

MSE Wall Notes:

Provide design in accordance with the latest version of the SCDOT Geotechnical Design Manual (GDM). Construct the Mechanically Stabilized Earth (MSE) wall in accordance with Supplemental Technical Specifications, SC-M-713 - Mechanically Stabilized Earth (MSE) Walls.

Design Methodology: LRFD Design - Simplified Method.

Design Life: Permanent structures - design life of 100 years. Temporary structures in service for more than 5 years design as permanent. Temporary structures in service for 5 years or less.

Foundation Soils:
 Total - Internal Friction Angle (deg) XX
 Total - Cohesion XXX psf
 Effective - Internal Friction Angle (deg) XX
 Effective - Cohesion XXX psf

**** Retained Soils:**

Layer 1 - Proposed Finished Grade to Elev. X
 Total - Internal Friction Angle (deg) XX
 Total - Cohesion XXXpsf
 Effective - Internal Friction Angle (deg) XX
 Effective - Cohesion XXXpsf
 Layer 2 - X ft. to Existing Grade
 Total - Internal Friction Angle (deg) XX
 Total - Cohesion XXXpsf
 Effective - Internal Friction Angle (deg) XX
 Effective - Cohesion XXXpsf

★ Reinforced Soils:
 Soil properties per SC-M-713 (latest version).

Soil Reinforcement Lengths for External Stability						
Wall X Sta XX+XX to XX+XX	Wall Height, H (ft) ¹	Strength I	Soil Properties			
			φ	c	φ	c
Wall X Sta XX+XX to XX+XX	Sta XX+XX to XX+XX	Strength I	X	X	X	X
	B _{req} (ft)	Extreme Event I	X	X	X	X
Wall X Sta XX+XX to XX+XX	Sta XX+XX to XX+XX	Strength I	X	X	X	X
	B _{req} (ft)	Extreme Event I	X	X	X	X

¹For wall heights in between the numbers indicated, use the next higher number.

Where:
 H is measured from the top of the leveling pad to the top of the coping, in feet.

External Stability Limit State Design:

- Permanent MSE Walls have been evaluated to meet external and overall global stability for Strength, Service, and Extreme Event I and II limit states.
- The external and global stability of the MSE walls, with appropriate load and resistance factors, is satisfied with the minimum base width required, B_{req}. Measure the minimum base width required B_{req} from the rear face of the permanent MSE Wall panel to the end of the soil reinforcement.

MSE Wall Loadings:

- Design MSE walls for live load surcharge (LS) located at the top of the MSE walls either perpendicular or parallel to the roadway. The live loads are modeled as uniform surcharge (LS), q_s, and are factored using load factors. The unfactored live load surcharge (LS) is 250 psf.
- Design MSE walls for Long Term design using a uniform dead load vertical surcharge pressure, q_x, to account for the pavement section constructed on top of the MSE wall. Include the moment slab and barrier, if present. In addition, use a minimum uniform dead load vertical surcharge pressure of 2 psf to account for future pavement overlay sections.
- Design MSE walls to resist horizontal loadings resulting from live load uniform vertical surcharge (LS), dead load vertical surcharges, and active pressure backfill by multiplying the vertical surcharge pressures or effective overburden pressures times the active earth pressure coefficient, K_a, of X.XX and the appropriate load factors, γ_i.

Extreme Event I Limit State: Two-Level Seismic Design

- Design Earthquake:
 - Functional Evaluation Earthquake (FEE) 15% Probability of Exceedance in 75 years
 - Safety Evaluation Earthquake (SEE) 3% Probability of Exceedance in 75 years
- Peak ground accelerations obtained from ADRS are presented in the table below.

Parameter	MSE Walls	
	FEE	SEE
PGA	X.XX g	X.XX g

Values determined from _____

Note to Designer:
 Designer to enter either "Three Point Method" or "Site-Specific Response Analysis" as appropriate for the project.

MSE Wall LRFD Design Criteria:

- Design MSE Walls for the following limit states:
 - Strength I Limit State
 - Service I Limit State
 - Extreme Event I Limit State
 - Extreme Event II Limit State
- MSE Wall Supplier responsible for the design of the MSE wall internal stability. Internal stability load and resistance factors are presented in Tables 1-1 (see Sliding Resistance) and 1-5. Load factors outlined in Table 1-4 are for Extreme Event II only.
- MSE wall design criteria for each limit state are presented below in Tables 1-1, 1-2, 1-3, 1-4 and 1-5.

Table 1-1 MSE Wall Strength I Limit State Design Criteria

Design Parameter	Factor Type	Factor Value	
		Max.	Min.
DC: Dead Load of Components and Attachments (γ _p)	Load	1.25	0.90
LS: Live Load Surcharge (γ _i)	Load	1.75	
EH: Horizontal Earth Pressure - Active (γ _p)	Load	1.50	0.90
EV: Vertical Earth Pressure - MSE Walls (γ _p)	Load	1.35	1.00
ES: Earth Surcharge (γ _i)	Load	1.50	0.75
Limiting Eccentricity Due To Overturning (Soil)	Eccentricity	B _{req} /3	
Limiting Eccentricity Due To Overturning (Rock)	Eccentricity	4.5B _{req} /10	
Soil Bearing Capacity (φ Bearing)	Resistance	0.65	
Sliding Frictional Resistance (Soil - Soil) (φ Sliding)	Resistance	1.00	
Sliding Frictional Resistance (Soil - Soil Reinforcement) (φ Sliding)	Resistance	1.00	

Table 1-2 MSE Wall Service I Limit State Design Criteria

Design Parameter	Factor Type	Factor Value
		MAX.
DC: Dead Load of Components and Attachments (γ _i)	Load	1.00
LS: Live Load Surcharge (γ _i)	Load	1.00
EH: Horizontal Earth Pressure - Active (γ _i)	Load	1.00
EV: Vertical Earth Pressure - Overall Stability (γ _i)	Load	1.00
EV: Vertical Earth Pressure - MSE Walls (γ _i)	Load	1.00
ES: Earth Surcharge (γ _i)	Load	1.00
Lateral Displacement (φ)	Resistance	1.00
Vertical Displacement (φ)	Resistance	1.00
Global Stability (Fill Walls) (φ Stability)	Resistance	0.75

Table 1-3 MSE Wall Extreme Event I Limit State Design Criteria

Design Parameter	Factor Type	Factor Value	
		MAX.	MIN.
DC: Dead Load of Components and Attachments (γ _i)	Load	1.00	
LS: Live Load Surcharge (γ _{req})	Load	0.00	
EH: Horizontal Earth Pressure - Active (γ _i)	Load	1.00	
EV: Vertical Earth Pressure - Overall Stability (γ _i)	Load	1.00	
EV: Vertical Earth Pressure - MSE Walls (γ _i)	Load	1.00	0.0
ES: Earth Surcharge (γ _i)	Load	1.00	0.0
EQ: Earthquake (γ _i)	Load	1.00	
Limiting Eccentricity Due To Overturning (φ _{req})(Soil+ Rock)	Eccentricity	B _{req} /3	
Soil Bearing Capacity (φ Bearing-eq)	Resistance	1.00	
Sliding Frictional Resistance (φ Sliding)	Resistance	1.00	
Lateral Displacement (φ)	Resistance	1.00	
Vertical Displacement (φ)	Resistance	1.00	
Global Stability (Fill Walls) (φ Stability-eq)	Resistance	1.00	

Table 1-4 MSE Wall Extreme Event II Limit State Design Criteria

Design Parameter	Factor Type	Factor Value
		MAX.
DC: Dead Load of Components and Attachments (γ _p)	Load	1.00
LS: Live Load Surcharge (γ _i)	Load	0.50
EH: Horizontal Earth Pressure - Active (γ _p)	Load	1.00
EV: Vertical Earth Pressure - Overall Stability (γ _p)	Load	1.00
EV: Vertical Earth Pressure - MSE Walls (γ _p)	Load	1.00
ES: Earth Surcharge (γ _p)	Load	1.00
CT: Vehicular Collision (γ _i)	Load	1.00
Limiting Eccentricity Due To Overturning (φ ₁)(Soil+ Rock)	Eccentricity	B _{req} /3
Soil Bearing Capacity (φ Bearing-II)	Resistance	1.00
Sliding Frictional Resistance (φ Sliding)	Resistance	1.00
Lateral Displacement (φ)	Resistance	1.00
Vertical Displacement (φ)	Resistance	1.00
Global Stability (Fill Walls) (φ Stability-II)	Resistance	1.00

γ_i: Load factor depending on type of load analyzed. See GDM Chapter 8.

Table 1-5 Resistance Factors Reinforced Soils (Internal)

Performance Limit	Limit States	Limit States			
		Strength	Service	Extreme Event	
Tensile Resistance of Reinforcement and Connectors	① Metallic Reinforcement	Strip Reinforcement	0.75	N/A	1.00
		② Grid Reinforcement	0.65	N/A	0.85
	Geosynthetic Reinforcement	Geotextiles and Geogrid Reinforcement	0.80	N/A	1.00
		Geostrip Reinforcement	0.55	N/A	1.00
Pullout Resistance	① Metallic Reinforcement	Strip and Grid Reinforcement	0.90	N/A	1.20
	Geosynthetic Reinforcement	Geotextiles, Geogrid and Geostrip Reinforcement	0.70	N/A	1.00

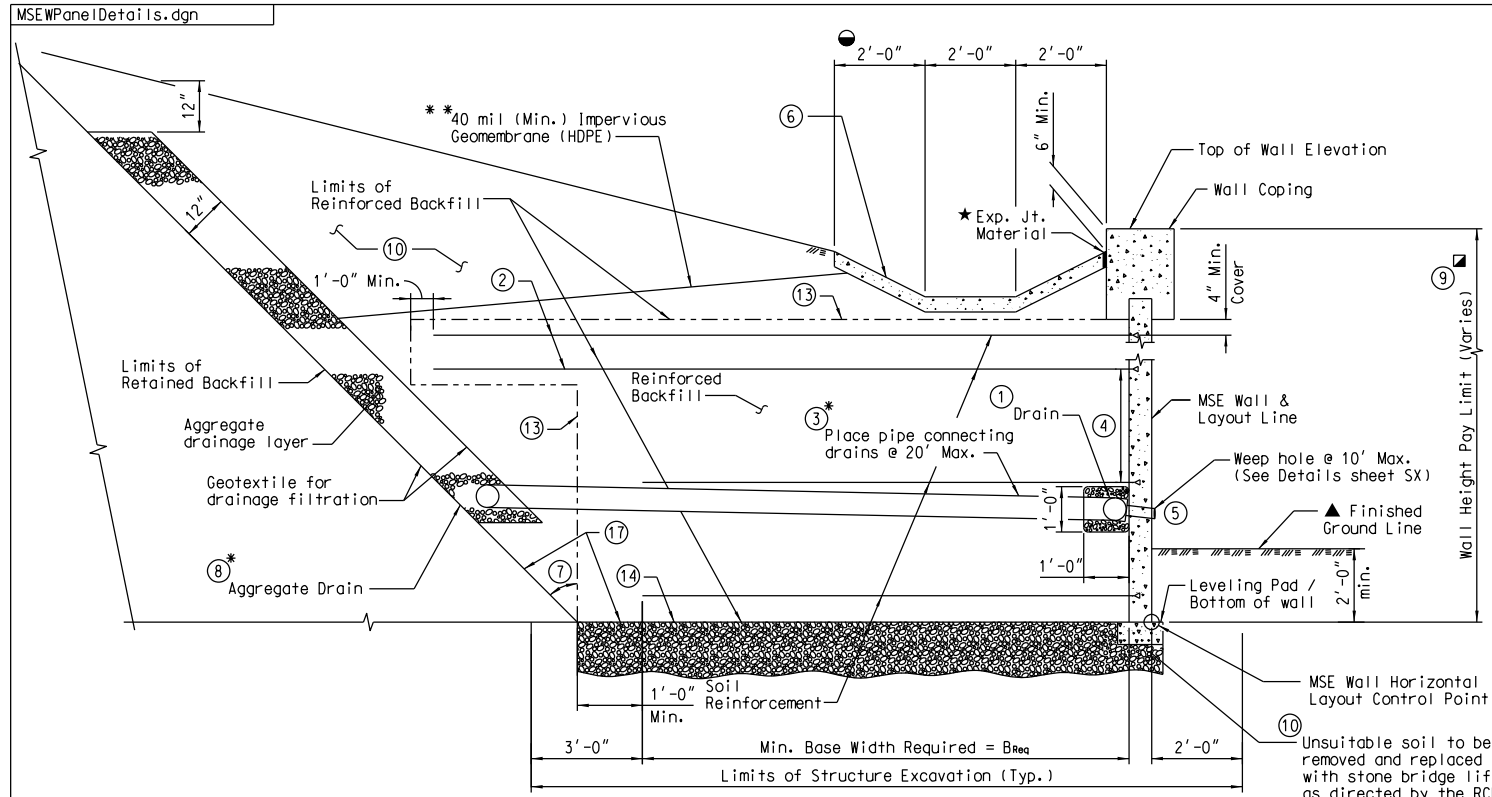
- Apply to gross cross-section less sacrificial area. For sections with holes, reduce the gross area and apply to net section less sacrificial area.
- Applies to grid reinforcements connected to a rigid facing element (concrete panel or block). For grid reinforcements connected to a flexible facing mat or which are continuous with the facing mat, use the resistance factor for strip reinforcements.

