

## **Changes to the 2010 UAM References:**

Std Index 201, Supplementary Details For Manholes & Inlets  
The UAM now references this entire standard index.  
(See Below)

Std Index 307, Miscellaneous Utility Details  
The UAM now references the entire standard rather than just conflict structures.  
(See Below)

Std Spec 7-11.6  
Changed to Std Spec 7-11.5.

Std Spec 102-5.9  
Added to replace separate reference to SAE J845 and SAE J1318.  
(See below)

Std Spec 102-7  
Revised to update the language for current Department practice.  
(See below)

Std Spec 102-9.1  
Revised to include vendor drawings for Category III devices.  
(See below)

Std Spec 102-9.2  
Revised to update the language for current Department practice.  
(See below)

Std Spec 125-8.1.1  
Revised to clear the confusion about the requirement on testing to ensure the different density requirements are met on plastic pipe as well as concrete structure even when both are compacted in one operation and because the minimum QC density requirements are different for different pipe types. The proposed changes make the QC density requirements the same for a given minimum cover height.  
(See below)

Std Spec 425-6.7

Added to prohibit concrete aprons around manhole lids.

(See below)

Std Spec 522-7.2

Revised surface requirements.

(See below)

Std Spec 555-1.1

Revised for grammatical changes.

(See below)

Std Spec 555-3.3 through 555-3.4

Added to clarify relation of bore (reamer) diameter to product size and to exclude hazardous materials from drilling mud.

(See Below)

Std Spec 555-5.2

Revised to reference survey points to a permanent FDOT feature.

(See Below)

Std Spec 556-2

Removed product material specifications.

(See Below)

Std Spec 557

Removed spec from book because the 557 pay item has not been used in the past twelve years. The specification will remain available as a Technical Special Provision for project use.

Std Spec 700-1.2.4

Added to address retroreflective sign sheeting previously in Std Spec 994.

(See below)

SAE J845:

Deleted and replaced with reference to Specification 102-5.9.

SAE J595:

Deleted and replaced with reference to Specification 102-5.9.

FDOT MOT Training Procedure:

Deleted reference to FDOT MOT Training Procedure from the UAM.

FDOT Telecommunication Policy:

Deleted reference to FDOT Telecommunication Policy from the UAM.

FDOT Utility Exception Request Form:

Deleted reference to FDOT Utility Exception Request Form from the UAM.

Section 335.15, F.S.:

Deleted reference to Section 335.15, F.S. from the UAM.

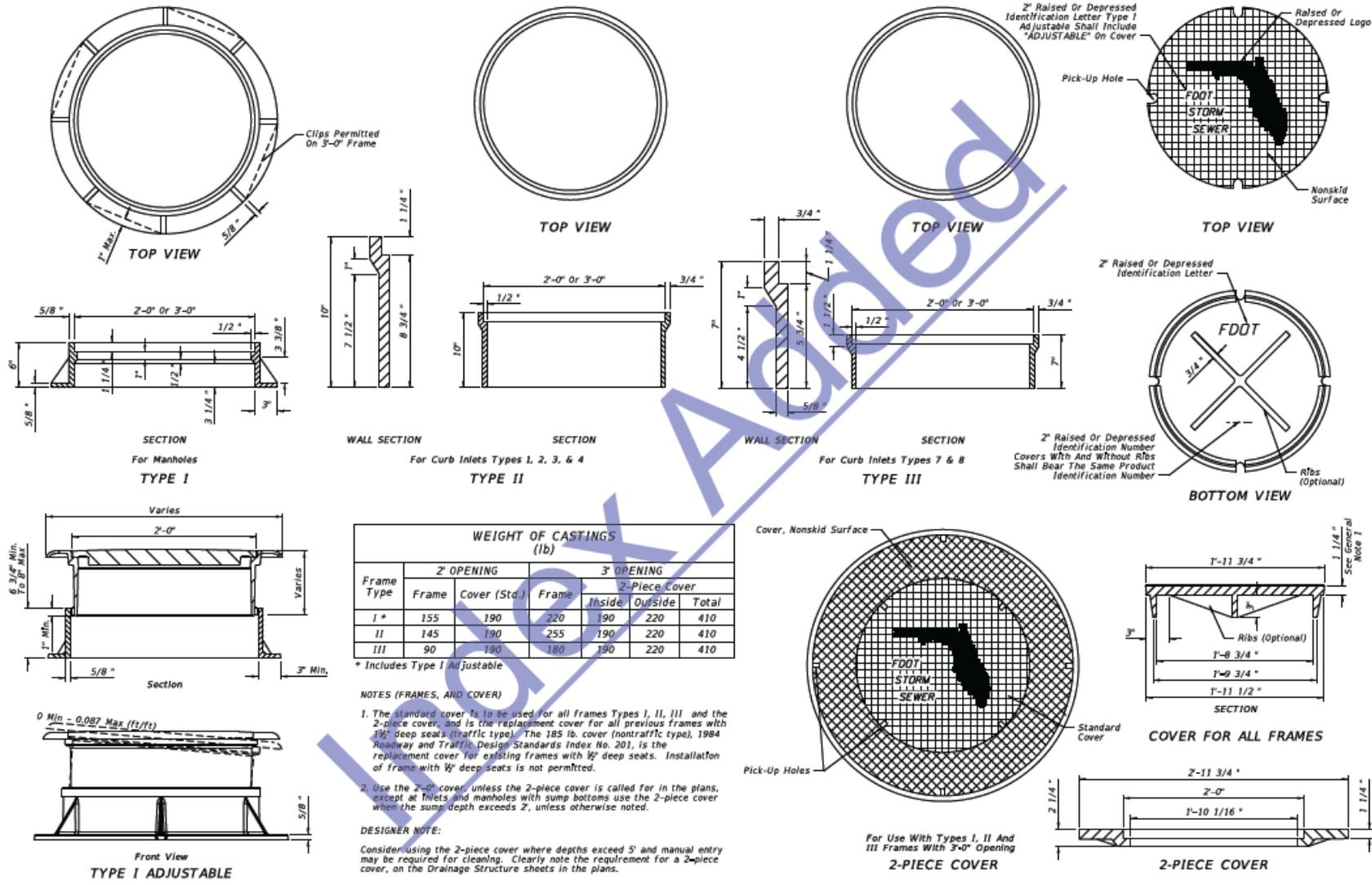
MUTCD

Deleted reference to MUTCD from the UAM.

Florida Statute 337.401 through 337.404:

Moved from Informational References to Incorporated References.

Revisions to the 2010, 2012/2013, and 2013 Design Standards  
(See Below)



LAST REVISION 01/01/12

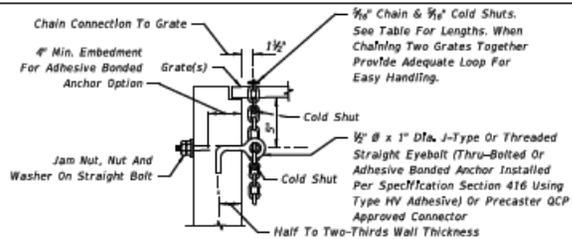
REVISION DESCRIPTION:



**FDOT 2014 DESIGN STANDARDS**  
**SUPPLEMENTARY DETAILS FOR MANHOLES & INLETS**

INDEX NO. 201

SHEET NO. 1 of 5

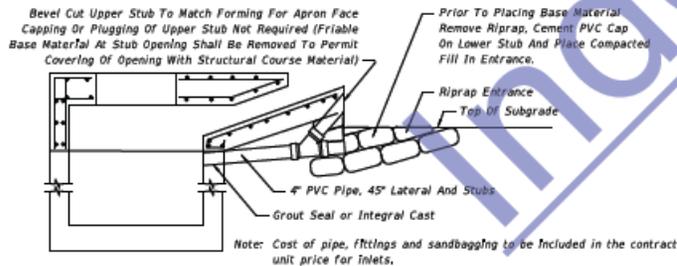


NOTE: When Alternate "G" grate is specified, the chain, bolt, nuts, washer and cold shuts shall be galvanized in accordance with Section 425 of the Standard Specifications.

