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 1½" x¼" 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 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 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 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	= 0.19 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	= 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 GG1-87, 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 CONSTRACTOR. 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 CONSIDER 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 SYSTEM MAY BE USED IN ALL ENVIRONMENTS AS NOTED IN THESE PLANS

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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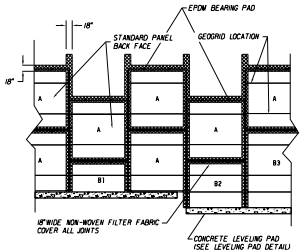
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

RETAINING WALL SYSTEM
TENSAR EARTH TECHNOLOGIES
MSE RETAINING WALL

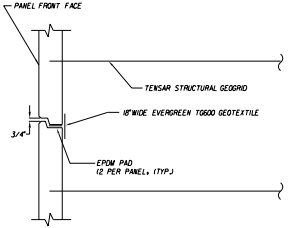
	Names	Dates	Approved By		
Designed By			State Structures Design Engineer		
Drawn By	JMS	8/14/98	Revision	Sheet No.	Index No.
Checked By			00	1 of 17	5025

$$$$$$$DGNSPECIFICATION$$$$$$$
$$$$$$SYTIME$$$$$$



TYPICAL FILTER FABRIC COVERAGE DETAIL

NOT TO SCALE



HORIZONTAL JOINT DETAIL

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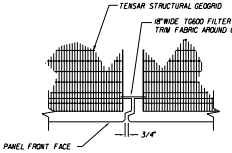

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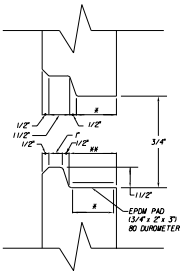

PANEL JOINT DETAIL

NOT TO SCALE

\# - 3" FOR MODERATELY & SLIGHTLY AGGRESSIVE ENVIRONMENT
- 4 1/2" FOR EXTREMELY AGGRESSIVE ENVIRONMENT

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

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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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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

RETAINING WALL SYSTEM
TENSAR EARTH TECHNOLOGIES
MSE RETAINING WALL

	Names	Dates	Approved By: State Structures Design Engineer
Designed By			
Drawn By	JMS	8/14/98	Revision 00
Checked By			Sheet No. 2 of 17
			Index No. 5025

########SPECIFICATION########
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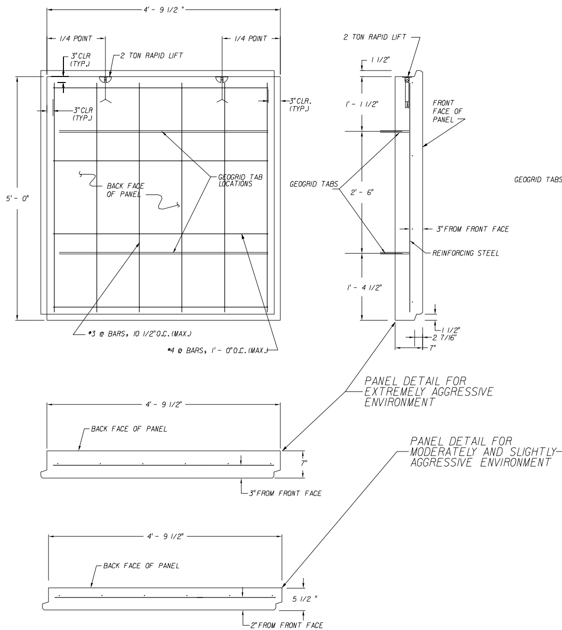

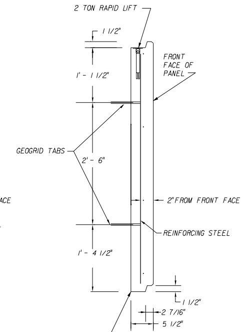

REINFORCING STEEL REQUIREMENTS

HORIZONTAL: 4 - #4 BARS @ 1' - 6"O.C. (MAX.)
VERTICAL: 6 - #3 BARS @ 10 1/2"O.C. (MAX.)
-OR-
4X4 - W4.0xW4.0 WELDED WIRE MESH

TYPICAL PANEL DETAILS - STANDARD A PANEL

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Checked By			00	3 of 17	5025

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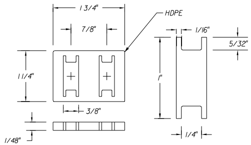

