

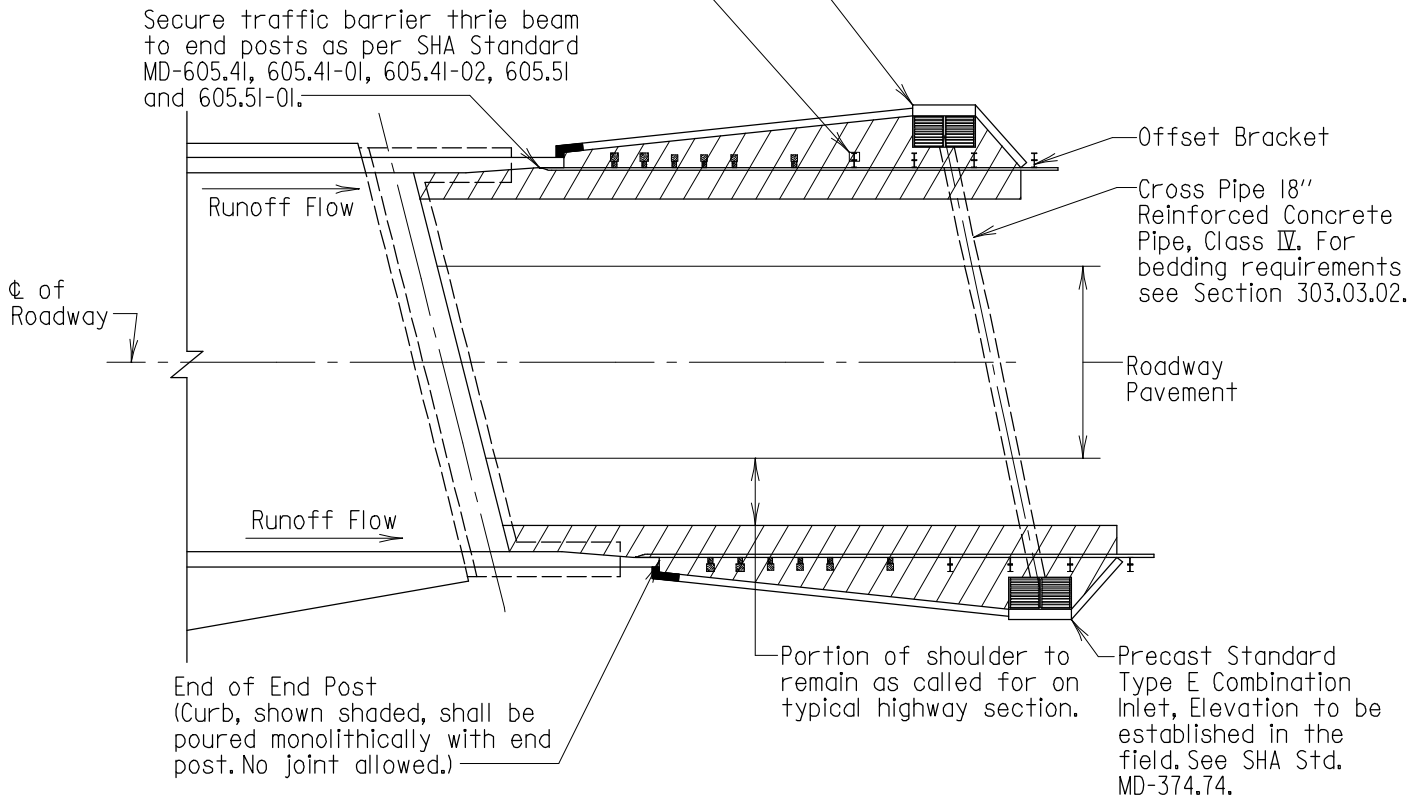
Chapter 02 - Substructure

SECTION 01

DRAINAGE (SUB-DR)

District Engineer shall have option of requiring sockets, placing posts, and filling with 9"± of grout, (grout in accordance with Standard Specification Section 902.11) sloped to drain, as second stage construction.

If inlets are required at each side of bridge, and distance between inlets is less than 60', then cross pipe shall be considered with outlet used on lower inlet. If length is greater than 60' or it would be more economical to provide a separate outlet for pipes less than 60', then each inlet shall have its own outlet pipe, etc. For details see sht. 2 of 2.



PLAN
Scale: 1" = 20'-0"

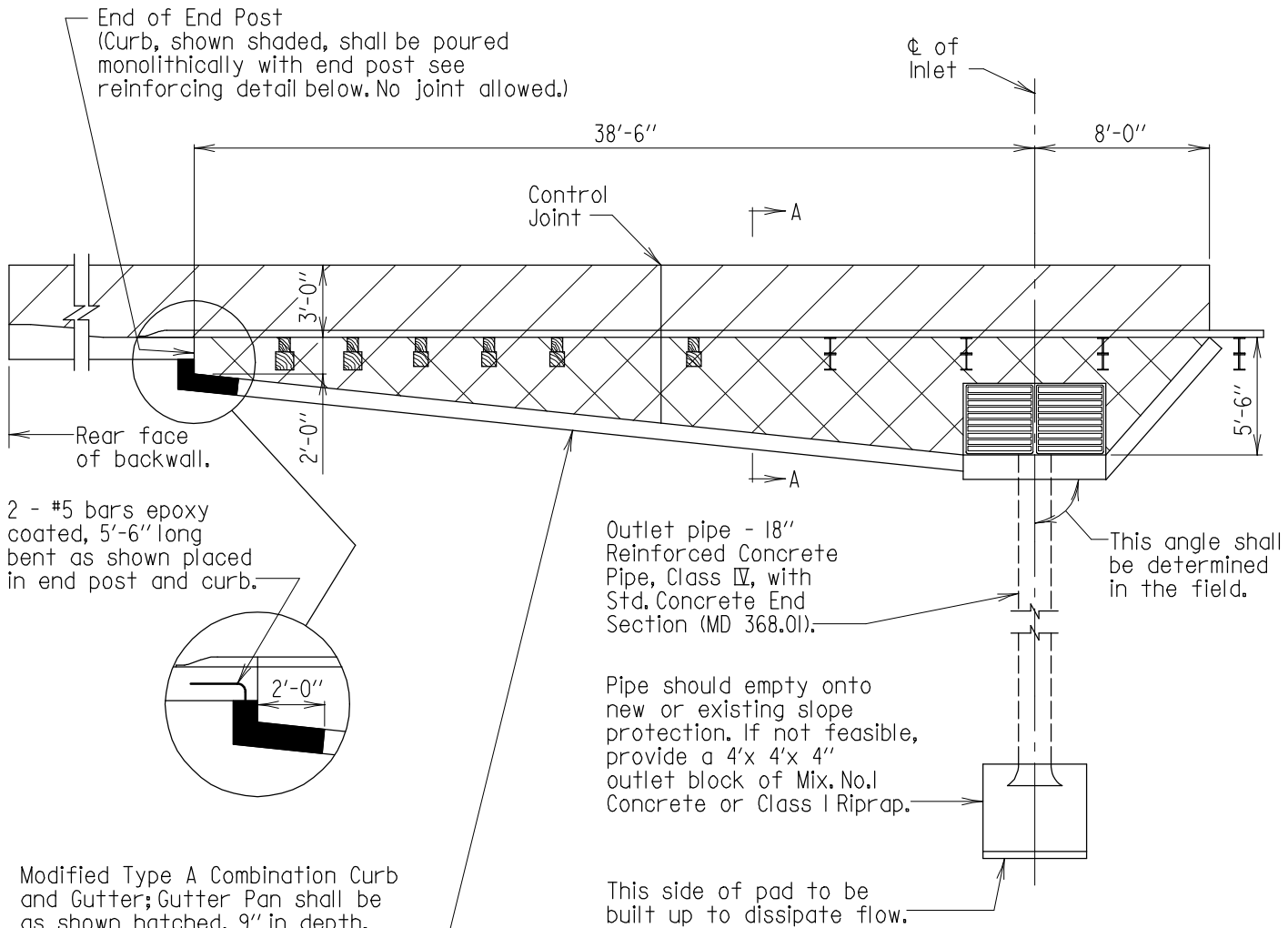
Notes:

