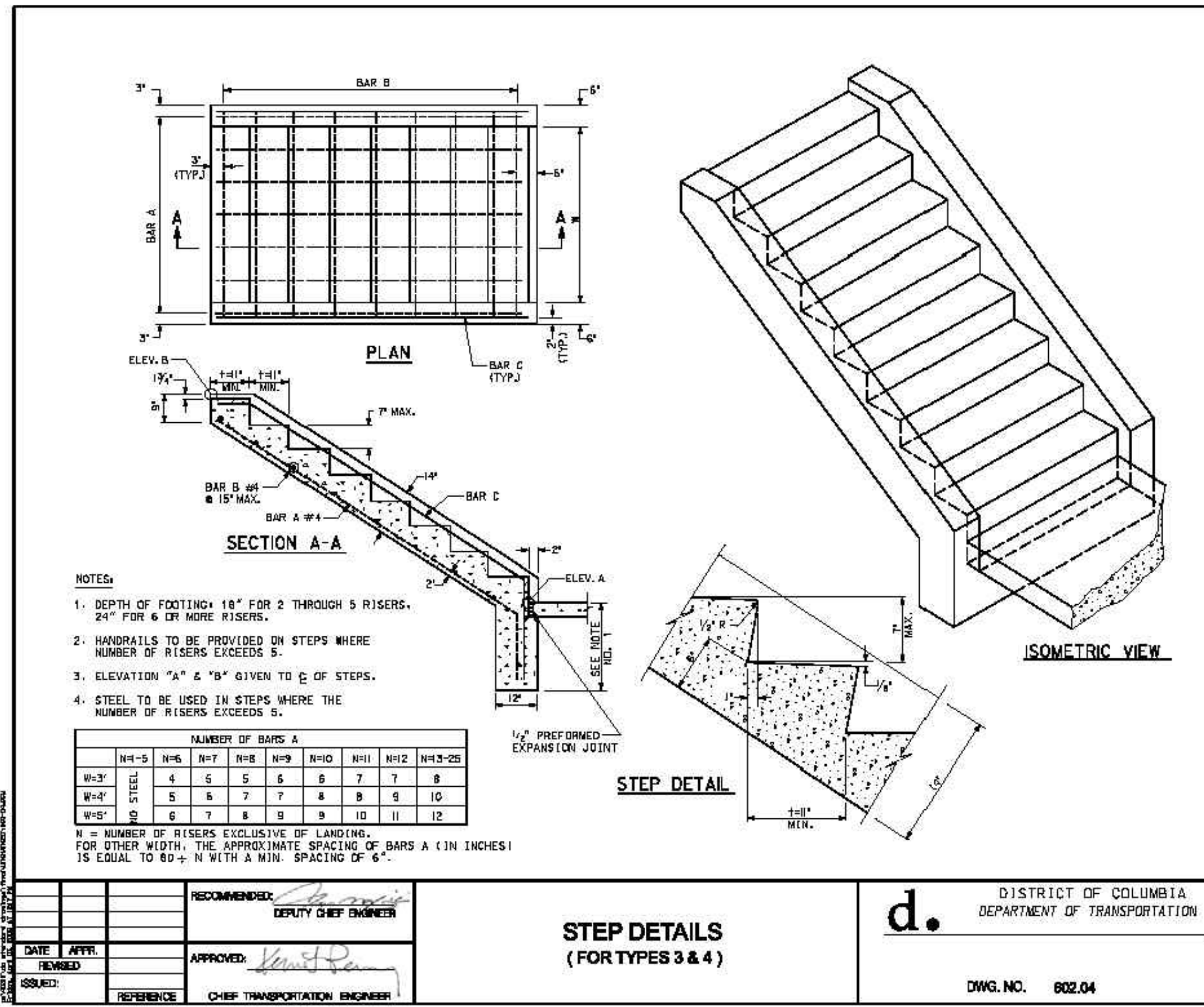
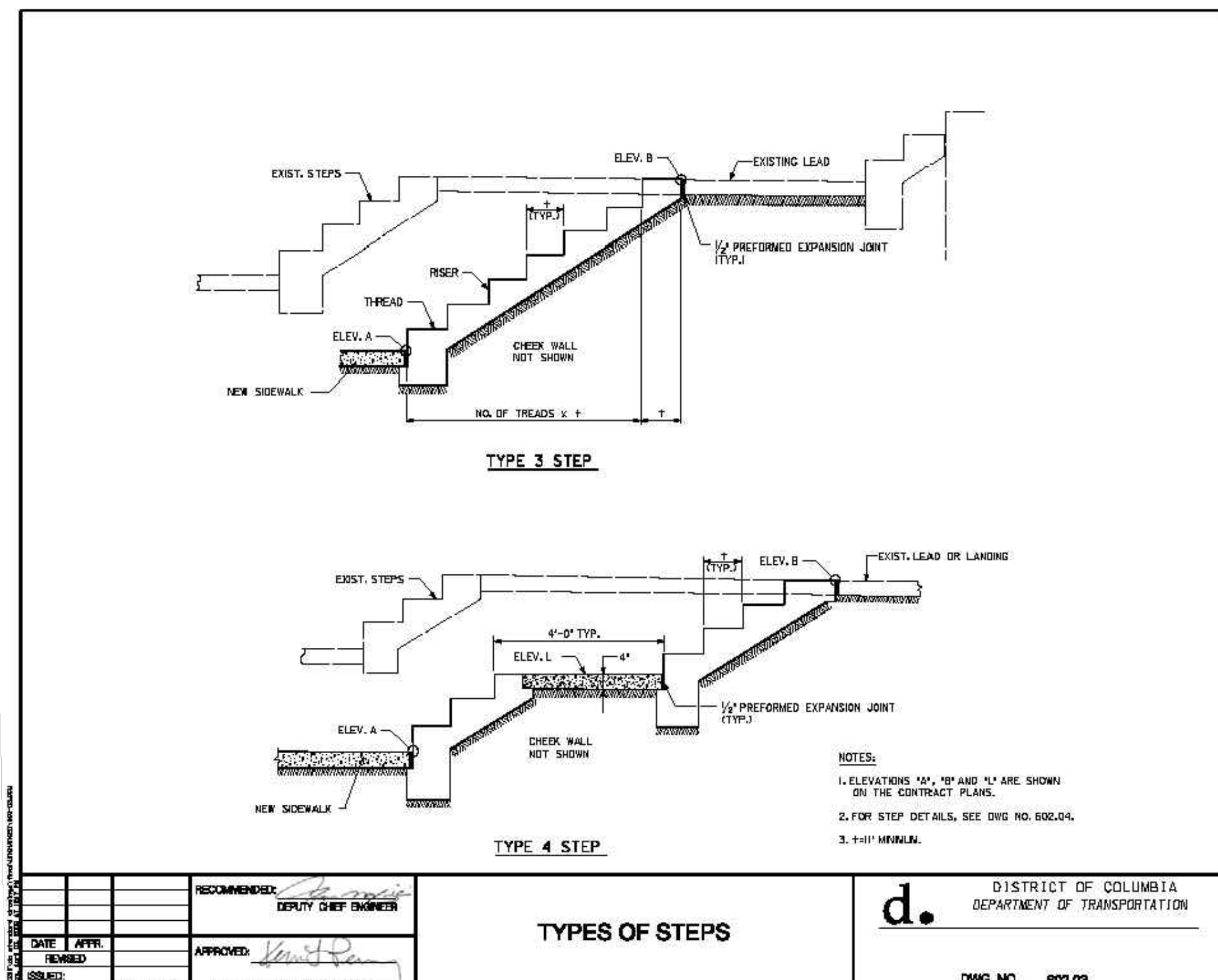


Material	Specification	Notes
Filter Media	See Table 3.20	Minimum depth of 24 inches (18 inches for small-scale practices). To account for settling/compaction, it is recommended that 110% of the plan volume be utilized.
Mulch Layer	Use aged, shredded hardwood bark mulch	Lay a 2 to 3-inch layer on the surface of the filter bed.
Alternative Surface Cover	Use river stone or pea gravel, coir and jute matting, or turf cover.	Lay a 2 to 3-inch layer of to suppress weed growth.
Top Soil For Turf Cover	Loamy sand or sandy loam texture, with less than 5% clay content, pH corrected to between 6 and 7, and an organic matter content of at least 2%.	3-inch tilled into surface layer.
Geotextile or Choking Layer	An appropriate geotextile fabric that complies with AASHTO M-288 Class 2, latest edition, requirements and has a permeability of at least an order of magnitude higher (10x) than the soil subgrade permeability must be used. Lay a 2 to 4 inch layer of choker stone (e.g., typically No.8 or No.89 washed gravel) over the underdrain stone.	Can use in place of the choking layer where the depth of the practice is limited. Geotextile fabric may be used on the sides of bioretention areas, as well.
Underdrain stone	1-inch diameter stone must be double-washed and clean and free of all fines (e.g., ASTM D448 No. 57 or smaller stone).	At least 2 inches above and below the underdrain.
Storage Layer (optional)	To increase storage for larger storm events, chambers, perforated pipe, stone, or other acceptable material can be incorporated below the filter media layer	
Impermeable Liner (optional)	Where appropriate, use a thirty mil (minimum) PVC Geomembrane liner	
Cleanouts, and Observation Wells	Use 4- or 6-inch rigid schedule 40 PVC pipe, or equivalent corrugated HDPE for small bioretention BMPs, with 3/8-inch perforations at 6 inches on center. Multiple underdrains are necessary for bioretention areas wider than 40 feet, and each underdrain must be located no more than 20 feet from the next pipe or the edge of the bioretention.	Lay the perforated pipe under the length of the bioretention cell, and install non-perforated pipe as needed to connect with the storm drain system or to daylight in a stabilized conveyance. Install T's and Y's as needed, depending on the underdrain configuration. Extend cleanout pipes to the surface.



**STORM DRAIN DETAIL AND NOTES**



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**MURCH ELEMENTARY SCHOOL ADDITION & MODERNIZATION**

4810 36TH ST. NW WASHINGTON DC, 20008

Project Number: 2015-4810

Revisions		
Revision Number	Revision Date	Revision Description
1	12/21/2016	ISSUE FOR CONSTRUCTION

Issue Date: 12/21/2016

Sheet Title: STORM DRAIN DETAIL AND NOTES

Sheet Number: CIV510

12-21-2016



3.2.6 Green Roof Construction Sequence

Green Roof Installation. Given the diversity of extensive vegetated roof designs, there is no typical step-by-step construction sequence for proper installation. The following general construction considerations are noted:

- Construct the roof deck with the appropriate slope and material.
Install the waterproofing method, according to manufacturer's specifications.
Conduct a flood test to ensure the system is watertight by placing at least 2 inches of water over the membrane for 48 hours to confirm the integrity of the waterproofing system.

- The growing media should be mixed prior to delivery to the site. Media must be spread evenly over the filter fabric surface as required by the manufacturer.
The growing media should be moistened prior to planting, and then planted with the ground cover and other plant materials, per the planting plan or in accordance with ASTM E2400.

- Most construction contracts should contain a Care and Replacement Warranty that specifies at least 50 percent coverage after one year and 80 percent coverage after two years for plugs and cuttings, and 90 percent coverage after one year for Sedum carpet/tile.

Construction Supervision. Supervision during construction is recommended to ensure that the vegetated roof is built in accordance with these specifications. Inspection checklists should be used that include sign-offs by qualified individuals at critical stages of construction and confirm that the contractor's interpretation of the plan is consistent with the intent of the designer and/or manufacturer.

An experienced installer should be retained to construct the vegetated roof system. The vegetated roof should be constructed in sections for easier inspection and maintenance access to the membrane and roof drains. Careful construction supervision/inspection is needed throughout the installation of a vegetated roof, as follows:

- During placement of the waterproofing layer, to ensure that it is properly installed and watertight.
During placement of the drainage layer and drainage system.
During placement of the growing media, to confirm that it meets the specifications and is applied to the correct depth (certification for vendor or source should be provided).

DDOE's construction phase inspection checklist for green roof practices can be found in Appendix K.

3.5.6 Permeable Pavement Construction Sequence

Experience has shown that proper installation is absolutely critical to the effective operation of a permeable pavement system.

Soil Erosion and Sediment Controls. The following soil erosion and sediment control guidelines must be followed during construction:

- All permeable pavement areas must be fully protected from sediment intrusion by silt fence or construction fencing, particularly if they are intended to infiltrate runoff.
Permeable pavement areas intended to infiltrate runoff must remain outside the limit of disturbance during construction to prevent soil compaction by heavy equipment and loss of design infiltration rate (unless the area has been determined to have a low CBR and will require compaction during the permeable pavement construction phase).

infiltration rates then deep tilling practices may be used in an effort to restore those rates. In this case further testing must be done to establish design rates exist before the permeable pavement can be installed.

- Permeable pavement areas must be clearly marked on all construction documents and grading plans.
During construction, care should be taken to avoid tracking sediments onto any permeable pavement surface to avoid post construction clogging and long term maintenance issues.
Any area of the site intended ultimately to be a permeable pavement area with an infiltration component must not be used as the site of a temporary sediment trap or basin.

Permeable Pavement Installation. The following is a typical construction sequence to properly install permeable pavement, which may need to be modified depending on the particular type of permeable pavement that is being installed.

- Step 1: Stabilize Drainage Area. Construction of the permeable pavement should only begin after the entire contributing drainage area has been stabilized.
Step 2: Install Soil Erosion and Sediment Control Measures for the Bioretention.
Step 3: Minimize Impact of Heavy Installation Equipment.
Step 4: Promote Infiltration Rate.

depth and dimensions. For small pavement applications, excavating equipment should have arms with adequate extension so they do not have to work inside the footprint of the permeable pavement area (to avoid compaction). Contractors can utilize a cell construction approach, whereby the proposed permeable pavement area is split into 500- to 1,000-square foot temporary cells with a 10- to 15-foot wide earth bridge in between, so cells can be excavated from the side.

- Step 5: Order of Materials. Geotextile fabric should be installed on the sides of the reservoir layer and the bottom if the design calls for it.
Step 6: Install Base Material Components.
Step 7: Stone Media.
Step 8: Reservoir Media.
Step 9: Paving Media.

Installation of Porous Asphalt. The following has been excerpted from various documents, most notably Jackson (2007):

- Install porous asphalt pavement similarly to regular asphalt pavement. The pavement should be laid in a single lift over the filter course. The laying temperature should be between 230oF and 260oF, with a minimum air temperature of 50°F, to ensure the surface does not stiffen before compaction.

- Complete compaction of the surface course when the surface is cool enough to resist a 10-ton roller. One or two passes of the roller are required for proper compaction.
Transport the mix to the site in a clean vehicle with smooth dump beds sprayed with a non-petroleum release agent.
Test the full permeability of the pavement surface by application of clean water at a rate of at least five gallons per minute over the entire surface.

Installation of Pervious Concrete. The basic installation sequence for pervious concrete is outlined by the National Ready Mixed Concrete Association (NRMCA) (NRMCA 2004). It is strongly recommended that concrete installers successfully complete a recognized pervious concrete installers training program, such as the Pervious Concrete Contractor Certification Program offered by the NRMCA.

- Drive the concrete truck as close to the project site as possible.
Water the underlying aggregate (reservoir layer) before the concrete is placed, so the aggregate does not draw moisture from the freshly laid pervious concrete.
After the concrete is placed, approximately 3/8 to 1/2 inches is struck off, using a vibratory screed.
Compact the pavement with a steel pipe roller.

Installation of Permeable Interlocking Concrete Pavers. The basic installation process is described in greater detail by Smith (2006):

- Place edge restraints for open-jointed pavement blocks before the bedding layer and pavement blocks are installed.
require edge restraints to prevent vehicle loads from moving the paver blocks.
Place the double washed No. 57 stone in a single lift.
Place and screed the bedding course material (typically No. 8 stone).
Fill gaps at the edge of the paved areas with cut pavers or edge units.

Construction Supervision. Supervision before, during, and after construction by a qualified professional is recommended to ensure permeable pavement is built in accordance with these specifications. Inspection checklists that require sign-offs by qualified individuals should be used at critical stages of construction to ensure the contractor's interpretation of the plan is consistent with the designer's intent.

DDOE's construction phase inspection checklist for permeable pavement practices can be found in Appendix K.

Some common pitfalls can be avoided by careful construction supervision that focuses on the following key aspects of permeable pavement installation:

- Store materials in a protected area to keep them free from mud, dirt, and other foreign materials.
The contributing drainage area should be stabilized prior to directing water to the permeable pavement area.
Check the aggregate material to confirm it is clean and washed, meets specifications and is installed to the correct depth.
Check elevations (e.g., the invert of the underdrain, inverts for the inflow, and outflow points.) and the surface slope.
Make sure the permeable pavement surface is even, runoff spreads evenly across it, and the storage bed drains within 48 hours.

Runoff diversion structures are recommended to protect larger permeable pavement applications from early runoff-producing storms away from, particularly when up-gradient conventional asphalt areas drain to the permeable pavement. This can help reduce the input of fine particles often produced shortly after conventional asphalt is laid.

3.6.6 Bioretention Construction Sequence

Soil Erosion and Sediment Controls. The following soil erosion and sediment control guidelines must be followed during construction:

- All Bioretention areas must be fully protected by silt fence or construction fencing.
Bioretention areas intended to infiltrate runoff must remain outside the limit of disturbance during construction to prevent soil compaction by heavy equipment and loss of design infiltration rate.
Where it is infeasible to keep the proposed bioretention areas outside of the limits of disturbance, there are several possible outcomes for the impacted area.

Bioretention Installation. The following is a typical construction sequence to properly install a bioretention basin. The construction sequence for micro-bioretention is more simplified. These steps may be modified to reflect different bioretention applications or expected site conditions:

- Step 1: Stabilize Drainage Area. Construction of the bioretention area may only begin after the entire contributing drainage area has been stabilized with vegetation.
Step 2: Preconstruction Meeting.
Step 3: Install Soil Erosion and Sediment Control Measures to Protect the Bioretention.
Step 4: Install Pretreatment Cells.
Step 5: Avoid Impact of Heavy Installation Equipment.
Step 6: Promote Infiltration Rate.
Step 7: Order of Materials.
Step 8: Layered Installation of Media.

Note: The batch receipt confirming the source of the soil media must be submitted to the DDOE inspector.

- Step 9: Prepare Filter Media for Plants.
Step 10: Planting.
Step 11: Secure Surface Area.
Step 12: Inflows.
Step 13: Final Inspection.

Construction Supervision. Supervision during construction is recommended to ensure that the bioretention area is built in accordance with the approved design and this specification. Qualified individuals should use detailed inspection checklists that include sign-offs at critical stages of construction, to ensure that the contractor's interpretation of the plan is consistent with the designer's intentions.

DDOE's construction phase inspection checklist can be found in Appendix K.

3.8.6 Infiltration Construction Sequence

Infiltration practices are particularly vulnerable to failure during the construction phase for two reasons. First, if the construction sequence is not followed correctly, construction sediment can clog the practice. In addition, loading from heavy construction equipment can result in compaction of the soil, which can then reduce the soil's infiltration rate. For this reason, a careful construction sequence needs to be followed.

During site construction, the following protective measures are absolutely critical:

- All areas proposed for infiltration practices should be fully protected from sediment intrusion by silt fence or construction fencing, particularly if they are intended to infiltrate runoff.
Avoid excessive compaction by preventing construction equipment and vehicles from traveling over the proposed location of the infiltration practice.
When this is unavoidable, there are several possible outcomes for the impacted area.
Any area of the site intended ultimately to be an infiltration practice must not be used as the site of a temporary sediment trap or basin.

Infiltration Installation. The actual installation of an infiltration practice is done using the following steps:

- Step 1: Avoid Impact of Heavy Installation Equipment.
Step 2: Hang Geotextile Walls.
Step 3: Promote Infiltration Rate.
Step 4: Observation Wells.
Step 5: Stabilize Surrounding Area.

Construction Supervision. Supervision during construction is recommended to ensure that the infiltration practice is built in accordance with the approved design and this specification. Qualified individuals should use detailed inspection checklists that include sign-offs at critical stages of construction, to ensure that the contractor's interpretation of the plan is consistent with the designer's intentions.

