

# Green Stormwater Infrastructure

## Typical Details

Version 2.0 June 2018



**PHILADELPHIA**  
**WATER**

# What's New

## June 2017

- Added Green City Inlet detail.
- Revised Water Level Control Structure, Typical Stormwater Trench Cross Section, and Construction Tree Protection – Fencing details.

## June 2018

- Added Shallow City Inlet, Domed Riser Standpipe, Concrete Endwall for 8-Inch Pipe, Stop Sign in Stormwater Trench, Geotextile Pipe Penetration, Geomembrane Pipe Penetration, Landscape Plug, Ornamental Fencing (18 and 36-inch versions), Split Rail Fence (2 and 3 Rail versions), Temporary Stake & Rope Fence, and Block Edging details.
- Removed Shallow Street Crossing, Stone Chimney, Brick Energy Dissipater, Split Rail Concrete Fence, and Permanent Tree Protection details.
- Moved Typical Stormwater Trench Cross Section detail to the Functional Details section and added measures to protect geomembrane liner from being punctured.
- Combined Concrete Apron at Trench Drain and Concrete Apron at City Inlet into one general Concrete Apron detail.
- Made numerous updates to individual details, documented in the revisions table for each detail.
- Added "NOTES TO DESIGNER" to some of the component details. See Introduction for more information.

**December 2020 - Addendum developed**

**June 2023 - Addendum updated**

# Introduction

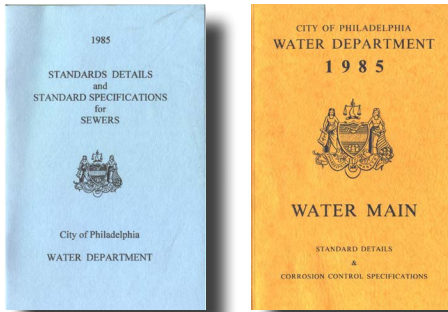
The GSI Typical Details are to be used by Philadelphia Water Department (PWD) staff, providers of professional engineering services hired by PWD, and other agencies/partner organizations that are working with PWD during the development of construction documents for PWD Green Stormwater Infrastructure (GSI) systems. The Typical Details should be used as a supplemental resource to the GSI Planning and Design Manual. The details are separated into functional and component details as follows:

- **Functional Details:** The functional details are examples to illustrate the typical design elements of stormwater management practices (SMPs) most commonly used by PWD. The functional details provide designers with a combination of general features, guidelines, requirements, and useful information to help them approach site-specific SMP design. The functional details do not reflect layouts, geometries, or extents that are fixed for each SMP, but instead provide a framework for SMP design, showing the design features that have been used to date. Functional details are not intended for construction.
- **Component Details:** The component details are typical details that are needed for construction of GSI systems. These details can generally be added to construction plans as shown but may be modified as needed to fit project-specific considerations with the approval of the PWD project manager. Some details have "NOTES TO DESIGNER", which are guidance for designers and not meant to end up on construction plans. These notes are in paperspace in CAD, so they won't be copied over to plans from modelspace.

PWD continues to explore new approaches through pilot details available upon request. Designers are encouraged to think through novel approaches and discuss new ideas with the PWD project manager. [CAD versions](#) of the details presented in this book are available for use by designers and can be modified according to the specifics of the project.

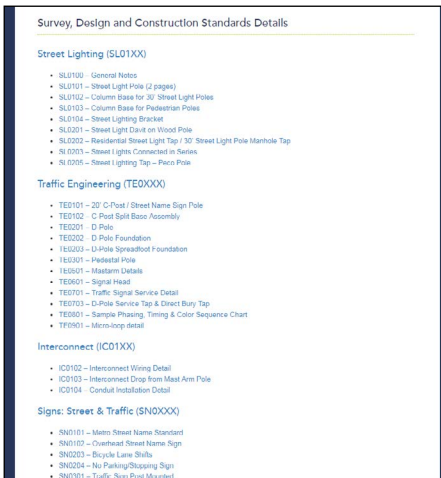
# Other References

In addition to the details presented herein, designers should reference the following additional resources:



1. **Philadelphia Water Department.** *City of Philadelphia Water Department Water Main Standard Details and Standard Details and Standard Specifications for Sewers.*

The Department standards for water main and sewer details are available at: <http://www.phillywaterdesign.org/current-standard-details.html>



2. **Philadelphia Streets Department.** *Streets Department Standard Details*

The Philadelphia Streets Department requires that standard details for curb, sidewalk, driveway, and pavement restoration, at minimum, be included on projects that disturb the right-of-way. Details are available for download from the Streets Department website. CAD files are available upon request.

[www.philadelphiastreet.com/customer-service/downloads-and-links](http://www.philadelphiastreet.com/customer-service/downloads-and-links)



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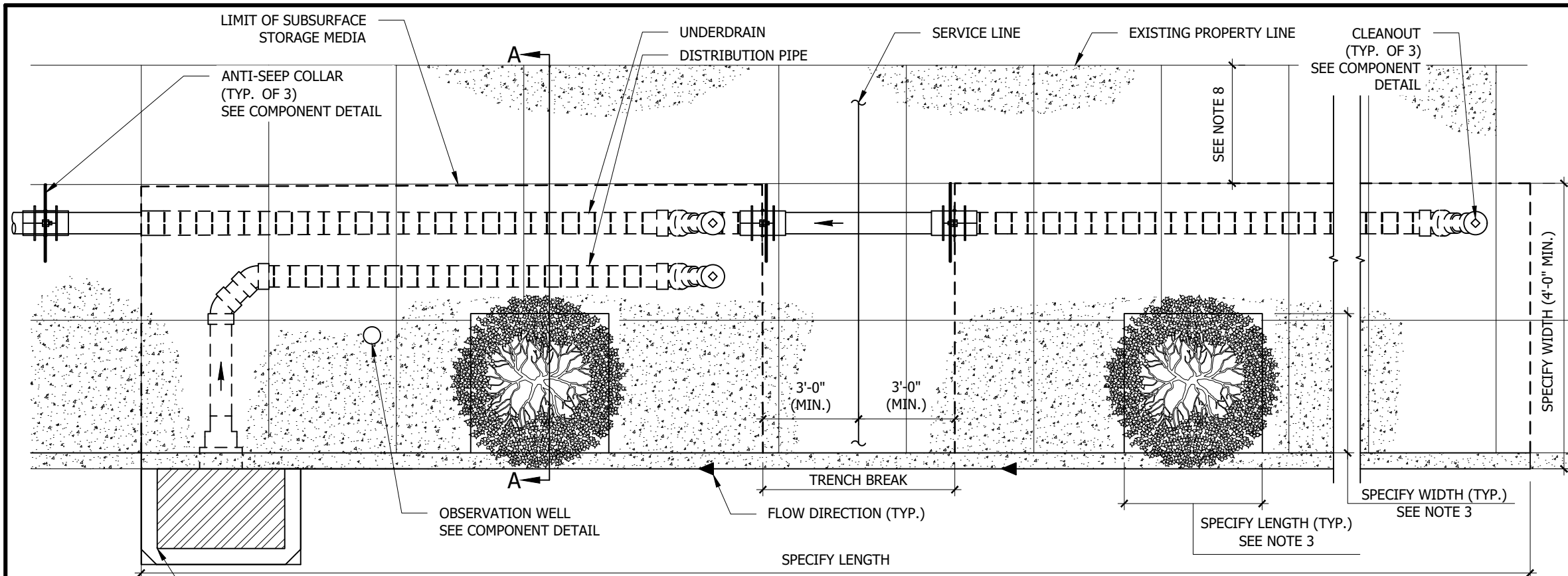
### Monitoring Details

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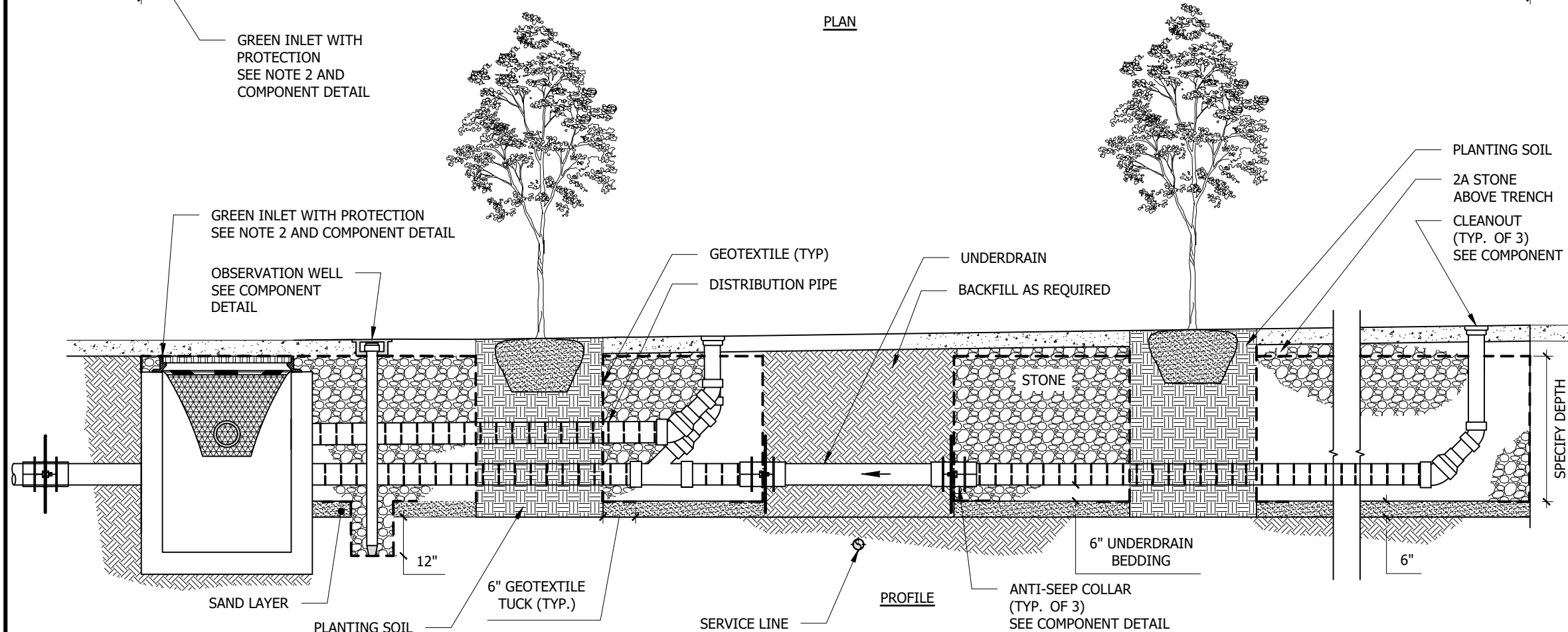
### Traffic Protection Details

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# Functional Details



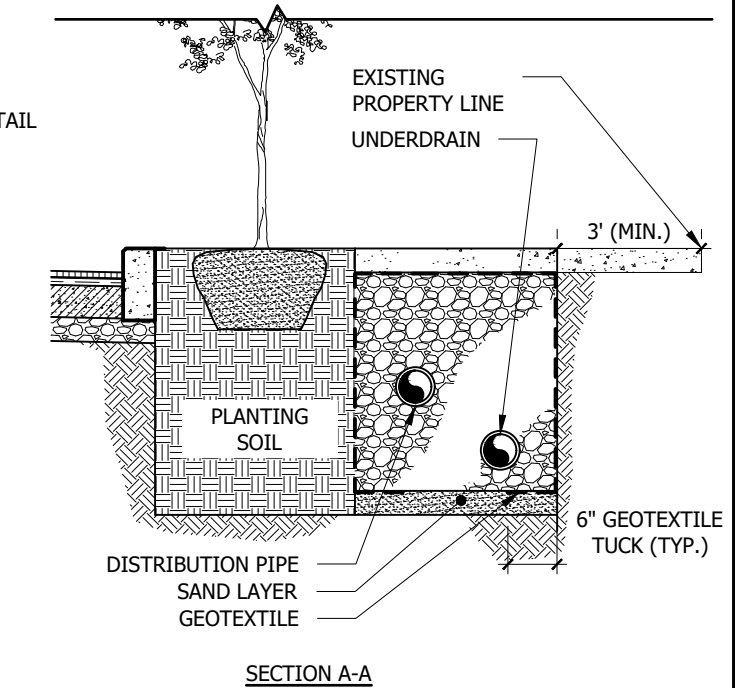
PLAN



PROFILE

NOTES TO DESIGNER:

1. THIS DESIGN DETAIL SHOULD BE ADAPTED TO THE SPECIFIC ENGINEERED DESIGN OF A RESPECTIVE INSTALLATION.
2. GREEN HIGHWAY GRATE INLETS ARE THE MOST TYPICAL INLET USED FOR STORMWATER TREE TRENCHES. WHILE A GREEN HIGHWAY GRATE INLET IS DEPICTED HERE AND PREFERRED, DESIGNERS MAY USE A GREEN CITY INLET IF THERE ARE UTILITY CONFLICTS OR OTHER CONSTRAINTS THAT PRECLUDE INSTALLATION OF A GREEN HIGHWAY GRATE INLET.
3. THE MINIMUM TREE PIT DIMENSION IS 4-FEET BY 4-FEET (3-FEET BY 5-FEET CAN BE USED IN AREAS WHERE SIDEWALK WIDTH OR ADA ACCESS IS A CONSTRAINT). LARGER TREE PIT AREAS ARE PREFERRED FOR THE HEALTH OF THE TREE, AND SHOULD BE USED IF SPACE IS AVAILABLE. TREE PITS MAY ALSO BE RECTANGULAR IN SHAPE, AND MAY SHARE SOIL IN CONTINUOUS SOIL BEDS, ESPECIALLY UNDER GRASS STRIPS. TREE PITS SHOULD COMPLY WITH THE CITY OF PHILADELPHIA COMPLETE STREETS DESIGN HANDBOOK AND SHOULD MAXIMIZE SOIL VOLUME AS NECESSARY.
4. DESIGN SHOULD INCLUDE THE NUMBER, SPACING, AND SPECIES SELECTION OF TREES. THE CITY OF PHILADELPHIA COMPLETE STREETS DESIGN HANDBOOK PROVIDES A STREET TREE PLANTING DIAGRAM THAT CAN BE REFERENCED FOR TREE PLACEMENT. NOTE THAT LOCATIONS AND SPECIES OF ALL TREES ARE REVIEWED AND APPROVED BY PP&R. PP&R CAN ALSO SELECT TREE SPECIES, IF REQUESTED.
5. ALTHOUGH SURFACE IS SHOWN AS CONCRETE SIDEWALK, TREE TRENCHES CAN BE CONSTRUCTED IN CONJUNCTION WITH VARIOUS SURFACES INCLUDING GRASS STRIPS, PAVERS, AND OTHER MATERIALS. SURFACE RESTORATION WILL VARY ACCORDINGLY.
6. TREE TRENCHES ARE FREQUENTLY COMBINED WITH OTHER SMP TYPES SUCH AS PLANTERS AND BUMPOUTS.
7. TRENCHES WITHOUT TREES ARE REFERRED TO AS "INFILTRATION/STORAGE TRENCHES" AND FOLLOW SIMILAR DESIGN STANDARDS AS SHOWN HEREIN.
8. DESIGNERS SHOULD CONSIDER EXISTING STRUCTURES, PROPOSED DEPTH OF TRENCH, AND OTHER FACTORS WHEN DETERMINING THE TRENCH LOCATION.
9. INFILTRATION COLUMNS SHALL BE CONSIDERED AS NEEDED TO ENHANCE INFILTRATION.

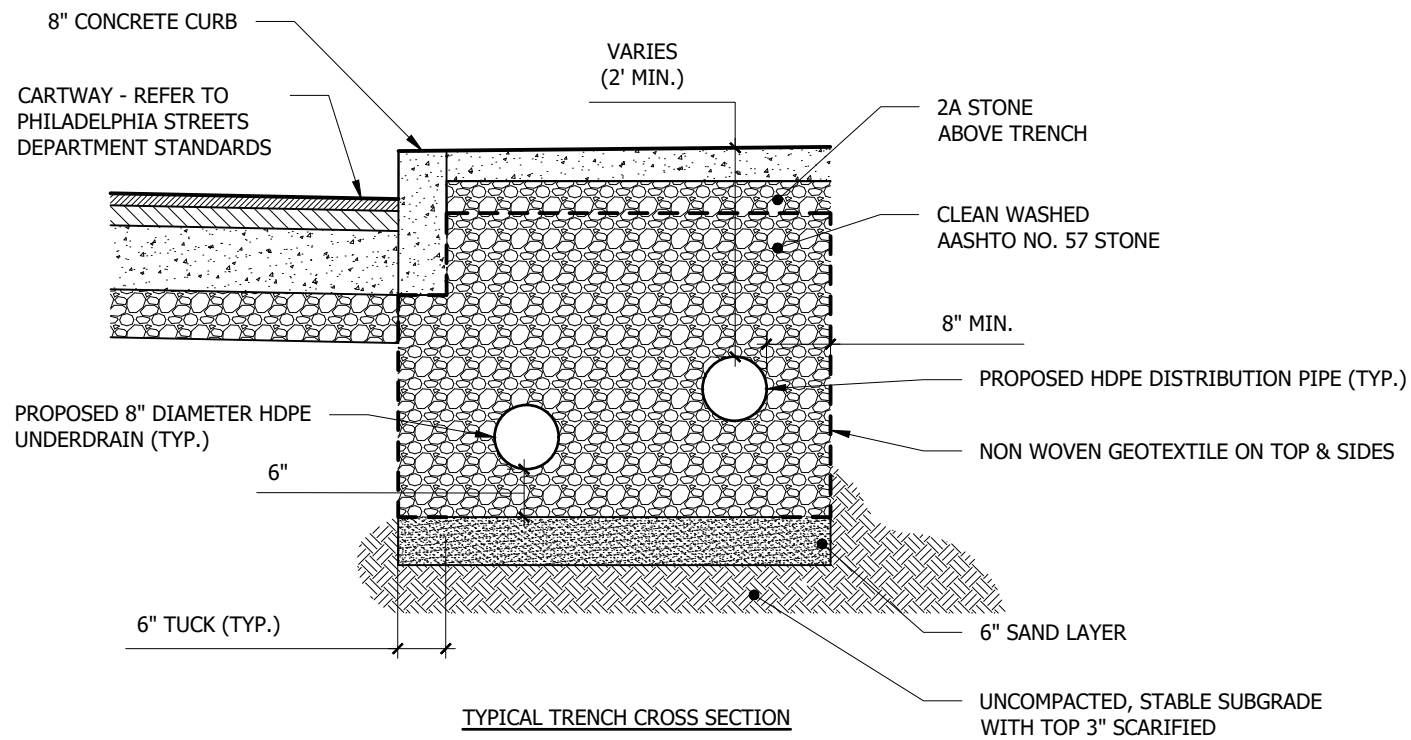


SECTION A-A

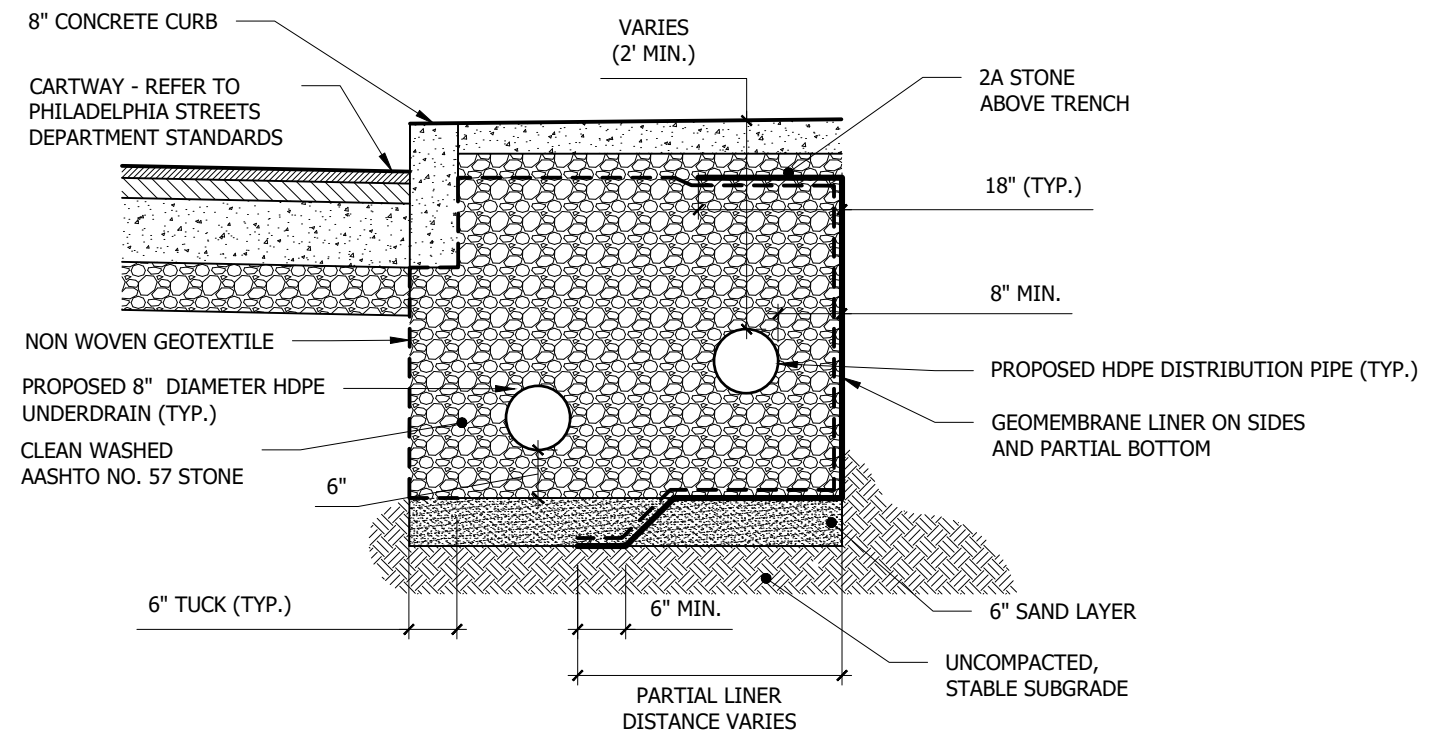
STORMWATER TREE TRENCH

VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	MJD	EXTENDED UNDERDRAIN, ADJUSTED INLET ELEV., CLARIFIED STONE PLACEMENT, AND RELOCATED OBSV. WELL

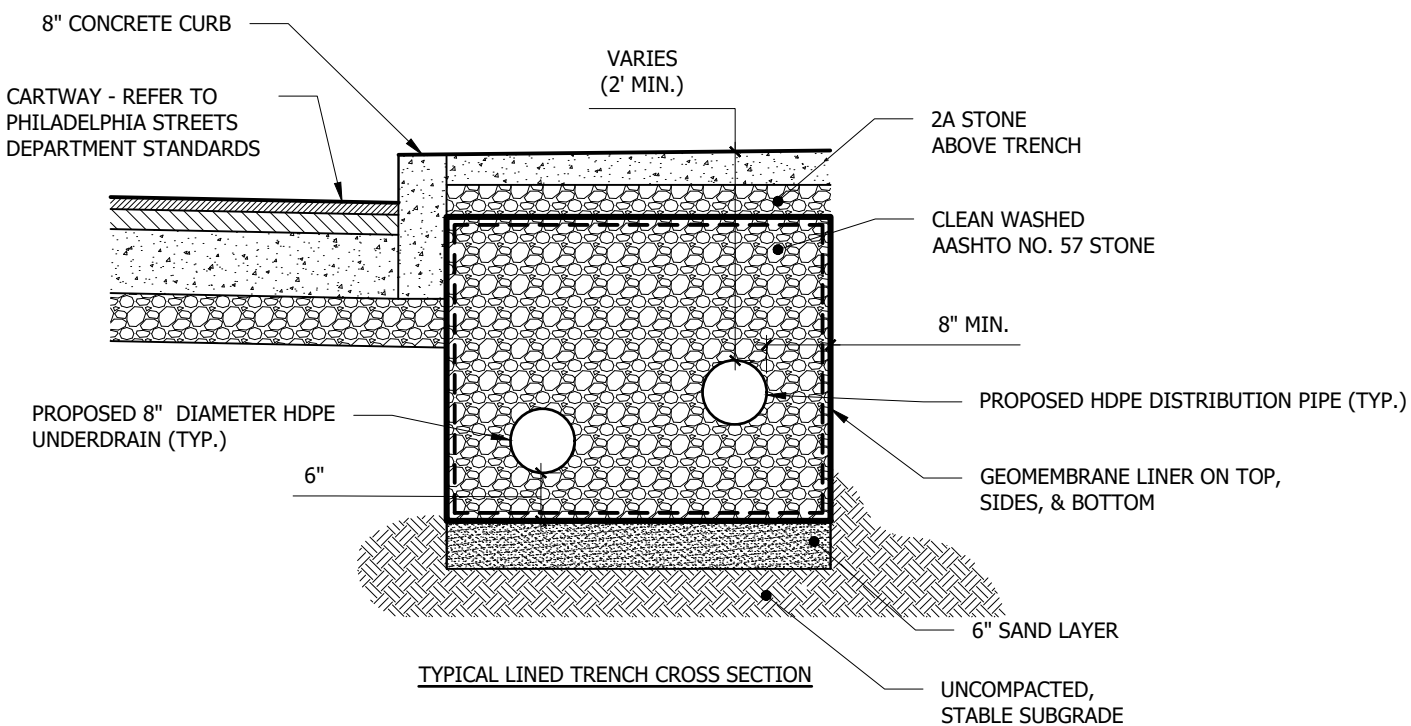
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TYPICAL TRENCH CROSS SECTION



TYPICAL PARTIALLY LINED TRENCH CROSS SECTION



TYPICAL LINED TRENCH CROSS SECTION

NOTES TO DESIGNER:

1. THE CROSS SECTIONS ABOVE ARE INTENDED AS AN EXAMPLE AND CAN BE MODIFIED AND USED FOR SECTIONS ON PLANS.
2. AVOID PLACING GEOMEMBRANE LINER UNDER CURB IF POSSIBLE. WHEN GEOMEMBRANE LINER IS PLACED UNDER CURB, INCLUDE THE FOLLOWING CALLOUT: "DO NOT PUNCTURE GEOMEMBRANE LINER WITH CURB FORM PINS"

SEE DECEMBER 2020 ADDENDUM FOR UPDATE



**PHILADELPHIA**  
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1101 MARKET ST.  
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19107

STORMWATER TREE TRENCH CROSS SECTION

VS.	DATE	INITIALS	REASON
1	06/09/2017	MJD	ADDED PARTIALLY LINED TRENCH SECTION
2	06/01/2018	MJD/DJM	CONVERTED TO FUNCTIONAL DETAIL, ADDED GEOTEXTILE AND SAND TO PROTECT GEOMEMBRANE LINER

SCALE: N.T.S.

DRAWING NUMBER:

F-2





STORMWATER PLANTERS SHOULD BE LOCATED IN ACCORDANCE WITH THE CITY OF PHILADELPHIA COMPLETE STREETS DESIGN HANDBOOK. THIS REQUIRES THAT THEY MAINTAIN MINIMUM CLEAR WALKING ZONE WIDTHS BASED ON APPLICABLE STREET TYPE AND DO NOT CREATE PINCH POINTS OR TRIPPING HAZARDS. REFER TO THE CITY OF PHILADELPHIA COMPLETE STREETS DESIGN HANDBOOK FOR MINIMUM CLEAR WALKING ZONE WIDTHS AS WELL AS ALLOWABLE EXCEPTIONS.

**NOTES:**

1. IF STORMWATER PLANTERS CONTAIN TREES, PLACEMENT OF PLANTERS WILL ALSO DEPEND ON STREET TREE PLACEMENT REQUIREMENTS PER THE STREET TREE PLANTING DIAGRAM IN THE THE CITY OF PHILADELPHIA COMPLETE STREETS DESIGN HANDBOOK.
2. THE MINIMUM DISTANCE TO THE STORMWATER PLANTER FROM FACE OF CURB IS 18" ALONG STREETS THAT ALLOW ON-STREET PARKING AND/OR LOADING. THERE IS NO MINIMUM DISTANCE WHERE PARKING AND/OR LOADING ARE PROHIBITED.

WHILE ALLOWED WITHIN BUS STOP AREAS, STORMWATER PLANTERS MUST BE PLACED SO THAT MINIMUM REQUIREMENTS FOR LOADING PADS, WAITING AREAS, PEDESTRIAN PATHS, AND CLEAR AREAS ARE MET IN ACCORDANCE WITH SEPTA GUIDANCE

PLANTERS MUST BE CLEAR OF HANDICAPPED STREET PARKING SPACES. OFFSET NOT REQUIRED BUT RECOMMENDED.

VEHICLE EXIT (BIKE/PARKING LANE)

VEHICLE APPROACH (NO PARKING LANE)

VEHICLE APPROACH (BIKE/PARKING LANE)

VEHICLE EXIT (NO PARKING LANE)

PLANTER (TYP.)

DRIVEWAY

PROVIDE OFFSET BETWEEN PLANTERS AND CURB RAMPS TO PROVIDE SUFFICIENT SPACE FOR PEDESTRIANS AT CORNERS

SUBSURFACE: 3'-0" FROM C-POLES (NO MAST ARMS - SIGNALS AND SCHOOL FLASHERS).  
 SUBSURFACE: 5'-0" FROM D-POLES (MAST ARMS), UTILITY POLES AND STREET LIGHTS.  
 SURFACE: 4'-0" (5'-0" PREFERRED) SPACING IN ALL CASES. INCREASED OFFSET MAY BE REQUIRED IF LIGHTS, SIGNS OR OTHER UTILITY POLES HAVE LARGE FOUNDATIONS.

SIDEWALK WIDTH (VARIES)

1'-6" (MIN)

5'-0" (MIN.)

**STORMWATER PLANTER PLACEMENT DIAGRAM**

SCALE: N.T.S.

VS.	DATE	INITIALS
1	09/01/2016	

REASON

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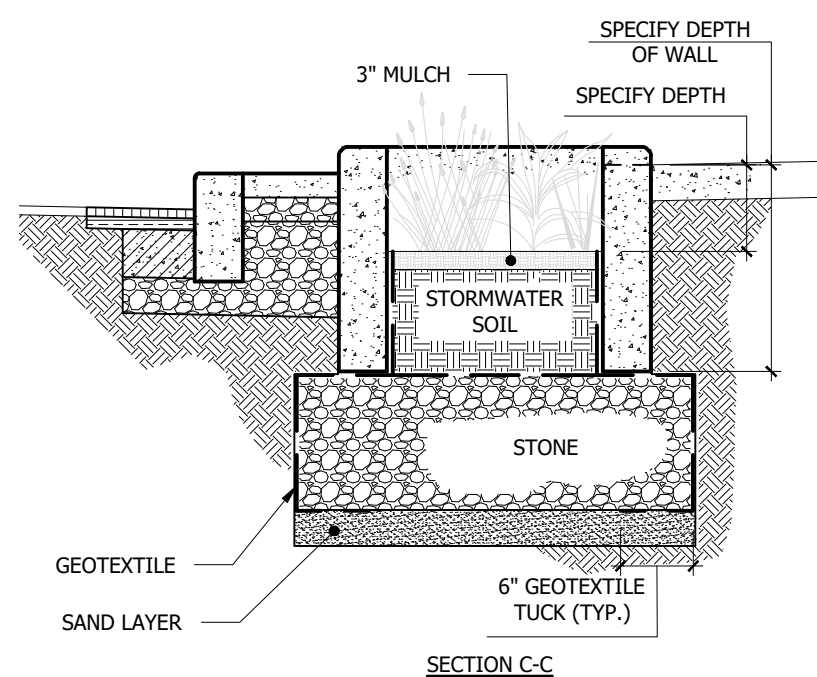
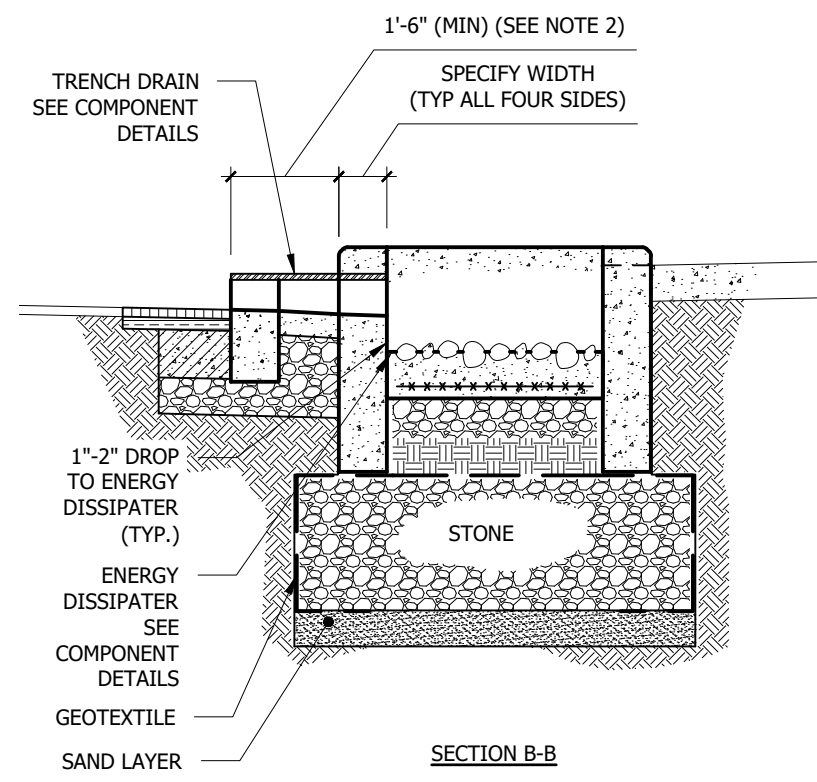
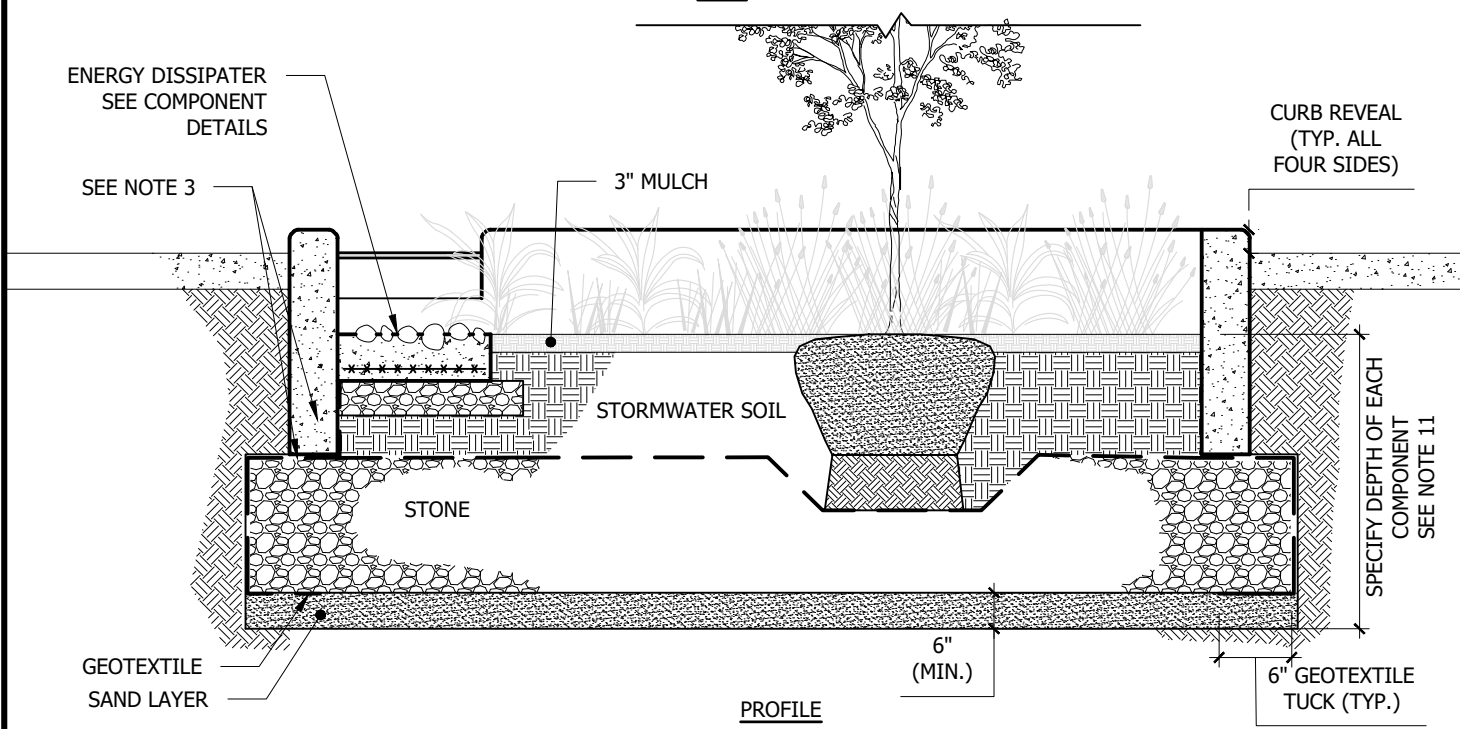
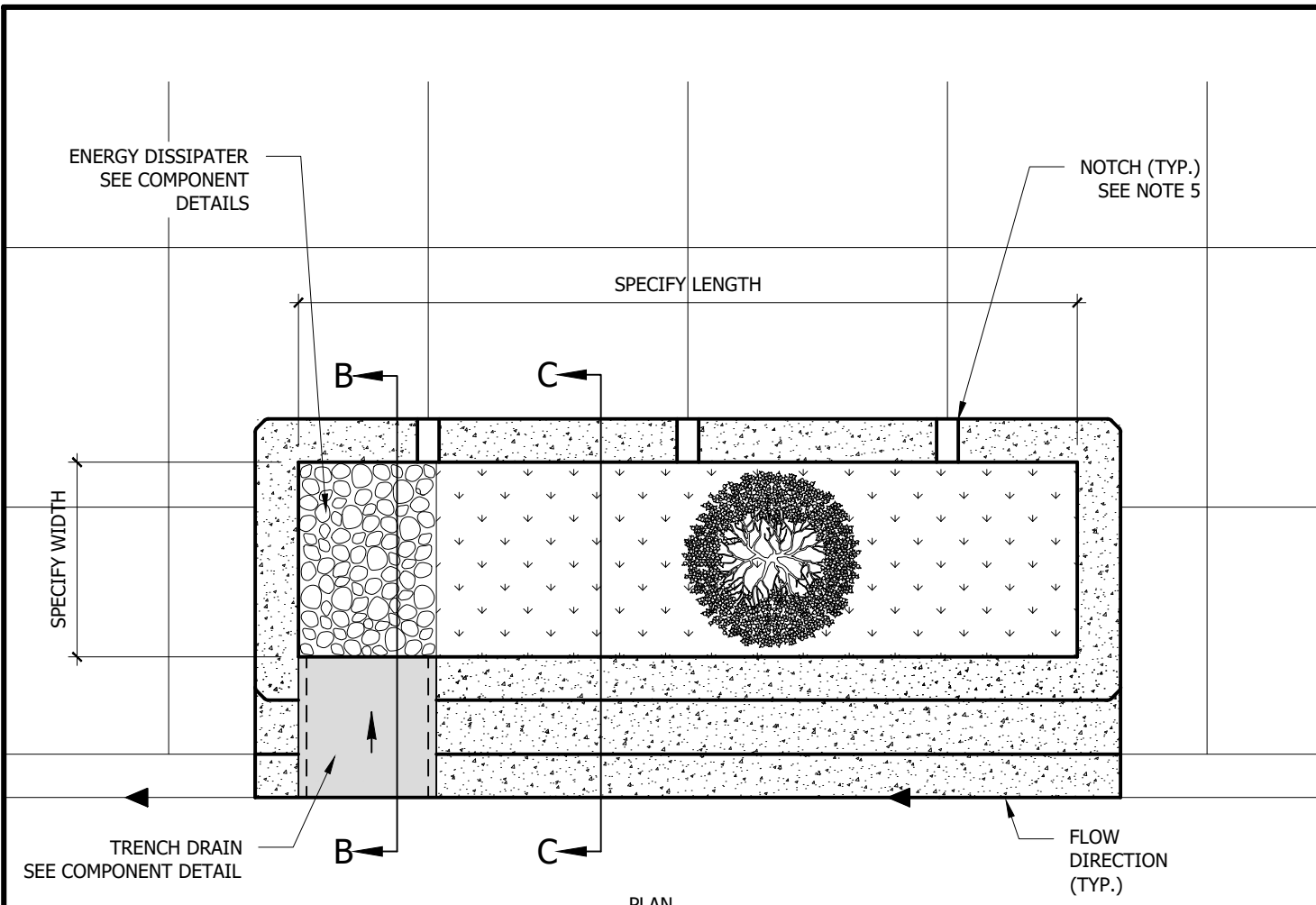
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**PHILADELPHIA WATER DEPARTMENT**

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NOTES TO DESIGNER:

- THIS DESIGN DETAIL SHOULD BE ADAPTED TO THE SPECIFIC ENGINEERED DESIGN OF A RESPECTIVE INSTALLATION.
- THE MINIMUM DISTANCE FROM FACE OF CURB IS 18" ALONG STREETS THAT ALLOW ON-STREET PARKING AND/OR LOADING. THERE IS NO MINIMUM DISTANCE WHERE PARKING AND/OR LOADING ARE PROHIBITED.
- STORMWATER PLANTER WALLS MAY BE PRECAST OR CAST-IN-PLACE CONCRETE. FOR ANY STRUCTURAL COMPONENTS, INCLUDING BUT NOT LIMITED TO PLANTER WALLS, STRUCTURAL DESIGN MUST BE PREPARED BY THE DESIGNER. AT A MINIMUM, DESIGNER SHOULD CONSIDER PLANTER WALL DEPTH, FOOTER/FOUNDATION FOR WALLS, CONCRETE MIX, CONCRETE STRENGTH, REINFORCING STEEL DESIGN (AS REQUIRED), JOINT PLACEMENT AND DESIGN, AND DESIGN LOAD CONDITION.
- DESIGNER SHOULD BE AWARE THAT PROPERLY ALIGNING THE INVERT OF TRENCH DRAIN WITH OPENING THROUGH PLANTER WALL CAN BE CHALLENGING WHEN PRECAST CONSTRUCTION IS USED.
- NOTCHES IN THE PLANTER WALL SHOULD BE SIZED AND SPACED AS REQUIRED TO PREVENT PONDING ON THE SIDEWALK ADJACENT TO THE PLANTER. IT IS RECOMMENDED THAT NOTCHES BE CAST-IN-PLACE RATHER THAN SAW-CUT.
- ALL EXPOSED CONCRETE EDGES SHALL BE BEVELED.
- DESIGNER SHOULD EVALUATE WHETHER TOP OF CURB REVEAL SHOULD FOLLOW SLOPE OF SURROUNDING GRADES OR BE LEVEL BASED ON DESIRED APPEARANCE AND SITE CONDITIONS.
- THE LOWEST PLANTING MEDIA SURFACE IN STORMWATER PLANTERS SHOULD BE LEVEL ALONG THE ALIGNMENT OF THE STREET. A MILD SLOPE NO GREATER THAN 1 PERCENT IS ACCEPTABLE BUT A LEVEL SURFACE IS RECOMMENDED. IF SURROUNDING SLOPES ARE STEEP, IMPERMEABLE BARRIERS SUCH AS SURFACE CHECK DAMS CAN HELP MAINTAIN A LEVEL SURFACE. NOTE THIS DOES NOT APPLY TO THE CROSS-GRADING, IF USED, FROM THE PERIMETER OF THE PLANTER DOWN TO THE LOWEST PLANTING MEDIA SURFACE.
- DESIGNER SHOULD CONSIDER THE HEIGHT OF VEGETATION BOTH AT INSTALLATION AND ANTICIPATED MATURITY. BOTH HEIGHTS SHOULD BE CONSIDERED IN THE CONTEXT OF THE STORMWATER PLANTER'S PLAN DIMENSIONS, DEPTH, AND SURROUNDING AREA PROTECTION AND VEGETATION SELECTED ACCORDINGLY. IT HAS BEEN FOUND THAT IF A PLANTER IS DEEP AND/OR HAS HIGH AREA PROTECTION, VERY LOW VEGETATION AT INSTALLATION TENDS TO GIVE A STORMWATER PLANTER AN EXCESSIVELY DEEP APPEARANCE. NOTE THAT WITH THE EXCEPTION OF TREES, MAXIMUM VEGETATION HEIGHT AT MATURITY SHOULD BE NO GREATER THAN 36-INCHES ABOVE THE SURROUNDING SIDEWALK ELEVATION. ALSO, PLANT SELECTION AND PLACEMENT SHOULD BE DONE TO PREVENT ENCROACHMENT OF PLANTS OUTSIDE OF THE LIMITS OF THE STORMWATER PLANTER AND IN CONSIDERATION OF MAINTAINING ADEQUATE SIGHT LINES BASED ON THE PLACEMENT OF THE STORMWATER PLANTER.
- THE PONDING DEPTH OF WATER IN THE STORMWATER PLANTER IS CORRELATED TO A VARIETY OF SITE SPECIFIC FACTORS SUCH AS SURROUNDING GRADES, OFFSETS BETWEEN STORMWATER ENTRANCE ELEVATIONS AND TOP OF PLANTING MEDIA, OFFSETS BETWEEN STORMWATER ENTRANCE AND OVERFLOW ELEVATIONS, DESIRED FREEBOARD, THE VEGETATION SELECTED FOR THE STORMWATER PLANTER, AND THE DESIGN DEPTH OF THE STORMWATER PLANTER. THE DESIGNER SHOULD EVALUATE SITE SPECIFIC CONDITIONS SUCH AS THOSE MENTIONED IN ORDER TO ACHIEVE A TYPICAL PONDING DEPTH OF 6" AND TO MAXIMIZE PONDING DEPTH TO THE EXTENT POSSIBLE.
- MINIMUM SOIL DEPTH SHALL BE APPROPRIATE FOR THE VEGETATION PLANTED AND NO LESS THAN 2 FEET, OR 3 FEET WHERE TREES ARE PRESENT.
- FENCING IS TYPICALLY INCLUDED AROUND STORMWATER PLANTERS. DESIGNERS SHOULD REFER TO COMPONENT DETAILS.
- DOMED RISERS MAY BE USED AS NEEDED TO ALLOW SUBSURFACE STONE STORAGE TO FILL BEFORE SYSTEM OVERFLOWS.
- UNDERDRAINS, WHILE NOT SHOWN, ARE TYPICALLY INSTALLED EXCEPT UNDER CERTAIN CIRCUMSTANCES WITH THE APPROVAL OF PWD.

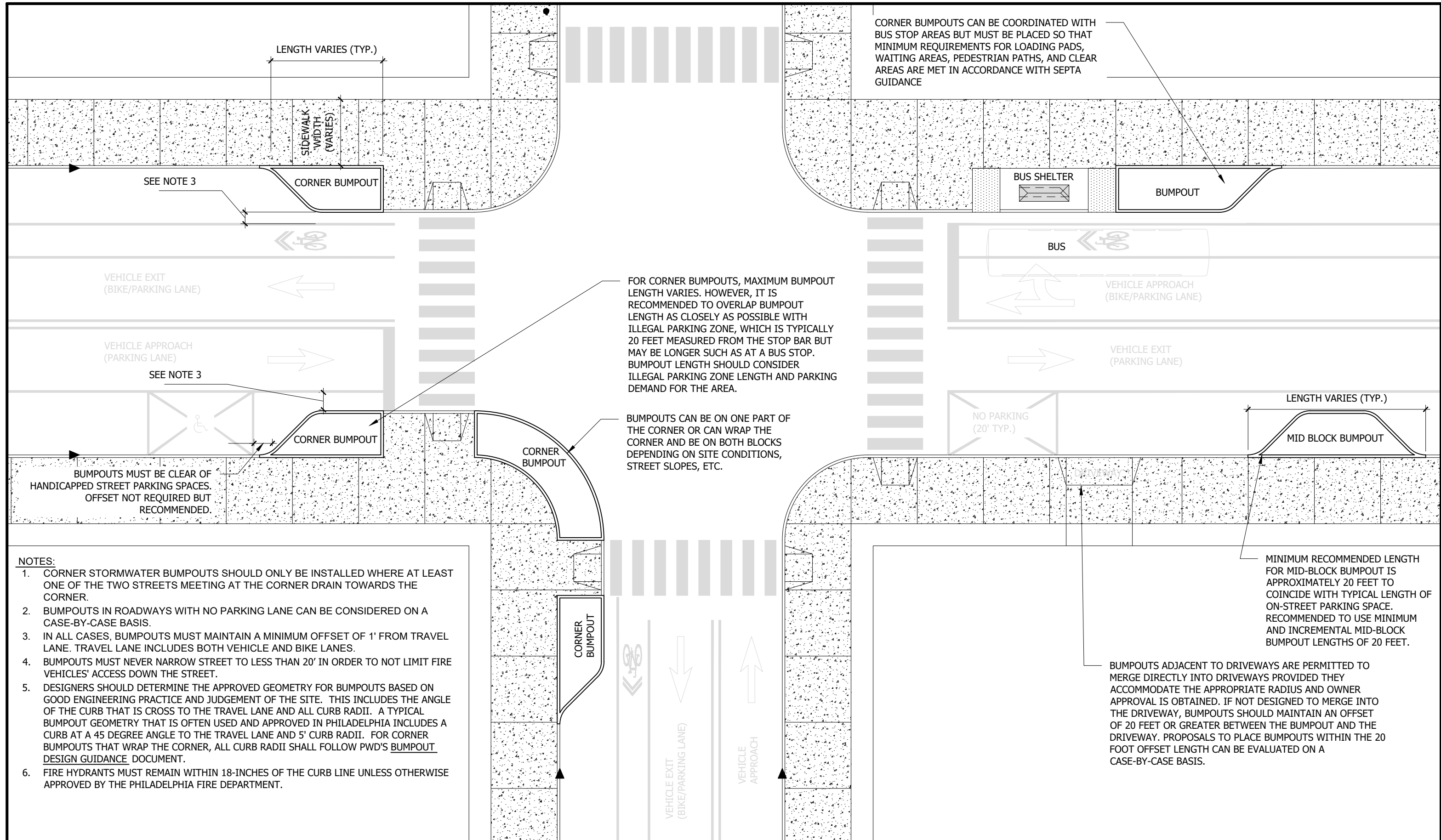
**PHILADELPHIA WATER DEPARTMENT**

1101 MARKET ST.  
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19107

VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	ANJ	ADDED MULCH LAYER

SCALE: N.T.S.

DRAWING NUMBER:  
**F-5**



**NOTES:**

1. CORNER STORMWATER BUMPOUTS SHOULD ONLY BE INSTALLED WHERE AT LEAST ONE OF THE TWO STREETS MEETING AT THE CORNER DRAIN TOWARDS THE CORNER.
2. BUMPOUTS IN ROADWAYS WITH NO PARKING LANE CAN BE CONSIDERED ON A CASE-BY-CASE BASIS.
3. IN ALL CASES, BUMPOUTS MUST MAINTAIN A MINIMUM OFFSET OF 1' FROM TRAVEL LANE. TRAVEL LANE INCLUDES BOTH VEHICLE AND BIKE LANES.
4. BUMPOUTS MUST NEVER NARROW STREET TO LESS THAN 20' IN ORDER TO NOT LIMIT FIRE VEHICLES' ACCESS DOWN THE STREET.
5. DESIGNERS SHOULD DETERMINE THE APPROVED GEOMETRY FOR BUMPOUTS BASED ON GOOD ENGINEERING PRACTICE AND JUDGEMENT OF THE SITE. THIS INCLUDES THE ANGLE OF THE CURB THAT IS CROSS TO THE TRAVEL LANE AND ALL CURB RADII. A TYPICAL BUMPOUT GEOMETRY THAT IS OFTEN USED AND APPROVED IN PHILADELPHIA INCLUDES A CURB AT A 45 DEGREE ANGLE TO THE TRAVEL LANE AND 5' CURB RADII. FOR CORNER BUMPOUTS THAT WRAP THE CORNER, ALL CURB RADII SHALL FOLLOW PWD'S BUMPOUT DESIGN GUIDANCE DOCUMENT.
6. FIRE HYDRANTS MUST REMAIN WITHIN 18-INCHES OF THE CURB LINE UNLESS OTHERWISE APPROVED BY THE PHILADELPHIA FIRE DEPARTMENT.