1. Payment for Drainage Inlet at End of Bridge Structure shall be on an each basis. Cost for entire installation of hatched area, curb and gutter, inlet, etc. Cross pipe, outlet pipe, elbows and concrete end section shall be incidental to the unit cost of inlet. Outlet pad will be paid for separately.
2. Open Approach Roadway is defined as a highway with full shoulders, no curbed sections, sidewalks and/or raised medians.
3. See note on General Plan and Elevation as to which ends of structure will require inlets.
4. Traffic barrier posts shall be driven prior to placing concrete gutter pan except if option above is utilized.
5. See sheet 2 of 2 for additional details.

APPROVAL
<i>L.S. Fisher</i> DIRECTOR OFFICE OF STRUCTURES
DATE: 01-30-2007
VERSION
1.0

STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES
DRAINAGE INLET AT END OF BRIDGE STRUCTURE (OPEN APPROACH ROADWAY)
DETAIL NO. SUB-DR-101
SHEET <u>1</u> OF <u>2</u>

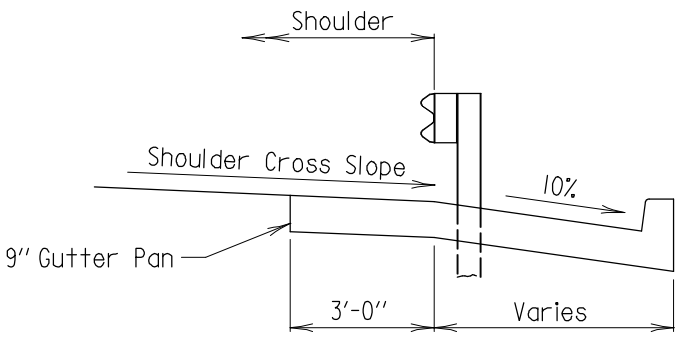
SUBSTRUCTURE - DRAINAGE



Modified Type A Combination Curb and Gutter; Gutter Pan shall be as shown hatched, 9" in depth. Single hatched area shall be sloped to follow shoulder configuration. Double hatched area to be sloped at 10%, see Section A-A.

PLAN OF INLET AREA

Scale: 1/8" = 1'-0"



SECTION A-A

Scale: 1/4" = 1'-0"

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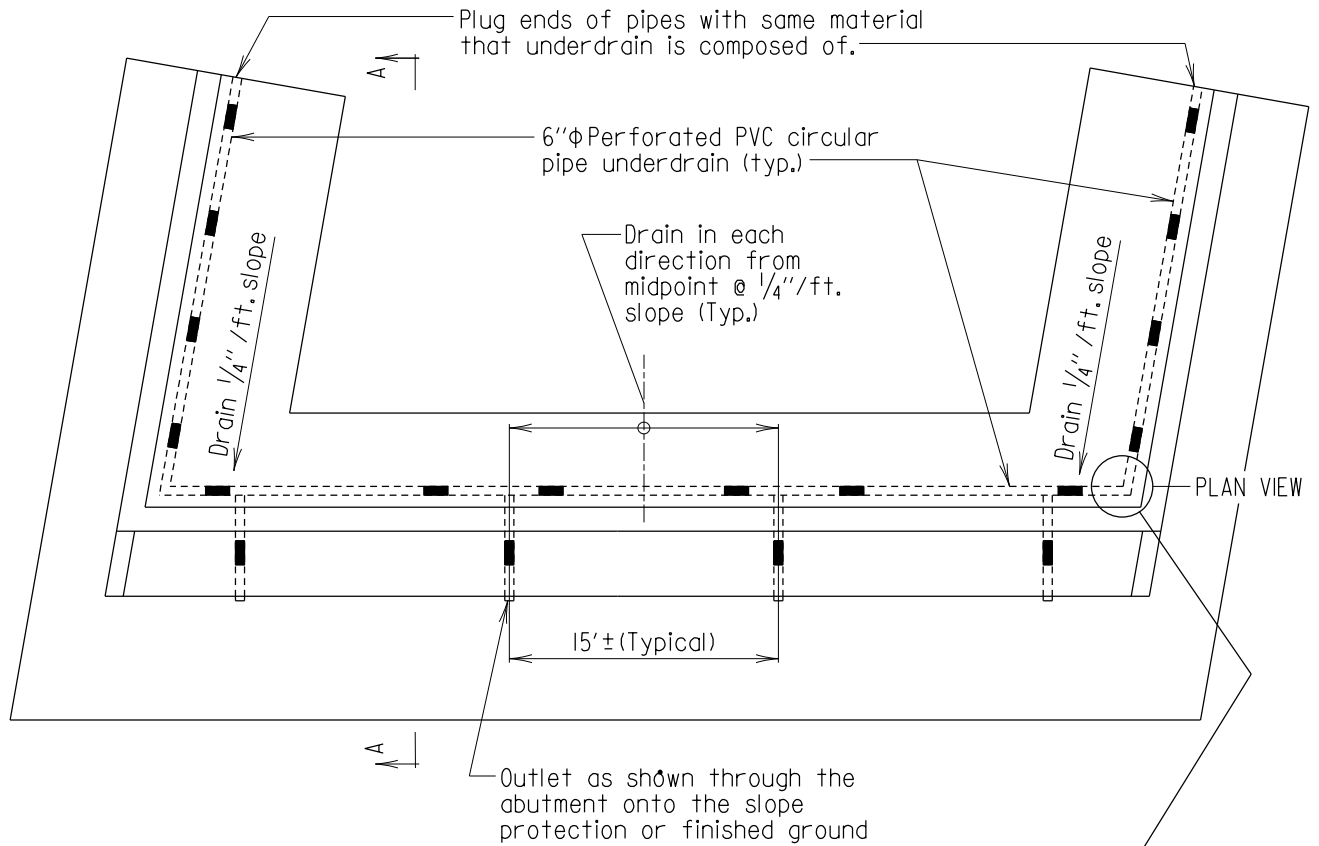
STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

DRAINAGE INLET
AT END OF BRIDGE STRUCTURE
(OPEN APPROACH ROADWAY)

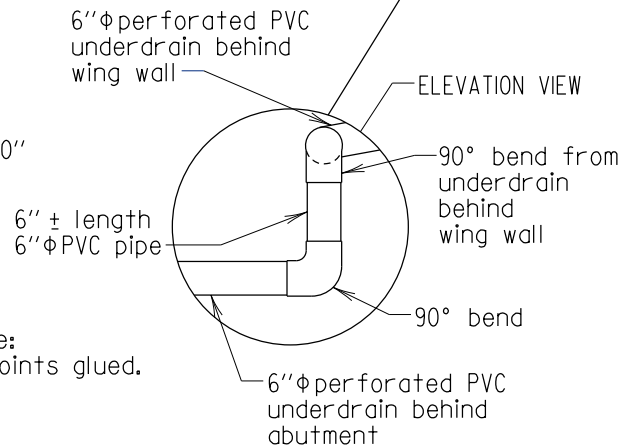
DETAIL NO. SUB-DR-101

SHEET 2 OF 2

SUBSTRUCTURE - DRAINAGE



PLAN
Scale: $\frac{3}{32}'' = 1'-0''$



Note:
All joints glued.

