STANDARD DRAWINGS FOR WATER & WASTEWATER CONSTRUCTION

October 2017
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 previous edition of “Standard Drawings for Water and Wastewater Construction” by DWU dated October, 2017.

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.

Copies Available On-line At:

http://www.dallascityhall.com/dwu/dwu_design_standards.html
## PART 1 - COMMON FOR WATER & WASTEWATER CONSTRUCTION

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COMMON FOR
WATER & WASTEWATER MAIN CONSTRUCTION

City of Dallas
Water Utilities Department
# PART 1

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<td>Project Construction Sign Technical Specifications</td>
<td>121</td>
</tr>
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</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.

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 Restored 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% 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.

GENERAL NOTES

ENCASEMENT PIPE SPECIFICATIONS (See 104 & 105)

REFER TO PAGES: 103 104
105 106
107 108
109

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

NCTCOG Spec: 509.2 - State Highway Crossing
NCTCOG Spec: 702.2.4 - Quality Of Concrete
TYPICAL FOR HIGHWAY CROSSING FOR WATER MAINS OVER 12in. (30.5cm.) DIAMETER

General Notes:

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.
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 Fences 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>
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HIGHWAY CROSSING ENCASMENT PIPE, GAUGE, CLASS, COVER

DATE OCT. 2009
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<th>ENC. PIPE I.D.</th>
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<th>4 FLNG. LINER H-20-L.L.</th>
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### Note:

∞ Infinity

### Diagram:

- **Highway Crossing Encasement Pipe, Gauge, Class, Cover**
- DWU
- OCT. 2009
- **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".

See 102, 103, 104, 105, 106

NCTCOG Spec: 509.2 - State Highway Crossing
TUNNEL APPROACHES WITH CASING SPACERS

PLAN VIEW

PROFILE VIEW

SECTION A-A
**CARRIER PIPE SUPPORT (TUNNEL)**

**CASING SPACERS**

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**

Wooden Skids Strapped To Carrier Pipe With Steel Straps or Heavy Wire.

Notch Skids To Facilitate Strapping Operation And To Prevent Strap Or Wire Movement.

Skids To Run Length Of Pipe (With Exception Of Bell And Spigot Areas).

Fill All Voids Between Carrier Pipe And Encasement Pipe With Grout.

**HOLD-DOWN-JACK**

Hold-Down-Jacks To Be Used On Water Mains ONLY.

**FOR STEEL ENCASEMENT PIPE**

Carrier Pipe Is To Rest On Bottom Of Encasement Pipe.

**FOR FLANGED LINER PLATE**

Carrier Pipe Is To Rest On A 6" Thick Concrete Pad.

**CONCRETE CRADLE**

1/4 O.D. Of Carrier Pipe

**20" Min.**

**10" Min.**

**FILL ALL Voids Between Carrier Pipe And Encasement Pipe With Grout.**
HOLD-DOWN-JACK
FABRICATION DETAIL

1/4" Steel Plate
(Fabricate To Match I.D.
Radius Of Encasement Pipe)

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

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)

ALL MATERIALS TO BE
HOT DIPPED GALVANIZED
AFTER FABRICATION
SECTIONAL PLAN VIEW

INITIAL BACKFILL OF CEMENT STABILIZED SAND (MINIMUM 2.5 BAGS OF CEMENT PER CUBIC YARD OF SAND)

WATER MAIN

PROPOSED NON-PRESSURE RATED WASTEWATER MAIN

SECTION A-A

INITIAL BACKFILL OF CEMENT STABILIZED SAND (MINIMUM 2.5 BAGS OF CEMENT PER CUBIC YARD OF SAND)

FOR P.V.C. - FINE CRUSHED STONE
FOR V.C.T. - CRUSHED STONE OR ROCK CUTTINGS

6" MIN. BELOW BELL OF PIPE

PIPE O.D.

PROPOSED NON-PRESSURE RATED WASTEWATER MAIN

NOTES:
1. Bc = Outside Diameter Of Pipe
2. Bd = Trench Width (See Pg.112 for Calculation Of "Bd")

EMBEDMENT DETAIL FOR NON-PRESSURE RATED WASTEWATER MAINS BELOW WATER MAINS

DATE
OCT. 2009
SECTIONAL PLAN VIEW

ENCASEMENT DETAIL FOR NON-PRESSURE RATED WASTEWATER MAINS ABOVE WATER MAINS

DATE
OCT. 2009

DWU
111

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

ENCASEMENT PIPE TO BE MIN. 18 FT. PRESSURE RATED ENCASEMENT PIPE TO BE MIN. 150 P.S.I. PRESSURE RATED AND TWO (2) NOMINAL SIZES LARGER THAN CARRIER PIPE

EMBEDMENT AND BACKFILL AS SPECIFIED ON PLANS

PROPOSED NON-PRESSURE RATED WASTEWATER MAIN

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

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

PROPOSED NON-PRESSURE RATED WASTEWATER MAIN

WATER MAIN

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.
SECTION A-A

ENCASEMENT DETAIL FOR PROPOSED WATER MAINS BELOW WASTEWATER MAINS

DWU

DATE
OCT. 2009

111A
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")
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

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

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

CLASS "A-1"
SELECT OR GRANULAR MATERIAL COMPACTED TO 90% OF STD. PROCTOR DENSITY.

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

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

GRANULAR MATERIAL COMPACTED TO 90% OF STD. PROCTOR DENSITY

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

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 "\( Bd \)"")

EMBEDMENT
CLASS "B", "B+", & "B-1"

DATE
OCT. 2011
CRUSHED STONE, FINE GRADATION

Bd CLASS "B-2"

Bc VARIES

Bc VARIES

Bc VARIES

CLASS "B-3"

Bd VARIES

Bd VARIES

Bd VARIES

CLASS "B-4"

Bc VARIES

Bc VARIES

Bc VARIES

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

SAND COMPACTED TO 90% OF STD. PROCTOR DENSITY

COMPACTED CRUSHED STONE, FINE GRADATION

SAND, FINE GRADATION

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")

EMBEDMENT

CLASS "B-2", "B-3", & "B-4"
CLASS "C"
N.T.S.
BEDDING ANGLE 75°
L.F. = 1.5
E' = 300

CLASS "C+
N.T.S.
BEDDING ANGLE 75°
L.F. = 1.5
E' = 300

CLASS "C-1"
N.T.S.

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

1/6 Bc

COMPACTED CRUSHED STONE
STD. GRADATION

Bd

6" MIN. BELOW PIPE BELL

V ARI ES

GRANULAR MATERIAL COMPACTED TO 90% OF STD. PROCTOR DENSITY

12" MIN. ABOVE PIPE BELL

1/6 Bc

COMPACTED CRUSHED STONE, FINE GRADATION

Bd

6" MIN. BELOW PIPE BELL

12" MIN. ABOVE PIPE BELL

V ARI ES

SAND, FINE GRADATION

Bd

6" MIN. BELOW PIPE BELL

12" MIN. ABOVE PIPE BELL

V ARI ES

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

SELECT MATERIAL COMPACTED TO 90% STD. PROCTOR DENSITY.

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"
CLASS "G"

V A R I E S

CLASS "B" CONCRETE

Bd

EMBEDMENT

CLASS "G" & "G-1"

N.T.S.

L.F. = 4.2

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. 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"

( FOR ROCK DITCHES IN CREEKS)

CLASS "B" CONCRETE

ROCK LINE IN CREEK

CLASS "G-1"

( FOR ROCK DITCHES IN CREEKS)

CLASS "B" CONCRETE

Bc

12" MIN. ABOVE PIPE BELL

CEMENT STABILIZED SAND BACKFILL

Bd

V A R I E S

6" MIN. BELOW PIPE BELL

6" MIN. BELOW PIPE BELL

OCT. 2011

EMBEDMENT

CLASS "G" & "G-1"

DWU

( PAGE NO. )

118

DATE

OCT. 2011
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")
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.

SECTION A-A'

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

CONTAMINATED SOIL CLAY CUT-OFF DAM

DWU 119A

OCT. 2011
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).
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 $10^{-8}$ cm/s.
DETAIL SHOWN FOR CREEK CROSSING
(TYPICAL FOR EMBANKMENT SLOPE PROTECTION)

STABILIZED BACKFILL & RIP-RAP DETAIL
FOR EMBANKMENT SLOPE PROTECTION

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

NCTCOG Spec: 803.3 - Riprap
NCTCOG Spec: 504.6.2 - Stabilized Backfill
2010 DWU Addendum: 803.3.4.DWU - Measurement And Payments
PART 2
(Series 200)

WATER MAIN CONSTRUCTION

City of Dallas
Water Utilities Department
PART 2
WATER MAIN CONSTRUCTION

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

N.T.S.

5/8" Meter Box

2" 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.

*3 Bars @ 24" O.C. (E.W.) & 4-3 Bars Diagonal@ Meter

**Pavement**

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.