Additional Requirements:

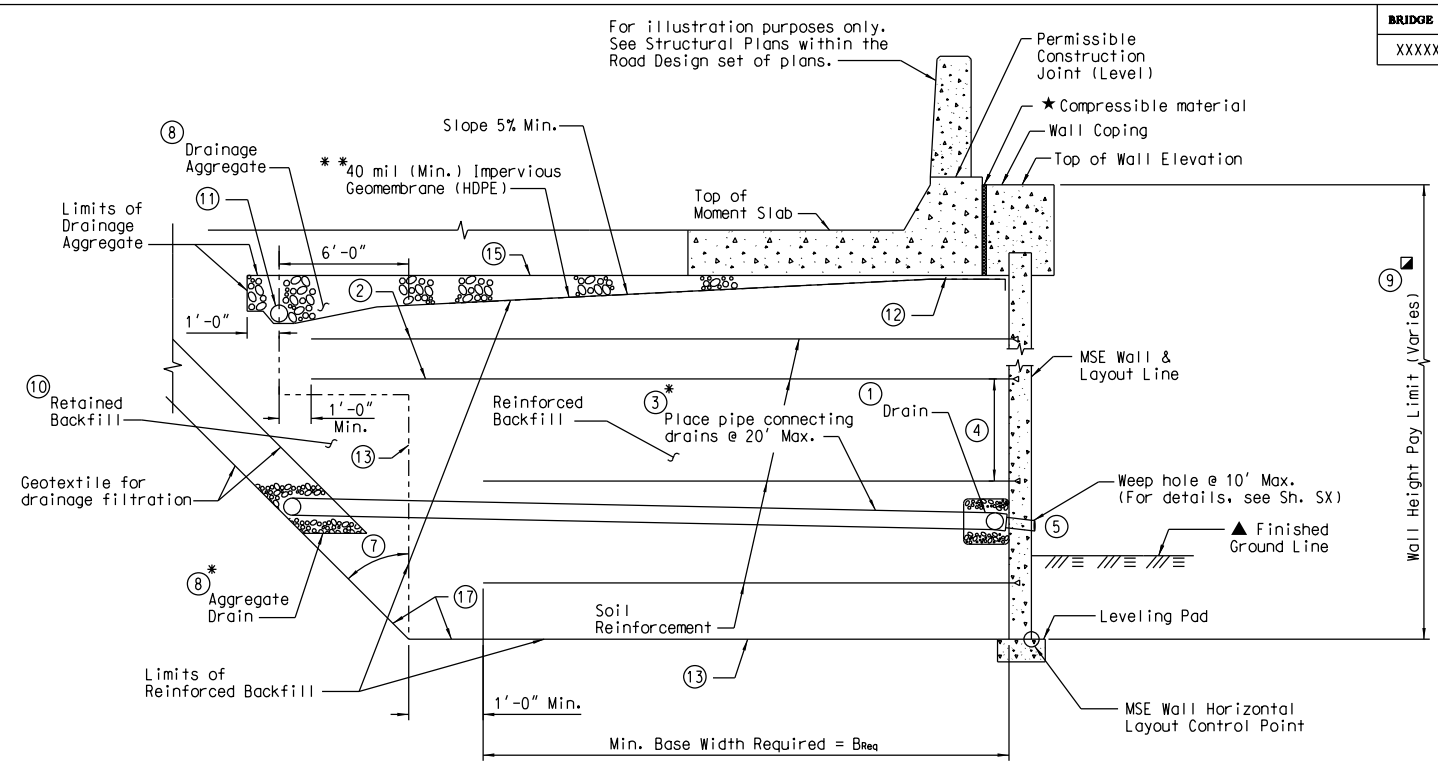
- For leveling pad, provide Class 2500 concrete.
 - For 4" concrete slope protection ditches, provide Class 2500 concrete.
 - Any portion of wall coping sloped steeper than 2H:1V must be cast-in-place concrete and anchored with dowels.
 - Do not attach traffic barrier, pedestrian railing, or moment slab to MSE wall facing or wall coping.
 - To ensure that the wall does not have a negative slope or batter (Slope outward away from backfill) after completion of construction, a positive batter is recommended. Monitor the actual movement of panels during the placement and compaction of each lift of backfill and adjust the amount of batter as needed according to field conditions. In accordance with Supplemental Technical Specification SC-M-713, walls constructed with negative batter are not acceptable.
 - ▲ Inundation Design Requirements
 Water Electro-Chemical Properties
 Non-Aggressive
 Aggressive
- Ensure that the MSE Wall panels are designed for aggressive environment. MSE Wall Supplier to provide either a statement or design indicating how the panels were designed for the aggressive environment, if required.
- If horizontal drainage pipe is necessary within the reinforced backfill of the MSE wall, coordination with the Hydraulic Engineer-of-Record and Road Engineer-of-Record is required.

Note to Designer:
 This drawing furnished for information only. All dimensions shown are sheet specific. Any use of this design and drawing, including dimensions, must be checked by the User's Engineer to ensure design is adequate for the intended use. All drawings must be signed and sealed by a South Carolina Registered Professional Engineer when used.
 Designer is required to address fall protection if pedestrian traffic is present.
 ★ - Designer to input "Stone" or "granular" based on the material required by the design.
 ** - Designer to use as many retained soil layers as required.
 X - Designer to input the required data.
 ☑ - Designer to determine and input surcharge due to project specific conditions. Use 200 psf minimum.
 ● - Designer to select correct design life.
 ▲ - Designer to indicate whether note 6 is needed. See the latest version of the GDM for determination of non-aggressive/aggressive.

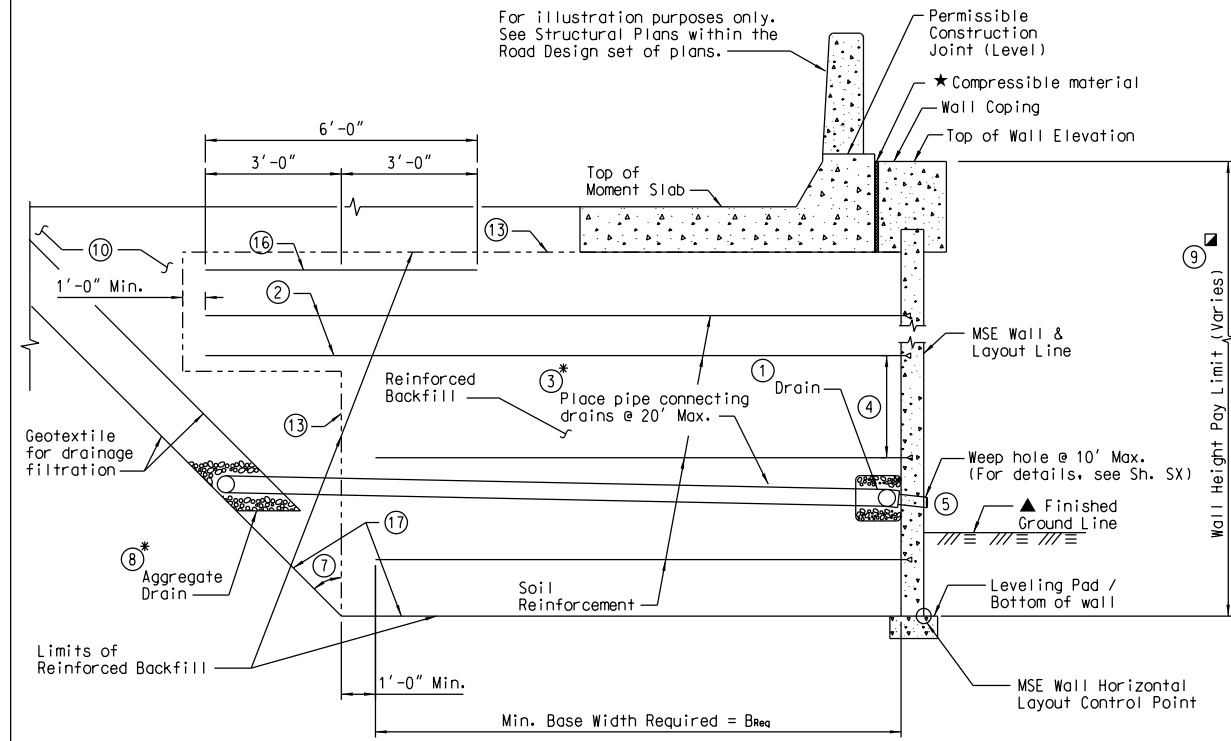
REV.					<p align="center">SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION</p> <p align="center">MSE WALL NOTES (PANEL FACE) (1 OF 11)</p> <p>COUNTY XXXXXXXX ROUTE XXXXXX</p>
REV.					
REV.					
REVIEWED					
QUAN.					
DR.	MCCA	NEH	03-20		
DES.					
BY		CHK.		DATE	



TYPICAL SECTION**



TYPICAL SECTION - WALL WITH MOMENT SLAB* AND GEOMEMBRANE



TYPICAL SECTION - WALL WITH MOMENT SLAB**

Notes:

Include the cost of reinforcing, concrete, and all other items needed for construction of the barrier wall and the moment slab in the bid price for Concrete Roadside Barrier.
 Extend compressible material from bottom of Moment Slab to top of Coping in Expansion joint.
 For impervious geomembrane requirements see Supplemental Technical Specification SC-M-713.
 Glue or weld all seams in the geomembrane to prevent leakage.

- 1 Construct 1'-0" x 1'-0" drain using 6" dia. perforated pipe when granular reinforced backfill, including screenings, is used. Provide aggregate, other than Macadam, that meets the requirements for stone backfill in Supplemental Technical Specification SC-M-713. Wrap geotextile for drainage filtration (see Supplemental Technical Specification SC-M-713) completely around aggregate drain and overlap 1'-0". Design MSE Wall drainage system to drain the aggregate drain. This drain may be eliminated if reinforced stone backfill is used or if the aggregate drain is not required.
- 2 Extend top two layers of soil reinforcement 5 feet beyond the end of the lower layers of soil reinforcement.
- 3 Slope 2% min. Provide non perforated pipe connecting aggregate drain to drain at wall facing.
- 4 Maximum vertical spacing of soil reinforcement is 32".
- 5 Provide rodent screen manufactured from 1304 stainless steel or galvanized steel with a minimum wire diameter of 0.050". Provide rodent screen with minimum of 2 openings per inch and a maximum of 4 openings per inch.
- 6 4" Concrete Slope Protection. Not used on Typical Section-Wall with Moment Slab.
- 7 Angle to be determined by the Contractor based on site conditions and the method of construction used. Excavation and/or shoring of retained backfill to permit construction of the MSE wall is considered incidental to the MSE wall construction and is not paid for as a separate item.
- 8 Provide aggregate, other than Macadam, that meets the requirements for stone backfill in Supplemental Technical Specification SC-M-713.
- 9 Pay limit is from top of leveling pad elevation to top of wall. See MSE wall profiles.
- 10 Retained fill in accordance with the plans or Section 205 of the Standard Specifications.
- 11 6" dia. perforated pipe wrapped with geotextile for drainage filtration (see Supplemental Technical Specification SC-M-713). Drain to end of wall.
- 12 Place geomembrane a minimum distance of 2 times the maximum aggregate size of the stone backfill below bottom of moment slab.
- 13 When the Reinforced Backfill is stone, encapsulate the Reinforced Backfill in a geotextile for drainage filtration. Keep a minimum distance of 3" between the reinforcement and the geotextile in any direction.
- 14 When the Reinforced Backfill is Sand and it is on top of stone, place a geotextile for drainage filtration in top of the stone. Keep a minimum distance of 3" between the reinforcement and the geotextile in any direction.
- 15 Geotextile for drainage filtration.
- 16 Place 6'-0" wide strip of B4 geogrid (see SC-M-203-2) with strong axis perpendicular to MSE Wall face.
- 17 Place High Survivability Geotextile Filter Fabric meeting the requirements of SC-M-203-1.

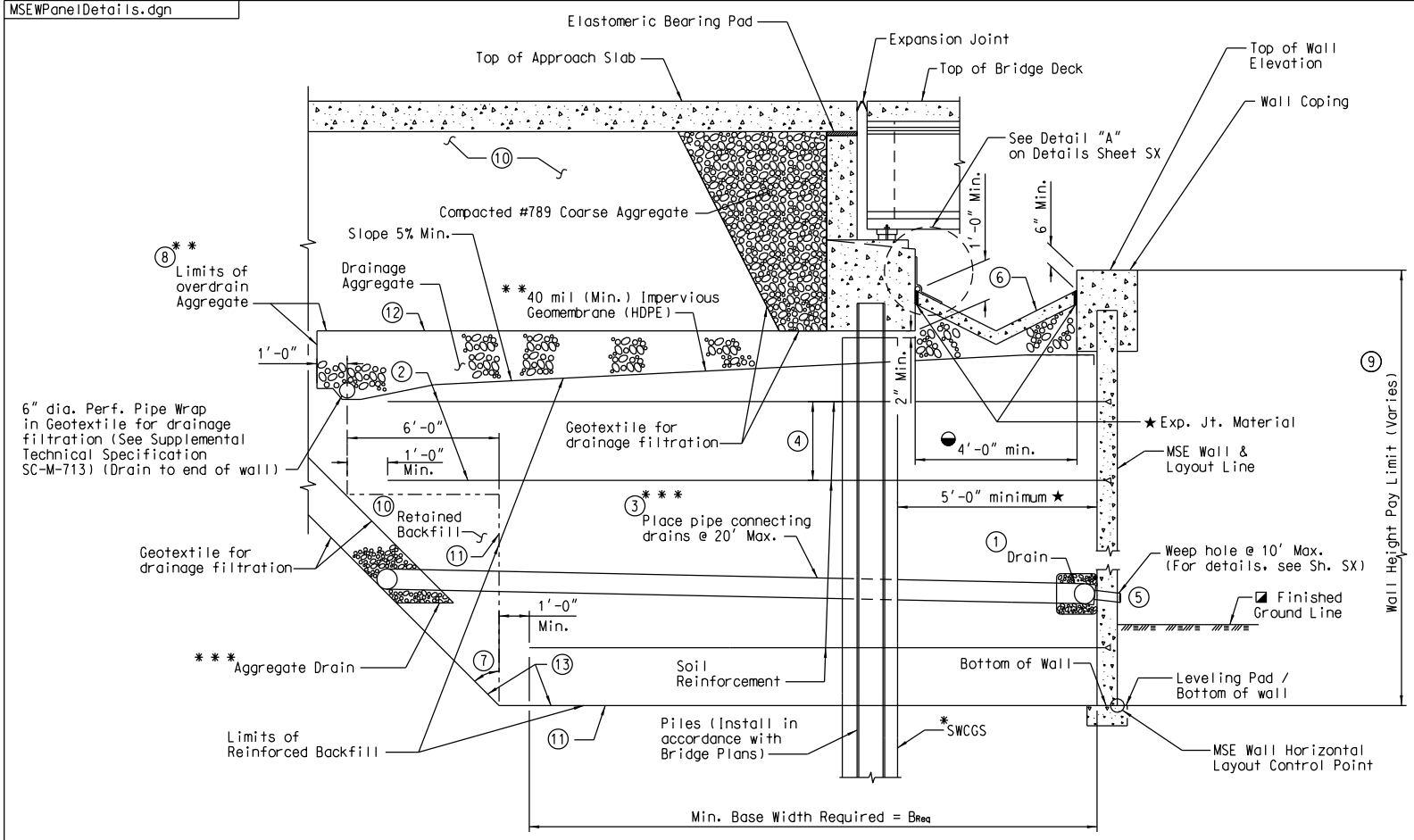
Note to Designer:

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- ★ - Designer to input dimension
- * - Designer to determine whether aggregate drain and connecting pipe is required.
- ** - For locations where the roadway or paved shoulder is directly above or within 5 feet of the end of the soil reinforcement, use a geomembrane on all roads/routes located North of a line along SC Route 72 from the Georgia State line to Chester, SC and North of SC Route 9 from Chester, SC to Interstate Route 1-77 and West of a line along Interstate Route 1-77 from the intersection of SC Route 9 and 1-77 to the North Carolina State line. Designer to determine the need for geomembrane for other locations.
- ▲ - Designer to input required bench width for walls on slopes.
- x - Designer to input the required data.
- - Unless otherwise directed by the Hydraulic Engineer-of-Record.
- ☑ - Add fall protection as required.

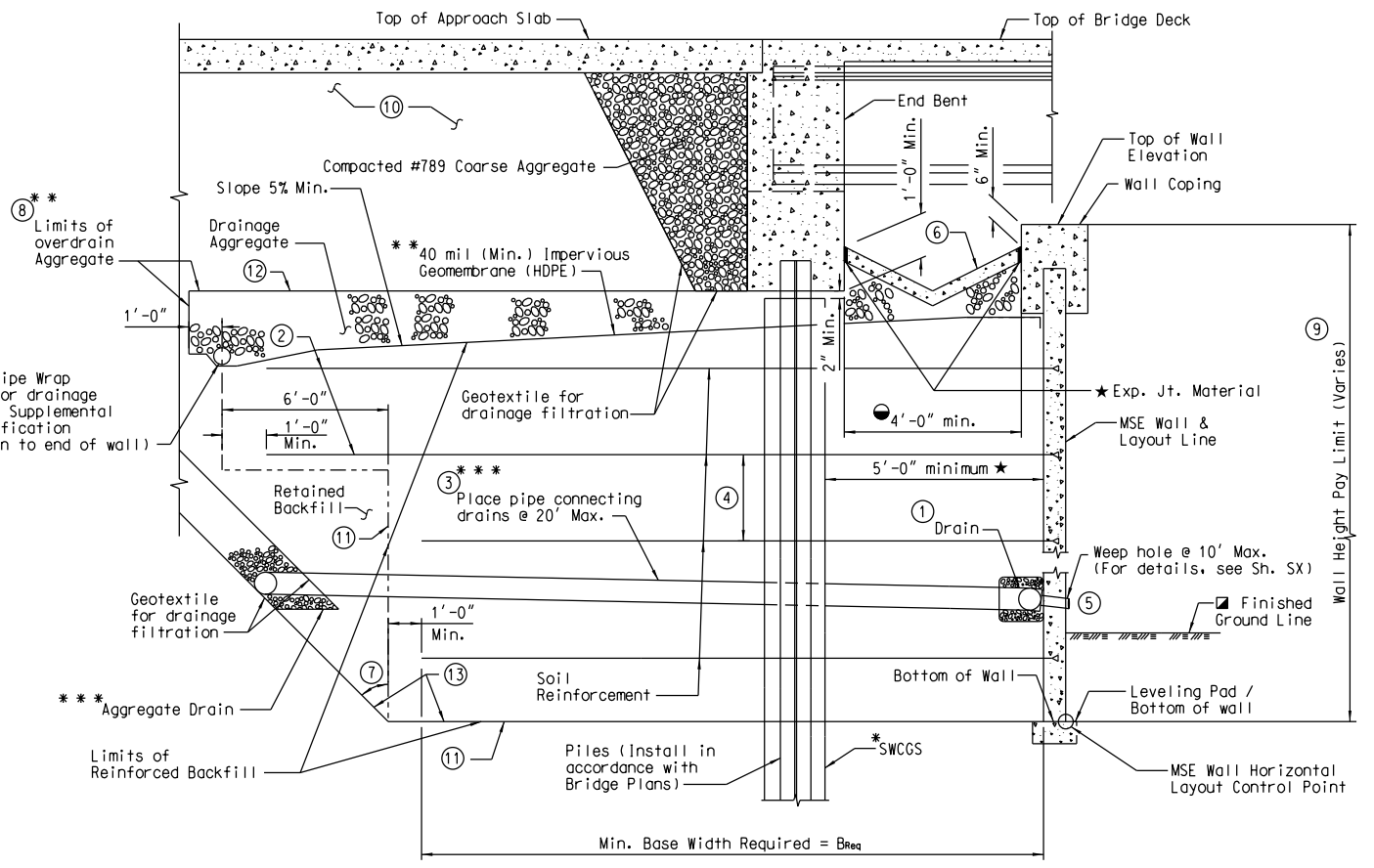
REV.					SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION PERMANENT MSE WALL - ROAD (PANEL FACE) (2 OF 11)	
REV.						
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REVIEWED						
QUAN.						
DR.	MCCA	NEH	03-20		COUNTY	XXXXXXX
DES.					ROUTE	XXXXXX
BY	CHK.	DATE				

\$\$\$DATE\$\$\$



TYPICAL SECTION AT END BENTS WITH EXPANSION JOINT

- Notes:
- Construct 1'-0" x 1'-0" drain using 6" dia. perforated pipe. Provide aggregate, other than Macadam, that meets the requirements for stone backfill in Supplemental Technical Specification SC-M-713. Wrap geotextile for drainage filtration (see Supplemental Technical Specification SC-M-713) completely around aggregate drain and overlap 1'-0". Design MSE Wall drainage system to drain the aggregate drain. This drain may be eliminated if reinforced stone backfill is used or if the aggregate drain is not required.
 - Extend top two layers of soil reinforcement 5 feet beyond the end of the lower layers of soil reinforcement.
 - Slope 2% min. Provide non perforated pipe connecting aggregate drain to drain at wall facing.
 - Maximum vertical spacing of soil reinforcement is 32".
 - Provide rodent screen manufactured from T304 stainless steel or galvanized steel with a minimum wire diameter of 0.050". Provide rodent screen with minimum of 2 openings per inch and a maximum of 4 openings per inch.
 - 4" Concrete Slope Protection. See MSE Wall Details (Panel Face) Sheet SX.
 - Angle to be determined by the Contractor based on site conditions and the method of construction used. Excavation and/or shoring of retained backfill to permit construction of the MSE wall is considered incidental to the MSE wall construction and is not paid for as a separate item.
 - Provide an aggregate overdrain with 40 mil (minimum) impervious High Density Polyethylene (HDPE) geomembrane at locations that meet the requirements of Note to Designer for overdrain only. Provide aggregate, other than Macadam, that meets the requirements for stone backfill in the Supplemental Technical Specification SC-M-713. Provide geomembrane that meets the requirements listed in Supplemental Technical Specification SC-M-713. Glue or weld all geomembrane seams to prevent leakage.
 - Pay limit is from top of leveling pad elevation to top of wall. See MSE wall profiles. Add fall protection as required.
 - Fill in accordance with the plans or Section 205 of the Standard Specifications.
 - When the Reinforced Backfill is stone, encapsulate the Reinforced Backfill in a geotextile for drainage filtration. Keep a minimum distance of 3" between the reinforcement and the geotextile in any direction.
 - Geotextile for drainage filtration.
 - Place High Survivability Geotextile Filter Fabric meeting the requirements of SC-M-203-1.

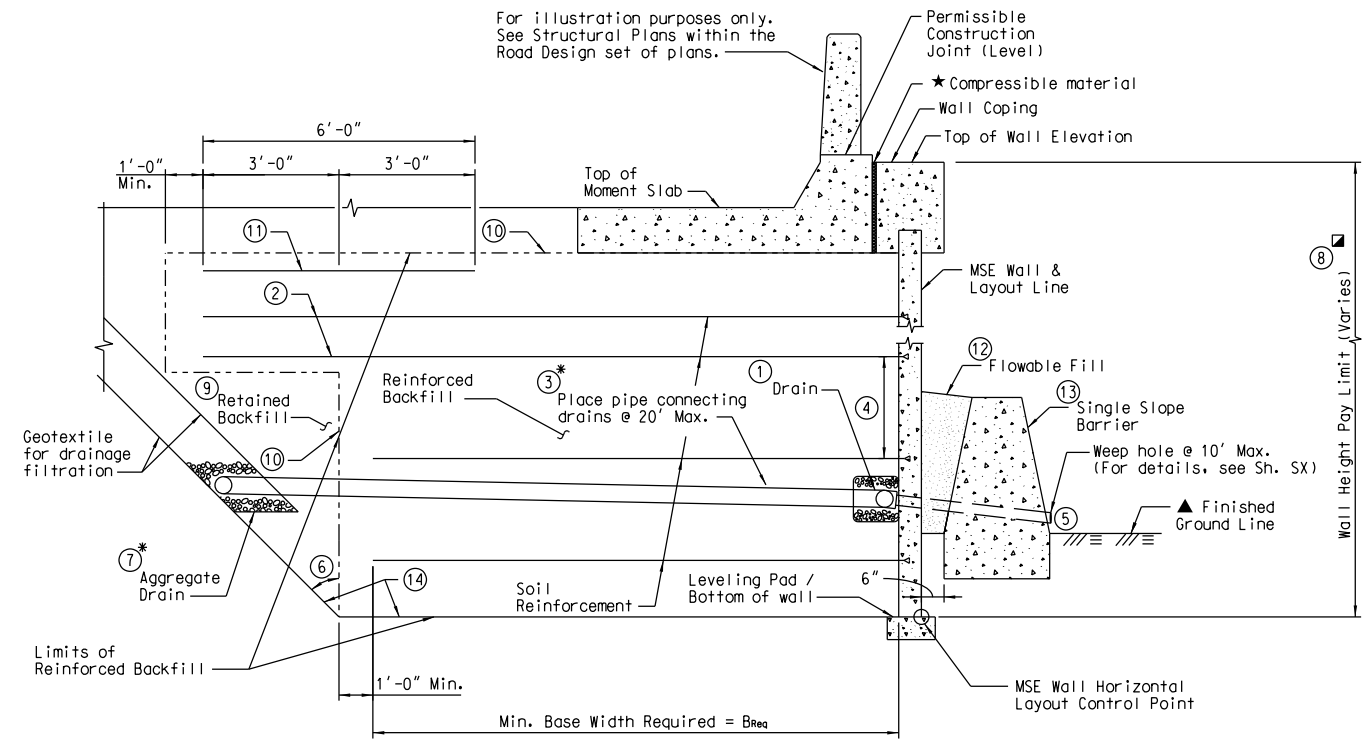


TYPICAL SECTION AT END BENTS WITHOUT EXPANSION JOINT

Note to Designer:
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- ★ - Minimum 5'-0". Designer to input required dimension.
- * - Backfill as required unless noted otherwise. Bridge Designer to determine the size of the Smooth Wall or Corrugated Galvanized Steel (SWCCS) pipe. Bridge Designer to determine the requirements of the backfill material.
- *** - For locations where the roadway or paved shoulder is directly above or within 5 feet of the end of the soil reinforcement, use an aggregate overdrain and geomembrane on all roads/routes located North of a line along SC Route 72 from the Georgia State line to Chester, SC and North of SC Route 9 from Chester, SC to Interstate Route I-77 and West of a line along Interstate Route I-77 from the intersection of SC Route 9 and I-77 to the North Carolina State line. Designer to determine the need for geomembrane for other locations to determine whether aggregate drain and connecting pipe is required.
- x - Designer to determine whether aggregate drain and connecting pipe is required.
- - Minimum 4'-0", unless increased as directed by the Hydraulic Engineer-of-Record to determine the required scour protection.
- - Hydraulic Engineer-of-Record to determine the required scour protection.