DDOE's construction phase inspection checklist for infiltration practices can be found in Appendix K.



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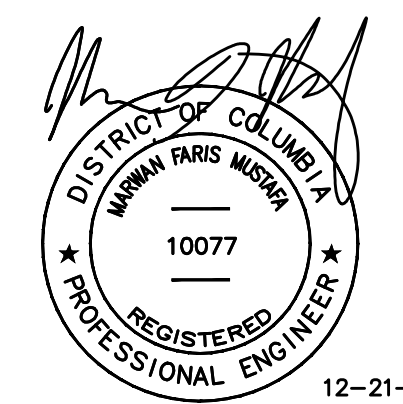
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Project Number:
2015-4810

Table with 3 columns: Revision Number, Revision Date, Revision Description. Row 1: 1, 12/21/2016, ISSUE FOR CONSTRUCTION

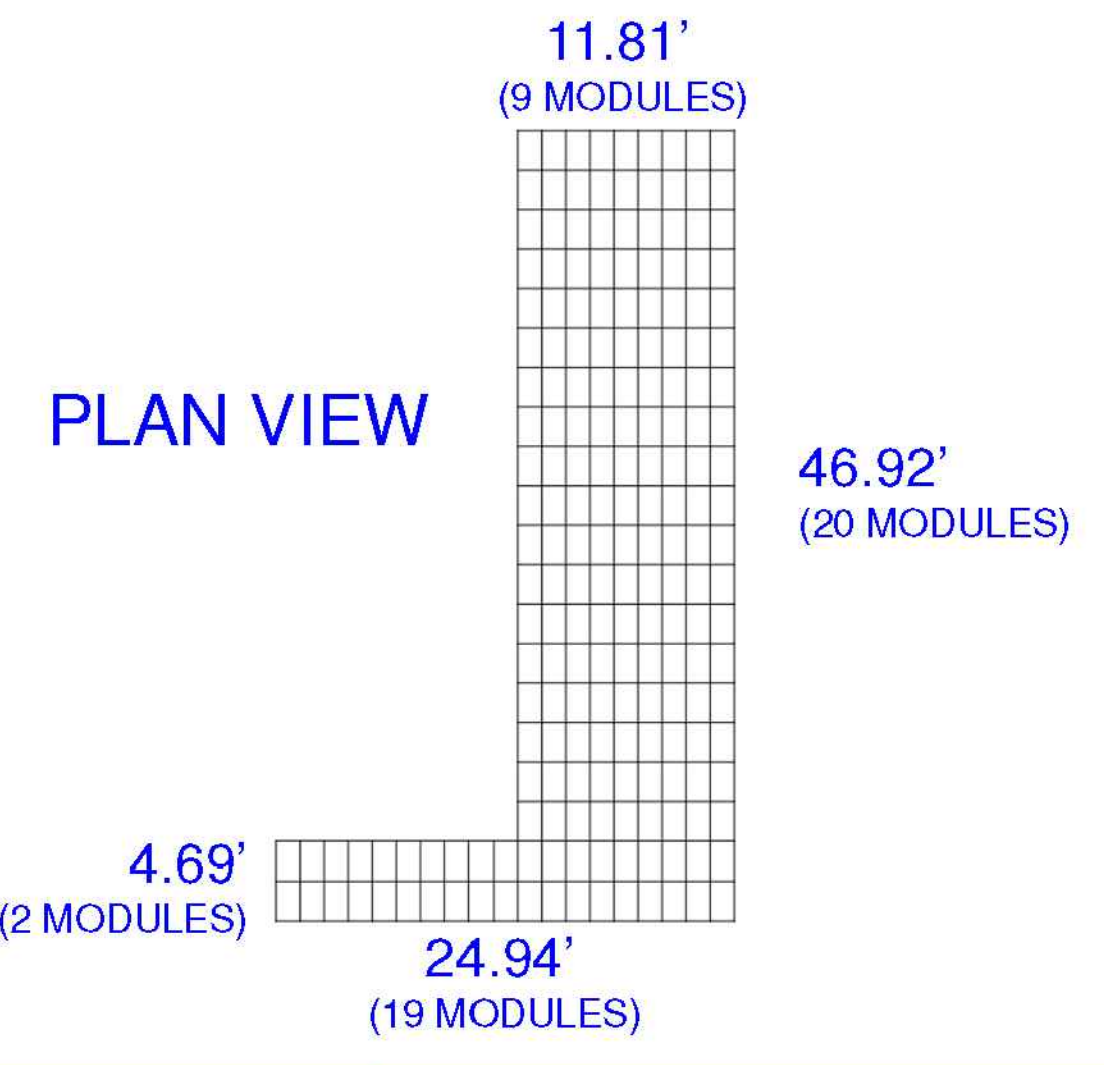
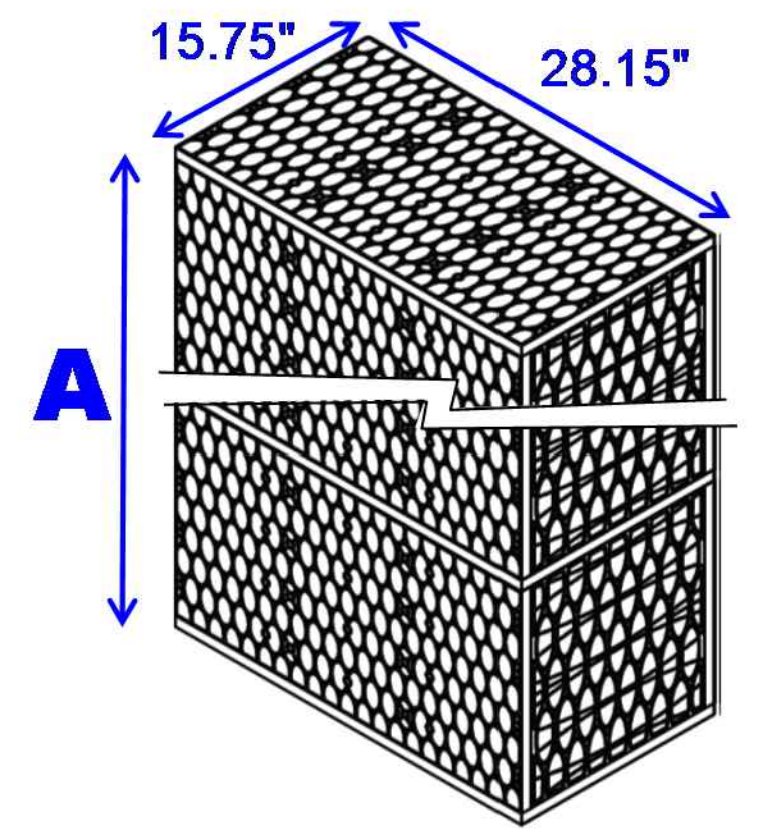
Issue Date: 12/21/2016
Sheet Title: STORM DRAIN DETAIL AND NOTES
Sheet Number:

CIV511
12-21-2016





Stormwater System Details		
A	System Depth	1.44 Feet 17.316 Inches
B	System Length	See Below
C	System Width	See Below
	R-Tank <sup>HD</sup> Unit	Single
	Total No. of Units	200 Units
	System Capacity	844 cubic feet

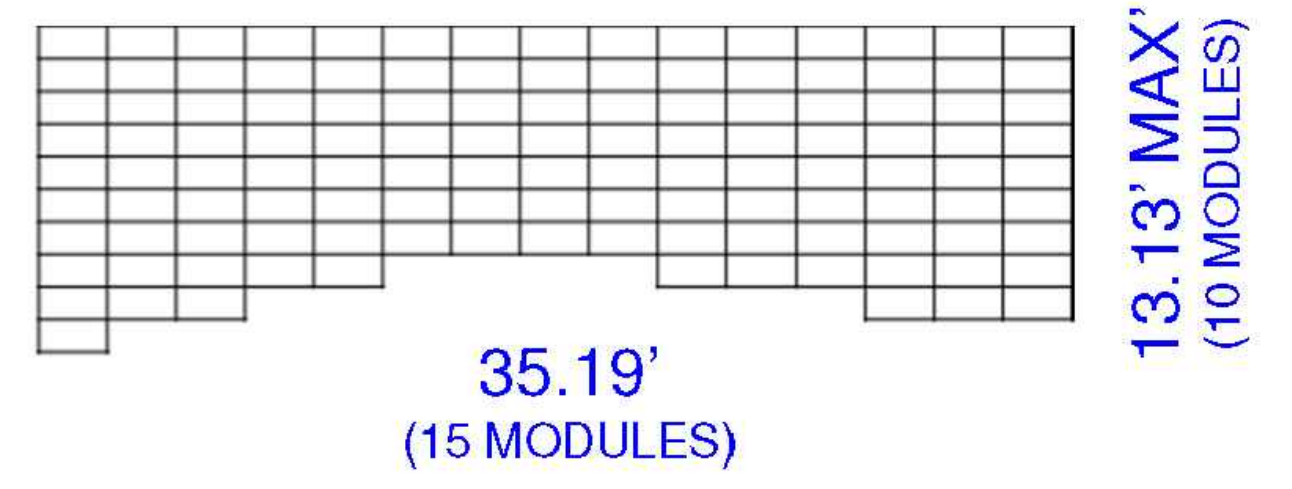


Individual R-Tank<sup>HD</sup> Unit

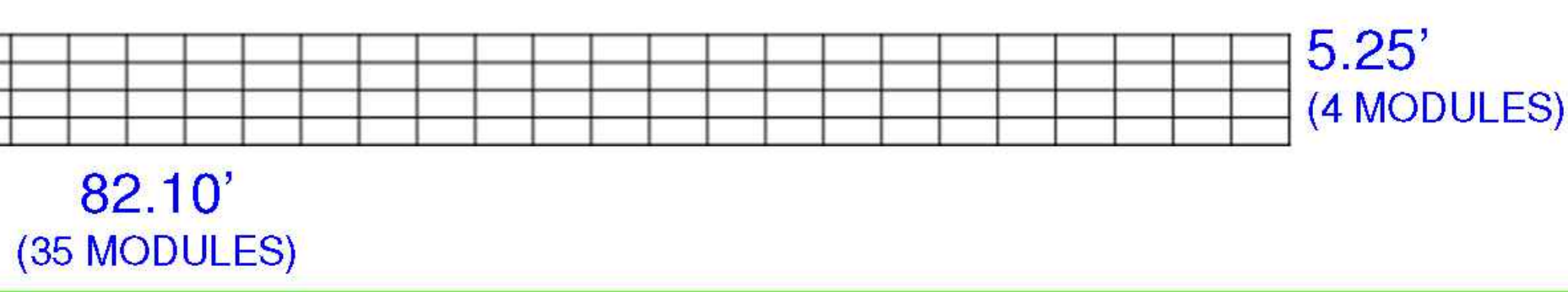
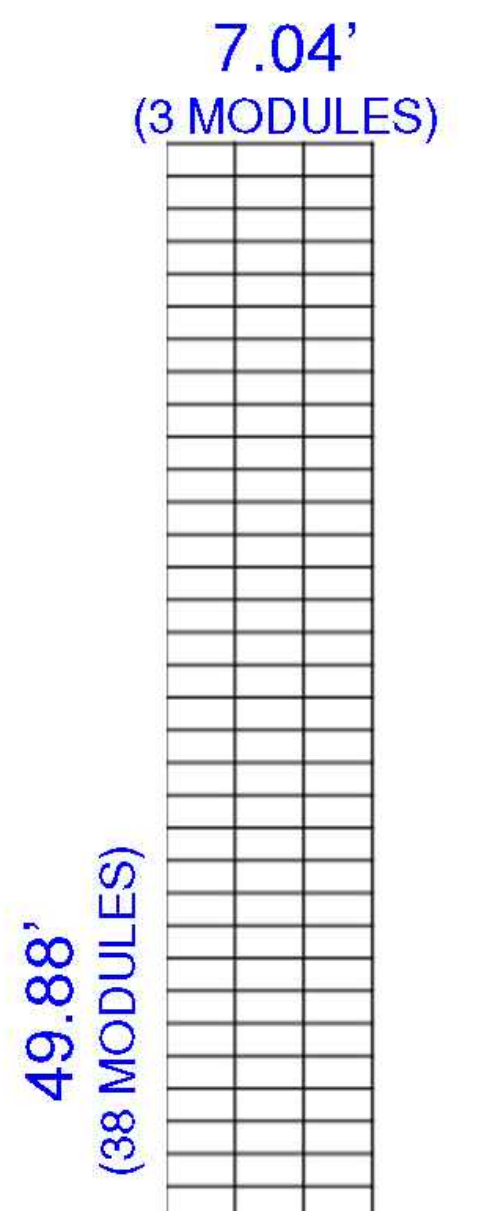
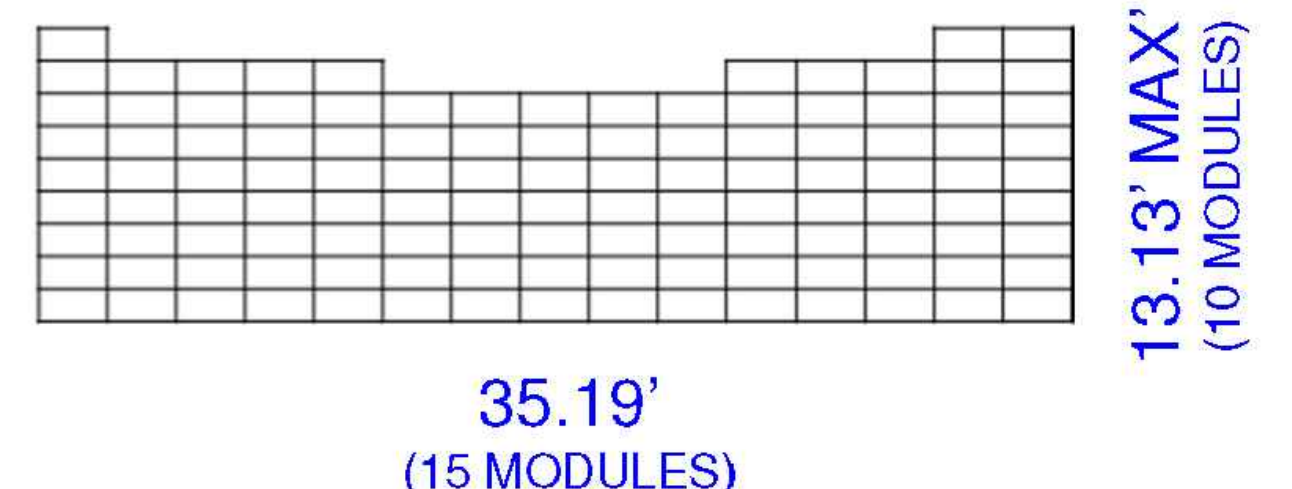
**ACF ENVIRONMENTAL**  
**R-Tank<sup>HD</sup> System for:**  
**Murch Elementary School**  
 FOR ADDITIONAL INFORMATION PLEASE CONTACT: ACF ENVIRONMENTAL 800-448-3636 www.acfenvironmental.com

**BR-1**  
 242 Single Modules  
 1017.02 cf

**BR-2**  
 123 Single Modules  
 519.06 cf



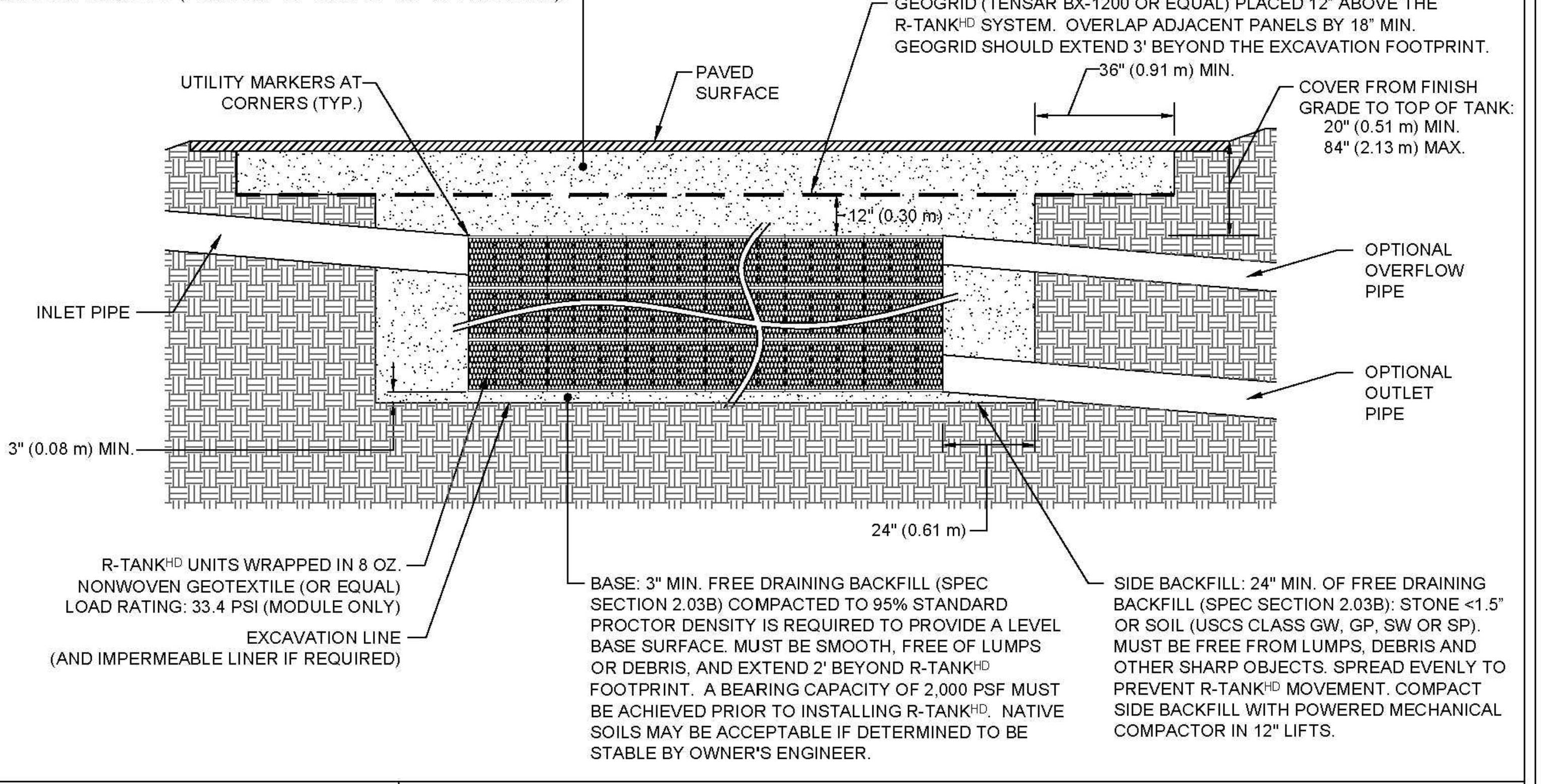
**BR-3**  
 118 Single Modules  
 497.96 cf



**ACF ENVIRONMENTAL**  
**R-Tank<sup>HD</sup> System for:**  
**Murch Elementary School – BIORETENTION SYSTEMS**  
 FOR ADDITIONAL INFORMATION PLEASE CONTACT: ACF ENVIRONMENTAL 800-448-3636 www.acfenvironmental.com

