PREFACE

The intent of this manual is to provide guidelines for the standard appurtenances of water and wastewater mains owned and operated by Dallas Water Utilities (DWU). This manual replaces the third edition of “Standard Drawings for Water and Wastewater Construction” by DWU dated February, 2009. The chronological list of events in developing this manual is summarized as follows:

**JAN, 1984  FIRST EDITION:** Standard drawings are compiled into the first edition of the manual.


**FEB. 2009  THIRD EDITION:** The 1998 manual is revised to accommodate new construction standards required by 30 TAC §217. This edition includes minor revisions made in 2003.


**OCTOBER 2011** The 2011 manual includes minor revisions made in 2011. Henceforth, this edition and all subsequent editions will be designated by the year of publication.

**APRIL 2012** The 2012 manual includes minor revisions made in 2011 and 2012. Henceforth, this edition and all subsequent editions will be designated by the year of publication.

**OCTOBER 2012** The 2012 manual includes three new AMI Standard Drawings, a Project Construction Sign Technical Specifications, two new Flush Point drawings, and several revision of some of the existing Standard Drawings.

**OCTOBER 2015** The 2015 manual includes an alternative manhole configuration drawing and several revisions of some if the existing Standards Drawings.

**OCTOBER 2016** The 2016 manual is revised to accommodate new series of Standard Drawings for Cathodic Protection for water mains and modifications to installation requirements for domestic water meters to better accommodate AMI meters.

This edition of “Standard Drawings for Water and Wastewater Construction” is written by Engineering Services, Dallas Water Utilities. Any questions or suggestions regarding to this manual should be forwarded to Engineering Services, Dallas Water Utilities.

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<td>Embedment--Class &quot;E-1&quot; &amp; “E-2” Landfill</td>
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<td>Embedment--Class &quot;E3” High Chemical of Concern Zone</td>
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<tr>
<td>Stabilized Backfill &amp; Rip-Rap Detail For Embankment Slope Protection</td>
<td>---</td>
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<tr>
<td>Project Construction Sign Technical Specifications</td>
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</tbody>
</table>
BY OTHER THAN OPEN CUT-FOR WATER MAINS & WASTEWATER MAINS
(NON Tx.D.O.T. - NON RAILROAD)

GENERAL NOTES

1. By Other Than Open Cut Construction Methods Are To Conform NCTCOG Specifications Item 503.3 Methods Of Jacking, Boring, Or Tunneling & 2010 City of Dallas Addendum To NCTCOG Specs. (Unless Otherwise Noted)
2. Carrier Pipe To Be Made Up Outside The Limits Of By Other Than Open Cut Area, Then Pushed Through Shaft Area.
3. The Carrier Pipe Must Be Restrained (Weighted) In Place Prior To The Placing Of Grout To Prevent The Carrier Pipe From Floating.
4. The Voids Between The Encasement Pipe/TunnelLiner Plate And The Earthen Bore Are To Be Filled With Grout.
5. The Voids Between The Encasement Pipe/TunnelLiner Plate And The Carrier Pipe Are To Be Filled With Grout.
6. Hold-Down Jacks Or Pipe Spacers (If Required By Design) Shall Conform To Page 109. Additionally, Grout Will Be Applied To All Voids Between The Carrier Pipe And Encasement Pipe.
7. When Main Is Installed With An Encasement Pipe Or TunnelLiner Plate, The Carrier Pipe Is To Be Supported By A Class "B" Concrete Cradle As Shown On Page 108.
8. The Contractor Must Submit An Encasement Design For Approval By The Owner. For Encasement Pipes Greater Than 15 Inches (I.D.), The Submittal Must Be Sealed By A Professional Engineer Registered Within The State Of Texas.

NCTCOG Spec: 203.5.7.2 - Tunneling
NCTCOG Spec: 503.3 - Methods Of Jacking, Boring Or Tunneling
2010 DWU Addendum 503.3.3.1 - General
TYPICAL FOR HIGHWAY CROSSING FOR ALL WASTEWATER MAINS &
FOR WATER MAINS 12 in. & UNDER IN DIAMETER

Required Safety Distances
Service Rd. (w/o Curb) 10 ft.
Service Rd. (w/Curb) 5 ft.
Ramp 20 ft.

Existing High Volume Roads
(Interstate Highways)
Pavement Structure
Including Sub-Base

Normal Face Of
Bore Pit

Service Rd. Or Ramp (Low
Volume Service Road)
Pavement Structure
Including Sub-Base

See Note 6 Below

30 ft. min.
See Note 6 & 7

18 in. min.
Or 1/2 Dia. Of Enc. Pipe
Whichever Is Greater

Encasement Pipe

Carrier Pipe

PLACE BY OTHER THAN OPEN CUT
ENCASEMENT PIPE SPECIFICATIONS (See 104 & 105)

GENERAL NOTES

1. Carrier Pipe To Be Made Up Outside The Encasement Pipe And Pushed Through With The Bell Of The Pipe Resting On The Encasement Pipe Or A
   Class "B" Concrete Cradle Where Applicable.
2. Carrier Pipe Shall Be Supported On A Continuous Class "B" Concrete Cradle, Within Corrugated Metal And Flange Liner Encasements.
3. Carrier Pipe Must Be Restrained (Weighted) In Place Prior To The Placing Of Grout To Prevent The Carrier Pipe From Floating.
5. The Contractor Must Submit An Encasement Design For Approval By The Owner. For Encasement Pipes Great Than 15 Inches (I.D.), The Submittal
   Must Be Sealed By A Professional Engineer Restered Within The State Of Texas.
6. Where Circumstances Necessitate The Excavation Of A Bore Pit Or Trench Closer To The Edge Of Pavement Than Set Forth On This Sheet, Guard
   Fence Or Other Approved Protective Devices Will Be Installed For The Protection Of The Traveling Public.
7. If Construction Site Is Wider Than Required Safety Distances And If Side Slopes Will Allow, Construction Of Bore Pits May Be Allowed (With Tx.D.O.T.
   Approval) But Access To Those Pits Must Be By Means Other Than Main Traffic Lanes.
8. In Tunnel Sections, Voids Between Earth Or Rock & Enc. Pipe Shall Be Filled With 1:7 Grout Including 5%-40% Air Entrainment By Pressure Injection.
9. In Tunnel Sections, Voids Between Encasement Pipe And Carrier Pipe Shall Be Filled With 1:7 Grout Including 5%-40% Air Entrainment By Pressure Injection.

REFER TO PAGES: 103 104
105 106
107 108
109

NCTCOG Spec: 509.2 - State Highway Crossing
NCTCOG Spec: 702.2.4 - Quality Of Concrete

HIGHWAY CROSSING
FOR ALL WASTEWATER MAINS &
FOR WATER MAINS 12" & UNDER IN DIAMETER.

DWU 102
DATE OCT. 2015
TYPICAL FOR HIGHWAY CROSSING FOR WATER MAINS OVER 12IN. (30.5CM.) DIAMETER

1. There shall be a minimum of two hold-down jacks or pipe spacers per carrier pipe joint, see 109.
2. Carrier pipe shall be supported on a continuous class "B" concrete cradle, within corrugated metal and flange liner encasements.
3. Construct tapered concrete tunnel approach at each end of enc. pipe. See detail on 108.
4. When standard pipe is made up inside larger enc. pipe, the carrier pipe shall be laid to grade on a class "B" concrete embedment which shall extend to the 1/4 point of the diameter of the carrier pipe. When mechanical joint pipe is used as a carrier pipe in larger enc. pipe, precast concrete blocks may be placed back of each bell. Each block will have minimum dimensions of 9 in. in length by 0.866 "D" in breadth (where "D" is the external diameter of the placed carrier pipe) with a sufficient thickness to clear the bells from the enc. pipe and to bring the carrier pipe to grade.
5. Where circumstances necessitate the excavation of a bore pit or trench closer to the edge of pavement than set forth on this sheet, guard fence or other approved protective devices will be installed for the protection of the traveling public.
6. If construction site is wider than required safety distances and if side slopes will allow, construction of bore pits may be allowed (with Tx.D.O.T. approval) but access to those pits must be by means other than main traffic lanes.
7. The contractor must submit an encasement design for approval by the owner. For encasement pipes greater than 15 inches (I.D.), the submittal must be sealed by a professional engineer registered within the state of Texas.
8. In tunnel sections, voids between earth or rock & enc. pipe shall be filled with 1:7 grout including 5%-40% air entrainment by pressure injection.
9. In tunnel sections, voids between encasement pipe and carrier pipe shall be filled with 1:7 grout including 5%-40% air entrainment by pressure injection.
10. Foam grout is an acceptable type of grout.

REFER TO PAGES:
102, 104, 105, 106, 107, 108 & 109

NCTCOG Spec: 509.2 - State Highway Crossing
NCTCOG Spec: 702.2.4 - Quality Of Concrete
<table>
<thead>
<tr>
<th>ENC. PIPE I.D.</th>
<th>2 FLNG. LINER H-20-L.L.</th>
<th>4 FLNG. LINER H-20-L.L.</th>
<th>CORRUGATED METAL</th>
<th>COUPLING BAND</th>
<th>R.C. CULVERT PIPE</th>
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NOTE:
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HIGHWAY CROSSING ENCASEMENT PIPE, GAUGE, CLASS, COVER
<table>
<thead>
<tr>
<th>ENC. PIPE I.D.</th>
<th>2 FLNG. LINER H-20-L.L.</th>
<th>4 FLNG. LINER H-20-L.L.</th>
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NOTE: ∞ Infinity

HIGHWAY CROSSING ENCASEMENT PIPE, GAUGE, CLASS, COVER

ALT. "B" ALT. "D"

OCT. 2009
STATE HIGHWAY CROSSINGS

All State Highway crossings shall conform to Tx.D.O.T.'s Public Transportation Utility Accommodation Policy Manual Special Specifications, and the following requirements:

All excavations within the State controlled right-of-way shall be back filled by tamping in 6 inch horizontal layers. All surplus material shall be removed from the right-of-way and the excavation area shall be restored flush with the surrounding natural ground.

All areas of sod that are disturbed by the construction operations are to be restored at completion of project. Areas with slopes of 2% or less are to be restored by mulch sodding. Areas with slopes greater the 2% are to be restored with block sod.

Crossings below paved roadways by water and wastewater mains within the State controlled right-of-way are to be installed by boring or tunneling methods. Optional “Wet” bore or “Slurry” bore methods must be approved by Tx.D.O.T. Water or other fluids used in the boring operation may only be used for lubricating the cutting head of the tunneling machine. Bores may not be installed by water jetting or jacking.

Highway crossings for all wastewater lines and water lines 12 inches and under will require an encasement pipe at least 2 inches greater than the largest outside diameter of the carrier pipe. The diameter of the encasement pipe for water lines over 12 inches will be determined by the Design Engineer and indicated on design plans. Encasement pipes will be of sectional liner or smooth bore steel pipe to suit conditions of crossing. Manholes will be specified on design plans. For all mains, voids between encasement and carrier pipe will be filled with 1:7 Grout with 5% Air Entrainment. Regardless of method used for installing the encasement pipe, it will be installed with even bearing throughout its length, and all voids between the encasement pipe and the earth or rock shall be filled with grout. Timber supports shall not be used. Trench excavations and bore pits shall not be closer than 30 feet from the edge of the nearest through traffic lane of High Volume Roadways. For other paved areas (Service Roads), open trenching and bore pits shall not be closer than 10 feet from the edge of pavement or 5 feet from the face of curb. The carrier pipe will be the kind and class designed to carry the water and wastewater. No explosives shall be used within limits of Highway without written permission from the Tx.D.O.T.
Depth of Cover

If depth of cover is insufficient to support live and dead loads, encasement or carrier pipe shall be installed concurrently as excavation of hole progresses so as to leave no more than 2 linear feet of unprotected hole at one time.

Open Cutting Of Pavement

Specific Tx.D.O.T. written approval is required for open cutting of all State Highway pavements. Any approved open cutting of pavement must conform to the special Tx.D.O.T. specification "Utility Facilities Involving Open Cutting of Pavement".
TUNNEL APPROACHES WITH CASING SPACERS

PLAN VIEW

PROFILE VIEW

SECTION A-A
CASING SPACERS SEPARATION
A Maximum Of 10' Separation Between Spacers If Pipe Is To Be Grouted
A Maximum Of 7' Separation Between Spacers If Pipe Is Not To Be Grouted

WOODEN SKIDS

CARRIER PIPE SUPPORT
(TUNNEL)
Hold-Down-Jack

Adjusting Point For

Heavy Steel Washer

Radius Of Encasement Pipe

Fabricate To Match I.D.
Radius Of Encasement Pipe

HOLD-DOWN-JACK

FABRICATION DETAIL

Date: DEC.2001

Machine Bolt

Std. Nut

Fabricate To Match O.D.
Radius Of Carrier Pipe

HOT DIPPED GALVANIZED
AFTER FABRICATION

ALL MATERIALS TO BE

1 1/4" X 8" Std.
Machine Bolt

1 1/4" Std. Nut
( Adjusting Point For
Hold-Down-Jack )

1 1/4" Heavy Steel Washer

Fabricate To Match I.D.
Radius Of Carrier Pipe

2" Galv. Iron Pipe
( Hold-Down-Jack Spacer, Length
As Required For Installation Of
Carrier Pipe In Encasement Pipe )

1 1/2" X 1" Galv. Iron Pipe
( Centering Plug Welded
To Base Plate To Secure
Hold-Down-Jack Spacer )

1/4" Steel Plate
(Fabricate To Match O.D.
Radius Of Carrier Pipe)
Embedment Detail for Non-Pressure Rated Wastewater Mains Below Water Mains

NOTES:
1. Bc = Outside Diameter Of Pipe
2. Bd = Trench Width (See Pg. 112 for Calculation Of "Bd")
SEAL THE SPACE BETWEEN THE ENCASEMENT PIPE AND THE CARRIER PIPE AT EACH END WITH NON-SHRINK CEMENT GROUT OR WITH A MANUFACTURED SEAL TO PREVENT SOIL MIGRATION INTO THE ENCASEMENT PIPE OR FULLY GROUT THE SPACE BETWEEN THE ENCASEMENT PIPE AND THE CARRIER PIPE PER THE DISCRETION OF THE PROJECT ENGINEER.

CARRIER PIPE TO BE SUPPORTED WITHIN ENCASEMENT PIPE AT FIVE FEET INTERVALS WITH CASING SPACERS

EMBEDMENT AND BACKFILL AS SPECIFIED ON PLANS

PROPOSED NON-PRESSURE RATED WASTEWATER MAIN

ENCASMENT PIPE TO BE MIN. 150 P.S.I. PRESSURE RATED AND TWO (2) NOMINAL SIZES LARGER THAN CARRIER PIPE

ENCASMENT DETAIL FOR NON-PRESSURE RATED WASTEWATER MAINS ABOVE WATER MAINS
SECTION A-A

LARGER THAN CARRIER PIPE AND TWO (2) NOMINAL SIZES
MIN. 150 P.S.I. PRESSURE RATED ENCASEMENT PIPE TO BE AS SPECIFIED ON PLANS

EMBEDMENT AND BACKFILL LARGER THAN CARRIER PIPE

MIN. 18 FT. PRESSURE RATED ENCASEMENT PIPE CENTERED BELOW EXISTING WASTEWATER MAIN

CARRIER PIPE TO BE SUPPORTED WITHIN ENCASEMENT PIPE AT FIVE FEET INTERVALS WITH CASING SPACERS

SECTIONAL PLAN VIEW

ENCASEMENT DETAIL FOR PROPOSED WATER MAINS BELOW WASTEWATER MAINS
TRENCH WIDTH FOR WATER & WASTEWATER MAINS ARE LIMITED TO "Bd" AS CALCULATED BY THE FOLLOWING FORMULAS:

For 12" Diameter Pipe and Smaller:

Minimum - "Bd" (Trench Width) = Outside Diameter of Pipe Bell plus 12 inches or a minimum of 24", Whichever is greater

Maximum - "Bd" (Trench Width) = Shall Not Exceed 32"

For Pipe Diameters Greater Than 12" to 24":

"Bd" (Trench Width) Shall Be Limited To Outside Diameter of Pipe Bell plus 12 inches

For Pipe Diameters Greater Than 24" to 72":

"Bd" (Trench Width) Shall Be Limited To Outside Diameter of Pipe plus 24 inches

For Pipe Diameters Greater Than 72":

"Bd" (Trench Width) Shall Be Limited To Outside Diameter of Pipe Times (X) 1.25 plus 12 inches

(REFER TO PAGES 113 THRU 119 FOR USAGE OF "Bd")
SELECT OR GRANULAR MATERIAL COMPACTED TO 90% OF STD. PROCTOR DENSITY.

NOTES:
1. LF = LOAD FACTOR TO BE USED TO DETERMINE 3 EDGE BEARING BASED ON TYPE OF EMBEDMENT.
2. FREE-FALL OF CONCRETE NOT TO EXCEED 5 FT. MAXIMUM.
3. P = Rho FOR STEEL ℩
4. Bc = OUTSIDE DIAMETER OF PIPE
5. Bd = TRENCH WIDTH
6. MIN. EMBEDMENT PLACEMENT TO BE MEASURED FROM EDGE OF PIPE BELL

CLASS "A"

CLASS "B" CONCRETE CRADLE
PLAIN CONC. LF 2.8
REINF. CONC. LF 3.4 P=0.4%

CLASS "B" CONCRETE CAP
PLAIN CONC. LF 2.8
REINF. CONC. LF 3.4 P=0.4%
REINF. CONC. LF 4.8 P=1.0%

CLASS "A-1"

CLASS "B" PLAIN OR REINFORCED CONCRETE.
SELECT OR GRANULAR MATERIAL COMPACTED TO 90% OF STD. PROCTOR DENSITY

GRANULAR MATERIAL COMPACTED TO 90% OF STD. PROCTOR DENSITY

COMPACTED CRUSHED STONE, STD. GRADATION

COMPACTED CRUSHED STONE, FINE GRADATION

CLASS "B"

N.T.S.

L.F. = 1.9
E' = 700

CLASS "B+"

N.T.S.

BEDDING ANGLE 150°
L.F. = 1.9
E' = 700

CLASS "B-1"

N.T.S.

NOTES:

1. Bc = OUTSIDE DIAMETER OF PIPE
2. Bd = TRENCH WIDTH
3. L.F. = LOAD FACTOR TO BE USED TO DETERMINE 3 EDGE BEARING BASED ON TYPE OF EMBEDMENT.
4. MIN. EMBEDMENT PLACEMENT TO BE MEASURED FROM EDGE OF PIPE BELL

(REFER TO PAGE 112 FOR CALCULATION OF "Bd")
CRUSHED STONE
FINE GRADATION

CLASS "B-2"

Bc

CONTINUED SELECT OR GRANULAR
MATERIAL COMPACTED TO 90% OF
STD. PROCTOR DENSITY

6" MIN. BELOW PIPE BELL

¾ Bc

COMPACTED CRUSHED STONE
FINE GRADATION

12" MIN. ABOVE PIPE BELL

VARES

CLASS "B-3"

Bc

SAND, FINE GRADATION

CLASS "B-4"

Bc

SAND, STD. GRADATION

NOTES:
1. Bc = OUTSIDE DIAMETER OF PIPE
2. Bd = TRENCH WIDTH
3. MIN. EMBEDMENT PLACEMENT TO BE
   MEASURED FROM EDGE OF PIPE BELL

(REFER TO PAGE 112 FOR CALCULATION OF "Bd")
SELECT OR GRANULAR MATERIAL COMPACTED TO 90% STD. PROCTOR DENSITY

1/6 Bc

CLASS "C"

Bc = OUTSIDE DIAMETER OF PIPE
Bd = TRENCH WIDTH
E' = 300
L.F. = 1.5
BEDDING ANGLE 75°

N.T.S.

GRANULAR MATERIAL COMPACTED TO 90% OF STD. PROCTOR DENSITY

12" MIN. ABOVE PIPE BELL

CLASS "C+"

Bc

V A R I E S

N.T.S.

E' = 300
L.F. = 1.5
BEDDING ANGLE 75°

GRANULAR MATERIAL COMPACTED TO

CLASS "C-1"

1/6 Bc

SAND, FINE GRADATION

12" MIN. ABOVE PIPE BELL

V A R I E S

N.T.S.

Note:
1. Bc = OUTSIDE DIAMETER OF PIPE
2. Bd = TRENCH WIDTH
3. L.F. = LOAD FACTOR TO BE USED TO DETERMINE 3 EDGE BEARING BASED ON TYPE OF EMBEDMENT.
4. MIN. EMBEDMENT PLACEMENT TO BE MEASURED FROM EDGE OF PIPE BELL

(REFER TO PAGE 112 FOR CALCULATION OF "Bd" )
NOTES:
1. Bc = OUTSIDE DIAMETER OF PIPE
2. Bd = TRENCH WIDTH
3. L.F. = LOAD FACTOR TO BE USED TO DETERMINE 3 EDGE BEARING BASED ON TYPE OF EMBEDMENT.
4. MIN. EMBEDMENT PLACEMENT TO BE MEASURED FROM EDGE OF PIPE BELL

(SELECT MATERIAL COMPACTED TO 90% STD. PROCTOR DENSITY.)