LOCKING CLIP
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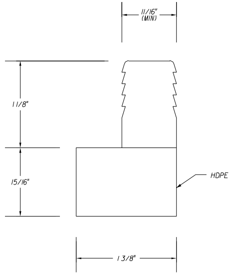

MESA HIGH PERFORMANCE CONNECTOR
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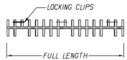
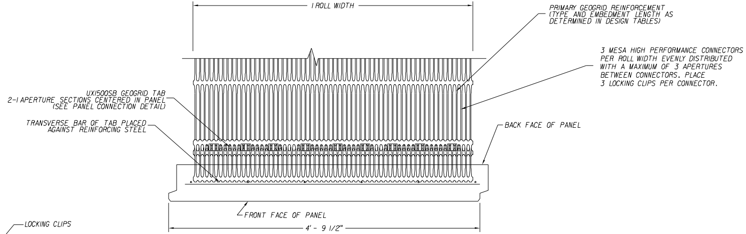
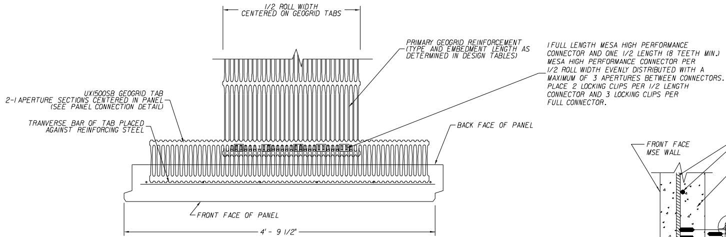
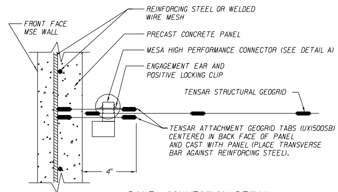




CONNECTION DETAIL PLAN VIEW (89% COVERAGE)
MAXIMUM COVERAGE
NOT TO SCALE



CONNECTION DETAIL PLAN VIEW (44% COVERAGE)
NOT TO SCALE



PANEL CONNECTION DETAIL
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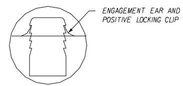

DETAIL A

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ROAD DESIGN

RETAINING WALL SYSTEM
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MSE RETAINING WALL

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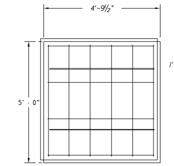
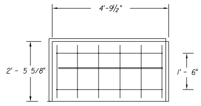
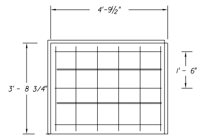


STANDARD A PANEL



STANDARD B1 PANEL



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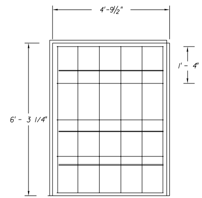
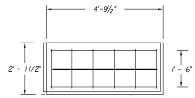
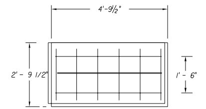


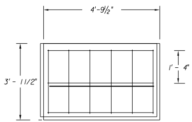
STANDARD B3 PANEL



STANDARD T24 PANEL



STANDARD T30 PANEL



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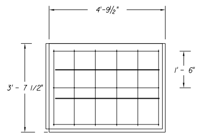

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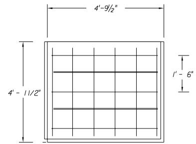

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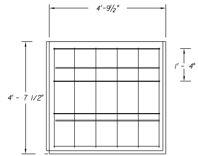
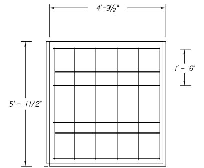


STANDARD T54 PANEL



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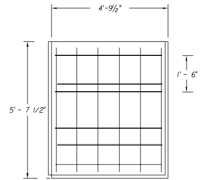

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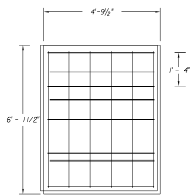
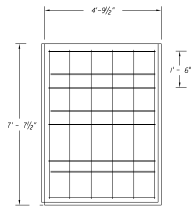


STANDARD T72 PANEL



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 1/2" 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

THIS SYSTEM MAY BE USED IN ALL ENVIRONMENTS.

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DESIGN OR CONSTRUCTION.

