

# City of Bradenton

## Department of Public Works & Utilities



# UTILITY SPECIFICATIONS

Updated July 2013

## **DISCLAIMER**

**Substantial effort has been made to ensure the information contained in these specifications is accurate. However, Bradenton Public Works & Utilities cannot accept responsibility for any errors or oversights in the use of the material or in the preparation of engineering plans. These specifications are intended for use by professional engineers and architects, or other professionals competent to evaluate the significance and limitations of the contents of these specifications and able to accept responsibility for the application of the material contained herein.**

**The design professional must recognize that no handbook or code can substitute for experienced engineering judgment. All of the specifications contained herein are under continual review and may be updated, as necessary. Users of these specifications are encouraged to check regularly with the City for information on any updates that are issued to this publication. Furthermore, users are encouraged to submit comments on this document and any suggestions for changes to future editions.**

**All construction and material standards referenced herein shall meet or exceed the latest revisions of said standards, unless otherwise noted.**



# Public Works & Utilities Department Memorandum

---

**DATE:** March 17, 2014  
**TO:** Design Professionals and Surveyors  
**FROM:** Jim McLellan, P.E. *jm*  
Engineering Section Manager  
Department of Public Works and Utilities  
**SUBJECT:** Elevation Datum for Approval of Projects within City of Bradenton

---

On March 17th, 2014 the new Flood Insurance Rate Maps (FIRMs) became effective for all of Manatee County, including the incorporated municipal areas as well. **The elevations of the new maps are based on the North American Vertical Datum of 1988 (NAVD88) instead of the National Geodetic Vertical Datum of 1929 (NGVD29).** As a result of the new FIRMs, all surveys and elevation certificates for projects in the Special Flood Hazard Area (SFHA) will be required to use the NAVD88 datum.

Historically, both Manatee County and the City of Bradenton have used, and accepted on development design projects elevations based on the NGVD29. However, since the flood elevations on the now in effect FIRMs are based solely on the NAVD88, it could lead to potential errors in establishing the flood risk for properties if plans continue to be accepted that have elevations based on NGVD29. While not all projects in the city are in the SFHA or require elevation certificates, the city wishes to establish a consistent datum for all projects throughout the city.

**Therefore, the City of Bradenton is transitioning to and requiring that all new projects undertaken within our jurisdictional area and completed after March 17, 2014 (the effective date for the new FIRMs), must be referenced to NAVD88.** It is our understanding that Manatee County is also making this same transition to NAVD88.

In anticipation of the change in datum for the FIRMs, the City of Bradenton is completing a project to convert all of its established survey bench marks throughout the city to NAVD88. We have established the NAVD88 elevations for our bench marks, but still need to update the nails and disk bench marks set in road curbs. However, the correct NAVD88 information for our bench mark can be obtained at the following sources:

- Land Boundary Information System (LABINS) sponsored by the Florida Department of Environmental Protection at <http://labinsw2010.freac.fsu.edu/LABINS/index.html>;
- National Geodetic Survey at <http://www.ngs.noaa.gov/cgi-bin/datasheet.prl>.

As of the date of this memorandum, any project submitted to the City of Bradenton Department of Planning & Community Development or Department of Public Works & Utilities for review and approval must clearly indicate the vertical datum and bench marks used as the basis for all site improvements. Plans received without this information will be returned for correction prior to staff reviews for approval.

If you have any questions regarding NAVD88 or our City of Bradenton bench marks, please feel free to contact the Department of Public Works and Utilities at 708-6300.

# INTRODUCTION

## ***Standard Drawings and Specifications for Public Works and Utilities Construction***

The information enclosed has been compiled from the latest standards for material specifications used by consulting engineers and local agencies. It is our intention that these specifications be used as a guideline for engineers, developers, architects, and contractors to insure uniformity of Public Works and Utilities construction.

All proposed projects will require a pre-design conference with Public Works and Utilities staff. The engineer shall coordinate the proposed and existing location of all water lines, sanitary sewer lines, storm sewers, pressure mains, lift stations, telephone cables, gas lines, electric lines, television cables, etc. prior to any approval by the Public Works and Utilities Department. This plan will be submitted with utility construction drawings for final approval.

A **Site Improvement Permit** will be required by any applicant improving a parcel of vacant land, existing development or proposed will need to submit four (4) sets of signed and sealed construction plans and one (1) Project PDF CD along with any bond estimates, specifications, and landscape drawings submitted to the City of Bradenton Department of Planning and Community Development for processing and final plan approval.

Before any construction shall take place, an approved Engineer Estimate for utility and road improvements may be required. If any utility work is to take place in any dedicated right of way the contractor shall be responsible for obtaining a Right of Way Use Permit from the City of Bradenton, Manatee County and/or the Florida Department of Transportation (FDOT) prior to commencement.

Upon completion of road and/or utility work, the Public Works and Utilities Department will complete a final inspection of the site prior to any certificate of occupancy.

The Engineer and Professional Surveyor and Mapper of record shall prepare and submit record drawings and certify that the required site improvements have been installed and completed in accordance with the original development approval and any authorized written modifications thereto. These drawings shall be signed and sealed by the Engineer of record attesting to compliance with the development approval and by the Professional Surveyor and Mapper in accordance with Chapter 5J-17, Florida Administrative Code and attesting to accuracy on location and elevations. A letter of acceptance will be granted by the Public Works and Utilities Department upon receiving **two (2) signed and sealed "As-Built" / "Record Drawing"** of each utility and/or roadway design.

*Created 2010  
Revised July 2013*

The engineer of record shall also supply the Public Works and Utilities Engineering Department with electronic PDF and AutoCAD® files of the project with any/all AutoCAD® supporting files. **Only Version 2010 or newer will be accepted.**

The owner or contractor shall be responsible for maintaining any utility or roadway repairs or deficiencies for one (1) year upon acceptance of items.

The following information contained within this guideline is for designing purposes only.

- All proposed projects will require shop drawing approval. When submitting this information please provide the Public Works and Utilities Department with a minimum of **four (4) sets** of engineer approved shop drawings for water, sewer, drainage, lift station and electrical products. Submittal of electronic copies in PDF format is acceptable.
- If at any time an engineer requests any modifications to the approved plan, the Public Works and Utilities Department requires **four (4) sets** of resubmitted drawings for approval.
- The placement of trees within any City maintained right of way or easement is not permissible, unless the Director of Public Works deems necessary.
- See Attached Project Check List, Construction Test(s) Report, Water/Force Main Pressure Test Form, and Release and Hold Harmless Agreement Pavers.
  - The Project Check List provides a detailed list of the information that must be addressed on any site plan submitted for approval.
  - The Construction Test(s) Report shall be used to report to the City the results of test performed, as required, on installed infrastructure components.
  - The Water/Force Main Pressure Test Form provides the means to calculate the necessary pressures for pipeline testing and shall be used to report the results of pipeline pressure testing to the City.
  - The Release and Hold Harmless Agreement Pavers shall be used whenever a property owner request approval for a brick paver driveway with a City ROW.

# INDEX

<u>Title</u>	<u>Page</u>
DISCLAIMER	2
INTRODUCTION	3
INDEX	5
DETAILED DRAWING INDEX	7
ACRONYMS USED	9
NEW PROJECT CHECKLIST	11
CONSTRUCTION TEST(S) REPORT	12
WATER/FORCE MAIN PRESSURE TEST	13
RELEASE AND HOLD HARMLESS AGREEMENT PAVERS	14
SECTION I – STREETS, CURBING, SIDEWALKS, DRAINAGE MARKING AND SIGNING	16
<i>SUB-SECTION</i>	
A    BASE AND PAVING	16
B    CURBS	17
C    PATCHING	17
D    SIDEWALKS	17
E    DRAINAGE	18
F    DRAINAGE AND RETENTION	20
G    MARKING AND SIGNING	21
H    UTILITY CUTS	21
I    TESTS	23
J    SITE CLEARING AND EXCAVATION	23
K    RECORD DRAWINGS	23
SECTION II - SANITARY SEWER SYSTEMS	26
<i>SUB-SECTION</i>	
A    GENERAL	26
B    MATERIALS	26
C    CONSTRUCTION	32
D    TESTS	35
E    LIFT STATIONS	37
F    RECORD DRAWINGS	41
SECTION III - WATER MAIN AND SERVICE CONNECTION	43

<u>Title</u>	<u>Page</u>
<b><i>SUB-SECTION</i></b>	
<b>A GENERAL</b>	<b>43</b>
<b>B PIPE AND FITTINGS</b>	<b>43</b>
<b>C INSTALLATION SPECIFICATIONS</b>	<b>47</b>
<b>D FIRE HYDRANTS</b>	<b>54</b>
<b>E RECORD DRAWINGS</b>	<b>55</b>

**SECTION IV - STREET LIGHT TECHNICAL SPECIFICATIONS** **57**

***SUB-SECTION***

<b>A GENERAL REQUIREMENTS</b>	<b>57</b>
<b>B EQUIPMENT AND MATERIALS</b>	<b>57</b>
<b>C INSTALLATION METHODS</b>	<b>59</b>
<b>D AS-BUILT / RECORD DRAWINGS</b>	<b>60</b>

**SECTION V – REUSE DISTRIBUTION SYSTEMS** **61**

***SUB-SECTION***

<b>A GENERAL REQUIREMENTS</b>	<b>61</b>
<b>B DESIGN STANDARDS</b>	<b>61</b>
<b>C MATERIALS</b>	<b>62</b>
<b>D SURFACE WATER CROSSINGS</b>	<b>64</b>
<b>E TESTING</b>	<b>64</b>
<b>F DISINFECTION</b>	<b>64</b>
<b>G RECORD DRAWINGS</b>	<b>65</b>

**SECTION VI – SOLID WASTE** **67**

***SUB-SECTION***

<b>A GENERAL REQUIREMENTS</b>	<b>67</b>
<b>B DUMPSTER PADS</b>	<b>67</b>

## **APPENDICES**

<b>APPENDIX A</b>	<b>STANDBY POWER GENERATOR</b>
<b>APPENDIX B</b>	<b>EROSION/SEDIMENTATION CONTROL STANDARDS</b>
<b>APPENDIX C</b>	<b>STANDARD DETAIL DRAWINGS</b>

*Created 2010  
Revised July 2013*

# DETAILED DRAWING INDEX

## *SHEET NUMBER*

### **STREETS AND ROADS**

TYPICAL ROAD SECTION	SR-1
CURBS (TYPE F, D AND TRANSITION)	SR-2
CURBS (TYPE A, VALLEY AND MODIFIED)	SR-3
ROAD CUT REPLACEMENT TRENCH BACKFILL & COMPACTION	SR-4
NON-PAVED TRENCH BACKFILL & COMPACTION	SR-4A
TYPICAL SIDEWALK CONSTRUCTION	SR-5
DRIVEWAY CONSTRUCTION (TYPE F CURVE)	SR-6
DRIVEWAY CONSTRUCTION (TYPE D CURVE)	SR-6A
BRICK PAVER DRIVEWAY CONSTRUCTION	SR-7

### **STORM DRAINAGE**

CURB INLET AND CATCH BASIN	SD-1
BUBBLER BOX WITH TYPE D CURVE	SD-1A
BUBBLER BOX WITH MIAMI CURVE	SD-1B
RING AND COVER	SD-21
SILT FENCE	SD-3
CURB INLET AND INLET GRATE EROSION CONTROL	SD-3A
SOIL TRACKING PREVENTION DEVICE	SD-4

### **SANITARY SEWER**

SERVICE LINE CLEAN OUT	SS-1
PRECAST MANHOLE	SS-2
PRECAST MANHOLE CONSTRUCTED OVER EXISTING SEWER LINE	SS-2A
PRECAST DROP MANHOLE	SS-3
FRAME AND COVER	SS-4
FORCE MAIN CONNECTION TO MANHOLE	SS-5
FORCE MAIN AIR RELEASE VALVE	SS-6
TYPICAL CONCRETE ENCASEMENT	SS-7
GREASE INTERCEPTOR	SS-8
LIFT STATION SITE PLAN	SS-9
LIFT STATION ELECTRICAL SPECIFICATIONS	SS-9A

*Created 2010  
Revised July 2013*

**WATER DISTRIBUTION**

WATER MAIN SEPARATION CHART	W-1
VALVE AND BOX	W-2
BUTTERFLY VALVE AND BOX FOR VALVES 16" OR LARGER	W-2A
WATER MAIN AIR RELEASE VALVE	W-2B
1-INCH WATER SERVICE	W-3
2-INCH WATER SERVICE	W-3A
DOUBLE WATER SERVICE CONNECTION	W-3B
1-INCH WATER SERVICE CONNECTION	W-4
TYPICAL METER SETS W/BACKFLOW PREVENTERS 1" AND 3/4" MODELS	W-5
TYPICAL METER SETS W/BACKFLOW PREVENTERS 1-1/2" AND 2" MODELS	W-6
COMMERCIAL WATER METER 90-DEGREE RISE 4-INCH AND LARGER MODELS	W-7
SCHOOL PROPERTY ONLY COMPOUND WATER METER 4-INCH AND LARGER	W-8
MASTER WATER METER 90-DEGREE RISE 4" AND LARGER MODELS	W-9
TYPICAL HORIZONTAL FIRE LINE BACKFLOW PREVENTER	W-10
TYPICAL VERTICAL FIRE LINE BACKFLOW PREVENTER	W-10A
WATER AND SANITARY SEWER SERVICE LAYOUT	W-11
THRUST RESTRAINING CHART	W-12
BACTERIOLOGICAL SAMPLE POINT	W-13
FLUSHING DEVICE (ABOVE GROUND METER)	W-14
FLUSHING DEVICE (BELOW GROUND METER)	W-14A
FIRE HYDRANT SETTING	W-15

**ELECTRICAL**

STREET LIGHT POLE	E-1
-------------------	-----

**RECLAIMED WATER**

RECLAIM WATER METER WITH BACKFLOW	RW-1
RECLAIM WATER METER WITHOUT BACKFLOW	RW-2

**SOLID WASTE**

SANITATION TRUCK TURNING RADIUS	SW-1
SANITATION PAVER DETAIL FOR DRIVEWAYS	SW-2
MINIMUM TURNING RADIUS SANITATION FRONT LOADING GARBAGE TRUCK	SW-3

# ACRONYMS USED

AASHTO	American Association of State Highway and Transportation Officials
AC	Alternating Current
ANSI	American National Standards Institute
ASA	American Standards Association
ASCO	American Switch Company
ASTM	American Society for Testing and Materials
AWG	American Wire Gauge
AWWA	American Water Works Association
BFV	Butterfly Valve
BHP	Brake Horse Power
CAD	Computer Aided Design
CIP	Cast Iron Pipe
COB	City of Bradenton
DC	Direct Current
DER	Department of Environmental Regulations
DIP	Ductile Iron Pipe
DSU	Device Switching Unit
EPDM	Ethylene Propylene Diene Monomer
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FES	Federal Specifications and Standards
GFCI	ground fault circuit interrupter
GV	Gate Valve
HDPE	High-Density Polyethylene
HP	Horse Power
HSWA	Hazardous and Solid Waste Amendments
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IES	Illumination Engineering Society
KW	Kilowatt
LBR	Load Bearing Ratio
lbs	pounds
LCD	Liquid Crystal Display
LED	Light Emitting Diode
MOT	Maintenance of Traffic
NEC	National Electrical Code
NEMA	National Electrical Manufactures Association
NFPA	National Fire Protection Association

*Created 2010  
Revised July 2013*

NSF	National Science Foundation
OD	Outside Diameter
OSHA	Occupational Safety and Health Administration
PK	Parker-Kalon
PPM	Part Per Million
psi	Pound-force per Square Inch
psig	Pound-force per square inch gauge
PVC	Polyvinyl Chloride
R/W	Right of Way
RCP	Reinforced Concrete Pipe
RCRA	Resource Conservation and Recovery Act
RPM	Revolutions per Minute
SDR	Standard Dimension Ratio
SSOCOF	Sunshine State One Call of Florida
SWFWMD	Southwest Florida Water Management District
TDH	Total Dynamic Head
UL	Underwriters Laboratories
ULFM	Underwriters Labs and Factory Mutual



# NEW PROJECT REVIEW CHECKLIST

The following information shall be addressed on the plan.



Project Name: \_\_\_\_\_  
 Address: \_\_\_\_\_  
 Engineer: \_\_\_\_\_  
 Date: \_\_\_\_\_

## WATER:

- Water service location with size of meter
- Irrigation service with size (potable, well, reclaimed)
- Existing water mains with sizes
- Backflow preventers
- Private / public system

## LIFT STATION:

- Plot plan of location 1"= 10' scale
- Dimension of property required (40'x 40'min.)
- Show roadway, service drive, wet well, electric panel, water service, telemetry, plug valve box, fences, landscaping, etc...
- Rim, invert, diameter of wet well elevations
- Pump sizes, flow data and electric
- Private / public system

## SEWER:

- Sanitary sewer service locations with clean out
- Sanitary sewer main with manhole locations, pipe sizes, rim, and invert
- Private / public system

## STREET LIGHTING:

- Show all street light locations with electric pull boxes and conduit
- Type of pole and light fixture
- Private / public system (private, no conduit or street lights allowed within city right-of-way)

## FIRE:

- Existing and proposed fire hydrant with flow data / distance to building
- Type of sprinkler system (13- 13R- 13D system)
- Two-sided access
- Fire lane and access
- Full building footprint shown on plan
- Building square footage (residential / commercial) and number of floors
- Turning radius (auto track) 35' radius inside / 45' radius outside
- Fire line service / backflow preventer (DDC)
- Electric Gates

## STREETS, DRAINAGE & PARKING:

- Road widths
- Curb type
- % - grade
- Sidewalks and width
- Street numbers or name of each road
- Stop signs / stop bars / cross walk / street marker
- Catch basins, junction boxes, swales, ponds, weir, under drain, etc...
- Profile grade of road and pipes
- Cross section views
- Ponds, swales, roadway, etc...
- Pollution prevention plan
- Handicap parking spaces
- Landscaping plan

## SANITATION / RECYCLING:

- Can pick-up (hand / automated)
- Dumpster (front loading)
- Compactor
- Recycle container
- Dumpster enclosure (city detail)

Revised July 2015



## CONSTRUCTION TEST(S) REPORT

PROJECT: \_\_\_\_\_

Project No.: \_\_\_\_\_ Date: \_\_\_\_\_

Prime Contractor: \_\_\_\_\_ Subcontractor: \_\_\_\_\_

TYPE OF TEST(S) / REVIEW \_\_\_\_\_

Sewer Air Test _____	Force Main Tap _____	Water Main Tap _____	Road Base _____
San Sewer Final _____	San Sewer Lamping _____	WM Pressure Test _____	Road Final _____
Mandrel Test _____	FM Pressure Test _____	Fire Flow Test _____	Curb Final _____
Infiltration Test _____	Storm Sewer Final _____	Water System Final _____	Street Light Final _____

TYPE OF TEST(S) / REVIEW \_\_\_\_\_

FROM:

Manhole # \_\_\_\_\_ ( \_\_\_\_\_ )

To:

Manhole # \_\_\_\_\_ ( \_\_\_\_\_ )

COMMENTS:

---



---



---



---



City of Bradenton, Florida

RELEASE AND HOLD HARMLESS AGREEMENT  
PAVERS

Date: \_\_\_\_\_

Name of Applicant: \_\_\_\_\_  
(type or print)

Address of Project: \_\_\_\_\_  
\_\_\_\_\_

Manatee County Tax ID #: \_\_\_\_\_

Mailing Address: \_\_\_\_\_  
(if different from project address)

City of Bradenton  
Department of Planning and Community Development  
101 Old Main Street  
Bradenton, Florida 34205

I, (We), \_\_\_\_\_ Owner(s) of the Project property described above, agree to take full responsibility for repair and replacement, regardless of cause, or any injury that may occur that is attributable to my installation of pavers\* within City of Bradenton Rights-of-Way or Easements lying across said property including any repair or replacement caused by the City of Bradenton's work and activities within such easement or right of way. The City of Bradenton shall not be responsible for any such repair or replacement or damaged pavers or area within such easement or right of way. The undersigned, in further consideration, of the permission to install such pavers does hereby on behalf of itself, its agents and insurers release the CITY OF BRADENTON and its employees, officers, agents, contractors and insurers from any and all liability and claims for damages and/or injuries arising in any manner out of the use of such personal property.

IN ADDITION, the undersigned does hereby hold the CITY OF BRADENTON, and its employees, officers, agents, contractors and insurers harmless from any and all claims or actions involving any damages or injuries including attorney's fees that might be incurred by the City, its officers, employees, agents, contractors and insurers in defending any action of any nature brought against the CITY its, employees, officers, agents, contractors and insurers resulting in any manner from the installation of such pavers the City of Bradenton right of way or easements over such property. This

*Created 2010  
Revised July 2013*

agreement shall run with the property and may be recorded in the Public Records of Manatee County, Florida.

Signature of Applicant(s): \_\_\_\_\_

Sworn and Subscribed to me this \_\_\_\_\_ day of \_\_\_\_\_, 2012 by

\_\_\_\_\_

\_\_\_\_\_ Personally Known  
\_\_\_\_\_ Produced ID                      Type of ID \_\_\_\_\_

Notary Public Signature: \_\_\_\_\_

Notary Printed Signature: \_\_\_\_\_

(Seal)

*\*Pavers shall mean pavers, bricks, architectural pavers, artistic pavers, interlocking pavers, block, stone pavers, flagstone or any other hardscape paving product other than poured concrete slab or asphalt pavement.*

# SECTION I

<b>STREETS, CURBING, SIDEWALKS, DRAINAGE, MARKING AND SIGNING</b>
---

## ***SUB-SECTION A - BASE AND PAVING***

- 1. *General:*** Unless otherwise specified herein, all streets, curbing, sidewalks, drainage, marking and signing shall be in accordance with FDOT Standard Specifications for Road and Bridge Construction, latest edition, as revised, and City Standard Drawings contained herein. FDOT Specifications are incorporated herein by reference as though printed in their entirety. Where City Specifications differ from the FDOT documentation, City Specifications shall take precedence. **(See detailed drawing SR-1 for Typical Road Construction Detail).**
- 2. *Sub-grade:*** The sub-grade shall conform to the elevation and cross-sections on the drawings after it has been compacted to 98% of the maximum density as determined by AASHTO 180 (ASTM D1557). Material not compacted thoroughly and to the satisfaction of the Public Works and Utilities Department shall be replaced with suitable material and re-compacted to grade.

  - a. *Stabilization:*** All roadwork shall consist of constructing a stabilized roadbed having a LBR of 40. The required LBR shall be obtained by stabilizing the roadbed material with crushed lime rock, oyster shell, coquina shell or any other material specified in Section 914 of the FDOT Standard Specifications.
- 3. *Base Courses:*** Base courses shall consist of a minimum of six-inch (6") of compacted river shell or asphalt. Materials and methods of construction shall conform to FDOT Specifications. However on any City of Bradenton Right-of-Way six-inch (6") of compacted crushed concrete may be used in lieu of compacted river shell or asphalt. All base courses shall extend in width a minimum of one-foot (1') beyond the back-of-curb line to provide a stable foundation for the curb. The Director of Public Works and Utilities or City Engineer may expand the depth of base to an approved thickness, as needed.

  - a. *Stabilization:*** Shell material or crushed concrete used in construction of shell base course shall have an average LBR value of not less than one hundred (100). The average LBR value of materials produced at a particular source shall be determined in accordance with an FDOT approved quality control procedure.
- 4. *Prime and Tack Coats:*** Prime and tack coats for base courses shall conform to Section 300 and, when directed by City, Section 330-8.5, FDOT Specifications.

5. **Surface Course:** Surface course (or wearing surface or traffic course) shall be a minimum of one and one half (1-1/2) inch of compacted Type S-III Asphaltic Concrete as specified in Section 334 of FDOT Standard Specifications. The use of reclaimed asphalt mix shall be permitted, but prior written approval is required by the Project Engineer and City of Bradenton, Public Works and Utilities official.

#### **SUB-SECTION B - CURBS**

1. **General:** Curb, of whatever cross-section, shall be constructed in accordance with Section 520, FDOT Specifications, City Standard Drawings, and details contained herein. **(See detailed drawings SR-2 and SR-3)**
2. **Foundations:** All sub-grade, or base, on which the curb is to be set, shall be stabilized in the same manner and the same depth as the roadway, and to a minimum distance of one-foot (1') beyond the back of curb.
3. **Finished Pavement:** The elevation of the top of pavement at the joint with concrete gutter shall be 0.25-inches above the low side lip of the gutter to minimize the potential for standing water at the edge of pavement.

#### **SUB-SECTION C - PATCHING**

1. **General:** Pavement patches including those associated with utility pipe repairs shall be constructed in accordance with FDOT specifications, City Standard Drawings and the details contained herein. **(See detailed drawing SR-4 and SR-4A)**

#### **SUB-SECTION D - SIDEWALKS**

1. **General:** All sidewalks shall be constructed in accordance with Section 522, FDOT Specifications. Sidewalks shall be four-foot (4') wide (minimum) in subdivisions and local streets, and five-feet (5') wide (minimum) on main through fares. Sidewalks shall be a minimum of four-inches (4") thick and constructed using 3,000-psi concrete. **(See detailed drawing SR-5)**
  - a. All new City roadways shall have sidewalks installed in accordance with the requirements of City of Bradenton Land Use Regulations Section 4.1.3.5. All sidewalks shall also be constructed to comply with the requirements of the Americans with Disabilities Act (ADA).
  - b. For complete ADA public sidewalk and curb ramp details, refer to FDOT Design Standards (current edition), Index 304, Sheets 1 through 6.

2. **Driveways:** Sidewalk that is to be used, as part of a driveway shall be six-inches (6”) thick and reinforced with six-inch (6”) by six-inch (6”) No. 10 steel wire mesh for the entire length and width of the driveway, within the R/W only, 3,000-psi concrete. The use of fiber mesh concrete is approved in lieu of the wire mesh. **(See detailed drawings SR-6 and SR-6A)**
  - a. Brick Paver Driveways: If a brick paver driveway is proposed for a property it shall be constructed in accordance with **detailed drawing SR-7.**
    - 1) As a condition of approval for installation of a brick paver driveway within a City ROW, the property owner shall execute with the City the Release and Hold Harmless Agreement Pavers contained within these specifications.
3. **Obstructions:** Prior to placing concrete around such structures, expansion joint filler one-half-inch (1/2”) in thickness shall be placed around the structure for the full depth of the concrete.
  - a. Concrete shall not be placed near a tree without the use of an approved tree barrier.

#### **SUB-SECTION E - DRAINAGE**

1. **General:** It is the intent of this section of the Specifications to detail the require procedures for installation of storm sewers and their appurtenances. All drainage system components shall be installed in strict accordance with the City Standard Drawings and the requirements of this section of the Specifications and referenced Details.
2. **Materials**
  - a. **Reinforced Concrete Pipe:** All RCP shall be in accordance with the Specifications as set forth in the FDOT Specifications Section 449-4.
    - 1) **Joints:** RCP joints shall be the O-Ring type or tongue and groove type for concrete sewer pipe. The gasket shall be the sole element utilized in sealing the joint from either internal or external pressure when using O-Ring type. Rubber for gaskets shall meet the physical requirements as set for forth in test methods of ASTM Designation C-76, or relevant FDOT construction requirements listed in 449-4.
  - b. **Underdrains:** Underdrains shall conform to Section 440 of the FDOT Standard Specifications for Road and Bridge Construction of the Florida Department of Transportation.

- c. **Corrugated Plastic Pipe:** Pipe and fittings shall conform to FDOT Standard Specification 948-2 for Corrugated Polyethylene (PE) Tubing and Fittings. The perforated pipe shall have a factory-applied knitted polyester envelope when used as an under drain. Installation shall be as recommended in 443-4, with the influent end of the pipe protected in a manner, which will prevent any soil from entering the drain.
- d. **Advanced Drainage Systems:** HDPE Class II Pipe for eighteen-inch (18") to forty-eight-inch (48") per FDOT 2010 specifications Section 948.
- e. **Precast Concrete Structures:** FDOT precast concrete catch basins, section 449, may be substituted for the concrete structures as shown on **detailed drawing SD-1**. Any bubbler boxes proposed for use shall comply with **detailed drawings SD-1A or SD-1B**. The sections shall meet the requirements of ASTM C478. Rings shall be custom made with openings to meet indicated pipe alignment conditions and invert elevations. Joint sealing and pipe connections shall be approved by the Public Works and Utilities Department through shop drawings submitted for review.
- f. **Inlet Grates, Manhole Frames and Lids:** US Foundry & Manufacturing Model USF 1258 Ring & LU Cover. ASTM A48, Class 30, or Grade 60-45-10 Ductile Iron, meeting the requirements of ASTM A536. Cast in a true symmetrical pattern of tough, dense and even-grained iron, free from warping, scales, lumps, blisters, sand holes or any defects of any kinds. Provide indented pattern lids with lettering. Machine or grind frames and lids at touching surfaces shall provide firm seats and prevent rocking. Remove and replace any set not matched perfectly. Inlet grates, manhole frames and lids shall be designed to withstand an HS20-44 loading as defined in AASHTO Specifications. **(See detailed drawing SD-2)**
- g. **Guarantee:** The Contractor shall guarantee the materials and installation against defective workmanship and other faults for a period of one (1) year.

### **3. Installation**

- a. Pipe jointing shall be done in strict accordance with the pipe manufacturer's recommendations. Spigots and bells shall be coated with lubricant as recommended by the manufacturer. An approved feeler gauge shall be used to insure perfect gasket placement.
- b. **All oval/elliptical concrete pipe shall utilize ram neck sealant and be wrapped with filter cloth on each joint. Wrapping of each joint of pipe shall extend one-foot (1') on each side of joint.**

- c. Under no circumstances shall pipe be laid in water or on sub-grade containing organic material and no pipe shall be laid when trench conditions are unsuitable for such work.
- d. In all cases, water shall be kept out of the trench until concrete cradles or in supports, where used, and materials in the joints have hardened. The pipeline shall be kept clean, and a swab shall be dragged through after the laying of each section.
- e. All joints must be completed the same day the pipe is laid. Watertight heads shall be on hand at all times to close off the pipe to prevent flow of storm sewer or debris into the line during rains. Lines under construction shall be closed off tight at the end of each construction day until the line is complete, tested, and accepted to be placed in service.
- f. **Excavation restoration shall be completed in strict accordance with the procedures outlined in Sub-Section H (Utility Cuts) of these Specifications.**

## **SUB-SECTION F - DRAINAGE AND RETENTION**

### **1. General**

- a. The City of Bradenton requires all proposed site developments (subdivision, condominium, and commercial projects) to apply to SWFWMD, Southwest Florida Water Management District for an Environmental Resource Permit (ERP).
- b. An approved SWFWMD ERP or SWFWMD ERP exemption is required for all projects within the City limits, by Chapter Rules 40D-4 and 40D-40 as revised and administered March 1, 1988. Copies of all ERPs or letters of exemption shall be forwarded to the City of Bradenton Public Works and Utilities Department as part of the City's Site Improvement Permit process.
- c. All projects meeting National Pollution Discharge Elimination System (NPDES) and Outstanding Florida Waters (OFW) regulations shall abide by those codes.
- d. All construction plans shall be submitted for review and approval with proper pollution prevention standards and methods of treatment and disposal and shall be done in accordance with FDOT Standard Specifications, Sections 102, 103, and 104, and other FDOT Specifications that may be issued from time to time.
- e. **Erosion control measures shall be implemented in accordance with the requirements of the SWFWMD permit and in accordance with detailed drawings SD-3, SD-3A and SD-4.**

*Created 2010  
Revised July 2013*

## **SUB-SECTION G - MARKING AND SIGNING**

1. **General:** Street signing and pavement marking shall be done in accordance with FDOT Standard Specifications, Sections 710, 711, and 971, and other FDOT Specifications that may be issued from time to time concerning sizes, shapes, legends, colors, heights, setbacks, spacing, etc. The developer shall be responsible for the installation of all stop signs, stop bars, cross walks, street markers, speed limit signs and warning signs required for their development. All signs shall be constructed of the same materials and procedures as furnished by Universal Signs and accessories, Fort Pierce, Florida or approved equal.
2. **Specific Projects:** Traffic control plans (stop signs, no parking, street markers, speed limits, etc.) for individual projects shall be submitted to the Director of Public Works and Utilities and Police Chief for review and approval. All required signs and marking shall be installed by the developer at their cost prior to City acceptance.
3. Any work being done within any City ROW will require submittal and approval of Maintenance of Traffic (MOT) drawing and a City of Bradenton Right of Way Use permit.

## **SUB-SECTION H - UTILITY CUTS**

1. **General:** Before utility work can begin on any public ROW within the City of Bradenton, the utility owner/contractor shall apply to the City of Bradenton Engineering Department for a Right of Way Use Permit. Permit procedures and applications can be obtained at the Engineering Department office address below, or on the City of Bradenton Web page ([www.cityofbradenton.com](http://www.cityofbradenton.com))

**1411 9<sup>th</sup> Street West  
Bradenton, FL 34205  
(941) 708-6300 ext. 236**

2. **Excavation Restoration:** Backfilling of the trench with rock spalls and unsuitable material shall be prohibited. Backfill shall conform to the following requirements after placement of the granular to stone bedding (if required), and pipe. The backfilling operation shall be performed in six operations:
  - **The Haunch:** To be mechanically or hand tamped to 98% of AASHTO T-180 density LBR 40.
  - **The Spring Line Lift(s):** Shall consist of selected stone-free earth placed in such a manner as not to disturb the pipe and then mechanically or hand tamped in layers not to exceed 6 inches and 98% of maximum density determined by AASHTO T-180 as LBR 40.

*Created 2010  
Revised July 2013*

- **The Pipe Crown Lift(s):** Shall consist of clean, dry selected stone-free earth placed in such a manner as not to disturb the pipe and then mechanically or hand tamped in layers not to exceed 6 inches and 98% of maximum density determined by AASHTO T-180 as LBR 40.
- **The Pipe Cover Lift(s):** Shall consist of clean, dry relatively stone-free earth to be mechanically or hand tamped in layers not to exceed 6 inches and 98% of maximum density determined by AASHTO T-180 as LBR 40.
- **The Intermediate Lift(s):** Shall consist of clean, dry relatively stone-free earth to be mechanically tamped in layers not to exceed 18 inches\* and 98% of maximum density determined by AASHTO T-180 as LBR 40.
- **The Final Lift(s):** Shall consist of clean, dry selected stone-free earth to be mechanically tamped in layers not to exceed 6 inches and 98% of maximum density determined by AASHTO T-180 as LBR 40.

*\* For intermediate lifts, if conventional power tampers are used, then all materials shall be compacted in 12 inch layers. Intermediate lifts in 18 inch layers will be allowed by the City provided that approved special heavy-duty power tampers, wagon or semi-truck mounted, are utilized which are capable of compacting the material to the required density. Such tampers shall be capable of delivering blows at varying energy rates in trenches of varying depth.*

**(See detailed drawings SR-4 and SR-4A)**

3. **Existing Underground Facilities:** Underground structures and utilities shall be shown on the drawings and be located according to the best available records. However, it shall be the Contractor's responsibility to acquaint themselves with all information, and to accurately locate and uncover all underground structures and utilities along the line of work in order to avoid conflicts with existing facilities.
  - a. Underground utilities shall be located by the Contractor far enough in advance of the trench excavation and pipe laying operations to assure ample opportunity to make the necessary adjustments to avoid conflicts. The City shall not be held accountable for inaccuracies or omissions in the locations or grade of facilities of this type.
4. **Conflicts:** Where actual conflicts are unavoidable, work shall be performed so as to cause as little interference as possible with the service rendered by the facility disturbed. Facilities or structures damaged in the prosecution of the work shall be repaired immediately in conformance with the best standard practices or according to

the direction of the owner of such facility, to the extent required, including replacement, at no cost to the Owner.

5. **SUNSHINE STATE ONE CALL NOTIFICATION CENTER** shall be notified by anyone preparing to do underground work within the City of Bradenton. The number to call is **811**; you are required to give at least **two (2) full business days** notice prior to commencement of any underground work per the Underground Facility Damage Prevention and Safety Act, Chapter 556, Florida Statutes.

#### **SUB-SECTION I - TESTS**

1. The Contractor shall have a certified laboratory perform in-place density tests on all base courses after final compaction. Results shall be furnished to the Engineering Department one (1) copy. Such tests shall be of sufficient numbers to properly evaluate condition of all base material.
2. The Public Works and Utilities Department reserves the right to require additional in-place testing of concrete, asphalt, or any other material at no expense to the City.

#### **SUB-SECTION J - SITE CLEARING AND EXCAVATION**

1. All land clearing and site preparation shall be in accordance with the conditions of an approved SWFWMD ERP for the project and the Best Management Practices (BMPs) contained in the City of Bradenton Erosion/Sedimentation Control Standards that are provided as an Appendix to these Specifications.
2. The use of silt screen barriers and erosion control methods shall be utilized for all construction sites within the City of Bradenton pursuant to Land Use Development Regulation Section 301.E.
3. **See detailed drawing SD-3, SD-3A & SD-4.**

#### **SUB-SECTION K - RECORD DRAWINGS FOR STREETS, STORM DRAINAGE PROJECTS)**

1. **General:** When construction is complete, record drawings indicating the locations and elevations of the improvements that have been built shall be submitted to the Public Works & Utilities Department. The record drawings shall be a revision of the approved construction plans and shall depict design information crossed out and replaced by accurate record information.

## **2. Record Information**

- a. Provide all street and curb dimensions. Centerline of roads shall be tied to ROW lines. Elevation of roadway centerline shall be given at a minimum at 100-foot intervals, all PVIs and at all intersections.
- b. Each roadway depicted on the drawings shall have the correct roadway name noted on it. Provisional roadway names, such as "Street A" will not be allowed/accepted on Record Drawings. Each new lot of a new subdivision shall have its street address number noted on the Record drawings.
- c. Bearing and distances for all ROW and easement lines and property corners shall be shown.
- d. Sidewalks, fences and walls shall be located every 200 feet. Dimensions shall include distances from the ROW line and the back of curb and lot line or easement line.
- e. Pipe sizes, length of pipe, catch basin, headwalls, retention areas including any elevations shown on approved layout. Slopes for pipes and ditches shall be recalculated, based on actual field measured distances elevations. Cross sections of drainage ditches shall be verified.
- f. Locations and elevations of drainage ditches and swales shall be shown every 200 feet, measured along their centerlines. Dimensions at these locations shall include distances from the centerline or ROW to the facility.
- g. Rim and invert elevations of catch basins and junction boxes, size and type of pipes, etc.
- h. Catch basins and manhole locations will be located by horizontal and vertical measurements referenced to Florida State Plane Coordinates.
- i. Retention/detention pond elevations shall be shown for high water level, top of bank, bank side slopes and bottom of dry ponds shall be verified. Elevations shall be provided for control structure top of grate, baffle, weir, orifice, oil skimmer and inverts. Bench marks and elevation datum shall be indicated.
- j. Details and changes to original construction plans shall be shown within a clouded area, strike through any elevations that may change on drawings.
- k. On Record Drawings, at locations where the horizontal position of the constructed pipelines or stormwater structures deviate by more than 5-feet (as scaled on the drawings) from the horizontal positions that were shown on the construction drawings, the actual positions of the structures/pipelines shall be depicted on the Record Drawings in their actual positions and their original

*Created 2010  
Revised July 2013*

design positions shall be cross-hatched out or screen shaded.

1. The engineer of record shall also supply the Public Works and Utilities Engineering Department with electronic PDF and AutoCAD® files of the project with any/all AutoCAD® supporting files. **Only Version 2010 or newer will be acceptable.**

## SECTION II

### SANITARY SEWER SYSTEMS

#### SUB-SECTION A - GENERAL

1. **Permitting:** Expansions to the City of Bradenton's municipal sewer system may require permitting through the FDEP. The developer/owner of any proposed development is responsible for obtaining any and all FDEP permits for their project related its sewer system. If an FDEP permit is required, the developer/owner shall:
  - a. Prior to commencing any construction, obtain a ***Permit for Constructing a Domestic Wastewater Collection/Transmission System.***
  - b. Prior to placing the constructed system into operation/use, obtain ***Approval to Place a Domestic Wastewater Collection/Transmission System in Operation.***

Any and all information required by FDEP to issue these permits shall be the responsibility of the developer/owner to provide to the FDEP.

#### SUB-SECTION B - MATERIALS

1. **General:** All material shall be free of defects affecting strength and durability and of the best commercial quality for the purpose specified. It shall have such structural properties sufficient to safely sustain or withstand stresses to which it is normally subjected, and it shall be true to dimensional detail.
2. **Pipe:**
  - c. **PVC Pipe**
    - 2) **Gravity Sewers:** Pipe for use in gravity services, sizes six-inch (6") through twelve-inch (12") shall meet the requirements of ASTM 3034, SDR 35. Any PVC pipe used in applications with burial depths in excess of 10 feet shall be meet the requirements of AWWA C-900 or C-905 SDR 18 pressure rated pipe or SDR 26 PVC sewer pipe.
      - a) **Service Lines:** Install in compliance with **Standard Drawing SS-1.**

- d. **Force Mains:** All PVC pipe to be used for sanitary force mains shall have an O.D. equivalent to that of cast and ductile iron and shall comply with AWWA Standards under Section C-900 and or Section C-905, minimum SDR 18.
- e. **Horizontal Direction Drills:** Pipe used for directional bore installations on force mains shall be Fusible PVC (FPVC) C-900 or C-905 DR 18 pipe, and color coded per manufacture regulations.
  - 1) An acceptable alternative pipe material for HDDs for force mains is High Density Polyethylene (HDPE) SDR 11.
  - 2) PVC or HDPE force main pipe shall have a No. 10 gauge solid, insulated tracer wire in the color of green installed along the pipe alignment. See the section on tracer wire under Sub-Section C of Section III for more details.

f. **Color Coding of PVC Pipe**

- 1) Gravity sewer pipes and Force main pipes shall be **GREEN** in color, using a solid pipe color pigment and shall bear identification markings in accordance with ASTM D3034 or AWWA C905.
  - 2) If color coded pipe cannot be located for use, a three-inch (3”) wide adhesive tape that is water resistant in the color of **GREEN** for sanitary and force mains to be adhered along the top of the pipe to mark the pipe identity.
3. ***Joint Sealer:*** Joint sealer plastisol compounds shall consist of a suspension of vinyl chloride resins in suitable plasticizers of non-volatile nature. These materials are to be filled with acid-proof substances, and after curing, will have elastomeric properties. The plastisol covered by this Specification shall be firmly bonded to the clay pipe at the factory.
4. ***Adapters and Flexible Couplings:*** Prefabricated polyvinyl joint sealer adapters and sewer pipe couplings shall be similar and equal to those manufactured by FERNCO® joint sealer company. Flexible couplings shall be installed with stainless steel bands and adjusting screws.

5. ***Pipe Locating Tape***

- a. The City requires a color coded detectable locating tape, with a minimum thickness of five (5) mils and a width of three-inches (3”).
- b. The marking of **SEWER** shall be printed every thirty-inches (30”) along the tape for sanitary sewer and force mains and shall be buried a minimum of eighteen-inches (18”) above all sewer pipe mains.

## 6. Manholes

- a. Manholes shall be precast concrete structures conforming to the requirements of ASTM C478. Precast manholes shall be constructed of 4,000 psi reinforced concrete. **(See detailed Drawing SS-2)**
  - a. **When a new manhole is constructed atop an existing sewer line (doghouse), the work shall conform with detailed drawing SS-2A**
- b. Manholes shall be of the types and construction as shown on the drawings. A shallow type manhole shall be constructed at locations shown where the difference in elevation from the invert of lowest line to grade does not exceed six-feet (6').
- c. Standard type manholes shall be constructed where the difference in elevation of the invert of lowest line is six-feet (6') or greater to grade line.
- d. A drop manhole shall be constructed when the difference in elevation, between the invert line of the deepest outlet pipe and the invert line of the inlet pipe is twenty-four-inches (24") or greater. **(See detailed Drawing SS-3)**
- e. Thickness for manhole risers shall be as listed under Wall B in the Class Tables of ASTM C76 for Reinforced Concrete Pipe. Base slab, wall thickness and invert for precast manholes shall be as shown on the detail drawings. Minimum wall thickness will vary according to the schedule on the plans.
- f. Reinforcing for the base section and lower wall shall be as specified in ASTM C478 or C76 for reinforced concrete pipe as wall B on Table III.
- g. Joints shall be tongue and groove suitable for rubber gasket. Joint material shall consist of O-Ring rubber gasket or approved equal. Voids remaining in the joint shall be caulked with polysulfide sealant on the inside and outside to make a smooth watertight joint seal.
- h. All precast manholes shall come complete with cast-in place compression-type pipe connectors that meet or exceed ASTM C 923, ASTM C 1244 and ASTM C 2321.
- i. Invert channels shall be constructed smooth and semicircular in shape conforming to inside of adjacent sewer section. Changes in direction of flow shall be made in a smooth curve of as large a radius as possible.
- j. Changes in size and grade of channels shall be formed by one of the following methods: (1) Formed directly into concrete manhole base, or with prior approval of the City (2) build up with brick and mortar.

- k. The manhole floor outside of channels shall be made smooth and sloped toward channels on a slope of two inches per foot. Free drop in manholes from inlet pipe invert to top of floor outside the channels shall not exceed twenty-four-inches (24"). Standard drop manholes shall be constructed wherever free drops exceed twenty-four-inches (24").
- l. Steep slopes outside the invert channels shall be avoided. Changes in size and grade shall be made gradually and evenly. Changes in the direction of the sewer and entering branch or branches shall be a true curve of as large a radius as the size of the manhole will permit.
- m. **Coatings**: The interior and exterior of all manholes shall be protected with three (3) coats of ConSeal™ CS-55 epoxy coating system or approved equal. Each coat shall be applied at a rate of four (4) dry mils for a total of twelve (12) dry mils. All pipe linings shall lap over the joint into the manhole and be sealed with Portland and ConSeal™ CS-55 as outlined above.
- 1) For precast wet wells and the first manhole outside the wet well, in lieu of the ConSeal coating, the interior of these structures shall be lined with a fiberglass coating system. Acceptable systems are:
    - SprayWall Liner as provided by Sprayroq, Inc, Birmingham, AL;
    - Green Monster Liner as provided by Cardinal Contractors, Sarasota, FL; or
    - IET System 3 by Paints and Coatings, Inc., Ft. Meyers, FL.
- n. Components of the manhole shall be free of fractures, cracks, and undue roughness. Concrete shall be free of defects which indicate improper mixing or placing and surface defects such as honeycomb are not acceptable. No lift holes will be allowed.
- o. Frames and Covers:
- 1) The manhole frames and covers shall be of cast iron similar and equal to the type specified on the plans and in accordance with City Specifications.
  - 2) The frames and covers shall be set so that the top of the cover will be flush or higher than finished grade as directed.
  - 3) All manhole covers shall be cast with lettering as noted on the plans.
  - 4) All manholes shall have inflow protectors installed per City of Bradenton Public Works and Utilities requirements.
  - 5) **See detailed drawing SS-4**

- p. **Grade Rings:** Precast concrete grade rings shall be used to support and adjust manhole frames to the required finished grades. Grade rings shall conform to ASTM C478 and shall be set in a full bed of mortar. **The maximum height of grade rings permitted is 18-inches, including mortar jointing.**
- 1) Brick and mortar proposed in lieu of concrete grade rings will only be approved if it can be verified that grade rings are not available.
  - 2) Mortar for brickwork and plastering shall consist of one part Portland cement and two parts fine sand. No lime or masonry cement shall be used. Joints shall be completely filled and the mortar shall be smoothed from inside the manhole.
  - 3) The entire exterior and interior of brick work shall be plastered with one-half-inch (1/2") of mortar.
  - 4) All precast grade rings (and brick if approved) shall be coated with ELASTASEAL® rubber base paint on all exposed surfaces.
7. **Connection to Existing Manholes:** Pipe connections to existing manholes shall be made so that finished work will conform as nearly as possible to essential requirements for new manhole construction as specified above. Existing manhole structures shall be core bored to facilitate the new connection. A stainless steel and rubber pipe insert fitting (Link Seal) shall be used for this connection. Non shrink grout shall be used to seal the pipe to the man hole as an approved alternate.
8. **Wye Branches and Cleanouts:** Commercially manufactured wye branches and sewer cleanouts shall be installed where sewer connections are indicated on the drawings or are required by the City.
- a. For new subdivisions and any situation where the building connection to a service lateral will be completed at a later date, all cleanouts or services are to be marked in the field at the Right-of-Way line with a two-inch (2") by four-inch (4") board with the upper half painted **GREEN**. **(See detailed drawing SS-1)**
9. **Air Release Valves:** Air release valves installed on force mains (pressure pipelines) shall be automatic-type specially designed to operate with carrying liquids containing solid particles, and shall be S-020 as manufactured by A.R.I. or approved equal.
- a. Air release valves shall be set in a precast concrete valve vault as manufactured by Oldcastle precast #UV1818-36, eighteen inches (18") by eighteen inches (18") by thirty-six inches (36") vault with four inch (4") walls and an H2O-rated galvanized steel traffic cover painted Rust-Oleum **GREEN** or approved equal.
  - b. The connection from the force main shall be a two inch (2") corporation stop with a double strap service clamp, Ford 202B or equal, connected to a two inch (2") schedule 80 PVC pipe. **(See detailed drawing SS-6)**

10. **Force Main Tapping Valve:** All Tapping Valves for connection of a new force main to an existing force main shall be American Flow Control gate valve series 2500 with ductile iron body, EPDM rubber wedge or approved equal. All gate and tapping valves shall have AWWA and ULFM approved body and be rated for two-hundred-and-fifty (250) psi and be epoxy lined.
- a. The valves shall be furnished with the tapping flange having a raised face or lip designed to engage the correspondence recess in the tapping sleeve flange in accordance with MSS-SP60.
  - b. Tapping valves without the raised face on the tapping flange are not permitted since they do not assure the proper alignment required to prevent damage by a misaligned shell cutter.
  - c. The interior of the waterway in the body shall have epoxy coating and have a full opening capable of passing a full sized shell cutter equal to the nominal diameter of the valve.
11. **Force Main Isolation Valves:** All force main isolation valves shall be DeZurik PEC, Clow F-5412, Val-Matic “Cam-Centric”, Milliken “Millcentric” Figure 601, Pratt “Ballcentric” or approved equal.
- a. Valves shall be epoxy coated eccentric plug valves and have a minimum port area of 80 percent of the nominal pipe size area. All eccentric plug valves shall have AWWA approved body and be rated for a minimum of two-hundred-and-fifty (250) PSI.
12. **Force Main Sewer Valve Boxes:** All force main sewer valve boxes shall be standard cast iron roadway type, adjustable three-piece, screw type, having five-and-one-half-inches (5-1/2") diameter shaft and suitable for three-foot (3') or four-foot (4') deep trenches.
- a. Valve boxes set in grass areas shall be encased with a 24-inch by 24-inch concrete collar six-inch (6") thick pad. The word **SEWER** shall be engraved onto a valve box lid and painted with Rust-Oleum green paint. A three-inch (3") brass disk shall be attached with epoxy to the concrete pad inscribed with the following information; gate valve (GV), plug valve (PV) or butterfly valve (BFV), the number of turns to open/close valve and COB.
13. **Guarantee:** The Contractor shall guarantee the materials and installation against defective workmanship and other faults for a period of one (1) year.