(SAND COMPACTED TO 90% STD. PROCTOR DENSITY.)

CLASS "C-2"

CLASS "D+"

EMBEDMENT
CLASS "C-2" & "D+"

(REFER TO PAGE 112 FOR CALCULATION OF "Bd")

DAT

OCT. 2011
CLASS "G" N.T.S. L.F. = 4.2

NOTES:
1. Bc = OUTSIDE DIAMETER OF PIPE
2. Bd = TRENCH WIDTH
3. LF. = LOAD FACTOR TO BE USED TO DETERMINE 3 EDGE BEARING BASED ON TYPE OF EMBEDMENT.
4. FREE-FALL OF CONCRETE NOT TO EXCEED 5 FT. MAXIMUM.
5. MIN. EMBEDMENT PLACEMENT TO BE MEASURED FROM EDGE OF PIPE BELL

(REFER TO PAGE 112 FOR CALCULATION OF "Bd" )

EMBEDMENT CLASS "G" & "G-1"
CLASS "B-1a"

CLASS "B-2a"

CLASS "B-5"

FINE GRADATION
CRUSHED STONE, COMPACTED

SELECT OR FINE GRANULAR MATERIAL COMPACTED TO 90% OF STD. PROCTOR DENSITY

NOTES:
1. Bc = OUTSIDE DIAMETER OF PIPE
2. Bd = TRENCH WIDTH
3. MIN. EMBEDMENT PLACEMENT TO BE MEASURED FROM EDGE OF PIPE BELL

(REFER TO PAGE 112 FOR CALCULATION OF "Bd")

EMBEDMENT
CLASS "B-1a", "B-2a" & "B-5"

DWU
119

DATE
OCT. 2011
CLAY DAMS SHALL BE PLACED AT CONTAMINATION PLUME LIMITS TO PREVENT CONTAMINANT CONVEYANCE THROUGH UTILITY TRENCH. PLACEMENT AND LOCATION OF DAMS ARE SUBJECT TO DWU APPROVAL.

CLAY DAM PLAN VIEW

CLAY DAM (MIN. IMPERVIOUSNESS = $10^{-6}$ CM/S)
BENTONITE OR OTHER TYPES OF MONTMORILLONITE ARE ACCEPTABLE CLAYS. OTHER TYPES OF CLAY MUST BE APPROVED BY OWNER.

CLAY TO EXTEND TO TOP OF TRENCH

COMPACTED CRUSHED STONE PER EMBEDMENT SPECIFICATIONS

BOTTOM OF TRENCH

SECTION A-A'

REFER TO PAGES 112, 113, 114, 115, 116, 117, 118 & 119

CONTAMINATED SOIL
CLAY CUT-OFF DAM

DWU 119A

OCT. 2011
CEMENT STABILIZED SAND EMBEDMENT
TRENCH E-2 (TRASH ZONE)

DIMENSIONS NOTES:
1. D = Inside Diameter Of Containment Pipe
2. Bd = Trench Width Per Standard Drawing 112

Note 1: Cement stabilized sand shall have a minimum of 12% cement per cubic yard of cement stabilized sand mixture, based on loose dry weight volume (at least 3 bags of cement per cubic yard of mixture).

REFER TO PAGE 112

EMBEDMENT
CLASS "E-1" & "E-2" LANDFILL

OCT. 2011
Note 1: Cement stabilized sand shall have a minimum of 12% cement per cubic yard of cement stabilized sand mixture, based on loose dry weight volume (at least 3.0 bags of cement per cubic yard of mixture). Minimum final permeability to be $10^{-6}$ cm/s.
DETAIL SHOWN FOR CREEK CROSSING
(TYPICAL FOR EMBANKMENT SLOPE PROTECTION)

Limits as Indicated on Design Plans

Contour To Match Creek Channel
(Or Slope of Embankment)

Dry Rip-Rap, Type "A"
NCTCOG Spec: 803.3

Stabilized Backfill
NCTCOG Spec: 504.6.2

Stabilized Backfill
NCTCOG Spec: 504.6.2

Proposed Water or Wastewater Main

Proposed Embedment
As Specified On Plans

*OPTION
Dry Rip-Rap As Indicated on Design Plans.
Dry Rip-Rap to Span Disturbed Trench
Width Area Plus 1 Ft. on Each Side.
**PROJECT CONSTRUCTION SIGN**

---

**PROJECT SIGN TECHNICAL SPECIFICATIONS**

1. **1/2" PRE-FINISHED (WHITE) SIGN GRADE, MDO PLYWOOD**
2. **DALLAS SYMBOL AND THE DALLAS PLAN SYMBOL** - LEFT-HAND SECTION OF SIGN
   - Shaded Area - Painted With Bulletin Color Type, Sign Grade Enamel.
   - Sign Color Per Department As Shown Below:
     - a) Public Works And Transportation Department - Pantone 1945 (3M Burgundy), 4010106 Carmine, Or Approved Equal
     - b) Dallas Water Utilities Department - Pantone 286 (3M Royal Blue), 4010152 Light Blue, Or Approved Equal
     - c) Parks Department - Pantone 5753 (3M Moss Green), 4010144 Medium Green, Or Approved Equal
     - d) Equipment And Building Services Department - Pantone 1595 (3M Burnt Orange), 4010124 Orange, Or Approved Equal
   - 2. **Shaded Area Lettering**
     - a) White Paint (101-L Polar White) On Colored Background
     - 3. **PROJECT INFORMATION** - RIGHT-HAND SECTION OF SIGN
       - 1. **Vinyl Lettering** (Used On Multi-Segment Projects, Specified On Purchase Order)
         - a) Background Color - White, Primarily Use 1-3/4" Galvanized Screws 2 Ft. OC.
       - 2. **Painted Lettering** (Used On Facility Projects, Specified On Purchase Order)
         - a) Background Color - White, Primarily Use 1-3/4" Galvanized Screws 2 Ft. OC.
       - 4. **STRIPES AND BORDERS** - BLACK REFLECTIVE VINYL
         - APPROX. 1/2" WIDE
       - 5. **LETTERING TYPE** - ARIAL BLACK, SIZES AS SPECIFIED ON THIS DRAWING SPECIFICATION
       - 6. **FRAME TO BE PAINTED WHITE**
       - 7. **LUMBER** - TREATED

---

**PROJECT SIGN FRAME**

---

**NOT TO SCALE**

---

**TECHNICAL SPECIFICATIONS**

1. **BOARD** - 1/2" PRE-FINISHED (WHITE) SIGN GRADE, MDO PLYWOOD
2. **FRAME TO BE PAINTED WHITE**
3. **SIDE**
   - a) White Paint (101-L Polar White) On Colored Background
   - b) Black Paint (199-L Black)
   - b) **LETTERING**
     - a) Background Color - White, Primarily Use 1-3/4" Galvanized Screws 2 Ft. OC.
     - 2. **Shaded Area Lettering**
       - a) White Paint (101-L Polar White) On Colored Background
       - b) **LETTERING**
         - a) Background Color - White, Primarily Use 1-3/4" Galvanized Screws 2 Ft. OC.
       - 4. **STRIPES AND BORDERS** - BLACK REFLECTIVE VINYL
         - APPROX. 1/2" WIDE
       - 5. **LETTERING TYPE** - ARIAL BLACK, SIZES AS SPECIFIED ON THIS DRAWING SPECIFICATION
       - 6. **FRAME TO BE PAINTED WHITE**
       - 7. **LUMBER** - TREATED
PART 2
(Series 200)

WATER MAIN CONSTRUCTION
# PART 2
## WATER MAIN CONSTRUCTION

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5/8" Meter Box

2" Meter Box

METER BOX (5/8" and 2")
WITH DUCTILE RING AND COVER

DWU

DATE

OCT. 2013
METER BOX (5/8" and 2"
WITH PLASTIC AMI LID

5/8" Meter Box
2" Meter Box

N.T.S.

DWU 200A
DATE  OCT. 2013
NOTE:
Water Services Greater Than 30 L.F. From The Main Must Be 1" Copper (Min.) Or Same Size As Meter, Whichever Is Greater.

Pavement

$\frac{3}{4}\"$ Compression Corp. Cock
Taps On Mains As Per NCTCOG Spec: 502.10.3.1. Location Of Tap To Be At 45°. All Taps To Be Made With A.W.W.A Tapered Threads.

METER ALIGNMENT CRITERIA
VERTICAL: The private side ferrule nut or flange must be 10" below the meter box lid.
HORIZONTAL: The deadhead must be 2" from the inside of the meter box.

REPLACEMENT MAINS:
Contractor To Install New Deadhead In This Position, Replace Meter Box & Reconnect Service To Existing Meter. Adjust The Meter As Required To Meet The Meter Alignment Criteria.

WATER MAIN IN STREET

$\frac{3}{4}\"$ Copper Service Line Soft Copper (Type K)

SUBDIVISIONS (PRIVATE CONTRACTS)
Contractor To Install New Deadhead In This Position, New Meter Box, Meter, And Connection To Service Line By Others.

NCTCOG Spec: 502.10.3.1 - Taps And Tap Assemblies In Water Conduit
2010 DWU Addendum:
502.10.3.1.1.DWU - Taps Through 502.10.3.1.7.DWU - Tapping Of PVC Pipe

NOTE:
Water Services Greater Than 30 L.F. From The Main Must Be 1" Copper (Min.) Or Same Size As Meter, Whichever Is Greater.

Pavement

$\frac{3}{4}\"$ Compression Corp. Cock
Taps On Mains As Per NCTCOG Spec: 502.10.3.1. Location Of Tap To Be At 45°. All Taps To Be Made With A.W.W.A Tapered Threads.

METER ALIGNMENT CRITERIA
VERTICAL: The private side ferrule nut or flange must be 10" below the meter box lid.
HORIZONTAL: The deadhead must be 2" from the inside of the meter box.

REPLACEMENT MAINS:
Contractor To Install New Deadhead In This Position, Replace Meter Box & Reconnect Service To Existing Meter. Adjust The Meter As Required To Meet The Meter Alignment Criteria.

$\frac{3}{4}\"$ Compression Corp. Cock

WATER MAIN IN PARKWAY

$\frac{3}{4}\"$ Copper Service Line Soft Copper (Type K)

SUBDIVISIONS (PRIVATE CONTRACTS)
Contractor To Install New Deadhead In This Position, New Meter Box, Meter, And Connection To Service Line By Others.

WATER SERVICE INSTALLATIONS
(SIDEWALK 5' FROM CURB)

$\frac{3}{4}\"$ Service Lines To Have A Minimum Of 3" Separation.
METER ALIGNMENT CRITERIA

VERTICAL: The private side ferrule nut or flange must be 9½" below the meter box lid.
HORIZONTAL: The deadhead must be 2" from the inside of the meter box.

NOTE:
Water Services Greater Than 30 L.F. From The Main Must Be 1" Copper (Min.) Or Same Size As Meter, Whichever Is Greater.

REPLACEMENT MAINS:
Contractor To Install New Deadhead In This Position, Replace Meter Box & Reconnect Service To Existing Meter. Adjust The Meter As Required To Meet The Meter Alignment Criteria.

Taps On Mains As Per NCTC OG Spec: 502.10.3.1. Location Of Tap To Be At 45°. All Taps To Be Made With A.W.W.A Tapered Threads.

1" Copper Service Line Soft Copper (Type K)

SUBDIVISIONS (PRIVATE CONTRACTS):
Contractor To Install New Deadhead In This Position. New Meter Box, Meter, And Connection To Service Line By Others.

NCTC OG Spec: 502.10.3.1 - Taps And Tap Assemblies In Water Conduit
2010 DWU Addendum: 502.10.3.1.1.DWU - Taps Through 502.10.3.1.7.DWU - Tapping Of PVC Pipe

WATER MAIN IN STREET

METER ALIGNMENT CRITERIA

VERTICAL: The private side ferrule nut or flange must be 9½" below the meter box lid.
HORIZONTAL: The deadhead must be 2" from the inside of the meter box.

NOTE:
Water Services Greater Than 30 L.F. From The Main Must Be 1" Copper (Min.) Or Same Size As Meter, Whichever Is Greater.

REPLACEMENT MAINS:
Contractor To Install New Deadhead In This Position, Replace Meter Box & Reconnect Service To Existing Meter. Adjust The Meter As Required To Meet The Meter Alignment Criteria.

Taps On Mains As Per NCTC OG Spec: 502.10.3.1. Location Of Tap To Be At 45°. All Taps To Be Made With A.W.W.A Tapered Threads.

1" Copper Service Line Soft Copper (Type K)

SUBDIVISIONS (PRIVATE CONTRACTS):
Contractor To Install New Deadhead In This Position. New Meter Box, Meter, And Connection To Service Line By Others.

NCTC OG Spec: 502.10.3.1 - Taps And Tap Assemblies In Water Conduit
2010 DWU Addendum: 502.10.3.1.1.DWU - Taps Through 502.10.3.1.7.DWU - Tapping Of PVC Pipe

WATER MAIN IN PARKWAY

1" WATER SERVICE INSTALLATIONS
(SIDWALK 5' FROM CURB)
METER ALIGNMENT CRITERIA
VERTICAL: The private side ferrule nut or flange must be 1" below the meter box lid.
HORIZONTAL: The deadhead must be 2" from the inside of the meter box.

WATER MAIN IN STREET

METER ALIGNMENT CRITERIA
VERTICAL: The private side ferrule nut or flange must be 1" below the meter box lid.
HORIZONTAL: The deadhead must be 2" from the inside of the meter box.

WATER MAIN IN PARKWAY

1 1/2" OR 2" WATER SERVICE INSTALLATIONS
(SIDEWALK 5' FROM CURB)
NOTE:
Water Services Greater Than 30 L.F. From The Main Must Be 1" Copper (Min.) Or Same Size As Meter, Whichever Is Greater.

1)¾" & 1" Service Lines To Have A Minimum Of 3' Separation.
2) 1½" & 2" Service Lines To Have A Minimum Of 4' Separation.

WATER MAIN IN STREET

WATER MAIN IN PARKWAY
Installation For Advanced Metering Infrastructure (AMI) Meter

1. The Contractor Shall Not Remove, Damage, Or Otherwise Disturb The AMI Meter Endpoint Components Except By Direction Of The Meter Reading Operation (MRO) Technician. The Installer Shall Be Liable For The Replacement Cost Of Any Lost Or Damaged AMI Components.

2. For Meters 2" Or Smaller:
   The Contractor Shall Install A New Meter Box With A New Meter AMI Lid For Water Meters 2" And Smaller In Existing And Proposed AMI Areas With The Following Configuration As Applicable:
   - For ¼" to 1" Meters: 12" Water Meter AMI Lid As Per the Approved Material List.
   - For 1½" to 2" Meters: 20" Water Meter AMI Lid As Per the Approved Material List.

   The Contractor Shall Also Return The Existing AMI Lids From Existing AMI Area TO DWU MRO For All Meters 2" And Smaller.

   For Meters 3" Or Larger:
   The Contractor Shall Either Connect To The Existing Meter Vault Or Construct A New Meter Vault As Specified On The Plans.

3. All Meters In The Existing And Proposed AMI Area Shall Be AMI Ready Meters As Furnished By DWU. A Non AMI Ready Meter Shall Be Replaced With An AMI Ready Meter By DWU.

4. The Contractor Shall Contact DWU MRO Five (5) Working Days In Advance At 214-670-5537 And By Email At DWUMRO@dallascityhall.com Before Any Removal, Disconnection, Reconnection, Or Installation Of AMI Endpoint Components.
Fixed Network Or Mobile System
(100W Endpoint Or Approved Equal)

100W Endpoint

Plan View

12" Or 20" AML Lid

Spring & Plunger Keyhole

Finished Installation With 100W Endpoint Configuration

Cradle

200W Endpoint With External Mounting Cradle

Spring & Plunger Keyhole

12" Or 20" AML Lid

Finished Installation With 200W Endpoint Configuration

Refer to Pages 206B & 206D

AMI Meter Installation Details
For 2" Or Smaller Meters
Fixed Network Or Mobile System
(100W Endpoint Or Approved Equal)

Fixed Network
(200W Endpoint Or Approved Equal)

Plan View

Profile View

AMI Meter Installation Details
For 3" And Larger Meters

REFER TO PAGES 206B & 206C
CONCRETE SIDEWALK

PAVEMENT

5/8" METER BOX

MIN. 12"

SMALL PLASTIC METER BOX WITH LID

RISING GRADE

2" COPPER SERVICE PIPE
SOFT COPPER (TYPE-K)

WATER MAIN

NOTE:
CENTER FLUSH POINT
WITH METER BOX IN
EXIST./PROP. SIDEWALK

MANUAL FLUSH POINT

2 INCH MINIMUM
OR
LARGER/SMALLER IF STATED ON PLANS
N.T.S.

MANUAL FLUSH POINT
INSTALLATION

DWU

DATE

OCT. 2012
**AUTOMATIC FLUSHING DEVICE**

MUST BE KUPFERLE MODEL 9800-WC ECLIPSE, OR APPROVED EQUAL

N.T.S.

* CONTRACTOR SHALL CONTACT DISTRIBUTION AT 214-670-8007 BEFORE INSTALLING THE AUTOMATIC FLUSH POINT.

1. UNLESS OTHERWISE SPECIFIED, A 2" AUTOMATIC FLUSHING DEVICE SHALL BE CONNECTED TO A 2" MANUAL FLUSH POINT USING 1" TYPE K COPPER PIPE.

2. 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.

3. 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 9 POSSIBLE FLUSHING CYCLES PER DAY, SHALL BE SUBMERSIBLE TO 12 FEET, OPERATE 9 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.

4. ALL ABOVE-GROUND COMPONENTS SHALL BE CONTAINED WITHIN A UV-RESISTANT LOCKING COVER KUPFERLE FOUNDRY COMPANY. 2511 NORTH 9TH STREET ST. LOUIS, MO. 63102 1-800-231-3990.

**NOTES:**

- 5/8" METER BOX
- 1" STOP
- 2" x 1" COPPER TO AUTO FLUSHER
- 2" COPPER SERVICE PIPE
- 1" TYPE K COPPER PIPE
- 2" COPPER COMPRESSION BALL VALVE CURB STOP
- 1" BRASS CLOSED NIPPLES
- 1" BRASS IP FEMALE TEE
- 2" COPPER IP FEMALE TEE
- 2" COPPER AUTOMATION COCK (COMPRESSION)
- 2" COPPER AUTOMATION COCK (COMPRESSION)
- 1" BRASS BALL VALVE CURB STOPS
- 1" BRASS IP MALE COMPRESSION COUPLINGS
- 2"x1" BRASS BUSHING REDUCERS
- 2" BRASS IP FEMALE 90 DEGREES
- 2" BRASS AUTOMATIC FLUSHER
- 2" PVC AUTOFLUSHER
- 6" CRUSHED ROCK FOUNDATION
- 6" PVC SEWER PIPE
PLAN VIEW OF
AUTO. READY FLUSH POINT PLACEMENT

SIDEWALK OFFSET FROM CURB

20" DIAMETER Meter Box (5/8" METER BOX)
SEE STD. DWG. 200 & 207

2" 90° COMPRESSION FITTING

2" CORPORATION COCK (COMPRESSION)

2" COPPER SERVICE PIPE
SOFT COPPER (TYPE-K)

6" PVC COMPRESSION FITTING

BAR DITCH WITH
NO CURB/GUTTER

SIDEWALK IMMEDIATELY
ADJACENT TO CURB

ELEVATION VIEW
N.T.S.

- SIDEWALK: SET 1FT MIN BEHIND SIDEWALK
- NO SIDEWALK: SET 2FT MIN BEHIND CURB
  INSTALL 2 - 6" STEEL GUARD POSTS AS PER STANDARD DRAWINGS 236
- NO CURB: SET 6" STEEL GUARD POSTS AS PER STANDARD DRAWINGS 236

REFER TO PAGES 200, 207 & 323

AUTOMATIC READY MANUAL
FLUSH POINT WITH 6" LATERAL

DWU 207B

DATE
OCT. 2016
1. HOSE BIB FOR BACTERIA SAMPLE.
2. HOSE BIB FOR FLUSHING LINE.
3. DO NOT BEND PIPE MORE THAN 90°.
4. CONTRACTOR SHALL FOLLOW 506.7.3.3 OF COD NTCOG ADDENDUM
5. HOSE WILL BE TAKEN TO NEAREST STORM WATER MANHOLE OR INLET.