**STORMWATER BUMPOUT PLACEMENT DIAGRAM**

VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018		ADDED REFERENCE TO BUMPOUT DESIGN GUIDANCE DOCUMENT

SCALE: N.T.S.

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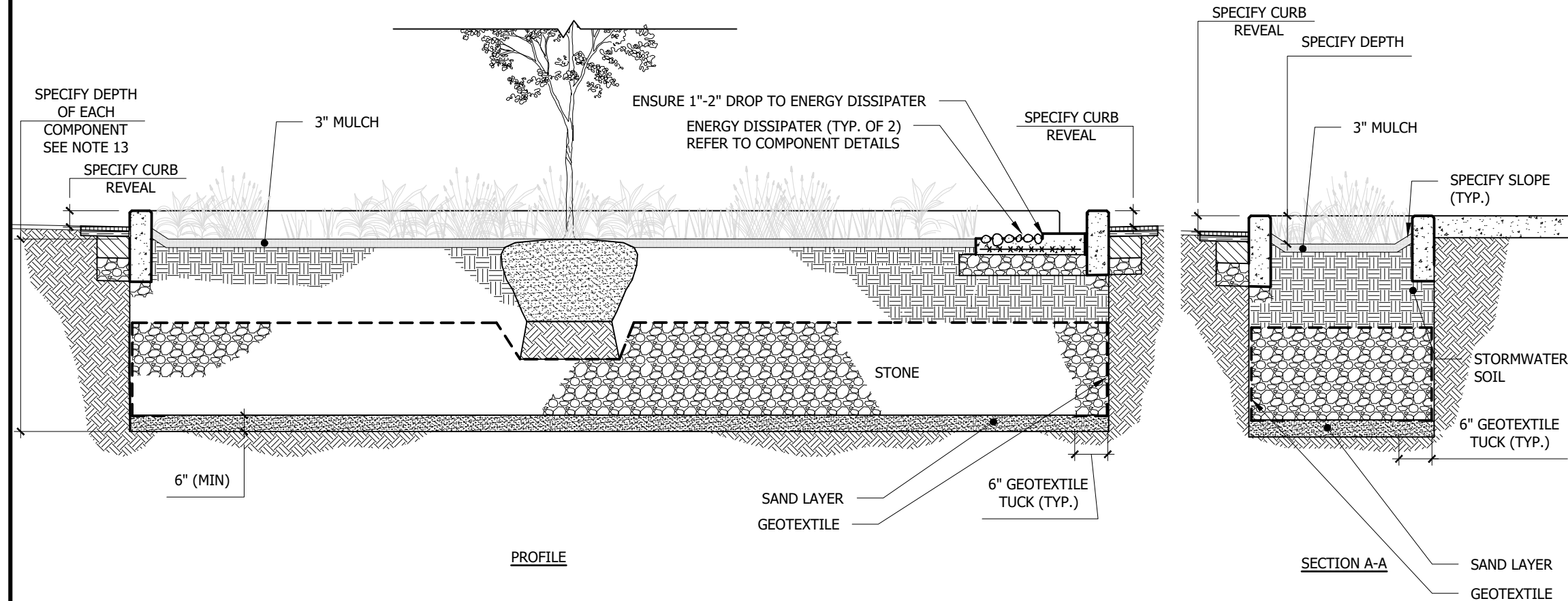
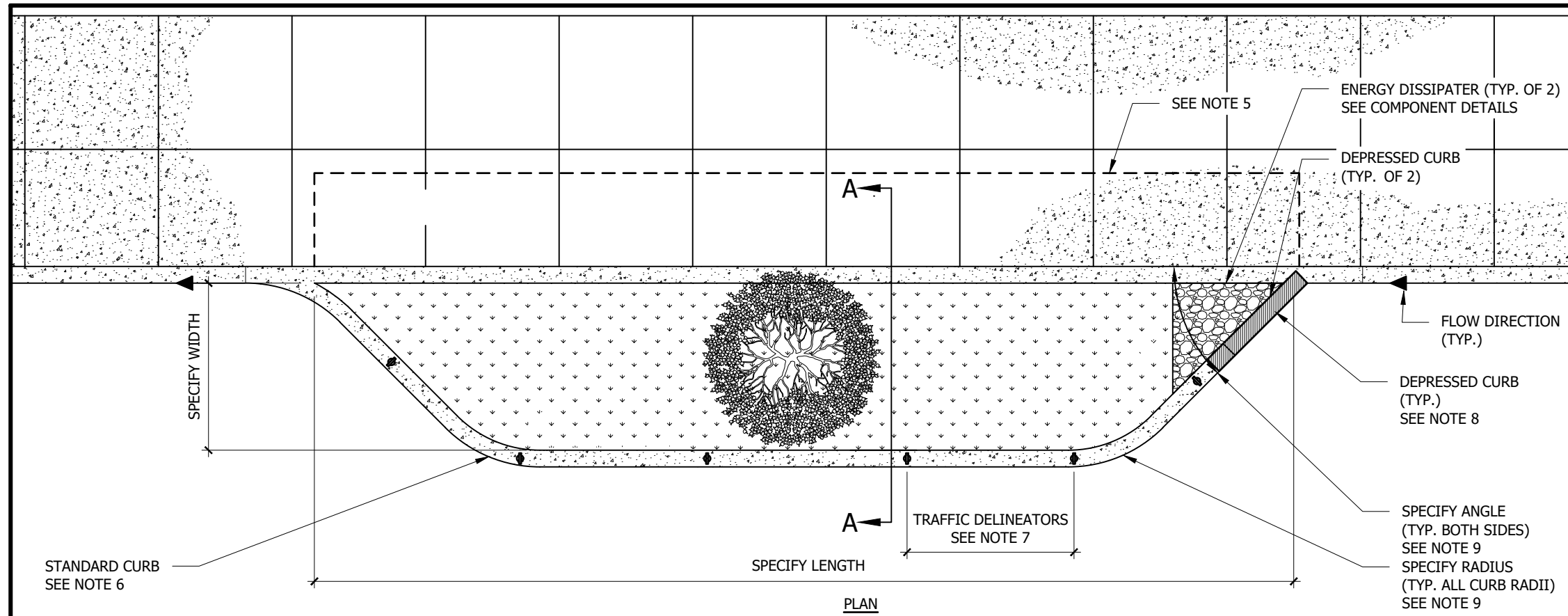
**F-6**



**PHILADELPHIA**  
**WATER**  
DEPARTMENT

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**NOTES TO DESIGNER:**

1. THIS DESIGN DETAIL SHOULD BE ADAPTED TO THE SPECIFIC ENGINEERED DESIGN OF A RESPECTIVE INSTALLATION.
2. THE LOWEST PLANTING MEDIA SURFACE IN STORMWATER BUMPOUTS SHOULD BE LEVEL ALONG THE ALIGNMENT OF THE STREET. A MILD SLOPE NO GREATER THAN 1 PERCENT IS ACCEPTABLE BUT A LEVEL SURFACE IS RECOMMENDED. IF SURROUNDING SLOPES ARE STEEP, IMPERMEABLE BARRIERS SUCH AS SURFACE CHECK DAMS CAN HELP MAINTAIN A LEVEL SURFACE. NOTE THIS DOES NOT APPLY TO THE CROSS-GRADING, IF USED, FROM THE PERIMETER OF THE BUMPOUT DOWN TO THE LOWEST PLANTING MEDIA SURFACE.
3. DESIGNER SHOULD CONSIDER THE HEIGHT OF VEGETATION BOTH AT INSTALLATION AND ANTICIPATED MATURITY. BOTH HEIGHTS SHOULD BE CONSIDERED IN THE CONTEXT OF THE STORMWATER BUMPOUT'S PLAN DIMENSIONS, DEPTH, AND SURROUNDING AREA PROTECTION AND VEGETATION SELECTED ACCORDINGLY. NOTE THAT WITH THE EXCEPTION OF TREES, MAXIMUM VEGETATION HEIGHT AT MATURITY SHOULD BE NO GREATER THAN 36-INCHES ABOVE THE SURROUNDING SIDEWALK ELEVATION. ALSO, PLANT SELECTION AND PLACEMENT SHOULD BE DONE TO PREVENT ENCROACHMENT OF PLANTS OUTSIDE OF THE LIMITS OF THE STORMWATER BUMPOUT AND IN CONSIDERATION OF MAINTAINING ADEQUATE SIGHT LINES BASED ON THE PLACEMENT OF THE STORMWATER BUMPOUT.
4. THE PONDING DEPTH OF WATER IN THE STORMWATER BUMPOUTS IS CORRELATED TO A VARIETY OF SITE SPECIFIC FACTORS SUCH AS SURROUNDING GRADES, OFFSETS BETWEEN STORMWATER ENTRANCE ELEVATIONS AND TOP OF PLANTING MEDIA, OFFSETS BETWEEN STORMWATER ENTRANCE AND OVERFLOW ELEVATIONS, DESIRED FREEBOARD, THE VEGETATION SELECTED FOR THE STORMWATER BUMPOUT, AND THE DESIGN DEPTH OF THE STORMWATER BUMPOUT. THE DESIGNER SHOULD EVALUATE SITE SPECIFIC CONDITIONS SUCH AS THOSE MENTIONED IN ORDER TO ACHIEVE A MINIMUM PONDING DEPTH OF 6" AND TO MAXIMIZE PONDING DEPTH TO THE EXTENT POSSIBLE.
5. ALTHOUGH NOT SHOWN, EXTENDING THE VEGETATED AREA INTO THE LIMITS OF THE SIDEWALK IS PERMITTED. HOWEVER, ANY REQUIREMENTS/GUIDELINES FOR OTHER SMPS LOCATED IN THE SIDEWALK, SUCH AS STORMWATER PLANTERS, WOULD APPLY.
6. CURBS AROUND STORMWATER BUMPOUTS ON CITY STREETS WILL FOLLOW THE SAME REQUIREMENTS AS NORMAL CURBS AND SHALL BE WITHIN A HEIGHT RANGE OF 4" TO 8". DESIGNER WILL SELECT A HEIGHT WITHIN THAT RANGE BASED ON APPLICABLE SITE CONDITIONS AND THE CURB HEIGHT SHALL BE CONSISTENT ALONG THE LENGTH OF THE BUMPOUT.
7. DELINEATORS SHOULD BE PLACED ALONG BUMPOUT CURB. PLACEMENT SHOWN HERE IS EXAMPLE ONLY AND PLACEMENT AND SPACING SHOULD BE DETERMINED ON A PER PROJECT BASIS
8. OPENING SIZE AND PLACEMENT TO BE DETERMINED BY DESIGNER. OPENINGS ALONG OUTSIDE EDGE OF BUMPOUT, IF USED, MUST INCLUDE A WHEEL GUARD.
9. DESIGNER SHOULD DETERMINE THE APPROPRIATE GEOMETRY FOR BUMPOUTS BASED ON GOOD ENGINEERING PRACTICE, JUDGMENT OF THE SITE, AND INFORMATION IN PWD'S BUMPOUT DESIGN GUIDANCE DOCUMENT.
10. MINIMUM SOIL DEPTH SHALL BE APPROPRIATE FOR THE VEGETATION PLANTED AND NO LESS THAN 2 FEET, OR 3 FEET WHERE TREES ARE PLANTED.
12. DOMED RISERS MAY BE USED AS NEEDED TO ALLOW SUBSURFACE STONE STORAGE TO FILL BEFORE SYSTEM OVERFLOWS.
13. UNDERDRAINS, WHILE NOT SHOWN, ARE TYPICALLY INSTALLED EXCEPT UNDER CERTAIN CIRCUMSTANCES WITH THE APPROVAL OF PWD.



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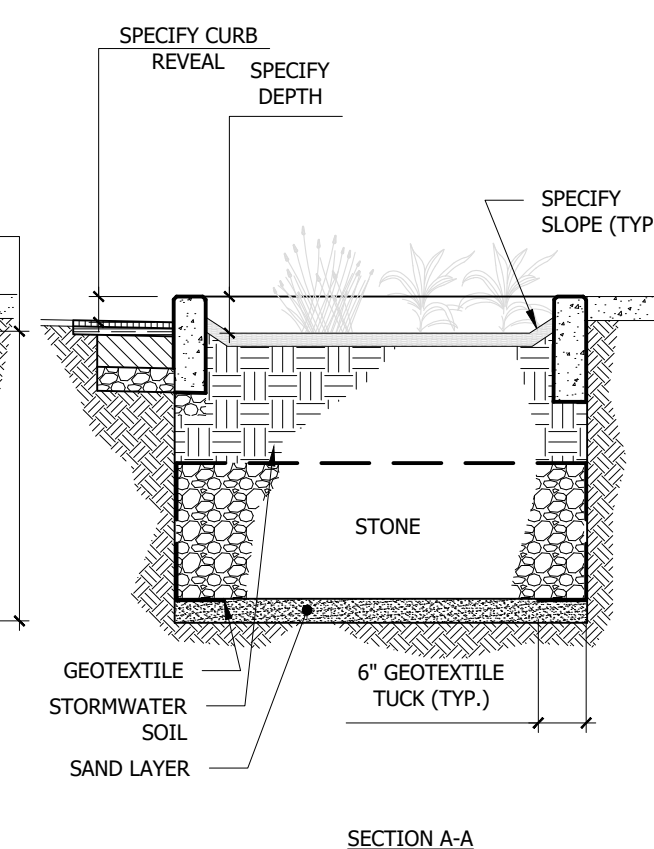
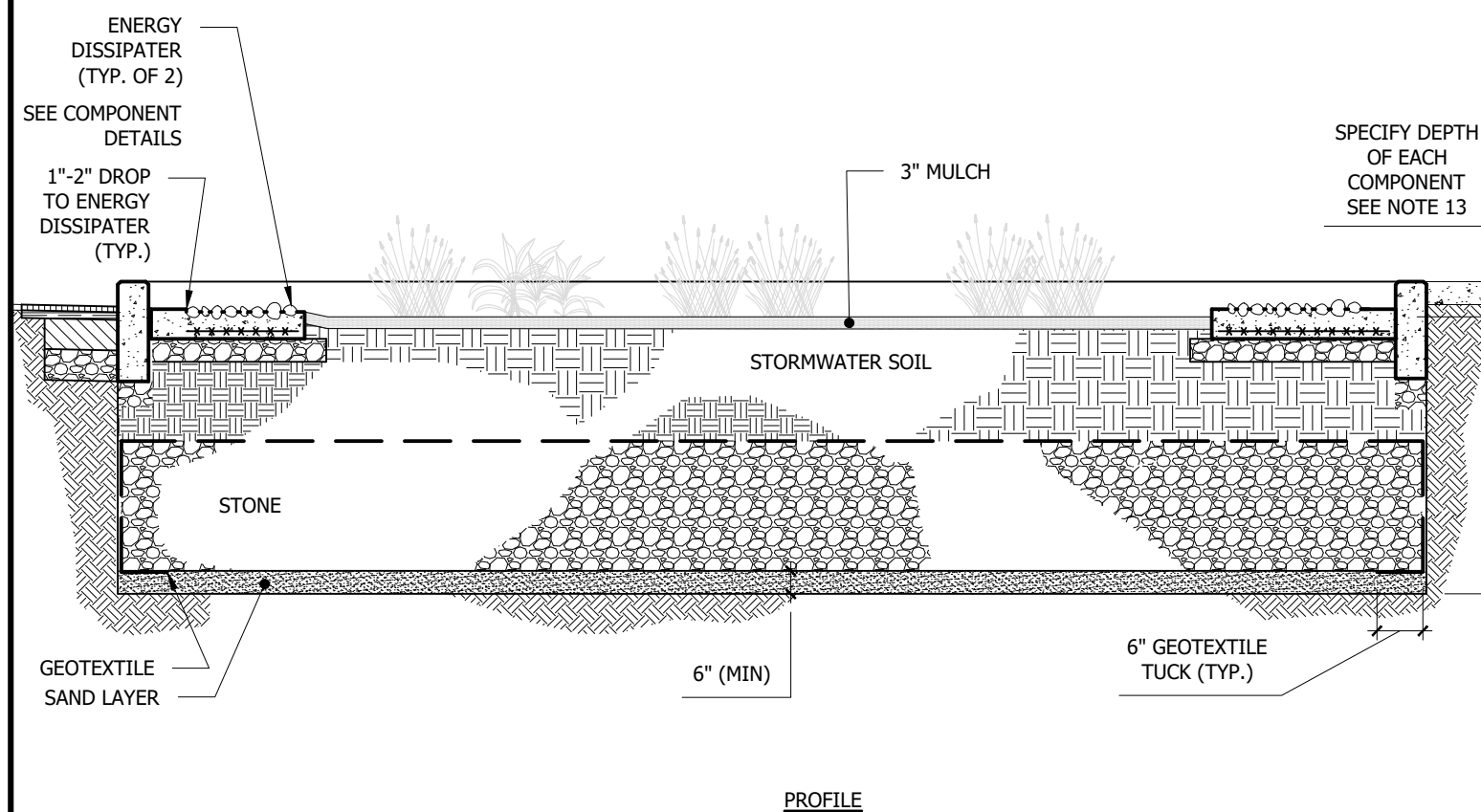
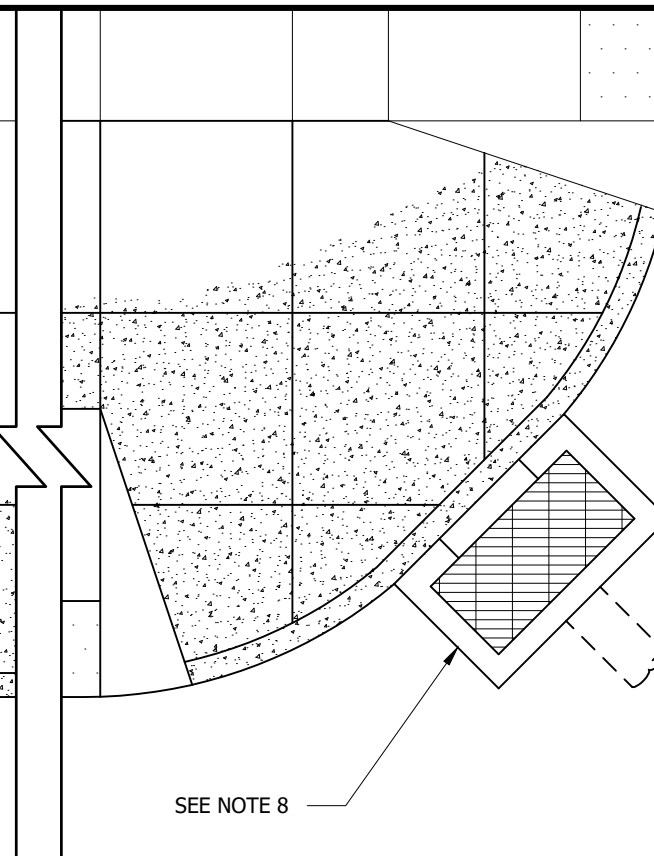
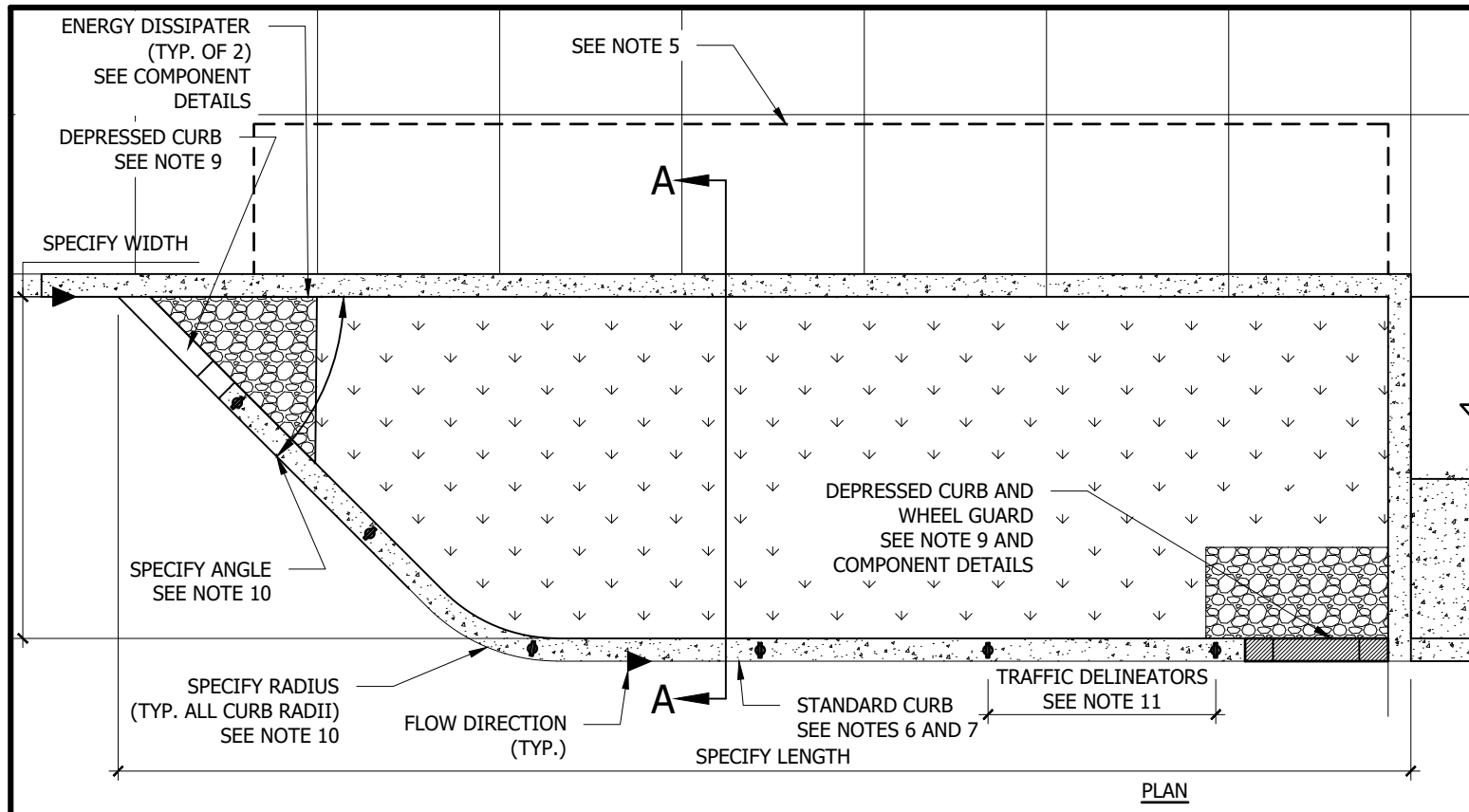
**STORMWATER BUMPOUT (MID-BLOCK)**

VS.	DATE	INITIALS	REASON
1	09/01/2016		
1	06/01/2018	ANJ	ADDED MULCH LAYER, ADDED REFERENCE TO BUMPOUT GUIDANCE DOCUMENT

SCALE: N.T.S.

DRAWING NUMBER:

**F-7**

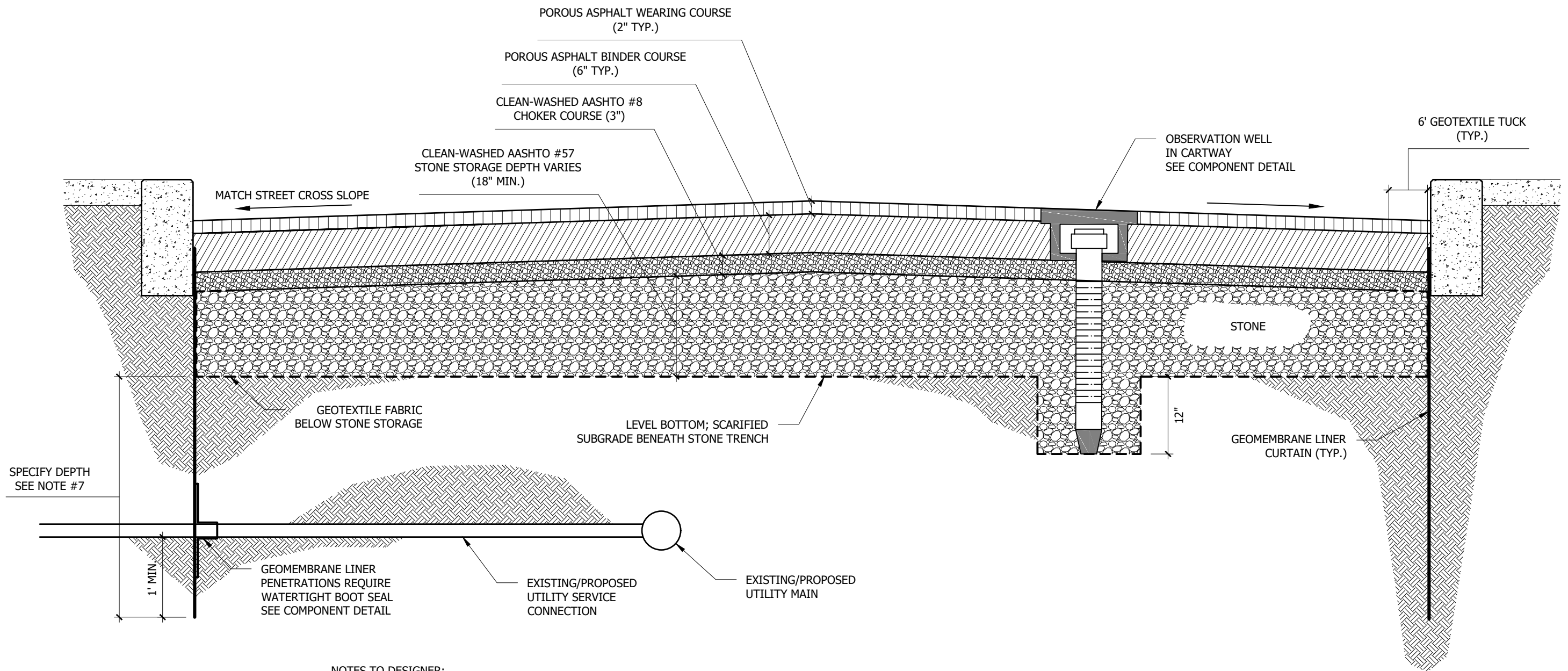


**NOTES TO DESIGNER:**

- THIS DESIGN DETAIL SHOULD BE ADAPTED TO THE SPECIFIC ENGINEERED DESIGN OF A RESPECTIVE INSTALLATION.
- THE LOWEST PLANTING MEDIA SURFACE IN STORMWATER BUMPOUTS SHOULD BE LEVEL ALONG THE ALIGNMENT OF THE STREET. A MILD SLOPE NO GREATER THAN 1 PERCENT IS ACCEPTABLE BUT A LEVEL SURFACE IS RECOMMENDED. IF SURROUNDING SLOPES ARE STEEP, IMPERMEABLE BARRIERS SUCH AS SURFACE CHECK DAMS CAN HELP MAINTAIN A LEVEL SURFACE. NOTE THIS DOES NOT APPLY TO THE CROSS-GRADING, IF USED, FROM THE PERIMETER OF THE BUMPOUT DOWN TO THE LOWEST PLANTING MEDIA SURFACE.
- DESIGNER SHOULD CONSIDER THE HEIGHT OF VEGETATION BOTH AT INSTALLATION AND ANTICIPATED MATURITY. BOTH HEIGHTS SHOULD BE CONSIDERED IN THE CONTEXT OF THE STORMWATER BUMPOUT'S PLAN DIMENSIONS, DEPTH, AND SURROUNDING AREA PROTECTION AND VEGETATION SELECTED ACCORDINGLY. NOTE THAT WITH THE EXCEPTION OF TREES, MAXIMUM VEGETATION HEIGHT AT MATURITY SHOULD BE NO GREATER THAN 36-INCHES ABOVE THE SURROUNDING SIDEWALK ELEVATION. ALSO, PLANT SELECTION AND PLACEMENT SHOULD BE DONE TO PREVENT ENCROACHMENT OF PLANTS OUTSIDE OF THE LIMITS OF THE STORMWATER BUMPOUT AND IN CONSIDERATION OF MAINTAINING ADEQUATE SIGHT LINES BASED ON THE PLACEMENT OF THE STORMWATER BUMPOUT.
- THE PONDING DEPTH OF WATER IN THE STORMWATER BUMPOUTS IS CORRELATED TO A VARIETY OF SITE SPECIFIC FACTORS SUCH AS SURROUNDING GRADES, OFFSETS BETWEEN STORMWATER ENTRANCE ELEVATIONS AND TOP OF PLANTING MEDIA, OFFSETS BETWEEN STORMWATER ENTRANCE AND OVERFLOW ELEVATIONS, DESIRED FREEBOARD, THE VEGETATION SELECTED FOR THE STORMWATER BUMPOUT, AND THE DESIGN DEPTH OF THE STORMWATER BUMPOUT. THE DESIGNER SHOULD EVALUATE SITE SPECIFIC CONDITIONS SUCH AS THOSE MENTIONED IN ORDER TO ACHIEVE A TYPICAL PONDING DEPTH OF 6" AND TO MAXIMIZE PONDING DEPTH TO THE EXTENT POSSIBLE.
- ALTHOUGH NOT SHOWN, EXTENDING THE VEGETATED AREA INTO THE LIMITS OF THE SIDEWALK IS PERMITTED. HOWEVER, ANY REQUIREMENTS/GUIDELINES FOR OTHER SMPS LOCATED IN THE SIDEWALK, SUCH AS STORMWATER PLANTERS, WOULD APPLY.
- CURBS AROUND STORMWATER BUMPOUTS ON CITY STREETS WILL FOLLOW THE SAME REQUIREMENTS AS NORMAL CURBS AND SHALL BE WITHIN A HEIGHT RANGE OF 4" TO 8". DESIGNER WILL SELECT A HEIGHT WITHIN THAT RANGE BASED ON APPLICABLE SITE CONDITIONS AND THE CURB HEIGHT SHALL BE CONSISTENT ALONG THE LENGTH OF THE BUMPOUT.
- CURB HEIGHT AROUND STORMWATER BUMPOUTS SHALL BE MAXIMIZED AT CORNER BUMPOUTS AS MUCH AS POSSIBLE AND BE A CONSISTENT HEIGHT BETWEEN ADA RAMPS.
- WHEN INSTALLING CORNER STORMWATER BUMPOUTS, GUTTER FLOW MUST BE MAINTAINED TO AN EXISTING DOWNSTREAM INLET OR A NEW INLET MUST BE INSTALLED ALONG THE NEW CURB LINE AS REQUIRED. LOCATION OF NEW INLET SHOWN CAN VARY AND MUST BE EVALUATED ON A CASE BY CASE BASIS.
- OPENING SIZE AND PLACEMENT TO BE DETERMINED BY DESIGNER. OPENINGS ALONG OUTSIDE EDGE OF BUMPOUT, IF USED, MUST INCLUDE A WHEEL GUARD WHEN PARALLEL TO TRAFFIC FLOW.
- DESIGNER SHOULD DETERMINE THE APPROPRIATE GEOMETRY FOR BUMPOUTS BASED ON GOOD ENGINEERING PRACTICE, JUDGMENT OF THE SITE, AND INFORMATION IN PWD'S BUMPOUT DESIGN GUIDANCE DOCUMENT.
- DELINEATORS SHOULD BE PLACED ALONG BUMPOUT. PLACEMENT SHOWN HERE IS EXAMPLE ONLY AND PLACEMENT AND SPACING SHOULD BE DETERMINED ON A PER PROJECT BASIS
- MINIMUM SOIL DEPTH SHALL BE APPROPRIATE FOR THE VEGETATION PLANTED AND NO LESS THAN 2 FEET, OR 3 FEET WHERE TREES ARE PLANTED.
- DOMED RISERS MAY BE USED AS NEEDED TO ALLOW SUBSURFACE STONE STORAGE TO FILL BEFORE SYSTEM OVERFLOWS.
- UNDERDRAINS, WHILE NOT SHOWN, ARE TYPICALLY INSTALLED EXCEPT UNDER CERTAIN CIRCUMSTANCES WITH THE APPROVAL OF PWD.

STORMWATER BUMPOUT (CORNER)		
VS.	DATE	INITIALS
1	09/01/2016	
1	06/01/2018	ANJ
		ADDED MULCH LAYER, ENERGY DISSIPATER, AND REFERENCE TO BUMPOUT GUIDANCE DOCUMENT





**NOTES TO DESIGNER:**

1. THIS DESIGN DETAIL SHOULD BE ADAPTED TO THE SPECIFIC ENGINEERED DESIGN AND ITS RESPECTIVE INSTALLATION.
2. THE USE OF AN IMPERVIOUS CONCRETE BASE COURSE IS TYPICAL IN PHILADELPHIA STREETS AND, WHEN PRESENT, MUST BE REMOVED AS PART OF THE PERMEABLE PAVEMENT INSTALLATION.
3. ALL EDGES BETWEEN NEW AND EXISTING ASPHALT PAVEMENT SHALL BE SEALED WITH HOT ASPHALT CEMENT. ALSO, JOINTS BETWEEN UTILITY FRAMES FOR MANHOLES AND INLETS OR OTHER UTILITY OWNED STRUCTURES AND PERMEABLE ASPHALT WEARING COURSE SHALL BE SEALED WITH HOT ASPHALT CEMENT FOR A DISTANCE OF 6-INCHES FROM THE EDGE OF THE FRAME.
4. PAVEMENT MARKINGS ON PERMEABLE PAVEMENT SURFACES SHALL BE LIQUID EPOXY PAVEMENT MARKINGS IN ACCORDANCE WITH PENNDOT PUBLICATION 408, SECTION 964.
5. PERMEABLE PAVEMENT SHALL INCLUDE CHECK DAMS AS NEEDED TO ACCOMMODATE STREET SLOPE (SEE COMPONENT DETAIL).
6. PERMEABLE PAVEMENT SHALL NOT BE USED IN AREAS WHERE LONGITUDINAL SLOPE IS GREATER THAN 5%.
7. SPECIFY GEOMEMBRANE LINER CURTAIN DEPTH TO PREVENT INFILTRATION INTO BASEMENTS OF ADJACENT BUILDINGS.



**PHILADELPHIA**  
**WATER**  
DEPARTMENT

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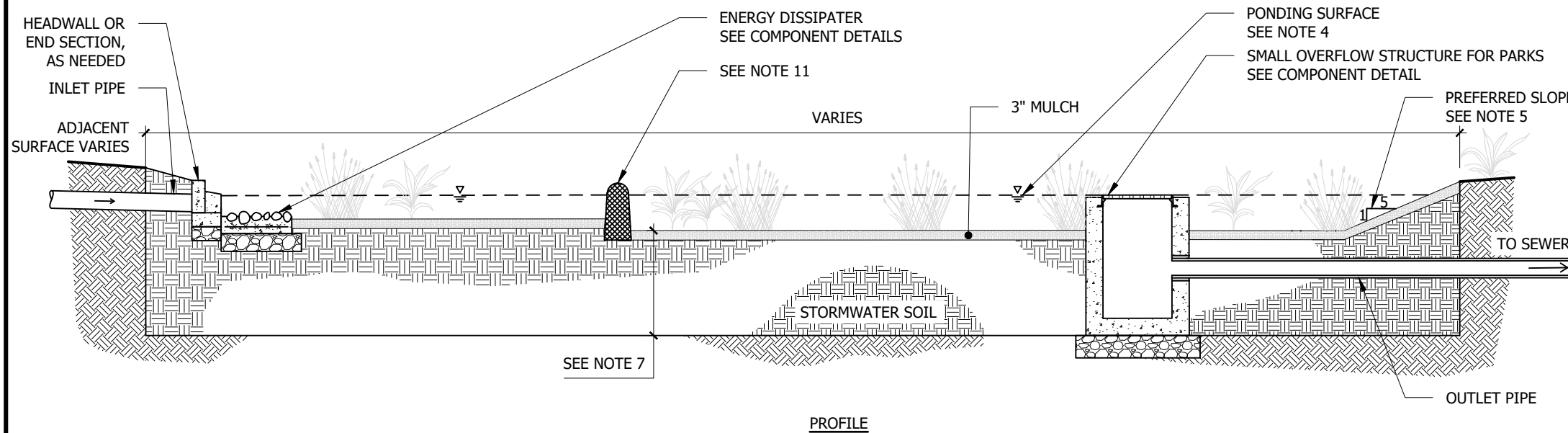
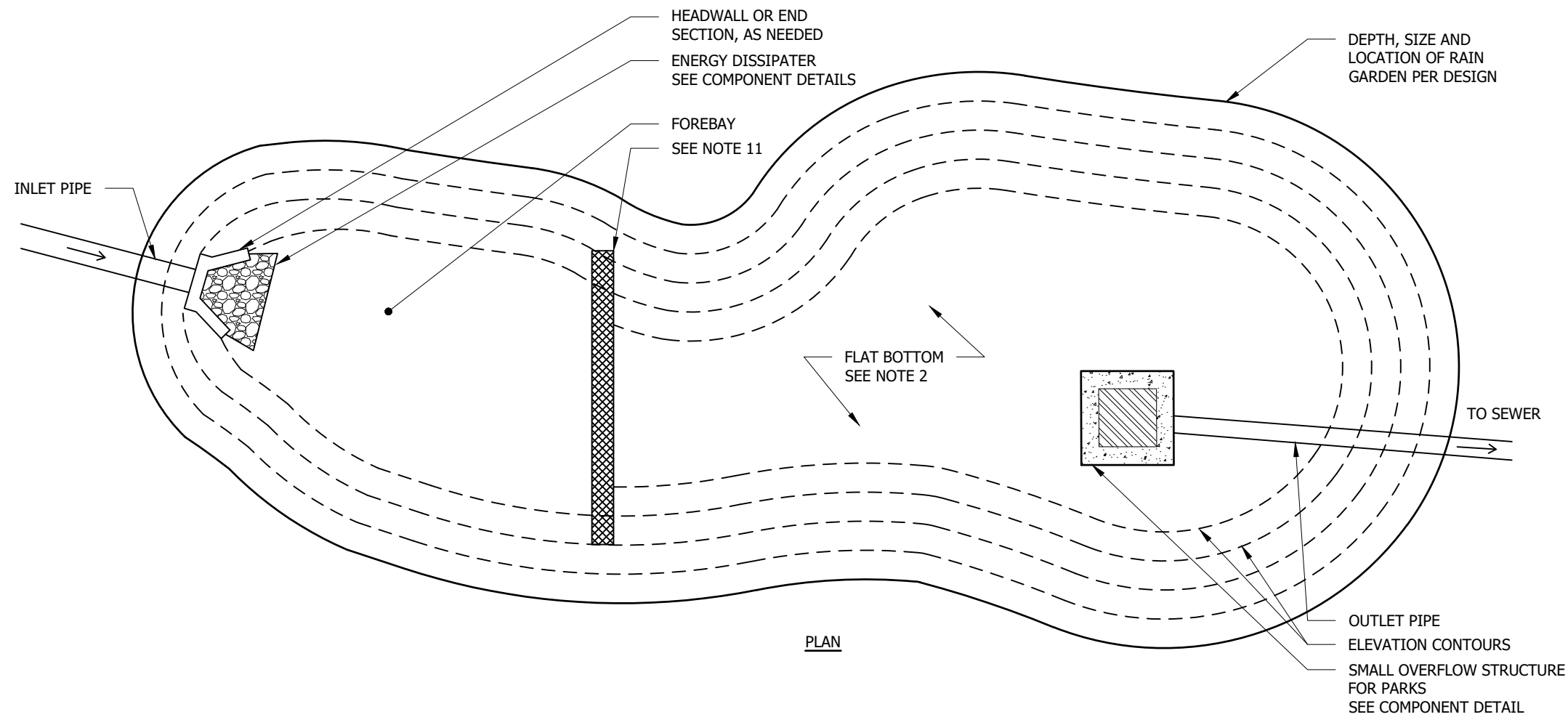
**PERMEABLE PAVEMENT**

VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	ANJ/DJM	REMOVED PAVER AND CONC. EXAMPLES AND SAND LAYER, ADDED GEOTEXTILE, GEOMEMBRANE, AND OBS. WELL

SCALE: N.T.S.

DRAWING NUMBER:

**F-9**



**NOTES TO DESIGNER:**

1. THIS DESIGN DETAIL SHOULD BE ADAPTED TO THE SPECIFIC ENGINEERED DESIGN OF A RESPECTIVE INSTALLATION.
2. THE LOWEST PLANTING MEDIA SURFACE IN THE RAIN GARDEN SHOULD BE LEVEL. A MILD SLOPE NO GREATER THAN 1 PERCENT IS ACCEPTABLE BUT A LEVEL SURFACE IS RECOMMENDED. IF SURROUNDING SLOPES ARE STEEP, IMPERMEABLE BARRIERS SUCH AS SURFACE CHECK DAMS CAN HELP MAINTAIN A LEVEL SURFACE. NOTE THIS DOES NOT APPLY TO THE CROSS-GRADING, IF USED, FROM THE PERIMETER OF THE RAIN GARDEN DOWN TO THE LOWEST PLANTING MEDIA SURFACE.
3. DESIGNER SHOULD CONSIDER THE HEIGHT OF VEGETATION BOTH AT INSTALLATION AND ANTICIPATED MATURITY. BOTH HEIGHTS SHOULD BE CONSIDERED IN THE CONTEXT OF THE RAIN GARDEN'S PLAN DIMENSIONS, DEPTH, AND SURROUNDING AREA PROTECTION AND VEGETATION SELECTED ACCORDINGLY. NOTE THAT WITH THE EXCEPTION OF TREES, MAXIMUM VEGETATION HEIGHT AT MATURITY SHOULD BE NO GREATER THAN 36-INCHES ABOVE THE SURROUNDING SIDEWALK ELEVATION IF IN THE RIGHT-OF-WAY. ALSO, PLANT SELECTION AND PLACEMENT SHOULD BE DONE TO PREVENT ENCROACHMENT OF PLANTS OUTSIDE OF THE LIMITS OF THE RAIN GARDEN AND IN CONSIDERATION OF MAINTAINING ADEQUATE SIGHT LINES BASED ON THE PLACEMENT OF THE RAIN GARDEN IF IN THE RIGHT-OF-WAY.
4. THE PONDING DEPTH OF WATER IN THE RAIN GARDEN IS CORRELATED TO A VARIETY OF SITE SPECIFIC FACTORS SUCH AS SURROUNDING GRADES, OFFSETS BETWEEN STORMWATER ENTRANCE ELEVATIONS AND TOP OF PLANTING MEDIA, OFFSETS BETWEEN STORMWATER ENTRANCE AND OVERFLOW ELEVATIONS, DESIRED FREEBOARD, THE VEGETATION SELECTED FOR THE RAIN GARDEN, AND THE DESIGN DEPTH OF THE RAIN GARDEN. THE DESIGNER SHOULD EVALUATE SITE SPECIFIC CONDITIONS IN ORDER TO ACHIEVE A MINIMUM PONDING DEPTH OF 6" AND TO MAXIMIZE PONDING DEPTH TO THE EXTENT POSSIBLE.
5. STEEPER SIDE SLOPES MAY BE ALLOWED ON A PROJECT-SPECIFIC BASIS.
6. CONSIDER CURB REVEAL, FENCING, EDGING, OR OTHER PROTECTIVE BARRIER WHEN RAIN GARDEN IS DIRECTLY ADJACENT TO PEDESTRIAN PATHS OR RIGHT-OF-WAY SIDEWALK AREAS.
7. MINIMUM SOIL DEPTH SHALL BE APPROPRIATE FOR THE VEGETATION PLANTED AND NO LESS THAN 2 FEET, OR 3 FEET WHERE TREES ARE PLANTED.
8. STONE CHIMNEYS AND/OR INFILTRATION COLUMNS SHALL BE CONSIDERED AS NEEDED TO ENHANCE INFILTRATION.
9. UNDERDRAINS, WHILE NOT SHOWN, ARE TYPICALLY INSTALLED EXCEPT UNDER CERTAIN CIRCUMSTANCES WITH THE APPROVAL OF PWD.
10. PROPOSED GRADING SHALL INCORPORATE EXISTING CONTOURS TO THE EXTENT FEASIBLE, AND THE DESIGN SHALL MITIGATE STEEP CHANGES IN ELEVATION.
11. DESIGNER SHOULD CONSIDER BARRIER/WEIR SYSTEM TO FORM FOREBAY AREA. THIS MAY ALSO BE ACHIEVED WITH GRADING.
12. DOMED RISERS MAY BE USED AS NEEDED TO ALLOW SUBSURFACE STONE STORAGE TO FILL BEFORE SYSTEM OVERFLOWS IN CASE STORMWATER SOIL DOES NOT INFILTRATE HIGH INTENSITY STORMS FAST ENOUGH.



**PHILADELPHIA**  
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**RAIN GARDEN**

VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	ANJ	ADDED MULCH LAYER

SCALE: N.T.S.

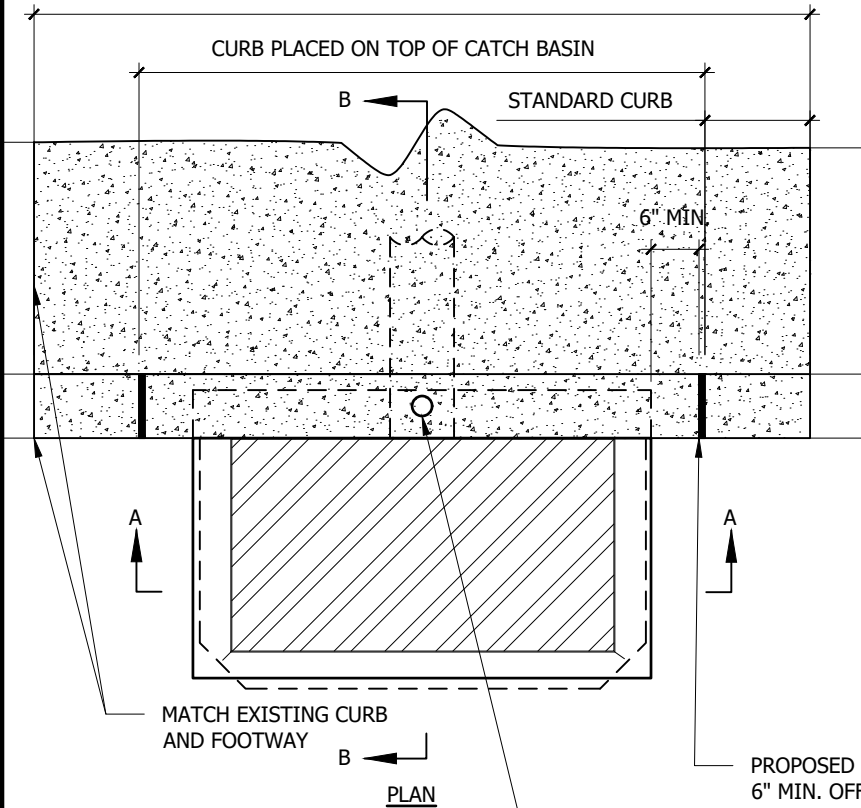
DRAWING NUMBER:

**F-10**

# Component Details

# Inlet Details

10'-0" CURB RESTORATION (TYP.)



**NOTES:**

1. LOCATE PIPE OPENINGS TO PROVIDE MINIMUM 4" OF CONCRETE BETWEEN TOP OF INLET BOX AND TOP OF PIPE OPENING. (PENNDOT RC-46M). CURB ABOVE INLET SHALL BE SUPPORTED WITH 2A STONE BETWEEN TOP OF PIPE AND BOTTOM OF CURB. CURB OUTSIDE OF INLET SHALL BE STANDARD DEPTH.
2. FOOTWAY AND CARTWAY RESTORATION HAS BEEN DRAWN FOR REFERENCE PURPOSES ONLY. PAVEMENT RESTORATION QUANTITIES AND DESIGN MUST CONFORM TO CURRENT PHILADELPHIA STREETS DEPARTMENT STANDARDS FOR CITY STREETS AND PENNDOT STANDARDS FOR STATE ROUTES.
3. MINIMUM COVER FOR THERMOPLASTIC PIPE IN ROW IS 2'.
4. PLUMBERS PLUG TO MAINTAIN WATERTIGHT SEAL UNTIL CONSTRUCTION IS COMPLETE. PLUMBERS PLUG TO BE REMOVED AT DIRECTION OF PWD. PLUMBERS PLUG IS NOT TO EXTEND MORE THAN 2" OUT FROM INLET WALL.
5. ALL JOINTS, ADJUSTMENTS, AND PIPE CONNECTIONS MUST BE WATERTIGHT.

GREEN INLET MARKER LOCATION SEE SPECIFICATIONS

PERMANENT INLET PROTECTION SEE SPECIFICATIONS

PROPOSED BOND BREAKER TAPE OR APPROVED EQUAL

SEE NOTE 3

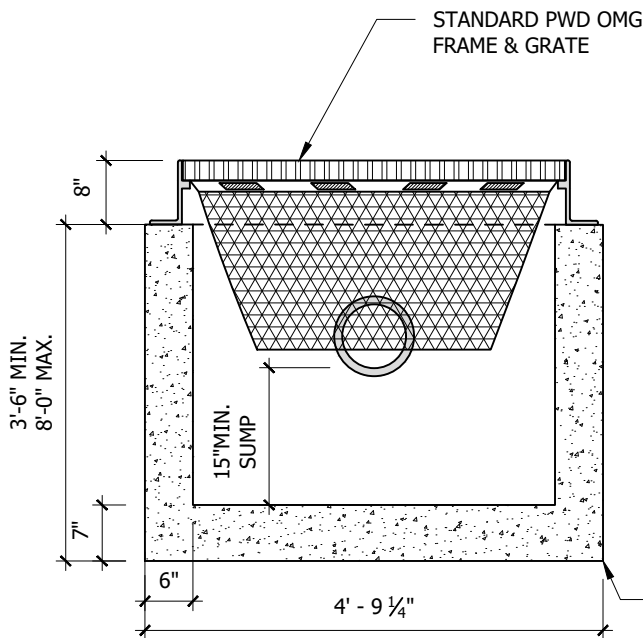
FOOTWAY

SEE NOTE 1

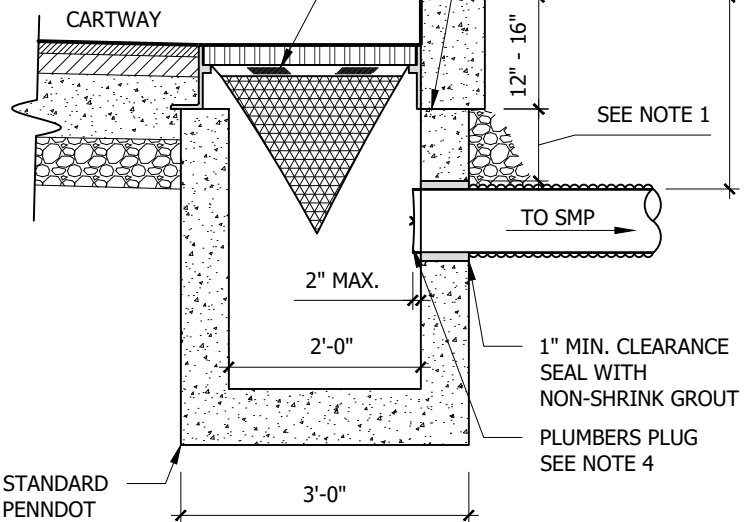
TO SMP

1" MIN. CLEARANCE SEAL WITH NON-SHRINK GROUT

PLUMBERS PLUG SEE NOTE 4



SECTION A-A



STANDARD PENNDOT PRECAST CONCRETE INLET BOX

SECTION B-B



**PHILADELPHIA WATER DEPARTMENT**

1101 MARKET ST, 4TH FLOOR  
PHILADELPHIA, PA, 19107

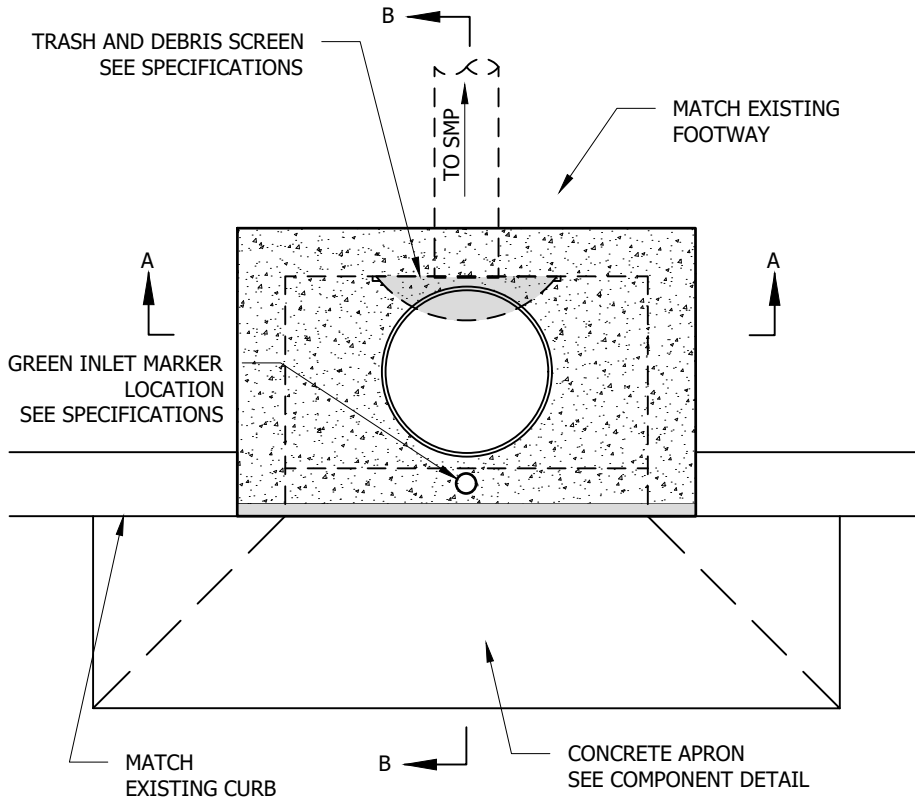
**GREEN HIGHWAY GRATE INLET WITH PROTECTION**

VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	ANJ/DJM	ADDED GREEN INLET MARKER, OTHER MINOR UPDATES

SCALE: N.T.S.