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

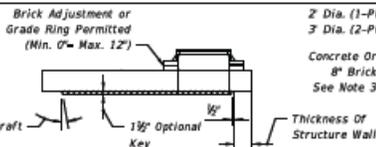
EYEBOLT AND CHAIN REQUIREMENTS				
Index Number	Inlet Type	Eye-Bolts	Length Of Chain	Handling & Remarks
217	(MB) 1	1	4'-0"	Slide & Spin
	(MB) 2	1	4'-0"	Slide & Spin
	(MB) 3	2	2 @ 4'-0"	Slide & Spin
	(MB) 4	2	2 @ 4'-0"	Slide & Spin
	(MB) 5	2	2 @ 4'-0"	Slide & Spin
218	(BW)	1	3'-8"	Slide Or Slide & Spin
219	(BW, RGD)	1	4'-0"	Slide & Spin
220	S	1	4'-0"	Slide & Spin
221	V	1	4'-0"	Slide & Spin
230	A	1	3'-0"	Slide
231	B	1	5'-0"	Slide & Spin
	C	1	2'-6"	Slide & Spin
	D	1	2'-6"	Slide & Spin
	E	2	2 @ 2'-6"	Slide & Spin
	H	2	2 @ 2'-6"	Flip Ctr. Grate and Slide & Spin Single Free Grate
232			1 or 2 @ 1'-6"	Ctr. Grate(s) Chained To One End Grate
	F	1	3'-6"	Flip Or Slide & Spin
233	G	1	6'-0"	Slide
			2'-0"	Lifting Loop
234	J	1	4'-0"	Slide & Spin

**EYEBOLT AND CHAIN FOR LOCKING GRATES TO INLETS**



Note: Cost of pipe, fittings and sandbagging to be included in the contract unit price for inlets.

**TEMPORARY DRAINS FOR SUBGRADE AND BASE**



**SECTION TYPE 7**  
Note: See Slab Designs Index No. 200.

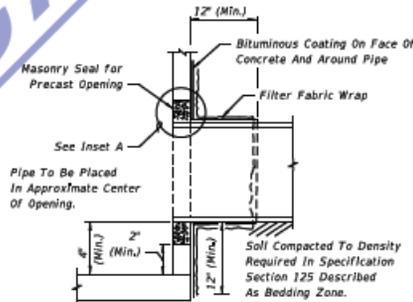
**MANHOLE TOPS**

**NOTES (TOPS)**

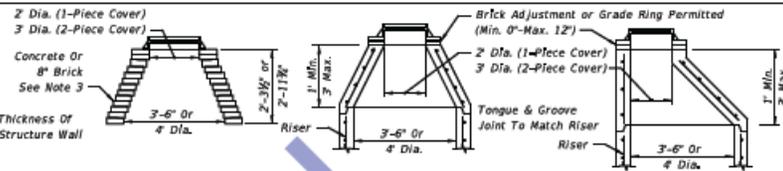
- Manhole top Type 7 slabs shall be of Class II concrete. Concrete as specified in ASTM C478 may be used for precast units; see General Note No. 3.
- Manhole top Type 7 slabs may be of cast-in-place or precast construction. The optional key is for precast tops and in lieu of dowels. Frame and slab openings are to be omitted when top is used over a junction box.
- 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.
- Frames can be adjusted a maximum 12" height with brick or precast ASTM C478 grade rings.
- Substitution of manhole top Type 8 for manhole top Type 7 is allowed provided that minimum dimensions shown above are not reduced.
- Substitution of Manhole top Type 7 for Type 8 is allowed if the minimum thickness (h) above pipe opening cannot be maintained with manhole top Type 8.

**DESIGN NOTES**

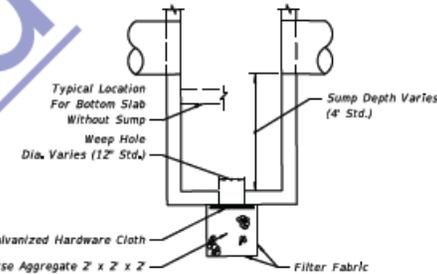
- Manhole top Type 8 should be specified in the plans when depths shown above can be maintained.



**FILTER FABRIC WRAP ON GROUTED PIPE TO STRUCTURE JOINT**



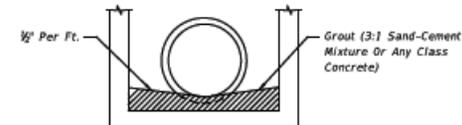
**BRICK OR CONCRETE PRECAST CONCENTRIC CONE TYPE 8 PRECAST ECCENTRIC CONE TYPE 8**



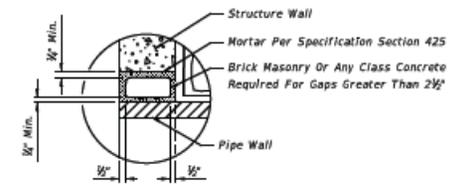
**SUMP BOTTOM**

NOTE: Sump bottom appropriate for all manhole and inlet types. Sumps are to be constructed in inlet and manholes connected to French Drains unless excluded in the plans. At other locations, sump is to be constructed only where called for in the plans. Weep holes to be constructed in sump bottom only where called for in the plans. Cost of sump bottom and weep hole to be included in the contract unit price for inlet or manhole.

**SUMP BOTTOM**



**FOR ALL STRUCTURES UNLESS EXCLUDED BY SPECIAL DETAIL ALL PIPE TYPES DRAINAGE STRUCTURE INVERT**



**INSET A**

LAST REVISION 07/01/12

DESCRIPTION:

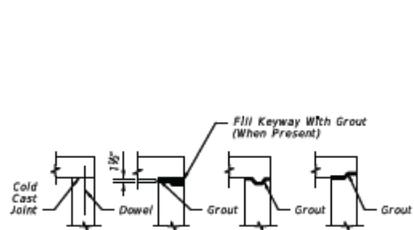


**FDOT 2014 DESIGN STANDARDS**

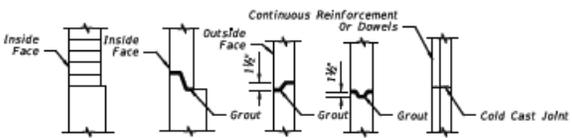
**SUPPLEMENTARY DETAILS FOR MANHOLES & INLETS**

INDEX NO. 201

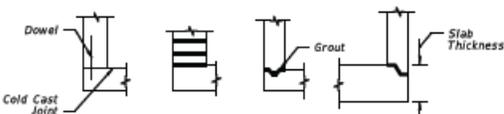
SHEET NO. 2 of 5



TOP SLABS TO WALLS



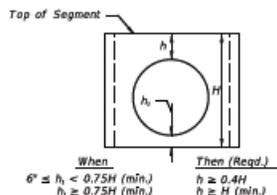
WALL JOINTS



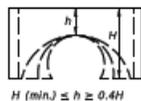
BOTTOM SLABS TO WALLS

- 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 1".
- Keyways are to be a minimum of 1 1/2" deep.
- Joint dowels are to be #4 bars, 12" long with a minimum of 6 bars per joint approximately evenly spaced for circular structures or at maximum 12" spacing for rectangular structures. Bars may be either Adhesive Bonded Dowels in accordance with Specification Section 416, or placed approximately 6" into fresh concrete leaving the remainder to extend into the secondary cast. Welded wire fabric may be substituted for the dowel bar in accordance with the equivalent steel area table on Sheet 4.
- Minimum cover on dowel reinforcing bars is 2" to outside face of structure.
- 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 430-7.3.1 of the Specifications or by non-shrink grout, in accordance with Section 934 of the Specifications.
- Approved product inserts may be used in lieu of dowel embedment.

**OPTIONAL CONSTRUCTION JOINTS**

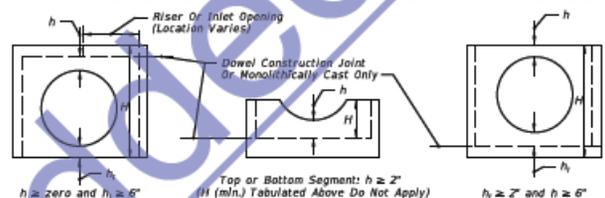


**SEPARATE RISER SEGMENTS WITH CONSTRUCTION JOINTS OTHER THAN DOWEL OPTION**



Segments may be inverted. Opening for pipe shall be the pipe OD plus 6" ( $\pm 2'$  tolerance). 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
1'-0"	3'-6" & 4'-0"
1'-6"	5'-0" & 6'-0"
2'-0"	>6'-0"

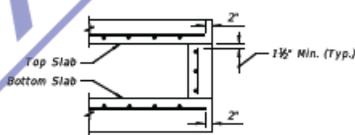


**SEGMENTS FOR SLAB TO WALL DOWEL CONSTRUCTION JOINTS OR MONOLITHICALLY CAST SEGMENTS**

NOTE:  $h$  may be less than 6" when approved by the Engineer, but not for inlet segments at finish grade elevation.