Notes:

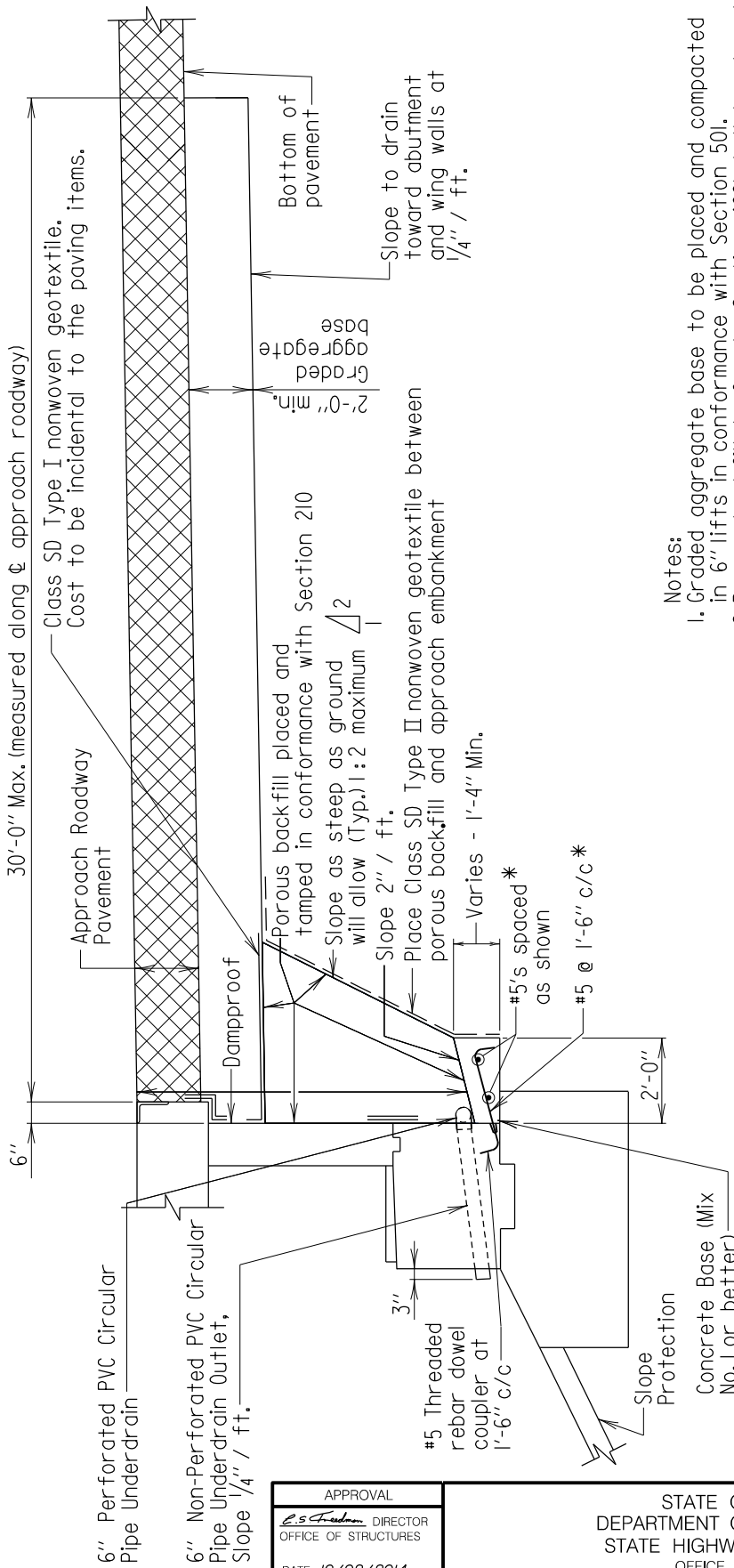
1. To be used for all fixed abutments or expansion abutments with lengths contributing to expansion less than or equal to 70 feet.
2. Minimum slope of Pipe Underdrain Outlets is $\frac{1}{4}''/ft.$
3. For Section A-A see Sheet No. 2, 3 or 4
4. The drainage system behind each wing wall can be connected to the drainage system behind the abutment using 2 - 90° bends and a short length of pipe. This will necessitate the drainage system behind the wing wall be slightly higher.
5. For wing walls over 15 ft. long, the drainage system behind them may be independent of the drainage system behind the abutment. They can be outletted directly through the wing wall.
6. The cost of the PVC underdrains complete in place will be incidental to the Substructure Concrete item.
7. For section through wing wall, see Detail No. SUB-DR-203.

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DATE: 10/02/2014
VERSION
1.0

STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES
**DRAINAGE SYSTEM AND BACKFILL FOR ABUTMENTS WITH
FIXED BEARINGS OR EXPANSION BEARINGS WITH LENGTHS
CONTRIBUTING TO EXPANSION LESS THAN OR
EQUAL TO 70 FEET**

DETAIL NO. SUB-DR-201

SHEET 1 OF 4



30'-0" Max. (measured along \perp approach roadway)

Class SD Type I nonwoven geotextile.
Cost to be incidental to the paving items.

Approach Roadway Pavement

6"

6" Perforated PVC Circular Pipe Underdrain

6" Non-Perforated PVC Circular Pipe Underdrain Outlet, Slope 1/4" / ft.

Dampproof

Porous backfill placed and tamped in conformance with Section 210

Slope as steep as ground will allow (Typ.) 1:2 maximum Δ 2

Place Class SD Type II nonwoven geotextile between porous backfill and approach embankment

Varies - 1'-4" Min.

#5's spaced* as shown

#5 @ 1'-6" c/c*

2'-0"

Slope Protection

Concrete Base (Mix No. 1 or better)

2'-0" min. Graded aggregate base

Bottom of pavement

Slope to drain toward abutment and wing walls at 1/4" / ft.

Notes:

1. Graded aggregate base to be placed and compacted in 6" lifts in conformance with Section 501.
2. Porous backfill (refer to Section 469) shall be placed as shown behind the abutment and to the same geometrics behind the abutment wing walls when they parallel the highway. (See sheet 5 of 5).
3. The Contractor must provide a well compacted surface to place the geotextile and stone fill against. In fill areas it will be necessary to overfill a sufficient distance so that a well compacted surface will be produced when the overfill is removed. The removed material will be incidental to the pertinent Structure Concrete items.
4. The cost of the geotextile within the limits shown will be incidental to the pertinent Structure Concrete items.

SECTION A-A

Scale: 1/4" = 1'-0"

* If 1'-6" width of the concrete base is poured to rest on top of footing, the reinforcing can be eliminated. No additional compensation will be allowed for this option.