TEMPORARY FLUSH POINT WITH SAMPLE POINT
N.T.S.

FLUSH POINT WITH SAMPLE POINT INSTALLATION

MAIN SIZE | COPPER SERVICE
-----------|-------------------
6" - 8"    | 6" - 8"
12" - 16"  | 12" - 16"
> 16"      | > 16"

DWU 207C
DATE DEC. 2011
1' - 0"  2' - 0"

MIN.

THIS RISER SHALL BE AS NEAR AS PRACTICAL TO R.O.W. LINES, AT LEAST 6' BEYOND SHOULDER OF ROAD

WARNING SIGN WITH TELEPHONE NUMBER ATTACHED BY STRAPS

WARNING SIGN WILL BE PURPLE FOR NON-POTABLE WATER.

1/4" X 3/4" GALVANIZED STRAPS DRILLED TO D.I. PIPE

3' - 6"

NOTE:

30"

LARGE PLASTIC METER BOX

GROUND LINE

PAVEMENT

NOTE:

RISING GRADE 8'

BOLTED STEEL COUPLING

GALVANIZED IRON AIR VENT PIPE

4" D.I. PIPE FILLED WITH CONCRETE.

3' MIN. BURY DEPTH

2" BRASS SOLDER JOINT ELL

SOLDER-OSIP BRASS COUPLING

I.P.-I.P. CORP. STOP

INSULATED FLANGED CONNECTION ASSEMBLY

WATER MAIN

2" I.P. THREADS

8" BLIND FLANGE-DRILLED AND TAPPED FOR 2" I.P. THREADS

COPPER PIPE HARD COPPER (TYPE K)

SOLDER-OSIP BRASS ELL

COMBINED AIR AND VACUUM RELEASE VALVE

BRASS WHEEL VALVE

BRICK & MORTAR COARSE S AS REQUIRED TO ENCLOSURE COMBINATION AIR VALVE

NOTE:

WHEN NOT IN PAVING OR WALK, A CONCRETE PAD, REINFORCED W/ #3 BARS AT 12" C-C EACH WAY, SHALL EXTEND A MINIMUM OF 2' AROUND THE METER BOX AND VENT PIPE, AND SHALL BE A MINIMUM OF 4" THICK.

NOTE: *

WHICH EVER IS GREATER YEAR FLOOD Plain OR 7', HEIGHT TO BE 2' ABOVE 100.

DATE OCT. 2015

REFER TO PAGES 210 & 211

AIR RELEASE VALVE
TYPE 1

DWU
DATE
208
OCT. 2015

N.T.S.
WARNING SIGN WITH TELEPHONE NUMBER ATTACHED BY STRAPS WARNING SIGN WILL BE PURPLE FOR NON-POTABLE WATER

NOTE:
WHEN NOT IN PAVING OR WALK, A CONCRETE PAD REINFORCED WITH #3 BARS AT 12" C-C EACH WAY, SHALL EXTEND A MINIMUM OF 2' AROUND THE M.H. AND VENT PIPE, AND SHALL BE A MINIMUM OF 4" THICK.

NOTE:
ON 4" AND LARGER TWO PIECE COMBINATION AIR VALVES, THE OUTLET PIPING OF THE SMALL VALVE SHALL BE VENTED INTO THE SIDE OF THE LARGER VENT PIPE THAT GOES ABOVE GROUND.

REFER TO PAGES 210 & 211
### AIR VENT

**N.T.S.**

<table>
<thead>
<tr>
<th>AIR VALVE</th>
<th>GATE VALVE</th>
<th>FLANGE OUTLET</th>
<th>MINIMUM FITTING HEIGHT</th>
<th>VENT PIPE DIAMETER</th>
<th>MANHOLE DIAMETER</th>
<th>VENT PIPE MATERIAL</th>
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### PLAN VIEW

**N.T.S.**

REFER TO PAGES 208, 209, & 211

**AIR RELEASE VALVE**

**TYPE 2**
1. Manholes must be precast.

2. Air vent pipes 4" and larger shall be Class 52 Ductile Iron Pipe with flange fittings with Rustoleum 7582 gray primer or equal in lieu of tar coating. Pipe shall be painted with Devguard 4-308 or equal (SILVER COLOR) per manufacture's instructions prior to installation.

3. A Dallas Water Utilities warning sign shall be furnished by the City and installed by the Contractor. Where the air valve is installed on a non-potable water line, the sign must be painted purple to designate the type of water.

4. Vent pipe must be extended a minimum of 7 feet above ground line, or (AS STATED ON DESIGN PLANS).

5. If vent pipe is located within a 100 year flood zone, vent pipe must be extended a minimum of 2 feet above the water surface, or (AS STATED ON DESIGN PLANS).

6. All underground portions of Ductile Iron Pipe will be encased in polywrap.

7. The following table of dimensions govern the required depths of cover for the installation of Type 2 air valves within public rights-of-ways:

<table>
<thead>
<tr>
<th>AIR VALVE SIZE</th>
<th>VALVE FITTING ASSEMBLY MIN. HEIGHT</th>
<th>MINIMUM REQUIRED DEPTH OF COVER</th>
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HORIZONTAL GATE VALVE
WITH MANHOLE INSTALLATION

REFER TO GENERAL NOTES FOR LARGE VALVES WITH MANHOLES - PAGE 216

PREFIX: M}

PLAN

CLASS "F" REINFORCED CONCRETE BASE

ECCENTRIC REDUCERS, IF REQUIRED, ARE TO BE INSTALLED W/ STRAIGHT SIDE UP

1" FLARED CURB STOPS (TEST POINTS)

VALVE BONNET & BOLTS SHALL BE INSIDE MANHOLE

CLASS "F" CONCRETE SUPPORT BLOCK

1" I.P. THD. OUTLET 1" C.O.R.P. COCK 1" COPPER PIPE (TEST POINTS EACH SIDE)

PAD EXTENSION FOR BLOCKING UNDER BY-PASS VALVE

INSTALL VALVES W/ INSULATION FLANGE KITS SEE PG.223

CLASS "F" CONCRETE SUPPORT BLOCK

SEAL BROKEN OUT PORTION OF MANHOLE W/ BRICK AND MORTAR. COAT INSIDE & OUTSIDE W/ NON-SHRINK GROUT

SHORT 40" C.I. M.H. FRAME AND COVER SEE PG.221

SHORT 9'-0" (6" DIA. M.H.) 7'-6" (5" DIA. M.H.)

DATE
OCT.2009

DWU 212
HORIZONTAL GATE VALVE WITH MANHOLE INSTALLATION

REFER TO GENERAL NOTES FOR LARGE VALVES WITH MANHOLES - PAGE 216
BUTTERFLY VALVE WITH MANHOLE INSTALLATION

**OPTIONAL BLOWOFF WITH MANHOLE**

(AS SPECIFIED ON DESIGN PLANS)

REFER TO GENERAL NOTES FOR LARGE VALVES WITH MANHOLES - PAGE 216
NOTE: Adjust M.J. Over Pipe Location To Provide Easy Access For Valve Operation Thru Open Manhole Cover

ADDITIONAL BRACING REQUIRED FOR EVERY EIGHT (8) VERTICAL FEET OF OPERATING NUT RISER

Pipe to Storm Drain or Drainage Channel As Shown On Plans Or As Directed By Construction Engineer

8" Gate Valve (FF)

Non-shrink Grout

Class "F" Conc. 8" Flap Valve Support Block

Water Main

40° Standard C.J. Manhole Frame & Cover As Per DWU Std. Dwg. *221

TRENCH JACKS SECURED WITH 1/2" STAINLESS STEEL BOLT ANCHORS INTO MANHOLE WALL

*7 Bars @ 12" C-C Bath Ways

*6 Bars @ 12" C-C Bath Ways

Precast Top

Ground Line

Precast Grade Rings

8" Min./12" Max. 6'-0" Dia. Manhole

Precast Manhole

4" PVC Pipe Drain To Be Installed At The Option Of Construction Engineer.

Crushed Stone Coarse Or Std. Gradation River Gravel

*4 Bars @ 12" C-C Bath Ways

RE�ER TO PAGE 218

FLANGED OUTLET SIZES

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<td>48&quot; and larger</td>
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LARGE MAIN BLOW-OFF

DATE
OCT. 2011

DWU 215A
GENERAL NOTES

1. Precast grade rings shall be eliminated and the top of the manhole shall be placed at existing grade when the location is not in an existing or proposed street. For this case only, the standard 40" manhole frame and cover will be set in the manhole precast top.

2. In open country, a 4" thick concrete pad, reinforced with *3 bars on 12" centers each way shall extend a minimum of 2' around the manholes and bypass valve stack.

3. When a reducer is installed into a hub and valve, the exposed steel on the end of the reducer will be wrapped with wire mesh and a minimum of 1" mortar coating shall be applied.

4. Manholes for 30" and larger valves shall be 6' in diameter.

---

PLAN VIEW FOR TYPICAL REINFORCING FOR WATER ACCESS MANHOLE TOPS (MANHOLE FOR VALVE ACCESS SHOWN)
Note: At no time during installation may the valve be left suspended from the tapping sleeve without underneath support in place.

Concrete slab, size as required by size of valve (Class "F" Conc.)

Proposed streets. When not in ex. or finished grade 6" min.

Existing water main

6" Min.

Center line

Prop. Water Main

Horizonatal gate valve

Center Line Operating Nut

1" Copper pipe to be laid close to valve body

By-pass valve see pages 212 & 213 for conc. support

Backfill 12" around valve body & tapping sleeve w/cement stabilized sand @ 2 sacks per cubic yard or as noted on plans.

Cement / mortar coating for protection of tapping sleeve assembly

1" L.P. threaded outlet & 1" corp. Cock

1" Copper pipe to be laid close to valve body

Prop. Water Main

Tapping valve.

Main, the new water main, or the on the top of the existing water main, it will not impose any dead load of precast manhole such that break concrete from the side or as noted on plans.

Thrust blocking see page 232

Thrust blocking see page 232

For conc. support pages 212 & 213

By-pass valve see

Thrust blocking see page 232

See page 221

Std. 40" M.H. Frame and Cover

See Note 14 Page 216

Seal broken out portion of manhole w/ brick and mortar, coat inside & outside w/ non-shrink grout

Standard Precast Manhole

(See Note 14 Page 216)

Precast grade rings

Finished grade when not in ex. or proposed streets.

Standard Precast Manhole

(See Note 14 Page 216)

12" High M.H. base section

Class "F" Concrete

Refer to general notes for large valves with manholes - page 216

SECTION "A-A"

LARGE TAPPING VALVE INSTALLATION

DATE

217

OCT. 2015
OPERATING NUT RISER
(For Large Valve Installations)

2" x 2" x 2"
OPERATING NUT
PER AWWA SPECS.
• C-500

3" MAX. FOR PLACEMENT
OF TOP OF NUT ON
RISER EXTENSION.

6" MIN.

SECURE JACK WITH
3/8" STAINLESS STEEL
BOLT ANCHORS INTO
M.H. WALL

1/2" DIA PIPE WITH
3/8" WALL THICKNESS

2 1/2" x 2 1/2" x 2 1/2"
SQUARE STOCK WITH
2" x 2" INSIDE CAVITY
PER AWWA SPECS.
• C -500

TRENCH JACKS

ADDITIONAL BRACING REQUIRED EVERY 8 FT.

ADDITIONAL BRACING REQUIRED
FOR EVERY EIGHT (8) VERTICAL
FEET OF OPERATING NUT RISER

VALVE ACTUATOR
ASSEMBLY

218
DEC. 2001

DWU
NOT IN PAVEMENT
Match Existing Soil & Compact As Needed Or As Required By Construction Inspector.

IN PAVEMENT

4" to 16" GATE
VALVE ABANDONMENT
Install Valve Cover Assembly Centered Over Valve Stack And Flush With Grade Surface.


6" Valve Stack To Be One Continuous Pipe Joint

Valve Extension Stem To Be Centered In Valve Stack.

Gate Valve

Installed 2" Thick Wooden Blocks Or Neoprene Bonnet To Valve Stack Spacers (Valve Stack Is Not To Rest Directly On Valve Body Or Valve Bonnet)

If Valve Operating Nut Is More Than 7' Below Surface Level, Then Extension Stem Must Be Installed.

Existing Pavement

Existing Ground Surface

Extension Stem To Be Fabricated So That It’s Operating Nut Is Set 12" Below Finished Surface Grade.

Valve Stack To Be Set 3" Below Grade Surface

4" to 16" GATE VALVE

COVER, STACK, & STEM INSTALLATION

JUNE 2002
PITOT OUTLET

1. Locate Pitot Outlets At Least 20 Pipe Diameters From Any Bends, Tees,Reducers Or Other Obstructions.

2. Precast Grade Rings Shall Be Eliminated When Not In Existing Or Proposed Street (Open Country). In This Case, 40" Standard C.I. M.H. Frame And Cover Shall Be Set In M.H. Top.
FRAME AND COVER

COVER - GRAY IRON
ASTM A48 CL35B

FRAME - GRAY IRON
ASTM A48 CL35B

WATER

STANDARD 32" MANHOLE.

PLAN VIEW

BOTTOM VIEW

OF COVER

COVER SECTION
**Insulating Material (Kit)**

1. \(\frac{1}{8}\)" Thick - Circular (Doughnut) Gasket
2. Insulating Sleeve for Each Bolt
3. 2 ~ Insulating Washers for Each Bolt
4. 2 ~ Steel Washers for Each Bolt

All flange bolts & flanges to be covered with cement mortar at least 1" thick. (Unless noted otherwise on design plans or other specific installation details.)

**Typical Connection**

**Detail "A"**

Threaded Connection on Butterfly Valves

**Insulation Kit Installation Detail**

(For R.C.C.P. Installations)

**Mortar Protection @ R.C.C.P. Joints**

(Bell & Spigot Joint Shown - Also Applies to Flanged Joints)

Mortar Protection shall be per pipe manufacturer recommendation.

**Mortar Protection @ R.C.C.P. Joints & Insulation Kit for Flanged Joints**

OCT. 2015
1. Equal to the crown of the road.

2. On front slope of ditch with C of nozzle when no curb or gutter exists, set F.H.

3. Pavement (Crown of road) when no curb or gutter exists, set F.H. on front slope of ditch with C of nozzle equal to the crown of the road.

4. Elevation view of fire hydrant.

5. Methods for setting fire hydrants.

6. General notes:
   1. C of F.H. barrel shall not be less than 2.5 or more than 7.5 from back of curb or edge of pavement.
   2. Do not set F.H. in an existing or proposed sidewalk, unless otherwise noted.
   3. All tees for F.H.s must provide secure anchoring from the main to F.H. valves.
   4. Set F.H. on the lot line extended when possible.
   5. On private contracts, the developer's engineer will stake location & grade, must still meet DWU requirements.
   6. Never place F.H. where fire truck could not park beside it.

7. DWU

8. Date:
   OCT. 2011
45° Bend With Retainer Glands And Class "B" Concrete Thrust Blocking As Required.

Ex. Water

Abandon In Place

Prop. Main

45° Bend With Retainer Glands And Class "B" Concrete Thrust Blocking As Required.

Embedment As Specified In Plans

I.D.

I.D. + 9 ft. Min.

45° Bend With Retainer Glands And Class "B" Concrete Thrust Blocking As Required.

Ex. Water

Solid Sleeve

Nipple

Pipe Material As Specified on Plans

STANDARD WATER MAIN LOWERING

DWU

(PAGE NO.3)

225

DATE

OCT. 2015
PLAN
N.T.S.

SECTION X-X
N.T.S.

TYPICAL TRENCH WIDTH

120°

HORIZONTAL THRUST BLOCK AT PIPE BEND

REFER TO GENERAL NOTES FOR THRUST BLOCKING - PAGE 234

DWU
229
DEC.2001
### Cubic Yard To Sacks of Concrete Conversion Table

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**Refer to General Notes for Thrust Blocking - Page 234**

---

**Horizontal Thrust Block at Pipe Bend**

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<td>230</td>
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**Refer to General Notes for Thrust Blocking - Page 234**

**Horizontal Thrust Block at Pipe Bend**

**DWU**

**Date**

**Dec. 2001**
GENERAL NOTES FOR ALL THRUST BLOCKS:

1. Concrete for blocking shall be CLASS "B". See NCTCOG 702.2.4.2
2. All calculations are based on internal pressure of 200 P.S.I. for ductile iron and P.V.C., and 150 P.S.I. for concrete pipe.
3. Volumes of thrust blocks are net volumes of concrete to be furnished. The corresponding weight of the concrete (CLASS "B") is equal to or greater than the vertical component of the thrust on the vertical bend.
4. Wall thickness T (See Table Page 230) assumed for estimating purposes only.
5. Pour concrete for thrust blocks against undisturbed earth.
6. Dimensions may be varied as required by field conditions where and as directed by the inspector. The volume of concrete blocking shall not be less than shown in tables.
7. The calculations are based on bearing pressures equal to 1,000 lbs./s.f. in soil and 2,000 lbs./s.f. in rock.
8. Use polyethylene wrap between concrete blocking and bends, tees, and plugs to prevent the concrete from sticking to fittings.
9. Concrete shall not extend beyond joints.
<table>
<thead>
<tr>
<th>SIZE AND MATERIAL TYPE OF WATER MAINS</th>
<th>EMBEDMENT TYPE PER DEPTH IN EARTH</th>
<th>EMBEDMENT TYPE PER DEPTH IN ROCK</th>
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<tr>
<td></td>
<td>0'-8'</td>
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<tr>
<td>16&quot; And Smaller Ductile Iron</td>
<td>D*</td>
<td>C</td>
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<tr>
<td>18&quot; And Larger Ductile Iron</td>
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<td>B</td>
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<td>16&quot; And Smaller Pretensioned</td>
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<tr>
<td>All Prestressed</td>
<td>C</td>
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<tr>
<td>All P.V.C. Water Pipe</td>
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<td>B+</td>
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STEEL GUARD POST
(SIZE DESIGNATED ON PLANS)
N.T.S.
Install 4 - 6" Dia. Steel Guard Posts Spaced 4'-6" Apart (Equal Distance From F.H.)
See Page No. 236

Guard Post Protection
For Fire Hydrants

Refer. To Pages 224 & 236
DETAIL FOR METER VAULTS

DETAIL FOR METERS 2\" AND SMALLER

GUARD POST PROTECTION FOR WATER METERS
ATTENTION:
PRV Designs Are Subject To DWU Approval.
Refer To Pages 242, 243, 244, 245 & 504

DUAL PRV ASSEMBLY
(OPTIONS 2A & 2B)

DATE
OCT. 2011
<table>
<thead>
<tr>
<th>Tag No.</th>
<th>Description</th>
<th>Fitting/Pipe Type</th>
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<td>2</td>
<td>1&quot; Flush Point</td>
<td>Copper</td>
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<tr>
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<td>Hi/Low Valve</td>
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<td>4</td>
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<td>8</td>
<td>90° Bend</td>
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<td>9</td>
<td>Pressure Reducing Valve</td>
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<td>4&quot; - 8&quot;</td>
<td>6&quot; - 10&quot;</td>
<td>10&quot; - 16&quot;</td>
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<td>12</td>
<td>Flange Coupling Adaptor</td>
<td>Flange x Flange</td>
<td>6&quot;</td>
<td>8&quot;</td>
<td>12&quot;</td>
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</table>

**ATTENTION:**
PRV Design And Parts Selection Are Subject to DWU Approval.
When Outside Of Pavement, A Concrete Pad Shall Be Constructed Extending A Minimum Of 2 ft Beyond The Perimeter Of The Hatch And Be A Minimum of 6 in Thick.

1" Flush Point with Stand Meter Box

1.5" P.V.C. Drain From Access Hatch Along Wall To Rock Embedment (Off The Front Right Or Left).

1" Pressure Gauge

Cast In Place Floor Slab Or Precast Floor Slab. (See DWU Std.Dwg. 504)

Sump (1' x 1' x 6")

Crushed Rock Gradation
4" Min. Thick in Rock
6" Min. Thick in Earth
NCTCOG Spec. 504.2.2

NOTE:
PRV Shall Be Centered Under The Hatch. The Top Of The Vault Shall Be At Least 6 in Above The Finished Grade.

Flanged Coupling Adaptor Smith Blair Model 912 Or Approved Equal

Ames Model Pressure Reducing Valve Flange x Flange Or Approved Equal

Reference to Page 504

NCTCOG Spec: 504.2.2 - Pipe Embedment Material for Water and Wastewater Mains

PRV VAULT
ELEVATION & SECTIONAL PLAN

DWU 243
DATE OCT. 2011
Vault Size
(NTS)

* Special Applications To Be Determined By Engineer. Vault shall be built according to Engineering Specifications.