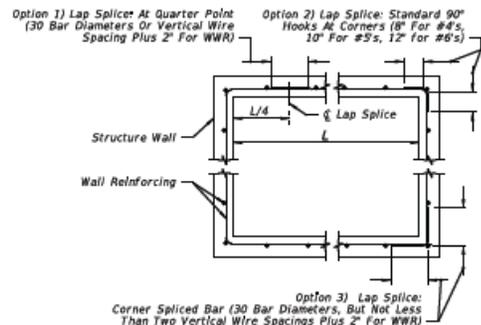
**COMPARATIVE SIDE VIEWS**

**MINIMUM DIMENSIONS FOR BOX AND RISER SEGMENTS**



(NOTE: NOT APPLICABLE AROUND MANHOLE AND RISER OPENINGS)

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



**WALL REINFORCING SPLICE DETAILS**

LAST REVISION	DESCRIPTION:
01/01/10	

REVISION	DESCRIPTION:



**SUPPLEMENTARY DETAILS FOR MANHOLES & INLETS**

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EXAMPLE TABLE OF EQUIVALENT STEEL AREA

SCHEDULE	GRADE 60 REINFORCING BAR		EQUIVALENT GRADE 40 REINFORCING BAR		EQUIVALENT 65 KSI SMOOTH WELDED WIRE REINFORCEMENT		EQUIVALENT 70 KSI DEFORMED WELDED WIRE REINFORCEMENT	
	Bar Size & Spacing	Steel Area (In <sup>2</sup> /ft)	Bar Size & Spacing	Min. Steel Area (In <sup>2</sup> /ft)	Style Designation	Min. Steel Area (In <sup>2</sup> /ft)	Style Designation	Min. Steel Area (In <sup>2</sup> /ft)
A	#3 @ 6 1/2' Ctrs. #4 @ 12' Ctrs.	0.20	#3 @ 4 1/2' Ctrs. #4 @ 8' Ctrs. #5 @ 12' Ctrs.	0.30	3"x3"-W4.6xW4.6 4"x4"-W6.2xW6.2 6"x6"-W9.2xW9.2	0.1846	3"x3"-D4.3xD4.3 4"x4"-D5.7xD5.7 6"x6"-D8.6xD8.6	0.1714
B	#3 @ 5 1/2' Ctrs. #4 @ 10' Ctrs.	0.24	#3 @ 3 1/2' Ctrs. #4 @ 6 1/2' Ctrs. #5 @ 10' Ctrs.	0.36	3"x3"-W5.5xW5.5 4"x4"-W7.4xW7.4 6"x6"-W11.1xW11.1	0.2215	3"x3"-D5.1xD5.1 4"x4"-D6.9xD6.9 6"x6"-D10.3xD10.3	0.2057
Special 1	#3 @ 5' Ctrs. #4 @ 9' Ctrs.	0.267	#3 @ 3' Ctrs. #4 @ 6' Ctrs. #5 @ 9' Ctrs.	0.40	3"x3"-W6.2xW6.2 4"x4"-W8.2xW8.2 6"x6"-W12.3xW12.3	0.2465	3"x3"-D5.7xD5.7 4"x4"-D7.6xD7.6 6"x6"-D11.4xD11.4	0.2289
C	#3 @ 3 1/2' Ctrs. #4 @ 6 1/2' Ctrs. #5 @ 10' Ctrs.	0.37	#4 @ 4' Ctrs. #5 @ 6 1/2' Ctrs. #6 @ 9 1/2' Ctrs.	0.555	3"x3"-W8.5xW8.5 4"x4"-W11.4xW11.4 6"x6"-W17.1xW17.1	0.3415	3"x3"-D7.9xD7.9 4"x4"-D10.6xD10.6 6"x6"-D15.9xD15.9	0.3171
D	#4 @ 4 1/2' Ctrs. #5 @ 7' Ctrs. #6 @ 10' Ctrs.	0.53	#4 @ 3' Ctrs. #5 @ 4 1/2' Ctrs. #6 @ 6 1/2' Ctrs.	0.795	3"x3"-W12.2xW12.2 4"x4"-W16.3xW16.3 6"x6"-W24.5xW24.5	0.4892	3"x3"-D11.4xD11.4 4"x4"-D15.1xD15.1 6"x6"-D22.7xD22.7	0.4543
E	#4 @ 3' Ctrs. #5 @ 5' Ctrs. #6 @ 7' Ctrs.	0.73	#5 @ 3 1/2' Ctrs. #6 @ 4 1/2' Ctrs. #7 @ 6 1/2' Ctrs.	1.095	3"x3"-W16.8xW16.8 4"x4"-W22.5xW22.5 6"x6"-W33.7xW33.7	0.6738	3"x3"-D15.6xD15.6 4"x4"-D20.9xD20.9 6"x6"-D31.3xD31.3	0.6257
F	#5 @ 3 1/2' Ctrs. #6 @ 5' Ctrs. #7 @ 7' Ctrs.	1.06	#6 @ 3' Ctrs. #7 @ 4 1/2' Ctrs. #8 @ 6' Ctrs.	1.59	3"x3"-W24.5xW24.5 4"x4"-W32.6xW32.6 6"x6"-W48.9xW48.9	0.9785	3"x3"-D22.7xD22.7 4"x4"-D30.3xD30.3 6"x6"-D45.4xD45.4	0.9086
Special 2	#5 @ 3' Ctrs. #6 @ 4' Ctrs. #7 @ 5 1/2' Ctrs.	1.24	#7 @ 4' Ctrs. #8 @ 5' Ctrs.	1.86	3"x3"-W28.6xW28.6 4"x4"-W38.2xW38.2 6"x6"-W57.2xW57.2	1.1446	3"x3"-D26.6xD26.6 4"x4"-D35.4xD35.4 6"x6"-D53.1xD53.1	1.0629
G	#6 @ 3 1/2' Ctrs. #7 @ 5' Ctrs.	1.46	#7 @ 3' Ctrs. #8 @ 4' Ctrs.	2.19	3"x3"-W33.7xW33.7 4"x4"-W44.9xW44.9	1.3477	3"x3"-D31.3xD31.3 4"x4"-D41.7xD41.7	1.2514

GENERAL NOTES

- For square or rectangular precast drainage structures, either deformed or smooth welded wire reinforcement in accordance with Specification Section 931:
  - Width and length of the unit is four times the spacing of the cross wires.
  - Wire reinforcement shall be continuous around the box, and lapped in accordance with Option 1 or 3 as shown in the Wall Reinforcing Splice Details.
- Horizontal steel in the walls of rectangular structures shall be lap spliced in accordance with Option 1, 2 or 3 as shown in the Wall Reinforcing Splice Details.
- Welding of splices and laps is permitted. The requirements and restrictions placed on welding in AASHTO R259 shall apply.
- Rebar straight end embedment of peripheral reinforcement may be used in lieu of ACI standard hooks for top and bottom slabs except when hooks are specifically called for in the plans or standard drawings.
- Concrete as specified in ASTM C478, (4000 psi) may be used in lieu of Class II concrete in precast items manufactured in plants which meet the requirements of Section 449 of the Specifications.
- Precast opening for pipe shall be the pipe OD plus 6" (± 2" tolerance). 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. Dry-pack mortar may be used in lieu of brick and mortar construction to seal openings less than 2 1/2' wide.
- For pay item purposes, the height used to determine if a drainage structure is greater than 10 feet shall be computed using:
  - the elevation of the top of the manhole lid,
  - the grate elevation or the theoretical gutter grade elevation of an inlet, or
  - the outside top elevation of a junction box less the flow line elevation of the lowest pipe or to top of sump floor.

NOTES FOR PRECAST OPTIONS & EQUIVALENT REINFORCEMENT SUBSTITUTION

- Details for optional precast Inlet construction up to depths of 15' are shown on the Inlet indexes.
- When precast units are used in conjunction with Alt. "B" Structure Bottoms, Index No. 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 C478 or Class IV must be used for precast structures constructed with 6" wall or slab thickness.
- Reinforcement can be either deformed bar reinforcement or welded wire reinforcement. Bar reinforcement other than 60 ksi may be used, however only two grades are recognized; Grade 40 and Grade 60. Smooth welded wire reinforcement will be recognized as having a design strength of 65 ksi and deformed welded wire reinforcement will be recognized as having a design strength of 70 ksi. The area of reinforcement required may be adjusted 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:

$$\text{Grade 40 Steel Area} = A_{s40} = \frac{60}{40} \times A_{s60}$$

$$\text{Smooth Welded Wire Reinforcement Steel Area} = A_{s65} = \frac{60}{65} \times A_{s60}$$

$$\text{Deformed Welded Wire Reinforcement Steel Area} = A_{s70} = \frac{60}{70} \times A_{s60}$$

continued...

When a reduced area of reinforcement is provided, any maximum bar spacing shown must also be reduced as determined by the following equations, unless otherwise shown:

$$\begin{aligned} \text{Max. Grade 40 Bar Spacing} &= \text{Grade 60 Bar Spacing} \\ \text{Max. Smooth Welded Wire Spacing} &= \text{Grade 60 Bar Spacing} \times 0.86 \\ \text{Max. Deformed Welded Wire Spacing} &= \text{Grade 60 Bar Spacing} \times 0.74 \end{aligned}$$

When an increased area of reinforcing is provided, then the maximum bar spacing may be increased by the squared ratio of increased steel area, but not to exceed 12":

$$\text{Max. Bar Spacing Provided} \leq \text{Max. Bar Spacing Required} \times \left( \frac{\text{Steel Area Provided}}{\text{Min. Steel Area Required}} \right)$$

In no case will reinforcement with wires smaller than W3.1 or D3.1, or spacings greater than 8" be permitted. Bar reinforcement shall show the minimum yield designation grade mark or either the number 60 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 12" or three (3) times the wall thickness, with a maximum spacing of 18" for vertical bars and 12" for horizontal bars. Wires smaller than W3.1 or D3.1 are permitted in the walls of ASTM C 478 round structure bottoms and round risers.