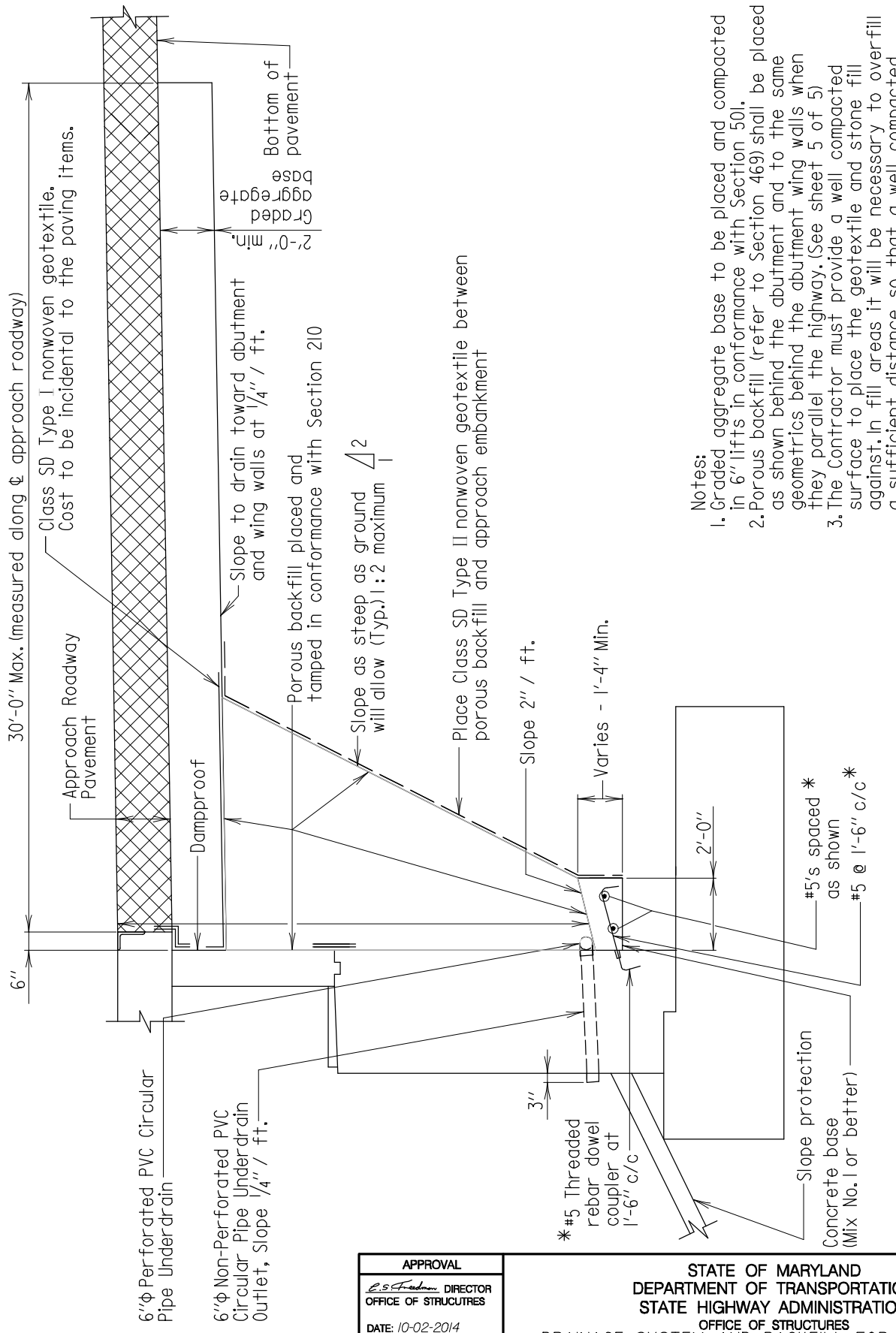
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DATE: 10/02/2014	
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STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

DRAINAGE SYSTEM AND BACKFILL FOR ABUTMENTS (PEDESTAL) WITH FIXED BEARINGS OR EXPANSION BEARINGS WITH LENGTHS CONTRIBUTING TO EXPANSION LESS THAN OR EQUAL TO 70 FEET

DETAIL NO. SUB-DR-201

SHEET 2 OF 4



- Notes:
1. Graded aggregate base to be placed and compacted in 6" lifts in conformance with Section 501.
 2. Porous backfill (refer to Section 469) shall be placed as shown behind the abutment and to the same geometrics behind the abutment wing walls when they parallel the highway. (See sheet 5 of 5)
 3. The Contractor must provide a well compacted surface to place the geotextile and stone fill against. In fill areas it will be necessary to overfill a sufficient distance so that a well compacted surface will be produced when the overfill is removed. The removed material will be incidental to the pertinent Structure Concrete items.
 4. The cost of the geotextile within the limits shown will be incidental to the pertinent Structure Concrete Items.

SECTION A-A
Scale: 1/4" = 1'-0"

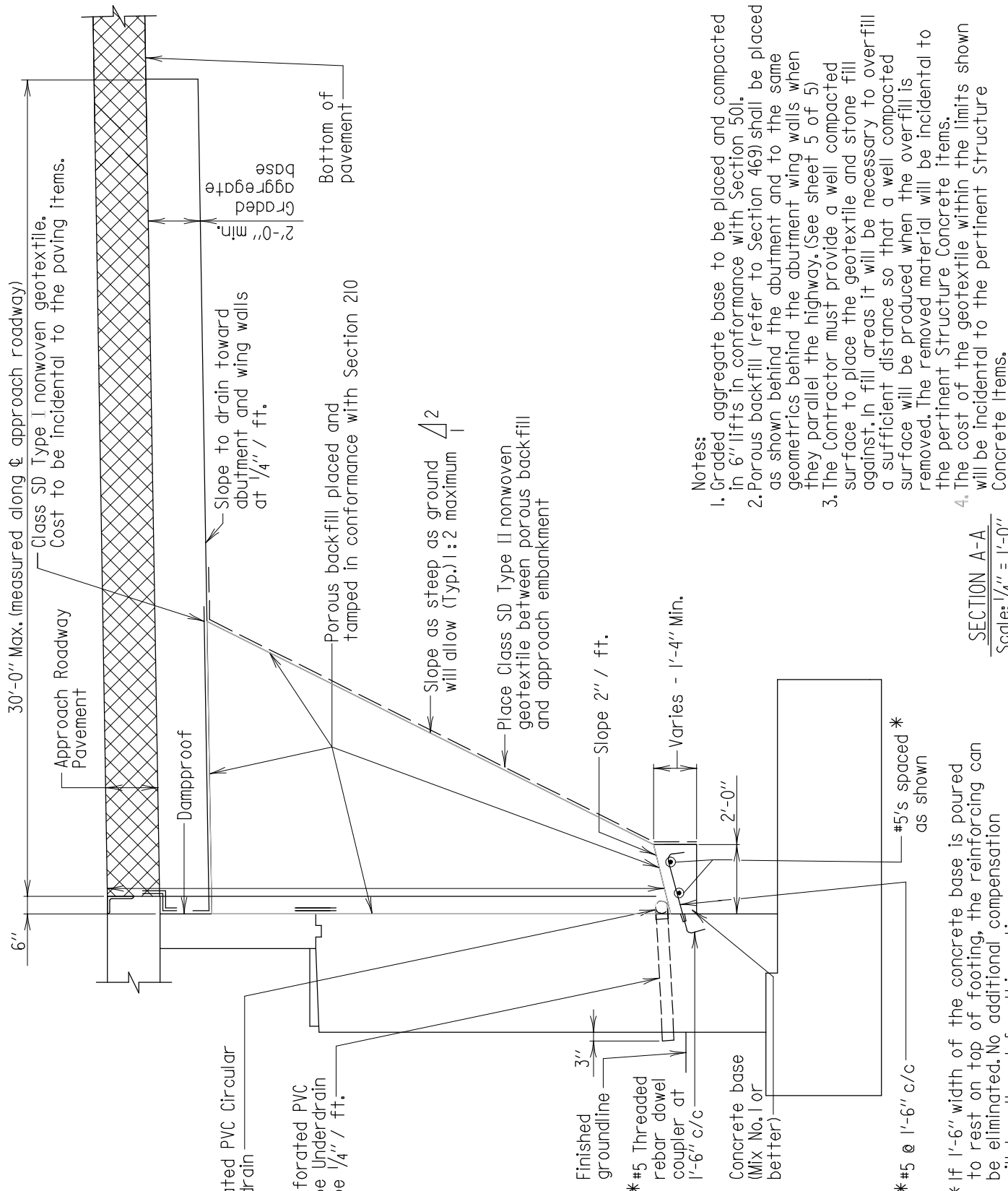
* If 1'-6" width of the concrete base is poured to rest on top of footing, the reinforcing can be eliminated. No additional compensation will be allowed for this option.