**SUB-SECTION B - CONSTRUCTION**

1. **Trenching, Lying, and Backfilling of Sewers:**

a. **General:** Construction methods for trenching, lying, and backfilling of sewer pipe shall be in accordance with Section 430 FDOT Specifications using Class C Bedding, except as modified by the following.

- 1) Blasting methods shall conform to the requirements of Section 7-9 of the FDOT Specifications.
- 2) Class B Bedding can be used if approved by the City. Pipe trenches shall be over-excavated to the limits shown on the drawings and the pipe bedded in granular or stone fill. Granular or stone fill shall be crushed stone or gravel conforming approximately to the following gradations.

***BEDDING, DRY DITCH***

<b><i>SIEVE</i></b>	<b><i>% PASSING</i></b>
3/4 inch	50 - 100
No. 4	0 - 50
No. 200	1 - 5

3) The City reserves the right to modify the make-up of the granular or stone fill as may be required by trench conditions encountered. Samples of all granular fill proposed for use shall be submitted by the Contractor to the City for approval prior to ordering material.

b. **Trenching and Backfilling:** The bottom of the trench for the pipeline shall conform to the grade of the pipeline and shall be so shaped that the pipe shall rest upon granular or stone backfill for its entire length. Where rock is encountered in the trench, it shall be removed to a minimum depth of nine-inches (9") below the pipe grade and the pipeline shall be laid on a cushion of suitably compacted granular to stone fill at least nine-inches (9") thick on each side

Backfilling of the trench with rock spalls and unsuitable material shall be prohibited. Backfill shall conform to the following requirements after placement of the granular to stone bedding (if required), and pipe. The backfilling operation shall be performed in six operations:

- 1) **The Haunch:** To be mechanically or hand tamped to 98% of AASHTO T-180 density LBR 40.
- 2) **The Spring Line Lift(s):** Shall consist of selected stone-free earth placed in such a manner as not to disturb the pipe and then mechanically or hand tamped in layers not to exceed 6 inches and 98% of maximum density determined by AASHTO T-180 as LBR 40.
- 3) **The Pipe Crown Lift(s):** Shall consist of clean, dry selected stone-free earth placed in such a manner as not to disturb the pipe and then mechanically or hand tamped in layers not to exceed 6 inches and 98% of maximum density determined by AASHTO T-180 as LBR 40.
- 4) **The Pipe Cover Lift(s):** Shall consist of clean, dry relatively stone-free earth to be mechanically or hand tamped in layers not to exceed 6 inches and 98% of maximum density determined by AASHTO T-180 as LBR 40.
- 5) **The Intermediate Lift(s):** Shall consist of clean, dry relatively stone-free earth to be mechanically tamped in layers not to exceed 18 inches\* and 98% of maximum density determined by AASHTO T-180 as LBR 40.
- 6) **The Final Lift(s):** Shall consist of clean, dry selected stone-free earth to be mechanically tamped in layers not to exceed 6 inches and 98% of maximum density determined by AASHTO T-180 as LBR 40.

***\*Intermediate lifts in 18 inch layers will be allowed by the City provided that approved special heavy-duty power tampers, wagon or semi-truck mounted, are utilized which are capable of compacting the material to the required density. Such tampers shall be capable of delivering blows at varying energy rates in trenches of varying depth. If conventional power tampers are used, then all materials shall be compacted in 12 inch layers.***

**(See detailed drawings SR-4)**

Suitable materials for pipe backfill shall be transported to the site at no extra cost to the City if not available at job site. The final lift shall be mounded slightly over the trench and properly compacted with power equipment in four-inch (4") to six-inch (6") layers.

A work force of sufficient numbers to insure proper backfill of the excavated trench as determined and directed by the Public Works and Utilities Department spokesperson, shall be maintained at all times.

The Public Works and Utilities spokesperson has the right to limit the amount of trench opened in advance of pipe lying and the amount of pipe lines in advance of backfilling.

The Public Works and Utilities Department retains the right at any time to require the refilling of open trenches over completed pipe lines, if in their judgment such action is necessary. The Contractor shall thereby have no claims for extra compensation even though to accomplish said refilling he is compelled to temporarily stop excavation or other work at any place.

If work is stopped on any trench or excavation for any reason except by order of the Public Works and Utilities Department, and the excavation is left open for an unreasonable length of time, the Contractor shall refill such trench or excavation at his own expense and shall not again open said trench until he is ready to complete the structure or work therein.

Following the trench preparations specified herein, pipe lying shall proceed upgrade with pipe laid carefully, bells upgrade, spigot ends fully entered into adjacent bells, and true to lines and grades given.

Laser beam devices for maintaining line and grade shall be used by the Contractor. Every pipe shall be inspected before laying and any containing cracks or defects shall not be used. Short specials as required for closures shall be furnished and installed by the Contractor.

Pipe shall be lowered into the trench by means of an approved sling. Joints shall be made with approved methods of construction. Each section of pipe shall rest upon the pipe bed for the full length of its barrel, with recesses excavated as required to accommodate bells and joints. Each pipe shall be firmly held in position so that the invert forms a continuous grade with the invert of the pipe previously placed. The interior of all pipe and the inside of the bell and outside of the spigot shall be thoroughly cleaned of all foreign matter before being lowered into the trench, and shall be kept clean during laying operations by means of plugs or other approved methods.

Pipe jointing shall be done in strict accordance with the pipe manufacturer's recommendations. Spigots and bells shall be coated with lubricant as recommended by the manufacturer. An approved feeler gauge shall be used to insure perfect gasket placement.

Under no circumstances, shall pipe be laid in water or on subgrade containing organic material and no pipe shall be laid when trench conditions are unsuitable for such work. In all cases water shall be kept out of the trench. The pipe line shall be kept perfectly clean and a swab shall be dragged through after the laying of each section. All joints must be completed the same day the pipe is laid.

Water-tight heads shall be on hand at all times to close off the pipe to prevent flow of storm water or debris into the line during rains.

Lines under construction shall be closed off tight at the end of each construction day until the line is complete, tested, and accepted to be placed in service.

2. **Permanent Curb Location Marker:** Location markers shall be provided for all service laterals and force main valves. Location markers shall be green anodized aluminum disc, labeled **SEWER** as manufactured by National Band and Tag Company®. The distance (in feet) from the cleanout or plug to the marker shall be engraved thereon. Markers shall be securely attached to the back of curb with a two-inch (2") long PK survey marker nail and epoxy.
3. **Force Main Connections to Manholes:** When a force main is connected to its discharge manhole, the force main piping shall be installed in full compliance with **standard drawing SS-5**.
4. **Force Main Air Release Valves:** All air release valves installed on new force mains shall be constructed in full compliance with **standard drawing SS-6**.
5. **Utility Main Crossings:** Where a sanitary sewer crosses either a water main or storm sewer pipe with less than 18-inches of vertical clearance between the pipes, the sewer main shall be encased in concrete a distance of 5-feet on each side of the point of intersection. The encasement shall be completed in accordance with **standard drawing SS-7**.
6. **Grease Interceptors:** For restaurants and other commercial establishments that by City Building Code require the installation of a grease interceptor on their sanitary sewer service, the grease interceptors shall be precast concrete structures meeting the specifications and requirements outlined on **standard drawing SS-8**.

### **SUB-SECTION C - TESTS**

1. **General:** All work shall be subject to visual inspection for faults and defects, and any deviations or omissions shall be corrected before the work proceeds. All testing, lapping, wire measuring, air test, etc., shall be performed by the Contractor or Developer at no expenses to the City.
2. **Infiltration:** Completed sewer lines, or logical sections thereof, shall be tested for infiltration before acceptance by the City for discharge to the public sewer. Allowable limit for infiltration shall not exceed one-hundred-and-seventy-five (175) gallons per inch of diameter per mile of pipe in a twenty-four (24) hour period. All pipe lines, or sections thereof, that exceed this limit shall be rejected until such necessary corrective action has been taken to eliminate or control excessive inflow.

*Created 2010  
Revised July 2013*

**3. Gravity Air Testing Procedures:** All sanitary sewer lines shall be air tested for leakage in accordance with this section of the contract specifications. Any section of installed sewer that fails to meet the air test requirements of this section shall be repaired and retested until such time as all defects have been corrected and a successful air test has been completed. All repairs and/or replacement required to correct any and all defects in materials or workmanship shall be made by the Contractor at no additional cost to the City of Bradenton. All air tests, including retests, must be witnessed by the City of Bradenton representative and the engineer of record.

The section of sewer line to be tested shall be plugged. Low-pressure air shall be introduced into the plugged line. The amount and rate of air loss shall be used to determine the acceptability of the section being tested. Gauges used to measure pressure shall have increments of 0.5 psig minimum and shall be approved by the Engineer prior to testing. The time required in minutes for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than the time shown for the given diameters in the following table:

Pipe Diameter in Inches	Minutes
4	2
6	3
8	4
10	5

In areas where ground water is known to exist, the Contractor shall install a one-half inch diameter capped nipple, approximately ten-inches (10") long, through the manhole wall on top of the sewer lines entering the manhole. This shall be done at the time the sewer line is installed. Immediately prior to the performance of the line acceptance test, the ground water shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the pipe nipple. The hose shall be held vertically and measurement of the height in feet of water over the invert of the pipe shall be taken after the water has stopped rising in this plastic tube. The height in feet shall be divided by 2.3 to establish the pounds of pressure that will be added to all readings.

Plug all pipe outlets to resist the test pressure. Give special attention to laterals. Determine the test duration for the section under test from the above table. Add air until the internal air pressure of the sewer line is raised to test pressure. After an internal test pressure is obtained, allow time for the air pressure to stabilize. The pressure will normally show some drop until the temperature of the air in the test section stabilizes. When the pressure has stabilized and is at or above the starting test pressure, commences the test. Before starting the test, the pressure may be allowed to drop 1.0 psig. Record the drop in pressure for the test period. If the pressure has dropped more than 1.0 psig during the test period, the line is presumed to have failed.

*Created 2010  
Revised July 2013*

The test may be discontinued when the prescribed test time has been completed even though the 1.0 psig drop has not occurred.

The air test may be dangerous if a line is improperly prepared. It is extremely important that the various plugs be installed and braced in such a way as to prevent blowouts. If so much as a force of two-hundred-and-fifty (250) lbs. is exerted on an eight-inch (8") plug by an internal pipe pressure of five (5) psi, it should be realized that a sudden expulsion of a poorly installed plug or a plug that is partially deflated before the pipe pressure is released can be dangerous. As a safety precaution, pressurizing equipment shall include a regulator or relief valve to avoid over-pressurizing and damaging an otherwise acceptable line. No one shall be allowed in the manholes during testing.

All sanitary sewer lines shall be air tested for leakage and lamped for horizontal and vertical alignment, not less than ninety (90) percent full circle vertically or eighty (80) percent of full circle horizontally from each end of pipe. Any section of installed sewer that fails to meet the air test or lamping requirements of this section shall be repaired and retested until such time as all defects have been corrected and a successful air test and lamping has been completed. All repairs and or replacements required to correct any and all defects in material or workmanship shall be made by the Contractor at no additional cost to the City of Bradenton. All air tests and lamping tests, including retests, must be witnessed by the City of Bradenton and the Engineer of Record. The city will reserve the right to have the sewer pipes inspected by a camera if warranted at no additional cost to the City.

- 4. *Force Main Testing Procedures:*** All force mains shall be tested for leaks prior to hooking up to any new system. Force mains shall be tested for one (1) hour at seventy-five (75) pounds pressure with no loss of pressure allowed.

#### **SUB-SECTION D - LIFT STATIONS**

- 1. *General:*** All sewage lift stations, whether factory build or tailored, shall be approved by the Public Works and Utilities Department. All materials, controls, pumps, motors, wiring, and piping shall be made of first class, non-corrosive materials, and all installations shall reflect first class workmanship. **(See detailed drawing SS-9 and SS-9A).**
- 2. *Approval for Plans and Shop Drawings:*** All plans for stations shall be submitted to the Public Works and Utilities Department at least thirty (30) days in advance of any proposed procurement date. All subsequent shop drawings shall be submitted as soon as received from the supplier, and no further action shall be taken by the Owner, Developer, Engineer, Contractor, Supplier, or any other agent of the owner until the shop drawings have been approved by the Public Works and Utilities Department.

### **3. Lift Station Materials:**

- a. Stainless steel (SS) electric control cabinet panel. Minimum dimensions twenty-four-inch (24") wide by thirty-inch (30") high by ten-inch (10") depth.
- b. Three (3) Phase energy for lift station power.
- c. Lightning arrestor inside main disconnect.
- d. Manual transfer switch consisting of two (2) main breakers mechanically interlocked.
- e. GFCI convenience receptacle inside control cabinet on dead front panel.
- f. NEMA standard starters, no IEC type starters.
- g. High level or station malfunction alarm consisting of a red glass globe with a flashing light mounted outside the control cabinet. NO penetrations in the top of the control cabinet are permitted.
- h. Level controls shall be bubbler type with a level display that is either digital or graphic. It shall be equivalent to Siemens LC150. Controls shall be capable of alternating pumps, provide for a lead and lag pump to operate, contain a hand-off-auto switch, an elapsed time meter and pilot light to show pump is running.
- i. Two (2) – three-inch (3") vents over wet well (Vents shall be located on the opposite side from the electrical cabinets).
- j. Two (2) – three-inch (3") vents over valve box.
- k. One-inch (1") Water service line with a hose bib connection and backflow preventer.
- l. Six-inch (6") By-pass "plug valve" and female quick disconnect coupling.
- m. Furnish one (1) spare pump with the same specifications as installed in lift station: size, TDH, and impeller.
- n. All hardware installed to be 316 stainless steel only.
- o. Install one (1) inline plug valve on force main, maximum distance from valve vault box shall not exceed ten-feet (10'). A two-inch (2") PVC marker shall be placed at the location of the inline plug valve, extending three-feet (3') above ground.

*Created 2010  
Revised July 2013*

p. Install a generator (diesel) capable of running a minimum of forty-eight (48) hours, at half load, with an automatic transfer switch.

1) **See APPENDIX - A for detailed specifications.**

q. All precast wet wells and the first manhole from the wet well shall be lined with fiberglass. The following are acceptable solutions:

a. SprayWall Liner as provided by Sprayroq, Inc., Birmingham, AL;

b. Green Monster Liner as provided by Cardinal Contractors, Sarasota, FL;  
or

c. IET System 3 by Paints and Coatings, Inc., Ft. Meyers, FL.

r. Install telemetry communications system compatible with existing City-system's central terminal unit. A duplex, triplex, or quadraplex Motorola ACE series remote terminal unit (RTU) to the specifications listed.

1) For a Duplex Motorola ACE RTU the following specifications must be met:

- 3-Slot Module Panel
- CPU Module
- VHF Radio
- Self-Diagnostics
- Modular Power Supply with 6.5ah battery backup
- NEMA-4X White Painted Stainless Steel lockable enclosure (22 by 16 by 8)
- 1-Mixed I/O Module
- 1-V245-AUX-I-O termination board with relays and analog surge suppression
- Total I/O: 16 Digital Inputs, 4 Digital Outputs (EE Contacts), and 4 Analog Inputs (4-20mA)

2) For Triplex or Quadraplex Motorola ACE RTU, the following specifications must be met:

- 3-Slot Module Panel
- CPU Module
- VHF Radio Self-Diagnostics
- Modular Power Supply with 6.5ah battery backup
- NEMA-4X White Painted Stainless Steel lockable enclosure (30 by 24 by 12)

- 2-Mixed I/O Module
  - 2-V245-AUX-I-O termination board with relays and analog surge suppression
  - Total I/O: 32 Digital Inputs, 8 Digital Outputs (EE Contacts), and 8 Analog Inputs (4-20 mA)
- s. Install a 20 foot concrete light pole with a cobra head fixture (see street light section for mast arm design and bulb wattage).
- t. Install 4-inch thick layer of prewashed shell over fiber mesh layment to cover whole lift station site plus 1-foot beyond fence limits.
- u. ***Guarantee:*** The Contractor shall guarantee the materials and installation against defective workmanship and other faults for a period of one (1) year.

#### 4. Lift Station Start Up

- a. **Prior to conducting any startup operations for a new lift station, the Developer and their Engineer of Record shall submit to the FDEP required forms and record drawings required to receive FDEP authorization to place the new facilities into service.**
- b. The Contractor shall provide a competent field services technician of the manufacturers of all Lift Station equipment, including generators where applicable, to supervise installation, adjustment, initial operation and testing, performance testing, final acceptance testing, and startup of the equipment.
- c. The startup and performance demonstration shall be successfully executed before acceptance by the City of the lift station.
- d. All performance tests and inspections shall be scheduled at least 5 working days in advance and be conducted during the period of the normal work week, Monday through Friday between the hours of 7 am to 4 pm.
- e. Check all mechanical and electrical equipment to ensure that they are in good working order and properly connected prior to startup. Make preliminary run-ins of the various pumps, compressors, and other equipment. All systems shall be cleaned and purged as required. All sumps, tanks, basins, chambers, pump wells, and pipelines which are hydraulically checked shall be drained and returned to their original condition once the water testing is completed.
- f. All instruments and controls shall be calibrated through their full range. All adjustments required for proper operation of all instrumentation and control equipment shall be made.

- g. The startup period shall not begin until all new facilities and equipment have been tested as specified and are ready for operation. The City shall receive spare parts, safety equipment, tools and maintenance equipment, lubricants, approved operation and maintenance data, and the specified operation and maintenance instructions before startup with wastewater. All valves shall be tagged before startup.
- h. If the lift station fails to demonstrate satisfactory performance on the first or any subsequent attempt, the Contractor shall make all necessary alterations, adjustments, repairs, and replacements. When the lift station is again ready for operation, it shall be brought on line and a new test shall be performed. This procedure shall be repeated as often as necessary until the facility has operated continuously to the satisfaction of the City.
- i. The City will furnish all operating personnel (other than vendor's or subcontractor's service personnel) needed to operate the equipment during the final test period; however, these personnel will perform their duties under the Contractor's direct supervision. Until performance tests are completed and units and systems accepted by the City as substantially complete, the Contractor shall be fully responsible for the operation and maintenance of all new lift stations.
- j. The City will provide all necessary chemicals and electricity. However, the Contractor shall provide all necessary personnel of the various construction trades, i.e. electricians, plumbers, etc., and field service personnel of the major equipment suppliers on an 8-hour-per-day basis at the lift station and on a 24-hour-per-day basis locally during the startup period. Major equipment suppliers shall include, but not be limited to the following:
  - a) Telemetry, Instrumentation, and Control Equipment
  - b) All Pumping Equipment
- k. At no time during the startup shall the Contractor allow the facility to be operated in a manner which subjects equipment to conditions that are more severe than the maximum allowable operating conditions for which the equipment was designed.**

***SUB-SECTION E - RECORD DRAWINGS FOR SANITARY SEWER PROJECTS***

1. ***General:*** When construction is complete, record drawings indicating the locations and elevations of the improvements that have been built shall be submitted to the Public Works & Utilities Department. The record drawings shall be a revision of the approved construction plans and shall depict design information crossed out and replaced by accurate record information.

*Created 2010  
Revised July 2013*

**2. Record Drawings:** Record drawings shall be submitted for review with the following information:

- 1) Pipe sizes and type of pipe used.
- 2) Rim and invert elevations for manholes.
- 3) Percent of grade for gravity lines on profile sheets.
- 4) Stationing recorded from manhole to manhole with service locations and offset distances shown on layout.
- 5) Force main location with valve tie in or manhole connection details along with stationing of main along route with any off-set measurements to curb line or center line of roadway including any air release valves.
- 6) Lift station plot plan survey along with a cross section view of the wet well and valve box details and pump manufacture, horsepower of pump, impeller size, inverts, slab elevation, etc.
- 7) The elevation of the top of nut on all valves.
- 8) Any field changes of dimensions, elevations and details shall be shown on a clouded area or by insert on record drawings.
- 9) All manholes, valves, clean outs, lift stations, air release valves, etc. shall be located by horizontal and vertical measurements referenced to permanent surface improvements using Florida State Plane Coordinates
- 10) On Record Drawings, at locations where the horizontal position of the constructed pipelines or structures deviate by more than 5-feet (as scaled on the drawings) from the horizontal positions that were shown on the construction drawings, the actual positions of the structures/pipelines shall be depicted on the Record Drawings in their actual positions and their original design positions shall be cross-hatched out or screen shaded.
- 11) The engineer of record shall also supply the Public Works and Utilities Engineering Department with electronic PDF and AutoCAD® files of the project with any/all AutoCAD® supporting files. **Only Version 2010 or newer will be accepted.**

## SECTION III

### WATER MAINS AND SERVICE CONNECTIONS

#### **SUB-SECTION A – GENERAL**

1. **Permitting:** Expansions to the City of Bradenton’s municipal water system may require permitting through the FDEP. The developer/owner and their engineer of record of any proposed development are responsible for obtaining any and all FDEP permits for their project related its water system. If an FDEP permit is required, the engineer of record shall:
  - a. Prior to commencing any construction, file an ***Application for a Specific Permit to Construct Public Water System Components***.
  - b. Prior to placing the constructed system into operation/use, file a ***Certification of Construction Completion and Request for Clearance to Place Permitted PWS Components into Operation***.

Any and all information required by FDEP to issue these permits shall be the responsibility of the developer/owner’s engineer of record to provide to the FDEP.

#### **SUB-SECTION B - PIPES AND FITTINGS**

1. **General:** All material shall be free of defects affecting strength and durability and be of the best commercial quality for the purpose specified. It shall contain such structural properties to safely withstand external and internal stresses to which it is normally subjected. All material and workmanship will be of such a quality as to preclude and entry of any contaminating matter into the public water supply system.
2. **Pipe:**
  - a. **PVC Pipe**
    - 1) Pipe of a nominal size of one-inch (1") to two-inch (2") shall be Class 150 (Schedule 40 or 80 white only), as approved by AWWA for water system use.
    - 2) Pipe of a nominal size of four-inches (4") or greater shall be plasticized polyvinyl chloride with ring-type joints, and suitable for use at maximum hydrostatic working pressure of one-hundred-and-fifty (150) PSI at seventy-three-degrees (73°) Fahrenheit. All pipes must meet the requirements as set

forth in commercial standard CS256-63 with standard dimensions ratio SDR 18 - Class 150 and bearing the National Sanitation Seal for potable water pipe.

- 3) All PVC pipe shall have an O.D. equivalent to that of cast and ductile iron and shall comply with AWWA Standards as approved under Section C900-07.
  - 4) All PVC pipes shall be color-coded **BLUE** for water lines, using a solid pipe color pigment and shall bear identification markings in accordance with AWWA C900, AWWA C905 or ASTM D2241.
    - b) If color-coded pipe cannot be located for use. The use of three-inch (3") wide adhesive tape in the color of **BLUE** for water lines that is water resistant shall be adhered along the top of the pipe to mark the pipe identity.
  - 5) The City requires a color coded detectable locating tape, with a minimum thickness of five (5) mils and a width of three-inches (3"). The use of a detectable locating tape shall be **BLUE** for water with the marking of **WATER** printed every thirty inches (30") along the tape and buried a minimum of eighteen inches (18") above a new PVC water main.
  - 6) PVC water main pipe shall have a No. 10 gauge solid, insulated tracer wire in the color of **BLUE** installed along the pipe alignment. See Sub-Section C for more details on tracer wire specifications.
- b. **HDPE Pipe:** Pipe used for directional bore shall be HDPE SDR 11 or fusible PVC C-900 and C-905 DR 18 pipe, and color coded per manufacture regulations.
- c. ***Polyethylene Service Lines:*** Polyethylene service lines, one-inch (1") in size **only**, shall be manufactured in accordance with ASTM D2737 from polyethylene extrusion materials conforming to the Plastic Pipe Institute certifications. All insert stiffeners shall be solid with roll-ends, approved Mueller 1"(504391).

The service line shall be a Class 200 pipe. The pipe will conform to the specifications of Section C901 of the AWWA Standards. The service line shall be marked with size, type of plastic material (PE3408), standard dimension ration (SDR 9.0), working pressure (200 PSI), ASTM specification (D2737), Copper Tube Sized (CTS), manufacturer's name and the NSF seal of approval (when conveying potable water). Color code **BLUE** pipe only.

- d. ***Copper Tubing:*** Seamless copper tubing shall conform to ASTM Specification B-88-62 Type K or Type L.

- e. ***Ductile Iron Pipe:*** Ductile iron pipe shall be of the centrifugally cast type to conform to the requirements of AWWA C150. Pipe thickness will be calculated on the basis of AWWA C150. Pipe lining and type of joint approved by the National Board of Fire Underwriters for one-hundred-and-fifty (150) PSI working pressure is specified. The joint shall be U.S. Pipe TYTON®, American Cast Iron Pipe FASTITE® or James B. Clow and Son BELLTITE®. Lubricants other than those furnished by the pipe manufacturer for making joints shall not be used.
- 1) All pipes shall be Class 51 and furnished in standard sixteen-foot (16') or eighteen-foot (18') lengths. The pipe shall be furnished with half thickness cement lining with a seal coat lining. Pipe shall be coated on the outside with bituminous enamel. All pipes shall be furnished complete with all necessary joint material, including rubber gaskets, lubricant, etc.
  - 2) The pipe manufacturer shall furnish the owner a certificate that all tests and inspection have been complied as required by the specifications under which the pipe is manufactured.
  - 3) **Color coding of ductile iron water mains:** The use of a detectable locating tape shall be buried a minimum of eighteen inches (18") above a new ductile iron water main. The marking tape shall be **BLUE** and have a minimum thickness of five (5) mils and a width of three-inches (3"). The marking of **WATER** shall be printed every thirty-inches (30") along the tape.
- f. ***Cast Iron, Brass and Ductile Iron Fittings:*** All cast iron and ductile iron pipe fittings shall be of a type made by a manufacturer member of the Cast Iron Pipe Research Association, and shall be designed for this use with pipe installed under this specification. Fittings are not to be less than Class 150 and shall conform to AWWA C-110.
- 1) Fittings shall be standard cement lined and shall be bituminous enamel coated on the outside, and joint surfaces shall be suitably protected against corrosion during storage and shipment.
  - 2) All bell and spigot fittings shall be Class "D" and may be AWWA Standard or short body fittings, ASA Specifications A21.10, standard cement lined.
  - 3) All flanged fittings shall be short body ASA Specifications B16.1 with Class 125 Flanges standard cement lined.
  - 4) Tapping saddles for one-inch (1") and two-inch (2") service connection shall be solid brass, double strap per ASTM B-62 and AWWA C-800 specifications. Ford 202B with iron pipe threads or approved equal.

- 5) Tapping sleeves for four-inch (4") and above pipe sizes shall be all stainless steel, including flange and be Smith - Blair tapping 663 or approved equal.
3. **Corporation and Curb Stops:** Corporation and curb stops shall be full port and shall conform to AWWA Standard C800. Approved corporation stops are Ford 1" F-1100-4Q, Ford 2" FB-1700-7 or approved equal. Approved curb stops are Ford 1" B11-444-WQ, Ford 2" B11-777-W or approved equal. Ford two (2) inch square nut adapter part number QT67, required on all two (2) inch curb stops.
4. **Backflow Preventers:** Backflow preventers shall be installed on all water service lines serving those facilities so designated as requiring backflow preventers by the City of Bradenton Backflow Prevention Program ordinance. Approved manufactures include Wilkins, Hersey, Neptune, Watts or approved equal.
5. **Air Release Valves:** Air release valves for water mains shall be automatic-type and shall be S-020 as manufactured by A.R.I. or approved equal.
- a. Air release valves shall be set in a precast concrete valve vault as manufactured by Oldcastle Precast, #UV1818-36 eighteen inches (18") by eighteen inches (18") by thirty-six inches (36") vault with four inch (4") walls and an H2O-rated galvanized steel traffic cover painted Rust-Oleum **BLUE** or approved equal.
- b. The connection from the force main shall be a two inch (2") corporation stop with a double strap service clamp, such as Ford 202B with iron pipe threads or approved equal, connected to two inch (2") schedule 80 PVC pipe.
- g. **Resilient Seat Gate Valves:** All gate valves shall be American Flow Control gate valve series 2500 with ductile iron body, and EPDM rubber wedge or approved equal. All gate and tapping valves shall have AWWA and ULFM approved body, two-hundred-and-fifty (250) PSI approved.
- 1) Valves shall be manufactured in accordance with the applicable provisions of ANSI/AWWA C515. Bonnet and body may be of the reduced metal thickness, exceed the minimum thickness permitted by ANSI/AWWA C153/A21.53-88 and be manufactured of Ductile Iron ASTM A 536 with minimum 65,000 psi tensile strength. This addition will allow both ductile and cast iron body valves. Both shall have bonded epoxy coating inside and out, a two-inch (2") square operating nut, a non-rising stem, and turn left to open with EPDM rubber wedge.
- 2) The valve shall be designed so that during operation, or cycling of the valve, there is no friction or abrasion or rubbing together of the gate and body that can wear away any rubber or epoxy and expose bare iron.

- 3) Valves shall be furnished with a standard mechanical joint and connections and shall be furnished complete with glands, gaskets, bolts, and nuts in accordance with applicable section of ASA Specifications A21.11.
- 4) Resilient seated tapping valves shall be furnished with the tapping flange having a raised face or lip designed to engage the correspondence recess in the tapping sleeve flange in accordance with MSS-SP60. Tapping valves without the raised face on the tapping flange are not permitted since they do not assure the proper alignment required to prevent damage by a misaligned shell cutter. The interior of the waterway in the body shall be a full opening and capable of passing a full sized shell cutter equal to the nominal diameter of the valve.
7. **Valve Boxes:** All valve boxes shall be standard cast iron roadway type, adjustable three-piece, screw type, having five-and-one-half-inch (5-1/2") diameter shaft and suitable for three-foot (3') or four-foot (4') deep trenches. Valve boxes shall be encased with twenty four -inch (24") by twenty four-inch (24") concrete collar six-inch (6") thick pad. The word **WATER** shall be engraved onto a valve box lid and painted with Rust-Oleum safety blue paint. A three-inch (3") brass disk shall be attached with epoxy to the concrete pad inscribed with the following information: gate valve (GV) or butterfly valve (BFV), the number of turns to open and close the valve, and COB.
8. **Fire Hydrants:** All fire hydrants shall be Kennedy K-81-D or approved equal. Hydrants shall have six-inch (6") inlet, five-and-one-quarter-inch (5-1/4") barrel, with two (2) two-and-one-half-inch (2-1/2") hose nozzles, and one (1) four-and-one-half-inch (4-1/2") streamer connection designed for one-hundred-and-fifty (150) PSI working pressure, and meeting all requirements of AWWA C520-64 standard for fire hydrants for ordinary water works service. All working parts shall be bronze with O-Ring seals, safety stem couplings and safety flange. Main valve rod standard shall turn to the left to open. Hydrants shall be provided with the necessary connection to fit the pipe indicated. All fire hydrants to be shop tested to three-hundred (300) PSI. Hydrants shall have weep holes plugged prior to installation.
9. **Restrained Joints and Blocking:** Bends, tees, wyes, offsets, caps, plugs, and all joints shall be restrained in all applications, including on hydrant assemblies. Acceptable types of thrust restraints accepted include Uni-Flange® Series 1300, Megalug® Series 2000PV, or approved equal.
10. **Guarantee:** The Contractor shall guarantee the materials and installation against defective workmanship and other faults for a period of one (1) year.

### **SUB-SECTION C - INSTALLATION SPECIFICATIONS**

1. **General:** Water mains shall have a minimum of thirty-six-inches (36") of cover material and be installed in a trench in accordance with **standard drawings SR-4 and SR-4A.**
2. **Water Mains:** Water mains shall be located to comply with the requirements of F.A.C. 62-555.314 regarding separation from other utilities, see **detailed drawing W-1.** Water mains shall be located no closer than ten-feet (10') in any direction from a sewer line. Where it is necessary to cross, the water line shall always be on top with a minimum clearance of eighteen-inches (18"), and the sewer line shall be encased in concrete at least five-feet (5') in each direction from the water line. **See detailed drawing SS-8.** Reuse water lines shall maintain a minimum separation of five-feet (5') from outside of pipe to outside of pipe.
3. **Valve Boxes:** Valve boxes shall be set so they are completely flush with the paved surface. Boxes that are disturbed during paving operations (particularly during rolling) shall be immediately brought to a flush position and centered over operating nut. Valve boxes set in grass areas shall be encased with a twenty four -inch (24") by twenty four-inch (24") concrete collar six-inch (6") thick pad. The word **WATER** shall be engraved onto a valve box lid and painted with Rust-Oleum safety blue paint. A three-inch (3") brass disk shall be attached with epoxy to the concrete pad inscribed with gate valve (GV) or butterfly valve (BFV), the number of turns to open / close valve and COB. Valve boxes shall use approved tracer wire as outlined in the tracer wire section boxes. **(See detailed drawing W-2)**
  - a. For water main valves 16-inches and larger, a butterfly valve shall be required and the valve box shall be installed per **detailed drawing W-2A.**
  - b. Air Release Valves shall be installed in accordance with **standard drawing W-2B.**
4. **Tracer Wire:** Tracer wire shall consist of THHN, 10 gauge, continuous, copper with steel core, insulated wire laid along the length of the pipe from valve box to valve box. **(See detailed drawing W-2)**
  - a. Acceptable tracer wire products are Reinforced Tracer Wire, SoloShot™ EHS or SuperFlex™, all manufactured by Copperhead® Industries, LLC or approved equivalent.
  - b. Valve boxes are required to include a magnetized tracer box, such as the Concrete/Driveway Box type SnakePit from CopperHead Industries, LLC or approved equivalent.

- c. Twisting wires together is not acceptable, only manufacturer or City approved connectors will be tolerated; such products include Snake Bite from Copperhead Industries, LLC.
- d. All tracer wire products must be color coded accordingly, such as **BLUE** for water mains.

5. **Water Services**

- a. All water services shall be constructed in strict accordance with the configuration and layout shown on City **standard drawing W-3 and standard drawing W-3A**. Double water services shall be in accordance with **standard drawing W-3B**. The corporation stop installed at the main shall be completed as depicted on City **standard drawing W-4**.

- b. **Backflow Preventers**

- 1) Backflow preventers (BFP) are required on all new service lines, and shall be installed on any existing water services associated with projects that require a plumbing permit from the City of Bradenton Building Department.
- 2) BFPs shall be installed in accordance with the City's Cross Connection Control Program.
- 3) BFPs installations will vary per size of the water service, and shall be installed in accordance with the appropriate City standard detail.
  - a) See **standard drawings W-5 and W-6** for residential and smaller commercial services.
  - b) For larger commercial service, refer to **standard drawings W-7 and W-8**.
  - c) For subdivisions or other facilities that will be master metered, the master meter assembly shall be installed per **standard drawing W-9**.
  - d) For developments that are required to provide a separate fire service line by the City Fire Marshal, the fire service feed shall be equipped with backflow prevention per **standard drawings W-10 or W-10A**.

- c. **Permanent Curb Location Marker**: Location markers shall be provided for all water service connections and valves. Location markers for service connections shall be a blue anodized aluminum disc, labeled **WATER** as manufactured by National Band and Tag Company®. The distance (in feet)

from the end of the water service to the tag shall be engraved thereon. Markers shall be securely attached to the back of curb with a two-inch (2") long "PK" survey marker nail and epoxy. Location markers for valves placed in pavement areas shall be a three-inch (3") brass disk and shall be securely attached with epoxy to a 24-inch x 24-inch concrete pad formed around the valve box, 6— inches thick with the inscribed with the following information: gate valve (GV) or butterfly valve (BFV), the number of turns to open and close valve, distance (in feet) from marker to valve and COB. **(See detailed drawings W-2, W-2A and W-11)**

- d. **New Developments:** In new developments where water service laterals are installed to the R.O.W line of the street for future connection to service a building, all water services shall be marked at the end of the service with a two-inch (2") by four-inch (4") wood board painted blue. **(See detailed drawing W-11)**
6. **Trenching and Backfilling:** All backfill material shall be free from cinders, ashes, refuse, vegetative or organic material, boulders, rocks or stones, or other materials which in the opinion of the Public Works and Utilities Department are unsuitable.
- a. When the type of backfill material is not indicated on the drawings or specifications, backfill may be made with the excavated material, provided that such material consists of loam, clay, sand, gravel or other materials which, in the opinion of the engineer, are suitable for backfilling.
  - b. The bottom of the trench for the pipeline shall conform to the grade of the pipeline and shall be so shaped that the pipe shall rest upon granular or stone backfill for its entire length. Where rock is encountered in the trench, it shall be removed to a minimum depth of nine-inches (9") below the pipe grade and the pipeline shall be laid on a cushion of suitably compacted granular or stone fill at least nine-inches (9") thick on each side of pipe.
  - c. Backfilling of the trench with rock spalls and unsuitable material shall be prohibited. Backfill shall conform to the following requirements after placement of the granular to stone bedding (if required), and pipe. The backfilling operation shall be performed in six operations:
    - **The Haunch:** To be mechanically or hand tamped to 98% of AASHTO T-180 density LBR 40.
    - **The Spring Line Lift(s):** Shall consist of selected stone-free earth placed in such a manner as not to disturb the pipe and then mechanically or hand tamped in layers not to exceed 6 inches 98% of AASHTO T-180 density LBR 40.

- **The Pipe Crown Lift(s):** Shall consist of clean, dry, selected stone-free earth placed in such a manner as not to disturb the pipe and then mechanically or hand tamped in layers not to exceed 6-inches 98% of AASHTO T-180 density LBR 40.
- **The Pipe Cover Lift(s):** Shall consist of clean, dry, relatively stone-free earth to be mechanically or hand tamped in layers not to exceed 6-inches 98% of AASHTO T-180 density LBR 40.
- **The Intermediate Lift(s):** Shall consist of clean, dry relatively stone-free earth to be mechanically tamped in layers not to exceed 18 inches\* 98% of AASHTO T-180 density LBR 40.
- **The Final Lift(s):** Shall consist of clean, dry selected stone-free earth to be mechanically tamped in layers not to exceed 6 inches 98% of AASHTO T-180 density LBR 40.

***\*Intermediate lifts in 18 inch layers will be allowed by the City provided that approved special heavy-duty power tampers, wagon or semi-truck mounted, are utilized which are capable of compacting the material to the required density. Such tampers shall be capable of delivering blows at varying energy rates in trenches of varying depth. If conventional power tampers are used, then all materials shall be compacted in 12 inch layers. See detailed drawings SR-4 & SR-4A.***

- d. Suitable materials for pipe backfill shall be transported to the site at no extra cost to the City if not available at job site.
- e. The final lift shall be mounded slightly over the trench and properly compacted with power equipment in four-inch (4") to six-inch (6") layers. The Contractor shall at all times maintain a work force of sufficient numbers to insure proper backfill of the excavated trench as determined and directed by the Public Works and Utilities Department spokesperson.
- f. The Public Works and Utilities spokesperson has the right to limit the amount of trench opened in advance of pipe lying and the amount of pipe lines in advance of backfilling.
- g. The Public Works and Utilities Department shall be empowered at any time to require the refilling of open trenches over completed pipe lines, if in their judgment such action is necessary. The Contractor shall thereby have no claims for extra compensation even though to accomplish said refilling he is compelled to temporarily stop excavation or other work at any place.

- h. If work is stopped on any trench or excavation for any reason except by order of the Public Works and Utilities Department, and the excavation is left open for an unreasonable length of time, the Contractor shall refill such trench or excavation at his own expense and shall not again open said trench until he is ready to complete the structure or work therein.
  - i. Pipe shall be lowered into the trench by means of an approved sling. Joints shall be made with approved methods of construction. Each section of pipe shall rest upon the pipe bed for the full length of its barrel, with recesses excavated as required to accommodate bells and joints. The interior of all pipe and the inside of the bell and outside of the spigot shall be thoroughly cleaned of all foreign matter before being lowered into the trench, and shall be kept clean during laying operations.
  - j. All water mains shall be installed with restrained joints. Pipe jointing shall be done in strict accordance with the pipe manufacturer's recommendations. Spigots and bells shall be coated with lubricant as recommended by the manufacturer. Refer to **standard drawing W-12** for restrained joint requirements.
  - k. Under no circumstances, shall pipe be laid in water or on sub grade containing organic material and no pipe shall be laid when trench conditions are unsuitable for such work. In all cases water shall be kept out of the trench. The pipe line shall be kept perfectly clean. All joints must be completed the same day the pipe is laid. Water-tight heads shall be on hand at all times to close off the pipe to prevent flow of storm water or debris into the line during rains.
  - l. Lines under construction shall be closed off tight at the end of each construction day until the line is complete, tested, and accepted to be placed in service.
7. ***Hydrostatic Tests:*** After the pipe has been laid and partially backfilled in accordance with Section 4 of AWWA C600-77, all pipe shall be subjected to the hydrostatic pressure mentioned above. If directed by the City, the Contractor may backfill the trench from one-foot (1') above the pipe to the finished grade by hand or approved mechanical methods before making the pressure tests. The duration of each pressure test shall be at least two (2) hours or as directed by the engineer. Pressure test shall be held at one-hundred-and-fifty (150) PSI with no allowable drop of pressure.

The engineer of record or an engineer of record staff member will be required to attend the hydrostatic test. The engineer of record will also notify the City of Bradenton Engineering Department **two (2) business days prior** to any hydrostatic pressure test. A minimum of **forty-eight (48) hours** will be required after pre-test of water system is completed.

**8. Disinfection of Water Mains:** After successful pressure testing and before calling for a main clearance, the entire system, including any part of the City's water system which has direct contact with finished water and has been out of service for repair, alteration, or replacement, shall be disinfected and must be completely blown down at all blow-off valves and or fire hydrants. The satisfactory result of this will be clear water free of air. Bacteriological sampling points, to facilitate the disinfection sampling, shall be incorporated into the water main design and shall be constructed per **standard drawing W-13**.

- a. Before being placed into service the entire system, including all new mains and repaired portions of or extensions to existing mains must be chlorinated to achieve at least fifty (50) PPM free chlorine residual. This residual must remain in the system for twenty-four (24) to forty-eight (48) hours.
- b. After this period, the system must be blown down again to achieve a free chlorine residual of not more than two (2) PPM.
- c. The disinfection shall be accomplished in accordance with the applicable provisions of AWWA Standard C-651 for Disinfecting Water Mains.
- d. The Contractor shall assume the responsibility for safe handling of chlorine and shall meet the requirements of OSHA and other regulatory agencies for safe handling of chlorine.
- e. The FDEP, through the Permit to Construct a Water System Extension, will be responsible for all test procedures, hose bib locations, spigot requirements, etc. The Contractor shall have a representative at the job site to operate the necessary valves and to witness the sampling. When a water main clearance is scheduled and cannot be attended, proper cancellation should be made prior to the date and time scheduled.
- f. Water samples will be taken a minimum of six (6) hours apart on two (2) consecutive days and must pass both days test. In addition, proper chain of custody procedures must be followed and samples shall only be collected by certified personnel. Copies of testing results and all related correspondence with the FDEP and other agencies shall be submitted to the engineer of record.
- g. Should the initial treatment result in an unsatisfactory bacterial test, the original chlorination procedure shall be repeated by the Contractor until satisfactory results are obtained. The engineer of record shall notify the City of Bradenton Public Works and Utilities Department a minimum of **two (2) full business days**, prior to the scheduling of a bacteriological test.

**9. Flushing Devices:** Should the contractor or the City determine a flushing device necessary, it shall be installed per City specifications outlined herein.

*Created 2010  
Revised July 2013*

- a. Any flushing device proposed shall be a Kupferle Foundary Co. Eclipse Model #9800WC flushing device and it shall be set with the meter either above or below ground and laid out as seen in **standard drawings W-14 or W-14A**. The automatic flushing device shall have a two-inch (2") brass fip inlet leading vertically into a two-inch (2") automatic solenoid valve. The automatic solenoid valve shall have an internal, self-cleaning debris screen and have a 220 psi rating.
- b. Each unit shall be furnished with a stand-alone controller. Valve controller will not require a second hand-held device for programming. Controller must have a minimum of nine possible flushing cycles per day, be submersible up to twelve feet, overate with a twelve volt battery, and have resin-sealed electrical components.
- c. Solenoid shall have no loose parts when removed from valve. Each unit shall have a double valve, all brass sampling point. Removal of two-inch (2") solenoid valve shall be possible via quick connect below the valve. All above ground components shall be contained within a UV-resistant locking cover as manufactured by Kupferle Foundary Company, Model 9800WC, St Louis, Missouri, or approved equal.

**10. Change Orders:** The engineer of record shall be required to notify the City of Bradenton Engineering Department of any changes to previously approved plans. Detailed drawings will be submitted for approval and must be accompanied with a letter of authorization from the City of Bradenton Public Works and Utilities Department prior to any commencement of work in the field.

**11. Test Procedure for Wet Taps:** Prior to City of Bradenton Water Department making any water taps of mains, the contractor will be required to install and pressure test the tapping saddle and valve. The pressure test will last one (1) hour at one-hundred-and-fifty (150) pounds pressure with no loss of pressure.

#### **SUB-SECTION D - FIRE HYDRANTS**

1. **General:** Fire hydrant spacing shall be no more than eight-hundred-feet (800') apart and within four-hundred-feet (400') of the main entrance of all principal buildings in the development as measured from normal access routes. All hydrants shall be in addition to any internal sprinkler or standpipe system serving the development and shall not be located on the "fire line" water main beyond the point of service or connection. Except for hydrants located within public street right of ways, all hydrants shall be located at least forty-feet (40') from any building, except one story single family residential buildings.
2. **Approved Fire Hydrant:** An approved fire hydrant shall mean a Kennedy K-81-D, or approved equal, fire hydrant connected to a City of Bradenton water main of not less

*Created 2010*

*Revised July 2013*

than six-inches (6”) in diameter and shall meet the performance standards as established in the City of Bradenton Comprehensive Plan. All fire hydrant installations shall be approved by the City of Bradenton Public Works and Utilities Department and the City of Bradenton Fire Department as it pertains to availability of water pressure, volume and reliability of water service such as to provide service from at least one (1) fire hydrant to each structure in an area. Spacing shall be in accordance with all national, state, and local codes, and shall meet any special criteria established by the Fire Chief of the City of Bradenton. **(See detailed drawing W-15)**

3. **Commercial and Industrial Zones:** Hydrant spacing in this zone shall be no greater than five-hundred-feet (500’) measured along the street.
4. **Residential Areas:** Hydrant spacing in residential areas shall be no greater than eight-hundred-feet (800’) measured along the street.
5. **Submission of Plans:** Developers shall furnish to the City of Bradenton Public Works and Utilities and the Fire Department two (2) copies of a fire hydrant location plan, with coverage circles drawn to scale for each hydrant, with the hydrant serving as the center of the circle. The radii of the coverage circle shall conform to paragraphs two (2) and three (3) above.
6. **Approval:** Developers shall not install proposed hydrants until an approved plan has been returned after signature by the Public Works and Utilities spokesman and the Fire Chief.

#### **SUB-SECTION E - RECORD DRAWINGS FOR WATER: LINES, VALVES AND SERVICE CONNECTIONS**

1. **Record Drawings:** Shall be submitted for review with the following information:
  - a. The plan shall have all stationing recorded from tie-in valve/fitting and recorded along water main to each fitting, valve, service, fire hydrant, etc., with an offset measurement to each service fire hydrant or valve where needed. The plan shall include all offsets to curb line or edge of road.
  - b. The plan shall show all pipe sizes (mains and services) and type of pipe installed in the field.
  - c. All fittings, valves, fire hydrants, etc. shall be located by horizontal and vertical measurements referenced to permanent surface improvements using Florida State Plane Coordinates.
  - d. The elevation of the top of nut on all valves shall be recorded on the record drawings.

*Created 2010  
Revised July 2013*

- e. Any field changes of dimensions, elevations and details shall be shown on a clouded area or by insert on record drawings.\
- f. On Record Drawings, at locations where the horizontal position of the constructed pipelines or structures deviate by more than 5-feet (as scaled on the drawings) from the horizontal positions that were shown on the construction drawings, the actual positions of the structures/pipelines shall be depicted on the Record Drawings in their actual positions and their original design positions shall be cross-hatched out or screen shaded.
- g. The engineer of record shall also supply the Public Works and Utilities Engineering Department with electronic PDF and AutoCAD® files of the project with any/all AutoCAD® supporting files. **Only Version 2010 or newer will be accepted.**

## SECTION IV

### STREET LIGHT TECHNICAL SPECIFICATIONS

#### **SUB-SECTION A - GENERAL REQUIREMENTS**

- 1. Scope:** Furnish all labor, equipment, supplies and materials and perform all operations necessary for the installation of the street light system including but not limited to installation of poles, luminaries, support arms, lamps, grounds, conduit, conductors and all necessary support materials and equipment in strict accordance with these specifications and applicable drawings. **(See detailed drawing E-1)**
- 2. Service:** Electric service to the street lights shall be obtained from the local power company and shall be 120 volt, single phase, and 60 hertz for street light.
- 3. General:** The installations shall comply with the applicable rules of the NEC and with the rules and regulations, codes or standards of all local agencies having jurisdiction. Workmanship shall be highest grade. The systems shall also comply with the applicable requirements of the NESC. All electrical materials shall be new and as approved by the UL except as otherwise specified herein. The drawings indicate the extent and general arrangement of the lighting system and wiring systems. If any departures from the drawings are deemed necessary by the Contractor, details of such departures and the reasons therefore shall be submitted as soon as practicable to the Public Works and Utilities Department for approval. All equipment and materials shall be standard products of the latest design of manufacturers regularly engaged in the productions of such equipment or material.
- 4. Approval of Materials, Fixtures and Equipment:** The Contractor shall submit for approval shop drawings on all materials, fixtures and equipment to be incorporated in the work.
- 5. Standard Products:** The materials to be furnished under this Specification shall be the standard products of manufacturers regularly engaged in the production of such equipment and shall be the manufacturer's latest design that complies with the Specification requirement.

#### **SUB-SECTION B - EQUIPMENT AND MATERIAL**

- 1. Conduit:** Conduit shall be grey PVC schedule 40. Conduit shall be installed in accordance with manufacturer's recommendations and the NEC. Fittings to be used in the installation of type 40 PVC conduit shall be UL listed. Adhesive shall be a solvent type for joining conduit length together and to fittings and shall be a type recommended by the conduit manufacturer. The adhesive shall be furnished in a

sufficient quantity, as recommended by the manufacturer, for the particular procurement of conduit and fittings.