LAST REVISION  
07/01/13

DESCRIPTION:

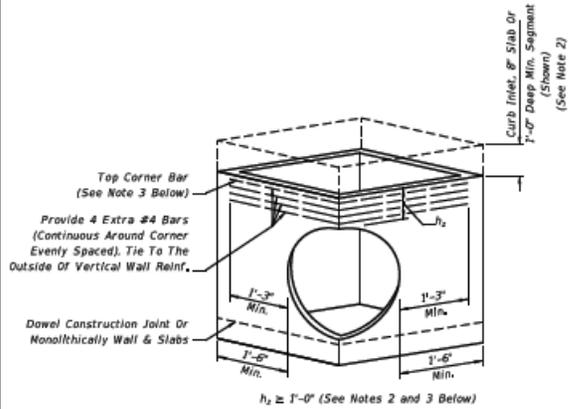


FDOT 2014  
DESIGN STANDARDS

SUPPLEMENTARY DETAILS FOR MANHOLES & INLETS

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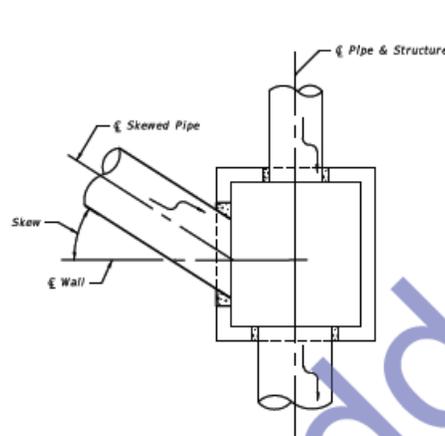


DESIGNER NOTE: Use only when round structures are not practical, engineer of record approval required.

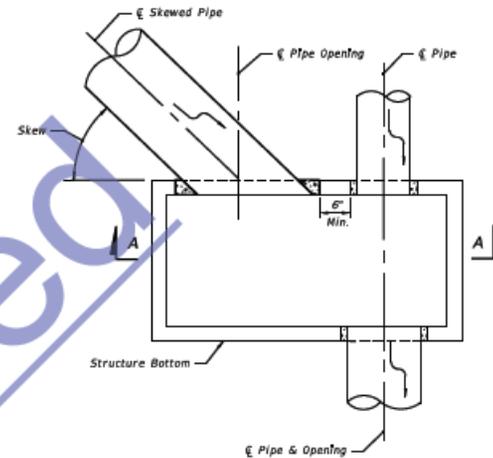
**PICTORIAL VIEW**

- NOTE: 1. Submit Shop Drawings of corner openings for approval by the Engineer of Record.
2.  $h_2$  may be less than 1'-0" when a minimum 1'-0" deep segment, 8" slab or curb inlet is provided above the corner opening.
3. For inlet segments at finish grade elevation substitute a #8 Bar for the top corner bar when  $1'-0" \leq h_2 < 2'-0"$ .

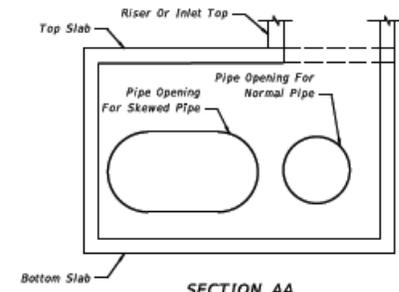
**RECTANGULAR SEGMENT WITH PIPE OPENING AT CORNER**



PLAN VIEW FOR SKEWS  $\leq 45^\circ$   
(Not Centered)



PLAN VIEW FOR SKEWS  $> 45^\circ$   
(Not Centered)

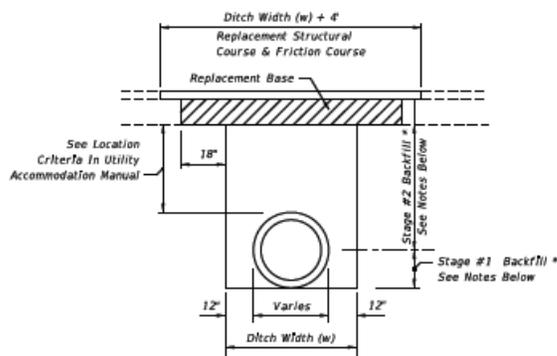


SECTION AA  
(Pipes Not Shown For Clarity)

**DETAILS FOR SKEWED PIPES IN RECTANGULAR STRUCTURES**

Index Added

LAST REVISION 07/01/12	REVISION	DESCRIPTION:	 <b>FDOT 2014 DESIGN STANDARDS</b>	<b>SUPPLEMENTARY DETAILS FOR MANHOLES &amp; INLETS</b>	INDEX NO. 201	SHEET NO. 5 of 5
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**FLEXIBLE PAVEMENT NOTES**

**PAVEMENT REMOVAL AND REPLACEMENT**

Pavement shall be mechanically sawed.

The replacement asphalt shall match the existing structural and friction courses for type and thickness in accordance with current FDOT asphalt mix specifications.

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 12" receiving Type B Stabilization. In lieu of Type B Stabilization, the Contractor may construct using Optional Base Group 3.

**\* FLOWABLE FILL OPTION**

If compaction can not be achieved through normal mechanical methods then flowable fill may be used.

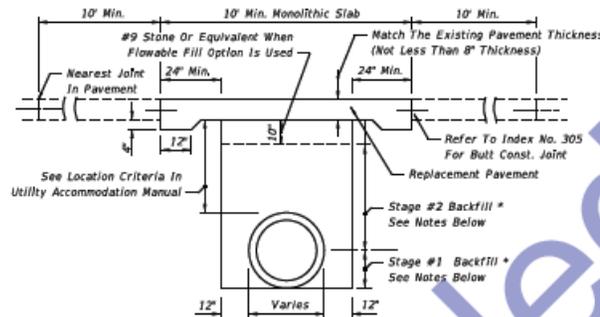
Flowable fill is to be placed in accordance with Section 121 of the Specifications, as approved by the Engineer.

Do not allow the utility being installed to float. If a method is provided to prevent flotation from occurring, Stages #1 and #2 can be combined, if approved by the Engineer.

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 base course.

**FLEXIBLE PAVEMENT CUT**



**RIGID PAVEMENT NOTES**

**PAVEMENT REMOVAL AND REPLACEMENT**

High early strength cement concrete (3000 psi) meeting the requirements of Standard Specification 346 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 edgeline system that is removed shall be replaced with the same type materials. Any edgeline 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.

**\* FLOWABLE FILL OPTION**

If mechanical compaction can not be achieved through normal mechanical methods then flowable fill may be used.

Flowable fill is to be placed in accordance with Section 121 of the Specifications, as approved by the Engineer.

Do not allow the utility being installed to float. If a method is provided to prevent flotation from occurring, Stages #1 and #2 can be combined, if approved by the Engineer.

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 stone layer.

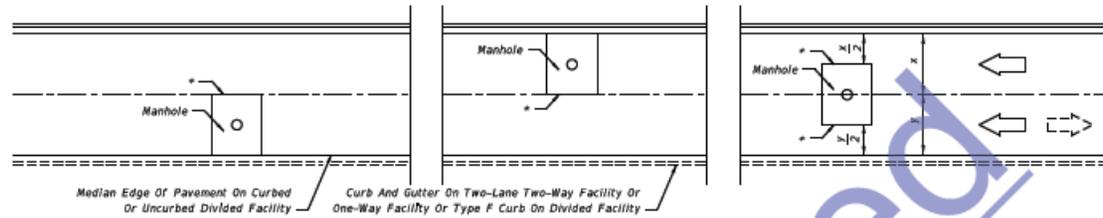
**RIGID PAVEMENT CUT**

**GENERAL NOTES**

- The details provided in this standard index apply to cases in which jack and bore or directional boring methods are not required by the Engineer.
- Flowable fill shall not be placed directly over loose, or high plastic, or muck material (see Index 505) which will cause settlement due to fill weight. Where highly compressible material exists, the amount, shape and depth of flowable fill must be engineered to prevent pavement settlement.
- These details do 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 6' 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 structural course may be used in lieu of dense graded friction course.
- All shoulder pavement, curb, curb and gutter, and their substructure disturbed by utility trench cut construction shall be restored in kind.
- The use of flowable fill to reduce the time traffic is taken off a facility is acceptable but must have prior approval by the Engineer. Flowable fill use is allowed only when properly engineered for pavement crossings, whether straight or diagonal, and shall not be installed for significant depths or lengths. The maximum length shall be fifty (50) feet and a maximum depth of six (6) feet unless supported by an engineering document prepared by a registered professional engineer that specializes in soils engineering. The engineering document shall address the evaluation of local groundwater flow interruption and settlement potential.
- Excavatable flowable fill is to be used when the flowable fill option is selected.