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STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

DRAINAGE SYSTEM AND BACKFILL FOR ABUTMENTS
(SEMI-CANTILEVER) WITH FIXED BEARINGS OR EXPANSION
BEARINGS WITH LENGTHS CONTRIBUTING TO EXPANSION
LESS THEN OR EQUAL TO 70 FEET

DETAIL NO. SUB-DR-201 SHEET 3 OF 4



- Notes:
1. Graded aggregate base to be placed and compacted in 6" lifts in conformance with Section 501.
 2. Porous backfill (refer to Section 469) shall be placed as shown behind the abutment and to the same geometrics behind the abutment wing walls when they parallel the highway. (See sheet 5 of 5)
 3. The Contractor must provide a well compacted surface to place the geotextile and stone fill against. In fill areas it will be necessary to overfill a sufficient distance so that a well compacted surface will be produced when the overfill is removed. The removed material will be incidental to the pertinent Structure Concrete items.
 4. The cost of the geotextile within the limits shown will be incidental to the pertinent Structure Concrete items.

SECTION A-A
Scale: 1/4" = 1'-0"

* If 1'-6" width of the concrete base is poured to rest on top of footing, the reinforcing can be eliminated. No additional compensation will be allowed for this option.

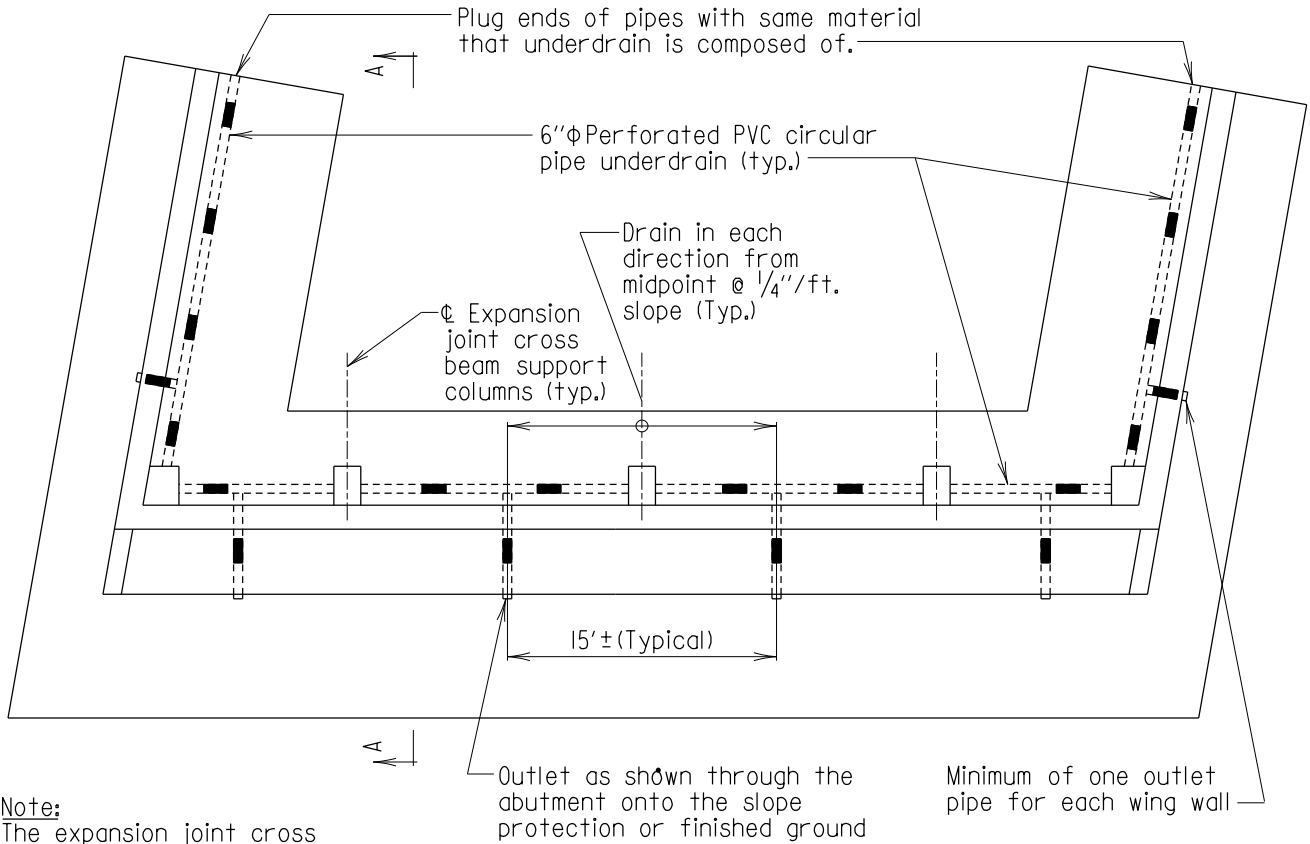
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STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES

DRAINAGE SYSTEM AND BACKFILL FOR ABUTMENTS
(FULL CANTILEVER) WITH FIXED BEARINGS OR EXPANSION
BEARINGS WITH LENGTHS CONTRIBUTING TO EXPANSION
LESS THEN OR EQUAL TO 70 FEET

DETAIL NO. SUB-DR-201

SHEET 4 OF 4



Note:
The expansion joint cross beam is not shown for clarity.