2. **Wire Cable:** Wire used between pole and fuse hand hole shall be number 6 aluminum with an identified neutral. Tapes shall be self-vulcanizing rubber for insulation. Insulation shall be restored using vinyl plastic tape conforming to the requirements of Scotch 88 electrical tape.
3. **Ground Rods and Clamps:** Ground rods shall be galvanized steel, with minimum diameter five-eighths (5/8") inch and minimum length eight feet (8'). Clamps used shall be UL approved for underground use.
4. **Light Fixtures:** Fixtures shall be StreetView LED Luminaire SVM, as manufactured by Philips, Model No. SVM-90W48LED4K-R-LE3-UNIV-RC-SP1-PH8-GY3 or approved equal.
  - a. Fixtures shall be designed for one-and-one-fourth-inch (1-1/4") pipe slip fitter with cast aluminum head. The refractors shall provide IES type III light distribution pattern, or roadway type three.
  - b. Luminaire shall be ninety (90) watt.
  - c. Street light control shall be photo-electric controller. It shall be of the plug-in type for use on luminary head. Unit shall be selected to match fixture. The photo cell tube shall be set or shielded to prevent operation by stray light from streets or building facing north.
5. **Mast Arms:** Mast arm assembly is to be fabricated of welded aluminum of sufficient strength to fit and support a Philips StreetView LED Luminaire SVM fixture or approved equal, mounted on a Type I concrete pole during any weather conditions likely to be encountered on the Florida west coast.
  - a. Mast arm base shall be aluminum channel one-quarter-inch (1/4") thick and fifteen-inch (15") long, with minimum external dimensions of three-and-one-quarter-inch (3-1/4") by five-eighths-inch (5/8").
  - b. Mast arm shall be aluminum pipe with one-and-five-eighths-inch (1-5/8") O.D. and one-eighth-inch (1/8") minimum wall thickness and six-feet (6') in length.
  - c. An aluminum brace with minimum dimensions of one-quarter-inch (1/4") by two-inch (2") shall be welded to each side of mast arm and to base to form a triangular pattern for rigidity.
  - d. A bolt of five-sixteenths-inch (5/16") by one-inch (1") shall be mounted in one of the side braces for attachment of ground wire.

*Created 2010  
Revised July 2013*

- e. Mast arm shall be fastened to pole using two five-eighths-inch (5/8") by eight-inch (8") galvanized steel bolts, two (2) five-eighths-inch (5/8") galvanized nuts, and two (2) galvanized flat washers, two-inch (2") square and one-eighth-inch (1/8") thick.

6. **Pre-stressed Concrete Street Light Poles:** Pre-stressed concrete poles shall be type designed especially for street and highway lighting with provision made for overhead wiring. The strength shall be such that with the bottom six-feet (6') held firm and a horizontal load applied two-feet (2') from the top, the minimum breaking strength shall be one-thousand-two-hundred (1,200) pounds or greater. The poles shall be Type I, thirty-feet (30') in length, and made of pre-stressed, white concrete. The cross-section configuration shall be square with chamfered edges. The poles shall be tapered over the entire length at approximately 0.155 inches per foot beginning with a bottom dimension of 8.9" by 8.9". There shall be two (2) holes drilled for brackets, the top hole eight-inches (8") from the top of the pole and the second hole twelve-inches (12") below the top hole. Holes shall be drilled to accommodate five-eighths-inch (5/8") bolts. **(See detailed drawing E-1)**
7. **Ground Wire:** A #6 AWG copper wire shall be cast into the pole which must exit at a point four-foot (4') from the bottom end of pole and at a point convenient to the mounting holes at top. It shall be of sufficient length to attach to the ground rod at the bottom and the bracket at the top.
8. **Handholes:** Hand holes shall be a minimum of twelve-inches (12") by eighteen-inches (18") by twelve-inches (12") deep. They shall be made by Quazite® or approved equal. The words **STREET LIGHTING** or **ELECTRICAL** shall appear on the non-metallic cover. Each hand hole shall contain one (1) waterproof in-line fuse holder similar to Fusetron® Type HEB-BB with a 15 amp fuse for each street light. Sufficient wire shall extend from the hand hole on the primary side of fuse holder for connection to the transformer.

### **SUB-SECTION C - INSTALLATION METHODS**

1. **Grounding:** All non-current carrying metal parts of the electrical installation shall be grounded. All grounds shall be common throughout.
2. **Equipment Connections:** The system shall be complete with all power and control connections required for operation.
3. **Pole Setting:** Poles shall be set a minimum of four-feet (4') from the back of the curb or edge of pavement. They shall be set at a depth of six-feet (6') and shall be plumb. Holes shall be dug large enough to permit the use of tampers the full depth of the hole. Backfill shall be placed in the hole in six-inch (6") maximum layers and thoroughly

tamped. Surplus backfill shall be placed around the pole in a conical shape and packed tightly to drain water way. **(See detail drawing E-1)**

4. **Wire:** All wire shall be run in one-inch (1") Schedule 40 PVC conduit in continuous runs from the transformer hand hole to the base of the pole. It shall be buried at a minimum depth of eighteen-inches (18"). All conduits shall be in utility easements or right-of-ways.
5. **Hand hole:** Hand holes shall be set with the top flush with finish grade and located no more than four-feet (4') from the power transformer.
6. **Pole Spacing:** Pole spacing shall not exceed two-hundred-and-fifty-feet (250') between poles. Poles shall be spaced on alternate sides of street wherever possible.
7. **Coordination of Work:** The Contractor shall coordinate all electrical work with the work of other trades on project. Care shall be taken not to damage the work of others and damaged work shall be repaired at the expense of the Contractor.

#### **SUB-SECTION D - RECORD DRAWINGS FOR STREET LIGHTS**

1. Three (3) drawings shall be submitted to the City Electrician prior to any final acceptance. All drawings shall show conduit, wire, and pole placement with stationing and offset distances from center line of roadway. The engineer of record shall also supply the Public Works and Utilities Engineering Department with electronic PDF and AutoCAD® files of the project with any/all AutoCAD® supporting files. **Only Version 2010 or newer will be accepted.**
2. On Record Drawings, at locations where the horizontal position of the constructed lights fixtures, conduits or structures deviate by more than 5-feet (as scaled on the drawings) from the horizontal positions that were shown on the construction drawings, the actual positions of the fixture, conduit or structure shall be depicted on the Record Drawings in their actual positions and their original design positions shall be cross-hatched out or screen shaded.

## SECTION V

### REUSE DISTRIBUTION SYSTEMS

#### **SUB-SECTION A - GENERAL REQUIREMENTS**

1. **General:** This section sets forth the general requirements for design and installation of public access reuse irrigation systems. All pipe used in reuse water irrigation systems shall be polyvinyl chloride (PVC).

#### **SUB-SECTION B - DESIGN STANDARD**

1. **General:** The contractor/developer shall comply with the design and installation requirements as established by the Florida Department of Environmental Protection (FDEP) and additional specific requirements contained herein. **(See detailed drawings RW-1 and RW-2)**
2. **System size computation:** The allowable minimum service pressure under the design conditions shall not be less than thirty (30) psi at the irrigation heads. Design computation shall be the “Hardy Cross” procedure, or other applicable methods, as dictated by the system configuration. Design flows and method of computation shall be subject to City review and approval. These calculations shall be signed and sealed and dated by a professional engineer registered in the State of Florida.
3. **Valve Locations:** Valves shall be provided for all branch connections, main ends, fire hydrant stubs or other locations, as required to provide and operable, easily maintained and repaired distribution system. Valves are to be placed so that the maximum allowable length of reuse main required to be shut-down for repair work shall be five-hundred-feet (500’) in commercial, industrial or high density residential districts, or one-thousand-feet (1000’) in other areas.
4. **Location:** Reuse water mains shall be located in dedicated rights-of-way or dedicated utility easements. When installed in right-of-way, reuse mains shall maintain a consistent alignment with respect to the centerline of the road. All reuse mains located outside of dedicated rights-of-way shall require a minimum 20-foot (20’) easement. If a potable water main is located adjacent to a road right-of-way, a minimum 10-foot (10’) easement shall be provided. Additional easement widths shall be provided when the pipe size or depth of cover so dictates. No reuse water main shall be placed under retention ponds or drainage ditches, tennis courts, or other structures. In general, reuse water mains shall not be located along side rear lot lines unless authorized by a City of Bradenton Public Works & Utilities.

5. **Plans:** The engineer shall submit four (4) signed and sealed drawings, along with one (1) electronic copy in PDF format for review and approval indicating size of lines, location, valves, fittings, meters and backflow preventers required to complete job.

### **SUB-SECTION C - MATERIALS**

1. **Pipe:** All polyvinyl chloride (PVC) pipe of nominal diameter of one-inch (1”) through eighteen-inches (18”) shall be manufactured in accordance with AWWA Standard C-900 and shall meet the requirements of Section 4.02C.
  - a. **Color Coding:** PVC pipe shall be purple in color (per FDEP standard)
  - b. **Pressure Rating:** Pipe shall be Class 150 (having a minimum working pressure of one-hundred-fifty (150) psi). Pipe shall have a standard dimension ratio, SDR-18. The pipe shall be the same outside diameter as ductile iron pipe and comply with AWWA Standard C900-07.
2. **Joints:** PVC pipe shall have integral bell push on type joints conforming to ASTM D3139. Joints for ductile iron pipe shall be pushed-on, mechanical or glued as approved by the City of Bradenton Public Works and Utilities Department shall confirm to ANSI/AWWA A21.11/C-11. Where called for by the City, restrained or flanged joints will be required. Restrained joints shall meet the requirements of Section 4.02F. Flanged joints shall conform to ANSI Standard B16.1, 125 lb.
3. **Fittings:** All fittings shall be mechanical joint ductile iron conforming ANSI/AWWA A21.10/C-110, two-hundred-fifty (250) psi minimum pressure rating. They shall also PVC schedule 40/80 requirements.
4. **Joint Restraining:** Pressure piping fittings and other items requiring restraint shall be braced with restraining assemblies. Said restraining devices shall be designed for the maximum pressure condition.
5. **Pipe Depth and Protection:** The standard minimum cover for reuse water distribution systems shall be three-feet (3’) from the top of pipe to finish grade. Should this design not be feasible, alternatives shall be reviewed for acceptance.
6. **Pipe Bedding:** Special care shall be exercised in design and installation to provide adequate bedding for the type of pipe used, taking into consideration trench width and depth, superimposed loadings above grade and the material below trench grade. Pipe loading capabilities shall be computed in accordance with established design criteria and special supporting bedding or facilities shall be provided as required.
7. **Air Venting and Blow-Offs:** Where the reuse main profile is such that air pockets or entrapment could occur, resulting in flow blockage, methods for air release shall be provided. Air venting capabilities shall be provided for distribution

*Created 2010*

*Revised July 2013*

mains by appropriately placing fire hydrants, blow-offs or other manual devices. At critical points on major mains, automatic air release assemblies shall be installed. All dead end reuse mains, temporary or permanent, shall be equipped with a manually operated blow off at the terminus.

- 8. Service Connections:** All service lines shall be constructed of PVC material conforming to the specifications in the AWWA C-901. Connections to reuse water mains, other than ductile iron, shall be made by the appropriate tapping service saddles. A corporation stop or valve shall be installed at the main and utilized along with any meters, above or below ground, to service residential or commercial lots. Meters required for services shall be furnished by the City unless otherwise approved by the City.
- 9. Identification Tape:** The use of a detectable locating tape shall be buried eighteen-inches (18") above a new reuse water main. The marking tape shall be **PURPLE** and have a minimum thickness of five (5) mils and a width of three-inches (3"). The marking of **REUSE WATER** shall be printed every thirty-inches (30") along the tape.
- 10. Separation of Reuse Water Mains from Water Mains and Sewers:** Reuse water mains that are installed in the vicinity of pipe lines designated to carry potable water and raw wastewater shall meet the horizontal and vertical separations specified herein.
  - A. Horizontal Separation:** Under normal conditions reuse water mains shall be located at least five-feet (5') horizontally from pipes carrying potable water and raw wastewater; the distance shall be measured from the inside edge of pipe to the inside edge of pipe. When local conditions prevent a horizontal separation of five-feet (5'), a water main may be laid closer to a pipe carrying reuse water provided that the bottom of the water main is at least eighteen-inches (18") above the top of the reuse water pipe and the water main is laid in a separate trench or on an undisturbed earth shelf.
  - B. Vertical Separation:** Under normal conditions, reuse water mains shall be laid to provide a separation of at least eighteen-inches (18") between the bottom of the water main and the top of the reuse water main. When construction conditions prevent a vertical separation of eighteen-inches (18") as described herein above, the reuse water pipe shall be constructed of ductile iron pipe with mechanical joints.
  - C. Crossing of Sewers:** Reuse water mains shall be installed above sewers whenever they cross. A vertical separation of at least eighteen-inches (18") shall be maintained between the top of the sewer and the bottom of the reuse water main. Adequate structural support for both the reuse water main and sewers shall be provided to prevent excessive deflection of joints and settling. Sewers shall be constructed of ductile iron pipe with mechanical joints and the length shall be a minimum of eighteen-feet (18'). The sewer shall be

*Created 2010  
Revised July 2013*

centered at the point of crossing so that the joints will be equidistant and as far as possible from the reuse water main.

#### **SUB-SECTION D - SURFACE WATER CROSSINGS**

1. **Aerial Crossing:** Aerial Crossings shall be avoided. If an aerial crossing is proposed it shall be approved in concept by the city prior to design.
2. **Underwater Crossings:** A minimum of a three-foot (3'), six-inch (6") concrete slab shall be provided over the pipe. The pipe material shall meet appropriate AWWA Standards for use in submerged conditions. Valves shall be provided at both ends of the water crossings so that the section can be easily isolated for testing or repair. The valves shall be easily accessible and not subject to flooding. Both valves shall be provided in a manhole or vault. It shall be the responsibility of the Developer/Contractor to obtain all applicable regulatory permits, including dredge and fill permits.

#### **SUB-SECTION E - TESTING**

1. **Hydrostatic Tests:** After the pipe has been laid and partially backfilled in accordance with Section 4, AWWA C600-77, all pipe shall be subjected to the hydrostatic pressure test. If directed by the engineer, the Contractor may backfill the trench from one-foot (1') above the pipe to the finished grade by hand or approved mechanical methods before making the pressure tests. The duration of each pressure test shall be at least two (2) hours or as directed by the engineer. Pressure test shall be held at one-hundred-and-fifty (150) psi with no allowable drop of pressure.

The engineer of record or an engineer of record staff member will be required to attend the hydrostatic test. The engineer of record will also notify the City of Bradenton Engineering Department **two (2) full business days** prior to any hydrostatic pressure test. A minimum of **forty-eight (48) hours** will be required after pre-test of water system is completed.

#### **SUB-SECTION F - DISINFECTION**

1. **Bacteriological Tests:** Before being placed into service the entire system, including all new mains and repaired portions of or extensions to existing mains must be chlorinated to achieve at least fifty (50) PPM free chlorine residual. This residual must remain in the system for twenty-four (24) to forty-eight (48) hours. After this period, the system must be blown down again to achieve a free chlorine residual of not more than two (2) PPM.

The disinfection shall be accomplished in accordance with the applicable provisions of AWWA Standard C-651, "Disinfecting Water Mains". The Contractor shall assume the responsibility for safe handling of chlorine and shall meet the requirements of OSHA and other regulatory agencies for safe handling of chlorine. The engineer of record shall notify the City of Bradenton Public Works and Utilities Department a minimum of **two (2) full business days**, prior to the scheduling of a bacteriological test.

After successful pressure testing and before calling for a main clearance, the entire system, including any part of the City's reuse water system which has direct contact with finished reuse water and has been out of service for repair, alteration, or replacement shall be disinfected and must be completely blown down at all blow-off valves and or fire hydrants. The satisfactory result of this will be clear water, free of air.

The Florida Department of Environmental Protection will be responsible for all test procedures, hose bib locations, spigot requirements, etc. The contractor shall have a representative at the job site to operate the necessary valves and to witness the sampling. When a reuse water main clearance is scheduled and cannot be attended, proper cancellation should be made prior to the date and time scheduled. Water samples will be taken a minimum of **six (6) hours** apart on **two (2) consecutive days** and must pass both days test. In addition, proper chain of custody procedures must be followed and samples shall only be collected by certified personnel.

Copies of testing results and all related correspondence with the Florida Department of Environmental Protection and other agencies shall be submitted to the engineer of record. Should the initial treatment result in an unsatisfactory bacterial test, the original chlorination procedure shall be repeated by the Contractor until satisfactory results are obtained.

### **SUB-SECTION G - RECORDS DRAWINGS FOR REUSE SYSTEMS**

- 1. Permanent Curb Location Marker:** Location markers shall be provided for all reuse water service connections and valves. Location markers for service connections shall be a purple anodized aluminum disc, labeled **REUSE WATER** as manufactured by National Band and Tag Company®. The distance in feet from the end of the reuse water service to the tag shall be engraved thereon. Markers shall be securely attached to the back of curb with a two-inch (2") long "PK" survey marker nail and epoxy.

Location markers for valves placed in pavement areas shall be a three-inch (3") brass disk and shall be securely attached with epoxy to the back of curb inscribed with the following information: gate valve (GV) or butterfly valve (BFV), the number of turns to open and close valve, distance in feet from marker to valve and COB.

- 2. Record Drawing:** As-built drawings shall be submitted for review with the following information:

*Created 2010  
Revised July 2013*

- a. The plan shall have all stationing recorded from tie-in valve/fitting and recorded along reuse water main to each fitting, valve, service, fire hydrant, etc., with an offset measurement to each service fire hydrant or valve where needed. The plan shall include all off sets to curb line or edge of road.
- b. The plan shall show all pipe sizes (mains and services) and type of pipe installed in the field.
- c. All fittings, valves, fire hydrants, etc. shall be located by horizontal and vertical measurements referenced to permanent surface improvements using Florida State Plane Coordinates.
- d. The elevation of the top of nut on all valves shall be recorded on the record drawings.
- e. Any field changes of dimensions, elevations and details shall be shown on a clouded area or by insert on record drawings.
- f. On Record Drawings, at locations where the horizontal position of the constructed lights pipelines, valves or structures deviate by more than 5-feet (as scaled on the drawings) from the horizontal positions that were shown on the construction drawings, the actual positions of the pipeline, valve or structure shall be depicted on the Record Drawings in their actual positions and their original design positions shall be cross-hatched out or screen shaded.
- g. The engineer of record shall also supply the Public Works and Utilities Engineering Department with electronic PDF and AutoCAD® files of the project with any/all AutoCAD® supporting files. **Only Version 2010 or newer will be accepted.**

## SECTION VI

### SOLID WASTE

#### **SUB-SECTION A - GENERAL REQUIREMENTS)**

1. **General:** This section sets out to outline design requirements for solid waste management principles and regulations.

#### **SUB-SECTION B - DUMPSTER PADS**

1. **Single Dumpster Pads:** Single dumpster pads shall be a minimum of ten feet (10') by ten feet (10'), clear inside fencing, and made of 3,000 psi concrete six inches (6") thick with a six inch (6") by six inch (6") wire mesh or fiber mesh. **See detailed drawing SW-1.**
  - a. Should the location for the dumpster pad be an asphalt parking or drive isle, these may be approved without pouring a new slab, pending City acceptance.
  - b. The fencing surrounding the dumpster shall be opaque.
    - Gate hinges and gates shall not infringe into the 10-foot opening required for the slab access.
    - Gates must open to a position 135-degrees from closed position.
  - c. The dumpster shall not be within ten feet (10') of any building without a fire sprinkler suppression system, which requires City of Bradenton Fire Marshal approval.
  - d. No overhead obstacles (wires, lighting, roof overhang, trees, etc.) shall be in the immediate area surrounding the pad.
  - e. Dumpster pads for restaurants shall require a concrete pad with a sump drain and grease trap shall be required.
2. **Double Dumpster Pads:** Double dumpster pads shall be a minimum of ten feet (10') by twenty-two feet (22'), clear inside fencing, and made of 3,000 psi concrete six inches (6") thick with a six inch (6") by six inch (6") wire mesh or fiber mesh. **See detailed drawing SW-2.**
  - a. All the requirements a. through e. listed above for Single Dumpster Pads shall apply.
3. **Solid Waste Truck Turning Radius:** In preparing site plans that include dumpsters, the turning radius for sanitation front end loading garbage trucks must be taken into account when placing dumpster pad. **See detailed drawings SW-3.**
  - a. Submitted site plans must clearly depict the truck turning radius to allow for City determination that safe, clear access will be available.

- b. The front loading trucks require a 35 foot radius on the inside turning radius and 45 foot radius on the outside of the radius.
- c. The front end loading trucks are 35 feet in length.
- 4. **Roll-off Service:** The City of Bradenton Solid Waste Division also provides roll off service to sites within the City of Bradenton. (construction debris, recycle materials, miscellaneous debris disposal).
- 5. **Compactor Service:** A compactor service is available for condominium, apartment and commercial sites. Contact the Solid Waste Division at 941-708-6340 to coordinate.
- 6. **Residential Service:** Household waste is picked up by individual can service along with recycle materials on a weekly basis.

#### 7. **General Considerations**

- a. For Planned Development Projects (PDP), City of Bradenton Land Use Regulations, 3.4.1.2.g requires that in addition to trash dumpster(s), an 8' x 22' concrete pad for recyclable materials be provided.
- b. While not mandatory for non-PDP submittals, all architects and designers are encouraged to incorporate recycling infrastructure into their plans.
- c. For all plans proposing dumpster service, a Double Dumpster Pad is highly recommended to accommodate a container for recycling cardboard as well as the regular garbage container.
- d. A Double Dumpster Pad will be the minimum requirement for all large complexes, manufacturing facilities as well as restaurants, bars and lounges in order to provide space for a cardboard recycling container.
- e. The City of Bradenton, Solid Waste department is available during regular work hours to discuss the service needs for a particular project.

# APPENDIX – A

## STANDBY POWER GENERATOR

### **PART 1 - GENERAL**

#### **1.01 INVOLVED EQUIPMENT**

- A.** The standby power generator installation shall include generator circuit breaker, control panel, annunciator, jacket water heaters, exhaust system, vibration isolators, batteries, battery charger, liquid level gauge, fuel tank(s) and piping, automatic transfer switch, weatherproof enclosure. The standby power generation facility shall be designed for automatic operation utilizing an automatic transfer switch which, upon interruption of normal power, will send a signal to the standby generator to start and will disconnect the load from the normal power supply and connect the load to the standby generator.

#### **1.02 REFERENCES**

- A.** The work shall conform to the latest edition or revisions of the applicable provisions of the following standards except as modified herein:

##### **1. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)**

- A 53** Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless  
**B 16.3** Malleable Iron Screwed Fittings 150 and 300 lb.

##### **2. FEDERAL SPECIFICATIONS AND STANDARDS (FES)**

- W-C-375C** Circuit Breakers, Molded Case; Branch Circuit and Service  
**W-P-115C** Panel, Power Distribution

##### **3. NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)**

- ICS-2** Automatic Transfer Switches

##### **4. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)**

- 30** Flammable and Combustible Liquids Code  
**37** Stationary Combustion Engines and Gas Turbines  
**110** Emergency and Standby Power Systems

## **5. UNDERWRITER'S LABORATORIES (UL)**

<b>142</b>	Steel Above-ground Tanks for Flammable and Combustible Liquids
<b>1008</b>	Automatic Transfer Switches

### **1.03 SUBMITTALS**

- A.** The Installer shall submit for approval a complete list of materials and equipment to be provided. Partial lists will not be acceptable.
- B.** The list shall include catalog numbers, cut sheets, diagrams, drawings, and other descriptive literature as related. A listing of standards and/or publications (i.e.; ANSI, NEMA, NFPA, IEEE, etc.) which apply to the material submitted shall be included.
- C.** The basis of acceptance will be the manufacturer's published ratings.

### **1.04 SHOP DRAWINGS**

- A.** Shop drawings shall be submitted for the following items of equipment:

- 1.** Engine
- 2.** Generator
- 3.** Generator Circuit Breaker
- 4.** Control Panel
- 5.** Annunciator
- 6.** Jacket Water Heater
- 7.** Exhaust System
- 8.** Vibration Isolators
- 9.** Batteries and Charger System
- 10.** Liquid Level Gauge
- 11.** Sub-Base Fuel Storage Tank
- 12.** Fuel Piping
- 13.** Automatic Transfer Switch
- 14.** Weatherproof Enclosure
- 15.** Concrete Foundations (Generating Set and Tanks)

- B.** Contents of the shop drawings shall include the following:

- 1.** Details of construction, setting, and anchorage of unit.
- 2.** Dimensions
- 3.** Materials
- 4.** Material Thickness

*Created 2010  
Revised July 2013*

5. Finish
6. Ratings
7. Accessories
8. Trim
9. Ladder type schematic control diagrams and wiring diagrams for all equipment provided. Diagrams shall show and identify remote mounted devices including those supplied with the equipment and with/or as part of other equipment. Diagrams shall indicate color coding and labeling of wiring and include a complete symbol legend and abbreviation list as used for all devices or diagrams.
10. Fuel Schematic Diagram

#### **1.05 MANUFACTURER'S LITERATURE**

- A. Manufacturer's literature shall be submitted for the equipment listed in Article 1.04, above, and shall include the following information:
  1. Written description of equipment function, normal operating characteristics and limiting conditions.
  2. Recommended assembly, installation, alignment, adjustment, and calibration instructions for all items of equipment.
  3. Operating instructions for start-up, normal operation, regulation, shutdown, and emergency conditions.
  4. Maintenance instructions and time tables.
  5. Guide to troubleshooting.
  6. Parts list with identification shown on assembly drawing.
  7. Outline and assembly drawings, engineering data and wiring diagrams.

#### **1.06 OPERATION AND MAINTENANCE MANUAL**

- A. Prior to final acceptance of this project, an operation and maintenance manual shall be submitted to the City. The manual shall include manufacturer's literature as outlined in Article 1.05 above, drawings corrected per shop drawing review comments and as-built modifications, and lists of suppliers and/or service shops that can provide parts and accessories and equipment repair for the items of equipment listed in Article 1.04 above. These lists shall include a contact name, telephone number, and address.

#### **1.07 POSTED OPERATING INSTRUCTIONS**

*Created 2010  
Revised July 2013*

- A. Operating instructions approved by the City shall be provided for each principal piece of equipment for the use by operation and maintenance personnel. The operating instructions shall include wiring and control diagrams showing the schematic layout of the system. Operating instructions shall be printed or engraved and shall be framed under glass or in approved laminated plastic and posted where directed by the City. Operating instructions shall be attached to or posted adjacent to each principal piece of equipment and shall include such instructions as startup, proper adjustment, operating shutdown, safety precautions, procedures in the event of equipment failure, and any other necessary items of instruction as recommended by the manufacturer of the equipment.

#### **1.08 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials and equipment with manufacturer's tags and labels and UL labels intact. Deliver packaged material in manufacturer's original, unopened containers bearing manufacturer's name, brand and UL label. Material and equipment shall be stored in a dry, clean location. Handle and store so as to avoid damage. Remove all items delivered in broken, damaged, rusted, or unlabeled condition from project site immediately.
- B. The Installer shall provide suitable protection of materials and equipment from dust and moisture. The Installer shall be responsible for the condition of materials and equipment until acceptance by the City.
- C. All items shall be cleaned, touched up, or replaced as necessary to assure first-class condition.

#### **1.09 WARRANTY**

- A. All equipment and materials supplied shall be warranted against defective design, materials and workmanship for a minimum period of five (5) years or fifteen-hundred (1500) hours of operation whichever occurs first under normal use. The warranty period shall begin when the generator is put into use and accepted by the City.
- B. The warranty shall cover replacement and/or repair including labor, travel time and miscellaneous expenses at no cost to the City for the full warranty period.
- C. The responsibility for performance, warranty, parts and service to the generating system in its entirety shall be assumed solely by the generating set manufacturer/supplier and shall not be split among individual suppliers of components comprising the system.
- D. Submit manufacturer's written warranty with the shop drawings and include an approved warranty in the Operations and Maintenance Manual.

*Created 2010  
Revised July 2013*

## **1.10 GENERATING SET REQUIREMENTS**

- A.** Generators shall be sized for one-hundred-twenty-five-percent (125%) of continuous full load.

## **PART 2: PRODUCTS**

### **2.01 MANUFACTURERS**

- A.** The standby power generator set(s) shall be the product of a firm regularly engaged in the manufacture of generator sets, and a standard model in production at the manufacturer's place of business. The generating set(s) and all major items of equipment shall be factory built in the U.S., tested and shipped by an authorized distributor of the generating set manufacturer to establish a single source responsibility. The distributor shall be authorized to perform warranty work on all units and shall have factory trained personnel in his direct employment. This distributor shall have no less than sixty-percent (60%) of all engine replacement parts locally available at all times.
- B.** The standby power generating set(s) shall be as manufactured by Caterpillar, Cummins or approved equal.

### **2.02 GENERAL REQUIREMENTS**

- A.** All materials and equipment shall be new and unused, of current manufacture, approved and labeled where required by UL.
- B.** The generating set shall consist of a diesel engine directly connected to a brushless alternating current generator with brushless exciter and integrally mounted generator circuit breaker and control panel. Automatic controls shall be furnished to start the unit upon signal from a remote start contact upon failure of the normal source of power.
  - 1.** The installation shall meet all applicable requirements of the NFPA standards, as listed in this specification, and state and local regulations.
- C.** The generating set shall be mounted on a common structural steel, skid-type base designed to maintain proper alignment of components. Suitable vibration isolators shall be furnished which, when installed between the engine generator skid and mounting surface, will permit only 5% of the unit's vibration to be transmitted. The vibration isolators shall be securely attached to the mounting surface.

1. The generator shall be set on an elevated pad of sufficient height, minimum six-inches (6”), above the surrounding floor or grade to allow the oil to be drained. A permanent, portable container shall be supplied with the generator set to catch the oil being drained, and shall have a formed spout for pouring the oil into a waste oil collection tank or disposable container.
- D.** The generating set shall be designed to sequentially start the electrical loads in the steps outlined in Article 1.10 and shall be adequate to run the loads for the duration of the power outage from the normal source. The minimum kW and voltage shall be as specified in Article 1.10.

## **2.03 ENGINE**

### **A. General**

1. The engine shall be an industrial, heavy duty type of the single camshaft design, V or In-line cylinder arrangement, counter-balanced with main bearings between each pair of cylinders in V-type engine or between each cylinder in-line arrangement. The engine shall be equipped with removable wet or dry-type cylinder liners, chrome faced rings and alloy steel valves with cast iron guides and replaceable valve seat inserts.
2. The engine shall be 4-cycle water cooled, having no less than 6 cylinders with a minimum brake horsepower rating of 1.5 HP/kW in an ambient temperature of 104 ° F at 2,000 feet altitude with a rotating speed not exceeding 1,800 rpm.
3. Horsepower rating shall be based on full load operation at synchronous rpm with all necessary operating accessories, such as turbocharger, radiator and fan, air cleaners, jacket water pump, lubricating oil pump, fuel pump, governor, charging alternator, alternating current generator, and exciter regulator.
4. The generating set supplier shall furnish the City curves, certified by the engine generator manufacturer, stating that the engine and generator of model and series to be furnished will produce not less than kW rating as specified. Manufacturer literature indicating the BHP rating, overall generator efficiency, required auxiliaries, guarantee of fuel consumption, governor performance, and torsional vibration shall be submitted. Certified curves shall be furnished to the Engineer prior to ordering the equipment.
5. The engine shall be equipped with a dry-type air filter with service indicator.
6. Engine protective systems shall be provided to cause engine shut-down on low lubricating oil pressure, high water temperature, overcrank, and overspeed.

*Created 2010  
Revised July 2013*

The fuel supply to the engine shall automatically close on a fault condition. Engine protective systems shall be provided with pre-alarm for pending engine shut-down, for low lubricating oil pressure and high water temperature.

7. Engine shall be equipped with a governor to maintain frequency regulation within 3% ( $\pm 1.8$  hertz) from no load to full load. The frequency at any constant load, including no load, shall remain within a steady state band width of 0.25% of rated frequency. The governor shall not permit frequency modulation, defined as the number of times per second that the frequency varies from the average frequency in cyclic manner, to exceed one cycle per second. Governor shall be an electronic type.
8. The engine shall be equipped with a pressure lubrication system supplying a continuous flow of lubricant, under pressure, to all moving parts. Pistons shall be spray cooled. Circulation shall be by means of a positive displacement gear-type pump. The lubrication system shall include full-flow filters and series connected oil cooler of sufficient size to properly cool all lubricating oil circulated. Filter systems shall be equipped with a spring-loaded bypass valve as an insurance against stoppage of lubricating oil circulation in event the filters become clogged. A fifteen (15) second time delay on low oil pressure shall be provided for starting, but shall not cause a delay on shutdown.
  - a. The engine shall be equipped with piping and gate valve as required to drain the crankcase oil. Piping shall be routed so the oil may be drained without the connection of hose or piping by the City. Valve shall be located inside weather-proof enclosure where applicable.
9. The engine shall be equipped with a water cooling system adequate to maintain the engine at recommended temperature level when the generating plant is delivering full-rated load in an ambient temperature of 104° F.
  - a. The cooling system shall consist of a unit-mounted radiator, pusher fan, fan shroud, fan and core guards, surge tanks, engine driven centrifugal-type water circulating pump, filler and cap. Radiator shall be equipped with a low-level coolant float switch and shall be wired to the safety shutdown system of the unit.
  - b. The cooling system shall be designed and engineered to be a functional unit capable of operating with a 50% ethylene glycol and 50% water solution. Cooling system shall be winterized for operation in temperature to 0° F.
  - c. Jacket water heater(s) shall be installed having ample capacity to automatically maintain water temperature at 120 °F in a 30 °F ambient

condition. Heater operating voltage shall be 208 to 230 volts, single phase, and 60 hertz. A resistance type heater shall be utilized. An amber indicating light shall be installed in the control panel to give indication that jacket water temperature is below 100°F.

10. The generating set shall be equipped with a 12 or 24 volt DC electric starting system. Heavy duty, maintenance free, batteries having sufficient capacity for cranking the engine for at least 4 minutes at firing speed in an ambient temperature of 40 °F shall be provided, complete with battery rack and cables.
  - a. Cranking period shall be controlled by a speed sensor which disengages the starting motor when the engine has started. Battery charging alternator or generator voltage may not be used for this signal. The cranking period shall be limited to thirty seconds. At the end of the cranking period the starter shall disengage and the overcrank alarm shall be activated.
  - b. The starting system shall be designed for restarting in the event of a false engine start, by permitting the engine to completely stop and then re-engaging the starter.
  - c. A current limiting battery charger shall be furnished to automatically recharge batteries. Charger shall float 2.17 volts per cell and equalize at 2.33 volts per cell. It shall include overload protection, silicon diode full wave rectifiers, voltage surge suppressors, DC voltmeter, DC ammeter and fused AC input. DC output shall be not less than 10 amperes and the unit shall be AC line compensated. Charger shall have contacts that operate upon a battery or charger malfunction to provide an alarm condition on the control panel.

## **B. Fuel**

1. The engine shall be designed for operations on #2 diesel fuel with ignition from the heat of compression. Starting systems requiring the use of glow plugs or other devices to facilitate ignition of fuel on a cold start are not acceptable.
2. The engine fuel system shall have a fuel filter with a replaceable element conveniently located in an accessible housing ahead of injection pump so that fuel that has been thoroughly filtered before it reaches the pump. Fuel filter elements shall be of the replaceable type that may be easily removed without breaking any fuel line connections or disturbing the fuel pump. Engine shall be equipped with a gear-type, engine driven, fuel transfer pump capable of lifting fuel 10 feet, for supplying fuel through filters to the injection pump at

constant pressure. A complete system with lines, transfer pump, injectors and flexible fuel lines shall be furnished.

## **2.04 GENERATOR**

- A.** The generator shall be a type specially designed for induction motor starting. It shall be capable with its prime mover of starting the connected loads and running continuously for the duration of a normal power outage. The voltage drop under starting conditions specified shall be such as to maintain, without impairment, all operation functions.
- B.** The generator shall be four-pole, brushless of drip-proof construction with amortisseur windings. Insulation shall be Class H with epoxy varnish. Temperature rise shall be 105 °C maximum at standby rating. Generator field current shall be controlled by a rotating thyristor bridge module optically coupled to a firing circuit type voltage regulator. The exciter shall be 24-pole-permanent-magnet type. Generator shall be reconnectable with output as specified in Article 1.10.
- C.** The generator shall have a single maintenance free bearing and shall be directly connected to the flywheel housing, with a disc coupling between the rotor and the flywheel. The generator drive shall be free from critical torsional vibration within the operating speed range.
- D.** The generator shall be able to sustain a 300% rated current for 10 seconds during a short circuit condition, without externally mounted devices. A resettable line current sensing circuit breaker with inverse time versus current response shall be furnished to protect the generator from damage due to overload. The breaker shall not trip within the 10 second time period.
- E.** The generator shall be supplied with five cable terminations, consisting of three phases, neutral and ground. Number and size of lugs per cable termination shall be as required by drawings. Neutral shall be isolated from ground.
- F.** Radio-interference suppression meeting commercial standards shall be supplied.
- G.** Voltage regulator shall be solid-state, frequency compensated type with +2% of rated voltage, from no load to rated load. Voltage adjustment range shall be ±5% of rated voltage.
- H.** Generator KW rating shall be not less than 125% of full load. KW rating shall be at 0.8 power factor. KW rating specified shall be usable power after deducting power for engine auxiliaries from the total output of generating set.
- I.** Upon application of any load up to 100% of the rated load at 0.8 power factor in one step, voltage and frequency shall not dip more than 20% and shall recover to

*Created 2010*

*Revised July 2013*

steady state operation within 5 seconds. Stable or steady state operation is defined as operation with terminal voltage remaining constant within  $\pm 1/2$  of 1% of rated voltage. Manufacturer shall provide certified copies of test data with shop drawings.

## **2.05 CONTROLS**

### **A. Engine/Generator Control Panel**

1. The panel shall be a solid-state, microprocessor-based engine control module shock mounted on the generator in a gasketed NEMA 1/IP enclosure.
2. The panel shall have digital LCD back-lighted display indicating the following:
  - a. Engine RPM
  - b. Battery DC volts
  - c. Coolant temperature
  - d. Lube oil pressure
  - e. Generator set operating hours
  - f. System diagnostic codes (for troubleshooting)
3. Diagnostic codes for the following conditions shall be provided:
  - a. Loss of magnetic speed pickup signal
  - b. Loss of DSU signal
  - c. Loss of programmed settings (i.e., cycle crank, cooldown timer, etc.)
  - d. Invalid engine control switch signal
  - e. Shutdown not control originated (i.e., fuel deprivation)
  - f. Module internal fault
4. Automatic/manual start-stop controls with the following safety shutdowns with LED indicators shall be provided.
  - a. Overspeed
  - b. Low lube oil pressure, two-state protection for low idle/high idle
  - c. High coolant temperature
  - d. Overcrank
  - e. Safety shutdown for all system diagnostic codes above
  - f. Loss of engine coolant
  - g. Emergency stop
5. The control panel shall have a cool down time that is adjustable from 0 to 30 minutes, four position engine control switch, LED indication and LCD display test switch, voltage adjust potentiometer from +10% to -25% range, 4-position ammeter or voltmeter phase selector switch, 3 current

*Created 2010  
Revised July 2013*

transformers and solid state, microprocessor-based digital AC metering module displaying AC volts, AC amps and frequency.

6. The control panel shall have an annunciator for generator faults, low coolant temperature, battery charger fault, low fuel in storage tank and fuel tank detected. A generator common trouble alarm shall also be included to actuate when any generator alarm occurs. Annunciator shall be mounted on generator set control system. Annunciator shall have interlock with telemetry system for generator running and generator online conditions.

## **B. Engine Instruments**

1. Engine instruments shall include water temperature, lubricating oil pressure, lubricating oil temperature, Battery Volt Meter, Engine Lapse – run-time meter, Tachometer and fuel pressure gauges.

## **C. Generator Circuit Breaker**

1. The generator circuit breaker shall be a molded case thermal-magnetic type and shall incorporate trip elements in each pole with a common trip bar. Circuit breaker shall be 3-pole, 600 volt rated as indicated on the drawings. The circuit breaker shall be mounted in a NEMA 1 enclosure on the generating set unless otherwise indicated.

## **D. Automatic Transfer Switch**

1. The automatic transfer switch shall be a three pole contactor type rated for the ampacity as shown on the drawings system voltage. It shall be rated for normal and standby operation. The transfer switch shall be capable of switching all classes of loads, and shall be rated for continuous duty. The transfer switch shall be housed in NEMA 3R gasketed stainless steel enclosure with 3-point padlockable latch.
2. The transfer switch shall be solid-state, electronically controlled, double throw, actuated by a single electrical operator momentarily energized. The transfer switch shall be capable of transferring successfully in either direction. Power for transfer shall be derived from supply being transferred. A delayed transition mode of transfer shall be utilized.
3. The normal and standby contacts shall be positively interlocked mechanically, mounted on a common steel bar, and electrically to prevent simultaneous closing. Contacts shall be mechanically locked in position in both the normal and emergency positions without the use of hooks, latches, magnets, or springs and shall be silver-tungsten alloy protected by arcing contacts, with magnetic blowouts on each pole. Main and arcing contacts shall be fully visible without major disassembly in order to facilitate inspection and

maintenance. All maintenance required shall be accomplished by front access only without major disassembly. Switch shall be designed for inductive loads and shall be equipped with magnetic blowouts and arc barriers on all poles.

4. The transfer switch shall be equipped with a manual operator which is designed to prevent injury to the operating personnel if the electrical operator should suddenly become energized during manual transfer.\
5. The transfer switch shall include a test switch to simulate normal power failure, pilot lights on the cabinet door to indicate the switch closed on normal or standby, all standard and optional features required to satisfy the requirements outlined in paragraph 3.03, and two auxiliary contacts on the main shaft; one closed on normal and the other closed on standby. All relays shall have wiping contacts.
6. The transfer switch shall be rated for one-hundred-twenty-five-percent (125%) of the full load. Withstand and closing rating shall comply with UL 1008. Transfer switch, complete with all timers, relays and accessories, shall be listed by UL and be approved for use on an emergency system.
7. The transfer switch shall be provided with auxiliary contacts; two normally open and two normally closed.\
8. The transfer switch shall be as manufactured by ASCO, Russelectric, Zenith or approved equal.

## **2.06 EXHAUST SYSTEM**

- A. Furnish and install according to manufacturer's recommendations: silencers, wall thimbles, stainless steel flexible corrugated exhaust connections, flanges, hangers and supports, pipe and fittings and insulation as specified herein or as indicated on the drawings to provide a complete and operable exhaust system.
- B. Silencers shall be critical grade, Maxim M-51 or equal, and shall have bolted flange connections. The silencer shall be mounted so that the engine shall not be supporting its weight nor will thermal expansion be imposed on the engine.
- C. Piping shall be seamless steel conforming to ASTM A 53 Grade B, schedule 40 black steel. Exhaust pipe and pipe support shall be painted with high temperature paint. Exhaust pipe shall be fitted with a 90-degree tail piece and stainless steel weather cap where indicated on the drawings. Fittings shall be seamless, black, standard weight, and butt-weld type of the same weight/schedule as adjoining pipe. Bends shall have radii at least 12 times the pipe diameter. Piping shall be installed with 9-inch (9") minimum clearance from combustible material or incorporate appropriate insulation and shielding. Piping shall be supported and braced to prevent weight or thermal growth being transferred to the engine.

*Created 2010  
Revised July 2013*

Support dampers and springs shall be provided where necessary to isolate vibration. Long runs of piping shall be pitched away from the engine and water traps installed at the lowest part.

- D. A stainless steel flexible corrugate connection, a minimum of 18 inches long (18”), shall be installed at the engine connection to take up thermal expansion and generator set movement.
- E. Insulation: Insulate silencer, piping and incidentals within building with 4-inch thick asbestos-free calcium silicate block or molded insulation. Apply in two layers with joints staggered, edges tightly butted and secure with No. 16 gauge galvanized, annealed steel wire or 1/2-inch by .015-inch galvanized steel bands on 9-inch (9”) centers maximum. Stretch 1-inch (1”) hexagonal, galvanized steel wire mesh over insulation with edges of mesh tied together. Provide welded studs if required for additional anchor support. Apply 1/2-inch (1/2”) thick coat of insulating cement troweled to a smooth, hard finish. Provide seams as necessary at all flange connections to facilitate easy removal. Provide galvanized insulation shields half circumference by 12 inches long (12”) minimum as required. Acceptable products include Owens-Corning Kaylo-10, Johns-Manville Thermal-12, or approved equal.

## **2.07 FUEL SYSTEM**

- A. Provide a diesel fuel system consisting of sub-base fuel storage, piping, fuel level gauges and miscellaneous appurtenances necessary for complete and working installation as specified herein.

### **B. Sub-Base Fuel Storage**

1. The sub-base fuel storage shall be a horizontal tank of double wall construction and shall have an interstitial leak detection system wired to the generator control panel. The tank shall be provided by the standby generator set manufacturer and shall serve as a mounting base for the generator set.
2. The tank shall contain structural steel members sufficient to support the generator, enclosure, exhaust system and other related equipment. The tank shall have a capacity to operate the generator set for at least forty-eight (48) hours at one-half (1/2) load. Tanks which must protrude beyond the generating set enclosure footprint shall have a non-skid diamond plate top and shall provide a 36-inch (36”) minimum walkway around the generating set, except at the radiator end. The top shall be designed to act as a rain shield. The tank shall have lifting provision for four point lifting.
3. Tank shall have low fuel level contact set at 25% full, fuel level gauge, lockable fill cap, and vent pipe which shall be installed through the

*Created 2010  
Revised July 2013*

enclosure roof. The base tank shall be pressure tested at fifteen (15) psi. The tank shall be constructed of aluminized steel plate. The top and bottom shall be eight (8) gauge minimum and sides shall be twelve (12) gauge minimum. Two (2) coats of high quality enamel paint shall be applied for the finish coat. The tank interior shall not be coated. The lockable tank fill cap shall be located external to the generator enclosure. The tank shall be in complete compliance with UL 142 and shall be labeled as such. Provide tank accessories as specified below.

4. **Fuel Level Gauge:** Provide as specified herein a fully automatic liquid level gauge and indicator for the fuel storage tank. Gauge shall be temperature compensated, balanced hydraulic type, providing continuous automatic indication in gallons on a circular dial. Gauge shall be as manufactured by Pneumercator or equal. Gauge shall be located for ease of observation.
  - a. Liquid level gauges shall be supplied with a set of contacts to give indication of a low fuel level. Set point shall be adjustable. Contacts shall be connected to the generator annunciator.

## **2.08 WEATHERPROOF ENCLOSURE**

- A. Standby generator set located outdoors shall be enclosed in a modular weatherproof non walk-in enclosure. The enclosure shall be constructed with hinged or removable side and end panels. Louver access doors and top panels shall be made out of 14-gauge steel with 12-gauge steel corner and side supports, and 16-gauge steel solid access doors minimum.
- B. The enclosure shall have continuous hinged doors on each side and at the control end and shall be equipped with key locks for ease of engine maintenance and a three point latch system. There shall be expanded metal grating or radiator core guard in front for the radiator grill and fixed punched louvered air intake ports on the enclosure sides and rear for proper air circulation within the housing. The complete generator set and housing shall be prime painted and have two finish coats of protective enamel paint. Provide lifting eyes and spreader bar reinforcement for crane unloading.
- C. The enclosure shall be sized to house the generator breaker, generator control panel, annunciator, rack mounted batteries, battery charger, and accessories. Control wire connection between starting and safety circuits shall be pre-connected before the standby generator is delivered. Crank case heater(s) shall be provided as recommended by the generator set manufacturer. Enclosures for electrical equipment shall be NEMA 3R.\

- D. Engine oil and radiator drain lines shall be brought to the outside of the enclosure. A globe type shut off valve shall be installed in each drain line inside the enclosure for security.
- E. An exhaust silencer as specified in Article 2.06 shall be mounted within or on top of the unit.
  - 1. A top mount shall be secured in position at no less than 4 points. The silencer shall be supported by an angle iron cradle welded to the silencer and bolted to the angle iron roof support members mounted inside the roof of the enclosure. The silencer shall be of the side inlet type. The exhaust side of the silencer shall have a length of black iron pipe extending beyond the radiator end of the enclosure a minimum of ten-inches (10") and cut back on a forty-five-degree (45°) angle.
  - 2. The intake of the silencer shall connect to a flexible exhaust connection. Exhaust pipe shall be routed to penetrate enclosure roof through a metal thimble. Flash penetration area is to be weatherproof and sized as required by engine manufacturer. The flexible exhaust connection as specified shall mount directly on exhaust manifold and shall be mounted so that no weight is exerted on the manifold at any time.
- F. The enclosure shall provide sound attenuation satisfactory for generator use in residential neighborhoods.

### **PART 3: EXECUTION**

#### **3.01 GENERAL**

- A. The Installer shall lay out the work and shall be responsible for all necessary lines, levels, elevations, and measurements. The drawings shall indicate extent and general arrangement of the components. The Installer shall become familiar with work of other trades engaged in the construction. Exact routing of raceways, piping and locations of equipment may be governed by structural conditions and obstructions. The Installer shall coordinate with the equipment shop drawings for locations of equipment to be connected as furnished by others. This is not to be construed as to permit redesigning of systems.

#### **3.02 INSTALLATION**

- A. Comply with Referenced Standards, National Electrical Code (NEC). Local codes and rules and regulations of local agencies have jurisdiction. Size of conductors, circuit breakers, motor controllers and protective devices indicated or specified shall meet all requirements of the NEC.

*Created 2010  
Revised July 2013*

- B. Standby generator shall be installed and secured to a reinforced concrete pad as indicated on the drawings and as recommended by the manufacturer. The concrete pad shall be designed to accommodate the standby generator, enclosure and housed equipment.
- C. Fuel storage tank shall be installed and secured to a reinforced concrete pad as indicated on the drawings and as recommended by the manufacturer.

### **3.03 SYSTEM OPERATION**

#### **A. Automatic Operation**

1. The generating set shall automatically start upon a signal from the automatic transfer switch and after the transfer switch has transferred back to normal, the generating plant shall be allowed to operate at no load for an adjustable time period of two (2) to thirty (30) minutes to allow it to cool before shutdown.
2. The generating plant shall start if any phase of the normal source drops below an adjustable set point of seventy-five-percent (75%) to ninety-eight-percent (98%) of rated system voltage, after an adjustable time delay of zero (0) to six (6) seconds, to allow for momentary dips. The transfer switch shall transfer to the standby source after an adjustable time delay of zero (0) seconds to five (5) minutes when the frequency and voltage output have reached an adjustable set point of eighty-five-percent (85%) to one-hundred-percent (100%) of rating.
3. Upon restoration of frequency and voltage to an adjustable set point on all phases of the normal power ratings, the transfer switch shall retransfer to the normal power source after an adjustable time delay period of zero (0) to thirty (30) minutes. If the standby power source should fail during the time delay period, the time delay shall be by-passed and the switch shall return immediately to the normal source.
4. There should be a delay in transfer to stand-by power or retransfer to commercial power of up to ten (10) seconds to prevent excessive switching transients due to non-synchronization of two power supplies. This may be accomplished by the use of a neutral position delay or other method with prior approval.

#### **B. Emergency Shutdown**

1. An emergency shutdown pushbutton shall be installed on the exterior of the generator room or on the weatherproof enclosure. When the pushbutton is activated, the engine-generator set shall be shut down.

