

**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 4/8" x 1/4" HDPE BARS MANUFACTURED BY THE TENSAR CORPORATION, MORROW, GEORGIA.

1.3 GEOTEXTILE FABRIC SHALL BE 6 OZ. NON-WOVEN NEEDLE PUNCHED POLYPROPYLENE GEOTEXTILE WITH MINIMUM PERMITIVITY OF 1.0 sec⁻¹.

1.4 TENSAR EARTH TECHNOLOGIES, INC. SHALL PROVIDE TO THE CONTRACTOR THE FOLLOWING MATERIALS ONLY
- PRECAST CONCRETE FACING PANELS
- GEOGRID, ROLL FORM
- GEOGRID CONNECTION DEVICES
- BEARING PADS
- JOINT COVER FABRIC

2.0 TECHNICAL REQUIREMENTS

2.1 FILL MATERIALS SHALL BE PLACED FROM NEAR THE BACK FACE OF THE WALL AND THEN TOWARDS THE TAILS OF THE GEOGRID TO ENSURE TENSIONING.

2.2 FILL SHALL BE COMPACTED AS SPECIFIED IN SECTION 548 OF THE PROJECT SPECIFICATIONS.

2.3 AN APPROVED SET OF SHOP 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 FRONT 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 SLACK IN THE GEOGRIDS.

3.4 TRACKED CONSTRUCTION EQUIPMENT SHALL NOT BE OPERATED DIRECTLY ON THE GEOGRID. A MINIMUM FILL THICKNESS OF SIX INCHES 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 10 MPH. 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 EXPRESSED PRIOR WRITTEN CONSENT OF TENSAR EARTH TECHNOLOGIES, INC. DESIGN ENGINEER.

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 OF FOUNDATION MATERIAL TO BE USED IN THE DESIGN OF THE WALL SYSTEM.

6.1.1 THE CONTRACTOR SHALL VERIFY THAT THE SOIL MATERIALS COMPLY WITH THE DESIGN PARAMETERS AS STATED IN THE CONTROL 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 EARTH TECHNOLOGIES, INC. 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 = 0.58 - 0.8
PERCENT COVERAGE OF GEOGRID: (ONE ROLL WIDTH) = 89%

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 = 250 psf

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 CONSTRUCTOR. 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 TO THE 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.

7.8 SEE CONTROL DRAWINGS, FDOT STANDARD SPECIFICATIONS AND PROJECT SPECIAL PROVISIONS FOR ADDITIONAL REQUIRED MATERIALS AND METHODS.

7.9 A COPY OF THE TENSAR EARTH TECHNOLOGIES, INC. "ARES RETAINING WALL SYSTEM CONSTRUCTION AND QUALITY CONTROL MANUAL" SHALL BE ON-SITE AT ALL TIMES DURING WALL CONSTRUCTION.

THIS SYSTEM MAY BE USED IN ALL ENVIRONMENTS AS NOTED IN THESE PLANS

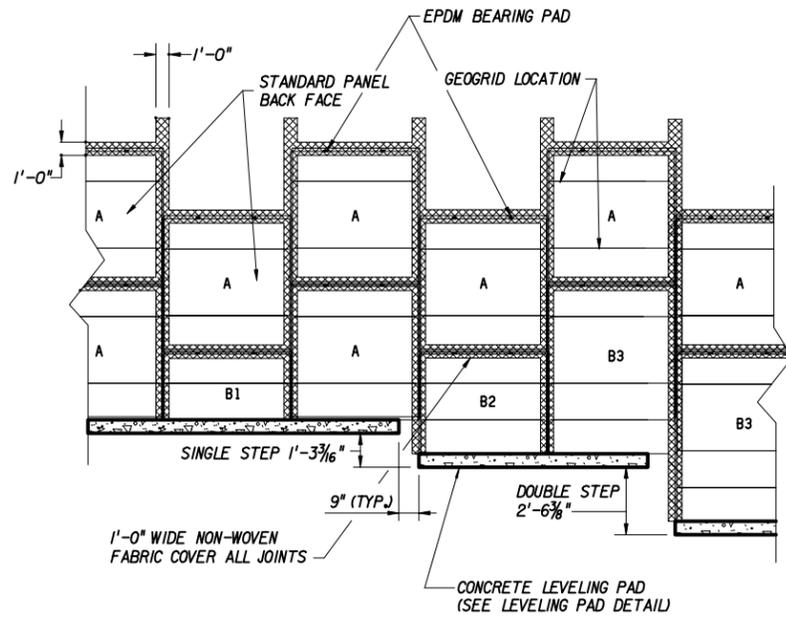
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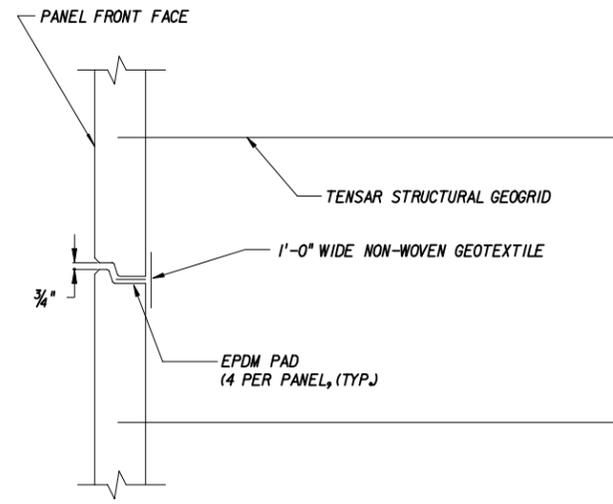
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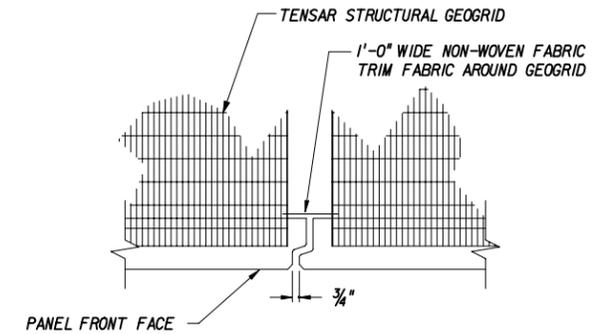
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RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES MSE RETAINING WALL				
Names	Dates	Approved By <i>[Signature]</i>		
Designed By	BS	3/03	State Structures Design Engineer	
Drawn By	WL	3/03	Revision	Sheet No. Index No.
Checked By	JSB	3/03	04	1 of 17 5025



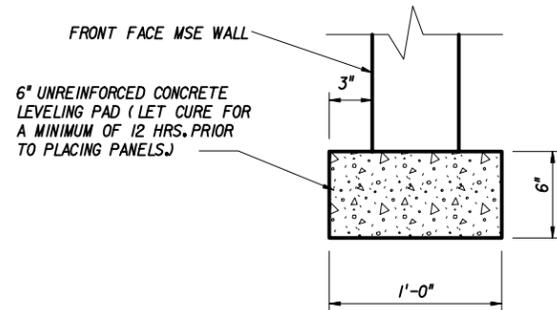
TYPICAL LEVELING PAD STEP AND FABRIC COVERAGE DETAIL
NOT TO SCALE



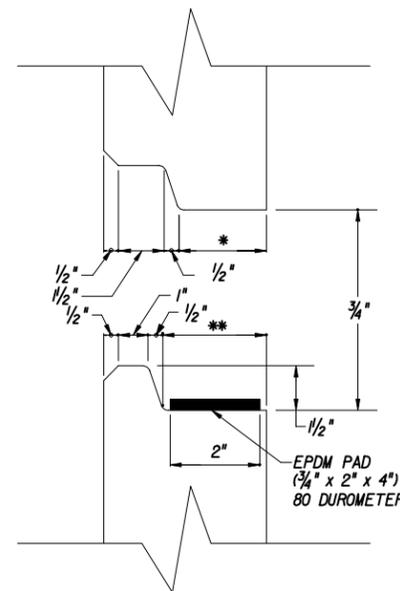
HORIZONTAL JOINT DETAIL
NOT TO SCALE



VERTICAL JOINT DETAIL



LEVELING PAD DETAIL
NOT TO SCALE



PANEL JOINT DETAIL
NOT TO SCALE

- * - 3" FOR MODERATELY & SLIGHTLY AGGRESSIVE ENVIRONMENT
- 4 3/8" FOR EXTREMELY AGGRESSIVE ENVIRONMENT
- ** - 3 1/2" FOR MODERATELY & SLIGHTLY AGGRESSIVE ENVIRONMENT
- 4 1/8" FOR EXTREMELY AGGRESSIVE ENVIRONMENT

THIS SYSTEM MAY BE USED IN ALL ENVIRONMENTS.

