMENT OF T-WALL STRUCTURE, SEE RETAINING WALL CONTROL PLANS.
3. T-WALL STRUCTURES ON CURVES SHALL BE BUILT IN CHORDS AS SHOWN IN THE T-WALL DESIGN DRAWINGS.
4. IF MANHOLES OR DROP INLETS ARE PRESENT, THEY SHALL BE LOCATED AS SHOWN IN THE T-WALL DESIGN DRAWINGS.
5. IF PILES ARE LOCATED WITHIN THE RETAINING WALL VOLUME, THEY SHALL BE DRIVEN BEFORE CONSTRUCTION OF THE T-WALL STRUCTURE.
6. T-WALL UNITS SHALL BE PLACED ONE ROW AT A TIME, AND BACKFILLED BEFORE PLACEMENT OF THE NEXT ROW.
7. IF A STRUCTURE EXCEEDS 6.000 M IN HEIGHT, THE FINISH GRADE AT THE FACE OF THE WALL SHALL BE PLACED AND COMPACTED BEFORE WALL CONSTRUCTION EXCEEDS 6.000 M IN HEIGHT.
8. THE CONTRACTOR IS RESPONSIBLE FOR CONTROLLING STORM WATER DRAINAGE IN THE VICINITY OF THE WALL DURING CONSTRUCTION. STORMWATER RUNOFF SHALL BE COLLECTED AND DISCHARGED AWAY FROM THE WALL AND THE RETAINING WALL VOLUME.

THIS SYSTEM SHALL BE USED IN MODERATELY OR SLIGHTLY AGGRESSIVE ENVIRONMENTS.

DESIGNER:



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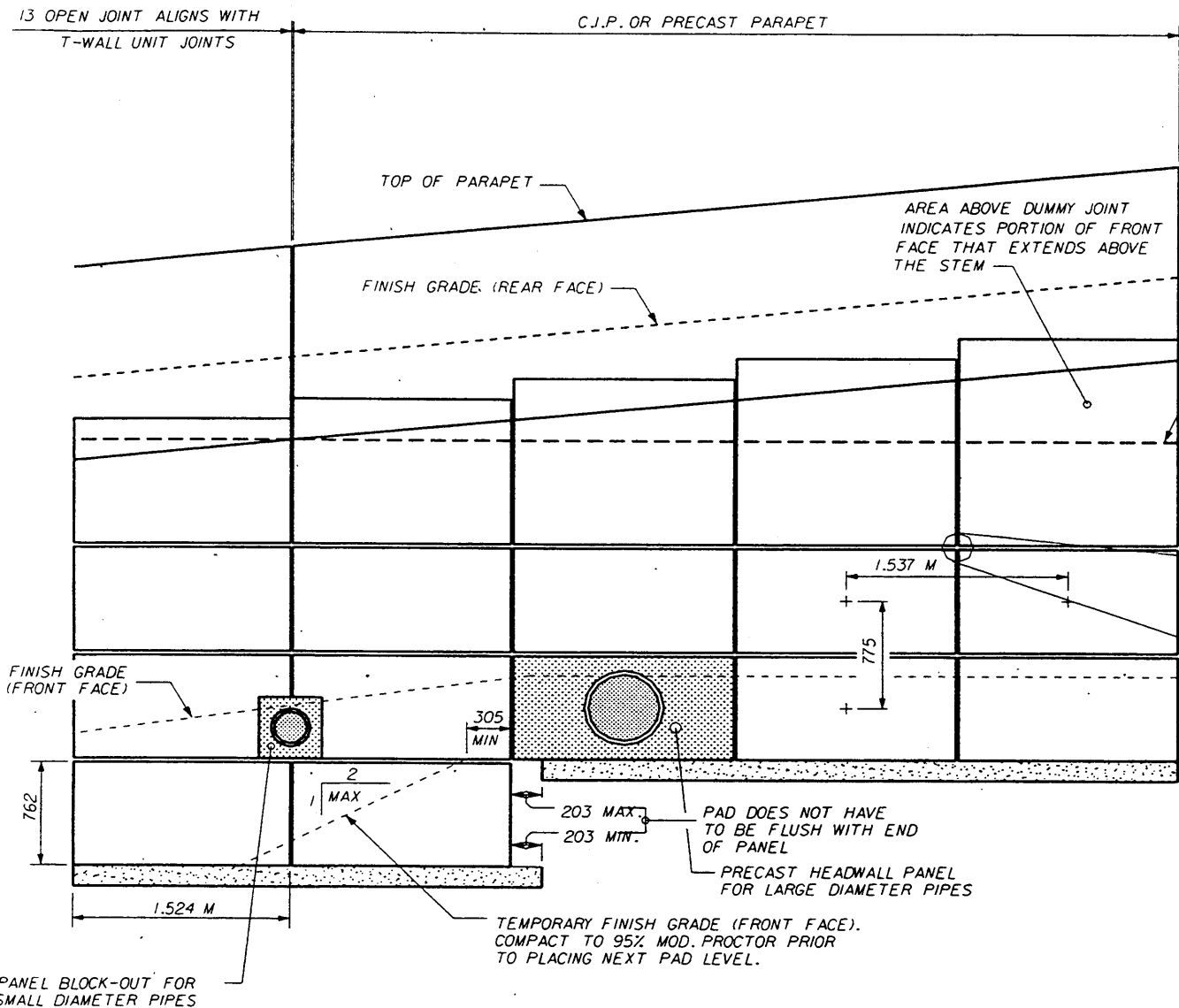
PRECASTER:

OLDCASTLE PRECAST, INC.  
11643 103rd STREET  
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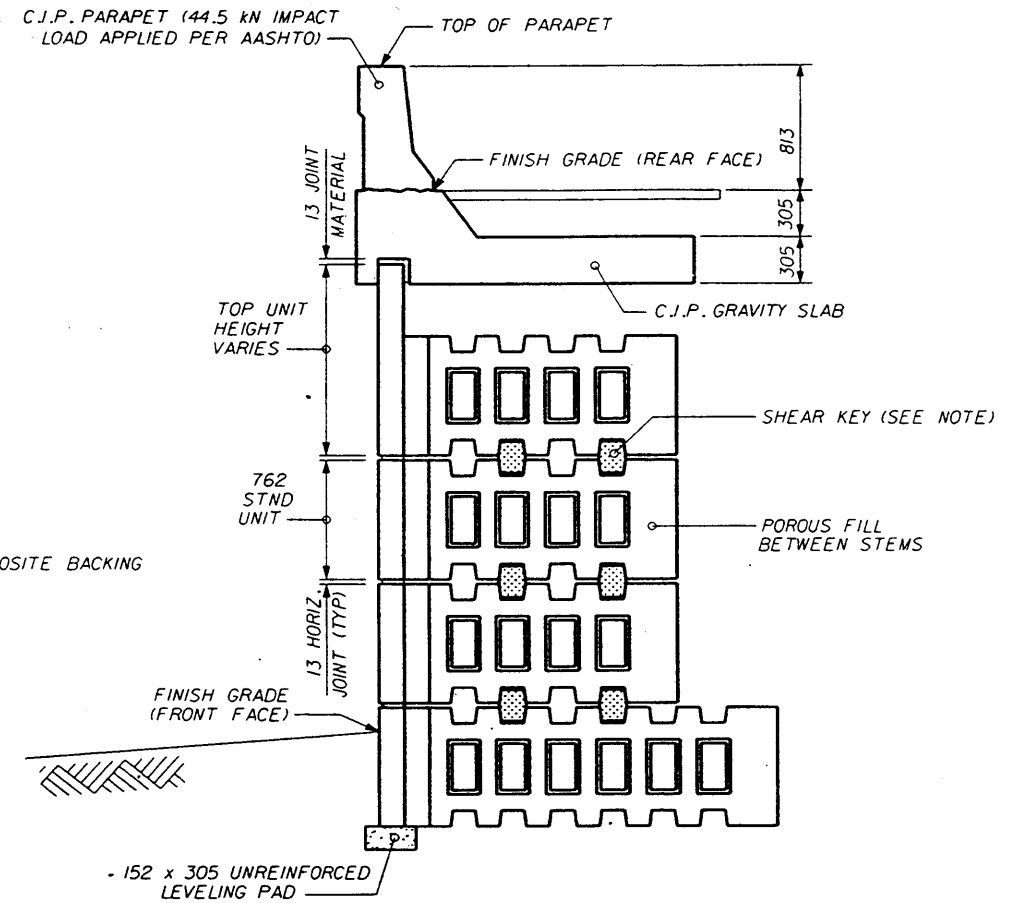
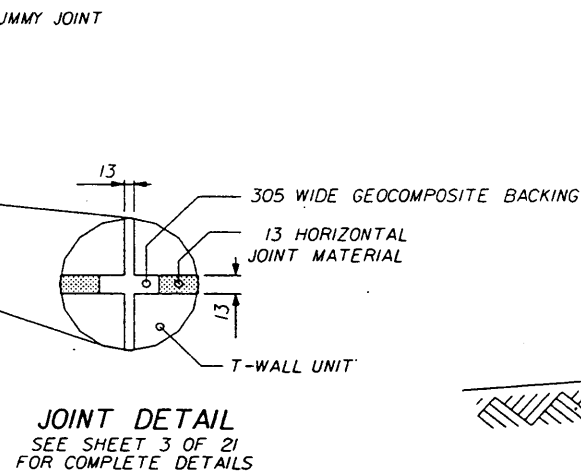
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

RETAINING WALL SYSTEM  
THE NEEL COMPANY T-WALL  
(50 mm COVER)

Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By	JMC	10/01/98	 State Structures Design Engineer		
Drawn By	CAA	10/01/98			
Checked By	JMC	10/01/98	00	1 of 21	5011



PART ELEVATION SHOWING TYPICAL DETAILS  
(NO SCALE)



SECTION SHOWING TYPICAL DETAILS  
(NOT ALL DETAILS APPLY TO EACH WALL)

NOTE: ALL EXTENDED FACE TOP UNITS REQUIRE A MINIMUM OF TWO SHEAR KEYS. ALL OTHER UNITS ARE AS SHOWN BELOW:

- TOP UNITS - 2 SHEAR KEYS
- 1.829 M STEM - 2 SHEAR KEYS
- 2.438 M STEM - 2 SHEAR KEYS
- 3.048 M STEM - 2 SHEAR KEYS
- 3.658 M STEM - 2 SHEAR KEYS
- 4.267 M STEM - 3 SHEAR KEYS
- 4.877 M STEM - 3 SHEAR KEYS

DESIGNER:

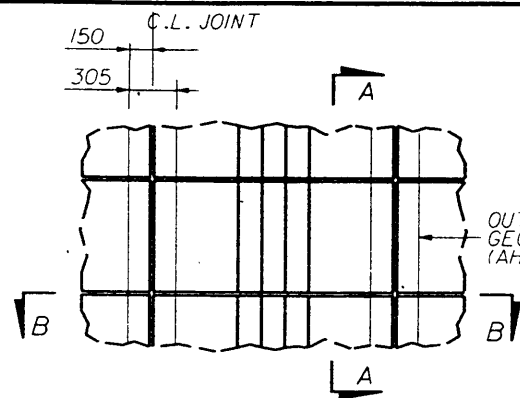


**THE NEEL COMPANY**  
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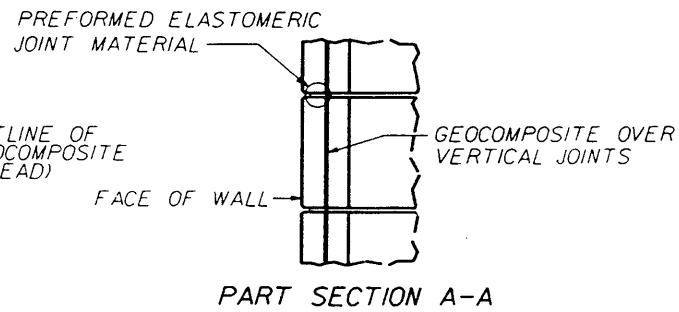
PRECASTER:

**OLDCASTLE PRECAST, INC**  
11643 103rd STREET  
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PH: (904) 778-2990  
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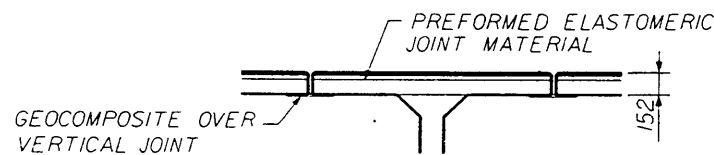
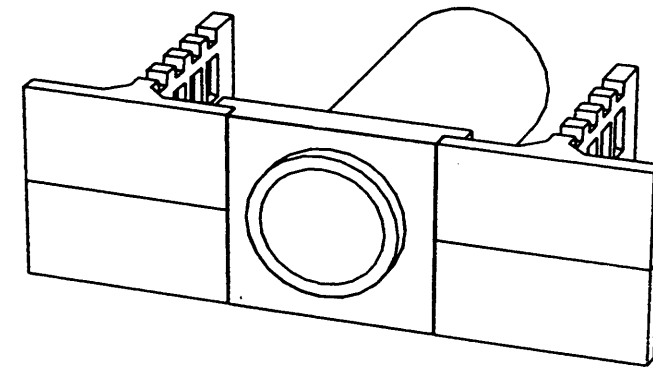
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (50 mm COVER)				
	Names	Dates	Approved By	
Designed By	JMC	10/01/98	State Structures Design Engineer	
Drawn By	CAA	10/01/98		
Checked By	JMC	10/01/98	00	2 of 21
				5011



PART ELEVATION - REAR FACE



PART SECTION A-A



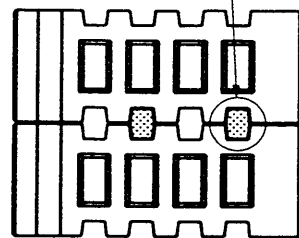
PART SECTION B-B

NOTES:

1. HORIZONTAL JOINT:  
13 x 101 x 1.524 M PREFORMED ELASTOMERIC JOINT MATERIAL
2. VERTICAL JOINT:  
13 SPACE  
305 WIDE GEOCOMPOSITE BACKING, CENTERED ABOUT JOINT CENTERLINE.

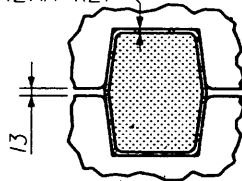
JOINT MATERIAL DETAILS

SHEAR KEY WRAPPED IN JOINT MATERIAL. SEE DETAILS THIS SHEET.

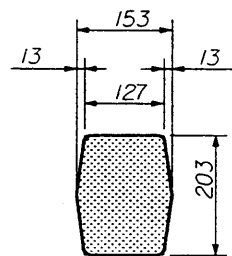


PART SECTION

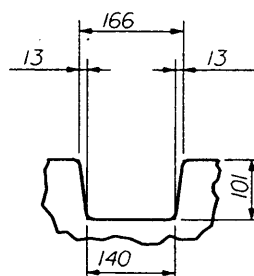
6 JOINT MATERIAL ALL AROUND SHEAR KEY



SHEAR KEY / JOINT MATERIAL ARRANGEMENT



SHEAR KEY DIMENSIONS

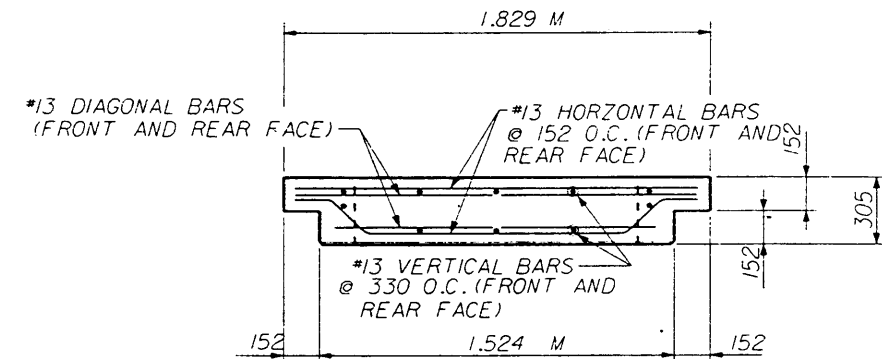


SHEAR KEY BLOCKOUT DIM'S

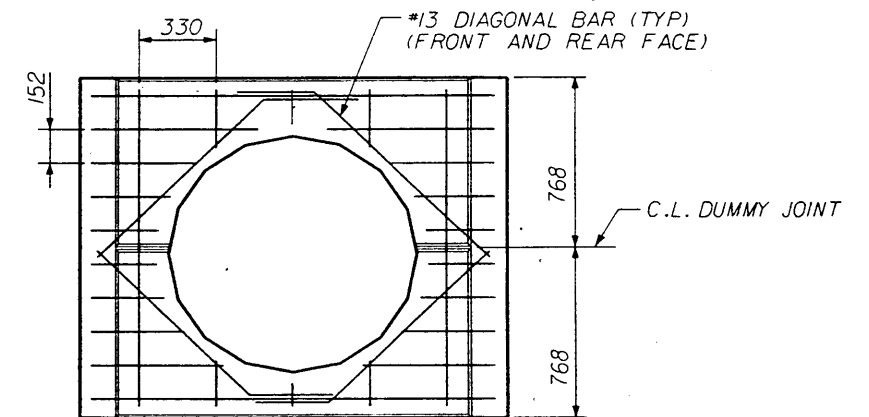
SHEAR KEY DETAILS

NOTES:

1. SHEAR KEY JOINT MATERIAL:  
MINIMUM OF ONE 6 x 203 x 610 PIECE OF AVIASTRO-FOAM AF-250 PER SHEAR KEY.
2. JOINT MATERIAL MAY BE ADDED OR REMOVED TO AID IN SHIMMING AND ALIGNING. HOWEVER SHEAR KEY MUST FIT SNUG IN THE SHEAR KEY BLOCKOUT WHEN UNIT IS IN ITS FINAL POSITION.
3. MINIMUM OF 2 SHEAR KEYS REQUIRED PER UNIT. SEE NOTES ON SHEET 2 OF 21, 'TYPICAL DETAILS (1)'.



PLAN

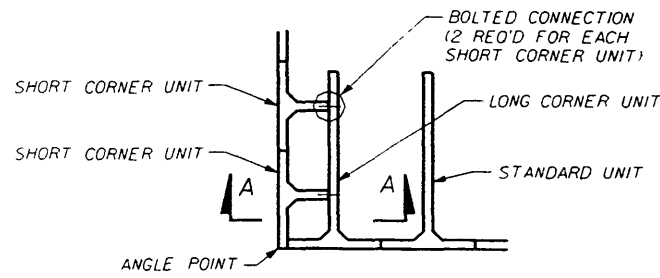


ELEVATION (FRONT FACE)  
PRECAST HEADWALL PANEL FOR LARGE DIAMETER PIPES

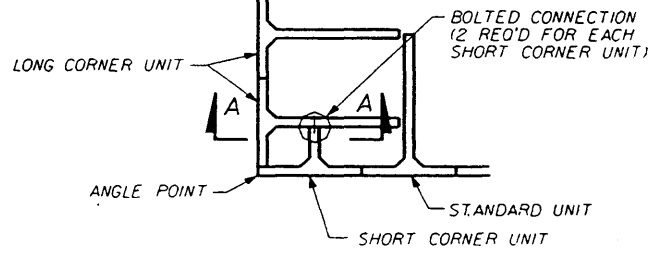
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (50 mm COVER)				
Names	Dates	Approved By		
Designed By	JMC	10/01/98	 State Structures Design Engineer	
Drawn By	CAA	10/01/98		
Checked By	JMC	10/01/98	Revision	Sheet No.
			00	3 of 21
				5011

DESIGNER:  
**THE NEEL COMPANY**  
 8328-D TAYLOR LANE  
 SPRINGFIELD, VIRGINIA 22152  
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 FX: (703) 913-7859

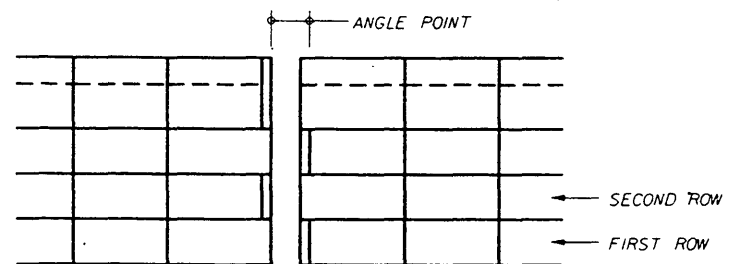
PRECASTER:  
**OLDCASTLE PRECAST, INC.**  
 11643 103rd STREET  
 JACKSONVILLE, FL 32210  
 PH: (904) 778-7990  
 FX: (904) 778-7992



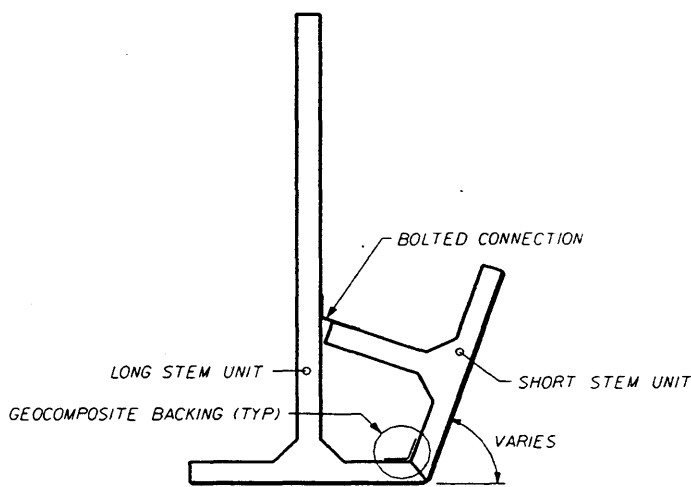
PART PLAN - FIRST ROW



PART PLAN - SECOND ROW

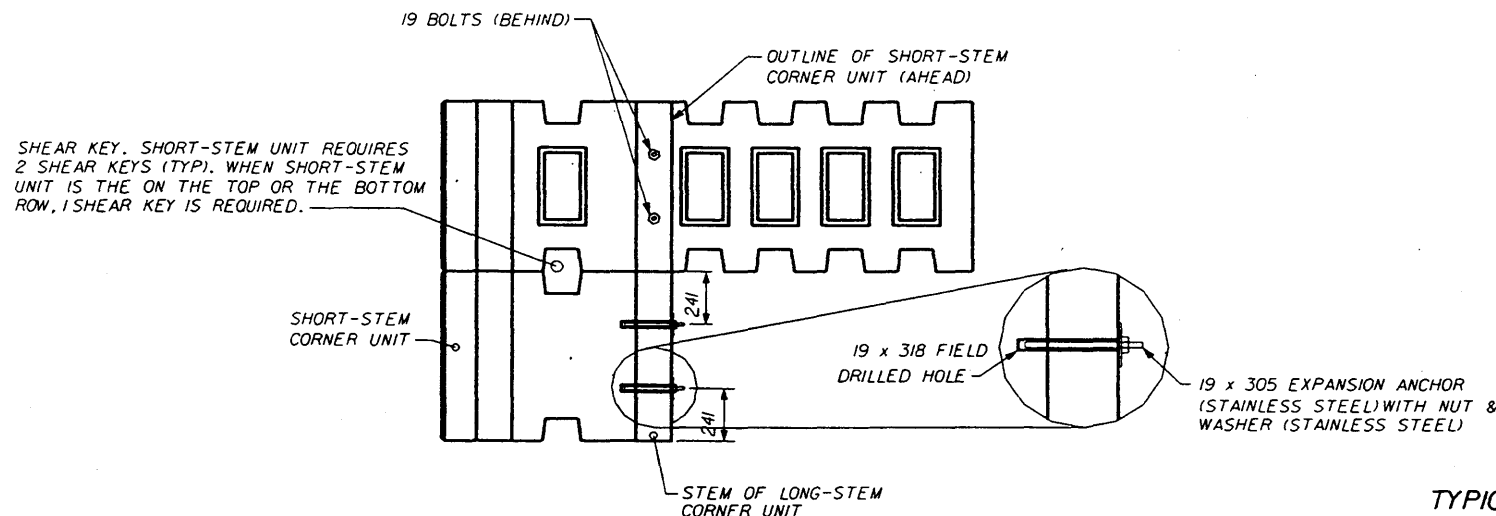


PART ELEVATION

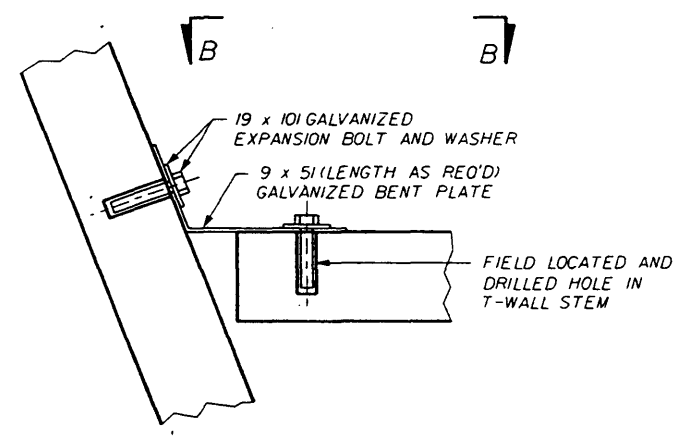


PART PLAN - ANGLE > 90°

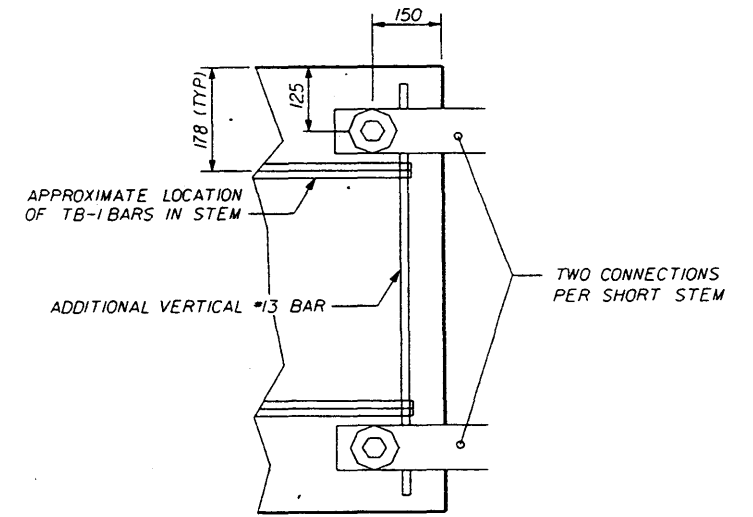
SHORT AND LONG STEMS ALTERNATE PER 90° CORNER DETAIL



TYPICAL CORNER UNIT ARRANGEMENT  
STEM LENGTHS VARY - SEE SPECIFIC ELEVATIONS FOR PROPER UNITS  
NO SCALE



TYPICAL BOLTED CONNECTION FOR ANGLE POINTS > 90°



VIEW B-B

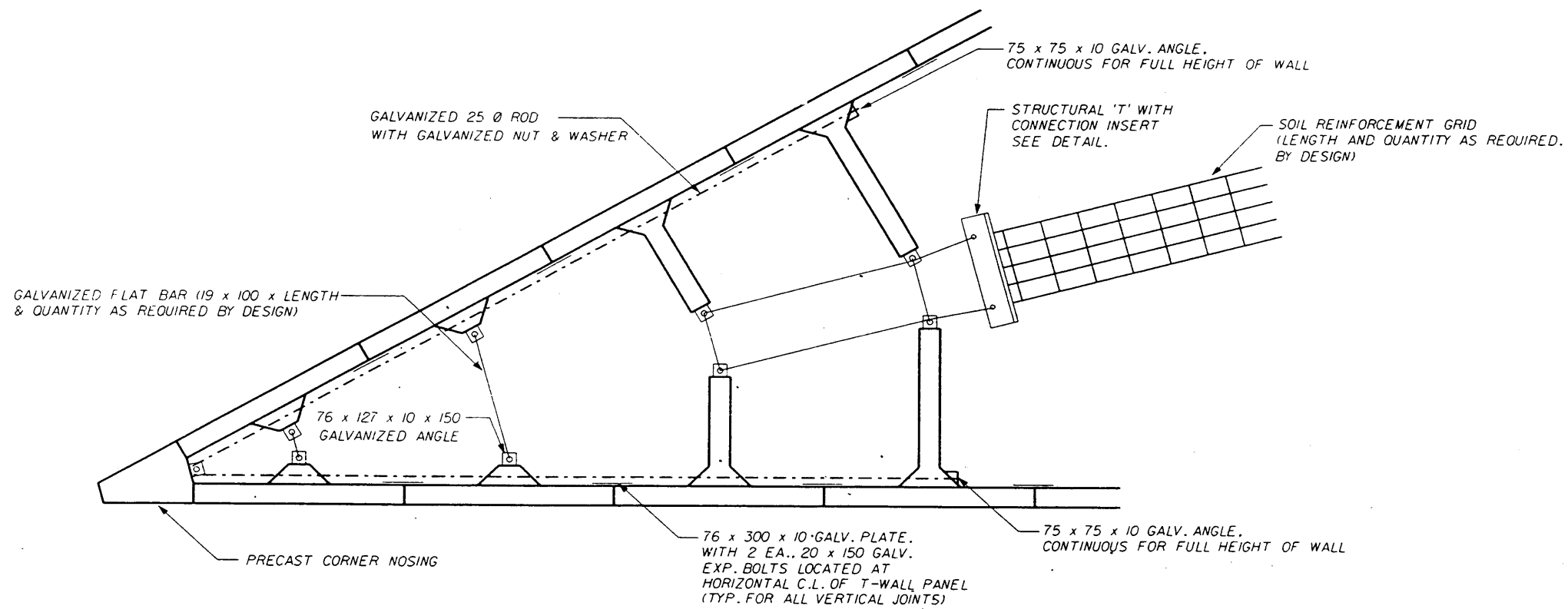
TYPICAL ANGLE POINT DETAIL  
NO SCALE

DESIGNER:  
**THE NEEL COMPANY**  
8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: 17031 913-7858  
FX: 17031 913-7855

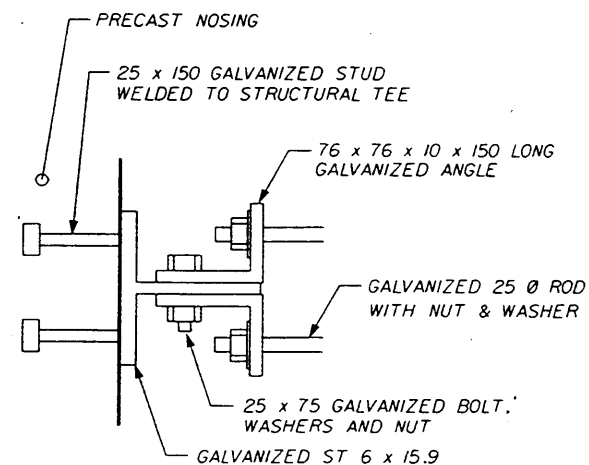
PRECASTER:  
**OLDCASTLE PRECAST, INC**  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: 19041 778-2990  
FX: 19041 778-2992

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (50 mm COVER)				
Names	Dates	Approved By		
Designed By	JMC	10/01/98	<i>William J. [Signature]</i> State Structures Design Engineer	
Drawn By	CAA	10/01/98	Revision	Sheet No.
Checked By	JMC	10/01/98	00	4 of 21
				Index No. 5011

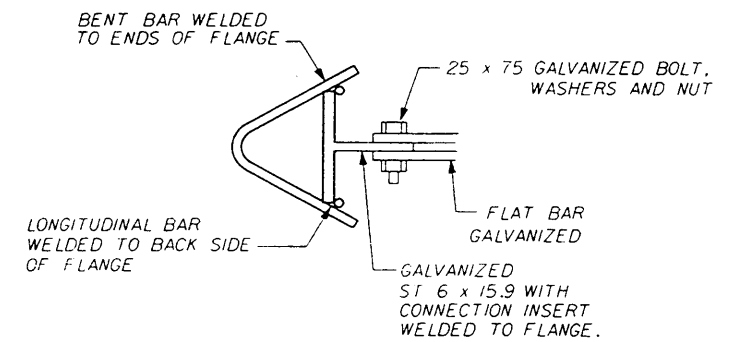




**PART PLAN  
SEVERE ACUTE ANGLE DETAIL**



**ROD/NOSING CONNECTION DETAIL**




**SOIL GRID CONNECTION DETAIL  
SEVERE ACUTE CORNERS**

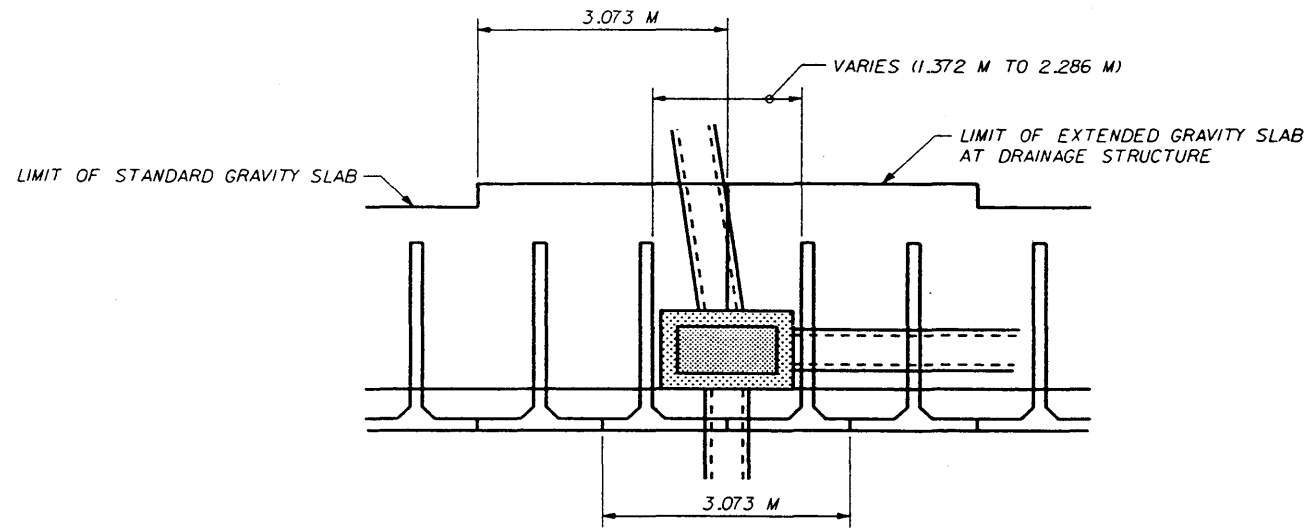
**NOTES:**

1. SOIL GRID TO BE DESIGNED FOR PULLOUT & TENSION. QUANTITY AND LENGTH OF GRIDS TO BE AS REQUIRED BY DESIGN.
2. CONNECTION INSERT:  
-PER SPEC SECTION 548  
-WII WIRE  
-WELDED PER ASTM A185 PRIOR TO GALVANIZATION
3. LOCKING BAR:  
-PER SPEC SECTION 548
4. SOIL REINFORCEMENT GRIDS:  
-PER SPEC SECTION 548  
-WII WELDED WIRE GRIDS:  
-5 LONGITUDINAL WIRES @ 152 O.C., LENGTH AS REQUIRED BY DESIGN  
-610 LONG TRANSVERSE BARS AT 152 OR 305 O.C., AS REQUIRED BY DESIGN  
-SOIL GRID LENGTHS SHOWN ON T-WALL DESIGN DRAWINGS ARE NOMINAL LENGTHS AS REQUIRED BY DESIGN CALCULATIONS. DUE TO MANUFACTURING TOLERANCES, ACTUAL GRID LENGTHS MAY BE LONGER.

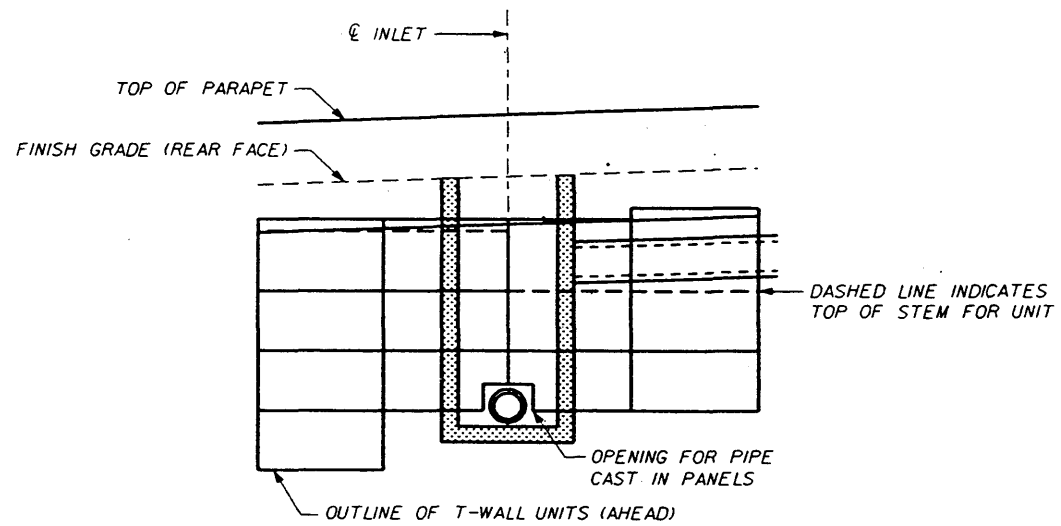
DESIGNER:  
 **THE NEEL COMPANY**  
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**OLDCASTLE PRECAST, INC.**  
11643 183RD STREET  
JACKSONVILLE, FL 32210  
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FX: (703) 913-7859

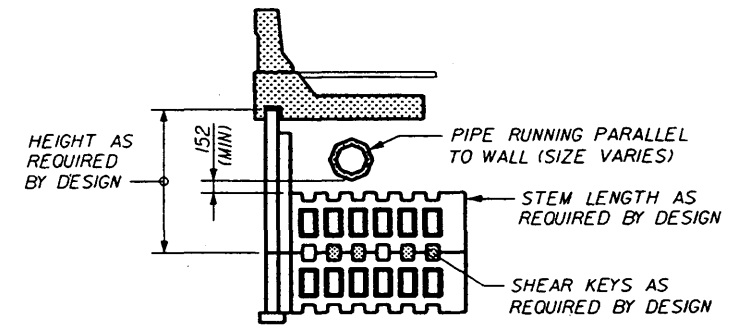
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (50 mm COVER)				
Names	Dates	Approved By		
Designed By	JMC	10/01/98	 State Structures Design Engineer	
Drawn By	CAA	10/01/98		
Checked By	JMC	10/01/98	Revision	00
			Sheet No.	5 of 21
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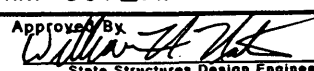
PART PLAN



PART ELEVATION (FRONT FACE)



SECTION  
(SHOWING PIPE PARALLEL TO WALL)

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (50 mm COVER)				
	Names	Dates	Approved By	
Designed By	JMC	08/01/98	 State Structures Design Engineer	
Drawn By	CAA	08/01/98		
Checked By	JMC	08/01/98	Revision	Sheet No.
			00	6 of 21
				Index No.
				5011

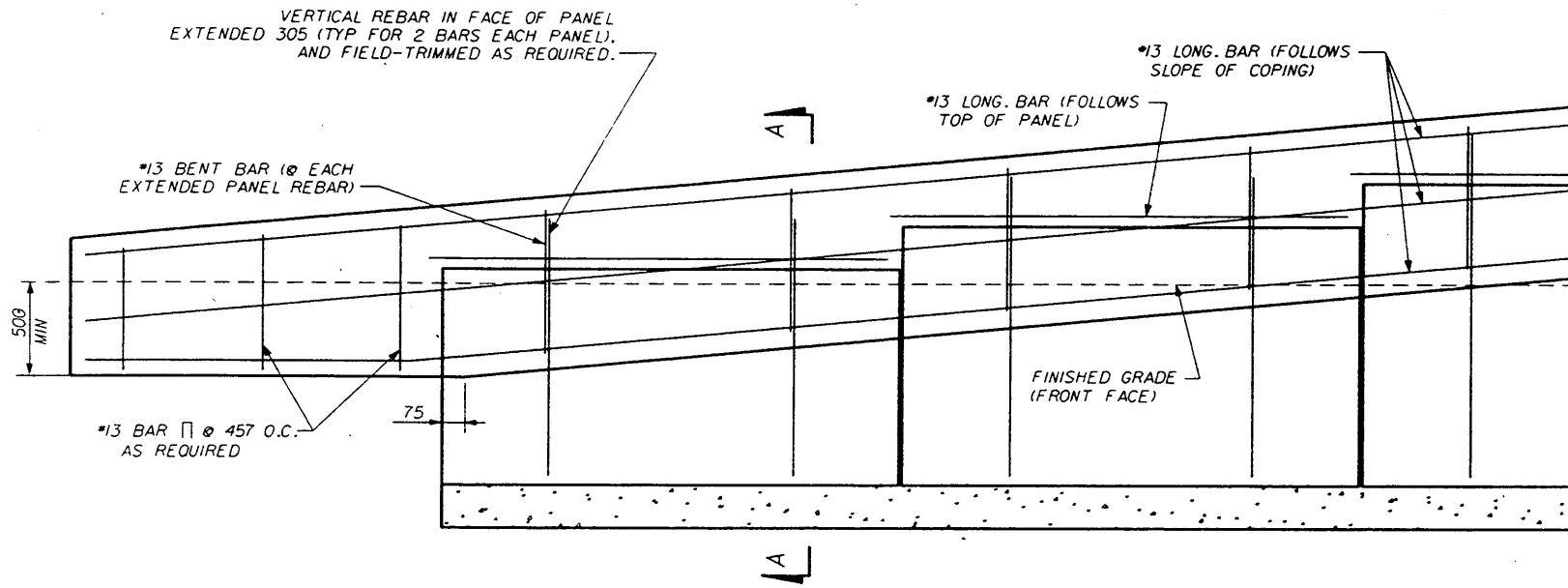
DESIGNER:



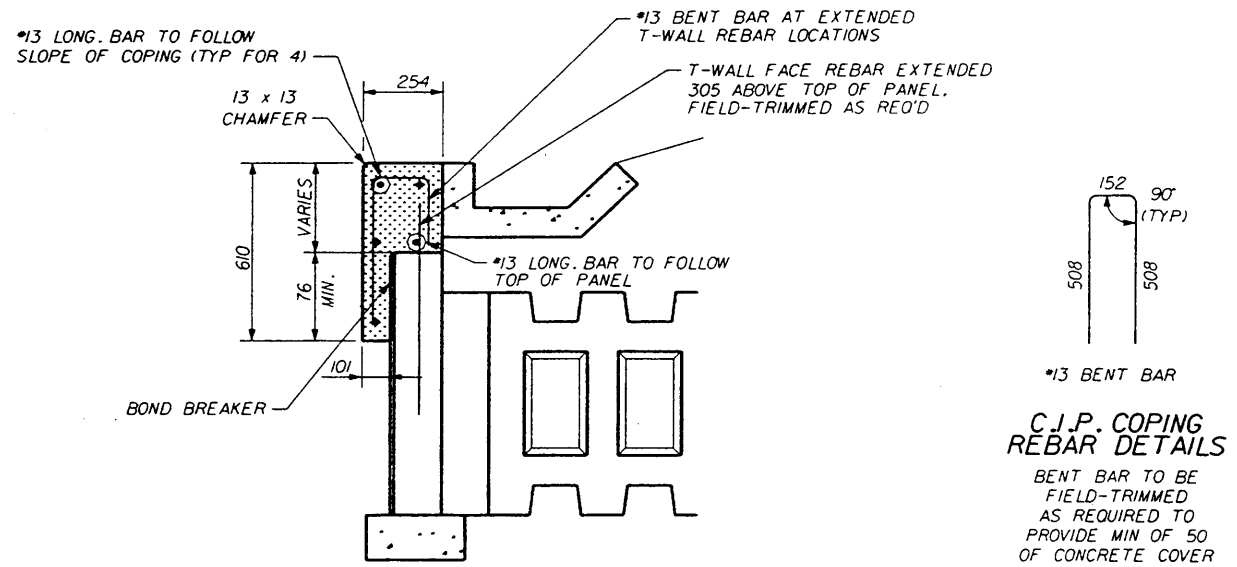
**THE NEEL COMPANY**  
8328-D TRAFORD LANE  
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PRECASTER:

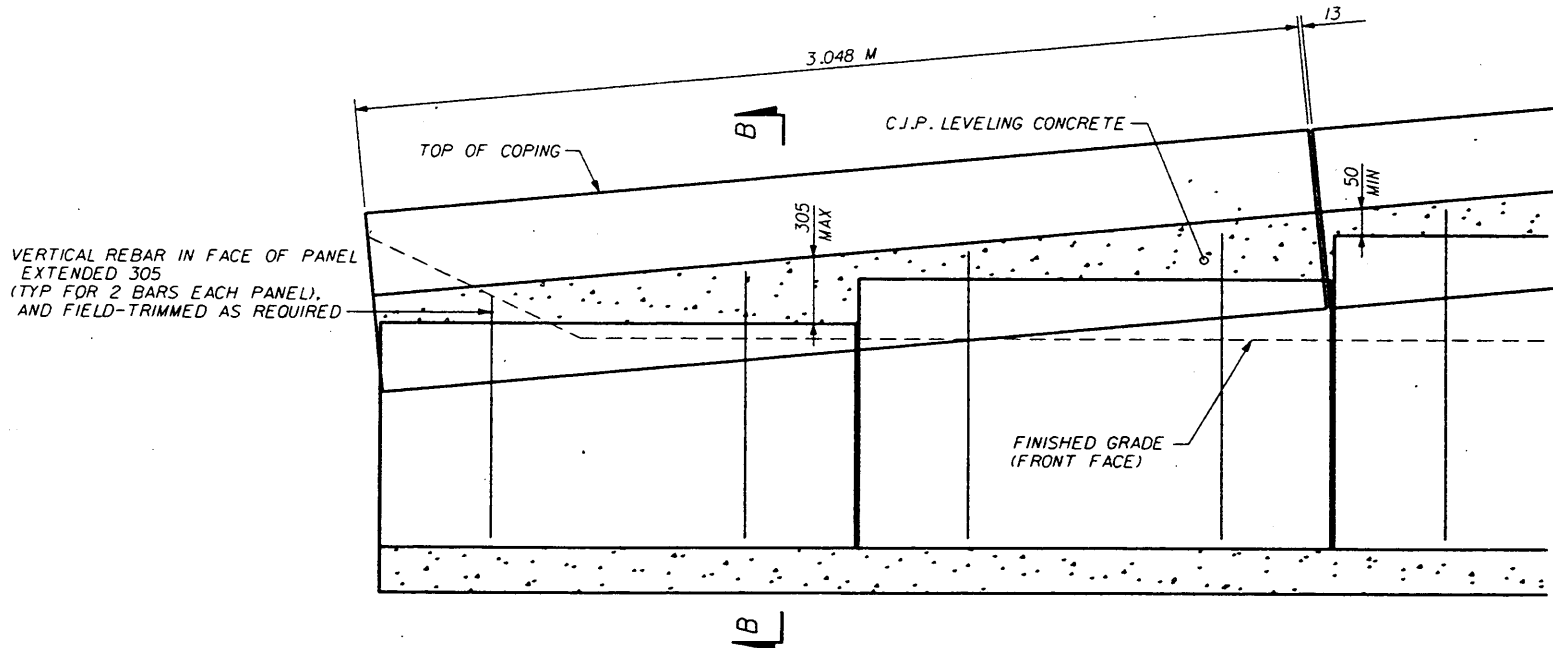
**OLDCASTLE PRECAST, INC**  
11643 183rd STREET  
JACKSONVILLE, FL 32210  
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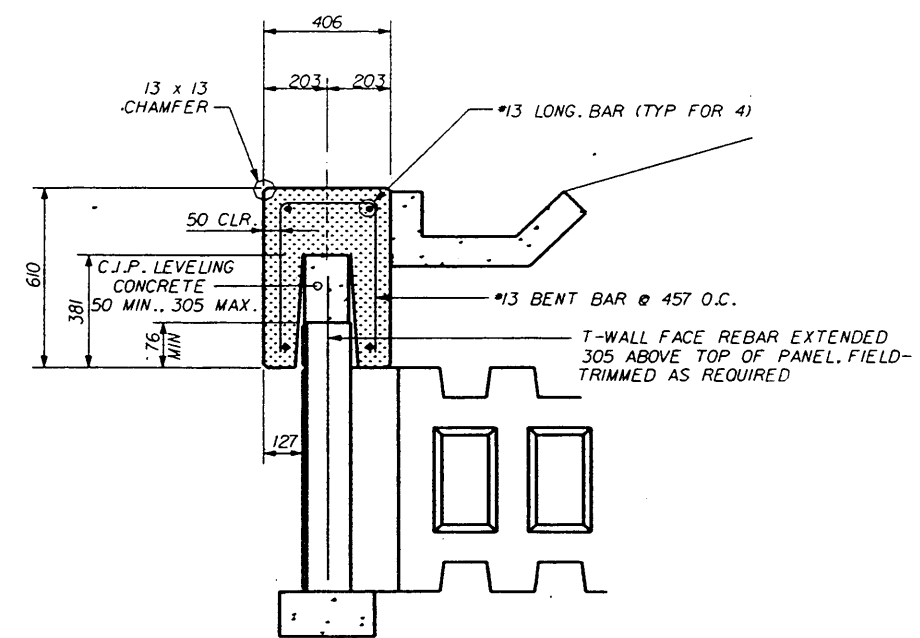
C.I.P. COPING TREATMENT AT BEGINNING/END OF WALLS



SECTION A-A  
C.I.P. COPING



PRECAST COPING - PART ELEVATION



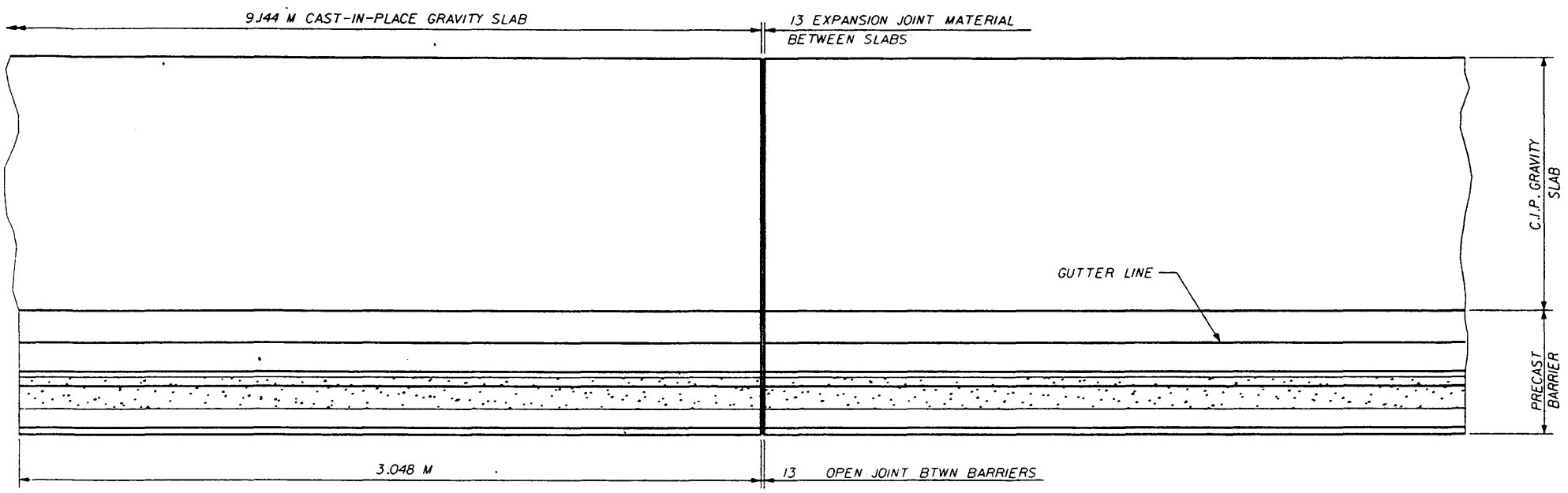
SECTION B-B  
PRECAST COPING

DESIGNER:  

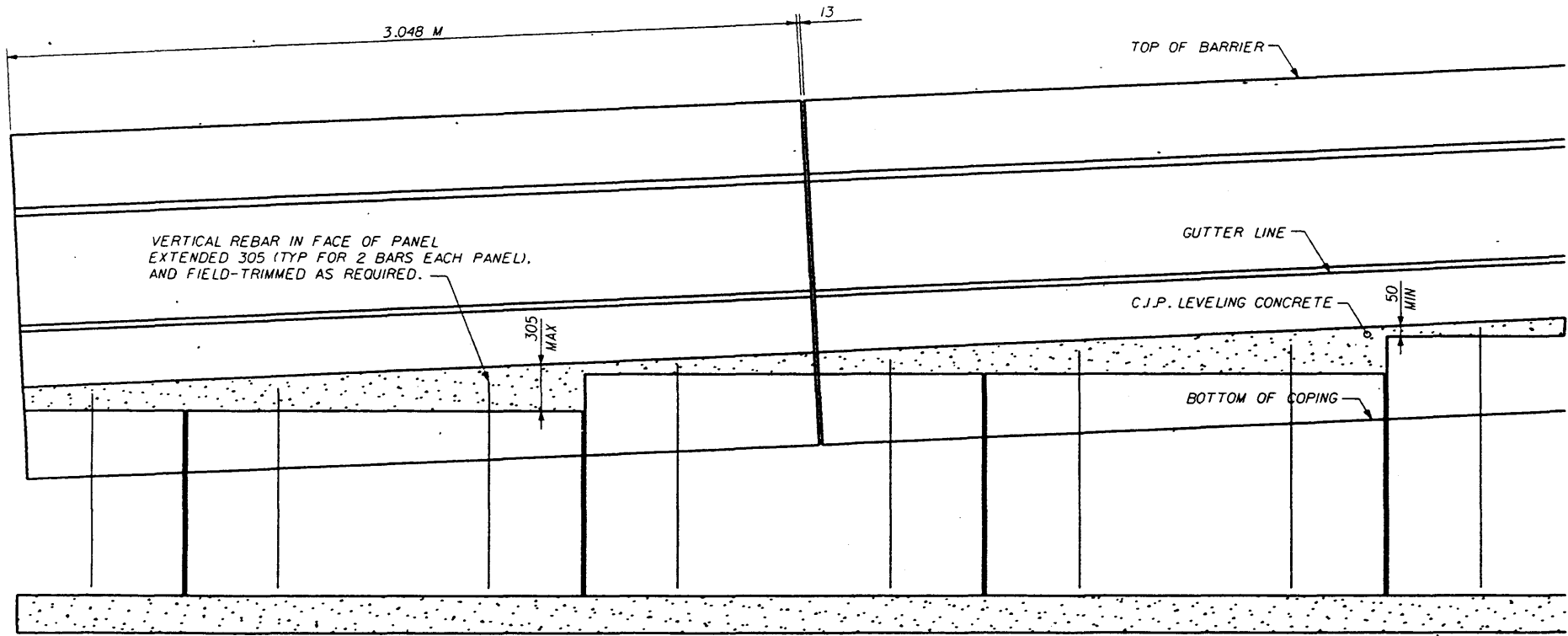
**THE NEEL COMPANY**  
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PRECASTER:  
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 11642 192ND STREET  
 JACKSONVILLE, FL 32210  
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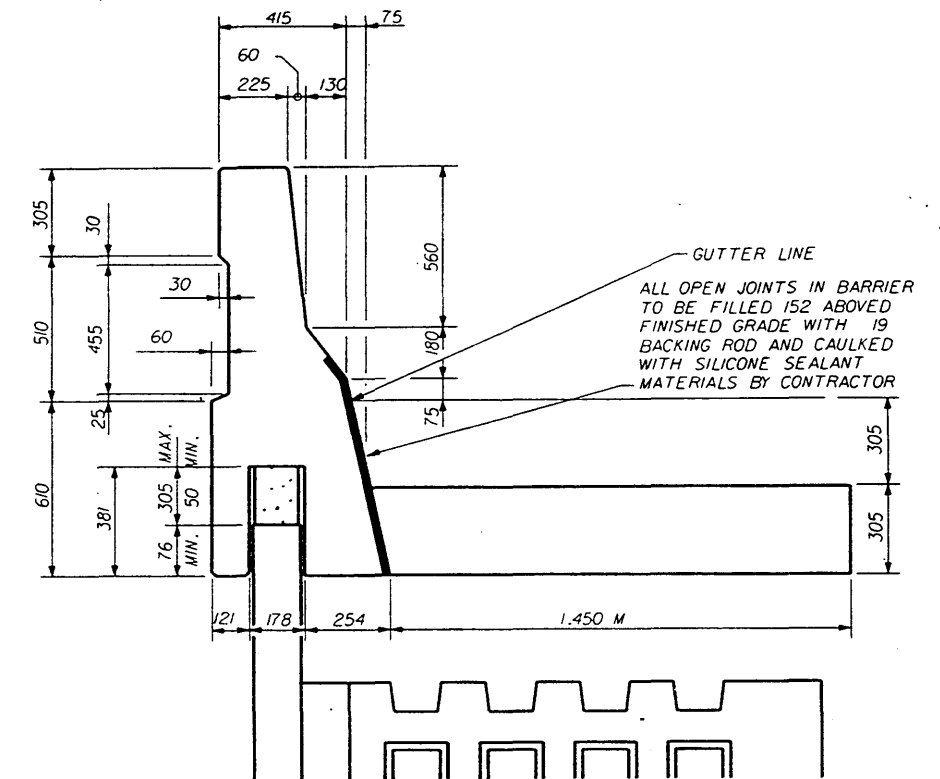
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (50 mm COVER)</b>					
Names	Dates	Approved By <i>Walter H. Vets</i> State Structures Design Engineer			
Designed By	JMC	10/01/98	Revision	Sheet No.	Index No.
Drawn By	CAA	10/01/98	00	7 of 21	5011
Checked By	JMC	10/01/98			



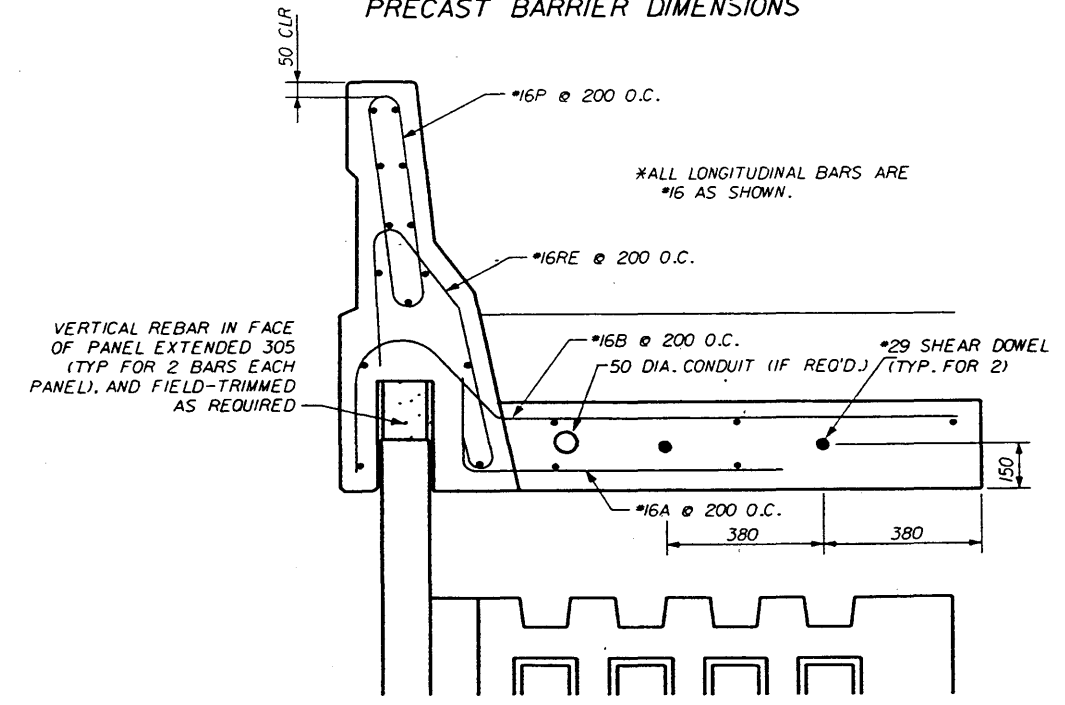
PART PLAN - PRECAST BARRIER



PART ELEVATION - PRECAST BARRIER



PRECAST BARRIER DIMENSIONS




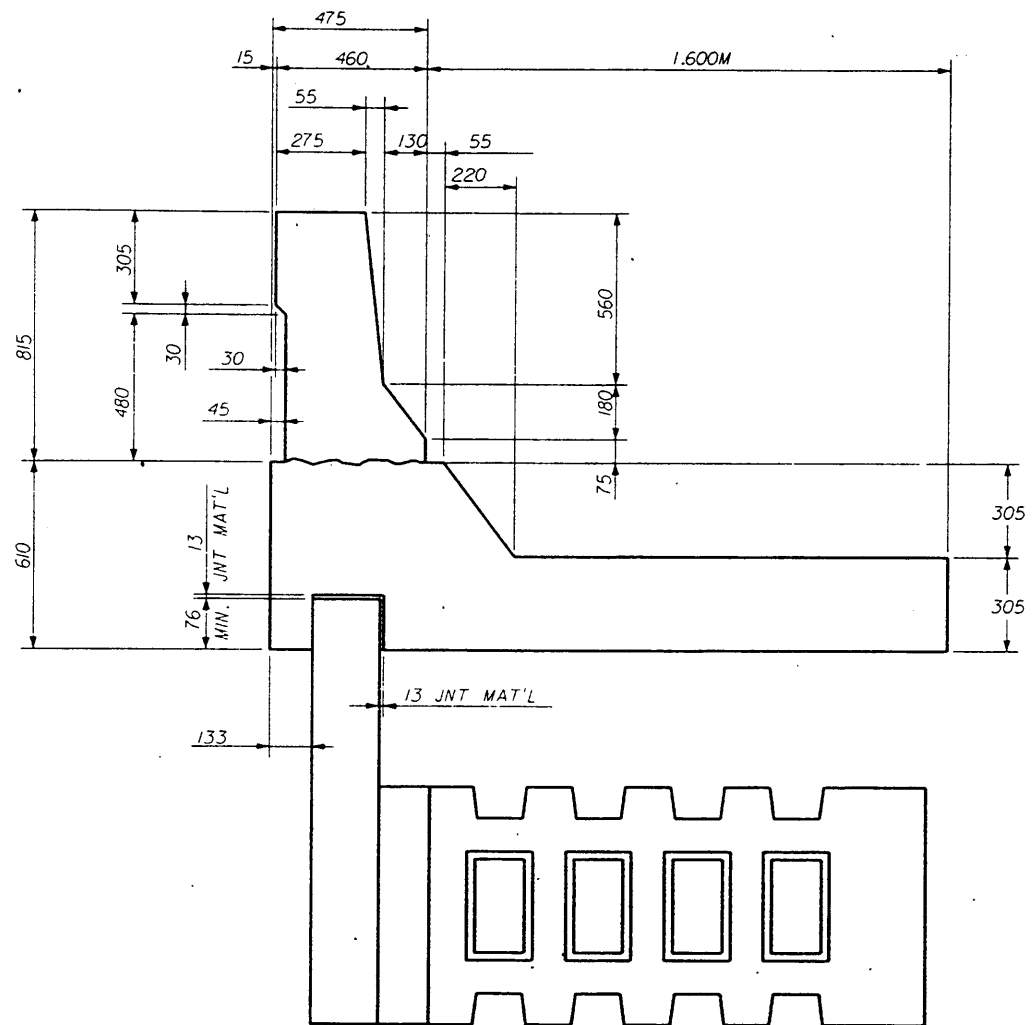
PRECAST BARRIER REBAR

DESIGNER:  

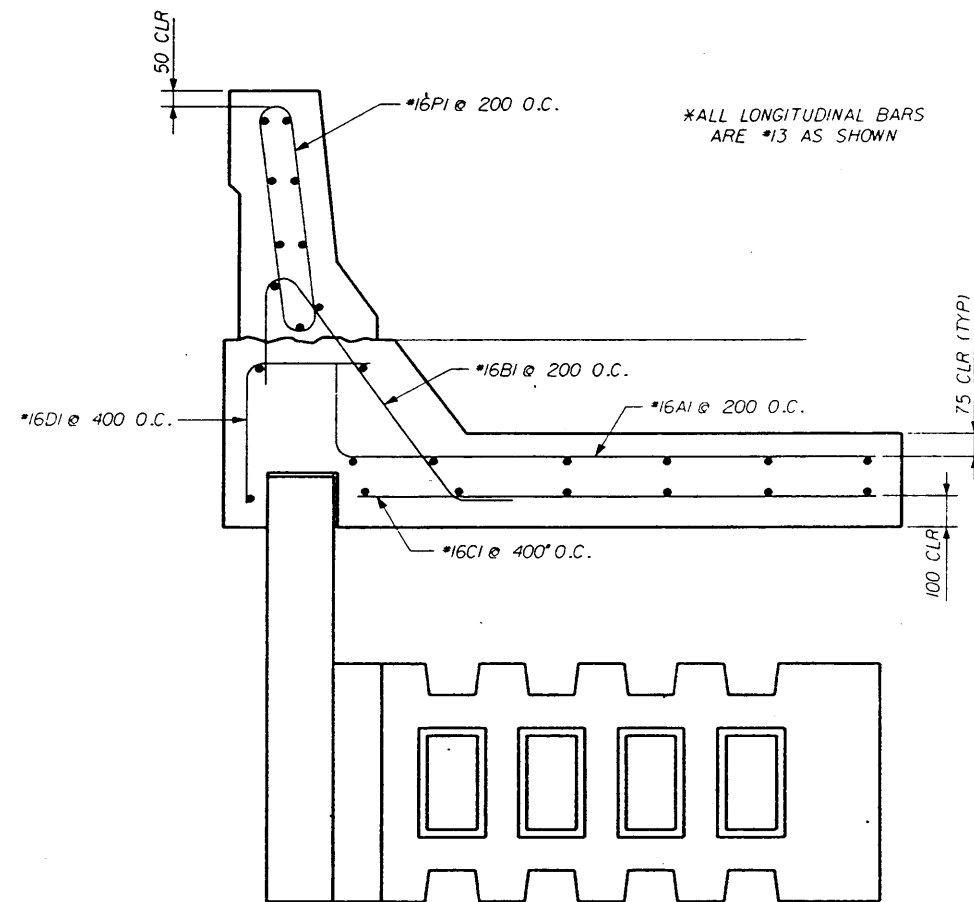
**THE NEEL COMPANY**  
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 SPRINGFIELD, VIRGINIA 22152  
 PH: (703) 913-7858  
 FX: (703) 913-7859

PRECASTER:  
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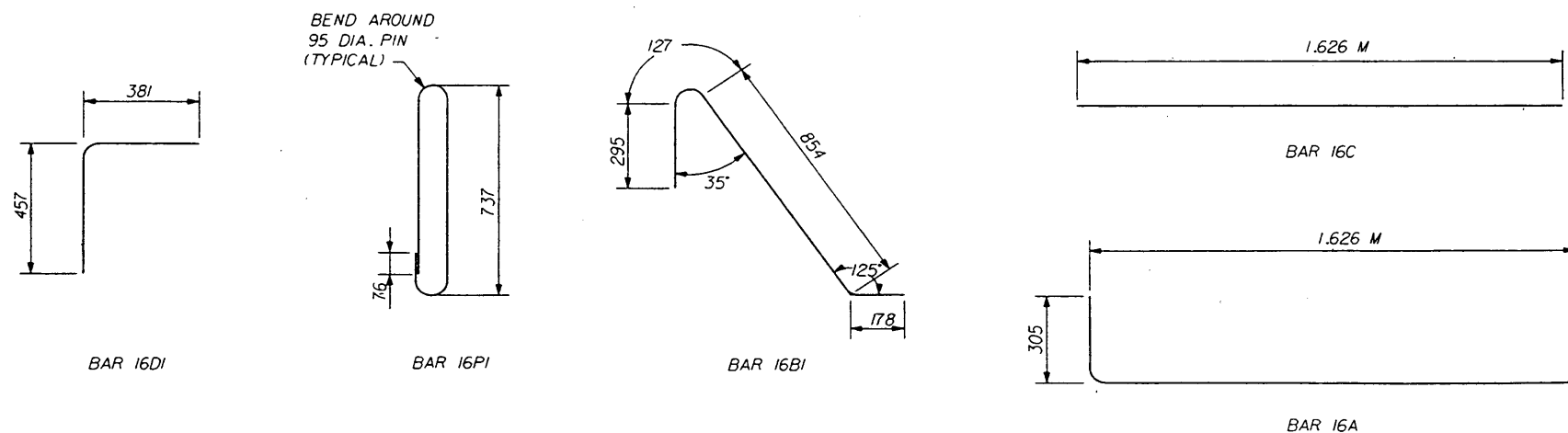
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (50 mm COVER)</b>				
Names	Dates	Approved By		
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Drawn By	CAA	10/01/98		
Checked By	JMC	10/01/98	Revision	Sheet No.
			00	8 of 21
				Index No. 5011



C.I.P. BARRIER AND C.I.P. JUNCTION SLAB DIMENSIONS



C.I.P. BARRIER AND C.I.P. JUNCTION SLAB REBAR




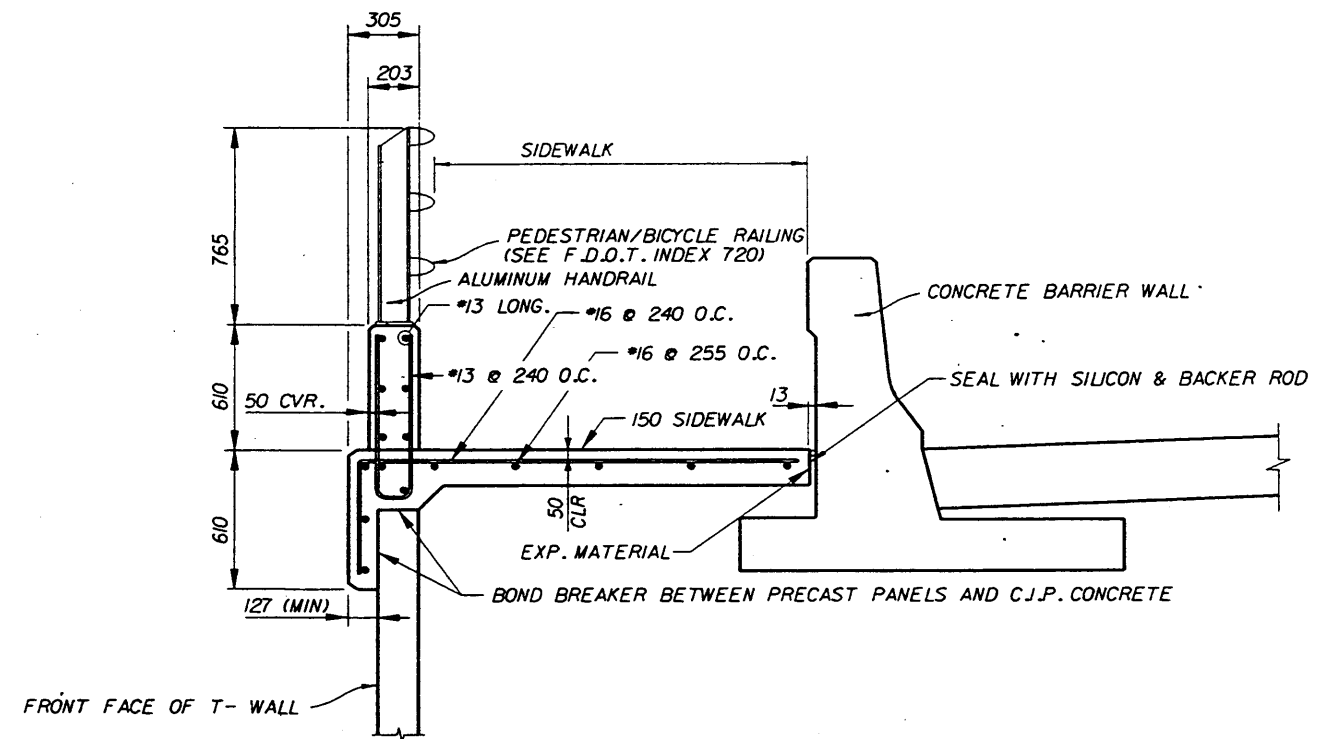
C.I.P. BARRIER REBAR DETAILS

DESIGNER:  

**THE NEEL COMPANY**  
 8329-D TRAFORD LANE  
 SPRINGFIELD, VIRGINIA 22152  
 PH: (703) 913-7858  
 FX: (703) 913-7859

PRECASTER:  
**OLDCASTLE PRECAST, INC.**  
 11643 103rd STREET  
 JACKSONVILLE, FL 32216  
 PH: (904) 778-2990  
 FX: (904) 778-2992

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (50 mm COVER)</b>				
Names	Dates	Approved By 		
Designed By JMC	10/01/98	State Structures Design Engineer		
Drawn By CAA	10/01/98	Revision	Sheet No.	Index No.
Checked By JMC	10/01/98	00	9 of 21	5011



C.J.P. PARAPET DETAIL W/ HANDRAIL

DESIGNER:

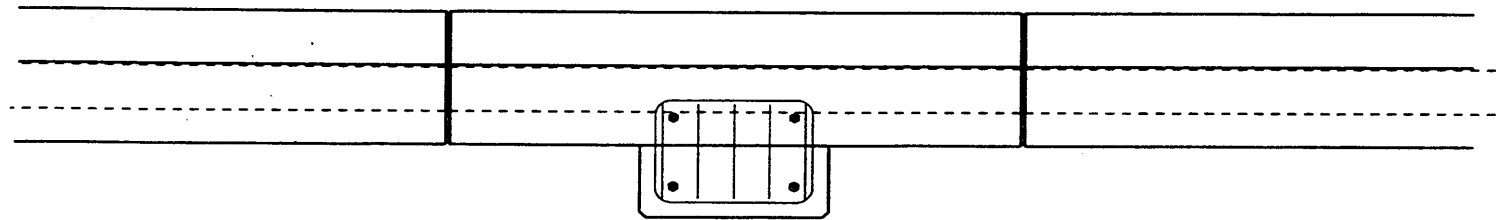


**THE NEEL COMPANY**  
 8328-D TRAFORD LANE  
 SPRINGFIELD, VIRGINIA 22152  
 PH: (703) 913-7858  
 FX: (703) 913-7859

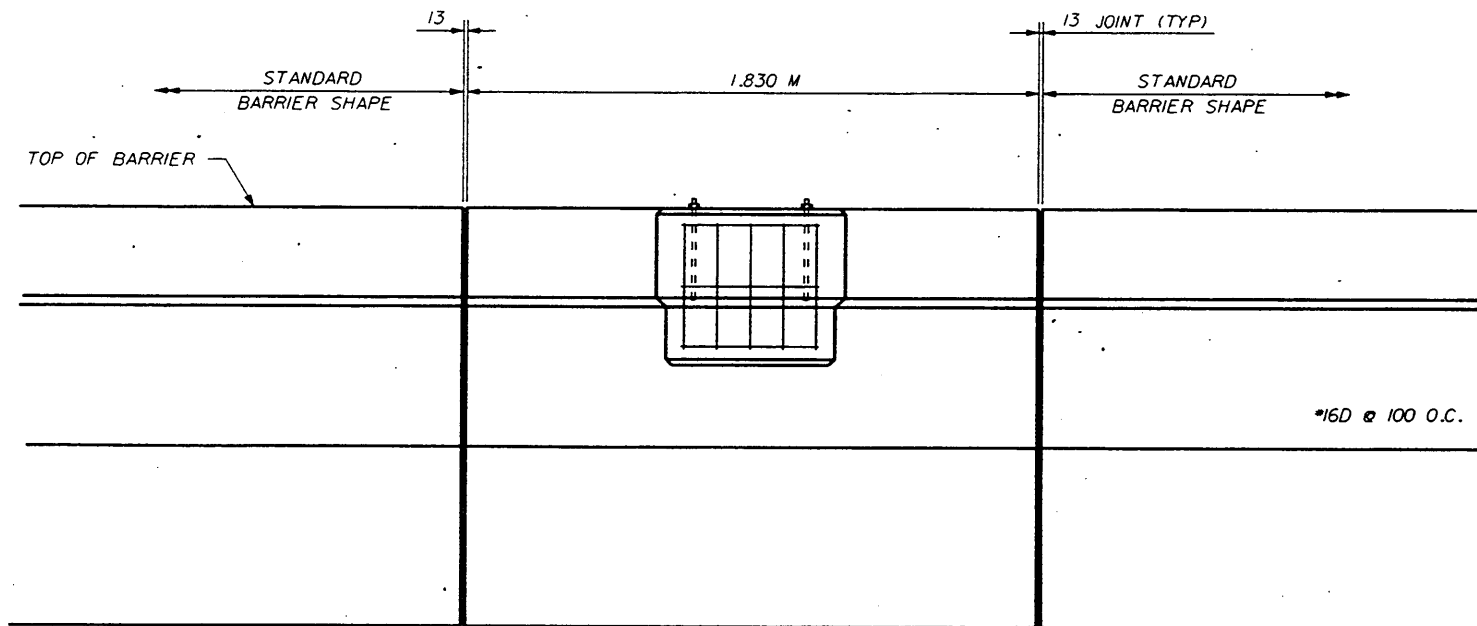
PRECASTER:

**OLDCASTLE PRECAST, INC**  
 11643 103rd STREET  
 JACKSONVILLE, FL 32210  
 PH: (904) 778-2990  
 FX: (904) 778-2992

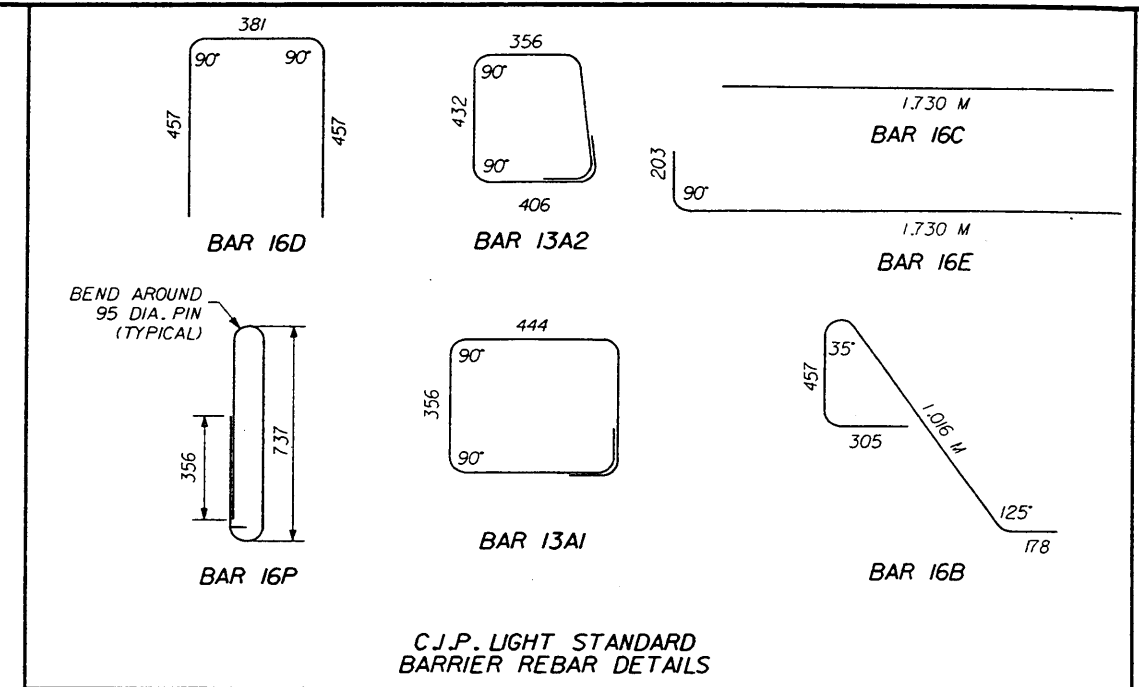
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (50 mm COVER)</b>				
	Names	Dates	Approved By	
Designed By	JMC	10/01/98	<i>[Signature]</i> State Structures Design Engineer	
Drawn By	CAA	10/01/98	Revision	Sheet No. / Index No.
Checked By	JMC	10/01/98	00	10 of 21 / 5011



C.J.P. LIGHT STANDARD BARRIER - PART PLAN WITH REBAR  
(BARRIER AND GRAVITY SLAB REBAR OMITTED FOR CLARITY)

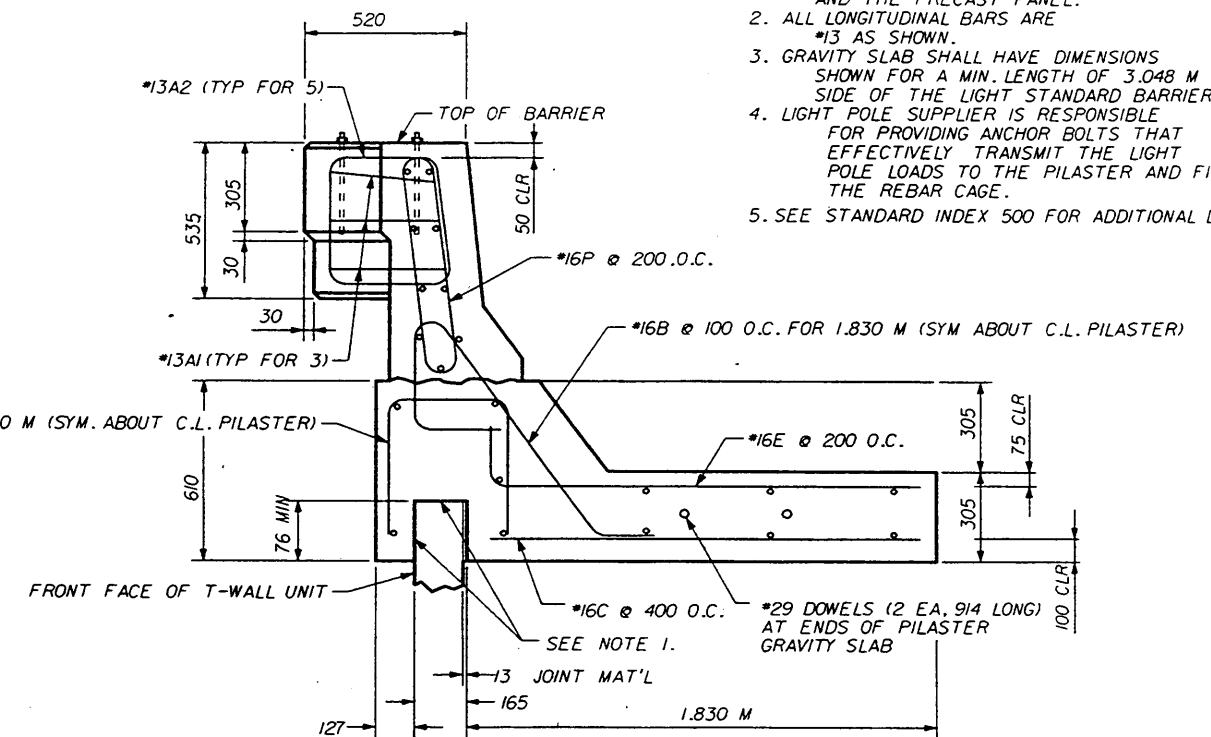


C.J.P. LIGHT STANDARD BARRIER - PART ELEVATION  
(BARRIER AND GRAVITY SLAB REBAR OMITTED FOR CLARITY)



C.J.P. LIGHT STANDARD BARRIER REBAR DETAILS

- NOTES
1. POSITIVE BOND BREAKER SHALL BE PROVIDED BETWEEN THE C.J.P. CONC. AND THE PRECAST PANEL.
  2. ALL LONGITUDINAL BARS ARE #13 AS SHOWN.
  3. GRAVITY SLAB SHALL HAVE DIMENSIONS SHOWN FOR A MIN. LENGTH OF 3.048 M EITHER SIDE OF THE LIGHT STANDARD BARRIER.
  4. LIGHT POLE SUPPLIER IS RESPONSIBLE FOR PROVIDING ANCHOR BOLTS THAT EFFECTIVELY TRANSMIT THE LIGHT POLE LOADS TO THE PILASTER AND FIT THE REBAR CAGE.
  5. SEE STANDARD INDEX 500 FOR ADDITIONAL DETAILS.




C.J.P. LIGHT STANDARD BARRIER - PART SECTION WITH REBAR

DESIGNER:  

**THE NEEL COMPANY**  
 8328-D TRAFORD LANE  
 SPRINGFIELD, VIRGINIA 22152  
 PH: (703) 913-7858  
 FX: (703) 913-7859

PRECASTER:  
**OLDCASTLE PRECAST, INC.**  
 11643 18TH STREET  
 JACKSONVILLE, FL 32210  
 PH: (904) 778-2990  
 FX: (904) 778-2992

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (50 mm COVER)				
Names	Dates	Approved By		
Designed By	JMC	10/01/98	 State Structures Design Engineer	
Drawn By	CAA	10/01/98	Revision	Sheet No. Index No.
Checked By	JMC	10/01/98	00	11 of 21 5011

**NOTES**

1. ADDITIONAL CONCRETE AND REINFORCING STEEL REQUIRED FOR THE CONSTRUCTION OF THE PILASTER SHALL MEET THE SAME REQUIREMENTS AS THAT OF THE PARAPET WALL.

2. TOP OF PILASTER SHALL BE FINISHED TO A TRULY LEVEL AREA.

3. LIGHT POLE PILASTER IS DESIGNED TO RESIST WORKING LOADS (IN ANY DIRECTION) FROM THE LIGHT POLE APPLIED AT THE TOP OF THE PILASTER AS FOLLOWS:

LONGITUDINAL MOMENT	=	437.8 kN-M
TRANSVERSE MOMENT	=	87.6 kN-M
LONGITUDINAL SHEAR	=	4.45 kN
TRANSVERSE SHEAR	=	890 N
TORSION	=	43.8 kN-M
AXIAL	=	1.78 kN

IF THE LIGHT POLE PROVIDED APPLIES LOADS THAT ARE IN EXCESS OF THOSE SHOWN ABOVE, THE CONTRACTOR SHALL REDESIGN THE PILASTER AND SUBMIT HIS DESIGN TO THE DEPARTMENT FOR REVIEW. THE CONTRACTOR'S REDESIGN SHALL BE PREPARED, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF FLORIDA, AND QUALIFIED TO PERFORM THE WORK.

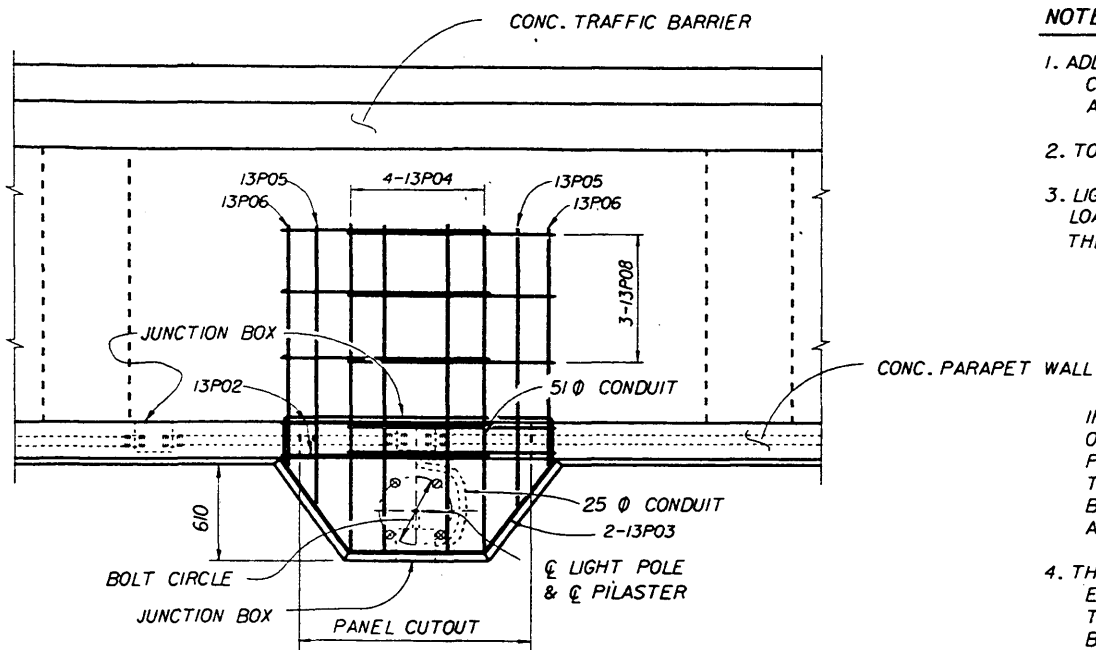
4. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ANCHOR BOLTS THAT EFFECTIVELY TRANSMIT THE LIGHT POLE LOADS TO THE PILASTER AND THAT FIT THE REINFORCING CAGE. CALCULATIONS SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF FLORIDA SHALL BE SUBMITTED BY THE CONTRACTOR TO THE DEPARTMENT FOR REVIEW AND APPROVAL SHOWING THAT THESE REQUIREMENTS HAVE BEEN MET PRIOR TO CONSTRUCTION.

5. STEEL FOR JUNCTION BOXES SHALL CONFORM WITH ASTM-A36. THE BOXES SHALL BE HOT DIP GALVANIZED AFTER FABRICATION. IN LIEU OF STEEL BOXES THE CONTRACTOR MAY SUBMIT FOR APPROVAL MOLDED P.V.C. BOXES (SCHEDULE 80).

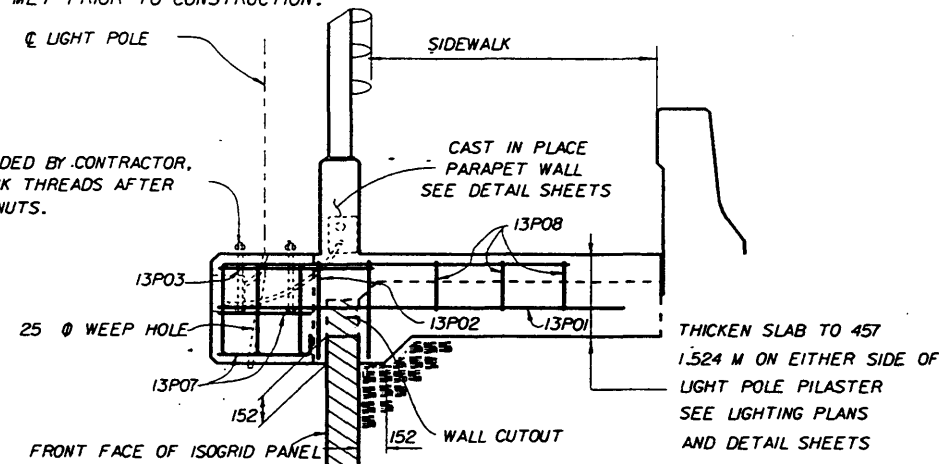
6. ALL CONDUITS SHALL BE RIGID GALVANIZED STEEL OR SCHEDULE 80 P.V.C.

7. THE COST OF ANCHOR BOLTS SHALL BE INCLUDED IN THE BID PRICE FOR LIGHT POLES.

8. PAYMENT: THE COST OF ALL LABOR, CONCRETE AND REINFORCING STEEL REQUIRED FOR THE CONSTRUCTION OF THE PILASTERS AND ALL CONDUITS, EXPANSION COUPLINGS, JUNCTION BOXES AND MISCELLANEOUS HARDWARE REQUIRED FOR COMPLETION OF THE ELECTRICAL INSTALLATION WITHIN THE LIMITS SHOWN ON THIS SHEET, SHALL BE INCLUDED IN THE CONTRACTOR'S BID PRICE FOR THE MSE WALLS.

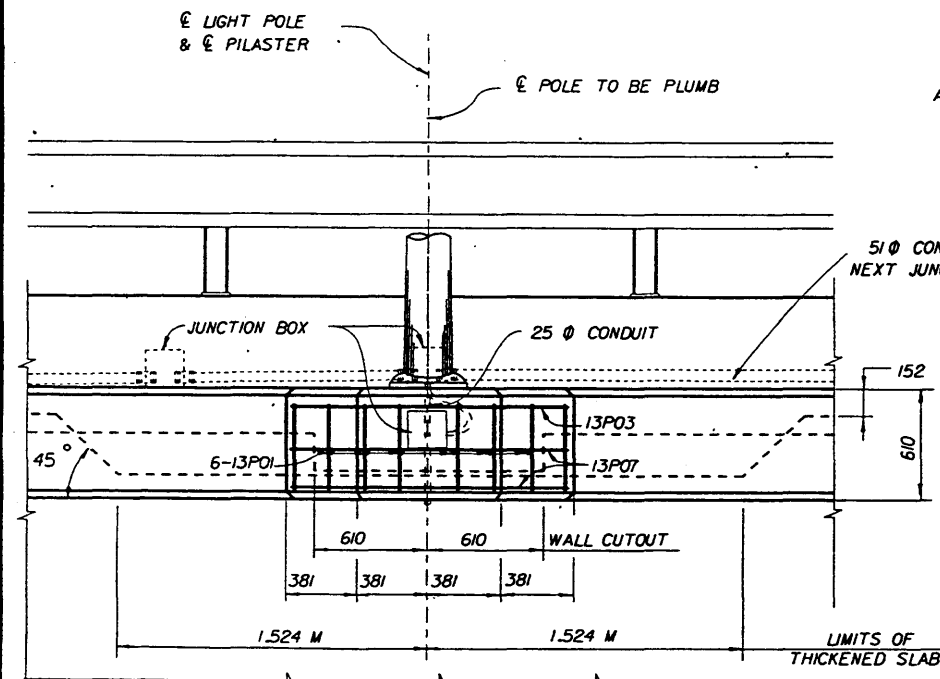


**PLAN**

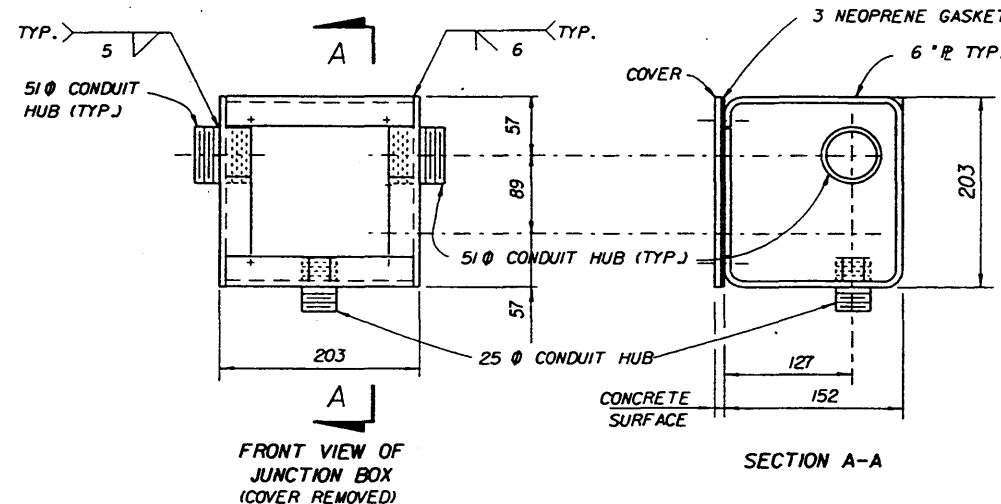


ANCHOR BOLTS PROVIDED BY CONTRACTOR, SEE NOTE 4. NICK THREADS AFTER TIGHTENING NUTS.

THICKEN SLAB TO 457 1524 M ON EITHER SIDE OF LIGHT POLE PILASTER SEE LIGHTING PLANS AND DETAIL SHEETS

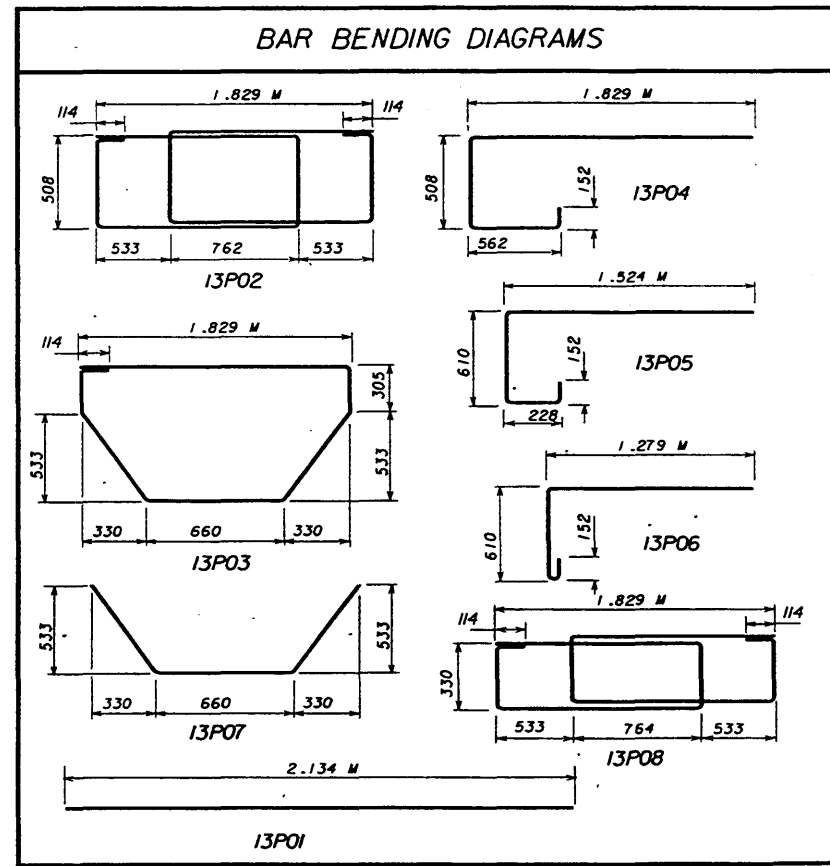


**LIGHT PILASTER DETAIL**



**FRONT VIEW OF JUNCTION BOX (COVER REMOVED)**

**SECTION A-A**



**BAR BENDING DIAGRAMS**

BILL OF REINFORCING STEEL			
MARK	SIZE	NO. REQ'D	LENGTH
13P01	13	6	2.134 M
13P02	13	2	7.442 M
13P03	13	1	4.496 M
13P04	13	4	2.946 M
13P05	13	2	2.413 M
13P06	13	2	1.880 M
13P07	13	2	1.930 M
13P08	13	3	6.731 M

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

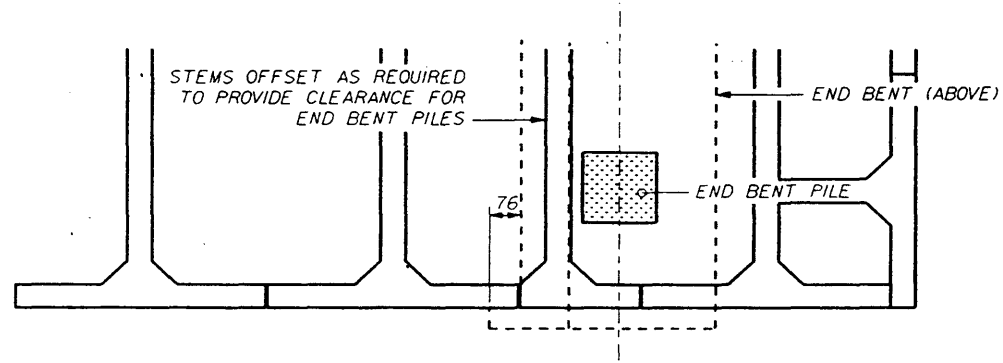
**RETAINING WALL SYSTEM  
THE NEEL COMPANY T-WALL  
(50 mm COVER)**

Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By	JMC	10/01/98			
Drawn By	CAA	10/01/98	00	12 of 21	5011
Checked By	JMC	10/01/98			

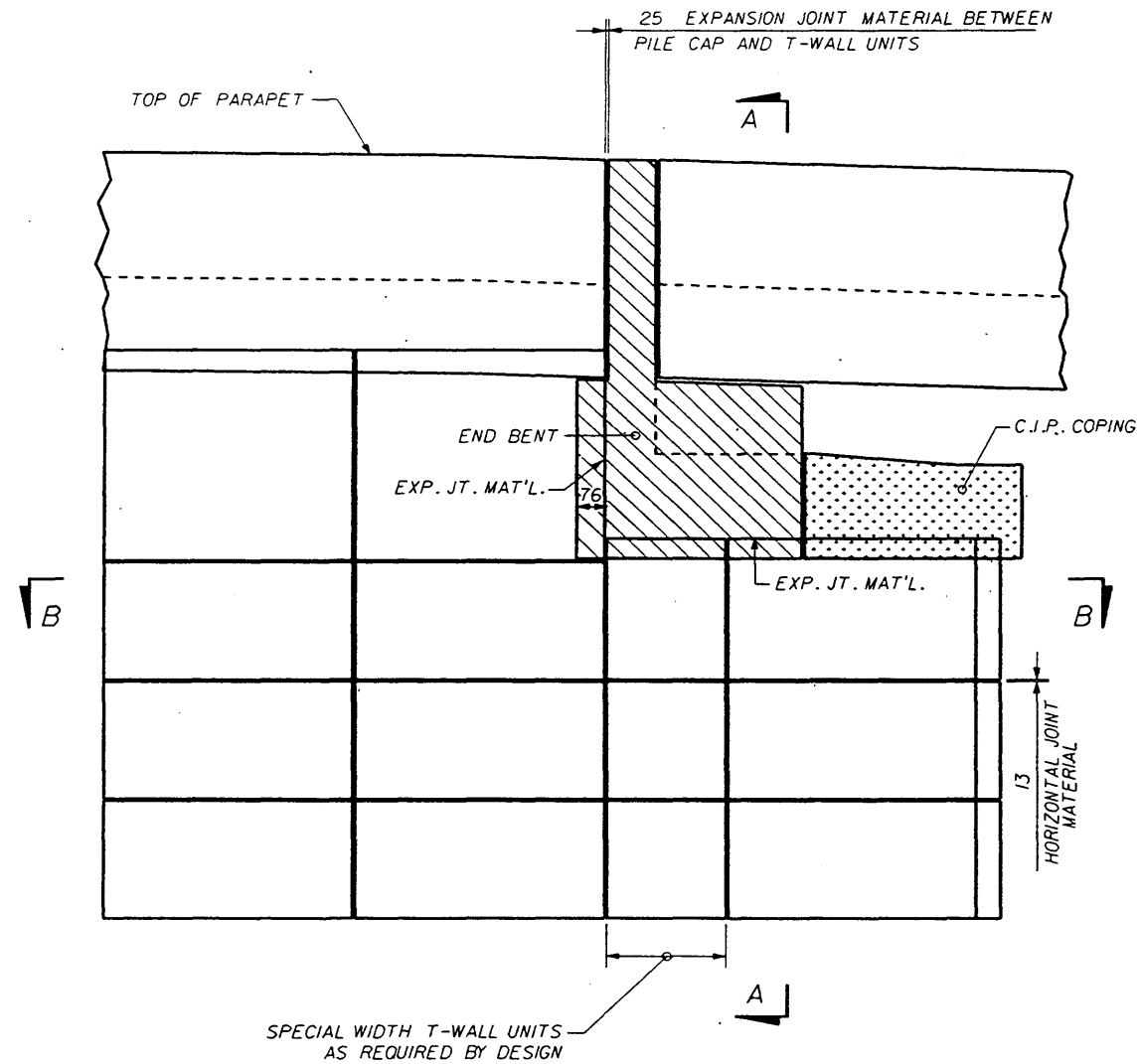
DESIGNER:  
**THE NEEL COMPANY**  
8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7850  
FX: (703) 913-7859

PRECASTER:  
**OLDCASTLE PRECAST, INC**  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (904) 778-2992

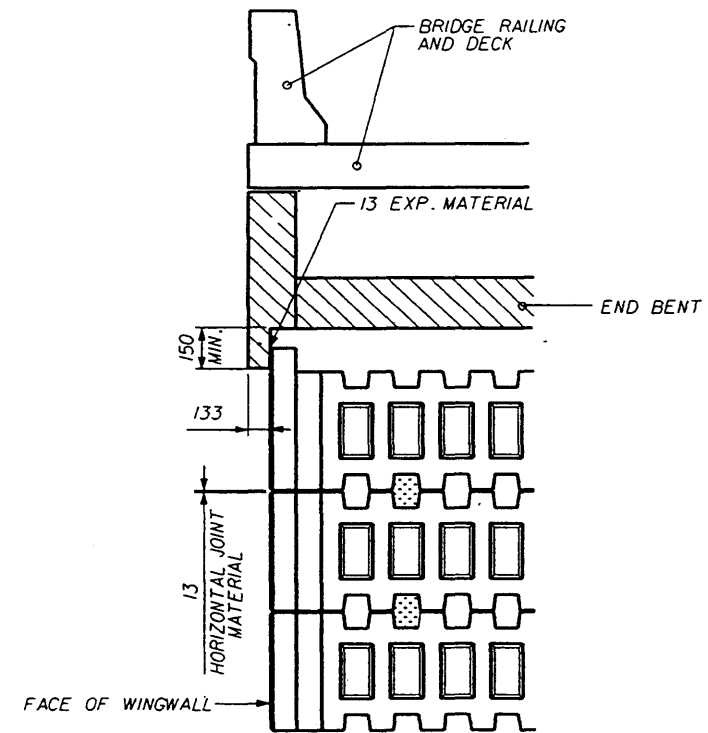




SECTION B-B  
STEM / END BENT PILE INTERFACE



PART ELEVATION SHOWING  
WINGWALL / END BENT INTERFACE



SECTION A-A  
SECTION THRU PILE CAP

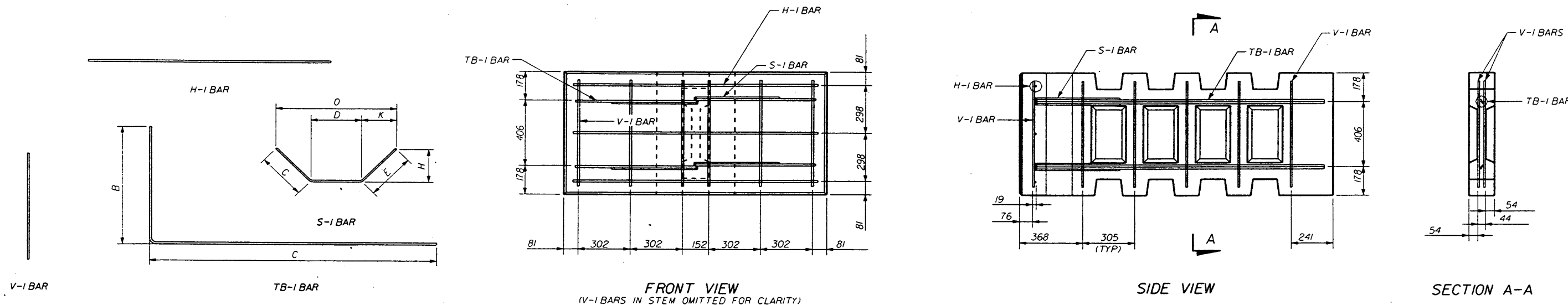
DESIGNER:  
**THE NEEL COMPANY**  
8328-D TOWNFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859

PRECASTER:  
**OLDCASTLE PRECAST, INC.**  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (904) 778-2992

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

RETAINING WALL SYSTEM  
THE NEEL COMPANY T-WALL  
(50 mm COVER)

Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By	JMC	10/01/98			
Drawn By	CAA	10/01/98			
Checked By	JMC	10/01/98	00	13 of 21	5011



FRONT VIEW  
(V-I BARS IN STEM OMITTED FOR CLARITY)

SIDE VIEW

SECTION A-A

REBAR SCHEDULE - 762 x 1.524 M x 1.219 M STD UNIT

MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-I	3	13	-	1.372 M								-	
V-I	12	10	-	610								-	
S-I	4	10	3	860		286	286	286	203	203	705	45	
TB-I	4	13	17	1.740 M	699	1.080 M						90	

REBAR SCHEDULE - 762 x 1.524 M x 1.829 M STD UNIT

MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-I	3	13	-	1.372 M								-	
V-I	16	10	-	610								-	
S-I	4	10	3	860		286	286	286	203	203	705	45	
TB-I	4	13	17	2.350 M	699	1.689 M						90	

REBAR SCHEDULE - 762 x 1.524 M x 2.438 M STD UNIT

MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-I	3	13	-	1.372 M								-	
V-I	20	10	-	610								-	
S-I	4	10	3	860		286	286	286	203	203	705	45	
TB-I	4	13	17	2.959 M	699	2.299 M						90	

REBAR SCHEDULE - 762 x 1.524 M x 3.048 M STD UNIT

MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-I	3	13	-	1.372 M								-	
V-I	24	10	-	610								-	
S-I	4	10	3	860		286	286	286	203	203	705	45	
TB-I	4	13	17	3.569 M	699	2.908 M						90	

REBAR SCHEDULE - 762 x 1.524 M x 3.658 M STD UNIT

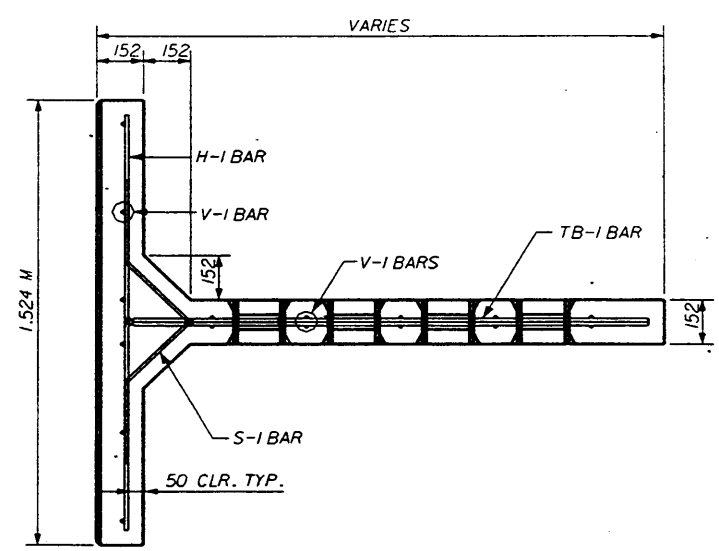
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H-I	3	13	-	1.372 M								-	
V-I	26	10	-	610								-	
S-I	4	10	3	860		286	286	286	203	203	705	45	
TB-I	4	13	17	4.178 M	699	3.518 M						90	

REBAR SCHEDULE - 762 x 1.524 M x 4.267 M STD UNIT

MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-I	3	13	-	1.372 M								-	
V-I	32	10	-	610								-	
S-I	4	10	3	860		286	286	286	203	203	705	45	
TB-I	4	13	17	4.788 M	699	4.128 M						90	

REBAR SCHEDULE - 762 x 1.524 M x 4.877 M STD UNIT

MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-I	3	13	-	1.372 M								-	
V-I	36	10	-	610								-	
S-I	4	10	3	860		286	286	286	203	203	705	45	
TB-I	4	13	17	5.397 M	699	4.737 M						90	



TOP VIEW

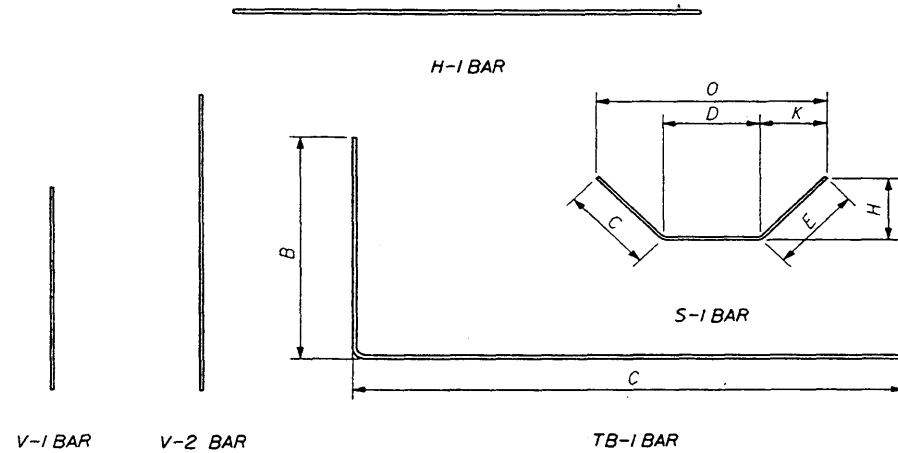
REINFORCING STEEL - STANDARD UNITS

DESIGNER:  
**THE NEEL COMPANY**  
 8328 D TRAFORD LANE  
 SPRINGFIELD, VIRGINIA 22152  
 PH: 1703/913-7858  
 FX: 1703/913-7859

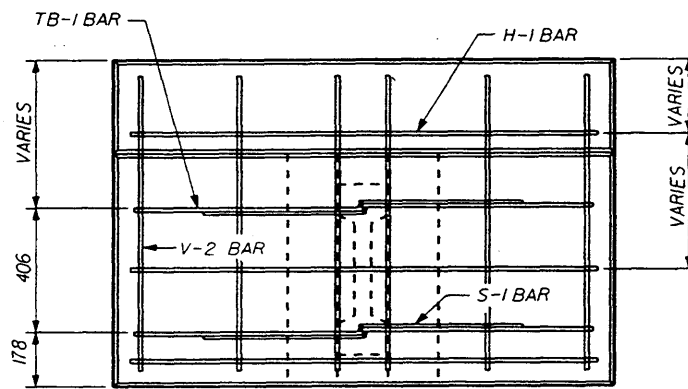
PRECASTER:  
**OLDCASTLE PRECAST, INC**  
 11643 103rd STREET  
 JACKSONVILLE, FL 32210  
 PH: 904/778-2998  
 FX: 904/778-2992

NOTE: ALL STEEL REINFORCING BARS SHALL HAVE 50 MIN. CONCRETE COVER

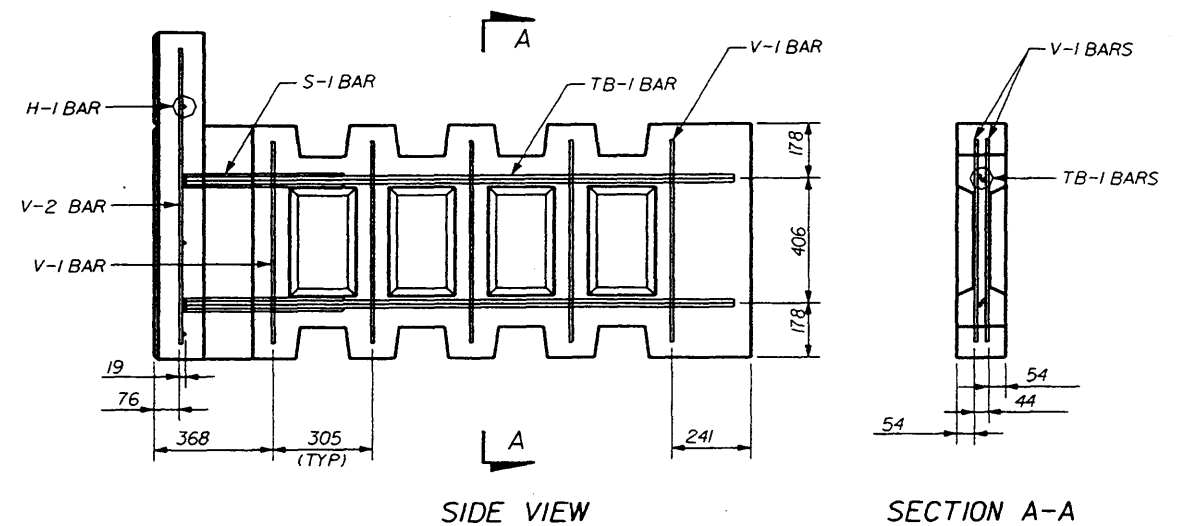
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (50 mm COVER)				
Names	Dates	Approved By		
Designed By	JMC	10/01/98	 State Structures Design Engineer	
Drawn By	CAA	10/01/98		
Checked By	JMC	10/01/98		
Revision		00		
			14 of 21	5011



V-1 BAR    V-2 BAR    TB-1 BAR



FRONT VIEW  
(V-1 BARS IN STEM OMITTED FOR CLARITY)



REBAR SCHEDULE - 914 x 1,524 M x 1,219 M TOP UNIT												
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE REMARKS
H-1	4	13	-	1,372 M	-	-	-	-	-	-	-	-
V-1	6	10	-	610	-	-	-	-	-	-	-	-
V-2	6	16	-	762	-	-	-	-	-	-	-	-
S-1	4	10	3	860	-	286	286	286	203	203	705	45
TB-1	4	13	IT	1,740 M	699	1,080 M	-	-	-	-	-	90

REBAR SCHEDULE - 914 x 1,524 M x 1,829 M TOP UNIT												
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE REMARKS
H-1	4	13	-	1,372 M	-	-	-	-	-	-	-	-
V-1	10	10	-	610	-	-	-	-	-	-	-	-
V-2	6	16	-	762	-	-	-	-	-	-	-	-
S-1	4	10	3	860	-	286	286	286	203	203	705	45
TB-1	4	13	IT	2,350 M	699	1,689 M	-	-	-	-	-	90

REBAR SCHEDULE - 1,067 M x 1,524 M x 1,219 M TOP UNIT												
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE REMARKS
H-1	5	13	-	1,372 M	-	-	-	-	-	-	-	-
V-1	6	10	-	610	-	-	-	-	-	-	-	-
V-2	6	16	-	914	-	-	-	-	-	-	-	-
S-1	4	10	3	860	-	286	286	286	203	203	705	45
TB-1	4	13	IT	1,740 M	699	1,080 M	-	-	-	-	-	90

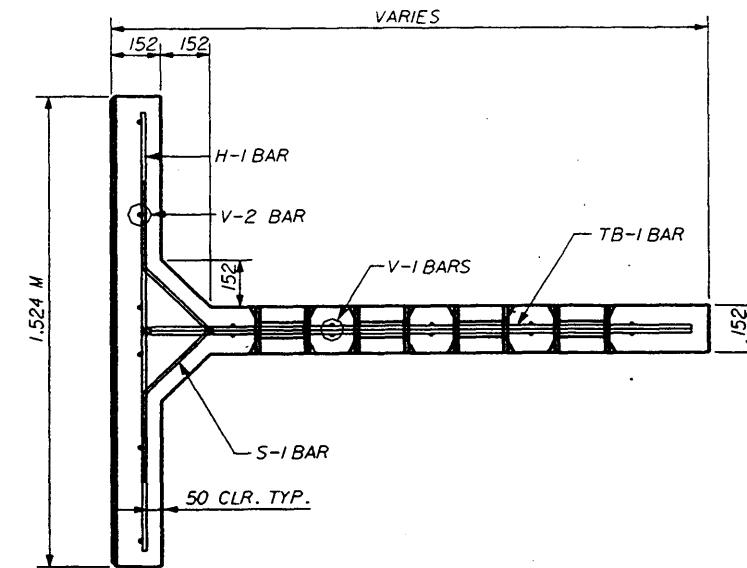
REBAR SCHEDULE - 1,067 M x 1,524 M x 1,829 M TOP UNIT												
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H-1	5	13	-	1,372 M	-	-	-	-	-	-	-	-
V-1	10	10	-	610	-	-	-	-	-	-	-	-
V-2	6	16	-	914	-	-	-	-	-	-	-	-
S-1	4	10	3	860	-	286	286	286	203	203	705	45
TB-1	4	13	IT	2,350 M	699	1,689 M	-	-	-	-	-	90

REBAR SCHEDULE - 1,219 x 1,524 M x 1,219 M TOP UNIT												
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE REMARKS
H-1	5	13	-	1,372 M	-	-	-	-	-	-	-	-
V-1	6	10	-	610	-	-	-	-	-	-	-	-
V-2	6	16	-	1,067 M	-	-	-	-	-	-	-	-
S-1	4	10	3	860	-	286	286	286	203	203	705	45
TB-1	4	13	IT	1,740 M	699	1,080 M	-	-	-	-	-	90

REBAR SCHEDULE - 1,219 M x 1,524 M x 1,829 M TOP UNIT												
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE REMARKS
H-1	5	13	-	1,372 M	-	-	-	-	-	-	-	-
V-1	10	10	-	610	-	-	-	-	-	-	-	-
V-2	6	16	-	1,067 M	-	-	-	-	-	-	-	-
S-1	4	10	3	860	-	286	286	286	203	203	705	45
TB-1	4	13	IT	2,350 M	699	1,689 M	-	-	-	-	-	90

REBAR SCHEDULE - 1,372 x 1,524 M x 1,829 M TOP UNIT												
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE REMARKS
H-1	6	13	-	1,372 M	-	-	-	-	-	-	-	-
V-1	6	10	-	610	-	-	-	-	-	-	-	-
V-2	6	16	-	1,219 M	-	-	-	-	-	-	-	-
S-1	4	10	3	860	-	286	286	286	203	203	705	45
TB-1	4	13	IT	2,350 M	699	1,689 M	-	-	-	-	-	90

REBAR SCHEDULE - 1,524 M x 1,524 M x 1,829 M TOP UNIT												
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE REMARKS
H-1	6	13	-	1,372 M	-	-	-	-	-	-	-	-
V-1	10	10	-	610	-	-	-	-	-	-	-	-
V-2	6	16	-	1,372 M	-	-	-	-	-	-	-	-
S-1	4	10	3	860	-	286	286	286	203	203	705	45
TB-1	4	13	IT	2,350 M	699	1,689 M	-	-	-	-	-	90



TOP VIEW  
REINFORCING STEEL - TOP UNITS (I)

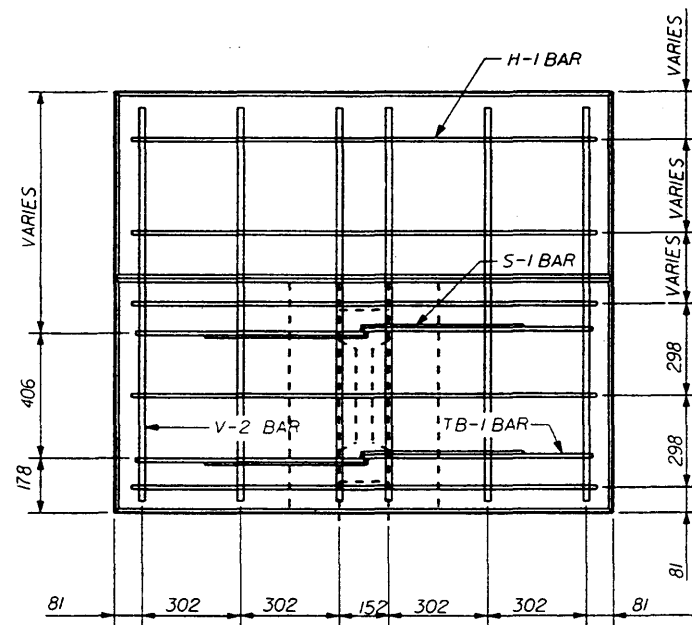
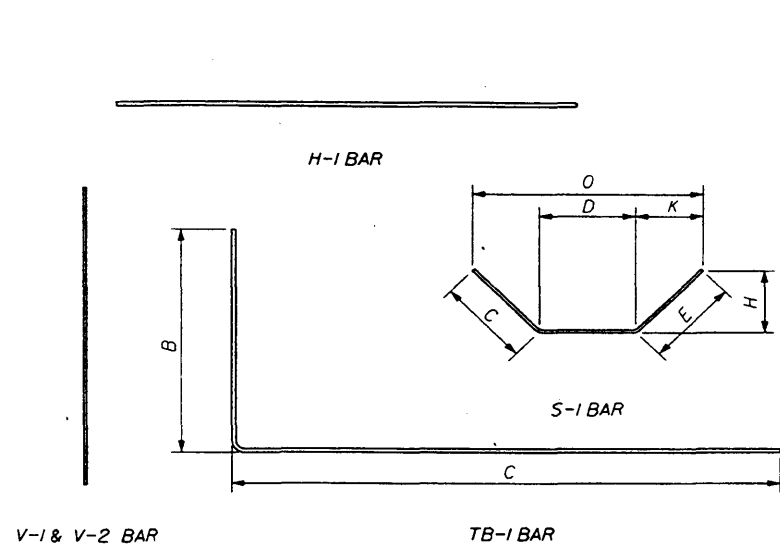
DESIGNER:  

**THE NEEL COMPANY**  
 8329-D TRAVERS LANE  
 SPRINGFIELD, VIRGINIA 22152  
 PH: (703) 913-7858  
 FX: (703) 913-7859

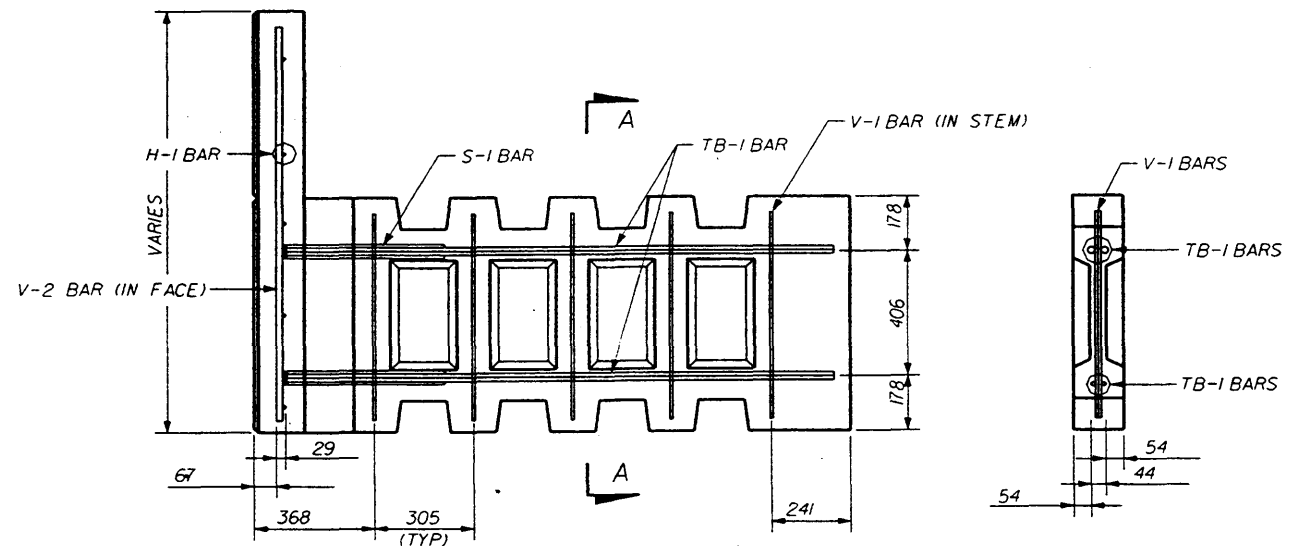
PRECASTER:  
**OLDCASTLE PRECAST, INC**  
 11643 103rd STREET  
 JACKSONVILLE, FL 32210  
 PH: (904) 778-2990  
 FX: (904) 778-2992

NOTE: ALL STEEL REINFORCING BARS SHALL HAVE 50 MIN. CONCRETE COVER

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (50 mm COVER)					
Names	Dates	Approved By <i>William J. [Signature]</i> State Structures Design Engineer			
Designed By	JMC	10/01/98	Revision	Sheet No.	Index No.
Drawn By	CAA	10/01/98	00	15 of 21	5011
Checked By	JMC	10/01/98			



FRONT VIEW  
(V-1 BARS IN STEM OMITTED FOR CLARITY)



SIDE VIEW

SECTION A-A

REBAR SCHEDULE - 1.676 M x 1.524 M x 2.438 M TOP UNIT

MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	5	13	-	1.372 M									
V-1	14	10	-	610									
V-2	6	19	-	1.524 M									
S-1	4	10	3	838		229	381	229	137	137	654	45	
TB-1	4	19	17	2.959 M	699	2.299 M						90	

REBAR SCHEDULE - 1.829 M x 1.524 M x 2.438 M TOP UNIT

MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	7	13	-	1.372 M									
V-1	14	10	-	610									
V-2	6	19	-	1.676 M									
S-1	4	10	3	838		229	381	229	137	137	654	45	
TB-1	4	19	17	2.959 M	699	2.299 M						90	

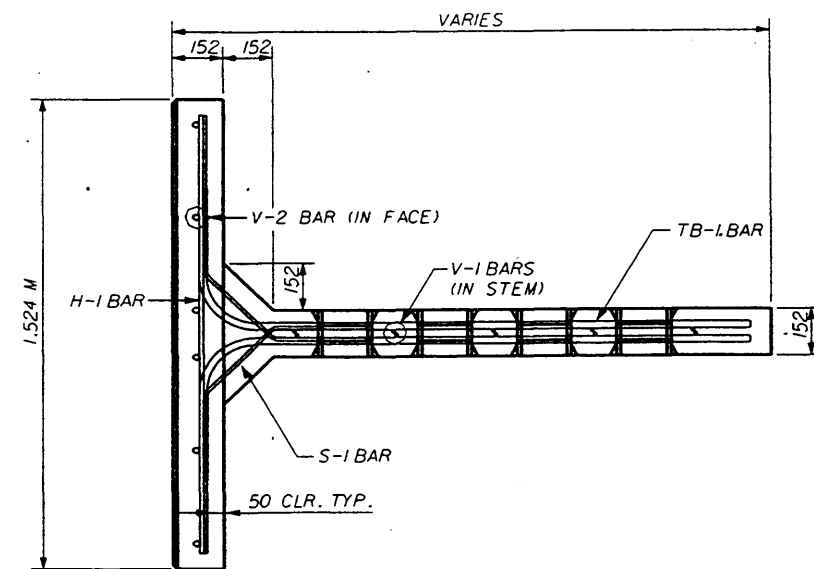
REBAR SCHEDULE - 1.981 M x 1.524 M x 2.438 M TOP UNIT

MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	7	13	-	1.372 M									
V-1	14	10	-	610									
V-2	6	19	-	1.829 M									
S-1	4	10	3	838		229	381	229	137	137	654	45	
TB-1	4	19	17	2.959 M	699	2.299 M						90	

REBAR SCHEDULE - 2.134 M x 1.524 M x 2.438 M TOP UNIT

MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	8	13	-	1.372 M									
V-1	14	10	-	610									
V-2	6	19	-	1.981 M									
S-1	4	10	3	838		229	381	229	137	137	654	45	
TB-1	4	19	17	2.959 M	699	2.299 M						90	

THESE TWO UNITS WILL ONLY BE USED BY APPROVAL OF THE F.D.O.T. STRUCTURES DESIGN OFFICE ON A PROJECT BY PROJECT BASIS.



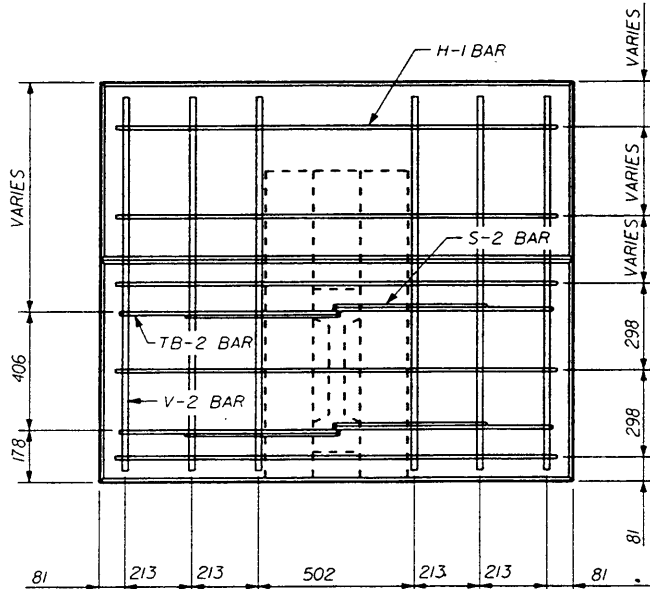
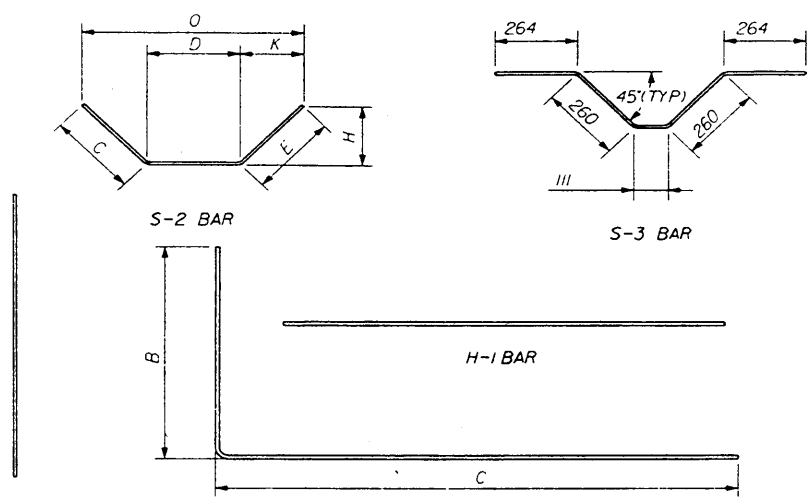
TOP VIEW  
REINFORCING STEEL - TOP UNITS (II)

DESIGNER:  
**THE NEEL COMPANY**  
8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859

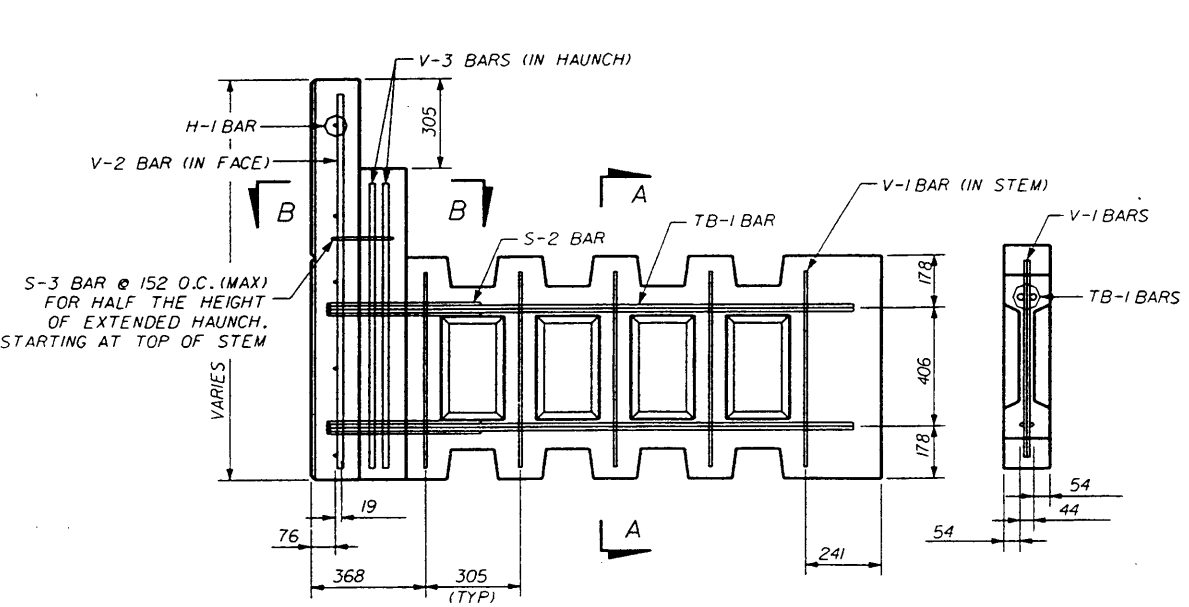
PRECASTER:  
**OLDCASTLE PRECAST, INC**  
11643 103RD STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (904) 778-2992

NOTE: ALL STEEL REINFORCING BARS SHALL HAVE 50 MIN. CONCRETE COVER

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (50 mm COVER)				
Names	Dates	Approved By		
Designed By	JMC	10/01/98	State Structures Design Engineer	
Drawn By	CAA	10/01/98	Revision	Sheet No.
Checked By	JMC	10/01/98	00	16 of 21
				5011

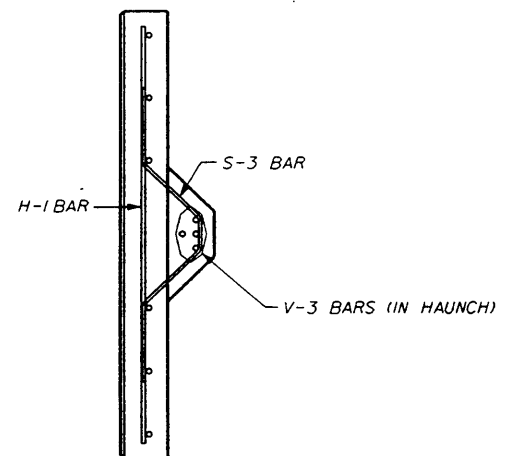


FRONT VIEW  
(V-1 BARS IN STEM AND V-3 BARS IN HAUNCH OMITTED FOR CLARITY)

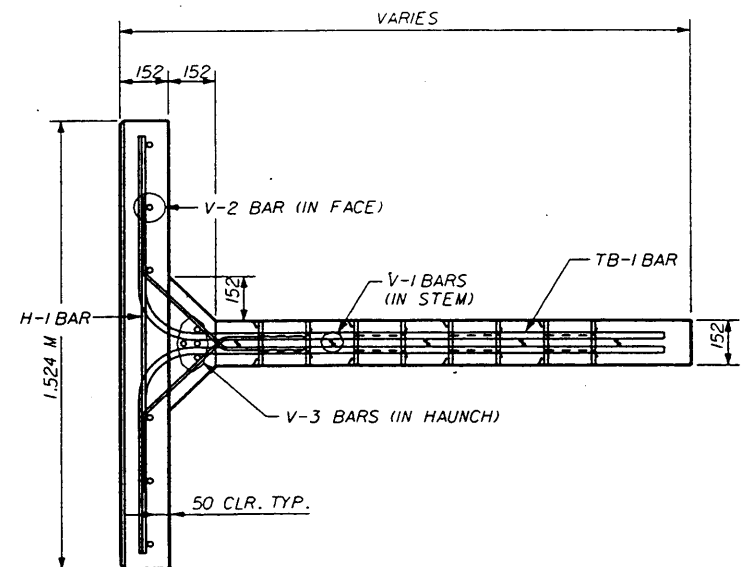


SIDE VIEW

SECTION A-A



SECTION B-B



TOP VIEW

S-3 BARS IN EXTENDED HAUNCH APPROVAL OF THE F.D.O.T. STRUCTURES DESIGN OFFICE ON A PROJECT BY PROJECT BASIS.

REINFORCING STEEL - TOP UNITS (III)

VI. V-2 & V-3 BAR

REBAR SCHEDULE - 2.286 M x 1.524 M x 3.048 M TOP UNIT													
MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	Q	ANGLE	REMARKS
H-1	8	13	-	1.372 M									
V-1	18	10	-	610									
V-2	6	19	-	2.154 M									
V-3	4	19	-	1.829 M									
S-2	4	10	3	864	264	365	264	191	191	7.37	45		
S-3	8	10	3	1.006 M									SEE BENDING DTL
TB-1	4	22	17	3.534 M	667	2.918 M						90	

REBAR SCHEDULE - 2.438 M x 1.524 M x 3.048 M TOP UNIT													
MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	Q	ANGLE	REMARKS
H-1	8	13	-	1.372 M									
V-1	18	10	-	610									
V-2	6	19	-	2.286 M									
V-3	4	19	-	1.981 M									
S-2	4	10	3	864	264	365	264	191	191	7.37	45		
S-3	9	10	3	1.006 M									SEE BENDING DTL
TB-1	4	22	17	3.534 M	667	2.918 M						90	

REBAR SCHEDULE - 2.591 M x 1.524 M x 3.048 M TOP UNIT													
MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	Q	ANGLE	REMARKS
H-1	8	13	-	1.372 M									
V-1	18	10	-	610									
V-2	6	19	-	2.438 M									
V-3	4	19	-	2.154 M									
S-2	4	10	3	864	264	365	264	191	191	7.37	45		
S-3	10	10	3	1.006 M									SEE BENDING DTL
TB-1	4	22	17	3.534 M	667	2.918 M						90	

REBAR SCHEDULE - 2.743 M x 1.524 M x 3.658 M TOP UNIT													
MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	Q	ANGLE	REMARKS
H-1	8	13	-	1.372 M									
V-1	22	10	-	610									
V-2	6	19	-	2.591 M									
V-3	4	19	-	2.286 M									
S-2	4	10	3	864	264	365	264	191	191	7.37	45		
S-3	11	10	3	1.006 M									SEE BENDING DTL
TB-1	4	22	17	4.143 M	667	3.527 M						90	

REBAR SCHEDULE - 2.896 M x 1.524 M x 3.658 M TOP UNIT													
MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	Q	ANGLE	REMARKS
H-1	8	13	-	1.372 M									
V-1	22	10	-	610									
V-2	6	19	-	2.743 M									
V-3	4	19	-	2.438 M									
S-2	4	10	3	864	264	365	264	191	191	7.37	45		
S-3	12	10	3	1.006 M									SEE BENDING DTL
TB-1	4	22	17	4.143 M	667	3.527 M						90	

REBAR SCHEDULE - 3.048 M x 1.524 M x 3.658 M TOP UNIT													
MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	Q	ANGLE	REMARKS
H-1	8	13	-	1.372 M									
V-1	22	10	-	610									
V-2	6	19	-	2.896 M									
V-3	4	19	-	2.591 M									
S-2	4	10	3	864	264	365	264	191	191	7.37	45		
S-3	13	10	3	1.006 M									SEE BENDING DTL
TB-1	4	22	17	4.143 M	667	3.527 M						90	

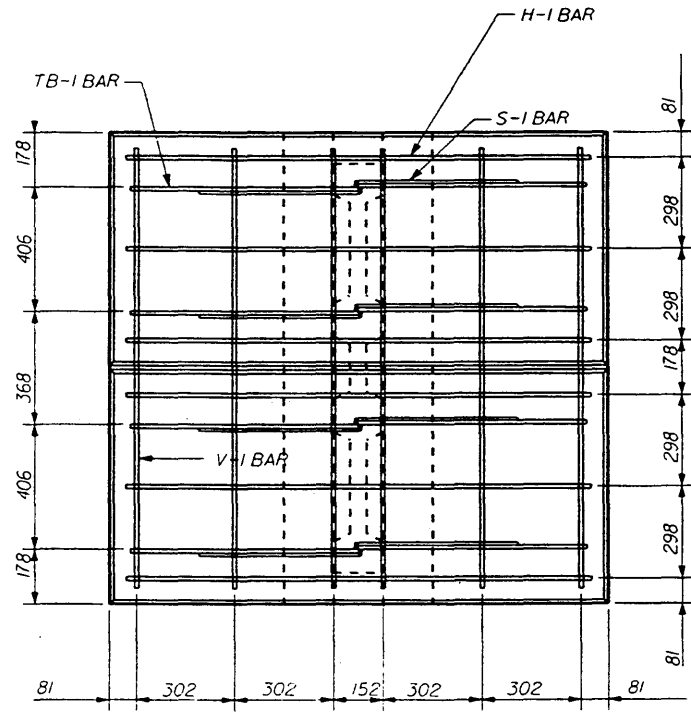
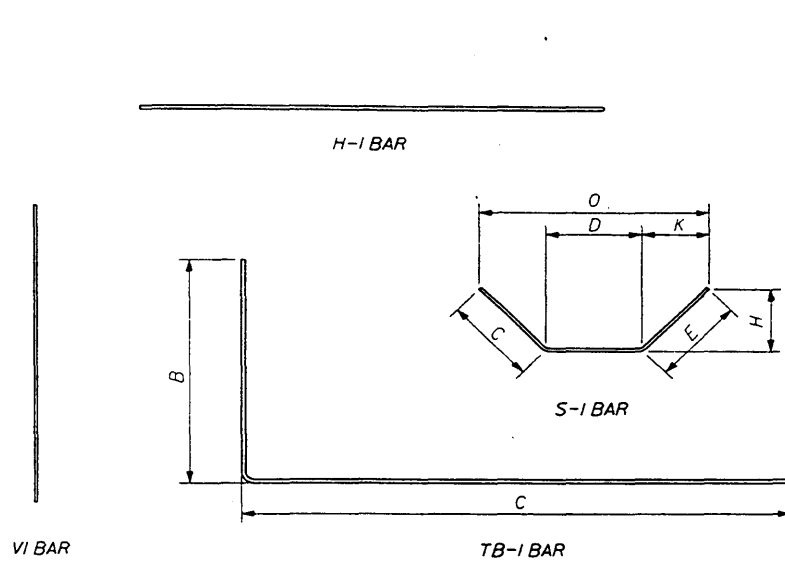
REBAR SCHEDULE - 3.200 M x 1.524 M x 3.658 M TOP UNIT													
MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	Q	ANGLE	REMARKS
H-1	8	13	-	1.372 M									
V-1	22	10	-	610									
V-2	6	19	-	3.048 M									
V-3	4	19	-	2.743 M									
S-2	4	10	3	864	264	365	264	191	191	7.37	45		
S-3	14	10	3	1.006 M									SEE BENDING DTL
TB-1	4	22	17	4.143 M	667	3.527 M						90	

DESIGNER:  
  
**THE NEEL COMPANY**  
 8328-D TRAFORD LANE  
 SPRINGFIELD, VIRGINIA 22152  
 PH: (703) 913-7858  
 FX: (703) 913-7859

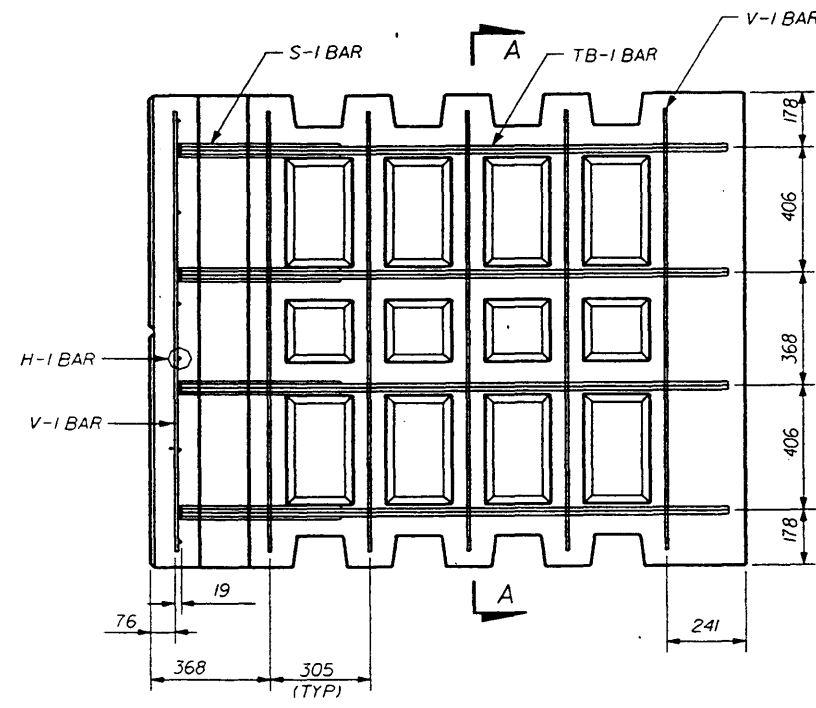
PRECASTER:  
**OLDCASTLE PRECAST, INC.**  
 11643 103RD STREET  
 JACKSONVILLE, FL 32210  
 PH: (904) 778-2990  
 FX: (904) 778-2992

NOTE: ALL STEEL REINFORCING BARS SHALL HAVE 50 MIN. CONCRETE COVER

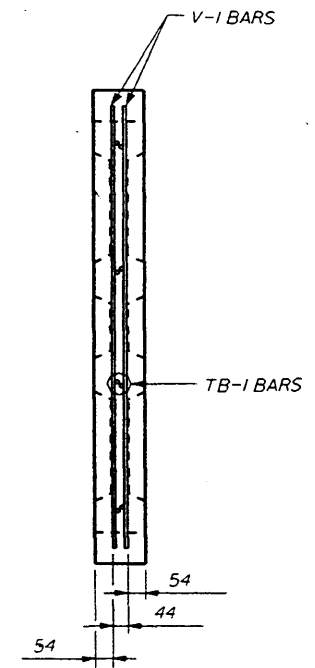
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN			
RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (50 mm COVER)			
Names		Dates	
Designed By	JMC	10/01/98	
Drawn By	CAA	10/01/98	
Checked By	JMC	10/01/98	
Approved By		State Structures Design Engineer	
Revision		Sheet No.	Index No.
00		17 of 21	5011



FRONT VIEW  
(V-I BARS IN STEM OMITTED FOR CLARITY)



SIDE VIEW  
VARIES



SECTION A-A

REBAR SCHEDULE - 1.524 M x 1.524 M x 1.219 M DBL UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	6	13	-	1.372 M								-	
V-1	12	10	-	1.372 M								-	
S-1	8	10	3	.860			286	286	286	203	203	45	
TB-1	8	13	17	1.740 M	699	1.080 M						90	

REBAR SCHEDULE - 1.524 M x 1.524 M x 1.829 M DBL UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	6	13	-	1.372 M								-	
V-1	16	10	-	1.372 M								-	
S-1	8	10	3	.860			286	286	286	203	203	45	
TB-1	8	13	17	2.350 M	699	1.689 M						90	

REBAR SCHEDULE - 1.524 M x 1.524 M x 2.438 M DBL UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	6	13	-	1.372 M								-	
V-1	20	10	-	1.372 M								-	
S-1	8	10	3	.860			286	286	286	203	203	45	
TB-1	8	13	17	2.959 M	699	2.299 M						90	

REBAR SCHEDULE - 1.524 M x 1.524 M x 3.048 M DBL UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	6	13	-	1.372 M								-	
V-1	24	10	-	1.372 M								-	
S-1	8	10	3	.860			286	286	286	203	203	45	
TB-1	8	13	17	3.569 M	699	2.908 M						90	

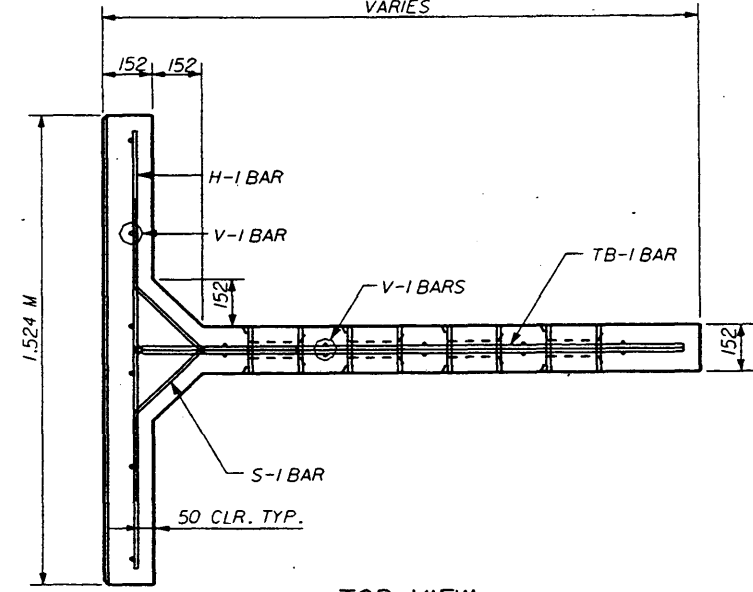
REBAR SCHEDULE - 1.524 M x 1.524 M x 3.658 M DBL UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	6	13	-	1.372 M								-	
V-1	26	10	-	1.372 M								-	
S-1	8	10	3	.860			286	286	286	203	203	45	
TB-1	8	13	17	4.178 M	699	3.518 M						90	

REBAR SCHEDULE - 1.524 M x 1.524 M x 4.267 M DBL UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	6	13	-	1.372 M								-	
V-1	32	10	-	1.372 M								-	
S-1	8	10	3	.860			286	286	286	203	203	45	
TB-1	8	13	17	4.788 M	699	4.128 M						90	

REBAR SCHEDULE - 1.524 M x 1.524 M x 4.877 M DBL UNIT													
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	6	13	-	1.372 M								-	
V-1	36	10	-	1.372 M								-	
S-1	8	10	3	.860			286	286	286	203	203	45	
TB-1	8	13	17	5.397 M	699	4.737 M						90	



TOP VIEW  
REINFORCING STEEL - DOUBLE UNITS

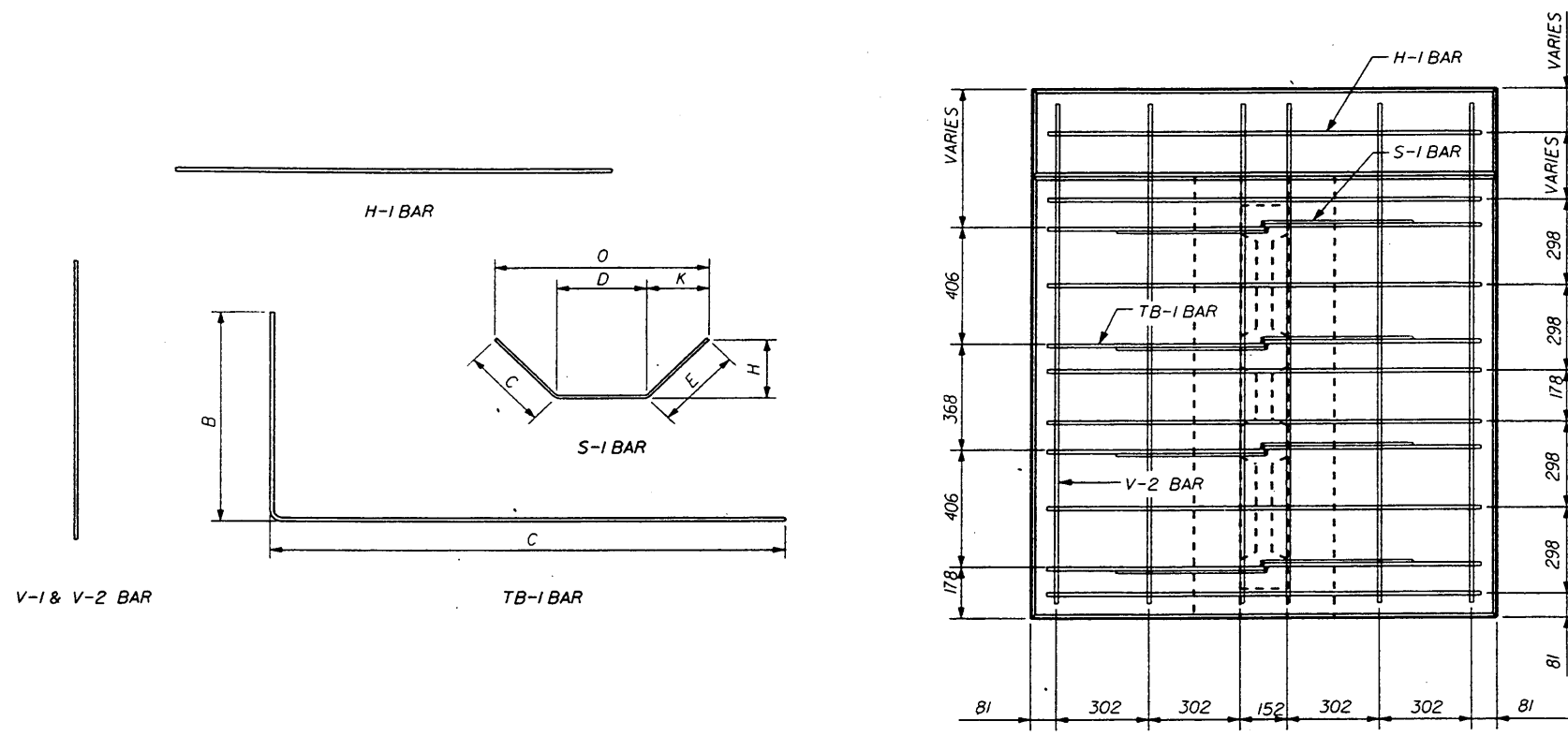


**DESIGNER:**  
**THE NEEL COMPANY**  
8378-D TRATFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: 17031 913-7858  
FX: 17031 913-7859

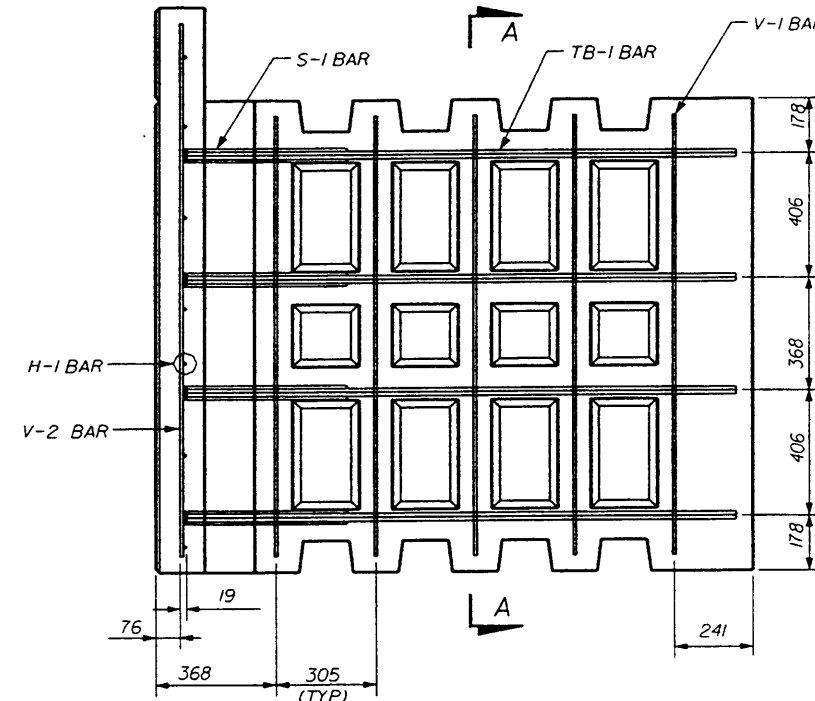
**PRECASTER:**  
**OLDCASTLE PRECAST, INC**  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: 19041 778-2990  
FX: 19041 778-2992

NOTE: ALL STEEL REINFORCING BARS SHALL HAVE 50 MIN. CONCRETE COVER

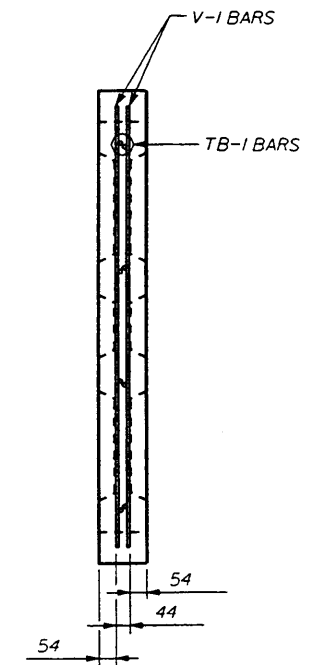
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (50 mm COVER)				
Names	Dates	Approved By		
Designed By JMC	10/01/98	 State Structures Design Engineer		
Drawn By CAA	10/01/98			
Checked By JMC	10/01/98			
		Revision	Sheet No.	Index No.
		00	18 of 21	5011



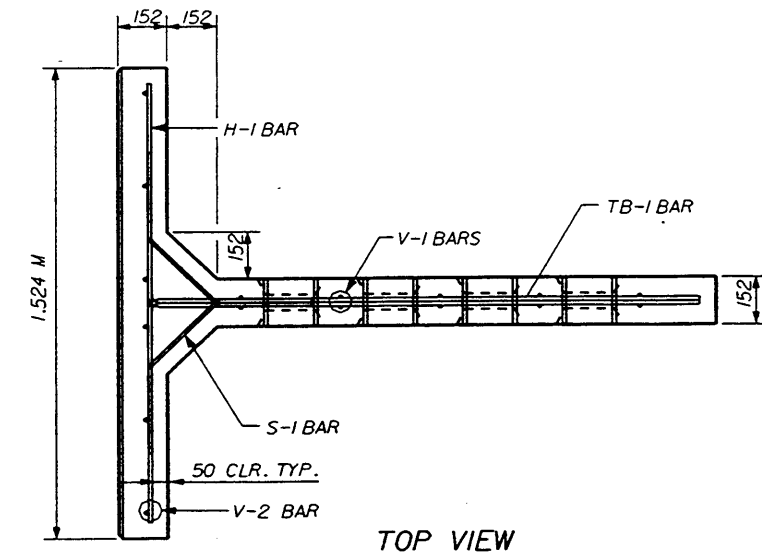
FRONT VIEW  
(V-1 BARS IN STEM OMITTED FOR CLARITY)



SIDE VIEW



SECTION A-A



TOP VIEW  
REINFORCING STEEL - DOUBLE TOP UNITS (1)

REBAR SCHEDULE - 1.676 M x 1.524 M x 1.829 M DBL TOP UNIT

MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	6	13	-	1.372 M									
V-1	10	10	-	1.372 M									
V-2	6	10	-	1.524 M									
S-1	8	3	3	860			286	286	203	203	705	45	
TB-1	8	16	17	2.350 M	699	1.689 M						90	

REBAR SCHEDULE - 1.829 M x 1.524 M x 1.829 M DBL TOP UNIT

MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	7	13	-	1.372 M									
V-1	10	10	-	1.372 M									
V-2	6	16	-	1.676 M									
S-1	8	10	3	860			286	286	203	203	705	45	
TB-1	8	16	17	2.350 M	699	1.689 M						90	

REBAR SCHEDULE - 1.981 M x 1.524 M x 1.829 M DBL TOP UNIT

MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	7	13	-	1.372 M									
V-1	10	10	-	1.372 M									
V-2	6	16	-	1.829 M									
S-1	8	10	3	860			286	286	203	203	705	45	
TB-1	8	16	17	2.350 M	699	1.689 M						90	

REBAR SCHEDULE - 2.134 M x 1.524 M x 1.829 M DBL TOP UNIT


MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	8	13	-	1.372 M									
V-1	10	10	-	1.372 M									
V-2	6	16	-	1.981 M									
S-1	8	10	3	860			286	286	203	203	705	45	
TB-1	8	16	17	2.350 M	699	1.689 M						90	

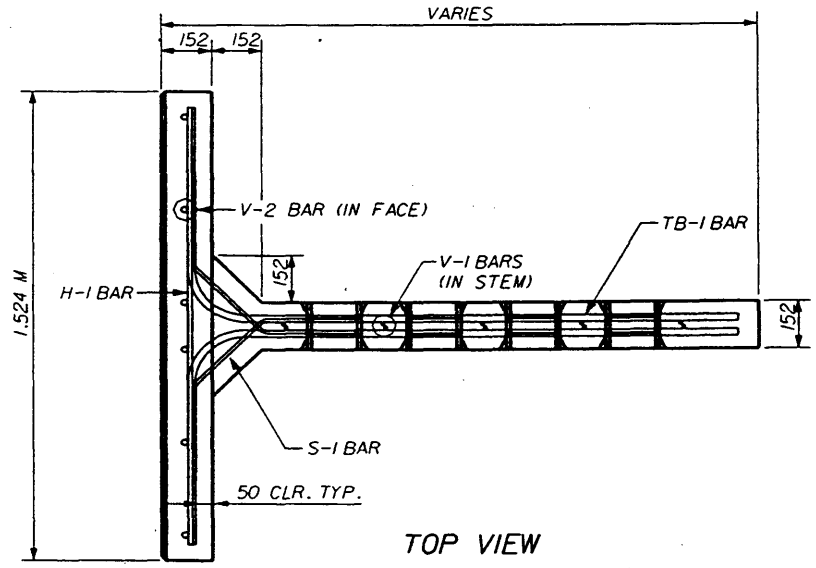
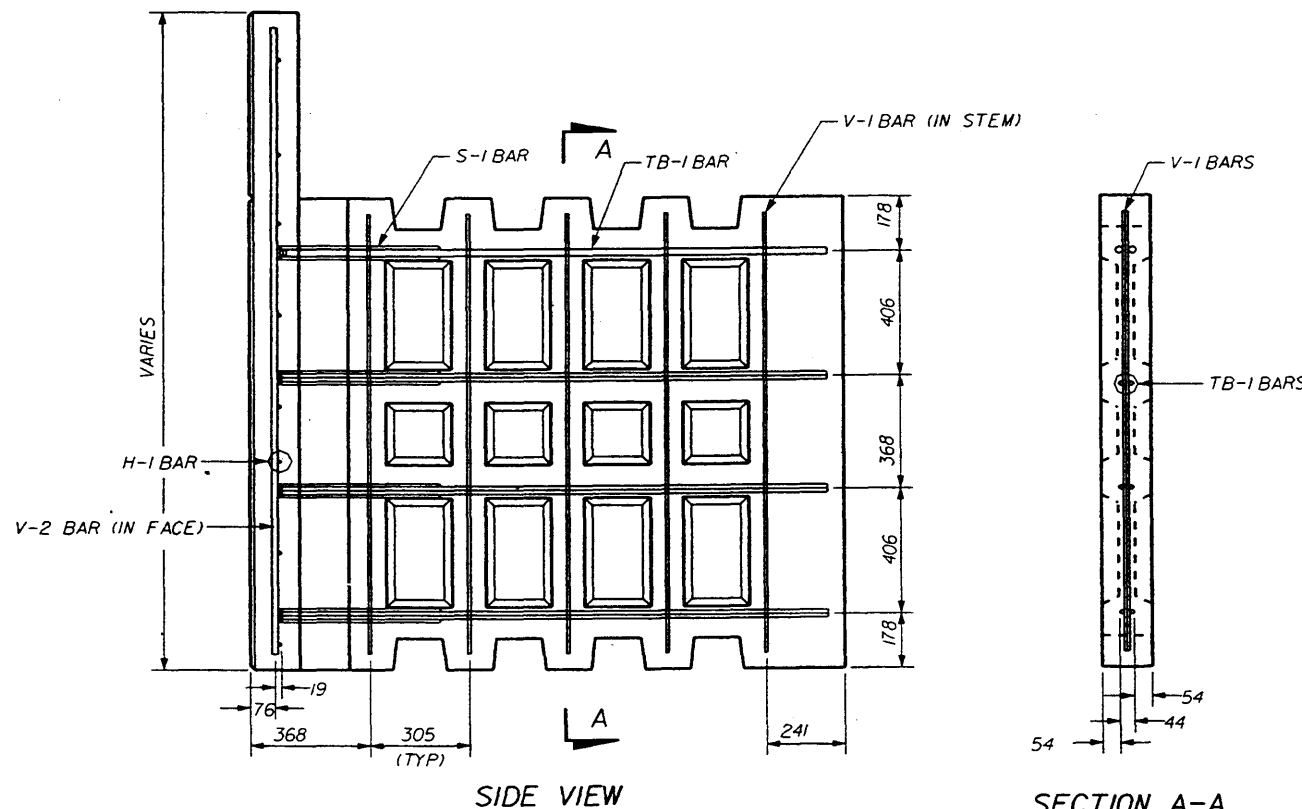
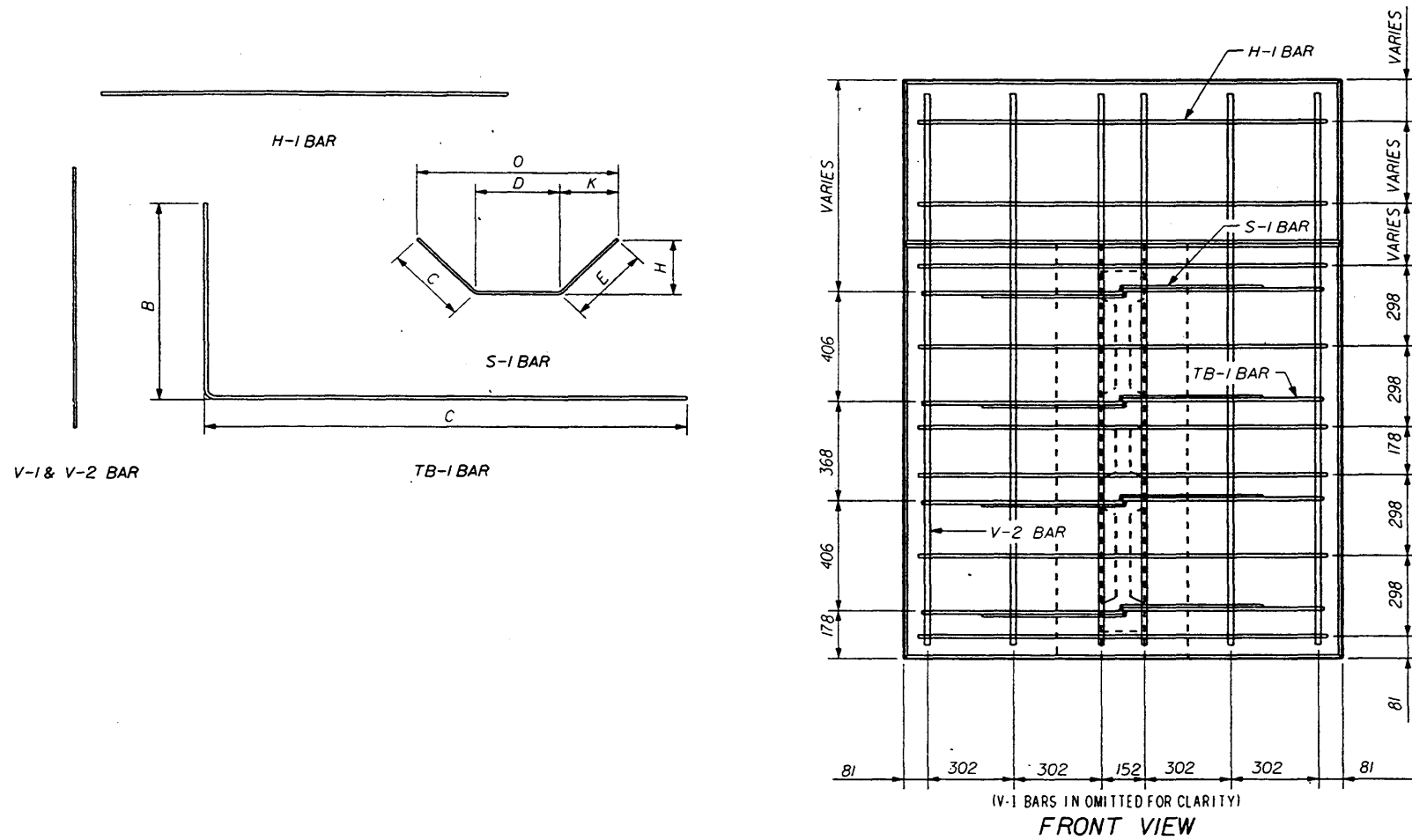
REBAR SCHEDULE - 2.286 M x 1.524 M x 1.829 M DBL TOP UNIT

MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	8	13	-	1.372 M									
V-1	10	10	-	1.372 M									
V-2	6	16	-	2.134 M									
S-1	8	10	3	860			286	286	203	203	705	45	
TB-1	8	16	17	2.350 M	699	1.689 M						90	

DESIGNER:  
 THE NEEL COMPANY  
8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859

PRECASTER:  
OLDCASTLE PRECAST, INC.  
11643 10TH STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2996  
FX: (904) 778-2992

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (50 mm COVER)				
Names	Dates	Approved By		
Designed By	JMC	10/01/98		
Drawn By	CAA	10/01/98		
Checked By	JMC	10/01/98	Revision	Sheet No.
			00	19 of 21
				Index No. 5011



REINFORCING STEEL - DOUBLE TOP UNITS (II)

REBAR SCHEDULE - 2.438 M x 1.524 M x 2.438 M DBL TOP UNIT

MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	9	13	-	1.372 M								-	
V-1	14	10	-	1.372 M								-	
V-2	6	19	-	2.286 M								-	
S-1	8	10	3	8.38			229	381	229	137	137	654	45
TB-1	8	19	17	2.959 M	699	2.299 M						90	

REBAR SCHEDULE - 2.591 M x 1.524 M x 2.438 M DBL TOP UNIT

MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	9	13	-	1.372 M								-	
V-1	14	10	-	1.372 M								-	
V-2	6	19	-	2.438 M								-	
S-1	8	10	3	8.38			229	381	229	137	137	654	45
TB-1	8	19	17	2.959 M	699	2.299 M						90	

REBAR SCHEDULE - 2.743 M x 1.524 M x 2.438 M DBL TOP UNIT

MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	10	13	-	1.372 M								-	
V-1	14	10	-	1.372 M								-	
V-2	6	19	-	2.591 M								-	
S-1	8	10	3	8.38			229	381	229	137	137	654	45
TB-1	8	19	17	2.959 M	699	2.299 M						90	

REBAR SCHEDULE - 2.896 M x 1.524 M x 2.438 M DBL TOP UNIT

MARK	QTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	10	13	-	1.372 M								-	
V-1	14	10	-	1.372 M								-	
V-2	6	19	-	2.743 M								-	
S-1	8	10	3	8.38			229	381	229	137	137	654	45
TB-1	8	19	17	2.959 M	699	2.299 M						90	

THESE TWO UNITS WILL ONLY BE USED BY APPROVAL OF THE F.D.O.T. STRUCTURES DESIGN OFFICE ON A PROJECT BY PROJECT BASIS.

DESIGNER:  
**THE NEEL COMPANY**  
 8328-D TRAFORD LANE  
 SPRINGFIELD, VIRGINIA 22152  
 PH: 1703 913-7858  
 FX: 1703 913-7859

PRECASTER:  
**OLDCASTLE PRECAST, INC**  
 11643 103rd STREET  
 JACKSONVILLE, FL 32210  
 PH: 1904 778-2990  
 FX: 1904 778-2992

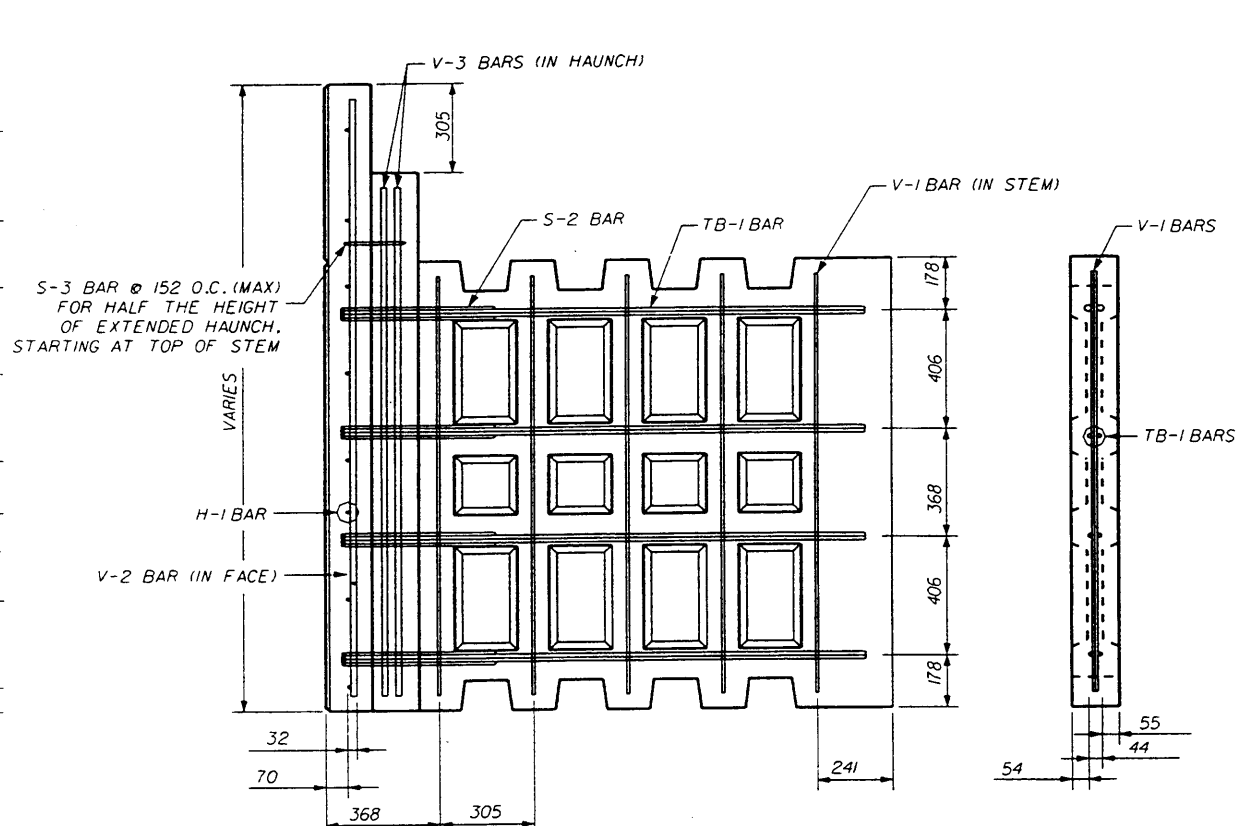
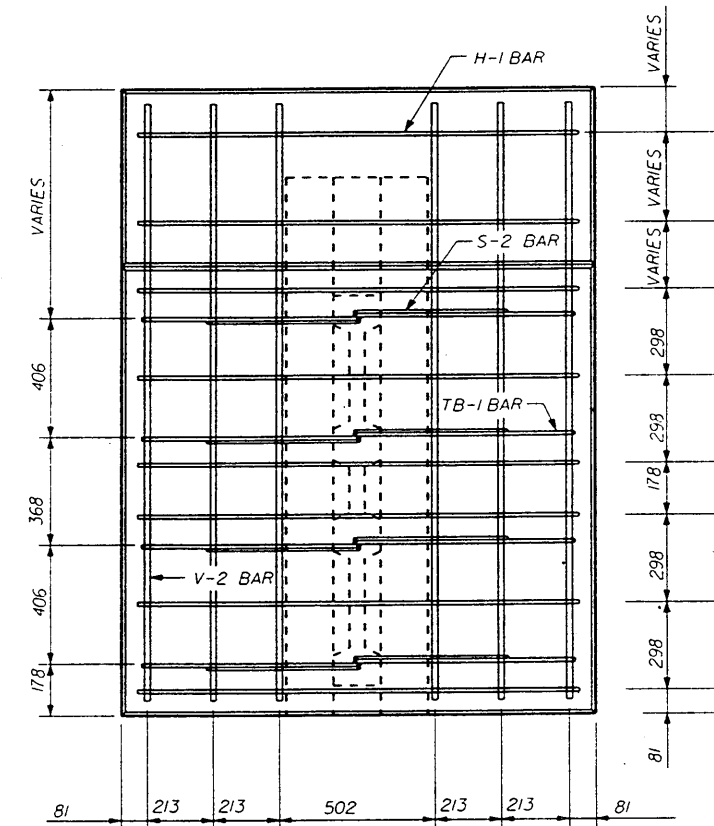
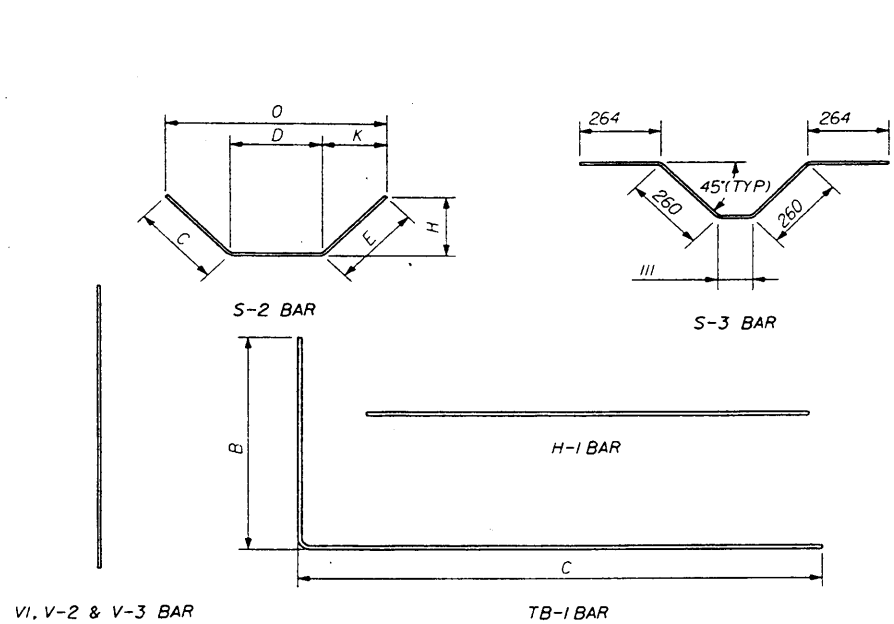
NOTE: ALL STEEL REINFORCING BARS SHALL HAVE 50 MIN. CONCRETE COVER

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
 ROAD DESIGN

**RETAINING WALL SYSTEM  
 THE NEEL COMPANY T-WALL  
 (50 mm COVER)**

Name	Date	Approved By		
Designed By	JMC 10/10/98	W. J. [Signature] State Structures Design Engineer		
Drawn By	CAA 10/10/98	Revision	Sheet No.	Index No.
Checked By	JMC 10/10/98	00	20 of 21	5011





**FRONT VIEW**  
(V-1 BARS IN STEM AND V-3 BARS IN HAUNCH OMITTED FOR CLARITY)

**SIDE VIEW**

**SECTION A-A**

REBAR SCHEDULE - 3.048 M x 1.524 M x 3.048 M DBL TOP UNIT

MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	11	13	-	1.372 M									
V-1	18	10	-	1.372 M									
V-2	6	19	-	2.896 M									
V-3	4	19	-	2.591 M									
S-2	8	10	3	864	264	365	264	191	191	7.37	45		SEE BENDING DTL
S-3	8	10	3	1,006									
TB-1	8	22	17	3.534	666	2,918						90	

REBAR SCHEDULE - 3.200 M x 1.524 M x 3.048 M DBL TOP UNIT

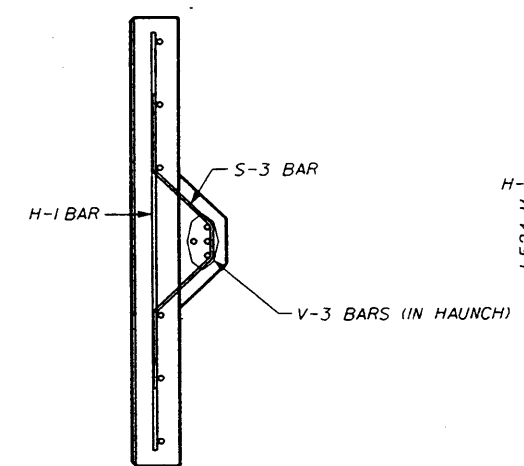
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	11	13	-	1.372 M									
V-1	18	10	-	1.372 M									
V-2	6	19	-	3.048 M									
V-3	4	19	-	2.743 M									
S-2	8	10	3	864	264	365	264	191	191	7.37	45		SEE BENDING DTL
S-3	8	10	3	1,006									
TB-1	8	22	17	3.534	666	2,918						90	

REBAR SCHEDULE - 3.353 M x 1.524 M x 3.048 M DBL TOP UNIT

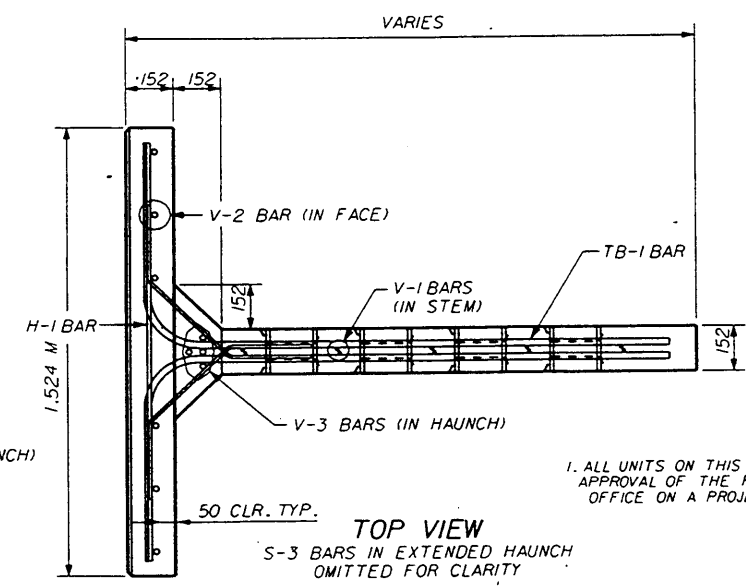
MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	12	13	-	1.372 M									
V-1	18	10	-	1.372 M									
V-2	6	19	-	3.200 M									
V-3	4	19	-	2.896 M									
S-2	8	10	3	864	264	365	264	191	191	7.37	45		SEE BENDING DTL
S-3	8	10	3	1,006									
TB-1	8	22	17	3.534	666	2,918						90	

REBAR SCHEDULE - 3.505 M x 1.524 M x 3.048 M DBL TOP UNIT

MARK	QNTY	SIZE	TYPE	LGTH	B	C	D	E	H	K	O	ANGLE	REMARKS
H-1	12	13	-	1.372 M									
V-1	18	10	-	1.372 M									
V-2	6	19	-	3.353 M									
V-3	4	19	-	3.048 M									
S-2	8	10	3	864	264	365	264	191	191	7.37	45		SEE BENDING DTL
S-3	8	10	3	1,006									
TB-1	8	22	17	3.534	666	2,918						90	



**SECTION B-B**



**TOP VIEW**  
S-3 BARS IN EXTENDED HAUNCH OMITTED FOR CLARITY  
**REINFORCING STEEL - DOUBLE TOP UNITS (III)**

1. ALL UNITS ON THIS SHEET WILL ONLY BE USED BY APPROVAL OF THE F.D.O.T. STRUCTURES DESIGN OFFICE ON A PROJECT BY PROJECT BASIS.

DESIGNER:  
**THE NEEL COMPANY**  
8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: 1703/913-7858  
FX: 1703/913-7859

PRECASTER:  
**OLDCASTLE PRECAST, INC**  
11643 102nd STREET  
JACKSONVILLE, FL 32210  
PH: 1904/1778-2998  
FX: 1904/1778-2992

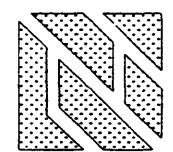
NOTE: ALL STEEL REINFORCING BARS SHALL HAVE 50 MIN. CONCRETE COVER

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM THE NEEL COMPANY T-WALL (50 mm COVER)</b>				
Names	Dates	Approved By <i>William H. [Signature]</i> State Structures Design Engineer		
Designed By	JMC	10/01/98	Revision	Sheet No.
Drawn By	CAA	10/01/98	00	21 of 21
Checked By	JMC	10/01/98		Index No. 5011

# STANDARD DETAILS

## ISOGRID® M.S.E. WALL SYSTEM

### DESIGNER












**THE NEEL COMPANY**  
8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859

### PRECASTER

**OLDCASTLE PRECAST, INC.**  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (904) 778-2992

### LEGEND

- 
PANEL WITH ONE SOIL REINFORCEMENT GRID
- 
PANEL WITH TWO SOIL REINFORCEMENT GRIDS
- 
PANEL WITH THREE SOIL REINFORCEMENT GRIDS
- 
PANEL WITH FOUR SOIL REINFORCEMENT GRIDS
- 
HORIZONTAL HALF-PANEL WITH ONE SOIL REINFORCEMENT GRID
- 
VERTICAL HALF-PANEL WITH ONE SOIL REINFORCEMENT GRID
- 
TL/BR & TR/BL QUARTER PANELS WITH ONE SOIL REINFORCEMENT GRID
- 
SPECIAL HEIGHT PANELS (X-1 THRU X-5) WITH ONE SOIL REINFORCEMENT GRID
- 
DENOTES LIMITS OF DIFFERENT LENGTHS OF SOIL REINF. GRIDS

DESIGNER:



**THE NEEL COMPANY**  
8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
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FX: (703) 913-7859

PRECASTER:

**OLDCASTLE PRECAST, INC.**  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (703) 913-7859

THIS SYSTEM SHALL BE USED IN MODERATELY OR SLIGHTLY AGGRESSIVE ENVIRONMENTS ONLY

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY ISOGRID				
Designed By	JMC	10/98	Approved/By <i>Willie H. Hester</i> State Structures Design Engineer	
Drawn By	CAA	10/98	Revision	Sheet No.
Checked By	JMC	10/98	00	1 of 20
				Index No. 5012

MISCELLANEOUS NOTES:

1. DESIGNER:  
THE NEEL COMPANY  
8328-D TRAFORD LANE  
SPRINGFIELD, VA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859
2. PRECASTER:  
OLDCASTLE PRECAST INC.  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (904) 778-2992
3. MATERIALS SUPPLIED BY PRECASTER:  
-PRECAST ISOGRID PANELS  
-GALVANIZED SOIL REINFORCEMENT GRID  
-GALVANIZED GRID LOCKING BAR  
-DIAGONAL JOINT MATERIAL AND ADHESIVE  
-VERTICAL JOINT MATERIAL

DESIGN NOTES:

1. DESIGN IS BASED ON THE ASSUMPTION THAT THE MATERIAL WITHIN THE RETAINING WALL VOLUME, METHODS OF CONSTRUCTION, AND QUALITY OF PREFABRICATED MATERIALS SHALL CONFORM TO SPEC SECTION 548 - RETAINING WALL SYSTEMS.
2. SOIL PARAMETERS:  
-SEE WALL CONTROL DRAWINGS FOR SOIL CHARACTERISTICS OF FOUNDATION MATERIAL TO BE USED IN THE DESIGN OF THE WALL SYSTEM. THE CONTRACTOR SHALL PROVIDE SOIL DESIGN PARAMETERS FOR BACKFILL MATERIAL BASED ON THE ACTUAL SOIL CHARACTERISTICS UTILIZED AT THE SITE. THE VALUE OF  $\phi$ ,  $C$  AND  $\gamma$  SHALL BE PROVIDED IN THE SHOP DRAWINGS
3. FACTORS OF SAFETY:  
-OVERTURNING - 2.0  
-SLIDING - 1.5  
-INTERNAL PULLOUT - 1.5 (ALLOWABLE DEFORMATION 19.055mm)  
-SOIL REINFORCEMENT GRID - 0.47  $F_y$  AT END OF DESIGN LIFE  
-BEARING CAPACITY - 2.5  
-OVERALL STABILITY - 1.5
4. THE MAXIMUM APPLIED BEARING PRESSURE AT THE FOUNDATION LEVEL IS AS SHOWN ON THE WALL DESIGN DRAWINGS FOR EACH DESIGN CASE. IT IS THE RESPONSIBILITY OF THE OWNER TO DETERMINE THAT THIS APPLIED BEARING PRESSURE IS ALLOWABLE FOR THAT LOCATION.
5. ALL DIMENSIONS ARE IN MILLIMETERS (mm) UNLESS OTHERWISE NOTED
6. THE DESIGN CONTAINED ON THESE DRAWINGS IS BASED ON INFORMATION PROVIDED BY THE OWNER. ON THE BASIS OF THIS INFORMATION, THE NEEL COMPANY IS RESPONSIBLE FOR INTERNAL STABILITY OF THE STRUCTURE ONLY. EXTERNAL STABILITY DESIGN INCLUDING FOUNDATION AND SLOPE STABILITY, IS THE RESPONSIBILITY OF OTHERS

MATERIALS NOTES:

1. PRECAST CONCRETE:  
-PRECAST ISOGRID PANELS - PER SPEC SECTION 548  
-ARCHITECTURAL FINISH SHALL BE PLAIN STEEL FORM FINISH UNLESS OTHERWISE SPECIFIED ON THE RETAINING WALL CONTROL PLANS.
2. C.I.P. CONCRETE:  
-C.I.P. LEVELING PAD - PER SPEC SECTION 548  
-OTHER C.I.P. CONCRETE - PER SPEC SECTION 548
3. REINFORCING STEEL:  
-PER SPEC SECTION 548  
-152 x 152 WELDED GRID, D8 x D8 WIRE OR  
-#10 REBAR @ 152 O.C. EACH WAY  
-WELDED PER ASTM A497 PRIOR TO GALVANIZATION
4. CONNECTION INSERT:  
-PER SPEC SECTION 548  
-WII WIRE  
-WELDED PER ASTM A185 PRIOR TO GALVANIZATION
5. LOCKING BAR:  
-PER SPEC SECTION 548
6. SOIL REINFORCEMENT GRIDS:  
-PER SPEC SECTION 548  
-WII WELDED WIRE GRIDS:  
-5 LONGITUDINAL WIRES @ 152 O.C., LENGTH AS REQUIRED BY DESIGN  
-610 LONG TRANSVERSE BARS AT 152 OR 305 O.C., AS REQUIRED BY DESIGN  
-SOIL GRID LENGTHS SHOWN ON ISOGRID DESIGN DRAWINGS ARE NOMINAL LENGTHS AS REQUIRED BY DESIGN CALCULATIONS. DUE TO MANUFACTURING TOLERANCES, ACTUAL GRID LENGTHS MAY BE LONGER.
7. JOINT MATERIAL:  
-DIAGONAL JOINT FILLER:  
-13 x 101 x 1.270 M  
-PREFORMED EPDM  
-DUROMETER: 80 - 90  
-DIAGONAL JOINT BACKING:  
-MIRAFI 140N OR EQUAL  
-305 WIDE x LENGTH OF JOINT  
-GEOTEXTILE MEETING REQUIREMENTS OF SPEC SECTION 548  
-WEEPHOLE COVER:  
-TENSAR DC4205 OR EQUAL  
-152 x 165 (MIN)  
-GEOCOMPOSITE MEETING REQUIREMENTS OF SPEC SECTION 548
8. BACKFILL:  
-PER SPEC SECTION 548

CONSTRUCTION NOTES:

1. ALL CONSTRUCTION PROCEDURES SHALL COMPLY WITH SPEC SECTION 548-8 AND THE 'ISOGRID CONSTRUCTION MANUAL' (PROVIDED BY THE NEEL COMPANY OR OLDCASTLE PRECAST, INC). IN THE EVENT OF A DISCREPANCY BETWEEN THE SPEC AND THE 'ISOGRID CONSTRUCTION MANUAL', THE SPEC SHALL CONTROL.
2. FOR LOCATION AND ALIGNMENT OF ISOGRID STRUCTURE, SEE RETAINING WALL CONTROL PLANS.
3. ISOGRID STRUCTURES ON CURVES SHALL BE BUILT IN CHORDS AS SHOWN IN THE ISOGRID DESIGN DRAWINGS.
4. IF MANHOLES OR DROP INLETS ARE PRESENT, THEY SHALL BE LOCATED AS SHOWN IN THE ISOGRID DESIGN DRAWINGS.
5. IF PILES ARE LOCATED WITHIN THE RETAINING WALL VOLUME, THEY SHALL BE DRIVEN BEFORE CONSTRUCTION OF THE ISOGRID STRUCTURE UNLESS A METHOD TO PROTECT THE STRUCTURE, WHICH IS ACCEPTABLE TO THE ENGINEER AND THE NEEL COMPANY, IS SUBMITTED AND APPROVED IN WRITING.
6. IF A STRUCTURE EXCEEDS 6.000 M IN HEIGHT, THE FINISH GRADE AT THE FACE OF THE WALL SHALL BE PLACED AND COMPACTED BEFORE WALL CONSTRUCTION EXCEEDS 6.000 M IN HEIGHT.
7. IF EXISTING OR FUTURE STRUCTURES, PIPES, FOUNDATIONS OR GUARDRAIL POSTS WHICH ARE WITHIN THE RETAINING WALL VOLUME INTERFERE WITH THE NORMAL PLACEMENT OF REINFORCING GRIDS AND SPECIFIC DIRECTION HAS NOT BEEN PROVIDED IN THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER.
8. TOP PANELS ON WALLS WITH CAST-IN -PLACE COPING SHALL HAVE #13 REBAR PROTRUDING FROM THEIR TOP EDGE.
9. BACKFILL MATERIAL SHALL BE PLACED AND COMPACTED IN ACCORDANCE WITH THE SPECIFICATIONS FOR MSE WALLS TO A LEVEL OF APPROXIMATELY 50 ABOVE THE CONNECTION INSERT EMBEDDED IN THE PANELS. INSTALLATION OF THE SOIL REINFORCEMENT SHALL BE PERMITTED ONLY AFTER PLACEMENT AND COMPACTION OF THE BACKFILL MATERIAL HAS REACHED THE REQUIRED LEVEL.
10. COMPACTION AND OPERATION EQUIPMENT SHALL BE KEPT A MINIMUM DISTANCE OF 914 FROM THE BACK FACE OF THE ISOGRID PANELS. COMPACTION WITHIN 914 OF THE ISOGRID PANEL SHALL BE 90% OF AASHTO T-180.
11. THE CONTRACTOR IS RESPONSIBLE FOR GRADUALLY DEFLECTING UPPER REINFORCING GRIDS DOWNWARD TO AVOID CONFLICTS WITH PAVING AND SUBGRADE PREPERATION. THE CONTRACTOR'S ATTENTION IS DIRECTED ESPECIALLY TO SITUATIONS WHERE ROADWAY SUPERELEVATION AND/OR SOIL MIXING ARE ANTICIPATED.
12. THE CONTRACTOR IS RESPONSIBLE FOR CONTROLLING STORM WATER DRAINAGE IN THE VICINITY OF THE WALL DURING CONSTRUCTION. STORMWATER RUNOFF SHALL BE COLLECTED AND DISCHARGED AWAY FROM THE WALL AND THE RETAINING WALL VOLUME.

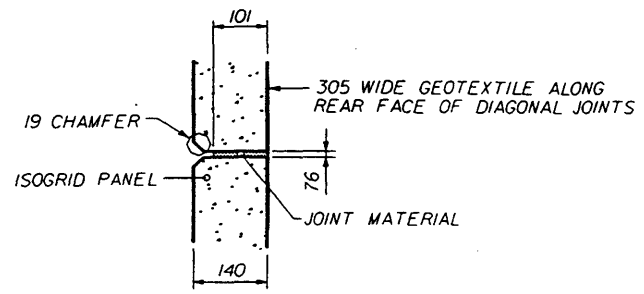


DESIGNER:  
**THE NEEL COMPANY**  
8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859

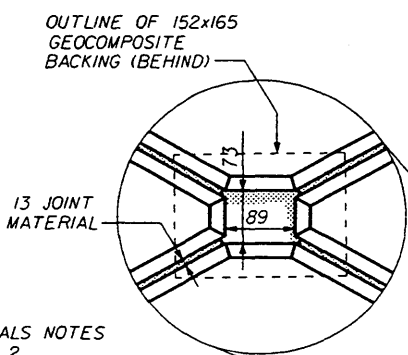
PRECASTER:  
**OLDCASTLE PRECAST, INC.**  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (904) 913-7859

THIS SYSTEM MAY BE USED IN MODERATELY OR SLIGHTLY AGGRESSIVE ENVIRONMENTS ONLY

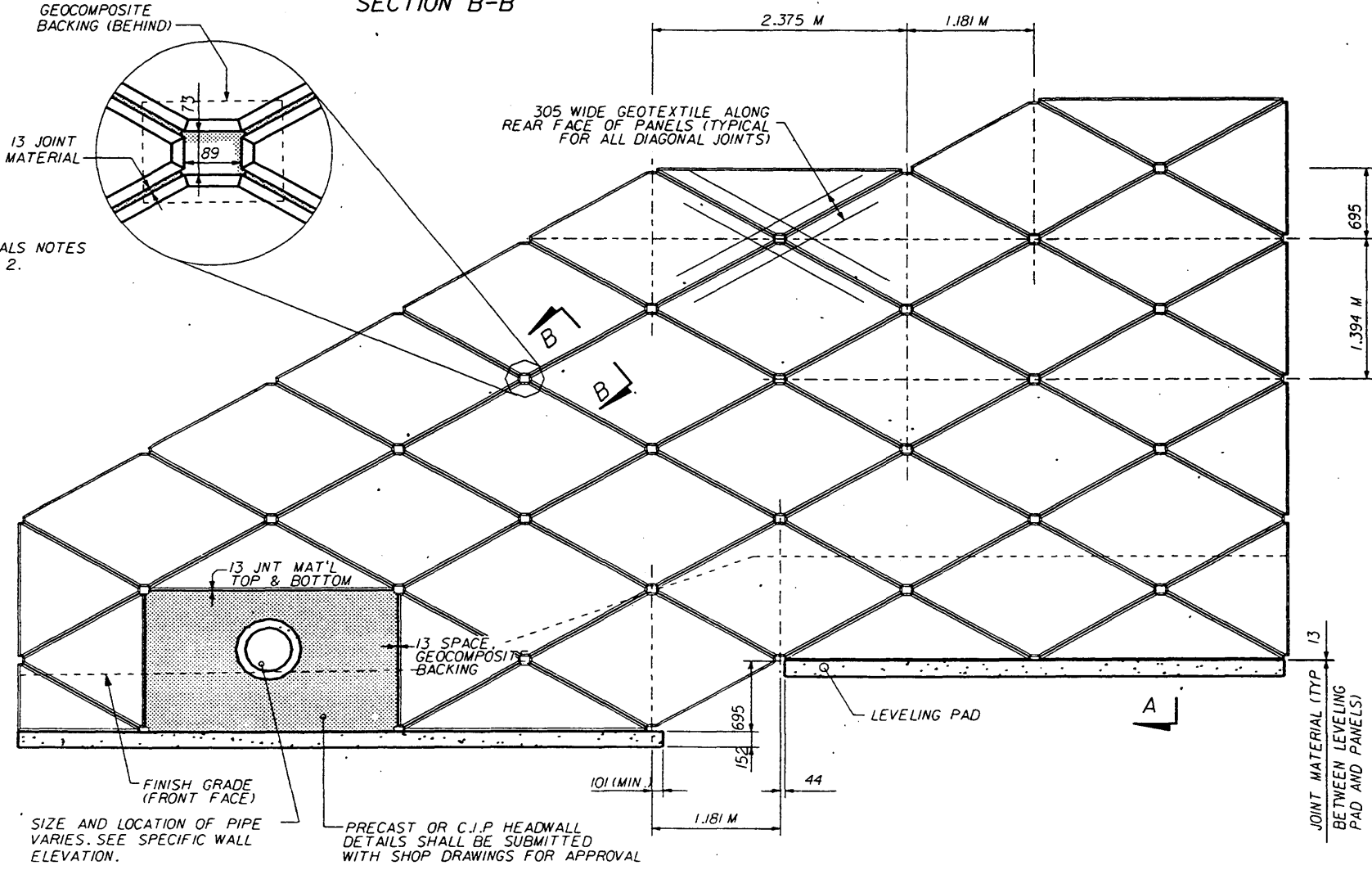
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY ISOGRID				
	Names	Dates	Approved By <i>William H. 7/65</i>	
Designed By	JMC	10/98	State Structures Design Engine	
Drawn By	CAA	10/98	Revision	Sheet No. Index No.
Checked By	JMC	10/98	00	2 of 20 5012



SECTION B-B

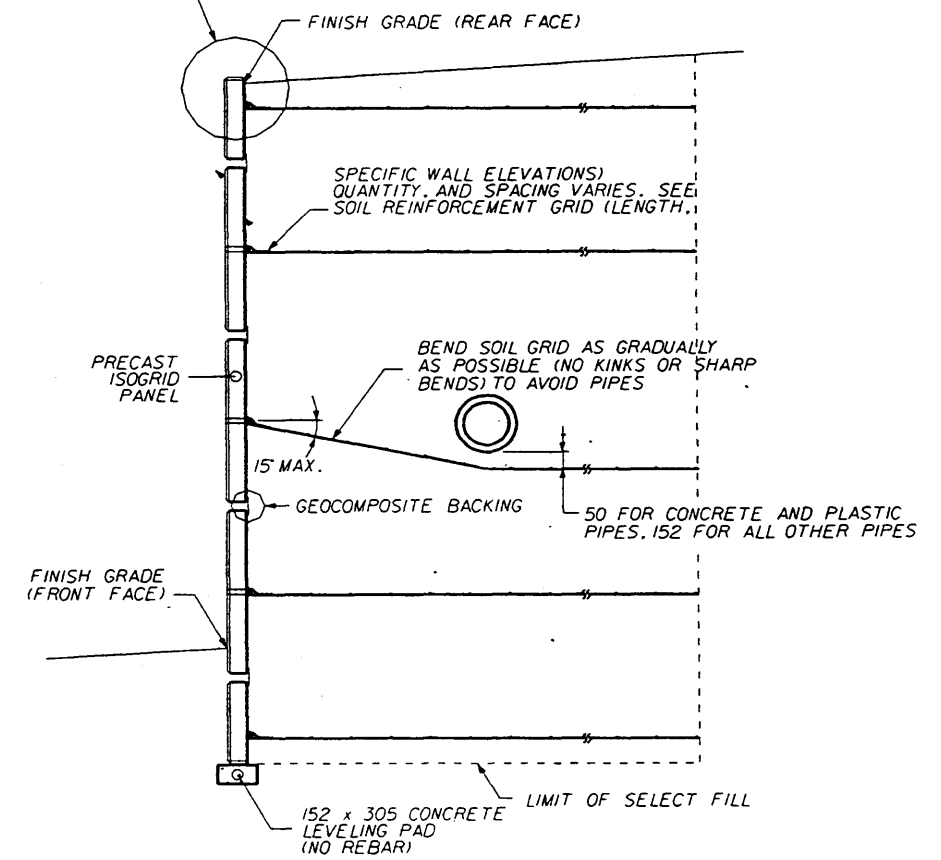


NOTE: FOR MATERIALS NOTES SEE SHEET 2.



ELEVATION (FRONT FACE) SHOWING TYPICAL DETAILS

TOP OF WALL TREATMENT VARIES. SEE SPECIFIC WALL ELEVATIONS AND ISOGRID STANDARD DRAWINGS FOR DETAILS



SECTION A-A SHOWING TYPICAL DETAILS

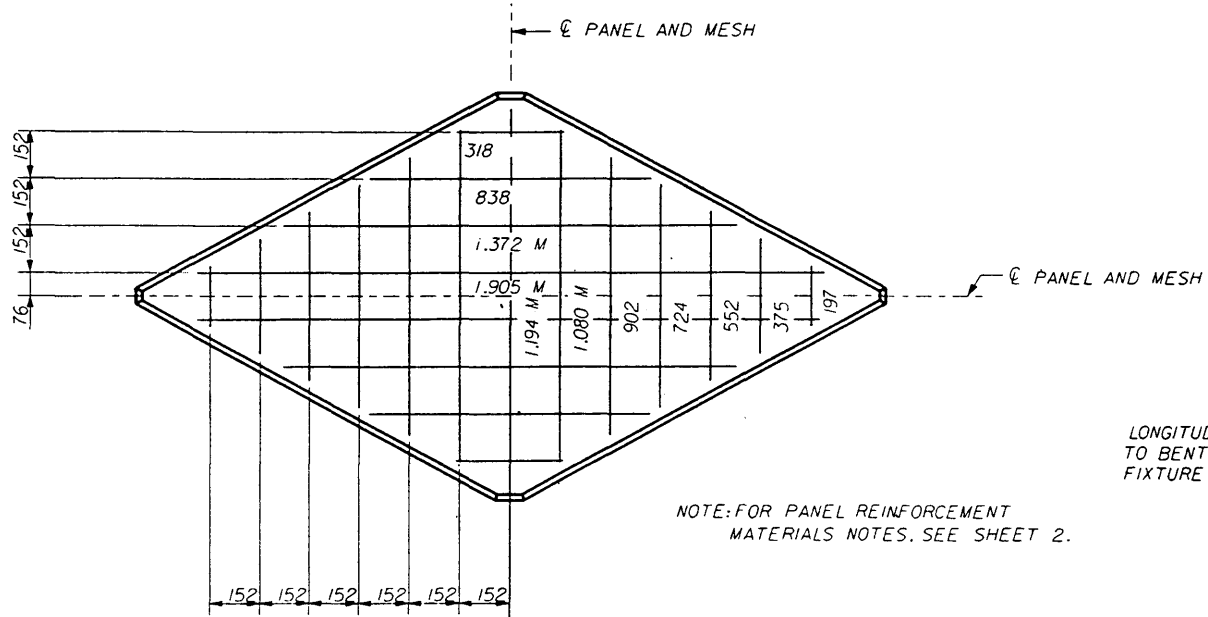
DESIGNER: **THE NEEL COMPANY**  
 8328-D TRAFORD LANE  
 SPRINGFIELD, VIRGINIA 22152  
 PH: (703) 913-7858  
 FX: (703) 913-7859

PRECASTER: **OLDCASTLE PRECAST, INC.**  
 11643 103RD STREET  
 JACKSONVILLE, FL 32210  
 PH: (904) 778-2990  
 FX: (703) 913-7859

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
RETAINING WALL SYSTEM THE NEEL COMPANY ISOGRID					
Designed By	JMC	3/98	Approved By	<i>William H. [Signature]</i> State Structures Design Engineer	
Drawn By	CAA	3/98	Revision	Sheet No.	Index No.
Checked By	JMC	3/98	00	3 of 20	5012

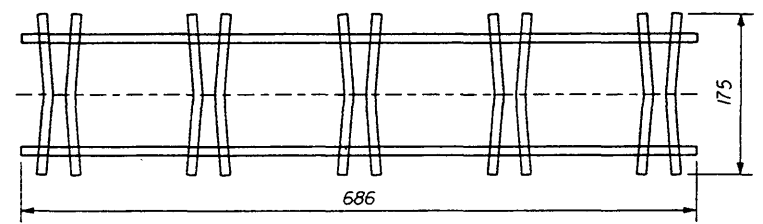
NOTE:

PANEL IS HANDLED BY LIFTING DEVICE THAT ATTACHES TO CONNECTION INSERT



NOTE: FOR PANEL REINFORCEMENT MATERIALS NOTES. SEE SHEET 2.

WELDED WIRE MESH PANEL REINFORCEMENT



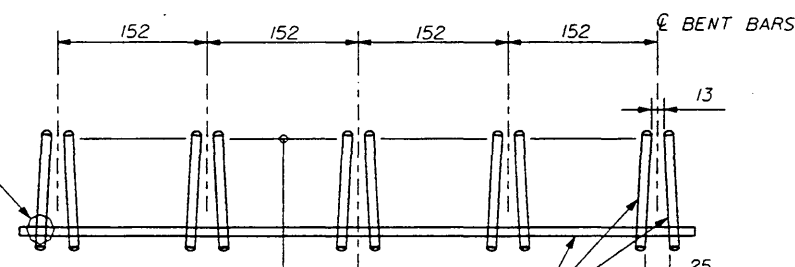
TOP VIEW

NOTE: FOR CONNECTION INSERT MATERIALS NOTES. SEE SHEET 2.

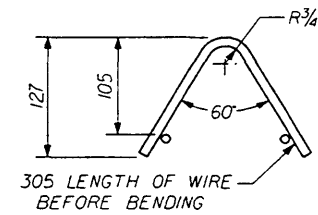
LONGITUDINAL WIRES TO BE WELDED TO BENT WIRES WHILE HELD IN A JIG FIXTURE (PRIOR TO GALVANIZATION).

INSIDE OF EACH BEND MUST BE WITHIN 2 (\*) OF INSIDE OF ALL OTHER BENDS TO ASSURE PROPER BEARING UPON LOCKING BAR.

WIRE SIZE TO BE EQUAL TO SOIL REINFORCEMENT GRID WIRE SIZE

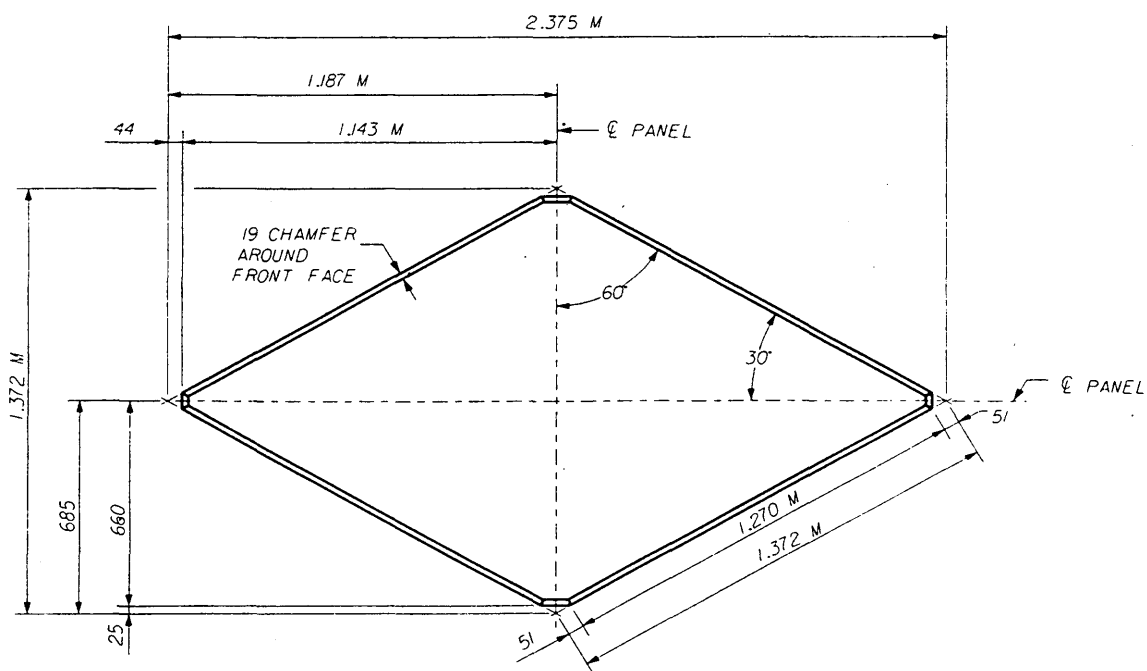


SIDE VIEW

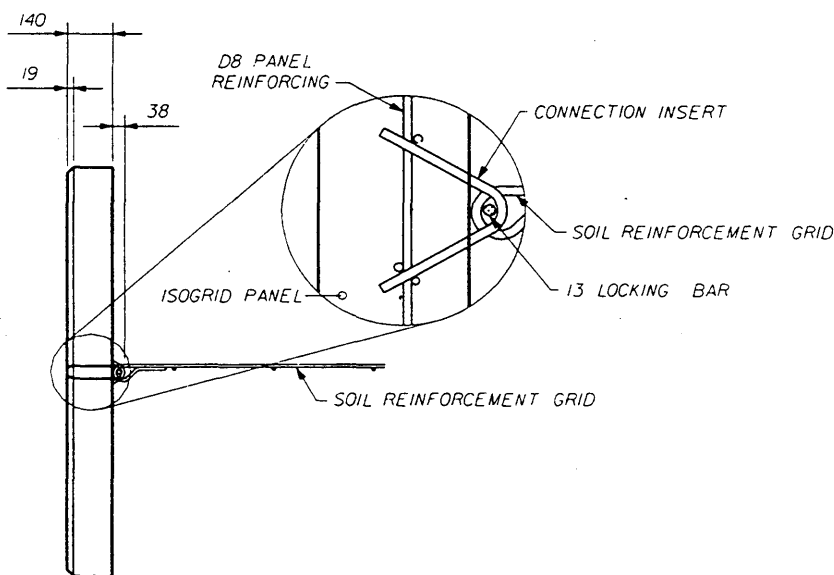


END VIEW

CONNECTION INSERT

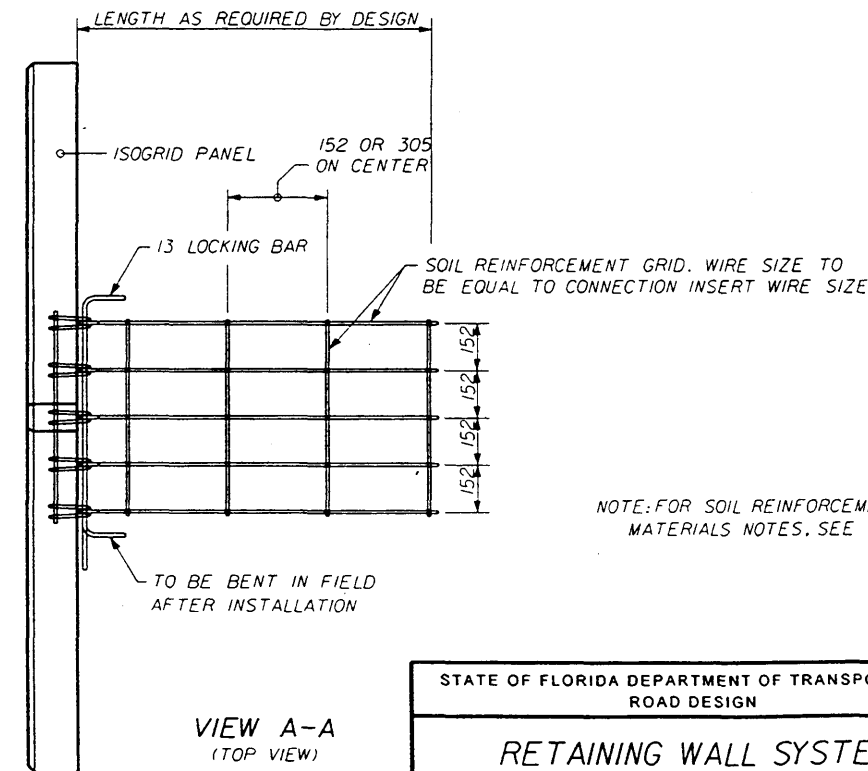


FRONT VIEW



SIDE VIEW

FULL-SIZE PANEL TYPICAL DIMENSIONS



VIEW A-A (TOP VIEW)

NOTE: FOR SOIL REINFORCEMENT MATERIALS NOTES. SEE SHEET 2.