DRAWING NUMBER:

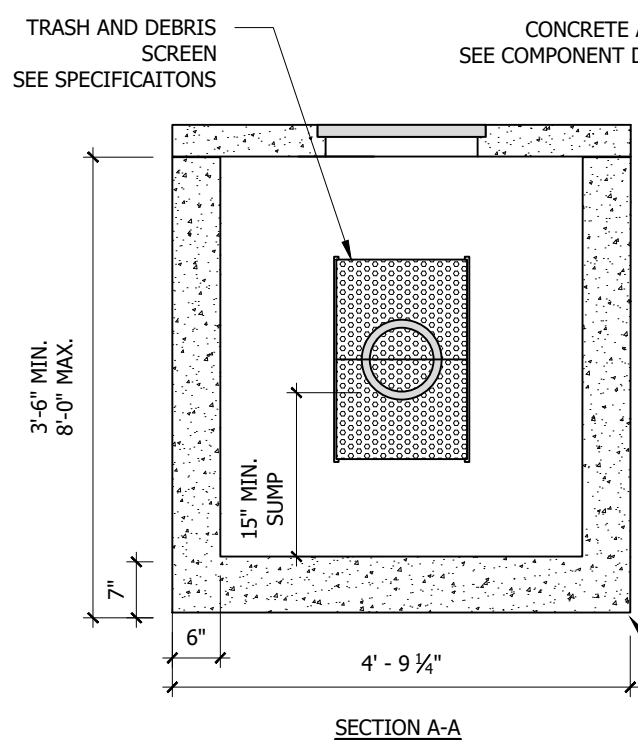
**C-1**



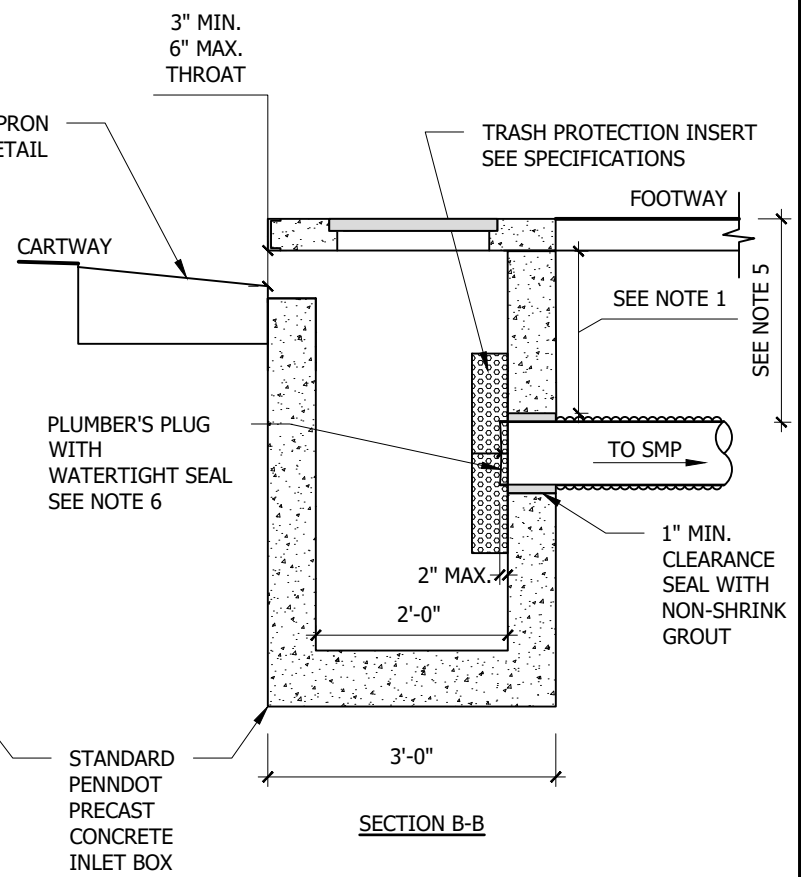
**PLAN**

**NOTES:**

1. LOCATE PIPE OPENINGS TO PROVIDE MIN. 4" OF CONCRETE BETWEEN TOP OF INLET BOX AND TOP OF PIPE OPENING (PENNDOT RC-46M).
2. OPEN MOUTH AT CURB FORMED IN TOP OF INLET BOX.
3. MODIFIED PWD CITY INLET TOP SLAB. OUTER DIMENSIONS REDUCED TO MATCH PENNDOT BOX.
4. FOOTWAY AND CARTWAY RESTORATION HAS BEEN DRAWN FOR REFERENCE PURPOSES ONLY. PAVEMENT RESTORATION QUANTITIES AND DESIGN MUST CONFORM TO CURRENT PHILADELPHIA STREETS DEPARTMENT STANDARDS FOR CITY STREETS AND PENNDOT STANDARDS FOR STATE ROUTES.
5. MIN. COVER FOR THERMOPLASTIC PIPE IN ROW IS 2'.
6. PLUMBERS PLUG TO MAINTAIN WATERTIGHT SEAL UNTIL CONSTRUCTION IS COMPLETE. PLUG TO BE REMOVED AT DIRECTION OF PWD. PLUG NOT TO EXTEND MORE THAN 2" OUT FROM INLET WALL.
7. ALL JOINTS, ADJUSTMENTS, AND PIPE CONNECTIONS MUST BE WATERTIGHT.



**SECTION A-A**



**SECTION B-B**

**SEE DECEMBER 2020 ADDENDUM FOR UPDATE**



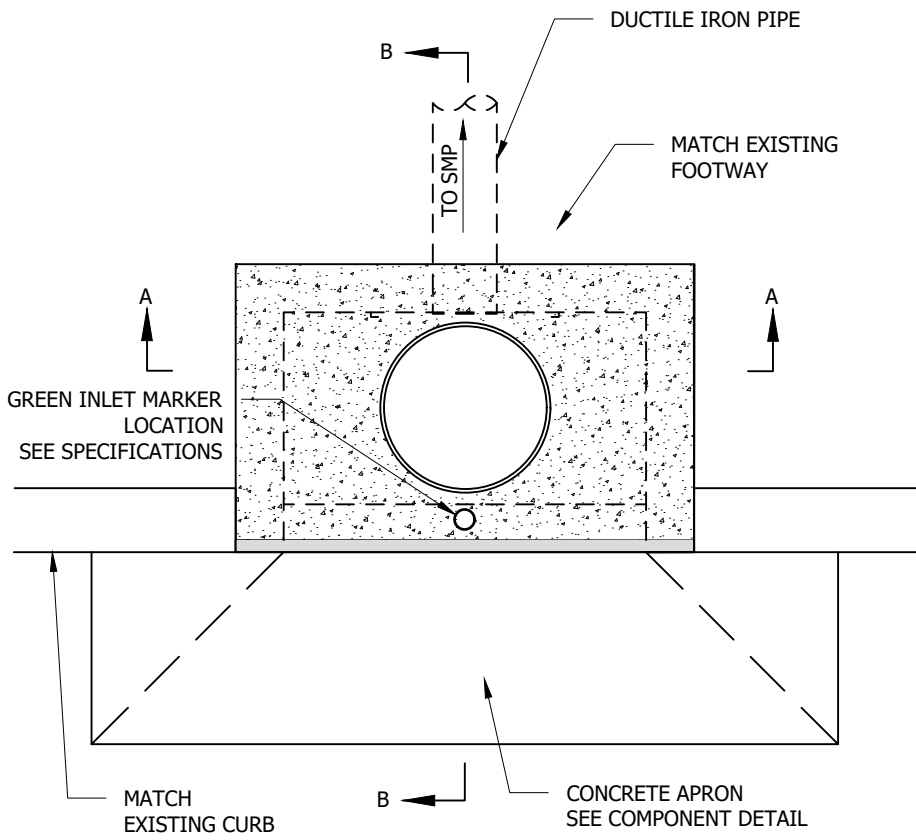
**GREEN CITY INLET**

SCALE: N.T.S.

VS.	DATE	INITIALS	REASON
1	06/09/2017	DJM	
2	06/01/2018	ANJ/DJM	ADDED MARKER, CLARIFIED OPEN MOUTH FORMATION

DRAWING NUMBER:  
**C-2**

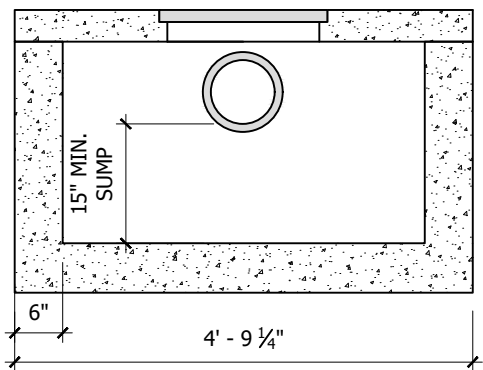




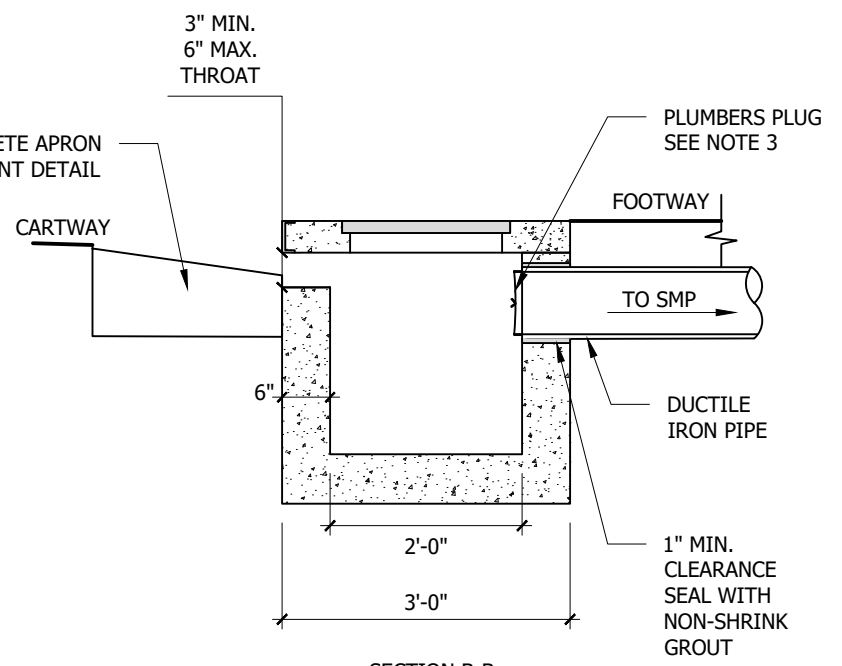
PLAN

NOTES:

1. CUSTOM INLET BOX WITH MODIFIED PWD CITY INLET TOP SLAB.
2. FOOTWAY AND CARTWAY RESTORATION HAS BEEN DRAWN FOR REFERENCE PURPOSES ONLY. PAVEMENT RESTORATION QUANTITIES AND DESIGN MUST CONFORM TO CURRENT PHILADELPHIA STREETS DEPARTMENT STANDARDS FOR CITY STREETS AND PENNDOT STANDARDS FOR STATE ROUTES.
3. PLUMBERS PLUG TO MAINTAIN WATERTIGHT SEAL UNTIL CONSTRUCTION IS COMPLETE. PLUG TO BE REMOVED AT DIRECTION OF PWD. PLUG NOT TO EXTEND MORE THAN 2" OUT FROM INLET WALL.
4. ALL JOINTS, ADJUSTMENTS, AND PIPE CONNECTIONS MUST BE WATERTIGHT.



SECTION A-A



SECTION B-B

NOTE TO DESIGNER:

1. THIS DETAIL IS TO BE USED WHEN PIPE COVER IS BETWEEN 4" AND 8".

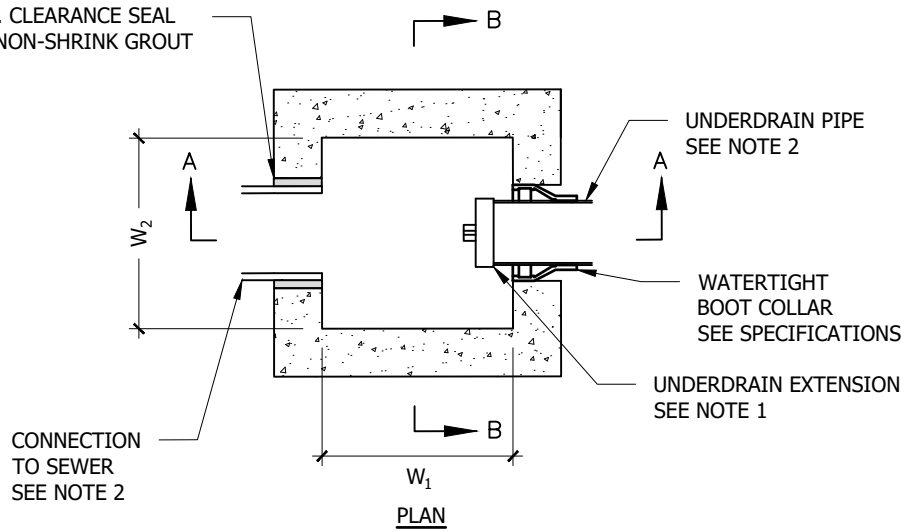
**PHILADELPHIA WATER DEPARTMENT**  
 1101 MARKET ST, 4TH FLOOR  
 PHILADELPHIA, PA, 19107

SHALLOW GREEN CITY INLET			
VS.	DATE	INITIALS	REASON
1	06/01/2018	MJD	

SCALE: N.T.S.  
 DRAWING NUMBER:  
**C-3**

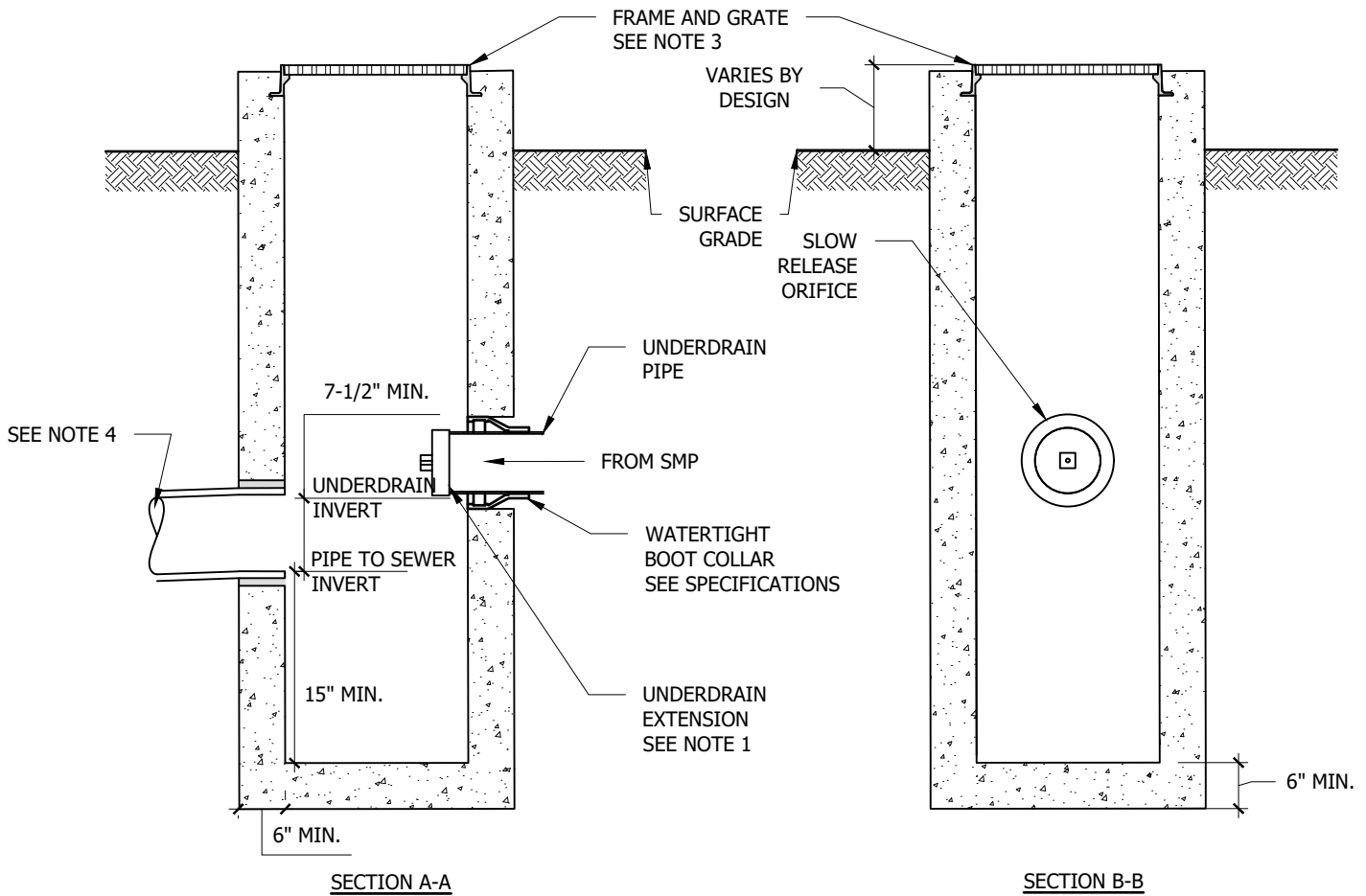
CATCH BASIN NO.	W <sub>1</sub> (FT)	W <sub>2</sub> (FT)	FRAME AND GRATE PRODUCT

1" MIN. CLEARANCE SEAL WITH NON-SHRINK GROUT (TYP.)



**NOTES:**

1. TOTAL EXTENSION OF UNDERDRAIN AND CAP ASSEMBLY INTO INLET TO BE 2" FROM INLET WALL TO END OF CAP.
2. SEE PLANS FOR DETAILS ON PIPE SIZES, MATERIALS, INVERT ELEVATIONS AND ORIENTATION.
3. SEE PLANS FOR GRATE ELEVATION AND STRUCTURE INVERT ELEVATION.
4. STANDARD HOUSE TRAP WITH VENT MUST BE INSTALLED BETWEEN CATCH BASIN AND SEWER CONNECTION.
5. ALL JOINTS, ADJUSTMENTS, AND PIPE CONNECTIONS MUST BE WATERTIGHT.



**NOTE TO DESIGNER:**

1. USE 2'x2' STRUCTURE ONLY IF THE ORIFICE ELEVATION IS LESS THAN 4' BELOW THE GRATE ELEVATION. IF THIS DISTANCE IS MORE THAN 4', A 2'x4' PENNDOT BOX SHOULD BE USED FOR MAINTENANCE ACCESS.



**PHILADELPHIA WATER DEPARTMENT**

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**SMALL OVERFLOW STRUCTURE FOR PARKS**

VS.	DATE	INITIALS	REASON
1	09/01/2016	ANJ/DJM	
2	06/01/2018	ANJ/DJM	ADDED BOOT COLLAR AND NOTE TO DESIGNER

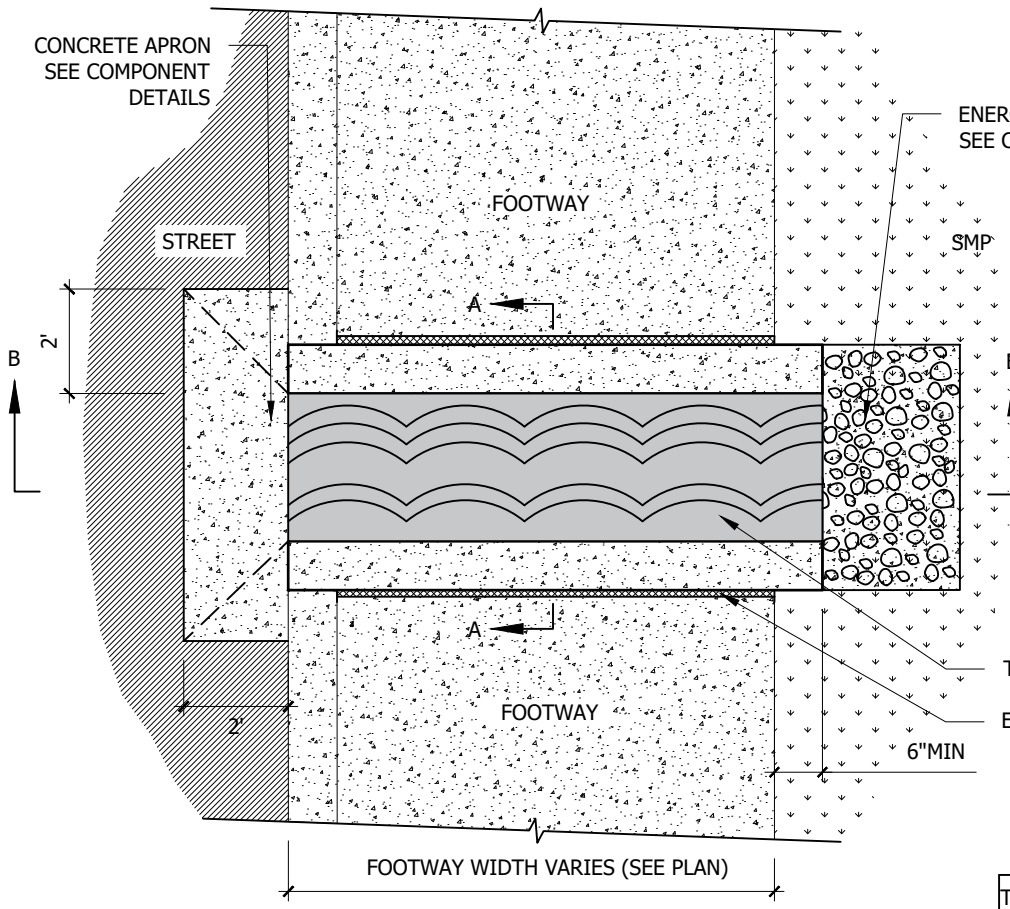
SCALE: N.T.S.

DRAWING NUMBER:

**C-4**

CONCRETE APRON  
SEE COMPONENT  
DETAILS

ENERGY DISSIPATER  
SEE COMPONENT  
DETAILS



**NOTES:**

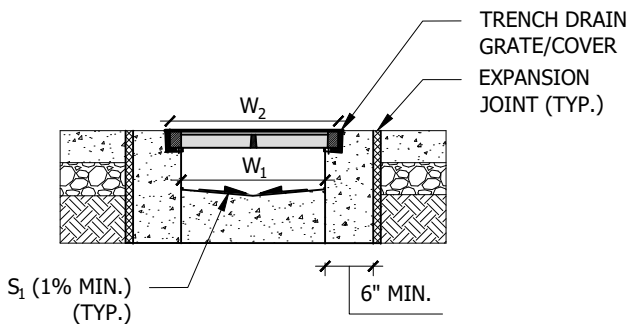
1. SEE SPECIFICATIONS FOR TRENCH DRAIN PRODUCT NUMBER. TRENCH DRAIN FRAME AND GRATE/COVER MUST BE HEEL SAFE, ADA COMPLIANT, BOLTABLE, AND CAPABLE OF H-20 LOADING.
2. ALL TRENCH DRAIN CONCRETE MUST BE 3500 PSI MIN.
3. ANCHOR FRAME INTO CONCRETE PER MANUFACTURER'S REQUIREMENTS.

TRENCH DRAIN GRATE/COVER  
EXPANSION JOINT (TYP.)  
6" MIN

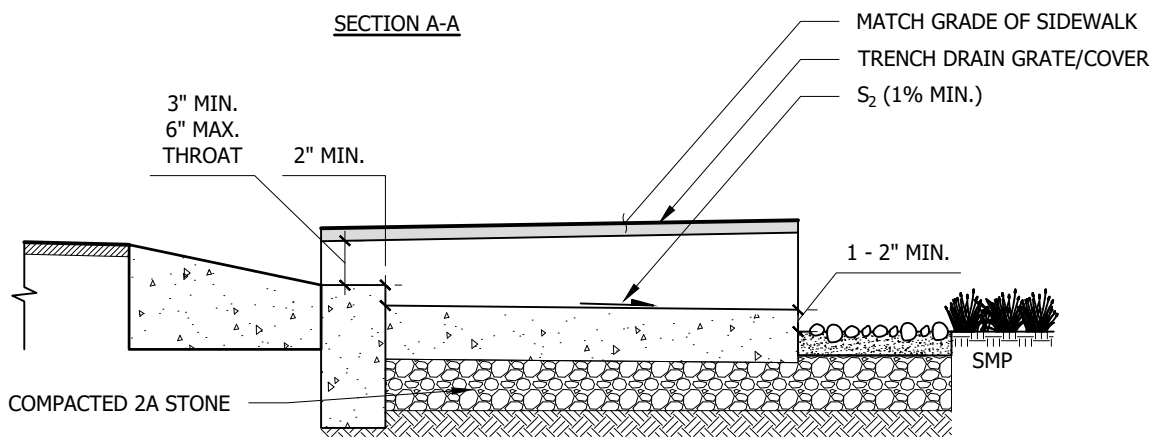
FOOTWAY WIDTH VARIES (SEE PLAN)

PLAN

TRENCH DRAIN NO.	W <sub>1</sub> (IN.)	W <sub>2</sub> (IN.)	H (IN.)	S <sub>1</sub> (%)	S <sub>2</sub> (%)



SECTION A-A



**SEE JUNE 2023 ADDENDUM FOR LATEST UPDATE**



**PHILADELPHIA  
WATER  
DEPARTMENT**

1101 MARKET ST, 4TH FLOOR  
PHILADELPHIA, PA, 19107

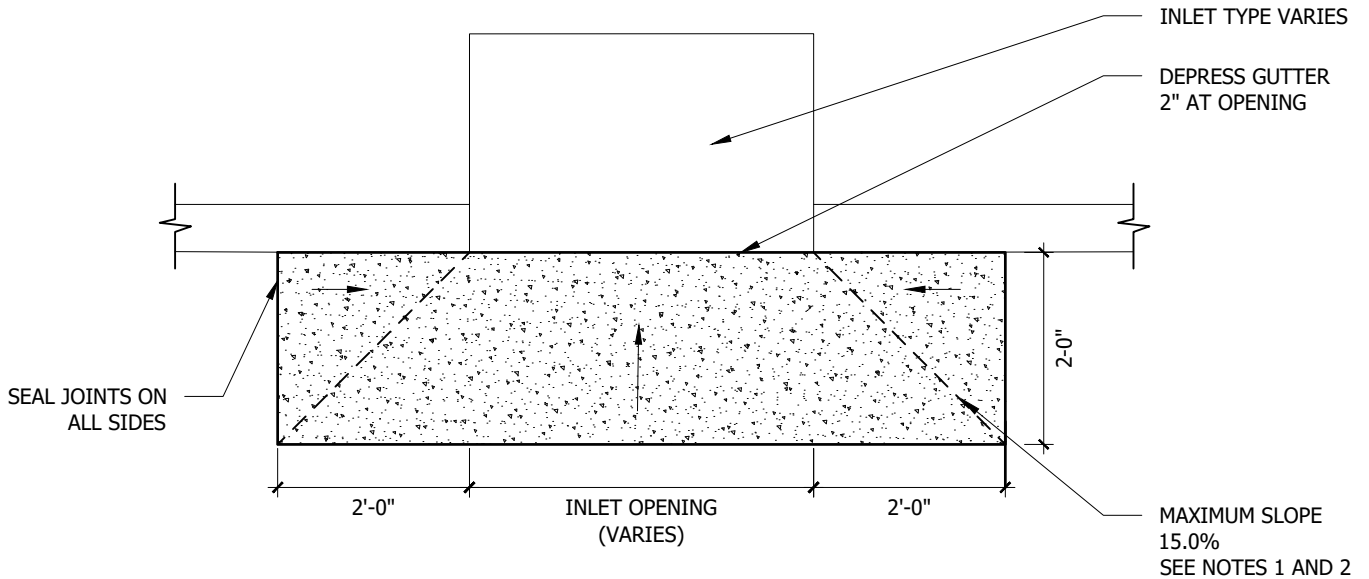
**TRENCH DRAIN**

VS.	DATE	INITIALS	REASON
1	09/01/2016	ANJ/DJM	
2	06/01/2018	MJD/DJM	EXTENDED 6" PAST SIDEWALK, UPDATED CURB APRON

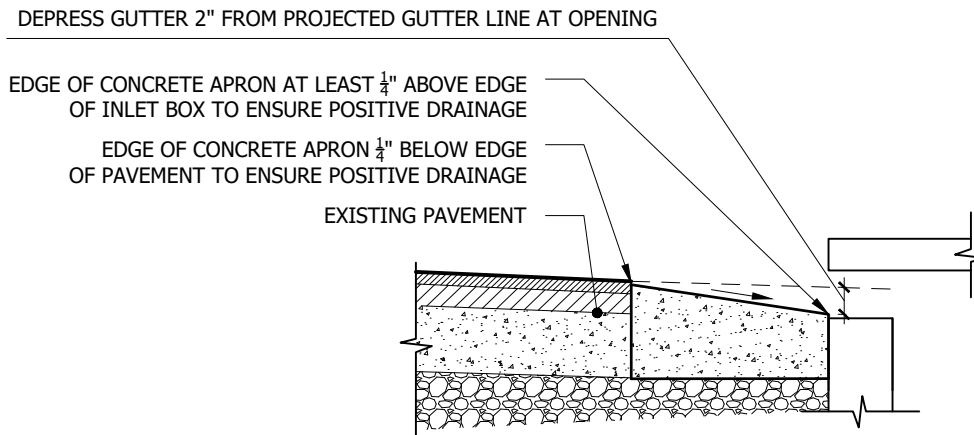
SCALE: N.T.S.

DRAWING NUMBER:

**C-5**



PLAN



SECTION

NOTES

1. MAXIMUM SLOPE OF APRON PARALLEL TO CURB IS 7H:1V (15.0%), 12H:1V (8.5%) IS PREFERRED.
2. MAXIMUM SLOPE OF APRON PERPENDICULAR TO CURB IS 7H:1V (15.0%), 12H:1V (8.5%) IS PREFERRED.
3. CONCRETE APRON THICKNESS TO MATCH BOTTOM OF EXISTING CONCRETE BASE COURSE.
4. CONCRETE BASE COURSE MINIMUM THICKNESS IS 8" ON CITY STREETS AND 10" ON STATE ROUTES.

NOTE TO DESIGNER:

1. CONCRETE APRONS SHOULD BE LOCATED SO AS NOT TO INTERFERE WITH PLANNED OR POTENTIAL FUTURE ADA RAMP CONSTRUCTION



**PHILADELPHIA**  
**WATER**  
DEPARTMENT

1101 MARKET ST, 4TH FLOOR  
PHILADELPHIA, PA, 19107

**CONCRETE APRON**

VS.	DATE	INITIALS	REASON
1	09/01/2016	ANJ/DJM	
2	06/01/2018	MJD/DJM	ADJUSTED CURB APRON GRADING AND INLET TYPE

SCALE: N.T.S.

DRAWING NUMBER:

**C-6**

STANDARD PWD PRECAST  
INLET BOX

STANDARD PWD  
TRAP

SLOW RELEASE ORIFICE  
SEE COMPONENT DETAIL

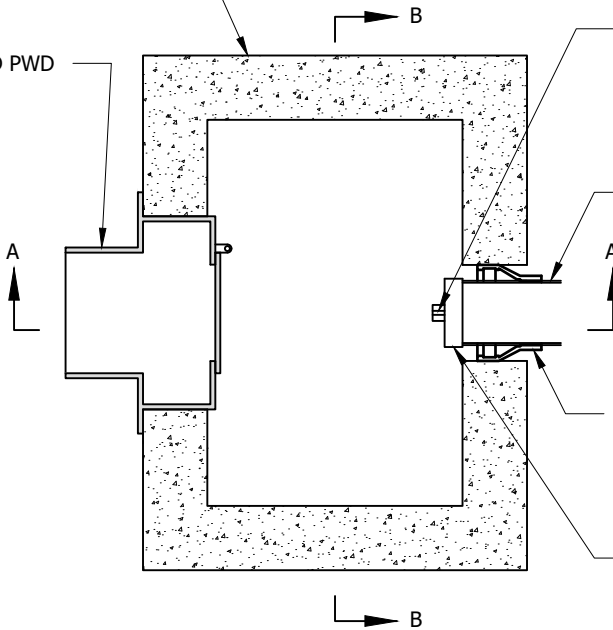
UNDERDRAIN  
PIPE

WATERTIGHT  
BOOT COLLAR  
SEE SPECIFICATIONS

UNDERDRAIN EXTENSION  
SEE NOTE 3

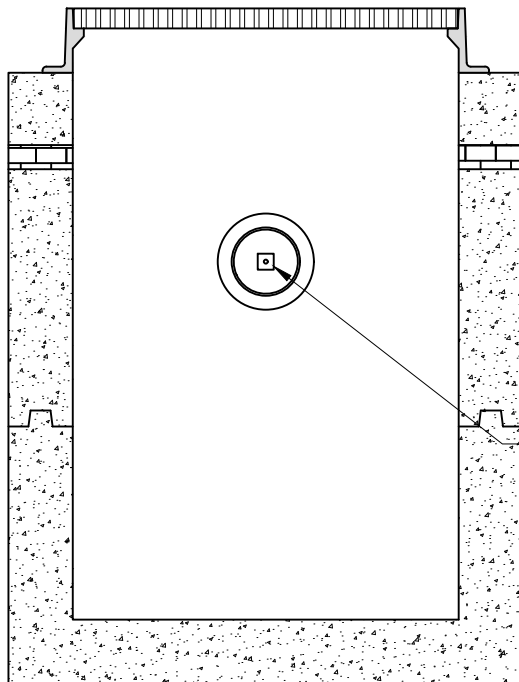
**NOTES:**

1. ALL CONCRETE COMPONENTS, INLET GRATE AND FRAME, INLET TRAP, AND CONNECTION TO SEWER SHALL BE PWD STANDARD CONSTRUCTION.
2. HIGHWAY INLET DEPICTED; DESIGN IS GENERALLY APPLICABLE TO ALL PWD STANDARD INLETS.
3. TOTAL EXTENSION OF UNDERDRAIN AND CAP ASSEMBLY INTO INLET TO BE 2" FROM INLET WALL TO END OF CAP.
4. ALL JOINTS, ADJUSTMENTS, AND PIPE CONNECTIONS MUST BE WATERTIGHT.

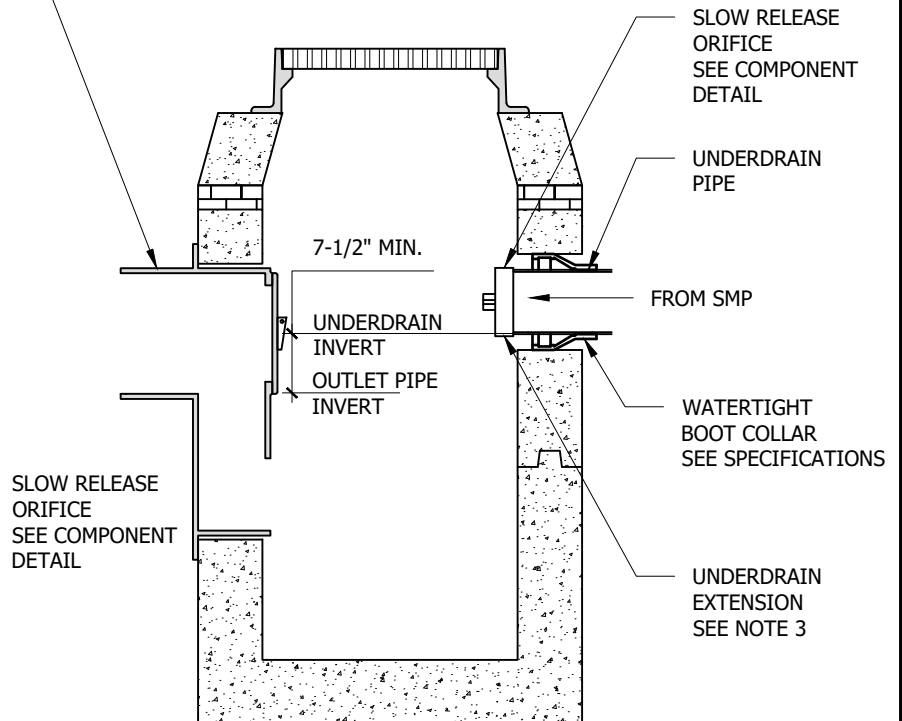


PLAN

STANDARD PWD TRAP AND  
CONNECTION TO SEWER



SECTION B-B



SECTION A-A



**PHILADELPHIA  
WATER  
DEPARTMENT**

1101 MARKET ST, 4TH FLOOR  
PHILADELPHIA, PA, 19107

**STANDARD INLET WITH UNDERDRAIN CONNECTION**

VS.	DATE	INITIALS	REASON
1	09/01/2016	ANJ/DJM	
2	06/01/2018	ANJ	UPDATED PVC PLUG, ADDED BOOT COLLAR

SCALE: N.T.S.

DRAWING NUMBER:

**C-7**

THREADED PVC END PLUG WITH NUT

12" CORED OPENING

INLET WALL

DRILLED ORIFICE OPENING  
(DIMENSION VARIES, SEE NOTE 2)

THREADED 8" PVC END PLUG WITH NUT

INLET WALL

WATERTIGHT BOOT COLLAR  
SEE SPECIFICATIONS

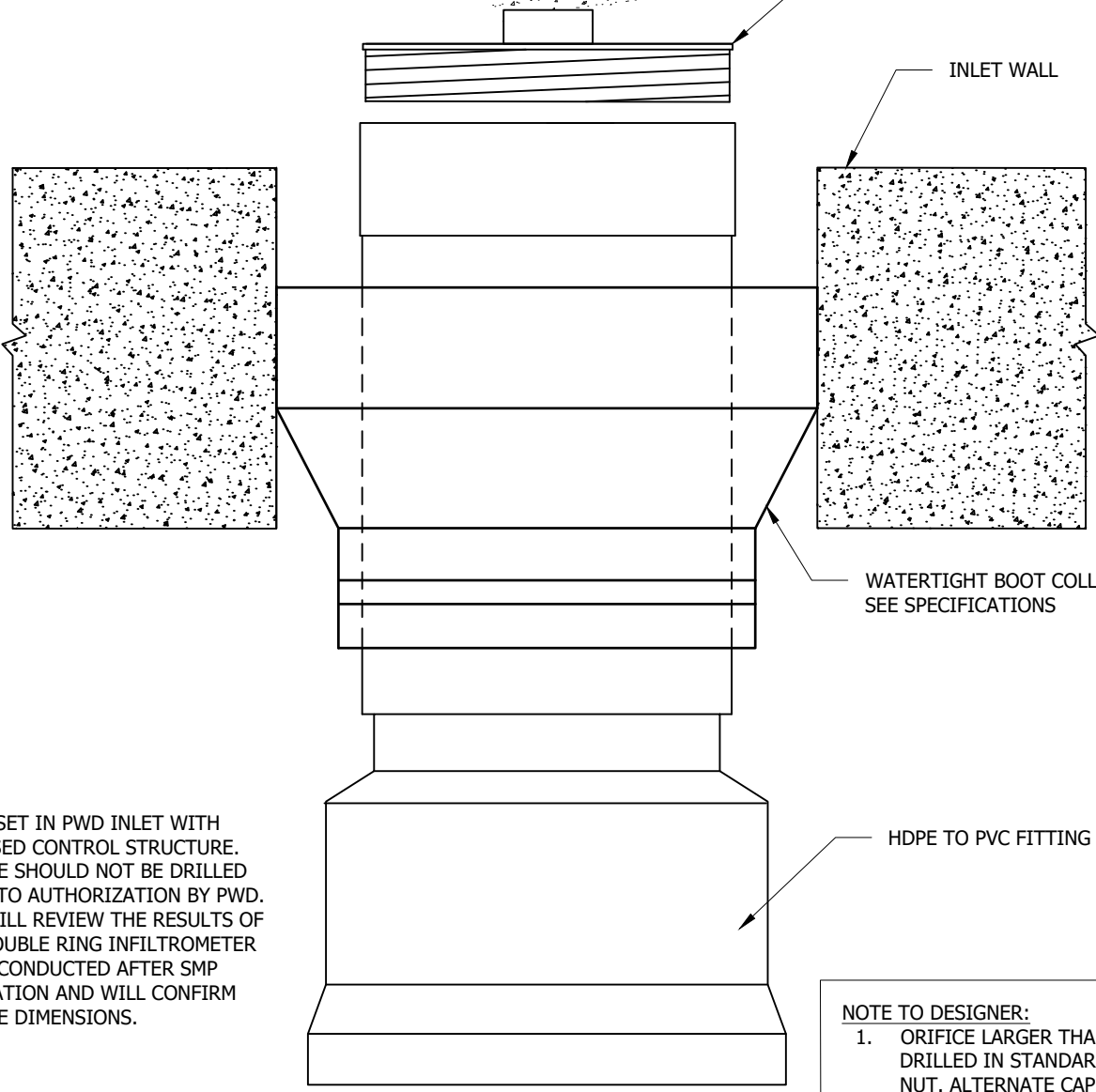
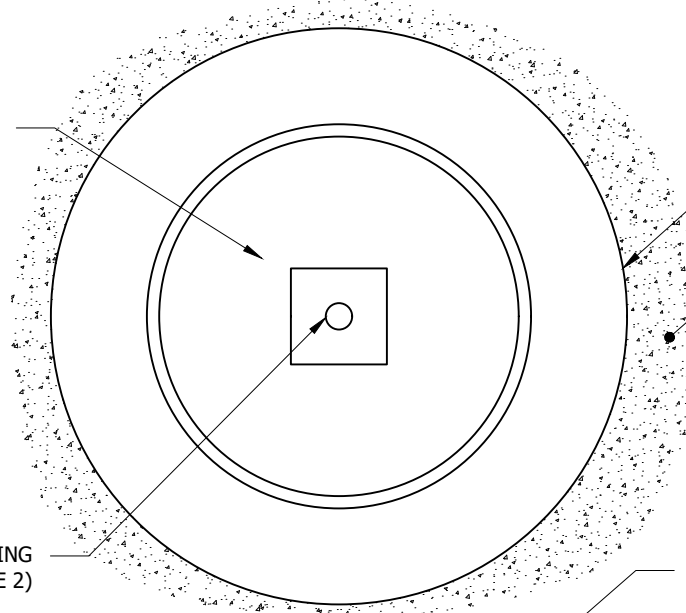
HDPE TO PVC FITTING

**NOTE TO DESIGNER:**

- ORIFICE LARGER THAN 1" CANNOT BE DRILLED IN STANDARD PVC PLUG NUT. ALTERNATE CAP DESIGN NEEDED IN THIS INSTANCE.

**NOTES:**

- TO BE SET IN PWD INLET WITH RECESSED CONTROL STRUCTURE.
- ORIFICE SHOULD NOT BE DRILLED PRIOR TO AUTHORIZATION BY PWD. PWD WILL REVIEW THE RESULTS OF THE DOUBLE RING INFILTRMETER TESTS CONDUCTED AFTER SMP EXCAVATION AND WILL CONFIRM ORIFICE DIMENSIONS.



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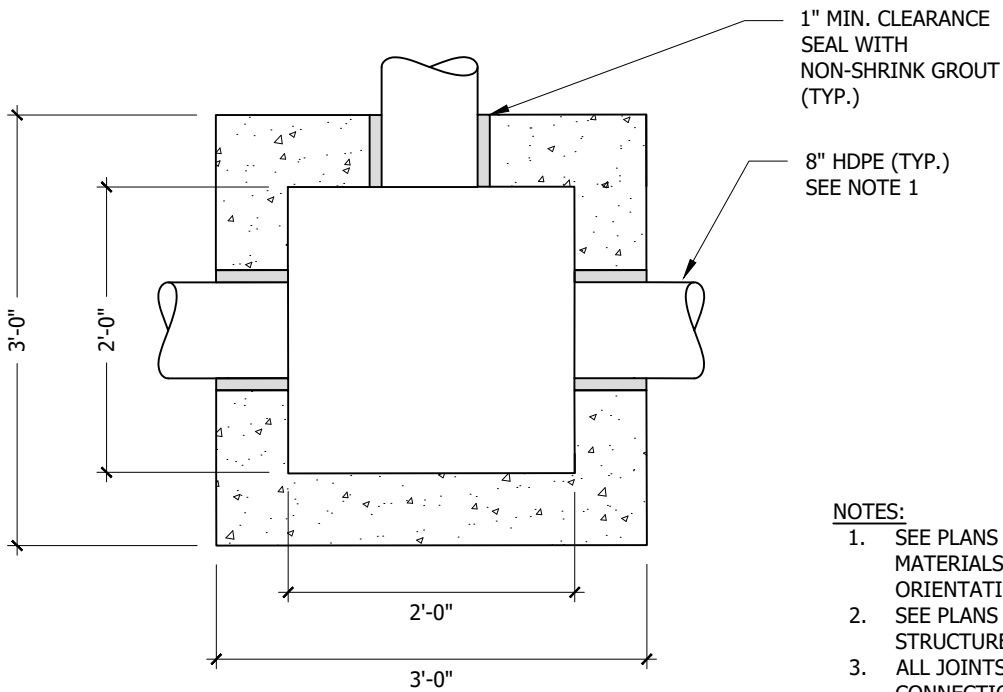
**SLOW RELEASE ORIFICE**

VS.	DATE	INITIALS	REASON
1	09/01/2016	ANJ/DJM	
2	06/01/2018	ANJ/DJM	UPDATED PVC PLUG, ADDED BOOT COLLAR

SCALE: N.T.S.

DRAWING NUMBER:

**C-8**

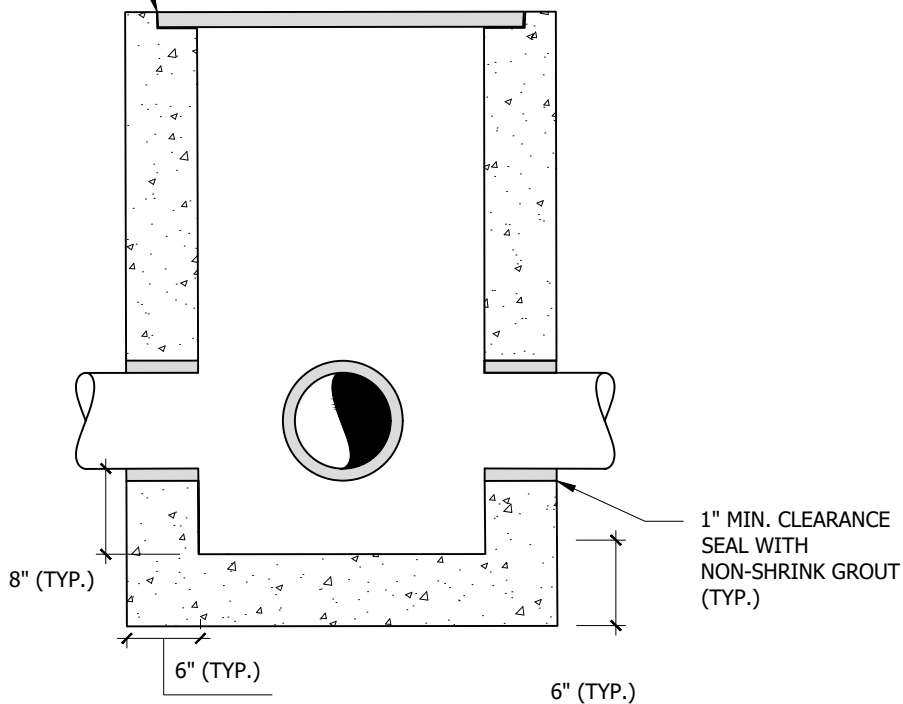


**NOTES:**

1. SEE PLANS FOR DETAILS ON PIPES, MATERIALS, INVERT ELEVATIONS AND ORIENTATION.
2. SEE PLANS FOR COVER ELEVATION AND STRUCTURE INVERT ELEVATION.
3. ALL JOINTS, ADJUSTMENTS, AND PIPE CONNECTIONS MUST BE WATERTIGHT.

2'-0" x 2'-0" JUNCTION BOX  
WITH LOCKABLE STEEL  
FRAME AND COVER  
SEE SPECIFICATIONS

PLAN



PROFILE

**NOTE TO DESIGNER:**

1. USE 2'x2' STRUCTURE ONLY IF THE ORIFICE ELEVATION IS LESS THAN 4' BELOW THE COVER ELEVATION. IF THIS DISTANCE IS MORE THAN 4', A LARGER STRUCTURE SHOULD BE USED FOR MAINTENANCE ACCESS.



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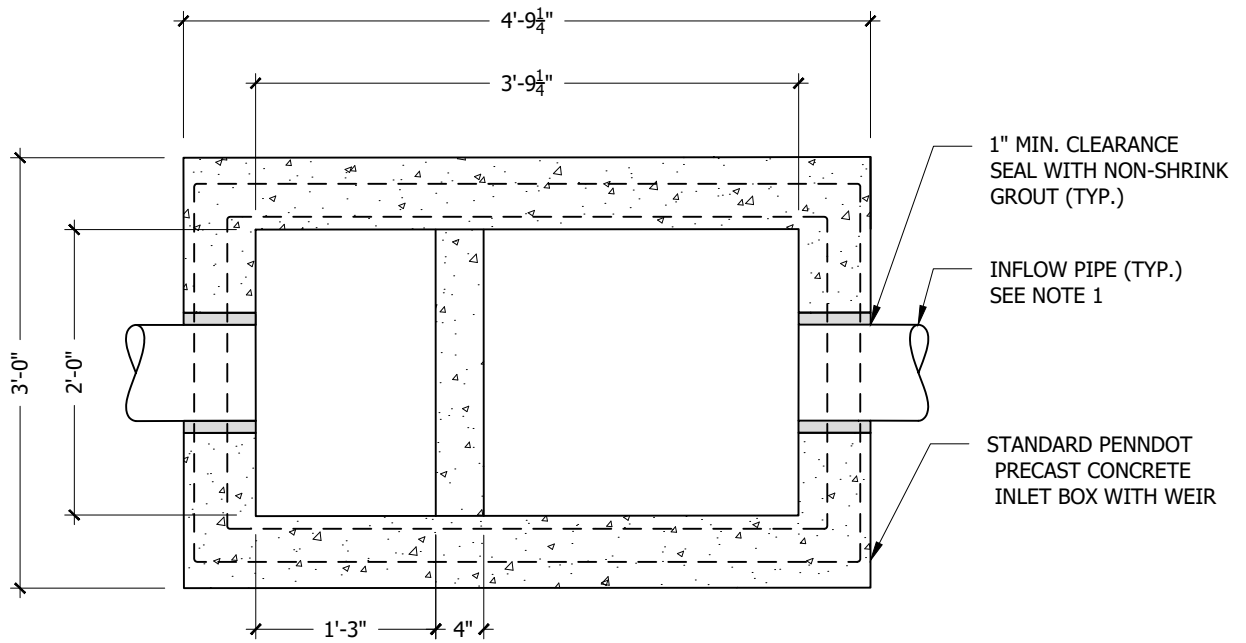
**JUNCTION BOX**

VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	DJM	ADDED NOTE TO DESIGNER

SCALE: N.T.S.