---

**WATER MAIN IN STREET**

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

*3 Bars @ 24" O.C. (E.W.) & 4-3 Bars Diagonal@ Meter

**Pavement**

* Plastic Tape To Mark Deadhead Location

½" Compression x F.I.P. Ball Valve

½""Copper Service Line Soft Copper (Type K)

---

**WATER MAIN IN PARKWAY**

½" WATER SERVICE INSTALLATIONS
(SIDEWALK ADJACENT TO CURB)

**NOTE:**

Water 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.

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.

½" Compression x F.I.P. Ball Valve

* Blue Inert Polyethylene Tape, 6" Wide x 2 Mils Thick, Imprinted Continuously With Black Letter Identifying Water Service

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

---

**DATE:**
OCT. 2016
**1" WATER SERVICE INSTALLATIONS**

**WATER MAIN IN STREET**

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

**Water Main**
- 1" Compression Corp. Cock
- Taps On Mains As Per NCTCOG Spec: 502.10.3.1
- 4 - 3 Bars @ 24" O.C. (E.W.) & 4 - 3 Bars Diagonal @ Meter

**Concrete Sidewalk**
- 5'
- 13 1/2"
- 4'
- 2 1/2'

**WATER MAIN IN PARKWAY**

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

**Water Main**
- 1" Compression Corp. Cock
- Taps On Mains As Per NCTCOG Spec: 502.10.3.1
- 4 - 3 Bars @ 24" O.C. (E.W.) & 4 - 3 Bars Diagonal @ Meter

**Concrete Sidewalk**
- 5'
- 13 1/2"
- 4'
- 2 1/2'

**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 PVC Pipe

**1" WATER SERVICE INSTALLATIONS (SIDWALK 5' FROM CURB)**

**DATE:**
- OCT. 2016

**DWU:**
- 205
METER ALIGNMENT CRITERIA

VERTICAL: The private side ferrule nut or flange must be 11" below the meter box lid.
HORIZONTAL: The deadhead must be 2" from the inside of the meter box.

---

WATER MAIN IN STREET

---

WATER MAIN IN PARKWAY

1 1/2" OR 2" WATER SERVICE INSTALLATIONS
(SIDWALK 5' FROM CURB)

---

NOTE:

1 1/2" & 2" Service Lines To Have A Minimum Of 4' Separation.
**WATER MAIN IN STREET**

- Taps On Mains As Per NCTCOG Spec: 502.10.3.1
- Location Of Tap To Be At 45° Angle To The Horizon (Up). All Taps To Be Made With A.W.W.A Tapered Threads.

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

**NOTE:**
1) ½" & 1" Service Lines To Have A Minimum Of 3' Separation.
2) 1 ½" & 2" Service Lines To Have A Minimum Of 4' Separation.

**WATER MAIN IN PARKWAY**

- Taps On Mains As Per NCTCOG Spec: 502.10.3.1
- Location Of Tap To Be At 45° Angle To The Horizon (Up). All Taps To Be Made With A.W.W.A Tapered Threads.

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

**NOTE:**
1) ½" & 1" Service Lines To Have A Minimum Of 3' Separation.
2) 1 ½" & 2" Service Lines To Have A Minimum Of 4' Separation.
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 5/8" to 1" Meters: 12" Water Meter AMI Lid As Per the Approved Material List.
   - For 1 1/2" 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

Spring & Plunger Keyhole

12" Or 20" AML Lid

Fixed Network (200W Endpoint Or Approved Equal)

200W Endpoint With External Mounting Cradle

Spring & Plunger Keyhole

12" Or 20" AML Lid

Profile View

Spring & Plunger

12" Or 20" Water Meter AML Lid

Ground Line

5' Inline Connector

Meter Box

To Main Line

6" to 10"

1/4" Mounting Rod

To Customer

Mount The Endpoint As Near To The Center Of The Meter Box As Possible Without Touching The Meter

Finished Installation With 100W Endpoint Configuration

Finished Installation With 200W Endpoint Configuration

REFER TO PAGES 206B & 206D

AMI Meter Installation Details For 2" Or Smaller Meters

DATE
MAY 2012
CONCRETE SIDEWALK

PAVEMENT

2" BALL VALVE
CURB STOP

5/8" METER BOX

MIN. 12"

SMALL PLASTIC METER BOX WITH LID

RISING GRADE

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

2" CORPORATION COCK (COMPRESSION)

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
207

DATE
OCT. 2012
AUTOMATIC FLUSHING DEVICE
MUST BE KUPFERLE MODEL 9800-WC ECLIPSE, OR APPROVED EQUAL N.T.S.

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

2. AUTOMATIC FLUSHING DEVICE SHALL HAVE A 2" BRASS FIT 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:

* CONTRACTOR SHALL CONTACT DISTRIBUTION AT 214-670-8007 BEFORE INSTALLING THE AUTOMATIC FLUSH POINT.
NOTES:
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 NCTCOG ADDENDUM
5. HOSE WILL BE TAKEN TO NEAREST STORM WATER MANHOLE OR INLET.

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

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

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

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

6" D.I. PIPE
FILLED WITH
CONCRETE, 5'
MIN. BURY DEPTH

BOLTED CAST COUPLING
ROCKWELL 441 OR EQUAL

COMBINED AIR AND VACUUM
AIR RELEASE VALVE FLANGE MOUNTING
ON INLET SIDE

GATE VALVE WITH HAND
WHEEL, FLG.x FLG.

REFERENCES:
FINE CRUSHED ROCK
POCKET ON CORNER
(SEE TOP VIEW, PAGE 210)

CLASS "F" CONCRETE
12" COMPACTED
CRUSHED ROCK

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 RELEASE VALVE
TYPE 2

DATE
OCT. 2015

DWU
209
GENERAL NOTES

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 4308 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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</thead>
<tbody>
<tr>
<td>2&quot;</td>
<td>26&quot;</td>
<td>7.5'</td>
</tr>
<tr>
<td>3&quot;</td>
<td>31&quot;</td>
<td>7.8'</td>
</tr>
<tr>
<td>4&quot;</td>
<td>38&quot;</td>
<td>8.6'</td>
</tr>
<tr>
<td>6&quot;</td>
<td>46&quot;</td>
<td>9.3'</td>
</tr>
<tr>
<td>8&quot;</td>
<td>53&quot;</td>
<td>10.1'</td>
</tr>
<tr>
<td>10&quot;</td>
<td>62&quot;</td>
<td>10.8'</td>
</tr>
<tr>
<td>12&quot;</td>
<td>72&quot;</td>
<td>11.7'</td>
</tr>
</tbody>
</table>

REFER TO PAGES 209 & 210

GENERAL NOTES
TYPE 2 AIR VALVE

DWU
(Page No.)

DATE
OCT. 2015
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

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

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

STANDARD PRECAST MANHOLE (See Note #4 Page 216)

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

CLASS "F" REINFORCED CONCRETE BASE

1" I.P. THD. OUTLET 1" COPPER PIPE (TEST POINTS EACH SIDE)

CLASS "F" CONCRETE SUPPORT BLOCK

PAD EXTENSION FOR BLOCKING UNDER BY-PASS VALVE

INSTALL VALVES W/ INSULATION FLANGE KITS SEE PG.223

CLASS "F" REINFORCED CONCRETE BASE

12" MAX.

12" MIN.

12"

8" MIN.
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

CLASS "F" CONC. SUPPORT BLOCKS

PADS Poured ON UNDISTURBED SOIL or 12" STABILIZED BACKFILL MATERIAL

CLASS "F" REINFORCED CONCRETE BASE PAD

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

FINISHED GRADE WHEN NOT IN EX. OR PROP. PAVEMENT

SOIL PIPE VALVE STACK

INSTALL VALVES W/ INSULATION FLANGE KITS SEE PG.223

CLASS "F" CONC. SUPPORT BLOCKS (SAME SIZE AS BY-PASS VALVES)

BACKFILL 12" AROUND VALVE BODY W/ CEMENT STABILIZED SAND & 2 SACKS PER CUBIC YARD or AS NOTED ON PLANS.

LENGTH AS REQUIRED BY SIZE OF VALVE, MANHOLE, AND BY-PASS

CLASS "F" REINFORCED CONCRETE BASE PAD

PADS Poured ON UNDISTURBED SOIL or 12" STABILIZED BACKFILL MATERIAL

FINISHED GRADE WHEN NOT IN EX. OR PROP. PAVEMENT

MEMBER SEE RISER AND CROSS OPERATING NUT INSTALL VALVE ACTUATOR

#4 BAR @ 12" O.C.

#7 @ 12" O.C. - E.W. TOP

#6 @ 12" O.C. - E.W. BOTTOM

1" FLARED CURB STOPS (TEST POINTS)

1" COPPER PIPE TO BE LAD ALONG VALVE BODY

#4 @ 12" BOTH WAYS

6'-10"

#5 @ 12" O.C.

6" MIN.

12" MAX.

6" MIN.

12"

6" MIN.

6" MIN.