DESIGNER:



THE NEEL COMPANY  
8378-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859

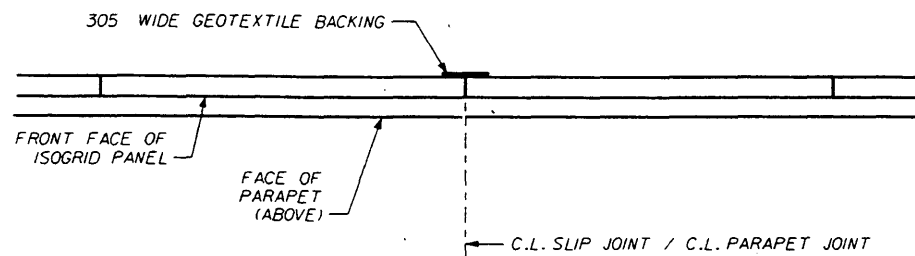
PRECASTER:

OLDCASTLE PRECAST, INC.  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (703) 913-7859

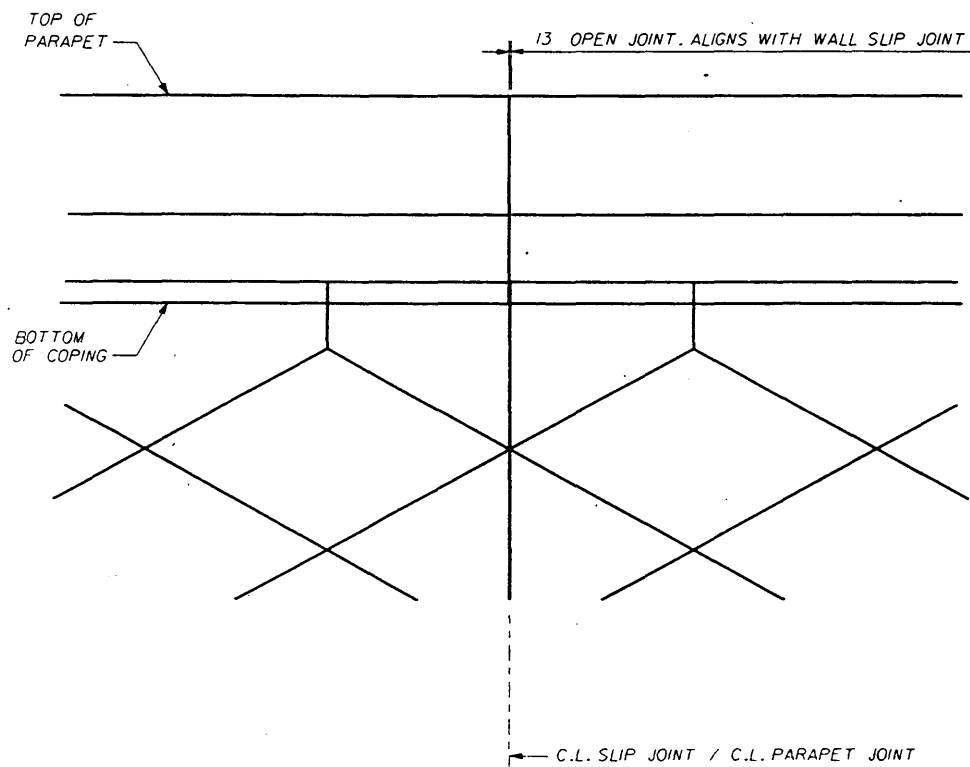
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

RETAINING WALL SYSTEM  
THE NEEL COMPANY ISOGRID

Names	Dates	Approved By		
Designed By	JMC	10/98	 State Structures Design Engineer	
Drawn By	CAA	10/98		
Checked By	JMC	10/98		
Revision	00	Sheet No.	4 of 20	Index No.
5012				

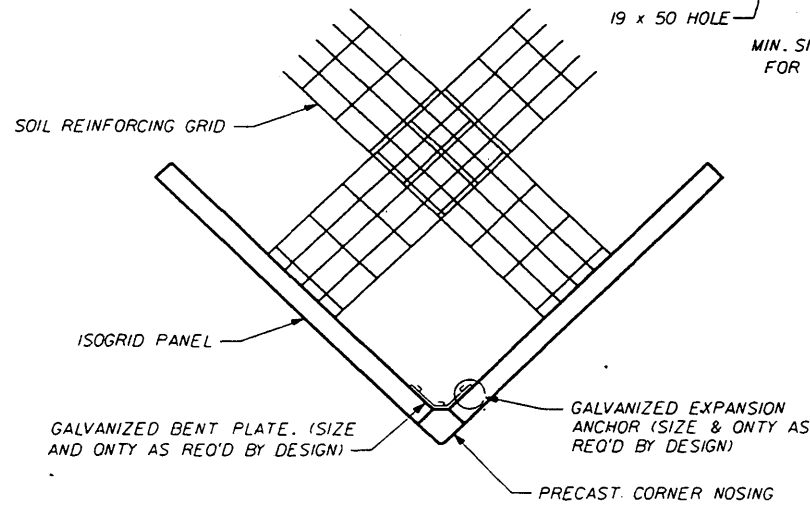
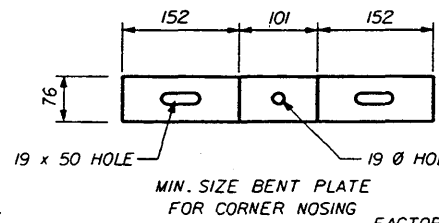


PART PLAN  
SLIP JOINT DETAIL

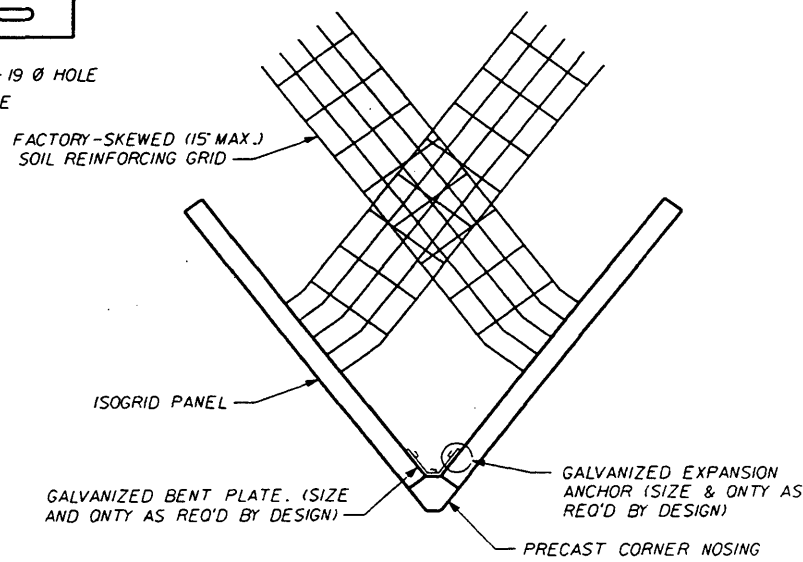


PART ELEVATION  
SLIP JOINT DETAIL

NOTE: MINIMUM THICKNESS OF BENT PLATE = 10

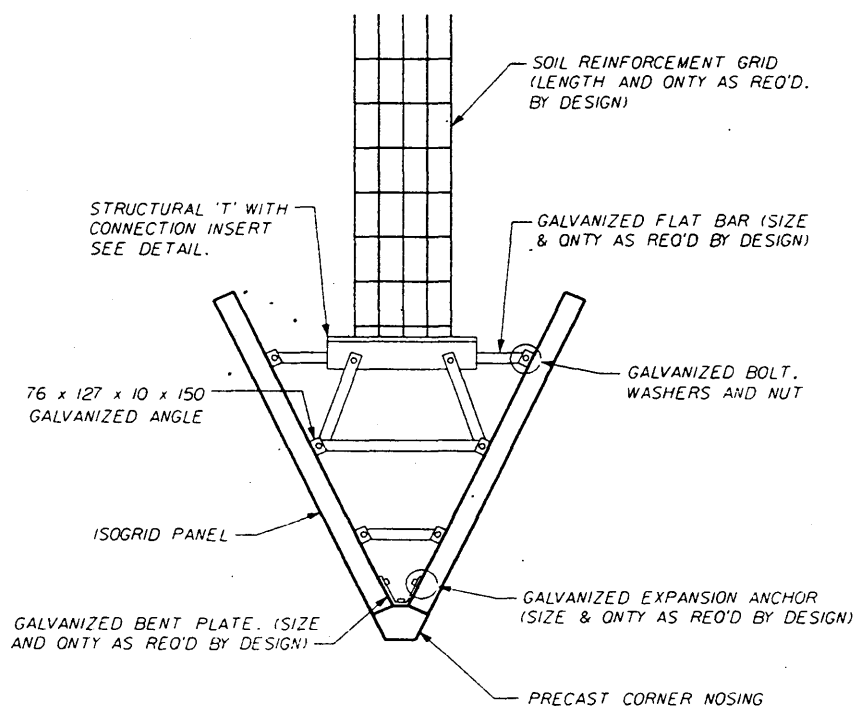


PART PLAN  
STD CORNER DETAIL

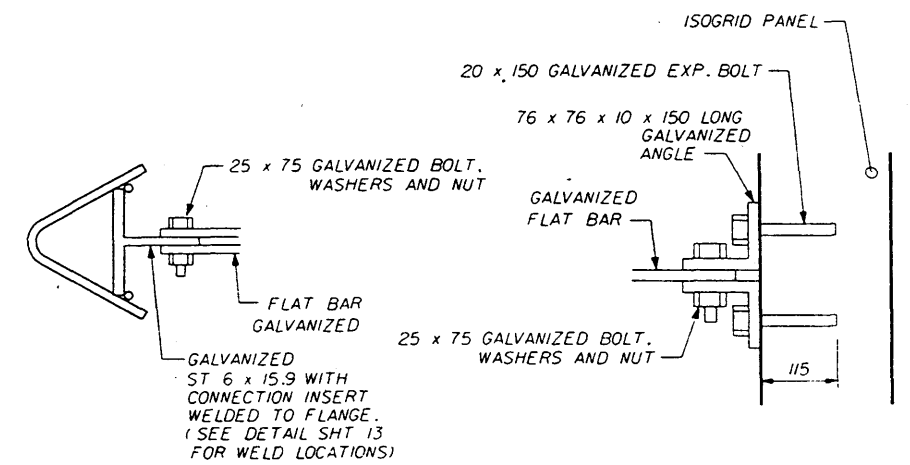


PART PLAN  
MILD (65° MIN.) ACUTE CORNER DETAIL

APPLIES UNTIL GRID CONFLICTS  
WITH ADJACENT PANELS



PART PLAN  
SEVERE ACUTE CORNER DETAIL



SOIL GRID CONNECTION DETAIL  
SEVERE ACUTE CORNERS

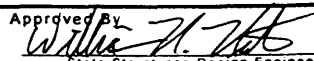
FLAT BAR CONNECTION DETAIL  
SEVERE ACUTE CORNERS

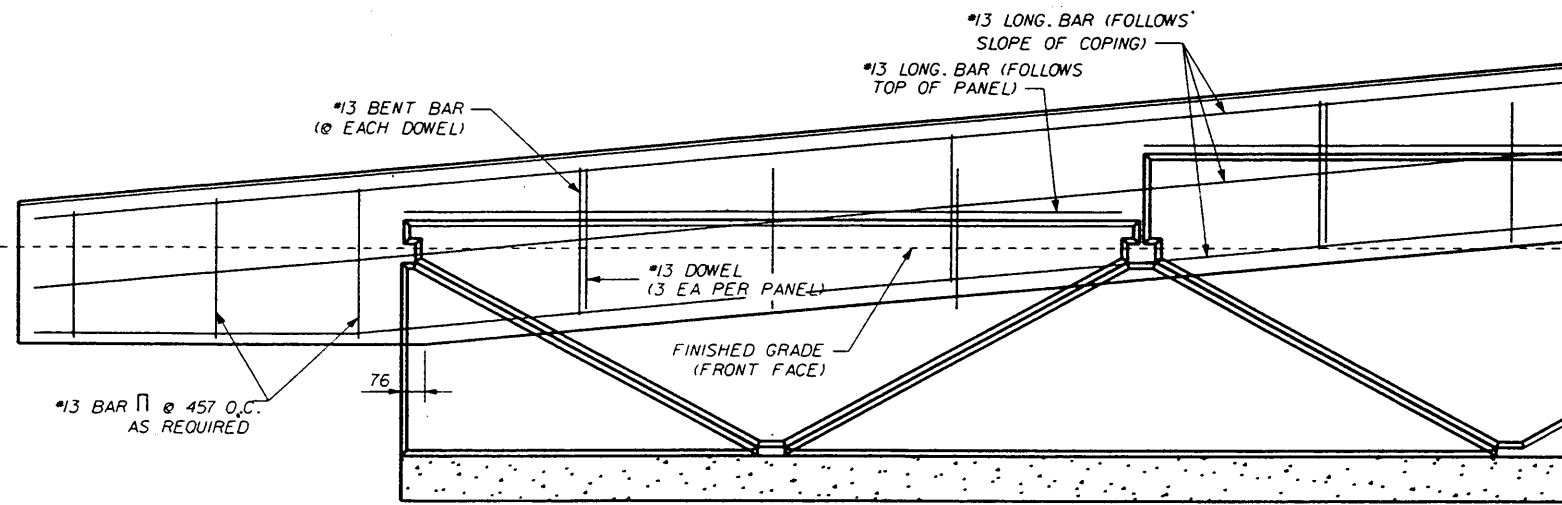
DESIGNER:  
**THE NEEL COMPANY**  
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FX: (703) 913-7859

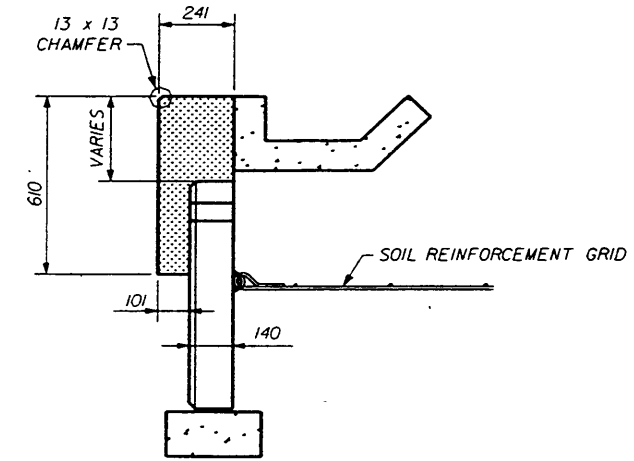
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ROAD DESIGN

RETAINING WALL SYSTEM  
THE NEEL COMPANY ISOGRID

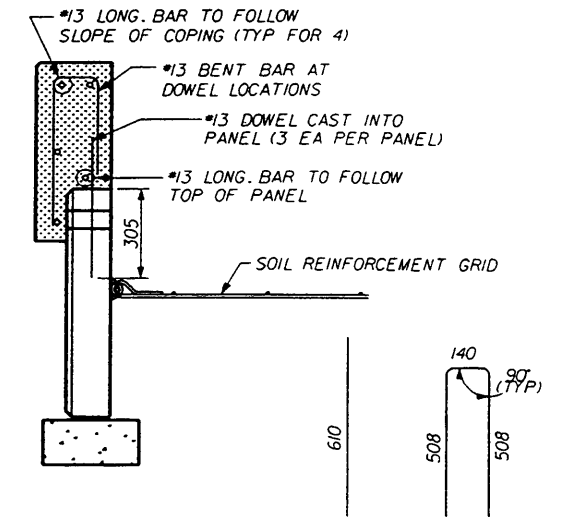
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Designed By	JHC 10/98	 State Structures Design Engineer	
Drawn By	CAJ 10/98		
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C.I.P. COPING TREATMENT AT BEGINNING/END OF WALLS



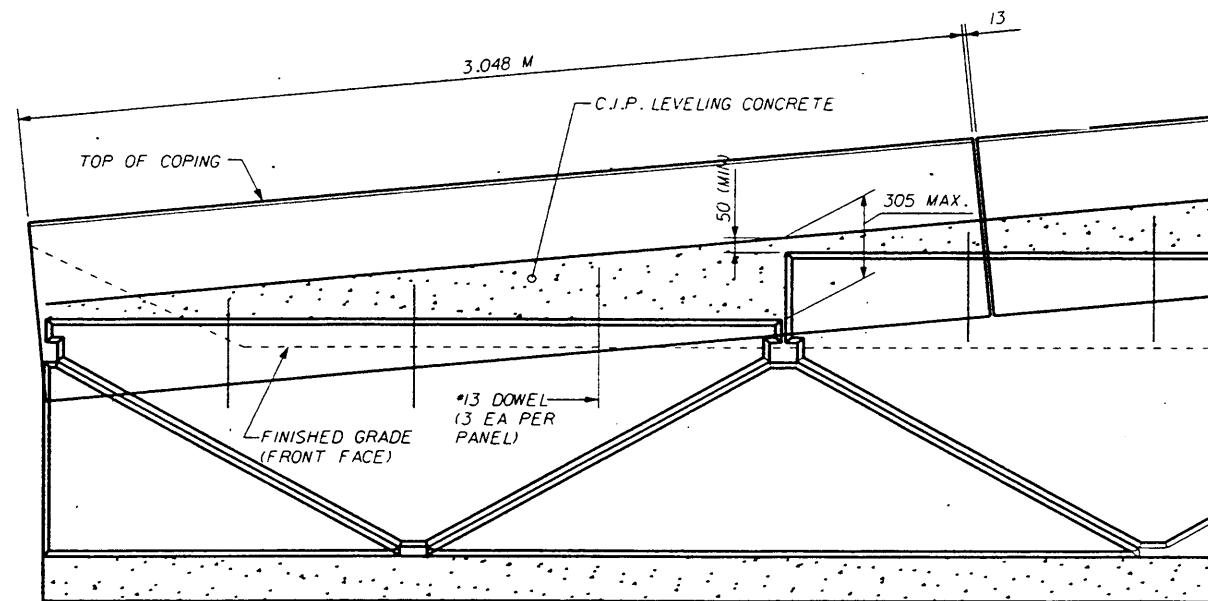
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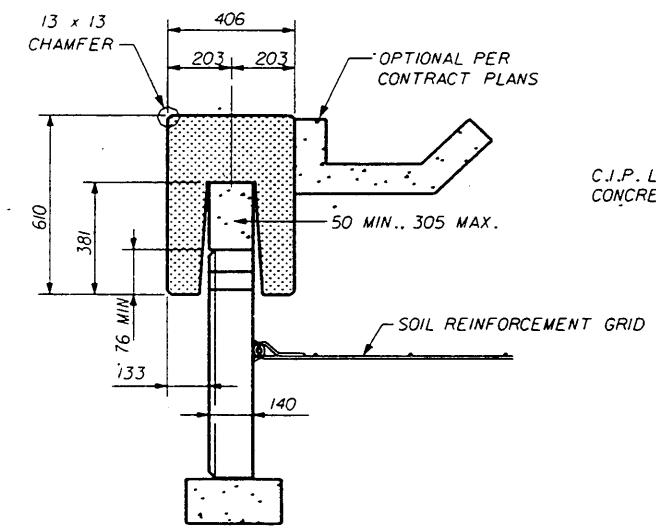
C.I.P. COPING REBAR

#13 DOWEL #13 BENT BAR

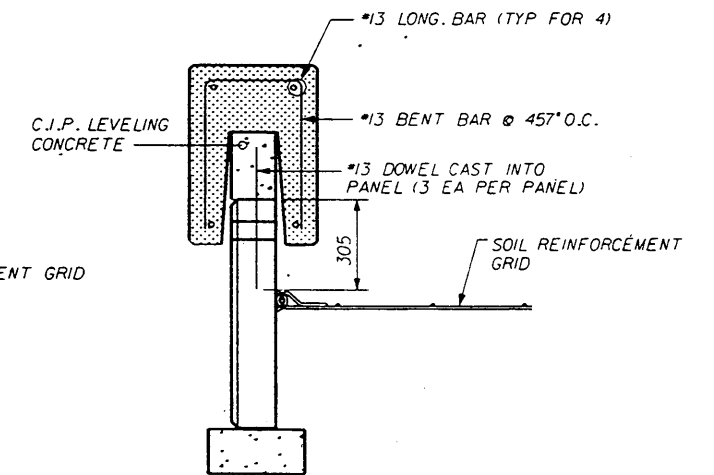
C.I.P. COPING REBAR DETAILS  
BENT BAR AND DOWEL TO BE FIELD-TRIMMED AS REQUIRED TO PROVIDE MIN OF 50 OF CONCRETE COVER



PRECAST COPING - PART ELEVATION



PRECAST COPING DIMENSIONS



PRECAST COPING REBAR

DESIGNER:



THE NEEL COMPANY  
8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-1858  
FX: (703) 913-1859

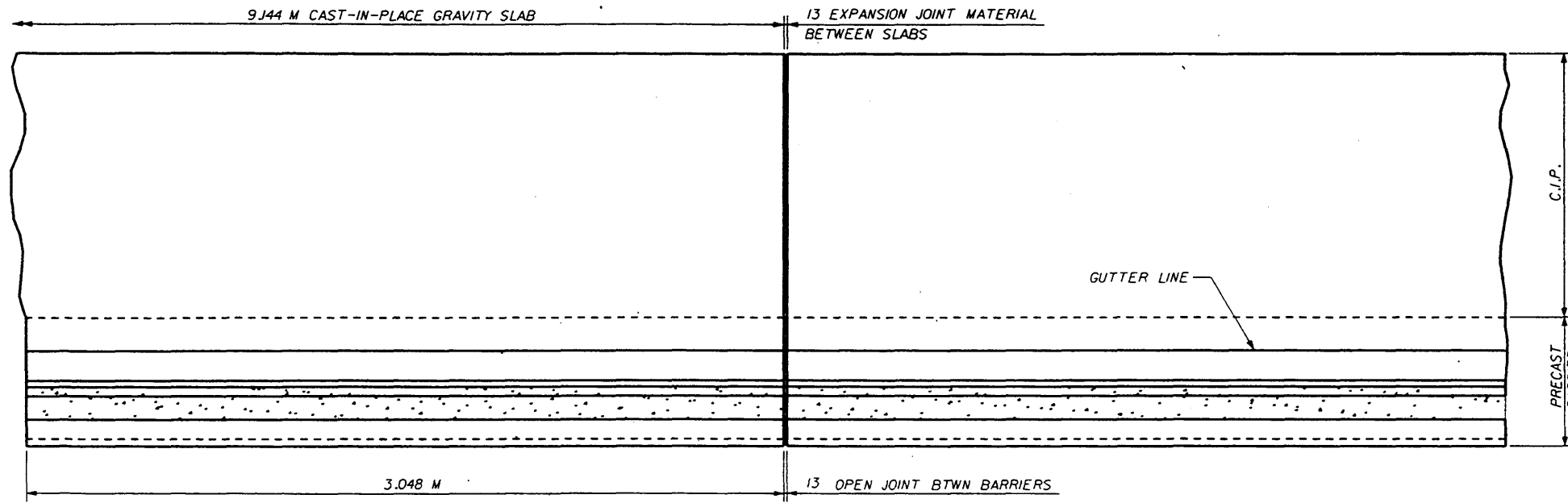
PRECASTER:

OLDCASTLE PRECAST, INC.  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (703) 913-1859

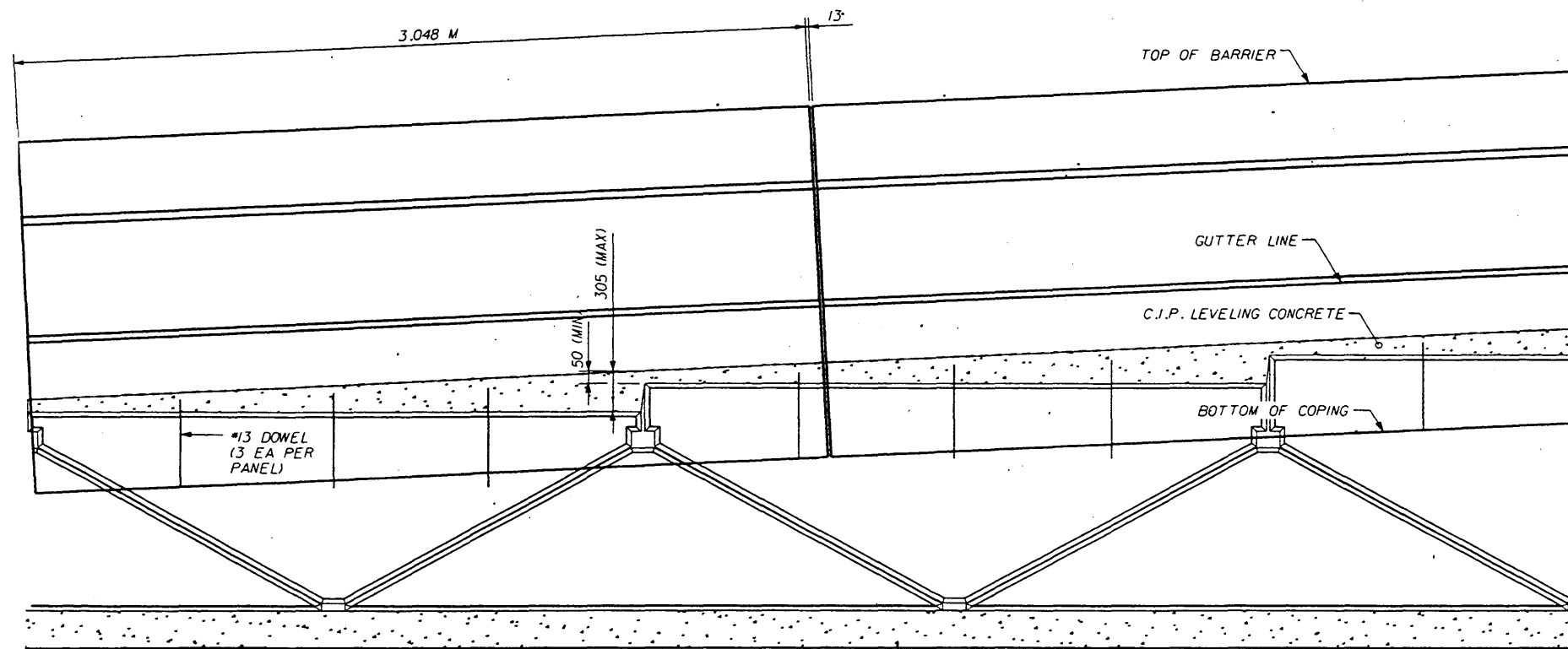
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
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THE NEEL COMPANY ISOGRID

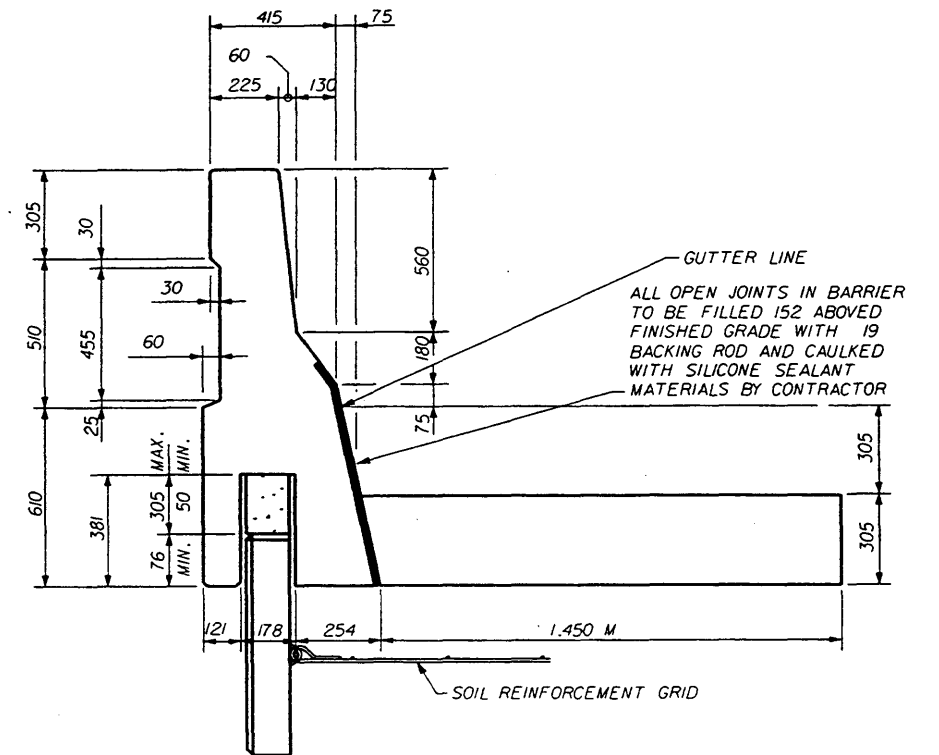
Names	Dates	Approved By	Revision	Sheet No.	Index No.
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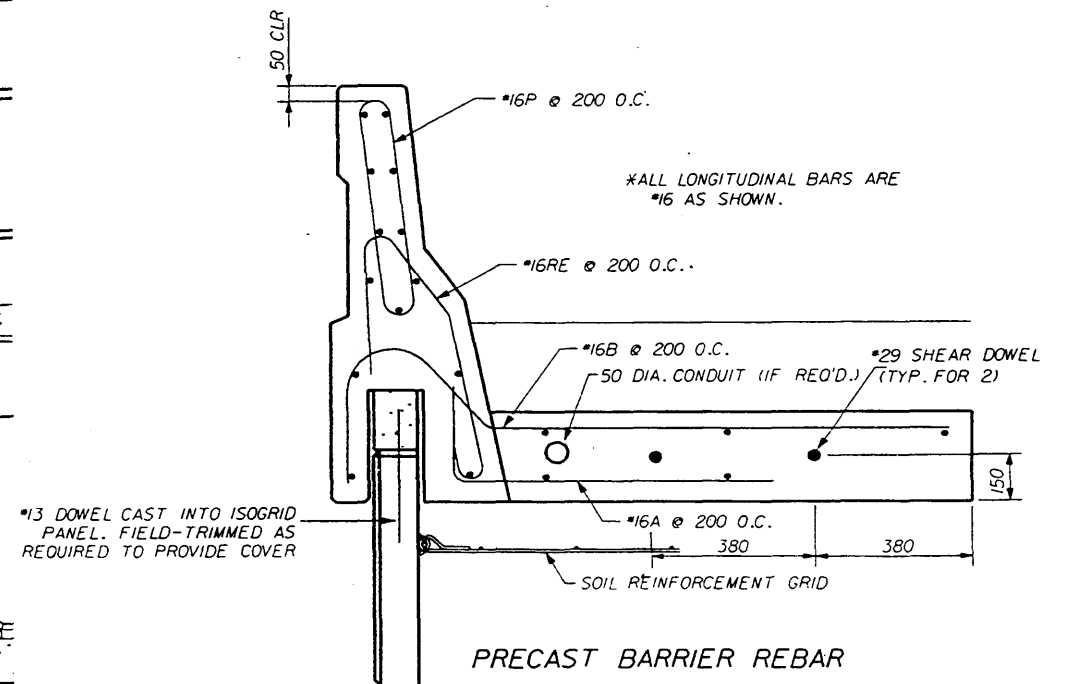
PART PLAN - PRECAST BARRIER



PART ELEVATION - PRECAST BARRIER




PRECAST BARRIER DIMENSIONS



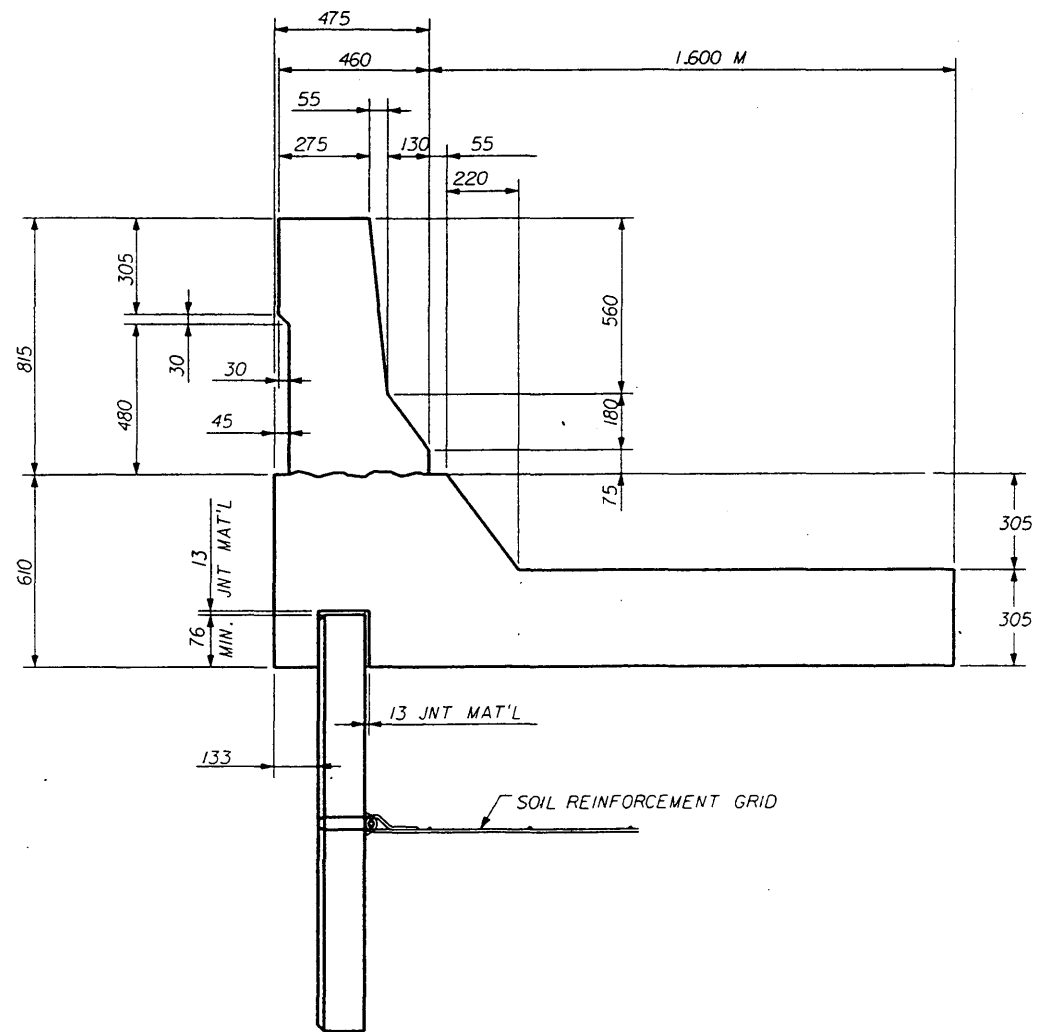
PRECAST BARRIER REBAR

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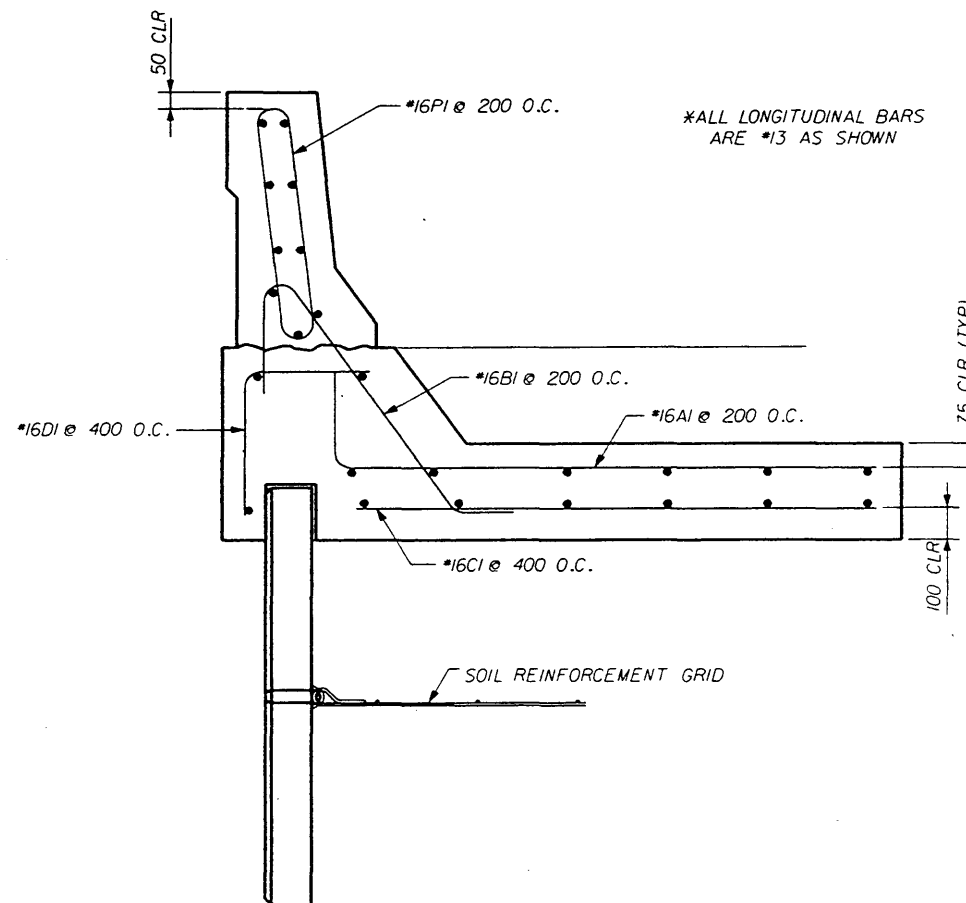
PRECASTER: **OLDCASTLE PRECAST, INC.**  
 11643 105th STREET  
 JACKSONVILLE, FL 32210  
 PH: (904) 778-2990  
 FX: (703) 913-1859

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Drawn By	CAA	10/98		
Checked By	JMC	10/98	Revision	Sheet No.
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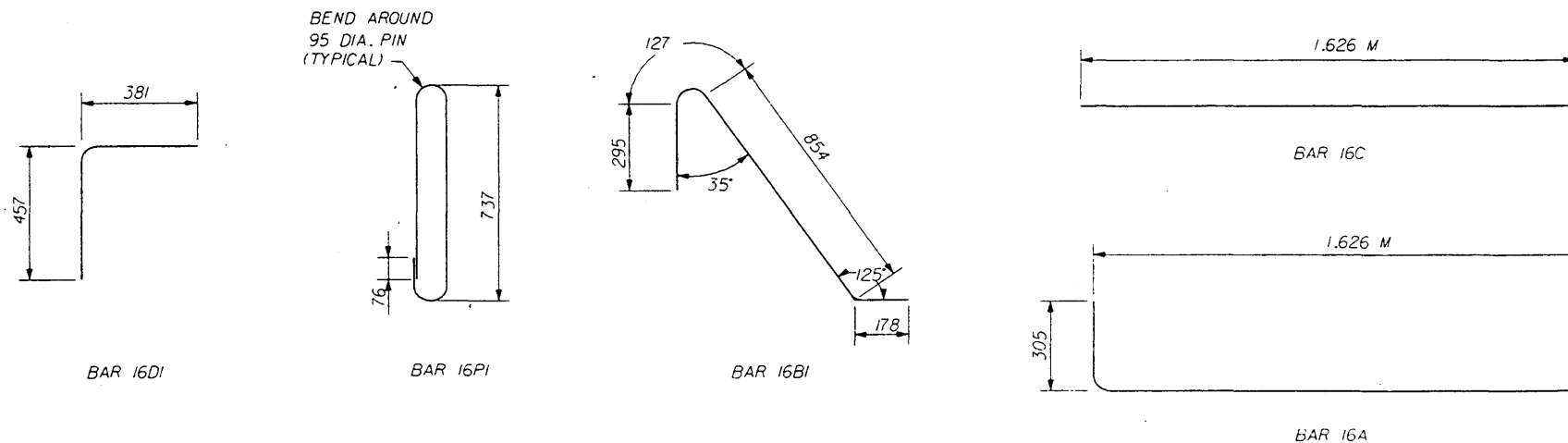




C.I.P. BARRIER AND C.I.P. JUNCTION SLAB DIMENSIONS



C.I.P. BARRIER AND C.I.P. JUNCTION SLAB REBAR



C.I.P. BARRIER REBAR DETAILS

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8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859

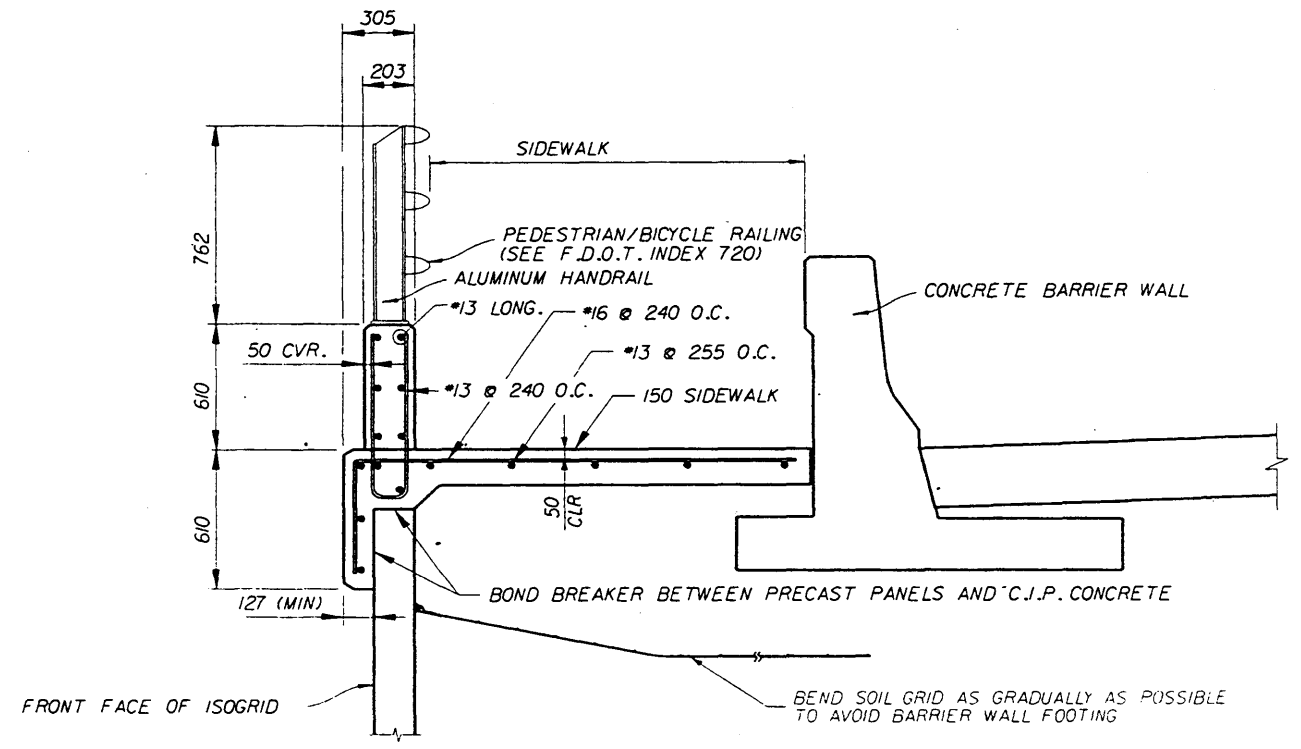
PRECASTER:

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JACKSONVILLE, FL 32210  
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FX: (904) 778-2992

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Checked By	JMC	10/98			
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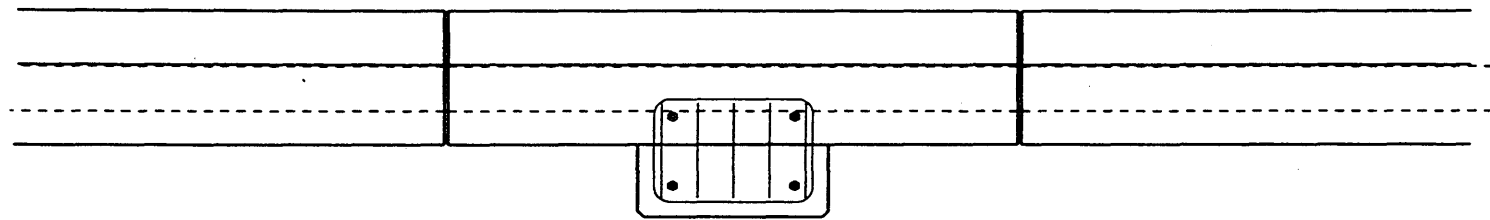


C.I.P. PARAPET DETAIL W/ HANDRAIL

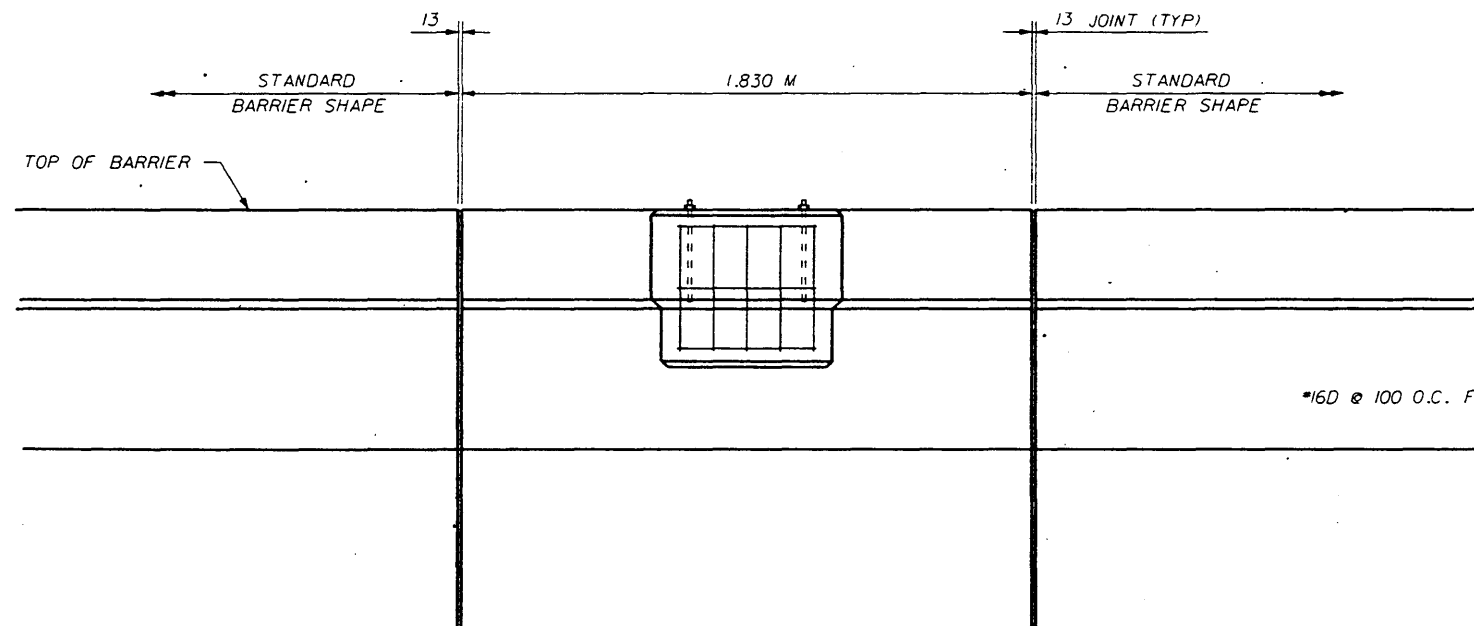
DESIGNER: **THE NEEL COMPANY**  
 8328-D TRAFORD LANE  
 SPRINGFIELD, VIRGINIA 22152  
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PRECASTER: **OLDCASTLE PRECAST, INC.**  
 11643 103RD STREET  
 JACKSONVILLE, FL 32210  
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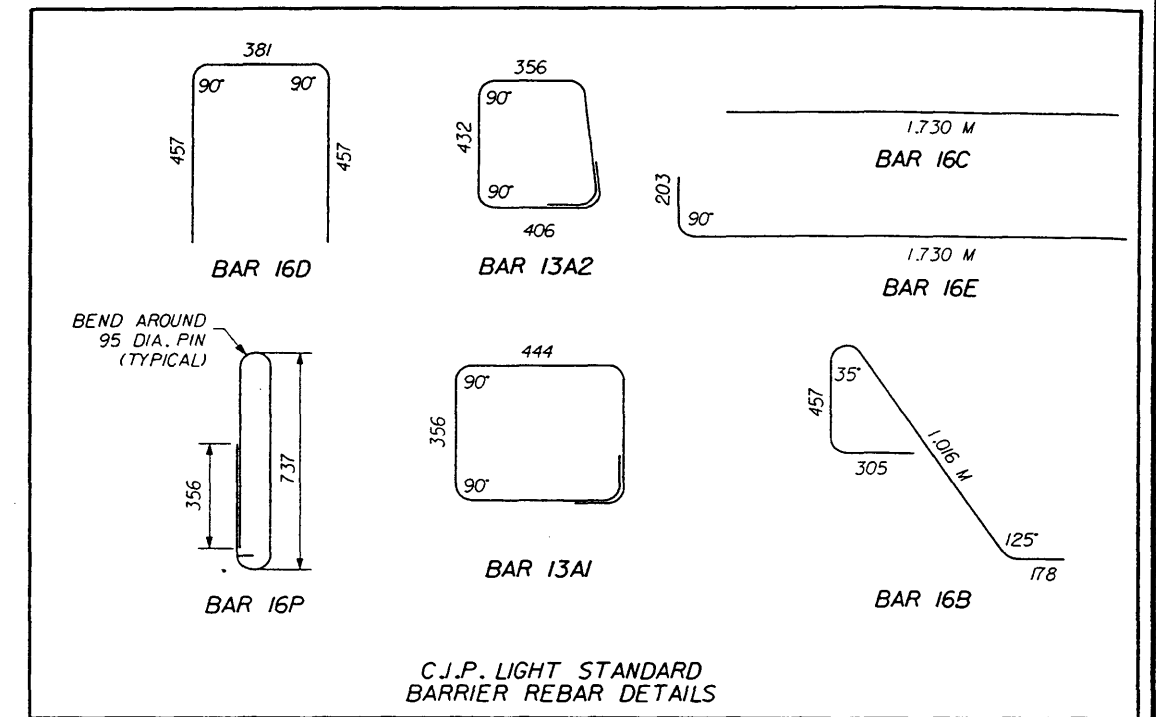
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
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Designed By	JMC	10/98	Approved By <i>William H. [Signature]</i> State Structures Design Engineer	
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Checked By	JMC	10/98	00	9 of 20
				5012



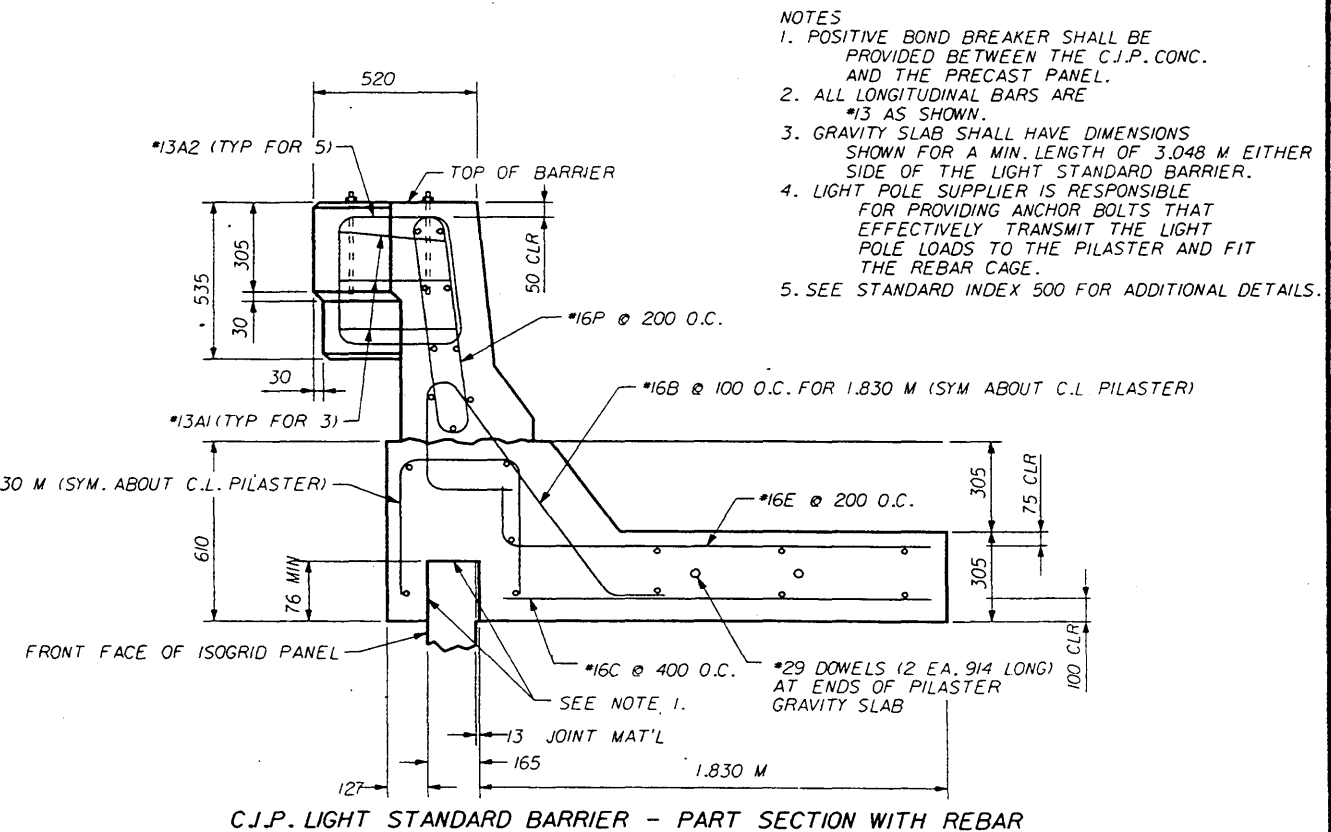
C.J.P. LIGHT STANDARD BARRIER - PART PLAN WITH REBAR  
(BARRIER AND GRAVITY SLAB REBAR OMITTED FOR CLARITY)



C.J.P. LIGHT STANDARD BARRIER - PART ELEVATION  
(BARRIER AND GRAVITY SLAB REBAR OMITTED FOR CLARITY)



C.J.P. LIGHT STANDARD BARRIER REBAR DETAILS



C.J.P. LIGHT STANDARD BARRIER - PART SECTION WITH REBAR

- NOTES
1. POSITIVE BOND BREAKER SHALL BE PROVIDED BETWEEN THE C.J.P. CONC. AND THE PRECAST PANEL.
  2. ALL LONGITUDINAL BARS ARE #3 AS SHOWN.
  3. GRAVITY SLAB SHALL HAVE DIMENSIONS SHOWN FOR A MIN. LENGTH OF 3.048 M EITHER SIDE OF THE LIGHT STANDARD BARRIER.
  4. LIGHT POLE SUPPLIER IS RESPONSIBLE FOR PROVIDING ANCHOR BOLTS THAT EFFECTIVELY TRANSMIT THE LIGHT POLE LOADS TO THE PILASTER AND FIT THE REBAR CAGE.
  5. SEE STANDARD INDEX 500 FOR ADDITIONAL DETAILS.

DESIGNER: **THE NEEL COMPANY**  
 8328-D TRAFORD LANE  
 SPRINGFIELD, VIRGINIA 22152  
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 11643 103rd STREET  
 JACKSONVILLE, FL 32210  
 PH: (904) 778-2990  
 FX: (904) 778-2992

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

RETAINING WALL SYSTEM  
THE NEEL COMPANY ISOGRID

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Drawn By CAA	10/98				
Checked By JMC	10/98				
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CONC. TRAFFIC BARRIER

**NOTES**

1. ADDITIONAL CONCRETE AND REINFORCING STEEL REQUIRED FOR THE CONSTRUCTION OF THE PILASTER SHALL MEET THE SAME REQUIREMENTS AS THAT OF THE PARAPET WALL.

2. TOP OF PILASTER SHALL BE FINISHED TO A TRULY LEVEL AREA.

3. LIGHT POLE PILASTER IS DESIGNED TO RESIST WORKING LOADS (IN ANY DIRECTION) FROM THE LIGHT POLE APPLIED AT THE TOP OF THE PILASTER AS FOLLOWS:

LONGITUDINAL MOMENT	=	437.8 kN-M
TRANSVERSE MOMENT	=	87.6 kN-M
LONGITUDINAL SHEAR	=	4.45 kN
TRANSVERSE SHEAR	=	890 N
TORSION	=	43.8 kN-M
AXIAL	=	1.78 kN

IF THE LIGHT POLE PROVIDED APPLIES LOADS THAT ARE IN EXCESS OF THOSE SHOWN ABOVE, THE CONTRACTOR SHALL REDESIGN THE PILASTER AND SUBMIT HIS DESIGN TO THE DEPARTMENT FOR REVIEW. THE CONTRACTOR'S REDESIGN SHALL BE PREPARED, SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF FLORIDA, AND QUALIFIED TO PERFORM THE WORK.

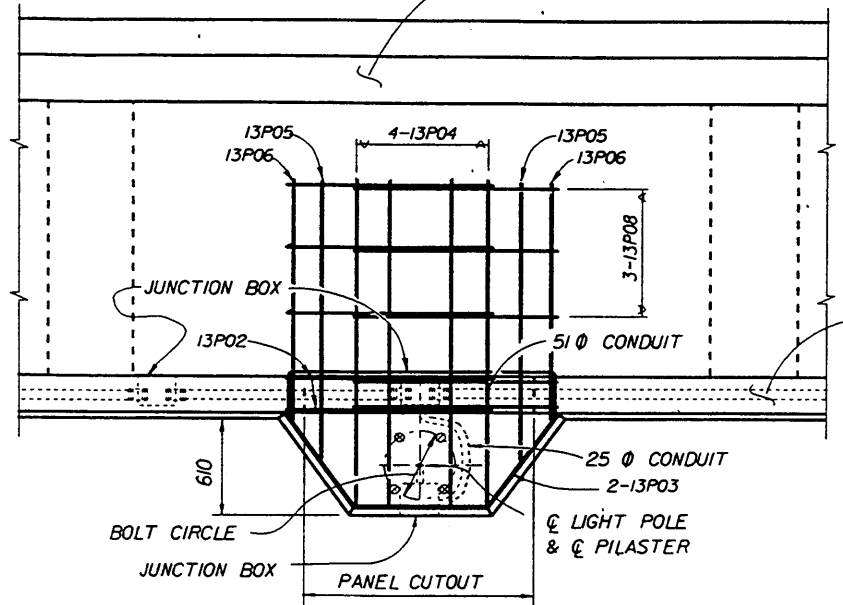
4. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING ANCHOR BOLTS THAT EFFECTIVELY TRANSMIT THE LIGHT POLE LOADS TO THE PILASTER AND THAT FIT THE REINFORCING CAGE. CALCULATIONS SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF FLORIDA SHALL BE SUBMITTED BY THE CONTRACTOR TO THE DEPARTMENT FOR REVIEW AND APPROVAL SHOWING THAT THESE REQUIREMENTS HAVE BEEN MET PRIOR TO CONSTRUCTION.

5. STEEL FOR JUNCTION BOXES SHALL CONFORM WITH ASTM-A36. THE BOXES SHALL BE HOT DIP GALVANIZED AFTER FABRICATION. IN LIEU OF STEEL BOXES THE CONTRACTOR MAY SUBMIT FOR APPROVAL MOLDED P.V.C. BOXES (SCHEDULE 80).

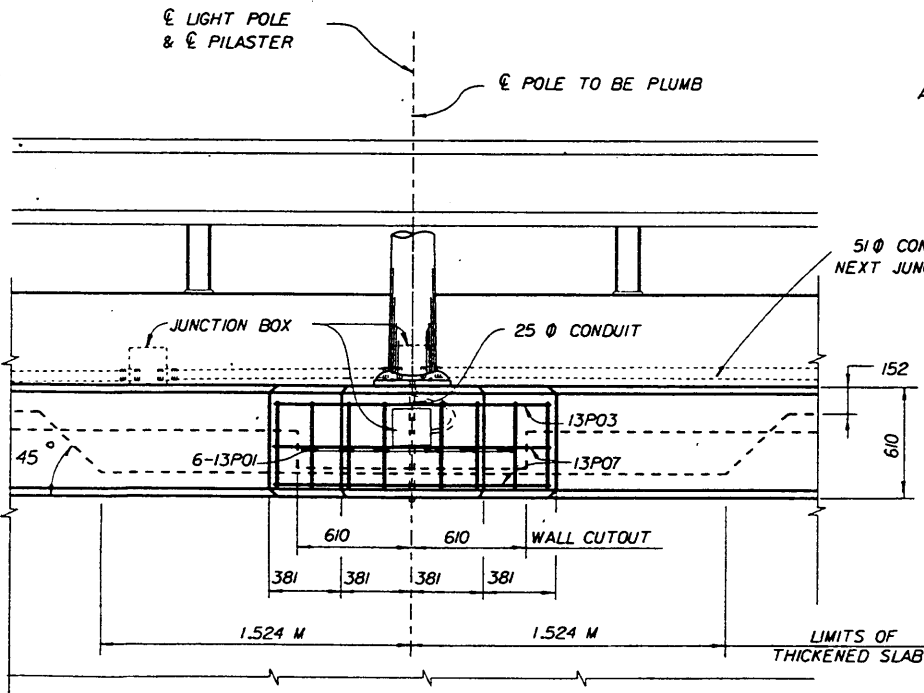
6. ALL CONDUITS SHALL BE RIGID GALVANIZED STEEL OR SCHEDULE 80 P.V.C.

7. THE COST OF ANCHOR BOLTS SHALL BE INCLUDED IN THE BID PRICE FOR LIGHT POLES.

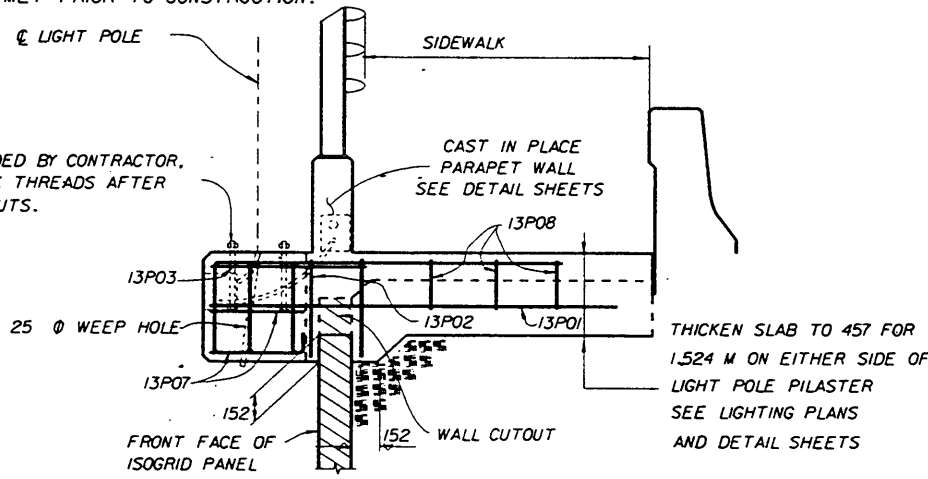
8. PAYMENT: THE COST OF ALL LABOR, CONCRETE AND REINFORCING STEEL REQUIRED FOR THE CONSTRUCTION OF THE PILASTERS AND ALL CONDUITS, EXPANSION COUPLINGS, JUNCTION BOXES AND MISCELLANEOUS HARDWARE REQUIRED FOR COMPLETION OF THE ELECTRICAL INSTALLATION WITHIN THE LIMITS SHOWN ON THIS SHEET, SHALL BE INCLUDED IN THE CONTRACTOR'S BID PRICE FOR THE MSE WALLS.



**PLAN**

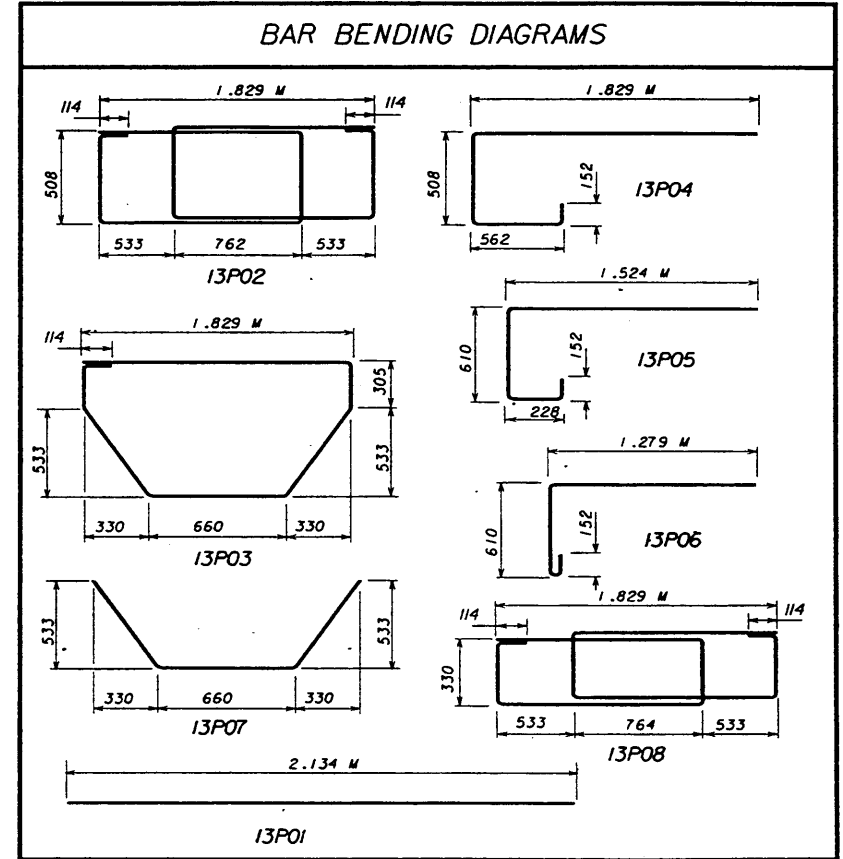


**LIGHT PILASTER DETAIL**



**FRONT VIEW OF JUNCTION BOX (COVER REMOVED)**

**SECTION A-A**



BILL OF REINFORCING STEEL			
MARK	SIZE	NO. REQ'D	LENGTH
13P01	13	6	2.134 M
13P02	13	2	7.442 M
13P03	13	1	4.496 M
13P04	13	4	2.946 M
13P05	13	2	2.413 M
13P06	13	2	1.880 M
13P07	13	2	1.930 M
13P08	13	3	6.731 M

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**RETAINING WALL SYSTEM  
THE NEEL COMPANY ISOGRID**

Names	Dates	Approved By		
Designed By	JMC 10/98	 State Structures Design Engineer		
Drawn By	CAA 10/98			
Checked By	JMC 10/98			
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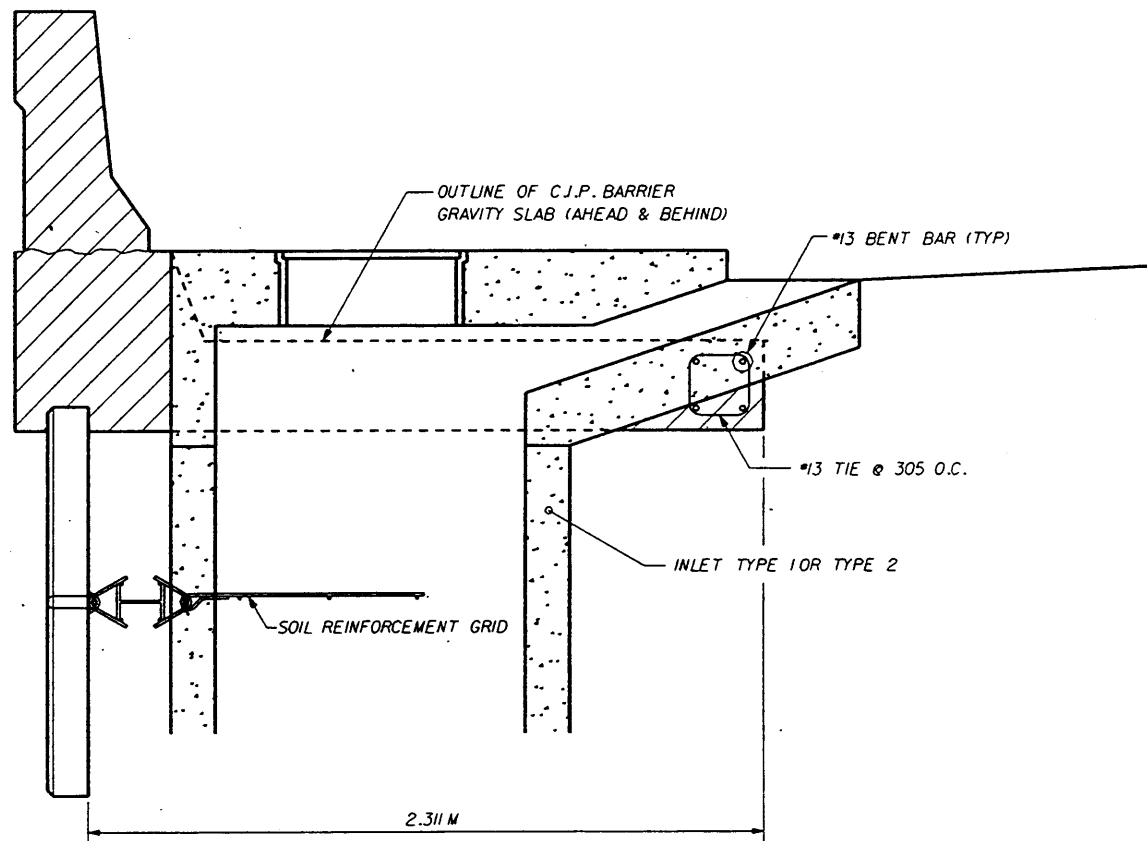
DESIGNER:



**THE NEEL COMPANY**  
8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
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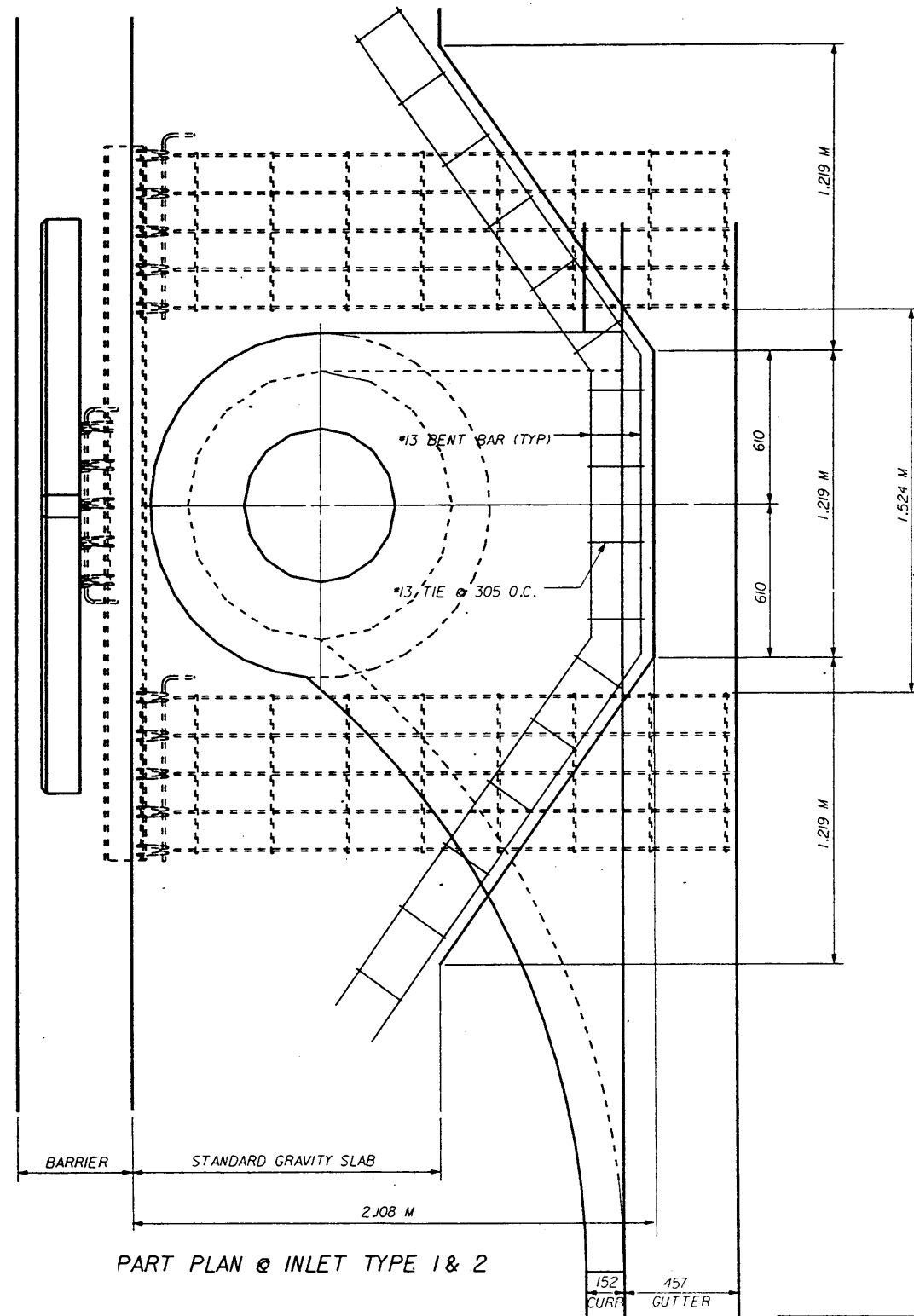
PRECASTER:

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11643 103RD STREET  
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PH: (904) 778-2990  
FX: (904) 778-2992



PART SECTION @ INLET TYPE 1 & 2

NOTE: GRID RELOCATION HARDWARE, SEE SHEET 13 OF 20 FOR DETAILS



PART PLAN @ INLET TYPE 1 & 2

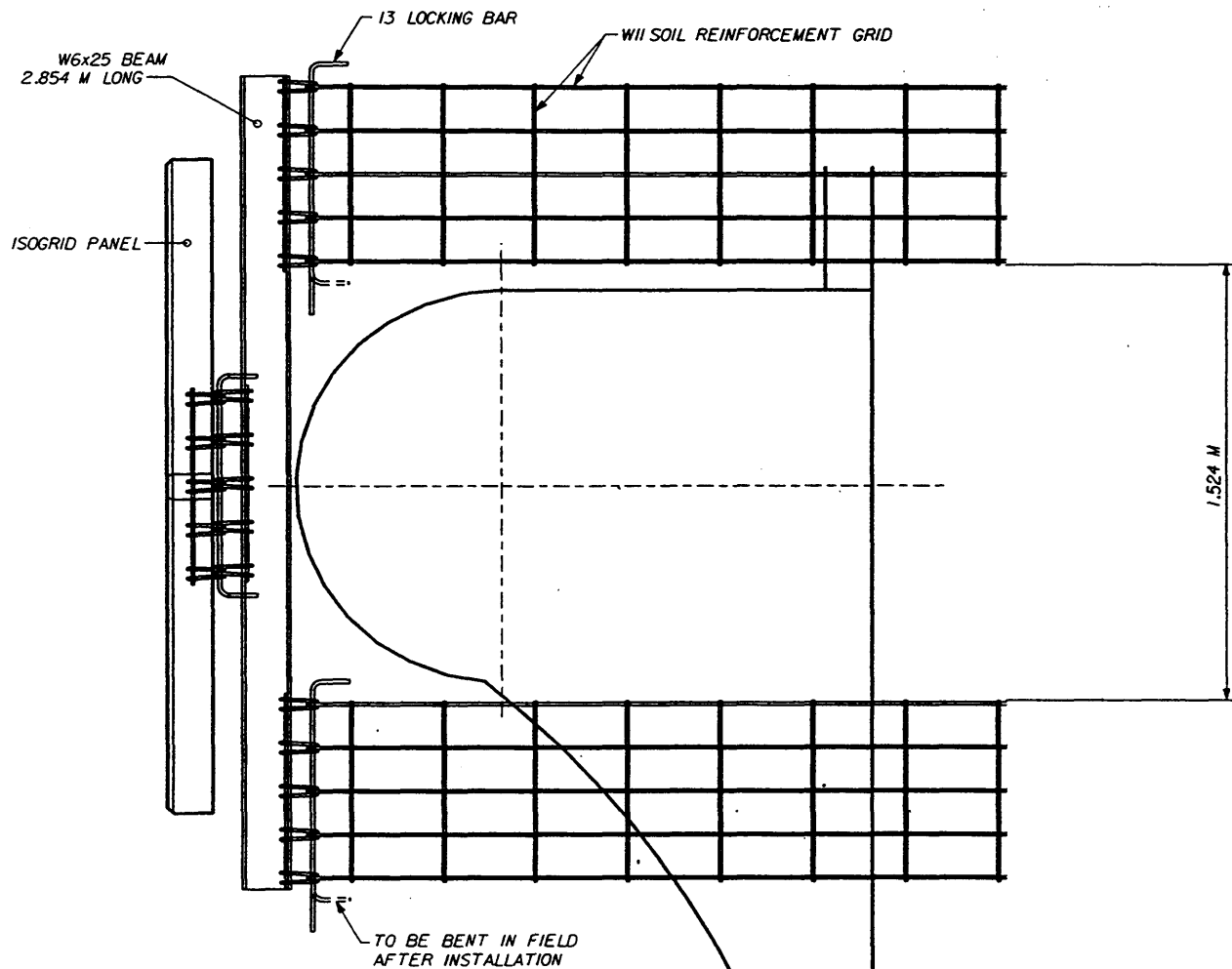
GRAVITY SLAB AT INLET TYPE 1 & 2



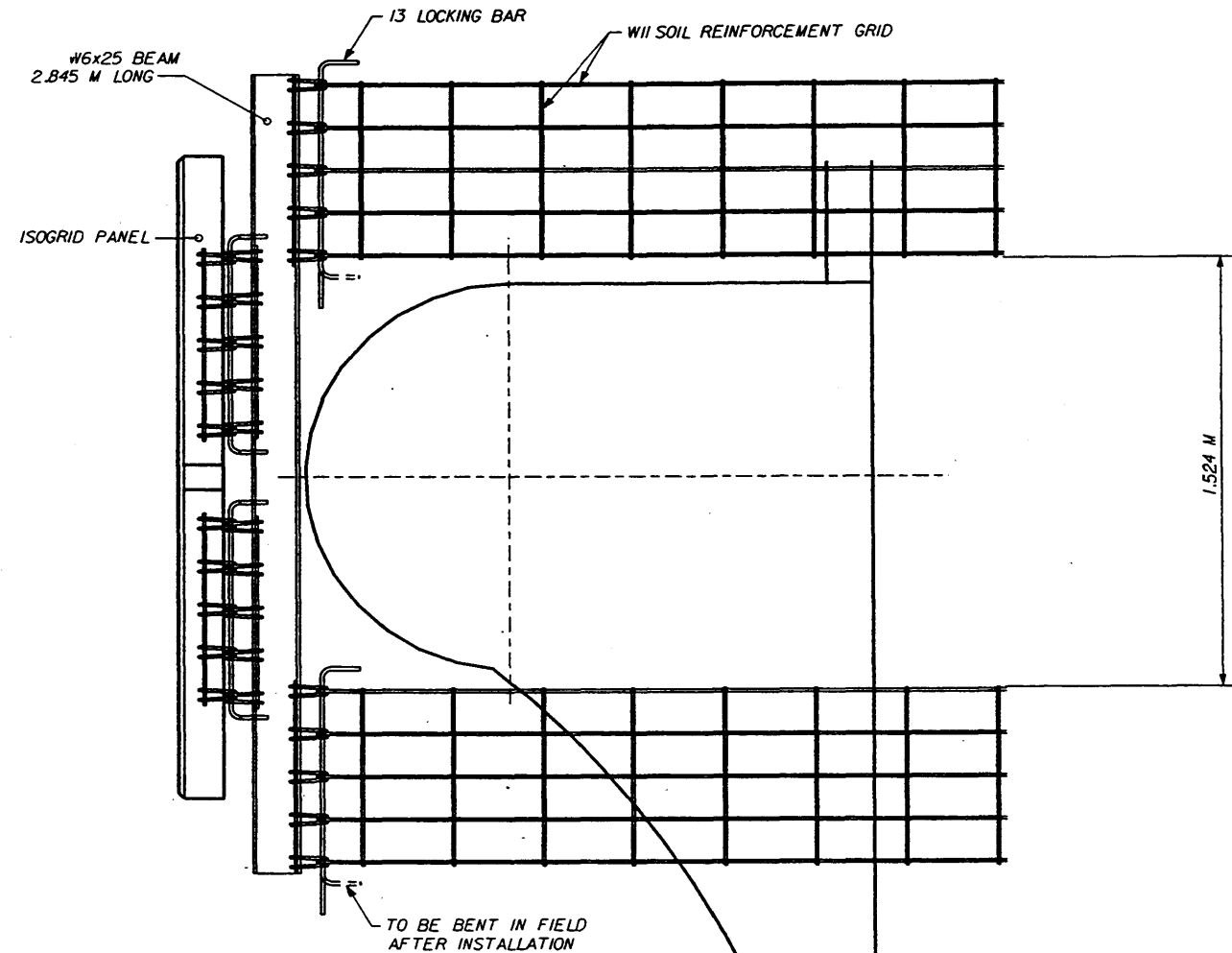
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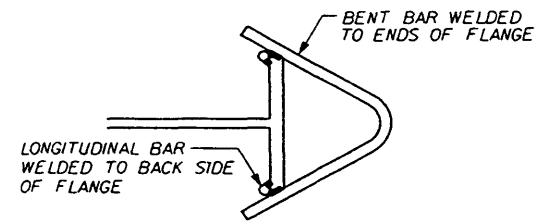
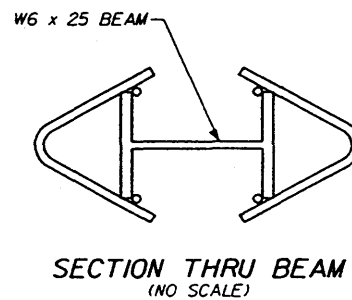
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
RETAINING WALL SYSTEM THE NEEL COMPANY ISOGRID					
Names	Dates	Approved By: <i>William H. [Signature]</i>			
Designed By	JMC	10/98	State Structures Design Engineer		
Drawn By	CAA	10/98	Revision	Sheet No.	Index No.
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SOIL GRID RELOCATION HARDWARE  
FOR SINGLE GRID PANEL  
(2 ea. REQUIRED)




SOIL GRID RELOCATION HARDWARE  
FOR DOUBLE GRID PANEL  
(3 ea. REQUIRED)




- NOTES:  
1. WELDING:  
\*CONNECTION INSERTS TO BE WELDED TO W6 x 25 BEAM.  
2. GALVANIZATION:  
\*AFTER FABRICATION, BEAM/INSERT ASSEMBLY WITH ASTM A123 (AASHTO M111-80)

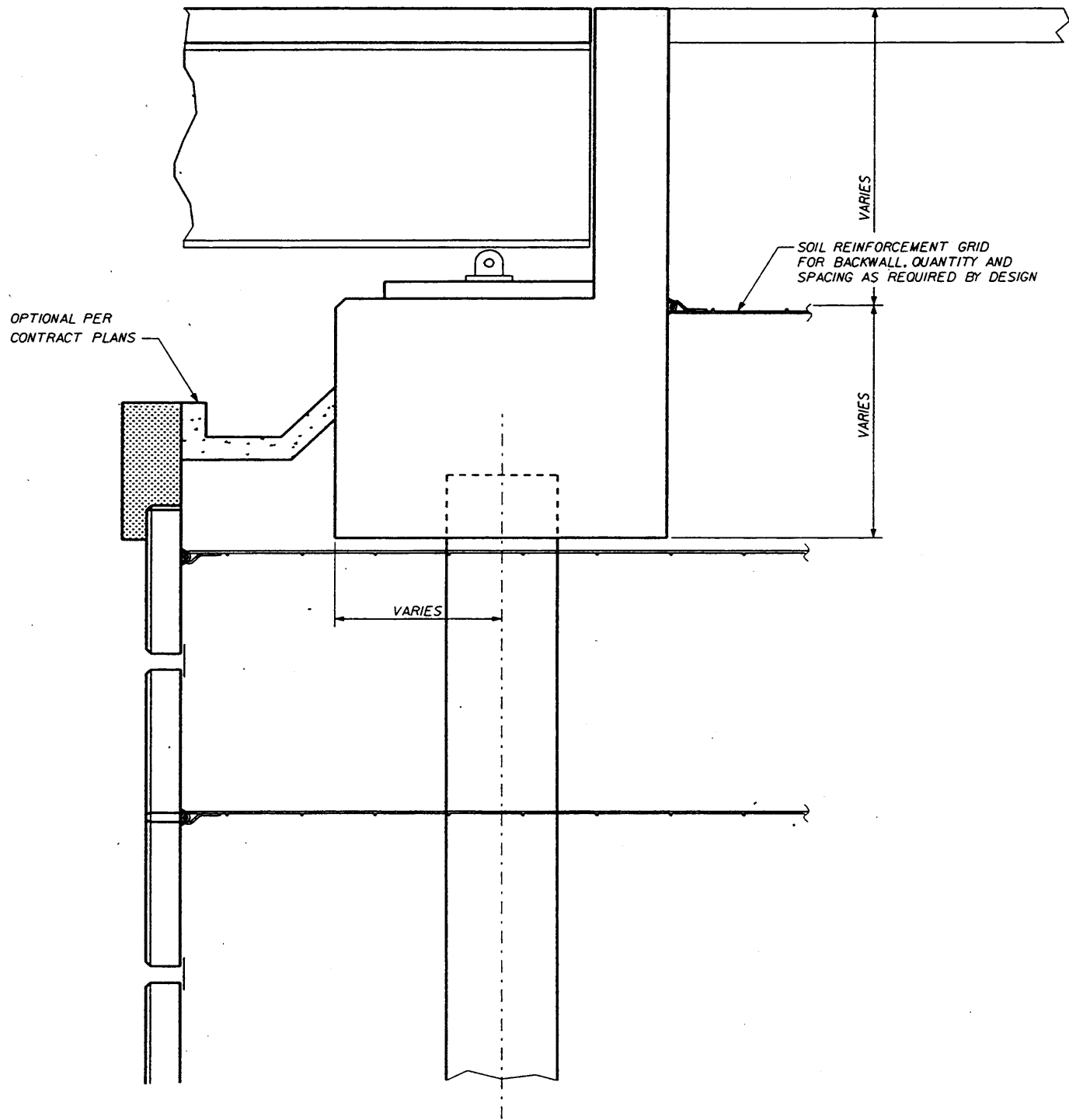
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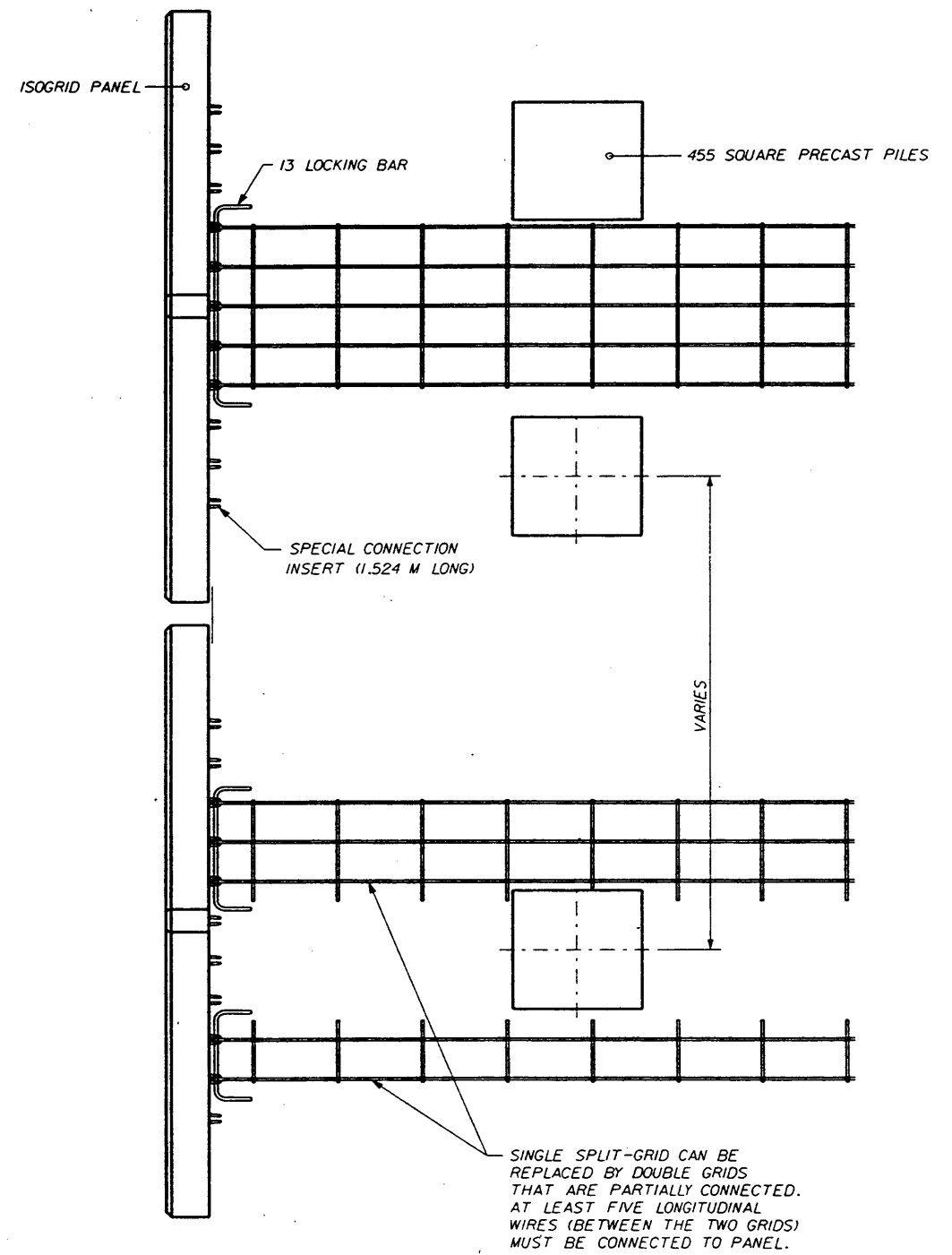
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SECTION THRU ABUTMENT



PLAN VIEW OF GRID/PILE ARRANGEMENT

DESIGNER:




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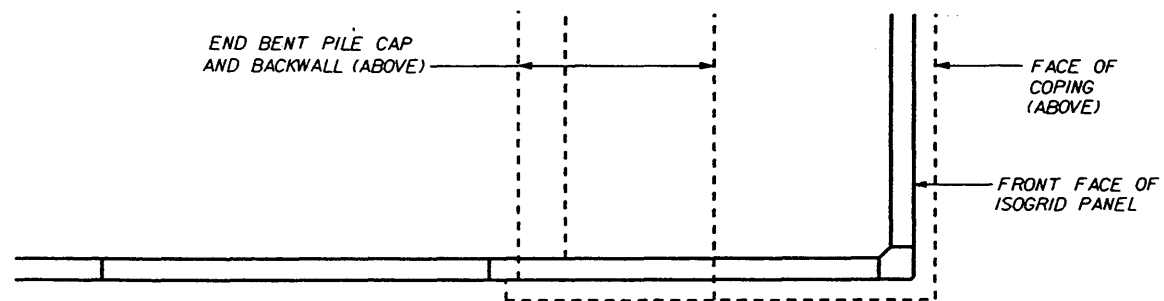
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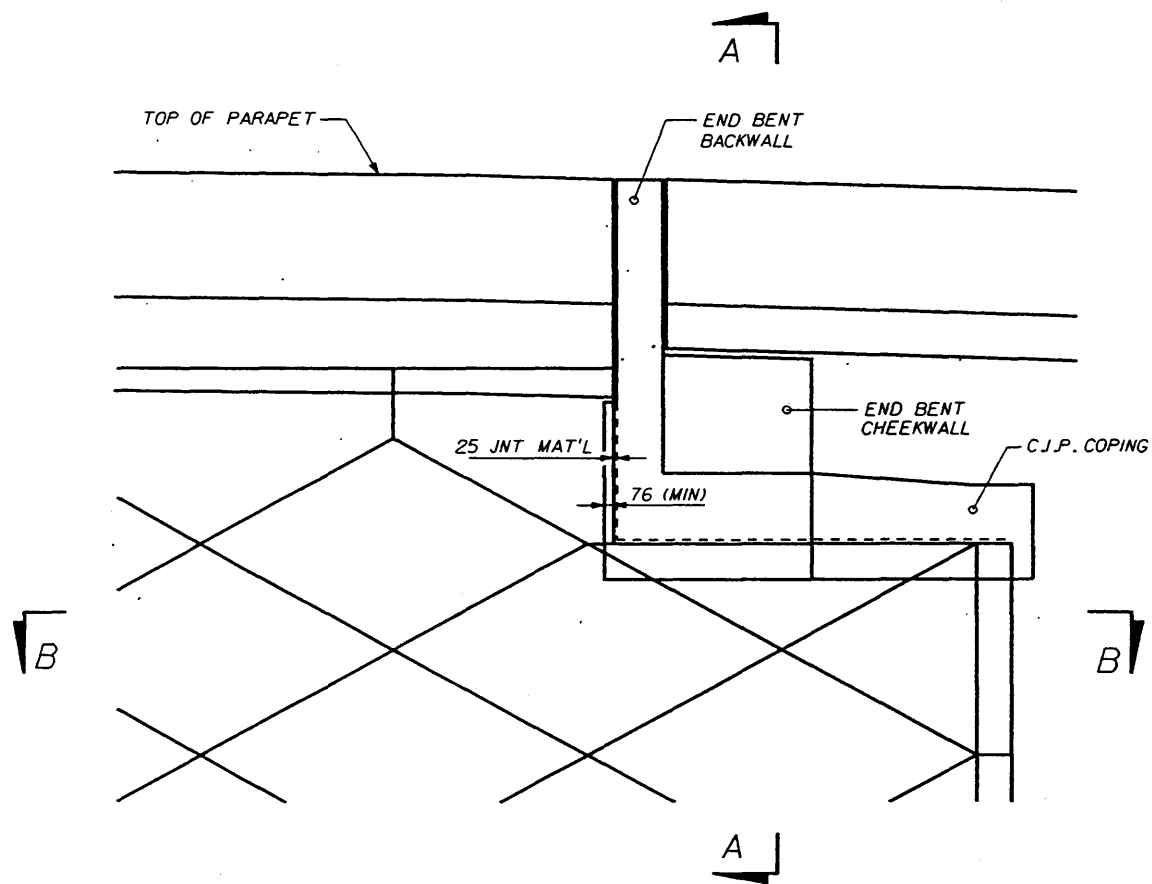
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 THE NEEL COMPANY ISOGRID

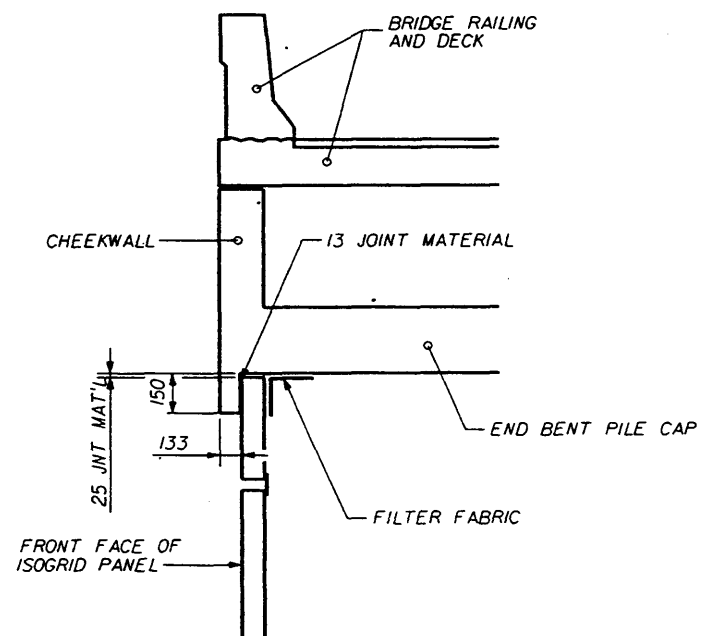
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Checked By	JMC	10/98	Revision	Sheet No.	Index No.
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SECTION B-B  
STEM / END BENT PILE INTERFACE



PART ELEVATION SHOWING  
WINGWALL / END BENT INTERFACE



SECTION A-A  
SECTION THRU PILE CAP

DESIGNER:



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8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
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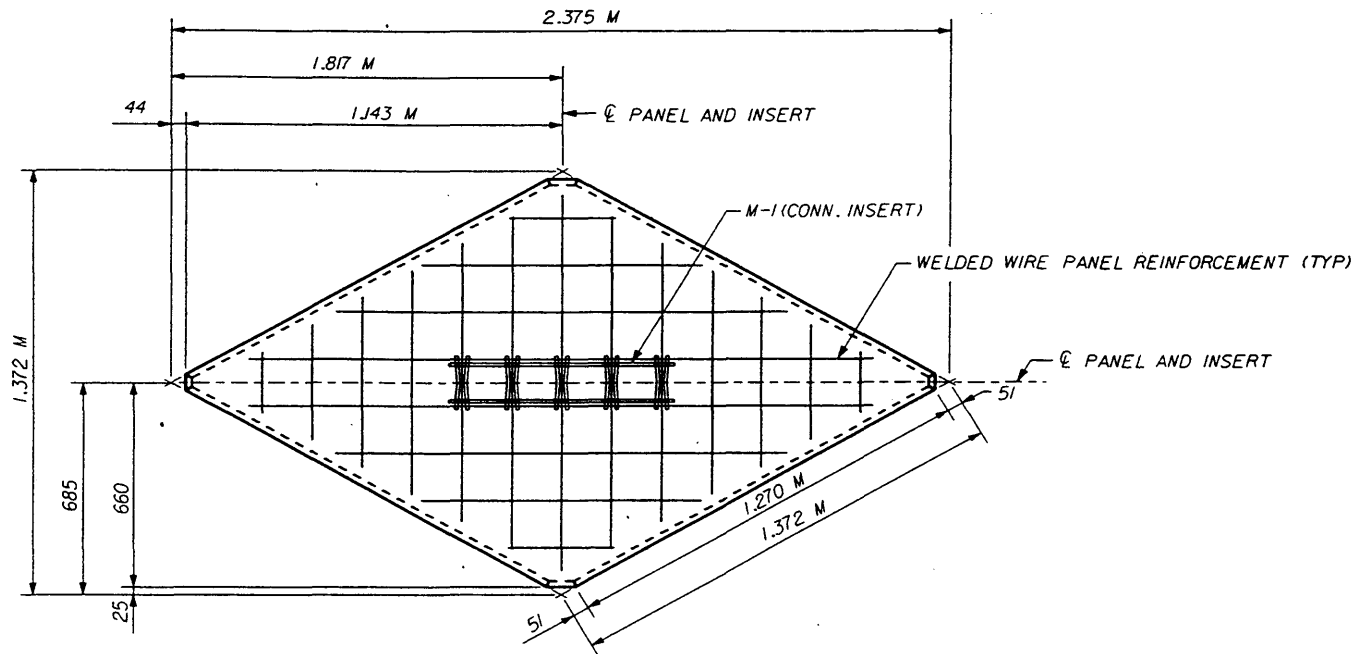
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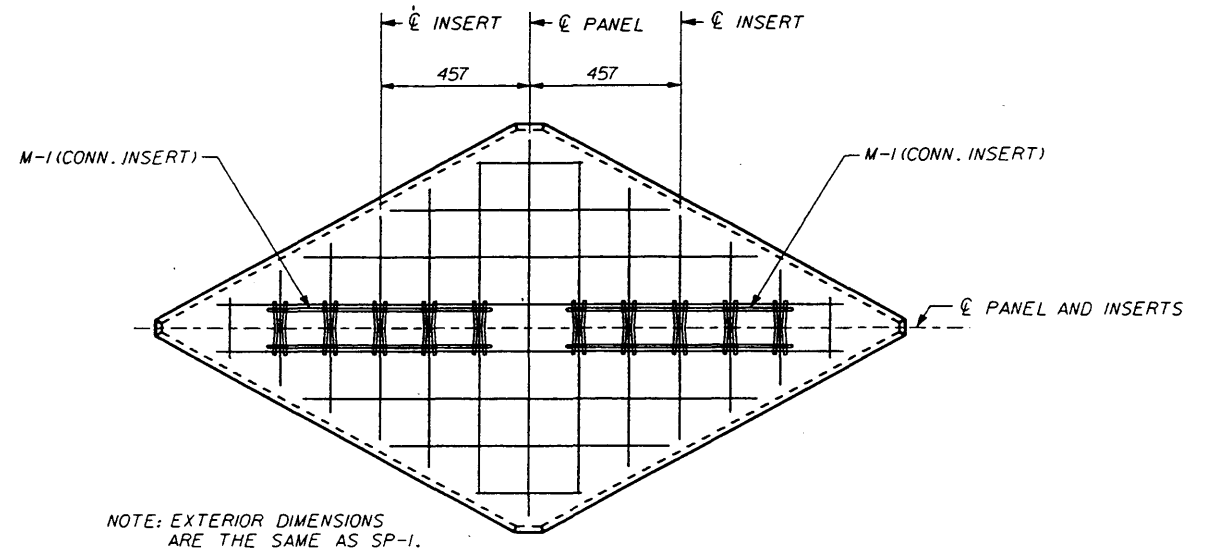
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THE NEEL COMPANY ISOGRID

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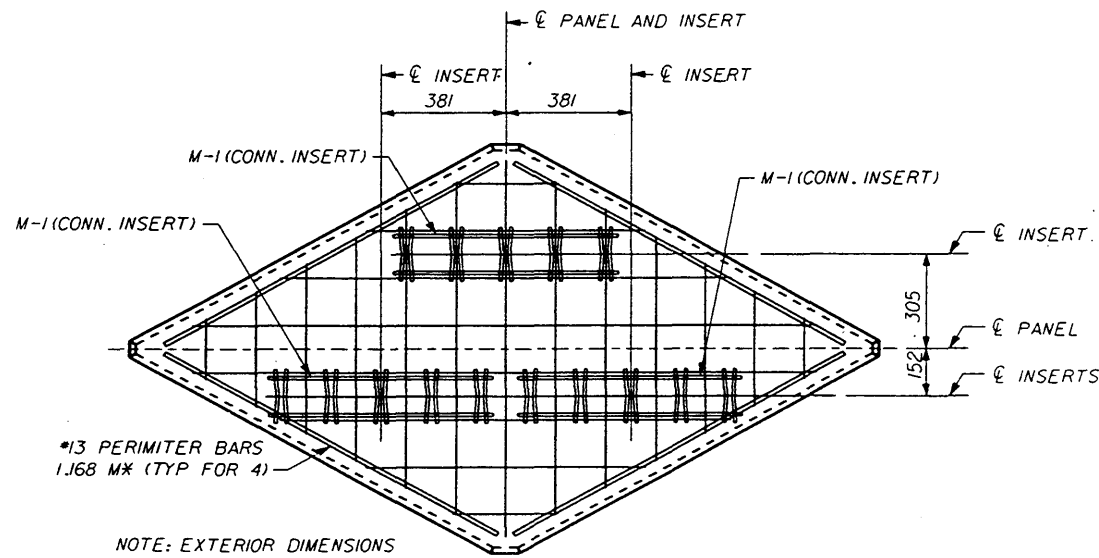


SP-1  
FULL-SIZE PANEL - ONE GRID  
ELEVATION (REAR FACE)



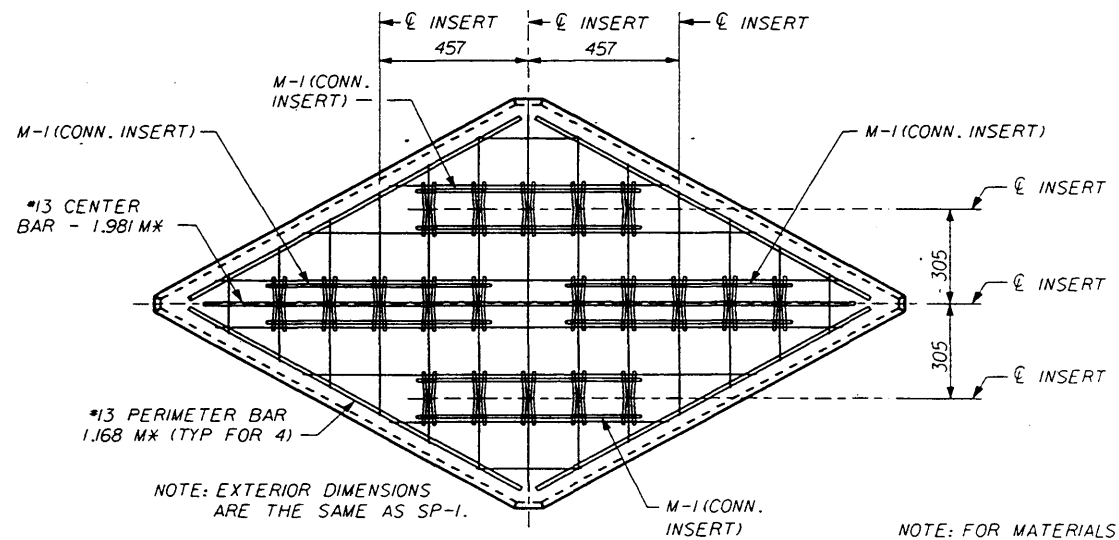
NOTE: EXTERIOR DIMENSIONS  
ARE THE SAME AS SP-1.

SP-2  
FULL-SIZE PANEL - TWO GRIDS  
ELEVATION (REAR FACE)



NOTE: EXTERIOR DIMENSIONS  
ARE THE SAME AS SP-1.

SP-3  
FULL-SIZE PANEL - THREE GRIDS  
ELEVATION (REAR FACE)



NOTE: EXTERIOR DIMENSIONS  
ARE THE SAME AS SP-1.

NOTE: FOR MATERIALS NOTES, SEE SHEET 2.

SP-4  
FULL-SIZE PANEL - FOUR GRIDS  
ELEVATION (REAR FACE)

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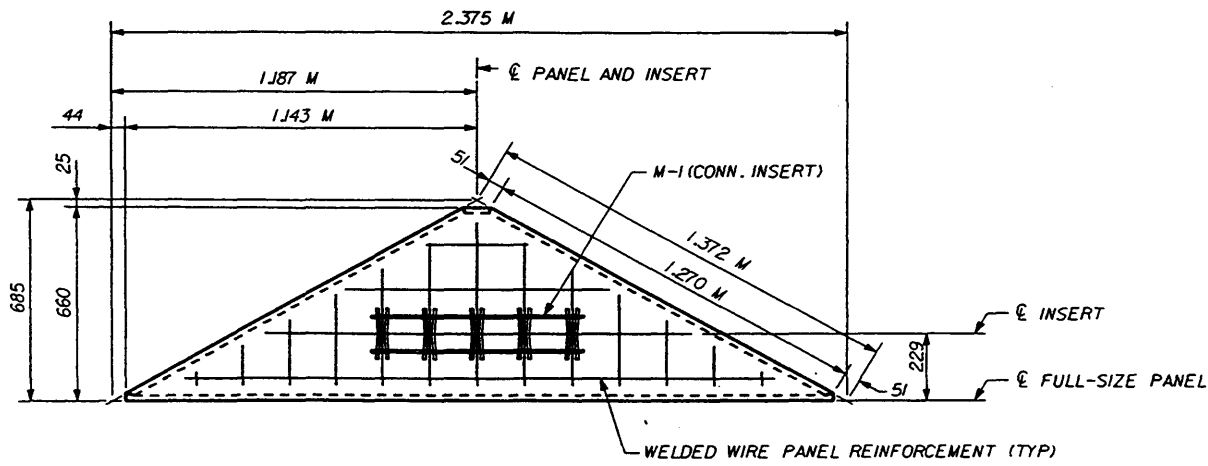
PRECASTER:

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11643 103rd STREET  
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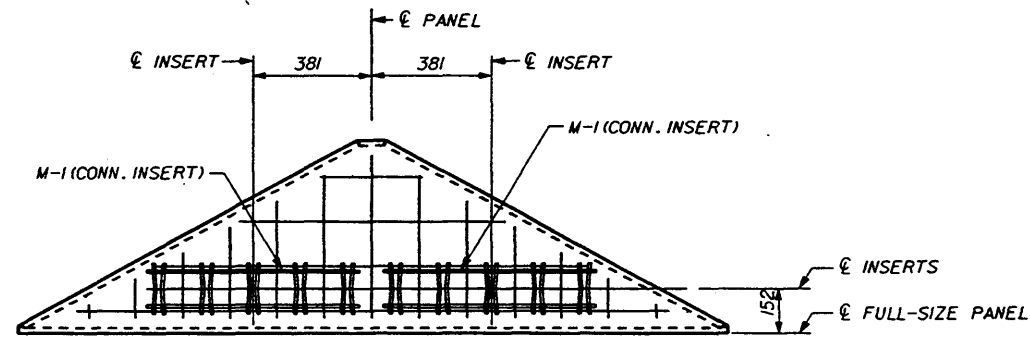
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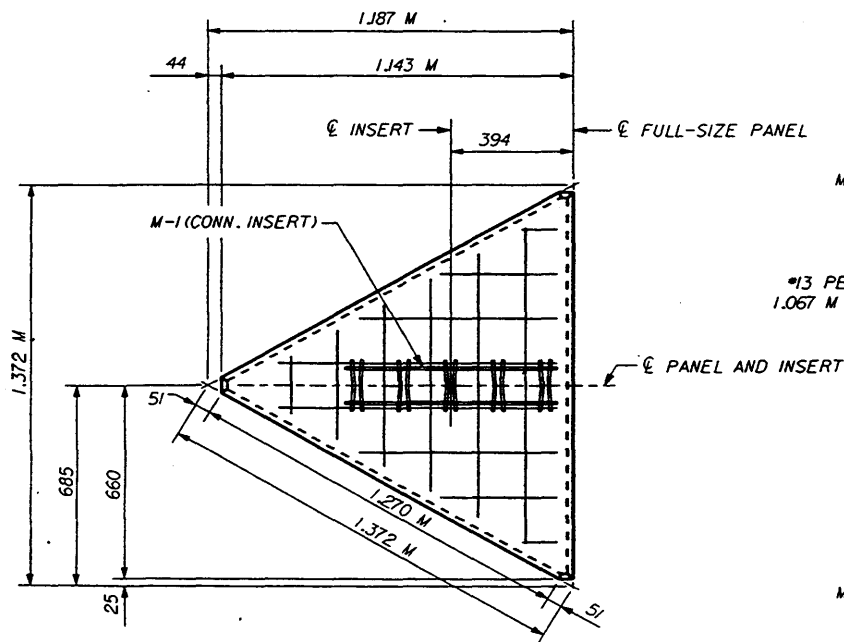


**HH-1**  
HORIZ.-HALF PANEL - ONE GRID  
ELEVATION (REAR FACE)

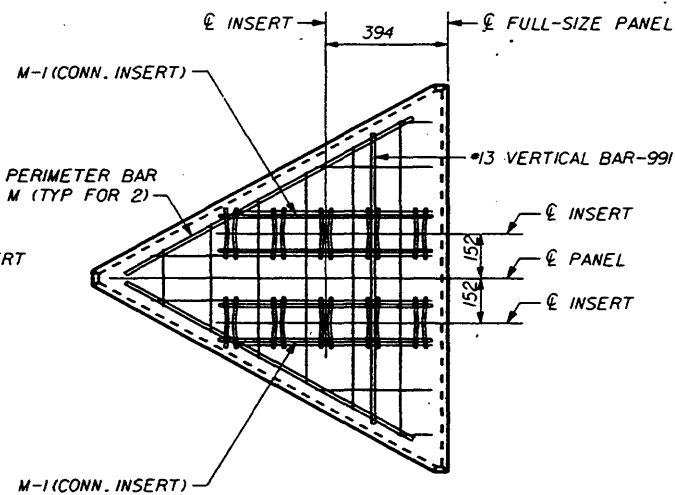


NOTE:  
\*EXTERIOR DIMENSIONS  
ARE THE SAME AS HH-1

**HH-2**  
HORIZ.-HALF PANEL - TWO GRIDS  
ELEVATION (REAR FACE)

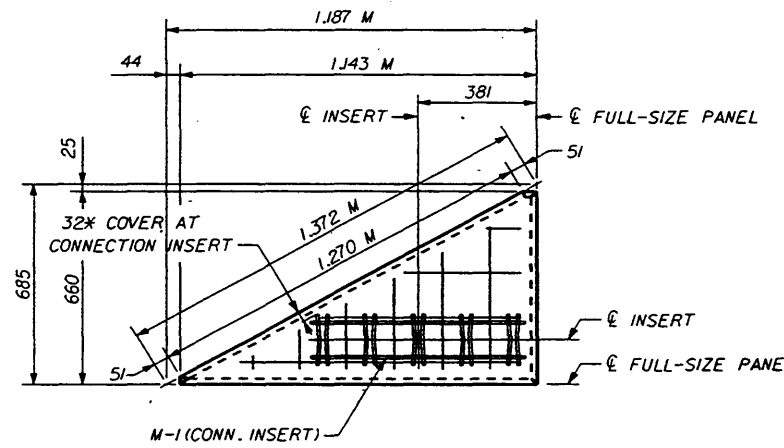


**VH-1**  
VERT.-HALF PANEL - ONE GRID  
ELEVATION (REAR FACE)

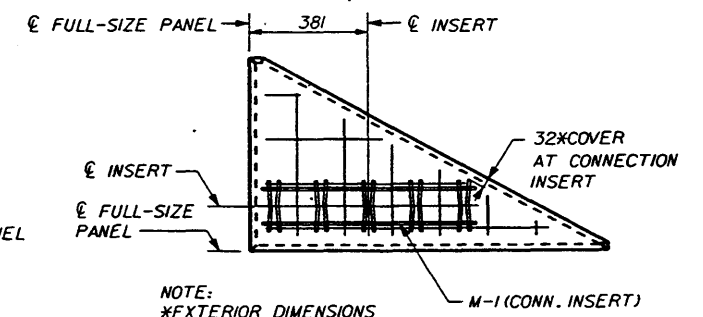


NOTE:  
\*EXTERIOR DIMENSIONS  
ARE THE SAME AS VH-1

**VH-2**  
VERT.-HALF PANEL - TWO GRIDS  
ELEVATION (REAR FACE)



**QP-R**  
TOP RIGHT / BOTTOM LEFT  
QUARTER PANEL - ONE GRID  
ELEVATION (REAR FACE)



NOTE:  
\*EXTERIOR DIMENSIONS  
ARE THE SAME AS QP-R  
BUT OPPOSITE HAND

**QP-L**  
TOP LEFT / BOTTOM RIGHT  
QUARTER PANEL - ONE GRID  
ELEVATION (REAR FACE)

NOTE: FOR MATERIALS NOTES, SEE SHEET 2.

DESIGNER:



**THE NEEL COMPANY**  
8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859

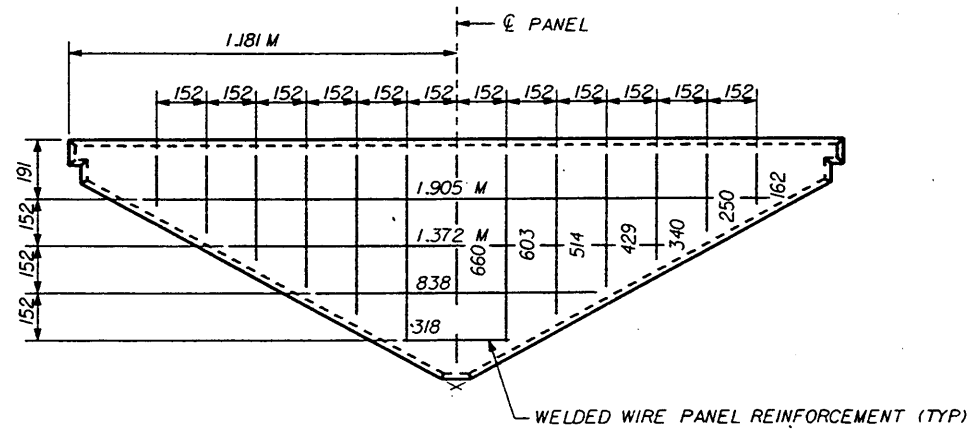
PRECASTER:

**OLDCASTLE PRECAST, INC.**  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (904) 778-2992

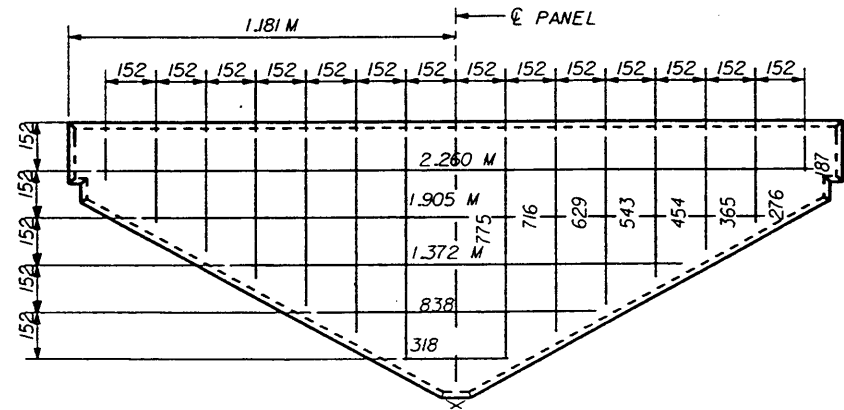
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

RETAINING WALL SYSTEM  
THE NEEL COMPANY ISOGRID

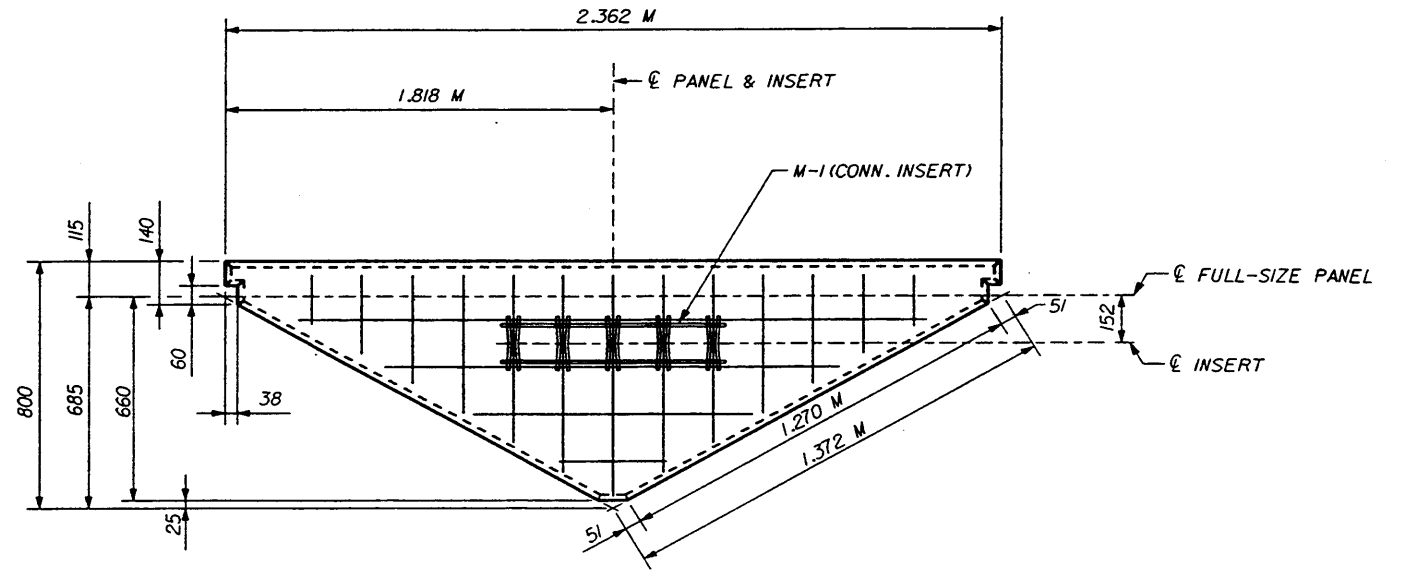
Names	Dates	Approved	Revision	Sheet No.	Index No.
Designed By	JNC	10/98			
Drawn By	CAI	10/98			
Checked By	JNC	10/98	00	17 of 20	5012



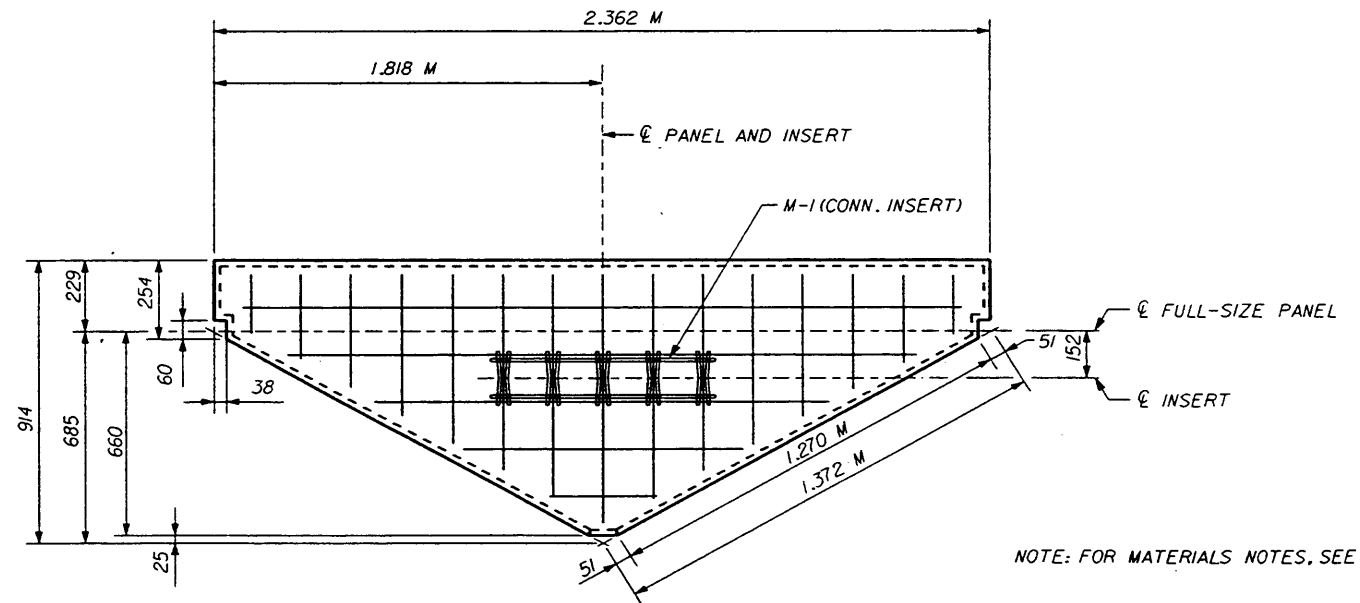
WELDED WIRE MESH PANEL REINFORCEMENT - X-1 PANEL  
ELEVATION (REAR FACE)



WELDED WIRE MESH PANEL REINFORCEMENT - X-2 PANEL  
ELEVATION (REAR FACE)



X-1  
115 RISER - ONE GRID  
ELEVATION (REAR FACE)



X-2  
229 RISER PANEL - ONE GRID  
ELEVATION (REAR FACE)

NOTE: FOR MATERIALS NOTES, SEE SHEET 2.

DESIGNER:

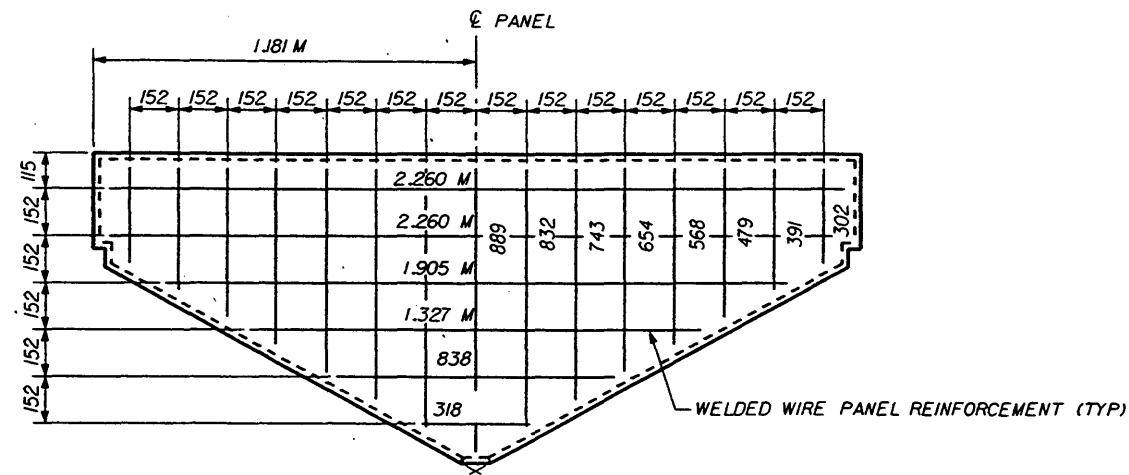


**THE NEEL COMPANY**  
8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
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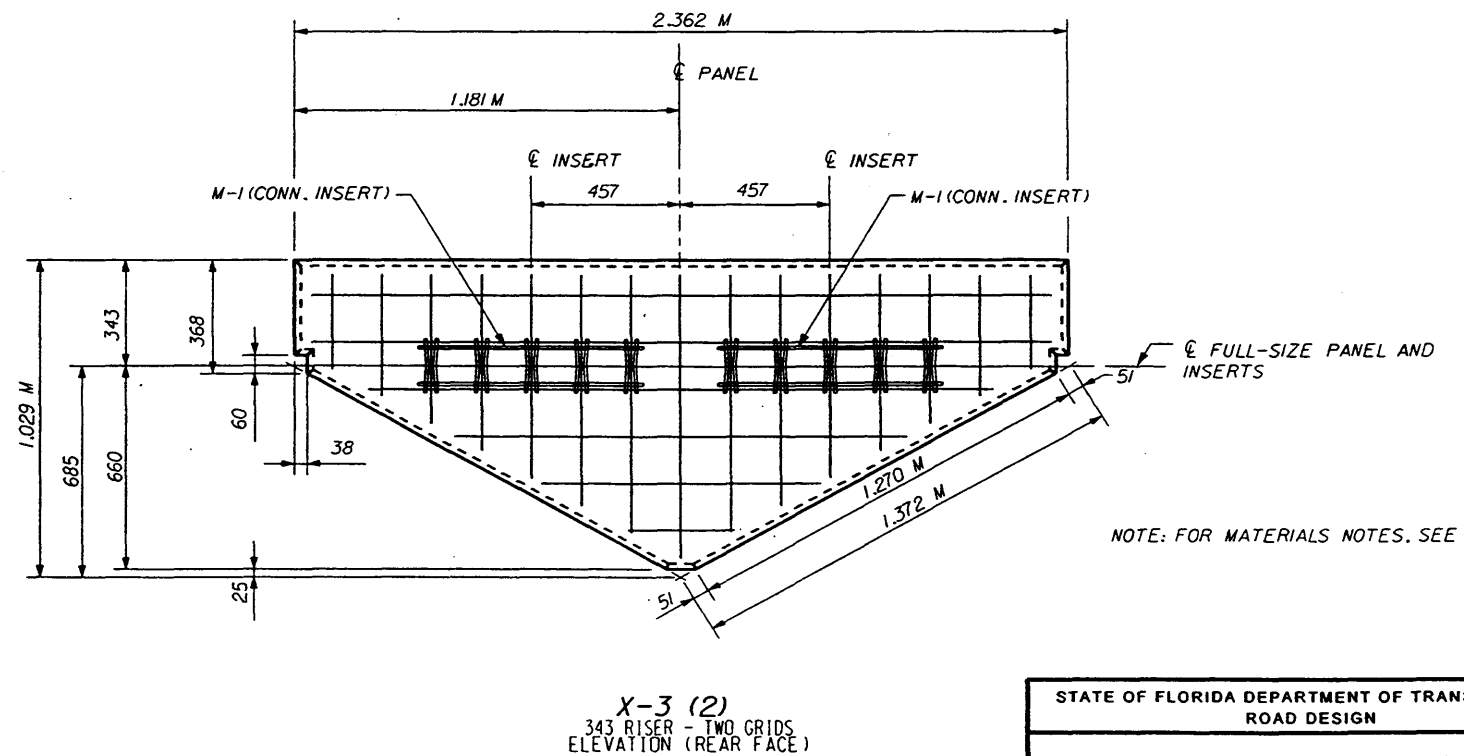
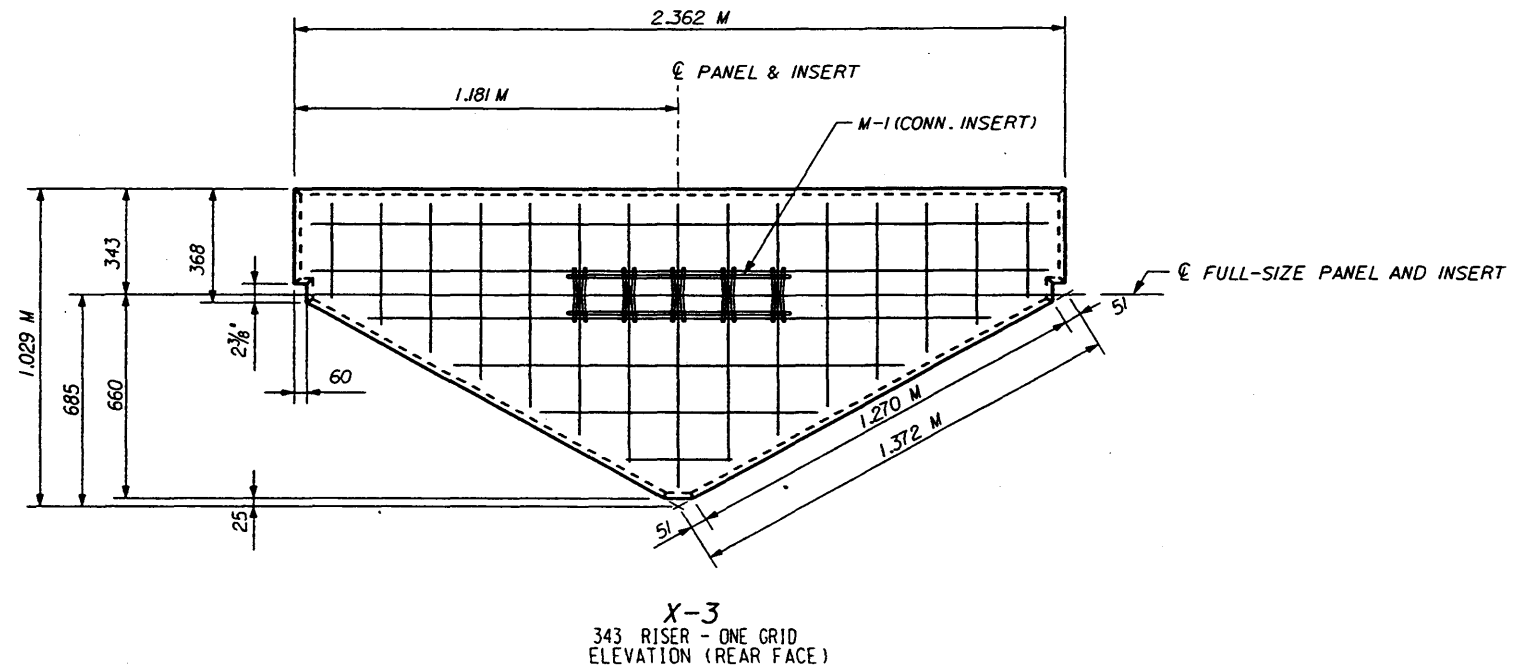
PRECASTER:

**OLDCASTLE PRECAST, INC.**  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
FX: (904) 778-2992

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM THE NEEL COMPANY ISOGRID</b>				
Designed By	JMC	Date	10/98	Approved By <i>William J. [Signature]</i> State Structures Design Engineer
Drawn By	CAH	Date	10/98	Revision
Checked By	JMC	Date	10/98	Sheet No. 18 of 20 Index No. 5012



WELDED WIRE MESH PANEL REINFORCEMENT - X-3 AND X-3(2) PANELS  
ELEVATION (REAR FACE)

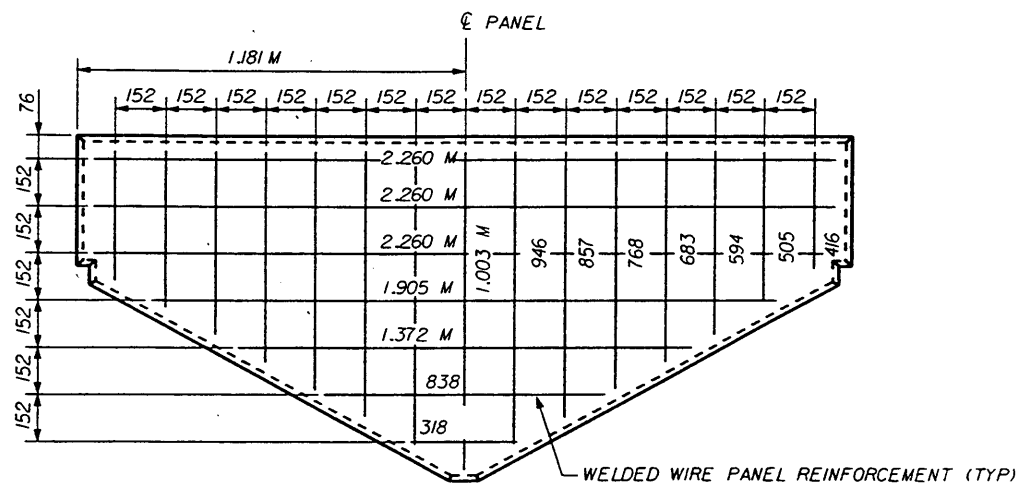


NOTE: FOR MATERIALS NOTES, SEE SHEET 2.

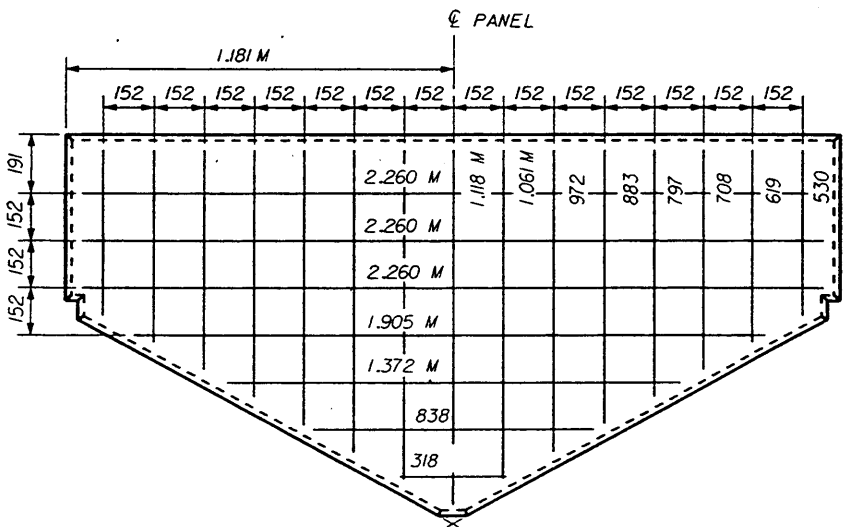
DESIGNER:  
**THE NEEL COMPANY**  
8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
FX: (703) 913-7859

PRECASTER:  
**OLDCASTLE PRECAST, INC.**  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
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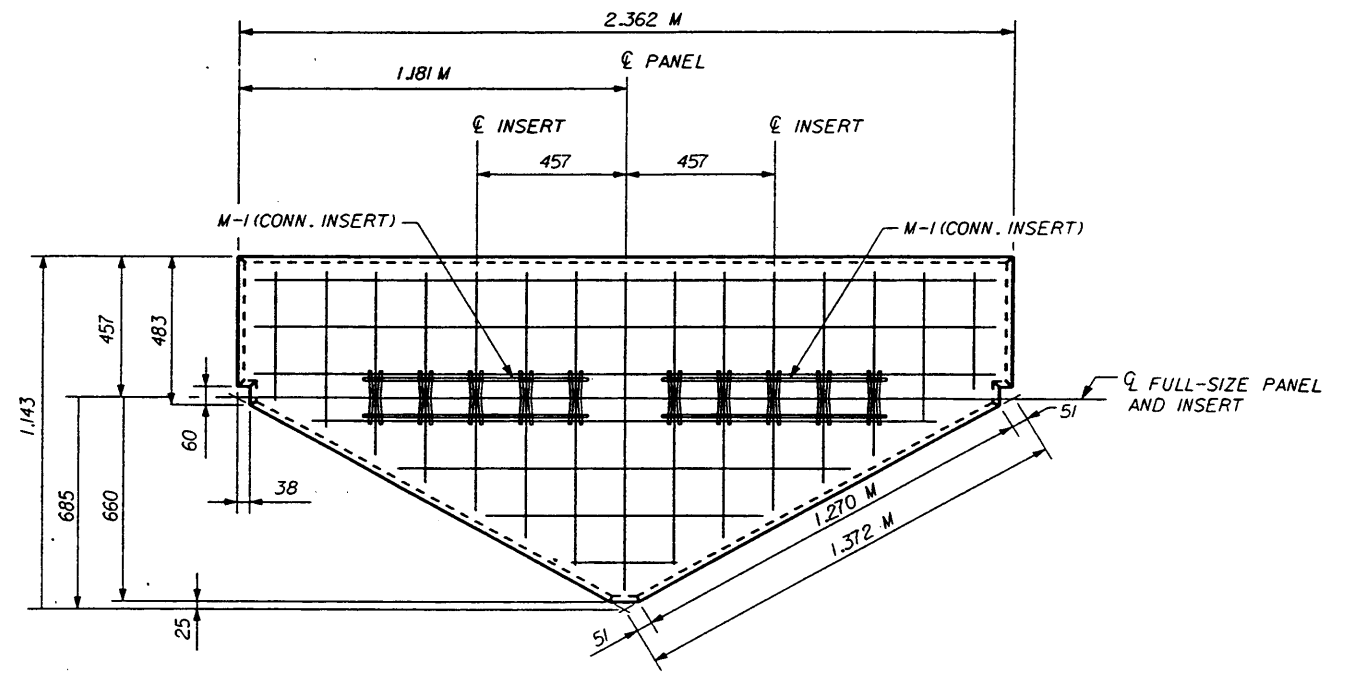
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY ISOGRID				
Designed By	JMC	10/98	Approved By <i>William H. [Signature]</i> State Structures Design Engineer	
Drawn By	CAA	10/98	Revision	Sheet No.
Checked By	JMC	10/98	00	19 of 20
				5012



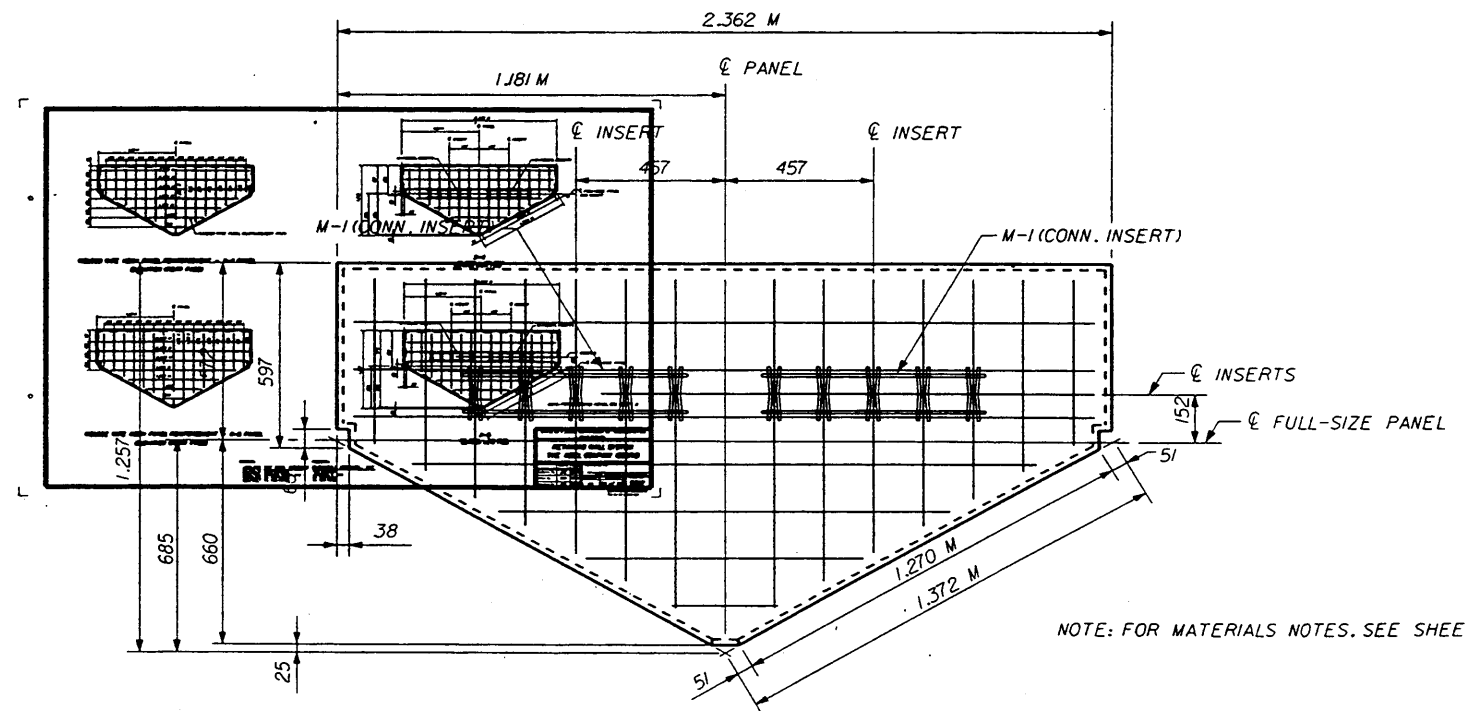
WELDED WIRE MESH PANEL REINFORCEMENT - X-4 PANEL  
ELEVATION (REAR FACE)



WELEDE WIRE MESH PANEL REINFORCEMENT - X-5 PANEL  
ELEVATION (REAR FACE)



X-4  
457 RISER - TWO GRIDS  
ELEVATION (REAR FACE)



X-5  
572 RISER - TWO GRIDS  
ELEVATION (REAR FACE)

NOTE: FOR MATERIALS NOTES, SEE SHEET 2.


DESIGNER:

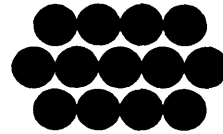


**THE NEEL COMPANY**  
8328-D TRAFORD LANE  
SPRINGFIELD, VIRGINIA 22152  
PH: (703) 913-7858  
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PRECASTER:

**OLDCASTLE PRECAST, INC**  
11643 103rd STREET  
JACKSONVILLE, FL 32210  
PH: (904) 778-2990  
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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE NEEL COMPANY ISOGRID				
Names	Dates	Approved By		
Designed By	JMC	10/98	 State Structures Design Engineer	
Drawn By	CAA	10/98		
Checked By	JMC	10/98	Revision	00
			Sheet No.	20 of 20
			Index No.	5012



TAI

# The Reinforced Earth Company

8614 WESTWOOD CENTER DRIVE SUITE 1100, VIENNA VIRGINIA 22182 (703) 821-1175

### DESIGN CRITERIA

1. DESIGN IS BASED ON THE ASSUMPTION THAT THE MATERIAL WITHIN THE REINFORCED EARTH VOLUME, METHODS OF CONSTRUCTION AND QUALITY OF PREFABRICATED MATERIALS SHALL CONFORM TO THE CONTRACTING AGENCY'S TECHNICAL SPECIFICATIONS FOR REINFORCED EARTH WALLS.
2. SOIL PARAMETERS:  
SEE WALL CONTROL DRAWINGS FOR SOIL CHARACTERISTICS OF FOUNDATION MATERIAL TO BE USED IN THE DESIGN OF THE WALL SYSTEM. THE CONTRACTOR SHALL PROVIDE SOIL DESIGN PARAMETERS FOR BACKFILL MATERIAL BASED ON THE ACTUAL SOIL CHARACTERISTICS UTILIZED AT THE SITE. THE VALUES OF FRICTION ANGLE ( $\phi$ ), COHESION ( $c$ ) AND TOTAL UNIT WEIGHT ( $\gamma$ ) SHALL BE PROVIDED IN THE SHOP DRAWINGS.
3. THE MAXIMUM APPLIED BEARING PRESSURE AT THE FOUNDATION LEVEL IS AS SHOWN ON THE WALL ELEVATIONS FOR EACH DESIGN CASE. IT IS THE RESPONSIBILITY OF THE OWNER TO DETERMINE THAT THIS APPLIED BEARING PRESSURE IS ALLOWABLE FOR THAT LOCATION.
4. ANY UNSUITABLE FOUNDATION MATERIAL BELOW THE REINFORCED EARTH VOLUME, AS DETERMINED BY THE ENGINEER, SHALL BE EXCAVATED AND REPLACED WITH SUITABLE MATERIAL OR OTHERWISE STABILIZED AS DIRECTED BY THE ENGINEER.
5. REINFORCING STRIPS FOR REINFORCED EARTH WALLS SHALL BE 50mm WIDE AND 4mm THICK, AND SHALL CONFORM TO THE PHYSICAL AND MECHANICAL PROPERTIES OF ASTM A-572 GRADE 450M. GALVANIZATION SHALL BE APPLIED IN ACCORDANCE WITH ASTM A-123.
6. THE MINIMUM FACTORS OF SAFETY REQUIRED FOR DESIGN  
OVERTURNING = 2.0  
SLIDING = 1.5  
INTERNAL PULLOUT = 1.5  
(ALLOWABLE DEFORMATION = 19mm)  
BEARING CAPACITY = 2.5  
OVERALL STABILITY = 1.5  
STEEL SOIL REINFORCEMENT = 0.55F<sub>y</sub> AT END OF DESIGN LIFE AND 0.50 F<sub>u</sub> AT NET SECTION OF BOLTED CONNECTION  
MAXIMUM PULLOUT FACTOR f<sub>x</sub> (FOR SAND) = 1.5  
(FOR LIMESTONE) = 2.0
7. REINFORCED EARTH WALLS IN CURVES WILL FORM A SERIES OF SHORT CHORDS OF 1.500m EACH TO MATCH DESIRED WALL ALIGNMENT.
8. FOR LOCATION AND ALIGNMENT OF REINFORCED EARTH WALLS. SEE RETAINING WALL CONTROL PLANS
9. IF MANHOLES AND DROP INLETS ARE PRESENT, THEY SHALL BE LOCATED AS SHOWN ON WALL ELEVATIONS.
10. IF PILES ARE LOCATED WITHIN THE REINFORCED EARTH VOLUME, THEY SHALL BE DRIVEN PRIOR TO CONSTRUCTION OF THE REINFORCED EARTH WALL UNLESS A METHOD TO PROTECT THE STRUCTURE, WHICH IS ACCEPTABLE TO THE ENGINEER AND THE REINFORCED EARTH COMPANY, AND IS PROPOSED AND APPROVED IN WRITING.

11. BACKFILL MATERIAL SHALL BE COMPACTED IN ACCORDANCE WITH SECTION 548 TO A LEVEL OF 50mm ABOVE THE TIE STRIPS EMBEDDED IN THE PANELS. INSTALLATION OF REINFORCING STRIPS SHALL BE PERMITTED ONLY AFTER PLACEMENT AND COMPACTION OF THE BACKFILL MATERIAL HAS REACHED THE REQUIRED LEVEL.
12. IF STRUCTURES IN EXCESS OF 6m IN HEIGHT OCCUR, THE FINISHED GRADE IN FRONT OF THE WALL SHALL BE PLACED AND COMPACTED BEFORE WALL CONSTRUCTION EXCEEDS A HEIGHT OF 6m. FINISHED GRADE BACKFILL SHALL BE COMPACTED TO 95% OF AASHTO T-180 UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
13. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE LOCATION OF ANY GUARDRAIL POSTS BEHIND THE REINFORCED EARTH PANELS. PRIOR TO PLACEMENT OF THE TOP LAYER OF REINFORCING STRIPS, INDIVIDUAL STRIPS MAY BE SKEWED UP TO 15° TO AVOID THE POST LOCATIONS IF AUTHORIZED BY THE ENGINEER. ANY DAMAGE DONE TO THE REINFORCING STRIPS DUE TO THE INSTALLATION OF THE GUARDRAIL SHALL BE REPAIRED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE.
14. IF EXISTING OR FUTURE STRUCTURES, PIPES, FOUNDATIONS OR GUARDRAIL POSTS WHICH ARE WITHIN THE REINFORCED EARTH VOLUME INTERFERE WITH THE NORMAL PLACEMENT OF REINFORCING STRIPS AND SPECIFIC DIRECTION HAS NOT BEEN PROVIDED ON THE PLANS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER TO DETERMINE WHAT COURSE OF ACTION SHOULD BE TAKEN.
15. TOP PANELS BENEATH COPING SHALL HAVE #13 BARS PROTRUDING FROM THEIR TOP EDGE.
16. FOR OTHER INFORMATION PERTAINING TO WALL CONSTRUCTION PLEASE REFER TO THE REINFORCED EARTH CONSTRUCTION MANUAL.
17. THE CONTRACTOR IS RESPONSIBLE FOR GRADUALLY DEFLECTING UPPER REINFORCING STRIPS DOWNWARD TO AVOID CONFLICTS WITH PAVING AND SUBGRADE PREPARATION. THE CONTRACTOR'S ATTENTION IS DIRECTED ESPECIALLY TO SITUATIONS WHERE ROADWAY SUPERELEVATION AND/OR SOIL MIXING ARE ANTICIPATED.
18. NOMINAL STRIP LENGTHS  
THE REINFORCING STRIP LENGTHS SHOWN ON THE PLANS, MEASURED FROM BACK FACE OF PANEL, ARE THE NOMINAL LENGTHS REQUIRED BY CALCULATION. THE ACTUAL FABRICATED STRIP LENGTHS ARE OFTEN LONGER (UP TO 150mm) DUE TO MANUFACTURING TOLERANCES. THE REQUIRED HORIZONTAL LIMIT OF GRANULAR BACKFILL IS EQUAL TO THE NOMINAL STRIP LENGTH. ADDITIONAL GRANULAR BACKFILL BEYOND THE NOMINAL STRIP LENGTH IS NOT REQUIRED BY CALCULATION.
19. PANEL FINISH  
THE PRECAST PANELS FOR THIS PROJECT SHALL HAVE A PLAIN FINISH UNLESS OTHERWISE SPECIFIED ON THE RETAINING WALL CONTROL PLANS.

### 20. NOTE TO CONTRACTORS

ONLY THE FOLLOWING MATERIALS ARE SUPPLIED BY THE REINFORCED EARTH COMPANY:

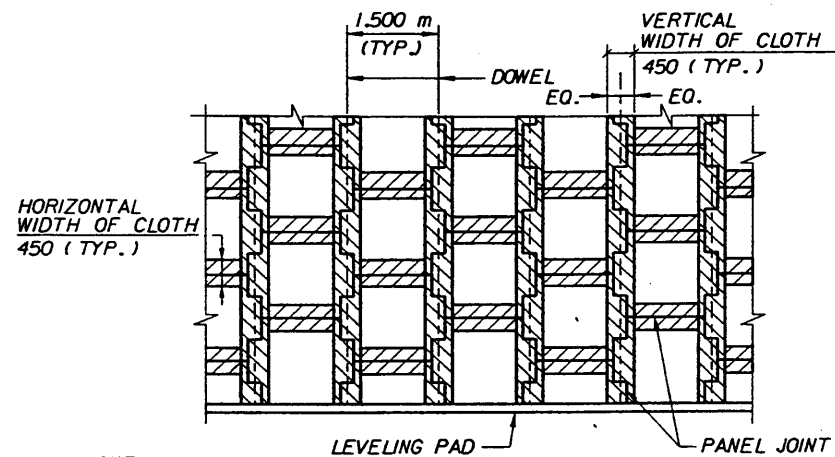
- PRECAST CONCRETE FACING PANELS
- REINFORCING STRIPS
- BOLT SETS (FOR ATTACHING PANELS TO THE REINFORCING STRIPS)
- BEARING BLOCKS
- RUBBER SHIMS
- FILTER CLOTH AND ADHESIVE (FOR PANEL JOINTS ONLY)

ANY OTHER MATERIALS CALLED FOR IN THE CONTRACT PLANS OR SPECIFICATIONS ARE TO BE SUPPLIED BY THE CONTRACTOR. ANY JOINT MATERIALS SHOWN AT THE INTERFACE OF PRECAST PANELS AND CAST-IN-PLACE CONCRETE STRUCTURES ARE TO BE SUPPLIED BY THE ERECTION CONTRACTOR. ALL SANDBLASTING, PAINTING, SEALERS OR OTHER SPECIAL APPLIED COATINGS ARE ALSO SUPPLIED/INSTALLED BY THE CONTRACTOR IN THE FIELD FOLLOWING PANEL ERECTION.

21. THE REINFORCED EARTH COMPANY SUPPLIES PRECAST CONCRETE FACING PANELS AND ACCESSORIES TO BE USED IN CONJUNCTION WITH OTHER MATERIALS IN THE CONSTRUCTION OF THE REINFORCED EARTH RETAINING WALLS DETAILED HEREIN. THE CONSTRUCTION AND QUALITY CONTROL PROCEDURES MANUAL FURNISHED BY THE REINFORCED EARTH COMPANY IS INTENDED TO PROVIDE A GENERAL EXPLANATION OF THE SYSTEM. IT IS THE CONTRACTOR'S OBLIGATION TO DEVISE AND EXECUTE A PROJECT SPECIFIC ERECTION SEQUENCE, PANEL UNLOADING, HANDLING AND BRACING SYSTEM, AND FALL PROTECTION SYSTEM. THE BRACING SYSTEM SHOWN IN THE CONSTRUCTION AND QUALITY CONTROL PROCEDURES MANUAL IS GENERAL IN NATURE AND DOES NOT ACCOUNT FOR PROJECT SPECIFIC CRITERIA. COMPLIANCE WITH THE GUIDELINES IN THIS MANUAL DOES NOT RELIEVE THE CONTRACTOR OF ITS RESPONSIBILITY TO ADHERE TO THE PROJECT PLANS, SPECIFICATIONS AND CONTRACT DOCUMENTS OR COMPLIANCE WITH ALL FALL PROTECTION, SAFETY, LAWS, STANDARDS AND PROCEDURES AT THE JOBSITE. CONTRACTORS SHOULD TAKE SPECIAL PRECAUTIONS TO PREVENT THE PANELS FROM SHIFTING OR FALLING DURING THE ERECTION PROCESS.
22. THE DESIGN CONTAINED ON THESE DRAWINGS IS BASED ON INFORMATION PROVIDED BY THE OWNER. ON THE BASIS OF THIS INFORMATION, THE REINFORCED EARTH COMPANY IS RESPONSIBLE FOR INTERNAL STABILITY OF THE STRUCTURE ONLY. EXTERNAL STABILITY DESIGN INCLUDING FOUNDATION AND SLOPE STABILITY IS THE RESPONSIBILITY OF OTHERS.
23. THESE DRAWINGS ARE CERTIFIED WITH RESPECT TO THE INTERNAL STABILITY OF REINFORCED EARTH STRUCTURES ONLY
24. THIS DRAWING CONTAINS INFORMATION PROPRIETARY TO THE REINFORCED EARTH COMPANY, AND IS BEING FURNISHED FOR THE USE IN CONNECTION WITH FDOT PROJECTS ONLY, AND THE INFORMATION CONTAINED HEREIN IS NOT TO BE TRANSMITTED TO ANY OTHER ORGANIZATION UNLESS SPECIFICALLY AUTHORIZED IN WRITING BY THE REINFORCED EARTH COMPANY. THE REINFORCED EARTH COMPANY IS EXCLUSIVE LICENSEE IN THE UNITED STATES UNDER PATENTS ISSUED TO HENRY VIDAL, AND THE FURNISHING OF THIS DRAWING DOES NOT CONSTITUTE AN EXPRESSED OR IMPLIED LICENSE UNDER THE VIDAL PATENTS.

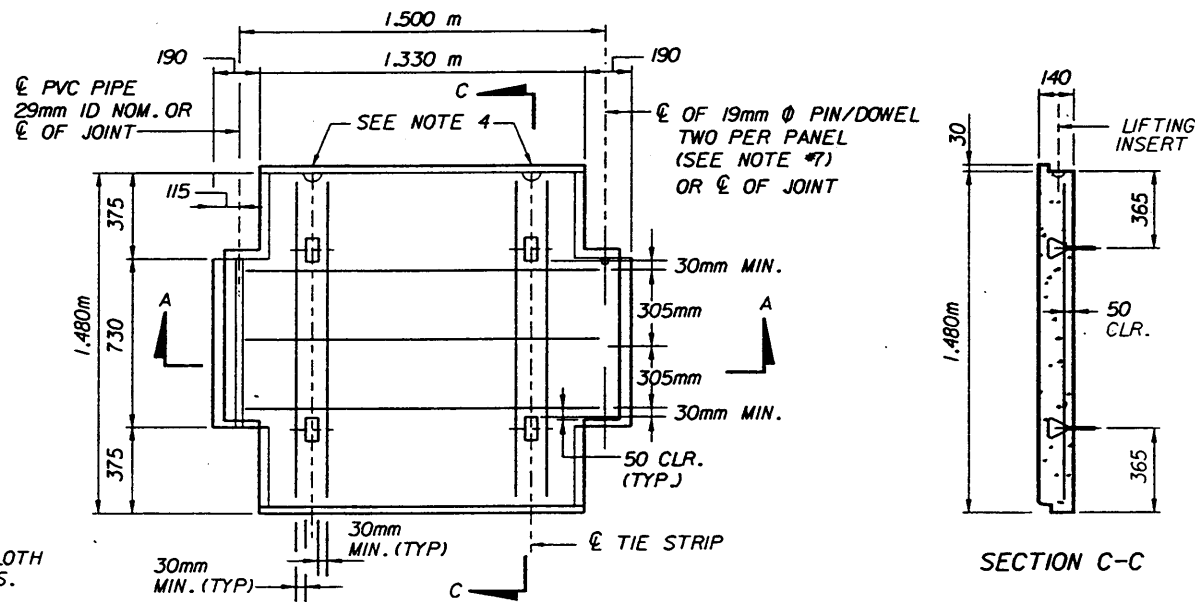
THIS SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY  
CRUCIFORM AND SQUARE PANELS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM REINFORCED EARTH COMPANY REINFORCED EARTH WALL				
Designed By	DM	Date	1-99	Approved By <i>Walter J. [Signature]</i> State Structures Design Engineer
Drawn By	DM	Revision	1-99	Sheet No. / Index No.
Checked By	AA	1-99	00	1 of 14 / 5015

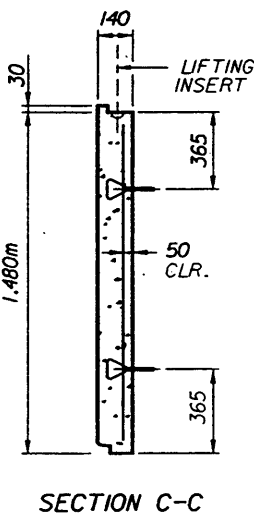


**NOTE:**  
STRIPS OF FILTER CLOTH SHALL BE PLACED ON BACK FACE OF PANEL, OVER PANEL JOINTS. FILTER CLOTH SHALL BE ADHERED TO BACK FACE OF PANELS USING AN ADHESIVE COMPOUND SUPPLIED BY THE REINFORCED EARTH COMPANY. ADHESIVE SHALL BE APPLIED TO PANEL THEN FILTER CLOTH (CARTHAGE MILLS TYPE FX-40HS OR EQUAL) SHALL BE APPLIED TO PANELS.

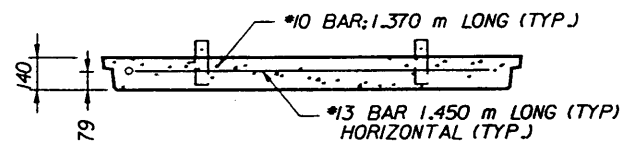
**FILTER CLOTH DETAIL  
PARTIAL ELEVATION - BACK FACE**



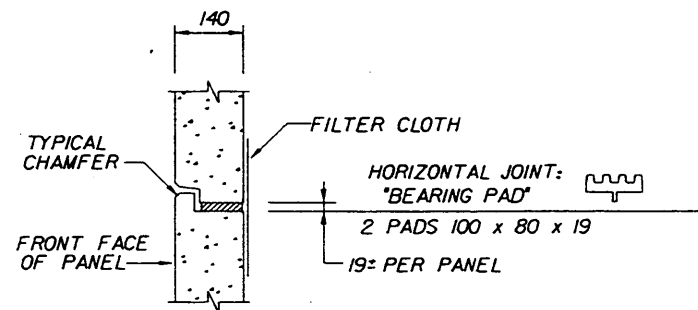
**PANEL TYPE "A"  
WITH R4 REINFORCEMENT  
FRONT VIEW**



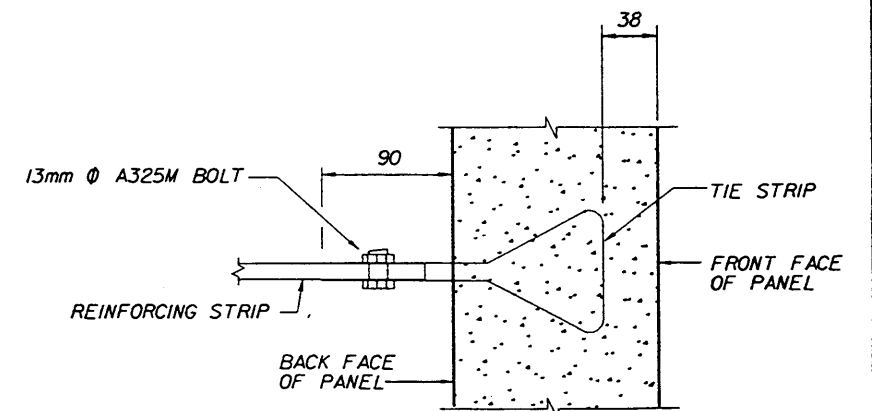
**SECTION C-C**



**SECTION A-A**



**SECTION I-I**



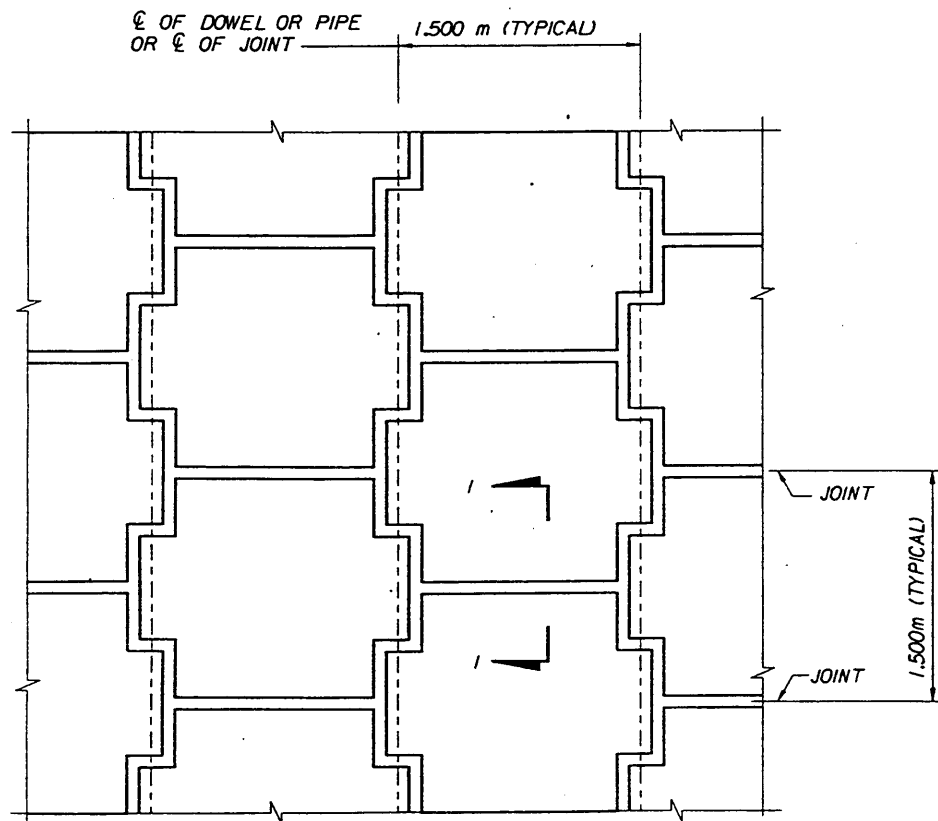
**CONNECTION DETAIL**

PANEL THICKNESS	REINFORCEMENT DESIGNATION	* PANEL REINFORCEMENT (mm <sup>2</sup> )	MAXIMUM ALLOWABLE HORIZONTAL STRESS AT FACING (KPA)
	R4	285 VERTICAL 375 HORIZONTAL	57
140	R6	425 VERTICAL 505 HORIZONTAL	70
	R7	760 VERTICAL 1140 HORIZONTAL	124

\* TOTAL AREA OF STEEL REQUIRED PER "TYPE A" PANEL.

**NOTES :**

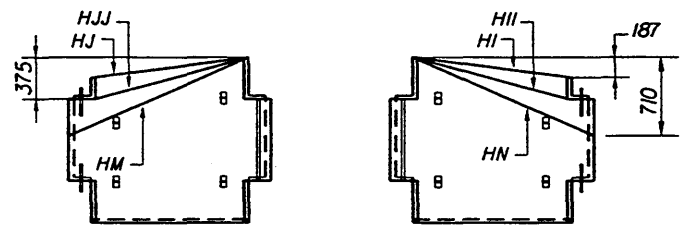
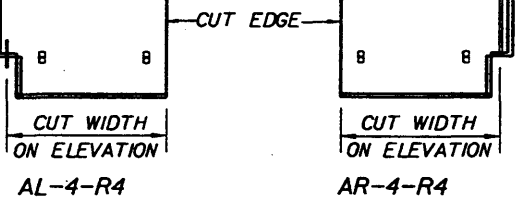
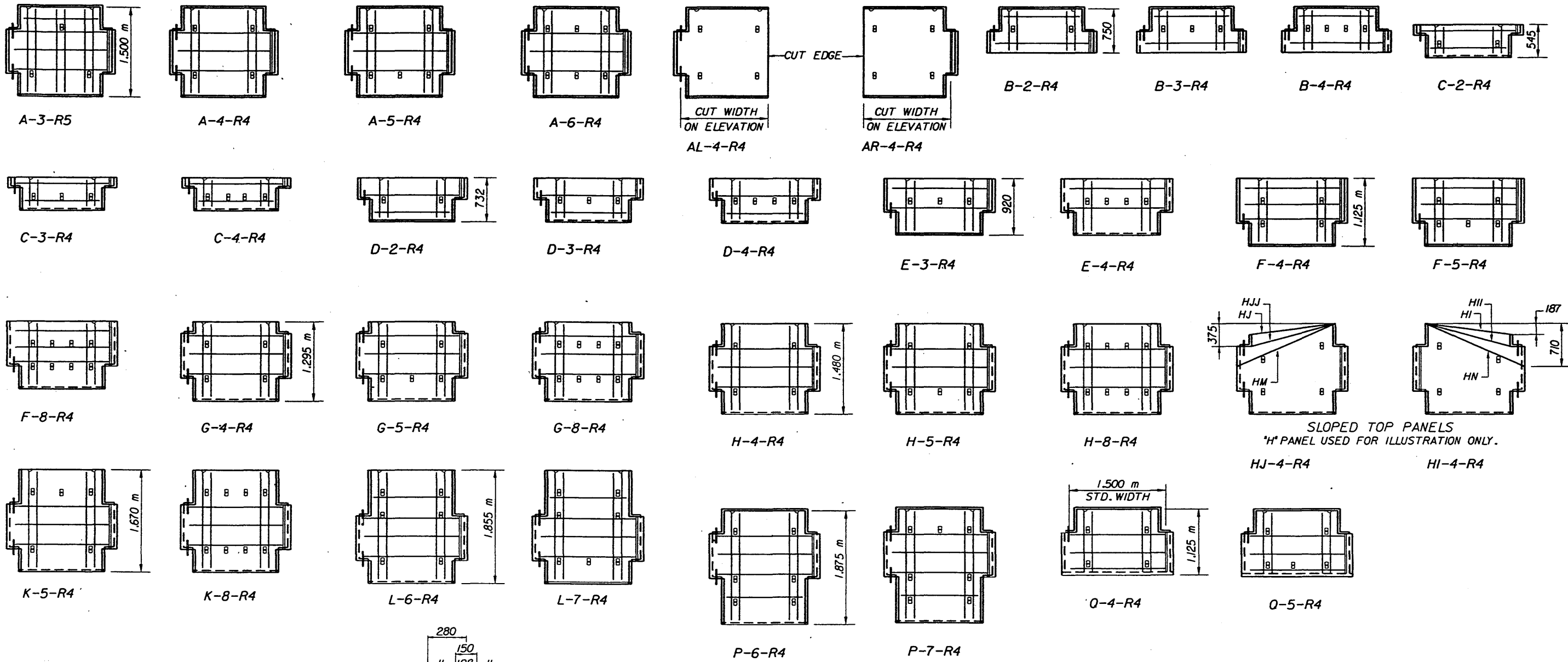
1. REINFORCING STEEL TO BE A615M-96 GRADE 420M.
2. 10 x 10 CHAMFER SHALL BE PROVIDED ON ALL EXPOSED EDGES (FRONT FACE ONLY).
3. ALL PANEL TYPES AND OTHER RELATED ELEMENTS WILL BE DETAILED ON SHOP DRAWINGS.
4. ALL PANELS SHALL HAVE TWO LIFTING INSERTS OF 9KN CAPACITY EACH.
5. PANEL DESIGN THICKNESS IS 140MM. THICKNESS OF CONCRETE MUST INCREASE TO ACCOMMODATE ANY ARCHITECTURAL SURFACE FINISH THAT MAY BE SPECIFIED.
6. ACTUAL PANEL REINFORCEMENT FOR ALL PANEL TYPES ON THIS PROJECT IS DESIGNATED ABOVE. R4 ILLUSTRATED FOR INFORMATION ONLY.
7. EACH 19MM Ø DOWEL SHALL HAVE A TYP. LENGTH OF 250. DOWELS MAY BE GALVANIZED STEEL OR PVC ROD. A SINGLE FULL LENGTH DOWEL MAY BE USED AT THE DISCRETION OF THE MANUFACTURER.



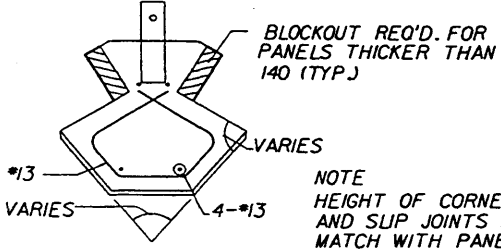
**TYPICAL PANEL LAYOUT  
PARTIAL ELEVATION - FRONT FACE**

THIS SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY  
CRUCIFORM PANELS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM REINFORCED EARTH COMPANY REINFORCED EARTH WALL</b>				
Designed By	DM	1-77	Approved By	<i>William J. [Signature]</i>
Drawn By	DM	1-77	Revision	Sheet No. Index No.
Checked By	AA	1-77	00	2 of 14 5015



SLOPED TOP PANELS  
\*H\* PANEL USED FOR ILLUSTRATION ONLY.

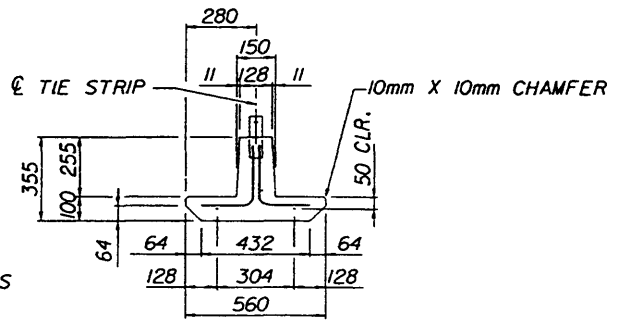


CORNER ELEMENT  
SIZE VARIES WITH ANGLES

BLOCKOUT REQ'D. FOR  
PANELS THICKER THAN  
140 (TYP.)

VARIES

NOTE  
HEIGHT OF CORNER ELEMENTS  
AND SLIP JOINTS SHOULD  
MATCH WITH PANEL HEIGHT.



SLIP JOINT

ALL PANELS ARE SHOWN BACK FACE VIEW

- B TIE STRIP LOCATION
- R4 VERTICAL BARS ARE #10 AS SHOWN  
R5 HORIZONTAL BARS ARE #13 AS SHOWN
- R6 VERTICAL BARS ARE 6-#10  
R7 HORIZONTAL BARS ARE 4-#13
- R7 VERTICAL BARS ARE 6-#13  
R8 HORIZONTAL BARS ARE 4-#19

\* INCLUDES HORIZONTAL JOINT  
MATERIAL BETWEEN PANELS.

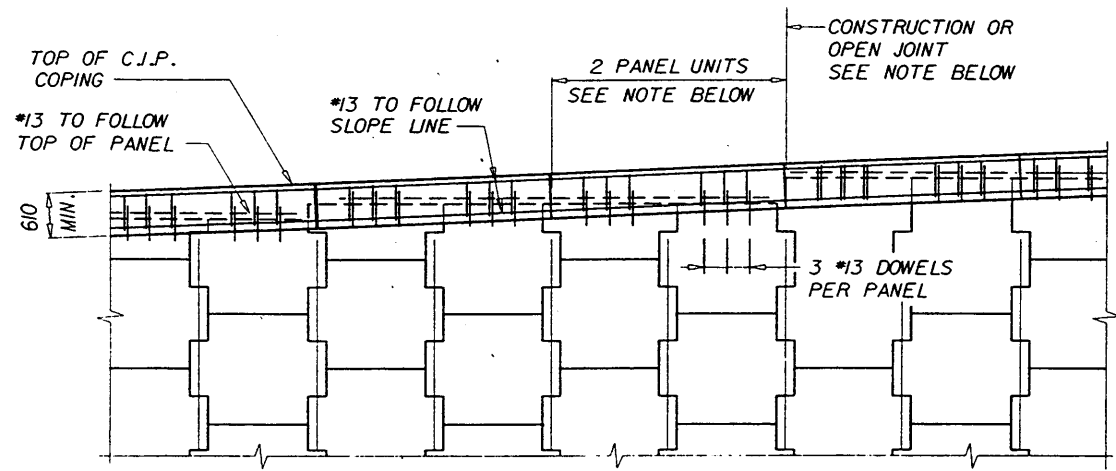
SEE PANEL TYPE \*A\* WITH R4 REINFORCEMENT  
ON SHEET TITLED \*PANEL DETAILS\* FOR TYPICAL  
REINFORCEMENT SPACING

THIS SYSTEM SHALL BE USED IN SLIGHTLY OR  
MODERATELY AGGRESSIVE ENVIRONMENTS ONLY

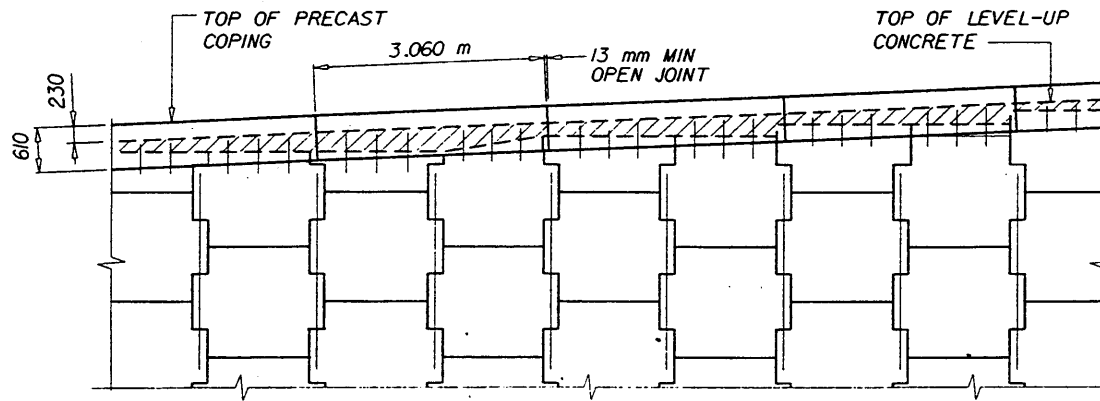
CRUCIFORM PANELS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM REINFORCED EARTH COMPANY REINFORCED EARTH WALL</b>				
Designed By	DM	1-77	Approved By	<i>William J. ...</i> State Structures Design Engineer
Drawn By	DM	1-79	Revision	Sheet No.
Checked By	RA	1-79	00	3 of 14
				Index No. 5015

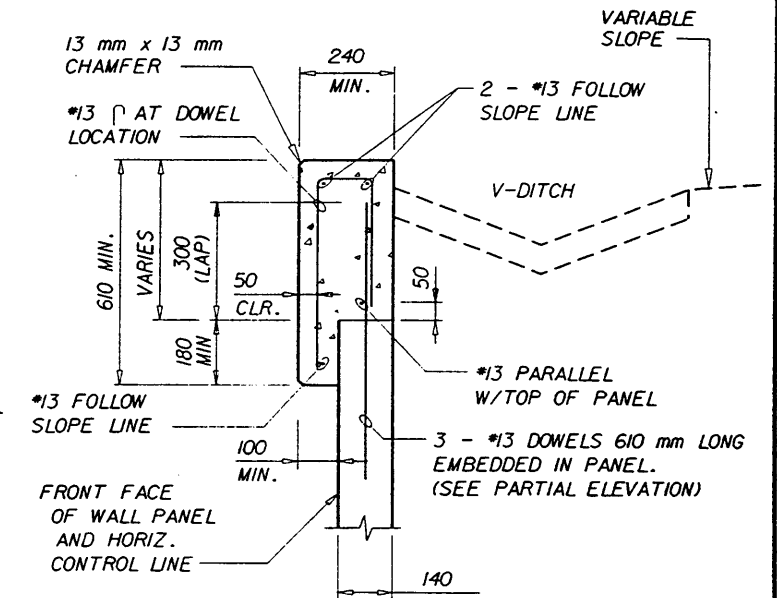




C.I.P. COPING - PARTIAL ELEVATION



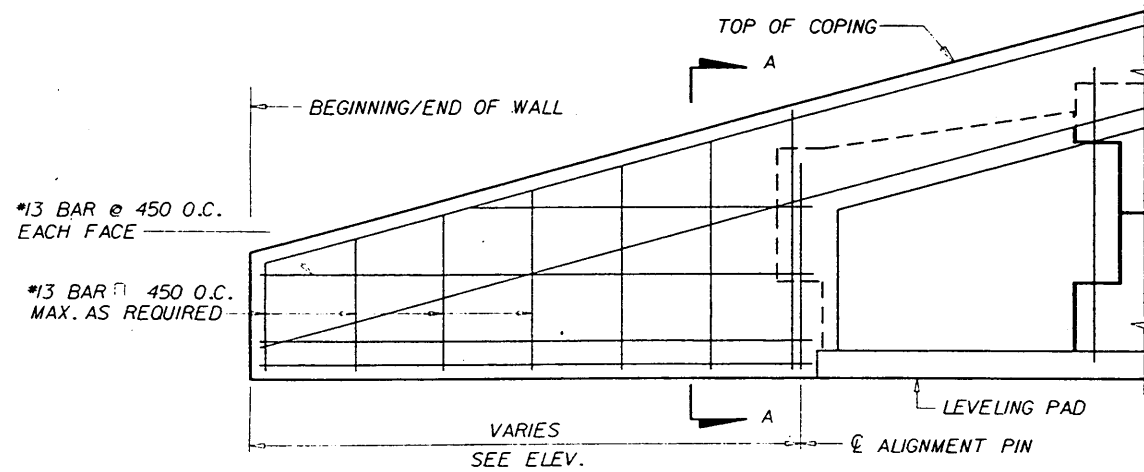
PRECAST COPING - PARTIAL ELEVATION



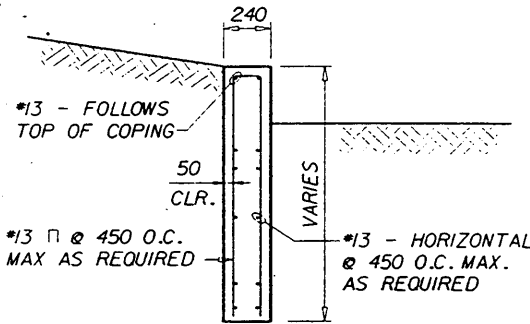
C.I.P. CONC. COPING W/DITCH

NOTE:

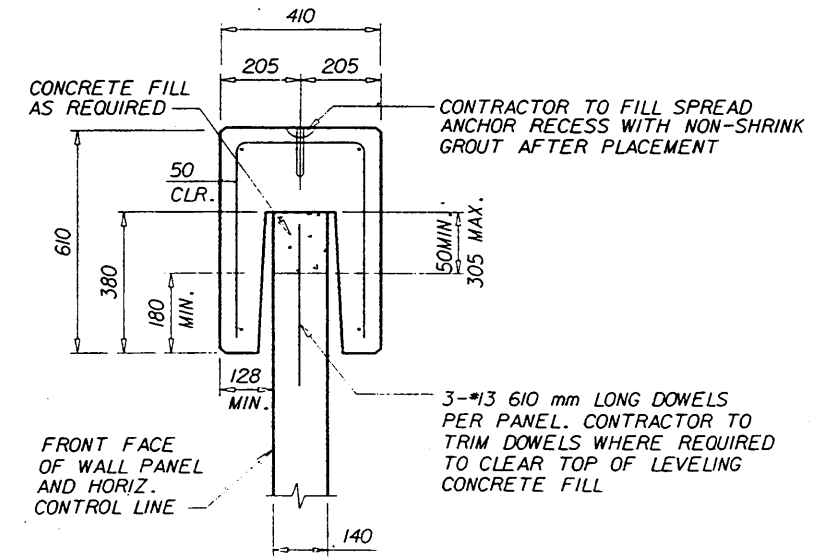
13mm OPEN JOINTS IN COPING SHALL BE AT 6 PANEL INTERVALS AND COINCIDE APPROXIMATELY WITH  $\phi$  OF ALIGNMENT PINS. REINFORCING STEEL SHALL BE STOPPED 50mm SHORT OF EITHER SIDE OF THE JOINTS. CONSTRUCTION JOINTS IN BETWEEN THE OPEN JOINTS SHALL BE PROVIDED AT 2 PANELS INTERVALS.



COPING ENCLOSURE DETAIL



SECTION A-A



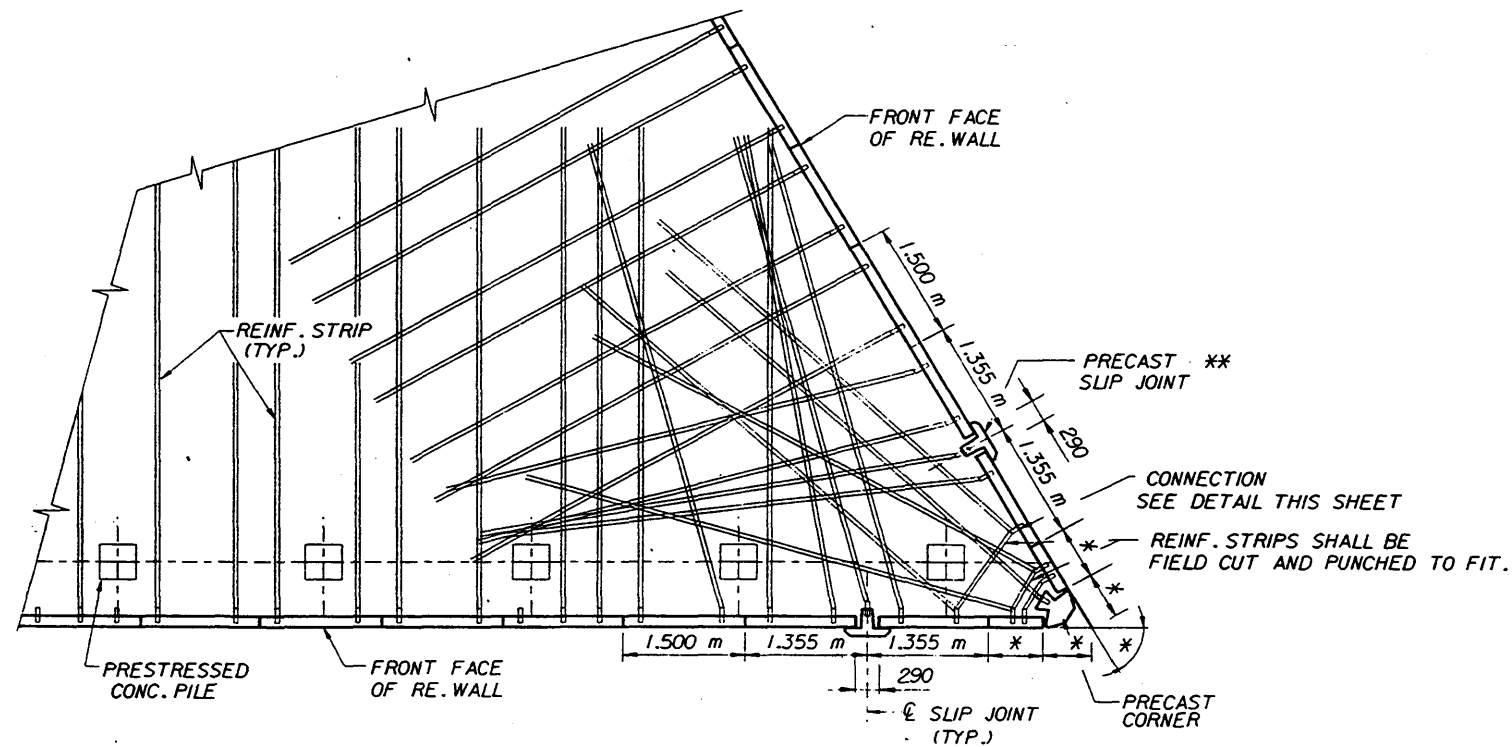
PRECAST COPING SECTION

NOTE:

STANDARD COPING UNIT IS 3048 mm LONG WITH SQUARE ENDS.

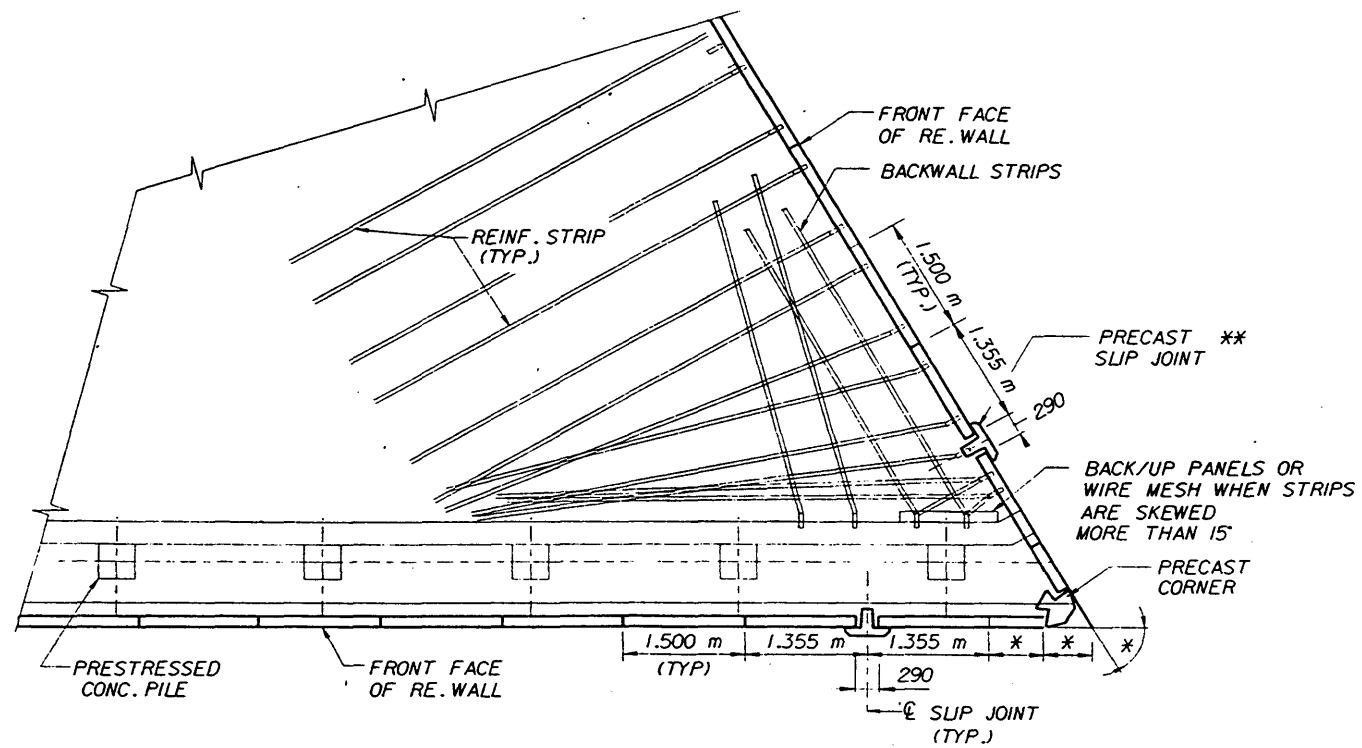
THIS SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY  
CRUCIFORM AND SQUARE PANELS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM REINFORCED EARTH COMPANY REINFORCED EARTH WALL				
Designed By	Names	Dates	Approved By	
Drawn By	DM	1-79	[Signature]	
Checked By	AA	1-79	Revision	Index No.
			00	4 of 14
				5015

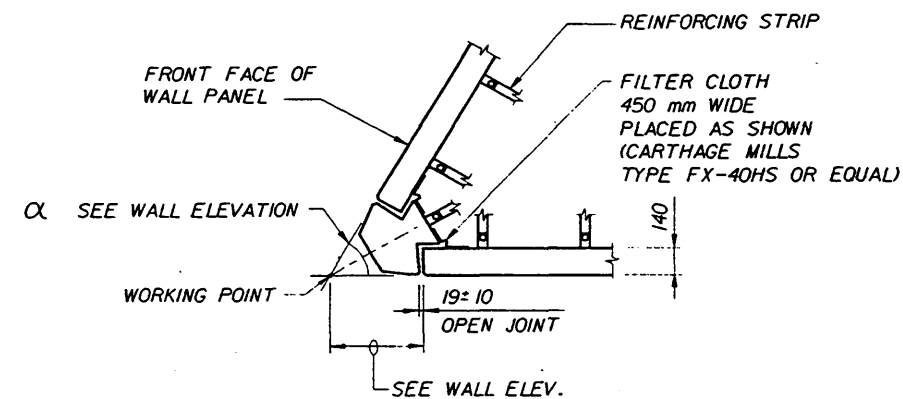


EXAMPLE ACUTE CORNER - SKEWED STRIPS UNDER PILE CAP

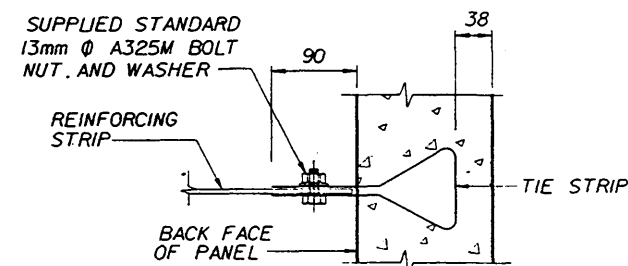
NOTE:  
 \* - DIMENSION OR ANGLE VARIES, SEE WALL ELEVATION  
 \*\* - SLIP JOINTS ARE NOT REQUIRED FOR SQUARE PANELS



EXAMPLE ACUTE CORNER - SKEWED STRIPS AT ABUTMENT LEVEL



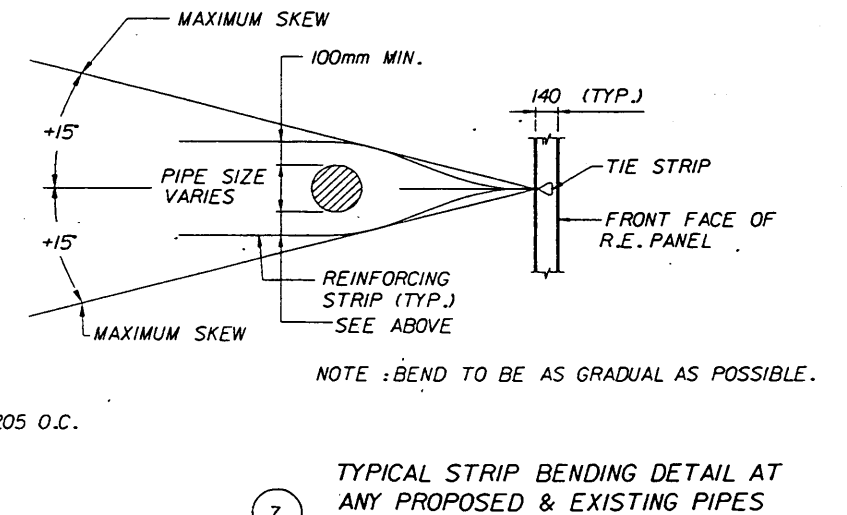
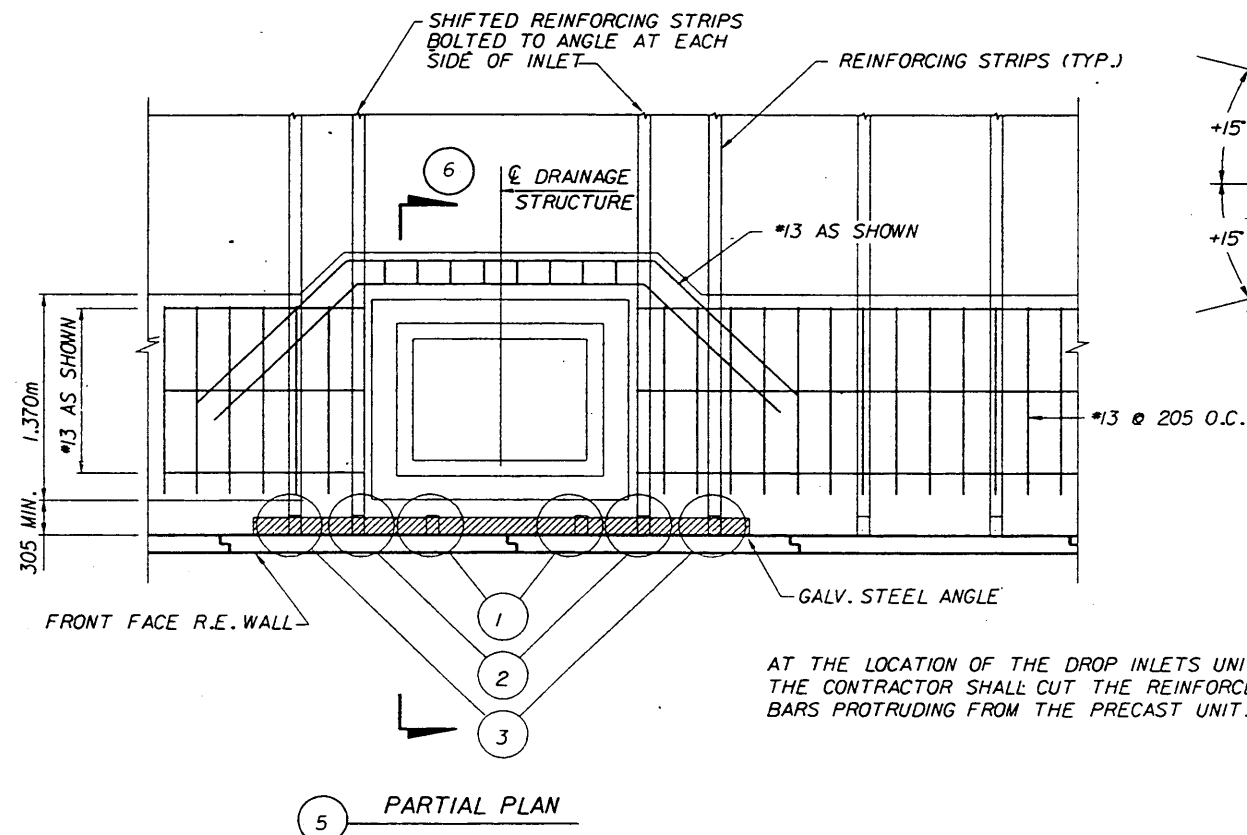
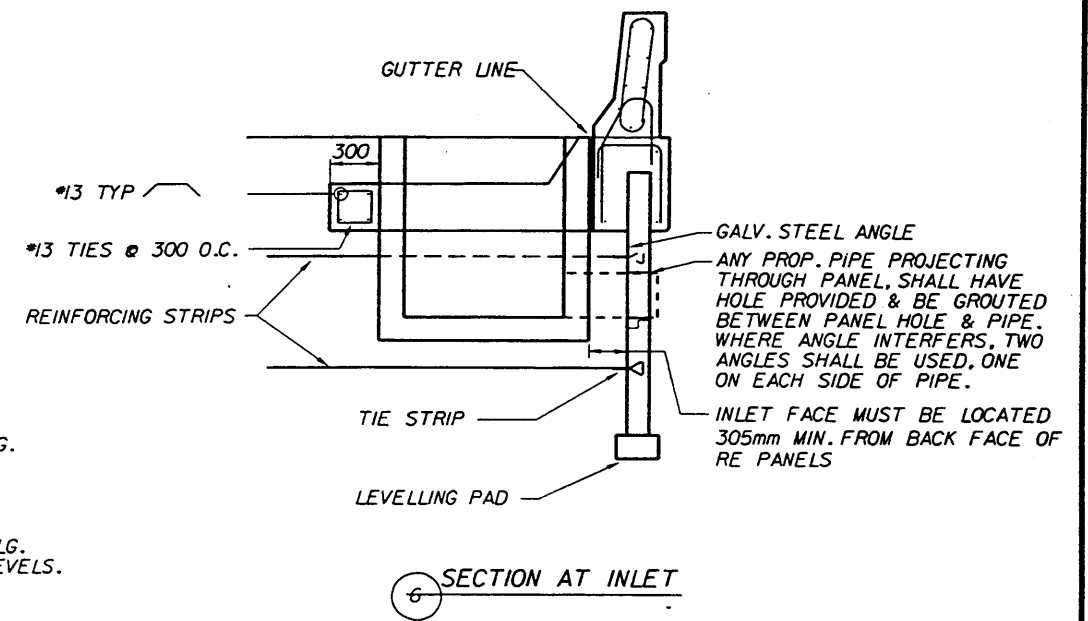
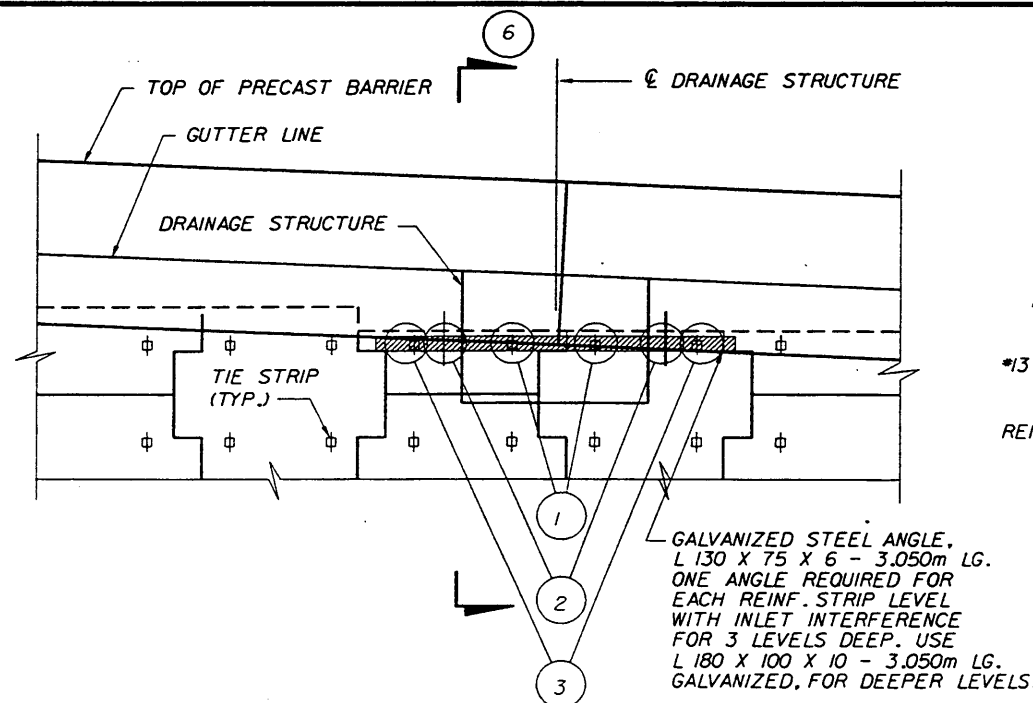
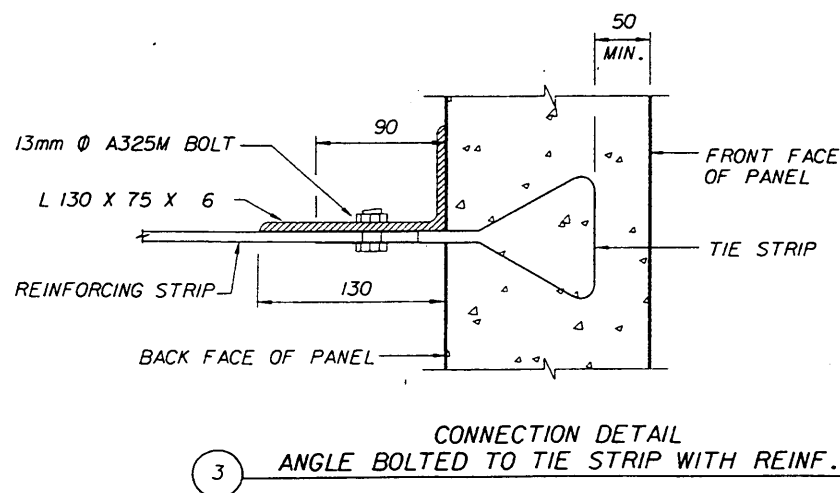
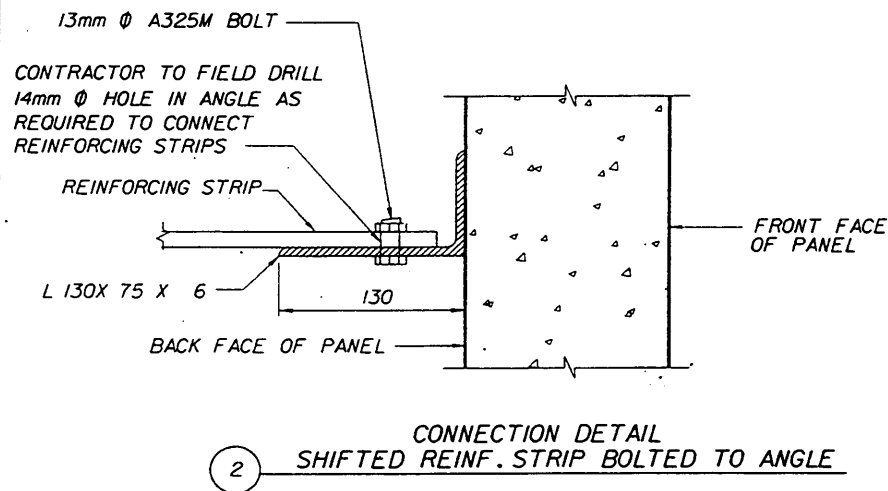
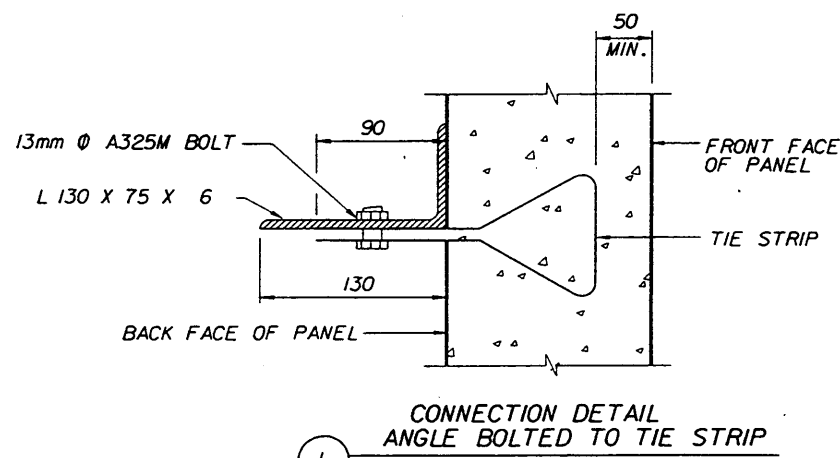
ACUTE CORNER ELEMENT DETAIL



CONNECTION DETAIL

THIS SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY  
 CRUCIFORM AND SQUARE PANELS

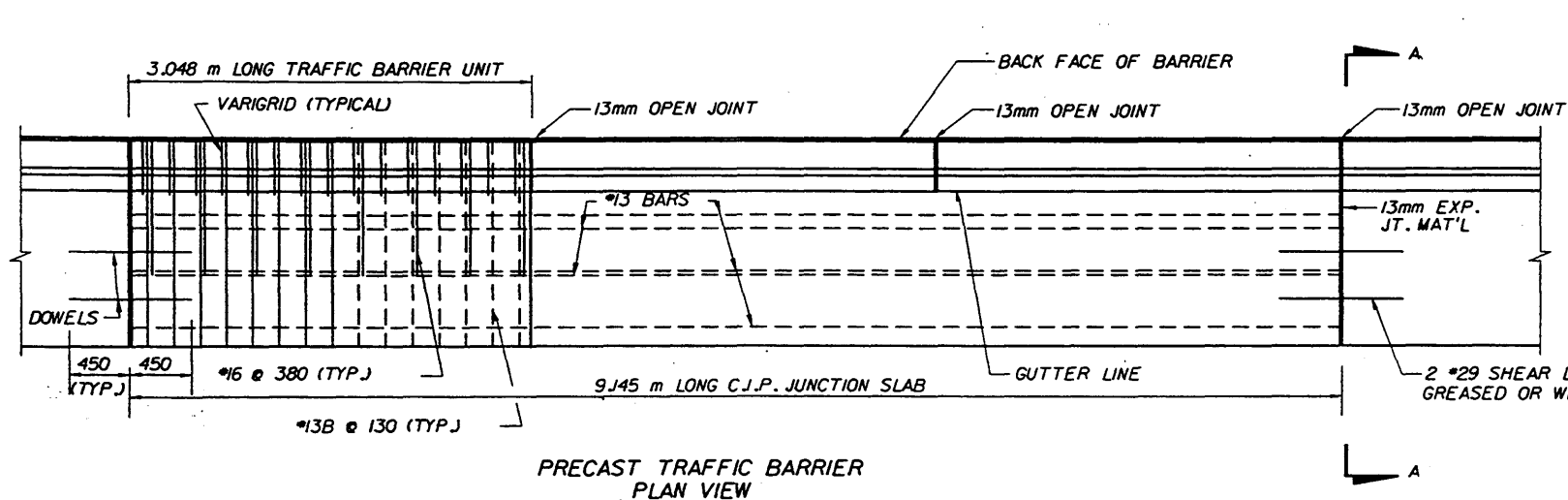
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM REINFORCED EARTH COMPANY REINFORCED EARTH WALL				
Designed By	DM	1-79	Approved By	<i>W. J. [Signature]</i>
Drawn By	DM	1-79	State Structures Design Engineer	
Checked By	AR	1-79	Revision	00
			Sheet No.	5 of 14
			Index No.	5015



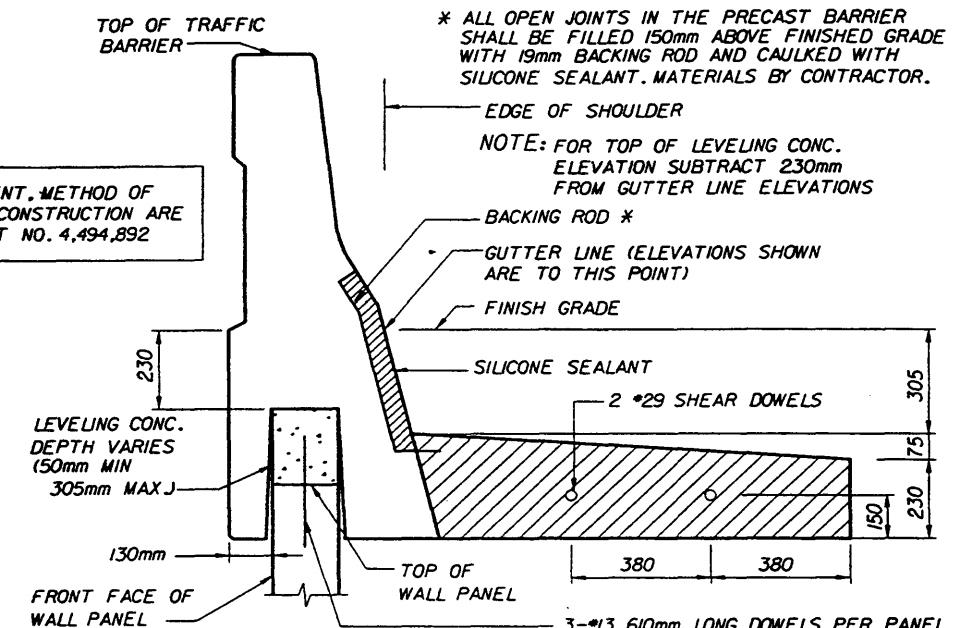
AT THE LOCATION OF THE DROP INLETS UNITS, THE CONTRACTOR SHALL CUT THE REINFORCEMENT BARS PROTRUDING FROM THE PRECAST UNIT.

THIS SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY  
CRUCIFORM AND SQUARE PANELS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM REINFORCED EARTH COMPANY REINFORCED EARTH WALL				
Names	Dates	Approved		
Designed By	DM	1-99	 State Structures Design Engineer	
Drawn By	DM	1-99		
Checked By	AA	1-99		
	Revision	Sheet No.	Index No.	
	00	6 of 14	5015	

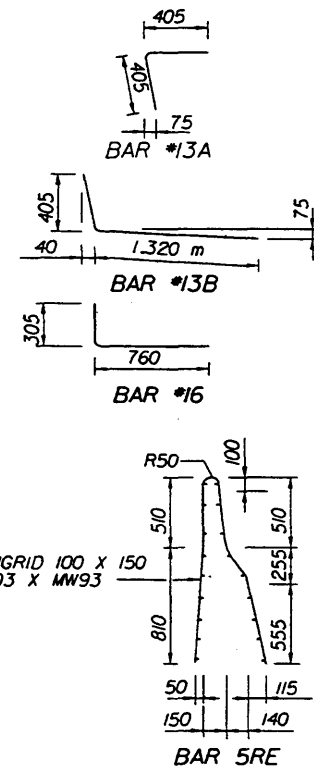
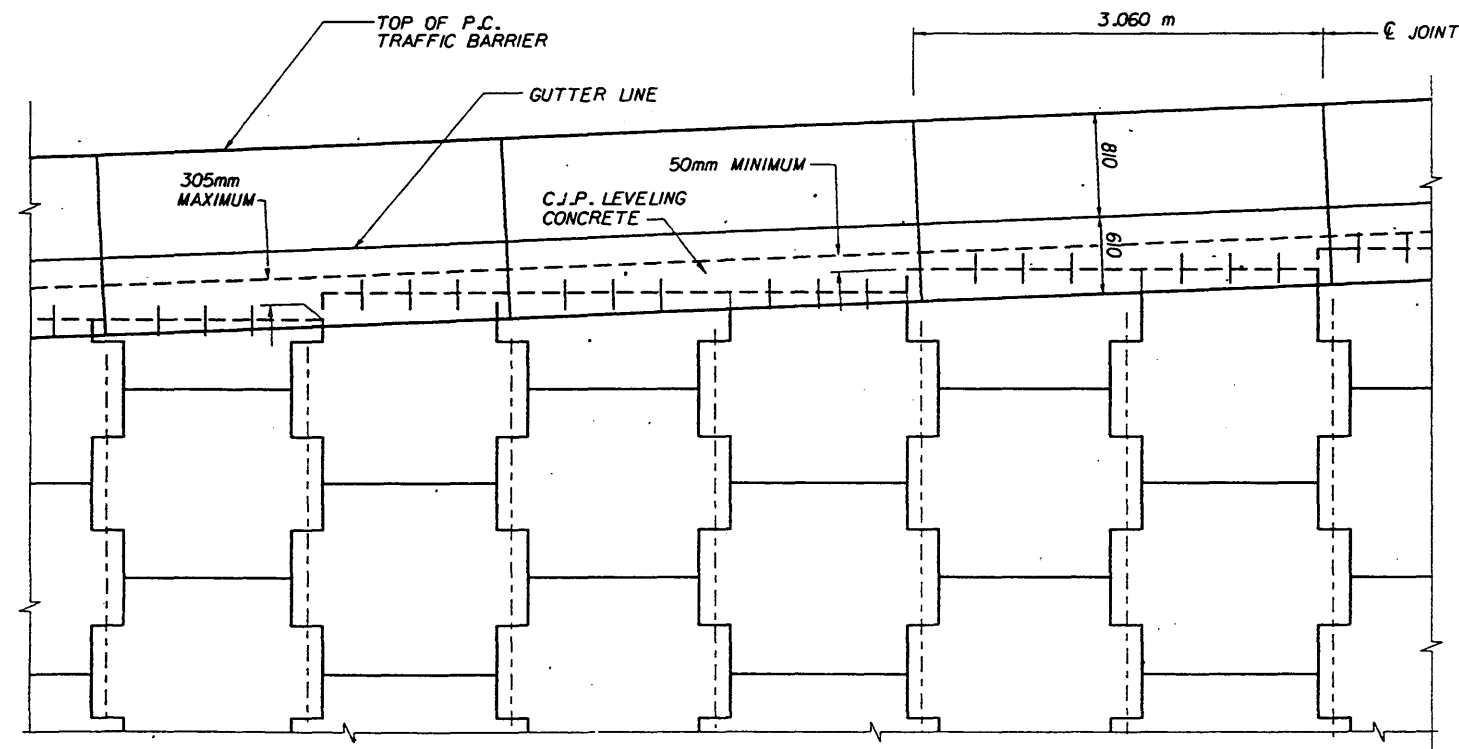


TRAFFIC BARRIER ELEMENT, METHOD OF SUPPORT AND METHOD OF CONSTRUCTION ARE COVERED BY U.S. PATENT NO. 4,494,892

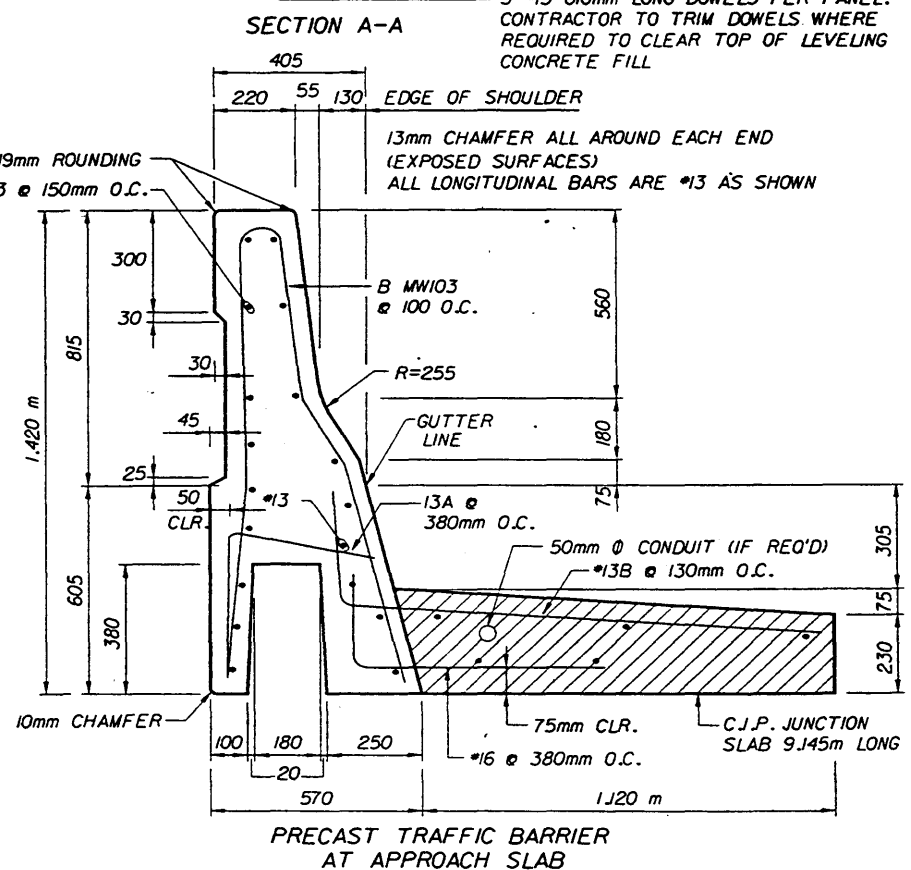


\* ALL OPEN JOINTS IN THE PRECAST BARRIER SHALL BE FILLED 150mm ABOVE FINISHED GRADE WITH 19mm BACKING ROD AND CAULKED WITH SILICONE SEALANT. MATERIALS BY CONTRACTOR.

NOTE: FOR TOP OF LEVELING CONC. ELEVATION SUBTRACT 230mm FROM GUTTER LINE ELEVATIONS



MARK	QUANTITY	REMARKS
#16	8	1.065m LONG
A	VARIGRID	MW93 @ 150 O.C.
B	VARIGRID	MW103 @ 100 O.C.
#13A	8	810 LONG
#13B	24	1.730m LONG



PRECAST TRAFFIC BARRIER AT APPROACH SLAB

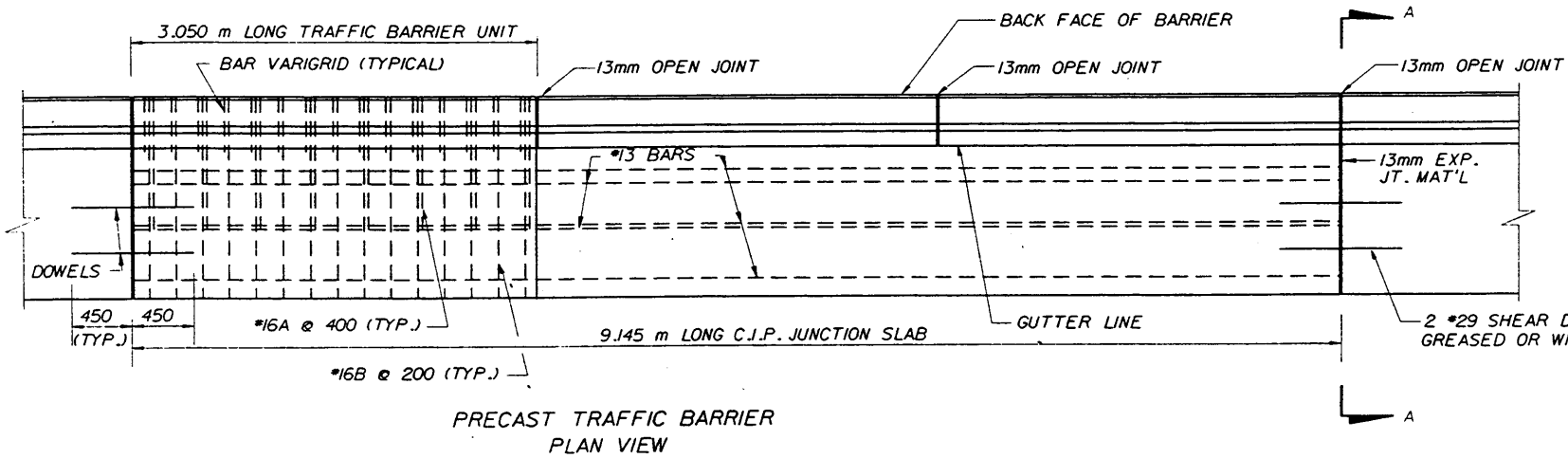
THIS SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY  
CRUCIFORM AND SQUARE PANELS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

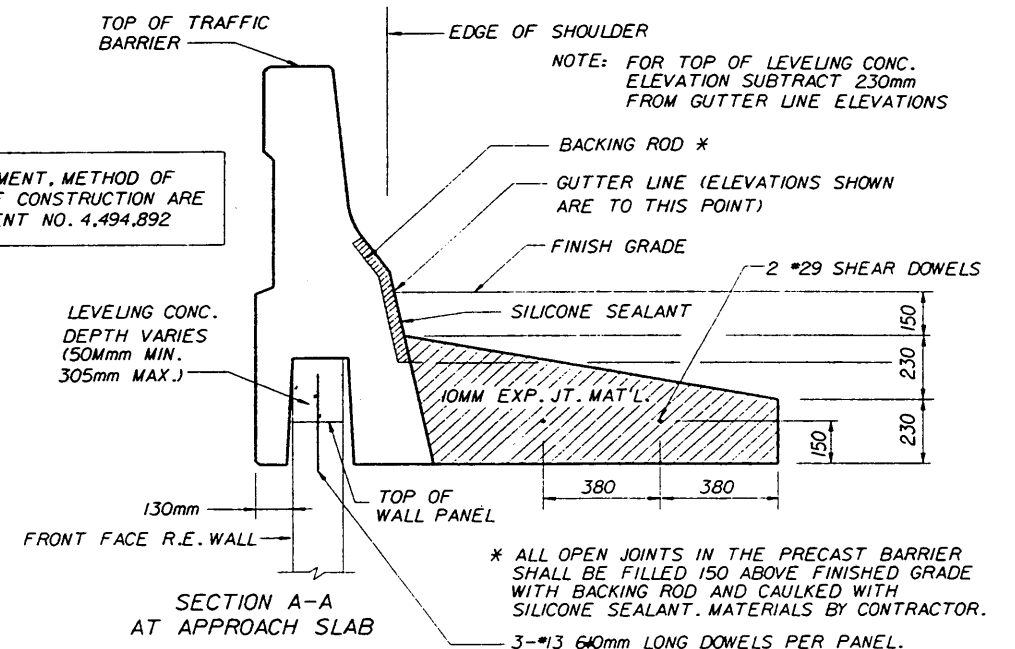
RETAINING WALL SYSTEM  
REINFORCED EARTH COMPANY  
REINFORCED EARTH WALL

Designed By	DM	1-79	Approved By	<i>William J. [Signature]</i>
Drawn By	DM	1-79	Revision	Sheet No.
Checked By	AA	1-79	00	7 of 14

Index No. 5015



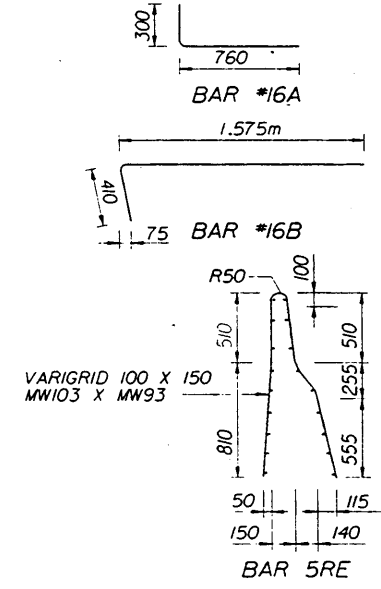
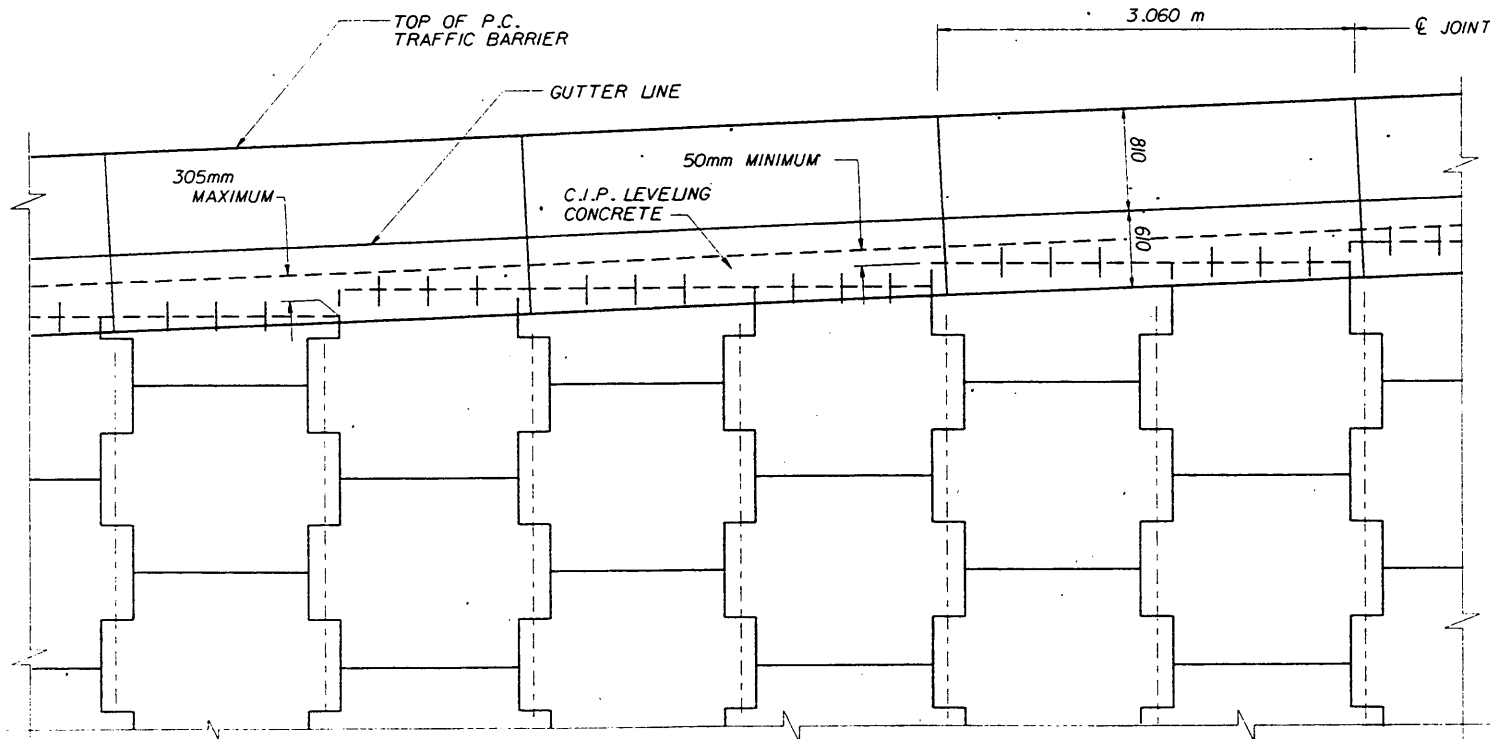
TRAFFIC BARRIER ELEMENT, METHOD OF SUPPORT AND METHOD OF CONSTRUCTION ARE COVERED BY U.S. PATENT NO. 4,494,892



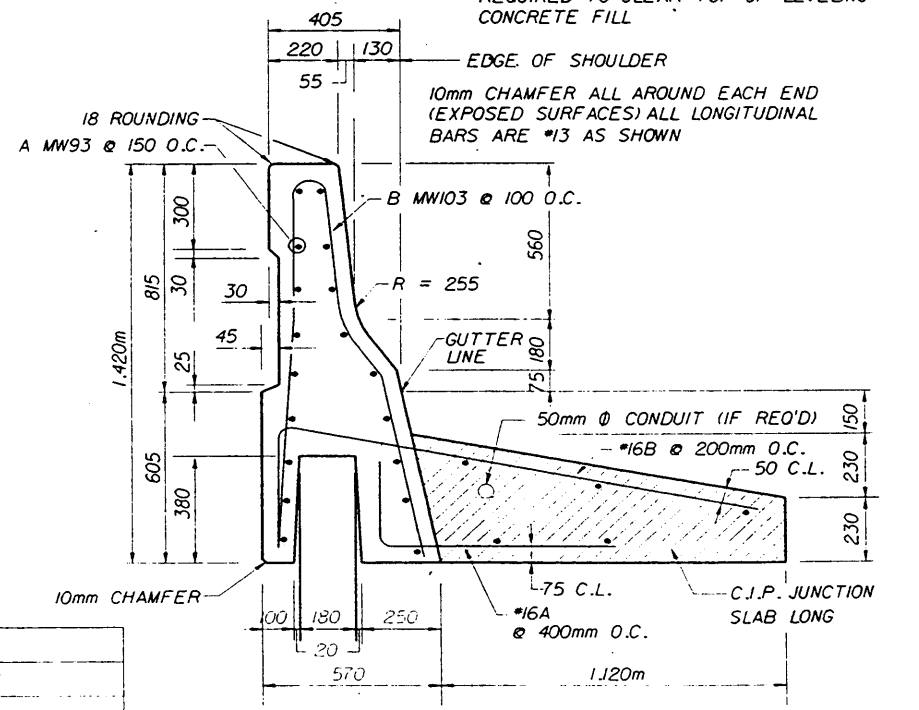
NOTE: FOR TOP OF LEVELING CONC. ELEVATION SUBTRACT 230mm FROM GUTTER LINE ELEVATIONS

\* ALL OPEN JOINTS IN THE PRECAST BARRIER SHALL BE FILLED 150 ABOVE FINISHED GRADE WITH BACKING ROD AND CAULKED WITH SILICONE SEALANT. MATERIALS BY CONTRACTOR.

3-#13 640mm LONG DOWELS PER PANEL. CONTRACTOR TO TRIM DOWELS WHERE REQUIRED TO CLEAR TOP OF LEVELING CONCRETE FILL



MARK	QUANTITY	REMARKS
#16A	8	1.070m LONG
#16B	15	1.995m LONG
A	VARIGRID	MW93 @ 150 O.C.
B	VARIGRID	MW103 @ 100 O.C.



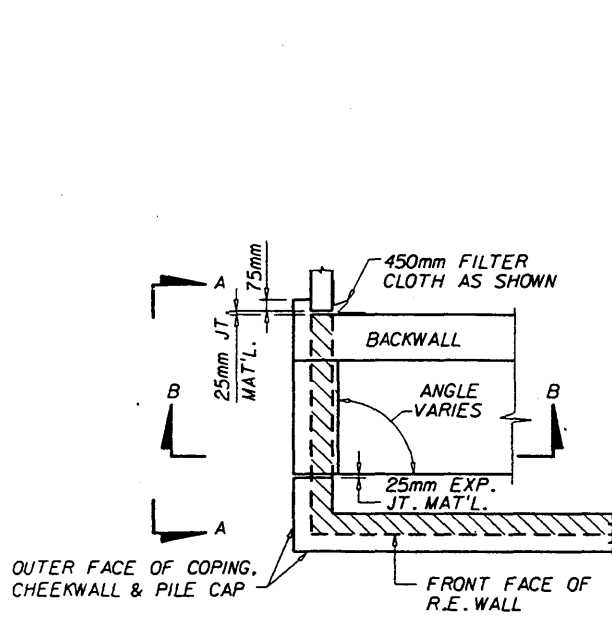
PRECAST TRAFFIC BARRIER OUTSIDE APPROACH SLAB

THIS SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY  
CRUCIFORM AND SQUARE PANELS

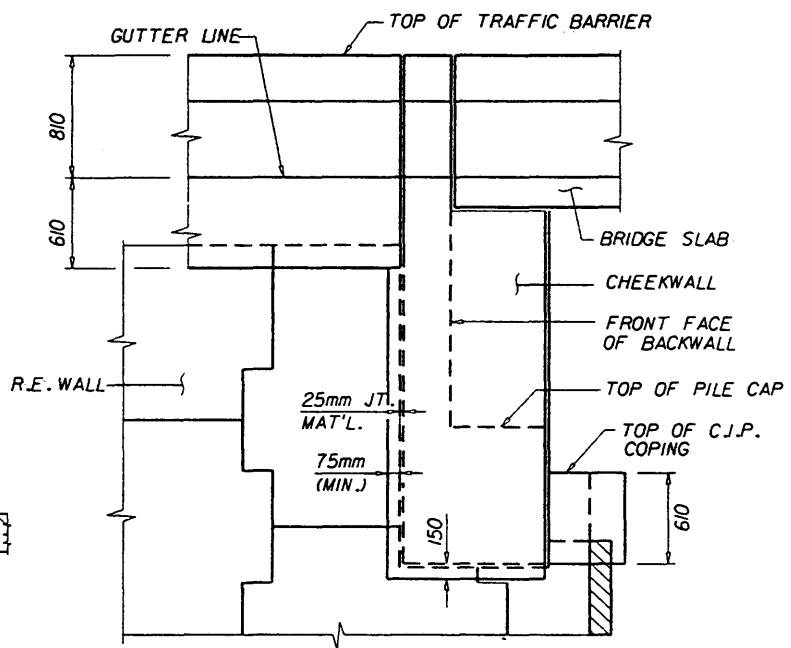
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

RETAINING WALL SYSTEM  
REINFORCED EARTH COMPANY  
REINFORCED EARTH WALL

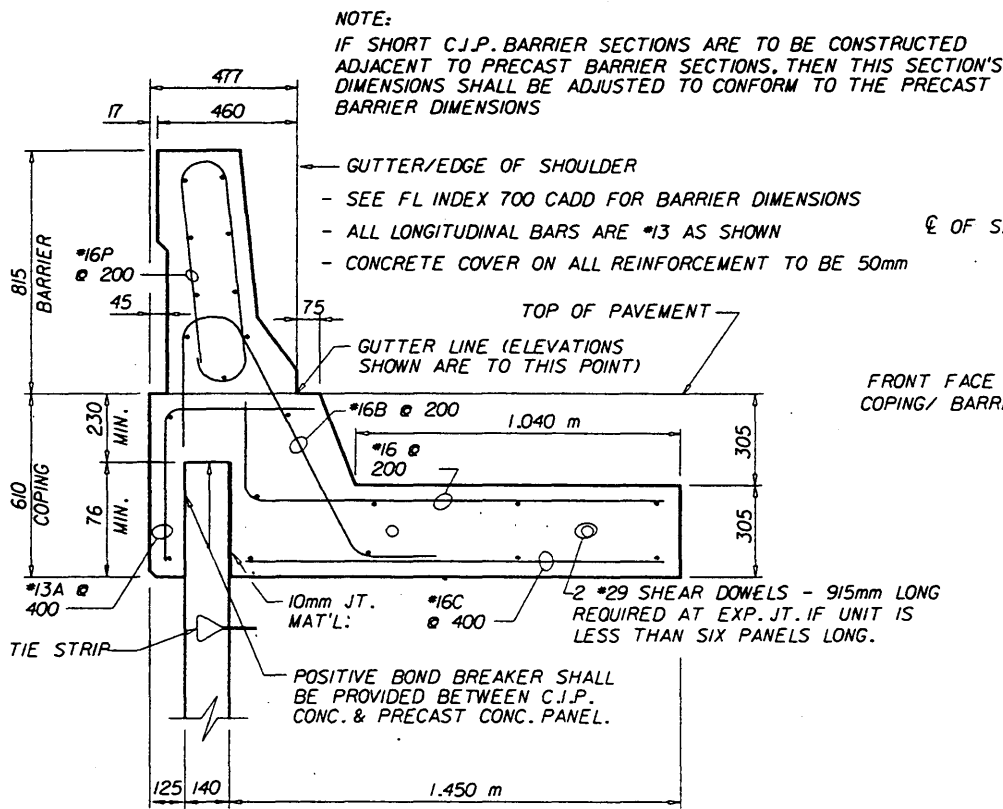
Designed By	DM	1-99	Approved By <i>[Signature]</i> State Structures Design Engineer
Drawn By	DM	1-99	
Checked By	AA	1-99	Revision 00
			Sheet No. 8 of 14
			Index No. 5015



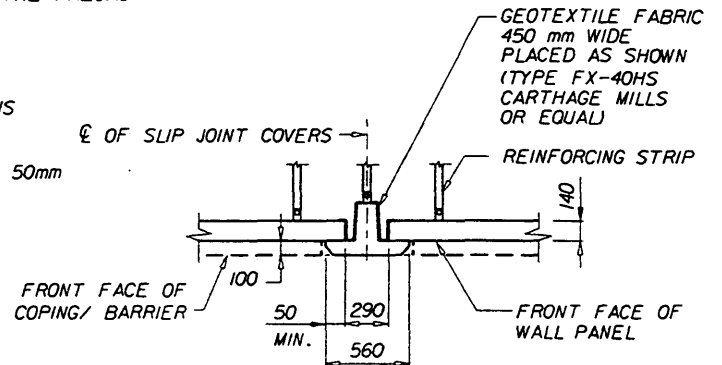
PLAN VIEW @ BEND (TYP.)



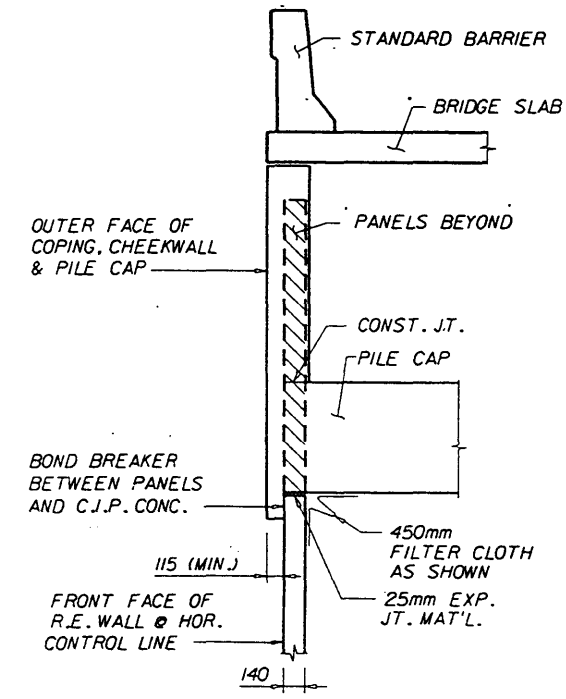
SECTION A-A



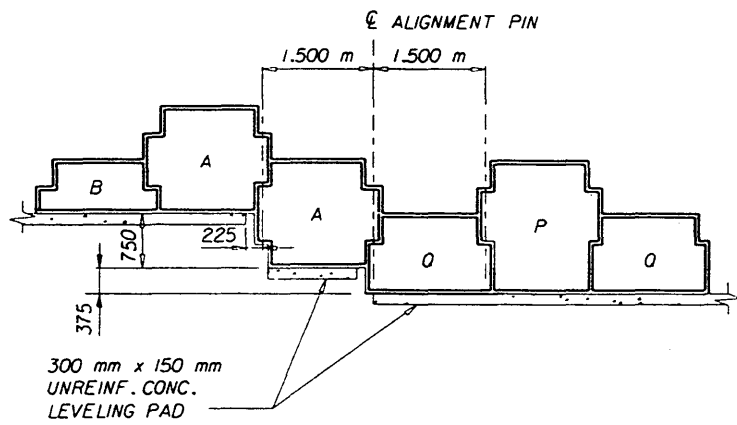
C.J.P. CONC. TRAFFIC BARRIER



SLIP JOINT COVER DETAIL

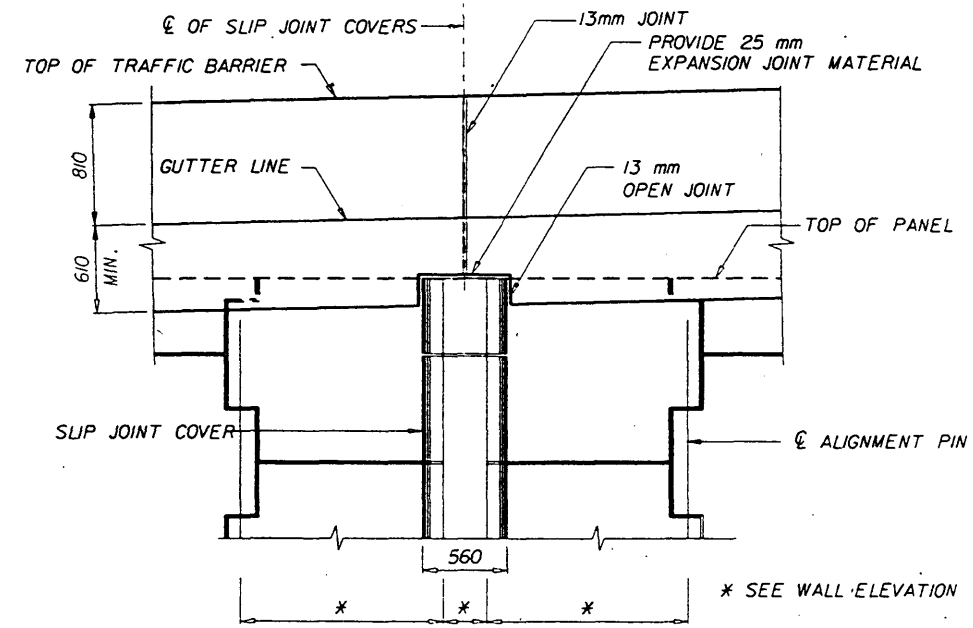


SECTION B-B



TYPICAL LEVELING PAD STEP DETAIL

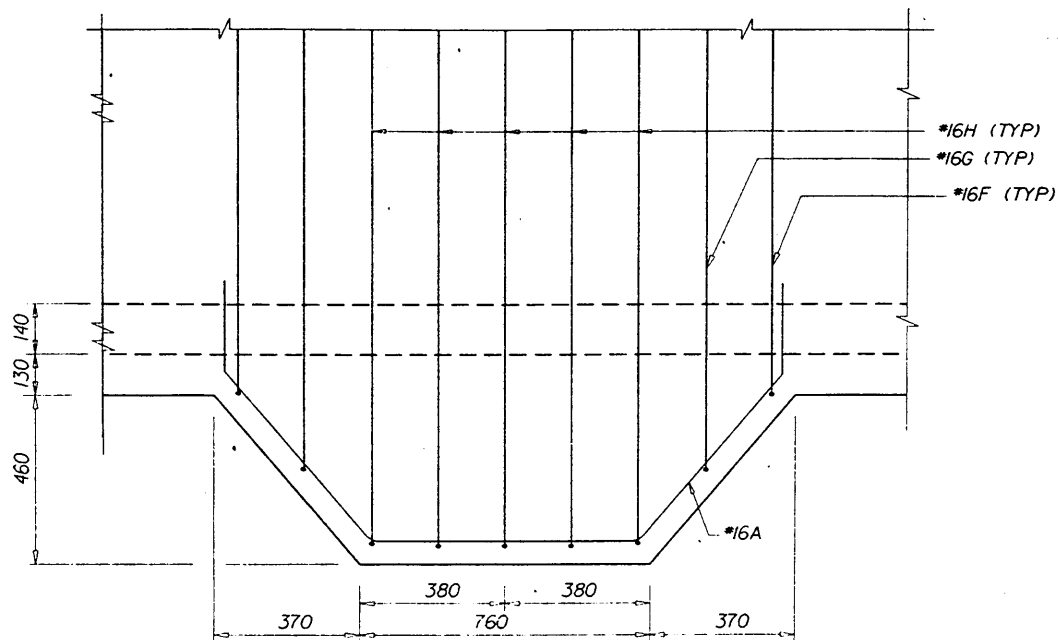
(LEVELING PAD DIMENSIONS ARE THE SAME FOR BOTH CRUCIFORM AND SQUARE PANELS, SEE WALL ELEVATIONS FOR PANEL TYPES AT STEPS)



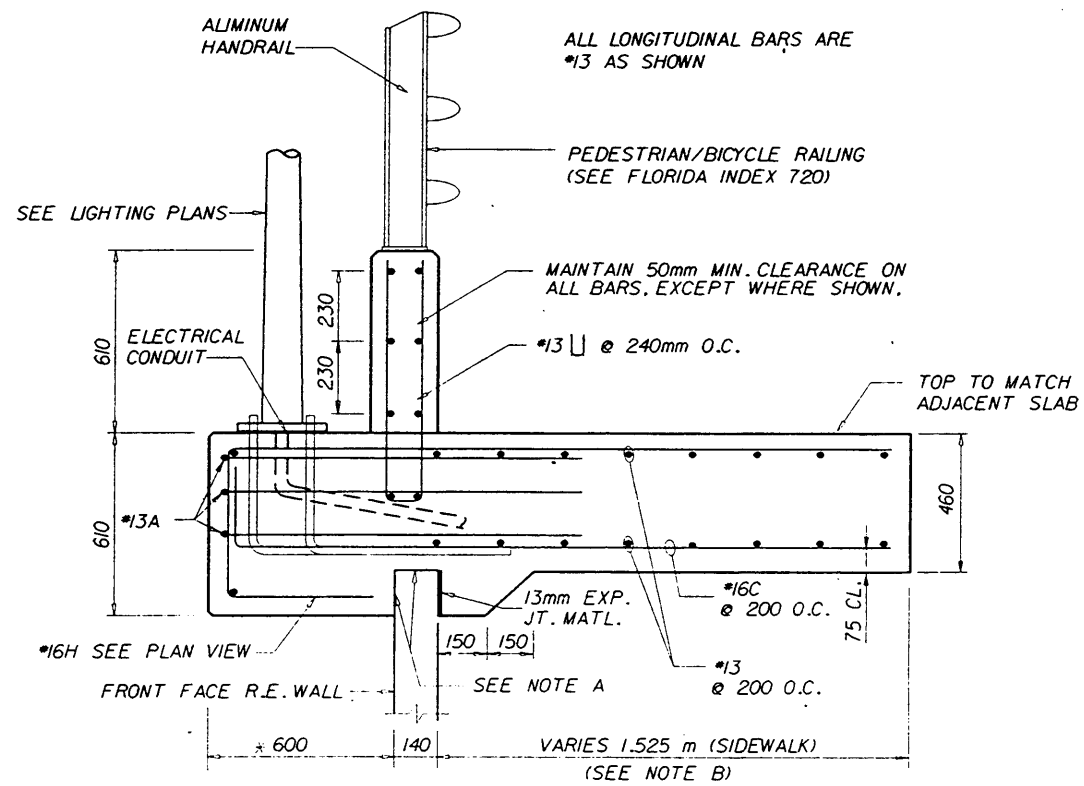
C.J.P. TRAFFIC BARRIER OVER SLIP JOINT COVER

THIS SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY  
CRUCIFORM AND SQUARE PANELS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM REINFORCED EARTH COMPANY REINFORCED EARTH WALL				
Designed By	DM	1-79	Approved By	<i>William J. [Signature]</i>
Drawn By	DM	1-79	State Structures Design Engineer	
Checked By	AA	1-79	Revision	00
			Sheet No.	9 of 14
			Index No.	5015



1 PLAN



2 BARRIER DETAIL @ LIGHT POLE

NOTE A:  
POSITIVE BOND BREAKER SHALL BE PROVIDED BETWEEN CAST IN PLACE CONC. AND PRECAST CONC. PANEL.

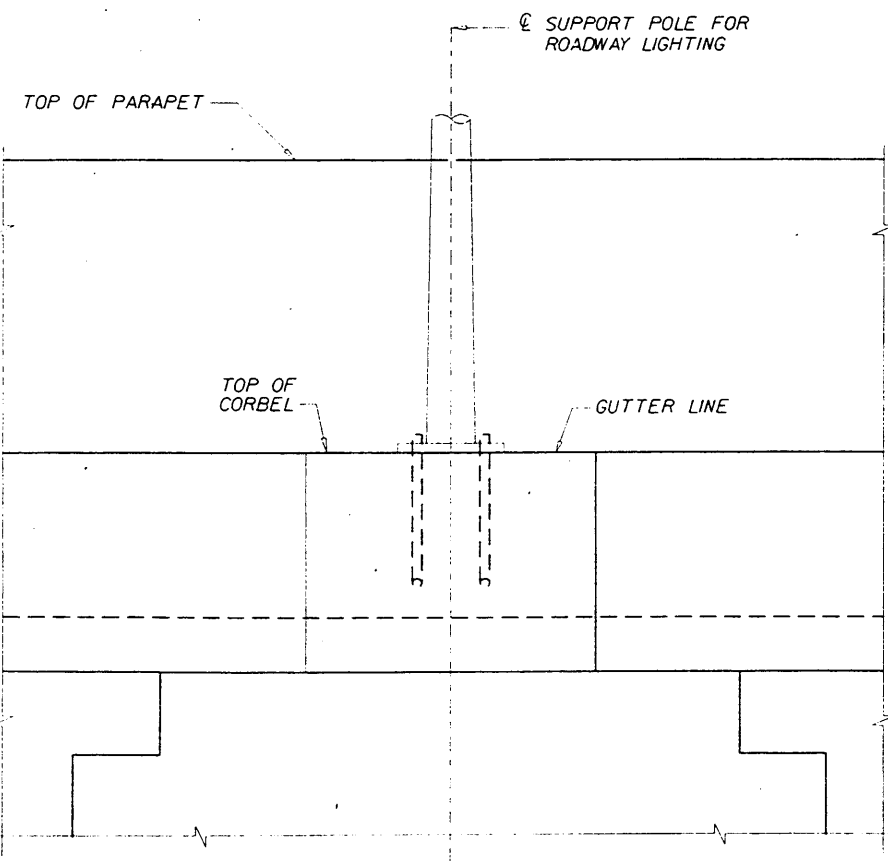
NOTE B:  
THE BARRIER JUNCTION SLAB SHALL HAVE THESE DIMENSIONS FOR 1.525 m UNIT EITHER SIDE OF LIGHT POLE BARRIER LONGITUDINAL BARS SHALL BE AS SHOWN ABOVE

NOTE C:  
SEE STANDARD INDEX NO. 500 FOR ADDITIONAL DETAILS

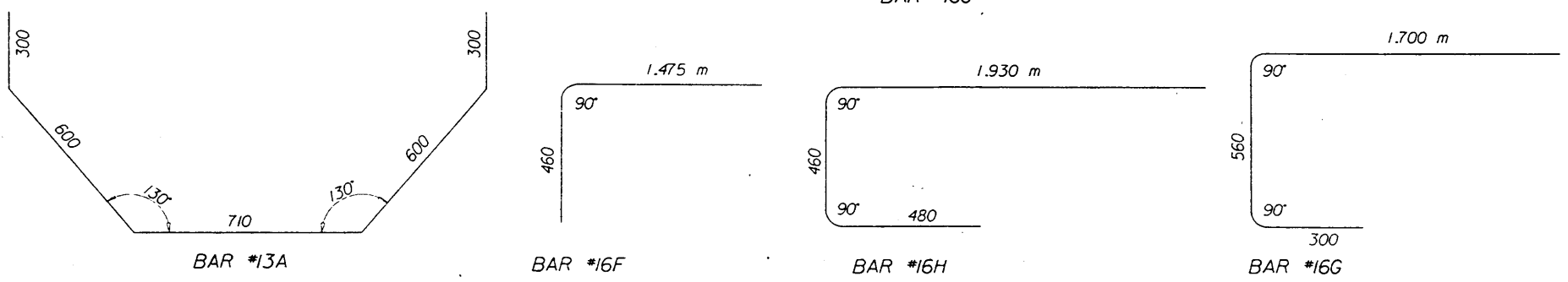
NOTE D:  
LIGHT POLE MANUFACTURER IS RESPONSIBLE FOR PROVIDING ANCHOR BOLTS THAT EFFECTIVELY TRANSMIT LOADS TO THE PILASTER AND FIT THE REINFORCING CAGE.

REBAR SCHEDULE	
MARK	QTY.
#13A	3
#16C	8
#16F	2
#16G	2
#16H	5
#13U	6

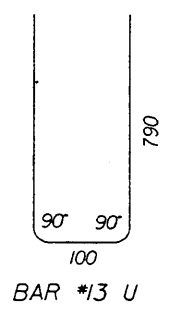
\* DIMENSION MAY VARY AS REQUIRED FOR LIGHT POLE BASE PLATE.