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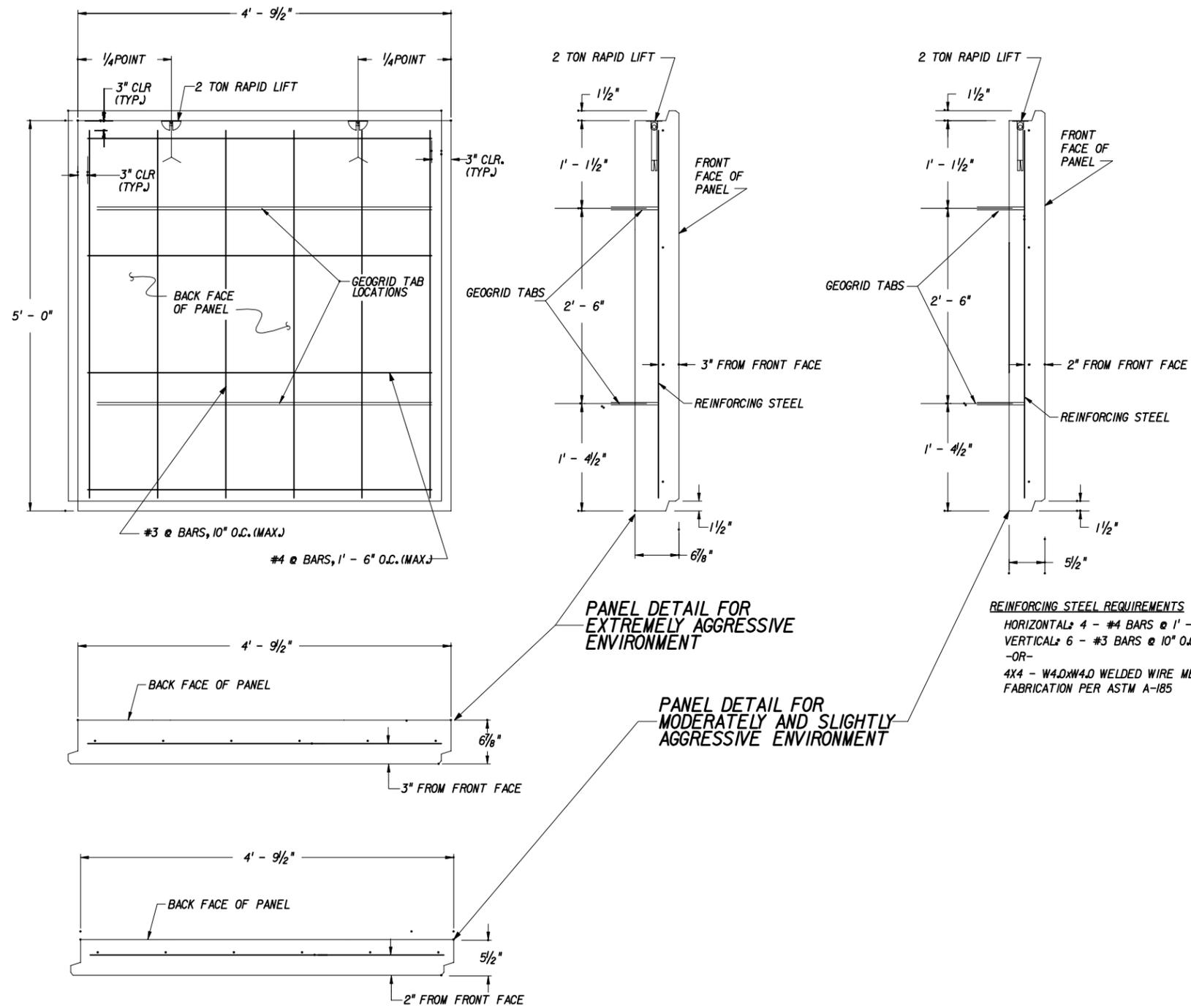
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RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES MSE RETAINING WALL				
	Names	Dates	Approved By <i>W. J. [Signature]</i>	
Designed By	BS	3/03	State Structures Design Engineer	
Drawn By	JSB	3/03	Revision	Sheet No. Index No.
Checked By	WL	3/03	04	2 of 17 5025



REINFORCING STEEL REQUIREMENTS
 HORIZONTAL: 4 - #4 BARS @ 1' - 6" O.C. (MAX.)
 VERTICAL: 6 - #3 BARS @ 10" O.C. (MAX.)
 -OR-
 4X4 - W4.0XW4.0 WELDED WIRE MESH
 FABRICATION PER ASTM A-185

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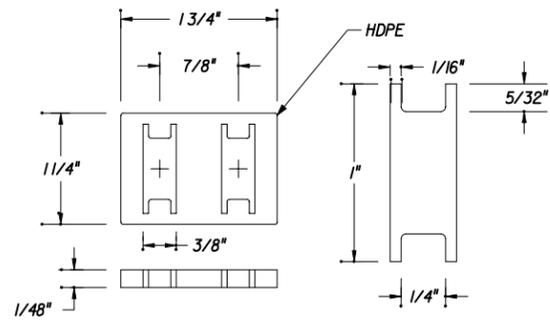
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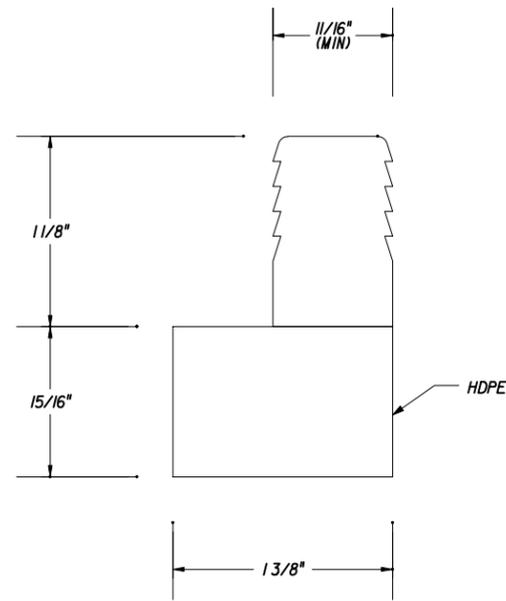
TYPICAL PANEL DETAILS - STANDARD A PANEL

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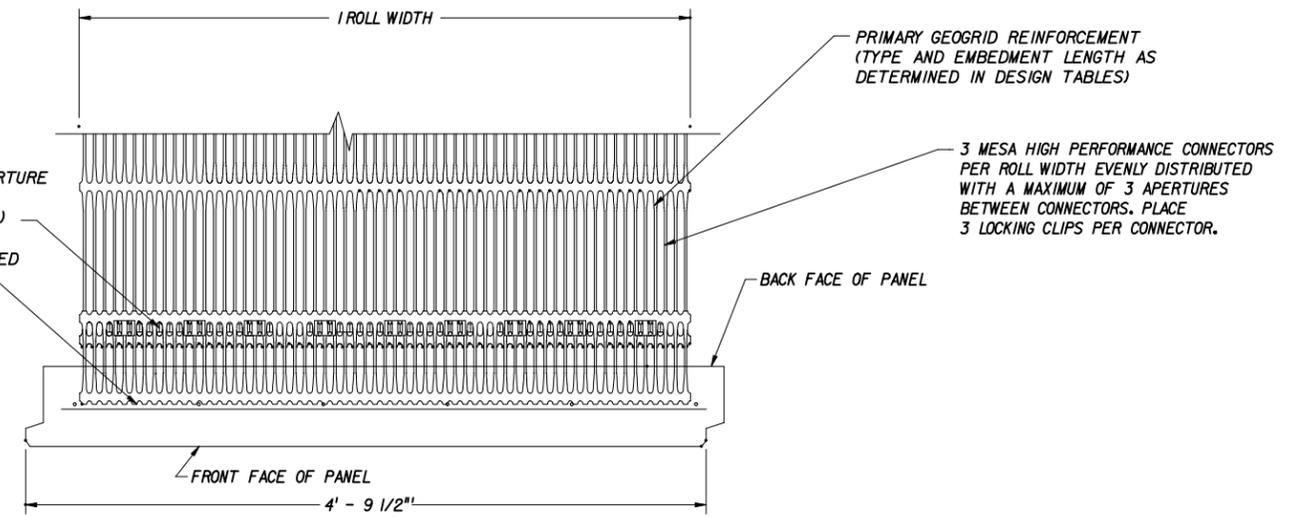
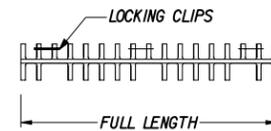
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				Index No. 5025