4" DIA. PRECAST MANHOLE

90° BASE BEND M.J. W/ RETAINER GLAND X FLG. & BLIND FLANGE (UP)

CLASS "F" CONC. SUPPORT BLOCKS

CONNECTOR ADAPTOR FLG. X M.J. W/ RETAINER GLAND

2"X4" BOARD

INSTALL VALVES W/ NON-SHRINK GROUT COATING

PRECAST CONCRETE GRADE RINGS W/ NON-SHRINK GROUT COATING

STANDARD C.I. VALVE COVER

2" MIN. CLEAR BETWEEN END OF PIPE AND VALVE COVER SEAT

VALVE COVER SEAT PIPE AND VALVE BETWEEN END OF 2" MIN. CLEAR

BLIND FLANGE (UP)

GLAND X FLG. & M.J. W/ RETAINER

90° BASE BEND

PG. 218

REINFORCED BASE PAD SECTION CAST IN 12" HIGH M.H. BASE ELEVATION

CONCRETE BASE PAD CLASS "F" REINFORCED YARD or AS NOTED ON PLANS.

SAND @ 2 SACKS PER CUBIC YARD or 12" STABILIZED

REPORTED VALVE BODY W/ CEMENT STABILIZED BACKFILL 12" AROUND VALVE

(AS SPECIFIED ON DESIGN PLANS)

BUTTERFLY VALVE WITH MANHOLE INSTALLATION

(AS SPECIFIED ON DESIGN PLANS)

BUTTERFLY VALVE WITH MANHOLE INSTALLATION

(AS SPECIFIED ON DESIGN PLANS)
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.
**Note:** At no time during installation may the valve be left suspended from the tapping sleeve without underneath support in place.

1. **1" L.P. Threaded Outlet & 1" Corp. Cock**
2. **1" Copper Pipe To Be Laid Close To Valve Body**
3. **By-Pass Valve See Pages 212 & 213 For Conc. Support**
4. **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

**PLAN**

**SECTION "A-A"**

**WEB**

**Thrust Blocking See Page 232**

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

**DWU**

**DATE**

**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

VALVE ACTUATOR
ASSEMBLY

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

DWU
PAGE NO. 1
218

DATE
DEC. 2001
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

Install 2" Thick Wooden Blocks Or Neoprene Bonnet To Valve Stack Spacers (VALVE STACK IS NOT TO REST DIRECTLY ON VALVE BODY OR VALVE BONNET)

Gate Valve

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

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

Valve Extension Stem To Be Centered In Valve Stack.

Existing Ground Surface

Existing Pavement

Gate Valve

Valve Stack To Be Set 3" Below Grade Surface

Valve Stack To Rest Directly On Valve

Spacers (VALVE STACK IS NOT TO REST DIRECTLY ON VALVE BODY OR VALVE BONNET)

Install 2" Thick Wooden Blocks Or Neoprene Bonnet To Valve Stack Spacers (VALVE STACK IS NOT TO REST DIRECTLY ON VALVE BODY OR VALVE BONNET)

Existing Pavement


6" Valve Stack To Be One Continuous Pipe Joint

Install Valve Cover Assembly Centered Over Valve Stack And Flush With Grade Surface.

Existing Ground Surface

Existing Pavement
NOTES

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.

Undisturbed Earth Or Rock As Directed By Construction Inspector.
STANDARD 40" MANHOLE FRAME AND COVER

Ring & Cover Material per ASTM A48 Class 35B Min. Gray Iron Castings.
FRAME AND COVER

STANDARD 32" MANHOLE.

COVER - GRAY IRON
ASTM A48 CL35B

FRAME - GRAY IRON
ASTM A48 CL35B

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

1" Minimum
1 1/2" Preferred

1/2 LETTERS (RECESSED FLUSH)

(2) PICKBARS

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)

**REINFORCED CONCRETE CYLINDER PIPE**

**INSULATION KIT INSTALLATION DETAIL**

FOR R.C.C.P. INSTALLATIONS

**INSULATION KIT INSTALLATION DETAIL**

ON LARGE WATER MAINS FOR CATHODIC ISOLATION

**TYPICAL INSTALLATION POINTS OF INSULATION KITS**

**R.C.C.P. FLANGED PIPE JOINT**

**BELL & SPIGOT JOINT SHOWN - ALSO APPLIES TO FLANGED JOINTS**

**MORTAR PROTECTION @ R.C.C.P. JOINTS**

MORTAR PROTECTION SHALL BE PER PIPE MANUFACTURER RECOMMENDATION.

**MORTAR PROTECTION @ R.C.C.P. JOINTS & INSULATION KIT FOR FLANGED JOINTS**
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.

METHODS FOR SETTING FIRE HYDRANTS

Install:
1 - ? x 6" F.H. Tee
1 - 6" Valve
1 - F.H.

Install:
1 - ? x 6" Tee, B.B.F.
1 - 6" Valve, F.M.J.
1 - F.H.

Install:
1 - ? x 6" Tee, B.B.F.
1 - 6" Valve, F.M.J.
1 - F.H.

ELEVATION VIEW OF FIRE HYDRANT

3' Min. From Walls Or Other Obstruction

18" TO 24"

Use Offset Or 2 Bends As Required

No More Than One Extension On Barrel Of F.H. With Max. 18" Extension

Main At Normal Depth

Mains With Excessive Depth

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.

METHODS FOR SETTING FIRE HYDRANTS

Install:
1 - ? x 6" F.H. Tee
1 - 6" Valve
1 - F.H.
45° Bend With Retainer Glands And Class "B" Concrete Thrust Blocking As Required.

Embedment As Specified In Plans

Prop. Main

I.D. + 9 ft. Min.

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

STANDARD WATER MAIN LOWERING

DWU

(I/PAGE NO.)

225

DATE

OCT. 2015
### Cubic Yard To Sacks of Concrete Conversion Table

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### Tables of Dimensions and Quantities

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Refer to general notes for thrust blocking - Page 234

### Horizontal Thrust Block at Pipe Bend

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### HORIZONTAL THRUST BLOCK AT PIPE BEND

**DWU** 231  
**DATE** DEC. 2001

Refer to general notes for thrust blocking - page 234.
PLAN OF PLUG THRUST BLOCK

PLAN OF TEE THRUST BLOCK

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REFER TO GENERAL NOTES FOR THRUST BLOCKING - PAGE 234

HORIZONTAL THRUST BLOCK
AT TEES AND PLUGS

DWU

DATE
DEC.2001

(Page No.) 232
### Elevation "B-B"

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Refer to General Notes for Thrust Blocking - Page 234

**Vertical 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.

REFER TO PAGES: 229, 230, 231, 232, & 233

THRUSt BLOCK
GENERAL NOTES

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<tr>
<td>DATE</td>
<td>OCT. 2012</td>
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<td>SIZE AND MATERIAL TYPE OF WATER MAINS</td>
<td>EMBEDMENT TYPE PER DEPTH IN EARTH</td>
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<tr>
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<tr>
<td>16&quot; And Smaller Ductile Iron</td>
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<tr>
<td>18&quot; And Larger Ductile Iron</td>
<td>B</td>
</tr>
<tr>
<td>16&quot; And Smaller Pretensioned</td>
<td>C</td>
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<td>B</td>
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<td>All Prestressed</td>
<td>C</td>
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<tr>
<td>All Steel</td>
<td>B+</td>
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<tr>
<td>All P.V.C. Water Pipe</td>
<td>C+</td>
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</tbody>
</table>
STEEL GUARD POST

(SIZE DESIGNATED ON PLANS)

N.T.S.

STEEL GUARD POST DETAIL

Fill With Class "B"
Concrete W/ Domed Top

6" D.I. Pipe
Clean Metal And Apply
1 Coat Of Rustoleum
7582 Gory Primer
And Two Coats Of
DevGuard 4308 Silver
Paint To Visible Surfaces

Install Expansion Joint
Sealing Compound At
Concrete Penetrations

Slope To Drain

Ex. Grade

12" Dia. Class "B"
Concrete Base

2"

3' 0"

3"

3"
Install: 4 - 6" Dia. Steel Guard Posts Spaced 4'-6" Apart
(Equal Distance From F.H.)
See Page No. 236

Refer. To Pages 224 & 236

GUARD POST PROTECTION
FOR FIRE HYDRANTS

DWU

DATE
JAN. 2010
DETAIL FOR METER VAULTS

Install: 4-6" Diameter D.I. Guard Posts. See Page 236

DETAIL FOR METERS 2" AND SMALLER

Install: 2-6" Diameter D.I. Guard Posts. See Page 236
ATTENTION: PRV Design Subject to DWU Approval.

DUAL PRV ASSEMBLY
(OPTION 1)

Refer To Pages 242, 243, 244, 245 & 504

DWU

DATE
OCT. 2011

(PAGE NO.)
239
NOTE: Single PRV Assemblies Require Special Approval by DWU.
<table>
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<th>Description</th>
<th>Fitting/Pipe Type</th>
<th>MAIN SIZE</th>
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<tr>
<td></td>
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<td>2</td>
<td>1&quot; Flush Point</td>
<td>Copper</td>
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<td>3</td>
<td>Hi/Low Valve</td>
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<td>4</td>
<td>Pipe</td>
<td>Ductile Iron</td>
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<td>7</td>
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<td>9</td>
<td>Pressure Reducing Valve</td>
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<td>4&quot; - 8&quot;</td>
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<td>45° Wye</td>
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<td>12</td>
<td>Flange Coupling Adaptor</td>
<td>Flange x Flange</td>
<td>6&quot;</td>
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</tbody>
</table>

**ATTENTION:**
PRV Design And Parts Selection Are Subject to DWU Approval.
When Outside Of Pavement, A Concrete Pod 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 Std. 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.