Bollard Location Plan
(NTS)

Refer To Pages TO 236
1. All pressure-reducing valves shall include a verifiable certification of compliance with the National Sanitation Foundation (NSF) Standard 61. Every bidder shall submit with their bid a signed statement clearly stating the present status of their receiving certification of compliance with the NSF 61 Standard for each particular make, model, and size of pressure reducing valve being bid. A failure to submit this verification shall result in the disqualification of that bid and its removal from consideration.

2. Every bidder shall submit re-lined copies of these standard drawings for exception requests needing final approval by DWU. If there are no exceptions to the specification, a signed statement at the bottom of the specification shall indicate "No Exception Taken." A failure to do so shall result in the disqualification of that bid and its removal from consideration.

3. All materials contained in the valves being bid shall be described and specified in the most current manufacturer's product literature.

4. The Distribution Division of the Dallas Water Utilities Department shall be the sole authority in determining the acceptability of any alternate valves.

5. All pressure reducing valves shall be certified by the manufacturer as being capable of withstanding a cold hydrostatic test at least one hundred percent (100%) above the maximum pressure for which the valve is to operate.

6. All valves, parts, and components shall be new and unused original factory-authorized manufacturer's parts and components. No "after-market" substitute parts from other manufacturers shall be accepted. No rebuilt or remanufactured parts allowed.

7. The pressure reducing valve provided shall be designed and constructed to maintain a pre-adjusted downstream pressure regardless of changes in the flow rate.

8. The adjustment range of the pilot valve shall be from 15 to 175 psi.

9. The main body flanges of the pressure reducing valves provided shall have bolt patterns compatible with ANSI/ASME B 16.1.

10. The pressure reducing valves provided shall be complete and shall have factory-installed position indicators, gauge cocks, control valve isolation valves, strainers, and pilot valves.

11. All external control piping on the pressure reducing valve shall be copper or stainless steel.

12. The body of the valve and the cover of the valves shall be fabricated entirely of stainless steel.

13. The entire interior wetted surface of the valve, including the spring, the upper diaphragm support, the disc holder, the seat ring and the shaft shall be fabricated of stainless steel and shall be inherently corrosion-resistant without any special coating.

14. The diaphragm shaft shall be guided at the top and at the bottom.

15. All internal and external threaded studs and nuts shall be fabricated of stainless steel.

16. The seat disc shall be fabricated of Buna-N resilient synthetic rubber.

17. All valves, parts, and components shall be supplied with a three (3) year manufacturer's warranty on materials and workmanship.

18. All valves shall be AMES MODEL 605GS reduced port, single chamber pressure reducing valves.

19. All valves, parts, and components shall be either bid Freight On Board (FOB) Factory, Freight Allowed or FOB Destination (4120 Scottsdale, Dallas, TX 75227).

20. All valves shall be crated in sturdy shipping containers to prevent damage to position indicators, control valves, and control valve piping during shipment.

21. The pressure reducing valve must be installed by the manufacturer in the presence of DWU Distribution and Pumping personnel.

22. All construction materials including valves, pipes, fittings and flush points shall conform to the most current version of the NCTCOG specifications, the City of Dallas Addendum to those specifications, this manual and the Approved Materials List.

23. All precast vaults shall meet DWU specifications and be approved by DWU.

24. The location of the vault must be approved by DWU.

25. The minimum depth for the piping in the vault shall be 4 feet.

26. All spool pipes shall be ductile iron pipe.
PART 3
(Series 300)

WASTEWATER MAIN CONSTRUCTION
### PART 3
**WASTEWATER MAIN CONSTRUCTION**

<table>
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<td>Wastewater Lateral Cleanout Frame and Cover</td>
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<td>Wastewater Access Device</td>
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<td>Wastewater Sample Site – Concrete Platform Detail</td>
<td>--- 329</td>
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</table>
MANHOLE UNDER PROPOSED PAVING WITHIN STREET R.O.W.
(IN ADVANCE OF PROPOSED PAVING IMPROVEMENT PROJECTS)

SET IN ADVANCE OF PROPOSED PAVING

PROP. TOP OF CURB

M.H. FRAME & COVER SIZE AS SPECIFIED ON PLANS

EXISTING GROUND

M.H. NECK IS NOT TO EXCEED 30° WHEN RAISING TO FINISHED GRADE

FINISHED GRADE

CONCENTRIC MANHOLE CONE

30°

2'-0" OR 3'-0"

INTERMEDIATE RISER

VARIES AVAILABLE IN 2'-0" & 3'-0" LENGTHS (USE MIN. NUMBER OF RISERS)

PRECAST BASE

MINIMUM MANHOLE WALL THICKNESSES
48" M.H. - 5" WALL
60" M.H. - 6" WALL
72" M.H. - 7" WALL
LESS DESIGN BY AN ENGINEER
PER ASTM C7-08a
NCTCOG 502.1.1.1.(3)

USE O-RING RUBBER GASKET (TYP.)

INTERNAL CHIMNEY SEAL

ALL MANHOLES WITH GRADE RINGS SHALL BE FURNISHED WITH INTERNAL CHIMNEY SEAL
See Pg. 327 & 302

1/4" NON SHRINK GROUT COATING

APPROVED RESILIENT PIPE-TO-MANHOLE CONNECTOR OR GASKET

PIPECUTO OUTS TO BE A MINIMUM OF 18 IN.
LONG, AND FOR MANHOLES W/PRECAST BASES,
THE PIPE IS TO BE SUPPORTED BY THE PIPE EMBEDMENT AS SPECIFIED ON PLANS

SET BASE RISER WITH "BELL/Butt END" INTEGRATED INTO THE CONCRETE POUR
FOR M.H. BASE, BRUSH THE BASE RISER RING WITH CONCRETE BONDING AGENT

APPROVED RESILIENT PIPE-TO-MANHOLE CONNECTOR OR GASKET

CLASS "F" CONCRETE BASE AND CRADLE, See General Note * 5 Pg. 302

CAST-IN-PLACE OPTIONAL BASE DETAIL

REFER TO GENERAL NOTES FOR WASTEWATER MANHOLE CONSTRUCTION - PAGE 302

WASTEWATER MANHOLE PRECAST

DWU 301

DATE OCT. 2015
1) All non-pressure type manholes are to be constructed with a minimum of 2 - precast concrete grade rings and with an internal chimney seal. The maximum allowable extension of manhole necks using grade rings is limited to 30". See typical drawing detail on page 327.

2) All manholes are to have inverts constructed as per details on pages 309 and 309A.

3) All wastewater main stubouts from manholes shall be a minimum of 18 inches in length and terminated with a water tight stopper or cap.

4) Where new manholes are constructed in advance of proposed paving, the frame and cover shall be set 23" below the proposed top of curb, or flush with the existing ground, which ever is lower. Use precast concrete grade rings to raise M.H. frame and cover to final paving grade. (LIMITED TO 30" MAXIMUM MANHOLE NECK EXTENSION, AS MEASURED FROM THE TOP TAPER OF THE M.H. CONE TO M.H. LID). When M.H. neck extension exceeds 30", then the M.H. cone is to be removed and reset in such a manner as to reduce the number of grade rings required to reset M.H. frame and cover to final grade. See typical drawing detail on page 301.

5) For all manholes with cast in place bases, the first pipe joint must extend a minimum of 18 inches past the edge of manhole, with a concrete cradle poured integrally with the base, and under the entire pipe joint length.

6) All cast in place manholes are to be constructed with pipe to manhole connectors as per detail on page 310, or with a connector as approved by the DWU construction superintendent.

7) False manhole bottoms are required on all advance of paving projects. They shall be constructed, installed, and removed in accordance with details and instructions on page 311.

8) Minimum manhole wall thicknesses are per ASTM C76-08a unless designed by and engineer. The standard thicknesses are: 48" manhole=5"wall; 60" manhole=6" wall; 72" manhole=7"wall.
FOR CONSTRUCTION OF MANHOLES IN ADVANCE OF PROPOSED PAVING PROJECTS, SEE DETAIL ON PG. 301 & GENERAL NOTE #4 ON PG. 302.

STD. M.H. FRAME & COVER AS SPECIFIED

FOR 5' & 6' DIA. M.H.'S SEE TRANSITION DETAIL

VANES

6" MIN. 4'-0"
8" MIN. 5'-0" & 6'-0"
12" MIN.

4'-0"
12" MIN.
12" MIN.

GEOTEXTILE LINER MATERIAL
12" ROCK FOUNDATION ROCK FOUNDATION

MANHOLE DETAIL

APPROVED RESILIENT PIPE-TO-MANHOLE CONNECTOR OR GASKET

FIRST MAIN LINE JOINT TO BE A MIN. OF 18" LONG, WITH CONC. CRADLE (POURED CONTIGUOUS WITH CONC. BASE) AND UNDER ENTIRE JOINT. SEE GENERAL NOTE #5 ON PG. 302

USE PRECAST CONCRETE GRADE RINGS AND NON SHRINK GROUT AS REQUIRED TO SET MANHOLE FRAME AND COVER TO FINAL GRADE. SEE GENERAL NOTE #1 ON PAGE 302

PRESSURE-TYPE-MANHOLE TO HAVE M.H. FRAME CAST IN ROOF

CONSTRUCTION JOINT WITH KEY WAY WATERSTOP, AND *3'S AT 12" O.C. EXTENDING 9" INTO WALL (NOT REQ'D FOR CONTINUOUS POUR)

1/2" NON SHRINK GROUT COATING

INTERIOR CHIMNEY SEAL

CLASS "F" CONCRETE MONOLITHIC POUR

MANHOLE FRAME TO BE CENTERED

ALL MANHOLES WITH GRADE RINGS SHALL BE FURNISHED WITH INTERNAL CHIMNEY SEAL. SEE PG. 327 & 302

MANHOLE FRAME & COVER AS SPECIFIED ON PLANS

*3'S AT 6" O.C., E.W.

FRAME & COVER AS SPECIFIED ON PLANS

*3'S AT 6" O.C., E.W.

ROOF STEEL LAYOUT

N.T.S.

TRANSITION DETAIL FOR 5' & 6' DIA. M.H.'S

N.T.S.

REFER TO GENERAL NOTES FOR WASTEWATER MANHOLE CONSTRUCTION - PAGE 302

WASTEWATER MANHOLE CAST-IN-PLACE

<table>
<thead>
<tr>
<th>DWU</th>
<th>303</th>
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<td>DATE</td>
<td>OCT. 2015</td>
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CONCRETE CONE <-> ROOF OPTIONS <-> REINFORCED CONCRETE SLAB

PRESSURE-TYPE-MANHOLE: TO HAVE M.H. FRAME CAST IN ROOF WITH CONTINUOUS POUR FROM BASE
FRAME & COVER AS SPECIFIED ON PLANS
PRESSURE-TYPE-MANHOLE: TO HAVE M.H. FRAME CAST IN ROOF
CONSTRUCTION JOINT WITH KEY WAY WATERSTOP, AND *3'S AT 12'' O.C. EXTENDING 9'' INTO WALL (NOT REq'D FOR CONTINUOUS POUR)
MANHOLE FRAME TO BE CENTERED

SECTION A - A

N.T.S.

"3'S AT 6'' O.C., E.W.

ROOF STEEL LAYOUT

N.T.S.

MANHOLE FRAME TO BE CENTERED

12'' COMPACTED ROCK FOUNDATION
GEOTEXTILE LINER MATERIAL

MANHOLE DETAIL

APPROVED RESILIENT PIPE-TO-MANHOLE CONNECTOR OR GASKET

FIRST MAIN LINE JOINT TO BE A MIN. OF 18'' LONG, WITH CONC. CRADLE (POURED CONTIGUOUS WITH CONC. BASE) AND UNDER ENTIRE JOINT
See General Note * 5 On Pg. 302

CONNECTION DETAIL

N.T.S.

REFER TO GENERAL NOTES FOR WASTEWATER MANHOLE CONSTRUCTION - PAGE 302

TRANSITION DETAIL FOR 5' & 6' DIA. M.H.'S

N.T.S.

WASTEWATER MANHOLE PRESSURE-TYPE

DWU
304
DATE
OCT. 2015
STANDARD CAST-IRON M.H. FRAME & COVER AS SPECIFIED ON PLANS

USE PRECAST CONCRETE GRADE RINGS AND NON SHRINK GROUT AS REQUIRED TO SET M Manhole Frame and Cover to Final Grade. See General Note # 1 on Page 302

FINISHED GRADE

ALL MANHOLES WITH GRADE RINGS SHALL BE FURNISHED WITH INTERNAL CHIMNEY SEAL See Pg. 327 & 302

FACTORY - BONDED JOINT

SAND OR STABILIZED SOIL COMPACTED TO 90% STD. PROCTOR DENSITY AND PLACED IN 6-INCH LIFTS. BEGINNING AT M.H. THEN WORKING OUTWARD TO THE EXCAVATION LIMITS.

CUT OUT FIBERGLASS M.H. TO SET OVER PIPE (O.D. + 1" MAX.)

SET BOTTOM OF FIBERGLASS M.H. WITHIN THE INTEGRALLY Poured, CAST-IN-PLACE, CLASS "F" REINFORCED CONCRETE BASE.

12" COMPACTED ROCK FOUNDATION

GEOTEXTILE LINER MATERIAL

*5 BARS Ø10" O.C. - E.W.

MANHOLE DETAIL

CONTINUOUS POUR CONCRETE OVER PIPE WITH BASE

APPROVED RESILIENT PIPE-TO-MANHOLE CONNECTOR OR GASKET

FIRST MAIN LINE JOINT TO BE A MIN. OF 18" LONG, WITH CONC. CRADLE (POURED CONTIGUOUS WITH CONC. BASE) AND UNDER ENTIRE JOINT. See General Note # 5 On Pg. 302

NOTES:
1. FUTURE CONNECTIONS. IF A SEALANT BETWEEN PIPE & M.H. IS NEEDED, USE APPROVED SILICONE SEALANT.

2. DESIGN: HS 20 LOADING

REFER TO GENERAL NOTES FOR WASTEWATER MANHOLE CONSTRUCTION - PAGE 302

WASTEWATER MANHOLE FIBERGLASS

DWU 305

DATE OCT. 2015
WASTEWATER MANHOLE
VENTED

TURBINE VENTILATOR—FIBERGLASS OR ALUMINUM WITH NYLON BUSHINGS
APPLY RUSTOLEUM 7582 GRAY PRIMER AND DEVGUARD 4308 SILVER PAINT
12 GAUGE STAINLESS STEEL STRAPS
6" P.V.C. SDR-35 PIPE

HEIGHT TO BE 2' ABOVE 100 YEAR FLOOD PLAN OR 6', WHICHEVER IS GREATER
6" DIAMETER TREATED APPROVED RESILIENT PIPE-TO-
APPLY RUSTOLEUM 7582 GRAY PRIMER AND DEVGUARD 4308 SILVER PAINT
SUPPORT POLE.

APPROVED RESILIENT PIPE-TO-
MANHOLE CONNECTOR OR GASKET.
WASTEWATER MANHOLE INSIDE DROP CONNECTION

MANHOLE TYPE-AS SPECIFIED ON PLANS

INSIDE DROP CONNECTOR "RELINER-DURAN "A" DROP BOWL" OR APPROVED EQUAL

APPROVED RESILIENT PIPE TO MANHOLE CONNECTOR OR GASKET

1½" WIDE STAINLESS STEEL PIPE STRAPS ANCHORED IN CONCRETE WALL AT 4" MAX. SPACING WITH MIN. OF 2 PER PIPE JOINT

TOP OF 90° BEND TO BE PLACED LEVEL WITH TOP OF MANHOLE DISCHARGE LINE, UNLESS NOTED OTHERWISE ON PLANS.

ROTATE LOWER 90° BEND AND FORM INVERT TO DIVERT DROP DISCHARGE DOWN STREAM

SEE GENERAL NOTES FOR WASTEWATER MANHOLE CONSTRUCTION - PAGE 302
NOTE:
REFER TO MANHOLE STANDARD DRAWINGS FOR ADDITIONAL DETAIL OF M.H.

SEE INVERT BENCH DETAILS PAGE 309A

PLAN
N.T.S.

SECTION A-A
N.T.S.

WASTEWATER MANHOLE
INVERT INTERSECTION DETAIL

WASTEWATER MANHOLE
FLOW
D = MANHOLE DIAMETER
d = PIPE DIAMETER

T = WALL THICKNESS

1:12 (TYP.)

FORM MANHOLE BOTTOM TO SLOPE
SEE INVERT DETAILS PAGE 309A

3"R.

T = WALL THICKNESS

NOTE:
REFER TO MANHOLE STANDARD DRAWINGS FOR ADDITIONAL DETAIL OF M.H.

SEE INVERT BENCH DETAILS PAGE 309A
WASTEWATER MANHOLE
INVERT BENCH DETAIL

FOR PIPE SMALLER THAN 15" IN DIAMETER

FOR PIPE FROM 15" TO 24" IN DIAMETER

FOR PIPE LARGER THAN 24" IN DIAMETER
### Dimension for Manhole Pipe Connector A.S.T.M. C-923

<table>
<thead>
<tr>
<th>PIPE SIZE</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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<tr>
<td>4&quot; - 6&quot;</td>
<td>1 1/2&quot;</td>
<td>7/8&quot;</td>
<td>3/8&quot;</td>
<td>10°</td>
<td>1/4&quot; - 3/8&quot;</td>
</tr>
<tr>
<td>8&quot; - 21&quot;</td>
<td>2 1/8&quot;</td>
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<td>5/8&quot;</td>
<td>10°</td>
<td>1/4&quot; - 3/8&quot;</td>
</tr>
<tr>
<td>24&quot; - 60&quot;</td>
<td>2 3/8&quot;</td>
<td>1 3/4&quot;</td>
<td>3/4&quot;</td>
<td>10°</td>
<td>1/4&quot; - 3/8&quot;</td>
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</tbody>
</table>
INSTALLATION
FALSE MANHOLE BOTTOM SHALL BE FURNISHED AND INSTALLED IN ALL MANHOLES CONSTRUCTED IN ADVANCE OF PAVING. THESE FALSE MANHOLE BOTTOMS WILL BE INSTALLED AT A TIME DIRECTED BY THE ENGINEER BUT WILL USUALLY BE AFTER ALL WORK IS COMPLETED ON THE WASTEWATER SYSTEM INCLUDING THE AIR TEST, BUT PRIOR TO THE FINAL INSPECTION.

REMOVAL
FALSE MANHOLE BOTTOM SHALL BE REMOVED AFTER THE FINAL APPURTENANCE ADJUSTMENT INSPECTION. THE PAVING CONTRACTOR AND OWNER'S REPRESENTATIVE WILL COORDINATE THE REMOVAL OF THE FALSE MANHOLE BOTTOMS.

INSTALLATION AND REMOVAL POSITION
N.T.S.

WASTEWATER MANHOLE FALSE BOTTOM
LETTERS (RECESSED FLUSH)
1" Minimum
1 1/2" Preferred

(6) 1" DIA HOLES
ON A 37" DIA B.C.

1 1/2" LETTERS (RECESSED FLUSH)

(2) PICKBARS

2 7/16"

COVER - GRAY IRON
ASTM A48 CL35B

FRAME - GRAY IRON
ASTM A48 CL35B

COVER SECTION

PLAN VIEW

BOTTOM VIEW OF COVER

STANDARD 32"
C.I. M.H. FRAME & COVER

LID MAY BE IDENTIFIED WITH EITHER "WASTEWATER" OR "SANITARY SEWER"

WASTEWATER

DWU

DATE

OCT.2011

312
NOT TO BE USED FOR NEW CONSTRUCTION

2 - 2" x 3¾" Pick Slots
With 2 - 1" Dia. Steel Rods

1" Letters Raised ¼"

PLAN

SECTION "A-A"

2 - 2" Dia. Steel Rods

RING & COVER MATERIAL
ASTM A48 Class 35B Min.
Gray Iron Castings.

STANDARD 24"
C.I. M.H. FRAME & COVER

DWU
PAGE No.
312A

DATE
JAN. 2010
LID MAY BE IDENTIFIED WITH EITHER "WASTEWATER" OR "SANITARY SEWER"

LETTERS (RECESSED FLUSH)
1" Minimum
1 ½" Preferred

(4) 3"-13 X 2" LG.

SS HEX HEAD BOLTS
W/ STL AND RUBBER
WASHERS

1/2" LETTERS (RECESSED FLUSH)

(2) PICKBARS

33 3/16"
32 3/16"

30"
33 7/8"
40 3/4"

1 3/4" R
1" DIA. H.R.S. ROD

7/8"

FRAME SECTION
EON LOCK OR EQUAL
POCKETS FOR 3/16-13 SQ NUT
ON A 29 3/8" DIA. B.C. (TYP)

COVER - GRAY IRON
ASTM A48 CL35B
FRAME - GRAY IRON
ASTM A48 CL35B

32" PRESSURE TYPE
CAST-IRON MH. FRAME & COVER

WASTEWATER

DATE
OCT. 2011

(page no.) 313
NOTE:
For seal between Frame & Cover use either a 1/2" or a 1/2" dia. Neoprene O-Ring gasket. Location of ring is left to mfr., but subject to approval by construction engineer.