DRAWING NUMBER:

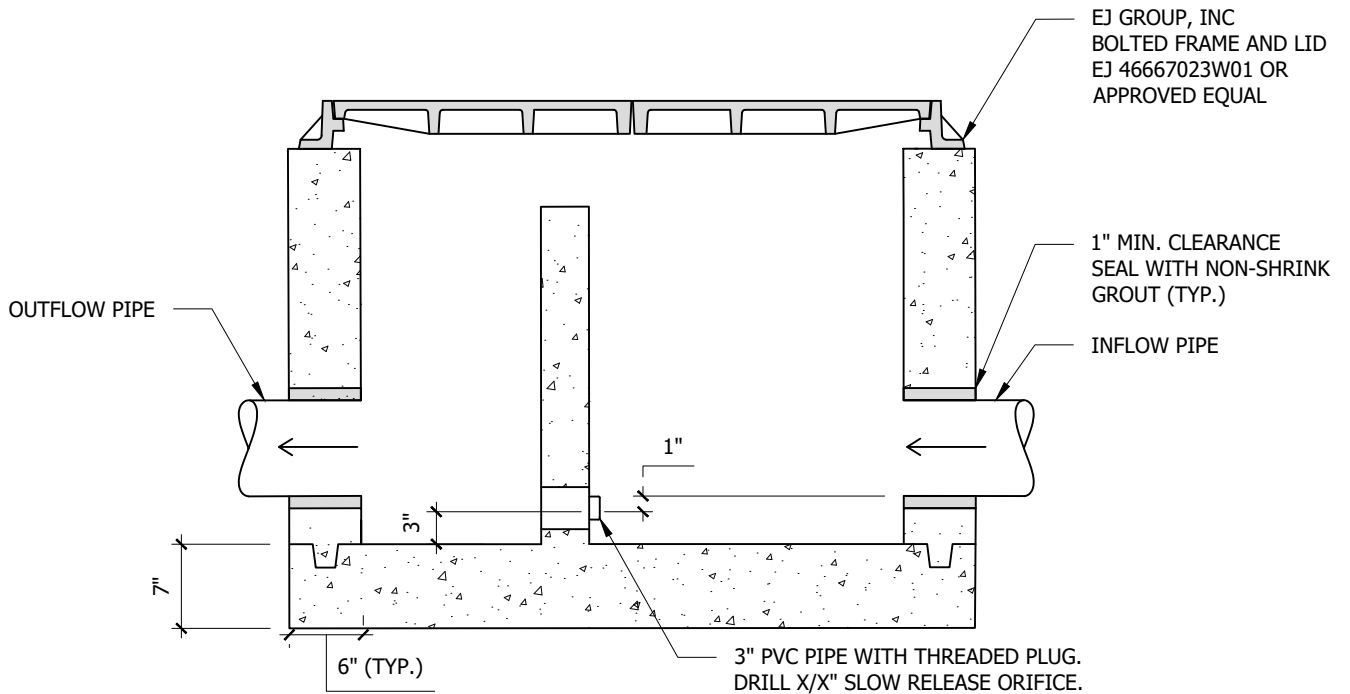
**C-9**



PLAN

NOTES:

1. SEE PLANS FOR DETAILS ON PIPES, MATERIALS, INVERT ELEVATIONS AND ORIENTATION.
2. SEE PLANS FOR COVER ELEVATION AND STRUCTURE INVERT ELEVATION.
3. ALL JOINTS, ADJUSTMENTS, AND PIPE CONNECTIONS MUST BE WATERTIGHT.



PROFILE

SEE DECEMBER 2020 ADDENDUM FOR UPDATE

NOTES TO DESIGNER:

1. SPECIFY SLOW RELEASE ORIFICE DIAMETER.
2. CONSIDER MINIMUM DISTANCE BETWEEN TOP OF WEIR WALL AND BOTTOM OF FRAME.
3. USE DEEPER FRAME WHEN LOCATING WATER LEVEL CONTROL STRUCTURE IN THE CARTWAY.



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**WATER LEVEL CONTROL STRUCTURE**

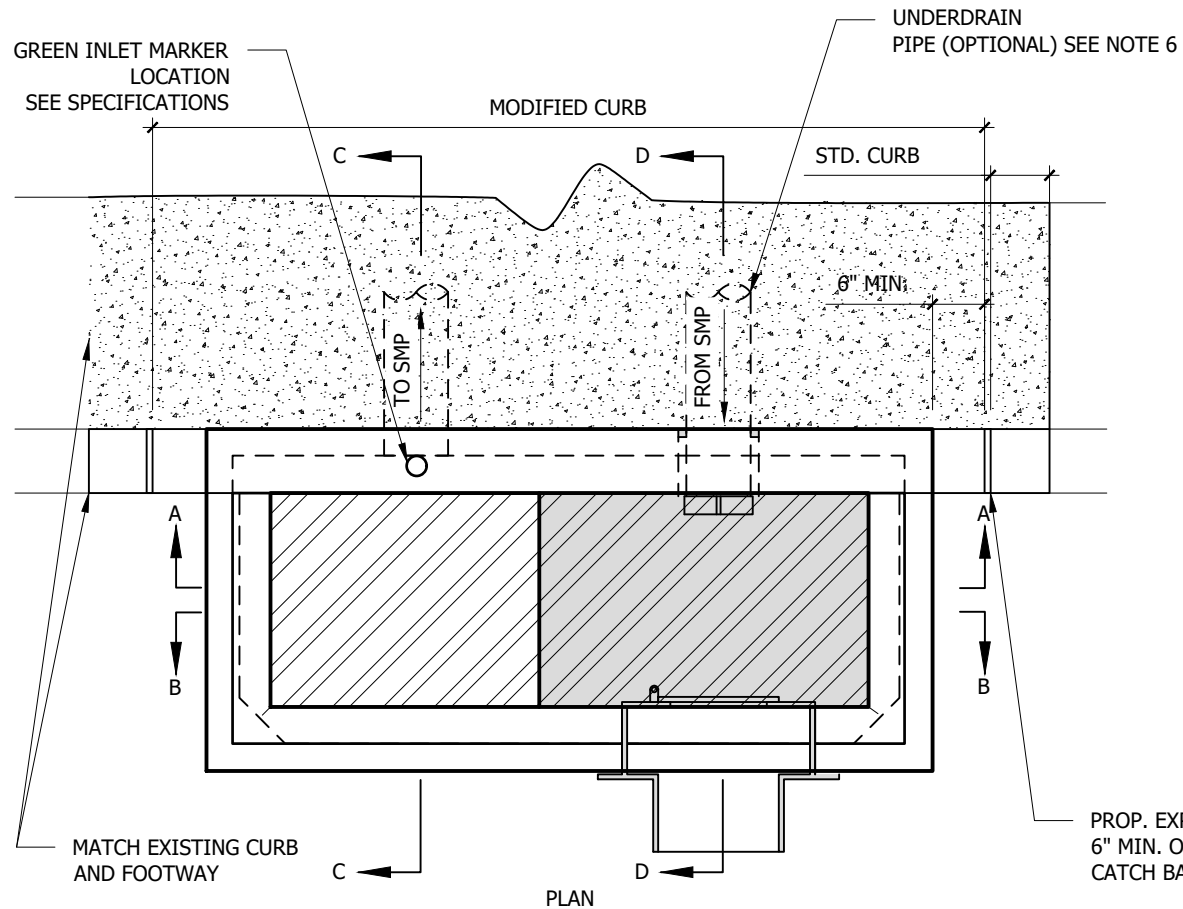
VS.	DATE	INITIALS	REASON
1	06/09/2017	MJD	UPDATED BOX, WEIR, FRAME AND GRATE
2	06/01/2018	ANJ	ADDED NOTE 3

SCALE: N.T.S.

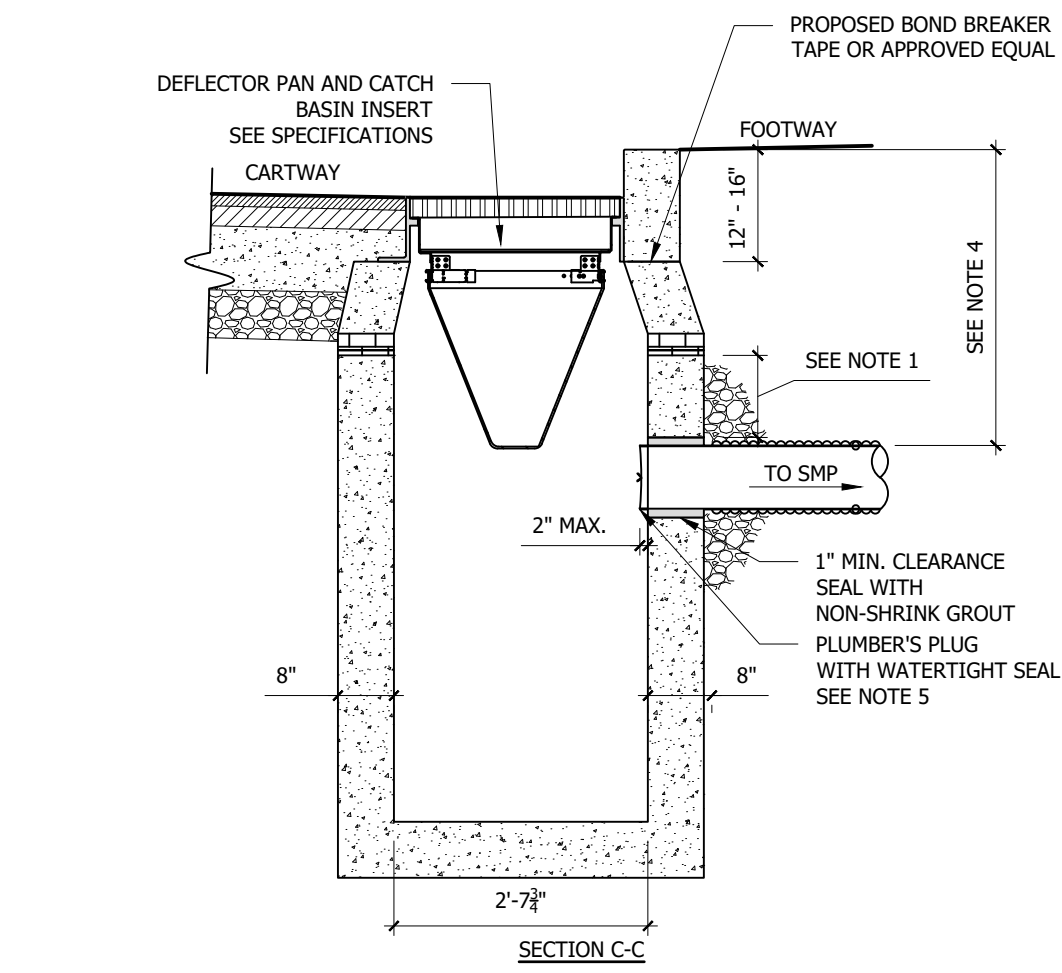
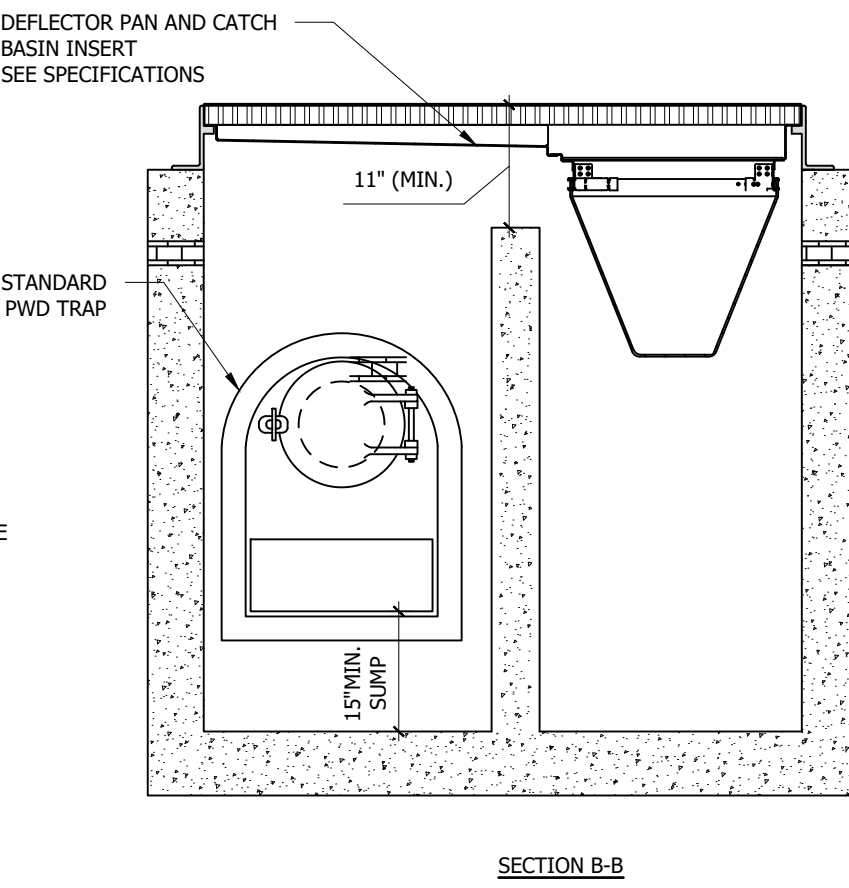
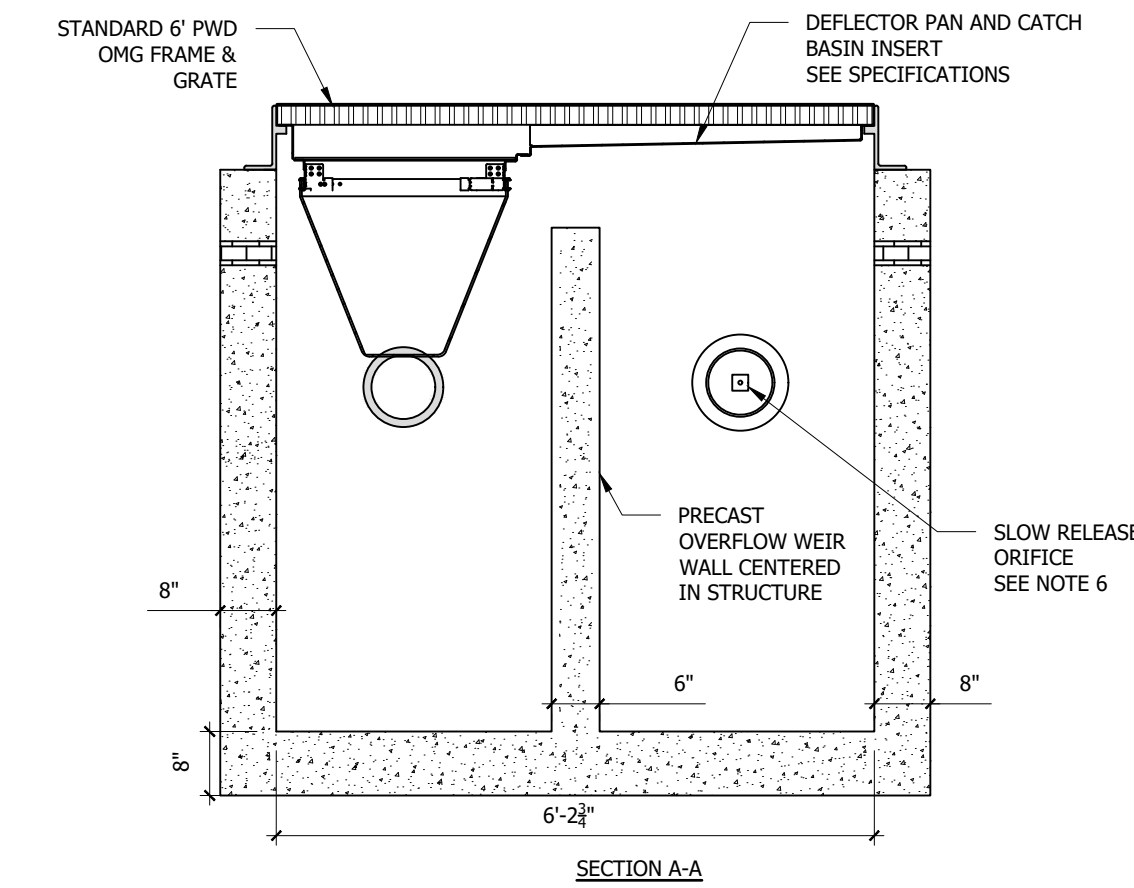
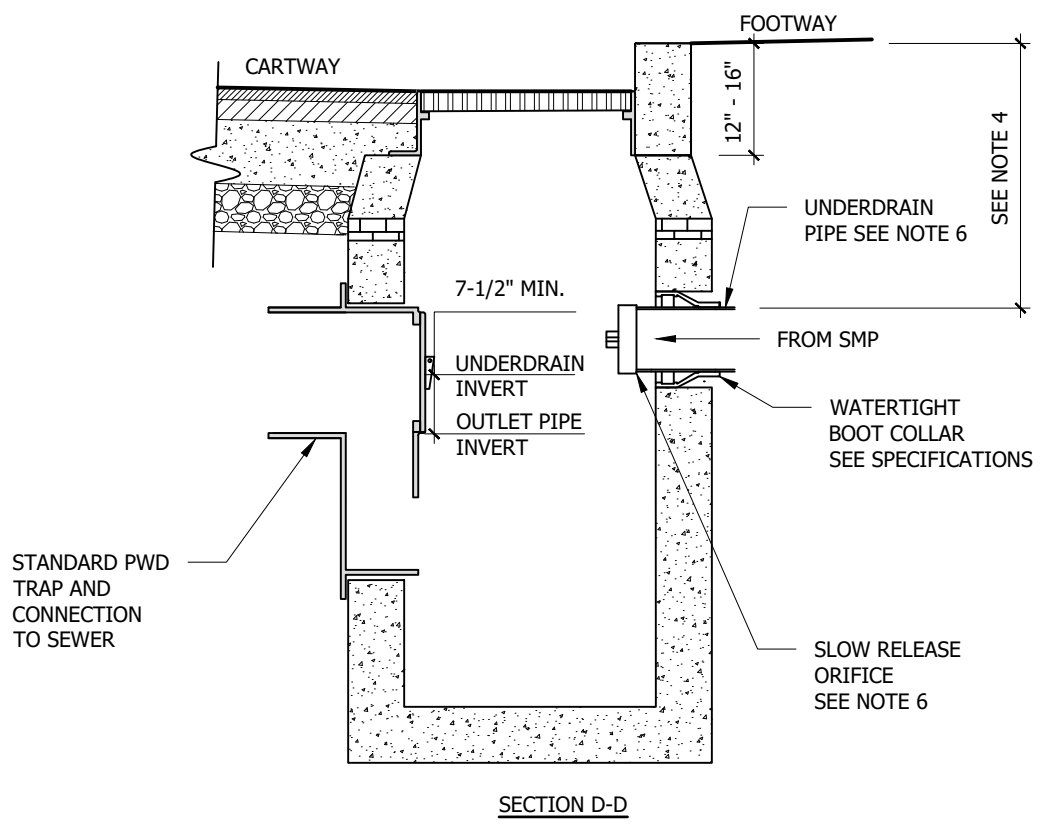
DRAWING NUMBER:

**C-10**

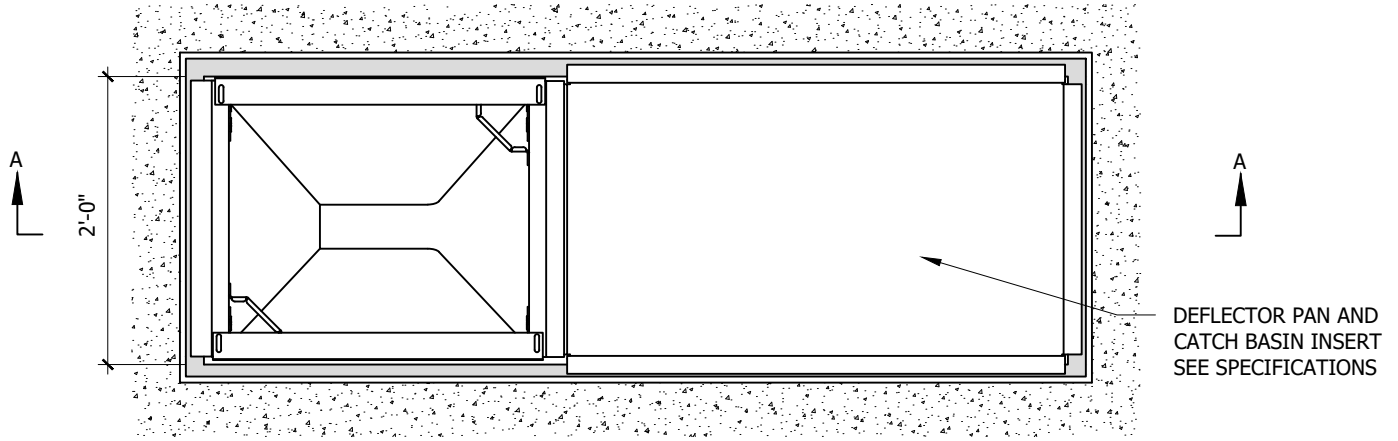




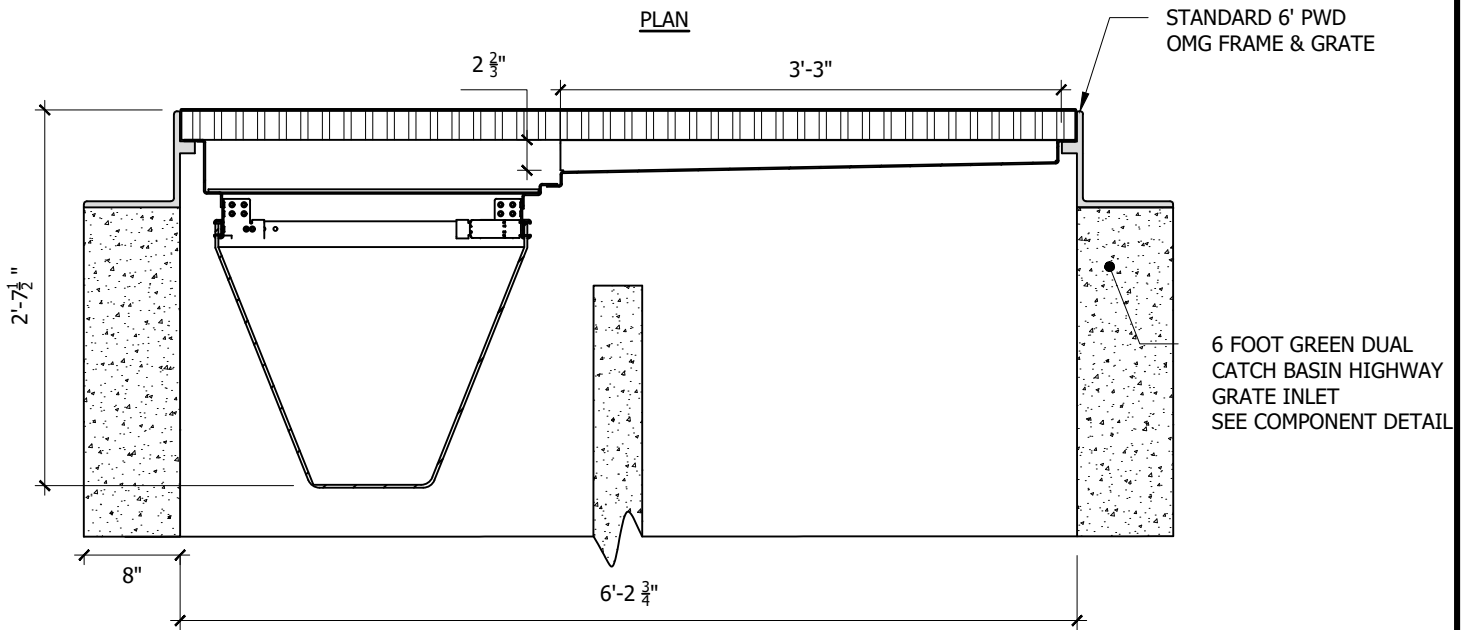
- NOTES:**
1. LOCATE PIPE OPENINGS TO PROVIDE MIN. 4" OF CONCRETE BETWEEN TOP OF INLET BOX AND TOP OF PIPE OPENING. CURB ABOVE INLET SHALL BE SUPPORTED WITH 2A STONE BETWEEN TOP OF PIPE AND BOTTOM OF CURB. CURB OUTSIDE OF INLET SHALL BE STANDARD DEPTH.
  2. ALL CONCRETE COMPONENTS, INLET GRATE AND FRAME, INLET TRAP, AND CONNECTION TO SEWER SHALL BE PWD STANDARD CONSTRUCTION.
  3. FOOTWAY AND CARTWAY RESTORATION HAS BEEN DRAWN FOR REFERENCE PURPOSES ONLY. PAVEMENT RESTORATION QUANTITIES AND DESIGN MUST CONFORM TO CURRENT PHILADELPHIA STREETS DEPARTMENT STANDARDS FOR CITY STREETS AND PENNDOT STANDARDS FOR STATE ROUTES.
  4. MIN. COVER FOR THERMOPLASTIC PIPE IN ROW MUST BE 2'.
  5. PLUMBERS PLUG TO MAINTAIN WATERTIGHT SEAL UNTIL CONSTRUCTION IS COMPLETE. PLUG TO BE REMOVED AT DIRECTION OF PWD. PLUG NOT TO EXTEND MORE THAN 2" OUT FROM INLET WALL.
  6. UNDERDRAIN FROM SMP IS OPTIONAL AND DEPENDS ON PROJECT SPECIFIC DESIGN. WHEN INSTALLED, REFER TO STANDARD INLET WITH UNDERDRAIN CONNECTION AND SLOW RELEASE ORIFICE DETAILS AS APPLICABLE.
  7. PROVIDE A MIN. 11" OF CLEARANCE BETWEEN TOP OF GRATE ELEVATION AND TOP OF WEIR WALL.
  8. ALL JOINTS, ADJUSTMENTS, AND PIPE CONNECTIONS MUST BE WATERTIGHT.



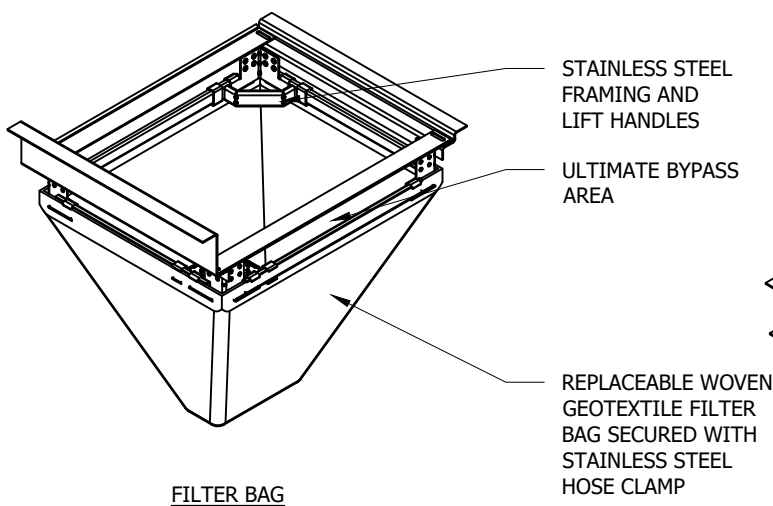
6 FOOT GREEN DUAL CATCH BASIN HIGHWAY GRATE INLET			SCALE: N.T.S.
VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	MJD/ANJ	GREEN INLET MARKER, WEIR WALL THICKNESS, AND MIN CLEARANCE FROM WEIR TO TOP OF GRATE



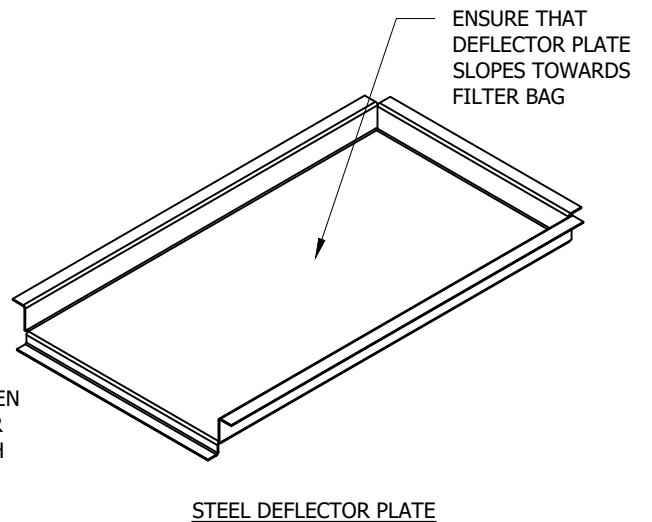
PLAN



SECTION A-A



FILTER BAG



STEEL DEFLECTOR PLATE



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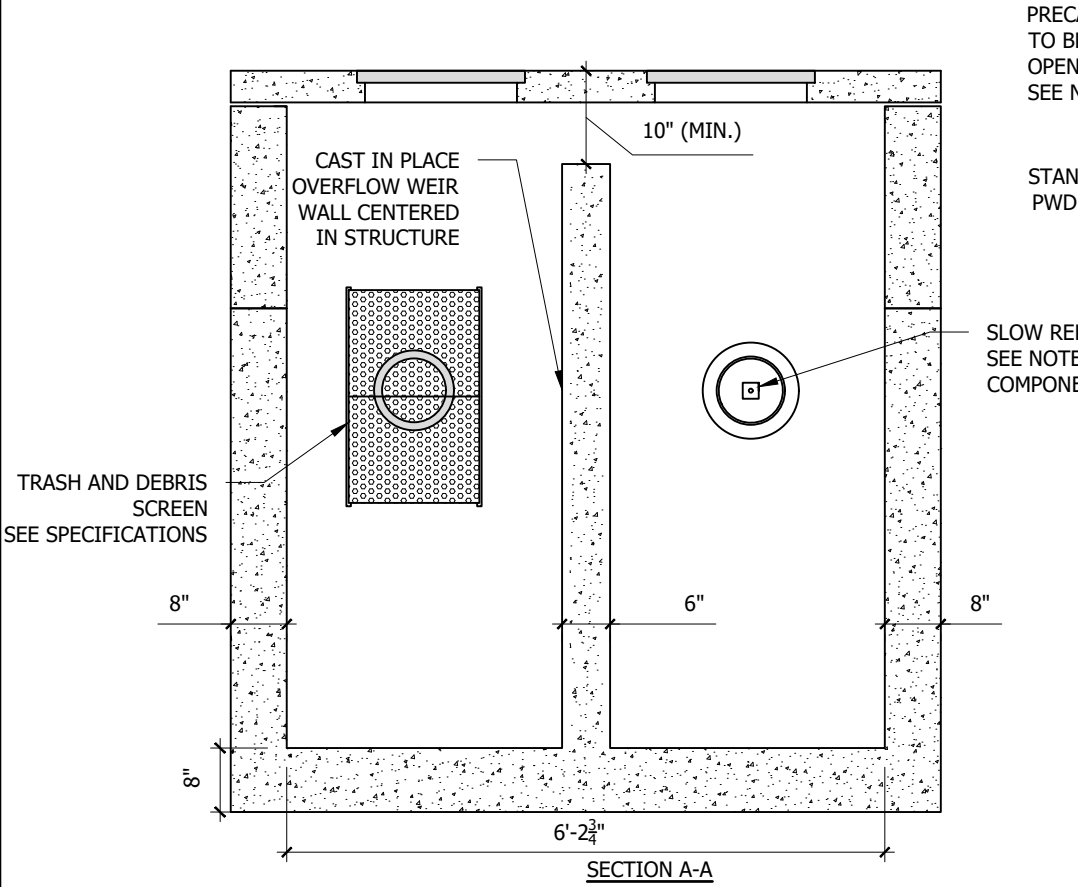
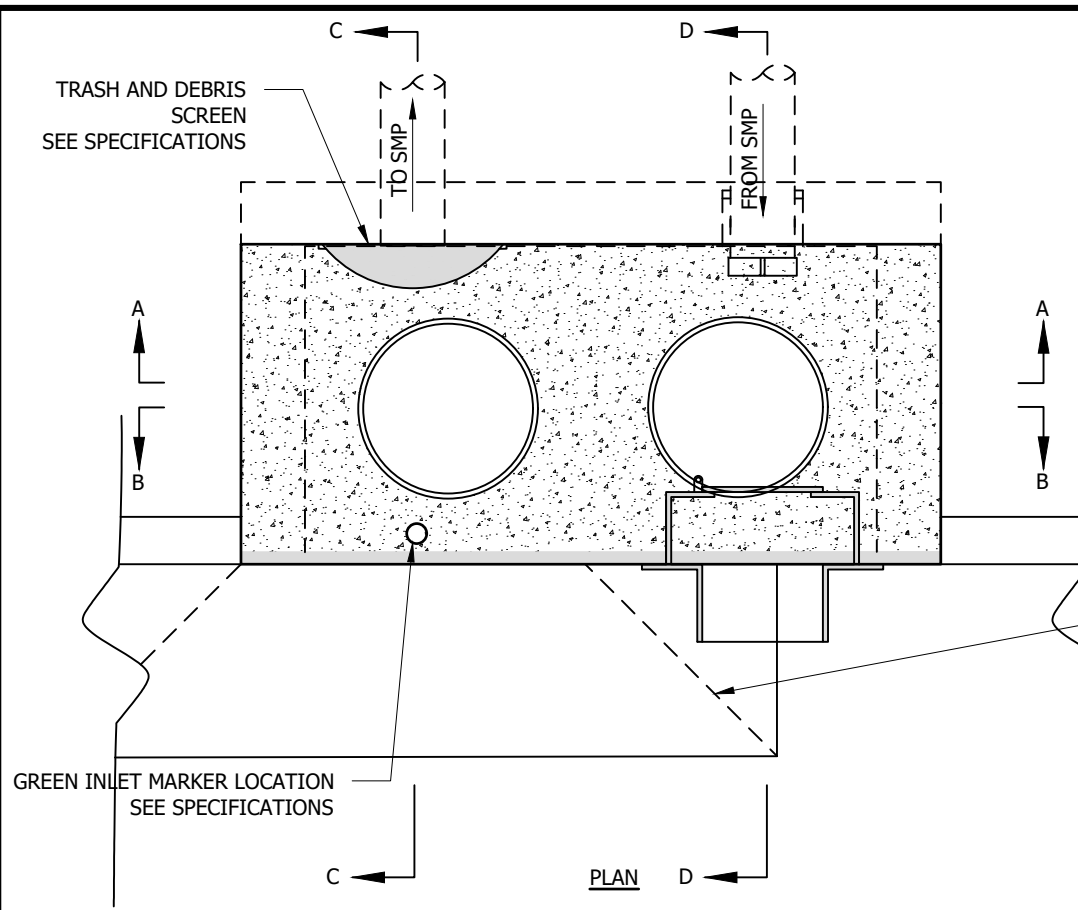
PROTECTION FOR DUAL CATCH BASIN HIGHWAY INLET

VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	MJD	UPDATED FRAME, GRATE AND INLET BOX

SCALE: N.T.S.

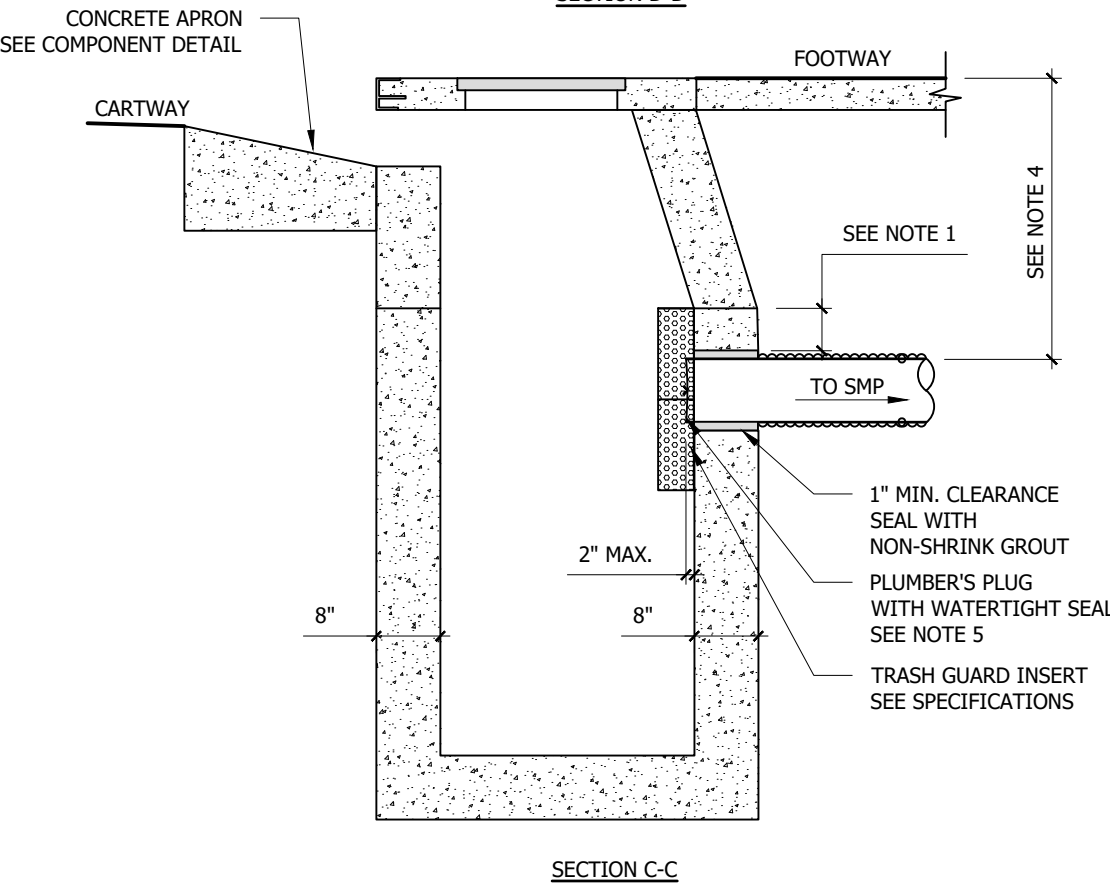
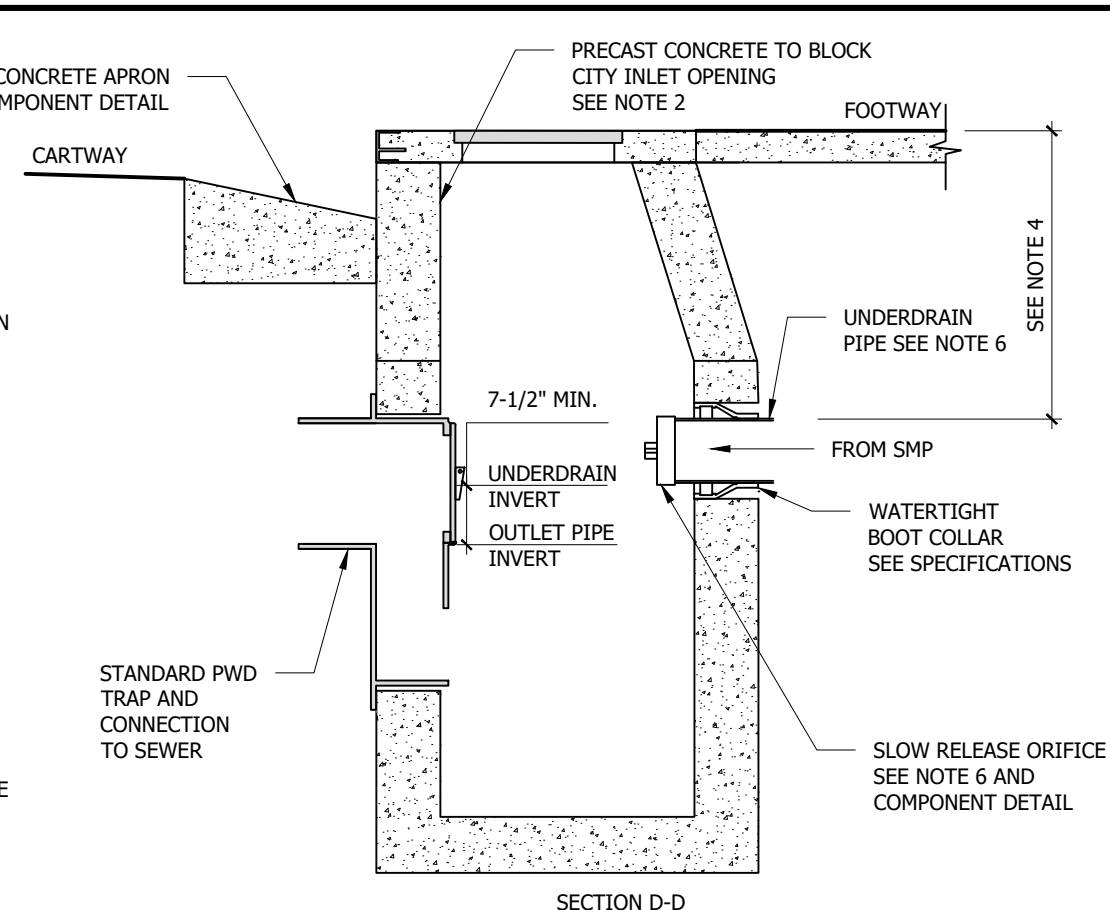
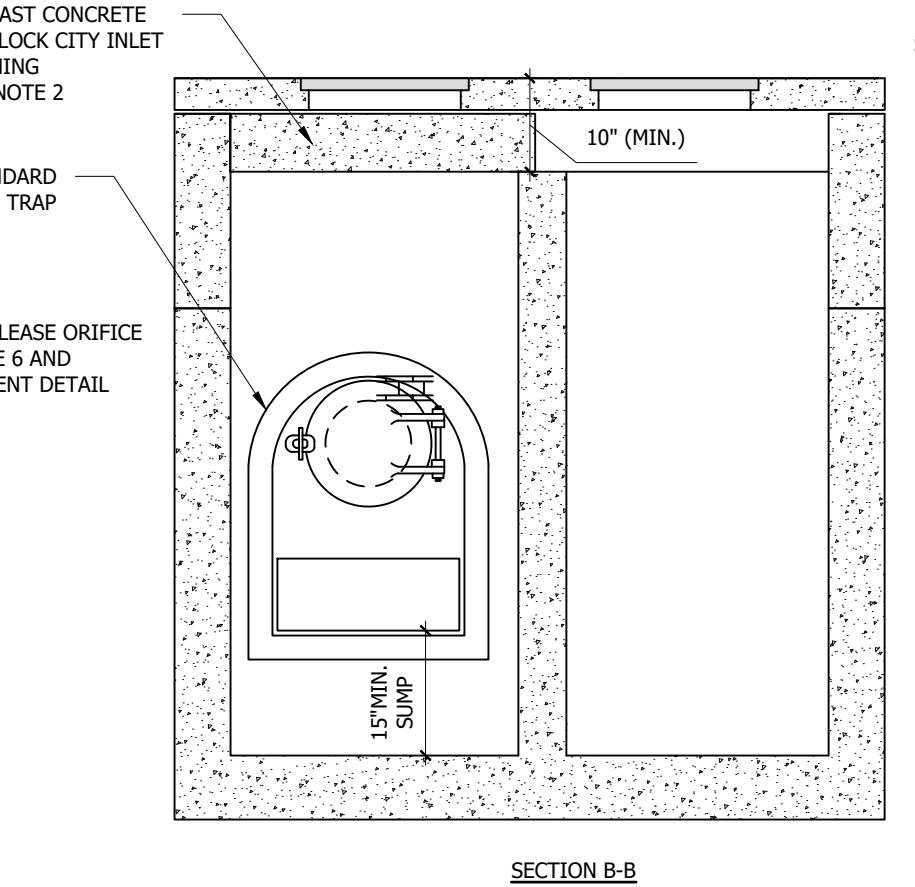
DRAWING NUMBER:

**C-12**



**NOTES:**

1. LOCATE PIPE OPENINGS TO PROVIDE MIN. 4" OF CONCRETE BETWEEN TOP OF INLET BOX AND TOP OF PIPE OPENING.
2. ALL CONCRETE COMPONENTS, CITY INLET, INLET TRAP, AND CONNECTION TO SEWER SHALL BE PWD STANDARD CONSTRUCTION EXCEPT THAT ADDITIONAL CONCRETE SHALL BE PRECAST WITH STRUCTURE TO BLOCK OPENING AS SHOWN ON SECTIONS.
3. FOOTWAY AND CARTWAY RESTORATION HAS BEEN DRAWN FOR REFERENCE PURPOSES ONLY. PAVEMENT RESTORATION QUANTITIES AND DESIGN MUST CONFORM TO CURRENT PHILADELPHIA STREETS DEPARTMENT STANDARDS FOR CITY STREETS AND PENNDOT STANDARDS FOR STATE ROUTES.
4. MIN. COVER FOR THERMOPLASTIC PIPE IN ROW MUST BE 2'.
5. PLUMBERS PLUG TO MAINTAIN WATERTIGHT SEAL UNTIL CONSTRUCTION IS COMPLETE. PLUG TO BE REMOVED AT DIRECTION OF PWD. PLUG NOT TO EXTEND MORE THAN 2" OUT FROM INLET WALL.
6. UNDERDRAIN FROM SMP IS OPTIONAL AND DEPENDS ON PROJECT SPECIFIC DESIGN. WHEN INSTALLED, REFER TO STANDARD INLET WITH UNDERDRAIN CONNECTION AND SLOW RELEASE ORIFICE DETAILS AS APPLICABLE.
7. PROVIDE A MINIMUM 10" CLEARANCE FROM TOP OF CURB TO TOP OF WEIR.
8. ALL JOINTS, ADJUSTMENTS, AND PIPE CONNECTIONS MUST BE WATERTIGHT.

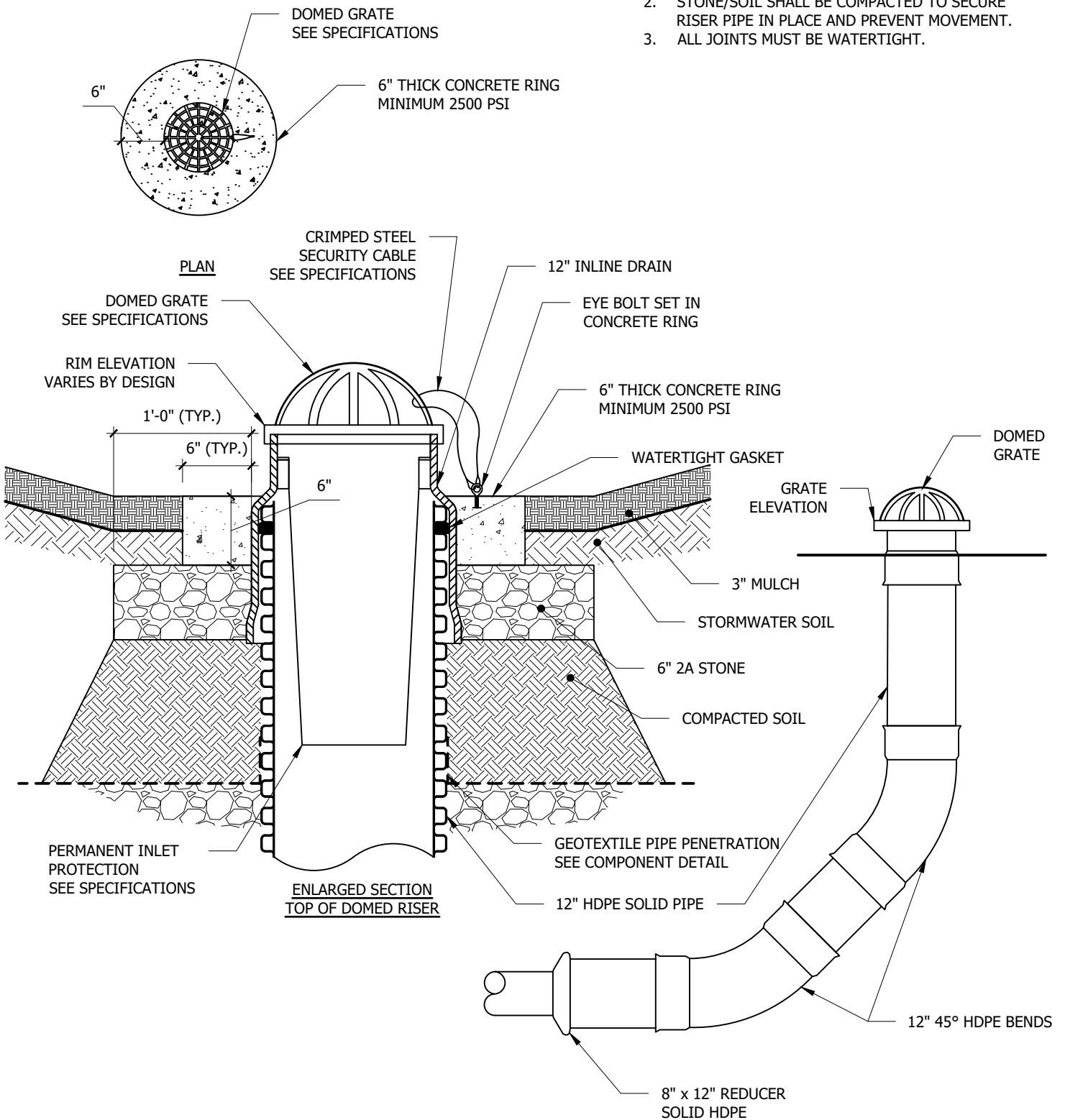


6 FOOT GREEN DUAL CATCH BASIN CITY INLET			
VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	MJD/ANJ	GREEN INLET MARKER, WEIR WALL THICKNESS, AND MIN CLEARANCE FROM WEIR TO TOP OF GRATE

# Pipe Details

**NOTES:**

1. RISER AND DISTRIBUTION PIPE SIZES MAY VARY BASED ON PROJECT SPECIFIC DESIGN. MINIMUM DIAMETERS SHOWN HERE.
2. STONE/SOIL SHALL BE COMPACTED TO SECURE RISER PIPE IN PLACE AND PREVENT MOVEMENT.
3. ALL JOINTS MUST BE WATERTIGHT.