Refer To Page 504
Section View

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

PRV DETAILS

DWU

DATE

OCT. 2011
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 of 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 pipe shall be ductile iron pipe.

PRV GENERAL NOTES

DWU

DATE

OCT. 2011

PAGE NO: 245
PART 3
(Series 300)

WASTEWATER MAIN CONSTRUCTION
# PART 3
## WASTEWATER MAIN CONSTRUCTION

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MANHOLE UNDER PROPOSED PAVING WITHIN STREET R.O.W.
(IN ADVANCE OF PROPOSED PAVING IMPROVEMENT PROJECTS)

* SEE GENERAL NOTE #4 PAGE 302

* USE PRECAST CONCRETE GRADE RINGS AND NON SHRINK GROUT AS REQUIRED WHEN RAISING MANHOLE FRAME AND COVER TO FINISHED GRADE. See General Note # 4 Pg. 302

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

4", 5", OR 6" AS SPECIFIED
BY OWNER

MINIMUM MANHOLE BASE RISER LENGTH (USE MIN. NUMBER OF RISERS)
VARIES AVAILABLE IN 2'-0", 4'-0", & 6'-0"

12" MIN.
12" COMPACTED ROCK FOUNDATION
GEOTEXTILE LINER MATERIAL

CONCENTRIC MANHOLE CONE

MANHOLE FRAME & COVER SIZE AS SPECIFIED ON PLANS

* PROP. TOP OF CURB

* SET IN ADVANCE OF PROPOSED PAVING

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

FINISHED GRADE

SET MANHOLE FRAME & COVER TO FINAL GRADE (NON ADVANCE OF PROPOSED PAVING AREAS). See General Note # 1 Pg. 302

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

USE O-RING RUBBER GASKET (TYP.)

APPROVED RESILIENT PIPE-TO-MANHOLE CONNECTOR OR GASKET

PIECE STUBOUTS 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
WASTEWATER MANHOLE
CAST-IN-PLACE
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)

SECTION A - A

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

MANHOLE FRAME TO BE CENTERED

ROOF STEEL LAYOUT

N.T.S.

12" COMPACTED ROCK FOUNDATION

CLASS "F" CONCRETE MONOLITHIC POUR

GEOTEXTILE LINER MATERIAL

12" MIN.

4'-0"

6" MIN.

5'-0" & 6'-0"

8" MIN.

VAREDS

N.T.S.

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

WASTEWATER MANHOLE
PRESSURE-TYPE

DWU

304

DATE

OCT. 2015
MANHOLE DETAIL

- STANDARD CAST-IRON M.H. FRAME & COVER AS SPECIFIED ON PLANS
- USE PRECAST CONCRETE GRADE RINGS AND NON SHRINK GROUT AS REQUIRED TO SET MANHOLE FRAME AND COVER TO FINAL GRADE. See General Note #10 on Page 302
- 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

SECTION A-A

- 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
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 PLAIN OR 6', WHICHEVER IS GREATER

6" DIAMETER TREATED APPROVED RESILIENT PIPE-TO-MANHOLE CONNECTOR OR GASKET.

APPROVED RESILIENT PIPE-TO-MANHOLE CONNECTOR OR GASKET.
MANHOLE TYPE - AS SPECIFIED ON PLANS

GAS SEaled DROP CONNECTION
N.T.S.

STANDARD DROP CONNECTION
N.T.S.

REVERSE 45° WYE ONLY

FLAP GATE OR REMOVABLE CAP AS SPECIFIED ON PLANS

REVERSE 45° WYE ONLY

45° BEND

GRANULAR MATERIAL

4" MIN.

VARIABLE 2" MIN.

1"

(TYP.)

4" MIN.

90° LONG RADIUS BEND

CLASS "F" CONCRETE

6" MIN.

12" MIN.

12" MIN.

12" COMPACTED ROCK FOUNDATION

CLASS "F" CONCRETE BASE 12" THICK

CLASS "F" CONCRETE

BASE 12" THICK

GEOTEXTILE LINER MATERIAL

SEE GENERAL NOTES FOR WASTEWATER MANHOLE CONSTRUCTION - PAGE 302
WASTEWATER MANHOLE INSIDE DROP CONNECTION

MANHOLE TYPE-AS SPECIFIED ON PLANS

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

STAINLESS STEEL WITH GASKET COUPLING BAND CONNECTOR

APPROVED RESILIENT PIPE TO MANHOLE CONNECTOR OR GASKET

1 1/4" 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.

12" COMPACTED ROCK FOUNDATION

GEOTEXTILE LINER MATERIAL

90° LONG RADIUS BEND

12" MIN.

FLOW

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

ELEVATION

PLAN

SEE GENERAL NOTES FOR WASTEWATER MANHOLE CONSTRUCTION - PAGE 302

WASTEWATER MANHOLE INSIDE DROP CONNECTION

DWU 308

DATE

SEP.2010
WASTEWATER MANHOLE

PLAN
N.T.S.

T = WALL THICKNESS
D = MANHOLE DIAMETER
d = PIPE DIAMETER

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

SECTION A-A
N.T.S.

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

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<th>B</th>
<th>C</th>
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<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>
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<tr>
<td>8&quot; - 21&quot;</td>
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<td>7/4&quot;</td>
<td>10°</td>
<td>1/4&quot; - 3/8&quot;</td>
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**Manhole Pipe Connector**  
*(For Cast-In-Place Manholes)*

**DATE**  
JAN. 2010
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.

NYLON ROPE HANDLES

1/4" PLYWOOD

METAL STRAP HINGES
(MIN. 3" LONG) W/BOLTS

INSTALLATION AND REMOVAL POSITION

D - INSIDE DIAMETER OF MANHOLE

WASTEWATER MANHOLE
FALSE BOTTOM

DATE
DEC.2001

DWU
311
LETTERS (RECESSED FLUSH)
1" Minimum
1½" Preferred

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

1/2" LETTERS (RECESSED FLUSH)

(2) PICKBARS

2 7/16"

COVER - GRAY IRON
ASTM A48 CL35B

FRAME - GRAY IRON
ASTM A48 CL35B

COVER SECTION

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

PLAN VIEW

BOTTOM VIEW
OF COVER

WASTEWATER

C.I. M.H. FRAME & COVER

STANDARD 32"

DWU

DATE

OCT. 2011

PAGE No.
312
NOT TO BE USED FOR NEW CONSTRUCTION

2 - 2" x 3 3/4" Pick Slots
With 2 - 1" Dia. Steel Rods

PLAN

SECTION "A-A"

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

Ring & Cover Material per
ASTM A48 Class 35B Min.
Gray Iron Castings.

With 2 - 1" Dia. Steel Rods

\[ R = \frac{\pi}{2} \]

\[ R = \frac{1}{4}'' \]

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

LETTERS (RECESSED FLUSH)
1" Minimum
1½" Preferred

(4) 1½'-13 X 2" LG.
SS HEX HEAD BOLTS W/ STL AND RUBBER WASHERS

(2) PICKBARS

(6) 1 ½" DIA. BOLT HOLES ON 37" DIA. BOLT CIRCLE

COVER SECTION

32"

1½"

33 3/16"
32 3/16"
1 9/16"
4 1/2"

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

FRAME BOLTING DETAIL

3 3/4"
7/8"

FRAME SECTION

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

PICKBAR DETAIL

EON LOCK OR EQUAL POCKETS FOR 3/4'-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

DWU
313
NOT TO BE USED FOR NEW CONSTRUCTION

NOTE:
For Seal Between Frame & Cover Use
Either A 1/6" Copper Gasket Or A 1/4" Dia.
Neoprene O-Ring Gasket (Location Of Ring
Is Left To Mfr., But Subject To Approval By
Construction Engineer.

2 - 2" x 3 3/4" Pick Slots
With 2 - 1" Dia. Steel Rods

6-1/4" Dia. Cores
As Shown

Index Marks On Frame & Cover
Engraved Into Casting 1/8" Deep

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

JAN. 2010
NOTE: For seal between frame and cover use either \( \frac{1}{8} \)" thick copper gasket or \( \frac{1}{4} \)" 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"

M.H. FRAME & COVER

40" PRESSURE TYPE CAST IRON

PLAN

\( \frac{1}{2} \)" Letters \( \frac{1}{4} \)" Raised

(8) \( \frac{1}{4} \)" Dia. Anchor Holes

\( \frac{3}{8} \)" Wide x \( \frac{1}{4} \)" Deep Grooves @ \( \frac{1}{2} \)" O.C.