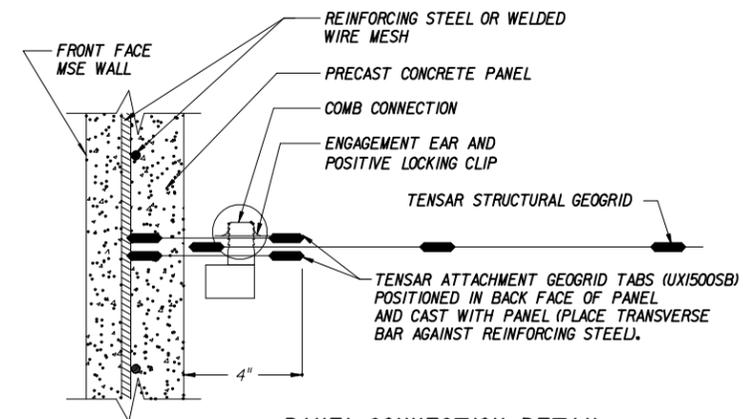
LOCKING CLIP
NOT TO SCALE



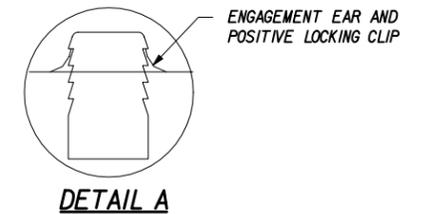
MESA HIGH PERFORMANCE CONNECTOR
NOT TO SCALE



CONNECTION DETAIL PLAN VIEW (89% COVERAGE)
MAXIMUM COVERAGE
NOT TO SCALE



PANEL CONNECTION DETAIL
NOT TO SCALE



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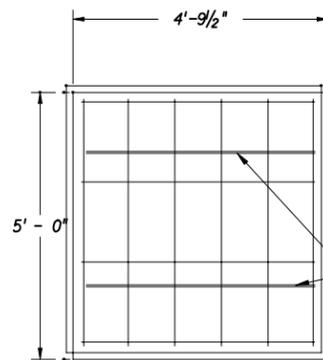
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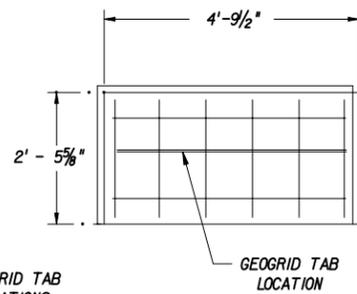
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RETAINING WALL SYSTEM
TENSAR EARTH TECHNOLOGIES
MSE RETAINING WALL

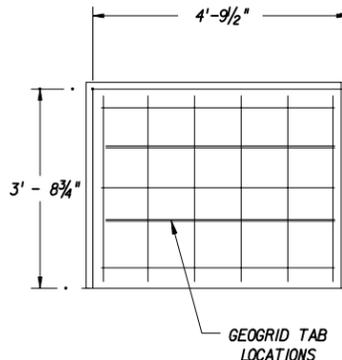
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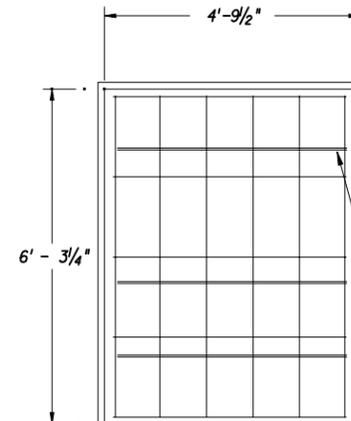
STANDARD A PANEL



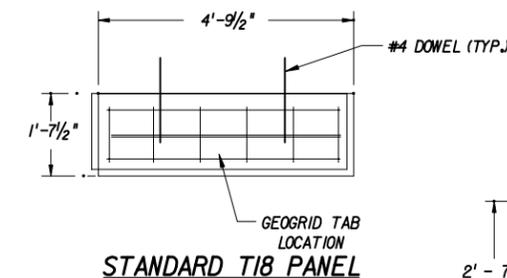
STANDARD B1 PANEL



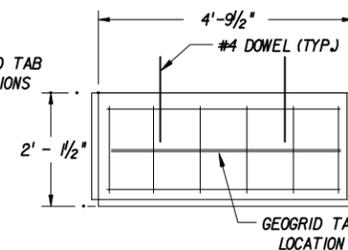
STANDARD B2 PANEL



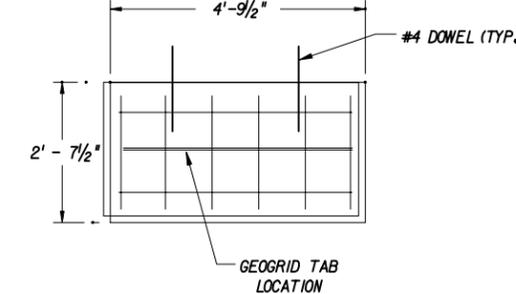
STANDARD B3 PANEL



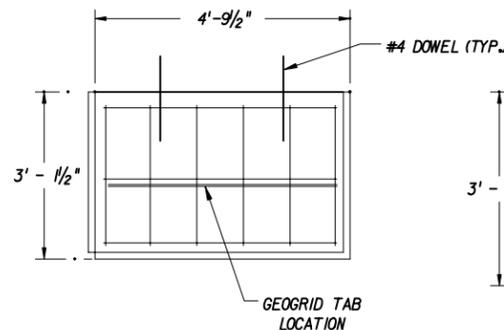
STANDARD T18 PANEL



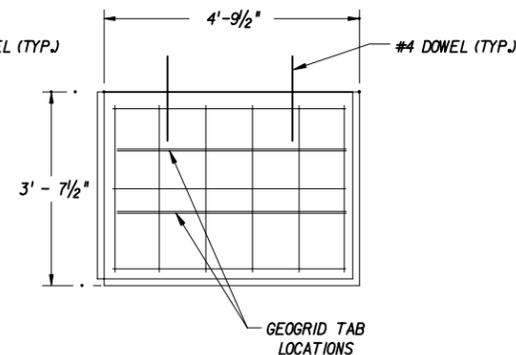
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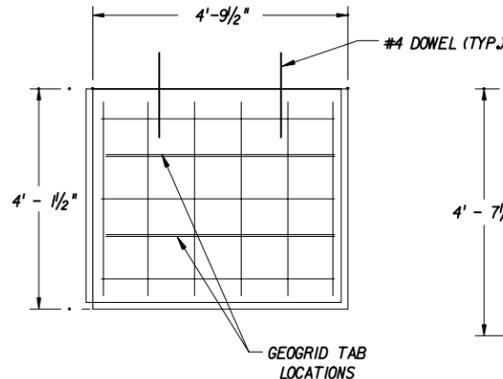
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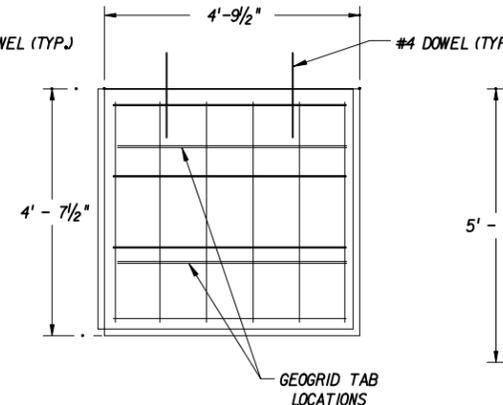
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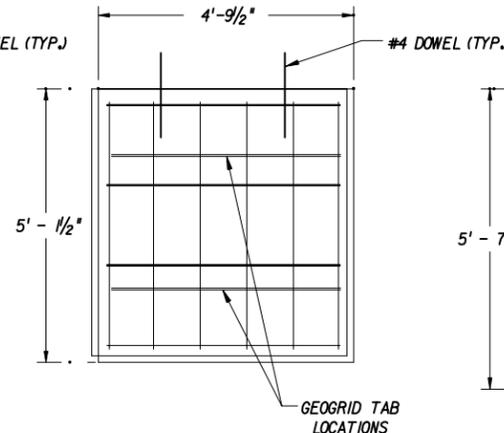
STANDARD T42 PANEL



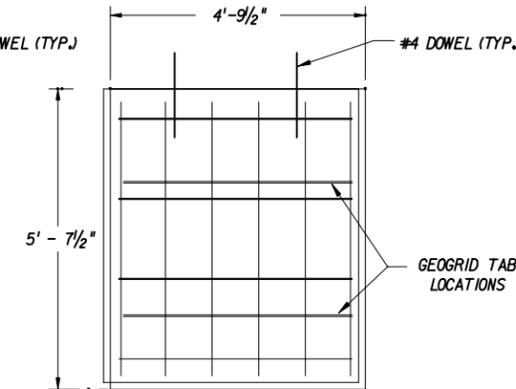
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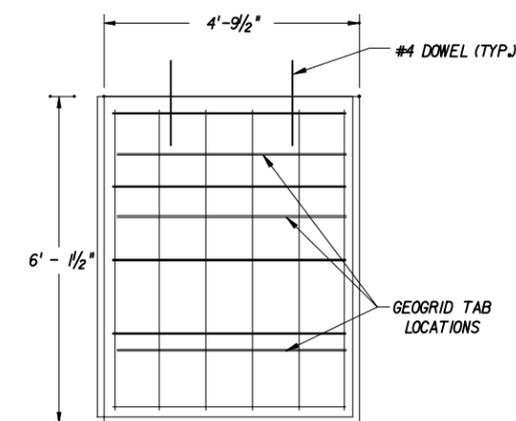
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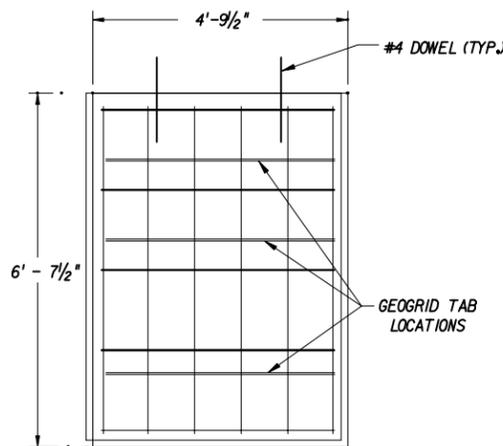
STANDARD T60 PANEL