REV.				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION			
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QUAN.				PERMANENT MSE WALL - BRIDGE (PANEL FACE) (3 OF 11)			
DR.	MCCA	NEH	03-20				
DES.							
BY	CHK.	DATE					
				COUNTY	XXXXXXX	ROUTE	XXXXXX



TYPICAL SECTION - WALL WITH SINGLE SLOPE BARRIER IN FRONT

Notes:

- Include the cost of reinforcing, concrete, and all other items needed for construction of the barrier wall and the moment slab in the bid price for Concrete Roadside Barrier.
 - Extend compressible material from bottom of Moment Slab to top of Coping in Expansion joint.
 - For impervious geomembrane requirements see Supplemental Technical Specification SC-M-713.
 - Glue or weld all seams in the geomembrane to prevent leakage.
- 1 Construct 1'-0" x 1'-0" drain using 6" dia. perforated pipe when granular reinforced backfill, including screenings, is used. Provide aggregate, other than Macadam, that meets the requirements for stone backfill in Supplemental Technical Specification SC-M-713. Wrap geotextile for drainage filtration (see Supplemental Technical Specification SC-M-713) completely around aggregate drain and overlap 1'-0". Design MSE Wall drainage system to drain the aggregate drain. This drain may be eliminated if reinforced stone backfill is used or if the aggregate drain is not required.
 - 2 Extend top two layers of soil reinforcement 5 feet beyond the end of the lower layers of soil reinforcement.
 - 3 Slope 2% min. Provide non perforated pipe connecting aggregate drain to drain at wall facing.
 - 4 Maximum vertical spacing of soil reinforcement is 32".
 - 5 Provide rodent screen manufactured from T304 stainless steel or galvanized steel with a minimum wire diameter of 0.050". Provide rodent screen with minimum of 2 openings per inch and a maximum of 4 openings per inch.
 - 6 Angle to be determined by the Contractor based on site conditions and the method of construction used. Excavation and/or shoring of retained backfill to permit construction of the MSE wall is considered incidental to the MSE wall construction and is not paid for as a separate item.
 - 7 Provide aggregate, other than Macadam, that meets the requirements for stone backfill in Supplemental Technical Specification SC-M-713.
 - 8 Pay limit is from top of leveling pad elevation to top of wall. See MSE wall profiles.
 - 9 Retained fill in accordance with the plans or Section 205 of the Standard Specifications.
 - 10 When the Reinforced Backfill is stone, encapsulate the Reinforced Backfill in a geotextile for drainage filtration. Keep a minimum distance of 3" between the reinforcement and the geotextile in any direction.
 - 11 Place 6'-0" wide strip of B4 geogrid (see SC-M-203-2) with strong axis perpendicular to MSE Wall face.
 - 12 Provide flowable fill that meets the requirements in SCDOT Standard Specifications for Highway Construction.
 - 13 Back face of barrier may be cast vertical instead of sloping, at the Contractor's option. Maintain clearance to reinforcement. Provide reinforcing as required by Standard Drawing 805-805-05.
 - 14 Place High Survivability Geotextile Filter Fabric meeting the requirements of SC-M-203-1.

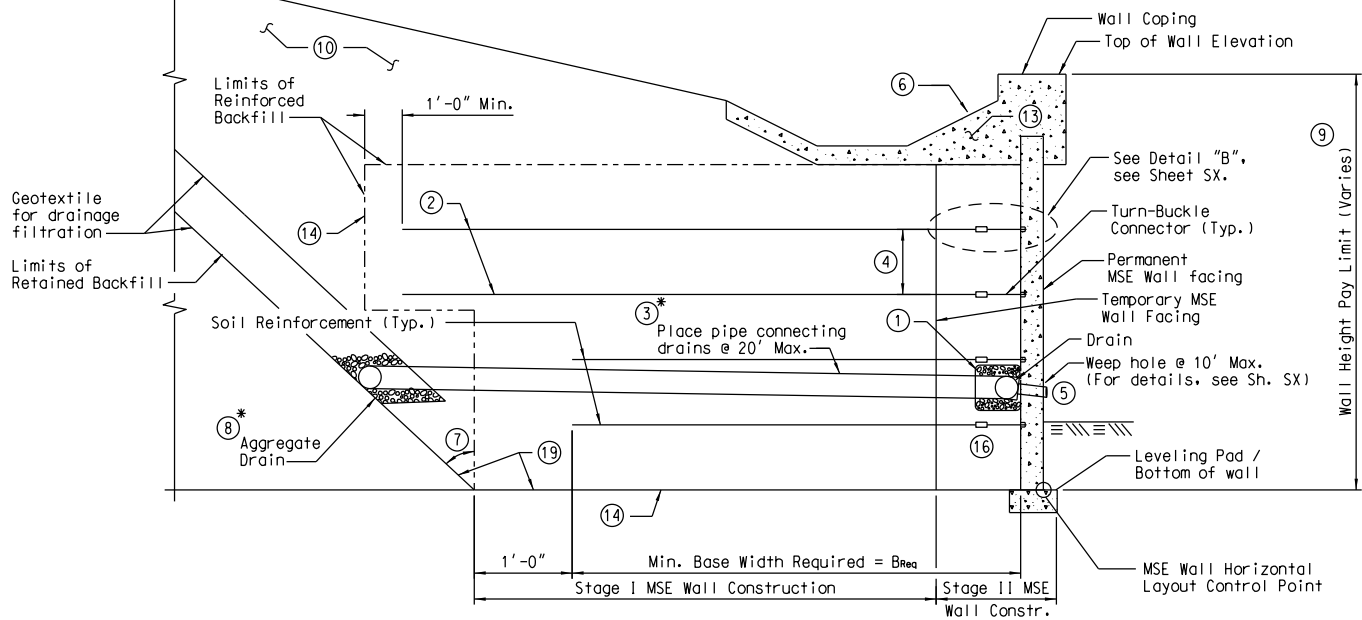
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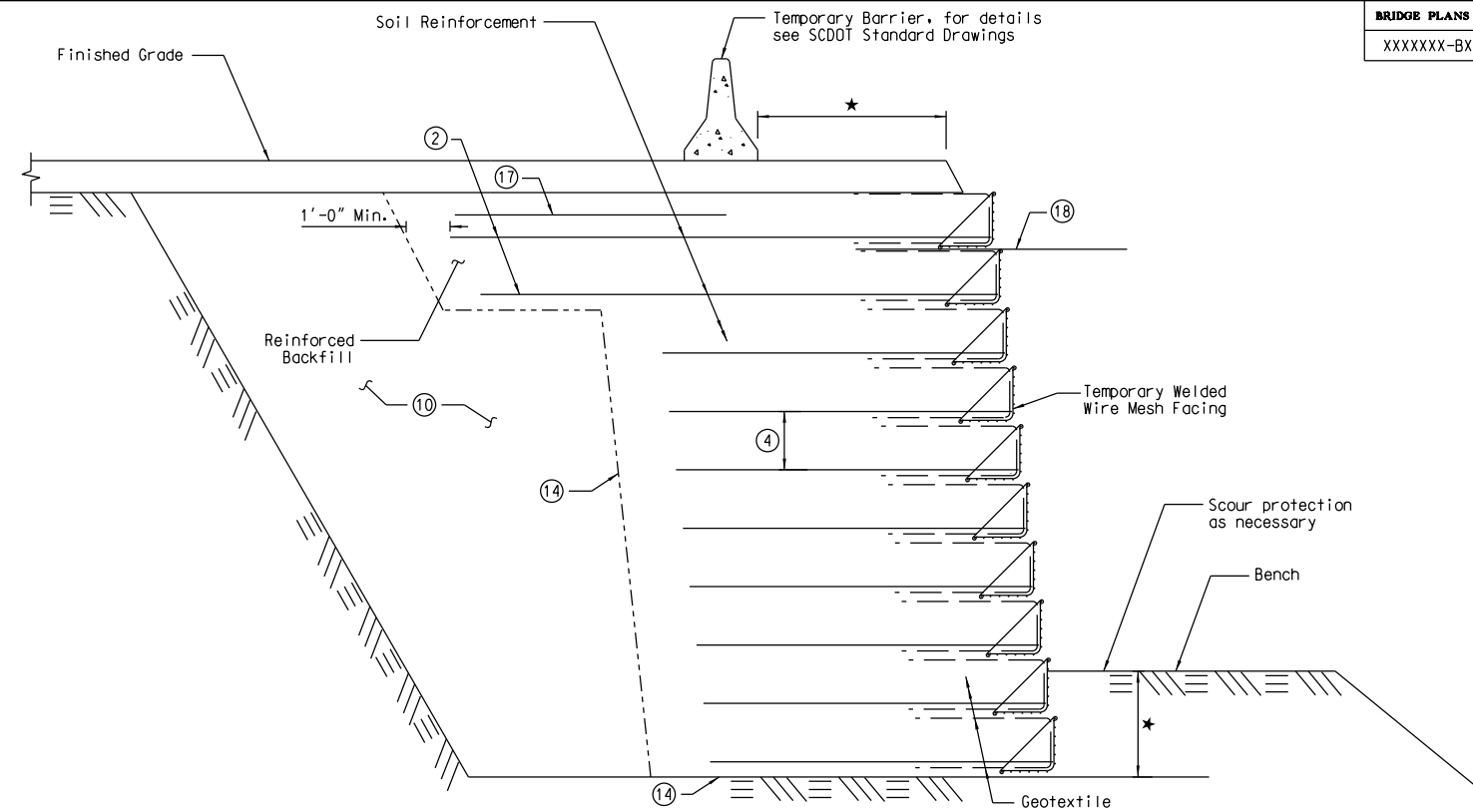
- ★ - Designer to input dimension
- * - Designer to determine whether aggregate drain and connecting pipe is required.
- ** - For locations where the roadway or paved shoulder is directly above or within 5 feet of the end of the soil reinforcement, use a geomembrane on all the soil reinforcement located North of a line along SC roads/routes located North of a line along SC Route 72 from the Georgia State line to Chester, SC and North of SC Route 9 from Chester, SC to Interstate Route 1-77 and West of a line along Interstate Route 1-77 from the intersection of SC Route 9 and 1-77 to the North Carolina State line. Designer to determine the need for geomembrane for other locations.
- ▲ - Designer to input required bench width for walls on slopes.
- ☑ - Add fall protection as required.

REV.				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION							
REV.								PERMANENT MSE WALL - ROAD (PANEL FACE) (4 OF 11)			
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DR.	MCCA	NEH	03-20								
DES.				BY	CHK.	DATE					

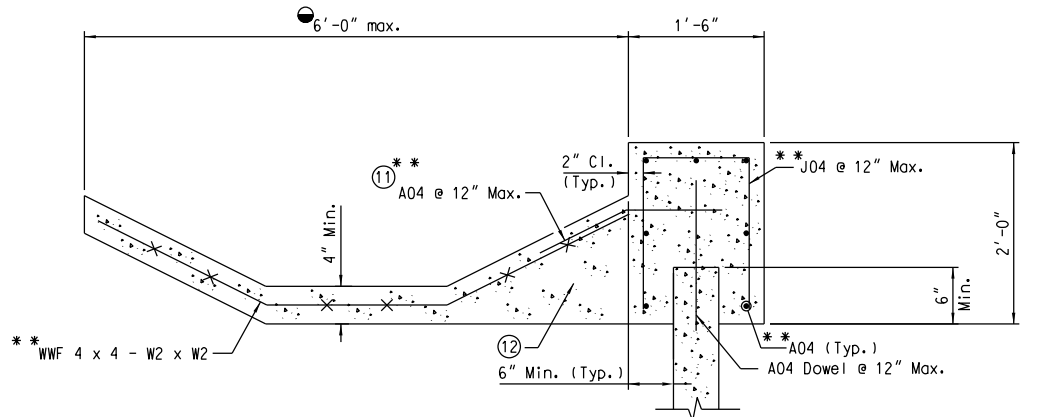
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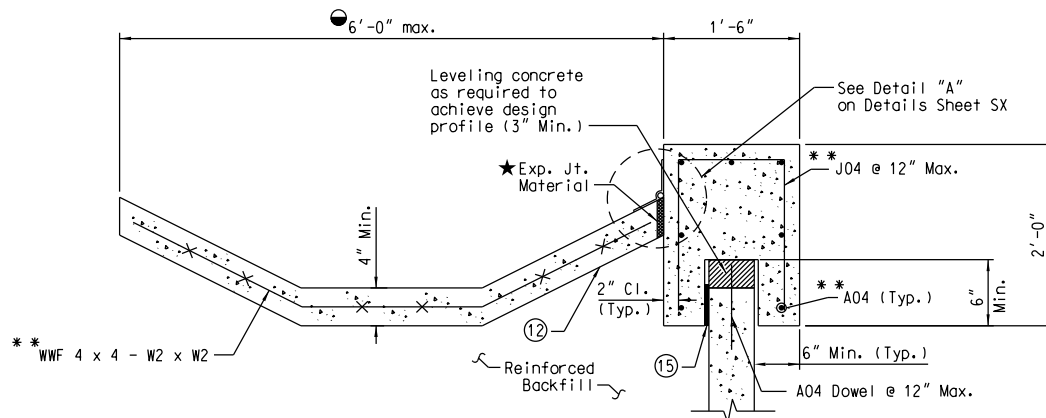
TWO-STAGE MSE WALL TYPICAL SECTION