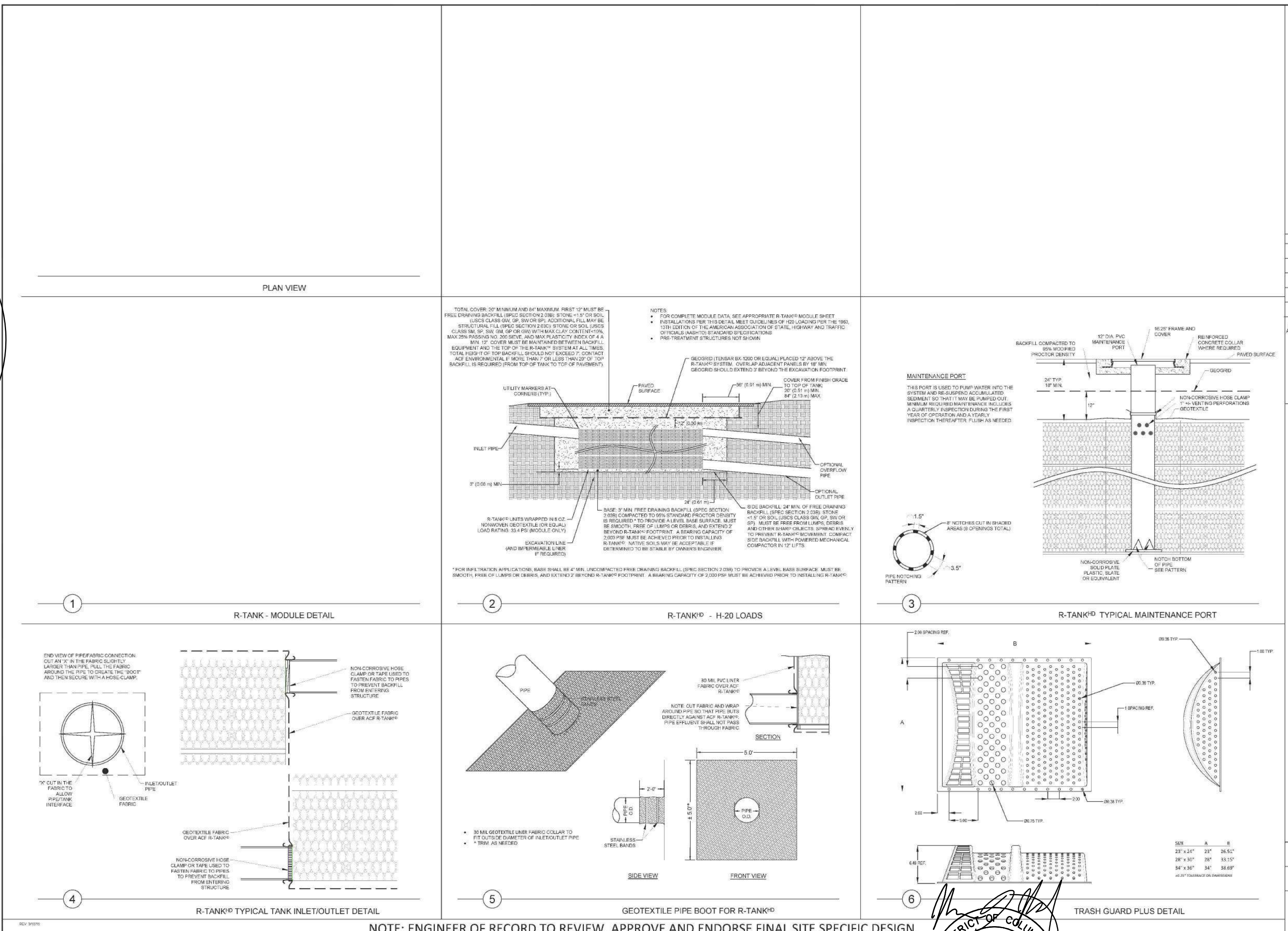
TOTAL COVER: 20" MINIMUM AND 84" MAXIMUM. FIRST 12" MUST BE FREE DRAINING BACKFILL (SPEC SECTION 2.03B): STONE <1.5" OR SOIL (USCS CLASS GW, GP, SW OR SP). ADDITIONAL FILL MAY BE STRUCTURAL FILL (SPEC SECTION 2.03C): STONE OR SOIL (USCS CLASS SM, SP, SW, GM, GP OR GW) WITH MAX CLAY CONTENT <10%, MAX 25% PASSING NO. 200 SIEVE, AND MAX PLASTICITY INDEX OF 4. A MIN. 12" COVER MUST BE MAINTAINED BETWEEN BACKFILL EQUIPMENT AND THE TOP OF THE R-TANK<sup>TM</sup> SYSTEM AT ALL TIMES. TOTAL HEIGHT OF TOP BACKFILL SHOULD NOT EXCEED 7'. CONTACT ACF ENVIRONMENTAL IF MORE THAN 7" OR LESS THAN 20" OF TOP BACKFILL IS REQUIRED (FROM TOP OF TANK TO TOP OF PAVEMENT).

- NOTES:
- FOR COMPLETE MODULE DATA, SEE APPROPRIATE R-TANK<sup>HD</sup> MODULE SHEET
  - INSTALLATIONS PER THIS DETAIL MEET GUIDELINES OF H2O LOADING PER THE 1983, 13TH EDITION OF THE AMERICAN ASSOCIATION OF STATE, HIGHWAY AND TRAFFIC OFFICIALS (AASHTO) STANDARD SPECIFICATIONS
  - PRE-TREATMENT STRUCTURES NOT SHOWN
  - FOR INFILTRATION APPLICATIONS, BASE SHALL BE 4" MIN. UNCOMPACTED FREE DRAINING BACKFILL (SPEC SECTION 2.03B) TO PROVIDE A LEVEL BASE SURFACE. MUST BE SMOOTH, FREE OF LUMPS OR DEBRIS, AND EXTEND 2' BEYOND R-TANK<sup>HD</sup> FOOTPRINT. A BEARING CAPACITY OF 2,000 PSF MUST BE ACHIEVED PRIOR TO INSTALLING R-TANK<sup>HD</sup>.
  - GEOGRID (TENSAR BX-1200 OR EQUAL) PLACED 12" ABOVE THE R-TANK<sup>HD</sup> SYSTEM. OVERLAP ADJACENT PANELS BY 18" MIN. GEOGRID SHOULD EXTEND 3' BEYOND THE EXCAVATION FOOTPRINT.



R-TANK<sup>HD</sup> - HS-20 LOADS

**ACF ENVIRONMENTAL**  
 LET'S GET IT DONE  
 FOR ADDITIONAL INFORMATION PLEASE CONTACT: ACF ENVIRONMENTAL, 1-800-448-3636, www.acfenvironmental.com 9/16



R-TANK<sup>HD</sup> DETAILS

DATE	REVISION

PROJECT NUMBER: 2015-4810

Revision Number	Revision Date	Revision Description
1	12/21/2016	ISSUE FOR CONSTRUCTION

PROJECT NAME  
 ADDRESS

PROJECT NO.  
 C0

DATE

ISSUE DATE: 12/21/2016

SHEET TITLE: STORM DRAIN DETAIL AND NOTES

SHEET NUMBER:



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1	12/21/2016	ISSUE FOR CONSTRUCTION

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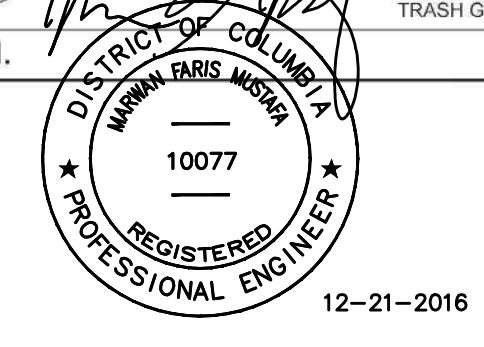
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ISSUE DATE: 12/21/2016

SHEET TITLE: STORM DRAIN DETAIL AND NOTES

SHEET NUMBER:

CIV512



12-21-2016



PART 1 - GENERAL

- 1.01 Related Documents
- 1.02 Description of Work Included
- 1.03 Quality Control
- 1.04 Submittals
- 1.05 Delivery, Storage, and Handling
- 1.06 Preinstallation Conference
- 1.07 Project Conditions

PART 2 - PRODUCTS

- 2.01 R-Tank Units

PROPERTY	DESCRIPTION	R-Tank VALUE	R-Tank <sup>RD</sup> VALUE	R-Tank <sup>SD</sup> VALUE
Void Area	Volume available for water storage	95%	95%	95%
Surface Void Area	Percentage of exterior available for infiltration	90%	90%	90%
Compressive Strength	ASTM D 2412 / ASTM F 2419	30.0 psi	33.4 psi	42.9 psi
HS-20 Minimum Cover	Cover required to support HS-20 loads	N/A	20"	18"
HS-25 Minimum Cover	Cover required to support HS-25 loads	N/A	24"	19"
Maximum Cover	Maximum allowable cover depth	3 feet	< 7 feet	< 10 feet
Unit Weight	Weight of plastic per cubic foot of tank	3.29 lbs / cf	3.62 lbs/cf	3.96 lbs / cf
Rib Thickness	Thickness of load-bearing members	0.18 inches	0.18 inches	0.18 inches
Service Temperature	Safe temperature range for use	-14 - 167° F	-14 - 167° F	-14 - 167° F

- 2.02 Geosynthetics

- A. Geotextile
- 1. Infiltration Applications
- 2. Infiltration Applications
- B. Geogrid

- 2.03 Backfill & Cover Materials

PART 3 - EXECUTION

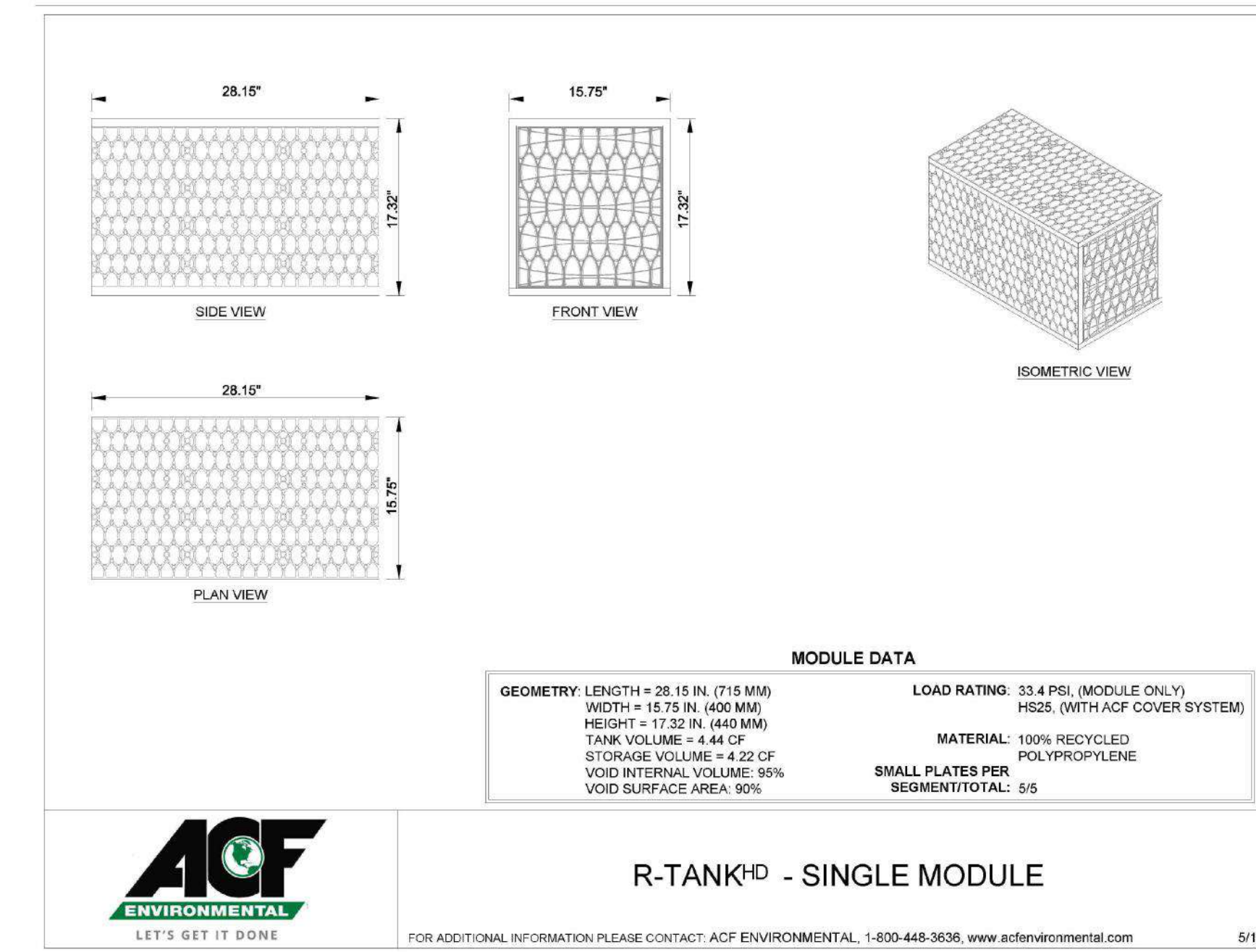
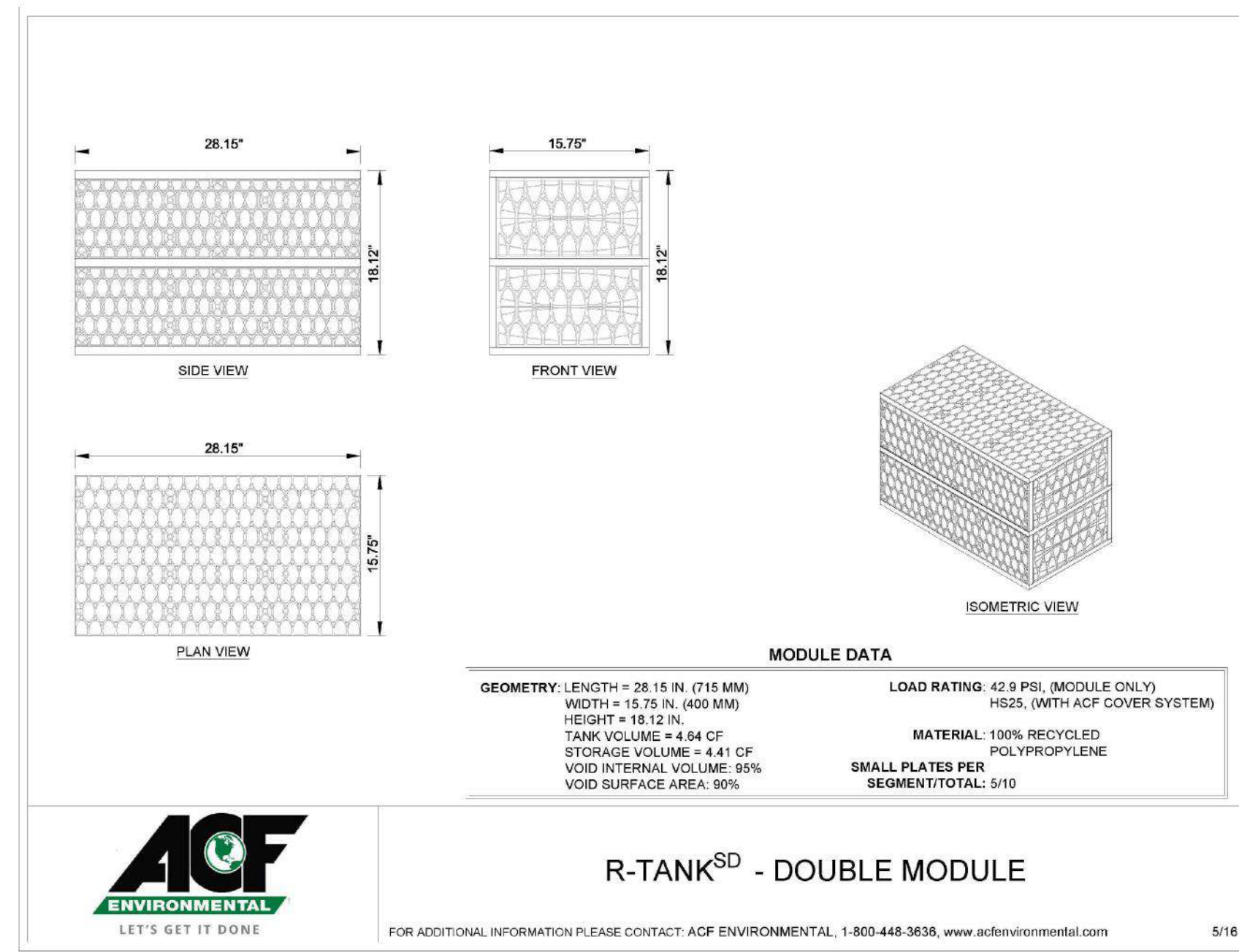
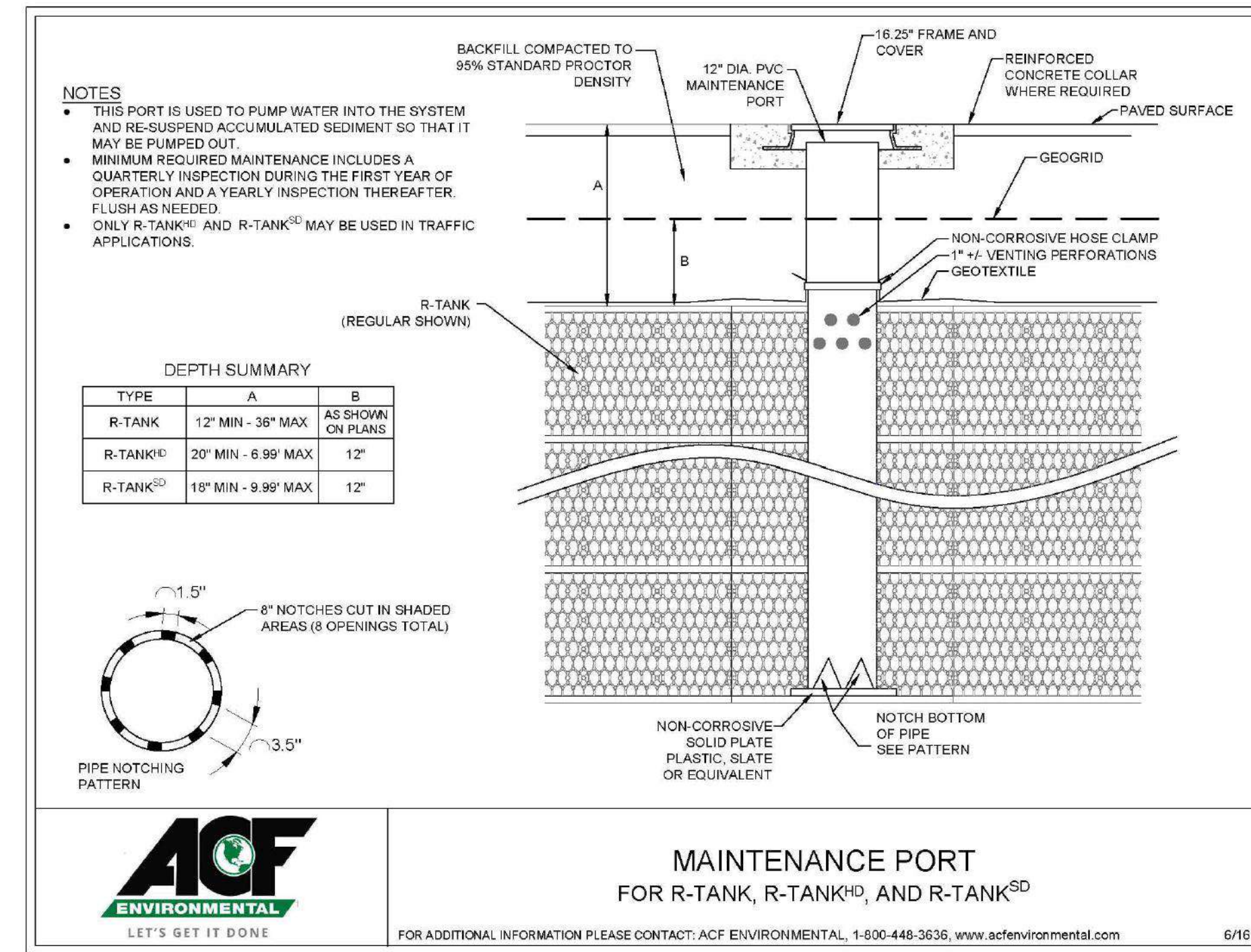
- 3.01 Assembly of R-Tank Units
- 3.02 Layout and Excavation
- 3.03 Preparation of Base
- 3.04 Installation of the R-Tanks

- 3.05 Backfilling of the R-Tank Units

- Proctor Density and shall cover the entire footprint of the R-Tank system
- 8. Place additional layers of geotextile and/or geogrid at elevations as specified in the design details.

