APPENDIX C

POTABLE WATER SYSTEM DETAILS

CITY OF CHARLOTTESVILLE, VIRGINIA

W 1.0  Pipe Trench and Bedding Standard Subgrade --Typical
W 1.1  Pipe Trench and Bedding --Unstable Soil
W 2.0  Concrete Thrust Blocks
W 2.1  Concrete Thrust Block Dimensions
W 2.2  Vertical Concrete Thrust Blocks
W 2.3  Vertical Concrete Thrust Block Dimensions
W 2.4  Restraint Joint Lengths Chart
W 3.0  Fire Hydrants --Typical
W 4.0  Gate Valve --Typical
W 5.0  Service Lateral --Typical
W 6.0  Meter Box - 5/8" and 1" Meters
W 6.1  Meter Vaults
W 6.2  Meter Vault - 1.5" and 2" Meters
W 6.3  Meter Vault - 3" Meter
W 6.4  Meter Vault - 4" Meter
W 7.0  Water Line Abandonment
W 7.1  Water Lateral Abandonment
W 8.0  Air Release Valve and Vault
W 8.1  Offset Air Release Valve and Vault
W 8.2  Blow-off Assembly
W 9.0  Steel Casing Installations Under Roadways
W 9.1  Steel Casing Installations Under Railways
W 9.2  Pipe Casing Requirements
W 9.3  Stream-Crossing
W 9.4  Concrete Anchors
W 9.5  Typical Water Pressure Test Rig
W 9.6  Typical Sprinkler Service
W 9.7  Concrete Piers
3. Rock shall be removed to a minimum of 6-inch clearance around the bottom and 12-inch minimum clearance to the sides of pipe.

Provide other safety measures in accordance with OSHA guidelines.

2. For excavations over 5 ft. deep, slope trench walls as required and/or crown of pipe. Trench width in this area: pipe o.d. + 24". Maintain vertical trench walls from bottom of trench to 24" above crown of pipe. Trench width in this area: pipe o.d. + 24".

1. Maintain vertical trench walls from bottom of trench to 24" above crown of pipe. Trench width in this area: pipe o.d. + 24".

Notes:

**Ductile Iron Pipe**

Undisturbed Earth

4" Min Bedding

12" See Note 1

24" Min Bedding

Common Fill

Select Fill

DOT #57 Crushed Stone

To Springline of Pipe

Sides and Bottom of Trench

Placed Against Undisturbed

B� Loving Patch

(See p.10 or p.11)

Loam and Seed

As Specified

Paved Surface

Unpaved Surface
Measures in accordance with OSHA guidelines.

2. For all excavations, slope trench walls as required and/or provide other safety measures.

Extend full width of trench excavation with minimum fabric overlap of 18".

Strength geotextile fabric; lino industrial fabric. Inc. of 2750 or equal. Mats shall consist of two (2) mats (9") max. Each. Foundation mat shall be placed in geotextile woven fabric if a high bedding to undisturbed stable soil. Or 18" max. depth. The foundation mat shall not be placed where the bottom of pipe is.

In unstable soils, provide a foundation mat from the bottom of pipe.

Notes:

Ductile iron pipe

8" - 12"

Undisturbed earth

Foundation

Crushed stone

Select fill

Common fill

Patch

Pavement

Bituminous surface

Topsoil, seed, fertilize and mulch as specified

Unpaved surface, paved surface
CONCRETE THRUST BLOCKS

1. Maximum test pressure: 225 psi
2. Minimum allowable soil bearing pressure: 2000 psi
3. Thrust block or restrained joint fittings are required whenever pipeline changes direction, size, or dead-ends.
4. Use 3000 psi. Concrete no concrete shall be poured on any part of the joint.
5. See drawing W-2.1. For thrust block dimensions.

NOTES:

FOR ALL BENDS

FOR TEE OR PLUG FITTINGS

SECTION 1-1

MIN 4.5
MIN 5.0
MIN 4.5
MIN 4.5

SECTION 2-2

MIN 4.5
MIN 5.0
MIN 4.5
MIN 4.5
4. The design engineer shall be responsibl for verification of adequacy of all concrete blocks.