STANDARD T66 PANEL



STANDARD T72 PANEL



STANDARD T78 PANEL

ALL PANELS ARE SHOWN BACK FACE VIEW

STANDARD STEEL LAYOUT
 REINFORCING STEEL REQUIREMENTS
 HORIZONTAL: #4 BARS (60 KSI) @ 1' - 6" O.C. (MAX.)
 VERTICAL: #3 BARS (60 KSI) @ 10" O.C. (MAX.)
 OR
 STANDARD WWF LAYOUT
 REINFORCING STEEL REQUIREMENTS
 4X4-W4.0XW4.0 WELDED WIRE MESH
 FABRICATION PER ASTM A-185

— GEOGRID TAB LOCATIONS

ALL TOP PANELS WILL HAVE 2 #4 DOWELS
 CAST 6" INTO THE TOP OF EACH PANEL.



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.

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DESIGN OR CONSTRUCTION.

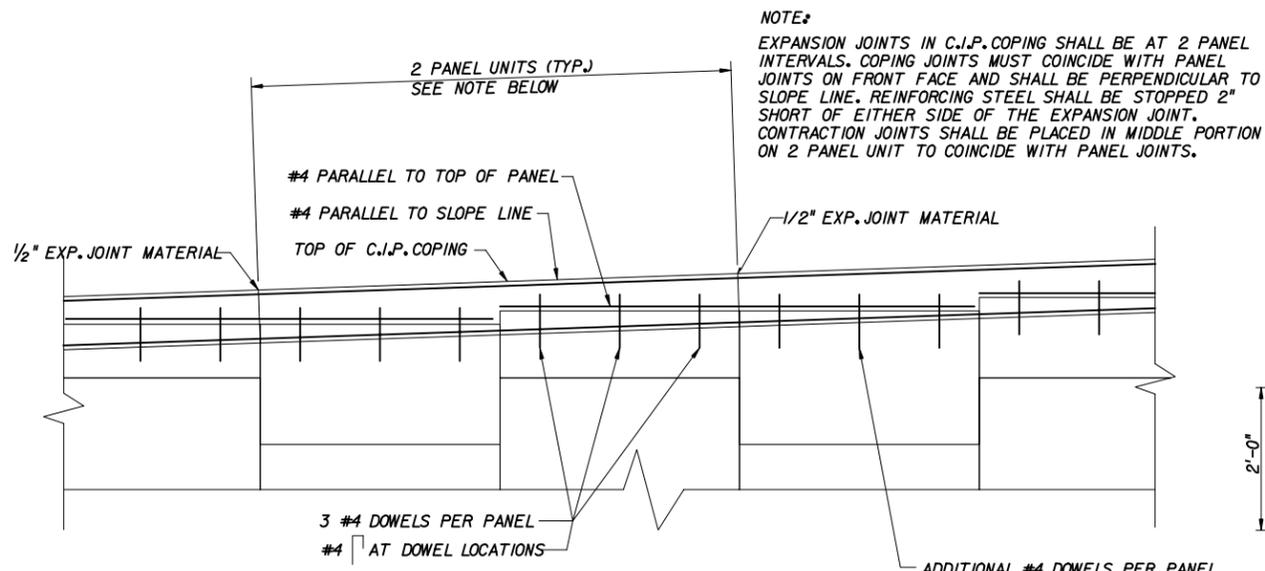
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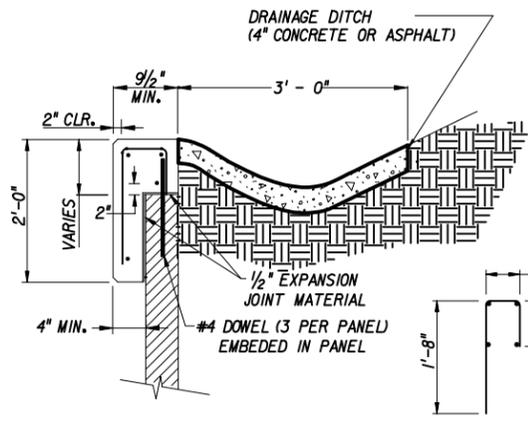
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**RETAINING WALL SYSTEM
 TENSAR EARTH TECHNOLOGIES
 MSE RETAINING WALL**

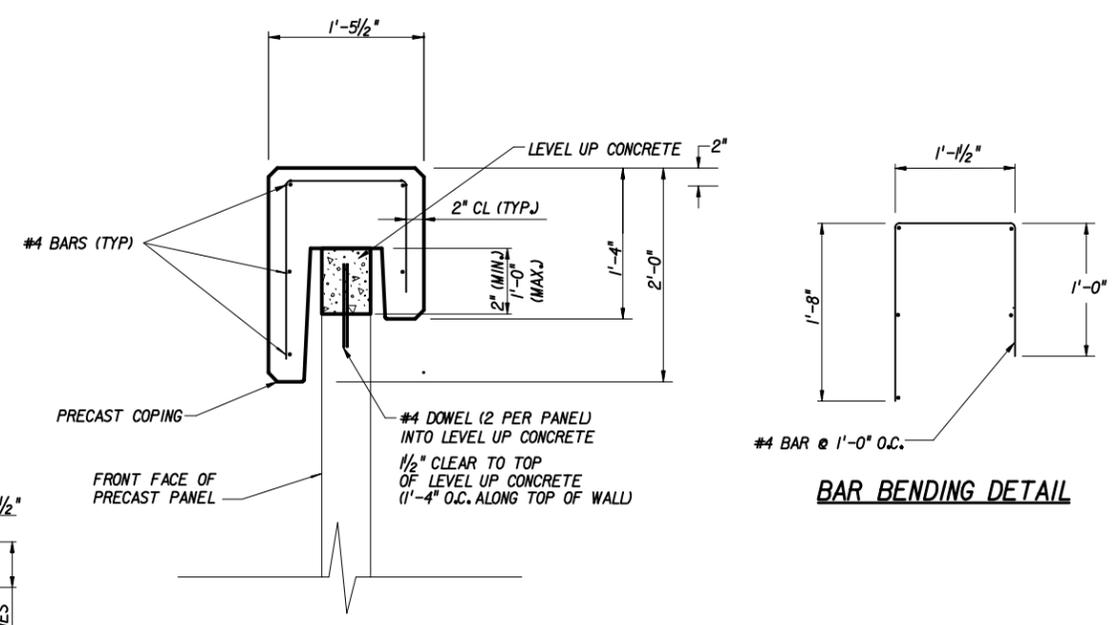
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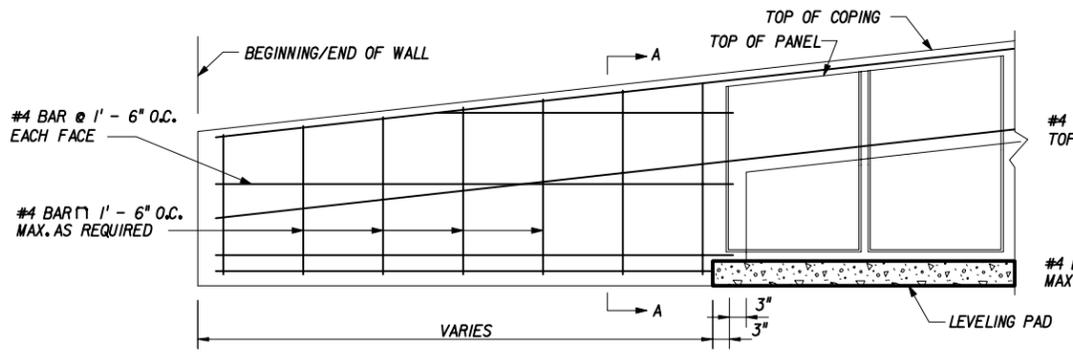
C.I.P. COPING PARTIAL ELEVATION VIEW
NOT TO SCALE