PLAN
Scale: $\frac{3}{32}$ " = 1'-0"

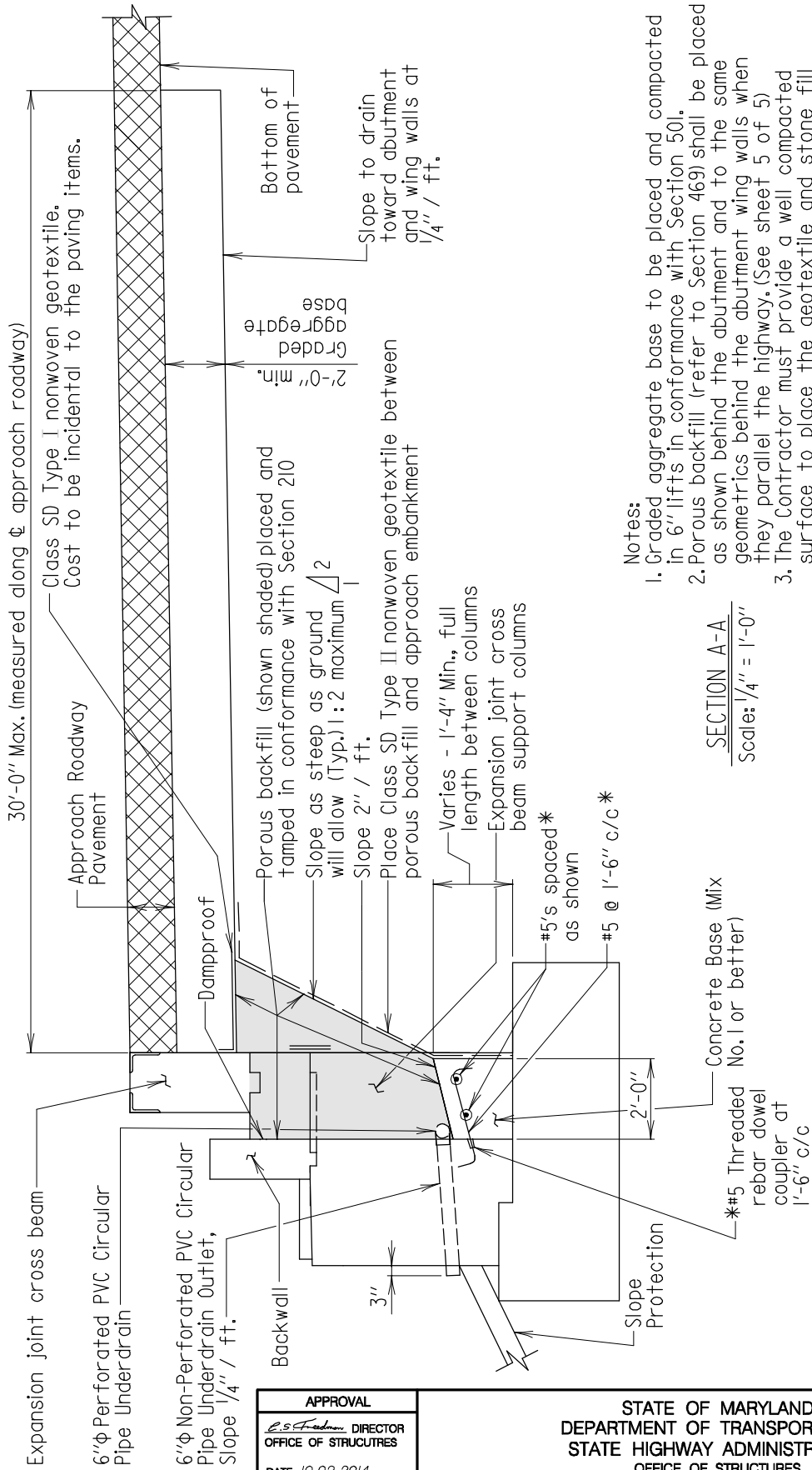
Notes:

1. To be used for all expansion abutments where an expansion cross beam is called for.
2. Minimum slope of Pipe Underdrain Outlets is $\frac{1}{4}$ "/ft.
3. For Section A-A see Sheet No. 2, 3 or 4
4. The drainage system behind wing walls shall be independent of the drainage system behind the abutment. They shall be outletted directly through the wing wall.
5. The cost of the PVC underdrains complete in place will be incidental to the Substructure Concrete item.
6. For section through wing wall, see Detail No. SUB-DR-203.

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DATE: 10/02/2014
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STATE OF MARYLAND DEPARTMENT OF TRANSPORTATION STATE HIGHWAY ADMINISTRATION OFFICE OF STRUCTURES DRAINAGE SYSTEM AND BACKFILL FOR ABUTMENTS WITH EXPANSION BEARINGS WITH LENGTHS CONTRIBUTING TO EXPANSION GREATER THAN 70 FEET
DETAIL NO. SUB-DR-202
SHEET <u>1</u> OF <u>4</u>

SUBSTRUCTURE - DRAINAGE



- Notes:
1. Graded aggregate base to be placed and compacted in 6" lifts in conformance with Section 501.
 2. Porous backfill (refer to Section 469) shall be placed as shown behind the abutment and to the same geometrics behind the abutment wing walls when they parallel the highway. (See sheet 5 of 5)
 3. The Contractor must provide a well compacted surface to place the geotextile and stone fill against. In fill areas it will be necessary to overfill a sufficient distance so that a well compacted surface will be produced when the overfill is removed. The removed material will be incidental to the pertinent Structure Concrete items.
 4. The cost of the geotextile within the limits shown will be incidental to the pertinent Structure Concrete items.

SECTION A-A
Scale: 1/4" = 1'-0"

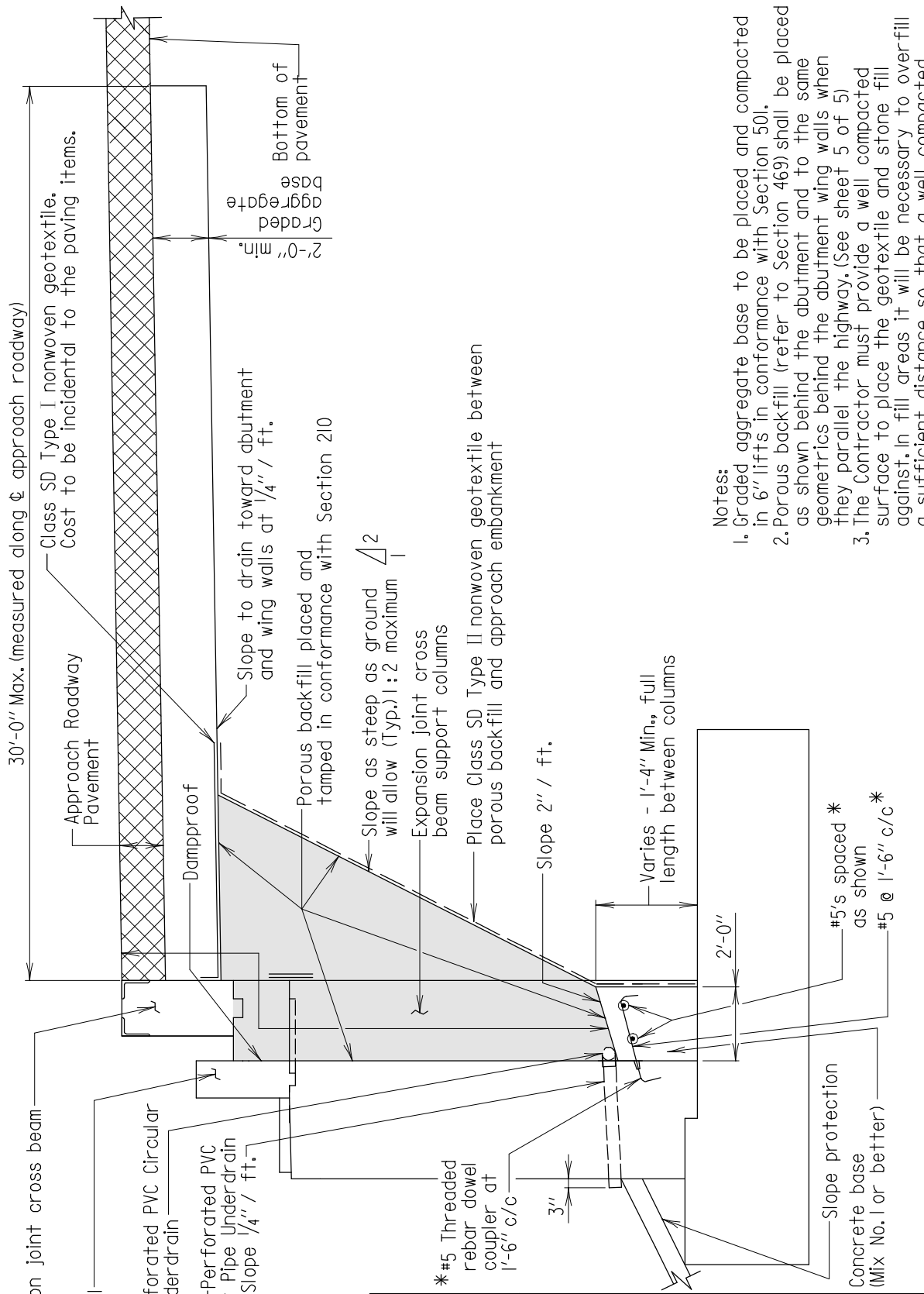
* If 1'-6" width of the concrete base is poured to rest on top of footing, the reinforcing can be eliminated. No additional compensation will be allowed for this option.