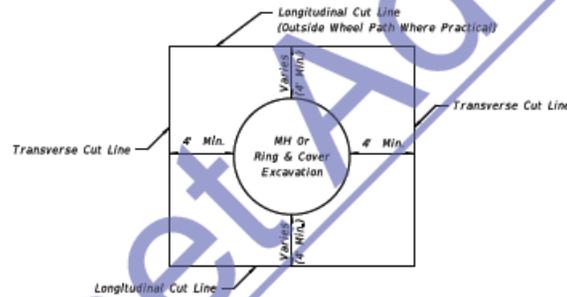
**TRENCH CUTS AND RESTORATIONS ACROSS ROADWAYS**

LAST REVISION 07/01/12	REVISION	DESCRIPTION:		<b>FDOT 2014 DESIGN STANDARDS</b>	<b>MISCELLANEOUS UTILITY DETAILS</b>	INDEX NO. 307	SHEET NO. 1 of 3
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\* Longitudinal Cut Lines For Both Curbed And Uncurbed Facilities Must Coincide With A Regular Seam Or Midlane Point In Order To Be Outside The Wheel Path

**PLAN VIEW  
FOR TWO OR MORE LANES (TWO LANES SHOWN)**



**PARTIAL CUTS FOR RING AND COVER ADJUSTMENTS**

**NOTES**

1. No irregular seams are permitted. All seams must be clean sawed.
2. Pavement cut seams for underground utility structures in rigid pavement are the same longitudinally, but the transverse seams shall extend to the nearest existing joint.
3. See Sheet 1 for replacement pavement.

**NONTRENCH PAVEMENT CUTS FOR UNDERGROUND UTILITY STRUCTURES IN PAVEMENT**

<b>LAST REVISION</b> 07/01/04	<b>REVISION</b>	<b>DESCRIPTION:</b>	 <b>FDOT 2014 DESIGN STANDARDS</b>	<b>MISCELLANEOUS UTILITY DETAILS</b>	<b>INDEX NO.</b> 307	<b>SHEET NO.</b> 3 of 3
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**102-5.9 Vehicle and Equipment Visibility:** Equip all pickups and automobiles used on the project with a minimum of one Class 2 amber or white warning light that meets the Society of Automotive Engineers Recommended Practice SAE J595, dated November 1, 2008, or SAE J845, dated December 1, 2007, and incorporated herein by reference. Existing lights that meet SAE J845, dated March, 1992, or SAE J1318, dated April, 1986, may be used to its end of service life. Lights should be unobstructed by ancillary vehicle equipment such as ladders, racks or booms. If the light is obstructed, additional lights will be required. The lights shall be operating when a vehicle is in a work area where a potential hazard exists, when operating the vehicle at less than the average speed for the facility while performing work activities, making frequent stops or called for in the Plans or Design Standards.

Equip all other vehicles and equipment with a minimum of 4 square feet of retroreflective sheeting or flashing lights.

To avoid distraction to motorists, do not operate the lights on the vehicles or equipment when the vehicles are outside the clear zone or behind a barrier.

### **102-7 Traffic Control Officer.**

Provide uniformed law enforcement officers, including marked law enforcement vehicles, to assist in controlling and directing traffic in the work zone when the following types of work is necessary on projects:

1. Directing traffic/overriding the signal in a signalized intersection.
2. When Design Standards, Index No. 619 is used on freeway facilities (Interstates, toll roads, and expressways) roadways at nighttime for work within the travel lane and called for in the plans.
3. When Design Standards, Index No. 655 Traffic Pacing for overhead work is called for in the pPlans or approved by the Engineer.
4. When pulling conductor/cable above an open traffic lane on limited access facilities, when called for in the pPlans or approved by the Engineer.
5. When Design Standards, Index No. 625 Temporary Road Closure 5 Minutes or Less is used.

**102-9.1 Installation and Maintenance:** Install and maintain temporary traffic control devices as detailed in the Plans, Index 600 of the Design Standards and when applicable, in accordance with the approved vendor drawings, as provided on the Department's Qualified Products List (QPL) or the Department's Approved Products List (APL). Erect the required temporary traffic control devices to prevent any hazardous conditions and in conjunction with any necessary traffic re-routing to protect the traveling public, workers, and to safeguard the work area. Use only those devices that are on the QPL or the APL. Immediately remove or cover any devices that do not apply to existing conditions.

All temporary traffic control devices must meet the requirements of National Cooperative Highway Research Program Report 350 (NCHRP 350) or the Manual for Assessing Safety Hardware 2009 (MASH) and current FHWA directives. Manufacturers seeking evaluation must furnish certified test reports showing that their product meets all test requirements set forth by NCHRP 350 or the MASH. Manufacturers seeking evaluation of Category I devices for inclusion on the QPL shall include the manufacturer's self-

certification letter. Manufacturer's seeking evaluation of Category II and Category III devices for inclusion on the QPL shall include the FHWA WZ numbered acceptance letter with attachments and vendor drawings of the device in sufficient detail to enable the Engineer to distinguish between this and similar devices. For devices requiring field assembly or special site preparation, vendor drawings shall include all field assembly details and technical information necessary for proper application and installation. Vendor drawings for Category III devices ~~and~~ must be signed and sealed by a Professional Engineer registered in the State of Florida. Manufacturers seeking evaluation of Category IV devices for inclusion on the QPL or APL must comply with the requirements of Section 990 and include detailed vendor drawings of the device along with technical information necessary for proper application, field assembly and installation.

Ensure an employee is assigned the responsibility of maintaining the position and condition of all temporary traffic control devices throughout the duration of the Contract. Keep the Engineer advised at all times of the identification and means of contacting this employee on a 24 hour basis.

**102-9.2 Work Zone Signs:** Provide Furnish, install, maintain, remove and relocate signs in accordance with the Plans and Design Standards, Index No. 600. Use signs that meet the material and process requirements of Section 994. Use Type IV sheeting for fluorescent orange work zone signs. Roll-up signs must shall meet the requirements of Type VI sheeting. Use Type IV or Type XI sheeting for all other work zone signs. Meet the requirements of 700-1.2.4, and 990-28. Use only approved systems, which includes sign support posts or stands and attachment hardware (nuts, bolts, clamps, brackets, braces, etc.), meeting the vendor requirements specified on the QPL drawings. Attach the sign to the sign support using hardware meeting the manufacturer's recommendations on the QPL vendor drawings or as specified in the Design Standards.

102-9.2.1 Post Mounted Signs: Meet the requirements of 990-8.

102-9.2.2 Portable Signs: Use only approved systems, which includes sign stands and attachment hardware (nuts, bolts, clamps, brackets, braces, etc.), meeting the vendor requirements specified on the QPL drawings.

Provide Federal Highway Administration's (FHWA) accepted sign substrate for use with accepted sign stands on the National Highway System (NHS) under the provisions of the NCHRP Report 350 "Recommended Procedures for the Safety Performance Evaluation of Highway Features."

102-9.2.3 Barrier Mounted Signs: If post mounting criteria cannot be achieved in accordance with Design Standards, Index No. 600 and a barrier or traffic railing exists, use temporary sign criteria provided in Design Standards, Index No. 11871.

**125-8.1.1 General:** Backfill in the dry whenever normal dewatering equipment and methods can accomplish the needed dewatering. A LOT is defined as one lift of backfill material placement, not to exceed 500 feet in length or a single run of pipe connecting two successive structures, whichever is less. Backfill for structures and plastic or metal pipe compacted in one operation will be considered as one separate LOTs within the cover zone. Backfill around structures compacted separately from the pipe will be considered as separate LOTs. Backfill on each side of the pipe for the first lift will be considered a separate LOT. Backfill on opposite sides of the

pipe for the remaining lifts will be considered separate LOTs, unless the same compactive effort is applied. Same compactive effort is defined as the same type of equipment (make and model) making the same number of passes on both sides of the pipe. For multiple phase backfill, a LOT shall not extend beyond the limits of the phase.

**425-6.7 Adjusting Existing Structures:** Cut down or extend existing manholes, catch basins, inlets, valve boxes, etc., within the limits of the proposed work, to meet the finished grade of the proposed pavement, or if outside of the proposed pavement area, to the finished grade designated in the Plans for such structures. Use materials and construction methods which meet the requirements specified above to cut down or extend the existing structures.

The Contractor may extend manholes needing to be raised using adjustable extension rings of the type which do not require the removal of the existing manhole frame. Use an extension device that provides positive locking action and permits adjustment in height as well as diameter and meets the approval of the Engineer. When adjusting structures in flexible pavement, restore final road surface in accordance with the Design Standards, Index No. 307.