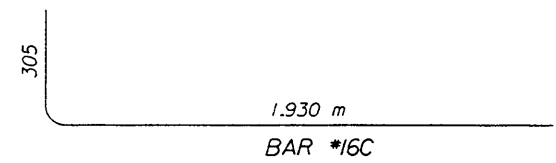
3 PARTIAL ELEVATION



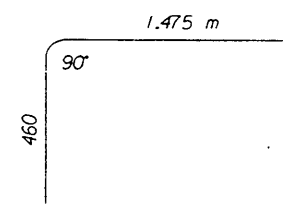
4 BAR BENDING DETAILS



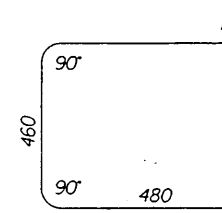
BAR #13 U



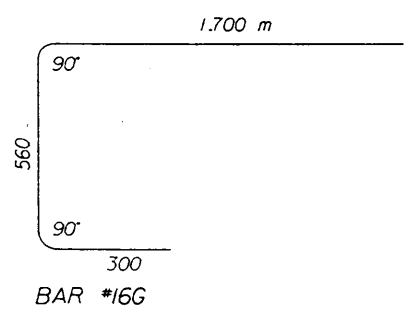
BAR #16C



BAR #16F



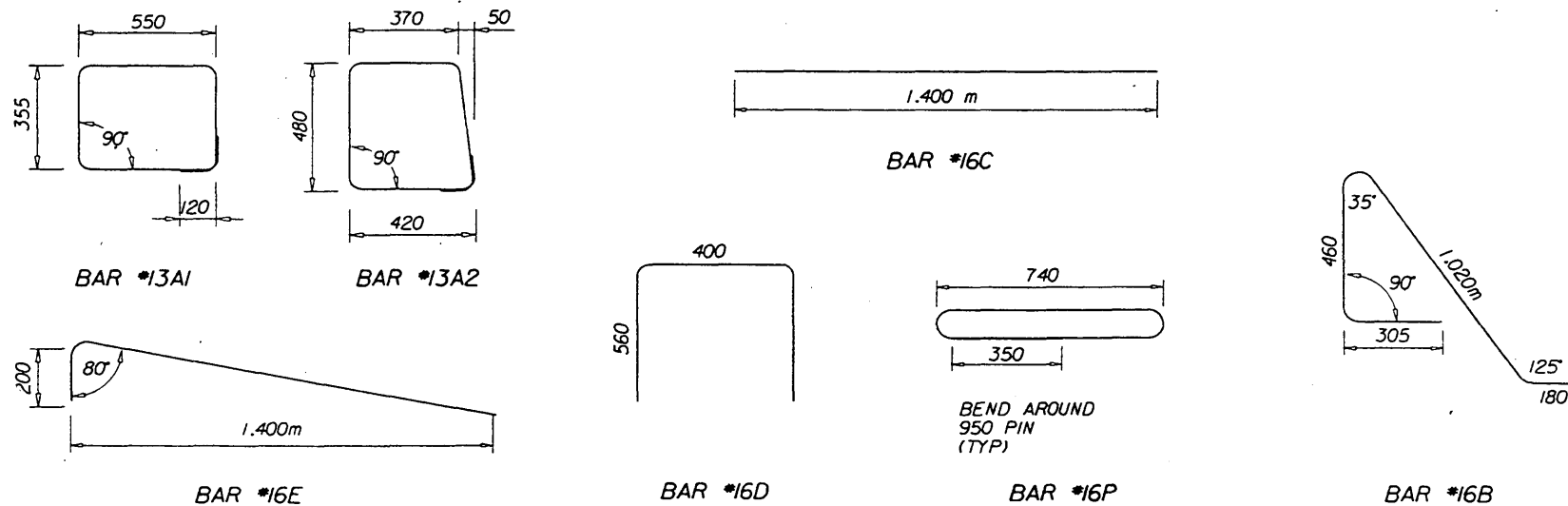
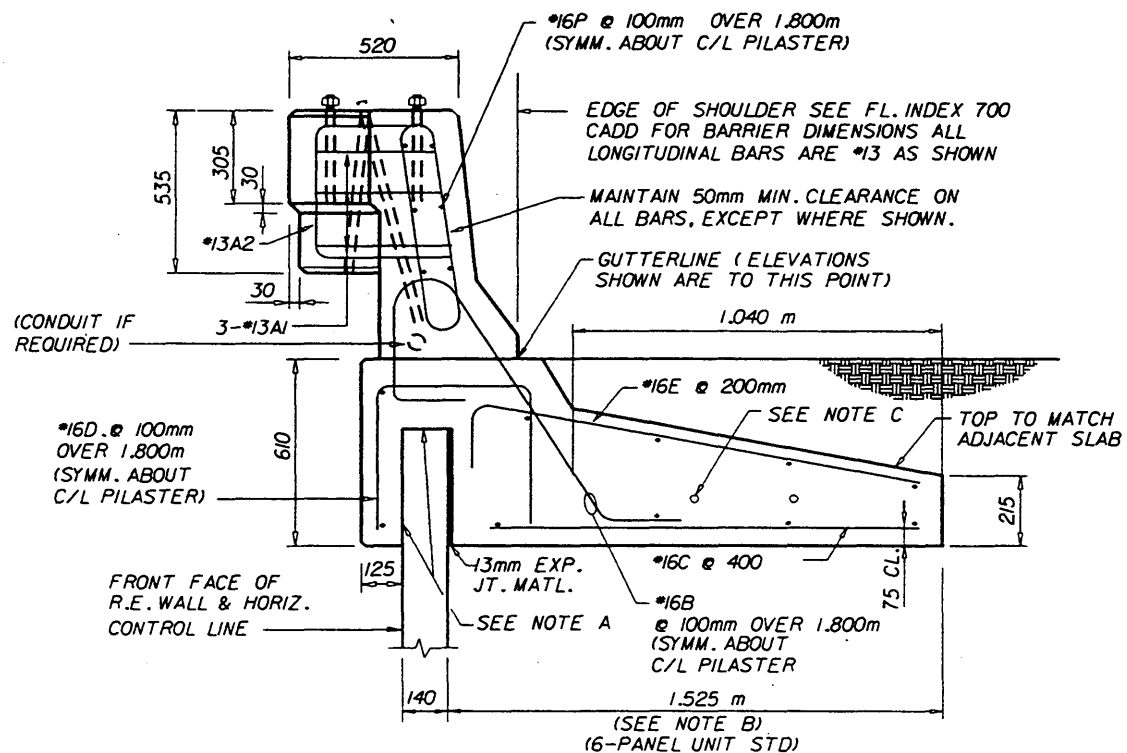
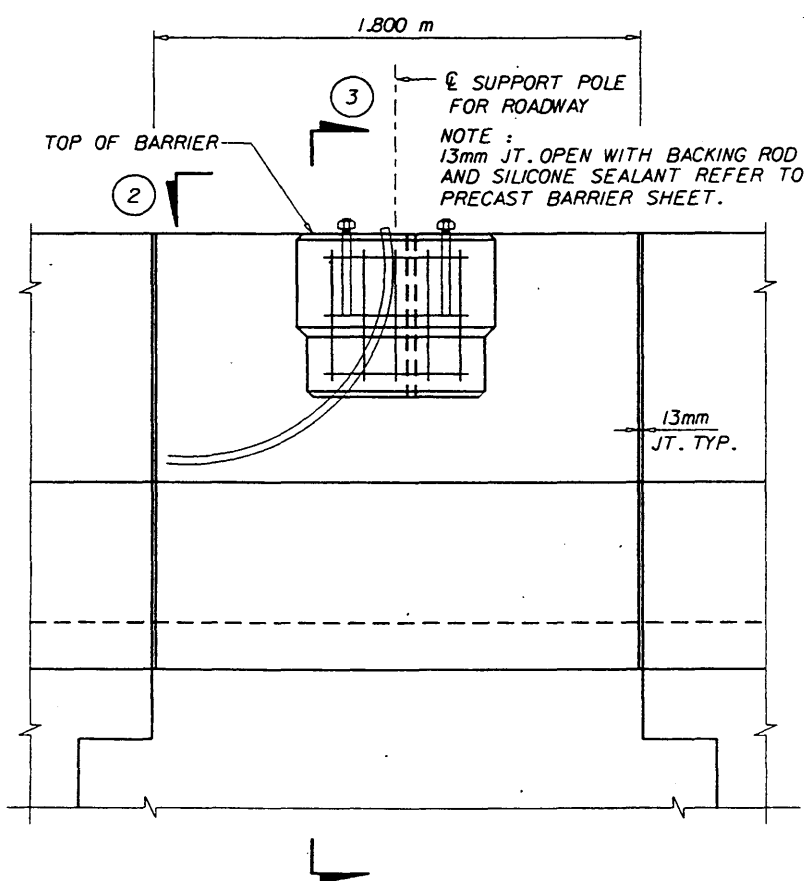
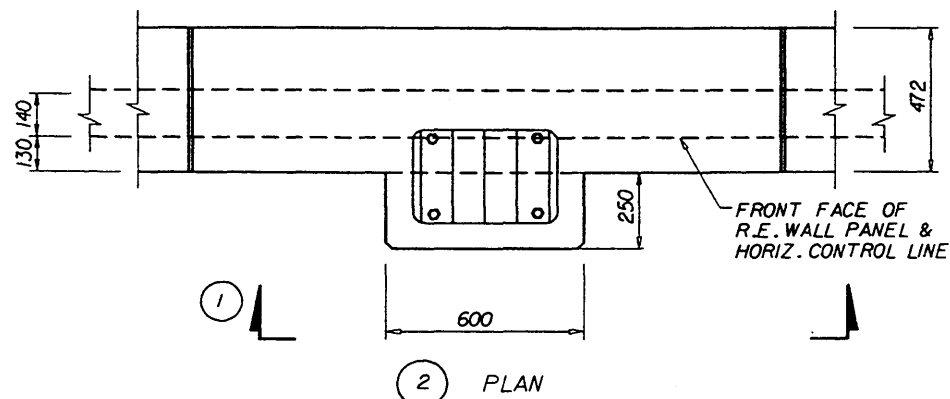
BAR #16H



BAR #16G

THIS SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY  
CRUCIFORM AND SQUARE PANELS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM REINFORCED EARTH COMPANY REINFORCED EARTH WALL				
Designed By	DM	1-99	Approved By	<i>Walter J. [Signature]</i>
Drawn By	DM	1-99	State Structures Design Engineer	
Checked By	RA	1-99	Revision	00
			Sheet No.	10 of 14
			Index No.	5015



NOTES:

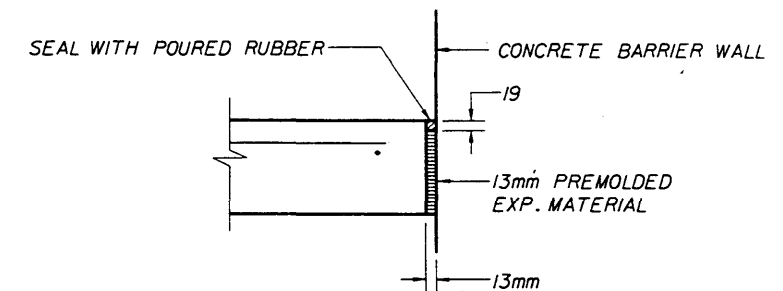
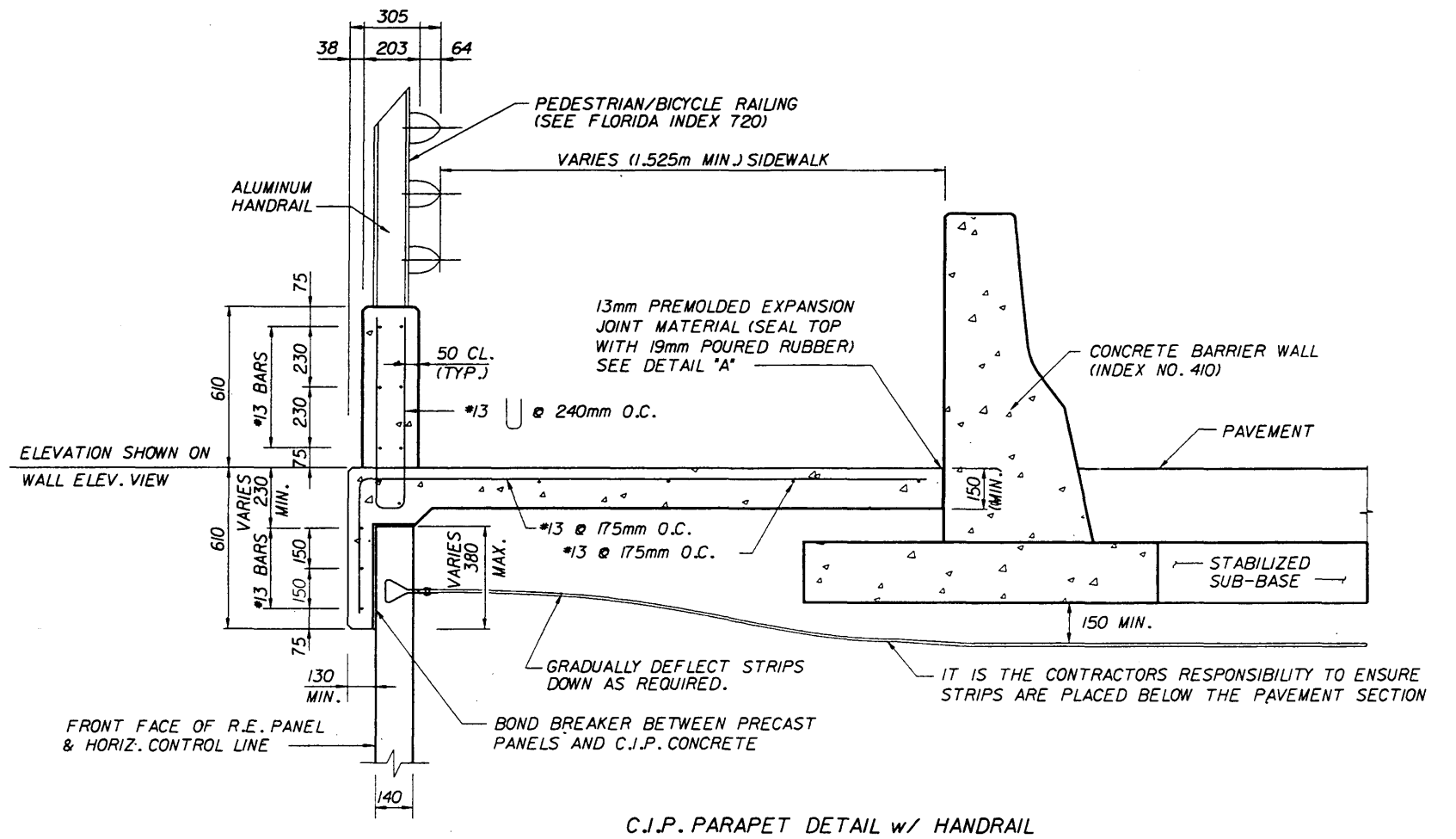
- A. POSITIVE BOND BREAKER SHALL BE PROVIDED BETWEEN CAST IN PLACE CONC. AND PRECAST CONC. PANEL.
- B. THE BARRIER JUNCTION SLAB SHALL HAVE THESE DIMENSIONS FOR ONE PRECAST UNIT EITHER SIDE OF LIGHT POLE BARRIER LONGITUDINAL BARS SHALL BE AS SHOWN ABOVE
- C. 2 - #29 SHEAR DOWELS - 915mm LONG REFER TO PRECAST BARRIER SHEET
- D. LIGHTPOLE SUPPLIER IS RESPONSIBLE FOR PROVIDING ANCHOR BOLTS THAT EFFECTIVELY TRANSMIT THE LIGHTPOLE LOADS TO THE PILASTER AND FIT THE REINFORCING CAGE.
- D. SEE STANDARD INDEX NO. 500 FOR ADDITIONAL DETAILS

REBAR SCHEDULE	
MARK	QTY.
#13A1	3
#13A2	5
#16B	18
#16C	4
#16D	18
#16E	9
#16P	18

THIS SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY  
CRUCIFORM AND SQUARE PANELS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM REINFORCED EARTH COMPANY REINFORCED EARTH WALL				
Names	Dates	Approved By		
Designed By	DM	1-99	 State Structures Design Engineer	
Drawn By	DM	1-99		
Checked By	AA	1-99	Revision	Sheet No.
			00	11 of 14
				5015

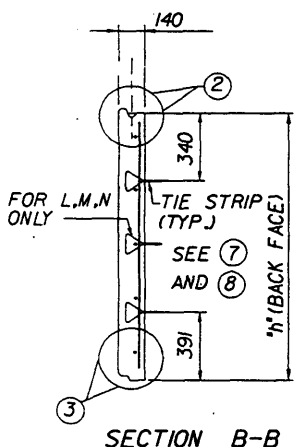
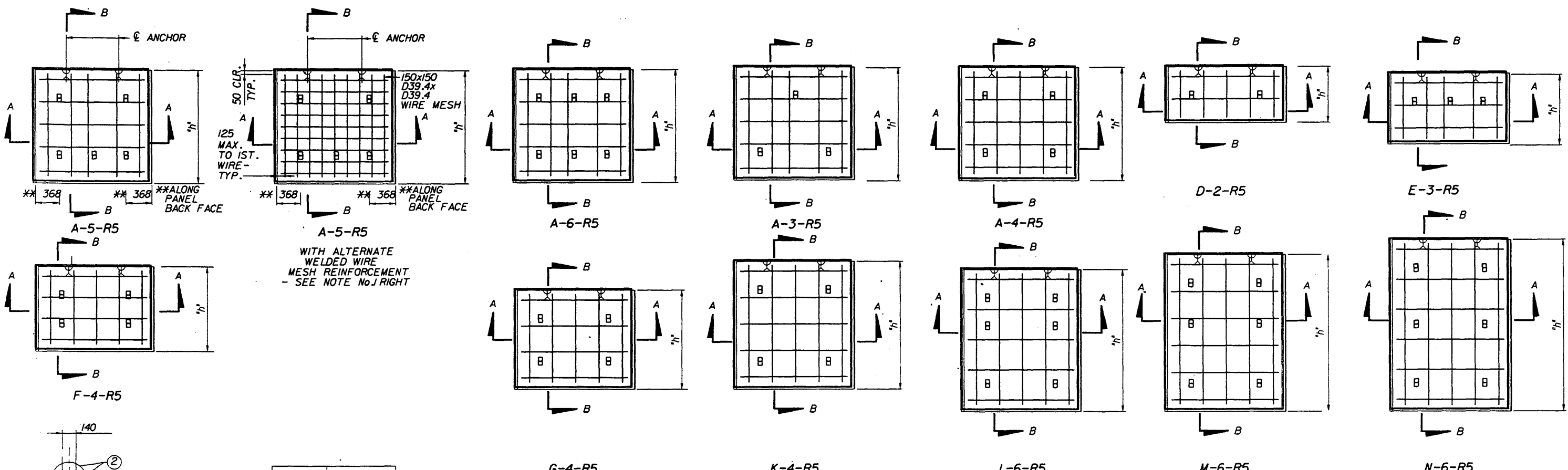




DETAIL "A"

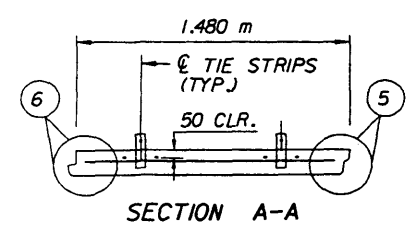
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM REINFORCED EARTH COMPANY REINFORCED EARTH WALL				
Names	Dates	Approved By <i>Willie J. [Signature]</i>		
Designed By	DM	1-99	State Structures Design Engineer	
Drawn By	DM	1-99	Revision	Sheet No.
Checked By	FAA	1-99	00	12 of 14
				Index No. 5015

THIS SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY  
CRUCIFORM AND SQUARE PANELS



PANEL TYPE	"h"
A	1.480m
D	730
E	921
F	1.105m
G	1.295m
K	1.670m
L	1.854m
M	2.045m
N	2.235m

NOTE:  
CONCRETE COVER ON ALL REINFORCEMENT TO BE 50mm MIN.



TYPICAL PANELS

PANEL THICKNESS	REINFORCEMENT DESIGNATION	PANEL REINFORCEMENT * (mm <sup>2</sup> )	MAXIMUM ALLOWABLE HORIZONTAL STRESS AT FACING (kPa)
140	R5	355 VERTICAL 355 HORIZONTAL	57 kPa
140	R7	497 VERTICAL 426 HORIZONTAL	85 kPa

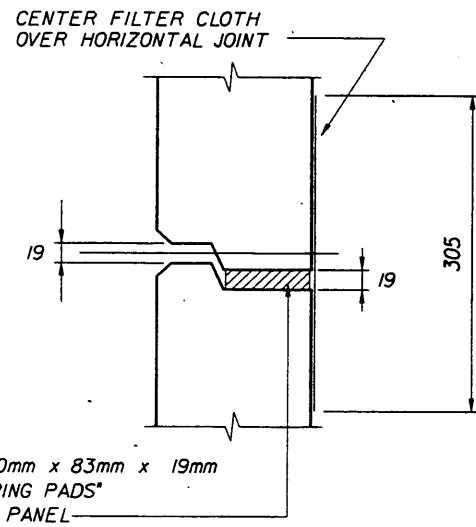
\* TOTAL AREA OF STEEL REQUIRED PER "TYPE A" PANEL

NOTES:

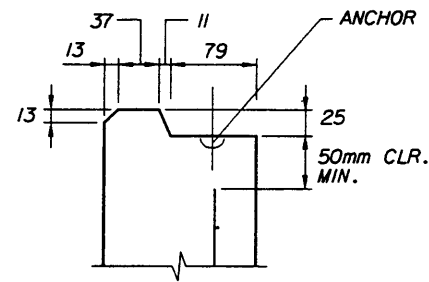
- REINFORCING STEEL TO BE A615M-96 GRADE 420. DEFORMED WELDED WIRE MESH (ASTM A497) MAY BE SUBSTITUTED FOR REBARS. DEFORMED WELDED MESH REQUIREMENTS FOR PANEL 'A' IS SHOWN IN THIS SHEET. MESH FOR OTHER PANEL TYPES SHALL BE DETERMINED BASED ON PANEL SHAPE, MESH STYLE AND MINIMUM EDGE CLEAR DISTANCES SHOWN ON THIS SHEET.
- 13mm x 13mm CHAMFER SHALL BE PROVIDED ON ALL EXPOSED EDGES (FRONT FACE ONLY).
- ALL PANEL TYPES AND OTHER RELATED ELEMENTS WILL BE DETAILED ON PANEL SHOP DRAWINGS.
- ALL PANELS SHALL HAVE 9kN CAPACITY SPREAD ANCHORS. (2 EACH)
- PANEL DESIGN THICKNESS IS 140mm THICKNESS OF CONCRETE MUST INCREASE TO ACCOMMODATE ANY ARCHITECTURAL SURFACE FINISH THAT MAY BE SPECIFIED.
- ACTUAL LOCATION OF REBARS WILL BE ADJUSTED TO ACCOMMODATE PANEL CASTING. 30mm CLEARANCE IS REQUIRED BETWEEN TIE-STRIPS AND REBARS.

THIS SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY  
SQUARE PANELS

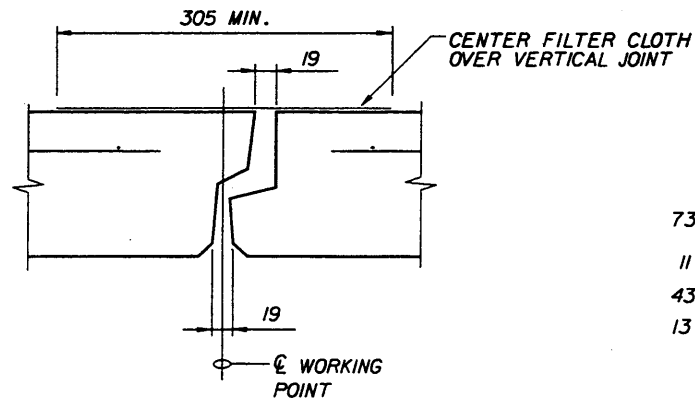
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN			
<b>RETAINING WALL SYSTEM REINFORCED EARTH COMPANY REINFORCED EARTH WALL</b>			
Designed By	DM 1-99	Approved By	<i>[Signature]</i>
Drawn By	DM 1-99	Revision	00
Checked By	AA 1-99	Sheet No.	13 of 14
		Index No.	5015



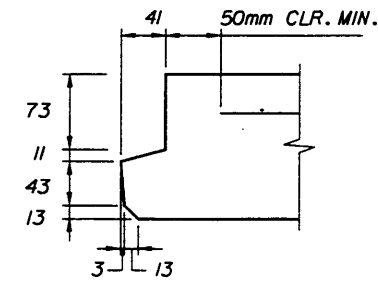
1 HORIZONTAL JOINT



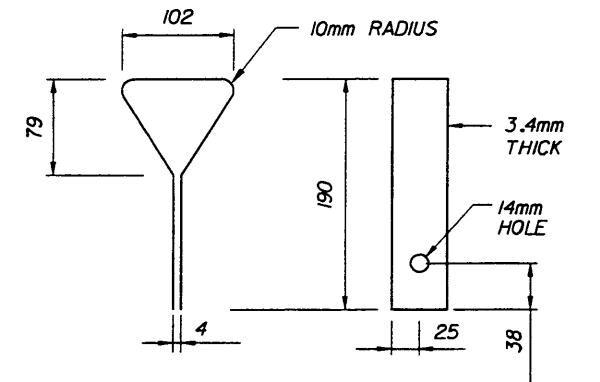
2 SECTION @ PANEL TOP



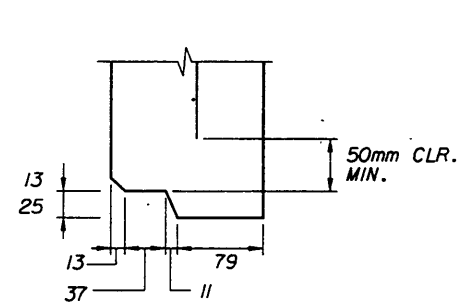
4 VERTICAL JOINT



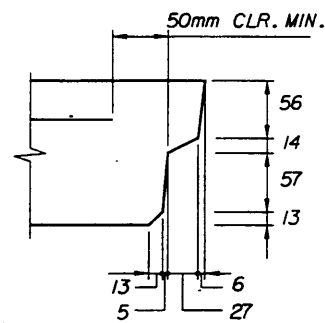
6 SECTION @ PANEL LEFT SIDE



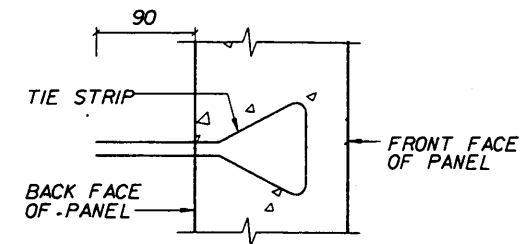
8 TIE STRIP DETAIL



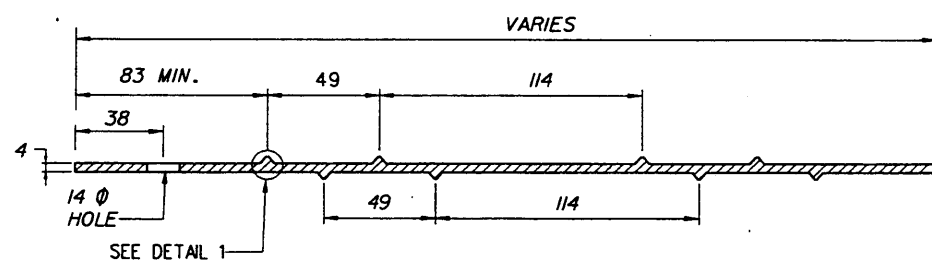
3 SECTION @ PANEL BOTTOM



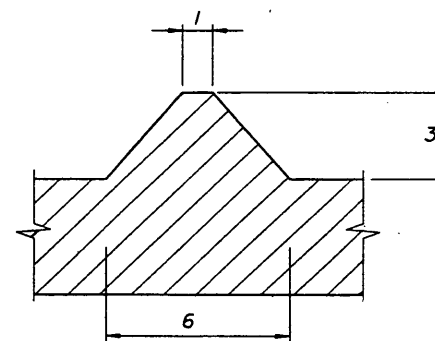
5 SECTION @ PANEL RIGHT SIDE



7 PARTIAL SECTION @ TIE STRIP



REINFORCING STRIP DETAIL

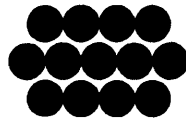


DETAIL 1

THIS SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY

SQUARE PANELS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM REINFORCED EARTH COMPANY REINFORCED EARTH WALL				
Names	Dates	Approved By		
Designed By	DM 1-99	State Structures Design Engineer		
Drawn By	DM 1-99	Revision	Sheet No.	Index No.
Checked By	RA 1-99	00	14 of 14	5015



TAI

# The Reinforced Earth Company

8614 WESTWOOD CENTER DRIVE SUITE 1100, VIENNA VIRGINIA 22182 (703) 821-1175

### DESIGN CRITERIA

1. DESIGN IS BASED ON THE ASSUMPTION THAT THE MATERIAL BEHIND THE PRECAST TECHWALL, METHODS OF CONSTRUCTION AND QUALITY OF PREFABRICATED MATERIALS SHALL CONFORM TO THE SECTION 548.

### 2. SOIL PARAMETERS:

SEE WALL CONTROL DRAWINGS FOR SOIL CHARACTERISTICS OF FOUNDATION MATERIAL TO BE USED IN THE DESIGN OF THE WALL SYSTEM. THE CONTRACTOR SHALL PROVIDE SOIL DESIGN PARAMETERS FOR BACKFILL MATERIAL BASED ON THE ACTUAL SOIL CHARACTERISTICS UTILIZED AT THE SITE. THE VALUES OF FRICTION ANGLE ( $\phi$ ), COHESION ( $c$ ) AND TOTAL UNIT WEIGHT ( $\gamma$ ) SHALL BE PROVIDED IN THE SHOP DRAWINGS.

3. THE MAXIMUM APPLIED BEARING PRESSURE AT THE TOE OF THE TECHWALL IS AS SHOWN ON THE WALL ELEVATIONS FOR EACH DESIGN CASE. IT IS THE RESPONSIBILITY OF THE OWNER TO DETERMINE THAT THIS APPLIED BEARING PRESSURE IS ALLOWABLE FOR THAT LOCATION.

4. ANY UNSUITABLE FOUNDATION MATERIAL BELOW THE CAST-IN-PLACE FOOTING, AS DETERMINED BY THE ENGINEER, SHALL BE EXCAVATED AND REPLACED WITH SUITABLE MATERIAL OR OTHERWISE STABILIZED AS DIRECTED BY THE ENGINEER.

### 5. THE MINIMUM FACTORS OF SAFETY REQUIRED FOR DESIGN

OVERTURNING = 2.0

SLIDING = 1.5

BEARING CAPACITY = 2.5

OVERALL STABILITY = 1.5

REINFORCING STEEL DESIGN SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES AND FOOT DESIGN GUIDELINES NO. 625-020-150B.

### WALL CONSTRUCTION

6. FOR LOCATION AND ALIGNMENT OF TECHWALL, SEE RETAINING WALL CONTROL PLANS.

7. TECHWALLS IN CURVES WILL FORM A SERIES OF SHORT CHORDS OF 2.440m EACH TO MATCH DESIRED WALL ALIGNMENT.

8. IF MANHOLES AND DROP INLETS ARE PRESENT, THEY SHALL BE LOCATED AS SHOWN ON WALL ELEVATIONS.

9. IF PILES ARE LOCATED WITHIN THE RETAINED VOLUME, THEY SHALL BE DRIVEN PRIOR TO CONSTRUCTION OF THE TECHWALL UNLESS A METHOD IS USED TO PROTECT THE STRUCTURE, WHICH IS ACCEPTABLE TO THE ENGINEER AND THE REINFORCED EARTH COMPANY, AND IS PROPOSED AND APPROVED IN WRITING.

10. BACKFILL MATERIAL SHALL BE COMPACTED IN ACCORDANCE WITH SECTION 548 OF THE FLORIDA DOT SPECIFICATIONS.

11. IF STRUCTURES IN EXCESS OF 6m IN HEIGHT OCCUR, THE FINISHED GRADE IN FRONT OF THE WALL SHALL BE PLACED AND COMPACTED BEFORE WALL CONSTRUCTION EXCEEDS A HEIGHT OF 6m. FINISHED GRADE BACKFILL SHALL BE COMPACTED TO 95% OF ASSHTO T-180, UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

12. TECHWALL PANELS TO BE FINISHED WITH COPING SHALL HAVE  $\phi$ 13 DOWELS PROTRUDING FROM THEIR TOP EDGE.

13. FOR OTHER INFORMATION PERTAINING TO WALL CONSTRUCTION PLEASE REFER TO THE REINFORCED EARTH CONSTRUCTION MANUAL FOR TECHWALL.

14. IF UNDERDRAIN IS SHOWN, THE FLOWLINE AND OUTLETS SHALL BE AS PER THE CONTRACT PLANS.

### MATERIALS NOTES

#### 15. PANEL FINISH

THE PRECAST PANELS FOR THIS PROJECT SHALL HAVE A PLAIN STEEL FORM FINISH UNLESS OTHERWISE SPECIFIED IN THE CONTROL PLANS.

#### 16. NOTE TO CONTRACTORS

ONLY THE FOLLOWING MATERIALS ARE SUPPLIED BY THE REINFORCED EARTH COMPANY:

- PRECAST CONCRETE FACING PANELS.

- GECCOMPOSITE TERRADRAIN 101 OR EQUIVALENT (FOR PANEL JOINTS ONLY).

- LIFTING HARDWARE FOR HANDLING PRECAST PANELS (ON LOAN BASIS)

- PANEL LEVELLING BOLTS AND PLATES.

ANY OTHER MATERIALS CALLED FOR IN THE CONTRACT PLANS OR SPECIFICATIONS ARE TO BE SUPPLIED BY THE CONTRACTOR. ANY JOINT MATERIALS SHOWN AT THE INTERFACE OF PRECAST PANELS AND CAST-IN-PLACE CONCRETE STRUCTURES ARE TO BE SUPPLIED BY THE ERECTION CONTRACTOR. ALL SANDBLASTING, PAINTING, SEALERS OR OTHER SPECIAL APPLIED COATINGS ARE ALSO SUPPLIED/INSTALLED BY THE CONTRACTOR IN THE FIELD FOLLOWING PANEL ERECTION.

17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN, SUPPLY, AND INSTALLATION OF A TEMPORARY FALSEWORK SUPPORT SYSTEM TO ADEQUATELY BRACE THE ASSEMBLED PRECAST WALL UNITS UNTIL THE CONCRETE FOOTING HAS BEEN POURED AND ADEQUATELY CURED ACCORDING TO THE REINFORCED EARTH COMPANY SPECIFICATIONS. PLANS FOR THE TEMPORARY FALSEWORK SUPPORT SYSTEM SHOWING DIMENSIONS, SUPPORT POINTS, MEMBER SIZES, CONNECTIONS AND MATERIAL SPECIFICATIONS SHALL BE SUBMITTED TO THE REINFORCED EARTH COMPANY PRIOR TO WALL ERECTION. NOTWITHSTANDING ITS REVIEW OF THE TEMPORARY FALSEWORK SUPPORT SYSTEM, THE REINFORCED EARTH COMPANY SHALL NOT BE RESPONSIBLE FOR ANY DAMAGE OR LOSS CAUSED BY ANY DEFECT IN THE DESIGN AND/OR CONSTRUCTION OF THE TEMPORARY FALSEWORK SUPPORT SYSTEM. THRUST BLOCKS OR REACTION ASSEMBLIES SHALL BE OF SUFFICIENT SIZE SO THAT THE APPLIED SOIL PRESSURE DOES NOT EXCEED THE ALLOWABLE SOIL PRESSURE OR PRODUCE DETRIMENTAL DEFORMATIONS IN THE RESULTING POSITIONING OF THE ASSEMBLED PRECAST WALL UNITS.

#### 18. CONCRETE COVER

- CAST-IN-PLACE

100mm CLEAR ON REBAR FOR CONCRETE CAST AGAINST EARTH.

75mm CLEAR ON REBAR FOR ALL OTHER C.I.P. CONCRETE UNLESS NOTED OTHERWISE.

- PRECAST

ALL REBARS IN PRECAST CONCRETE SHALL HAVE A 50 mm MIN. CONCRETE COVER.

19. CONCRETE FOR PRECAST PANELS WILL BE PROVIDED BY THE REINFORCED EARTH COMPANY'S MANUFACTURING PLANT IN ACCORDANCE WITH SECTION 346 OF THE FLORIDA DOT SPECIFICATIONS.

20. THE REINFORCED EARTH COMPANY IS RESPONSIBLE FOR INTERNAL STABILITY OF THE STRUCTURE ONLY. EXTERNAL STABILITY DESIGN INCLUDING FOUNDATION AND SLOPE STABILITY IS THE RESPONSIBILITY OF OTHERS.

21. THESE DRAWINGS ARE CERTIFIED WITH RESPECT TO THE INTERNAL STABILITY OF REINFORCED EARTH STRUCTURES ONLY

22. THIS DRAWING CONTAINS INFORMATION PROPRIETARY TO THE REINFORCED EARTH COMPANY, AND IS BEING FURNISHED FOR THE USE IN CONNECTION WITH FDOT PROJECTS ONLY, AND THE INFORMATION CONTAINED HEREIN IS NOT TO BE TRANSMITTED TO ANY OTHER ORGANIZATION UNLESS SPECIFICALLY AUTHORIZED IN WRITING BY THE REINFORCED EARTH COMPANY. THE REINFORCED EARTH COMPANY IS EXCLUSIVE LICENSEE IN THE UNITED STATES UNDER PATENTS ISSUED TO HENRY VIDAL, AND THE FURNISHING OF THIS DRAWING DOES NOT CONSTITUTE AN EXPRESSED OR IMPLIED LICENSE UNDER THE VIDAL PATENTS.

THIS SYSTEM SHALL NOT BE USED IN ACUTE ANGLES SMALLER THAN 60°

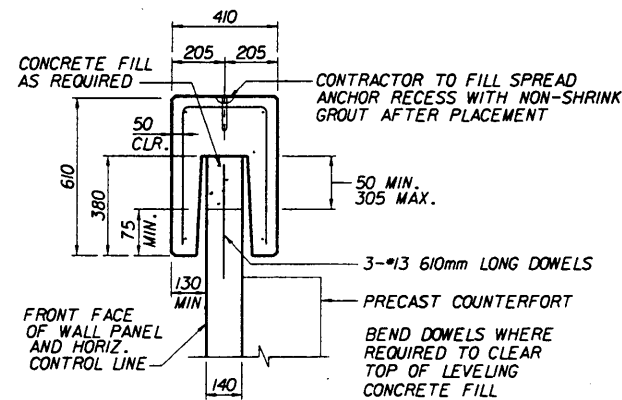
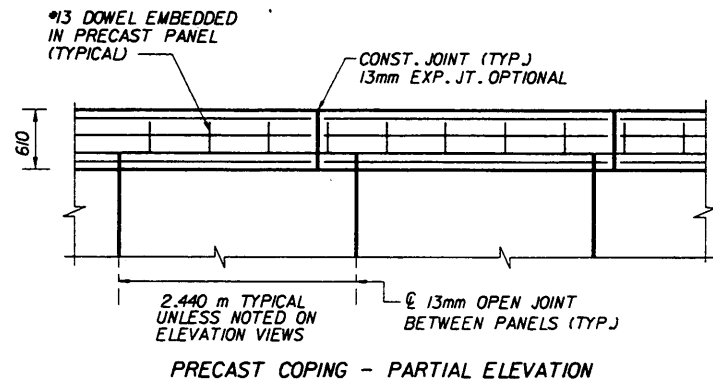
THIS SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY

TECHWALL

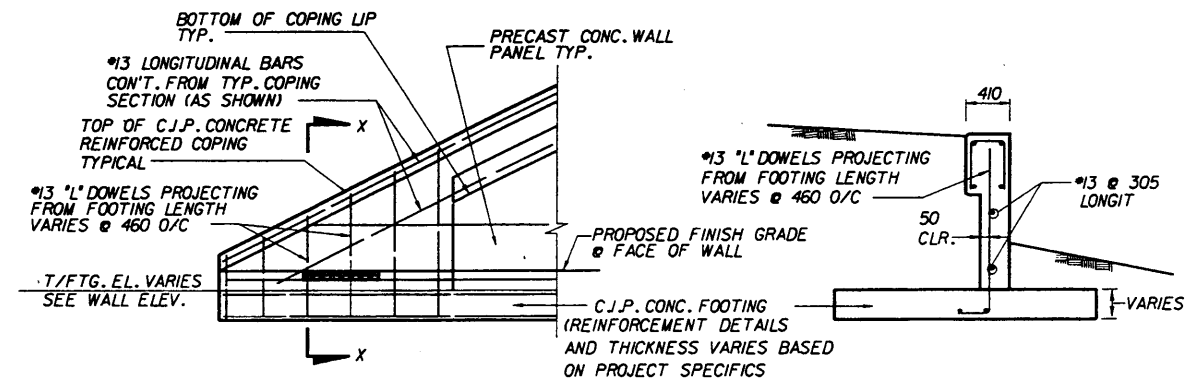
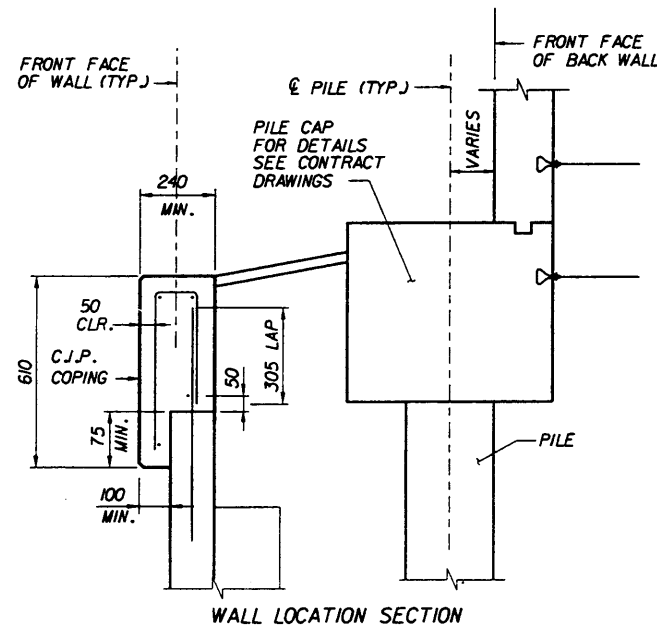
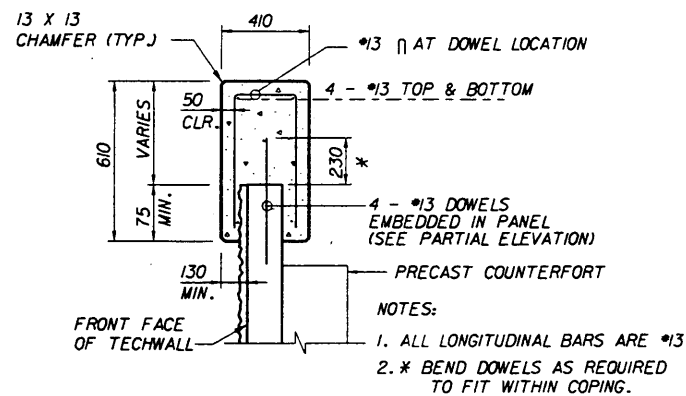
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

## RETAINING WALL SYSTEM REINFORCED EARTH COMPANY TECHWALL

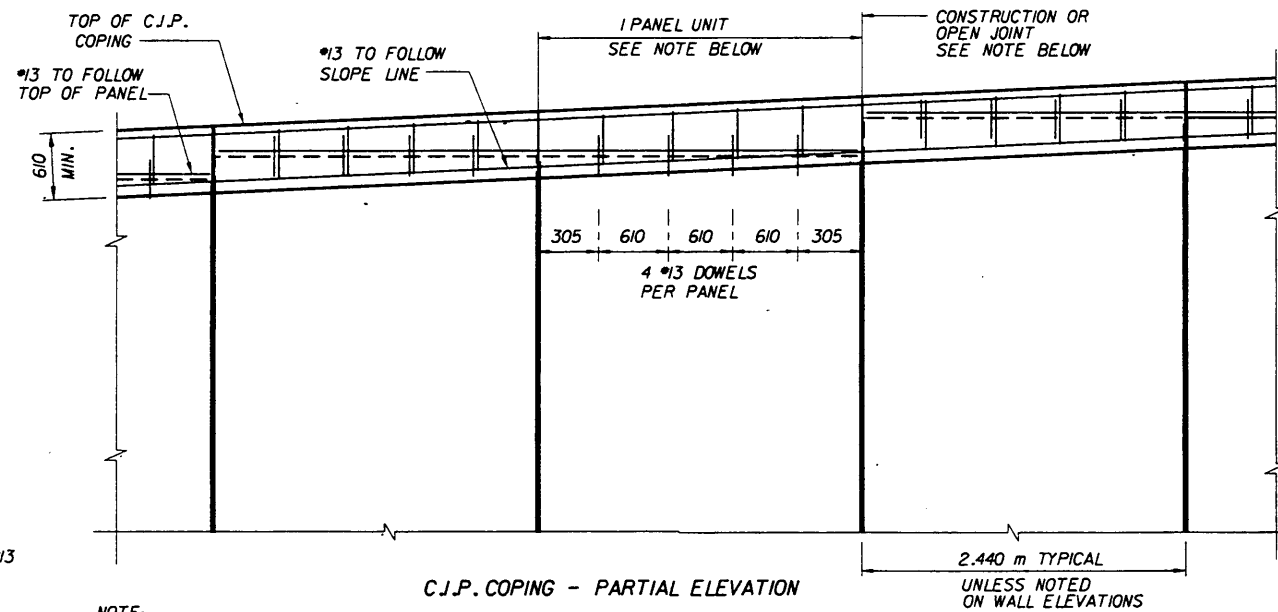
	Names	Dates	Approved By		
Designed By	DM	1-99		Revision	Index No.
Drawn By	DM	1-99		Sheet No.	
Checked By	AA	1-99		00	1 of 8



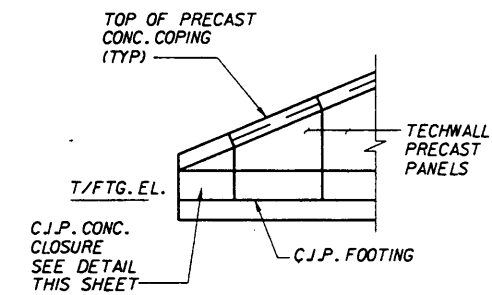
NOTE:  
STANDARD COPING UNIT IS 3.048 m LONG WITH SQUARE ENDS.



C.J.P. CLOSURE - PARTIAL ELEVATION



NOTE:  
13-mm OPEN JOINTS IN COPING SHALL BE AT 4 PANEL INTERVALS AND COINCIDE APPROXIMATELY WITH PANEL JOINTS. REINFORCING STEEL SHALL BE STOPPED 50mm SHORT OF EITHER SIDE OF THE JOINTS. CONSTRUCTION JOINTS IN BETWEEN THE OPEN JOINTS SHALL BE PROVIDED AT EVERY PANEL JOINT.



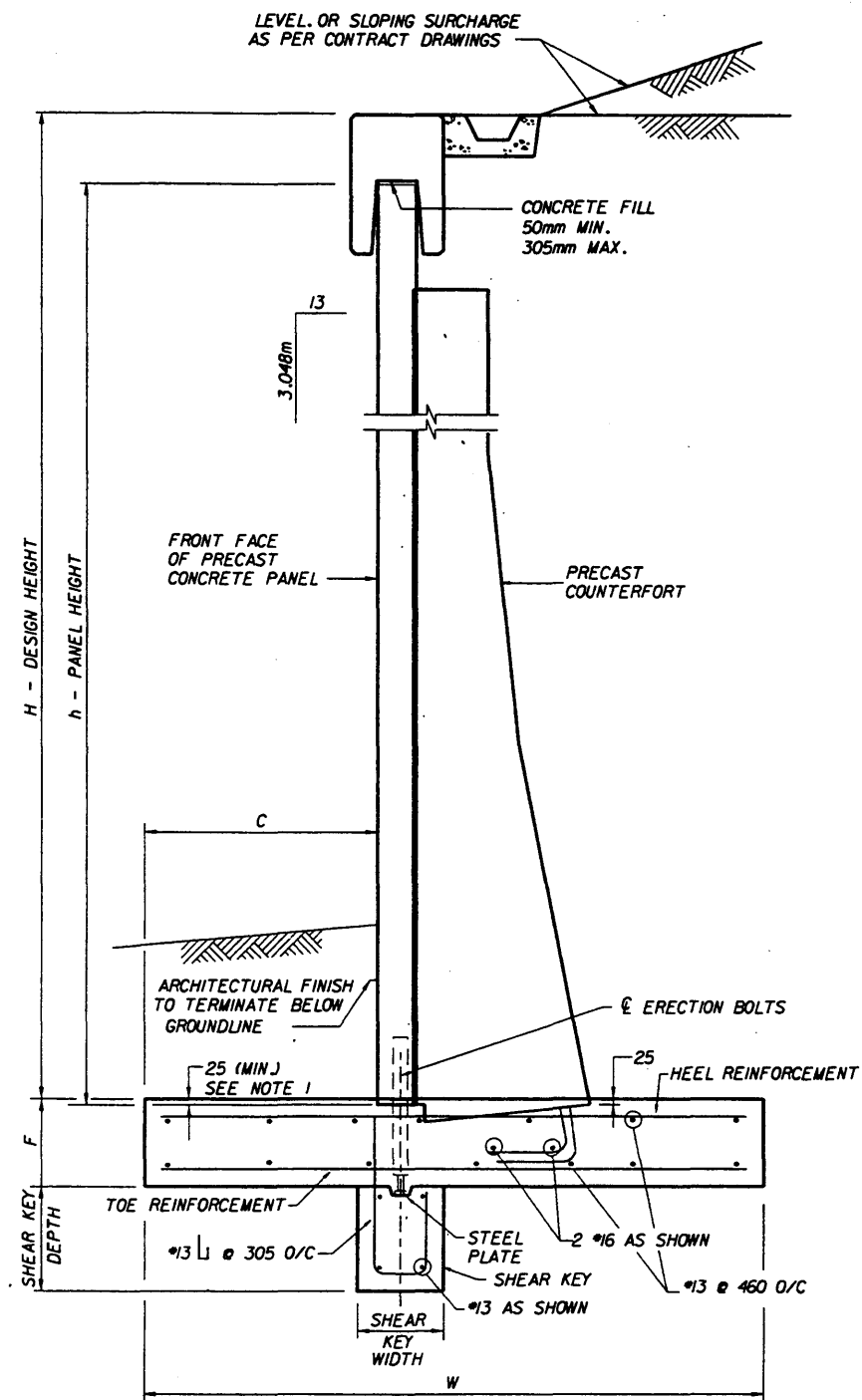
PARTIAL ELEVATION C.J.P. CONCRETE CLOSURE

NOTE:  
ALL REBARS IN PRECAST CONCRETE SHALL HAVE A 50mm MIN. CONCRETE COVER.

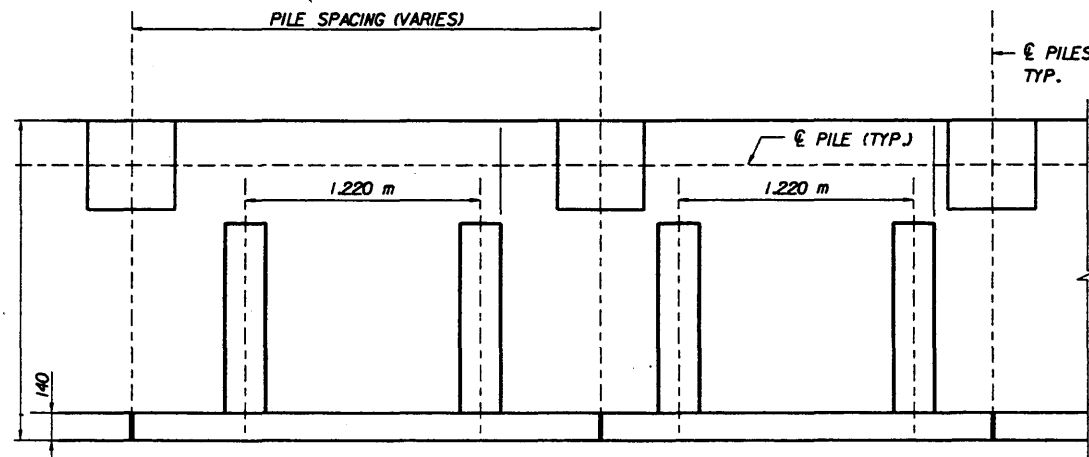
THIS SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY

TECHWALL

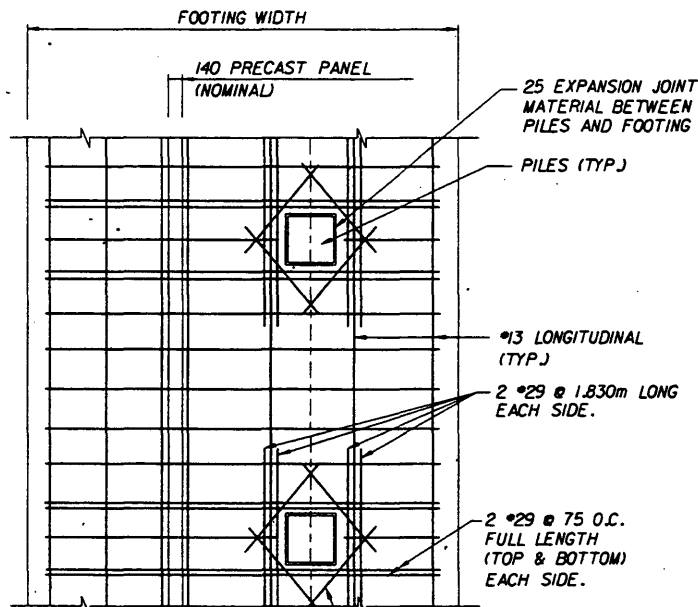
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM REINFORCED EARTH COMPANY TECHWALL				
Designed By	DM	1-99	Approved By	<i>[Signature]</i>
Drawn By	DM	1-99	Revision	00
Checked By	AA	1-99	Sheet No.	2 of 8
				Index No. 5016



TYPICAL SECTION THRU WALL



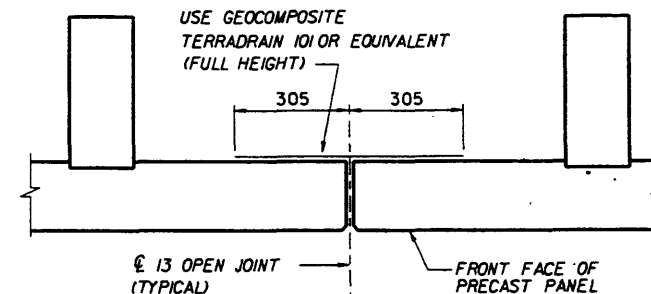
LAYOUT PRECAST PANEL W/COUNTERFORTS RELATED TO PILE LAYOUT



NOTE:  
TOE REINFORCEMENT NOT SHOWN FOR CLARITY

PLAN-FOOTING AT ABUTMENT PILES

C.F.H.W AND THE REINFORCEMENT DETAILS ARE DETERMINED BY PROJECT SPECIFICS.




JOINT DETAIL

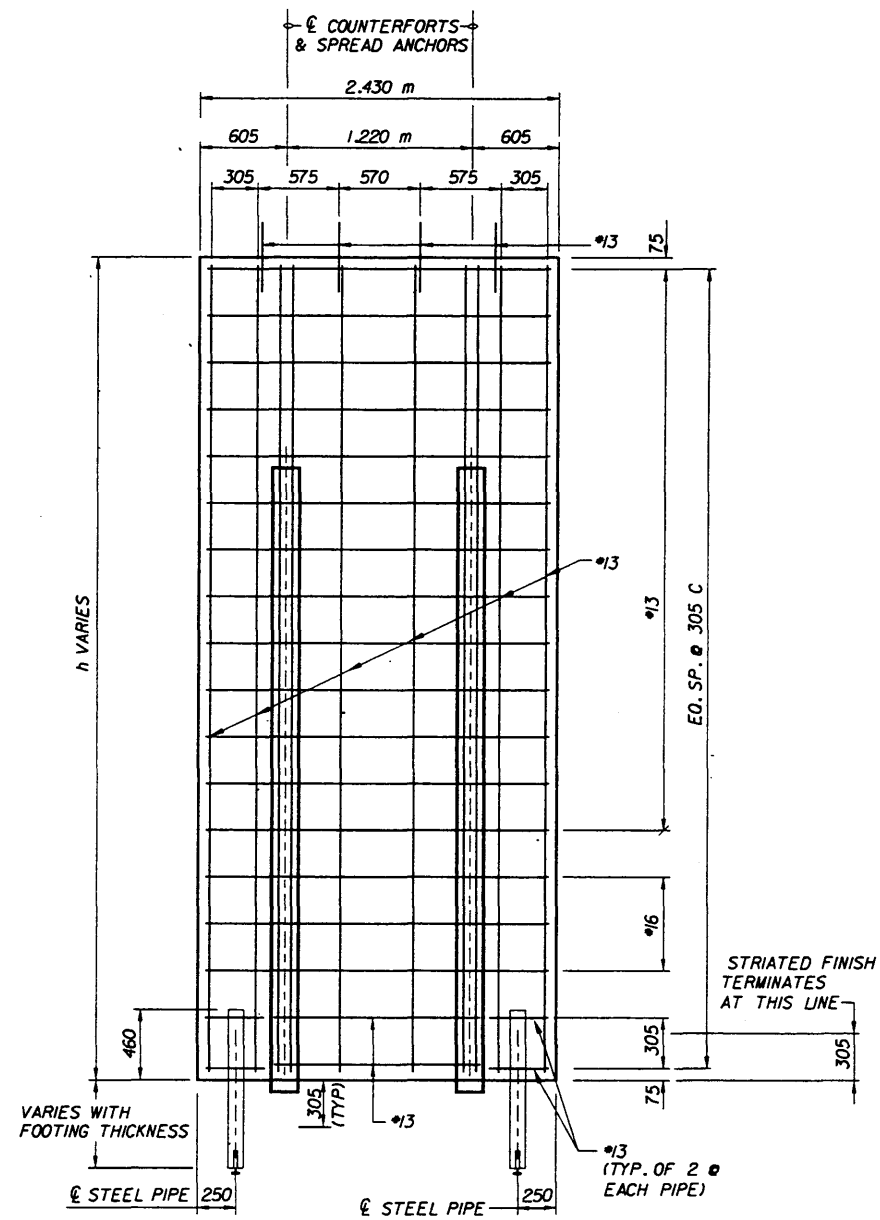
NOTES:

1. THE BOTTOM EDGE OF THE ASSEMBLED PRECAST PANEL SHALL BE COVERED BY 25 MINIMUM OF CAST-IN-PLACE FOOTING CONCRETE.
2. PRECAST WALL UNITS SHALL BE INSTALLED AT BATTER OF 13 PER 3.048m UNLESS OTHERWISE SHOWN ON CONSTRUCTION DRAWINGS.
3. FOR PANEL HEIGHTS OF 1.830m OR LESS COUNTERFORTS ARE NOT REQUIRED. PANELS WITHOUT COUNTERFORTS SHALL BE 205 THICK (NOMINAL). DETAILS WILL BE SHOWN ON CASTING DRAWINGS.

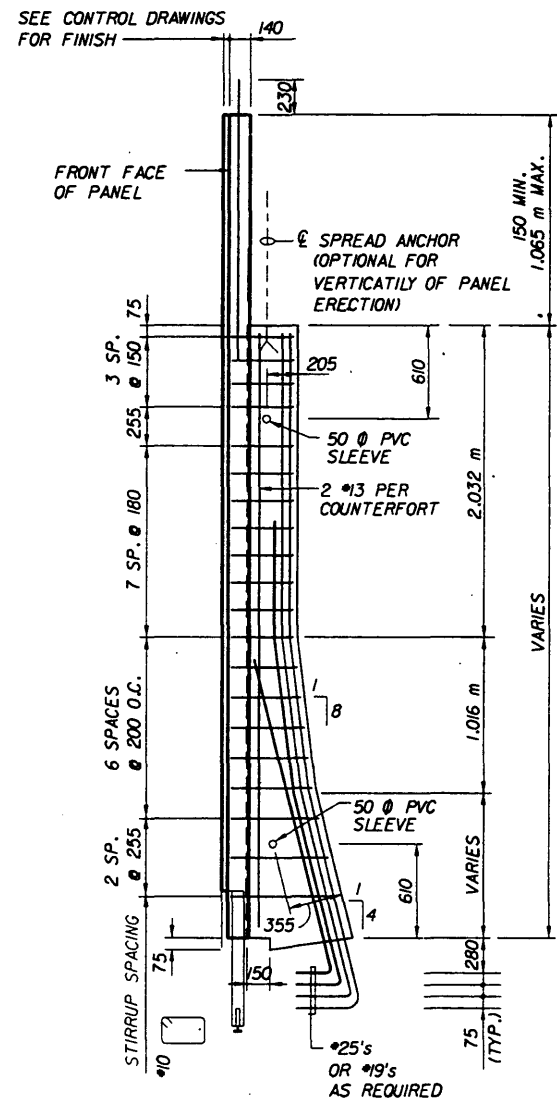
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

RETAINING WALL SYSTEM  
REINFORCED EARTH COMPANY  
TECHWALL

Names	Dates	Approved By					
Designed By	DM 1-99	 State Structures Design Engineer					
Drawn By	DM 1-99						
Checked By	VAR 1-99	Revision	00	Sheet No.	3 of 8	Index No.	5016

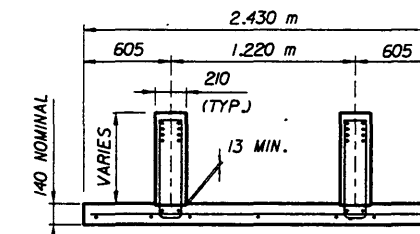


PANEL ELEVATION  
(REINFORCEMENT DETAILS  
MAY VARY WITH PROJECT  
SPECIFICS)



COUNTERFORT - SIDE ELEVATION  
(REINFORCEMENT DETAILS  
MAY VARY WITH PROJECT  
SPECIFICS)

LIST OF MATERIALS	
CONCRETE: PANEL FACING (CM)	VARIABLES
COUNTERFORT, EACH (CM)	VARIABLES
TOTAL (CM)	VARIABLES
TOTAL PANEL WT. (KG)	VARIABLES
50 I.D. X 305 PVC SLEEVE	4
SPREAD ANCHORS	2

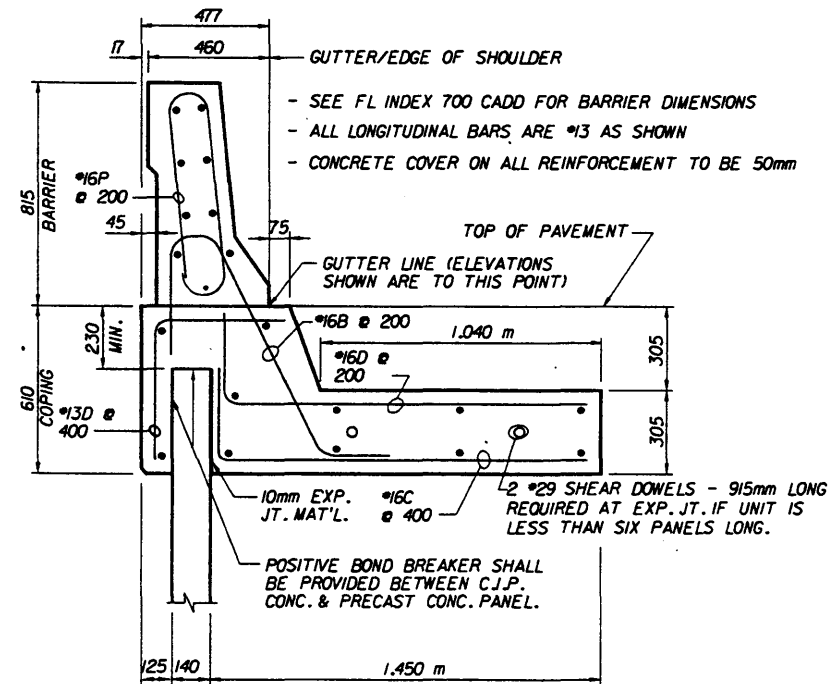


PANEL SECTION

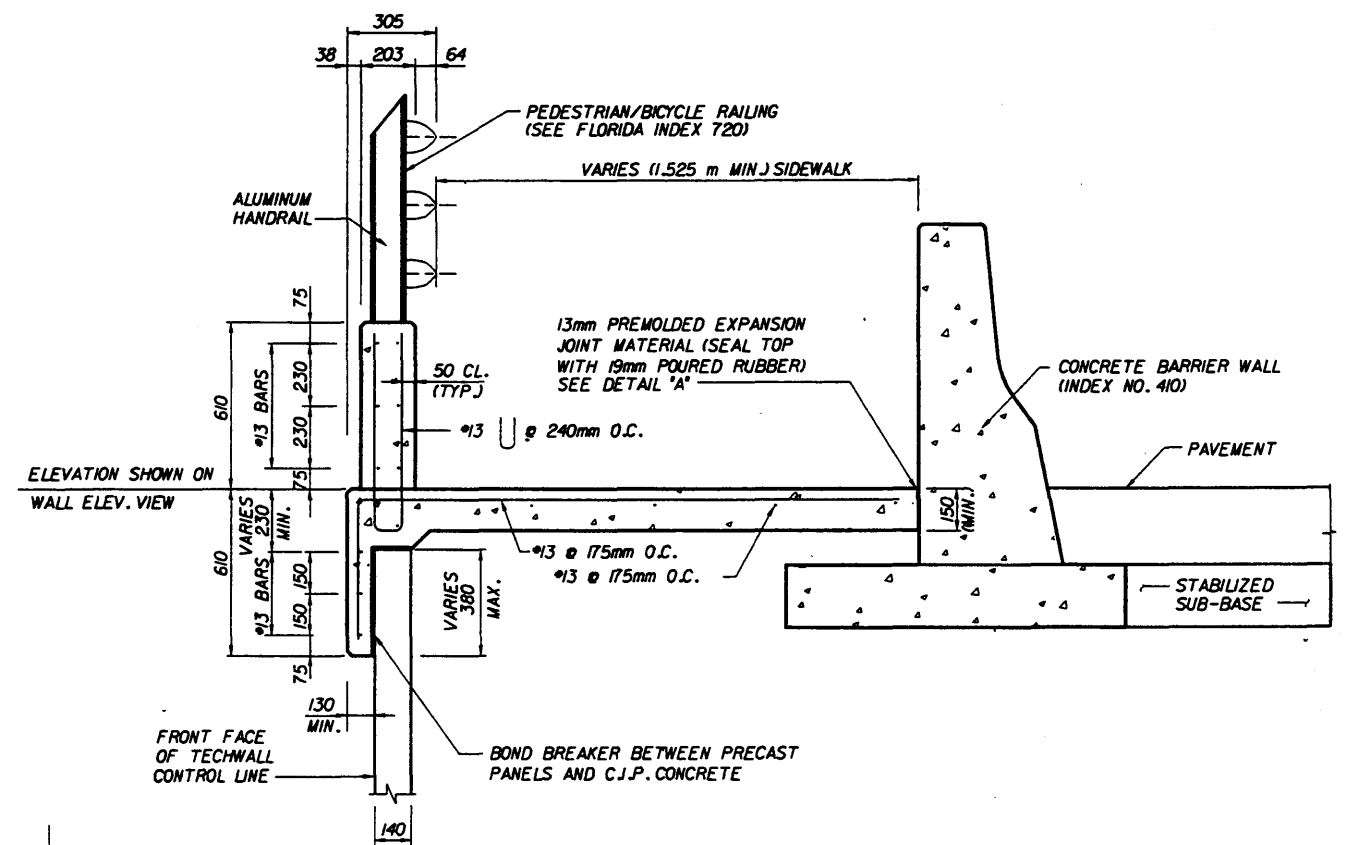
NOTE:  
ALL REBARS IN PRECAST CONCRETE  
SHALL HAVE A 50mm MIN. CONCRETE COVER

THIS SYSTEM SHALL BE USED IN SLIGHTLY OR  
MODERATELY AGGRESSIVE ENVIRONMENTS ONLY  
TECHWALL

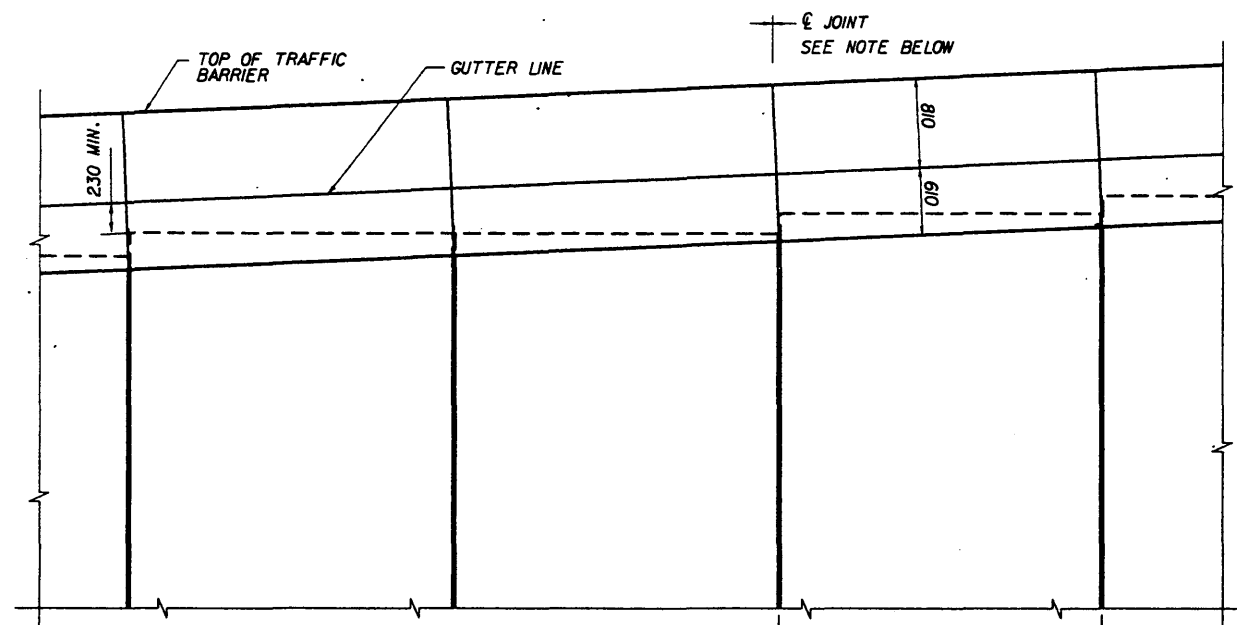
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM REINFORCED EARTH COMPANY TECHWALL</b>				
Designed By	DM	1-99	Approved By	<i>William J. Hark</i>
Drawn By	DM	1-99	State Structures Design Engineer	
Checked By	AA	1-99	Revision	00
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C.J.P. CONC. TRAFFIC BARRIER

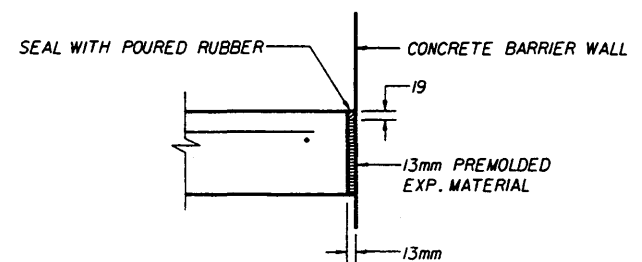


C.J.P. PARAPET DETAIL w/ HANDRAIL



C.J.P. TRAFFIC BARRIER PARTIAL ELEVATION

NOTE:  
13mm OPEN JOINTS IN COPING SHALL BE AT 4 PANEL INTERVALS AND COINCIDE APPROXIMATELY WITH PANEL JOINTS. REINFORCING STEEL SHALL BE STOPPED 50mm SHORT OF EITHER SIDE OF THE JOINTS. CONSTRUCTION JOINTS IN BETWEEN THE OPEN JOINTS SHALL BE PROVIDED AT EVERY PANEL JOINT.



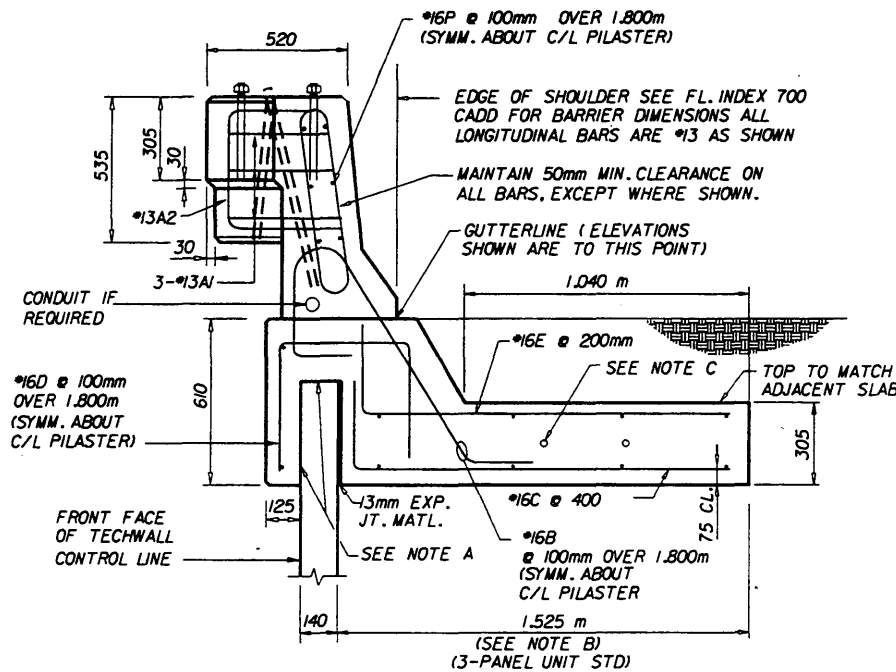
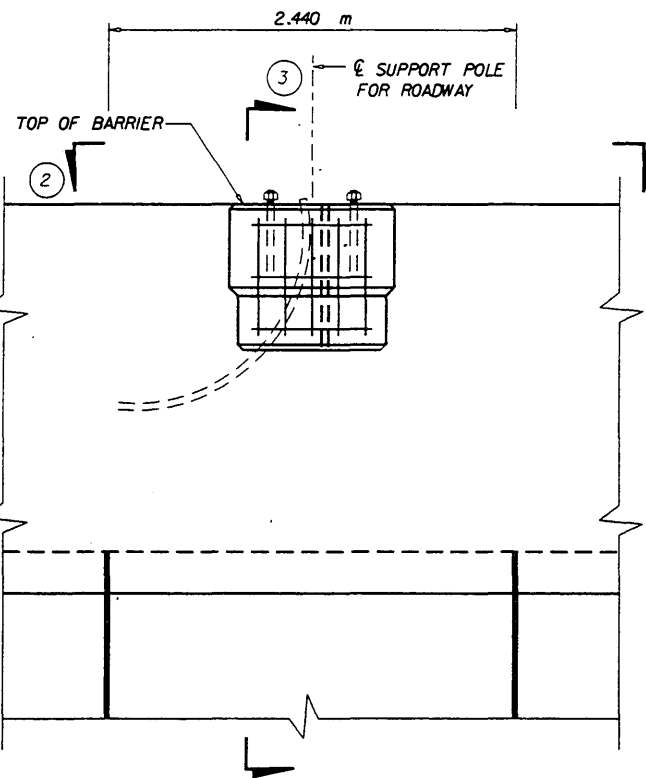
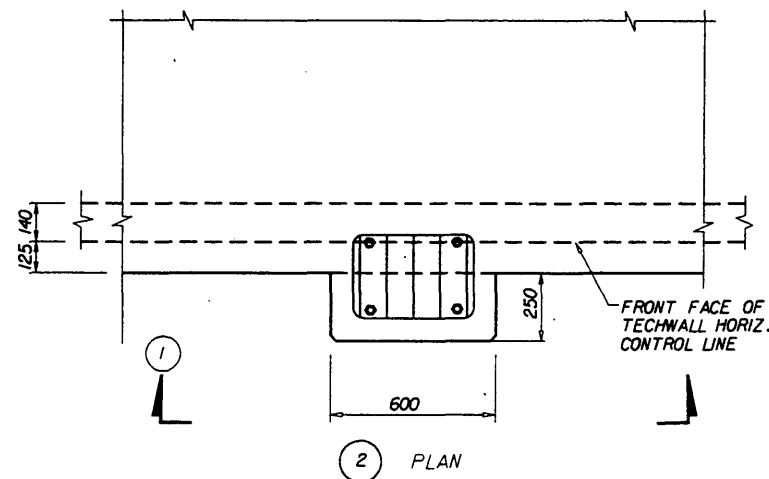
DETAIL 'A'

NOTE:  
ALL REBARS IN PRECAST CONCRETE SHALL HAVE A 50mm MIN. CONCRETE COVER.

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TECHWALL

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM REINFORCED EARTH COMPANY TECHWALL				
Names	Dates	Approved By		
Designed By	DM 1-99	[Signature]		
Drawn By	DM 1-99	Revision	Sheet No.	Index No.
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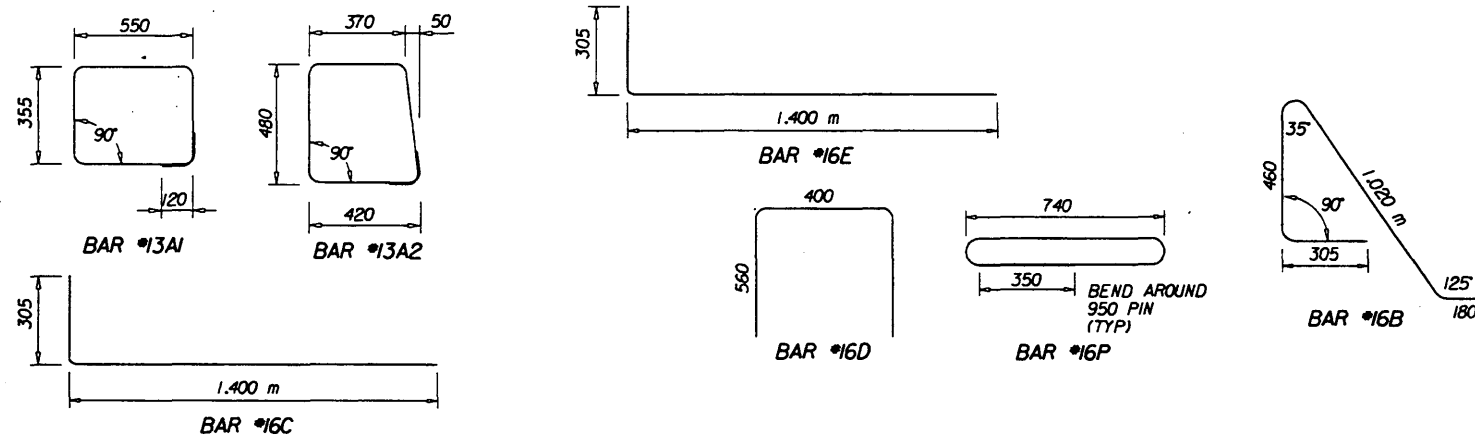


3 BARRIER DETAIL @ LIGHT POLE

NOTES:

- A. POSITIVE BOND BREAKER SHALL BE PROVIDED BETWEEN CAST IN PLACE CONC. AND PRECAST CONC. PANEL.
- B. THE BARRIER JUNCTION SLAB SHALL HAVE THESE DIMENSIONS FOR ONE PRECAST UNIT EITHER SIDE OF LIGHT POLE BARRIER LONGITUDINAL BARS SHALL BE AS SHOWN ABOVE
- C. 2 - #29 SHEAR DOWELS - 915mm LONG
- D. LIGHTPOLE SUPPLIER IS RESPONSIBLE FOR PROVIDING ANCHOR BOLTS THAT EFFECTIVELY TRANSMIT THE LIGHTPOLE LOADS TO THE PILASTER AND FIT THE REINFORCING CAGE.
- E. SEE STANDARD INDEX NO. 500 FOR ADDITIONAL DETAILS.


REBAR SCHEDULE	
MARK	QTY.
#13A1	3
#13A2	5
#16B	18
#16C	4
#16D	18
#16E	9
#16P	18

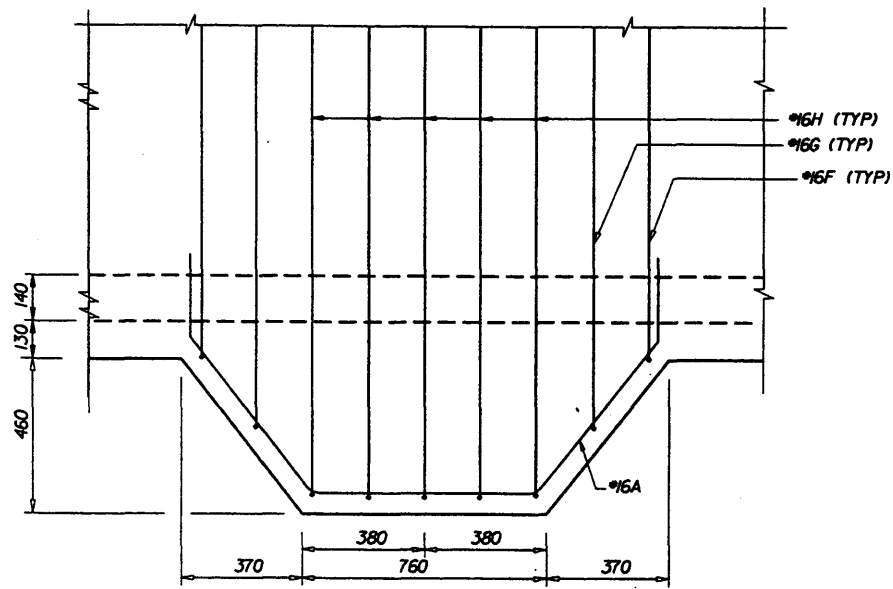


4 BAR BENDING DETAILS

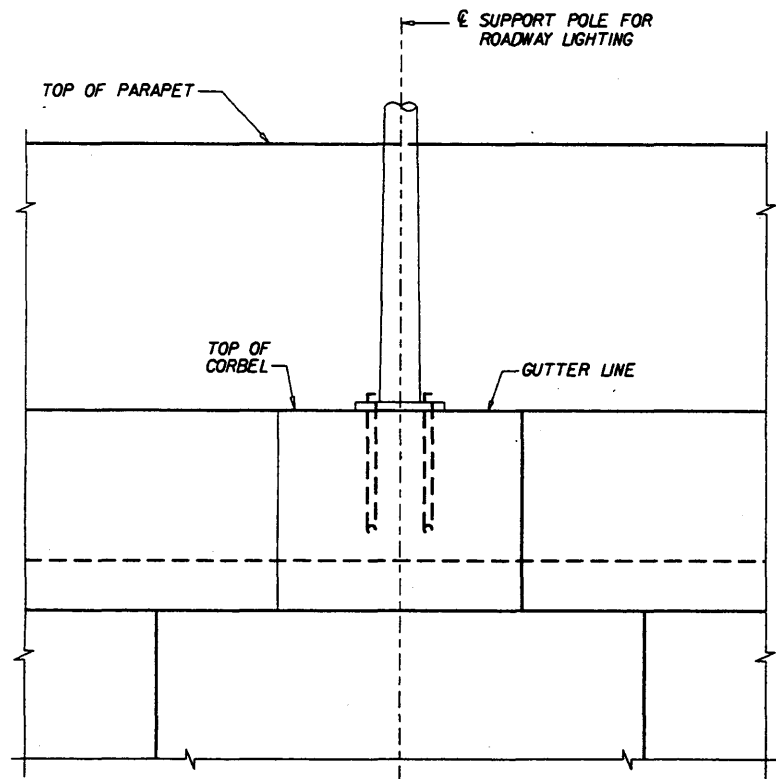
NOTE:  
ALL REBARS IN PRECAST CONCRETE SHALL HAVE A 50mm MIN. CONCRETE COVER.

THIS SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY  
TECHWALL

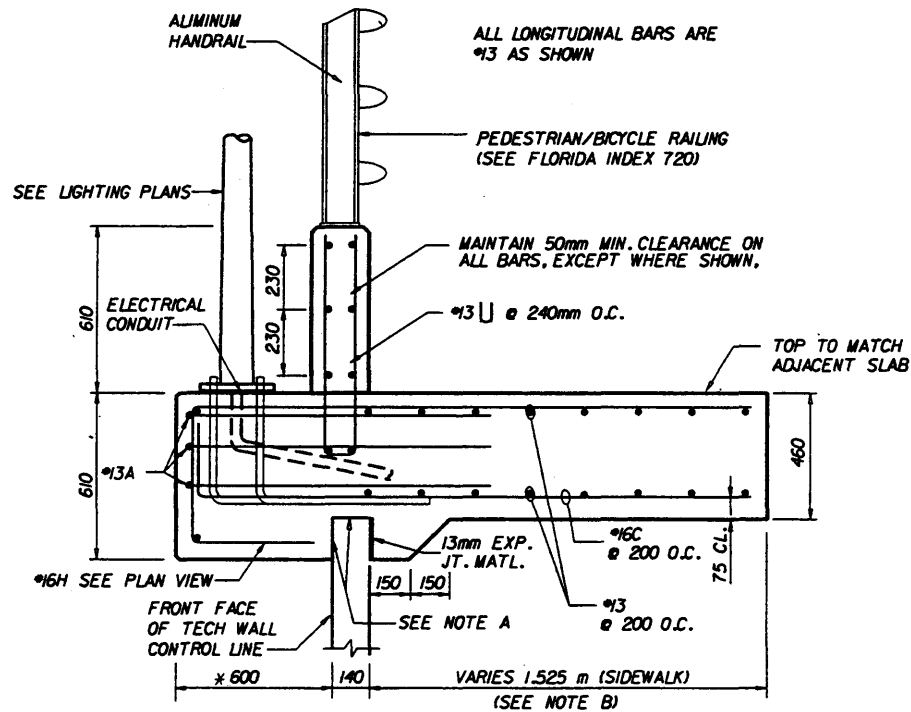
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RETAINING WALL SYSTEM REINFORCED EARTH COMPANY TECHWALL				
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DM	DM	1-79	 State Structures Design Engineer	
Drawn By	DM	1-79		
Checked By	AA	1-79	Revision	00
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1 PLAN



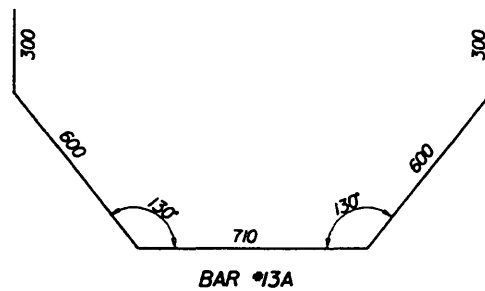
3 PARTIAL ELEVATION



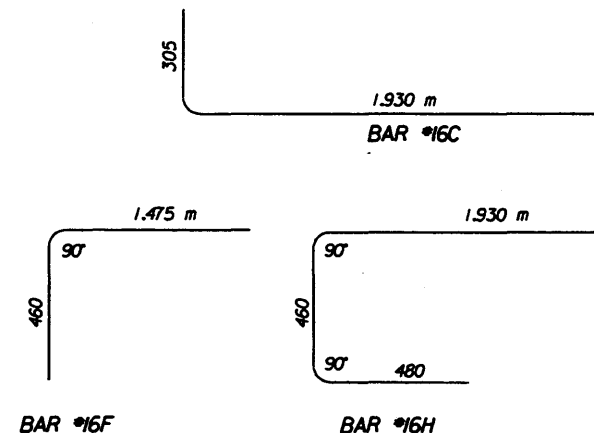
\* DIMENSION MAY VARY AS REQUIRED FOR LIGHT POLE BASE PLATE.

2 BARRIER DETAIL @ LIGHT POLE

REBAR SCHEDULE	
MARK	QTY.
#13A	3
#16C	8
#16F	2
#16G	2
#16H	5
#13U	6

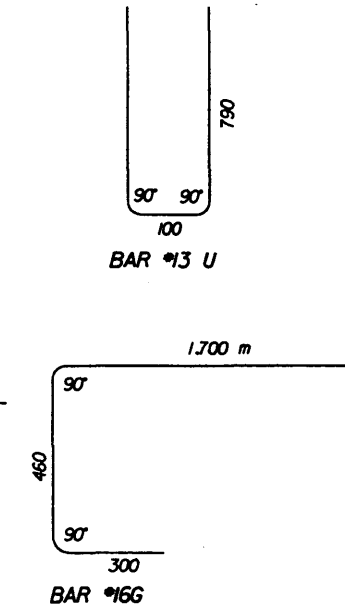


BAR #13A



BAR #16F

BAR #16C



BAR #16G

BAR #13 U

4 BAR BENDING DETAILS

NOTE A:  
POSITIVE BOND BREAKER SHALL BE PROVIDED BETWEEN CAST IN PLACE CONC. AND PRECAST CONC. PANEL.

NOTE B:  
THE BARRIER JUNCTION SLAB SHALL HAVE THESE DIMENSIONS FOR 1.525 m UNIT EITHER SIDE OF LIGHT POLE BARRIER LONGITUDINAL BARS SHALL BE AS SHOWN ABOVE


NOTE C:  
SEE STANDARD INDEX NO. 500 FOR ADDITIONAL DETAILS

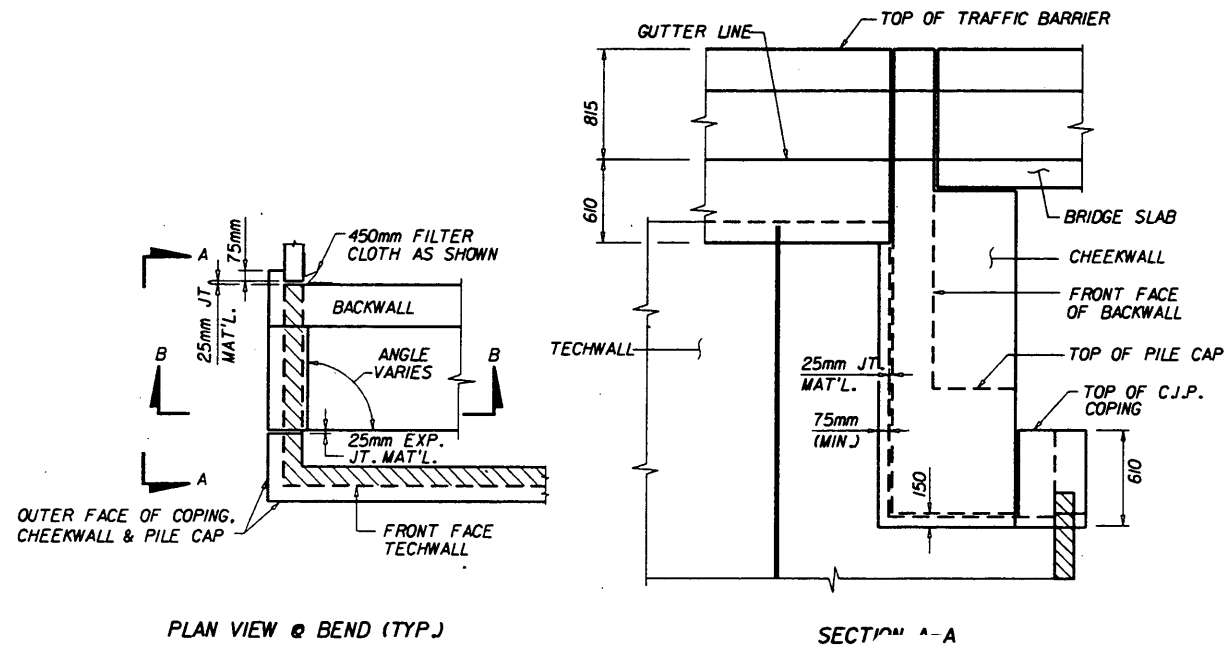
NOTE D:  
LIGHT POLE MANUFACTURER IS RESPONSIBLE FOR PROVIDING ANCHOR BOLTS THAT EFFECTIVELY TRANSMIT LOADS TO THE PILASTER AND FIT THE REINFORCING CAGE.

NOTE:  
ALL REBARS IN PRECAST CONCRETE SHALL HAVE A 50mm MIN. CONCRETE COVER.

THIS SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY

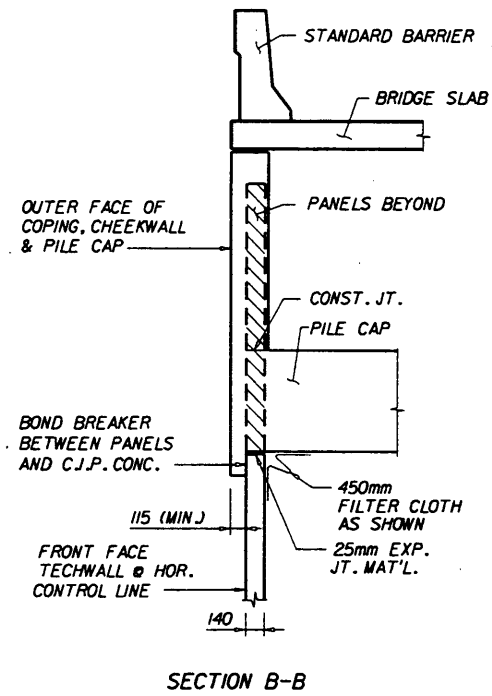
TECHWALL

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		Revision	Sheet No.	Index No.
		00	7 of 8	5016

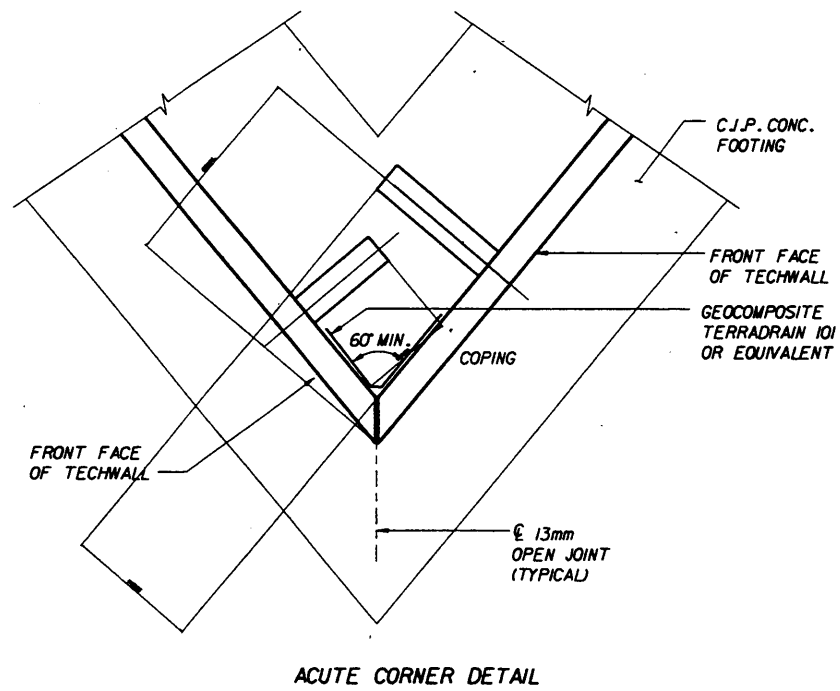


PLAN VIEW @ BEND (TYP.)

SECTION A-A




SECTION B-B

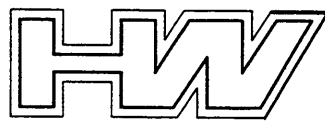


ACUTE CORNER DETAIL

NOTE:  
ALL REBARS IN PRECAST CONCRETE SHALL HAVE A 50mm MIN. CONCRETE COVER.

THIS SYSTEM SHALL BE USED IN SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENTS ONLY  
TECHWALL

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM REINFORCED EARTH COMPANY TECHWALL				
Names	Dates	Approved By		
Designed By	DM 1-99	 State Structures Design Engineer		
Drawn By	DM 1-99			
Checked By	AA 1-99	Revision	00	8 of 8
		Sheet No.		Index No. 5016



# HILFIKER MSE SQUARE PANEL WALL SYSTEM



### GENERAL NOTES

#### DESIGN CRITERIA

1. THE ATTACHED DETAILS ARE BASED ON THE ASSUMPTIONS THAT THE MATERIAL WITHIN THE REINFORCED VOLUME, METHODS OF CONSTRUCTION AND QUALITY OF PREFABRICATED COMPONENTS MEET THE GOVERNING AGENCIES SPECIFICATION FOR MECHANICALLY STABILIZED EARTH STRUCTURES

#### 2. MINIMUM DESIGN PARAMETERS

SEE WALL CONTROL DRAWINGS FOR SOIL CHARACTERISTICS OF FOUNDATION MATERIAL TO BE USED IN THE DESIGN OF THE WALL SYSTEM. THE CONTRACTOR SHALL PROVIDE SOIL DESIGN PARAMETERS FOR BACKFILL MATERIAL BASED ON THE ACTUAL SOIL CHARACTERISTICS UNITIZED AT THE SITE. THE VALUE OF THE INTERNAL FRICTION ANGLE, PHI, THE COHESION, C, AND THE UNIT WEIGHT, GAMMA, SHALL BE PROVIDED IN THE SHOP DRAWINGS.

#### EXTERNAL STABILITY

OVERTURNING  $\geq 2.0$   
SLIDING  $\geq 1.5$   
BEARING PRESSURE  $\geq 2.5$

OVERALL STABILITY  $\geq 1.5$

#### INTERNAL STABILITY

PULLOUT  $\geq 1.5$   
STEEL YIELD STRESS =  $0.47 \times F_y$   
SERVICE LIFE = 75 YEARS  
LIVE LOAD SURCHARGE =  $11.97 \text{ KN/M}^2$

3. THE MAXIMUM APPLIED BEARING PRESSURE AT THE INTERFACE OF THE FOUNDATION AND SELECT BACKFILL MATERIAL IS SHOWN ON THE PLANS. THE BEARING PRESSURE SHOWN IS THE MAXIMUM FOR THE GIVEN BASE MAT LENGTH. IT IS THE RESPONSIBILITY OF OTHERS TO DETERMINE THAT THE BEARING PRESSURE IS ALLOWABLE FOR THAT LOCATION.

4. ANY UNSUITABLE FOUNDATION MATERIAL BELOW THE REINFORCED VOLUME AS DETERMINED BY THE ENGINEER SHALL BE EXCAVATED AND REPLACED WITH SUITABLE MATERIAL AS DIRECTED BY THE ENGINEER.

5. THE DESIGN CONTAINED ON THESE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS. ON THE BASIS OF THIS INFORMATION, T&B STRUCTURAL SYSTEMS IS RESPONSIBLE FOR THE INTERNAL STABILITY OF THE STRUCTURE. EXTERNAL STABILITY DESIGN INCLUDING FOUNDATION AND SLOPE STABILITY IS THE RESPONSIBILITY OF OTHERS.

#### WALL CONSTRUCTION

1. WALLS FOUNDED ON CURVES SHALL HAVE THEIR PANELS DIMENSIONED AS A SERIES OF CORDS (AS DIMENSIONED IN SHOP DRAWINGS) IN ORDER TO MATCH THE REQUIRED WALL RADIUS.

2. FOR LOCATION AND ALIGNMENT OF THE MSE STRUCTURES REFERENCE THE RETAINING WALL CONTROL PLANS.

3. IF MANHOLE AND DROP INLETS ARE REQUIRED, THEY SHALL BE LOCATED AS SHOWN ON THE RETAINING WALL ELEVATION DRAWINGS.

4. IF PILES ARE LOCATED WITHIN THE REINFORCED VOLUME THEY SHALL BE DRIVEN PRIOR TO CONSTRUCTION OF THE WALL UNLESS AN ALTERNATE METHOD IS USED TO ISOLATE THE COLUMNS FROM THE REINFORCED VOLUME AS APPROVED BY THE ENGINEER.

5. BACKFILL MATERIAL SHALL BE COMPACTED IN ACCORDANCE WITH SECTION 548 TO A LEVEL 50mm (PLUS OR MINUS) ABOVE THE ELEVATION OF THE SOIL REINFORCING ELEMENT. NO SOIL REINFORCEMENT SHALL BE ATTACHED TO ANY PANEL BEFORE THE BACKFILL IS PLACED AT THE REQUIRED ELEVATION AND IS COMPACTED.

6. STRUCTURES GREATER THAN 6.10 METERS SHALL HAVE THE FINISHED GRADE PLACED AND COMPACTED AT THE FRONT FACE OF THE STRUCTURE BEFORE THE STRUCTURE HEIGHT EXCEEDS 6.10 METERS. FINISH GRADE SHALL BE COMPACTED TO 95% OF AASHTO T-180 UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

7. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE ANY GUARDRAIL POSTS PRIOR TO PLACING THE TOP ROW OF SOIL REINFORCEMENT. THE POST SPACING SHALL BE ADJUSTED TO AVOID CONFLICTS WITH THE LONGITUDINAL SOIL REINFORCING WIRE. CUTTING OF THE LONGITUDINAL WIRE SHALL BE ALLOWED ONLY AS DIRECTED BY THE ENGINEER.

8. IF EXISTING OR FUTURE STRUCTURES ARE TO BE PLACED IN THE REINFORCED VOLUME THAT INTERFERE WITH THE PROPER PLACEMENT OF THE SOIL REINFORCEMENT THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY FOR A COURSE OF ACTION.

9. TOP COPING PANELS BENEATH CAST-IN-PLACE COPING SHALL HAVE 13mm DOWELS PROTRUDING FROM THEIR TOP EDGE.

10. FOR OTHER INFORMATION PERTAINING TO THE CONSTRUCTION OF THE HILFIKER RETAINING WALL PLEASE REFER TO T&B STRUCTURAL SYSTEMS ERECTION MANUAL.

11. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DEFLECT THE TOP ROW OF SOIL REINFORCEMENT DOWNWARD SO AS TO NOT CONFLICT WITH ROADWAY MIXING OPERATIONS AND/OR ROADWAY CONSTRUCTION OPERATIONS. ANY SOIL REINFORCING MATERIAL THAT IS DAMAGED SHALL BE REPLACED AT THE CONTRACTORS EXPENSE.

#### MISCELLANEOUS NOTES

#### 1. NOMINAL SOIL REINFORCING GRID LENGTH

THE WELDED WIRE MESH IS MANUFACTURED IN LENGTHS CORRESPONDING TO THE DIMENSION 'B' AS GIVEN IN THE RETAINING WALL ELEVATIONS. THE ACTUAL LENGTH FROM THE FRONT FACE OF THE PANEL TO THE TAIL OF THE SOIL REINFORCING GRID IS PLUS 305mm. THIS ACCOUNTS FOR THE THICKNESS OF THE PANEL AND THE LOCATION OF THE CONNECTION OF THE SOIL REINFORCING MAT WITH THE PANEL ANCHOR. THE FOUNDATION SHALL BE EXCAVATED TO AN EXTENT OF 'B' PLUS 305mm.

#### 2. SELECT BACKFILL QUANTITY

THE REQUIRED VOLUME OF IN-PLACE SELECT BACKFILL IS CALCULATED BY MULTIPLYING THE RETAINING WALL FACE AREA BY THE SOIL REINFORCING LENGTH. THIS IS PERFORMED AT EACH INDIVIDUAL SEGMENT OF WALL FOR EACH CORRESPONDING 'B'. THE BACKFILL QUANTITY IF GIVEN BY T&B STRUCTURAL SYSTEMS IS AN ESTIMATE ONLY. THE CONTRACTOR IS ULTIMATELY TO DETERMINE THE QUANTITY OF SELECT BACKFILL MATERIAL THAT IS REQUIRED.

#### 3. PANEL FINISH

THE CONCRETE PANELS SHALL HAVE A PLAIN STEEL FORM FINISH UNLESS OTHERWISE SPECIFIED ON THE RETAINING WALL CONTROL PLANS.

#### 4. THE FOLLOWING MATERIALS ARE SUPPLIED BY T&B STRUCTURAL SYSTEMS

- PRECAST CONCRETE FACING PANEL
- SOIL REINFORCING GRIDS
- CONNECTION PINS
- 1/2" DIAMETER ALIGNMENT PINS
- 60 DURO 3/4" X 8" BEARING PADS
- SYNTHETIC INDUSTRIES GEOTEX 401 NONWOVEN GEOTEXTILE FILTER FABRIC

ANY OTHER MATERIAL REQUIRED TO BUILD THE MSE STRUCTURES ACCORDING TO THE GOVERNING SPECIFICATION SHALL BE SUPPLIED BY THE CONTRACTOR.

5. T&B STRUCTURAL SYSTEM SUPPLIES MECHANICALLY STABILIZED EARTH STRUCTURAL COMPONENTS FOR USE WITH THE HILFIKER RETAINING WALL SYSTEMS FOR THE STRUCTURES DETAILED HEREIN. THE ERECTION MANUAL PROVIDED BY T&B STRUCTURAL SYSTEMS IS A GENERAL GUIDELINE FOR ERECTING THE HILFIKER RETAINING WALL SYSTEM. ALL QUALITY CONTROL PROCEDURES, STAGING PROCEDURES, MATERIAL HANDLING, AND SAFETY IS THE RESPONSIBILITY OF THE CONTRACTOR. THIS DOES NOT RELIEVE THE CONTRACTOR OF THE OBLIGATION TO CONSTRUCT THE RETAINING WALL ACCORDING TO THE PROJECT PLANS AND SPECIFICATIONS AND ALL LAWS OF THE GOVERNING STATE.

## METRIC

\*\*\*THIS SYSTEM FOR USE IN MODERATELY OR SLIGHT AGGRESSIVE ENVIRONMENTS ONLY\*\*

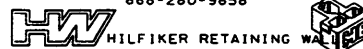
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM HILFIKER SQUARE PANEL</b>				
	Names	Dates	Approved By <i>[Signature]</i>	
Designed By	TPT	12-78	State Structures Design Engineer	
Drawn By	TPT	12-78	Revision	Sheet No.
Checked By	TBW	12-78	00	1 of 13
				5021

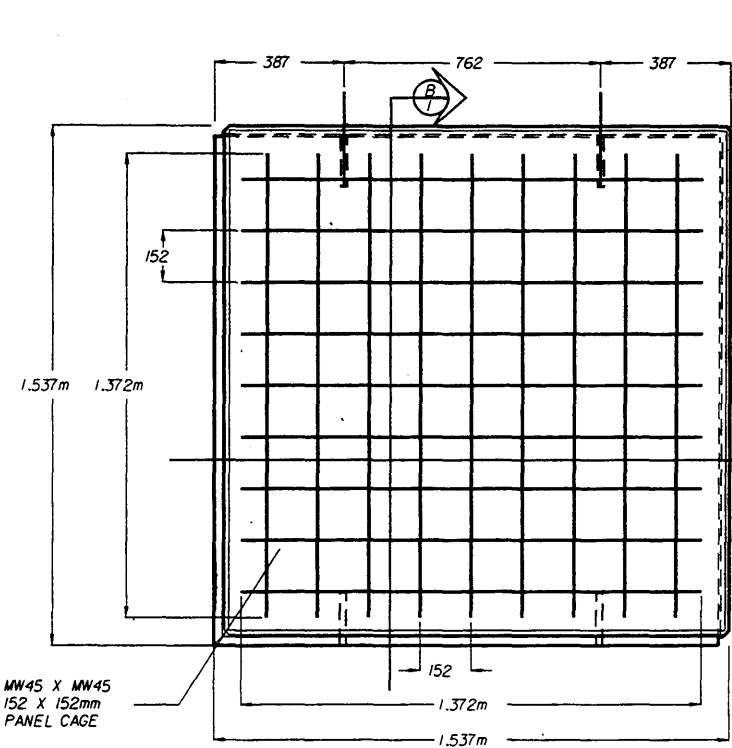
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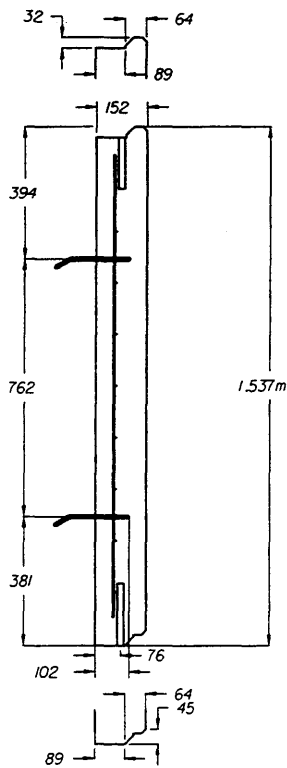
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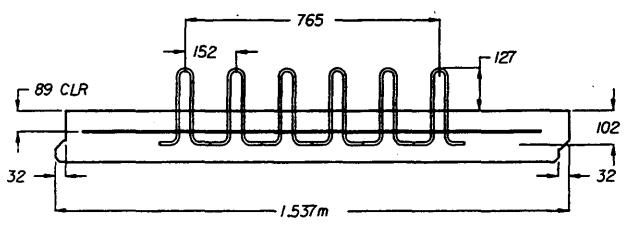




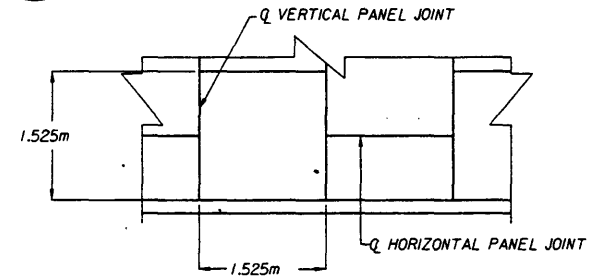
**A** STANDARD SQUARE PANEL  
TYPE G - FRONT FACE



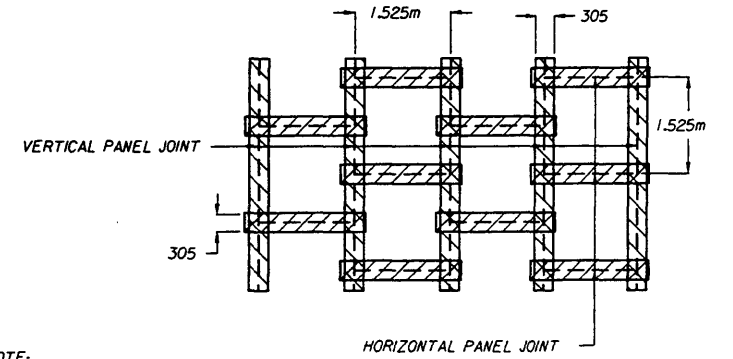
**B** STANDARD SQUARE PANEL  
TYPE G SECTION



**E** STANDARD SQUARE PANEL  
TYPE B/G

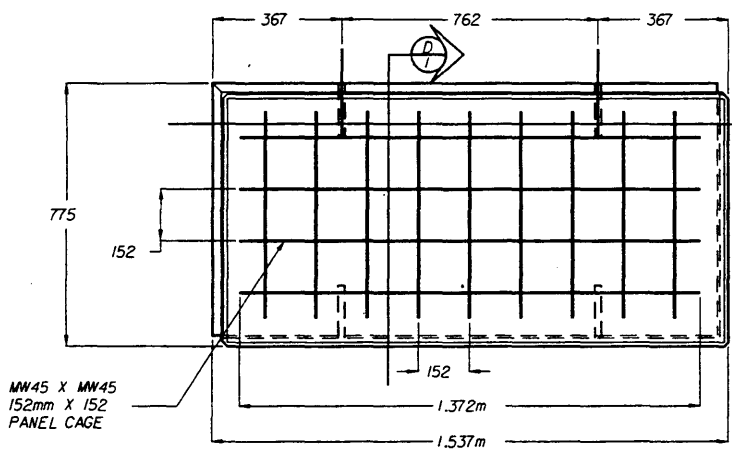


**F** TYPICAL PANEL LAYOUT  
PARTIAL ELEVATION - FRONT FACE

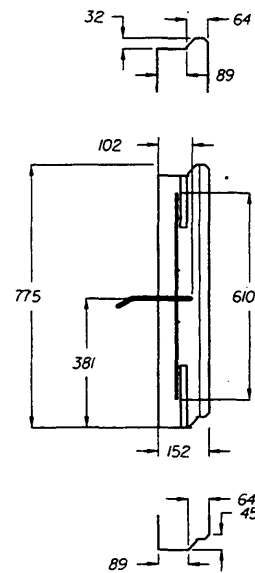


NOTE:  
1. FILTER FABRIC SHALL BE PLACED OVER ALL VERTICAL AND HORIZONTAL JOINTS  
2. FABRIC SHALL BE ADHERED TO BACK FACE OF PANEL WITH THE USE OF AN APPROVED CONSTRUCTION ADHESIVE  
3. MINIMUM OVER LAP OF 305mm REQUIRED BETWEEN ROLLS.

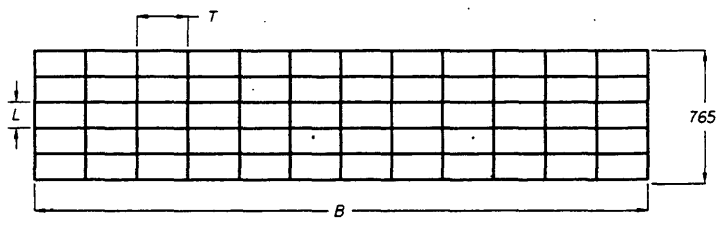
**J** FILTER CLOTH - JOINT DETAIL  
PARTIAL ELEVATION - BACK FACE



**C** STANDARD HALF PANEL  
TYPE B - FRONT FACE

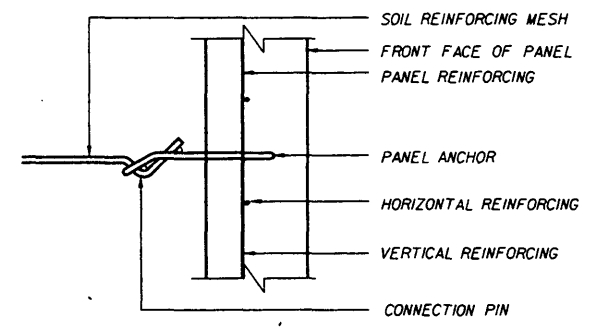


**D** STANDARD HALF PANEL  
TYPE B SECTION



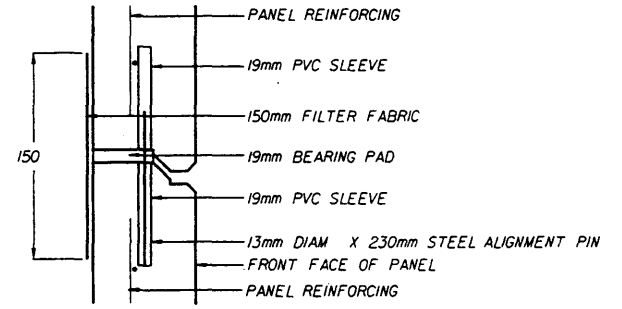
B = LENGTH OF SOIL REINFORCING ELEMENT  
W = WIDTH OF SOIL REINFORCING ELEMENT  
L = LONGITUDINAL WIRE SPACING (155mm MAXIMUM)  
T = TRANSVERSE WIRE SPACING (1.220m MAXIMUM)

**G** SOIL REINFORCING ELEMENT  
MW30 MINIMUM WIRE SIZE

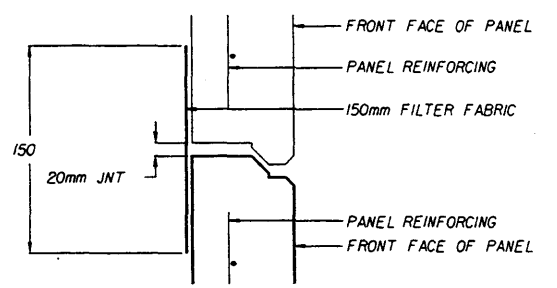


NOTE: ANCHOR SIZE SHALL BE MINIMUM SIZE OF ATTACHED SOIL REINFORCING

**H** CONNECTION DETAIL - TYP



**K** HORIZONTAL JOINT DETAIL  
PARTIAL SECTION

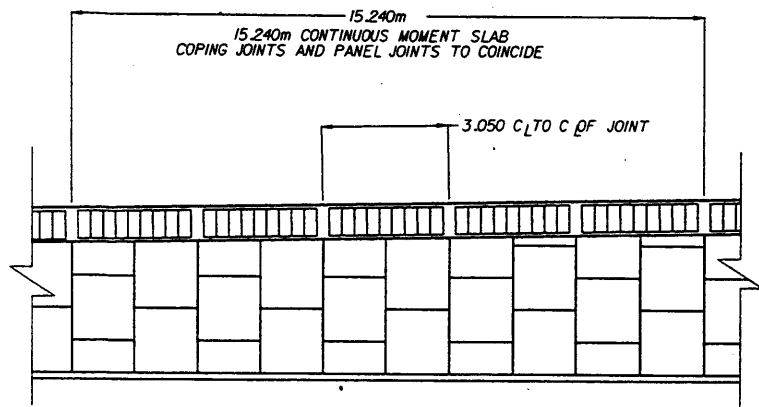


**L** VERTICAL JOINT DETAIL  
PARTIAL SECTION

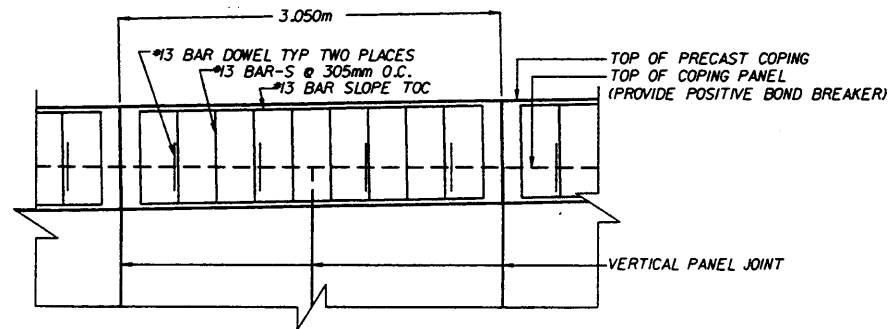
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T. B. STRUCTURAL SYSTEMS INC.  
ENGINEERED STRUCTURES  
637 WEST HURST BLVD.  
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888-280-9858  
HILFIKER RETAINING WALLS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM HILFIKER SQUARE PANEL				
Designed By	TPT	12-98	Approved By	<i>William H. [Signature]</i>
Drawn By	TPT	12-98	Revision	00
Checked By	TBW	12-98	Sheet No.	2 of 13
			Index No.	5021

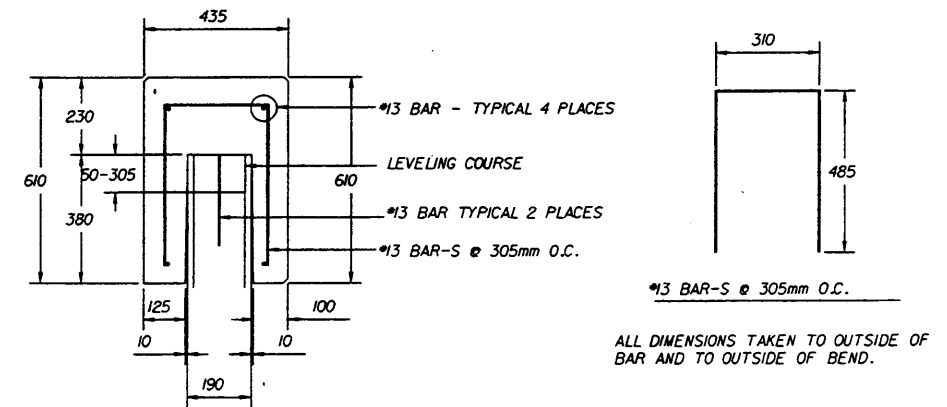


**(A) PRECAST COPING ELEVATION**



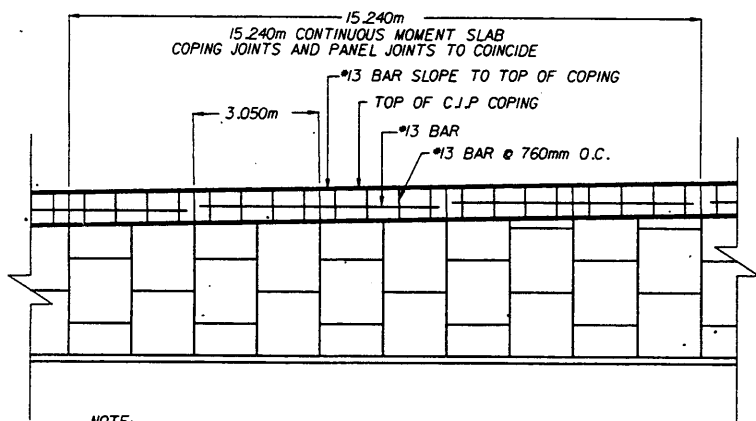
NOTE: PLACE PRE-CAST COPING SO JOINTS LINE UP WITH COPING PANEL BELOW. USE GROUT TO BRING TOP COPING PANEL TO GRADE.

**(B) PRECAST COPING PARTIAL ELEVATION**



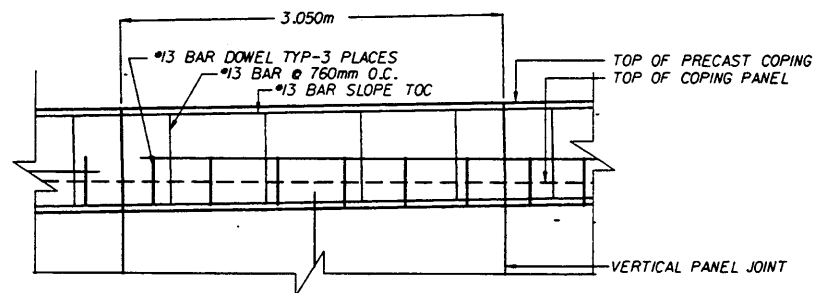
ALL DIMENSIONS TAKEN TO OUTSIDE OF BAR AND TO OUTSIDE OF BEND.

**(C) PRECAST COPING**



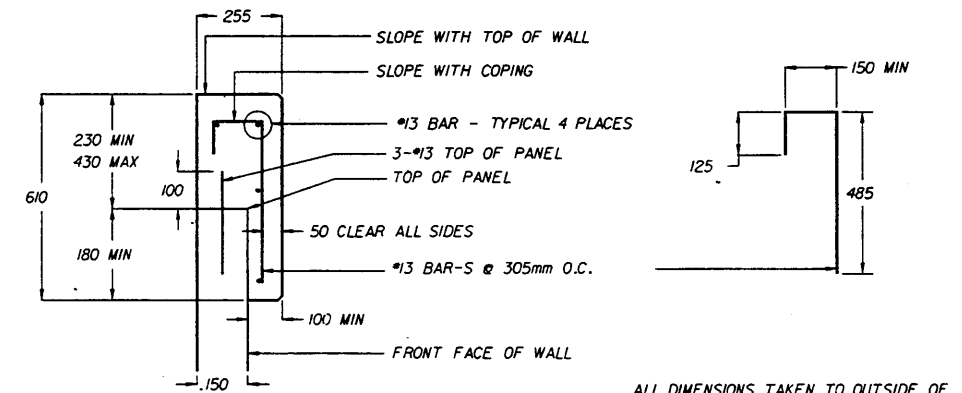
NOTE: JOINTS TO 3.050m O.C. AND SHALL LINE UP WITH THE PANEL JOINT BELOW

**(D) C.I.P. COPING ELEVATION**



NOTE: PLACE PRE-CAST COPING SO JOINTS LINE UP WITH COPING PANEL BELOW. USE GROUT TO BRING TOP COPING PANEL TO GRADE.

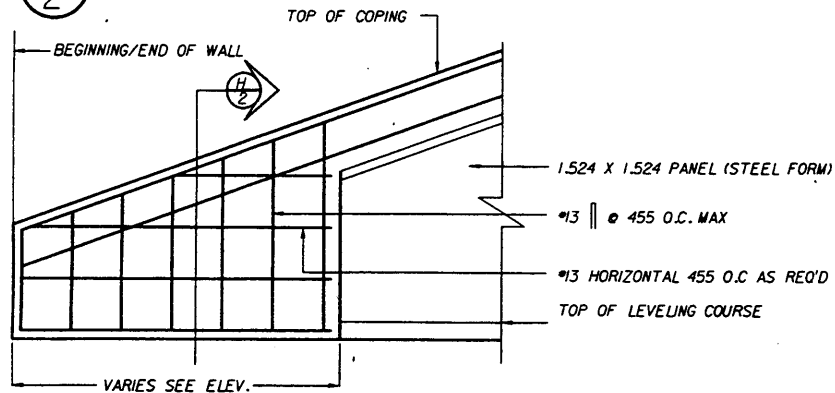
**(E) C.I.P. COPING PARTIAL ELEVATION**



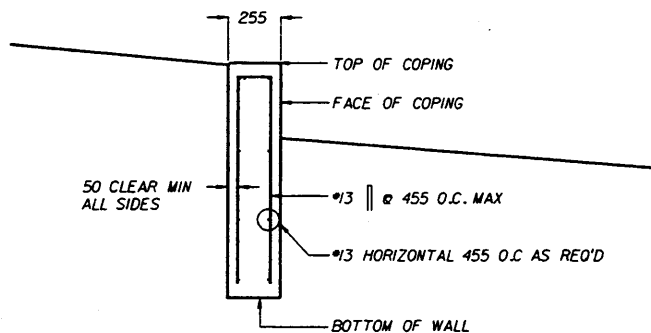
ALL DIMENSIONS TAKEN TO OUTSIDE OF BAR AND TO OUTSIDE OF BEND.

ALL DIMENSIONS AS SHOWN ARE MINIMUMS

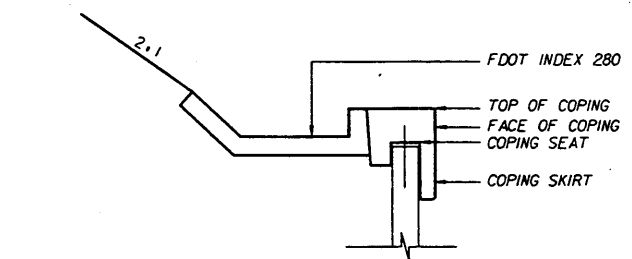
**(F) C.I.P. COPING**



**(G) COPING ENCLOSURE ELEVATION**



**(H) COPING ENCLOSURE SECTION**

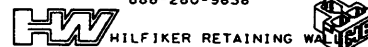


**(I) COPING-DRAINAGE SECTION DETAIL**

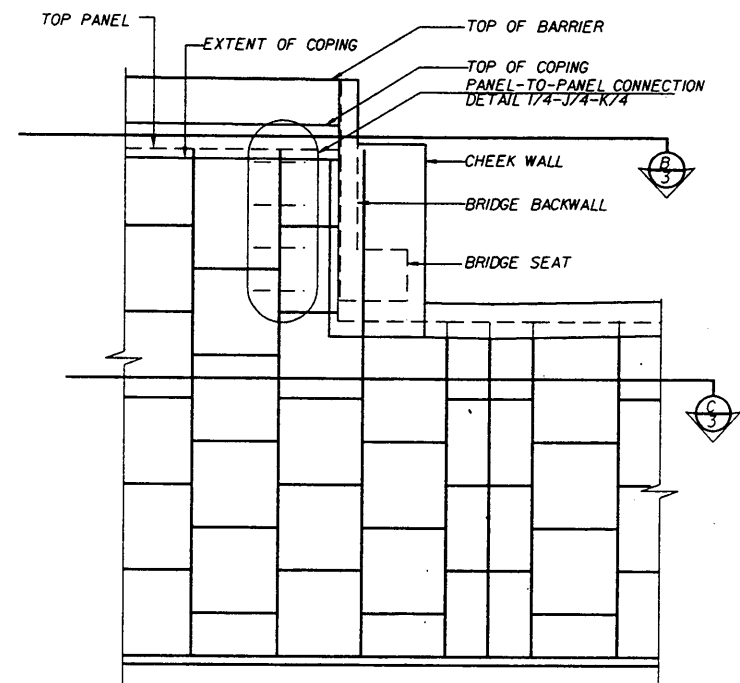
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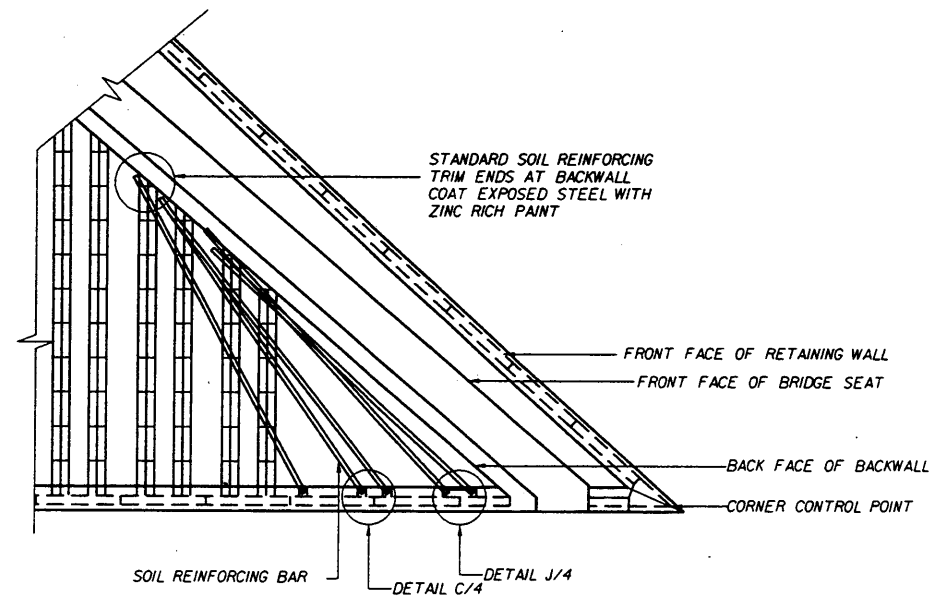
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HURST, TEXAS 76053  
888-280-9858



STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN						
RETAINING WALL SYSTEM HILFIKER SQUARE PANEL						
Names	Dates	Approved By				
Designed By	TPT 12-98	 State Structures Design Engineer				
Drawn By	TPT 12-98				Revision	Sheet No.
Checked By	TBW 12-98				00	3 of 13
				Index No. 5021		

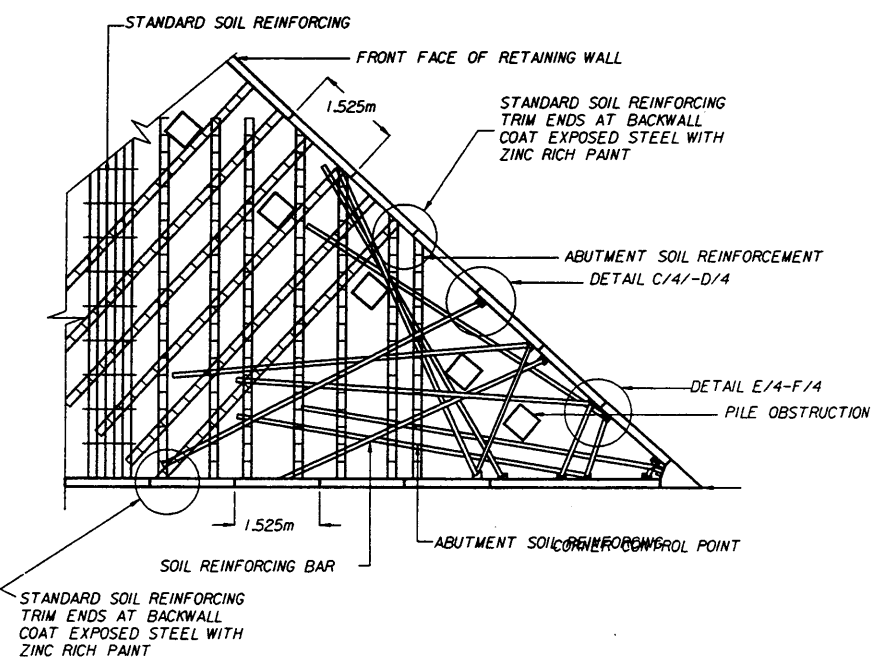


**A**  
3 ELEVATION ACUTE CORNER



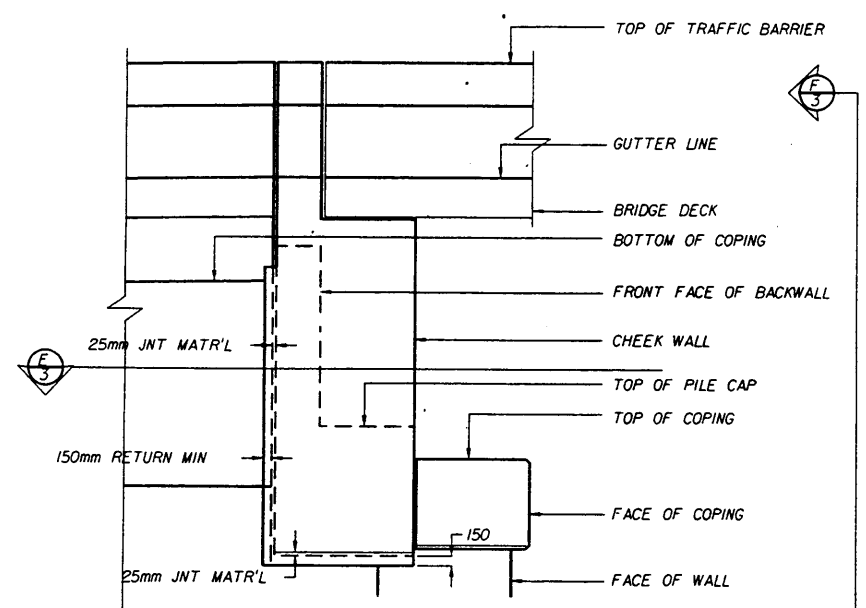
ABUTMENT RETAINING WALL SOIL REINFORCEMENT NOT SHOWN FOR CLARITY  
END BENT BACK WALL REINFORCING NOT SHOWN FOR CLARITY

**B**  
3 ACUTE CORNER PLAN SECTION

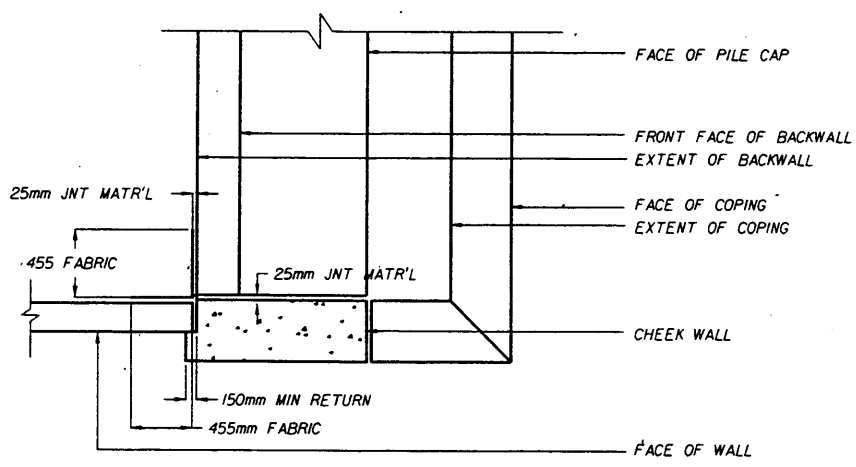


NOTE: REFERENCE DETAIL G/5 FOR ABUTMENT SOIL REINFORCEMENT SHOWN

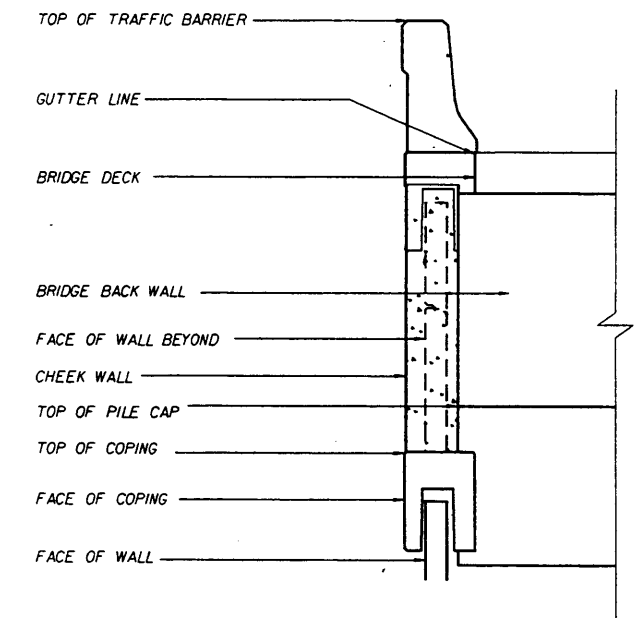
**C**  
3 ACUTE CORNER PLAN SECTION



**D**  
3 ELEVATION AT CHEEK WALL



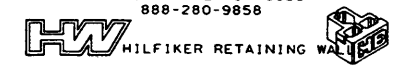
**E**  
3 PLAN SECTION AT CHEEK WALL



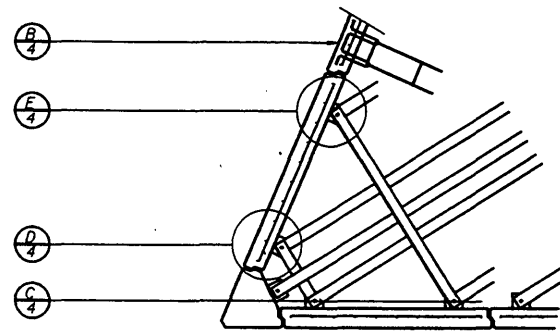
**F**  
3 SECTION AT CHEEK WALL

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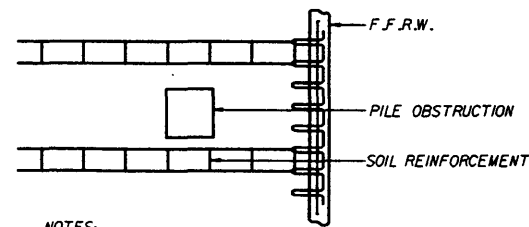
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888-280-9858



STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM HILFIKER SQUARE PANEL</b>				
Designed By	TPT	12-98	Approved By <i>William J. [Signature]</i> State Structures Design Engineer	
Drawn By	TPT	12-98	Revision	Sheet No. 4 of 13
Checked By	TBW	12-98	00	Index No. 5021

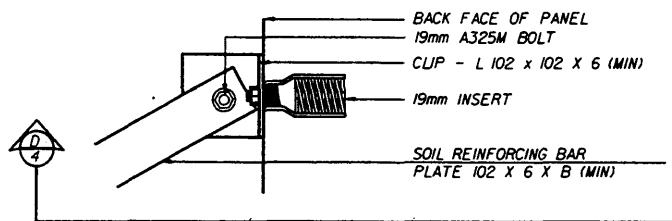


**A ACUTE CORNER DETAIL**  
4 ALL STEEL TO BE HOT DIP GALVANIZED U.N.O.

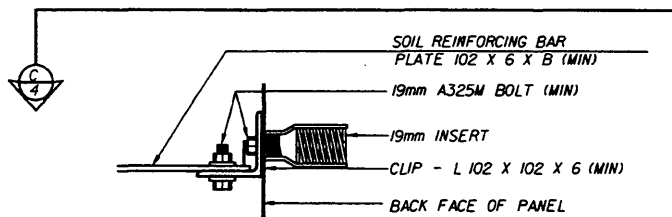


NOTES:  
1. SPACE SOIL REINFORCEMENT SO AS TO MISS OBSTRUCTION

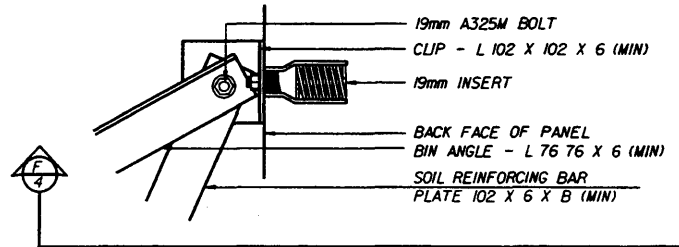
**B CONTINUOUS ANCHOR PLAN**  
4 ALL STEEL TO BE HOT DIP GALVANIZED U.N.O.



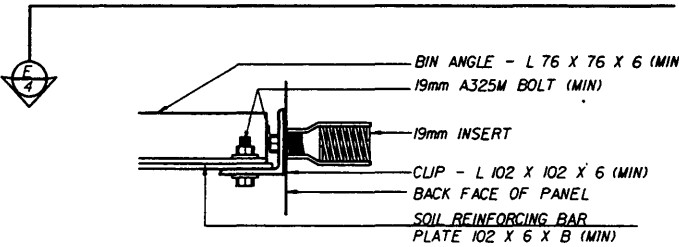
**C SOIL REINFORCING BAR PLAN**  
4



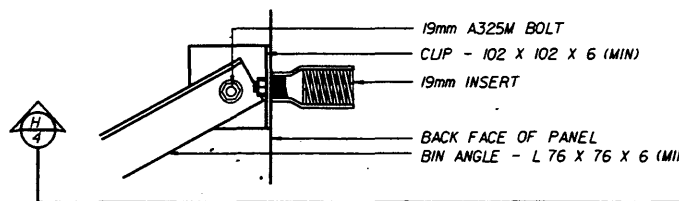
**D SOIL REINFORCING BAR DETAIL**  
4 ALL STEEL TO BE HOT DIP GALVANIZED U.N.O.



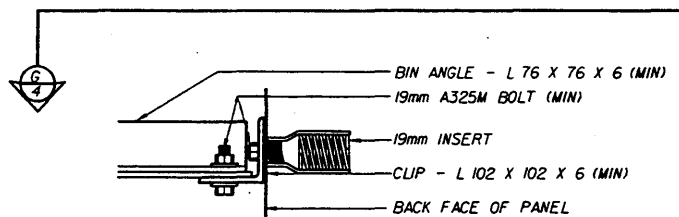
**E COMBINATION ANGLE/BAR PLAN**  
4 ALL STEEL TO BE HOT DIP GALVANIZED U.N.O.



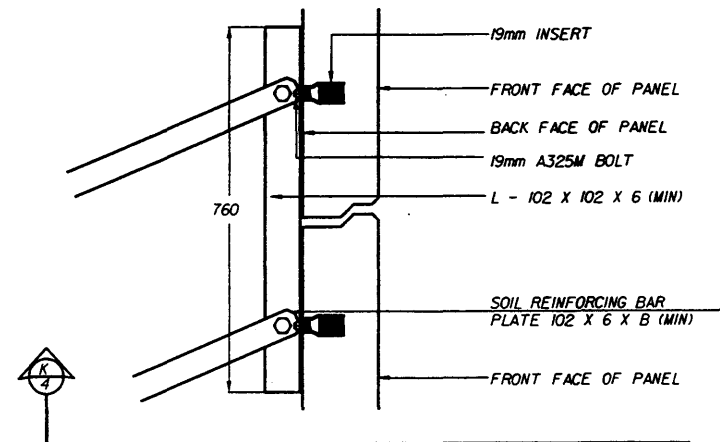
**F COMBINATION STRAP/BAR DETAIL**  
4 ALL STEEL TO BE HOT DIP GALVANIZED U.N.O.



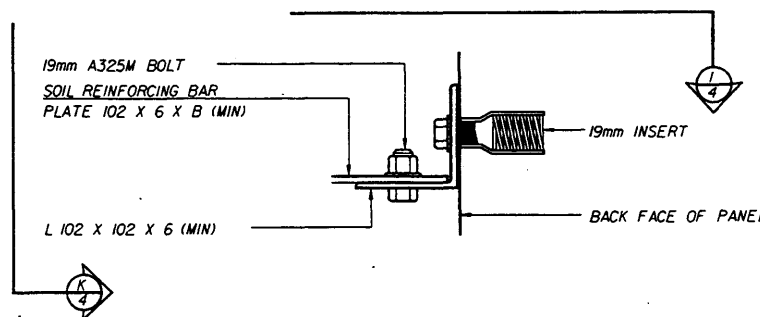
**G BIN CLIP PLAN DETAIL**  
4 ALL STEEL TO BE HOT DIP GALVANIZED U.N.O.



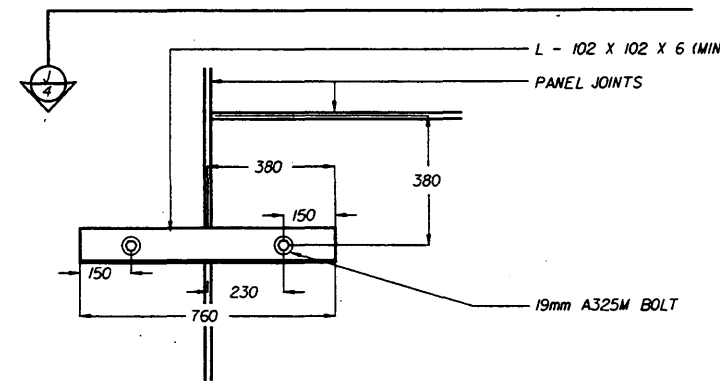
**H BIN CLIP SECTION DETAIL**  
4 ALL STEEL TO BE HOT DIP GALVANIZED U.N.O.



**I PANEL-TO-PANEL CONNECTION PLAN**  
4 ALL STEEL TO BE HOT DIP GALVANIZED U.N.O.



**J PANEL-TO-PANEL CONNECTION SECTION**  
4 ALL STEEL TO BE HOT DIP GALVANIZED U.N.O.

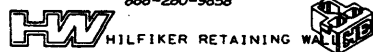


**K PANEL-TO-PANEL CONNECTION ELEVATION**  
4 ALL STEEL TO BE HOT DIP GALVANIZED U.N.O.

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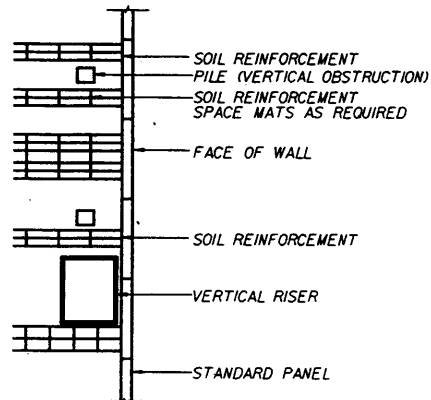


STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

RETAINING WALL SYSTEM  
HILFIKER SQUARE PANEL

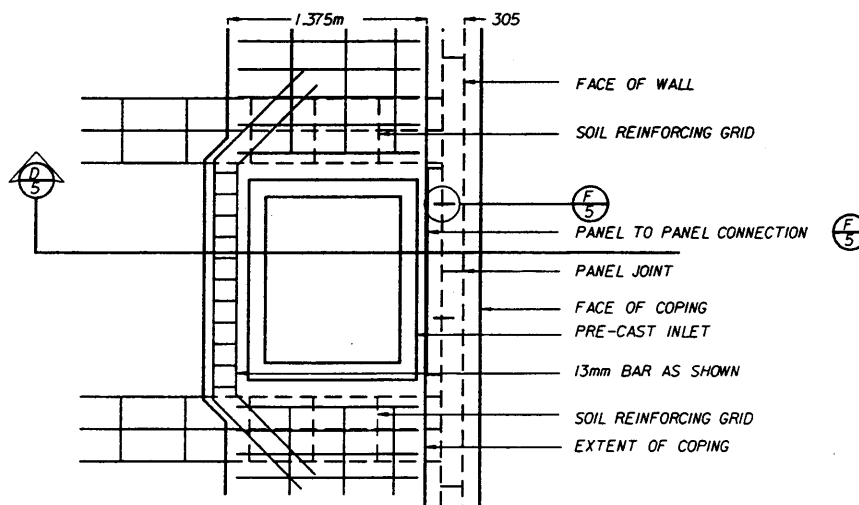
Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By	TPT 12-78	[Signature]			
Drawn By	TPT 12-78		State Structures Design Engineer		
Checked By	TBW 12-78		00	5 of 13	5021



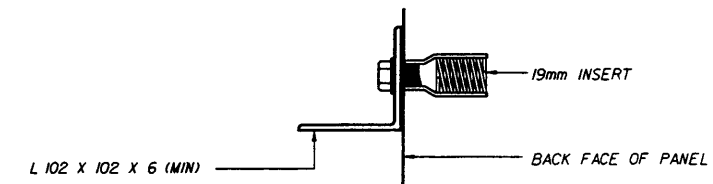


- NOTE:
1. VERTICAL OBSTRUCTIONS REQUIRE SPECIAL DESIGN CONSIDERATIONS
  2. THE DETAIL AS SHOWN IS FOR CONCEPT ONLY AND MAY VARY ON FINAL DESIGN
  3. REFERENCE SPECIAL DESIGN CALCULATIONS FOR DETAILS AND COMPONENT TYPE AND SIZE
  4. OBSTRUCTION SHALL BE INSTALLED BEFORE WALL

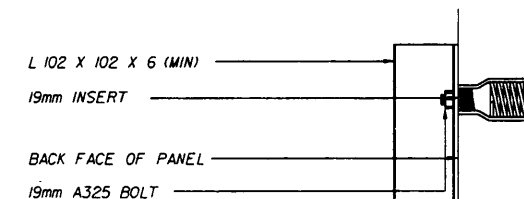
**A**  
5 VERTICAL OBSTRUCTION



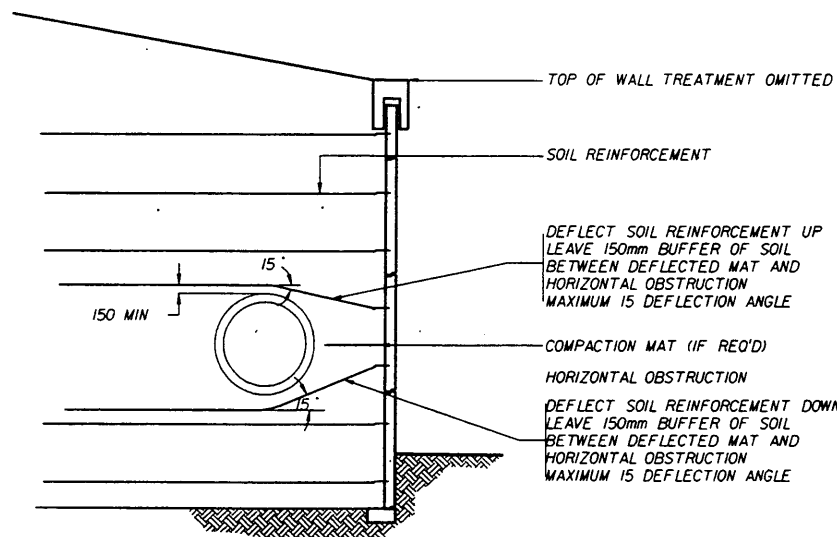
**C**  
5 VERTICAL OBSTRUCTION



**E**  
5 PANEL-TO-PANEL CONNECTION DETAIL SECTION

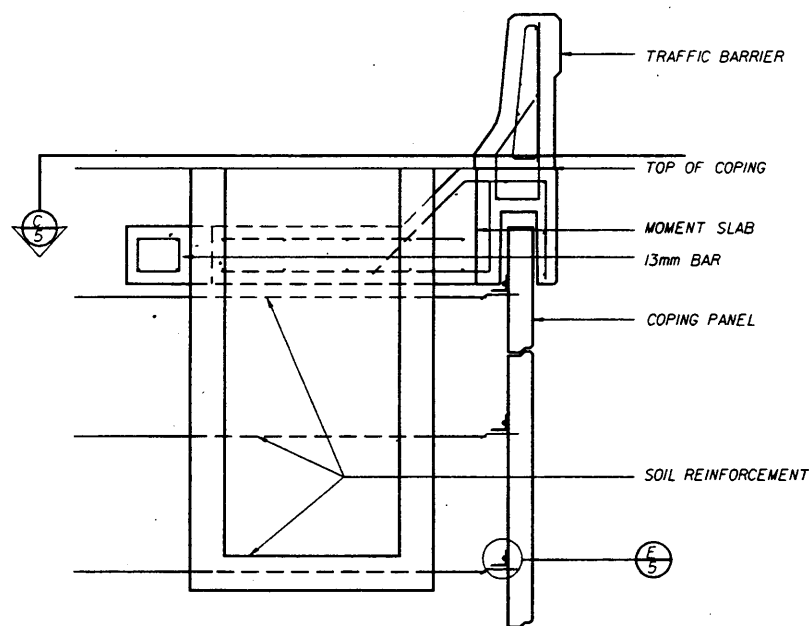


**F**  
5 PANEL-TO-PANEL CONNECTION DETAIL PLAN

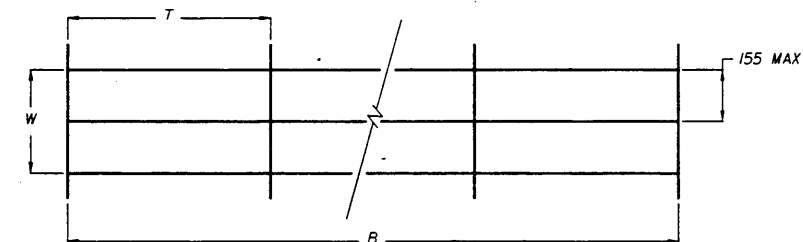


- NOTE:
1. HORIZONTAL OBSTRUCTIONS REQUIRE SPECIAL DESIGN CONSIDERATIONS
  2. THE DETAIL AS SHOWN IS FOR CONCEPT ONLY AND MAY VARY ON FINAL DESIGN
  3. REFERENCE SPECIAL DESIGN CALCULATIONS FOR DETAILS AND COMPONENT TYPE AND SIZE

**B**  
5 HORIZONTAL OBSTRUCTION



**D**  
5 PANEL-TO-PANEL CONNECTION DETAIL



B = SOIL REINFORCING LENGTH  
T = TRANSVERSE WIRE SPACING (1.220M MAX)  
W = WIDTH OF SOIL REINFORCING ELEMENT

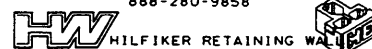
NOTE: THE MAT SHOWN IS USED TO PASS OBSTRUCTIONS AND TYPICALLY IS A WELDED WIRE MESH WITH LARGE DIAMETER WIRES. THE LONGITUDINAL WIRE SHALL BE EQUAL TO OR SMALLER THAN THE PANEL ANCHOR. A MINIMUM OF TWO LONGITUDINAL WIRES IS REQUIRED. THE MINIMUM WIRE SIZE SHALL BE AN MW30

**G**  
5 OBSTRUCTION SOIL REINFORCING PLAN

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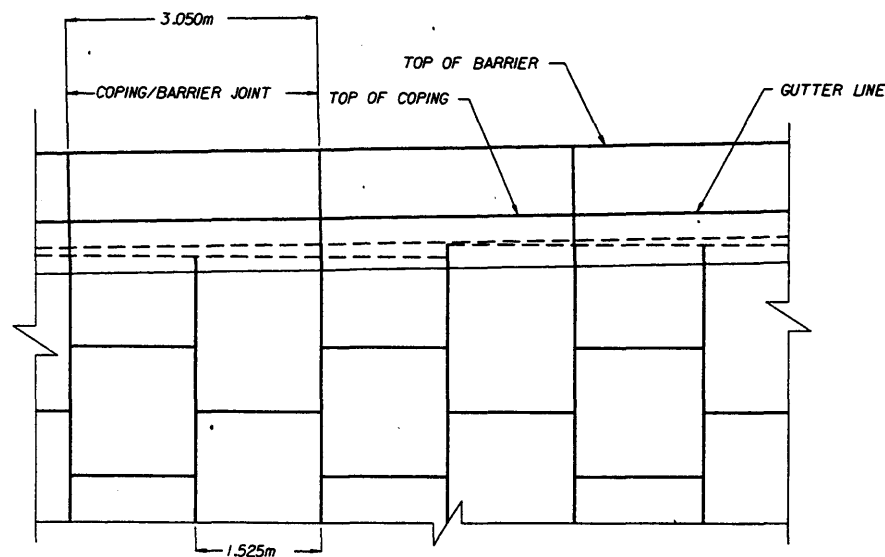
T&B STRUCTURAL SYSTEMS INC.  
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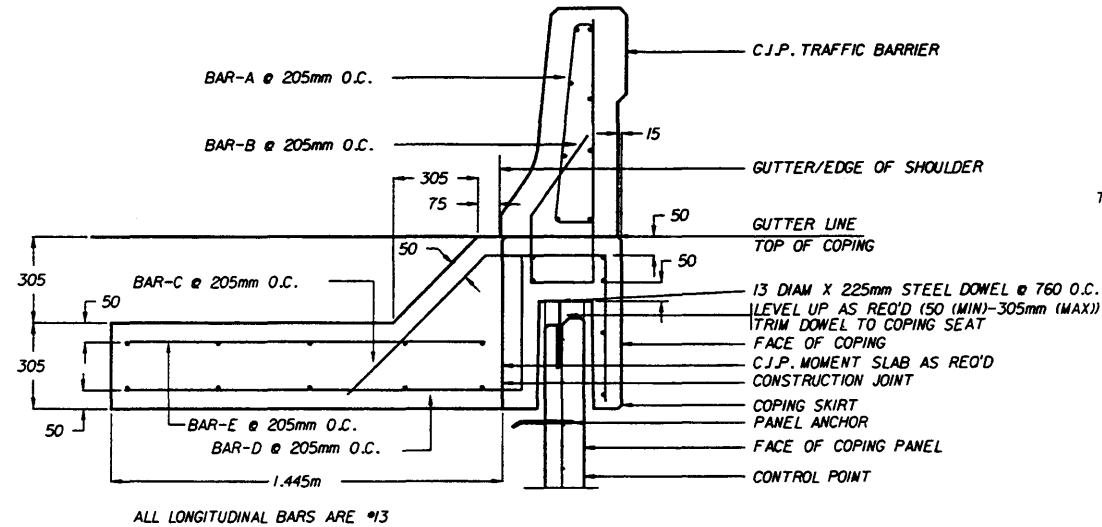
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

RETAINING WALL SYSTEM  
HILFIKER SQUARE PANEL

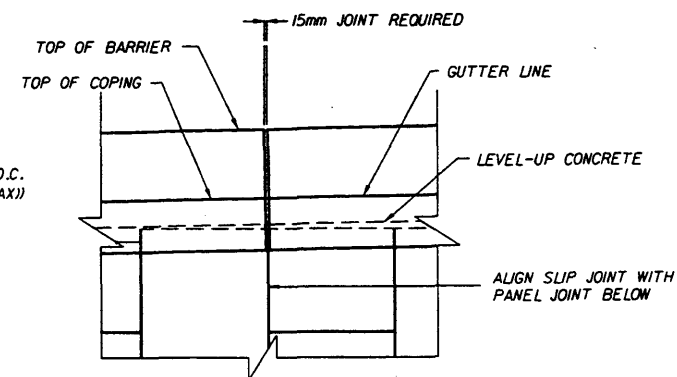
Designed By	Names	Dates	Approved By	State Structures Design Engineer
TPT	TPT	12-78	William J. [Signature]	
Drawn By	TPT	12-78	Revision	Sheet No.
Checked By	TBW	12-78	00	6 of 13
				5021



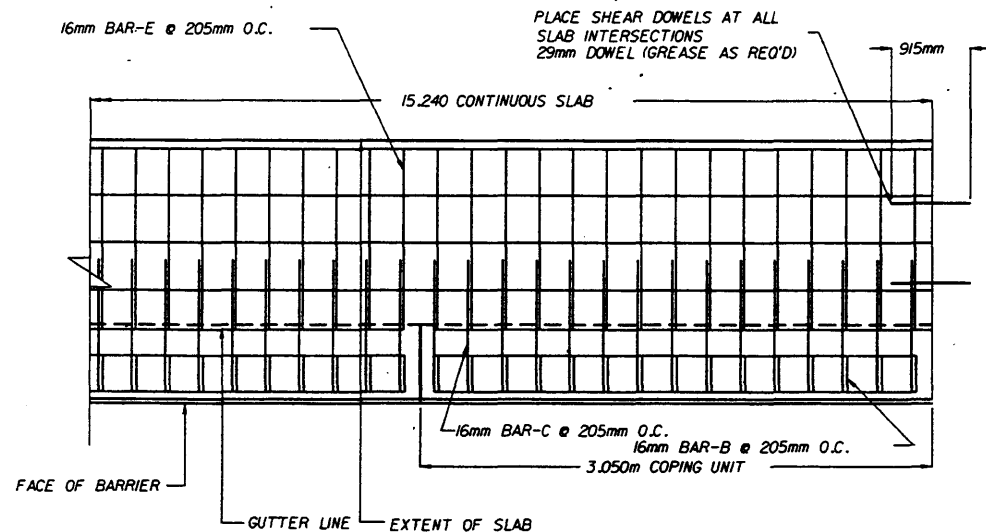
**A** PRECAST COPING WITH C.I.P. BARRIER ELEVATION



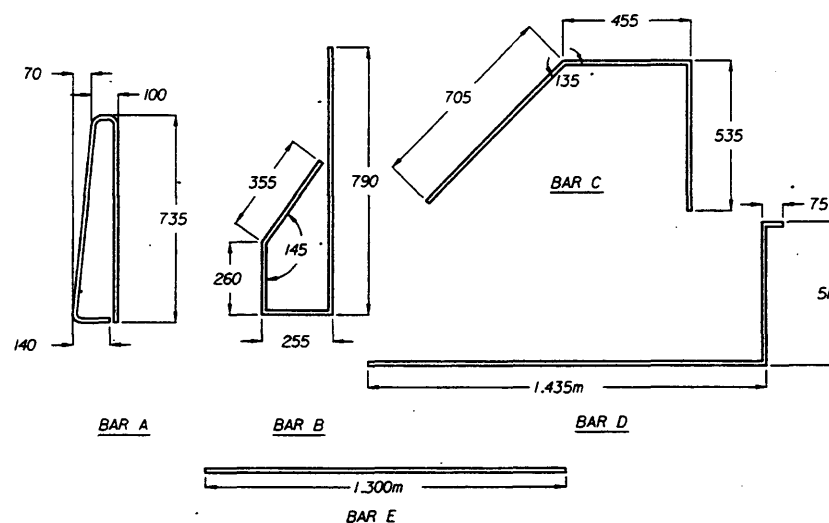
**C** PRECAST COPING WITH C.I.P. BARRIER AND C.I.P. JUNCTION SLAP



**E** TRAFFIC BARRIER SLIP JOINT



**B** PRECAST COPING WITH C.I.P. BARRIER PLAN

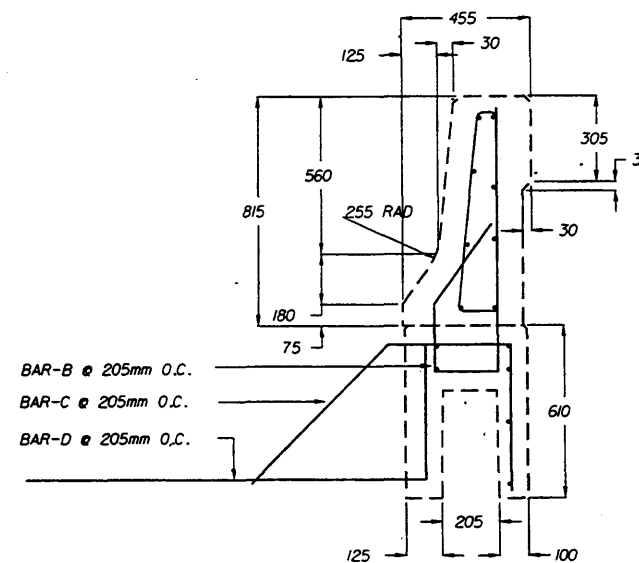


**REBAR SCHEDULE**

MARK	SIZE	QTY	LENGTH	BENDING
A	16	11	AS DETAILED	AS DETAILED
B	16	11	AS DETAILED	AS DETAILED
C	16	11	AS DETAILED	AS DETAILED
D	16	11	AS DETAILED	AS DETAILED

QUANTITIES SHOWN ARE FOR A 3.048m COPING SECTION

**D** PRECAST BARRIER/COPING REINFORCING



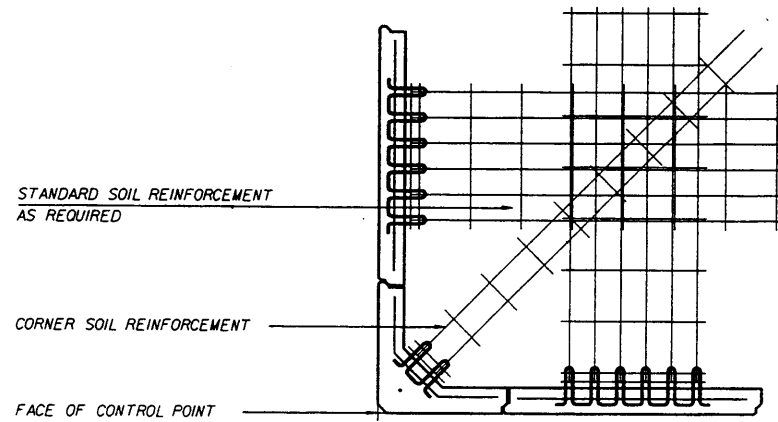
**F** PRECAST COPING REBAR LAYOUT

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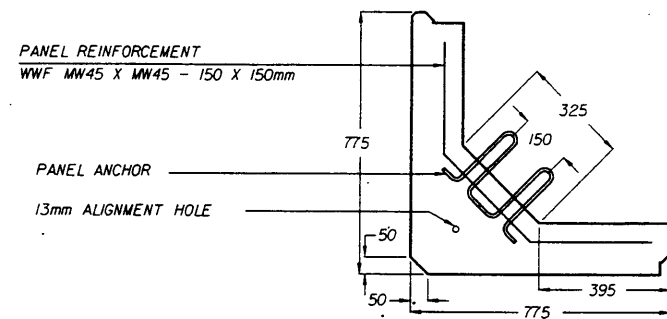
THE DESIGN CONTAINED IN THIS DRAWING IS BASED ON INFORMATION SUPPLIED BY THE FOOT CONSULTANT. TBS IS CERTIFYING THE INTERNAL STABILITY OF THE MASS ONLY. ALL EXTERNAL STABILITY REQUIREMENTS ARE THE RESPONSIBILITY OF THE OWNER.

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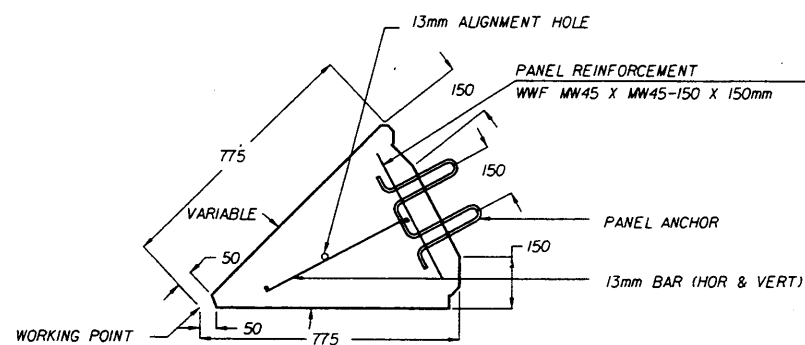
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM HILFIKER SQUARE PANEL				
Names	Dates	Approved By		
Designed By	TPT 12-98	[Signature] State Structures Design Engineer		
Drawn By	TPT 12-98	Revision	Sheet No.	Index No.
Checked By	TBW 12-98	00	7 of 13	5021



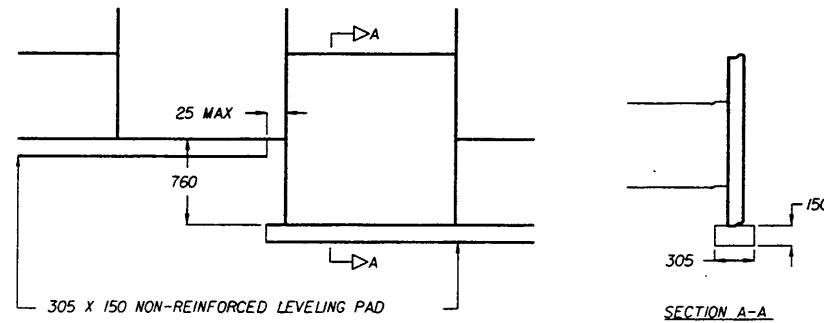
**A** 90° CORNER PLAN



**B** ABTUSE CORNER PANEL  
PANEL ANGLE VARIES FROM 90 TO 180°

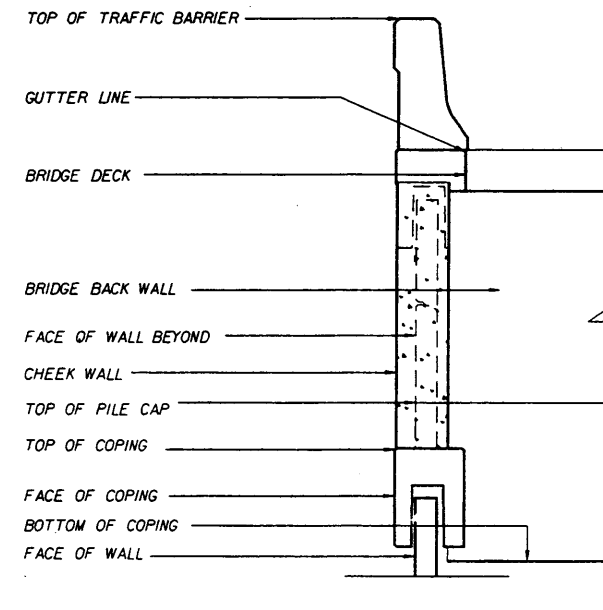


**C** ADJUSTABLE CORNER PANEL

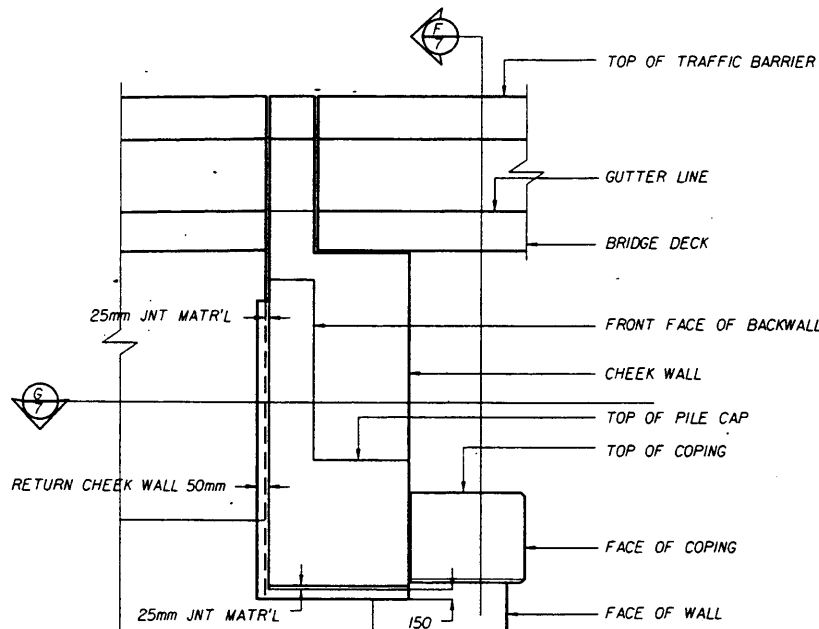


NOTE: LEVELING COURSE SHALL BE PLACED TO THE ELEVATIONS AS SHOWN ON THE PLANS. TOLERANCE FOR ELEVATIONS SHALL BE PLUS-MINUS 3mm

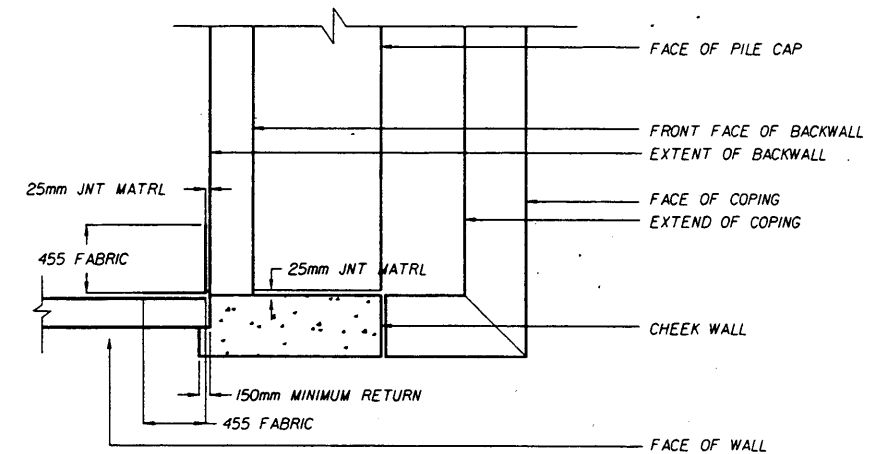
**D** LEVELING COURSE STEP ELEVATION



**F** SECTION AT CHEEK WALL



**E** ELEVATION AT CHEEK WALL

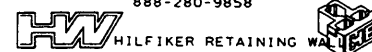


**G** PLAN SECTION AT CHEEK WALL

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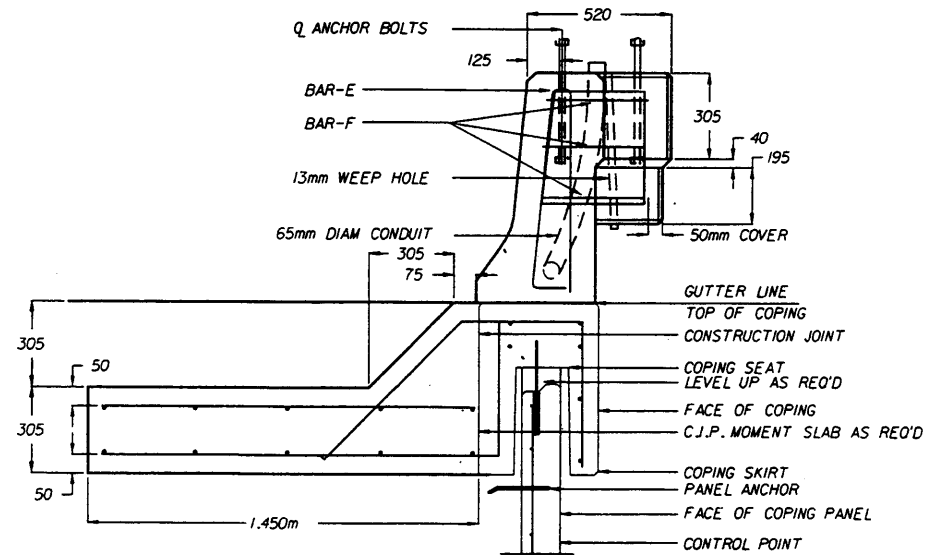
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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

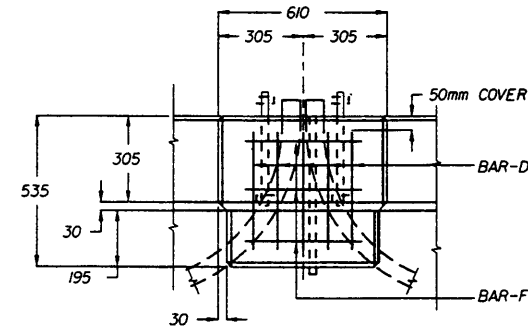
RETAINING WALL SYSTEM  
HILFIKER SQUARE PANEL

Names	Dates	Approved By	State Structures Design Engineer
Designed By	TPT 12-98	<i>William J. J...</i>	
Drawn By	TPT 12-98	Revision	Sheet No.
Checked By	TBW 12-98	00	8 of 13
			Index No. 5021



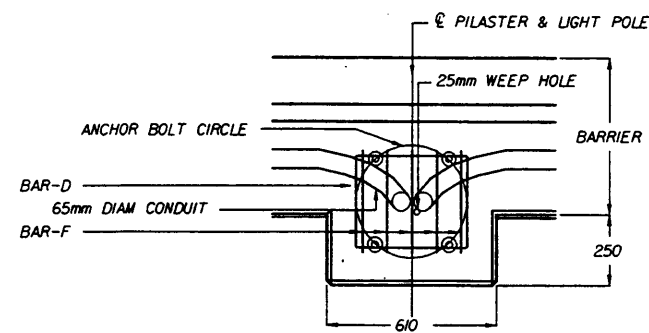
FOR ADDITIONAL DETAILS REFERENCE FOOT LIGHT POLE PILASTER FL INDEX 500  
FOR JUNCTION SLAB DIMENSIONS AND REINFORCING REFERENCE SHEET HW-6

**A**  
**8** PRECAST COPING WITH PILASTER SECTION



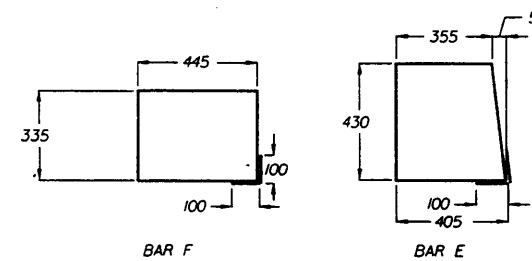
FOR ADDITIONAL DETAILS REFERENCE FOOT LIGHT POLE PILASTER FL INDEX 500

**C**  
**8** PILASTER ELEVATION



FOR ADDITIONAL DETAILS REFERENCE FOOT LIGHT POLE PILASTER FL INDEX 500

**B**  
**8** PILASTER PLAN VIEW



REBAR SCHEDULE

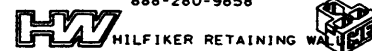
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F	16	3	AS DETAILED	AS DETAILED

**D**  
**8** PILASTER REINFORCING SCHEDULE

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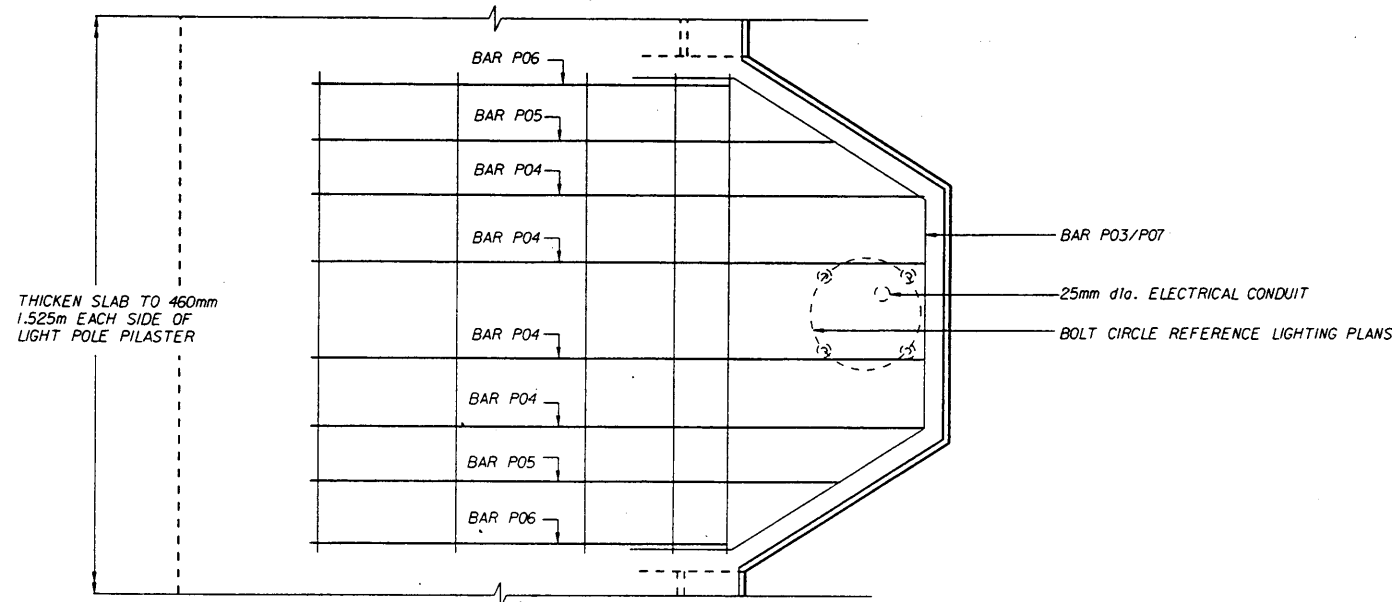
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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

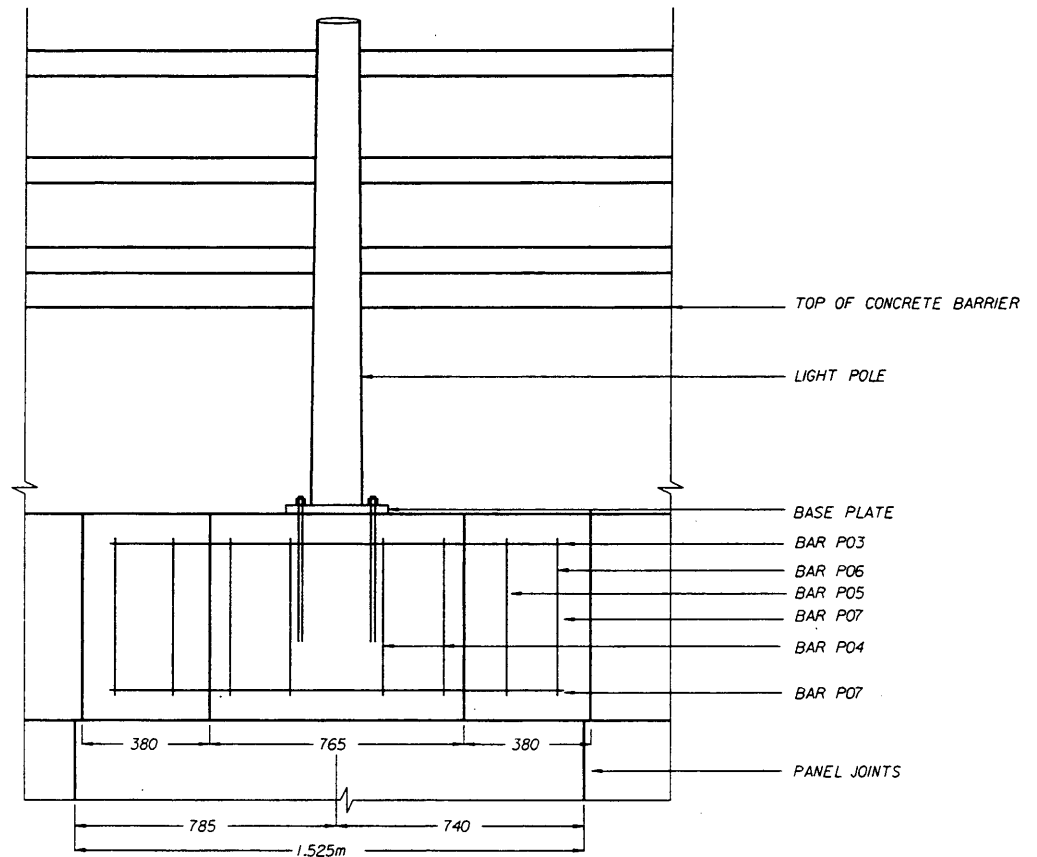
RETAINING WALL SYSTEM  
HILFIKER SQUARE PANEL

Names	Dates	Approved By		
Designed By	TPT 12-98	<i>William J. Walker</i> State Structures Design Engineer	Revision	Sheet No.
Drawn By	TPT 12-98		00	9 of 13
Checked By	TBW 12-98			Index No. 5021



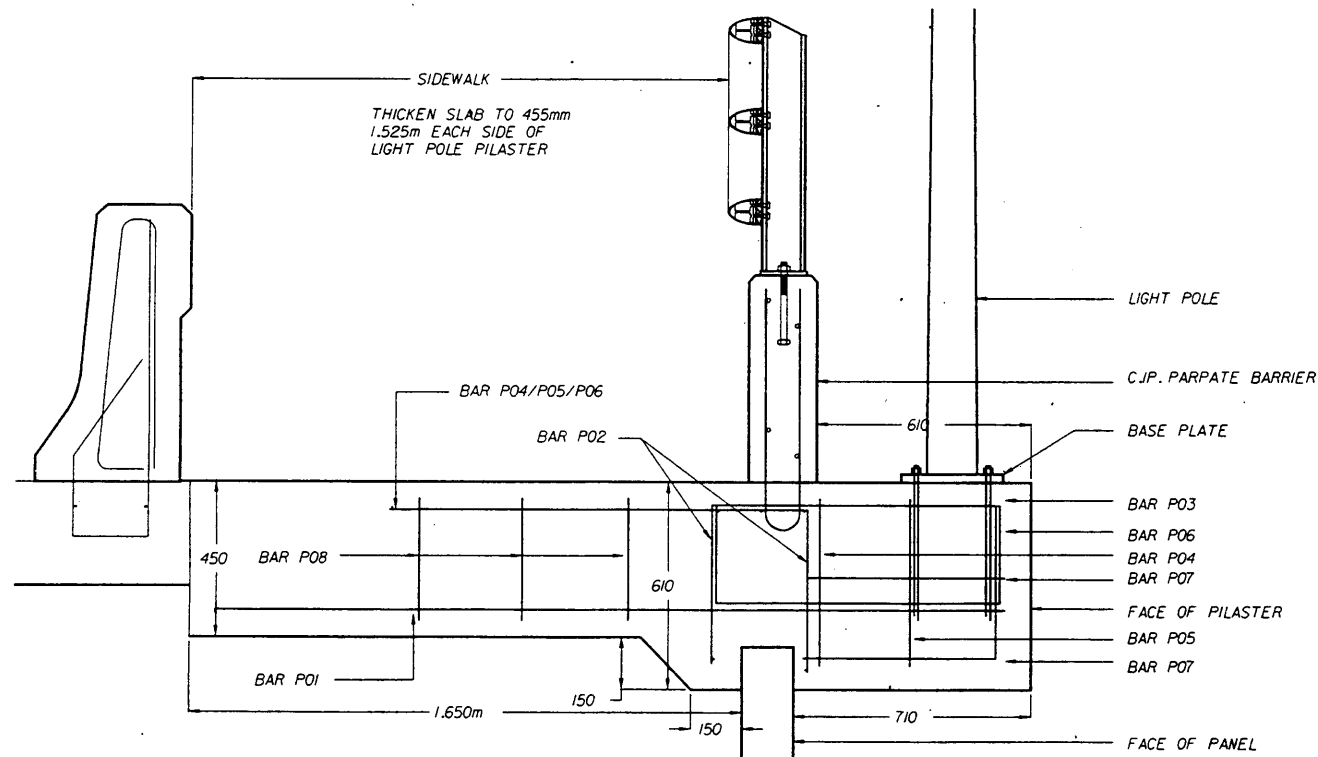
FOR ADDITIONAL DETAILS REFERENCE FL INDEX 710

**A** PLAN BARRIER DETAIL @ LIGHT POLE  
 HORIZONTAL REINFORCING NOT SHOWN FOR CLARITY

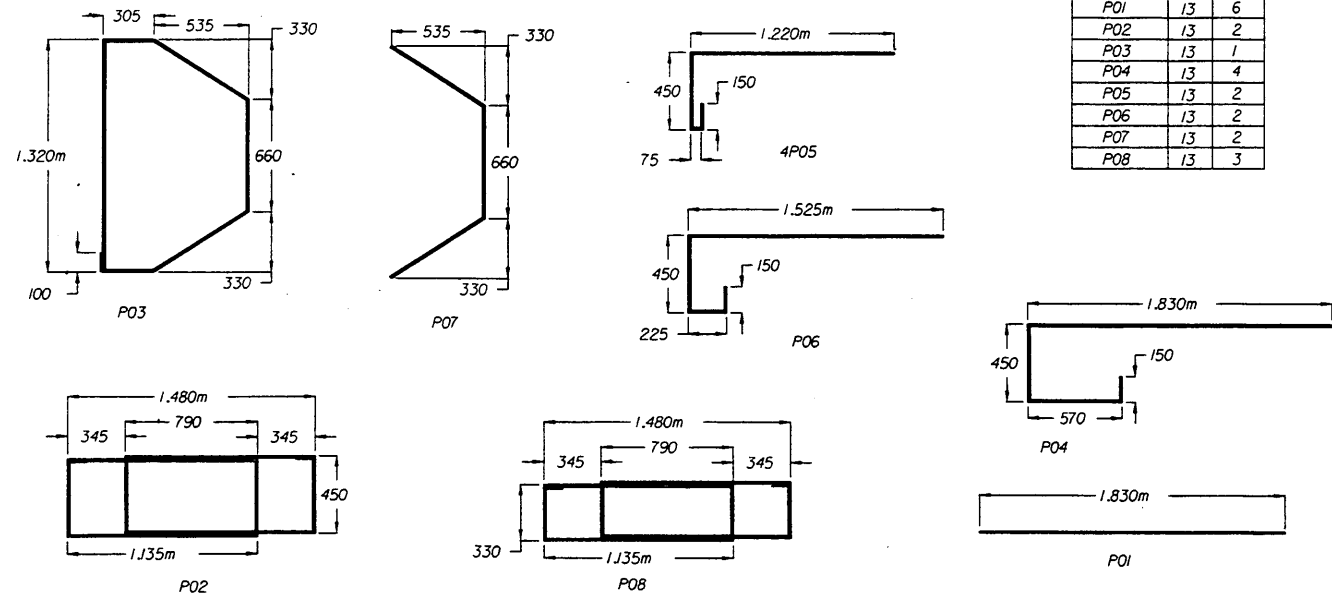


**B** ELEVATION BARRIER DETAIL @ LIGHT POLE

LIGHT POLE PILASTER REBAR SCHEDULE		
MARK	SIZE	QTY
P01	13	6
P02	13	2
P03	13	1
P04	13	4
P05	13	2
P06	13	2
P07	13	2
P08	13	3



**C** SECTION BARRIER DETAIL @ LIGHT POLE

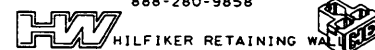


**D** LIGHT POLE PILASTER REINFORCING DETAIL

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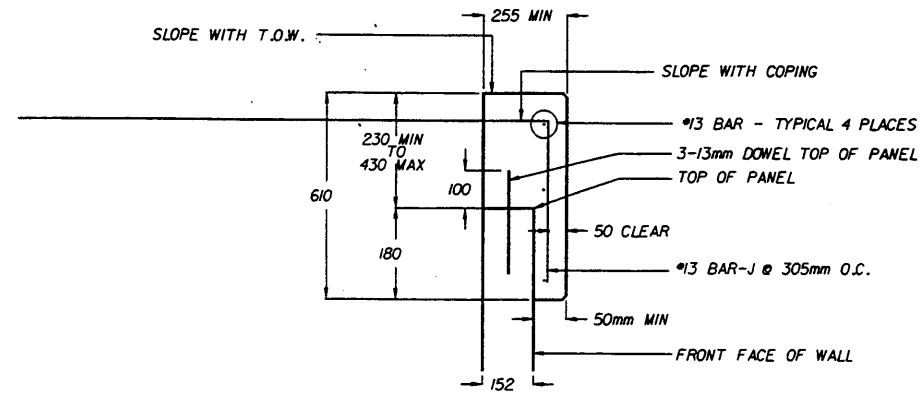
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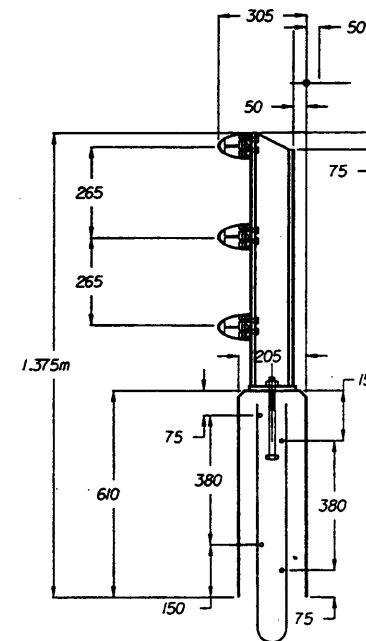
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
 ROAD DESIGN

RETAINING WALL SYSTEM  
 HILFIKER SQUARE PANEL

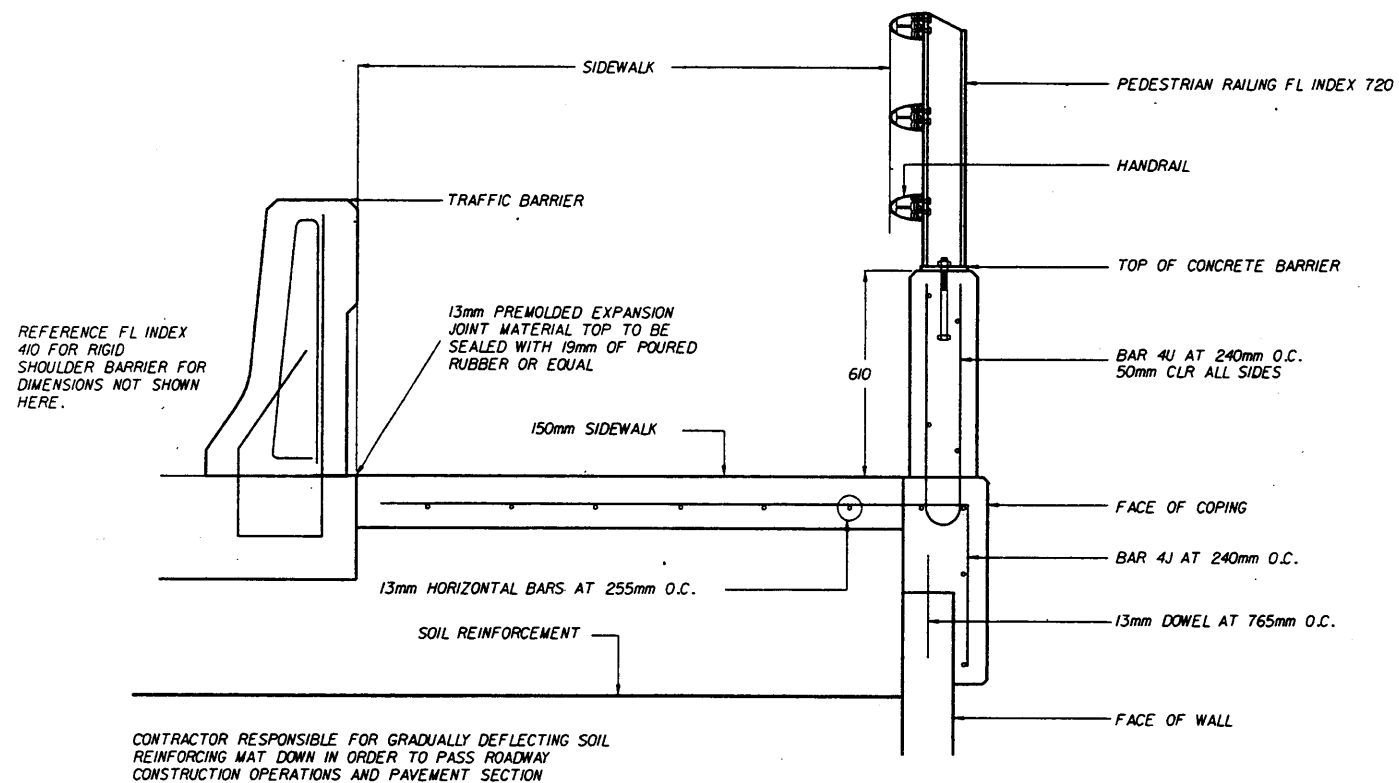
Names	Dates	Approved/By	Revision	Sheet No.	Index No.
Designed By	TPT 1298	Walter J. [Signature]			
Drawn By	TPT 1298				
Checked By	TBW 1298		00	10 of 13	5021



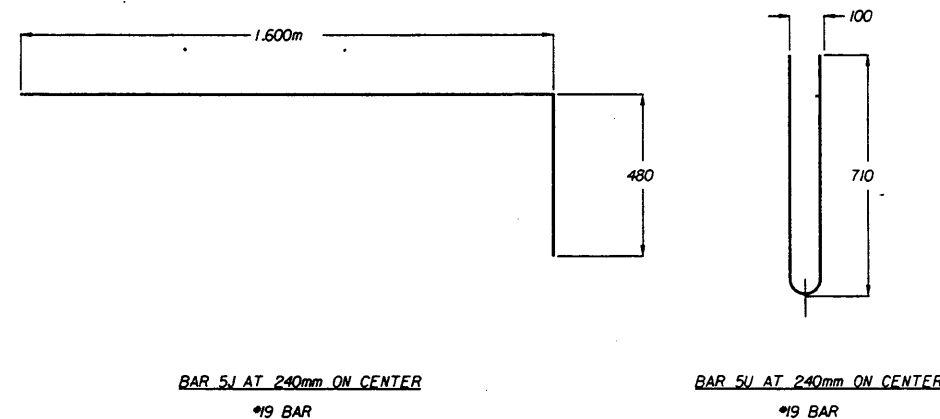
**A** SECTION C.I.P. PARAPET COPING  
 HORIZONTAL REINFORCING NOT SHOWN FOR CLARITY



**B** SECTION C.I.P. PEDESTRIAN BARRIER  
 REFERENCE FDOT STANDARD 720 FOR DETAILS NOT SHOWN



**C** SECTION C.I.P. BARRIER WITH PEDESTRIAN RAILING

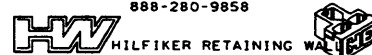


**D** C.I.P. COPING WITH PEDESTRIAN BARRIER BAR DETAILS

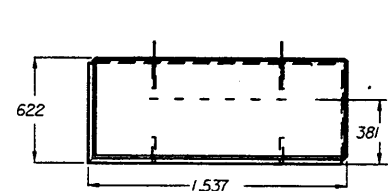
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 ENGINEERED STRUCTURES  
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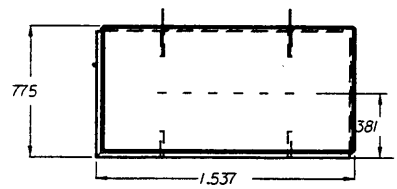


STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM HILFIKER SQUARE PANEL				
Names	Dates	Approved By		
Designed By	TPT 12-78	[Signature]		
Drawn By	TPT 12-78	Revision	Sheet No.	Index No.
Checked By	TBW 12-78	00	11 of 13	5021



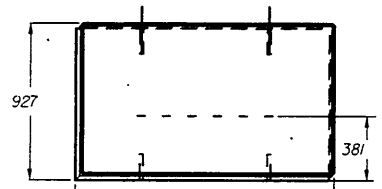
PANEL MATERIAL LIST		
DESG.	SIZE AND TYPE	QTY.
ANCHOR	MW300	1 OF 6
CAGE	MW45 - 155x155	1
PVC	19mm DIAM	4
HOOKE	PRE-BENT	4

TYPE A - 610 PANEL



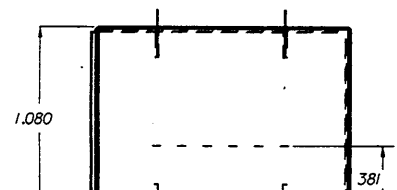
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DESG.	SIZE AND TYPE	QTY.
ANCHOR	MW300	1 OF 6
CAGE	MW45 - 155x155	1
PVC	19mm DIAM	4
HOOKE	PRE-BENT	4

TYPE B - 762 PANEL



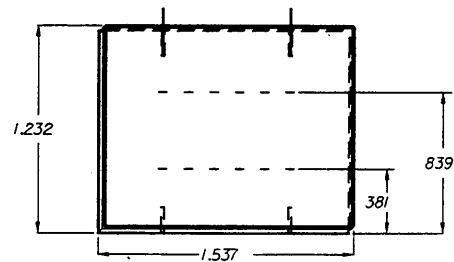
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DESG.	SIZE AND TYPE	QTY.
ANCHOR	MW300	1 OF 6
CAGE	MW45 - 155x155	1
PVC	19mm DIAM	4
HOOKE	PRE-BENT	4

TYPE C - 914 PANEL



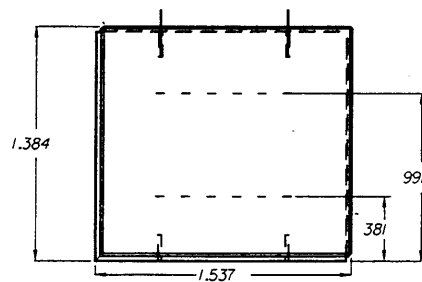
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DESG.	SIZE AND TYPE	QTY.
ANCHOR	MW300	1 OF 6
CAGE	MW45 - 155x155	1
PVC	19mm DIAM	4
HOOKE	PRE-BENT	4

TYPE D - 1067 PANEL



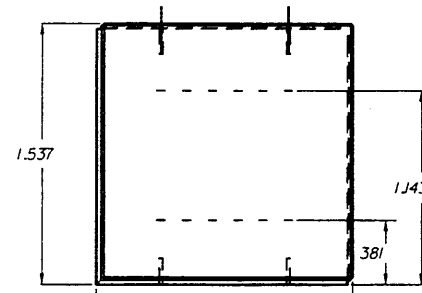
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DESG.	SIZE AND TYPE	QTY.
ANCHOR	MW300	2 OF 6
CAGE	MW45 - 155x155	1
PVC	19mm DIAM	4
HOOKE	PRE-BENT	4

TYPE E - 1219 PANEL



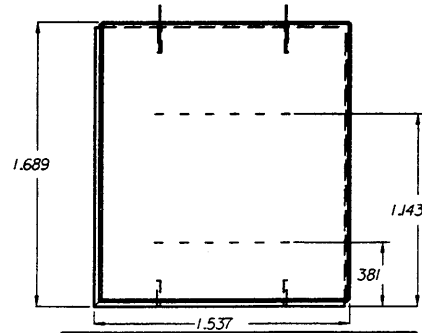
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DESG.	SIZE AND TYPE	QTY.
ANCHOR	MW300	2 OF 6
CAGE	MW45 - 155x155	1
PVC	19mm DIAM	4
HOOKE	PRE-BENT	4

TYPE F - 1372 PANEL



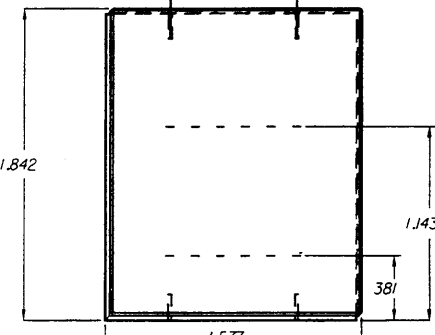
PANEL MATERIAL LIST		
DESG.	SIZE AND TYPE	QTY.
ANCHOR	MW300	2 OF 6
CAGE	MW45 - 155x155	1
PVC	19mm DIAM	4
HOOKE	PRE-BENT	4

TYPE G - 1524 PANEL



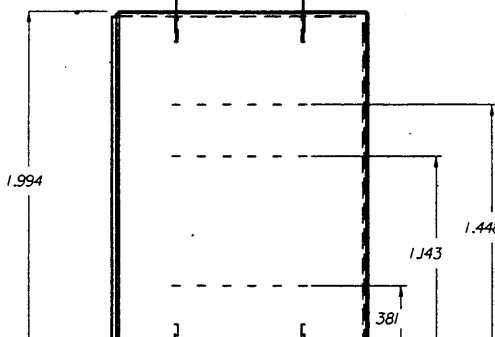
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DESG.	SIZE AND TYPE	QTY.
ANCHOR	MW300	2 OF 6
CAGE	MW45 - 155x155	1
PVC	19mm DIAM	4
HOOKE	PRE-BENT	4

TYPE H - 1676 PANEL



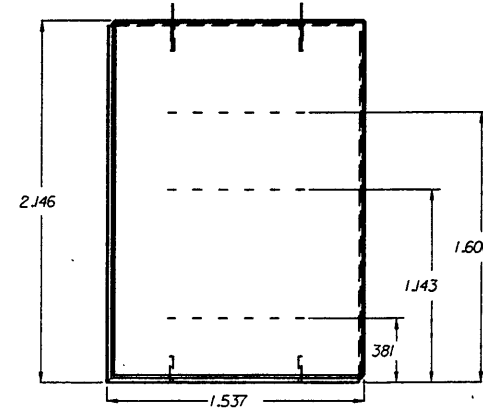
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DESG.	SIZE AND TYPE	QTY.
ANCHOR	MW300	2 OF 6
CAGE	MW45 - 155x155	1
PVC	19mm DIAM	4
HOOKE	PRE-BENT	4

TYPE J - 1829 PANEL



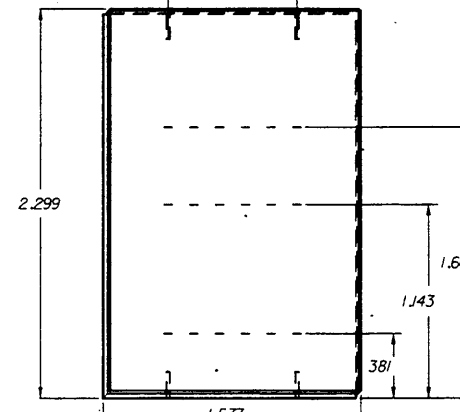
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DESG.	SIZE AND TYPE	QTY.
ANCHOR	MW300	3 OF 6
CAGE	MW45 - 155x155	1
PVC	19mm DIAM	4
HOOKE	PRE-BENT	4

TYPE K - 1981 PANEL



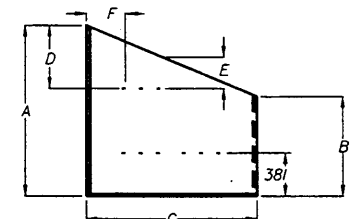
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DESG.	SIZE AND TYPE	QTY.
ANCHOR	MW300	3 OF 6
CAGE	MW45 - 155x155	1
PVC	19mm DIAM	4
HOOKE	PRE-BENT	4

TYPE L - 2134 PANEL



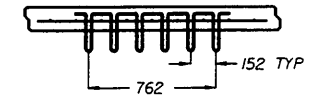
PANEL MATERIAL LIST		
DESG.	SIZE AND TYPE	QTY.
ANCHOR	MW300	1 OF 6
CAGE	MW45 - 155x155	1
PVC	19mm DIAM	4
HOOKE	PRE-BENT	4

TYPE M - 2286 PANEL

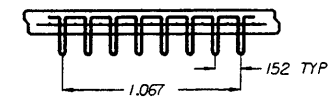


PANEL MATERIAL LIST		
DESG.	SIZE AND TYPE	QTY.
ANCHOR	MW300	VARIES
CAGE	MW45 - 155x155	1
PVC	19mm DIAM	4
HOOKE	PRE-BENT	4

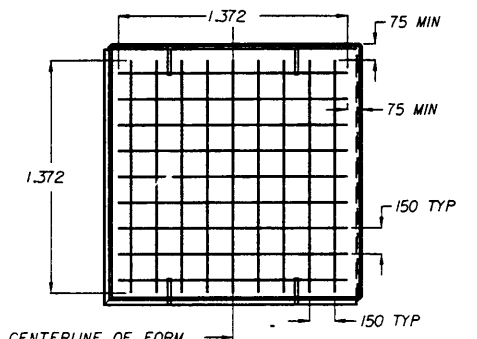
SPECIAL SLOPED PANEL



STANDARD ANCHOR LAYOUT

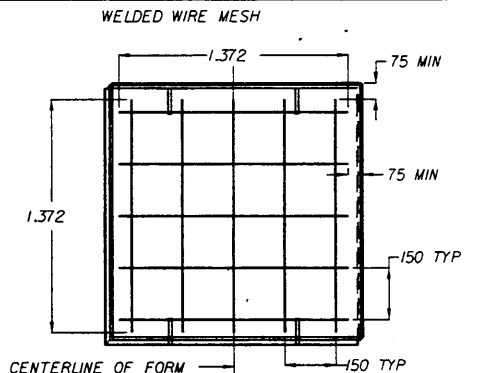


CONTINUOUS ANCHOR LAYOUT



- CENTERLINE OF FORM
- NOTE:  
 1. MINIMUM 75mm COVER AT ALL EDGES  
 2. CENTER MESH IN FORM  
 3. WIRE MESH TO BE PLACED ON TOP OF PVC ALIGNMENT SLEEVES.  
 4. TRIM AS REQUIRED  
 5. MINIMUM MW45 X MW45 WWF

PANEL REINFORCING LAYOUT



- WELDED WIRE MESH
- CENTERLINE OF FORM
- NOTE:  
 1. MINIMUM 75mm COVER AT ALL EDGES  
 2. CENTER REBAR IN FORM  
 3. REBAR TO BE PLACED ON TOP OF PVC ALIGNMENT SLEEVES.  
 4. TRIM AS REQUIRED  
 5. MINIMUM #13 BAR BOTH WAYS  
 6. TIE REBAR TOGETHER AT INTERSECTION POINTS

PANEL REINFORCING LAYOUT

OPTIONAL REBAR

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

RETAINING WALL SYSTEM  
HILFIKER SQUARE PANEL

Names	Dates	Approved By
Designed By	TPT 12/98	
Drawn By	TPT 12/98	
Checked By	TBW 12/98	

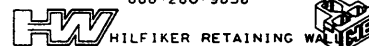
Revision	Sheet No.	Index No.
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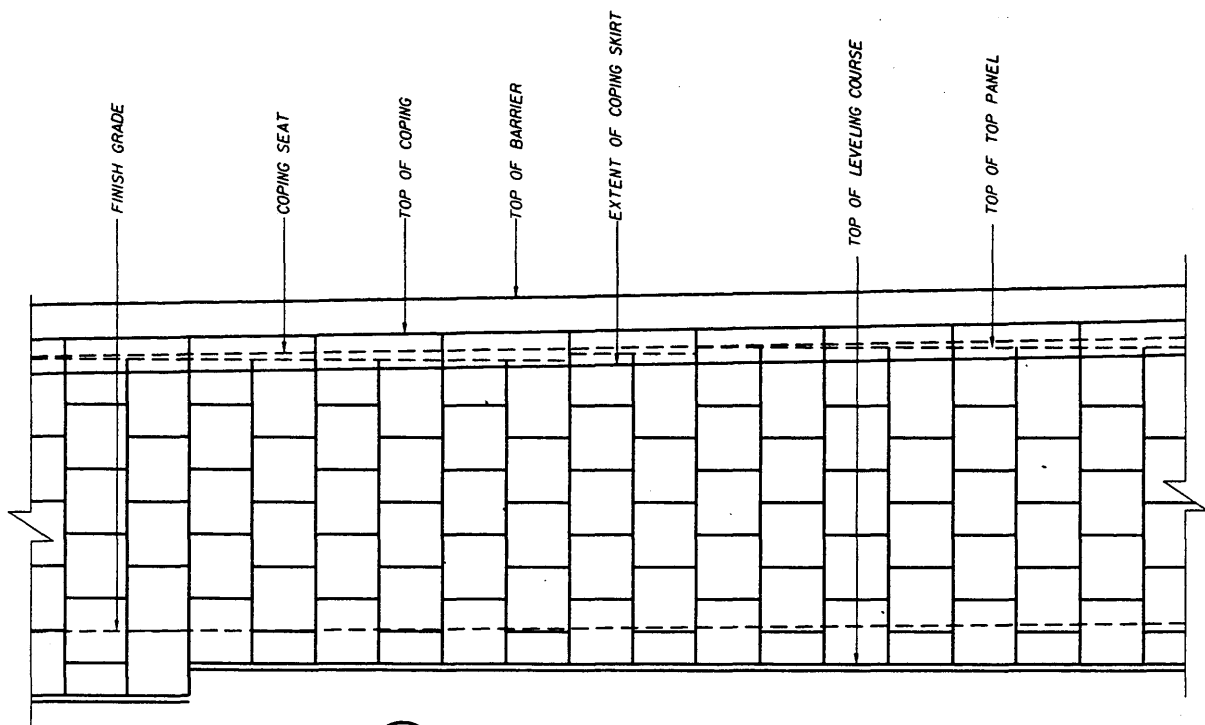
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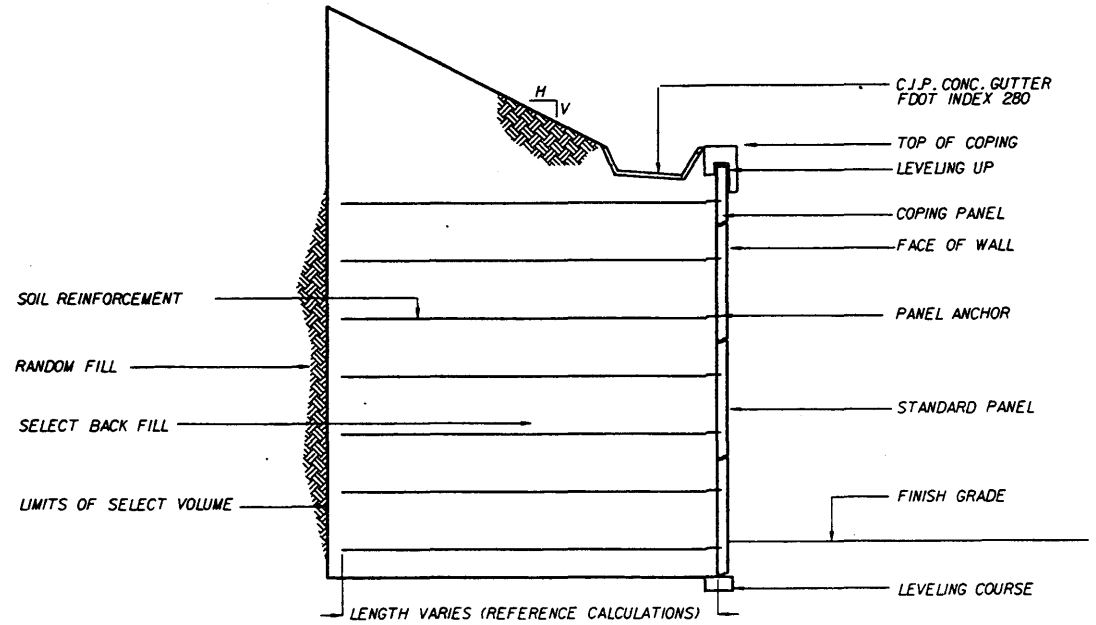
T B STRUCTURAL SYSTEMS INC.

ENGINEERED STRUCTURES  
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HURST, TEXAS 76053  
888-280-9858

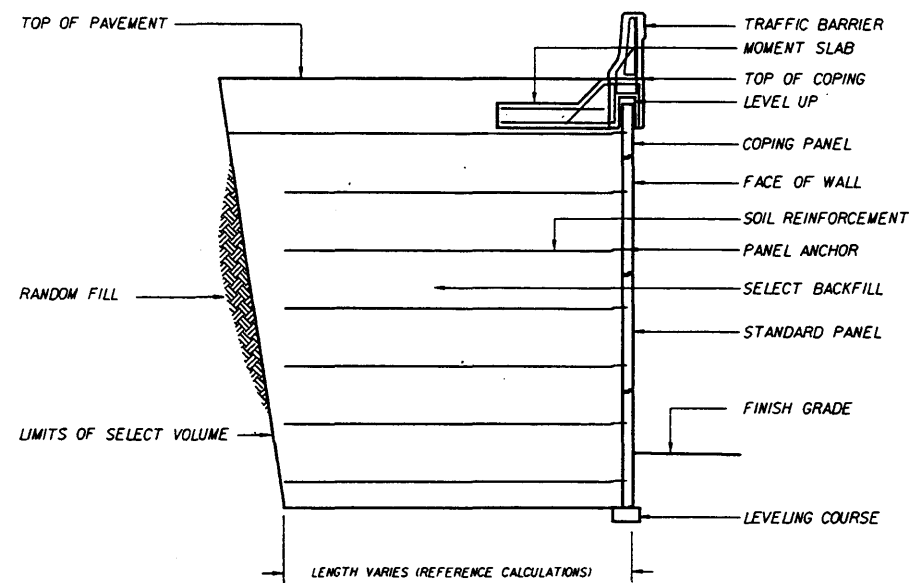




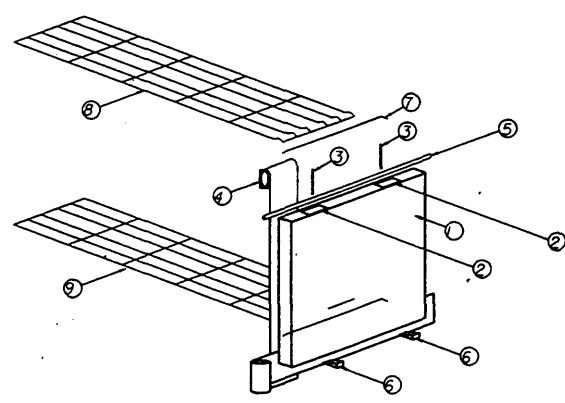
**A** TYPICAL MSE ELEVATION  
12



**B** TYPICAL MSE SECTION WITH SLOPE  
12

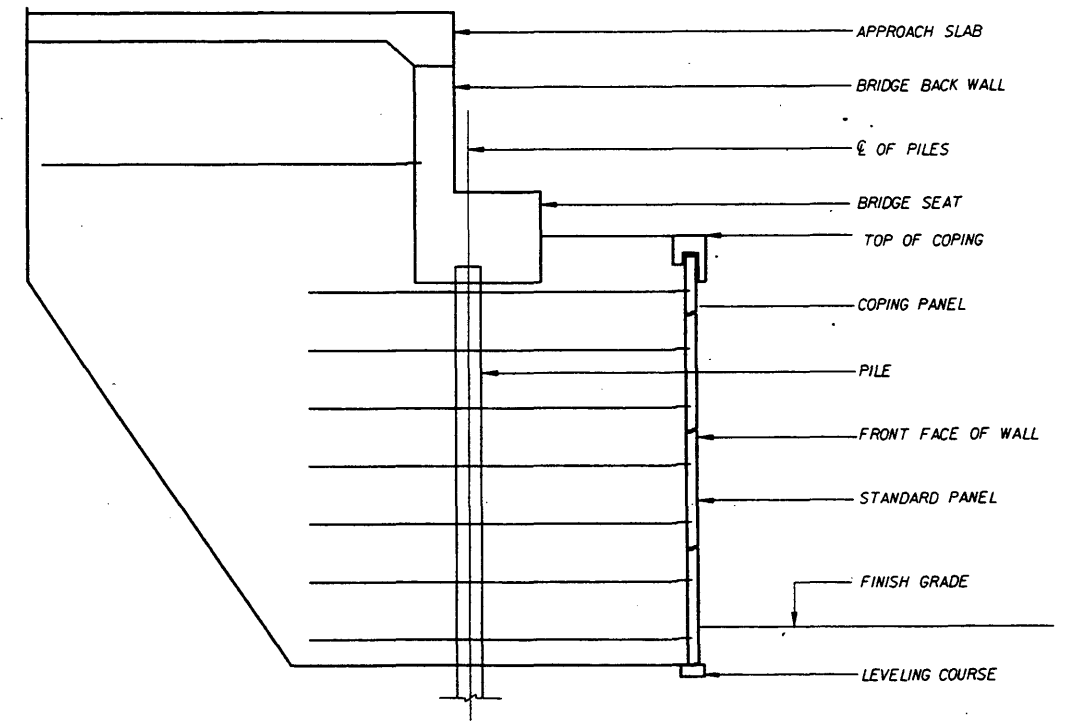


**C** TYPICAL MSE SECTION WITH BARRIER  
12



1. TYPICAL PRE-CAST PANEL WITH CAST IN PLACE ANCHORS
2. 75 X 205 X 19mm NEOPRENE PAD 2 PER PANEL
3. 13 X 205mm GALVANIZED STEEL ALIGNMENT PIN
4. 610mm FILTER FABRIC
5. 19mm BACKER ROD (OPTIONAL BY OTHERS)
6. HARD WOOD SHIMS (USE IF NECESSARY)
7. CONNECTION PIN - 1 PER SOIL REINFORCING MAT
8. WELDED WIRE GRID SOIL REINFORCING MAT (AS REQUIRED)
9. WELDED WIRE GRID SOIL REINFORCING MAT (AS REQUIRED)

**D** TYPICAL MATERIAL ISOMETRIC  
12



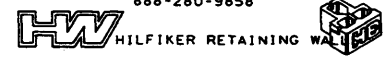
**E** TYPICAL MSE SECTION AT ABUTMENT  
12


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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM HILFIKER SQUARE PANEL				
Names	Dates	Approved By		
Designed By	TPT 12-98	 State Structures Design Engineer		
Drawn By	TPT 12-98	Revision	Sheet No.	Index No.
Checked By	TBW 12-98	00	13 of 13	5021



**CONSTRUCTION NOTES FOR PLACEMENT OF TENSAR GEOGRIDS AND BACKFILL SOILS FOR  
TENSAR PRECAST CONCRETE REINFORCED WALLS  
TENSAR MSE RETAINING WALL SYSTEM**

**1.0 MATERIALS**

**1.1** GEOGRID REINFORCING SHALL BE TENSAR BIAXIAL AND UNIAXIAL GEOGRIDS MANUFACTURED BY THE TENSAR CORPORATION, MORROW, GEORGIA.

**1.2** BODKIN BARS SHALL BE 38.1 mm x 6.4 mm HDPE BARS MANUFACTURED BY THE TENSAR CORPORATION, MORROW, GEORGIA.

**1.3 DRAINAGE MATERIALS**

**1.3.1** GEOTEXTILE TG600 FABRIC SHALL BE MANUFACTURED BY EVERGREEN TECHNOLOGIES, INC., EVERGREEN, ALABAMA, OR EQUIVALENT AS APPROVED BY THE ENGINEER.

**2.0 TECHNICAL REQUIREMENTS**

**2.1** FILL MATERIALS SHALL BE PLACED FROM THE BACK FACE OF THE WALL TOWARDS THE TAILS OF THE GEOGRID TO ENSURE FURTHER TENSIONING.

**2.2** FILL SHALL BE COMPACTED AS SPECIFIED IN SECTION 548 OF THE PROJECT SPECIFICATIONS.

**2.3** AN APPROVED SET OF CONSTRUCTION DRAWINGS AND CONTRACT SPECIFICATIONS SHALL BE ON-SITE AT ALL TIMES, DURING CONSTRUCTION OF THE TENSAR RETAINING WALL.

**3.0 TENSAR GEOGRID PLACEMENT**

**3.1** TENSAR GEOGRID SHALL BE PLACED AT THE LOCATIONS AND ELEVATIONS SHOWN ON THE SHOP DRAWINGS.

**3.2** TENSAR GEOGRID LENGTH SHALL BE AS SHOWN ON THE CONSTRUCTION DRAWINGS. REINFORCED FILL ZONE LENGTH IS MEASURED FROM THE BACK FACE OF THE CONCRETE PANEL, EXTENDING TO THE TAIL OF THE GEOGRIDS.

**3.2.1** TENSAR GEOGRID REINFORCEMENT SHALL BE CONTINUOUS THROUGHOUT THEIR EMBEDMENT LENGTH(S). THE BODKIN CONNECTION SHALL NOT BE UTILIZED UNLESS PRE-APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION.

**3.2.2** IF PRE-APPROVED, TENSAR UNIAXIAL GEOGRIDS MAY BE SPLICED UTILIZING THE BODKIN CONNECTION DETAIL. NO MORE THAN ONE SPLICE SHALL BE ALLOWED IN ANY ONE LENGTH OF REINFORCING.

**3.3** PRIOR TO PLACING FILL, THE GEOGRID MATERIALS SHALL BE CONNECTED TO THE PANELS PER PANEL CONNECTION DETAIL (SEE TYPICAL DETAILS) AND PULLED TAUT AND ANCHORED TO REMOVE ANY SLACK IN THE GEOGRIDS.

**3.4** TRACKED CONSTRUCTION EQUIPMENT SHALL NOT BE OPERATED DIRECTLY ON THE GEOGRID. A MINIMUM FILL THICKNESS OF 150 mm IS REQUIRED FOR OPERATION OF TRACKED VEHICLES OVER THE GEOGRID. TURNING OF TRACKED VEHICLES SHOULD BE KEPT TO A MINIMUM TO PREVENT TRACKS FROM DISPLACING THE FILL AND/OR THE GEOGRID.

**3.5** RUBBER-TIRED VEHICLES MAY PASS OVER THE GEOGRID REINFORCEMENT AT SLOW SPEEDS, LESS THAN 15 KPH. SUDDEN BRAKING AND SHARP TURNING SHALL BE AVOIDED.

**3.6** TENSAR UNIAXIAL GEOGRID SHALL BE ROLLED OUT WITH THE LONG AXIS OF THE APERTURES (MACHINE DIRECTION) PERPENDICULAR TO THE WALL FACE. TENSAR BIAXIAL GEOGRIDS SHALL BE ROLLED OUT WITH THE MACHINE DIRECTION BAR PARALLEL TO THE WALL FACE.

**4.0 CHANGES TO GEOGRID LAYOUT OR PLACEMENT**

**4.1** NO CHANGES TO THE TENSAR GEOGRID LAYOUT, INCLUDING, BUT NOT LIMITED TO, LENGTH, GEOGRID TYPE, OR ELEVATION, SHALL BE MADE WITHOUT THE EXPLICIT WRITTEN CONSENT OF TENSAR EARTH TECHNOLOGIES, INC.

**5.0 DRAINAGE**

**5.1** AT THE END OF EACH WORK DAY, BACKFILL SURFACE SHALL BE GRADED AWAY FROM THE WALL FACE A MINIMUM OF 2 PERCENT SLOPE AND A TEMPORARY SOIL BERM SHALL BE CONSTRUCTED NEAR THE WALL CREST TO PREVENT SURFACE WATER RUNOFF FROM OVERTOPPING THE WALL.

**5.2** AT THE END OF EACH WORK DAY, BACKFILL SURFACE SHALL BE COMPACTED WITH A SMOOTH WHEEL ROLLER TO MINIMIZE PONDING OF WATER AND SATURATION OF THE BACKFILL.

**5.3** THE TENSAR WALL HAS BEEN DESIGNED ON THE ASSUMPTION THAT THE REINFORCED FILL MATERIAL SHALL BE FREE OF SUBSURFACE DRAINAGE OF WATER (SEEPAGE).

**5.4** THE CONTRACTOR SHALL BE RESPONSIBLE FOR WATER RETENTION AS NEEDED DURING CONSTRUCTION.

**6.0 DESIGN PARAMETERS**

**6.1 SOIL PARAMETERS:**

SEE WALL CONTROL DRAWINGS FOR SOIL CHARACTERISTICS FOR FOUNDATION MATERIAL TO BE USED IN THE DESIGN OF THE WALL SYSTEM. THE CONTRACTOR SHALL PROVIDE SOIL DESIGN PARAMETERS FOR BACKFILL MATERIAL BASED ON THE ACTUAL SOIL CHARACTERISTICS UTILIZED AT THE SITE. THE VALUES OF FRICTION ANGLE, APPARENT COHESION AND UNIT WEIGHT SHALL BE PROVIDED IN THE SHOP DRAWINGS.

**6.1.1 DESIGN:**

THE DESIGN CONTAINED ON THESE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS. ON THE BASIS OF THIS INFORMATION, THE TENSAR CORPORATION IS RESPONSIBLE FOR INTERNAL STABILITY OF THE STRUCTURE ONLY. EXTERNAL STABILITY DESIGN INCLUDING FOUNDATION AND SLOPE STABILITY IS THE RESPONSIBILITY OF OTHERS.

**6.2 FACTORS OF SAFETY:**

**6.2.1 INTERNAL STABILITY:**  
 MAXIMUM GEOGRID DESIGN STRENGTH = 0.19 ULT  
 MINIMUM FACTOR OF SAFETY FOR GEOGRID PULLOUT = 1.5  
 MINIMUM FACTOR OF SAFETY FOR SLIDING AT LOWEST GEOGRID = 1.5  
 SOIL-GEOGRID INTERACTION COEFFICIENT = 0.8  
 PERCENT COVERAGE OF GEOGRID:  
 (ONE ROLL WIDTHS) = 89%  
 (ONE-HALF ROLL WIDTH) = 44%

**6.2.2 EXTERNAL STABILITY:**  
 MINIMUM FACTOR OF SAFETY FOR SLIDING AT BASE = 1.5  
 MINIMUM FACTOR OF SAFETY FOR OVERTURNING = 2.0  
 MINIMUM FACTOR OF SAFETY FOR BEARING = 2.5

(EXTERNAL STABILITY, INCLUDING SLIDING, OVERTURNING, AND BEARING CAPACITY, IS THE RESPONSIBILITY OF OTHERS. TENSAR EARTH TECHNOLOGIES, INC. ACCEPTS NO LIABILITY OR RESPONSIBILITY FOR EXTERNAL STABILITY. (SEE NOTES 7.6 & 7.7))

**6.2.3 GLOBAL STABILITY:**

MINIMUM FACTOR OF SAFETY FOR GLOBAL STABILITY = 1.5

GLOBAL STABILITY IS THE RESPONSIBILITY OF OTHERS. TENSAR EARTH TECHNOLOGIES, INC. ACCEPTS NO LIABILITY OR RESPONSIBILITY FOR GLOBAL STABILITY. (SEE NOTES 7.6 & 7.7)

**6.3** SURCHARGE LOADING = 12 kN/m<sup>2</sup>

**6.4** HYDROSTATIC DESIGN = NONE

**6.5** SEISMIC DESIGN = NONE

**6.6** GEOGRID LONG TERM ALLOWABLE DESIGN STRENGTH (LTADS):  
 GEOGRID LTADS SHALL BE 19 PERCENT OF ULTIMATE GEOGRID STRENGTH AS DETERMINED IN ACCORDANCE WITH GEOSYNTHETIC RESEARCH INSTITUTE, (GRI), TEST METHOD GGI-87, SINGLE RIB TEST.

**7.0 SPECIAL PROVISIONS**

**7.1** WALL ELEVATION VIEWS AND LOCATIONS AND GEOMETRY OF EXISTING STRUCTURES MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO CONSTRUCTION.

**7.2** TENSAR EARTH TECHNOLOGIES, INC. ASSUMES NO LIABILITY FOR INTERPRETATION OR VERIFICATION OF SUBSURFACE CONDITIONS, SUITABILITY OF SOIL DESIGN PARAMETERS AND INTERPRETATION OF SUBSURFACE GROUNDWATER CONDITIONS.

**7.3** THE CONTRACTOR IS RESPONSIBLE FOR REVIEWING AND VERIFYING THAT THE ACTUAL SITE CONDITIONS ARE AS DESCRIBED IN SECTION 6.0 PRIOR TO AND DURING CONSTRUCTION. THE ENGINEER SHALL BE ON-SITE TO ASSURE THE PROVISIONS IN THE CONSTRUCTION NOTES ARE FOLLOWED.

**7.4** THE SOIL DESIGN PARAMETERS STATED IN SECTION 6.0 SHALL BE VERIFIED BY THE CONTRACTOR. WRITTEN VERIFICATION OF DESIGN PARAMETERS SHALL BE SUBMITTED TO TENSAR EARTH TECHNOLOGIES, INC. PRIOR TO COMMENCING WITH CONSTRUCTION.

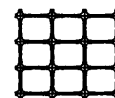
**7.5** ANY REVISIONS TO DESIGN PARAMETERS STATED IN SECTION 6.0 OR STRUCTURE GEOMETRY SHALL REQUIRE DESIGN MODIFICATIONS PRIOR TO PROCEEDING WITH CONSTRUCTION.

**7.6** PER THE MSE RETAINING WALL GENERAL NOTES, TENSAR EARTH TECHNOLOGIES, INC HAS CONSIDERED INTERNAL STABILITY OF THE RETAINING WALLS ONLY. EXTERNAL AND GLOBAL STABILITY OF THE WALL IS THE RESPONSIBILITY OF OTHERS

**7.7** DIFFERENTIAL SETTLEMENT AND ITS EFFECTS ON THE TENSAR RETAINING WALL SYSTEM SHALL BE THE RESPONSIBILITY OF OTHERS.

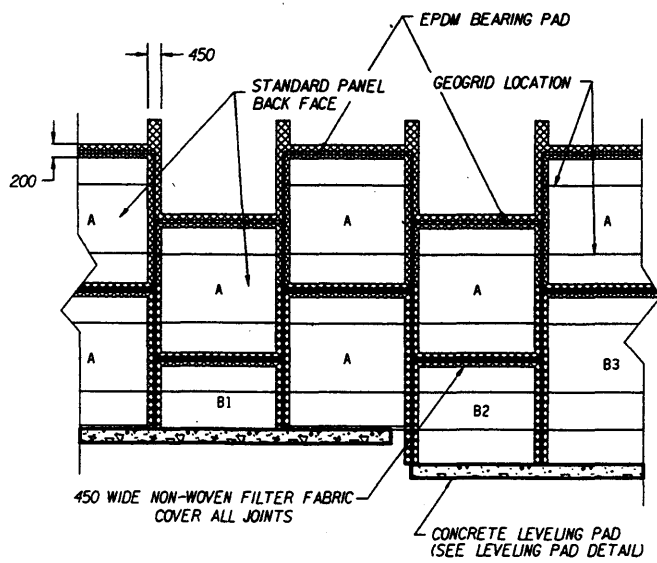
THIS DESIGN IS BASED UPON SPECIFIC PROPERTIES OF TENSAR PRODUCTS (GEOGRIDS, DRAINAGE COMPOSITES AND EROSION MEDIA), WHICH ARE PROPRIETARY TO THE TENSAR CORPORATION 1210 CITIZENS PARKWAY, MORROW GA. 30260. ANY SUBSTITUTION OF THE SPECIFIED PRODUCTS WILL INVALIDATE THIS DESIGN.

THIS DRAWING, DESIGN NOTES AND ASSOCIATED CALCULATIONS HAVE BEEN PREPARED BY TENSAR EARTH TECHNOLOGIES, INC. FOR PRELIMINARY DESIGN PURPOSES AND SHALL NOT BE USED FOR FINAL DESIGN OR CONSTRUCTION.

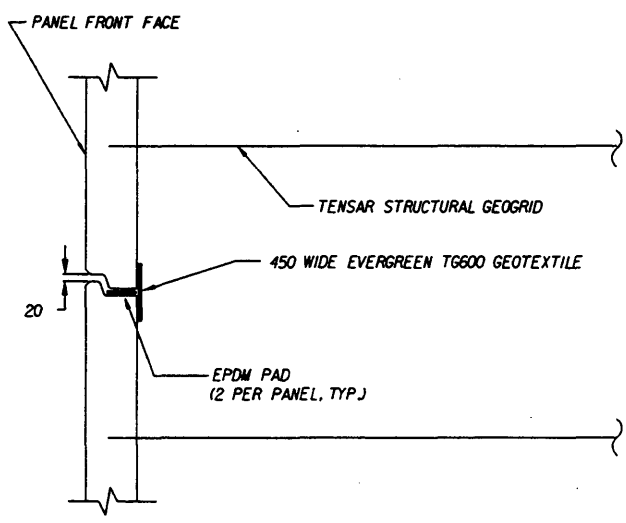


THIS SYSTEM MAY BE USED IN ALL ENVIRONMENTS

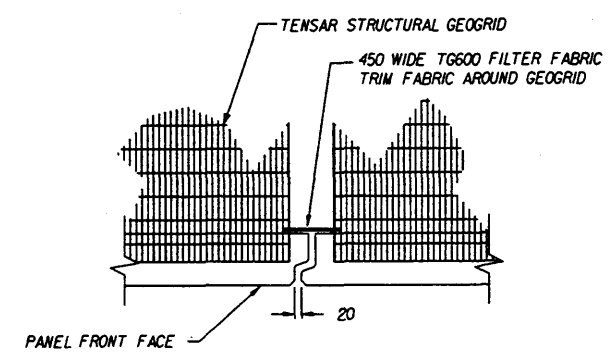
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES MSE RETAINING WALL				
Designed By	DJ	Date	8-98	Approved By
Drawn By	JMS	Date	8/11/98	State Structures Design Engineer
Checked By	KPA	Revision	3-97	00
		Sheet No.	1 of 17	Index No.
				5025



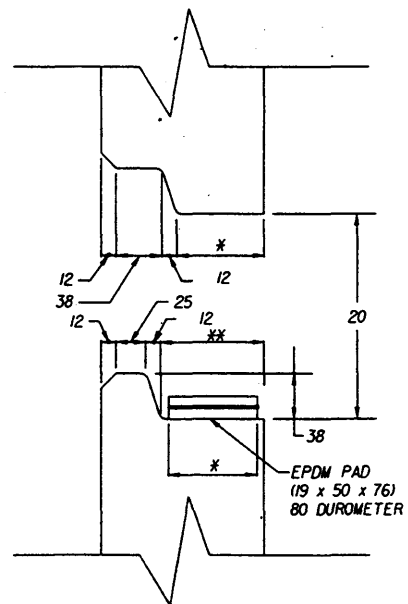
TYPICAL FILTER FABRIC COVERAGE DETAIL  
NOT TO SCALE



HORIZONTAL JOINT DETAIL  
NOT TO SCALE



VERTICAL JOINT DETAIL  
NOT TO SCALE



PANEL JOINT DETAIL  
NOT TO SCALE

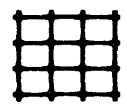
- \* - 76 FOR MODERATELY & SLIGHTLY AGGRESSIVE ENVIRONMENT
- 108 FOR EXTREMELY AGGRESSIVE ENVIRONMENT
- \*\* - 90 FOR MODERATELY & SLIGHTLY AGGRESSIVE ENVIRONMENT
- 121 FOR EXTREMELY AGGRESSIVE ENVIRONMENT

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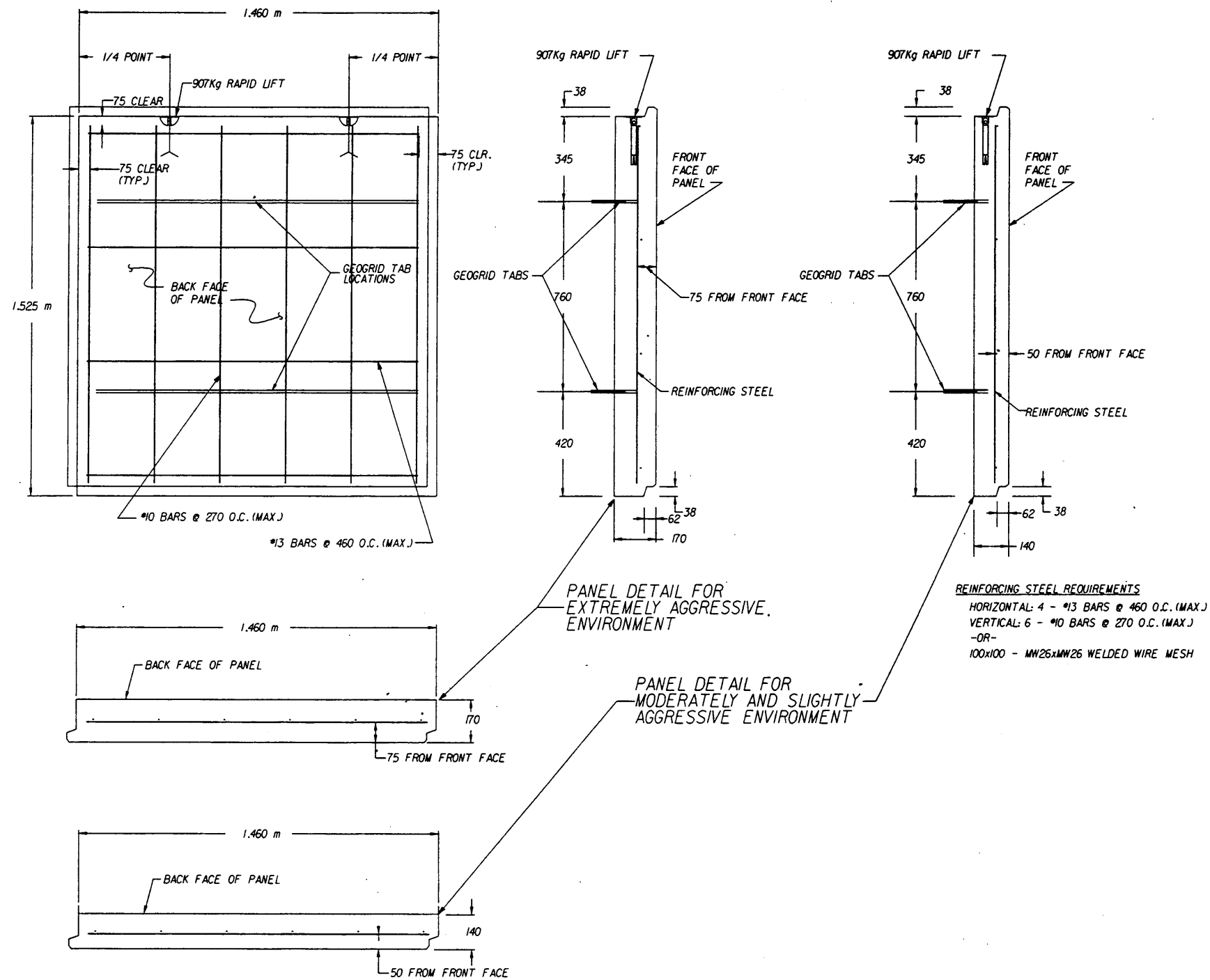
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5775-B Glenridge Drive  
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Atlanta, GA 30328  
(404) 250-1290



STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES MSE RETAINING WALL</b>				
Designed By	Names	Date	Approved By	
Drawn By	JMS	8/14/98	<i>W. J. [Signature]</i> State Structures Design Engineer	
Checked By	KPA	2-97	Revision	00
			Sheet No.	2 of 17
			Index No.	5025



TYPICAL PANEL DETAILS - STANDARD A PANEL

THIS DESIGN IS BASED UPON SPECIFIC PROPERTIES OF TENSAR PRODUCTS (GEOGRIDS, DRAINAGE COMPOSITES AND EROSION MEDIA), WHICH ARE PROPRIETARY TO THE TENSAR CORPORATION 1210 CITIZENS PARKWAY, MORROW GA. 30260. ANY SUBSTITUTION OF THE SPECIFIED PRODUCTS WILL INVALIDATE THIS DESIGN.