TEMPORARY MSE WALL WITH TEMPORARY BARRIER



CAST-IN-PLACE WALL COPING AND SLOPE PROTECTION DETAIL



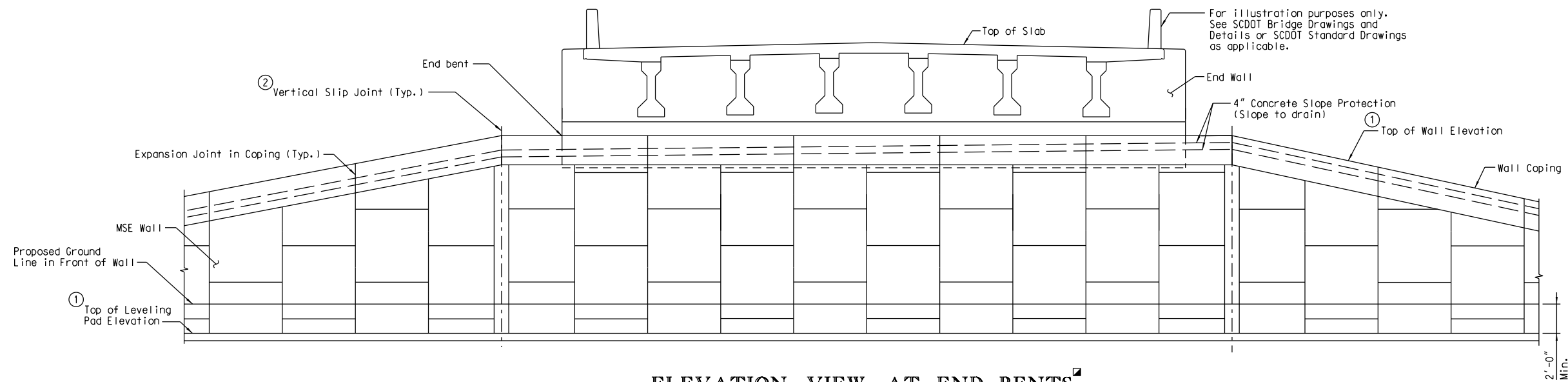
PRECAST WALL COPING AND SLOPE PROTECTION DETAIL

Notes:

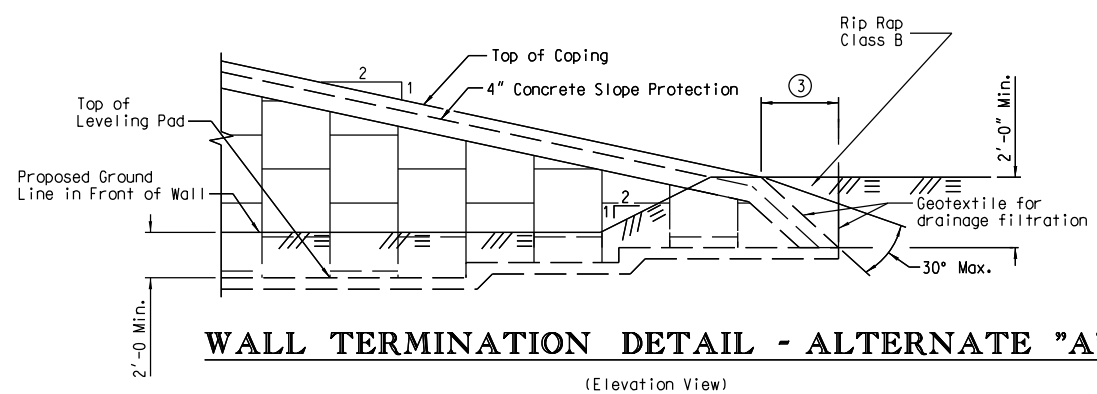
- 1 Construct 1'-0" x 1'-0" drain using 6" dia. perforated pipe. Provide aggregate, other than Macadam, that meets the requirements for stone backfill in Supplemental Technical Specification SC-M-713. Wrap geotextile for drainage filtration (see Supplemental Technical Specification SC-M-713) completely around aggregate drain and overlap 1'-0". Design MSE Wall drainage system to drain the aggregate drain. This drain may be eliminated if reinforced stone backfill is used or if the aggregate drain is not required.
- 2 Extend top two layers of soil reinforcement 5 feet beyond the end of the lower layers of soil reinforcement.
- 3 Slope 2% min. Provide non perforated pipe connecting aggregate drain to drain at wall facing.
- 4 Maximum vertical spacing of soil reinforcement is 32".
- 5 Provide rodent screen manufactured from T304 stainless steel or galvanized steel with a minimum wire diameter of 0.050". Provide rodent screen with minimum of 2 openings per inch and a maximum of 4 openings per inch.
- 6 4" Concrete Slope Protection. See MSE Wall Details (Panel Face) Sheet SX.
- 7 Angle to be determined by the Contractor based on site conditions and the method of construction used. Excavation and/or shoring of retained backfill to permit construction of the MSE wall is considered incidental to the MSE wall construction and is not paid for as a separate item.
- 8 Provide aggregate, other than Macadam, that meets the requirements for stone backfill in the Supplemental Technical Specification SC-M-713.
- 9 Pay limit is from top of leveling pad elevation to top of wall. See MSE wall profiles. Add fall protection as required.
- 10 Fill in accordance with the plans or Section 205 of the Standard Specifications.
- 11 Field bend as necessary.
- 12 Use Class 4000 concrete for concrete in ditch section. Include cost of ditch concrete and reinforcing steel in unit bid price for coping.
- 13 Designer to determine the Wall Coping and Slope Protection Detail to be used.
- 14 When the Reinforced Backfill is stone, encapsulate the Reinforced Backfill in a geotextile for drainage filtration. Keep a minimum distance of 3" between the reinforcement and the geotextile in any direction.
- 15 1/2" thick, 3 1/2" x 3 1/2" treated timber spacer block.
- 16 MSE Wall supplier to determine if void to be filled. If soil is to be used as fill, material to meet the requirements for reinforced backfill. As an alternative, MSE Wall supplier may elect to use a concrete closure pour. Concrete closure pour to be designed by MSE Wall supplier. Concrete closure pour incidental to MSE Wall.
- 17 Place 6'-0" wide strip of B4 Geogrid (see SC-M-203-2) with strong axis perpendicular to MSE Wall face.
- 18 Place 6'-0" wide strip of B4 Geogrid (see SC-M-203-2) with strong axis perpendicular to MSE Wall face, as required to achieve final configuration. Roll and protect exposed geogrid until additional embankment is constructed. Extend rolled geogrid into new embankment once new fill meets elevation of geogrid.
- 19 Place High Survivability Geotextile Filter Fabric meeting the requirements of SC-M-203-1.

Note to Designer:
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 Designer to specify details of settlement monitoring system and required settlement criteria to determine the appropriate time to construct the permanent wall facing.
 * - Designer to input dimension.
 * - Unless otherwise directed by the Hydraulic Engineer-of-Record.
 * - Designer to determine whether aggregate drain and connecting pipe required.
 * - Unless otherwise directed by the Structural Engineer-of-Record.

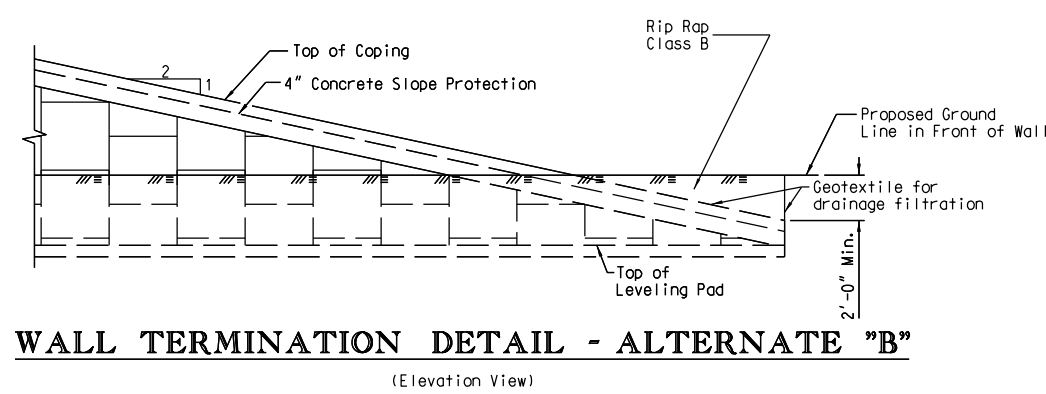
REV.				SOUTH CAROLINA	
REV.				DEPARTMENT OF TRANSPORTATION	
REV.				TEMPORARY MSE WALL (PANEL FACE) (5 OF 11)	
REVIEWED					
QUAN.					
DR.	MCCA	NEH	03-20		
DES.				COUNTY	ROUTE
BY	CHK.	DATE		XXXXXXX	XXXXXX



ELEVATION VIEW AT END BENTS



WALL TERMINATION DETAIL - ALTERNATE "A"
(Elevation View)

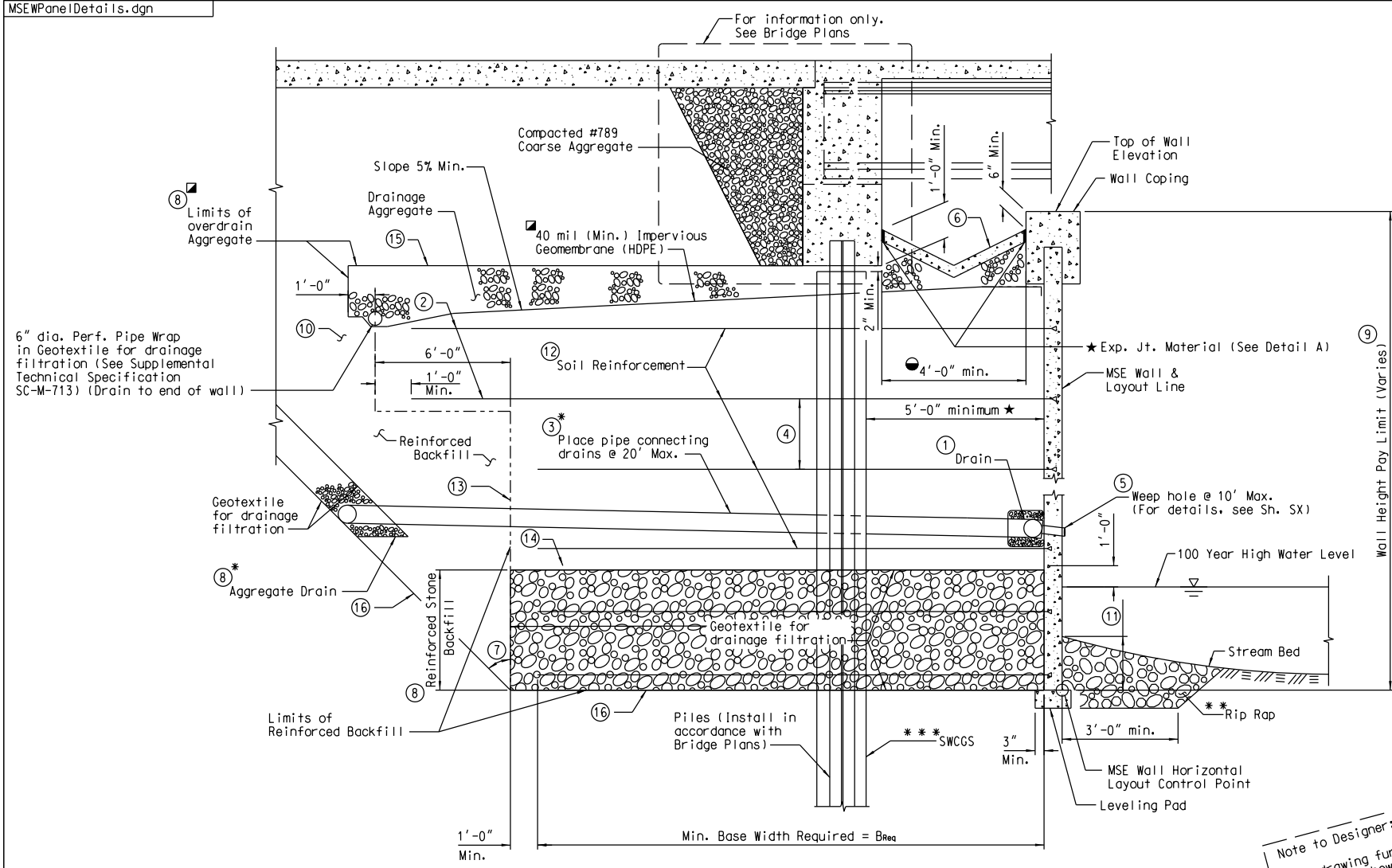


WALL TERMINATION DETAIL - ALTERNATE "B"
(Elevation View)

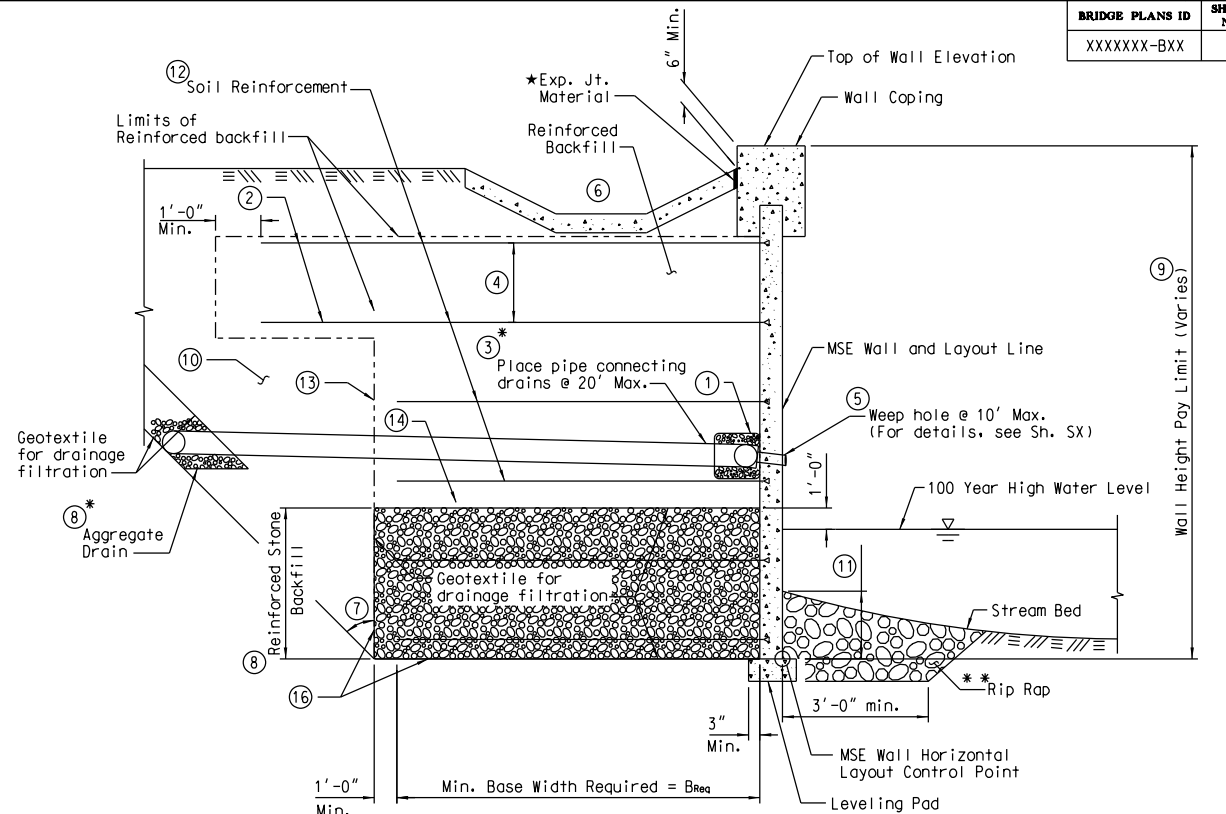
Note to Designer:
 This drawing furnished for information only. All dimensions shown are sheet specific. Any use of this design and drawing, including dimensions, must be checked by the User's Engineer to ensure design is adequate for the intended use. All drawings must be signed and sealed by a South Carolina Registered Professional Engineer when used.
 Do not use the block facing for MSE Walls that are defined as part of the bridge embankment by Table 10-4.1 of the SCDOT Geotechnical Design Manual.
 - Detail may be eliminated if all information is provided on MSE wall profile.