*Created 2010  
Revised July 2013*

2. The pushbutton shall be red in color, two-and-one-half-inches (2-1/2") minimum diameter, and shall have a cover or release device to prevent accidental operation.
3. An engraved nameplate with the words "Generator Emergency Stop" in one-half-inch (1/2") high letters shall be mounted on the wall above the pushbutton.

### **3.04 TESTING**

- A.** The Installer shall operate the standby generator(s) under full load conditions for a continuous period of eight (8) hours with loading provided by a contractor furnished load bank.
  1. Load bank testing shall be done in the presence of the City's appointed representative after the unit is permanently installed in accordance with drawings and specifications. In lieu of an onsite load bank test, the factory load bank test report may be submitted to the City.
  2. Prior to acceptance, any defects which become evident during this test shall be corrected at no expense to the City.
- B.** The services of a factory-trained service engineer who is specifically trained on the type of equipment herein specified shall be provided for start-up of generator.
- C.** Upon completion of testing, the services of the above engineer shall be provided for instruction of the City's operating and maintenance personnel. The instructions shall include operating and maintenance procedures specifically written for the equipment installed and not generally written to cover all options available.
- D.** The transfer switch shall be operationally tested as part of the complete system to verify satisfactory operation.
- E.** After testing is complete, the fuel storage tank(s) should be filled to full capacity with #2 diesel fuel.

# APPENDIX B



## EROSION/SEDIMENTATION CONTROL STANDARDS

Prepared by  
City of Bradenton  
Department of Public Works & Utilities

July 2013

# Introduction

This booklet contains standard erosion control plans and procedures that are suitable for implementation with typical residential building construction, as well as commercial building construction. It is not intended to address all sites or circumstances.

Since Bradenton's streets and storm sewers are conduits for draining and conveying stormwater to surface waters within our city, it is important during construction activities to retain sediment and debris on the lots (construction sites) rather than tracked or eroded onto streets.

Our primary objective is to eliminate or reduce the amount of sediments and other pollutants leaving any construction site. To accomplish this goal, erosion and sediment control steps and procedures called Best Management Practices (BMPs) must be utilized. When properly implemented and maintained, BMPs are very effective in minimizing erosion and migration of sediments off construction sites.

For residential construction, the subdivision in which you are building likely already has an overall Stormwater Pollution Prevention Plan (SWPPP) and Southwest Florida Water Management District (SWFWMD) Environmental Resources Permit (ERP). That permit remains in effect until all the lots are developed. BMPs related to that permit and plan are in place and should not be removed or compromised.

The grading/erosion control permit holder, also the building permit holder, is responsible for ensuring that adequate BMPs are in place on the individual lot, and catch basins adjacent to the site are properly protected and remain functional until the building project is completed. A project is defined as completed only when 70 percent of the lot has been re-vegetated.

There will be situations where side or rear lot line protection as depicted within this document may not be required. For example, there are two houses under construction on adjacent lots where the surface drainage runs away from the other lot. Given this scenario, it is not the intention to require perimeter protection between the two lots.

When reviewing the standards presented in this publication and considering implementation on your construction project, keep in mind the intent of the standard is "to prevent erosion and to minimize sediments from leaving the lot." Failure to do so can result in damage to adjacent property, damage to the City's storm sewer system, and contribute to the pollution of stormwater ponds and surface waters within the City limits which can be a violation of the federal Clean Water Act and result in fines of up to \$25,000 per day.

If any questions or concerns arise, please feel free to contact me or one of our engineering staff. We are committed to helping all of those involved with the implementation of these construction procedures.

*Created 2010  
Revised July 2013*

# Best Management Practices

**BMP's** — Examples include, but are not limited to, temporary construction entrance, sediment (silt) fence, sediment logs, erosion control mat, straw mulch, sod, seed and fiber mulch.

## Installation Sequencing

1. **Grass Buffer Strips** — Ensure that the existing grass buffer strips along the curb line (and if present at the rear yard) are not disturbed. Temporary fencing can be used to keep vehicles and material storage from disturbing these buffers.
2. **Inlet Protection** — Ensure that the curb or rear yard inlets that receive runoff water from your lot have inlet protection (see details).
3. **Protection of Adjacent Lots** — Install BMP's along the common lot lines where the adjacent lot receives runoff water from your lot **and where** the adjacent lot has been graded, sodded or seeded. Sediment (silt) fence or sediment logs can be used as a perimeter BMP.
4. **Grading/Excavating** — Install all BMP's prior to any grading or excavation.
  - An exception is allowed for the temporary construction entrance. The future driveway may be excavated, then the temporary construction entrance installed.
  - Take special care when stripping and stockpiling the topsoil from the lot to avoid disturbing the grass buffer strips. **DO NOT** store stockpiles on city boulevards.
  - When excavating for sewer and water connections, the grass buffer strip may be unavoidably disturbed. The grass buffer strip must be restored or a BMP installed in the area disturbed. Sediment (silt) fence or sediment logs are acceptable.
  - Dewatering of excavated trenches, basements or foundation walls must be done in a manner to protect the inlets from sediments. This can be accomplished by use of sediment or filter bags (see detail), or temporary sediment basins.
5. **Stabilize Soil Stockpiles** — Install BMP's to stabilize stockpiles to prevent erosion of sediments onto adjacent lots or into rear yard or curb line inlets. Use sediment (silt) fence or sediment logs. **DO NOT** place stockpiles on city streets or within the public Right-of-Way.
6. **Temporary Construction Entrance** — Required for all construction sites (see detail). The temporary construction entrance must be used by all trades and delivery personnel entering the property. Acceptable materials for the entrance will be crushed rock, crushed concrete, class 5, wood chips, tracking mat, or driveway.
7. **Backfill and Rough Grading** — Take special care when backfilling the foundation and rough grading the lot to avoid disturbing the grass buffer strips.

8. **Maintenance** — The grading/erosion control permit holder, also the building permit holder, is responsible for ensuring that adequate BMPs are in place and functioning until the project is completed.
9. **Final Grading** — BMP's may be removed to complete final lot grading. However, if the lot is to remain without vegetation for fourteen (14) days, the BMP's must remain in place and final grading should be delayed to coincide with seeding or sodding. During final grading, back dragging soil onto the street must be avoided. **Any soil placed on the street must be removed and the street swept immediately.**
10. **Seeding or Sodding** — The right-of-way (boulevard) along the curb line must receive one of the following within 14 days after final grading has been completed:
  - Sod
  - Seed with erosion mat
  - Seed with sprayed fiber mulch
  - Seed with anchored straw mulch

## Contractor Responsibilities

1. The grading/erosion control permit holder, also the building permit holder, is responsible for ensuring that adequate BMPs are in place and functioning until the project is completed.
2. **Periodic inspection shall be at least once a week or more frequently following rainfalls** to ensure that erosion and sediment control measures are functioning as designed. Any problems noted during these inspections should be corrected immediately.
3. Once construction has commenced, the permit holder is responsible for maintenance of erosion and sediment control measures protecting area inlets on their lots, as well as curb inlets along the street frontage. **It is critical that sediment not be allowed to enter the storm sewer system.**
4. The temporary construction entrance provides a place for entering and leaving the construction site. The intent of the requirement is to provide a stable surface for vehicles entering and leaving the lot where mud is not likely to be tracked onto the street. The contractor is responsible for ensuring that all employee and delivery vehicles use this entrance and do not disturb the grass buffer strips along the curb line. Proper maintenance of the temporary construction entrance is required until such time as a permanent driveway can be put in place.
5. **During the entire construction period, the permit holder is responsible for ensuring that mud, dirt, rocks and other debris are not allowed to erode or be blown onto City streets or sidewalks, nor to be tracked onto streets by vehicles leaving the construction site.** Should any mud or other debris be tracked or eroded onto the street, the contractor shall take

immediate steps to have it removed. Tracking must be removed from city streets by the end of the day by sweeping of roadways or other approved methods.

**Maintenance (silt fence and sediment logs)**

1. Inspect silt fences and sediment logs at least once a week and after every 0.5 inch or greater rainfall. Make needed repairs immediately.
2. Promptly replace any collapsed, torn, decomposed or ineffective silt fence or sediment logs.
3. Remove the sediments accumulated against silt fences and sediment logs when those sediments reach 1/3 the height of the fence or sediment logs (MPCA requirement). Take care to avoid damaging or undermining the fence or sediment logs during cleanout.
4. If utilities are installed after construction commences, the permit holder is responsible for control of erosion and sediment during the process. The contractor is responsible for ensuring that all BMP devices are reinstalled per the original design.

**Maintenance (grass buffer strips)**

1. Promptly repair any damage to the grass buffer strip or install BMPs (silt fence, sediment logs, sod or mulch) if the area is beyond repair.
2. On a regular basis reinforce the need to use the construction entrance and to preserve the grass buffer strips with employees and delivery personnel.

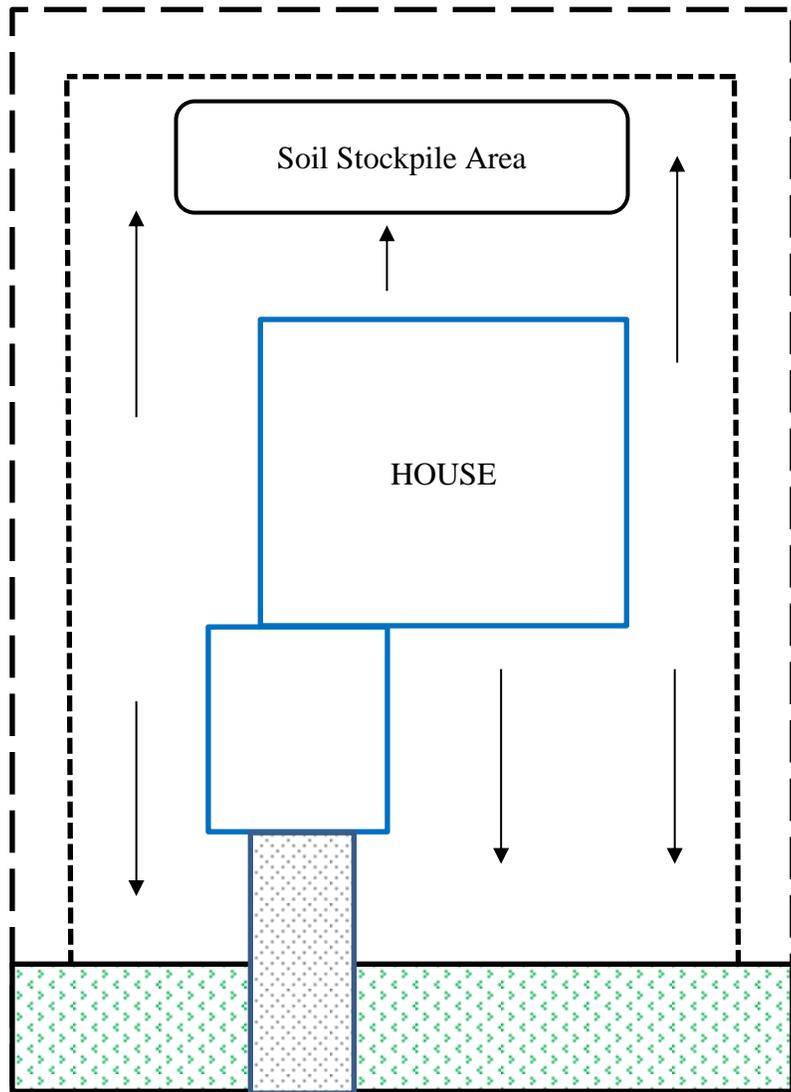
# INSPECTIONS — CITY

1. The City inspector will routinely inspect erosion and sediment control measures. Inspections will ensure that appropriate erosion and sediment control measures are in place and properly installed.
2. As noted in the previous section on BMP's Installation Sequencing, there are a number of items to check. This inspection will concentrate on the following:
  - Perimeter Controls
  - Construction Entrance
  - Debris/trash Control
  - Dewatering
  - Inlet Protection
  - Tracking
    - Concrete Washout Area
  - Hazardous Material

If BMP's are not installed, or are improperly installed, a Notice of Violation/Order to Comply will be given to the permit holder. If the violations are not repaired within the allowed time the inspector may issue an administrative fine or a Stop Work Order until the sediments have been removed and proper BMP's are established.

3. Site inspections shall be done weekly by the permittee (general contractor, developer or the developer's designates representative), and within twenty four (24) hours after every storm event of 0.5 inches or greater.
4. There will be instances that fall outside the norms. City staff will be available to discuss erosion and sediment control measures for any lot and the sequencing for installation. If you have questions or concerns call 941-708-6300 to speak with the Engineering Department.

# SINGLE FAMILY LOT EROSION CONTROL PLAN — TYPE A



- SILT FENCE
- LOT LINE
- - - GRASS BUFFER STRIP
- CONCRETE ENTRANCE
- DIRECTION OF FLOW

Created 2010  
Revised July 2013

# Temporary Construction Entrance

Each building site must have a designated construction entrance. The future driveway is a good place for the construction entrance. Insist that all trades, delivery and supply companies only use the approved entrance.

- Construction entrances must have a minimum depth of six (6) inches.
- The construction entrance should consist of gravel, wood chips, crushed concrete, crushed rock, class 5 or a tracking mat.
- Should access block drainage from the road, a pipe must be installed along the curb to allow water to pass to the storm drain.
- Any sediment tracked on a paved surface from the construction site must be removed by the end of the day by sweeping or other approved method.
- Vehicles should stay off the construction site during wet conditions to avoid tracking sediment off the job site and into the storm sewer.
- Refer to the detail on next page for details on appropriate construction techniques for the temporary construction entrance.

The photograph to the right depicts a construction entrance that is **UNACCEPTABLE**. The lack of a construction entrance has resulted in mud tracked onto the street and the curb line is full of sediment.



*Created 2010  
Revised July 2013*

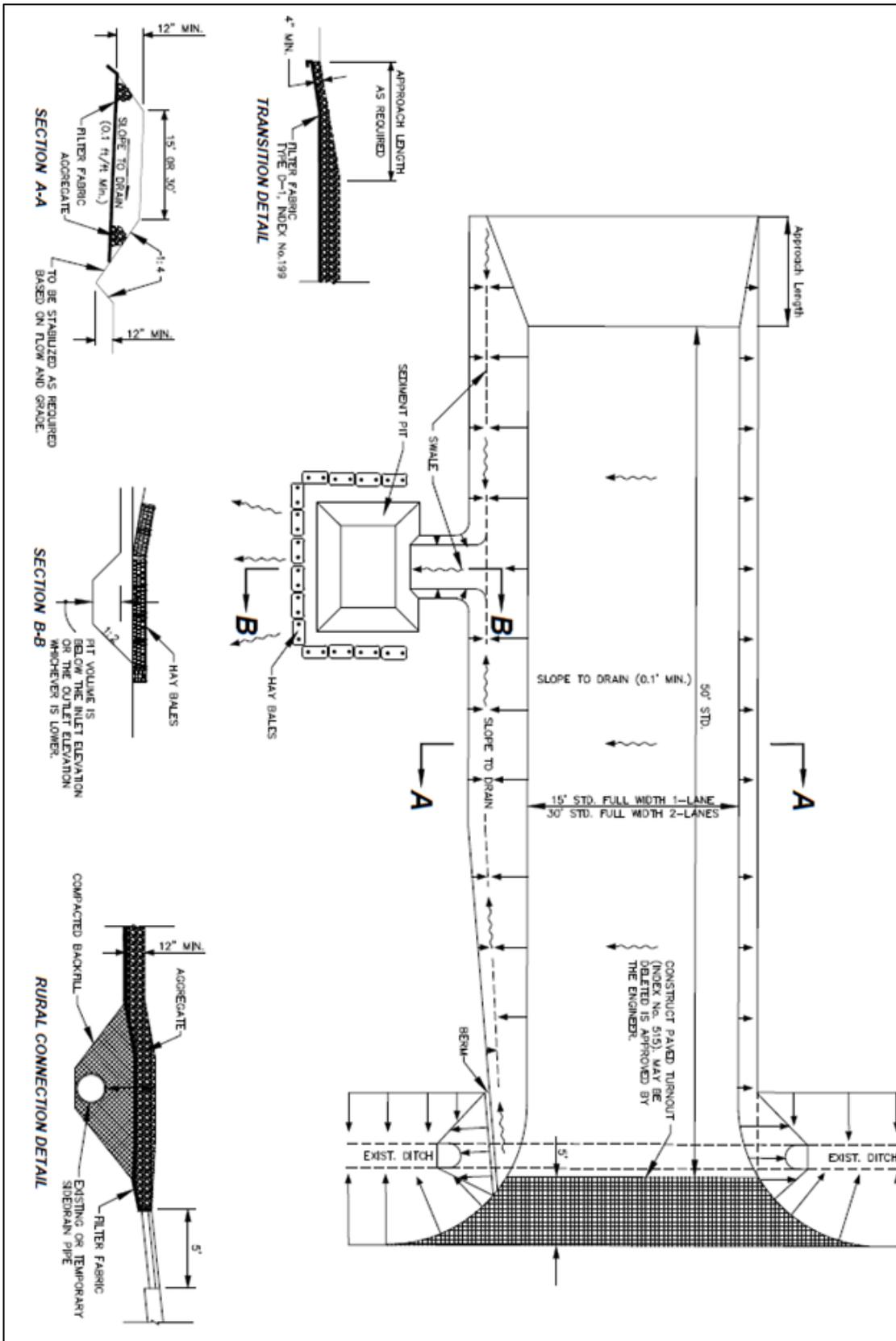


Figure 1 Temporary Construction Entrance

Created 2010  
 Revised July 2013

The following photographs depict **ACCEPTABLE** temporary construction entrances that comply with standards.



## Silt Fence

Silt fence must be in compliance with City specifications. The following guidelines must be utilized for proper usage of the silt screen fence:

- A minimum of eight inches (8") of the silt fence must be embedded in the ground.
- Sediment control fence posts must be driven a minimum of sixteen inches (16") into the ground.
- Above the ground, the fence post must be a minimum of twenty inches (20") above ground and be a minimum of thirty-six inches (36") in length.
- Between each fence post, the maximum distance allowed is ten feet (10').

The diagram on the next page shows how two sections of silt fence should be connected.

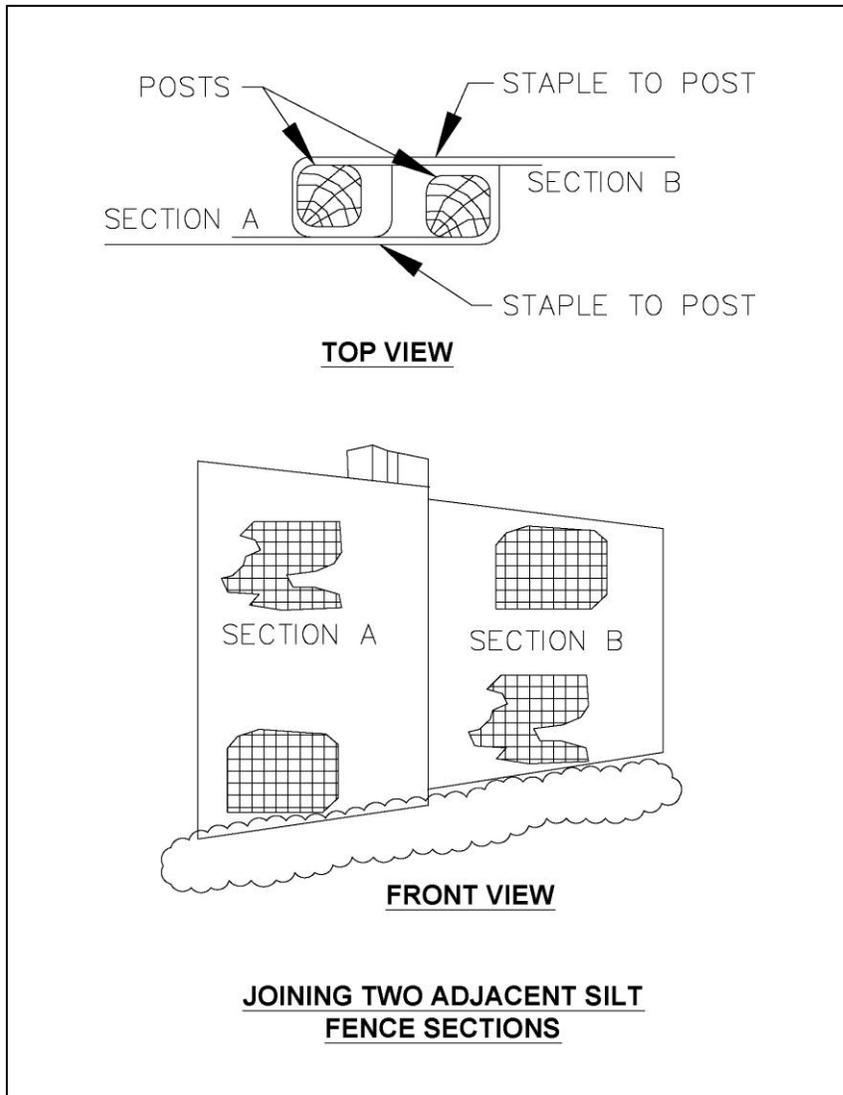


Figure 2 - Joining Two Adjacent Silt Fence Sections

## Curb and Inlet Protection

Curb and inlet protection must be performed immediately as construction begins. Outlined here and in the City's specifications are approved methods for protection of curbs and inlets:

- For inlet grates, filter cloth must be placed under the inlet grate during worksite construction to prevent sediment infiltration into drainage pipes.
- Filter cloth must be a minimum of



twelve inches (12”) past the inlet drainage structure as shown in the figure below.

- For curb inlets, a 6” wrapped under drain with washed shell, commonly referred to as a “sock,” will be placed along the length of the inlet to prevent sediment from entering the drain as shown in the figure below.
- The “socks” and filter cloths must be inspected daily by the grading/erosion control permit holder and the building permit holder or contractor. “Socks” and filter cloths must be replaced before sediment clogs the inlet as shown in the above picture.
- Sediment bags may also be used in inlet structures. They are to be cleaned regularly, as they cannot hold high volumes of sediments.

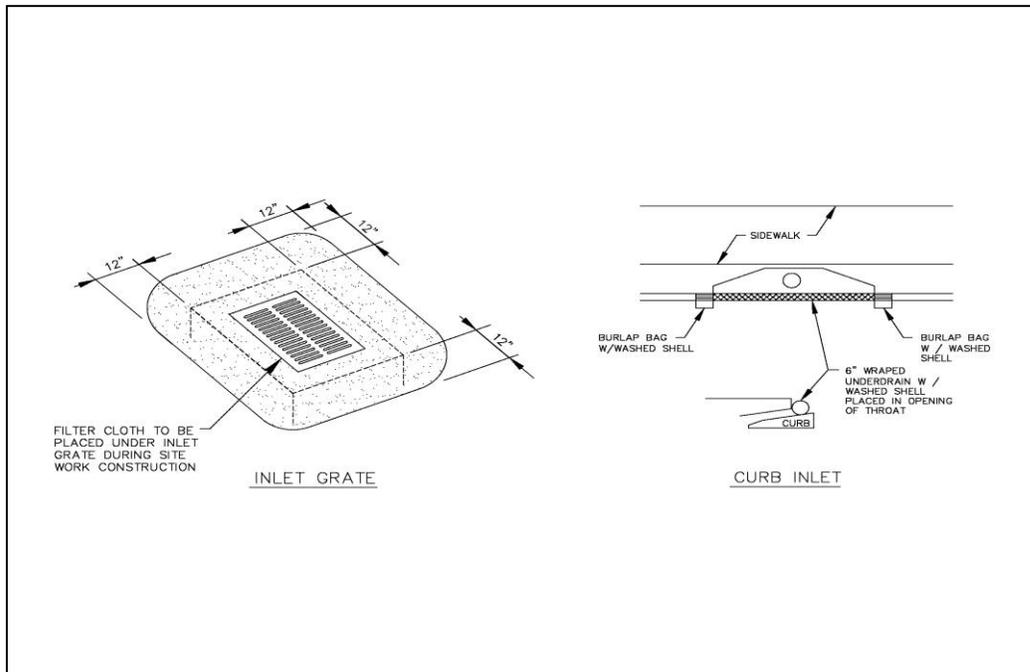


Figure 3 - Inlet Protection Techniques

The following details actions that are **NOT ALLOWED**. The pictures depict actions listed and other disallowed practices.

- Any activity that damages filters or “socks.”
- Parking vehicles in the right-of-way. This includes trailers, cars and trucks.
- Storing building materials, such as sand, clay, dirt, or gravel, in the right-of-way.



# Dewatering

During high rainfall months, standing water can become an issue on work sites. Waiting for the water to dry or infiltrate naturally takes essential time and effort and can delay work for a project. The common solution is to pump this water onto the City Street or to a nearby storm drain inlet. However, this water that is being pumped is carrying sediment and must be treated prior to being deposited into the storm drain. It is the permit holder's responsibility to keep sediment from leaving the job site and from entering the storm drain.

- A sediment filter bag or temporary sediment basin may be used to remove sediment from the effluent prior to entering a storm drain.
- Visual inspection must be done to ensure adequate treatment is achieved.
- Dewatering must not cause a nuisance to other adjacent properties or cause erosion of right-of way.

Pollution of storm system will not be tolerated and can result in Notice of Violation/Order to Comply and even Stop Work Order until the conditions are met and sediment is removed from the storm drain system.

# Concrete Washout Area

The grading/ erosion control permit holder is responsible for keeping sediments from leaving the construction site. This also includes actions of sub-contractors, suppliers, and delivery firms visiting the site.



- The site must provide a washout area for trucks leaving the site.
- The washout material and water must be contained, meaning that none of the water can leave the washout area.
- Streets and right-of-ways must not be used as washout areas.
- Washout areas must be lined or compacted per EPA NPDES construction permitting.
- The washout area should be clearly and properly marked.
- The permit holder is responsible for suppliers' and deliveries' knowledge of washout areas.
- The washout area must be a minimum of fifteen feet (15') from any storm inlet.
- The washout area must be inspected once a week, and within 24 hours after a rain event of 0.5 inches or more.
- The washout must be emptied when 80% of its capacity is used.



In any instance of mechanical breakdown or similar circumstance where a truck cannot be cleaned via washout area, all spilled material must be shoveled off the street and swept accordingly. **NONE** of this sediment shall enter any storm drain, and the material **WILL NOT** be sprayed with water, as this will send pollutants into the storm inlet.

# Summary

Best Management Practices should be utilized in order to manage sediment and drainage for construction worksites. The permit holder(s) are responsible for all BMP's usage.

- Grass buffer strips and inlet protection will be installed first in order to prevent sediment and runoff produced from excavation and grading running from flowing into the storm sewer.
- Soil stockpiles will be stabilized to prevent erosion into adjacent lots, rear yard or curb lines. Stockpiles will not be placed on City streets or within the public right-of-way.
- Temporary entrances, silt fences, curb and inlet protection measures must abide by the mentioned specifications.
- BMPs may be removed to complete final lot grading unless the lot is to remain without vegetation for fourteen days.
- If BMP's are not installed, or are improperly installed, a Notice of Violation/Order to Comply will be given to the permit holder. If the violations are not repaired within the allowed time the inspector may issue an administrative fine or a Stop Work Order until the sediments have been removed and proper BMP's are established.

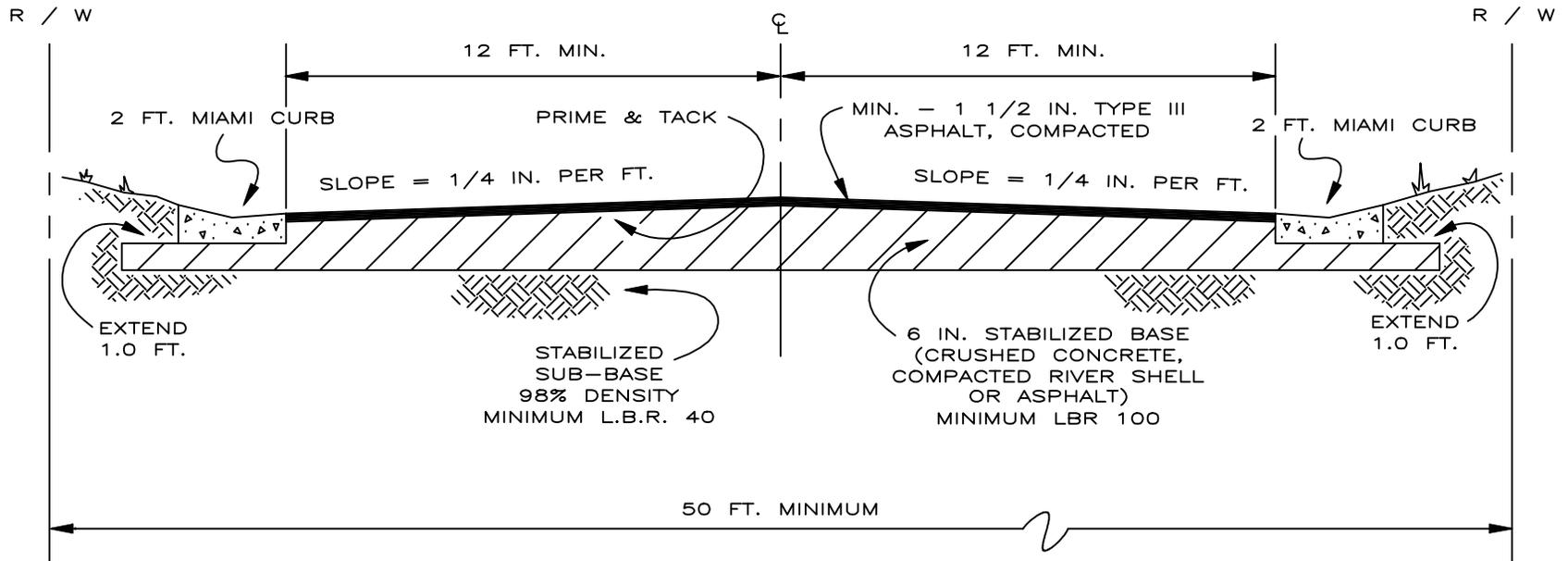
In review of the main sections, these are found to be most essential.

- Any soil placed on the street must be removed and the street swept immediately.
- Periodic inspection shall be at least once a week or more frequently following rainfalls.
- It is critical that sediment not be allowed to enter the storm sewer system.
- During the entire construction period, the permit holder is responsible for ensuring that mud, dirt, rocks and other debris are not allowed to erode or be blown onto City streets or sidewalks, nor to be tracked onto streets by vehicles leaving the construction site.
- Dewatering of job sites must not allow sediment-laden water to be pumped into the City's storm sewer.
- Concrete washout areas must be provided for job sites and washout material and water must not leave the job site. The washout must be emptied when 80% of its capacity is used.

Any questions or concerns can be directed to the City of Bradenton Engineering Division at 941-708-6300.

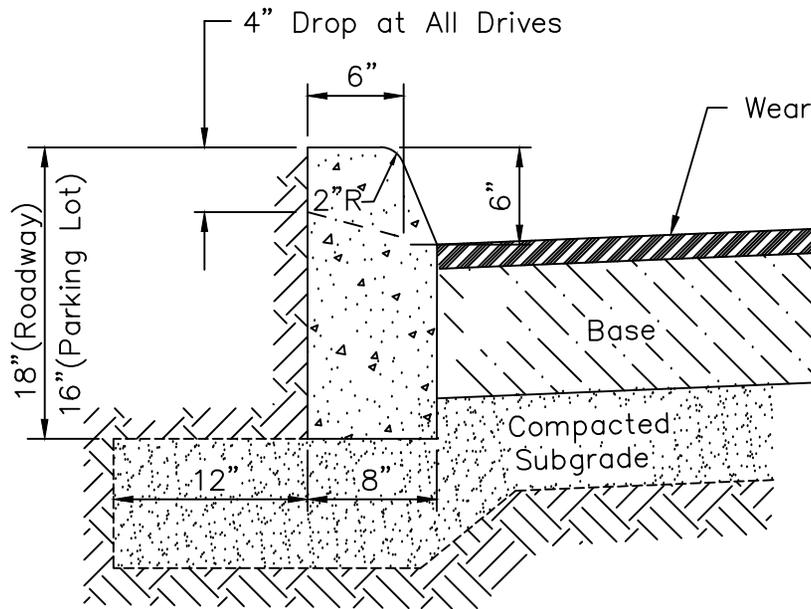
**APPENDIX C**

**STANDARD DETAIL  
DRAWINGS**

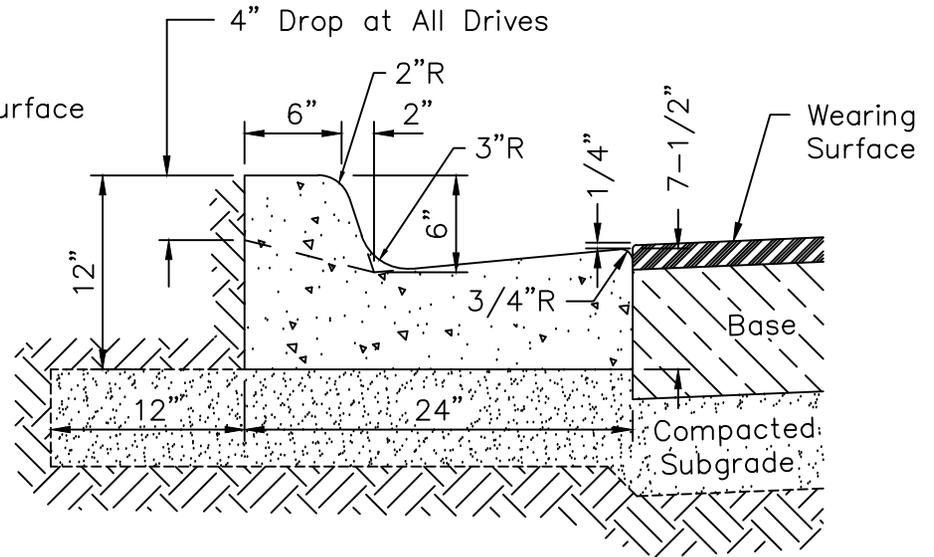


TYPICAL ROAD CONSTRUCTION

					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	STREETS AND ROADS	DATE
						TYPICAL ROAD SECTION	2/07
REV.	DATE	DESCRIPTION	BY				SHEET NO.
							SR-1



TYPE D CURB

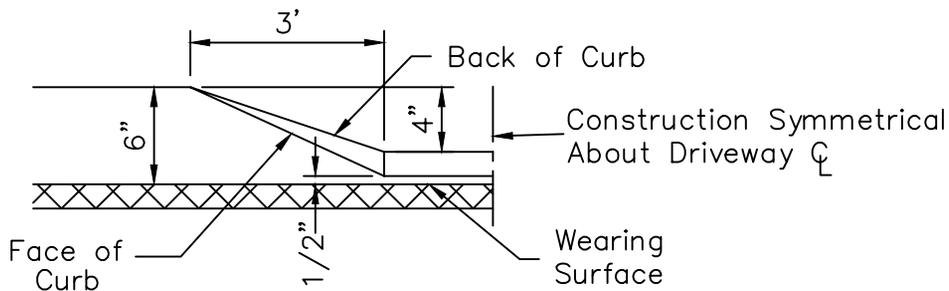


NOTE: When used on high side of roadways, the cross slope of the gutter shall match the cross slope of the adjacent pavement and the thickness of the lip shall be 6", unless otherwise shown on plans.

TYPE F CURB

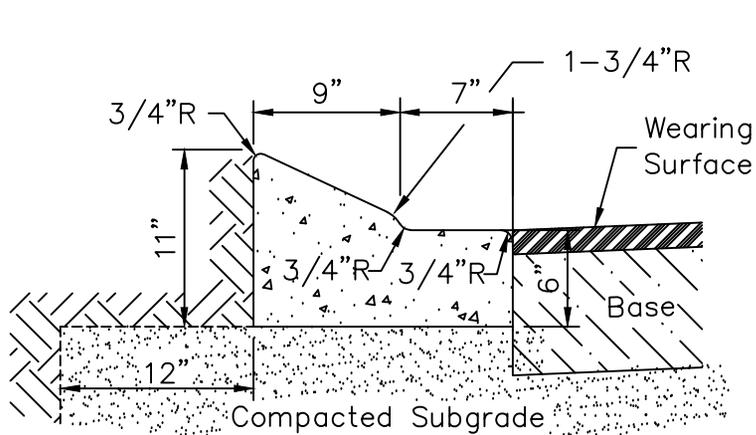
NOTES:

1. There shall be a 1/2" seal joint between back of curb and driveway.
2. Concrete in curbs shall be 3000 psi, with fiber mesh reinforcing.

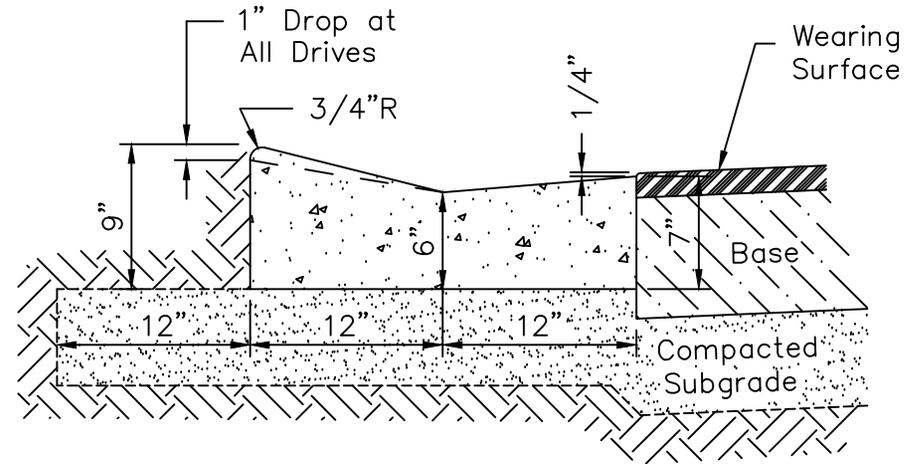


3' TRANSITION AT DRIVES

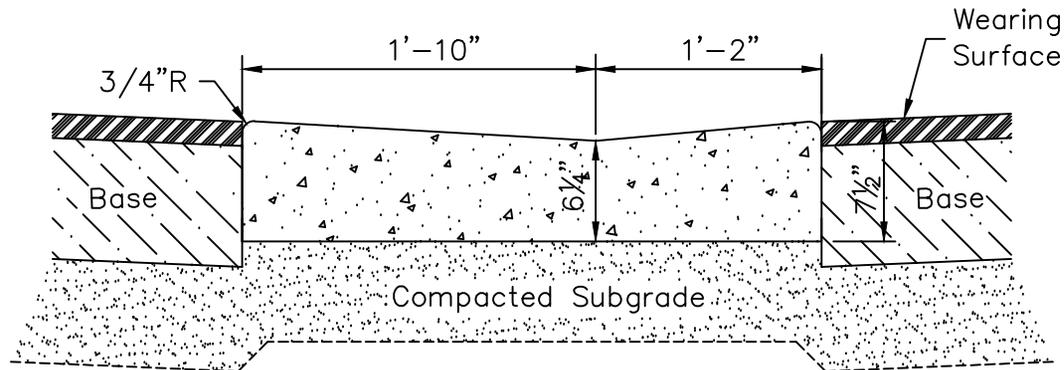
					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	STREETS AND ROADS	DATE
						TYPICAL CURB CROSS	2/07
REV.	DATE	DESCRIPTION	BY			SECTIONS	SHEET NO.
							SR-2



TYPE A CURB



MIAMI CURB - TYPE "F"



VALLEY GUTTER

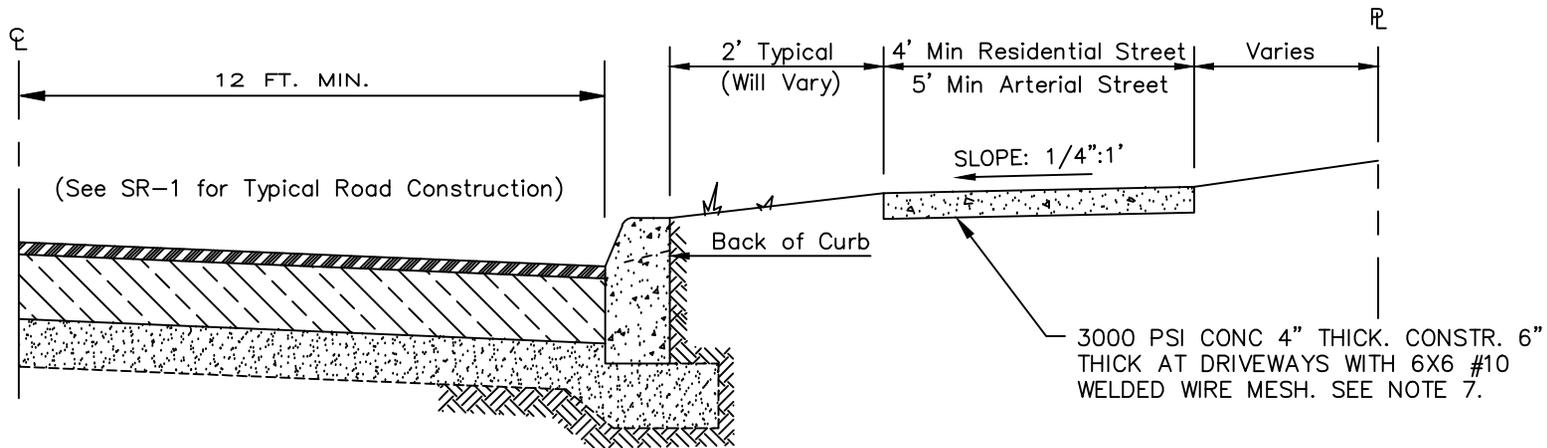
NOTES:

- 1) There shall be a 1/2" seal joint between back of curb and driveway.
- 2) Concrete in curbs shall be 3000 psi, with fiber mesh reinforcing.

					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	STREETS AND ROADS	DATE
						TYPICAL CURB CROSS	2/07
1	7/2013	REMOVED TYPE "F" MODIFIED	SIBE			SECTIONS	SHEET NO.
REV.	DATE	DESCRIPTION	BY				<b>SR-3</b>



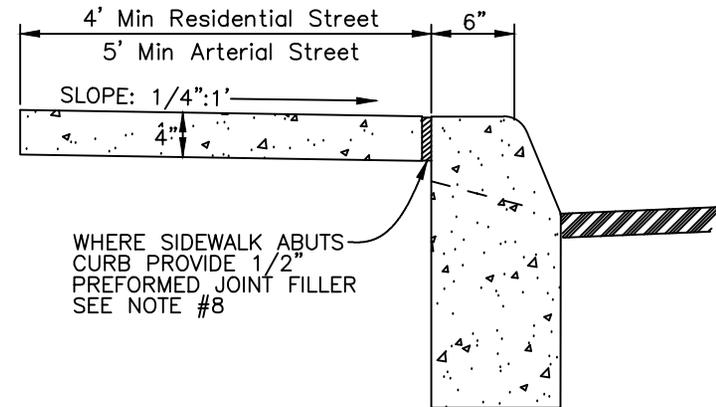




PRIMARY SIDEWALK LOCATION

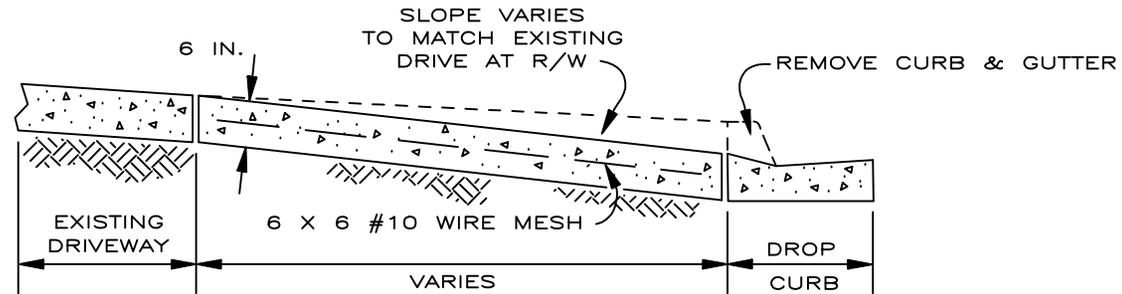
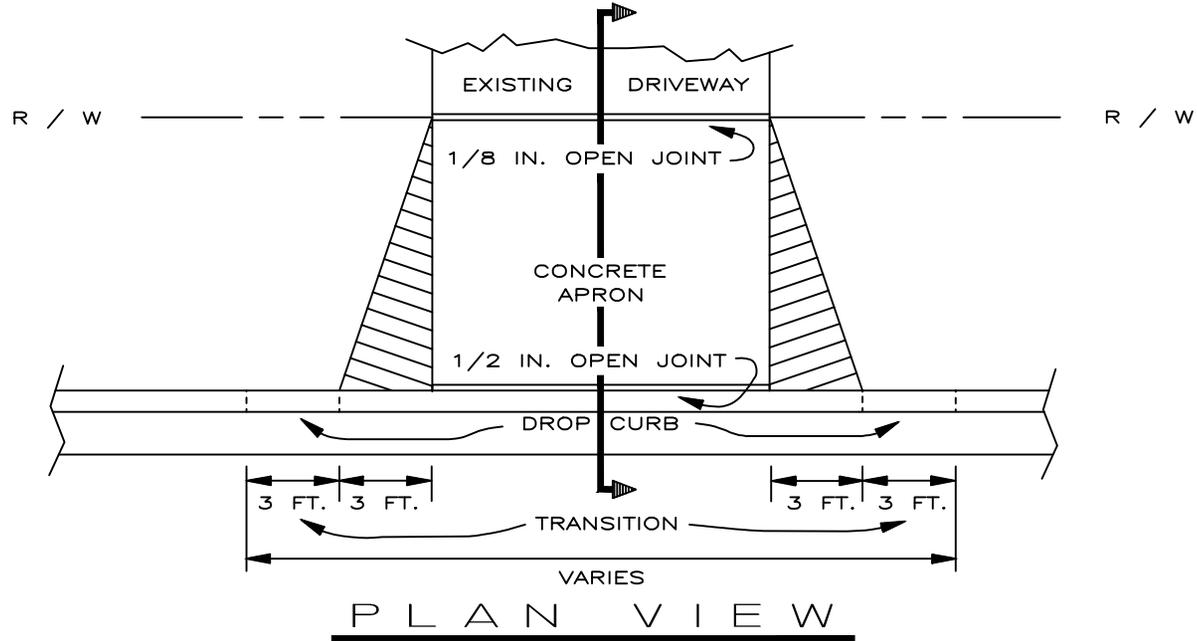
NOTES:

1. PROVIDE TOOLED JOINTS AT DISTANCES MATCHING THE WIDTH. ALSO PLACE EXPANSION JOINTS AT DRIVEWAYS.
2. IF SOME PHYSICAL OBSTRUCTION EXISTS WHICH PREVENTS THE PLACING OF SIDEWALKS AS SHOWN, CONTACT THE ENGINEERING DIVISION FOR ALTERNATE LOCATION.
3. WOODEN AND OTHER SPACERS WILL NOT BE PERMITTED IN SIDEWALKS OR DRIVEWAYS.
4. NO COATINGS OF ANY KIND WILL BE PERMITTED ON CONCRETE SIDEWALKS OR DRIVEWAYS WITHOUT SPECIFIC APPROVAL OF THE CITY ENGINEER.
5. ALL CONCRETE SHALL BE 3000 PSI MIN. @ 28 DAYS, WITH FIBER MESH REINFORCING.
6. CONCRETE SURFACE TO BE LIGHT BROOM FINISH.
7. CONCRETE DRIVEWAY CONSTRUCTION SHALL BE 6" THICK W 6X6/10X10 WELDED WIRE MESH REINFORCEMENT.
8. EXPANSION JOINT: EXPANSION JOINTS BETWEEN THE SIDEWALKS AND THE CURB OR DRIVEWAY OR AT FIXED OBJECTS AND SIDEWALK INTERSECTIONS SHALL BE 1/2". MATERIAL SHALL MEET THE REQUIREMENTS OF AASHTO M153 OR AASHTO M213. FOR LONG POURS, AND EXPANSION JOINT SHALL BE PLACED AT INTERVALS NOT TO EXCEED 120'.