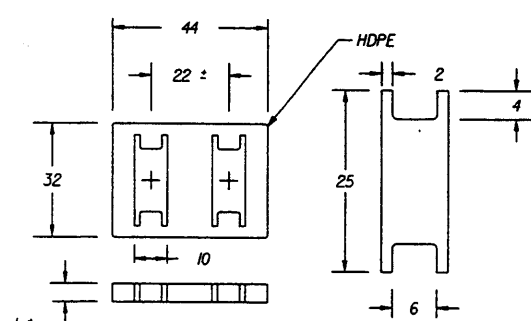
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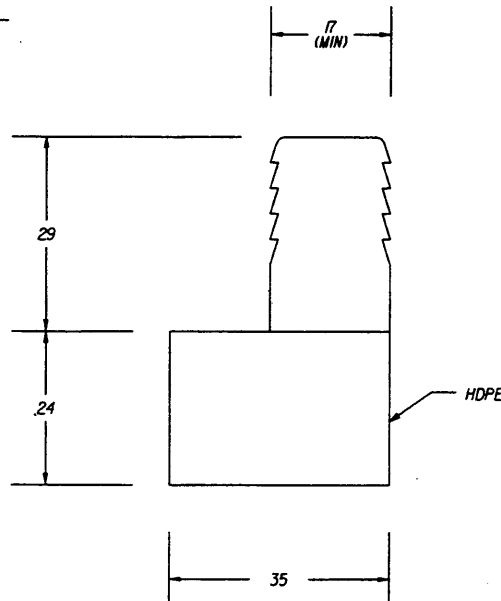
**TENSAR**  
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 Lakeside Center Suite 450  
 Atlanta, GA 30328  
 (404) 250-1290



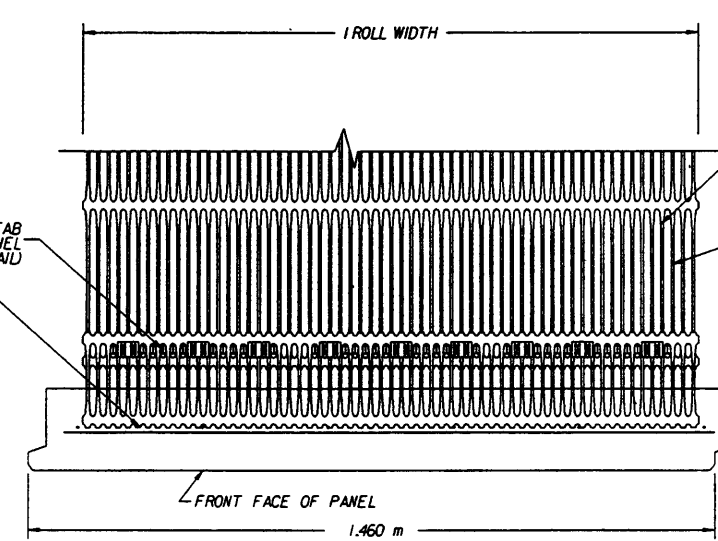
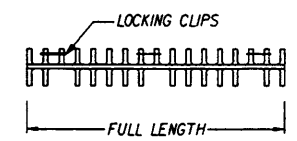
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES MSE RETAINING WALL				
Names	Dates	Approved By		
Designed By	DJ 8-98	W. H. [Signature]		
Drawn By	JMS 8/11/98	Revision	Sheet No.	Index No.
Checked By	KPA 3-99	00	3 of 17	5025



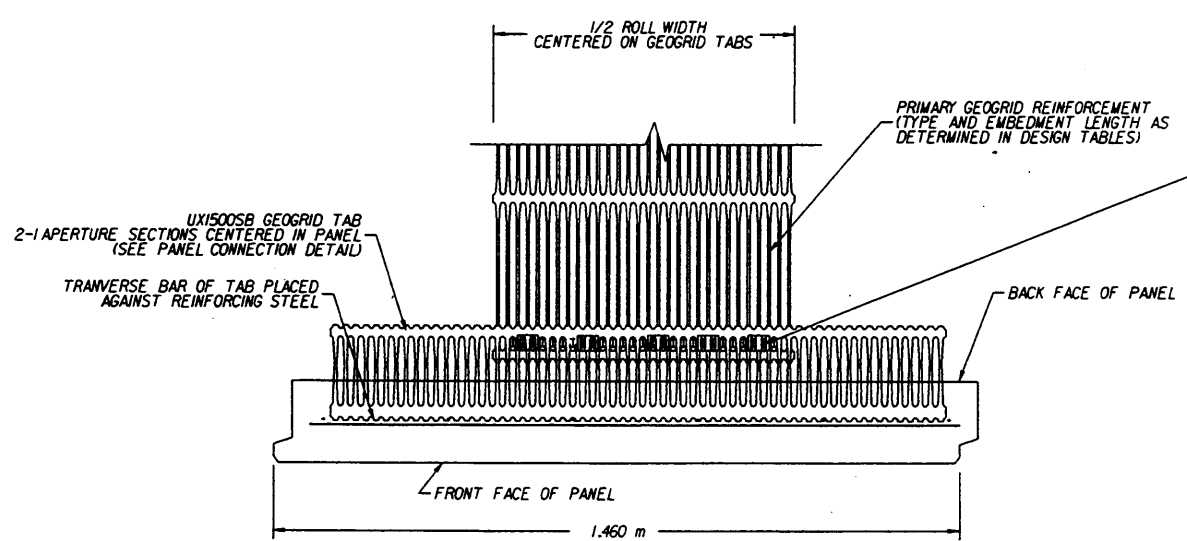
**LOCKING CLIP**  
NOT TO SCALE



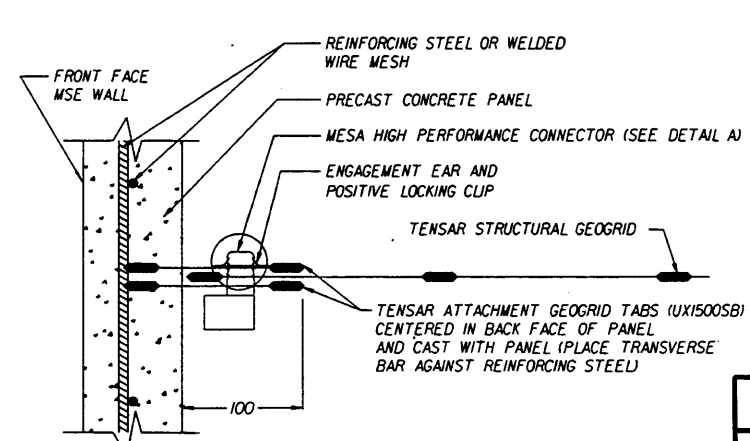
**MESA HIGH PERFORMANCE CONNECTOR**  
NOT TO SCALE



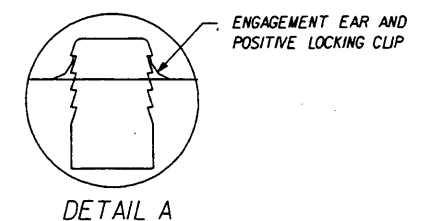
**CONNECTION DETAIL PLAN VIEW (89% COVERAGE)**  
MAXIMUM COVERAGE  
NOT TO SCALE



**CONNECTION DETAIL PLAN VIEW (44% COVERAGE)**  
NOT TO SCALE



**PANEL CONNECTION DETAIL**  
NOT TO SCALE



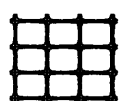
**DETAIL A**

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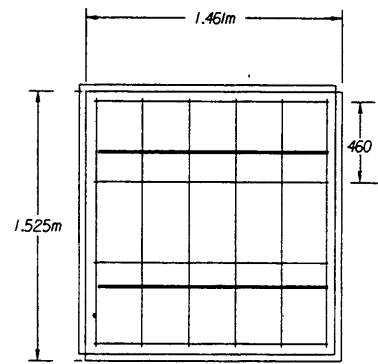
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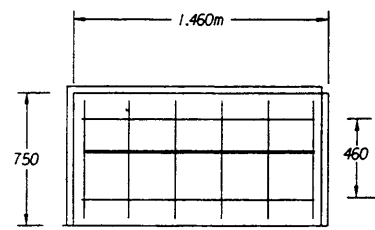
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Atlanta, GA 30328  
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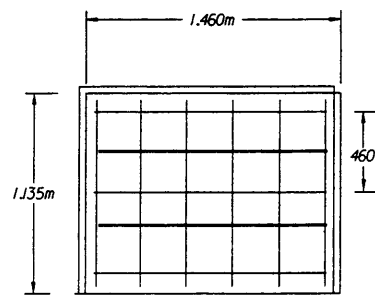
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES MSE RETAINING WALL</b>				
Designed By	DJ	8-98	Approved By	<i>[Signature]</i>
Drawn By	JMS	8/14/98	Revision	Sheet No.
Checked By	KPA	3-97	00	4 of 17
				Index No. 5025



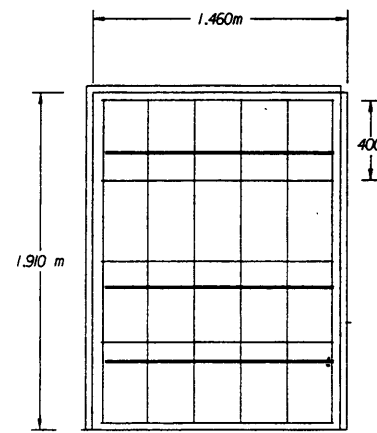
STANDARD A PANEL



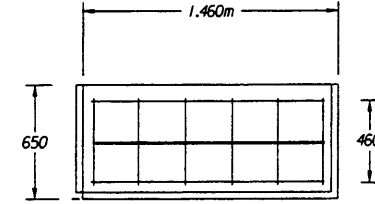
STANDARD B1 PANEL



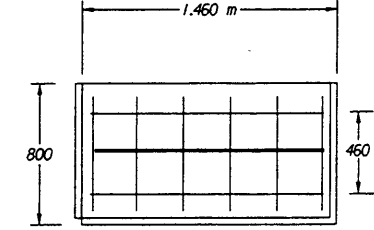
STANDARD B2 PANEL



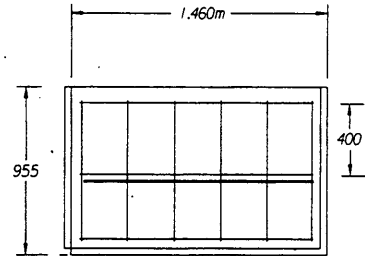
STANDARD B3 PANEL



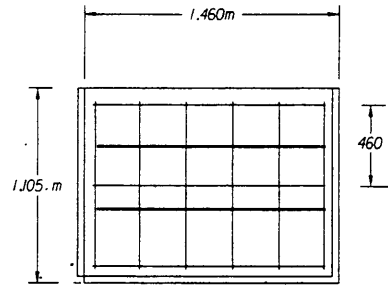
STANDARD T24 PANEL



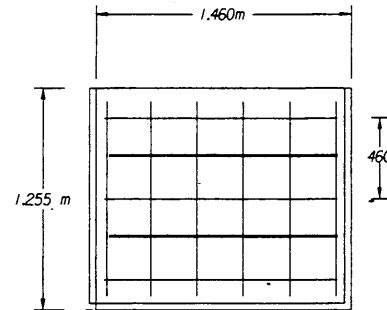
STANDARD T30 PANEL



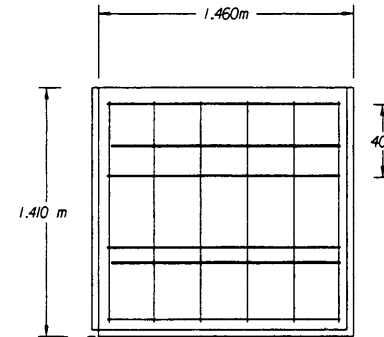
STANDARD T36 PANEL



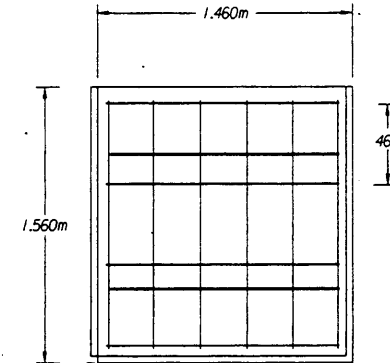
STANDARD T42 PANEL



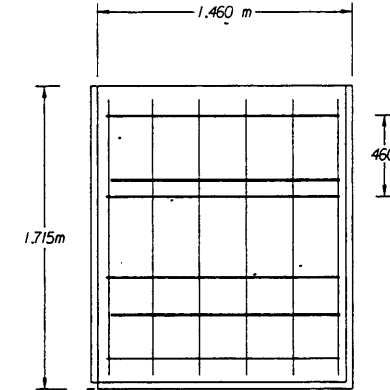
STANDARD T48 PANEL



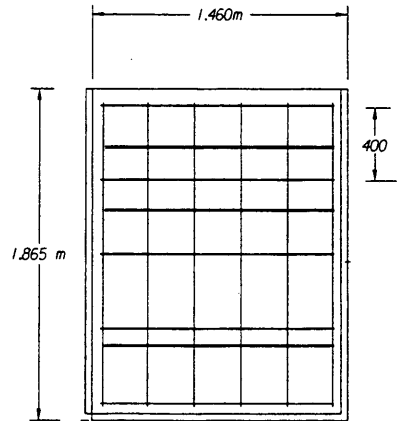
STANDARD T54 PANEL



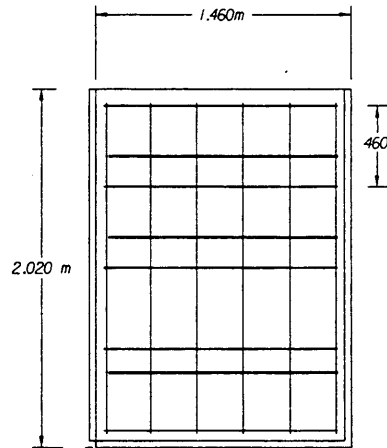
STANDARD T60 PANEL



STANDARD T66 PANEL



STANDARD T72 PANEL



STANDARD T78 PANEL

ALL PANELS ARE SHOWN BACK FACE VIEW

STANDARD STEEL LAYOUT  
 REINFORCING STEEL REQUIREMENTS  
 HORIZONTAL: #13 BARS (420 MPa) @ 460 O.C. (MAX.)  
 VERTICAL: #10 BARS (420 MPa) @ 270 O.C. (MAX.)  
 OR  
 STANDARD WWF LAYOUT  
 REINFORCING STEEL REQUIREMENTS  
 102x102 - MW26xMW26 WELDED WIRE MESH  
 FABRICATION PER ASTM A-185

— GEOGRID TAB LOCATIONS

THIS DESIGN IS BASED UPON SPECIFIC PROPERTIES OF TENSAR PRODUCTS (GEOGRIDS, DRAINAGE COMPOSITES AND EROSION MEDIA), WHICH ARE PROPRIETARY TO THE TENSAR CORPORATION 1210 CITIZENS PARKWAY, MORROW GA. 30260. ANY SUBSTITUTION OF THE SPECIFIED PRODUCTS WILL INVALIDATE THIS DESIGN.

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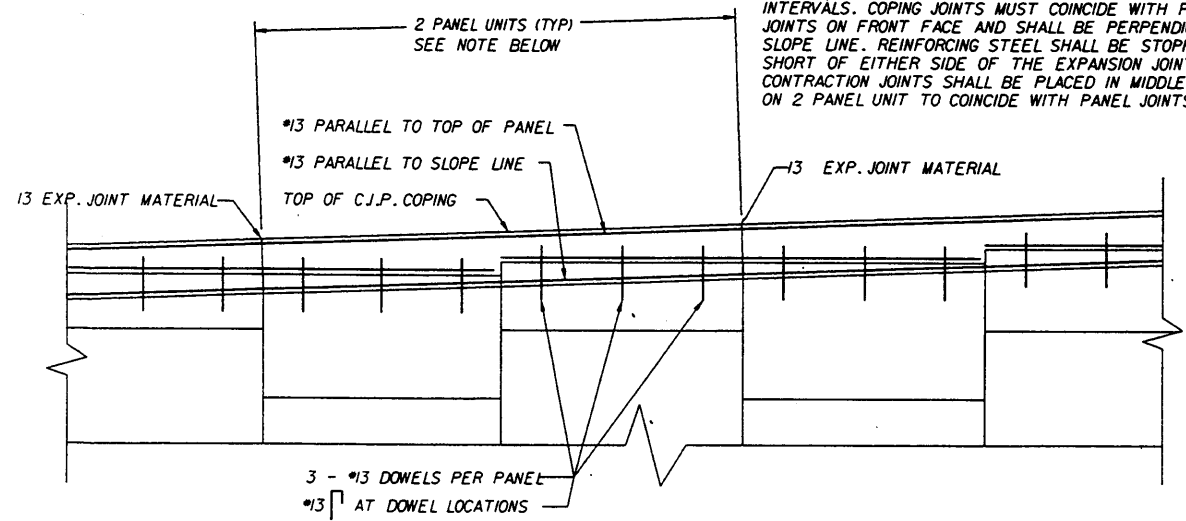
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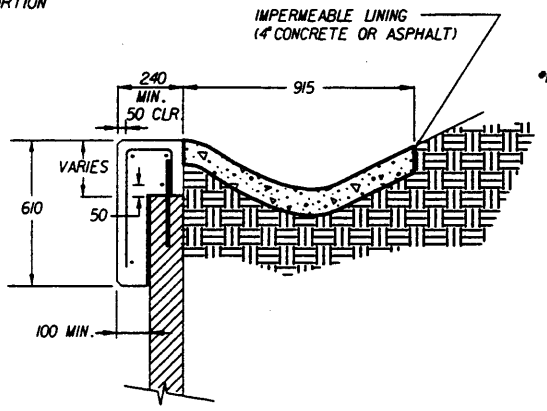


STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES MSE RETAINING WALL</b>				
Designed By	Names	Dates	Approved By	
Drawn By	JMS	8/14/98	<i>William J. [Signature]</i> State Structures Design Engineer	
Checked By	KPA	3-99	Revision	Sheet No.
			00	5 of 17
				5025

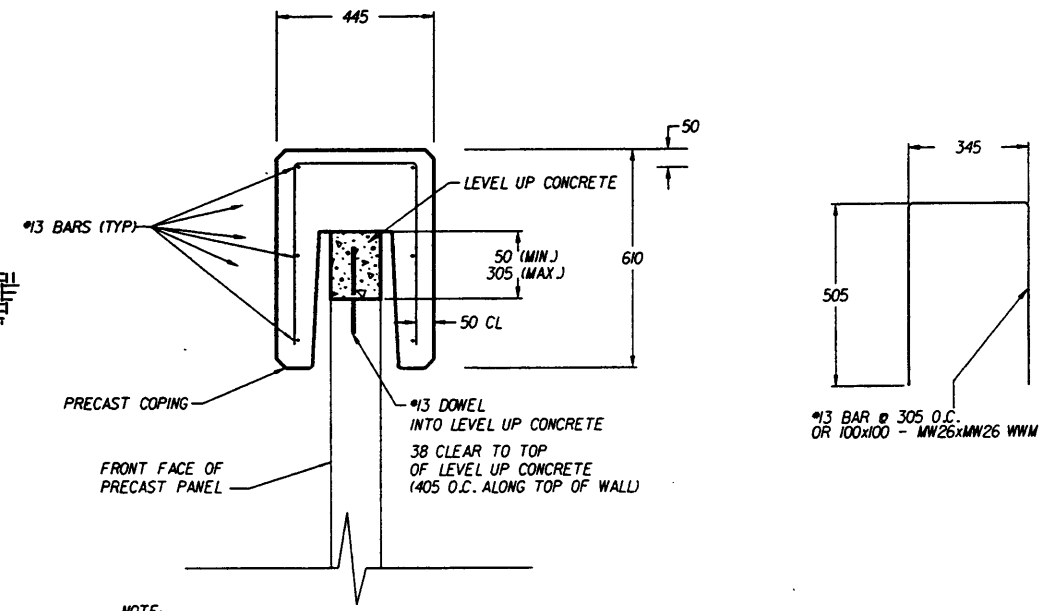
NOTE:  
EXPANSION JOINTS IN C.J.P. COPING SHALL BE AT 2 PANEL INTERVALS. COPING JOINTS MUST COINCIDE WITH PANEL JOINTS ON FRONT FACE AND SHALL BE PERPENDICULAR TO SLOPE LINE. REINFORCING STEEL SHALL BE STOPPED 50 SHORT OF EITHER SIDE OF THE EXPANSION JOINT. CONTRACTION JOINTS SHALL BE PLACED IN MIDDLE PORTION ON 2 PANEL UNIT TO COINCIDE WITH PANEL JOINTS.



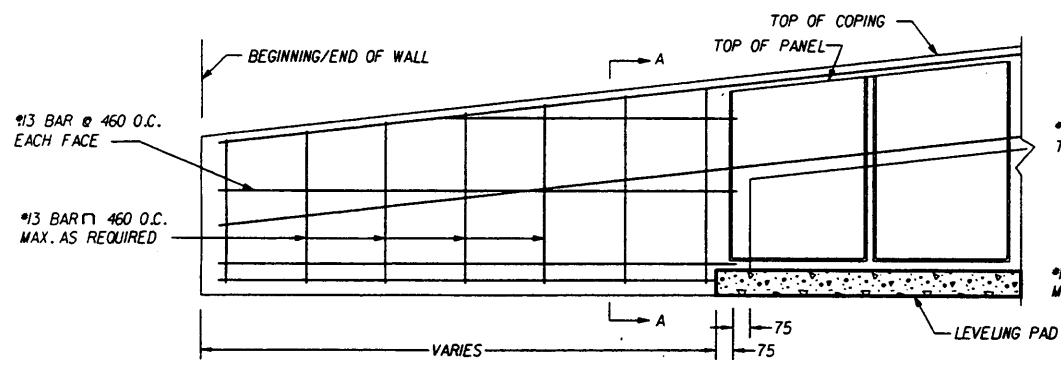
C.J.P. COPING PARTIAL ELEVATION VIEW  
NOT TO SCALE



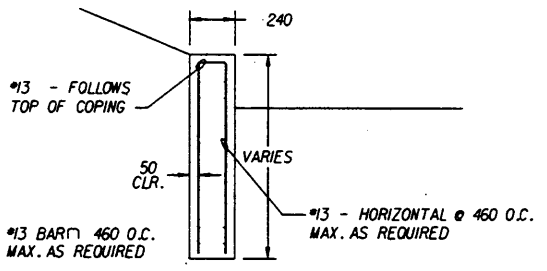
C.I.P. COPING WITH SWALE  
NOT TO SCALE



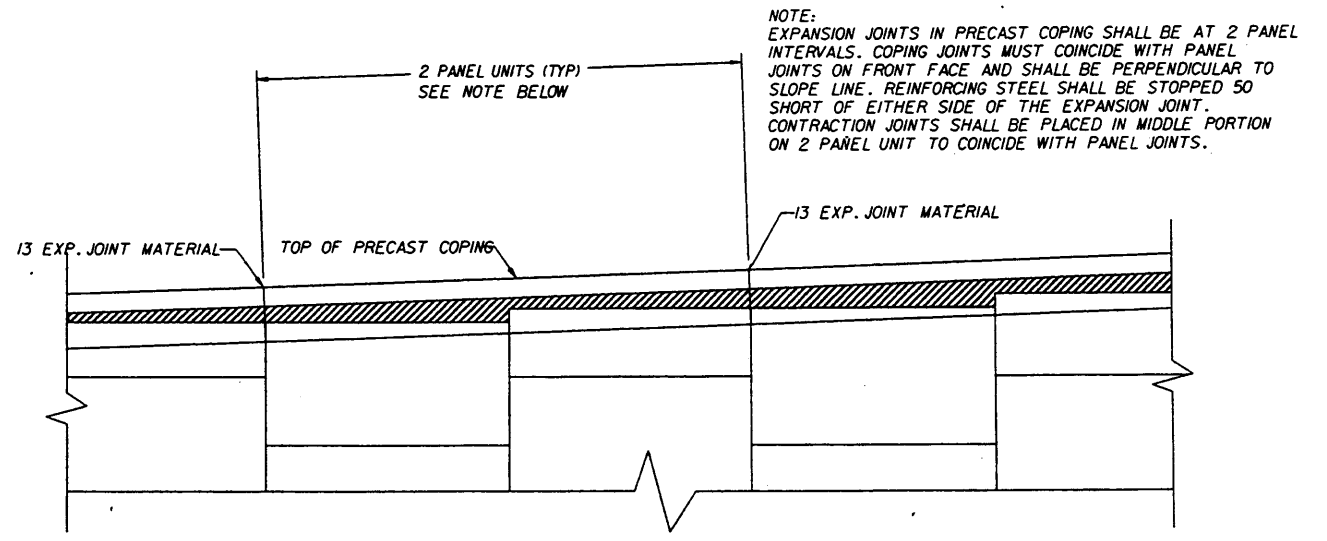
PRECAST COPING SECTION  
NOT TO SCALE



COPING ENCLOSURE DETAIL  
NOT TO SCALE



SECTION A-A



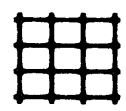
PRECAST COPING PARTIAL ELEVATION VIEW  
NOT TO SCALE

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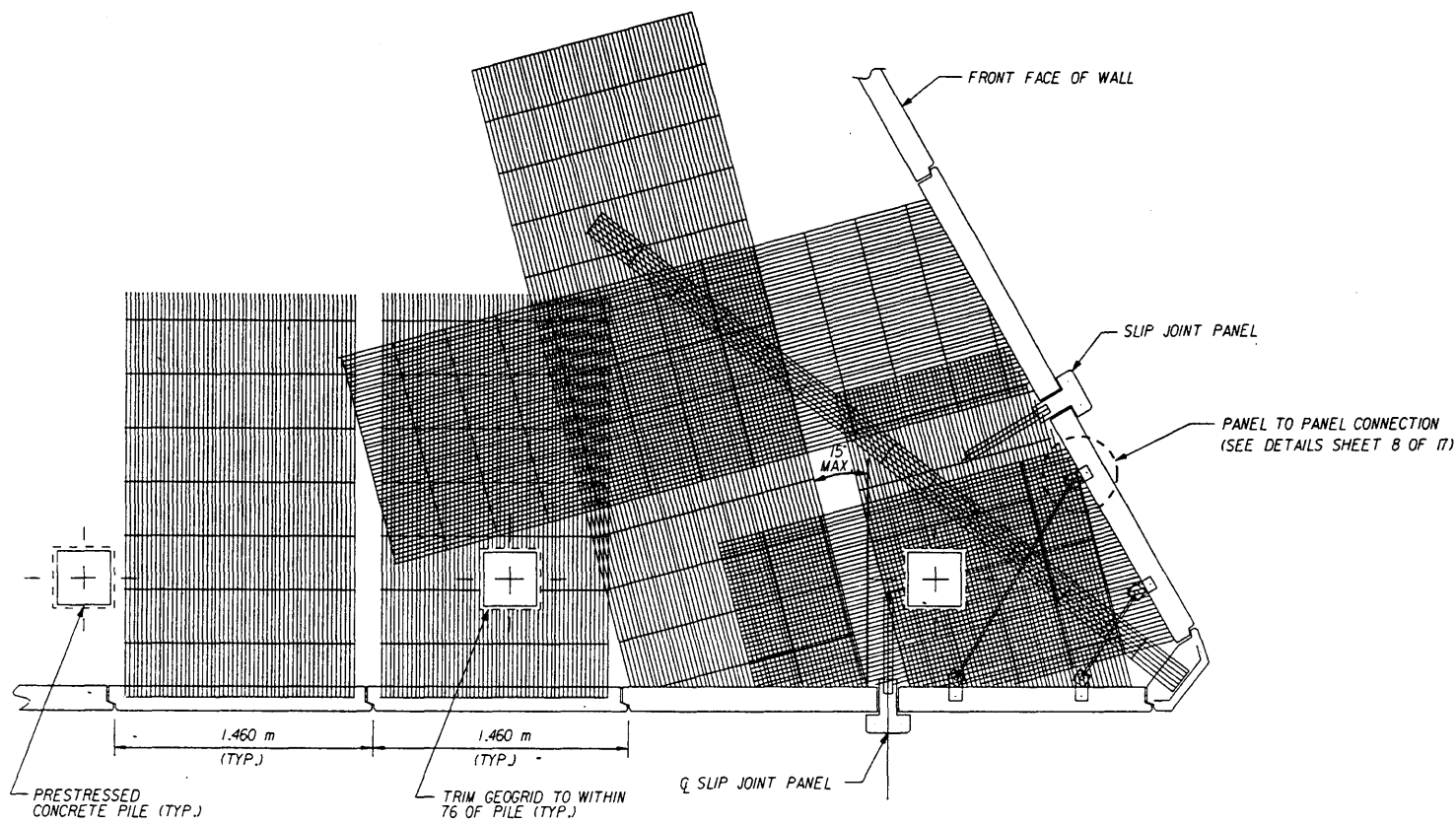
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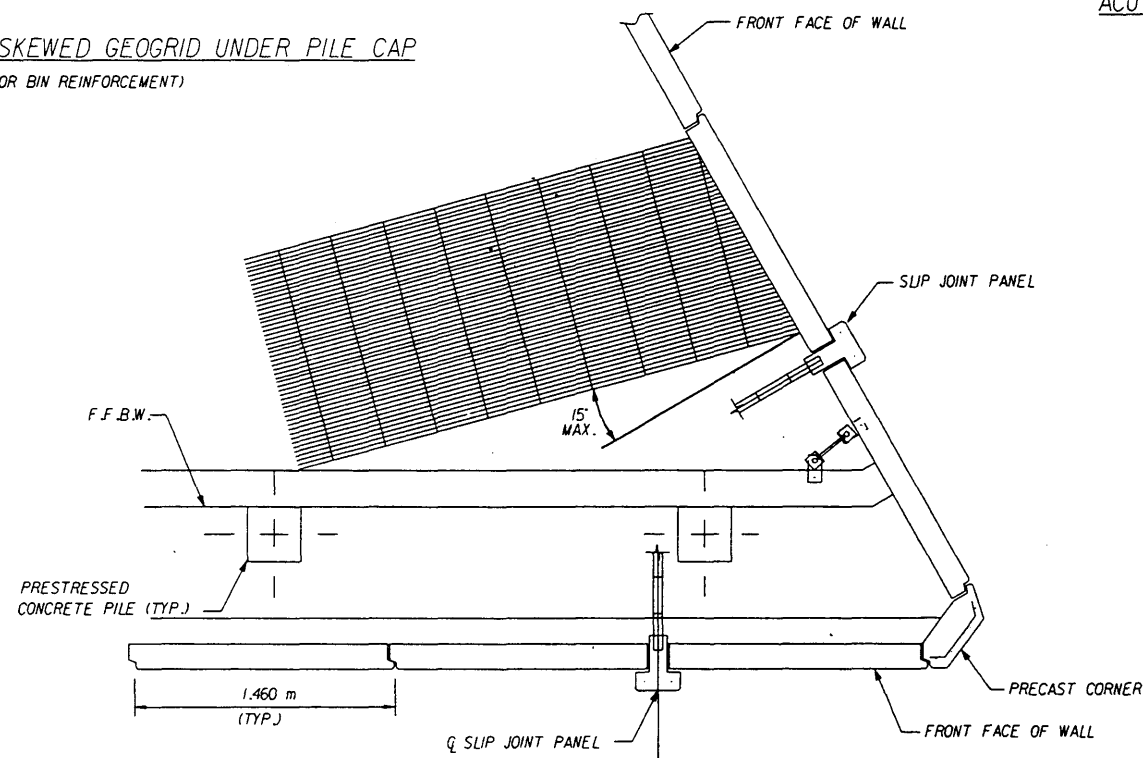
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Atlanta, GA 30328  
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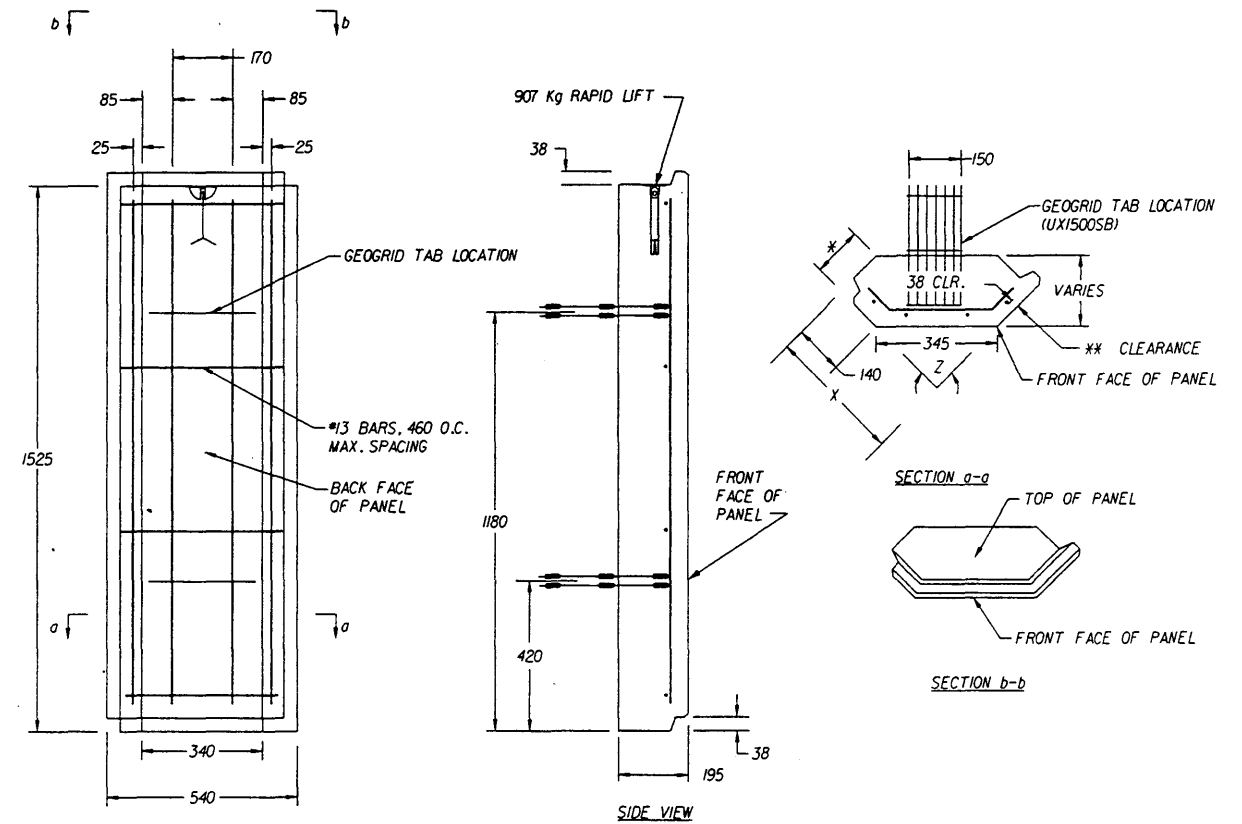
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES MSE RETAINING WALL					
Names	Dates	Approved By			
Designed By	DJ 8-98	W. J. [Signature] State Structures Design Engineer			
Drawn By	JMS 8/14/98	Revision	Sheet No.	Index No.	
Checked By	KPA 3-99	00	6 of 17	5025	



LESS THAN 75° ACUTE CORNER - SKEWED GEOGRID UNDER PILE CAP  
(SEE DETAIL BELOW FOR BIN REINFORCEMENT)



EXAMPLE ACUTE CORNER - SKEWED GEOGRID AT ABUTMENT LEVEL  
NOT TO SCALE



ACUTE CORNER ELEMENT DETAIL

\* SEE SHEET 3 OF 17 FOR PANEL THICKNESS

\*\* VARIES

75 FOR MARINE ENVIRONMENTS

38 FOR MILD OR SLIGHTLY AGGRESSIVE ENVIRONMENTS.

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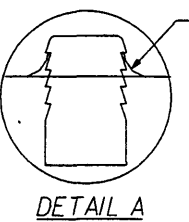
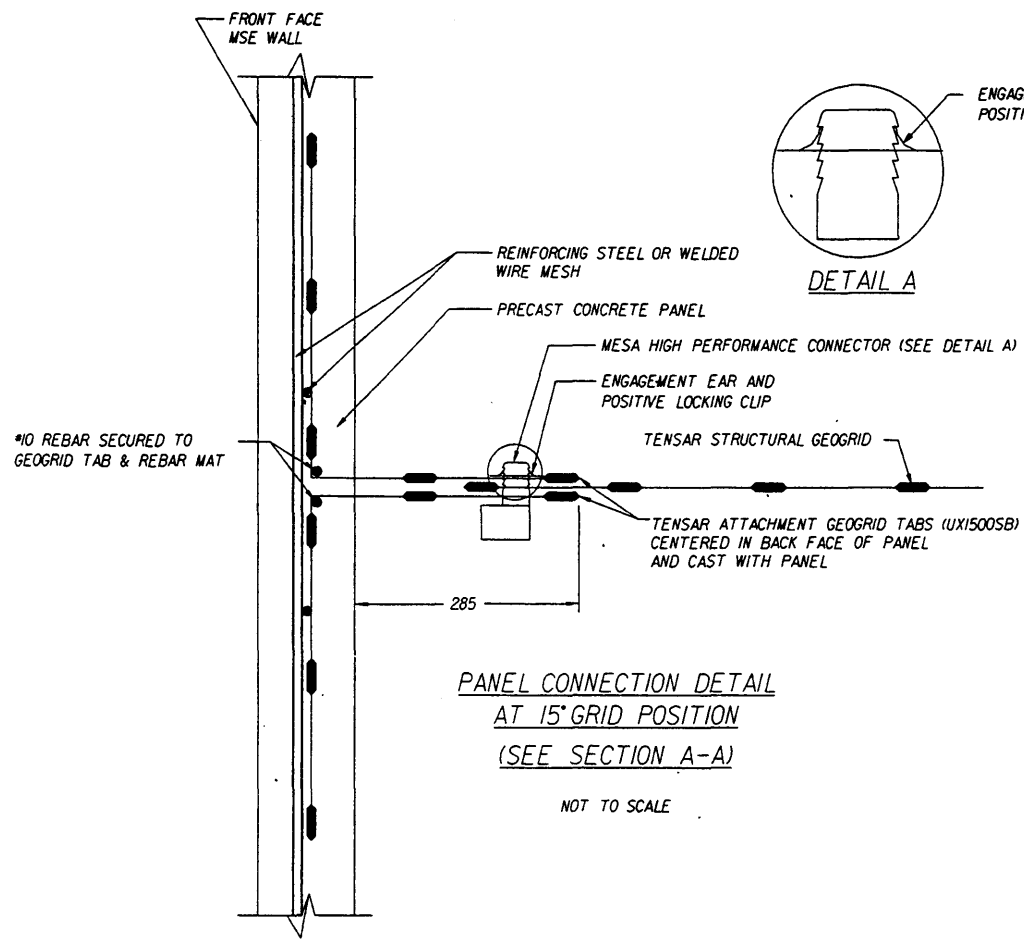
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(404) 250-1290

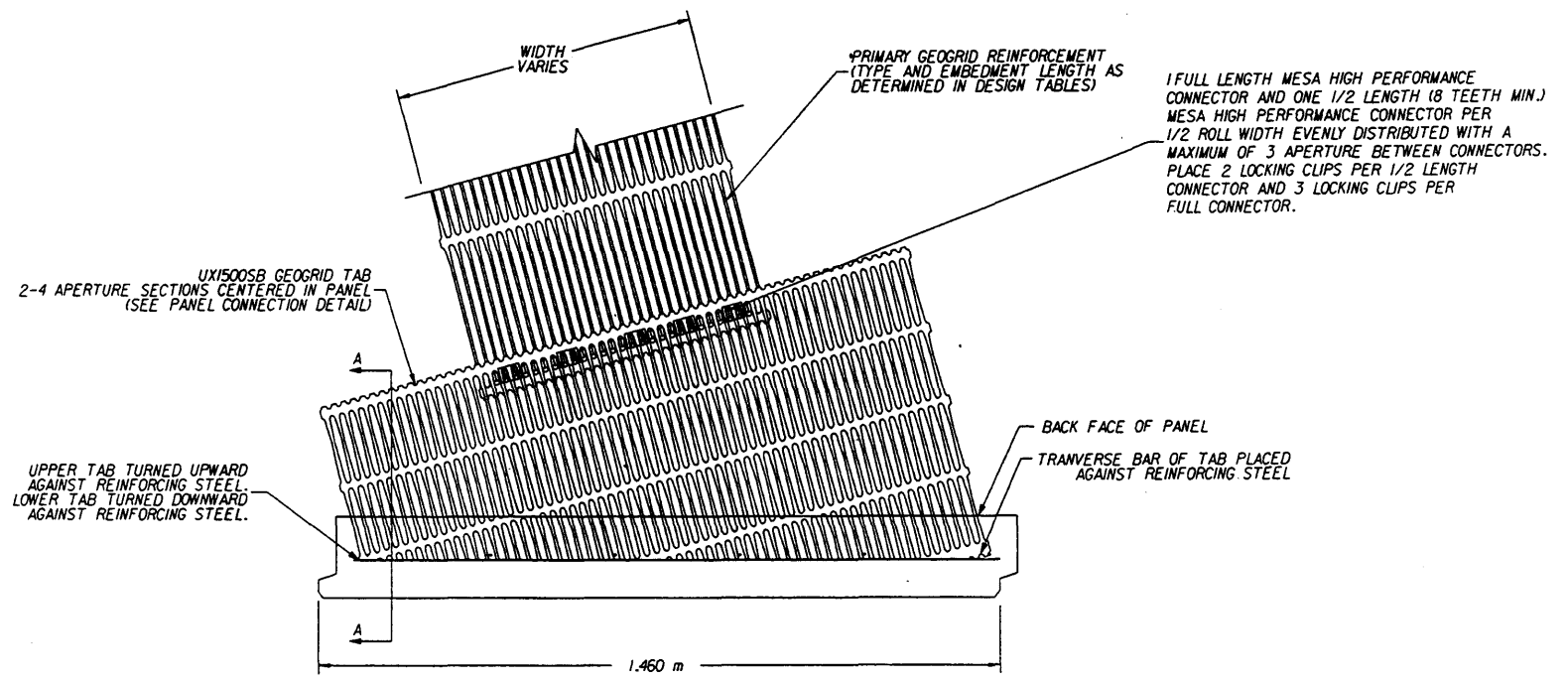


STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES MSE RETAINING WALL				
Designed By	DJ	Dates	8-98	Approved By
Drawn By	JMS	8/14/98	Revision	State Structures Design Engineer
Checked By	KPA	3-99	00	7 of 17
				5025



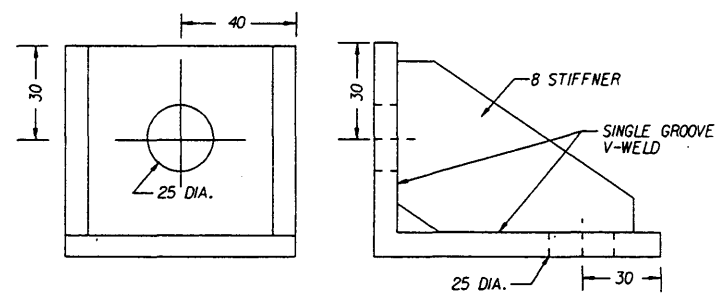
PANEL CONNECTION DETAIL  
AT 15' GRID POSITION  
(SEE SECTION A-A)

NOT TO SCALE



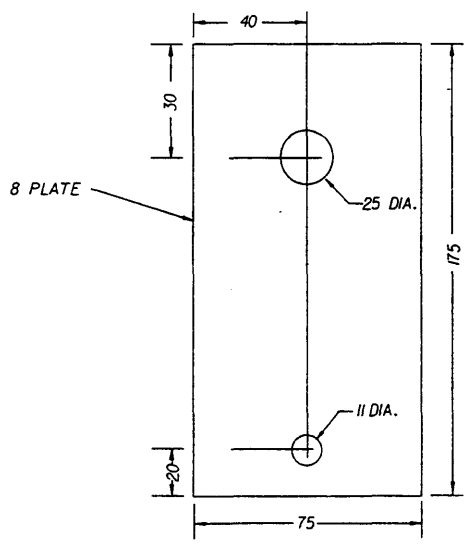
CONNECTION DETAIL PLAN VIEW AT 15' GRID POSITION

NOT TO SCALE

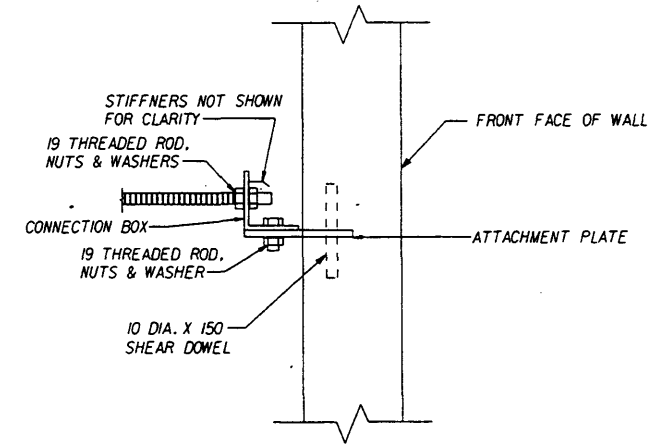


ANGLE: 75 X 100 X 8, HOT DIP GALVANIZED  
75 X 100 X 6, 316 L GRADE STAINLESS STEEL

CONNECTION BOX



ATTACHMENT PLATE

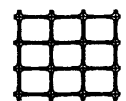


PANEL TO PANEL ATTACHMENT

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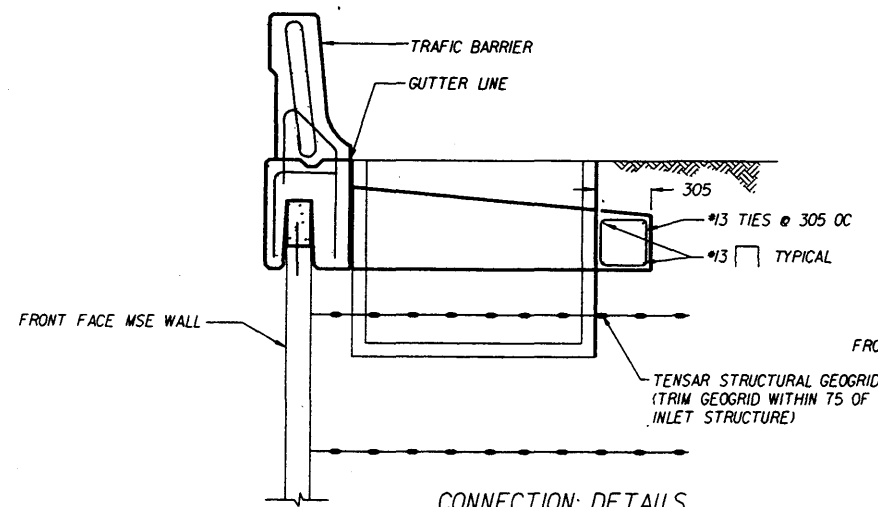
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Atlanta, GA 30328  
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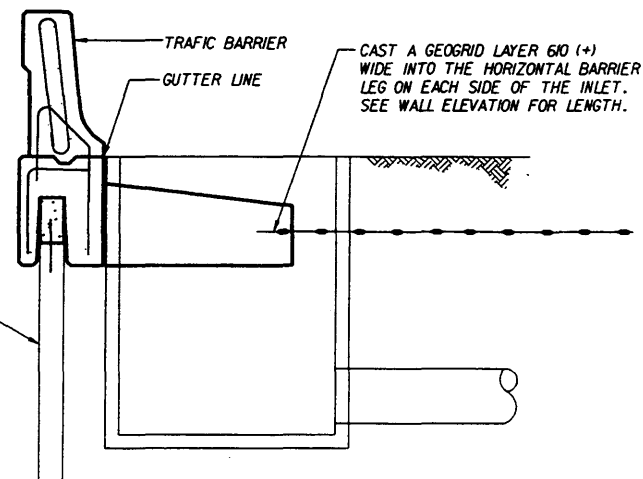
- NOTES:
1. ALL PARTS SHALL BE HOT DIP GALVANIZED AFTER FABRICATION FOR MODERATELY OR SLIGHTLY AGGRESSIVE ENVIRONMENTS.
  2. ALL PARTS SHALL BE FABRICATED FROM 316 L GRADE STAINLESS STEEL FOR USE IN A SALT WATER ENVIRONMENT.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES MSE RETAINING WALL					
Designed By	Names	Dates	Approved By		
Drawn By	JMS	8/14/98	W. J. [Signature]	State Structures Design Engineer	
Checked By	KPA	3-79	00	8 of 17	5025

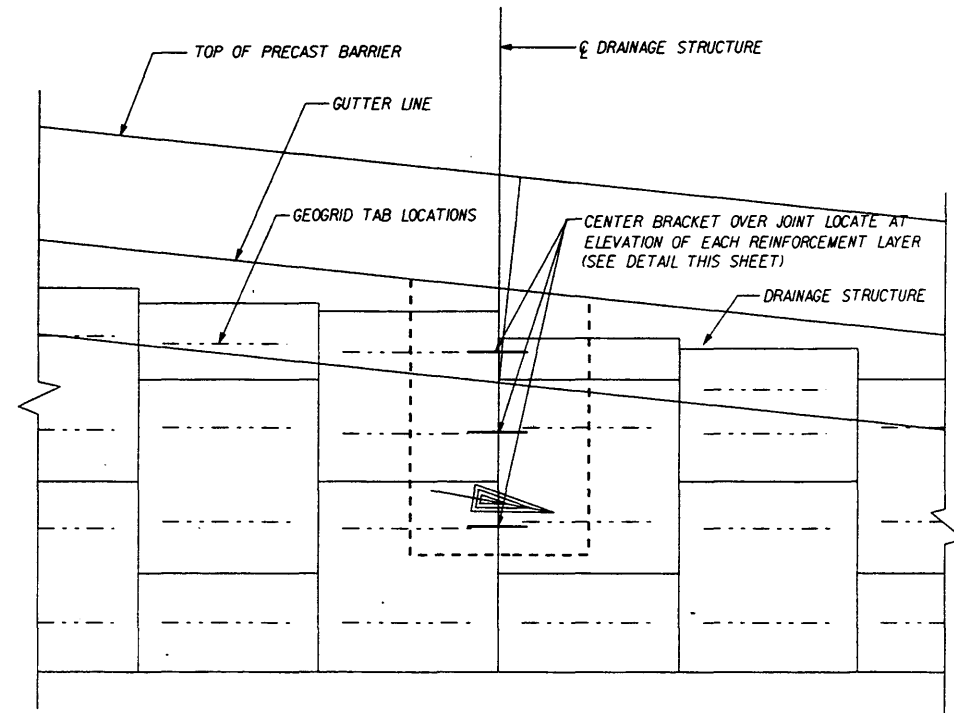




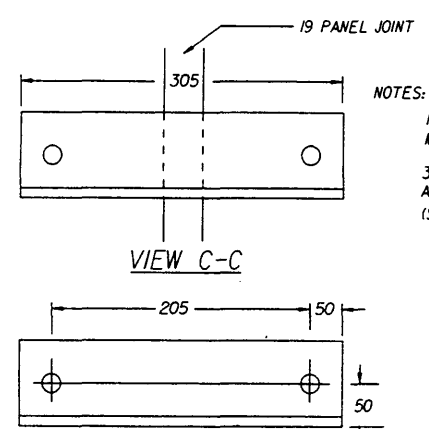
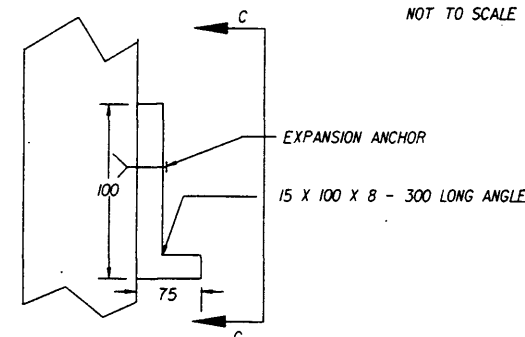
CONNECTION DETAILS  
SECTION A-A  
NOT TO SCALE



DETAIL OF TENSAR PANELS @ INLETS  
SECTION B-B  
NOT TO SCALE

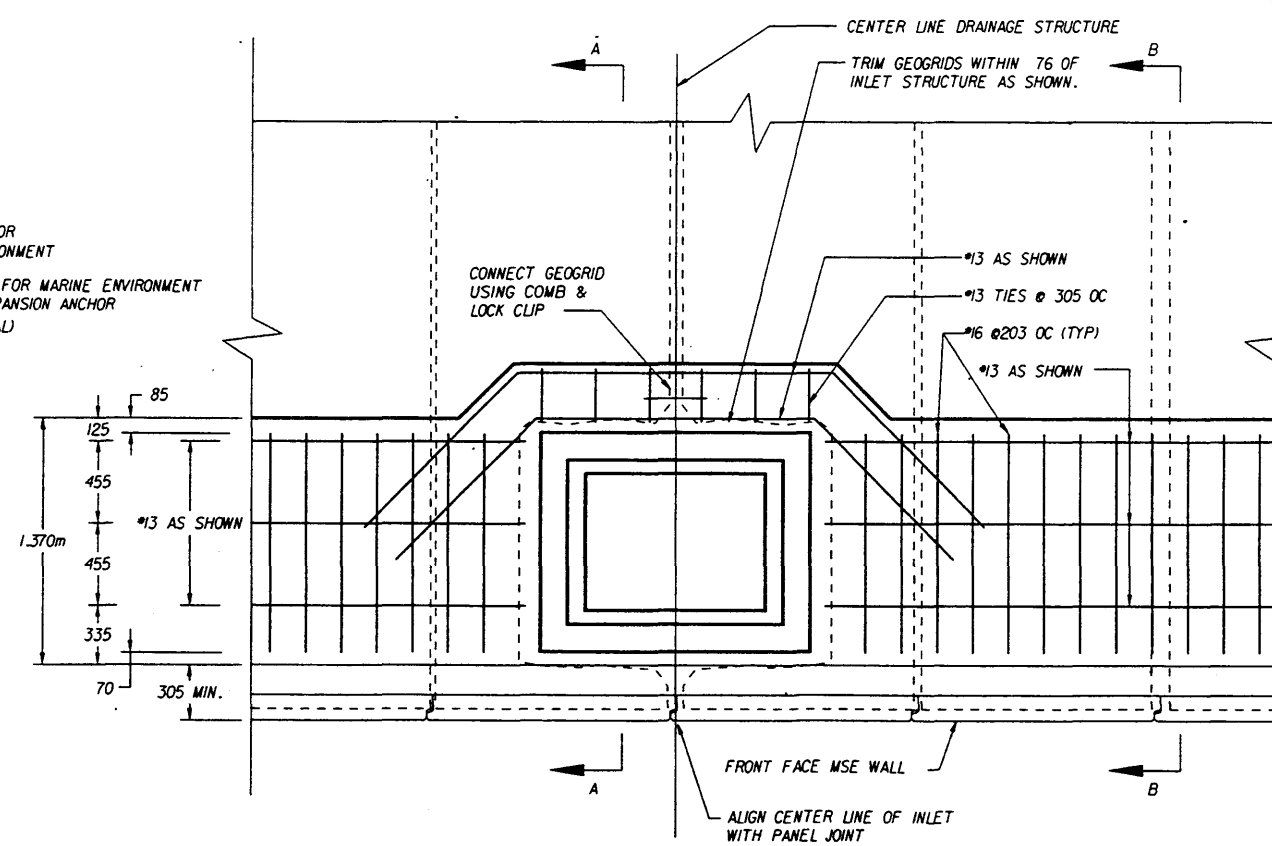


PARTIAL ELEVATION - WALL @ DRAINAGE INLET  
NOT TO SCALE

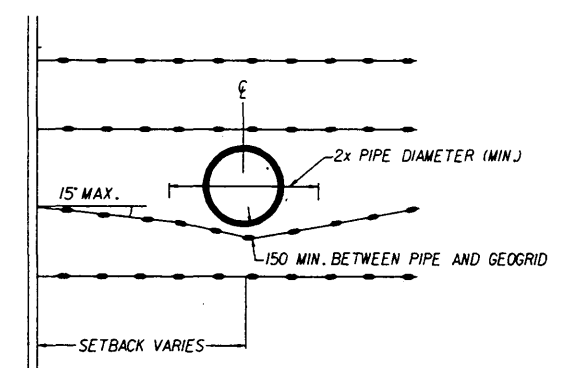


CENTER BRACK OVER JOINT DETAIL

NOTES:  
HOT DIP GALVANAIZED ANGLE FOR MODERATELY AGGRESSIVE ENVIRONMENT  
316 L GRADE STAINLESS STEEL FOR MARINE ENVIRONMENT  
ANGLE HILTIHSLG RM 10/20 EXPANSION ANCHOR (STAINLESS) OR APPROVED EQUAL



PARTIAL PLAN - WALL @ DRAINAGE INLET  
NOT TO SCALE



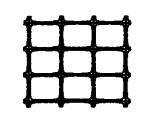
TYPICAL OBSTRUCTION AVOIDANCE DETAIL  
NOT TO SCALE

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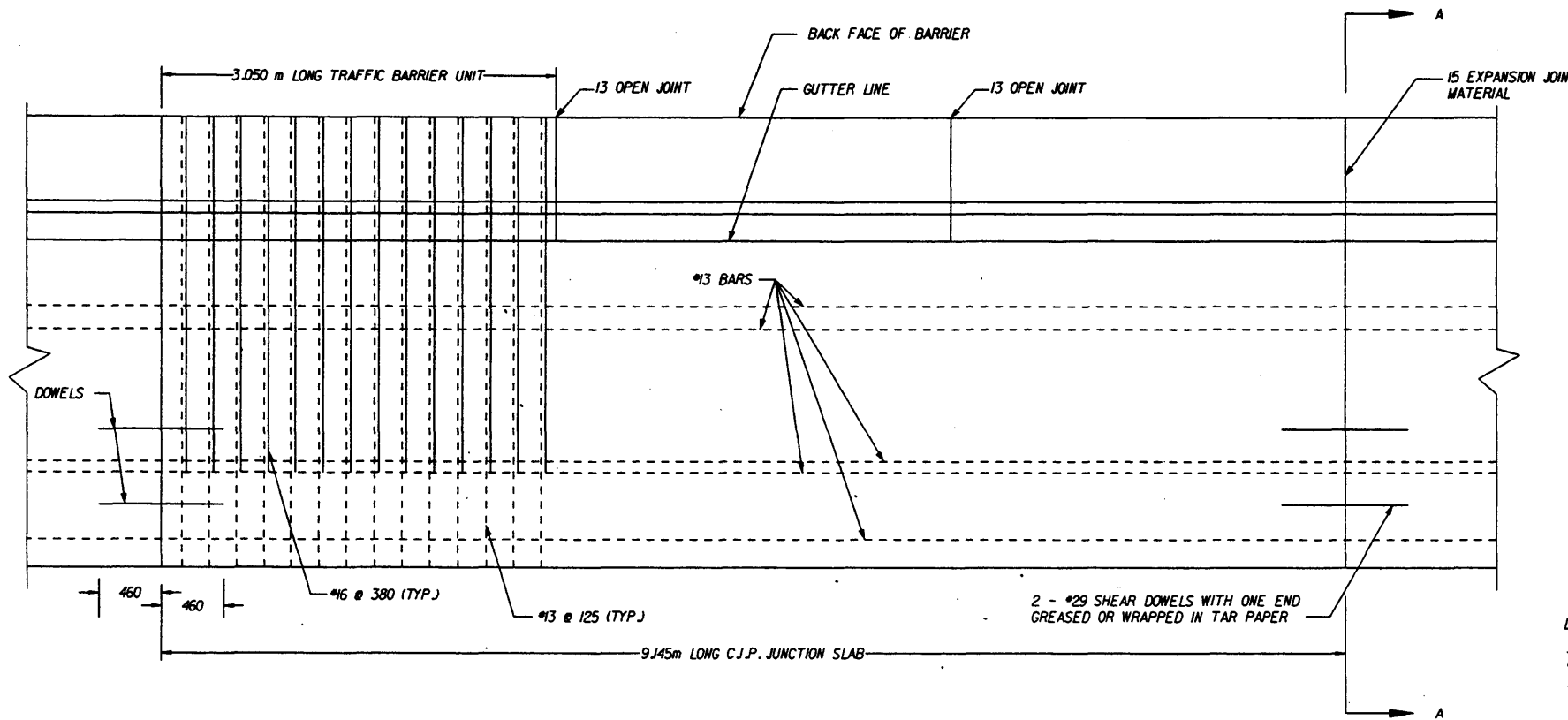
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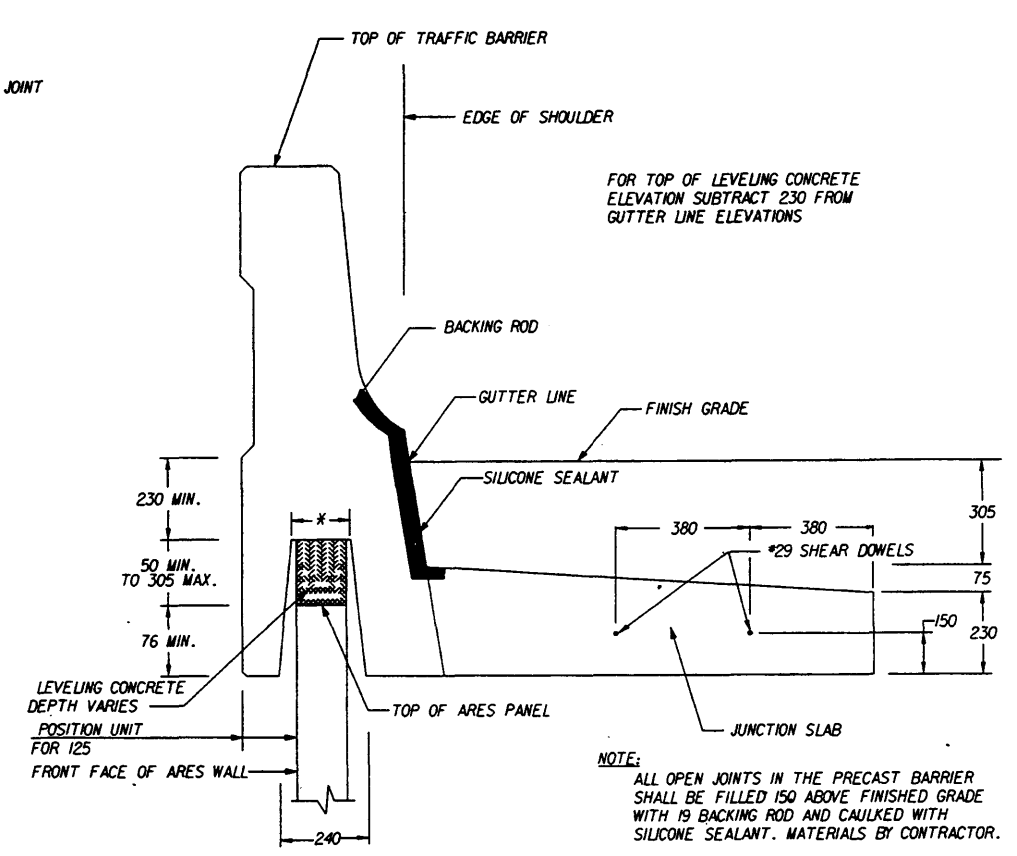
**TENSAR EARTH TECHNOLOGIES, INC.**  
5775-B Glenridge Drive  
Lakeside Center Suite 450  
Atlanta, GA 30328  
(404) 250-1290



STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES MSE RETAINING WALL</b>				
Designed By	DU	Date	8-78	Approved By
Drawn By	MS	8/14/98	Revision	State Structures Design Engineer
Checked By	KPA	3-99	00	9 of 17
				Index No. 5025

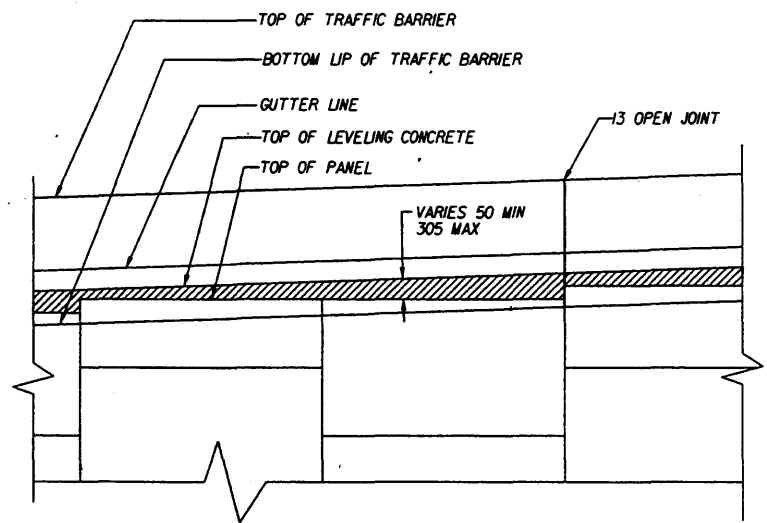


PLAN VIEW  
 PRECAST TRAFFIC BARRIER  
 NOT TO SCALE



SECTION A-A AT APPROACH SLAB  
 NOT TO SCALE

\* 200 FOR PANELS IN SLIGHTLY TO MODERATELY AGGRESSIVE ENVIRONMENTS  
 220 FOR SALT WATER ENVIRONMENTS

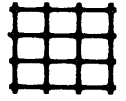


PRECAST TRAFFIC BARRIER PARTIAL ELEVATION VIEW  
 NOT TO SCALE

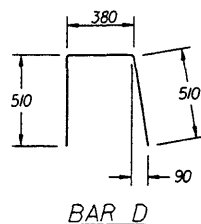
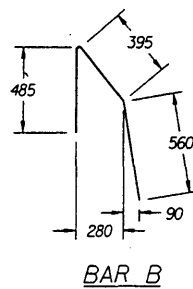
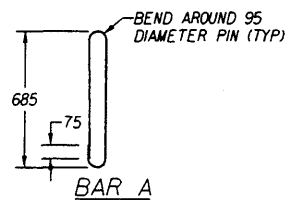
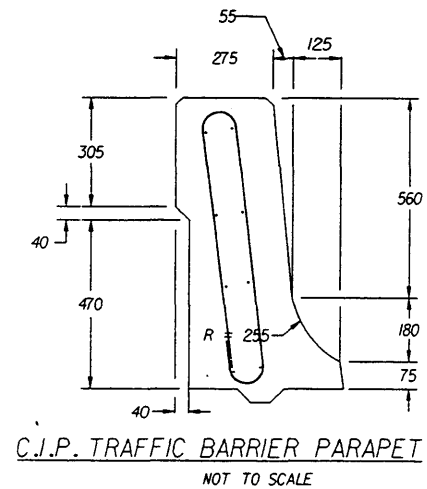
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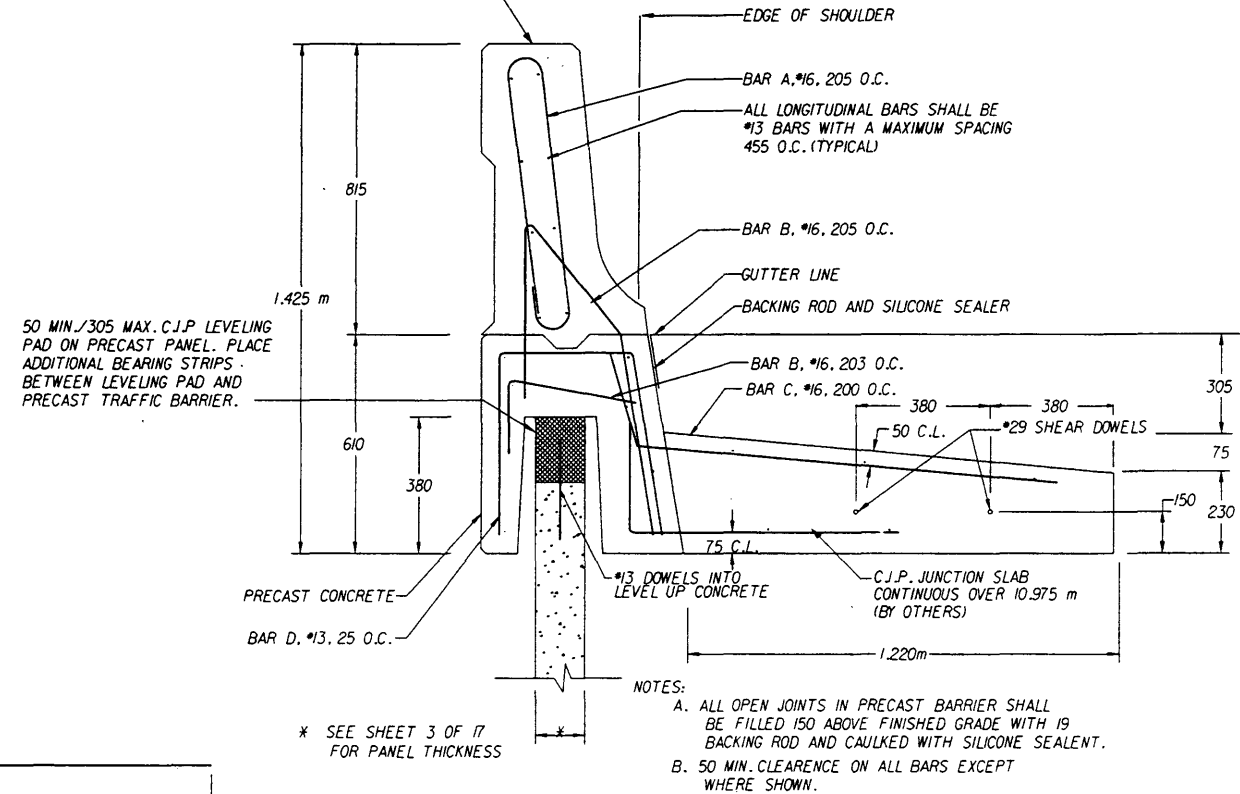
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 (404) 250-1290



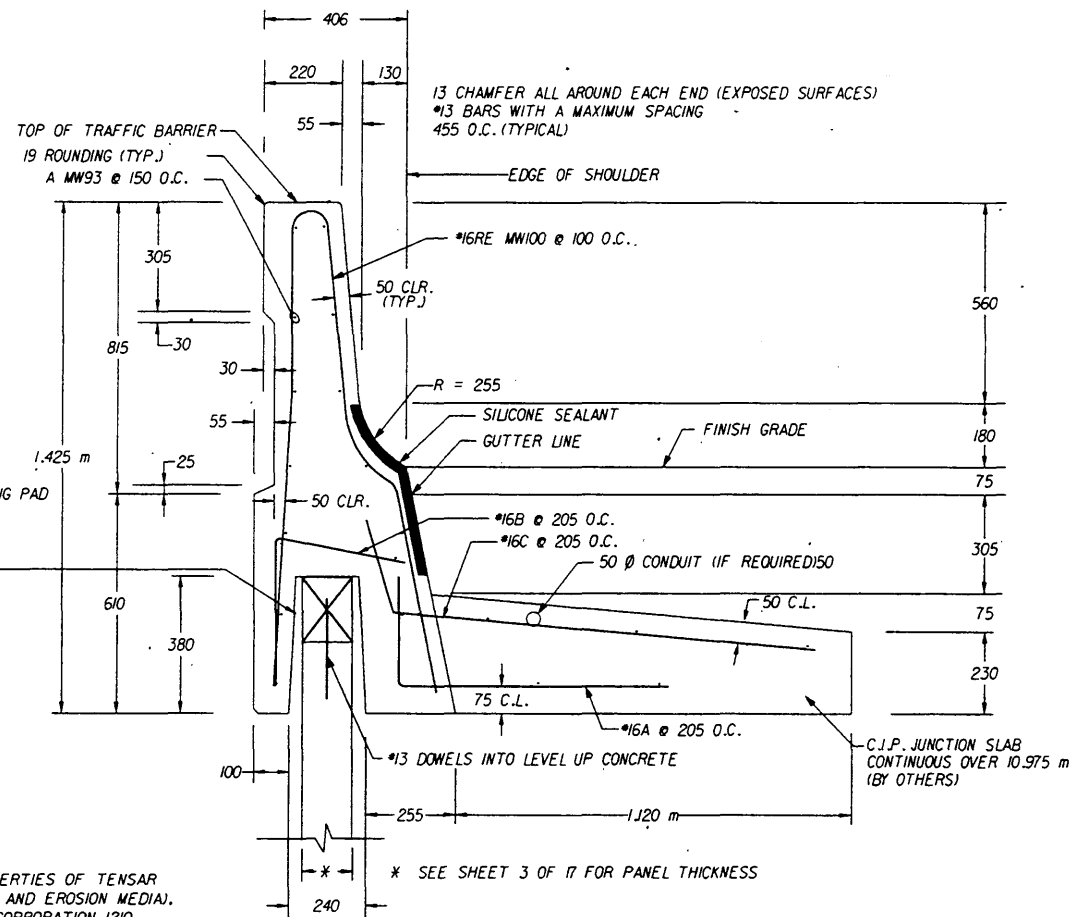
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES MSE RETAINING WALL					
Designed By	Names	Dates	Approved By		
Drawn By	JMS	8/14/98	W. J. [Signature]		
Checked By	KPA	3-77	Revision	00	Sheet No. 10 of 17
				Index No.	5025



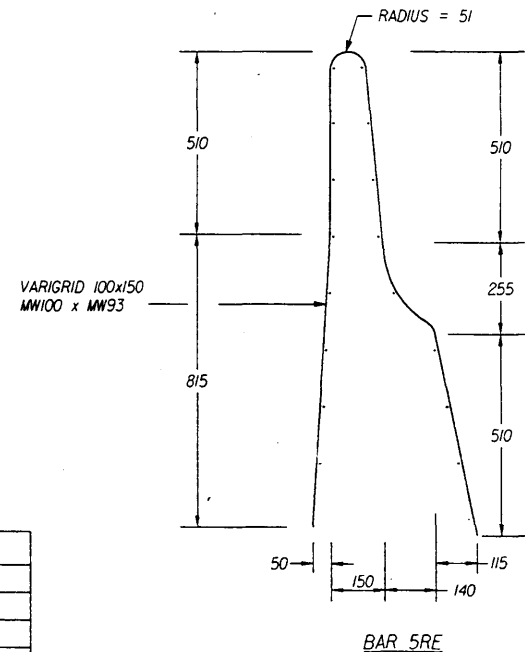
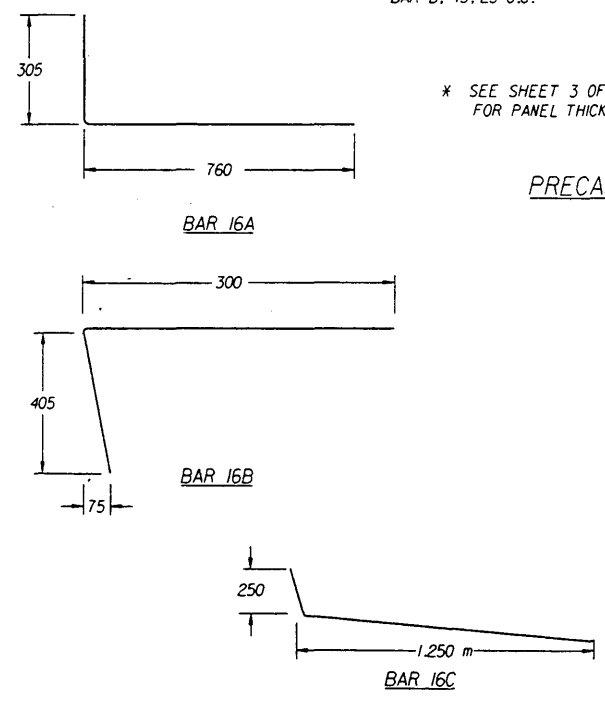
PRECAST OR C.J.P. TRAFFIC BARRIER (MIN. LENGTH BETWEEN JOINTS 10')



PRECAST BARRIER - STANDARD REBAR REINFORCEMENT NOT TO SCALE



PRECAST BARRIER - VARIGRID REINFORCEMENT NOT TO SCALE



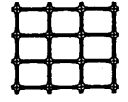
MARK	QUANTITY	REMARKS
16A	8	1.065 m LONG
16B	15	1.980 m LONG
A	VARIGARD	MW93 @ 150 O.C.
B	VARIGARD	MW100 @ 100 O.C.

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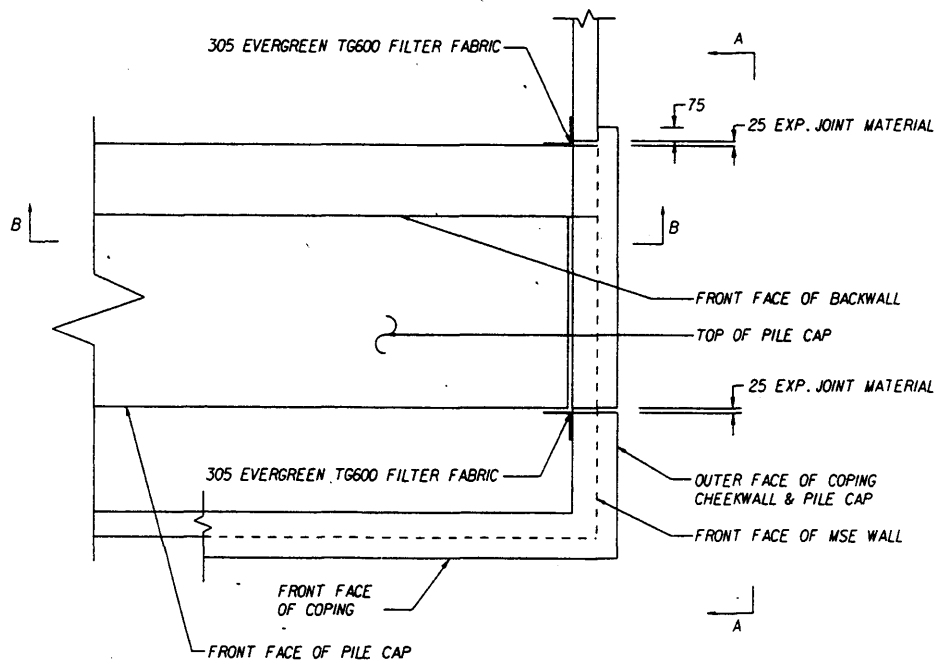
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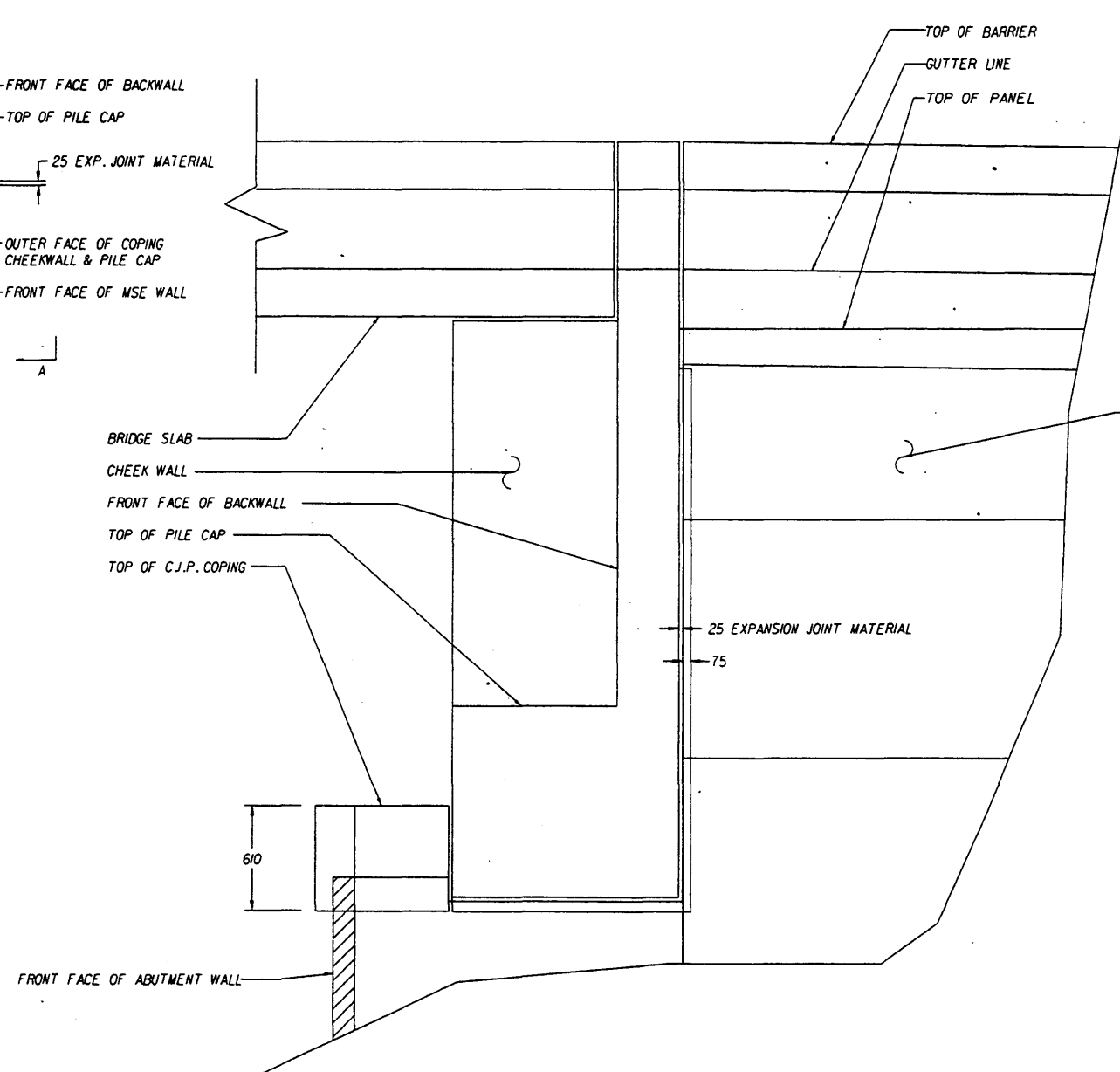
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Atlanta, GA 30328  
(404) 250-1290



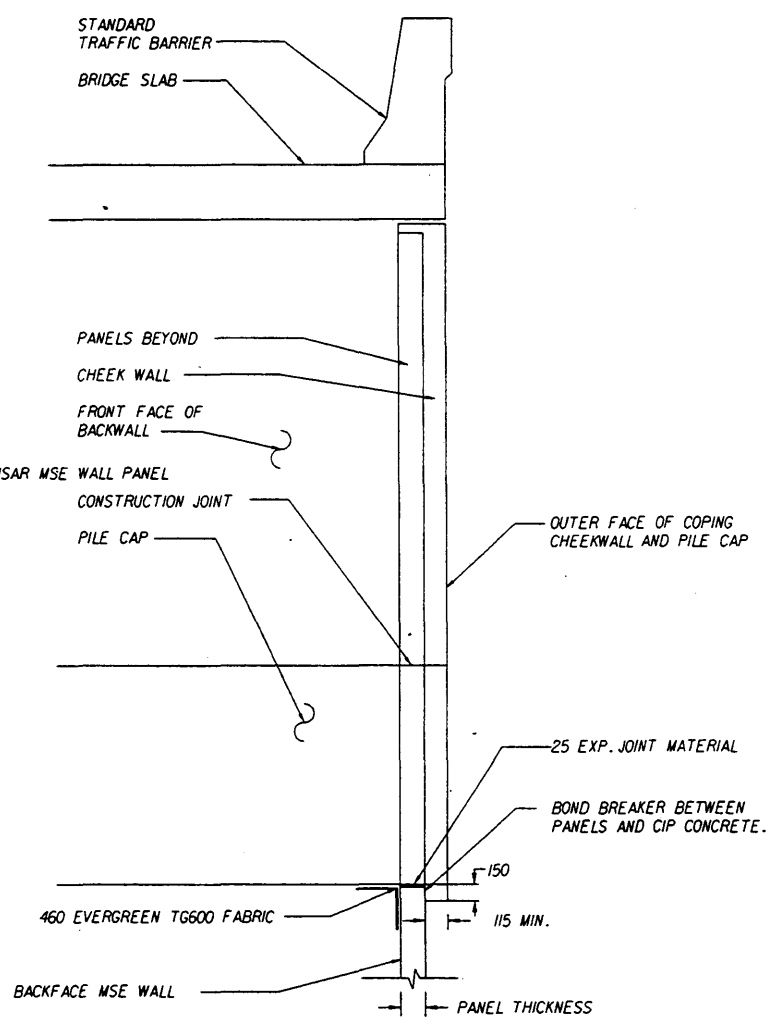
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES MSE RETAINING WALL				
Designed By	Names	Dates	Approved By	
Drawn By	JMS	8/14/98	State Structures Design Engineer	
Checked By	KPA	3-99	Revision	00
			Sheet No.	11 of 17
			Index No.	5025



PLAN VIEW @ ENDBENT  
NOT TO SCALE



VIEW A-A



SECTION B-B

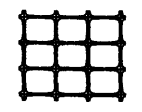
SECTIONS @ ENDBENT  
NOT TO SCALE

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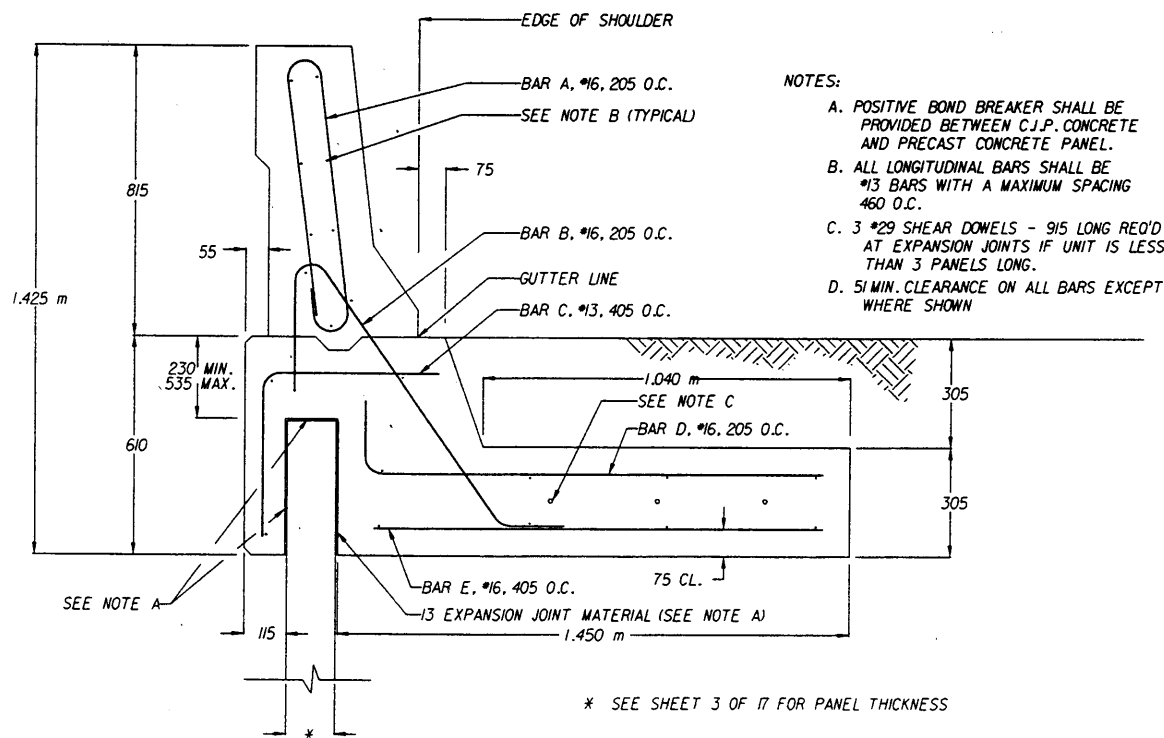
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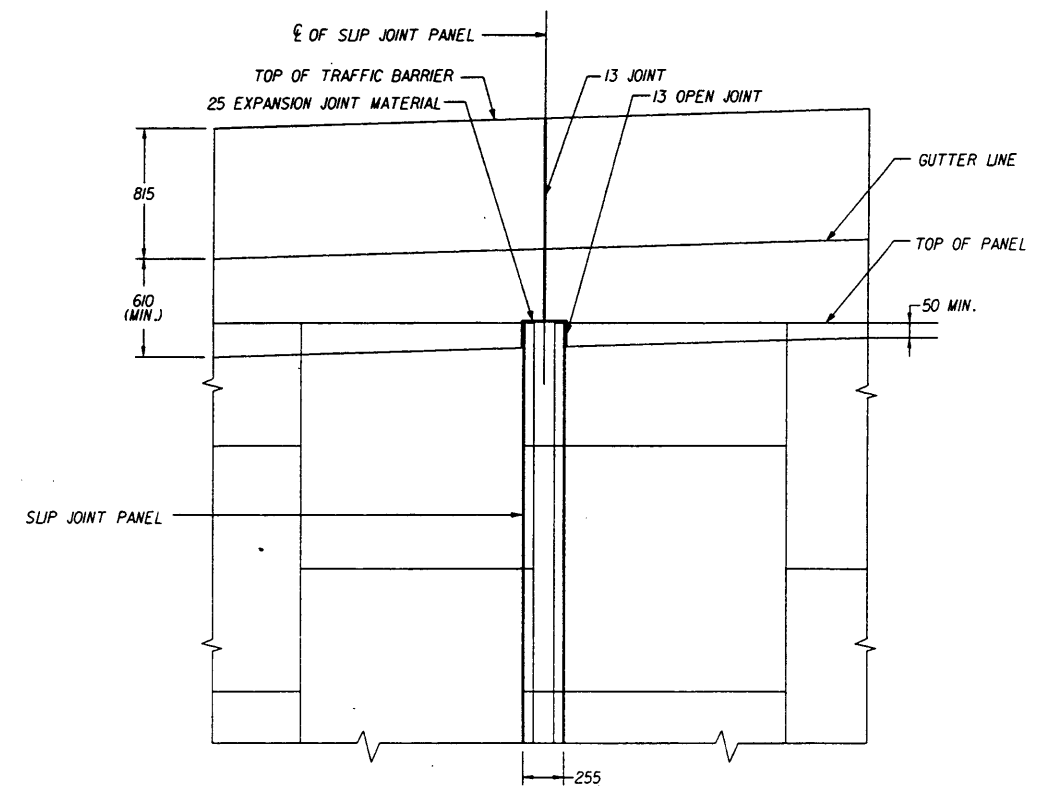


STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES MSE RETAINING WALL					
Names	Dates	Approved By <i>[Signature]</i>			
Designed By	DJ	8-98	State Structures Design Engineer		
Drawn By	JMS	8/14/98	Revision	Sheet No.	Index No.
Checked By	KPA	3-99	00	12 of 17	5025

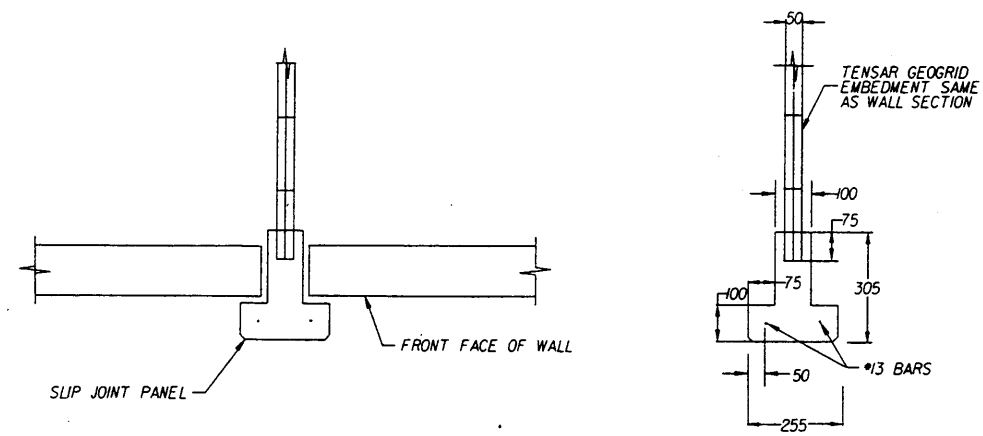


- NOTES:
- A. POSITIVE BOND BREAKER SHALL BE PROVIDED BETWEEN C.J.P. CONCRETE AND PRECAST CONCRETE PANEL.
  - B. ALL LONGITUDINAL BARS SHALL BE #13 BARS WITH A MAXIMUM SPACING 460 O.C.
  - C. 3 #29 SHEAR DOWELS - 915 LONG REQ'D AT EXPANSION JOINTS IF UNIT IS LESS THAN 3 PANELS LONG.
  - D. 51 MIN. CLEARANCE ON ALL BARS EXCEPT WHERE SHOWN

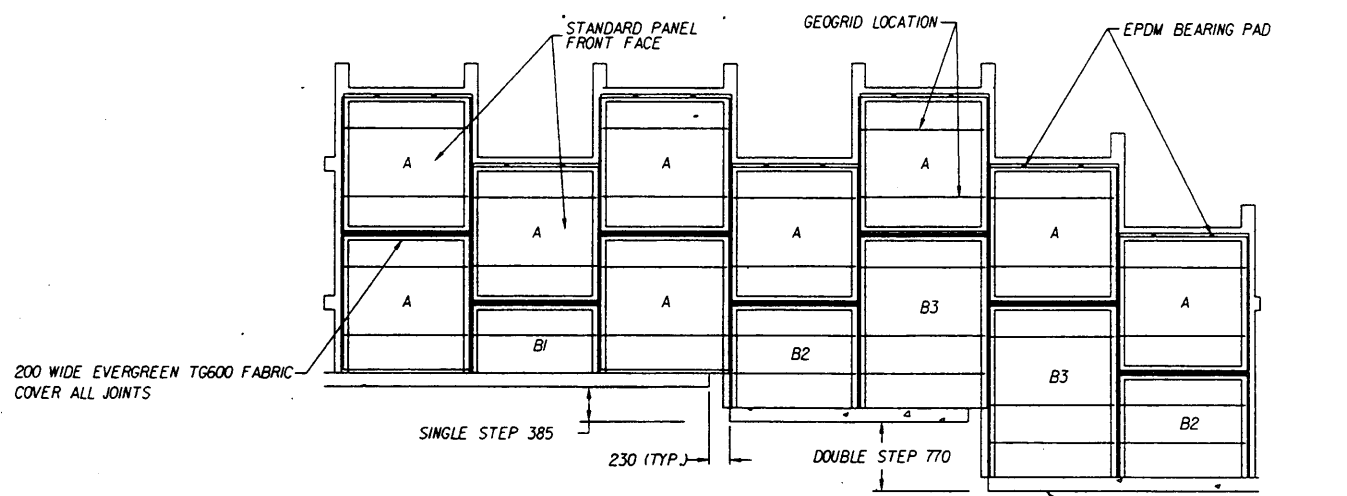
**C.J.P. CONCRETE TRAFFIC BARRIER**  
NOT TO SCALE



**C.J.P. TRAFFIC BARRIER OVER SLIP JOINT PANEL**  
NOT TO SCALE



**SLIP JOINT DETAIL**  
NOT TO SCALE



**TYPICAL LEVELING PAD STEP DETAIL**  
NOT TO SCALE

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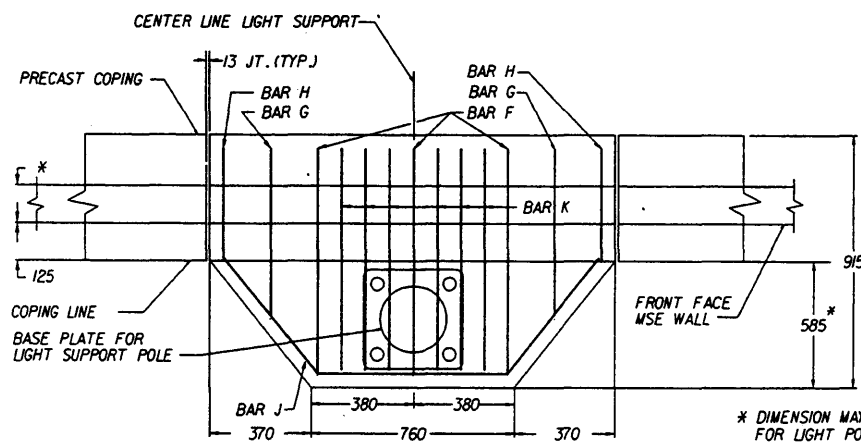
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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES MSE RETAINING WALL</b>				
Designed By	DJ	8-78	Approved By <i>[Signature]</i> State Structures Design Engineer	
Drawn By	JMS	8/14/98	Revision	Sheet No.
Checked By	KPA	3-99	00	13 of 17
				Index No. 5025

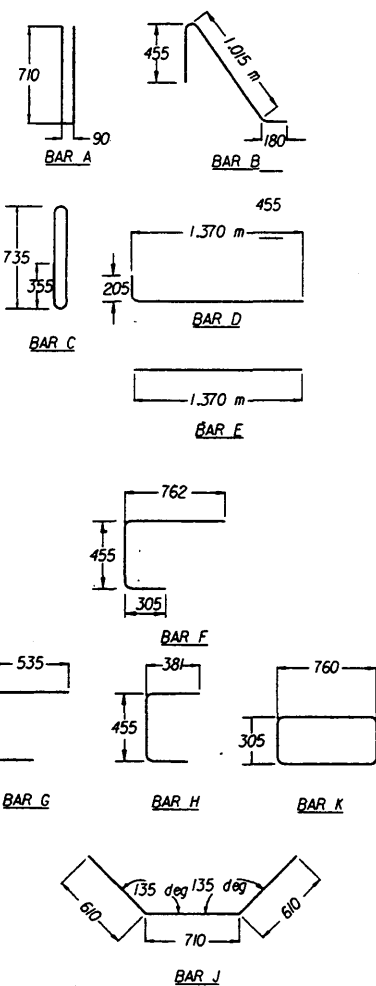


NOTE:  
REFER TO LIGHT POLE PILASTER DETAILS  
IN BRIDGE PLANS FOR NOTES AND ADDITIONAL  
DETAILS (CONDUIT, JUNCTION BOXES, ETC.)

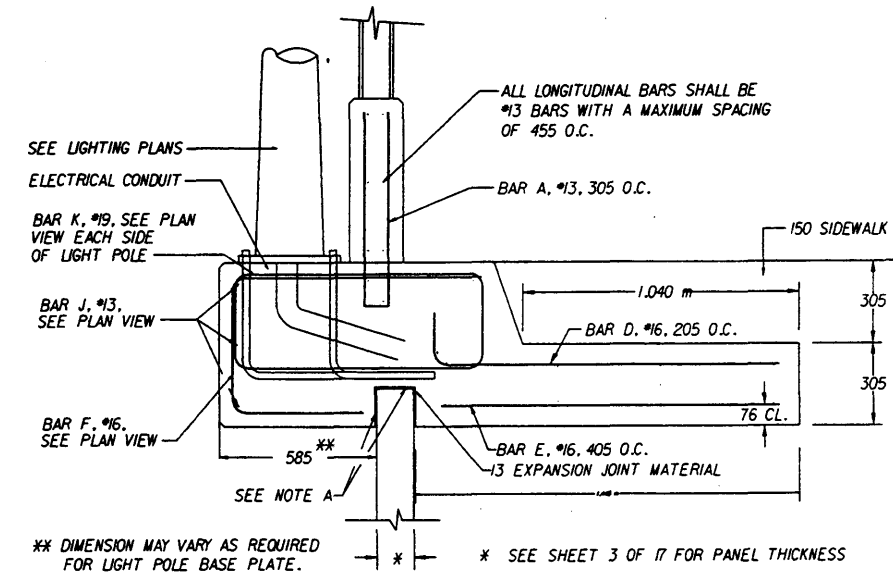
\* DIMENSION MAY VARY AS REQUIRED  
FOR LIGHT POLE BASE PLATE.

NOTE:  
REBAR IN BARRIER AND JUNCTION  
SLAB NOT SHOWN FOR CLARITY

PLAN  
NOT TO SCALE

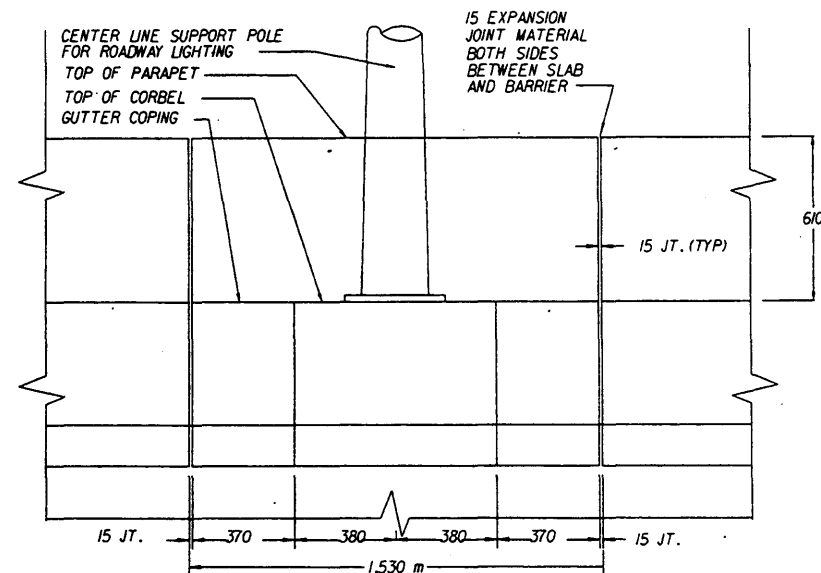


BAR BENDING DETAIL  
NOT TO SCALE



NOTES:  
A. POSITIVE BOND BREAKER (6 MIL. POLYETHYLENE  
OR APPROVED EQUAL) SHALL BE  
PROVIDED BETWEEN CAST IN PLACE  
CONC. AND PRECAST CONC. PANEL.  
B. MAINTAIN A 51 MIN. CLEARANCE ON ALL BARS.  
EXCEPT WHERE NOTED OTHERWISE.

PARAPET DETAIL AT LIGHT POLE  
NOT TO SCALE



PARTIAL ELEVATION

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CITIZENS PARKWAY, MORROW GA. 30260. ANY SUBSTITUTION OF THE  
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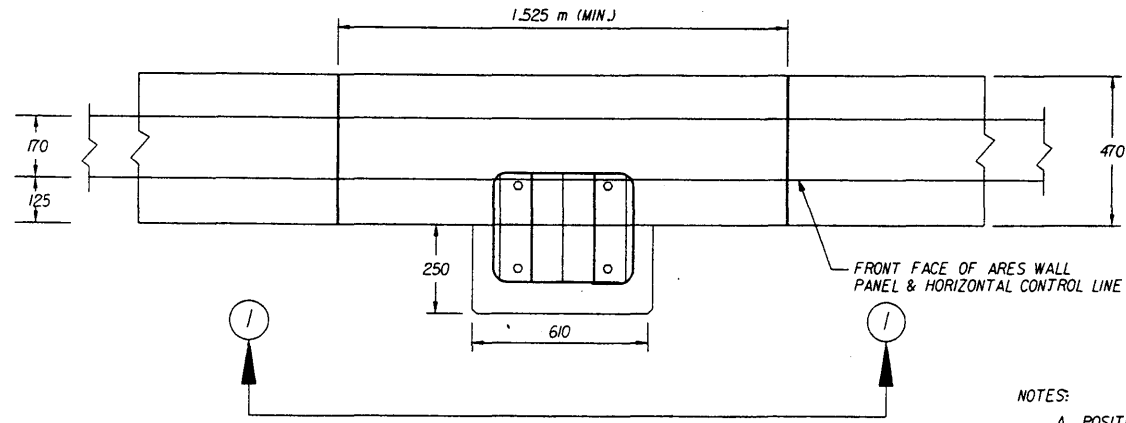
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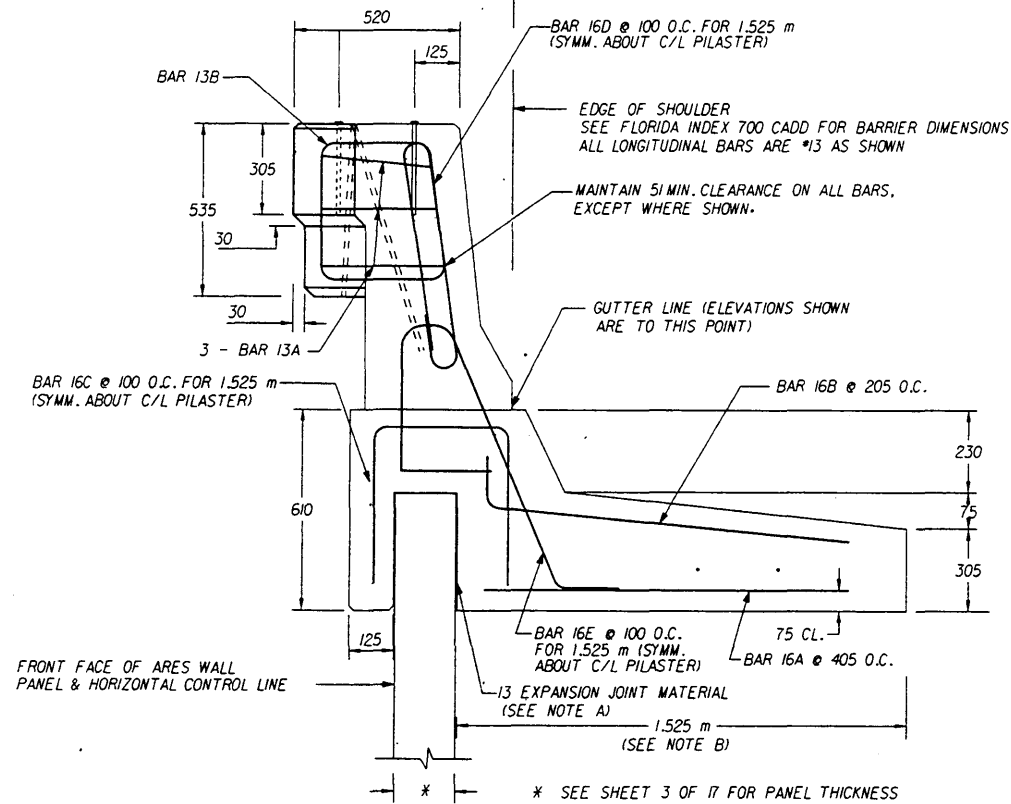
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Atlanta, GA 30328  
(404) 250-1290



STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES MSE RETAINING WALL				
Names	Dates	Approved By		
Designed By	DJ 8-98	W. J. [Signature] State Structures Design Engineer		
Drawn By	JMS 8/14/98	Revision	Sheet No.	Index No.
Checked By	KPA 3-99	00	14 of 17	5025



2 PLAN  
NOT TO SCALE

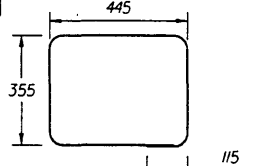


3 BARRIER DETAIL AT LIGHT POLE  
NOT TO SCALE

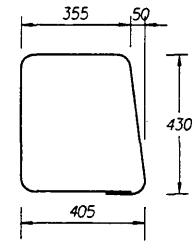
NOTES:

- A. POSITIVE BOND BREAKER SHALL BE PROVIDED BETWEEN CAST IN PLACE CONCRETE AND PRECAST CONCRETE PANEL.
- B. THE BARRIER JUNCTION SLAB SHALL HAVE THESE DIMENSIONS FOR ONE PRECAST UNIT EITHER SIDE OF LIGHT POLE BARRIER LONGITUDINAL BARS SHALL BE AS SHOWN ABOVE.
- C. 2 - #29 SHEAR DOWELS - 915 LONG REFER TO PRECAST BARRIER SHEET.
- D. LIGHT POLE SUPPLIER IS RESPONSIBLE FOR PROVIDING ANCHOR BOLTS THAT EFFECTIVELY TRANSMIT THE LIGHT POLE LOADS TO THE PILASTER AND FIT THE REINFORCING CAGE.
- E. SEE STANDARD INDEX 500 FOR ADDITIONAL DETAILS.

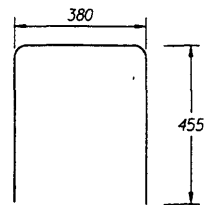
REBAR QUANTITY	
BAR	QTY
13A	3
13B	5
16A	18
16B	9
16C	18
16D	18
16E	18



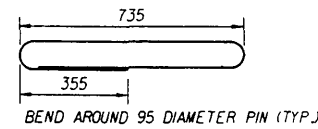
BAR 13A



BAR 13B

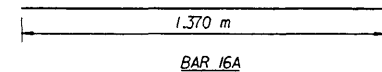


BAR 16C

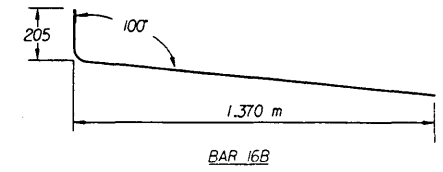


BAR 16D

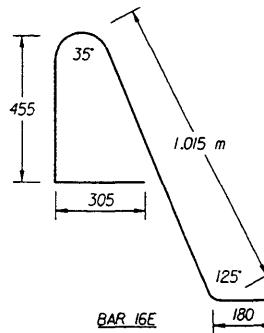
1 PARTIAL ELEVATION  
NOT TO SCALE



BAR 16A

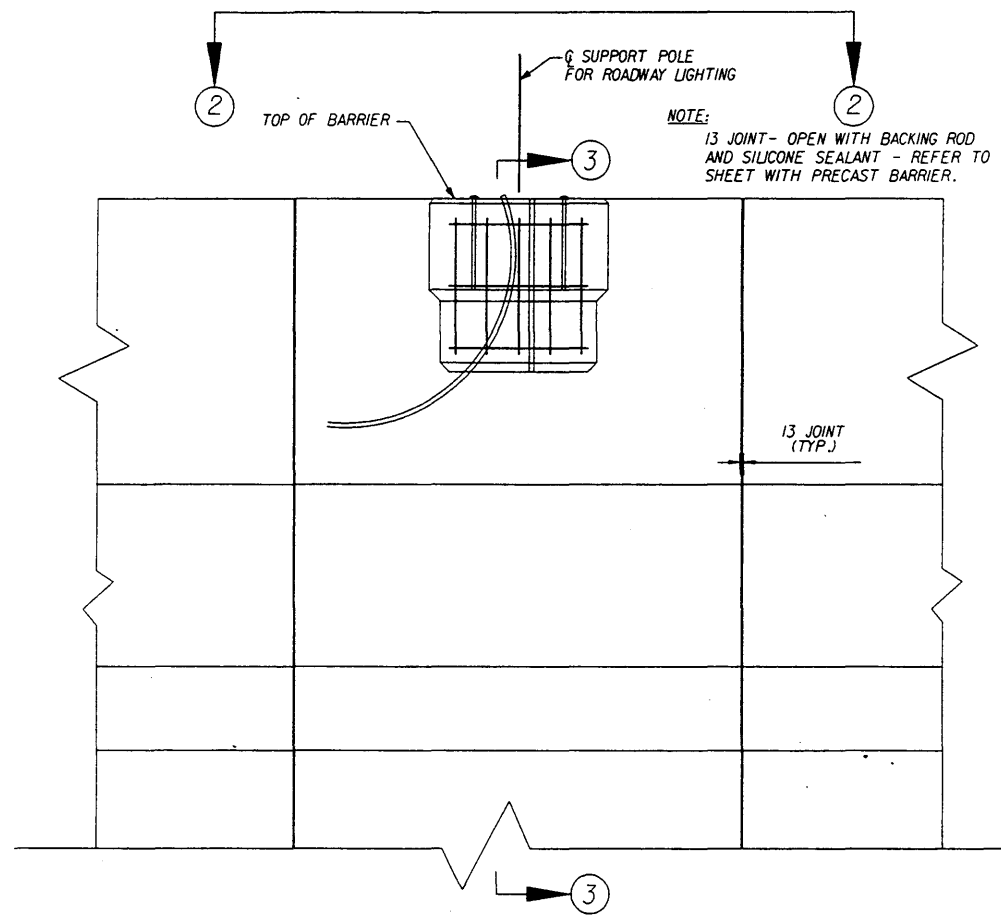


BAR 16B



BAR 16E

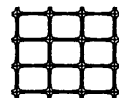
4 BAR BENDING DETAIL  
NOT TO SCALE



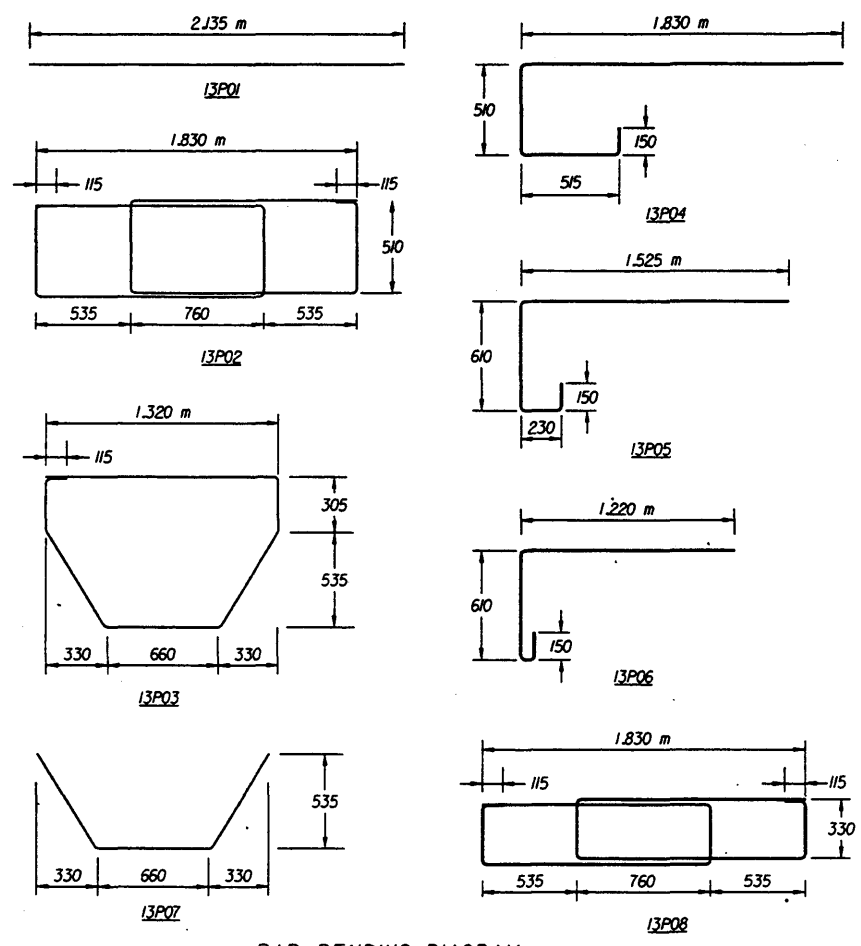
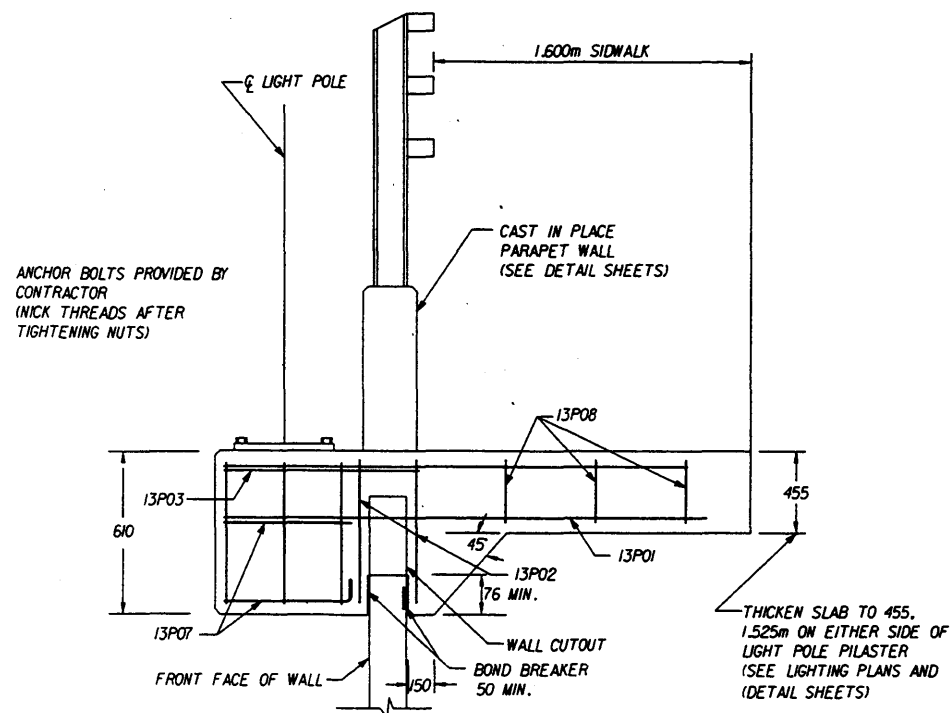
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Atlanta, GA 30328  
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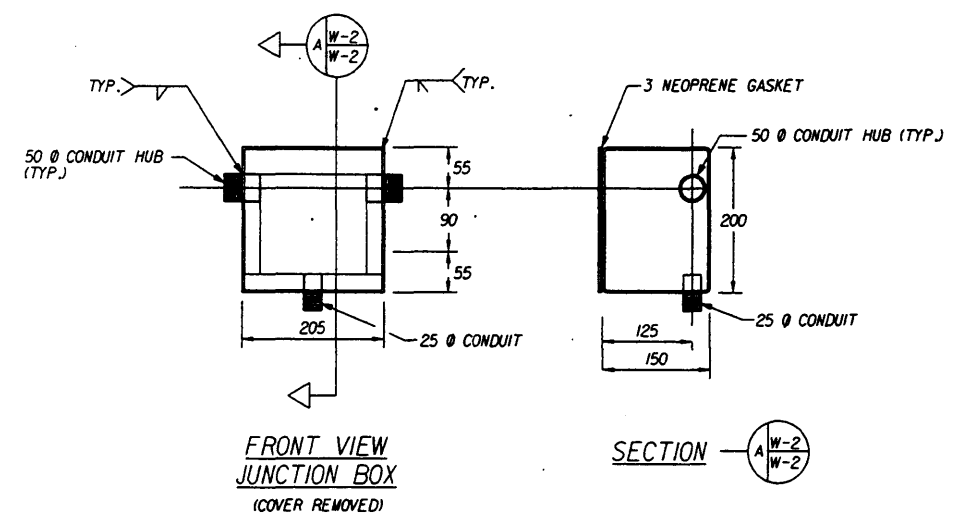


STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES MSE RETAINING WALL				
Designed By	Names	Dates	Approved By	Index No.
Drawn By	JMS	8/14/98	State Structures Design Engineer	
Checked By	KPA	3-79	00	15 of 17
				5025



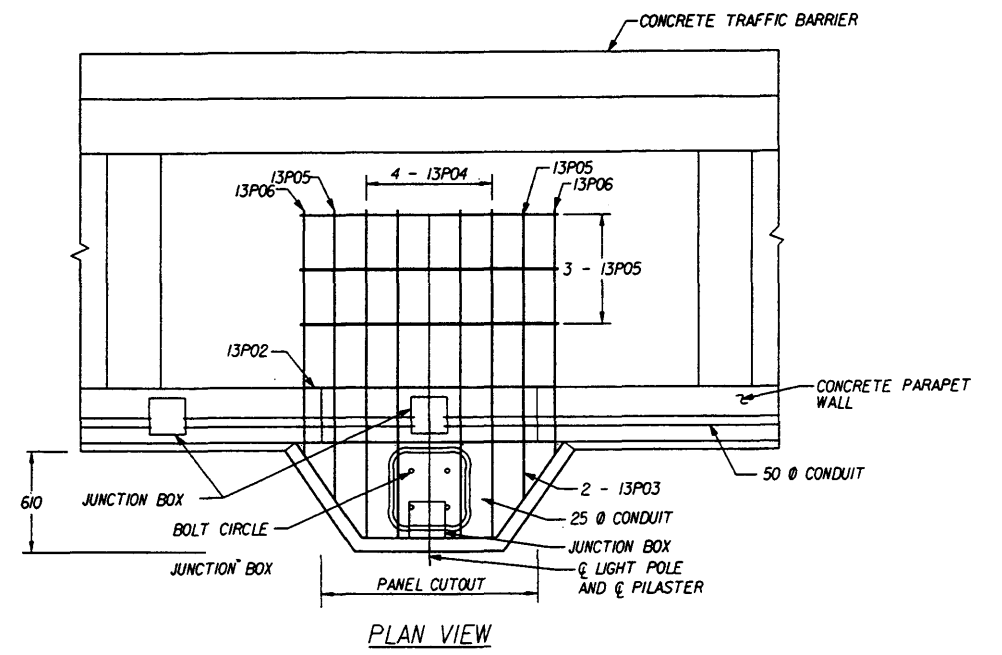
BAR BENDING DIAGRAM

BILL OF REINFORCING STEEL			
MARK	SIZE	NO. REQUIRED	LENGTH
13P01	13	6	2.135 m
13P02	13	2	7.440 m
13P03	13	1	4.495 m
13P04	13	4	2.945 m
13P05	13	2	2.415 m
13P07	13	2	1.880 m
13P07	13	2	1.930 m
13P08	13	3	6.730 m

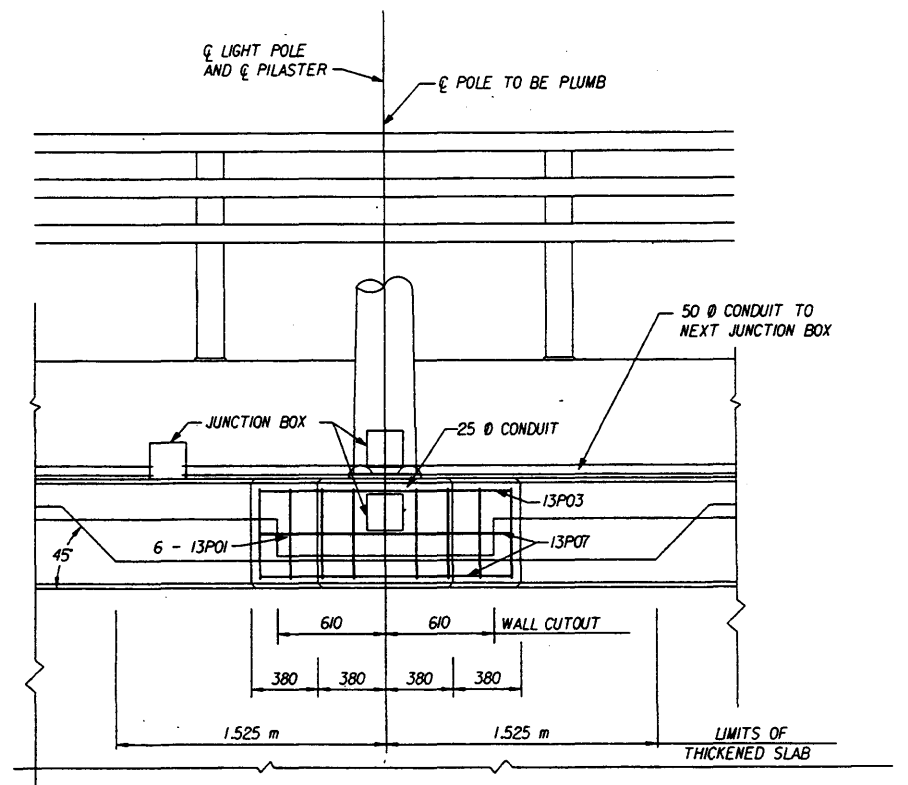


FRONT VIEW JUNCTION BOX (COVER REMOVED)

SECTION



PLAN VIEW



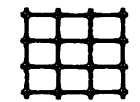
LIGHT PILASTER DETAIL

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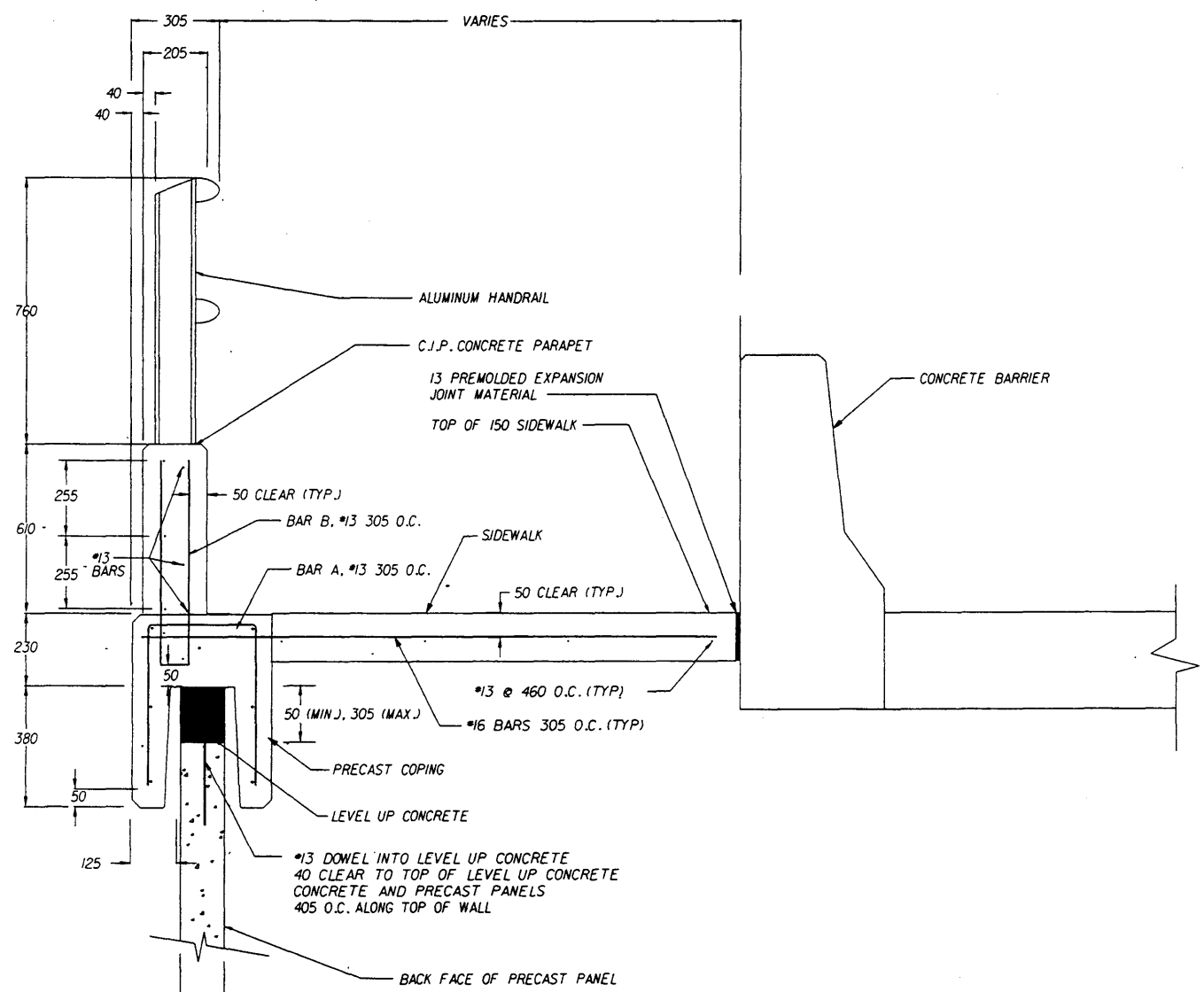
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 Atlanta, GA 30328  
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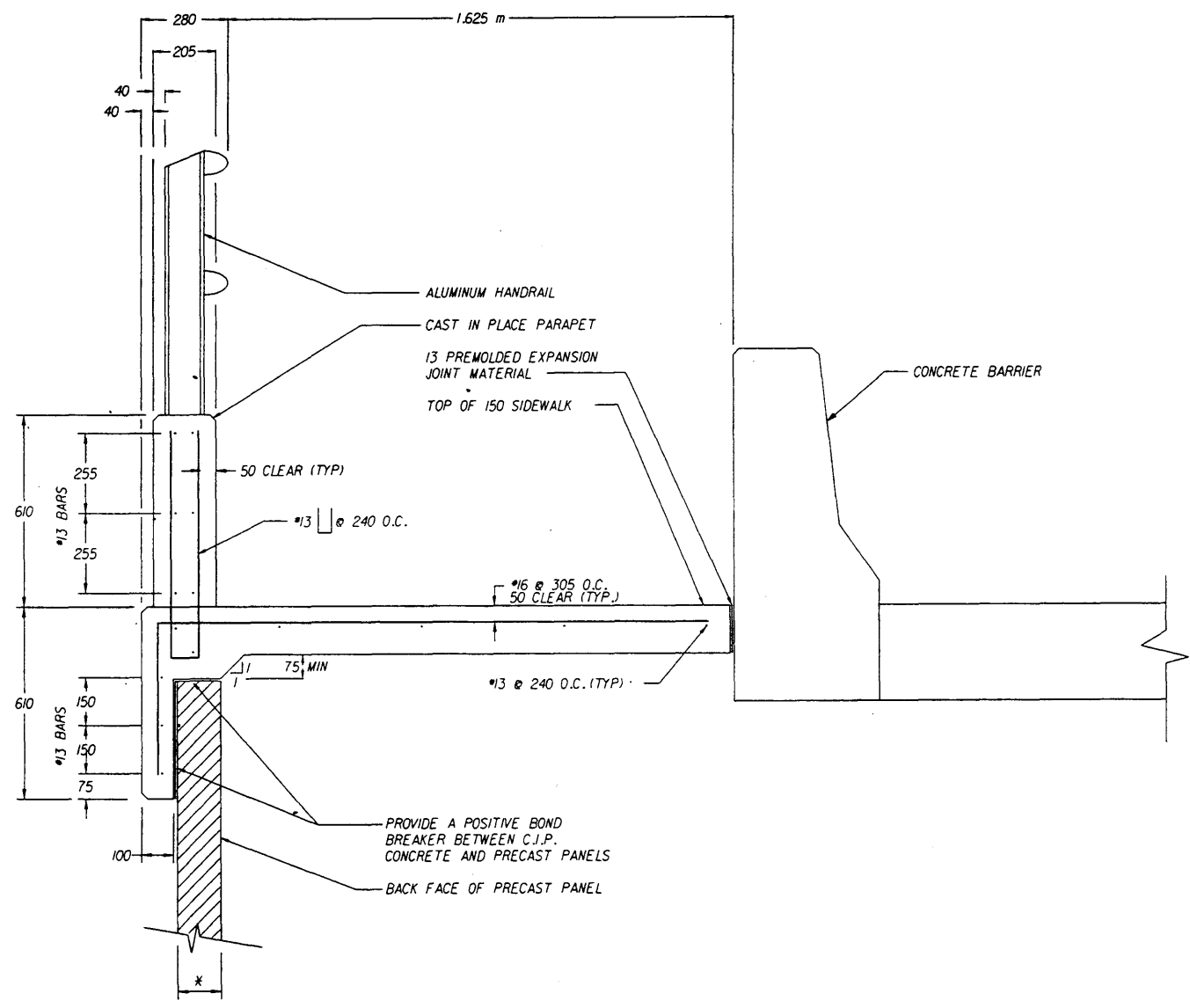


STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES MSE RETAINING WALL</b>				
Designed By	Names	Dates	Approved By	
Drawn By	JWS	8/14/98	State Structures Design Engineer	
Checked By	KPA	3-97	Revision	00
			Sheet No.	16 of 17
			Index No.	5025





PRECAST PARAPET DETAIL  
NOT TO SCALE



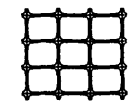
C.I.P. PARAPET DETAIL  
NOT TO SCALE

THIS DESIGN IS BASED UPON SPECIFIC PROPERTIES OF TENSAR PRODUCTS (GEOGRIDS, DRAINAGE COMPOSITES AND EROSION MEDIA), WHICH ARE PROPRIETARY TO THE TENSAR CORPORATION 1210 CITIZENS PARKWAY, MORROW GA. 30260. ANY SUBSTITUTION OF THE SPECIFIED PRODUCTS WILL INVALIDATE THIS DESIGN.

THIS DRAWING, DESIGN NOTES AND ASSOCIATED CALCULATIONS HAVE BEEN PREPARED BY TENSAR EARTH TECHNOLOGIES, INC. FOR PRELIMINARY DESIGN PURPOSES AND SHALL NOT BE USED FOR FINAL DESIGN OR CONSTRUCTION.

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**TENSAR**  
**EARTH TECHNOLOGIES, INC.**  
5775-B Glenridge Drive  
Lakeside Center Suite 450  
Atlanta, GA 30328  
(404) 250-1290



STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM</b> <b>TENSAR EARTH TECHNOLOGIES</b> <b>MSE RETAINING WALL</b>				
Designed By	DJ	8-98	Approved By <i>[Signature]</i> State Structures Design Engineer	
Drawn By	JWS	8/14/98	Revision	Sheet No. Index No.
Checked By	KPA	3-99	00	17 of 17 5025

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**FOSTER • GEOTECHNICAL**  
A Division of L. B. Foster Company

6455 OLD PEACHTREE ROAD  
NORCROSS, GA 30071  
Telephone: (770) 446-3000  
Fax: (770) 242-7493

**GENERAL NOTES**

**DESIGN CRITERIA**

1. DESIGN IS BASED ON THE ASSUMPTION THAT THE MATERIAL WITHIN THE REINFORCED EARTH VOLUME, METHODS OF CONSTRUCTION AND QUALITY OF PREFABRICATED MATERIALS SHALL CONFORM TO THE CONTRACTING AGENCY'S TECHNICAL SPECIFICATIONS FOR RETAINED EARTH WALLS.

**2. FACTORS OF SAFETY**

OVERTURNING 2.0  
INTERNAL PULLOUT 1.5 (ALLOW DEFORMATION 3/4")  
OVERALL STABILITY 1.5  
SLIDING 1.5  
BEARING 2.5

SOIL REINFORCEMENT MESH 0.47 Fy AT END OF DESIGN LIFE

**3. SOIL CHARACTERISTICS ASSUMED FOR DESIGN:**

**SOIL PARAMETERS:**

SEE WALL CONTROL DRAWINGS FOR SOIL CHARACTERISTICS OF FOUNDATION MATERIAL TO BE USED IN THE DESIGN OF THE WALL SYSTEM. THE CONTRACTOR SHALL PROVIDE SOIL DESIGN PARAMETERS FOR BACKFILL MATERIAL BASED ON THE ACTUAL SOIL CHARACTERISTICS UTILIZED AT THE SITE. THE VALUES OF  $\phi$ , C AND  $\gamma$  SHALL BE PROVIDED IN THE SHOP DRAWINGS.

4. THE MAXIMUM APPLIED BEARING PRESSURE AT THE FOUNDATION LEVEL IS AS SHOWN ON THE WALL ELEVATIONS FOR EACH DESIGN CASE. IT IS THE RESPONSIBILITY OF OTHERS TO DETERMINE THAT THIS APPLIED BEARING PRESSURE IS ALLOWABLE FOR THAT LOCATION.

5. ANY UNSUITABLE FOUNDATION MATERIAL BELOW THE REINFORCED EARTH VOLUME, AS DETERMINED BY THE ENGINEER, SHALL BE EXCAVATED AND REPLACED WITH SUITABLE MATERIAL OR OTHERWISE STABILIZED AS DIRECTED BY THE ENGINEER.

**WIRE FACING PANELS & REINFORCING ELEMENTS**

6. REINFORCING MESH ELEMENTS SHALL BE SHOP FABRICATED FROM COLD DRAWN STEEL ROD CONFORMING TO THE MINIMUM REQUIREMENTS OF ASTM A-82M AND SHALL BE WELDED AT THE JUNCTIONS BETWEEN LONGITUDINAL AND TRANSVERSE WIRES IN ACCORDANCE WITH ASTM A-185M. GALVANIZATION SHALL BE APPLIED AFTER MESH FABRICATION AND SHALL CONFORM TO THE MINIMUM REQUIREMENTS OF ASTM A-123M.

LOOP EMBEDS SHALL BE FABRICATED FROM COLD DRAWN STEEL ROD CONFORMING TO ASTM A-510M OR ASTM A-82M. LOOP EMBEDS SHALL BE WELDED IN ACCORDANCE WITH ASTM A-185M. LOOP EMBEDS SHALL BE GALVANIZED IN ACCORDANCE WITH ASTM B-633M.

**DESIGN:**

7. THE DESIGN CONTAINED ON THESE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS. ON THE BASIS OF THIS INFORMATION, THE WALL COMPANY IS RESPONSIBLE FOR INTERNAL STABILITY OF THE STRUCTURE ONLY. EXTERNAL STABILITY DESIGN INCLUDING FOUNDATION AND SLOPE STABILITY IS THE RESPONSIBILITY OF OTHERS.

**WALL CONSTRUCTION**

8. RETAINED EARTH WALLS IN CURVES WILL FORM A SERIES OF SHORT CHORDS OF 3.048m EACH TO MATCH DESIRED WALL ALIGNMENT.

9. FOR LOCATION AND ALIGNMENT OF RETAINED EARTH WALLS, SEE RETAINING WALL CONTROL PLANS.

10. IF MANHOLES AND DROP INLETS ARE PRESENT, THEY SHALL BE LOCATED AS SHOWN ON WALL ELEVATIONS.

11. IF PILES ARE LOCATED WITHIN REINFORCED SOIL VOLUME, THEY SHALL BE DRIVEN PRIOR TO CONSTRUCTION OF THE REINFORCED EARTH WALL UNLESS A METHOD TO PROTECT THE STRUCTURE WHICH IS ACCEPTABLE TO THE ENGINEER AND FOSTER GEOTECHNICAL COMPANY AND IS PROPOSED AND APPROVED IN WRITING.

12. BACKFILL MATERIAL SHALL BE COMPACTED IN ACCORDANCE WITH SECTION 548 TO A LEVEL OF 50mm (+/-) ABOVE THE TIE MESH EMBEDDED IN THE PANELS. INSTALLATION OF REINFORCING MESH SHALL BE PERMITTED ONLY AFTER PLACEMENT AND COMPACTION OF THE BACKFILL MATERIAL HAS REACHED THE REQUIRED LEVEL.

13. WALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH SECTION 548.

14. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE LOCATION OF ANY GUARDRAIL POSTS BEHIND RETAINED EARTH PANELS. PRIOR TO PLACEMENT OF THE TOP LAYER OF REINFORCING MESH, INDIVIDUAL REINFORCING MESH MAY BE SKEWED TO AVOID THE POST LOCATIONS IF AUTHORIZED BY THE ENGINEER (NO CUTTING OF SOIL REINFORCEMENT GRIDS ALLOWED UNLESS SHOWN ON SHOP DRAWINGS AND APPROVED BY THE ENGINEER). ANY DAMAGE DONE TO THE REINFORCING MESH DUE TO THE INSTALLATION OF THE GUARDRAIL SHALL BE REPAIRED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE.

15. IF EXISTING OR FUTURE STRUCTURES, PIPES, FOUNDATIONS OR GUARDRAIL POSTS WHICH ARE WITHIN REINFORCED SOIL VOLUME INTERFERE WITH THE NORMAL PLACEMENT OF REINFORCING MESH AND SPECIFIC DIRECTION HAS NOT BEEN PROVIDED ON THE PLANS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER TO DETERMINE WHAT COURSE OF ACTION SHOULD BE TAKEN.

16. FOR OTHER INFORMATION PERTAINING TO WALL CONSTRUCTION PLEASE REFER TO FOSTER GEOTECHNICAL CONSTRUCTION MANUAL.

17. THE CONTRACTOR IS RESPONSIBLE FOR GRADUALLY DEFLECTING UPPER REINFORCING MESH DOWNWARD TO AVOID CONFLICTS WITH PAVING AND SUBGRADE PREPARATION. THE CONTRACTOR'S ATTENTION IS DIRECTED ESPECIALLY TO SITUATIONS WHERE ROADWAY SUPER ELEVATION AND/OR SOIL MIXING ARE ANTICIPATED.

**MATERIALS NOTES**

**18. NOMINAL MESH LENGTHS**

THE REINFORCING MESH LENGTH SHOWN ON THE PLANS, MEASURED FROM BACK FACE OF PANEL ARE THE NOMINAL LENGTHS REQUIRED BY CALCULATION. THE ACTUAL FABRICATED MESH LENGTHS ARE OFTEN LONGER (UP TO 150mm) DUE TO MANUFACTURING TOLERANCES. THE REQUIRED HORIZONTAL LIMIT OF GRANULAR BACKFILL IS EQUAL TO THE NOMINAL MESH LENGTH. ADDITIONAL GRANULAR BACKFILL BEYOND THE NOMINAL MESH LENGTH IS NOT REQUIRED BY CALCULATION.

**19. SELECT BACKFILL QUANTITY**

THE SELECT BACKFILL QUANTITY INDICATED BY FOSTER GEOTECHNICAL IS CALCULATED BY MULTIPLYING THE NOMINAL MESH LENGTHS SHOWN ON THE PLANS BY THEIR TRIBUTARY WALL SURFACE AREA AND CONVERTING THE RESULT TO A NEATER CUBIC METER QUANTITY. THIS INFORMATION IS FURNISHED FOR THE CONTRACTOR'S INFORMATION ONLY AND IS NOT INTENDED TO PRESENT THE ACTUAL QUANTITIES REQUIRED TO COMPLETE THE WORK. THE CONTRACTOR MUST CALCULATE HIS OWN EXCAVATION AND BACKFILL QUANTITIES BASED UPON THE SPECIFIC CONDITIONS OF THE PROJECT.

**20. NOTE TO CONTRACTORS**

ONLY THE FOLLOWING MATERIALS ARE SUPPLIED BY FOSTER GEOTECHNICAL

- PREFABRICATED WIRE FACING PANELS
- REINFORCING MESH
- NON-WOVEN FILTER CLOTH (FOR BEHIND FACING PANELS ONLY) (WEBTECH-TERRATEX N04 OR EQUAL)

ANY OTHER MATERIALS CALLED FOR IN THE CONTRACT PLANS OR SPECIFICATIONS ARE TO BE SUPPLIED BY THE CONTRACTOR. ANY JOINT MATERIALS SHOWN AT THE INTERFACE OF PRECAST PANELS AND CAST-IN-PLACE CONCRETE STRUCTURES ARE TO BE SUPPLIED BY THE ERECTION CONTRACTOR. ALL SANDBLASTING, PAINTING, SEALERS OR OTHER SPECIAL APPLIED COATINGS ARE ALSO SUPPLIED / INSTALLED BY THE CONTRACTOR IN THE FIELD FOLLOWING PANEL ERECTION.

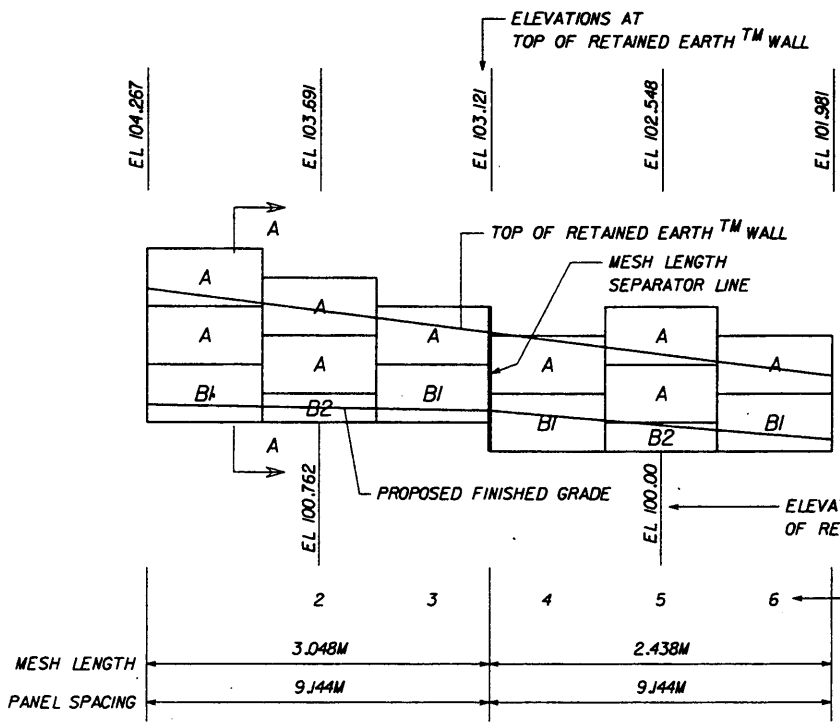
21. FOSTER GEOTECHNICAL SUPPLIES FACING PANELS AND ACCESSORIES TO BE USED IN CONJUNCTION WITH OTHER MATERIALS IN THE CONSTRUCTION OF RETAINED EARTH WALLS DETAILED HEREIN. THE CONSTRUCTION AND QUALITY CONTROL PROCEDURES MANUAL FURNISHED BY FOSTER GEOTECHNICAL IS INTENDED TO PROVIDE A GENERAL EXPLANATION OF THE SYSTEM. IT IS THE CONTRACTOR'S OBLIGATION TO DEVISE AND EXECUTE A PROJECT SPECIFIC ERECTION SEQUENCE, PANEL UNLOADING, HANDLING AND BRACING SYSTEM, AND FALL PROTECTION SYSTEM. THE BRACING SYSTEM SHOWN IN THE CONSTRUCTION AND QUALITY CONTROL PROCEDURES MANUAL IS GENERAL IN NATURE AND DOES NOT ACCOUNT FOR PROJECT SPECIFIC CRITERIA COMPLIANCE WITH THE GUIDELINES IN THIS MANUAL DOES NOT RELIEVE THE CONTRACTOR OF ITS RESPONSIBILITY TO ADHERE TO THE PROJECT PLANS, SPECIFICATIONS AND CONTRACT DOCUMENTS OR COMPLIANCE WITH ALL FALL PROTECTION, SAFETY, LAWS, STANDARDS AND PROCEDURES AT THE JOBSITE. CONTRACTORS SHOULD TAKE SPECIAL PRECAUTIONS TO PREVENT THE PANELS FROM SHIFTING OR FALLING DURING THE ERECTION PROCESS.

THIS SYSTEM MAY BE USED IN ALL ENVIRONMENTS.

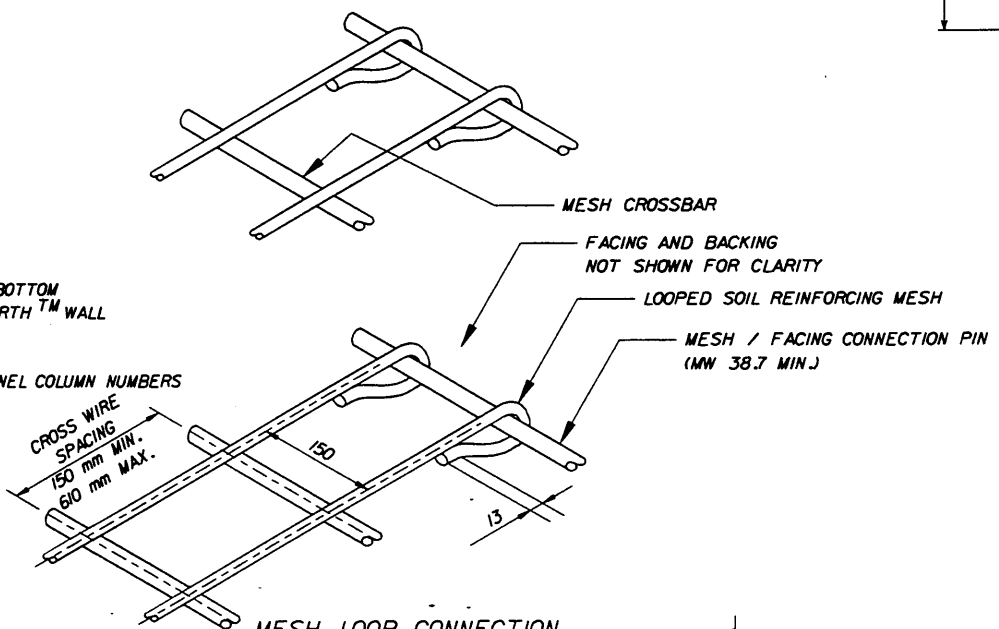
METRIC  
WIRE FACED PANELS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM FOSTER GEOTECHNICAL WIRE FACE WALL</b>				
Designed By	TCNA	Date	11/98	Approved By <i>William J. [Signature]</i> State Structures Design Engineer
Drawn By	CAD	Date	11/98	Revision
Checked By	DOT	Date	11/98	Sheet No. 1 of 3 Index No. 5105

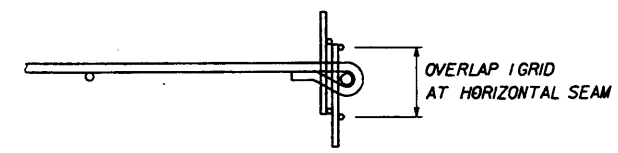
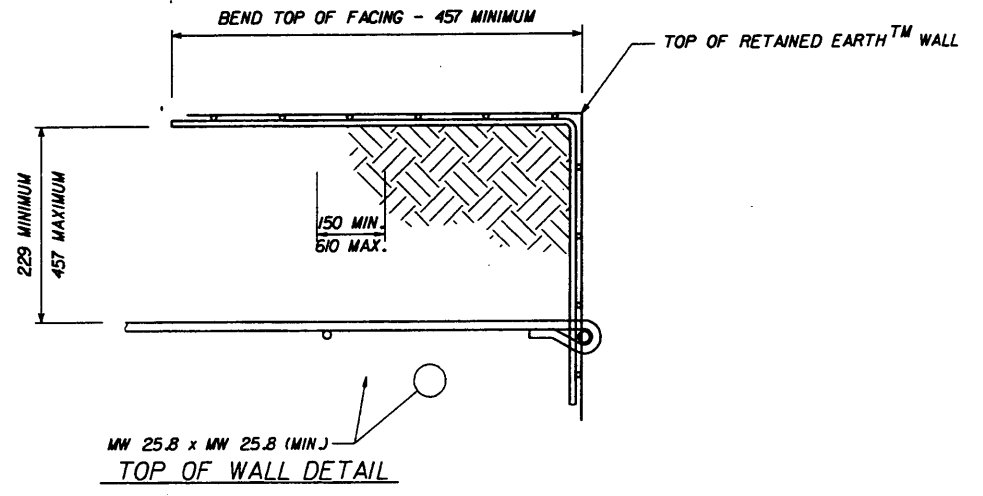
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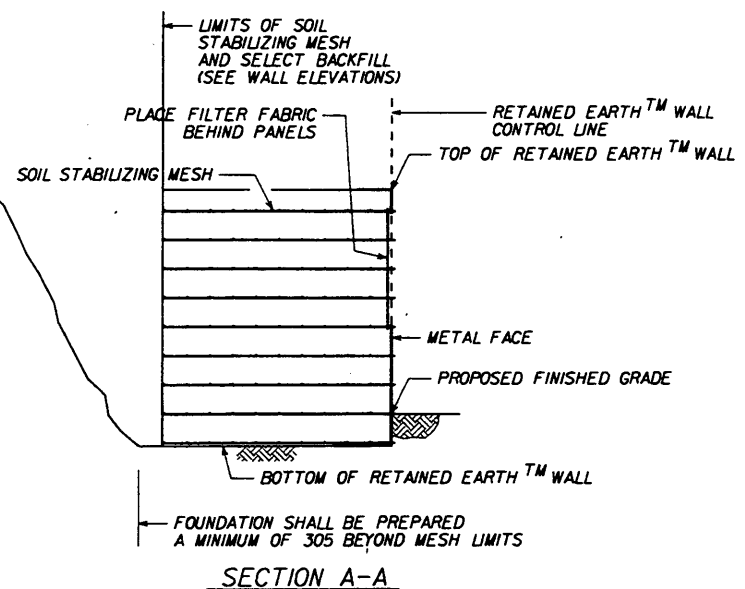
WALL ELEVATION KEY  
(FRONT FACE SHOWN)



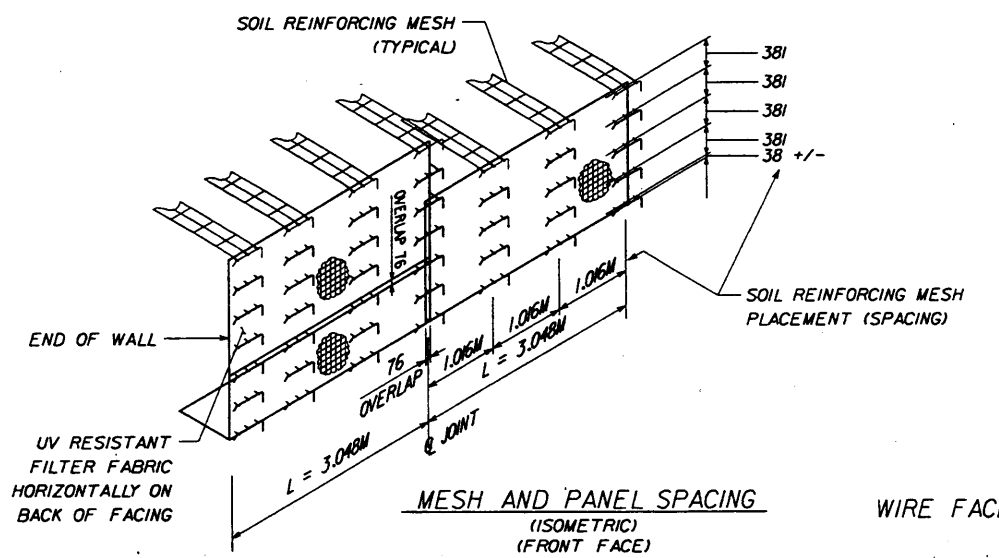
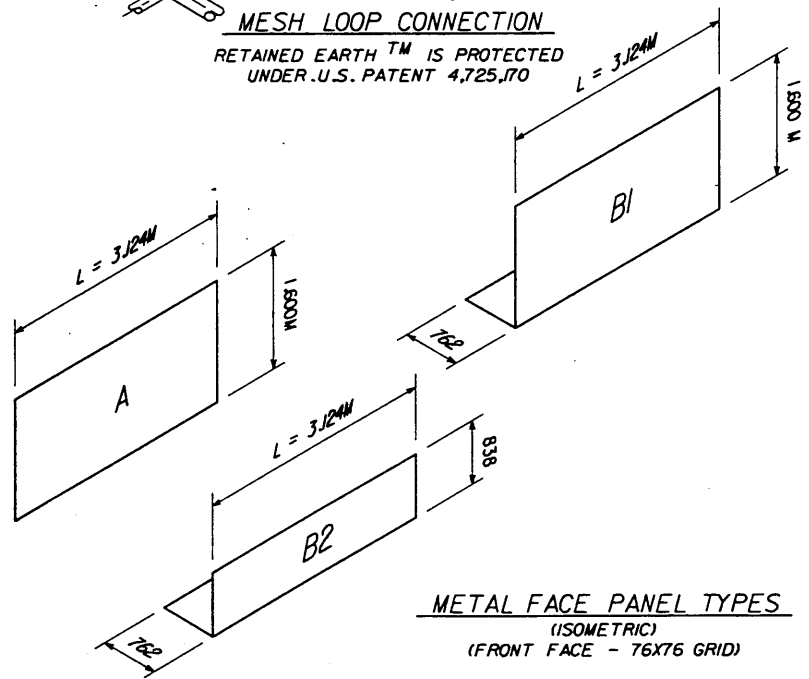
MESH LOOP CONNECTION  
 RETAINED EARTH™ IS PROTECTED UNDER U.S. PATENT 4,725,170



DETAIL OF HORIZONTAL OVERLAP  
(VERTICAL OVERLAP SIMILAR)



SECTION A-A

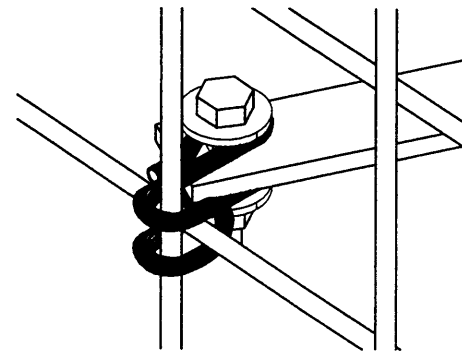


MESH AND PANEL SPACING (ISOMETRIC)  
(FRONT FACE)

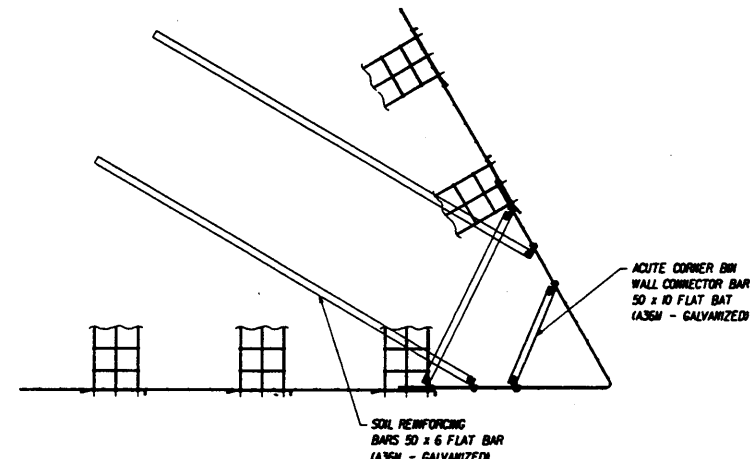
METRIC WIRE FACED PANELS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM FOSTER GEOTECHNICAL WIRE FACE WALL</b>				
Names	Dates	Approved By: <i>William J. [Signature]</i>		
Designed By: TCNA	11/98	State Structures Design Engineer		
Drawn By: CAD	11/98	Revision	Sheet No.	Index No.
Checked By: DOT	11/98	00	2 of 3	5105

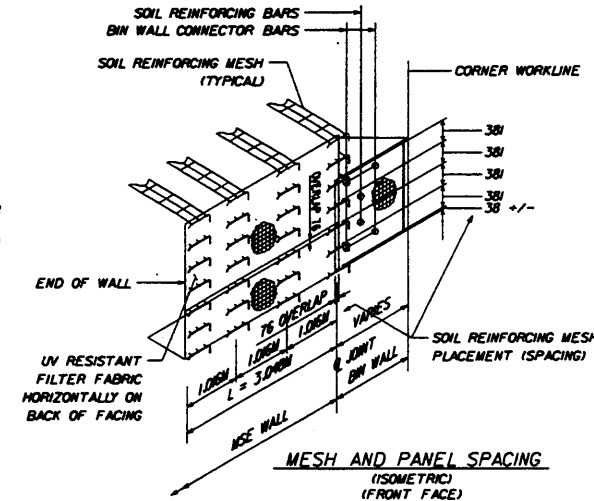
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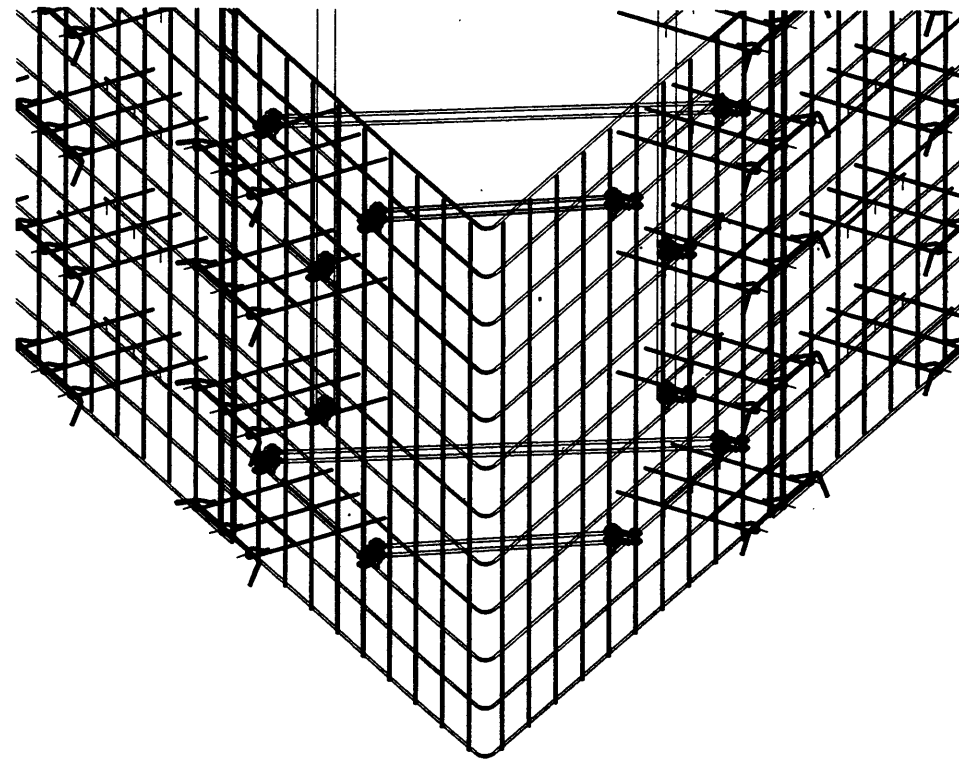
ISOMETRIC VIEW OF CONNECTION



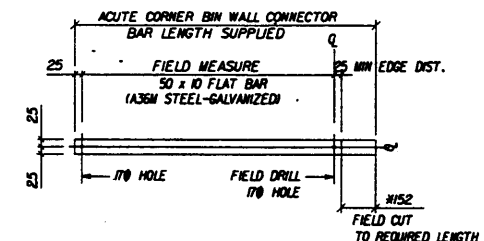
BIN WALL CONNECTOR & SOIL REINF. BAR LAYOUT



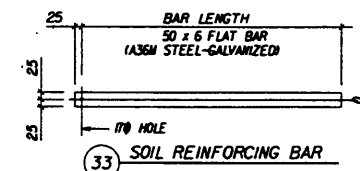
MESH AND PANEL SPACING (ISOMETRIC) (FRONT FACE)



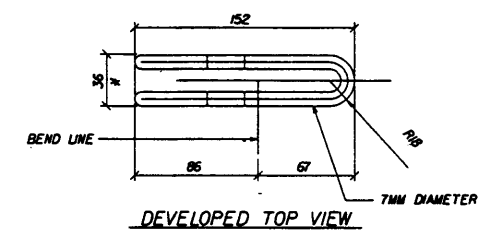
ISOMETRIC VIEW OF BIN WALL



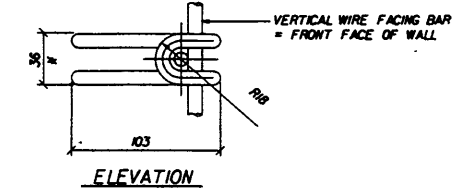
32 BIN WALL CONNECTOR BAR



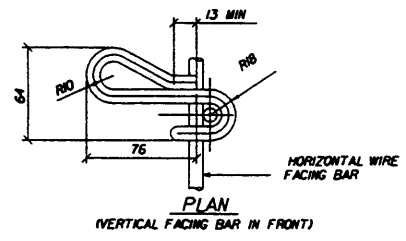
33 SOIL REINFORCING BAR



DEVELOPED TOP VIEW



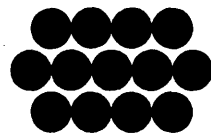
ELEVATION



PLAN (VERTICAL FACING BAR IN FRONT)

METRIC  
WIRE FACED PANELS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM FOSTER GEOTECHNICAL WIRE FACE WALL</b>				
Designed By	TCNA	11/98	Approved By <i>W. J. [Signature]</i> State Structures Design Engineer	
Drawn By	CAD	11/98	Revision	Sheet No.
Checked By	DOT	11/98	00	3 of 3
				Index No. 5105



TAI

# The Reinforced Earth Company

8614 WESTWOOD CENTER DRIVE SUITE 1100, VIENNA VIRGINIA 22182 (703) 821-1175

## TERRATREL™ A WIRE FACED MSE WALL SYSTEM

### DESIGN CRITERIA

- DESIGN IS BASED ON THE ASSUMPTION THAT THE MATERIAL WITHIN, BEHIND, AND BENEATH THE REINFORCED VOLUME; METHODS OF CONSTRUCTION; AND QUALITY OF PREFABRICATED MATERIALS SHALL CONFORM TO SECTION 548
- SOIL PARAMETERS:  
SEE WALL CONTROL DRAWINGS FOR SOIL CHARACTERISTICS OF FOUNDATION MATERIAL TO BE USED IN THE DESIGN OF THE WALL SYSTEM. THE CONTRACTOR SHALL PROVIDE SOIL DESIGN PARAMETERS FOR BACKFILL MATERIAL BASED ON THE ACTUAL SOIL CHARACTERISTICS UTILIZED AT THE SITE. THE VALUES OF FRICTION ANGLE ( $\phi$ ), COHESION ( $c$ ) AND TOTAL UNIT WEIGHT ( $\gamma$ ) SHALL BE PROVIDED IN THE SHOP DRAWINGS.
- THE MAXIMUM APPLIED BEARING PRESSURE AT THE FOUNDATION LEVEL IS AS SHOWN ON THE WALL ELEVATIONS FOR EACH DESIGN CASE. IT IS THE RESPONSIBILITY OF THE ENGINEER TO DETERMINE THAT THIS APPLIED BEARING PRESSURE IS ALLOWABLE FOR THAT LOCATION.
- ANY UNSUITABLE FOUNDATION MATERIAL BELOW THE REINFORCED VOLUME, AS DETERMINED BY THE ENGINEER, SHALL BE EXCAVATED AND REPLACED WITH SUITABLE MATERIAL OR OTHERWISE STABILIZED AS DIRECTED BY THE ENGINEER.
- THE MINIMUM FACTORS OF SAFETY REQUIRED FOR DESIGN  
OVERTURNING = 2.0  
SLIDING = 1.5  
INTERNAL PULLOUT = 1.5  
(ALLOWABLE DEFORMATION = 19.05mm)  
BEARING CAPACITY = 2.5  
OVERALL STABILITY = 1.5  
STEEL SOIL REINFORCEMENT = 0.55F<sub>y</sub> AT END OF DESIGN LIFE AND 0.50 F<sub>u</sub> AT NET SECTION OF BOLTED CONNECTION  
MAXIMUM PULLOUT  
FOR STRIPS f<sub>x</sub> (FOR SAND) = 1.5  
(FOR LIMEROCK) = 2.0  
FOR LADDERS n<sub>p</sub>MAX = 30

### LAYOUT

- FOR LOCATION OF THE WALLS, SEE RETAINING WALL CONTROL PLANS.

### CONSTRUCTION

- BACKFILL MATERIAL SHALL BE COMPACTED IN ACCORDANCE WITH SEC 548 SPECIFICATIONS. INSTALLATION OF REINFORCING LADDERS SHALL BE PERMITTED ONLY AFTER PLACEMENT AND COMPACTION OF THE BACKFILL MATERIAL HAS REACHED THE REQUIRED LEVEL.
- IF STRUCTURES IN EXCESS OF 6.000m IN HEIGHT OCCUR, THE FINISHED GRADE IN FRONT OF THE WALL SHALL BE PLACED AND COMPACTED BEFORE WALL CONSTRUCTION EXCEEDS A HEIGHT OF 6.000m. FINISHED GRADE BACKFILL SHALL BE COMPACTED TO 95% OF AASHTO T-180 UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

### CONFLICTING STRUCTURES

- IF MANHOLES AND DROP INLETS ARE PRESENT, THEY SHALL BE LOCATED AS SHOWN ON THE WALL ELEVATIONS.
- IF PILES ARE LOCATED WITHIN THE REINFORCED VOLUME, THEY SHALL BE DRIVEN PRIOR TO CONSTRUCTION OF THE WALL UNLESS A METHOD TO PROTECT THE STRUCTURE, WHICH IS ACCEPTABLE TO THE ENGINEER AND THE REINFORCED EARTH COMPANY, IS PROPOSED AND APPROVED IN WRITING.
- IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE THE LOCATION OF ANY GUARDRAIL POSTS WITHIN THE REINFORCED VOLUME. PRIOR TO PLACEMENT OF THE TOP LAYERS OF REINFORCEMENTS, INDIVIDUAL REINFORCING LADDERS MAY BE SYSTEMATICALLY SHIFTED TO AVOID THE POST LOCATIONS IF AUTHORIZED BY THE ENGINEER. ANY DAMAGE DONE TO THE REINFORCING LADDERS DUE TO INSTALLATION OF GUARDRAIL POSTS SHALL BE REPAIRED BY THE CONTRACTOR AT THE CONTRACTOR'S EXPENSE.
- IF EXISTING OR FUTURE STRUCTURES, PIPES, FOUNDATIONS OR GUARDRAIL POSTS WHICH ARE WITHIN THE REINFORCED VOLUME INTERFERE WITH THE NORMAL PLACEMENT OF REINFORCING LADDERS AND SPECIFIC DIRECTION HAS NOT BEEN PROVIDED ON THE PLANS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER TO DETERMINE WHAT COURSE OF ACTION SHOULD BE TAKEN, UNLESS SHOWN OTHERWISE.
- THE CONTRACTOR IS RESPONSIBLE FOR GRADUALLY DEFLECTING UPPER REINFORCING LADDERS DOWNWARD TO AVOID CONFLICTS WITH PAVING AND SUBGRADE PREPARATION. THE CONTRACTOR'S ATTENTION IS DIRECTED ESPECIALLY TO SITUATIONS WHERE ROADWAY SUPERELEVATION AND/OR SOIL MIXING ARE ANTICIPATED.

### MATERIALS NOTES

#### 14. SUPPLIES

ONLY THE FOLLOWING MATERIALS ARE SUPPLIED BY THE REINFORCED EARTH COMPANY:

- PREFABRICATED WIRE FACING PANELS
- WIRE REINFORCING LADDERS OR STRIPS
- HANDLE BAR CONNECTORS OR PINS
- MX-4 SOIL RETENTION FABRIC OR EQUAL

ANY OTHER MATERIALS CALLED FOR IN THE CONTRACT PLANS OR SPECIFICATIONS ARE TO BE SUPPLIED BY THE CONTRACTOR.

#### 15. LADDER OR STRIP LENGTH

THE REINFORCING LADDER LENGTHS SHOWN ON THE PLANS ARE MEASURED FROM THE BACK FACE OF THE WIRE FACING PANELS TO THE LIMIT OF THE SELECT BACKFILL MATERIAL, AND ARE THE LENGTHS USED IN THE LADDER REINFORCEMENT CALCULATIONS.

16. THE REINFORCED EARTH COMPANY SUPPLIES FACING PANELS AND ACCESSORIES TO BE USED IN CONJUNCTION WITH OTHER MATERIALS IN THE CONSTRUCTION OF THE REINFORCED EARTH (®) RETAINING WALLS DETAILED HEREIN. THE CONSTRUCTION AND QUALITY CONTROL PROCEDURES MANUAL FURNISHED BY THE REINFORCED EARTH COMPANY IS INTENDED TO PROVIDE A GENERAL EXPLANATION OF THE SYSTEM. IT IS THE CONTRACTOR'S OBLIGATION TO DEVISE AND EXECUTE A PROJECT SPECIFIC ERECTION SEQUENCE, PANEL UNLOADING, HANDLING AND BRACING SYSTEM, AND FALL PROTECTION SYSTEM. THE BRACING SYSTEM SHOWN IN THE CONSTRUCTION AND QUALITY CONTROL PROCEDURES MANUAL IS GENERAL IN NATURE AND DOES NOT ACCOUNT FOR PROJECT SPECIFIC CRITERIA. COMPLIANCE WITH THE GUIDELINES IN THIS MANUAL DOES NOT RELIEVE THE CONTRACTOR OF ITS RESPONSIBILITY TO ADHERE TO THE PROJECT PLANS, SPECIFICATIONS AND CONTRACT DOCUMENTS OR COMPLIANCE WITH ALL FALL PROTECTION, SAFETY, LAWS, STANDARDS AND PROCEDURES AT THE JOBSITE. CONTRACTORS SHOULD TAKE SPECIAL PRECAUTIONS TO PREVENT THE PANELS FROM SHIFTING OR FALLING DURING THE ERECTION PROCESS.

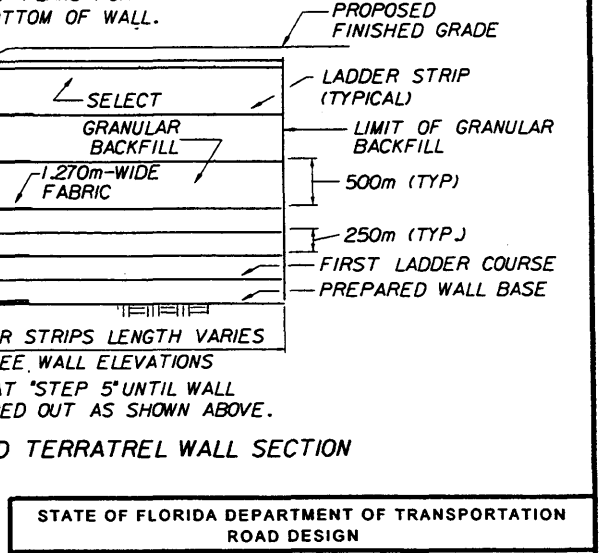
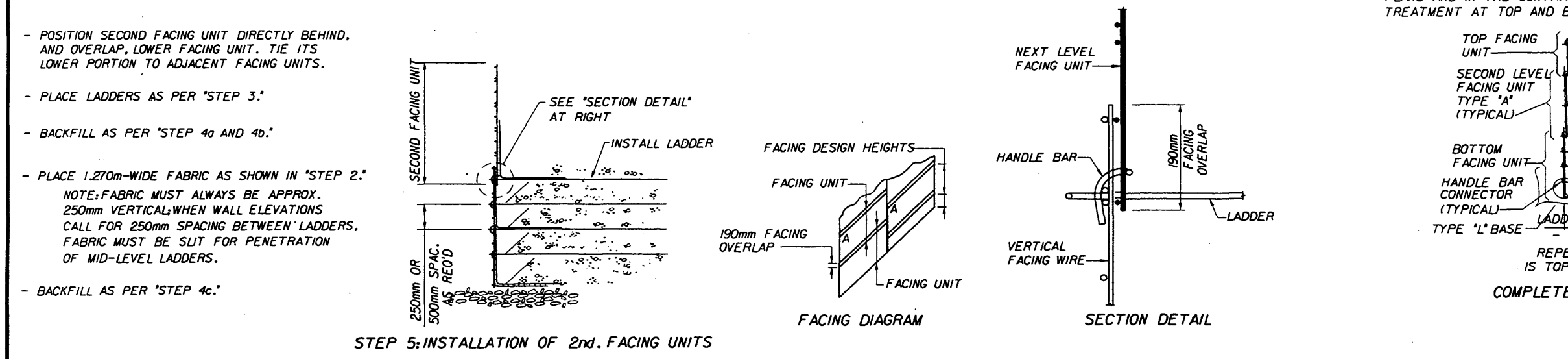
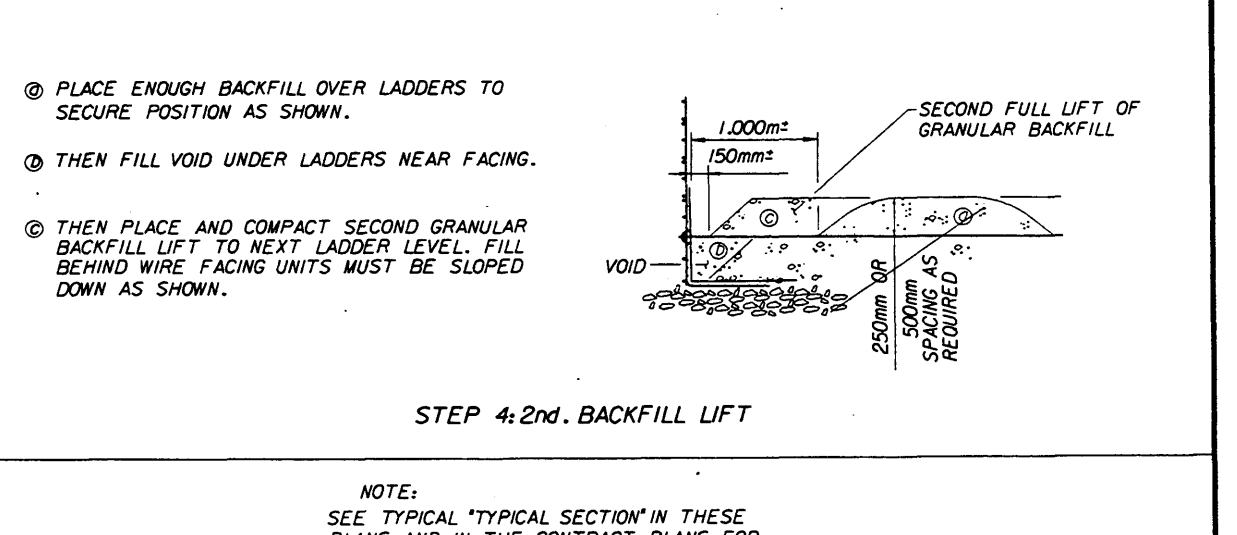
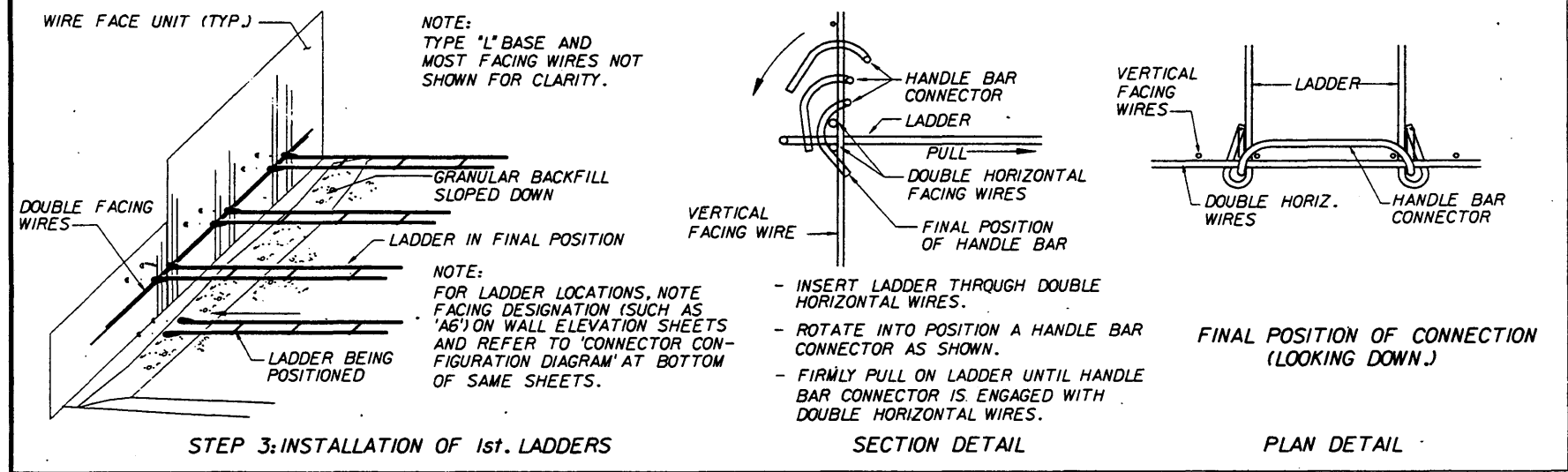
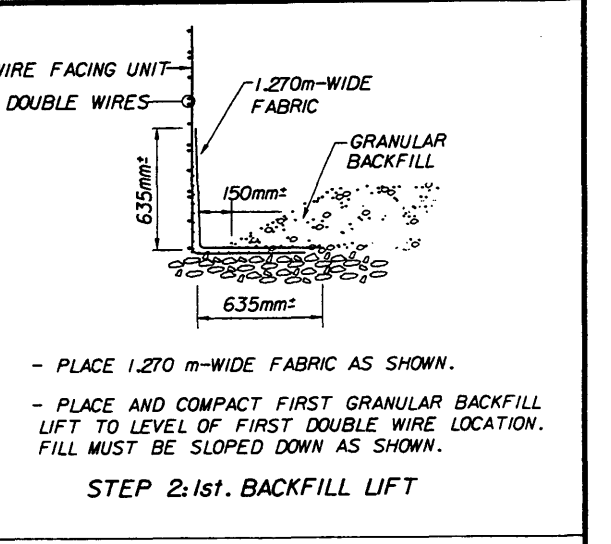
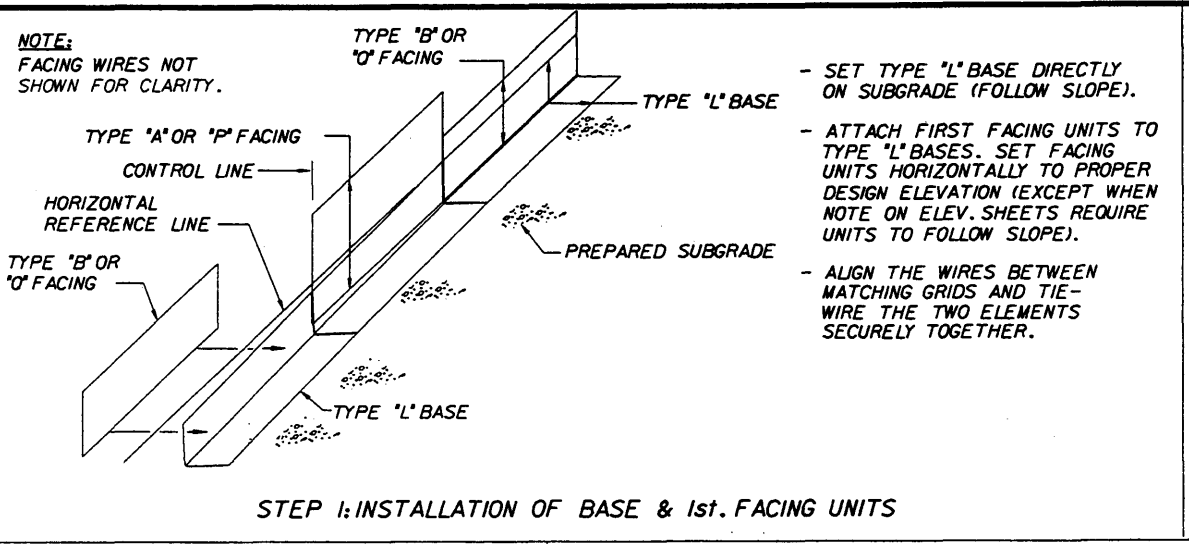
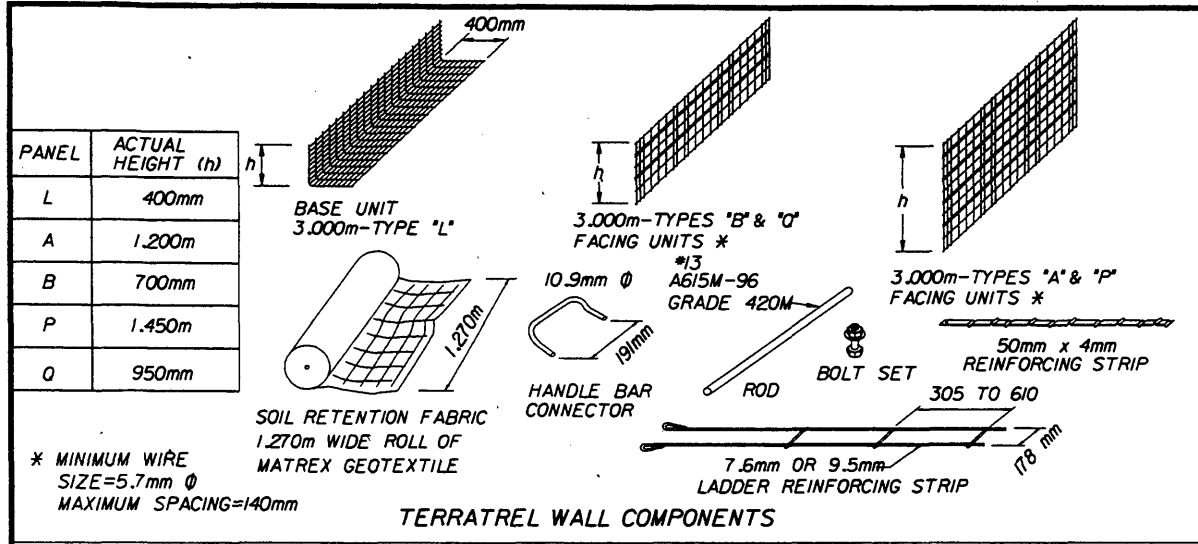
17. THE REINFORCED EARTH COMPANY IS RESPONSIBLE FOR INTERNAL STABILITY OF THE STRUCTURE ONLY. EXTERNAL STABILITY DESIGN INCLUDING FOUNDATION AND SLOPE STABILITY IS THE RESPONSIBILITY OF OTHERS.

18. THIS DRAWING CONTAINS INFORMATION PROPRIETARY TO THE REINFORCED EARTH COMPANY, AND IS BEING FURNISHED FOR THE USE OF FLORIDA DEPARTMENT OF TRANSPORTATION ONLY IN CONNECTION WITH FDOT PROJECTS, AND THE INFORMATION CONTAINED HEREIN IS NOT TO BE TRANSMITTED TO ANY OTHER ORGANIZATION UNLESS SPECIFICALLY AUTHORIZED IN WRITING BY THE REINFORCED EARTH COMPANY. THE REINFORCED EARTH COMPANY IS EXCLUSIVE LICENSEE IN THE UNITED STATES UNDER PATENTS ISSUED TO HENRY VIDAL, AND THE FURNISHING OF THIS DRAWING DOES NOT CONSTITUTE AN EXPRESSED OR IMPLIED LICENSE UNDER THE VIDAL PATENTS.

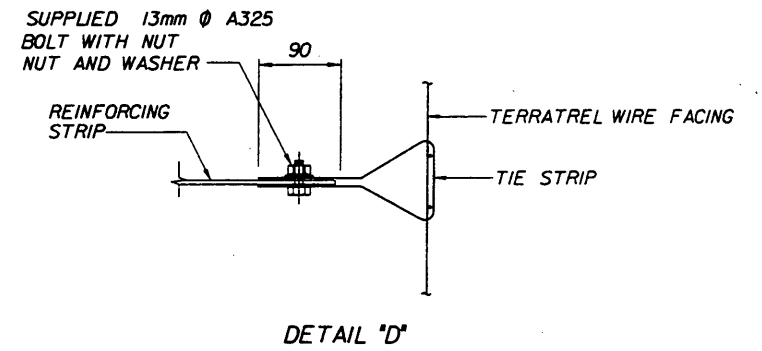
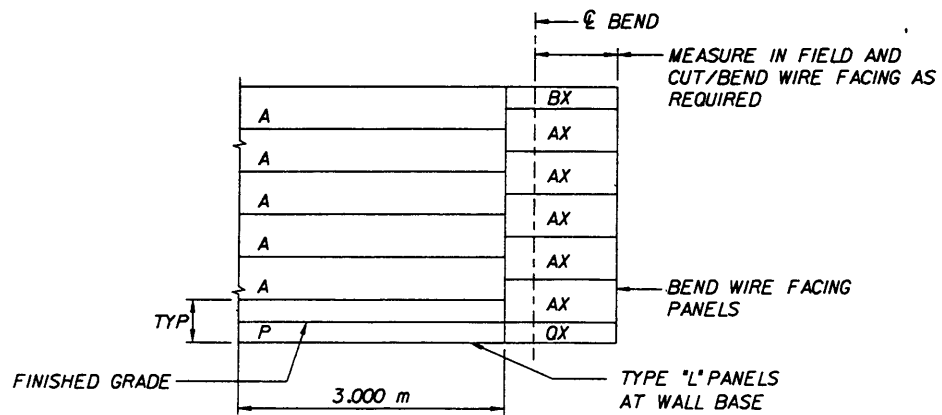
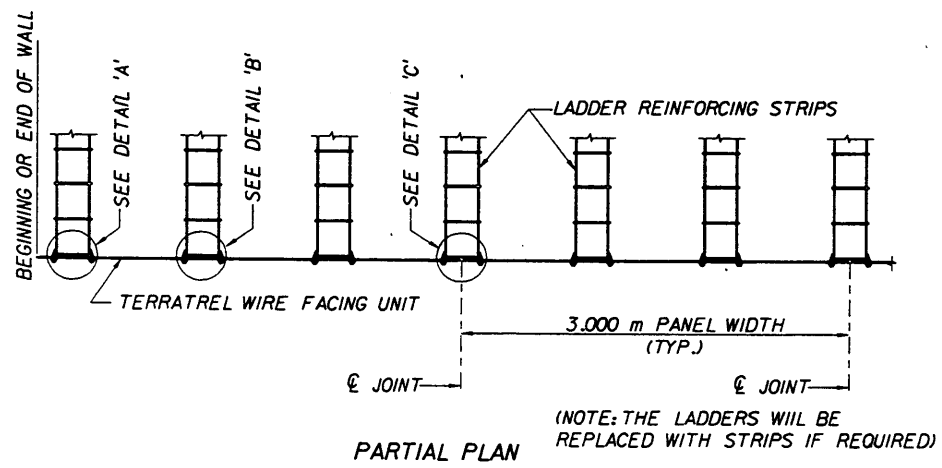
19. THESE DRAWINGS ARE CERTIFIED WITH RESPECT TO THE INTERNAL STABILITY OF REINFORCED EARTH STRUCTURES ONLY

THIS SYSTEM SHALL BE USED IN ALL ENVIRONMENTS.

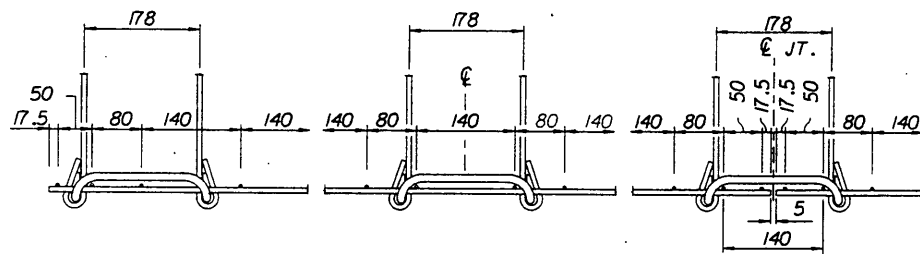
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RETAINING WALL SYSTEM THE REINFORCED EARTH COMPANY TERRATREL WIRE WALL				
Designed By	DM	Dates	1-79	Approved By <i>William H. [Signature]</i> State Structures Design Engineer
Drawn By	DM	Revision	1-79	Sheet No. 1 of 4
Checked By	AA	Index No.	00	5115



STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM THE REINFORCED EARTH COMPANY TERRATREL WIRE WALL</b>				
Designed By	DM	1-99	Approved By	<i>William J. [Signature]</i>
Drawn By	DM	1-99	Revision	Sheet No. 5115
Checked By	AA	1-99	00	2 of 4



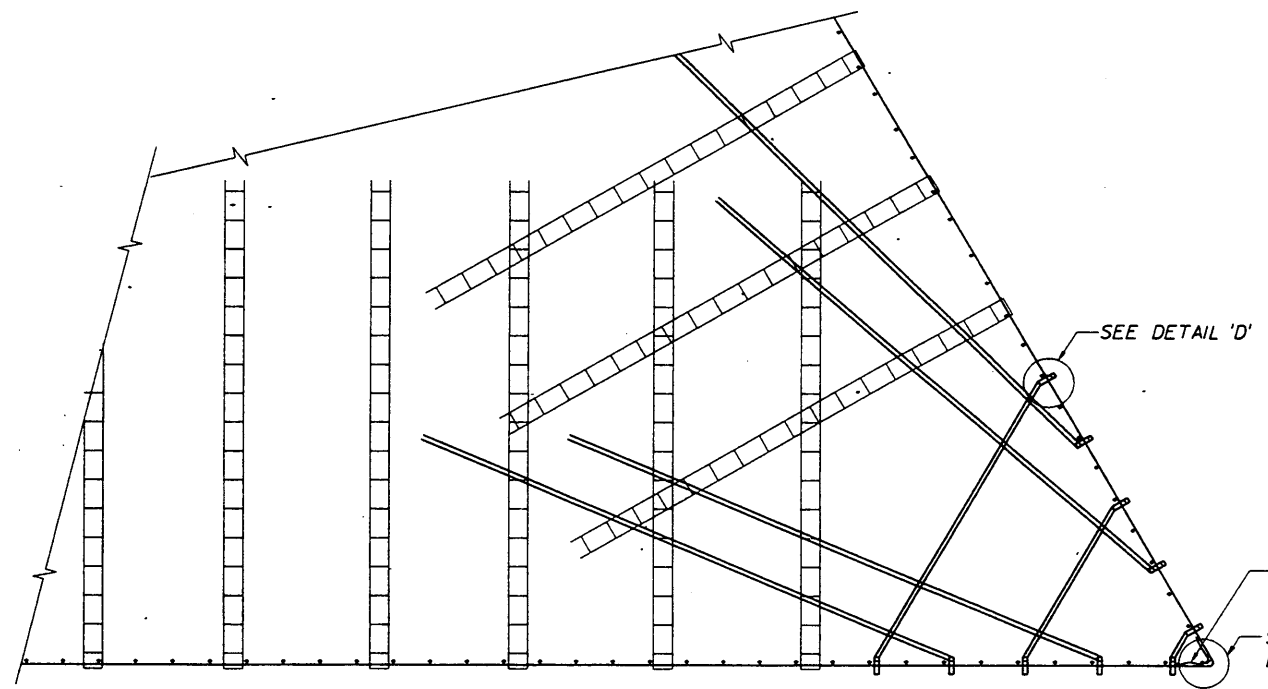
WIRE FACING AT INSIDE AND OUTSIDE CORNERS



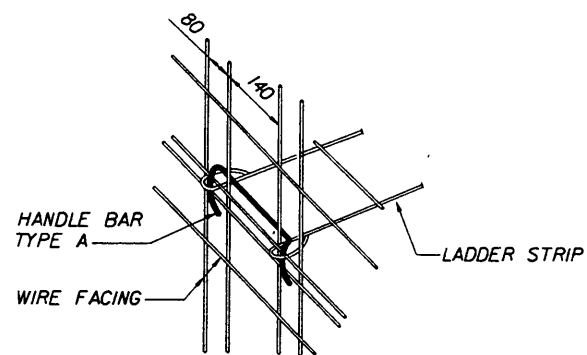
DETAIL 'A'

DETAIL 'B'

DETAIL 'C'



EXAMPLE ACUTE CORNER - SKEWED STRIPS

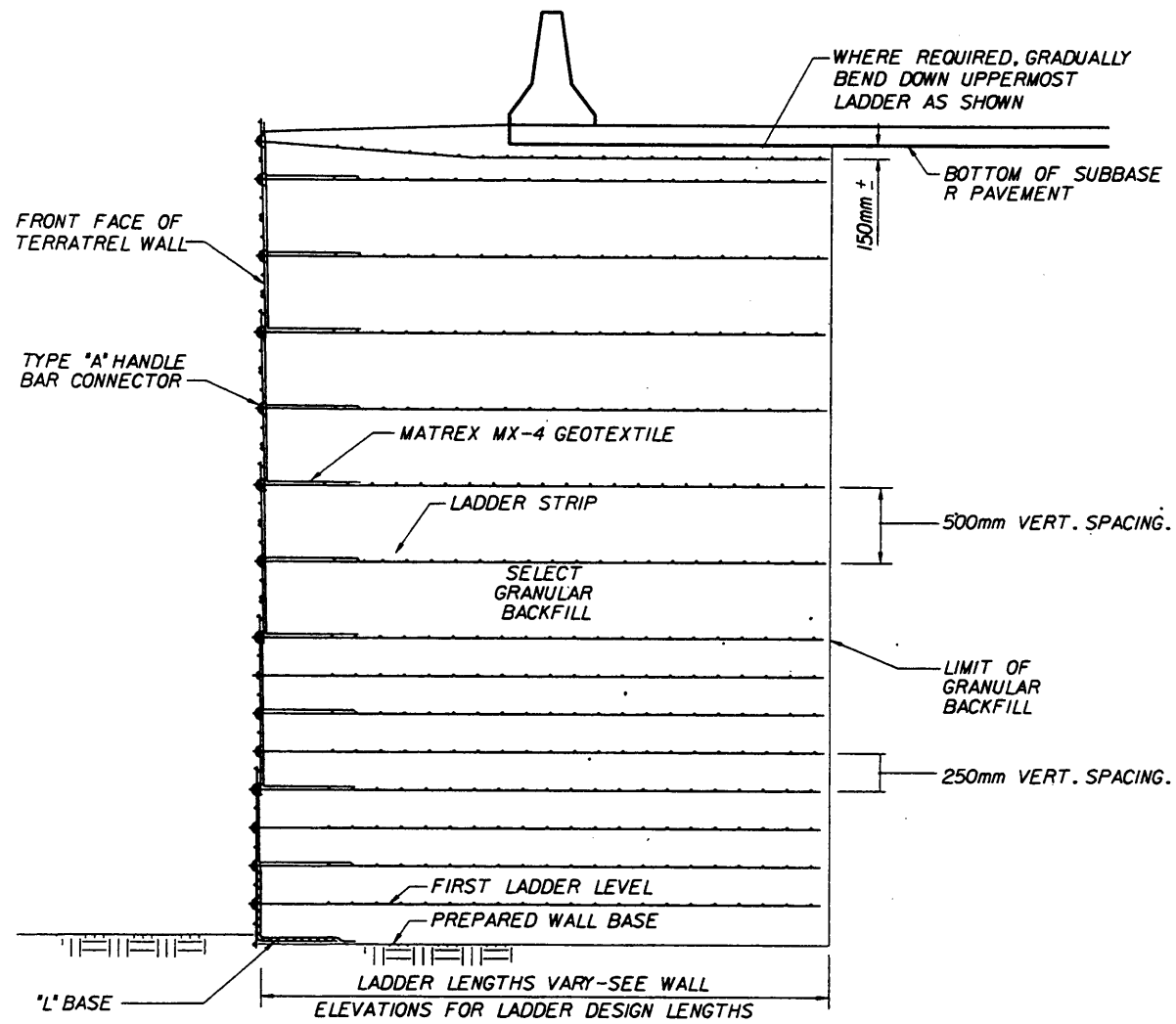


TYPE A HANDLE BAR CONNECTION IN PERSPECTIVE

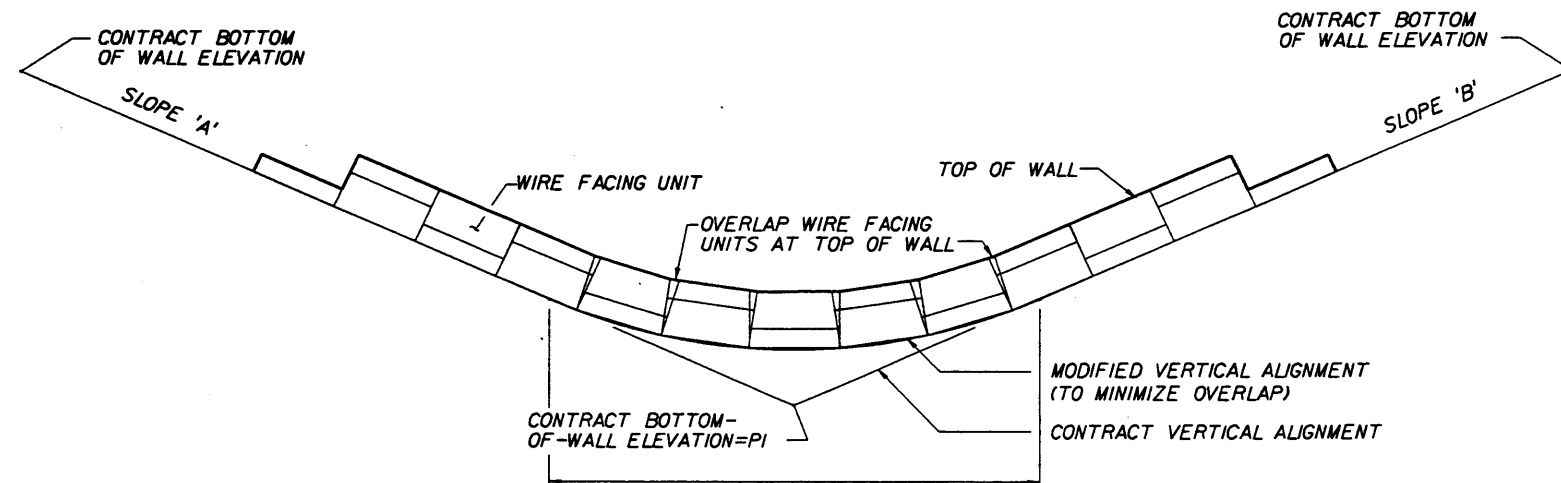
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THIS SYSTEM SHALL BE USED IN ALL ENVIRONMENTS.

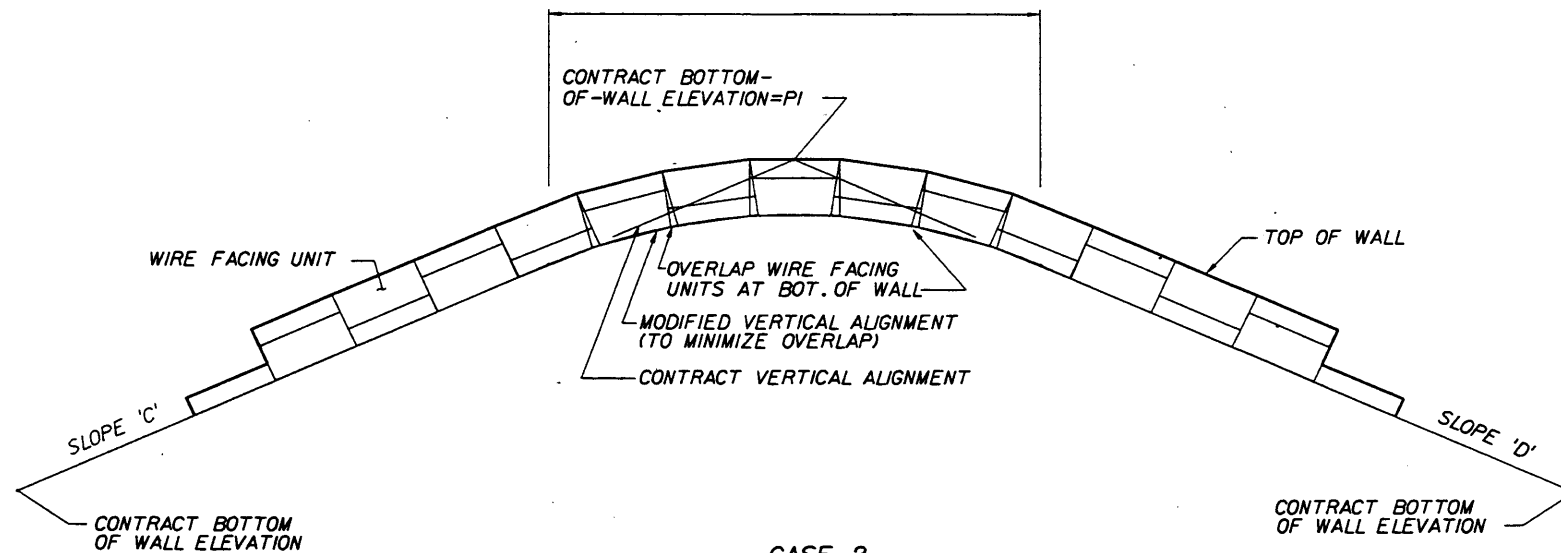
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RETAINING WALL SYSTEM THE REINFORCED EARTH COMPANY TERRATREL WIRE WALL				
Designed By	DM	1-99	Approved By	<i>Walter J. [Signature]</i>
Drawn By	DM	1-99	Revision	Sheet No. Index No.
Checked By	AA	1-99	00	3 of 4 5115



TYPICAL WALL SECTION



CASE 1



CASE 2

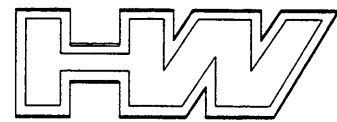
VERTICAL ALIGNMENT DIAGRAMS

(SLOPES HAVE BEEN SHOWN EXAGGERATED FOR CLARITY)  
 ADDING THE CURVES TO THE VERTICAL ALIGNMENT IS OPTIONAL, AND WHEN USED,  
 MAY ELIMINATE OVERLAPPING FOR LOW WALLS WITH SMALL CHANGES IN SLOPE.

THIS SYSTEM SHALL BE USED IN ALL ENVIRONMENTS.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM THE REINFORCED EARTH COMPANY TERRATREL WIRE WALL				
Names	Dates	Approved By <i>[Signature]</i>		
Designed By	DM	1-99	State Structures Design Engineer	
Drawn By	DM	1-99	Revision	Sheet No.
Checked By	AA	1-99	00	4 of 4
				Index No. 5115





# HILFIKER MSE WELDED WIRE WALL SYSTEM



## GENERAL NOTES

### DESIGN CRITERIA

- THE ATTACHED DETAILS ARE BASED ON THE ASSUMPTIONS THAT THE MATERIAL WITHIN THE REINFORCED VOLUME, METHODS OF CONSTRUCTION AND QUALITY OF PREFABRICATED COMPONENTS MEET THE GOVERNING AGENCIES SPECIFICATION FOR MECHANICALLY STABILIZED EARTH STRUCTURES
- MINIMUM DESIGN PARAMETERS  
REFERENCE WALL CONTROL DRAWINGS FOR SOIL CHARACTERISTICS OF FOUNDATION MATERIAL TO BE USED IN THE DESIGN OF THE WALL SYSTEM. THE CONTRACTOR SHALL PROVIDE SOIL DESIGN PARAMETERS FOR BACKFILL MATERIAL BASED ON ACTUAL SOIL CHARACTERISTICS UTILIZED AT THE SITE. THE VALUES OF THE INTERNAL FRICTION ANGLE,  $\phi$ , THE COHESION,  $c$ , AND THE UNIT WEIGHT,  $\gamma$ , SHALL BE PROVIDED IN THE SHOP DRAWINGS.  
  
EXTERNAL STABILITY  
OVERTURNING  $\geq 2.0$   
SLIDING  $\geq 1.5$   
BEARING PRESSURE  $\geq 2.5$   
  
OVERALL STABILITY  $\geq 1.5$   
INTERNAL STABILITY  
PULLOUT  $\geq 1.5$   
STEEL YIELD STRESS  $= 0.47 \times F_y$   
SERVICE LIFE  $= 75$  YEARS  
LIVE LOAD SURCHARGE  $= 11.97$  kN/m<sup>2</sup>
- THE MAXIMUM APPLIED BEARING PRESSURE AT THE INTERFACE OF THE FOUNDATION AND SELECT BACKFILL MATERIAL IS SHOWN ON THE PLANS. THE BEARING PRESSURE SHOWN IS THE MAXIMUM FOR THE GIVEN BASE MAT LENGTH. IT IS THE RESPONSIBILITY OF OTHERS TO DETERMINE THAT THE BEARING PRESSURE IS ALLOWABLE FOR THAT LOCATION.
- ANY UNSUITABLE FOUNDATION MATERIAL BELOW THE REINFORCED VOLUME AS DETERMINED BY THE ENGINEER SHALL BE EXCAVATED AND REPLACED WITH SUITABLE MATERIAL AS DIRECTED BY THE ENGINEER.
- THE DESIGN CONTAINED ON THESE DRAWINGS ARE BASED ON INFORMATION PROVIDED BY OTHERS. ON THE BASIS OF THIS INFORMATION, T&B STRUCTURAL SYSTEMS IS RESPONSIBLE FOR THE INTERNAL STABILITY OF THE STRUCTURE ONLY. EXTERNAL STABILITY, INCLUDING FOUNDATION AND SLOPE STABILITY IS THE RESPONSIBILITY OF OTHERS.

### WALL CONSTRUCTION

- WALLS FOUNDED ON CURVES SHALL HAVE THEIR PANELS DIMENSIONED AS A SERIES OF SHORT CORDS (AS DIMENSIONED) IN ORDER TO MATCH THE REQUIRED WALL RADIUS.
- FOR LOCATION AND ALIGNMENT OF THE MSE STRUCTURES REFERENCE THE RETAINING WALL CONTROL PLANS.
- IF MANHOLE AND DROP INLETS ARE REQUIRED, THEY SHALL BE LOCATED AS SHOWN ON THE RETAINING WALL ELEVATION DRAWINGS.
- IF PILES ARE LOCATED WITHIN THE REINFORCED VOLUME THEY SHALL BE DRIVEN PRIOR TO CONSTRUCTION OF THE WALL UNLESS AN ALTERNATE METHOD IS USED TO ISOLATE THE COLUMNS FROM THE REINFORCED VOLUME AS APPROVED BY THE ENGINEER.
- BACKFILL MATERIAL SHALL BE COMPACTED IN ACCORDANCE WITH SECTION 548 TO A LEVEL 50mm (PLUS OR MINUS) ABOVE THE ELEVATION OF THE SOIL REINFORCING ELEMENT. NO SOIL REINFORCEMENT SHALL BE ATTACHED TO ANY PANEL BEFORE THE BACKFILL IS PLACED AT THE REQUIRED ELEVATION AND IS COMPACTED.
- STRUCTURES GREATER THAN 6 METERS SHALL HAVE THE FINISHED GRADE PLACED AND COMPACTED AT THE FRONT FACE OF THE STRUCTURE BEFORE THE STRUCTURE HEIGHT EXCEEDS 6 METERS. THE FINISH GRADE SHALL BE COMPACTED TO 95 PERCENT OF AASHTO T-180 UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO LOCATE ANY GUARDRAIL POSTS PRIOR TO PLACING THE TOP ROW OF SOIL REINFORCEMENT. THE POST SPACING SHALL BE ADJUSTED TO AVOID CONFLICTS WITH THE LONGITUDINAL SOIL REINFORCING WIRE. CUTTING OF THE LONGITUDINAL WIRE SHALL BE ALLOWED ONLY AS DIRECTED BY THE ENGINEER.
- IF EXISTING OR FUTURE STRUCTURES ARE TO BE PLACED IN THE REINFORCED VOLUME THAT INTERFERE WITH THE PROPER PLACEMENT OF THE SOIL REINFORCEMENT THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY FOR A COURSE OF ACTION.
- THE CAP MAT SHALL BE PLACED AS CLOSE TO THE TOP OF WALL LOCATION AS POSSIBLE. THE REMAINING FACE PANEL ABOVE THE CAP MAT MAY BE CUT FREE.
- FOR OTHER INFORMATION PERTAINING TO THE CONSTRUCTION OF THE HILFIKER RETAINING WALL PLEASE REFER TO T&B STRUCTURAL SYSTEMS ERECTION MANUAL.
- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO DEFLECT THE TOP CAP MAT OF THE SOIL REINFORCEMENT DOWNWARD SO AS TO NOT CONFLICT WITH ROADWAY MIXING OPERATIONS AND/OR ROADWAY CONSTRUCTION OPERATIONS. ANY SOIL REINFORCING MATERIAL THAT IS DAMAGED SHALL BE REPLACED AT THE CONTRACTORS EXPENSE.

### CONSTRUCTION NOTES

- NOMINAL SOIL REINFORCING GRID LENGTH  
  
THE WELDED WIRE MESH IS MANUFACTURED IN LENGTHS CORRESPONDING TO THE DIMENSION "B" AS GIVEN IN THE RETAINING WALL ELEVATIONS. THE ACTUAL LENGTH FROM THE FRONT FACE OF THE PANEL TO THE TAIL OF THE SOIL REINFORCING GRID IS PLUS 50-100mm. THE FOUNDATION SHALL BE EXCAVATED TO AN EXTENT OF "B" PLUS 150mm.
- THE FOLLOWING MATERIALS ARE SUPPLIED BY T&B STRUCTURAL SYSTEMS
  - WELDED WIRE FACING PANEL
  - SOIL REINFORCING GRIDS
  - CAP MATS
  - CONNECTION PINS
  - SYNTHETIC INDUSTRIES GEOTEX 401 NONWOVEN GEOTEXTILE FILTER FABRIC
 ANY OTHER MATERIAL REQUIRED TO BUILD THE MSE STRUCTURES ACCORDING TO THE GOVERNING SPECIFICATION SHALL BE SUPPLIED BY THE CONTRACTOR.
- T&B STRUCTURAL SYSTEM SUPPLIES MECHANICALLY STABILIZED EARTH STRUCTURAL COMPONENTS FOR USE WITH THE HILFIKER RETAINING WALL SYSTEMS FOR THE STRUCTURES DETAILED HEREIN. THE ERECTION MANUAL PROVIDED BY T&B STRUCTURAL SYSTEMS IS A GENERAL GUIDELINE FOR ERECTING THE HILFIKER RETAINING WALL SYSTEM. ALL QUALITY CONTROL PROCEDURES, STAGING PROCEDURES, MATERIAL HANDLING, AND SAFETY IS THE RESPONSIBILITY OF THE CONTRACTOR. THIS DOES NOT RELIEVE THE CONTRACTOR OF THE OBLIGATION TO CONSTRUCT THE RETAINING WALL ACCORDING TO THE PROJECT PLANS AND SPECIFICATIONS AND ALL LAWS OF THE GOVERNING STATE.

## METRIC

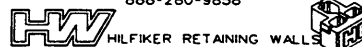
THIS SYSTEM MAY BE USED IN ALL ENVIRONMENTS

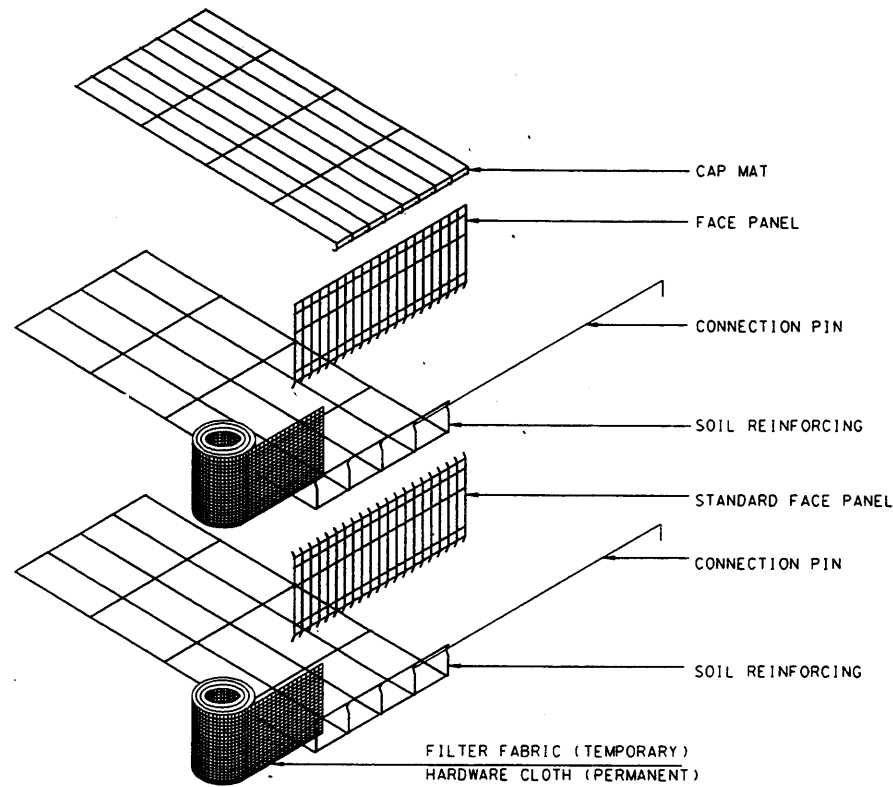
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM HILFIKER WELDED WIRE WALL				
Names	Dates	Approved By <i>[Signature]</i> State Structures Design Engineer		
Designed By TPT		Revision	Sheet No.	Index No.
Drawn By		00	1 of 4	5120
Checked By				

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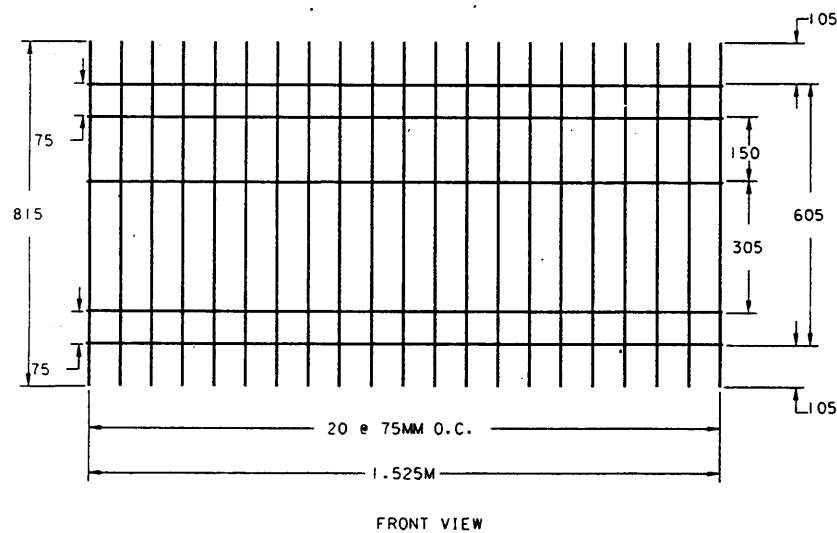
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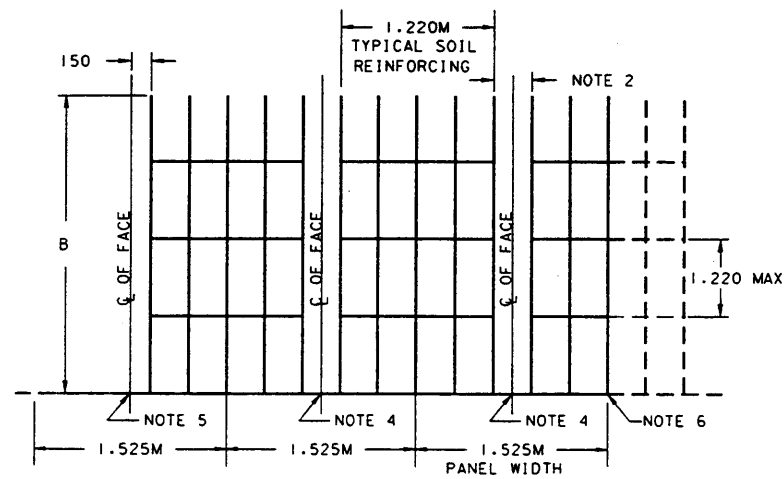




**A** WELDED WIRE WALL COMPONENT ISOMETRIC



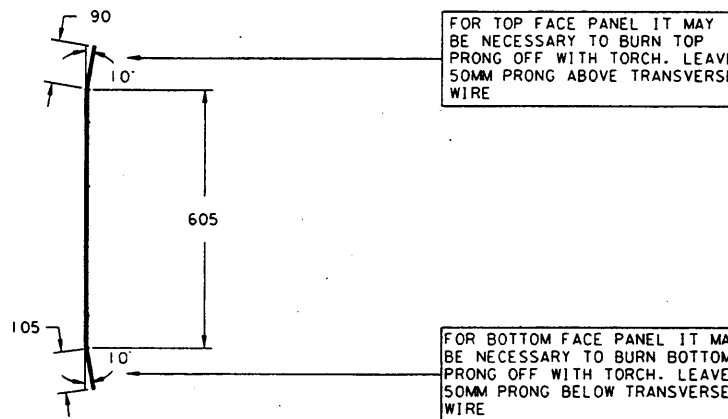
**B** FACE PANEL DETAIL  
MINIMUM WIRE SIZE IS WM29 BOTH DIRECTIONS



NOTE.

1. SOIL REINFORCING MAT TO BE PLACED ON PREPARED SURFACE
2. .305 SPACE BETWEEN SOIL REINFORCING MAT U.N.O.
3. PLACE FACE PANEL AT MIDPOINT OF SOIL REINFORCING MAT
4. BUTT FACE PANEL TOGETHER AND SECURE WITH A HOG RING
5. AT START OF WALL PLACE SOIL MAT AND TRIM EXCESS FACE PANEL
6. AT END OF WALL PLACE SOIL MAT AND FACE PANEL AND TRIM EXCESS

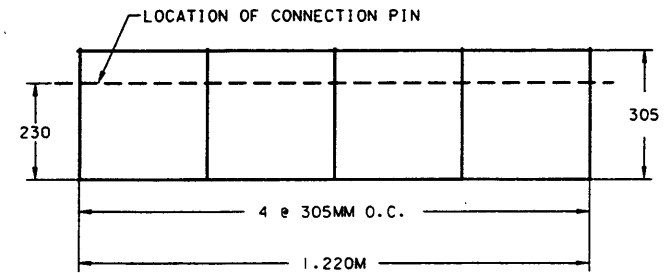
**C** SOIL REINFORCING LAYOUT PLAN



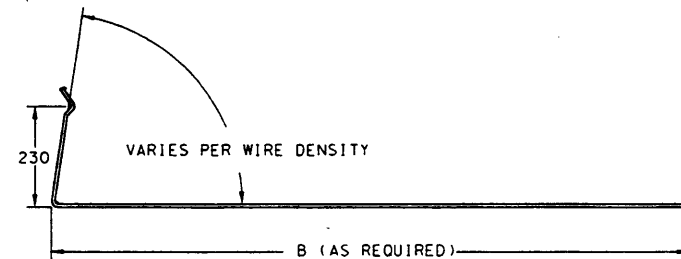
NOTE.

1. BOTTOM FACE PANEL MAY NEED TO HAVE PRONGS BURNED OFF IN FIELD
2. BURN PRONGS OFF 50MM FROM TRANSVERSE WIRE
3. GALVANIZED FACE PANELS REQUIRE EXPOSED BLACK STEEL TO BE COATED WITH RICH ZINC PAINT OR APPROVED EQUAL
4. INTERSECTION OF ADJACENT FACE PANEL SECURE VERTICAL WIRES TOGETHER AT INTERFACE

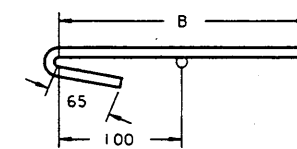
**D** FACE PANEL SECTION



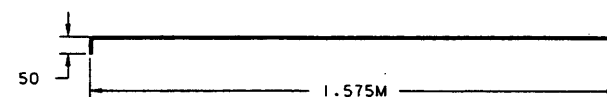
**E** SOIL REINFORCEMENT FRONT ELEVATION



**F** SOIL REINFORCEMENT SIDE ELEVATION  
MINIMUM WIRE SIZE IS WM29



**G** CAP MAT DETAIL

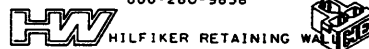


**H** CONNECTION PIN DETAIL  
MINIMUM WIRE SIZE IS WM29

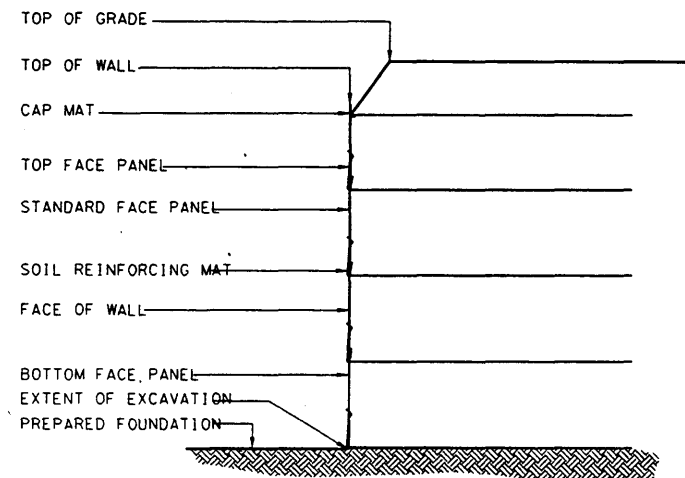
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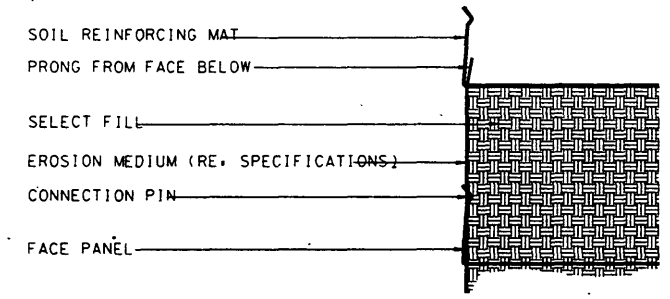
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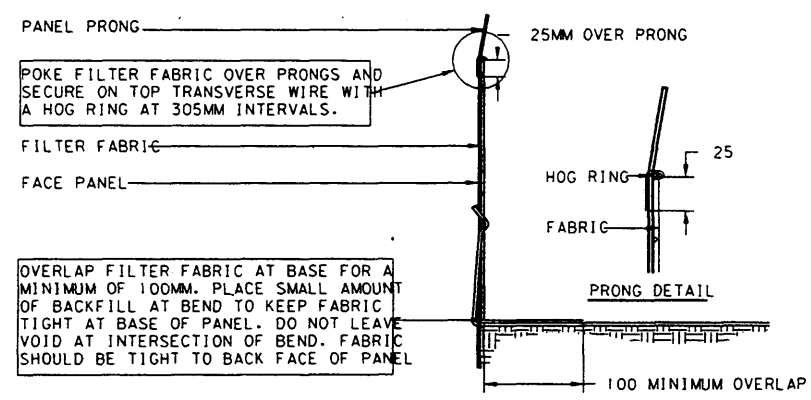
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RETAINING WALL SYSTEM HILFIKER WELDED WIRE WALL				
Names	Dates	Approved By		
Designed By	TPT 12-78	<i>[Signature]</i> State Structures Design Engineer		
Drawn By	TPT 12-78			
Checked By	TBW 12-78	00	2 of 4	5120



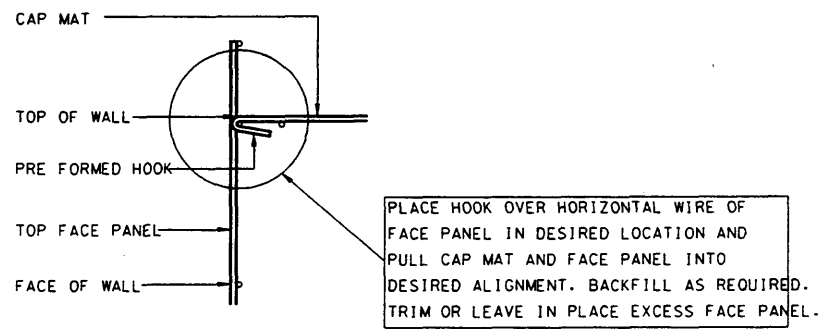
**A**  
2  
TYPICAL SECTION WELDED WIRE WALL



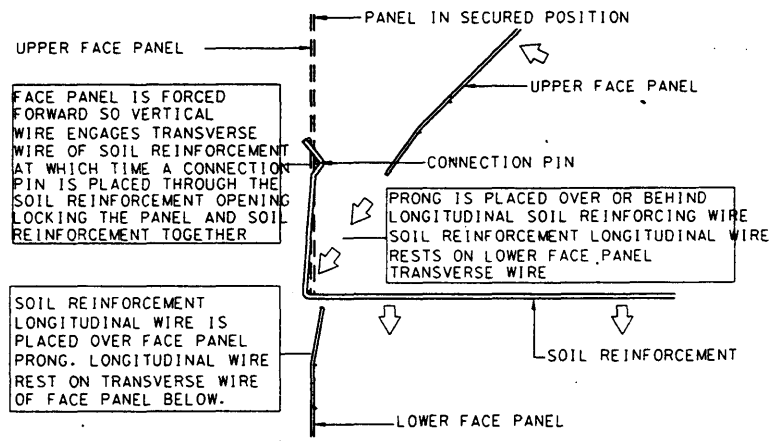
**B**  
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WELDED WIRE WALL LIFT SECTION



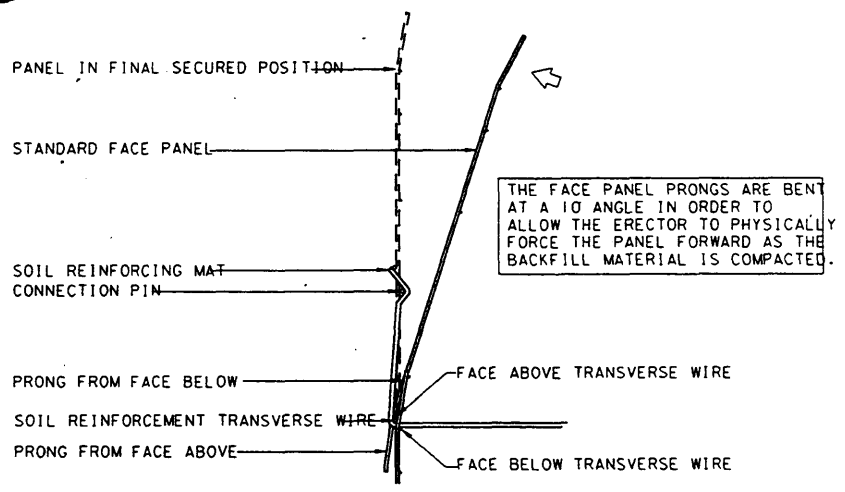
**C**  
2  
FILTER FABRIC PLACEMENT



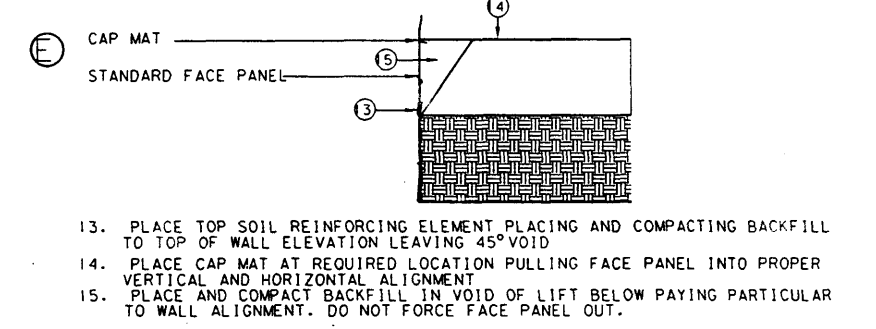
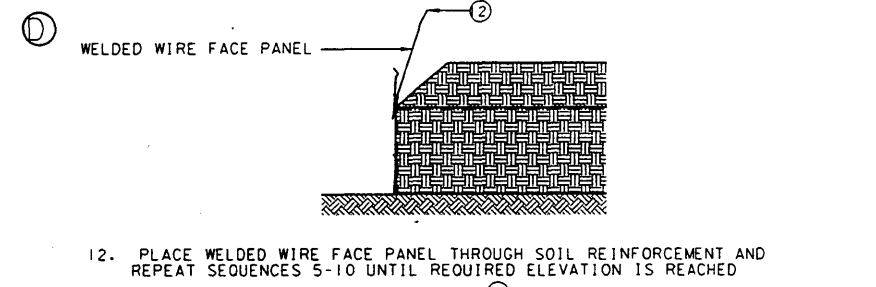
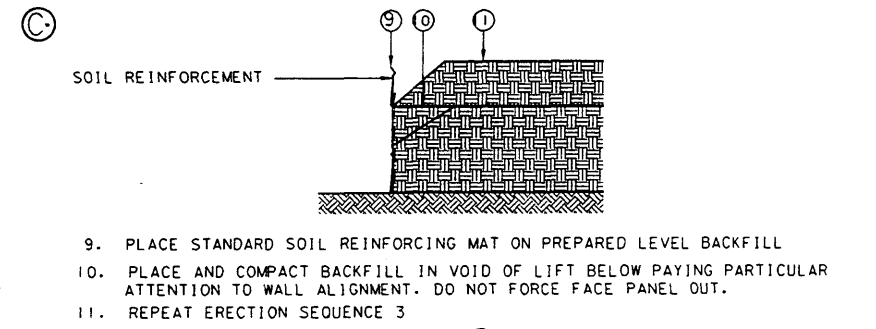
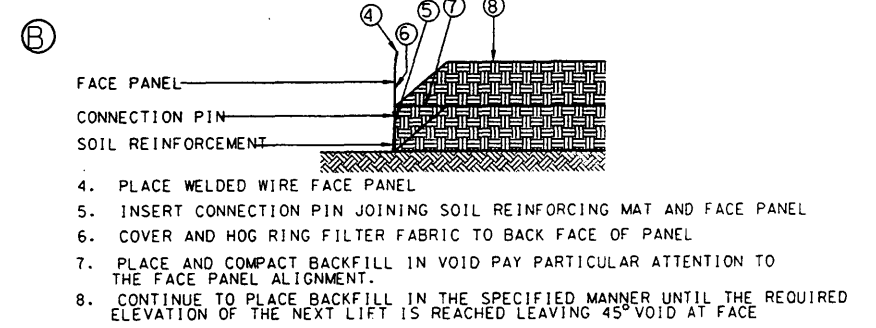
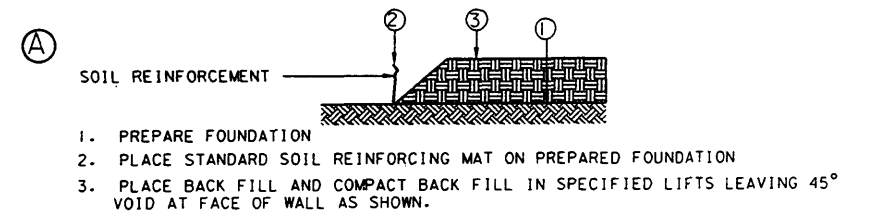
**D**  
2  
CAP MAT CONNECTION DETAIL



**E**  
2  
SOIL REINFORCEMENT CONNECTION SEQUENCE



**F**  
2  
SOIL REINFORCEMENT CONNECTION SEQUENCE

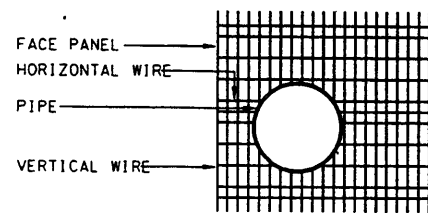


**G**  
2  
CONSTRUCTION SEQUENCE

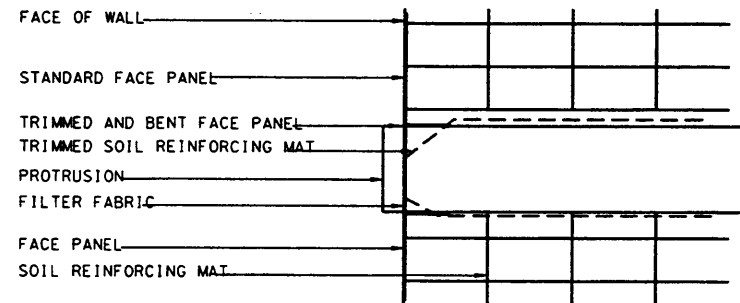
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**HW** HILFIKER RETAINING WALLS

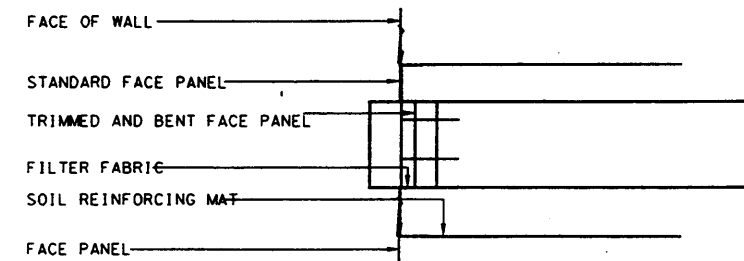
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM HILFIKER WELDED WIRE WALL</b>				
Designed By	TPT	12-98	Approved By	<i>W. J. [Signature]</i> State Structures Design Engineer
Drawn By	TPT	12-98	Revision	Sheet No. Index No.
Checked By	T&B	12-98	00	3 of 4 5120



NOTE:  
TRIM PROTRUSION AREA FROM FACE PANEL BY CUTTING HORIZONTAL WIRE BETWEEN EACH VERTICAL WIRE. BEND WIRES BACK INTO MSE MASS AND AS CLOSE TO PROTRUSION AS POSSIBLE. APPLY FILTER FABRIC OVER AND AROUND PROTRUSION MAKING SURE FACE PANEL IS COVERED. MAKE SURE THAT ALL GAPS BETWEEN FACE AND PROTRUSION ARE COVERED WITH FILTER FABRIC. IF PROTRUSION INTERFERES WITH SOIL REINFORCING MAT CUT TRANSVERSE WIRES OF MAT AND BEND LONGITUDINAL WIRE TO PASS PROTRUSION AND CONFORM TO THE PROTRUSIONS SHAPE.