PART 4 - USING THE SYSTEM

- 4.01 Maintenance Requirements
- 4.02 Bioretention Maintenance Criteria

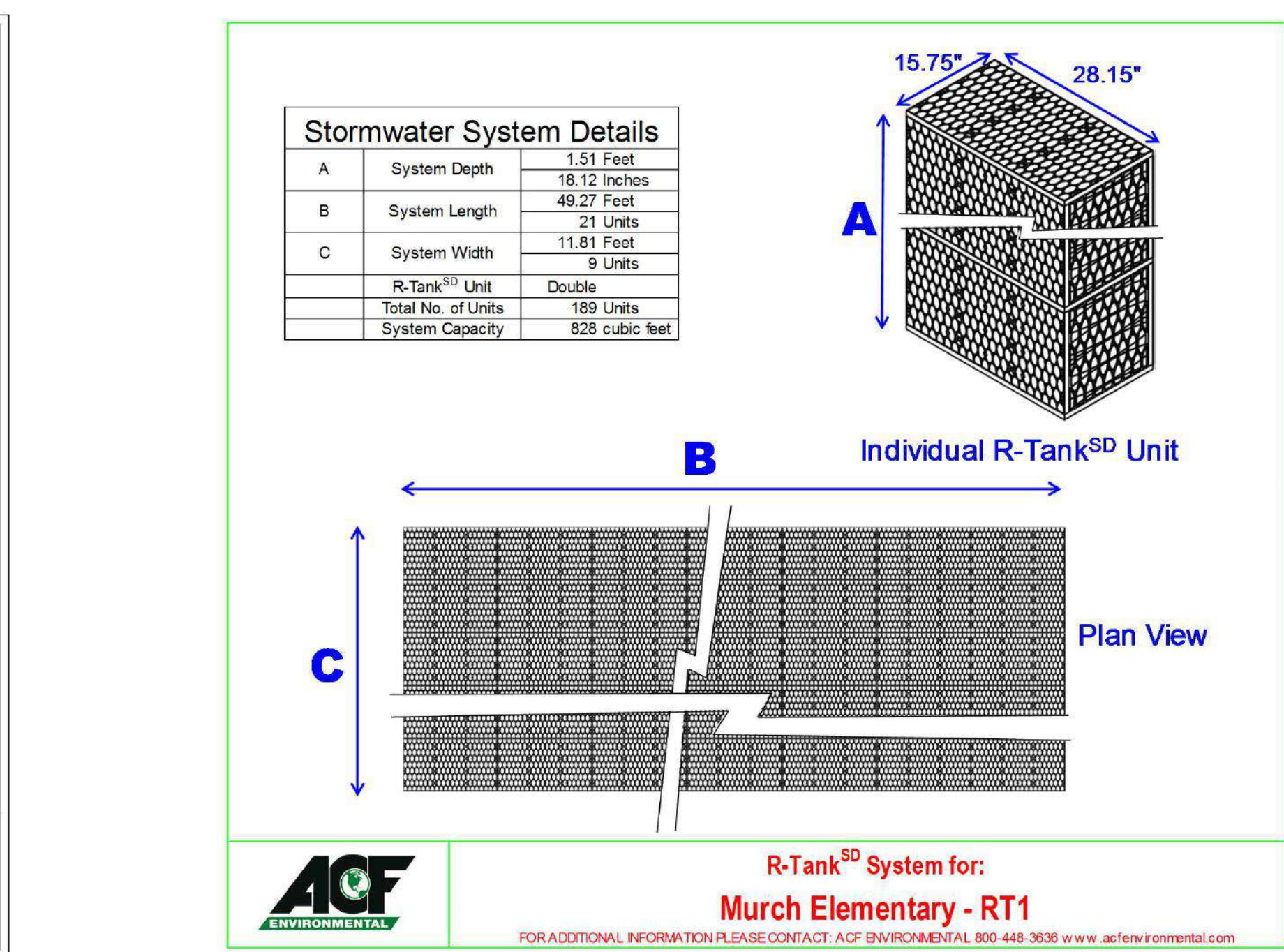
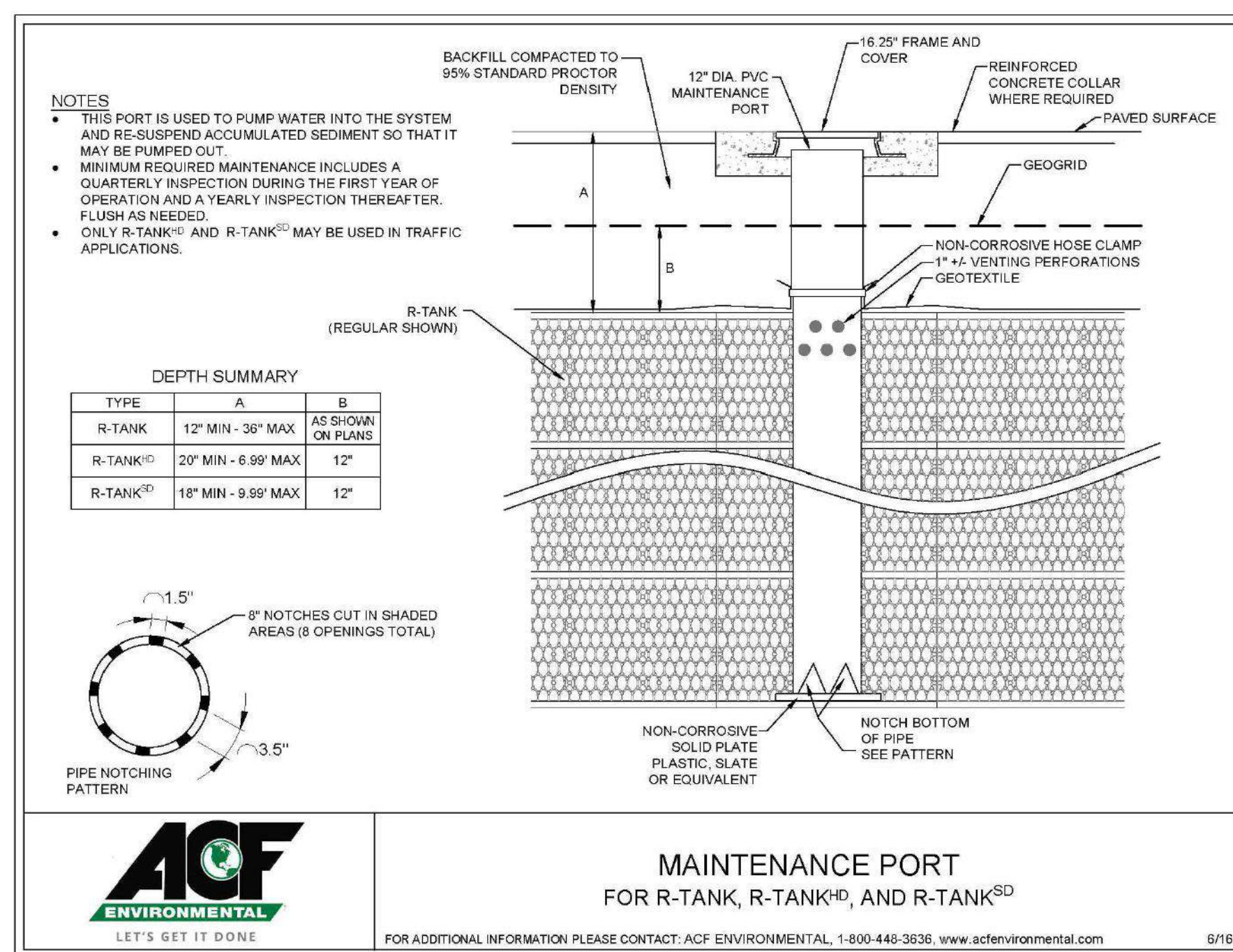


Frequency	Maintenance Tasks
Upon establishment	• For the first 6 months following construction, the practice and CDA should be inspected at least twice after storm events that exceed 1/2 inch of rainfall. • Conduct any needed repair or stabilization. • Inspectors should look for bare or eroding areas in the contributing drainage area or around the bioretention area, and make sure they are immediately stabilized with grass cover. • One-time, spot fertilization may be needed for initial plantings. • Watering is needed once a week during the first 2 months, and then as needed during first growing season (April-October), depending on rainfall. • Remove and replace dead plants. Up to 10% of the plant stock may die or in the first year, so construction contracts should include a care and replacement warranty to ensure that vegetation is properly established and survives during the first growing season following construction.
At least 4 times per year	• Mow grass filler strips and bioretention with turf cover. • Check curb and inlets for accumulated gut, leaves, and debris that may block inflow.
Twice during growing season	• Spot weed, remove trash, and rake the mulch
Annually	• Conduct a maintenance inspection. • Supplement mulch in devoid areas to maintain a 3 inch layer. • Prune trees and shrubs. • Remove sediment in pretreatment cells and inflow points
Once every 3-5 years	• Remove sediment in pretreatment cells and inflow points • Remove and replace the mulch layer • Add reinforcement planting to maintain desired vegetation density • Remove invasive plants using recommended control methods • Remove any dead or diseased plants • Stabilize the contributing drainage area to prevent erosion
As needed	• Conduct a maintenance inspection • Supplement mulch in devoid areas to maintain a 3 inch layer • Prune trees and shrubs • Remove sediment in pretreatment cells and inflow points • Remove and replace the mulch layer • Add reinforcement planting to maintain desired vegetation density • Remove invasive plants using recommended control methods • Remove any dead or diseased plants • Stabilize the contributing drainage area to prevent erosion

- 3.8.7 Infiltration Maintenance Criteria
- Maintenance of bioretention area should be integrated into routine landscape maintenance tasks.
- 3.8.7 Infiltration Maintenance Criteria

Schedule	Maintenance Activity
Quarterly	• Ensure that the contributing drainage area, inlets, and facility surface are clear of debris. • Ensure that the contributing drainage area is stabilized. Perform spot-seeding if where needed.
Semi-annual inspection	• Remove sediment and silt/clay from inlets, pretreatment devices, flow diversion structures, and overflow structures. • Repair undercut and eroded areas at inflow and outflow structures.
Annually	• Check observation wells 3 days after a storm event in excess of 1/2 inch in depth. Standing water observed in the well after three days is a clear indication of clogging. • Inspect pretreatment devices and diversion structures for sediment build-up and the size of the clogging.
As needed	• Clean out accumulated sediment from the pretreatment cell. • Replace low gravel/ripples and top surface geotextile fabric (when clogged). • Mow vegetated filter strips as necessary and remove the clippings.

It is highly recommended that a qualified professional conduct annual site inspections for infiltration practices to ensure the practice performance and longevity of infiltration practices.



STORM DRAIN DETAIL AND NOTES



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Technology: Educational Systems Planning  
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Acoustics: Acoustical Design Collaborative LTD  
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Landscape Architect: Jordan Honeyman - 711 Florida Ave NW Washington, DC 20004 T: 202-986-0711

Kitchen: Nyikos Associates - 18219-A Flower Hill Way Gaithersburg, MD 20879 T: 240-683-9530

MURCH ELEMENTARY SCHOOL ADDITION & MODERNIZATION  
4810 36TH ST. NW WASHINGTON DC, 20008

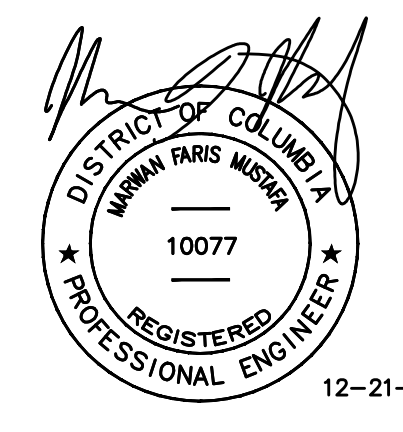
Project Number: 2015-4810

Revision Number	Revision Date	Revision Description
1	12/21/2016	ISSUE FOR CONSTRUCTION

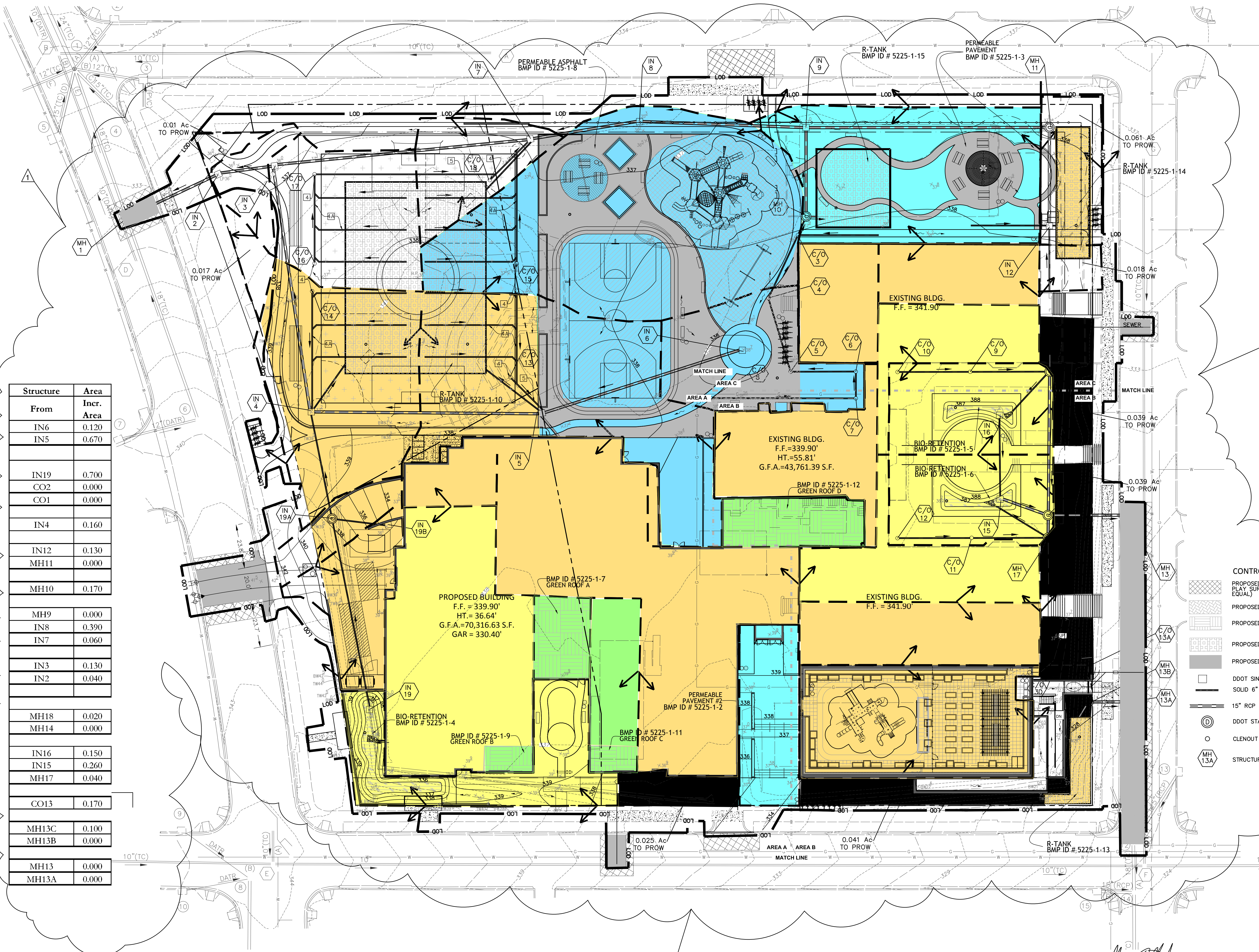
Issue Date: 12/21/2016

Sheet Title: STORM DRAIN DETAIL AND NOTES

Sheet Number: CIV513



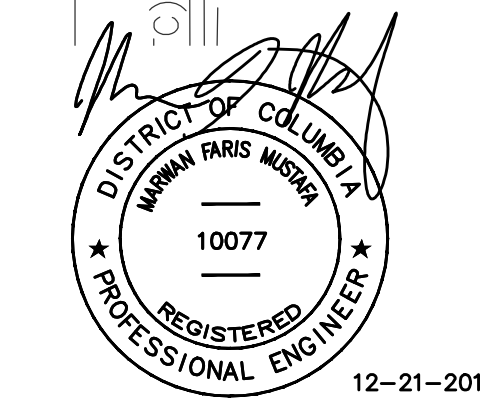
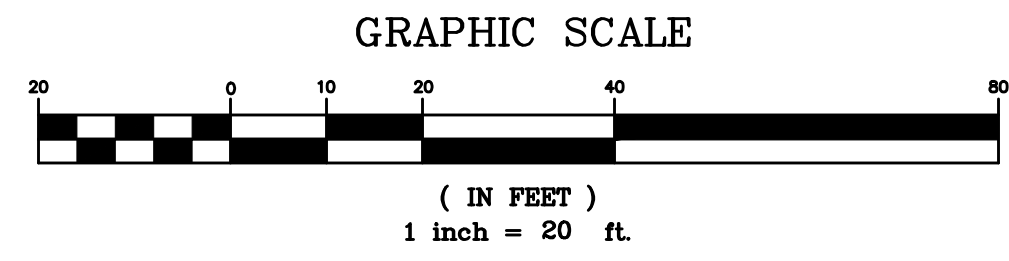




Structure	Area
From	Incr. Area
IN6	0.120
IN5	0.670
IN19	0.700
CO2	0.000
CO1	0.000
IN4	0.160
IN12	0.130
MH11	0.000
MH10	0.170
MH9	0.000
IN8	0.390
IN7	0.060
IN3	0.130
IN2	0.040
MH18	0.020
MH14	0.000
IN16	0.150
IN15	0.260
MH17	0.040
CO13	0.170
MH13C	0.100
MH13B	0.000
MH13	0.000
MH13A	0.000

- CONTROL LEGEND**
- PROPOSED FLEXPAVE POROUS PLAY SURFACE - P2000 (OR APPROVED EQUAL)
  - PROPOSED PERMEABLE PAVERS
  - PROPOSED GREEN ROOF
  - PROPOSED R-TANK
  - PROPOSED BIO-RETENTION
  - DDOT SINGLE GRATE TYPE CATCH BASIN
  - SOLID 6" PVC SCHEDULE 40
  - 15" RCP CL III/IV
  - DDOT STANDARD MANHOLE
  - CLENOUT
  - STRUCTURE NUMBER

DRAINAGE AREA PLAN



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**MURCH ELEMENTARY SCHOOL  
ADDITION & MODERNIZATION**  
4810 36TH ST. NW  
WASHINGTON DC, 20008