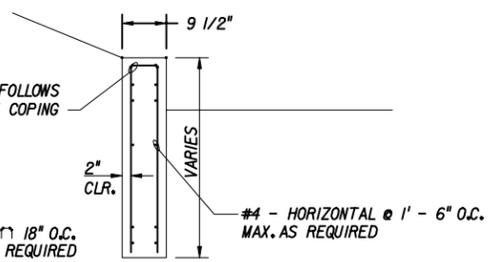
C.I.P. COPING WITH SWALE
NOT TO SCALE



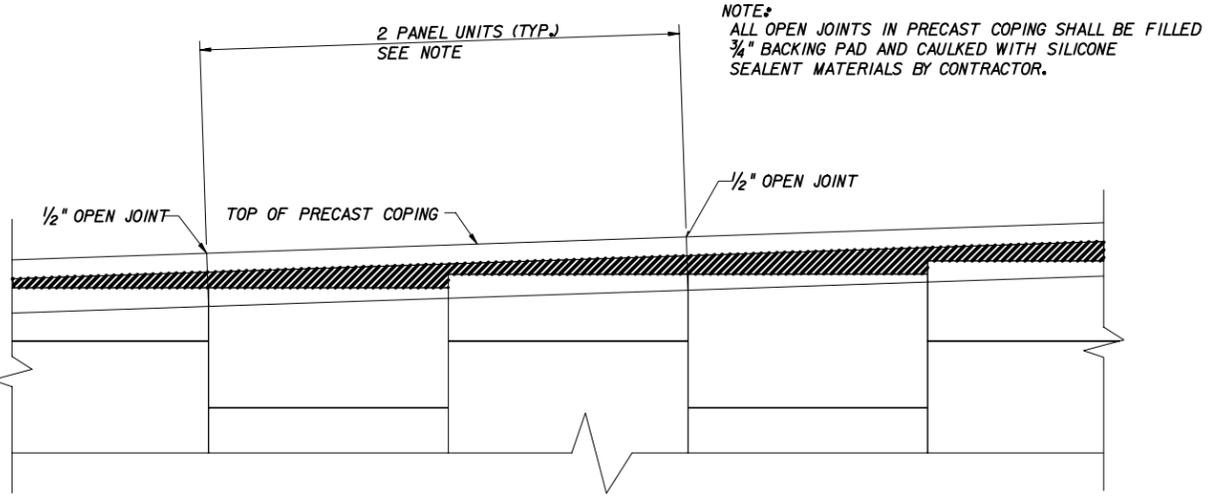
PRECAST COPING SECTION
NOT TO SCALE



COPING ENCLOSURE DETAIL
NOT TO SCALE



SECTION A-A



PRECAST COPING PARTIAL ELEVATION VIEW
NOT TO SCALE

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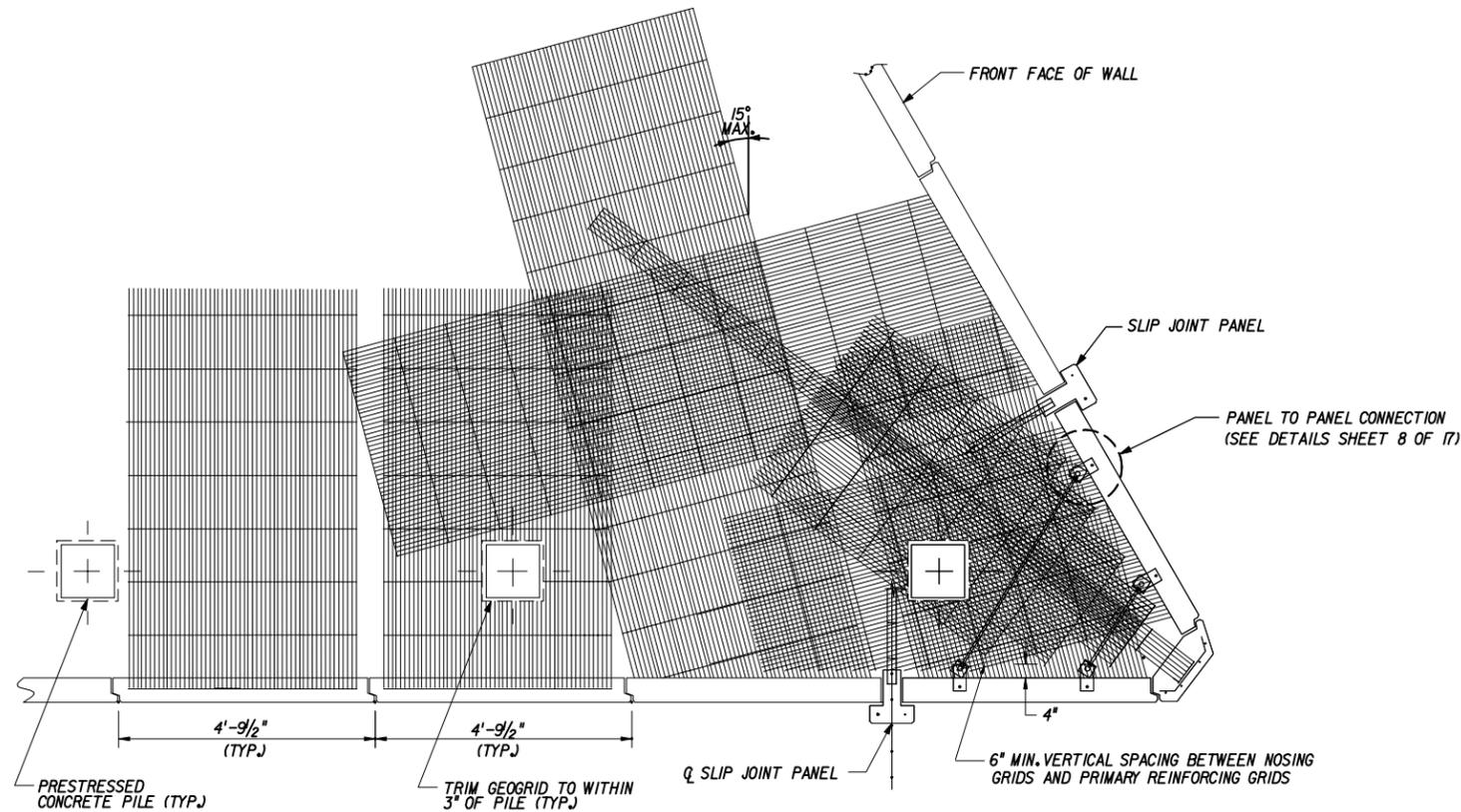
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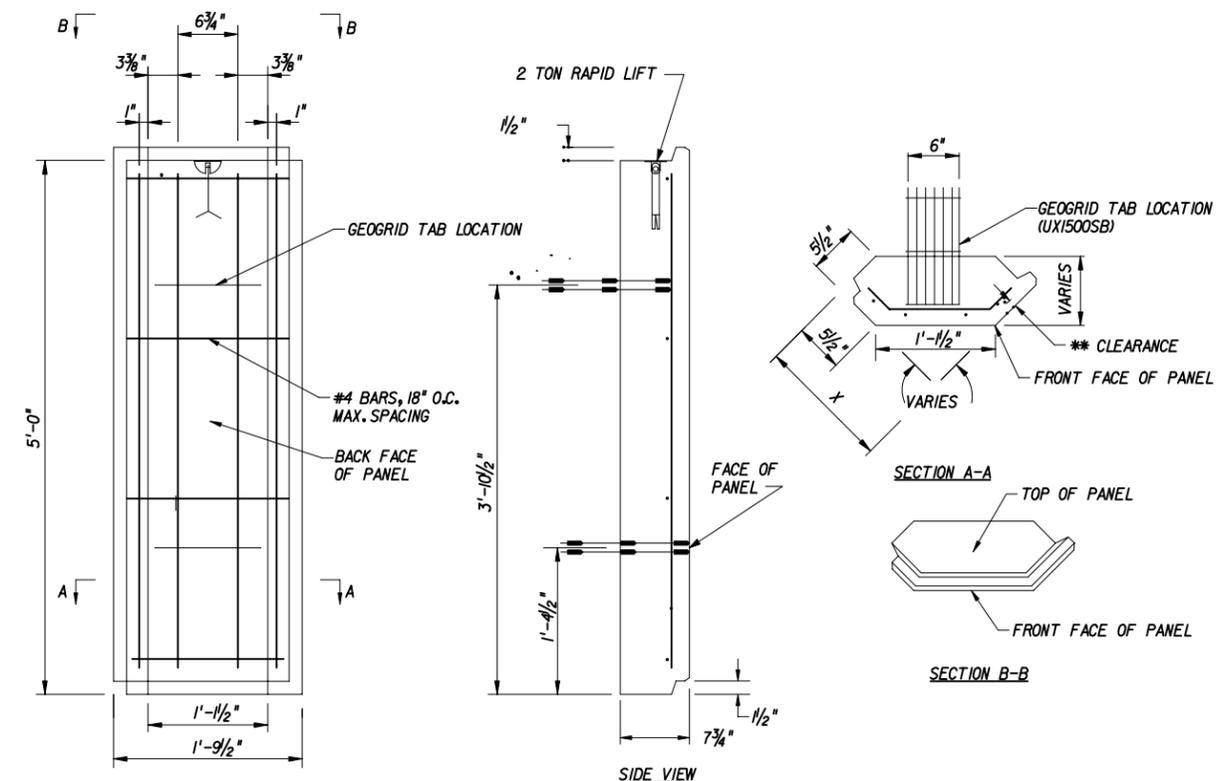