**NOTES TO DESIGNER:**

1. DISTANCE FROM TOP OF MULCH TO RIM ELEVATION SHOULD BE MAXIMIZED, 3" MINIMUM.
2. IF LANDSCAPE CONTRACT WILL BE USED, AND USE FADED LINETYPE FOR TOP OF M

**SEE JUNE 2023 ADDENDUM FOR UPDATE**

**SECTION**



**PHILADELPHIA WATER DEPARTMENT**

1101 MARKET ST, 4TH FLOOR  
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**DOMED RISER**

VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	ANJ	REVISED TO MORE ACCURATELY MATCH SPECIFICATIONS

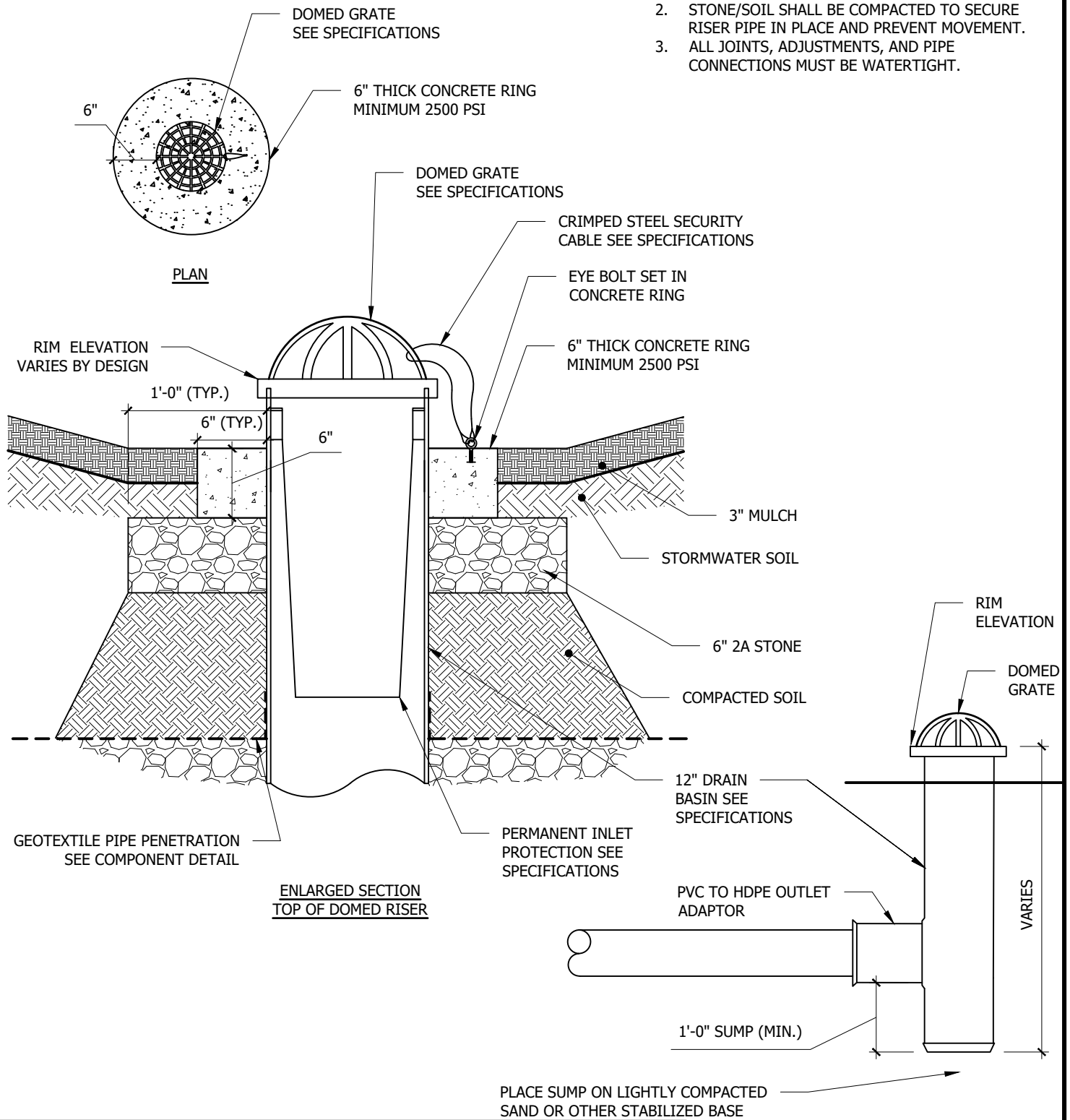
SCALE: N.T.S.

DRAWING NUMBER:

**C-14**

**NOTES:**

1. RISER AND DISTRIBUTION PIPE SIZES MAY VARY BASED ON PROJECT SPECIFIC DESIGN. MINIMUM DIAMETERS SHOWN HERE.
2. STONE/SOIL SHALL BE COMPACTED TO SECURE RISER PIPE IN PLACE AND PREVENT MOVEMENT.
3. ALL JOINTS, ADJUSTMENTS, AND PIPE CONNECTIONS MUST BE WATERTIGHT.



**NOTES TO DESIGNER:**

1. DISTANCE FROM TOP OF MULCH TO RIM ELEVATION SHOULD BE MAXIMIZED. 3" MINIMUM.
2. IF LANDSCAPE CONTRACT WILL BE USED, (SEE JUNE 2023 ADDENDUM FOR UPDATE) AND USE FADED LINETYPE FOR TOP OF MULCH.
3. 4' MAX DIFFERENCE BETWEEN RIM ELEVATION AND INVERT ELEVATION.

SEE JUNE 2023 ADDENDUM FOR UPDATE



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**DOMED RISER WITH SUMP**

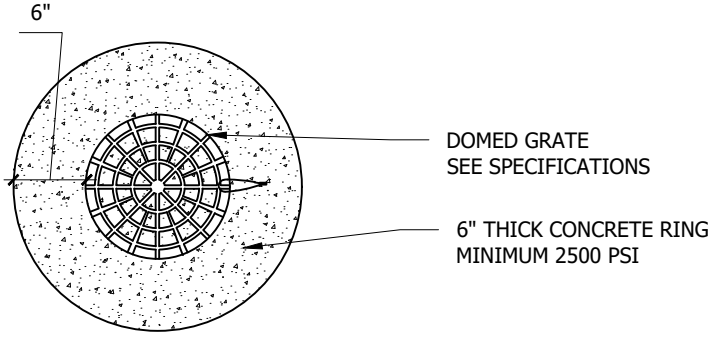
VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	ANJ	REVISED TO MORE ACCURATELY MATCH SPECIFICATIONS

SCALE: N.T.S.

DRAWING NUMBER:

**C-15**

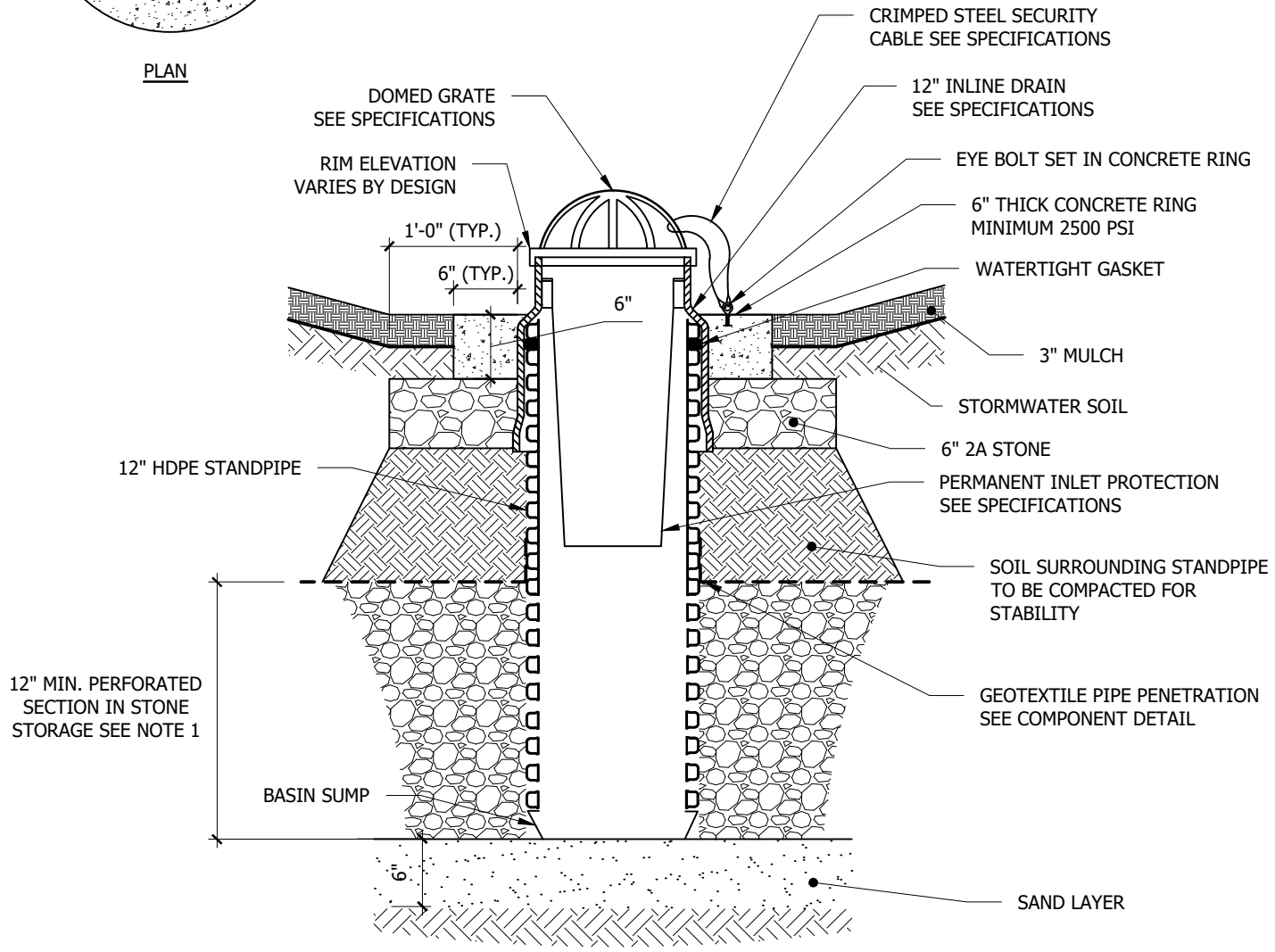




PLAN

**NOTES:**

1. STANDPIPE SHALL INCLUDE PERFORATED SECTION OPEN TO STONE TRENCH. PERFORATIONS SHALL BE 0.5" DIAMETER, 2" O/C DRILLED VERTICALLY AND RADIALLY, AND OFFSET 1" EVERY OTHER ROW.
2. STONE/SOIL SHALL BE COMPACTED TO SECURE STANDPIPE IN PLACE AND PREVENT MOVEMENT.
3. ALL JOINTS MUST BE WATERTIGHT.



**NOTES TO DESIGNER:**

1. IF THERE IS A DISTRIBUTION PIPE IN THE AREA, CONNECT TO IT WITH ANOTHER DOMED RISER TYPE.
2. FOR LARGER SYSTEMS, EVALUATE CAPACITY FOR FLOW THROUGH STANDPIPE.
3. DISTANCE FROM TOP OF MULCH TO RIM ELEVATION SHOULD BE MAXIMIZED. 3" MINIMUM.
4. IF LANDSCAPE CONTRACT WILL BE USED, CALLOUT MULCH AS "INSTALLED BY OTHERS" AND USE FADED LINETYPE FOR TOP OF MULCH.

**SEE JUNE 2023 ADDENDUM FOR UPDATE**

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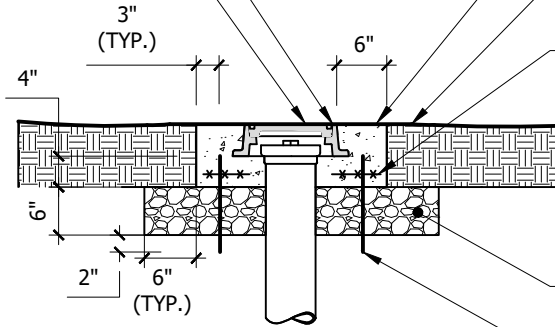
DOMED RISER STANDPIPE			
VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	DJM	FORMERLY STONE CHIMNEY

SCALE: N.T.S.

DRAWING NUMBER:  
**C-16**

PHILADELPHIA WATER  
CLEANOUT FRAME  
PHILADELPHIA WATER  
CLEANOUT COVER  
SEE COMPONENT DETAILS

6" THICK CONCRETE  
COLLAR 2500 PSI  
SOIL TO BE FLUSH WITH  
FINISHED CONCRETE  
3x3 8/8 WWM, PLACED IN  
BOTTOM THIRD OF 6"  
CONCRETE RING



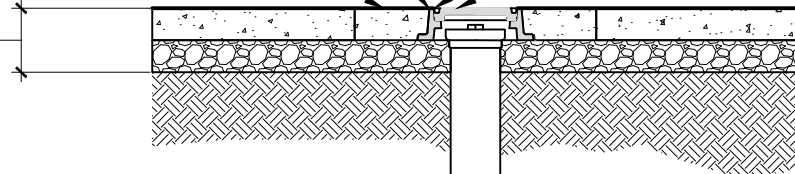
CLEANOUT IN SOIL/GRASS

AASHTO #57 STONE  
SEE NOTE 3  
5/8" DIAMETER REBAR  
(12" LENGTH, TYP.)  
SEE NOTE 4

EXPANSION JOINT  
(CONTINUOUS AROUND  
FRAME) USED AS  
NECESSARY  
CONCRETE COLLAR  
SEE NOTE 2

PHILADELPHIA WATER  
CLEANOUT FRAME  
PHILADELPHIA WATER  
CLEANOUT COVER  
SEE COMPONENT DETAILS

SURFACE  
RESTORATION  
(VARIES)



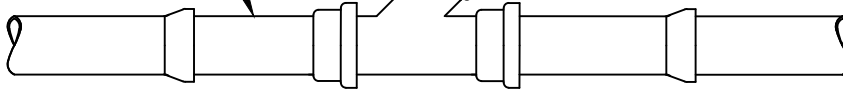
**NOTES:**

1. 8" X 6" PVC WYE JOINT FOR INLINE SECTION OR 8" 45° BEND AND 8" TO 6" PVC REDUCER FOR END SECTION.
2. CONCRETE COLLAR TO BE POURED SINGULARLY IN SOIL/GRASS OR MONOLITHICALLY WITH FOOTWAY. THE CONCRETE COLLAR MUST HAVE STONE FOOTING. EXPANSION JOINT OR CAULK MAY BE USED.
3. STORMWATER SOIL AND STONE SUBBASE SURROUNDING CLEANOUT RISER MUST BE COMPACTED TO ENSURE NO LATERAL MOVEMENT PRIOR TO PLACEMENT OF CONCRETE COLLAR.
4. PLACE THREE (3) LENGTHS OF REBAR EVENLY SPACED AROUND COLLAR, AND 3" FROM OUTER EDGE.

45° BEND

6" PVC

PROPOSED 8" UNDERDRAIN /  
DISTRIBUTION PIPE (TYP.)



CLEANOUT IN FOOTWAY



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**CLEANOUT**

VS.	DATE	INITIALS	REASON
1	09/01/2016		

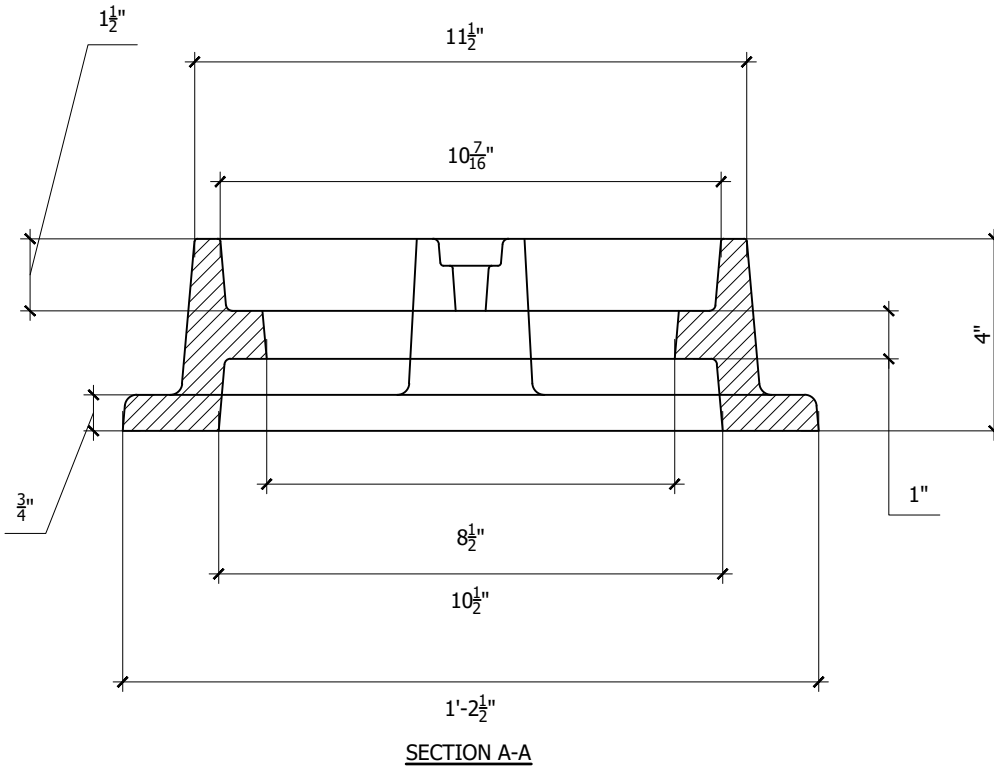
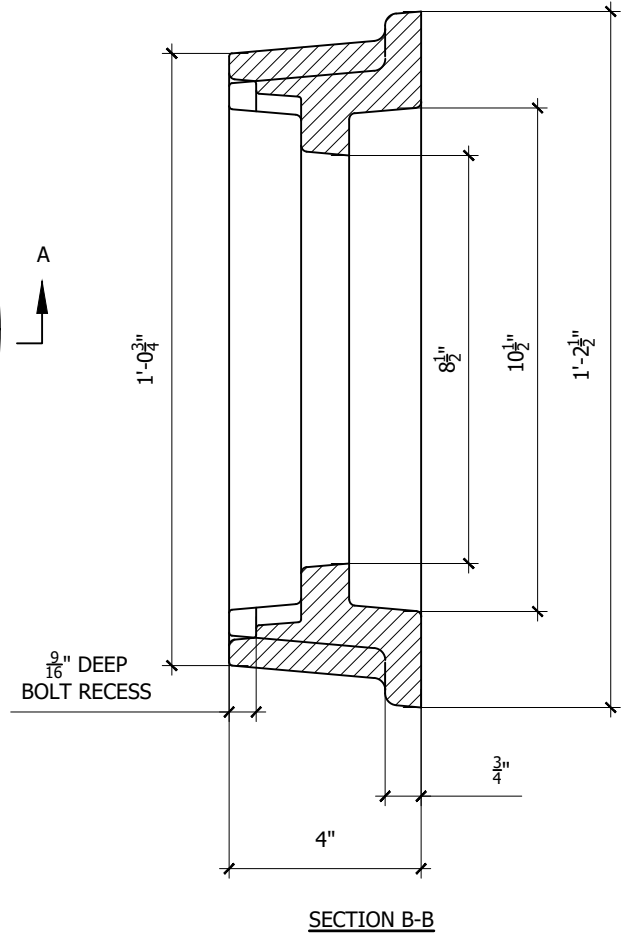
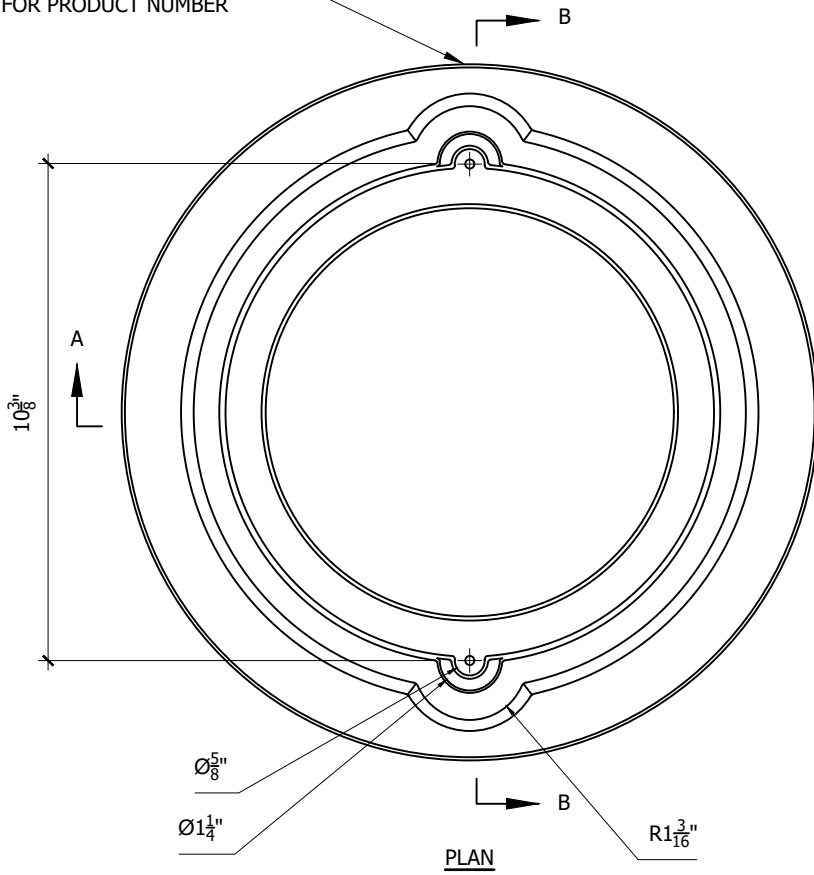
SCALE: N.T.S.

DRAWING NUMBER:

**C-17**



SEE SPECIFICATIONS  
FOR PRODUCT NUMBER



NOTES:

1. BOLTS SHALL BE STAINLESS STEEL AND LUBRICATED PRIOR TO INSTALLATION.



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PWD CLEANOUT FRAME

VS.	DATE	INITIALS	REASON
1	09/01/2016		

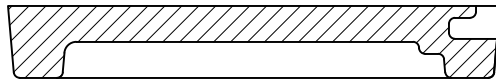
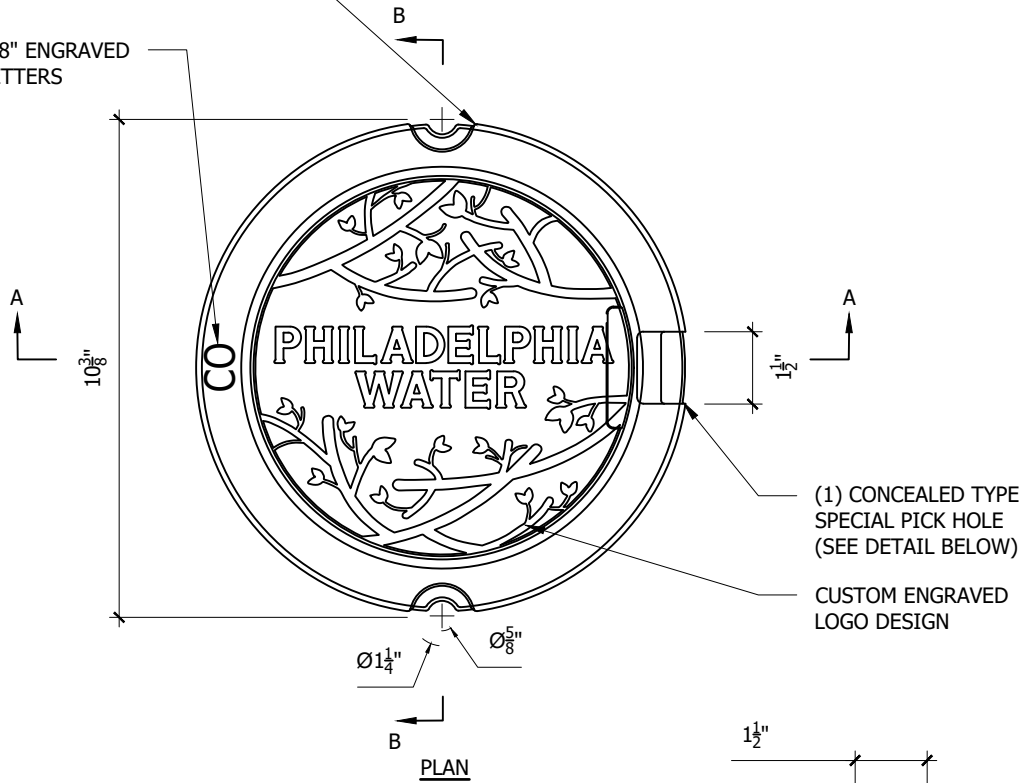
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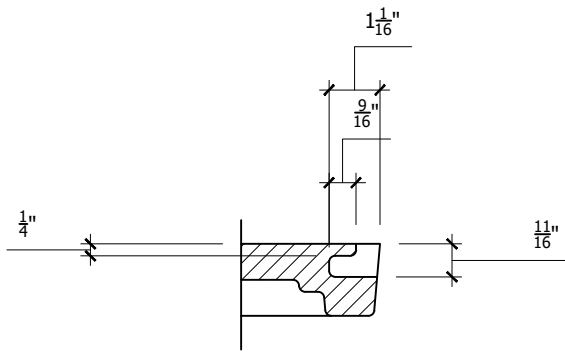
**C-18**

SEE SPECIFICATIONS FOR  
PRODUCT NUMBER

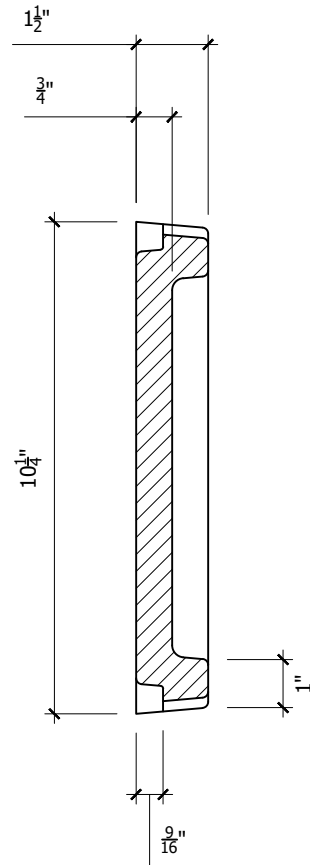
5/8" ENGRAVED  
LETTERS



SECTION A-A



CONCEALED PICKHOLE DETAIL



SECTION B-B



**PHILADELPHIA**  
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DEPARTMENT

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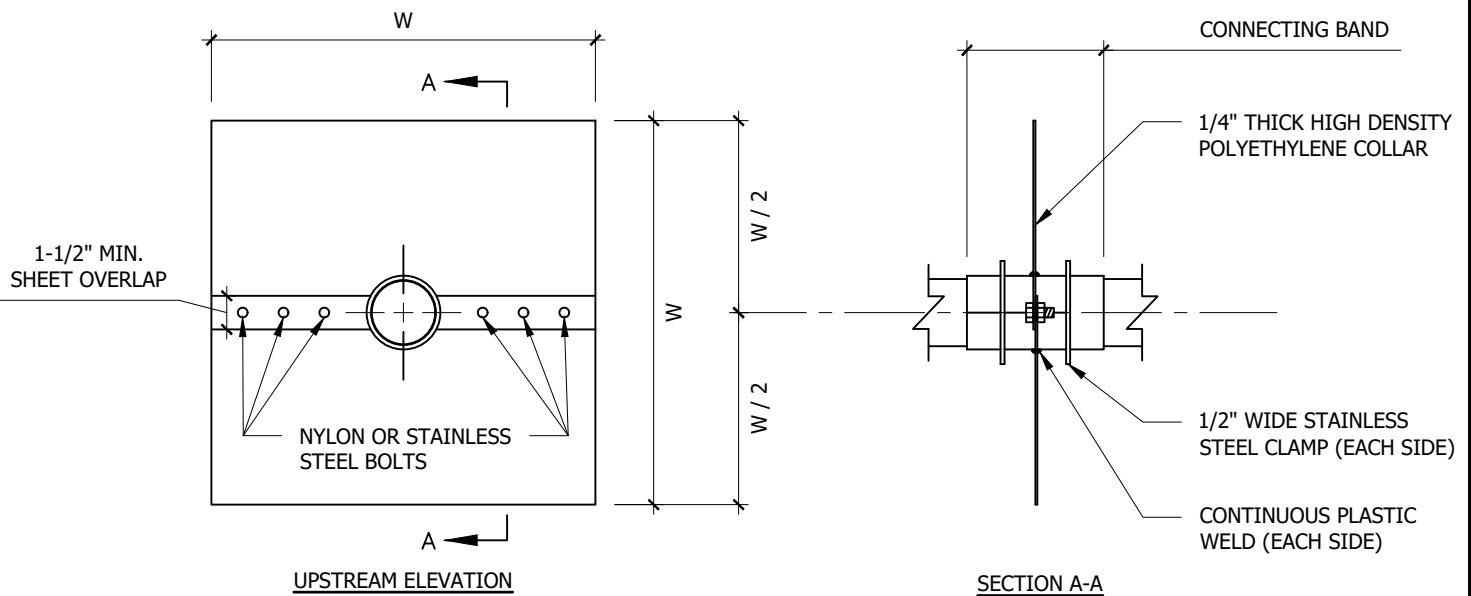
**PWD CLEANOUT LID**

VS.	DATE	INITIALS	REASON
1	09/01/2016		

SCALE: N.T.S.

DRAWING NUMBER:

**C-19**



**NOTES:**

1. CONNECTING BAND SHALL BE SEALED AT BOTH ENDS WITH CAULK OR MASTIC.
2. COLLAR MATERIAL SHALL BE RIGID POLYETHYLENE SHEET.
3. STAINLESS STEEL SHALL BE GRADE 304 OR BETTER.
4. DIMENSION "W" SHALL BE 3 TIMES THE DIAMETER OF THE INTERSECTING PIPE.
5. ONE COLLAR WITH TWO HOLES MAY BE USED WHEN CLOSE PARALLEL PIPES ARE INSTALLED.



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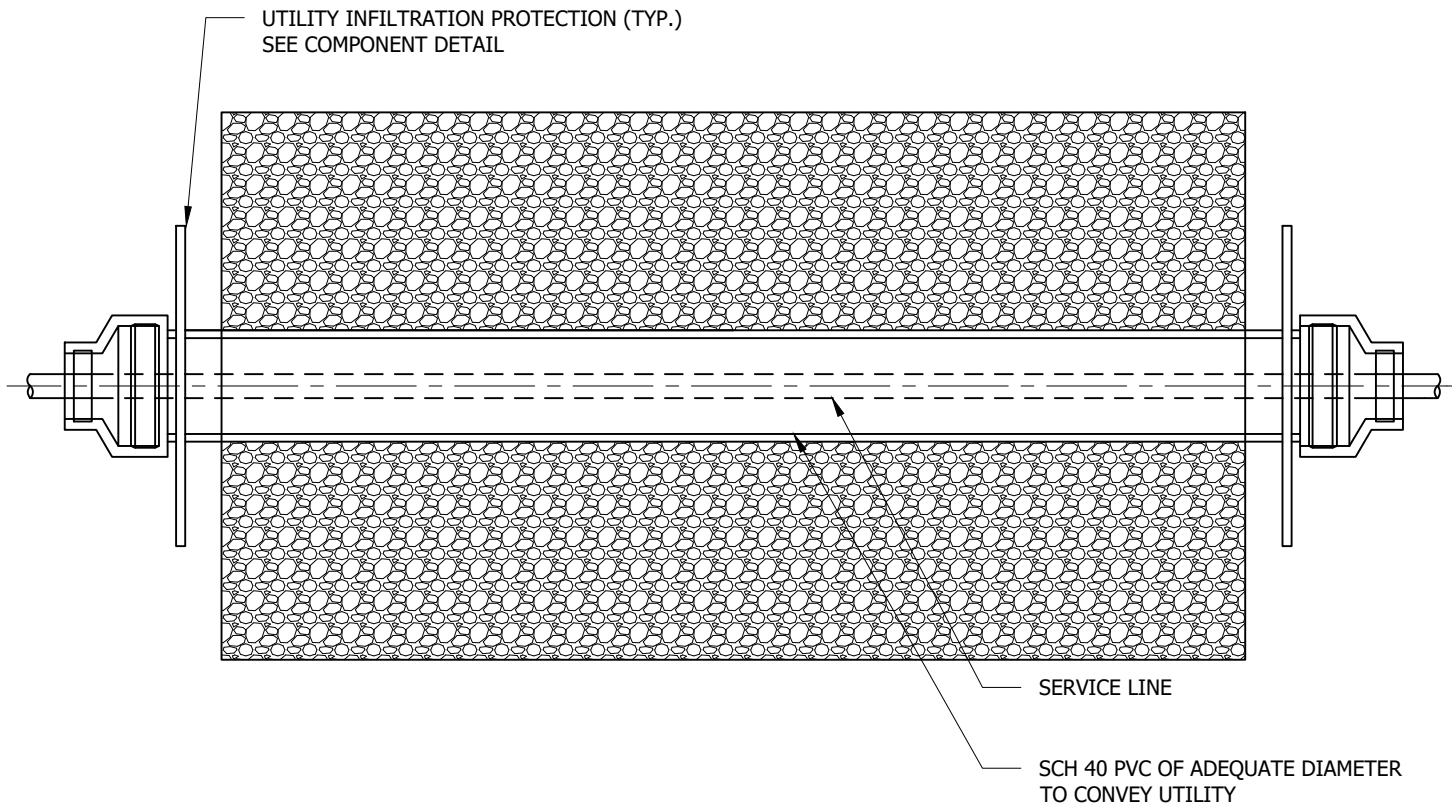
**ANTI-SEEP COLLAR**

VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	DJM	UPDATED NOTE 1 (SEAL MATERIAL) AND ADDED NOTE 5

SCALE: N.T.S.

DRAWING NUMBER:

**C-20**



NOTES:

1. SEE SPECIFICATIONS FOR UTILITY SLEEVE MANUFACTURER AND MODEL.
2. UTILITY SLEEVES FOR PREFABRICATED MODULAR STORAGE SYSTEMS SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S INSTRUCTIONS.
3. SPLIT PIPE UTILITY SLEEVES SHALL BE WATERTIGHT AND SEALED AT EITHER END WITH NON-SHRINK GROUT OR SEALANT.



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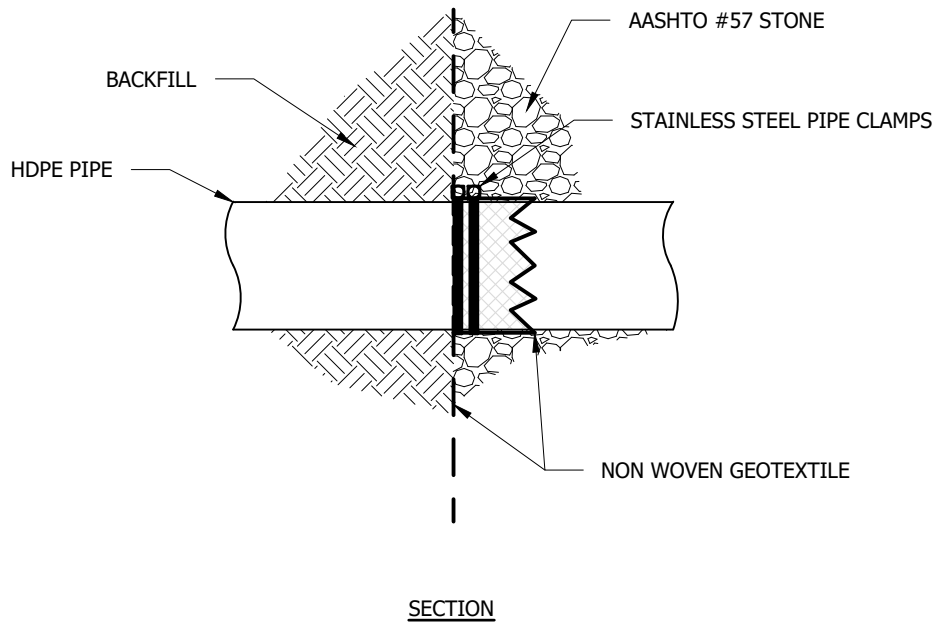
**UTILITY SLEEVE**

VS.	DATE	INITIALS	REASON
1	09/01/2016		

SCALE: N.T.S.

DRAWING NUMBER:

**C-21**



NOTES:

1. THIS DETAIL APPLIES TO ALL PIPE PENETRATIONS THROUGH GEOTEXTILE LINER, EXCEPT WHERE ANTI-SEEP COLLAR IS PLACED AT THE PENETRATION. SEE PLANS FOR LOCATION AND PIPE SIZE/MATERIAL.
2. CUT ASTERISK SHAPE IN GEOTEXTILE FOR PIPE OPENING AND PLACE STEEL CLAMP OVER UNCUT PORTION OF GEOTEXTILE SO THERE ARE NO GAPS BETWEEN CLEAN-WASHED STONE AND BACKFILL. SOME BUNCHING OF GEOTEXTILE AROUND PIPE IS ACCEPTABLE.
3. CLAMPS MAY BE PLACED ON EITHER THE AASHTO #57 STONE OR BACKFILL SIDE OF THE GEOTEXTILE.



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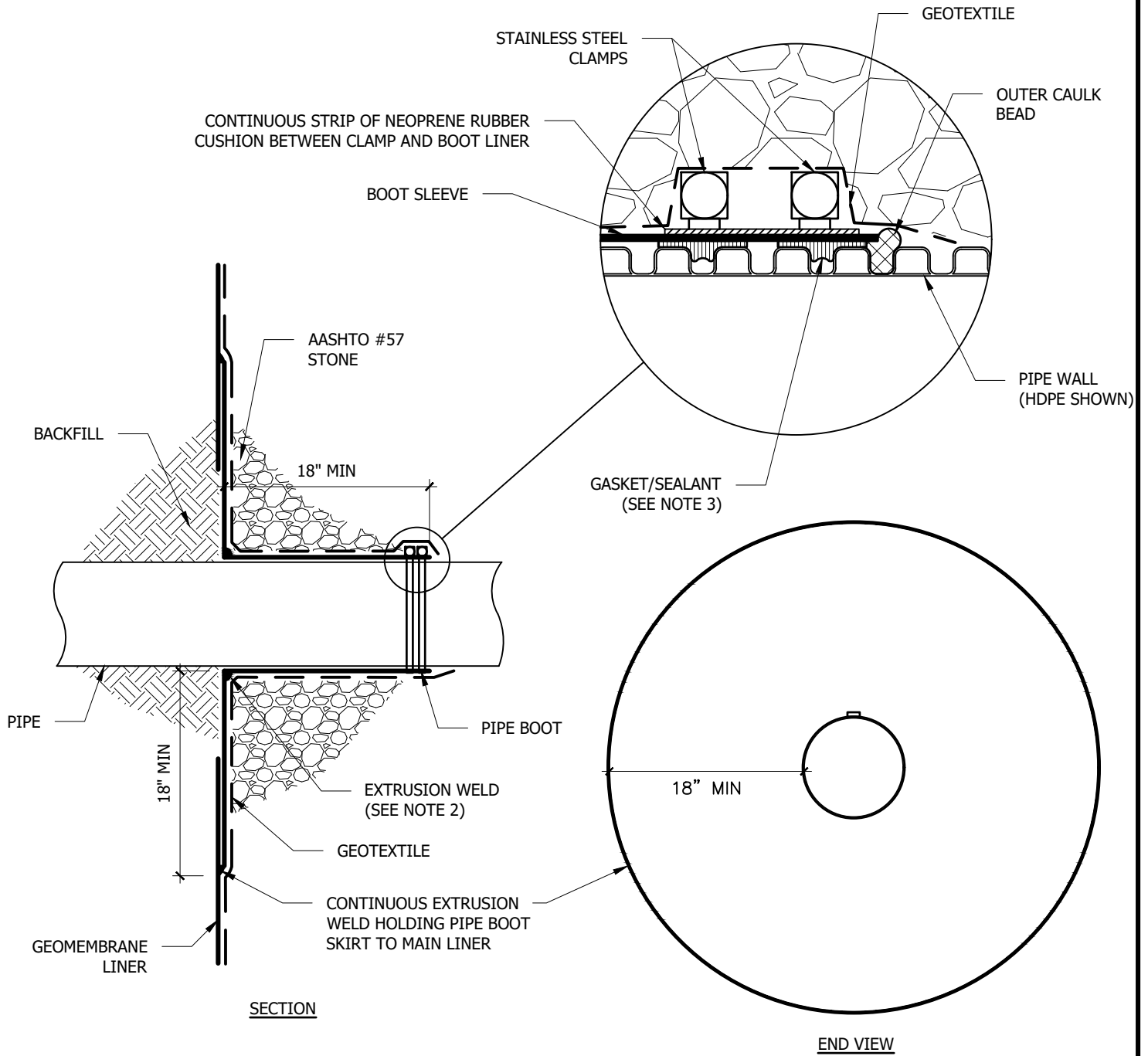
**GEOTEXTILE PIPE PENETRATION**

VS.	DATE	INITIALS	REASON
1	06/01/2018	ANJ/DJM	

SCALE: N.T.S.

DRAWING NUMBER:

**C-22**



**NOTES:**

1. THIS DETAIL APPLIES TO ALL PIPE PENETRATIONS THROUGH GEOMEMBRANE LINER. SEE PLANS FOR LOCATION, PIPE SIZE, PIPE MATERIAL, AND PIPE ANGLE.
2. WELD CONNECTING PIPE BOOT TO SKIRT NOT NECESSARY IF PREFABRICATED.
3. FOR CORRUGATED PIPE, INSERT PIPE ADAPTERS TO CREATE SMOOTH SURFACE FOR CLAMPS.



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**GEOMEMBRANE PIPE PENETRATION**

VS.	DATE	INITIALS	REASON
1	06/01/2018	ANJ/DJM	

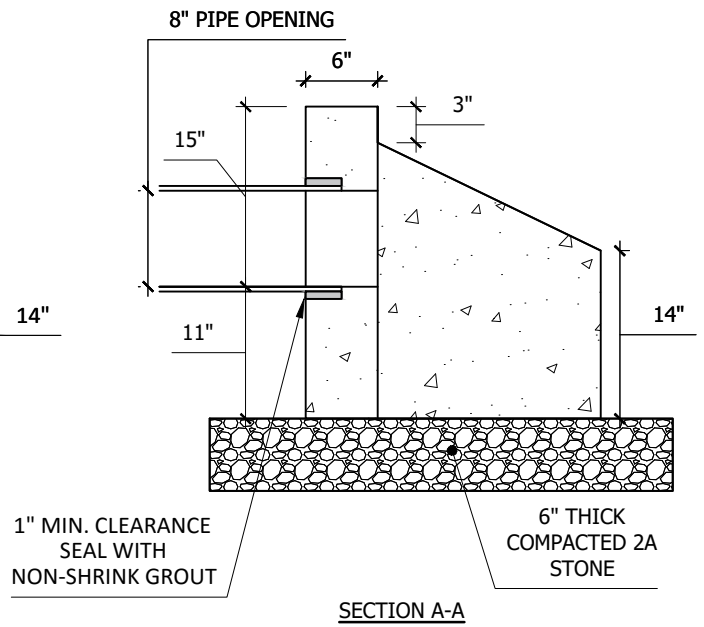
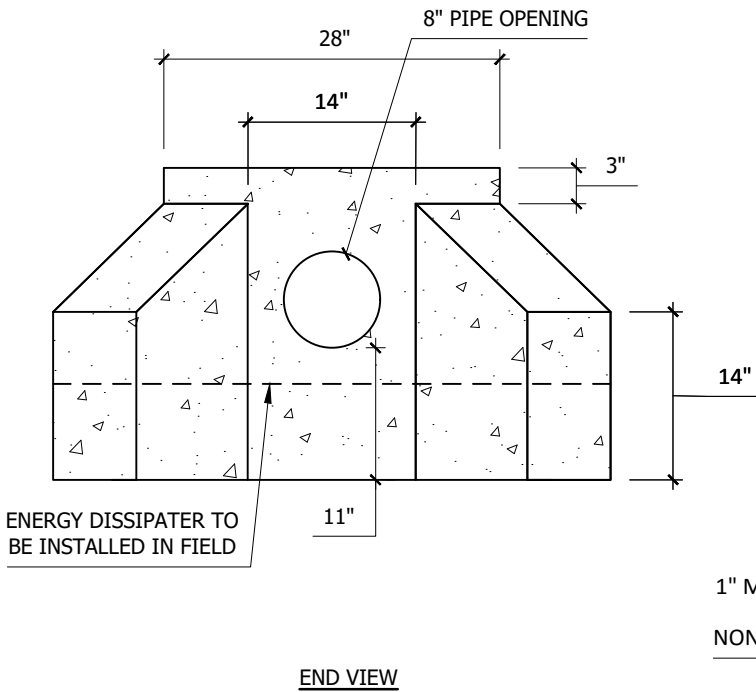
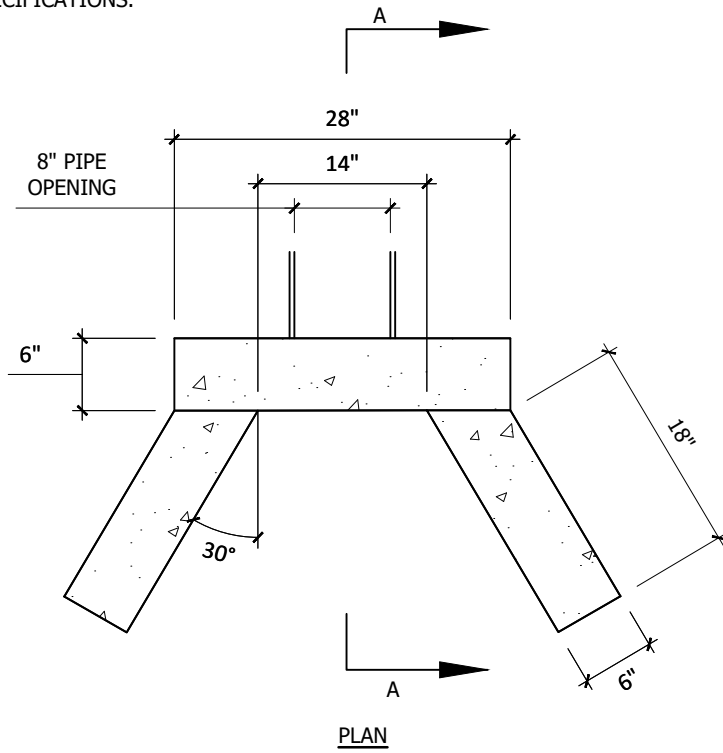
SCALE: N.T.S.

DRAWING NUMBER:

**C-23**

**NOTES:**

1. CONCRETE TO BE 3500 PSI AIR ENTRAINED.
2. REINFORCED WITH 4x4-W4.0xW4.0 WELDED WIRE FABRIC CONFORMING TO ASTM A1064.
3. ENERGY DISSIPATER TO BE INSTALLED IN FIELD. SEE COMPONENT DETAIL.
4. INSTALL PIPE PROTECTION PER SPECIFICATIONS.



**NOTE TO DESIGNER:**

1. PIPE OPENING INVERT IS SHOWN ABOVE ENERGY DISSIPATER BECAUSE ELEVATION DROP HELPS WITH ENERGY DISSIPATION. 3" ELEVATION DIFFERENCE IS RECOMMENDED, BUT MAY VARY ON INDIVIDUAL PROJECTS. SPECIFY ELEVATION OF PIPE INVERT AND ENERGY DISSIPATER ON PLANS.



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**CONCRETE ENDWALL FOR 8 INCH PIPE**

VS.	DATE	INITIALS	REASON
1	06/01/2018	JWB/DJM	

SCALE: N.T.S.