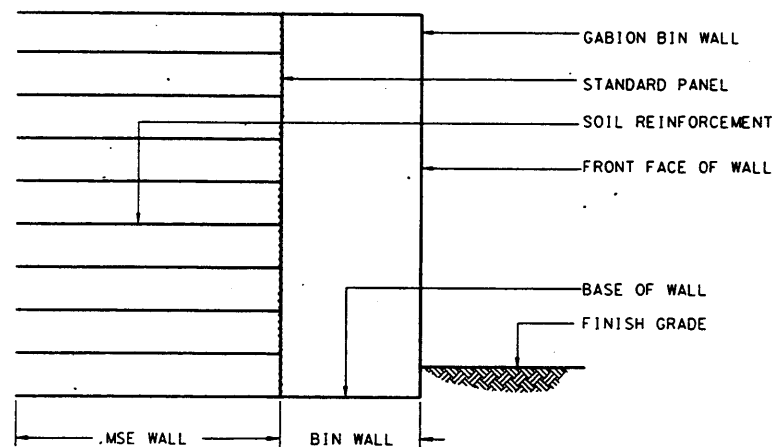


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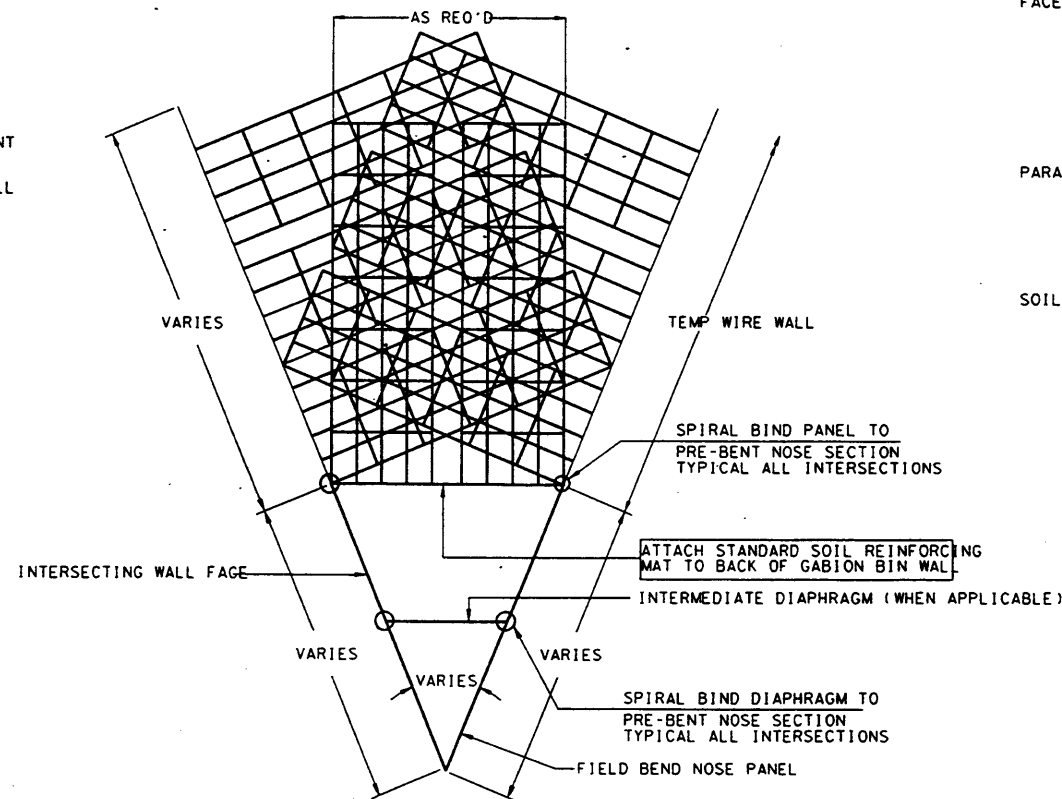


NOTE:  
TRIM PROTRUSION AREA FROM FACE PANEL BY CUTTING HORIZONTAL WIRE BETWEEN EACH VERTICAL WIRE. BEND WIRES BACK INTO MSE MASS AND AS CLOSE TO PROTRUSION AS POSSIBLE. APPLY FILTER FABRIC OVER AND AROUND PROTRUSION MAKING SURE FACE PANEL IS COVERED. MAKE SURE THAT ALL GAPS BETWEEN FACE AND PROTRUSION ARE COVERED WITH FILTER FABRIC. IF PROTRUSION INTERFERES WITH SOIL REINFORCING MAT CUT TRANSVERSE WIRES OF MAT AND BEND LONGITUDINAL WIRE TO PASS PROTRUSION AND CONFORM TO THE PROTRUSIONS SHAPE.

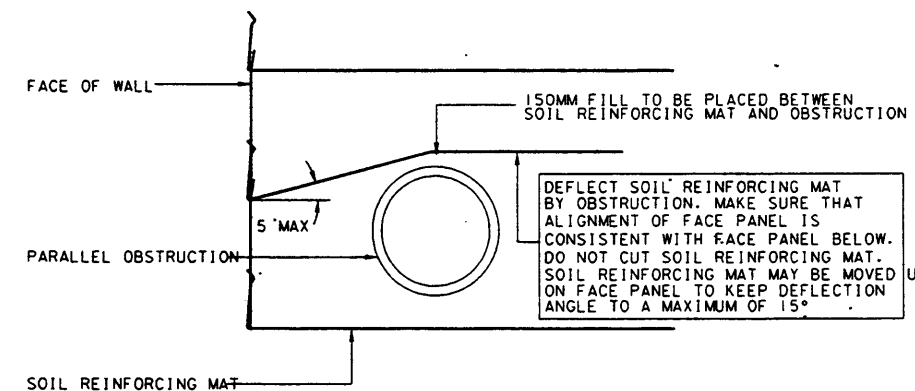
**A**  
3 TYPICAL ELEVATION THROUGH PENETRATION



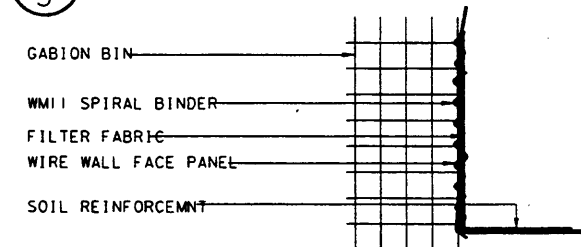
**D**  
3 TYPICAL PLAN VIEW THROUGH PENETRATION



**F**  
3 TYPICAL SECTION THROUGH PENETRATION



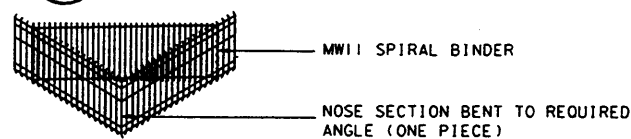
**G**  
3 SECTION AT PARALLEL OBSTRUCTION



NOTE: 12 GAUGE GALVANIZED STEEL HOG RING MAY BE SUBSTITUTED FOR SPIRAL BINDER. HOG RINGS TO BE ATTACHED AT 3" CENTERS

**H**  
3 SPIRAL BINDER CONNECTION

**B**  
3 TYPICAL SECTION THROUGH BIN



NOTE: 12 GAUGE GALVANIZED STEEL HOG RING MAY BE SUBSTITUTED FOR SPIRAL BINDER. HOG RINGS TO BE ATTACHED AT 3" CENTERS TOP TO BOTTOM.

**C**  
3 ISOMETRIC OF BIN GABION NOSE SECTION

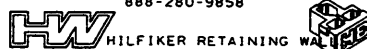
**E**  
3 TYPICAL PLAN VIEW AT BIN

HILFIKER PRODUCTS ARE COVERED BY UNITED STATES AND FOREIGN PATENTS AND PATENTS PENDING. MATERIAL CONTAINED HERE WITHIN IS PROPRIETARY PROPERTY OF T&B STRUCTURAL SYSTEMS AND MAY NOT BE REPRODUCED OR TRANSMITTED.  
US PATENTS: 4,260,296/4,324,508/4,343,572/4,616,959/4,661,023/4,929,125/  
4,993,879/4,329,089/4,117,686/4,505,621/5,484,235/5,702,208/5,722,799/0.P.

THE DESIGN CONTAINED IN THIS DRAWING IS BASED ON INFORMATION SUPPLIED BY THE FOOT CONSULTANT. TBSS IS CERTIFYING THE INTERNAL STABILITY OF THE MSE MASS ONLY. ALL EXTERNAL STABILITY REQUIREMENTS ARE THE RESPONSIBILITY OF THE OWNER.

T & B STRUCTURAL SYSTEMS INC.

ENGINEERED STRUCTURES  
637 WEST HURST BLVD.  
HURST, TEXAS 76053  
888-280-9858



STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

RETAINING WALL SYSTEM  
HILFIKER WELDED WIRE WALL

Names	Dates	Approved By		
Designed By	TPT 12-78	<i>William J. [Signature]</i> State Structures Design Engineer	Revision	Sheet No.
Drawn By	TPT 12-78		00	4 of 4
Checked By	TBW 12-78		Index No.	5120

**CONSTRUCTION NOTES FOR THE PLACEMENT OF TENSAR GEOGRIDS AND BACKFILL  
SOILS FOR TENSAR WWF TEMPORARY RETAINING WALL**

**1.0 MATERIALS**

- 1.1 GEOGRID REINFORCING SHALL BE TENSAR UNIAXIAL GEOGRID AND BIAXIAL GEOGRIDS MANUFACTURED BY THE TENSAR CORPORATION, MORROW, GEORGIA.
- 1.2 BODKIN BARS SHALL BE 38 mm x 6 mm HDPE BARS MANUFACTURED BY THE TENSAR CORPORATION, MORROW, GEORGIA.
- 1.3 GEOTEXTILE FILTER FABRIC TG600 SHALL BE MANUFACTURED BY EVERGREEN TECHNOLOGIES, INC., EVERGREEN, ALABAMA OR EQUIVALENT AS APPROVED BY THE ENGINEER.
- 1.4 WALL FACING

1.4.1 FACING SHALL BE PRE-FABRICATED BLACK STEEL WELDED WIRE FORMS 102mm x 102mm - MW26 x MW26 AND GEOTEXTILE FABRIC. WIRE FORM GEOMETRY SHALL BE AS DETAILED IN THE CONSTRUCTION DRAWINGS.

**2.0 TECHNICAL REQUIREMENTS**

- 2.1 FILL MATERIALS SHALL BE PLACED FROM THE BACK OF THE WELDED WIRE FACING FORMS TOWARDS THE ENDS OF THE GEOGRID TO ENSURE FURTHER TENSIONING.
- 2.2 WELDED WIRE FACING (WWF) SHALL BE MONITORED DURING FILL PLACEMENT AND COMPACTION. COMPACTION EQUIPMENT AND OPERATION PROCEDURES MAY HAVE TO BE MODIFIED TO PREVENT EXCESSIVE DEFORMATION OF THE FLEXIBLE WELDED WIRE FACING.
- 2.3 TIE WIRES OR HOG RINGS MAY BE REQUIRED IF WWF MOVES DURING BACKFILL OPERATIONS.

**3.0 TENSAR GEOGRID PLACEMENT**

- 3.1 TENSAR GEOGRID SHALL BE PLACED AT THE SAME LOCATIONS AND ELEVATIONS SHOWN ON THE SHOP DRAWINGS.
- 3.2 TENSAR GEOGRID REINFORCEMENT SHALL BE CONTINUOUS THROUGHOUT THEIR EMBEDMENT LENGTH(S). THE BODKIN CONNECTION SHALL NOT BE UTILIZED UNLESS PRE-APPROVED BY THE ENGINEER PRIOR TO CONSTRUCTION.
- 3.2.1 IF PRE-APPROVED, TENSAR UNIAXIAL GEOGRIDS MAY BE SPLICED UTILIZING THE BODKIN CONNECTION DETAIL. NO MORE THAN ONE SPLICE SHALL BE ALLOWED IN ANY ONE LENGTH OF REINFORCING AND NO SPLICES SHALL BE ALLOWED FOR GEOGRIDS LESS THAN 1.83 meters IN LENGTH (EACH). THE BODKIN CONNECTION SHALL NOT BE PLACED LESS THAN 1.83 meters BELOW PLANNED FINISHED GRADE, NOR HORIZONTALLY NOR VERTICALLY ADJACENT TO ANOTHER BODKIN CONNECTION.

3.3 PRIOR TO PLACING FILL, THE GEOGRID MATERIALS SHALL BE PLACED TO LAY FLAT AND PULLED TAUT TO REMOVE ANY SLACK IN THE GEOGRIDS.

3.4 TRACKED CONSTRUCTION EQUIPMENT SHALL NOT BE OPERATED DIRECTLY ON THE GEOGRID. A MINIMUM FILL THICKNESS OF 150 mm IS REQUIRED FOR OPERATION OF TRACKED VEHICLES OVER THE GEOGRID. TURNING OF TRACKED VEHICLES SHOULD BE KEPT TO A MINIMUM TO PREVENT TRACKS FROM DISPLACING THE FILL AND/OR THE GEOGRID.

3.5 RUBBER-TIRED VEHICLES MAY PASS OVER THE GEOGRID REINFORCEMENT AT SLOW SPEEDS, LESS THAN 15 km/h. SUDDEN BRAKING AND SHARP TURNING SHALL BE AVOIDED.

3.6 TENSAR UNIAXIAL GEOGRIDS SHALL BE ROLLED OUT WITH THE LONG AXIS OF THE APERTURES (MACHINE DIRECTION) PERPENDICULAR TO THE WELDED WIRE FORM FACE. TENSAR BIAXIAL GEOGRIDS SHALL BE ROLLED OUT WITH THE MACHINE DIRECTION BAR PARALLEL TO THE WELDED WIRE FORM FACE.

3.6.1 UNIAXIAL (UX) GEOGRIDS SHALL BE CUT NEXT TO THE CROSS MACHINE DIRECTION BAR. UX GEOGRIDS SHALL BE UNROLLED PERPENDICULAR TO THE WALL FACE.

3.6.2 BIAXIAL (BX) GEOGRIDS SHALL BE CUT NEXT TO THE MACHINE DIRECTION BAR. BX GEOGRIDS SHALL BE UNROLLED PARALLEL TO THE WALL FACE.

3.7 GEOGRIDS SHALL BE CUT AND PLACED SO THAT A TRANSVERSE BAR IS EXTENDED TO THE BACK FACE OF THE WELDED WIRE FORM.

3.8 A MINIMUM OF 75 mm OF FILL MATERIAL SHALL BE REQUIRED BETWEEN LAYERS OF BIAXIAL, UNIAXIAL AND FILTER FABRIC, UNLESS OTHERWISE SHOWN.

**4.0 CHANGES TO GEOGRID LAYOUT OR PLACEMENT**

4.1 NO CHANGES TO THE TENSAR GEOGRID LAYOUT, INCLUDING, BUT NOT LIMITED TO, LENGTH, GEOGRID TYPE, OR ELEVATION, SHALL BE MADE WITHOUT THE EXPRESSED PRIOR WRITTEN CONSENT OF TENSAR EARTH TECHNOLOGIES, INC.

**5.0 DRAINAGE**

5.1 THE TENSAR REINFORCED WALL HAS BEEN DESIGNED ON THE ASSUMPTION THAT THE REINFORCED BACKFILL MATERIAL SHALL BE FREE OF SUBSURFACE DRAINAGE OF WATER (SEEPAGE).

**6.0 DESIGN PARAMETERS**

**6.1 SOIL PARAMETERS:**

SEE WALL CONTROL DRAWINGS FOR SOIL CHARACTERISTICS OF FOUNDATION MATERIAL TO BE USED IN THE DESIGN OF THE WALL SYSTEM. THE CONTRACTOR SHALL PROVIDE SOIL DESIGN PARAMETERS FOR BACKFILL MATERIAL BASED ON THE ACTUAL SOIL CHARACTERISTICS UTILIZED AT THE SITE. THE VALUES OF FRICTION ANGLE, APPARENT COHESION AND UNIT WEIGHT SHALL BE PROVIDED IN THE SHOP DRAWINGS.

**6.1.1 DESIGN:**

THE DESIGN CONTAINED ON THESE DRAWINGS IS BASED ON INFORMATION PROVIDED BY OTHERS. ON THE BASIS OF THIS INFORMATION, THE TENSAR CORPORATION IS RESPONSIBLE FOR INTERNAL STABILITY OF THE STRUCTURE ONLY EXTERNAL STABILITY DESIGN INCLUDING FOUNDATION AND SLOPE STABILITY IS THE RESPONSIBILITY OF OTHERS.

**6.2 FACTORS OF SAFETY:**

6.2.1 INTERNAL STABILITY:  
 MAXIMUM GEOGRID DESIGN STRENGTH = 0.29 ULT  
 MINIMUM FACTOR OF SAFETY FOR GEOGRID PULLOUT = 1.5  
 MINIMUM FACTOR OF SAFETY FOR SLIDING AT LOWEST GEOGRID = 1.5  
 SOIL-GEOGRID SOIL INTERACTION COEFFICIENT = 0.8  
 PERCENT COVERAGE OF GEOGRID = VARIES

6.2.2 EXTERNAL STABILITY:  
 MINIMUM FACTOR OF SAFETY FOR SLIDING = 1.5  
 MINIMUM FACTOR OF SAFETY FOR OVERTURNING = 2.0  
 (EXTERNAL STABILITY, INCLUDING SLIDING, OVERTURNING, AND BEARING CAPACITY, IS THE RESPONSIBILITY OF OTHERS. TENSAR EARTH TECHNOLOGIES, INC. ACCEPTS NO LIABILITY FOR EXTERNAL STABILITY. (SEE SECTION 7.5))

6.2.3 GLOBAL STABILITY:  
 GLOBAL STABILITY IS THE RESPONSIBILITY OF OTHERS. TENSAR EARTH TECHNOLOGIES, INC. ACCEPTS NO LIABILITY OR RESPONSIBILITY FOR GLOBAL STABILITY. (SEE SECTION 7.5)

**7.0 SPECIAL PROVISIONS**

7.1 WALL ELEVATION VIEWS AND LOCATIONS AND GEOMETRY OF EXISTING STRUCTURES MUST BE VERIFIED BY THE CONTRACTOR BEFORE COMMENCEMENT OF SHOP DRAWINGS.

7.2 TENSAR EARTH TECHNOLOGIES, INC. ASSUMES NO LIABILITY FOR INTERPRETATION OR VERIFICATION OF SUBSURFACE CONDITIONS, SUITABILITY OF SOIL DESIGN PARAMETERS AND INTERPRETATION OF SUBSURFACE GROUNDWATER CONDITIONS.

7.3 ANY REVISIONS TO DESIGN PARAMETERS STATED ON CONTROL DRAWINGS OR STRUCTURE GEOMETRY SHALL REQUIRE DESIGN MODIFICATIONS PRIOR TO PROCEEDING WITH CONSTRUCTION.

7.4 THIS DESIGN IS ONLY VALID FOR THE INTERNAL STABILITY OF THE PROPOSED TENSAR REINFORCED RETAINING WALLS AS SHOWN HEREIN.

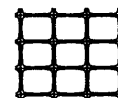
7.5 BEARING CAPACITY, TOTAL SETTLEMENT, DIFFERENTIAL SETTLEMENT, AND THEIR EFFECTS ON THE TENSAR REINFORCED RETAINING WALL SYSTEM SHALL BE THE RESPONSIBILITY OF OTHERS.

THIS DESIGN IS BASED UPON SPECIFIC PROPERTIES OF TENSAR PRODUCTS (GEOGRIDS, DRAINAGE COMPOSITES AND EROSION MEDIA), WHICH ARE PROPRIETARY TO THE TENSAR CORPORATION 1210 CITIZENS PARKWAY, MORROW GA. 30260. ANY SUBSTITUTION OF THE SPECIFIED PRODUCTS WILL INVALIDATE THIS DESIGN.

THIS DRAWING, DESIGN NOTES AND ASSOCIATED CALCULATIONS HAVE BEEN PREPARED BY TENSAR EARTH TECHNOLOGIES, INC. FOR PRELIMINARY DESIGN PURPOSES AND SHALL NOT BE USED FOR FINAL DESIGN OR CONSTRUCTION.

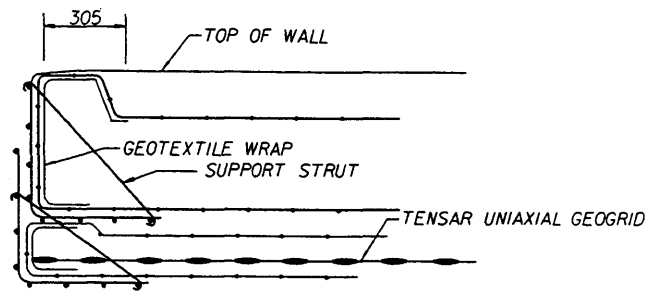
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**TENSAR  
EARTH TECHNOLOGIES, INC.**  
 5775-B Glenridge Drive  
 Lakeside Center Suite 450  
 Atlanta, GA 30328  
 (404) 250-1290



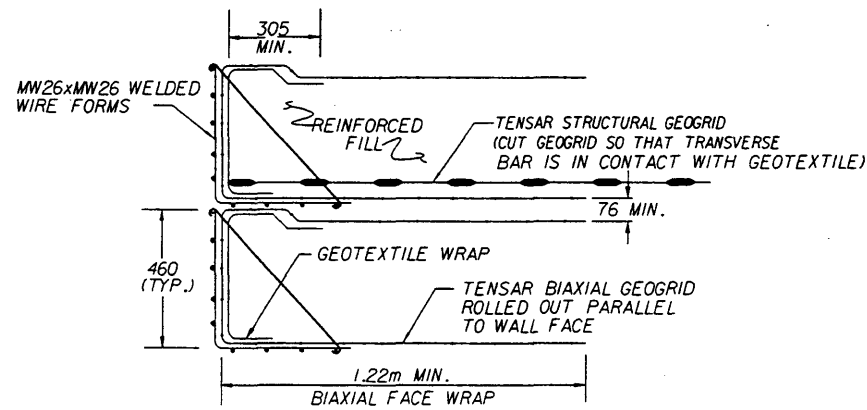
THIS SYSTEM MAY BE USED IN ALL ENVIRONMENTS.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES TEMPORARY RETAINING WALL				
Designed By	DJ	8-98	Approved	<i>[Signature]</i>
Drawn By	JMS	8/14/98	Revision	Sheet No. Index No.
Checked By	KPA	3-99	00	1 of 3 5125

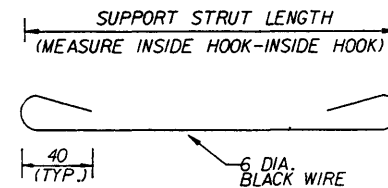


SET TOP MOST WIRE FORM INSIDE WIRE FORM BELOW TO FOLLOW GRADE.

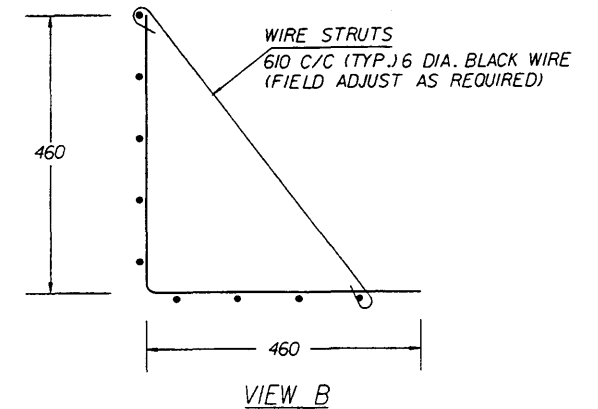
TOP WIRE BASKET DETAIL  
NOT TO SCALE



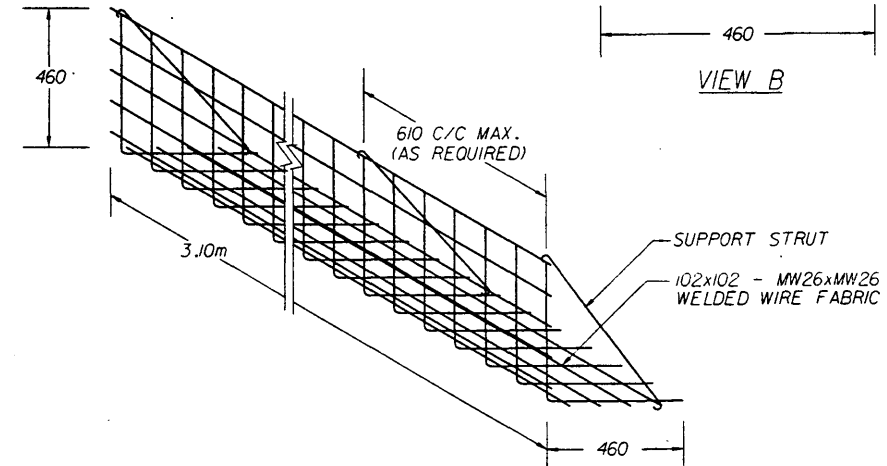
WALL FACE DETAIL  
NOT TO SCALE



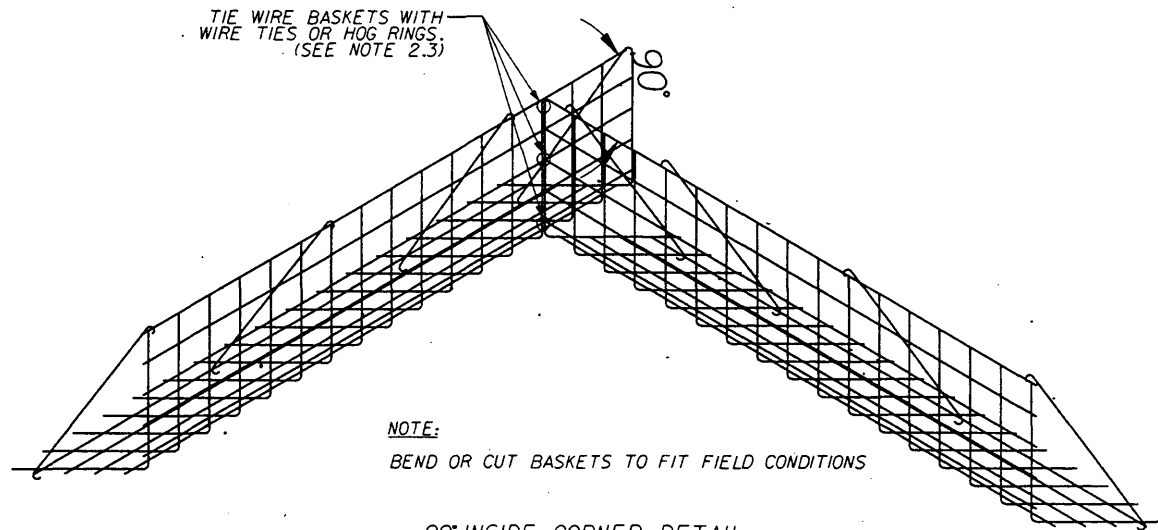
SUPPORT STRUT



VIEW B



TIE WIRE BASKETS WITH WIRE TIES OR HOG RINGS (SEE NOTE 2.3)

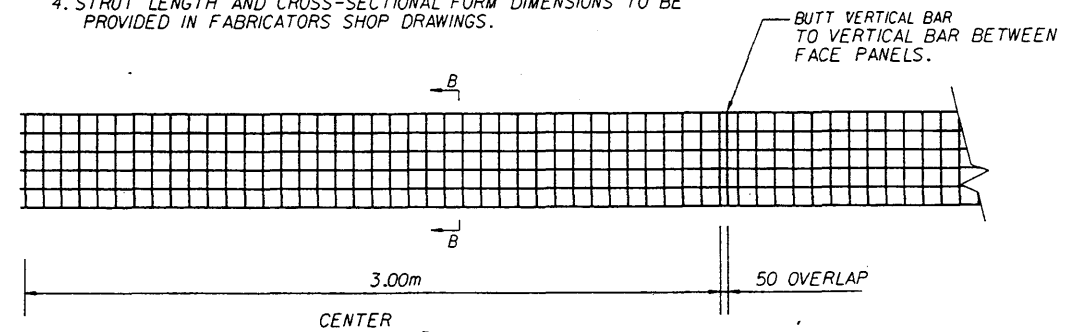


NOTE:  
BEND OR CUT BASKETS TO FIT FIELD CONDITIONS

90° INSIDE CORNER DETAIL  
NOT TO SCALE

NOTES:

1. FACING TO CONSIST OF PREFABRICATED WWF 102x102 - MW26xMW26 FORMS PER ASTM A497.
2. ALL FORMS AND STRUTS WILL BE FABRICATED WITH 6 DIA. BLACK WIRE.
3. OVERALL LENGTH OF WIRE FORMS IS 3.10m. EFFECTIVE CONSTRUCTED WIDTH IS 3.00m WITH 50 OVER LAPPING AT ENDS.
4. STRUT LENGTH AND CROSS-SECTIONAL FORM DIMENSIONS TO BE PROVIDED IN FABRICATORS SHOP DRAWINGS.



WELDED WIRE FORM DETAIL  
NOT TO SCALE

NOTE:  
DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED.

THIS SYSTEM MAY BE USED IN ALL ENVIRONMENTS.

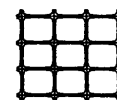
THIS DESIGN IS BASED UPON SPECIFIC PROPERTIES OF TENSAR PRODUCTS (GEOGRIDS, DRAINAGE COMPOSITES AND EROSION MEDIA), WHICH ARE PROPRIETARY TO THE TENSAR CORPORATION 1210 CITIZENS PARKWAY, MORRON GA. 30260. ANY SUBSTITUTION OF THE SPECIFIED PRODUCTS WILL INVALIDATE THIS DESIGN.

NOTES:  
BEND OR CUT BASKETS TO FIT FIELD CONDITIONS ENSURE THAT GEOTEXTILE FILTER FABRIC T6600 AND BIAxIAL GEOGRID OVERLAP 300 MINIMUM

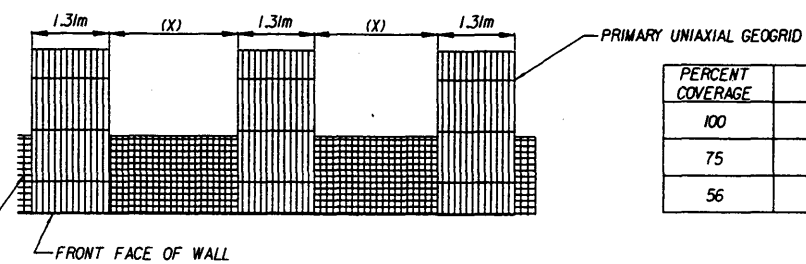
90 DEGREE CORNER DETAIL  
NOT TO SCALE

THIS DRAWING, DESIGN NOTES AND ASSOCIATED CALCULATIONS HAVE BEEN PREPARED BY TENSAR EARTH TECHNOLOGIES, INC. FOR PRELIMINARY DESIGN PURPOSES AND SHALL NOT BE USED FOR FINAL DESIGN OR CONSTRUCTION.

**TENSAR**  
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Lakeside Center Suite 450  
Atlanta, GA 30328



STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES TEMPORARY RETAINING WALL				
Names	Dates	Approved By		
Designed By	DJ 8-98	[Signature]		
Drawn By	JMS 8/14/98			
Checked By	KPA 3-99	Revision	00	Sheet No.
				2 of 3
				Index No.
				5125

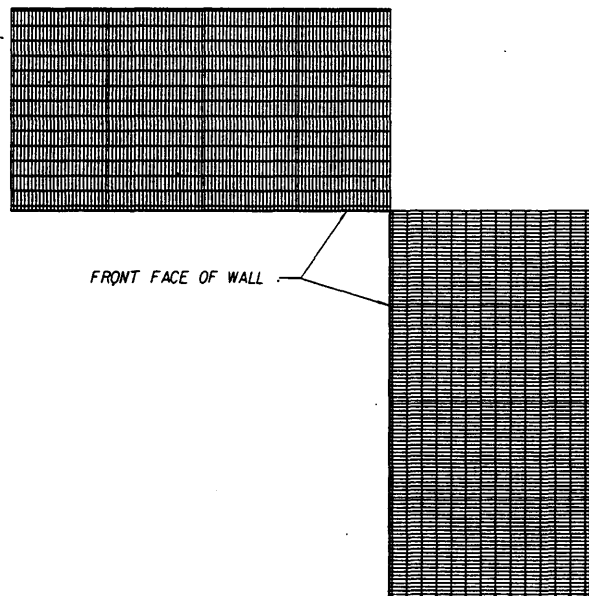


PERCENT COVERAGE	X
100	0
75	433
56	1016

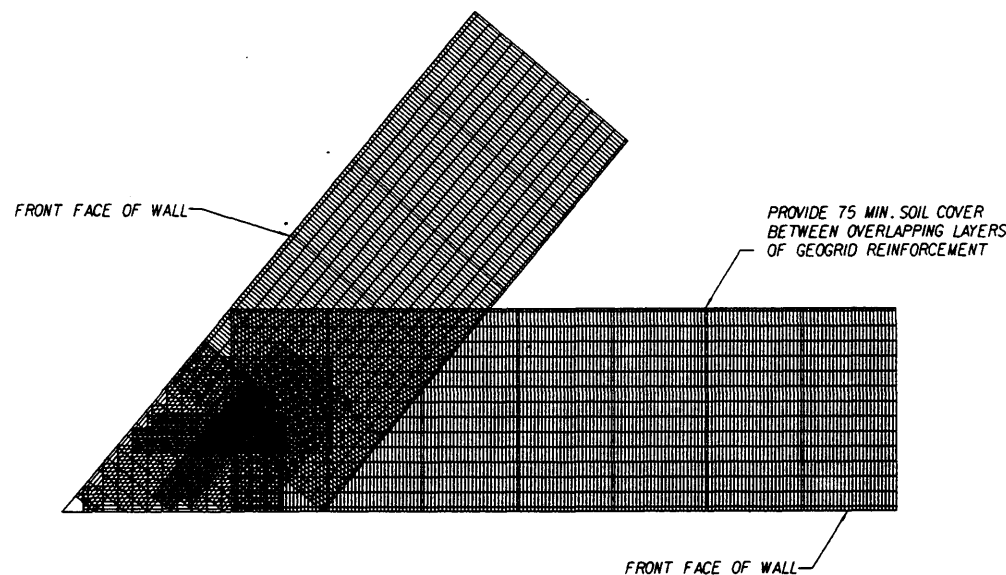
BIAxIAL (1/3 ROLL WIDTH) 1.31m WIDE ROLLED OUT PARALLEL TO WALL FACE. BIAxIAL GEOGRID SHALL BE PROVIDED BETWEEN PRIMARY REINFORCEMENT ONLY WHEN 56% COVERAGE IS SPECIFIED.

**NOTE:**  
ALTERNATE LAYERS OF UNIAXIAL PRIMARY REINFORCEMENT SHALL BE PLACED IN STAGGERED PATTERN SUCH THAT THE LAYER ABOVE IS PLACED WITH THE CENTERLINE OF THE GEOGRID IN ALIGNMENT WITH THE CENTERLINE OF THE SPACE BELOW.

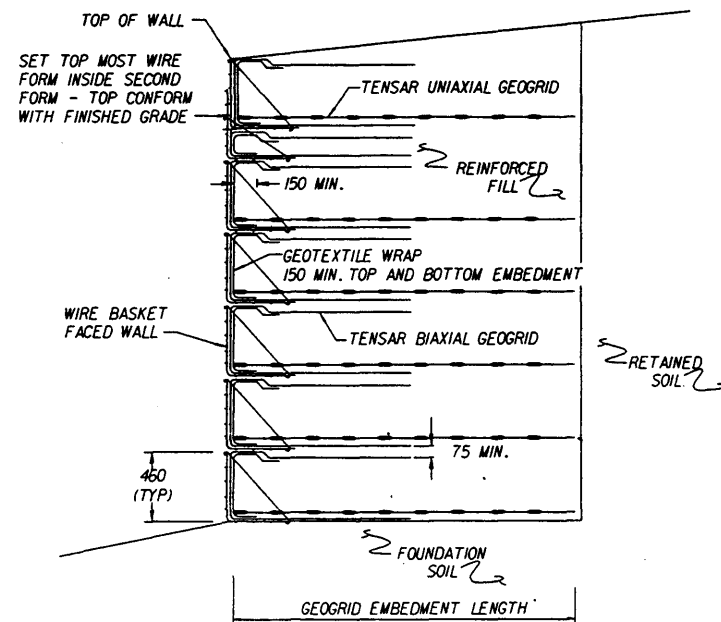
TYPICAL GEOGRID COVERAGE  
NOT TO SCALE



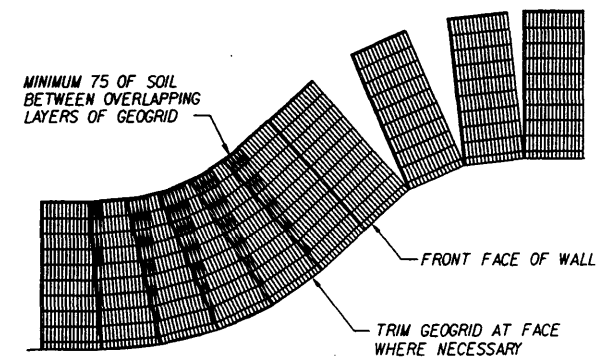
GEOGRID 90° INSIDE CORNER DETAIL  
NOT TO SCALE



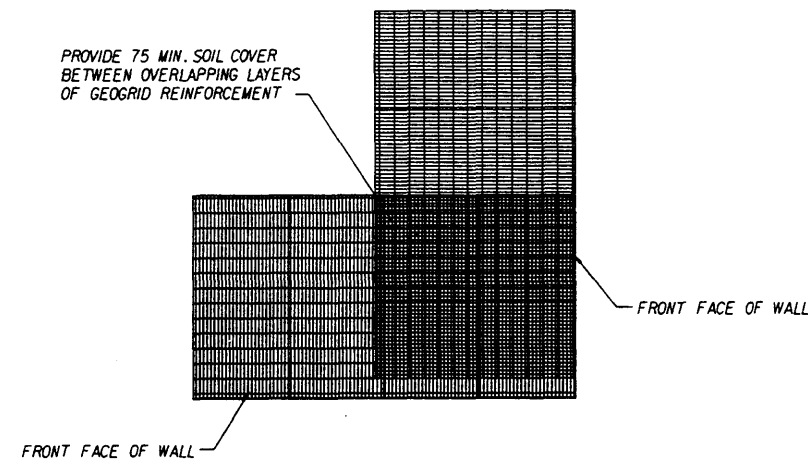
GEOGRID ACUTE CORNER DETAIL  
NOT TO SCALE



TYPICAL CROSS-SECTION  
NOT TO SCALE



GEOGRID PLACEMENT ON CURVES  
NOT TO SCALE



GEOGRID 90° OUTSIDE CORNER DETAIL  
NOT TO SCALE

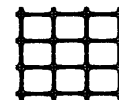
THIS SYSTEM MAY BE USED IN ALL ENVIRONMENTS.

THIS DESIGN IS BASED UPON SPECIFIC PROPERTIES OF TENSAR PRODUCTS (GEOGRIDS, DRAINAGE COMPOSITES AND EROSION MEDIA), WHICH ARE PROPRIETARY TO THE TENSAR CORPORATION 1210 CITIZENS PARKWAY, MORROW GA, 30260. ANY SUBSTITUTION OF THE SPECIFIED PRODUCTS WILL INVALIDATE THIS DESIGN.

THIS DRAWING, DESIGN NOTES AND ASSOCIATED CALCULATIONS HAVE BEEN PREPARED BY TENSAR EARTH TECHNOLOGIES, INC. FOR PRELIMINARY DESIGN PURPOSES AND SHALL NOT BE USED FOR FINAL DESIGN OR CONSTRUCTION.

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5775-B Glenridge Drive  
Lakeside Center Suite 450  
Atlanta, GA 30328  
(404) 250-1290



STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES TEMPORARY RETAINING WALL				
Names	Dates	Approved By		
Designed By	DJ	8-78	[Signature] State Structures Design Engineer	
Drawn By	JMS	8/11/98	Revision	Sheet No.
Checked By	KPA	3-99	00	3 of 3
				Index No. 5125



# TC Mirafi Engineering Services, Inc.

365 SOUTH HOLLAND DRIVE, PENDERGRASS, GA 30567 TEL (706) 693-2226

CONSTRUCTION NOTES FOR THE PLACEMENT OF MIRAFI REINFORCEMENT AND BACKFILL SOILS FOR TEMPORARY MECHANICALLY STABILIZED EARTH (MSE) WALLS

### 1.0 DESIGN CRITERIA

1.1 SOIL PARAMETERS:  
SEE WALL CONTROL DRAWINGS FOR SOIL CHARACTERISTICS OF FOUNDATION MATERIAL TO BE USED IN THE DESIGN OF THE WALL SYSTEM. THE CONTRACTOR SHALL PROVIDE SOIL DESIGN PARAMETERS FOR BACKFILL MATERIAL BASED ON THE ACTUAL SOIL CHARACTERISTICS UTILIZED AT THE SITE. THE VALUE OF  $\phi$ ,  $c$ , AND  $\gamma$  SHALL BE PROVIDED IN THE SHOP DRAWINGS.

### 1.2 MINIMUM FACTOR OF SAFETY

#### 1.2.1 EXTERNAL STABILITY

SLIDING	1.5
OVERTURNING	2.0
BEARING CAPACITY	2.5

#### 1.2.2 INTERNAL STABILITY

RUPTURE	1.5
PULLOUT	1.5

#### 1.2.3 GLOBAL STABILITY

1.5

#### 1.2.4 UNIFORM SURCHARGE

12.00 KN/M2

#### 1.2.5 HYDROSTATIC FORCES

NONE

#### 1.2.6 SEISMIC FORCES

IN ACCORDANCE WITH AASHTO AND FDOT PLANS PREPARATION MANUAL.

### 2.0 MATERIALS

2.1 GEOSYNTHETIC REINFORCEMENT AND RETENTION FABRIC, MIRAFI 140N, SHALL BE MANUFACTURED BY TC MIRAFI, PENDERGRASS, GEORGIA.

2.2 REINFORCED BACKFILL SHALL MEET THE REQUIREMENTS IN FLORIDA DOT SPECIFICATIONS - SECTION 548 RETAINING WALL SYSTEMS.

2.3 WALL FACING SHALL BE PRE-FABRICATED STEEL WIRE FORMS COMPOSED OF A MINIMUM W23 SIZE STANDARD WIRE WELDED ORTHOGONALLY 100MM ON CENTER. STEEL WIRE FORMS SHALL BE AS DETAILED IN THE DRAWINGS.

2.4 RING FASTENER SHALL BE BLAIR STYLE #3-LOXIT, 10 GAUGE GALVANIZED, MANUFACTURED BY DECKER MANUFACTURING CO. OR EQUIVALENT.

### 3.0 WALL CONSTRUCTION

3.1 FOR LOCATION AND ALIGNMENT OF REINFORCED SOIL STRUCTURES, SEE RETAINING WALL CONTROL PLANS.

3.2 STEEL WIRE FORMS, REINFORCEMENT, SOIL RETENTION FABRIC, AND COMPACTED FILL SHALL BE PLACED IN SUCCESSIVE LIFTS IN THE SEQUENCE SHOWN IN THE CONSTRUCTION DRAWINGS.

3.3 GEOSYNTHETIC REINFORCEMENT SHALL BE PLACED AT THE ELEVATIONS, LOCATION, TYPE, ORIENTATION, AND TO THE LENGTHS SHOWN ON THE CONSTRUCTION DRAWINGS. THE REINFORCEMENT SHALL BE PLACED IN A MANNER SO AS TO AVOID SLACK OR WRINKLES. PINNING OR STAKES MAY BE REQUIRED TO MAINTAIN WRINKLE-FREE PLACEMENT DURING INSTALLATION.

3.4 AT EACH REINFORCEMENT ELEVATION, BACKFILL SOILS SHALL BE COMPACTED TO A LEVEL SURFACE BEFORE PLACING THE REINFORCEMENT. ALL REINFORCEMENT SHALL BE PLACED NORMAL TO THE FACE OF THE WALL.

3.5 ADJACENT WIRE FORMS SHALL BE CONNECTED ALONG VERTICAL AND HORIZONTAL SEAMS WITH GALVANIZED INTERLOCKING FASTENERS PLACED 200mm ON CENTER.

3.6 BACKFILL MATERIAL SHALL BE COMPACTED IN ACCORDANCE WITH FDOT SPECIFICATIONS - SECTION 548.

3.7 TRACKED CONSTRUCTION EQUIPMENT SHALL NOT BE OPERATED DIRECTLY ON THE REINFORCEMENT. A MINIMUM FILL THICKNESS OF 150MM IS REQUIRED FOR THE OPERATION OF TRACKED VEHICLES OVER THE REINFORCEMENT. TURNING OF TRACKED VEHICLES SHOULD BE AVOIDED TO PREVENT TRACKS FROM DISPLACING THE FILL AND THE REINFORCEMENT.

3.8 RUBBER Tired VEHICLES MAY PASS OVER THE REINFORCEMENT AT SLOW SPEEDS, LESS THAN 15 KM/HR. SUDDEN BRAKING AND SHARP TURNING SHALL BE AVOIDED.

3.9 TC MIRAFI ENGINEERING SERVICES, INC. IS RESPONSIBLE FOR THE INTERNAL STABILITY OF THE STRUCTURE ONLY. EXTERNAL STABILITY IS THE RESPONSIBILITY OF OTHERS.

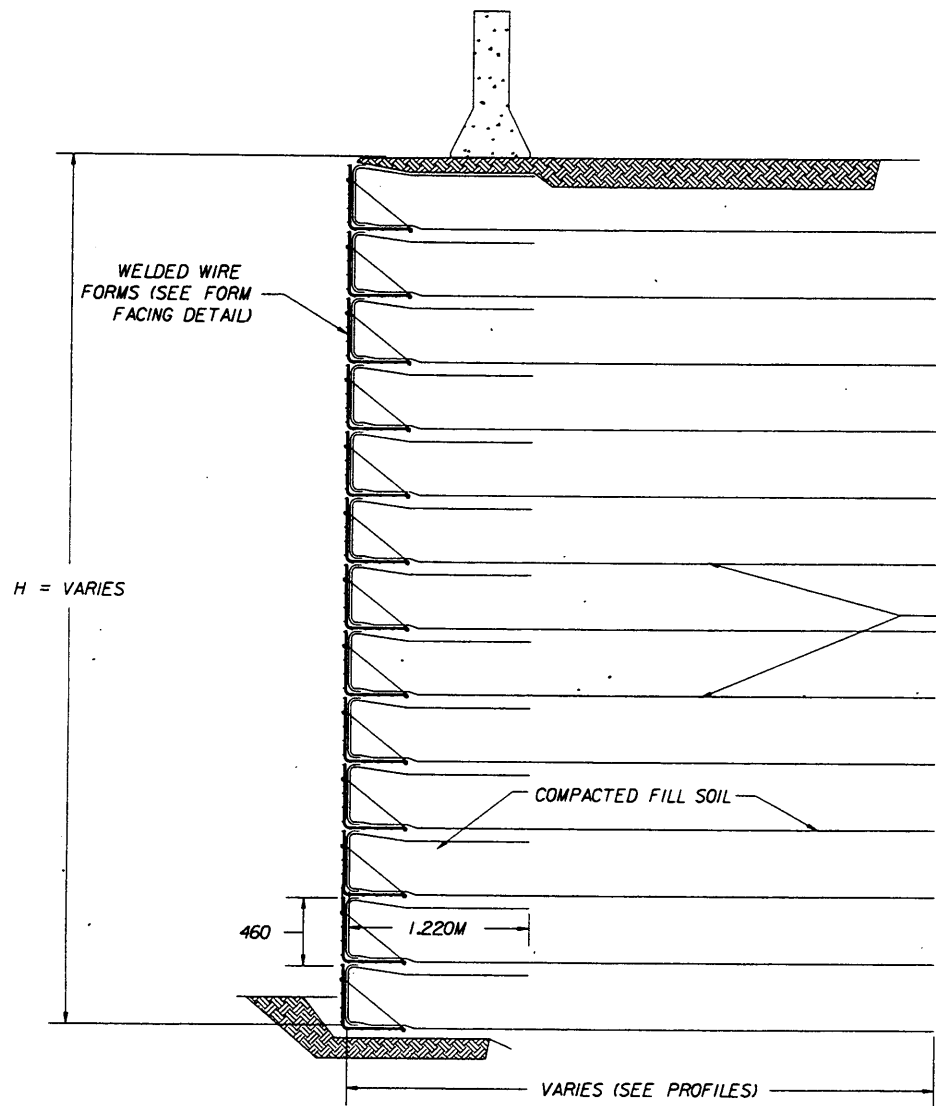
TC Mirafi  
Engineering  
Services, Inc.  
365 SOUTH HOLLAND DRIVE  
PENDERGRASS, GEORGIA 30567



THIS SYSTEM SHALL BE USED IN ALL ENVIRONMENTS.

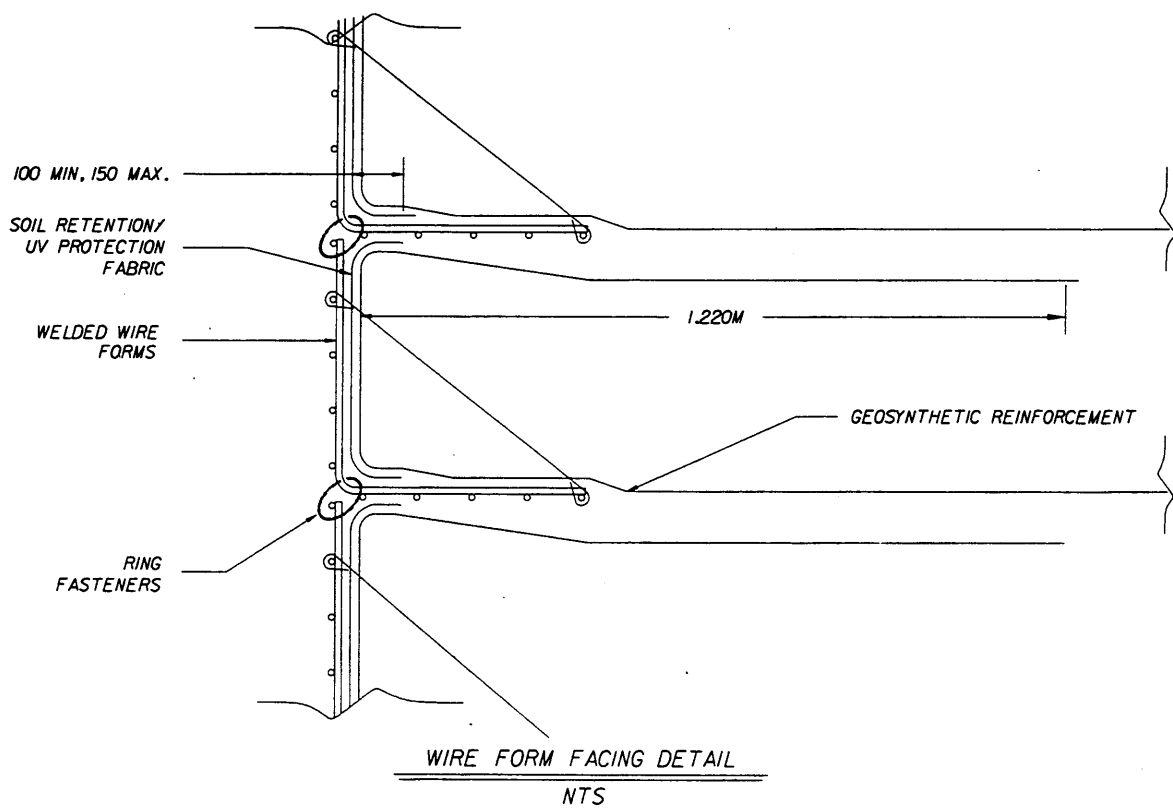
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
RETAINING WALL SYSTEM TC MIRAFI WIRE FORM TEMPORARY				
Designed By	NPA	11/5/98	Approved By	
Drawn By	CGA	11/5/98	Revision	Sheet No.
Checked By	NPA	11/5/98	00	1 of 4
				5130



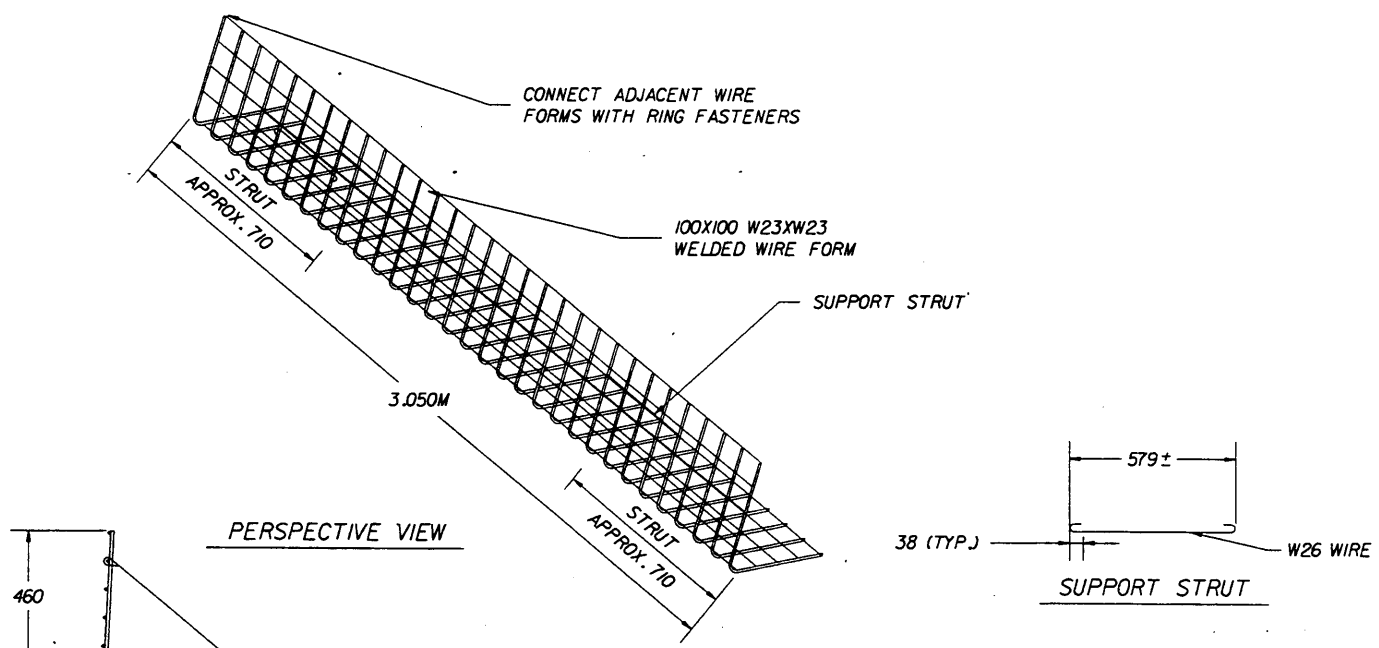


WIRE FORM  
TEMPORARY WALL SECTION  
NTS

MIRAFI GEOSYNTHETIC PRIMARY SOIL  
REINFORCEMENT (SEE WALL  
PROFILE FOR PLACEMENT DETAILS)



WIRE FORM FACING DETAIL  
NTS



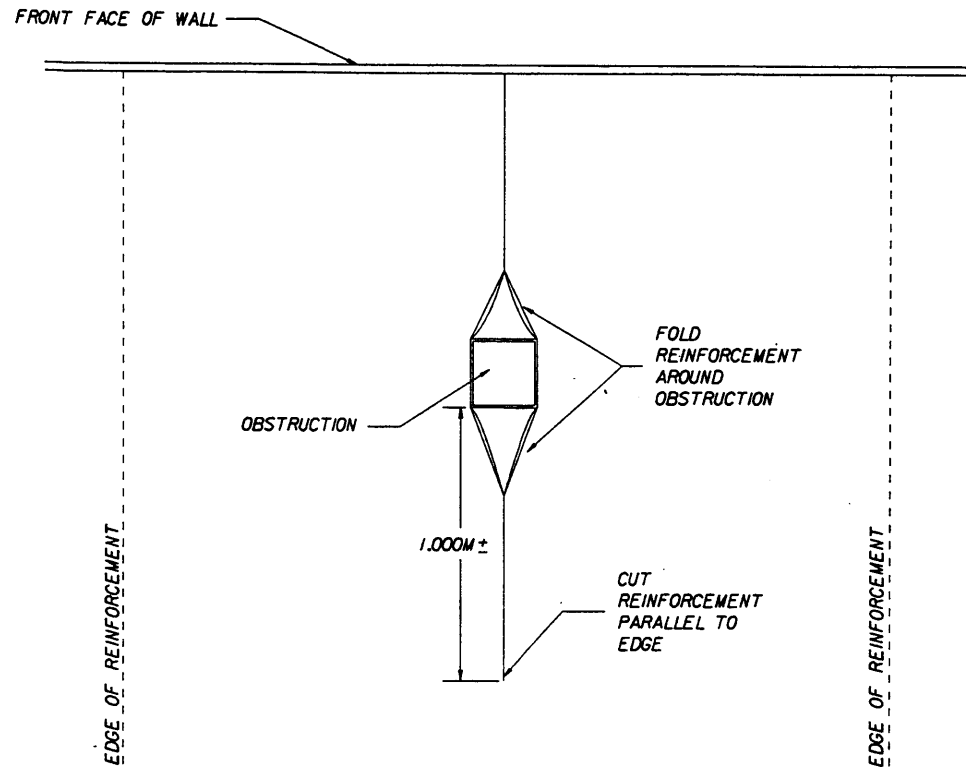
WELDED WIRE FORM DETAIL  
NTS

**TC Mirafi**  
Engineering  
Services, Inc.  
365 SOUTH HOLLAND DRIVE  
PENDERGRASS, GEORGIA 30567

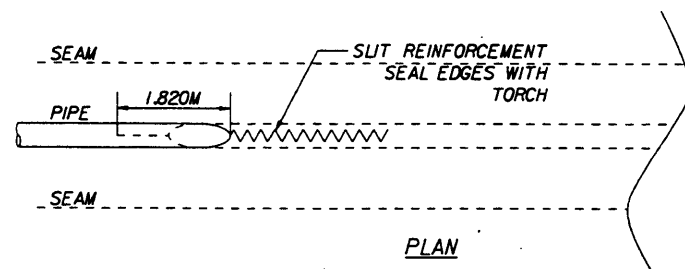


THIS SYSTEM SHALL BE USED IN ALL ENVIRONMENTS.

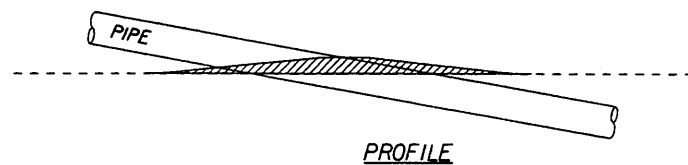
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
<b>RETAINING WALL SYSTEM TC MIRAFI WIRE FORM TEMPORARY</b>				
Designed By	NPA	11/5/98	Approved By	<i>[Signature]</i>
Drawn By	CGA	11/5/98	Revision	Sheet No.
Checked By	NPA	11/5/98	00	2 of 4
				Index No. 5130



PLACEMENT AROUND OBSTRUCTIONS  
NTS



PLAN

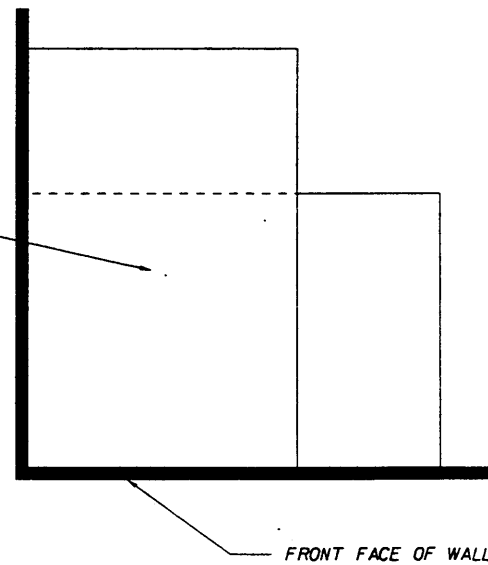


PROFILE

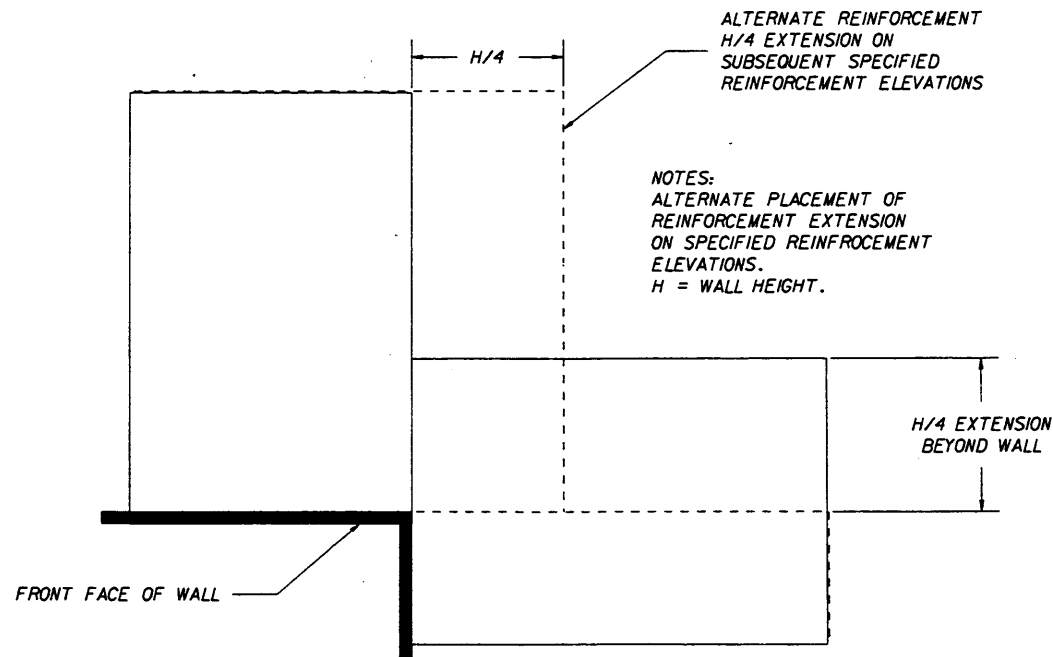
INSTALLATION AROUND PIPE RUNNING PARALLEL TO MACHINE (ROLL) DIRECTION OF REINFORCEMENT  
NTS

- SLIT REINFORCEMENT FROM END CLOSEST TO PIPE TO 1.800M BEYOND.
- LAY REINFORCEMENT IN AROUND PIPE.

PROVIDED 76MM MIN. OF SOIL BETWEEN OVERLAPPING LAYERS OF REINFORCEMENT FOR PROPER ANCHORAGE.




CONVEX CORNER DETAIL  
NTS



CONCAVE CORNER DETAIL  
NTS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

RETAINING WALL SYSTEM  
TC MIRAFI WIRE FORM TEMPORARY

Names		Dates		Approved By			
Designed By	NPA	11/5/98	 State Structures Design Engineer				
Drawn By	CGA	11/5/98				Revision	Sheet No.
Checked By	NPA	11/5/98				00	3 of 4
				Index No.			
				5130			

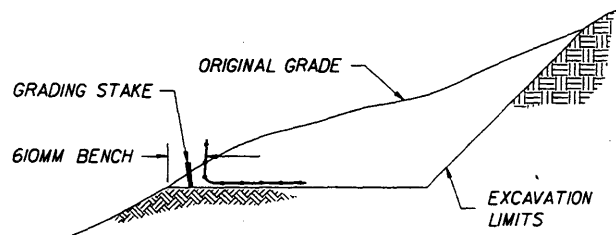
**TC Mirafi**  
Engineering  
Services, Inc.  
365 SOUTH HOLLAND DRIVE  
PENDERGRASS, GEORGIA 30567



THIS SYSTEM SHALL BE USED IN ALL ENVIRONMENTS.

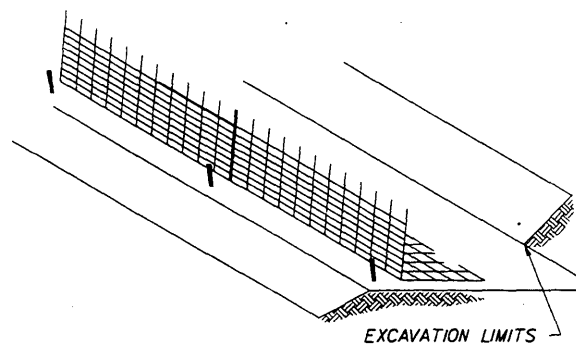
# CONSTRUCTION SEQUENCE

- EXCAVATE FOR LEVEL BASE TO A LENGTH ADEQUATE FOR REINFORCEMENT EMBEDMENT.
- SET GRADING STAKES AT A 150MM OFFSET TO FACILITATE PROPER WIRE FORM ALIGNMENT.
- EMBED BOTTOM BASKET 150MM BELOW FINISHED GRADE AT FRONT FACE OF WALL OR AS SHOWN ON WALL PROFILE.



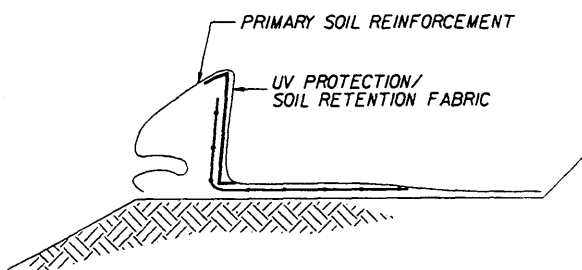
STEP 1

- FOR THE FIRST COURSE OF THE WALL, ALIGN BASKETS WITHOUT SPACES AND ATTACH WITH RING FASTENERS.
- INSTALL STRUTS AT ABOUT 1.52M SPACING.



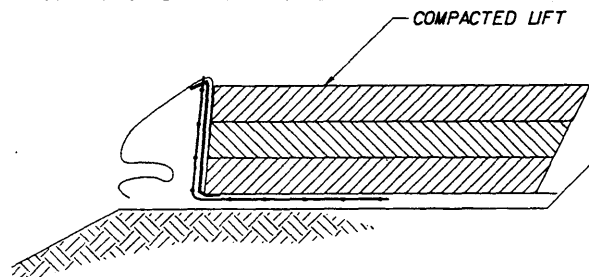
STEP 2

- PLACE UV PROTECTION/SOIL RETENTION FABRIC AT ELEVATIONS AS SHOWN.
- PLACE FACE FABRIC AGAINST WIRE FORM FACE.
- DRAPE FABRIC OVER WIRE FORM ALLOWING FOR THE REQUIRED WRAP EMBEDMENT.



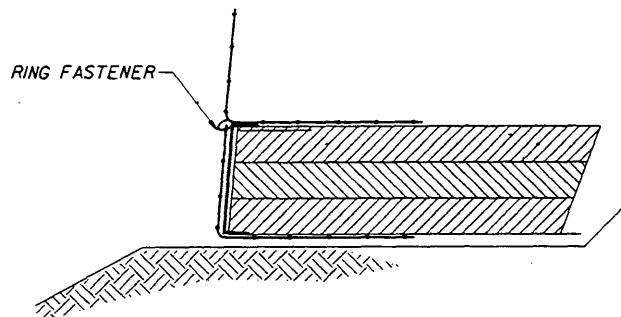
STEP 3

- PLACE BACKFILL SOIL IN 150MM MAXIMUM LIFTS.
- COMPACT SOILS WITHIN 1M OF WIRE FORM USING LIGHT WEIGHT COMPACTION EQUIPMENT.
- COMPACT REMAINING BACKFILL SOILS WITH STANDARD COMPACTION EQUIPMENT TO REQUIRED DENSITY.



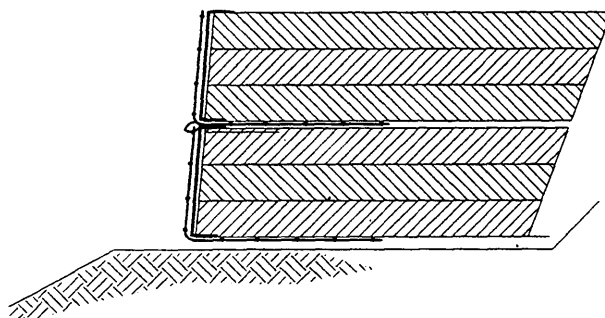
STEP 4

- PULL UV PROTECTION/SOIL RETENTION FABRIC AND PRIMARY REINFORCEMENT OVER COMPACTED FILL AND ANCHOR WITH SOIL.
- PLACE THE NEXT WIRE FORM AGAINST THE LOWER FORM AND ATTACH WITH RING FASTENERS.
- INSTALL STRUTS ON SUCCEEDING LIFT.



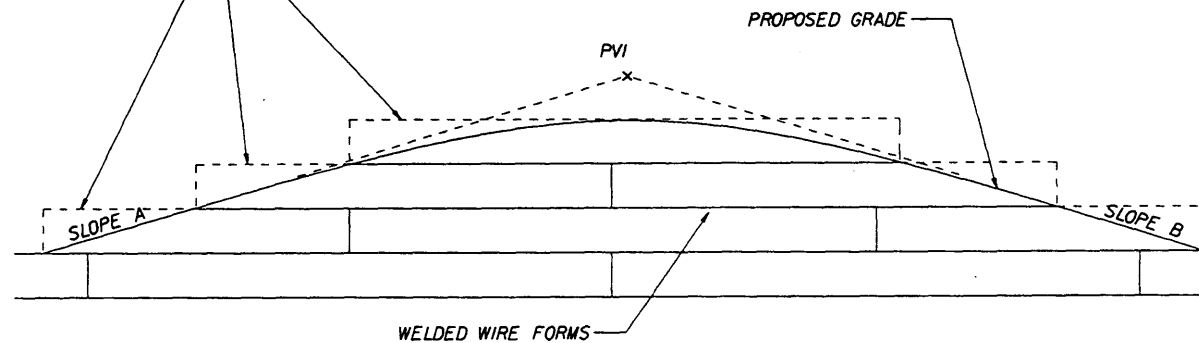
STEP 5

- REPEAT STEPS 2 THRU 5 UNTIL DESIRED HEIGHT OF WALL IS REACHED.



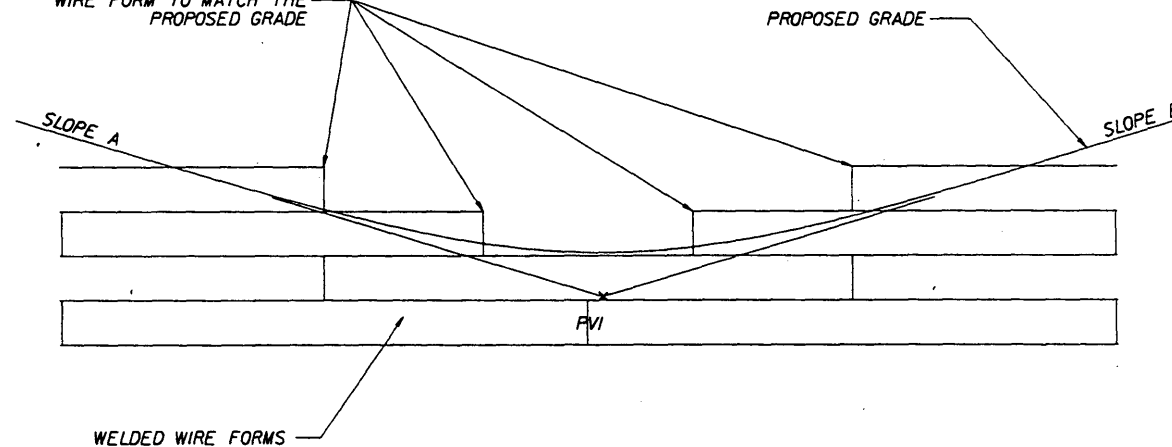
STEP 6

CUT OR BEND THE WELDED WIRE FORM TO MATCH THE PROPOSED GRADE



WELDED WIRE FORM ON VERTICAL CREST CURVE  
NTS

CUT OR BEND THE WELDED WIRE FORM TO MATCH THE PROPOSED GRADE



WELDED WIRE FORM ON VERTICAL SAG CURVE  
NTS

**TC Mirafi**  
Engineering  
Services, Inc.  
365 SOUTH HOLLAND DRIVE  
PENDERGRASS, GEORGIA 30567

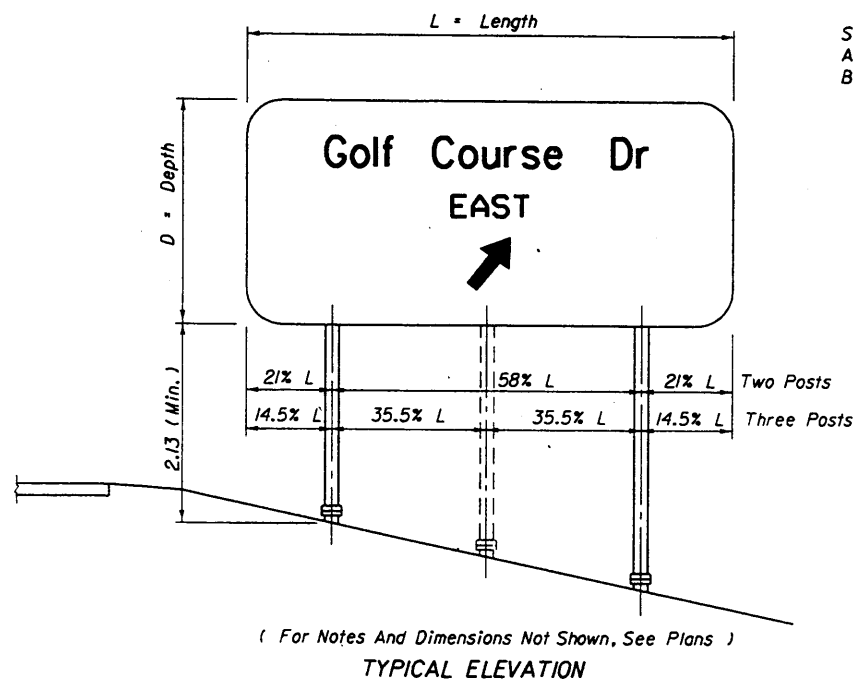


THIS SYSTEM SHALL BE USED IN ALL ENVIRONMENTS.

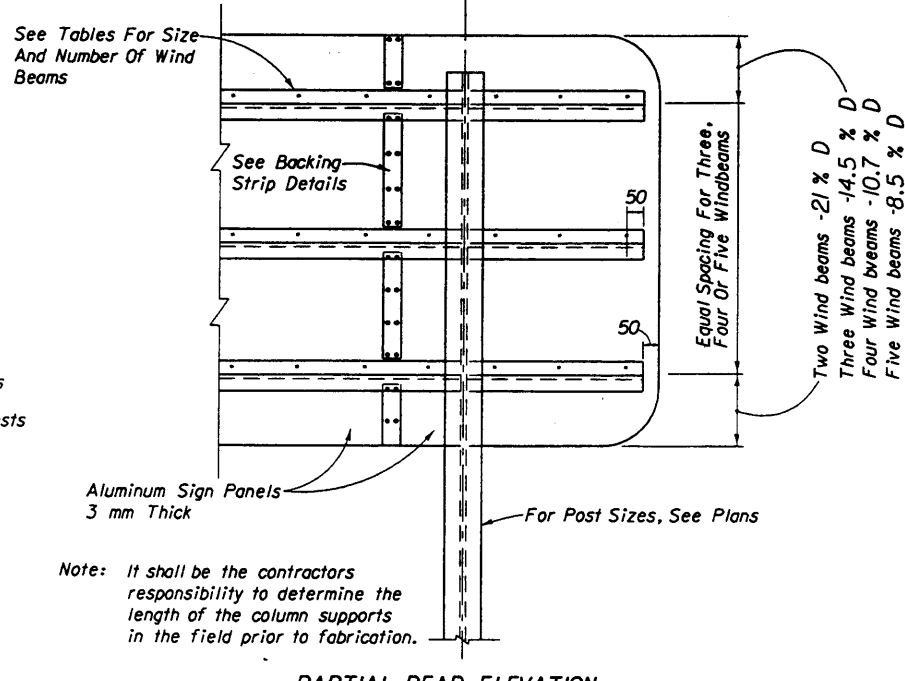
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

RETAINING WALL SYSTEM  
TC MIRAFI WIRE FORM TEMPORARY

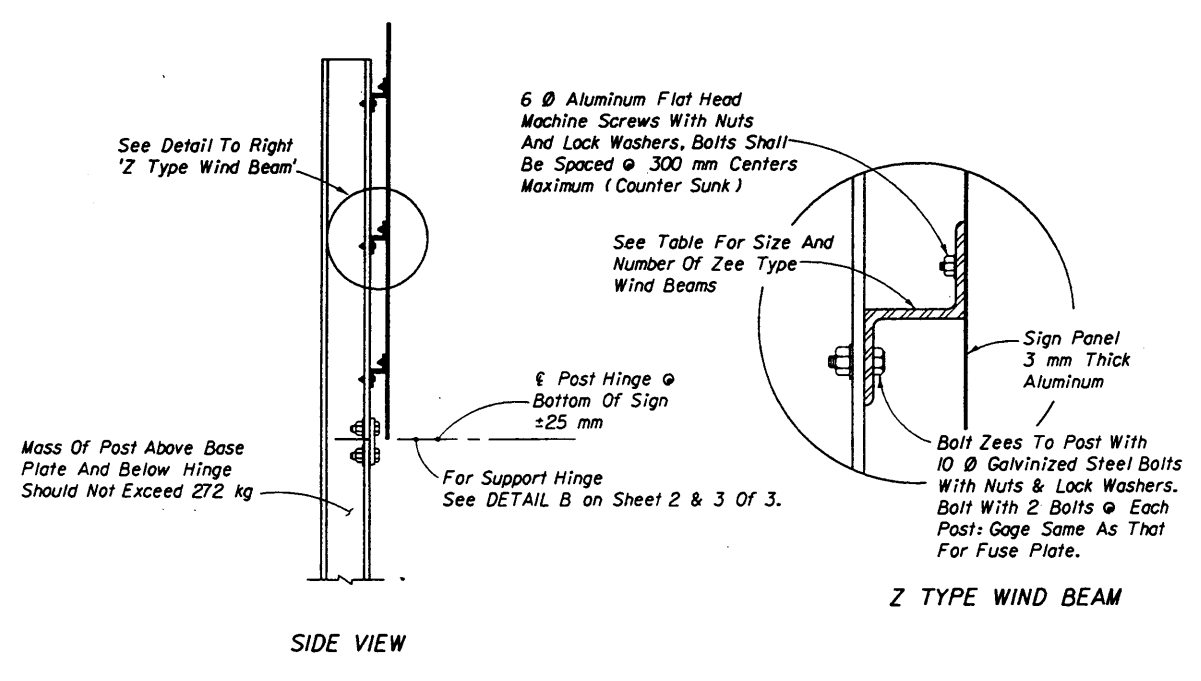
Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By	NPA	11/5/98			
Drawn By	CGA	11/5/98			
Checked By	NPA	11/5/98	00	4 of 4	5130



TYPICAL ELEVATION



PARTIAL REAR ELEVATION



SIDE VIEW

Z TYPE WIND BEAM

( For Notes And Dimensions Not Shown, See Plans )

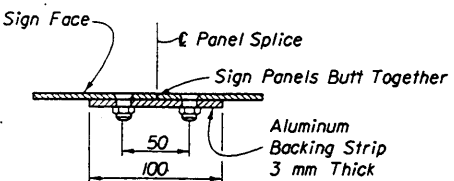
GENERAL NOTES

Note: If the sign panels are deeper than 4.270 m, a horizontal panel splice is allowed at an interior Z bar support, shop drawings shall be required. Minimum panel section width = 750 mm.

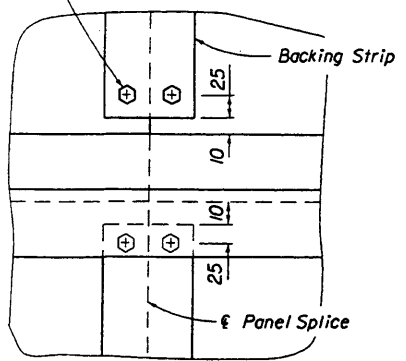
DESIGN WIND SPEEDS BY COUNTY

- ZONE NO. 1 (100 km/h)**  
Alachua, Baker, Bay, Bradford, Calhoun, Clay, Columbia, Escambia, Gadsden, Gilchrist, Hamilton, Holmes, Jackson, Jefferson, Lafayette, Lake, Leon, Liberty, Madison, Marion, Okaloosa, Putnam, Santa Rosa, Sumter, Suwannee, Union, Walton And Washington Counties.
- ZONE NO. 2 (115 km/h)**  
Citrus, Desoto, Dixie, Duval, Flagler, Franklin, Glades, Gulf, Hardee, Hendry, Hernando, Highlands, Hillsborough, Levy, Nassau, Okeechobee, Orange, Osceola, Pasco, Pinellas, Polk, Seminole, St. Johns, Taylor And Wakulla Counties.
- ZONE NO. 3 (130 km/h)**  
Brevard, Charlotte, Collier, Indian River, Lee, Manatee, Martin, Palm Beach, Sarasota, St. Lucie And Volusia Counties.
- ZONE NO. 4 (145 km/h)**  
Broward, Dade And Monroe Counties.

- DESIGN SPECIFICATION** Standard Specification for Structural Supports for Highway Signs, Luminaries and Traffic Signals, AASHTO 1994. For welding refer to the latest editions of the AWS Structural Welding Codes for Steel and Aluminum, the AASHTO Standard Specifications for Welding Structural Steel Highway Bridges, and the FDOT Standard Specifications with Supplement.
- DESIGN WIND LOAD** See Design Wind Speeds By County for wind in kilometers per hour on flat sign area. The allowable working stress shall be increased by 40% for combination dead load and wind load.
- ALUMINUM MATERIALS** All aluminum materials shall meet the requirements of the Aluminum Association's Alloy 6061-T6 and also the following ASTM specifications: Sheets and plates, B209M; extruded tube, bars, rods & shapes, B221M; and standard structural shapes, B308M. Sheets are to be degreased, etched, neutralized and treated with Alodine 1200, Iridite 14-2, Bonderite 721, or equal. No stenciling permitted on sheets. Aluminum welding rods shall meet the requirements of Aluminum Association Alloy No. 5556 filler wire.
- STRUCTURAL STEEL** All structural steel shall meet the requirements of ASTM A709M Grade 250.
- ALUMINUM BOLTS, NUTS, & LOCKWASHERS** Aluminum bolts shall meet the requirements of Aluminum Association Alloy 2024-T4 (ASTM F468M). The bolts shall have an anodic coating at least 0.005 mm thick and be Chromate sealed. Lock washers shall meet the requirements of Aluminum Association Alloy 7075-T6 (ASTM B221M). Nuts shall meet the requirements of Aluminum Association Alloy 6061-T6 or 6262-T9 (ASTM F467M).
- STEEL BOLTS, NUTS, & WASHERS** All steel bolts, nuts and washers shall meet the requirements of ASTM F568 Class 8.8.
- ALTERNATE MATERIAL** Material meeting the requirements of ASTM B209M or Aluminum Association Alloys 5154-H38 or 5052-H38 may be used for sheet and plate. Material meeting the requirements of Aluminum Association Alloy 6351-T5 and ASTM B221M may be used for extruded bars, rods, shapes and tubes.
- TOLERANCES** All above materials shall be in accordance with the governing ASTM specifications.
- GALVANIZING** All steel shapes, angles, tees, plates, bolts, nuts and washers shall be galvanized in accordance with Standard Specification 962-7.
- BASE CONNECTION** High strength bolts L<sub>2</sub> in the base connection shall be tightened only to the torque shown in the tables on sheets 2 & 3 of 3. Overtightened base connections will not be accepted.
- FUSE PLATES** All holes in fuse plates shall be drilled. All plate cuts shall, preferably, be saw cuts; however, flame cutting will be permitted provided all edges are ground. Metal projecting beyond the plane of the plate face will not be tolerated.
- SIGN FACE** All sign face corners shall be rounded. See Sign Layout Sheet.
- SHOP DRAWINGS** When ground sign supports are fabricated in accordance with these plans no shop drawings are required. Shop drawings will be required for approval when the column length exceeds the length shown in the plans by more than 600 mm. However, shop drawings for sign panels, messages, lettering and quantities shall be submitted to traffic plans for approval.
- FABRICATOR NOTE** All bolted connections, except L<sub>2</sub> bolts and Zee to Post bolts, shall be high strength bolts. Bolts shall be tightened in the shop following a method approved by the engineer. Tightening shall be to such a degree so as to attain in each bolt the residual tension specified in the tabulation below:



Pairs Of 6 Ø Aluminum Flat Head Machine Screws With Nuts And Lock Washers Spaced At 300 mm Centers Maximum



BACKING STRIP DETAIL

NUMBER OF WIND BEAMS FOR GIVEN DEPTH & WIND					
Wind	No. Beams	Max. Depth	Wind	No. Beams	Max. Depth
100	2	2.4	130	2	2.0
100	3	4.0	130	3	3.4
100	4	5.4	130	4	4.6
100	5	6.8	130	5	5.7
115	2	2.1	145	2	1.8
115	3	3.6	145	3	3.1
115	4	4.9	145	4	4.2
115	5	6.2	145	5	5.3

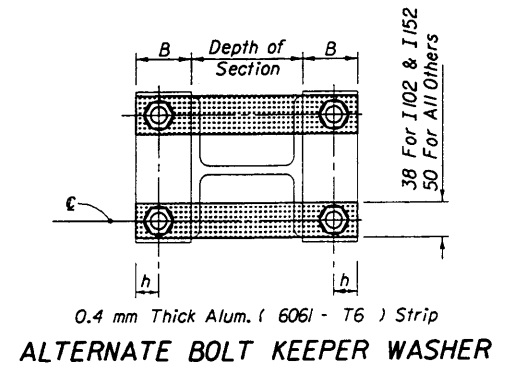
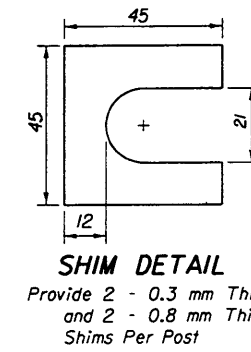
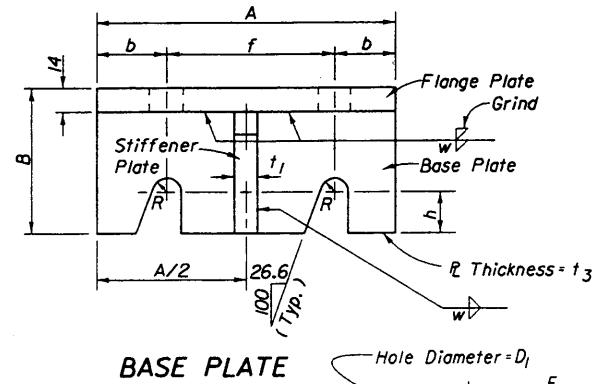
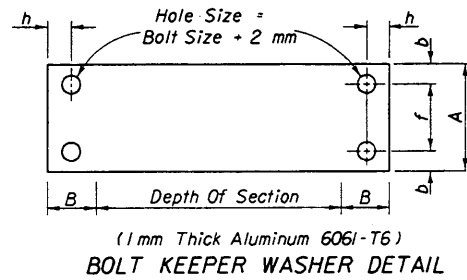
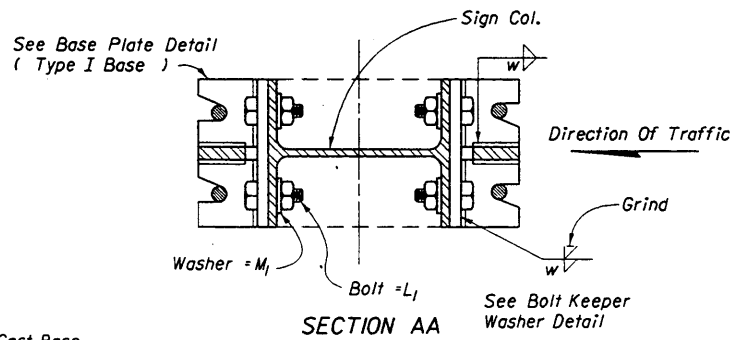
SIZE OF WIND BEAMS		
Size Of Zee*	Length Of Sign (Meters)	
	2 Posts	3 Posts
Z44x1.61	0 - 3.4	0 - 5.3
Z76x3.47	3.4 - 5.8	5.3 - 9.0
Z76x5.03	5.8 - 6.3	9.0 - 9.6

\*Note: Zees Are Aluminum - No Steel Equivalent Available Designation Gives (Member Depth) x (kg/m)

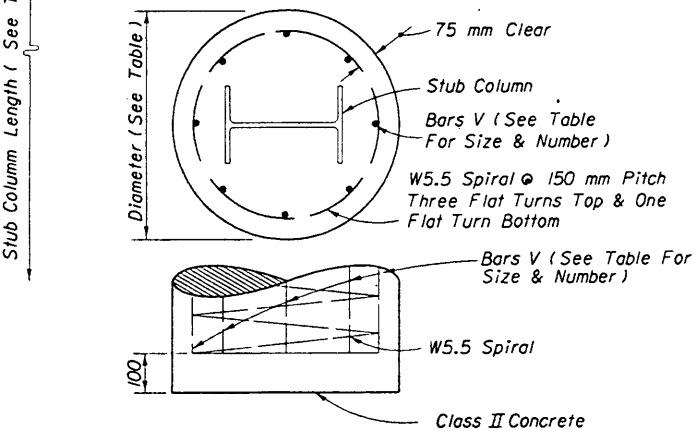
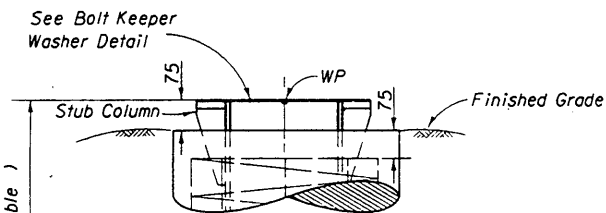
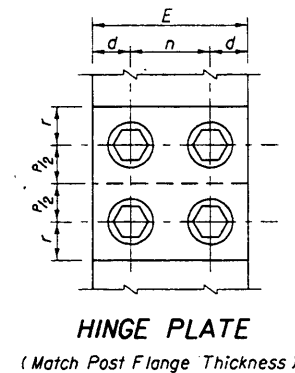
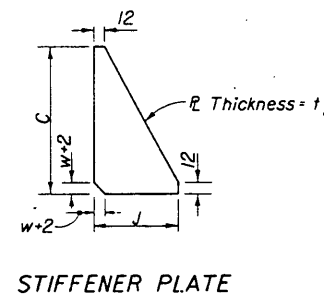
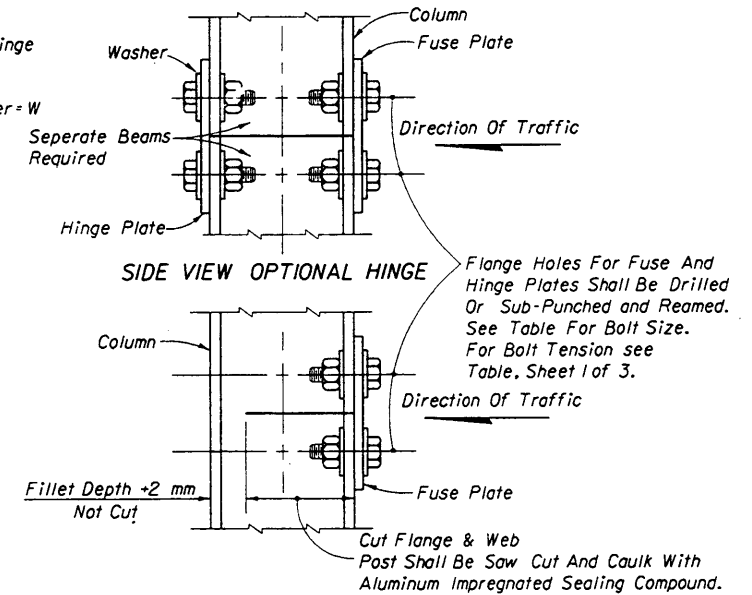
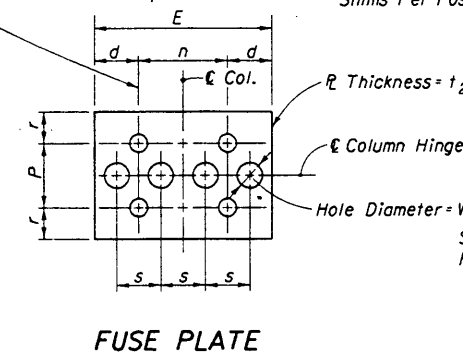
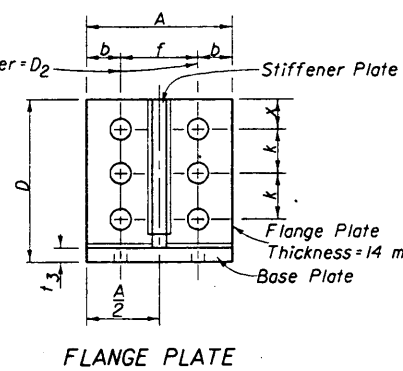
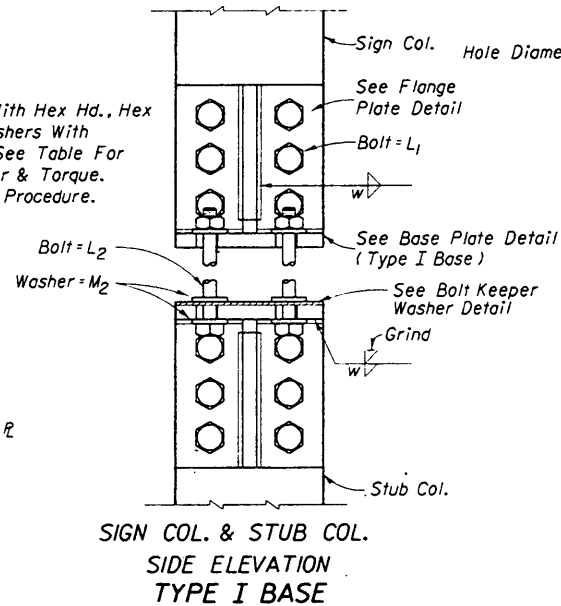
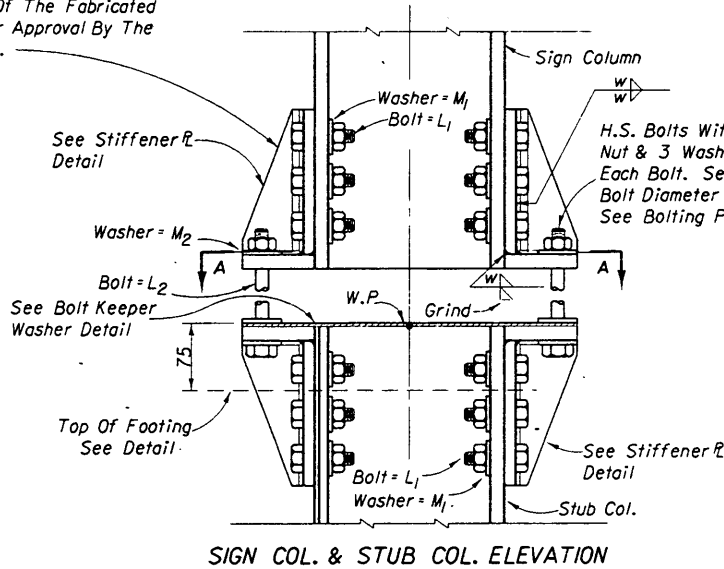
HIGH STRENGTH BOLTS (F568, CLASS 8.8)	
MINIMUM RESIDUAL TENSION	
BOLT SIZE	TENSION (N)
16	91,000
20	142,000
22	176,000
24	205,000
27	267,000
30	326,000
36	475,000

SIGN PANEL AND WIND BEAMS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION STRUCTURES DESIGN				
<b>STANDARD ROADSIDE SIGN BREAK-AWAY PANEL DETAIL</b>				
Designed By	RES	11-94	Approved By	
Drawn By	DDDS	11-94	Revision	
Checked By	DER	11-94	00	Sheet No. 1 of 3
				Index No. 9535



An Alternate Cast Base Of Alloy 356 And T6 May Be Submitted For Consideration In Lieu Of The Fabricated Base For Approval By The Engineer.



FOUNDATION DETAIL

NOTES: To prevent galvanic corrosion, reinforcing steel shall not be in contact with the aluminum stud column. All reinforcing to be Grade 420.

Section*	BASE CONNECTION DATA TABLE															FUSE (HINGE) PLATE DATA TABLE										FOUNDATION DATA TABLE							
	A	B	C	D	J	L <sub>1</sub> Dia.	Bolt Size (Dia.) & Torque (L <sub>2</sub> )(N·m)	M <sub>1</sub>	M <sub>2</sub>	D <sub>2</sub>	R	x	b	f	h	k	t <sub>1</sub>	t <sub>2</sub>	w	Bolt Size	E	P	D <sub>1</sub>	d	n	r	s	t <sub>2</sub>	W	Dia.	Depth	Stub Length	Reinforcing Bars "V"
I 102x4.16	93	71	144	160	57	16	16 Ø 39	34	34	18	9	32	24	45	22	40	10	16	10	16	93	70	18	24	45	35	22	8	16	500	1300	500	10-#16
I 152x6.00	106	71	144	160	57	16	16 Ø 39	34	34	18	9	32	26	54	22	40	10	16	10	16	106	72	18	26	54	35	25	8	19	600	1700	620	10-#22
I 203x9.20	128	74	180	196	60	20	16 Ø 39	42	34	22	9	40	31	66	22	50	14	16	13	20	128	90	22	31	66	40	30	10	23	600	2200	800	10-#22
I 229x12.44	142	84	198	214	70	22	20 Ø 62	44	42	24	11	44	36	70	22	55	14	16	13	22	142	98	24	36	70	47	33	10	24	700	2400	800	8-#25
I 254x15.31	152	86	216	232	72	24	20 Ø 62	50	42	27	11	48	36	80	22	60	14	16	15	24	152	120	27	36	80	55	36	12	27	700	2800	920	8-#25
I 305x21.27	180	90	244	264	76	27	24 Ø 78	56	50	30	13	54	45	90	22	68	16	20	16	27	180	130	30	45	90	55	42	12	31	800	3300	1100	10-#25

\* All Shapes Listed are Aluminum Association I Beams. Designation Gives (Member Depth) x (kg/m).

PROCEDURE FOR ASSEMBLY OF BASE CONNECTION: FOR BOLTS L<sub>2</sub>

1. Assemble post to stub with bolts and with one flat washer on each bolt between plates.
2. Shim as required to plumb post ( See Shim Detail ).
3. Tighten all bolts the maximum possible with 300 mm to 380 mm wrench to bed washers and shims and to clean bolt threads then loosen each bolt in turn and retighten in a systematic order to the prescribed torque ( See Table ).
4. Burr threads at junction with nut using a center punch to prevent nut loosening.

NOTE:

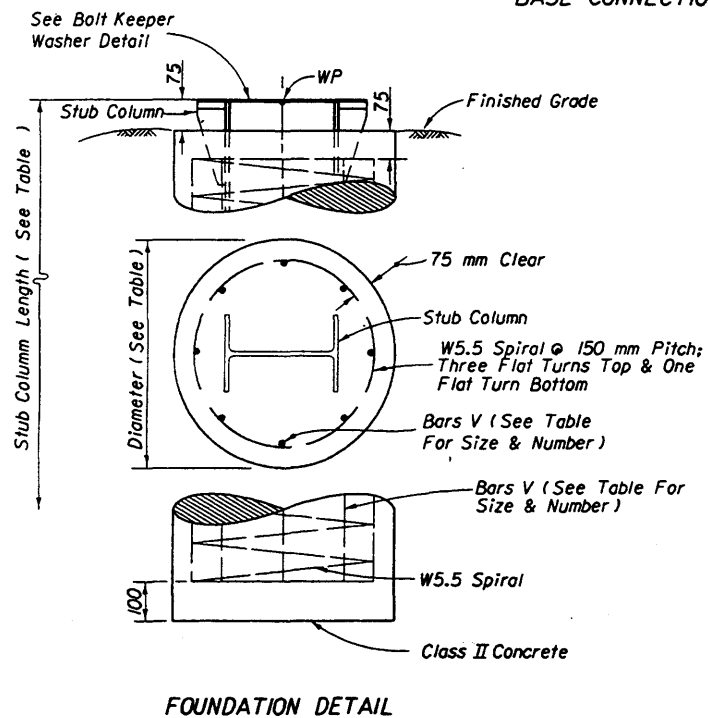
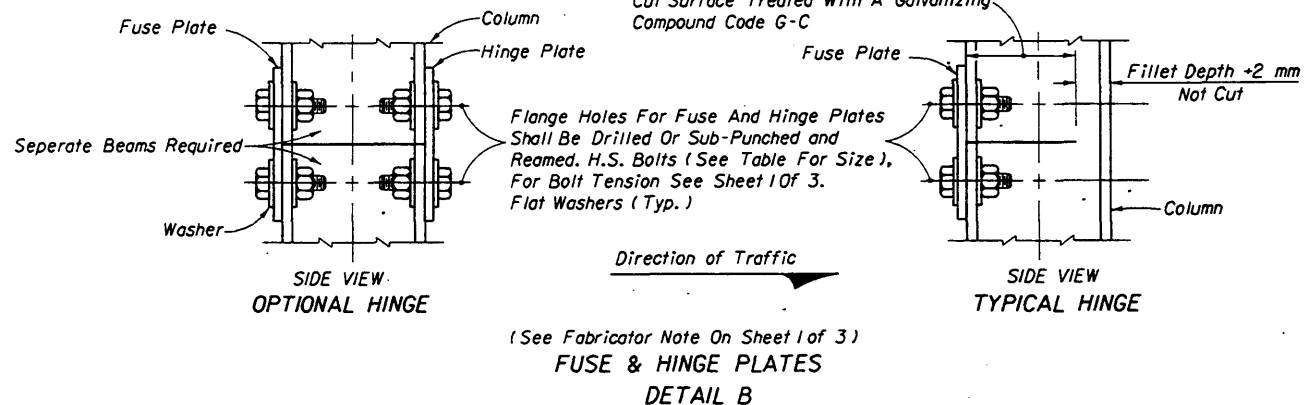
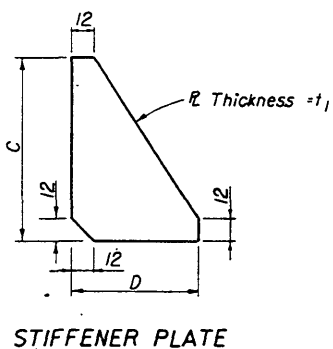
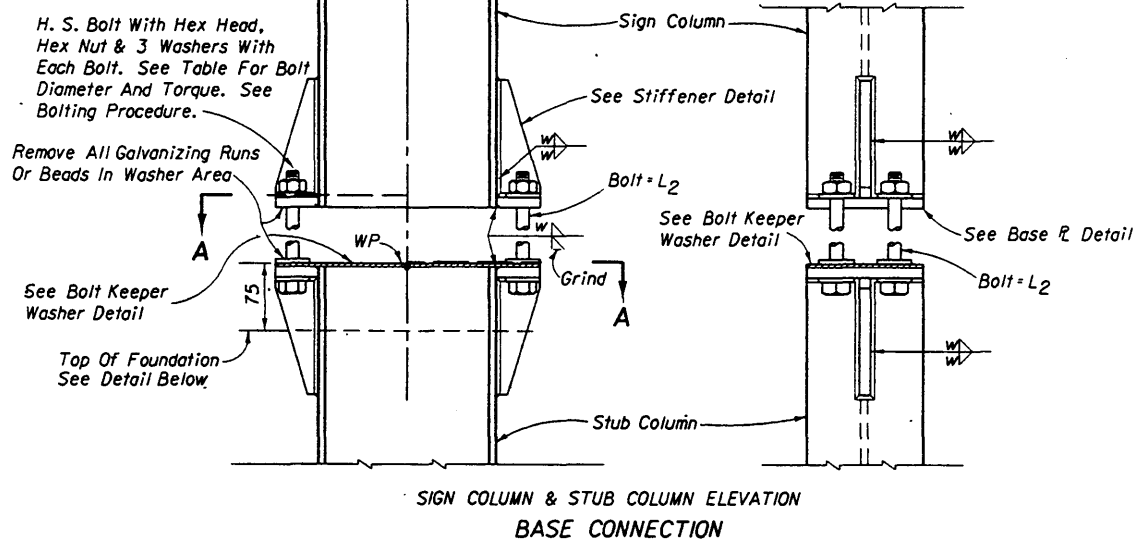
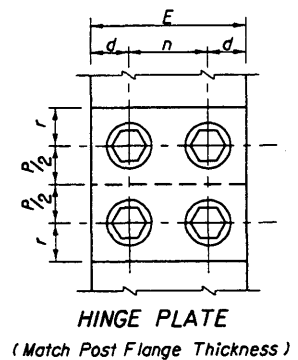
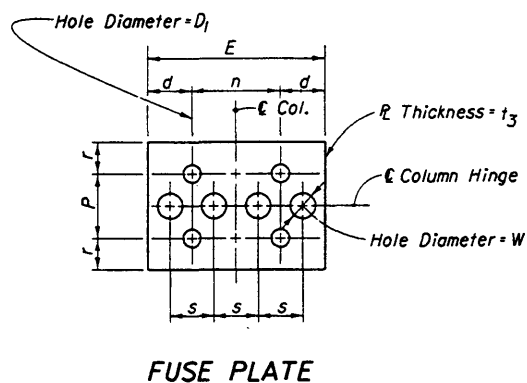
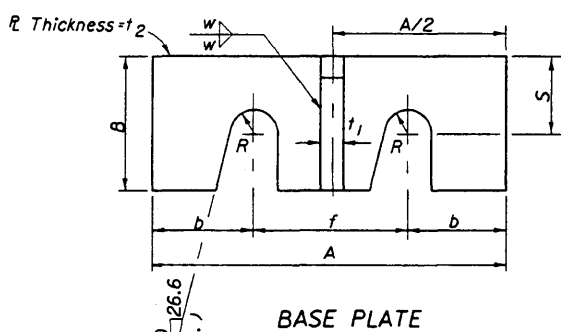
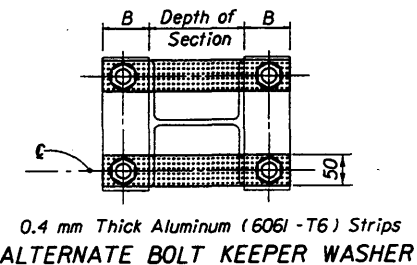
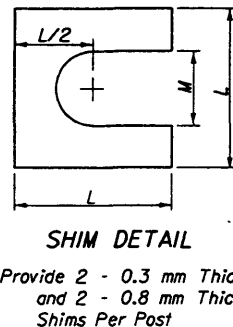
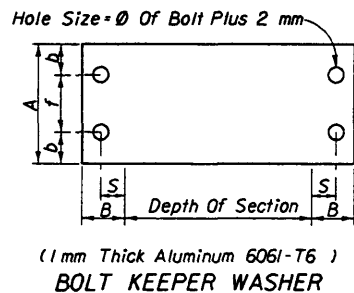
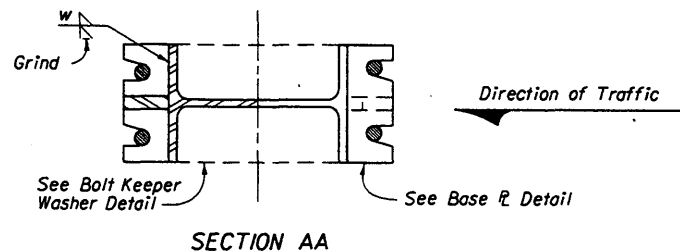
Sections shown are for installation on right shoulder and in gore. Plate slot bevels are opposite hand from that shown for installations in the median.

ALUMINUM POST, BASE, FOUNDATION & FUSE PLATE DETAILS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION STRUCTURES DESIGN

STANDARD ROADSIDE SIGN BREAK-AWAY POST DETAILS

Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By	RES	11-94			
Drawn By	SGF	11-94			
Checked By	DER	11-94	00	2 of 3	9535



Section*	BASE CONNECTION DATA													FUSE (HINGE) PLATE DATA										FOUNDATION DATA			SHIM	
	A	B	C	D	Bolt Size L2 / Torque N·m	R	b	f	S	t1	t2	w	Bolt Size	E	P	D1	d	n	r	s	t3	W	Dia.	Depth	Stub Length	Reinf. Bars V	L	M
W 150x18	120	50	130	50	16 Ø 39	9	28	64	30	14	14	7	16	110	75	18	29	52	30	26	7	21	600	1700	700	10-#22	35	18
W 200x27	144	55	160	55	20 Ø 62	11	38	68	35	14	16	7	20	140	95	22	38	64	35	33	9	27	600	2300	850	10-#22	45	22
W 250x33	156	60	200	60	22 Ø 72	12	40	76	35	14	20	8	24	160	110	27	44	72	45	38	10	30	700	2600	1000	8-#25	50	24
W 250x49	200	70	200	70	27 Ø 88	15	50	100	40	14	20	8	27	200	135	30	57	86	50	48	12	39	700	3100	1200	8-#25	60	29
W 310x60	200	75	200	75	27 Ø 88	15	50	100	40	14	20	8	30	210	145	33	56	98	55	50	12	43	800	3400	1400	10-#25	60	29

\* Designations Give (Nominal Depth) x (kg/m)

**PROCEDURE FOR ASSEMBLY OF BASE CONNECTION**

1. Assemble post to stub with bolts and with one flat washer on each end bolt between plates.
2. Shim as required to plumb post (see shim detail).
3. Tighten all bolts the maximum possible with 300 mm to 380 mm wrench to bed washers and shims and to clean bolt threads then loosen each bolt in turn and retighten in a systematic order to the prescribed torque (see table).
4. Burr threads at junction with nut using a center punch to prevent nut loosening.

**NOTE:**  
Sections shown are for installation on right shoulder and in gore. Plate slot bevels are opposite hand from that shown for installations in the median.

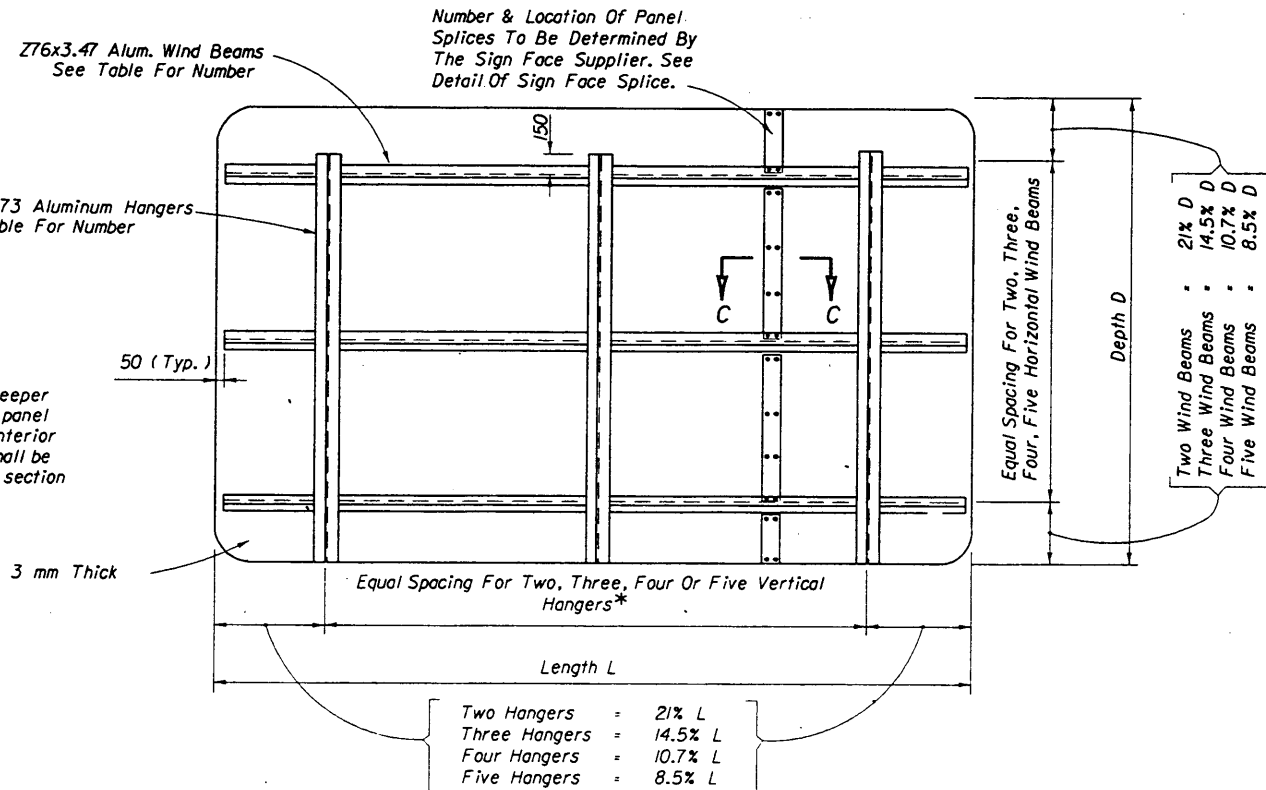
**STEEL POST, BASE, FOUNDATION & FUSE & HINGE DETAILS**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
STRUCTURES DESIGN

**STANDARD ROADSIDE SIGN BREAK-AWAY POST DETAILS**

Designed By	RES	11-94	Names	Dates	Approved By	Index No.
Drawn By	SGF	11-94	Revision	Sheet No.	 State Structures Design Engineer	9535
Checked By	DER	11-94	00	3 of 3		

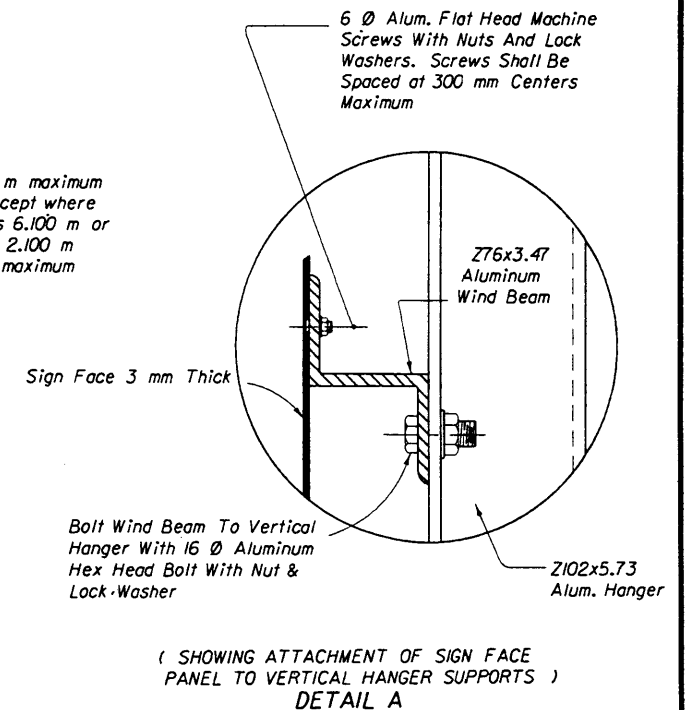
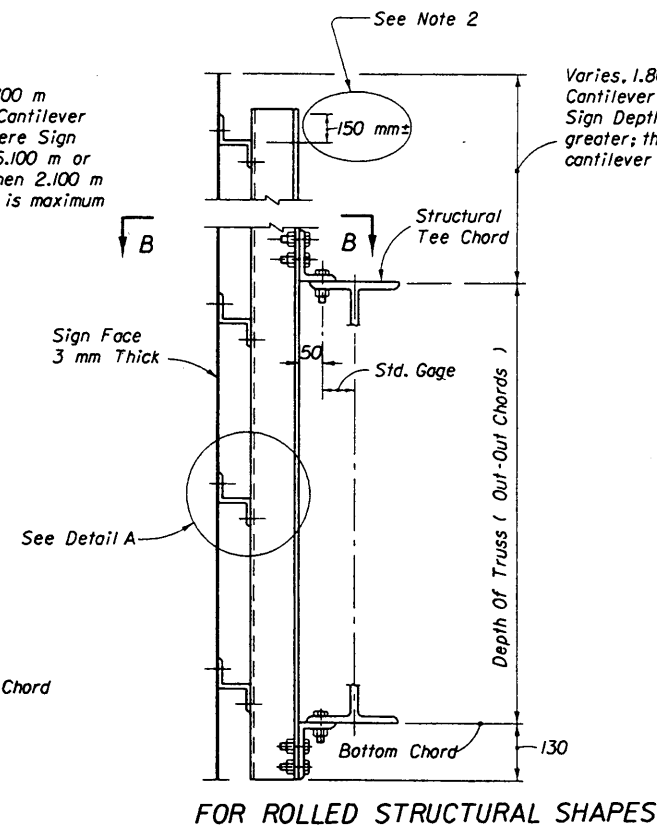
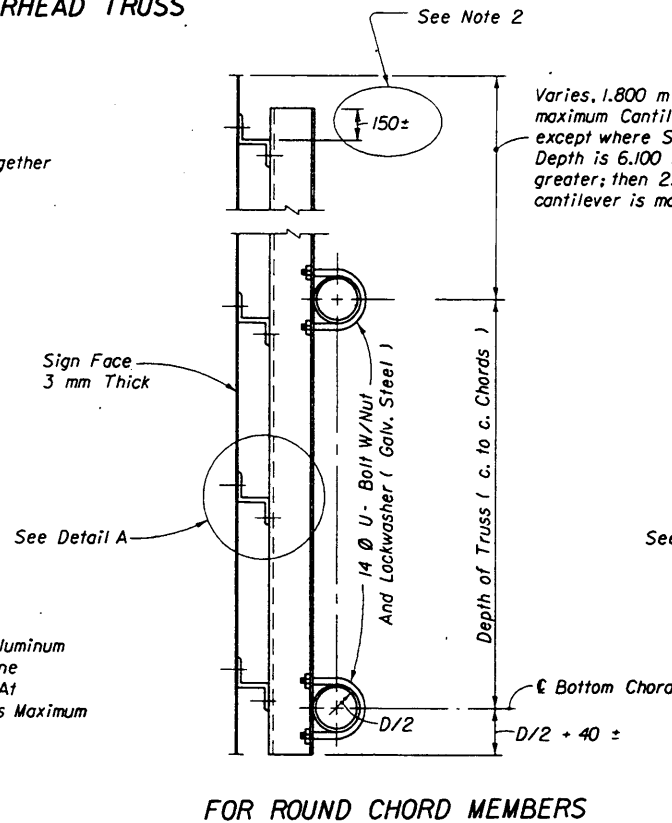
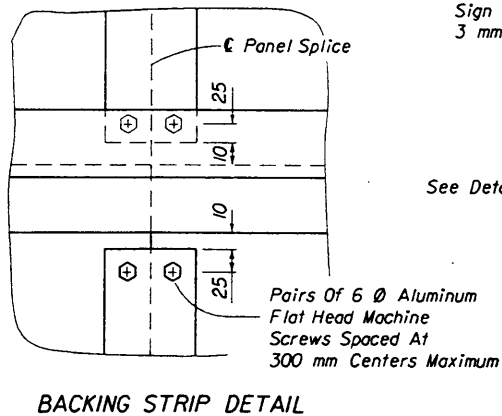
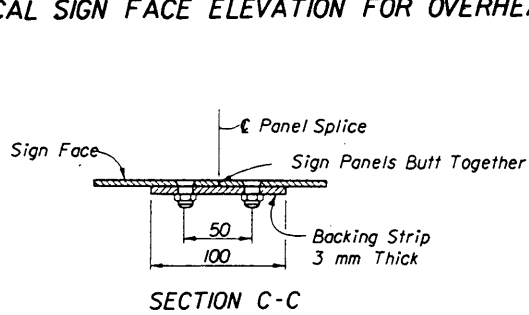
NOTE: All Reinforcing To Be Grade 420.



NOTE:  
If the Sign Panels are deeper than 4.27 m, a horizontal panel splice is allowed at an interior support, shop drawings shall be required. Minimum panel section width = 750 mm.

\*Note: Spacing of vertical hangers may be varied slightly or as necessary to clear the truss struts and diagonals at panel points.  
**TYPICAL SIGN FACE ELEVATION FOR OVERHEAD TRUSS**

Number Of Z76x3.47 Horiz. Wind Beams For Sign Depth And Wind			Number Of Z102x5.73 Vertical Hanger Beams For Sign Length			
Wind km/h	No. Beams	Max. Depth (Meters)	Sign Length (Meters)	3 Hangers Sign Length (Meters)	4 Hangers Sign Length (Meters)	5 Hangers Sign Length (Meters)
175	2	1.5	4.5	4.5 - 9.0	9.0 - 13.5	
175	3	2.6	4.5	4.5 - 9.0	9.0 - 13.5	
175	4	3.5	3.9	3.9 - 5.5	5.5 - 7.4	7.4 - 9.4
175	5	4.3	3.9	3.9 - 5.5	5.5 - 7.4	7.4 - 9.4
160	2	1.6	4.5	4.5 - 9.0	9.0 - 13.5	
160	3	2.7	4.5	4.5 - 6.7	6.7 - 9.0	9.0 - 11.4
160	4	3.7	4.5	4.5 - 6.7	6.7 - 9.0	9.0 - 11.4
160	5	4.6	3.5	3.5 - 4.9	4.9 - 6.6	6.6 - 8.4
145	2	1.7	4.5	4.5 - 9.0	9.0 - 13.5	
145	3	2.9	4.5	4.5 - 8.2	8.2 - 11.1	
145	4	3.9	4.5	4.5 - 8.2	8.2 - 11.1	
145	5	4.9	4.3	4.3 - 6.0	6.0 - 8.1	8.1 - 10.3
130	2	1.8	4.5	4.5 - 9.0	9.0 - 13.5	
130	3	3.1	4.5	4.5 - 9.0	9.0 - 13.5	
130	4	4.2	4.5	4.5 - 7.7	7.7 - 10.4	



**GENERAL NOTES**

- (1) For "General Notes" covering Material Specifications; see Sheets 1 Of 3, Index 9535.
- (2) This dimension shall be adjusted for porcelain enameled sign panel.

( LIGHTING NOT SHOWN )  
**TYPICAL DETAILS OF SIGN & TRUSS CONNECTION**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**ALUMINUM & STEEL  
OVERHEAD SIGN STRUCTURES**

Names	Dates	Approved By	Revision	Sheet No.	Index No.
DESIGNED BY	RBS	11/94	 State Structures Design Engineer		
DRAWN BY	DDDS	11/94			
CHECKED BY	DER	11/94			
			00	1 of 1	11037

Sign Identification Number	SIGN			TYPE OF SIGN BRACKET				Sign Identification Number	SIGN			TYPE OF SIGN BRACKET				Sign Identification Number	SIGN			TYPE OF SIGN BRACKET			
	PROFILE - SIZE	SQ. m	WIND ZONE	100	115	130	145		PROFILE - SIZE	SQ. m	WIND ZONE	100	115	130	145		PROFILE - SIZE	SQ. m	WIND ZONE	100	115	130	145
1	▽	600 x 600	0.16	2-I	2-I	2-I	2-I	29		600 x 750 375 x 525	0.65	2-I	2-I	2-I	2-I	52	◇	600 x 600	0.36	2-I	2-I	2-I	2-I
2	▽	750 x 750	0.24	2-I	2-I	2-I	2-I	30		375 x 750 600 x 750	0.73	1-I	1-I	1-I	1-I	53	▭	450 x 900	0.41	2-I	2-I	2-I	2-I
3	▽	900 x 900	0.35	2-I	2-I	2-I	2-I	31		375 x 525 900 x 750	0.87	1-I	1-I	1-I	1-I	54	△	750 x 750	0.42	2-I	2-I	2-I	2-I
4	▽	1,200 x 1,200	0.62	1-II & 1-I	1-II & 1-I	1-II & 1-I	1-II & 1-I	32		375 x 750 900 x 750	0.96	1-I	1-I	1-I	1-I	55	□	750 x 600	0.45	2-I	2-I	2-I	2-I
5	▽	1,500 x 1,500	0.97	DO NOT USE SINGLE COLUMN				33		300 x 600 600 x 600 375 x 525	0.74	1-I	1-I	1-I	1-I	56	▷	900 x 1,200	0.50	2-II	2-II	2-II	2-II
6	○	900 ∅	0.64	2-I	2-I	2-I	2-I	34		375 x 750 600 x 600 375 x 525	0.84	1-I	1-I	1-I	1-I	57	▭	600 x 900	0.54	2-I	2-I	2-I	2-I
7	○	1,200 ∅	1.13	2-II	2-II	2-II	2-II	35		300 x 600 600 x 750 375 x 525	0.83	1-I	1-I	1-I	1-I	58	▭	900 x 600	0.54	2-I	2-I	2-I	2-I
8	○	450 x 450	0.17	2-I	2-I	2-I	2-I	36		375 x 750 600 x 750 375 x 525	0.93	1-I	1-I	1-I	1-I	59	▭	750 x 750	0.56	2-I	2-I	2-I	2-I
9	○	600 x 600	0.30	2-I	2-I	2-I	2-I	37		300 x 600, 300 x 600 600 x 600, 600 x 600 375 x 525	1.20	1-II	1-II	1-II	1-II	60	◇	750 x 750	0.56	2-I	2-I	2-I	3-I
10	○	750 x 750	0.47	2-I	2-I	2-I	2-I	38		300 x 600, 300 x 600 600 x 600, 600 x 600 375 x 525, 375 x 525	1.33	1-II	1-II	1-II	1-II	61	△	900 x 900	0.61	2-I	2-I	2-I	2-I
11	○	900 x 900	0.67	2-I	2-I	2-I	2-I	39		300 x 600, 300 x 600 600 x 600, 600 x 600 375 x 525, 375 x 525	1.47	1-II	1-II	1-II	1-II	62	▭	750 x 900	0.68	2-I	2-I	2-I	2-I
12	○	1,200 x 1,200	1.19	2-II	2-II	2-II	2-II	40		375 x 750, 375 x 750 600 x 750, 600 x 750 375 x 525, 375 x 525	1.67	DO NOT USE SINGLE COLUMN				63	▭	900 x 750	0.68	2-I	2-I	2-I	2-I
13		300 x 600 600 x 600	0.47	1-I	1-I	1-I	1-I	41		300 x 600, 300 x 600 300 x 600, 300 x 600 600 x 600, 600 x 600 375 x 525, 375 x 525	1.83	1-II	1-II	1-II	1-II	64	▭	600 x 1,200	0.72	2-II	2-II	2-II	2-II
14		375 x 750 600 x 600	0.57	1-I	1-I	1-I	1-I	42		375 x 525 600 x 600 300 x 600, 300 x 600 600 x 600, 600 x 600 375 x 525, 375 x 525	2.03	1-I	1-I	1-I	1-I	65		300 x 900 750 x 750	0.74	1-I	1-I	1-I	1-I
15		300 x 600 600 x 750	0.54	1-I	1-I	1-I	1-I	43		300 x 600 600 x 750 375 x 525 300 x 600, 300 x 600 600 x 600, 600 x 600 375 x 525, 375 x 525	2.30	DO NOT USE SINGLE COLUMN				66	▭	750 x 1,050	0.79	2-I	2-I	2-II	2-II
16		375 x 750 600 x 750	0.64	1-I	1-I	1-I	1-I	44		450 x 300	0.14	1-I	1-I	1-I	1-I	67	▭	900 x 900	0.81	2-I	2-I	2-I	2-I
17		375 x 750 900 x 900	0.93	1-I	1-I	1-I	1-I	45		300 x 900	0.27	1-I	1-I	1-I	1-I	68	◇	900 x 900	0.81	2-I & 1-II	2-I	2-I & 1-II	2-I & 1-II
18		375 x 750 900 x 1,125	1.09	1-I	1-I	1-I	1-I	46		450 x 600	0.27	2-I	2-I	2-I	2-I	69		300 x 900 750 x 750	0.83	1-I	1-I	1-I	1-I
19		375 x 750 1,200 x 1,200	1.43	1-I	1-I	1-I	1-I	47		600 x 450	0.27	2-I	2-I	2-I	2-I	70	◇	750 x 750 450 x 600	0.83	2-I	2-I	2-I	3-I
20		375 x 750 1,200 x 1,500	1.72	DO NOT USE SINGLE COLUMN				48		450 x 450 225 x 300	0.27	2-I	2-I	2-I	2-I	71	▷	1,200 x 1,600	0.89	DO NOT USE SINGLE COLUMN			
21		300 x 600 600 x 600 375 x 525	0.66	1-I	1-I	1-I	1-I	49		450 x 750	0.34	2-I	2-I	2-I	2-I	72	▭	750 x 1,200	0.90	2-II	2-II	2-II	2-II
22		375 x 750 600 x 600 375 x 525	0.77	1-I	1-I	1-I	1-I	50		750 x 1,000	0.35	2-I	2-I	2-I	2-I	73		300 x 900 900 x 900	0.94	1-I	1-I	1-I	1-I
23		300 x 600 600 x 750 375 x 525	0.74	1-I	1-I	1-I	1-I	51		600 x 600	0.36	2-I	2-I	2-I	2-I	74	▭	750 x 1,350	1.01	DO NOT USE SINGLE COLUMN			
24		375 x 750 600 x 750 375 x 525	0.84	1-I	1-I	1-I	1-I								75	▭	900 x 1,200	1.08	2-II	2-II	2-II	2-II	
25		300 x 600 600 x 600	0.54	1-I	1-I	1-I	1-I								76	▭	1,200 x 900	1.08	2-I	2-I	2-I	2-I	
26		600 x 600 375 x 525	0.56	2-I	2-I	2-I	2-I								77	◇	900 x 900 450 x 600	1.08	2-I & 1-II	2-I	2-I & 1-II	2-I & 1-II	
27		375 x 750 600 x 600	0.64	1-I	1-I	1-I	1-I								78	△	1,200 x 1,200	1.08	1-I & 1-II	1-I	1-I & 1-II	1-I & 1-II	
28		300 x 600 600 x 750	0.63	1-I	1-I	1-I	1-I								79	▭	750 x 1,500	1.13	DO NOT USE SINGLE COLUMN				
															80	▭	1,200 x 1,200	1.44	2-II	2-II	2-II	2-II	
															81	◇	1,200 x 1,200	1.44	2-I & 1-II	2-I	2-I & 1-II	2-I & 1-II	
															82	▭	750 x 1,950	1.46	DO NOT USE SINGLE COLUMN				
															83	▭	750 x 2,100	1.58	DO NOT USE SINGLE COLUMN				
															84	▭	1,200 x 1,350	1.62	DO NOT USE SINGLE COLUMN				
															85	▭	1,050 x 1,650	1.73	DO NOT USE SINGLE COLUMN				
															86	▭	1,500 x 1,200	1.80	3-II	3-II	3-II	3-II	
															87	▭	1,650 x 1,200	1.98	3-II	3-II	3-II	3-II	

**NOTE:**

The Gore Exit Panel (FTP-31, Index 17355, Sheet 3), Sign identification Number 88, can be installed on a single column with the following stipulations:

1. Maximum height to bottom of sign is 4.2 meters.
2. Column size is 152.4 mm aluminum round tube with 6.4 mm wall.
3. 3 Type II Brackets required for attachment.
4. For Type II Bracket details, Attachment and General Notes see Index No. 11860.
5. For Footing size and Slip Base Details, see Index No. 11863.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
SINGLE COLUMN GROUND SIGNS					
Designed By	RES	10/94	Names	Dates	Approved By
Drawn By	DDDS	10/94			
Checked By	DER	11/94	Revision	Sheet No.	Index No.
			00	1 of 3	11860



GENERAL SPECIFICATIONS : Florida Department of Transportation Standard Specifications for Road and Bridge Construction (1999) and Supplements thereto.  
 DESIGN SPECIFICATIONS : Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, AASHTO 1994.  
 ALUMINUM : Except as noted below, Aluminum Materials shall meet the requirements of Aluminum Association Alloy 6061-T6 (ASTM B209M, B221M, or B308M).

1. Permitted Alternate for Sheets and Plates--- Alloy 5154-H38 (ASTM-B209M)

CONCRETE : All concrete shall be Class I (Special), the specified compressive strength at 28 days (f'c) shall be 21 MPa min.

SIGN PANELS : Sign Panels shall be 3 mm min. thick Aluminum Plate with all corners rounded. See sign layout sheet. Panels are to be degreased, etched, neutralized and treated with Alodine 1200, Irdine 14-2, Bonderite T21 or equal. No stenciling permitted on panels.

ALUMINUM BOLTS, NUTS & LOCKWASHERS : Aluminum bolts shall meet the requirements of ASTM F468M, Alloy 2024-T4. The Bolts shall have an Anodic Coating of at least .005 mm thick and be chromate sealed. Lockwashers shall meet the requirements of Aluminum Association Alloy 7075-T6 (ASTM B221M). Nuts shall meet the requirements of ASTM F-467M, Alloy 6061-T6 or 6262-T9.

STAINLESS STEEL BOLTS, NUTS AND LOCKWASHERS : Stainless Steel Bolts, Nuts and Lockwashers conforming to ASTM F738M, Property Class A4-50, 70, or 80 may be provided in lieu of Aluminum Bolts, Nuts and Washers.

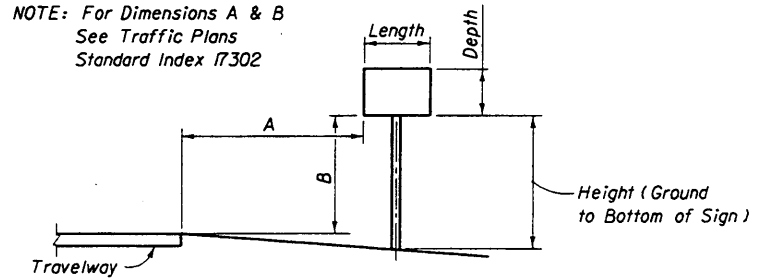
U-BOLTS, NUTS & LOCKWASHERS : U-Bolts, Nuts and Lockwashers shall meet the requirements of ASTM F568 Class 4.6 and shall be galvanized in accordance with ASTM A153.

INSTALLING FRANGIBLE COLUMN SUPPORTS : Columns (Posts) may be installed by driving the columns in accordance with index Nos. 11861 thru 11865, or as an alternate method the contractor may set the columns (Posts) to the depth indicated in preformed holes backfilled with suitable material tamped in layers not thicker than 150 mm to provide adequate compaction.

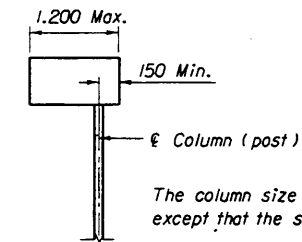
SHOP DRAWINGS : When Type C ground sign supports are furnished and fabricated in accordance with these plans, shop drawings will NOT be required for approval by the Engineer.

HOW TO USE THIS TABLE : Select the appropriate Sign Profile and Size to determine the Sign Identification Number. If the exact Sign Size of all Components are not listed, select the appropriate profile and larger Component Sizes. This table also gives the Quantity and Type of Sign Brackets required for each Sign for each Wind Zone. Where the Sign Size is given as a Vertical and Horizontal Dimension, the Vertical Dimension (Depth) is given first and the Horizontal Dimension (Length) is given last. For Column Sizes, Heights and Footings see appropriate (Wind Zone or Height = 4.2 m Max.) sheets titled "Column Sizes, Column Heights and Footings" Index Numbers 11861 thru 11865. No Shop or Field Splice is allowed in Sign Panels. All Panels shall be furnished in one piece.

NOTE: For Dimensions A & B See Traffic Plans Standard Index 17302



TYPICAL SECTION



The column size shall be as tabulated in the Standard except that the size shall not be smaller than 89 mm Ø.

Note: All cantilever sign installations shall comply with standard Index 17302. The sign shall be supported by an aluminum round column with concrete footing and breakaway support. All sign brackets shall be Type II.

CANTILEVER SIGN

WIND SPEEDS BY COUNTY

ZONE NO. 1 (100 km/h.)

Alachua, Baker, Bay, Bradford, Calhoun, Clay, Columbia, Escambia, Gadsden, Gilchrist, Hamilton, Holmes, Jackson, Jefferson, Lafayette, Lake, Leon, Liberty, Madison, Marion, Okaloosa, Putnam, Santa Rosa, Sumter, Suwannee, Union, Walton and Washington Counties.

ZONE NO. 2 (115 km/h)

Citrus, De Soto, Dixie, Duval, Flagler, Franklin, Glades, Gulf, Hardee, Hendry, Hernando, Highlands, Hillsborough, Levy, Nassau, Okeechobee, Orange, Osceola, Pasco, Pinellas, Polk, Seminole, St. Johns, Taylor and Wakulla Counties.

ZONE NO. 3 (130 km/h)


Brevard, Charlotte, Collier, Indian River, Lee, Manatee, Martin, Palm Beach, Sarasota, St. Lucie and Volusia Counties.

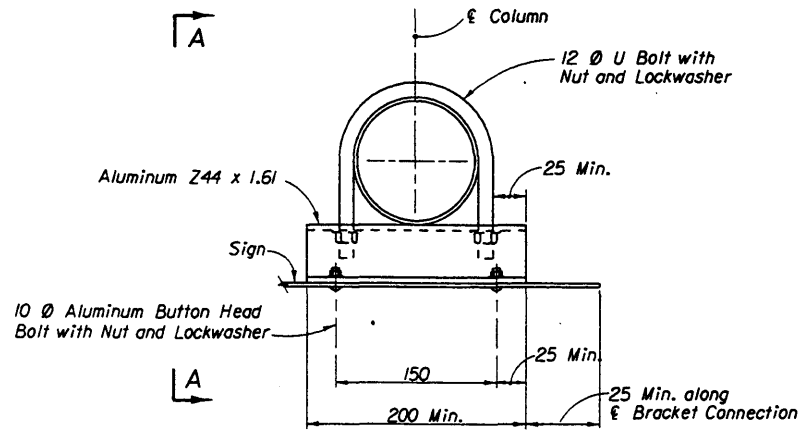
ZONE NO. 4 (145 km/h)

Broward, Dade and Monroe Counties.

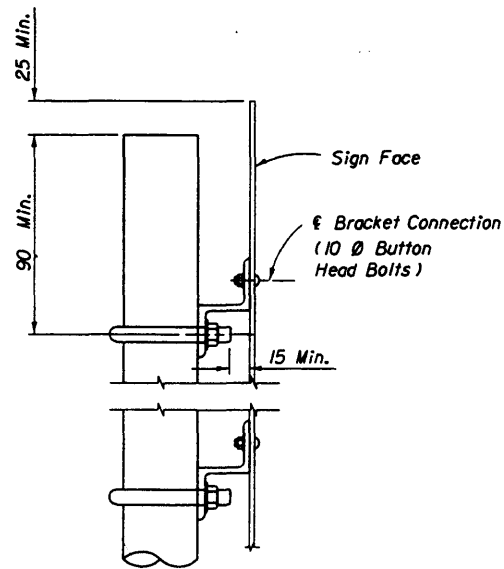
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

SINGLE COLUMN  
GROUND SIGNS

Names		Dates		Approved By		
Designed By	RES	10/94	 State Structures Design Engineer			
Drawn By	DDDS	10/94	Revision	Sheet No.	Index No.	
Checked By	DER	11/94	00	2 of 3	11860	

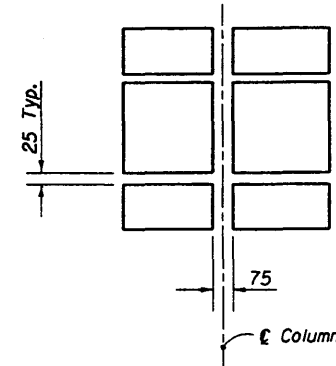


TYPE I BRACKET

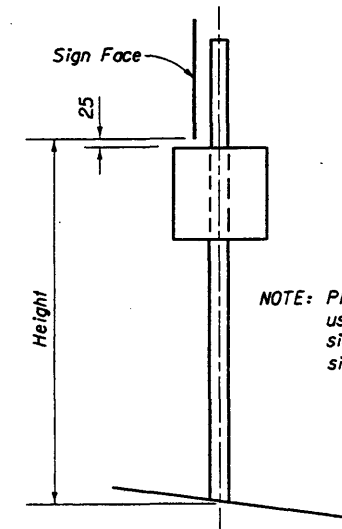


VIEW AA

NOTE: Use profile of largest sign and height to bottom of largest sign to determine column size.

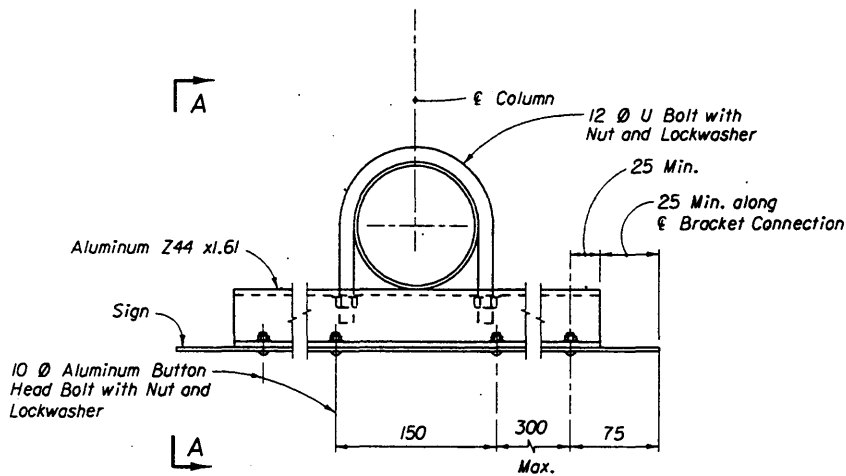


SIGN CLEARANCE

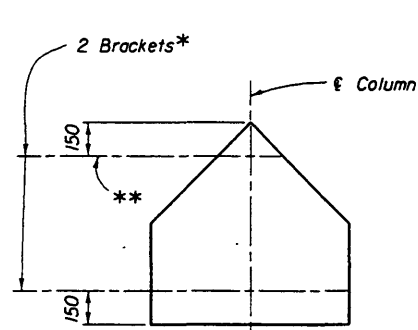


SIGNS AT 90°

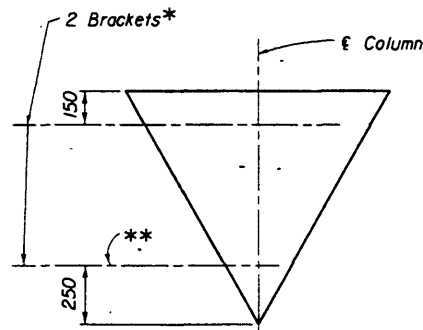
NOTE: Place largest sign on top, use profile of largest sign to determine column size.



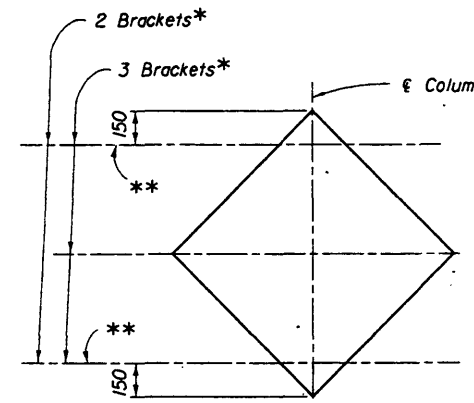
TYPE II BRACKET (SINGLE SIGN)



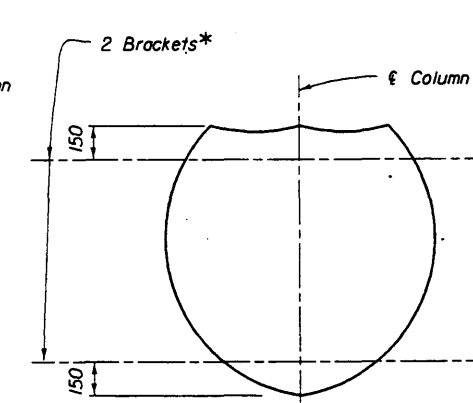
SCHOOL



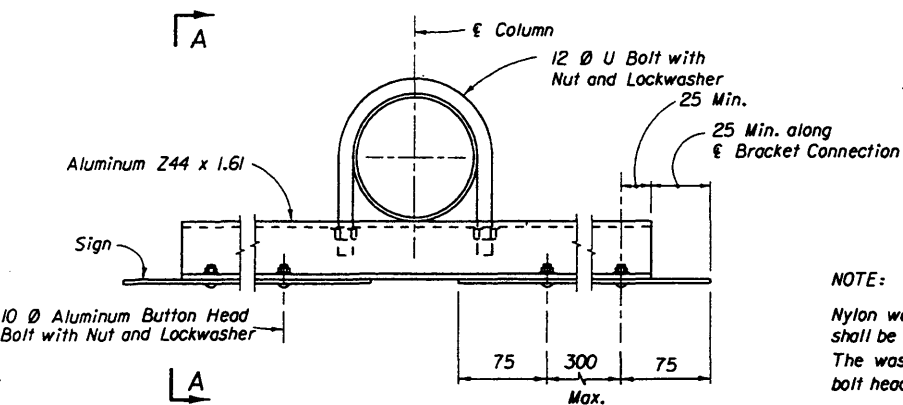
YIELD



DIAMOND



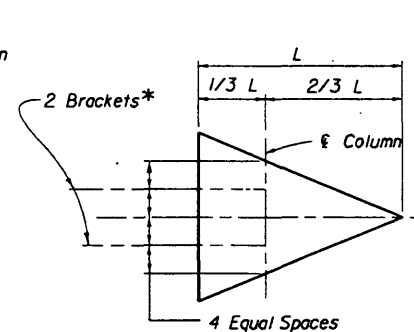
SHIELD



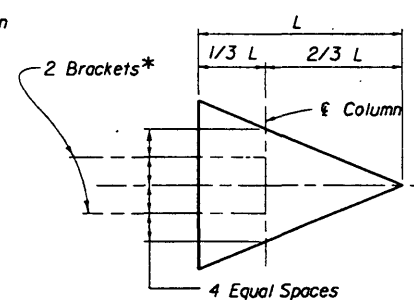
TYPE II BRACKET (DOUBLE SIGNS)

NOTE: 8 inch diameter Stainless Steel Hex Head Bolts with Flat Washer under Head and Lockwasher under Nut may be used in lieu of 10 inch diameter Aluminum Button Head Bolts.

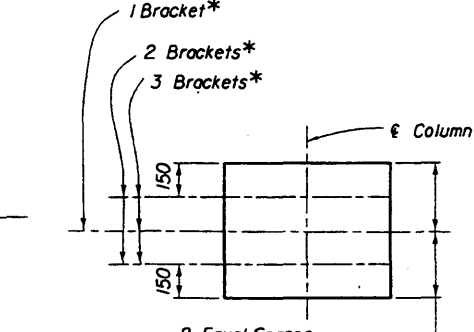
NOTE: Nylon washers provided by the sheeting supplier shall be used on all ground mounted signs. The washers shall be installed under the sign bolt head to protect the sheeting.



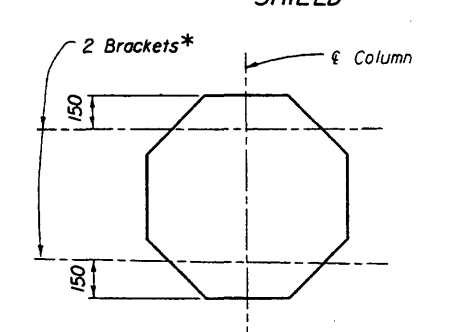
RAILROAD



PENDANT



RECTANGLE

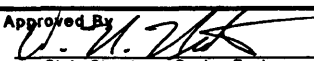


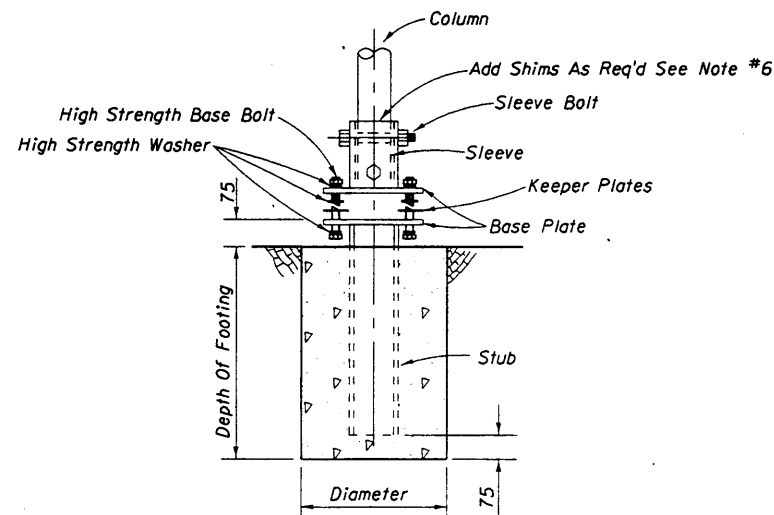
STOP

BRACKET LOCATIONS (SEE VIEW AA)

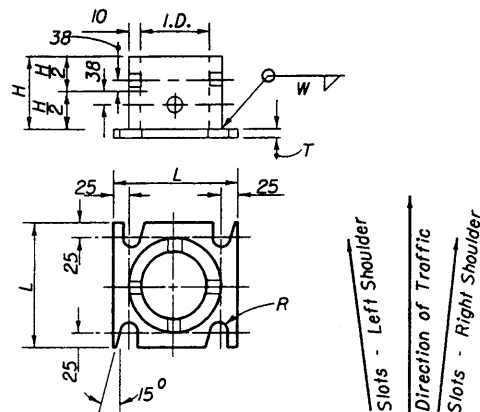
\* NOTE: The above Bracket locations apply at the  $\epsilon$  of Bracket-Sign Connection (10 inch diameter Button Head Bolts). See View AA. The locations also apply to Double Signs configurations. When installing back-to-back signs the topmost bracket location of one of the signs will require adjustment as shown on the above detail.

\*\* NOTE: Use Type I Bracket at the apex location (always).

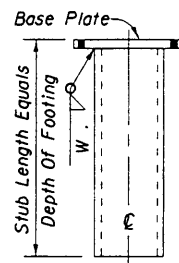
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
SINGLE COLUMN GROUND SIGNS				
Names	Date	Approved By		
Designed By RES	10/94	 State Structures Design Engineer		
Drawn By DORS	10/94			
Checked By DER	11/94	Revision 00	Sheet No. 3 of 3	Index No. 11860



SLIP BASE AND FOOTING DETAIL

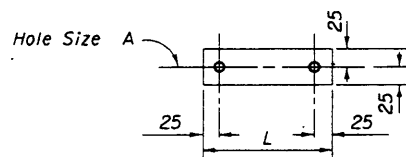


SLEEVE & BASE PLATE DETAILS



Stub Size Equals Min. Sleeve Size Or Longer

STUB DETAIL



1.00 mm Thick Alum. Strip-2 Req'd Per Base

BOLT KEEPER DETAIL

SLIP BASE DETAILS

Note: Unless noted otherwise, all dimensions are in millimeters.

Column Size	Sleeve I.D. (Max)	Sleeve Height H	Weld W	Base Plate		Radius R	Base Bolt		Base Bolt Torque N-m	Hole Size A
				L	T		Size	Length		
102 x 6.4	104	152	16	203	20	9	16	76	40	18
114 x 6.4	116	152	16	203	22	9	16	83	40	18
127 x 6.4	129	178	16	203	22	9	16	83	40	18
152 x 6.4	154	203	17	229	25	11	20	89	65	22
203 x 7.9	205	254	19	279	25	12	22	95	72	24

NOTES

1. Work this Standard with Standard Index Numbers 11860 and 11865.
2. To determine column (post) size and footing requirements use the required Sign Identification Number and Sign Height (H). Designs for Heights (H) lower than those listed in the Table are included in Standard Index Number 11865.
3. Single Column installations are not allowed for heights (H) exceeding the maximum height shown in the Table, and for sign profiles (Sign Identification Numbers) without any design tabulated. In this event, the sign(s) will have to be supported by multiple columns (posts) featuring breakaway devices. See Standard Index Number 9535.
4. The Column (Post) material shall be aluminum. The size is given as outside diameter and wall thickness. Columns (posts) larger than 89 x 4.0 are non-fragible and shall be installed with breakaway supports and will have concrete footings and slip bases.
5. The footing size is given as outside diameter and depth.
  - a) Frangible Supports: Footings for Frangible Supports do not require concrete. The column (post) shall be driven into the ground to the depth indicated.
  - b) Breakaway Supports: Footings for Breakaway Supports require concrete. The column support shall be set in a concrete footing, sized as shown in the table. The first dimension indicates the diameter and the second dimension the depth into the ground. In all cases the ground is to be considered as undisturbed earth, road material, or properly compacted fill.
6. SLIP BASE NOTES :
  - a) The Inside Diameter (I.D.) of the sleeve shall be no more than 2mm larger than the Outside Diameter (O.D.) of the Column.
  - b) The sleeve bolts shall be 12 Ø with locknuts. The bolts shall be galvanized steel (ASTM A-307M) or Aluminum Association Alloy 2024-T4 or 6061-T6 (ASTM B-211M).
  - c) The base bolts, nuts and washers shall be high strength ASTM A-325M and shall have an electroplated zinc coating SC3, Type II applied in accordance with ASTM B633.
  - d) An alternate cast base of aluminum alloy 356 and T6 temper in lieu of the fabricated base may be submitted for approval by the Engineer. If a cast base is used the stub will be the same as the column and will be bolted to the casting.
  - e) Assemble the slip base connection in the following manner :
    - Connect column to sleeve using two (2) 12 Ø machine bolts.
    - Assemble top base plate to stub base plate using high strength bolts with three (3) hardened washers per bolt. One (1) washer per bolt and two (2) bolt keeper plates go between the base plates.
    - Use shim stock as required to plumb the column.
    - Tighten all bolts the maximum possible with a 300mm to 375mm wrench to bed the washers and shims and to clear the bolt threads. Loosen each bolt one (1) turn and retighten to the prescribed torque (see table). Bolts shall be tightened with properly calibrated wrenches under the supervision of the project engineer.
    - Burr threads at junction with nut using a center punch to prevent nut loosening.
  - f) Use galvanized steel shims to obtain a tight fit between the column face and the sleeve. Place shims in all quadrants between the 12 Ø sleeve bolts. The shim length shall be 25mm shorter than the height of the sleeve.

COLUMN SIZE, COLUMN HEIGHT & COLUMN FOOTINGS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

SINGLE COLUMN  
GROUND SIGNS

100 km/h  
WIND  
LOADING

Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By	DER	10/94			
Drawn By	DDDS	10/94			
Checked By	RES	11/94	00	1 of 2	11861

COL. SIZE	51 x 3.2	64 x 3.2	76 x 3.2	89 x 4.0	102 x 6.4	114 x 6.4	127 x 6.4	152 x 6.4	203 x 7.9	
FOOTING	0 x 1.2	0 x 1.3	0 x 1.4	0 x 1.6	0.5 x 1.1	0.5 x 1.2	0.5 x 1.3	0.5 x 1.4	0.5 x 1.4	
Sign Identification Number	HEIGHT (Meters)									
	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)
1	4.6	4.6	6.2	6.2	7.6					
2		5.1	5.1	6.6	6.6	7.6				
3		3.9	3.9	5.4	5.4	7.6				
4		2.7	2.7	3.5	3.5	5.5	7.6			
5										
6		2.8	2.8	3.8	3.8	5.5	7.6			
7			2.0	2.0	3.6	3.6	6.9	7.6		
8	4.5	4.5	6.1	6.1	7.6					
9		4.5	4.5	6.0	6.0	7.6				
10		3.8	3.8	4.5	4.5	6.8	7.6			
11		2.7	2.7	3.8	3.8	5.4	7.6			
12				3.6	3.6	6.6	7.6			
13		3.7	3.7	4.4	4.4	6.8	7.6			
14			3.7	3.7	6.0	6.0	7.6			
15		3.3	3.3	4.0	4.0	6.2	7.6			
16		2.8	2.8	3.7	3.7	5.5	7.6			
17			2.7	2.7	3.9	3.9	7.6			
18				3.6	3.6	7.1	7.6			
19				2.9	2.9	5.6	7.0	7.6		
20										
21		2.6	2.6	3.5	3.5	5.3	7.6			
22			3.3	3.3	4.6	4.6	7.6			
23		2.2	2.2	3.5	3.5	4.8	7.6			
24			3.0	3.0	4.2	4.2	7.6			
25		3.3	3.3	4.0	4.0	6.2	7.6			
26		3.2	3.2	3.8	3.8	6.1	7.6			
27		2.8	2.8	3.7	3.7	5.5	7.6			
28		2.9	2.9	3.8	3.8	5.6	7.6			
29		2.7	2.7	3.7	3.7	5.4	7.6			
30		2.4	2.4	3.7	3.7	5.0	7.6			
31		1.8	1.8	3.0	3.0	4.2	7.6			
32			2.6	2.6	3.8	3.8	7.6			
33		2.2	2.2	3.5	3.5	4.8	7.6			
34		1.8	1.8	3.0	3.0	4.2	7.6			
35			3.1	3.1	4.3	4.3	7.6			
36			2.7	2.7	3.8	3.8	7.6			
37				3.5	3.5	6.5	7.6			
38				3.3	3.3	6.0	7.5	7.6		
39				2.9	2.9	5.5	6.9	7.6		
40										
41					4.3	4.3	5.6	5.6	7.0	7.6
42					3.7	3.7	5.0	5.0	6.2	7.6
43										
44	5.0	5.0	6.6	6.6	7.6					
45		4.9	4.9	6.4	6.4	7.6				
46		4.9	4.9	6.4	6.4	7.6				
47		4.9	4.9	6.3	6.3	7.6				
48		4.8	4.8	6.3	6.3	7.6				
49		4.2	4.2	5.6	5.6	7.6				
50		4.0	4.0	5.4	5.4	7.6				
51			5.4	5.4	7.6					
52		3.9	3.9	5.3	5.3	7.6				

COL. SIZE	51 x 3.2	64 x 3.2	76 x 3.2	89 x 4.0	102 x 6.4	114 x 6.4	127 x 6.4	152 x 6.4	203 x 7.9		
FOOTING	0 x 1.2	0 x 1.3	0 x 1.4	0 x 1.6	0.5 x 1.1	0.5 x 1.2	0.5 x 1.3	0.5 x 1.4	0.5 x 1.4		
Sign Identification Number	HEIGHT (Meters)										
	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	
53		4.0	4.0	5.0	5.0	7.4	7.4	7.6			
54		3.9	3.9	4.9	4.9	7.3	7.3	7.6			
55		3.8	3.8	4.6	4.6	7.0	7.0	7.6			
56		3.5	3.5	4.1	4.1	6.5	6.5	7.6			
57		3.4	3.4	4.0	4.0	6.3	6.3	7.6			
58		3.3	3.3	4.0	4.0	6.2	6.2	7.6			
59		3.3	3.3	3.9	3.9	6.1	6.1	7.6			
60		3.1	3.1	3.7	3.7	6.0	6.0	7.6			
61		3.0	3.0	3.9	3.9	5.8	5.8	7.6			
62		2.7	2.7	3.8	3.8	5.3	5.3	7.6			
63				3.8	3.8	5.3	5.3	7.6			
64		2.5	2.5	3.8	3.8	5.1	5.1	7.6			
65				3.5	3.5	4.9	4.9	7.6			
66				3.4	3.4	4.7	4.7	7.6			
67		2.1	2.1	3.3	3.3	4.6	4.6	7.6			
68				3.1	3.1	4.4	4.4	7.6			
69				3.2	3.2	4.4	4.4	7.6			
70		1.8	1.8	3.0	3.0	4.3	4.3	7.6			
71											
72				2.9	2.9	4.2	4.2	7.6			
73				2.7	2.7	3.9	3.9	7.6			
74											
75				2.3	2.3	3.8	3.8	7.2	7.6		
76				2.3	2.3	3.6	3.6	7.1	7.1	7.6	
77					3.3	3.3	6.9	6.9	7.6		
78				2.3	2.3	3.8	3.8	7.2	7.2	7.6	
79											
80					3.0	3.0	5.7	5.7	7.1	7.6	
81					2.7	2.7	5.4	5.4	6.9	7.6	
82											
83											
84											
85											
86						4.5	4.5	5.8	5.8	7.1	7.6
87						4.0	4.0	5.2	5.2	6.5	7.6
88											
89											
90											
91											

The Column Size is O.D. x Wall Thickness in millimeters.  
The Footing Size is O.D. x Depth in meters. A zero O.D. means that a concrete footing is not necessary.

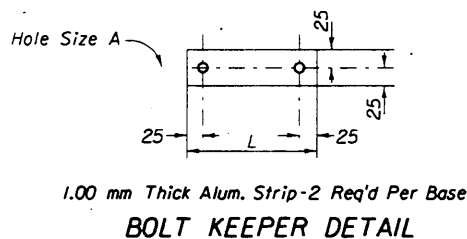
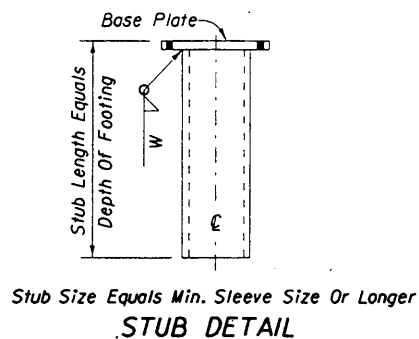
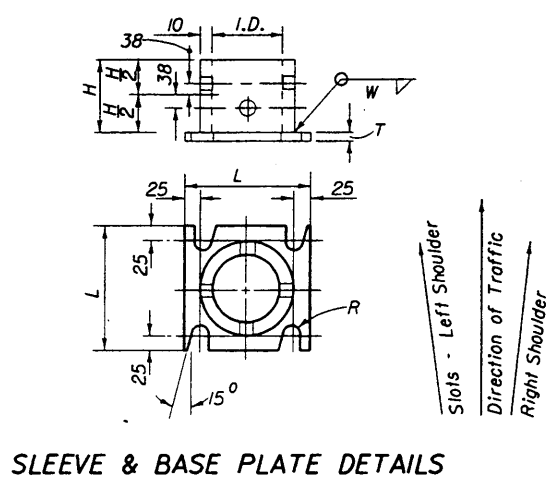
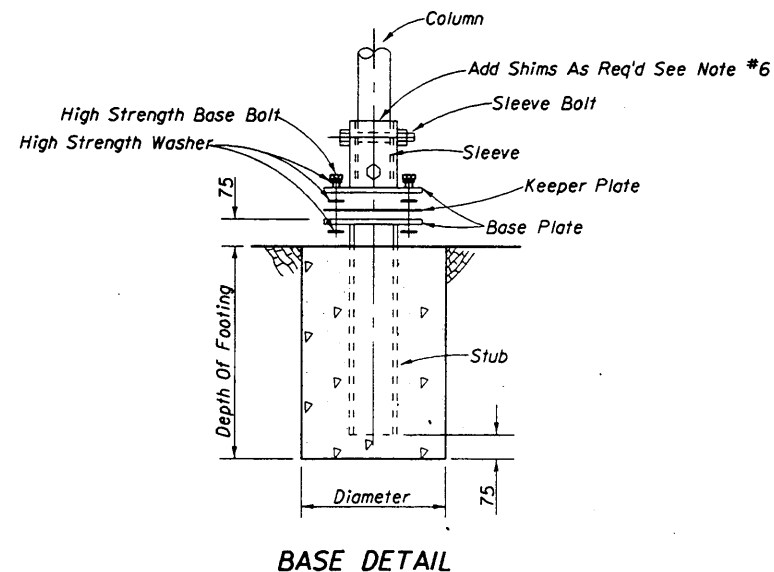
**COLUMN SIZE , COLUMN HEIGHT & COLUMN FOOTINGS**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**SINGLE COLUMN  
GROUND SIGNS**

Designed By	DER	10/94	Approved By	<i>William H. Vets</i> State Structures Design Engineer
Drawn By	DDDS	10/94	Revision	Sheet No.
Checked By	BES	11/94	00	2 of 2
			Index No.	11861

**100 km/h  
WIND  
LOADING**



**SLIP BASE DETAILS**

Note: Unless noted otherwise, all dimensions are in millimeters.

Column Size	Sleeve I.D. (Max)	Sleeve Height H	Weld W	Base Plate		Radius R	Base Bolt		Base Bolt Torque N-m	Hole Size A
				L	T		Size	Length		
102 x 6.4	104	152	16	203	20	9	16	76	40	18
114 x 6.4	116	152	16	203	22	9	16	83	40	18
127 x 6.4	129	178	16	203	22	9	16	83	40	18
152 x 6.4	154	203	17	229	25	11	20	89	65	22
203 x 7.9	205	254	19	279	25	12	22	95	72	24

**NOTES**

1. Work this Standard with Standard Index Numbers 11860 and 11865.
2. To determine column (post) size and footing requirements use the required Sign Identification Number and Sign Height (H), Designs for Heights (H) lower than those listed in the Table are included in Standard Index Number 11865.
3. Single Column installations are not allowed for heights (H) exceeding the maximum height shown in the Table, and for sign profiles (Sign Identification Numbers) without any design tabulated. In this event, the sign(s) will have to be supported by multiple columns (posts) featuring breakaway devices. See Standard Index Number 9535.
4. The Column (Post) material shall be aluminum. The size is given as outside diameter and wall thickness. Columns (posts) larger than 89 x 4.0 are non-fragible and shall be installed with breakaway supports and will have concrete footings and slip bases.
5. The footing size is given as outside diameter and depth.
  - a) Frangible Supports: Footings for Frangible Supports do not require concrete. The column (post) shall be driven into the ground to the depth indicated.
  - b) Breakaway Supports: Footings for Breakaway Supports require concrete. The column support shall be set in a concrete footing, sized as shown in the table. The first dimension indicates the diameter and the second dimension the depth into the ground. In all cases the ground is to be considered as undisturbed earth, road material, or properly compacted fill.
6. SLIP BASE NOTES :
  - a) The Inside Diameter (I.D.) of the sleeve shall be no more than 2mm larger than the Outside Diameter (O.D.) of the Column.
  - b) The sleeve bolts shall be 12 Ø with locknuts. The bolts shall be galvanized steel (ASTM A-307M) or Aluminum Association Alloy 2024-T4 or 6061-T6 (ASTM B-211M).
  - c) The base bolts, nuts and washers shall be high strength ASTM A-325M and shall have an electroplated zinc coating SC3, Type II applied in accordance with ASTM B633.
  - d) An alternate cast base of aluminum alloy 356 and T6 temper in lieu of the fabricated base may be submitted for approval by the Engineer. If a cast base is used the stub will be the same as the column and will be bolted to the casting.
  - e) Assemble the slip base connection in the following manner :  
 Connect column to sleeve using two (2) 12 Ø machine bolts.  
 Assemble top base plate to stub base plate using high strength bolts with three (3) hardened washers per bolt. One (1) washer per bolt and two (2) bolt keeper plates go between the base plates.  
 Use shim stock as required to plumb the column.  
 Tighten all bolts the maximum possible with a 300mm to 375mm wrench to bed the washers and shims and to clear the bolt threads. Loosen each bolt one (1) turn and retighten to the prescribed torque (see table). Bolts shall be tightened with properly calibrated wrenches under the supervision of the project engineer.  
 Burr threads at junction with nut using a center punch to prevent nut loosening.
  - f) Use galvanized steel shims to obtain a tight fit between the column face and the sleeve. Place shims in all quadrants between the 12 Ø sleeve bolts. The shim length shall be 25mm shorter than the height of the sleeve.

<b>COLUMN SIZE, COLUMN HEIGHT &amp; COLUMN FOOTINGS</b>			
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN			
<b>SINGLE COLUMN GROUND SIGNS</b>			
Designed By	Names	Dates	Approved By
DER	DER	10/94	<i>[Signature]</i>
Drawn By	DDDS	10/94	State Structures Design Engineer
Checked By	RES	11/94	Revision Sheet No. Index No.
			00 1 of 2 11862

**115** km/h  
WIND  
LOADING

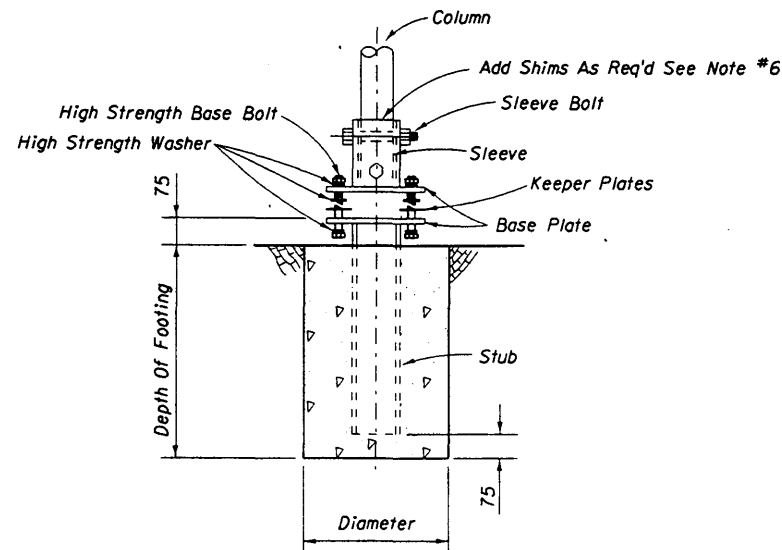
COL. SIZE	51 x 3.2	64 x 3.2	76 x 3.2	89 x 4.0	102 x 6.4	114 x 6.4	127 x 6.4	152 x 6.4	203 x 7.9			
FOOTING	0 x 1.3	0 x 1.3	0 x 1.4	0 x 1.7	0.5 x 1.1	0.5 x 1.2	0.5 x 1.3	0.5 x 1.4	0.5 x 1.5			
Sign Identification Number	HEIGHT (Meters)											
	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)		
1		5.1	5.1	6.3	6.3	7.6						
2			5.3	5.3	7.4	7.4	7.6					
3			4.2	4.2	6.3	6.3	7.6					
4		1.8	1.8	2.9	2.9	4.1	4.1	7.6				
5												
6			3.0	3.0	4.2	4.2	7.6					
7				2.8	2.8	5.3	5.3	6.6	7.6			
8		5.0	5.0	6.2	6.2	7.6						
9			4.8	4.8	6.9	6.9	7.6					
10			3.8	3.8	5.4	5.4	7.6					
11			2.9	2.9	4.1	4.1	7.6					
12				2.6	2.6	5.1	5.1	6.4	7.6			
13			3.7	3.7	5.3	5.3	7.6					
14			3.4	3.4	4.6	4.6	7.6					
15			3.6	3.6	4.8	4.8	7.6					
16			3.0	3.0	4.2	4.2	7.6					
17				3.5	3.5	6.2	6.2	7.6				
18				3.0	3.0	5.5	5.5	6.8	7.6			
19					4.2	4.2	5.4	5.4	6.6	7.6		
20												
21		1.8	1.8	2.8	2.8	4.0	4.0	7.6				
22			2.3	2.3	3.5	3.5	7.0	7.0	7.6			
23			2.5	2.5	3.6	3.6	7.2	7.2	7.6			
24				3.5	3.5	6.6	6.6	7.6				
25			3.6	3.6	4.8	4.8	7.6					
26			3.5	3.5	4.7	4.7	7.6					
27			3.0	3.0	4.2	4.2	7.6					
28			3.1	3.1	4.3	4.3	7.6					
29			3.0	3.0	4.1	4.1	7.6					
30			2.6	2.6	3.7	3.7	7.4	7.4	7.6			
31			2.1	2.1	3.6	3.6	6.5	6.5	7.6			
32			1.8	1.8	3.5	3.5	6.0	6.0	7.4	7.6		
33			2.5	2.5	3.6	3.6	7.2	7.2	7.6			
34			2.0	2.0	3.5	3.5	6.6	6.6	7.6			
35			2.1	2.1	3.5	3.5	6.7	6.7	7.6			
36			1.8	1.8	3.5	3.5	6.1	6.1	7.5	7.6		
37				2.5	2.5	4.9	4.9	6.2	6.2	7.5	7.6	
38				2.2	2.2	4.5	4.5	5.8	5.8	7.0	7.6	
39				1.9	1.9	4.1	4.1	5.3	5.3	6.5	7.6	
40												
41					3.4	3.4	4.2	4.2	5.3	5.3	7.6	
42					3.2	3.2	3.6	3.6	4.6	4.6	6.9	7.6
43												
44		5.4	5.4	6.6	6.6	7.6						
45			5.1	5.1	7.2	7.2	7.6					
46			5.1	5.1	7.2	7.2	7.6					
47			5.1	5.1	7.2	7.2	7.6					
48			5.0	5.0	7.1	7.1	7.6					
49			4.4	4.4	6.5	6.5	7.6					
50			4.2	4.2	6.3	6.3	7.6					
51			4.2	4.2	6.3	6.3	7.6					
52			4.1	4.1	6.2	6.2	7.6					

COL. SIZE	51 x 3.2	64 x 3.2	76 x 3.2	89 x 4.0	102 x 6.4	114 x 6.4	127 x 6.4	152 x 6.4	203 x 7.9				
FOOTING	0 x 1.3	0 x 1.3	0 x 1.4	0 x 1.7	0.5 x 1.1	0.5 x 1.2	0.5 x 1.3	0.5 x 1.4	0.5 x 1.5				
Sign Identification Number	HEIGHT (Meters)												
	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)	(-) to (-)			
53				4.0	4.0	5.9	5.9	7.6					
54				3.9	3.9	5.8	5.8	7.6					
55				3.8	3.8	5.5	5.5	7.6					
56			2.6	2.6	3.7	3.7	5.1	5.1	7.6				
57				3.7	3.7	4.9	4.9	7.6					
58				3.6	3.6	4.9	4.9	7.6					
59				3.5	3.5	4.8	4.8	7.6					
60				3.4	3.4	6.0	6.0	7.6					
61				3.3	3.3	4.5	4.5	7.6					
62				2.9	2.9	4.1	4.1	7.6					
63				2.9	2.9	4.0	4.0	7.6					
64				2.7	2.7	3.9	3.9	7.5	7.6				
65				2.5	2.5	3.6	3.6	7.3	7.6				
66					3.8	3.8	7.1	7.1	7.6				
67				2.3	2.3	3.8	3.8	6.9	6.9	7.6			
68				2.1	2.1	3.6	3.6	6.8	6.8	7.6			
69				2.2	2.2	3.7	3.7	6.8	6.8	7.6			
70				2.0	2.0	3.5	3.5	6.6	6.6	7.6			
71													
72					3.8	3.8	6.5	6.5	7.6				
73				1.8	1.8	3.5	3.5	6.1	6.1	7.5	7.6		
74													
75					3.1	3.1	5.6	5.6	6.9	6.9	7.6		
76					3.1	3.1	5.5	5.5	6.9	6.9	7.6		
77					2.7	2.7	5.3	5.3	6.7	6.7	7.6		
78					3.1	3.1	5.6	5.6	6.9	6.9	7.6		
79													
80						4.3	4.3	5.5	5.5	6.7	7.6		
81						4.0	4.0	5.2	5.2	6.4	7.6		
82													
83													
84													
85													
86						3.5	3.5	4.3	4.3	5.4	5.4	7.6	
87						3.4	3.4	3.9	3.9	4.9	4.9	7.2	7.6
88													
89													
90													
91													

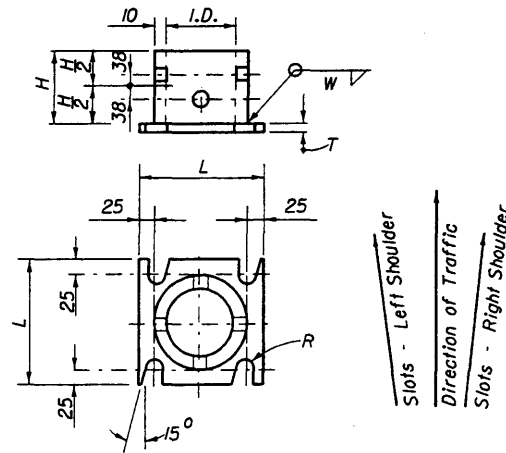
The Column Size is O.D. x Wall Thickness in millimeters.  
The Footing Size is O.D. x Depth in meters. A zero O.D. means that a concrete footing is not necessary.

COLUMN SIZE, COLUMN HEIGHT & COLUMN FOOTINGS					
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
SINGLE COLUMN GROUND SIGNS					
Names	Dates	Approved		Signature	
Designed By	DER	10/94	State Structures Design Engineer		Signature
Drawn By	DDBS	10/94	Revision	Sheet No.	Index No.
Checked By	RES	11/94	00	2 of 2	11862

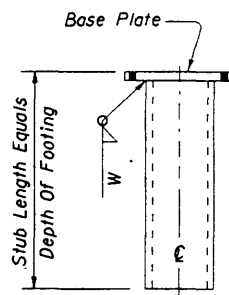
115 km/h  
WIND  
LOADING



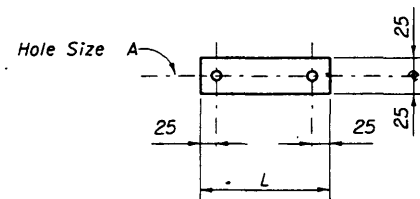
SLIP BASE AND FOOTING DETAIL



SLEEVE & BASE PLATE DETAILS



Stub Size Equals Min. Sleeve Size Or Longer  
STUB DETAIL



1.00 mm Thick Alum. Strip-2 Req'd Per Base  
BOLT KEEPER DETAIL

SLIP BASE DETAILS

Column Size	Sleeve I.D. (Max)	Sleeve Height H	Weld W	Base Plate		Radius R	Base Bolt		Base Bolt Torque N-m	Hole Size A
				L	T		Size	Length		
102 x 6.4	104	152	16	203	20	9	16	76	40	18
114 x 6.4	116	152	16	203	22	9	16	83	40	18
127 x 6.4	129	178	16	203	22	9	16	83	40	18
152 x 6.4	154	203	17	229	25	11	20	89	65	22
203 x 7.9	205	254	19	279	25	12	22	95	72	24

Note: Unless noted otherwise, all dimensions are in millimeters.

NOTES

- Work this Standard with Standard Index Numbers 11860 and 11865.
- To determine column (post) size and footing requirements use the required Sign Identification Number and Sign Height (H). Designs for Heights (H) lower than those listed in the Table are included in Standard Index Number 11865.
- Single Column installations are not allowed for heights (H) exceeding the maximum height shown in the Table, and for sign profiles (Sign Identification Numbers) without any design tabulated. In this event, the sign(s) will have to be supported by multiple columns (posts) featuring breakaway devices. See Standard Index Number 9535.
- The Column (Post) material shall be aluminum. The size is given as outside diameter and wall thickness. Columns (posts) larger than 89 x 4.0 are non-fragible and shall be installed with breakaway supports and will have concrete footings and slip bases.
- The footing size is given as outside diameter and depth.
  - Fragible Supports: Footings for Fragible Supports do not require concrete. The column (post) shall be driven into the ground to the depth indicated.
  - Breakaway Supports: Footings for Breakaway Supports require concrete. The column support shall be set in a concrete footing, sized as shown in the table. The first dimension indicates the diameter and the second dimension the depth into the ground. In all cases the ground is to be considered as undisturbed earth, road material, or properly compacted fill.
- SLIP BASE NOTES :
  - The Inside Diameter (I.D.) of the sleeve shall be no more than 2mm larger than the Outside Diameter (O.D.) of the Column.
  - The sleeve bolts shall be 12 Ø with locknuts. The bolts shall be galvanized steel (ASTM A-307M) or Aluminum Association Alloy 2024-T4 or 6061-T6 (ASTM B-211M).
  - The base bolts, nuts and washers shall be high strength ASTM A-325M and shall have an electroplated zinc coating SC3, Type II applied in accordance with ASTM B633.
  - An alternate cast base of aluminum alloy 356 and T6 temper in lieu of the fabricated base may be submitted for approval by the Engineer. If a cast base is used the stub will be the same as the column and will be bolted to the casting.
  - Assemble the slip base connection in the following manner :
    - Connect column to sleeve using two (2) 12 Ø machine bolts.
    - Assemble top base plate to stub base plate using high strength bolts with three (3) hardened washers per bolt. One (1) washer per bolt and two (2) bolt keeper plates go between the base plates.
    - Use shim stock as required to plumb the column.
    - Tighten all bolts the maximum possible with a 300mm to 375mm wrench to bed the washers and shims and to clear the bolt threads. Loosen each bolt one (1) turn and retighten to the prescribed torque (see table). Bolts shall be tightened with properly calibrated wrenches under the supervision of the project engineer.
    - Burr threads at junction with nut using a center punch to prevent nut loosening.
    - Use galvanized steel shims to obtain a tight fit between the column face and the sleeve. Place shims in all quadrants between the 12 Ø sleeve bolts. The shim length shall be 25mm shorter than the height of the sleeve.

130 km/h  
WIND  
LOADING

COLUMN SIZE, COLUMN HEIGHT & COLUMN FOOTINGS			
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN			
SINGLE COLUMN GROUND SIGNS			
Names	Dates	Approved By	
Designed By	DER	10/94	 State Structures Design Engineer
Drawn By	DDDS	10/94	
Checked By	RES	11/94	
Revision		Sheet No.	Index No.
00		1 of 2	11863

COL. SIZE	51 x 3.2	64 x 3.2	76 x 3.2	89 x 4.0	102 x 6.4	114 x 6.4	127 x 6.4	152 x 6.4	203 x 7.9				
FOOTING	0 x 1.3	0 x 1.4	0 x 1.4	0 x 1.6	0.5 x 1.1	0.5 x 1.2	0.5 x 1.3	0.5 x 1.4	0.5 x 1.6				
Sign Identification Number	HEIGHT (Meters)												
	(+) to	(+) to	(+) to	(+) to	(+) to	(+) to	(+) to	(+) to	(+) to	(+) to			
1		4.2	4.2	5.3	5.3	7.2	7.2	7.6					
2			4.3	4.3	6.2	6.2	7.6						
3				5.1	5.1	7.6							
4			2.1	2.1	3.5	3.5	6.5	6.5	7.6				
5													
6				3.8	3.8	6.5	6.5	7.6					
7				2.0	2.0	4.2	4.2	5.3	5.3	6.4	6.4	7.6	
8			5.2	5.2	7.1	7.1	7.6						
9				5.7	5.7	7.6							
10				4.3	4.3	7.6							
11				3.8	3.8	6.4	6.4	7.6					
12					4.0	4.0	5.1	5.1	6.2	6.2	7.6		
13				4.2	4.2	7.6							
14				3.7	3.7	7.0	7.0	7.6					
15				3.8	3.8	7.2	7.2	7.6					
16				3.7	3.7	6.5	6.5	7.6					
17				2.6	2.6	4.9	4.9	6.1	6.1	7.3	7.3	7.6	
18					4.3	4.3	5.4	5.4	6.6	6.6	7.6		
19					3.5	3.5	4.2	4.2	5.2	5.2	7.6		
20													
21			2.1	2.1	3.5	3.5	6.3	6.3	7.6				
22				3.2	3.2	5.6	5.6	6.9	6.9	7.6			
23				3.3	3.3	5.8	5.8	7.1	7.1	7.6			
24				2.9	2.9	5.3	5.3	6.5	6.5	7.6			
25				3.8	3.8	7.2	7.2	7.6					
26				3.7	3.7	7.0	7.0	7.6					
27				3.7	3.7	6.5	6.5	7.6					
28				3.8	3.8	6.6	6.6	7.6					
29				3.7	3.7	6.4	6.4	7.6					
30				3.5	3.5	6.0	6.0	7.3	7.3	7.6			
31				2.9	2.9	5.2	5.2	6.4	6.4	7.6			
32				2.5	2.5	4.8	4.8	6.0	6.0	7.2	7.2	7.6	
33				3.4	3.4	5.8	5.8	7.1	7.1	7.6			
34				2.9	2.9	5.3	5.3	6.5	6.5	7.6			
35				3.0	3.0	5.4	5.4	6.6	6.6	7.6			
36				2.6	2.6	4.8	4.8	6.1	6.1	7.3	7.3	7.6	
37					3.8	3.8	4.9	4.9	6.0	6.0	7.6		
38					3.5	3.5	4.5	4.5	5.6	5.6	7.6		
39					3.5	3.5	4.1	4.1	5.1	5.1	7.5	7.6	
40													
41					3.0	3.0	3.4	3.4	4.0	4.0	6.1	6.1	7.6
42						3.2	3.2	3.5	3.5	5.4	5.4	7.6	
43													
44			4.5	4.5	5.6	5.6	7.4	7.4	7.6				
45				4.2	4.2	6.0	6.0	7.6					
46					6.0	6.0	7.6						
47					6.0	6.0	7.6						
48					5.9	5.9	7.6						
49					5.4	5.4	7.6						
50					5.2	5.2	7.6						
51					5.2	5.2	7.6						
52					5.1	5.1	7.6						

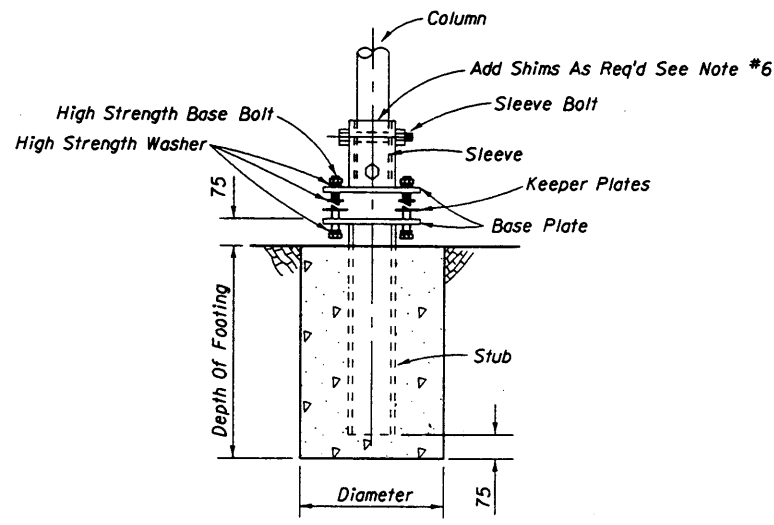
COL. SIZE	51 x 3.2	64 x 3.2	76 x 3.2	89 x 4.0	102 x 6.4	114 x 6.4	127 x 6.4	152 x 6.4	203 x 7.9					
FOOTING	0 x 1.3	0 x 1.4	0 x 1.4	0 x 1.6	0.5 x 1.1	0.5 x 1.2	0.5 x 1.3	0.5 x 1.4	0.5 x 1.6					
Sign Identification Number	HEIGHT (Meters)													
	(+) to	(+) to	(+) to	(+) to	(+) to	(+) to	(+) to	(+) to	(+) to	(+) to				
53				4.8	4.8	7.6								
54				4.7	4.7	7.6								
55				4.4	4.4	7.6								
56				2.9	2.9	4.0	4.0	7.5	7.5	7.6				
57				3.9	3.9	7.3	7.3	7.6						
58				3.8	3.8	7.2	7.2	7.6						
59				3.8	3.8	7.1	7.1	7.6						
60				3.7	3.7	7.0	7.0	7.6						
61				2.5	2.5	3.9	3.9	6.8	6.8	7.6				
62				3.8	3.8	6.3	6.3	7.6						
63				3.8	3.8	6.3	6.3	7.6						
64				2.0	2.0	3.6	3.6	6.2	6.2	7.4	7.4	7.6		
65				3.4	3.4	5.9	5.9	7.2	7.2	7.6				
66				3.3	3.3	5.7	5.7	7.0	7.0	7.6				
67				3.2	3.2	5.6	5.6	6.8	6.8	7.6				
68				3.0	3.0	5.5	5.5	6.7	6.7	7.6				
69				3.0	3.0	5.4	5.4	6.7	6.7	7.6				
70				2.9	2.9	5.3	5.3	6.5	6.5	7.6				
71														
72				2.9	2.9	5.2	5.2	6.4	6.4	7.6				
73				2.6	2.6	4.9	4.9	6.1	6.1	7.3	7.3	7.6		
74														
75				2.2	2.2	4.4	4.4	5.6	5.6	6.7	6.7	7.6		
76				2.2	2.2	4.4	4.4	5.5	5.5	6.7	6.7	7.6		
77						4.1	4.1	5.3	5.3	6.5	6.5	7.6		
78				2.2	2.2	4.4	4.4	5.6	5.6	6.7	6.7	7.6		
79														
80						3.6	3.6	4.3	4.3	5.3	5.3	7.6		
81						3.4	3.4	4.0	4.0	5.0	5.0	7.4	7.6	
82														
83														
84														
85														
86						3.1	3.1	3.5	3.5	4.2	4.2	6.3	6.3	7.6
87							3.4	3.4	3.7	3.7	5.7	5.7	7.6	
88														
89														
90														
91														

The Column Size is O.D. x Wall Thickness in millimeters.  
The Footing Size is O.D. x Depth in meters. A zero O.D. means that a concrete footing is not necessary.

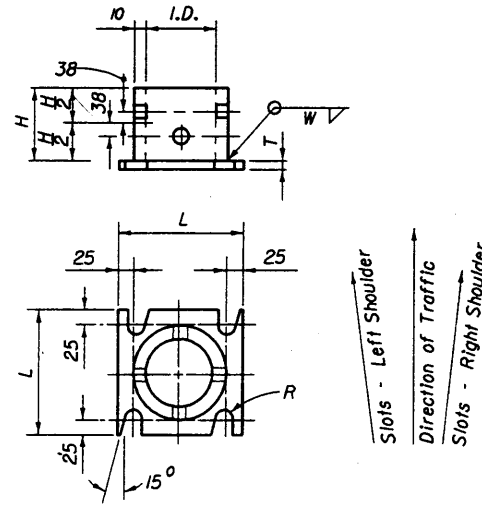
COLUMN SIZE , COLUMN HEIGHT & COLUMN FOOTINGS				
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
SINGLE COLUMN GROUND SIGNS				
Designed By	DER	Date	10/94	
Drawn By	DDDS	Date	10/94	
Checked By	RES	Date	11/94	
Approved By	<i>W. J. [Signature]</i>		State Structures Design Engineer	
Revision	00	Sheet No.	2 of 2	
Index No.	11863			

130 km/h WIND LOADING

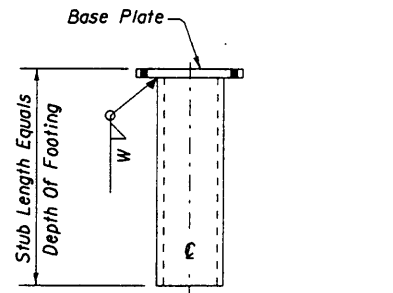




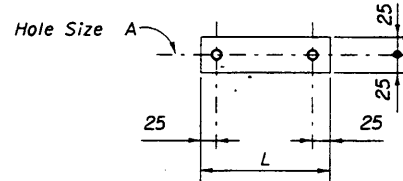
SLIP BASE AND FOOTING DETAIL



SLEEVE & BASE PLATE DETAILS



Stub Size Equals Min. Sleeve Size Or Longer  
STUB DETAIL



1.00 mm Thick Alum. Strip-2 Req'd Per Base  
BOLT KEEPER DETAIL

SLIP BASE DETAILS

Column Size	Sleeve I.D. (Max)	Sleeve Height H	Weld W	Base Plate		Radius R	Base Bolt		Base Bolt Torque N-m	Hole Size A
				L	T		Size	Length		
102 x 6.4	104	152	16	203	20	9	16	76	40	18
114 x 6.4	116	152	16	203	22	9	16	83	40	18
127 x 6.4	129	178	16	203	22	9	16	83	40	18
152 x 6.4	154	203	17	229	25	11	20	89	65	22
203 x 7.9	205	254	19	279	25	12	22	95	72	24

Note: Unless noted otherwise, all dimensions are in millimeters.

NOTES

1. Work this Standard with Standard Index Numbers 11860 and 11865.
2. To determine column (post) size and footing requirements use the required Sign Identification Number and Sign Height (H), Designs for Heights (H) lower than those listed in the Table are included in Standard Index Number 11865.
3. Single Column installations are not allowed for heights (H) exceeding the maximum height shown in the Table, and for sign profiles (Sign Identification Numbers) without any design tabulated. In this event, the sign(s) will have to be supported by multiple columns (posts) featuring breakaway devices. See Standard Index Number 9535.
4. The Column (Post) material shall be aluminum. The size is given as outside diameter and wall thickness. Columns (posts) larger than 89 x 4.0 are non-fragible and shall be installed with breakaway supports and will have concrete footings and slip bases.
5. The footing size is given as outside diameter and depth.
  - a) Frangible Supports: Footings for Frangible Supports do not require concrete. The column (post) shall be driven into the ground to the depth indicated.
  - b) Breakaway Supports: Footings for Breakaway Supports require concrete. The column support shall be set in a concrete footing, sized as shown in the table. The first dimension indicates the diameter and the second dimension the depth into the ground. In all cases the ground is to be considered as undisturbed earth, road material, or properly compacted fill.
6. SLIP BASE NOTES :
  - a) The Inside Diameter (I.D.) of the sleeve shall be no more than 2mm larger than the Outside Diameter (O.D.) of the Column.
  - b) The sleeve bolts shall be 12 Ø with locknuts. The bolts shall be galvanized steel (ASTM A-307M) or Aluminum Association Alloy 2024-T4 or 6061-T6 (ASTM B-211M).
  - c) The base bolts, nuts and washers shall be high strength ASTM A-325M and shall have an electroplated zinc coating SC3, Type II applied in accordance with ASTM B633.
  - d) An alternate cast base of aluminum alloy 356 and T6 temper in lieu of the fabricated base may be submitted for approval by the Engineer. If a cast base is used the stub will be the same as the column and will be bolted to the casting.
  - e) Assemble the slip base connection in the following manner :
    - Connect column to sleeve using two (2) 12 Ø machine bolts.
    - Assemble top base plate to stub base plate using high strength bolts with three (3) hardened washers per bolt. One (1) washer per bolt and two (2) bolt keeper plates go between the base plates.
    - Use shim stack as required to plumb the column.
    - Tighten all bolts the maximum possible with a 300mm to 375mm wrench to bed the washers and shims and to clear the bolt threads. Loosen each bolt one (1) turn and retighten to the prescribed torque (see table). Bolts shall be tightened with properly calibrated wrenches under the supervision of the project engineer.
    - Burr threads at junction with nut using a center punch to prevent nut loosening.
  - f) Use galvanized steel shims to obtain a tight fit between the column face and the sleeve. Place shims in all quadrants between the 12 Ø sleeve bolts. The shim length shall be 25mm shorter than the height of the sleeve.

COLUMN SIZE, COLUMN HEIGHT & COLUMN FOOTINGS			
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN			
SINGLE COLUMN GROUND SIGNS			
Designed By	DER	Date	10/94
Drawn By	DDGS	Revision	10/94
Checked By	RES	Date	11/94
Approved by		State Structures Design Engineer	
145 km/h WIND LOADING		Sheet No.	1 of 2
		Index No.	11864

COL. SIZE	51 x 3.2	64 x 3.2	76 x 3.2	89 x 4.0	102 x 6.4	114 x 6.4	127 x 6.4	152 x 6.4	203 x 7.9				
FOOTING	0 x 1.3	0 x 1.4	0 x 1.4	0 x 1.6	0.5 X 1.1	0.5 X 1.2	0.5 X 1.3	0.5 X 1.5	0.5 X 1.7				
Sign Identification Number	HEIGHT (Meters)												
	(-) to	(-) to	(-) to	(-) to	(-) to	(-) to	(-) to	(-) to	(-) to	(-) to	(-) to		
1			4.5	4.5	6.2	6.2	7.6						
2				5.3	5.3	7.6							
3				4.2	4.2	7.5	7.5	7.6					
4				3.0	3.0	5.4	5.4	6.6	6.6	7.6			
5													
6				3.1	3.1	5.4	5.4	6.6	6.6	7.6			
7					3.6	3.6	4.3	4.3	5.4	5.4	7.6		
8			4.4	4.4	6.1	6.1	7.6						
9				4.8	4.8	7.6							
10				3.8	3.8	6.6	6.6	7.6					
11				3.0	3.0	5.3	5.3	6.5	6.5	7.6			
12					3.6	3.6	4.1	4.1	5.1	5.1	7.4	7.4	7.6
13				3.7	3.7	6.5	6.5	7.6					
14				3.4	3.4	5.8	5.8	7.0	7.0	7.6			
15				3.6	3.6	6.1	6.1	7.3	7.3	7.6			
16				3.1	3.1	5.4	5.4	6.6	6.6	7.6			
17					4.0	4.0	5.0	5.0	6.2	6.2	7.6		
18					3.6	3.6	4.4	4.4	5.5	5.5	7.6		
19					3.1	3.1	3.5	3.5	4.2	4.2	6.3	6.3	7.6
20													
21				2.9	2.9	5.2	5.2	6.4	6.4	7.6			
22				2.4	2.4	4.6	4.6	5.7	5.7	7.0	7.0	7.6	
23				2.6	2.6	4.8	4.8	5.9	5.9	7.3	7.3	7.6	
24				2.1	2.1	4.3	4.3	5.4	5.4	6.6	6.6	7.6	
25				3.7	3.7	6.1	6.1	7.3	7.3	7.6			
26				3.5	3.5	5.9	5.9	7.1	7.1	7.6			
27				3.1	3.1	5.4	5.4	6.6	6.6	7.6			
28				3.2	3.2	5.5	5.5	6.7	6.7	7.6			
29				3.0	3.0	5.3	5.3	6.5	6.5	7.6			
30				2.7	2.7	4.9	4.9	6.1	6.1	7.4	7.4	7.6	
31				2.2	2.2	4.2	4.2	5.3	5.3	6.6	6.6	7.6	
32				1.9	1.9	3.9	3.9	4.9	4.9	6.1	6.1	7.6	
33				2.6	2.6	4.8	4.8	5.9	5.9	7.3	7.3	7.6	
34				2.1	2.1	4.3	4.3	5.4	5.4	6.6	6.6	7.6	
35				2.2	2.2	4.4	4.4	5.5	5.5	6.7	6.7	7.6	
36				1.9	1.9	3.9	3.9	5.0	5.0	6.2	6.2	7.6	
37					3.5	3.5	3.9	3.9	5.0	5.0	7.3	7.3	7.6
38					3.4	3.4	3.6	3.6	4.6	4.6	6.7	6.7	7.6
39					3.1	3.1	3.5	3.5	4.1	4.1	6.2	6.2	7.6
40													
41						3.1	3.1	3.4	3.4	4.9	4.9	7.6	
42							3.2	3.2	4.3	4.3	7.6		
43													
44				4.8	4.8	6.4	6.4	7.6					
45					5.1	5.1	7.6						
46					5.1	5.1	7.6						
47					5.0	5.0	7.6						
48					5.0	5.0	7.6						
49					4.5	4.5	7.6						
50					4.3	4.3	7.5	7.5	7.6				
51					4.3	4.3	7.5	7.5	7.6				
52					4.2	4.2	7.4	7.4	7.6				

COL. SIZE	51 x 3.2	64 x 3.2	76 x 3.2	89 x 4.0	102 x 6.4	114 x 6.4	127 x 6.4	152 x 6.4	203 x 7.9					
FOOTING	0 x 1.3	0 x 1.4	0 x 1.4	0 x 1.6	0.5 X 1.1	0.5 X 1.2	0.5 X 1.3	0.5 X 1.5	0.5 X 1.7					
Sign Identification Number	HEIGHT (Meters)													
	(-) to	(-) to	(-) to	(-) to	(-) to	(-) to	(-) to	(-) to	(-) to	(-) to	(-) to			
53					4.0	4.0	7.1	7.1	7.6					
54					3.9	3.9	7.0	7.0	7.6					
55					3.8	3.8	6.7	6.7	7.6					
56					3.8	3.8	6.3	6.3	7.6					
57					3.7	3.7	6.1	6.1	7.4	7.4	7.6			
58					3.7	3.7	6.1	6.1	7.3	7.3	7.6			
59					3.6	3.6	6.0	6.0	7.2	7.2	7.6			
60					3.5	3.5	5.9	5.9	7.1	7.1	7.6			
61					3.3	3.3	5.7	5.7	6.9	6.9	7.6			
62					3.0	3.0	5.3	5.3	6.4	6.4	7.6			
63					3.0	3.0	5.2	5.2	6.4	6.4	7.6			
64					2.8	2.8	5.1	5.1	6.3	6.3	7.6			
65					2.6	2.6	4.8	4.8	6.0	6.0	7.3	7.3	7.6	
66						4.7	4.7	5.9	5.9	7.1	7.1	7.6		
67					2.5	2.5	4.6	4.6	5.7	5.7	7.0	7.0	7.6	
68					2.2	2.2	4.4	4.4	5.6	5.6	6.8	6.8	7.6	
69					2.3	2.3	4.4	4.4	5.6	5.6	6.8	6.8	7.6	
70					2.1	2.1	4.3	4.3	5.4	5.4	6.7	6.7	7.6	
71														
72						4.3	4.3	5.3	5.3	6.5	6.5	7.6		
73					1.9	1.9	3.9	3.9	5.0	5.0	6.2	6.2	7.6	
74														
75						3.8	3.8	4.6	4.6	5.7	5.7	7.6		
76						3.6	3.6	4.5	4.5	5.6	5.6	7.6		
77						3.3	3.3	4.2	4.2	5.3	5.3	7.6		
78						3.8	3.8	4.5	4.5	5.7	5.7	7.6		
79														
80						3.2	3.2	3.6	3.6	4.3	4.3	6.4	6.4	7.6
81						2.9	2.9	3.4	3.4	4.0	4.0	6.1	6.1	7.6
82														
83														
84														
85														
86							3.2	3.2	3.5	3.5	5.1	5.1	7.6	
87									3.4	3.4	4.6	4.6	7.6	
88														
89														
90														
91														

The Column Size is O.D. x Wall Thickness in millimeters.  
The Footing Size is O.D. x Depth in meters. A zero O.D. means that a concrete footing is not necessary.

COLUMN SIZE , COLUMN HEIGHT & COLUMN FOOTINGS				
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
SINGLE COLUMN GROUND SIGNS				
Names	Dates	Approved By <i>[Signature]</i>		
Designed By	DER	10/94	State Structures Design Engineer	
Drawn By	DDDS	10/94	Revision	Sheet No.
Checked By	RES	11/94	00	2 of 2
Index No.		11864		

145 km/h  
WIND  
LOADING

COL. SIZE	50.8x3.2	50.8x3.2	50.8x3.2	63.5x3.2	63.5x3.2	63.5x3.2	76.2x3.2	76.2x3.2	76.2x3.2	*
FOOTING	600	600	600	675	675	675	750	750	750	*
COL. SIZE	3.7 kg/m	3.7 kg/m	4.5 kg/m	6.0 kg/m	6.0 kg/m	N/A	N/A	N/A	N/A	*
FOOTING	900	900	900	900	900	N/A	N/A	N/A	N/A	*
COL. SIZE	W=38J	W=44.5	W=44.5	W=50.8	W=57.2	W=57.2	W=57.2	W=63.5	N/A	*
FOOTING	900	900	900	900	900	900	900	900	N/A	*

Sign Identification Number

HEIGHT (METERS)

1	To 2.4	——	2.4*-3.0	3.0*-3.9	——	——	3.9*-4.2			
2	To 1.8	1.8*-2.1	2.1*-2.4	2.4*-3.6	——	3.6*-3.9	3.9*-4.2			
3		To 1.8	1.8*-2.1	2.1*-2.7	2.7*-3.3	——	3.3*-3.6	3.6*-3.9		
4										
5										
6					To 1.8	——	1.8*-2.4	2.4*-2.7		
7										
8	To 2.4	2.4*-2.7	2.7*-3.0	3.0*-3.9	——	3.9*-4.2				
9		To 2.1	2.1*-2.4	2.4*-3.3	3.3*-3.6	3.6*-3.9	——	3.9*-4.2		
10				To 2.4	2.4*-2.7	——	2.7*-3.0	3.0*-3.6		
11					To 1.8	——	1.8*-2.1	2.1*-2.7		
12										
13					To 2.4	——	2.4*-2.7	2.7*-3.3	3.3*-3.6	
14				To 1.8	1.8*-2.1	——	2.1*-2.4	2.4*-3.0	3.0*-3.3	
15				To 1.8	1.8*-2.1	——	2.1*-2.4	2.4*-3.0		
16					To 1.8	——	1.8*-2.1	2.1*-2.7		
17										
18										
19										
20										
21						To 1.8				
22										
23							To 1.8			
24										
25			To 1.8	1.8*-2.1	——	2.1*-2.7	2.7*-3.3			
26			To 1.8	——	——	1.8*-2.4	2.4*-2.7			
27				To 1.8	——	1.8*-2.1	2.1*-2.7			
28				To 1.8	——	1.8*-2.1	2.1*-2.7			
29						To 2.1	2.1*-2.4			
30						To 1.8	1.8*-2.4			
31							To 1.8			
32							To 1.8			
33						To 1.8	1.8*-2.1			
34							To 1.8			
35							To 2.1			
36							To 1.8			
37										
38										
39										
40										
41										
42										
43										
44	To 2.7	——	2.7*-3.0	3.0*-3.9	——	3.9*-4.2				
45	To 1.8	1.8*-2.1	2.1*-2.7	2.7*-3.3	3.3*-3.6	3.6*-3.9	3.9*-4.2			
46	To 1.8	1.8*-2.1	2.1*-2.7	2.7*-3.3	3.3*-3.6	3.6*-3.9	3.9*-4.2			

COL. SIZE	50.8x3.2	50.8x3.2	50.8x3.2	63.5x3.2	63.5x3.2	63.5x3.2	76.2x3.2	76.2x3.2	76.2x3.2	*
FOOTING	600	600	600	675	675	675	750	750	750	*
COL. SIZE	3.7 kg/m	3.7 kg/m	4.5 kg/m	6.0 kg/m	6.0 kg/m	N/A	N/A	N/A	N/A	*
FOOTING	900	900	900	900	900	N/A	N/A	N/A	N/A	*
COL. SIZE	W=38J	W=44.5	W=44.5	W=50.8	W=57.2	W=57.2	W=57.2	W=63.5	N/A	*
FOOTING	900	900	900	900	900	900	900	900	N/A	*

Sign Identification Number

HEIGHT (METERS)

47	To 1.8	1.8*-2.1	2.1*-2.7	2.7*-3.3	3.3*-3.6	3.6*-3.9	3.9*-4.2			
48		To 2.1	2.1*-2.4	2.4*-3.3	3.3*-3.6	——	3.6*-3.9	3.9*-4.2		
49		To 1.8	1.8*-2.1	2.1*-3.0	3.0*-3.3	——	3.3*-3.6	3.6*-4.2		
50										
51		To 1.8	1.8*-2.1	2.1*-2.7	2.7*-3.3	——	3.3*-3.6	3.6*-4.2		
52			To 1.8	1.8*-2.7	2.7*-3.0	——	3.0*-3.6	3.6*-3.9		
53			To 1.8	1.8*-2.4	2.4*-3.0	——	3.0*-3.3	3.3*-3.9		
54				To 2.4	2.4*-2.7	——	2.7*-3.3	3.3*-3.6		
55				To 2.4	2.4*-2.7	——	2.7*-3.0	3.0*-3.6		
56										
57				To 2.1	——	——	2.1*-2.7	2.7*-3.0		
58				To 1.8	1.8*-2.1	——	2.1*-2.7	2.7*-3.3		
59				To 1.8	1.8*-2.1	——	2.1*-2.7	2.7*-3.0		
60				To 1.8	1.8*-2.1	——	2.1*-2.4	2.4*-3.0		
61				To 1.8	——	——	1.8*-2.4			
62						To 1.8	——	1.8*-2.1	2.1*-2.4	
63						To 1.8	——	1.8*-2.1	2.1*-2.7	
64										
65							To 1.8	1.8*-2.4		
66										
67							To 1.8	1.8*-2.1		
68									To 2.1	
69									To 2.1	
70									To 1.8	
71										
72										
73								To 1.8		
74										
75										
76										
77										
78										
79										
80										
81										
82										
83										
84										
85										
86										
87										
88										
89										
90										
91										

\* Aluminum Round Post dimensions are given in millimeters (mm). The size is shown as outside diameter times wall thickness.

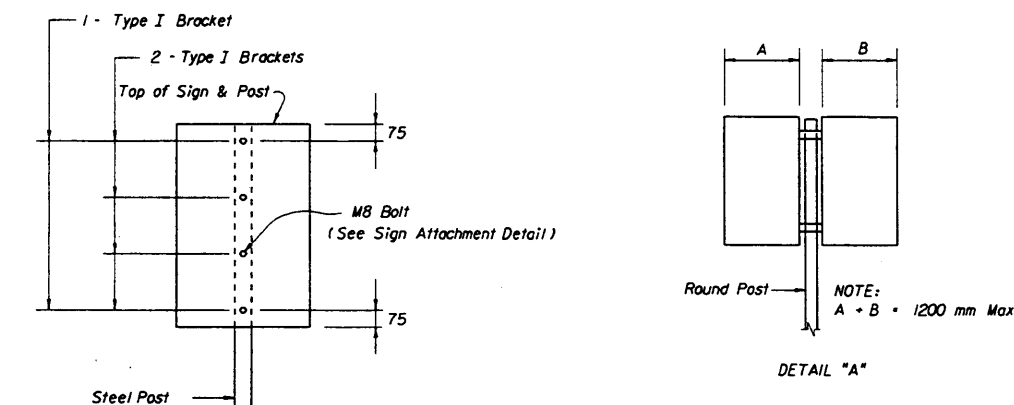
Steel Flanged Channel Post sizes are given in kilograms (kg) per linear meter. Section definitions and properties are shown on Sheet 2 of 2. (See QPL for approved posts).

Steel Square Tube Post dimensions for "W" are given in millimeters (mm). The "W" dimension is defined on Section F-F. (See QPL for approved posts).

Footings dimensions shown are given in millimeters (mm). The dimension shown is the minimum embedment of the driven post.

**NOTES**

- This Standard Index 11865 provides designs for driven single post sign installations for implementation at all locations within the State of Florida. The designs adhere to the following criteria:
  - Mounting Height = 4.2 Meters Maximum
  - Sign(s) Area = 2.3 Square Meters Maximum
  - Sign(s) Width: Single = 900 mm Maximum  
Dual = 1200 mm Maximum (See Detail "A")
  - Driven Post only
- Designs exceeding above criteria or requiring concrete footings are included on Index 11861 thru 11864.
- Specifications for Aluminum materials, Sign Panel Details, etc. are shown on standard Index 11860. Additional information and details are shown on Index 11861 thru 11864. Therefore, work this Standard Index 11865 with Standard Indices 11860 to 11864.
- Sign Bracket requirements are shown on Index 11860 (USE 130 km/h WIND ZONE). If Flanged Channels or Square Tubes are used, substitute two M8 bolts for each Type I Bracket. See Detail "B".
- All posts shall be installed Plumb.
- Steel for Flanged Channel Posts shall conform with ASTM A499 Grade 415, or ASTM A576 Grade 1080.
- Steel for fabrication of square Tubes shall conform with ASTM A446/A446M or ASTM A570/A570M. HOWEVER, STEEL FROM THE FABRICATED SQUARE TUBES MUST MEET A CERTIFIED MINIMUM YIELD STRENGTH OF 380 MPa.
- Steel Flanged Channel Posts with a mass of 6.0 Kg/m are non-frangible and shall be installed with approved breakaway (frangible) bases. See Detail "C". The base and the sign posts shall be same size and type and the splice shall be 150 mm long and fastened with two bolts, 100 mm apart. The bolts shall be wrench-tightened sufficiently to clamp splice assembly tightly together. Bolts shall conform with ASTM A 354 Grade DH or SAE J995 Grade 8. Washers and spacers shall conform with ASTM A307 or A36/A36M.
- Steel Flanged Channel Posts with masses of 3.7 kg/m and 4.5 kg/m, all Aluminum Round Posts and all Steel Square Tubes included in this standard are frangible and do not require breakaway (frangible) bases. However, the contractor may mount frangible posts on approved breakaway bases.
- Bolts, Nuts and washers not included in note 8 above, shall conform with ASTM A307.
- Steel Posts shall be selected from the Department's book of Qualified Product List (QPL).
- All steel posts, and hardware shall be galvanized in accordance with ASTM A123 or A153, or AASHTO M181 Grade 2.
- Shop Drawings: If the contractor proposes to utilize sign panel connections and/or breakaway devices not shown in this standard or in the above referenced standards, the Contractor shall submit shop drawings for approval.
- All dimensions are in millimeters (mm), unless otherwise noted.



DETAIL "B" (See Note No. 4)

SIGN MOUNTING USING CHANNELS OR SQUARE TUBES

**COLUMN SIZE, COLUMN HEIGHT & COLUMN FOOTINGS**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
STRUCTURES DESIGN

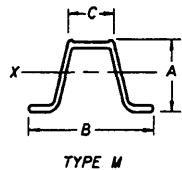
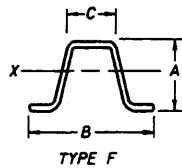
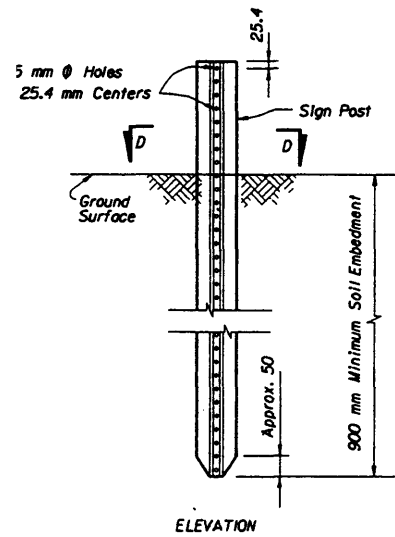
**SINGLE COLUMN GROUND SIGNS**

Designed By	JMD	4-94	Approved By	
Drawn By	SBM	4-94	 State Structures Design Engineer	
Checked By	AJC	4-94		
			Revision	Sheet No.
			96	1 of 2
			Index No.	
			11865	

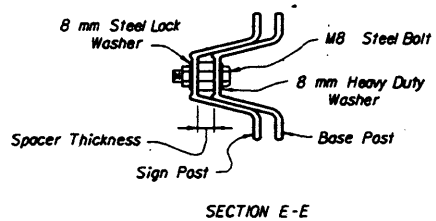
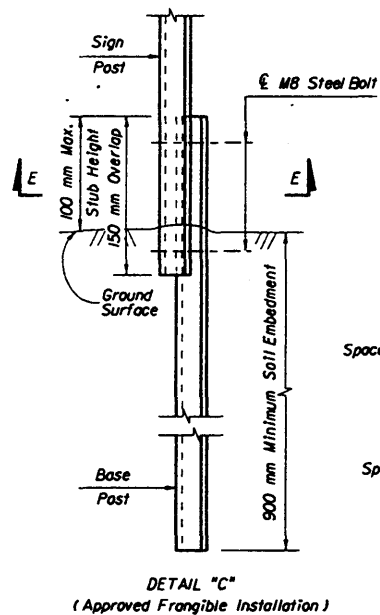
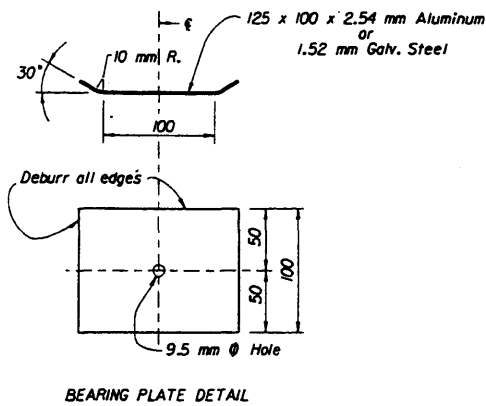
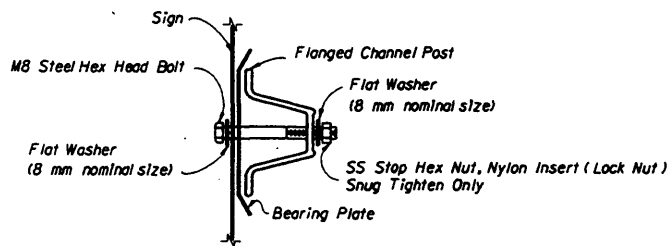
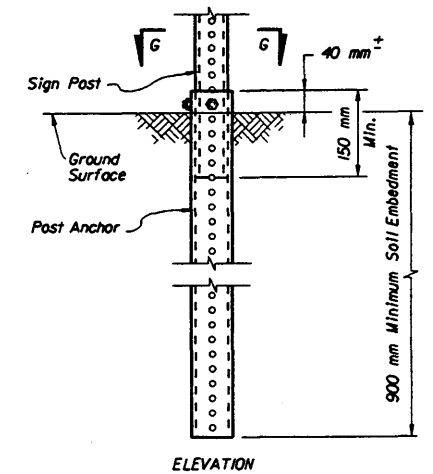
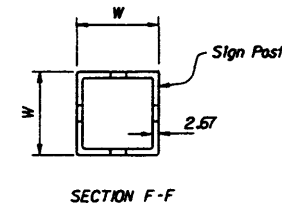
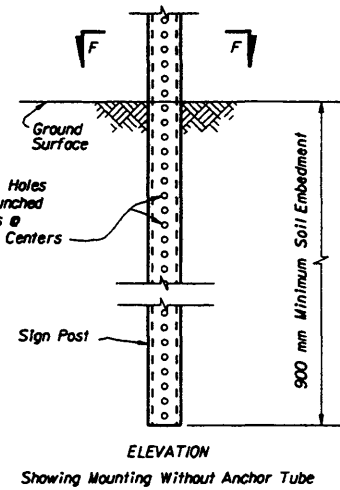
HEIGHT = 4.2 m MAX.  
(ALL WIND ZONES)

APPROVED STEEL FLANGED CHANNEL POSTS					
Kg/m*	Type	A (mm)	B (mm)	C (mm)	SxI mm <sup>3</sup>
3.7	F	39.7	79.4	31.8	5080
3.7	M	38.1	77.8	32.5	5130
4.5	F	44.5	88.9	41.3	7050
4.5	M	47.6	88.9	33.4	7330
6.0	F	44.5	88.9	42.4	9180
6.0	M	49.2	88.9	33.4	10240

\* ± 4%

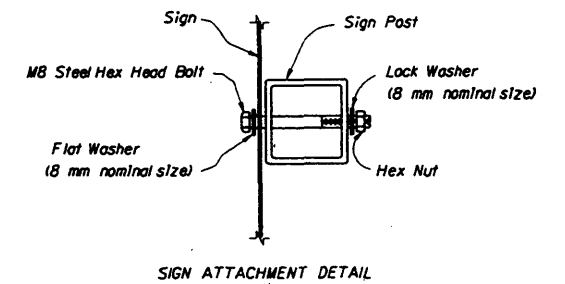
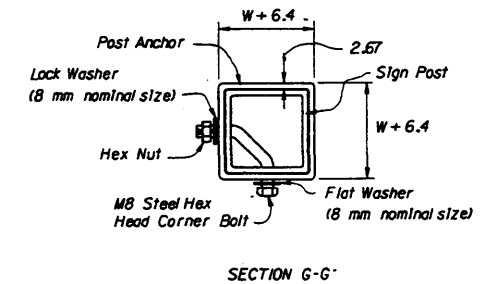
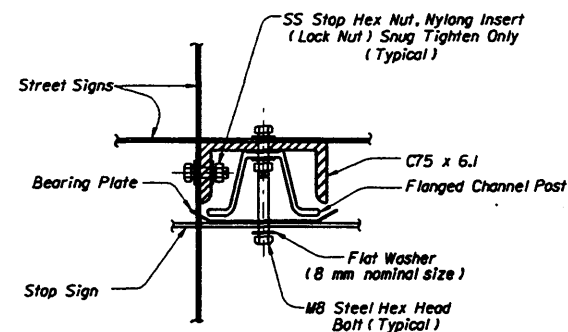
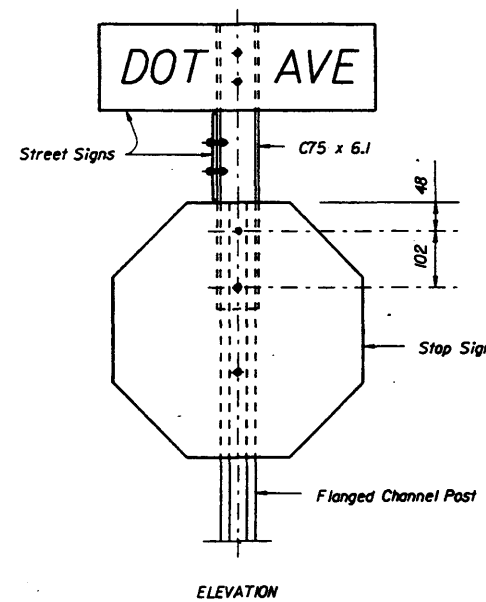


SECTION D-D



Spacer Thickness shall be as follows:  
3.7 Kg/m Type M posts shall use 8 mm spacer.  
Other posts shall use 16 mm spacer (or two 8 mm).

STEEL FLANGED CHANNEL POST DETAILS

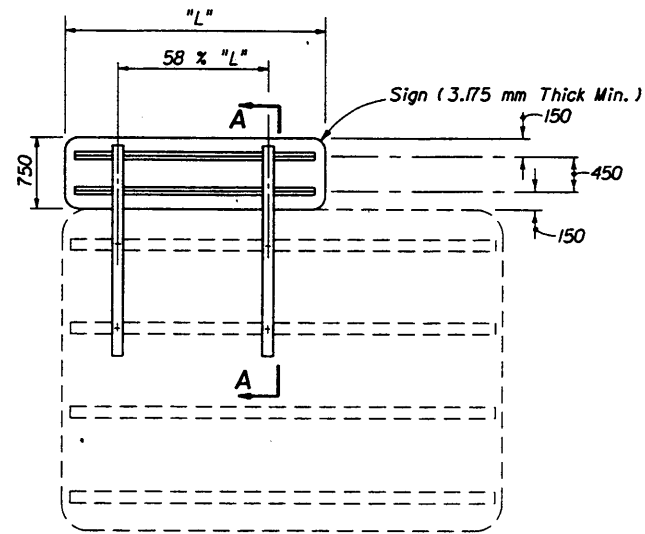


STEEL SQUARE TUBE POST DETAILS

NOTE: All dimensions are in millimeters (mm), unless otherwise noted.

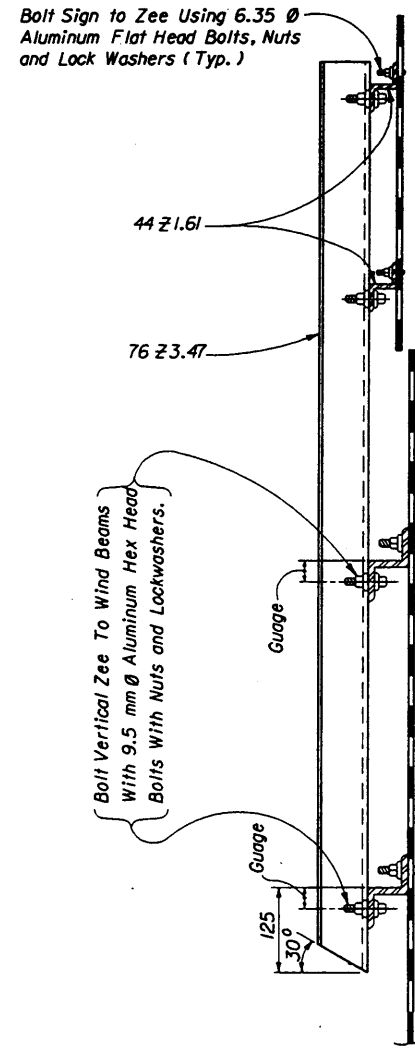
HEIGHT = 4.2 m MAX.  
(ALL WIND ZONES)

COLUMN SIZE, COLUMN HEIGHT & COLUMN FOOTINGS			
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION STRUCTURES DESIGN			
SINGLE COLUMN GROUND SIGNS			
Designed By	JRD/TJB	6/99	Approved By  State Structures Design Engineer
Drawn By	JR	6/99	
Checked By	TJB	6/99	
Revision		00	Sheet No. 2 of 2
Index No.		11865	



NOTE: Exit numbering panel shall be located to the right side for right exit and to the left for left exit.

Mounting of Exit Numbering Panels To Highway Signs  
ELEVATION



SECTION AA

GENERAL NOTES

DESIGN SPECIFICATION: Latest Standard specifications for structural supports for highway signs, luminaires and traffic signals, AASHTO.

SHEETS AND PLATES: Material used shall meet the requirements of Aluminum Association Alloy 6061-T6 and ASTM B209M. Sheets are to be degreased, etched, neutralized and treated with Alodine 11200, Iridite 14-2, Bonderite 721, or equal. No stenciling permitted on sheets.


MATERIALS: All aluminum materials shall meet the requirements of the Aluminum Association Alloy 6061-T6 and also the following ASTM specifications for the following: Sheets and plates B209M; extruded shapes B221M and standard structural shapes B308/B308M.

ALUMINUM BOLTS, NUTS & LOCK WASHERS: Aluminum bolts shall meet the requirements of the Aluminum Association Alloy 2024-T4 or 6061-T6 (ASTM B211M). The bolts shall have an anodic coating of at least 0.005 thick and be chromate sealed. Lockwashers shall meet the requirement of Aluminum Association Alloy 7075-T6 (ASTM B221M). Nuts shall meet the requirement of Aluminum Association Alloy 6262-T9 or 6061-T6.

SIGN FACE: All sign face corners shall be rounded. See sign layout sheet for dimension "L" and sign face details.

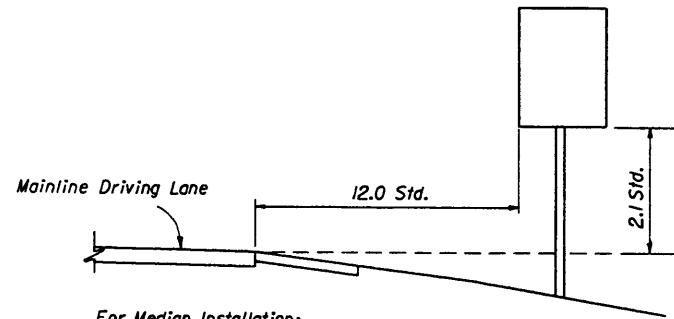
MATERIAL STRESSES: All allowable stresses are in accordance with standard specifications for structural supports for highway signs, luminaires and traffic signals. AASHTO for all materials shown in the plans.

For mounting details refer to Index No. 11037.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION STRUCTURES DESIGN					
<b>MOUNTING EXIT NUMBERING PANELS TO HIGHWAY SIGNS</b>					
Designed By	Names	Dates	Approved By		
CK/CWB		7-82	 State Structures Design Engineer		
Drawn By			Revision	Sheet No.	Index No.
Checked By	CK	7-82	98	1 of 1	13417

**CASE I**

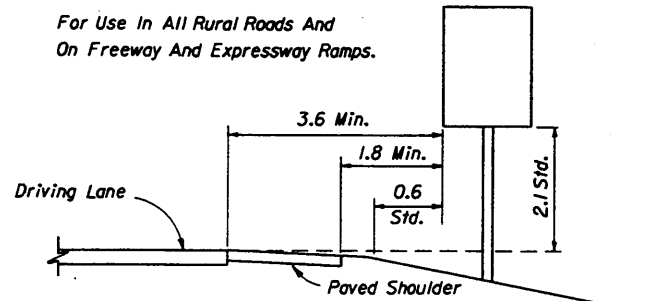
For use on Freeway and Expressway systems for signs on mainline.



For Median Installation:  
If Median Width Does Not Allow Std. Offset From Both Roadways, Center Sign In Median.

**CASE II**

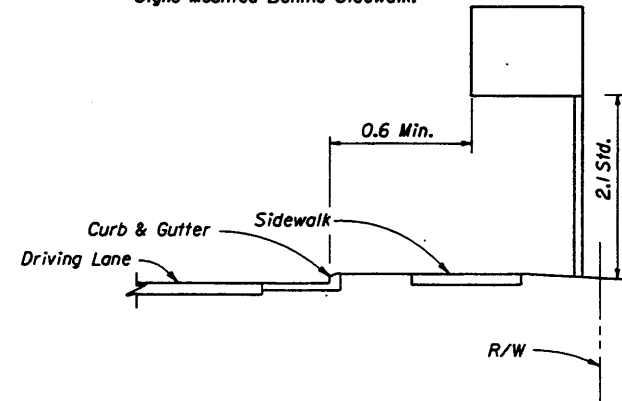
For Use In All Rural Roads And On Freeway And Expressway Ramps.



4.2 m Horizontal Clearance Standard On All Freeway And Expressway Ramps  
For Sections Without Paved Shoulder The 1.8 m Min Does Not Apply.

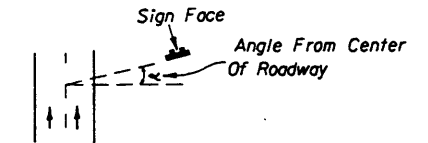
**CASE III**

For Use On All Roads With Signs Mounted Behind Sidewalk.



**GENERAL NOTES:**

1. The typical sections shown hereon serve as a guide for locating the traffic signs required under various roadside conditions. For size and details of sign construction and footing, refer to the appropriate standard index drawing for roadside sign.
2. It shall be the CONTRACTORS responsibility to verify the length of sign supports in the field prior to fabrication.
3. Roadside signs shall be installed at an angle of 1 to 4 degrees away from the traffic flow (see illustration). Shoulder mounted signs shall be rotated counterclockwise and median mounted signs rotated clockwise. Signs on curves shall be mounted as noted above from the perpendicular to the motorists line of sight.



4. The setback for stop and yield signs may be reduced to 0.9 m minimum from the driving lane if required for visibility in business or residential sections with no curb and speeds of 50 km/h or less.
5. The mounting heights are measured from the bottom of the sign panel to a horizontal line extended from the edge of the driving lane. If the standard heights cannot be met, the minimum heights are as follows;

Expressway & Freeway Systems	2.1 m
Other Roadway Systems	
Rural	1.5 m
Urban (including residential with parking and/or pedestrian activity)	2.1 m

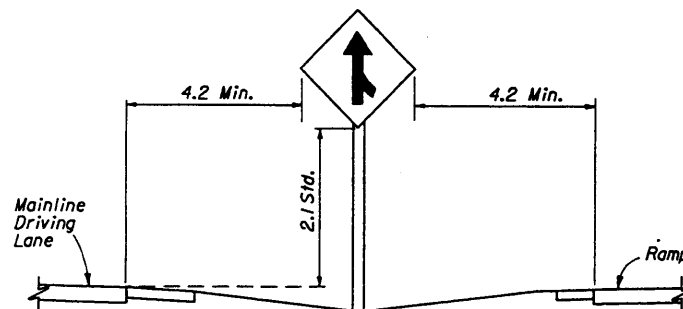
If a secondary sign is mounted below the major sign, the major sign shall be at least 2.4 m and the secondary sign at least 1.5 m for expressway & freeway systems and for other systems the height to the secondary sign shall be at least 1.2 m for rural and 1.8 m for urban sections.

6. Sign supports should never be placed in the bottom of ditches where erosion might affect the proper operation of the breakaway feature.

7. Sign supports shall not reduce the accessible route /continuous passage to less than 0.915 m min. clear width as required by the Americans with Disabilities Act (ADA) Accessibility Guidelines.

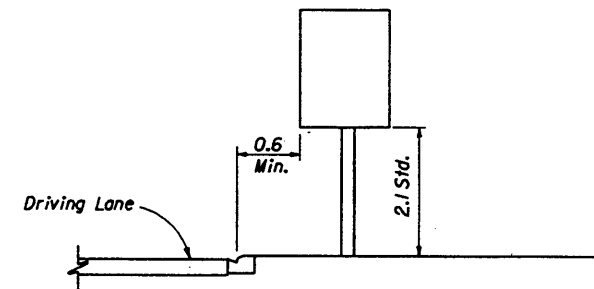
**CASE IV (Merge Sign)**

For Use On All Rural, Freeway And Expressway Systems.



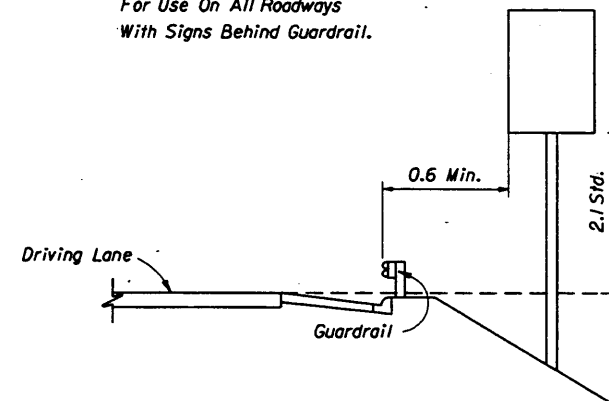
**CASE V**

For Use In Business Or Residential Areas Only.