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STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

RETAINING WALL SYSTEM
TENSAR EARTH TECHNOLOGIES
MSE RETAINING WALL

	Names	Dates
Designed By		
Drawn By	JMS	8/14/98
Checked By		

Approved By [signature]
State Structures Design Engineer

Revision	Sheet No.	Index No.
00	5 of 17	5025

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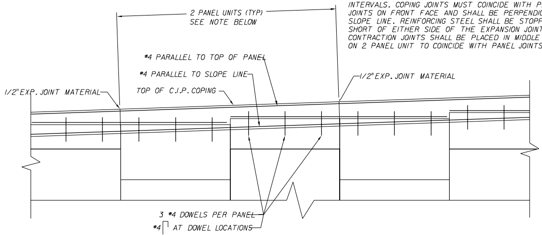
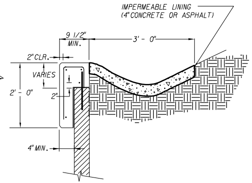
$$$$$$SYTIME$$$$$$

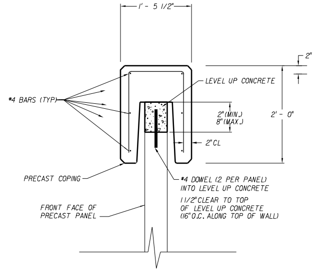
NOTE:
EXPANSION JOINTS IN C.I.P. COPING SHALL BE AT 2 PANEL INTERVALS. COPING JOINTS MUST COINCIDE WITH PANEL JOINTS ON FRONT FACE AND SHALL BE PERPENDICULAR TO SLOPE LINE. REINFORCING STEEL SHALL BE STOPPED 2" SHORT OF EITHER SIDE OF THE EXPANSION JOINT. CONTRACTION JOINTS SHALL BE PLACED IN MIDDLE PORTION ON 2 PANEL UNIT TO COINCIDE WITH PANEL JOINTS.

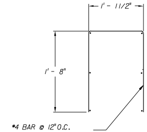


C.I.P. COPING PARTIAL ELEVATION VIEW
NOT TO SCALE



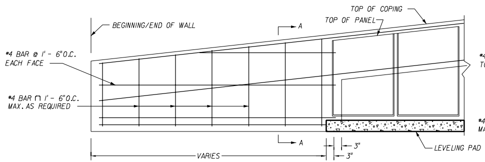
C.I.P. COPING WITH SWALE
NOT TO SCALE



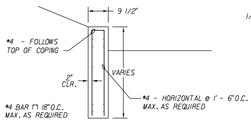


PRECAST COPING SECTION
NOT TO SCALE

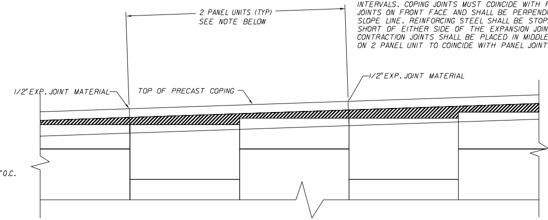
NOTE:
EXPANSION JOINTS IN C.I.P. COPING SHALL BE AT 2 PANEL INTERVALS. COPING JOINTS MUST COINCIDE WITH PANEL JOINTS ON FRONT FACE AND SHALL BE PERPENDICULAR TO SLOPE LINE. REINFORCING STEEL SHALL BE STOPPED 2" SHORT OF EITHER SIDE OF THE EXPANSION JOINT. CONTRACTION JOINTS SHALL BE PLACED IN MIDDLE PORTION ON 2 PANEL UNIT TO COINCIDE WITH PANEL JOINTS.



COPING ENCLOSURE DETAIL
NOT TO SCALE



SECTION A-A



PRECAST COPING PARTIAL ELEVATION VIEW
NOT TO SCALE

THIS SYSTEM MAY BE USED IN ALL ENVIRONMENTS

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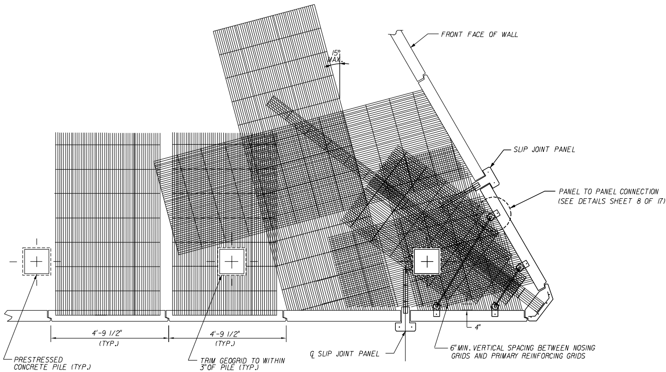
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
ROAD DESIGN