ALTERNATE SIDEWALK LOCATION

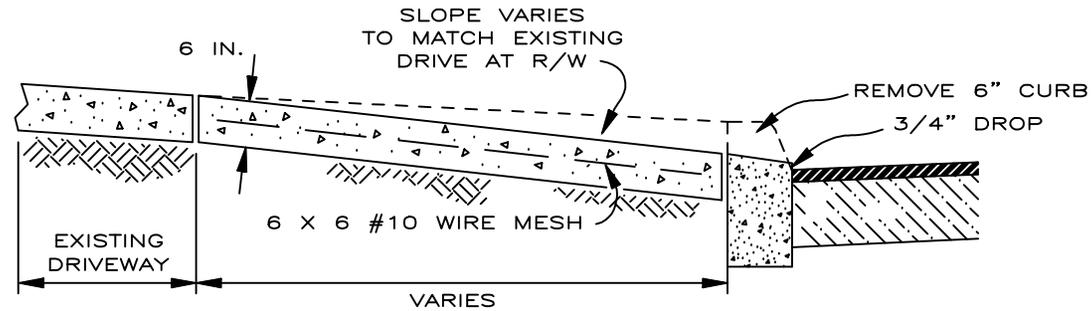
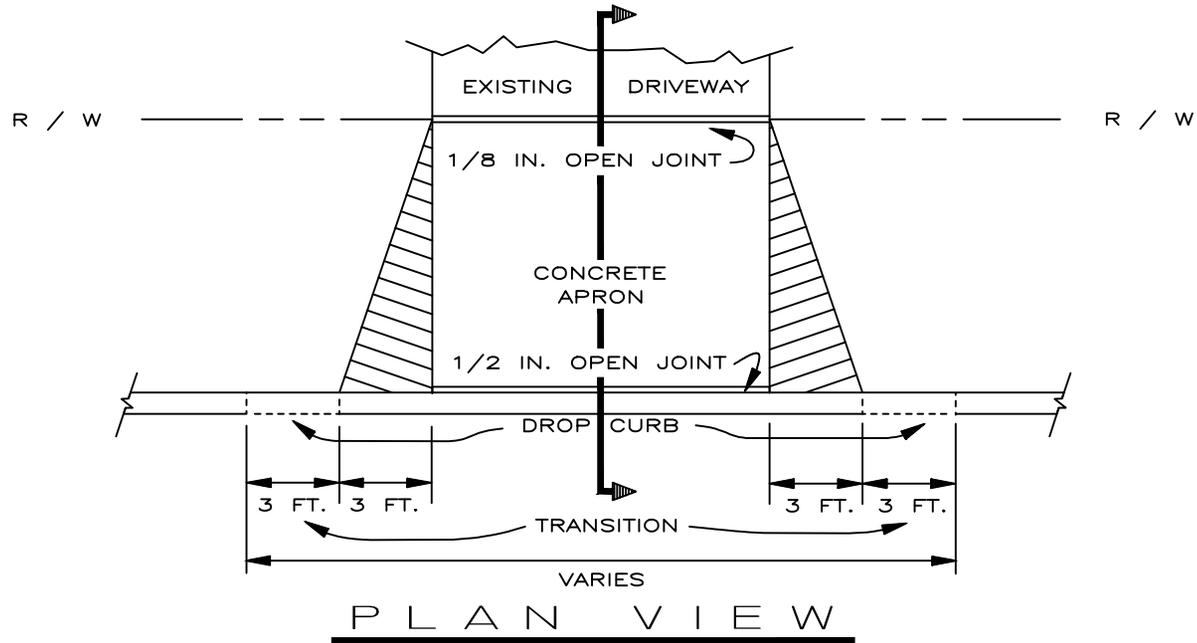
					<b>CITY OF BRADENTON, FLORIDA</b> <b>PUBLIC WORKS AND UTILITIES</b> <b>DEPARTMENT OF ENGINEERING</b>	STREETS AND ROADS	DATE
						TYPICAL SIDEWALK CONSTRUCTION	7/13
REV.	DATE	DESCRIPTION	BY				SHEET NO. SR-5



**NOTE:**  
3,000 p.s.i. CONCRETE SPECIFIED

**NOTE:**  
No City of Bradenton Utility Lines Including Water Meters or Sewer Cleanouts May Be Placed In The Driveway.

					<b>CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING</b>	STREETS AND ROADS	DATE
						TYPE F CURB	2/07
1	4/13/2011	Added No Utility Lines Note	SIBE			DRIVEWAY CONSTRUCTION	SHEET NO.
REV.	DATE	DESCRIPTION	BY				<b>SR-6</b>



**NOTE:**  
 No City of Bradenton Utility Lines Including Water Meters or Sewer Cleanouts May Be Placed In The Driveway.

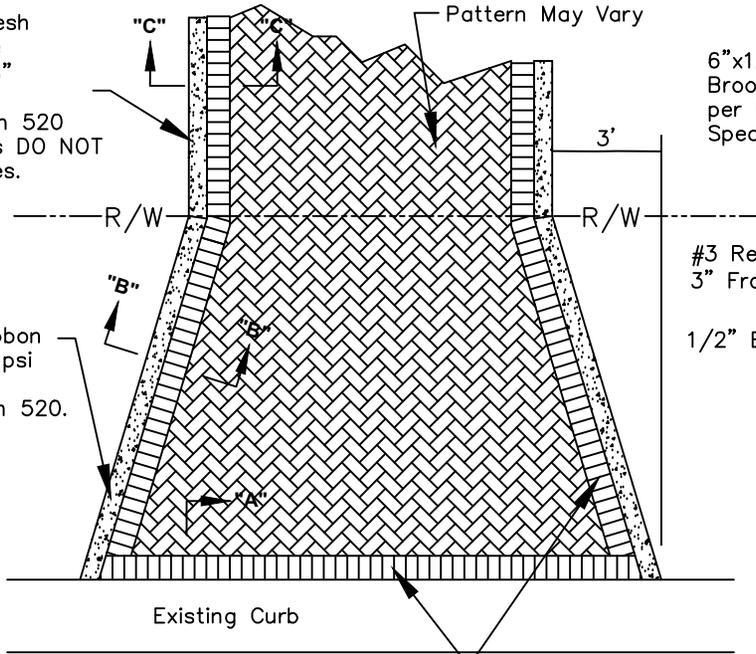
**NOTE:**  
 3,000 p.s.i. CONCRETE SPECIFIED

SECTION

					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	STREETS AND ROADS	DATE
						TYPE D CURB	2/07
1	4/13/2011	Added No Utility Lines Note	SIBE			DRIVEWAY CONSTRUCTION	SHEET NO.
REV.	DATE	DESCRIPTION	BY				SR-6A

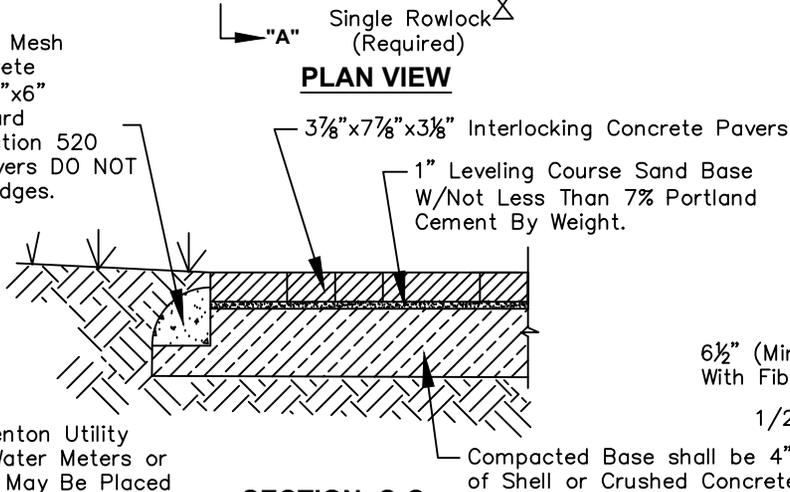
Subsurface Fiber Mesh Reinforced Concrete Curb Restraint 6"x6" per FDOT Standard Specification Section 520 Install Where Pavers DO NOT Abut Concrete Edges.

6"x12" Concrete Ribbon Broom Finish 3000 psi per FDOT Standard Specification Section 520.



**PLAN VIEW**

Subsurface Fiber Mesh Reinforced Concrete Curb Restraint 6"x6" per FDOT Standard Specification Section 520 Install Where Pavers DO NOT Abut Concrete Edges.



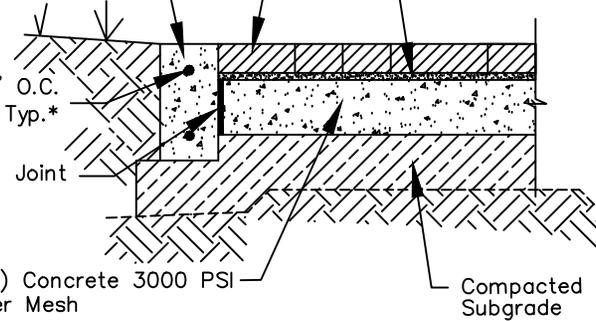
**SECTION C-C**  
OUTSIDE OF RIGHT-OF-WAY ONLY

6"x12" Concrete Ribbon Broom Finish 3000 psi per FDOT Standard Specification Section 520.

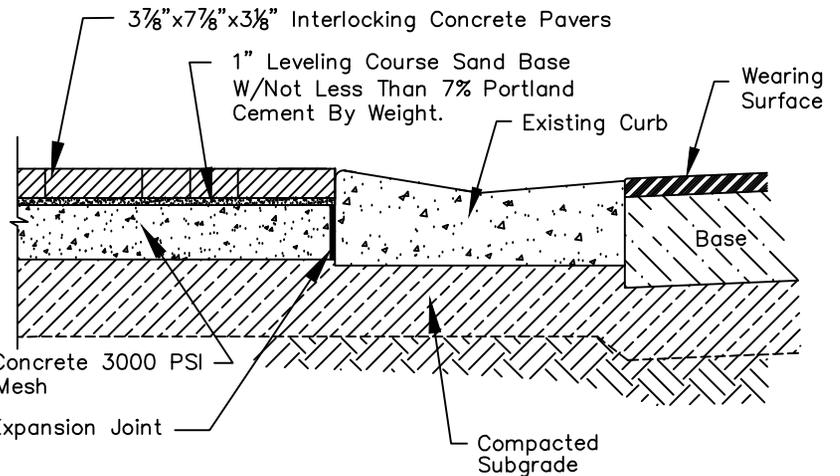
#3 Rebar @ 9" O.C. 3" From Edge Typ.\*  
1/2" Expansion Joint

6 1/2" (Min) Concrete 3000 PSI With Fiber Mesh

3 7/8" x 7 7/8" x 3 1/8" Interlocking Concrete Pavers  
1" Leveling Course Sand Base W/Not Less Than 7% Portland Cement By Weight.



**SECTION B-B**  
REQUIRED INSIDE OF RIGHT-OF-WAY



**SECTION A-A**

**NOTE:**  
No City of Bradenton Utility Lines Including Water Meters or Sewer Cleanouts May Be Placed In The Driveway.

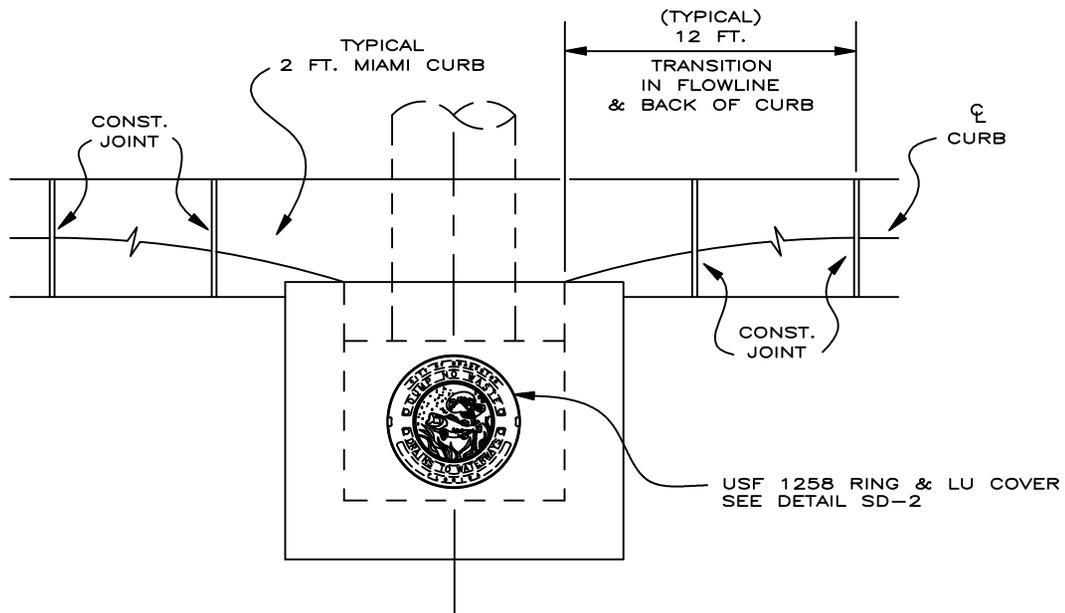
\* 3,000 p.s.i. Concrete With Fiber Mesh May Be Used In Lieu Of Rebar

REV.	DATE	DESCRIPTION	BY
2	5/31/2011	Private Side Base Material	SIBE
1	4/13/2011	Added No Utility Lines Note	SIBE



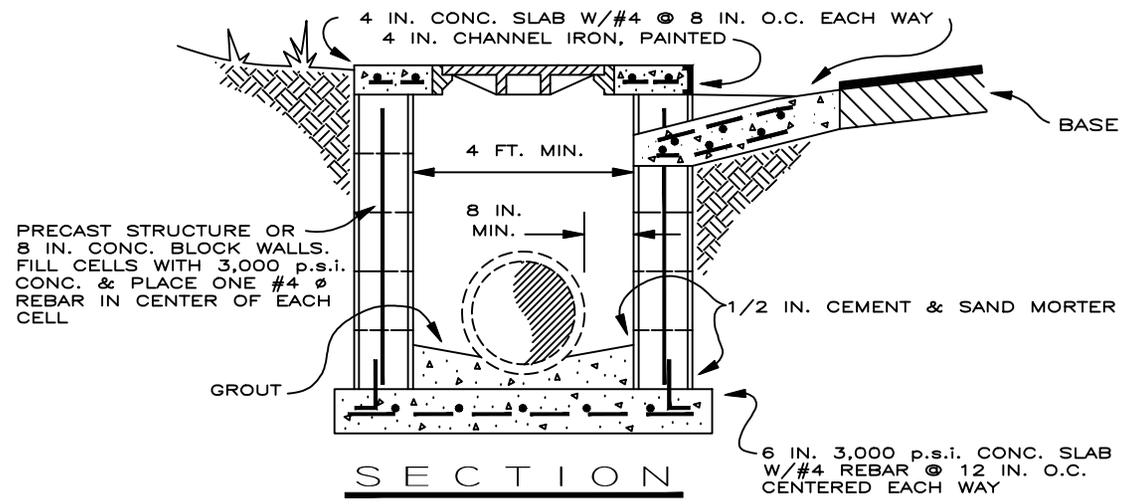
CITY OF BRADENTON, FLORIDA  
PUBLIC WORKS AND UTILITIES  
DEPARTMENT OF ENGINEERING

STREETS AND ROADS	DATE
BRICK PAVER	11/09
DRIVEWAY CONSTRUCTION	SHEET NO.
	SR-7



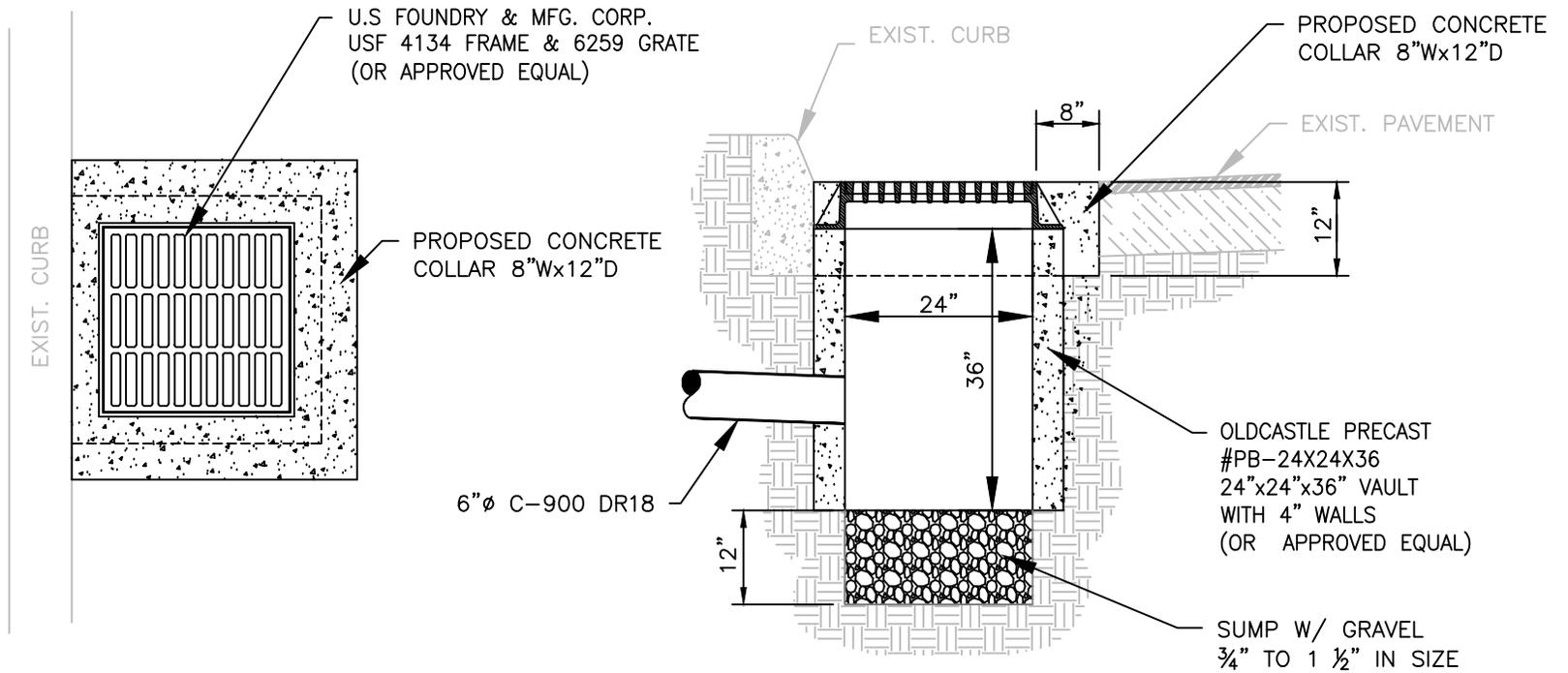
PLAN VIEW

MANHOLE - USF - 1258 OR APPROVED EQUAL



SECTION

					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	STORM DRAINAGE	DATE	
								2/07
REV.	DATE	DESCRIPTION	BY					SHEET NO.
								SD-1

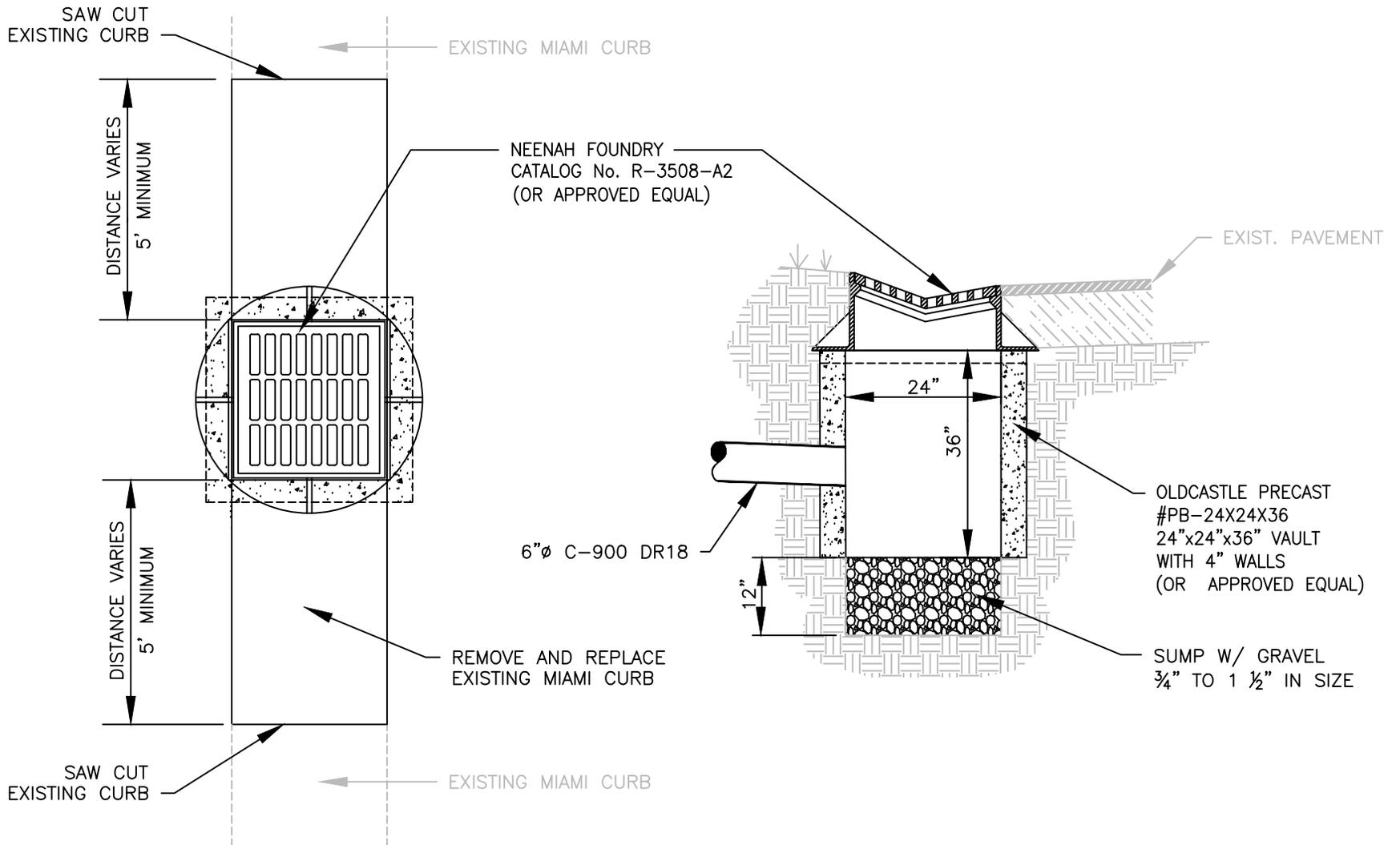


PLAN

SECTION

BUBBLER BOX WITH TYPE-D CURB  
N.T.S.

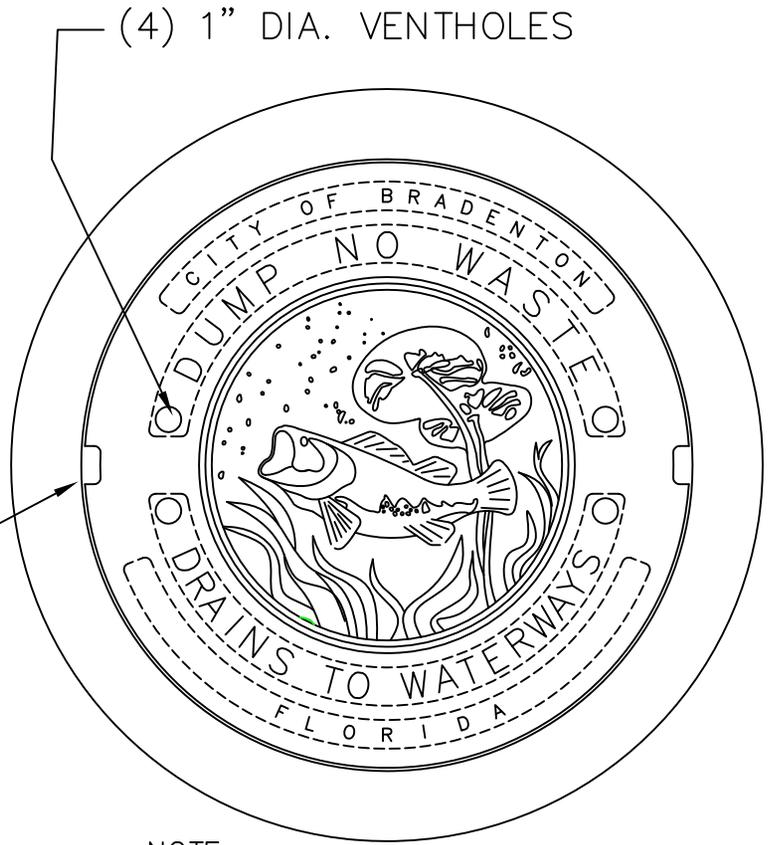
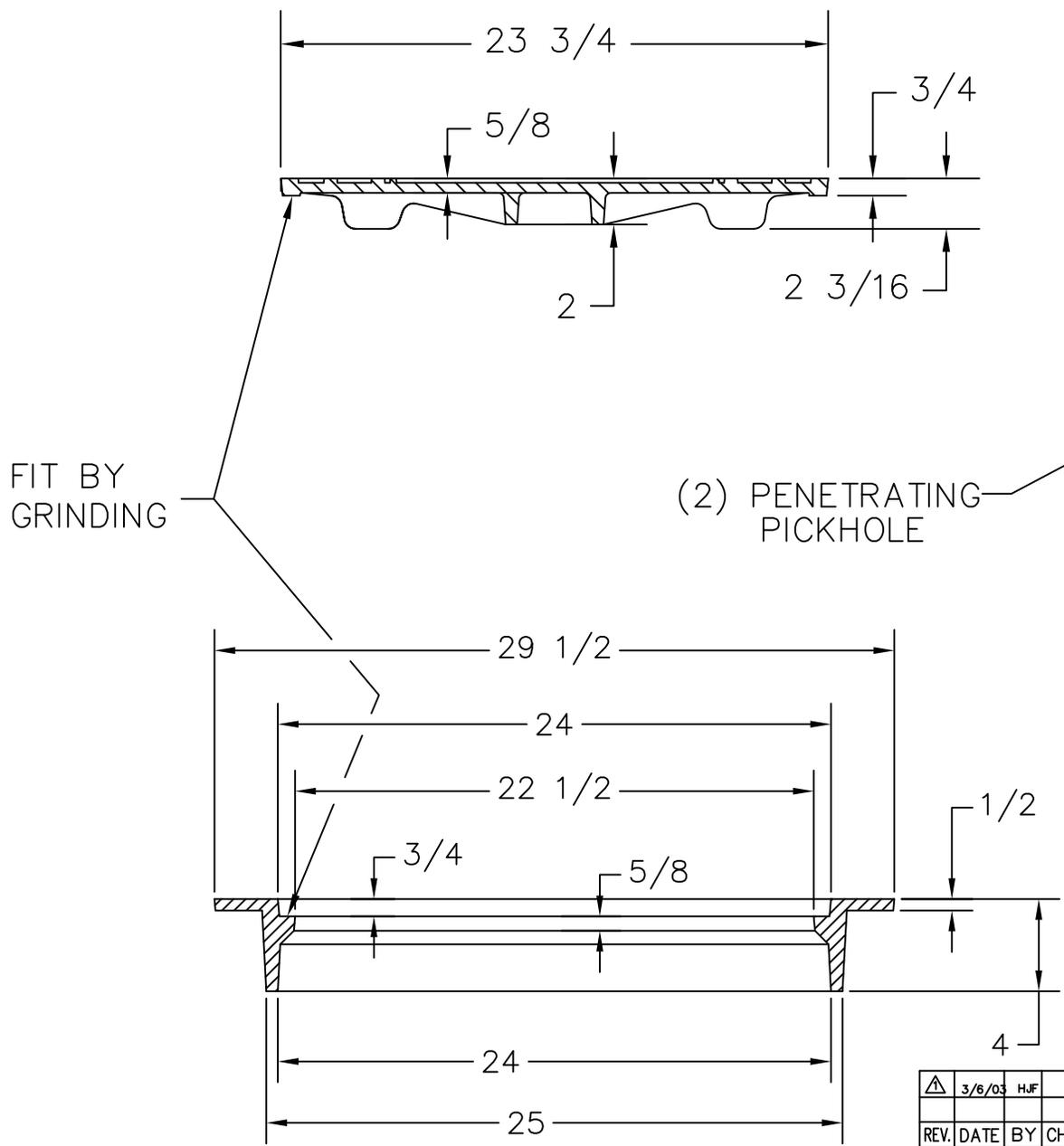
					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	STORM DRAINAGE	DATE
						BUBBLER BOX	4/10
REV.	DATE	DESCRIPTION	BY			WITH TYPE-D CURB	SHEET NO.
							SD-1A



# BUBBLER BOX WITH MIAMI CURB

N.T.S.

					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	STORM DRAINAGE	DATE
						BUBBLER BOX	4/10
REV.	DATE	DESCRIPTION	BY			WITH MIAMI CURB	SHEET NO.
							SD-1B



- NOTE:**
- 1- MATERIAL; ASTM A48 CLASS 35B GRAY IRON
  - 2- COVER WEIGHT: 66 LBS APP.  $\triangle$
  - 3- RING WEIGHT: 75 LBS APP.

**U.S. FOUNDRY & MFG. CORP.**  
 MEDLEY, FLORIDA

USF 1258 RING & LU COVER

REV. $\triangle$	DATE 3/6/03	BY HJF	CHANGE APP. WEIGHT 80 LB TO ACTUAL 66 LB	DWN. BY: ULS	SCALE: 1/8"=1"	DATE: 03/28/03
REV.	DATE	BY	CHK.	DESCRIPTION	CHK. BY:	DWG. NO: A6131

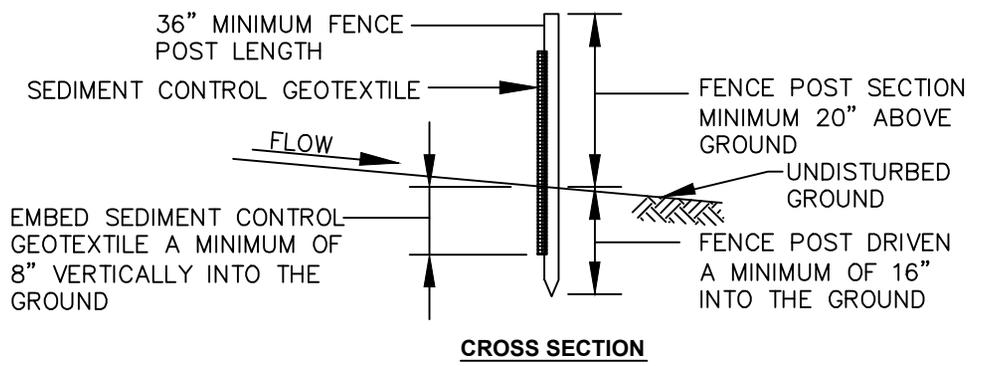
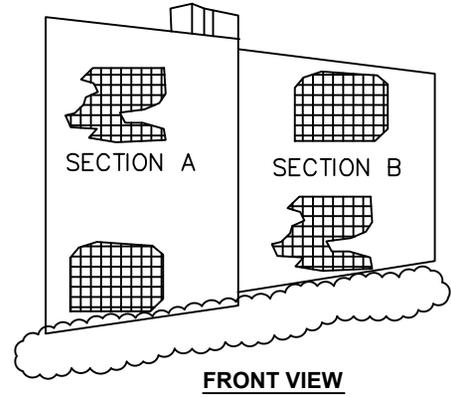
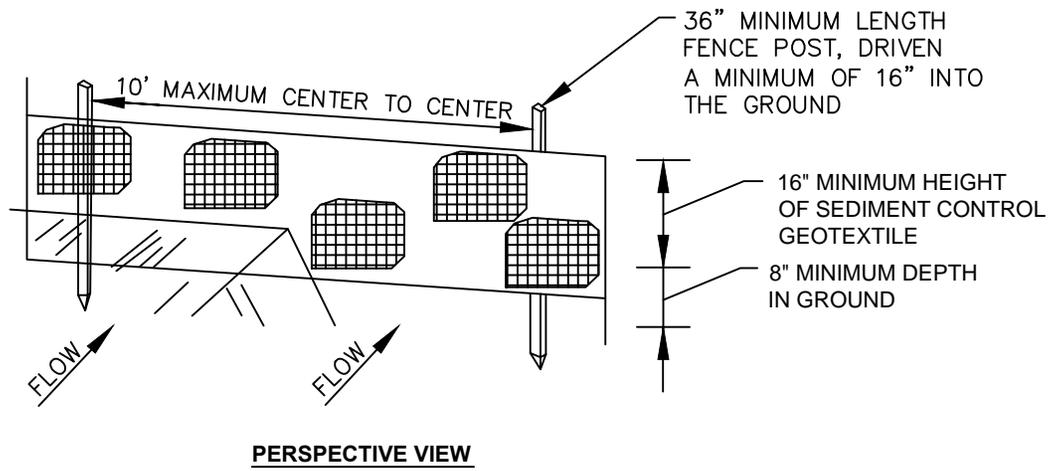
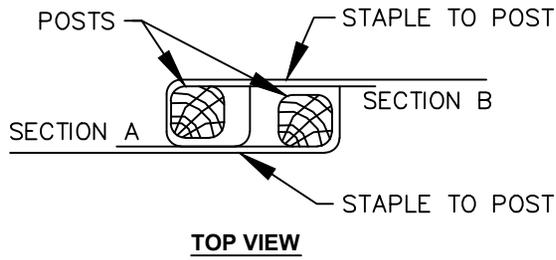
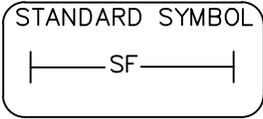
QUOTE #1309

REV.	DATE	DESCRIPTION	BY



**CITY OF BRADENTON, FLORIDA**  
**PUBLIC WORKS AND UTILITIES**  
**DEPARTMENT OF ENGINEERING**

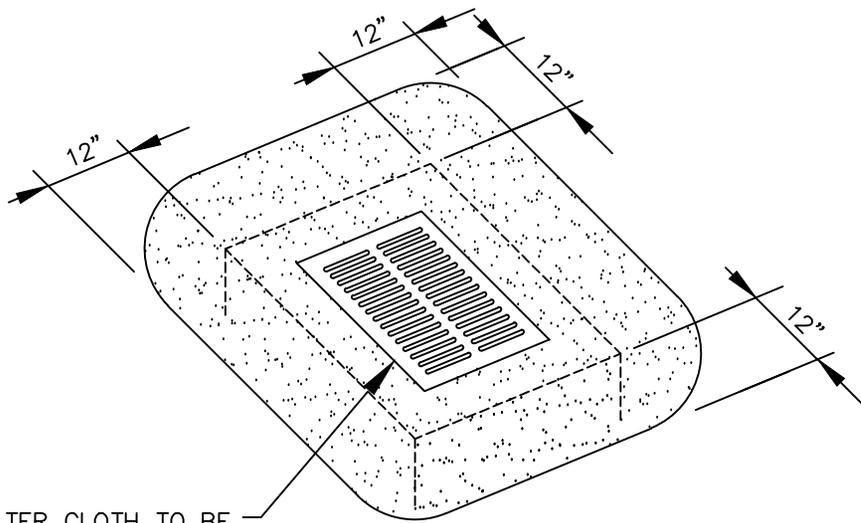
STORM DRAINAGE	DATE 2/07
RING AND COVER	SHEET NO. <b>SD-2</b>



**JOINING TWO ADJACENT SILT FENCE SECTIONS**

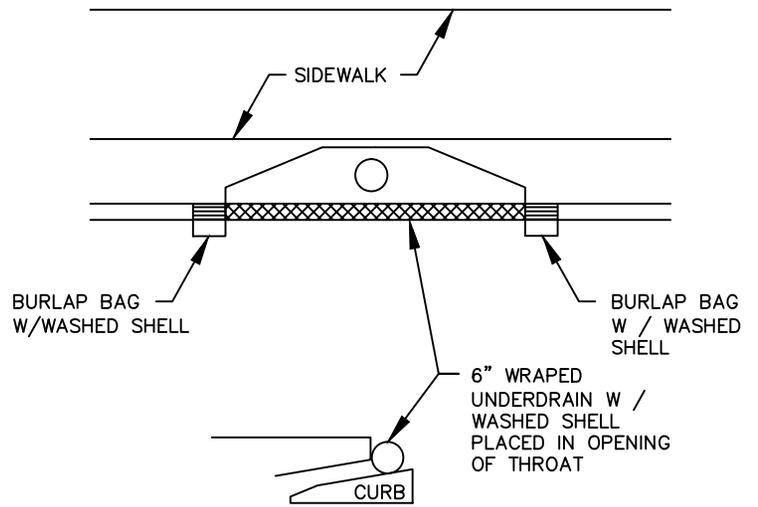
**SILT FENCE**

					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	STREETS AND ROADS	DATE
						SILT FENCE	2/08
REV.	DATE	DESCRIPTION	BY				SHEET NO.
2	7-2013	MOVED CURB INLET TO SD-3A	SIBE		SD-3		
1	8-2012	ADDED CURB INLET	SIBE				



FILTER CLOTH TO BE PLACED UNDER INLET GRATE DURING SITE WORK CONSTRUCTION

INLET GRATE



CURB INLET

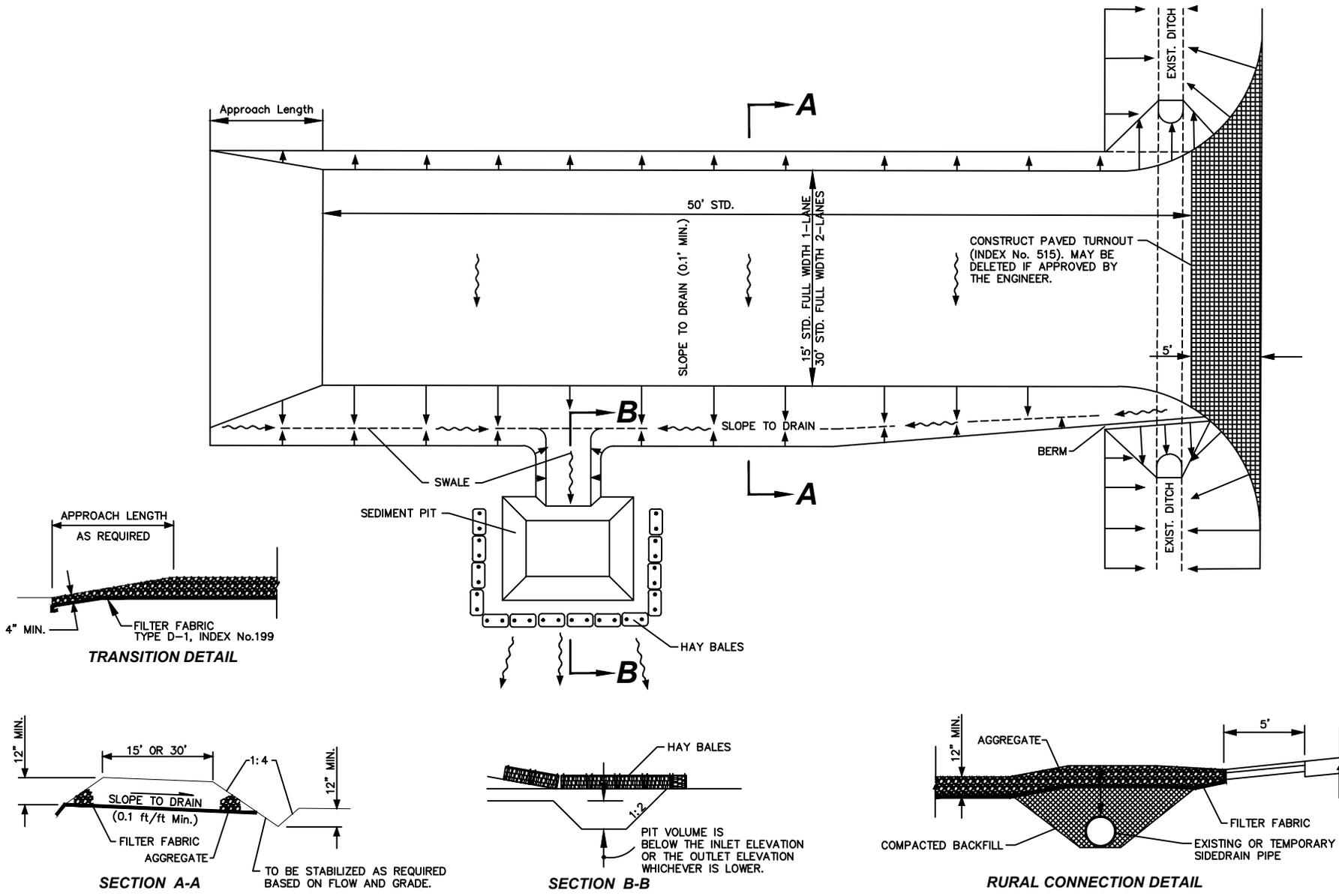
REV.	DATE	DESCRIPTION	BY



CITY OF BRADENTON, FLORIDA  
PUBLIC WORKS AND UTILITIES  
DEPARTMENT OF ENGINEERING

STREETS AND ROADS  
CURB INLET  
AND INLET GRATE  
EROSION CONTROL

DATE  
7/2013  
SHEET NO.  
SD-3A

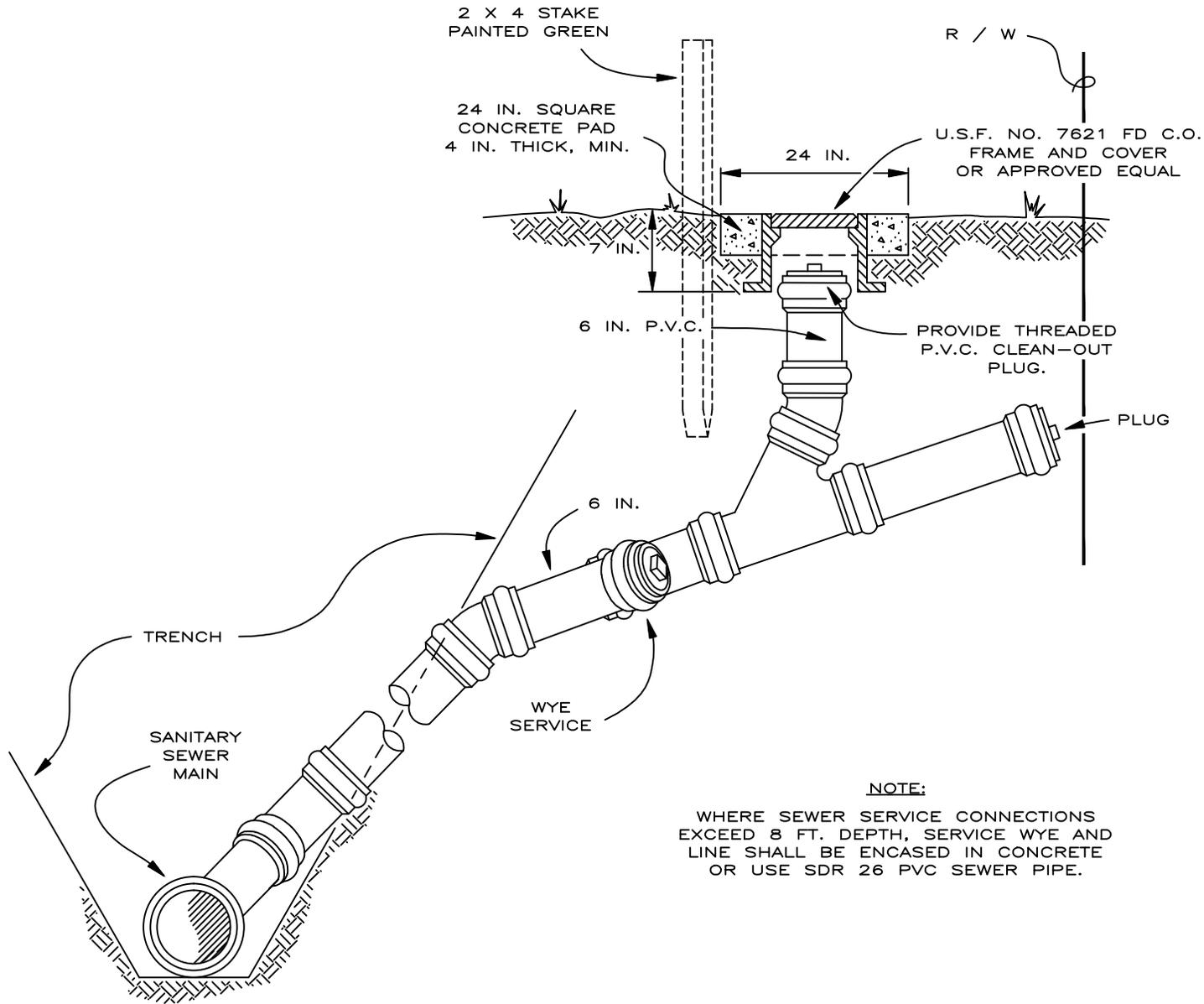


REV.	DATE	DESCRIPTION	BY



CITY OF BRADENTON, FLORIDA  
 PUBLIC WORKS AND UTILITIES  
 DEPARTMENT OF ENGINEERING

STREETS AND ROADS	DATE
SOIL TRACKING	7/2010
PREVENTION DEVICE	SHEET NO.
	<b>SD-4</b>



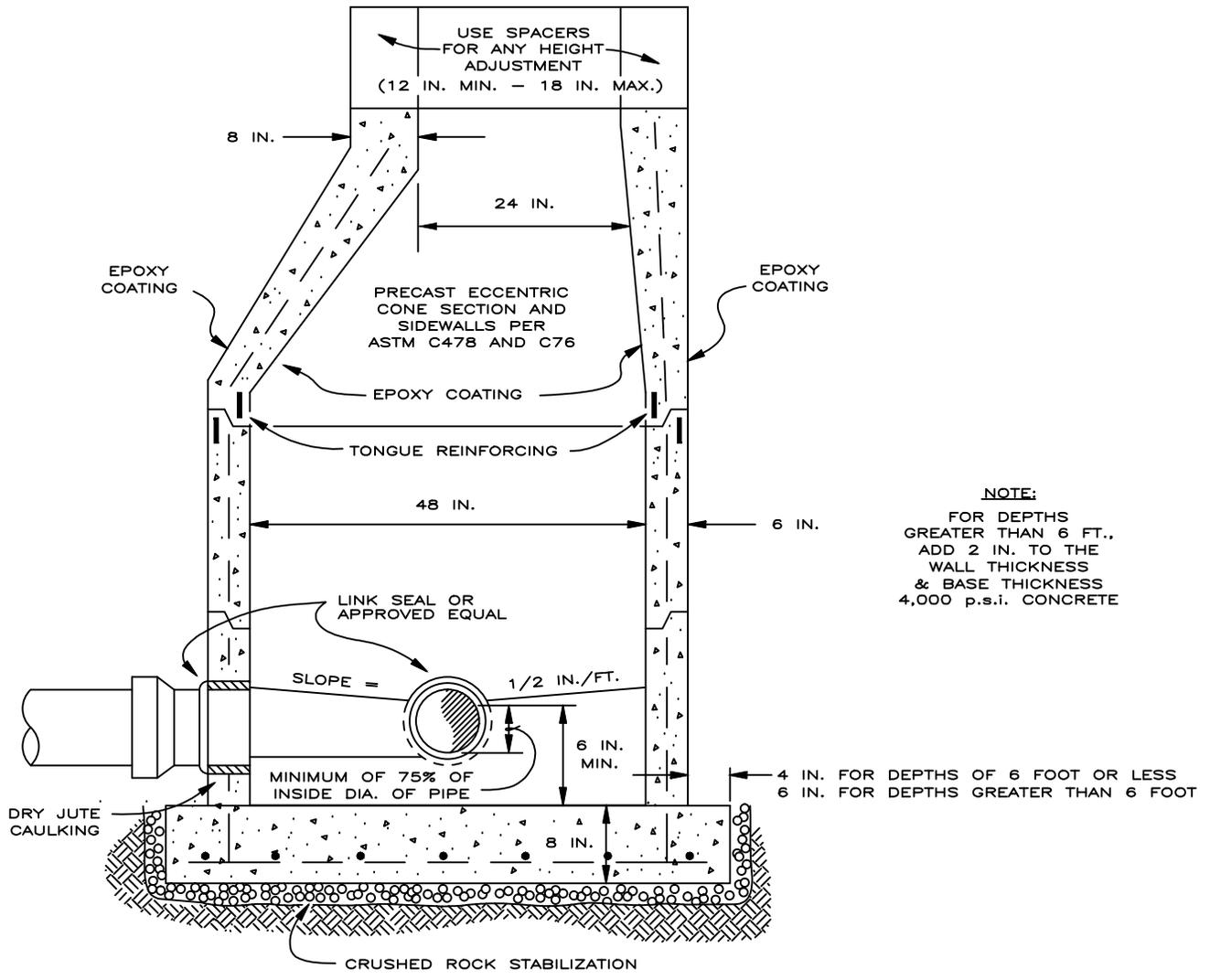
**NOTE:**  
 WHERE SEWER SERVICE CONNECTIONS EXCEED 8 FT. DEPTH, SERVICE WYE AND LINE SHALL BE ENCASED IN CONCRETE OR USE SDR 26 PVC SEWER PIPE.

REV.	DATE	DESCRIPTION	BY



CITY OF BRADENTON, FLORIDA  
 PUBLIC WORKS AND UTILITIES  
 DEPARTMENT OF ENGINEERING

SANITARY SEWER	DATE
SERVICE LINE	2/07
CLEAN-OUT INSTALLATION	SHEET NO.
	SS-1



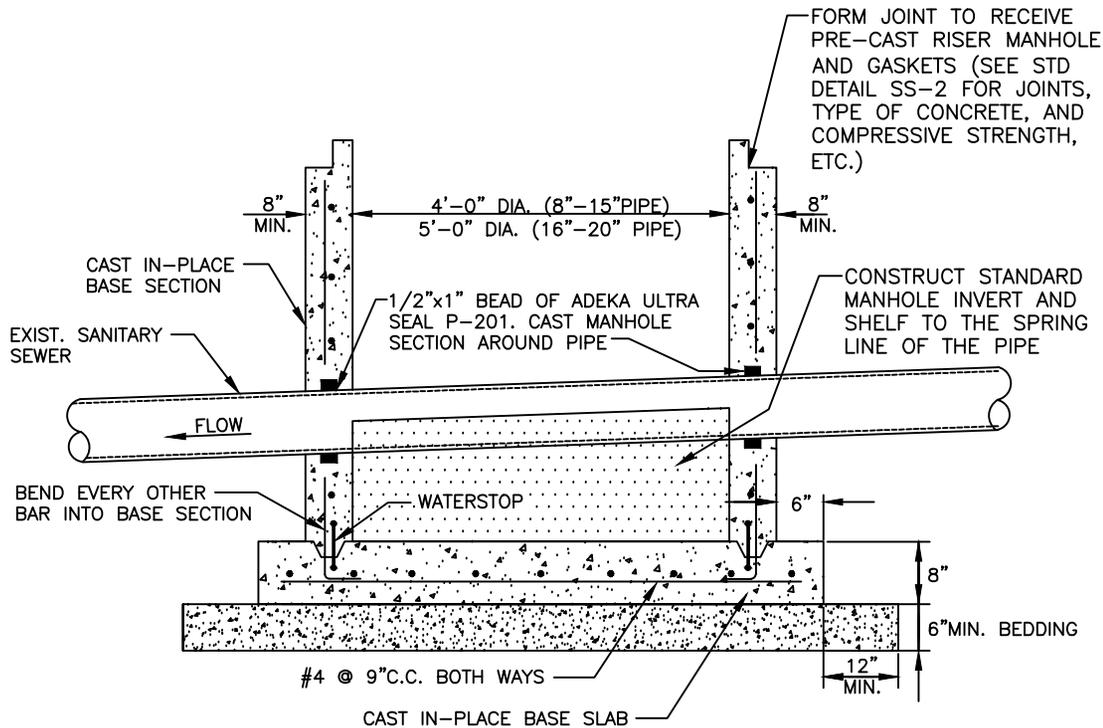
**NOTE:**  
 FOR DEPTHS  
 GREATER THAN 6 FT.,  
 ADD 2 IN. TO THE  
 WALL THICKNESS  
 & BASE THICKNESS  
 4,000 p.s.i. CONCRETE

REV.	DATE	DESCRIPTION	BY
1	7/2013	ADDED SPACER AND LINK SEAL	SIBE



CITY OF BRADENTON, FLORIDA  
 PUBLIC WORKS AND UTILITIES  
 DEPARTMENT OF ENGINEERING

SANITARY SEWER	DATE
PRECAST MANHOLE	2/07
	SHEET NO.
	SS-2



**NOTES:**

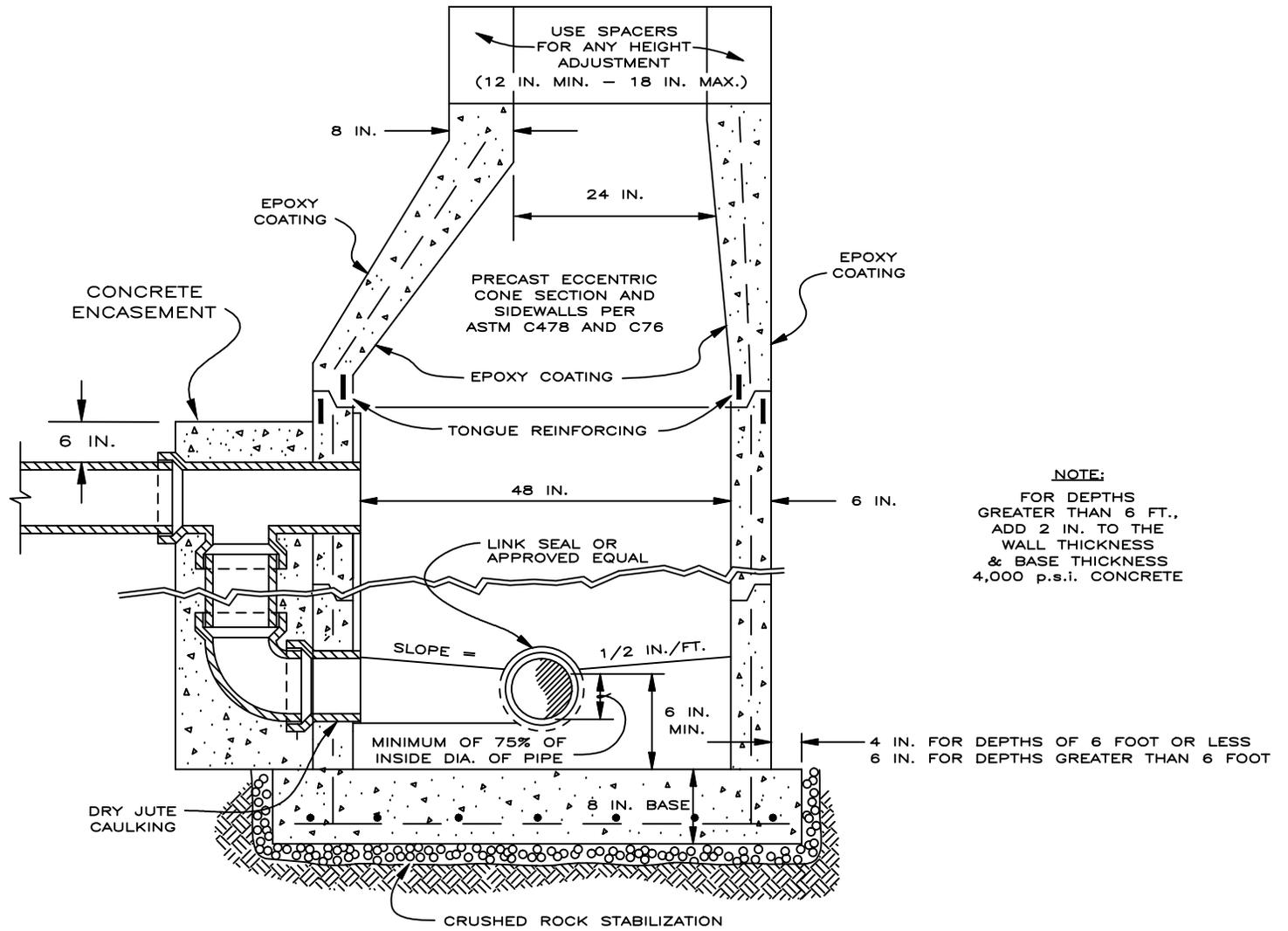
1. THE CONTRACTOR SHALL CAREFULLY EXCAVATE AROUND AND PROPERLY SUPPORT THE EXISTING PIPE.
2. PREFERRED CONSTRUCTION IS BY "CUTTING-IN" A STANDARD SANITARY SEWER MANHOLE WITH A TEMPORARY FLOW BY-PASS SYSTEM.
3. SEWER LINES GREATER THAN 20" REQUIRE SPECIAL DESIGN AND APPROVAL BY CITY OF BRADENTON ENGINEERING.
4. ALLOW SUFFICIENT CURING TIME, 24-36 HOURS, FOR THE ADEKA ULTRA-SEAL P-201, BEFORE POURING CONCRETE.
5. FOLLOWING SATISFACTORY CURING OF THE INVERT CHANNEL AND SHELF, THE CONTRACTOR SHALL CUT AND REMOVE THE TOP HALF OF THE EXISTING PIPE WITHIN THE MANHOLE, TAKING CARE NOT TO ALLOW ANY PIECES TO BE WASHED DOWN STREAM IN THE PIPE. CUTTING OF THE PIPE SHALL BE IN A WORKMAN LIKE MANNER, PROVIDING A SMOOTH AND EVEN FINISHED PRODUCT.
6. THERE SHALL BE NO VISIBLE LEAKS IN THE MANHOLE.