3. Use minimum 3000 P.S.I. concrete.

2. Minimum allowable soil bearing pressure: 2000 P.S.F.

1. Maximum test pressure: 225 P.S.I.

NOTES:

REFERENCE DRAWING 2.0 FOR DIMENSION LOCATIONS

<table>
<thead>
<tr>
<th>SIZE OF PIPE</th>
<th>DIA. (IN)</th>
<th>COVER (FT)</th>
<th>MIN.</th>
<th>TEE AND PLUG (FT)</th>
<th>MIN.</th>
<th>BEND (FT)</th>
<th>MIN.</th>
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NOTES:

1. MAXIMUM TEST PRESSURE: 225 PSI.
2. MINIMUM ALLOWABLE SOIL BEARING PRESSURE: 2000 PSI.
3. THRUST BLOCKS ARE REQUIRED WHENEVER PIPING CHANGES DIRECTION, SIZE OR DEAD-ENDS.
4. USE 3000 P.S.I. CONCRETE. CLAMPS AND BOLTS SHALL BE PROTECTED FROM CONCRETE BY PLASTIC SHEETING WHEN POURING THRUST BLOCKS.
5. SEE DRAWING W. 2.3 FOR THRUST BLOCK DIMENSIONS.

SECTION

LOWER VERTICAL BEND

STAINLESS STEEL 3/8" X 2" PIPE STRAP

3/4" DIAM. ANCHOR

BOLT TYPE

SECTION

UPPER VERTICAL BEND

STAINLESS STEEL 3/8" X 2" PIPE STRAP

BOLT TYPE

3/4" DIAM. ANCHOR

#5 BARS @ 9" O.C. EACH WAY

ALL REINFORCEMENT
NOTES:
1. MAXIMUM TEST PRESSURE: 225 PSI
2. MINIMUM ALLOWABLE SOIL BEARING PRESSURE: 2000 PSI
3. USE MINIMUM 3000 PSI CONCRETE
4. THE DESIGN ENGINEER SHALL BE RESPONSIBLE FOR VERIFICATION OF ADEQUACY OF ALL THRUST BLOCKS.

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REFERENCE DRAWING 2.0 FOR DIMENSION LOCATIONS

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</table>

### Conditions:

- **Design Pressure:** 150 PSI
- **Depth of Pipe:** 3 feet
- **Soil Condition:** Clay 2
- **Type:** 4

*Distances are given in feet both upstream and downstream from the fitting.*

*Distances are given in feet both upstream and downstream from the fitting.*

---

**Notes:**

- Large Diameter
- Small Diameter
- Run Diameter
- Branch Diameter
- Pipe Diameter
- Tee and Wye

---

**Safety Factor:** 1.5

---

**Conditions:**
8. All chains shall be removed following installation and testing.

7. The Contractor is responsible for ensuring that all fire hydrants are provided with "City of Charlotte, N.C. Hydrant" threads.

6. Each new fire hydrant shall be freshly painted with "City of Charlotte" paint, #45 Safety Red.

5. A groundwater line is present at the installation site. Coordinate the relocation of the hydrant with the city.

4. Gate valve shall not be placed within the ditch lines.

3. Finishing grade shall stop away from the fire hydrant and valve box.

2. Maintain a 3' minimum cover from the main to the fire hydrant (including ditches).

1. Surround with gravel and keep free of concrete.

NOTES:

- All joints shall be mechanically restrained.
- 2 x 2 x 2 x 2', Min. Concrete
- Base and thrust block
- Valve (not required if all joints are restrained)
- 2', 2 x 2', Bearing block at
- 6' Min. Clearance
- Length of branch varies

STANDARDS

LENGTH: 77 FT.

DATE: JAN 2012
DETAIL W2.4
DIRECTIONS IN ACCORDANCE WITH 
JOINTS ARE RESTRAINED IN 
NOT REQUIRED IF ALL 
BEARING BLOCK 
3000 P.S.I. CONCRETE

M. J. GATE VALVE
2. USE RESTRAINED JOINTS IN BOTH
GRADE.
SHALL EXTEND SIX (6) INCHES ABOVE
1. IN REMOTE AREAS, VALUE BOXES
NOTES:
FORM APPROVED EQUAL
& 4909-D #160 (OVAL SCREW TYPE BASE)
& 4909-A TAILOR MOD. # 4906 (SCREW TYPE TOP)
ADJUSTABLE VALUE BOX W/LID
FINISHED GRADE

2. X 2 BEARING AREA
NOTES:

1. THE SERVICE LATERAL / ¼ BEND COUPLING AND CORRUGATION STOP

2. METER TO BE INSTALLED BY THE CITY.

3. INSTALL WARNING TAPE WITH SERVICE LATERAL.

4. CORRUGATION STOP TO BE SEATED INTO RON PIPES, FITTINGS OR SPECIALS.

5. TAPS SHALL NOT BE MADE WITHIN TWO (2) FEET OF A BELL JOINT, FITTING.

ASSAMBLE:

SHALL HAVE THEIR THREADS WRAPPED IN TEFLOM TAPE PRIOR TO INSTALLATION.