2 - 2" x 3\( \frac{1}{2} \)" Pick Slots with 1 - 1" Dia. Steel Rod Each

INDEX NOTCHES - Engraved INTO the Casting \( \frac{1}{8} \)" Deep

Drill and Tap 4 Holes
Furnish 4 - 5/8" x 2" Hex Head Stainless Steel Bolts

1" Dia. - 6" Long Stainless Steel Anchor Bolts w/ Hex Head Nuts 8 Required

Ring & Cover Material per ASTM A48 Class 35B Min. Gray Iron Castings.
SECTION THRU COVER

1½" Letters ¼" Raised

Machined Bearing Surface

1½" Letters ¼" Raised

(8) 1¼" Dia. Anchor Holes

3/8" Wide x ¼" Deep Grooves @ 1½" O.C.

See Pickbar Detail

WASTEWATER

PLAN

42¼"

STEEL ROD

SECTION THRU FRAME

STANDARD 40" MANHOLE FRAME AND COVER

Ring & Cover Material per ASTM A48 Class 35B Min.
Gray Iron Castings.

LID MAY BE IDENTIFIED WITH EITHER "WASTEWATER" OR "SANITARY SEWER"
EXISTING CONC. BASE

OUT OF PAVEMENT                  IN PAVEMENT
N.T.S.                           N.T.S.

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 (WHICHEVER IS GREATER)

EXISTING PAVEMENT

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.

EX. WASTEWATER MAIN

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

ABANDONMENT OF MANHOLE IN OR OUT OF PAVEMENT

DWU

(N=Page No.)

DATE

OCT. 2010

316
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 22½ 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.

1ST. JOINT FROM 22½ BEND TO BE A REDUCER TO 6" IF MAIN IS LARGER THAN 6".

PROFILE VIEW

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

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

WASTEWATER MAIN CLEANOUT

DATE JAN. 2001
CAST IRON C.O. CASTING
FOR WASTEWATER MAINLINE

DATE
JAN. '98

DWU
318

CAST IRON C.O. CASTING
FOR WASTEWATER MAINLINE

DATE
JAN. '98

DWU
318
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 UTILITES AND PROPOSED FACILITIES SUCH AS STORM SEWER MAINS, PAVING, SIDEWALKS, RETAINING WALLS, ETC.
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.

WASTEWATER LATERALS WITH CLEANOUT
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 ADAPTOR INSTALLED SHALL BE OF THE SAME MATERIAL AS THE WASTEWATER MAINLINE.

B) THE WYE AND ADAPTOR 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 CLEANOUT FRAME & COVER

NOTES:
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.

ASSEMBLY VIEW

COVER

CLEANOUT FRAME TOP

SECTION "A-A"

SECTION "B-B"

CLEANOUT FRAME BOTTOM

N.T.S.

CASTING LIP
OPTIONAL

½"-13 UNC HEX BOLT
2-REQ'D.
(STAINLESS STEEL)

ASSEMBLY VIEW

N.T.S.

DATE
OCT. 2015

DWU
321

N.T.S.
TRENCH WITH SLOPING SIDES

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

REFER TO PAGES 319, 320, 323, 324 & 325
Example:
Vertical Depth=5'/2"
Horizontal Distance=14'/2"
Use Lateral Type III As Shown Above

REFER TO PAGES 323 & 325
Note! Clean out as per Page 319 to Ground Surface.

Class "B" Conc. Wye, Or Double Wye As Req'd

Sand Backfill

Wye Class "B" Conc.

Embed. As Per Plans

SEC. "A-A"

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.

REFER TO 319, 320, 321, 322, 323, 324 & 325

WASTEWATER LATERAL STUBOUT
N.T.S.

WASTEWATER LATERAL STUBOUT

DWU 326
DATE OCT. 2011
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

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

\[ 4" \text{ OVERLAP} \]

\[ \text{INTERNAL CHIMNEY SEAL} \]

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
Equal to Pipe Embedment

**DETAIL A**

- Two Concrete Grade Rings
- Ex Ground
- Undisturbed Soil
- Water Tight Plug

**SECTION A-A**

- Water Tight Adaptor
- PVC to PVC for PVC Pipe
- Clay to PVC for Clay Pipe
- Alternate Connection
- May Be Made With A Manufacturers Trapped Gasket

**DETAIL B**

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

- Clearance: 4" Min. 8" Max.

- 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

- Grout (Minimum) and Non-Shrink Soil
- Stone, Fine Gradation

**WASTEWATER ACCESS DEVICE**

- Oct. 2011
- P.E. to PVC Water Tight Adaptor
- PVC to PVC for PVC Pipe
- Clay to PVC for Clay Pipe
- Water Tight Plug
- Two Concrete Grade Rings (Minimum) and Non-Shrink Grout
SAMPLE SITE CONSTRUCTION NOTES

A. The 5'x4' 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 Rainwater Runoff.


E. 1½" 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"x1". 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 ½" Round Bar Stock.

H. The Lid Is Attached To The Box By A Heavy Hasp 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 1½" 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 or Approved Equal

WASTEWATER SAMPLE SITE - CONCRETE PLATFORM DETAIL

DATE

OCT. 2011
PART 4
(Series 400)

WATER & WASTEWATER
ADJUSTMENTS

City of Dallas
Water Utilities Department
# PART 4
## WATER AND WASTEWATER ADJUSTMENTS

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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, HiMod" 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.

ALTER & ADJUSTMENT OF
STANDARD CAST-IN-PLACE MANHOLE

<table>
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<th>DATE</th>
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<tr>
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<td>OCT. 2011</td>
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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.
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 soil pipe 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 lateral 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 22-1/2 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

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 shall 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.

**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.

Refer to pages 201 thru 206 WATER SERVICE INSTALLATIONS.
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.

REFER TO PAGE 317 MAINLINE CLEANOUT
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.
Coat the entire outside of the new concrete with a waterproof bituminous coating.

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) Construct joint with key way waterstop, and extend #3 bars 12" O.C. into wall section (not req'd. for continuous pour).

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

**SECTION "A-A"**

**NOTES**

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.
**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.
ENCASEMENT PROTECTION FOR WASTEWATER MAIN

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.
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.
A STORM WATER MANHOLE

WASTEWATER MAIN PASSING THROUGH

STORM WATER MANHOLE

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 RATED 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.
Proposed Pipe To Soil Potential Test Station Relocation
In Meter Box Type II

**MECHANICAL CABLE SPLICE DETAIL**
## PART 5
### LARGE WATER SERVICE INSTALLATIONS

<table>
<thead>
<tr>
<th>TITLE</th>
<th>Pg.</th>
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<tbody>
<tr>
<td>Large Water Services (4&quot; and Larger) Descriptions and Typical Uses</td>
<td>501</td>
</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>
</tr>
<tr>
<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>
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<tr>
<td>Large Service Installation Details--General Notes</td>
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<td>507</td>
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<td>10&quot; Closed Fireline Service with 10&quot; Detector Check Device</td>
<td>521</td>
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</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.
Precast Meter Vault Or Cast In Place (Monolithically Poured) With Concrete Floor And Access Hatch. (See 503, 504, & 505)

Meter Line

Normal Closed By-Pass

See General Notes: 506

TYPICAL METER ALIGNMENT (Combined Service Shown)

Normal Closed By-Pass

To Customer

PRECAST METER VAULT OR CAST IN PLACE (MONOLITHICALLY Poured) WITH CONCRETE FLOOR AND ACCESS HATCH. (See 503, 504, & 505)

See General Notes: 506

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

COMBINED SERVICE - 15' x 30' EASEMENT

FIRE LINE SERVICE - 10' x 15' EASEMENT

MINIMUM EASEMENT SIZES FOR LARGE METER INSTALLATIONS

DWU

DATE

OCT. 2011
See General Notes 506

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.)*

**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

* 10" VAULT
* Available Heights 36", 48", 60"
* Special Applications To Be Determined By Engineer.

DATE
JAN. '98

LARGE SERVICE INSTALLATION DETAILS
PRECAST VAULTS
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.)
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<tr>
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4" COMBINED SERVICE WITH 4" METER

Ref. 501 to 506

JUNE 2002
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</tr>
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6" COMBINED SERVICE WITH 6" METER

Date: JUNE 2002

Ref. 501 to 506
Material List

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<td>8&quot; Gate Valve F. x F.</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&quot; x 60&quot; Pipe S. x S.</td>
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<tr>
<td>6</td>
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<td>6&quot; Flanged Coupling Adaptor</td>
</tr>
<tr>
<td>7</td>
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<td>6&quot; x 4&quot; Tee F. x F. (Test Point)</td>
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<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>