REV.	DATE	DESCRIPTION	BY



CITY OF BRADENTON, FLORIDA  
PUBLIC WORKS AND UTILITIES  
DEPARTMENT OF ENGINEERING

SANITARY SEWER	DATE
PRECAST MANHOLE	2/07
CONSTRUCTED OVER	SHEET NO.
EXISTING SEWER LINE	SS-2A



**NOTE:**  
FOR DEPTHS GREATER THAN 6 FT., ADD 2 IN. TO THE WALL THICKNESS & BASE THICKNESS 4,000 p.s.i. CONCRETE

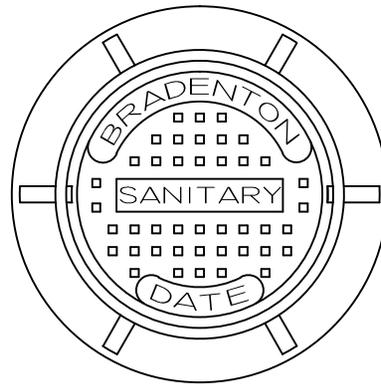
**NOTE:**  
FOR PIPES LARGER THAN 12 IN., INCREASE BASE THICKNESS TO 10 IN.

REV.	DATE	DESCRIPTION	BY
1	7/2013	ADDED SPACER AND LINK SEAL	SIBE



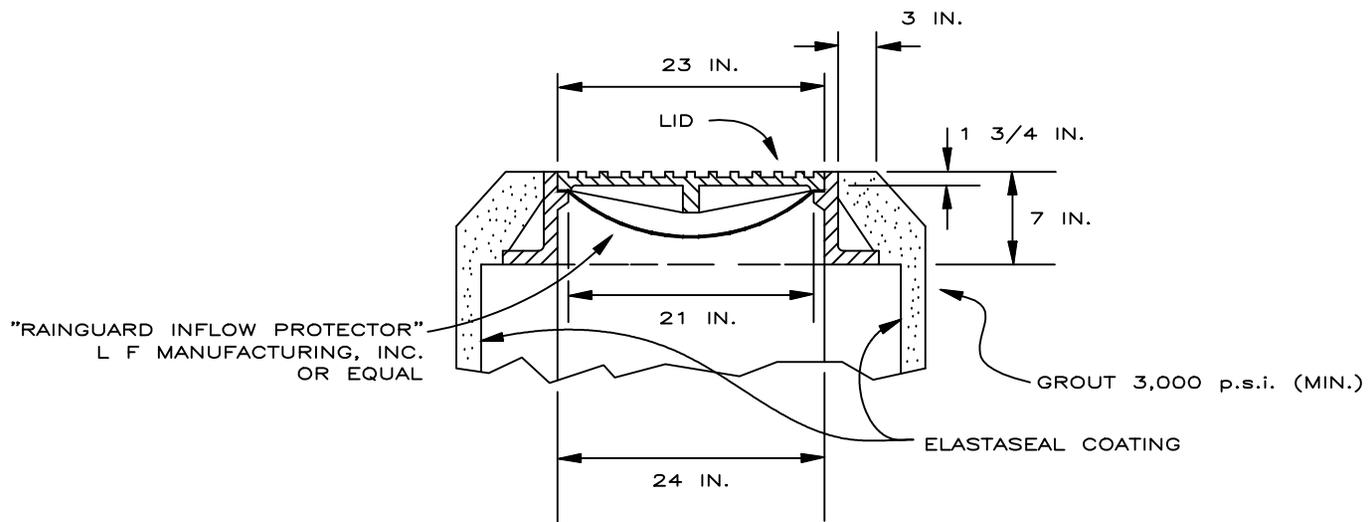
CITY OF BRADENTON, FLORIDA  
PUBLIC WORKS AND UTILITIES  
DEPARTMENT OF ENGINEERING

SANITARY SEWER	DATE
	2/07
PRECAST DROP MANHOLE	SHEET NO.
	SS-3



USF 420 No.32 TYPE "G"  
RING AND COVER

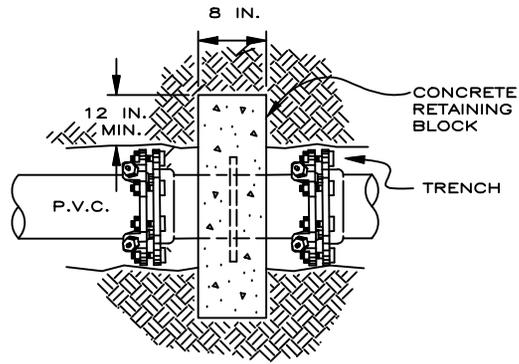
PLAN VIEW



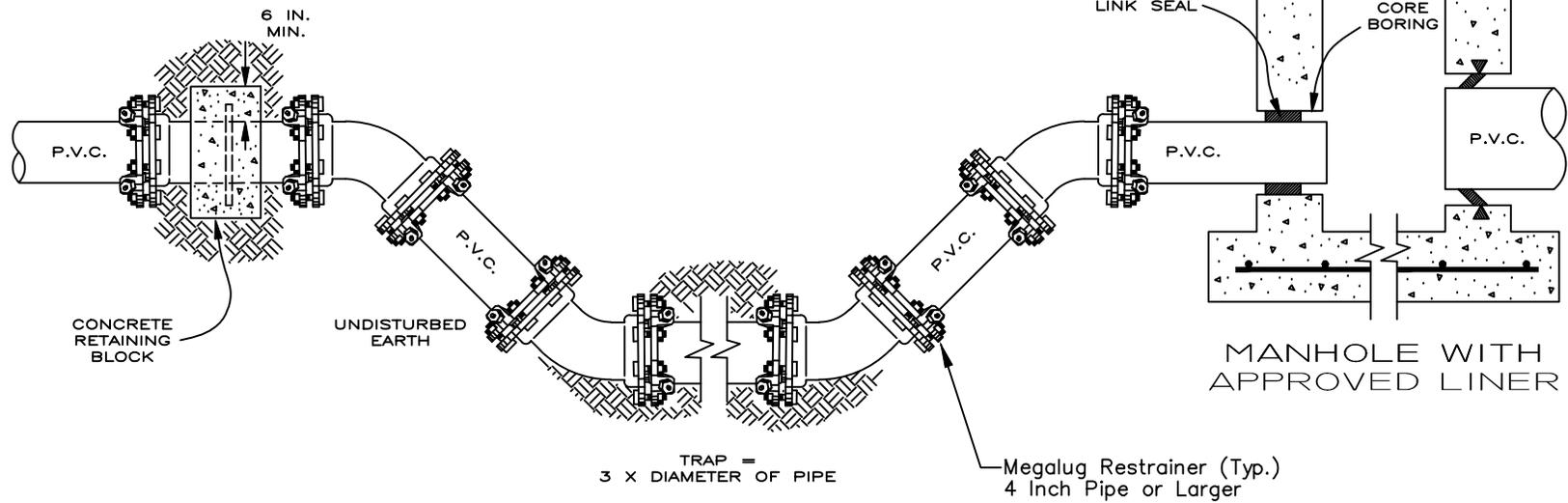
U.S.F. DRAWING NO. 32, TYPE "G"

SECTION

					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	SANITARY SEWER	DATE
						FRAME AND COVER	2/07
1	7/2013	ADDED RING AND COVER INFO	SIBE				SHEET NO.
REV.	DATE	DESCRIPTION	BY				SS-4



PLAN VIEW



PROFILE

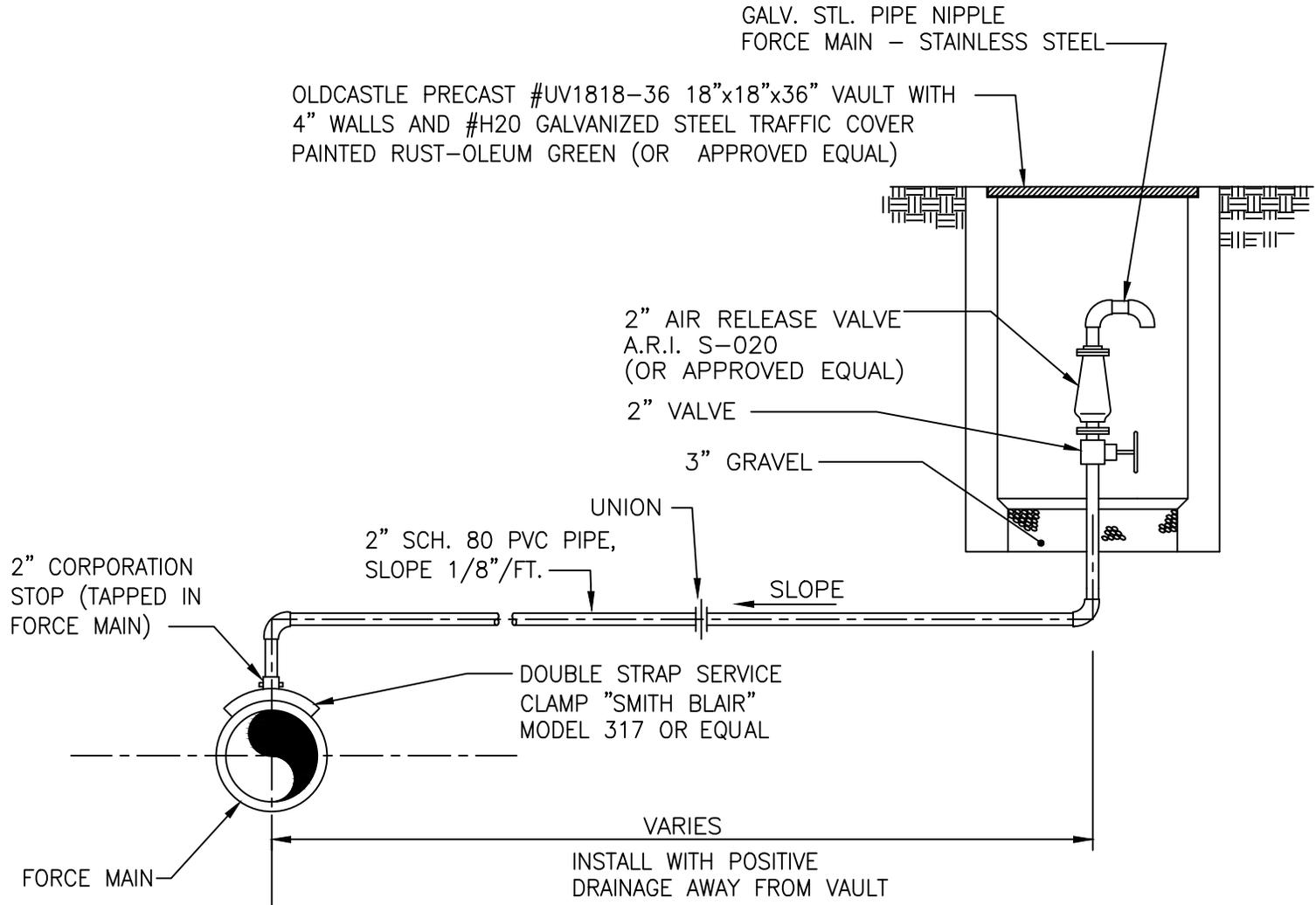
FORCE MAIN CONNECTION TO MANHOLE

REV.	DATE	DESCRIPTION	BY
1	7/2013	REMOVED ALL REFERENCE TO D.I.	SIBE



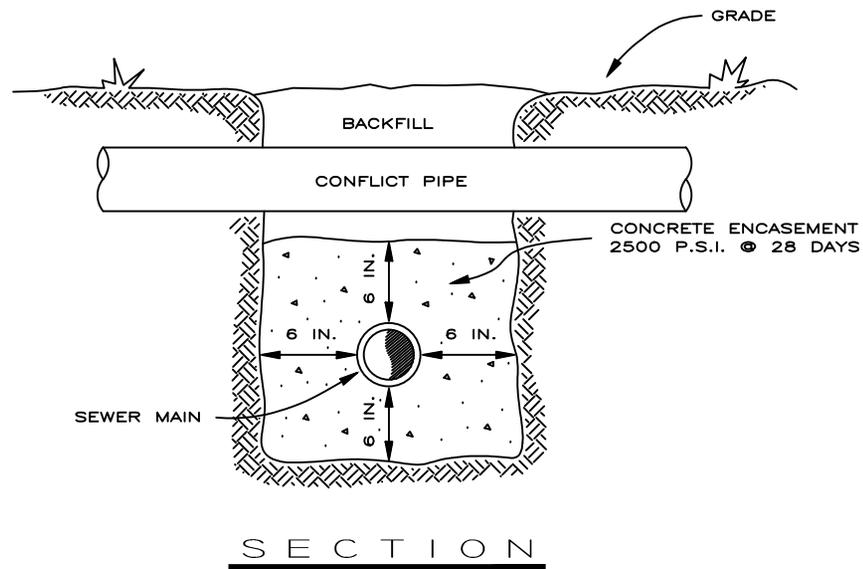
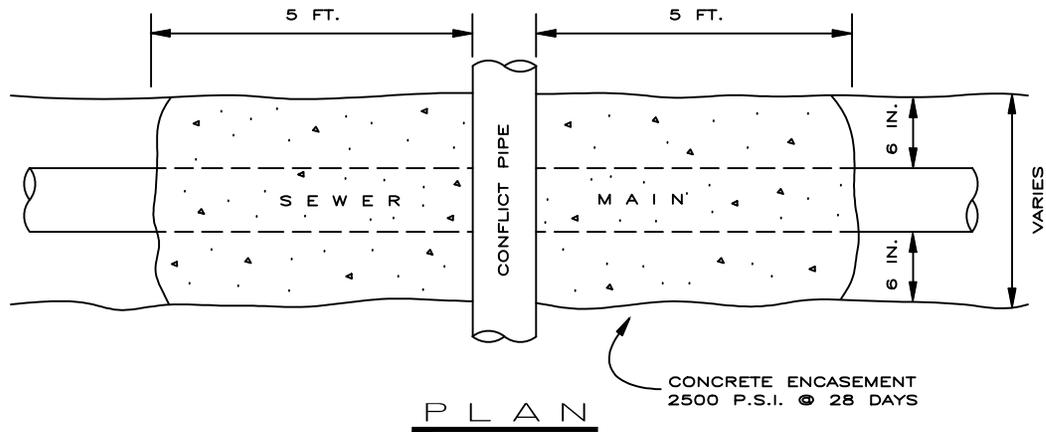
CITY OF BRADENTON, FLORIDA  
PUBLIC WORKS AND UTILITIES  
DEPARTMENT OF ENGINEERING

SANITARY SEWER		DATE
FORCE MAIN CONNECTION TO MANHOLE		2/07
		SHEET NO. <b>SS-5</b>



SEWER FORCE MAIN AIR RELEASE VALVE  
N.T.S.

					CITY OF BRADENTON, FLORIDA		SANITARY SEWER		DATE
					PUBLIC WORKS AND UTILITIES		FORCE MAIN		1/08
REV.	DATE	DESCRIPTION	BY	DEPARTMENT OF ENGINEERING		AIR RELEASE VALVE		SHEET NO.	SS-6

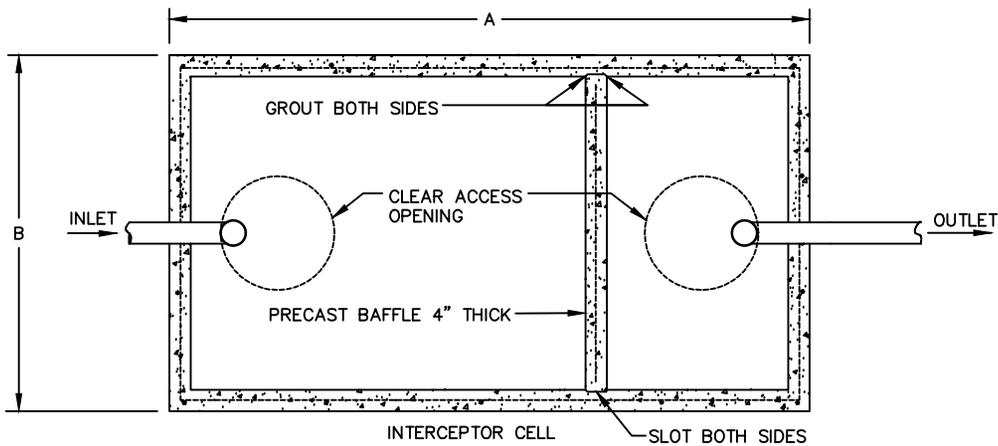


**NOTE:**

WHERE SANITARY SEWER AND WATER MAINS CROSS WITH LESS THAN 18 IN. VERTICAL CLEARANCE, THE SEWER MAIN WILL BE ENCASED IN CONCRETE A DISTANCE OF 5 FT. ON EACH SIDE OF THE POINT OF INTERSECTION. THIS ALSO APPLIES WHEN SANITARY SEWERS CROSS STORM DRAINS.

TYPICAL CONCRETE ENCASEMENT

					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	SANITARY SEWER	DATE 2/07
REV.	DATE	DESCRIPTION	BY			TYPICAL CONCRETE ENCASEMENT	SHEET NO. <b>SS-7</b>



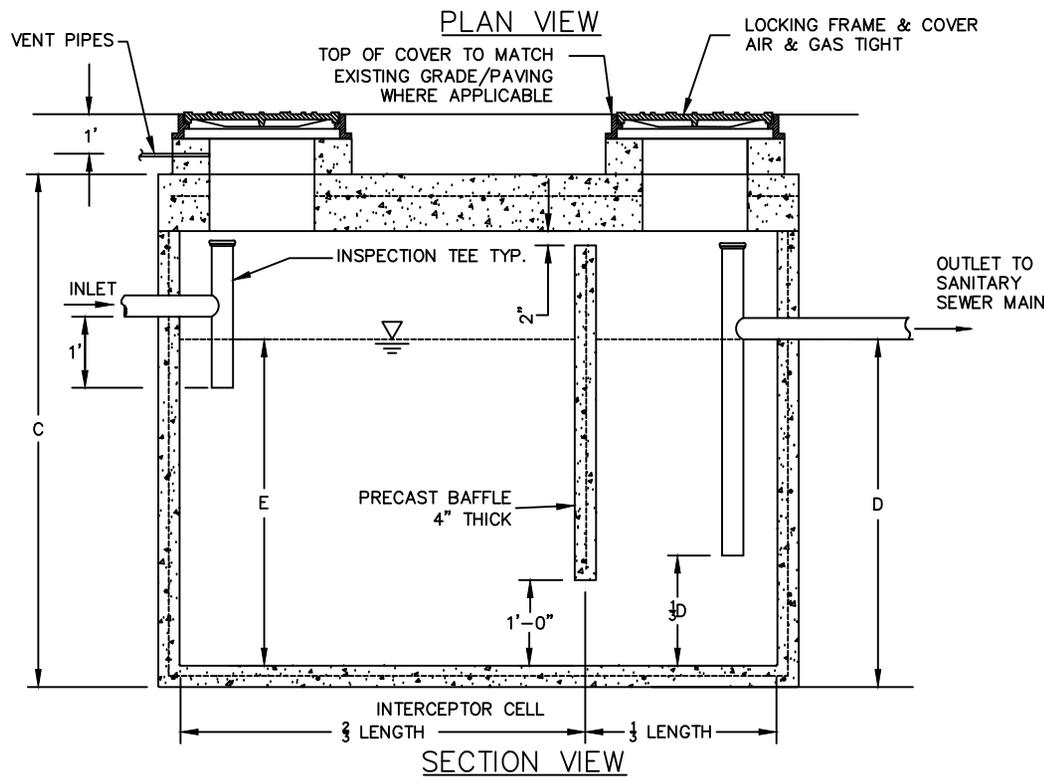
GALLON CAPACITY	A	B	C	D	E
750	7'-0"	4'-8"	7'-0"	4'-3"	3'-11"
1000	9'-0"	5'-0"	7'-2"	4'-2"	3'-10"
1250	9'-0"	5'-0"	7'-2"	5'-2"	4'-10"

General Notes:

1. The interceptor system may consist of multiple interceptor cells, if required greater than 1250 gallon capacity.
2. Concrete wall coating taking into consideration the water-oil mix.
3. Contractor to supply & install all piping and sanitary tee's, clean-outs for cleaning toward and away from interceptor (alternate dual sweep clean-outs).
4. Contractor shall assure 2,500 PSI minimum soil bearing capacity @ bedding elevation.

NOTES:

1. Concrete: 4500psi @ 28 day.
2. Rebar: ASTM A615 Grade 60.
3. Mesh: ASTM A815 Grade 65.
4. Design: ACI3 18-83 Building Code  
ASTM C857 Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
5. Loads: H-20 truck wheels w/30% impact per AASHTO.
6. Fill w/clean water prior to start up of system.
7. Gray water only, black water shall be carried by separate sewer.

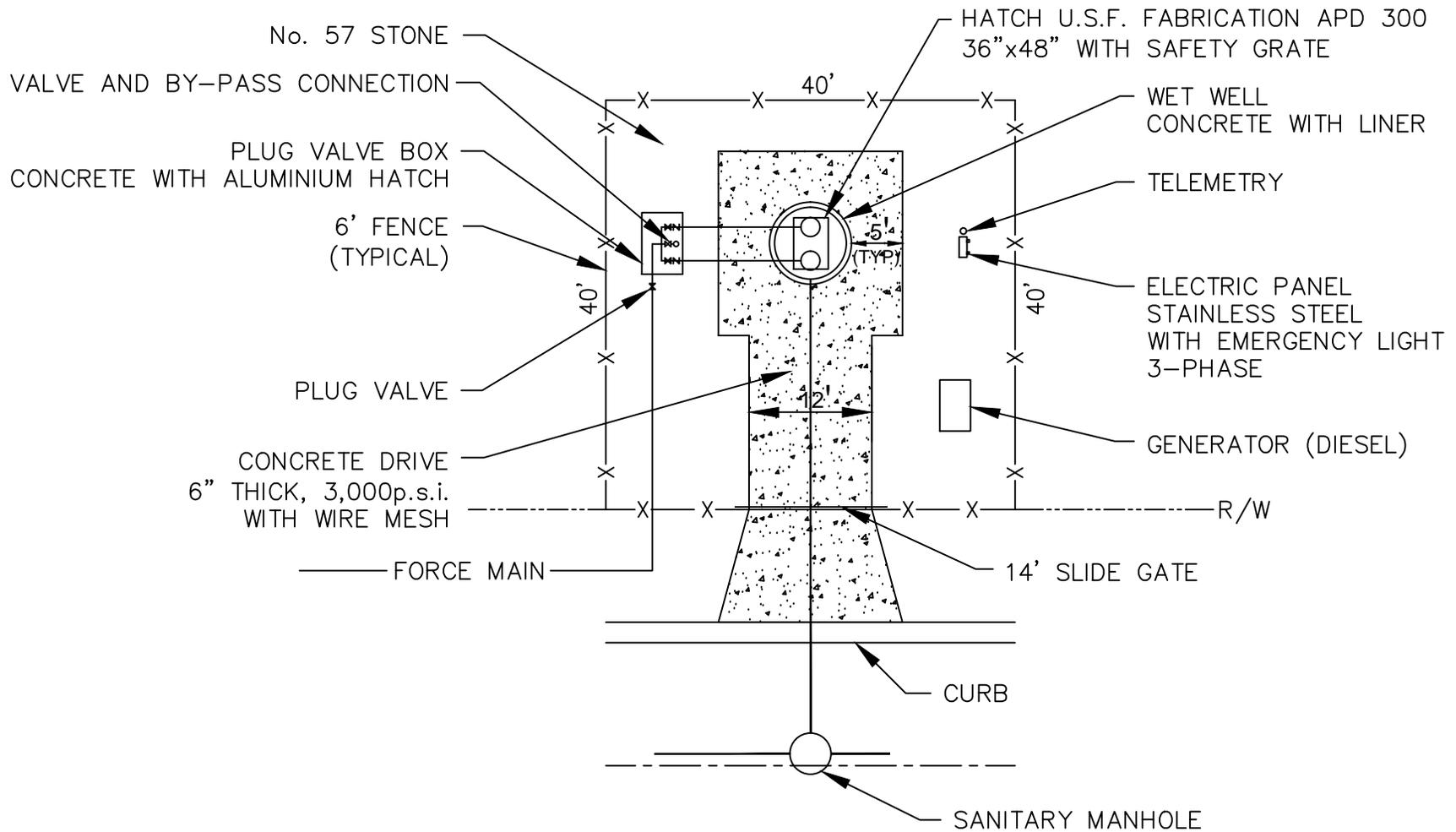


REV.	DATE	DESCRIPTION	BY



CITY OF BRADENTON, FLORIDA  
PUBLIC WORKS  
DEPARTMENT OF ENGINEERING

SANITARY SEWER	DATE
GREASE INTERCEPTOR	12/10
750-1250 GALLON	SHEET NO.
	SS-8



TYPICAL LIFT STATION SITE PLAN  
 N.T.S.

					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	SANITARY SEWER	DATE
						LIFT STATION	1/08
1	AUG, 2012	CHANGED HATCH SIZE	SIBE			SITE PLAN	SHEET NO.
REV.	DATE	DESCRIPTION	BY				SS-9

# LIFT STATIONS ELECTRICAL

## SPECIFICATIONS:

1) STAINLESS STEEL ELECTRICAL CONTROL CABINET WITH HASP FOR PADLOCK. MINIMUM DIMENSIONS SHALL BE NO LESS THAN 24" x 30" x 8".

2) THREE-PHASE POWER SHALL BE SUPPLIED UNLESS OTHERWISE APPROVED.

3) LIGHTNING ARRESTOR SHALL BE INSTALLED INSIDE MAIN DISCONNECT. A PHASE MONITOR WITH CONTACTS TO INTERRUPT CONTROL CIRCUIT SHALL BE INSTALLED IN CABINET.

4) A MANUAL TRANSFER SWITCH FOR EMERGENCY POWER SHALL BE INCLUDED. CONSISTING OF EITHER TWO MAIN BREAKERS MECHANICALLY INTERLOCKED SO ONLY ONE CAN BE ENERGISED AT A TIME OR A DOUBLE THROW SWITCH RATED FOR STATION'S SERVICE.

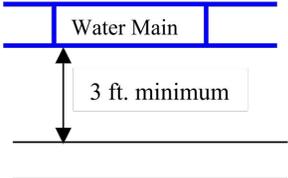
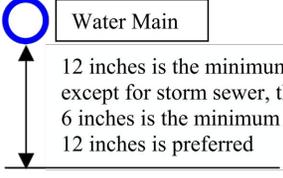
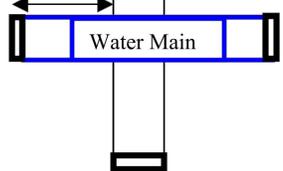
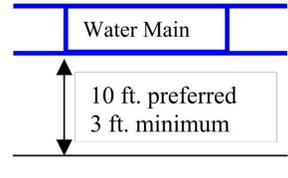
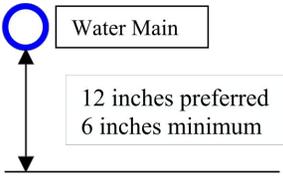
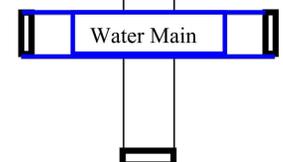
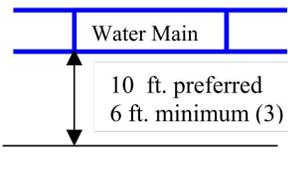
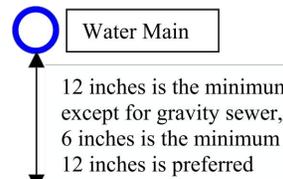
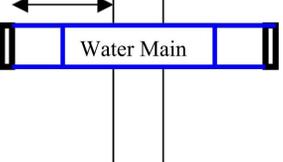
5) ALL ELECTRICAL WORK SHALL COMPLY WITH MOST RECENT NATIONAL ELECTRICAL CODE.

6) A GROUND FAULT INTERRUPTER RECEPTACLE SHALL BE MOUNTED INSIDE CABINET. NEMA STANDARD STARTERS SHALL BE USED, NO IEC TYPE STARTERS. A HIGH LEVEL OR STATION MALFUNCTION VISUAL ALARM SHALL CONSIST OF A RED GLASS GLOBE MOUNTED OUTSIDE OF THE CABINET, NOT ON THE TOP OF CABINET. THERE SHALL BE NO PENETRATIONS OF THE TOP OF THE CABINET.

7) THE LEVEL CONTROLS SHALL BE US FILTERS MODEL D152, 10' RANGE DIGITAL CONTROLLER FOR TWO PUMPS, USING A 10' RANGE BUBBLER TYPE TRANSDUCER THAT IS PANEL MOUNTED AND PRESSURIZED BY A COMPRESSOR NOT EXCEEDING 15 psi. IN ADDITION TO THE D152 CONTROLLER SHALL BE HAND-OFF-AUTOMATIC SWITCH, PILOT LIGHT AND ELAPSED TIME METER FOR EACH PUMP.

					<b>CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING</b>	ELECTRICAL DEPARTMENT	DATE
						LIFT STATIONS	7/2013
1	7/2013	CHANGED SHEET NUMBER	SIBE			ELECTRICAL	SHEET NO.
REV.	DATE	DESCRIPTION	BY			SPECIFICATIONS	<b>SS-9A</b>

## LOCATION OF PUBLIC WATER SYSTEM MAINS IN ACCORDANCE WITH F.A.C. RULE 62-555.314

Other Pipe	Horizontal Separation	Crossings (1)	Joint Spacing @ Crossings (Full Joint Centered)
<b>Storm Sewer, Stormwater Force Main, Reclaimed Water (2)</b>	 <p style="text-align: center;">Water Main 3 ft. minimum</p>	 <p style="text-align: center;">Water Main 12 inches is the minimum, except for storm sewer, then 6 inches is the minimum and 12 inches is preferred</p>	<p style="text-align: center;">Alternate 3 ft. minimum</p>  <p style="text-align: center;">Water Main</p>
<b>Vacuum Sanitary Sewer</b>	 <p style="text-align: center;">Water Main 10 ft. preferred 3 ft. minimum</p>	 <p style="text-align: center;">Water Main 12 inches preferred 6 inches minimum</p>	<p style="text-align: center;">Alternate 3 ft. minimum</p>  <p style="text-align: center;">Water Main</p>
<b>Gravity or Pressure Sanitary Sewer, Sanitary Sewer Force Main, Reclaimed Water (4)</b>	 <p style="text-align: center;">Water Main 10 ft. preferred 6 ft. minimum (3)</p>	 <p style="text-align: center;">Water Main 12 inches is the minimum, except for gravity sewer, then 6 inches is the minimum and 12 inches is preferred</p>	<p style="text-align: center;">Alternate 6 ft. minimum</p>  <p style="text-align: center;">Water Main</p>
<b>On-Site Sewage Treatment &amp; Disposal System</b>	10 ft. minimum	---	---

- (1) Water main should cross above other pipe. When water main must be below other pipe, the minimum separation is 12 inches.  
 (2) Reclaimed water regulated under Part III of Chapter 62-610, F.A.C.  
 (3) 3 ft. for gravity sanitary sewer where the bottom of the water main is laid at least 6 inches above the top of the gravity sanitary sewer.  
 (4) Reclaimed water not regulated under Part III of Chapter 62-610, F.A.C.

**Disclaimer – This document is provided for your convenience only. Please refer to F.A.C. Rule 62-555.314 for additional construction requirements.**

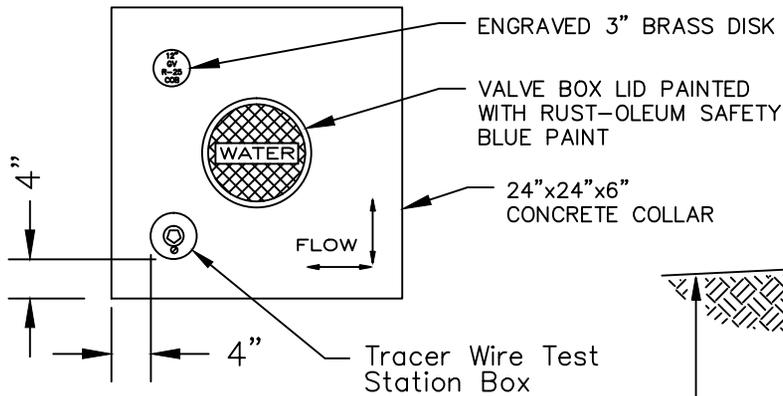
REV.	DATE	DESCRIPTION	BY



**CITY OF BRADENTON, FLORIDA  
PUBLIC WORKS AND UTILITIES  
DEPARTMENT OF ENGINEERING**

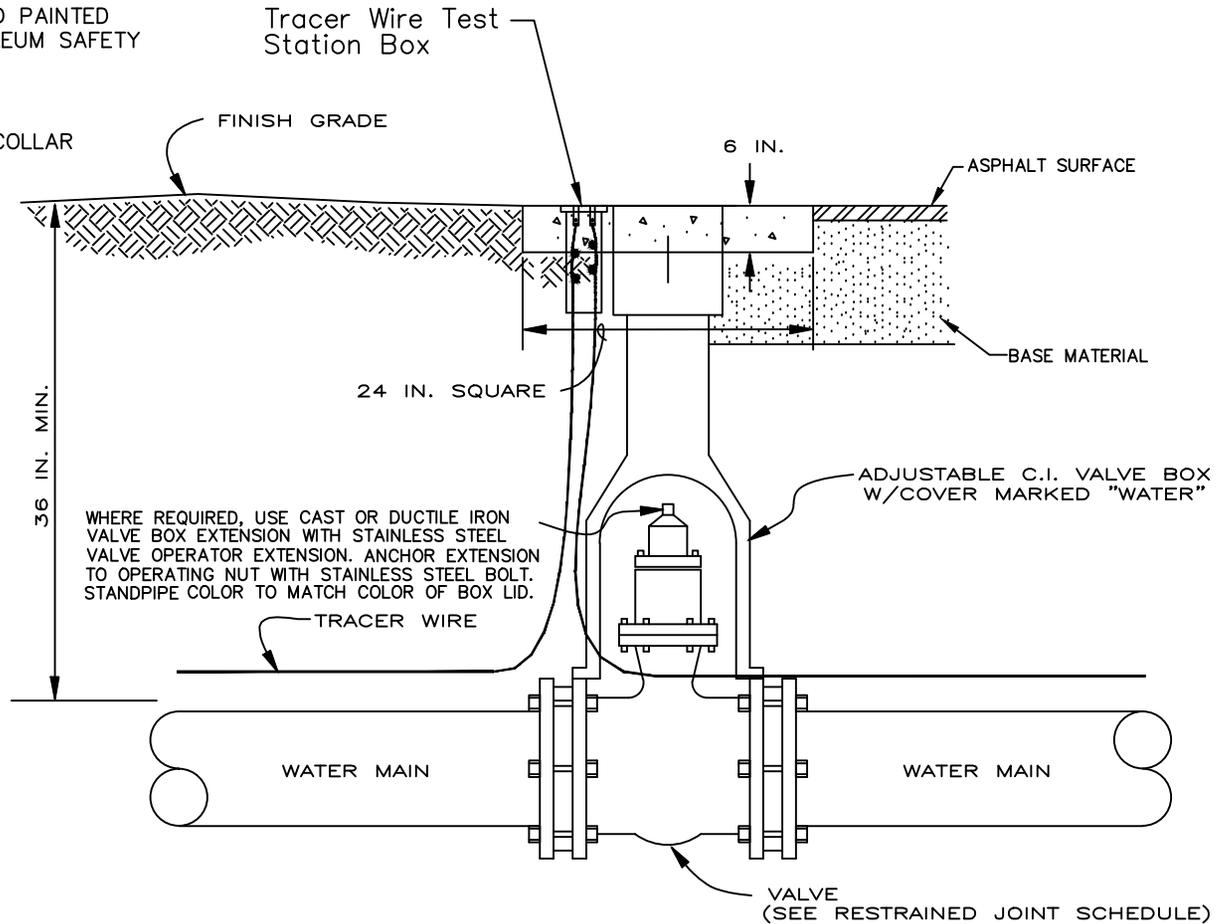
**WATER DISTRIBUTION  
WATER MAIN  
SEPARATION CHART**

DATE  
6/13  
SHEET NO.  
**W-1**



**NOTES:**

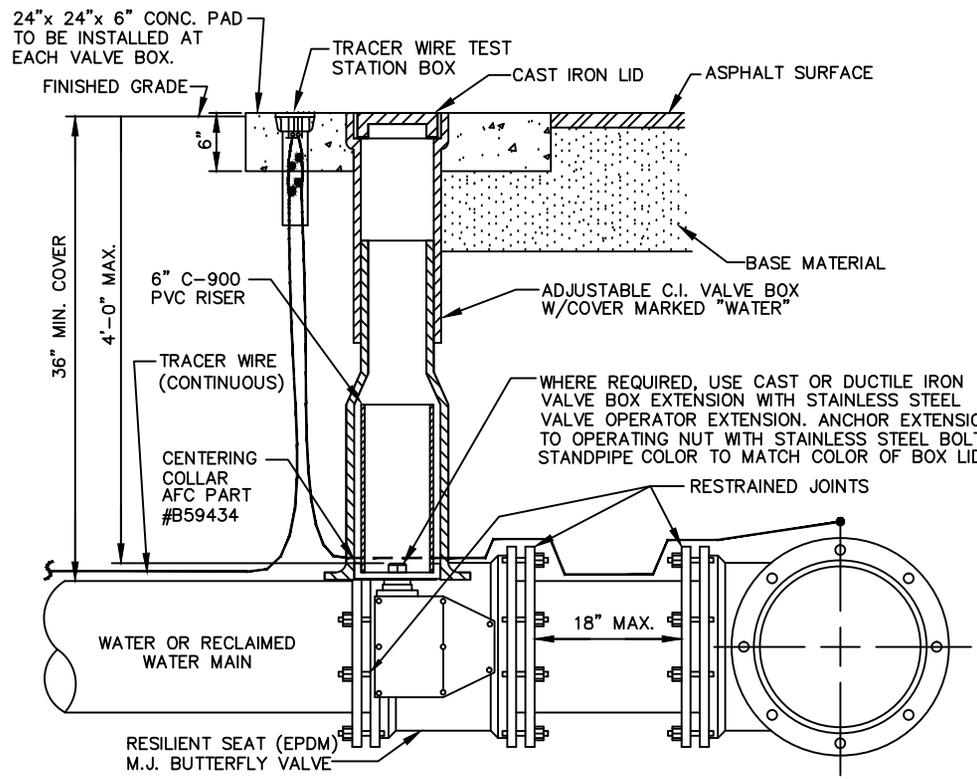
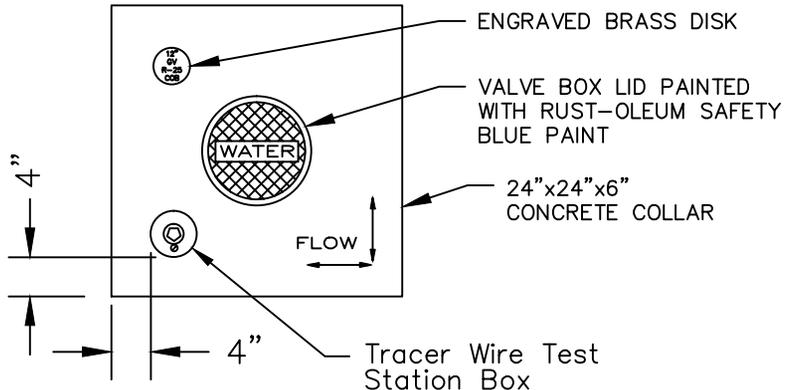
1. Tracer wire shall consist of THHN, 10 gauge, continuous, copper with steel core, insulated wire laid along the length of the pipe from valve box to valve box.
  - 1.1. Acceptable tracer wire products are Reinforced Tracer Wire, SoloShot™ EHS or SuperFlex™, all manufactured by Copperhead® Industries, LLC or approved equivalent.
  - 1.2. Valve boxes are required to include a magnetized tracer box, such as the Concrete/Driveway Box type SnakePit™ from CopperHead Industries, LLC or approved equivalent
  - 1.3. Twisting wires together is not acceptable, only manufacturer or City approved connectors will be tolerated; such products include Snake Bite™ from CopperHead Industries, LLC
  - 1.4. All tracer wire products must be color coded accordingly, such as BLUE for water mains
2. A three inch (3") brass disk shall be attached with epoxy to the concrete pad inscribed with the following information: Gate Valve (GV) or Butterfly Valve (BFV), the number of turns to open and close the valve and COB.



# GATE VALVE AND BOX

n.t.s.

					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	WATER DISTRIBUTION	DATE
						GATE VALVE AND BOX	12/11
1	7/2013	ADDED NOTES	SIBE				SHEET NO.
REV.	DATE	DESCRIPTION	BY				W-2



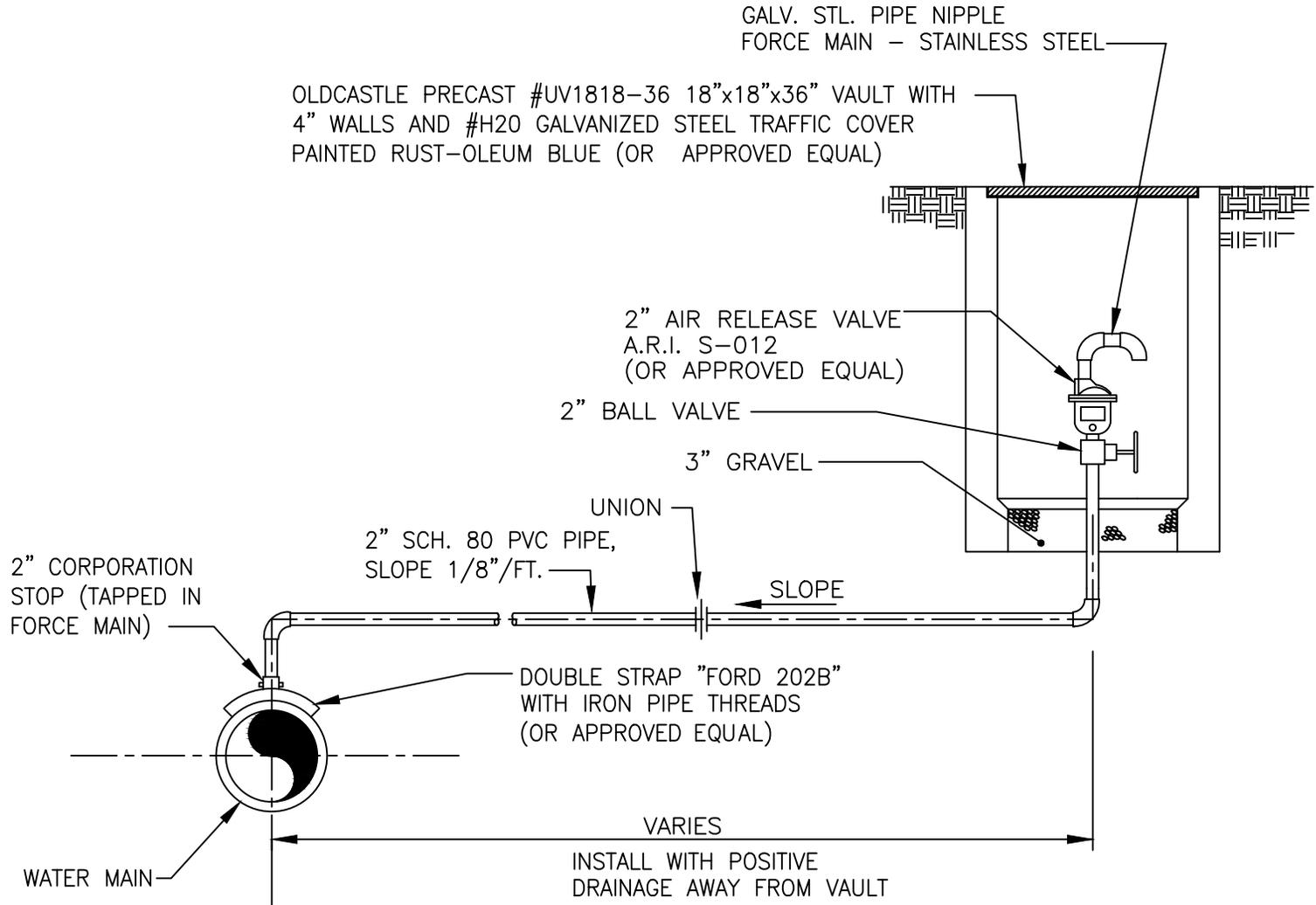
**NOTES:**

1. Tracer wire shall consist of THHN, 10 gauge, continuous, copper with steel core, insulated wire laid along the length of the pipe from valve box to valve box.
  - 1.1. Acceptable tracer wire products are Reinforced Tracer Wire, SoloShot™ EHS or SuperFlex™, all manufactured by Copperhead® Industries, LLC or approved equivalent.
  - 1.2. Valve boxes are required to include a magnetized tracer box, such as the Concrete/Driveway Box type SnakePit™ from CopperHead Industries, LLC or approved equivalent
  - 1.3. Twisting wires together is not acceptable, only manufacturer or City approved connectors will be tolerated; such products include Snake Bite™ from CopperHead Industries, LLC
  - 1.4. All tracer wire products must be color coded accordingly, such as BLUE for water mains
2. A three inch (3") brass disk shall be attached with epoxy to the concrete pad inscribed with the following information: Gate Valve (GV) or Butterfly Valve (BFV), the number of turns to open and close the valve and COB.

# BUTTERFLY VALVE AND BOX

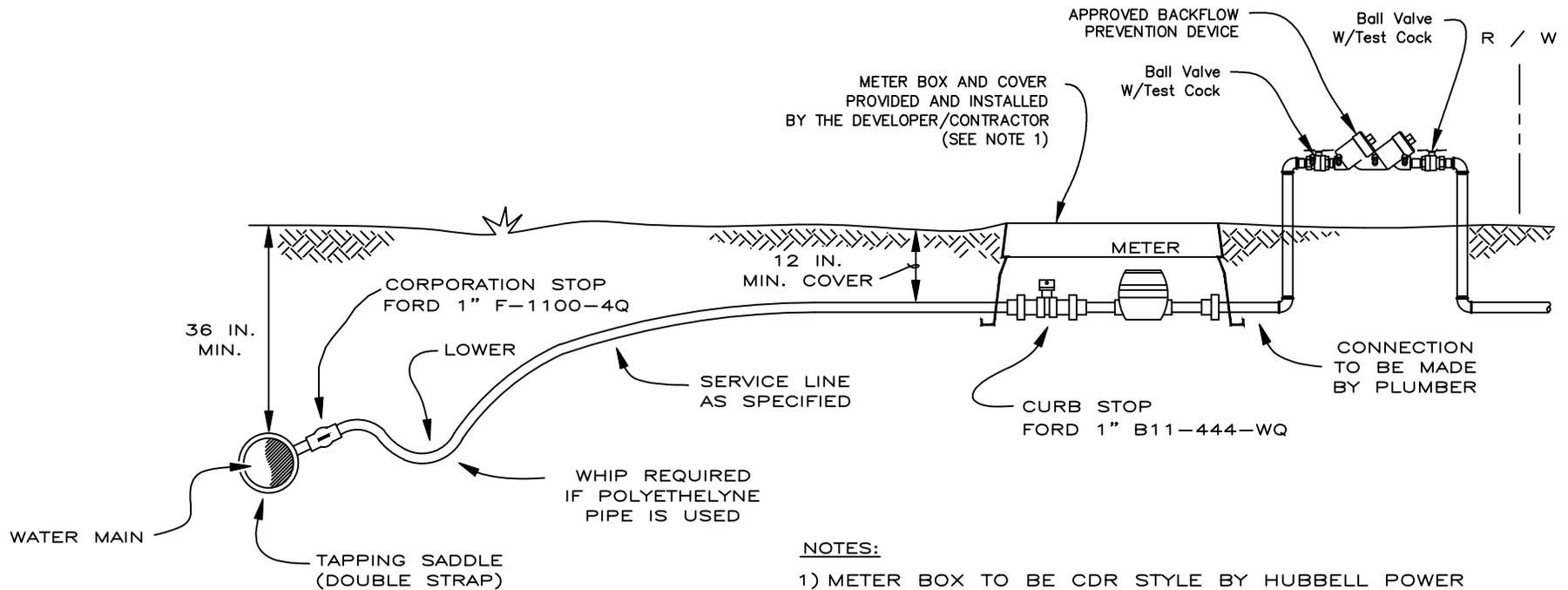
n.t.s.