Project Number: 2015-4810

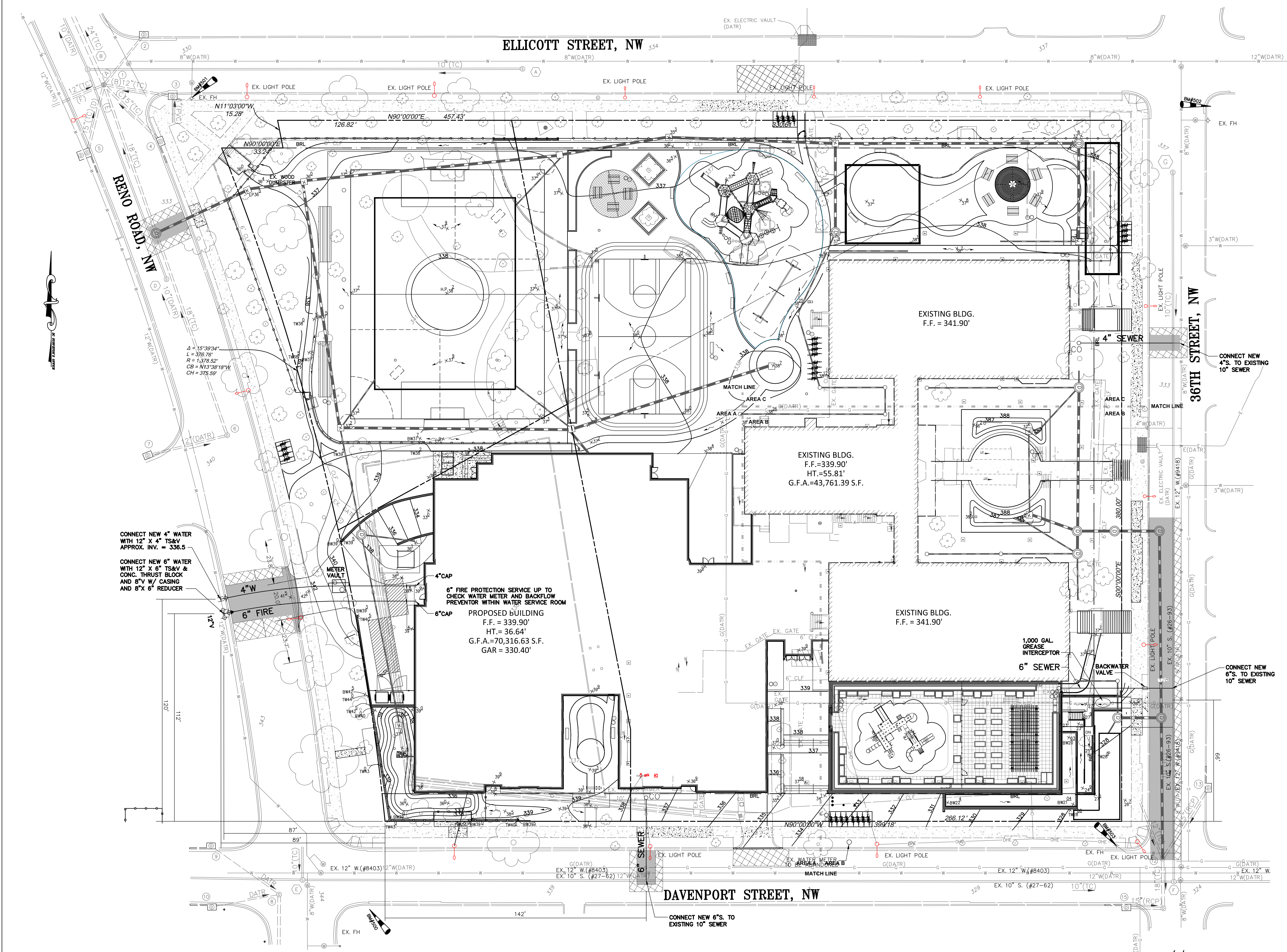
Revisions		
Revision Number	Revision Date	Revision Description
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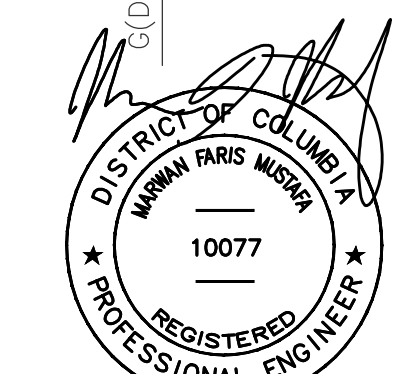
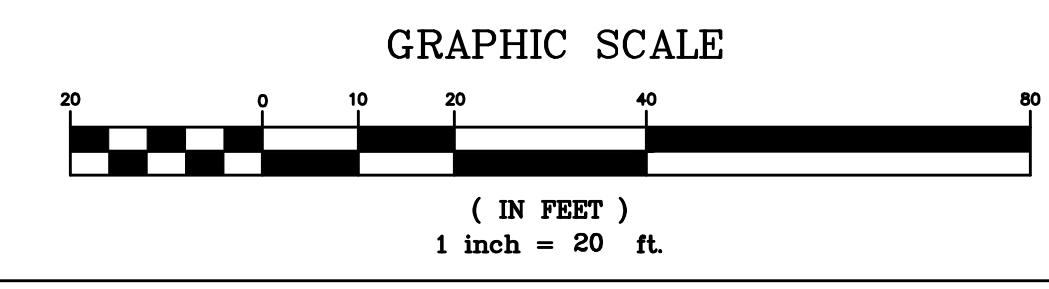
Sheet Title: DRAINAGE AREA PLAN

Sheet Number: CIV514





**WATER AND SEWER PLAN**



12-21-2016

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**MURCH ELEMENTARY SCHOOL ADDITION & MODERNIZATION**  
**4810 36TH ST. NW WASHINGTON DC, 20008**

Project Number: 2015-4810

Revisions		
Revision Number	Revision Date	Revision Description

Issue Date: 12/21/2016

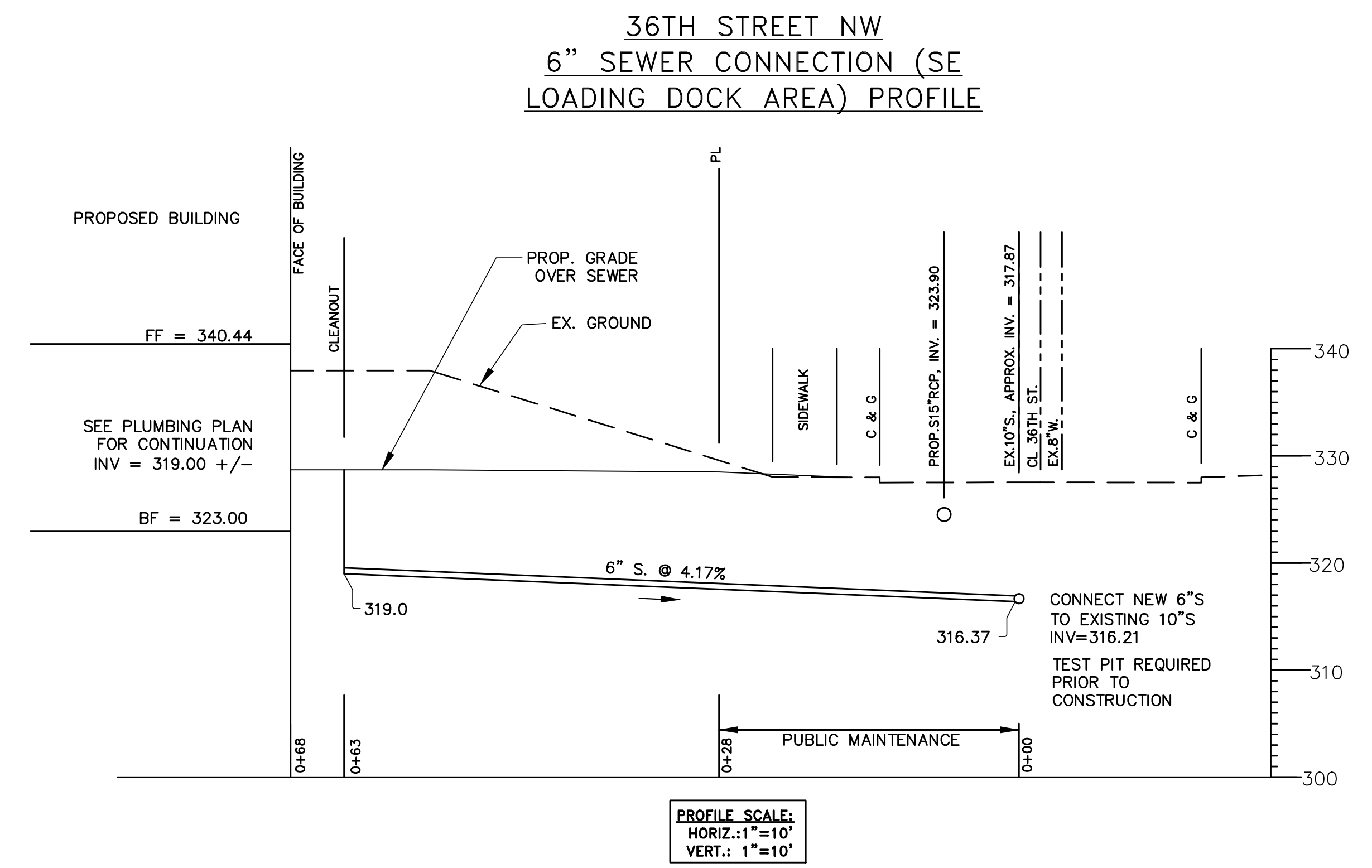
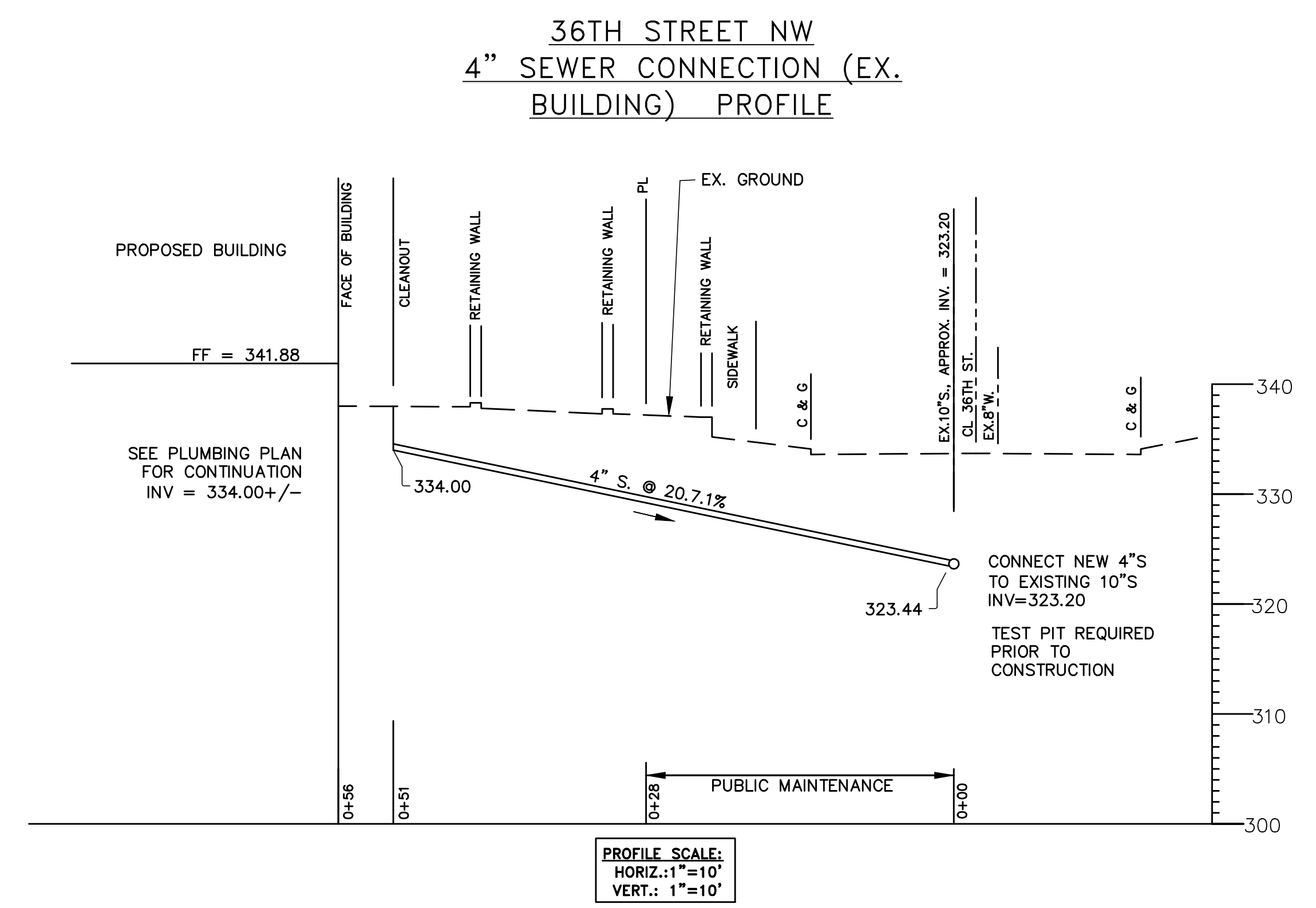
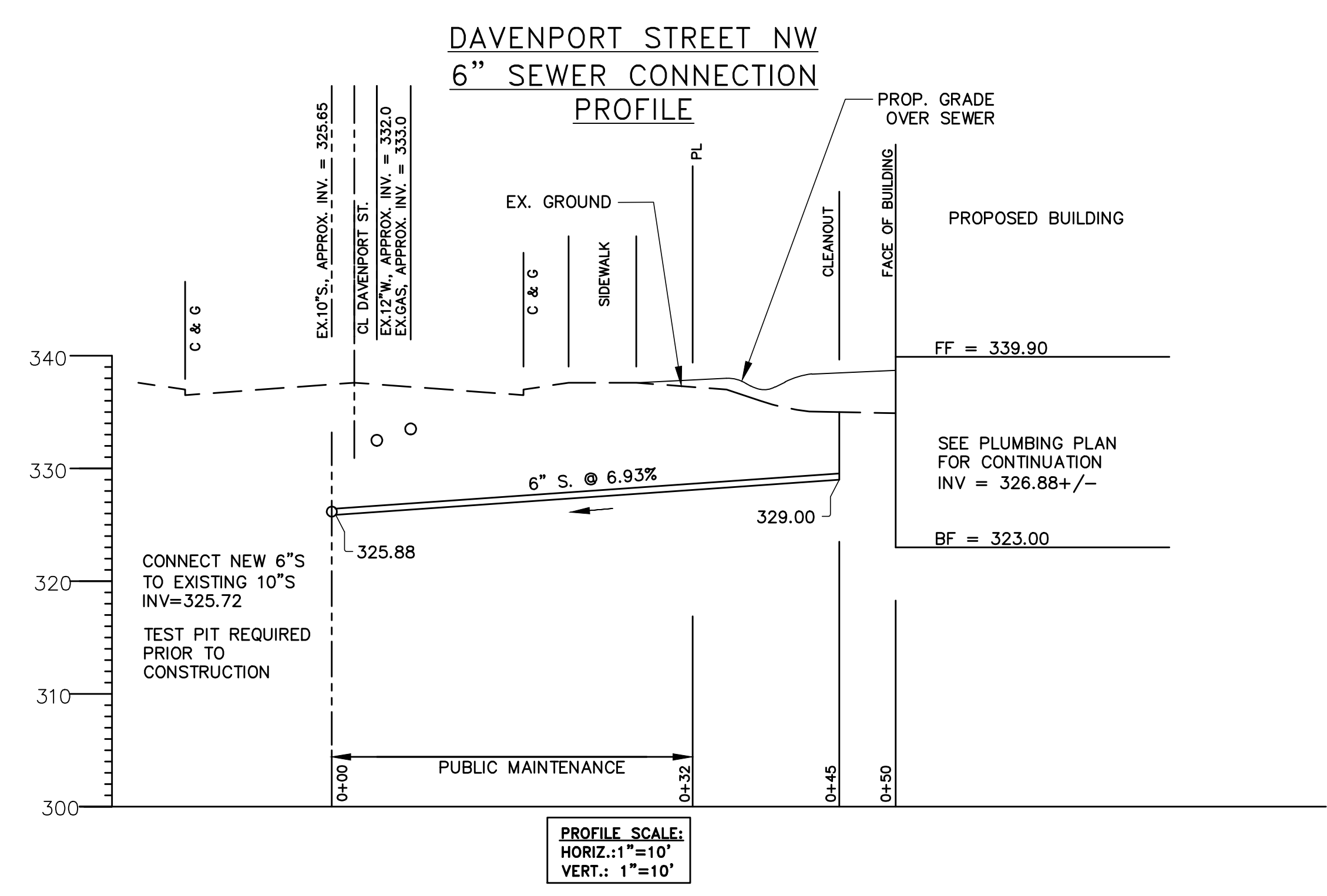
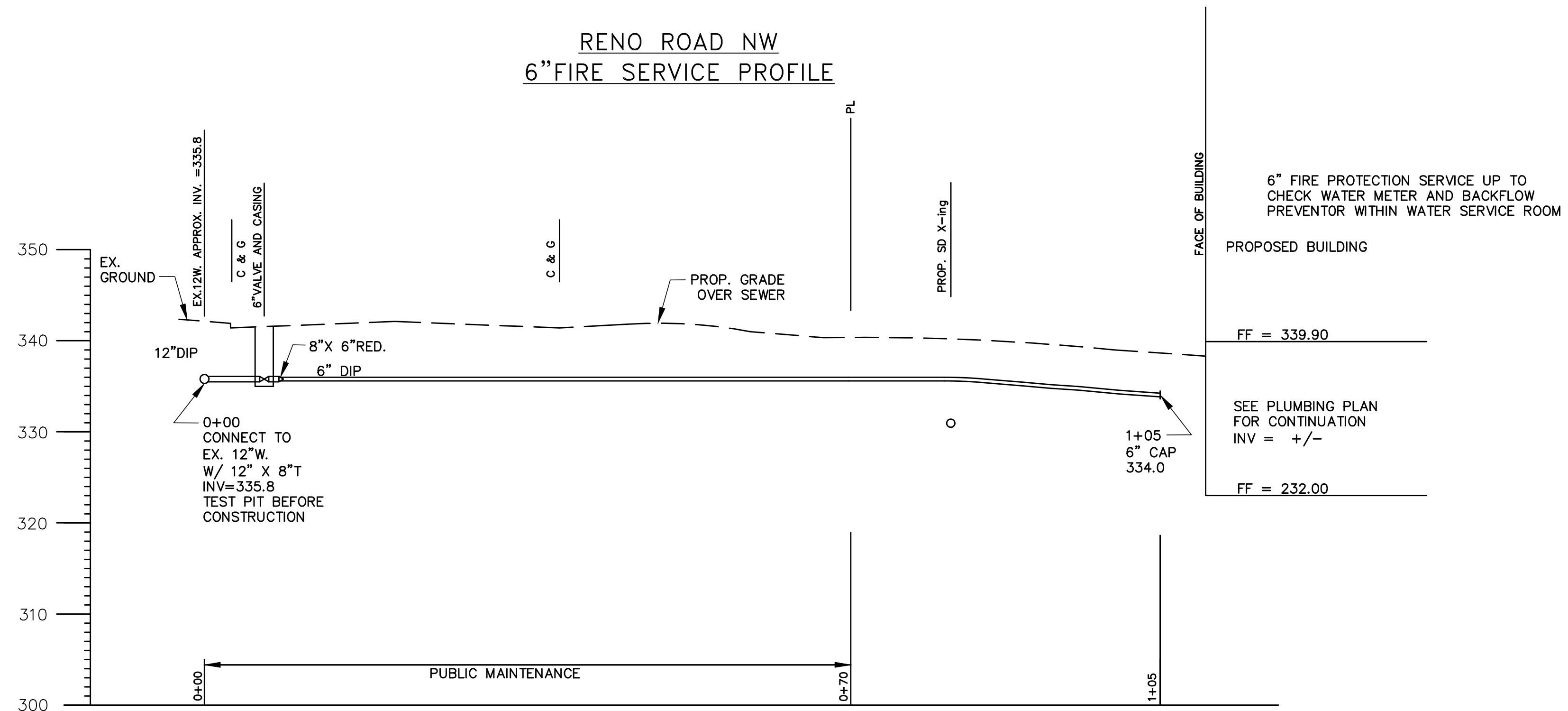
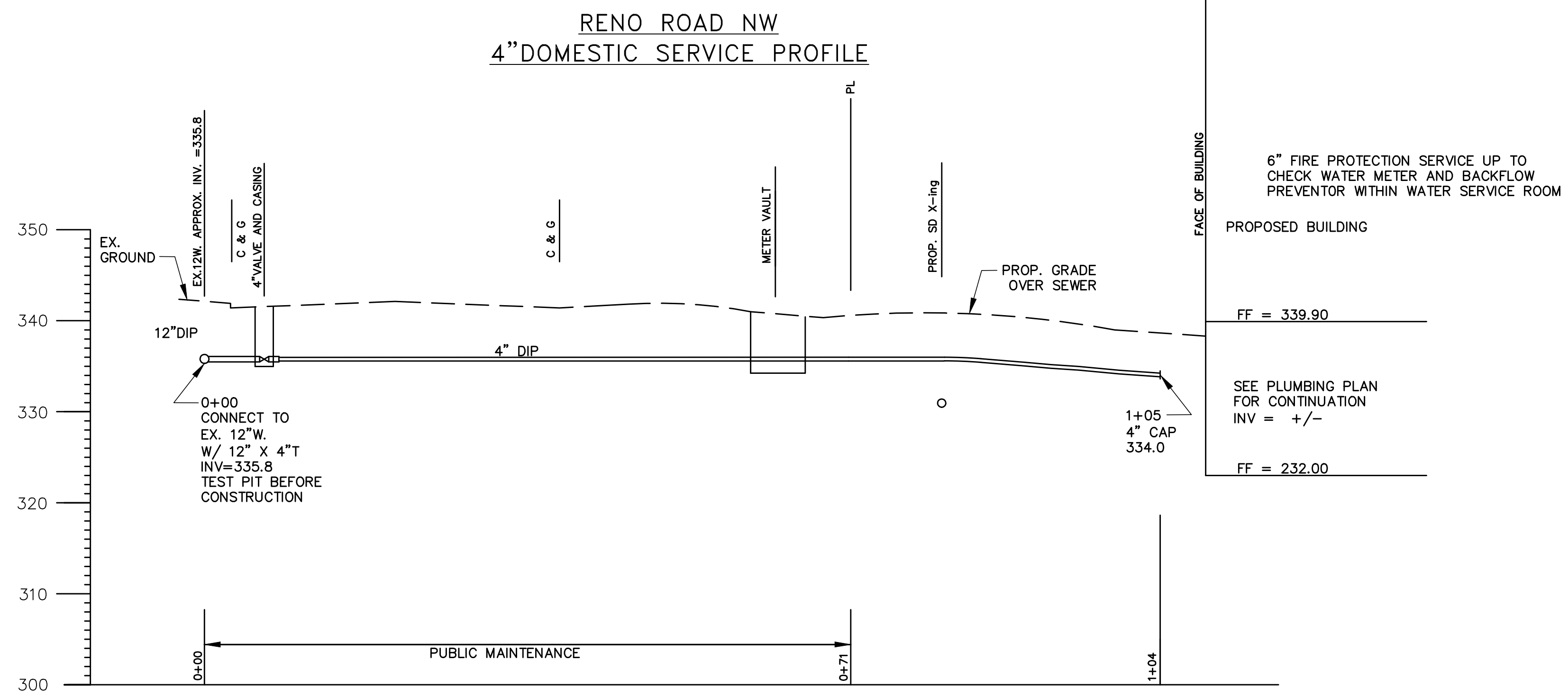
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Sheet Number:

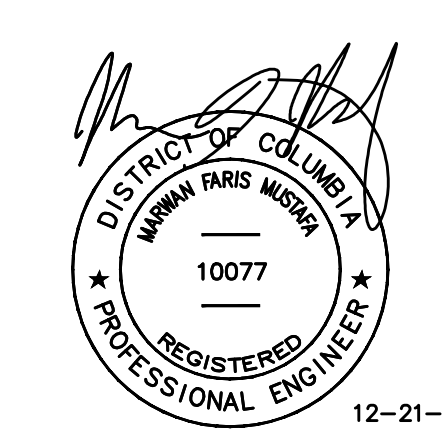
**CIV601**

MISS UTILITY  
FOR LOCATION OF UTILITIES CALL 1-800-257-7777  
48 HOURS IN ADVANCE OF ANY WORK IN THE VICINITY





WATER AND SEWER PROFILES



12-21-2016

MISS UTILITY  
FOR LOCATION OF UTILITIES CALL 1-800-257-7777  
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**MURCH ELEMENTARY SCHOOL ADDITION & MODERNIZATION**  
4810 36TH ST. NW  
WASHINGTON DC, 20008

Project Number: 2015-4810

Revisions		
Revision Number	Revision Date	Revision Description

Issue Date:	12/21/2016
Sheet Title:	WATER AND SEWER PROFILES
Sheet Number:	

10077  
REGISTERED PROFESSIONAL ENGINEER

**CIV602**

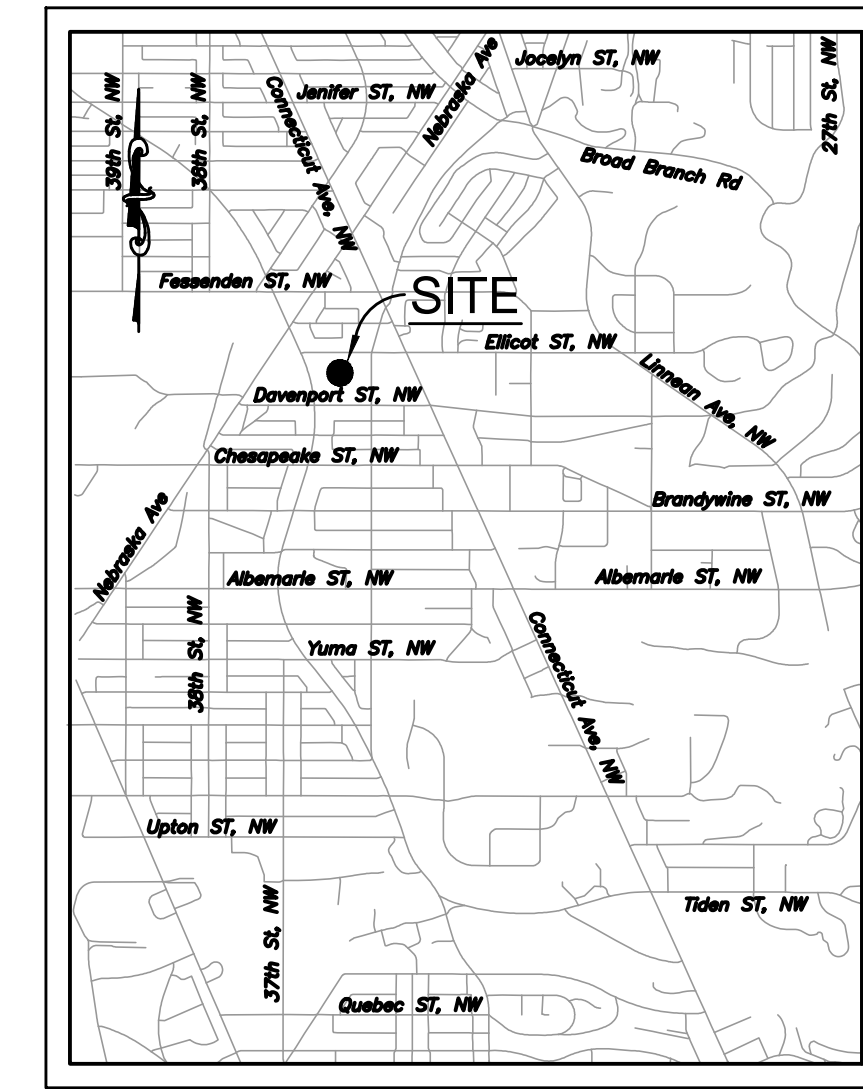
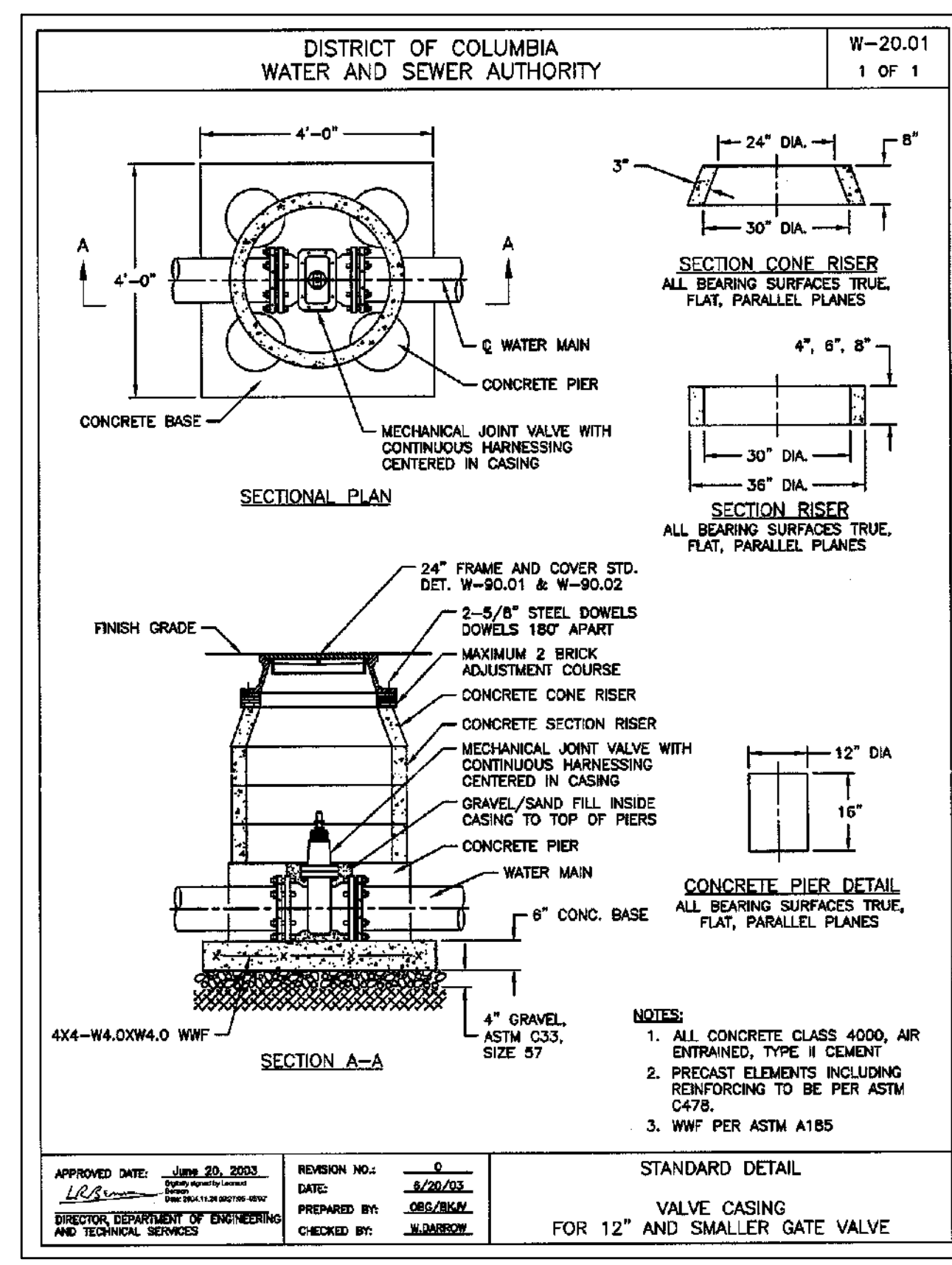
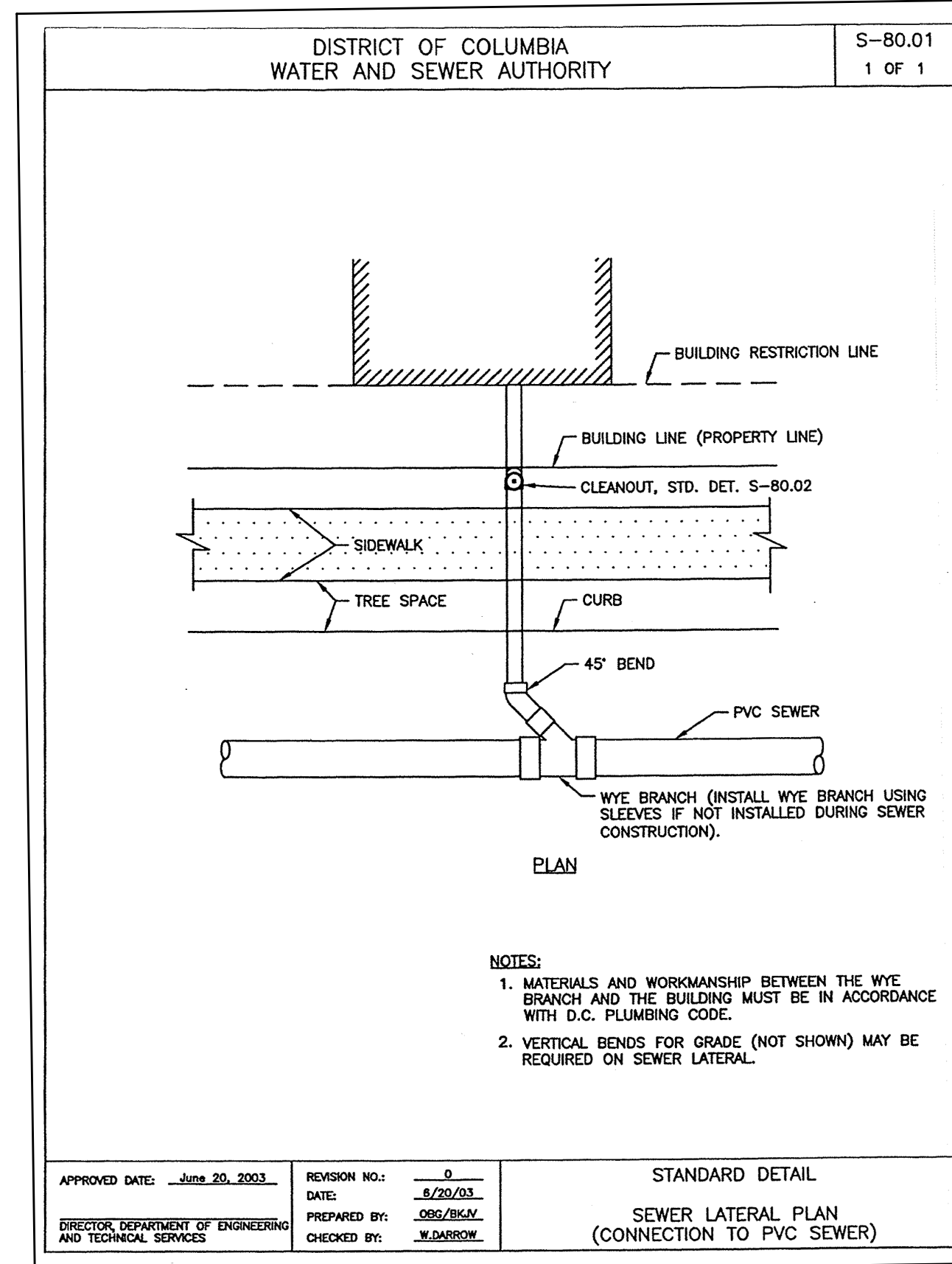


**WASA NOTES:**

- SANITARY BENCHMARK to be used for sewer construction. Use invert of existing manhole at next connection or the next down stream manhole.
- WATER BENCHMARK to be used for water construction. Use operating nut elevation of closest fire hydrant.
- Contractor shall excavate and locate vertically and horizontally all other utilities in close proximity to the proposed water and sewer facilities.
- Watermain to be constructed with a nominal cover of 4' below proposed grade.
- All 12" and smaller diameter watermain fittings, including valves and fire hydrants, to be installed using ductile iron retainer glands as follower rings instead of standard follower rings for restraint.
- Notify Miss Utility, 1-800-257-7777, 48 hours before excavating.
- All manholes used in conveying sanitary sewage shall have pipe entry seals for all connections 21" and smaller in diameter.
- The Contractor shall verify, by field measurement, the required dimensions of all pipes, fittings, equipment and structures to assure proper clearance and spacing prior to fabrication or installation.
- During excavation all abandon sewer laterals uncovered in the excavation shall be plugged or capped at or outside of the property line and tightly sealed by contractor.
- Notify District of Columbia - Water and Sewer Authority 48 hours prior to start of construction: Mr. Ted Dyson (202) 787-4299.
- All proposed utility work to be constructed in accordance with latest Standards and Specifications of the District of Columbia - Water and Sewer Authority.
- The contractor shall take proper precaution so as not to damage existing adjacent facilities and structures. The contractor shall restore disturbed areas to their original condition or better unless noted otherwise.
- All existing WASA items such as catch basins, taps, manhole frames and covers and fire hydrants not required shall be salvaged and returned to WASA yard.
- The contractor shall maintain the service of all existing utilities in place and ready for making connections. Coordinate with WASA for valve operation. Fire hydrants shall be operation at all times.
- The contractor shall provide DOWASA an as-built plan of the utilities which were constructed in public space for review and approval by DOWASA. Contact Ted Dyson at (202) 787-4299 to arrange for a pre-work conference. Submit all documents to Mr. Dyson.