**522-7.2 Surface Requirements:** ~~Provide the concrete with a broom finish.~~ Imprint concrete as detailed in the Plans, otherwise provide a broom finish. Ensure that the surface variations are not more than 1/4 inch under a 10 foot straightedge, or more than 1/8 inch on a 5 foot transverse section. Finish the edge of the sidewalk with an edging tool having a radius of 1/2 inch.

~~———— **522-7.2.1 Finish:** Provide the concrete with a broom finish as unless shown otherwise in the Plans.~~

~~———— **522-7.2.2 Embossed Imprinted Concrete:** Furnish and install embossed imprinted concrete as shown in the Plans.~~

**555-1.1 Scope of Work:** The work specified in this Section documents the approved construction methods, and procedures ~~and materials~~ for ~~D~~irectional ~~B~~oring, also commonly called ~~H~~orizontal ~~D~~irectional ~~D~~rilling (HDD).

**555-3.3 Product Bore Hole Diameter:** Minimize potential damage from soil displacement/settlement by limiting the ratio of the bore hole to the product size. The size of the back reamer bit or pilot bit, if no back reaming is required, will be limited relative to the product diameter to be installed as follows:

<u>Maximum Pilot or Back-Reamer Bit Diameter When Rotated 360 Degrees</u>	
<u>Outside Pipe Diameter Inches*</u>	<u>Maximum Bit Diameter Inches</u>
<u>≤8</u>	<u>Diameter + 4</u>
<u>8 to 24</u>	<u>1.5 x Diameter</u>
<u>&gt;24</u>	<u>Diameter + 12</u>
<u>*Use manufacturer's recommendation for pipe with restrained joints.</u>	

**555-3.4 Drilling Fluids:** Use a mixture of bentonite clay or other approved stabilizing agent mixed with potable water with a minimum pH of 6.0 to create the drilling fluid for lubrication and soil stabilization. Do not use any other chemicals or polymer surfactants in the drilling fluid without written consent from the Engineer. Certify to the Engineer in writing that any chemicals to be added are environmentally safe and not harmful or corrosive to the facility. Identify the source of water for mixing the drilling fluid. Any water source used other than a potable water source may require a pH test.

**555-65.2 As-Built Plans:** Provide the Engineer a complete set of ~~Aas-B~~built ~~P~~plans showing all bores (successful and failed) within 30 calendar days of completing the work. Ensure that the plans are dimensionally correct copies of the Contract ~~p~~Pplans and include roadway plan and profile, cross-section, boring location and subsurface conditions as directed by the Engineer. The plans must show appropriate elevations ~~and be~~ referenced to a permanent FDOT feature (i.e. mast arm foundation, manhole inlet cover, head wall, etc). ~~Department Bench Mark when associated with a Department project, otherwise to a U.S. Geological Survey (USGS) grid system and datum, or a specific location on top of an existing Department head wall.~~ Plans must be same scale in black ink on white paper, of the same size and weight as the Contract ~~p~~Pplans. Submittal of electronic plans data in lieu of hard copy plans is preferred and may be approved by the Engineer if compatible with the Department software. Specific plans content requirements include but may not be limited to the following:

(a) The Contract plan view shows the center line location of each facility installed, or installed and placed out of service, to an accuracy of 1 inch at the ends and other points physically observed in accordance with the bore path report.

(b) As directed by the Engineer, provide either a profile plan for each bore path, or a cross-section of the roadway at a station specified by the Engineer, or a roadway centerline profile. Show the ground or pavement surface and crown elevation of each facility installed, or installed and placed out of service, to an accuracy of within 1 inch at the ends and other exposed locations. On profile plans for bore paths crossing the roadway, show stationing of the crossing on the Contract ~~p~~Pplans. On the profile plans for the bore

paths paralleling the roadway, show the Contract pPlans stationing. If the profile plan for the bore path is not made on a copy of one of the Contract profile or cross-section sheets, use a 10 to 1 vertical exaggeration.

(c) If, during boring, an obstruction is encountered which prevents completion of the installation in accordance with the design location and specification, and the product is left in place and taken out of service, show the failed bore path along with the final bore path on the plans. Note the failed bore path as “Failed Bore Path - Taken Out of Service”. Also show the name of the Uutility owner, location and length of the drill head and any drill stems not removed from the bore path.

(d) Show the top elevation, diameter and material type of all utilities encountered and physically observed during the subsoil investigation. For all other obstructions encountered during a subsoil investigation or the installation, show the type of material, horizontal and vertical location, top and lowest elevation observed, and note if the obstruction continues below the lowest point observed.

(e) Include bore notes on each plan stating the final bore path diameter, product diameter, drilling fluid composition, composition of any other materials used to fill the annular void between the bore path and the product, or facility placed out of service. Note if the product is a casing as well as the size and type of carrier pipes placed within the casing as part of the Contract work.

**556-2 Materials:**

Select materials approved for installation within the right-of-way based on their suitability for the construction method as defined in Table 556-2.1. After determining product suitability, individual material standards as contained in Table 556-2.2 apply.

Table 556-2.1 Product Suitability by Construction Method		
Type	Pipe/Casing Installation Mode	Suitable Pipe/Casing
Jack and Bore	Jacking	Steel, Plastic
Micro-tunneling	Jacking	DI, FRPM, PC, PCCP, RCCP, RCP, Steel

Table 556-2.2 Material Standards Acceptable for J&B and MT Installations		
Material Type	Non-Pressure	Pressure
Ductile Iron (DI)	AWWA C150/C151 ASTM A716, A747	AWWA C150/C151

Fiberglass Reinforced Polymer Mortar (FRPM)	ASTM D 3262	ASTM D 3517 AWWA C950
Polymer Concrete (PC)	DIN 54815-1 & 2	N/A
Prestressed Concrete Cylinder Pipe (PCCP)	N/A	AWWA C300
Reinforced Concrete Cylinder Pipe (RCCP)	N/A	ASTM C361
Reinforced Concrete Pipe (RCP)	ASTM C 76	ASTM C361 AWWA C300/C302
Steel	ASTM A139 Grade B <sup>(1)</sup> API 2B <sup>(2)</sup>	AWWA C200 API 2B <sup>(2)</sup>
Polyvinyl Chloride (PVC)	ASTM D 1785	N/A
Polyethylene (PE)	ASTM D 2447 ASTM D 2513 FOR GAS >3 Inches	N/A
Polybutylene (PB)	ASTM D 2662	N/A
Cellulose Acetate Butyrate (CAB)	ASTM D 1503	N/A
Acrylonitrile Butadiene Styrene (ABS)	ASTM D 1527	N/A
Reinforced Thermosetting Resin Pipe (RTRP)	ASTM D 2296 OR ASTM D2997	N/A
<sup>(1)</sup> No hydrostatic test required <sup>(2)</sup> Dimensional tolerances only		

Unless otherwise tested and approved by the Department, only use encasement pipe or uncased carrier pipe material that is new and has smooth interior and exterior walls.

**556-2.1 Steel Pipe Casing and Welds:** In addition to meeting or exceeding the conditions contained in Tables 556-2.1 and Table 556-2.2, meet the following requirements:

(a) The size of the steel casing must be at least 6 inches larger than the largest outside diameter of the carrier.

~~(b) The casing pipe must be straight seam pipe or seamless pipe.~~

~~(c) All steel pipe may be bare inside and out, with the manufacturer's recommended minimum nominal wall thicknesses to meet the greater of either installation, loading or carrier requirements.~~

~~(d) All steel casing pipe must be square cut and have dead even lengths which are compatible with the J&B equipment.~~

~~Use steel pipe casings and welds meeting or exceeding the thickness requirements to achieve the service life requirements noted in the Department Drainage Manual Chapter 6. For purposes of determining service life, ensure that casings installed under roadways meet or exceed cross drain requirements and casings under driveways meet or exceed side drain pipe requirements. For purposes of material classification, consider steel pipe casing structural plate steel pipe. Ensure that steel pipe casing of insufficient length achieves the required length through fully welded joints. Ensure that joints are air tight and continuous over the entire circumference of the pipe with a bead equal to or exceeding the minimum of either that required to meet the thickness criteria of the pipe wall for jacking and loading or service life. A qualified welder must perform all welding.~~

~~**556-2.2 Reinforced Concrete Pipe Casing:** In addition to meeting or exceeding the conditions contained in Tables 556-2.1 and Table 556-2.2, meet the following requirements:~~

~~Ensure that concrete pipe complies with the following minimum requirements:~~

~~(a) 5,000 psi concrete compressive strength~~

~~(b) Class III, IV, or V as required by load calculations, with a C wall~~

~~(c) Full circular inner and/or outer reinforcing cage~~

~~(d) Multiple layers of steel reinforcing cages, wire splices, laps and spacers are permanently secured together by welding in place~~