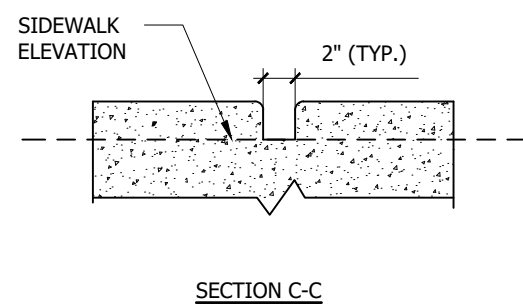
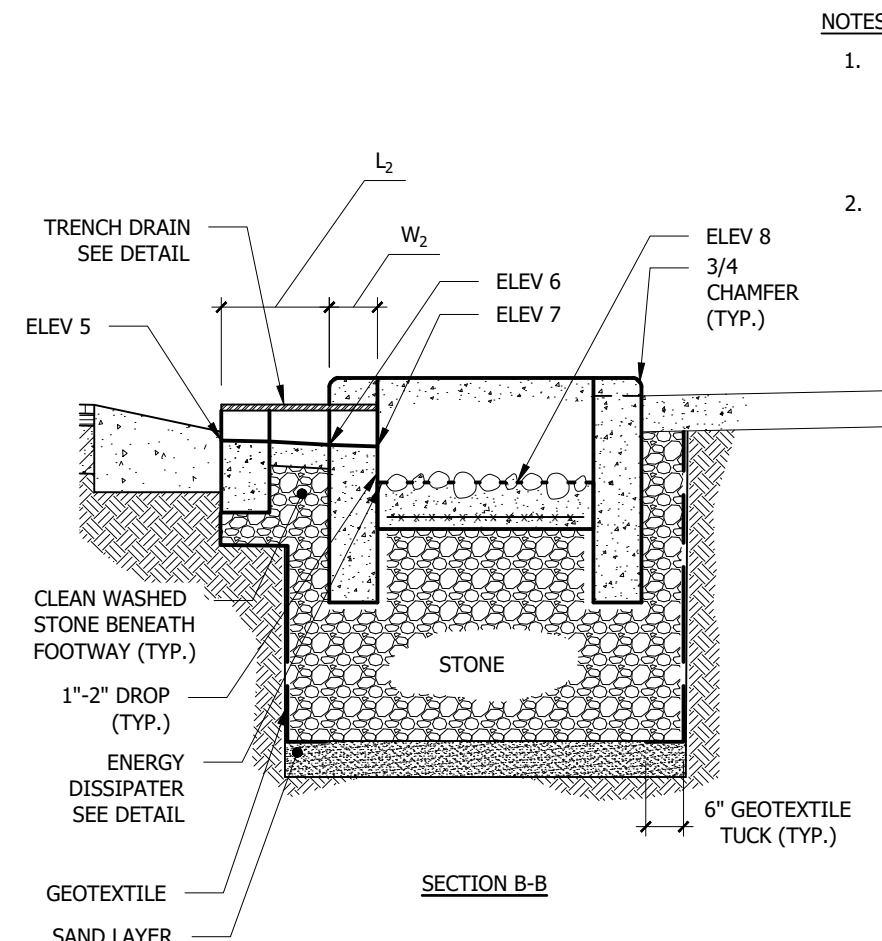
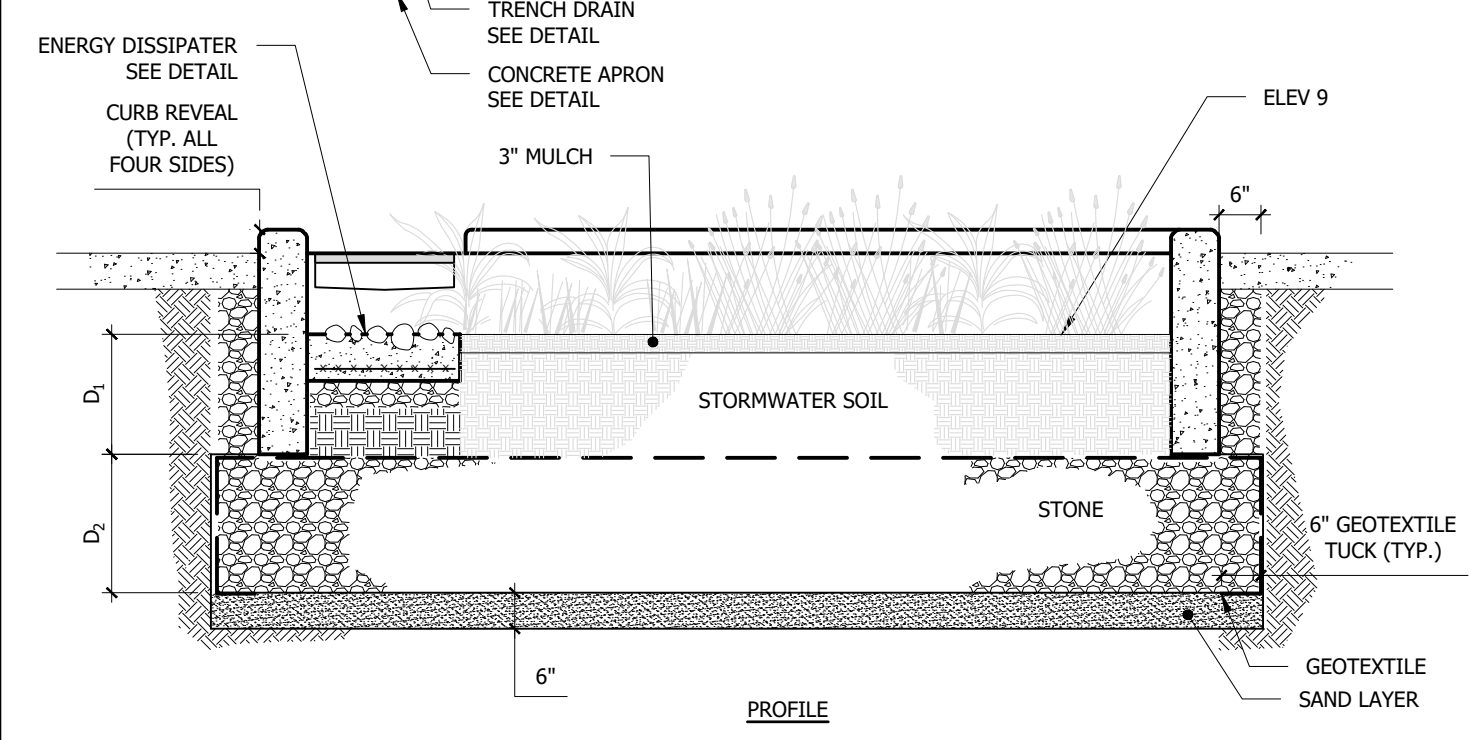
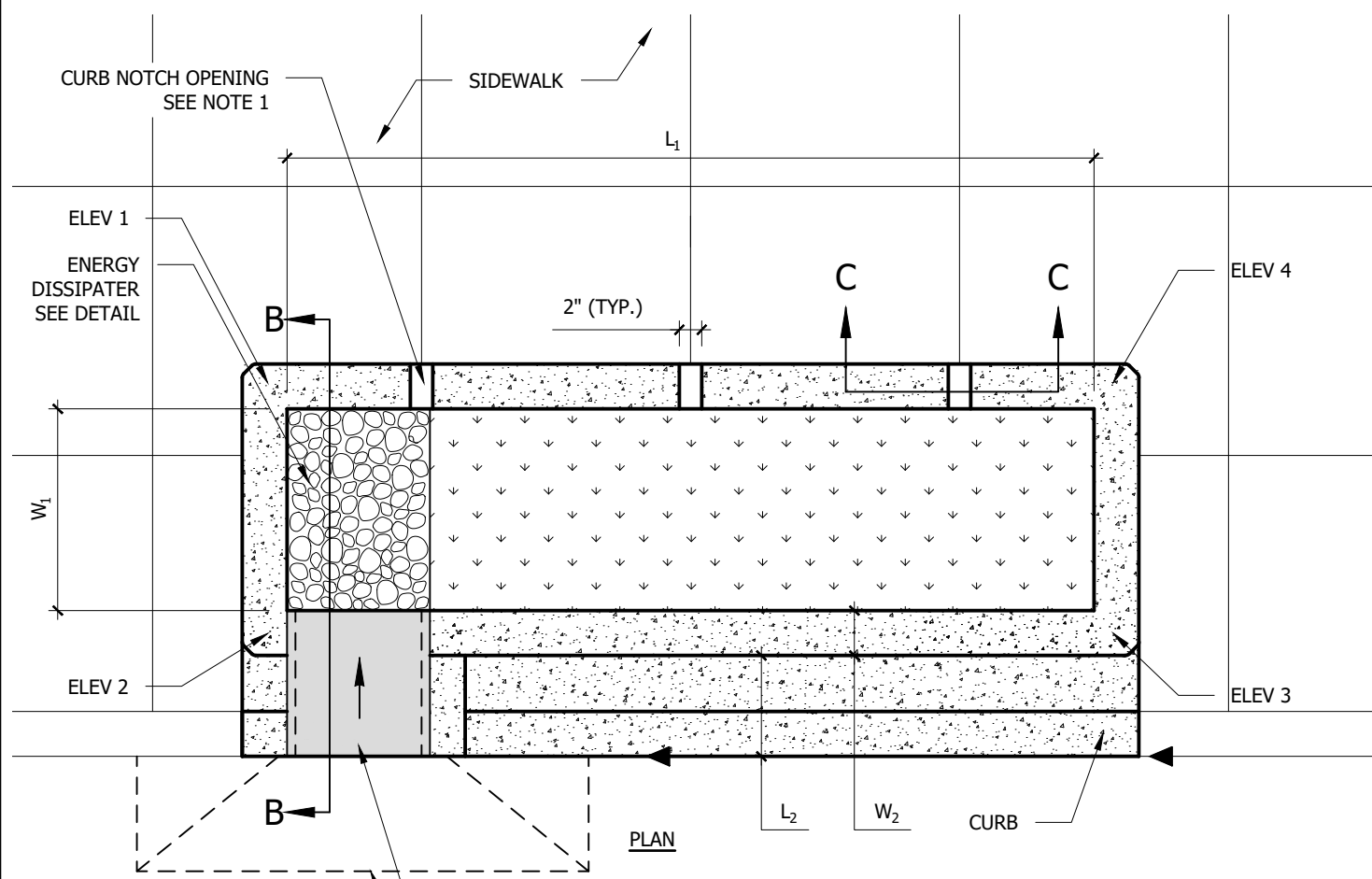
DRAWING NUMBER:

**C-24**

# OF #

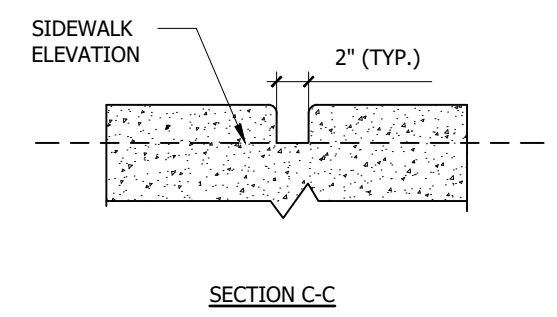
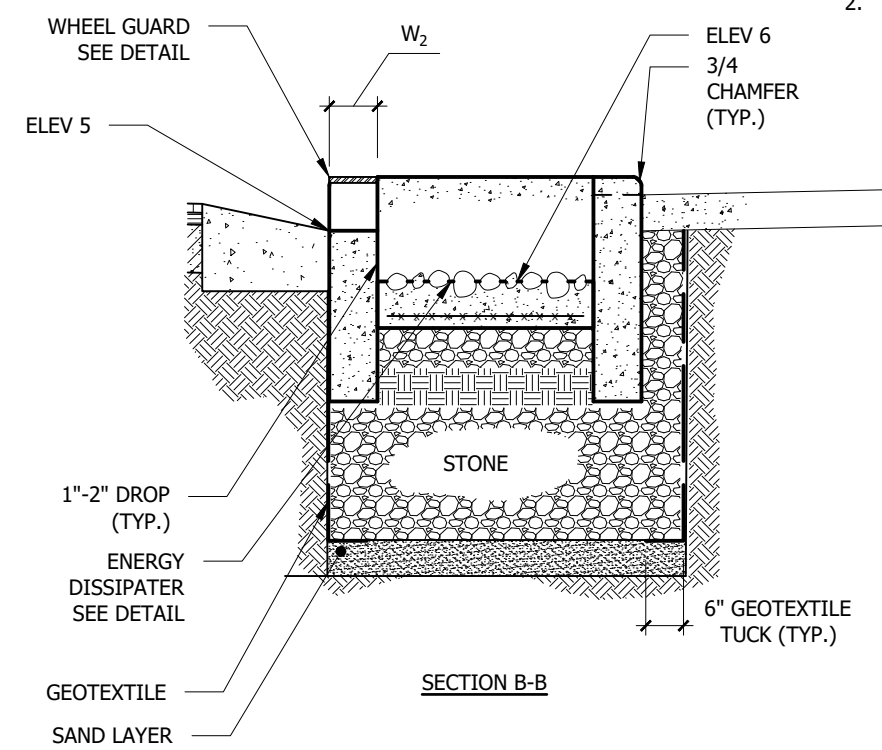
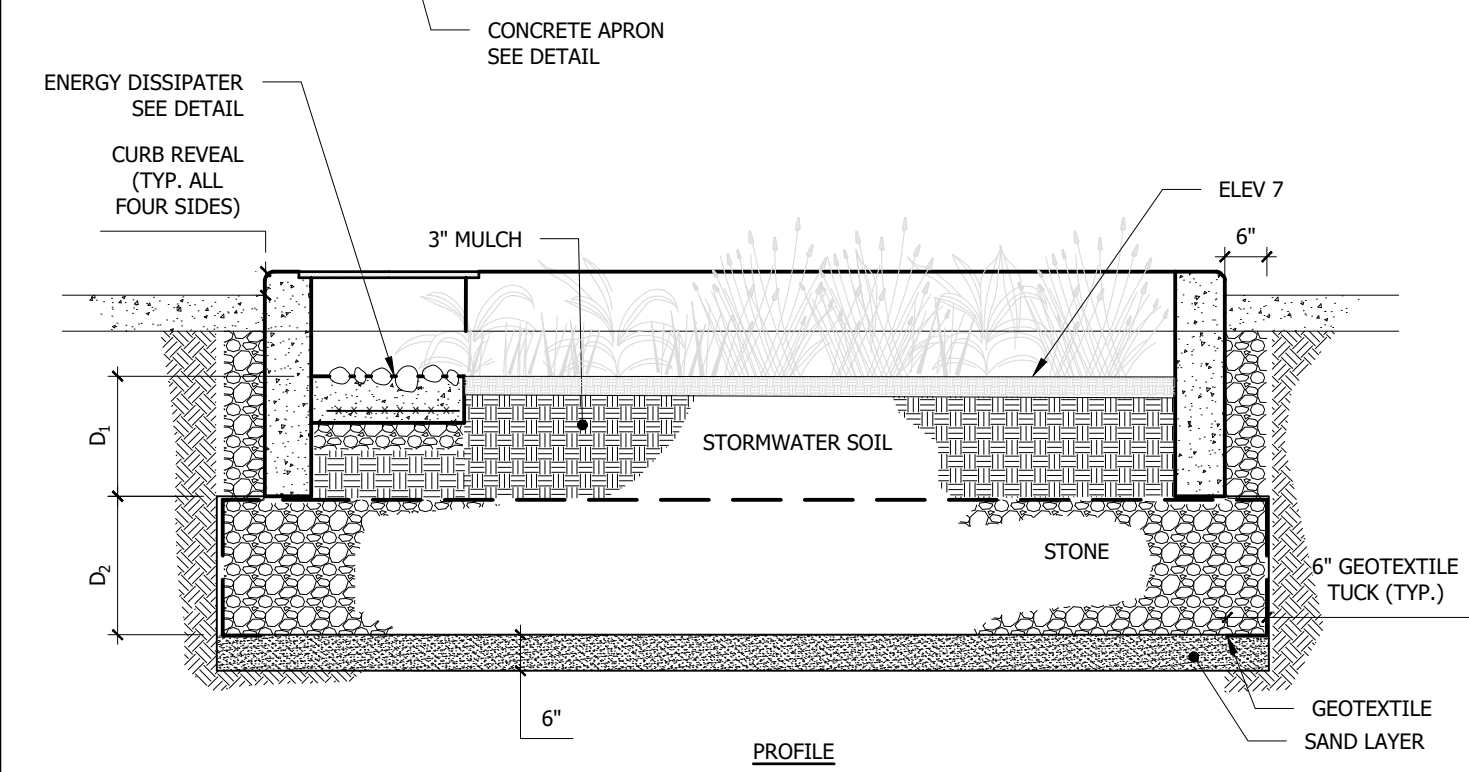
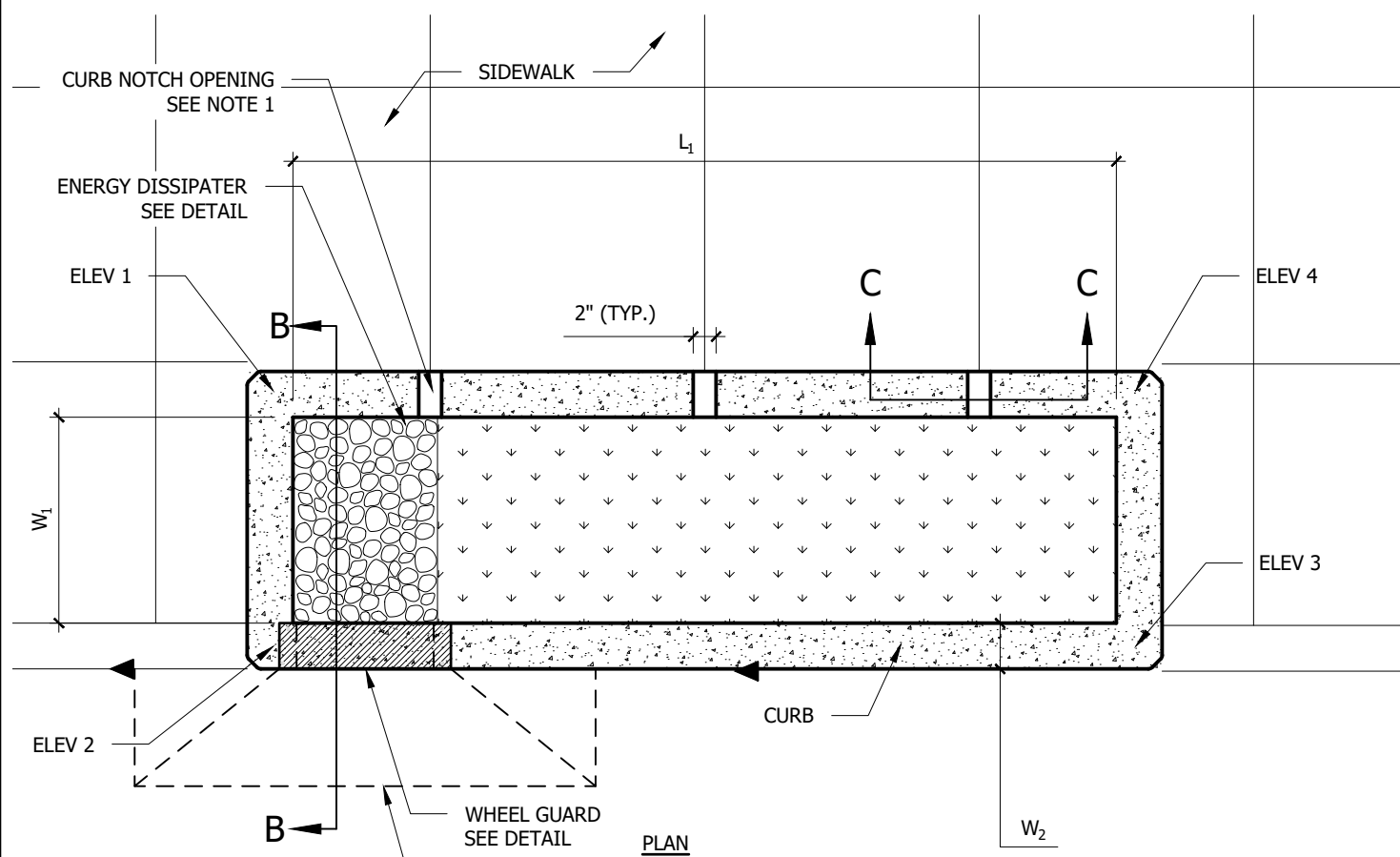
## SMP Details





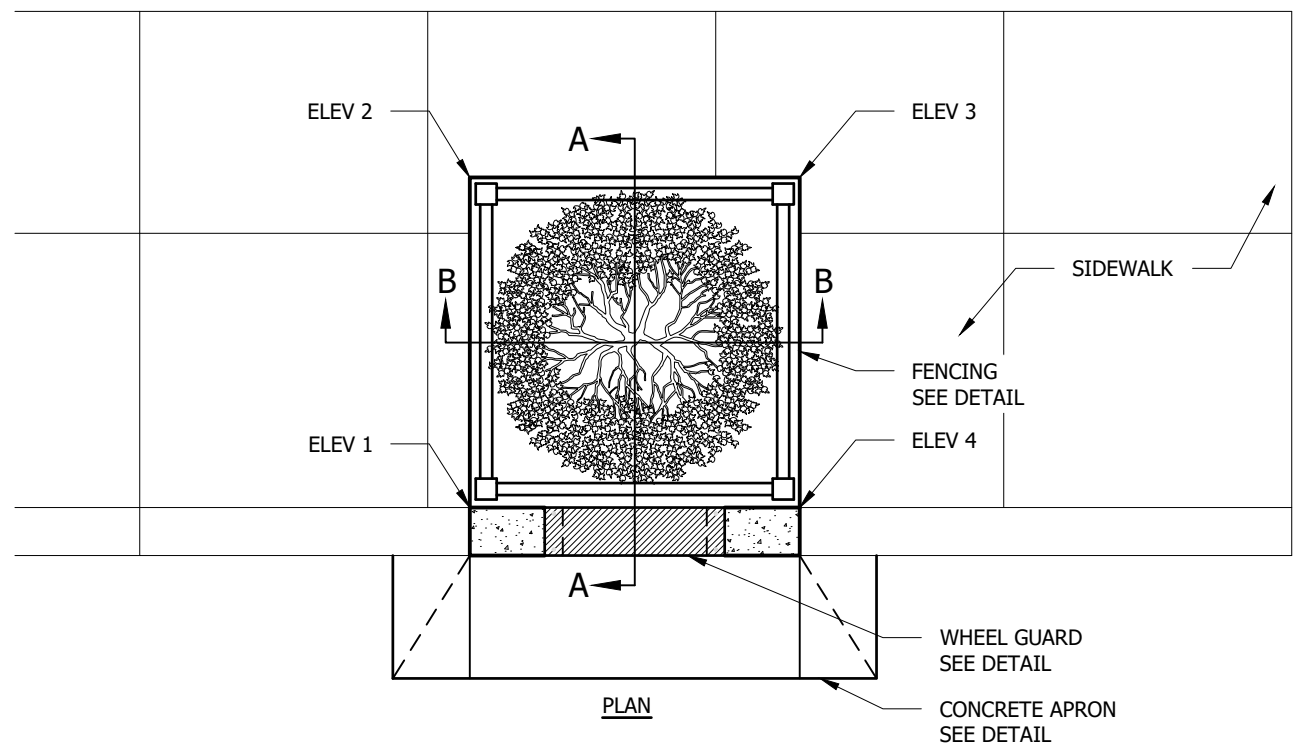
- NOTES TO DESIGNER:**
1. NOTCHES IN THE PLANTER WALL SHOULD BE SIZED AND SPACED AS REQUIRED TO PREVENT PONDING ON THE SIDEWALK ADJACENT TO THE PLANTER. IT IS RECOMMENDED THAT NOTCHES BE CAST-IN-PLACE RATHER THAN SAW-CUT.
  2. IN ORDER TO ADD THIS DETAIL TO PLANS, ADD PERTINENT DESIGN INFORMATION TO TABLE AND UPDATE REFERENCES TO SPECIFIC DETAILS.

PLANTER NO.	PLANTER WALL ELEVATIONS				TRENCH DRAIN ELEVATIONS			ENERGY DISSIPATOR ELEVATION	SOIL ELEVATION	PLANTER LENGTH	PLANTER WIDTH	TRENCH DRAIN LENGTH	CURB WIDTH	SOIL DEPTH	STONE DEPTH
	ELEV 1 (FT)	ELEV 2 (FT)	ELEV 3 (FT)	ELEV 4 (FT)	ELEV 5 (FT)	ELEV 6 (FT)	ELEV 7 (FT)	ELEV 8 (FT)	ELEV 9 (FT)	L <sub>1</sub> (FT)	W <sub>1</sub> (FT)	L <sub>2</sub> (FT)	W <sub>2</sub> (FT)	D <sub>1</sub> (FT)	D <sub>2</sub> (FT)



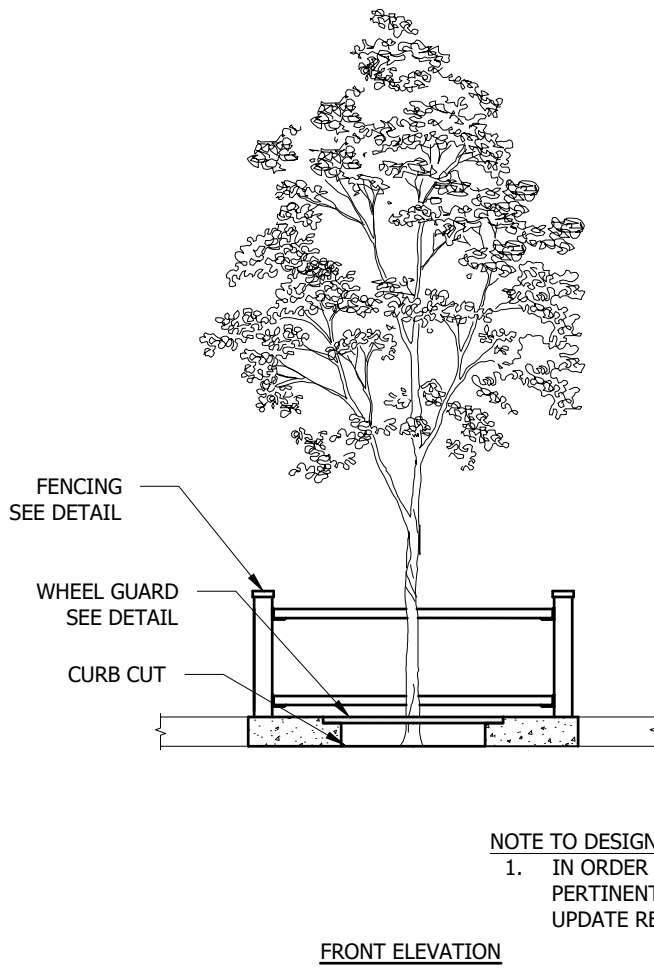
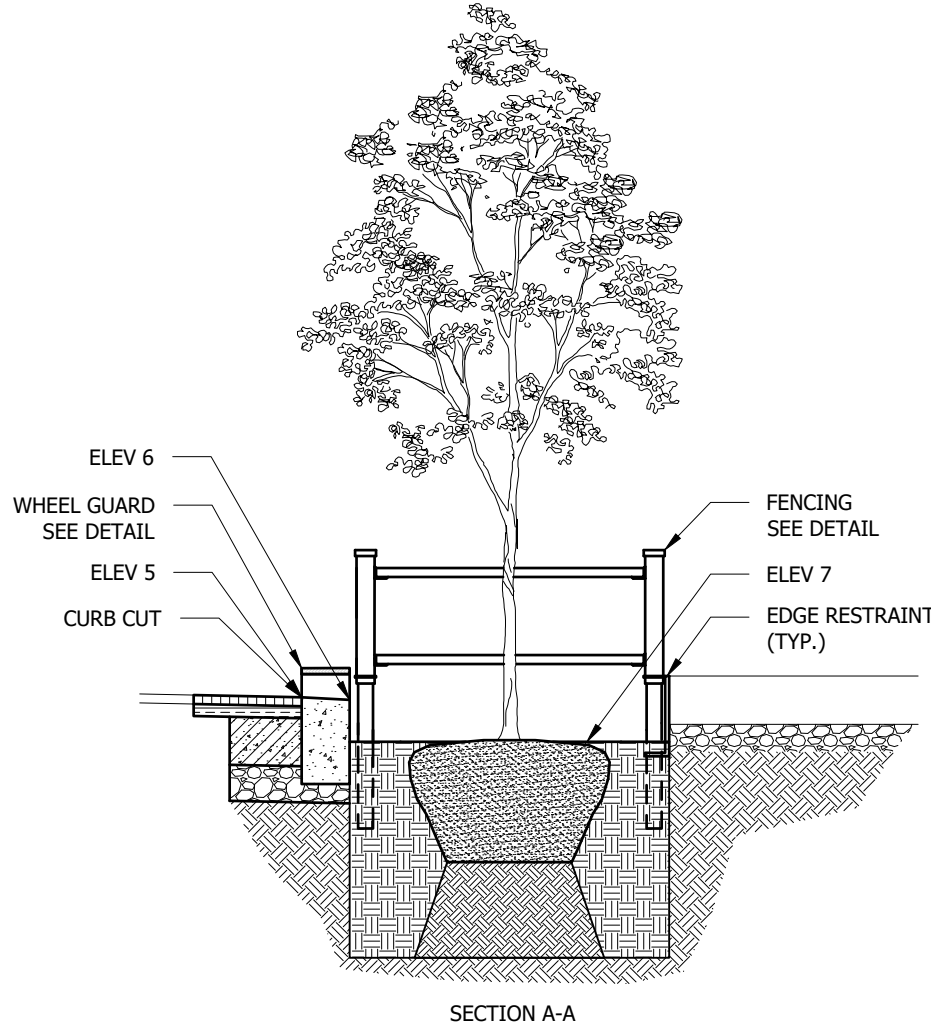
- NOTES TO DESIGNER:**
1. NOTCHES IN THE PLANTER WALL SHOULD BE SIZED AND SPACED AS REQUIRED TO PREVENT PONDING ON THE SIDEWALK ADJACENT TO THE PLANTER. IT IS RECOMMENDED THAT NOTCHES BE CAST-IN-PLACE RATHER THAN SAW-CUT.
  2. IN ORDER TO ADD THIS DETAIL TO PLANS, ADD PERTINENT DESIGN INFORMATION TO TABLE AND UPDATE REFERENCES TO SPECIFIC DETAILS.

PLANTER NO.	PLANTER WALL ELEVATIONS				PLANTER BOX INLET ELEVATION	ENERGY DISSIPATOR ELEVATION	SOIL ELEVATION	PLANTER LENGTH	PLANTER WIDTH	CURB WIDTH	SOIL DEPTH	STONE DEPTH
	ELEV 1 (FT)	ELEV 2 (FT)	ELEV 3 (FT)	ELEV 4 (FT)								

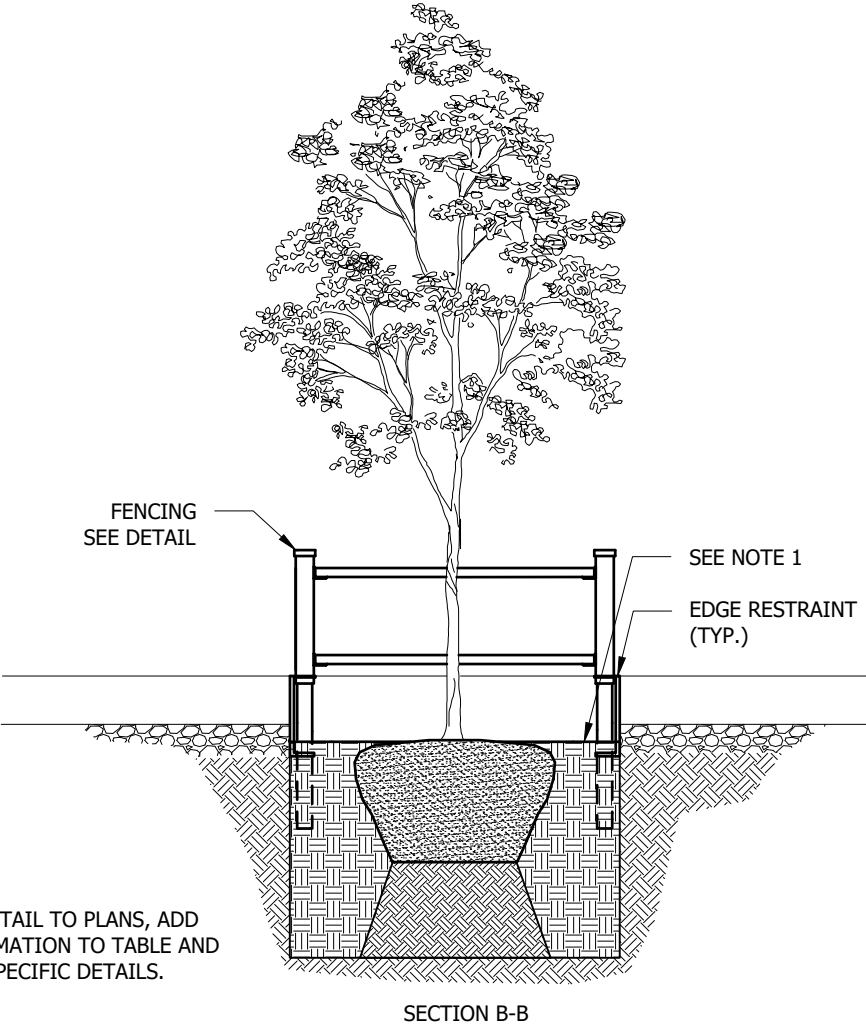


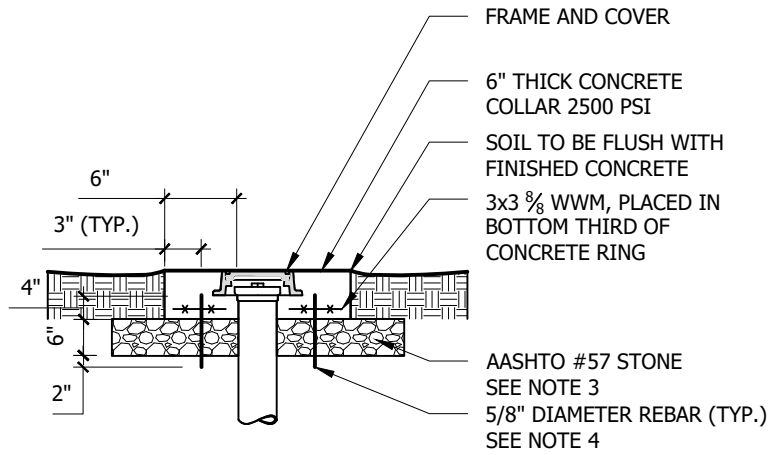
TREE NO.	ADJACENT PAVEMENT ELEVATIONS				CURB CUT ELEVATION		SOIL ELEVATION	TREE PIT LENGTH	TREE PIT WIDTH	CURB CUT LENGTH	SOIL DEPTH
	ELEV 1 (FT)	ELEV 2 (FT)	ELEV 3 (FT)	ELEV 4 (FT)	ELEV 5 (FT)	ELEV 6 (FT)	ELEV 7 (FT)	L <sub>1</sub> (FT)	W <sub>1</sub> (FT)	L <sub>2</sub> (FT)	D <sub>1</sub> (FT)

**NOTE:**  
 1. GRADE SOIL TO ENSURE SIDEWALK SUBGRADE IS NOT EXPOSED (ALL SIDES).



**NOTE TO DESIGNER:**  
 1. IN ORDER TO ADD THIS DETAIL TO PLANS, ADD PERTINENT DESIGN INFORMATION TO TABLE AND UPDATE REFERENCES TO SPECIFIC DETAILS.

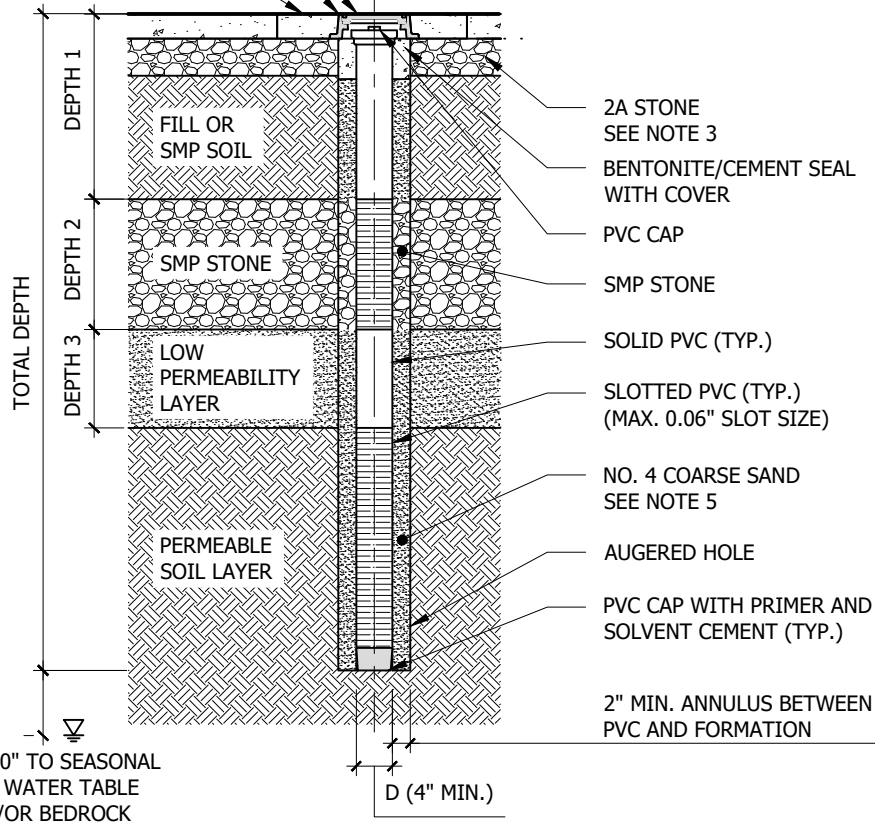




**INFILTRATION COLUMN IN SOIL/GRASS**

COLUMN NO.	D (IN)	PVC SLOT SIZE (IN)	SAND SIEVE SIZE (IN)	DEPTH 1 (FT)	DEPTH 2 (FT)	DEPTH 3 (FT)	TOTAL DEPTH (FT)	FRAME AND GRATE PRODUCT

FRAME AND COVER  
EXPANSION JOINT USED AS NECESSARY  
CONCRETE COLLAR SEE NOTE 2



**INFILTRATION COLUMN IN PAVED AREA**

**NOTES:**

- COVER SHALL BE SECURED IN CONCRETE SURROUND IF NOT OTHERWISE SECURED BY SURFACE RESTORATION.
- CONCRETE COLLAR TO BE POURED SINGULARLY IN SOIL/GRASS OR MONOLITHICALLY WITH FOOTWAY. THE CONCRETE COLLAR MUST HAVE STONE FOOTING. EXPANSION JOINT OR CAULK MAY BE USED.
- STORMWATER SOIL AND STONE SUBBASE SURROUNDING CLEANOUT RISER MUST BE COMPACTED TO ENSURE NO LATERAL MOVEMENT PRIOR TO PLACEMENT OF CONCRETE COLLAR.
- FOR INFILTRATION COLUMNS IN SOIL/GRASS, PLACE THREE (3) LENGTHS OF REBAR EVENLY SPACED AROUND COLLAR, AND 3" FROM OUTER EDGE.
- A FINER SAND AND NARROWER SLOT SIZE MAY BE SPECIFIED AS NEEDED TO PREVENT MIGRATION OF FINES FROM THE SURROUNDING FORMATION.



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**INFILTRATION COLUMN**

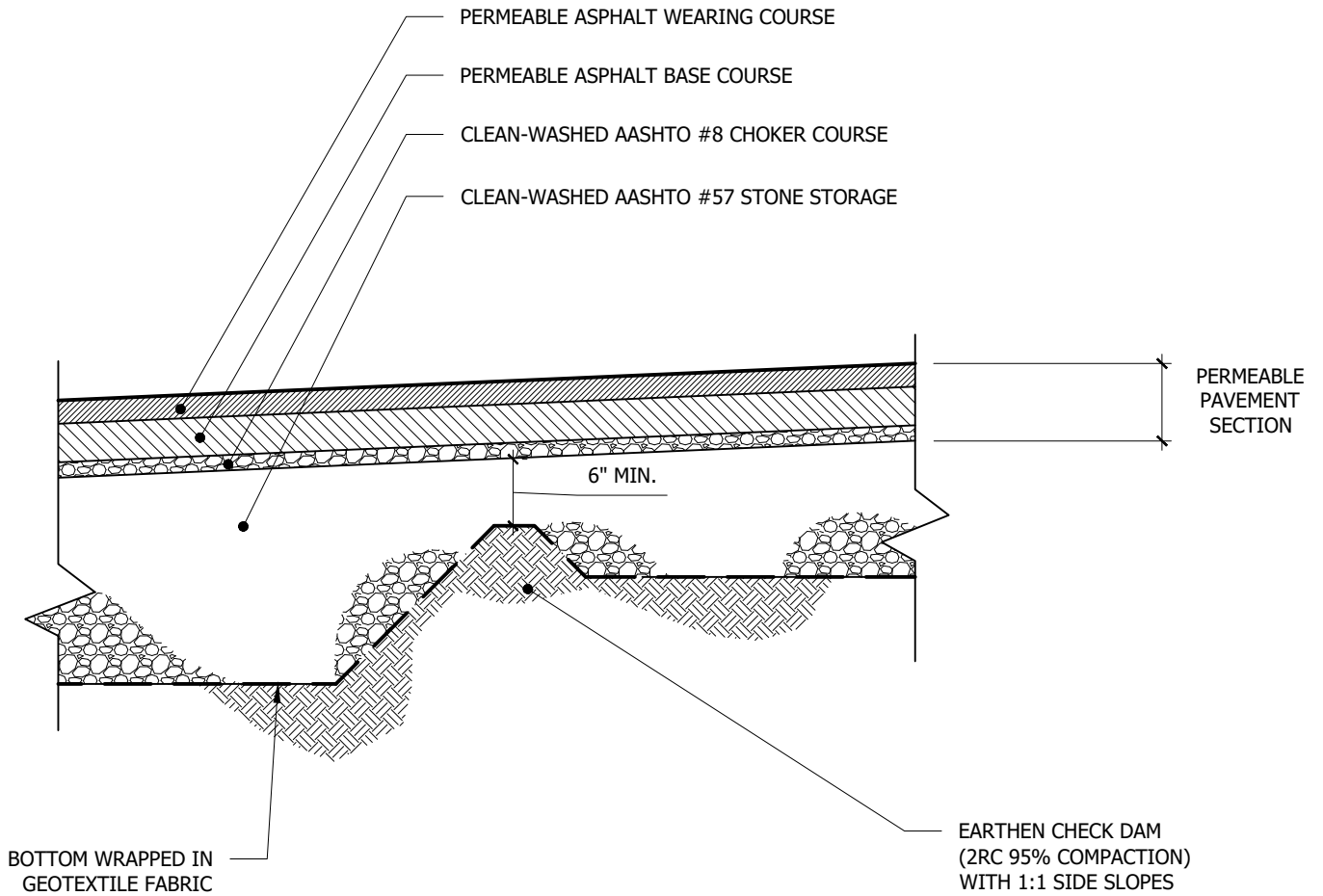
VS.	DATE	INITIALS	REASON
1	09/01/2016		

SCALE: N.T.S.

DRAWING NUMBER:

**C-28**





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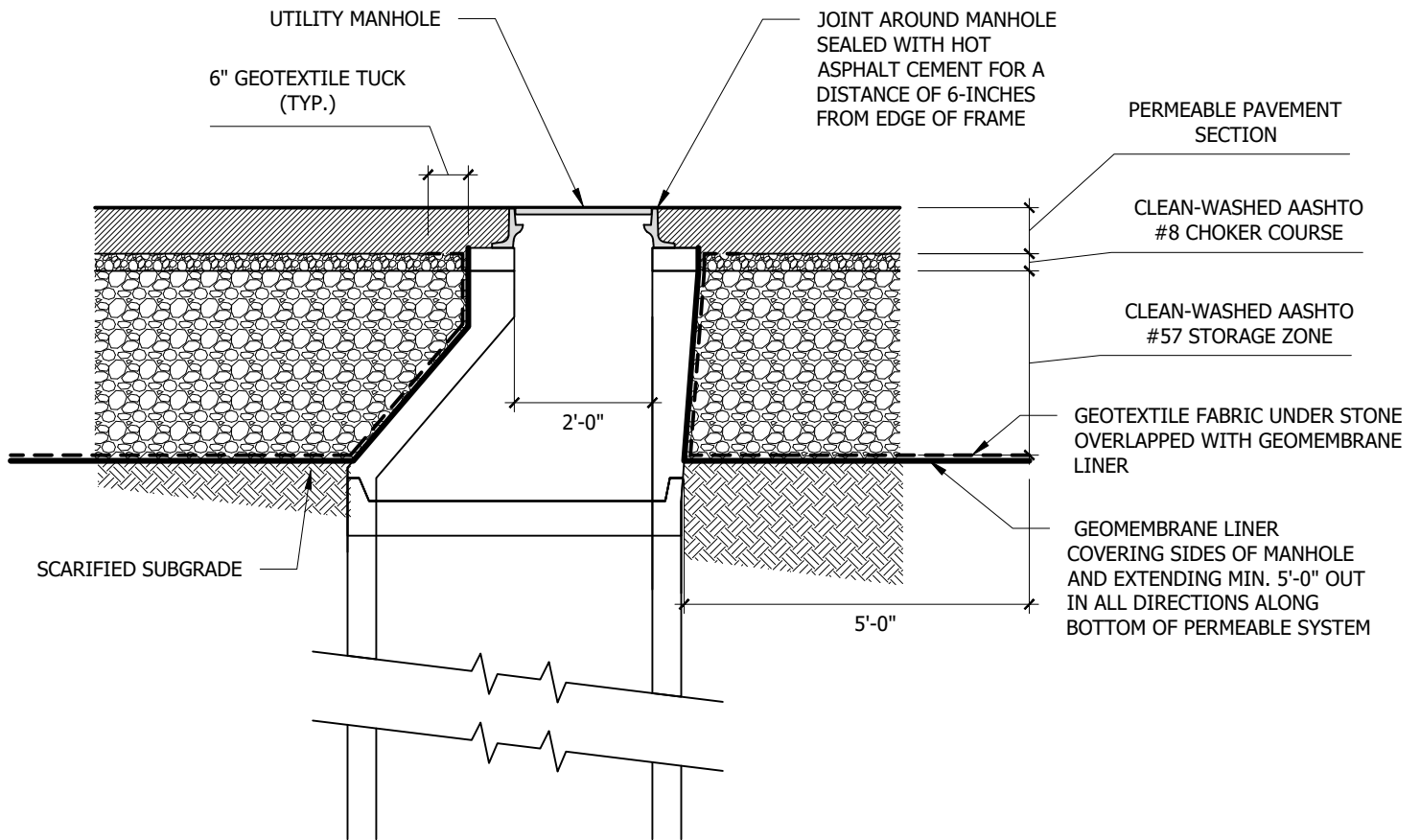
**PERMEABLE ASPHALT SECTION AT EARTHEN CHECK DAM**

VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	ANJ	UPDATED EARTHEN CHECK DAM, REMOVED SAND LAYER

SCALE: N.T.S.

DRAWING NUMBER:

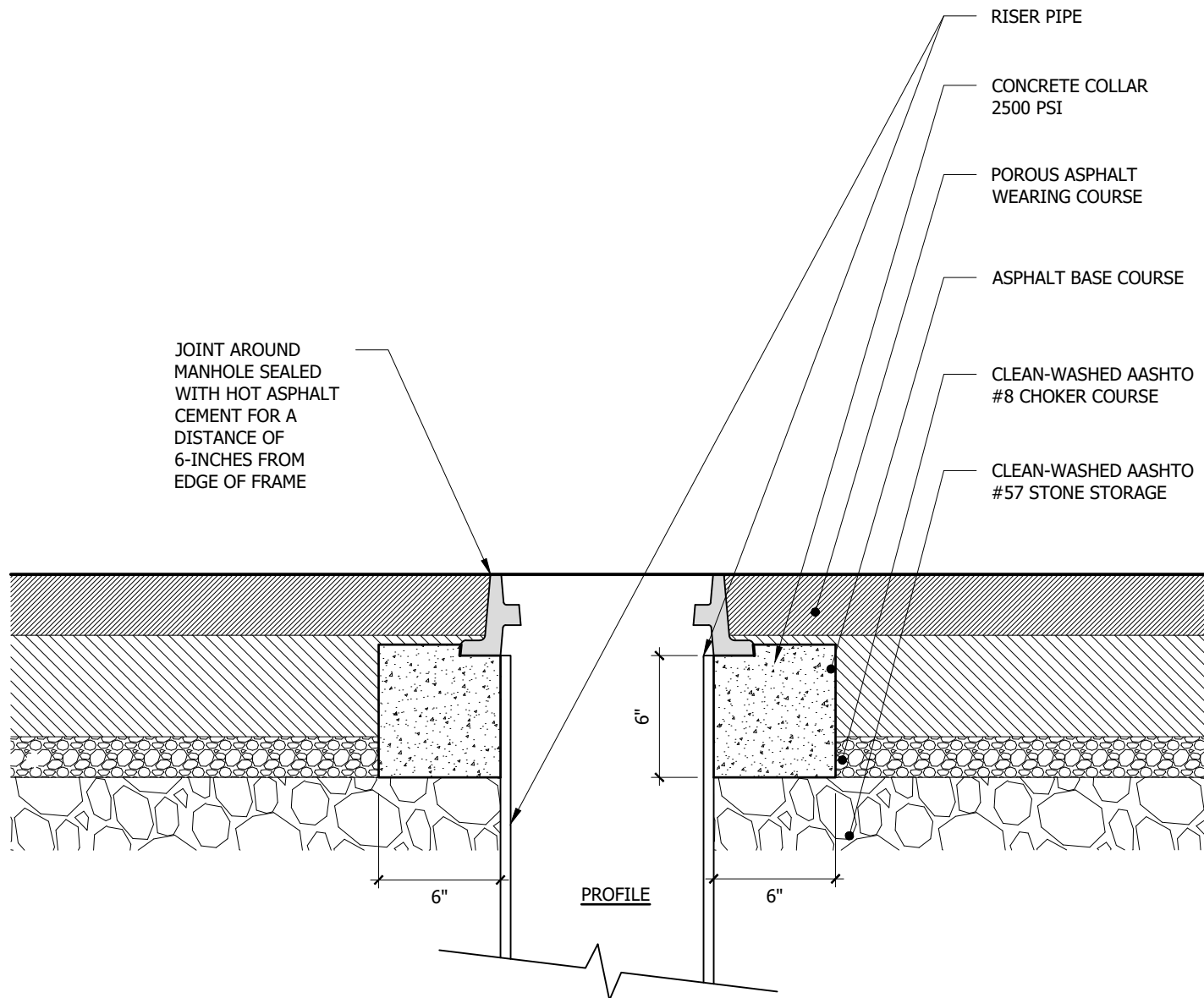
**C-29**



UTILITY MANHOLE IN PERMEABLE PAVING			
VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	ANJ	REMOVED SAND LAYER, ADDED JOINT SEAL NOTE

**NOTES:**

1. TO BE USED ON WATER VALVES, OBSERVATION WELLS, CLEANOUTS, GAS VALVES LOCATED IN POROUS PAVING



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**FRAME & CASTING SUPPORT IN PERMEABLE PAVING**

VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	DJM	ADDED JOINT SEAL NOTE

SCALE: N.T.S.

DRAWING NUMBER:

**C-31**



BREAKAWAY STOP SIGN POLE  
PER CITY STANDARD

2" CONCRETE FILL

CONCRETE FOOTWAY

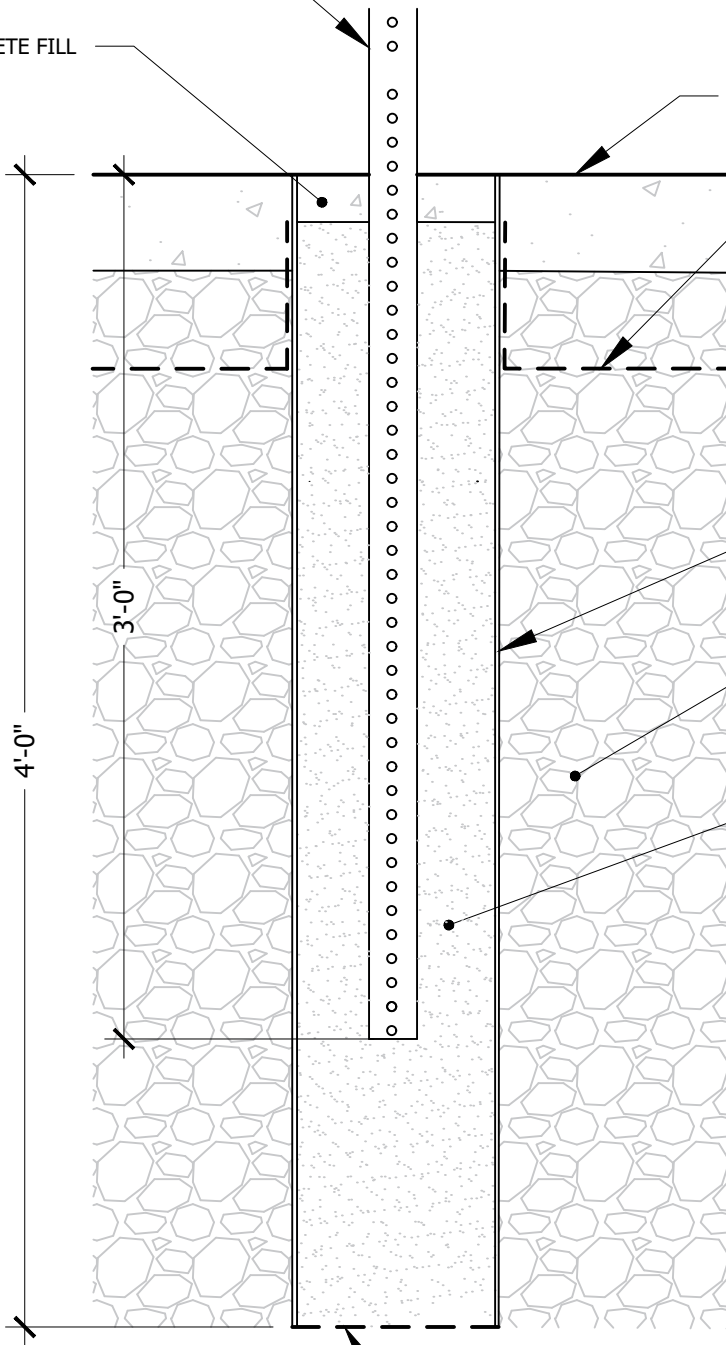
NON WOVEN GEOTEXTILE ON TOP OF  
TRENCH. TUCK INTO CONCRETE  
FOOTWAY PAVING. IF GEOMEMBRANE  
LINER IS PRESENT, CUT A HOLE TO FIT  
POLE/PIPE AND WRAP OPENING IN  
GEOTEXTILE.

8" MINIMUM  
DIAMETER PIPE

CLEAN WASHED  
AASHTO NO. 57 STONE

SAND FILL

BLOCK BOTTOM WITH GEOTEXTILE  
FABRIC TO HOLD SAND FILL AND  
ALLOW TO DRAIN



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**STOP SIGN POLE IN STORMWATER TRENCH**

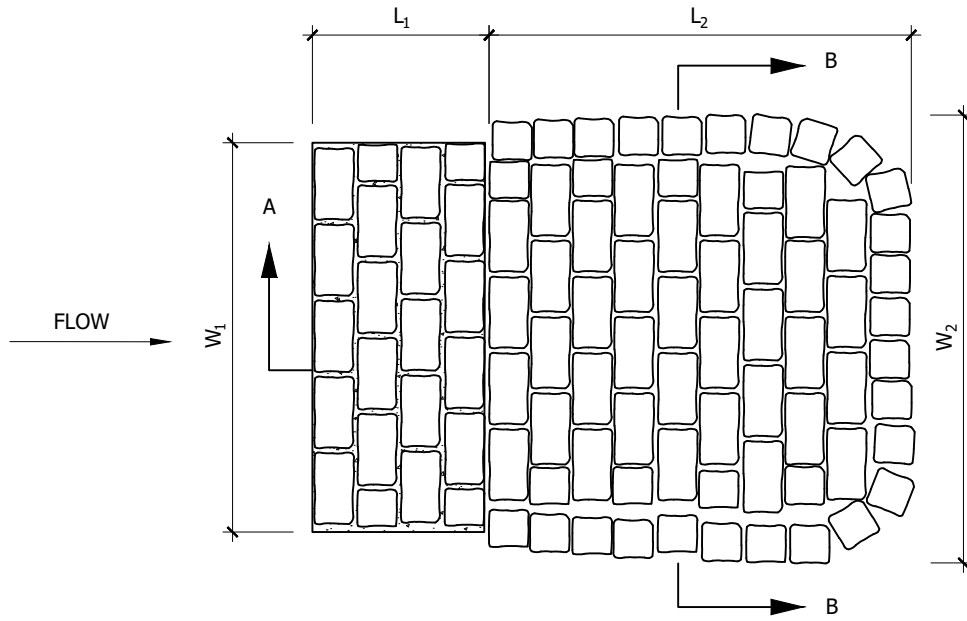
VS.	DATE	INITIALS	REASON
1	06/01/2018	ANJ/DJM	

SCALE: N.T.S.

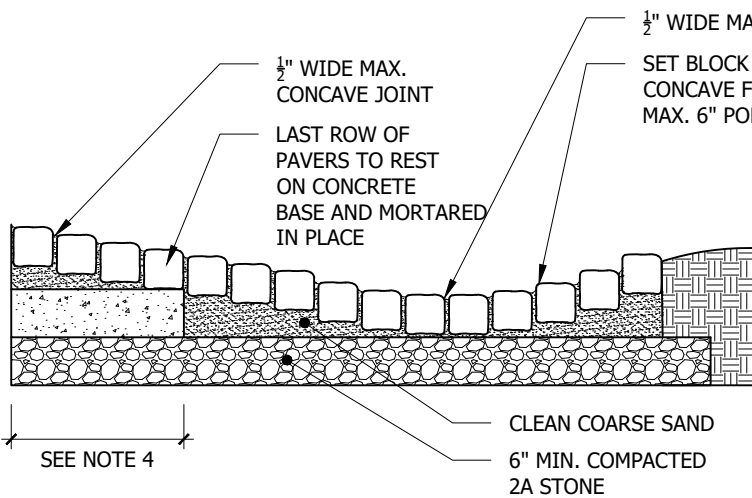
DRAWING NUMBER:

**C-32**

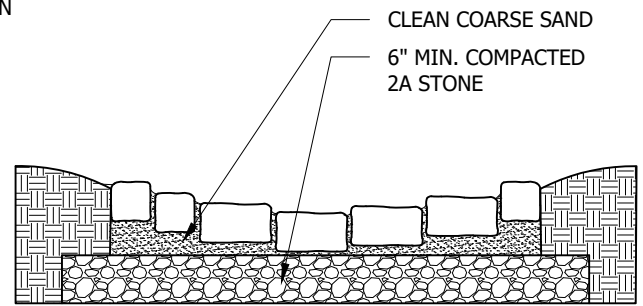
# Energy Dissipation Details



PLAN



SECTION A-A



SECTION B-B

ENERGY DISSIPATER NO.	L <sub>1</sub> (FT)	L <sub>2</sub> (FT)	W <sub>1</sub> (FT)	W <sub>2</sub> (FT)

NOTES:

- MORTARED JOINTS SHALL BE A CONCAVE TOOLED JOINT SET NO MORE THAN 1/4" BELOW FINISHED SURFACE.
- 5" x 5" x 9" (NOM.) BLOCK DIMENSIONS.
- MINIMUM BLOCK LENGTHS MUST NOT BE LESS THAN 4".
- CONCRETE BASE SHALL BE 6" THICK AND EXTEND A MINIMUM OF FOUR (4) BLOCK ROWS BEYOND POINT OF INFLOW. FIRST THREE COURSES TO BE MORTARED IN PLACE WITH GROUT AND 1/2" WIDE CONCAVE JOINT.
- ENSURE THAT SOIL BENEATH ENERGY DISSIPATERS IS STABLE AND WILL NOT SETTLE OVER TIME.