6-1/4" dia. cores
As shown

Index marks on frame & cover engraved into casting 3/8" deep

Machine both surfaces
6-3/8" dia., 1/2" long stainless steel bolts

1" dia.-6" long stainless steel anchor bolts w/hex. head nut
6-required

SECTION "A-A"

1" dia. steel rod material per item 2.11.5 (b) (2)
Ring & cover material per item 2.11.5 (c)

Ring & cover material per ASTM A48 Class 35B Min.
Gray iron castings.

24" PRESSURE TYPE
CAST-IRON MH. FRAME & COVER

DATE
JAN. 2010

DWU
313A
NOTE: For seal between frame and cover use either 1/8" thick copper gasket or 1/4" diameter neoprene "O"-ring. Location of the "O"-ring is left to the manufacturer, but subject to approval by DWU Construction Engineer.

LID MAY BE IDENTIFIED WITH EITHER "WASTEWATER" OR "SANITARY SEWER"

- 1/2" Letters 1/4" Raised
- (8) 1 1/4" Dia. Anchor Holes
- 3/8" Wide x 1/4" Deep Grooves @ 1 1/2" O.C.
- 2 - 2" x 3 1/2" Pick Slots with 1 - 1" Dia. Steel Rod Each
- INDEX NOTCHES - Engraved Into the Casting 1/8" Deep
- 1" Dia. - 6" Long Stainless Steel Anchor Bolts w/ Hex Head Nuts 8 Required

40" PRESSURE TYPE CAST IRON
M.H. FRAME & COVER

Ring & Cover Material per
ASTM A48 Class 35B Min.
Gray Iron Castings.
LID MAY BE IDENTIFIED WITH EITHER "WASTEWATER" OR "SANITARY SEWER"

1½" Letters ¼" Raised

(8) 1¼" Dia. Anchor Holes

⅜" Wide x ¼" Deep Grooves @ 1½" O.C.

See Pickbar Detail

WASTEWATER

RING & COVER MATERIAL
ASTM A48 Class 35B Min.
Gray Iron Castings.
EXISTING CONC.
BASE

EX. M.H. FRAME & COVER TO
BE REMOVED & SALVAGED
RESTORE SURFACE WITH
TOP SOIL AND BLOCK SOD.

REMOVE TOP PORTION
OF M.H. FOR 2' MINIMUM
CLEARANCE FROM SURFACE
OF EXISTING PAVEMENT,
GROUND, OR PROPOSED
PAVEMENT (WHICHER
IS GREATER)

SAND AND/OR GRAVEL
COMPACTED TO 90 %
(95% IN PAVEMENT) OF
THE MAXIMUM STANDARD
PROCTOR DRY DENSITY
AS PER NCTCOG SPEC:
504.5.3.2.2

TO BE PLUGGED
PRIOR TO POURING
CLASS "B" CONCRETE.

CLASS "B" CONC.
TO A POINT ABOVE
TOP OF PIPE.

EXISTING PAVEMENT

EXISTING WASTEWATER MAIN

EX. WASTEWATER MAIN

EX. WASTEWATER MAIN

EX. M.H. FRAME & COVER TO
BE REMOVED & SALVAGED
PAVING TO BE REPAIRED AS
PER P.W.&T. PAVEMENT CUT
AND REPAIR STANDARDS

PLUG WITH CLASS "B" CONCRETE

TO BE PLUGGED
PRIOR TO POURING
CLASS "B" CONCRETE.

NCTCOG Spec: 504.5.3.2.2. - Densities - Areas Not Subjected To Or Influenced By Vehicular Traffic
2009 DWU Addendum: 504.5.3.2.2.DWU: Densities - Areas Not Subjected To Or Influenced By Vehicular Traffic

DWU 316

DATE OCT. 2010
CLEANOUT CASTING OPENING TO BE INSTALLED CENTERED OVER THE CENTERLINE OF THE CLEANOUT STACK EXTENDED TO GROUND LEVEL.

WATER TIGHT REMOVABLE PLUG

CLASS "B" CONCRETE

1ST. JOINT FROM 22 ½ ° BEND TO BE A REDUCER TO 6" IF MAIN IS LARGER THAN 6".

FOR EARTH DITCH:
USE CLASS "C" EMB. FOR CLAY PIPE
USE CLASS "B-1" EMB. FOR P.V.C.

FOR ROCK DITCH:
CLASS "A" EMB.

6" CLEANOUT STACK 2'-6" X 2'-0" X 6"

FOUNDATION

H' 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 H'
Y' 10 12 14 17 19 22 24 27 29 31 34 36 39 41 43 46 48 Y'

PROFILE VIEW
N.T.S.

SECTION "X - X"
N.T.S.

NOTE:
IF CLEANOUT IS PLACED IN ADVANCE OF PAVEMENT PLACE SAND AROUND CLEANOUT CASTING IN LIEU OF CLASS "B" CONCRETE.

WASTEWATER MAIN CLEANOUT

DWU
DATE JAN. 2001

(Page No.) 317
KEY:
1. WASTEWATER MAIN
2. 6" WYE OR TAPPING SADDLE (SEE NOTE 8)
3. 6" WASTEWATER LAT. (LENGTH VARIES)
4. 6" X 4" RED. AND 4" X 4" TEE OR 6" X 4" TEE.
5. 4" STACK (LENGTH VARIES)
6. 4" WASTEWATER LAT. CLEANOUT CASTING
7. 4" WASTEWATER PIPE (LENGTH VARIES)
8. ADAPTOR
9. BUILDING SEWER LAT.
10. CLASS "B" CONCRETE
11. 6" X 4" REDUCER
12. COMPACTED AS SPECIFIED, OR INUNDATED SAND

NOTES:
1. CLEANOUT CASTING TO BE FURNISHED AND PLACED PER SPECIAL CONDITIONS IN VEHICLE TRAFFIC AREAS AND FOR COMMERCIAL MAINLINE LATERALS, WASTEWATER CLEANOUT SHALL BE OF CAST IRON.
2. SLOPE OF LATERAL TO BE 1% MIN., 2% MAX. UNLESS INSTRUCTED OTHERWISE BY OWNER.
3. THE WASTEWATER LATERAL SHALL BE CONNECTED TO BUILDING LATERAL AND CONSTRUCTED IN SUCH MANNER AS TO CLEAR EXISTING UTILITIES AND PROPOSED FACILITIES SUCH AS STORM SEWER MAINS, PAVING, SIDEWALKS, RETAINING WALLS, ETC. VERTICAL BENDS (22.5° MAX.) MAY BE USED IF APPROVED BY OWNER.
4. THE MAINLINE LATERAL CONNECTION TO THE PRIVATE BUILDING LATERAL SHALL BE AS CLOSE TO THE PROPERTY LINE AS POSSIBLE.
5. INSTALL 4" STOPPER OR CAP AT PROPERTY LINE IF BUILDING LATERAL DOES NOT EXIST.
6. SUBSTITUTE 4" FOR 6" FITTINGS IF PLANS OR SPEC. COND. CALL FOR 4" LATERALS.
7. THE CLEANOUT STACK & CASTING MAY BE PLACED IN THE PARKWAY, VEHICLE TRAFFIC AREAS, OR SIDEWALK, IF NECESSARY.
8. TAPPING SADDLES CAN ONLY BE USED IN CONJUNCTION WITH PIPE BURSTING OR IF THE EXISTING MAIN IS 10" OR LARGER.
KEY

1. WASTEWATER MAIN
2. WYE (45° MAX.)
3. MAINLINE LATERAL
4. 45° BEND (MAX.)
5. ADAPTOR
6. RUBBER SLEEVE COUPLING
   OR PVC ADAPTER COUPLING
7. CLASS "B" CONCRETE
8. EMBEDMENT SAME AS USED ON MAIN.

NOTES:

A) THE WYE AND ADAPTORS INSTALLED SHALL BE OF THE SAME MATERIAL AS THE
   WASTEWATER MAINLINE.

B) THE WYE AND ADAPTORS SHALL BE ASSEMBLED PRIOR TO INSTALLATION.

C) CONNECTIONS TO THE EXISTING MAIN SHALL BE MADE USING A RUBBER SLEEVE
   COUPLING WITH STAINLESS STEEL BAND CLAMPS. THE CLAMPS SHALL BE TIGHTENED
   TO THE TORQUE RECOMMENDED BY THE MANUFACTURER.

D) THE EMBEDMENT USED SHALL BE EQUAL TO THAT USED FOR THE MAINLINE SEWER.

NOTE: THIS DETAIL SHALL NOT BE USED
FOR THOSE CASES WHERE 150 PSI
PVC IS REQUIRED BY T.C.E.Q.

WASTEWATER LATERAL WYE
CONNECTION TO THE EXISTING MAINLINE

DWU
DATE
JAN. 2010

(PAGE No.: 320)
1. THE WORDS "WASTEWATER LATERAL CLEANOUT" SHALL BE CAST INTO TOP OF COVER.
2. MATERIALS TO BE CAST IRON, P.V.C. OR ABS PLASTIC.
3. CAST IRON REQUIRED WHERE TRAFFIC MAY BE PRESENT.
IN EARTH & IN ROCK

TRENCH WITH SLOPING SIDES

IN EARTH
N.T.S.

IN ROCK
N.T.S.

NOTES:
1. WYE SHALL BE SUPPORTED AS SHOWN FOR WYE CONNECTION SUPPORT.
2. LATERALS ARE TO CLEAR ALL EXISTING UTILITIES. 11 1/4" OR 22 1/2° BEND, ONLY, MAY BE REQUIRED.

REFER TO PAGES 319, 320, 323, 324 & 325

WASTEWATER LATERAL CONNECTIONS
IN EARTH & IN ROCK

DATE
OCT. 2011
LATERALS TYPES

TYPE I
1% to 10%

TYPE II
10% to 30%
II-1/4 bend
2' Min.

TYPE III
30% to 50%
22 1/2' bend
2' Min.

TYPE IV
1% to 10%
2-22 1/2' bend

DEEP CUT CONNECTION

REFER TO PAGES 319, 320, 324 & 325

DWU
DATE
OCT. 2011

PAGE NO. 323
Example:
Vertical Depth=5\(\frac{1}{2}\)'
Horizontal Distance=14\(\frac{1}{2}\)'
Use Lateral Type III as shown above
Note! Clean out as per Page 319 to Ground Surface

Refer To Pages 319, 320, 321, 322, 323 & 324
WASTEWATER LATERALS ARE TO BE CONSTRUCTED TO CLEAR EXISTING AND PROPOSED FACILITIES, SUCH AS STORM SEWER MAINS, RETAINING WALLS, OTHER UTILITIES, ETC. THE WASTEWATER LATERAL SHALL HAVE A MINIMUM COVER OF 4'-0" BELOW THE PROPOSED TOP OF PAVEMENT CURB GRADE AT THE PROPERTY LINE, DETERMINED FROM PAVING GRADE, OR AS REQUIRED TO MAINTAIN A MINIMUM OF 1.00% GRADE, OR AS DIRECTED BY THE OWNER.
USE PRECAST CONCRETE GRADE RINGS AND NON SHRINK GROUT AS NECESSARY TO SET MANHOLE FRAME AND COVER TO FINAL GRADE. See General Note #1 On Page 302

\[ \frac{1}{2} \text{" NON SHRINK GROUT COATING} \]

\[ 4" \text{ OVERLAP} \]

\[ \text{INTERNAL CHIMNEY SEAL} \]

\[ \text{MANHOLE FRAME AND COVER AS SPECIFIED ON PLANS} \]

\[ \text{STAINLESS STEEL EXPANSION BANDS} \]

\[ \text{RUBBER SLEEVE} \]

\[ \text{STAINLESS STEEL EXPANSION BANDS} \]

\[ \text{NOTE: INTERNAL CHIMNEY SEAL TYPE TO BE APPROVED BY CONSTRUCTION ENGINEER} \]

Refer to General Notes for Wastewater Manhole Construction - Page 302, & Drawings on Pages 301, 303, 304, & 305
Cut as Required for 6, 8, 10, 12 inch Pipe Along Cutting Groove

DETAIL A

Gasket
Riser Pipe

DETAIL B

24" Standard Cast Iron M. H. Frame & Cover

Pavement

DETAIL B

Clearance: 4" Min. 8" Max.

SECTION A-A

Two Concrete Grade Rings Ex Ground

Undisturbed Soil

Pipe Embedment as Specified on Plans

Undisturbed Soil

Water Tight Plug

Two Concrete Grade Rings (Minimum) and Non-Shrink Grout

15" P.V.C. Pipe
ASTM D 3034 (SDR 35)

Undisturbed Soil

Sand or Stabilized Soil Compacted to 95% Std. Proctor Density and Placed in 6-inch Lifts Beginning at the Wastewater Access Device Working Outward to the Excavation Walls

Cross Link High Density Polyethylene Access Fitting or Linear Low Density Polyethylene

Compacted Crushed Stone, Fine Gradation

Equal to Pipe Embedment

WASTEWATER ACCESS DEVICE

DATE
OCT. 2011

DWU (Page No.)
328
SAMPLE SITE CONSTRUCTION NOTES

A. The 5' X 4' Platform Is To Be Constructed Of Class "B" Concrete And A Minimum Of 4" Thick, Reinforce Pad With #3 Bars at 12" O.C. In Both Directions And Centered Within Pad.

B. The Platform Is To Be Level, With The Cleanout Cover Flush With The Surface Of The Platform.

C. The Platform And Cleanout Cover Are To Be Elevated A Minimum Of 2" To 3" Above Ground Level To Prevent Infiltration Of Poolwater Runoff.


E. 1/2" Threaded Female Anchor Bolts Shall Be Set In Each Corner 10" Inset From The Rear And Sides Of The Pad. The Front Bolts Need To Be 20" From The Rear Of The Pad. The Top Of The Female Anchor Bolts Shall Be Flush With The Surface Of The Platform.

F. The Box And Lid Will Be Constructed Of Aluminum Or Steel. All Seams and Joints Are To Be Joined By A Continuous Weld.

G. The Sides Of The Box Will Consist Of Two Banks Of 8" Louvers With A Total Of Twelve Stamped. Each Louver Will Be 8" X 1". A Sixteen-inch Aluminum Grab Handle Will Be Installed On Each 24" Side Panel. The Support Rail Will Be 8" From The Bottom Of The Box And 4" From The Side Of The Box. The Handle Will Be 1/4" Round Bar Stock.

H. The Lid Is Attached To The Box By A Heavy-Hinge With A Continuous Weld Along The Length Of One Side (36"), The Lid Is To Be Locked To The Box With A Heavy-Duty Hasp, Which Enters Through A Hole Punched In The Lid. The Lid Will Have A 1 1/2" Lip.

I. Two Heavy-Duty Plated Steel Lid Supports (See Example) Will Be Installed To Allow Lid To Remain Open During Setup Of An Automatic Sampler.

J. The Security Box Will Be Painted White.

K. Modifications May Occur For Security Boxes If Approved And Any Question Concerning The Installation Of The Sample Platform Should Be Addressed To Pretreatment And Laboratory Services

Suggested Vendors for Security Boxes:
Company: The EMF Co.          Model: DWU CAB-001        Tel: (214) 350-6848

*Approved Equal

REFERENCE DWU Std. Drawing #319 For Lateral Details.

WASTEWATER SAMPLE SITE - CONCRETE PLATFORM DETAIL

DATE

OCT. 2011
PART 4
(Series 400)

WATER & WASTEWATER
ADJUSTMENTS
### PART 4
**WATER AND WASTEWATER ADJUSTMENTS**

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<td>Alter &amp; Adjustment of Standard Precast Manhole</td>
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<tr>
<td>Adjustment of Standard Cast-in-Place Manhole</td>
<td>402</td>
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<tr>
<td>Adjustment of Fiberglass Manhole</td>
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<td>Adjustment of Valve Stack</td>
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<td>New Lateral Cleanout on Existing Lateral</td>
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<td>Adjustment of Existing Lateral</td>
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<td>Adjustment of Type “S” Manhole</td>
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<td>Wastewater Main Passing Through Stormwater Main</td>
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<td>Wastewater Main Passing Thorough Stormwater Manhole</td>
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<td>Relocation of Pipe-To-Soil Potential Test Station</td>
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FIGURE 1 EXISTING MANHOLE

1. Install a false bottom in the manhole.
2. Remove and salvage the existing ring and cover and remove the existing grade rings or brick. If the ring and/or cover are damaged at any time prior to final acceptance, it will be replaced by the contractor at no cost to the City.
3. Remove the cone section and remove or add one or more riser section as required.
4. Reset the cone section on the existing manhole. To meet the required depth, one or more existing riser sections may have to be removed and replaced with new riser section(s) of a different height.
5. Reset the salvaged ring and cover on the cone section with concrete mortar.

FIGURE 2 PRE-GRADING (ALTER)

4. Reset the cone section on the existing manhole.
To meet the required depth, one or more existing riser sections may have to be removed and replaced with new riser section(s) of a different height.
5. Reset the salvaged ring and cover on the cone section with concrete mortar.

FIGURE 3 PRE-PAVING (ADJUST)

6. Remove the salvaged ring and cover and mortar.
7. Use precast concrete grade rings and non-shrink grout to raise M.H. frame and cover to final paving grade. (LIMITED TO 30” MAX. MANHOLE NECK EXTENSION, AS MEASURED FROM THE TOP TAPER OF THE M.H. CONE TO M.H. LID). When M.H. neck extension exceeds 30”, then the M.H. cone is to be removed and reset in such a manner as to reduce the number of grade rings required to reset M.H. frame and cover to final grade.
8. Set the salvaged ring and cover in place with non-shrink grout. Install internal chimney seal. See pg. 327
9. Coat the entire outside of the neck with a waterproof bituminous coating.
10. The false bottom will be removed during the final inspection.

NOTE: If the existing wastewater main is in cone section or if there is only one riser section, the entire manhole must be removed and a new manhole is to be installed.
**FIGURE 1 EXISTING MANHOLE**

1. Install a false bottom in the manhole.
2. Remove the existing ring, cover and any grade rings or bricks.

**FIGURE 2**

3. Remove the existing manhole cone section to a minimum of 6" below the cone taper to M.H. Wall.

**FIGURE 3 PRE-GRADING**

4. Form and monolithically pour a new manhole extension with cone section. Use epoxy bonding agent, "Sikadur 32, HMod" or approved equal, to bond new concrete to existing concrete. Coat entire outside of the new concrete with a waterproof bituminous coating. Set an new ring and cover meeting current TCEQ requirements on top of the new section with concrete mortar.

**FIGURE 4 PRE-PAVING**

5. Remove the new ring and cover and mortar.
6. Use precast concrete grade rings to raise manhole frame and cover to final paving grade. (LIMITED TO 30" MAX. MANHOLE NECK EXTENSION, AS MEASURED FROM THE TOP TAPER OF THE MANHOLE CONE TO MANHOLE LID). When M.H. neck extension exceeds 30", then the manhole cone is to be removed and reset in such a manner as to reduce the number of grade rings required to reset manhole frame and cover to final grade.
7. Set the new ring and cover in place with non-shrink grout. Install internal chimney seal. See pg. 327
8. Coat the entire outside of the neck with a waterproof bituminous coating.
9. The false bottom will be removed during the final inspection.
FIGURE 1 EXISTING MANHOLE
1. Install a false bottom in the manhole.
2. Remove the existing ring, cover and any grade rings or bricks.
3. Cut the existing manhole at a point no closer than 1' below the bottom of the cone section.

FIGURE 2 PRE-GRADING
4. Build up or remove a portion of the manhole to meet the required depth. A new riser section may be required if the manhole is to be raised. The salvaged cone section may be used if approved by the engineer. A manufacturer's repair kit approved by the engineer must be used to make the connection(s).
5. Backfill material must be sand or stabilized soil compacted to a minimum of 90% Std. Proctor Density and placed in 6" lifts beginning at the manhole and working outward to the excavation walls.
6. Set the new ring and cover meeting current TCEQ requirements on the cone section with concrete mortar.

FIGURE 3 PRE-PAVING
7. Remove the new ring and cover and mortar.
8. Use precast concrete grade rings and non-shrink grout to raise manhole frame and cover to final paving grade. (LIMITED TO 30" MAX. MANHOLE NECK EXTENSION, AS MEASURED FROM THE TOP TAPER OF THE MANHOLE CONE TO MANHOLE LID). When manhole neck extension exceeds 30", then the manhole cone is to be removed and reset in such a manner as to reduce the number of grade rings required to reset manhole frame and cover to final grade.
9. Set the new ring and cover in place with non-shrink grout. Install internal chimney seal. See pg. 327
10. Coat the entire outside of the neck with a waterproof bituminous coating.
11. The false bottom will be removed during the final inspection.