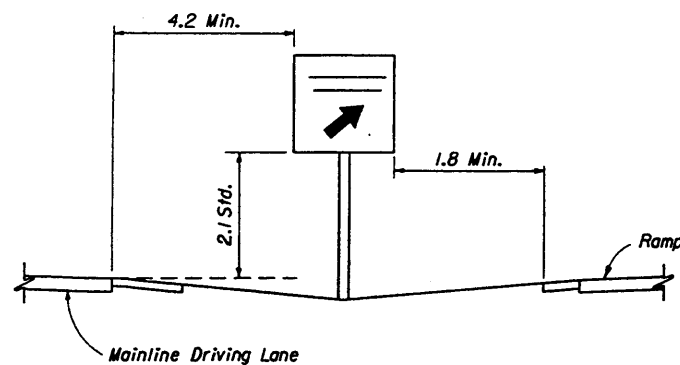
**CASE VI**

For Use On All Roadways With Signs Behind Guardrail.



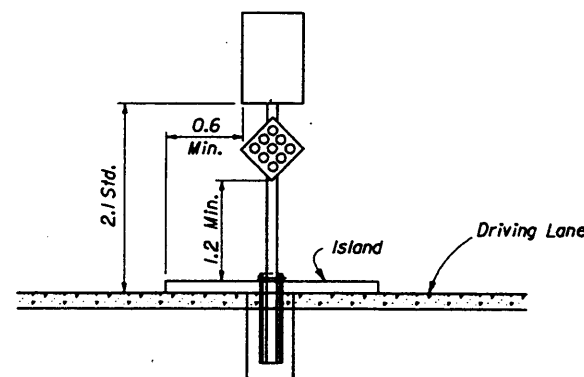
**CASE VII (REST AREA & EXIT GORE SIGNS)**

For Use On All Freeway And Expressway Systems



**CASE VIII**

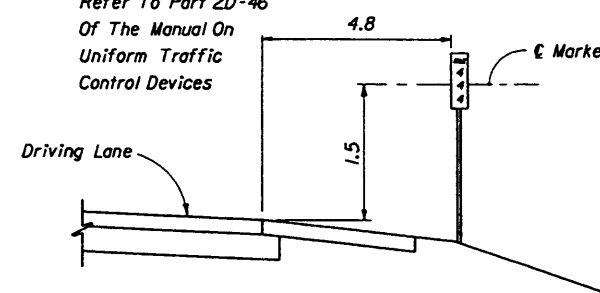
Sign On Island



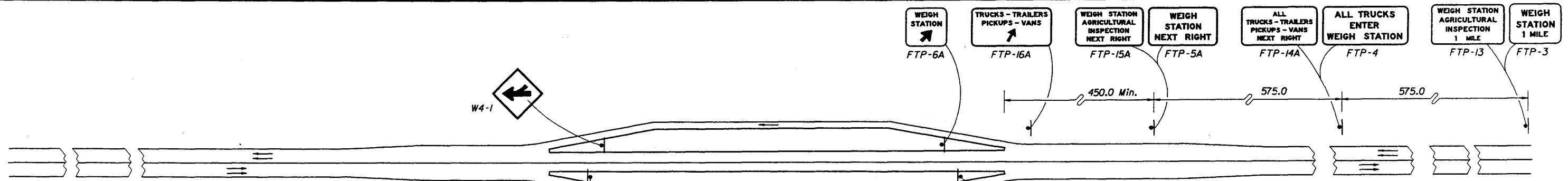
Center Sign Column On Island

**CASE IX (MILE POST MARKER)**

For More Information Refer To Part 2D-46 Of The Manual On Uniform Traffic Control Devices

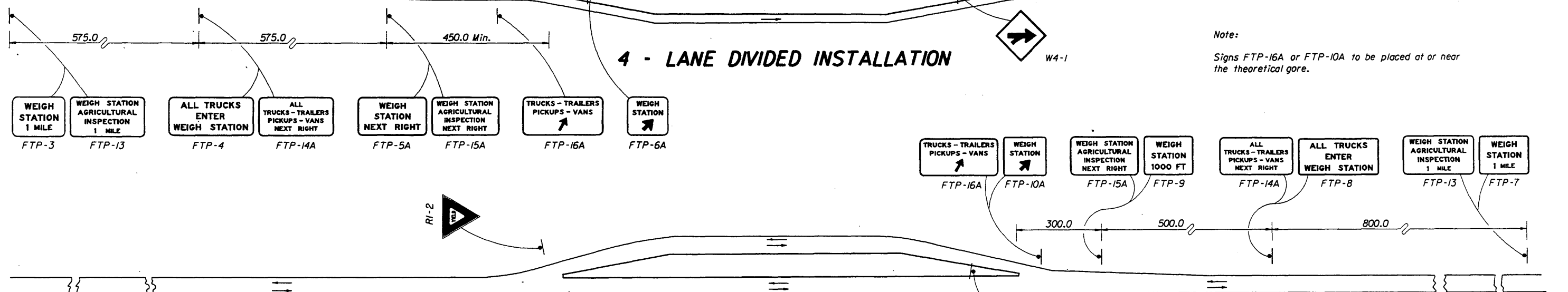


STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
<b>TYPICAL SECTIONS FOR PLACEMENT OF SINGLE &amp; MULTI-COLUMN SIGNS</b>				
Names	Dates	Approved By <i>Charles Scott</i> State Traffic Plans Engineer		
Designed By	3-75	Revision	Sheet No.	Index No.
Drawn By		96	1 of 1	17302
Checked By				

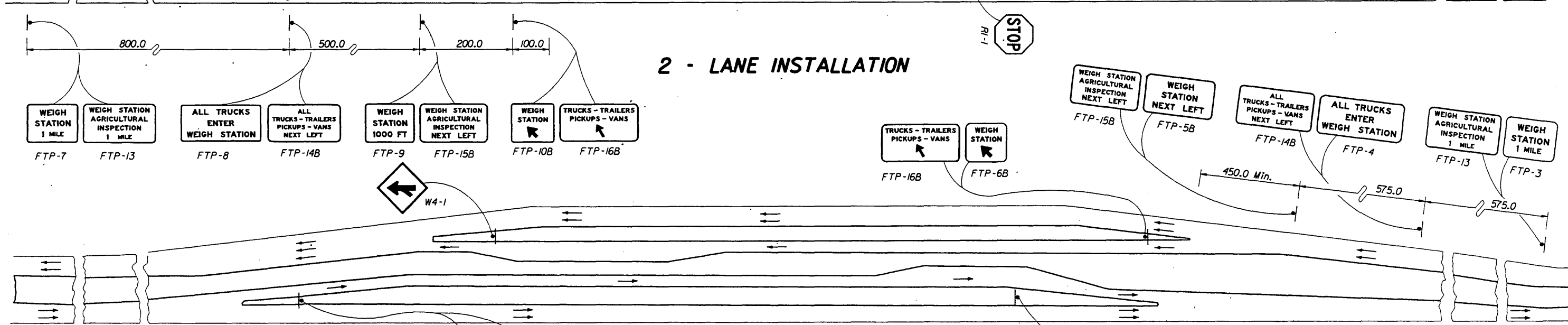


**4 - LANE DIVIDED INSTALLATION**

Note:  
Signs FTP-16A or FTP-10A to be placed at or near the theoretical gore.



**2 - LANE INSTALLATION**

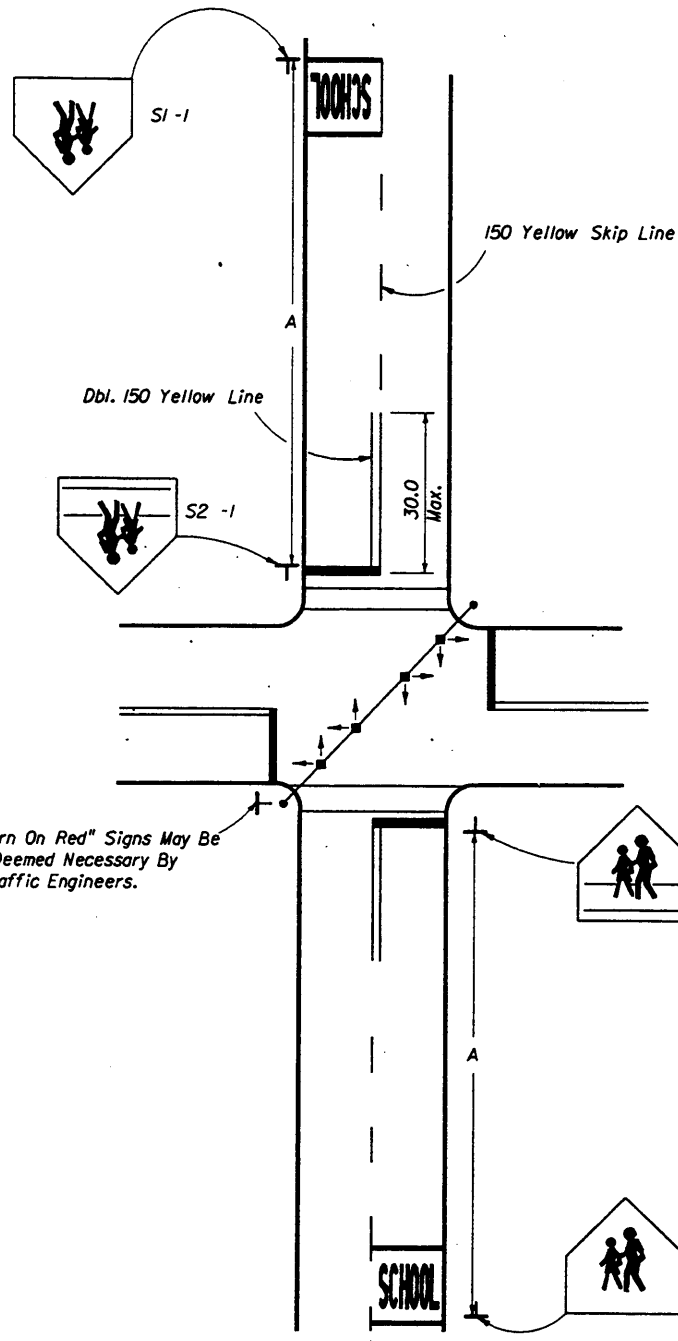


**MEDIAN INSTALLATION**

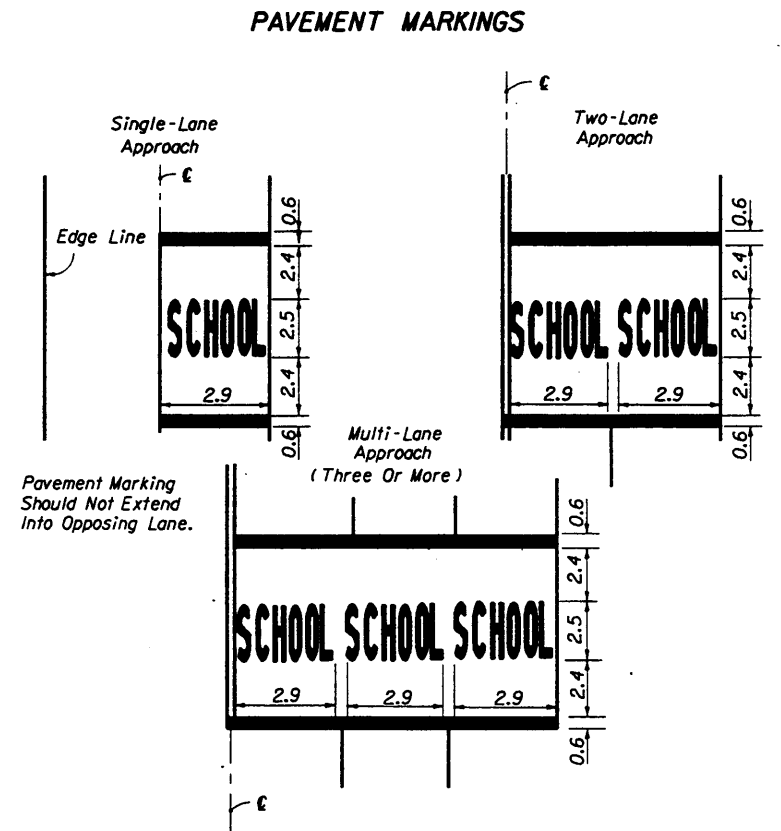
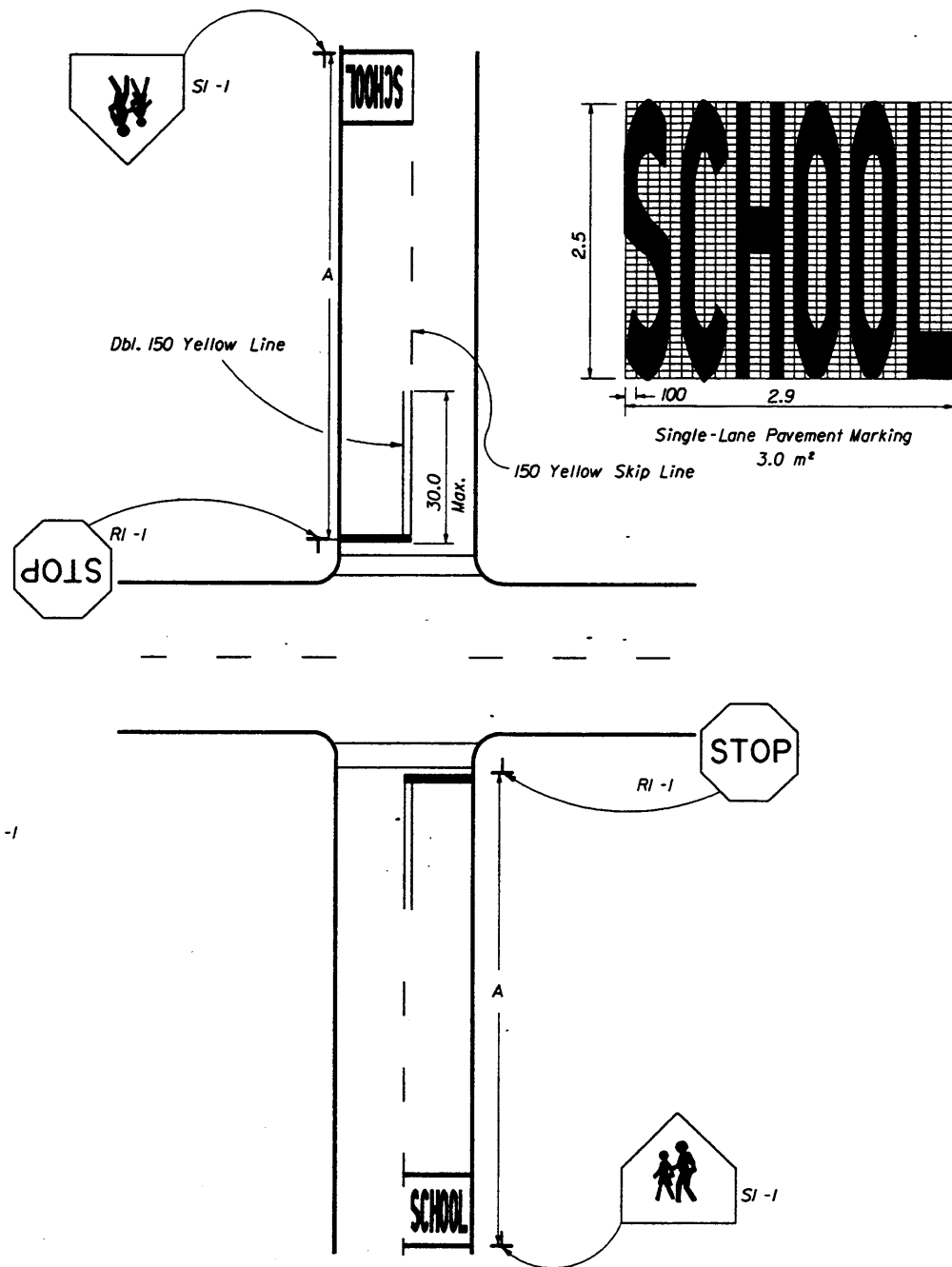


STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>TYPICAL SIGNING FOR TRUCK WEIGH AND INSPECTION STATIONS</b>					
Names	Dates	Approved By <i>Clark A. Scott</i> State Traffic Design Engineer			
Designed By	01-75	Revision	Sheet No.	Index No.	
Drawn By		00	1 of 1	17328	
Checked By					

Approach Speed (km/h)	Approach Speed (MPH)	Distance A (m)
40 To 60	25 To 35	60.0
61 To 70	36 To 45	105.0
71 To 90	46 To 55	150.0



"No Right Turn On Red" Signs May Be Erected As Deemed Necessary By The Local Traffic Engineers.



Pavement Marking Should Not Extend Into Opposing Lane.

**Notes**

Signs shall be erected in accordance with Index No. 17302.

When computing pavement messages quantities do not include transverse lines.

All school signs shall be reflective.

School crosswalk width shall be 1.8 m min. 3.0 m std. without public sidewalk curb ramps 3.0 m min. with public sidewalk curb ramps. See Index No. 17346 sheet 9 of 9.

For signalized intersections or mid-block signalized crossings where flashing beacon speed limit signs (post mounted or overhead) are installed, the minimum distance from the speed limit sign to the stop line shall be 30.0 m. The sign shall not block the view of the signal.

1. TRAFFIC CONTROL DEVICES FOR A SCHOOL CROSSWALK AT A SIGNALIZED INTERSECTION

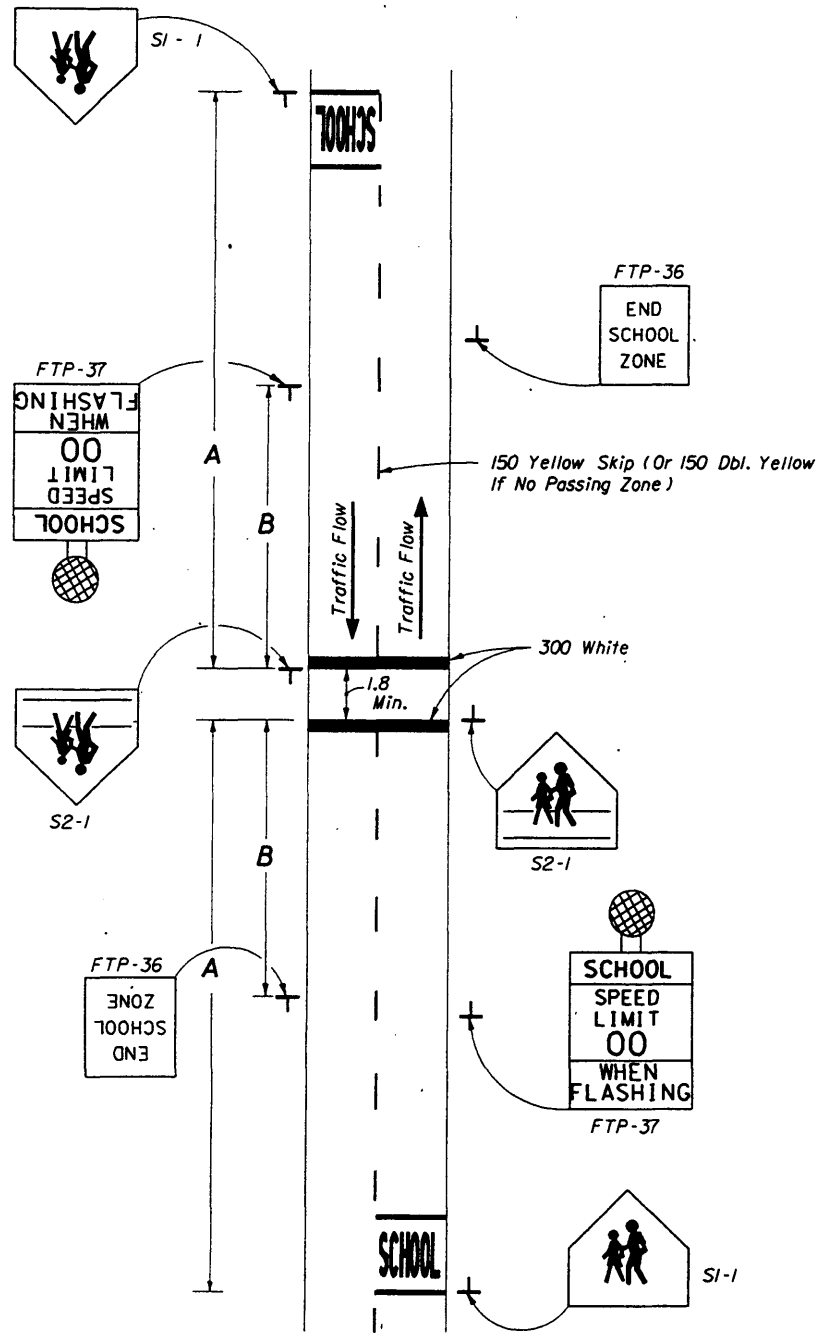
2. TRAFFIC CONTROL DEVICES FOR A SCHOOL CROSSWALK AT A STOP CONTROLLED INTERSECTION

Note: Special speed restrictions are not normally applicable to these two cases.

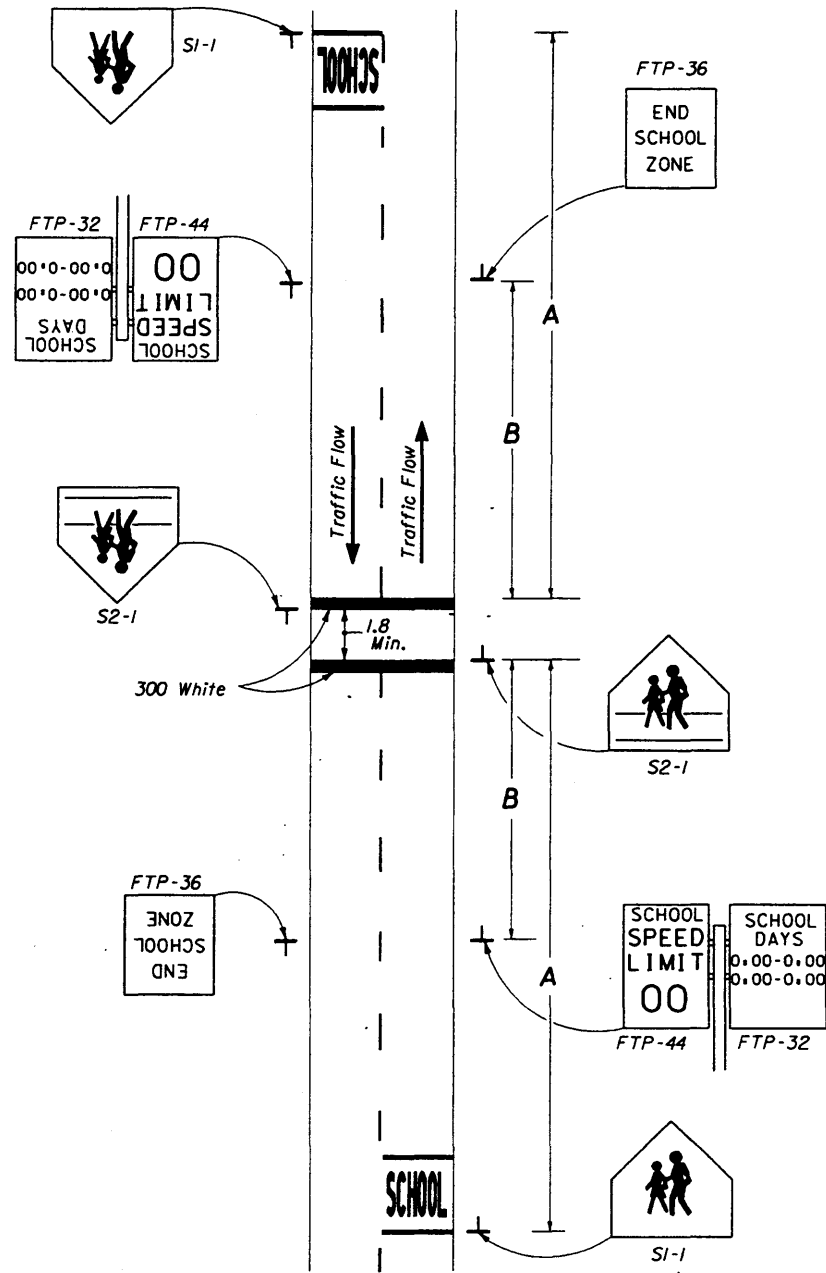
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC PLANS				
SCHOOL SIGNS & MARKINGS				
Names	Dates	Approved By		
Designed By	7-76	Clark P. Acott State Traffic Plans Engineer		
Drawn By		Revision	Sheet No.	Index No.
Checked By	7-76	95	1 of 6	17344



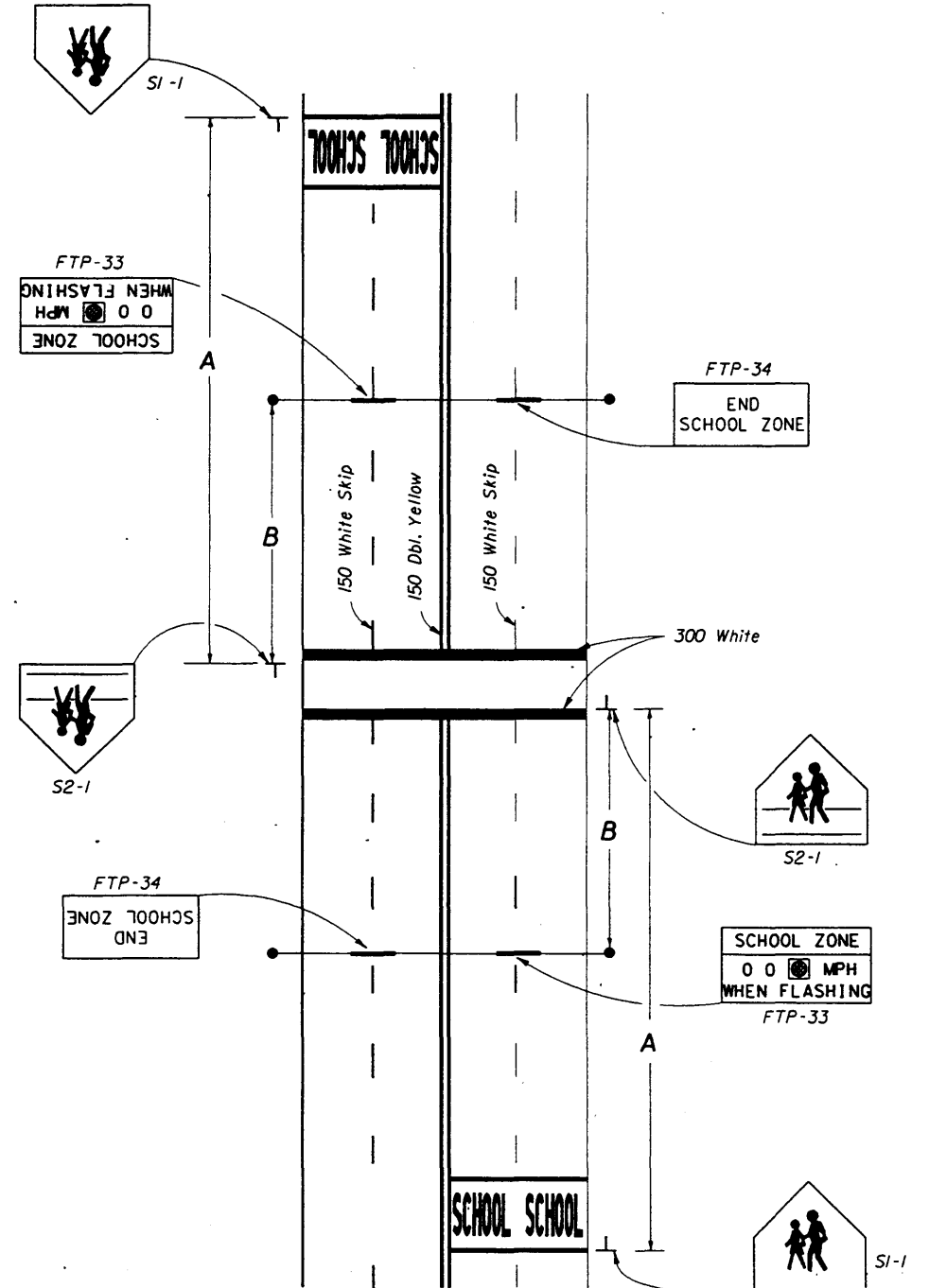
3. TRAFFIC CONTROL DEVICES WITH FLASHING BEACON FOR REDUCED SPEED ZONE AT A SCHOOL CROSSWALK (2 LANES - 2 WAY TRAFFIC) (MIDBLOCK OR ON THRU STREET AT AN INTERSECTION)



4. TRAFFIC CONTROL DEVICES FOR A REDUCED SPEED ZONE AT A SCHOOL CROSSWALK (NO FLASHING BEACON) (2 LANES - 2 WAY TRAFFIC) (MIDBLOCK OR ON THRU STREET AT AN INTERSECTION)



5. TRAFFIC CONTROL DEVICES FOR A REDUCED SPEED ZONE AT A SCHOOL CROSSWALK WITH OVERHEAD FLASHING BEACON SPEED LIMIT SIGNS (4 LANES UNDIVIDED - 2 WAY TRAFFIC) (MIDBLOCK OR ON THRU STREET AT AN INTERSECTION)



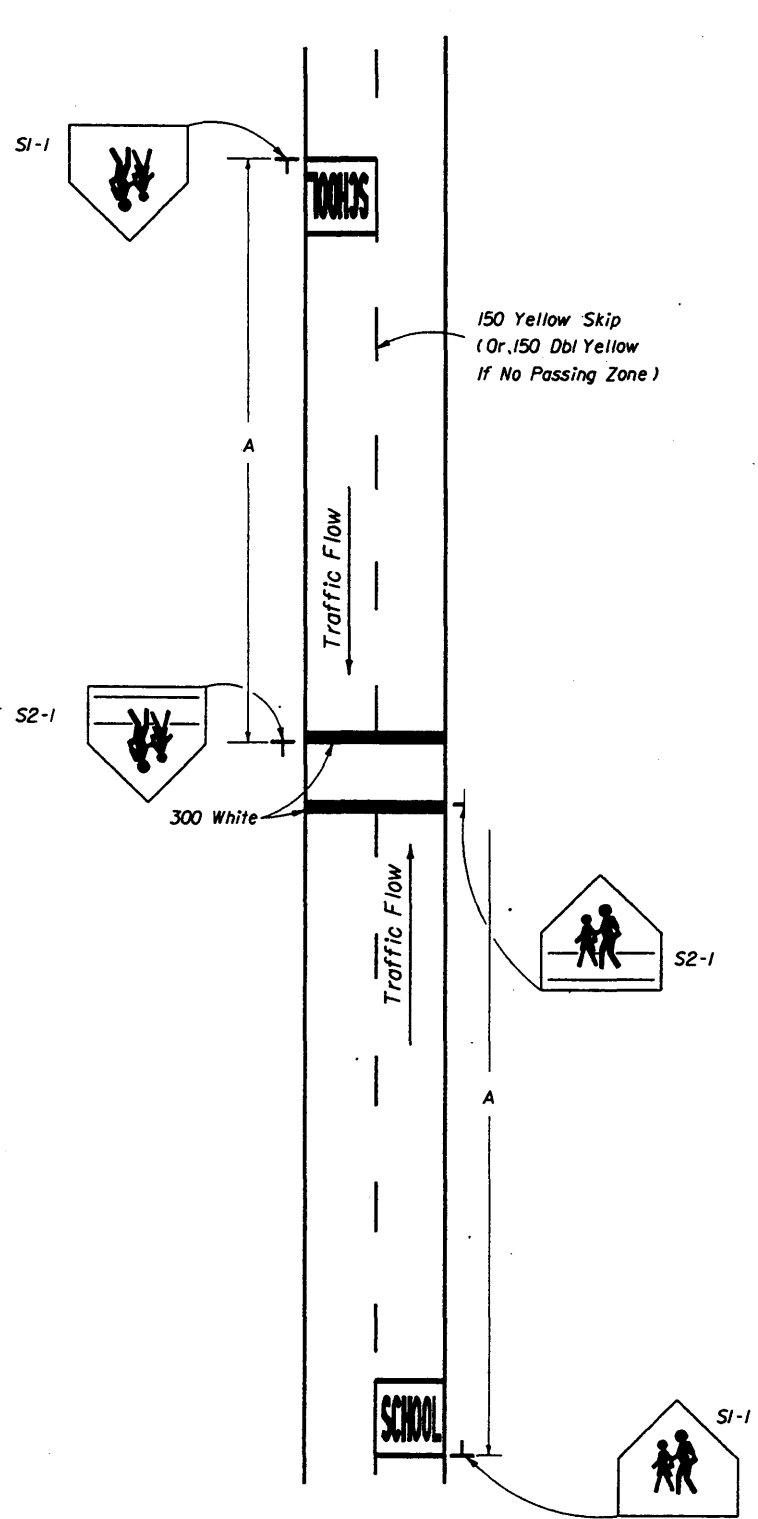
APPROACH SPEED MPH	APPROACH SPEED km/h	SUGGESTED DISTANCE IN METERS	
		A	B
25 To 35	40 To 60	60.0	15.0
36 To 45	61 To 70	105.0	20.0
46 To 55	71 To 90	150.0	24.0

School crosswalk width shall be 1.8 m min.  
 3.0 m std. without public sidewalk curb ramps.  
 3.0 m min. with public sidewalk curb ramps.  
 See Index No. 17346 sheet 9 of 9.

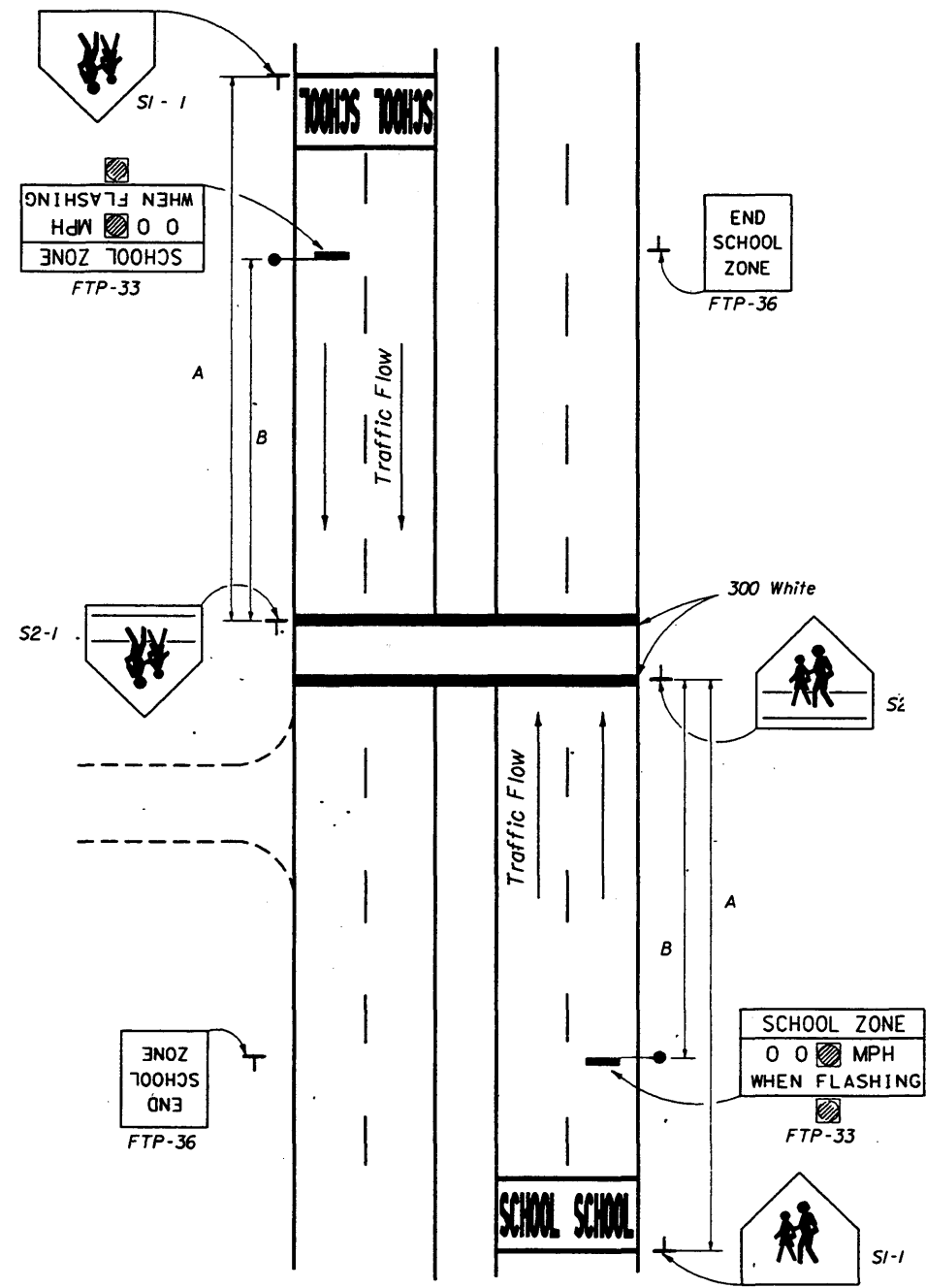
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
 TRAFFIC DESIGN

SCHOOL SIGNS & MARKINGS

Designed By	Names	Dates	Approved By
Drawn By		7-76	<i>Clark O. Scott</i> State Traffic Plans Engineer
Checked By		7-76	Revision
			Sheet No. 2 of 6
			Index No. 17344



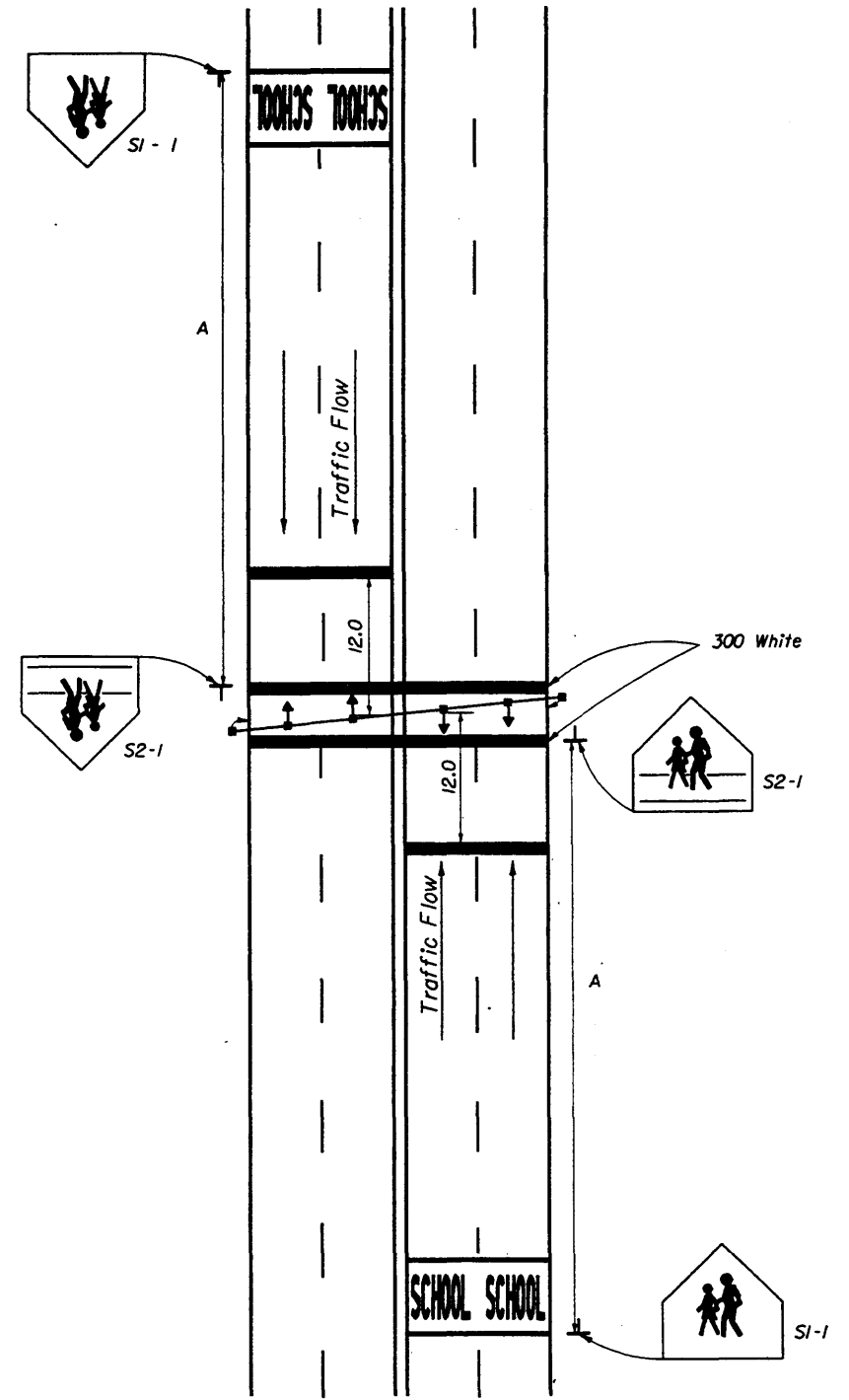
6. TRAFFIC CONTROL DEVICES FOR A SCHOOL CROSSWALK WITHOUT A SPEED REDUCTION (2 LANES - 2 WAY TRAFFIC)



7. TRAFFIC CONTROL DEVICES FOR A REDUCED SPEED ZONE AT A SCHOOL CROSSWALK WITH OVERHEAD FLASHING BEACON SPEED LIMIT SIGNS (4 LANES DIVIDED - 2 WAY TRAFFIC)

APPROACH SPEED MPH	APPROACH SPEED km/h	SUGGESTED DISTANCE IN METERS	
		A	B
25 To 35	40 To 60	60.0	15.0
36 To 45	61 To 70	105.0	20.0
46 To 55	71 To 90	150.0	24.0

School crosswalk width shall be 1.8 m min. 3.0 m std. without public sidewalk curb ramps. 3.0 m min. with public sidewalk curb ramps. See Index No. 17346 sheet 9 of 9.

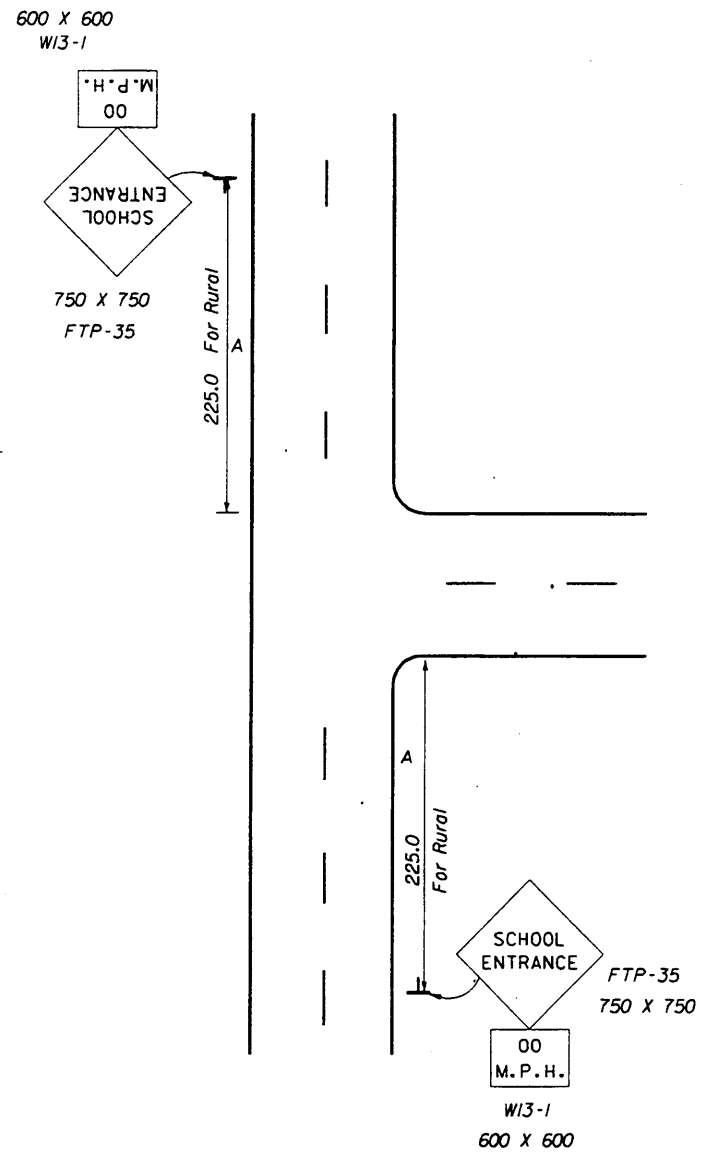


8. TRAFFIC CONTROL DEVICES FOR SIGNALIZED MIDBLOCK SCHOOL CROSSWALK

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

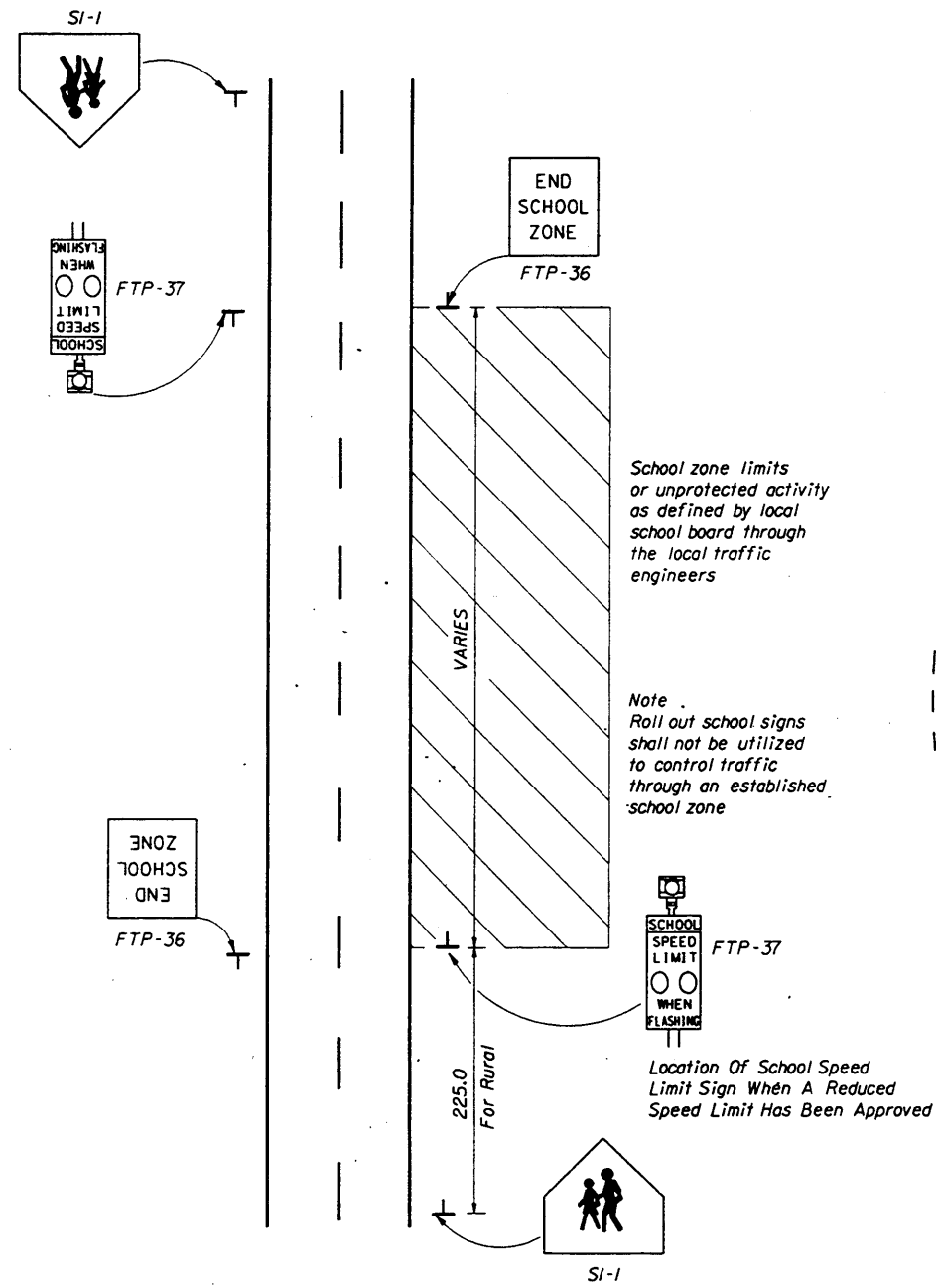
### SCHOOL SIGNS & MARKINGS

Names	Dates	Approved By		
Designed By	7-76	<i>Charles A. Scott</i> State Traffic Plans Engineer		
Drawn By				
Checked By	7-76	Revision	Sheet No.	Index No.
		98	3 of 6	17344

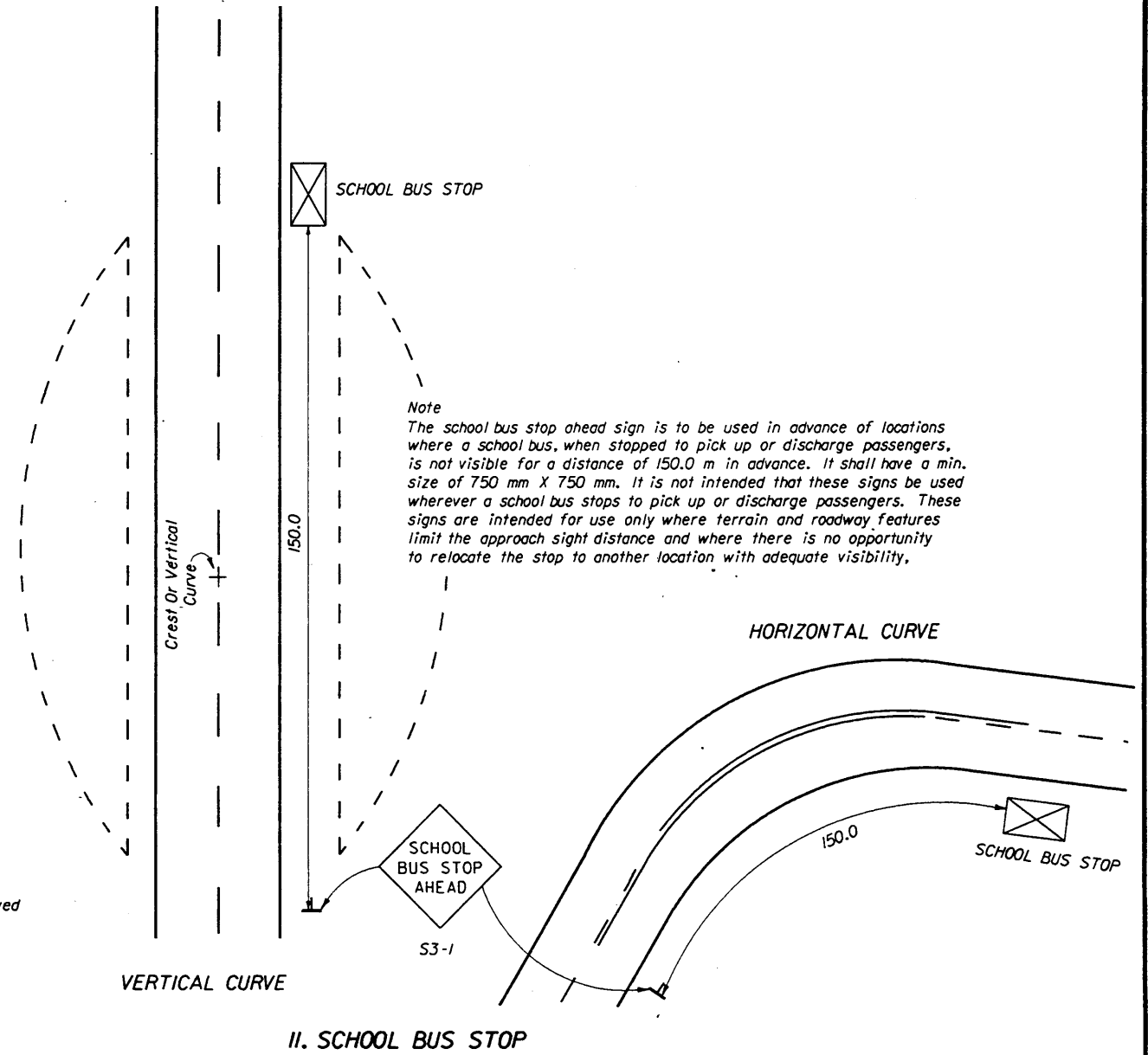


**9. TRAFFIC CONTROL DEVICES AT SCHOOL ENTRANCES WITH LOW VOLUMES OF WALKING STUDENTS**

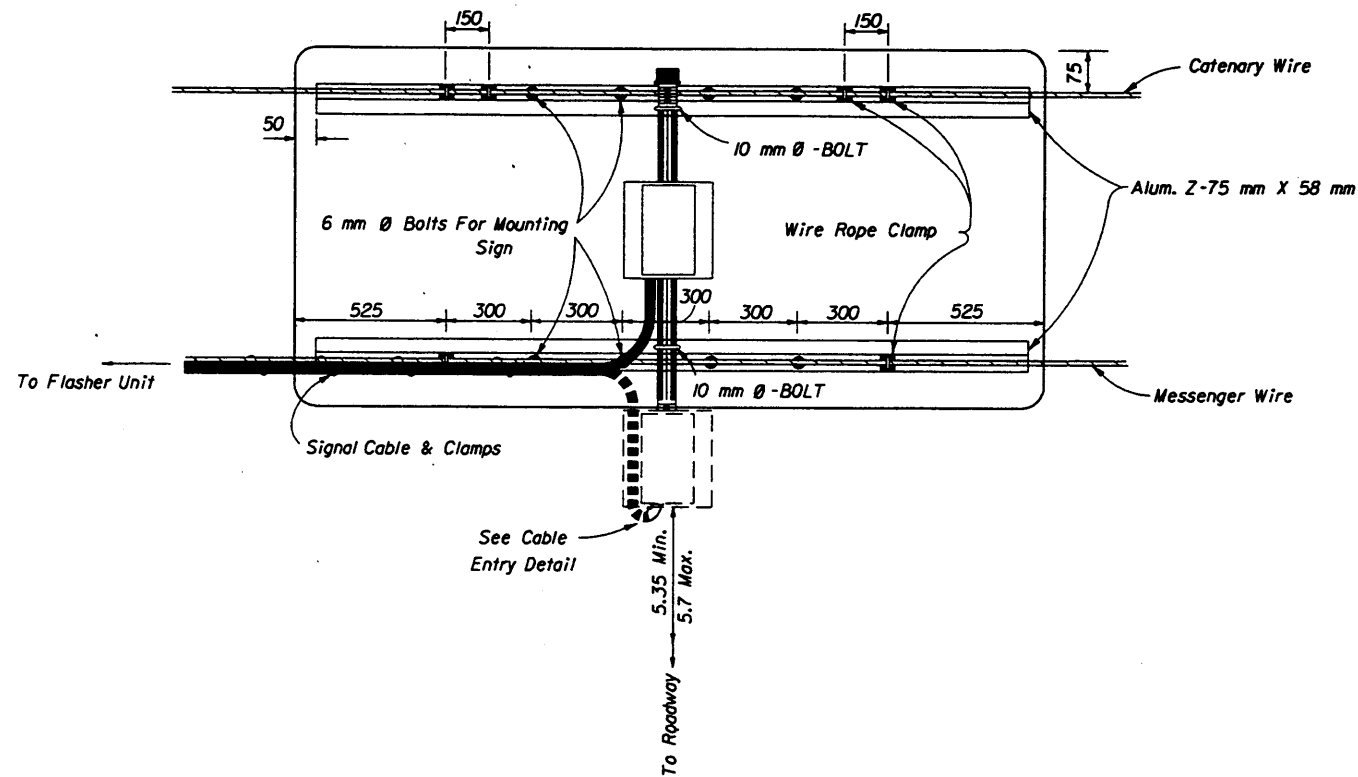
These signs are intended for use only at those few locations where the school entrance is not evident to the motorist, and must be approved in advance by the responsible traffic engineering authority.



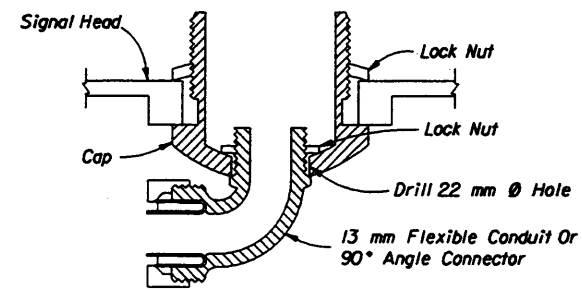
**10. TRAFFIC CONTROL DEVICES FOR A TYPICAL SCHOOL ZONE FRONTING THE SCHOOL PROPERTY**



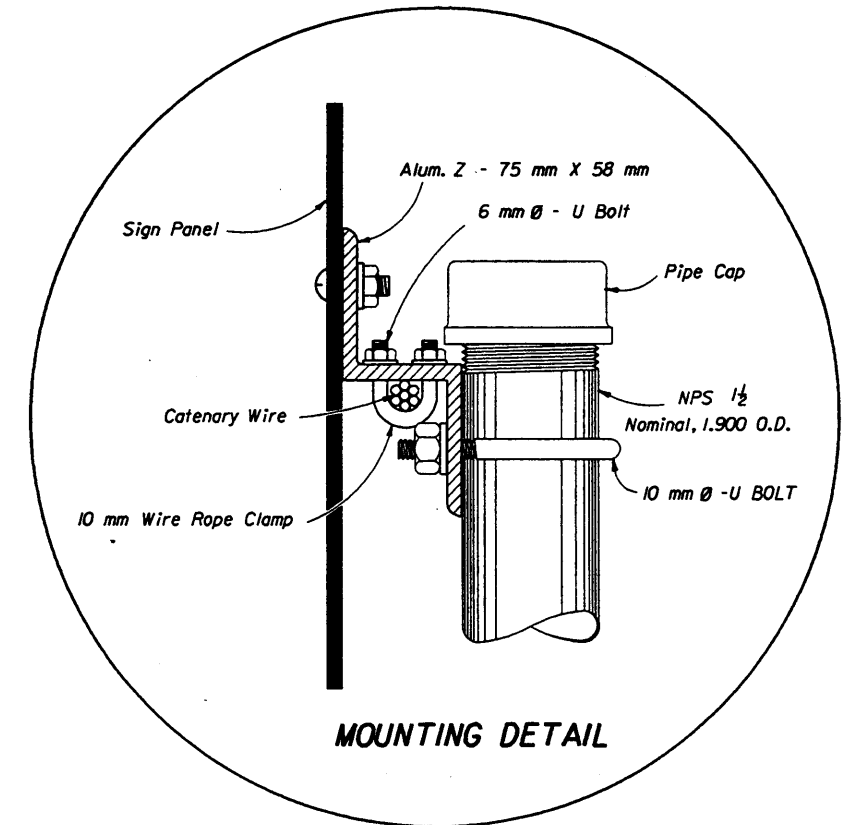
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN					
<b>SCHOOL SIGNS &amp; MARKINGS</b>					
Designed By	Names	Dates	Approved By <i>Charles A. Scott</i> State Traffic Plans Engineer		
Drawn By		7-76	Revision	Sheet No.	Index No.
Checked By		7-76	96	4 of 6	17344



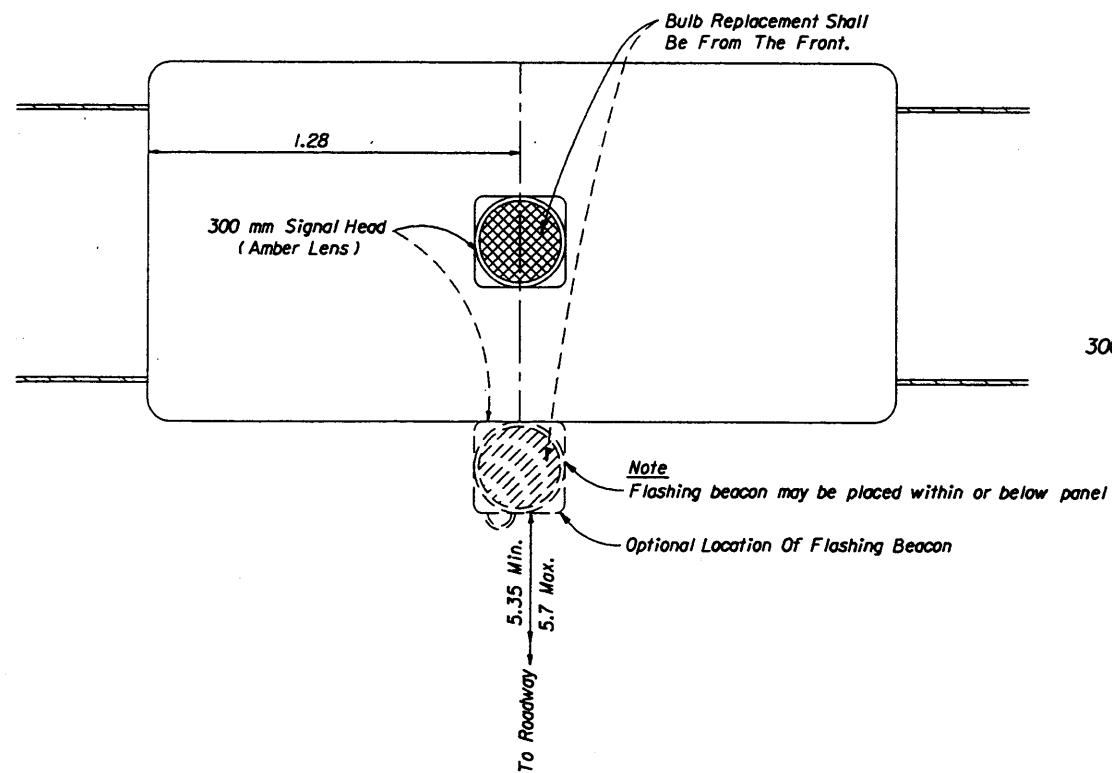
REAR VIEW



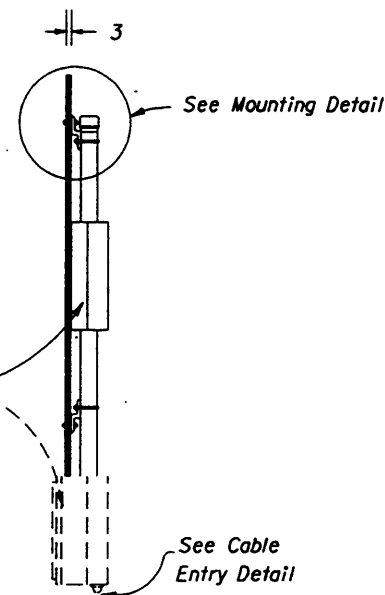
CABLE ENTRY DETAIL



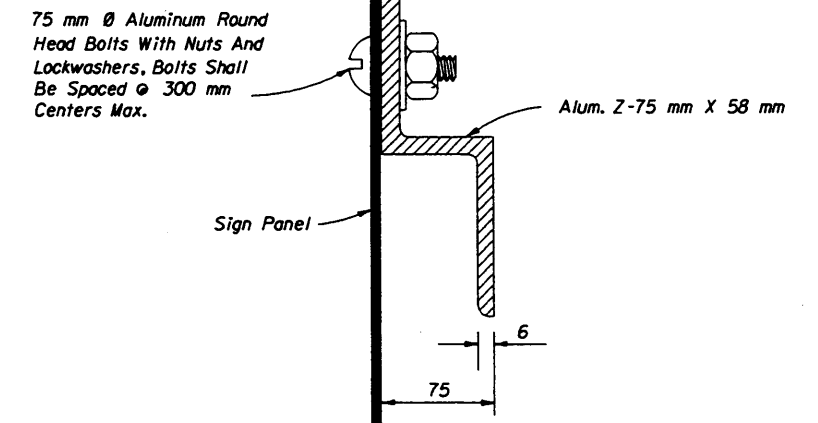
MOUNTING DETAIL



FRONT VIEW




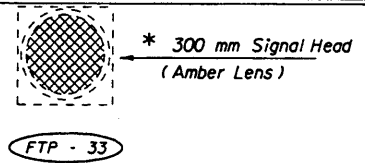
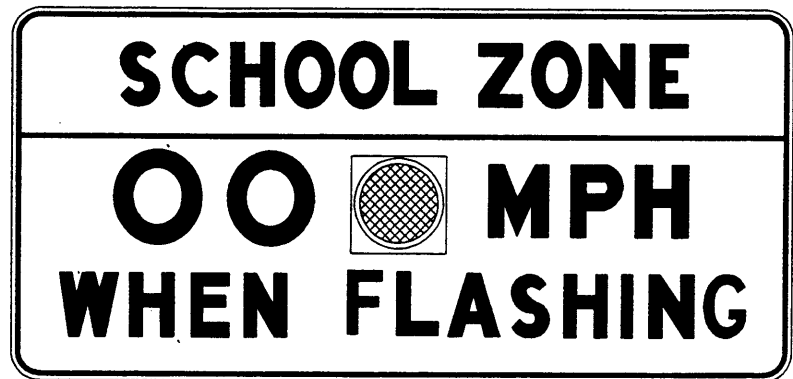
SIDE VIEW



Z SECTION DETAIL

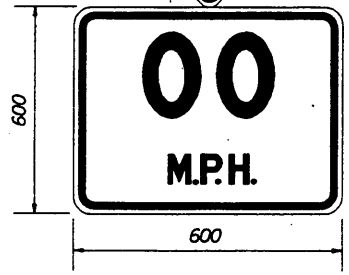
Flasher unit and cabinet to be placed on the strain pole supporting overhead sign assembly or on service pole. The flasher unit not to overhang private property or sidewalk.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
SCHOOL SIGNS & MARKINGS				
Names	Dates	Approved By		
Designed By	7-76	 State Traffic Plans Engineer		
Drawn By				
Checked By	7-76	Revision	Sheet No.	Index No.
		00	5 of 6	17344

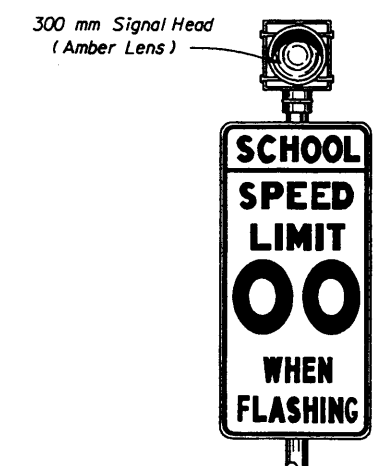
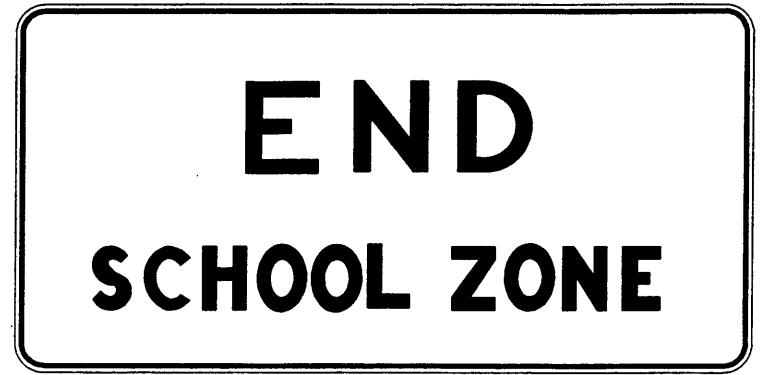
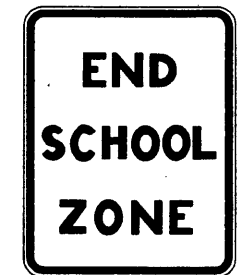
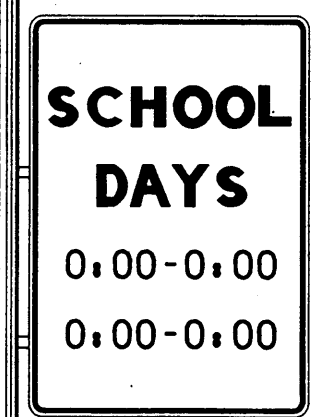
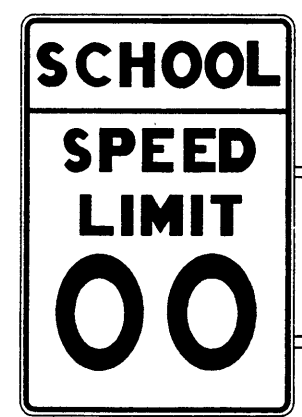


OVERHEAD STANDARD

\* Flashing Beacon May Be Placed Within Or Below Panel



SPEED LIMIT ASSEMBLY



Ground Mount Standard

Notes:

1. Standard size signs should be used whenever possible. Minimum sizes may be used only on low volume, low speed (less than 35 m.p.h.) streets. Special sizes should be used on expressway facilities where special emphasis is needed.
2. The value of the actual school zone speed limit shall be determined by the District Traffic Operations Engineer in cooperation with local school superintendents. In no case shall it be less than the 15 m.p.h. min. as set by law.
3. See Index No. 17355 for sign details.

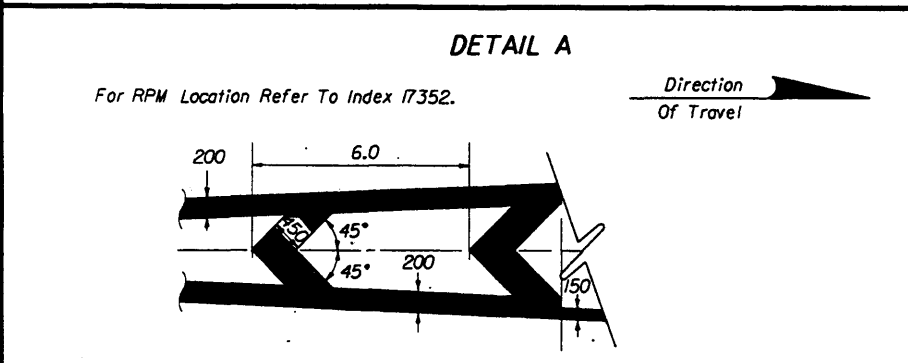
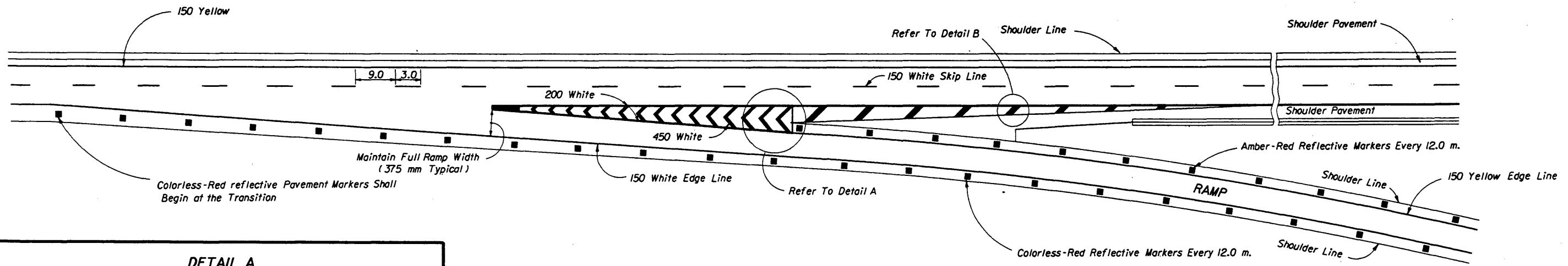
Note:

Existing ground mount school speed limit signs utilizing a single 200 mm min. size beacon or two 150 mm min. size beacons inside the sign border are considered meeting the standard. However, replacement or upgrading of these school speed limit signs shall conform to the above standard. Numerical speed limit displayed shall be established by appropriate regulatory authorities.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

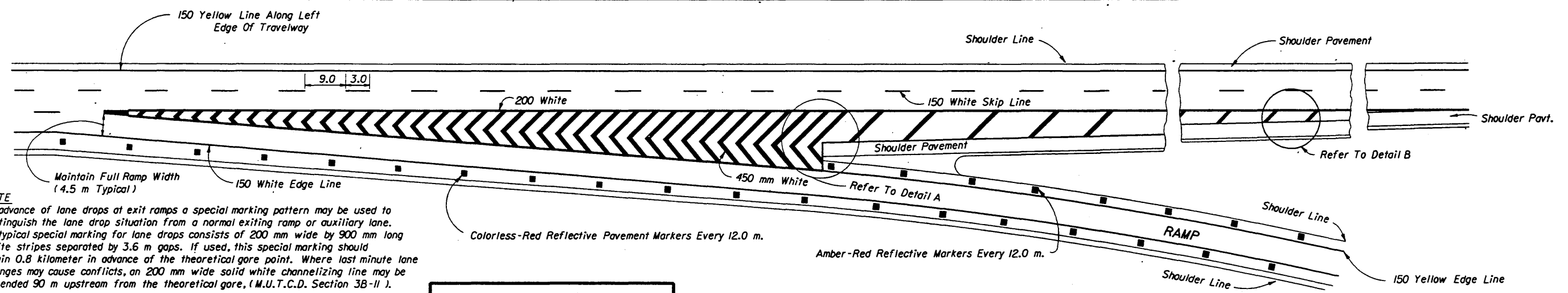
SCHOOL SIGNS & MARKINGS

Names	Dates	Approved By		
Designed By	7-76	 State Traffic Plans Engineer		
Drawn By				
Checked By	7-76	94	6 of 6	Index No. 17344

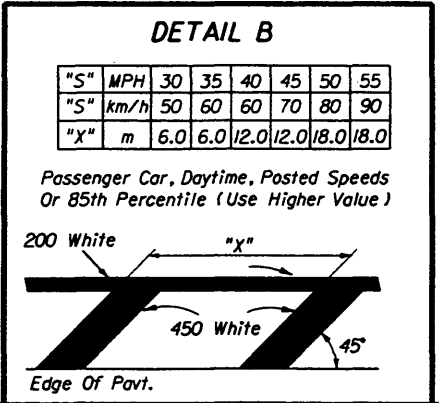


Note:  
Reflective pavement markers  
are installed adjacent to the  
edge line.

**NORMAL TAPERED EXIT**  
(TWO THRU LANES)



**NOTE**  
In advance of lane drops at exit ramps a special marking pattern may be used to distinguish the lane drop situation from a normal exiting ramp or auxiliary lane. A typical special marking for lane drops consists of 200 mm wide by 900 mm long white stripes separated by 3.6 m gaps. If used, this special marking should begin 0.8 kilometer in advance of the theoretical gore point. Where last minute lane changes may cause conflicts, a 200 mm wide solid white channelizing line may be extended 90 m upstream from the theoretical gore. (M.U.T.C.D. Section 3B-11).

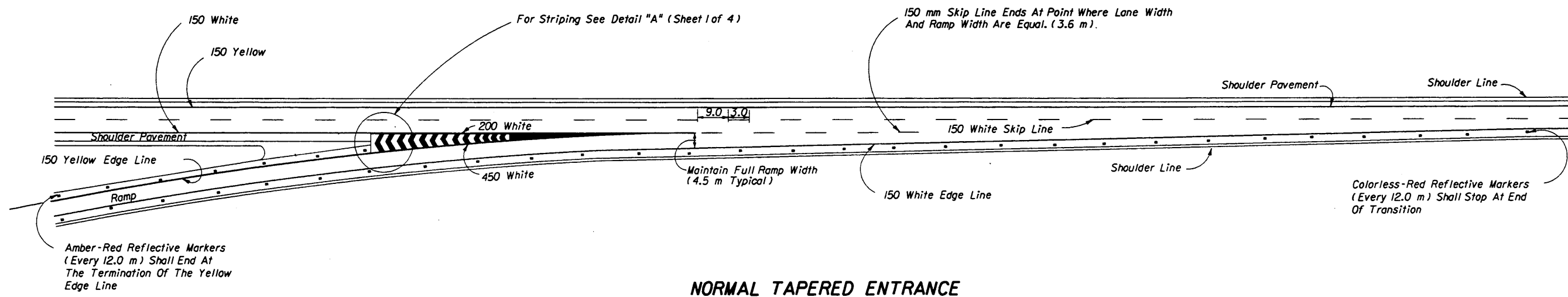


**NORMAL TAPERED EXIT ONLY**  
(TWO THRU LANES - THREE APPROACH LANES)

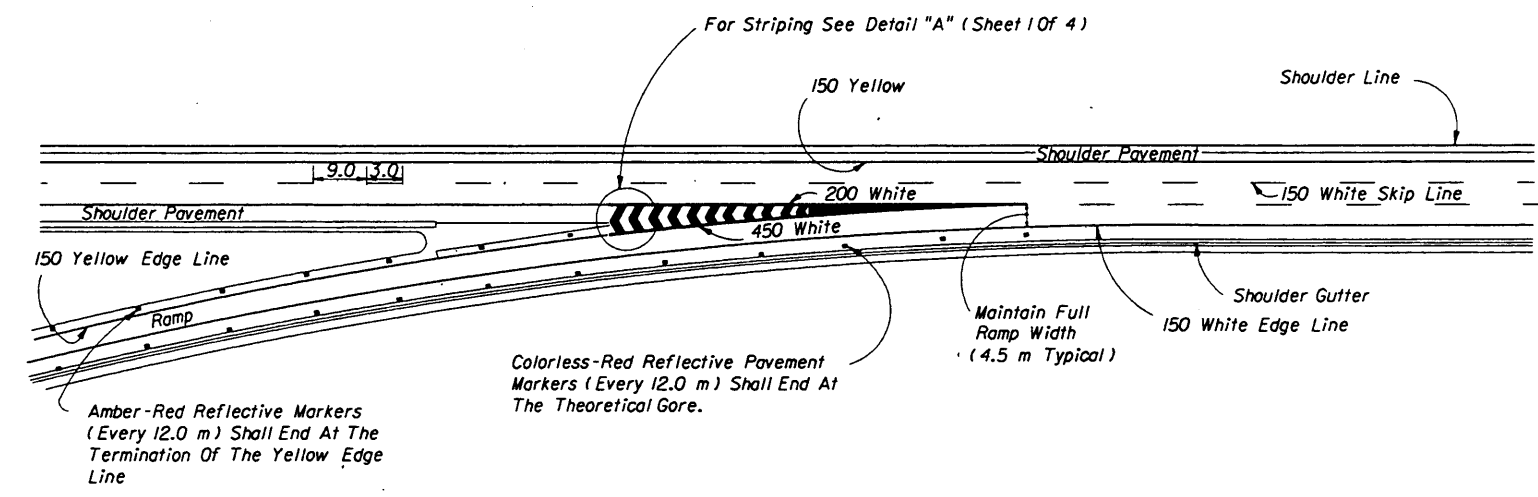
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

**INTERCHANGE MARKINGS**

Designed By	Names	Dates	Approved By
Drawn By		9-73	<i>Charles A. Scott</i> State Traffic Plans Engineer
Checked By		9-73	Revision
		94	Sheet No.
			Index No.
			1 of 4
			17345

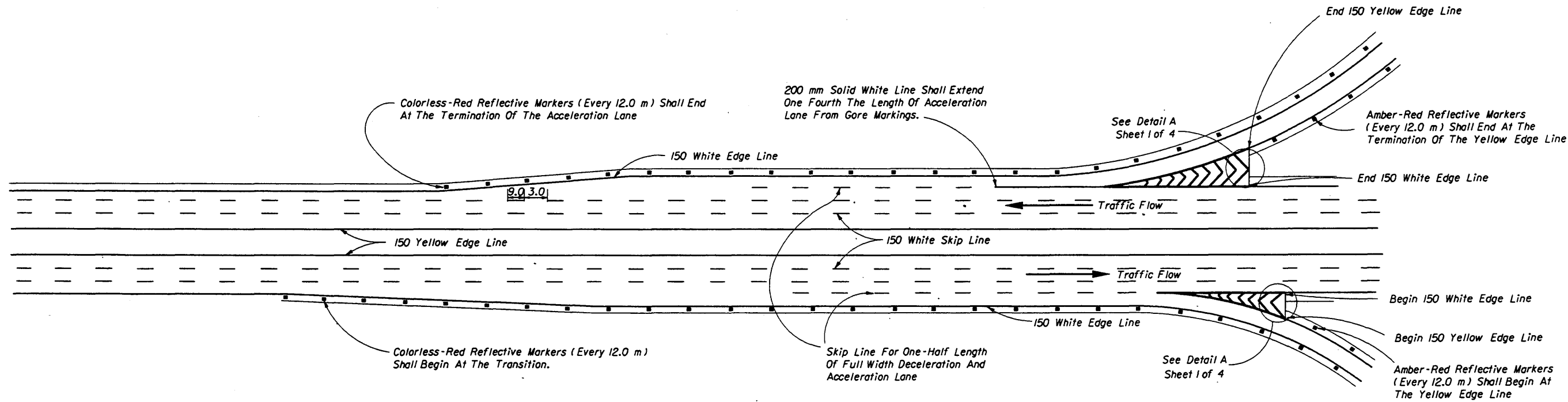


**NORMAL TAPERED ENTRANCE**

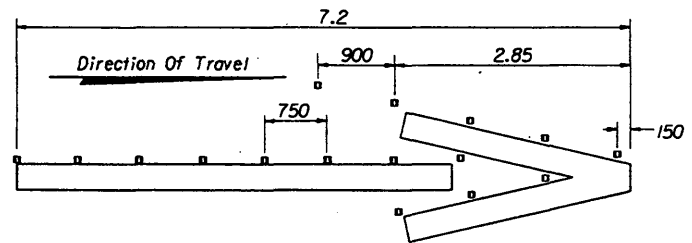


**NORMAL TAPERED ENTRANCE WITH ADDED LANE**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
<b>INTERCHANGE MARKINGS</b>				
Designed By	Names	Dates	Approved By	
		7-73	<i>Charles Satt</i> State Traffic Plans Engineer	
Drawn By	Revision	Sheet No.	Index No.	
	94	2 of 4	17345	
Checked By		7-73		



**PARALLEL ACCELERATION AND DECELERATION LANE**

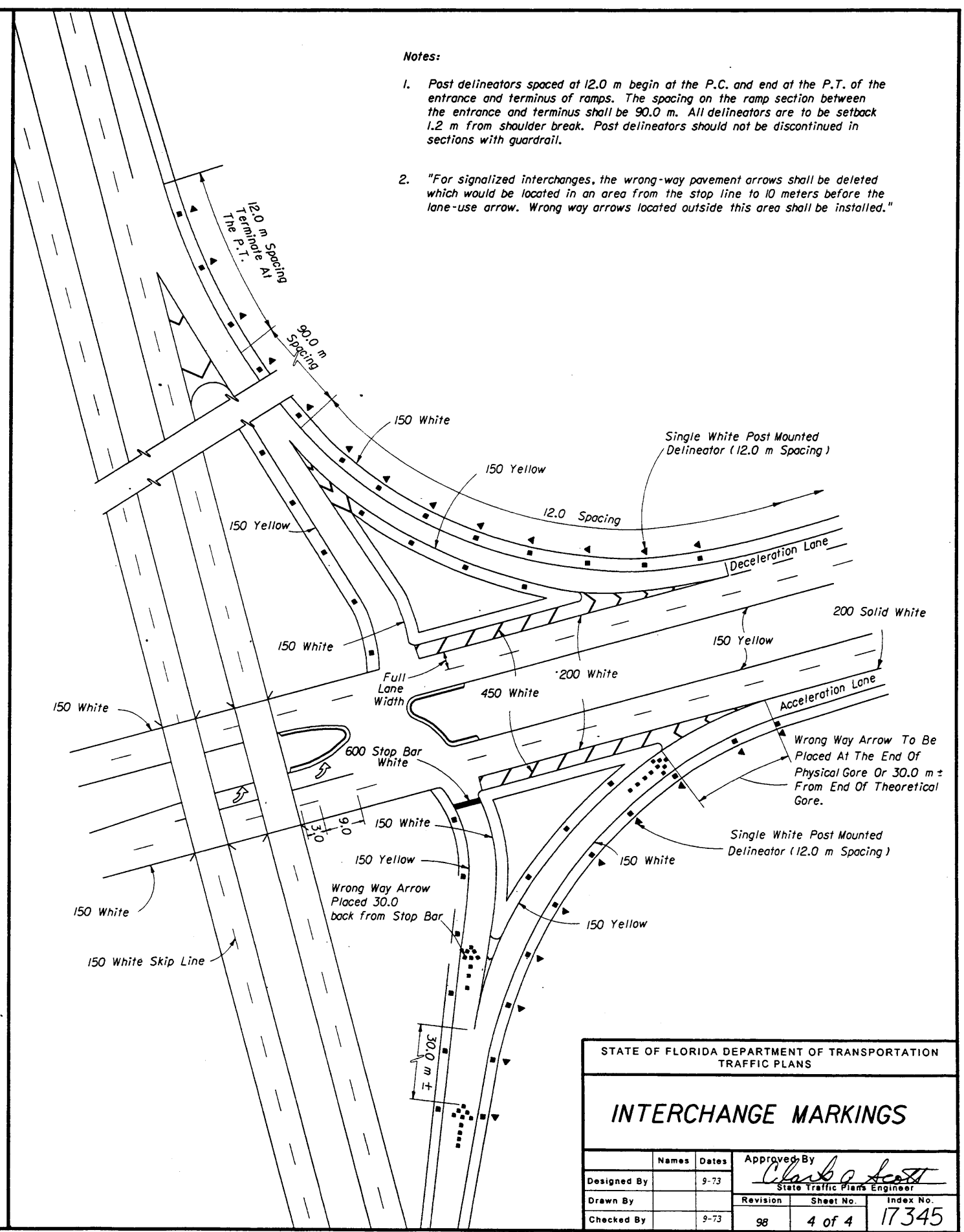
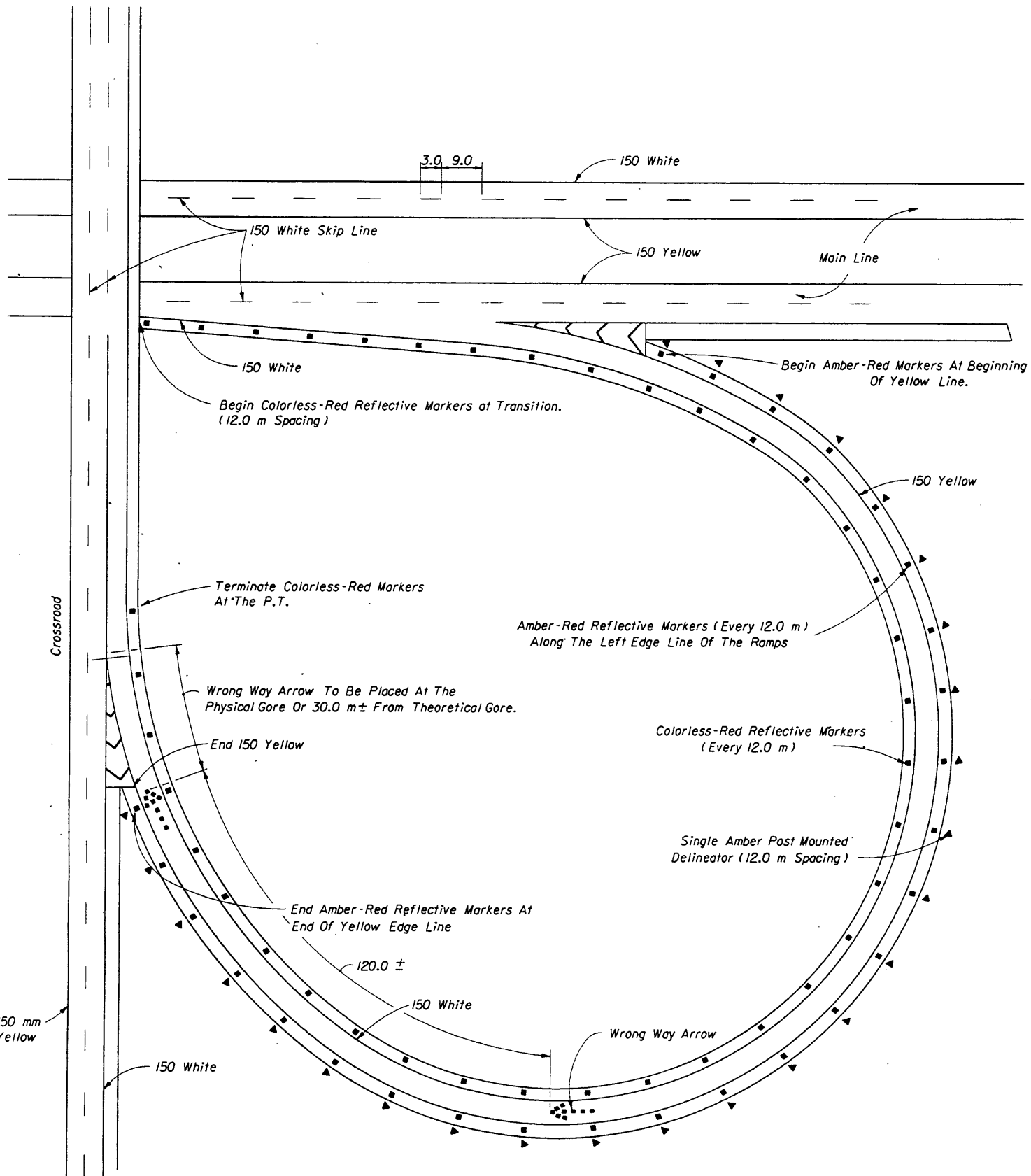


White Arrow With  
Colorless-Red Reflective Markers  
For Arrow details see Index No. 17346  
sheet 1 of 9.

**WRONG WAY ARROW**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC PLANS				
<b>INTERCHANGE MARKINGS</b>				
Designed By		Date	Approved By <i>Charles Scott</i> State Traffic Plans Engineer	
Drawn By		9-73	Revision	Sheet No. 3 of 4
Checked By		9-73	94	Index No. 17345



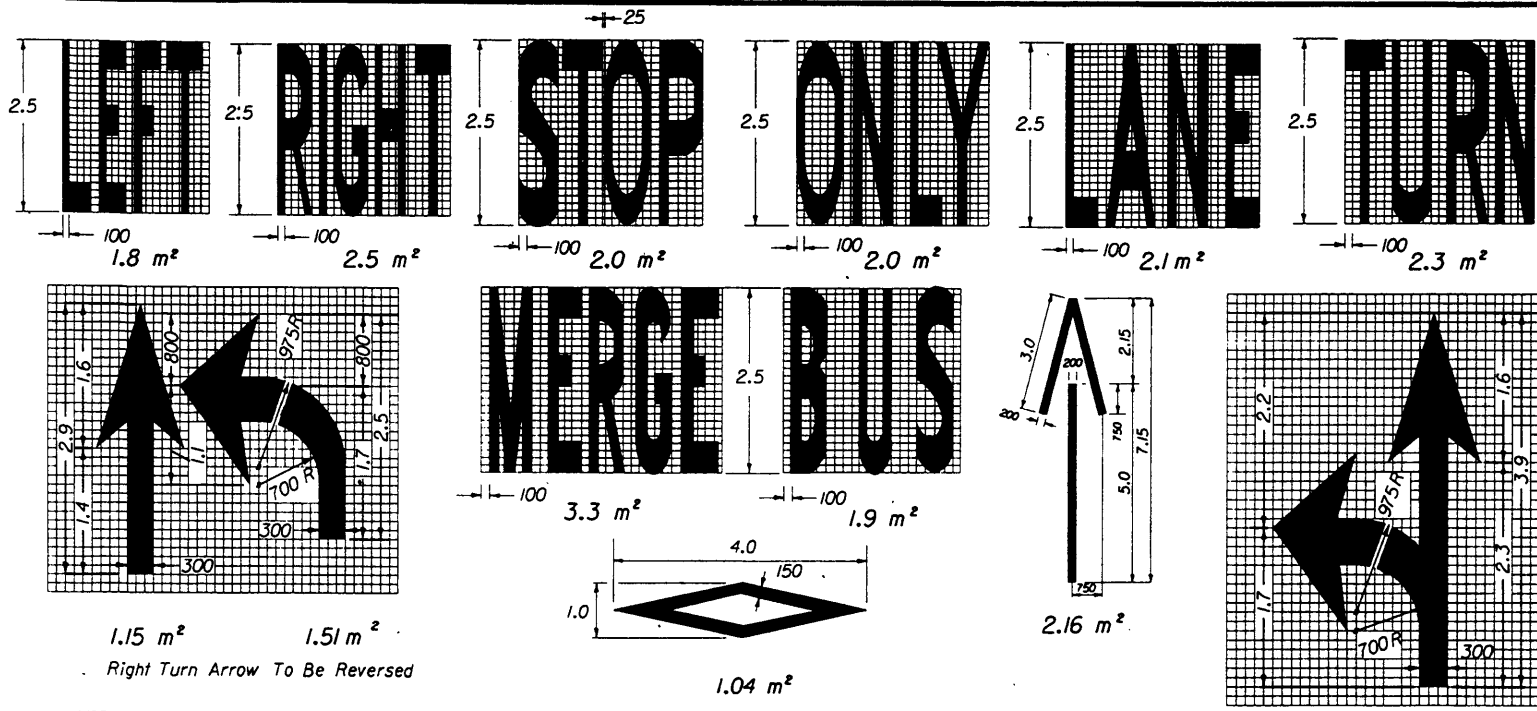


- Notes:
1. Post delineators spaced at 12.0 m begin at the P.C. and end at the P.T. of the entrance and terminus of ramps. The spacing on the ramp section between the entrance and terminus shall be 90.0 m. All delineators are to be setback 1.2 m from shoulder break. Post delineators should not be discontinued in sections with guardrail.
  2. "For signalized interchanges, the wrong-way pavement arrows shall be deleted which would be located in an area from the stop line to 10 meters before the lane-use arrow. Wrong way arrows located outside this area shall be installed."

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC PLANS

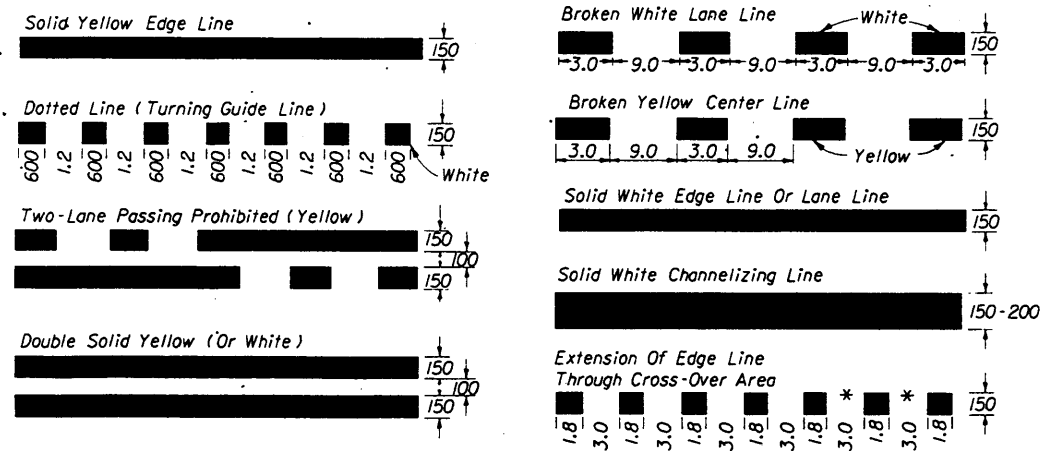
**INTERCHANGE MARKINGS**

Names	Dates	Approved By		
Designed By	9-73	 State Traffic Plans Engineer		
Drawn By				
Checked By	9-73	Revision	Sheet No.	Index No.
		98	4 of 4	17345



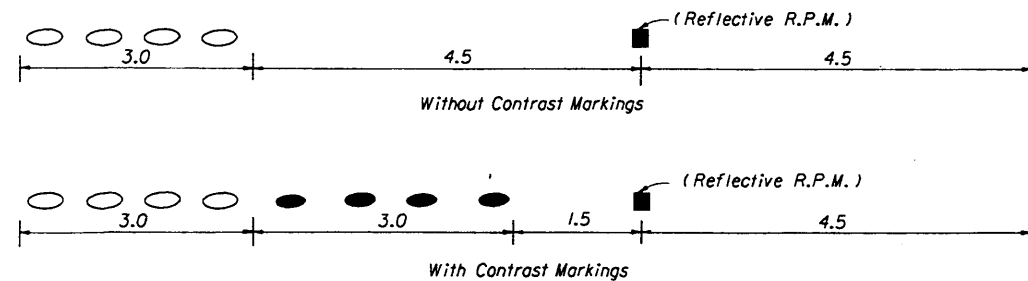
NOTE: When arrow and pavement message are used together, the arrow shall be located down stream of the pavement message and shall be separated from the pavement message by a distance of 7.5 m (Base of the arrow to the base of the message).  
DIMENSIONS ARE WITHIN 25 mm ±

**PAVEMENT ARROW AND MESSAGE DETAILS**



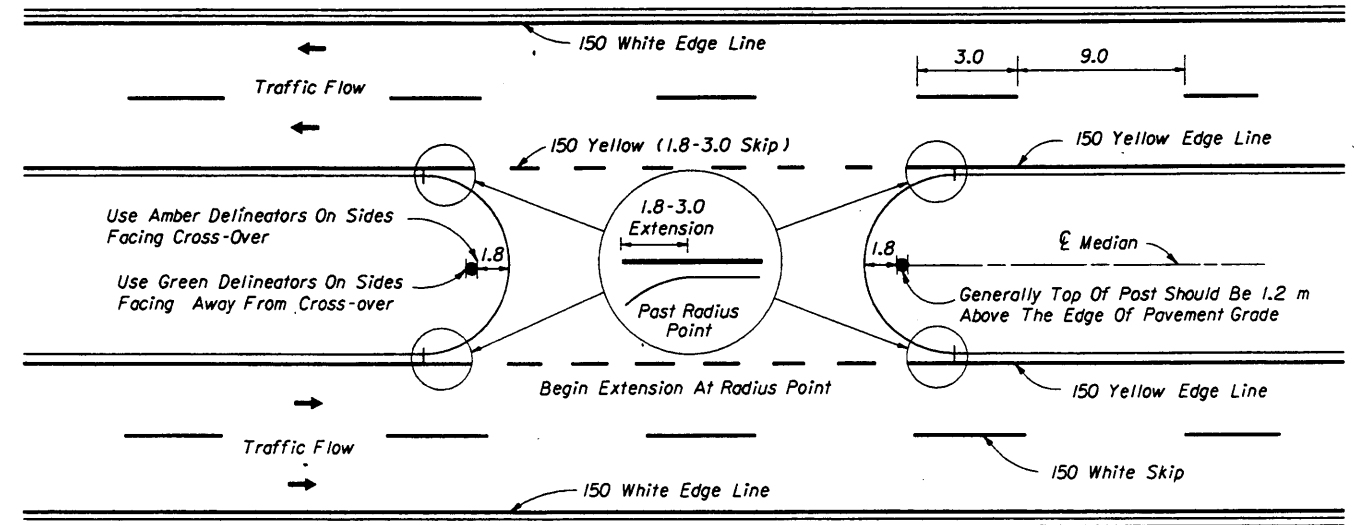
**TYPES OF PERMANENT LONGITUDINAL LINES**

**BASIC COLOR RULE**  
White lines separate traffic in the same direction.  
Yellow lines separate traffic in opposing directions.  
Yellow dotted lines may be used in special cases.



NOTE: Ceramic Markers should not be installed unless specifically called for in the plans. Use is limited to high volume sections with ADT's greater than 50,000 where lane changing is to be discouraged or other areas where channelization is required.

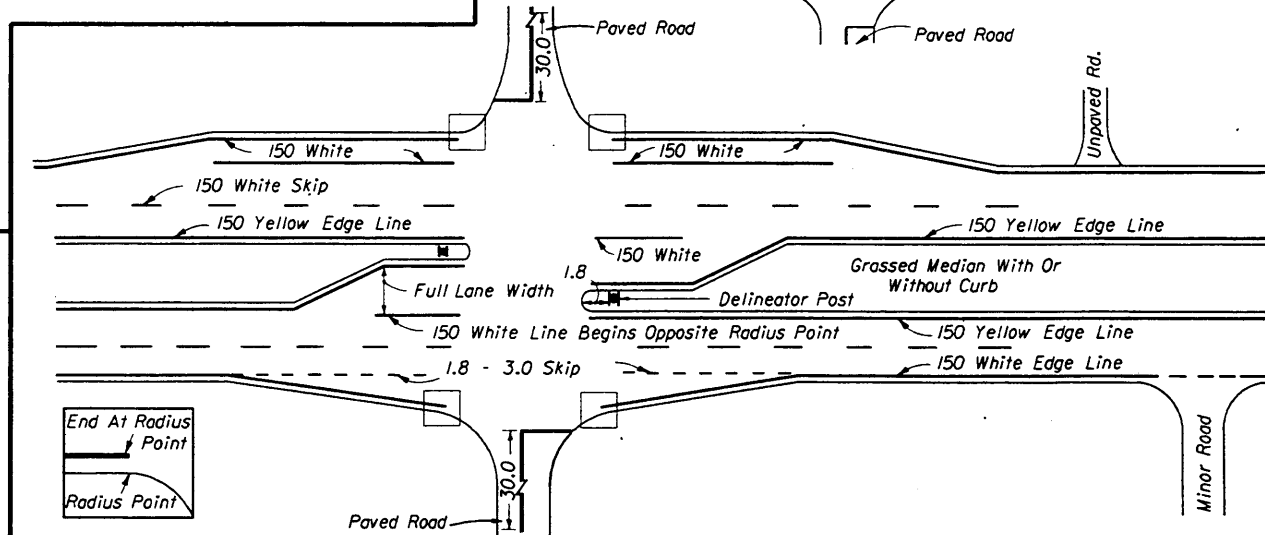
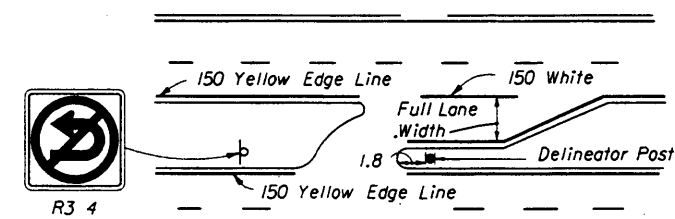
**NON-REFLECTIVE CERAMIC PAVEMENT MARKER PLACEMENT**



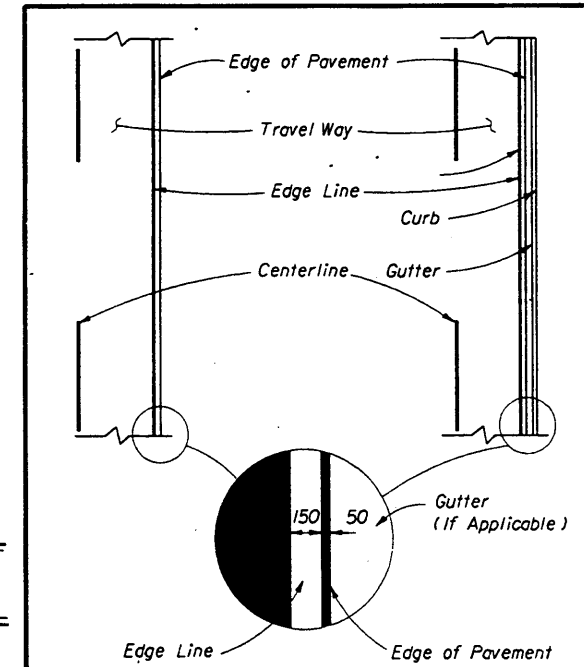
**PAVEMENT MARKINGS AND DELINEATORS FOR MEDIAN CROSS-OVER**

NOTE:

Markings applied to median noses shall be yellow in color.



**PAVEMENT MARKINGS FOR INTERSECTIONS WITH MAJOR AND MINOR ROADS**

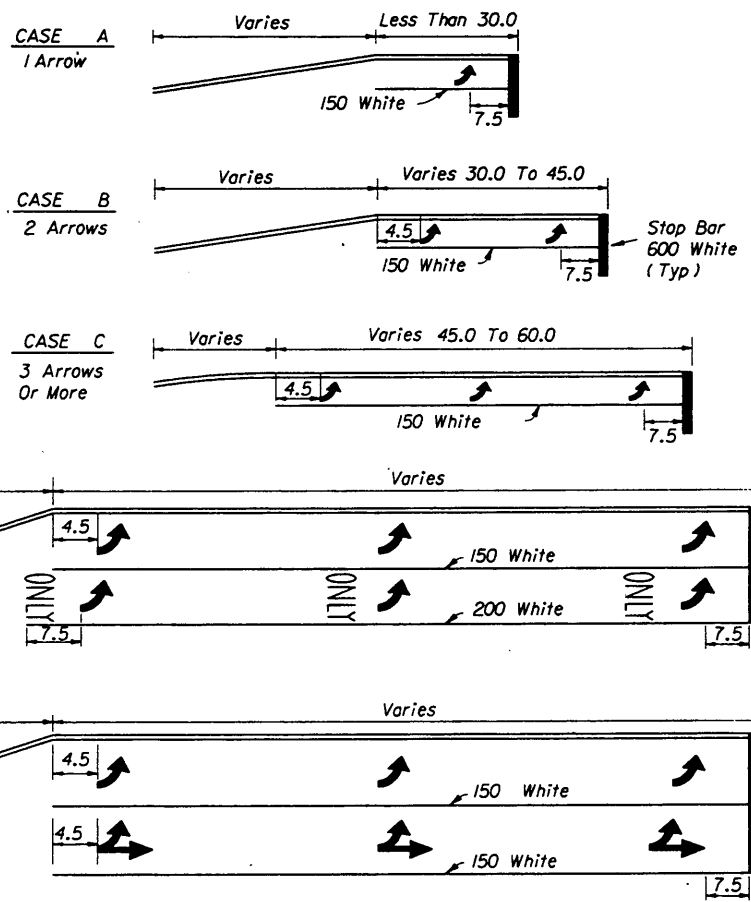


**PLACEMENT OF EDGE LINES**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

**SPECIAL MARKING AREAS**

Names	Dates	Approved By	
Designed By	8-78	Charles P. Acosta State Traffic Plans Engineer	
Drawn By		Revision	Sheet No. Index No.
Checked By	8-78	96	1 of 9 17346



**NOTE:**

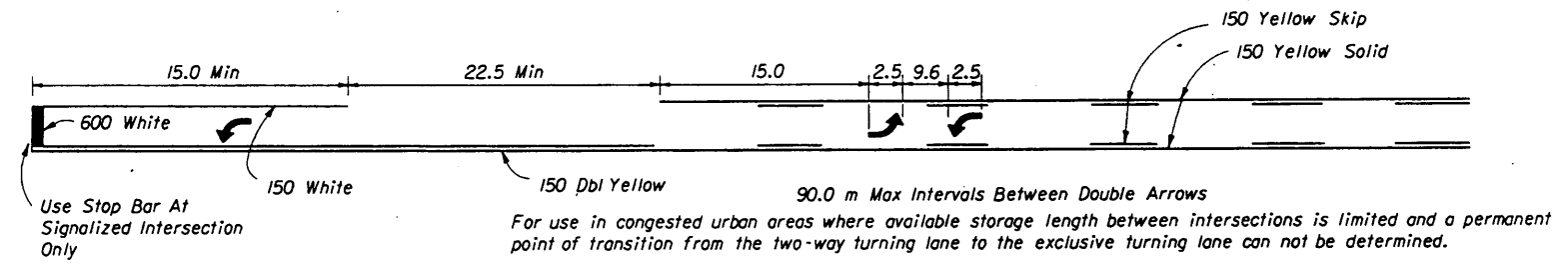
Yellow left turn edge marking may be used adjacent to raised curb or grass medians if lane use is not readily apparent to drivers approaching a left turn storage lane.

Turn lanes longer than 60.0 m add one arrow for each 30.0 m additional length.

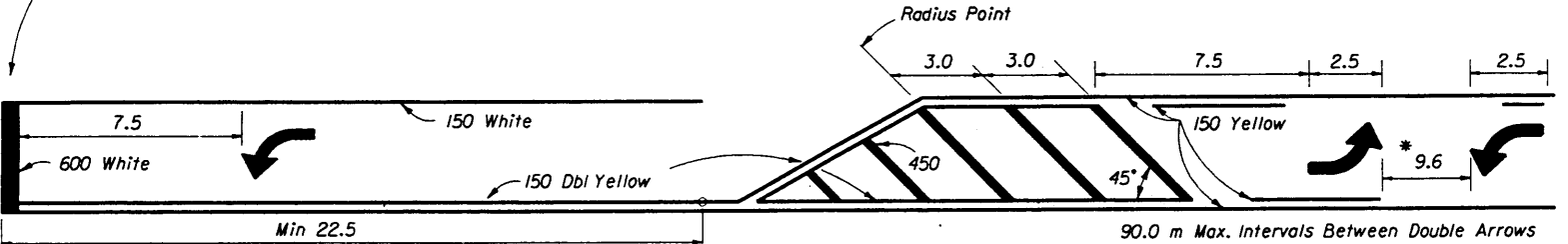
Arrows Should Be Evenly Spaced Between First And Last Arrow

Pavement message ONLY is not required for created (shadowed) turn lanes, single or dual, where the driver must exit the thru lane to enter a turn lane.

(STOP CONTROLLED OR SIGNALIZED INTERSECTIONS)  
**PAINTED LEFT TURN STORAGE LANE(S) DETAILS**



**SCHEME ONE**

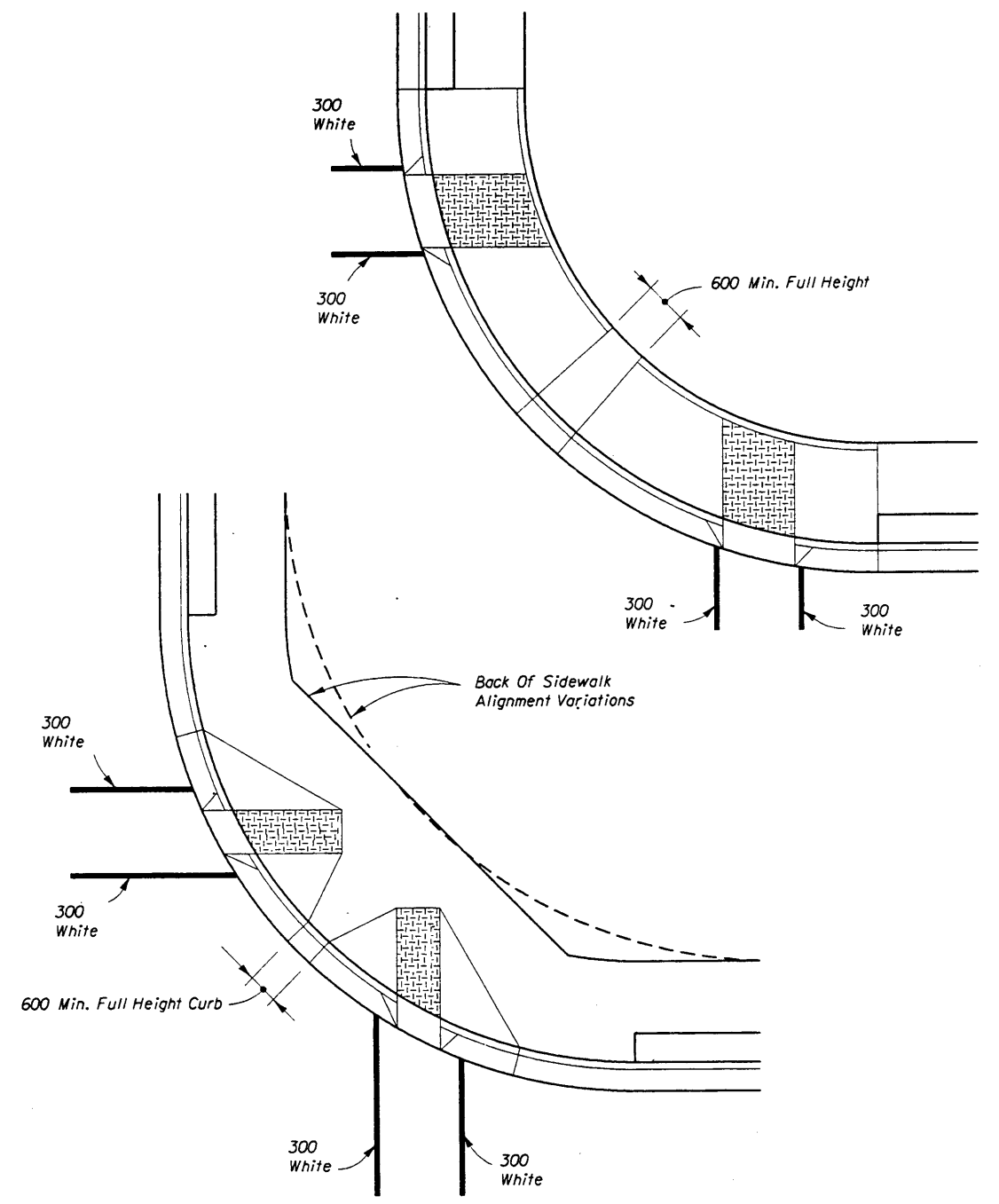


\*Typical spacing reference page 3B-6 in the M.U.T.C.D.

For use in rural & suburban areas where an adequate storage lane length can be specifically determined.

**SCHEME TWO**

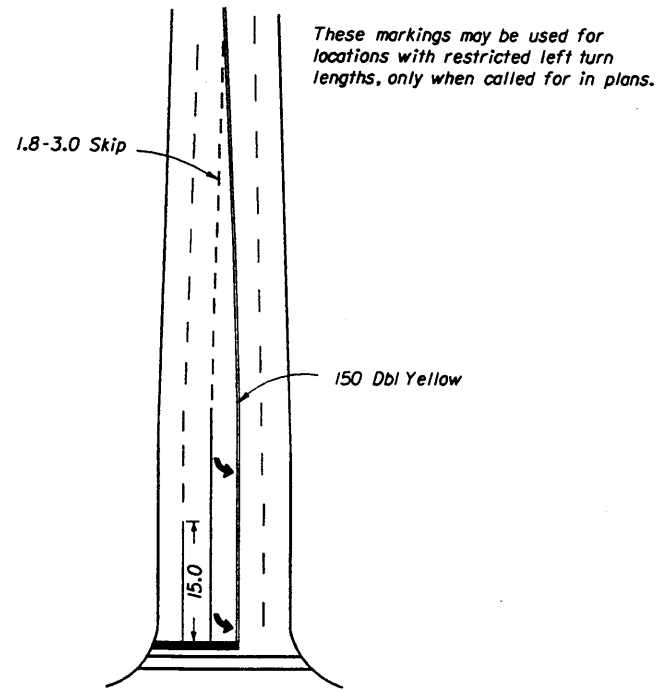
(WITH SINGLE LANE LEFT TURN CHANNELIZATION)  
**TWO WAY LEFT TURN LANE**



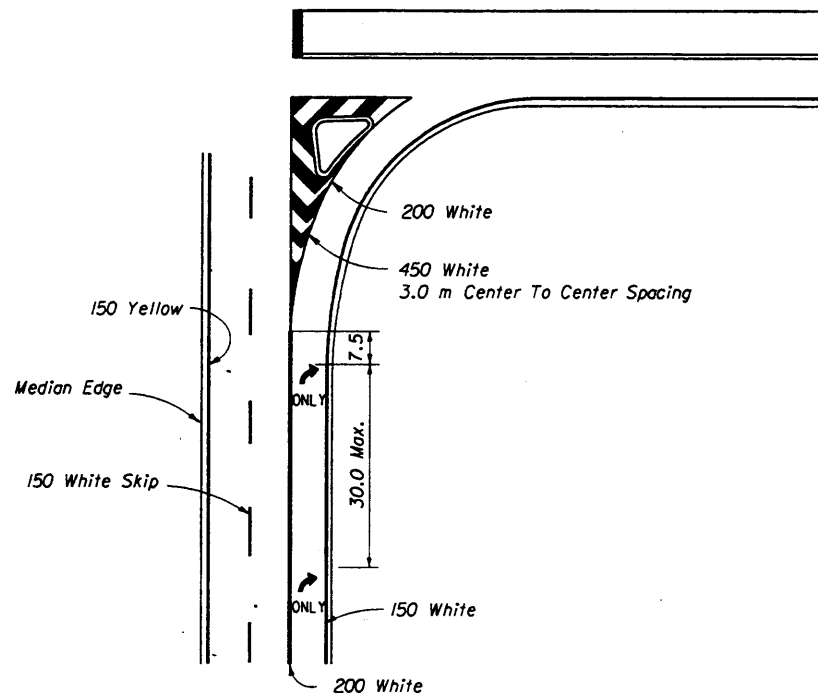
REFER TO INDEX NO. 17346 SHEET 9 OF 9.

**TYPICAL CROSSWALK MARKINGS FOR PUBLIC SIDEWALK CURB RAMPS**

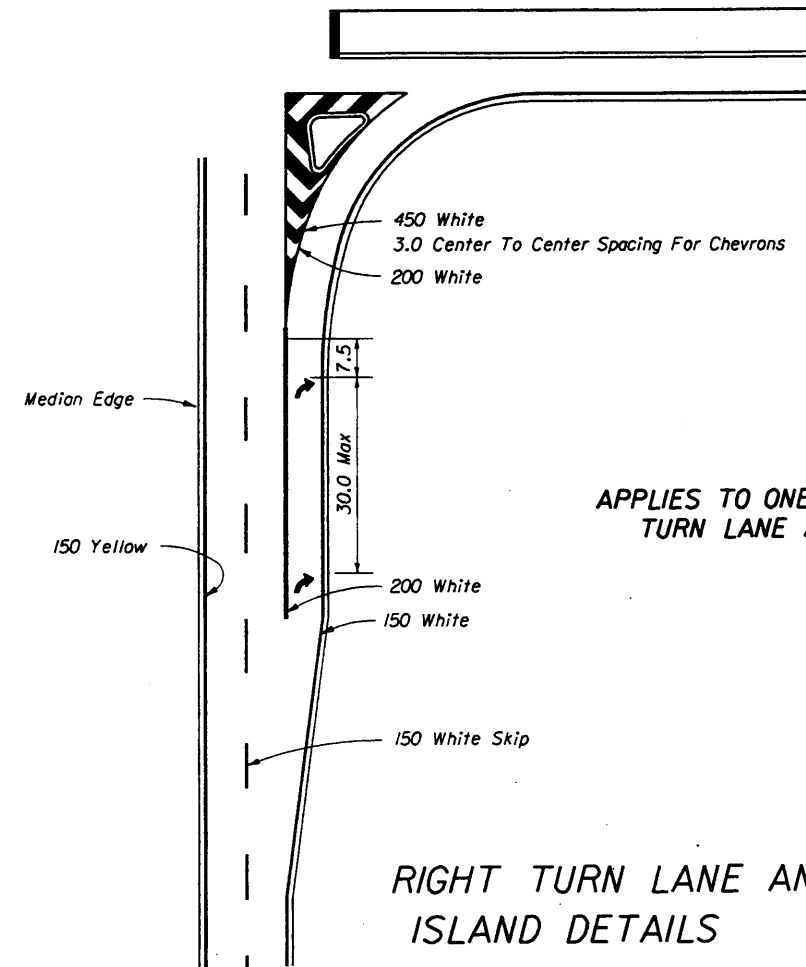
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
<b>SPECIAL MARKING AREAS</b>				
Names	Dates	Approved By		
Designed By	9-76	<i>Clara Scott</i> State Traffic Plans Engineer		
Drawn By		Revision	Sheet No.	Index No.
Checked By	9-76	96	2 of 9	17346



RESTRICTED LEFT TURN MARKING



RIGHT TURN LANE DROP AND ISLAND DETAILS  
LEFT TURN LANE DROP IS MIRROR IMAGE



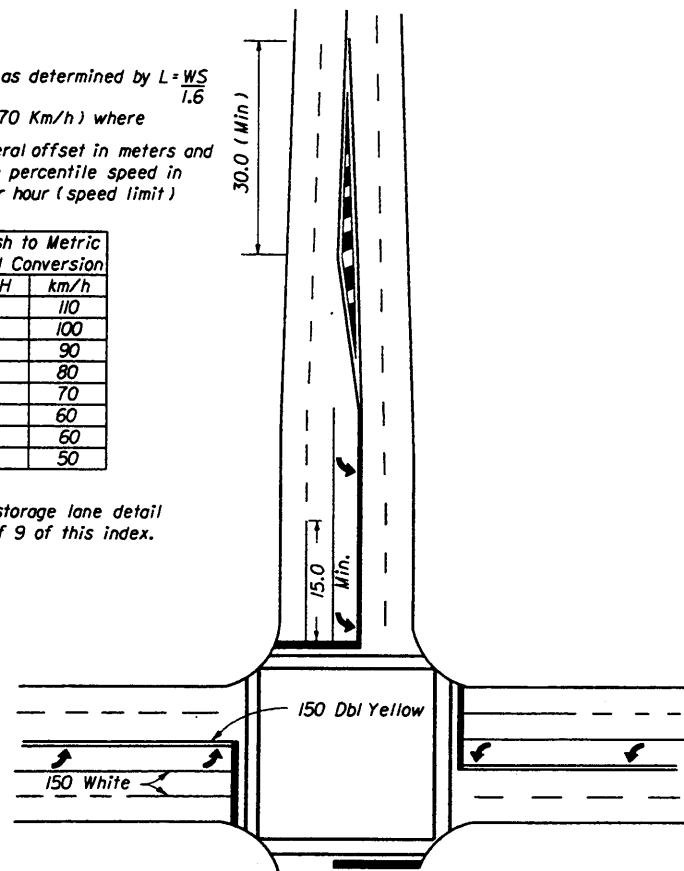
APPLIES TO ONE WAY LEFT TURN LANE ALSO

RIGHT TURN LANE AND ISLAND DETAILS

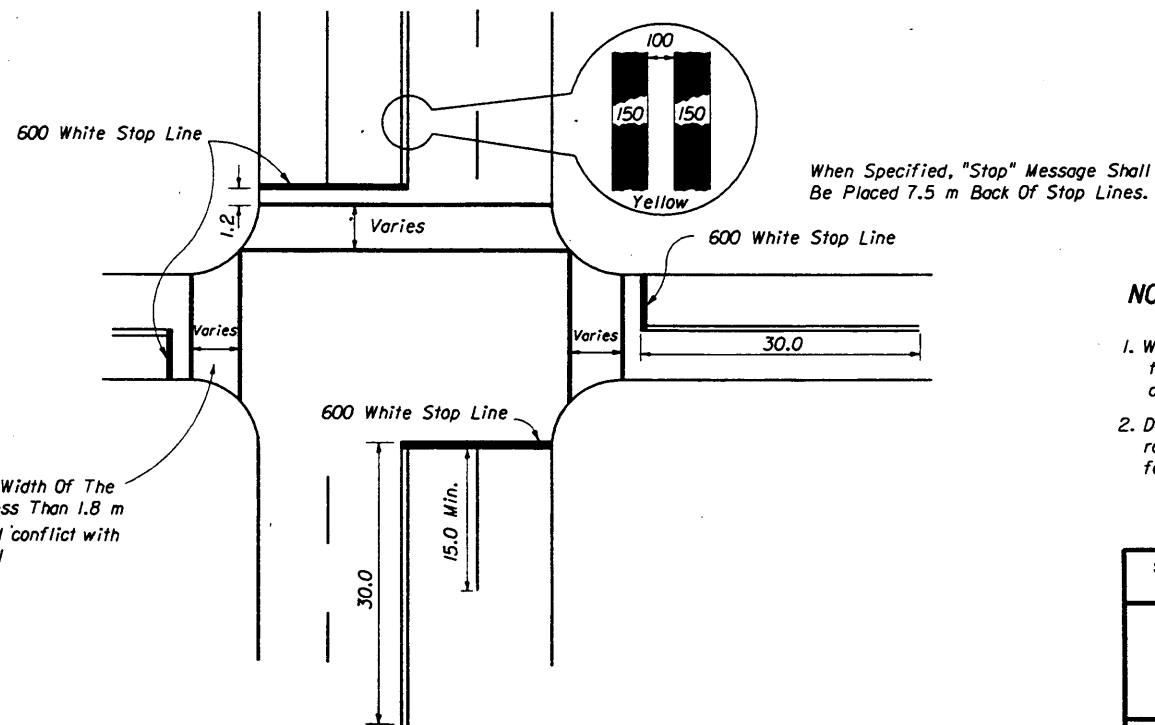
30.0 Minimum or as determined by  $L = \frac{WS^2}{1.6}$   
 $(L = \frac{WS^2}{150} < 70 \text{ Km/h})$  where  
 W is the lateral offset in meters and  
 S is the 85th percentile speed in kilometers per hour (speed limit)

English to Metric Speed Conversion	
MPH	km/h
65	110
60	100
55	90
50	80
45	70
40	60
35	60
30	50

For left turn storage lane detail see sheet 2 of 9 of this index.



TYPICAL INTERSECTION 2 THRU LANES PLUS LEFT TURN LANE, WITH CROSSWALK



STOP BARS, CROSSWALKS AND DOUBLE CENTER LINE DETAILS

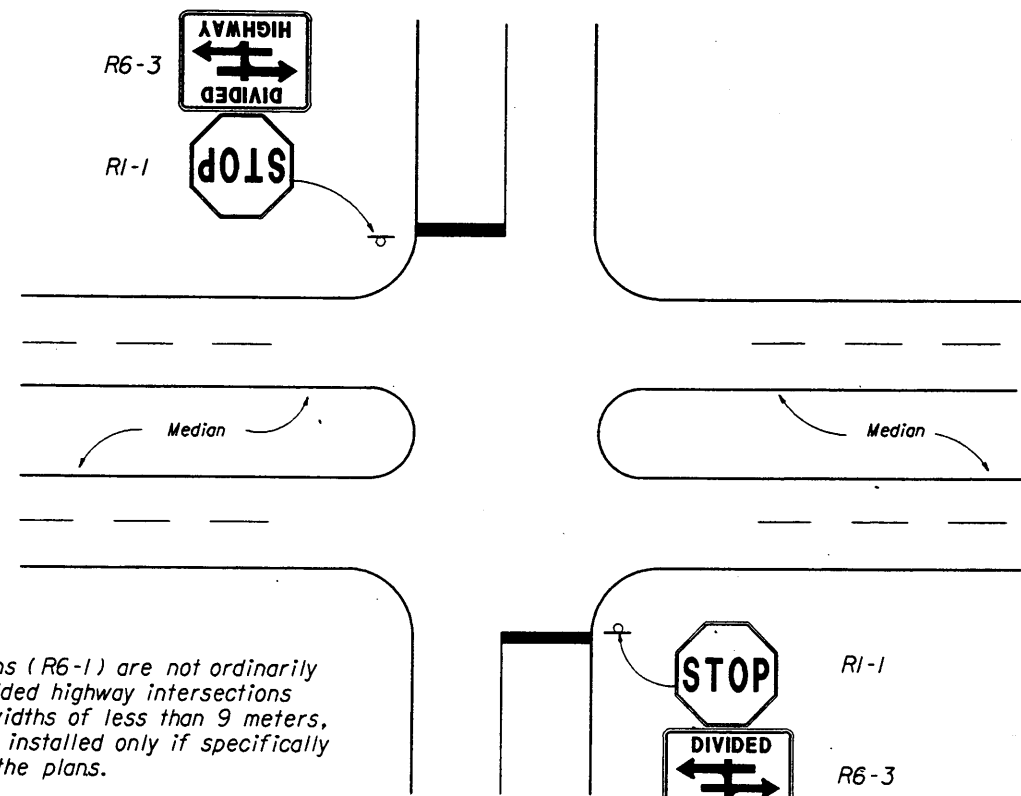
NOTES:

1. When public sidewalk curb ramps are present, refer to sheet 2 of 9 & 7 of 9 of this index 17346 and Index No. 304 for crosswalk widths.
2. Double yellow longitudinal center lines on all roadway approaches shall be extended back 30.0 m for projects involving intersection improvements only.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

SPECIAL MARKING AREAS

Names	Dates	Approved By		
Designed By	9-76	Clark A. Scott State Traffic Plans Engineer		
Drawn By				
Checked By	9-76	Revision	Sheet No.	Index No.
		96	3 of 9	17346



ONE WAY signs (R6-1) are not ordinarily needed at divided highway intersections with median widths of less than 9 meters, and should be installed only if specifically called for in the plans.

FIGURE 1

MEDIAN WIDTHS UNDER 9.0 m

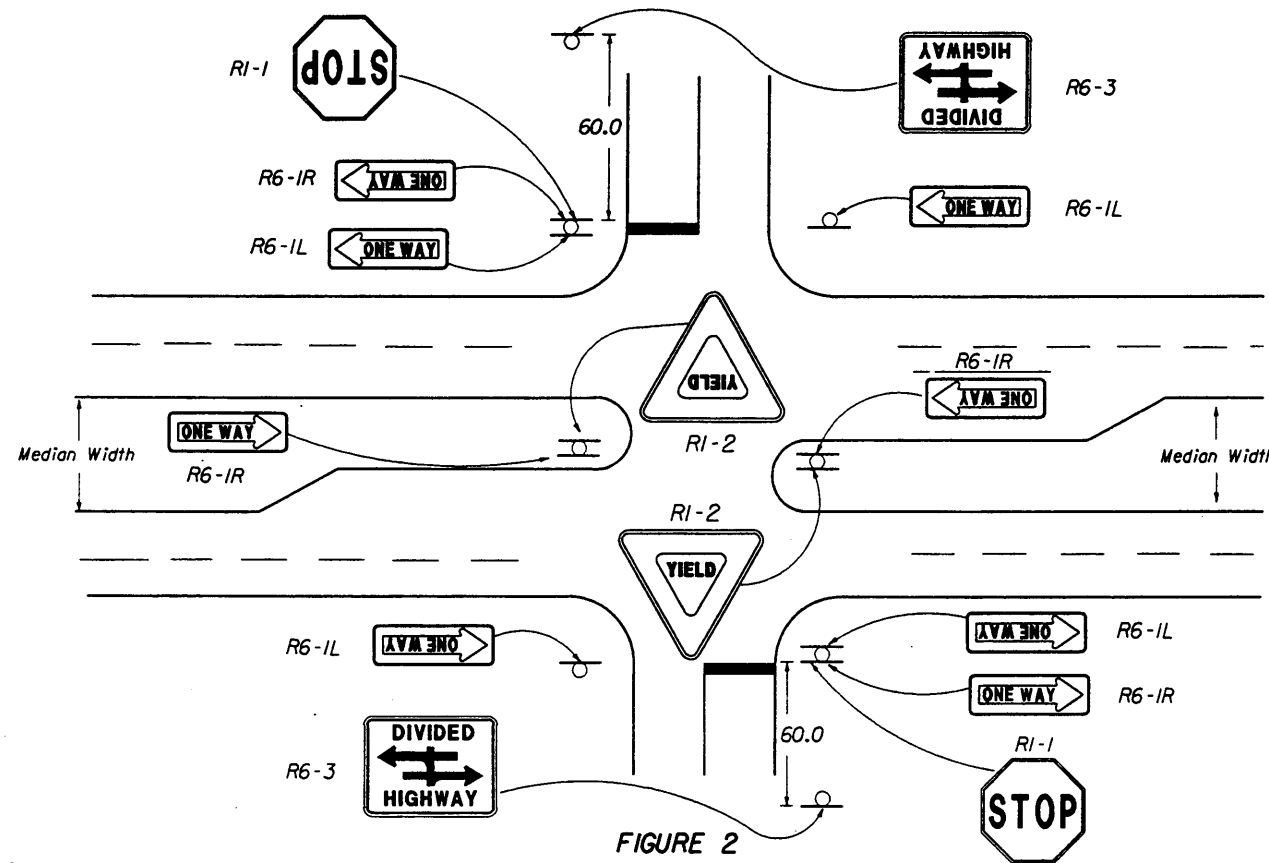


FIGURE 2

MEDIAN WIDTHS 9.0 m AND GREATER

ONE-WAY SIGNS ON DIVIDED HIGHWAY INTERSECTIONS

PAVEMENT MARKINGS FOR TRAFFIC CHANNELIZATION AT GORE  
(TRAFFIC FLOWS IN SAME DIRECTION)

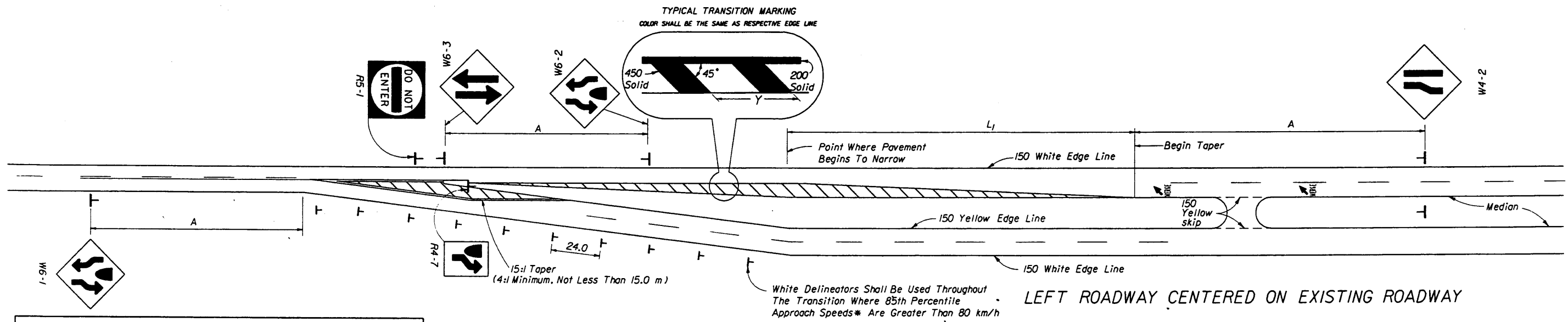
PAVEMENT MARKING FOR TRAFFIC SEPARATION  
(TRAFFIC FLOWS IN OPPOSING DIRECTIONS)

POSTED (DAY) SPEED LIMIT M.P.H.	SPEED LIMIT km/h	"y" m
30 OR LESS	50 OR LESS	3.0
35	60	6.0
40	60	6.0
45	70	9.0
50 OR MORE	80 OR MORE	12.0

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

**SPECIAL MARKING AREAS**

Designed By	Names	Dates	Approved By
Drawn By		8-78	<i>Clark A. Scott</i> State Traffic Plans Engineer
Checked By		8-78	Revision
		00	Sheet No. 4 of 9
			Index No. 17346

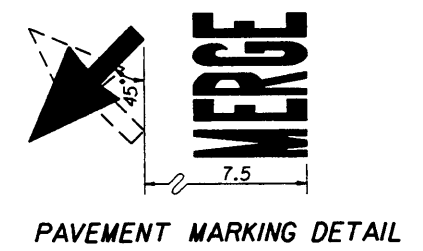
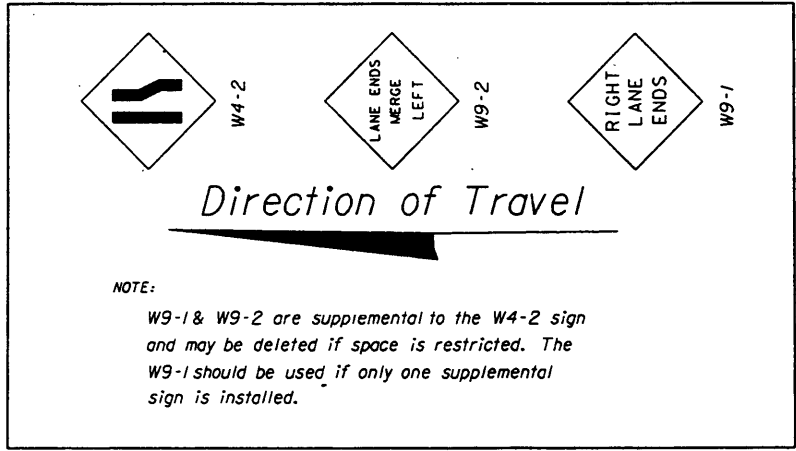


**TRANSITION DISTANCE  $L_1$**

MPH	$\frac{S^*W}{1.6}$ km/h	2.4	2.7	3.0	3.3	3.6	3.9	4.2
30	50	40.0	45.0	50.0	55.0	60.0	65.0	70.0
35	60	60.0	65.0	75.0	80.0	90.0	95.0	105.0
40	60	60.0	65.0	75.0	80.0	90.0	95.0	105.0
45	70	105.0	120.0	135.0	145.0	160.0	175.0	185.0
50	80	120.0	135.0	150.0	165.0	180.0	195.0	210.0
55	90	135.0	155.0	170.0	190.0	205.0	220.0	240.0
60	100	150.0	170.0	190.0	210.0	225.0	245.0	265.0
65	110	165.0	185.0	210.0	230.0	250.0	270.0	290.0

SPEED* (MPH)	SPEED* (km/h.)	"A" (m)
55	90	210.0
50	80	190.0
45	70	165.0
40	60	145.0
35	50	125.0

POSTED (DAY) SPEED LIMIT MPH	POSTED (DAY) SPEED LIMIT km/h	"y" (m)
30 OR LESS	50 OR LESS	3.0
35	60	6.0
40	60	6.0
45	70	9.0
50 OR MORE	80 OR MORE	12.0



$L_1 = \frac{WS}{1.6}$

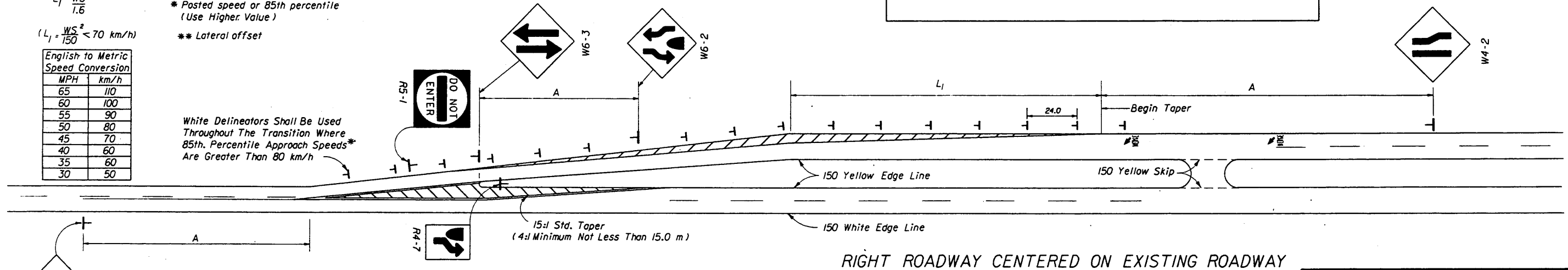
$(L_1 = \frac{WS^2}{150} < 70 \text{ km/h})$

\* Posted speed or 85th percentile (Use Higher Value)

\*\* Lateral offset

MPH	km/h
65	110
60	100
55	90
50	80
45	70
40	60
35	60
30	50

White Delineators Shall Be Used Throughout The Transition Where 85th. Percentile Approach Speeds\* Are Greater Than 80 km/h



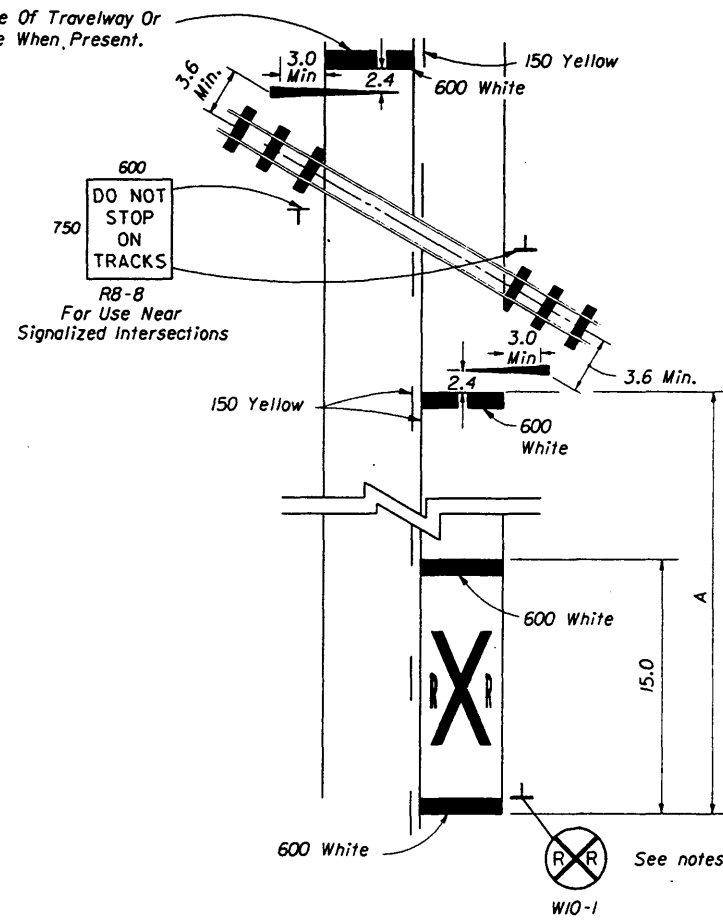
**SCHEMES FOR TRANSITION - 2 LANE / 4 LANE ROADWAY**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

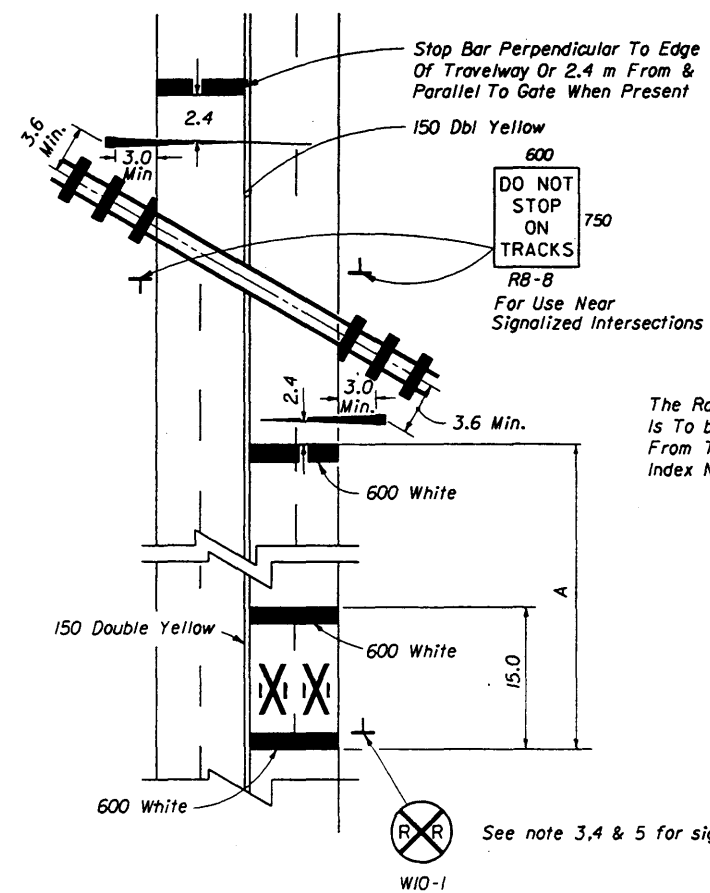
**SPECIAL MARKING AREAS**

Names	Dates	Approved By
Designed By	8-78	<i>Clark A. Scott</i> State Traffic Plans Engineer
Drawn By		Revision      Sheet No.      Index No.
Checked By	8-78	98      5 of 9      17346

Stop Bar Perpendicular To Edge Of Travelway Or 2.4 m From & Parallel To Gate When Present.



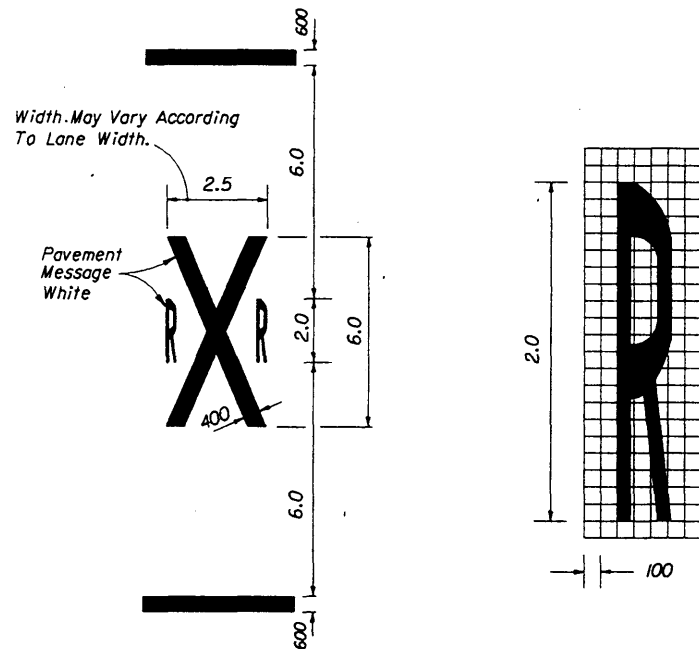
The Railroad Traffic Control Device Is To Be Located A Minimum Of 3.6 m From The Railroad Centerline. See Index No. 17882 For Protection Devices.



The Railroad Traffic Control Device Is To Be Located A Minimum Of 3.6 m From The Railroad Centerline. See Index No. 17882 For Protection Devices.

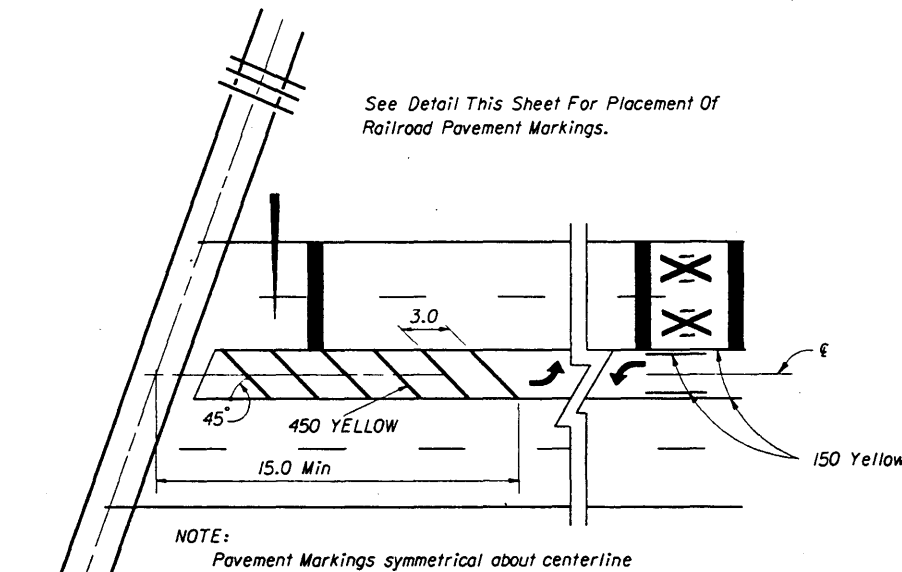
**RAILROAD CROSSING AT 2-LANE ROADWAY**

**RAILROAD CROSSING AT 4-LANE ROADWAY**



8.3 m<sup>2</sup>\*  
\*Does not include 600 mm bars.

**TYPICAL PAVEMENT MARKINGS FOR R/R CROSSING**



**PAVEMENT MARKINGS FOR TERMINATION OF TWO WAY LEFT TURN AT R/R CROSSINGS**

**NOTES:**

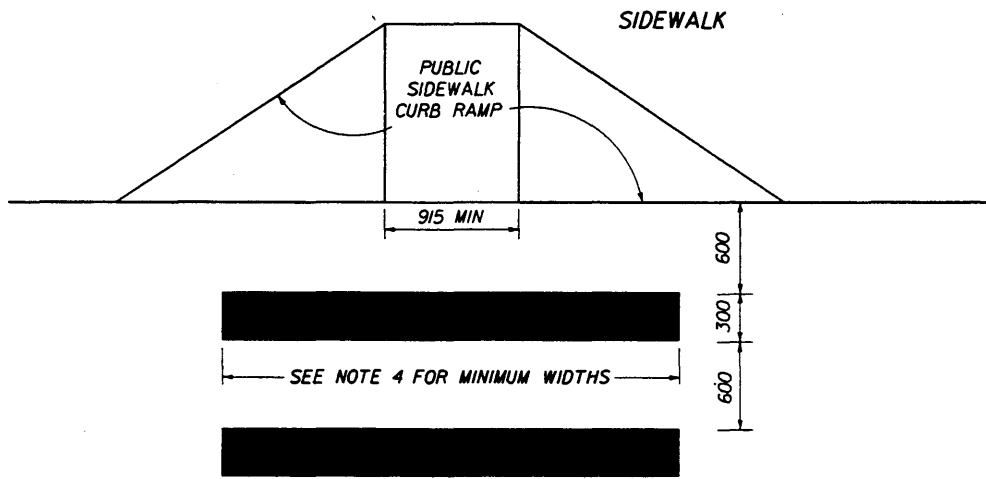
1. When computing pavement messages, quantities do not include transverse lines.
2. When dynamic devices are not present or are to be installed, the crossbuck shall be located at the future location of the RR gate or signal and gate in accordance with Index No. 17882.
3. Placement of sign W10-1 in a residential or business district, where low speeds are prevalent, the W10-1 sign may be placed a minimum distance of 30.0 m from the crossing. Where street intersections occur between the RR pavement message and the tracks an additional W10-1 sign & additional pavement message should be used.
4. Recommended location for FTP-38 or FTP 38B sign, 30.0 m urban & 90.0 m rural in advanced of the crossing.
5. A portion of the pavement marking symbol should be directly opposite the W10-1 sign.

SPEED MPH	SPEED km/h	A (m)
65	110	195.0
60	100	165.0
55	90	135.0
50	80	112.5
45	70	90.0
40	60	67.5
35	60	45.0
30	50	30.0
Urban	Urban	15.0 Min.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

**SPECIAL MARKING AREAS**

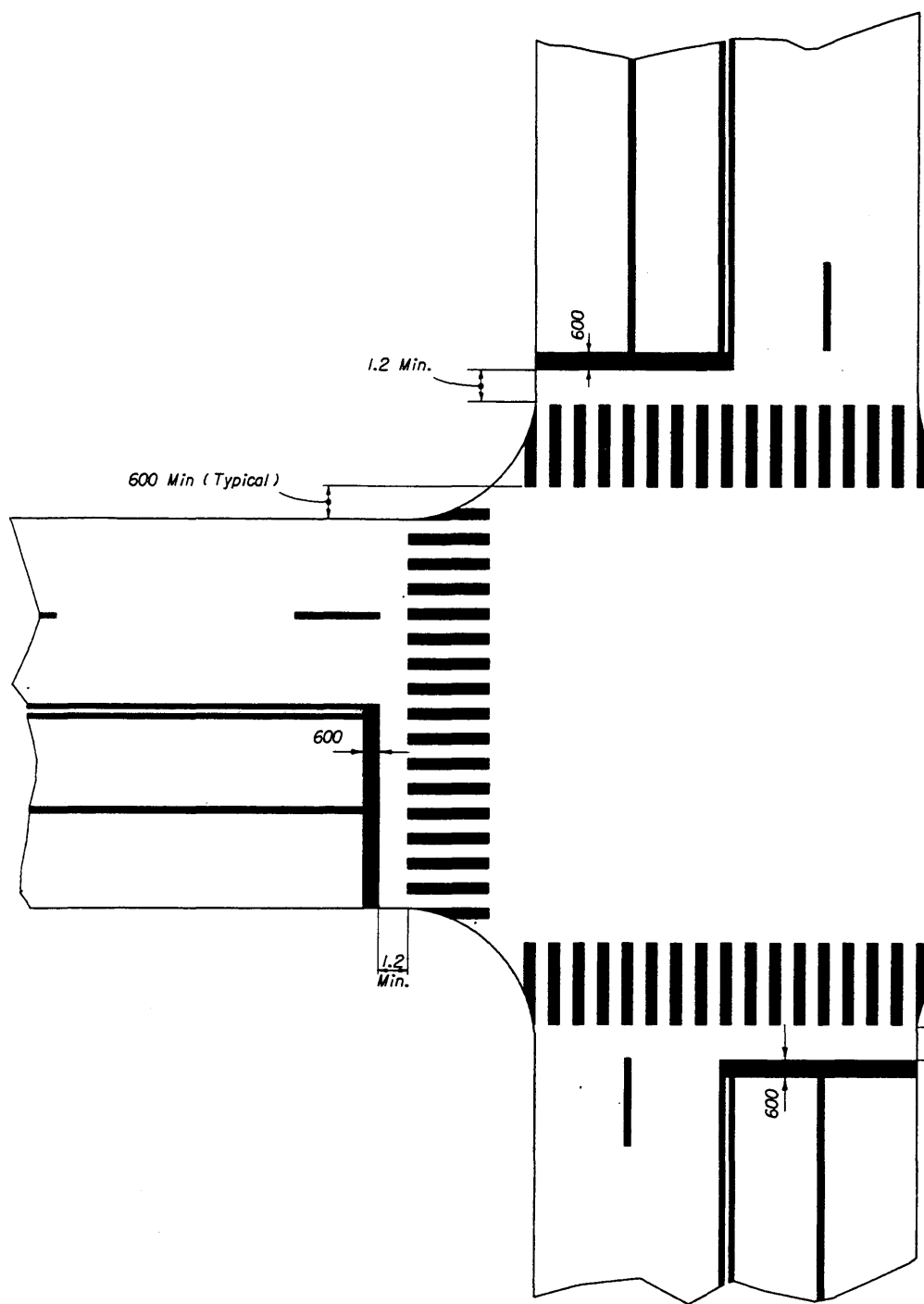
Names	Dates	Approved By
Designed By	6-76	<i>Charles A. Scott</i> State Traffic Plans Engineer
Drawn By		Revision Sheet No. Index No.
Checked By	6-76	00 6 of 9 17346



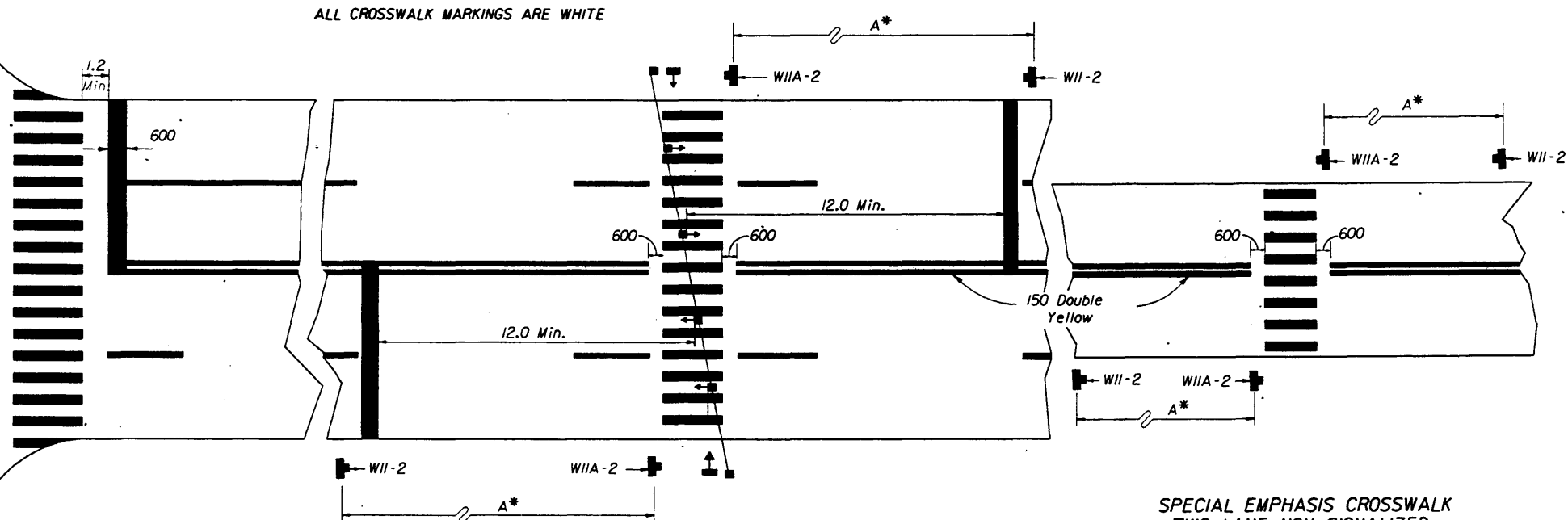
**GENERAL NOTES**

1. For traffic and pedestrian signal installation, refer to Index No. 17721 through 17890.
2. For public sidewalk curb ramps, refer to Index No. 304.
3. For pavement marking and sign installation, refer to Indexes 9535 through 17356.
4. Crosswalk minimum widths:  
Intersection Crosswalk 1.8 m  
Mid Block Crosswalk 3.0 m

ALL CROSSWALK MARKINGS ARE WHITE



**SPECIAL EMPHASIS CROSSWALK  
SIGNALIZED OR STOP SIGN CONTROLLED INTERSECTION**



**SPECIAL EMPHASIS CROSSWALK  
MIDBLOCK-SIGNALIZED**

**SPECIAL EMPHASIS CROSSWALK  
TWO LANE NON-SIGNALIZED**

APPROACH SPEED MPH	APPROACH SPEED km/h	A* SUGGESTED DISTANCE (m)
25 To 35	40 To 60	83.0
36 To 45	60 To 70	105.0
46 To 55	70 To 90	150.0

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

**SPECIAL MARKING AREAS**

Designed By	Names	Dates	Approved By		
Drawn By		3-83	<i>Charles Scott</i> State Traffic Plans Engineer		
Checked By					
	Revision	98	Sheet No.	7 of 9	Index No.
					17346



Markings in or adjacent to bike lanes should be thermoplastic with a mixture of 50 percent glass spheres and 50 percent sharp silica sand applied at a rate of .976 kg/m<sup>2</sup>.

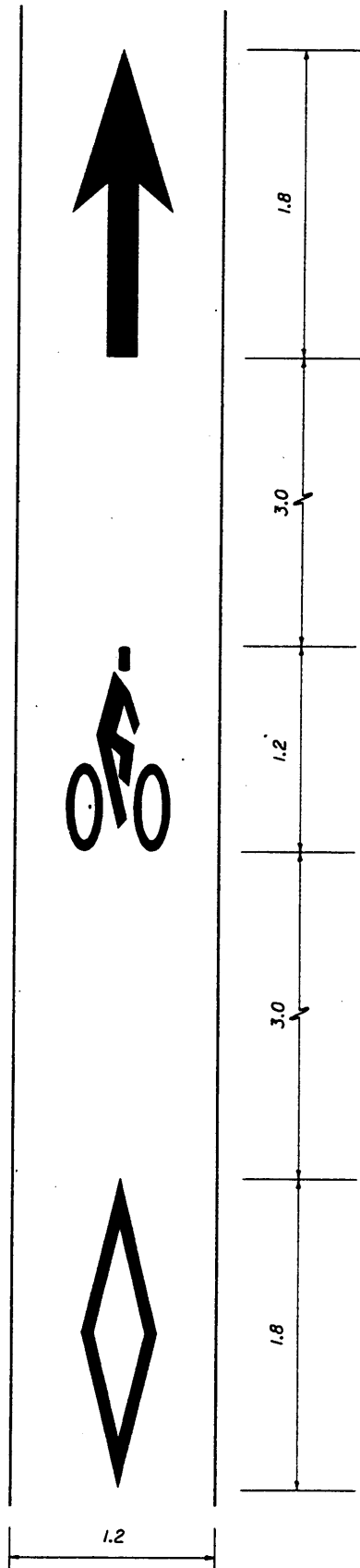
The sharp silica sand shall meet the following gradation requirements:

U.S. Sieve Number	Sieve Size (μm)	Percent Passing
20	850	100
50	300	0-10

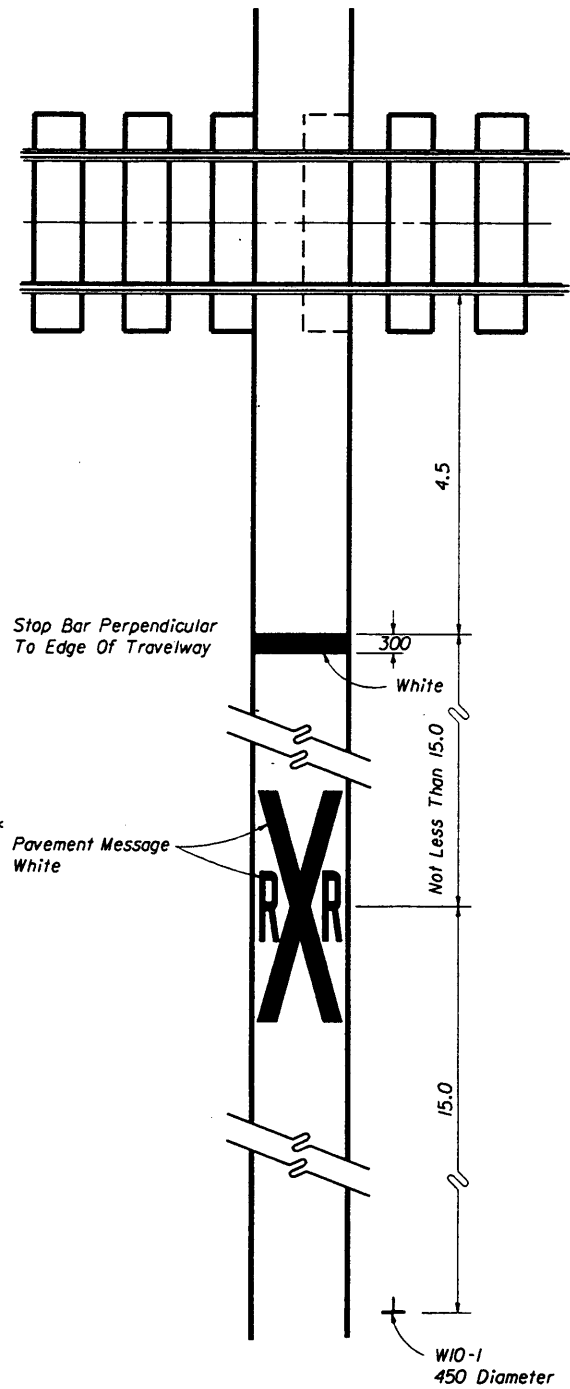
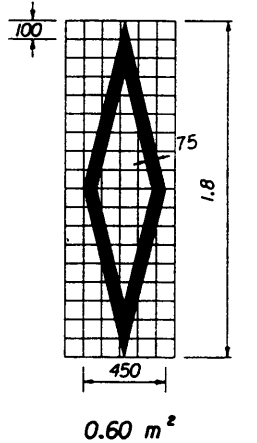
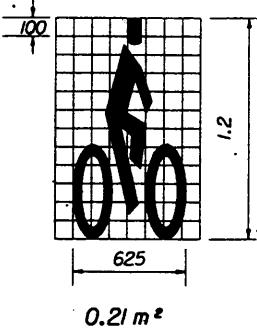
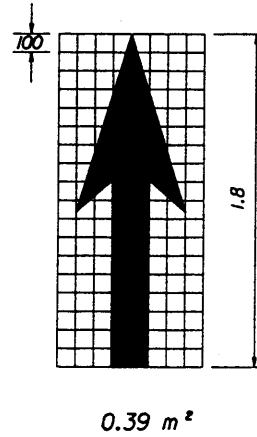
(Florida Standard Spec. 711-4.6)

Recommended spacing of diamond symbol: Immediately after intersections and major driveways and at a maximum spacing of 182 meters for urban sections and 400 meters for rural sections.

Raised pavement markings and raised barriers can cause steering difficulties and should not be used to delineate bicycle lanes. All pavement markings and pavement messages shall be white.

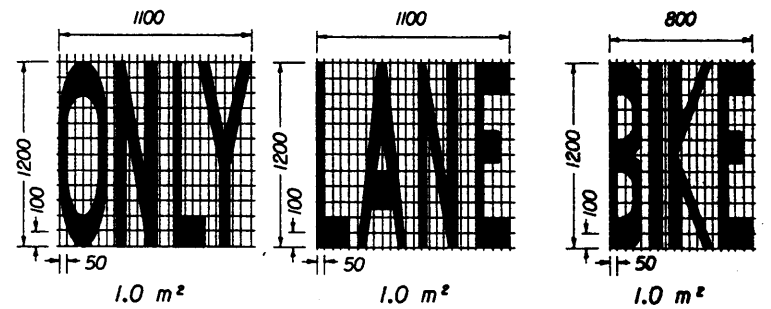
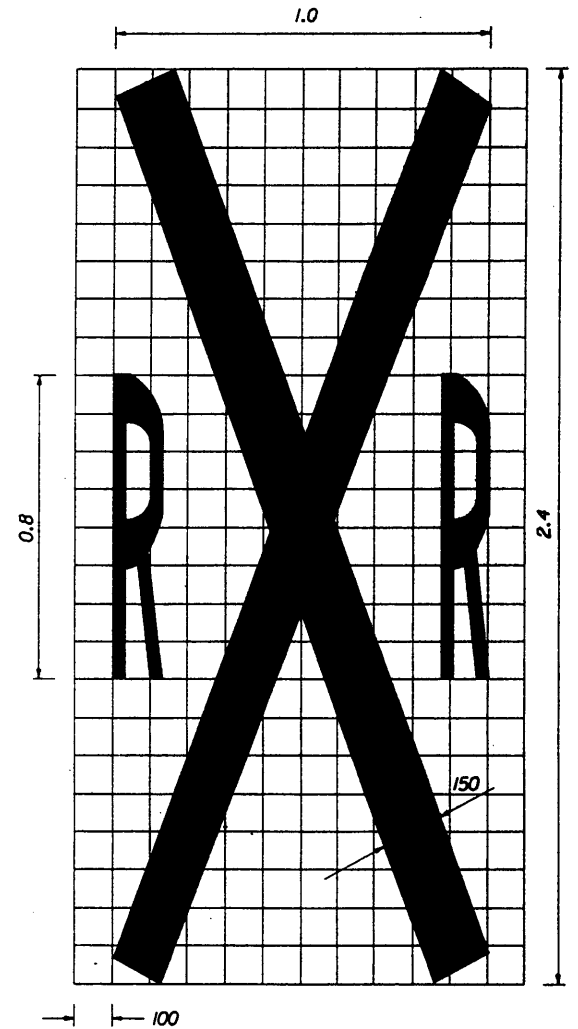


DETAIL OF BIKE LANE MARKINGS



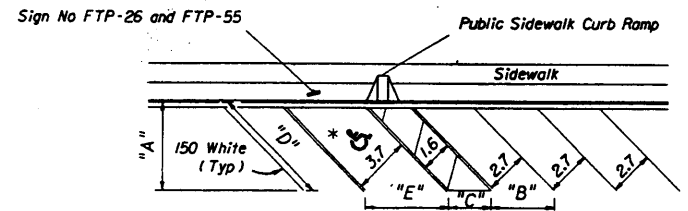
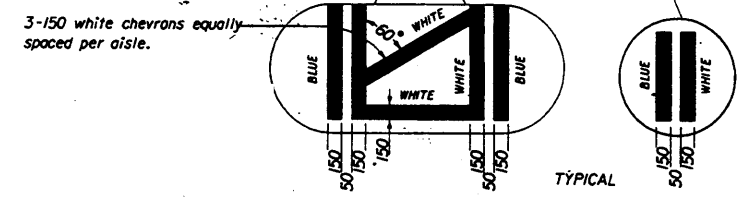
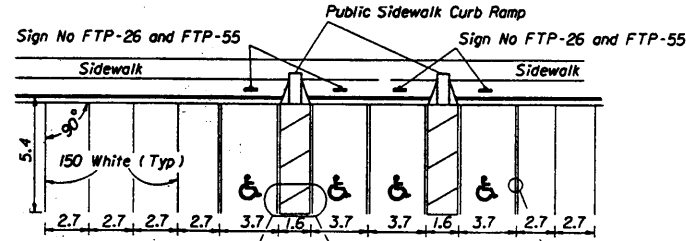
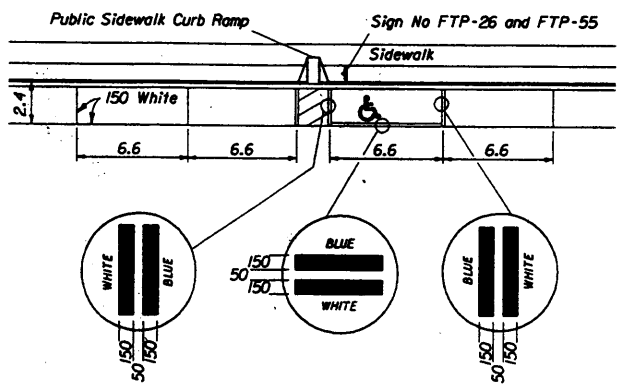
\* Pavement Message White

\* NOTE  
When used on a bike lane (adjacent to vehicle lane) markings shall be placed adjacent to markings for vehicles & W10-1 sign shall be sized and placed for vehicles.



PAVEMENT MESSAGE DETAILS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
SPECIAL MARKING AREAS (BICYCLE)				
Names	Dates	Approved By		
Designed By	8-84	 State Traffic Plan Engineer		
Drawn By		Revision	Sheet No.	Index No.
Checked By		96	8 of 9	17346

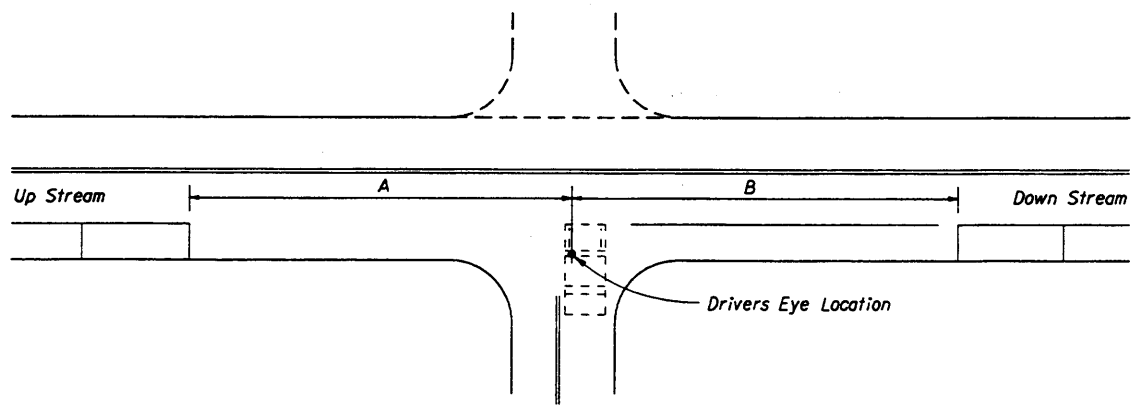


\* FOR ACCESSIBLE MARKINGS - SEE ABOVE

Δ°	"DIMENSIONS"				
	"A"	"B"	"C"	"D"	"E"
45°	5.8	3.9	2.3	8.2	5.3
60°	6.1	3.2	1.9	7.1	4.3

- NOTES:
1. Dimensions are to the centerline of markings.
  2. An Access Aisle is required for each accessible space when angle parking is used.
  3. Criteria for pavement markings only, not public sidewalk curb ramp locations. For ramp locations refer to plans.
  4. Blue pavement markings shall be tinted to match shade 15180 of Federal Standards 595a.
  5. The FTP-55 panel shall be mounted below the FTP-26 sign.

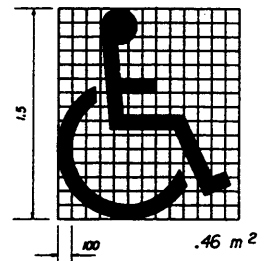
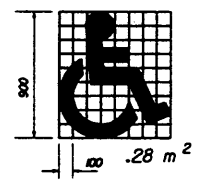
**PAVEMENT MARKING FOR PUBLIC SIDEWALK CURB RAMPS IN REST AREAS**



SPEED MPH	SPEED km/h	UP STREAM (A)		DOWN STREAM (B)	
		2 LANE	4 LANE	2 LANE	4 LANE
0-30	0-50	25.5	18.0	13.5	
35	60	30.0	21.0	15.0	

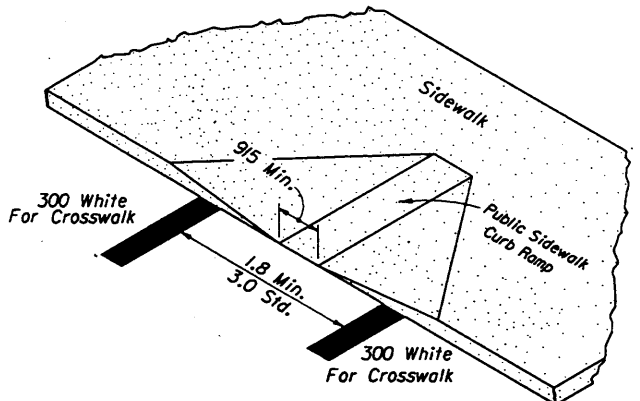
- NOTES
1. Distances measured longitudinally along the street from driver location of entering vehicle to end of parking restriction.
  2. Distances applicable to intersecting street, major driveways and other driveways to the extent practical.
  3. For non-signalized intersections, the values above shall be compared with the values for signalized intersections and the maximum restrictions implemented. These restrictions apply to both accessible and non-accessible parking.

**MINIMUM PARKING RESTRICTION FOR NON-SIGNALIZED INTERSECTIONS**



Use of pavement symbol in accessible parking spaces is optional, when used the symbol shall be 900 mm or 1.5 m high and white in color.

**"UNIVERSAL SYMBOL OF ACCESSIBILITY"**

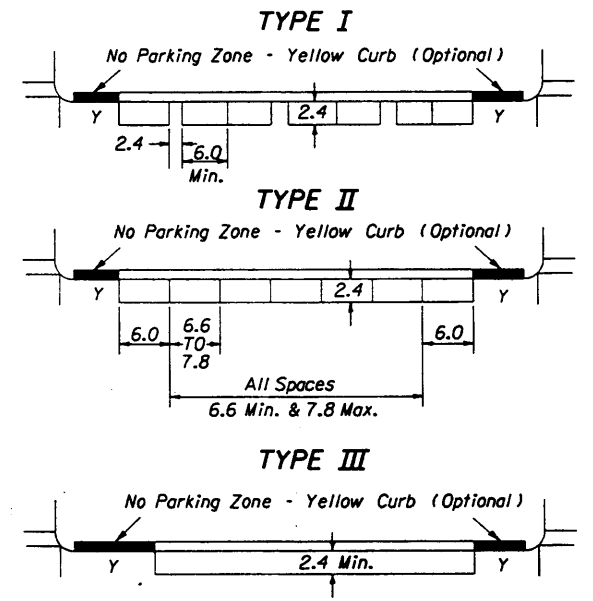


REFER TO INDEX NO. 17346

**TYPICAL MARKINGS FOR CROSSWALKS**

**GENERAL NOTES (Signalized & Non-signalized)**

1. For entrances to a one-way street, the downstream restriction may be reduced to 6.0 m.
2. Parking shall not be allowed within 6.0 m of a crosswalk.
3. All parking lane markings shall be 150 mm white.
4. Parking lane lines shall be broken at driveways.
5. Refer to Chapter 316, Fla. statutes, for laws governing parking spaces.
6. Where curb and gutter is used, the gutter pan width may be included as part of the minimum width of parking lane, but desirably the lane width should be in addition to that of the gutter pan.



SPEED LIMIT MPH	SPEED LIMIT KMH -	SIGNALIZED INTERSECTIONS	DISTANCE FROM CURB RADIUS (Y)
0 - 30	0 - 50	9.0	
35	60	15.0	

**PARKING RESTRICTION (m) FOR SIGNALIZED INTERSECTION**

- NOTES:
1. Parking restrictions measured from curb radius point.
  2. Restrictions for accessible parking are the same as those applied to non-signalized intersections.

**MINIMUM PARKING RESTRICTION FOR SIGNALIZED INTERSECTION**

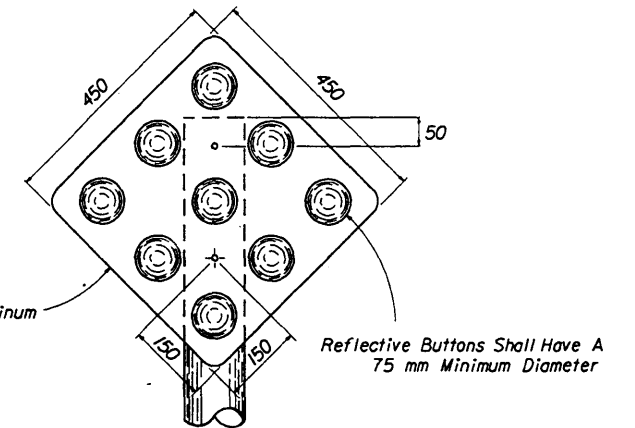
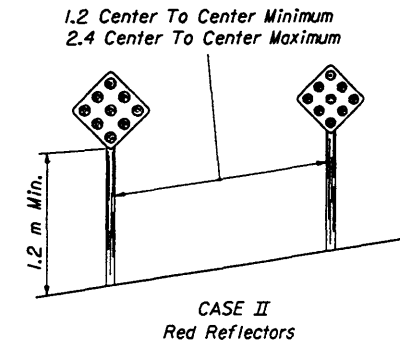
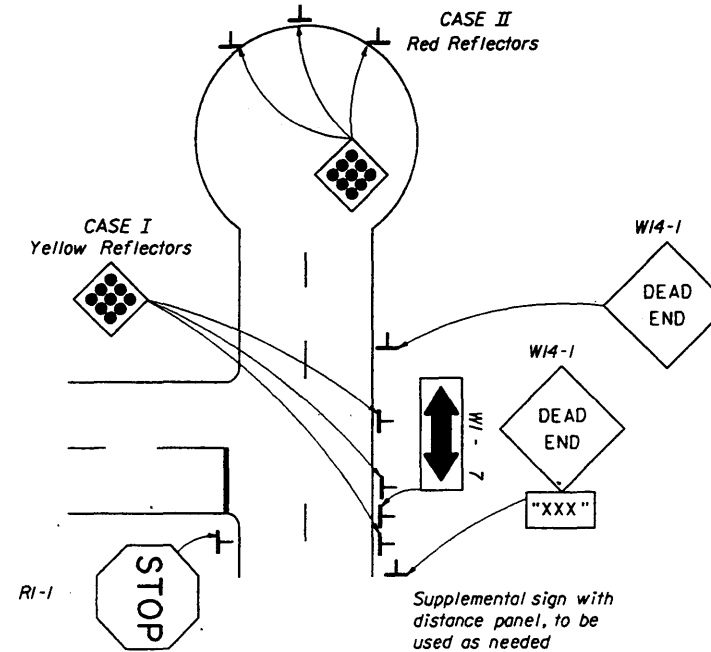
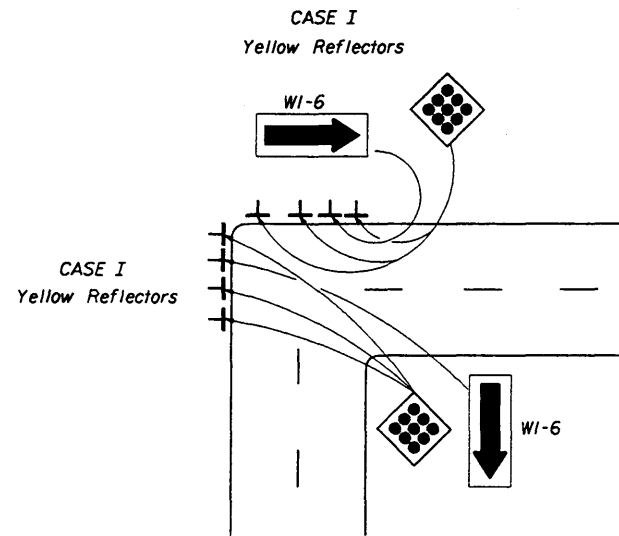
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
SPECIAL MARKING AREAS (PARKING)				
Names	Dates	Approved By		
Designed By	8-86	Chris A. Scott State Traffic Plans Engineer		
Drawn By		Revision	Sheet No.	Index No.
Checked By	8-86	00	9 of 9	17346

**CASE I** Type I Object Markers shall consist of nine yellow reflectors mounted on a yellow reflective background or consist of a reflective panel of the same size with Type III-A, III-B or III-C yellow sheeting.

**CASE II** End of Road Markers shall consist of nine red reflectors mounted on a red reflective background or consist of a reflective panel of the same size with Type III-A, III-B or III-C red sheeting.

**NOTES:**

1. This index applicable to residential and minor streets only. Major streets to be evaluated on a case by case basis.
2. "T"-intersection-Two-Way arrows and reflectors are optional. The need should be based on a review of each location.
3. For additional details on aluminum round post, steel flanged channel post, sign panel material and bolts, nuts and washers see Index Nos. 11860 and 11865.
4. Case I Installation - The arrow panels and object markers shall be located approximately 6.0 m, but not less than 3.6 m from the edge of the travel lane.
5. Dead end sign shall be posted a sufficient advance distance to permit the vehicle operator to avoid the dead end by turning off, if possible, at the nearest intersecting street.
6. For pavement marking see index no. 17346
7. No guardrail is required unless special field conditions require its use.

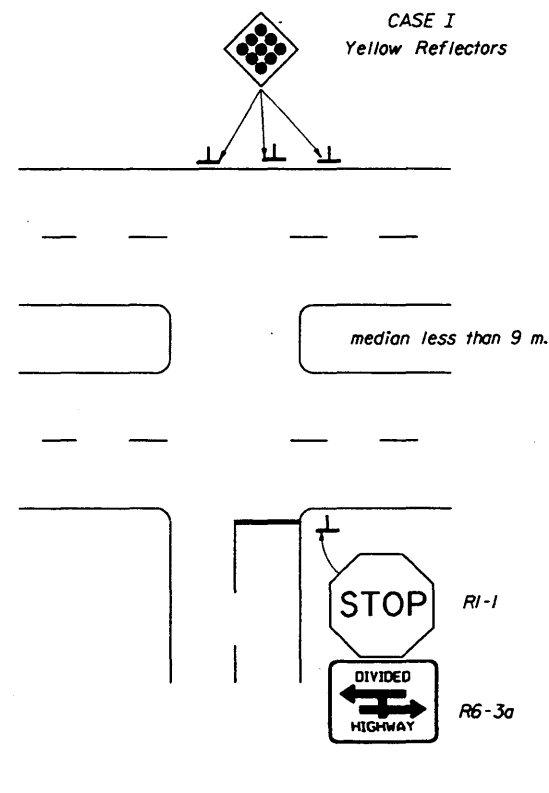
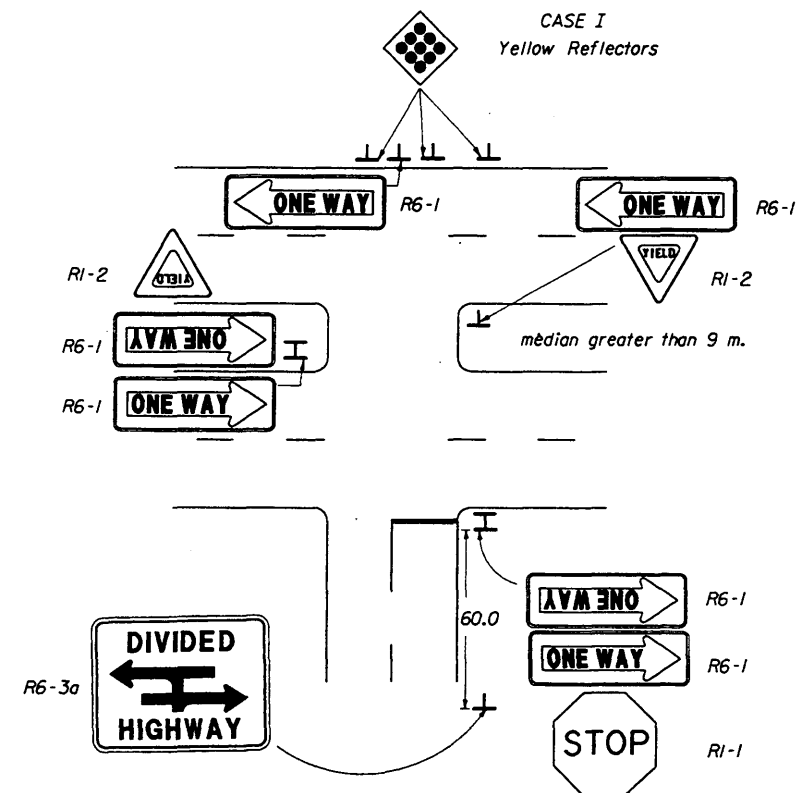


Supports shall be driven 900 mm into the ground.

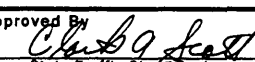
50 mm Ø X 3 mm Aluminum Round Post or 3.7 kg/m Steel Flanged Channel Post.

Aluminum Post: 10 mm Ø Aluminum Button Head Bolt with Nut and Lockwasher or 24 mm Ø Stainless Steel Hex Head Bolt with Flat Washer under Head and Lockwasher under Nut.

Channel Post: Provide Attachment in Accordance with the "Sign Attachment Detail" on Index No. 11865.

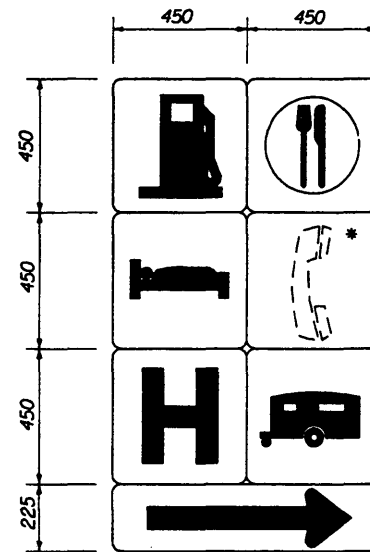


ONE WAY signs (R6-1) are not ordinarily needed at divided highway intersections with median widths of less than 9 meters, and should be installed only if specifically called for in the plans.

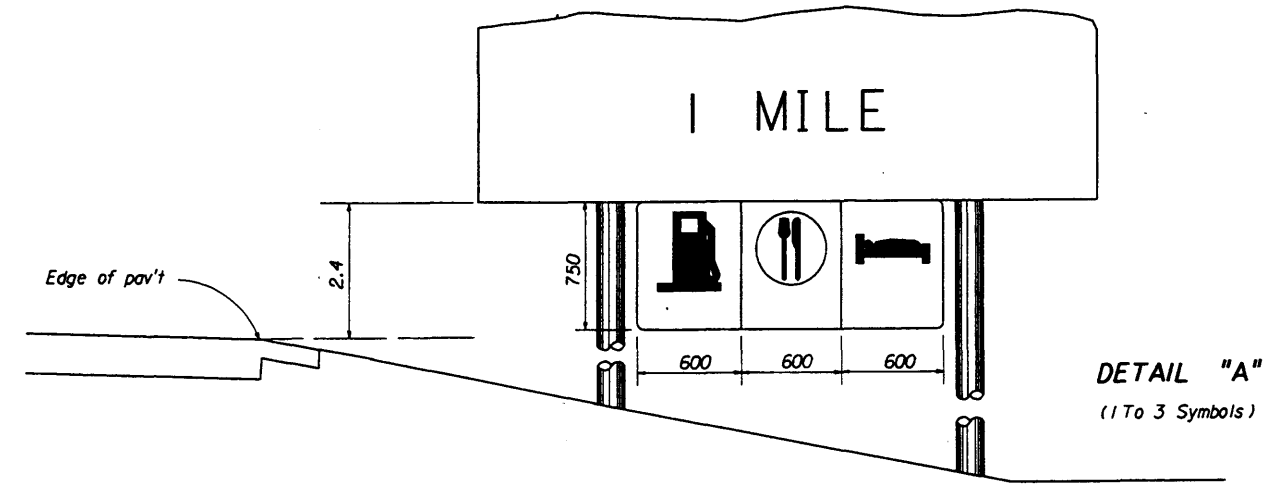
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
TRAFFIC CONTROLS FOR STREET TERMINATIONS				
Names	Dates	Approved By		
Designed By	11 74	 State Traffic Plans Engineer		
Drawn By		Revision	Sheet No.	Index No.
Checked By	11 74	00	1 of 1	17349

**\*\* Note:**  
Two assemblies are required; one for each side of the ramp, showing those services in each particular direction from the ramp terminal.

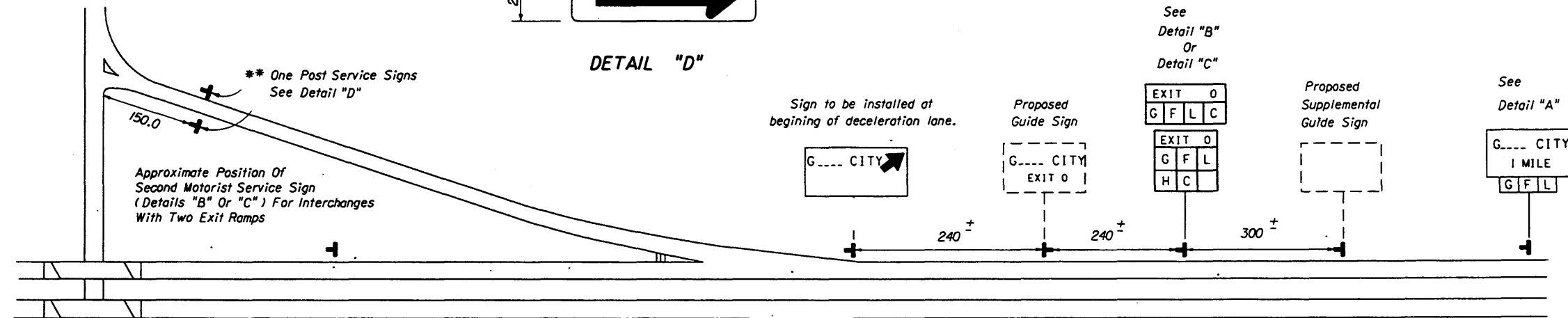
Ramp mounted signs shall be installed to avoid conflict with existing signs and in no case should they be placed within 30.0 m of another sign.



**DETAIL "D"**



**DETAIL "A"**  
(1 To 3 Symbols)



**\*\* One Post Service Signs**  
See Detail "D"

Approximate Position Of  
Second Motorist Service Sign  
(Details "B" Or "C") For Interchanges  
With Two Exit Ramps

Sign to be installed at  
beginning of deceleration lane.

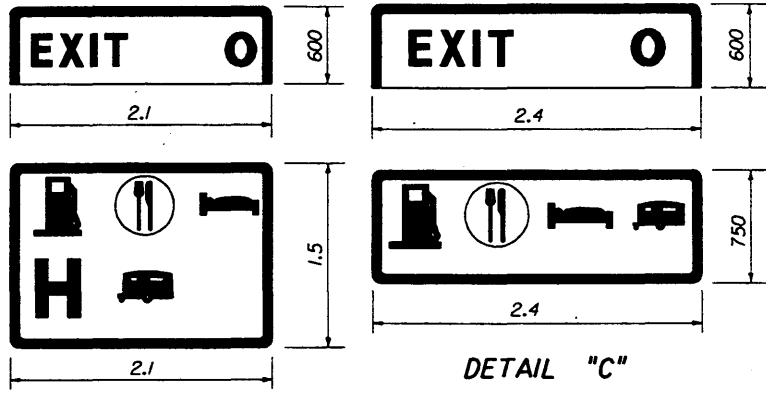
Proposed  
Guide Sign

See  
Detail "B"  
Or  
Detail "C"

Proposed  
Supplemental  
Guide Sign

See  
Detail "A"

**NOTE**  
When approved for attachment to the advance guide signs, up to 3 services may be used for an exit. The symbol signs shall be suspended from the guide sign panel or existing wind beams. Symbol signs are not to be connected to existing sign posts.  
The mounting height of the advance guide sign shall be increased, where necessary, to provide 2.4 m between the level of the pavement edge and the bottom of the guide sign, prior to mounting the supplementary panel.



**DETAIL "B"**  
(4 To 6 Symbols)

**DETAIL "C"**  
(4 Symbols)

**GENERAL NOTES**

- 1 - Only those services meeting criteria established by the Department and approved by the State Traffic Operations Engineer for each interchange shall be shown. Symbol signs for motorist services shall always appear in the following order reading from left to right and top to bottom: Gas, Food, Lodging, Phone\*, Hospital, Camping.
- \* The phone symbol shall not be shown whenever any Gas, Food, Lodging or Camping symbol appears.
- 2 - Symbols shall appear consecutively on the sign with no positions left blank or reserved for intermediate symbols not currently approved for a particular interchange.

- 3 - All motorist service signs to have White Legend and Border with Blue Background.
- 4 - For mounting details see Index 9535 for Type "A" breakaway or Index 11860 for Type "C" Frangibility.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
<b>SIGNING FOR MOTORIST SERVICES</b>				
Designed By	Names	Dates	Approved By	
Drawn By		3-76	<i>Clark A. Scott</i> State Traffic Plans Engineer	
Checked By		3-76	Revision	Sheet No.
			94	1 of 1
				Index No. 17350


STATE OF FLORIDA  
WELCOME CENTER  
1 MILE

Sign No. FTP-17

STATE OF FLORIDA  
WELCOME CENTER  
↑

Sign No. FTP-18

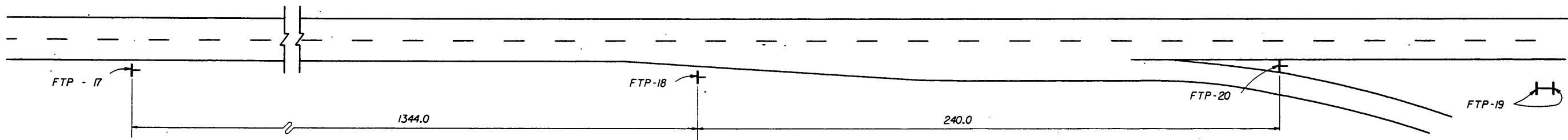
STATE OF FLORIDA  
OFFICIAL  
WELCOME CENTER



Sign No. FTP-19

WELCOME  
CENTER  
↑

Sign No. FTP-20



Note : Roadway not drawn to scale  
Distances shown are adequate for driver communication  
but may be altered slightly if conditions require.

Notes :

- (1) Signs and sign structures shall be erected in accordance with the details shown on Index 9535.
- (2) Sign FTP-19 shall be located on the Welcome Center grounds in proximity to the building and as far from the main line roadway as possible (2 signs back to back).
- (3) Sign FTP-17, 18, 19 shall be located on limited access highways only.
- (4) All legend to be Series E.
- (5) See Index 17355 for sign details.

Tourist Information  
Center  
NEXT RIGHT


Sign No. FTP-21

Note: Sign FTP-21 shall be used as a supplemental guide sign at interchanges which have a Tourist Information Center approved for such signing (locate half-way between normal guide signs)

FOR LIMITED ACCESS HIGHWAYS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN


WELCOME CENTER SIGNING

Names	Dates	Approved By	
Designed By	6-75	 State Traffic Plans Engineer	
Drawn By	6-75		
Checked By	6-75	Revision	Index No.
		98	17351

STATE OF FLORIDA  
WELCOME CENTER  
1 MILE

SIGN NO. FTP-22A

STATE OF FLORIDA  
OFFICIAL  
WELCOME CENTER



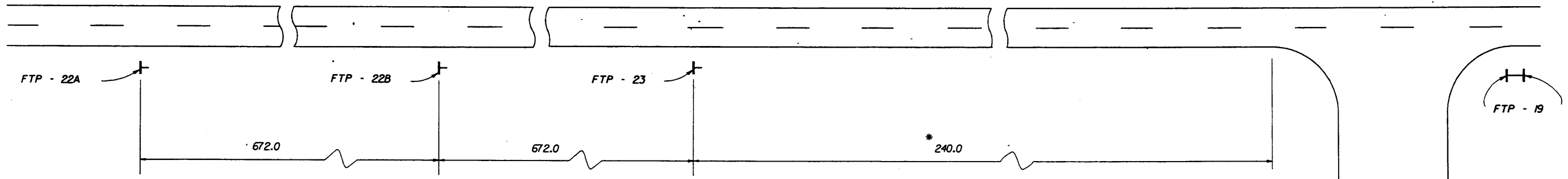
SIGN NO. FTP-19

1/2 MILE

SIGN NO. FTP-22B



SIGN NO. FTP-23



Note :  
One sign FTP-22A or 22B should be used depending on speed, roadside development & geometric conditions.

NOTE  
Roadway not drawn to scale


\* 240.0 m Maximum For Rural Conditions  
15.0 m Minimum For Congested Areas

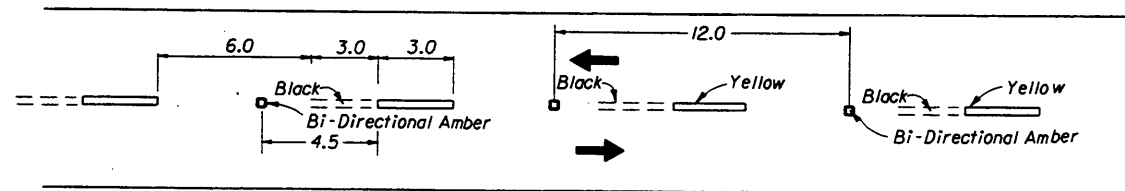
- Notes
- (1) Signs and sign structures shall be erected in accordance with the details shown on Index 9535.
  - (2) Sign FTP-19 shall be located on the Welcome Center grounds in proximity to the building and as far from the Main Line Roadway as possible ( 2 signs back to back )
  - (3) All legend to be Series E.

FOR PRIMARY HIGHWAYS

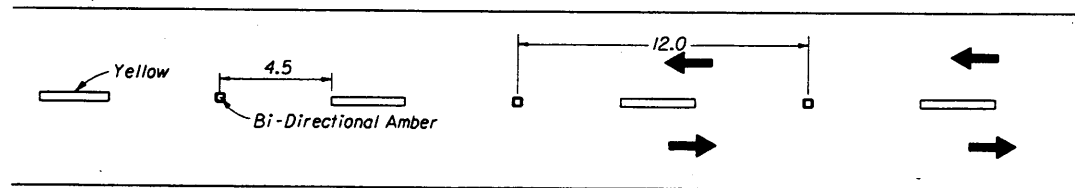
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

WELCOME CENTER SIGNING

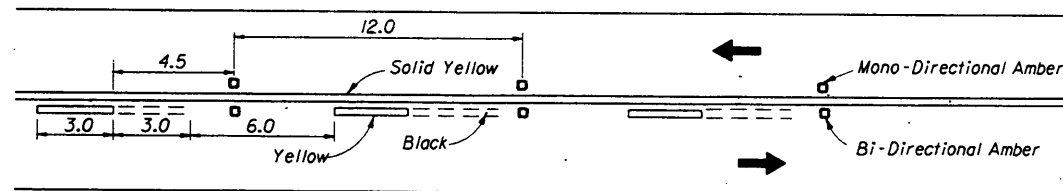
		Names	Dates	Approved By		
Designed By			6-75	 State Traffic Plans Engineer		
Drawn By			6-75			
Checked By			6-75	Revision	Sheet No.	Index No.
				98	2 of 2	17351



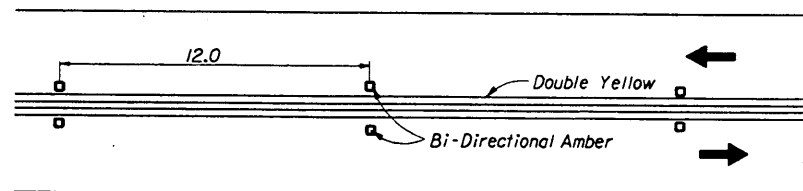
ALTERNATING SKIP LINE



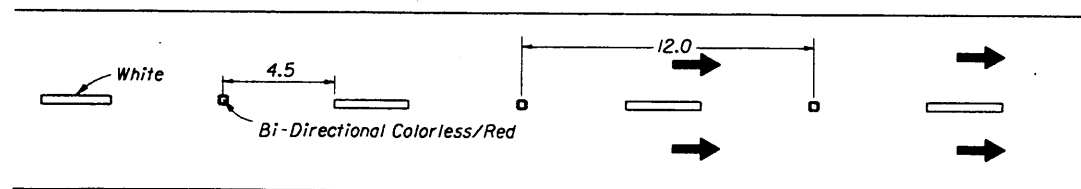
SKIP LINE



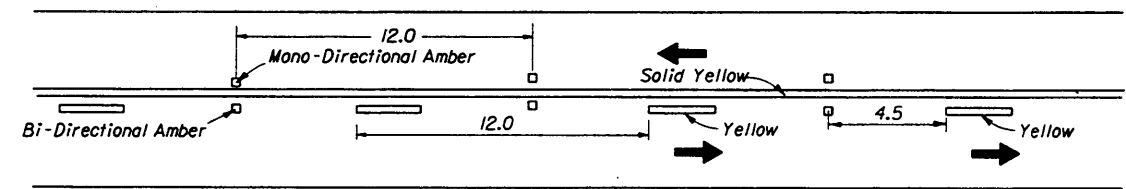
SOLID LINE WITH ALTERNATING SKIP



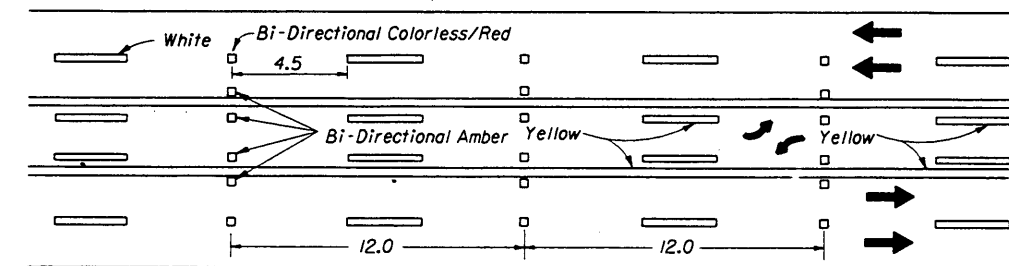
DOUBLE SOLID LINE



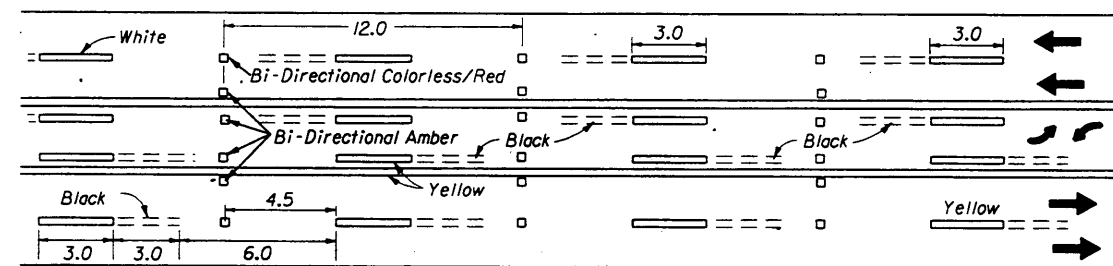
MULTI-LANE



SOLID LINE WITH SKIP



SKIP LINE WITH TWO WAY LEFT TURN LANE

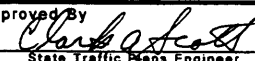


ALTERNATING SKIP LINE WITH TWO WAY LEFT TURN LANE

1. Reflective Pavement Markers shall be spaced at 12.0 m on all skip lane lines and skip center lines. This spacing may be reduced to 6.0 m if specifically called for in the plans.
2. The spacing on solid lines and solid/skip combination lines shall be 12.0 m.
3. All R.P.M.s shall be offset 25 mm from solid lines.
4. These spacings may be reduced for sharp curves if required.
5. All R.P.M.s shall be class "B".

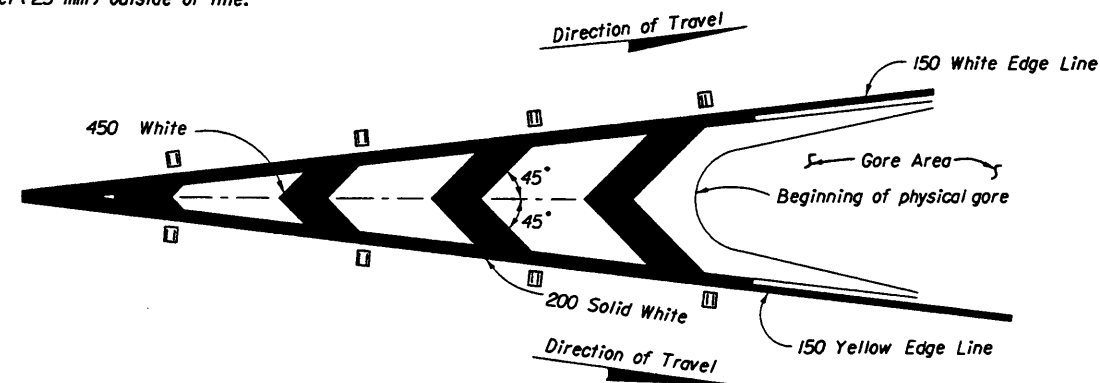
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

TYPICAL PLACEMENT OF REFLECTIVE  
PAVEMENT MARKERS

Names	Dates	Approved By		
Designed By	10-87	 State Traffic Plans Engineer		
Drawn By				
Checked By	10-87	00	1 of 2	17352

**NOTE**

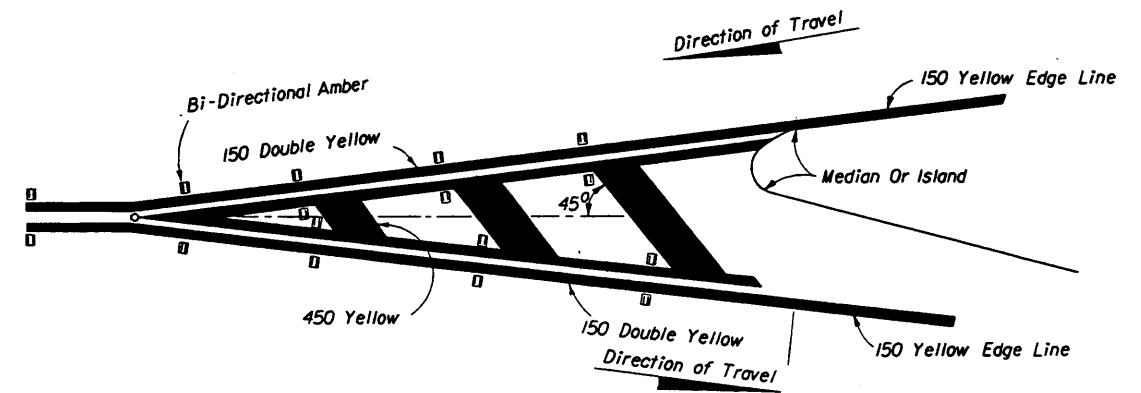
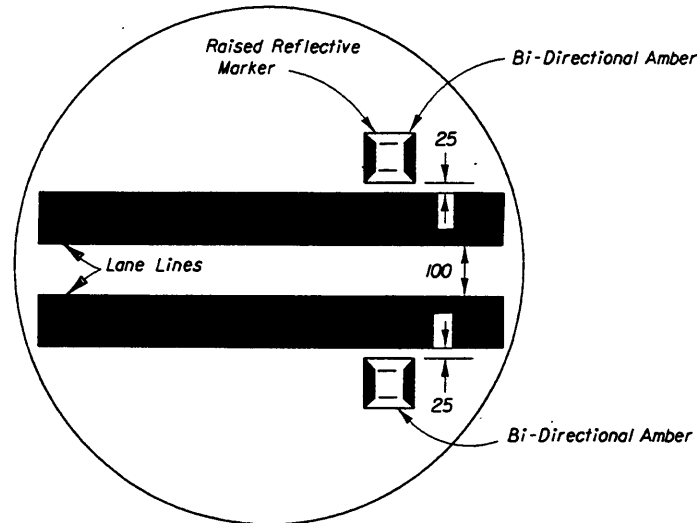
Raised pavement markers shall be set (25 mm) outside of line.



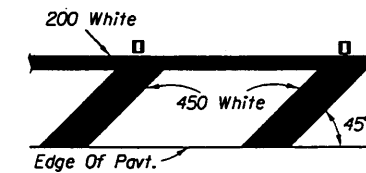
**RPM PLACEMENT FOR TRAFFIC CHANNELIZATION AT GORE  
(TRAFFIC FLOWS IN SAME DIRECTION)**

**NOTE**

Raised pavement markers (Bi-Directional Red and Colorless) should be used in all gores of this type



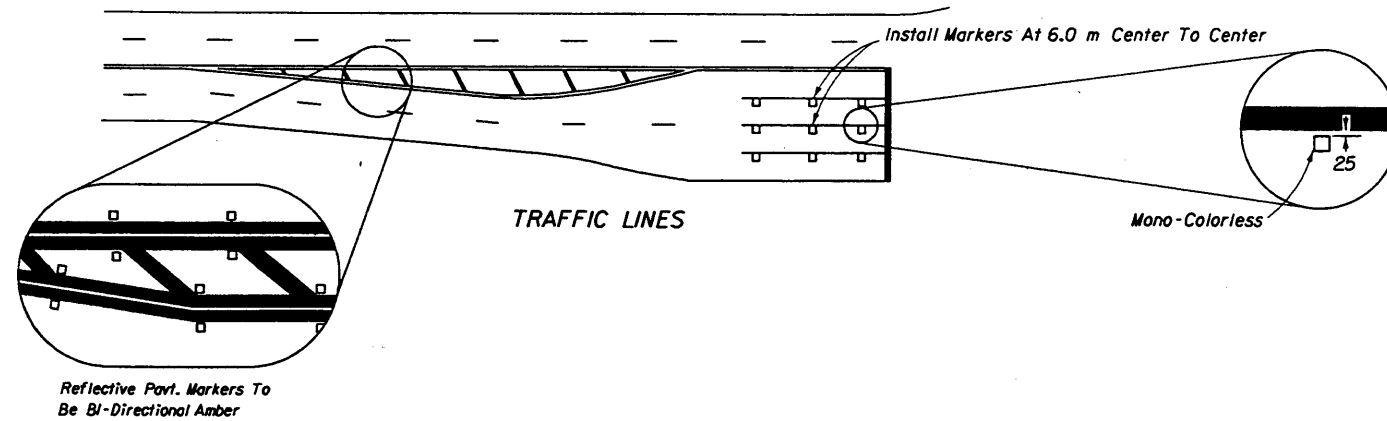
**RPM PLACEMENT FOR TRAFFIC SEPARATION  
(TRAFFIC FLOWS IN OPPOSITE DIRECTION)**



**PLACEMENT OF RPMS ON SHOULDER MARKINGS**

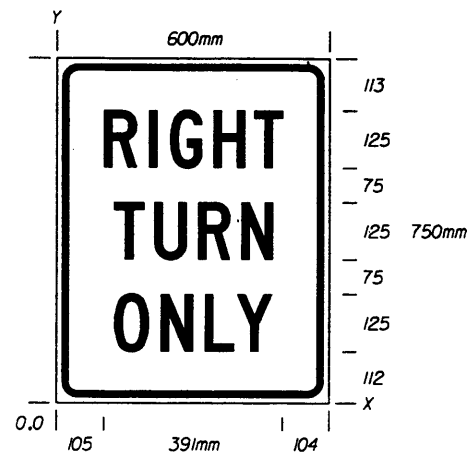
Shoulder Markings For Left Side Of Roadway Shall Be Yellow.

For Placement Of RPMS On Ramps See Index 17345.

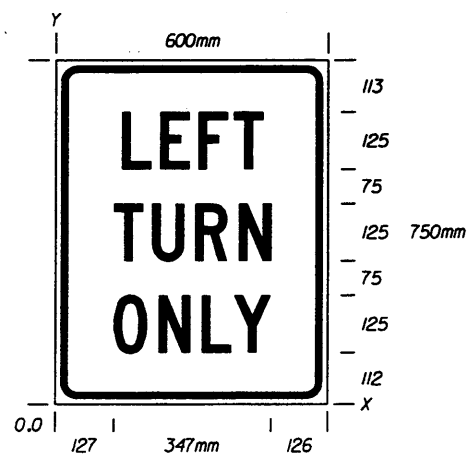


STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
<b>TYPICAL PLACEMENT OF REFLECTIVE PAVEMENT MARKERS</b>				
Designed By	Names	Dates	Approved By	
Drawn By		10-75	<i>Clark A. Scott</i> State Traffic Plans Engineer	
Checked By		10-75	Revision	Sheet No. Index No.
			94	2 of 2 17352

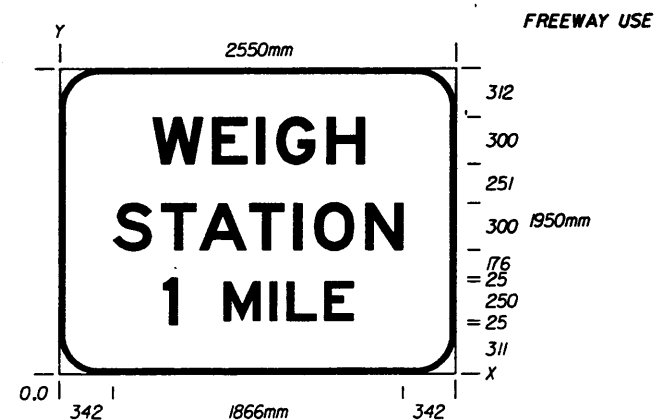




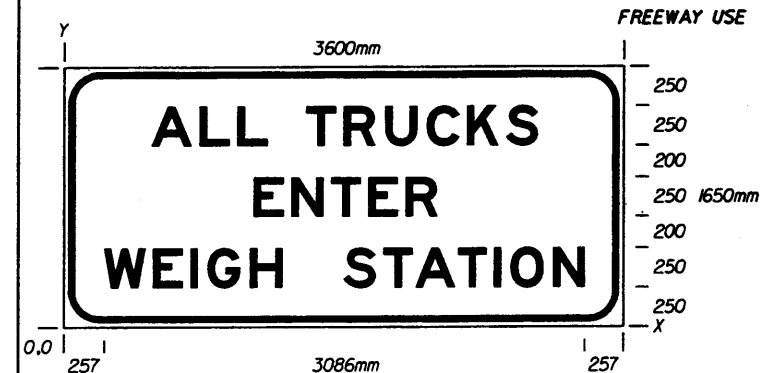
FTP - 1  
600 X 750  
35 Radii 19 Border  
125 Series C Legend  
White Background  
Black Legend & Border



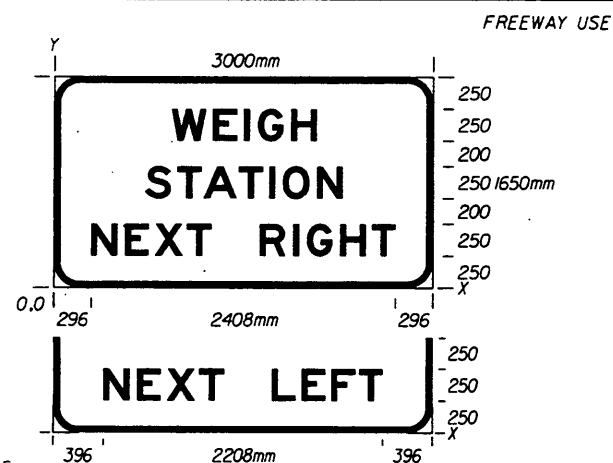
FTP - 2  
600 X 750  
35 Radii 19 Border  
125 Series C Legend  
White Background  
Black Legend & Border



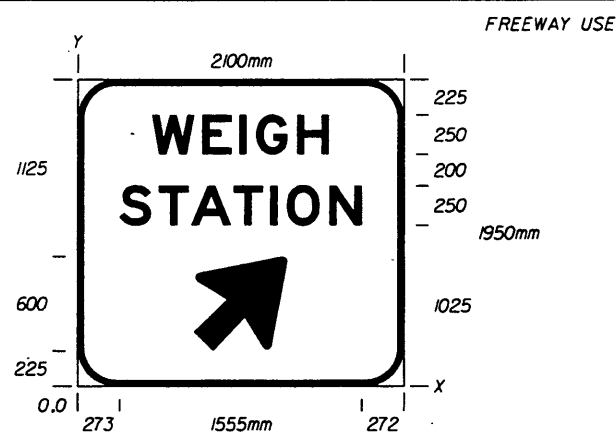
FTP - 3  
2550 X 1950  
75 Radii 50 Border  
Series E Legend  
Green Background  
White Legend & Border



FTP - 4  
3600 X 1650  
75 Radii 50 Border  
250 Series E Legend  
White Background  
Black Legend & Border

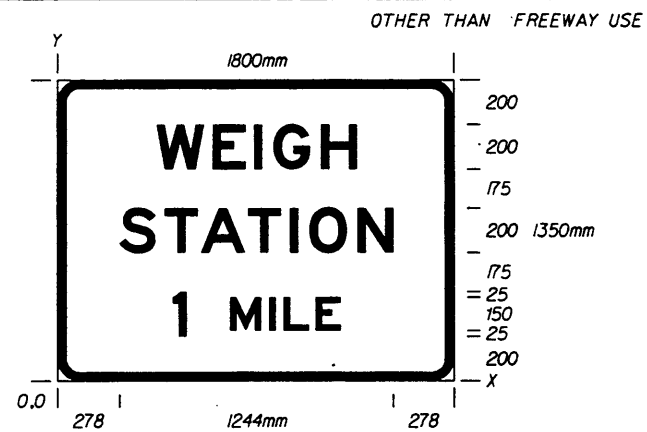


FTP - 5  
3000 X 1650  
75 Radii 50 Border  
250 Series E Legend  
Green Background  
White Legend & Border

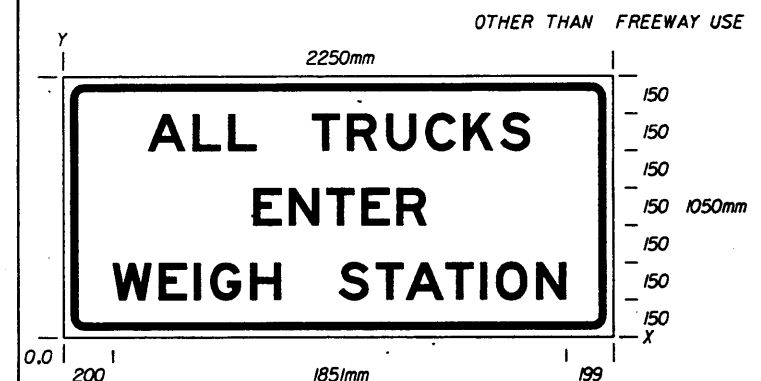


FTP - 6  
2100 X 1950  
75 Radii 50 Border  
250 Series E Legend  
Green Background  
White Legend & Border

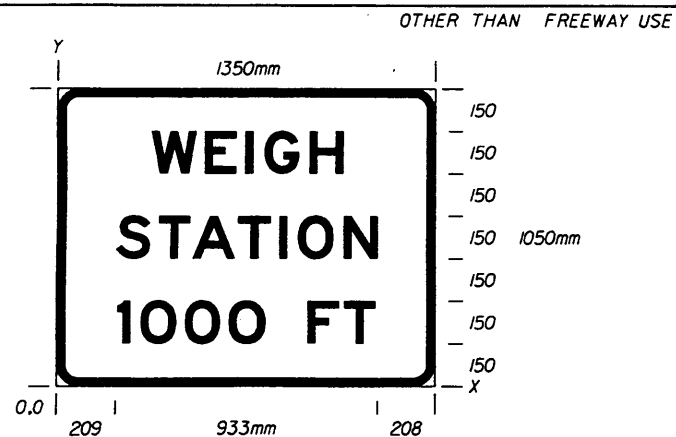
FTP-6A Right Arrow  
FTP-6B Left Arrow



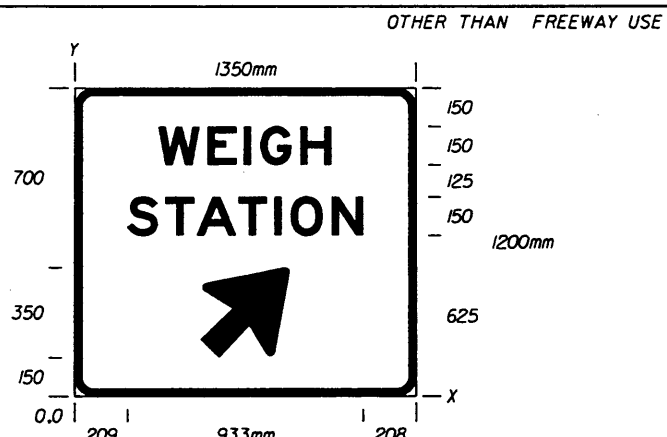
FTP - 7  
1800 X 1350  
75 Radii 50 Border  
Series E Legend  
Green Background  
White Legend & Border



FTP - 8  
2250 X 1050  
75 Radii 50 Border  
150 Series E Legend  
White Background  
Black Legend & Border

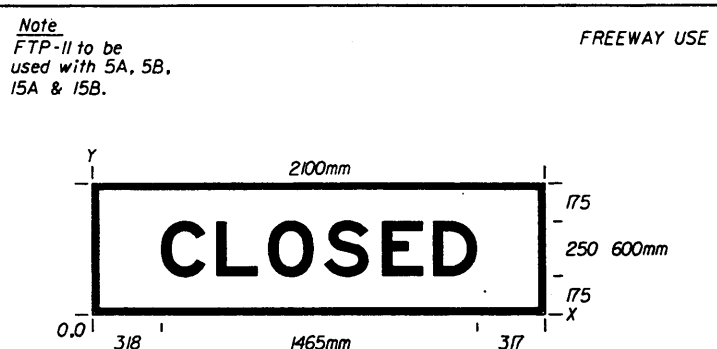


FTP - 9  
1350 X 1050  
75 Radii 50 Border  
150 Series E Legend  
Green Background  
White Legend & Border

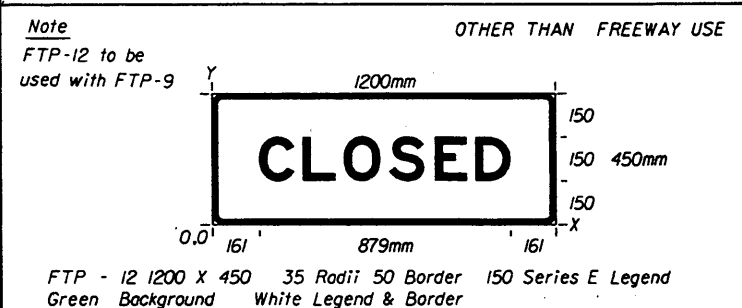


FTP - 10  
1350 X 1200  
75 Radii 50 Border  
150 Series E Legend  
Green Background  
White Legend & Border

FTP - 10A - Right Arrow  
FTP - 10B - Left Arrow



FTP - 11  
2100 X 600  
35 Radii 50 Border  
250 Series E Legend  
Green Background  
White Legend & Border

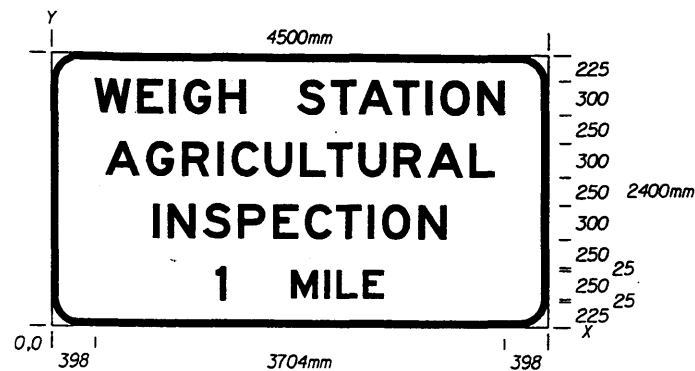


FTP - 12 1200 X 450 35 Radii 50 Border 150 Series E Legend  
Green Background White Legend & Border

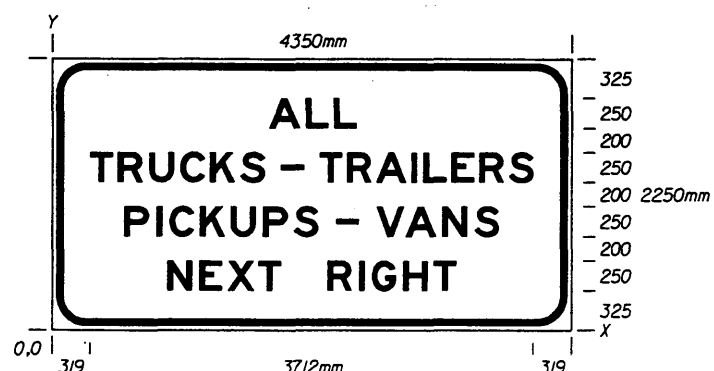
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

SPECIAL SIGN DETAILS

Names	Dates	Approved By
Designed By		 State Traffic Plans Engineer
Drawn By		
Checked By		
Revision	00	Sheet No. 1 of 12
		Index No. 17355



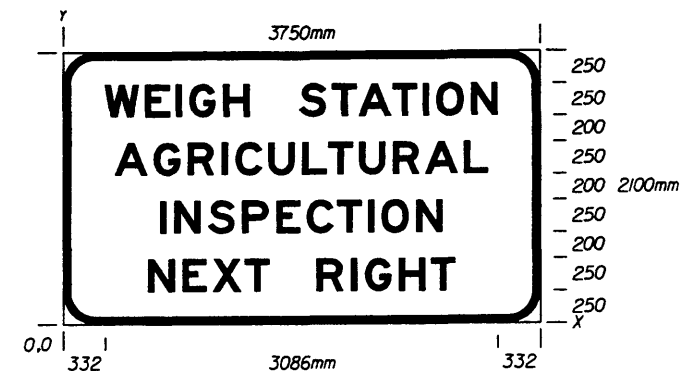
FTP - 13  
4500 X 2400  
75 Radii 50 Border  
Series E Legend  
Green Background  
White Legend & Border



FTP - 14A  
4350 X 2250  
75 Radii 50 Border  
250 Series E Legend  
White Background  
Black Legend & Border  
*- On Interstate Station  
Delete, Pickups-Vans,  
and reduce Sign height  
accordingly.*



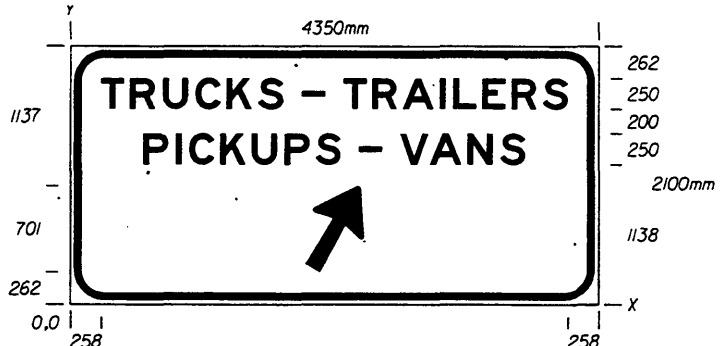
FTP - 14B  
4350 X 2250  
75 Radii 50 Border  
250 Series E Legend  
White Background  
Black Legend & Border



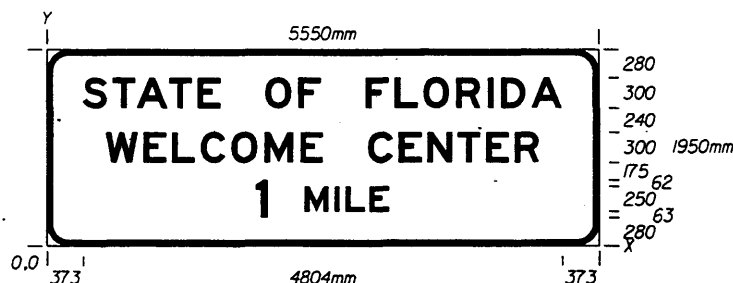
FTP - 15A  
3750 X 2100  
75 Radii 50 Border  
250 Series E Legend  
Green Background  
White Legend & Border



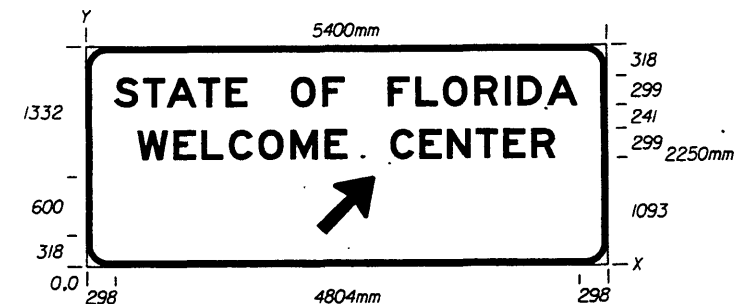
FTP - 15B  
3750 X 2100  
75 Radii 50 Border  
Series E Legend  
Green Background  
White Legend & Border



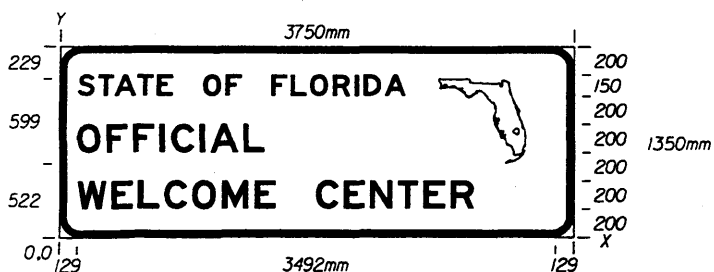
FTP - 16  
4350 X 2100  
75 Radii 50 Border  
Series E Legend  
Green Background  
White Legend & Border  
FTP - 16A - RIGHT ARROW  
FTP - 16B - LEFT ARROW



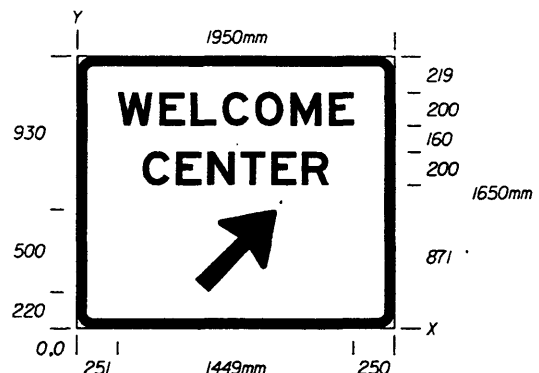
FTP - 17  
5550 X 1950  
75 Radii 50 Border  
Series E Legend  
Blue Background  
White Legend & Border



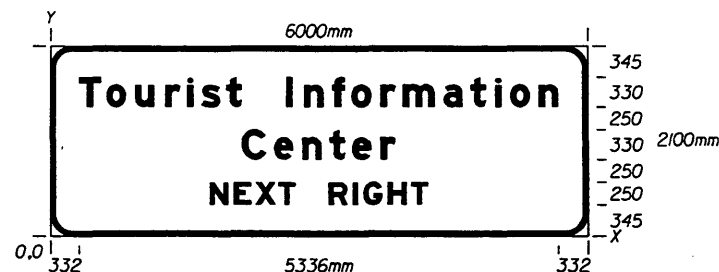
FTP - 18  
5400 X 2250  
75 Radii 50 Border  
Series E Legend  
Blue Background  
White Legend & Border



FTP - 19  
3750 X 1350  
75 Radii 50 Border  
Series E Legend  
Blue Background  
White Legend & Border

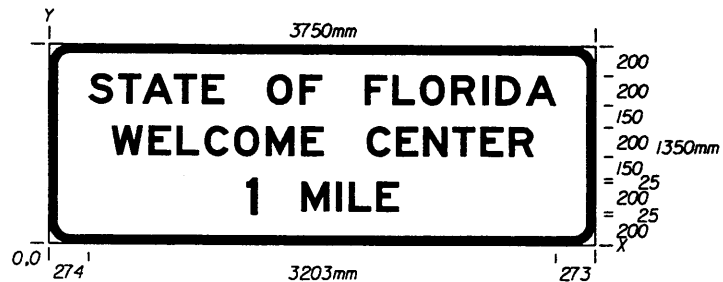


FTP - 20  
1950 X 1650  
75 Radii 50 Border  
Series E Legend  
Blue Background  
White Legend & Border

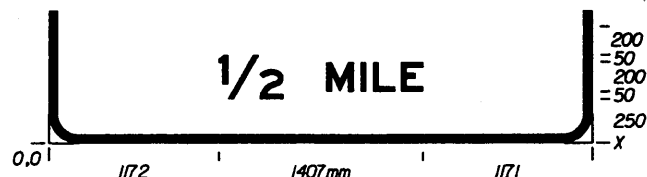


FTP - 21  
6000 X 2100  
75 Radii 50 Border  
Blue Background  
White Legend & Border

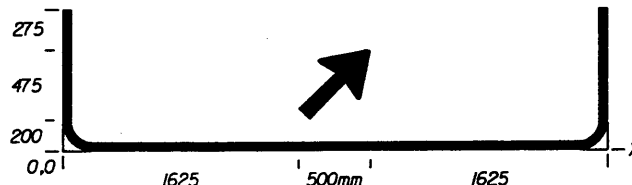
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
SPECIAL SIGN DETAILS				
Names	Dates	Approved By		
Designed By		 State Traffic Plans Engineer		
Drawn By		Revision	Sheet No.	Index No.
Checked By		00	2 of 12	17355



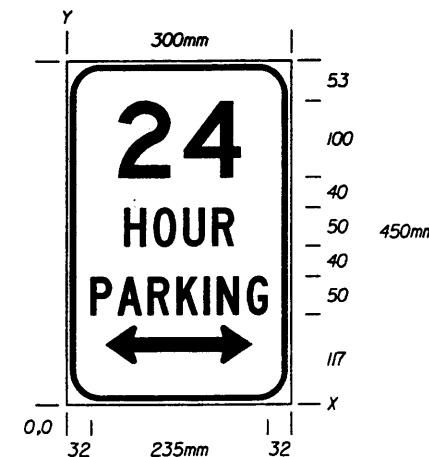
FTP - 22A  
3750 X 1350  
75 Radii 50 Border  
200 Series E Legend  
Blue Background  
White Legend & Border



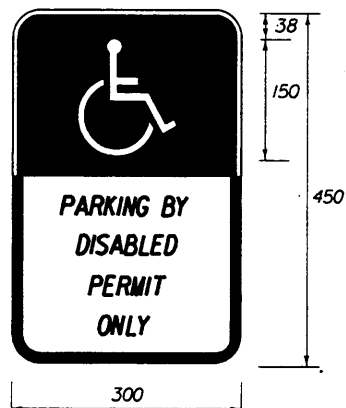
FTP - 22B  
3750 X 1500  
75 Radii 50 Border  
200 Series E Legend  
Blue Background  
White Legend & Border



FTP - 23  
3750 X 1650  
75 Radii 50 Border  
Blue Background  
White Legend & Border



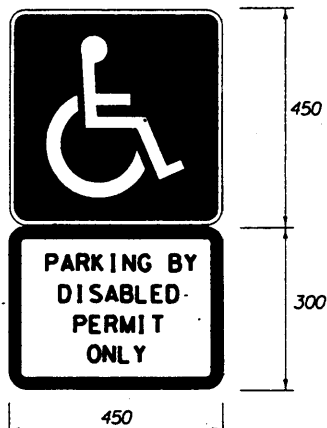
FTP - 24  
300 X 450  
35 Radii 19 Border  
White Background  
Green Legend & Border



ALL LETTERS  
25 SERIES C  
25 SPACING  
BETWEEN LINES  
OF TEXT

FTP - 25  
300 X 450  
35 Radii 19 Border  
25 Series C Legend  
Color  
Background Legend and Border

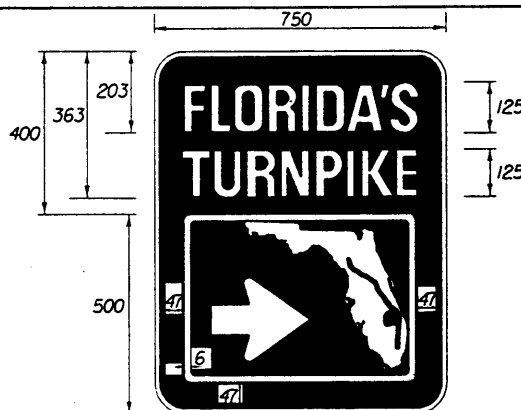
Top	Bottom
Blue	White
White	Black



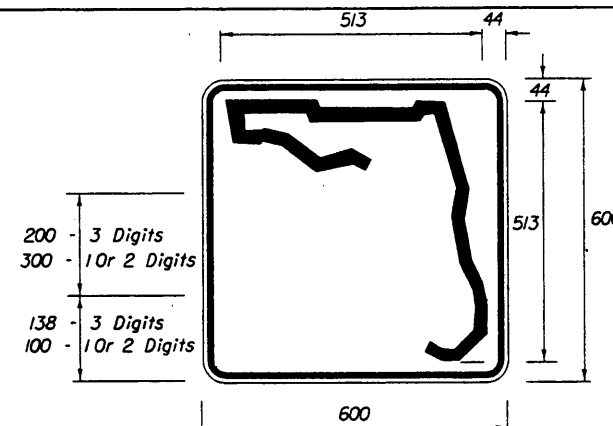
ALL LETTERS  
38 SERIES C  
25 SPACING  
BETWEEN LINES  
OF TEXT

FTP - 26  
450 X 300  
35 Radii 19 Border  
38 Series C Legend  
Color  
Background Legend and Border

Top	Bottom
Blue	White
White	Black

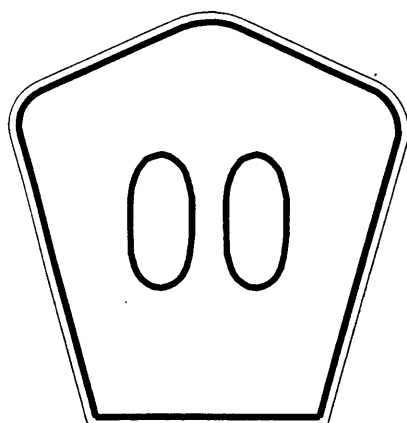


FTP - 27  
750 X 900  
35 Radii 19 Border  
Green Background  
White Legend & Border



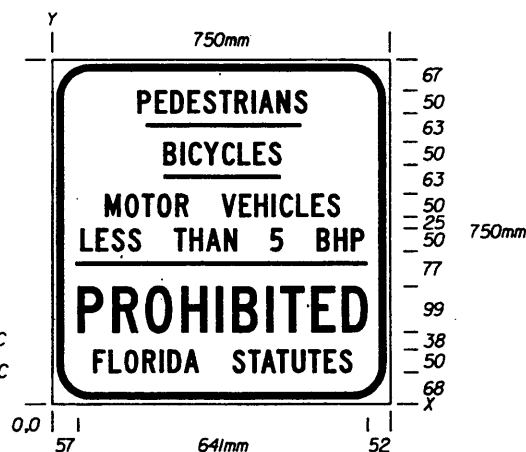
FTP - 28  
600 X 600  
35 Radii 19 Border  
White Background  
Black Legend & Border

See Sheet 4 For Additional Details



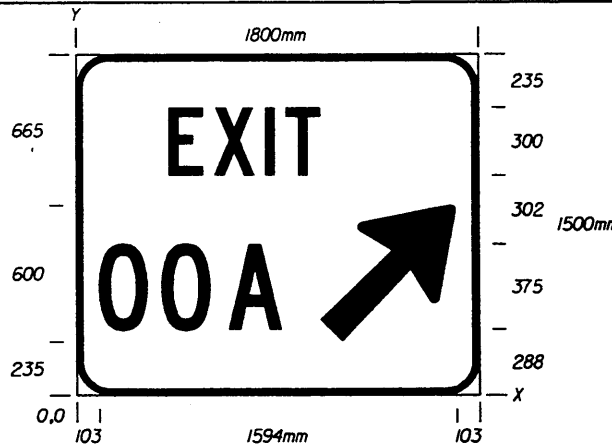
FTP - 29  
Blue Background  
Yellow Legend & Border

SEE SHEET 4 FOR DETAILS.