SEE DECEMBER 2020 ADDENDUM FOR UPDATE



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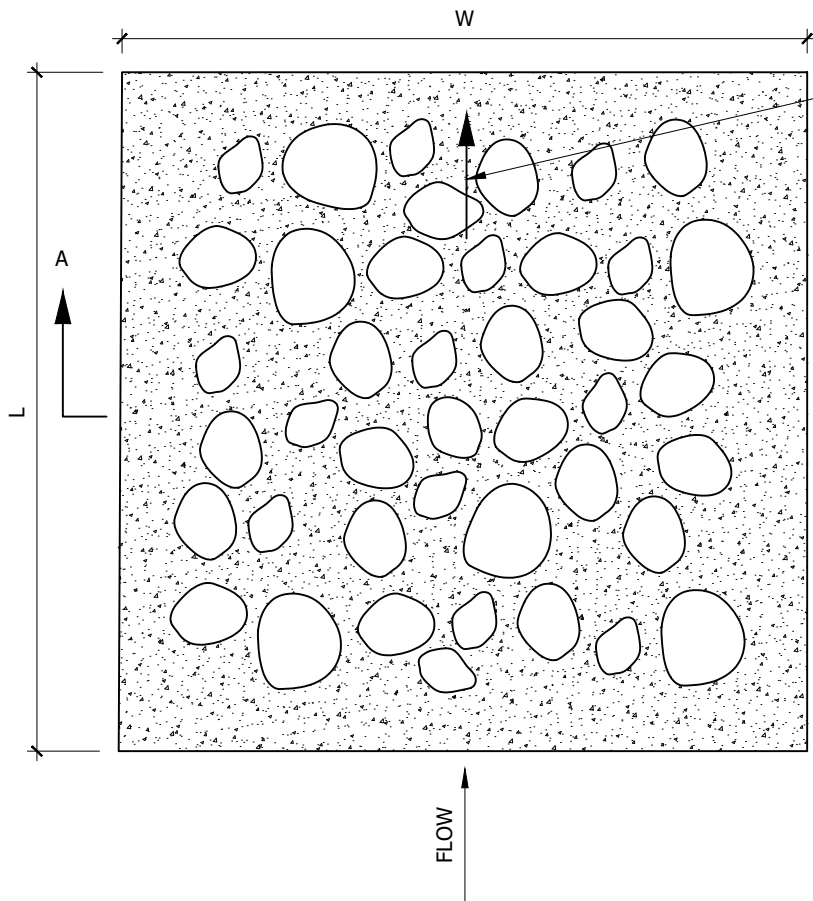
**BLOCK PAVER ENERGY DISSIPATER**

VS.	DATE	INITIALS	REASON
1	09/01/2016		

SCALE: N.T.S.

DRAWING NUMBER:

**C-33**



SLOPE IN DIRECTION OF FLOW TO AVOID PONDING ON DISSIPATER

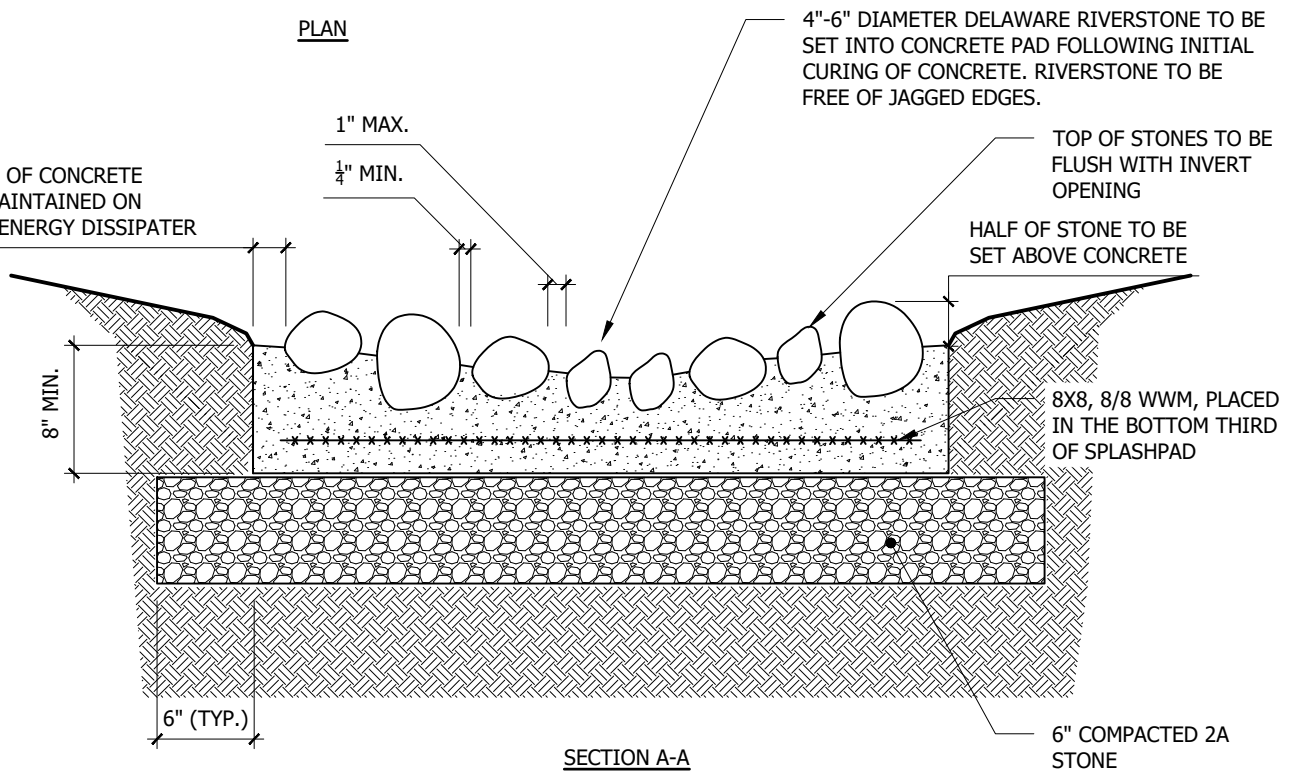
ENERGY DISSIPATER NO.	L (FT)	W (FT)

**NOTES:**

1. ROCKS SHALL BE ARRANGED IN PATTERN THAT PREVENTS LINEAR FLOW PATHS THROUGH THE ENERGY DISSIPATER.
2. ENSURE THAT SOIL BENEATH ENERGY DISSIPATERS IS STABLE AND WILL NOT SETTLE OVER TIME.
3. MAKE SIDES SLIGHTLY HIGHER THAN MIDDLE TO CHANNEL FLOW DOWN FULL LENGTH OF DISSIPATER.

**PLAN**

2" (TYP.) OF CONCRETE TO BE MAINTAINED ON ALL SIDES OF ENERGY DISSIPATER



4"-6" DIAMETER DELAWARE RIVERSTONE TO BE SET INTO CONCRETE PAD FOLLOWING INITIAL CURING OF CONCRETE. RIVERSTONE TO BE FREE OF JAGGED EDGES.

TOP OF STONES TO BE FLUSH WITH INVERT OPENING

HALF OF STONE TO BE SET ABOVE CONCRETE

8X8, 8/8 WWM, PLACED IN THE BOTTOM THIRD OF SPLASHPAD

6" COMPACTED 2A STONE

**SECTION A-A**

SEE DECEMBER 2020 ADDENDUM FOR UPDATE



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**ROCK ENERGY DISSIPATER**

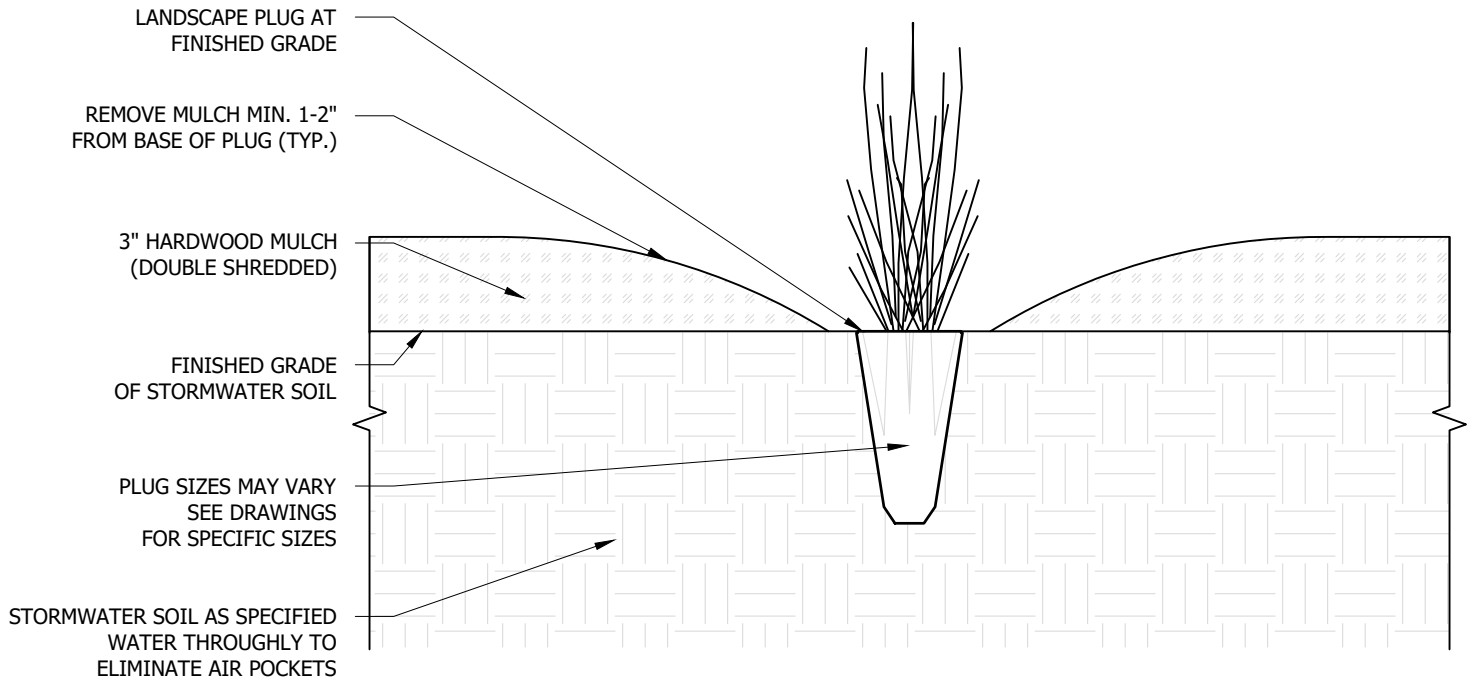
VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	DJM	ADDED GUIDANCE ON SLOPE TO AVOID PONDING

SCALE: N.T.S.

DRAWING NUMBER:

**C-34**

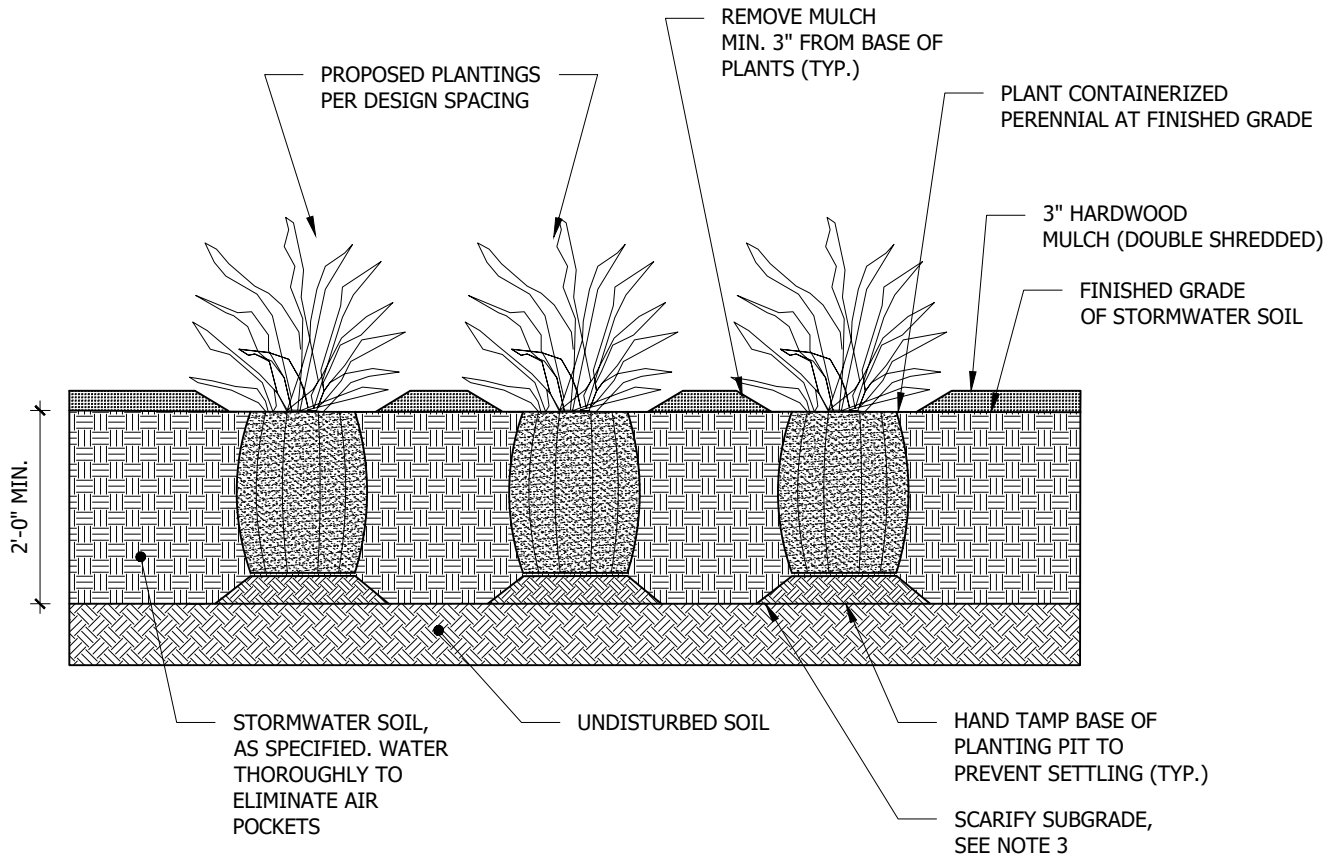
# Landscaping Details



- NOTES:
1. PLUG SPACING MAY VARY BY SPECIES. SEE DRAWINGS FOR SPACING REQUIREMENT
  2. AVOID UNNECESSARY SOIL COMPACTION (FOOT TRAFFIC, MACHINERY, ETC.)
  3. AVOID WET SOIL CONDITIONS
  4. INSTALL SPECIES IN ACTIVE GROWTH ONLY
  5. INSTALLATION OF DORMANT MATERIAL REQUIRES PREAUTHORIZATION
  6. INSTALLATION WINDOWS VARY BY SPECIES AND PLANT METABOLISM. CONSULT WITH PROJECT MANAGER PRIOR TO INSTALLATION OF PLUGS

LANDSCAPE PLUG			
VS.	DATE	INITIALS	REASON
1	06/01/2018	TJL	





**NOTES:**

1. MINIMIZE SOIL COMPACTION TO PRESERVE INFILTRATION CAPACITY OF SOIL.
2. SET PLANTS PLUMB AND FACE TO GIVE BEST APPEARANCE TO ADJACENT AREAS.
3. WHERE STORMWATER SOIL MEETS UNDISTURBED SOIL, SCARIFY SIDES AND BOTTOM OF EXCAVATION UP TO THE BOTTOM OF ROOTBALL.
4. SCARIFY ROOTS ALONG EDGE WHERE STORMWATER SOIL MEETS CONTAINERIZED PERENNIAL BEFORE PLANTING.



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**CONTAINER PLANTING**

VS.	DATE	INITIALS	REASON
1	09/01/2016		

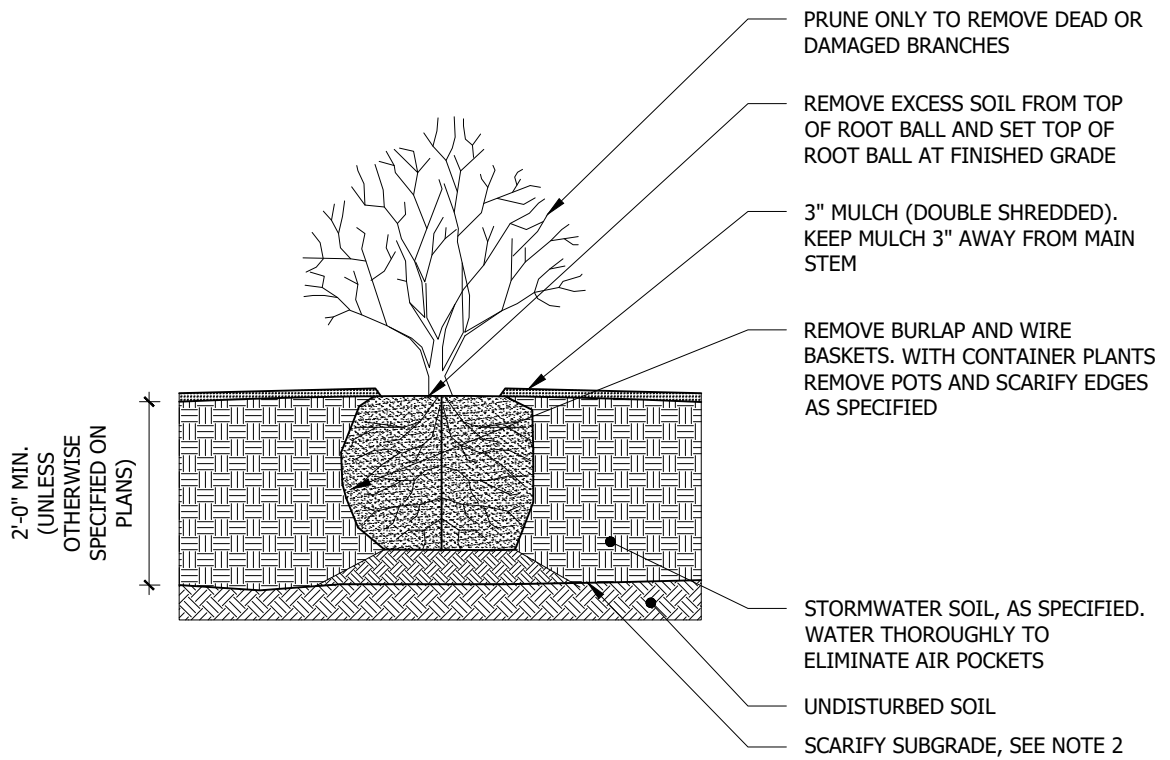
SCALE: N.T.S.

DRAWING NUMBER:

**C-36**

**NOTES:**

1. SET PLANTS PLUMB AND FACE TO GIVE BEST APPEARANCE TO ADJACENT AREAS.
2. WHERE STORMWATER SOIL MEETS UNDISTURBED SOIL, SCARIFY SIDES AND BOTTOM OF EXCAVATION UP TO THE BOTTOM OF THE ROOTBALL.



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**SHRUB PLANTING**

VS.	DATE	INITIALS	REASON
1	09/01/2016		

SCALE: N.T.S.

DRAWING NUMBER:

**C-37**

**NOTES:**

1. DO NOT HEAVILY PRUNE THE TREE AT PLANTING. PRUNE ONLY TO REMOVE CO-DOMINANT LEADERS, DEAD, AND BROKEN BRANCHES. PRUNE WITH A CLEAN CUT PER ANSI A300 & ISA (2008) STANDARDS. DO NOT CUT TREE'S CENTRAL LEADER.
2. SET PLANTS PLUMB AND FACE TO GIVE THE BEST APPEARANCE OR RELATIONSHIP TO ADJACENT AREAS.
3. CONTRACTOR SHALL REMOVE EXCESS SOIL FROM TOP OF ROOT BALL TO EXPOSE ROOT FLARE PRIOR TO PLANTING TO ENSURE THAT THE BASE OF THE TRUNK FLARE IS FLUSH WITH ADJACENT GRADE AND PLUMB IN ALL DIRECTIONS.
4. DO NOT USE TREE WRAP OR CARDBOARD TUBING FROM ALL TREE TRUNKS. DO NOT LEAVE MATERIALS IN THE TREE PIT.
5. STAKE TREES OVER 2" CAL, SET STAKES VERTICAL AND AT SAME HEIGHT. STAKES TO BE PLACED STREET SIDE AND OPPOSITE OF STREET SIDE.
6. WHERE PLANTING SOIL MEETS UNDISTURBED SOIL, SCARIFY SIDES AND BOTTOM OF TREE PIT UP TO THE BOTTOM OF ROOT BALL.
7. PLANTING SOIL SHALL BE A MINIMUM DEPTH OF 3'-0" UNLESS OTHERWISE SPECIFIED.
8. THE TRUNK OF THE TREE SHALL NOT BE USED AS A LEVER IN POSITIONING OR MOVING THE TREE. CONTRACTOR SHALL LEAVE NURSERY/CONTRACTOR SEAL IN PLACE.
9. PRIOR TO MULCHING, LIGHTLY TAMP SOIL AROUND ROOT BALL IN 6" LIFTS TO BRACE TREE. DO NOT OVER COMPACT. WHEN PLANTING HOLE HAS BEEN BACKFILLED, POUR WATER AROUND ROOT BALL TO SETTLE THE SOIL.
10. TREE PROTECTION, WHERE REQUIRED, SHALL BE AS SHOWN ON TREE PROTECTION DETAILS.
11. BARK PROTECTORS MAY BE REQUESTED BY PWD ON A PROJECT BY PROJECT BASIS.



3'-0" MIN.  
SEE NOTE 7

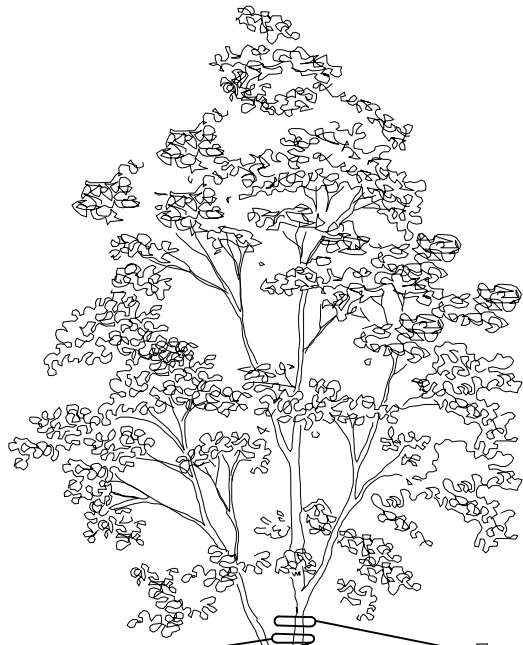
- 3/4" EXT. DIAMETER REINFORCED RUBBER GARDEN HOSE. STAYS TO BE SET 2/3 UP TREE OR ABOVE FIRST BRANCHES
- 3" DOUBLE SHREDDED HARDWOOD MULCH
- KEEP MULCH 3" AWAY FROM TRUNK
- SET ROOT FLARE ABOVE FINISHED GRADE, SEE NOTE 3
- PLANTING SOIL, SEE NOTE 9
- STAKES TO EXTEND 1'-6" MIN. BELOW SURFACE INTO UNDISTURBED SOIL
- REMOVE BURLAP AND WIRE BASKET. SCARIFY EDGES OF ROOTBALL BEFORE BACKFILLING.
- SCARIFY SUBGRADE, SEE NOTE 6
- UNDISTURBED SOIL
- PLACE ROOTBALL ON FIRMLY PACKED SOIL PEDESTAL TO PREVENT SETTLING AND PROVIDE TREE STABILITY



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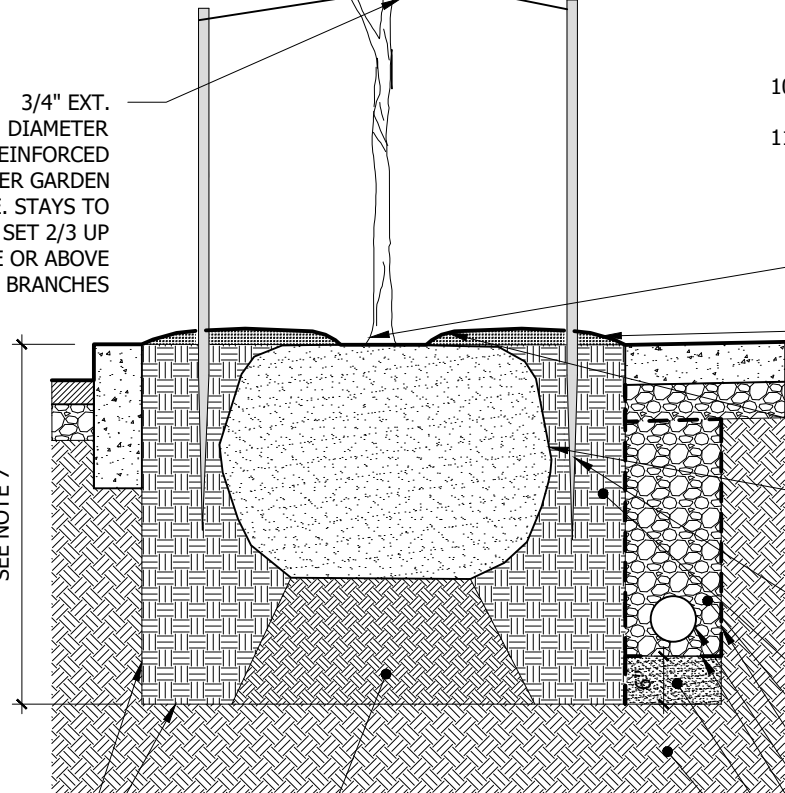
TREE PLANTING			
VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	TJL	ADDED BARK PROTECTORS NOTE

SCALE: N.T.S.  
DRAWING NUMBER:  
**C-38**



3/4" EXT. DIAMETER REINFORCED RUBBER GARDEN HOSE. STAYS TO BE SET 2/3 UP TREE OR ABOVE FIRST BRANCHES

3'-0" MIN. SEE NOTE 7



SCARIFY SUBGRADE, SEE NOTE 6

PLACE ROOTBALL ON FIRMLY PACKED SOIL PEDESTAL TO PREVENT SETTLING AND PROVIDE TREE STABILITY

SET ROOT FLARE ABOVE FINISHED GRADE, SEE NOTE 3

3" DOUBLE SHREDDED HARDWOOD MULCH DRESSING AROUND ALL SIDES TO THE EDGE OF THE SIDEWALK OPENING

KEEP MULCH 3" AWAY FROM TRUNK

REMOVE BURLAP AND WIRE BASKET. SCARIFY EDGES OF ROOTBALL BEFORE BACKFILLING.

STAKES TO EXTEND 1'-6" MIN. BELOW SURFACE INTO UNDISTURBED SOIL

PLANTING SOIL, SEE NOTE 9

CLEAN WASHED AASHTO NO.57 STONE, SEE NOTE 11

NON WOVEN GEOTEXTILE, TOPS AND SIDES

DISTRIBUTION PIPE

6" GEOTEXTILE TUCK (TYP.)

6" SAND LAYER

UNDISTURBED SOIL

**NOTES:**

1. DO NOT HEAVILY PRUNE THE TREE AT PLANTING. PRUNE ONLY CO-DOMINANT LEADERS, BROKEN, DEAD OR DAMAGED BRANCHES. PRUNE WITH A CLEAN CUT PER ANSI A300 & ISA (2008) STANDARDS. DO NOT CUT TREE'S CENTRAL LEADER.
2. SET PLANTS PLUMB AND FACE TO GIVE THE BEST APPEARANCE OR RELATIONSHIP TO ADJACENT AREAS.
3. CONTRACTOR SHALL REMOVE EXCESS SOIL FROM TOP OF ROOT BALL TO EXPOSE ROOT FLARE PRIOR TO PLANTING TO ENSURE THAT THE BASE OF THE TRUNK FLARE IS FLUSH WITH ADJACENT GRADE AND PLUMB IN ALL DIRECTIONS.
4. DO NOT USE TREE WRAP. REMOVE TREE WRAP OR CARDBOARD TUBING FROM ALL TREE TRUNKS. DO NOT LEAVE MATERIALS IN THE TREE PIT.
5. STAKE TREES OVER 2" CAL, SET STAKES VERTICAL AND AT SAME HEIGHT. STAKES TO BE PLACED STREET SIDE AND OPPOSITE OF STREET SIDE.
6. WHERE PLANTING SOIL MEETS UNDISTURBED SOIL, SCARIFY SIDES AND BOTTOM OF TREE PIT UP TO THE BOTTOM OF ROOTBALL.
7. PLANTING SOIL SHALL BE A MINIMUM DEPTH OF 3'-0" UNLESS OTHERWISE SPECIFIED.
8. THE TRUNK OF THE TREE SHALL NOT BE USED AS A LEVER IN POSITIONING OR MOVING THE TREE. CONTRACTOR SHALL LEAVE NURSERY/CONTRACTOR SEAL IN PLACE.
9. PRIOR TO MULCHING, LIGHTLY TAMP SOIL AROUND ROOT BALL IN 6" LIFTS TO BRACE TREE. DO NOT OVER COMPACT. WHEN PLANTING HOLE HAS BEEN BACKFILLED, POUR WATER AROUND ROOT BALL TO SETTLE THE SOIL.
10. TREE PROTECTION, WHERE REQUIRED, SHALL BE AS SHOWN ON TREE PROTECTION DETAILS.
11. EXTENTS OF STONE STORAGE AND SAND LAYER CAN VARY.



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**TREE PIT IN STORMWATER TRENCH**

VS.	DATE	INITIALS	REASON
1	09/01/2016		

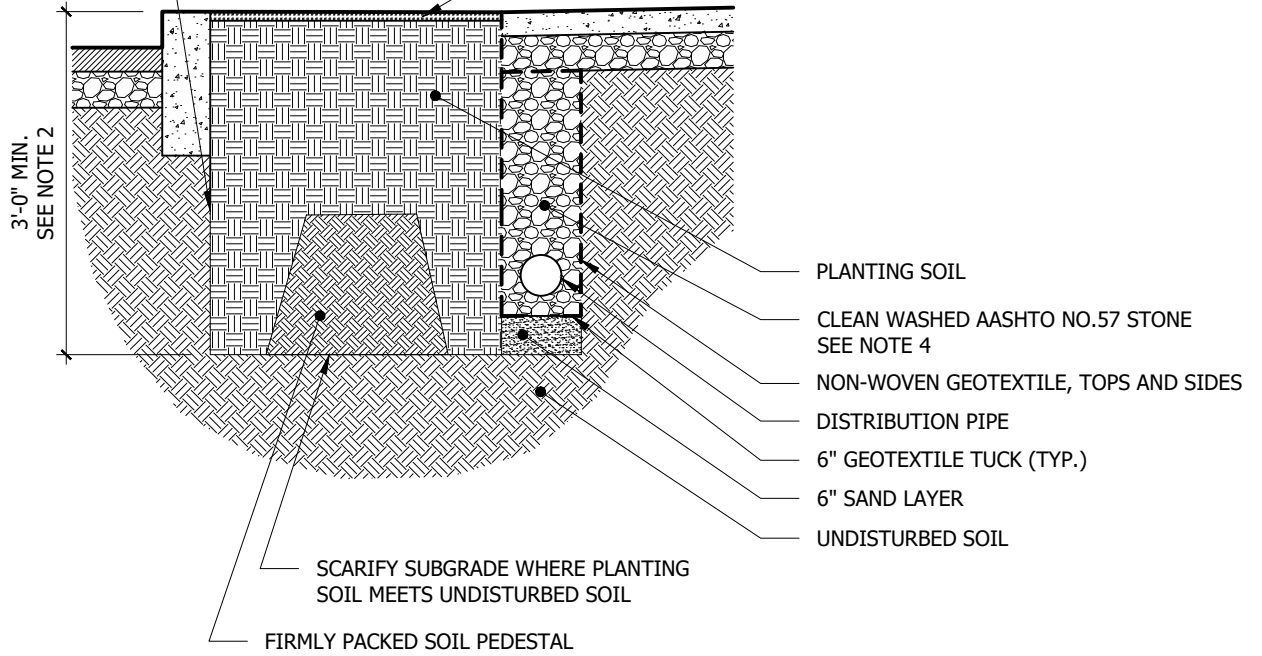
SCALE: N.T.S.

DRAWING NUMBER:

**C-39**

SCARIFY SOIL HORIZON  
WHERE PLANTING SOIL  
MEETS UNDISTURBED SOIL  
TO DEPTH OF SOIL  
PEDESTAL

WEED BARRIER SEE SPECIFICATIONS  
SEE NOTE 3



**NOTES:**

1. TREE TO BE INSTALLED BY OTHERS
2. PLANTING SOIL SHALL BE A MINIMUM DEPTH OF 3'-0" UNLESS OTHERWISE SPECIFIED.
3. INCLUDE STEEL WIRE STAPLES , SIX (6) INCHES LONG PER MANUFACTURER SPECIFICATIONS.
4. EXTENTS OF STONE STORAGE AND SAND LAYER CAN VARY.



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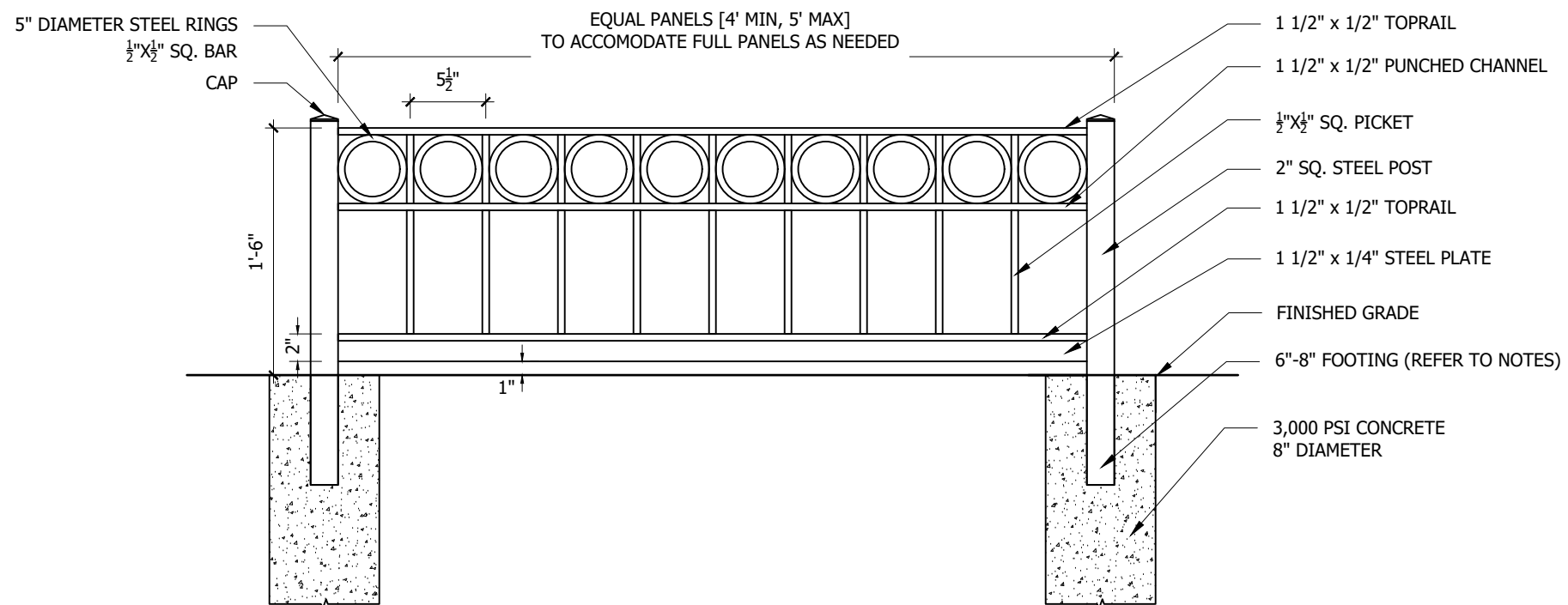
**TREE PIT IN STORMWATER TRENCH (WITHOUT TREE)**

VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	ANJ	ADDED WEED BARRIER

SCALE: N.T.S.

DRAWING NUMBER:

**C-40**



**NOTES:**

1. FIELD MEASUREMENTS MUST BE TAKEN PRIOR TO FABRICATION.
2. ALL STEEL SHALL CONFORM TO SPECIFICATION C1015 OF THE A.I.S.I.
3. ALL JOINTS TO BE WELDED UNLESS NOTED OTHERWISE.
4. ALL STEEL TO BE PLANTED WITH ONE (1) SHOP COAT OF PRIMER AND ONE (1) SHOP COAT (OR ROLLED FIELD COAT) OF FINISH TOP COAT IN COMPLIANCE WITH THE PENNDOT APPROVED MATERIALS REPORT SECTION 1022.2(a). THE COLOR OF THE TOP COAT SHALL BE BLACK.
5. RAILS TO FOLLOW LINE OF GRADE.
6. ALL STEEL TO BE SOLID STEEL.
7. WHEN PLACED IN CONCRETE CURB, POSTS MUST BE CORE DRILLED 6"-8" INTO CURB AND SET WITH EPOXY. WHEN PLACED IN SOIL, POSTS MUST BE SET IN A 3'-0" CONCRETE FOOTING. REFER TO MANUFACTURER FOR FULL LIST OF INSTALLATION INSTRUCTIONS.

**NOTE TO DESIGNER:**

1. CALLOUT ORNAMENTAL FENCE HEIGHT ON PLANS.

SEE DECEMBER 2020 ADDENDUM FOR UPDATE



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**ORNAMENTAL FENCING 18 INCH**

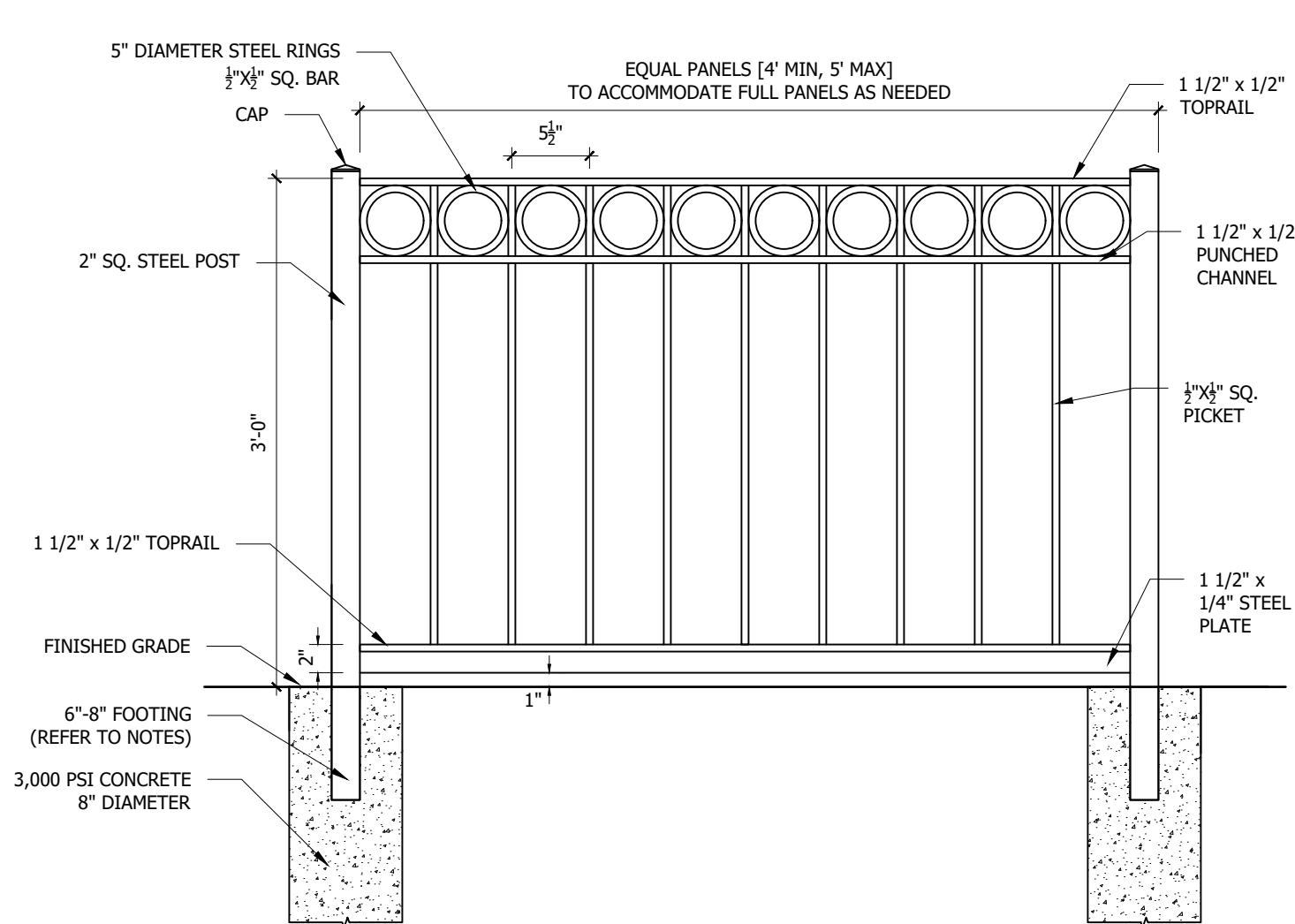
SCALE: N.T.S

VS.	DATE	INITIALS	REASON
1	09/01/2016		

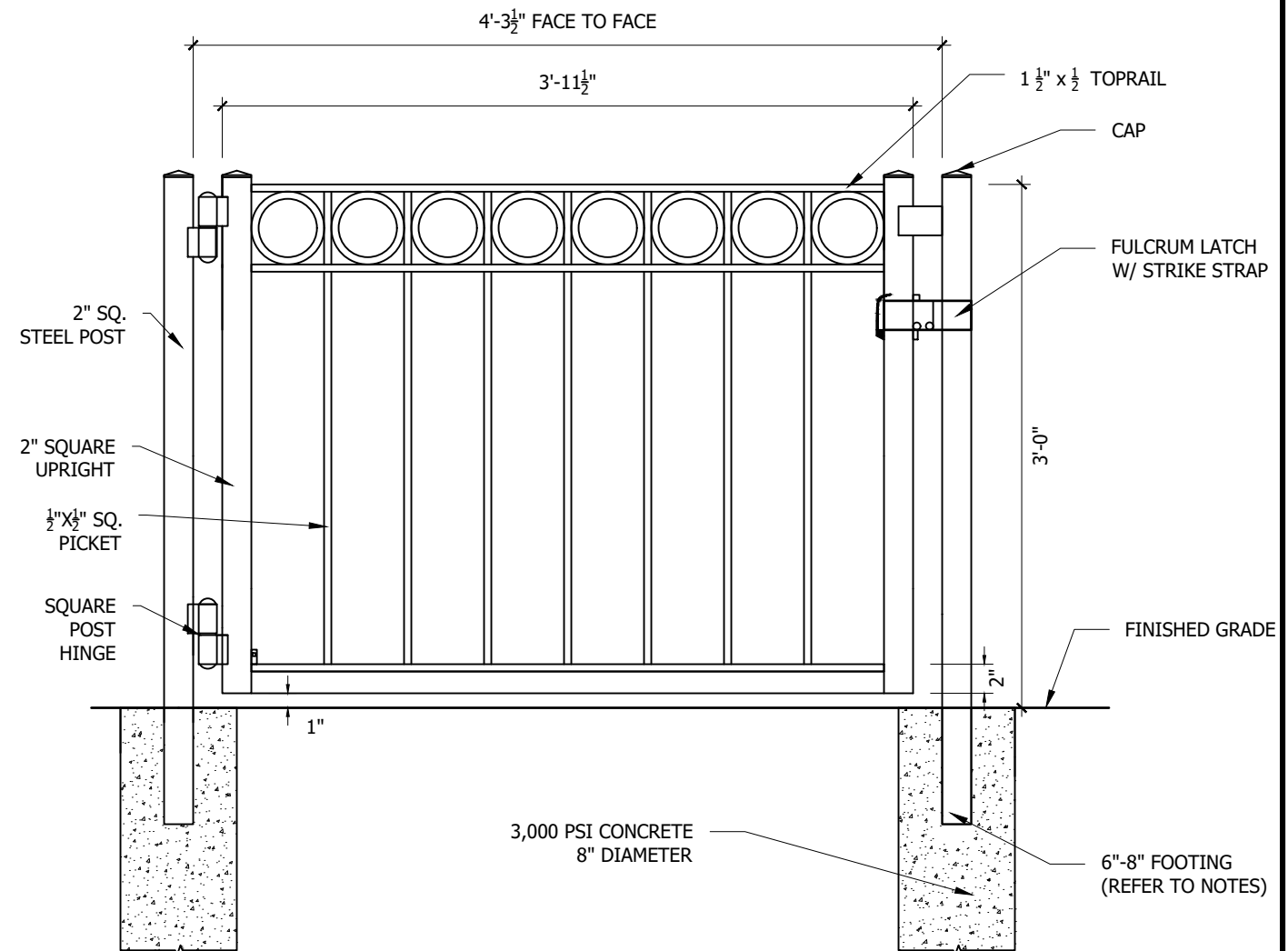
DRAWING NUMBER:

**C-41**





TYPICAL FENCE



GATE

NOTES:

1. FIELD MEASUREMENTS MUST BE TAKEN PRIOR TO FABRICATION.
2. ALL STEEL SHALL CONFORM TO SPECIFICATION C1015 OF THE A.I.S.I.
3. ALL JOINTS TO BE WELDED UNLESS NOTED OTHERWISE.
4. ALL STEEL TO BE PLANTED WITH ONE (1) SHOP COAT OF PRIMER AND ONE (1) SHOP COAT (OR ROLLED FIELD COAT) OF FINISH TOP COAT IN COMPLIANCE WITH THE PENNDOT APPROVED MATERIALS REPORT SECTION 1022.2(a). THE COLOR OF THE TOP COAT SHALL BE BLACK.
5. RAILS TO FOLLOW LINE OF GRADE.
6. ALL STEEL TO BE SOLID STEEL.
7. WHEN PLACED IN CONCRETE CURB, POSTS MUST BE CORE DRILLED 6"-8" INTO CURB AND SET WITH EPOXY. WHEN PLACED IN SOIL, POSTS MUST BE SET IN A 3'-0" CONCRETE FOOTING. REFER TO MANUFACTURER FOR FULL LIST OF INSTALLATION INSTRUCTIONS.
8. GATE TO BE INCLUDED ON PROJECT BY PROJECT BASIS. REFER TO DRAWINGS FOR GATE INFORMATION.

SEE DECEMBER 2020 ADDENDUM FOR UPDATE

NOTE TO DESIGNER:  
1. CALLOUT ORNAMENTAL FENCE HEIGHT ON PLANS.



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ORNAMENTAL FENCING 36 INCH

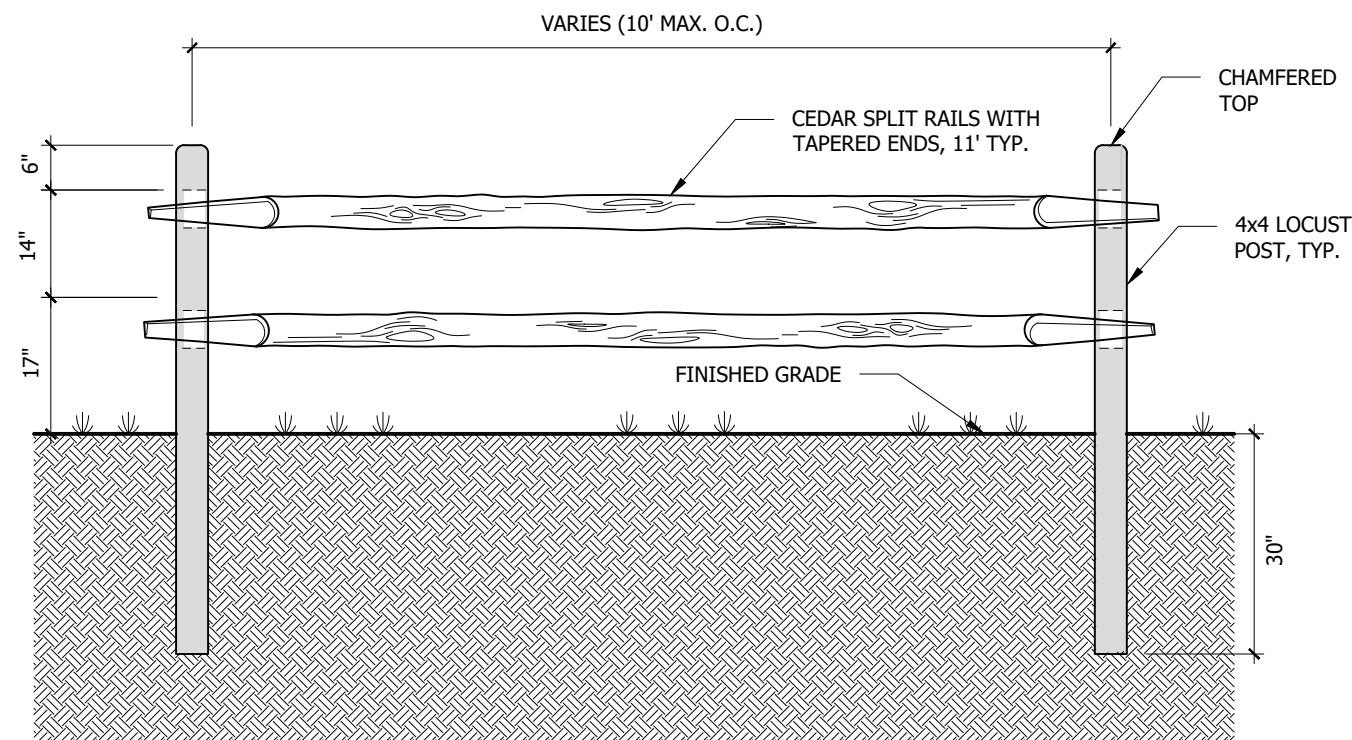
VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	TJL	UPDATED TO 18 INCH AND 36 INCH OPTIONS

UPDATED TO 18 INCH AND 36 INCH OPTIONS

SCALE: N.T.S.