- Notes:**
- Do not attach soil reinforcement to end bent caps, end walls, wing walls, or other bridge elements.
 - Provide geotextile for drainage filtration (see Supplemental Technical Specification SC-M-713) at all horizontal and vertical joints.
 - For MSE Wall General notes, see Sh. SX.
 - For Wall Coping details, see Sh. SX.
 - For Leveling Pad details, see Sh. SX.
 - For Slip Joint details, see Sh. SX.
 - For Concrete Slope Protection details, see Sh. SX.
 - ① Pay limit is from top of leveling pad elevation to top of wall. See MSE wall profiles. Add fall protection as required.
 - ② Locate vertical Slip joint at slope break on each side of end bent.
 - ③ This portion of coping must be cast-in-place.

REV.				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION							
REV.								ELEVATION VIEW MSE WALLS (PANEL FACE) (6 OF 11)			
REV.											
REVIEWED											
QUAN.				COUNTY XXXXXXXX ROUTE XXXXXX							
DR.	MCCA	NEH	03-20								
DES.				BY	CHK.	DATE					



TYPICAL SECTION END BENT AT WATERFRONT MSE WALL



TYPICAL SECTION AT WATERFRONT MSE WALL

Notes:

- 1 Construct 1'-0" x 1'-0" drain using 6" dia. perforated pipe. Provide aggregate, other than Macadam, that meets the requirements for stone backfill in Supplemental Technical Specification SC-M-713. Wrap geotextile for drainage filtration (see Supplemental Technical Specification SC-M-713) completely around aggregate drain and overlap 1'-0". Design MSE Wall drainage system to drain the aggregate drain. This drain may be eliminated if reinforced stone backfill is used or if the aggregate drain is not required.
- 2 Extend top two layers of soil reinforcement 5 feet beyond the end of the lower layers of soil reinforcement.
- 3 Slope 2% min. Provide non perforated pipe connecting aggregate drain to drain at wall facing.
- 4 Maximum vertical spacing of soil reinforcement is 32".
- 5 Provide rodent screen manufactured from T304 stainless steel or galvanized steel with a minimum wire diameter of 0.050". Provide rodent screen with minimum of 2 openings per inch and a maximum of 4 openings per inch.
- 6 4" Concrete Slope Protection. See MSE Wall Details (Panel Face) Sheet SX.
- 7 Angle to be determined by the Contractor based on site conditions and the method of construction used. Excavation and/or shoring of retained backfill to permit construction of the MSE wall is considered incidental to the MSE wall construction and is not paid for as a separate item.
- 8 Provide aggregate, other than Macadam, that meets the requirements for stone backfill in the Supplemental Technical Specification SC-M-713.
- 9 Pay limit is from top of leveling pad elevation to top of wall. See MSE wall profiles. Add fall protection as required.
- 10 Fill in accordance with the plans or Section 205 of the Standard Specifications.
- 11 Construct leveling pad below the maximum scour elevation and no higher than 3 feet below the bottom of the stream bed. Backfill excavated area in front of wall with Class *** Rip Rap.
- 12 Non-metallic reinforcement required for all waterfront MSE walls for the full height of the wall.
- 13 When the Reinforced Backfill is stone, encapsulate the Reinforced Backfill in a geotextile for drainage filtration. Keep a minimum distance of 3" between the reinforcement and the geotextile in any direction.
- 14 When the Reinforced Backfill is Granular or Screening and it is on top of stone, place a geotextile for drainage filtration on top of the stone. Keep a minimum distance of 3" between the reinforcement and the geotextile in any direction.
- 15 Geotextile for drainage filtration.
- 16 Place High Survivability Geotextile Filter Fabric meeting the requirements of SC-M-203-1.

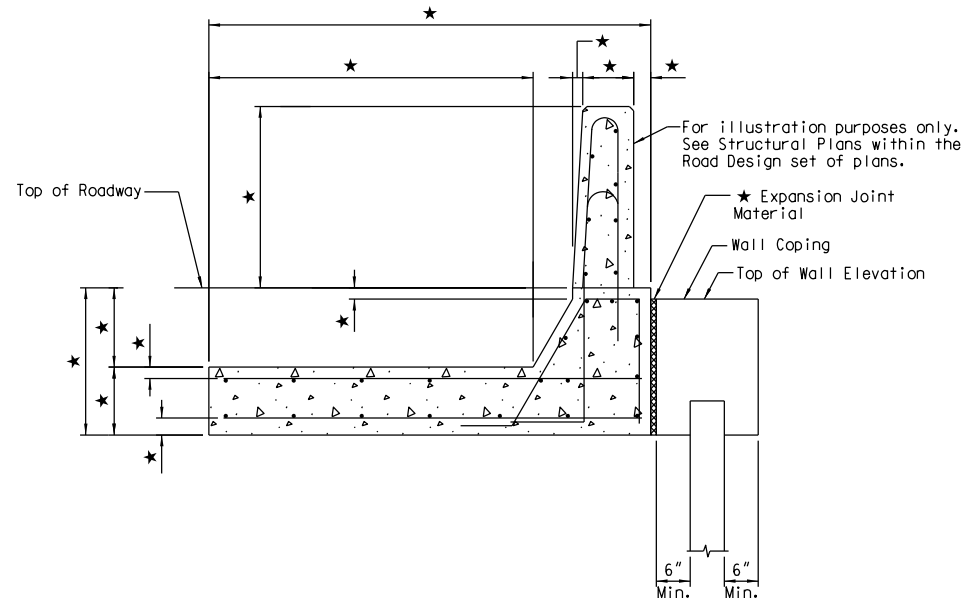
Note to Designer:
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- * - Minimum 5'-0". Designer to input required dimension.
- X - Designer to input the required data.
- * - Designer to determine whether aggregate drain and connecting pipe required.
- ** - Designer to input required Class of Rip Rap.
- *** - Backfill as required unless noted otherwise. Bridge Designer to determine the size of the Smooth Wall or Corrugated Galvanized Steel (SWCGS) pipe. Bridge Designer to determine the requirements of the backfill material.
- ☑ - For locations where the roadway or paved shoulder is directly above or within 5 feet of the end of the soil reinforcement, use an aggregate overdrain and geomembrane on all roads/routes located North of a line along SC Route 72 from the Georgia State line to Chester, SC and North of SC Route 9 from Chester, SC to Interstate Route 1-77 and West of a line along Interstate Route 1-77 from the intersection of SC Route 9 and I-77 to the North Carolina State line. Designer to determine the need for geomembrane for other locations.
- - Unless otherwise directed by the Hydraulic Engineer-of-Record.

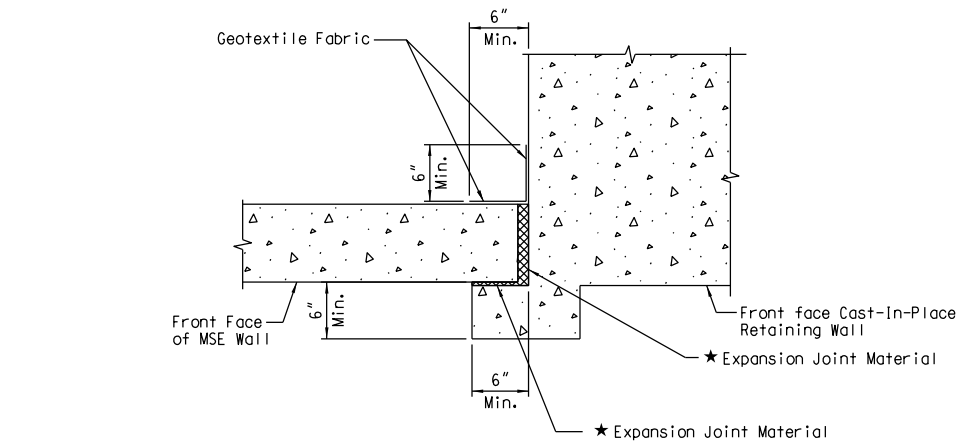
Do not use Typical Section at Waterfront MSE Wall where the maximum velocity of the water exceeds 5 ft/sec.

REV.				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION	
REV.					
REV.				WATERFRONT MSE WALL (PANEL FACE) (7 OF 11)	
REV.					
REVIEWED				COUNTY	ROUTE
QUAN.				XXXXXXX	XXXXXX
DR.	MCCA	NEH	03-20		
DES.					
BY	CHK.	DATE			

\$\$\$DATE\$\$\$

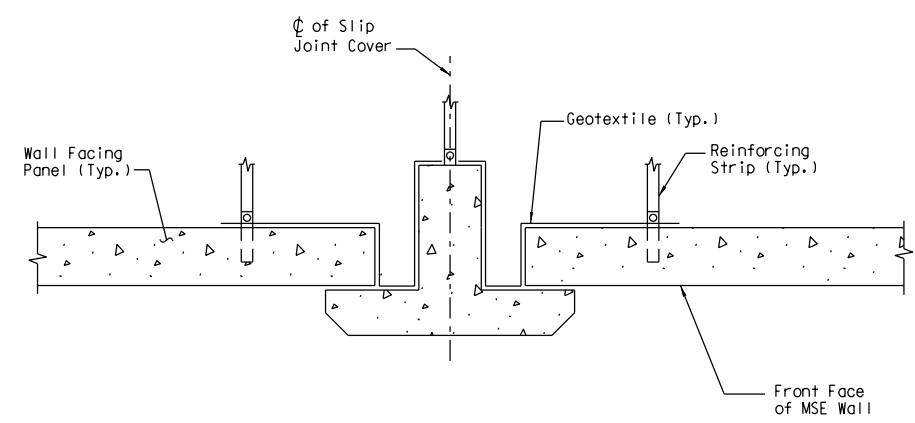


MOMENT SLAB SECTION

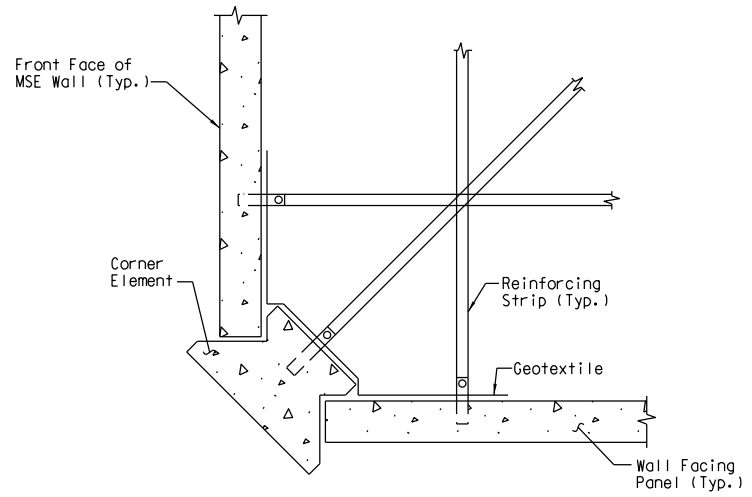


MSE WALL INTERFACE WITH CAST-IN-PLACE WALL
(Plan View)

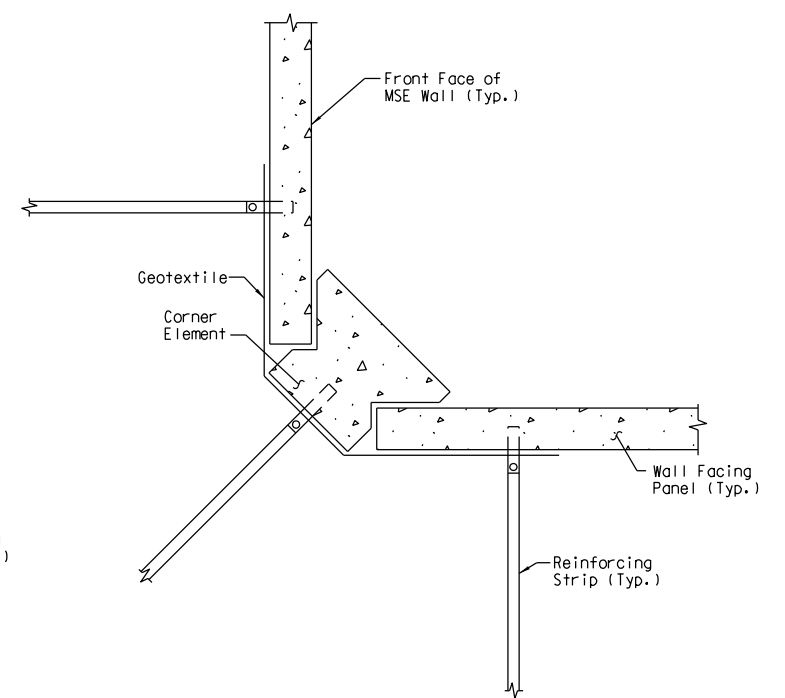
Notes:
 Include the cost of reinforcing, concrete, and all other items needed for construction of the barrier wall and the moment slab in the bid price for Concrete Roadside Barrier.
 Extend compressible material from bottom of Moment Slab to top of Coping in Expansion joint.
 ① Acute angles less than 70° not permitted.
 ② For angles between 90° and 180°, MSE Wall Supplier to provide detail for acceptance prior to commencing construction of wall.