RETAINING WALL SYSTEM
TENSAR EARTH TECHNOLOGIES
MSE RETAINING WALL

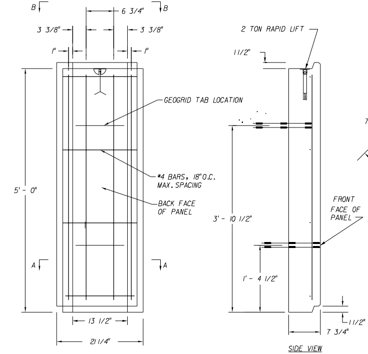
	Names	Dates	Approved By		
Designed By			State Structures Design Engineer		
Drawn By	JMS	8/14/98	Revision	Sheet No.	Index No.
Checked By			00	6 of 17	5025

$$$$$$$DGNSPECIFICATION$$$$$$$$
$$$$$$SYTIME$$$$$$

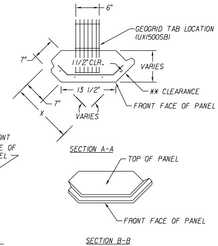


LESS THAN 75° ACUTE CORNER - SKEWED GEOGRID UNDER PILE CAP

(SEE DETAIL BELOW FOR BIN REINFORCEMENT)



ACUTE CORNER ELEMENT DETAIL

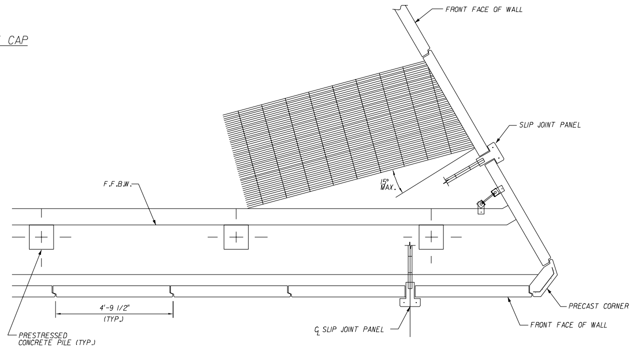


* SEE SHEET 3 OF 17 FOR PANEL THICKNESS

** VARIES

3" FOR MARINE ENVIRONMENTS

2" FOR MODERATELY OR SLIGHTLY AGGRESSIVE ENVIRONMENTS



EXAMPLE ACUTE CORNER - SKEWED GEOGRID AT ABUTMENT LEVEL

NOT TO SCALE

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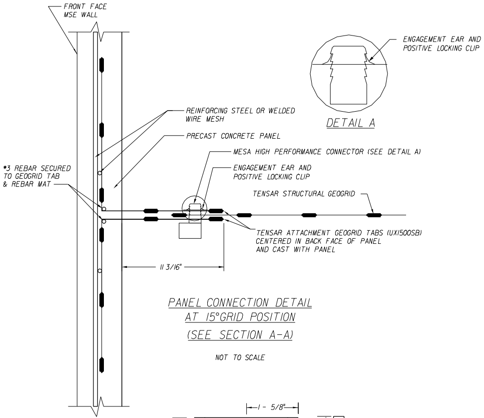
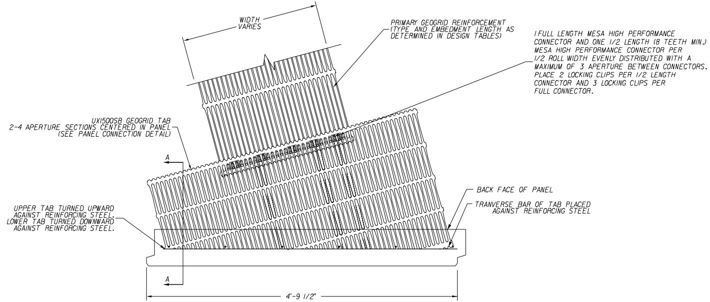