8" COMBINED SERVICE
WITH 6" METER

Ref. 501 to 506

JUNE 2002
<table>
<thead>
<tr>
<th>Part No.</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1B</td>
<td>2 Ea.</td>
<td>6&quot; x 8&quot; Nipple M.J. x F.</td>
</tr>
<tr>
<td>2B</td>
<td>2 Ea.</td>
<td>6&quot; x 8&quot; Tee F. x F.</td>
</tr>
<tr>
<td>3B</td>
<td>2 Ea.</td>
<td>6&quot; Gate Valve F. x M.J.</td>
</tr>
<tr>
<td>4B</td>
<td>3 Ea.</td>
<td>Valve Stack Riser Cover &amp; Lid</td>
</tr>
<tr>
<td>5B</td>
<td>1 Ba.</td>
<td>8&quot; x 80&quot; Pipe S. x S.</td>
</tr>
<tr>
<td>6B</td>
<td>1 Ba.</td>
<td>6&quot; Flanged Coupling Adaptor</td>
</tr>
<tr>
<td>7B</td>
<td>1 Ba.</td>
<td>4&quot; Meter As Specified (Type F.M. Shown)</td>
</tr>
<tr>
<td>8B</td>
<td>1 Ba.</td>
<td>6&quot; x 4&quot; Tee F. x F. (Test Point)</td>
</tr>
<tr>
<td>9B</td>
<td>1 Ba.</td>
<td>4&quot; Gate Valve F. x F. (Test Point)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>1 Ba.</td>
<td>8&quot; x 24&quot; Nipple F. x F.</td>
</tr>
<tr>
<td>11</td>
<td>2 Ba.</td>
<td>8&quot; x 36&quot; Nipple F. x F.</td>
</tr>
<tr>
<td>12</td>
<td>1 Ba.</td>
<td>8&quot; C.I. 90° Bend F. x F.</td>
</tr>
<tr>
<td>13</td>
<td>1 Ba.</td>
<td>8&quot; Gate Valve F. x F.</td>
</tr>
<tr>
<td>14</td>
<td>1 Ba.</td>
<td>8&quot; 90° Bend M.J. x F.</td>
</tr>
<tr>
<td>15</td>
<td>1 Ba.</td>
<td>8&quot; Pipe</td>
</tr>
<tr>
<td></td>
<td>1 Ba.</td>
<td>Precast F.M. Vault</td>
</tr>
<tr>
<td></td>
<td>1 Ba.</td>
<td>F.M. Vault Floor (Not Shown)</td>
</tr>
<tr>
<td></td>
<td>1 Ba.</td>
<td>Access Hatch (Not Shown)</td>
</tr>
</tbody>
</table>

Ref. 501 to 506

8" COMBINED SERVICE
WITH 8" METER

DATE: OCT 2011
### 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>10&quot; x 8&quot; Nipple M.J. x F.</td>
</tr>
<tr>
<td>2</td>
<td>2 Ea.</td>
<td>10&quot; x 8&quot; Tee F. x F.</td>
</tr>
<tr>
<td>3</td>
<td>2 Ea.</td>
<td>10&quot; Gate Valve F. x F.</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>8&quot; x 80&quot; Pipe S. x S.</td>
</tr>
<tr>
<td>6</td>
<td>1 Ea.</td>
<td>8&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>8&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>
<tr>
<td>10</td>
<td>1 Ea.</td>
<td>10&quot; x 8&quot; Reducer F. x M. J.</td>
</tr>
<tr>
<td>11</td>
<td>1 Ea.</td>
<td>8&quot; x 12&quot; Nipple F. x F.</td>
</tr>
<tr>
<td>12</td>
<td>2 Ea.</td>
<td>8&quot; x 36&quot; Nipple F. x F.</td>
</tr>
<tr>
<td>13</td>
<td>1 Ea.</td>
<td>8&quot; 90° Bend F. x F.</td>
</tr>
<tr>
<td>14</td>
<td>1 Ea.</td>
<td>8&quot; Gate Valve F. x M.J.</td>
</tr>
<tr>
<td>15</td>
<td>1 Ea.</td>
<td>8&quot; 90° Bend M.J. x F.</td>
</tr>
<tr>
<td>16</td>
<td>1 Ea.</td>
<td>8&quot; Pipe</td>
</tr>
<tr>
<td>17</td>
<td>1 Ea.</td>
<td>Precast F.M. Vault</td>
</tr>
<tr>
<td>18</td>
<td>1 Ea.</td>
<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>

### Diagram

- **Direction Of Flow**:箭头标志
- **Vault Opening**: 塔顶开口

---

**Ref. 501 to 506**

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

**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>2 Ea.</td>
<td>40&quot; x 8&quot; Nipple M.J. x F.</td>
</tr>
<tr>
<td>②</td>
<td>2 Ea.</td>
<td>40&quot; x 10&quot; Tee F. x F.</td>
</tr>
<tr>
<td>③</td>
<td>2 Ea.</td>
<td>40&quot; Gate Valve F. x M.J.</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>40&quot; x 100&quot; Pipe S. x S.</td>
</tr>
<tr>
<td>⑥</td>
<td>1 Ea.</td>
<td>40&quot; Flanged Coupling Adaptor</td>
</tr>
<tr>
<td>⑦</td>
<td>1 Ea.</td>
<td>40&quot; U.L. Approved Strainer (For Turbine)</td>
</tr>
<tr>
<td>⑧</td>
<td>1 Ea.</td>
<td>40&quot; Meter As Specified (Type F.M. Shown)</td>
</tr>
<tr>
<td>⑨</td>
<td>1 Ea.</td>
<td>40&quot; x 4&quot; Tee F. x F. (Test Point)</td>
</tr>
<tr>
<td>⑩</td>
<td>1 Ea.</td>
<td>4&quot; Gate Valve F. x F. (Test Point)</td>
</tr>
</tbody>
</table>

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

Vault Opening

Ref. 501 to 506

**DATE**

OCT 2011

**DWU**

512
## 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&quot; x 8&quot; Nipple M.J. x F.</td>
</tr>
<tr>
<td>②</td>
<td>2 Ea.</td>
<td>4&quot; x 2&quot; Tee F. x F.</td>
</tr>
<tr>
<td>③</td>
<td>1 Ea.</td>
<td>4&quot; 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&quot; x 36&quot; Pipe S. x S.</td>
</tr>
<tr>
<td>⑥</td>
<td>1 Ea.</td>
<td>4&quot;x 3&quot; Reducing Flanged Coupling Adaptor</td>
</tr>
<tr>
<td>⑦</td>
<td>1 Ea.</td>
<td>3&quot; Meter As Specified (Type Compound Shown)</td>
</tr>
<tr>
<td>⑧</td>
<td>1 Ea.</td>
<td>4&quot; x 24&quot; Nipple F. x F.</td>
</tr>
<tr>
<td>⑨</td>
<td>1 Ea.</td>
<td>4&quot; x 3&quot; Reducer F. x F.</td>
</tr>
</tbody>
</table>

### Part No. 10
- 2 Ea. 2" Companion Flange
### Part No. 11
- 4 Ea. 2" Comp X OSIP Adaptor
### Part No. 12
- 2 Ea. 2" Comp 90 Deg. Ell
### Part No. 13
- 1 Ea. 2" Ball Valve
### Part No. 14
- 1 Ea. 2" Copper Pipe
### Part No. 15
- 1 Ea. Precast D.C. Vault
### Part No. 16
- 1 Ea. D.C. Vault Floor (Not Shown)
- 1 Ea. Access Hatch (Not Shown)
- 1 Ea. 4" Gate Valve F. x F.
### Material List

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
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<td>2 Ea.</td>
<td>4&quot; x 8&quot; Nipple M.J. x F.</td>
</tr>
<tr>
<td>2</td>
<td>2 Ea.</td>
<td>4&quot; x 2&quot; Tee F. x F.</td>
</tr>
<tr>
<td>3</td>
<td>1 Ea.</td>
<td>4&quot; Gate Valve F. x M.J.</td>
</tr>
<tr>
<td>4</td>
<td>2 Ea.</td>
<td>Valve Stock Riser Cover &amp; Lid</td>
</tr>
<tr>
<td>5</td>
<td>1 Ea.</td>
<td>4&quot; x 36&quot; Pipe S. x S.</td>
</tr>
<tr>
<td>6</td>
<td>1 Ea.</td>
<td>4&quot; Flanged Coupling Adapter</td>
</tr>
<tr>
<td>7</td>
<td>1 Ea.</td>
<td>4&quot; Meter As Specified (Type Compound Shown)</td>
</tr>
<tr>
<td>8</td>
<td>1 Ea.</td>
<td>4&quot; x 36&quot; Pipe F. x F.</td>
</tr>
<tr>
<td>9</td>
<td>2 Ea.</td>
<td>2&quot; Companion Flange</td>
</tr>
<tr>
<td>10</td>
<td>4 Ea.</td>
<td>2&quot; Comp X OSIP Adaptor</td>
</tr>
<tr>
<td>11</td>
<td>2 Ea.</td>
<td>2&quot; Comp 90 Deg. Ell</td>
</tr>
<tr>
<td>12</td>
<td>1 Ea.</td>
<td>2&quot; Ball Valve</td>
</tr>
<tr>
<td>13</td>
<td>1 Ea.</td>
<td>2&quot; Copper Pipe</td>
</tr>
<tr>
<td>14</td>
<td>1 Ea.</td>
<td>Precast D.C. Vault</td>
</tr>
<tr>
<td>15</td>
<td>1 Ea.</td>
<td>D.C. Vault Floor (Not Shown)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Access Hatch (Not Shown)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4&quot; Gate Valve F. x F.</td>
</tr>
</tbody>
</table>