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RETAINING WALL SYSTEM TENSAR EARTH TECHNOLOGIES MSE RETAINING WALL				
Names	Dates	Approved By <i>[Signature]</i>		
Designed By BS	3/03	State Structures Design Engineer		
Drawn By WL	3/03	Revision	Sheet No.	Index No.
Checked By JSB	3/03	04	6 of 17	5025

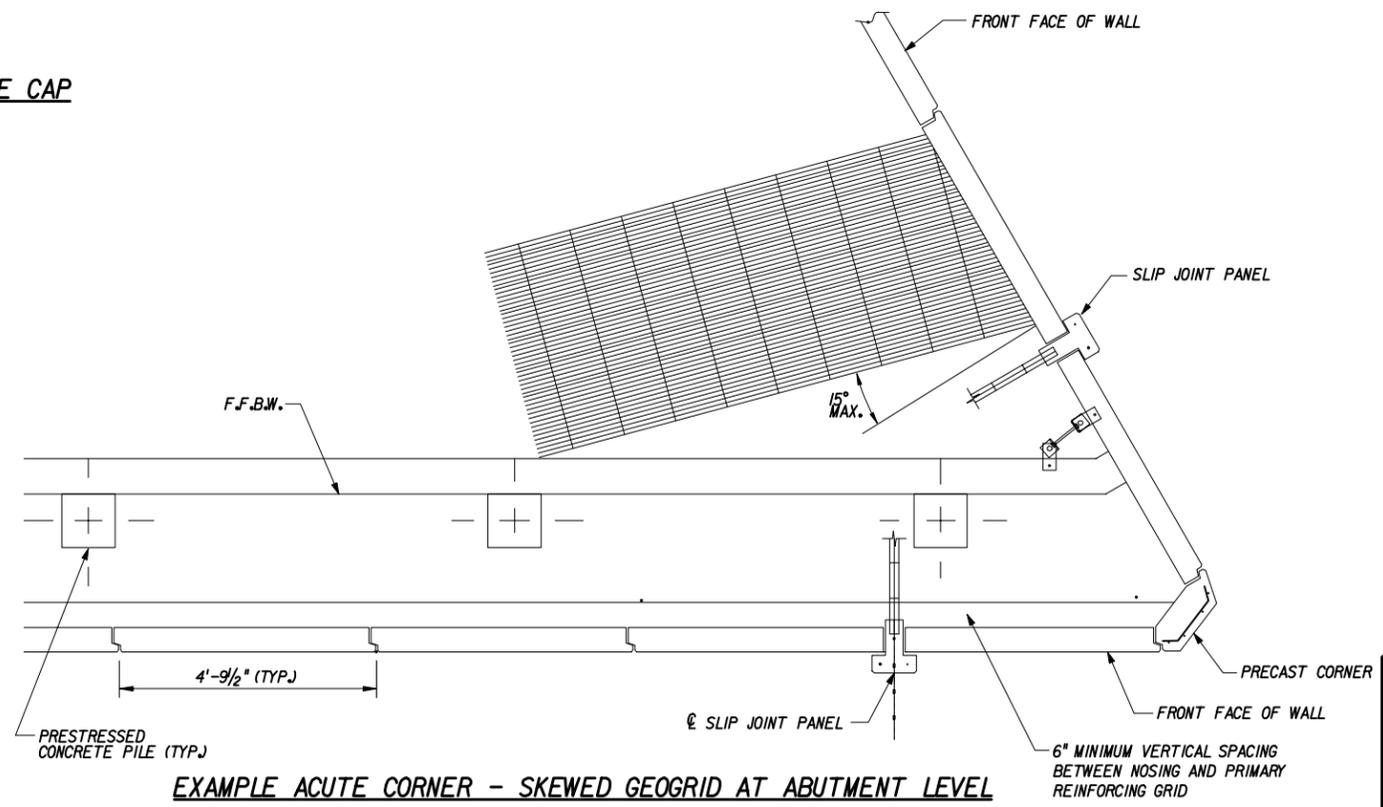


LESS THAN 75° ACUTE CORNER - SKEWED GEOGRID UNDER PILE CAP
 (SEE DETAIL BELOW FOR BIN REINFORCEMENT)



ACUTE CORNER ELEMENT DETAIL

** VARIES
 3" FOR MARINE ENVIRONMENTS
 2" FOR MODERATELY OR SLIGHTLY AGGRESSIVE ENVIRONMENTS



EXAMPLE ACUTE CORNER - SKEWED GEOGRID AT ABUTMENT LEVEL

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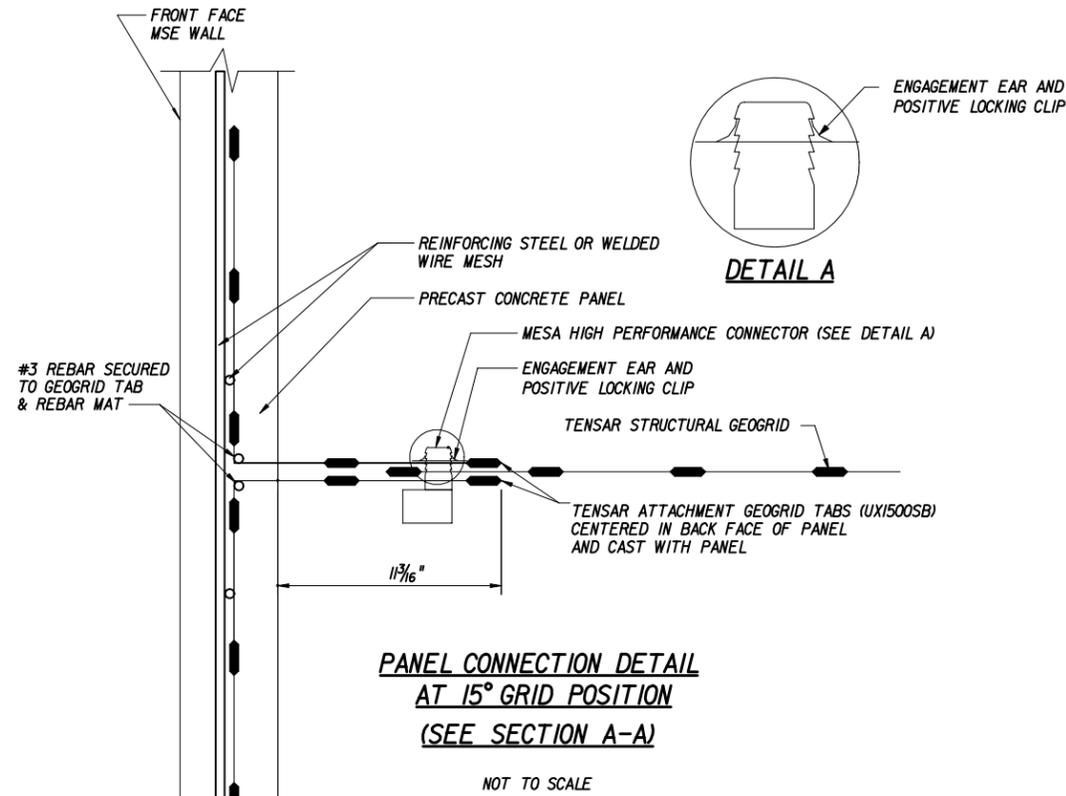
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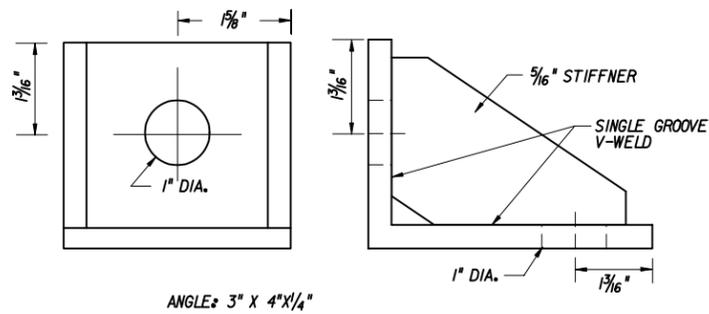
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Drawn By	WL	3/03	Revision	Sheet No.
Checked By	JSB	3/03	04	7 of 17
				Index No. 5025