~~(e) Straight outside pipe wall with no bell modification~~

~~(f) No elliptical reinforcing steel is allowed~~

~~(g) Single cage reinforcement with a 1 inch minimum cover from the inside wall~~

~~(h) Double cage reinforcement with a 1 inch minimum cover from each wall~~

~~(i) Joints are gasket type~~

~~(j) Additional joint reinforcement~~

~~Upon installation, the Engineer may, at his discretion, require the Contractor to perform concrete wiping or injection of the joints if it is believed the joints have not maintained their water tightness during the jacking operation. No additional payment will be made for this operation.~~

~~**556-2.3 Plastic Pipe Casing:** Plastic pipe may be jacked and bored if its physical properties are sufficient, and it is rigid such that when supported or suspended at mid point it maintains a straight alignment. If plastic pipe is Jacked and Bored it may not be used as a pressurized carrier. Plastic pipe casing installed by the jack and bore method requires the use of an auger. Open end jacking without the use of an auger for continuous cleanout of the bore as the pipe is advanced is not permitted. Closed end jacking is not permitted.~~

~~**556-2.4 Pipe Couplings and Joints:** In addition to meeting or exceeding the conditions contained in Tables 556-2.1 and 556-2.2, to minimize potential for bore failure, couplings must not project at right angles from the casing diameter by more than 3/4 inch.~~

~~(a) Steel Pipe Coupling and Joints:~~

~~1. Welds must comply with 556-2.1(d) when couplings are not used or when the coupling thickness is less than the casing thickness.~~

~~2. When couplings are used the casing joint needs only to be tack welded. Couplings must have a full bead weld such that the thickness, when measured at an angle of 45 degrees to the casing and coupling interface, must be no less than the casing thickness.~~

~~(b) Plastic Pipe Couplings and Joints:~~

- ~~1. Must meet or exceed all ASTM strength and composition standards established for the casing material to which they are being attached.~~
- ~~2. Joints must be made sufficiently strong to withstand the pressures of jacking. All chemical welds must be completely set and cured before any jacking is attempted.~~

## **SECTION 557 VIBRATORY PLOWING**

### **557-1 Description:**

**557-1.1 Scope of Work:** The work specified in this Section documents the approved construction methods, procedures and materials for vibratory plowing, also known as cable plowing.

**557-1.2 General:** Vibratory plowing is a trenchless method for installing a product which typically consists of a cable or small conduit for later insertion of wire line products. It is a multi-stage process consisting of positioning a vibrating plow equipped with a trailing product guide which feeds the cable or conduit to the depth setting of the plow as it moves forward. The product is inserted into the ground continuously along a predetermined path and depth. Reshape any disturbance of the ground surface such as localized residual mounding or grooves, by grading and compaction. If a conduit is installed, subsequent operations may involve pulling a desired product back through the conduit. The vertical depth of installation is controlled by two factors, hydraulic adjustment of the plow shear head and the surface contours. The depth of insertion must be continually adjusted to compensate for changes in terrain to ensure compliance with depth criteria. Horizontal profiles or steering the bore is accomplished by proper orientation of a tractor which pulls the vibratory plow. Alignments are generally limited to straight sections with minor deviation unless approved by the Engineer.

### **557-2 Construction Site Requirements:**

**557-2.1 Site Conditions:** Consider vibratory plowing an excavation method and comply with all applicable provisions required of excavation methods.

- ~~(a) Ensure that subsequent excavation for manholes, hand pulls, or other service vaults, recovery pits or any other excavation is carried out as specified in Section 120.~~
- ~~(b) After completing installation of the product, restore the work site. Restore excavated or plowed areas in accordance with the Specifications and Design Standards.~~
- ~~(c) It is the plowing Contractor's responsibility for removal of excess material or debris created during the construction process as well as restoring the site to the condition which existed before construction.~~
- ~~(d) Exposure may be allowed for periods exceeding 14 consecutive days if the exposure is limited to 3 feet or less. Periods longer than described above may be approved by the Engineer if it will not affect maintenance or construction activities.~~
- ~~(e) Ensure that equipment does not impede visibility of the roadway user without taking the necessary precautions of proper signing and maintenance of traffic operations.~~

**557-2.2 Damage Restoration:** Take responsibility for restoring any damage caused by cutting, heaving, settlement or separation of pavement at no cost to the Department.

~~**557-2.2.1 Remediation Plans:** When required by the Engineer, provide detailed plans which show how damage to any roadway facility will be remedied and include this as part of the As-Built Plans Package. Remediation Plans must follow the same guidelines for development and presentation of the As-Built Plans.~~

~~**557-3 Quality Control.**~~

~~**557-3.1 General:** Take control of the operation at all times, have a representative who is thoroughly knowledgeable of the equipment and procedures, present at the job site during the entire installation and available to address immediate concerns and emergency operations. Notify the Engineer 48 hours in advance of starting work. Do not begin installation until the Engineer is present at the job site and agrees that proper preparations have been made.~~

~~**557-3.2 Alignment:** Ensure that the plow operator maintains a true and consistent alignment. Deviation from the approved alignment more than 1 foot in either direction to avoid obstructions such as boulders, stumps or general vegetation will not be allowed unless approved by the Engineer. Document all approved deviations from the original permitted alignment.~~

~~**557-3.3 Product Locating and Tracking:** For all installations, submit sufficient information to establish the proposed strategy for compliance with the permit.~~

~~(a) Define what reference will be used to control and ensure alignment as permitted will be maintained with respect to line and grade. Also indicate the intervals for checking line and grade and maintain a record at the job site.~~

~~(b) Ensure the equipment is of adequate size and capability to install the project. This includes the equipment manufacturer's information for all power equipment used in the installation.~~

~~(c) Define the means for controlling line and grade.~~

~~Install all facilities in such a way that their location can be readily determined by electronic designation after installation. For non-conductive installations, accomplish this by attaching a minimum of two separate and continuous conductive wires (minimum 12-gauge) either externally, internally, or integrally with the product. Any break in the conductor must be connected by electrical clamp of brass or solder and coated with a rubber or plastic insulator to maintain the integrity of the connection from corrosion.~~

~~**557-4 Documentation.**~~

~~**557-4.1 Plowing Path Report:** Furnish a Plowing Path Report to the Engineer within 14 days of the completion of each installation. Include the following information on the report:~~

~~(a) Location of project and financial project number including the permit number when assigned.~~

~~(b) Name of person collecting data, including title, position and company name.~~

~~(c) Contract Plans station number or reference to a permanent structure within the project right-of-way.~~

~~(d) As-built placement plans showing roadway plan and profile, cross-section and plowing location and elevations every 100 feet along the alignment. Reference shown plan elevations to a Department bench mark when associated with a Department project, otherwise to a USGS grid system and datum, or to the top of an existing Department head wall. These plans must be the same scale in black ink on white paper, of the same size and weight and as the Contract Plans. Submittal of electronic plans data in lieu of hard copy plans may be approved by the Engineer if compatible with the Department software.~~

~~**557-4.2 As-Built Plans:** Submit the completed As-Built Plans to the Engineer within 30 calendar days. Ensure that the plans are dimensionally correct copies of the Contract Plans. Include notes on each plan stating the final plow path, facility diameter and any facility~~

placed out of service. If the facility is a duct, note this, as well as the size and type of product to be placed within the duct as part of the permitted work. Produce the plans as follows:

(a) On the Contract plan view, show the centerline location of each facility installed to an accuracy within 1 inch at the ends and other points physically observed. Show the remainder of the horizontal alignment of the centerline of each facility installed and note the accuracy with which the installation was monitored.

(b) As directed by the Engineer, provide either a profile plan for each path, or a cross section of the roadway at a station specified by the Engineer, or a roadway centerline profile. Show the ground or pavement surface and the crown elevation of each facility installed to an accuracy within 1 inch at the ends and other points physically observed. Show the remainder of the vertical alignment of the crown of each facility installed and note the accuracy with which the installation was monitored. On profile plans for paths crossing the roadway show the Contract Plans stationing of the crossing. On the profile plans for paths paralleling the roadway also show the Contract Plans stationing. If the profile plan for the path is not made on a copy of one of the Contract profile or cross section sheets, use a 10 to 1 vertical exaggeration.

(c) If, during installation, an obstruction is encountered which prevents installation of the product in accordance with this Specification, submit a new installation procedure and revised plans to the Engineer for approval before resuming work along a new alignment. If a section of a plowing path fails without installing a product or it has been removed, show the failed section of the plow path along with the final plow path on the plans. Note the failed path as "Failed Plow Path." Do not leave any products in a failed plow path. If breakage occurs or the plow path fails, remove all products from the broken or failed section of the plow path.

(d) On all of the plans, show the crown elevation, diameter and material type of all utilities encountered and physically observed during installation. For all other obstructions encountered during a subsoil investigation or the installation, show the type of material, horizontal and vertical location, top elevation and lowest elevation observed, and note if the obstruction continues below the lowest point observed.