ALTER & ADJUSTMENT OF FIBERGLASS MANHOLE

DATE
OCT. 2011

DWU
403
NOTE: The valve cover must always be exposed so the valve can be operated at any time. Exceptions must be approved by the engineer in advance.

The existing valve cover and lid may be reused if not damaged during removal. If the valve cover and/or lid is damaged at any time prior to final acceptance, it will be replaced by the contractor at no cost to the City.

FIGURE 1 EXISTING VALVE STACK AND COVER

FIGURE 2 PRE-GRADING
1. If the proposed paving is 2' to 4' below the top of the existing valve cover, the entire valve stack and cover may be left in place until final adjustment for paving.

FIGURE 3 PRE-GRADING
2. If the proposed paving is less than 2' below the top of the existing valve cover, the valve stack must be extended.
3. The cover is removed and an extension of soilpipe only is installed on the existing valve stack. The valve stack and extension must be properly aligned so that the valve can be operated properly. The extension must be connected to the existing valve stack with a bell and rubber gasket.

FIGURE 4 PRE-PAVING
4. The valve stack or extension is cut to a point not more than 3" below the proposed top of paving.
5. The valve cover is installed over the valve stack or extension to the top of the paving grade.
FIGURE 1 EXISTING LATERAL WITHOUT CLEANOUT
1. The adaptor may not be encased in concrete. If it is not, the same adaptor may be used if it is in serviceable condition. If the adaptor is encased in concrete, the concrete and adaptor must be removed and replaced.

FIGURE 2 NEW CLEANOUT INSTALLED
2. Cut the existing laterals as shown and remove the existing lateral pipe to the private line.
3. Install the new cleanout as shown. The new pipe and embedment shall be of the same type as the existing.
FIGURE 1 EXISTING LATERAL
1. Conflict with a proposed utility shown.

FIGURE 2 PRE-PAVING
2. The new adjustment may be constructed over or under the proposed conflict:
   A. A downstream minimum grade of 1.0% must be maintained.
   B. Bends greater than 22½ degrees are NOT permitted.
   C. The new pipe and embedment must be of the same type as the existing. (Unless the lateral is concrete pipe, in which case clay pipe is to be used.)
   D. Connections between the existing lateral pipe and new lateral pipe may be made with a rubber sleeve coupling or PVC adaptor, which ever is appropriate.
   E. A minimum clearance between the outside of the new lateral pipe and the proposed conflict will be 6". If the clearance is less than 6", a steel pipe or D.I. pipe encasement will be required as shown on PAGE 414, ENCASEMENT PROTECTION FOR WASTEWATER MAINS.
3. The existing wye or tee connection to the existing main may have to be removed and reinstalled to meet the proposed new grade of the lateral. This work, if required, will be included at no additional cost to the City.
**EXISTING CLEANOUT**

1. RUBBER SLEEVE COUPLING OR PVC ADAPTOR
2. NEW LATERAL PIPE
3. MAINLINE LATERAL
4. TEE
5. 4" STACK
6. 4" WASTEWATER CLEANOUT CASTING
   (CAST IRON, P.V.C. OR ABS PLASTIC)
7. WATER TIGHT ADAPTOR
8. PRIVATE WASTEWATER LATERAL
9. CLASS "B" CONCRETE
10. COMPACTED AS SPECIFIED OR INUNDATED SAND.

**NEW CLEANOUT**

1. RUBBER SLEEVE COUPLING OR PVC ADAPTOR
2. NEW LATERAL PIPE
3. MAINLINE LATERAL
4. TEE
5. 4" STACK
6. 4" WASTEWATER CLEANOUT CASTING
   (CAST IRON, P.V.C. OR ABS PLASTIC)
7. WATER TIGHT ADAPTOR
8. PRIVATE WASTEWATER LATERAL
9. CLASS "B" CONCRETE
10. COMPACTED AS SPECIFIED OR INUNDATED SAND.

**NOTES**

A) The new lateral pipe shall be the same type of pipe as the existing lateral. If the lateral is concrete, the entire lateral must be rebuilt.

B) For commercial laterals, use cast iron cleanout castings only.

C) The new cleanout shall be constructed as close to the property line as possible.

D) The embedment will match the embedment on the existing lateral.

**PROCEDURE**

1. Remove existing cleanout and lateral to limits of existing concrete.

2. Salvage the cleanout casting and lid. If either is damaged, a new cleanout casting and/or lid will be furnished at no cost to the City.

3. Install the lateral extension and cleanout as shown in the detail using all new materials. The salvaged cleanout casting and lid may be used if approved by the engineer.
A) The wye and adaptors installed shall be of the same material as the wastewater mainline.
B) The wye and adaptors shall be assembled prior to installation.
C) Connections to the existing main shall be made using a rubber sleeve coupling with stainless steel band clamps or PVC adaptor. The clamps shall be tightened to the torque recommended by the manufacturer.
D) The embedment used shall be equal to that used for the mainline sewer.
E) Class "B" concrete shall be installed in accordance with PAGE 322 to support the wye.
A new water service is installed to the new box. A line is run from the new box to the property line next to the existing house line and turned up with a curb stop. After flushing, the new line is connected to the existing house line at the property line.

**Elevation**

**Plan**

If a new service is installed to replace an existing service to the existing main, the connection will be made as follows:

**Existing Main Under Pressure.** Connect the new copper pipe to the existing corporation cock on the main.

**Existing Main Not Under Pressure.** Tap the existing main a minimum of 1' from the existing tap and install a new corporation cock and service. Remove the existing corporation cock and plug the tap with a plug approved by the engineer.

If the new copper pipe is connected to the existing copper pipe, it shall be accomplished with the use of an approved compression type coupling.

If any existing water service is galvanized pipe, it must be replaced to the existing main with a new copper service.
FIGURE 1. EXISTING CLEANOUT
1. Remove and salvage the existing cleanout. If the cleanout cannot be salvaged or is damaged prior to final acceptance, it will be replaced by the contractor at no cost to the city.

FIGURE 2. PRE-GRADING
2. Remove the cleanout pipe to a point 23" below the proposed top of curb.
3. Plug the pipe with a "T" Cone Stopper or approved equal.

FIGURE 3. PRE-PAVING
4. Extend the existing cleanout pipe, if required. The connection to the existing pipe will be made with a rubber sleeve coupling. The new pipe and embedment shall be of the same type as the existing.
5. Set the salvaged or new cleanout on a Class B concrete pad.
6. Insert a "T" Cone Stopper or approved equal in the cleanout pipe.
NOTES:

1. All materials must be new.

2. Install the new service with a minimum clearance of 1 foot below the excavation of the trench for the proposed storm sewer and a minimum of 1 foot clearance from the edge of the trench excavation when the service is installed laterally along the proposed storm sewer.

3. The minimum bending radius of the copper shall be 6 times the O.D. of the pipe.

4. Adjustment of the proposed water service may be over the proposed storm sewer only if the minimum clearances are maintained, otherwise the service must be installed under the proposed storm sewer excavation.

5. The bend angle is not to exceed 45° for any bend in a new copper service line.
NOTES
N.T.S.

1) Use an epoxy bonding agent to bond new concrete to existing concrete. Bonding agent shall be "Sikadur 32, Hi Mod" or Approved Equal.

2) Epoxy grout to be a high strength rigid epoxy adhesive manufactured for the purpose of anchoring dowels into hardened concrete. Epoxy grout shall be "Sikadur Hi-Mod, LV No. 32" or approved equal.

3) Coat the entire outside of the new concrete with a waterproof bituminous coating.

4) Follow construction sequence typical to the notes as outlined on page 402.
NOTE:

1. REPLACE EX. R.C.P./CLAY PIPE WITH CLAY PIPE.
REPLACE P.V.C. PIPE WITH P.V.C. PIPE.
2. USE RUBBER SLEEVE COUPLINGS FOR R.C.P./CLAY PIPE WITH CLAY PIPE.
USE PRESSURE RATE PVC COUPLINGS FOR PVC PIPE WITH PVC PIPE.
3. RELAY NEW WASTEWATER MAIN TO MATCH EXISTING GRADE.

Contractor Must Contact Wastewater Collection Two Working Days Prior To Construction.
Encasement Protection for Wastewater Mains

Where Sleeve Is Undercut, Backfill With Crushed Rock Or Gravel

Carrying Pipe To Be Supported Within Encasement Pipe At Five Feet Intervals, With Casing Spacers.

Seal The Space Between The Encasement Pipe And The Carrier Pipe At Each End With Non-Shrink Cement Grout Or With A Manufactured Seal To Prevent Soil Migration Into The Encasement Pipe Or Fully Grout The Space Between The Encasement Pipe And The Carrier Pipe. Per The Discretion Of The Project Engineer.

Contractor Must Contact Wastewater Collection Two Working Days Prior To Construction.

NOTES:

1. REPLACE EX. R.C.P./CLAY PIPE WITH CLAY PIPE.
   REPLACE P.V.C. PIPE WITH P.V.C. PIPE.

2. USE RUBBER SLEEVE COUPLINGS FOR R.C.P./CLAY PIPE WITH CLAY PIPE.
   USE PRESSURE RATED PVC COUPLINGS FOR PVC PIPE WITH PVC PIPE.

3. RELAY NEW WASTEWATER MAIN TO MATCH EXISTING GRADE.

SECTION "A-A"

ENCASEMENT PROTECTION FOR WASTEWATER MAIN
NOTES:
1. REPLACE EX. R.C.P./CLAY PIPE WITH CLAY PIPE.
   REPLACE P.V.C. PIPE WITH P.V.C. PIPE.
2. USE RUBBER SLEEVE COUPLINGS FOR R.C.P./CLAY PIPE WITH CLAY PIPE.
   USE PRESSURE RATE PVC COUPLINGS FOR PVC PIPE WITH PVC PIPE.
3. RELAY NEW WASTEWATER MAIN TO MATCH EXISTING GRADE.

Contractor Must Contact Wastewater Collection Two Working Days Prior To Construction.
A STORM WATER MANHOLE
WASTEWATER MAIN PASSING THROUGH

SECTION "A-A"

NOTES:
1. REPLACE EX. R.C.P./CLAY PIPE WITH CLAY PIPE. REPLACE P.V.C. PIPE WITH P.V.C. PIPE.
2. USE RUBBER SLEEVE COUPLINGS FOR R.C.P./CLAY PIPE WITH CLAY PIPE. USE PRESSURE RATE PVC COUPLINGS FOR PVC PIPE WITH PVC PIPE.
3. RELAY NEW WASTEWATER MAIN TO MATCH EXISTING GRADE.

Contractor Must Contact Wastewater Collection Two Working Days Prior To Construction.

WASTEWATER MAIN PASSING THROUGH STORM WATER MANHOLE

DATE
OCT. 2011

DWU
416
Proposed Pipe To Soil Potential Test Station Relocation
In Meter Box Type II

MECHANICAL CABLE SPLICE DETAIL
PART 5
(Series 500)

4" and LARGER WATER SERVICE INSTALLATIONS
<table>
<thead>
<tr>
<th>Title</th>
<th>Pg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Water Services (4&quot; and Larger) Descriptions and Typical Uses</td>
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</tr>
<tr>
<td>Large Service Installation Details and Plan Views</td>
<td>502</td>
</tr>
<tr>
<td>Minimum Easement Sizes for Large Meter Installation</td>
<td>502A</td>
</tr>
<tr>
<td>Large Service Installation Detail--Elevation View</td>
<td>503</td>
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<td>Large Service Installation Details--Precast Vaults (F.M. &amp; D.C. Type)</td>
<td>504</td>
</tr>
<tr>
<td>Large Service Installation Details--Precast Vaults (10&quot; or Larger Meter Size)</td>
<td>505</td>
</tr>
<tr>
<td>Large Service Installation Details--General Notes</td>
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<td>4&quot; Combined Service with 4&quot; Meter</td>
<td>507</td>
</tr>
<tr>
<td>6&quot; Combined Service with 6&quot; Meter</td>
<td>508</td>
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<tr>
<td>8&quot; Combined Service with 6&quot; Meter</td>
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<td>8&quot; Domestic Service with 6&quot; Meter</td>
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<td>4&quot; Closed Fireline Service with 4&quot; Detector Check Device</td>
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<td>8&quot; Closed Fireline Service with 8&quot; Detector Check Device</td>
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</tr>
<tr>
<td>10&quot; Closed Fireline Service with 10&quot; Detector Check Device</td>
<td>521</td>
</tr>
</tbody>
</table>
GENERAL DESCRIPTION OF LARGE WATER SERVICES

1) A Closed Fireline Service -
   A) Definition - A system with automatic sprinklers only, regularly inspected and supervised by an insurance agency.
   B) Metering - Monitored with a detector check device.

2) Combined Water Service - (Domestic and Fire)
   A) Definition - Fire protection and domestic water through a single water service and meter.
   B) Metering - Metered with Underwriter approved "FM" full flow meter or turbine meter with U.L. approved strainer.

3) Domestic Water Service
   A) Definition - Domestic water through a single water service and meter.
   B) Metering - Metered with compound meter or turbine meter with domestic type strainer.

4) Irrigation Water Service
   A) Definition - Same as domestic water through a single water service and meter without a bypass and for irrigation purpose only.
   B) Metering - Metered with compound meter or turbine meter with domestic type strainer.
To Customer
Street

Distribution Main

Tee (B.B.F.) With Valve (F.M.J.) Or Tapping Sleeve With Tapping Valve

Direction Of Flow

Normal Closed

Gate Valve

By-Pass

Service Line

Gate Valve

To Customer

Property Line

Curb Line

Normal Closed

By-Pass

Precast Meter Vault Or Cast In Place (Monolithically Poured) With Concrete Floor And Access Hatch. (See 503, 504, & 505)

TYPICAL METER ALIGNMENT
(Combined Service Shown)

SEE GENERAL NOTES: 506

ALTERNATE METER ALIGNMENT
FOR LIMITED SPACE INSTALLATION
(Combined Service Shown)

SEE GENERAL NOTES: 506

LARGE SERVICE INSTALLATION DETAILS
PLAN VIEWS

DWU

DATE
JAN. 2010

Page No. 502
COMBINED SERVICE - 15' x 30' EASEMENT

FIRE LINE SERVICE - 10' x 15' EASEMENT

MINIMUM EASEMENT SIZES FOR LARGE METER INSTALLATIONS
TYPICAL FOR ALL LARGE METER VAULTS
Lifting Anchors
With 4-Two Ton Precast Meter Vault

SECTION VIEW

Floor Slab, With 4 - Two Ton Lifting Anchors

F.M. VAULT

* Available Heights 36'', 48'', 60''

* Special Applications To Be Determined By Engineer.

LARGE SERVICE INSTALLATION DETAILS
PRECAST VAULTS

D.C. VAULT

* Available Heights 36'', 48'', 60''

* Special Applications To Be Determined By Engineer.
Lifting Anchors
With 4-Two Ton Precast Meter Vault

SECTION VIEW

Floor Slab, With 4 - Two Ton Lifting Anchors

* Available Heights 36", 48", 60"

10" VAULT

* Special Applications To Be Determined By Engineer.
GENERAL NOTES FOR
MATERIAL AND CONSTRUCTION METHODS

1.) All materials including tapping sleeves, tapping valves, valves, pipe, associated fittings and construction methods shall conform to the most current version of the NCTCOG specifications, the DWU Addendum to that specification, this manual and the latest edition of the approved materials list.

NOTE:

A.) Only full body gray or ductile iron fittings and glands will be permitted for large water service installation. In no case will compact fittings be allowed.

B.) All connections including valves and fittings shall be restrained joints. No threaded rod will be allowed. Along with restrained joints, thrust blocking will be required.

C.) All pipe must be either Ductile Iron (Class 52) or PVC C900 (DR-14).

2.) All precast vaults and precast floors used in the installation of large water services will meet DWU specifications and must be on the approved materials list.

3.) Cast in place concrete shall be class "F" concrete, except for concrete used for thrust blocking, which shall be class "B" concrete.

4.) The 3' x 4' aluminum access hatch cover shall meet DWU specifications and must be on the approved materials list. (Currently supplied by DWU and may be purchased for use on DWU facilities only.)
### Material List

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2 Ea.</td>
<td>4'' x 8'' Nipple M.J. x F.</td>
</tr>
<tr>
<td>2</td>
<td>2 Ea.</td>
<td>4'' x 4''. Tee F. x F.</td>
</tr>
<tr>
<td>3</td>
<td>2 Ea.</td>
<td>4'' Gate Valve F. x M.J.</td>
</tr>
<tr>
<td>4</td>
<td>3 Ea.</td>
<td>Valve Stack Riser Cover &amp; Lid</td>
</tr>
<tr>
<td>5</td>
<td>1 Ea.</td>
<td>4'' x 40'' Pipe S. x S.</td>
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<tr>
<td>6</td>
<td>1 Ea.</td>
<td>4'' Flanged Coupling Adaptor</td>
</tr>
<tr>
<td>7</td>
<td>1 Ea.</td>
<td>4'' Meter As Specified (Type F.M. Shown)</td>
</tr>
<tr>
<td>8</td>
<td>1 Ea.</td>
<td>4'' x 4'' Tee F. x F. (test Point)</td>
</tr>
<tr>
<td>9</td>
<td>1 Ea.</td>
<td>4'' Gate Valve F. x F. (Test Point)</td>
</tr>
<tr>
<td>10</td>
<td>1 Ea.</td>
<td>4'' x 24'' Nipple F. x F.</td>
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<td>4'' x 36'' Nipple F. x F.</td>
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<td>12</td>
<td>1 Ea.</td>
<td>4'' 90° Bend F. x F.</td>
</tr>
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<td>13</td>
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<td>4'' Gate Valve F. x F.</td>
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<td>14</td>
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<td>4'' 90° Bend M.J. x F.</td>
</tr>
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<td>15</td>
<td>1 Ea.</td>
<td>4'' Pipe</td>
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<tr>
<td>16</td>
<td>1 Ea.</td>
<td>Precast F.M. Vault</td>
</tr>
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<td>17</td>
<td>1 Ea.</td>
<td>F.M. Vault Floor (Not Shown)</td>
</tr>
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<td>18</td>
<td>1 Ea.</td>
<td>Access Hatch (Not Shown)</td>
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</tbody>
</table>

### Diagram

**Direction Of Flow**

- **Vault Opening**
- **Precast F.M. Vault**
- **F.M. Vault Floor (Not Shown)**
- **Access Hatch (Not Shown)**

### Notes

- Ref. 501 to 506
- **4'' COMBINED SERVICE WITH 4'' METER**
- DWU 507
- **JUNE 2002**
## Material List

<table>
<thead>
<tr>
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<td>3</td>
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<td>6'' Gate Valve F. x M.J.</td>
</tr>
<tr>
<td>4</td>
<td>3 Ea.</td>
<td>Valve Stack Riser Cover &amp; Lid</td>
</tr>
<tr>
<td>5</td>
<td>1 Ea.</td>
<td>6'' x 60'' Pipe S. x S.</td>
</tr>
<tr>
<td>6</td>
<td>1 Ea.</td>
<td>6'' Flanged Coupling Adaptor</td>
</tr>
<tr>
<td>7</td>
<td>1 Ea.</td>
<td>6'' Meter As Specified (Type F.M. Shown)</td>
</tr>
<tr>
<td>8</td>
<td>1 Ea.</td>
<td>6'' x 4'' Tee F. x F. (test Point)</td>
</tr>
<tr>
<td>9</td>
<td>1 Ea.</td>
<td>4'' Gate Valve F. x F. (Test Point)</td>
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</table>

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<td>11</td>
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<td>6'' x 36'' Nipple F. x F.</td>
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<tr>
<td>12</td>
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<td>6'' 90'' Bend F. x F.</td>
</tr>
<tr>
<td>13</td>
<td>1 Ea.</td>
<td>6'' Gate Valve F. x F.</td>
</tr>
<tr>
<td>14</td>
<td>1 Ea.</td>
<td>6'' 90'' Bend M.J. x F.</td>
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<td>1 Ea.</td>
<td>6'' Pipe</td>
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<td></td>
<td>1 Ea.</td>
<td>F.M. Vault Floor (Not Shown)</td>
</tr>
<tr>
<td></td>
<td>1 Ea.</td>
<td>Access Hatch (Not Shown)</td>
</tr>
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**Direction Of Flow**