					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	WATER DISTRIBUTION	DATE 6/13
REV.	DATE	DESCRIPTION	BY			BUTTERFLY VALVE and BOX FOR VALVES 16" OR LARGER	SHEET NO. <b>W-2A</b>



WATER MAIN AIR RELEASE VALVE  
N.T.S.

					<b>CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING</b>	WATER DISTRIBUTION	DATE
						WATER MAIN	1/08
1	DEC.-2012	CLARIFIED STRAP AND CLAMP	SIBE			AIR RELEASE VALVE	SHEET NO.
REV.	DATE	DESCRIPTION	BY				<b>W-2B</b>

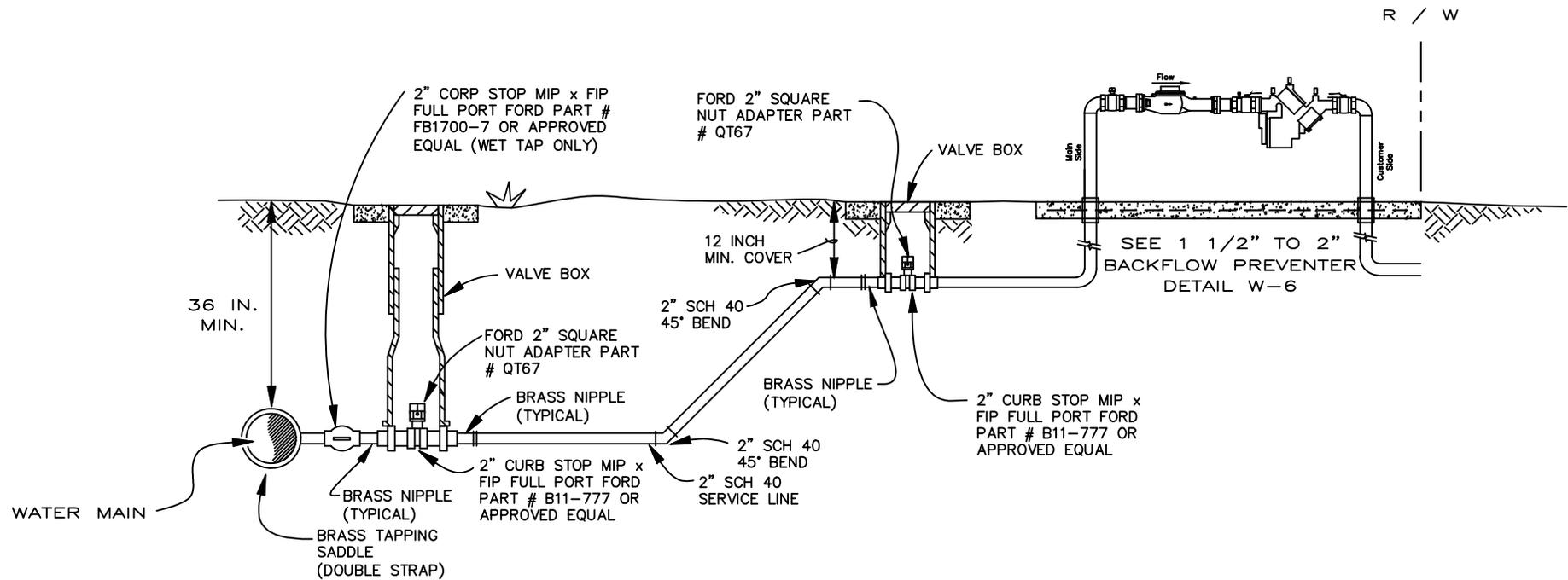


**NOTES:**

- 1) METER BOX TO BE CDR STYLE BY HUBBELL POWER SYSTEMS PART NO. B10111812M AND C08111802F.
  - FLARED WALLS
  - MOUSEHOLE BOTH ENDS
  - BLUE SKID RESISTANT READER LID WITH 6"x9" CAST IRON OPENING; NO BOLTS; UNDER 90°

TYPICAL WATER METER INSTALLATION

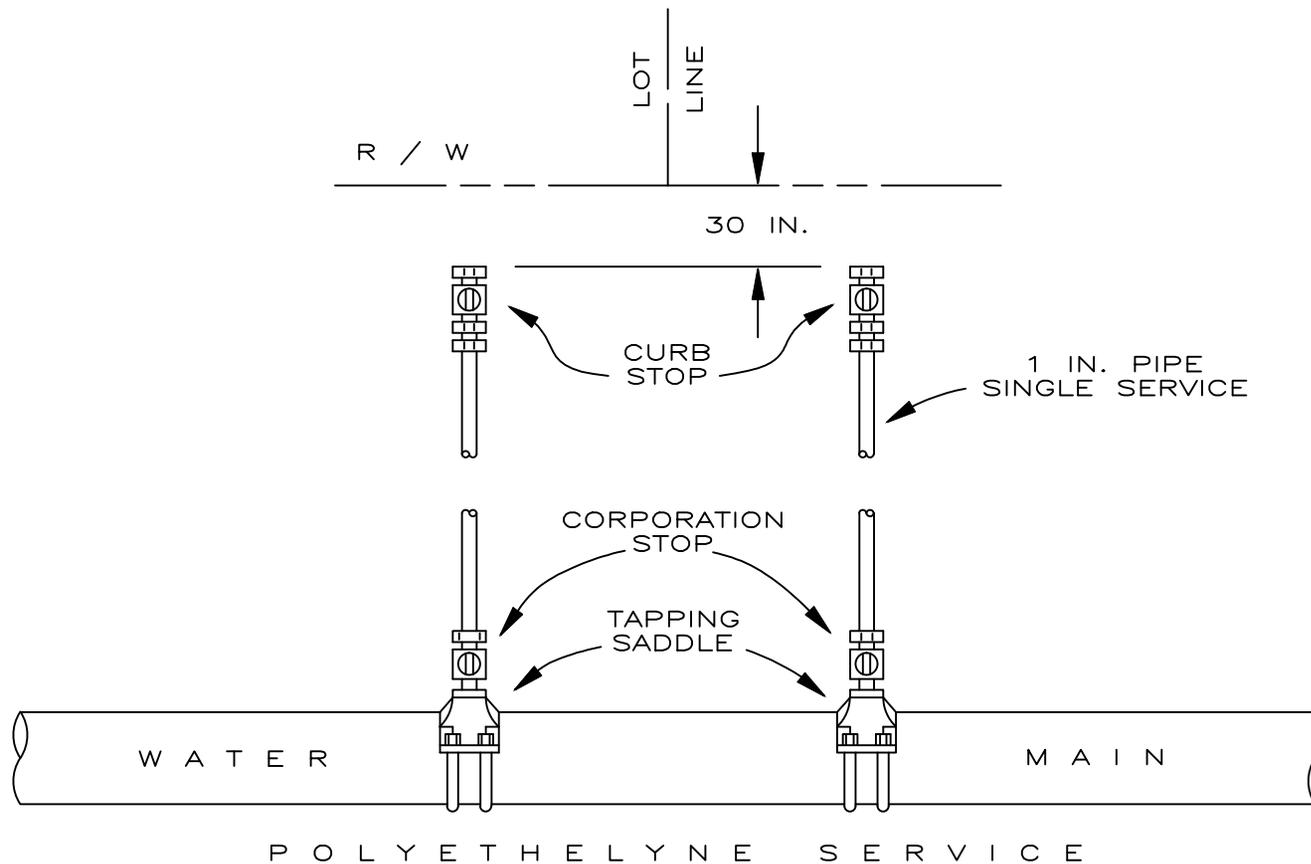
					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	WATER DISTRIBUTION	DATE
						TYPICAL WATER	2/07
1	4/12/2012	METER BOX NOTE	SIBE			METER INSTALLATION	SHEET NO.
REV.	DATE	DESCRIPTION	BY				W-3



TYPICAL 2" WATER METER INSTALLATION

N.T.S.

					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	WATER DISTRIBUTION	DATE
2	2/28/14	CHANGED METER ASSEMBLY	SIBE			2/07	
1	1/18/08	ADDED CURB STOP AND BOX	SIBE			2" WATER METER	SHEET NO.
REV.	DATE	DESCRIPTION	BY				W-3A

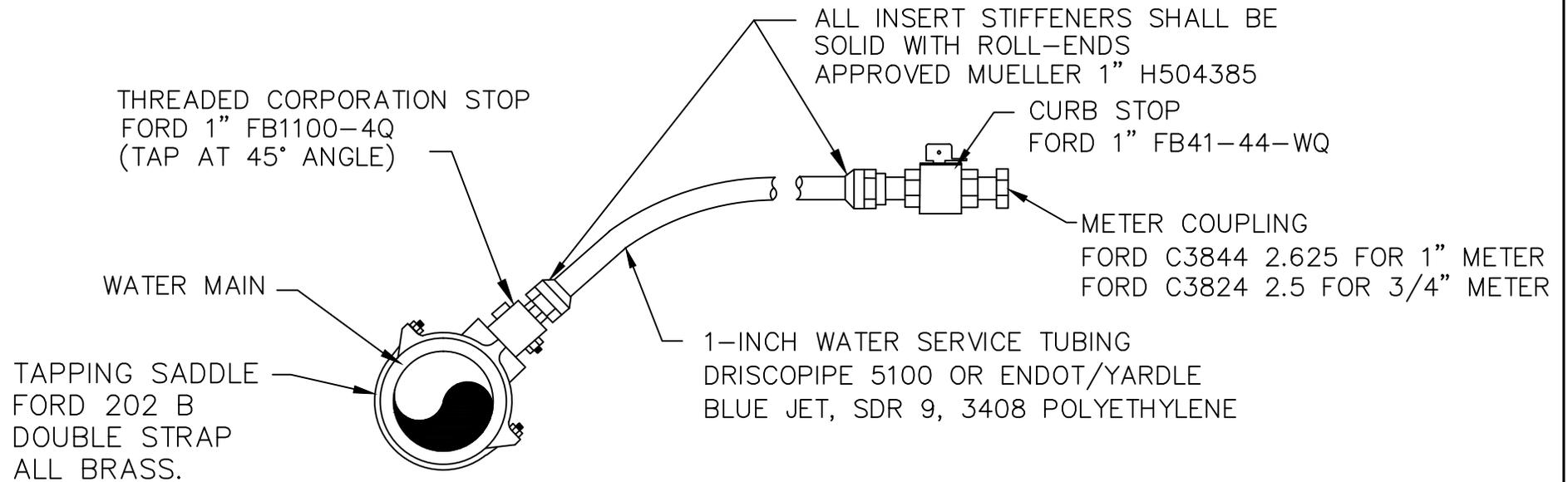


## TYPICAL DOUBLE SERVICE DETAIL

P L A N   V I E W

					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	WATER DISTRIBUTION	DATE
REV.	DATE	DESCRIPTION	BY			DOUBLE SERVICE	SHEET NO.
							<b>W-3B</b>

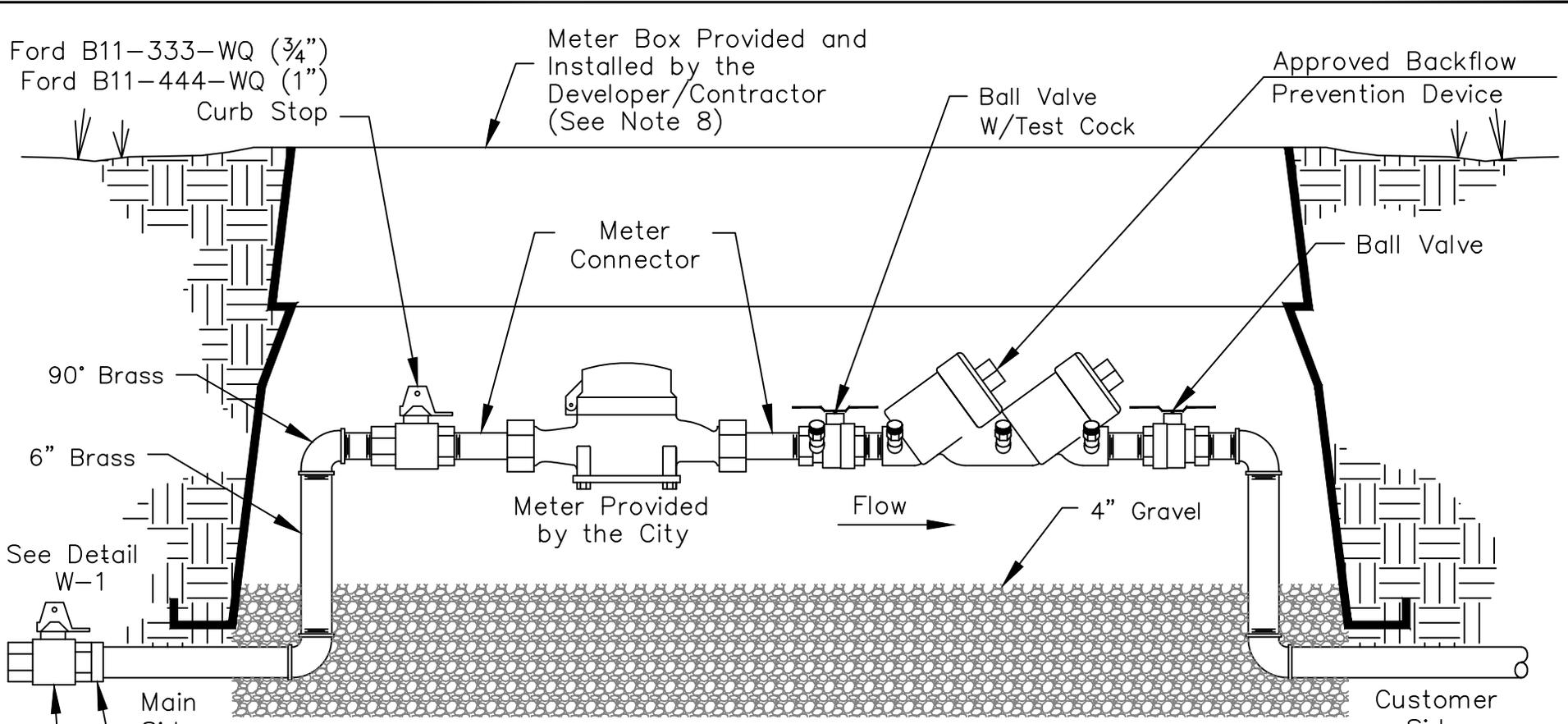
# 1" SERVICE CONNECTION DETAIL



**NOTES:**

- 1-SERVICE CONNECTIONS SHALL BE 2 FT. FROM SIDE LOT LINE ON EITHER SIDE OF LOT.
- 2-METERS SHALL NOT BE INSTALLED IN DRIVEWAYS AND MUST BE LOCATED A MINIMUM OF TWO FOOT FROM DRIVEWAYS.
- 3-ALL LINES SHALL BE CHLORINATED AND HYDROSTATIC TESTED (SEE SECTION III SUB-SECTION B NUMBER 6 OF THE CITY OF BRADENTON UTILITY SPECIFICATIONS)
- 4-FORD 202 B DOUBLE STRAP ALL BRASS TAPPING SADDLE IS REQUIRED FOR ALL SERVICE CONNECTIONS TO MAINS.
- 5-DISTANCE BETWEEN SERVICE TAPS SHALL NOT BE LESS THAN 36".

					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	WATER DISTRIBUTION	DATE
						1" SERVICE	1/10
REV.	DATE	DESCRIPTION	BY			CONNECTION DETAIL TO	SHEET NO.
						1" OR 3/4" METER	<b>W-4</b>



**TYPICAL SINGLE DEVICE 1" and 3/4" MODELS  
WHERE A BACKFLOW PREVENTER IS REQUIRED**

- NOTES:**
1. Backflow Device Must Be Installed Downstream Of Meter, As Close To Meter As Possible.
  2. Copper Pipe Type "L" or "K" or Brass Pipe Minimum Schedule 40 Shall be Used to a Minimum Depth of 12" Below Grade.
  3. The System Must Meet All Requirements of the City of Bradenton--SSBC Plumbing Code and the Backflow Prevention Code.
  4. All Piping From Backflow Device to the First Atmospheric Opening or to Each Branch Valve Must be Color Coded Blue.
  5. Meter and Meter Connectors Will be Provided by City of Bradenton Public Works Department.
  6. For Use Where Backflow Preventer is Required With Meter.
  7. Paint Entire Assembly Rust-Olium Safety Blue.

**NOTE 8:**  
 METER BOX TO BE CDR STYLE BY HUBBELL POWER SYSTEMS PART NO. B00113212M AND C00113202F  
 • FLARED WALLS  
 • MOUSEHOLE BOTH ENDS  
 • BLUE SKID RESISTANT READER  
 LID WITH 6"x9" CAST IRON OPENING; NO BOLTS; UNDER 90°

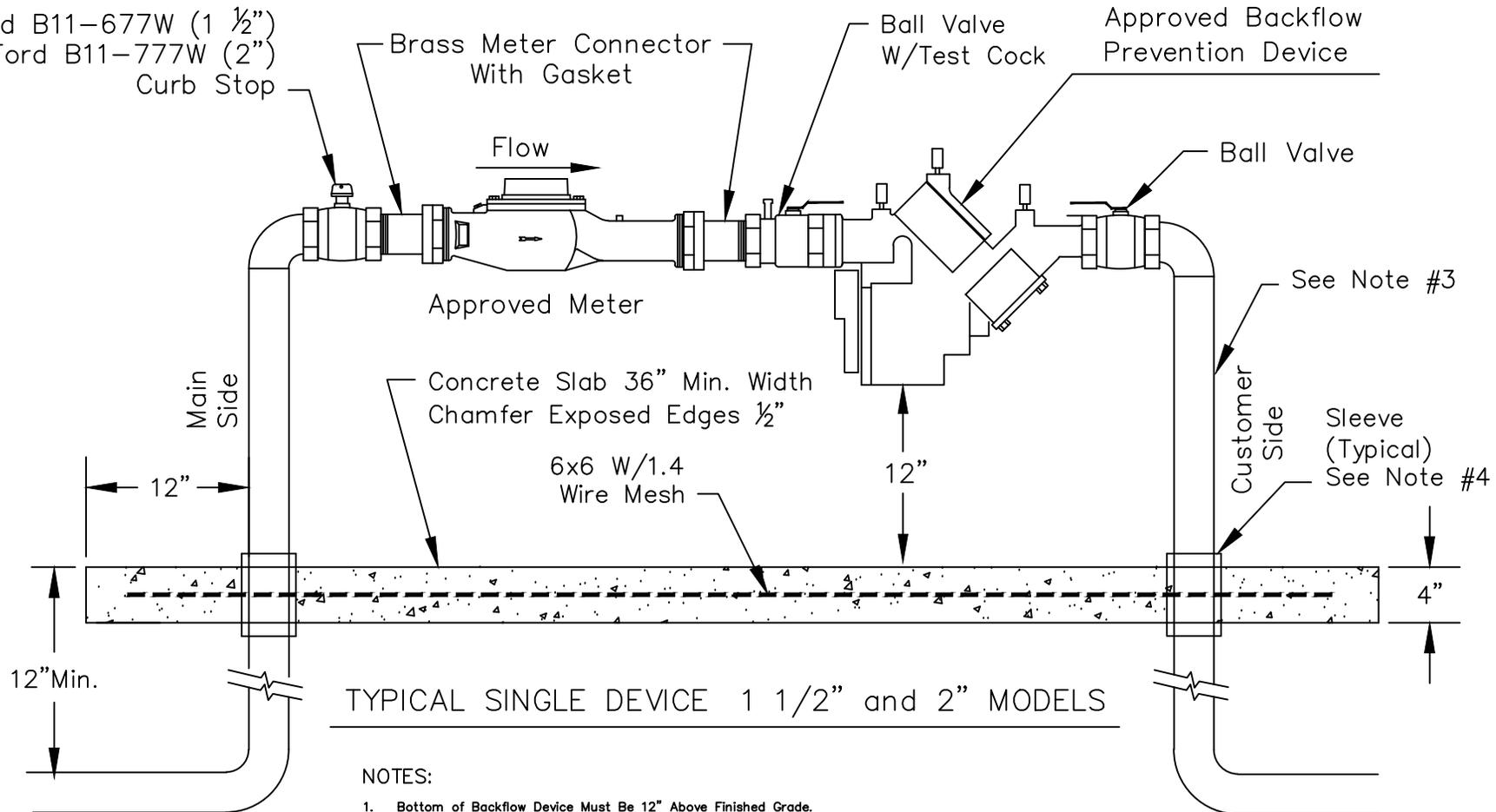
REV.	DATE	DESCRIPTION	BY
1	4/12/2012	ADDED NOTE 8	SIBE



**CITY OF BRADENTON, FLORIDA  
 PUBLIC WORKS AND UTILITIES  
 DEPARTMENT OF ENGINEERING**

WATER DISTRIBUTION	DATE
TYPICAL METER SETS W/ BACKFLOW PREVENTERS	7/10
1" and 3/4" MODELS	SHEET NO. <b>W-5</b>

Ford B11-677W (1 1/2")  
 Ford B11-777W (2")  
 Curb Stop



TYPICAL SINGLE DEVICE 1 1/2" and 2" MODELS

NOTES:

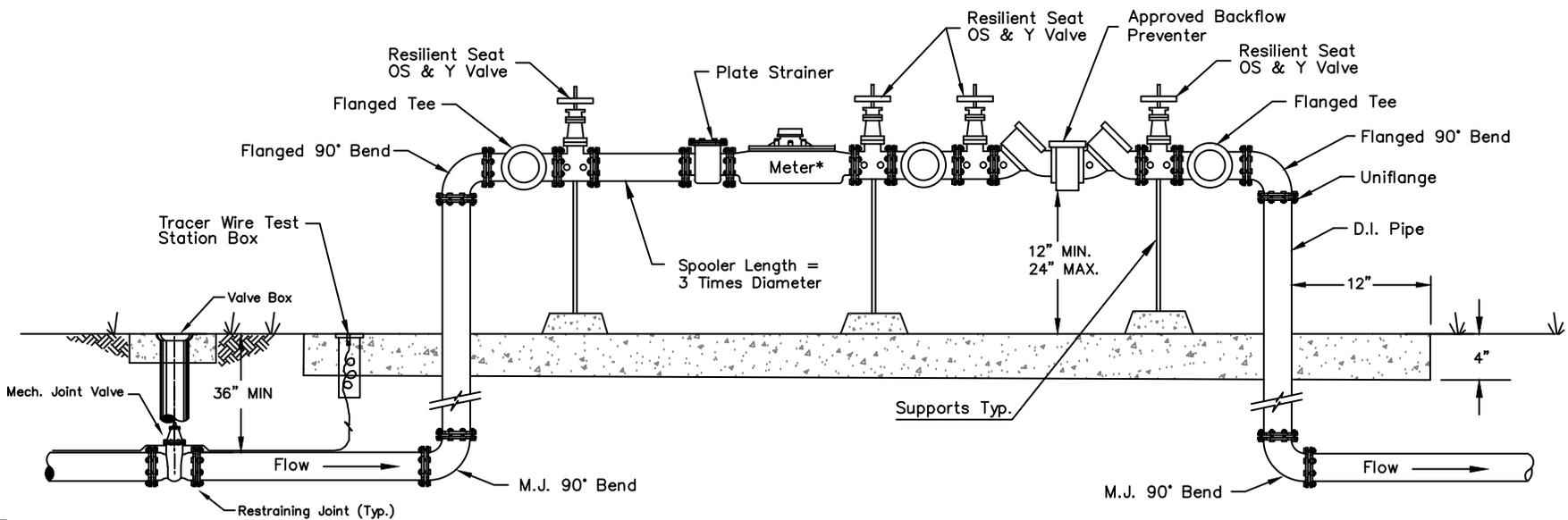
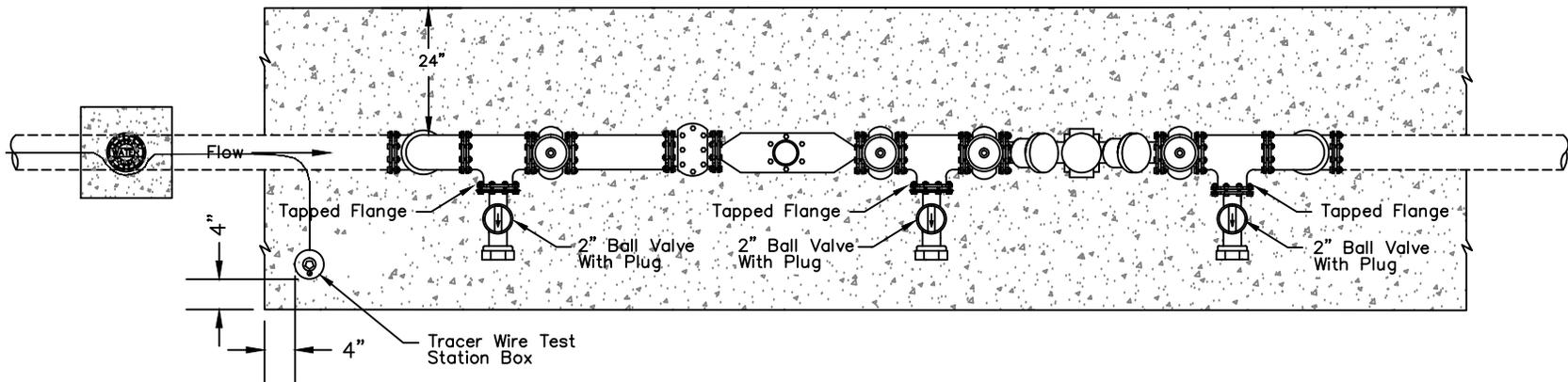
1. Bottom of Backflow Device Must Be 12" Above Finished Grade.
2. Backflow Device Must Be Installed Downstream Of Meter, As Close To Meter As Possible.
3. Copper Pipe Type "L" or "K" or Brass Pipe Minimum Schedule 40 Shall be Used to a Minimum Depth of 12" Below Grade.
4. Pipes Passing Through of Encased in Concrete Must be Properly Protected and Sleeved.
5. The System Must Meet All Requirements of the City of Bradenton-SSBC Plumbing Code and the Backflow Prevention Code.
6. All Piping From Backflow Device to the First Atmospheric Opening or to Each Branch Valve Must be Color Coded Rust-Olium Safety Blue.
7. Meter and Brass Meter Connector Will be Provided by City of Bradenton Public Works Department. Nipples go Halfway into Lock Packs.
8. For Use Where Backflow Preventer is Required With Meter.
9. Paint Entire Assembly Rust-Olium Safety Blue.

REV.	DATE	DESCRIPTION	BY
1	4/28/14	REMOVED BRASS NIPPLE & LOCK PACK ADDED METER CONNECTOR W/GASKET	SIBE



CITY OF BRADENTON, FLORIDA  
 PUBLIC WORKS AND UTILITIES  
 DEPARTMENT OF ENGINEERING

WATER DISTRIBUTION	DATE
TYPICAL METER SETS W/ BACKFLOW PREVENTERS	2/07
1 1/2" and 2" MODELS	SHEET NO.
	W-6



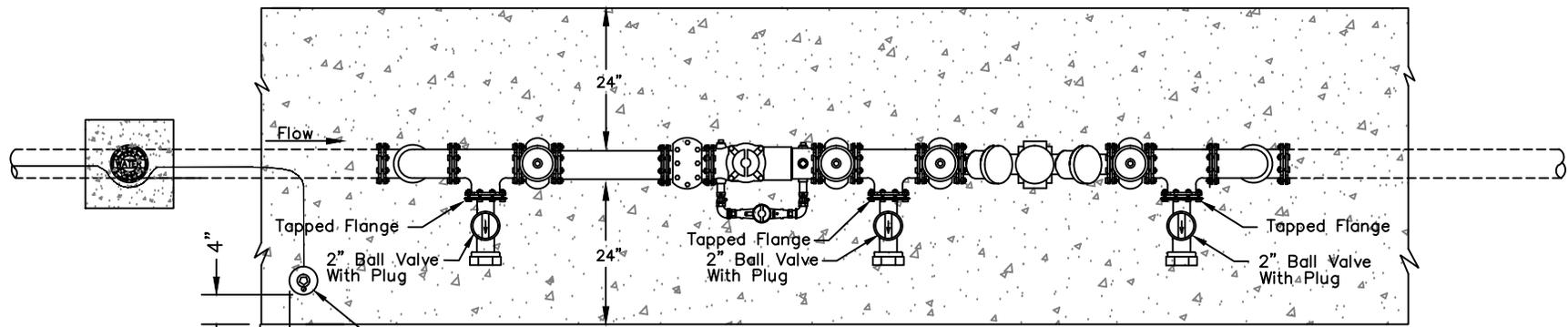
**TYPICAL COMMERCIAL WATER METER SET**

n.t.s.

- NOTE:**
1. O S & Y Valve Handles will be Chained and Locked.
  2. Meter Sets will be Painted Rust-Olium Safety Blue After Installation.
- \*APPROVED METERS:**
1. Hersey-Horizon (Plate Strainer Required).

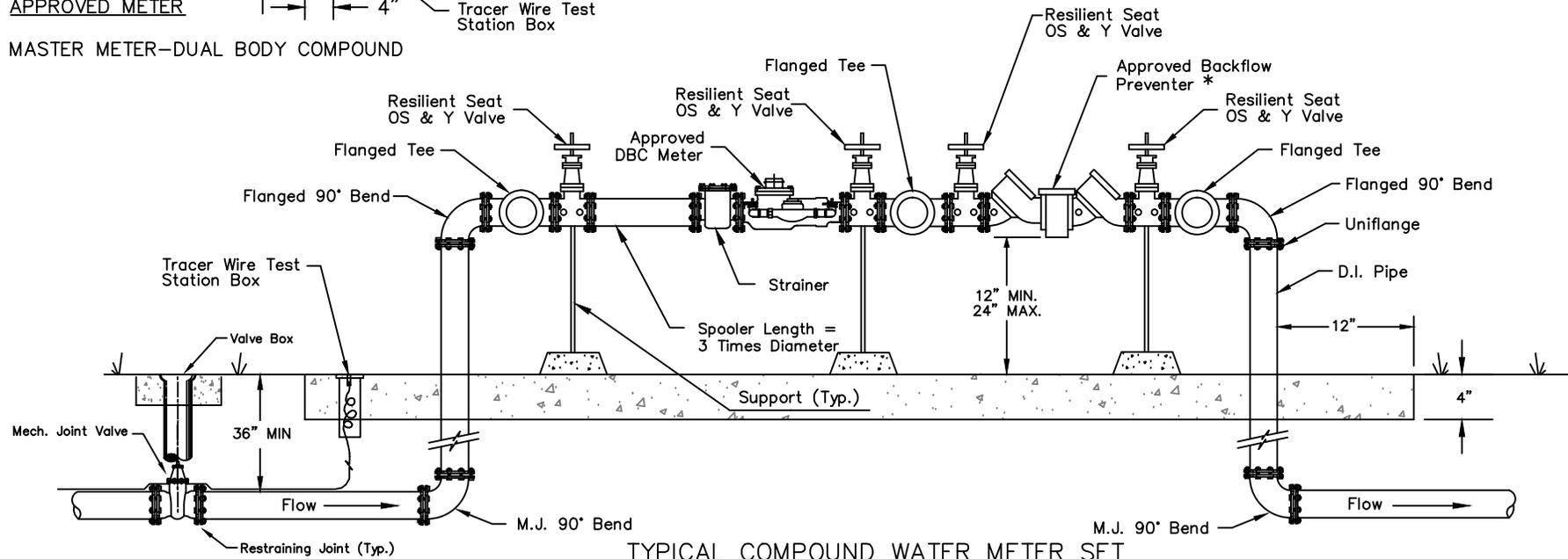
**NOTE:** ALL NEW 3 INCH OR LARGER METERS AND THE ABOVE GROUND METER ASSEMBLY INSTALLATION SHALL BE COMPLETED BY THE DEVELOPER, CONTRACTOR OR PROPERTY OWNER UNDER THE SUPERVISION OF THE CITY OF BRADENTON PUBLIC WORKS DEPARTMENT WITH THE METER PROVIDED BY THE CONTRACTOR.

					<b>CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING</b>	<b>WATER DISTRIBUTION</b>	<b>DATE</b> 11/07
<b>REV.</b>	<b>DATE</b>	<b>DESCRIPTION</b>	<b>BY</b>			<b>COMMERCIAL WATER METER</b> 90° RISE	<b>SHEET NO.</b> W-7
						<b>4" and LARGER MODELS</b>	



APPROVED METER

MASTER METER-DUAL BODY COMPOUND



TYPICAL COMPOUND WATER METER SET

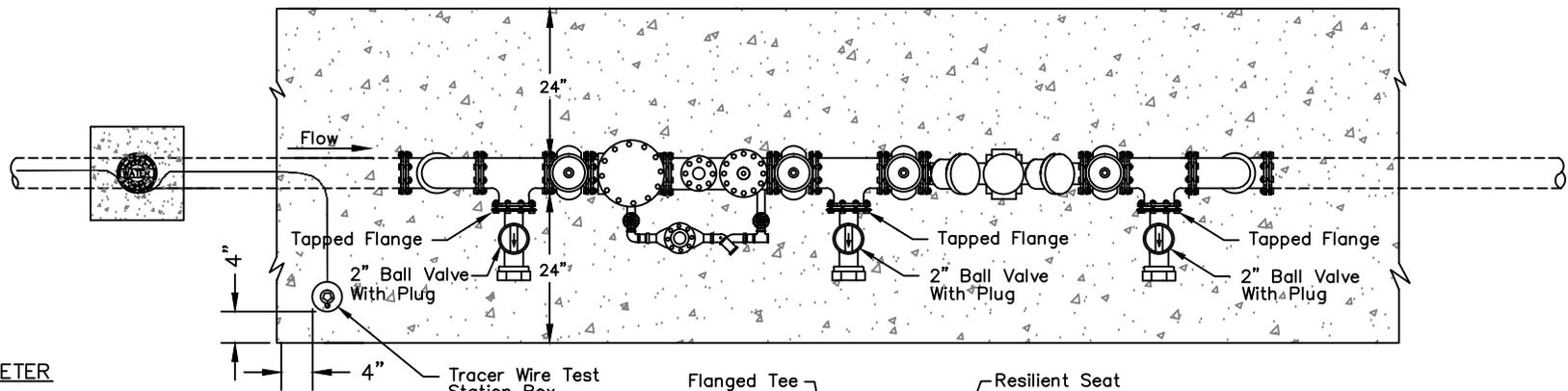
n.t.s.

NOTE:

1. O S & Y Valve Handles will be Chained and Locked.
2. Meter Sets shall be Painted Rust-Olium Safety Blue After Installation.

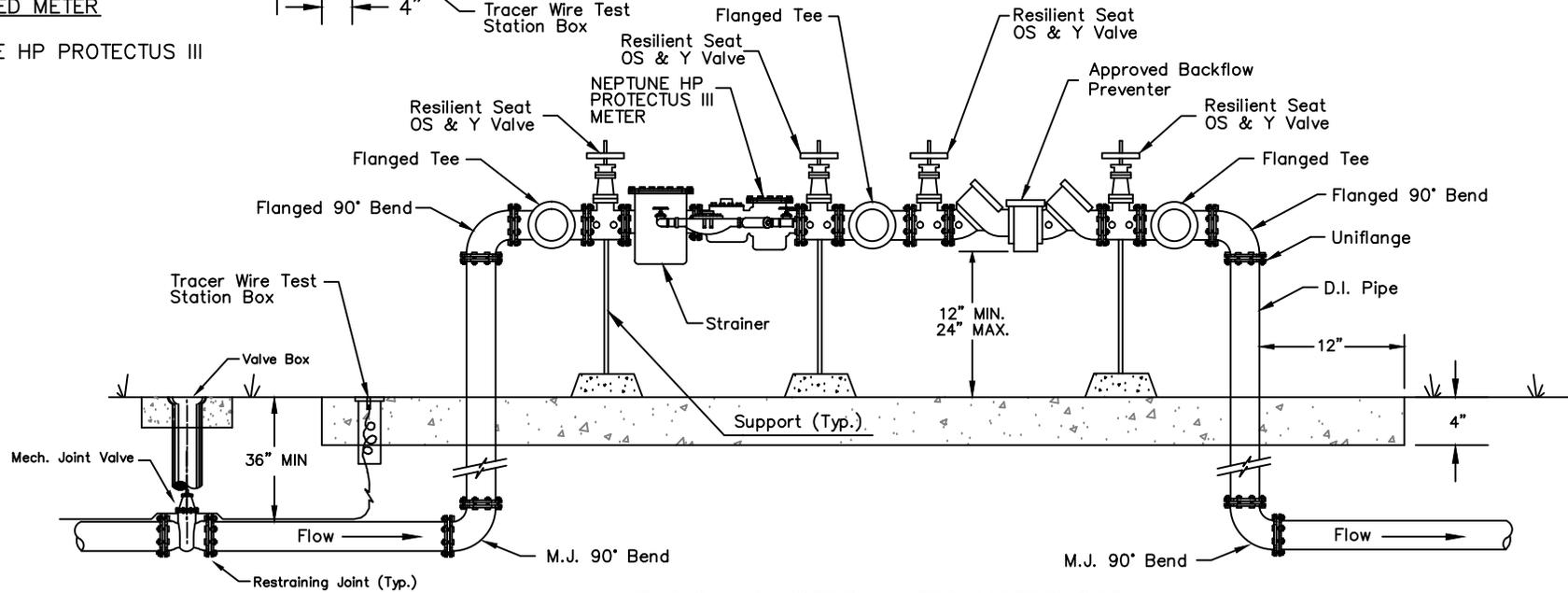
NOTE: ALL NEW 3 INCH OR LARGER METERS AND THE ABOVE GROUND METER ASSEMBLY INSTALLATION SHALL BE COMPLETED BY THE DEVELOPER, CONTRACTOR OR PROPERTY OWNER UNDER THE SUPERVISION OF THE CITY OF BRADENTON PUBLIC WORKS DEPARTMENT WITH THE METER PROVIDED BY THE CONTRACTOR.

					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	WATER DISTRIBUTION	DATE
						SCHOOL PROPERTY ONLY	3/07
						COMPOUND WATER METER	SHEET NO.
						4" and LARGER MODELS	W-8
REV.	DATE	DESCRIPTION	BY				



APPROVED METER

NEPTUNE HP PROTECTUS III



TYPICAL MASTER WATER METER SET

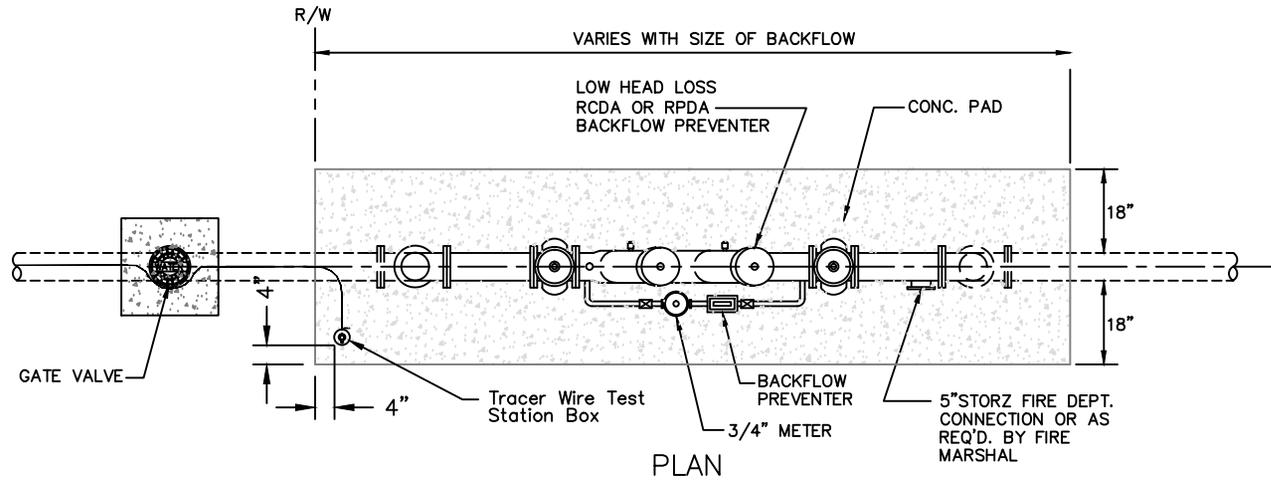
n.t.s.

NOTE:

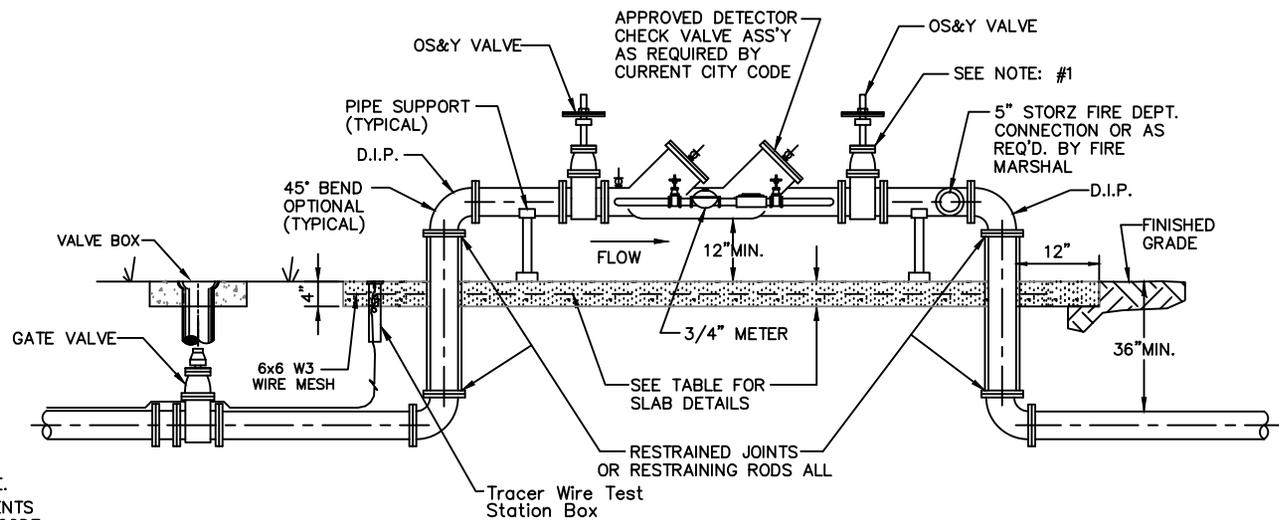
1. O S & Y Valve Handles will be Chained and Locked.
2. Meter Sets shall be Painted Rust-Olium Safety Blue After Installation.

NOTE: ALL NEW 3 INCH OR LARGER METERS AND THE ABOVE GROUND METER ASSEMBLY INSTALLATION SHALL BE COMPLETED BY THE DEVELOPER, CONTRACTOR OR PROPERTY OWNER UNDER THE SUPERVISION OF THE CITY OF BRADENTON PUBLIC WORKS DEPARTMENT WITH THE METER PROVIDED BY THE CONTRACTOR.

					<b>CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING</b>	<b>WATER DISTRIBUTION</b>		DATE
						<b>MASTER WATER METER</b>		8/10
						<b>90° RISE</b>		SHEET NO. <b>W-9</b>
						<b>4" and LARGER MODELS</b>		
REV.	DATE	DESCRIPTION	BY					



PLAN



SECTION

NOTES:

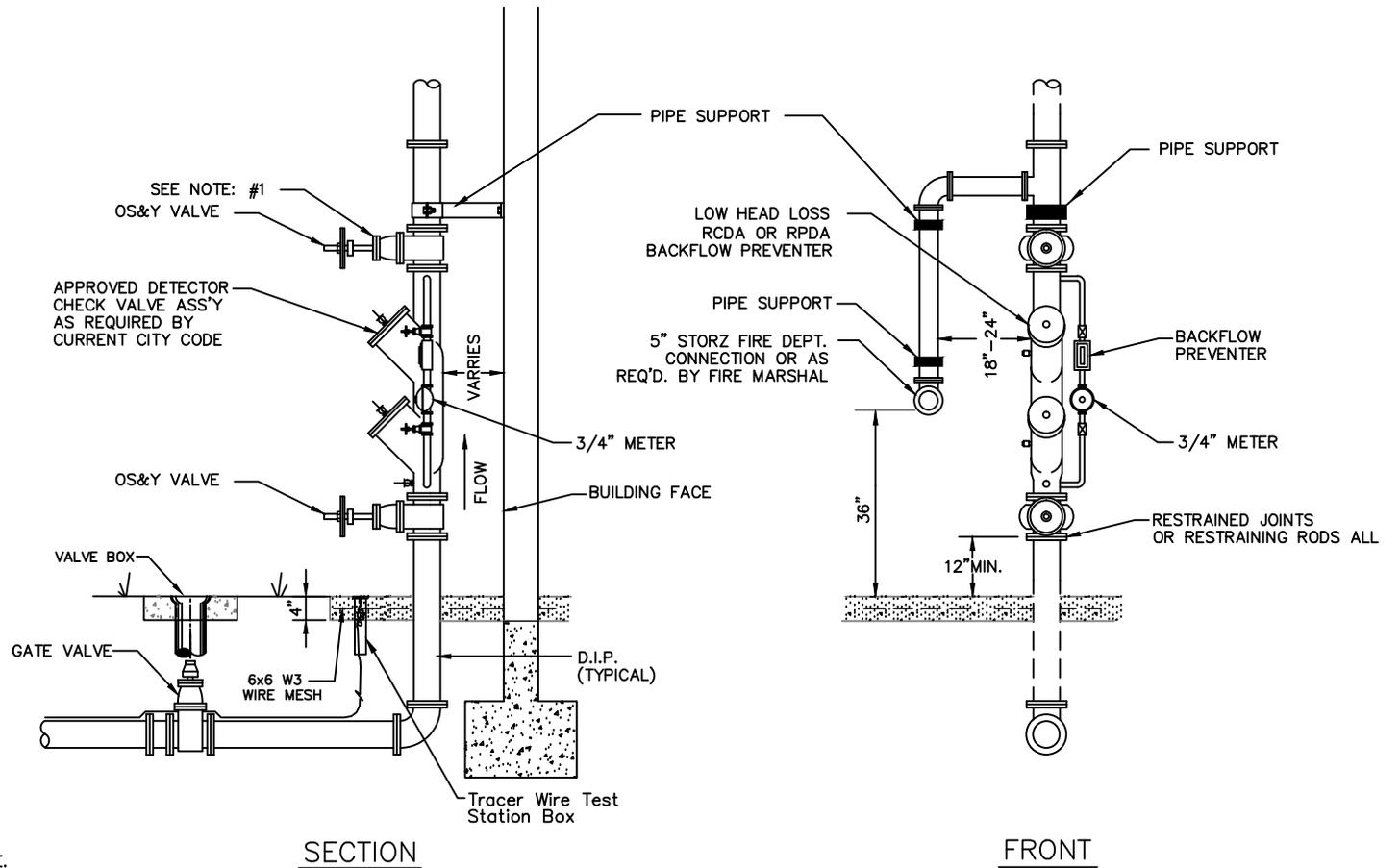
1. WHEN PRESSURE TESTING FIRE LINE, TEST AGAINST DOWNSTREAM GATE VALVE.
2. THE SYSTEM MUST MEET ALL REQUIREMENTS OF THE CITY OF BRADENTON PLUMBING CODE (LATEST EDITION) AND THE CITY OF BRADENTON BACKFLOW PREVENTION CODE (LATEST EDITION), AND THE CITY OF BRADENTON FIRE MARSHAL REQUIREMENTS.
3. PAINT BACKFLOW ASSEMBLY RUST-OLIUM SAFETY RED.
4. CHAMFER ALL EXPOSED EDGES OF CONCRETE

REV.	DATE	DESCRIPTION	BY
1	AUG-2010	TRACER WIRE	SIBE



CITY OF BRADENTON, FLORIDA  
PUBLIC WORKS AND UTILITIES  
DEPARTMENT OF ENGINEERING

WATER DISTRIBUTION	DATE
TYPICAL HORIZONTAL	2/07
FIRE LINE	SHEET NO.
BACKFLOW PREVENTER	W-10

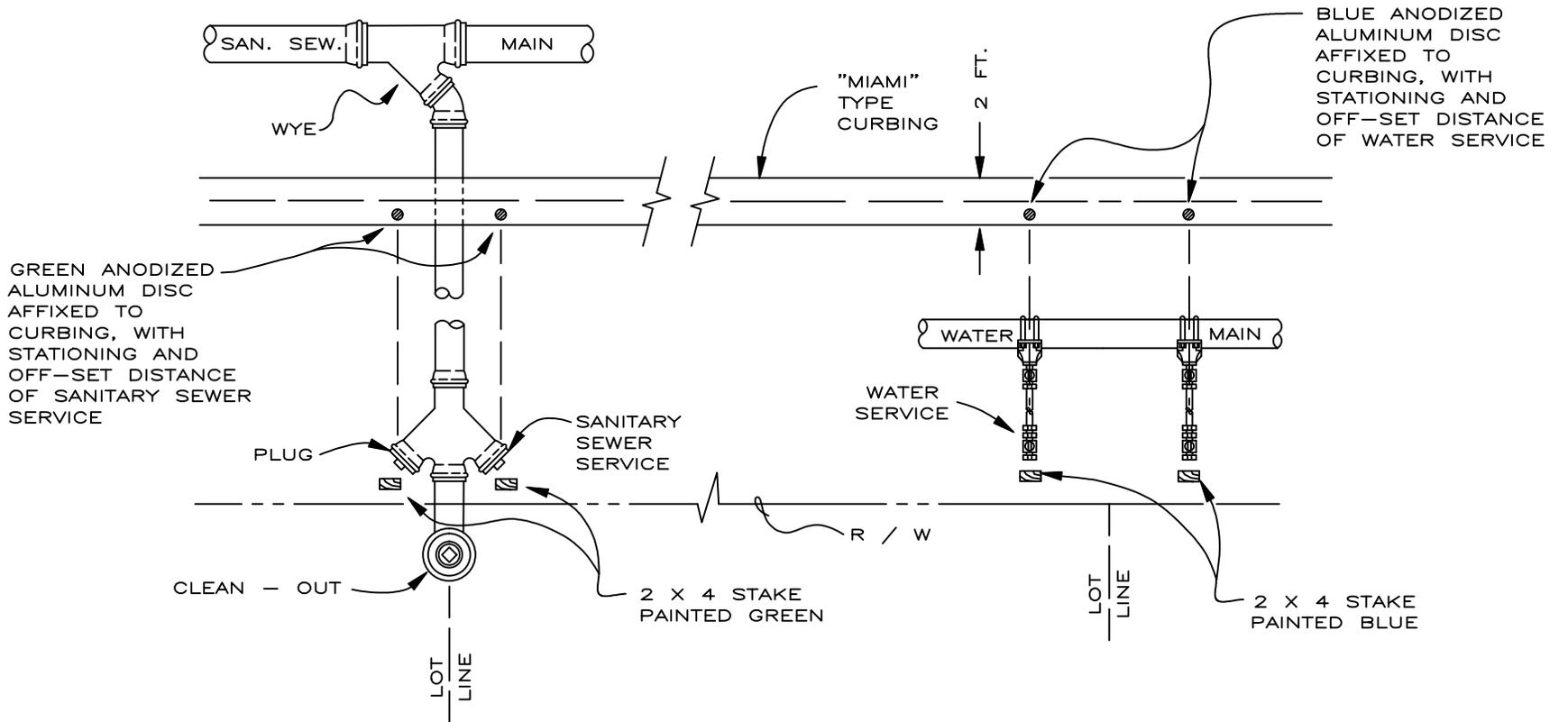


NOTES:

1. WHEN PRESSURE TESTING FIRE LINE, TEST AGAINST DOWNSTREAM GATE VALVE.
2. THE SYSTEM MUST MEET ALL REQUIREMENTS OF THE CITY OF BRADENTON PLUMBING CODE (LATEST EDITION) AND THE CITY OF BRADENTON BACKFLOW PREVENTION CODE (LATEST EDITION), AND THE CITY OF BRADENTON FIRE MARSHAL REQUIREMENTS.
3. PAINT BACKFLOW ASSEMBLY RUST-OLIUM SAFETY RED.
4. CHAMFER ALL EXPOSED EDGES OF CONCRETE
5. BACKFLOW ASSEMBLY AND STORTZ FIRE CONNECTION MUST BE ATTACHED TO STRUCTURE.