SLIP JOINT DETAIL - PRECAST PANELS



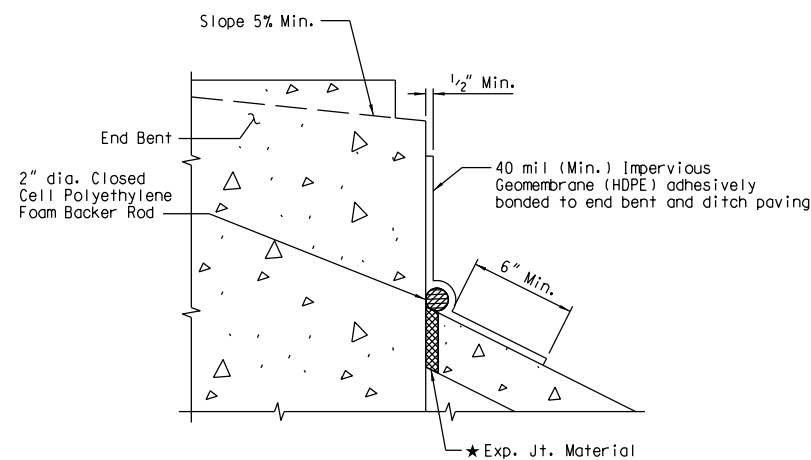
OUTSIDE CORNER DETAIL ①



INSIDE CORNER DETAIL ②

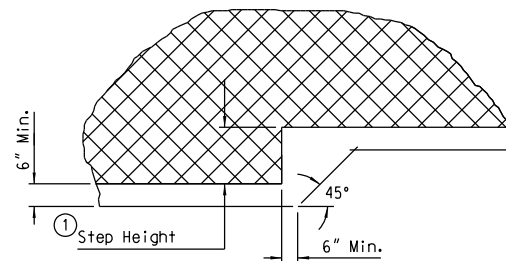
Note to Designer:
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 Place Contraction Joints at 30' maximum spacing and Expansion Joints at 90' maximum spacing, in moment slab. Designer to detail minimum length of moment slab section between joints so that continuous unit length satisfies design requirements.
 ★ - Designer to input dimension.
 ▣ - Designer to design, detail, and label reinforcing steel. Minimum reinforcing requirement is #16 bars at 12" max. spacing in each direction of each face.

REV.				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION MSE WALL DETAILS 1 OF 4 (PANEL FACE) (8 OF 11)				COUNTY	ROUTE
REV.								XXXXXXX	XXXXXX
REV.									
REVIEWED									
QUAN.									
DR.	MCCA	NEH	03-20						
DES.									
	BY	CHK.	DATE						

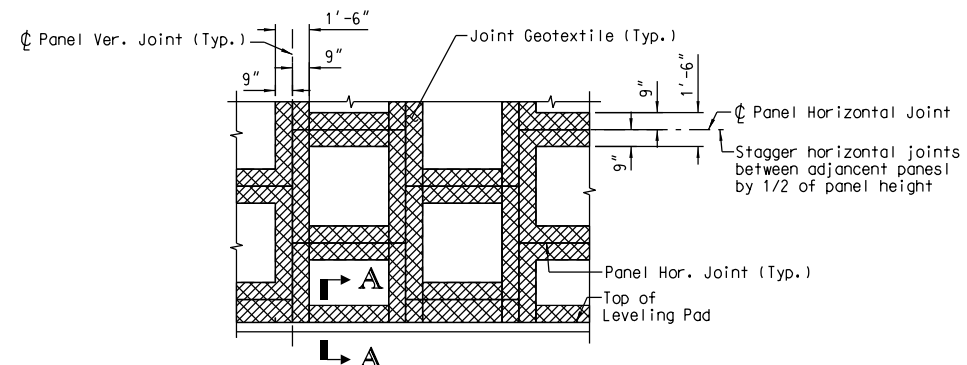


DETAIL "A"

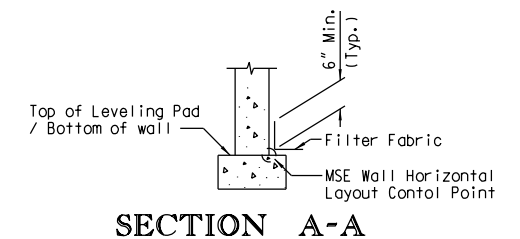
Applies to all End Bents with Expansion joints.



LEVELING PAD STEP DETAIL



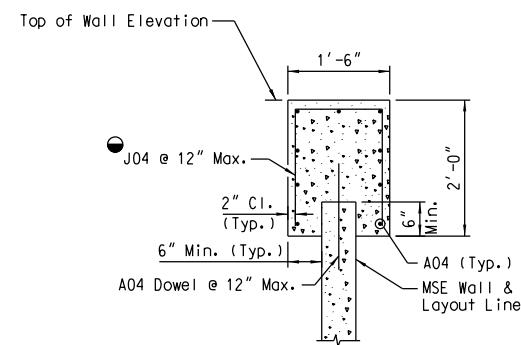
LAYOUT OF JOINT GEOTEXTILE AT FILL FACE OF PANEL JOINTS



SECTION A-A

Notes:

- Do not attach soil reinforcement to end bent caps, end walls, wing walls, or other bridge elements.
- ① Limit step height for panel facing to 1/2 of the full panel height.
- ② Rodent screen to be manufactured from T304 stainless steel or galvanized steel with a minimum wire diameter of 0.050". Provide rodent screen with minimum of 2 openings per inch and a maximum of 4 openings per inch.
- ③ 1/2" thick, 3 1/2" x 3 1/2" treated timber block.
- ④ Slope bench at a maximum of 12H:1V.

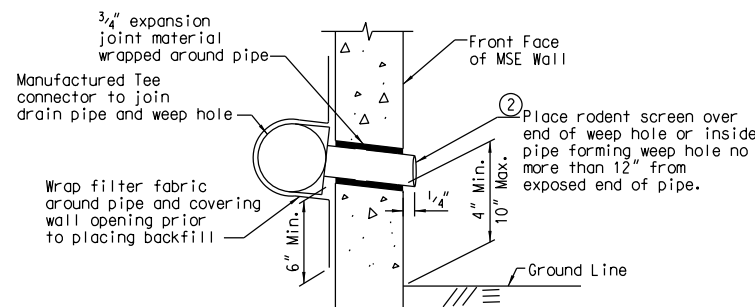


CAST-IN-PLACE WALL COPING SECTION

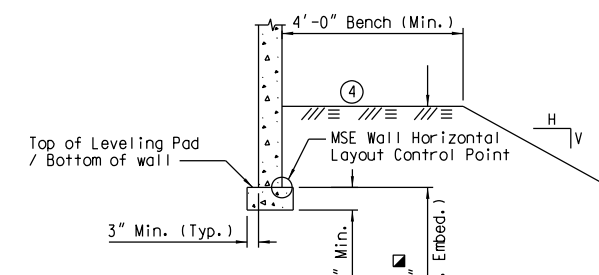
BAR SIZE DESIGNATION

US. CUSTOMARY	METRIC
#3	10
#4	13
#5	16

Note: For bar bending details see SCDOT Reinforcing Bending Bars Details Bridge DWG



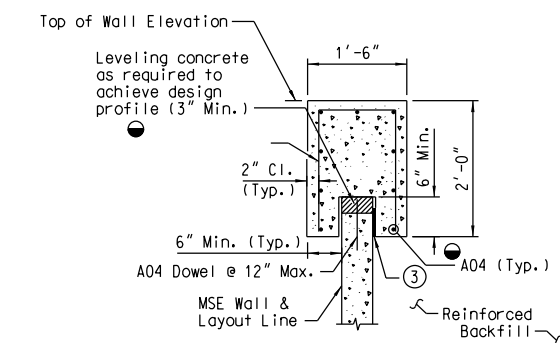
WEEP HOLE DETAIL



LEVELING PAD DETAIL

Minimum MSE Wall Embedment Depth	
Slope of Ground in front of Wall	Minimum Embedment Depth *
Horizontal** (Walls)	Wall Height/20
Horizontal** (Abutments)	Wall Height/10
3H:1V	Wall Height/10
2H:1V	Wall Height/7
1.5H:1V	Wall Height/5

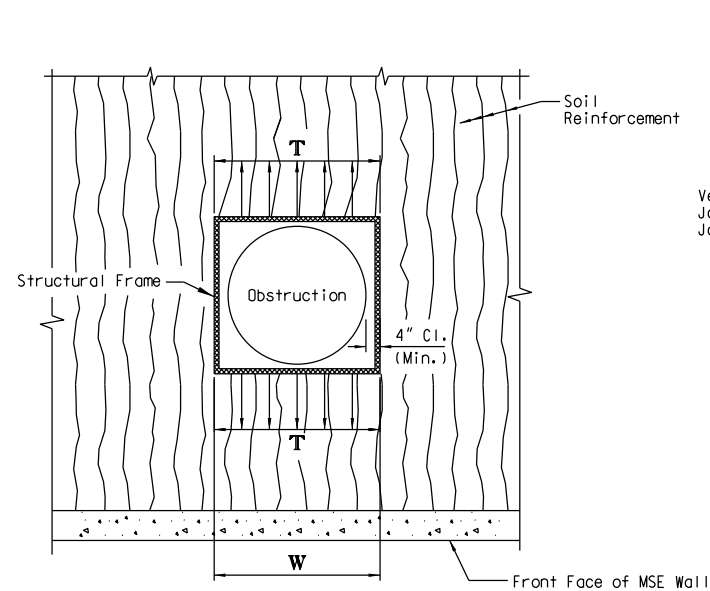
* If table results in embedment depth less than 2'-0", use 2'-0".
 ** or slopes flatter than 3H:1V



PRECAST WALL COPING SECTION

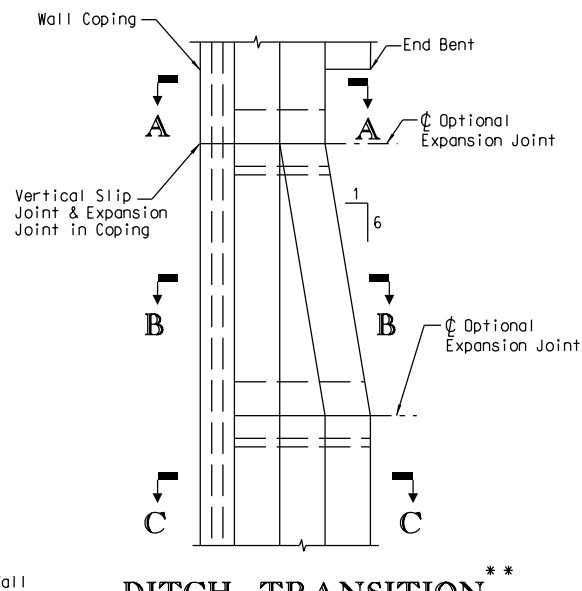
Note to Designer:
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 ★ - Designer to input dimension.
 ● - Unless otherwise directed by the Structural Engineer-Record.