**6'' COMBINED SERVICE WITH 6'' METER**

Ref. 501 to 506

*DWU 508*

*DATE JUNE 2002*
<table>
<thead>
<tr>
<th>Part No.</th>
<th>Quantity</th>
<th>Description</th>
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<tbody>
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<td>8&quot; x 8&quot; Nipple M.J. x F.</td>
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<td>8&quot; x 6&quot; Tee F. x F.</td>
</tr>
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<td>8&quot; Gate Valve F. x F.</td>
</tr>
<tr>
<td>4</td>
<td>3 Ea.</td>
<td>Valve Stock Riser Cover &amp; Lid</td>
</tr>
<tr>
<td>5</td>
<td>1 Ea.</td>
<td>6&quot; x 60&quot; Pipe S. x S.</td>
</tr>
<tr>
<td>6</td>
<td>1 Ea.</td>
<td>6&quot; Flanged Coupling Adaptor</td>
</tr>
<tr>
<td>7</td>
<td>1 Ea.</td>
<td>8&quot; Meter As Specified (Type F.M. Shown)</td>
</tr>
<tr>
<td>8</td>
<td>1 Ea.</td>
<td>6&quot; x 4&quot; Tee F. x F. (Test Point)</td>
</tr>
<tr>
<td>9</td>
<td>1 Ea.</td>
<td>4&quot; Gate Valve F. x F. (Test Point)</td>
</tr>
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<td>8&quot; x 6&quot; Reducer F. x M.J.</td>
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<td>2 Ea.</td>
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<td>1 Ea.</td>
<td>6&quot; 90° Bend F. x F.</td>
</tr>
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<td>14</td>
<td>1 Ea.</td>
<td>6&quot; Gate Valve F. x M.J.</td>
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<td>1 Ea.</td>
<td>6&quot; 90° Bend M.J. x F.</td>
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<td>16</td>
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</tr>
<tr>
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</tr>
<tr>
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<td>F.M. Vault Floor (Not Shown)</td>
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<tr>
<td>19</td>
<td>1 Ea.</td>
<td>Access Hatch (Not Shown)</td>
</tr>
<tr>
<td>20</td>
<td>1 Ea.</td>
<td>8&quot; x 6&quot; Reducer F. x F.</td>
</tr>
</tbody>
</table>

Ref. 501 to 506

8" COMBINED SERVICE
WITH 6" METER

JUNE 2002
# Material List

<table>
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<th>Description</th>
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</thead>
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<td>8&quot; Gate Valve F. x F. (Type F.M. Shown)</td>
</tr>
<tr>
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<td>1 Ba.</td>
<td>F.M. Vault Floor (Not Shown)</td>
</tr>
<tr>
<td>4</td>
<td>1 Ba.</td>
<td>Access Hatch (Not Shown)</td>
</tr>
<tr>
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<td>1 Ba.</td>
<td>8&quot; x 80&quot; Pipe S. x S.</td>
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<tr>
<td>7</td>
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<td>8&quot; x 8&quot; Tee F. x F.</td>
</tr>
<tr>
<td>8</td>
<td>2 Ea.</td>
<td>8&quot; Gate Valve F. x M.J.</td>
</tr>
<tr>
<td>9</td>
<td>3 Ea.</td>
<td>Valve Stack Riser Cover &amp; Lid</td>
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<td>1 Ba.</td>
<td>6&quot; x 24&quot; Nipple F. x F.</td>
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<td>6&quot; x 36&quot; Nipple F. x F.</td>
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<td>8&quot; Gate Valve F. x F.</td>
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<td>8&quot; Gate Valve M.J. x F.</td>
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<td>16</td>
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<tr>
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<td>1 Ba.</td>
<td>6&quot; x 4&quot; Tee F. x F. (Test Point)</td>
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<tr>
<td>18</td>
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<td>4&quot; Gate Valve F. x F. (Test Point)</td>
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---

### Direction of Flow

- **8" COMBINED SERVICE WITH 8" METER**
- **Ref. 501 to 506**

---

**DATE**

- **OCT 2011**

---

**DWU**

- **510**
### Material List

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<td>10&quot; Gate Valve F. x F.</td>
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<td>3 Ea.</td>
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<td>8&quot; x 80&quot; Pipe S. x S.</td>
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<td>8&quot; Meter As Specified (Type F.M. Shown)</td>
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<tr>
<td>9</td>
<td>1 Ea.</td>
<td>4&quot; Gate Valve F. x F. (Test Point)</td>
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<tr>
<td>10</td>
<td>1 Ea.</td>
<td>10&quot; x 8&quot; Reducer F. x M.J.</td>
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<table>
<thead>
<tr>
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<th>Quantity</th>
<th>Description</th>
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<tbody>
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<tr>
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<td>1 Ea.</td>
<td>8&quot; 90° Bend F. x F.</td>
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<td>1 Ea.</td>
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<td>16</td>
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<td>8&quot; Pipe</td>
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<tr>
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<td>1 Ea.</td>
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<tr>
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<td>F.M. Vault Floor (Not Shown)</td>
</tr>
<tr>
<td>19</td>
<td>1 Ea.</td>
<td>Access Hatch (Not Shown)</td>
</tr>
<tr>
<td>20</td>
<td>1 Ea.</td>
<td>10&quot; x 8&quot; Reducer F. x F.</td>
</tr>
</tbody>
</table>

**Vault Opening**

**10" COMBINED SERVICE WITH 8" METER**

Ref. 501 to 506

(JUNE 2002)
Material List

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<th>Part No.</th>
<th>Quantity</th>
<th>Description</th>
</tr>
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<tbody>
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Part No. | Quantity | Description                                      |
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10" COMBINED SERVICE WITH 10" METER

Ref. 501 to 506

DATE

OCT 2011

DWU

512
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<th>Material List</th>
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<td>4&quot; x 36&quot; Pipe S. x S.</td>
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<td>3&quot; Meter As Specified (Type Compound Shown)</td>
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<td></td>
</tr>
<tr>
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<td>Access Hatch (Not Shown)</td>
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</tr>
<tr>
<td>⑱</td>
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**Material List**

4" DOMESTIC SERVICE WITH 3" METER

Ref. 501 to 506

DWU

DATE

OCT 2010
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<th>Material List</th>
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</tr>
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<td>1 Ea.</td>
</tr>
<tr>
<td>6</td>
<td>1 Ea.</td>
</tr>
<tr>
<td>7</td>
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</tr>
<tr>
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Vault Opening

Direction Of Flow

4" DOMESTIC SERVICE WITH 4" METER

Ref. 501 to 506

DATE
OCT 2010
<table>
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<th>Part No.</th>
<th>Quantity</th>
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<th>Part No.</th>
<th>Quantity</th>
<th>Description</th>
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<td>1 Ea.</td>
<td>6&quot; x 24&quot; Pipe S. x S.</td>
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<td>4&quot; Pipe</td>
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<tr>
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**Material List**

**6" DOMESTIC SERVICE WITH 6" METER**

Ref. 501 to 506
### Material List

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</thead>
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<td>8&quot; Gate Valve F. x M.J.</td>
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<td>Valve Stack Riser Cover &amp; Lid</td>
</tr>
<tr>
<td>5</td>
<td>1 Ea.</td>
<td>8&quot; x 24&quot; Pipe S. x S.</td>
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<td>6</td>
<td>1 Ea.</td>
<td>8&quot; x 6&quot; Reducing Flanged Coupling Adaptor</td>
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<td>6&quot; Meter As Specified (Type Compound Shown)</td>
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<td>9</td>
<td>1 Ea.</td>
<td>8&quot; x 6&quot; Reducer F. x F.</td>
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<table>
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<th>Part No.</th>
<th>Quantity</th>
<th>Description</th>
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<tbody>
<tr>
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<td>12</td>
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<td>13</td>
<td>1 Ea.</td>
<td>4&quot; Gate Valve F. x M.J.</td>
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<tr>
<td>14</td>
<td>1 Ea.</td>
<td>4&quot; Pipe</td>
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<tr>
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<td>1 Ea.</td>
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</table>

### Diagram

- **Direction Of Flow**: 8" Domestic Service with 6" Meter
- **Vault Opening**: 8" Gate Valve F. x F.

**Ref. 501 to 506**

**DWU**

**Date**

**OCT 2010**
## Material List

<table>
<thead>
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<th>Part No.</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
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<td>1 Ea.</td>
<td>4&quot; Detector Check Device W/ By-Pass Meter</td>
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<tr>
<td>3</td>
<td>1 Ea.</td>
<td>4&quot; x 8&quot; Nipple M.J. x F.</td>
</tr>
<tr>
<td>4</td>
<td>1 Ea.</td>
<td>Precast D.C. Vault</td>
</tr>
<tr>
<td></td>
<td>1 Ea.</td>
<td>D.C. Vault Floor (Not Shown)</td>
</tr>
<tr>
<td></td>
<td>1 Ea.</td>
<td>Access Hatch (Not Shown)</td>
</tr>
</tbody>
</table>

---

**4" CLOSED FIRELINE SERVICE WITH 4" DETECTOR CHECK DEVICE**

Ref. 501 to 506

DATE

JUNE 2002
### Material List

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1 Ea.</td>
<td>6&quot; Flanged Coupling Adaptor</td>
</tr>
<tr>
<td>2</td>
<td>1 Ea.</td>
<td>6&quot; Detector Check Device W/ By-Pass Meter</td>
</tr>
<tr>
<td>3</td>
<td>1 Ea.</td>
<td>6&quot; x 8&quot; Nipple M.J. x F.</td>
</tr>
<tr>
<td>4</td>
<td>1 Ea.</td>
<td>Precast D.C. Vault</td>
</tr>
<tr>
<td></td>
<td>1 Ea.</td>
<td>D.C. Vault Floor (Not Shown)</td>
</tr>
<tr>
<td></td>
<td>1 Ea.</td>
<td>Access Hatch (Not Shown)</td>
</tr>
</tbody>
</table>

### Notes
- **Vault Opening**
- **Direction Of Flow**
- **Vault Opening**
- Ref. 501 to 506
- JUNE 2002

### Design

- **6" CLOSED FIRELINE SERVICE WITH 6" DETECTOR CHECK DEVICE**
- **DATE:** JUNE 2002
- **DWU:** 518
### Material List

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Quantity</th>
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</thead>
<tbody>
<tr>
<td>①</td>
<td>1 Ea.</td>
<td>8&quot; X 6&quot; Flanged Coupling Adaptor</td>
</tr>
<tr>
<td>②</td>
<td>1 Ea.</td>
<td>6&quot; Detector Check Device W/ By-Pass Meter</td>
</tr>
<tr>
<td>③</td>
<td>1 Ea.</td>
<td>8&quot; X 6&quot; Reducer M.J. X F.</td>
</tr>
<tr>
<td>④</td>
<td>1 Ea.</td>
<td>Precast D.C. Vault</td>
</tr>
<tr>
<td></td>
<td>1 Ea.</td>
<td>D.C. Vault Floor (Not Shown)</td>
</tr>
<tr>
<td></td>
<td>1 Ea.</td>
<td>Access Hatch (Not Shown)</td>
</tr>
</tbody>
</table>

8" CLOSED FIRELINE SERVICE WITH 6" DETECTOR CHECK DEVICE

Ref. 501 to 506

DATE: JUNE 2002
# Material List

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>1 Ea.</td>
<td>8&quot; Flanged Coupling Adaptor</td>
</tr>
<tr>
<td>②</td>
<td>1 Ea.</td>
<td>8&quot; Detector Check Device W/ By-Pass Meter</td>
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<tr>
<td>③</td>
<td>1 Ea.</td>
<td>8&quot; X 8&quot; Nipple M.J. X F.</td>
</tr>
<tr>
<td>④</td>
<td>1 Ea.</td>
<td>Precast D.C. Vault</td>
</tr>
<tr>
<td></td>
<td>1 Ea.</td>
<td>D.C. Vault Floor (Not Shown)</td>
</tr>
<tr>
<td></td>
<td>1 Ea.</td>
<td>Access Hatch (Not Shown)</td>
</tr>
</tbody>
</table>

---

**Diagram:**

8" CLOSED FIRELINE SERVICE WITH 8" DETECTOR CHECK DEVICE

Ref. 501 to 506

DATE: JUNE 2002

DWU: 520
<table>
<thead>
<tr>
<th>Part No.</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1</td>
<td>10&quot; Flanged Coupling Adaptor</td>
</tr>
<tr>
<td>②</td>
<td>1</td>
<td>10&quot; Detector Check Device W/ By-Pass Meter</td>
</tr>
<tr>
<td>③</td>
<td>1</td>
<td>10&quot; X 8&quot; Nipple M.J. X F.</td>
</tr>
<tr>
<td>④</td>
<td>1</td>
<td>Precast D.C. Vault</td>
</tr>
<tr>
<td></td>
<td></td>
<td>D.C. Vault Floor (Not Shown)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Access Hatch (Not Shown)</td>
</tr>
</tbody>
</table>

**Diagram:**

- **10" CLOSED FIRELINE SERVICE WITH 10" DETECTOR CHECK DEVICE**
- **Dimensions:**
  - Vault Opening: 46" x 46"
  - Height: 72"
  - Width: 64"
  - Depth: 19" x 26½" x 18½"

**Date:**

- JUNE 2002
PART 6
(Series 600)

CATHODIC PROTECTION

City of Dallas
Water Utilities Department
# PART 6
## CATHODIC PROTECTION

<table>
<thead>
<tr>
<th>TITLE</th>
<th>Pg.</th>
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<tbody>
<tr>
<td>Potential Test Station</td>
<td>601</td>
</tr>
<tr>
<td>Insulating Joint Test Station</td>
<td>602</td>
</tr>
<tr>
<td>Casing Test Station</td>
<td>603</td>
</tr>
<tr>
<td>Foreign Pipeline Test Station</td>
<td>604</td>
</tr>
<tr>
<td>Galvanic Anode Test Station</td>
<td>605</td>
</tr>
<tr>
<td>Flush Mounted Test Station</td>
<td>606</td>
</tr>
<tr>
<td>Condulet Style Test Station</td>
<td>607</td>
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<tr>
<td>Post Mounted Test Station</td>
<td>608</td>
</tr>
<tr>
<td>Type Roadway Offset</td>
<td>609</td>
</tr>
<tr>
<td>Wall Mounted Vault Style Test Station</td>
<td>610</td>
</tr>
<tr>
<td>Flush Mounted Vault Style Test Station</td>
<td>611</td>
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<tr>
<td>Flush Mounted Potential Test Station Test Terminal Board</td>
<td>612</td>
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<tr>
<td>Flush Mounted Insulating Joint Test Station Test Terminal</td>
<td>613</td>
</tr>
<tr>
<td>Flush Mounted Casing Test Station Test Terminal Board</td>
<td>614</td>
</tr>
<tr>
<td>Flush Mounted Foreign Pipeline Test Station Test Terminal Board</td>
<td>615</td>
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<tr>
<td>Flush Mounted Anode Test Station Test Terminal Board</td>
<td>616</td>
</tr>
<tr>
<td>Condulet Test Box</td>
<td>617</td>
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<tr>
<td>Post Mounted Galvanic Anode Junction Box Test Station</td>
<td>618</td>
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<tr>
<td>Galvanic Anode Junction Box</td>
<td>619</td>
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<tr>
<td>Post Mounted Foreign Pipeline Test Station Test Terminal Board</td>
<td>620</td>
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<td>Post Mounted Foreign Pipeline Test Station Test Terminal Board (Section A-A)</td>
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<tr>
<td>Post Mounted Foreign Pipeline Test Station Test Terminal Board (Section B-B)</td>
<td>622</td>
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<tr>
<td>Galvanic Ribbon Test Station</td>
<td>623</td>
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<tr>
<td>Galvanic Ribbon Installation Section-A</td>
<td>624</td>
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<tr>
<td>Anode To Lead Cable Connection</td>
<td>625</td>
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<tr>
<td>Soldered Terminal Connection</td>
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<tr>
<td>Flush Mounted Ribbon Anode Test Station Test Terminal Board</td>
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<tr>
<td>Anode Junction Box</td>
<td>627</td>
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<tr>
<td>Rectifier/Deep Anode Well Installation Plan View</td>
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<td>Rectifier/Deep Anode Well Section A</td>
<td>629</td>
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<tr>
<td>Deep Well Anode</td>
<td>630</td>
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<tr>
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<td>631</td>
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<tr>
<td>Utility Pole</td>
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<tr>
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<td>Insulating Flexible Coupling</td>
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<tr>
<td>Ductile Iron Push-On</td>
<td>636</td>
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<tr>
<td>Flanged Joint Bond Cables</td>
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<tr>
<td>Flexible Coupling Bond Cables</td>
<td>638</td>
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<tr>
<td>Gate Valve And Flange Adapter Bonding</td>
<td>639</td>
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<tr>
<td>CCP or MLCP Joint Bond With Steel Clip</td>
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<tr>
<td>Bonding Clip</td>
<td>643</td>
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<tr>
<td>CCP or MLCP Joint Bond With Steel Bar</td>
<td>644</td>
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<tr>
<td>Cable-To-Pipe Connection</td>
<td>645</td>
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<tr>
<td>Exothermic Weld Detail</td>
<td>646</td>
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<tr>
<td>Cast Iron Cover &amp; Valve Box</td>
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<tr>
<td>Electrical Pull Box</td>
<td>648</td>
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<tr>
<td>Cable Identifier</td>
<td>649</td>
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<tr>
<td>Pin Brazing Wiring-To-Structure Weld Detail</td>
<td>650</td>
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<tr>
<td>IR Free Coupon Detail</td>
<td>651A</td>
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<tr>
<td>2-Cable Test Station With ER Probe Detail</td>
<td>653</td>
</tr>
<tr>
<td>Low Profile ER Probe (Electrical Resistance) Probe Detail</td>
<td>655</td>
</tr>
<tr>
<td>Copper Sulfate Reference Electrode Cell</td>
<td>657</td>
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<tr>
<td>Line Current Span Test Station</td>
<td>660</td>
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</table>
POST-MOUNTED TEST STATION
DWG 608 & 612

FINISHED GRADE

2-6 PIPELINE CABLES

REFERENCE ELECTRODE, PER DETAIL 651A

12" MIN

6"

WIRE CONNECTION, PER DETAIL 645 & 650

PIPELINE

NOTES:
1. PLACE PLASTIC WARNING TAPE 12" ABOVE CABLES RUNS.
2. HORIZONTAL RUNS TO BE 36" BELOW GRADE.

REFER TO PAGES 608, 612, 645, 650 & 651A

POTENTIAL TEST STATION

DWU 601
DATE OCT. 2016
NOTES:

1. PLACE PLASTIC WARNING TAPE 12" ABOVE CABLE RUNS.
2. HORIZONTAL RUNS TO BE 36" BELOW GRADE.
3. DO NOT MAKE CABLE CONNECTIONS WITHIN 18" OF MONOLITHIC ISOLATION JOINT.

REFER TO PAGES 608, 613, 633, 645, 650, 651, 656 & 656

INSULATING JOINT TEST STATION
NOTES:
1. PLACE PLASTIC WARNING TAPE 12" ABOVE WIRE RUNS.
2. HORIZONTAL RUNS TO BE 36" BELOW GRADE.

REFER TO PAGES 608, 614, 645, 650, & 651A

CASING TEST STATION
NOTES:

1. PLACE PLASTIC WARNING TAPE 12" ABOVE CABLE RUNS.
2. HORIZONTAL RUNS TO BE 36" BELOW GRADE.
POST-MOUNTED TEST STATION, PER DETAILS 608 & 616

*10 ANODE, LEAD CABLES, LEFT SIDE OF PIPELINE WITH ADVANCING STATIONING (BLACK)

GALVANIC ANODE, NUMBER OF ANODES AS DESIGNATED ON INSTALLATION SCHEDULE

*10 ANODE, LEAD CABLES, RIGHT SIDE OF PIPELINE WITH ADVANCING STATIONING (RED)

NOTES:
1. PLACE PLASTIC WARNING TAPE 12" ABOVE CABLE RUNS.
2. HORIZONTAL RUNS TO BE 36" BELOW GRADE.

REFER TO PAGES 608, 616, 645, 650 & 651A

GALVANIC ANODE TEST STATION
24"x24" FORMED CONCRETE PAD 6" THICK IN PAVEMENT
36"x36" CONCRETE PAD 6" THICK IN UNIMPROVED AREAS
WITH 2% SLOPE AROUND TEST BOX

CAST IRON COVER LABEL PER DETAIL 647

ASPHALT OR CONCRETE FINISHED GRADE

4000 PSI CONCRETE

TEST TERMINAL BOARD

CONCRETE VALVE BOX PER DETAIL 647

4 REBAR (TYP ALL AROUND)

CONDUIT

SOIL FINISHED GRADE

1" MIN

2%

TEST/ANODE CABLES, QUANTITY VARIES

NOTES:
1. PROVIDE SLACK IN CABLES, 24" MINIMUM
2. INSTALL CONCRETE SLAB 1" TO 2" ABOVE FINISH GRADE IN OPEN AREAS AND FLUSH WITH FINISH GRADE IN ASPHALT OR CONCRETE PAVED AREAS.
3. PROVIDE EXTENSIONS AS REQUIRED TO MATCH OR EXCEED PAVEMENT THICKNESS, NOT SHOWN.
4. BOTTOM OF VALVE BOX SHALL BE NATIVE SOIL. DO NOT PLACE ROCK, GRAVEL, OR SAND IN VALVE BOX.