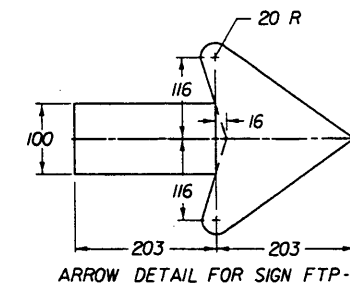


\* 50 Series C  
\*\* 100 Series C

FTP - 30  
750 X 750  
35 Radii 19 Border  
White Background  
Black Legend & Border



FTP - 31  
1800 X 1500  
75 Radii 50 Border  
Series C Legend  
Green Background  
White Legend & Border

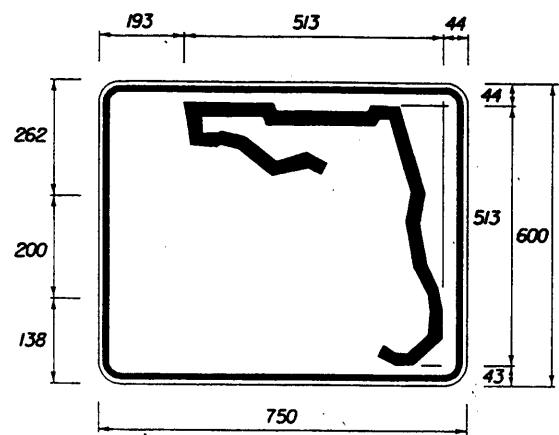


ARROW DETAIL FOR SIGN FTP-27

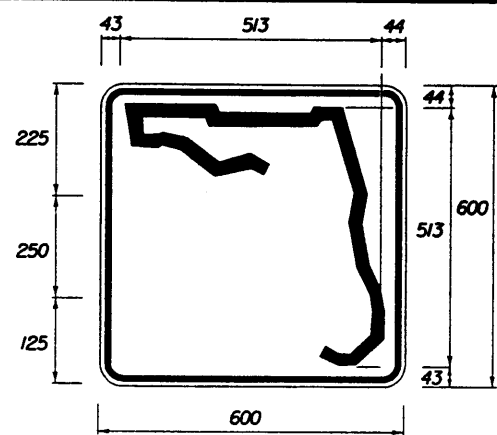
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

SPECIAL SIGN DETAILS

Names	Dates	Approved By	Revision	Sheet No.	Index No.
Designed By		<i>Charles A. Scott</i> State Traffic Plans Engineer			
Drawn By			00	3 of 12	17355
Checked By					



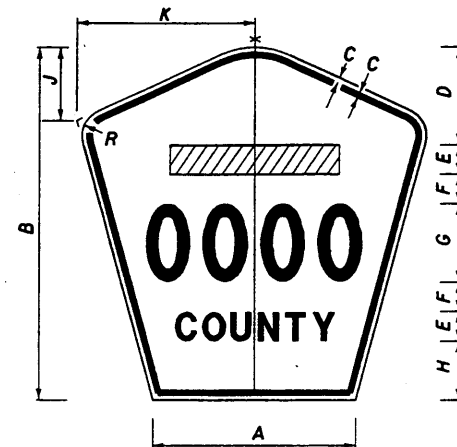
3 or 4 DIGITS



1 or 2 DIGITS

NUMERAL SIZE

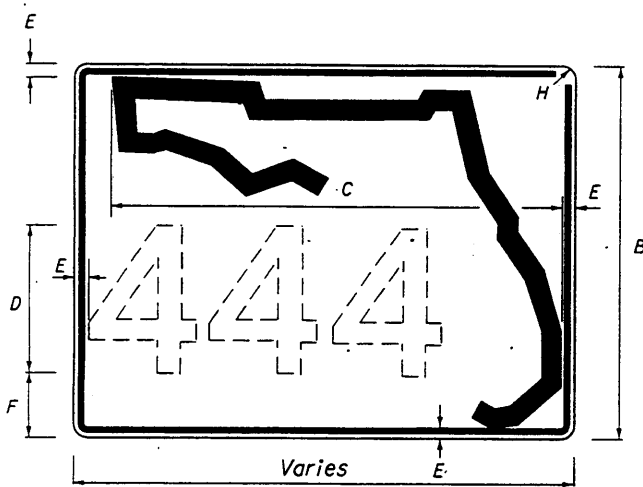
DIGITS	NUMERAL SIZE (mm)	SERIES	PANEL SIZE (mm)
1-2	250	D	600 x 600
3	200	C	750 x 600
4	200	C	750 x 600



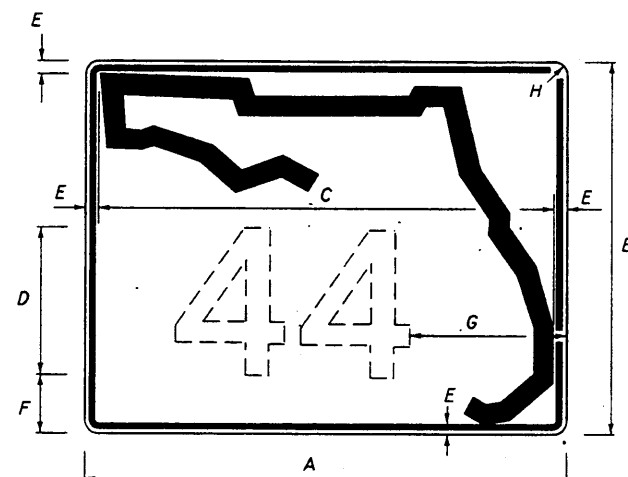
Notes :

- All Legend Series "D".
- Color: Yellow Legend and Border on Blue Background.
- When used on a guide sign, marker must be overlaid on a rectangular Yellow Background as shown in chart. \*\*

INDEPENDENT USE OTHER THAN FREEWAY



3 OR MORE DIGITS



1 OR 2 DIGITS

A	B	C	D	E	F	G	H
750	600	650	300	35	70	210	35
900	750	800	375	35	85	220	55
1050	900	950	375	35	160	275	55

GUIDE SIGN USE

- Notes: 1. Florida marker shall have Black Legend with White Background.  
 2. Stroke width of State outline to be 25 mm for independent use and 32 mm for Guide Sign.  
 3. Numbers are series D.

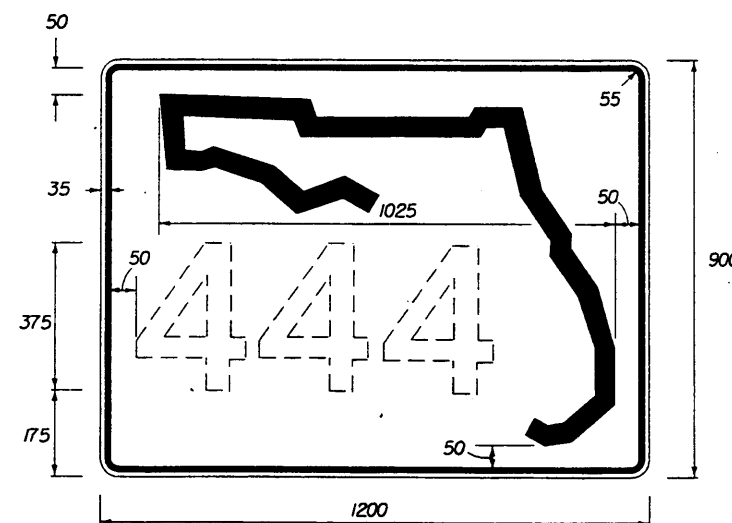
FLORIDA ROUTE MARKER

FTP - 28

SIGN	DIMENSIONS												**
	A	B	C	D	E	F	G	H	J	K	R	S	
1 & 2 DIGIT POST MOUNTED	355	600	10	125	50	50	200	75	128	311	35	133	
3 DIGIT POST MOUNTED	444	750	10	180	63	63	200	118	163	388	35	166	
4 DIGIT POST MOUNTED	531	900	10	200	75	75	200	200	188	463	35	188	
2 DIGIT OVERHEAD	531	900	15	200	75	75	300	100	188	463	35	188	** 1000 x 1025
3 DIGIT OVERHEAD	730	900	20	200	75	75	300	100	200	530	55	206	** 1000 x 1100
4 DIGIT OVERHEAD	920	1050	20	275	75	75	300	175	263	650	55	213	** 1050 x 1300

COUNTY ROUTE MARKER DETAIL

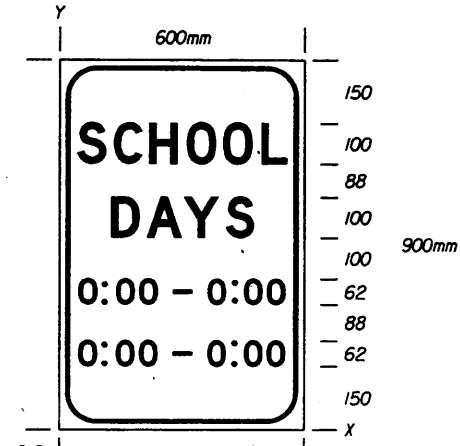
FTP - 29



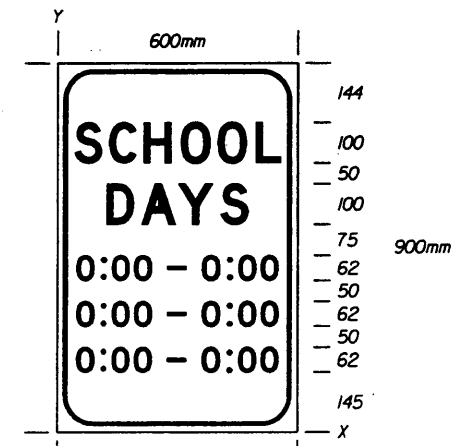
1-3 DIGITS 375 SERIES C  
 4 DIGITS 300 SERIES C

INDEPENDENT USE FOR FREEWAY

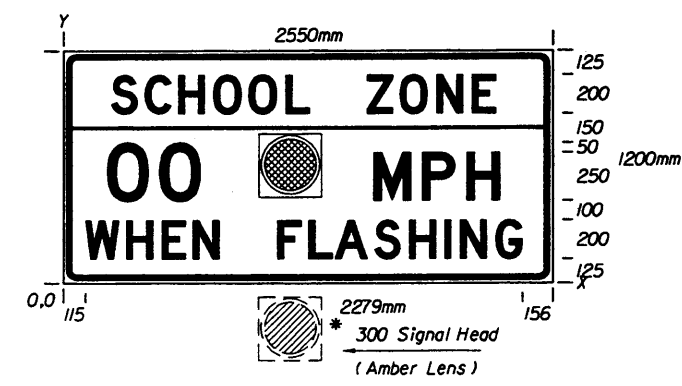
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN					
<b>SPECIAL SIGN DETAILS</b>					
Designed By	Names	Dates	Approved By <i>Chuck O'Leary</i> State Traffic Plans Engineer		
Drawn By	Revision		Sheet No.	Index No.	
Checked By	00		4 of 12	17355	



FTP - 32  
600 X 900  
35 Radii 19 Border  
100 Series D Legend  
White Background  
Black Legend & Border

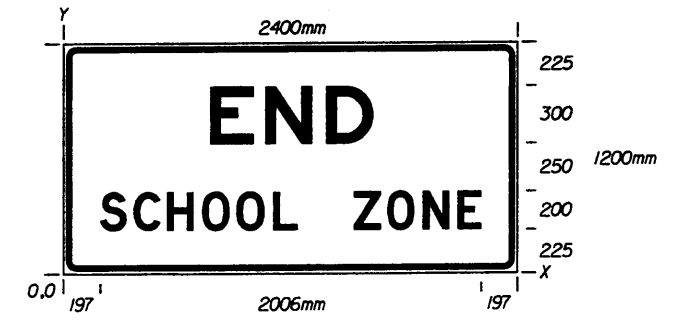


FTP - 32A  
600 X 900  
35 Radii 19 Border  
100 Series D Legend  
White Background  
Black Legend & Border

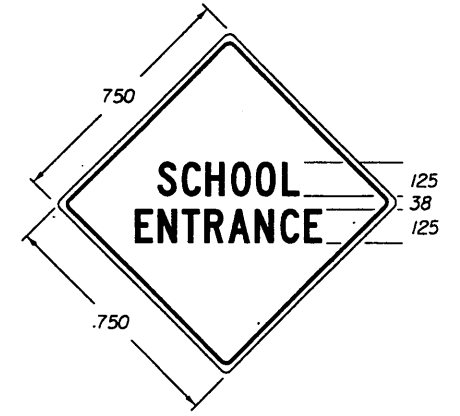


FTP - 33  
2550 X 1200  
75 Radii 50 Border  
Series D Legend  
Yellow Background Top White Background Bottom  
Black Legend & Border

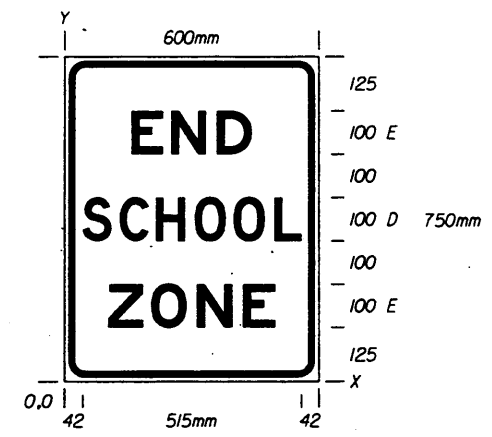
\* Note:  
Flashing beacon may  
be placed within or  
below panel.



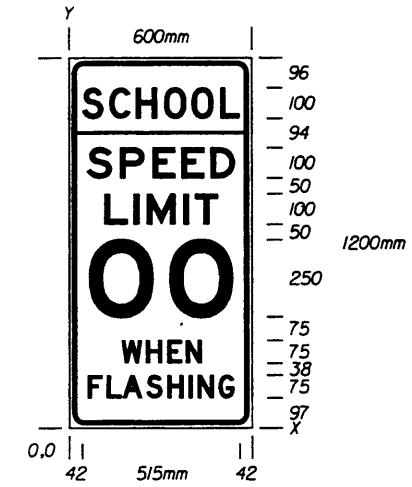
FTP - 34  
2400 X 1200  
75 Radii 19 Border  
White Background  
Black Legend & Border



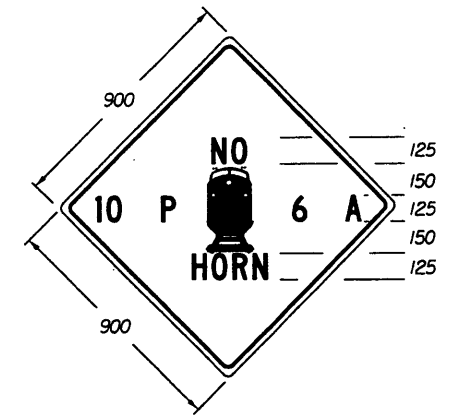
FTP - 35  
750 X 750  
125 Series C Legend  
55 Radii 19 Border  
Yellow Background  
Black Legend & Border



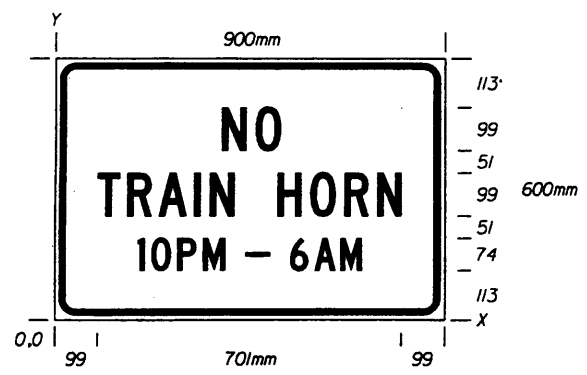
FTP - 36  
600 X 750  
100 Series D and E Legend  
35 Radii 19 Border  
White Background  
Black Legend & Border



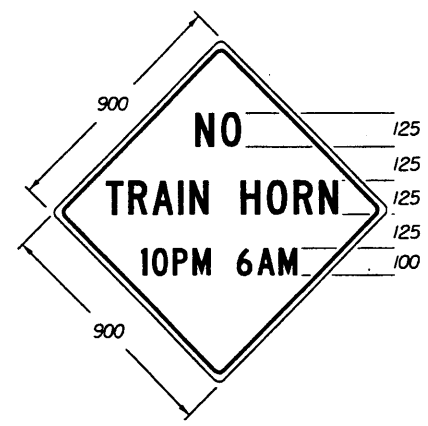
FTP - 37  
600 X 1200  
35 Radii 19 Border  
Top Background Yellow Bottom Background White  
Black Legend & Border Top and Bottom



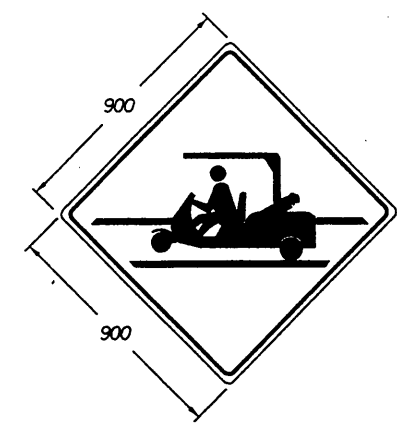
FTP - 38  
900 X 900  
55 Radii 19 Border  
125 Series C Legend  
Yellow Background  
Black Legend & Border



FTP - 38A  
900 X 600  
Series C Legend  
55 Radii 19 Border  
Yellow Background  
Black Legend & Border



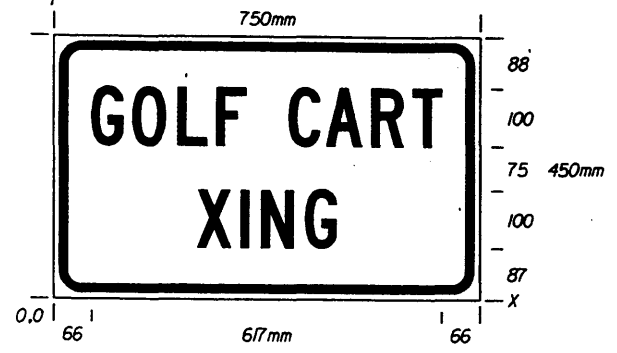
FTP - 38B  
900 X 900  
Series C Legend  
55 Radii 19 Border  
Yellow Background  
Black Legend & Border



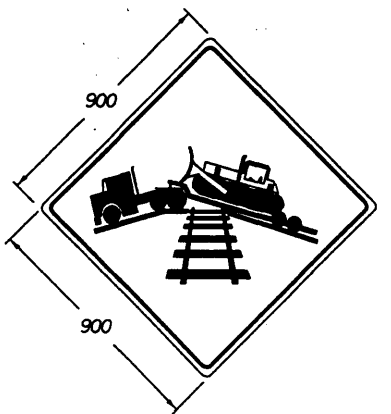
FTP - 39  
900 X 900  
55 Radii 19 Border  
Yellow Background  
Black Legend & Border

Remove the two crosswalk  
stripes for advance warning sign.

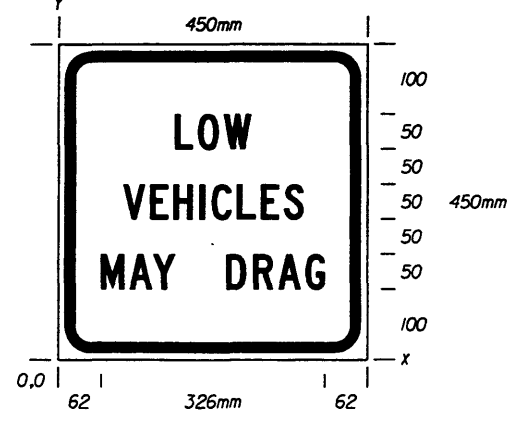
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
SPECIAL SIGN DETAILS				
Names	Dates	Approved By		
Designed By		 State Traffic Plans Engineer		
Drawn By		Revision	Sheet No.	Index No.
Checked By		00	5 of 12	17355



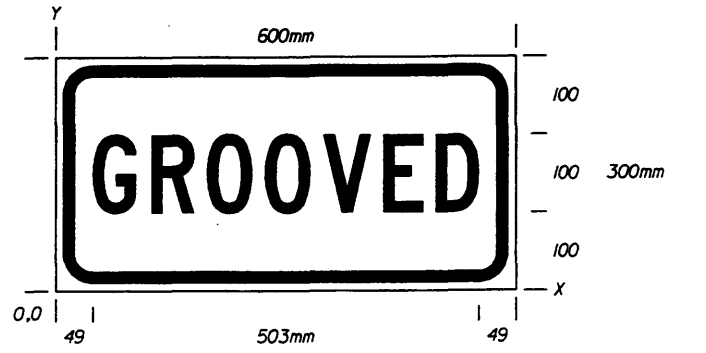
FTP - 39A  
 750 X 450  
 35 Radii 19 Border  
 100 Series C Legend  
 Yellow Background  
 Black Legend & Border



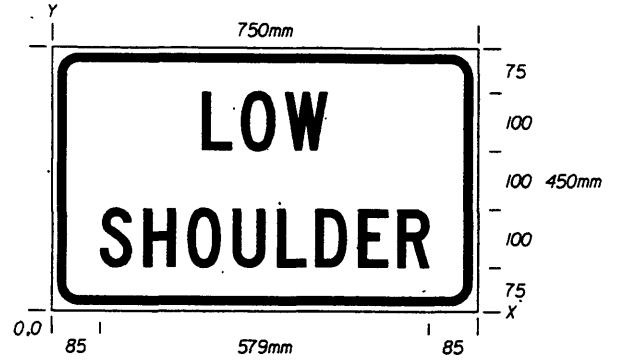
FTP - 40  
 900 X 900  
 55 Radii 19 Border  
 Yellow Background  
 Black Legend & Border



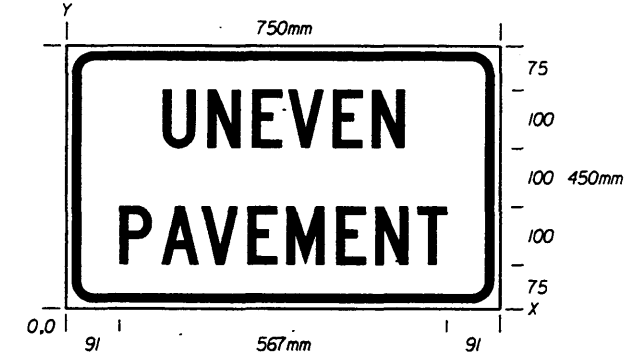
FTP - 40A  
 450 X 450  
 35 Radii 19 Border  
 50 Series C Legend  
 Yellow Background  
 Black Legend & Border



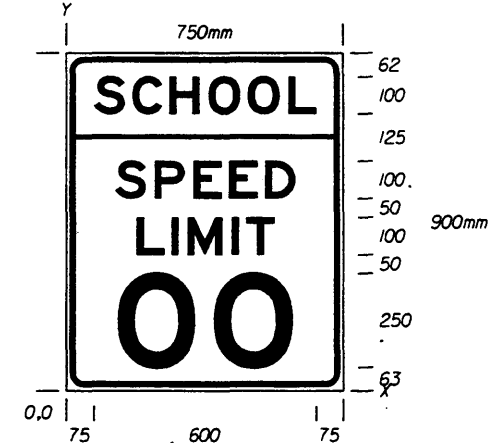
FTP - 41  
 600 X 300  
 35 Radii 19 Border  
 100 Series C Legend  
 Yellow Background  
 Black Legend & Border



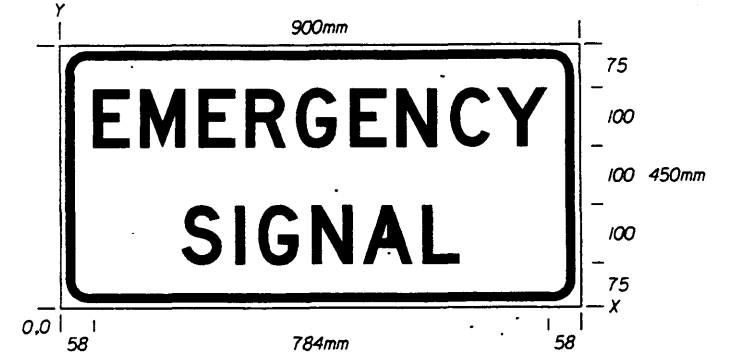
FTP - 42  
 750 X 450  
 35 Radii 19 Border  
 100 Series C Legend  
 Yellow Background  
 Black Legend & Border



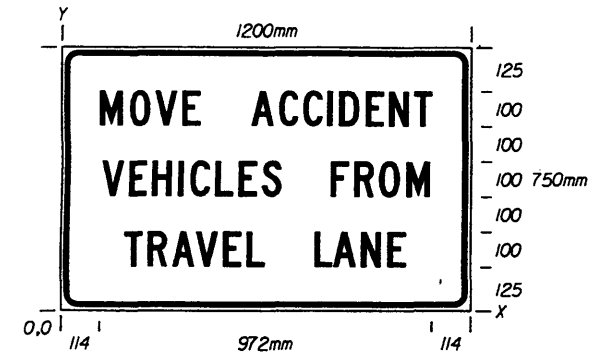
FTP - 43  
 750 X 450  
 35 Radii 19 Border  
 100 Series C Legend  
 Yellow Background  
 Black Legend & Border



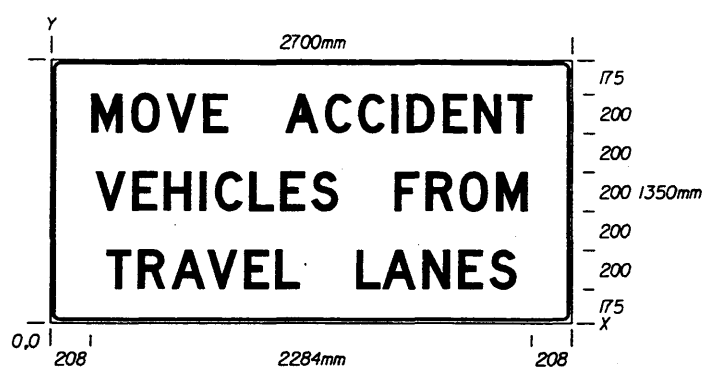
FTP - 44  
 750 X 900  
 35 Radii 19 Border  
 Series E Legend  
 Yellow Background Top White Background Bottom  
 Black Legend & Border



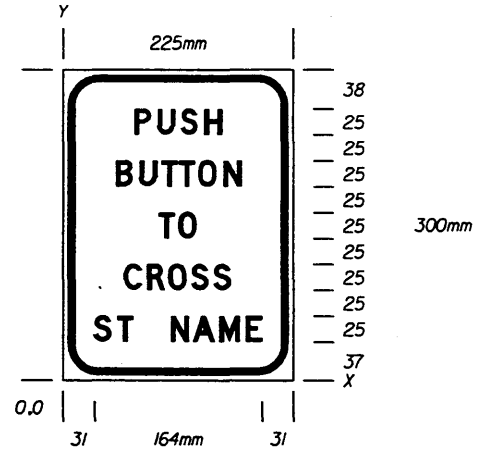
FTP - 45  
 900 X 450  
 35 Radii 19 Border  
 100 Series D Legend  
 Yellow Background  
 Black Legend & Border



FTP - 46  
 1200 X 750  
 55 Radii 19 Border  
 100 Series C Legend  
 White Background  
 Black Legend & Border

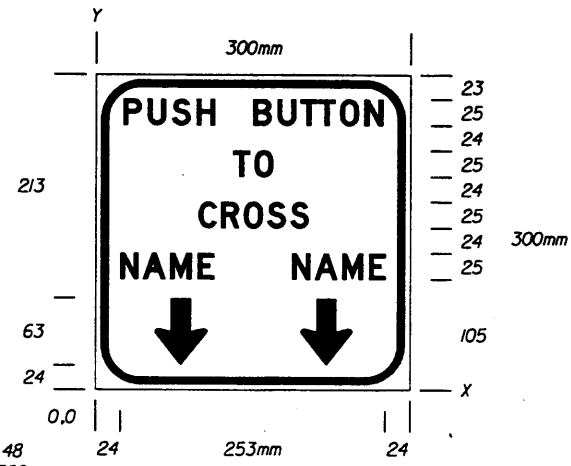


FTP - 46A  
 2700 X 1350  
 75 Radii 19 Border  
 200 Series D Legend  
 White Background  
 Black Legend & Border

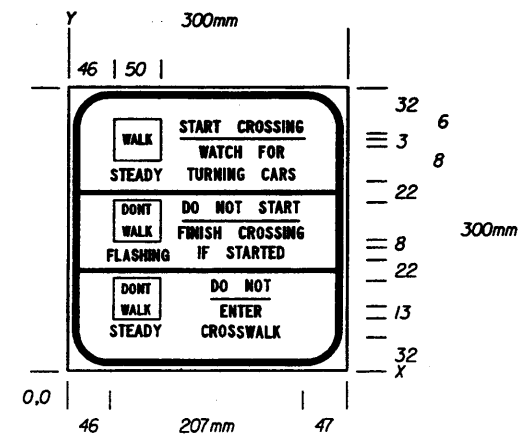


FTP - 47  
 225 X 300  
 35 Radii 19 Border  
 25 Series D Legend  
 White Background  
 Black Legend & Border

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
SPECIAL SIGN DETAILS				
Designed By	Names	Dates	Approved By <i>Charles Scott</i> State Traffic Plans Engineer	
Drawn By			Revision	Sheet No.
Checked By			00	6 of 12
				Index No. 17355

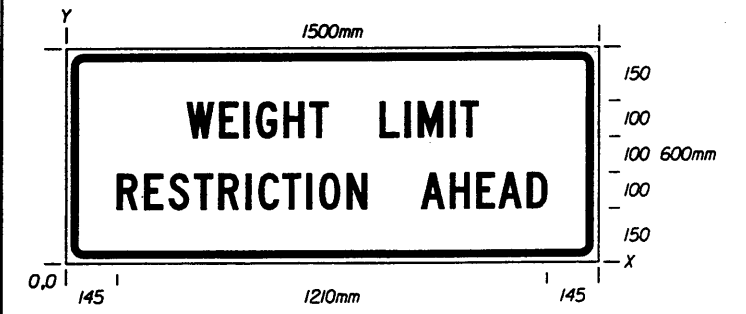


FTP - 48  
300 X 300  
35 Radii 19 Border  
25 Series D Legend  
White Background  
Black Legend & Border

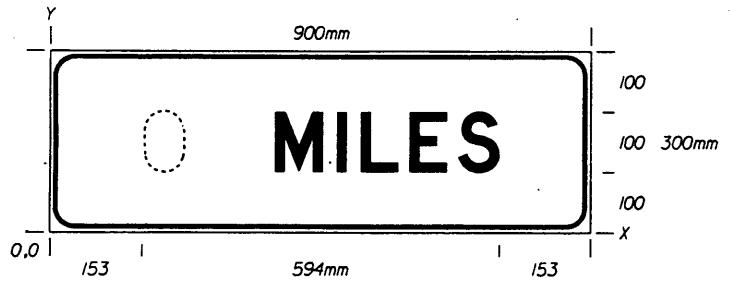


FTP - 49  
300 X 300  
35 Radii 19 Border  
Series C Legend  
White Background  
Black Legend & Border

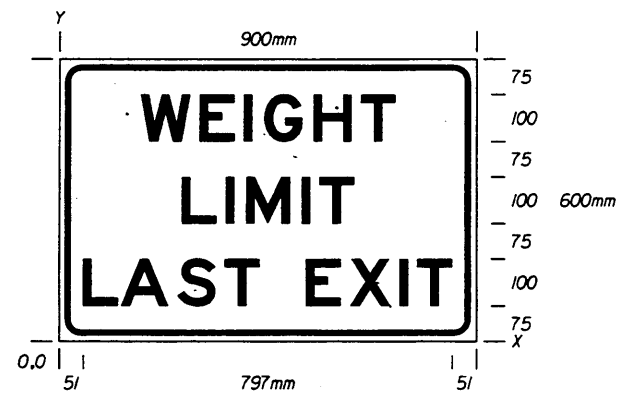
- Notes for FTP 49:
1. Text for FTP 49 shall be 13 mm except (WALK) and (DONT WALK) which will be 11 mm.
  2. Spacing between lines of legend shall be 8 mm except as noted.
  3. Underbar spacing as detailed.
  4. Colors shall be White background with Black legend and border  
Walk Plaque - White legend on Black background  
Dont Walk Plaque - Orange legend on Black background  
The international symbol may be used for walk and dont walk



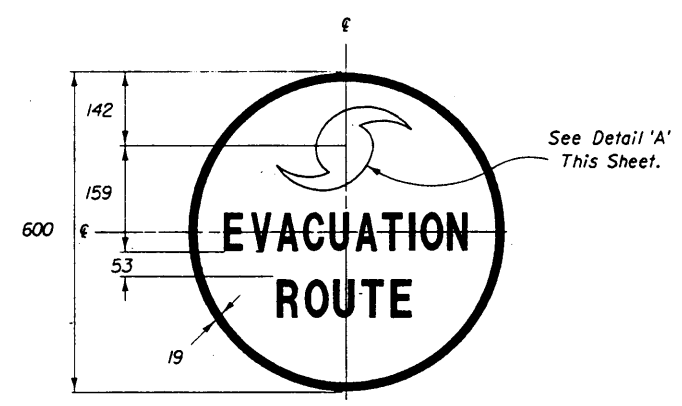
FTP - 50  
1500 X 600  
35 Radii 19 Border  
100 Series C  
Yellow Background  
Black Legend & Border



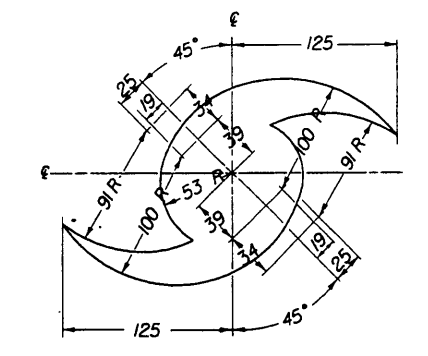
FTP - 51  
900 X 300  
35 Radii 19 Border  
100 Series D  
White Background  
Black Legend & Border



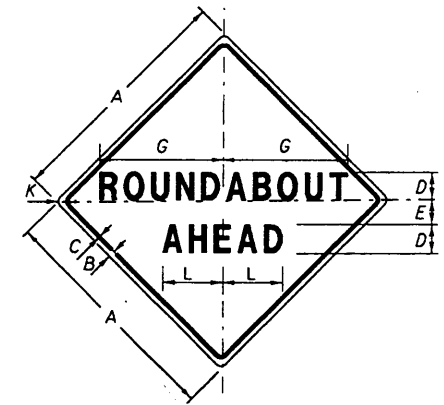
FTP - 52  
900 X 600  
35 Radii 19 Border  
100 Series E  
White Background  
Black Legend & Border



FTP - 53  
600 Diameter  
19 Border  
75 Series C  
Blue Background  
White Legend, Border & Symbol

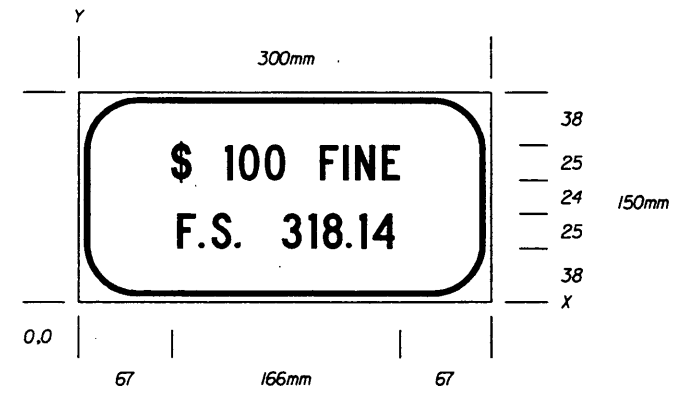


DETAIL 'A' for FTP - 53  
Symbol

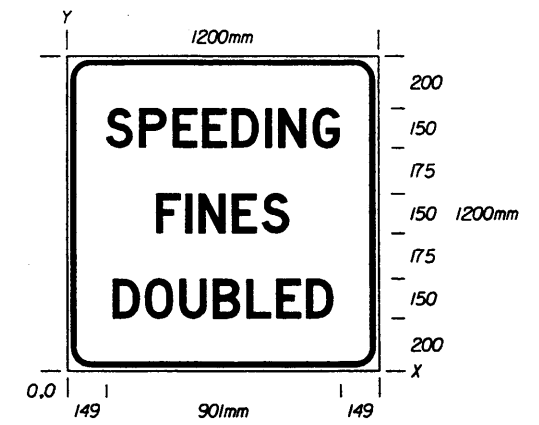


FTP - 54  
900 X 900  
55 Radii 19 Border  
125 Series D  
Yellow Background  
Black Legend & Border

DIMENSIONS IN MILLIMETERS							
A	B	C	D	E	G	K	L
900	15	20	1250	88	450	55	219

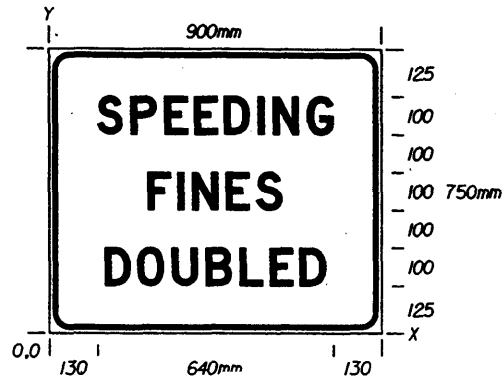


FTP - 55  
300 X 150  
35 Radii 19 Border  
25 Series C  
White Background  
Black Legend & Border  
Supplemental panel for the FTP-25 and FTP-26 signs

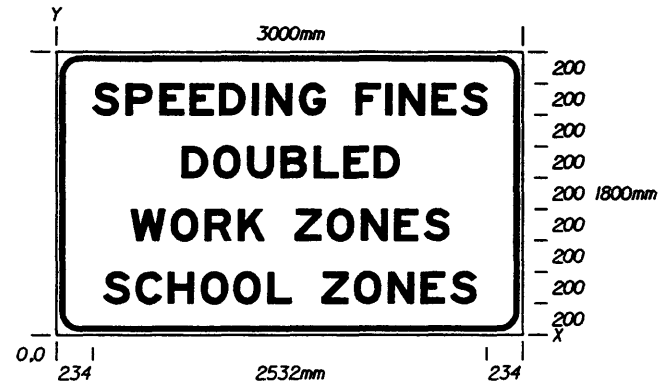


FTP - 56  
Freeway Sign  
1200 X 200  
75 Radii 30 Border  
150 Series D  
White Background  
Black Legend & Border

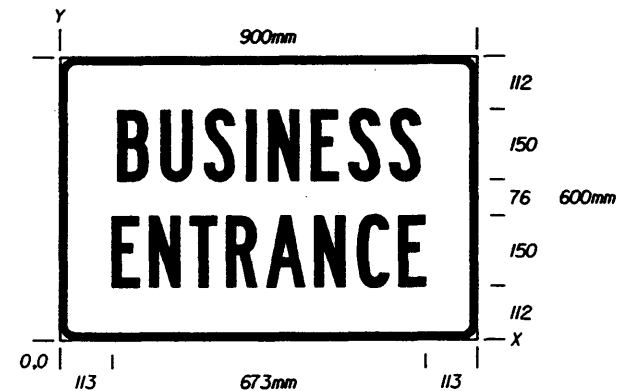
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
<b>SPECIAL SIGN DETAILS</b>				
Designed By	Names	Dates	Approved By <i>Charles A. [Signature]</i> State Traffic Plans Engineer	
Drawn By	Revision		Sheet No.	Index No.
Checked By	00		7 of 12	17355



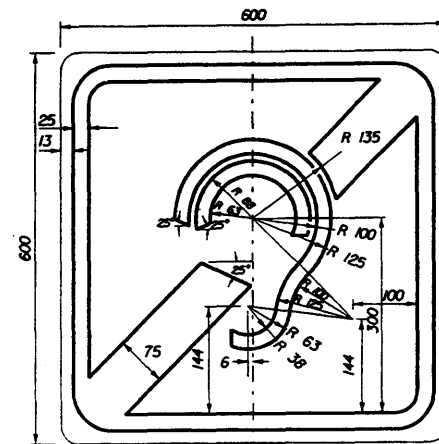
FTP - 57  
Arterial Sign  
900 X 750  
55 Radii 19 Border  
100 Series D  
White Background  
Black Legend & Border



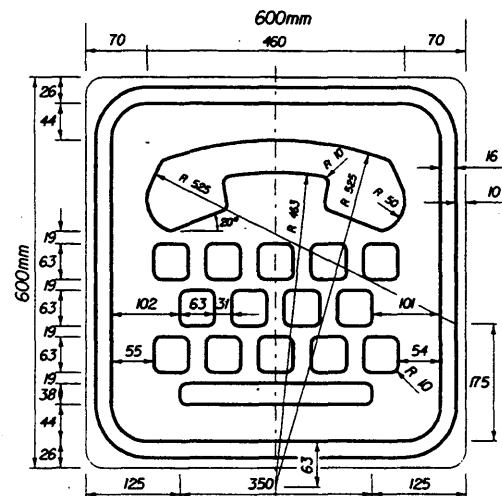
FTP - 58  
State Line Sign  
3000 X 1800  
75 Radii 50 Border  
200 Series E  
White Background  
Black Legend & Border



FTP - 59  
900 X 600  
35 Radii 19 Border  
150 Series B  
Blue Background  
White Legend & Border

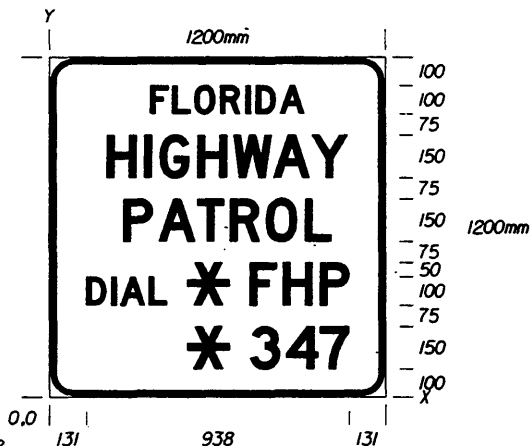


FTP - 60  
600 X 600  
35 Radii 19 Border  
Blue Background  
White Legend & Border



FTP - 61  
600 X 600  
35 Radii 19 Border  
Blue Background  
White Legend & Border

INTERNATIONAL TDD SYMBOL



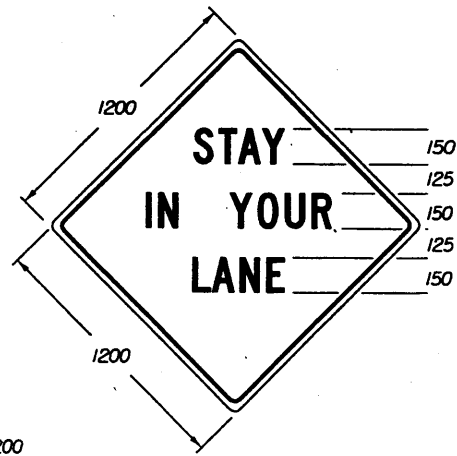
FTP - 62  
1200 X 1200  
75 Radii 20 Border  
Series D  
Blue Background  
White Legend & Border

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

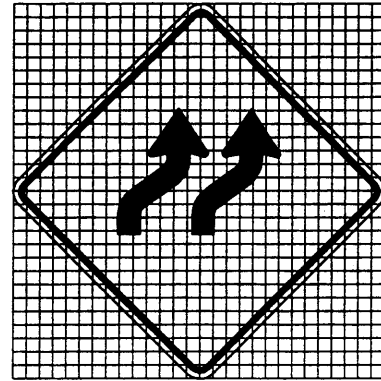
SPECIAL SIGN DETAILS

Names		Dates		Approved By		
Designed By				 State Traffic Plans Engineer		
Drawn By						
Checked By						
				Revision	Sheet No.	Index No.
				00	8 of 12	17355

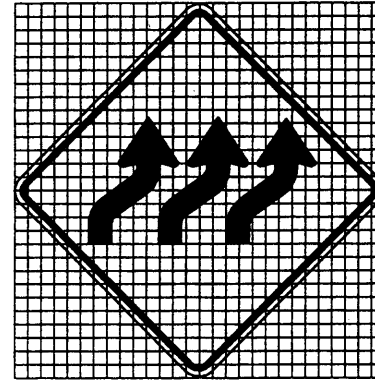




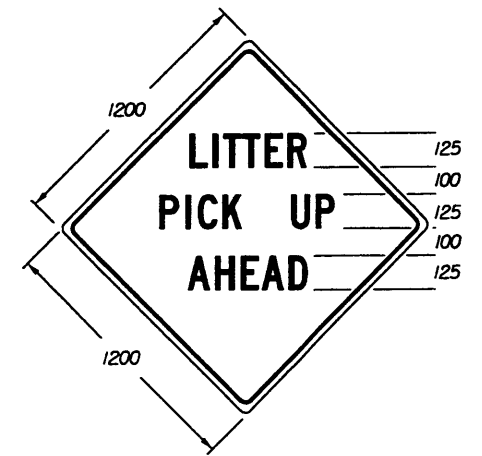
MOT - 1  
1200 X 1200  
75 Radii 19 Border  
150 Series C Legend  
Orange Background  
Black Legend & Border



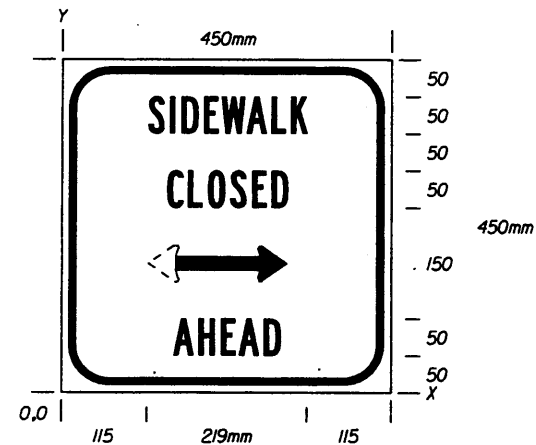
MOT - 2  
1200 X 1200  
75 Radii 19 Border  
Grid = 50 X 50  
Orange Background  
Black Arrows & Border



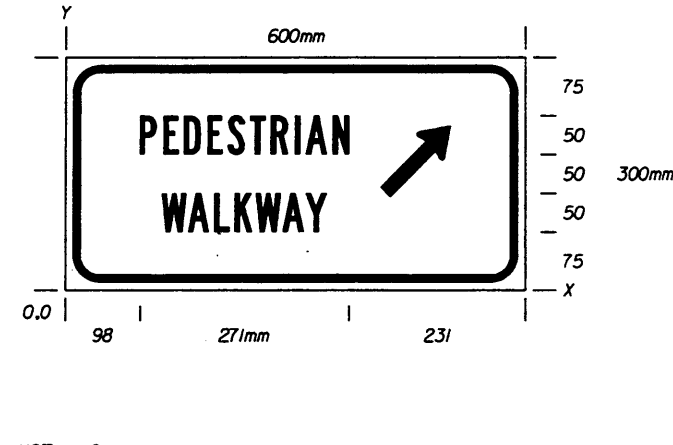
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75 Radii 19 Border  
Grid = 50 X 50  
Orange Background  
Black Arrows & Border



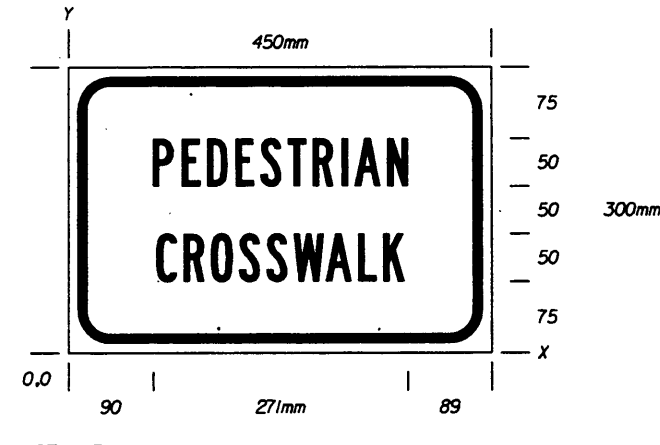
MOT - 4  
1200 X 1200  
75 Radii 19 Border  
Orange Background  
Black Arrows & Border



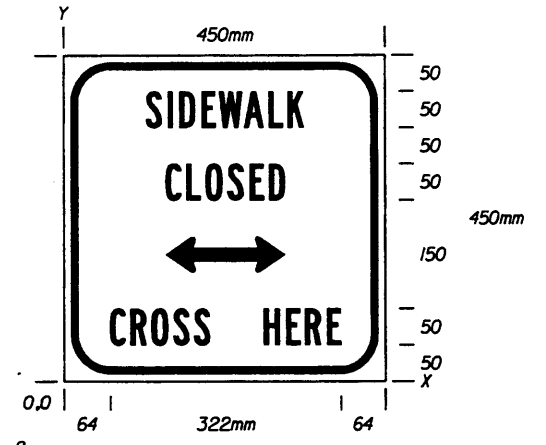
MOT - 5  
450 X 450  
55 Radii 19 Border  
50 Series B Legend  
White Background  
Black Legend & Border



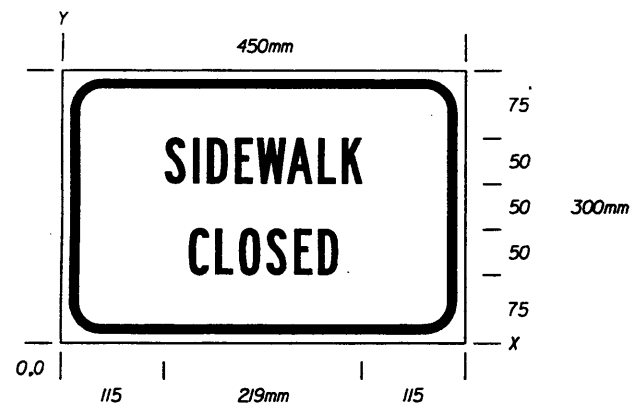
MOT - 6  
600 X 300  
35 Radii 19 Border  
50 Series B Legend  
White Background  
Black Legend & Border



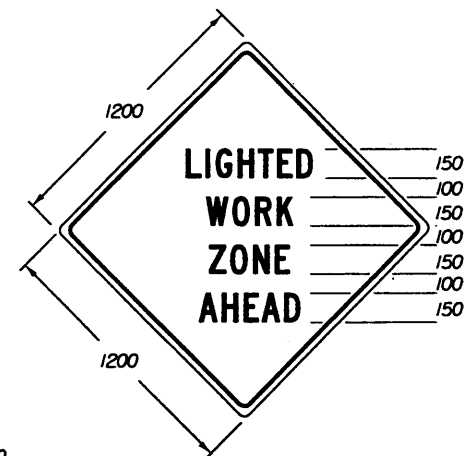
MOT - 7  
450 X 300  
35 Radii 19 Border  
50 Series B Legend  
White Background  
Black Legend & Border



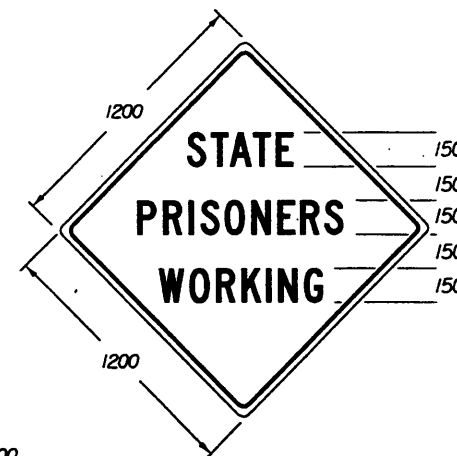
MOT - 8  
450 X 450  
55 Radii 19 Border  
50 Series B Legend  
White Background  
Black Legend & Border



MOT - 9  
450 X 300  
35 Radii 19 Border  
50 Series B Legend  
White Background  
Black Legend & Border

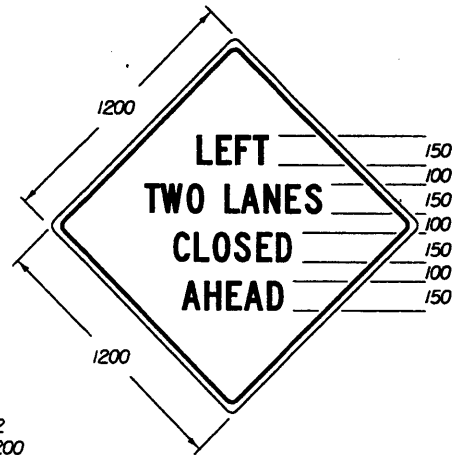


MOT - 10  
1200 X 1200  
75 Radii 19 Border  
150 Series C Legend  
Orange Background  
Black Legend & Border

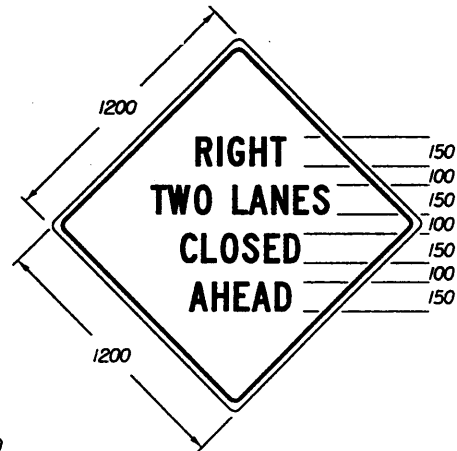


MOT - 11  
1200 X 1200  
75 Radii 19 Border  
150 Series C Legend  
Orange Background  
Black Legend & Border

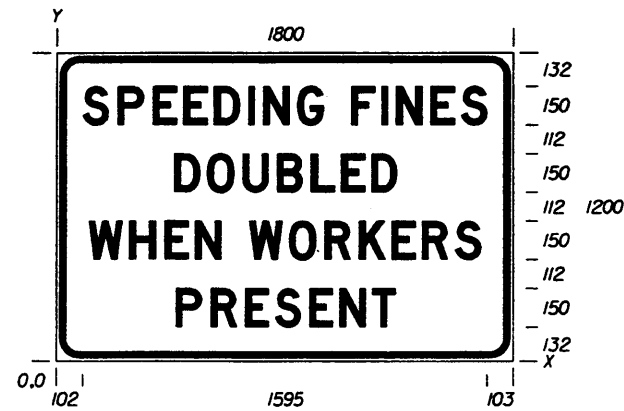
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN			
SPECIAL SIGN DETAILS			
Names	Dates	Approved By	
Designed By		 State Traffic Plans Engineer	
Drawn By			
Checked By		Revision	Sheet No. Index No.
		00	.9 of 12 17355



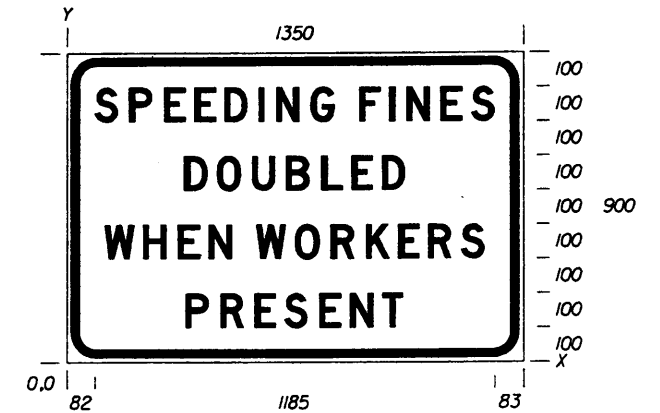
MOT - 12  
1200 X 1200  
75 Radii 19 Border  
150 Series C Legend  
Orange Background  
Black Legend & Border



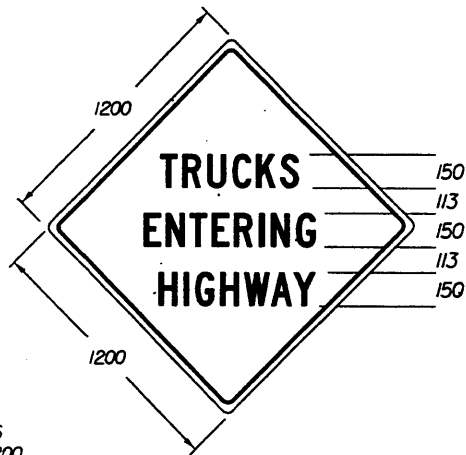
MOT - 13  
1200 X 1200  
75 Radii 19 Border  
150 Series C Legend  
Orange Background  
Black Legend & Border



MOT - 14  
1800 X 1200  
75 Radii 19 Border  
150 Series C Legend  
White Background  
Black Legend & Border

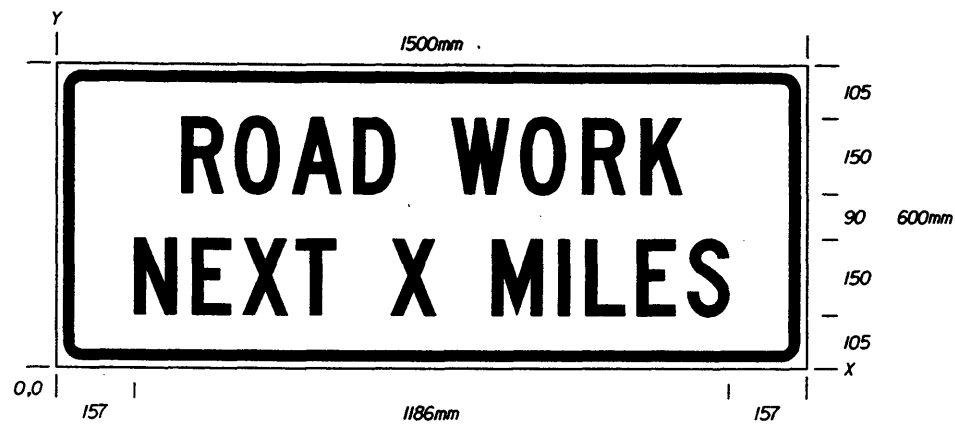


MOT - 15  
1350 X 900  
75 Radii 19 Border  
100 Series C Legend  
White Background  
Black Legend & Border

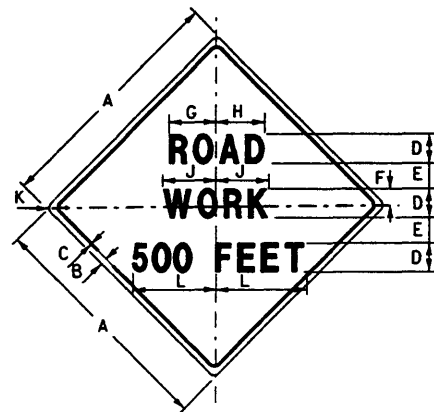


MOT - 16  
1200 X 1200  
75 Radii 19 Border  
150 Series C Legend  
Orange Background  
Black Legend & Border

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
SPECIAL SIGN DETAILS				
Names	Dates	Approved By		
Designed By		 State Traffic Plans Engineer		
Drawn By		Revision	Sheet No.	Index No.
Checked By		∞	10 of 12	17355

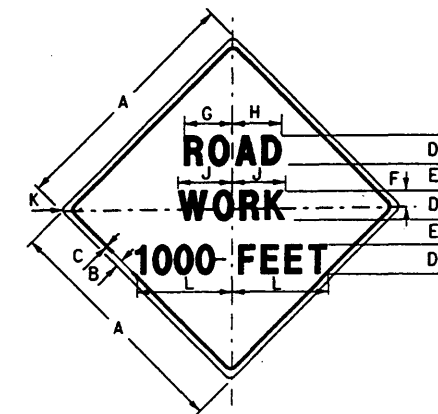


G20-1  
1500 X 600  
35 Radii 19 Border  
150 Series C Legend  
Orange Background  
Black Legend & Border



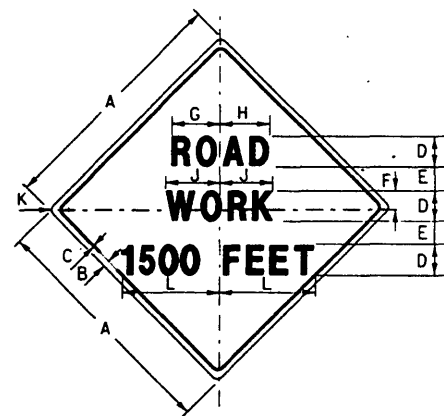
W20-IA  
LEGEND AND BORDER: BLACK  
BACKGROUND: ORANGE

DIMENSIONS IN MILLIMETERS										
A	B	C	D	E	F	G	H	J	K	L
900	15	20	1250	88	82	212	225	228	55	436
1200	20	30	1750	120	114	297	315	320	75	611



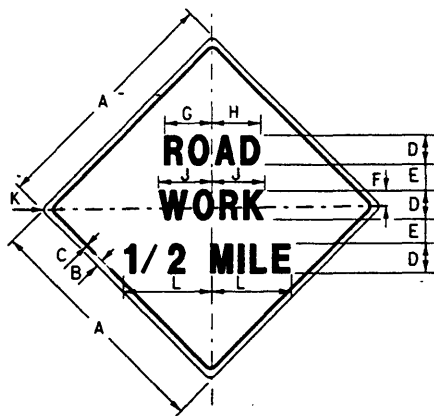
W20-IB  
LEGEND AND BORDER: BLACK  
BACKGROUND: ORANGE

DIMENSIONS IN MILLIMETERS										
A	B	C	D	E	F	G	H	J	K	L
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1200	20	30	1750	120	114	297	315	320	75	656



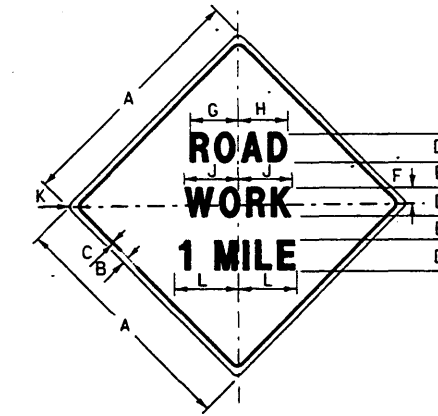
W20-IC  
LEGEND AND BORDER: BLACK  
BACKGROUND: ORANGE

DIMENSIONS IN MILLIMETERS										
A	B	C	D	E	F	G	H	J	K	L
900	15	20	1250	88	82	212	225	228	55	466
1200	20	30	1750	120	114	297	315	320	75	654



W20-ID  
LEGEND AND BORDER: BLACK  
BACKGROUND: ORANGE

DIMENSIONS IN MILLIMETERS										
A	B	C	D	E	F	G	H	J	K	L
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1200	20	30	1750	120	114	297	315	320	75	561



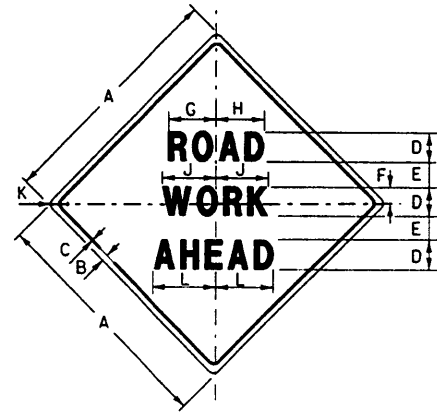
W20-IE  
LEGEND AND BORDER: BLACK  
BACKGROUND: ORANGE

DIMENSIONS IN MILLIMETERS										
A	B	C	D	E	F	G	H	J	K	L
900	15	20	1250	88	82	212	225	228	55	288
1200	20	30	1750	120	114	297	315	320	75	403

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

SPECIAL SIGN DETAILS

Names	Dates	Approved By		
Designed By		<i>Chuck A. Scott</i>	State Traffic Plans Engineer	
Drawn By		Revision	Sheet No.	Index No.
Checked By		00	11 of 12	17355



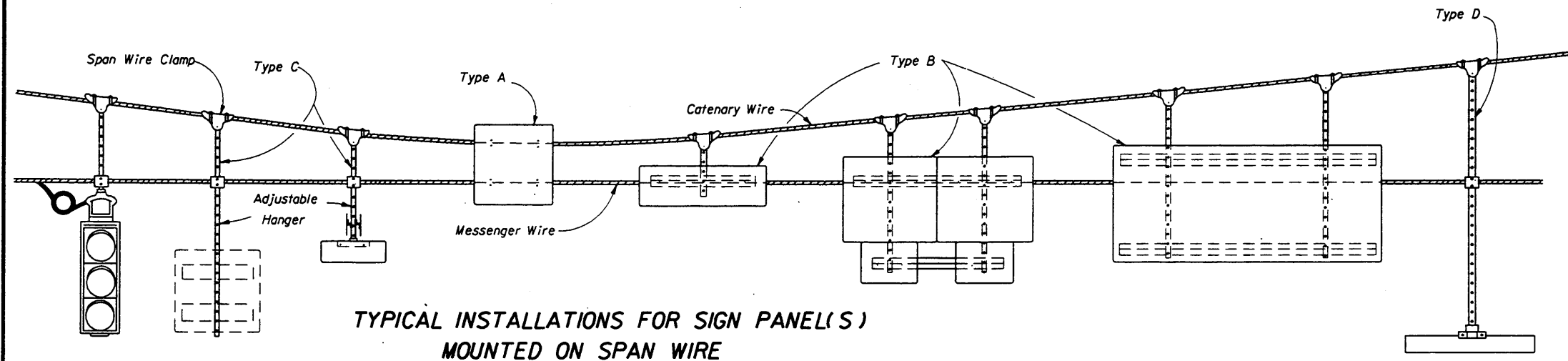
W20-IF  
 LEGEND AND BORDER: BLACK  
 BACKGROUND: ORANGE

DIMENSIONS IN MILLIMETERS										
A	B	C	D	E	F	G	H	J	K	L
900	15	20	1250	88	82	212	225	228	55	277
1200	20	30	1750	120	114	297	315	320	75	388

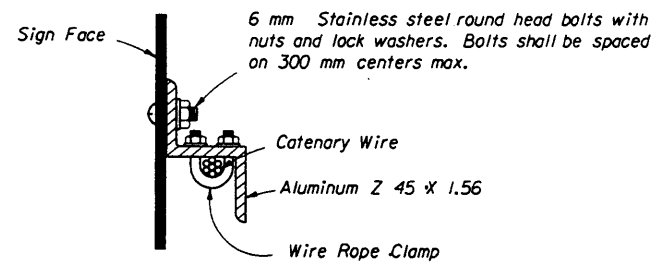
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
 TRAFFIC DESIGN

**SPECIAL SIGN DETAILS**

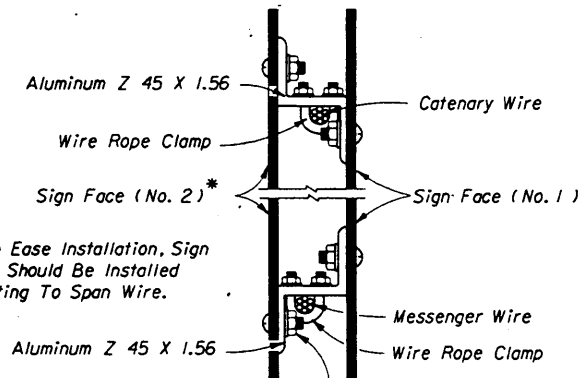
	Names	Dates	Approved By		
Designed By			 State Traffic Plans Engineer		
Drawn By					
Checked By			Revision	Sheet No.	Index No.
			98	12 of 12	17355



- Notes :
1. Bottom edge of signs shall be approximately at the same elevation.
  2. Span wire installations that support only signs should be provided with a minimum panel weight of 34 kg/m<sup>2</sup>.
  3. Type B & C attachments with one hanger shall have wind beams for signs wider than 1.0 m. The beams shall extend to within 150 mm of the sign edge.
  4. Type B & C attachments for signs 1.2 m and wider shall have 2 hangers. Signs 2.1 m and wider shall have wind beams that extend to within 150 mm of the sign edge.
  5. Type D attachments shall be for signs 1.0 m wide or less.
  6. Sign panels shall meet the requirements of Index 9535.
  7. Refer to section 634 of the Standard Specifications For Road And Bridge Construction.
  8. All bolts, nuts, and washers shall be passivated stainless steel, AISI 300 series, commercial grade, type 316.



**SIGN MOUNTING DETAIL**

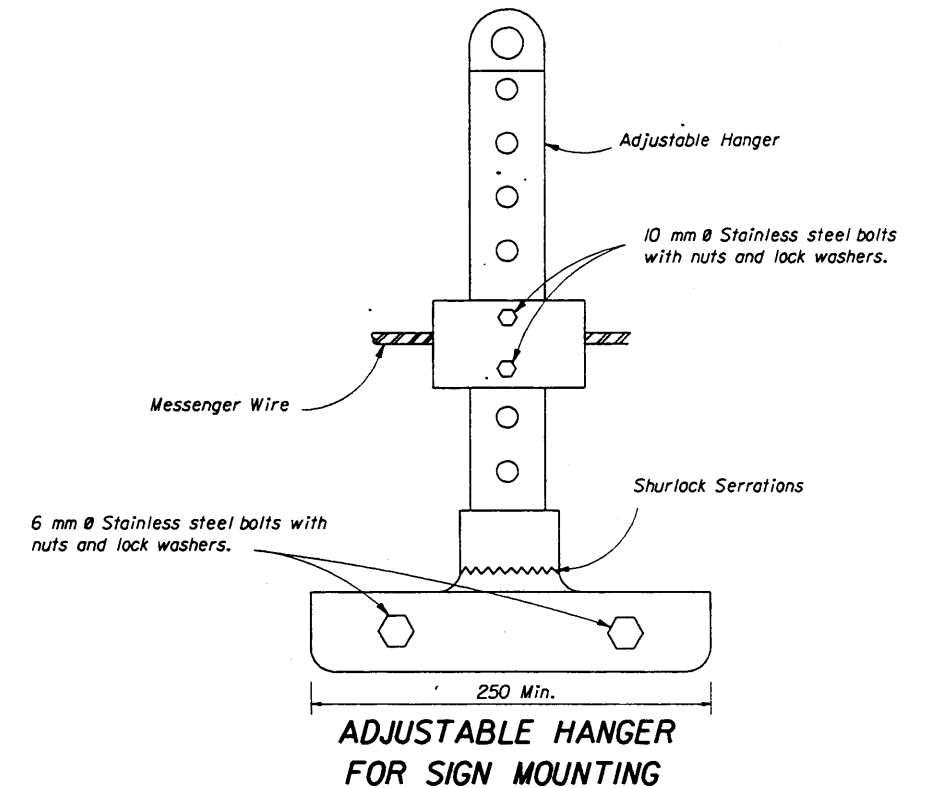


\* In Order To Ease Installation, Sign Face No. 2 Should Be Installed After Mounting To Span Wire.

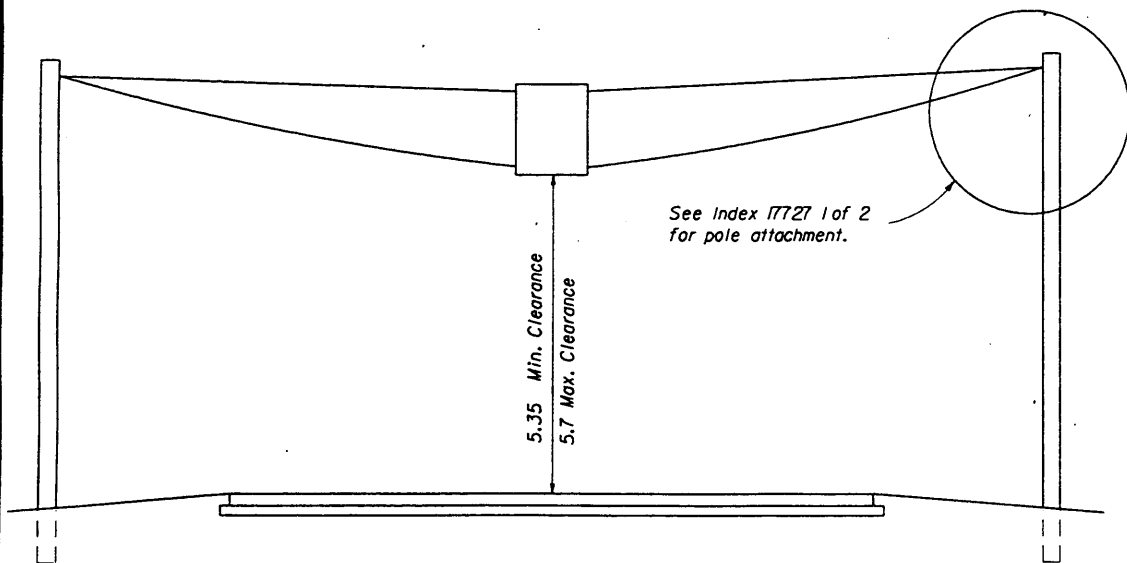
6 mm Ø Stainless steel round head bolts with nuts and lock washers. Bolts shall be spaced on 300 mm centers max.

The overlapped connection of adjustable hangers shall use a minimum of 2 bolts with a minimum spacing between bolts of 50 mm.

**DETAIL OF OPPOSING SIGNS SPAN WIRE MOUNTED**



**ADJUSTABLE HANGER FOR SIGN MOUNTING**



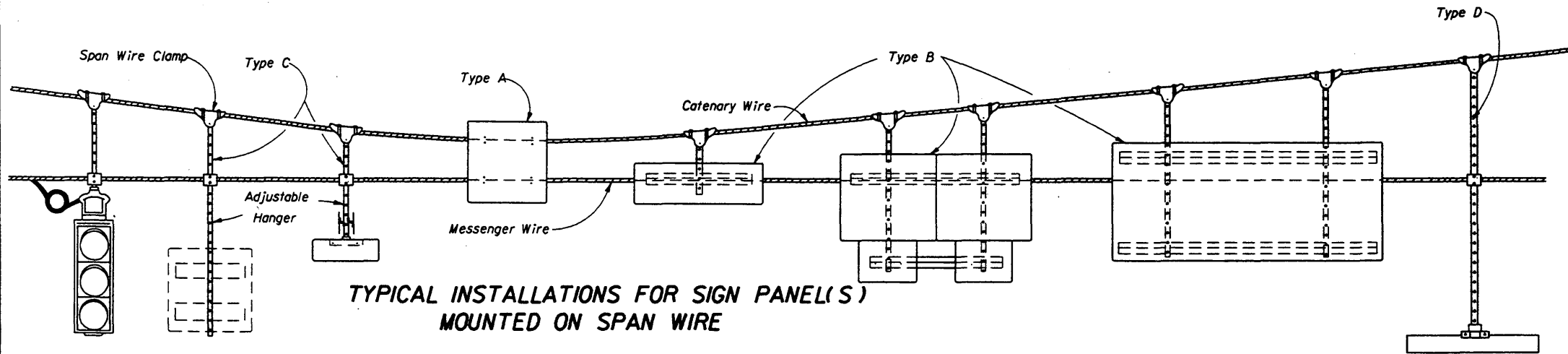
**TYPICAL SPAN WIRE INSTALLATION**

**SINGLE POINT ATTACHMENT**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

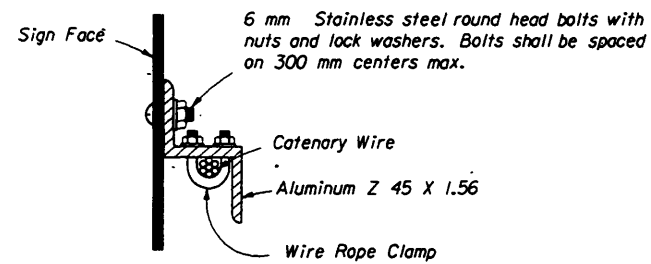
**SPAN WIRE MOUNTED SIGN DETAILS**

Names	Dates	Approved By		
Designed By		 State Traffic Plans Engineer		
Drawn By				
Checked By		Revision	Sheet No.	Index No.
		00	1 of 2	I7356

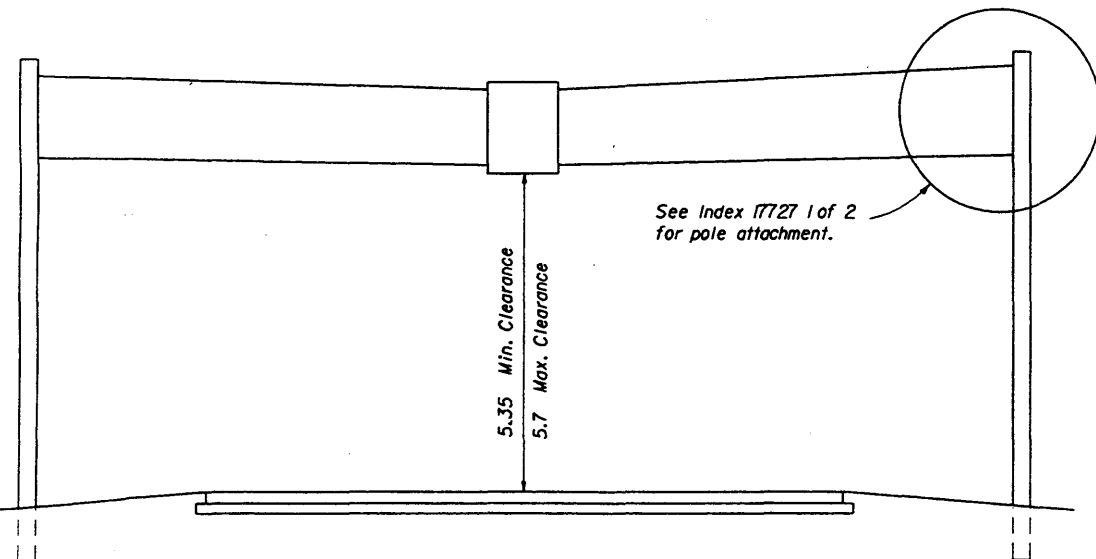


**TYPICAL INSTALLATIONS FOR SIGN PANEL(S) MOUNTED ON SPAN WIRE**

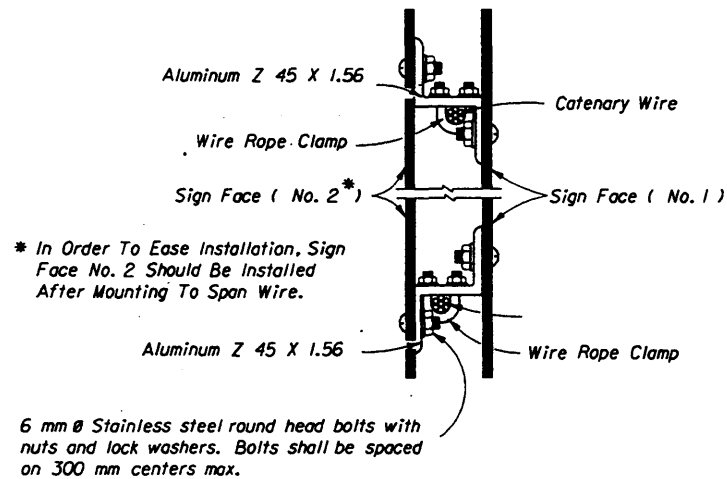
- Notes :
1. Bottom edge of signs shall be approximately at the same elevation.
  2. Type B & C attachments with one hanger shall have wind beams for signs wider than 1.0 m. The beams shall extend to within 150 mm of the sign edge.
  3. Type B & C attachments for signs 1.2 m and wider shall have 2 hangers. Signs 2.1 m and wider shall have wind beams that extend to within 150 mm of the sign edge.
  4. Type D attachments shall be for signs 1.0 m wide or less.
  5. Sign panels shall meet the requirements of Index 9535.
  6. Refer to section 634 of the Standard Specifications For Road And Bridge Construction.
  7. All bolts, nuts, and washers shall be passivated stainless steel, AISI 300 series, commercial grade, type 316.



**SIGN MOUNTING DETAIL**

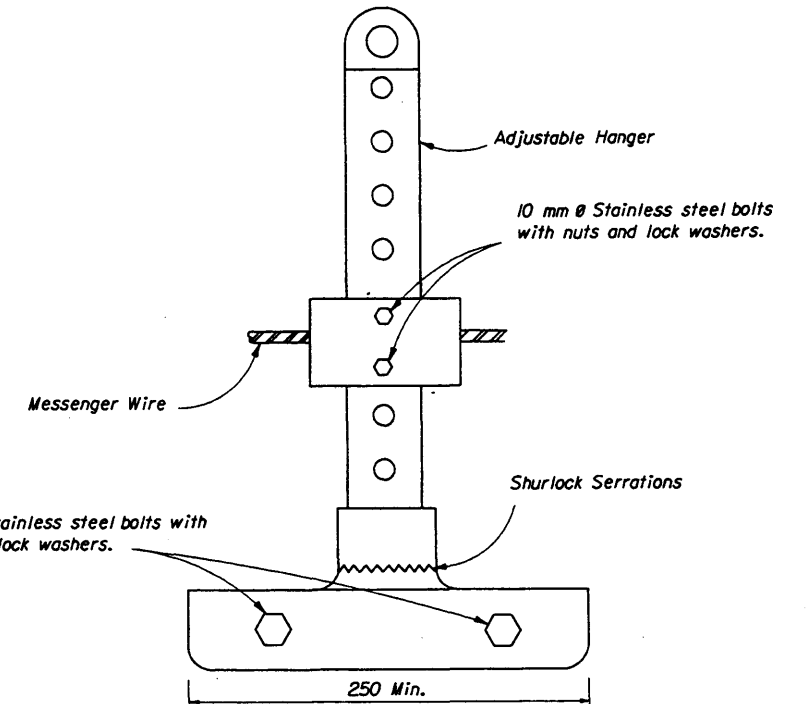


**TYPICAL SPAN WIRE INSTALLATION**



The overlapped connection of adjustable hangers shall use a minimum of 2 bolts with a minimum spacing between bolts of 50 mm.

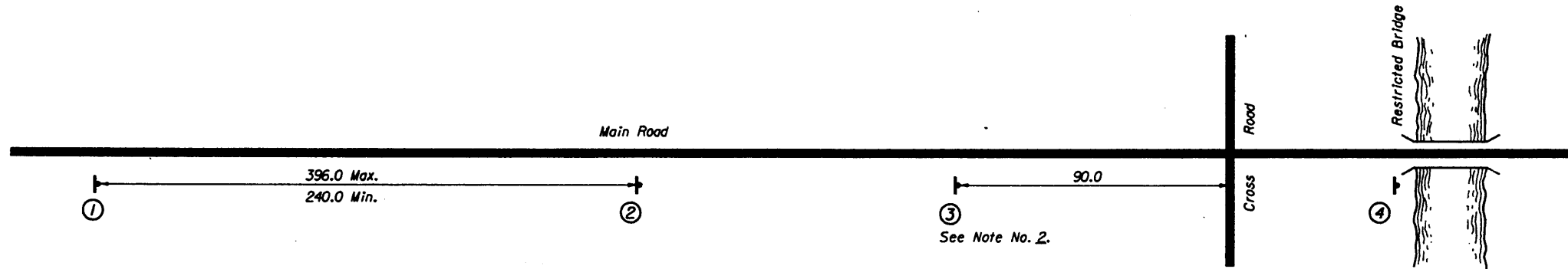
**DETAIL OF OPPOSING SIGNS SPAN WIRE MOUNTED**



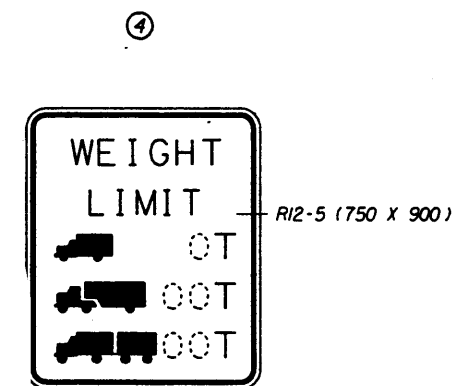
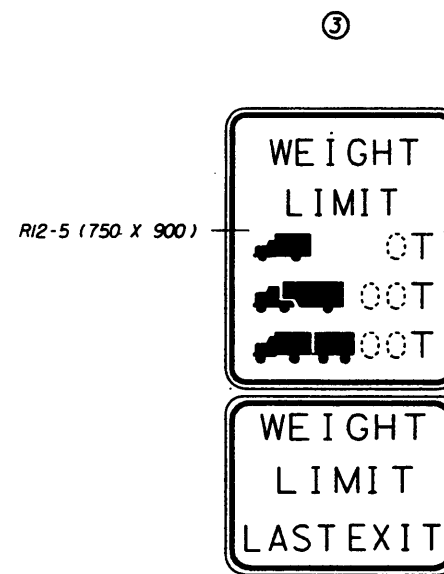
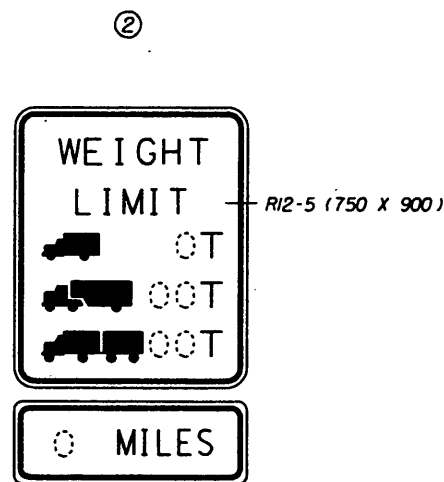
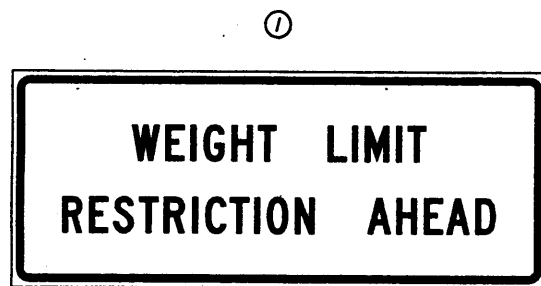
**ADJUSTABLE HANGER FOR SIGN MOUNTING**

**TWO POINT ATTACHMENT**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
<b>SPAN WIRE MOUNTED SIGN DETAILS</b>				
Designed By	Names	Dates	Approved By <i>Chub A. Scott</i> State Traffic Plans Engineer	
Drawn By			Revision	Sheet No. 2 of 2
Checked By			00	Index No. 17356

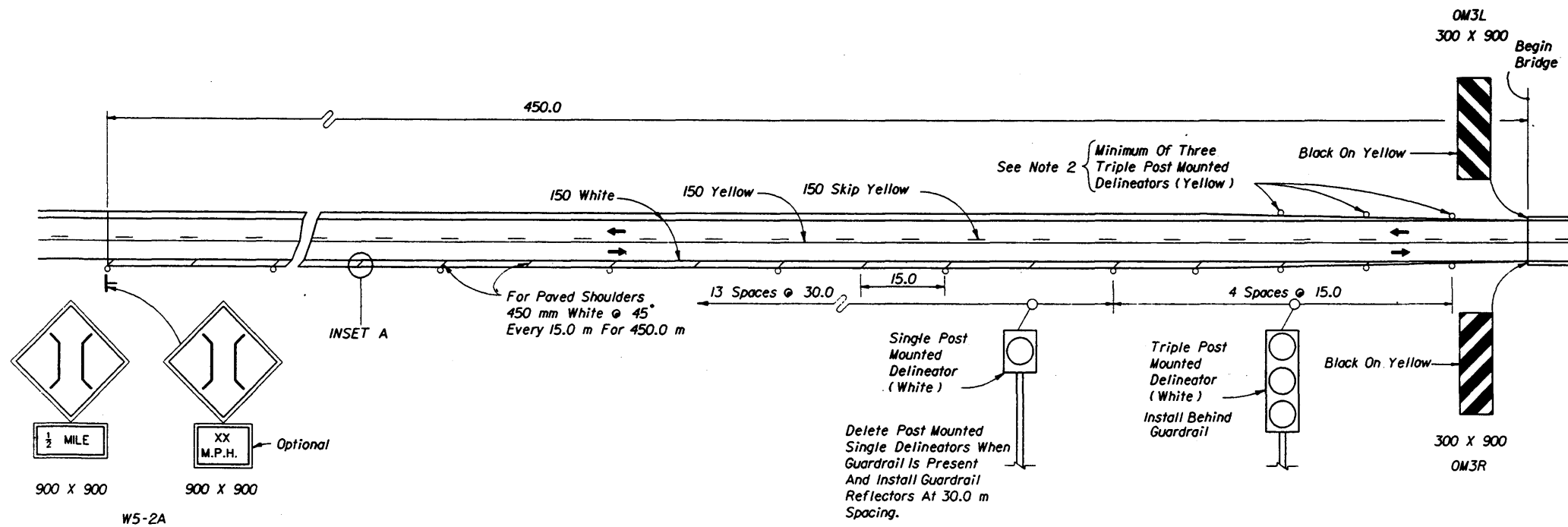


**SIGN LOCATIONS TYPICAL**

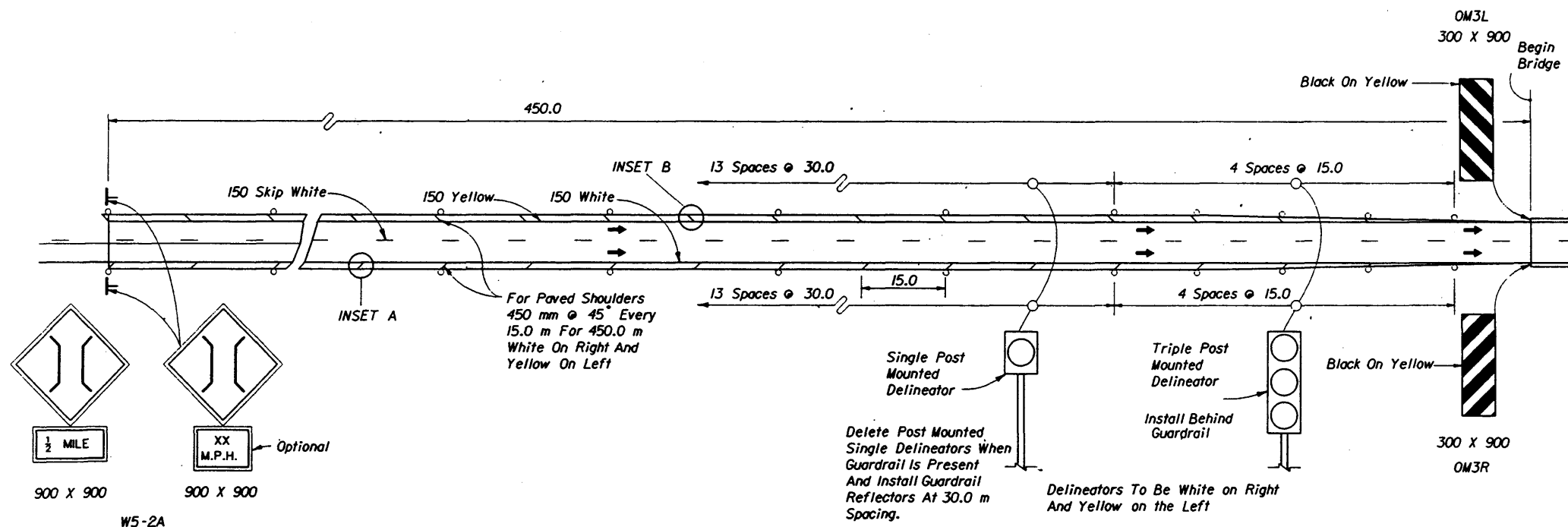


- NOTE:**
1. See Standard Highway Signs dated 1979 for sign R12-5 detail.
  2. Sign location No. 3 may require some field adjustment.
  3. Signs FTP-50, FTP-51 & FTP-52 shall have a 13 mm edge and 19 mm border with a 100 mm radius.
  4. The Cross Road is the last detour around the restricted bridge.
  5. Sign location No. 2 should be established from the Cross Road the following approximate distances:  
Interstate - 1.61 kilometer Non-Interstate - 0.8 kilometer
  6. See Index 17355 for sign details.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
<b>BRIDGE WEIGHT RESTRICTIONS</b>				
	Names	Dates	Approved By <i>Clark A. Scott</i> State Traffic Plans Engineer	
Designed By			Revision	Sheet No. 1 of 1
Drawn By			94	17357
Checked By				



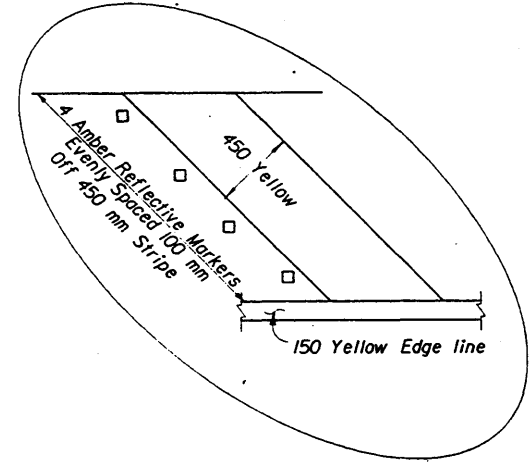
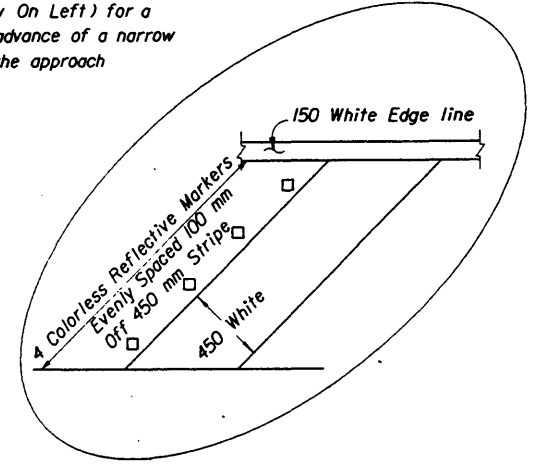
**TWO - WAY TRAFFIC**



**ONE - WAY TRAFFIC**

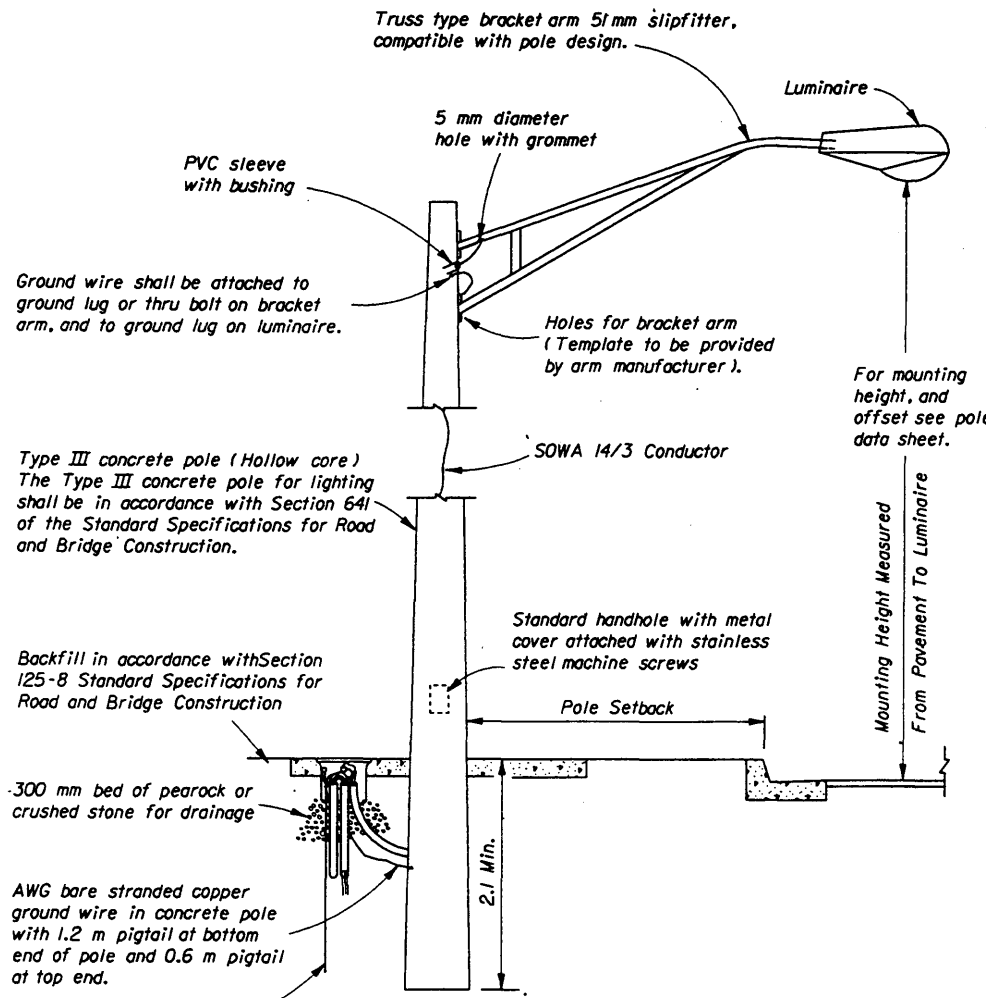
**NOTES:**

- Bridges should be marked as narrow bridges under the following conditions:
  - For approach roadways with paved shoulders when the bridge width including shoulders is less than the width of the approach roadway including paved shoulders.
  - For approach roadways without paved shoulders when the bridge shoulder width is less than 0.6 m.
- Roadways with two-way traffic:
  - No passing zone should be extended 450.0 m in advance of narrow bridge.
  - The post mounted delineators shall be installed on both sides of the roadway (White On Right / Yellow On Left) for a distance of 450.0 m in advance of a narrow bridge if the bridge or the approach is on a curve.
- Delineators on both sides of roadway shall face traffic approaching bridge.
- Delineators to be placed not less than 0.6 m or more than 2.4 m outside the outer edge of pavement.
- The OM-3R & OM-3L mounting height shall be 1.2 m above the roadway edge. The panels may be post mounted at the bridges.

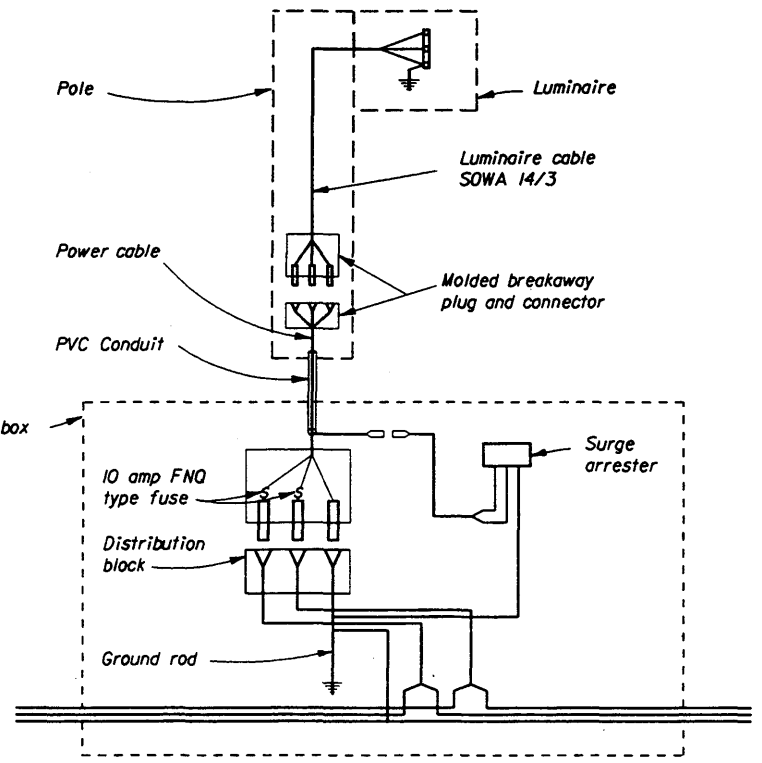


STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN					
<b>RURAL NARROW BRIDGE TREATMENT</b>					
Designed By	Names	Dates	Approved By <i>Charles H. Scott</i> State Traffic Plans Engineer		
Drawn By			Revision	Sheet No.	Index No.
Checked By			00	1 of 1	17359

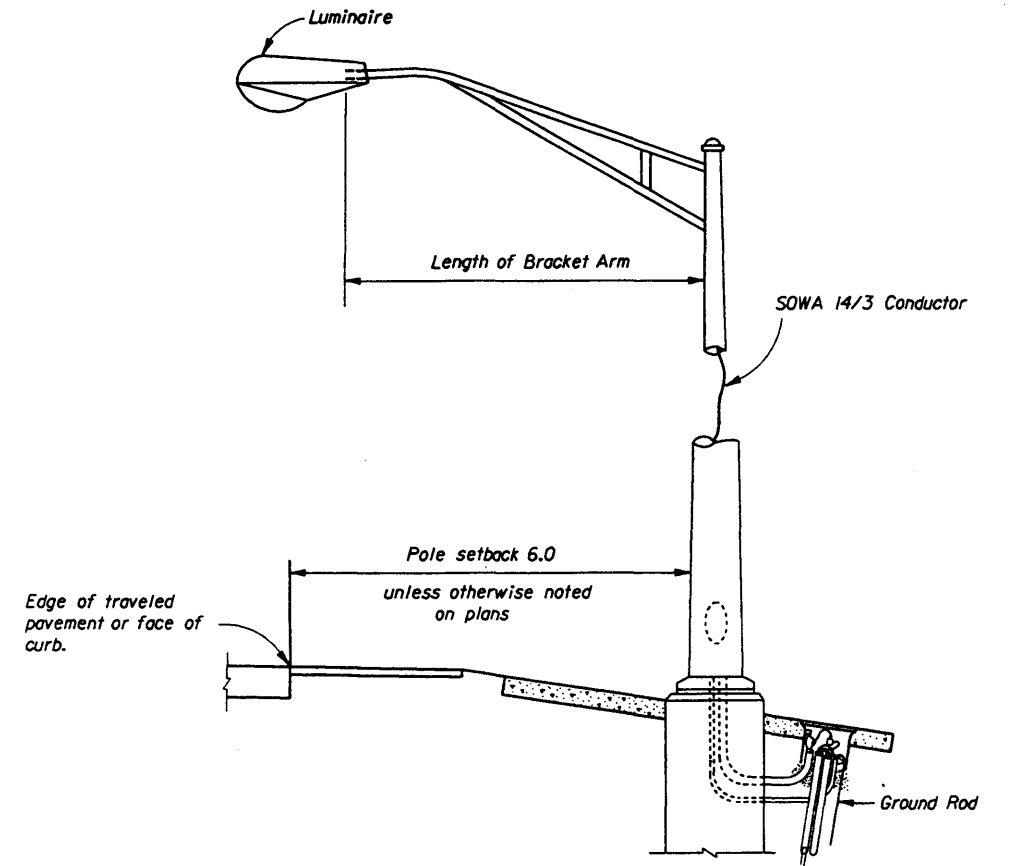




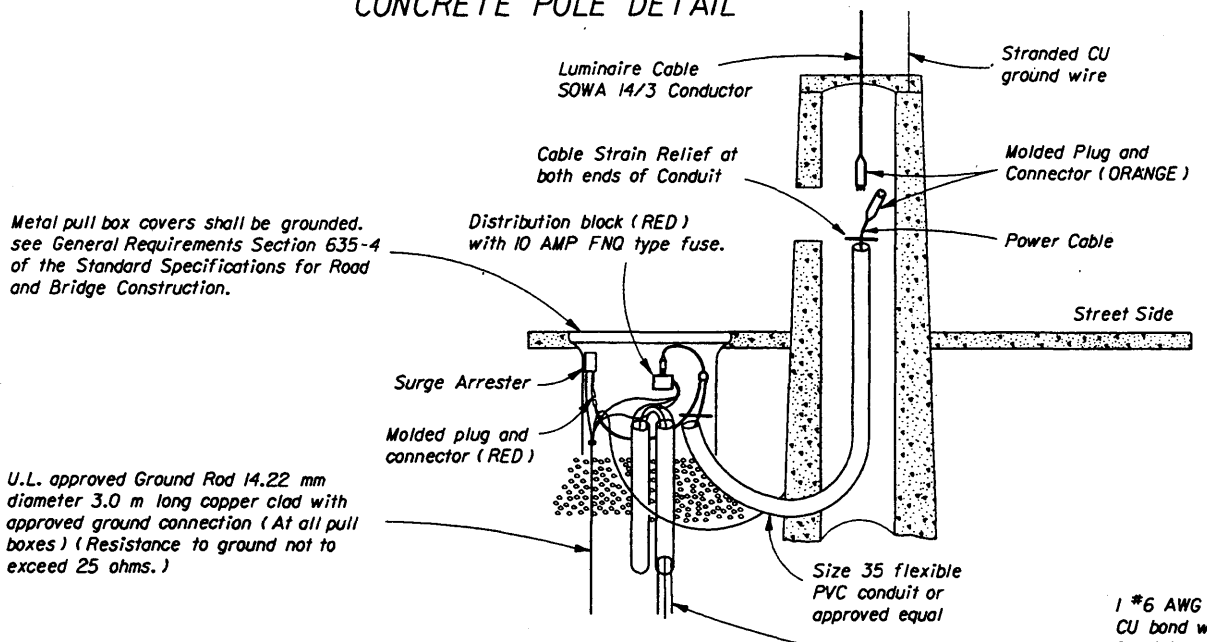
CONCRETE POLE DETAIL



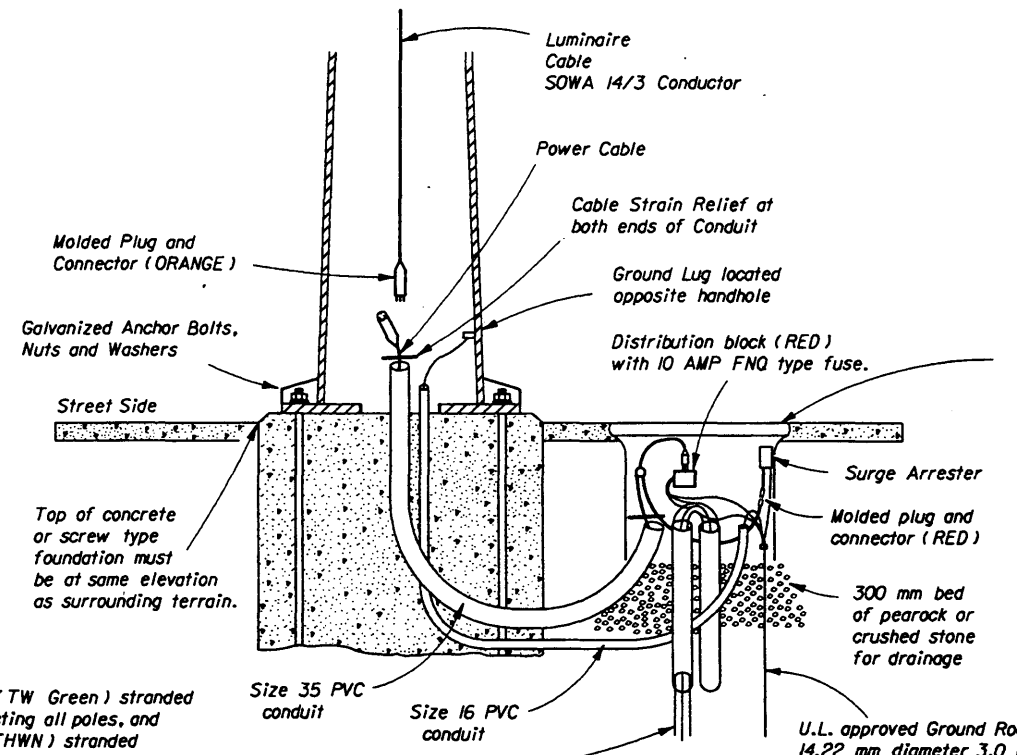
WIRING DIAGRAM



METAL POLE DETAIL



CONCRETE POLE WIRING DETAIL



METAL POLE WIRING DETAIL

Metal pull box covers shall be grounded, see General Requirements Section 635-4 of the Standard Specifications for Road and Bridge Construction.

U.L. approved Ground Rod 14.22 mm diameter 3.0 m long copper clad with approved ground connection (At all pull boxes) (Resistance to ground not to exceed 25 ohms.)

1 #6 AWG insulated (TW Green) stranded CU bond wire connecting all poles, and insulated (THW or THWN) stranded copper circuit conductors in schedule 40 PVC conduit. Circuit conductors and conduit size as shown in plans. (Typical)

Metal pull box covers shall be grounded, see General Requirements Section 635-4 of the Standard Specifications for Road and Bridge Construction.

U.L. approved Ground Rod 14.22 mm diameter 3.0 m long copper clad with approved ground connection (At all pull boxes) (Resistance to ground not to exceed 25 ohms.)

LIGHTING POLE DETAILS

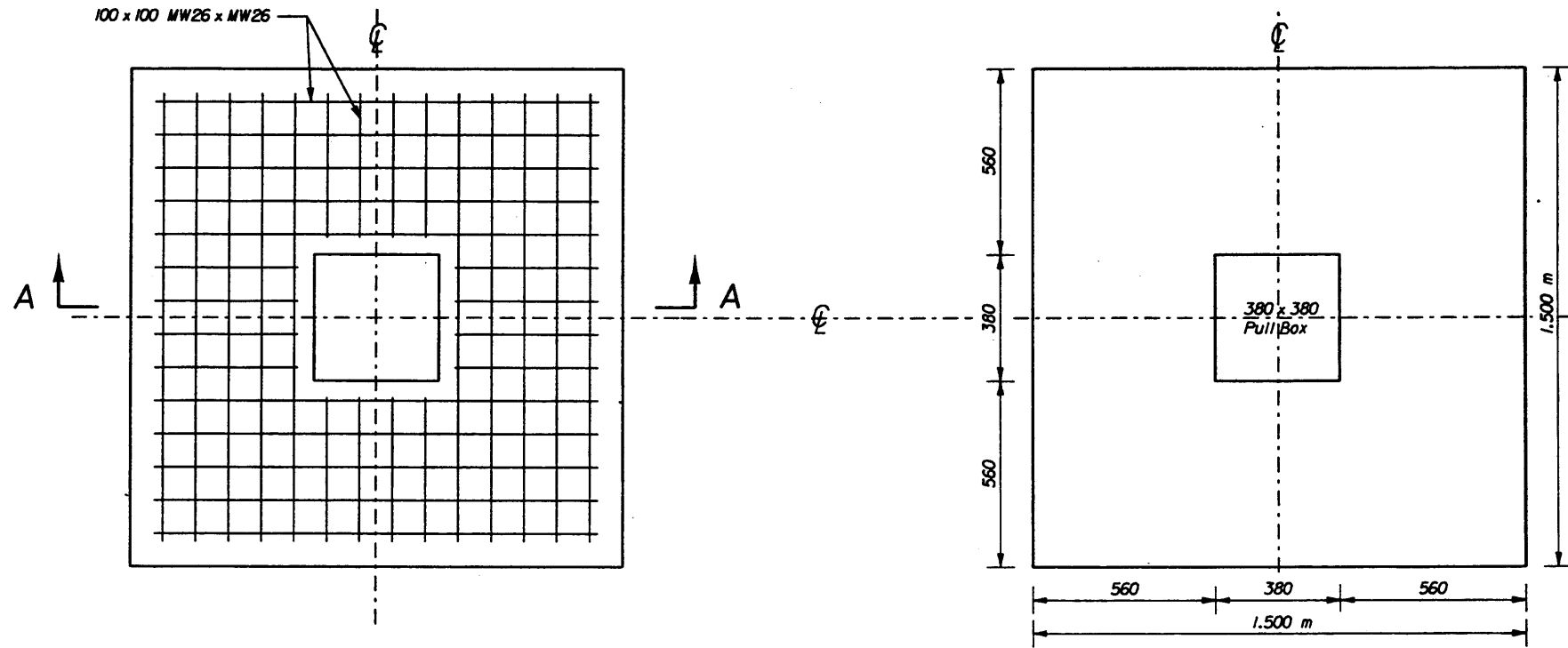
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
<b>CONVENTIONAL LIGHTING</b>				
Designed By	Names	Dates	Approved By	
Drawn By			<i>Charles A. Scott</i> State Traffic Plans Engineer	
Checked By			Revision	Sheet No. Index No.
			96	1 of 3 17500

**GENERAL NOTES:**

1. Luminaire shall be supplied with a regulator type ballast.
2. The ballast shall be mounted on a hinged door or panel. The unit shall swing open to provide access to the ballast assembly by release of captive screws. The electrical connector shall be a quick disconnect plug. The unit shall be easily removed from the luminaire after release of the captive screws and disconnect plug.
3. All splices shall be made in pull boxes only with compression sleeves or split bolt connectors, properly taped and waterproofed. Allow enough slack in wires to permit distribution block, surge arrester, and splices to be handled three hundred millimeters outside pull box.
4. A pull box shall be installed at each pole location. Pull boxes should be located 0.6 m max from pole unless otherwise directed by the project engineer. Metal pull box covers shall be grounded. See General Requirements Section 635-4 of the Standard Specifications for Road and Bridge Construction.
5. All mounting heights are  $\pm 750$  mm unless otherwise noted in plans.
6. At all pull boxes and pole bases, ends of conduit shall be sealed in accordance with Section 630 of the Standard Specifications for Road and Bridge Construction.
7. A handhole is required in all poles. Handhole should be located opposite approaching traffic with cover fastened with Stainless Steel Screws. Poles having handholes with less than 12 500 mm<sup>2</sup> of area shall incorporate a pull box at each pole.
8. For frangibility requirements, see Breakaway Feature Index (750).
9. Ground rod (At all pull boxes.) shall be U.L. approved 14.22 mm diameter 3.0 m long copper clad with approved ground connection (Resistance to ground not to exceed 25 OHMS.)
10. The luminaire and arm on JOINT USE POLES shall be grounded.
11. Concrete slabs around poles and pull boxes shall be paid for under the contract unit price for Class I Concrete (Miscellaneous); the cost of reinforcing steel fabric shall be included in the price for Class I Concrete (Miscellaneous).

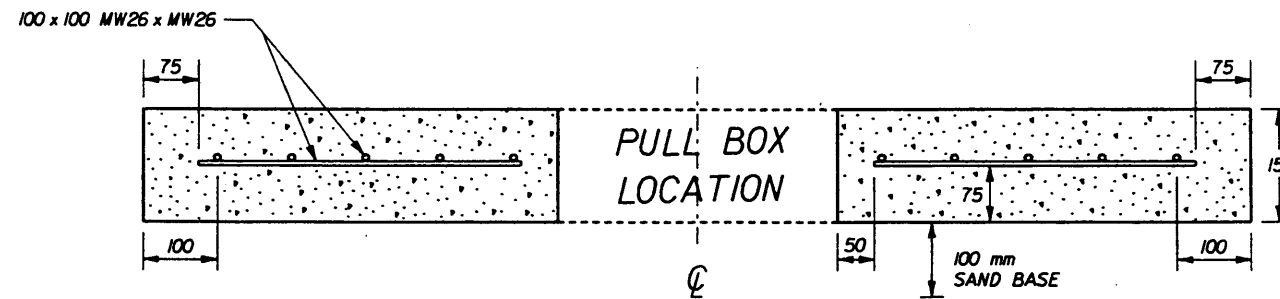
**SURGE PROTECTOR SPECIFICATIONS**

1. The unit shall withstand a surge current up to 20,000 Amps, and repetitive surges of 200 Amps for a minimum of 10,000 occurrences.
2. The unit shall respond in less than 50 nanoseconds and within this time have a peak clamping voltage better than 1,100 Vrms.
3. The maximum allowable voltage that can pass continuously through the hot leg of the protector must be less than 550 Vrms.
4. The current drain shall be less than 100 microamps.
5. The unit shall be insulated 600 V. to ground and shall be weatherproof.
6. The unit shall not allow holdover current or conduction to ground after the surge ends.
7. Protection shall be achieved for both the 480 V. and neutral conductors with the surges being passed to ground and NOT to neutral.
8. There shall be no discharge lag in the protection of the 480 V. conductor over the neutral conductor.
9. Underwriters Laboratory approval not required.



**REINFORCEMENT LAYOUT**

**SLAB DIMENSIONS**



**SECTION A-A**


**NOTES:**

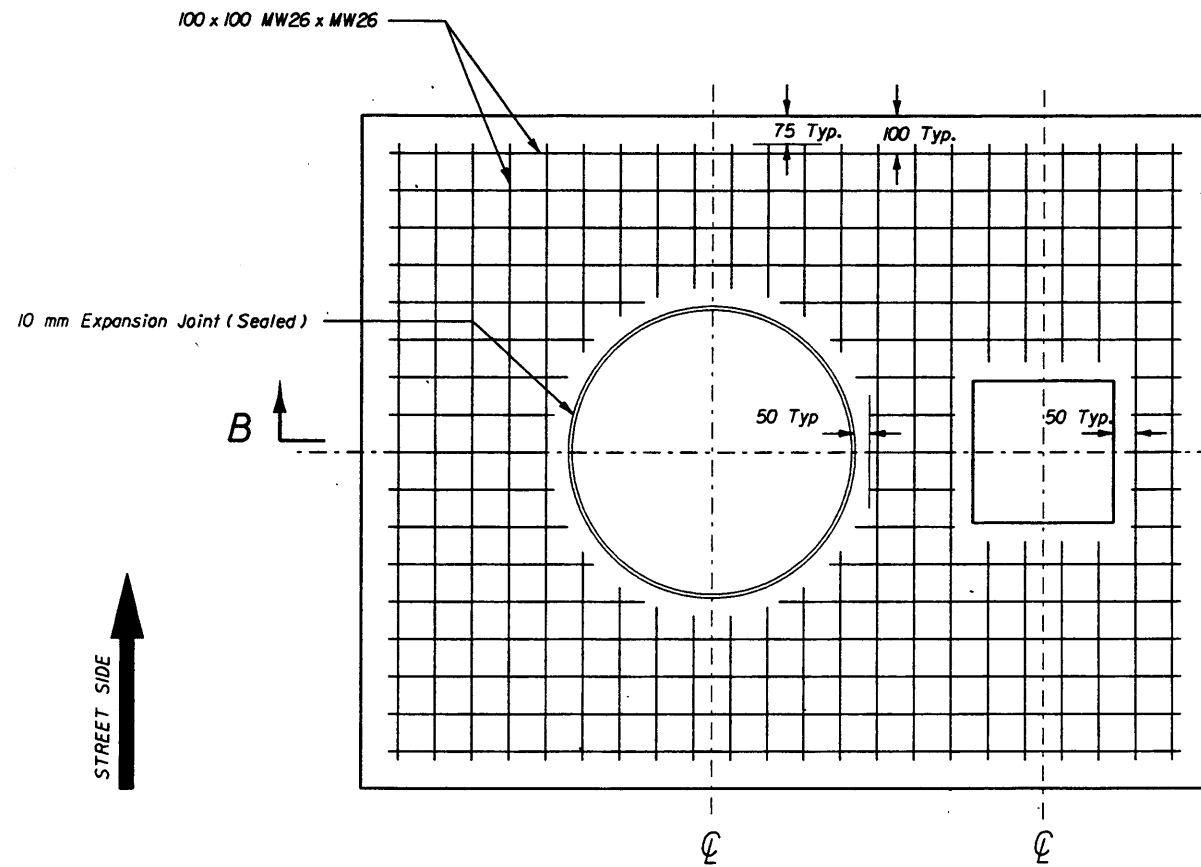
1. Use clean free draining sand < 5% passing 0.075 mm sieve for base.
2. Welded wire fabric shall meet the requirements of ASTM A185.
3. Concrete strength at 28 days shall be  $f'c = 21$  MPa.
4. Outside edges of slab shall be cast against formwork.
5. The pull box shown is 380 x 380; others approved under Section 635 of the Standard Specifications may be used.

**LIGHTING GENERAL NOTES AND SLAB DETAILS FOR PULLBOX LOCATIONS**

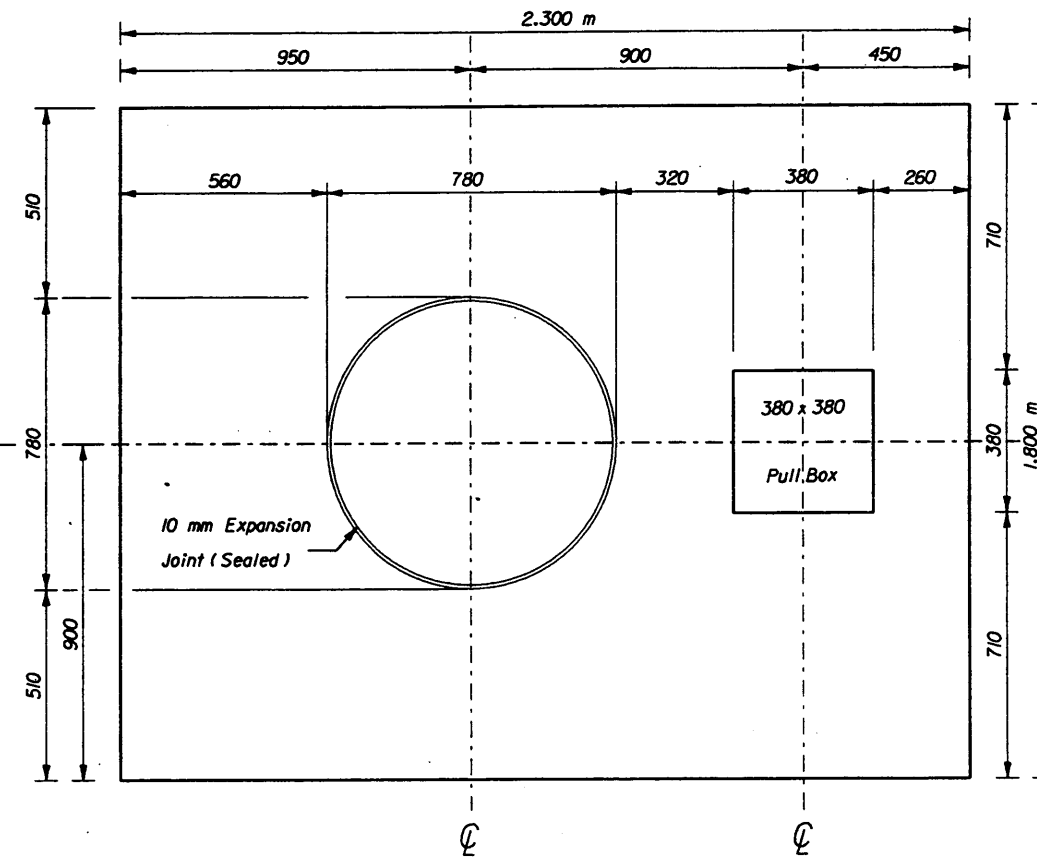
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

**CONVENTIONAL LIGHTING**

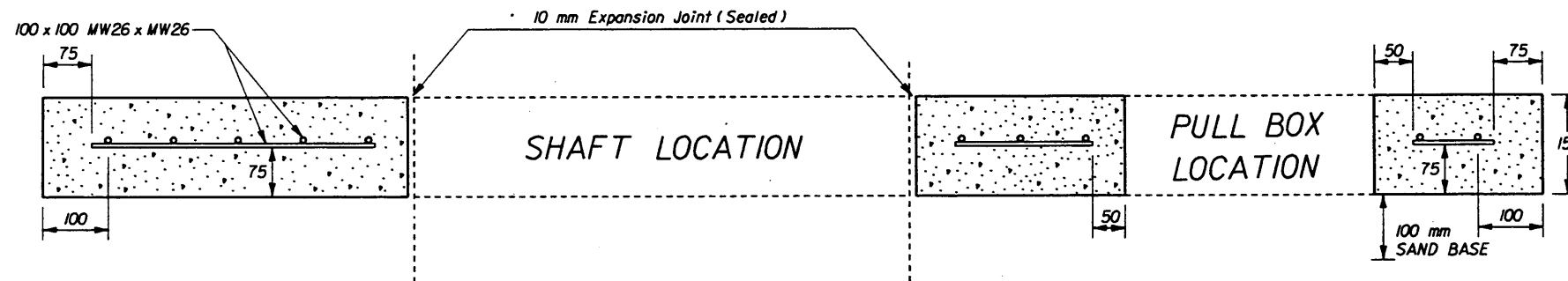
Designed By	Names	Dates	Approved By	Index No.
Drawn By			 State Traffic Plans Engineer	17500
Checked By				
			00	2 of 3



REINFORCEMENT LAYOUT



SLAB DIMENSIONS



SECTION B-B

SLAB DETAILS FOR POLE AND PULL BOX LOCATIONS

NOTES:

1. Use clean free draining sand < 5% passing 0.075 mm sieve for base (100 mm).
2. Welded wire fabric shall meet the requirements of ASTM A185.
3. Concrete strength at 28 days shall be  $f'c + 21$  MPa.
4. Outside edges of slab shall be cast against formwork.
5. The 10 mm thick expansion joint between shaft and slab shall be sealed with a hot poured elastic joint sealer.
6. Slabs to be placed around all Poles and Pull Boxes in rural locations. In urban areas or where space is limited slab dimensions may be adjusted as shown in the plans.
7. The pull box shown is 380 x 380; others approved under Section 635 of the Standard Specifications may be used.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
CONVENTIONAL LIGHTING				
Names	Dates	Approved By		
Designed By		<i>Charles Scott</i> State Traffic Plans Engineer		
Drawn By		Revision	Sheet No.	Index No.
Checked By		00	3 of 3	17500

- 1) Ground rods shall have a resistance to ground not to exceed 25 ohms. Where the resistance is greater than 25 ohms, two or more ground rods connected in parallel shall be used. Contractor shall have necessary test equipment (current calibration certificate required) at final inspection to ensure acceptability of grounding system. Total grounding system not to exceed 10 ohms, see note 23. Method of Measurement and Basis of Payment as per Section 620 of the Standard Specifications.
- 2) The contractor shall be responsible for contacting all utility companies prior to any underground work. The utility company will locate and identify their facilities.
- 3) Contractor shall determine the service required date for the power company transformer installation at the pre-construction conference.
- 4) The power company reserves the right to install the riser, switch gear and weatherhead on power company poles at the expense of the contractor. Contact the power company for cost or for authorization for an alternate procedure.
- 5) Any damaged portions of galvanized steel poles and bracket arms shall be painted in accordance with Section 562 of the Standard Specifications.
- 6) Poles and bracket arms shall be designed in accordance with the design criteria, as indicated in the plans and using the applicable equations found in the AASHTO 'Standard Specifications For Structural Supports For Highway Signs, Luminaires And Traffic Signals'. The calculations shall be based on the actual projected area of the luminaire or 0.28 square meters whichever is greater.
- 7) The luminaire manufacturer shall place a permanent tag on the luminaire housing on which is imprinted the following information: Wattage, ballast type, lamp shown on design plans, lamp setting (position of luminaire), IES light distribution with this lamp in the position specified, input voltage and power factor. Luminaire photometric submittals required.
- 8) Before final acceptance, contractor shall provide 2 sets of full size as built plans to the maintaining agency.
- 9) Conduit routing shall be pole to pole, maintaining pole setback distance from edge of pavement. Any cable routing in locations where guardrail is proposed shall be 0.6 meters in front of the standard guardrail position.
- 10) Pole positions and conduit routing may be adjusted, as approved by the Engineer, to prevent conflicts with utility and drainage structures not indicated, and prevent guardrail post conflict with underground lighting circuits.
- 11) Where guardrail is constructed, the poles shall be placed a minimum of 1.2 meters behind the face of the guardrail.
- 12) Pole foundation installations shall be backfilled to the top of the foundation, compacted to a firm, stable condition approximately equal to that of the adjacent soil. The fill shall conform to existing grade and be fully sodded.

- 13) The wires at pullboxes shall have sufficient length to completely remove connectors to the outside of pullboxes to make connectors accessible for changing fuses and trouble shooting the system.
- 14) Neutral wires to have white insulation. Do not use white or green insulated wires for ungrounded conductors.
- 15) Unless otherwise specified, all cable shall be single conductor, 98 percent conductivity stranded copper, with THW or THWN insulation.
- 16) All splices shall be made in pullboxes or the pole base. No splices shall be made inside the conduit.
- 17) All exposed or surfaced mounted conduit shall be rigid or intermediate metal. These exposed runs of conduit shall be provided with either expansion joints or flexible metal conduit sections adequate to take care of vibrations and thermal expansions. All metal conduit shall be grounded. Steel conduit shall be hot dipped galvanized.
- 18) All conduit that will remain empty as spares shall be mandrel tested, cleaned inside and both ends capped. Leave the corrosion resistant pull/drag wire and place duct makers, or pullboxes to mark the location of the ends of the conduits.
- 19) Pull boxes shall be located at ends of conduit crossing roadways, and as necessary for the completion of the project.
- 20) These plans represent minimum acceptable criteria. The inspection per these drawings represent the minimum base of acceptance.
- 21) All material, unless otherwise specified, shall be Underwriters Laboratory approved.
- 22) Pull boxes shall meet the requirements of Section 635 of the 'Standard Specifications For Road And Bridge Construction' and Section 635 of the 'Minimum Specifications For Traffic Control Signals And Devices'.
- 23) All grounding system connections shall be exothermically welded. This includes all cable connections, ground rod connections, rod to rod connections, and splices.

#### BREAKAWAY FEATURE

All conventional mounting height poles shall be mounted on a frangible metal base or system of breakaway couplings. If couplings are used, one coupling shall be provided for each anchor bolt connection. The only continuous connection of the pole to the foundation at each anchor bolt shall be provided by the couplings. The area between the top of the pole foundation and the base of the pole including the couplings shall be enclosed with a non-structural aluminum skirt.

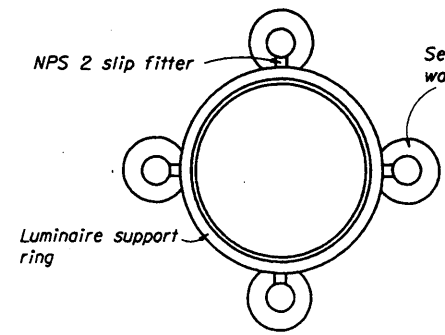
If a frangible metal base is used, it shall be one piece and be designed to breakaway without the aid of any slipping or sliding surfaces.

The design of the breakaway feature shall be in accordance with the breakaway performance requirements of the AASHTO 'Standard Specifications For Structural Supports For Highway Signs, Luminaires and Traffic Signals'. The contractor (supplier) shall submit copies of test reports as evidence the breakaway feature meets the above specifications and calculations to verify the design will meet the AASHTO wind loading specified in the contract plans. No poles are to be installed prior to approval of submittal data.

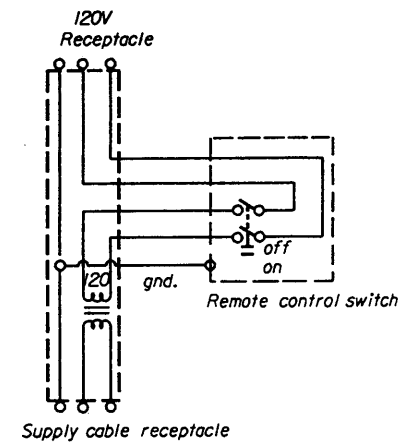
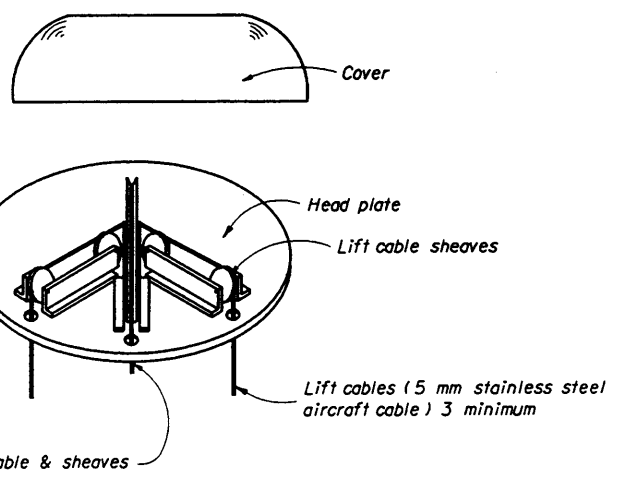
Any substantial remains of a breakaway support, when it is broken away, should not project more than 100 mm as discussed in Section 7 of the above AASHTO specifications, and, Chapter 4, Section 4.2 of the AASHTO 'Roadside Design Guide'.

Poles behind bridge rail or barrier wall mounted, shall be non-frangible.

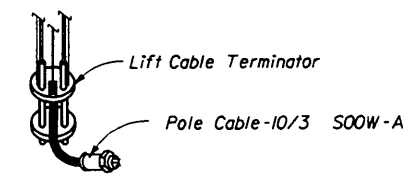
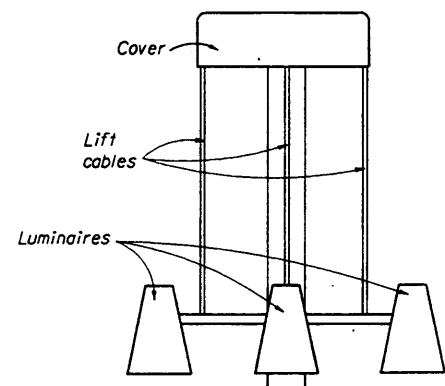
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
HIGHWAY LIGHTING GENERAL NOTES				
	Names	Dates	Approved By	
Designed By			<i>Charles A. East</i> State Traffic Plans Engineer	
Drawn By			Revision	Sheet No.
Checked By			00	1 of 1
				17501



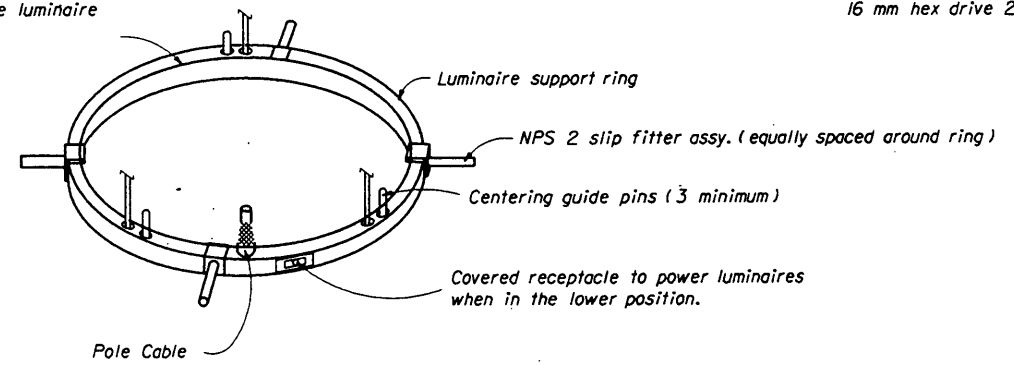
See legend for number of luminaires, lamp wattage and light distribution.



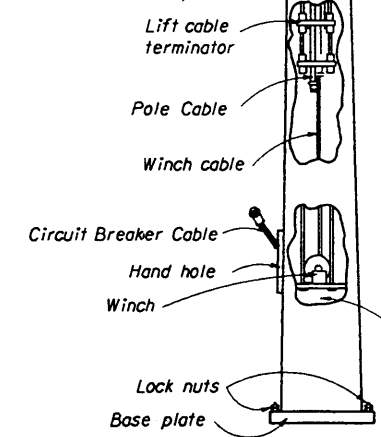
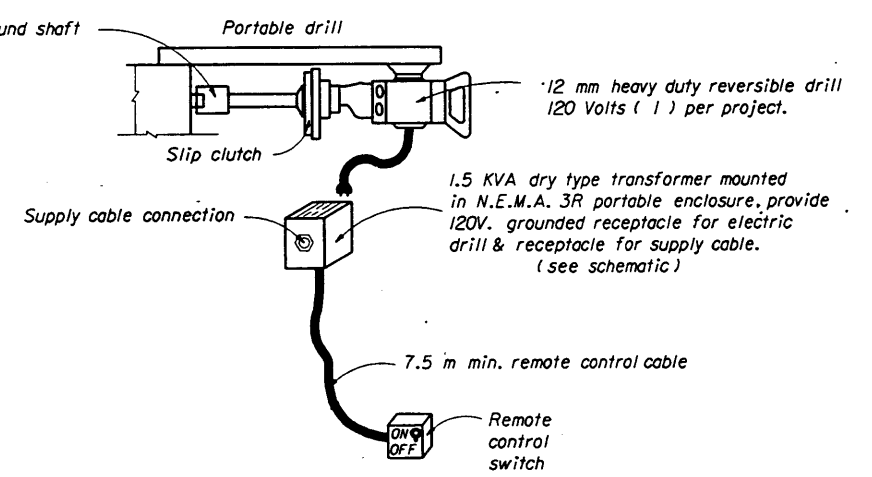
SCHEMATIC OF REMOTE AUXILIARY POWER UNIT



Spring supported centering arms provided to center the luminaire ring.

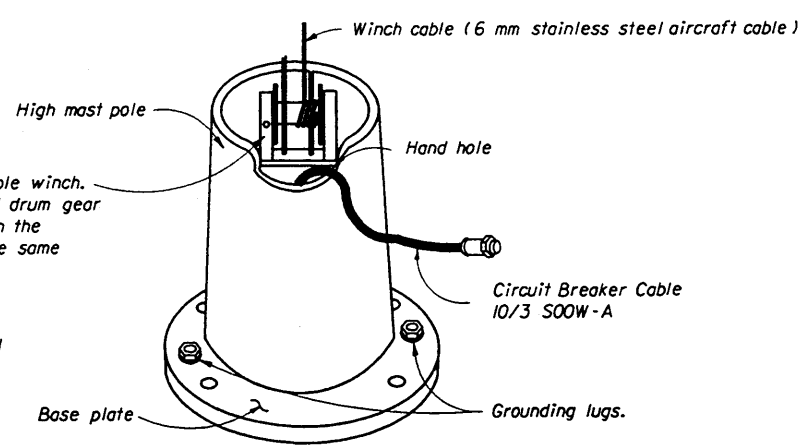


16 mm hex drive 20 mm round shaft



Surge protector shall be located in pole with circuit breaker.

Positive drive reversible winch. The complete enclosed drum gear shall directly mesh with the worm gear train, in the same enclosure.



POLE DETAILS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

HIGHMAST LIGHTING

Names	Dates	Approved By		
Designed By		 State Traffic Plans Engineer		
Drawn By				
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LUMINAIRE SPECIFICATIONS

The reflector with its aluminum cover shall be firmly attached to a cast ring. This ring shall have keyhole slots in its upper surface such that the reflector/refractor assembly may be readily attached to, or detached from, the luminaire bracket entry and lamp support assembly without completely removing the support bolts.

Each luminaire shall contain an integral auto-regulator type ballast connected for 480 volts input  $\pm 10\%$  and a power factor of more than 90%. The luminaire ballast shall be enclosed within an aluminum housing which integrally attaches to the luminaire bracket entry and lamp support assembly. It shall be readily removable without removing the luminaire from the bracket arm.

The luminaire shall be attached to the bracket arm by means of a bracket entry and lamp support assembly. The assembly shall include a side entry slipfitter designed for NPS 2 pipe with provision for 3° adjustment for leveling the luminaire. An enclosed terminal block shall be included such that all electrical connections shall be protected from exposure to weather.

All electrical connections shall be made waterproof or be made inside a weather resistant enclosure. All luminaires shall be ANSI/IES light distribution as indicated in plans. Each luminaire shall be labeled with a permanent label which states the type of lamp, voltage input, power input, power factor, ballast type, socket position, ANSI/IES light distribution, and such other catalog information that a complete replacement can be readily ordered.

The contractor's attention is directed to those plan sheets detailing the mounting of luminaires at the pole top. Particular attention is directed to alignment of luminaire light distributions. Special attention must be exercised in the physical alignment of these luminaires to ensure that the approved photometric layout is physically produced at each lighting standard in the field. A marking shall be placed on the external face of the refractor to allow visual inspection of alignment. The marking shall correspond to the 0° axis of the refractor.

FOOTING

The high mast foundations shall be constructed in accordance with the details shown in the plans.

Anchor bolts per manufacturer's Specifications. Submittals shall be supplied to the engineer of record prior to purchase.

One leveling nut, one hold-down nut, and one locking/jam nut shall be supplied per anchor bolt. All small metal parts, (nuts, screws, washers, etc.) shall be rustproofed either by galvanizing per ASTM A153 or by the nature of the material used in their fabrication.

LOWERING SYSTEM SPECIFICATIONS

The lowering system shall consist of the following:

- A. Head frame and cover
- B. Luminaire ring
- C. Cables
- D. Winch
- E. Portable power unit (1 per project)

The head frame unit shall rigidly mate the top of the pole to the head frame platform. The platform with its associated sheaves, etc. shall be covered and raintight. The head frame structure shall be zinc coated steel, attached to the pole by means of a steel slipfitter. Head frame shall encompass six 125 millimeter nominal steel cable sheaves grooved to the exact cable diameter, for 180° cable bearing surface. The sheave shall be zinc electroplated to ASTM 164 and dipped in yellow chromate for corrosion resistance. Bearings and cable keepers shall have permanent lubrication. Three (3) stainless steel 7 x 19 aircraft cables of 5 millimeters or greater diameter shall be provided.

The pole cable shall be attached to the luminaire ring with a waterproof connector capable of withstanding the pull of the weight of the pole cable. Where the wire ropes are required to bend over sheaves or over the winch drum, the maximum working stress in the outer fibers of wire rope shall not exceed 20% of the wire rope manufacturer's rated ultimate stress.

Drum design shall cause level wind of wire rope. The power cord shall travel on sheave (s) or a combination of rollers providing a radius for the cord of 150 millimeters or larger. Each end of the sheave (s) or rollers shall have a keeper to prevent the cable from jumping out of the roller track.

The head frame shall also include three (3) latching devices to support the luminaire ring assembly when the lowering device is not in operation. The latches shall be actuated by alternate raising and lowering of the hoisting cables. Locking of luminaire ring shall be signaled by indicators visible from ground. All moving parts of the latch mechanism shall be serviceable from the ground. Each of the three latches shall be strong enough, by itself, to support twice the weight of the ring and all the luminaires. Latching mechanisms which depend primarily upon spring operation or contain dissimilar metals are not acceptable. The latching mechanism shall not require adjustment after the original installation.

The luminaire ring shall be constructed of a minimum of 150 mm x 50 mm x 7 mm steel channel galvanized in accordance with ASTM A123 Class "B" steel channel with the appropriate number of NPS 2 steel pipe mounting arms. The luminaire ring shall be prewired with Type "W" or specially reinforced Type "SO" power cable with suitable conductor quantity and size for proper operation and Type "ST" distribution wiring with insulation suitable for at least 105° C. All power cables should be attached to the aluminum weathertight wiring chamber with weathertight cable connectors. A 600 volt terminal block, completely prewired shall be included in the weathertight wiring chamber. A weather-tight twistlock power inlet shall be provided on the luminaire ring to allow testing of the luminaire while in the lowered position. The power inlet shall face away from the pole for easy access.

The ultimate support of the luminaire ring shall not be dependent upon the lowering and raising cables.

The system shall be provided with circuit-breaker switches and twistlock disconnects in the pole base. Raising speed of luminaire ring shall be a minimum of 4 meters per minute.

The winch shall be a reversible worm gear self locking type with an integral friction drag brake to prevent freespooling. The winch shall be designed for hand operation or for operation by means of a 12 mm heavy duty reversing electric drill motor, remote controlled to enable the operator to stand 7 meters from the pole. Stainless Steel 7 x 19 aircraft cables of 6 mm or greater diameter equal to MIL-W-5424 shall be supplied on the winch. The winch shall be provided with keepers above the drum to force the cable away from the ends of the drum for spooling. The drum shall have a wire guard to prevent the cable from coming off.

The winch shall be mounted in such a way that the cable terminator and the riser cable connector may be reached and worked on by a person with his arm through the handhole.

Roller contact spring-loaded centering arms shall be provided to center the luminaire ring while ascending or descending the pole. The rollers for the centering arm shall be made of a water resistant non-marking composition material. All shafts and washers shall be #304 stainless steel. The spring-loading mechanism shall consist of an oil-tempered steel compression spring over an aluminum rod. The rollers shall be in contact with the pole at all times.

POLE SPECIFICATIONS

The pole shaft may be jointed or single piece, polygon or round, high strength steel having a minimum yield strength of 345 MPa. All material shall be single thickness steel plate with no laminations. Steel shall be as specified.

All poles shall be equipped with a reinforced handhole approximately 300 millimeters above the base plate. The handhole shall be 250 millimeters wide by 500 millimeters high minimum.

All poles and hardware will be adequately packed to assure protection to the finish during shipping and handling, poles shall not be shipped preassembled.

Drawings shall be provided with the equipment which show assembly sequence, lift point, and recommended erection procedure. A permanent decal or card shall be fixed on the inside of the handhole cover which describes the sequence for lowering the luminaires and the cautions.

The proportioning of weld details and the operation of welding shall be in accordance with the current edition of the AASHTO Standard Specifications for Welding of Structural Steel Highway Bridges, and The Referenced American Welding Society Structural Welding Code.

Shop drill two (2) 16 millimeter diameter holes 180 degrees apart through total thickness of base plate. Top top of hole for 16 mm x 20 mm INC stainless steel hex head bolt.

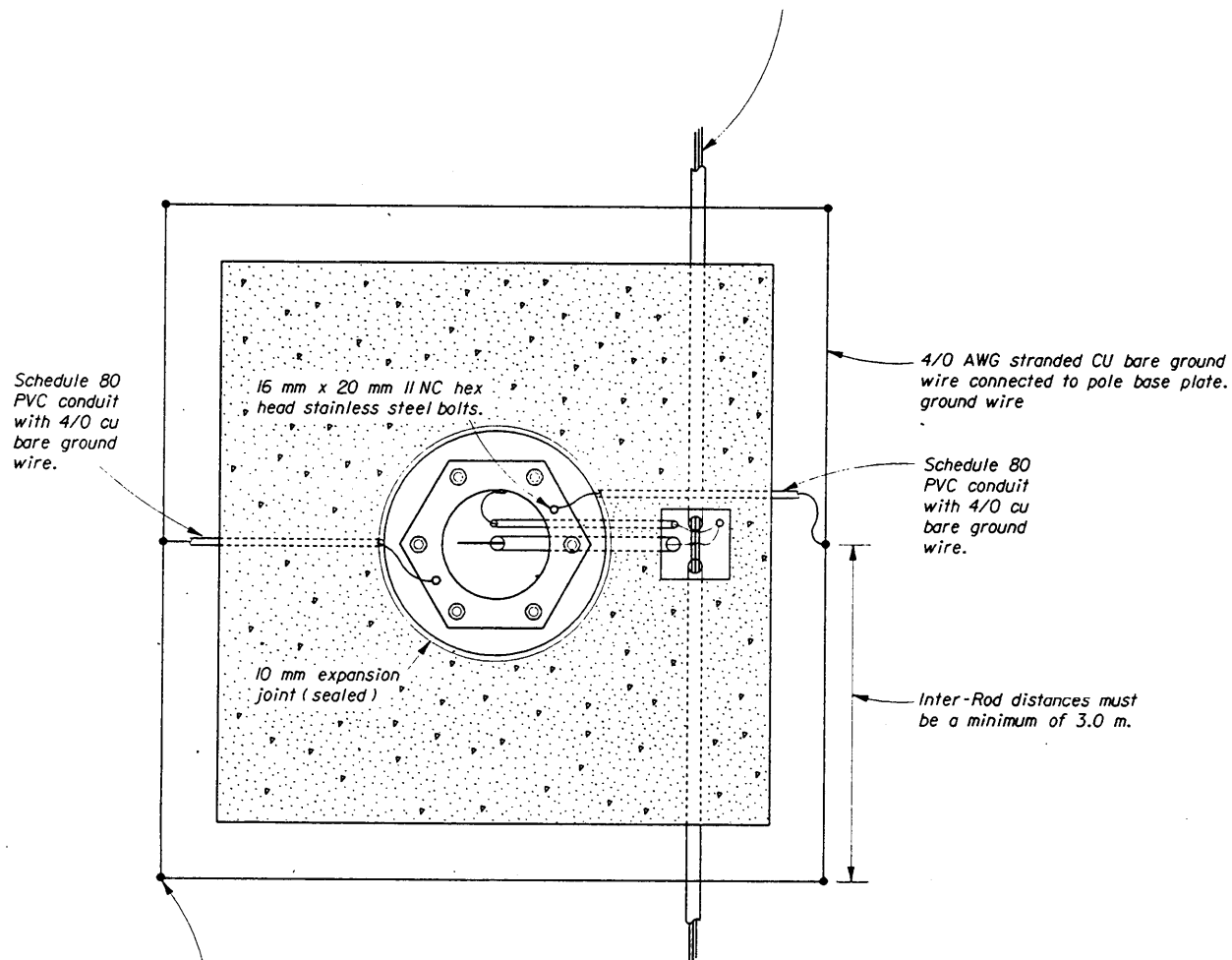
Finished poles shall have a protective coating of hot galvanizing applied in accordance with ASTM A123.

Note: It is the responsibility of the contractor to coordinate the anchor bolt design with foundation design.

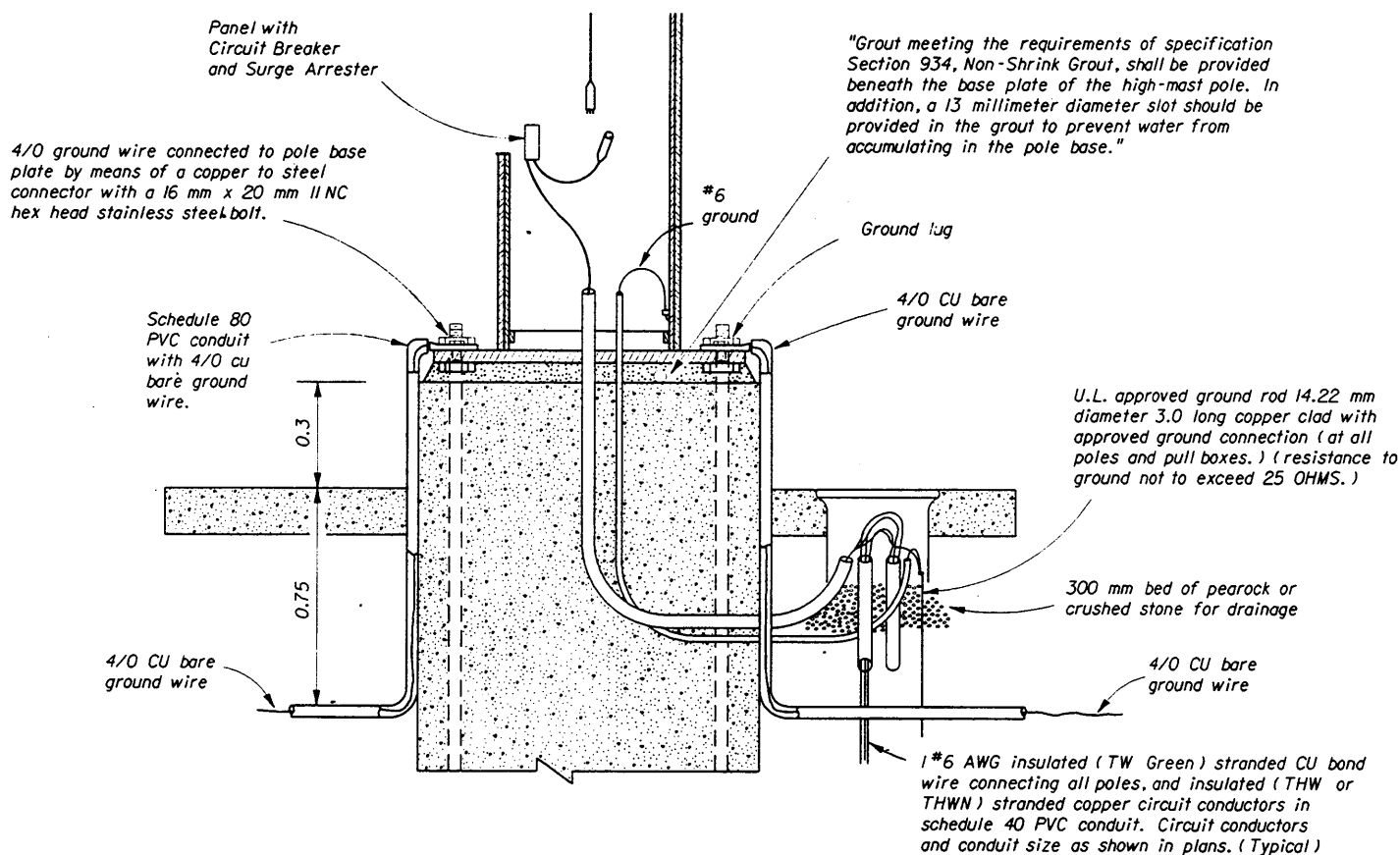
NOTES

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
<b>HIGHMAST LIGHTING</b>				
Designed By	Names	Dates	Approved By	
		8-78	<i>Charles A. Heath</i> State Traffic Plans Engineer	
Drawn By			Revision	Sheet No.
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1\*6 AWG insulated (TW Green) stranded CU bond Wire connecting all poles, and insulated (THW or THWN) stranded copper circuit conductors in schedule 40 PVC conduit. Circuit conductors and conduit size as shown in plans. (Typical)



Minimum 14.22 mm x 6.0 m approved ground rods (6).  
Maximum resistance to ground 25 ohms per rod and total system not to exceed 10 ohms.



"Grout meeting the requirements of specification Section 934, Non-Shrink Grout, shall be provided beneath the base plate of the high-mast pole. In addition, a 13 millimeter diameter slot should be provided in the grout to prevent water from accumulating in the pole base."

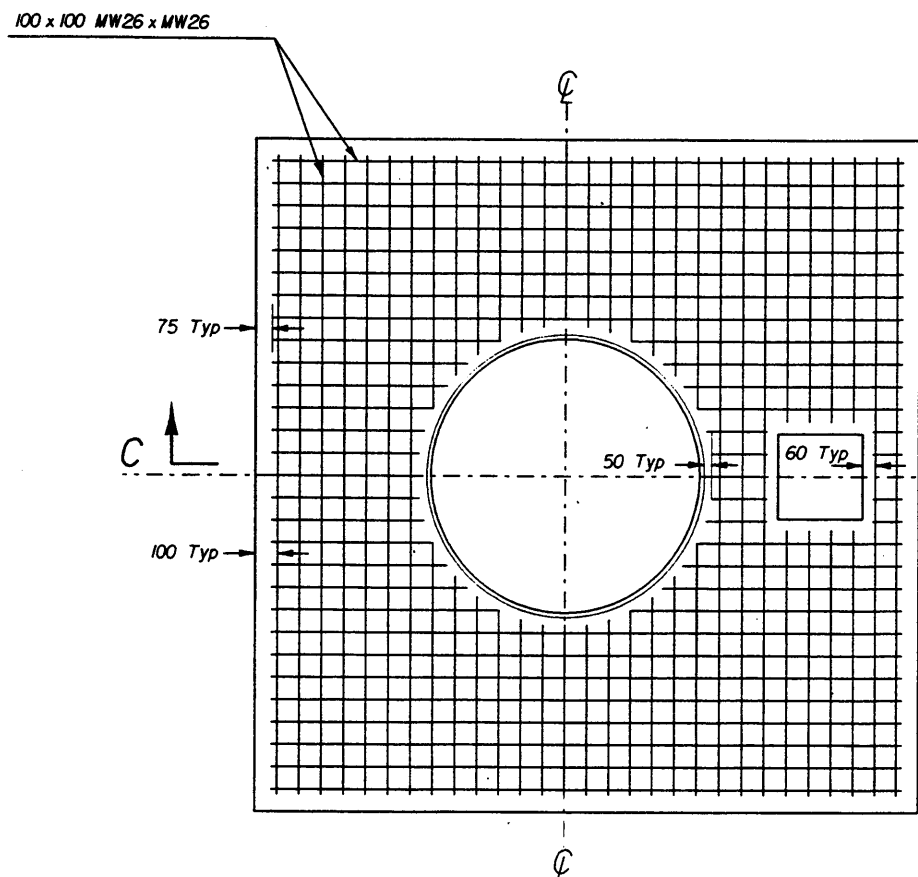
U.L. approved ground rod 14.22 mm diameter 3.0 long copper clad with approved ground connection (at all poles and pull boxes.) (resistance to ground not to exceed 25 OHMS.)

Notes:

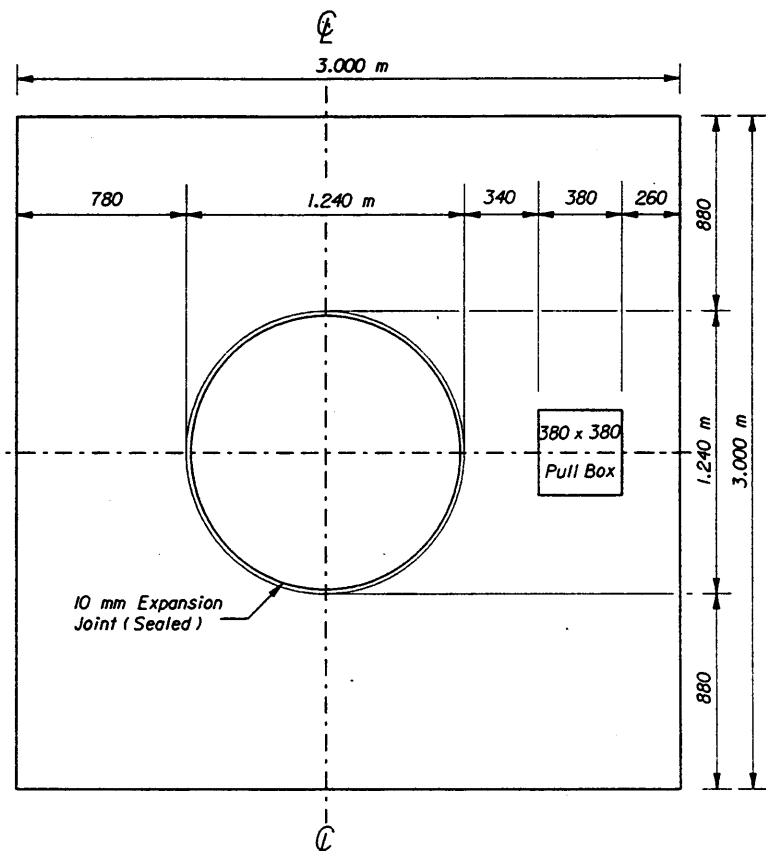
1. At all pull boxes and pole bases, ends of conduit shall be sealed in accordance with Section 630 of The Standard Specifications For Road And Bridge Construction.
2. 1\* 6 AWG insulated (TW Green) stranded CU bond wire connecting all poles, and insulated (THW or THWN) stranded copper circuit conductors in schedule 40 PVC conduit Circuit conductors and conduit size as shown in plans. (Typical)
3. Slabs to be placed around all Poles and Pull Boxes.
4. For Pull Boxes between Poles refer to index 17500 sheet 2 of 3.

WIRING DETAILS

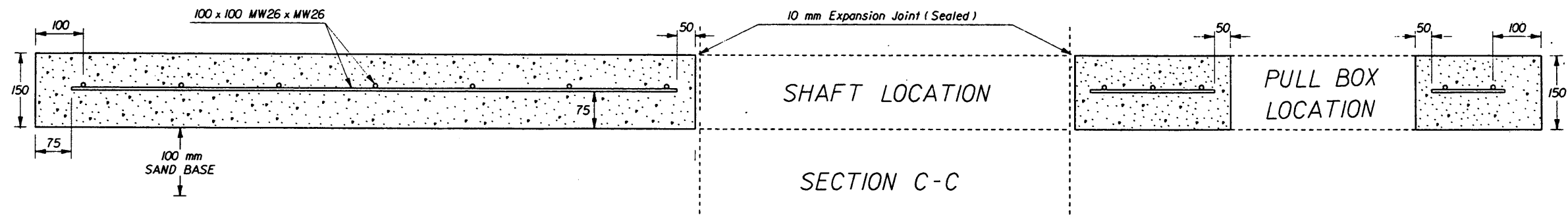
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
<b>HIGHMAST LIGHTING</b>				
Designed By	Names	Dates	Approved By <i>Charles A. Scott</i> State Traffic Plans Engineer	
Drawn By			Revision	Sheet No.
Checked By			00	3 of 4
				17502



REINFORCEMENT LAYOUT



SLAB DIMENSIONS



SECTION C-C

NOTES:

1. Use clean free draining sand < 5% passing 0.075 mm sieve for base (100 mm).
2. Welded wire fabric shall meet the requirements of ASTM A185.
3. Concrete strength at 28 days shall be  $f'c = 21$  MPa.
4. Outside edges of slab shall be cast against formwork.

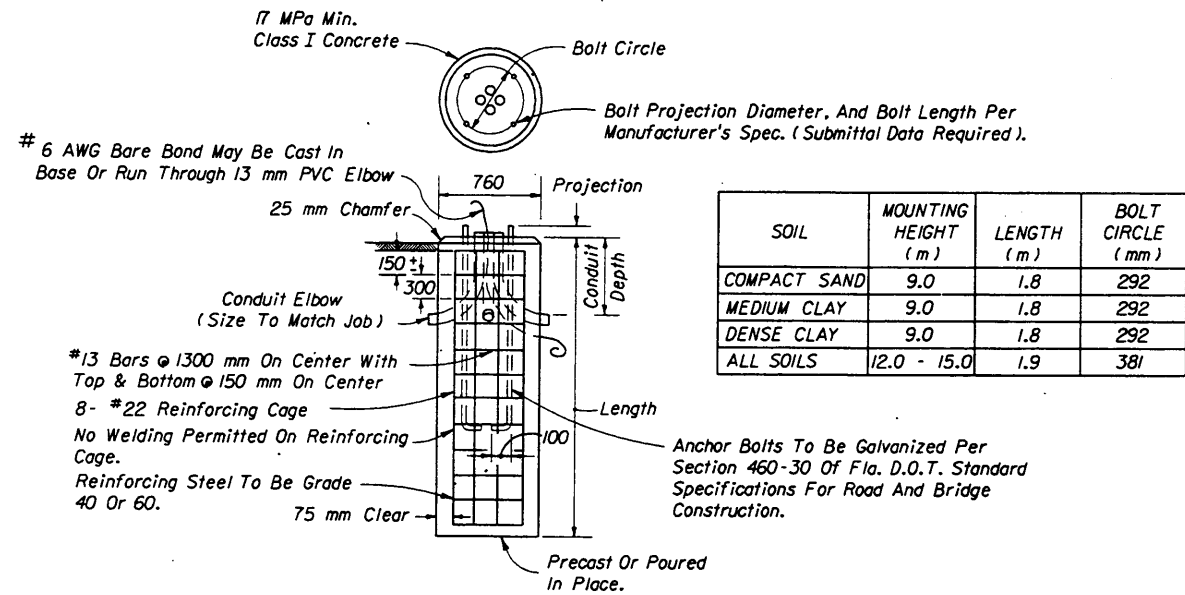
5. The 10 mm thick expansion joint between shaft and slab shall be sealed with a hot poured elastic joint sealer.
6. Concrete slabs around poles and pull boxes shall be paid for under the contract unit price for Class I Concrete (Miscellaneous); the cost for reinforcing steel fabric shall be included in the price for Class I Concrete (Miscellaneous).
7. The pull box shown is 380 x 380; others approved under Section 635 of the Standard Specifications may be used.

SLAB DETAILS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
<b>HIGHMAST LIGHTING</b>				
Designed By	Names	Dates	Approved By <i>Charles A. Kott</i> State Traffic Plans Engineer	
Drawn By			Revision	Sheet No. Index No.
Checked By			98	4 of 4 17502



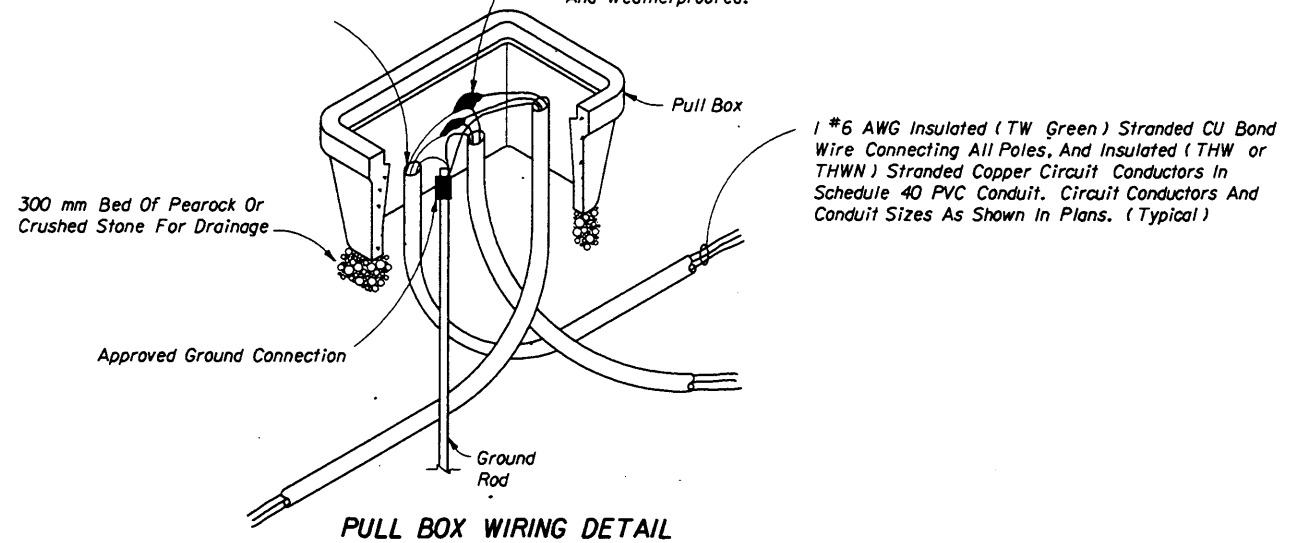
Foundations apply only to slopes of 1:4 or flatter.



METAL POLE CONCRETE FOUNDATION DETAIL

At All Pull Boxes, And Pole Bases, Ends Of Conduit Shall Be Sealed In Accordance With Section 630 Of The Standard Specifications For Road And Bridge Construction.

All Splices Shall Be Made In Pull Box Or Pole Base With Compression Sleeves Or Split Bolt Connectors Properly Taped And Weatherproofed.



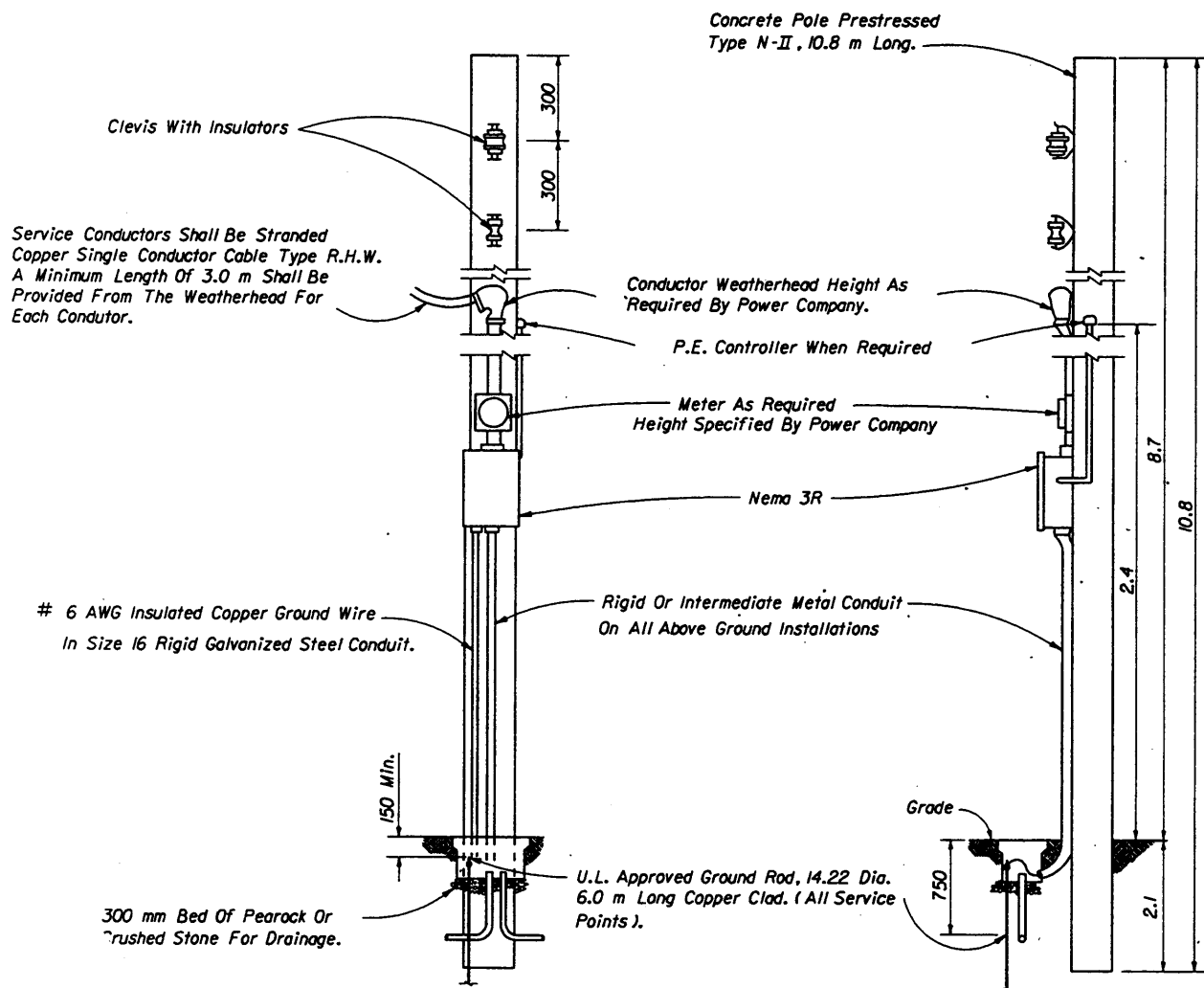
PULL BOX WIRING DETAIL

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

ROADWAY LIGHTING DETAILS

Names	Dates	Approved By		
Designed By		 State Traffic Plans Engineer		
Drawn By				
Checked By		Revision	Sheet No.	Index No.
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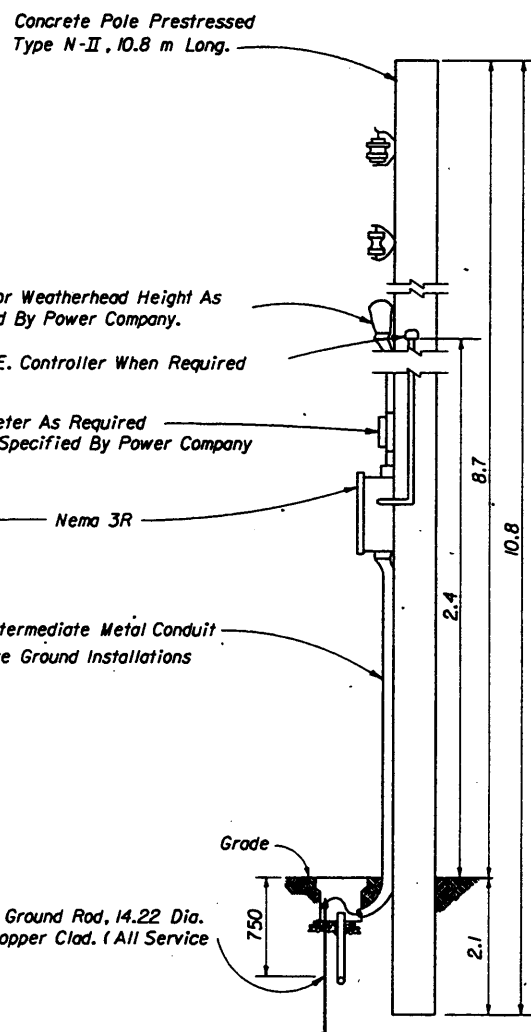
**NOTE :**  
 It shall be the contractor's responsibility to provide a complete service assembly as per the plans and service specifications. The service installation shall meet the requirements of the national electric code and applicable local codes. Shop drawings are not required for service equipment, unless noted in the plans.



**DETAIL A**  
**AERIAL FEED**

**Notes:**

1. Photo electric control as required.
2. All neutral wires to have white insulation, do not use white or green insulated wires for ungrounded conductors.
3. A pull box is required at each service point.

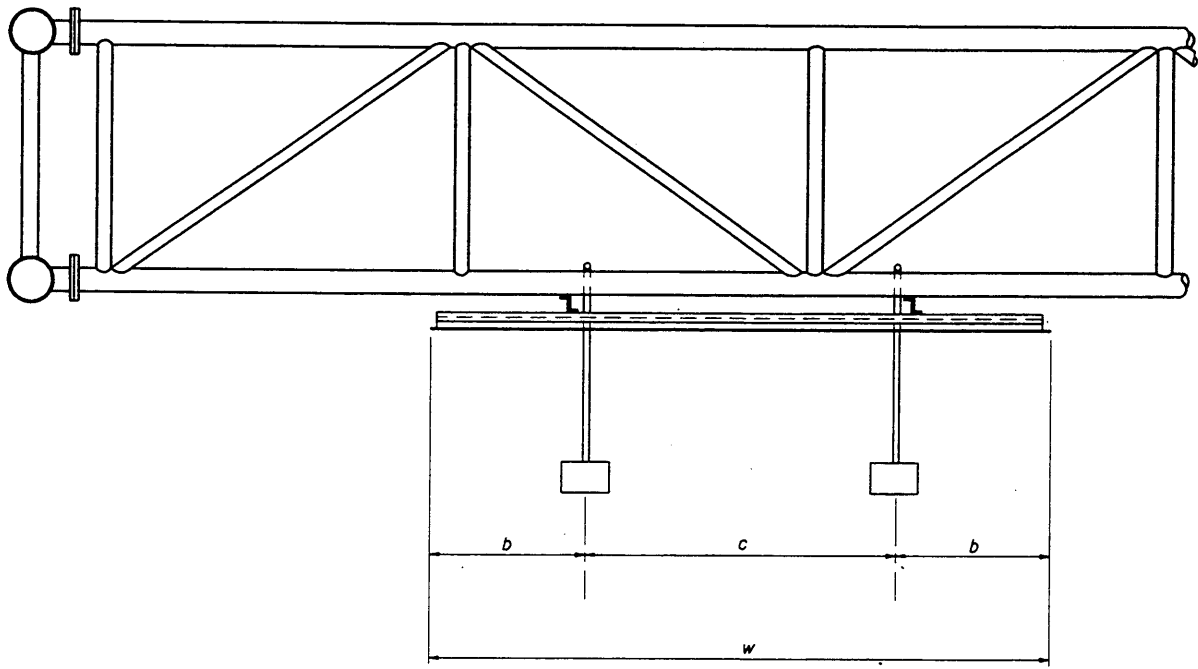


**DETAIL B**  
**UNDERGROUND FEED**

**SERVICE SPECIFICATIONS**

1. The enclosure shall be NEMA 3R, pole mounted, rain-tight.
2. The enclosure door shall be lockable by padlock and four keys provided to the maintaining agency. The door shall have a minimum of three hinges and be latchable. No screws to be used to attach door.
3. 480 V minimum rating bolt-in type breakers shall be used.
4. Busbar to be copper coated and have a minimum rating of 100 amps. When main breaker exceeds 100 amps busbar to match breaker amperage.
5. Locate contactor, transformer, and H.O.A. switch inside enclosure. The enclosure to be sized to accommodate as many breakers as called for and all other service equipment.
6. The Enclosure to be rigidly attached to the pole face.
7. A 600 V lightning protector shall be wired inside the enclosure.
8. A main breaker is required in all service panels with 2 or more feeder breakers.
9. All service equipment shall be U.L. approved.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
<b>SERVICE POINT DETAILS</b>				
Designed By	Names	Dates	Approved By	
Drawn By			<i>Charles J. Scott</i> State Traffic Plans Engineer	
Checked By			Revision	Sheet No. Index No.
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**SIGN LIGHTING INSTALLATION**

**Roadway Lighting included in contract:**

The power for the sign lighting shall be provided from the roadway lighting circuit. The lighting plans shall indicate the sign location and a pull-box location for connection to the sign lights. The lighting contractor shall install pull-box and loop 0.6 meters of lighting circuit conductors in the pull-box for connection by the signing contractor

The signing contractor shall furnish and install luminaires, Nema 3R enclosure, 30 amp breaker, conduit, conductors and all other electrical equipment necessary for connection to the lighting circuit.

**Roadway Lighting not included in contract:**

The signing plans shall include pay item numbers to furnish and install conduit, conductors, ground rods, pull-boxes and service point equipment. The signing plans shall indicate the location of the service point equipment and circuit runs. The signing contractor shall provide all electrical equipment necessary for connection of the sign lights..

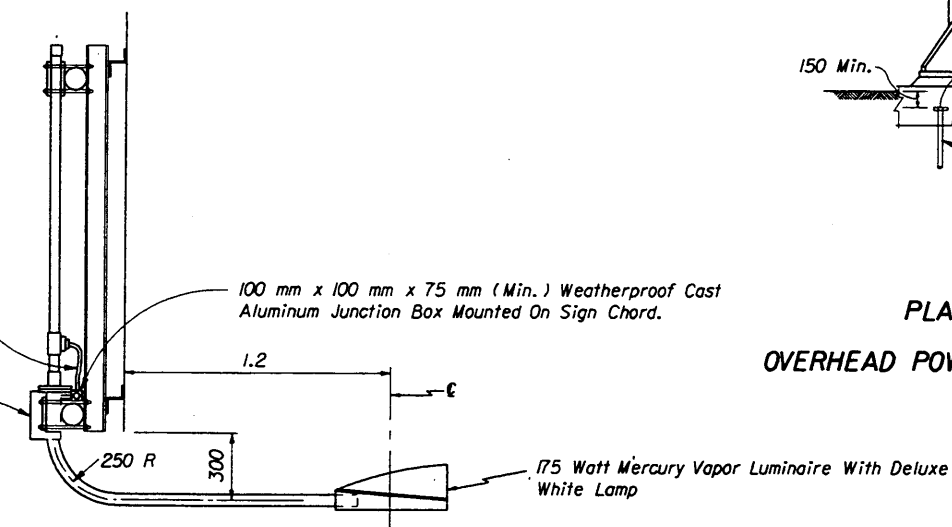
WIDTH OF SIGN FACE	To 3.0 m	To 6.5 m	To 9.75 m	To 13.0 m
NUMBER OF FIXTURES	ONE	TWO	THREE	FOUR
EQUATIONS FOR PLACING FIXTURES ALONG SIGN WIDTH	$W = 2b$ $c = 0$	$W = 2b + c$ $c = 2.2b$	$W = 2b + 2c$ $c = 2.2b$	$W = 2b + 3c$ $c = 2.2b$

**PLACEMENT OF SIGN LIGHTS**

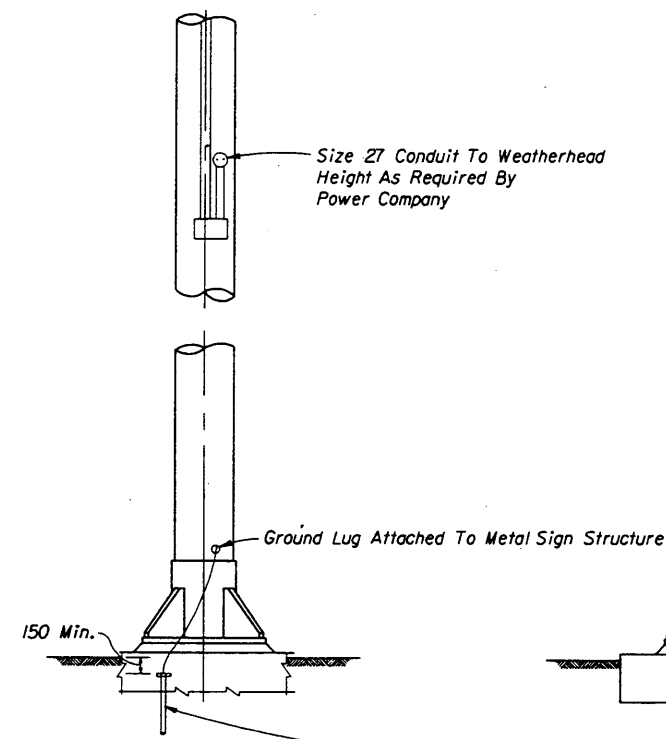
- 1- Luminaire shall be mounted so the lamp center is 1.2 m in front of the sign face.
- 2- Luminaire shall be mounted so the back of the fixture is placed 0.3 m below the bottom edge of the sign face.
- 3- Luminaires from manufacturers who recommended their fixture be tilted shall be mounted on a bracket which provides this recommended tilt.
- 4- Photometric data for mercury vapor luminaire proposed for sign lighting shall be submitted for approval to the District Lighting Engineer, Florida Department Of Transportation.

Use 20 mm Liquid Tight Flexible Conduit From Junction Box To Ballast And From Junction Box To Tee In Luminaire Bracket. Conduit Shall Be Of Sufficient Length To Allow Rotation Of Luminaire Bracket 90° In Either Direction.

Ballast Shall Be Mounted To Sign Chord With Stainless Steel Band. Bracket For Ballast To Be Fabricated From Galvanized Steel Plate For Steel Sign Structures And Aluminum Plate For Aluminum Sign Structures. ( Submittal Data Required )

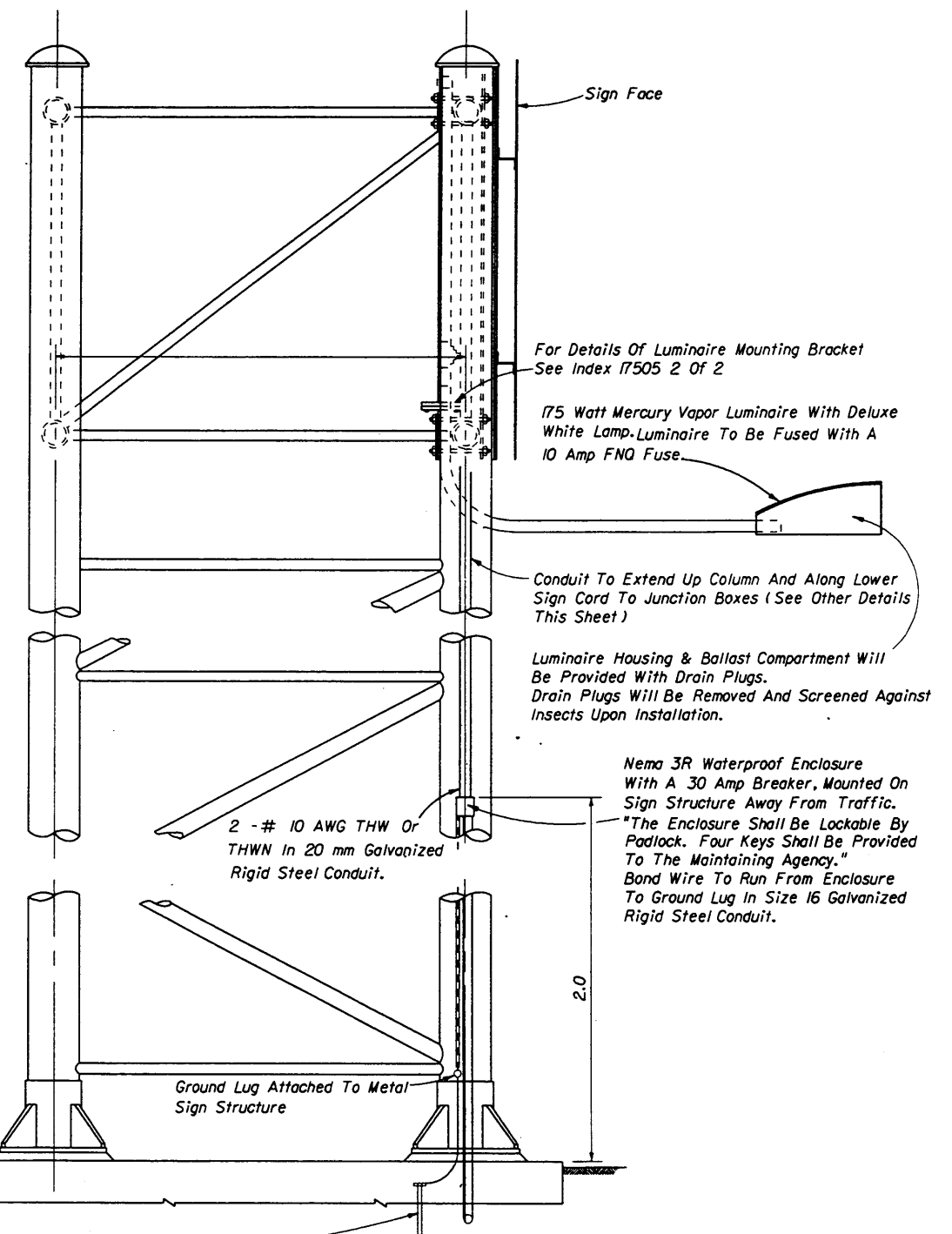


**PLAN OVERHEAD POWER SUPPLY**

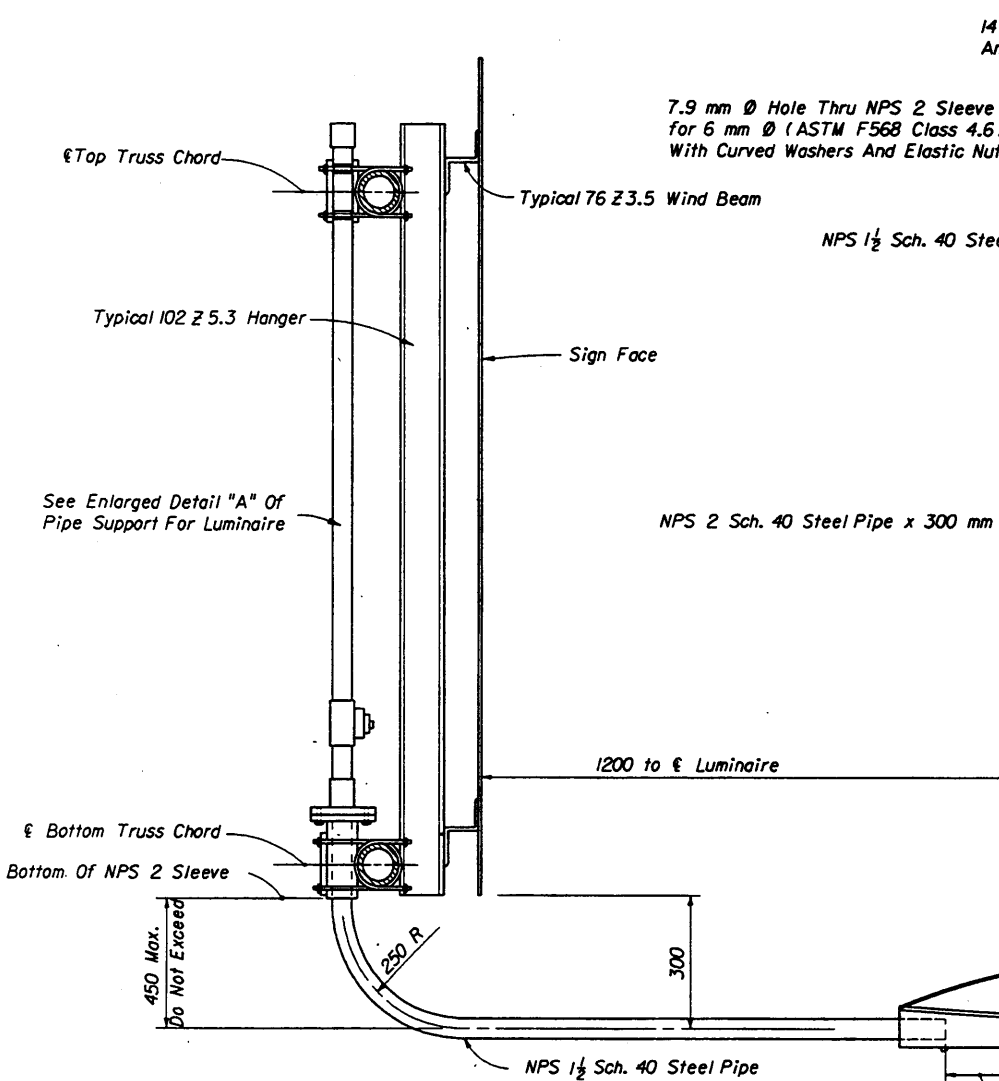


U.L. Approved Ground Rod 14.22 mm x 3.0 m Copper Clad With Approved Ground Connection To Be Placed In Pull Box For Inspection Purposes. Resistance To Ground Not To Exceed 25 OHMS.

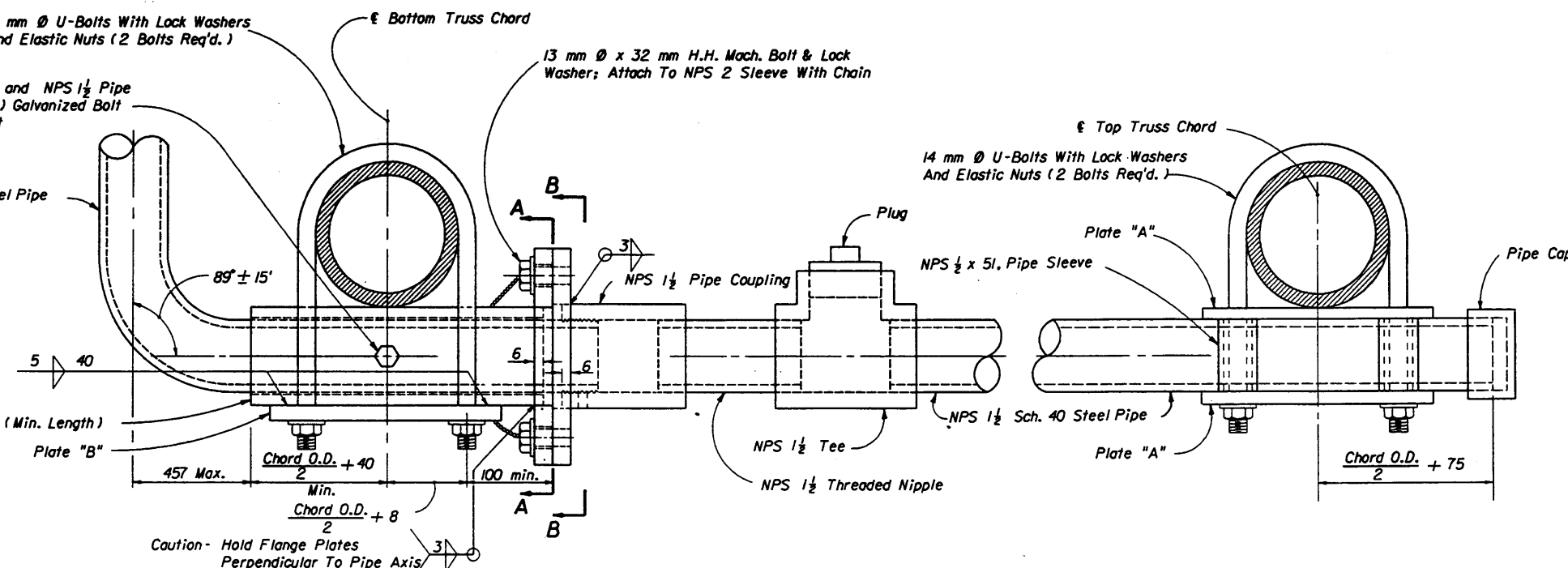
Splices To Be Made With Compression Sleeves Then Properly Insulated & waterproofed



STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
<b>EXTERNAL LIGHTING FOR SIGN (MERCURY VAPOR)</b>				
Designed By	Names	Dates	Approved By <i>Clark A. Scott</i> State Traffic Plans Engineer	
Drawn By			Revision	Sheet No. 1 of 2
Checked By			96	Index No. 17505



SECTION THROUGH SIGN SUPPORT AT LUMINAIRE



DETAIL "A"

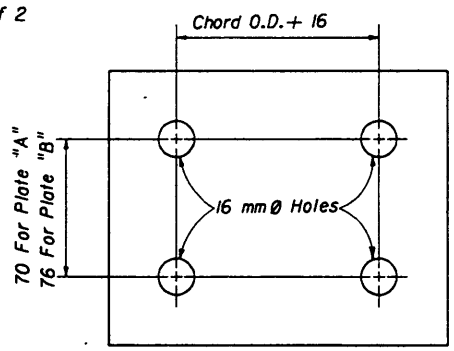
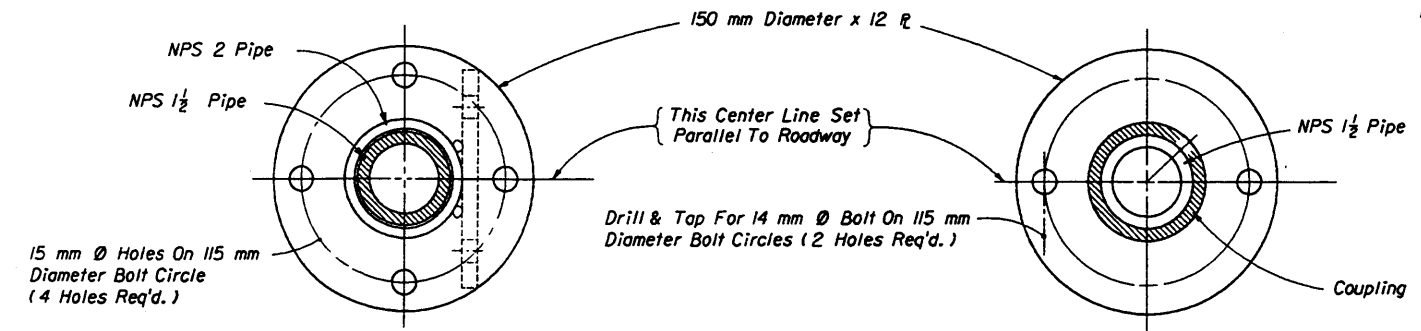


Plate "A": 6 x 120 x Chord O.D. + 65  
 Plate "B": 10 x 125 x Chord O.D. + 65

NOTES

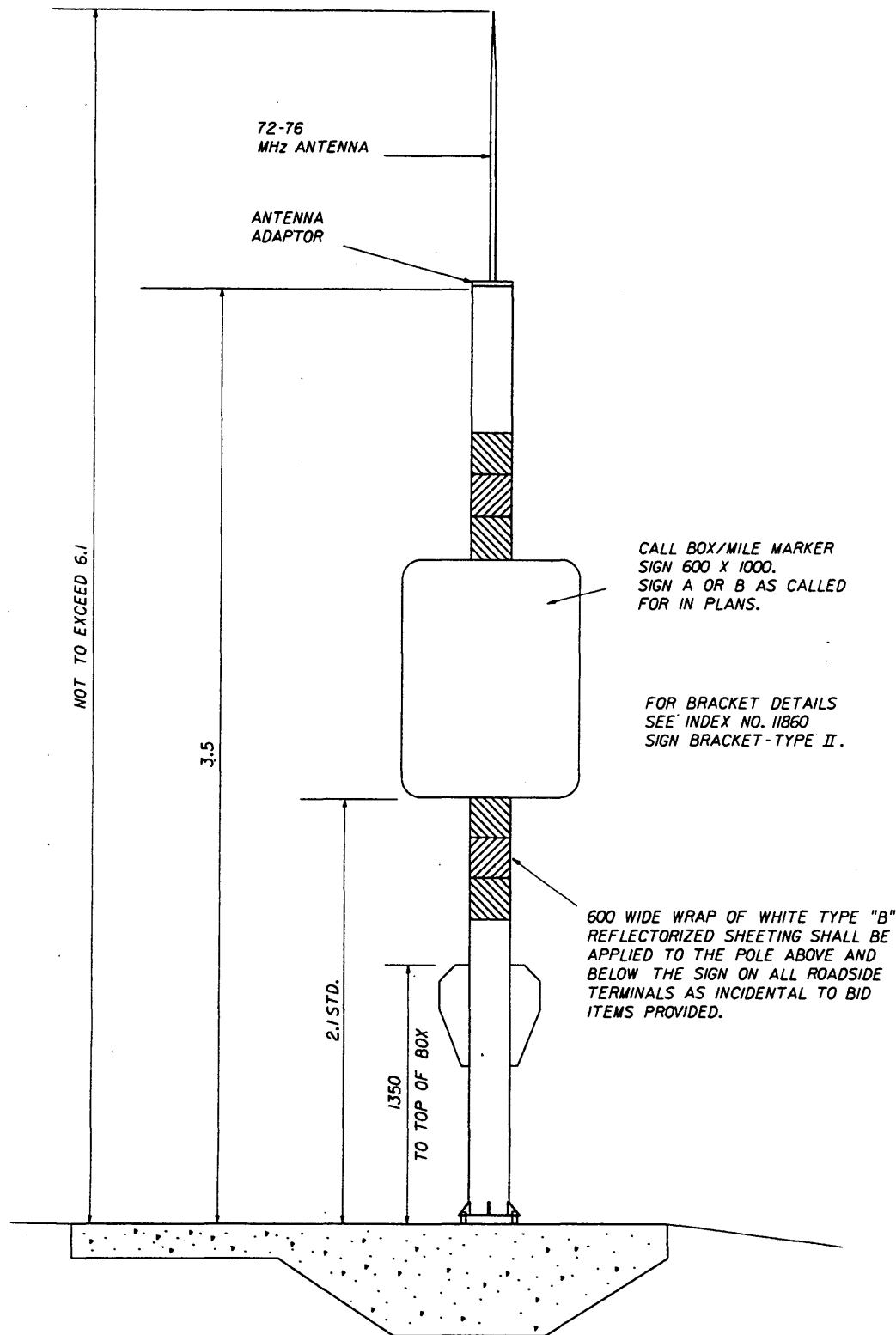
- 1- Dimension "A" to be established by type and make of luminaire to be purchased and used on the project.
- 2- The center lines of both flange plates and the luminaire support arm are to be set parallel to the roadway before the set screw is seated.
- 3- Minor adjustments in the horizontal location of the luminaire support arm along the bottom chord of the truss will be allowed so that the flange plates will clear the truss web members.
- 4- All steel pipe shall meet the strength requirements of ASTM Specification A53 Grade "A" or Grade "B". Steel plates shall meet the requirements of A36 and bolts, nuts and washers shall meet the requirements of ASTM F568 Class 4.6.
- 5- All items shall be hot dip galvanized after fabrication in accordance with the requirements of ASTM A123 and /or A153.
- 6- Luminaire support arm shall be free to rotate in a clockwise or counter clockwise direction. When service or maintenance is required for sign face or vertical face of truss; Support arm shall be capable of being locked in a position 90° from parallel to the roadway for unobstructed working clearance.



SECTION AA

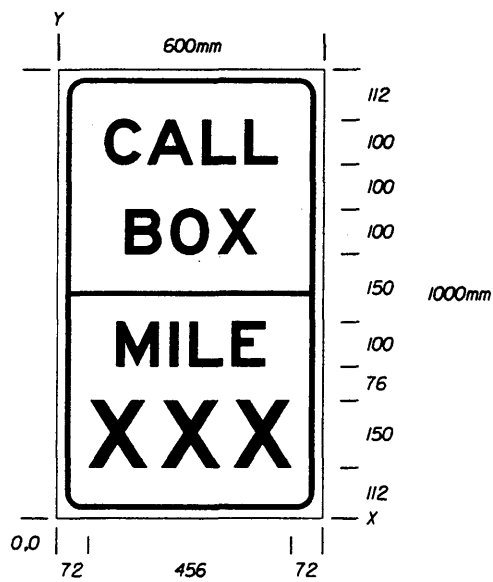
SECTION BB

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN					
<b>EXTERNAL LIGHTING FOR SIGNS (MERCURY VAPOR)</b>					
Designed By	Names	Dates	Approved By <i>Charles A. Scott</i> State Traffic Plans Engineer		
Drawn By			Revision	Sheet No.	Index No.
Checked By			94	2 of 2	17505

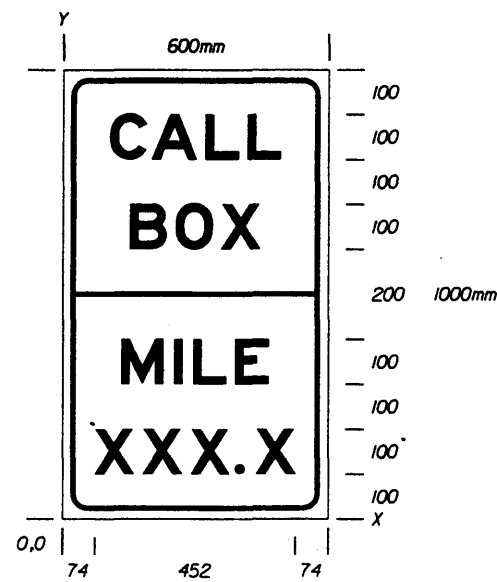


SEE SHEET 2 OF 2 FOR CONCRETE PAD DETAILS.

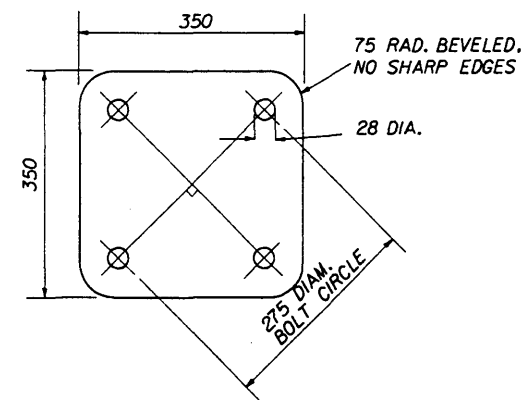
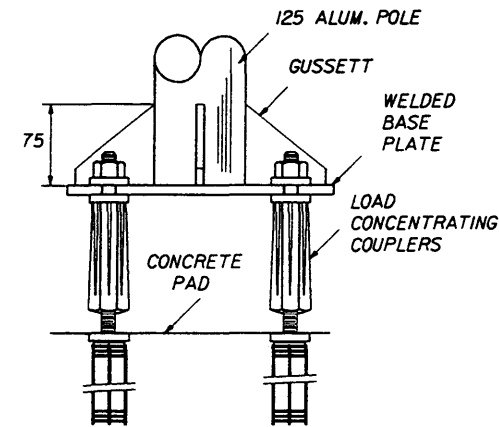
TYPICAL MOTORIST AID CALL BOX TERMINAL



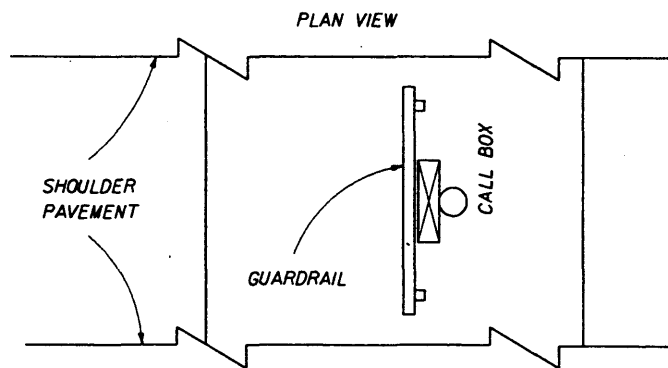
SIGN A



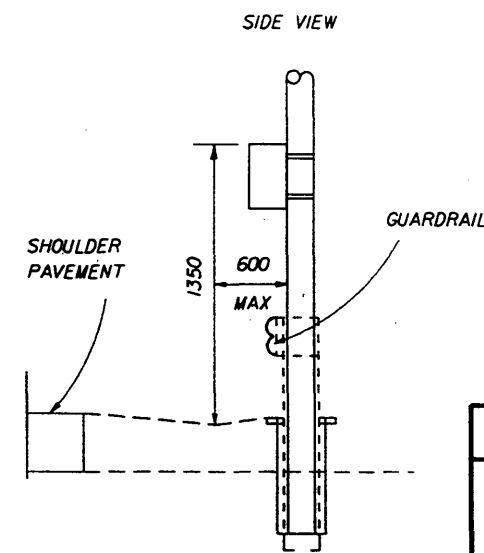
SIGN B



BASE PLATE & BOLT PATTERN



CALL BOX DETAIL BEHIND GUARDRAIL

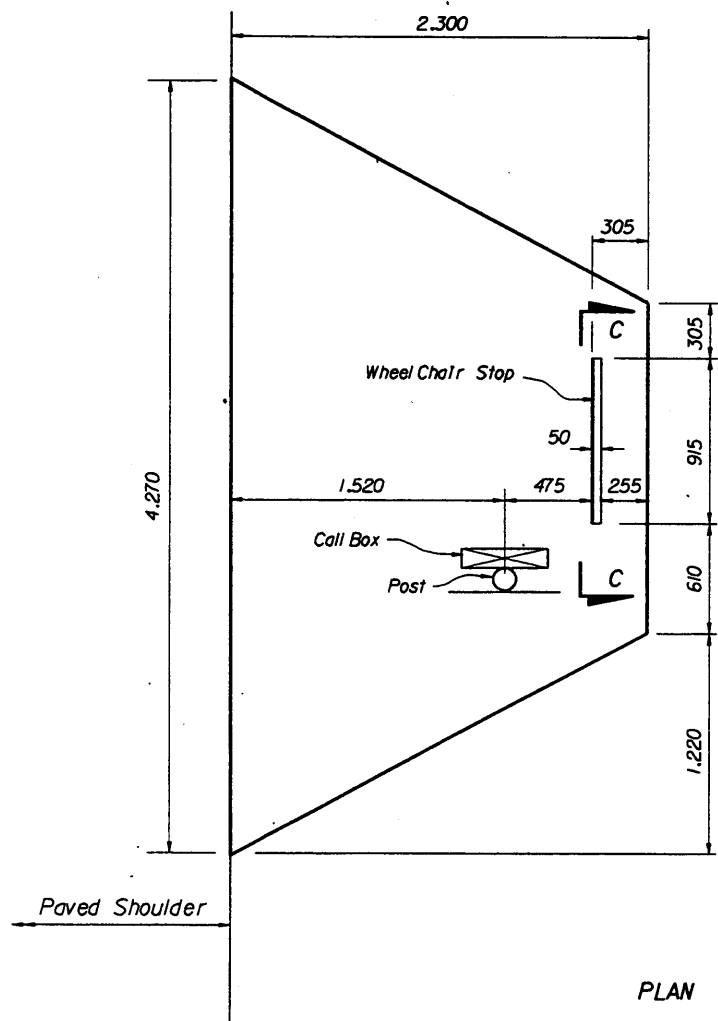


TERMINALS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

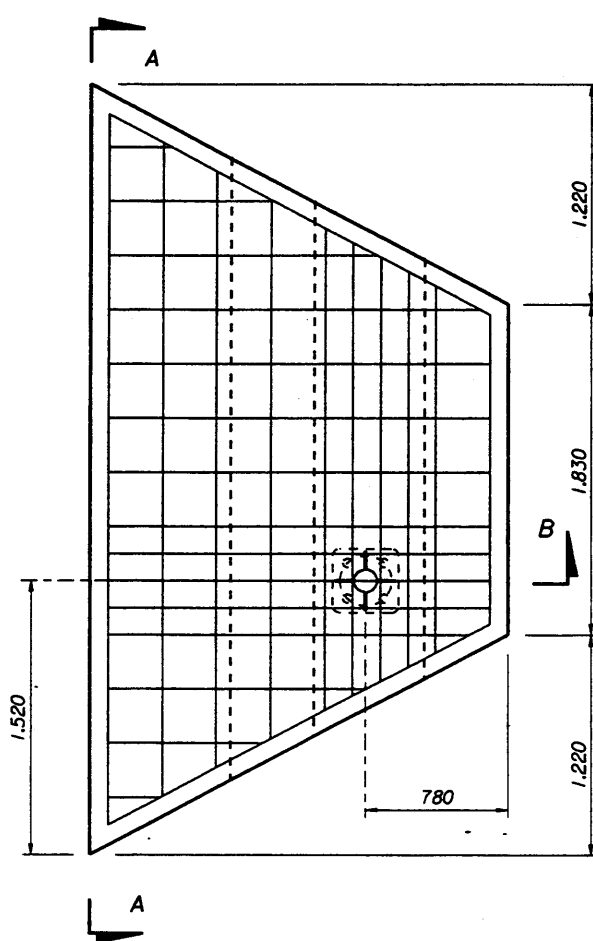
MOTORIST AID CALL BOX

Names	Dates	Approved By		
Designed By	CAS 5-98	<i>Charles Scott</i> State Traffic Plans Engineer		
Drawn By	JM 5-98			
Checked By	CAS 5-98	Revision	Sheet No.	Index No.
			1 of 2	17600

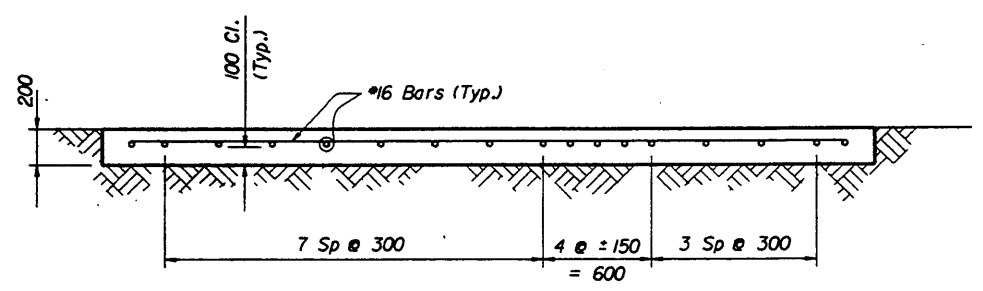


PLAN

Call Box Attachment To Slab  
As Per Manufacturer's Recommendation.



SECTION A-A



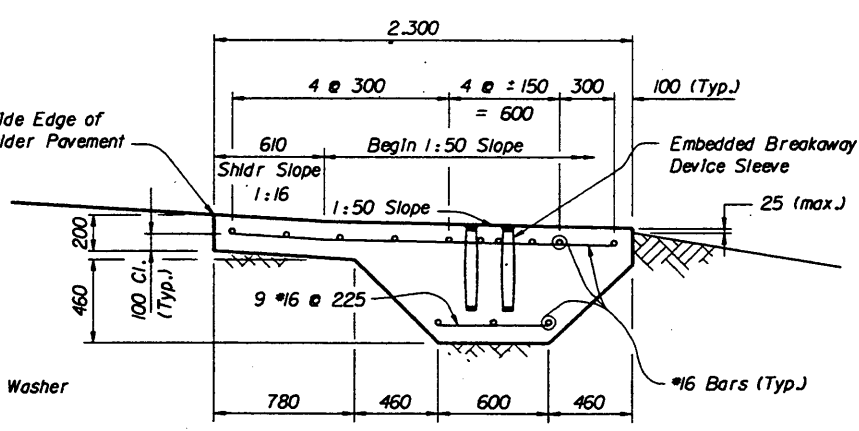
SECTION A-A

MOTORIST AID CALL BOX CONCRETE PAD QUANTITIES

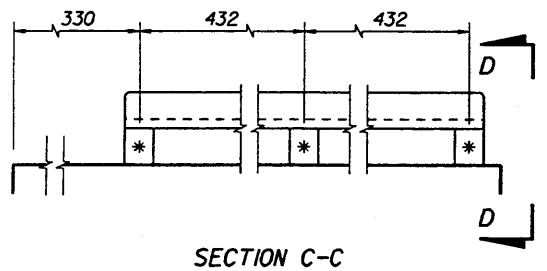
Concrete : 2.7 m<sup>3</sup> (each)  
Reinforcing Steel : 110 kg (each)

GENERAL NOTES

1. General Specifications: FDOT Standard Specifications for Road and Bridge Construction (Current Edition) and Supplements thereto.
2. Design Specifications: AASHTO Standard Specifications For Highway Bridges (Current Edition and approved revisions thereto).
3. Concrete: Concrete strength shall be Class II (f'c=23 MPa).
4. Reinforcing Steel: Reinforcing Steel shall conform to ASTM A615M-96, Grade: 420.
5. Payment : Motorist Aid Call Box Concrete Pads shall be paid for under the contract unit price for Class II Concrete (Miscellaneous), M3, and shall include all labor, materials, and installation of embedded breakaway device sleeves, and miscellaneous galvanized steel for wheel chair stop and attachments.
6. Breakaway Device shall be paid for under Call Box Assembly.

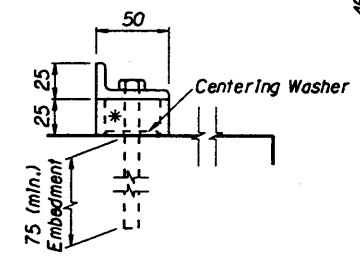


SECTION B-B



SECTION C-C

50 x 25 x 6 mm Galv. Angle And  
3 - 10 mm Ø x 125 mm Galvanized Steel Expansion  
Anchor Bolt With 75 mm Min. Embedment



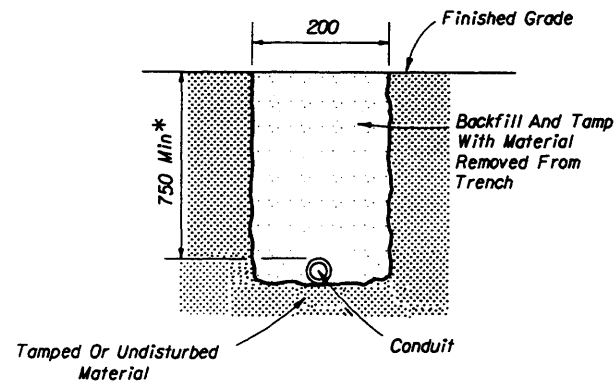
VIEW D-D

\* 38 mm Ø x 25 mm High  
Galvanized Steel Pipe Spacer

WHEEL CHAIR STOP DETAIL

CONCRETE PAD

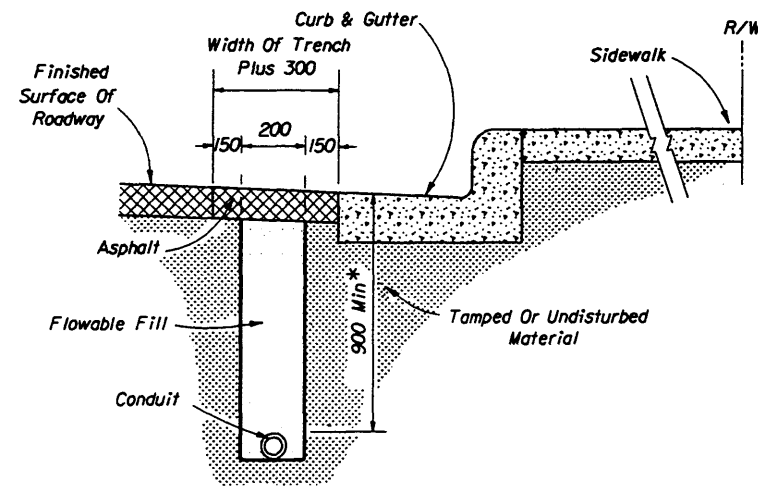
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN					
<b>MOTORIST AID CALL BOX</b>					
Designed By	TJB	Date	4-98	Approved By	<i>W. J. [Signature]</i>
Drawn By	SM	Revision	4-98	State Structures Design Engineer	
Checked By	TJB	Sheet No.	2 of 2	Index No.	17600



FOR USE IN AREAS NOT EXPOSED TO VEHICULAR TRAFFIC AND UNDER DRIVEWAYS

**FIGURE A**

\*May be adjusted due to field conditions upon approval of project engineer.

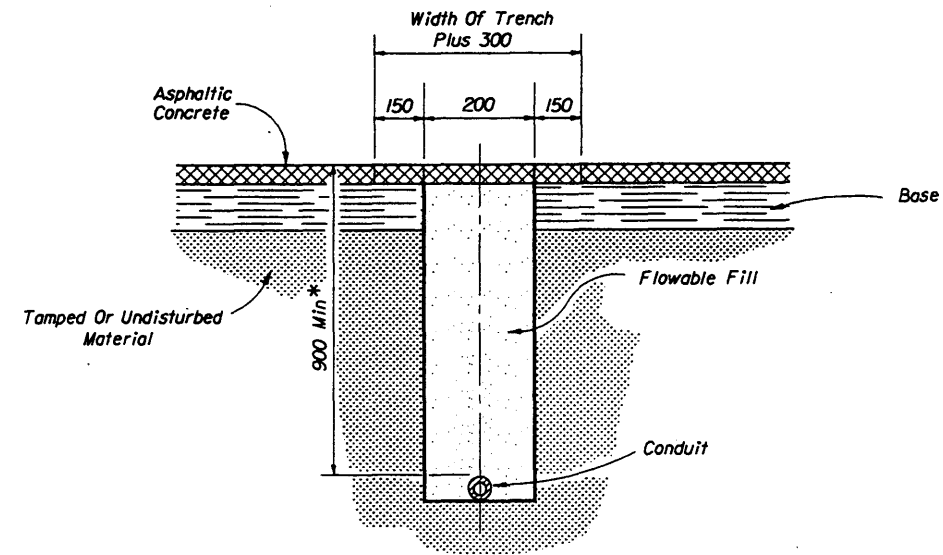


FOR USE IN ASPHALT ROADWAY ADJACENT TO GUTTER WHEN PLACEMENT OUTSIDE OF THE PAVEMENT IS NOT FEASIBLE.

Note

1. Trench not to be open more than 75.0 m at a time when construction area is subject to vehicular or pedestrian traffic.
2. Asphalt to be sawcut and removed to leave neat lines on both sides of the 300 mm pavement cut.
3. See note 3 Figure C.

**FIGURE B**

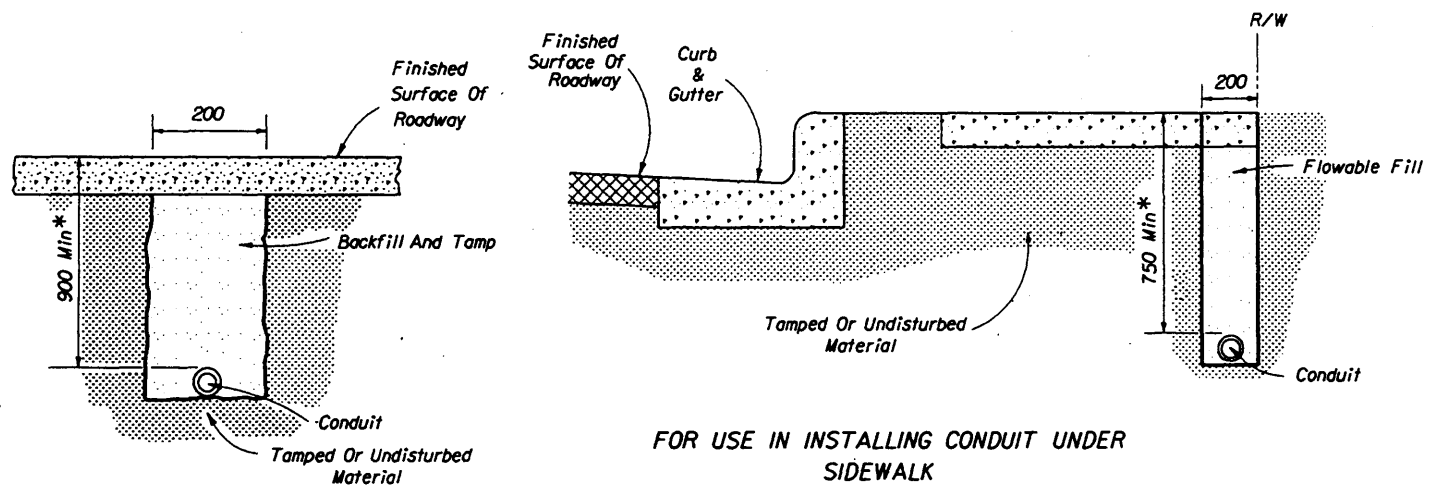


FOR USE IN INSTALLING CONDUIT UNDER EXISTING ASPHALT PAVEMENT NOT ADJACENT TO GUTTER WHEN JACKING IS NOT FEASIBLE

Note:

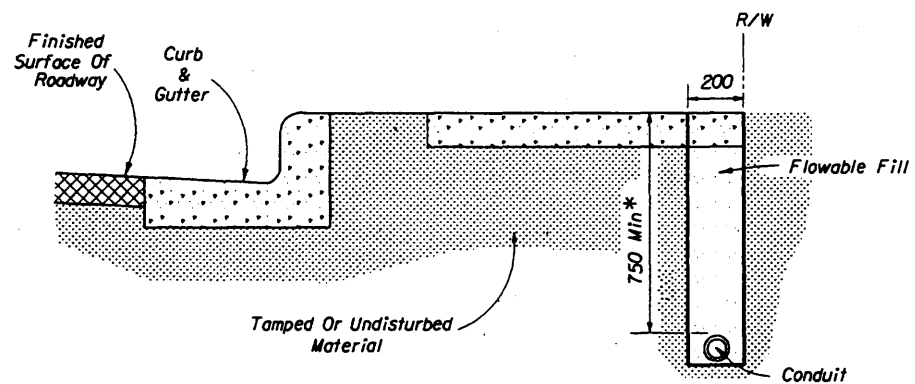
1. Rigid conduit must be used when jacking under existing pavement at 900 mm minimum depth.
2. Asphalt to be sawcut at the edges of the trench.
3. The removal and replacement of the additional pavement width (150 mm) will not be required when the trench can be constructed without disturbing the asphalt surface on either side.

**FIGURE C**



FOR USE INSTALLING CONDUIT UNDER A NEW ROADWAY PRIOR TO INSTALLATION OF CURBS, BASE AND PAVEMENT

**FIGURE D**



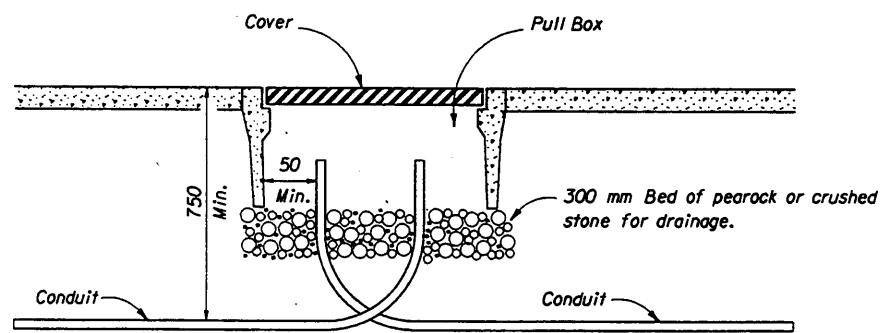
FOR USE IN INSTALLING CONDUIT UNDER SIDEWALK

Note:

1. Sidewalk patches to match existing joints.
2. Entire sidewalk slab must be replaced when specified in the plans.
3. Backfill and tamp with material from trench except at driveways. At driveways, backfill a length of trench within the driveway entirely with Flowable Fill.

**FIGURE E**

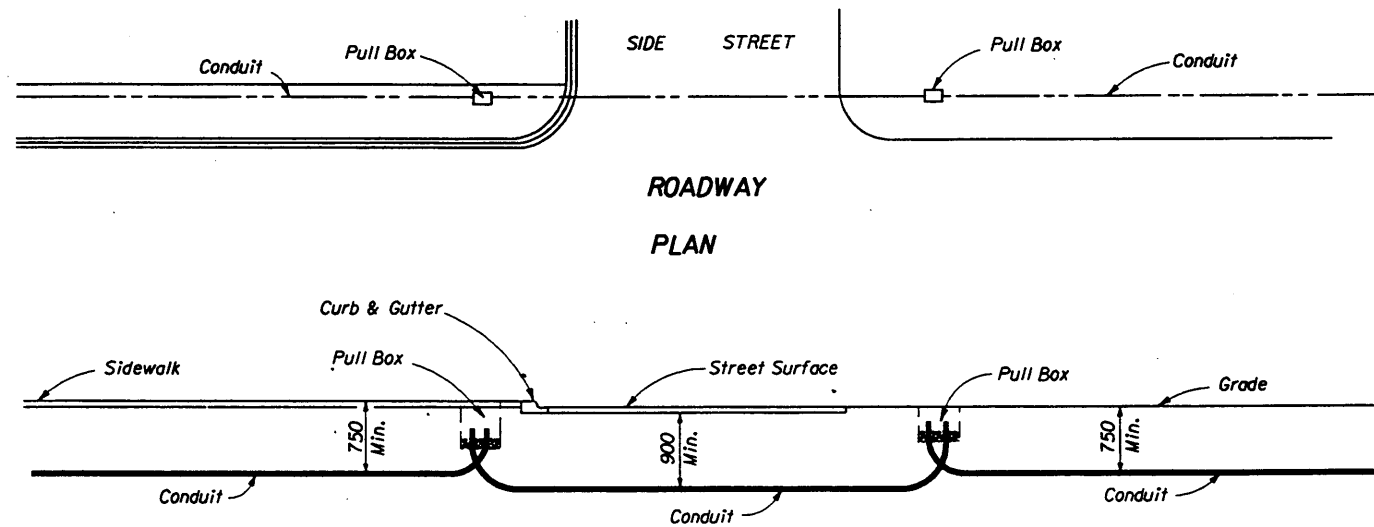
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
CONDUIT INSTALLATION DETAILS				
Names	Dates	Approved By		
Designed By	2-75	Clark A. Scott State Traffic Plans Engineer		
Drawn By		Revision	Sheet No.	Index No.
Checked By	2-75	00	1 of 2	17721



PULL BOX ENTRY OF CONDUIT UNDER SIDEWALKS

FIGURE A

Note:  
Ends of conduit shall be sealed in accordance with Section 630 of the Standard Specifications for Road and Bridge Construction.



UNDER SIDEWALK

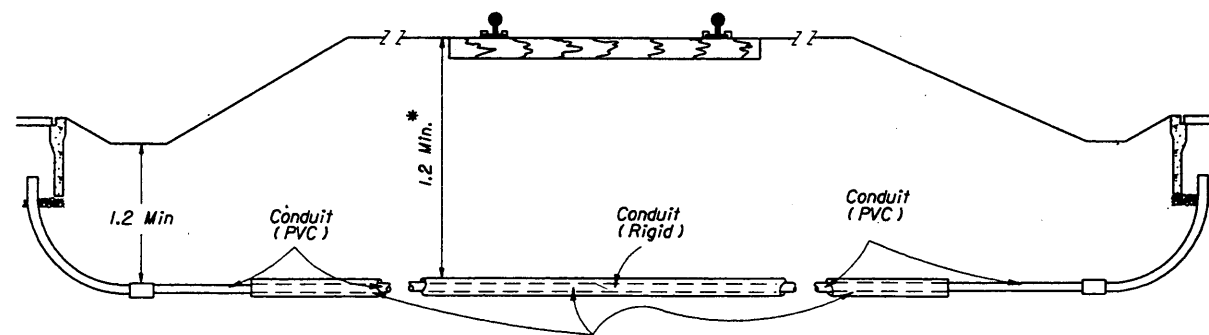
UNDER ROADWAY

UNDER NON-TRAFFIC BEARING SURFACE

SECTION

FIGURE B

Note:  
One run of conduit (between pull boxes) shall not contain more than 360° of bend including pull box bends.



\* Note  
Conduit depth to be at R/R requirement but not less 1.2 m.

After jacking, leave rigid conduit as a sleeve extending to R/R right of way limits.

FOR USE UNDER RAILROADS

FIGURE C

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
CONDUIT INSTALLATIONS DETAILS				
Names	Dates	Approved By		
Designed By		 State Traffic Plans Engineer		
Drawn By				
Checked By		Revision	Sheet No.	Index No.
		94	2 of 2	17721



**NOTES:**

Design Poles (Concrete and Strain Poles) in accordance with the latest edition of the AASHTO "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals" and Supplement thereto. For allowable unit stresses, meet the requirements of Section 6.

Place the prestressing symmetrically. Supply a sufficient amount of prestressing to provide a calculated compressive stress of 15 MPa for Type N-II and 20 MPa for Type N-III at the top of pole after all losses.

Concrete Strength shall be 41 MPa minimum at 28 days and 28 MPa minimum at transfer of the Prestressing force.

Reinforcing steel shall be A615M Grade 420. Provide a minimum area of non-prestressed reinforcement equal to 0.33% of the concrete area.

Prestressed Strands shall be A416M Grade 1860 stress relieved or low relaxation.

One turn required for spiral splices and two turns required at the top and bottom of poles. Spiral shall be manufactured from cold-drawn steel wire meeting the requirements of ASTM A82.

Attach span wire assemblies (consisting of the catenary wire, the messenger wire, and the tether wire) to the concrete poles in accordance with Section 634.

If a two point attachment is required by the plans, provide an eye bolt hole for the messenger wire, or field drill one at the location indicated in the plans. Field drill the eye bolt hole for the tether wire, when required, prior to installation.

Use cover plates made of non-corrosive materials and attached to the pole using lead anchors or threaded inserts embedded in the pole and round head chrome plated screws.

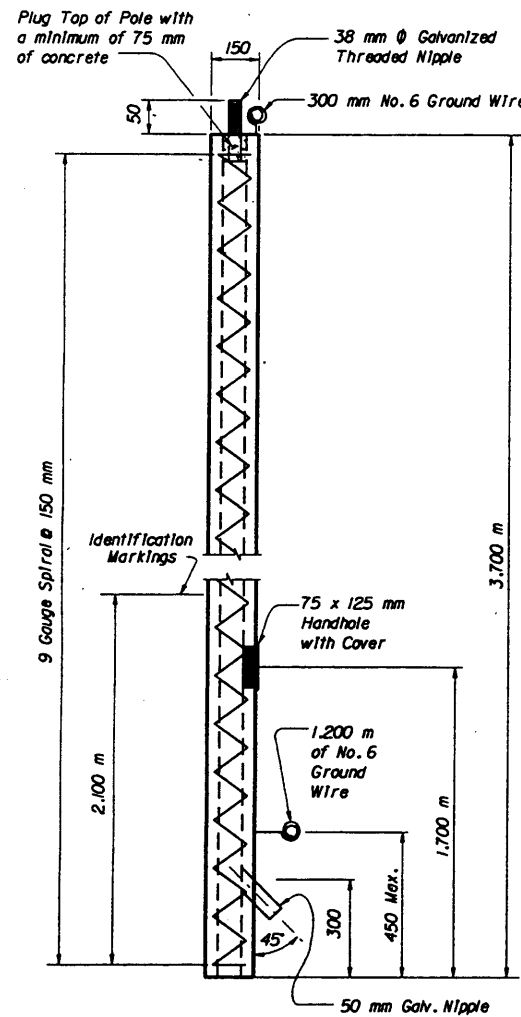
Attach ground wires to the reinforcing steel in the pole as necessary to prevent the ground wire from being displaced during concreting operations.

Identify concrete poles as to pole manufacturer, Department's pole type, length and Qualified Product List qualification number by inset numerals 25 mm in height inscribed on the same face of the pole as the handhole and ground wire.

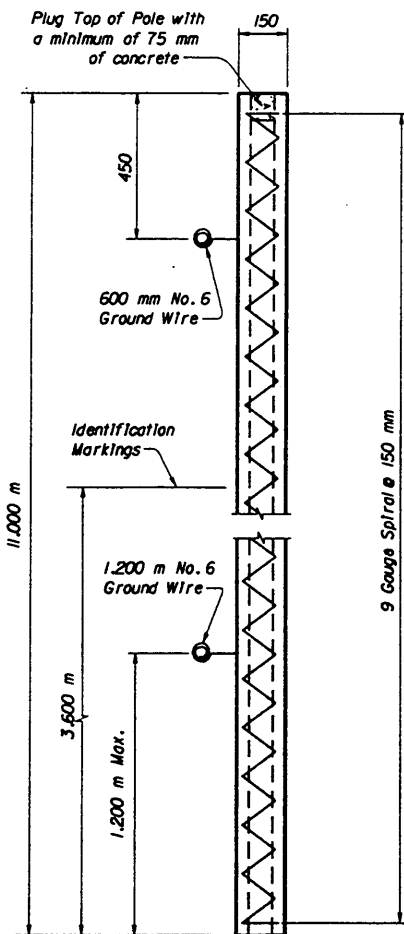
Provide a Class 3 Surface Finish as Specified in 400-15.2.4.

Provide a minimum cover of 25 mm.

Provide all poles with total taper of 13 mm/m.