### Diagram

- **Direction Of Flow**
- **Vault Opening**

---

**4" DOMESTIC SERVICE WITH 4" METER**

Ref. 501 to 506

DWU: 514

DATE: OCT 2010
### 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>6'' x 8'' Nipple M.J. x F.</td>
</tr>
<tr>
<td>②</td>
<td>2 Ea.</td>
<td>6'' x 4'' Tee F. x F.</td>
</tr>
<tr>
<td>③</td>
<td>1 Ea.</td>
<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 24'' Pipe S. x S.</td>
</tr>
<tr>
<td>⑥</td>
<td>1 Ea.</td>
<td>6'' Flanged Coupling Adapter</td>
</tr>
<tr>
<td>⑦</td>
<td>1 Ea.</td>
<td>8'' Meter As Specified (Type Compound Shown)</td>
</tr>
<tr>
<td>⑧</td>
<td>1 Ea.</td>
<td>6'' x 24'' Pipe F. x F.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>⑨</td>
<td>2 Ea.</td>
<td>4'' x 36'' Nipple F. x F.</td>
</tr>
<tr>
<td>⑩</td>
<td>1 Ea.</td>
<td>4'' 90 Deg. Bend F.x F.</td>
</tr>
<tr>
<td>⑪</td>
<td>1 Ea.</td>
<td>4'' 90 Deg. Bend M.J. x F.</td>
</tr>
<tr>
<td>⑫</td>
<td>1 Ea.</td>
<td>4'' Gate Valve F. x M.J.</td>
</tr>
<tr>
<td>⑬</td>
<td>1 Ea.</td>
<td>4'' Pipe</td>
</tr>
<tr>
<td>⑭</td>
<td>1 Ea.</td>
<td>Precast D.C. Vault</td>
</tr>
<tr>
<td>⑮</td>
<td>1 Ea.</td>
<td>D.C. Vault Floor (Not Shown)</td>
</tr>
<tr>
<td>⑯</td>
<td>1 Ea.</td>
<td>Access Hatch (Not Shown)</td>
</tr>
<tr>
<td>⑰</td>
<td>1 Ea.</td>
<td>6'' Gate Valve F. x F.</td>
</tr>
</tbody>
</table>

---

Ref. 501 to 506

**6'' DOMESTIC SERVICE WITH 6'' METER**

DWU 515

DATE OCT 2011
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>8&quot; x 8&quot; Nipple M.J. x F.</td>
</tr>
<tr>
<td>②</td>
<td>2 Ea.</td>
<td>8&quot; x 4&quot; Tee F. x F.</td>
</tr>
<tr>
<td>③</td>
<td>1 Ea.</td>
<td>8&quot; 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>8&quot; x 24&quot; Pipe S. x S.</td>
</tr>
<tr>
<td>⑥</td>
<td>1 Ea.</td>
<td>8&quot; x 6&quot; Reducing Flanged Coupling Adaptor</td>
</tr>
<tr>
<td>⑦</td>
<td>1 Ea.</td>
<td>6&quot; Meter As Specified (Type Compound Shown)</td>
</tr>
<tr>
<td>⑧</td>
<td>1 Ea.</td>
<td>6&quot; x 24&quot; Pipe F. x F.</td>
</tr>
<tr>
<td>⑨</td>
<td>1 Ea.</td>
<td>8&quot; x 6&quot; Reducer F. x F.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Part No.</th>
<th>Quantity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>⑩</td>
<td>2 Ea.</td>
<td>4&quot; x 36&quot; Nipple F. x F.</td>
</tr>
<tr>
<td>⑪</td>
<td>1 Ea.</td>
<td>4&quot; 90 Deg. Bend F.x F.</td>
</tr>
<tr>
<td>⑫</td>
<td>1 Ea.</td>
<td>4&quot; 90 Deg. Bend M.J. x F.</td>
</tr>
<tr>
<td>⑬</td>
<td>1 Ea.</td>
<td>4&quot; Gate Valve F. x M.J.</td>
</tr>
<tr>
<td>⑭</td>
<td>1 Ea.</td>
<td>4&quot; Pipe</td>
</tr>
<tr>
<td>⑮</td>
<td>1 Ea.</td>
<td>Precast D.C. Vault</td>
</tr>
<tr>
<td>⑯</td>
<td>1 Ea.</td>
<td>D.C. Vault Floor (Not Shown)</td>
</tr>
<tr>
<td>⑰</td>
<td>1 Ea.</td>
<td>Access Hatch (Not Shown)</td>
</tr>
<tr>
<td>⑱</td>
<td>1 Ea.</td>
<td>8&quot; Gate Valve F. x F.</td>
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</table>

8" DOMESTIC SERVICE WITH 6" METER

Ref. 501 to 506

DATE
OCT 2010

DWU
516
### 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>4&quot; Flanged Coupling Adaptor</td>
</tr>
<tr>
<td>②</td>
<td>1 Ea.</td>
<td>4&quot; Detector Check Device W/ By-Pass Meter</td>
</tr>
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<td>③</td>
<td>1 Ea.</td>
<td>4&quot; x 8&quot; Nipple M.J. x F.</td>
</tr>
<tr>
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<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

- **4" CLOSED FIRELINE SERVICE WITH 4" DETECTOR CHECK DEVICE**
- **Vault Opening**
- **Direction Of Flow**

Ref. 501 to 506

DATE: JUNE 2002

DWU: 517
<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>

**6" CLOSED FIRELINE SERVICE WITH 6" DETECTOR CHECK DEVICE**

Ref. 501 to 506

DATE
JUNE 2002

DWU
518
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; 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>
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8" CLOSED FIRELINE SERVICE WITH 6" DETECTOR CHECK DEVICE

Ref. 501 to 506

DATE
JUNE 2002

DWU
519
### Material List

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<th>Part No.</th>
<th>Quantity</th>
<th>Description</th>
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<tbody>
<tr>
<td>①</td>
<td>1</td>
<td>8'' Flanged Coupling Adaptor</td>
</tr>
<tr>
<td>②</td>
<td>1</td>
<td>8'' Detector Check Device W/ By-Pass Meter</td>
</tr>
<tr>
<td>③</td>
<td>1</td>
<td>8'' X 8'' 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>1</td>
<td>D.C. Vault Floor (Not Shown)</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>Access Hatch (Not Shown)</td>
</tr>
</tbody>
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**8'' CLOSED FIRELINE SERVICE WITH 8'' DETECTOR CHECK DEVICE**

- Direction Of Flow
- Vault Opening

Ref. 501 to 506

DATE
JUNE 2002
### Material List

<table>
<thead>
<tr>
<th>Part No.</th>
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<tbody>
<tr>
<td>1</td>
<td>1 Eq.</td>
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<td>2</td>
<td>1 Eq.</td>
<td>10&quot; Detector Check Device W/ By-Pass Meter</td>
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<tr>
<td>3</td>
<td>1 Eq.</td>
<td>10&quot; X 8&quot; Nipple M.J. X F.</td>
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<td>4</td>
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<tr>
<td></td>
<td>1 Eq.</td>
<td>Access Hatch (Not Shown)</td>
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</tbody>
</table>

### Diagram

- Dimensions:
  - 72" (Height)
  - 64" (Width)
  - 19" (Length)
  - 26 1/2" (Flow Direction)
  - 18 1/2" (Flow Direction)
  - 30" (Vault Opening)
  - 54" (Vault Opening Direction)

- vault opening labeled

### Reference

Ref. 501 to 506

### Title

10" CLOSED FIRELINE SERVICE WITH 10" DETECTOR CHECK DEVICE

### Date

JUNE 2002
PART 6
(Series 600)

CATHODIC PROTECTION

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

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<tr>
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<td>--- 602</td>
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<tr>
<td>Casing Test Station</td>
<td>--- 603</td>
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<tr>
<td>Foreign Pipeline Test Station</td>
<td>--- 604</td>
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<tr>
<td>Galvanic Anode Test Station</td>
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<td>Flush Mounted Test Station</td>
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<td>Condulet Style Test Station</td>
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<td>Type Roadway Offset</td>
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<tr>
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<td>Flush Mounted Casing Test Station Test Terminal Board</td>
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<td>Line Current Span Test Station</td>
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NOTES:
1. PLACE PLASTIC WARNING TAPE 12" ABOVE CABLES RUNS.
2. HORIZONTAL RUNS TO BE 36" BELOW GRADE.
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, 651A & 656
POST-MOUNTED TEST STATION, PER DETAIL 608 & 614

FINISHED GRADE

3 CONDUCTOR CABLE

2-6 PIPELINE CABLES

ELECTRODE, PER DETAIL 651A

CABLE CONNECTION, PER DETAIL 645 & 650

2-6 CABLES TO PIPELINE AT OPPOSITE END OF CASING

2-6 CASING CABLES

CARRIER PIPELINE

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

REFER TO PAGES 608, 615, 645, 650, 651A & 657
NOTES:
1. PLACE PLASTIC WARNING TAPE 12" ABOVE CABLE RUNS.
2. HORIZONTAL RUNS TO BE 36" BELOW GRADE.
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.
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.
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.
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 CARSONITE MARKER IN CONCRETE.