REV.				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION MSE WALL DETAILS 2 OF 4 (PANEL FACE) (9 OF 11)
REV.				
REV.				
REVIEWED				
QUAN.				
DR.	MCCA	NEH	03-20	COUNTY XXXXXXXX
DES.				
BY	CHK.	DATE		

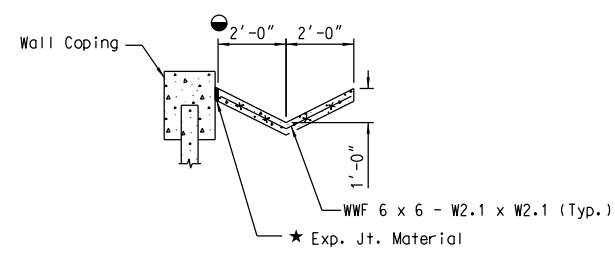


MSE WALL OBSTRUCTION (VERTICAL) WITH STRUCTURAL FRAME
(Plan View)

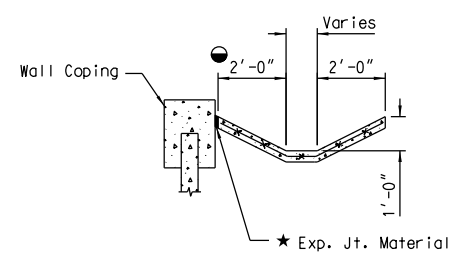
T = Total Load Which Structural Frame Must Carry = $T_{max} \times W$
 T_{max} = Max. Reinforcement Unit Tensile Load



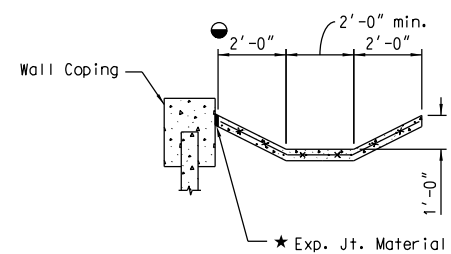
DITCH TRANSITION



SECTION A-A

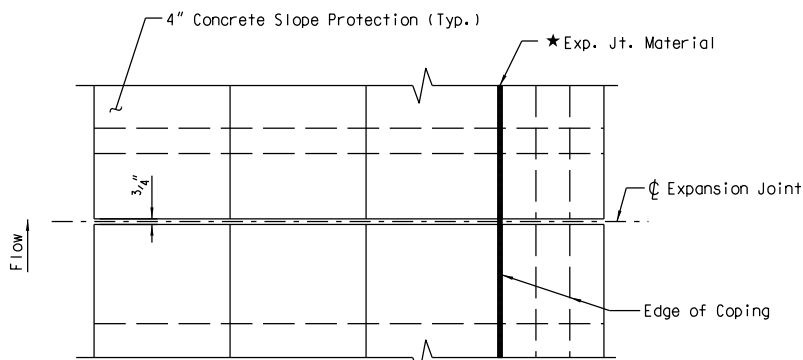


SECTION B-B



SECTION C-C

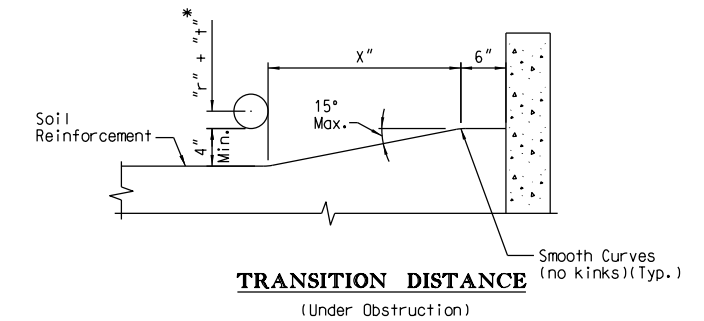
4 IN. SLOPE PROTECTION DITCH TRANSITION SECTION



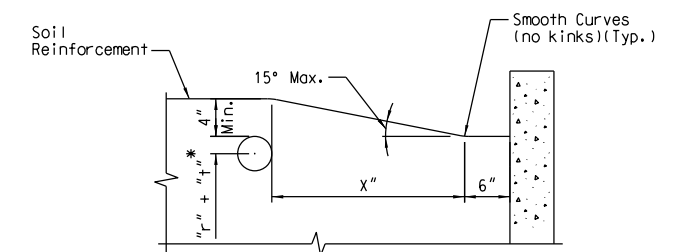
PART. PLAN OF DITCH AT EXPANSION JOINT

Notes:

- ① MSE Wall Supplier to design and provide additional soil reinforcement on each side of obstruction or a structural frame around the obstruction to transfer the load from the soil reinforcement on one side of the obstruction to the other. Design and detailing of either method is the MSE Wall Supplier's responsibility.

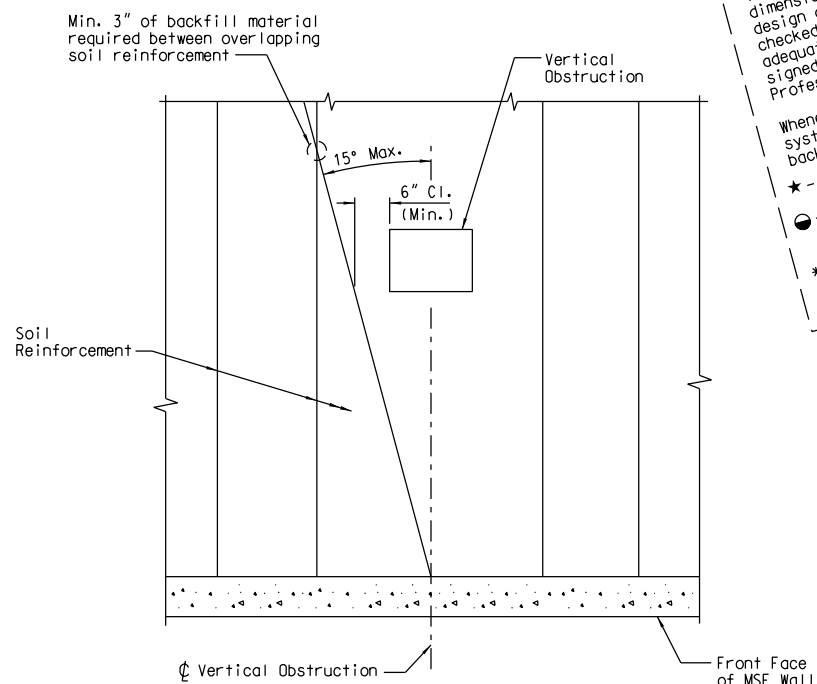


TRANSITION DISTANCE
(Under Obstruction)

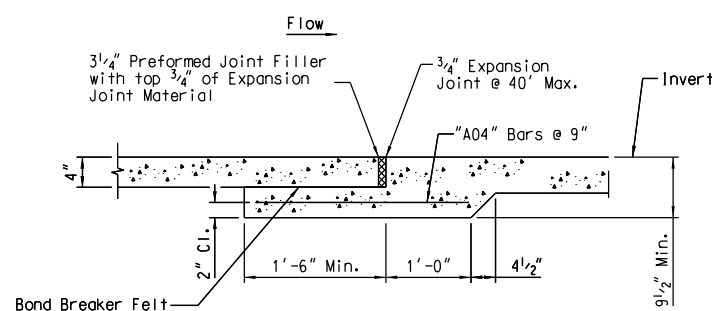


TRANSITION DISTANCE
(Over Obstruction)

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 * - Designer to input dimension
 * - Unless otherwise directed by the Hydraulic Engineer-of-Record.
 * - Remove detail for walls that are not adjacent to Bridge End Bents.
 Whenever possible relocate utilities, roadway drainage system, or other obstructions from the reinforced backfill.



MSE WALL OBSTRUCTION (VERTICAL)
(Plan View)



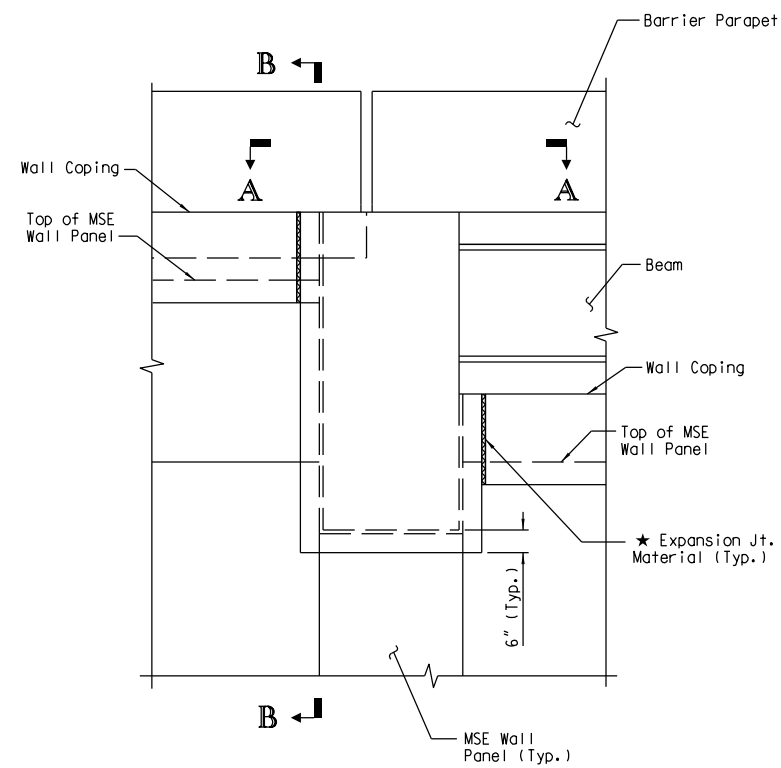
SECTION THRU DITCH AT EXPANSION JOINT

Pipe Inside Diameter (in)	Pipe Radius r (in)	X (in) 1	X (in) 2
6	3	27	34
12	6	38	49
18	9	49	58
24	12	60	73
30	15	71	84

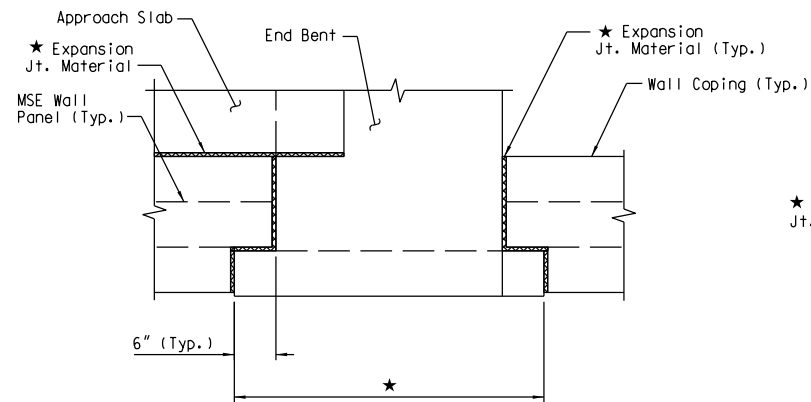
* - "t" denotes pipe wall thickness
 1 - Use for all pipe material except concrete
 2 - Use for concrete pipe

MSE WALL OBSTRUCTION (HORIZONTAL)

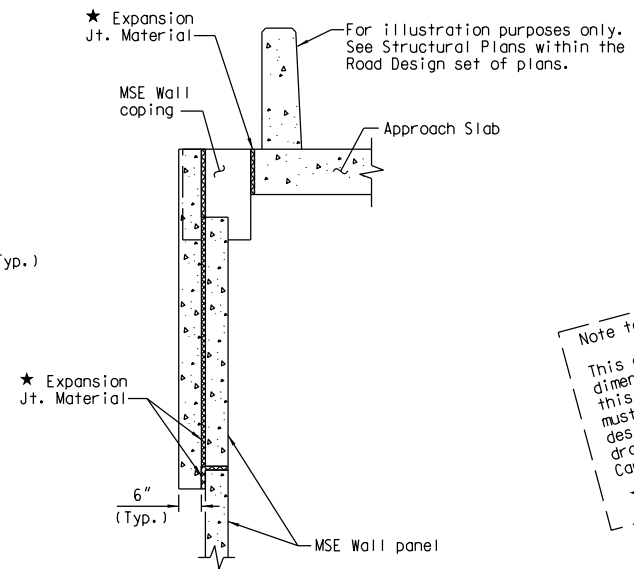
REV.				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION MSE WALL DETAILS 3 OF 4 (PANEL FACE) (10 OF 11)
REV.				
REV.				
REVIEWED				
QUAN.				
DR.	MCCA	NEH	03-20	COUNTY XXXXXXX
DES.				ROUTE XXXXXX
BY	CHK.	DATE		



ELEVATION - END OF END BENT

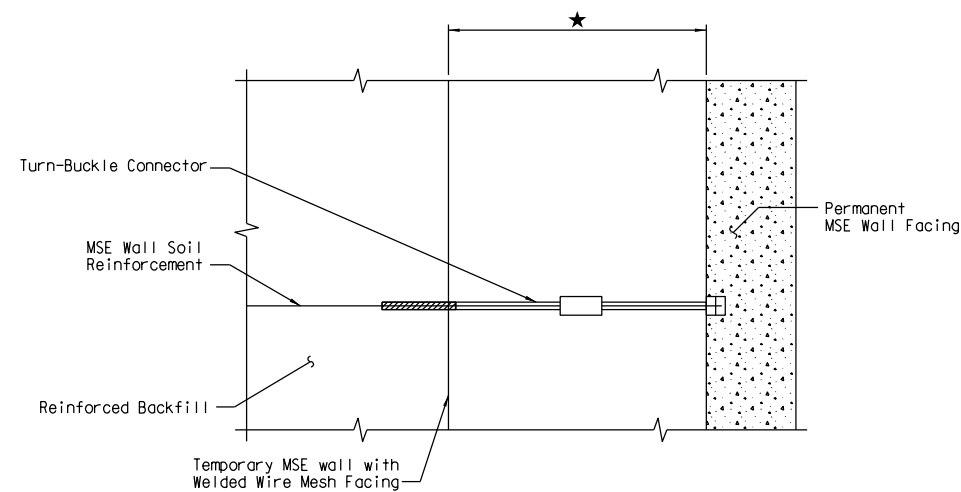


SECTION A-A
(Slab not Shown)



SECTION B-B

Note to Designer:
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 ★ - Designer to input dimension



DETAIL "B"

Attach the permanent MSE Wall facing to the MSE Wall soil reinforcement. Align the permanent MSE Wall facing connection point and the MSE Wall soil reinforcement and connect with a turn-buckle connector. Do not attach the permanent MSE Wall facing to the temporary MSE Wall facing.

REV.				SOUTH CAROLINA DEPARTMENT OF TRANSPORTATION MSE WALL DETAILS 4 OF 4 (PANEL FACE) (11 OF 11)
REV.				
REV.				
REVIEWED				
QUAN.				
DR.	MCCA	NEH	03-20	COUNTY XXXXXXXX
DES.				
	BY	CHK.	DATE	