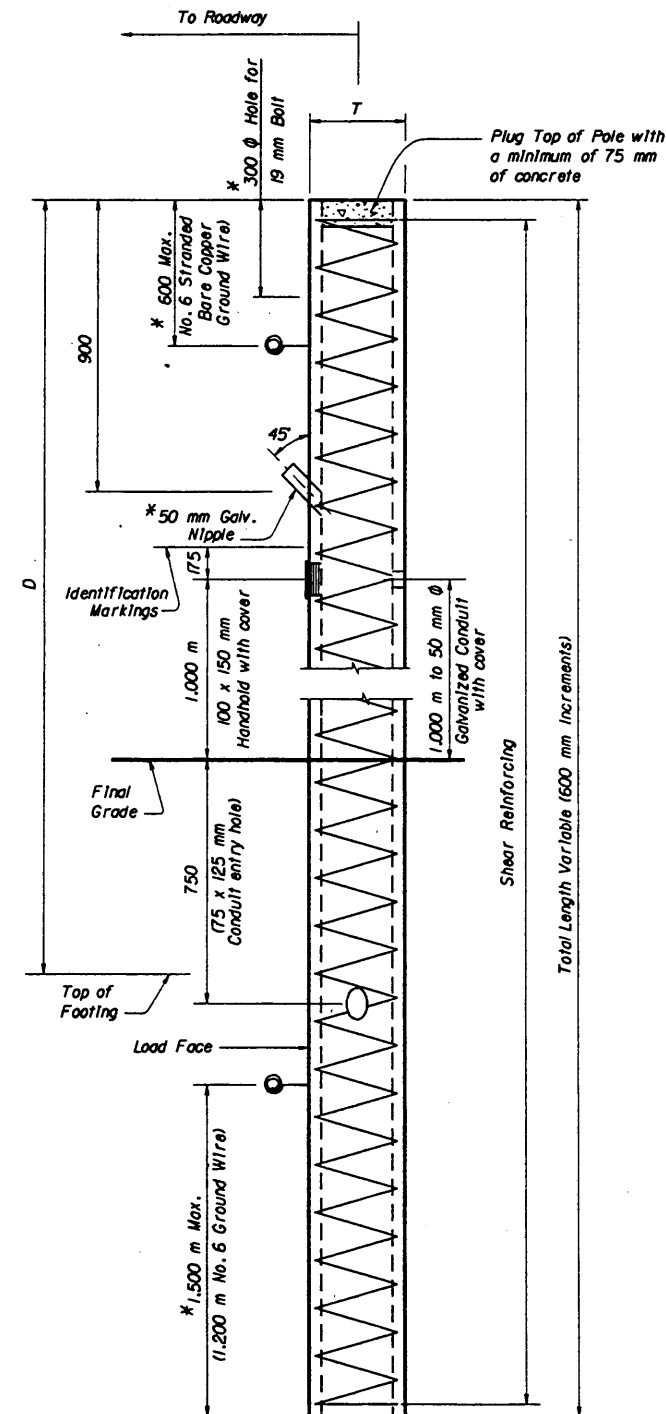
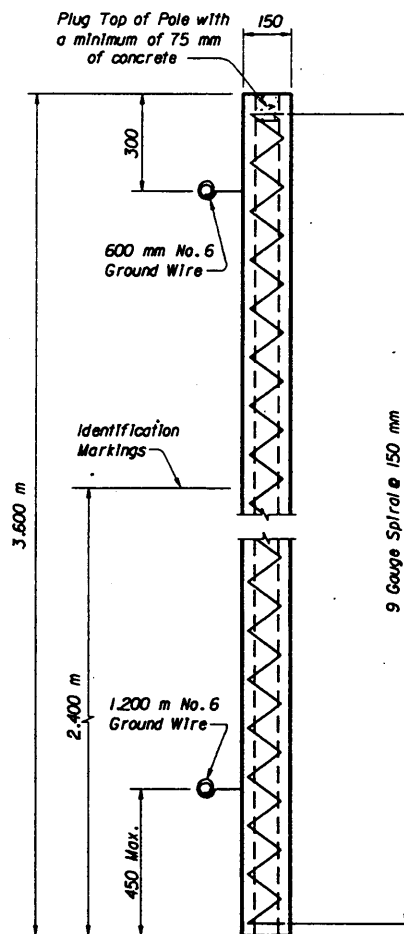


**TYPE N-II POLE ON CONCRETE PEDESTAL**



**SERVICE POLES - TYPE N-II**

(For installation, refer to Roadway and Traffic Design Standard, Index No. 17504)



**POLE TYPES N-III THROUGH N-VII**

\* Do not apply these items to Type N-III. Establish bolt hole locations, ground wire location and conduit location as shown in the plans.

D (meters)	**MINIMUM REQUIRED MOMENT CAPACITY			
	TYPE OF POLE			
	N-IV (kN-m)	N-V (kN-m)	N-VI (kN-m)	N-VII (kN-m)
6.0	44.7	143.6	205.9	271.0
6.7	49.6	150.6	215.0	295.3
7.3	55.0	157.7	220.8	306.2
7.9	59.6	164.7	233.0	317.0
8.5	65.3	171.8	242.1	327.8
9.1	70.5	178.8	251.0	338.7
9.7	75.6	185.9	260.1	349.5
10.3	80.7	192.9	269.2	360.3
11.0	85.9	200.0	277.7	371.2
11.6	91.0	207.0	287.2	382.0
12.2	96.2	214.0	296.3	392.9
12.8	101.3	221.1	305.2	403.7
13.4	106.5	228.1	314.3	414.5
14.0	111.6	235.2	323.4	425.4
14.6	116.8	239.5	332.3	436.2
15.2	121.9	243.8	341.4	447.0

\*\* Service Conditions: Design poles to carry the "Minimum Required Moment Capacity." These moments are based on a dead load plus wind load combinations, therefore obtain the allowable stresses by multiplying those for normal exposure conditions given in Section 6 by the applicable factor from Section 2 of the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

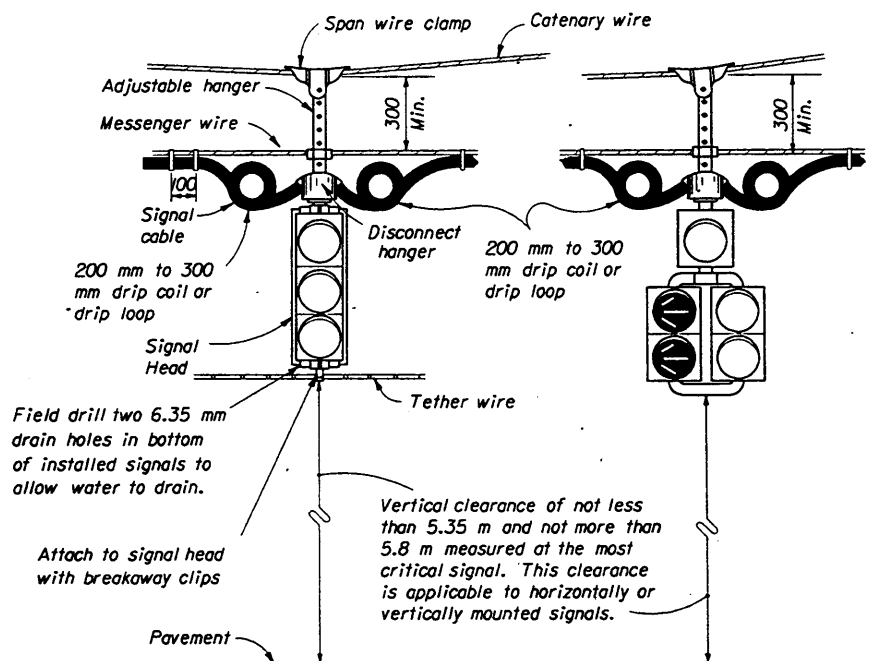
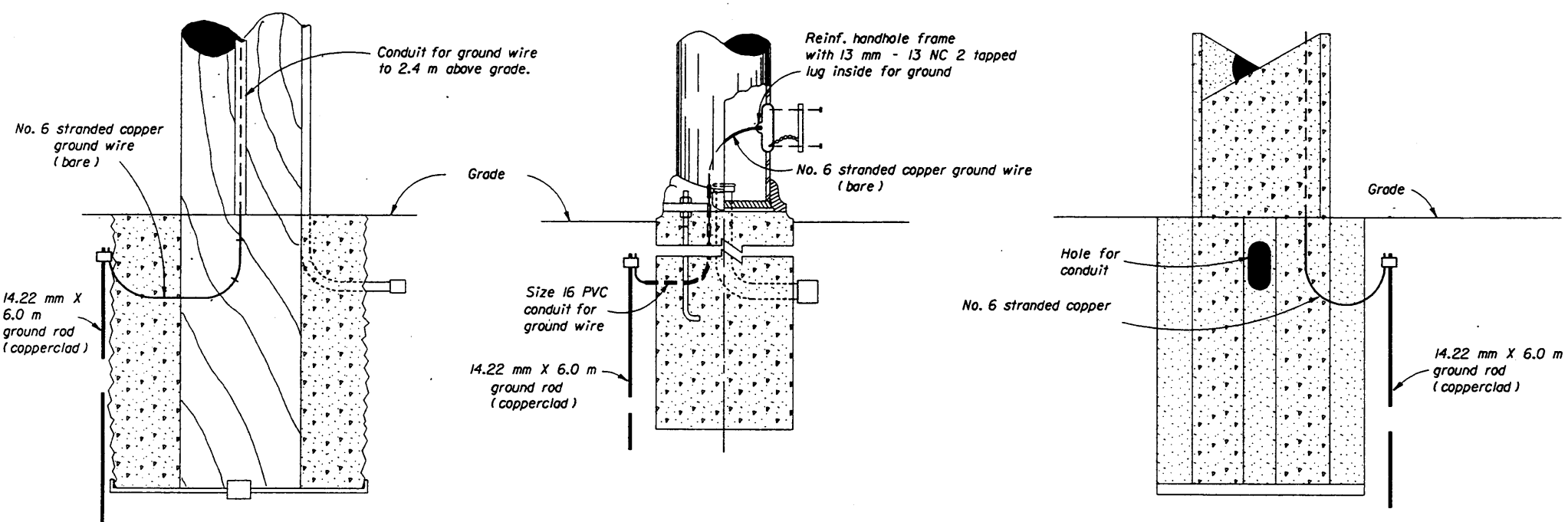
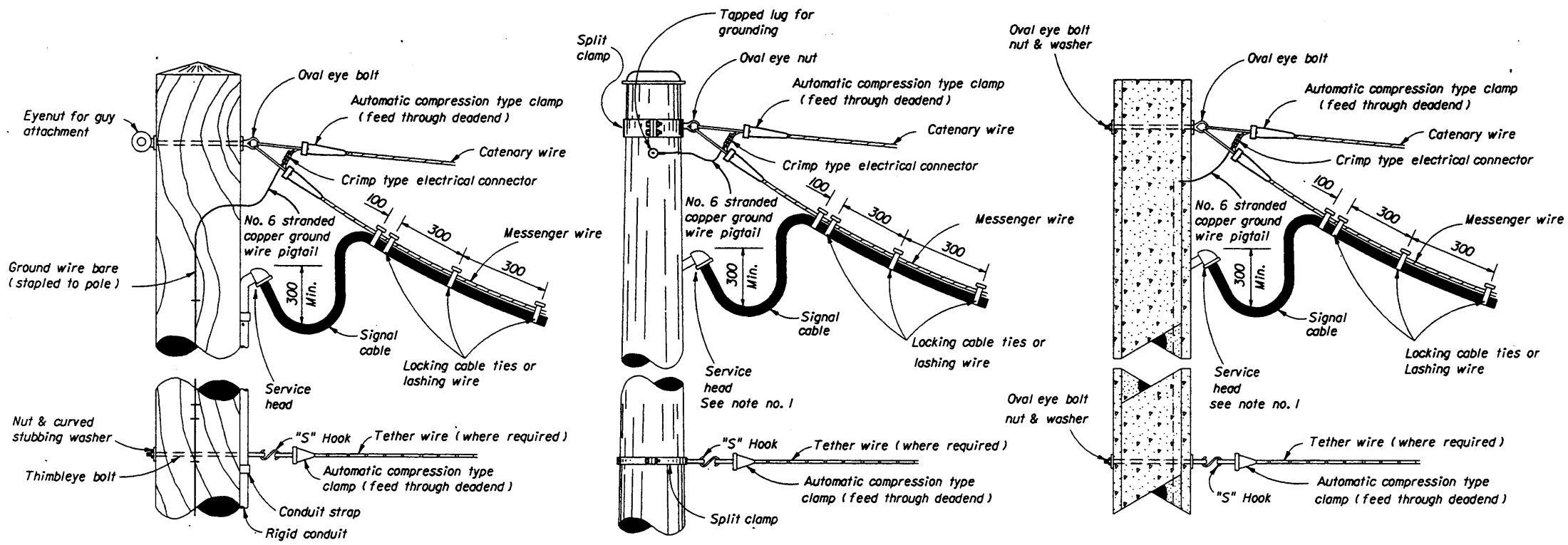
The ultimate moment capacity of each pole shall be a minimum of 1.3 times the "Minimum Required Moment Capacity."

TYPE OF POLE	CONCRETE POLE	
	SIZE AT TOP (T)	SHEAR REINFORCING
Type II	150 x 150 mm	9 Gauge Spiral @ 150 mm
Type III	150 x 150 mm	6 Gauge Spiral @ 150 mm
Type IV	200 x 200 mm	5 Gauge Spiral @ 150 mm
Type V	250 x 250 mm	5 Gauge Spiral @ 150 mm
Type VI	300 x 300 mm	5 Gauge Spiral @ 150 mm
Type VII	350 x 350 mm	5 Gauge Spiral @ 150 mm

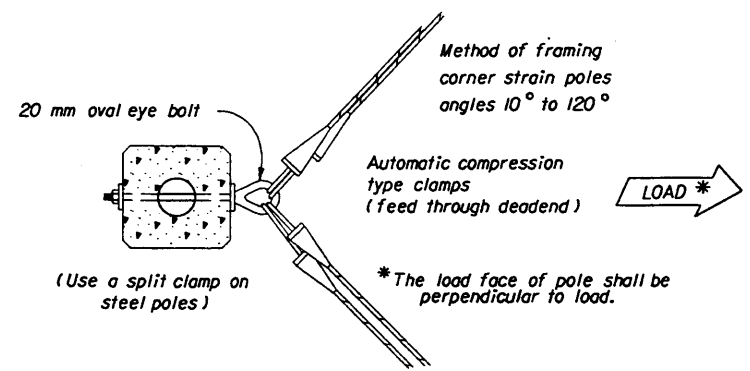
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

**CONCRETE POLES**

Designed By	Names	Dates	Approved By		
Drawn By	JP	4/99	[Signature]	Revision	Sheet No.
Checked By	TJB	4/99		00	1 of 1



- Notes:
1. With the approval of the resident engineer, the service head hole for joint use poles may be drilled by the utility company at an angle of 90° but not less than 45° to the face of the pole.
  2. Lashing wire should normally be used for distances of 3.6 m or greater.
  3. The overlapped connection of adjustable hangers shall use a minimum of 2 bolts with a minimum spacing of 50 mm between bolts.
  4. Meet all grounding requirements of Section 620 of the Standard Specifications.

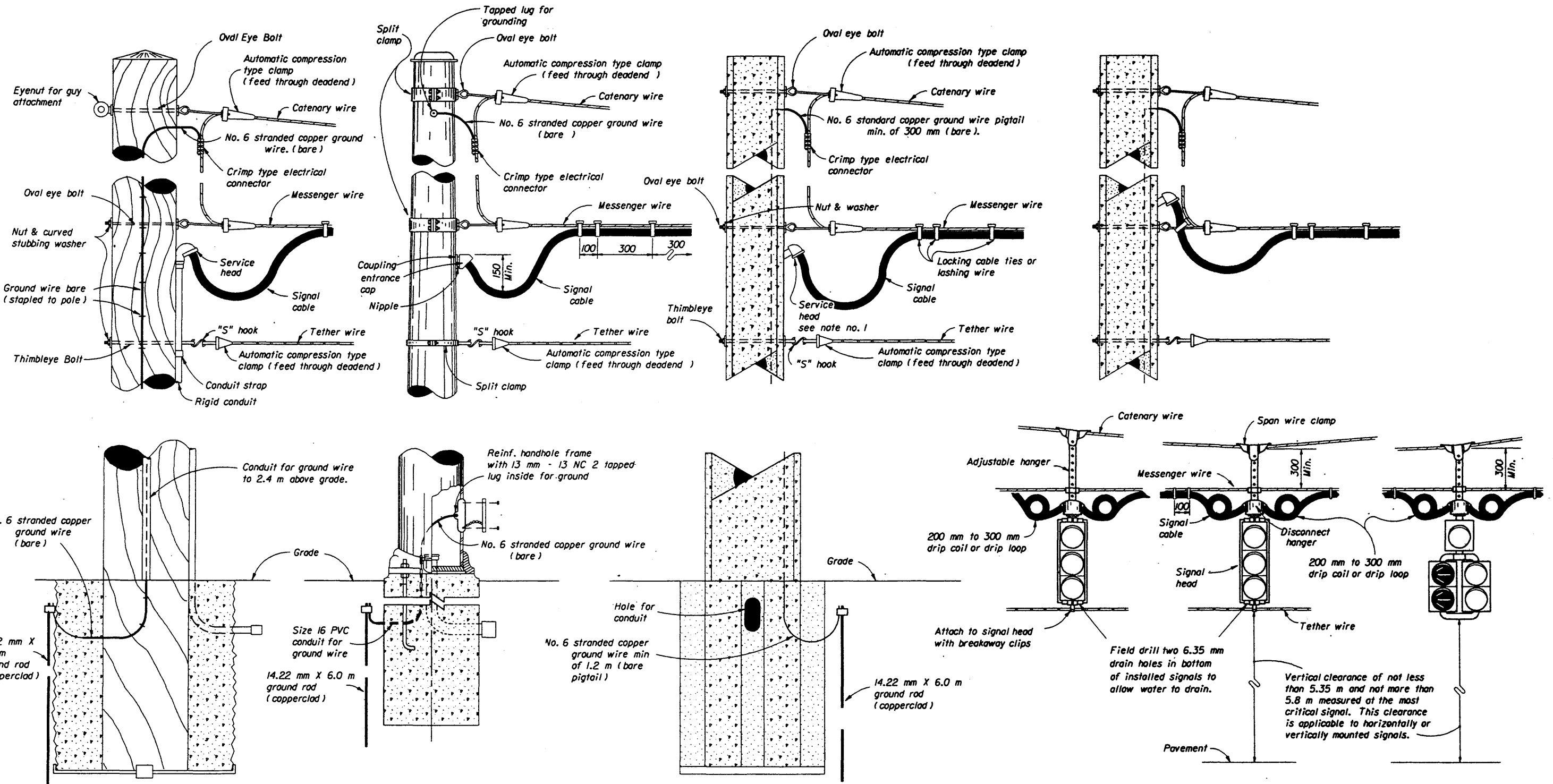


**SINGLE POINT ATTACHMENT**

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

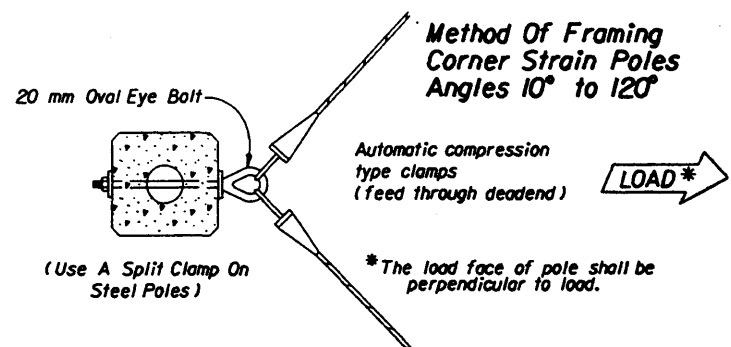
**SIGNAL CABLE & SPAN WIRE  
INSTALLATION DETAILS**

Designed By	Names	Dates	Approved By	Index No.
Drawn By			<i>Charles A. Smith</i> State Traffic Plans Engineer	17727
Checked By			Revision	Sheet No.
			00	1 of 2



**Notes:**

1. With the approval of the resident engineer. The service head hole for joint use poles may be drilled by the utility company at an angle of 90° but not less than 45° to the face of the pole.
2. Lashing wire should normally be used for distances of 3.6 m or greater.
3. The overlapped connection of adjustable hangers shall use a minimum of 2 bolts with a minimum spacing of 50 mm between bolts.
4. Meet all grounding requirements of Section 620 of the Standard Specifications.

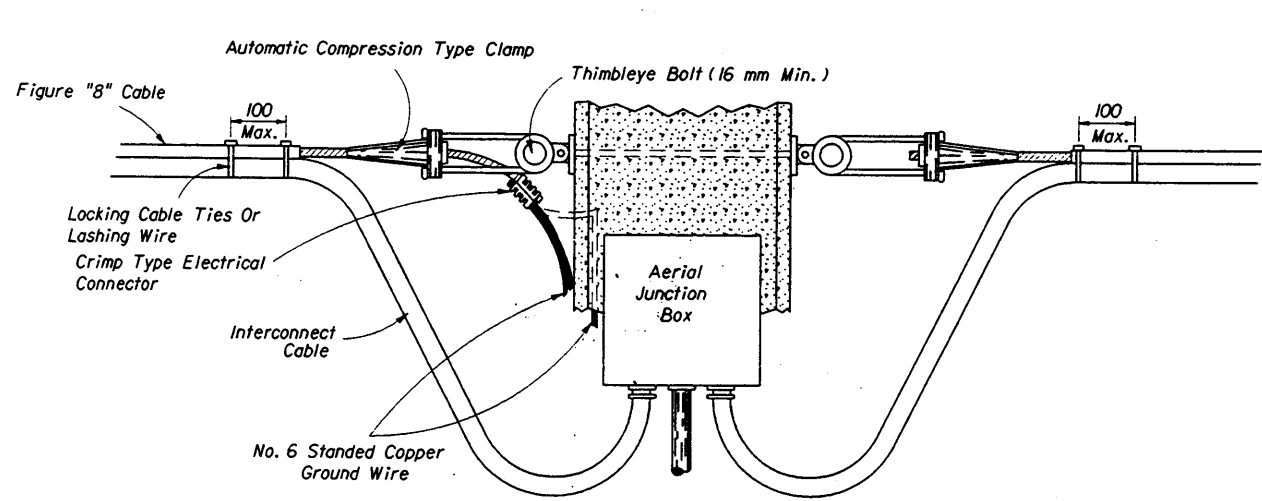


**TWO POINT ATTACHMENT**

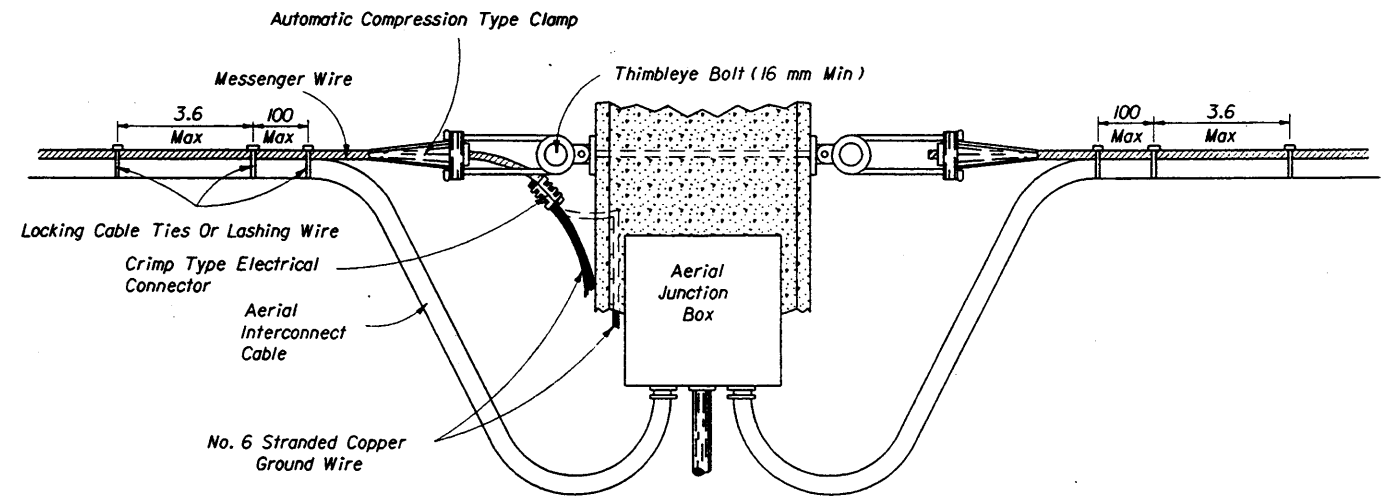
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

**SIGNAL CABLE & SPAN WIRE  
INSTALLATION DETAILS**

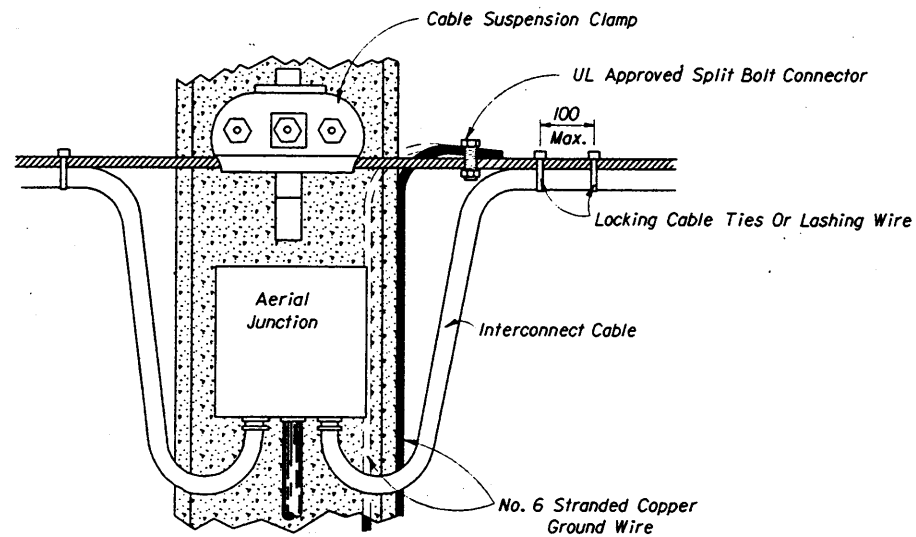
Names	Dates	Approved By		
Designed By		 State Traffic Plans Engineer		
Drawn By				
Checked By				
		Revision	Sheet No.	Index No.
		00	2 of 2	17727



**FIGURE A**  
**CABLE DROP AND**  
**TERMINATION DETAIL**  
**AERIAL INTERCONNECT FIGURE "8"**



**FIGURE B**  
**CABLE DROP AND**  
**TERMINATION DETAIL**  
**AERIAL INTERCONNECT MESSENGER**  
**WIRE WITH CLAMPS**

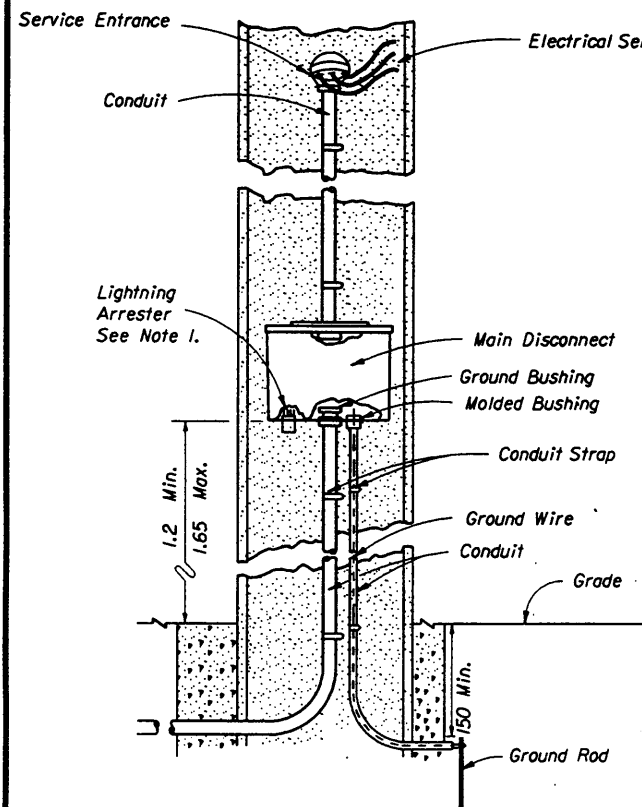


**FIGURE C**  
**CABLE DROP DETAIL**  
**AERIAL INTERCONNECT MESSENGER**  
**WIRE WITH CLAMPS**

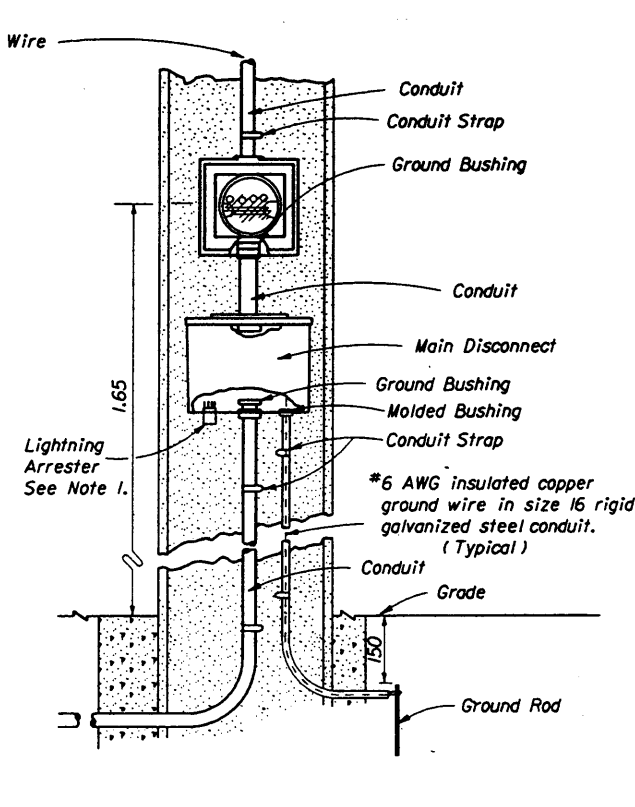
**Notes:**

1. The messenger wire of the interconnect cables shall be grounded to the copper ground wire of the pole or to the external wire extending down the pole.
2. When utilizing the external ground wire to the pole, a piece of size 16 rigid conduit shall extend up the pole externally to a point 2.4 m above finish grade to protect the ground wire connecting the messenger wire to the ground rod.
3. Locking cable ties or lashing wire when used shall be placed no further than 300 mm apart except at the point of cable drop or terminations where one (1) shall be placed at the point where the cables separate from the messenger wire and another placed 100 mm (max) from that tie. When using figure "8" interconnect cable only the locking cable ties shall be used.
4. If accessible the internal ground wire of the support pole may be used to ground the messenger wire.
5. Lashing wire should normally be used for distances of 3.6 m or greater.
6. Meet all grounding requirements of Section 620 of the Standard Specifications.

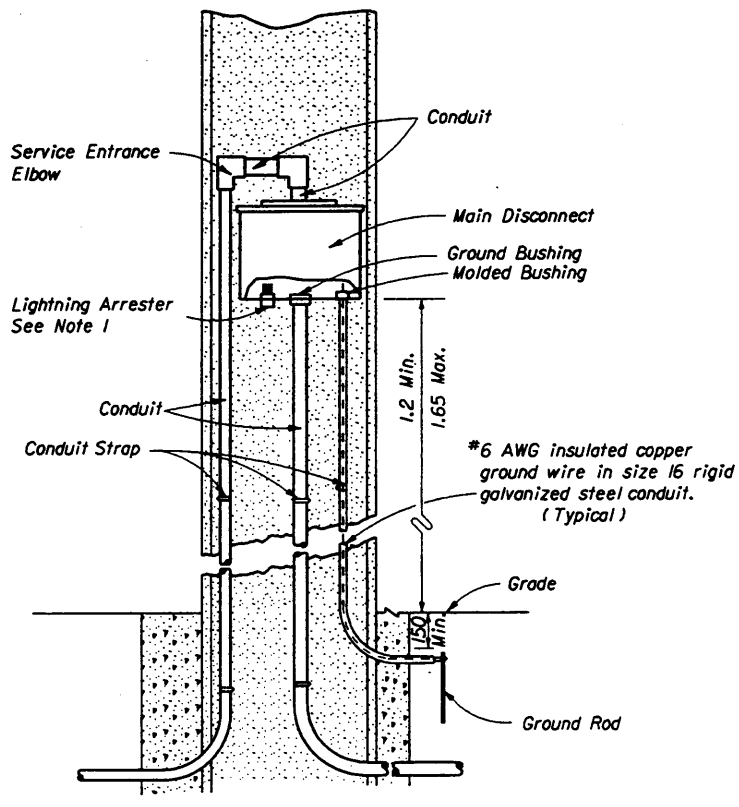
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
<b>AERIAL INTERCONNECT</b>				
Designed By	Names	Dates	Approved By <i>Clark A. Sext</i> State Traffic Plans Engineer	
Drawn By			Revision	Sheet No. Index No.
Checked By			00	1 of 1 17733



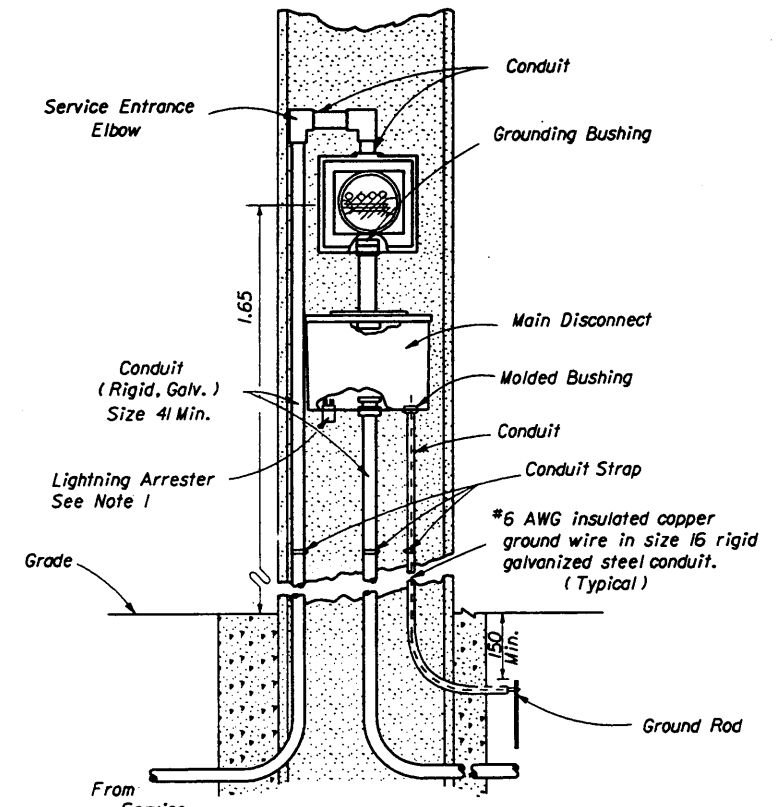
**FIGURE A**  
AERIAL FEED  
(NO METER USED)



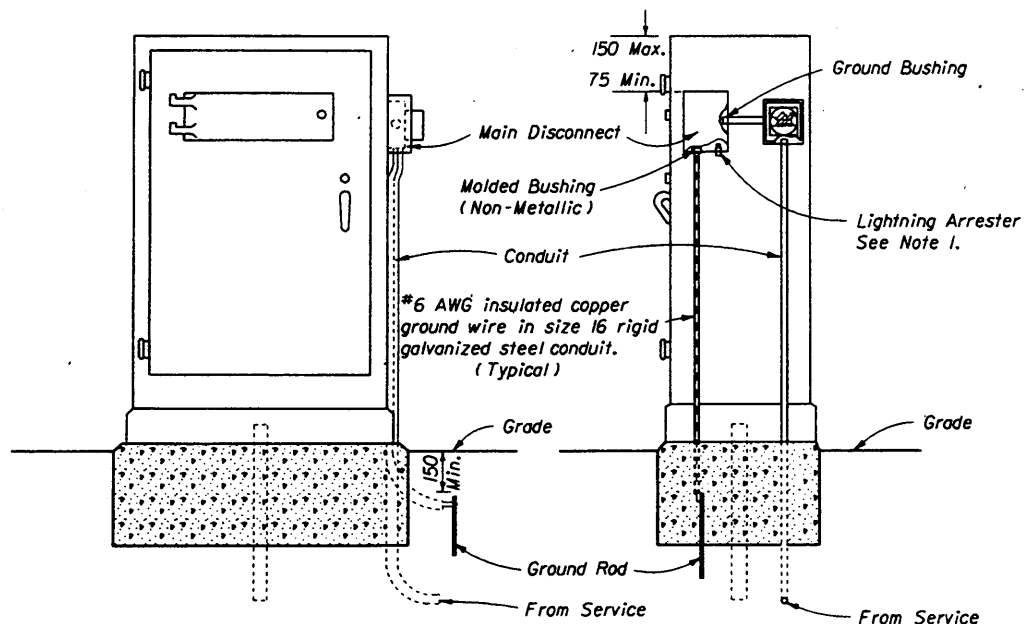
AERIAL FEED  
(METER USED)  
**FIGURE B**



UNDERGROUND FEED  
(NO METER USED)  
**FIGURE C**



TYPE "B" UNDERGROUND FEED  
(METER USED)  
**FIGURE D**



UNDERGROUND CABINET MOUNTED  
(METER USED)  
**FIGURE E**

**NOTES:**

1. The lightning arrester can be located on the side or bottom of the main disconnect enclosure at the Contractor's Option.
2. Liquidtight flexible conduit is approved for use from the electrical disconnect to the cabinet when both are installed on the same pole.
3. Bond all elements together to form an Intersection Grounding Network in accordance with Section 620 of the Department's current Standard Specifications for Road and Bridge Construction. The bond wire shall be run in conduit with the Electrical Service Wire or Signal Cable.
4. Meet all grounding requirements of Section 620 of the Standard Specifications.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
<b>ELECTRIC POWER SERVICE</b>				
Designed By	Names	Dates	Approved By	
Drawn By			<i>Charles A. East</i> State Traffic Plans Engineer	
Checked By			Revision	Sheet No. Index No.
			00	1 of 1 17736

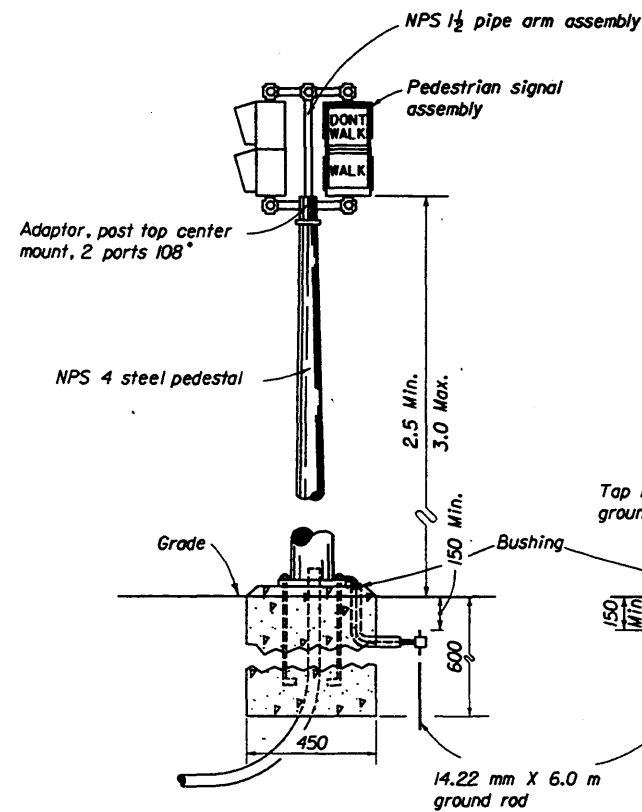


FIGURE A

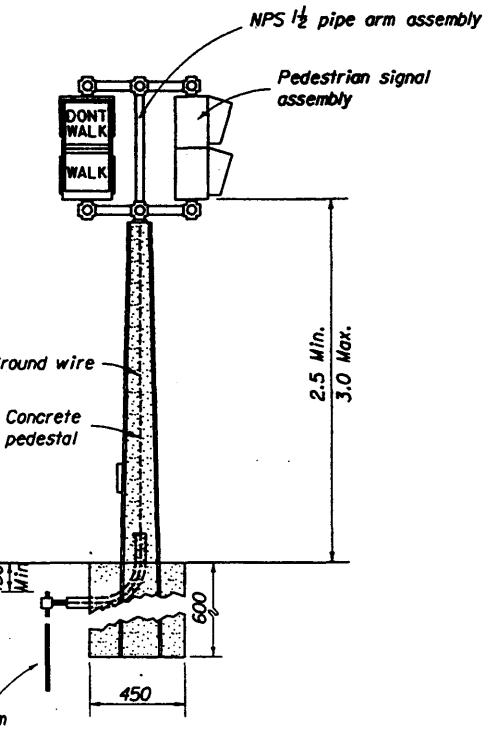
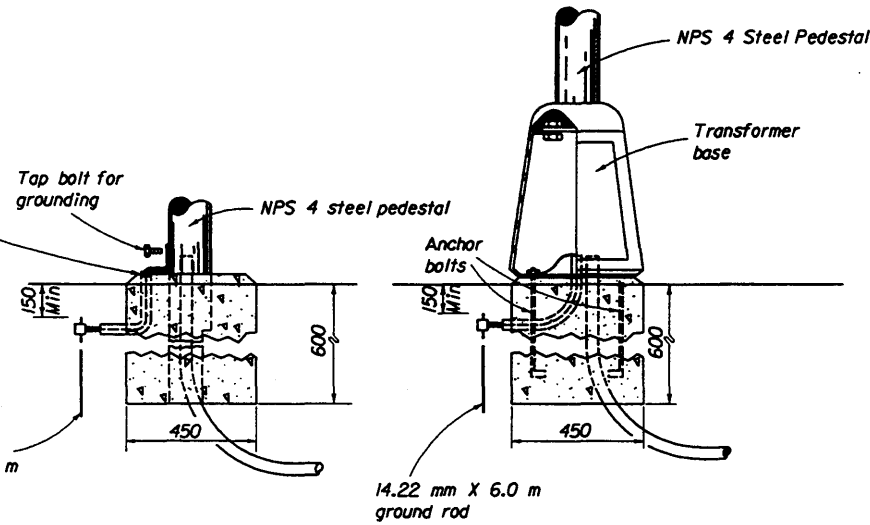


FIGURE B

Notes:

1. As an option, the contractor will be allowed to install pedestrian signals on concrete poles and pedestals with the use of lead anchors (two bolts same size per hub.) in lieu of the standard steel bands.
2. Holes drilled or punched in metal poles or pedestals shall be thoroughly reamed, cleaned of all burrs and covered with two (2) coats of zinc rich paint as specified in the standard specifications for road and bridge, construction. Grommets or bushings shall be installed in holes.
3. Meet all grounding requirements of Section 620 of the Standard Specifications.

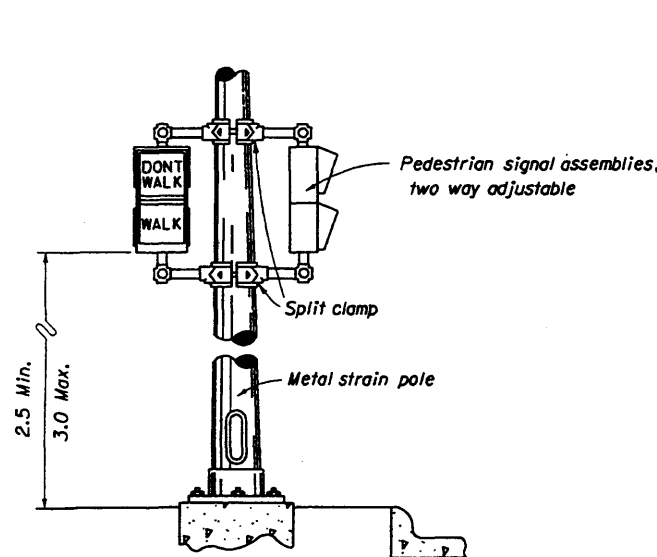


FIGURE C

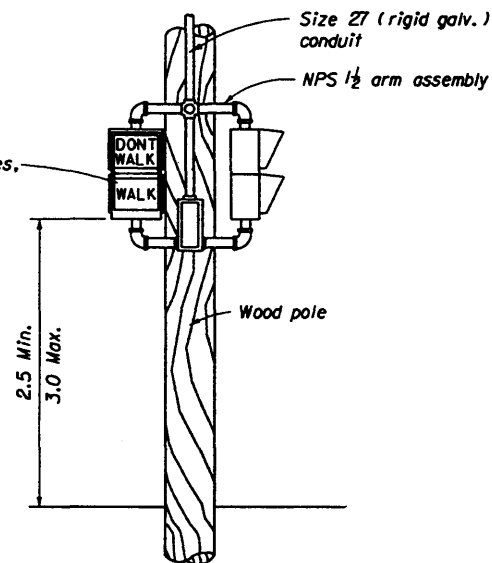


FIGURE D

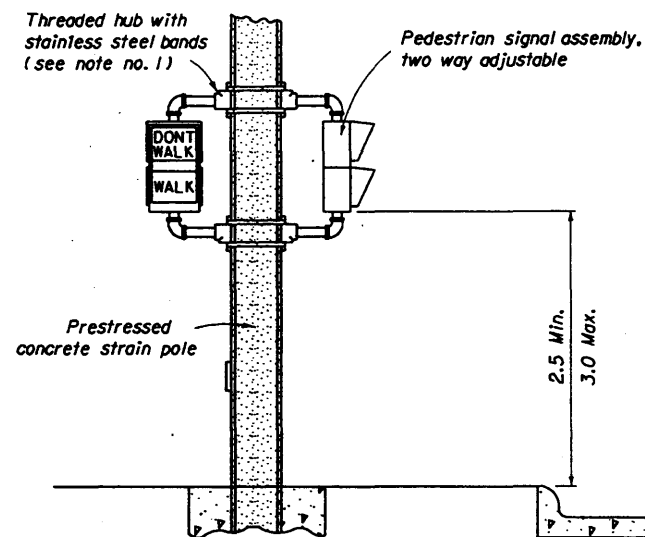

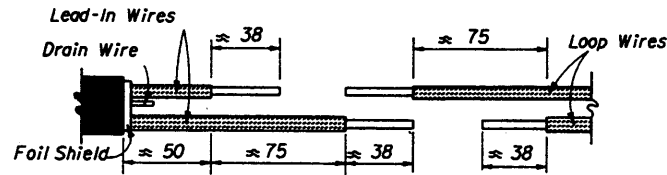


FIGURE E

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN					
PEDESTRIAN CONTROL SIGNAL INSTALLATION DETAILS					
Names	Dates	Approved By			
Designed By	9-80	 State Traffic Plans Engineer			
Drawn By					
Checked By		Revision	Sheet No.	Index No.	
		00	1 of 1	17764	

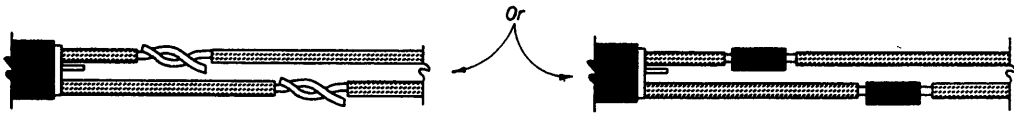
**DETAILS FOR SPLICING  
LOOP WIRE TO LEAD-IN WIRE**

**STEP 1**



Strip Loop And Lead-In Cable Conductors. If Heat Shrinkable Silicone Lined, Cross Linked Polyethylene Insulating Tubing Is To Be Used, Slip Tubing Over Lead-In Cable And Individual Conductors.

**STEP 2**



Twist The Bare Conductors Together.

Crimp The Bare Conductors Together With An Uninsulated Butt Connector.

**STEP 3**



Solder Each Splice Using Resin-Core Solder.

Solder Each Splice Using Resin-Core Solder.

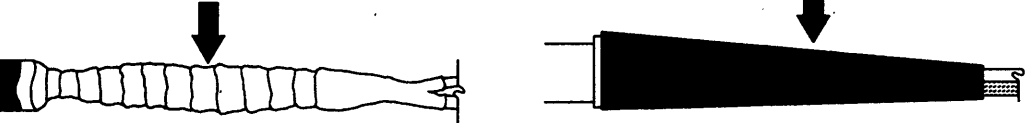
**STEP 4**



Wrap Each Splice With Silicone Tape. Half Lap Starting At Center Of Splice And Proceeding To The Right (Or Left)  $\approx$  20 mm Past End Of Splice, Then Proceeding To The Left (Or Right)  $\approx$  20 mm Past Other End Of Splice And Returning To Center. Wrap Each Splice, With An All Weather Heavy Duty Electrical Tape In The Same Manner  $\approx$  20 mm Past Each End Of Silicone Tape.

Slide Heat Shrinkable Tubing Over Splices. The Tubing Shall Cover  $\approx$  25 mm Of Conductor Insulation At Each End Of Splice. Heat Tubing As Specified By Manufacturer.

**STEP 5**



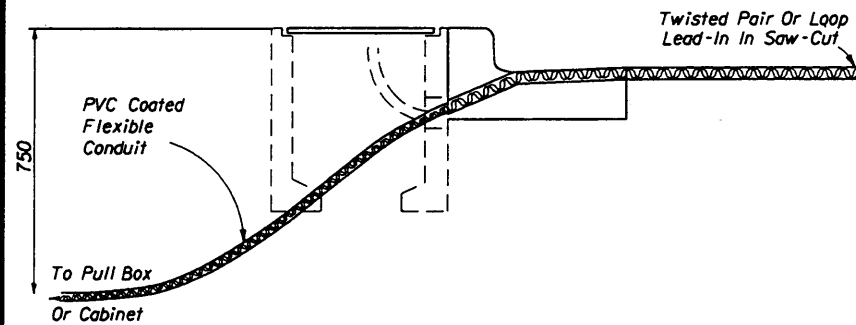
Half Lap The Two Splices Together With An All Weather Heavy Duty Electrical Tape  $\approx$  25 mm Past The End Of The Lead-In Cable Outside Cover And  $\approx$  25 mm Past Farther Most Wrap Of Step 4.

Slide Outer Heat Shrinkable Tubing Over Entire Splice Area. The Tubing Shall Cover  $\approx$  38 mm Of The Lead-In Cable Outside Cover And  $\approx$  25 mm Of The Loop Conductor Insulation.

**TWISTED PAIR AND LOOP LEAD-IN  
INSTALLATION WITH CURB & GUTTER**

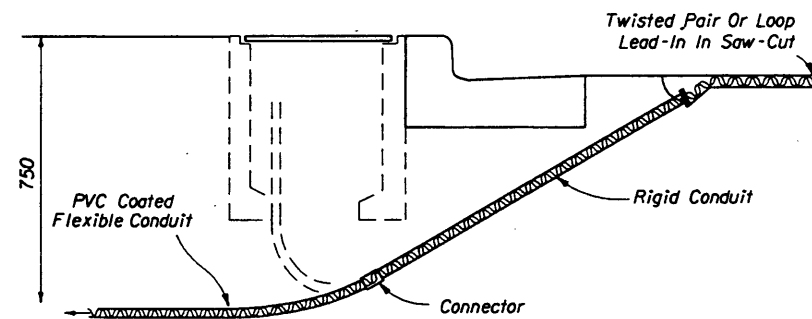
**ALTERNATIVE 1**

Drill A Hole Through The Curb At The Point Which The Required Saw-Cut Depth Is Obtained Just Prior To Cutting The Top Inside Edge Of The Curb. Slide A Section Of Flexible Conduit At Least 150 mm Into The Hole From The Back Side Of The Curb But Not Within 50 mm Of The Top Of The Hole. The Conduit Shall Fit Snug Within The Drilled Hole. Fill The Top Of The Hole With Loop Sealant To The Level Of The Curb Surface. A Nonmetallic Material Should Be Used To Prevent Excessive Loop Sealant From Entering The Flexible Conduit.



**ALTERNATIVE 2**

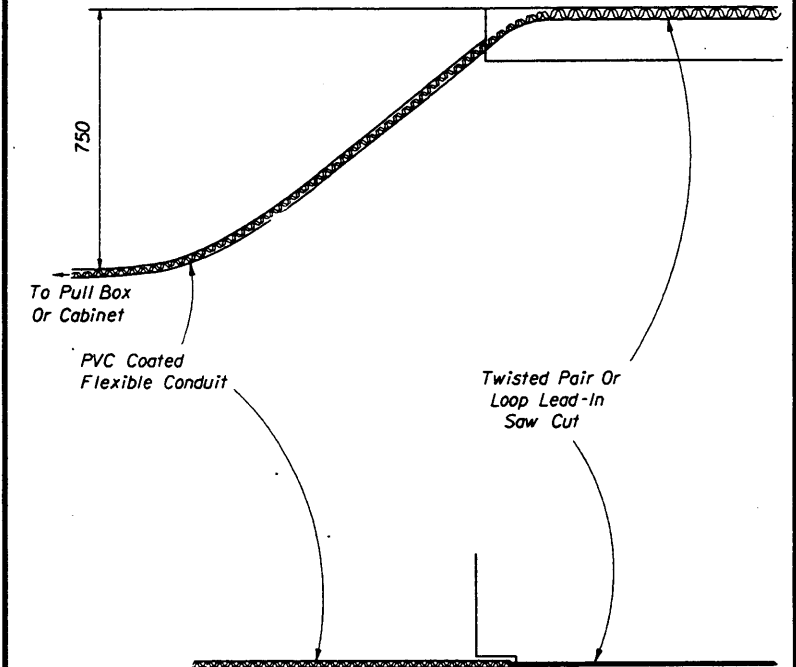
Drill A Hole 13 mm To 25 mm Larger In Diameter Than The Rigid Conduit To Be Used Through The Roadway Asphalt (Or Concrete) Surface And Base At An Appropriate Angle To Intercept The Trench Or Pull Box Hole. Place A Predetermined Length Of Rigid Conduit In The Hole And Drive The Conduit Into The Trench Or Hole. Install A Molded Bushing (Nonmetallic) On The Roadway End Of The Rigid Conduit. The Top Of The Rigid Conduit Shall Be Approximately 50 mm Below The Roadway Surface. Fill The Hole With Loop Sealant To The Level Of The Roadway Surface. A Nonmetallic Material Should Be Used To Prevent Excessive Loop Sealant From Entering The Rigid Conduit.



Note  
Other alternatives may be approved by the State Traffic Operations Engineer

**TWISTED PAIR AND LOOP LEAD-IN  
INSTALLATION WITHOUT CURB & GUTTER**

Cut A Slot In The Edge Of The Roadway Of Sufficient Size And Depth To Snugly Place The End Of The Flexible Conduit. The End Of The Conduit Shall Be At Least 150 mm Into The Roadway And  $\approx$  50 mm Below The Top Of The Roadway Surface. The Departure Angle Of The Conduit From The Roadway Shall Be 30° To 45°.



Note  
Other alternatives may be approved by the State Traffic Operations Engineer

**GENERAL NOTES**

- If the loop lead-in is 22.5 m or less from the edge of the loop to the detector or controller cabinet, continue the twisted pair to the cabinet. If the loop lead-in is greater than 22.5 m continue the twisted pair to the specified pull box, splice to shielded lead-in wire and continue to the detector or controller cabinet.
- The width of all saw cuts shall be sufficient to allow unforced placement of loop wires or lead-in cables into the saw cut. The depth of all saw cuts, except across expansion joints, shall be 75 millimeters standard with a maximum of 100 millimeters.

3. On resurfacing or new roadway construction projects, the loop wires and lead-in cables may be installed in the asphalt structural course prior to the placement of the final asphalt wearing course. The loop wires and lead-in cables shall be placed in a saw cut in the structural course. The depth of the cables below the top of the final surface shall comply with note 2.

4. A nonmetallic hold down material shall be used to secure loop wires and lead-ins to the bottom of saw-cuts. Hold down material shall be placed at approximately 300 mm intervals around loops and 600 mm intervals on lead-ins.

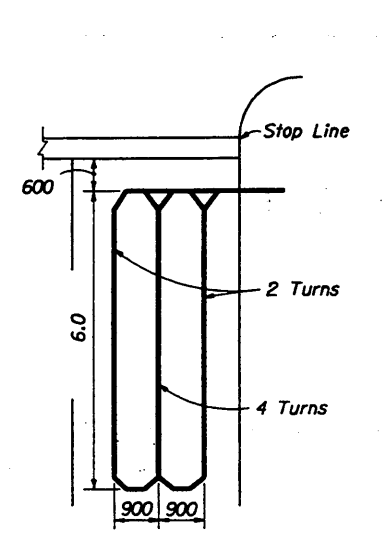
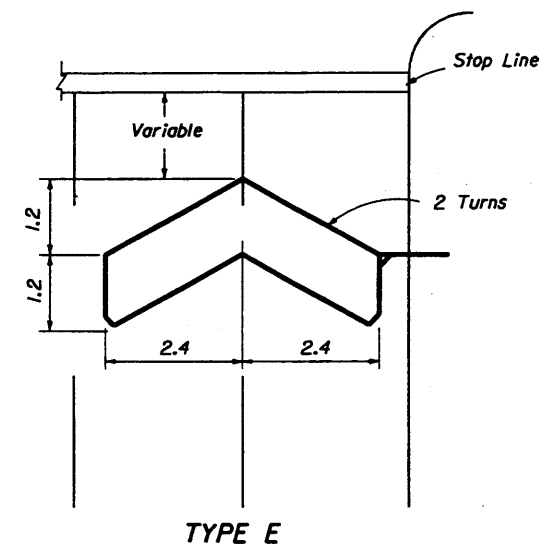
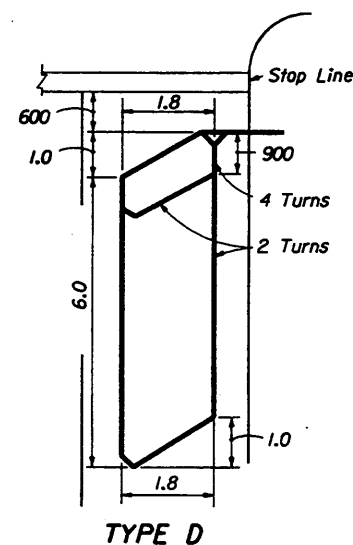
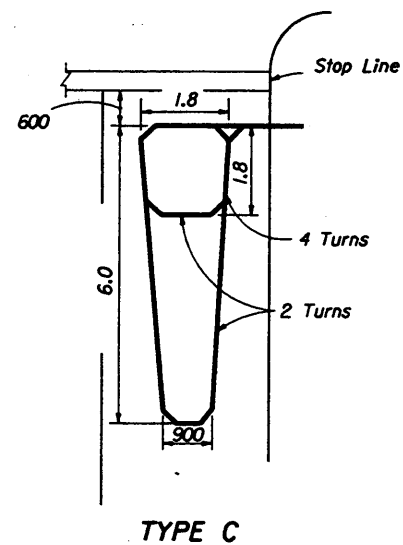
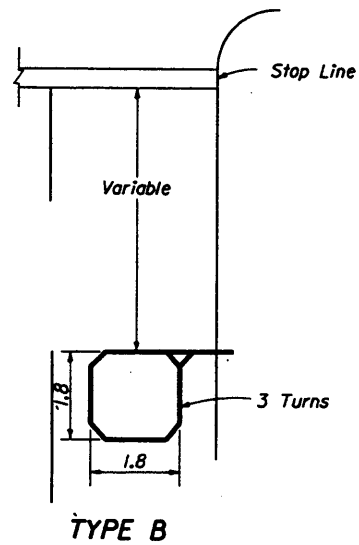
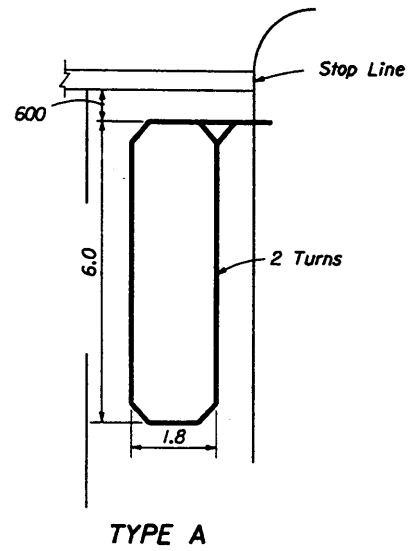
5. The minimum distance between the twisted pairs of loop lead-in wire is 150 mm from the loop to 300 mm from the pavement edge or curb.

6. Splice Connections in pull boxes may be made with U.L. listed, watertight, insulated connectors in lieu of the details above. The lead-in cable insulation shall be sealed using electrical tape or heat shrinkable tubing (refer to step 5 above). The seal shall extend approximately 25 mm either side of the lead-in cable outer cover.

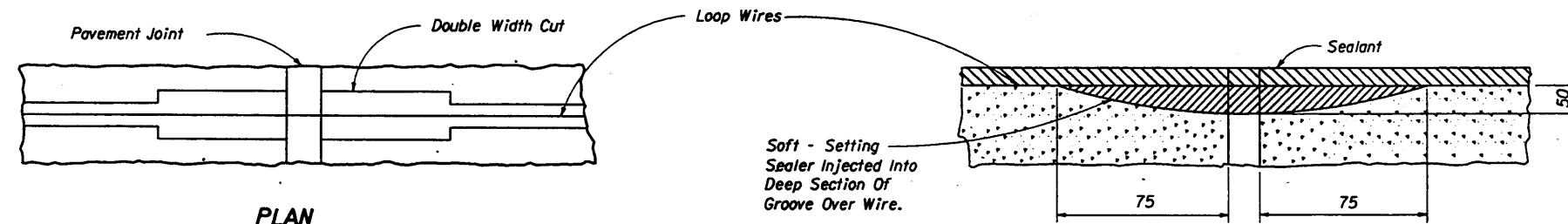
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

**VEHICLE LOOP  
INSTALLATION DETAILS**

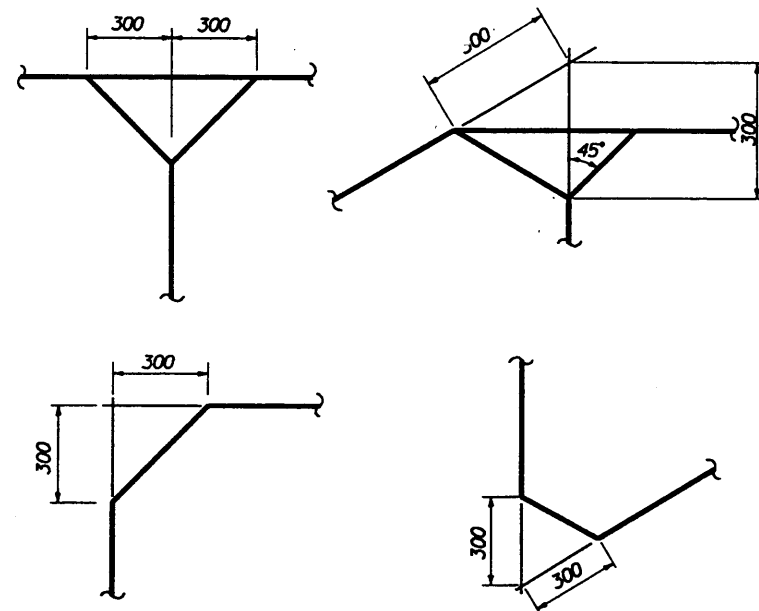
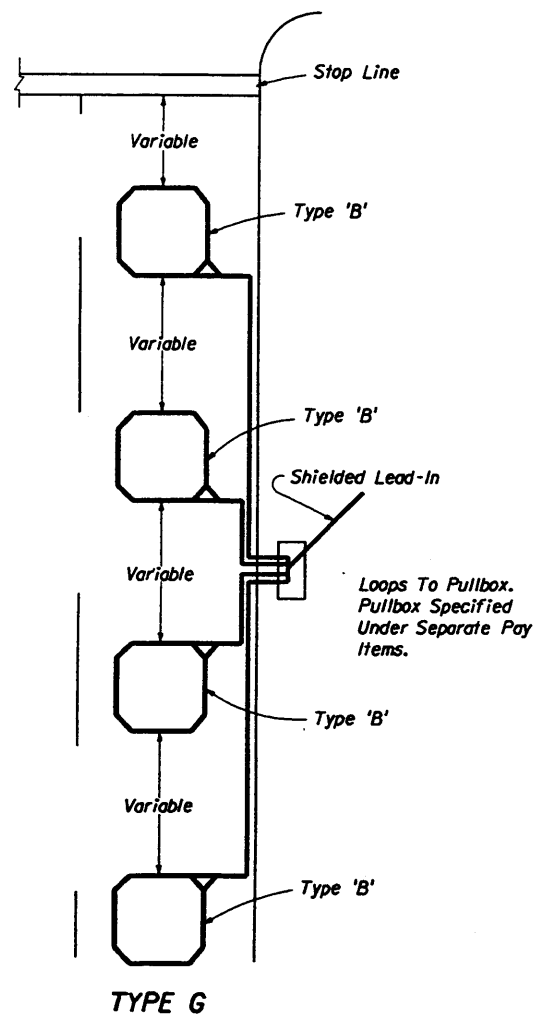
Names	Dates	Approved By		
Designed By		 State Traffic Plans Engineer		
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Note: Loop conductors must follow saw-cut to bottom forming slack section at joint.



### CONCRETE PAVEMENT EXPANSION JOINTS VERTICAL SECTION



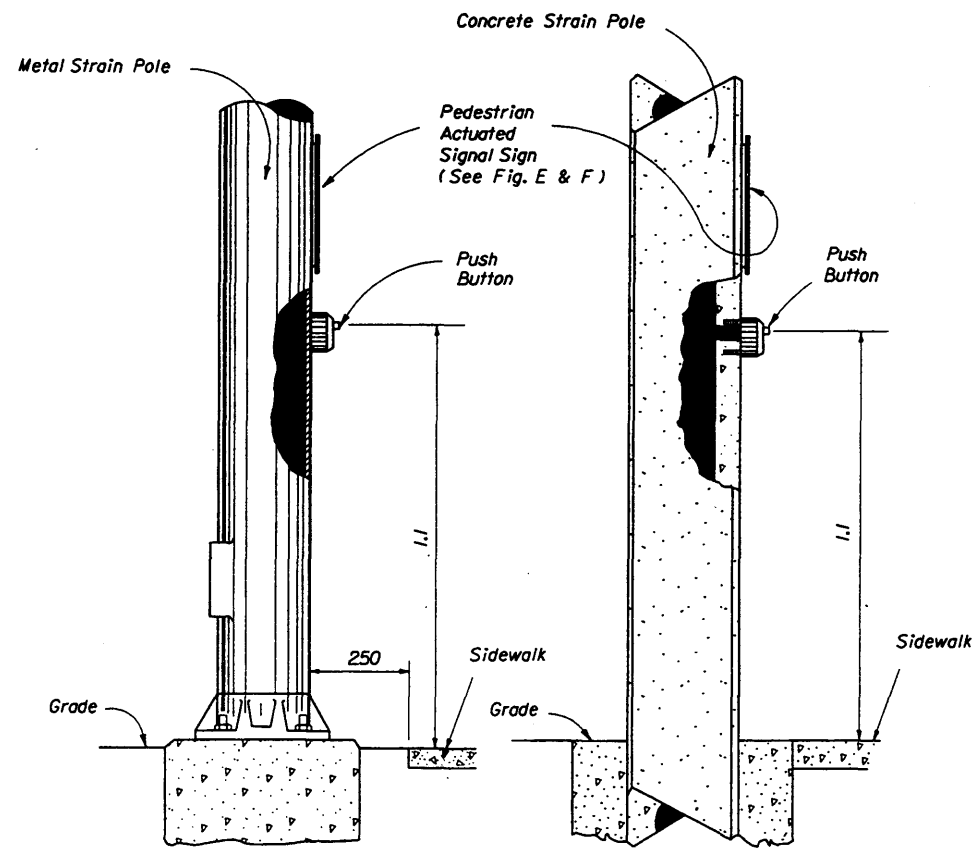
### LOOP CORNER AND LEAD-IN DETAILS

#### Notes:

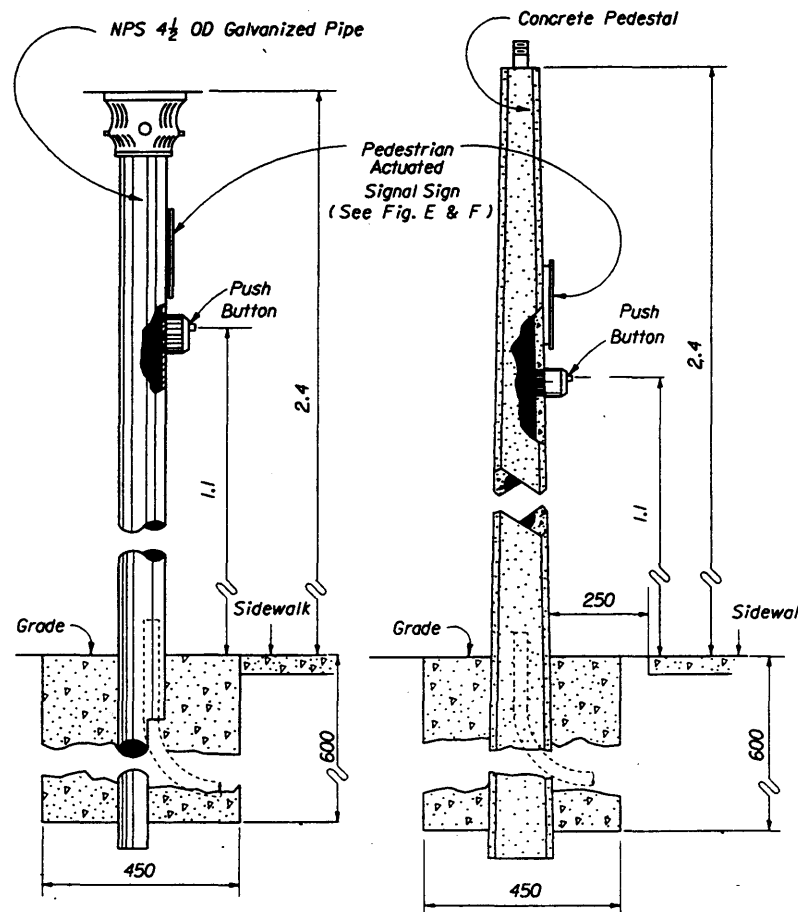
1. The "number of turns" indicated at the specified point on the loop refers to the number of passes of loop-wires which are placed in the saw-cut forming the complete loop.
2. Loop types or details not drawn to scale.
3. Loop Types are centered in a single lane except Type E which is centered on two lanes.
4. The number of individual loops in the Type G loop may vary up to a maximum of four (4).
5. Lead-in may be connected to either end of loop.
6. The leading edge of loop Types A,C,D.& F may extend past the stop line a maximum of 3.0 m. The length of these loops may be extended to a maximum of 18.0 m. Each intersection should be individually designed and if the modifications noted above is required it must be noted or detailed in the plans.
7. Loop lead-in wires should not be installed in the same pull box with signal power cable.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
VEHICLE LOOP INSTALLATION DETAILS				
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Checked By		Revision	Sheet No.	Index No.
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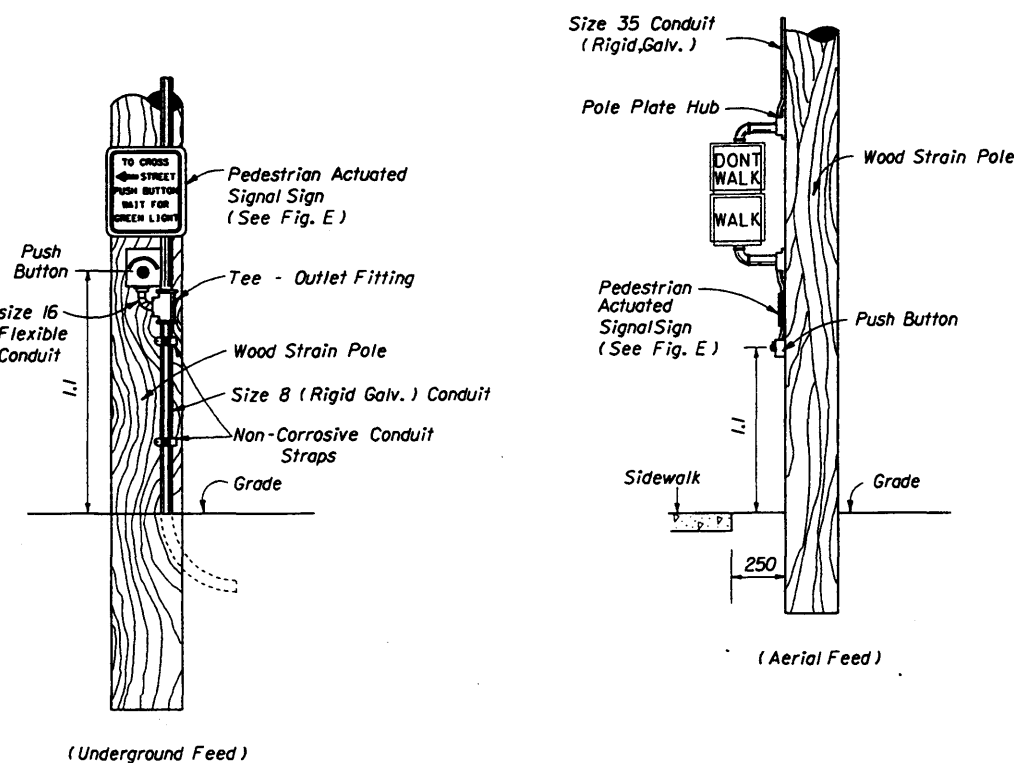




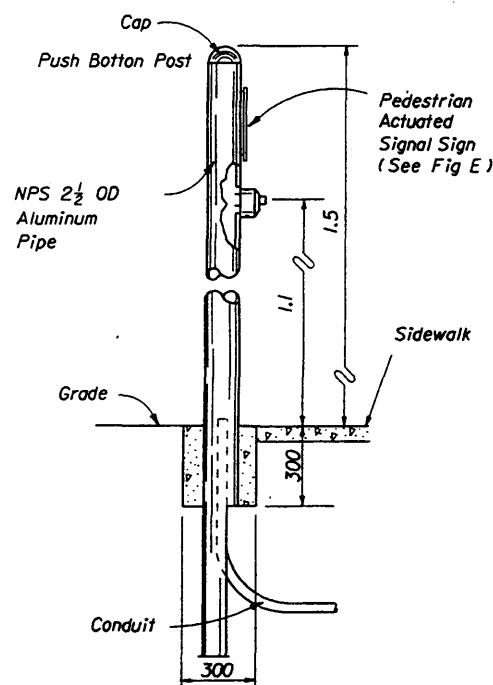
**FIGURE A**  
POLE MOUNTED  
DETECTOR STATION



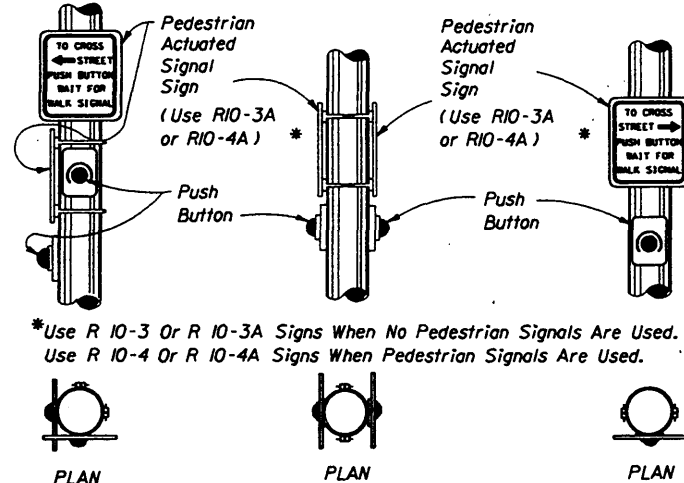
**FIGURE B**  
PEDESTAL STATION  
DETECTOR STATION



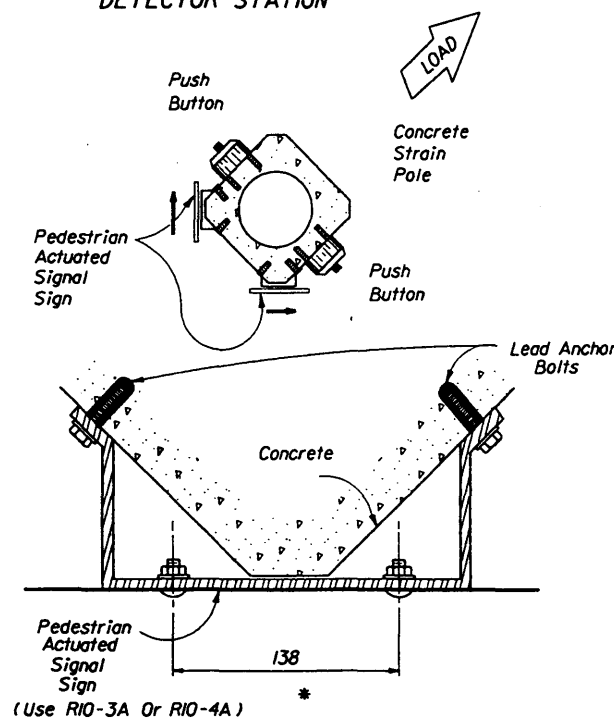
**FIGURE C**  
WOOD POLE MOUNTED  
DETECTOR STATION



**FIGURE D**  
POST DETECTOR STATION  
DETECTOR STATION



**FIGURE E**

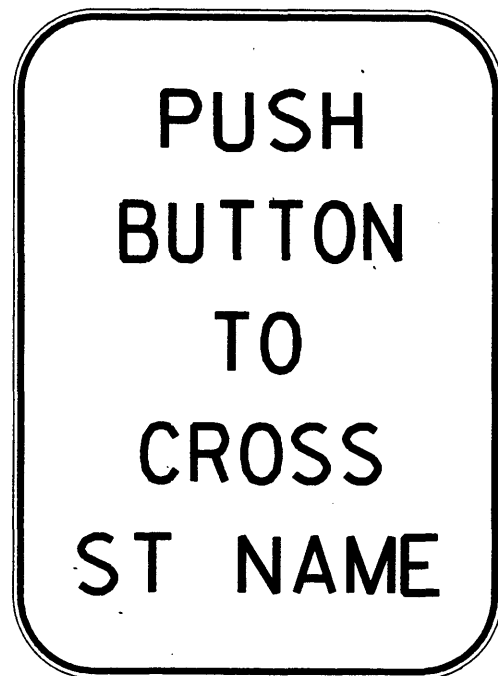


**FIGURE F**

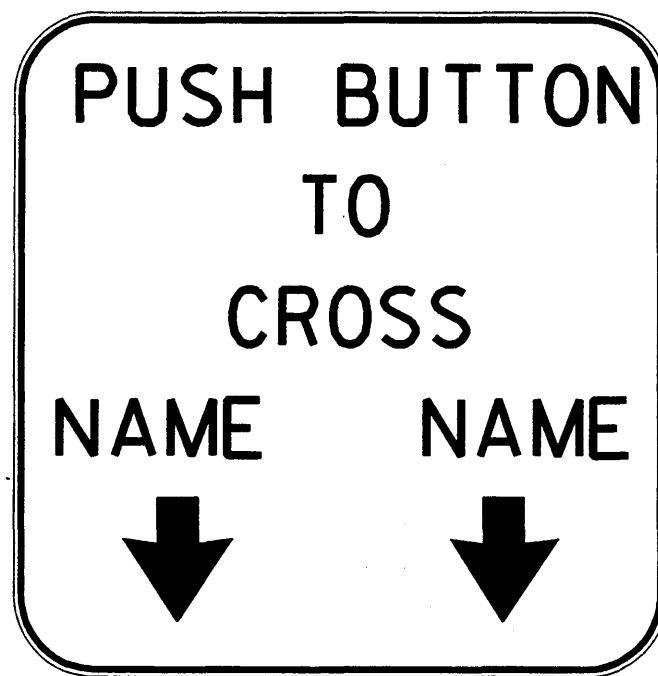
**Notes:**

- 1 Signs (RIO-3A & RIO-4A) shall be mounted above detectors, explaining their purpose and use.
- 2 The positioning of pedestrian push button should clearly indicate which cross-walk signal is actuated by each push button.
- 3 Push buttons and signs are to be mounted in accordance with Standard Specifications, section 665.
- 4 Meet all grounding requirements of Section 620 of the Standard Specifications.

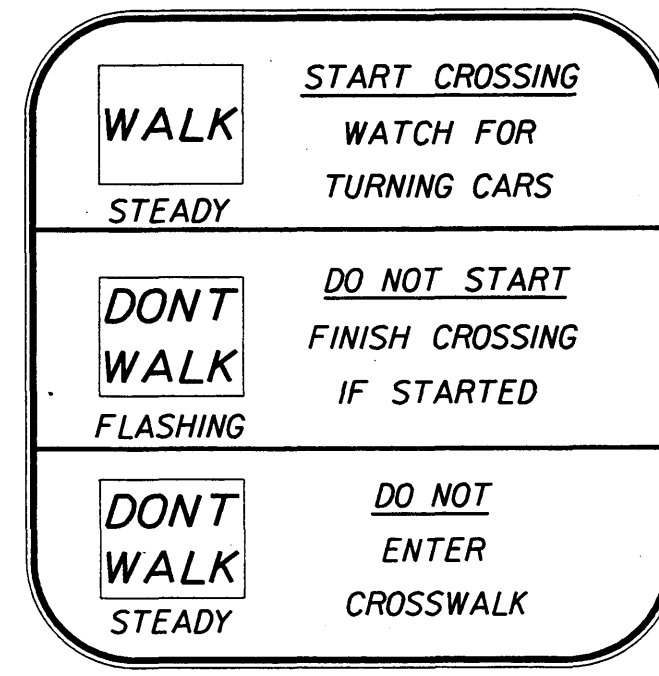
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
PEDESTRIAN DETECTOR ASSEMBLY INSTALLATION DETAILS				
Names	Dates	Approved By		
Designed By		Charles A. East State Traffic Plans Engineer		
Drawn By		Revision	Sheet No.	Index No.
Checked By		00	1 of 2	17784



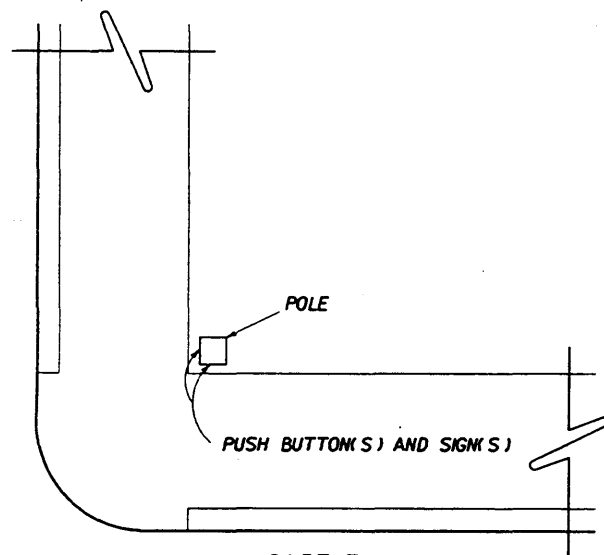
FTP-47



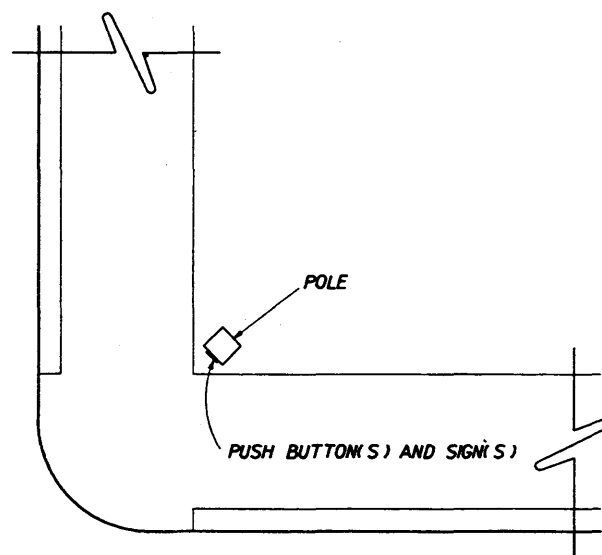
FTP-48



FTP-49



CASE I  
POLE PARALLEL TO CURBLINE  
ALTERNATE TO FIGURE F

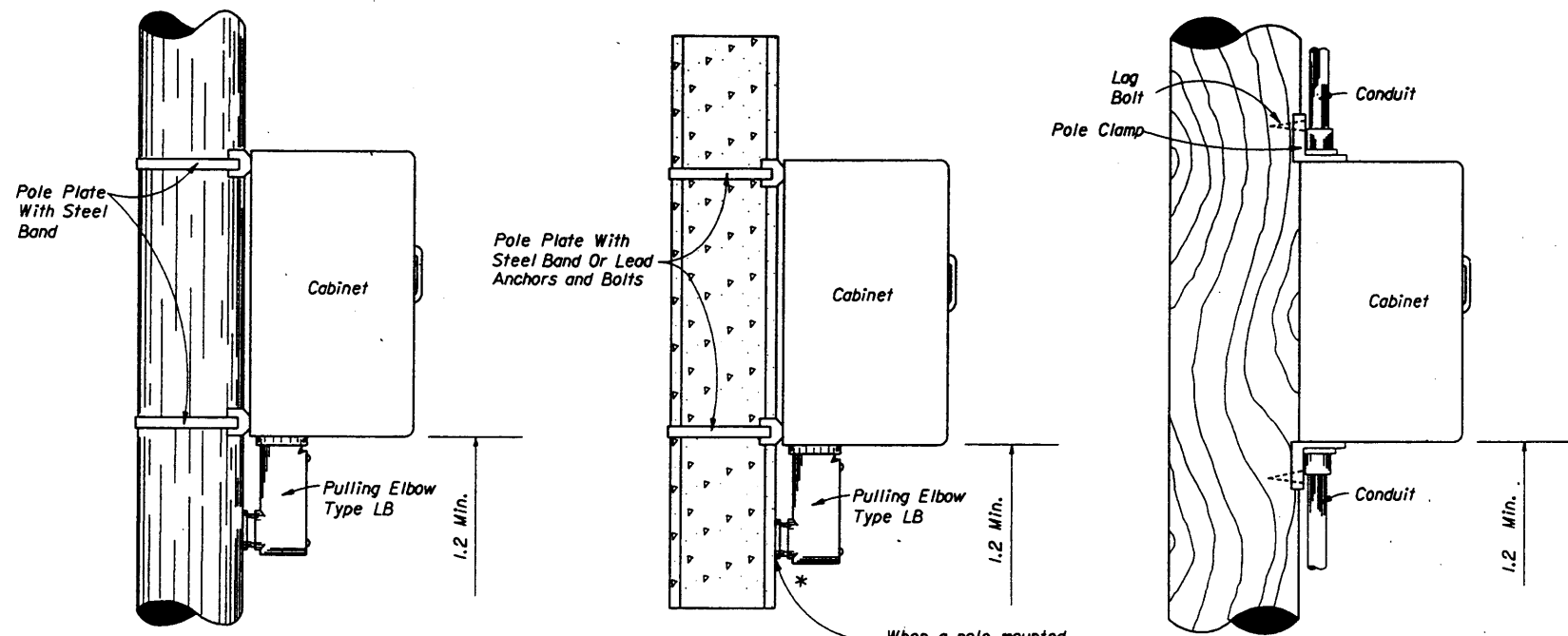


CASE II  
POLE DIAGONAL TO CURBLINE

WHITE BACKGROUND WITH BLACK LEGEND AND BORDER  
WALK PLAQUE - WHITE LEGEND ON BLACK BACKGROUND  
DONT WALK PLAQUE - ORANGE LEGEND ON BLACK BACKGROUND  
THE INTERNATIONAL SYMBOLS MAY BE USED FOR WALK AND DONT WALK.

Note: 1. See Index 17355 for sign details.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
PEDESTRIAN DETECTOR ASSEMBLY INSTALLATION DETAILS				
Names	Dates	Approved By		
Designed By		 State Traffic Plans Engineer		
Drawn By				
Checked By		Revision	Sheet No.	Index No.
		94	2 of 2	17784



METAL POLE

CONCRETE POLE

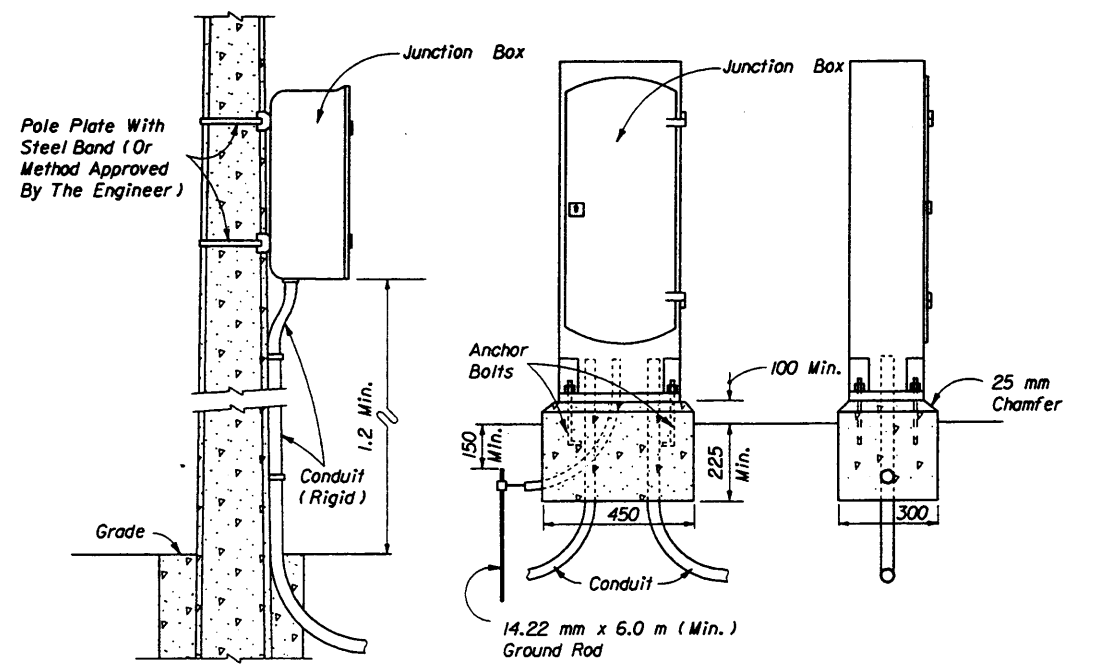
WOOD POLE

**POLE MOUNTED CABINET**

When a pole mounted cabinet is specified the 63 mm hole for the cabinet shall be field drilled.

\* If holes for cabinet mounting require relocation, original holes shall be filled in with concrete or covered with a non corrosive cover plate.

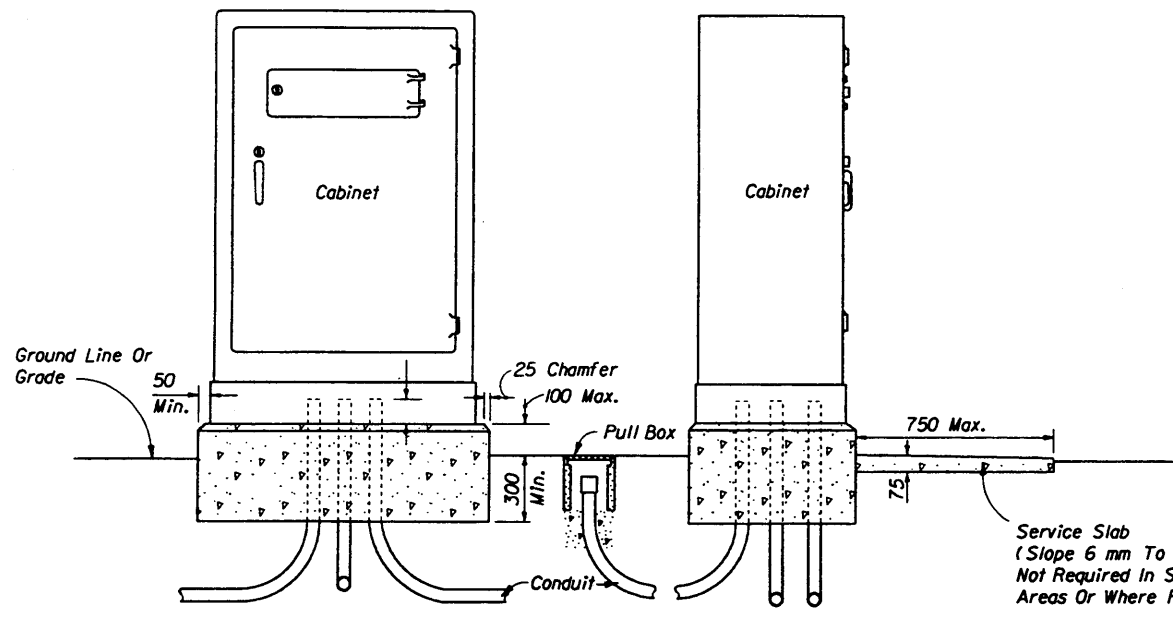
Liquid tight flexible conduit is approved for use from the electrical disconnect to the cabinet when both are installed on the same pole.



POLE MOUNTED

BASE MOUNTED

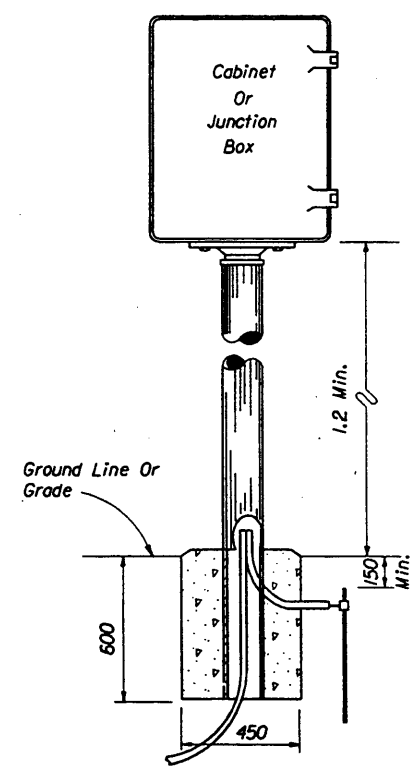
**INTERCONNECT JUNCTION BOX**



**BASE MOUNTED CABINET**

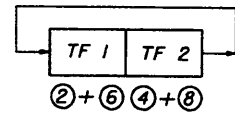
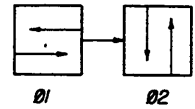
Service Slab (Slope 6 mm To 25 mm For Drainage) Not Required In Sidewalk Or Pavement Areas Or Where R/W Is Restricted.

- Notes:
1. The number, size and orientation of conduit sweep will vary according to site condition or locations. Two spare size 53 PVC conduits shall be provided in all bases. The spares shall exit in the direction of the center rear of the cabinet base, into a pull box and capped with a weather tight fitting. If obstructions prevent the spare conduit from exiting to the rear, or the rear of the cabinet is located on the R/W line, a side exit of the spare conduits will have to be approved by the project engineer. All spare conduit sweeps shall be capped with a weather proof fitting.
  2. Meet all grounding requirements of Section 620 of the Standard Specifications.

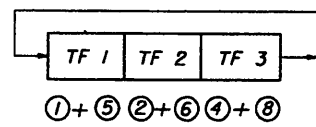
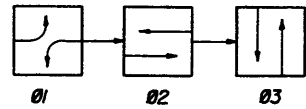


**PEDESTAL MOUNTED**

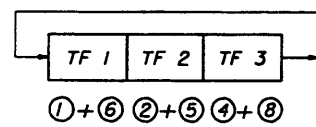
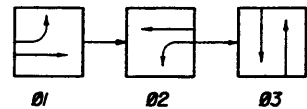
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
<b>CABINET INSTALLATION DETAILS</b>				
Designed By	Names	Dates	Approved By <i>Charles A. Scott</i> State Traffic Plans Engineer	
Drawn By			Revision	Sheet No. Index No.
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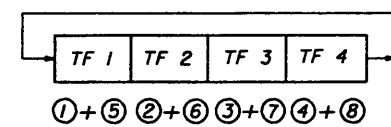
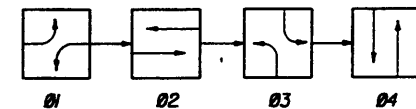
SOP 1



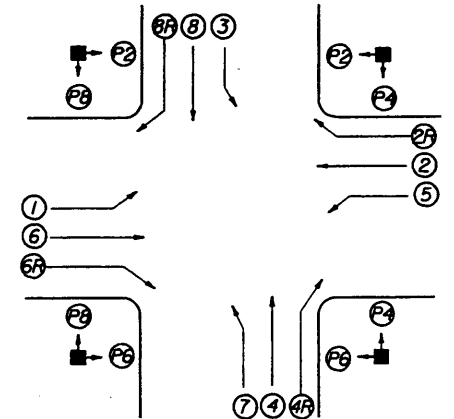
SOP 2



SOP 3

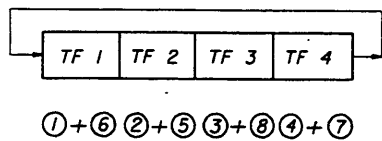
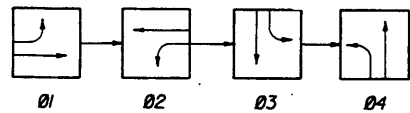


SOP 4

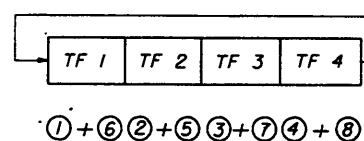
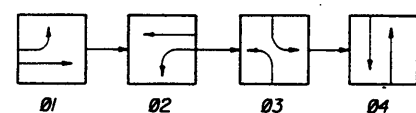


**SIGNALIZED INTERSECTION**  
 Vehicle movements & signal head number assignments are not directionally oriented but shall maintain their relative orientation about the intersection (i.e. movements 7 and 4 are always to the right of movements 1 and 6 etc.)

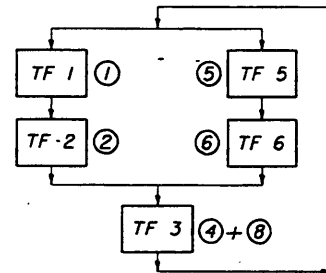
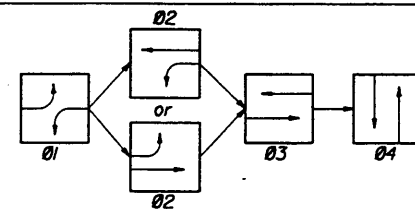
- LEGEND**
- (X) Vehicle Movement Number
  - (P) Pedestrian Movement Number
  - TF X Timing Function Number
  - 0X Phase Number
  - ← Green Arrow (Left or Right)
  - ↔ Red Arrow
  - ↔ Yellow Arrow



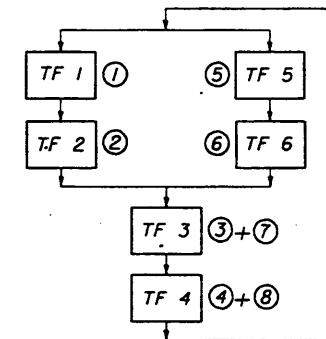
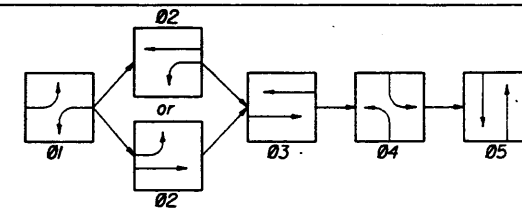
SOP 5



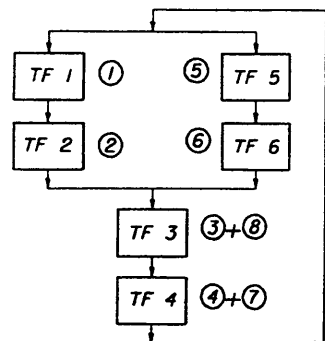
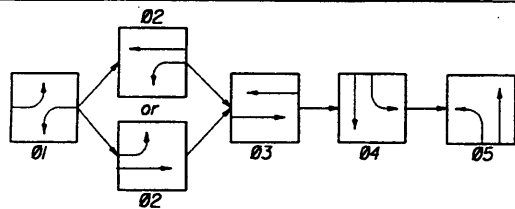
SOP 6



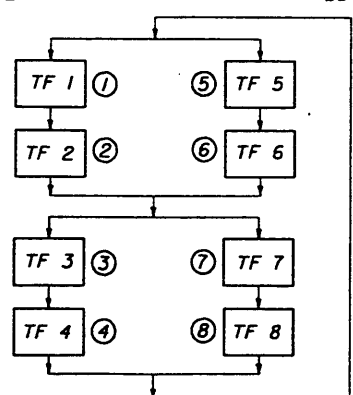
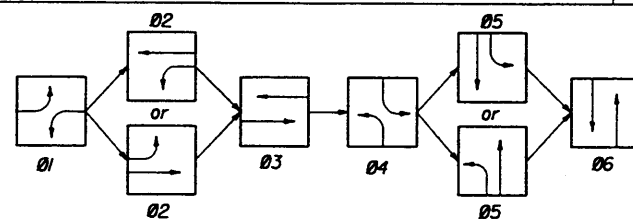
SOP 7



SOP 8



SOP 9



SOP 10

**SIGNAL CLEARANCE TABLE**  
 (Blank Indicates No Clearance Required)

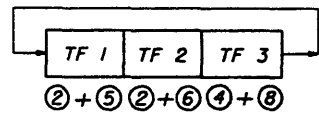
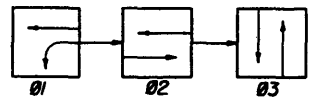
From \ To		SIGNAL INDICATIONS							
		R	R	G	G*	G*	WALK	DONT WALK	
S I G N A L  I N D I C A T I O N S	R			Y	Y	↔	Y		
	↔			Y	Y	↔	Y		
	G				Y	↔			
	↔								
	G*								
	↔								
	WALK								
	DONT WALK							Flash DONT WALK	

\* Clearance Indication When Yellow Arrow Is Used.

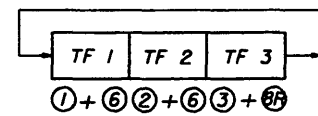
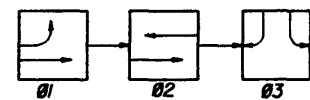
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
 TRAFFIC DESIGN

**STANDARD SIGNAL OPERATING PLANS**

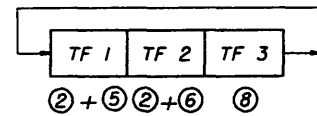
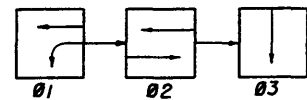
Designed By	Names	Dates	Approved By
Drawn By		1-79	<i>Charles A. Smith</i> State Traffic Plans Engineer
Checked By		94	Revision 1 of 2
			Sheet No. 17870



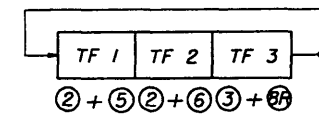
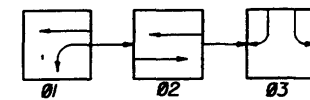
SOP 11



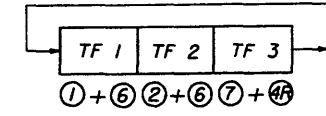
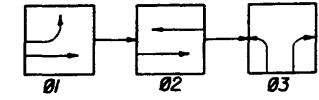
SOP 12



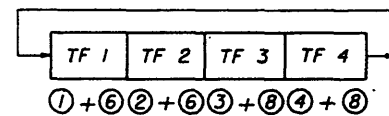
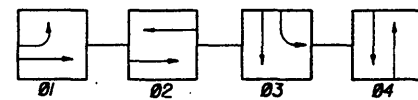
SOP 13  
(ONE-WAY STREET INTERSECTION)



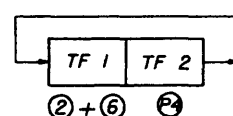
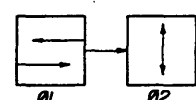
SOP 14  
(DIAMOND INTERCHANGE OPERATION)



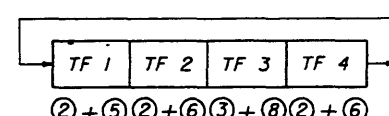
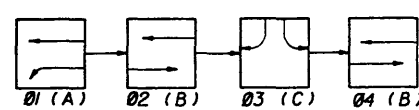
SOP 15  
(DIAMOND INTERCHANGE OPERATION)



SOP 16

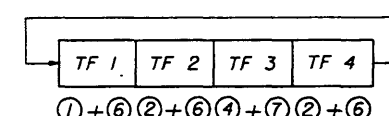
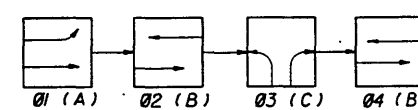


SOP 17  
(MID-BLOCK)



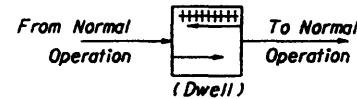
NOTE:  
Only Ø2 Or Ø4 Used, Not Both To Obtain  
ABC, Or ACB Operation.

SOP 18  
(DIAMOND INTERCHANGE OPERATIONS)

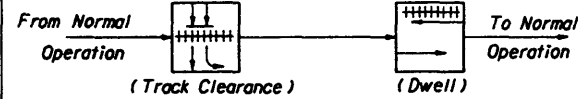


NOTE:  
Only Ø2 Or Ø4 Used, Not Both To Obtain  
ABC, Or ACB Operation.

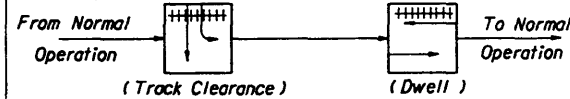
SOP 19  
(DIAMOND INTERCHANGE OPERATIONS)



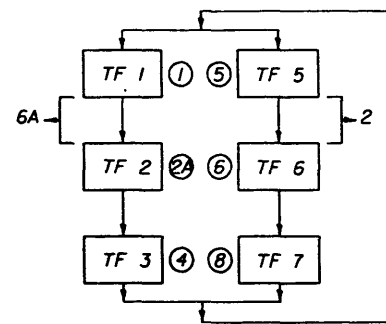
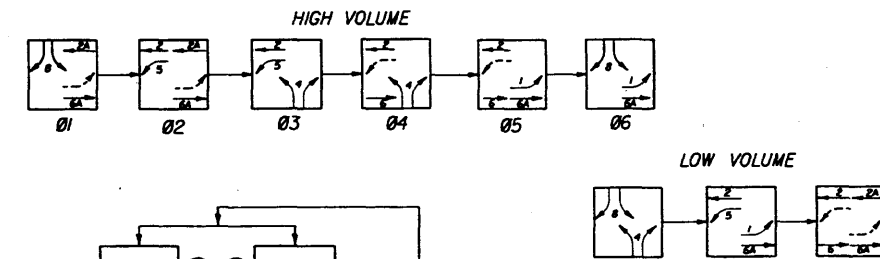
POP 1



POP 2



POP 3

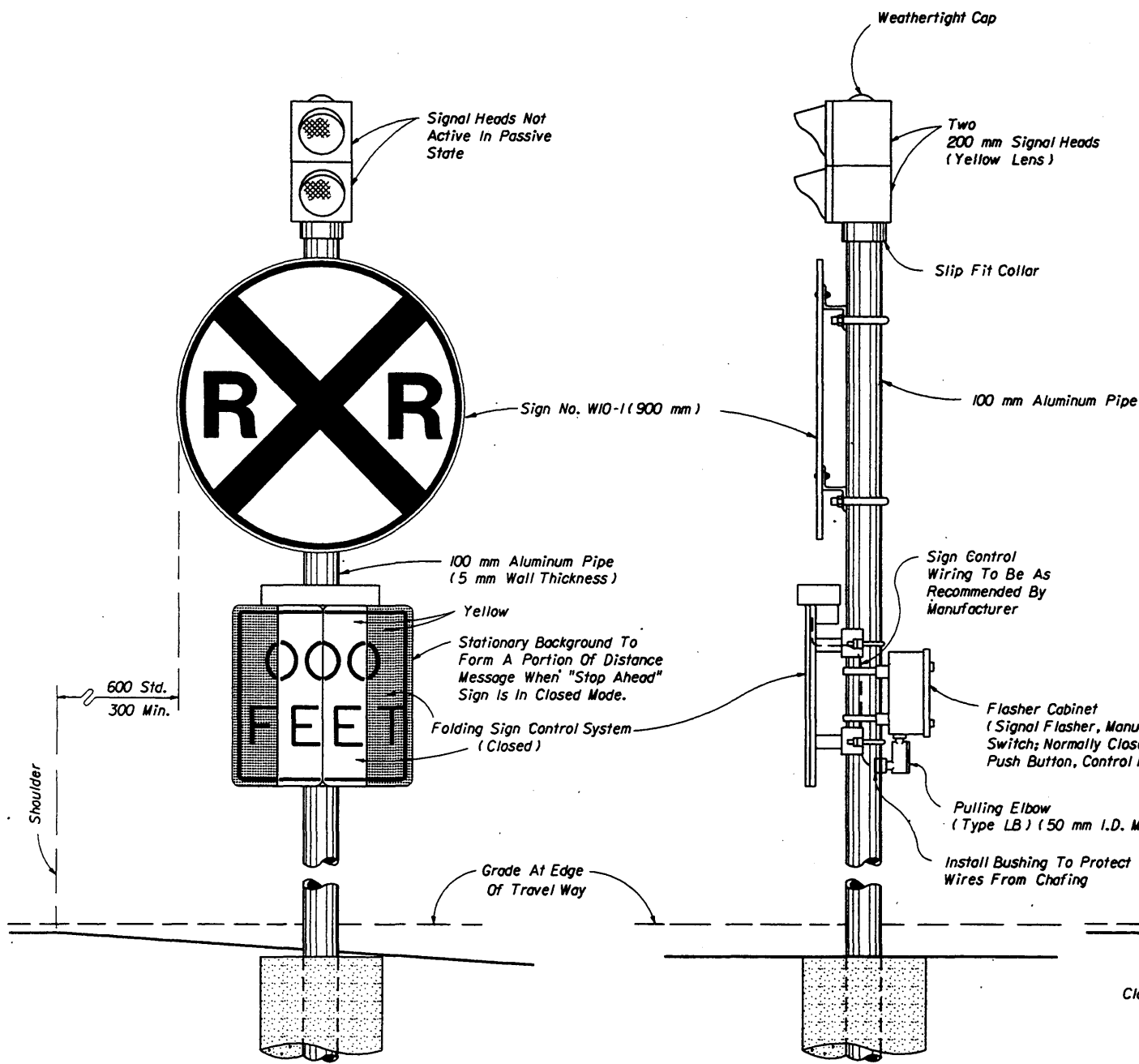


SOP 20  
(DIAMOND INTERCHANGE OPERATIONS)

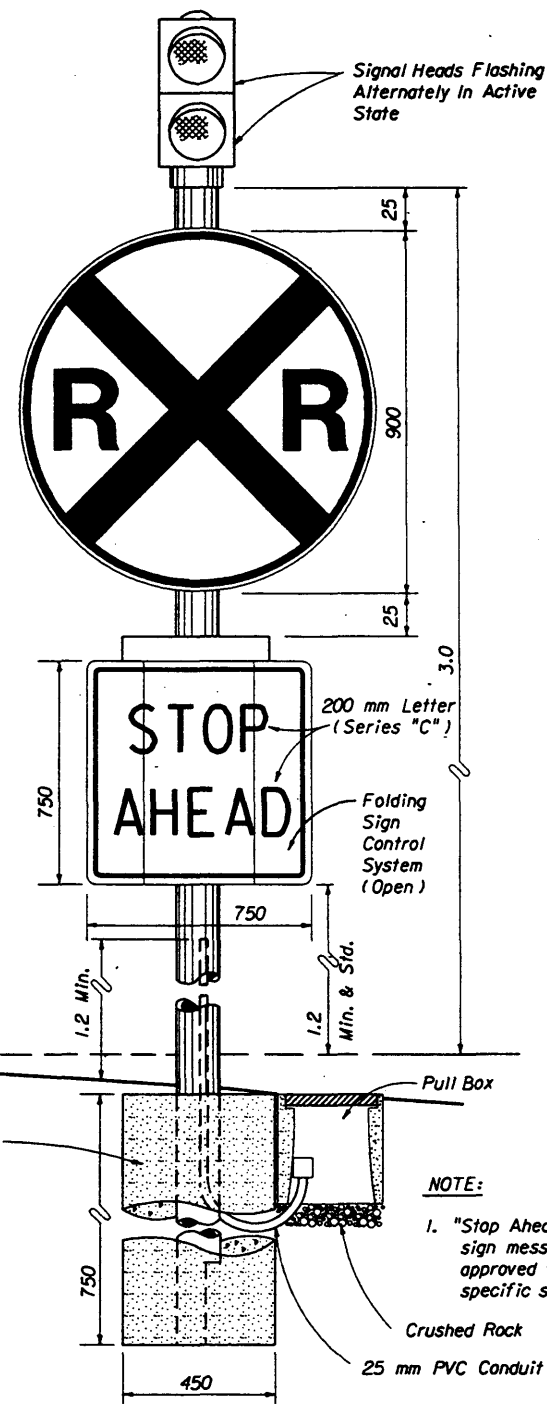
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

STANDARD SIGNAL  
OPERATING PLANS

Names	Dates	Approved By
Designed By	9-79	<i>Charles Scott</i> State Traffic Plans Engineer
Drawn By		Revision
Checked By		Sheet No. 2 of 2
		Index No. 17870



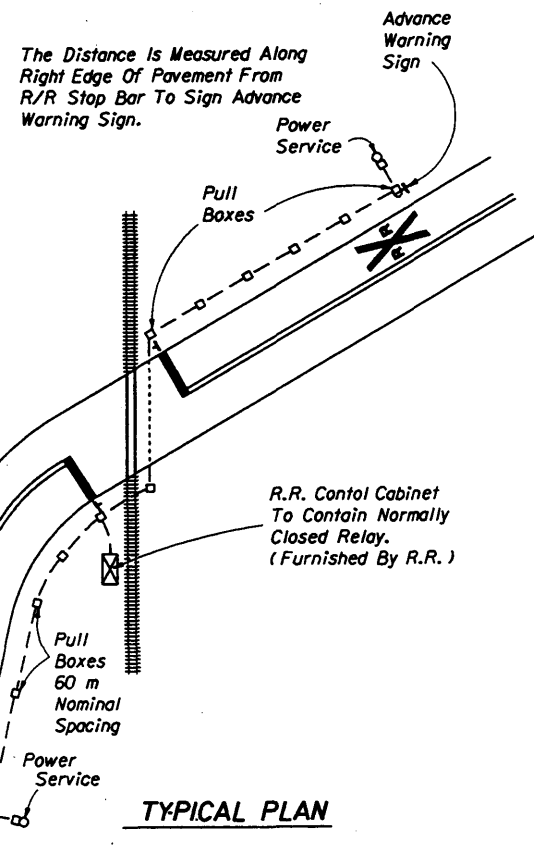
**PASSIVE STATE**  
(TRAIN CIRCUIT NOT ACTUATED)



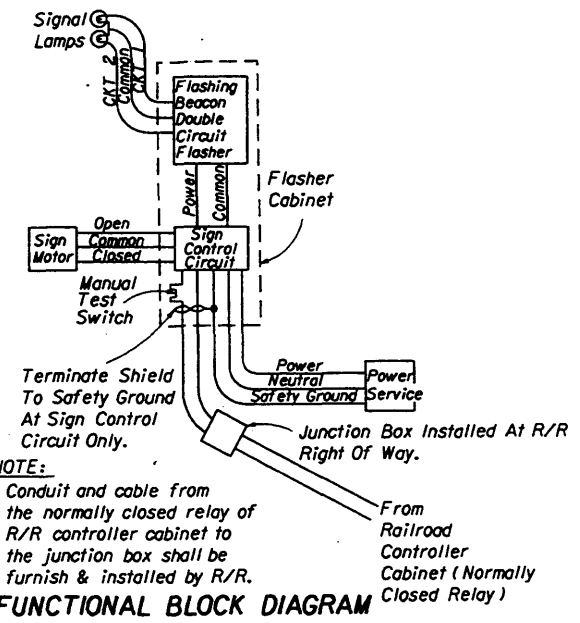
**ACTIVE STATE**  
(TRAIN CIRCUIT ACTUATED)

LOCATION OF THE ADVANCE WARNING SIGN

SPEED M.P.H.	SPEED km/h	DISTANCE meters
30	50	60.0
40	60	83.0
50	80	105.0
55	90	128.0



**TYPICAL PLAN**

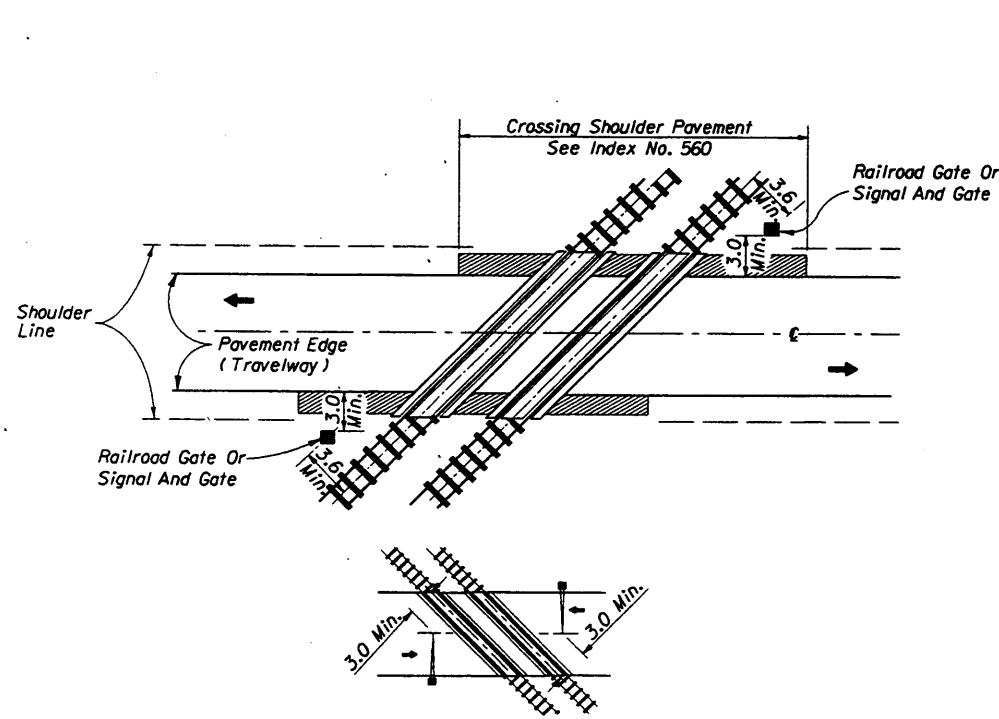


**FUNCTIONAL BLOCK DIAGRAM**

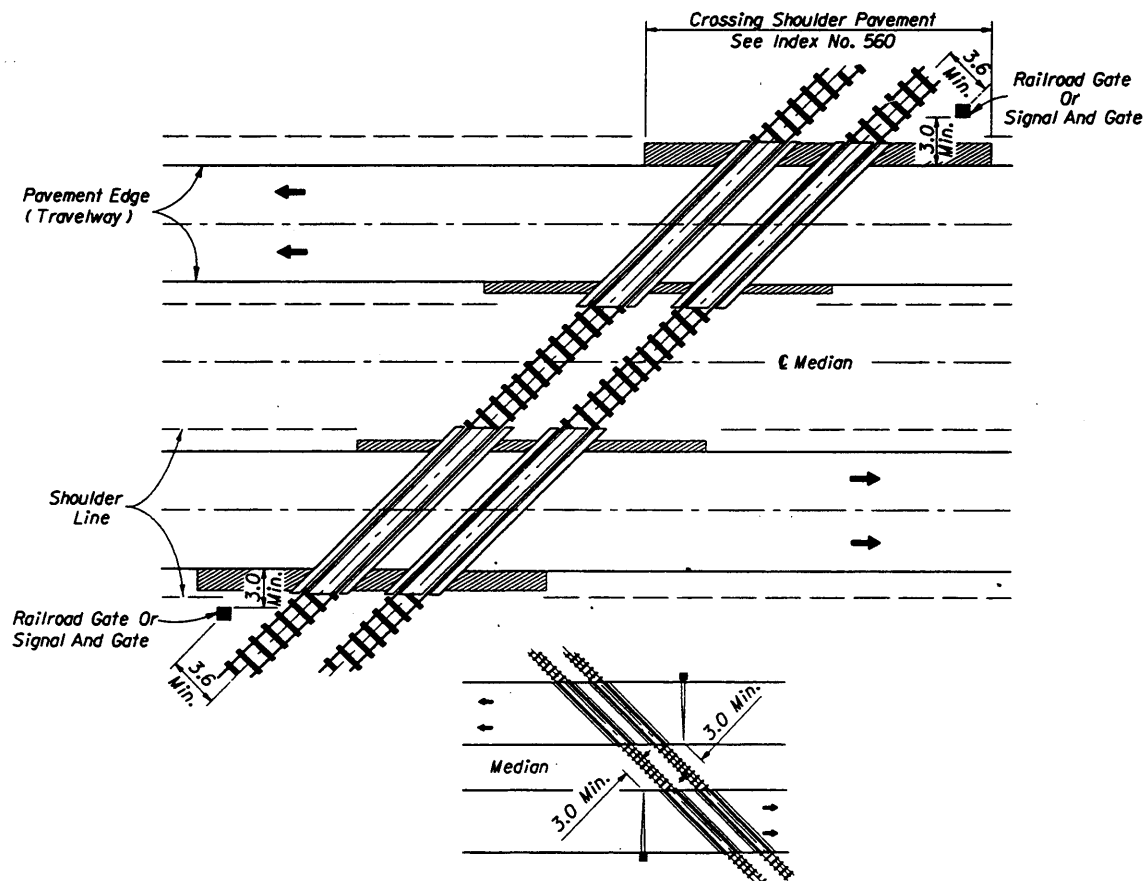
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

**ADVANCE WARNING FOR R.R. CROSSING**

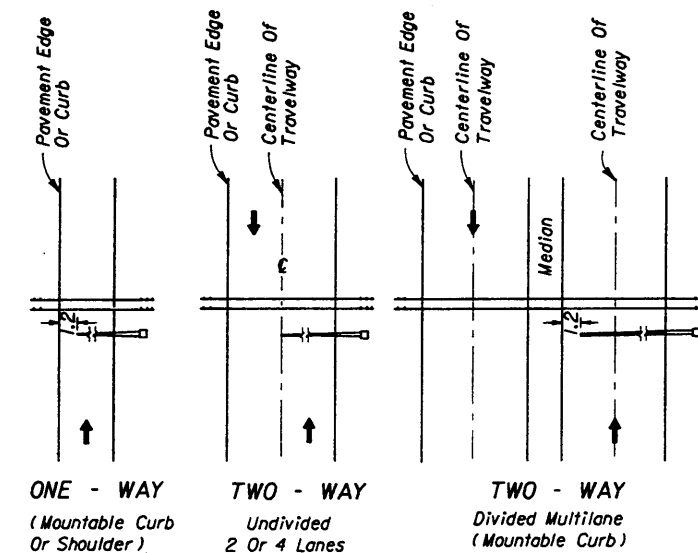
Names	Dates	Approved By		
Designed By	12-75	<i>Charles A. Scott</i> State Traffic Plans Engineer		
Drawn By				
Checked By	12-75	Revision	Sheet No.	Index No.
		96	1 of 1	17881



**SIGNAL PLACEMENT AT RAILROAD CROSSING  
( 2 - LANE DESIGN )**



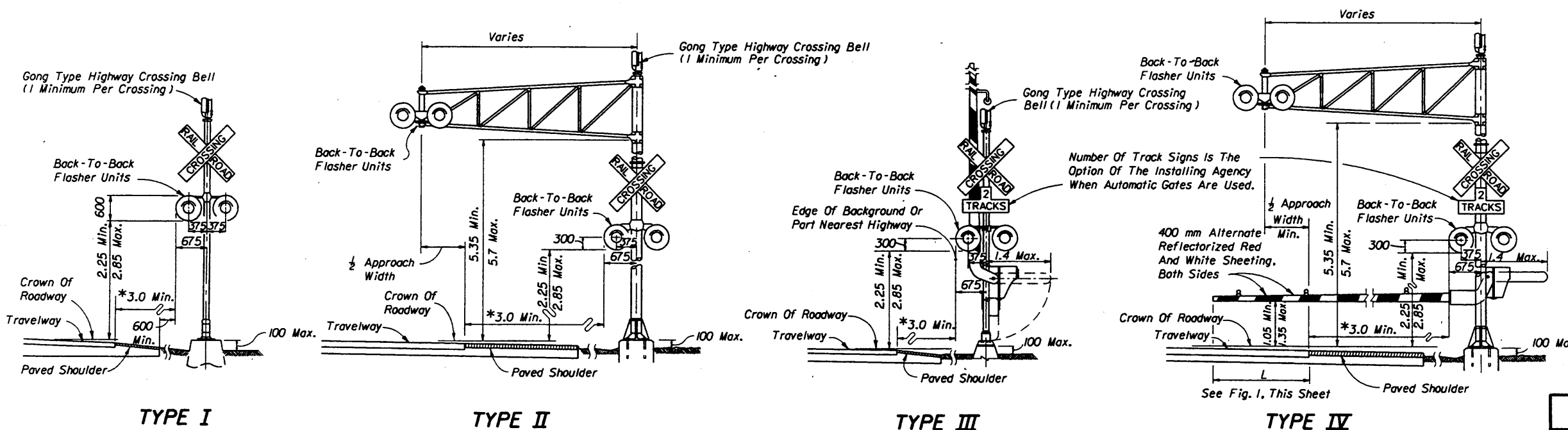
**SIGNAL PLACEMENT AT RAILROAD CROSSING  
( 4 - LANE DESIGN )**



Note :  
Arrows denote direction of travel not lane indication

**FIGURE 1**

Gate Length Requirements  
See Note 6 Sheet 3



**General Notes**

- No guardrail is proposed for signals; however, some form of impact attenuation device may be specified for certain locations.
- Advance flasher to be installed when and if called for in plans or specifications.
- Top of foundation shall be no higher than 100 mm above finished shoulder grade.
- Type of traffic control device
  - Flashing signals
  - Flashing signals with cantilever
  - Flashing signals with gate
  - Flashing signals with cantilever & gate
  - Gate
- Class of traffic control devices
  - Flashing signals - one track
  - Flashing signals - multiple tracks
  - Flashing signals and gates - one track
  - Flashing signals and gates - multiple tracks

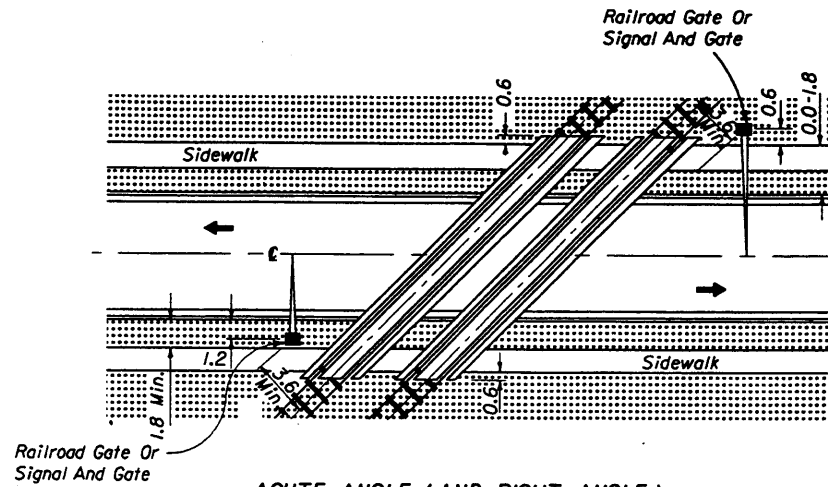
\* Desirable minimum - where field conditions dictate absolute minimum may be as per the Plans Preparation Manual.

Note :  
Two separate foundations may be required (one for signals, one for gate), depending on type of equipment used.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

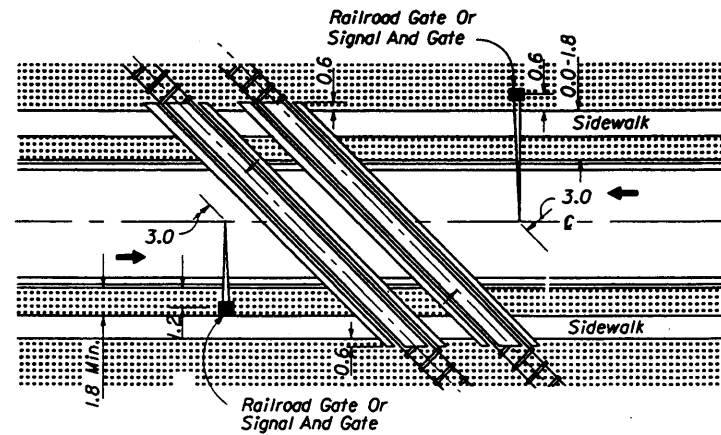
**RAILROAD GRADE CROSSING  
TRAFFIC CONTROL DEVICES**

Names	Dates	Approved By <i>Clark A. Scott</i> State Traffic Plans Engineer		
Designed By	4-76	Revision	Sheet No.	Index No.
Drawn By		00	1 of 4	17882
Checked By	4-76			



ACUTE ANGLE (AND RIGHT ANGLE)

**SIGNAL PLACEMENT AT RAILROAD CROSSING  
(2 LANES, CURB & GUTTER)**

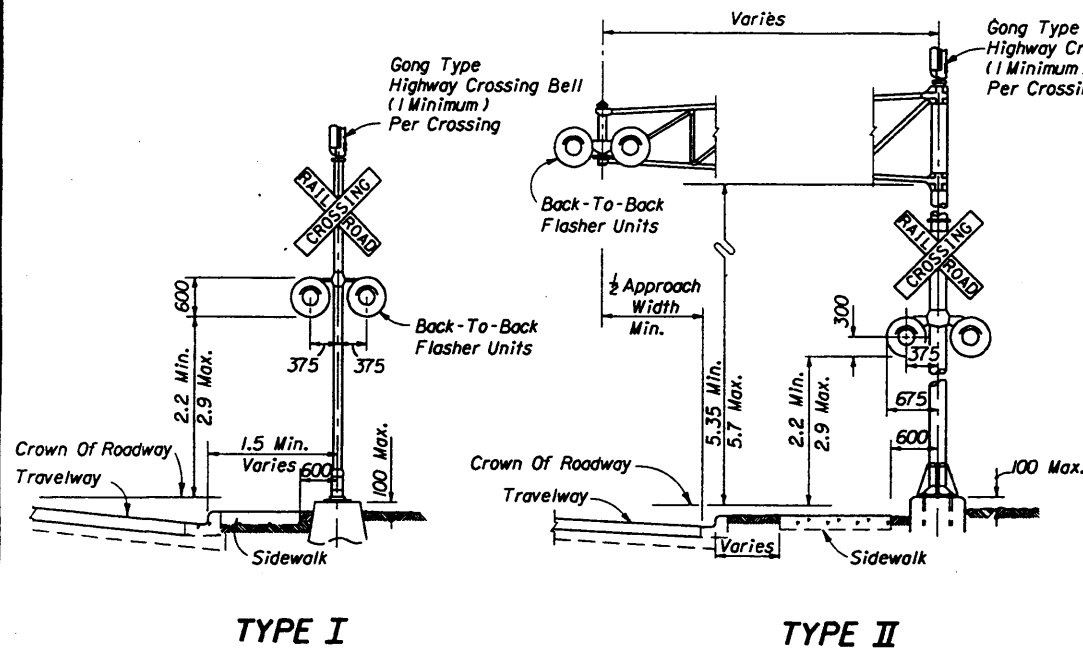


OBTUSE ANGLE

**SIGNAL PLACEMENT AT RAILROAD CROSSING  
(2 LANES, CURB & GUTTER)**

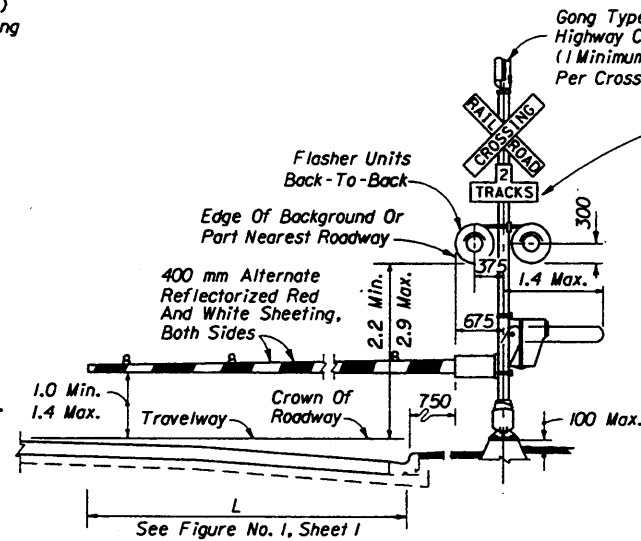
**GENERAL NOTES**

1. The location of flashing signals and stop lines shall be established based on future (or present) installation of gate with appropriate track clearances.
2. Where plans call for railroad traffic control devices to be installed in curbed medians, the minimum median width shall be 3.75 m.
3. Location of railroad traffic control device is based on the distance available between face of curb & sidewalk.  
0 m to 1.8 m - Locate device outside sidewalk.  
Over 1.8 m - Locate device between face of curb and sidewalk.
4. Stop line to be perpendicular to edge of roadway, approx. 4.5 m from nearest rail; or 2.4 m from and parallel to gate when present.

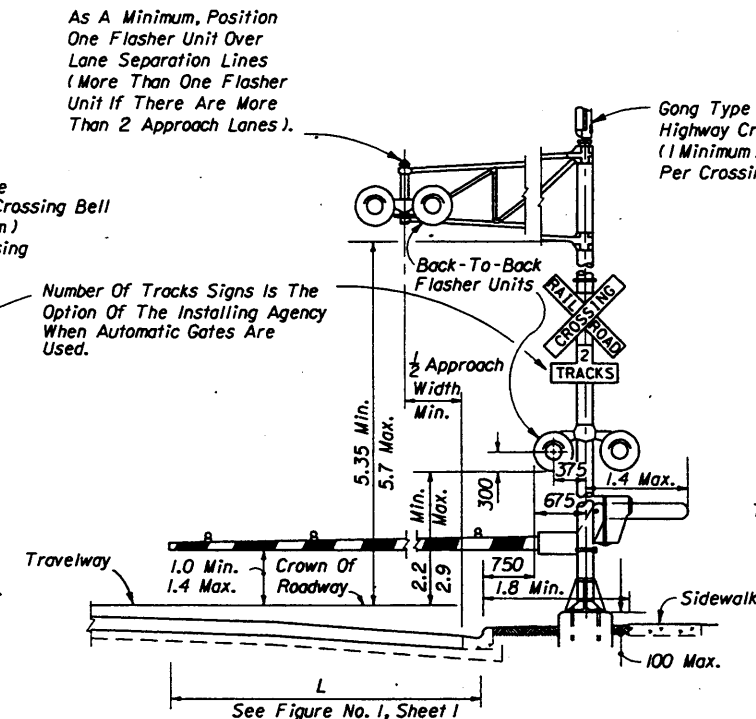


**TYPE I**

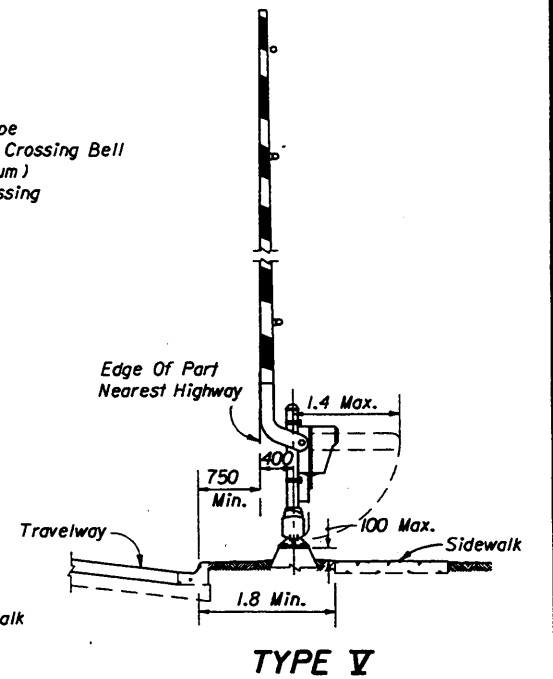
**TYPE II**



**TYPE III**



**TYPE IV**



**TYPE V**

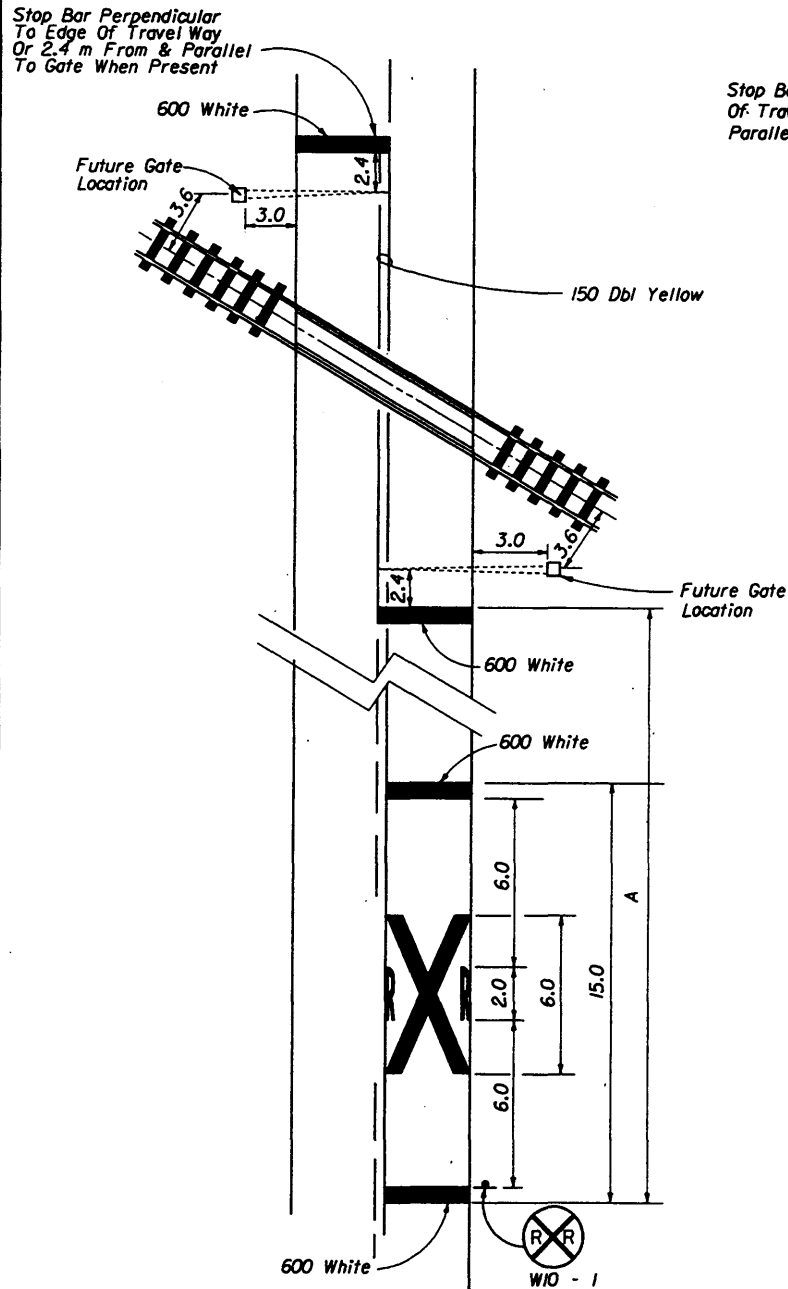
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

**RAILROAD GRADE CROSSING  
TRAFFIC CONTROL DEVICES**

Designed By	Names	Dates	Approved By
Drawn By			<i>Clark A. Scott</i>
Checked By		4-76	State Traffic Plans Engineer
			Revision
			Sheet No.
			Index No.
		4-76	00
			2 of 4
			17882

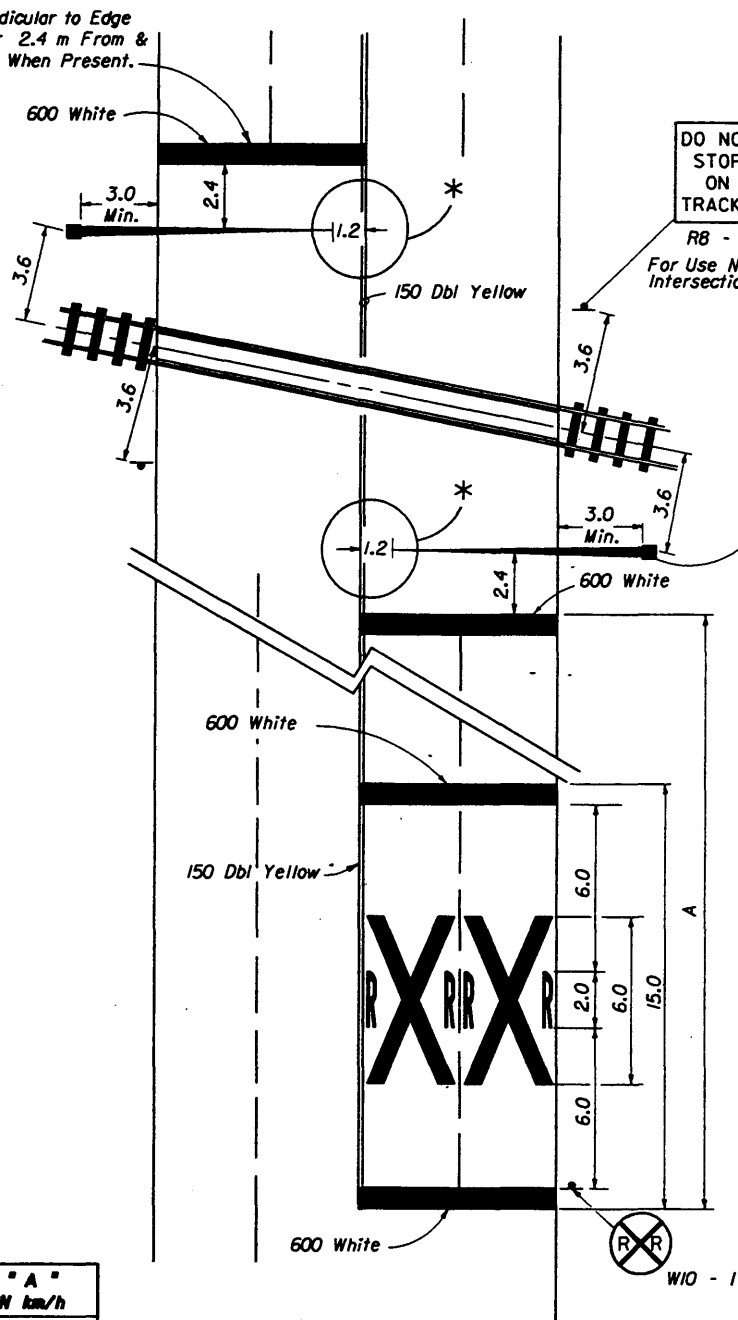


### RAILROAD CROSSING AT TWO (2) - LANE ROADWAY



Stop Bar Perpendicular To Edge Of Travel Way Or 2.4 m From & Parallel To Gate When Present.

### RAILROAD CROSSING AT MUTI-LANE ROADWAY



**DO NOT STOP ON TRACKS**  
R8 - 8  
For Use Near Signalized Intersections

Railroad Protection Device Is Not To Be Located Within 3.6 m Of The R/R Center Line.

#### NOTES:

- When computing pavement message, quantities do not include transverse lines.
- Placement of sign W10-1 in a residential or business district, where low speeds are prevalent, the W10-1 sign may be placed a minimum distance of 30.0 m from the crossing. Where street intersections occur between the R R pavement message and the tracks an additional W10-1 sign and additional pavement message should be used.
- Recommended location for sign FTP-38, 30.0 m Urban & 90.09 m Rural in advance of the crossing.
- A portion of the pavement markings symbol should be directly opposite the W10-1 sign.
- Recommended location for FTP-38 A or B signs, 30.0 m urban and 90.0 m rural. See index 17355 for sign details.
- Gate Length Requirements

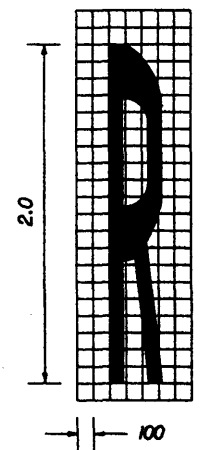
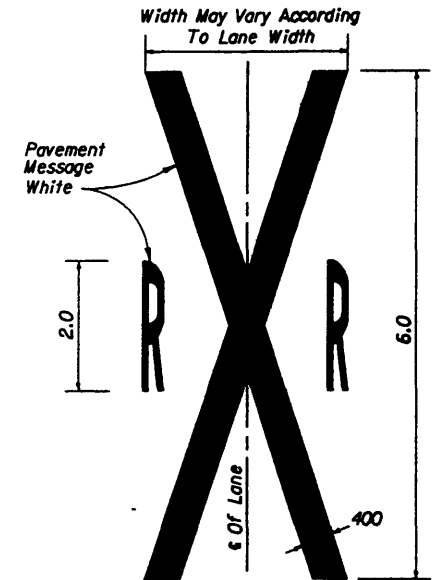
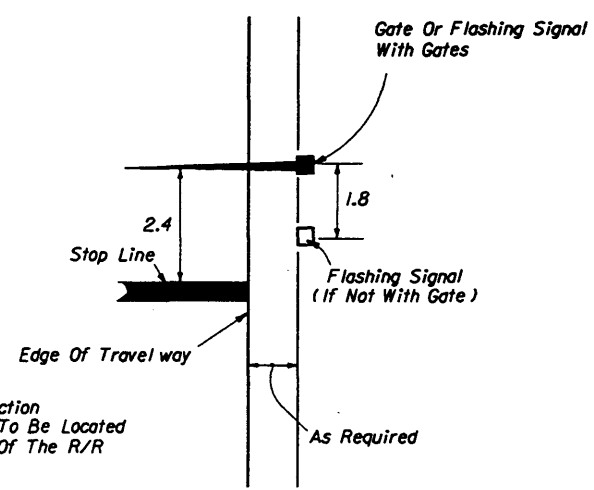
For two-way undivided sections:

The gate should extend to within 300 mm of the center line. On multilane approaches the maximum gate length may not reach to within 300 mm of the center line. For those cases, the distance from the gate to the center line shall be a maximum of 1.2 m.

For one-way or divided sections:

The gate shall be of sufficient length such that the distance from the gate tip to the inside edge of pavement is a maximum of 1.2 m.

### RELATIVE LOCATION OF CROSSING TRAFFIC CONTROL DEVICES

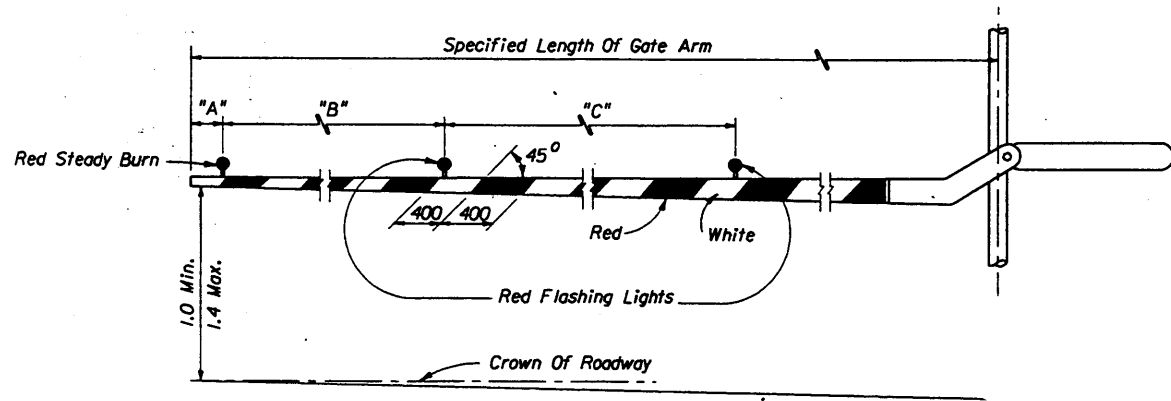


SPEED MPH	SPEED km/h	"A" IN km/h
60	100	165.0
55	90	135.0
50	80	112.5
45	70	90.0
40	60	67.5
35	60	45.0
30	50	30.0
URBAN		15.0 MIN.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
TRAFFIC DESIGN

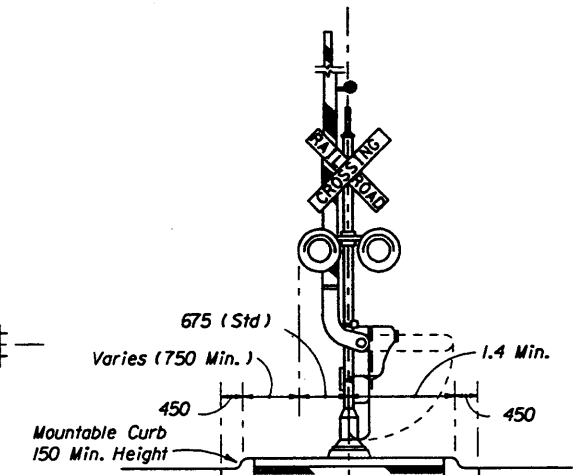
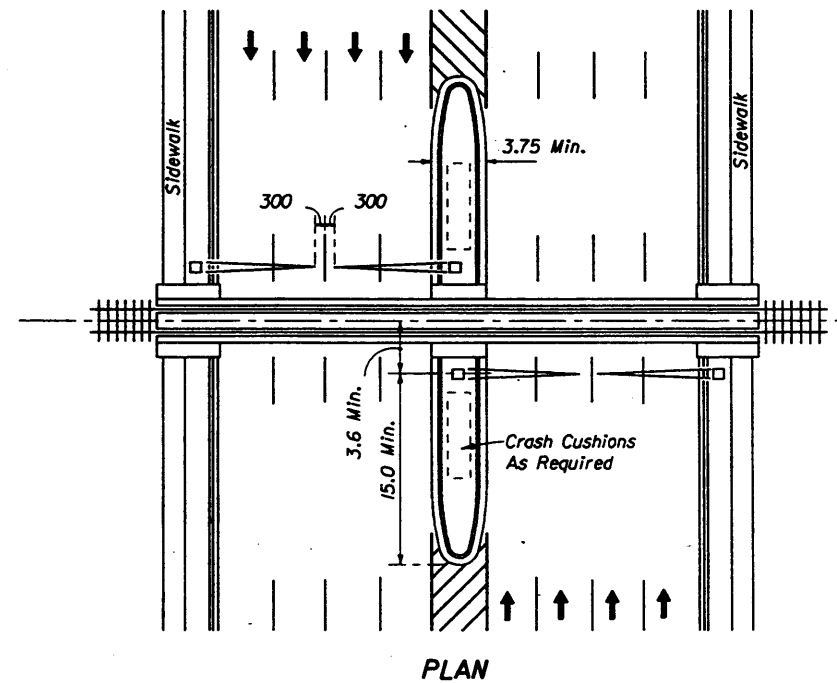
### RAILROAD GRADE CROSSING TRAFFIC CONTROL DEVICES

Names	Dates	Approved By	
Designed By	10-77	<i>Clark A. Smith</i>	State Traffic Plans Engineer
Drawn By		Revision	Sheet No. Index No.
Checked By		94	3 of 4 17882



**RAILROAD GATE ARM LIGHT SPACING**

Specified Length Of Gate Arm	Dimension "A"	Dimension "B"	Dimension "C"
4.2	150	900	1.5
4.5	450	900	1.5
4.8-5.39	600	900	1.5
5.4-5.99	700	1025	1.5
6.0-7.19	700	1.2	1.5
7.2-8.69	700	1.5	1.5
8.7-9.59	900	1.8	1.8
9.6-10.49	900	2.1	2.1
10.5-11.39	900	2.7	2.7
11.4 And Over	900	3.0	3.0



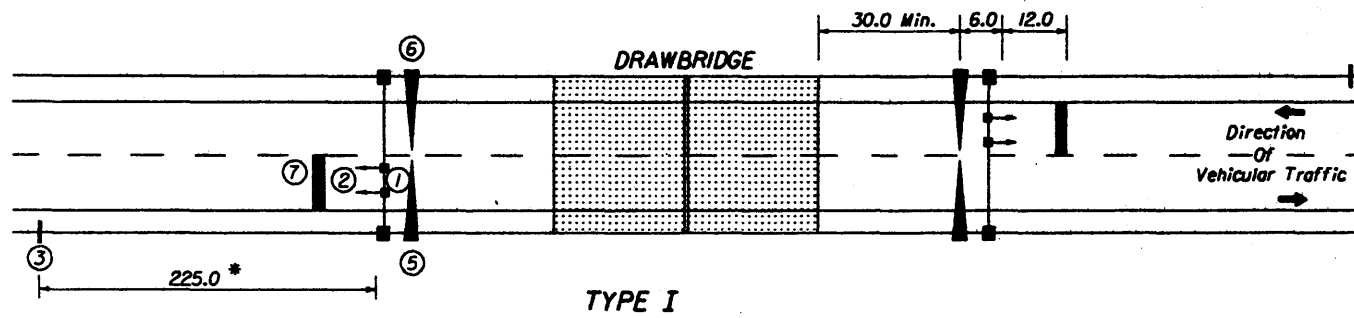
**MEDIAN SECTION AT SIGNAL GATES**

**NOTE :**  
 For additional information see the "Manual On Uniform Traffic Control Devices", Part VIII; The "Traffic Control Devices Handbook", Part VIII; and AASHTO "A Policy On Geometric Design Of Streets And Highways".

**MEDIAN SIGNAL GATES FOR  
 MULTI LANE UNDIVIDED URBAN SECTIONS**  
 (THREE OR MORE DRIVING LANES IN ONE DIRECTION, 45 mph (70 km/h) OR LESS)

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
<b>RAILROAD GRADE CROSSING TRAFFIC CONTROL DEVICES</b>				
Designed By	Names	Dates	Approved By	
Drawn By		10-85	<i>Charles O. Scott</i> State Traffic Plans Engineer	
Checked By		10-85	Revision	Sheet No.
			98	4 of 4
				Index No. 17882

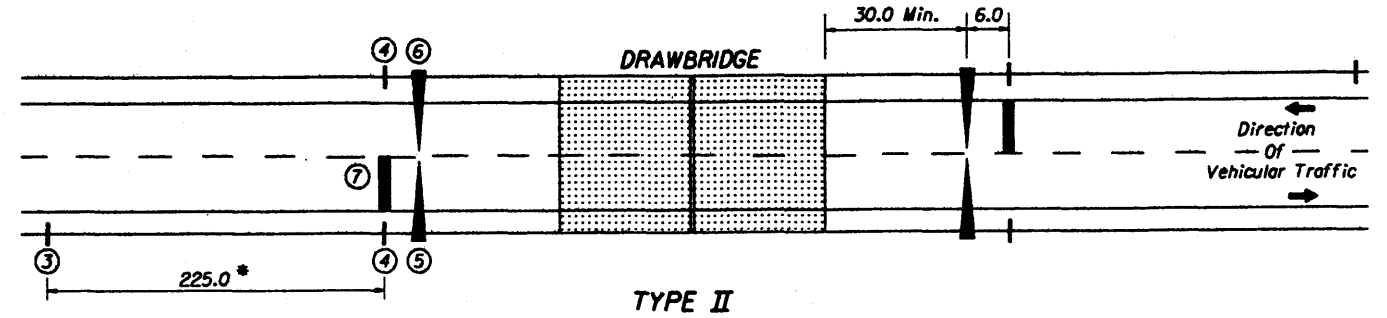
# TYPICAL BRIDGE MOUNTS



**TYPE I**

TO BE USED WHERE BRIDGE OPERATORS ARE FULL TIME OR A DAILY BASIS

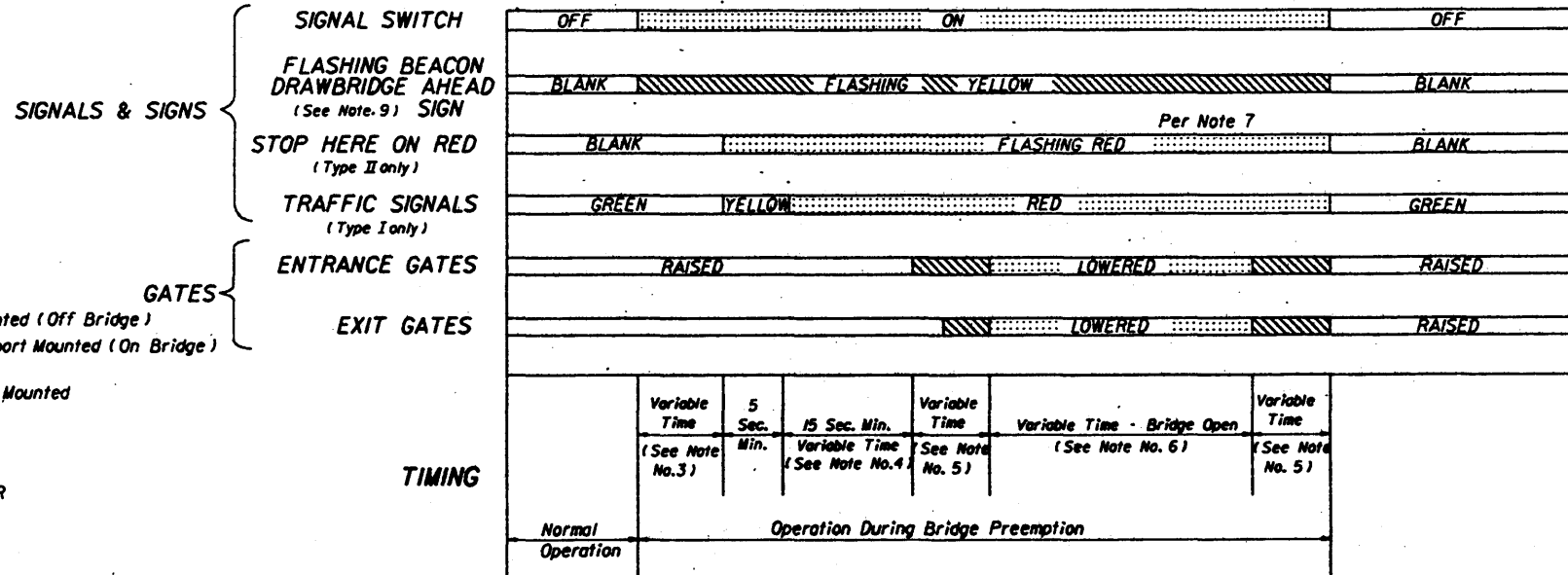
\* Field conditions may require adjustment of this standard distance.



**TYPE II**

TO BE USED WHERE TYPE I IS NOT APPLICABLE (USUALLY WHEN THE BRIDGE OPERATOR IS "ON CALL")

## SEQUENCE CHART



### LEGEND

- ① TRAFFIC SIGNALS } Mast Arm Mounted (Off Bridge)
- ② DRAWBRIDGE SIGN } Monotube Support Mounted (On Bridge)
- ③ DRAWBRIDGE AHEAD SIGN } Ground Mounted
- ④ STOP HERE ON RED SIGN } Ground Mounted
- ⑤ ENTRANCE GATE
- ⑥ EXIT GATE
- ⑦ 600 mm THERMOPLASTIC STOP BAR

### NOTES:

1. A bypass switch shall be installed to override each timing interval in case of a malfunction.
2. "STOP HERE ON RED" is omitted in Type I operation and "TRAFFIC SIGNALS" are omitted in Type II operation.
3. The time between beginning of flashing yellow on "Drawbridge Ahead" sign and the clearance of traffic signal to red, or beginning of flashing red should not be less than the travel time of a passenger car, from the sign location to the stop line, traveling at the 85 percentile approach speed.
4. Beginning of operation of drawbridge gates shall not be less than 15 seconds after steady red or 20 seconds after flashing red (Actual time may be determined by the bridge tender.)
5. Time of gate lowering and raising is dependent upon gate type.
6. Time of bridge opening is determined by the bridge tender.
7. Each gate shall be operated by a separate switch.
8. On each approach (Type II), all four red signals shall be on the same two circuit flashers, with the two top signals on one circuit, and the two bottom signals on the alternately flashing circuit.
9. A Drawbridge Ahead sign is required for both types of signal operation. However a flashing beacon shall be added to the sign when physical conditions prevent a driver traveling at the 85% approach speed from having continuous view of at least one signal indication for approximately 10 seconds.
10. Requirements on gate installation are contained in Section 4E-14 through 4E-17 of the Manual on Uniform Traffic Control Devices.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN			
<b>TRAFFIC CONTROL DEVICES FOR MOVABLE SPAN BRIDGE SIGNALS</b>			
Designed By	Names	Dates	Approved By
Drawn By		4-75	<i>Charles O. Smith</i> State Traffic Plans Engineer
Checked By		4-75	Revision
		94	Sheet No. 1 of 3
			Index No. 17890

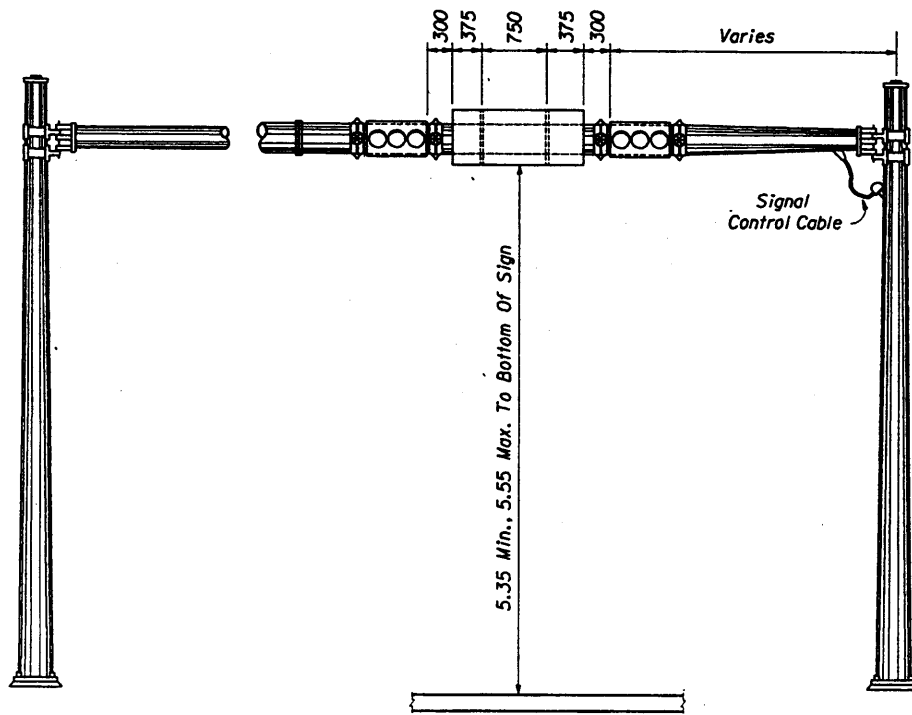
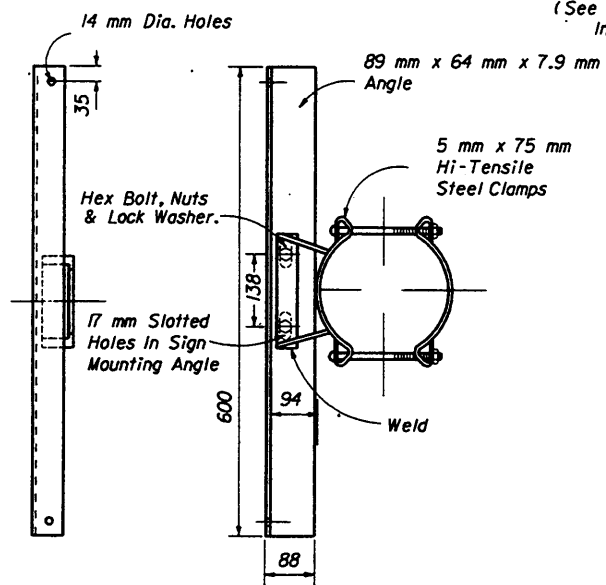


FIGURE - A

MONOTUBE SUPPORT MOUNTING



SIGN PANEL MOUNTING ASSEMBLY

FIGURE - B

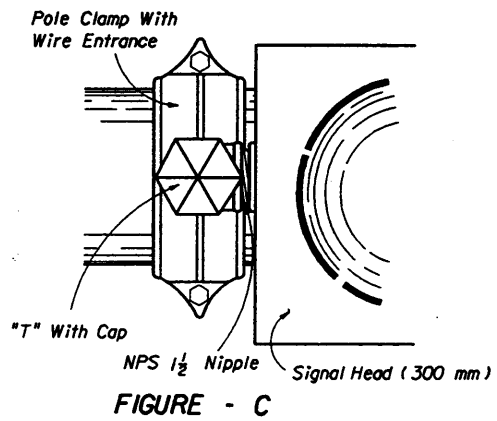


FIGURE - C

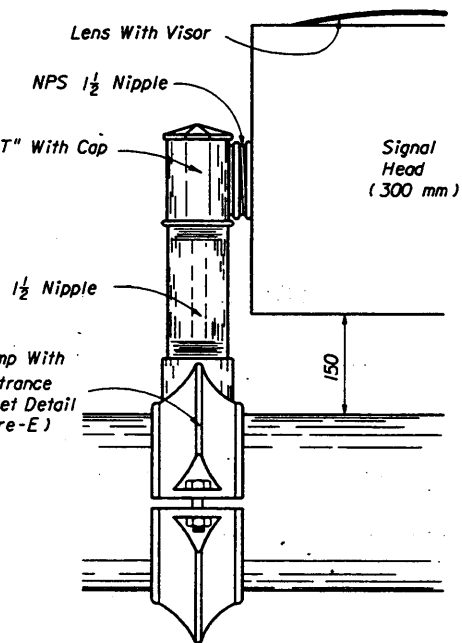


FIGURE - D

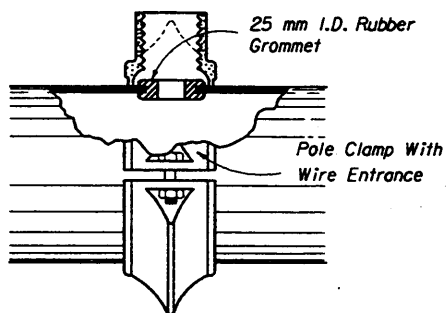


FIGURE - E

SIGNAL HEAD MOUNTING ASSEMBLY

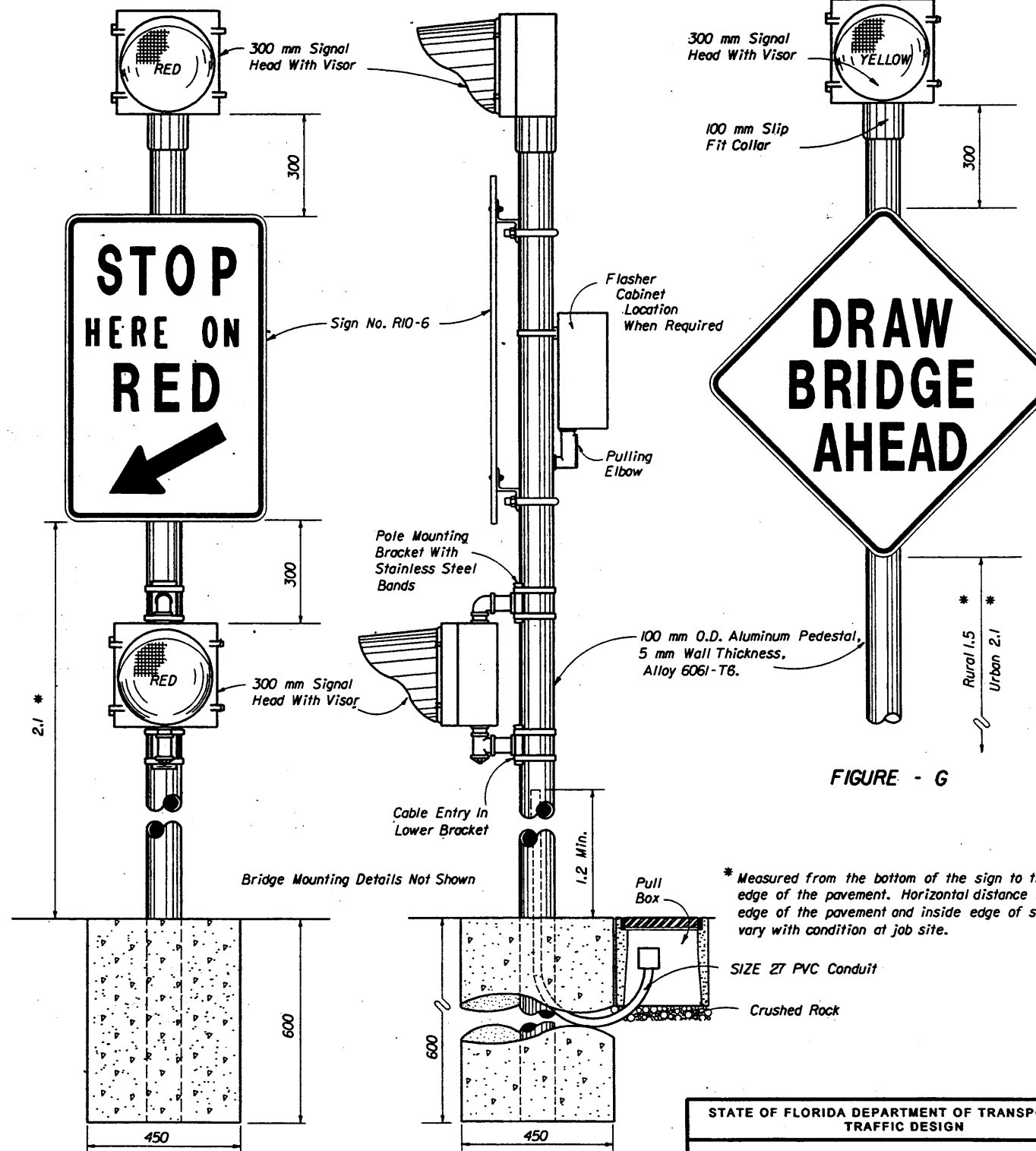


FIGURE - F

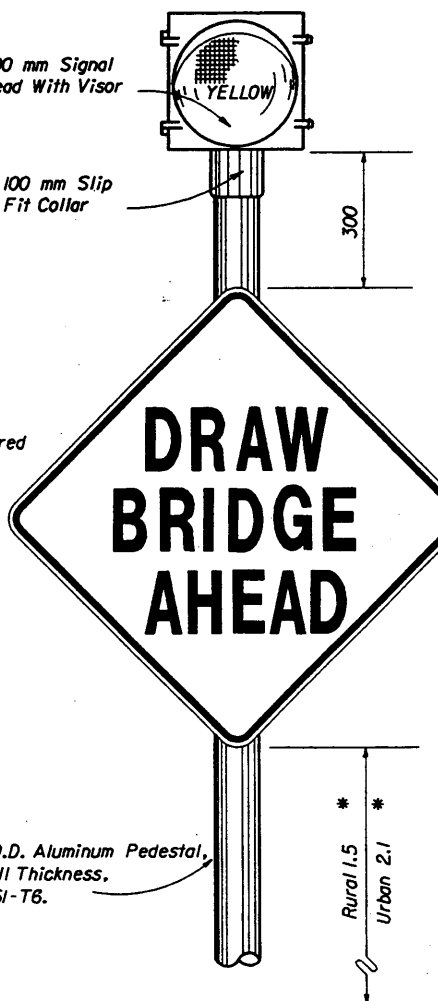


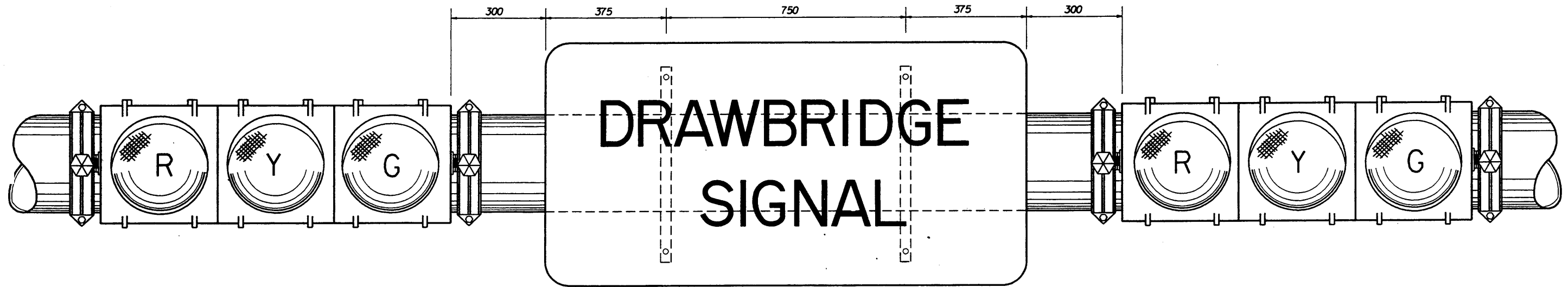
FIGURE - G

\* Measured from the bottom of the sign to the near edge of the pavement. Horizontal distance between edge of the pavement and inside edge of sign will vary with condition at job site.

SIZE 27 PVC Conduit

Crushed Rock

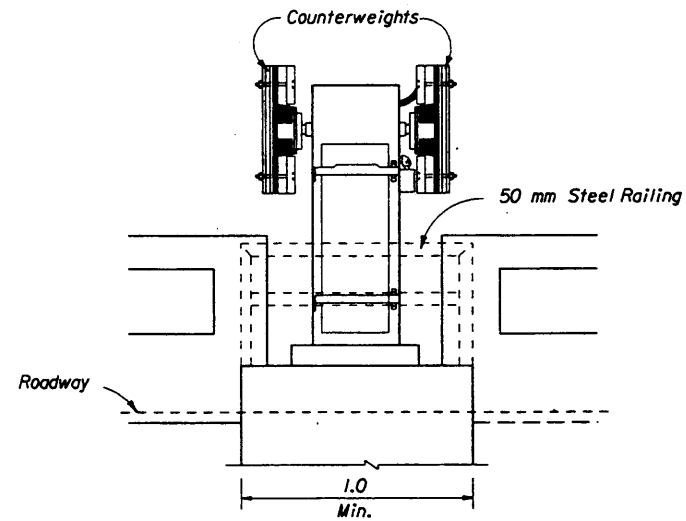
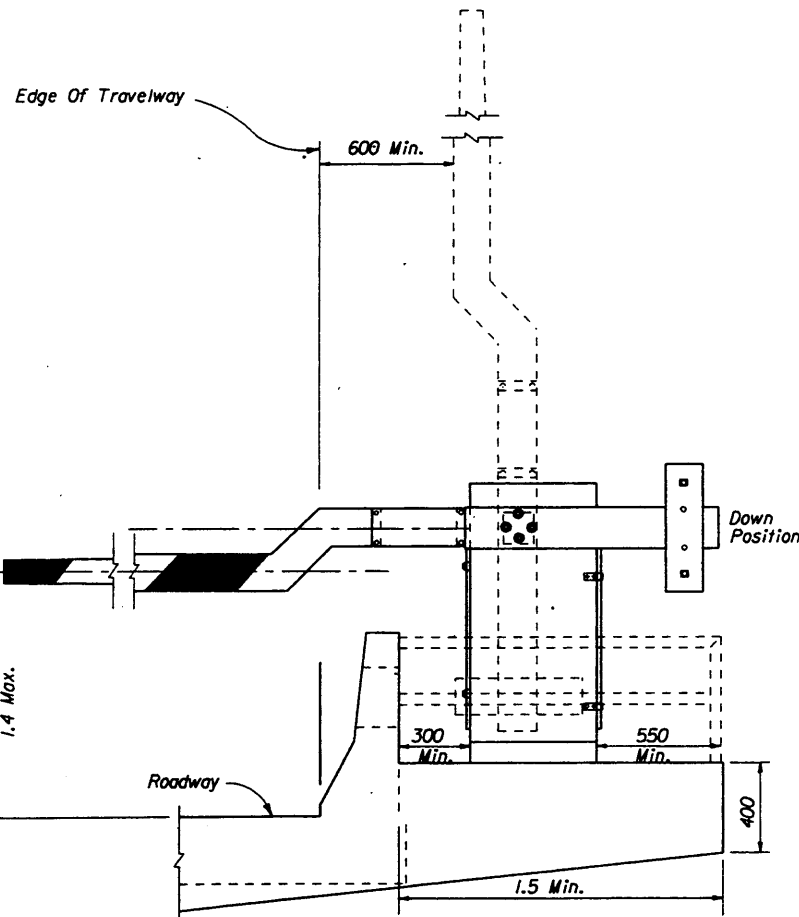
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN				
TRAFFIC CONTROL DEVICES FOR MOVABLE SPAN BRIDGE SIGNALS				
Names	Dates	Approved By		
Designed By	4-75	<i>Clark Sext</i> State Traffic Plans Engineer		
Drawn By				
Checked By	4-75	Revision	Sheet No.	Index No.
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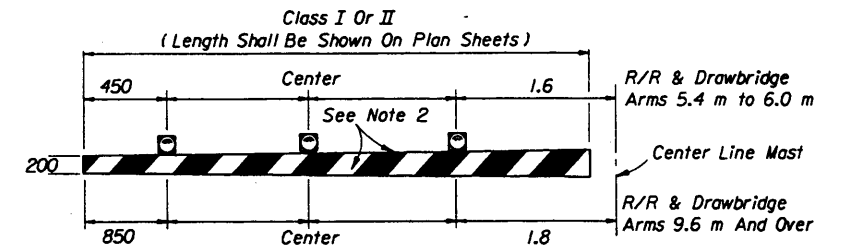
1500 x 750  
 50 mm Border-100 mm Radius  
 150 mm Series "D" Letters

BLACK OPAQUE LEGEND AND BORDER ON REFLECTORIZED YELLOW BACKGROUND

TO BE USED WITH TYPE I OPERATION, AS SHOWN  
 ON PREVIOUS SHEET  
**MONOTUBE SUPPORT MOUNTING**



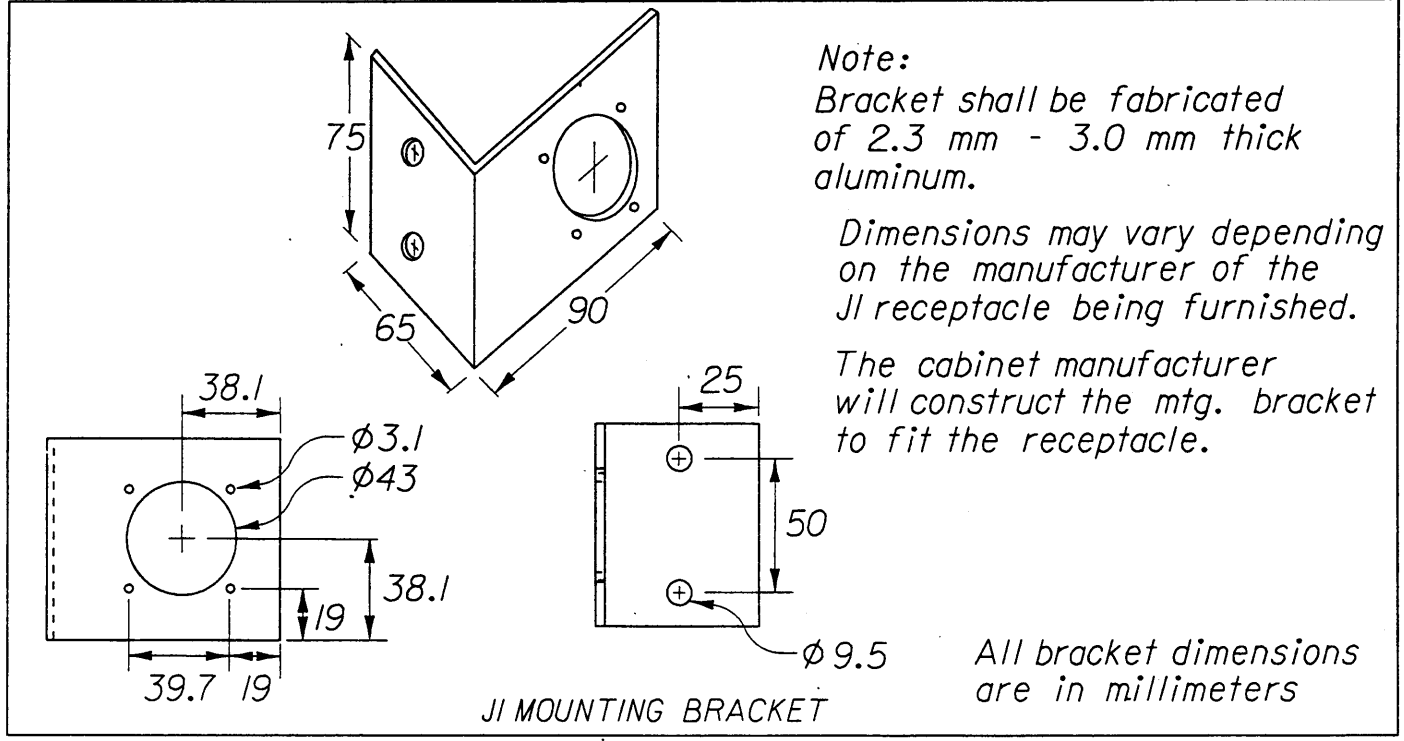
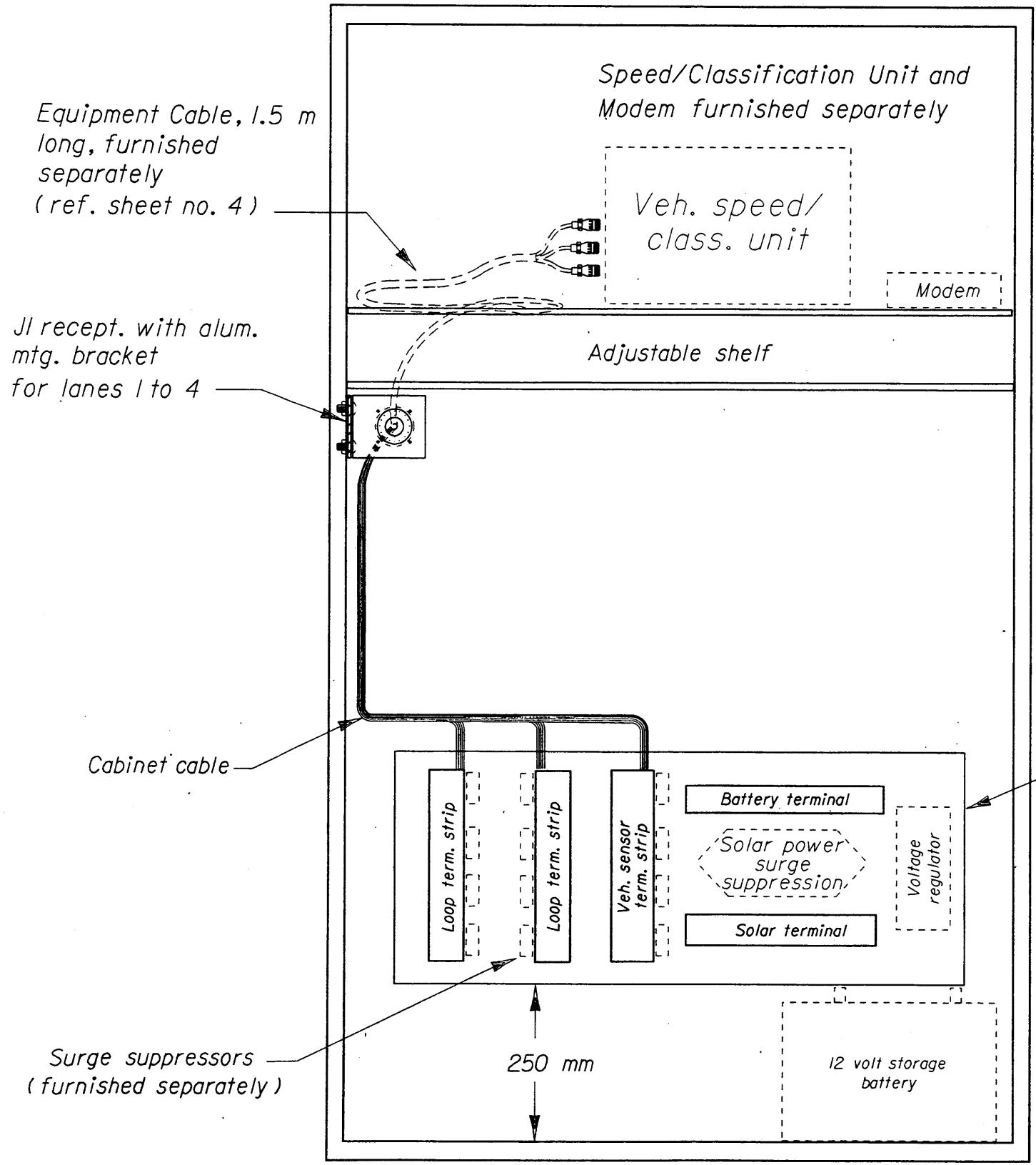
**GATE & ARM DETAIL**



- Note :
- 12 volt flashing red lights shall be mounted on gate arm and shall operate in the flashing mode only when gate arm is in the lower position or in the process of being lowered. The number of lights shall vary accordingly to length of the gate arm.
  - 400 mm alternate diagonal fully reflectorized red and white stripes.


**TYPICAL LAMP PLACEMENT**

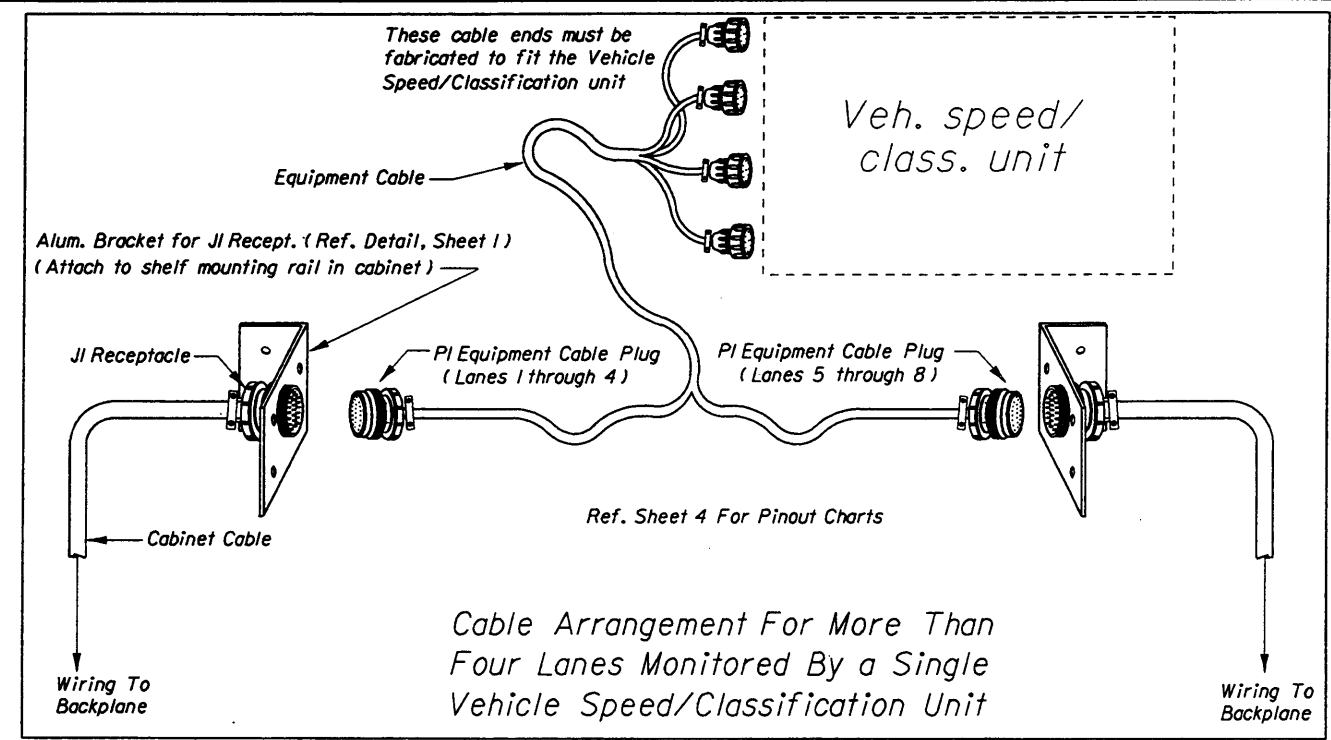
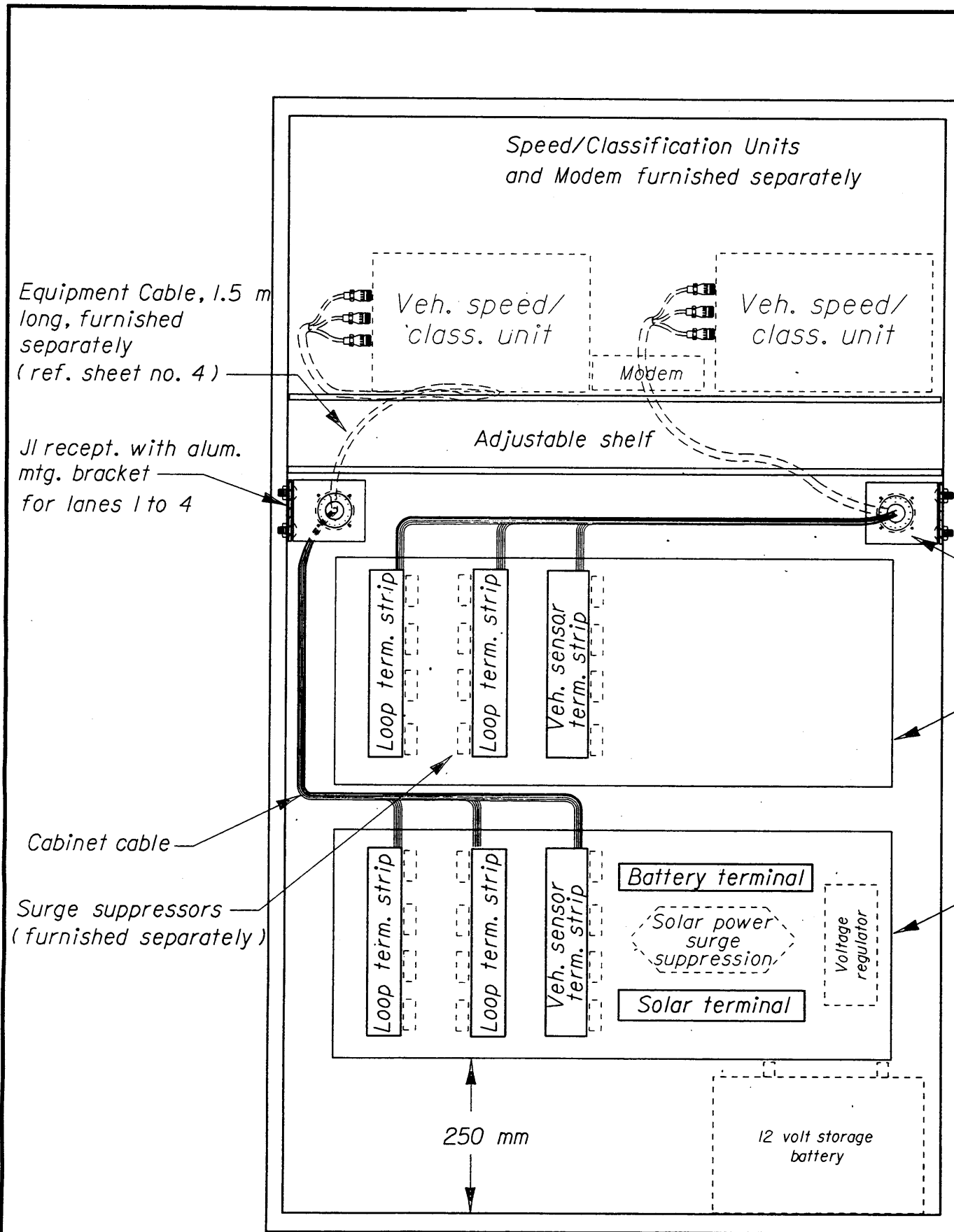
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION TRAFFIC DESIGN			
TRAFFIC CONTROL DEVICES FOR MOVABLE SPAN BRIDGE SIGNALS			
Names	Dates	Approved By	
Designed By		 State Traffic Plans Engineer	
Drawn By			
Checked By			
		Revision	Sheet No.
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			Index No.
			17890



1. Traffic monitoring site cabinet includes:
  - A. One adjustable shelf;
  - B. One backplane ass'y;
  - C. One J1 receptacle with mounting bracket;
  - D. All associated wiring and wiring harnesses.
2. Basic backplane assembly consists of:
  - A. Two inductive loop terminal strips;
  - B. One vehicle sensor terminal strip;
  - C. One battery terminal strip;
  - D. One solar panel terminal strip.
3. When piezoelectric axle sensors are used, the shields must be connected to earth ground.

CABINET LAYOUT DETAIL  
(For Up To Four Lanes)

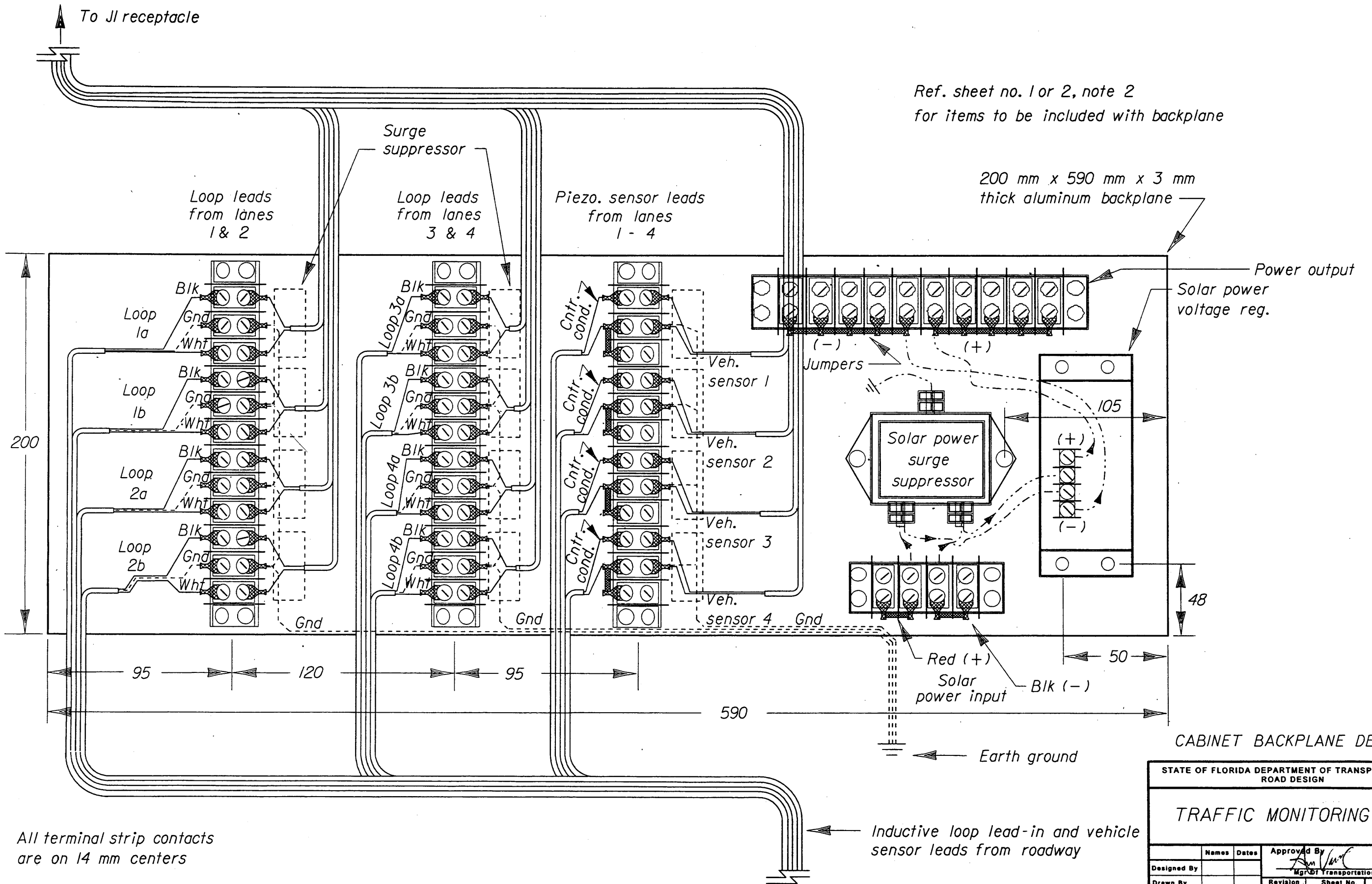
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC MONITORING SITE				
Designed By	Names	Dates	Approved By	
Drawn By			 M. G. Transportation Statistics	
Checked By			Revision	Sheet No. Index No.
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1. Traffic monitoring site cabinet includes:
  - A. One adjustable shelf;
  - B. Two backplane assemblies (equipped as shown);
  - C. Two J1 receptacles with mtg. brackets;
  - D. All associated wiring and wiring harnesses.
  
2. Basic backplane assembly consists of:
  - A. Two inductive loop terminal strips;
  - B. One vehicle sensor terminal strip;
  - C. One battery terminal strip;
  - D. One solar panel terminal strip.
  
3. When piezoelectric axle sensors are used, the shields must be connected to earth ground.

CABINET LAYOUT DETAIL  
(For More Than Four Lanes  
And Up to Eight Lanes)

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC MONITORING SITE				
Names	Dates	Approved By <i>Ann Vail</i> Mgr. of Transportation Statistics		
Designed By		Revision	Sheet No.	Index No.
Drawn By		∞	2 of 8	17900
Checked By				



Ref. sheet no. 1 or 2, note 2  
for items to be included with backplane

200 mm x 590 mm x 3 mm  
thick aluminum backplane

Power output  
Solar power  
voltage reg.

Jumpers

Solar power  
surge  
suppressor

105

48

50

Red (+)  
Solar power input  
Bk (-)

Earth ground


CABINET BACKPLANE DETAIL

All terminal strip contacts  
are on 14 mm centers

Inductive loop lead-in and vehicle  
sensor leads from roadway

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

TRAFFIC MONITORING SITE

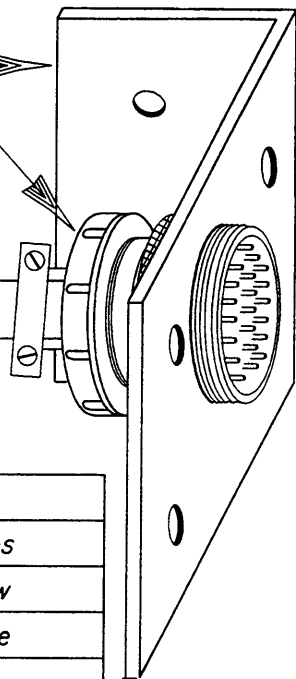
Names	Dates	Approved By		
Designed By		 Mgr of Transportation Statistics		
Drawn By				
Checked By				
		Revision	Sheet No.	Index No.
		∞	3 of 8	17900



Alum. Bracket for JI Recept.  
(Attach to shelf mounting rail  
in cabinet)

J1 Receptacle

Cabinet Cable

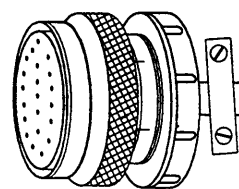


JI Receptacle Pinout	
26 Recessed Male Pins	
A	Loop 1a (5a) yellow
B	Loop 1a (5a) purple
C	Loop 1b (5b) gray
D	Loop 1b (5b) pink
E	Loop 2a (6a) brown
F	Loop 2a (6a) blue
G	Loop 2b (6b) orange
H	Loop 2b (6b) tan
J	Loop 3a (7a) white
K	Loop 3a (7a) green
L	Loop 3b (7b) red
M	Loop 3b (7b) black
N	Gnd
P	Loop 4a (8a) w/yellow
R	Loop 4a (8a) w/purple
S	Loop 4b (8b) w/gray
T	Loop 4b (8b) w/brown
U	Piezo 1(5) (+) w/blue
V	Piezo 1(5) sh w/orange
W	Piezo 2 (6) (+) w/green
X	Piezo 2 (6) sh w/red
Y	Piezo 3 (7) (+) w/black
Z	Piezo 3 (7) sh w/red/blk
a	Piezo 4 (8) (+) red/green
b	Piezo 4 (8) sh red/orange
d	Gnd red/black

Wiring To  
Backplane

PI Equipment Cable Plug

Equipment Cable



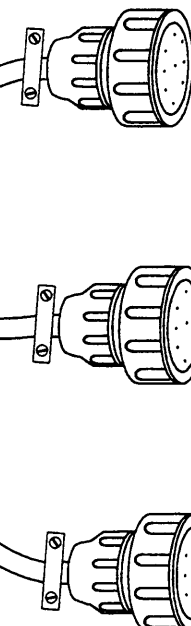
PI Equipment Cable Plug	
26 Female Pin Slots	
A	Loop 1a (5a)
B	Loop 1a (5a)
C	Loop 1b (5b)
D	Loop 1b (5b)
E	Loop 2a (6a)
F	Loop 2a (6a)
G	Loop 2b (6b)
H	Loop 2b (6b)
N	Gnd
J	Loop 3a (7a)
K	Loop 3a (7a)
L	Loop 3b (7b)
M	Loop 3b (7b)
P	Loop 4a (8a)
R	Loop 4a (8a)
S	Loop 4b (8b)
T	Loop 4b (8b)
d	Gnd
U	Piezo 1(5) (+)
V	Piezo 1 sh
W	Piezo 2 (6) (+)
X	Piezo 2 sh
Y	Piezo 3 (7) (+)
Z	Piezo 3 sh
a	Piezo 4 (8) (+)
b	Piezo 4 sh

Connects to  
electronics unit

Connects to  
electronics unit

Connects to  
electronics unit

These cable ends must be  
fabricated to fit the Vehicle  
Speed/Classification unit



**NOTE:**

The equipment cable can accommodate up to four lanes of inductive loop and vehicle sensor inputs.

(Ref. Sheet No. 1 for cabinet layout)

For more than four lanes and up to eight lanes of inputs, the following options are available:

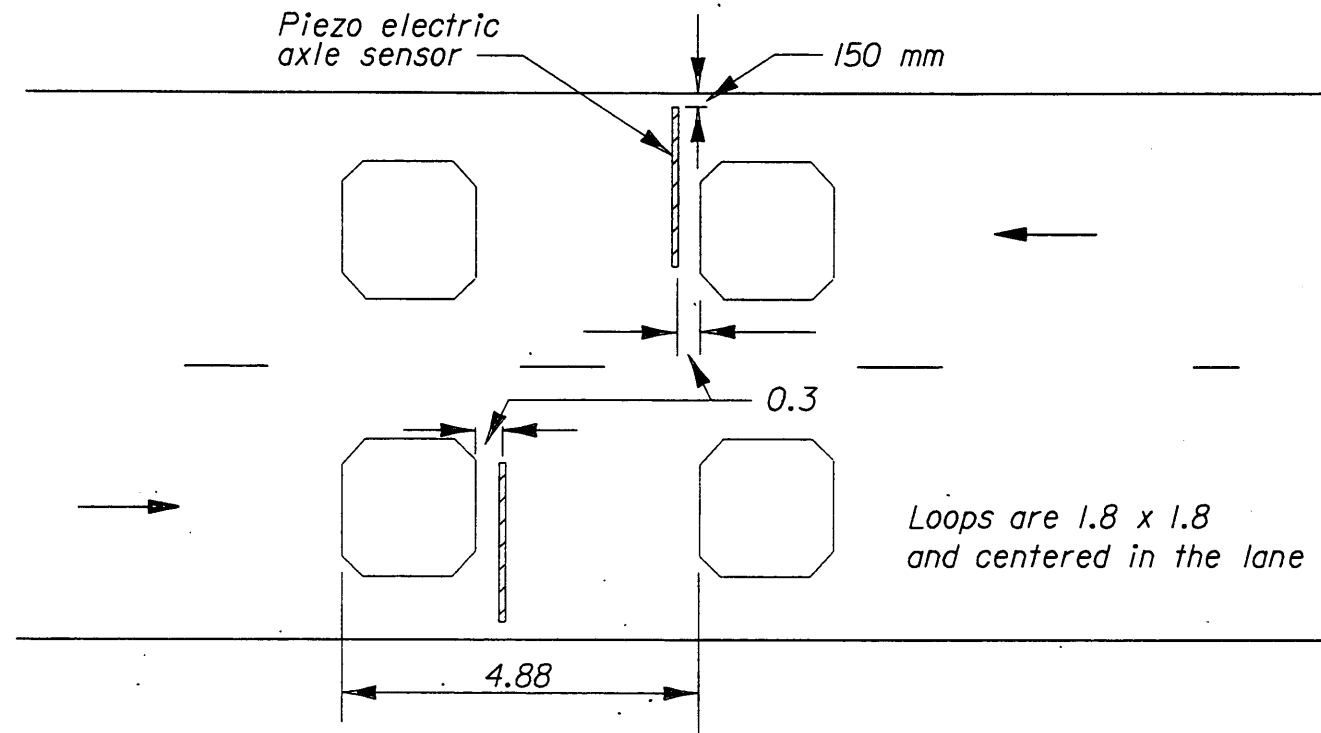
1. A second Vehicle Speed/Class. Unit and separate equipment cable connecting to a second J1 receptacle; or
2. A single Vehicle Speed/Class. Unit capable of up to eight lanes of inputs and a single equipment cable with split ends to fit two J1 receptacles. (Ref. Sheet 2 detail)

Numbers in parenthesis in the pinout chart identify lane numbers when a second backplane for lanes 5 through 8 is required.

**EQUIPMENT CABLE DETAIL**

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SPEED/CLASSIFICATION LOOP ASSEMBLY WITH AXLE SENSORS PLACEMENT DETAIL



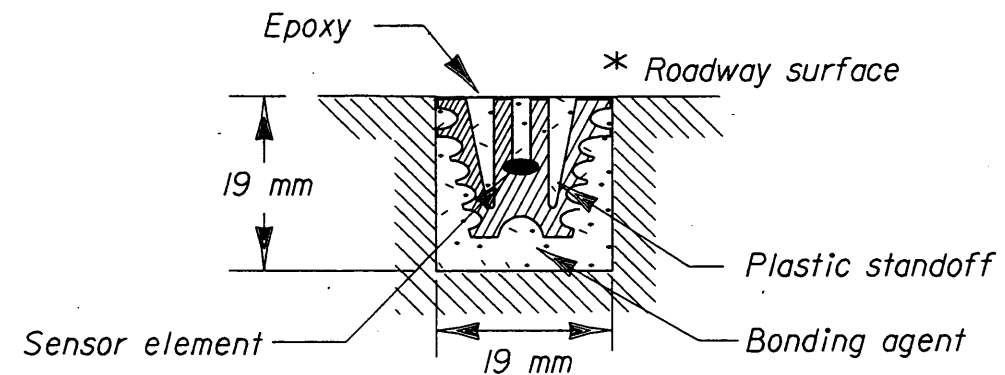
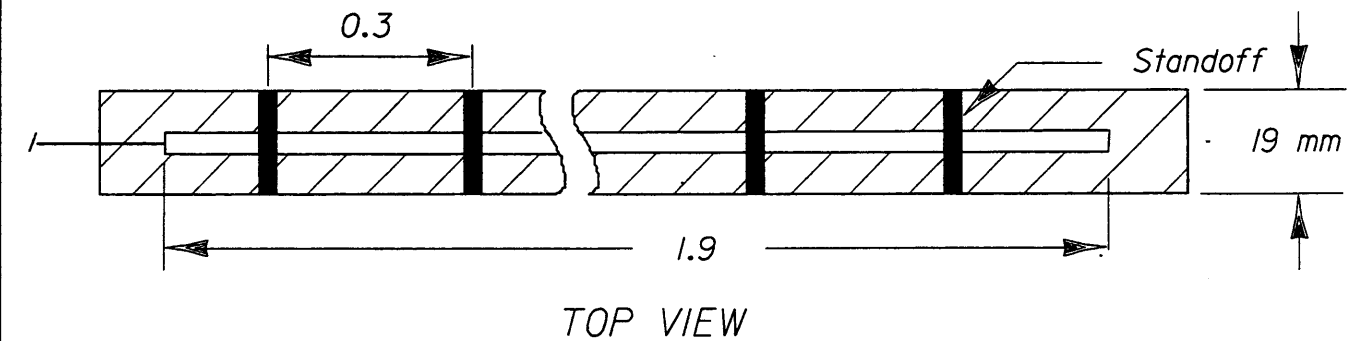
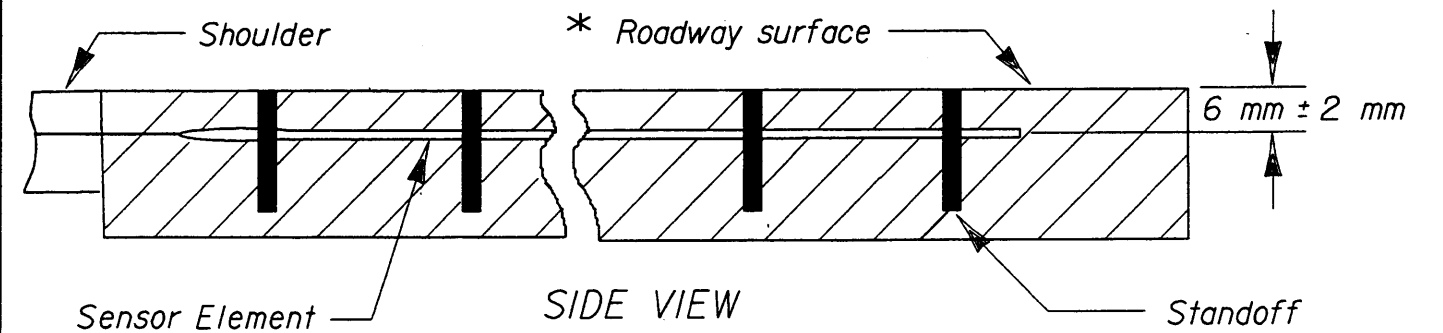
Note:

Loop slots shall be 6 mm wide (approx.) by 38 to 50 mm deep. Three turns of #12 AWG, type XHHW stranded copper wire shall be placed in the slot. Backer rod shall be used to hold the loop wire in the bottom of the slot.

Loop leads shall be twisted at the rate of 35 to 40 twists per meter. The twisted pair shall extend to the pull box with one meter of spare length coiled in the pull box.

All leads ( inductive loop & vehicle sensor ) shall be identified according to the lane numbering convention shown on sheet 7 through 9.

TYPICAL UNENCAPSULATED CLASS II VEHICLE SENSOR



\* Some installations may require axle sensors to be placed in the structural course, prior to placement of the friction course.


Note:

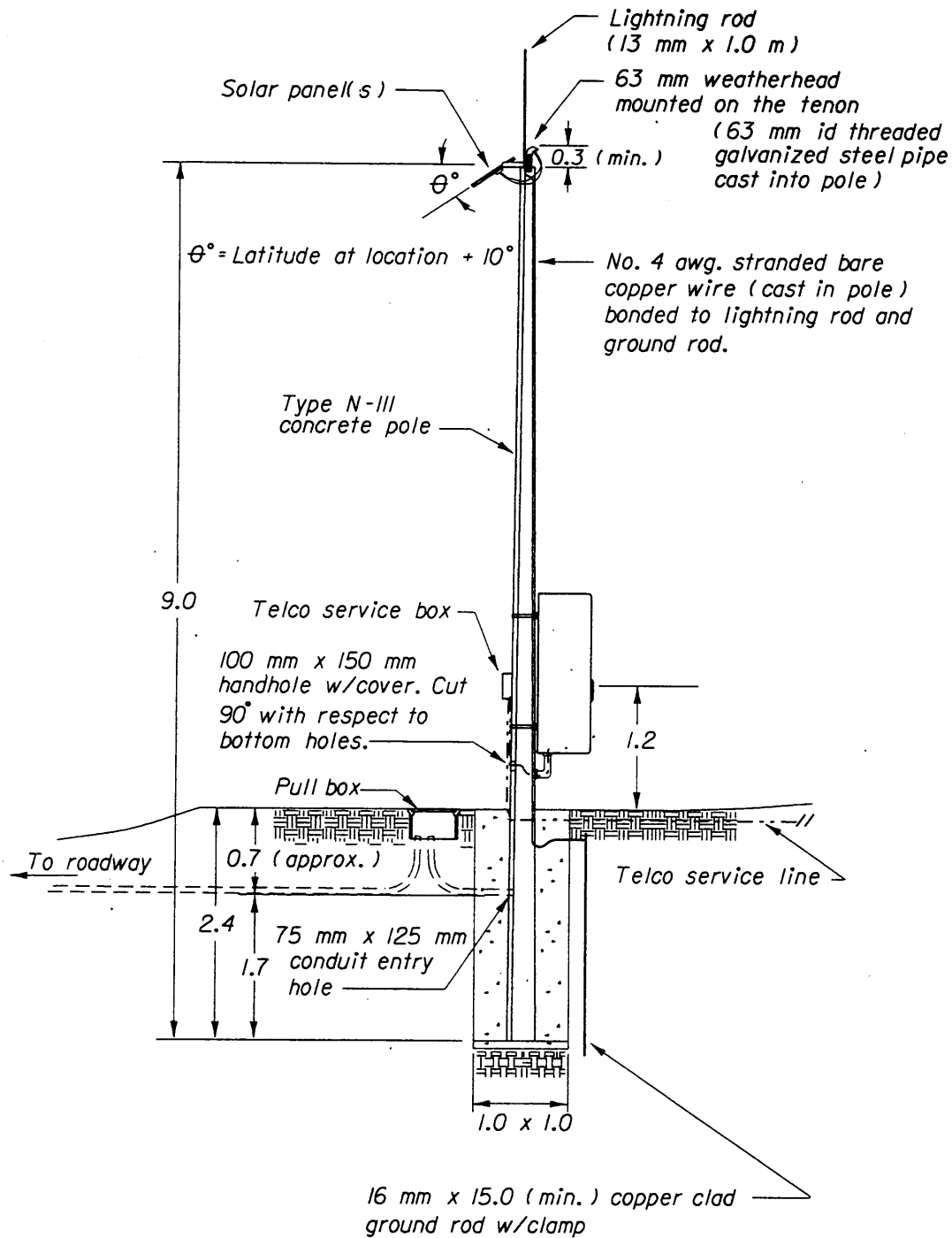
These are typical dimensions. actual dimensions, element cross-sections and standoffs may vary depending on manufacturer and model.

LOOP AND PIEZOELECTRIC VEHICLE SENSOR DETAIL

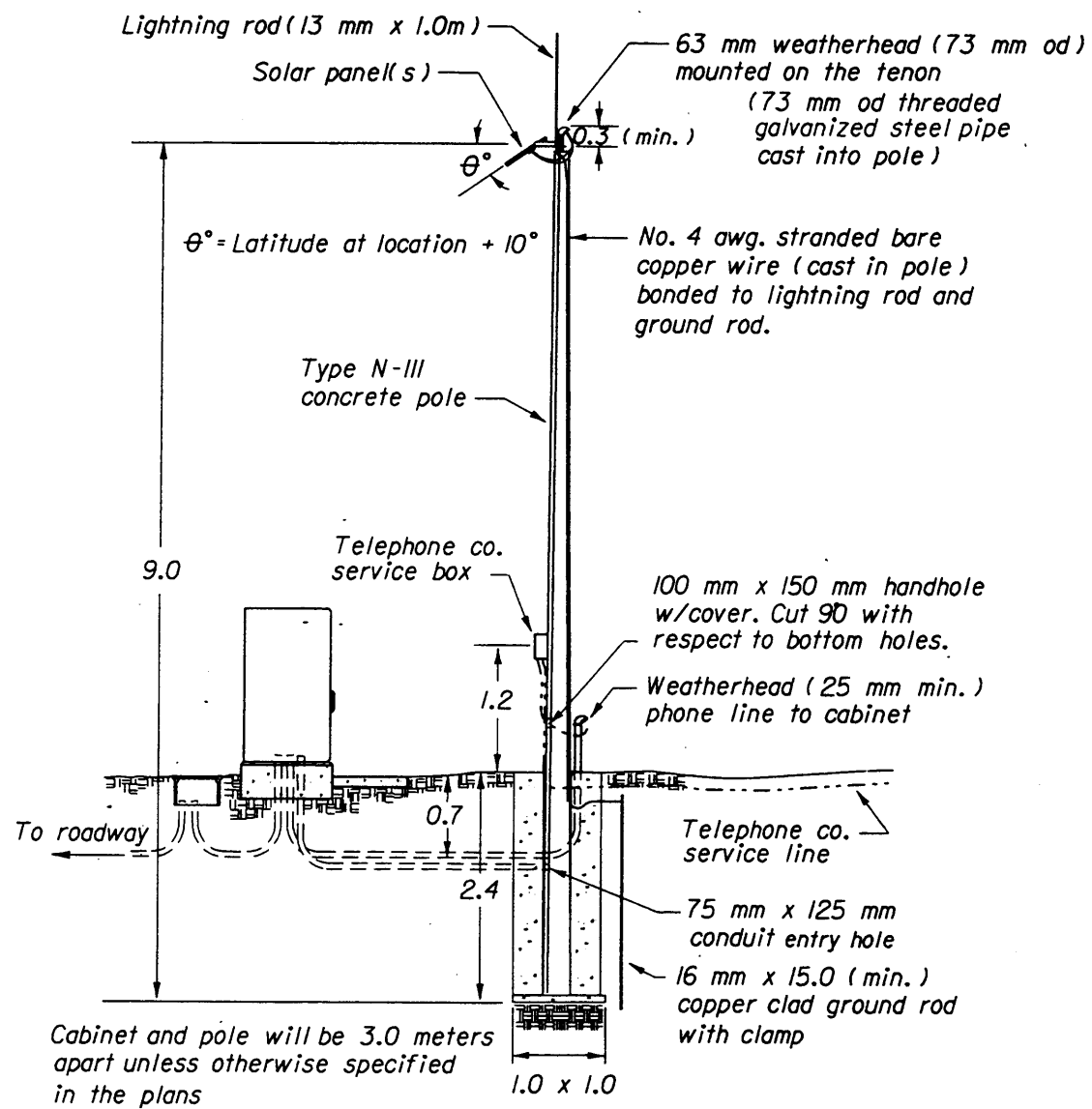
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION  
ROAD DESIGN

TRAFFIC MONITORING SITE

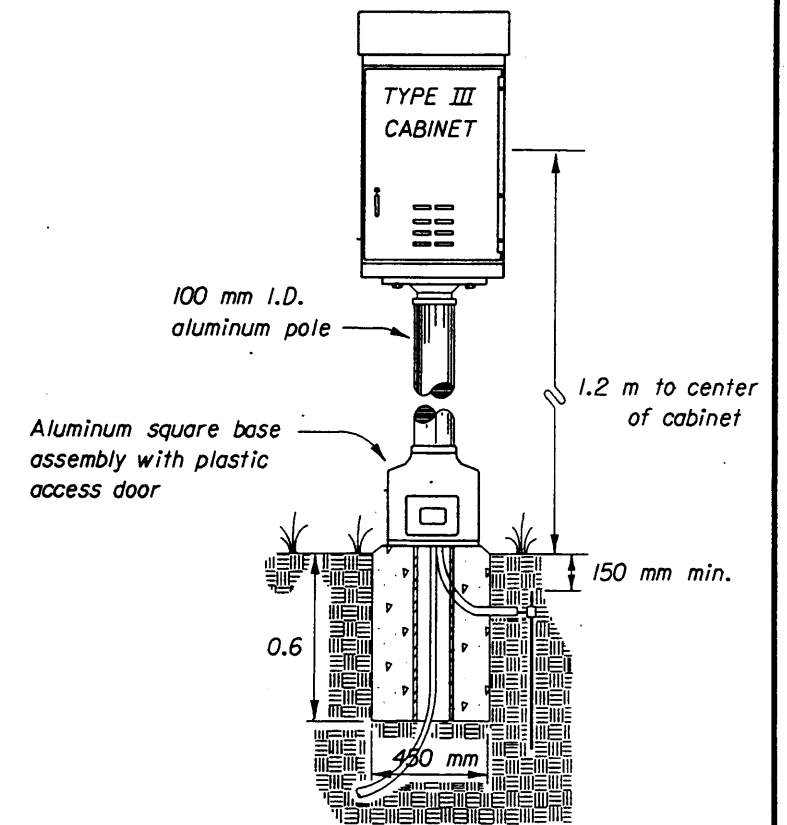
Names	Dates	Approved By		
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SOLAR POWER POLE  
WITH POLE MTD. CABINET



SOLAR POWER POLE  
WITH BASE MTD. CABINET



PEDESTAL MTD. CABINET

SOLAR POWER POLE DETAIL

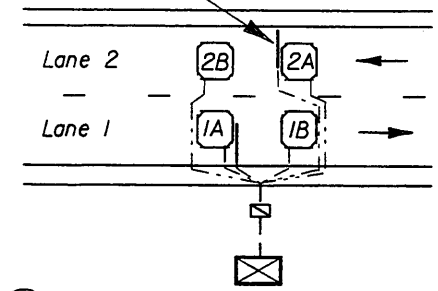
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
TRAFFIC MONITORING SITE				
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Designed By		An Varc		
Drawn By		Mgr. of Transportation Statistics		
Checked By		Revision	Sheet No.	Index No.
		00	6 of 8	17900

Note: When cabinets are located on both shoulders, lane numbering begins with the outside lane.

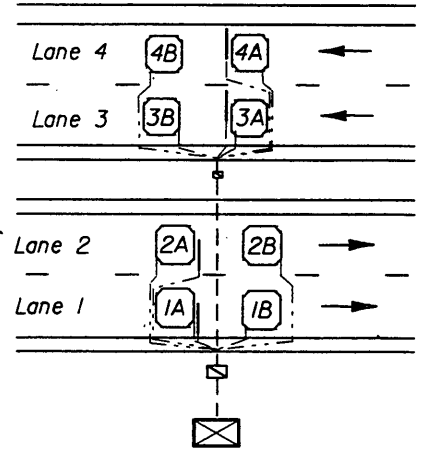
SINGLE CABINET CONFIGURATION

Vehicle sensors will be identified by, and leads marked with, the letters "VS" followed with the lane number.

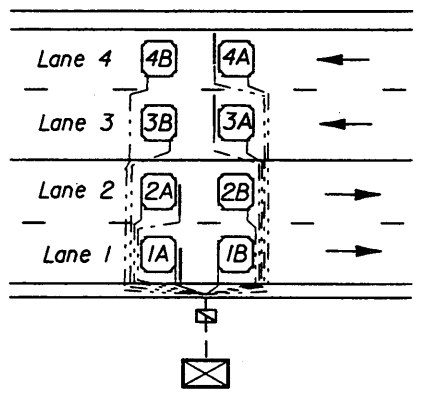
Example: "VS2"



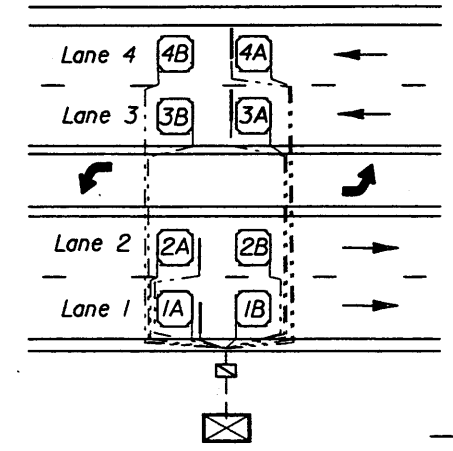
(A) TWO LANE - TWO WAY



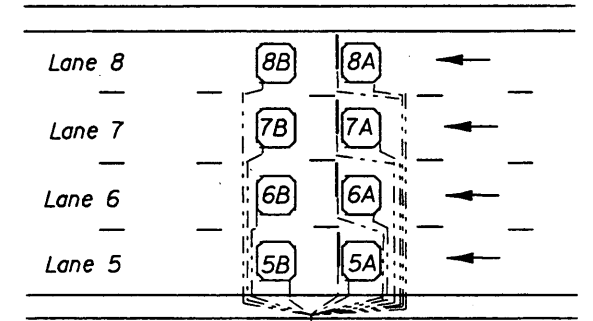
(B) FOUR LANE, DIVIDED - TWO WAY



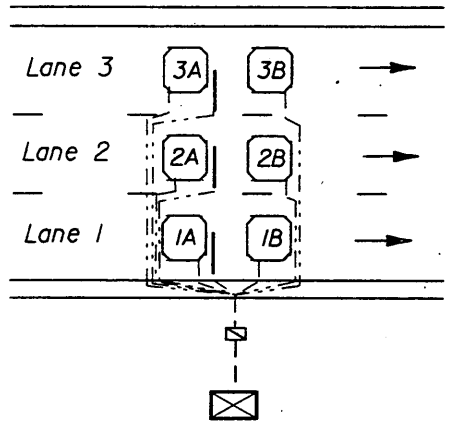
(C) FOUR LANE, UNDIVIDED - TWO WAY



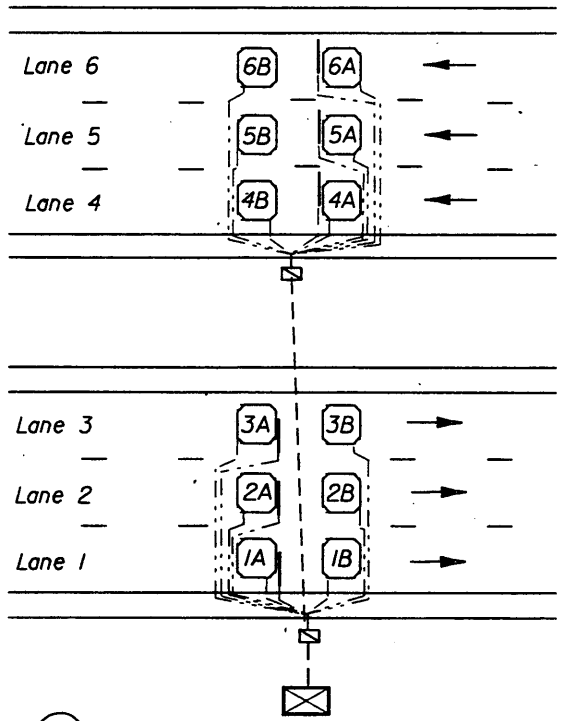
(D) FOUR LANE/CONTINUOUS LEFT TURN LANE



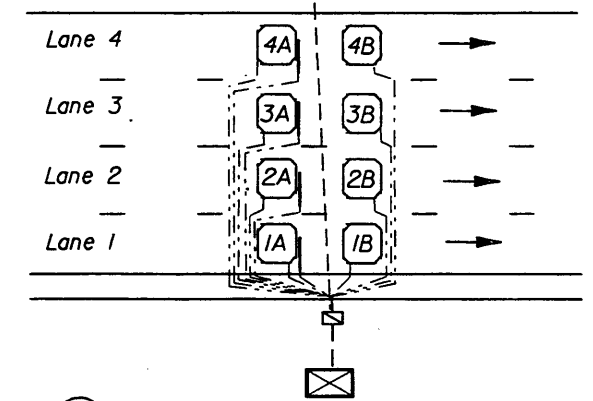
(E) TWO LANE - ONE WAY



(F) THREE LANE - ONE WAY



(G) SIX LANE, DIVIDED - TWO WAY



(H) SIX LANE, DIVIDED - TWO WAY

LANE NUMBERING CONVENTION DETAIL

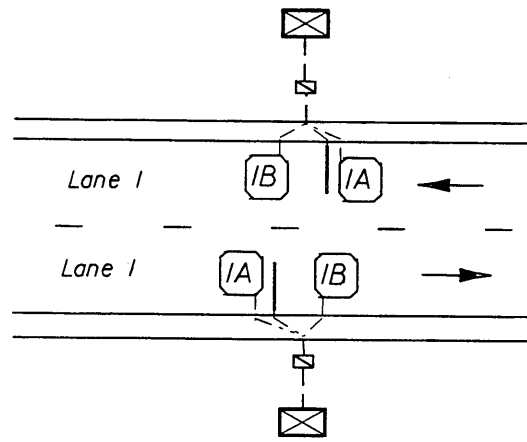
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION ROAD DESIGN				
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Designed By	Names	Dates	Approved By <i>Am Vart</i> Mgr. of Transportation Statistics	
Drawn By			Revision	Sheet No. Index No.
Checked By			00	7 of 8 17900

Note: When cabinets are located on both shoulders, lane numbering begins with the outside lane.

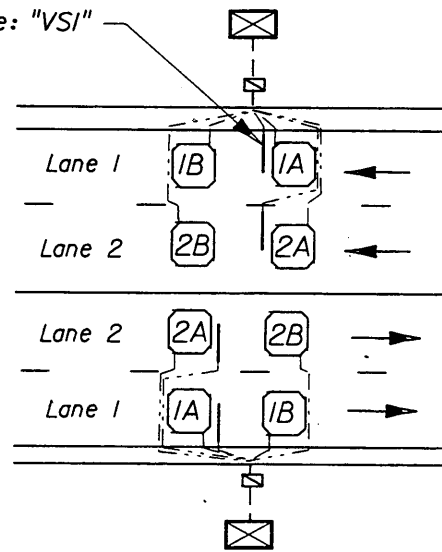
Vehicle sensors will be identified by, and leads marked with, the letters "VS" followed with the lane number.

**TWO CABINET CONFIGURATION**

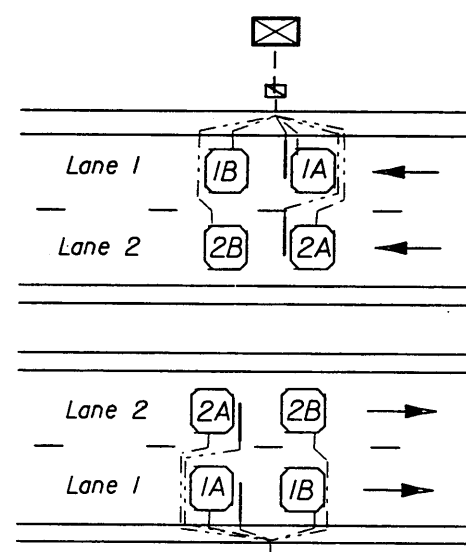
Example: "VS1"



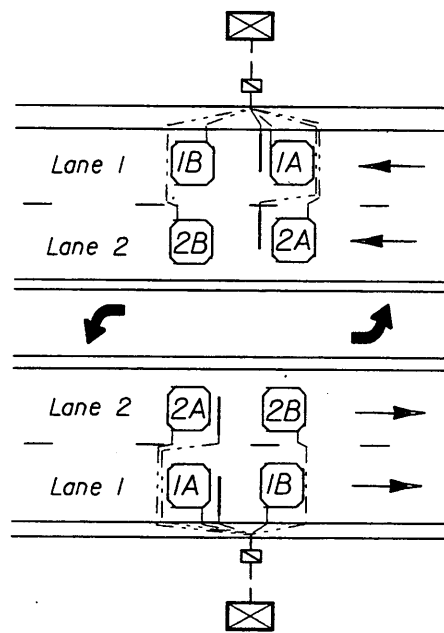
(A) TWO LANE - TWO WAY



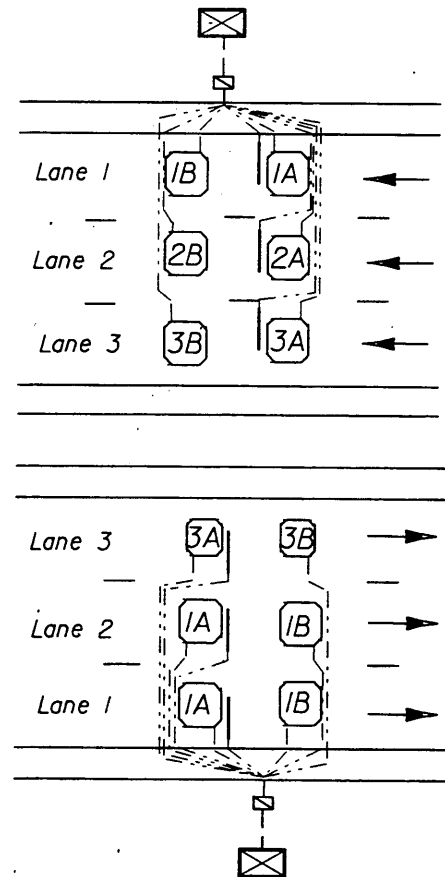
(B) FOUR LANE, UNDIVIDED TWO WAY



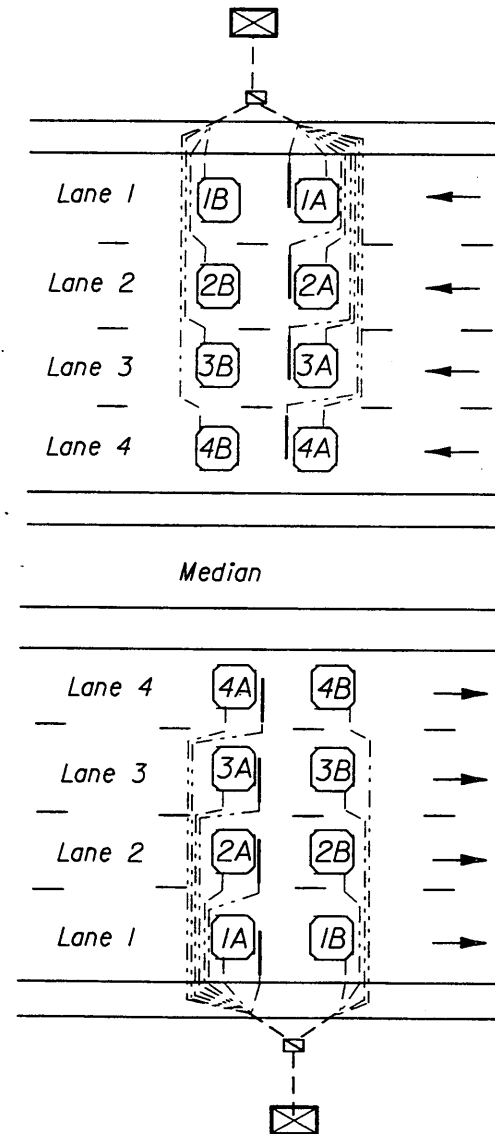
(C) FOUR LANE, DIVIDED - TWO WAY



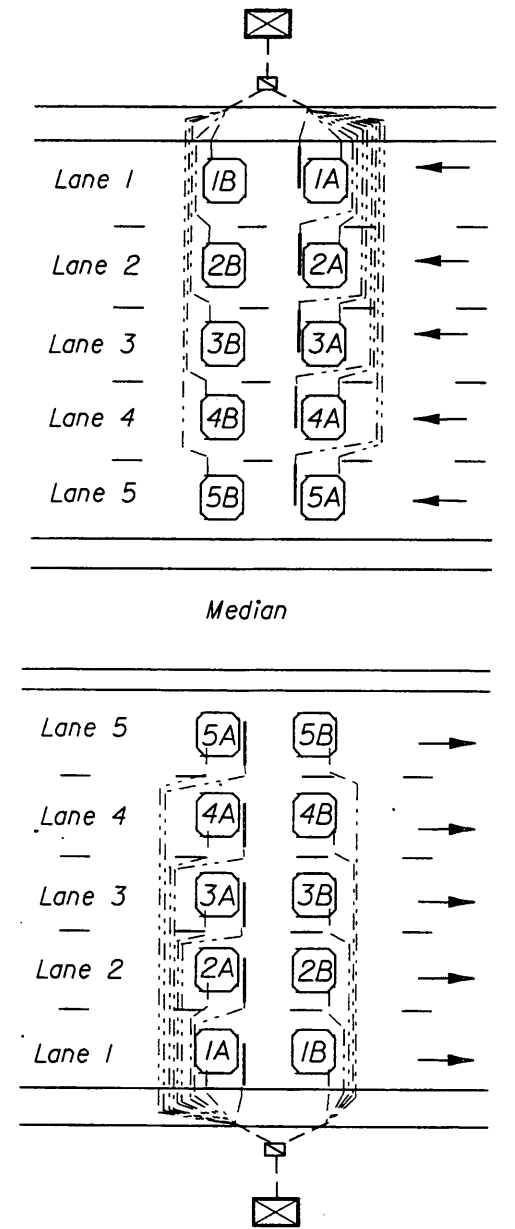
(D) FOUR LANE/CONTINUOUS LEFT TURN LANE



(E) SIX LANE, DIVIDED - TWO WAY



(F) EIGHT LANE, DIVIDED TWO WAY



(G) TEN LANE, DIVIDED TWO WAY

LANE NUMBERING CONVENTION DETAIL

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TRAFFIC MONITORING SITE			
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