REFER TO PAGE 647

FLUSH MOUNTED TEST STATION

DWU

606

DATE

OCT. 2016
NOTES:

1. USE CONDULET STYLE TEST STATION ONLY WHERE SUPPORT IS PROVIDED BY STEEL PIPE MARKER, FENCE POST, ABOVE GROUND STRUCTURE, MANHOLE, OR BUILDING.

2. LOOP WIRE AT BASE OF POST TO MINIMIZE CABLE STRESS.

3. STENCIL LABEL ON SIDE OF POST AS DEPICTED IN DWG 608.

REFER TO PAGE 617
NOTES:
1. LOOP WIRE AT BASE OF POST TO MINIMIZE CABLE STRESS.
2. COAT CABLES WITH INORGANIC ZINC PRIMER OR COLD GALVANIZING REPAIR COATING.
3. FOR ANODE TEST STATION, USE ANODE JUNCTION BOX IF NUMBER OF ANODES IS MORE THAN 4, PER STD DWG 618.
4. ALL WELDING BEFORE WIRE INSTALLATION TO PREVENT DAMAGE TO CABLE.
5. REMOVE SHARP EDGES FROM STEEL CONDUIT.

TEST CABLES/ANODE LEAD CABLES NUMBER AS REQUIRED

12" DIA LOOP IN CABLES, SEE NOTE 1
NOTES:

1. INSTALLATION SIMILAR FOR POST STYLE TEST STATION.
2. BURIED CONDUIT TO BE SCH 80 PVC.
3. SEAL BOTH ENDS OF RIGID CONDUIT WITH DUCT COMPOUND OR URETHANE FOAM.
4. EMBED CARBONITE MARKER IN CONCRETE.

REFER TO PAGES 608 & 618

TYPE ROADWAY OFFSET

DWU 609

DATE OCT. 2016
NOTES:

1. INSTALL TEST STATION OVER CENTER OF PIPE.

2. IF VAULT TOP IS LESS THAN 36" ABOVE FINISHED GRADE, THEN INSTALL FLUSH MOUNTED VAULT PER STD DWG 611.

3. TEST BOX SHOULD BE TYPE CONDULET TEST BOX. PER STD DWG 617.

REFER TO PAGES 611, 617 & 645

WALL MOUNTED VAULT STYLE
TEST STATION

REFER TO GENERAL NOTES
FOR LARGE VALVES WITH MANHOLES - PAGE 216

DWU 610
OCT. 2016
NOTE:

1. INSTALL TEST STATION OVER CENTER OF PIPE.

REFER TO PAGES 606, 645 & 650

REFER TO GENERAL NOTES
FOR LARGE VALVES WITH
MANHOLES - PAGE 216
**NOTES:**

1. TERMINALS SHALL BE 1/4" NICKEL PLATED BRASS LOCKING WASHER, TWO FLAT WASHERS, AND DOUBLE NUTS.

2. SOLDER ALL LUGS TO CABLES.

3. REFERENCE ELECTRODE SHOULD ONLY BE INSTALLED AT TEST STATIONS DESIGNATED IN THE INSTALLATION SCHEDULE.
NOTES:
1. TERMINALS SHALL BE 1/4" NICKEL PLATED BRASS WITH LOCKING WASHER, TWO FLAT WASHERS, AND DOUBLE NUTS.
2. SOLDER ALL LUGS TO CABLES.
1. TERMINALS SHALL BE 1/4" NICKEL PLATED BRASS WITH LOCKING WASHER, TWO FLAT WASHERS, AND DOUBLE NUTS.

2. SOLDER ALL LUGS TO CABLES.
NOTES:

1. TERMINALS SHALL BE 1/4" NICKEL PLATED BRASS WITH LOCKING WASHER, TWO FLAT WASHERS, AND DOUBLE NUTS.

2. SOLDER ALL LUGS TO CABLES.
NOTES:

1. TERMINALS SHALL BE 1/4" NICKEL PLATED BRASS WITH LOCKING WASHER, TWO FLAT WASHERS, AND DOUBLE NUTS.

2. SOLDER ALL LUGS TO CABLES.

3. REFERENCE ELECTRODE SHOULD ONLY BE INSTALLED AT TEST STATIONS DESIGNATED IN THE INSTALLATION SCHEDULE.

REFERENCE ELECTRODE/COPPER SULFATE ELECTRODE AS REQUIRED, 3 CONDUCTOR CABLE
NOTES:
1. COLOR OF FRONT COVER TO DENOTE APPLICATION.
2. USE CONDULET STYLE TEST STATION ONLY WHERE SUPPORT IS PROVIDED BY STEEL PIPE MARKER, FENCE POST, ABOVE GROUND STRUCTURE, MANHOLE, OR BUILDING.
3. LOOP WIRE AT BASE OF POST TO MINIMIZE CABLE STRESS.
4. STENCIL LABEL ON SIDE OF POST AS DEPICTED IN DWG 608.
NOTES:

1. LOOP WIRE AT BASE OF POST TO MINIMIZE WIRE STRESS.

2. COAT THREADS WITH INORGANIC ZINC PRIMER OR COLD GALVANIZING REPAIR COATING.
LOCKABLE STAINLESS STEEL JUNCTION BOX SIZE AS REQUIRED

1/4" THICK PHENOLIC BOARD

ENGRAVED PHENOLIC BOARD LABEL WITH TYPE OF TEST STATION, PIPE DIAMETER AND PIPE STATION

COTT 0.010 OHM SHUNT (TYP)

ATS XXX XX+XX

TOGGLE SWITCH

COPPER BUS BAR

CABLE LUG CONNECTOR (TYP), PROTECT END W/ ADHESIVE LINED SHRINK SLEEVE

IR FREE COUPON/CSE AS REQUIRED, CABLE, RED

*6 PIPELINE CABLES

*10 ANODE LEAD CABLES, NUMBER AS REQUIRED

NOTE:
1. TERMINALS SHALL BE 1/4" STAINLESS STEEL WITH LOCKING WASHER, TWO FLAT WASHERS, AND DOUBLE NUTS.
POST MOUNTED FOREIGN PIPELINE
TEST STATION TEST TERMINAL BOARD

ANODE JUNCTION BOX PER STD DWG 619

CONDUIT WITH ANODE LEAD CABLES

GALVANIZED STEEL CONDUIT WITH ANODE LEAD CABLES

4000 PSI CONCRETE

#4 REINFORCING STEEL, 12" EW

DEEP ANODE WELL PER STD DWGS 630 & 647

ANODE WIRE TO ANODE JUNCTION BOX

PVC VENT PIPE

AC METER AND ELECTRICAL SERVICE PEDESTAL

GALVANIZED STEEL CONDUIT WITH GROUNDING CABLE

GALVANIZED STEEL CONDUIT WITH STRUCTURE LEAD CABLES

316 STAINLESS STEEL ANCHOR STUD, NUT AND WASHER, TYP

5/8"x8'-0" GROUND ROD

ELECTRICAL PULL BOX PER STD DWG 648

REFER TO PAGES 619, 620, 622, 630, 647 & 648
NOTES:

1. Maintain 12" minimum separation between galvanic ribbon anode and pipeline.

2. Wet anode backfill and geotextile fabric prior to pipe backfill to prevent loss of anode backfill.

REFER TO PAGES 608 & 612
NOTES:
1. ANODE HEADER CABLE COLOR VARIES PER ANODE CONFIGURATIONS.
2. ONLY ONE ANODE LEAD CABLE CONNECTION ALLOWED PER SPLICE.
NOTE:

1. TERMINALS SHALL BE 1/4" STAINLESS STEEL WITH LOCKING WASHER, TWO FLAT WASHERS, AND DOUBLE NUTS.
ANODE JUNCTION BOX

CABLE IDENTIFIER TYP PER STD DWG 649
COPPER SOLDERLESS LUG CONNECTOR TYP
*10 ANODE LEAD CABLES
*4 STRUCTURE LEADS
*6 RECTIFIER NEGATIVE
*6 RECTIFIER POSITIVE CABLE
STAINLESS STEEL JUNCTION BOX SIZE AS REQUIRED

1/4" THICK PHENOLIC BOARD
1/4" THICK COPPER BUS BAR (TYP)
0.001 OHM SHUNT (TYP)

REFER TO PAGE 649

DWU 627
DATE OCT. 2016
AC CABLES TO RECTIFIER
AC POWER METER
ELECTRICAL CIRCUIT BREAKER
CONDUIT WITH AC CABLE
5/8"x10' COPPER CLAD GROUND ROD, SEE NOTE
4000 PSI CONCRETE
ELECTRICAL PULL BOX, AS PER STD DWG 648
1" CONDUIT WITH AC CABLE TO AC POWER SUPPLY
SCH 80 PVC CONDUIT WITH 2-#4 & 2-#6 TEST LEADS, STRUCTURE LEADS
NOTE:
MAXIMUM AC GROUNDING SYSTEM TO EARTH IS 2 OHMS.

SECTION A-A

REFER TO PAGES 628, 630, 631, 647, 648 & 650

RECTIFIER/DEEP ANODE WELL
INSTALLATION SECTION A A
NOTES:

1. TEST INSULATING FLANGE BEFORE APPLYING WAX TAPE AND BURIAL.

2. EXTEND WAX TAPE 12" BEYOND FLANGE FACE OR 12" ONTO PIPE COATING, WHICHEVER IS GREATER.

3. EXTEND FULL FACE GASKET 1/8" BEYOND STEEL CAN ID. FILL REMAINING ANNULUS BETWEEN LINING W/ NSF APPROVED ELASTOMERIC SEALANT COMPATIBLE W/ LINING MATERIAL.
NOTE:

1. EXTEND WAX TAPE 12" BEYOND RESTRAINT HARNESS OR 12" ONTO PIPE COATING, WHICHERVER IS GREATER.
NOTES:
1. 2 BOND CABLES REQUIRED FOR PIPES DIAMETERS LESS THAN 18".
2. 3 BOND CABLES REQUIRED FOR PIPE DIAMETERS GREATER THAN OR EQUAL TO 18".

CABLE CONNECTION, PER STD DWG 645

#4 BOND CABLES
(= BONDS AS REQUIRED)
CABLE CONNECTION, PER STD DWG 645

*4 BOND CABLES
(* BONDS AS REQUIRED)

3" TYP

6" TYP

APPLY PETROLATUM TAPE IN ACCORDANCE WITH AWWA C217

NOTES:
1. 2 BOND CABLES REQUIRED FOR PIPES DIAMETERS LESS THAN 18".
2. 3 BOND CABLES REQUIRED FOR PIPE DIAMETERS GREATER THAN OR EQUAL TO 18".
3. DO NOT INSTALL BOND CABLES IF JOINT IS AN INSULATING JOINT.

REFER TO PAGE 645
NOTES:
1. 2 BOND CABLES REQUIRED FOR PIPES DIAMETERS LESS THAN 18".
2. 3 BOND CABLES REQUIRED FOR PIPE DIAMETERS GREATER THAN OR EQUAL TO 18".
3. DO NOT INSTALL BOND CABLES IF JOINT IS AN INSULATING JOINT.

APPLY PETROLATUM TAPE IN ACCORDANCE WITH AWWA C217
NOTES:

1. 2 BOND CABLES REQUIRED FOR PIPES DIAMETERS LESS THAN 18".

2. 3 BOND CABLES REQUIRED FOR PIPE DIAMETERS GREATER THAN OR EQUAL TO 18".

3. DO NOT INSTALL BOND CABLES IF JOINT IS AN INSULATING JOINT.
NOTES:

1. JOINT BONDING IS REQUIRED AT ALL RUBBER GASKET JOINTS EXCEPT FIELD WELDED JOINTS.

2. PROVIDE FOUR CLIPS PER JOINT AS SPECIFIED.

3. COAT BONDING CLIPS, WELDS, AND 6" OF SURROUNDING BASE METAL WITH FAST CURE EPOXY AT 15 MILS DRY FILM THICKNESS AFTER INSTALLATION.

REFER TO PAGE 643
NOTES:

1. STEEL BONDING CLIP:
   MATERIAL SPECIFICATION...ASTM A366 (COMMERCIAL QUALITY)
   CUT LENGTH......................2 1/2" ± 1/16"
   WIDTH.............................1 1/4" ± 1/16"

2. LYTHERM FILLER STRIP TO BE 1"x1 1/2" WIDE TO OVERLAP SIDES OF
   CLIP. CRIMP THE STEEL JOINT BONDING CLIP OVER THE LYTHERM
   FILLER STRIP AT PT "A" TO COMPRESS THE FILLER MATERIAL
   CLOSE THE CAP AT PT "A" AS MUCH AS POSSIBLE WITHOUT
   CUTTING THE LYTHERM FILLER STRIP.

3. IF THE LYTHERM FILLER STRIP IS CUT AT PT "A" REMOVE THE
   ENTIRE STRIP AND REPLACE WITH A NEW LYTHERM FILLER STRIP
   PER THIS DETAIL.
NOTES:

1. BONDING BAR DIAMETER = 0.375 IN
   LENGTH = 4.50 IN ±

2. PLACE BONDING BARS 90° APART.

3. 2 BOND CABLES REQUIRED FORPIPES
   DIAMETERS LESS THAN 18".

4. 3 BOND CABLES REQUIRED FOR PIPE DIAMETERS
   GREATER THAN OR EQUAL TO 18".

CCP OR MLCP JOINT
BOND WITH STEEL BAR
Chip back mortar coating to provide clearance to allow installation of cable connection in joint recess.

Fill with epoxy to cover all exposed steel & copper a minimum of 1/4".

Fill to original thickness with cement mortar.

Joint bond or test station cable.

Cement mortar coating.

Exothermic weld per standard DWG 646.

Mortar lined and coated steel pipe.

Remove pipe coating as required for connection.

Exothermic weld per standard DWG 646.

Joint bond or test station cable.

Dielectric coating.

Ductile iron or steel pipe.

NOTE:
Place connections at pipe joints/specials to minimize coating damage.

REFER TO PAGE 646

CABLE-TO-PIPE CONNECTION

DWU 645

DATE OCT. 2016
NOTES:

1. GRIND PIPE/STRUCTURE TO BARE METAL AND CLEAN SURFACE.

2. STRIP INSULATION FROM CABLE AND ATTACH SLEEVE.

3. HOLD MOLD FIRMLY WITH OPENING AWAY FROM OPERATOR. IGNITE WITH FLINT GUN, REMOVE SLAG FROM CONNECTION WITH CHIPPING HAMMER. TEST WELD WITH 22 OZ HAMMER W/GLANCING BLOW. IF WELD FAILS, POSITION WIRE ATTACHMENT A MINIMUM 3'' AWAY REPEATING THE ABOVE STEPS. ATTACH LEAD CABLES A MINIMUM 6'' APART.

4. COVER CONNECTION WITH BITUMASTIC COATING OVER ALL EXPOSED METAL, PLACE WELD CAP OVER CONNECTION, REPAIR ALL DAMAGE TO COATING AND LINING IN ACCORDANCE WITH MFG RECOMMENDATIONS.

5. ALLOW COATING TO CURE BEFORE BURIAL.

6. ILLUSTRATION DEPICTS HORIZONTAL WELDER FOR OTHER ORIENTATION USE MOLD RECOMMENDED BY MANUFACTURER.
CAST IRON COVER LABEL WITH "ANODE" OR "DWU-CP-TEST"
ASSHTO H-20 RATED

11 1/8\"Ø

13 13/16\"Ø

11 3/16\"Ø

5/16\"Ø STAINLESS STEEL BOLT

ASSHTO H-20 RATED

CONCRETE

12"

CAST IRON COVER & VALVE BOX
DUCTILE IRON COVER LABELED "ELECTRICAL", LID AND BODY WEIGHTS MUST MEET ASSHTO H-20 RATING

ELECTRICAL PULL BOX

DWU 648
DATE OCT. 2016
LEGEND:

PCCP - PRE-STRESSED PIPE
WSP - WELDED STEEL PIPE
IR-CSE - IR-FREE COPPER-COPPER SULFATE ELECTRODE
ANODE - GALVANIC ANODE
CASING - CASING

*FOR FOREIGN TEST STATIONS INDICATE ATTACHMENT LOCATIONS RELATIVE TO TEST STATION (UPSTATION OR DOWNSTATION) AND FOR PCCP ANODES THE LOCATION RELATIVE TO TEST STATION AND SIDE OF PIPE (UPSTATION OR DOWN STATION AND LEFT OR RIGHT)
NOTES:

1. DEGREASE AND CLEAN STRUCTURE TO BARE, BRIGHT METAL WITH MECHANICAL DEVICES.

2. STRIP INSULATION FROM WIRE AND ATTACH A BAC M1 COMPRESSION TERMINAL OR APPROVED EQUAL.

3. LOAD THE BRAZING GUN WITH A DIRECT BRAZING PIN AND FERRULE. USE A THREADED TYPE CONNECTION FOR ABOVE-GROUND USE ONLY.

4. BRAZE THE CABLE TO THE PIPE, EXTRA MATERIAL REQUIRED FOR DIOR CI PIPE.

5. TEST BRAZE BY BREAKING OFF THE SHANK OF THE PLAIN PIN WITH A HAMMER.

6. COVER CONNECTION WITH MASTIC FILLED WELD CAP AND BITUMASTIC COATING BOX SOLIDS BY VOLUME OVER WELD CAP AND ALL EXPOSED METAL.

7. ALL WELDS SHALL BE A MINIMUM OF 6" APART.

8. ALLOW WELD COATING TO CURE PER MANUFACTURER'S RECOMMENDATIONS BEFORE BURIAL.
"BIG FINK" TERMINAL BOX (OR APPROVED MATERIAL)

PROJECT PIPELINE 2-#6 AWG-XLPE TEST CABLES

STEEL ER PROBE GROUND LEAD(GREEN)

TERMINAL POST RING CONNECTION (TYP)

6-PIN PROBE CONNECTOR

3" DIA. X 3" LONG SCH 80 PVC COLLAR. FILL WITH DUCT SEAL AFTER CABLES ARE IN PLACE.
LOW PROFILE ER PROBE
(ELECTRICAL RESISTANCE)
PROBE DETAIL

1 SQ INCH SENSING AREA
WITH ELEMENT TO MATCH PIPE MATERIAL

6" LENGTH AS REQUIRED

1/10" THICK RIBBON CABLE

STANDARD CABLE
GROUND LEAD
MOLDED ENCASEMENT

6 PIN MS-STYLE CONNECTOR
CERAMIC SENSING TUBE IMPREGNATED WITH CHLORIDE ION TRAPPING MATERIAL AND A MINIMUM 28 SQUARE INCHES OF SENSING SURFACE AREA

NOTES:

1. THE REFERENCE ELECTRODE SHALL HAVE A MINIMUM SENSING SURFACE AREA OF 28 SQUARE INCHES. IT SHALL BE CAPABLE OF MAINTAINING A STABLE POTENTIAL WITHIN PLUS OR MINUS 10 MILLIVOLTS TO THAT OF A FRESHLY MADE COPPER SULFATE REFERENCE ELECTRODE WHILE A 3 MICROAMPERE ELECTRICAL CURRENT IS APPLIED TO IT. PROVIDE STELTH 2 MODEL SRE-007-CUY BY BORIN MANUFACTURING OR STAPERM MODEL CU-1-UGPC BY GMC CORROSION, OR APPROVED EQUAL.

2. MEASURE THE ACCURACY OF EACH COPPER SULFATE REFERENCE ELECTRODE BEFORE INSTALLING IT BY MEASURING THE DC VOLTAGE DIFFERENCE BETWEEN IT AND ONE OR MORE REFERENCE ELECTRODES OF KNOWN ACCURACY. THE MEASUREMENTS SHALL BE LESS THAN PLUS OR MINUS 0.010 DC VOLTS FOR ALL REFERENCE ELECTRODES. PERFORM THESE MEASUREMENTS AFTER TOTALLY SUBMERGING THE REFERENCE ELECTRODES IN A FIVE-GALLON BUCKET OF WATER FOR A MINIMUM PERIOD OF 15 MINUTES. USE ONLY POTABLE DRINKING WATER FOR THIS TEST. BRACKISH WATER OR SALTWATER WILL AFFECT THE TEST RESULTS AND DAMAGE THE REFERENCE ELECTRODE. PROVIDE FIVE DAYS WRITTEN NOTICE TO THE ENGINEER TO ALLOW THESE TESTS TO BE WITNESSED.
NOTES:
1. PLACE PLASTIC WARNING TAPE 12" ABOVE CONDUIT.
2. HORIZONTAL RUNS TO BE 36" BELOW GRADE.

LINE CURRENT SPAN TEST STATION

REFER TO PAGES 608, 612, 645, 650 & 651A

DATE
OCT. 2016