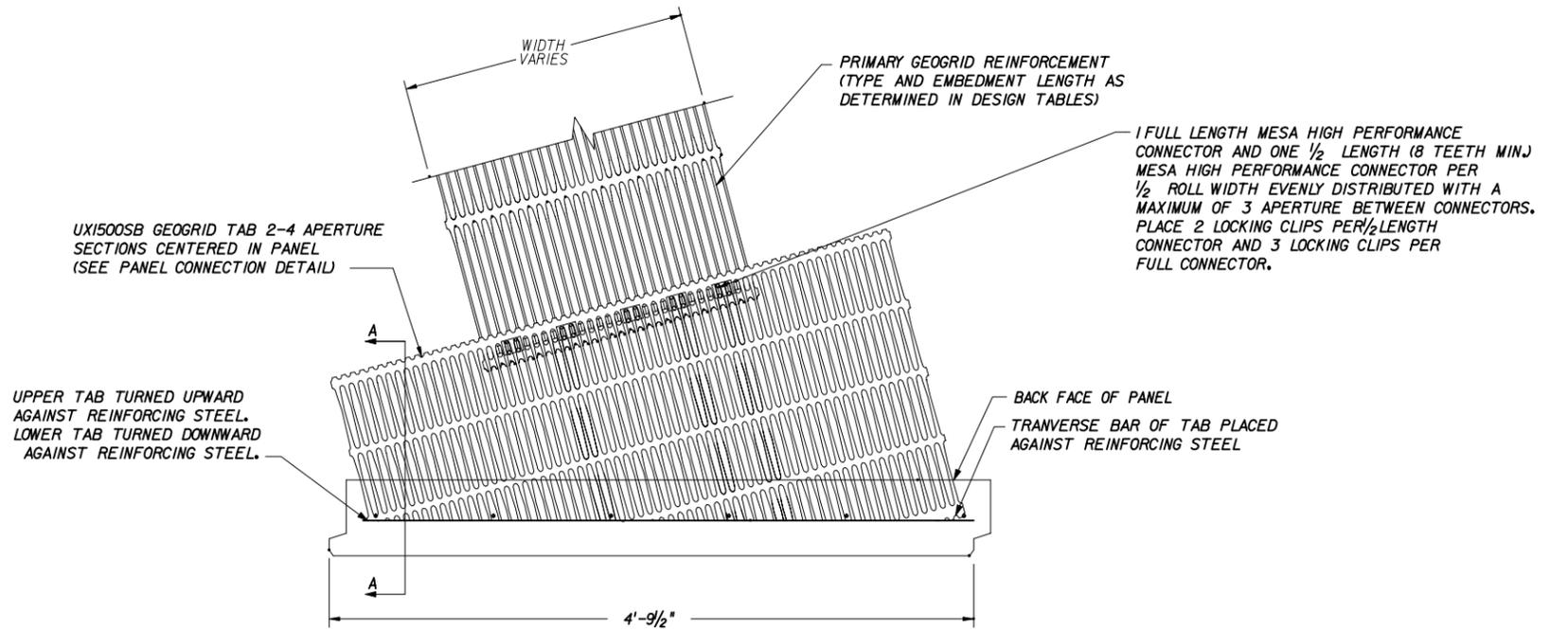
**PANEL CONNECTION DETAIL
AT 15° GRID POSITION
(SEE SECTION A-A)**

NOT TO SCALE



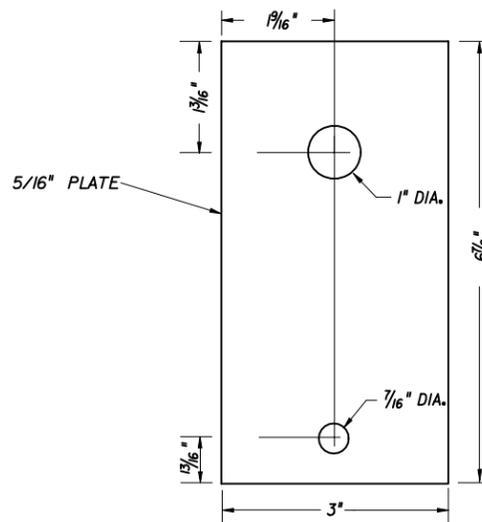
ANGLE: 3° X 4° X 1/4"

CONNECTION BOX

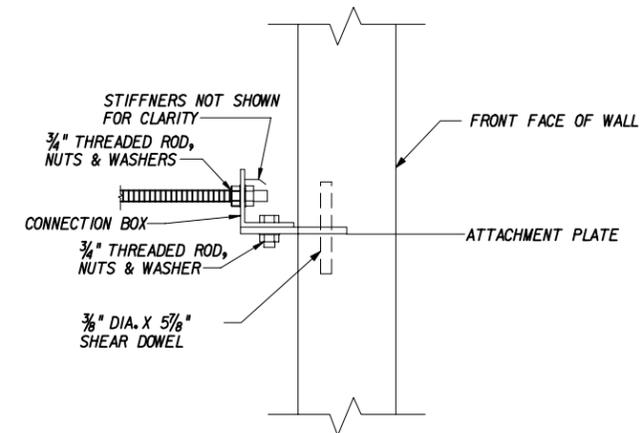


CONNECTION DETAIL PLAN VIEW AT 15° GRID POSITION

NOT TO SCALE



ATTACHMENT PLATE



PANEL TO PANEL ATTACHMENT

FABRICATION ATTACHMENT STEEL NOTES:

1. ALL FABRICATED STEEL PARTS SHALL BE HOT DIP GALVANIZED AFTER FABRICATION FOR MODERATELY OR SLIGHTLY AGGRESSIVE ENVIRONMENTS.
2. ALL FABRICATED STEEL PARTS SHALL BE FABRICATED FROM 316 L GRADE STAINLESS STEEL FOR USE IN 100 YR FLOOD PLAIN + 2' (SALT WATER ZONE OF INFLUENCE).
3. ALL DIMENSIONS ARE MINIMUM REQUIREMENT

THIS SYSTEM MAY BE USED IN ALL ENVIRONMENTS.

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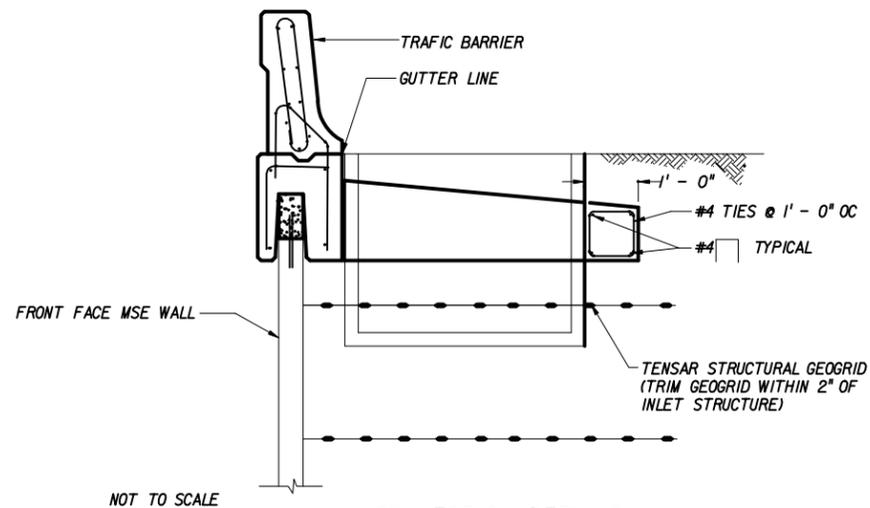
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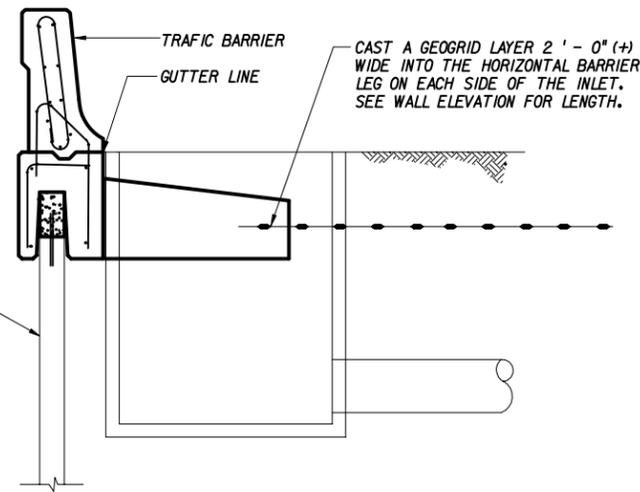