#### **557-5 Method of Measurement.**

Payment will be based on the length of the installation, measured in place along with the surface of the ground, completed and accepted.

#### **557-6 Basis of Payment.**

Payment will be full compensation for all work specified in this Section, including all installations, from plan point of beginning to plan point of ending (i.e. pull box) at plan depth, removal and disposal of excavated materials such as boulders, stumps, and debris, or grading and backfilling to complete restoration of the site. Bundled product in a single plow will be paid for as a single plow based on the required vibrating plow head size. Separate payment will not be made for individual products in a bundle.

The installation of tracking conductors will be included in the cost of the plow and will not be paid for separately.

No payment will be made for a failed plow path or incomplete installations. The removal of all materials installed in a failed plow path will be at no cost to the Department.

No payment will be made for installations until the Plowing Path Report has been delivered to the Engineer.

Payment will be made under:

Pay Item No. 557-1 Vibratory Plowing—per foot of aggregate product pull diameter.

**700-1.2.4 Retroreflective Sign Sheeting:** Use signs that meet the material and process requirements of Section 994.

Use Type XI sheeting for all regulatory, warning and overhead signs. The R1-1, R1-2, R5-1 and R5-1a signs must use a sheeting system that includes a colorless film overlay.

Type XI sheeting shall also be used for all limited access advance exit and exit guide signs.

Use Type IV yellow-green fluorescent sheeting for school S1-1, S3-1, S4- 3, S4-5 and supplemental panels used with S1-1 signs. Do not mix signs having fluorescent yellow-green sheeting with signs having yellow retroreflective sheeting.

Use fluorescent orange for all work zone signs. Roll-up signs shall meet the requirements of Type VI sheeting.

Use Type IV sheeting for all other signs.

# **DESIGN STANDARDS MODIFICATIONS**

## **Modifications to Year 2010, 2012/2013, and 2013 Design Standards**

Index No. 600 (Sheet 1 of 13), Index reorganized. "GENERAL INFORMATION FOR TRAFFIC CONTROL THROUGH WORK ZONES", "ABBREVIATIONS", changed description of "TMA" to read: "Truck/Trailer Mounted Attenuator", and changed "VECP Value Engineering Change Proposal" to "CSIP Cost Savings Initiative Proposal", also changed throughout Index 600 series.

Index No. 600 (Sheet 2 of 13), added the note "All temporary traffic control devices shall be on either the Department's Qualified Product List (QPL) or the Department's Approved Products List (APL). Ensure the appropriate QPL or APL number is permanently marked on the device in a readily visible location" to the TEMPORARY TRAFFIC CONTROL DEVICES

Index No. 600 (Sheet 2 of 13), Added a sentence to end of SIGHT DISTANCE note in reference to "Construction equipment".

Index No. 600 (Sheet 2 of 13), Replaced "temporary traffic control" with "pedestrian longitudinal channelizing".

Index No. 600 (Sheet 3 of 13), Rearranged notes, HIGH VISIBILITY SAFETY APPAREL and REGULATORY SPEEDS IN WORK ZONES were moved over from sheet 4. Removed detail of TYPICAL PLACEMENT OF TEMPORARY RAISED RUMBLE STRIPS and TEMPORARY RAISED RUMBLE STRIP SET to sheet 4. Under the heading SUPERELEVATION replaced the term normal "cross slope" in both the text description and in the heading of the table with the term normal "crown".

Index No. 600 (Sheet 3 of 13), Added "107/2004 or " to HIGH-VISIBILITY SAFETY APPAREL.

Index No. 600 (Sheet 3 of 13), Added quotation mark in front of High-Visibility.

Index No. 600 (Sheet 4 of 13), HIGH VISIBILITY SAFETY APPAREL and REGULATORY SPEEDS IN WORK ZONES notes moved to sheet 3. FLAGGER CONTROL and SURVEY WORK ZONES moved to sheet 5. Added the following details: TYPICAL PLACEMENT OF TEMPORARY RAISED RUMBLE STRIPS, TEMPORARY PORTABLE RUMBLE STRIP SET.

Index No. 600 (Sheet 4 of 13), Deleted the flashing light and flag from the ONE LANE ROAD AHEAD signs.

Index No. 600 (Sheet 4 of 13), Moved BALLASTED RUMBLE STRIPS to match RAISED RUMBLE STRIPS.

Index No. 600 (Sheet 5 of 13), Revised INTERSECTING ROAD SIGNING note. Removed SIGN PLACEMENT note, added FLAGGER CONTROL and SURVEY WORK ZONES notes, revised standard sign number for the END ROAD WORK SIGN from G20-2A to G20-2.

Index No. 600 (Sheet 6 of 13), Revised Details and notes

Index No. 600 (Sheet 6 of 13), Added note No. 2 under GENERAL NOTES. Changed note No. 7 under POST MOUNTED SIGN NOTES, from "3 ft2 " to "5 ft2 " and removed "for single post... post mounting".

Index No. 600 (Sheet 7 of 13), Added new smaller PROJECT INFORMATION SIGN DETAIL 45 MPH ORLESS. Added reference to Index 11200 for splicing of panel and sheeting. New note 3, Payment for Project Information sign shall be included in Lump Sum MOT.

Index No. 600 (Sheet 8 of 13), Added RUMBLE STRIPS AHEAD (MOT-18-10) and BE PREPARED TOSTOP (W3-4) signs, changed designation of WORKERS sign to (W21-1) for the symbol sign and (W21-1A) for the word message sign; and added Graphic sign with motorcycle (W8-15P) under GROOVED PAVEMENT AHEAD (MOT-15-06) and LOOSE GRAVEL (W8-7) sign.

Index No. 600 (Sheet 9 of 13), Added note that Standard Orange Flags are not to be used on portable sign supports. Added note to clarify that Type B lights are not required on portable sign supports and revised REMOVING PAVEMENT MARKINGS note. Changed "ADVANCED WARNING ARROW PANEL " to "ADVANCED WARNING ARROW BOARD".

Index No. 600 (Sheet 10 of 13), Added "PEDESTRIAN AND/OR BICYCLIST WAY DROP-OFF CONDITION NOTES to sheet. Added criteria for bike and sidewalk drop-off to match PPM ch 8.8 criteria.

Index No. 600 (Sheet 11 of 13), Added new Note 5, and changed "should" to "shall" in note No. 2 under PLACEMENT OF BUSINESS ENTRANCE SIGNS.

Index No. 600 (Sheet 11 of 13), Added to TEMPORARY LANE SEPARATOR notes. Revised BUSINESS ENTRANCE SIGN notes and deleted note No. 5.

Index No. 600 (Sheet 12 of 13), "CHANNELIZING AND LIGHTING DEVICE NOTES", deleted notes 1 and 2 and renumbered remaining notes. Added MODULAR DEFORMABLE DEVICE detail.

Index No. 600 (Sheet 12 of 13), Added Longitudinal Channelizing Device (LCD). Added note 11 and note 12 to the GENERAL NOTES.

Index No. 600 (Sheet 12 of 13), Added first sentence to note No. 11.

Index No. 600 (Sheet 13 of 13), Removed type D and E RPM's from notes.

Index No. 602, (Sheet 1), Deleted Note 2 "WORKERS sign to be removed or fully covered when no work is being performed."

Index No. 602, (Sheet 1), Added " \* Midway between signs" under the DISTANCE BETWEEN SIGNS table.

Index No. 603 (Sheet 2 of 2), Added new notes #1 and 5

Index No. 607, (Sheet 1), Updated signing and arrow panel display in accordance with 2009 MUTCD changes.

Index No. 612, (Sheet 1), Corrected SYMBOLS text for Sign with 18" X 18" (Min.) Orange Flag

Index No. 613 (Sheet 1 of 2), Revised Duration Notes

Index No. 615, (Sheet 1), Corrected merging traffic sign direction.

Index No. 616 (Sheet 1 of 3), Revised Duration Notes

Index No. 616 (Sheet 3 of 3), Changed "significant right turning" to "significant left turning" in note No. 1.

Index No. 619 (Sheet 1 of 2), Added ADVANCED WARNING ARROW BOARD to drawing. Revised sheet layout, and moved details to new sheet 2.

Index No. 619 (Sheet 2 of 2), New sheet

Index No. 623 (Sheet 1), New Index

Index No. 625, (Sheet 1), Modified note No. 5.

Index No. 628 (Sheet 1), Changed Detail so that there is nothing within the Buffer zone

Index No. 635, (Sheet 1), Added Table for Buffer Space

Index No. 660, (Sheet 1), Added Pedestrian LCD to SYMBOLS and MID-BLOCK SIDEWALK CLOSURE WITH TEMPORARY WALKWAY.

Index No. 660, (Sheet 1), Added note No. 11 to GENERAL NOTES.