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STATE OF MARYLAND
DEPARTMENT OF TRANSPORTATION
STATE HIGHWAY ADMINISTRATION
OFFICE OF STRUCTURES
DRAINAGE SYSTEM AND
BACKFILL FOR ABUTMENTS (PEDESTAL) WITH
EXPANSION BEARINGS WITH LENGTHS CONTRIBUTING TO
EXPANSION GREATER THAN 70 FEET

DETAIL NO. SUB-DR-202

SHEET 2 OF 4



30'-0" Max. (measured along ϕ approach roadway)

Class SD Type I nonwoven geotextile. Cost to be incidental to the paving items.

Approach Roadway Pavement

Expansion joint cross beam

Backwall

6" ϕ Perforated PVC Pipe Underdrain

6" ϕ Non-Perforated PVC Circular Pipe Underdrain Outlet, Slope 1/4" / ft.

Dampproof

Slope to drain toward abutment and wing walls at 1/4" / ft.

Porous backfill placed and tamped in conformance with Section 210

Slope as steep as ground will allow (Typ.) 1:2 maximum

Expansion joint cross beam support columns

Place Class SD Type II nonwoven geotextile between porous backfill and approach embankment

Slope 2" / ft.

Varies - 1'-4" Min., full length between columns

2'-0"

#5's spaced * as shown

#5 @ 1'-6" c/c *

Slope protection

Concrete base (Mix No. 1 or better)

3"

Bottom of pavement

Graded aggregate base

2'-0" Min.

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 OFFICE OF STRUCTURES
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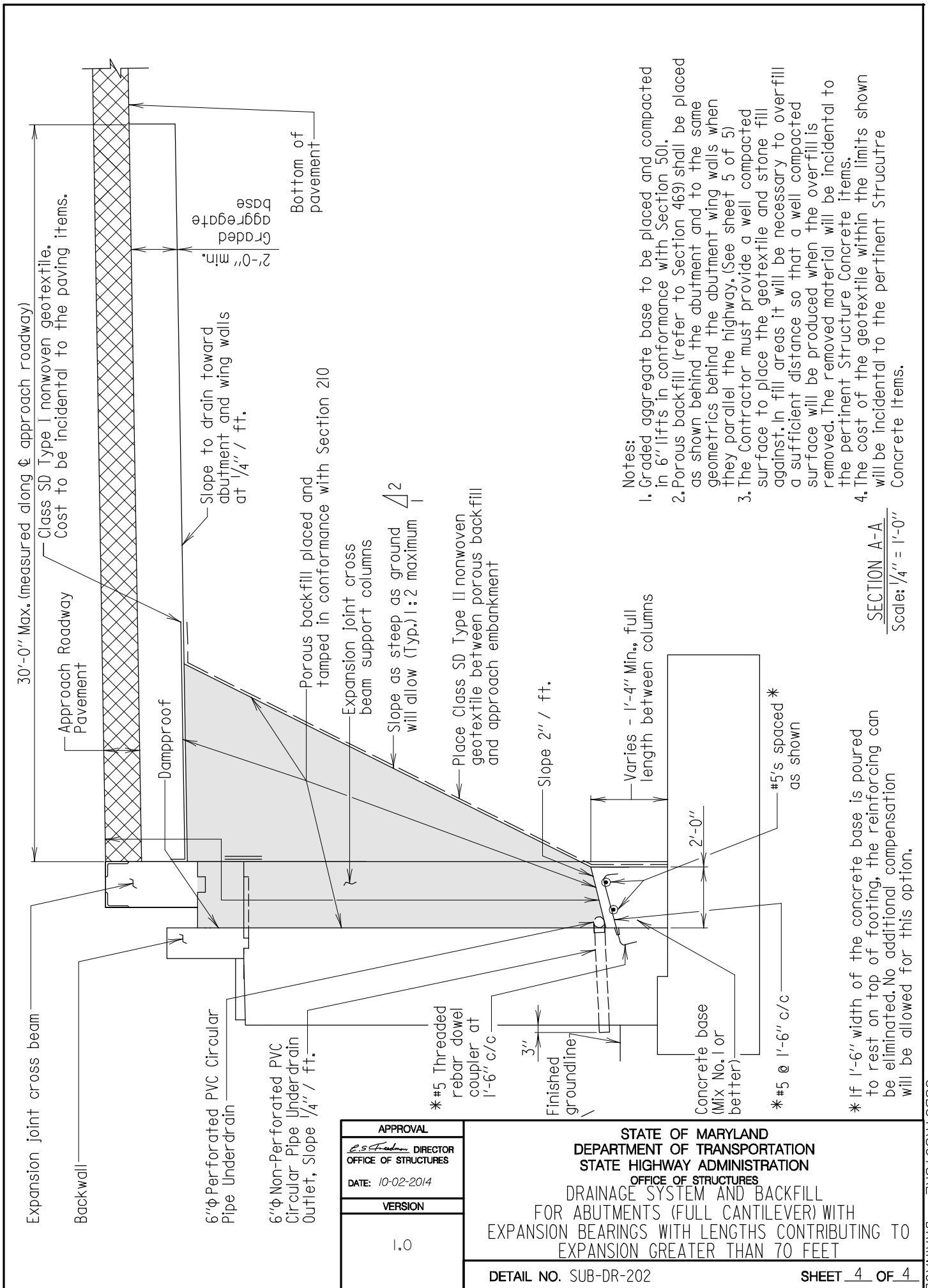
STATE OF MARYLAND
 DEPARTMENT OF TRANSPORTATION
 STATE HIGHWAY ADMINISTRATION
 OFFICE OF STRUCTURES
 DRAINAGE SYSTEM AND BACKFILL
 FOR ABUTMENTS (SEMI-CANTILEVER) WITH
 EXPANSION BEARINGS WITH LENGTHS CONTRIBUTING TO
 EXPANSION GREATER THAN 70 FEET

DETAIL NO. SUB-DR-202 SHEET 3 OF 4

- Notes:
1. Graded aggregate base to be placed and compacted in 6" lifts in conformance with Section 501.
 2. Porous backfill (refer to Section 469) shall be placed as shown behind the abutment and to the same geometrics behind the abutment wing walls when they parallel the highway. (See sheet 5 of 5)
 3. The Contractor must provide a well compacted surface to place the geotextile and stone fill against. In fill areas it will be necessary to overfill a sufficient distance so that a well compacted surface will be produced when the overfill is removed. The removed material will be incidental to the pertinent Structure Concrete items.
 4. The cost of the geotextile within the limits shown will be incidental to the pertinent Structure Concrete items.