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CONNECTION DETAILS

SECTION A-A

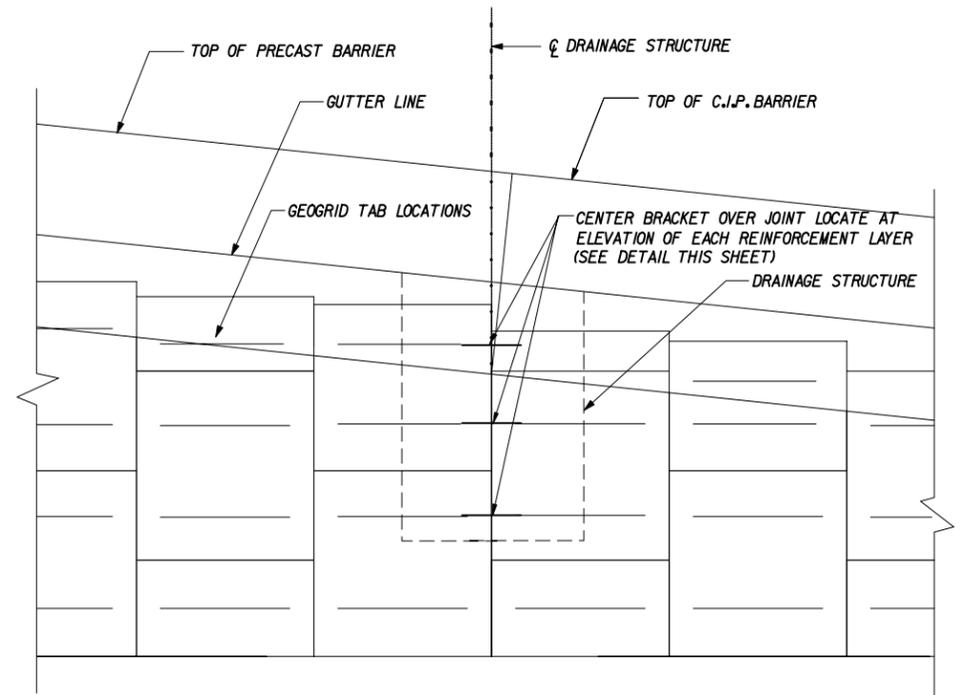
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DETAIL OF TENSAR PANELS @ INLETS

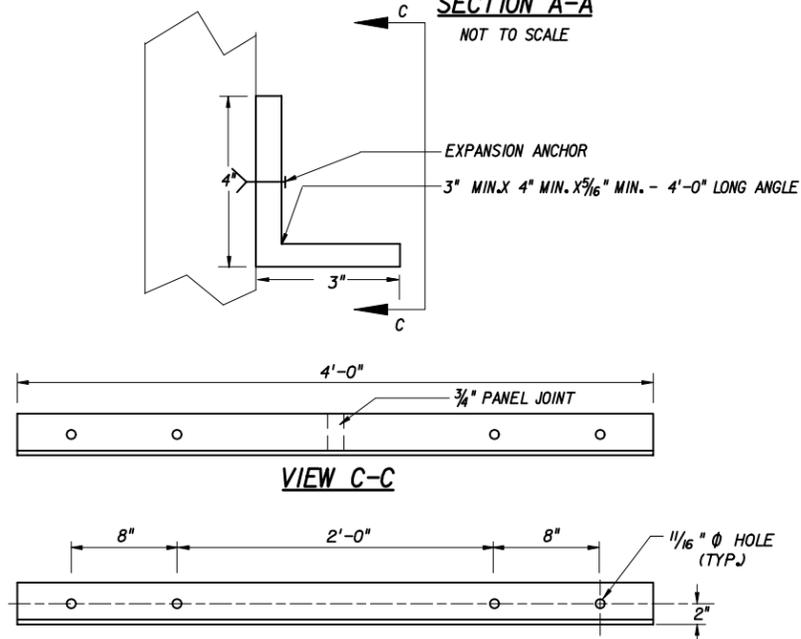
SECTION B-B

NOT TO SCALE



PARTIAL ELEVATION - WALL @ DRAINAGE INLET

NOT TO SCALE



CENTER BRACKET OVER JOINT DETAIL

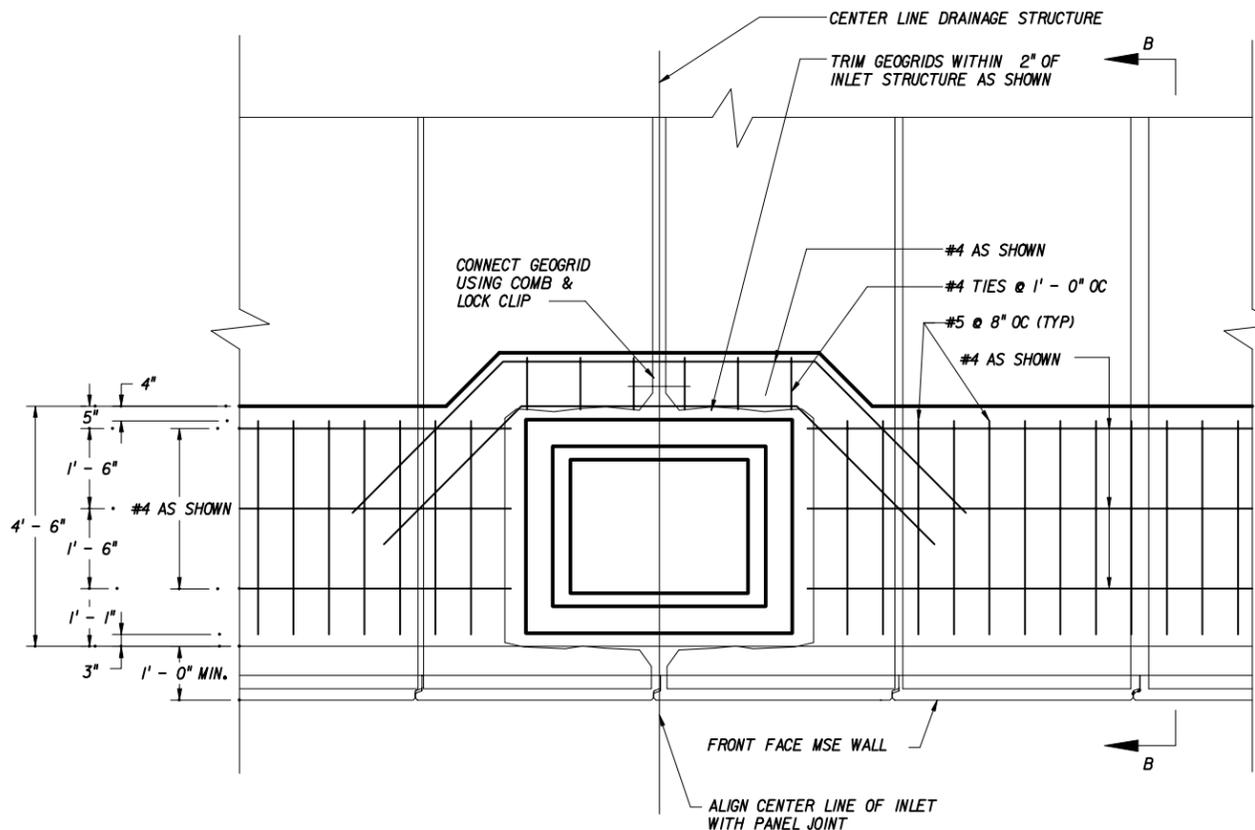
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- NOTES:**
1. ALL FABRICATED STEEL PARTS SHALL BE HOT DIP GALVANAIZED AFTER FABRICATION FOR MODERATELY OR SLIGHTLY AGGRESSIVE ENVIRONMENT
 2. ALL FABRICATED STEEL PARTS SHALL BE FABRICATED FROM 316 L GRADE STAINLESS STEEL FOR USE IN 100 YR FLOOD PLAIN + 2' (SALT WATER ZONE OF INFLUENCE)
 3. ANCHOR SHALL BE HILTI HSLG RM 10/20 STAINLESS OR APPROVED EQUAL

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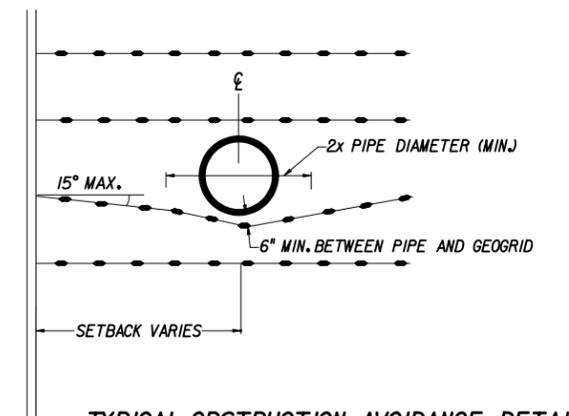
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PARTIAL PLAN - WALL @ DRAINAGE INLET

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TYPICAL OBSTRUCTION AVOIDANCE DETAIL

NOT TO SCALE

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