REFER TO PAGES 608 & 618

TYPE ROADWAY OFFSET
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 GENERAL NOTES FOR LARGE VALVES WITH MANHOLES - PAGE 216

WALL MOUNTED VAULT STYLE TEST STATION

REFER TO PAGES 611, 617 & 645

TEST STATION
SEE NOTE 3

1" HOT DIPPED GALVANIZED STEEL CONDUIT

HOT DIPPED GALVANIZED CONDUIT CLAMP AND WEDGE ANCHOR, TYP OF 2

#6 PIPELINE CABLES

CABLE CONNECTION, PER STD DWG 645

CONCRETE VAULT OR MANHOLE

PIPELINE

24"

36" MIN SEE NOTE 2

PER STD DWG 645
NOTE:

1. INSTALL TEST STATION OVER CENTER OF PIPE.

REFER TO PAGES 606, 645 & 650

FLUSH MOUNTED VAULT STYLE
TEST STATION

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

DATE
OCT. 2016

DWU
611
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.
TEST BOX "BIG FINK" BY COTT OR APPROVED EQUAL

1/8" THICK PHENOLIC LABEL PLATE

TOGGLE SHORTING STRAP MOUNTED ON BACKSIDE

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

- 10 (OUTSIDE), *6 (INSIDE)
- 10 (OUTSIDE), 6 (INSIDE)

REFERENCE ELECTRODE/ COPPER SULFATE ELECTRODE AS REQUIRED, 3 CONDUCTOR CABLE

*6 PIPELINE 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.
TEST BOX "BIG FINK" BY COTT OR APPROVED EQUAL

1/8" THICK PHENOLIC LABEL PLATE

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

ATS 1-00
108" CM88PC

OR

ATS 1-00
108" PCCP

TOGGLE SHORTING STRAP MOUNTED ON BACKSIDE

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

FOR WSP *10 ANODE LEAD WIRES.
FOR PCCP *4 ANODE HEADER CABLE.
(ONLY TWO SHOWN FOR CLARITY)

*6 PIPELINE CABLES

COTT 0.01 OHM SHUNT

REFERENCE ELECTRODE/COPPER SULFATE ELECTRODE AS REQUIRED, 3 CONDUCTOR CABLE

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.
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.

REFER TO PAGE 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.
NOTE:

1. TERMINALS SHALL BE 1/4" STAINLESS STEEL WITH LOCKING WASHER, TWO FLAT WASHERS, AND DOUBLE NUTS.
ANODE JUNCTION BOX
PER STD DWG 619

AC METER
ELECTRICAL PULL BOX
PER STD DWG 648

1" CONDUIT WITH AC CABLE TO AC POWER SUPPLY

CONCRETE PAD

PAD MOUNTED RECTIFIER

PVC VENT PIPE

DEEP ANODE WELL PER
STD DWG 630 & 647

PVC CONDUIT WITH ANODE LEAD
CABLES TO ANODE JUNCTION BOX

CABLE CONNECTION, PER
STD DWGS 645 & 650

PROJECT PIPELINE

REFER TO PAGES 621, 622, 630, 645, 647, 648 & 650

POST MOUNTED FOREIGN PIPELINE
TEST STATION TEST TERMINAL BOARD

DWU 620
DATE OCT. 2016
SECTION B–B

POST MOUNTED FOREIGN PIPELINE
TEST STATION TEST TERMINAL BOARD

REFER TO PAGES 620, 621, 627, 631, 645 & 650
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

GALVANIC RIBBON INSTALLATION SECTION-A

DWU 624

DATE OCT. 2016
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.
ELECTRICAL CIRCUIT BREAKER
CONDUIT WITH AC CABLE
AC POWER METER
RECTIFIER
AC CABLES TO RECTIFIER
CONCRETE PAD
GROUND ROD, SEE NOTE
5/8"x10' COPPER CLAD

ELECTRICAL ENCLOSURE (DOOR NOT SHOWN)
RECTIFIER UNIT
STAINLESS STEEL MOUNTING BRACKET, (TYP)
ANODE TERMINAL BOARD PER STD DWG 631
2" DIA PVC VENT PIPE ATTACHED TO ELECTRICAL ENCLOSURE
NON-METALLIC BUG SCREEN

DEEP ANODE WELL PER STD DWGS 630 & 647
FINISHED GRADE
18"
4"
4"
4"
32"

CONCRETE PAD
CONCRETE
1" CONDUIT WITH AC CABLE TO AC POWER SUPPLY
SCH 80 PVC CONDUIT WITH 2-#4 & 2-#6 TEST LEADS, STRUCTURE LEADS

SECTION A-A

NOTE:
MAXIMUM AC GROUNDING SYSTEM TO EARTH IS 2 OHMS.

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

RECTIFIER/DEEP ANODE WELL INSTALLATION SECTION A

DWU 629
DATE OCT. 2016
DEEP WELL ANODE

- PVC VENT PIPE
- CONCRETE TRAFFIC BOX
- ANODE LEAD CABLES
- ROUTE TO ANODE TERMINAL BOARD
- INACTIVE COLUMN
- TOTAL DEPTH
- ACTIVE COLUMN
- ACTIVE COLUMN
- METALLIC CASING AT THE CONTRACTOR'S OPTION
- COKE BREEZE
- ANODE CENTRALIZERS (TYP)
- HIGH SILICON CAST IRON ANODE (TYP) SEE TABLE FOR QUANTITY AND TYPE OF ANODE
- GROUT OR PERMAPlug SEAL
- DRILL FOUR 3/16" Ø HOLES 90 DEG APART EVERY 6" ALONG PVC VENT PIPE FROM BOTTOM TO TOP OF ACTIVE COLUMN
- VENT PIPE END CAP
- 10" DIA

**DEEP WELL ANODE**

**DATE**

**OCT. 2016**
G-10 TYPE E, FULL FACE GASKET, SEE NOTE 3

G-10 INSULATING SLEEVE

STEEL WASHER, (TYP)

STEEL STUD OR BOLT

PETROLATUM WAX TAPE PER AWWA C217, (TYP)

STEEL NUT, (TYP)

G-10 INSULATING WASHER, (TYP)

STEEL FLANGES

APPLY NSF APPROVED EPOXY LINING FOR TWO PIPE DIAMETERS

ELASTOMERIC SEALANT

G-10 TYPE E, FULL FACE GASKET W/ SEALING ELEMENT

ALL-THREAD STUD, (TYP)

STEEL WASHER, (TYP)

NUT, (TYP)

G-10 WASHER, (TYP)

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, WHICHEVER 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)
*4 BOND CABLES
(* BONDS AS REQUIRED)

CABLE CONNECTION, PER
STD DWG 645

6" TYP

3" 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.
GATE VALVE AND FLANGE ADAPTER BONDINGS

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
FILL WITH EPOXY TO COVER ALL EXPOSED STEEL & COPPER A MINIMUM OF 1/4".

CHIP BACK MORTAR COATING TO PROVIDE CLEARANCE TO ALLOW INSTALLATION OF CABLE CONNECTION IN JOINT RECESS.

FILL TO ORIGINAL THICKNESS WITH CEMENT MORTAR.

JOINT BOND OR TEST STATION CABLE.

MORTAR LINED AND COATED STEEL PIPE.

REMOVE PIPE COATING AS REQUIRED FOR CONNECTION.

EXOTHERMIC WELD PER STD 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
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
MILITARY GRADE HEAT SHRINK LABELS REPLACE "XXXX" WITH CABLE IDENTIFICATION FOR PIPE, INCLUDE DIAMETER, TYPE, PIPE & MATERIAL, EG: 36" PCCP FOR U/J's INDICATE ORIENTATION, EG: 108" WSP (DOWNSTATION)

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 CIPIPE.**

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)

HEAT SHRINK LABEL

*14 AWG RHW

3" DIA. x 3" LONG SCH 80 PVC COLLAR. FILL WITH DUCT SEAL AFTER CABLES ARE IN PLACE.

TERMINAL BOX

2-CABLE TEST STATION
WITH ER PROBE DETAIL

DATE
OCT. 2016
LOW PROFILE ER PROBE
(ELECTRICAL RESISTANCE)
PROBE DETAIL

1 SQ INCH SENSING AREA
WITH ELEMENT TO
MATCH PIPE MATERIAL

1/10" THICK
RIBBON CABLE

LENGTH AS REQUIRED

6 INCH

GROUND LEAD
MOLDED ENCASEMENT

1/10" THICK
RIBBON CABLE

STANDARD CABLE

6 PIN MS-STYLE CONNECTOR

OCT. 2016
CERAMIC SENSING TUBE IMPREGNATED WITH CHLORIDE ION TRAPPING MATERIAL AND A MINIMUM 28 SQUARE INCHES OF SENSING SURFACE AREA

PROTECTIVE END CAP (TYP)

SATURATED SOLUTION OF COPPER SULFATE

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.
POST-MOUNTED TEST STATION
DWGS 608 & 612

FINISHED GRADE

*10 PIPELINE CABLES

*6 PIPELINE CABLES

CABLE CONNECTION, PER STD
DWGS 645 & 650

COUPON,
PER STD DWG 651A

3 CONDUCTOR CABLE

6"

NOTES:

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

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

LINE CURRENT SPAN TEST STATION

DWU 660

DATE OCT. 2016