					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	WATER DISTRIBUTION	DATE 2/11
REV.	DATE	DESCRIPTION	BY			VERTICAL FIRE LINE BACKFLOW PREVENTER	SHEET NO. W-10A

S T R E E T



WATER & SANITARY SEWER SERVICES—MISC. DETAILS

					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	WATER DISTRIBUTION	DATE
						WATER & SANITARY	2/07
REV.	DATE	DESCRIPTION	BY			SERVICE DETAILS	SHEET NO.
							W-11

# P.V.C. PIPE RESTRAINT

MINIMUM LENGTH (FT) TO BE RESTRAINED ON EACH SIDE OF FITTING(S)										TEES (SEE NOTE 4)			REDUCERS	
PVC PIPE	PIPE SIZE									RUN SIZE	BRANCH SIZE	LENGTH FT	SIZE	LENGTH FT
	4"	6"	8"	10"	12"	16"	20"	24"	30"					
HORIZONTAL 90° BEND	20	28	36	40	50	60	75	76	88	4"	4"	F.O.	6x4	35
HORIZONTAL 45° BEND	8	10	14	18	20	26	32	33	36	6"	6"	F.O.	8x4	65
HORIZONTAL 22 1/2° BEND	4	5	6	8	9	11	13	15	18	8"	8"	F.O.	10x8	35
HORIZONTAL 11 1/4° BEND	2	2	3	4	4	6	7	7	9	10"	10"	F.O.	10x6	65
PLUG OR BRANCH OF TEE	50	70	90	110	120	160	195	200	235	12"	12"	F.O.	12x10	35
VERTICAL OFFSETS 45° BENDS Lu (FT.)	20	28	36	45	52	67	80	81	97	12"	10"	F.O.	12x8	65
VERTICAL OFFSETS 45° BENDS Li (FT.)	3	4	5	6	8	10	13	14	16	16"	8"	F.O.	16x12	65
										16"	16"	F.O.	20x18	35
										20"	10"	F.O.	20x16	65
										20"	8"	F.O.	20x12	120
										24"	16"	F.O.	24x20	65
										24"	12"	F.O.	24x18	95
										30"	10"	F.O.	24x16	120
										30"	16"	F.O.	30x24	80
										30"	12"	F.O.	30x20	150
										30"	24"	F.O.		
										30"	20"	F.O.		
										30"	16"	F.O.		

**NOTES:**

- 1.) THIS SCHEDULE SHALL BE UTILIZED ON ALL WATER, SEWER FORCE MAIN OR RECLAIMED WATER SYSTEMS. ALL FITTINGS SHALL BE RESTRAINED TO LENGTHS INDICATED ON THE ABOVE SCHEDULE, AT A MINIMUM, UNLESS OTHERWISE INDICATED.
- 2.) VERTICAL OFFSETS: ARE APPROX. 3 FEET COVER ON TOP AND APPROX. 8 FEET COVER ON BOTTOM. PER THE DETAILS, Lu IS THE RESTRAINED LENGTH FOR THE UPPER (TOP) LEVEL. Li IS THE RESTRAINED LENGTH FOR THE LOWER (DEEPER) LEVEL. ASSUME 45 DEGREE BENDS.
- 3.) WHERE TWO OR MORE FITTINGS ARE TOGETHER, USE FITTING WHICH YIELDS THE GREATEST LENGTH OF RESTRAINED PIPE.
- 4.) TEES: TOTAL LENGTH BETWEEN FIRST JOINTS OR RESTRAINED LENGTH ON EITHER SIDE OF TEE (RUN) SHALL BE A TOTAL DISTANCE OF 30 FEET (MIN) SEE SCHEDULE ABOVE FOR RESTRAINT LENGTH ON TEE "BRANCH" LINE.
- 5.) HDPE TO PVC TRANSITIONS: THE PVC PIPE SIDE SHALL BE RESTRAINED 35 FEET (MIN.)
- 6.) THE INSTALLATION OF BELL HARNESS RESTRAINTS AT PVC JOINTS (DR-18 & 25 PIPE) SHALL BE COMPLETED PER THE MANUFACTURERS RECOMMENDATION, WHICH INCLUDES NOT OVER TIGHTENING THE PARALLEL RODS/NUTS. THESE NUTS SHOULD ONLY BE SNUG TIGHT. THE HOME MARKS ON THE PIPE SHOULD ALWAYS BE VISIBLE AFTER THE RESTRAINT IS INSTALLED. OVERHOMING THE JOINT MAY CAUSE A FAILURE AT THE BELL RESULTING IN A SERVICE OUTAGE.
- 7.) LENGTHS SHOWN IN THE TABLE HAVE BEEN CALCULATED WITH THE FOLLOWING ASSUMPTIONS:  
 WORKING PRESSURE: 150 P.S.I.  
 SOIL DESIGNATION: GM OR SM  
 SAFETY FACTOR: 1.5  
 TRENCH TYPE: 3  
 DEPTH OF COVER: 30 INCHES FOR 20" AND SMALLER PIPE SIZE  
 36 INCHES FOR 24" AND LARGER PIPE SIZE

F.O.= Fitting Only

THE FOLLOWING JOINTS MUST BE RESTRAINED IN ALL APPLICATIONS:

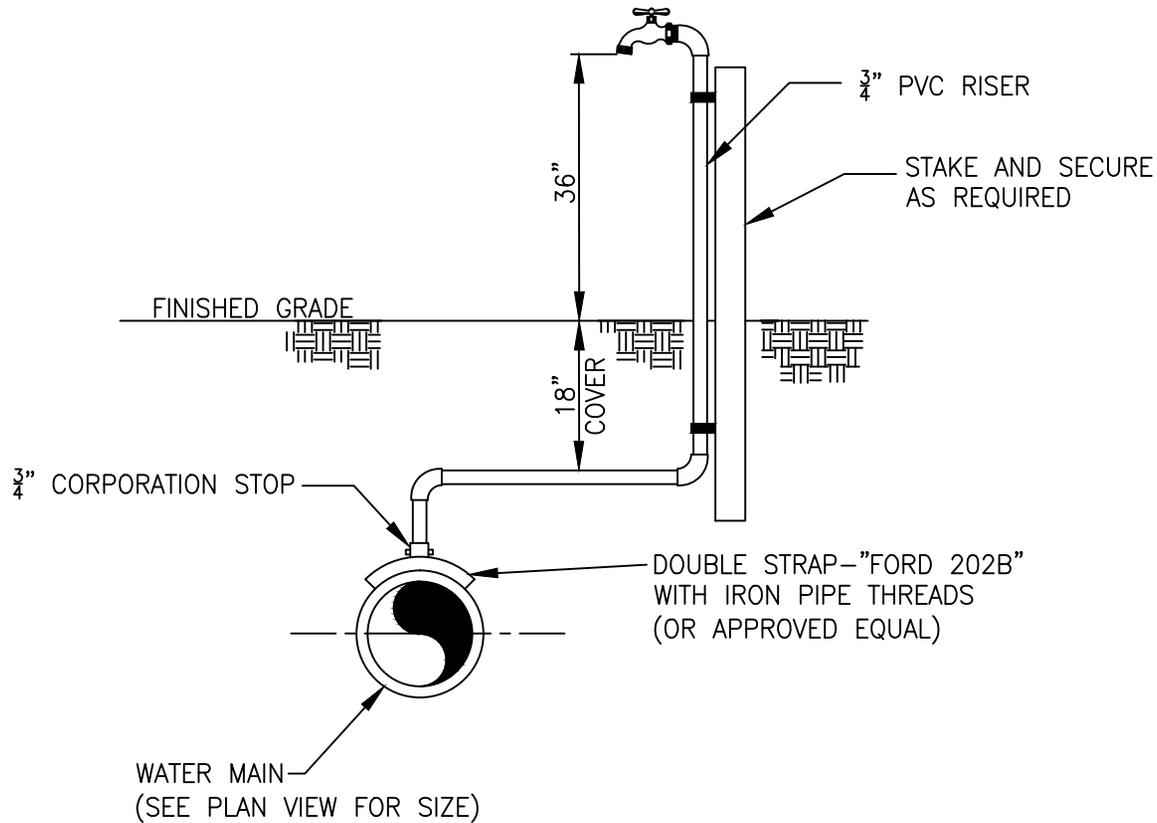
1. BEND – INLET AND OUTLET
2. TEES
3. OFFSETS – INLET AND OUTLET
4. CAPS
5. PLUGS
6. ENTIRE HYDRANT RUNOUTS SHALL BE RESTRAINED

NOTE:

THRUST RESTRAINT AT FITTINGS AND VALVES SHALL BE EBBA IRON MEGALUG RESTRAINERS. THRUST RESTRAINT BETWEEN PIPE JOINTS SHALL BE EBBA IRON SERIES 1500 RESTRAINERS.

FIGURES BASED ON 30" OF COVER DEPTH.

REV.	DATE	DESCRIPTION	BY		CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	WATER DISTRIBUTION	DATE
						THRUST RESTRAINING	2/07
						CHART	SHEET NO.
							<b>W-12</b>



## BACTERIOLOGICAL SAMPLE POINT DETAIL

N.T.S.

**NOTE:**

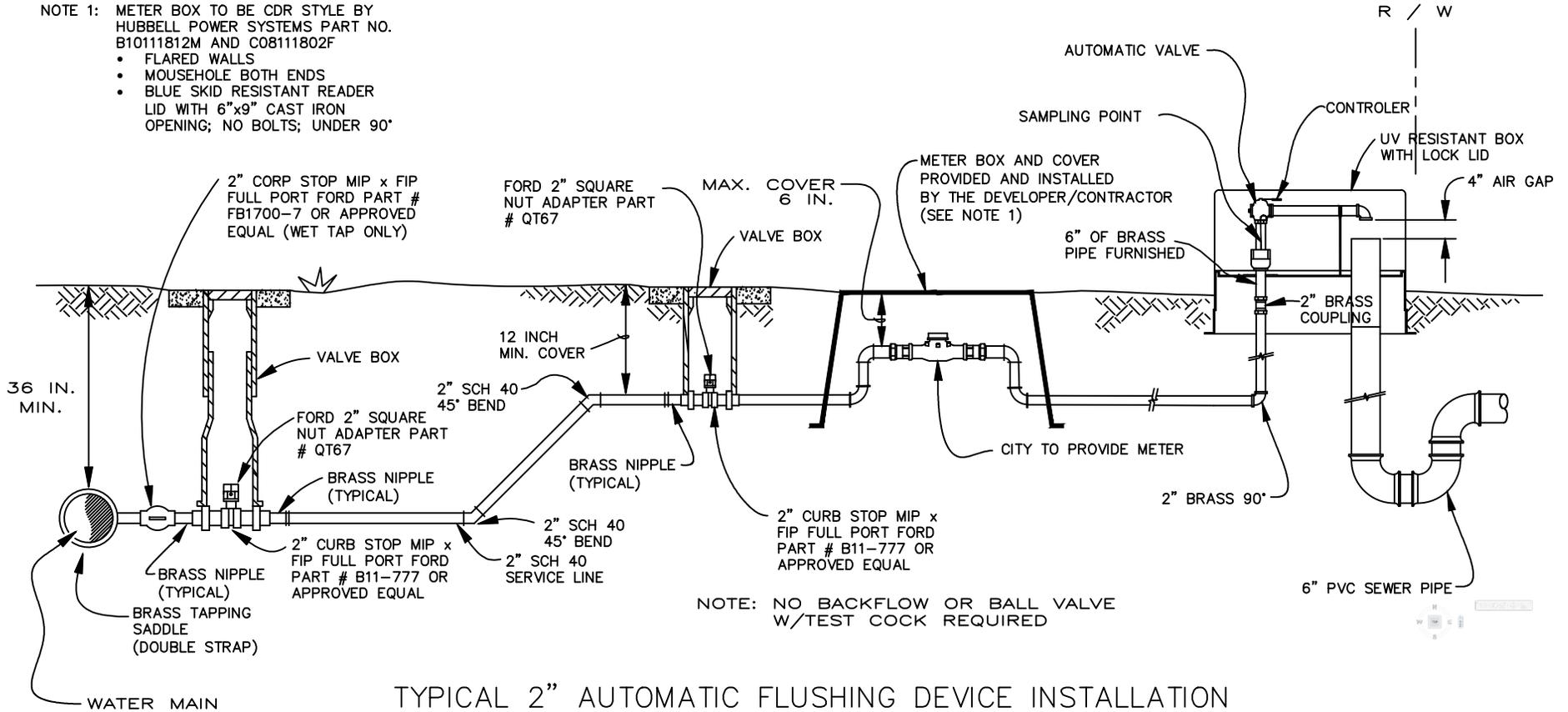
CONTRACTOR SHALL REMOVE SAMPLE POINT ASSEMBLY TO 3/4" CORPORATION STOP AND PLUG UPON WRITTEN ACCEPTANCE OF DISINFECTION BY THE HEALTH DEPARTMENT AND APPROVAL OF THE ENGINEER.

					<b>CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING</b>	WATER DISTRIBUTION	DATE
						WATER MAIN	12/11
						BACTERIOLOGICAL	SHEET NO.
						SAMPLE POINT	<b>W-13</b>
REV.	DATE	DESCRIPTION	BY				



NOTE 1: METER BOX TO BE CDR STYLE BY HUBBELL POWER SYSTEMS PART NO. B10111812M AND C08111802F

- FLARED WALLS
- MOUSEHOLE BOTH ENDS
- BLUE SKID RESISTANT READER LID WITH 6"x9" CAST IRON OPENING; NO BOLTS; UNDER 90°



NOTE: NO BACKFLOW OR BALL VALVE W/TEST COCK REQUIRED

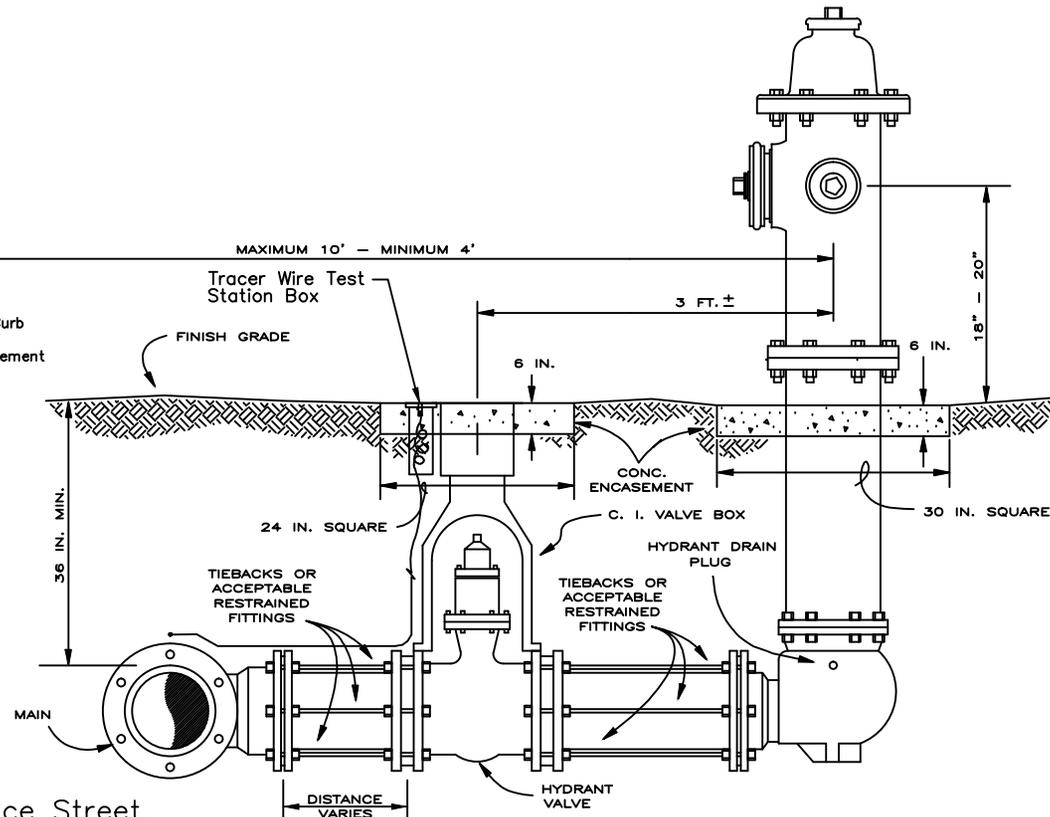
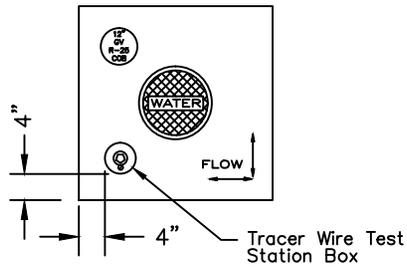
**TYPICAL 2" AUTOMATIC FLUSHING DEVICE INSTALLATION**  
N.T.S.

AUTOMATIC FLUSHING DEVICE SHALL HAVE A 2" BRASS FIP INLET LEADING VERTICALLY INTO A 2" AUTOMATIC SOLENOID VALVE. AUTOMATIC SOLENOID VALVE SHALL HAVE AN INTERNAL, SELF-CLEANING DEBRIS SCREEN AND HAVE A 220 PSI RATING. EACH UNIT SHALL BE FURNISHED WITH A STAND-ALONE CONTROLLER. VALVE CONTROLLER WILL NOT BE REQUIRE A SECOND HAND-HELD DEVICE FOR PROGRAMMING. CONTROLLER MUST HAVE A MINIMUM OF 9 POSSIBLE FLUSHING CYCLES PER DAY. SHALL BE SUBMERSIBLE TO 12 FEET. OPERATE WITH A 12 VOLT BATTERY AND HAVE RESIN-SEALED ELECTRICAL COMPONENTS. SOLENOID SHALL HAVE NO LOOSE PARTS WHEN REMOVED FROM VALVE. EACH UNIT SHALL HAVE A DOUBLE VALVE, ALL BRASS SAMPLING POINT. REMOVAL OF 2" SOLENOID VALVE SHALL BE POSSIBLE VIA A QUICK DISCONNECT BELOW THE VALVE. ALL ABOVE-GROUND COMPONENTS SHALL BE CONTAINED WITHIN A UV-RESISTANT LOCKING COVER AS MANUFACTURED BY KUPFERLE FOUNDRY COMPANY. MODEL 9800WC ST. LOUIS, MO. 1-800-231-3990, OR APPROVED EQUAL.

					<b>CITY OF BRADENTON, FLORIDA</b> <b>PUBLIC WORKS AND UTILITIES</b> <b>DEPARTMENT OF ENGINEERING</b>	<b>WATER DISTRIBUTION</b>		DATE
1		4/12/2012	METER BOX NOTE			SIBE	<b>KUPFERLE FOUNDRY CO.</b> <b>ECLIPSE MODEL #9800WC</b>	
REV.	DATE	DESCRIPTION		BY	<b>FLUSHING DEVICE</b>		SHEET NO. <b>W-14A</b>	

# TYPICAL FIRE HYDRANT SETTING

n.t.s.



**NOTES:**

1. Steamer Connection to Face Street.
2. All Fire Hydrants to have 5 1/4" Valve Seat.
3. All Fire Hydrants to be Painted with Rust-Oleum Aluminum 470402
4. Fire Hydrants Shall be Placed at Street Corners or in the R.O.W. Adjacent to Side Lot Lines Whenever Possible
5. No Utilities Shall be Installed Within 6 Feet of the Fire Hydrant.

ONLY APPROVED HYDRANT  
Kennedy Guardian No. K-81D

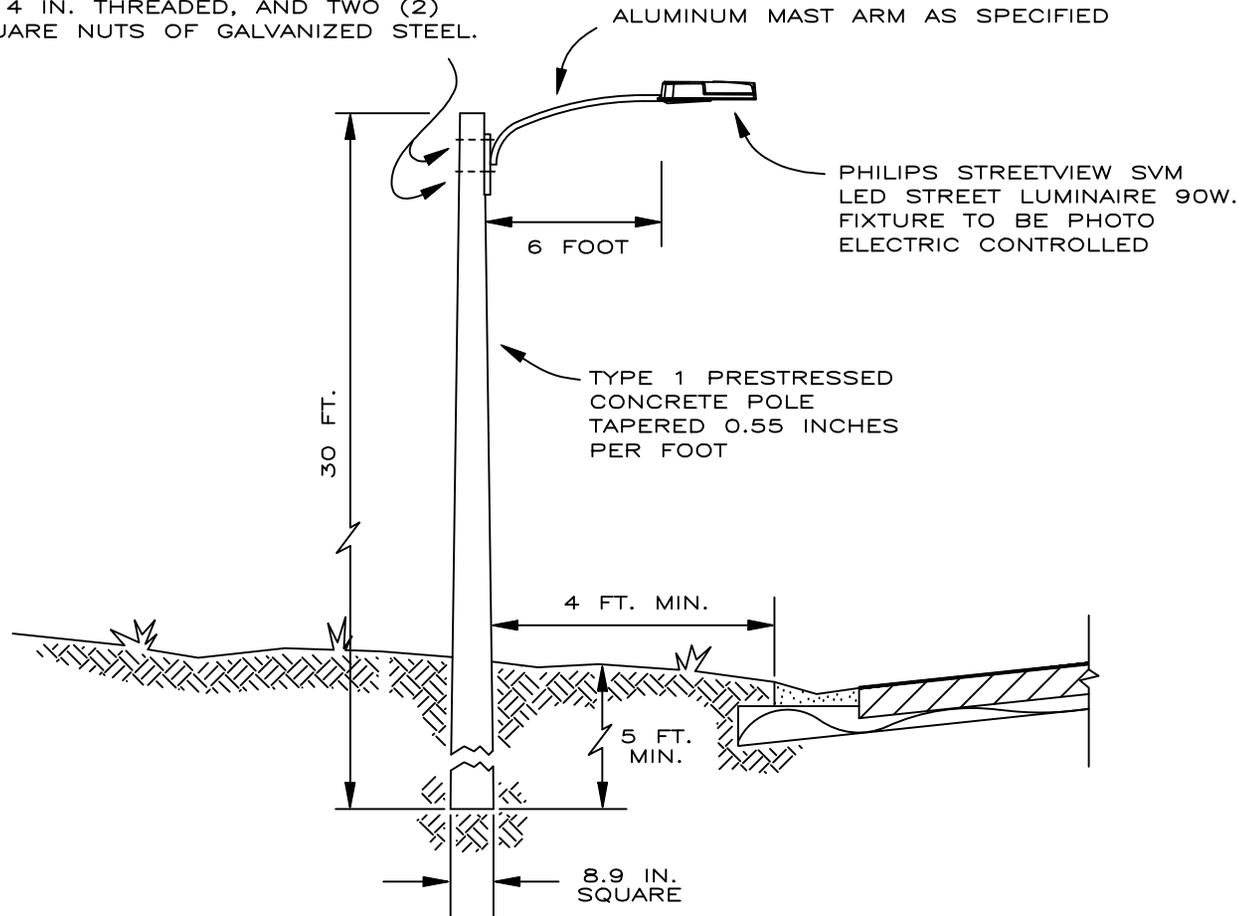
1	4/12/2012	ADDED NOTE 5	SIBE
REV.	DATE	DESCRIPTION	BY



CITY OF BRADENTON, FLORIDA  
PUBLIC WORKS AND UTILITIES  
DEPARTMENT OF ENGINEERING

WATER DISTRIBUTION	DATE
TYPICAL HYDRANT	2/07
SETTING	SHEET NO.
CROSS-SECTION	W-15

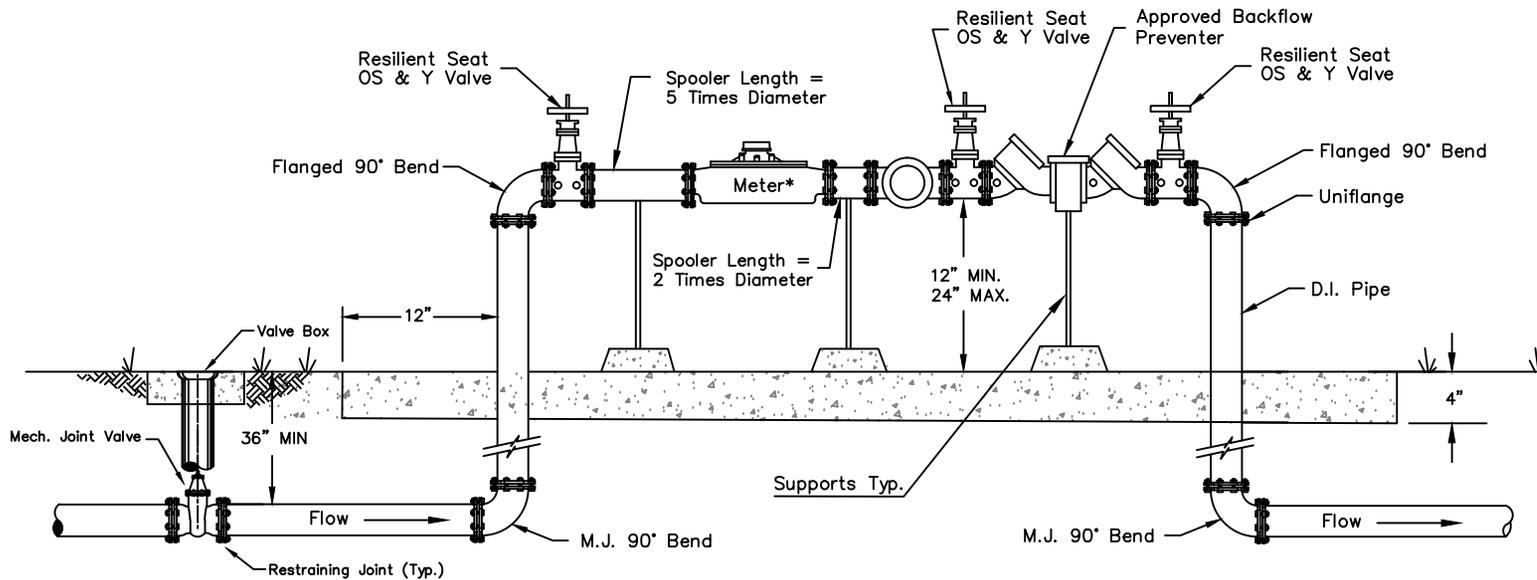
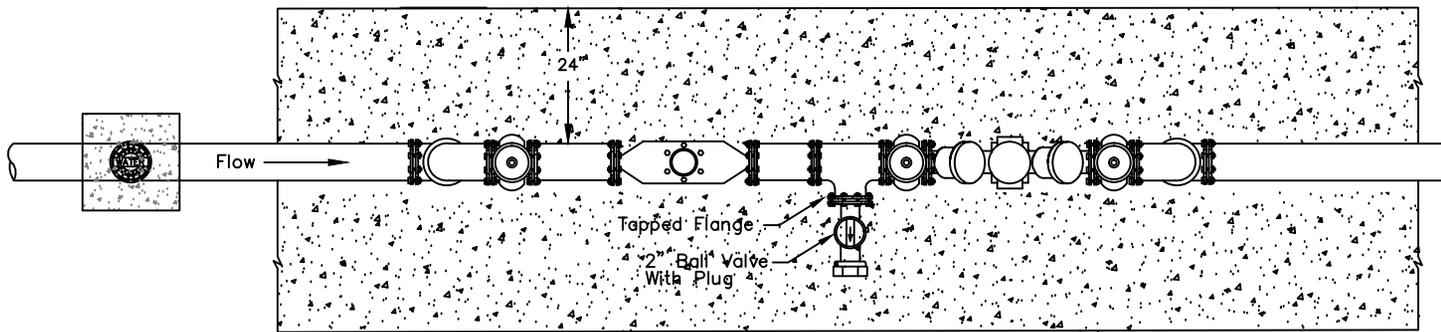
TWO (2) 5/8 IN. X 8 IN. GALVANIZED STEEL BOLTS WITH A MINIMUM OF 4 IN. THREADED, AND TWO (2) SQUARE NUTS OF GALVANIZED STEEL.



**N O T E :**

ELECTRIC SERVICE TO THE STREET LIGHTS SHALL BE OBTAINED FROM THE LOCAL POWER COMPANY TRANSFORMERS AND SHALL BE 120V 60HZ FOR STREET LIGHTS.

					CITY OF BRADENTON, FLORIDA PUBLIC WORKS DEPARTMENT OF ENGINEERING	ELECTRICAL DEPARTMENT	DATE
						TYPICAL LIGHT POLE	2/07
1	8/2013	CHANGED TO LED LUMINAIRE	SIBE				SHEET NO.
REV.	DATE	DESCRIPTION	BY				E-1



TYPICAL RECLAIM WATER METER SET

n.t.s.

NOTE:

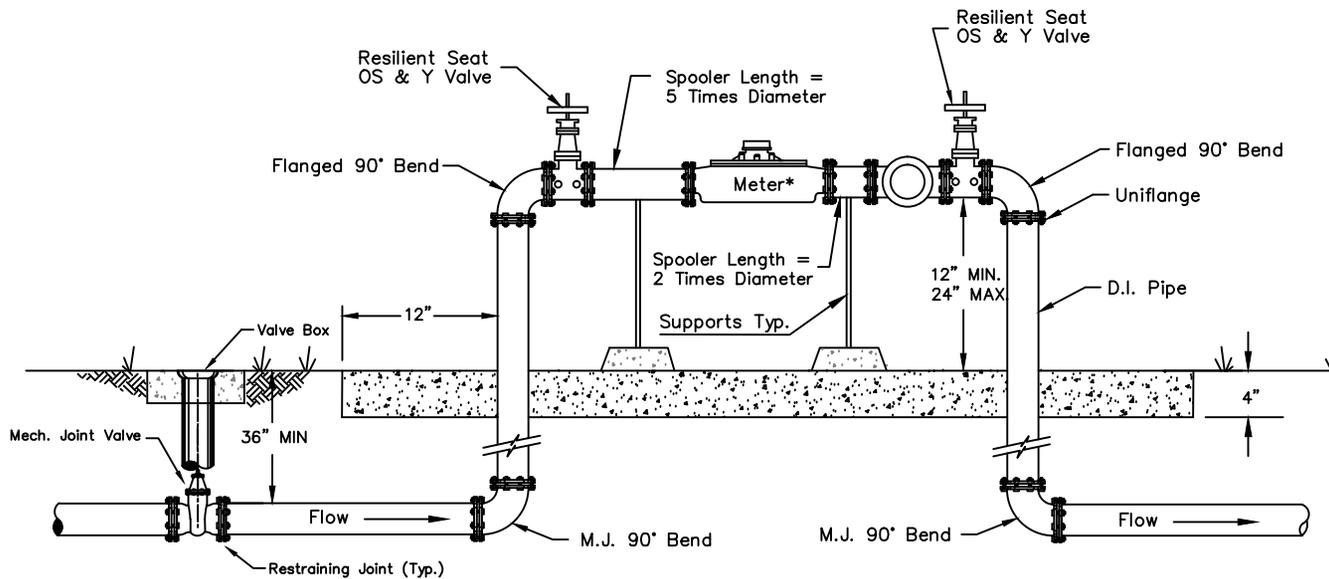
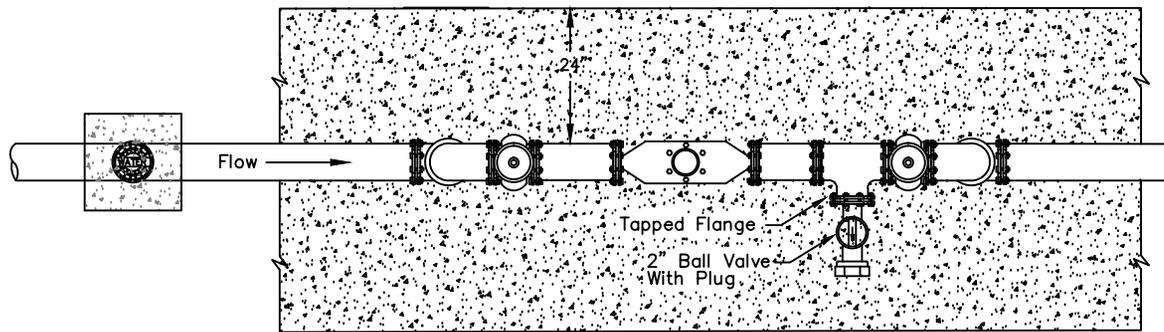
1. O S & Y Valve Handles will be Chained and Locked.
2. Meter Sets will be Painted Pantone-522C Purple Rust-Olium After Installation.

\*APPROVED METER:

1. AVANTI FLANGED TUBE METER.  
MODEL = ML-03

NOTE: ALL NEW 3 INCH OR LARGER METERS AND THE ABOVE GROUND METER ASSEMBLY INSTALLATION SHALL BE COMPLETED BY THE DEVELOPER, CONTRACTOR OR PROPERTY OWNER UNDER THE SUPERVISION OF THE CITY OF BRADENTON PUBLIC WORKS DEPARTMENT WITH THE METER PROVIDED BY THE CONTRACTOR.

					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING		RECLAIM DISTRIBUTION	DATE
							RECLAIM WATER METER SET	8/08
REV.	DATE	DESCRIPTION	BY				90° RISE	SHEET NO.
						4" and LARGER MODELS		RW-1



TYPICAL RECLAIM WATER METER

n.t.s.

NOTE:

1. O S & Y Valve Handles will be Chained and Locked.
2. Meter Sets will be Painted Pantone-522C Purple Rust-Olium After Installation.

\*APPROVED METER:

1. AVANTI FLANGED TUBE METER.  
MODEL = ML-03

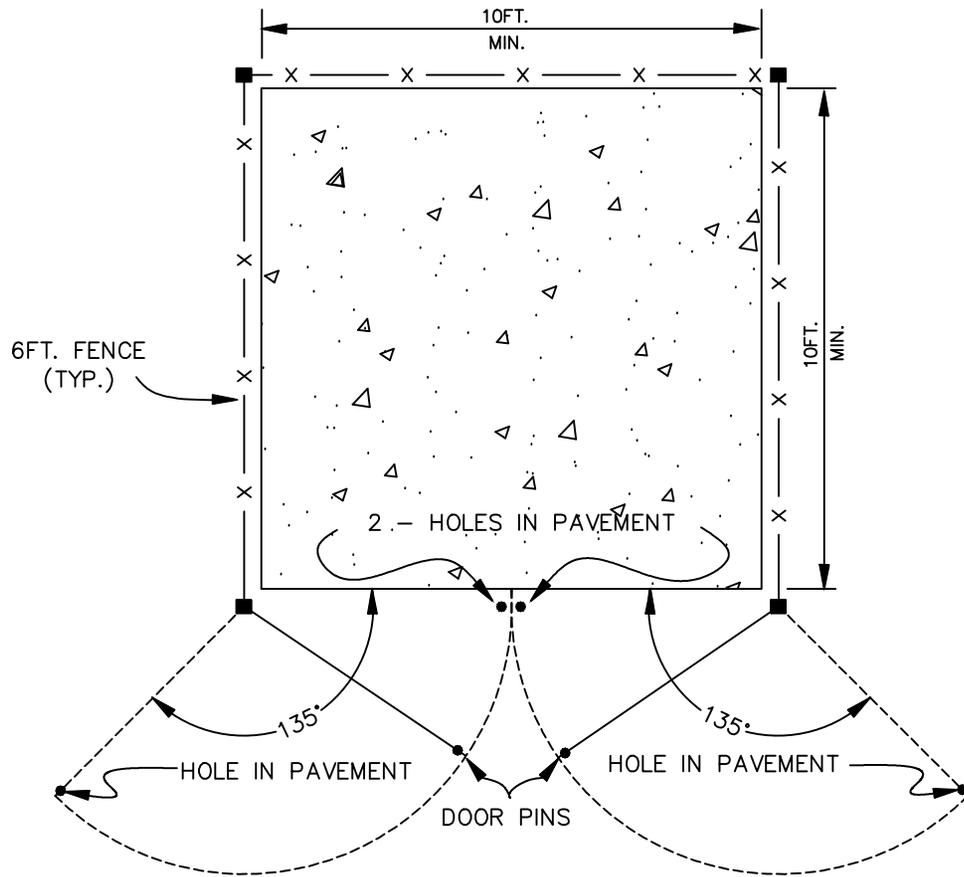
NOTE: ALL NEW 3 INCH OR LARGER METERS AND THE ABOVE GROUND METER ASSEMBLY INSTALLATION SHALL BE COMPLETED BY THE DEVELOPER, CONTRACTOR OR PROPERTY OWNER UNDER THE SUPERVISION OF THE CITY OF BRADENTON PUBLIC WORKS DEPARTMENT WITH THE METER PROVIDED BY THE CONTRACTOR.

REV.	DATE	DESCRIPTION	BY



CITY OF BRADENTON, FLORIDA  
PUBLIC WORKS AND UTILITIES  
DEPARTMENT OF ENGINEERING

RECLAIM DISTRIBUTION	DATE
RECLAIM WATER METER	8/08
90° RISE	SHEET NO.
4" and LARGER MODELS	<b>RW-2</b>



NOTES:

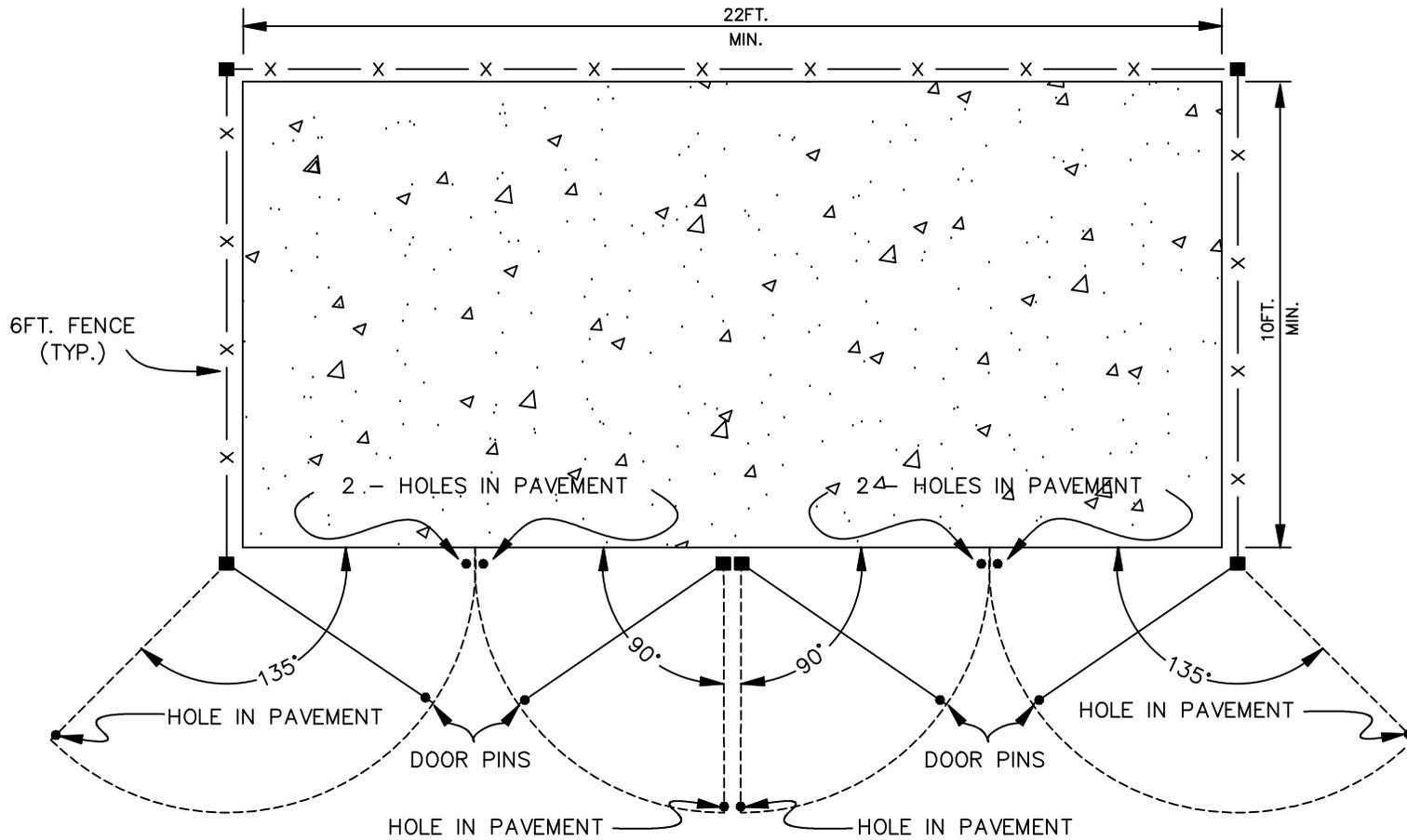
- SLABS SHALL BE A MINIMUM OF 10 FT. BY 10 FT. 3,000 p.s.i. CONCRETE, 6 INCHES THICK WITH 6"x6" WIRE MESH OR FIBER MESH.
- EXISTING ASPHALT PARKING AND DRIVE ISLES MAY BE APPROVED FOR DUMPSTER PAD LOCATION
- OPAQUE FENCING REQUIRED.
- CONCRETE PAD WITH SUMP DRAIN AND GREASE TRAP WILL BE REQUIRED FOR ALL RESTAURANTS.
- NO OVERHEAD OBSTACLES IN IMMEDIATE LOADING AREA (WIRES, LIGHTING, ROOF OVERHANG, TREES etc...)
- THE DUMPSTER SHALL NOT BE LOCATED WITHIN TEN (10) FEET OF ANY BUILDING. IF THE DUMPSTER MUST BE LOCATED WITHIN TEN (10) FEET OF A BUILDING A FIRE SPRINKLER SUPPRESSION SYSTEM WILL BE REQUIRED AND MUST BE APPROVED BY THE FIRE MARSHAL.
- ALL FENCING TO BE LOCATED OUTSIDE OF THE PAD AREA.

REV.	DATE	DESCRIPTION	BY
1	AUG. 2011	ADDED 10' SEPARATION NOTE	SIBE



CITY OF BRADENTON, FLORIDA  
PUBLIC WORKS AND UTILITIES  
DEPARTMENT OF ENGINEERING

STREETS AND ROADS	DATE
DUMPSTER PAD FOR	2/07
FRONT LOADING DUMPSTER	SHEET NO.
WITH 6 FOOT FENCE	SW-1



**NOTES:**

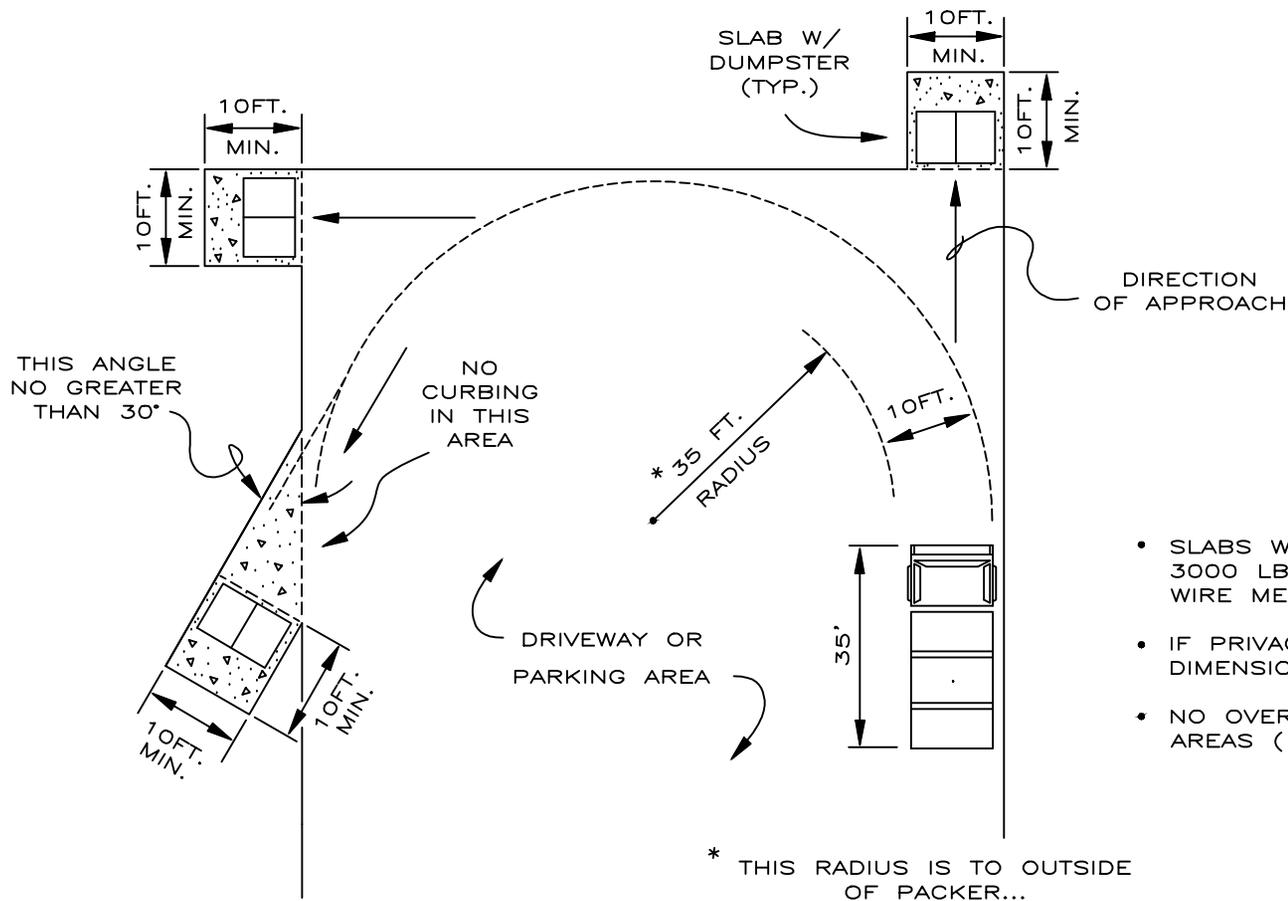
- SLAB SHALL BE A MINIMUM OF 10 FT. BY 22 FT. 3,000 p.s.i. CONCRETE, 6 INCHES THICK WITH 6"x6" WIRE MESH OR FIBER MESH.
- EXISTING ASPHALT PARKING AND DRIVE ISLES MAY BE APPROVED FOR DUMPSTER PAD LOCATION
- OPAQUE FENCING REQUIRED.
- CONCRETE PAD WITH SUMP DRAIN AND GREASE TRAP WILL BE REQUIRED FOR ALL RESTAURANTS.
- NO OVERHEAD OBSTACLES IN IMMEDIATE LOADING AREA (WIRES, LIGHTING, ROOF OVERHANG, TREES etc...)
- THE DUMPSTER SHALL NOT BE LOCATED WITHIN TEN (10) FEET OF ANY BUILDING. IF THE DUMPSTER MUST BE LOCATED WITHIN TEN (10) FEET OF A BUILDING A FIRE SPRINKLER SUPPRESSION SYSTEM WILL BE REQUIRED AND MUST BE APPROVED BY THE FIRE MARSHAL.
- ALL FENCING TO BE LOCATED OUTSIDE OF THE PAD AREA.

REV.	DATE	DESCRIPTION	BY



CITY OF BRADENTON, FLORIDA  
 PUBLIC WORKS AND UTILITIES  
 DEPARTMENT OF ENGINEERING

STREETS AND ROADS	DATE
DOUBLE DUMPSTER PAD	11/11
FRONT LOADING DUMPSTER WITH 6 FOOT FENCE	SHEET NO.
	SW-2



**NOTES:**

- SLABS WILL BE A MINIMUM OF 10 FT. BY 10 FT. 3000 LB. CONCRETE, 6 INCHES THICK WITH 6X6 WIRE MESH
- IF PRIVACY FENCE IS USED, A MINIMUM INSIDE DIMENSION OF 10 FT. BY 10 FT. IS REQUIRED
- NO OVERHEAD OBSTACLES IN IMMEDIATE LOADING AREAS ( WIRES, LIGHTING, ROOF OVERHANG ETC. )

THIS SKETCH IS ONLY TO  
SHOW AREA TO  
ACCOMMODATE PACKERS

					CITY OF BRADENTON, FLORIDA PUBLIC WORKS AND UTILITIES DEPARTMENT OF ENGINEERING	STREETS AND ROADS	DATE
						MINIMUM TURN RADIUS	2/07
REV.	DATE	DESCRIPTION	BY			SANITATION FRONT END	SHEET NO.
						LOADING GARBAGE TRUCK	SW-3