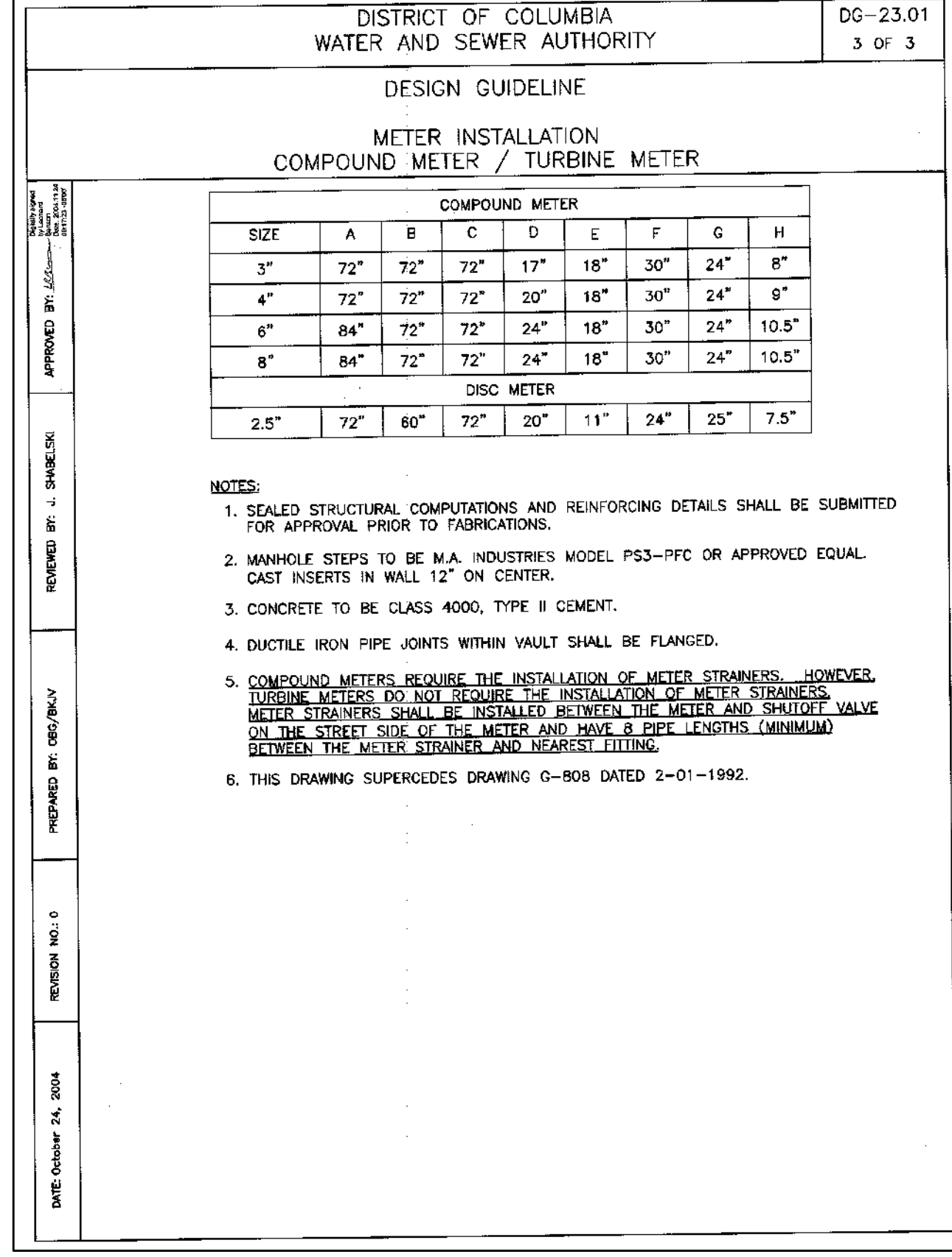
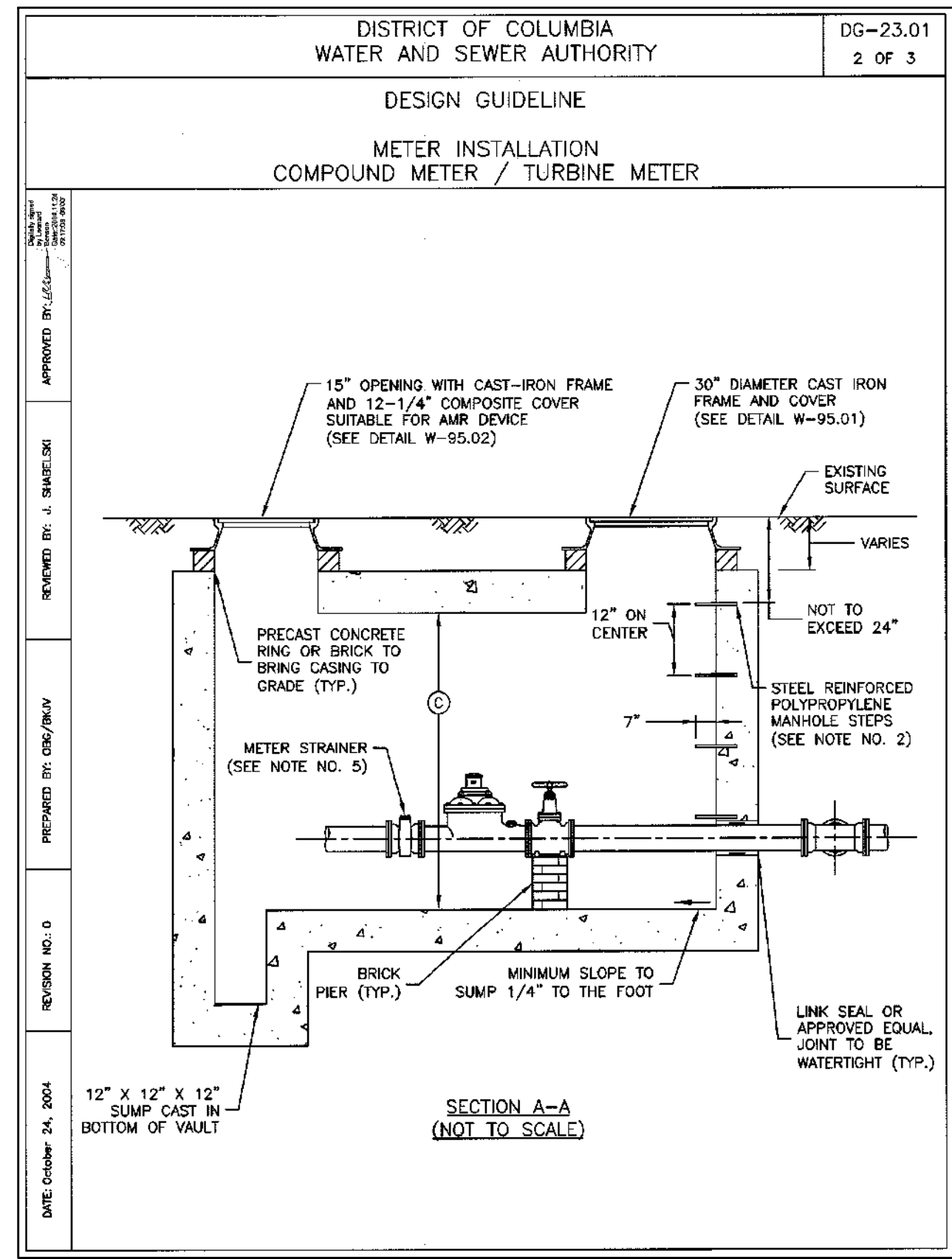
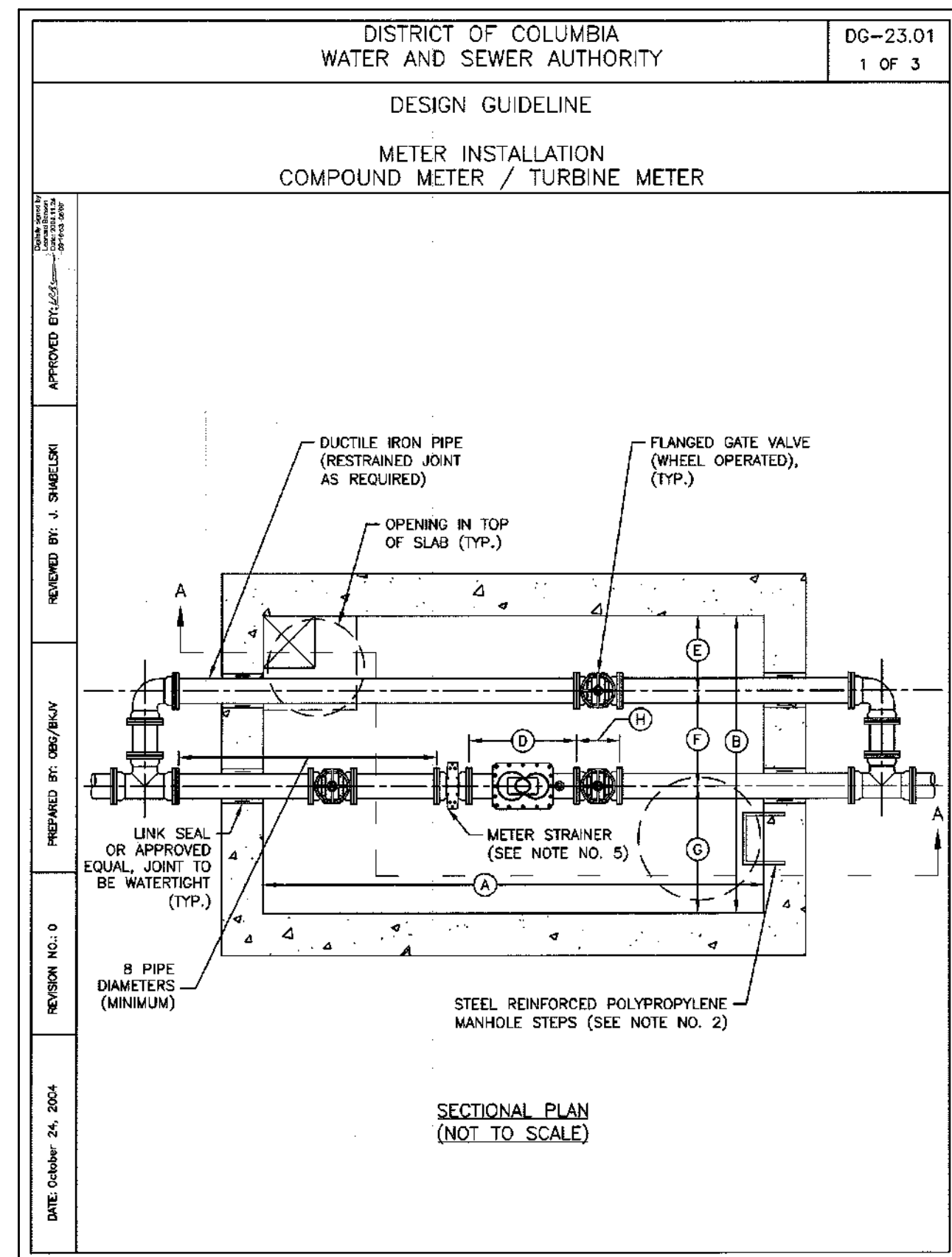
**STANDARD AND SPECIFICATIONS FOR DUST CONTROL**

1. THE CONTRACTOR SHALL CONDUCT OPERATIONS AND MAINTAIN THE PROJECT SITE SO AS TO MINIMIZE THE CREATION AND DISPERSION OF DUST. DUST CONTROL SHALL BE USED THROUGHOUT THE WORK AT THE SITE.
2. THE CONTRACTOR MUST PROVIDE CLEAN WATER, FREE FROM SALT, OIL AND OTHER DELETERIOUS MATERIAL TO BE USED FOR ON-SITE DUST CONTROL.
3. THE CONTRACTOR SHALL SUPPLY WATER SPRAYING EQUIPMENT CAPABLE OF ACCESSING ALL WORK AREAS.
4. THE CONTRACTOR SHALL IMPLEMENT STRICT DUST CONTROL MEASURES DURING ACTIVE CONSTRUCTION PERIODS ON-SITE. THESE CONTROL MEASURES WILL GENERALLY CONSIST OF WATER APPLICATIONS THAT SHALL BE APPLIED A MINIMUM OF ONCE PER DAY DURING DRY WEATHER OR MORE OFTEN AS REQUIRED TO PREVENT DUST EMISSIONS.
5. FOR WATER APPLICATION TO UNDISTURBED SOIL SURFACES, THE CONTRACTOR SHALL:
  - A. APPLY WATER WITH EQUIPMENT CONSISTING OF TANK, SPRAY BAR, PUMP WITH DISCHARGE PRESSURE GAUGE.
  - B. ARRANGE SPRAY BAR HEIGHT, NOZZLE SPACING & SPRAY PATTERN TO PROVIDE COMPLETE COVERAGE OF GROUND WITH WATER.
  - C. DISPERSE WATER THROUGH NOZZLES ON SPRAY BAR AT 20 PSI (137.8 KPa) MINIMUM. KEEP AREAS DAMP WITHOUT CREATING NUISANCE CONDITIONS SUCH AS PONDING.
6. FOR WATER APPLICATION TO UNDISTURBED SOIL SURFACES DURING DEMOLITION AND/OR EXCAVATION, THE CONTRACTOR SHALL:
  - A. APPLY WATER WITH EQUIPMENT CONSISTING OF A TANK, PUMP WITH DISCHARGE GAUGE, HOSES AND MIST NOZZLES.
  - B. LOCATE TANK AND SPRAYING EQUIPMENT SO THAT THE ENTIRE EXCAVATION AREA CAN BE MISTED WITHOUT INTERFERING WITH DEMOLITION AND/OR EXCAVATION EQUIPMENT OR OPERATIONS. KEEP AREAS DAMP WITHOUT CREATING NUISANCE CONDITIONS SUCH AS PONDING.
  - C. APPLY WATER SPRAY IN A MANNER TO PREVENT MOVEMENT OF SPRAY BEYOND THE SITE BOUNDARIES.

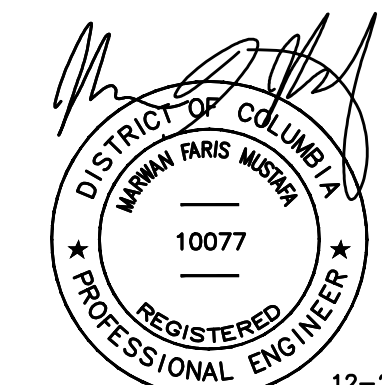


**dc water is life General Construction Notes**

1. **Contract:** Notify the following DC Water departments prior to the commencement of utility construction:
  - a) Construction Inspection Section at 202-787-4024 at least two weeks prior to the commencement of utility construction to schedule pre-construction meeting.
  - b) Department of Water Services at 202-612-3400 or 3460 at least one week prior to the commencement of water utility construction.
  - c) Department of Sewer Services at 202-264-3824 or 3829 at least one week prior to the commencement of sewer utility construction.
2. **Standards:** All construction, materials, and appearances shall comply with the latest editions of the DC Water Project Design Manual, Standard Details & Design Guidelines, and Specifications.
3. **Lead Service Replacement:** If this project includes the replacement of a water main that has existing lead water service laterals, the Contractor is responsible for contacting the DC Water Construction Inspection Section at 202-787-4024 at least 90 days prior to construction to allow adequate time to initiate standard lead service replacement protocol. Lateral replacement includes the full length of pipe in public space.
4. **Owner Responsibility:** The Owner is responsible for all work, and costs associated with excavation, installation, and restoration of public space to perform a water/sewer connection/abandonment. Once the Contractor has obtained a Public Space Permit, he/she must also contact DC Water prior to performing the excavation to install/inspect the utility work. The Owner shall be held responsible for all damages to existing structures and utilities caused by construction activity.
5. **DC Water Responsibility:** DC Water is only responsible for installation of small water service taps (2" diameter and less) to the public main, small water service tap removals from the public main, furnishing & installing the meter in public space, and inspection of work performed on the public systems.
6. **Miss Utility:** Contact Miss Utility at 800-257-7777 48 hours before any digging.
7. **Plan Set:** A set of signed & sealed and DC Water stamped Plans shall be kept at all times at the job site on which all changes or variations in the work, including all existing utilities, are to be recorded and/or corrected daily.
8. **Abandonments:** The Owner must physically disconnect existing water, sewer, and storm laterals that are to be abandoned at their connection to the public main.
9. **Diametered Water:** There shall be no unwatered connections to the City's water system, including connections bypassing meters for testing on-site plumbing or for obtaining construction water.
10. **Pressure Testing Against Valves:** Pressure testing against valves will not be allowed.
11. **Water Meter Installation:** To schedule the installation of a domestic water meter contact Permit Operations at 202-646-8600. DC Water will furnish and install the meter after the connection to the main has been made and the meter pit/vault has been installed.
12. **Cross Contamination Control:** ASSE 1048 certified backflow prevention assemblies are required on all fire services and are to be located inside the building (unless an external location is necessary or required by DC Water) where it is supplied, owned, operated, and maintained by the Owner. DC Water does not furnish nor install fire double check detector fire protection backflow prevention assemblies.
13. **Utility Service Disruptions:** Phase all utility work to maintain utility services to the surrounding area during all phases of construction. Limit required utility shut-downs in number and duration. Coordinate these shut-downs with DC Water Construction Inspection staff.
14. **Water Valve Operation:** The Contractor is required to coordinate with DC Water for all necessary water main shut-downs with adequate advanced notice. Only DC Water employees may shut down a public water main. A certified plumber is only authorized to turn off valves inside meter pits.
15. **Water Gate Valve Location:** Locate gate valves for domestic and fire services as close to the public water main toe as possible. However, if necessary adjustments are required due to conflicts, coordinate with a DC Water inspector.
16. **Material:** The Contractor is responsible for submitting shop cuts to the appropriate DC Water office for approval or obtaining a DC Water approval stamp for all work in public space in advance of installation. Only approved materials may be used.
17. **Temporary Conditions Minimum Cover:** A nominal four feet of cover is required for all water mains at final grade. Cover of less than four feet requires DC Water approval.
18. **As-Built:** Developers, contractors and/or plumbers must submit final construction as-built information to the appropriate DC Water inspector(s) for review and approval, upon completion of installation of new services or abandonment of existing services. When the final as-built is approved all deposits will be returned to the applicant. See DC Water as-built requirements for additional information.
19. **Conflicts:** The Contractor shall field verify the location of existing underground utilities prior to installation of proposed utilities. A minimum of one foot vertical and five feet horizontal clearance shall be maintained from any utilities and public water and sewer mains.
20. **Fire Hydrant Use:** The use of a fire hydrant as a water source is prohibited unless a permit has been obtained from DC Water for use of a specific hydrant(s). Daily or extended use permits can be obtained from the DC Water Permit Operations Department 202-646-8600.
21. **Fire Hydrant Status:** The Contractor shall notify FEMS at 202-277-1889, prior to taking any fire hydrant out of service or rendering any hydrant inaccessible for any reason. FEMS is also to be provided with the location of any new installation of private fire hydrants.
22. **DC Water Safety Office:** The DC Water Safety Office can be contacted at 202-787-4350.
23. **Sewer Backwater Prevention:** The plumbing system must be in compliance with Section 715 of the 2006 International Plumbing Code which states a backwater valve is required for all plumbing fixtures below the elevation of the manhole cover of the next upstream manhole in the public sewer.



**WATER AND SEWER NOTES & DETAILS**



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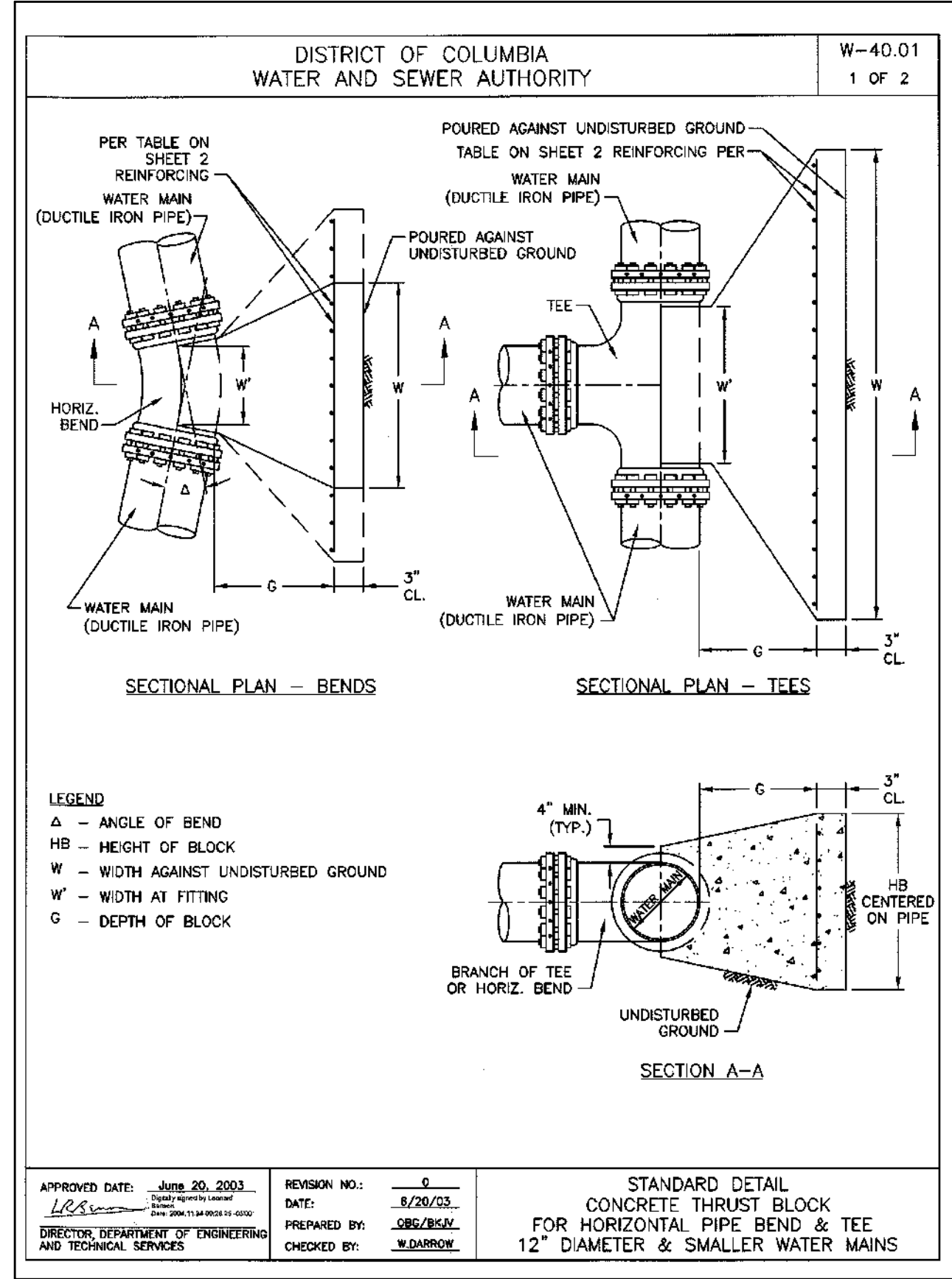
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Revisions		
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Sheet Title:	WATER AND SEWER NOTES & DETAILS
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Issue Date: 12/21/2016  
Sheet Title: WATER AND SEWER NOTES & DETAILS  
Sheet Number: CIV603