DETAIL A

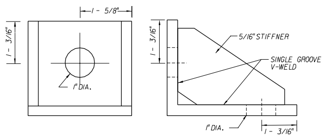
PANEL CONNECTION DETAIL
AT 15°GRID POSITION
(SEE SECTION A-A)

NOT TO SCALE



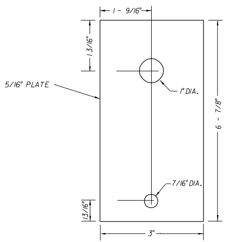
CONNECTION DETAIL PLAN VIEW AT 15°GRID POSITION

NOT TO SCALE

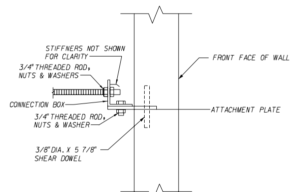


ANGLE: 3" X 4" X 5/16", HOT DIP GALVANIZED
3" X 4" X 1/4", 316 L GRADE STAINLESS STEEL

CONNECTION BOX



ATTACHMENT PLATE



PANEL TO PANEL ATTACHMENT

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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

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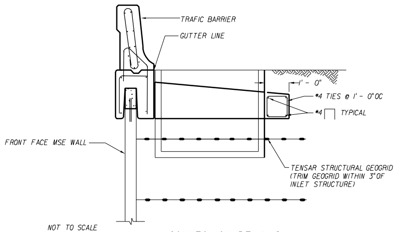
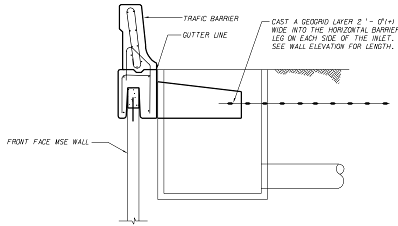
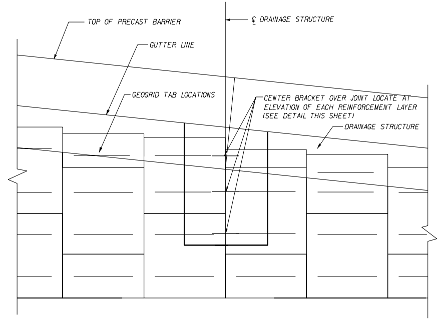


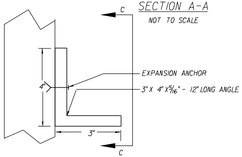
CONNECTION DETAILS
SECTION A-A
NOT TO SCALE

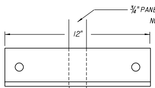


DETAIL OF TENSAR PANELS @ INLETS
SECTION B-B
NOT TO SCALE



PARTIAL ELEVATION - WALL @ DRAINAGE INLET
NOT TO SCALE



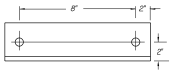


VIEW C-C

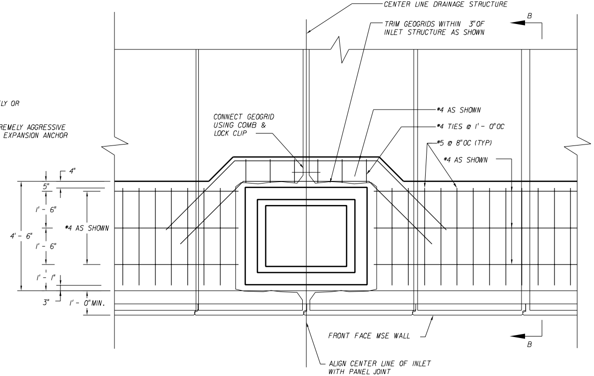
NOTES:

HOT DIP GALVINAIZED ANGLE FOR SLIGHTLY OR MODERATELY AGGRESSIVE ENVIRONMENT

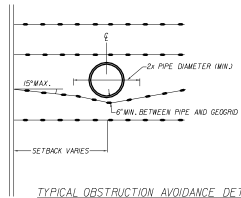
316 L GRADE STAINLESS STEEL FOR EXTREMELY AGGRESSIVE ENVIRONMENT ANGLE HILTI HSLG RM 10/20 EXPANSION ANCHOR (STAINLESS)(OR APPROVED EQUAL)



CENTER BRACKET OVER JOINT DETAIL



PARTIAL PLAN - WALL @ DRAINAGE INLET
NOT TO SCALE



TYPICAL OBSTRUCTION AVOIDANCE DETAIL
NOT TO SCALE

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