SECTION A-A
 Scale: 1/4" = 1'-0"


* If 1'-6" width of the concrete base is poured to rest on top of footing, the reinforcing can be eliminated. No additional compensation will be allowed for this option.



- Notes:
1. Graded aggregate base to be placed and compacted in 6" lifts in conformance with Section 501.
 2. Porous backfill (refer to Section 469) shall be placed as shown behind the abutment and to the same geometrics behind the abutment wing walls when they parallel the highway. (See sheet 5 of 5)
 3. The Contractor must provide a well compacted surface to place the geotextile and stone fill against. In fill areas it will be necessary to overfill a sufficient distance so that a well compacted surface will be produced when the overfill is removed. The removed material will be incidental to the pertinent Structure Concrete items.
 4. The cost of the geotextile within the limits shown will be incidental to the pertinent Structure Concrete items.

SECTION A-A
Scale: 1/4" = 1'-0"

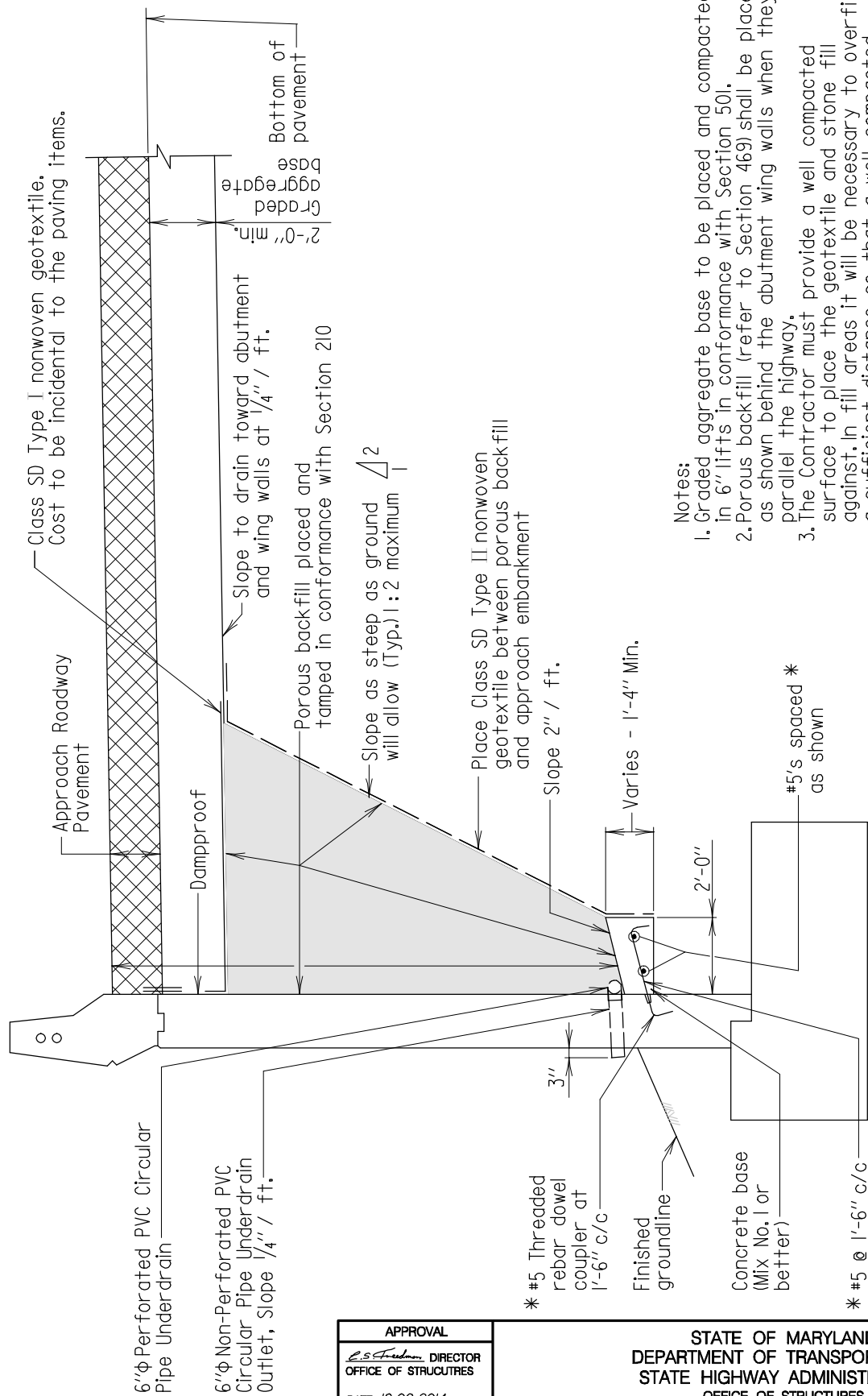
* If 1'-6" width of the concrete base is poured to rest on top of footing, the reinforcing can be eliminated. No additional compensation will be allowed for this option.

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STATE OF MARYLAND
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 OFFICE OF STRUCTURES
 DRAINAGE SYSTEM AND BACKFILL
 FOR ABUTMENTS (FULL CANTILEVER) WITH
 EXPANSION BEARINGS WITH LENGTHS CONTRIBUTING TO
 EXPANSION GREATER THAN 70 FEET

DETAIL NO. SUB-DR-202 SHEET 4 OF 4

SUBSTRUCTURE - DRAINAGE




- Notes:
1. Graded aggregate base to be placed and compacted in 6" lifts in conformance with Section 501.
 2. Porous backfill (refer to Section 469) shall be placed as shown behind the abutment wing walls when they parallel the highway.
 3. The Contractor must provide a well compacted surface to place the geotextile and stone fill against. In fill areas it will be necessary to overfill a sufficient distance so that a well compacted surface will be produced when the overfill is removed. The removed material will be incidental to the pertinent Structure Concrete items.
 4. The cost of the geotextile within the limits shown will be incidental to the pertinent Structure Concrete items.
 5. For bridges with wing walls that are not parallel to highway see std. no. RW-301 for details.

SECTION THROUGH WING WALL

Scale: 1/4" = 1'-0"

* If 1'-6" width of the concrete base is poured to rest on top of footing, the reinforcing can be eliminated. No additional compensation will be allowed for this option.

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STATE OF MARYLAND
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DRAINAGE SYSTEM AND BACKFILL
FOR WING WALLS THAT ARE PARALLEL TO THE HIGHWAY

DETAIL NO. SUB-DR-203 SHEET 1 OF 1