DISTRICT OF COLUMBIA  
WATER AND SEWER AUTHORITY

W-40.01  
2 OF 2

BRANCH OF TEE OR PIPE DIA.	BEND TYPE	W	HB	W'	G	REIN. (E.W.)
6"	11.25°	1'-8"	1'-8"	0'-8"	1'-0"	#4 @ 12"
	22.5°	1'-9"	1'-8"	0'-8"	1'-0"	#4 @ 12"
	45°	2'-8"	2'-0"	0'-8"	1'-0"	#5 @ 12"
	90°	4'-8"	2'-3"	0'-10"	1'-0"	#5 @ 12"
	TEE	3'-0"	3'-0"	0'-10"	1'-0"	#5 @ 12"
	TEE	1'-8"	1'-8"	0'-8"	1'-0"	#5 @ 12"
8"	11.25°	1'-9"	1'-8"	0'-8"	1'-0"	#4 @ 12"
	22.5°	1'-9"	1'-8"	0'-8"	1'-0"	#4 @ 12"
	45°	2'-8"	2'-0"	0'-8"	1'-0"	#5 @ 12"
	90°	5'-0"	3'-8"	1'-0"	1'-8"	#5 @ 12"
	TEE	4'-0"	3'-8"	1'-4"	1'-0"	#5 @ 12"
	TEE	1'-8"	1'-8"	0'-8"	1'-0"	#5 @ 12"
12"	11.25°	2'-8"	2'-8"	1'-0"	1'-0"	#4 @ 12"
	22.5°	3'-8"	2'-8"	1'-0"	1'-3"	#4 @ 12"
	45°	7'-0"	4'-8"	1'-4"	1'-8"	#5 @ 12"
	90°	10'-0"	4'-8"	1'-4"	1'-8"	#5 @ 12"
	TEE	8'-8"	5'-0"	1'-4"	1'-8"	#5 @ 12"
	TEE	2'-8"	2'-8"	1'-0"	1'-8"	#5 @ 12"

NOTES:

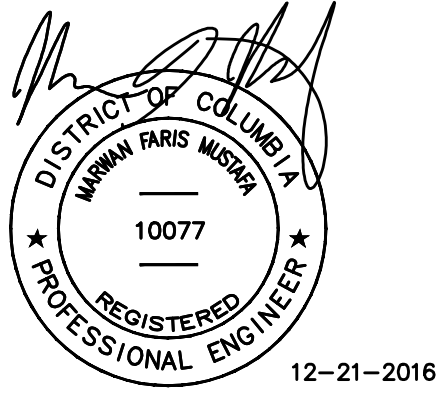
- ALL CONCRETE TO BE CLASS 4000, AIR ENTRAINED, TYPE II CEMENT
- REINFORCING STEEL SHALL CONFORM TO ASTM A615, GRADE 60
- NOMINAL DEPTH OF COVER ON WATER MAIN IS FOUR FEET
- UNIT WEIGHT OF SOIL, 120 PCF
- DESIGN BASED ON  $\theta = 30^\circ$  AND TEST PRESSURE = 185 PSI
- HB = HEIGHT OF BLOCK, W' = WIDTH AT FITTING AND W = WIDTH AGAINST UNDISTURBED GROUND SHOULD BE CENTERED ON PIPE AND FITTING.
- FOR PIPE SIZE GREATER THAN 12", BLOCKS BEDDED IN SOILS WEAKER THAN  $\theta = 30^\circ$  OR FOR MAINS WITH A TEST PRESSURE GREATER THAN 185 PSI, THE THRUST BLOCK MUST BE SPECIFICALLY DESIGNED FOR EACH APPLICATION.

APPROVED DATE: June 20, 2003  
DESIGNED BY: J. G. B. / J. G. B.  
CHECKED BY: J. G. B. / J. G. B.

REVISION NO.: 0  
DATE: 8/20/03  
PREPARED BY: J. G. B. / J. G. B.  
CHECKED BY: J. G. B. / J. G. B.

STANDARD DETAIL  
CONCRETE THRUST BLOCK  
FOR HORIZONTAL PIPE BEND & TEE  
12" DIAMETER & SMALLER WATER MAINS

WATER AND SEWER NOTES & DETAILS



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Kitchen: Nyikos Associates -  
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MURCH ELEMENTARY SCHOOL  
ADDITION & MODERNIZATION  
4810 36TH ST. NW  
WASHINGTON DC, 20008

Project Number:  
2015-4810

Revisions		
Revision Number	Revision Date	Revision Description

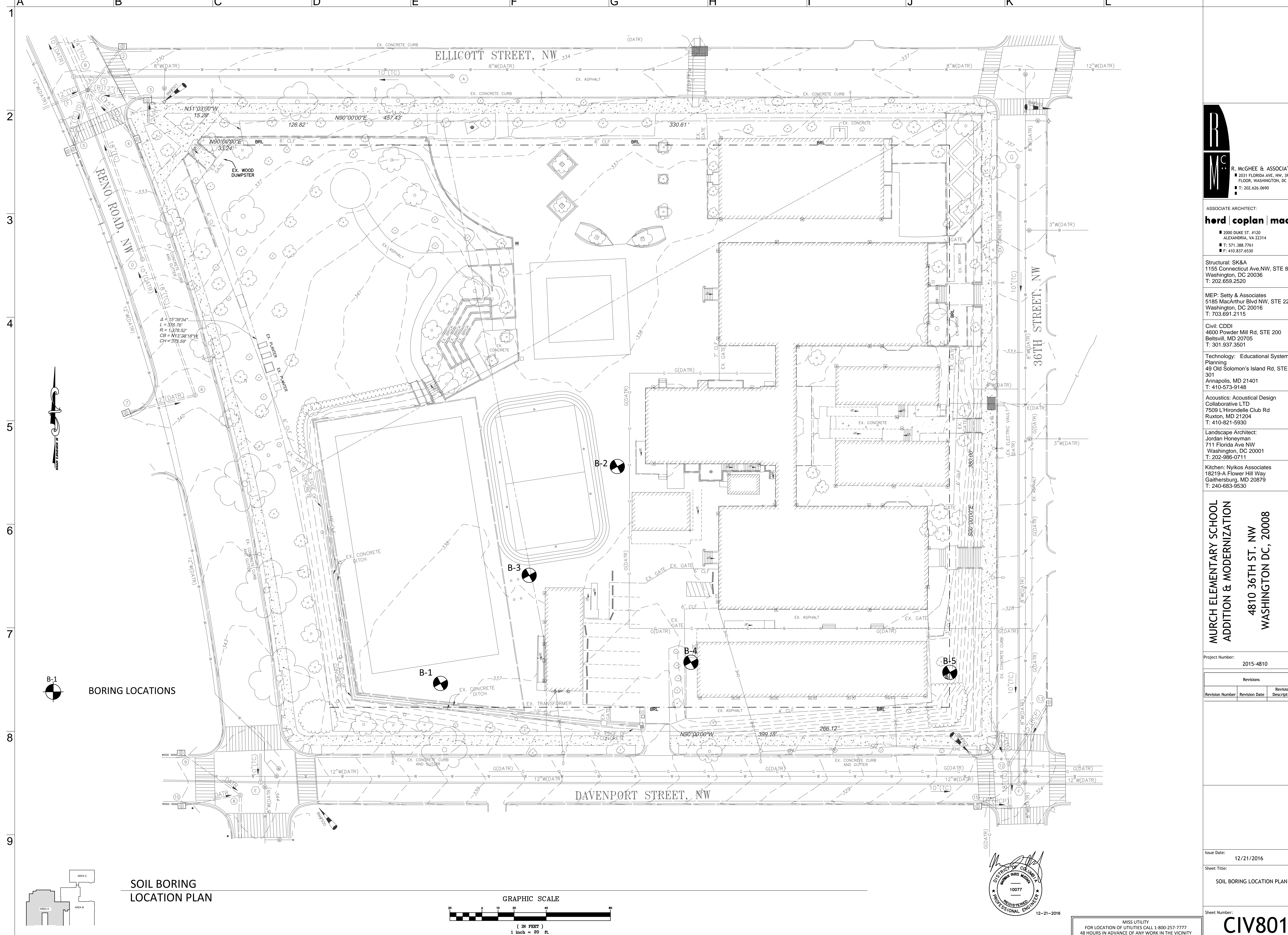
Issue Date: 12/21/2016

Sheet Title:  
WATER AND SEWER NOTES & DETAILS

Sheet Number:

CIV604





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A B C D E F G H I J K L

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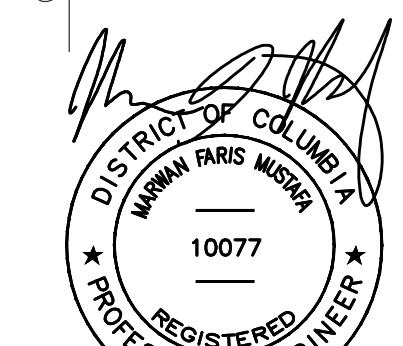
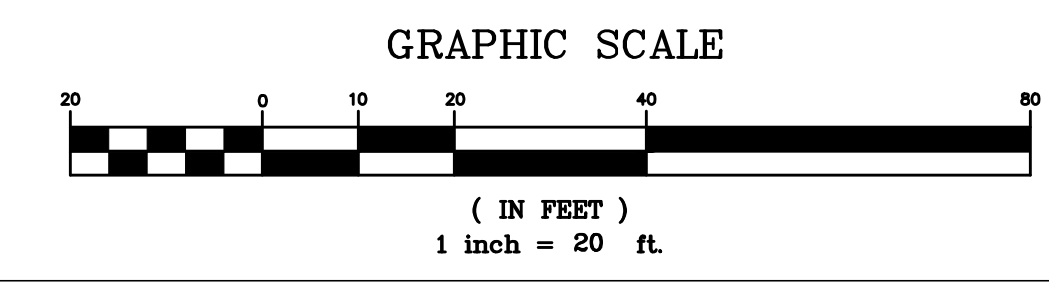
Project Number: 2015-4810

Revisions		
Revision Number	Revision Date	Revision Description

Issue Date: 12/21/2016  
Sheet Title: SOIL BORING LOCATION PLAN  
Sheet Number: CIV801

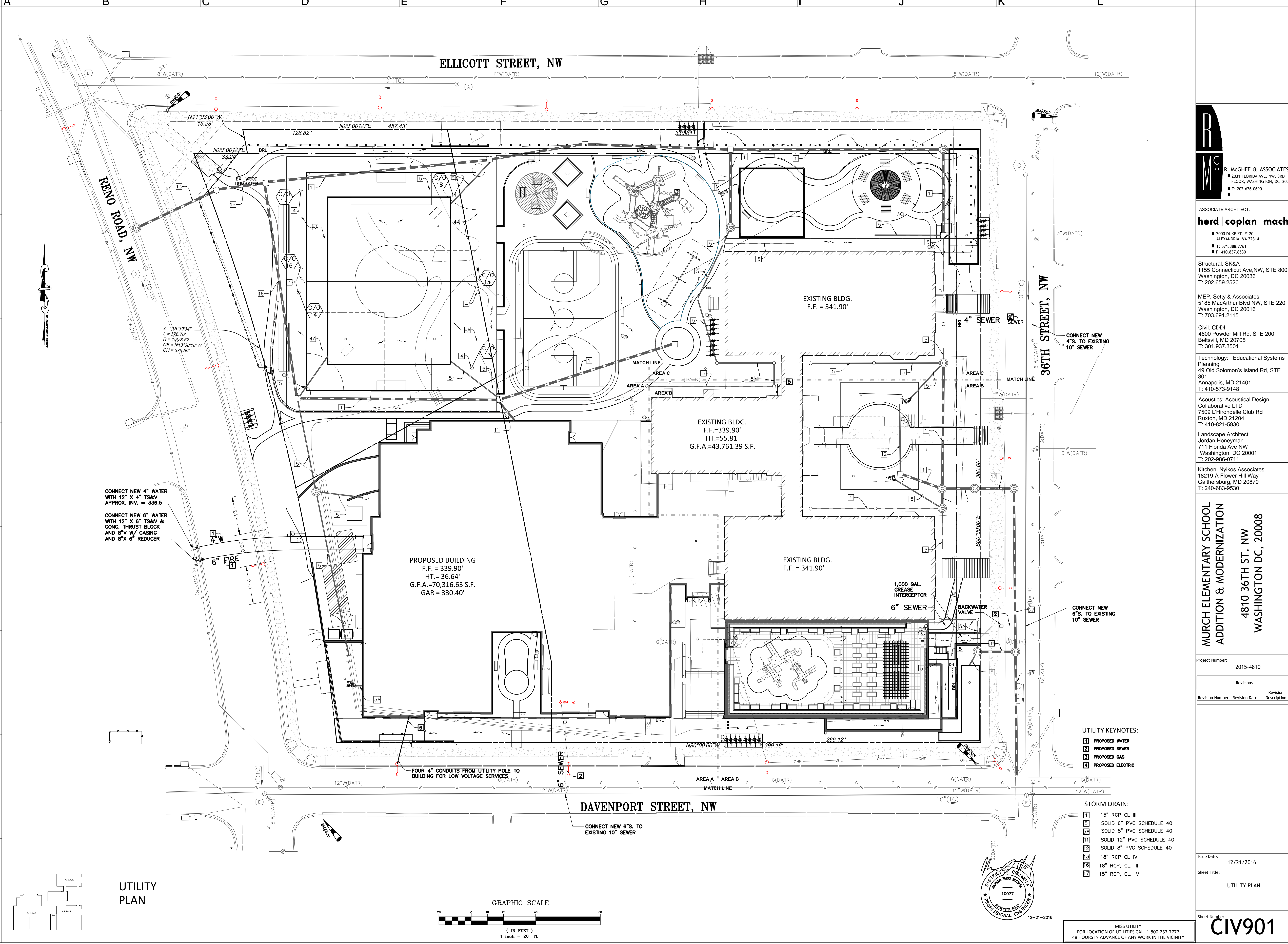
MISS UTILITY  
FOR LOCATION OF UTILITIES CALL 1-800-257-7777  
48 HOURS IN ADVANCE OF ANY WORK IN THE VICINITY

SOIL BORING  
LOCATION PLAN

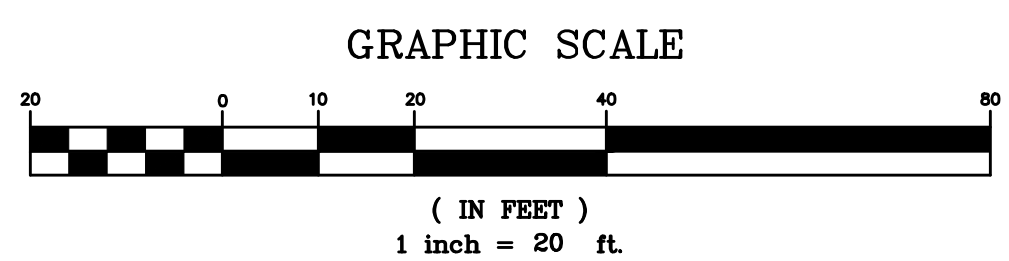


12-21-2016





**UTILITY PLAN**



- UTILITY KEYNOTES:**
- 1 PROPOSED WATER
  - 2 PROPOSED SEWER
  - 3 PROPOSED GAS
  - 4 PROPOSED ELECTRIC

- STORM DRAIN:**
- 1 15" RCP CL. III
  - 5 SOLID 6" PVC SCHEDULE 40
  - 6 SOLID 8" PVC SCHEDULE 40
  - 11 SOLID 12" PVC SCHEDULE 40
  - 12 SOLID 8" PVC SCHEDULE 40
  - 13 18" RCP CL. IV
  - 16 18" RCP, CL. III
  - 17 15" RCP, CL. IV

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Project Number: 2015-4810

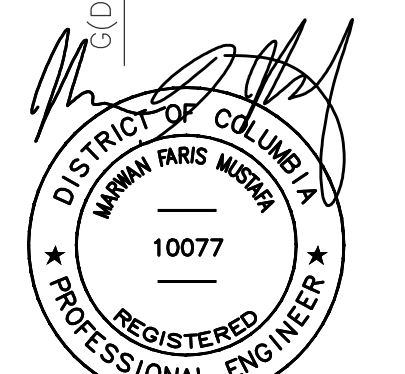
Revisions		
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Issue Date: 12/21/2016

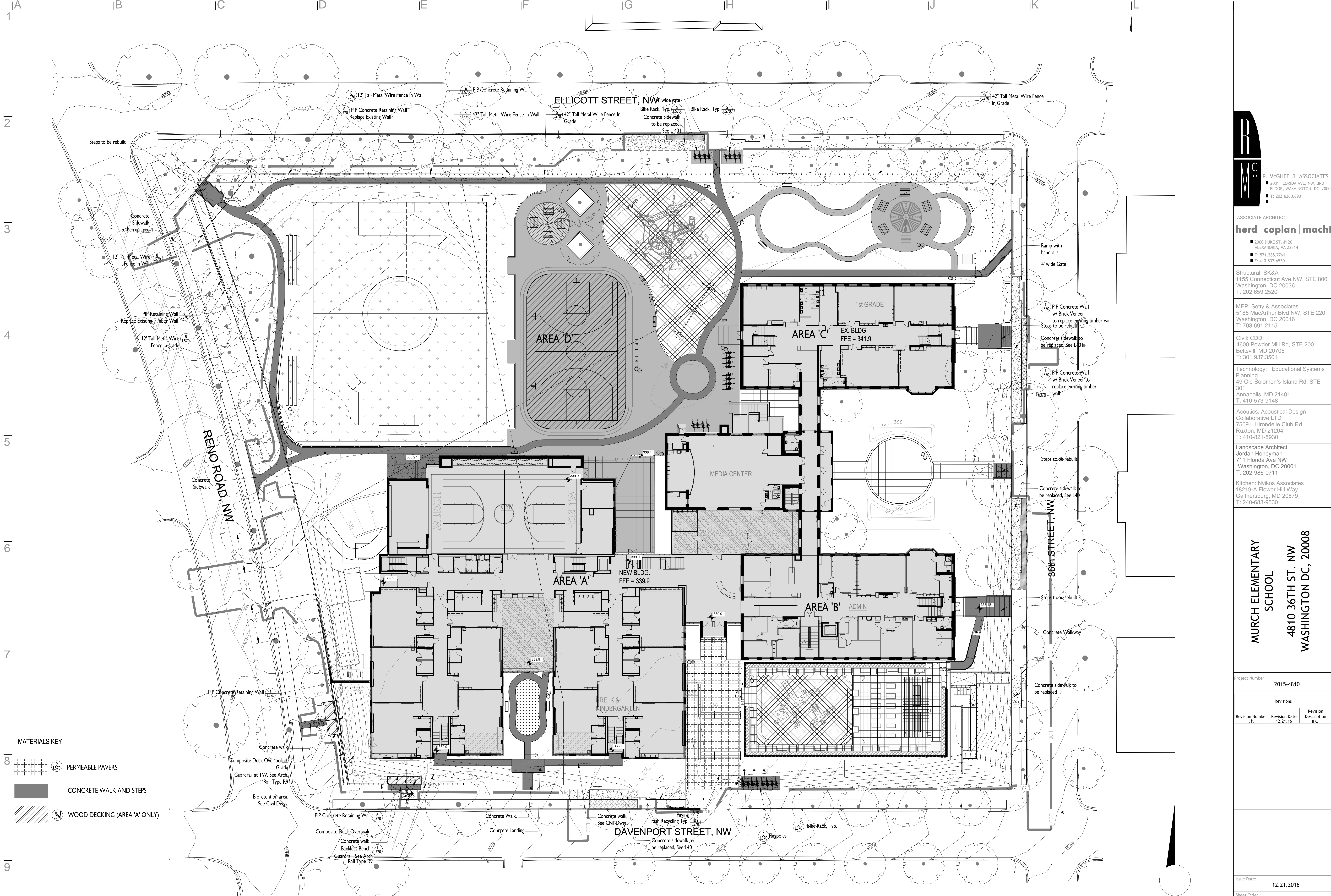
Sheet Title: **UTILITY PLAN**

Sheet Number: **CIV901**



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Project Number: 2015-4810

Revision Number	Revision Date	Revision Description
1	12.21.16	IFC

Issue Date: 12.21.2016

Sheet Title: SITE/LANDSCAPE PUBLIC SPACE PLAN

Sheet Number: L200A