DRAWING NUMBER:

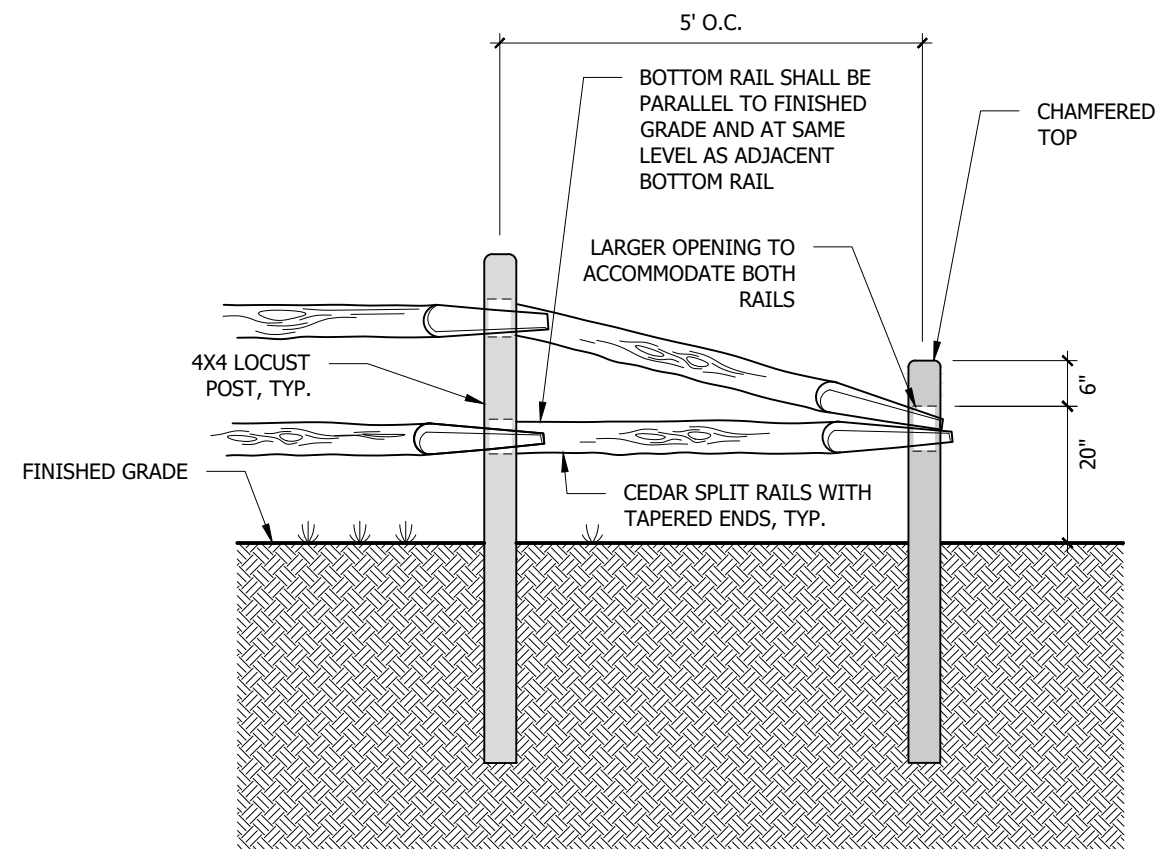
**C-42**



TYPICAL FENCE

**NOTES:**

1. DECK SCREWS SHALL BE USED TO TIE FASTEN RAILS TOGETHER AT POINT OF INTERSECTION AT POSTS.
2. END SECTION TO BE INCLUDED WHERE NOTED ON DRAWINGS.



FENCE END

**NOTES:**

1. THIS END TREATMENT SHOULD ONLY BE USED WHERE NOTED ON PLAN

**NOTE TO DESIGNER:**

1. SPECIFY 2 OR 3 RAIL FENCE ON PLANS.

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SPLIT RAIL FENCE 2 RAILS

VS.	DATE	INITIALS
1	06/01/2018	TJL

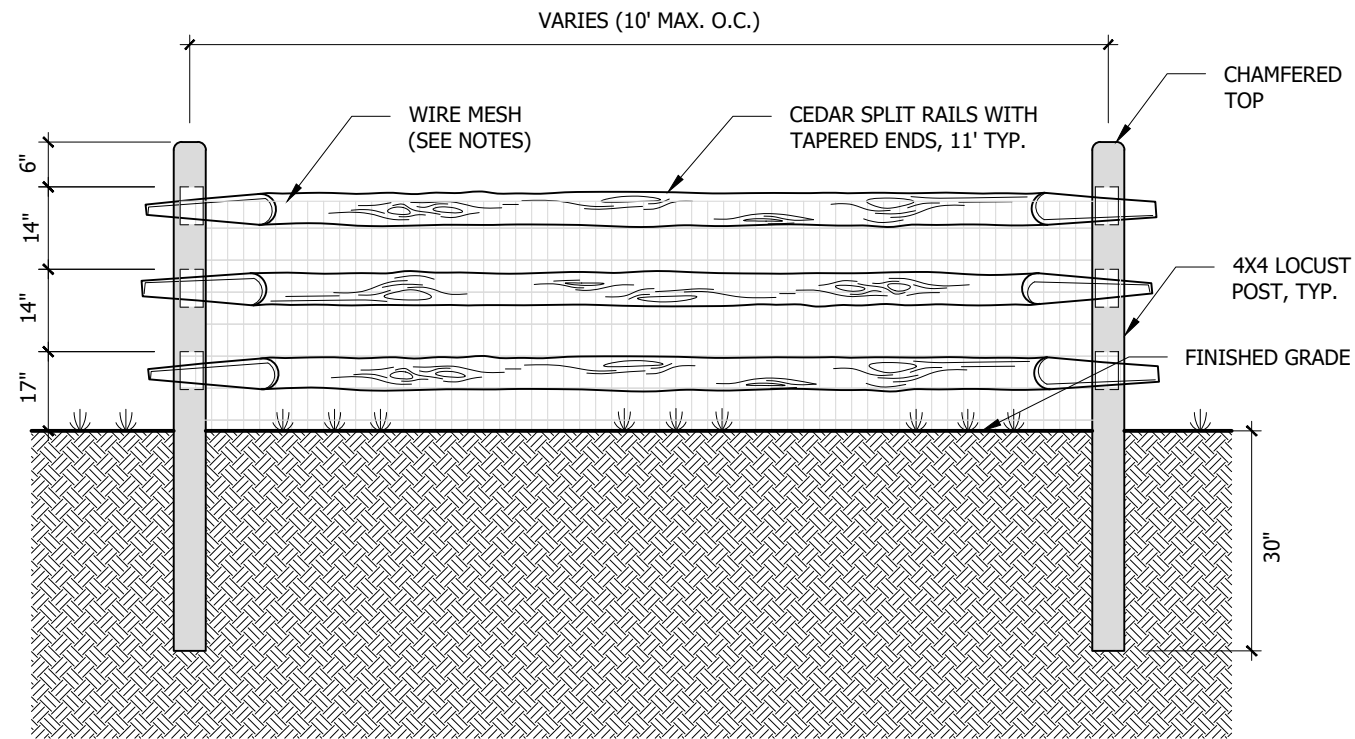
REASON

SCALE: N.T.S.

DRAWING NUMBER:

C-43

--- OF XX



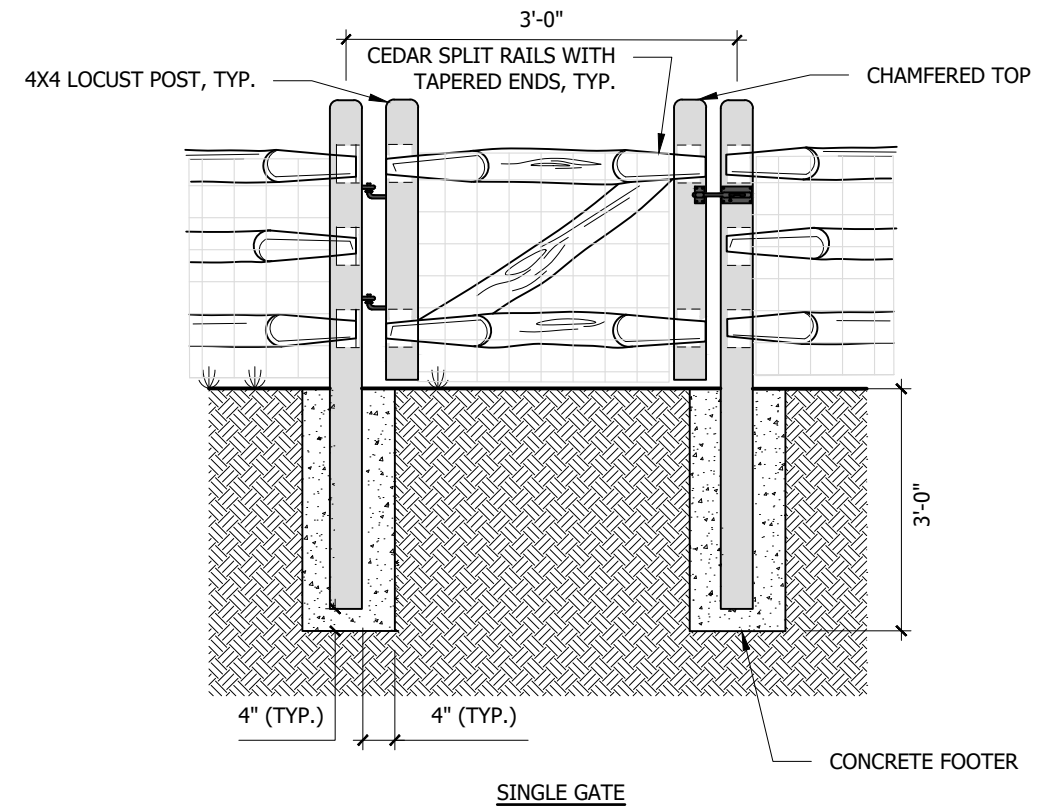
TYPICAL FENCE

NOTES:

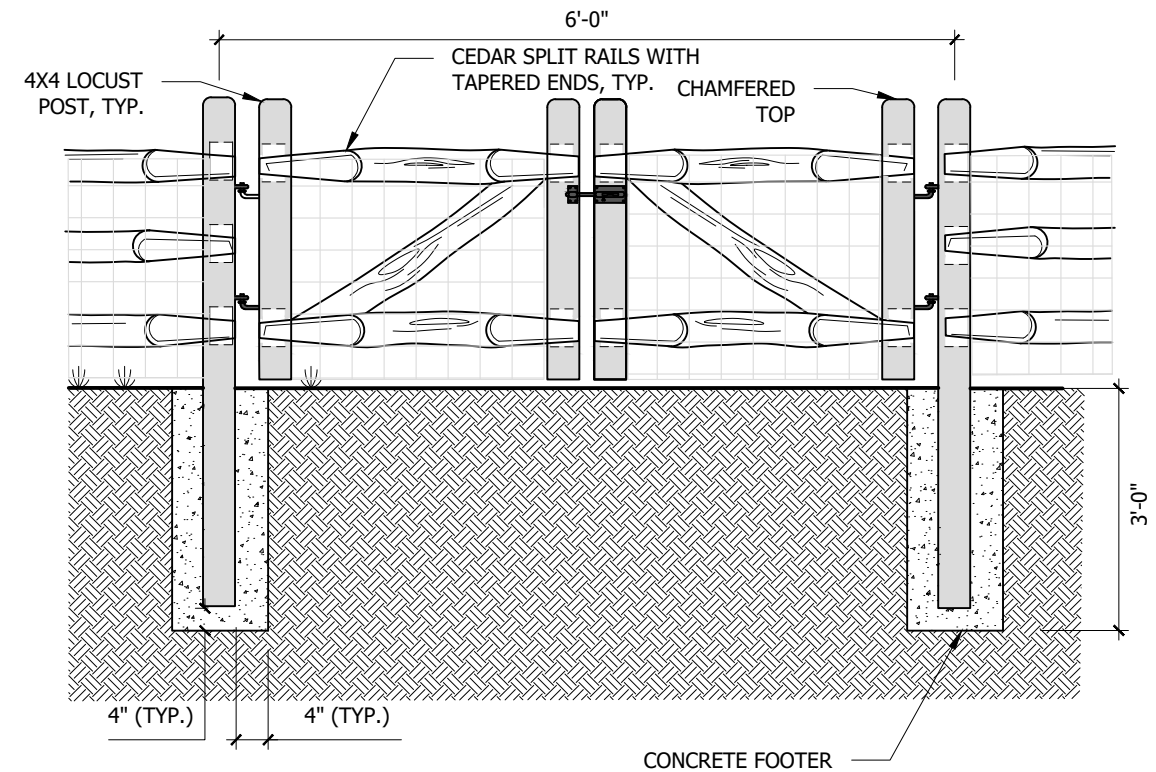
1. WIRE MESH SHALL BE GALVANIZED IRON, VINYL COATED IRON, STAINLESS STEEL OR APPROVED EQUIVALENT. WIRE MESH SHALL HAVE A 0.15" DIAMETER AND A 2" MESH OPENING.
2. WIRE MESH SHALL BE SECURED TO FENCE POSTS AND/OR RAILS USING STEEL U-NAILS, OR APPROVED EQUIVALENT.
3. WIRE MESH MAY NOT BE NEEDED IN ALL APPLICATIONS.
4. WIRE MESH TO BE USED WHEN 3 RAIL OPTION IS SELECTED.
5. DECK SCREWS SHALL BE USED TO FASTEN RAILS TOGETHER AT POINT OF INTERSECTION AT POSTS.
6. GATE TO BE INCLUDED WHERE NOTED ON THE DRAWINGS.

NOTES TO DESIGNER:

1. WIRE MESH MAY NOT BE NEEDED IN ALL APPLICATIONS.. TO BE USED TO KEEP PEOPLE, ANIMALS, AND OBJECTS OUT OF GSI SYSTEM IN BUSY AREAS.
2. SPECIFY 2 OR 3 RAIL FENCE ON PLANS.
3. SPECIFY SINGLE OR DOUBLE GATE ON PLANS



SINGLE GATE



DOUBLE GATE

SEE DECEMBER 2020 ADDENDUM FOR UPDATE

SPLIT RAIL FENCE 3 RAILS

VS.	DATE	INITIALS	REASON
1	06/01/2018	TJL	

SCALE: N.T.S.

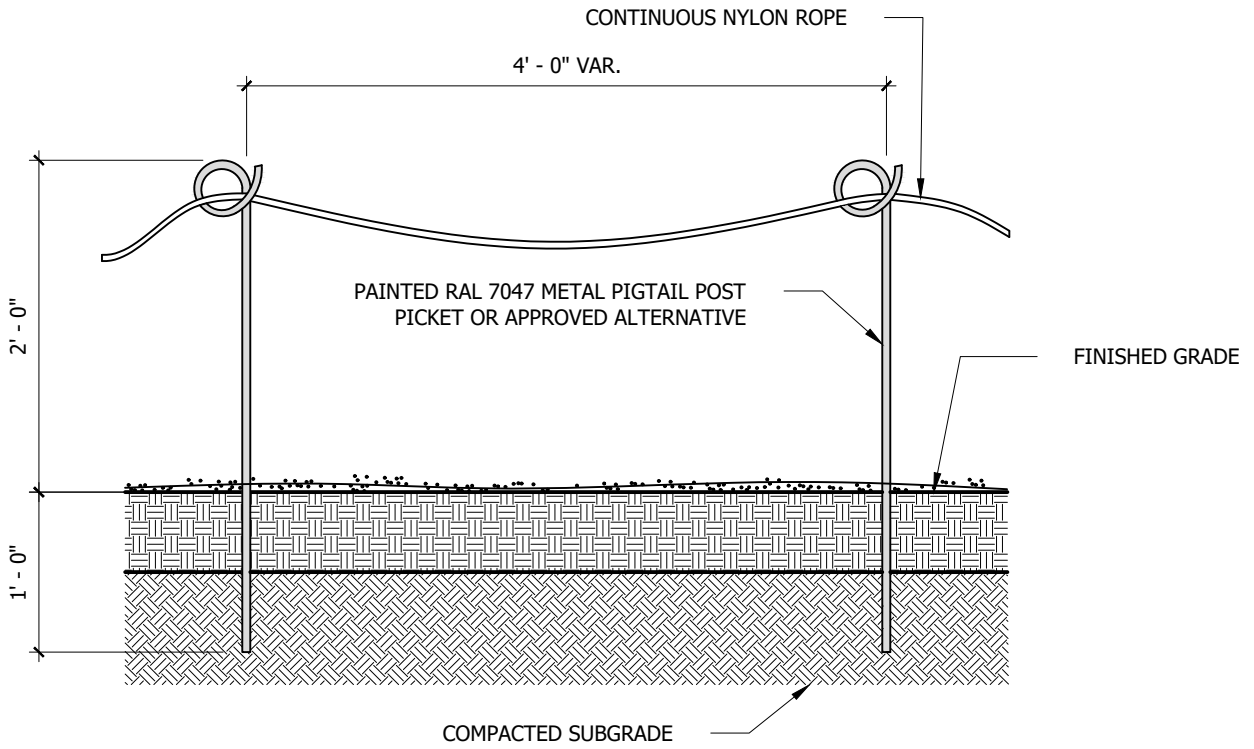
DRAWING NUMBER:

C-44



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**NOTES:**

1. SPACING OF PICKETS WILL VARY. REFER TO DRAWINGS.

**NOTES TO DESIGNER:**

1. TO BE USED AS NEEDED TO TEMPORARILY PROTECT NEWLY PLANTED VEGETATION.



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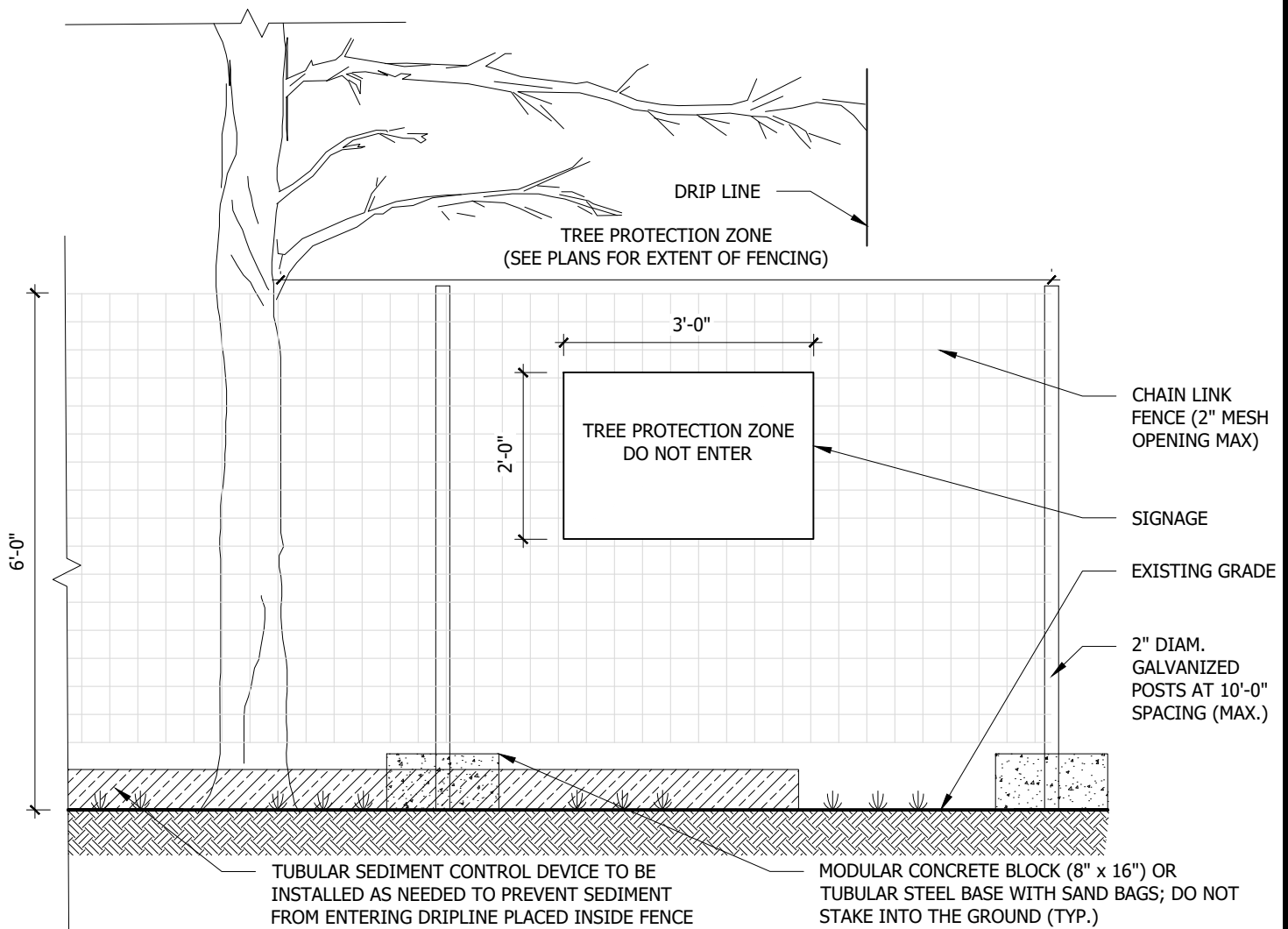
**TEMPORARY STAKE AND ROPE FENCE**

VS.	DATE	INITIALS	REASON
1	06/01/2018	TJL	

SCALE: N.T.S.

DRAWING NUMBER:

**C-45**



TREE NO.	DBH (IN.)	TPZ DIAMETER (FT.) SEE NOTE 6	FENCE PANELS REQUIRED

**NOTES:**

1. THE TREE PROTECTION FENCING IS TO BE INSTALLED AND REMAIN IN PLACE THROUGHOUT THE CONSTRUCTION PERIOD TO PROTECT THE CRITICAL ROOT ZONES (CRZs) AND PROHIBITIVE ROOT ZONES (PRZs), IN ACCORDANCE WITH SPECIFICATION SECTION 01535. REFER TO EROSION & SEDIMENT CONTROL SHEETS FOR TREE PROTECTION ZONE. ONE HEAVY DUTY WARNING SIGN SHALL BE PROMINENTLY DISPLAYED ON EACH TREE PROTECTION FENCE ENCLOSURE.
2. NO WORK IS TO OCCUR WITHIN THE TPZ, UNLESS OTHERWISE APPROVED BY THE PROJECT MANAGER. IF WORK IS TO OCCUR WITHIN THE TPZ, EXERCISE EXTREME CAUTION AND CARE UNDER THE SUPERVISION OF AN ISA CERTIFIED ARBORIST. HAND TOOLS SHOULD ONLY BE USED IF WORKING WITHIN THE TPZ. NOTIFY OWNER PRIOR TO COMMENCEMENT OF WORK WITHIN THE TPZ.
3. AVOID DAMAGING EXISTING TREES. DAMAGE INCLUDES BUT IS NOT LIMITED TO: CUTTING, BREAKING, SKINNING, OR COMPACTING SOIL AROUND ROOTS, SKINNING AND BRUISING OF BARK AND BREAKING OF BRANCHES AND LIMBS.
4. ACTIVITIES PROHIBITED WITHIN THE TPZ INCLUDE BUT ARE NOT LIMITED TO: EXCAVATION, DUMPING OF CONSTRUCTION WASTE, STORAGE OF MATERIALS, STORAGE OF VEHICLES AND EQUIPMENT, TRENCHING, CHANGING SOIL GRADE, COMPACTING SOIL WITH VEHICLE OR EQUIPMENT TRAFFIC, INSTALLING PAVEMENT OF ANY KIND, ATTACHING ANYTHING TO TREES USING NAILS, SCREWS, AND/OR SPIKES, OR CAUSING INJURY BY FIRE OR EXCESSIVE HEAT.
5. ANY REMOVAL OR PRUNING OF TREE BRANCHES, LIMBS, OR ROOTS MUST BE CONDUCTED BY AN ISA CERTIFIED ARBORIST. IF ANY TREE IS DAMAGED WITHIN THE TPZ, CONTACT THE PROJECT ARBORIST AND PROJECT MANAGER IMMEDIATELY.
6. THE TPZ SHALL BE DELINEATED BY ASSUMING 1 FOOT OF TPZ RADIUS FOR EACH INCH OF DIAMETER AT BREAST HEIGHT (DBH). THEREFORE A 10-INCH DBH TREE SHALL HAVE A TPZ DIAMETER OF 20 FEET.



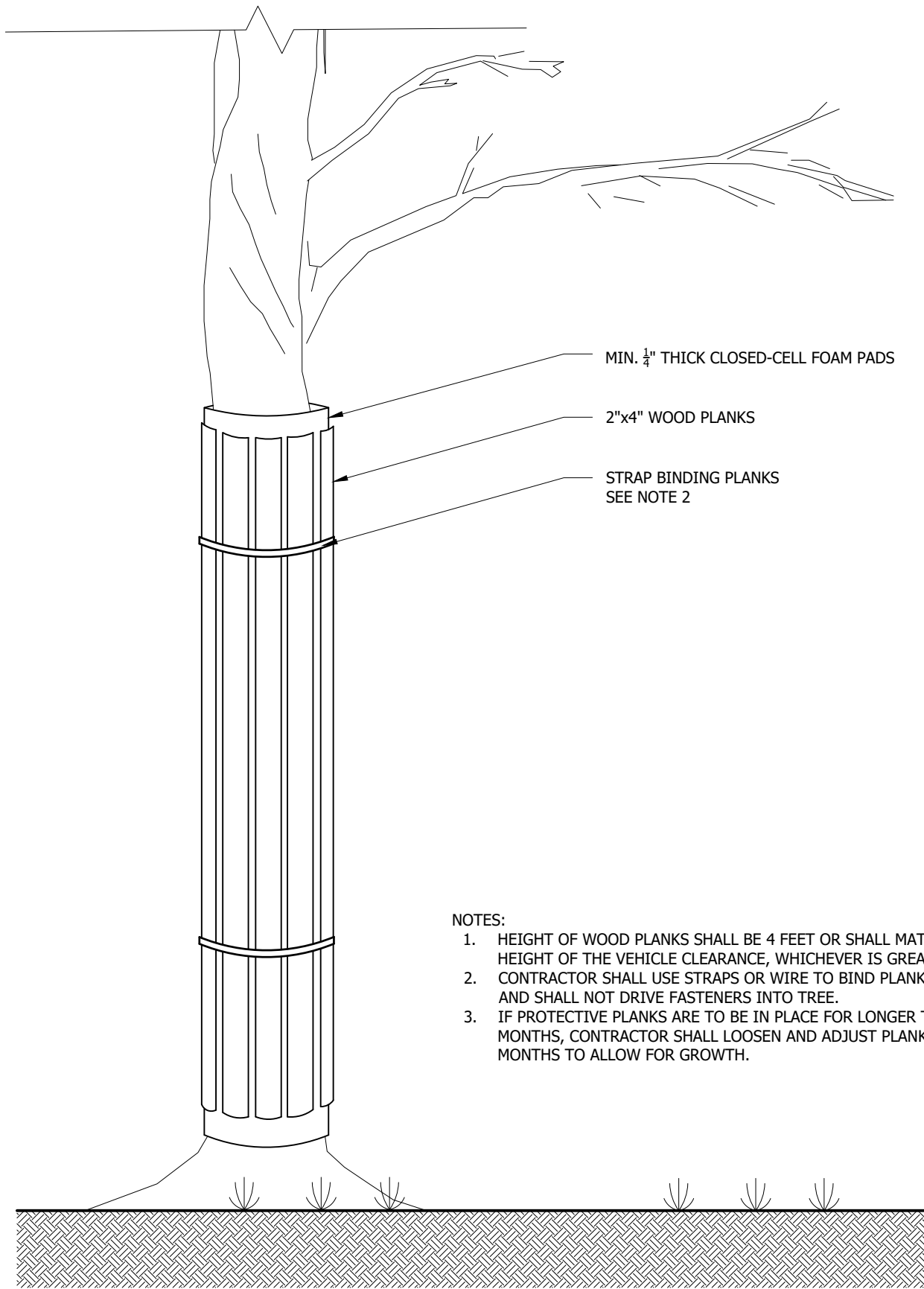
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**CONSTRUCTION TREE PROTECTION - FENCING**

VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	TJL	REVISED NOTATIONS & LANGUAGE

SCALE: N.T.S.

DRAWING NUMBER:  
**C-46**



NOTES:

1. HEIGHT OF WOOD PLANKS SHALL BE 4 FEET OR SHALL MATCH THE HEIGHT OF THE VEHICLE CLEARANCE, WHICHEVER IS GREATER.
2. CONTRACTOR SHALL USE STRAPS OR WIRE TO BIND PLANKS IN PLACE, AND SHALL NOT DRIVE FASTENERS INTO TREE.
3. IF PROTECTIVE PLANKS ARE TO BE IN PLACE FOR LONGER THAN 6 MONTHS, CONTRACTOR SHALL LOOSEN AND ADJUST PLANKS EVERY 3 MONTHS TO ALLOW FOR GROWTH.



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**CONSTRUCTION TREE PROTECTION - PLANKING**

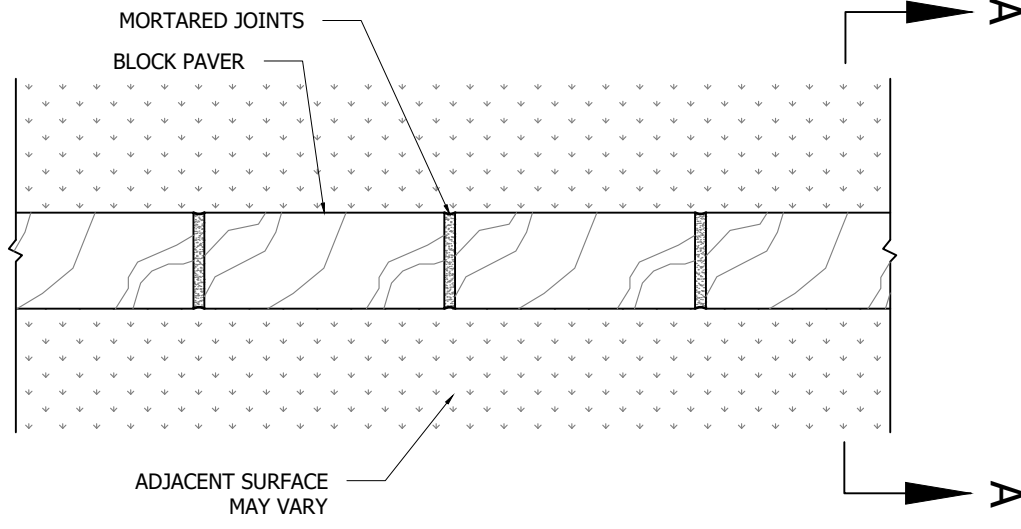
VS.	DATE	INITIALS	REASON
1	09/01/2016		

SCALE: N.T.S.

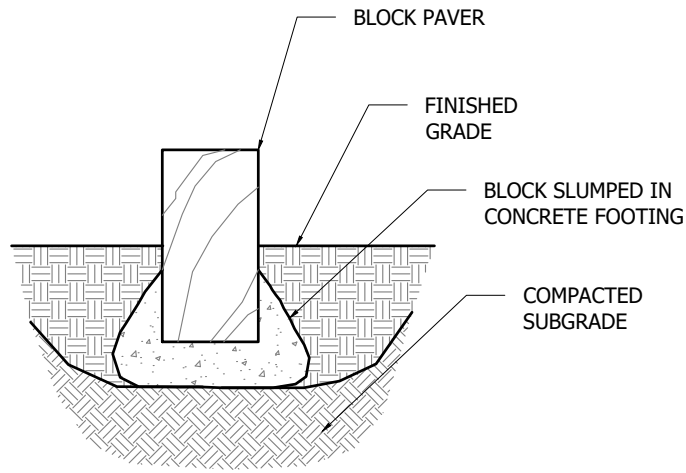
DRAWING NUMBER:

**C-47**





PLAN



SECTION A-A

NOTES:

1. ADJACENT SURFACE TO BLOCK EDGING MAY VARY.
2. MATERIAL OF BLOCK MAY VARY. REFER TO DESIGN PLANS FOR SPECIFIED MATERIAL.
3. A MINIMUM OF  $\frac{1}{3}$  OF BLOCK SHOULD BE BURIED TO PREVENT ANY SHIFTING.



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**BLOCK EDGING**

VS.	DATE	INITIALS	REASON
1	06/01/2018	TJL	

SCALE: N.T.S.

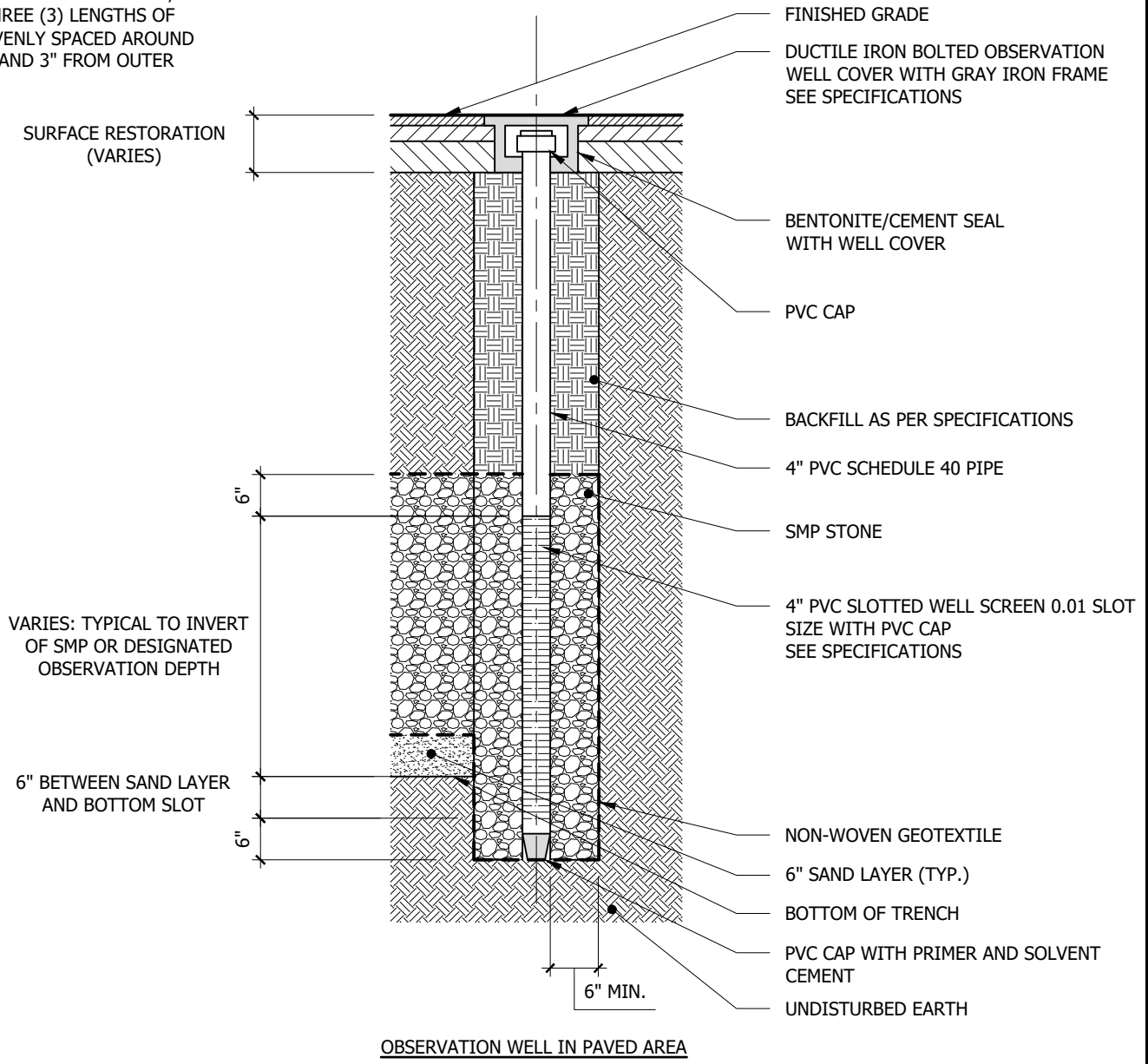
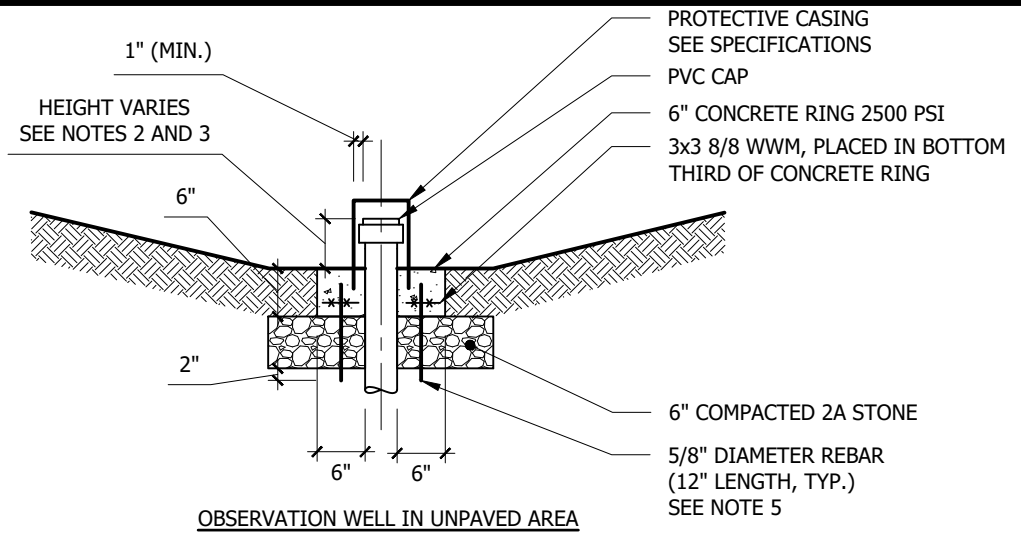
DRAWING NUMBER:

**C-48**

# Monitoring Details

**NOTES:**

1. WELL COVER SHALL BE SECURED IN CONCRETE SURROUND (1'-4" TOTAL DIAMETER) IF WELL IS NOT OTHERWISE SECURED BY SURFACE RESTORATION.
2. FOR OBSERVATION WELLS LOCATED WITHIN SURFACE SMPs, PVC CAP SHALL EXTEND 3" ABOVE MAXIMUM PONDING DEPTH.
3. OBSERVATION WELLS LOCATED IN UNPAVED AREAS (NO SURFACE SMPs) SHALL BE FLUSH WITH FINISHED GRADE.
4. OBSERVATION WELLS AREA TO BE LOCATED AS SHOWN ON PLANS.
5. FOR OBSERVATION WELLS LOCATED IN UNPAVED AREAS, PLACE THREE (3) LENGTHS OF REBAR EVENLY SPACED AROUND COLLAR, AND 3" FROM OUTER EDGE.



OBSERVATION WELL IN INFILTRATION TRENCH			
VS.	DATE	INITIALS	REASON
1	09/01/2016		

SCALE: N.T.S.

DRAWING NUMBER:  
**C-49**



2" PVC CAP  
SEE SPECIFICATIONS

FINISHED GRADE

MONITORING WELL MANHOLE WITH  
BOLT DOWN COVER  
SEE SPECIFICATIONS

SURFACE  
RESTORATION  
(VARIES)

**NOTES:**

1. CONTRACTOR TO PERFORM GEOTECHNICAL DRILLING TO A DEPTH AS REQUIRED TO DETERMINE THE EXISTING GROUNDWATER ELEVATION.
2. LENGTH OF WELL SCREEN TO BE DETERMINED BY ENGINEER BASED ON RESULTS OF GEOTECHNICAL DRILLING.
3. TOP OF WELL SCREEN TO EXTEND A MINIMUM OF 5 FEET BELOW DETERMINED WATER TABLE AT WELL LOCATION.
4. DESIGN MIX FOR BENTONITE/CEMENT GROUT SHALL CONSIST OF THE FOLLOWING: 5 GALLONS WATER, 94 LBS CEMENT, AND 10 LBS BENTONITE.
5. WELL COVER SHALL BE SECURED IN CONCRETE SURROUND (1'-6" TOTAL DIAMETER) IF WELL IS NOT OTHERWISE SECURED BY SURFACE RESTORATION.
6. WELL CASING IS TO EXTEND 6" ABOVE BOTTOM OF THE COVER'S FRAME.

VARIES  
(SEE NOTES)

2'-0"

2'-0"

VARIES  
(SEE NOTES)

1'-0"

2"

2" SOLID PVC SCHEDULE 40 CASING.  
SEE SPECIFICATIONS

BENTONITE / CEMENT GROUT

BENTONITE SEAL

MORIE NO. 1 GRAVEL OR  
EQUIVALENT (TYP.)

2" PVC SLOTTED WELL SCREEN. 0.01  
SLOT SIZE, W. SLEEVE.  
SEE SPECIFICATIONS

UNDISTURBED EARTH (TYP.)

2" PVC PLUG  
SEE SPECIFICATIONS



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**GROUNDWATER MONITORING WELL**

VS.	DATE	INITIALS	REASON
1	09/01/2016		

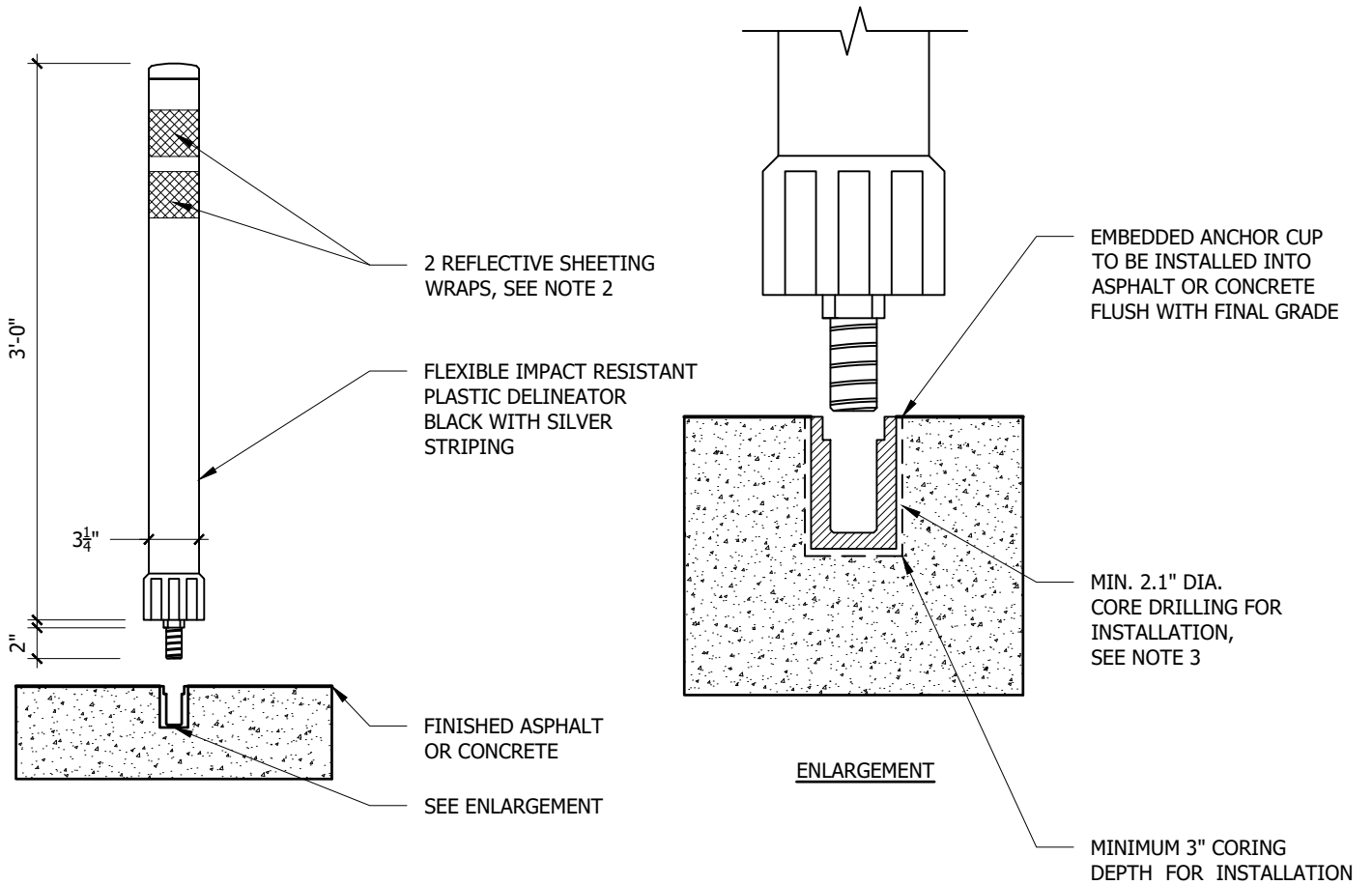
SCALE: N.T.S.

DRAWING NUMBER:

**C-51**

# Traffic Protection Details





**NOTES:**

1. INSTALLATION TO BE COMPLETED AS SPECIFIED BY MANUFACTURER
2. DELINEATOR AND REFLECTIVE STRIPS MUST MEET MUTCD SECTION 3F.02
3. ANCHOR TO BE SECURED IN PAVEMENT WITH EPOXY AS PER MANUFACTURER'S INSTRUCTIONS



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**TRAFFIC DELINEATOR**

VS.	DATE	INITIALS	REASON
1	09/01/2016		

SCALE: N.T.S.

DRAWING NUMBER:

**C-52**

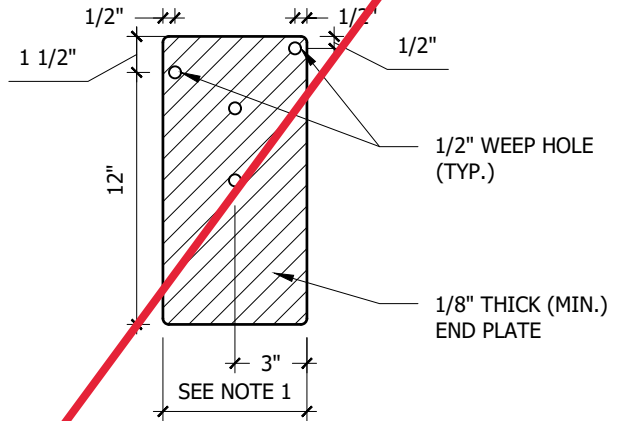
CONCRETE APRON  
SEE COMPONENT  
DETAIL

STREET

WHEEL GUARD

FOOTWAY

PLAN

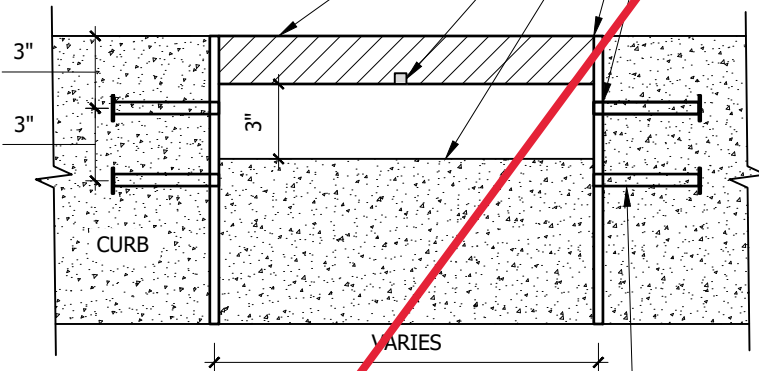


SIDE

HOLLOW STRUCTURAL SECTION  
3/16"  $\phi$  WEEP HOLE  
BOTTOM OF CURB OPENING  
WELD/GRIND SMOOTH (TYP.  
BOTH SIDES)  
SEE NOTE 2  
SEE SIDE DETAIL

NOTES:

1. MATCH CURB WIDTH.
2. WHEEL GUARD MUST BE FLUSH WITH TOP OF CURB.
3. WHEEL GUARD MATERIALS AND DIMENSIONS TO BE SPECIFIED ON A PER PROJECT BASIS.
4. WHEEL GUARD SHALL BE DESIGNED TO WITHSTAND H-20 LOADING.
5. WHEEL GUARD SHALL BE METAL CHANNEL MEETING THE REQUIREMENTS OF ASTM A-500 GRADE B, CAST IRON, OR GRAY IRON. ALTERNATE MATERIALS CAN BE APPROVED BY PWD.



FRONT



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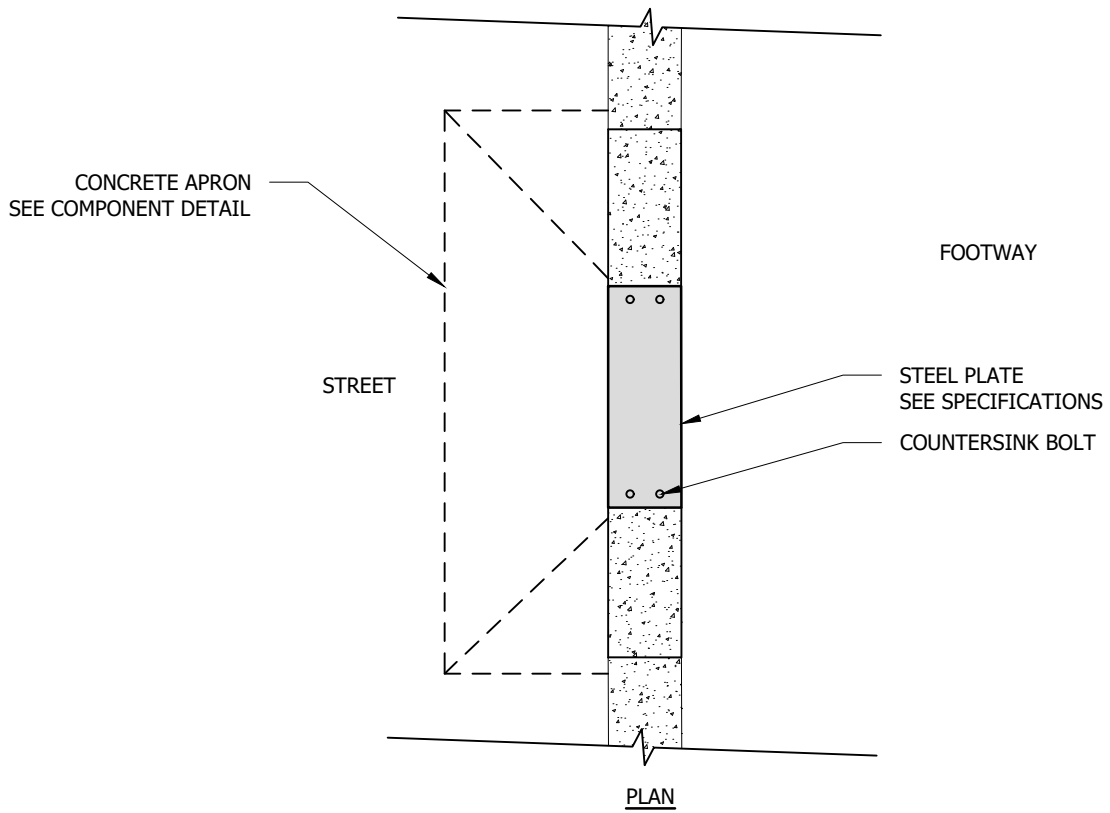
WHEEL GUARD

SCALE: N.T.S.

VS.	DATE	INITIALS	REASON
1	09/01/2016		
2	06/01/2018	MJD	FORMERLY ALTERNATE WHEEL GUARD

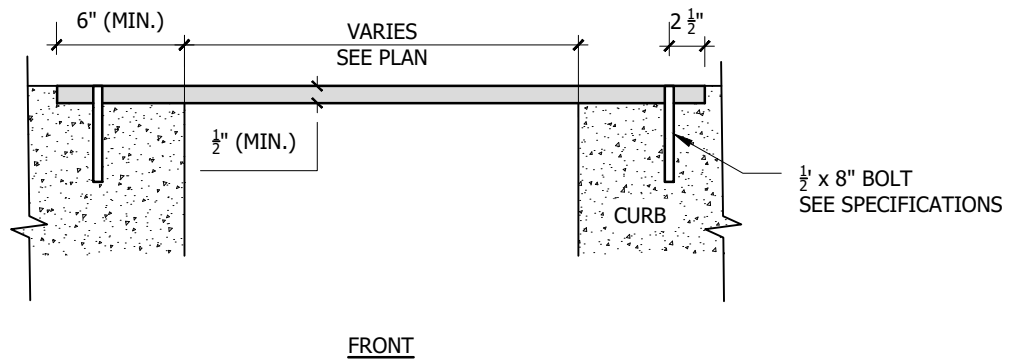
DRAWING NUMBER:

**C-53**



**NOTES:**

1. LONG EDGES OF STEEL PLATE SHALL BE ROUNDED AND SMOOTH.
2. ALL HARDWARE SHALL BE SET FLUSH WITH TOP SURFACE OF WHEEL GUARD.
3. STEEL PLATE MUST BE SET FLUSH WITH ADJACENT CURB.



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**WHEEL GUARD**

VS.	DATE	INITIALS	REASON
1	09/01/2016		

SCALE: N.T.S.

DRAWING NUMBER:

**C-54**