OR OTHER TAP.

CONNECTION:

BEDDING - VOET #57 CRUSHED STONE

NECESSARY

BRICK AS

SOFT COPPER

LOCKING

ANGLE

4" STONE

STONE DUST

STOP (VOET M-10)

MAIN WATER

1/4 BEND COUPLING

36" MIN

16"-20" VALVE

METER

VALVE BOX

COUPLER SETTER

X 3/4" X 3/4"

3/4" TYPE "K"

SOFT COPPER

1/4" TYPE "K"
3. Lid must be cast to accept an iron, inc. water, 4" ER meter module.

Increase depth to 24".

6/12 - B or approved equal. Use 6" of brick and/or block to

2. Paved areas (alternative location): cast iron Bingham and Taylor No.

With 6" extension or approved equal.

1. Unpaved areas (preferred location): Plastic Brooks 2200 Series

Notes:

Carson 2200 Series

12 3/16" extension

18 1/4" meter box

6" extension

Pipeslot (2 places)
### Proposals Will Be Submitted

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Minimum Depth</th>
<th>Minimum Width</th>
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<td>2&quot; Min.</td>
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<td>1.2&quot; Min.</td>
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<td>6&quot; Min.</td>
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<td>6&quot; Min.</td>
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<td>Door</td>
<td>C Width</td>
<td>A Depth</td>
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### Section A - A
- Bearing Plate
- Top Plate
- Access Hatch

### Side View
- Depth: A
- Length: B

### Top View
- Width: C
- Access Hatch: Aluminum
1. Precast Vault shall be 4 ft. high.
2. Outside of vault below ground shall be coated with an approved water proofing grade.
3. Consult with Department of Public Works - Water before installing the lateral terminations.
4. Install warning tape above and below vault.

NOTES:

- Crushed stone 6" over #57
- Elevation assembly
- Bypass
- Meter
- Strainer
- Assembly
- Wingnut Locking

MEASURES:
- MIN 37" Min 12" Min 18" Min 24" x 30" Aluminum Access Hatch (22.5" for compound meter)
ELEVATION
6" VOLT # 57

PLAN

NOTES:
1. MINIMUM WALL THICKNESS FOR METER VAULT: 3"
2. OUTSIDE OF VAULT SHALL BE 6."
3. PROVIDE A FLOOR DRAIN WITH A COMPOUND
APPROVED WATER PROOFING SHALL BE COATED WITH AN
4. CONSULT WITH DEPARTMENT OF PUBLIC WORKS - WATER DIVISION
5. INSTALL WARNING TAPE AND LATERAL TERMINATE WIRE IN A LOOP WITHIN METER BOX.
6. INSTALL LUMP-SEAL OR ECOLL TIP

METER VAULT - 3" METER
CRUSHED STONE

ACCESS HATCH
30" X 30" ALUMINUM

24" MAX
12" MIN
60" MIN

TYPE SPACING: 12"
MANHOLE STEPS, WEDGE-Lock

3 GATE VALVE
SLEEVE COUPLING
CONE METER W/CONC SUPPORT TP
3 STRAINER

3 STRAINER

3 STRAINER
1. Precast vault shall be 6".
2. Outside of vault below grade shall be coated with an approved water proofing compound.
3. Provide a floor drain with a "A"-sump pump.
4. Consult with Department of Public Works - Water Division.
5. Install warned tape and tracer wire with service lateral.
6. Void # 57
7. Crushed stone
8. Elevation
9. Support TP w/concrete
10. 4" gate valve
11. Support TP
12. Manhole steps "Weed-Lok"
13. Type-spacing: 12" 30" X 30" Aluminum
14. Access hatch
15. Meter box.
16. Terminate wire in a loop within
17. Notes:
1. Pipe shall be saw cut perpendicular to pipe.

2. Provide plastic sheeting between pipe and concrete thrust block.

3. Pressure pipe shall be checked for leaks prior to backfill.

NOTES:

INSTALL TRUSS BLOCK PER

DETAIL W. 2.0

SEAL PIPE ABDONDEP PIPE

GROUT OR FOAM END WITH NON-SHRINK

APPROVED EQUA.

FITTINGS "Mega-Lug" OR

CAP WITH RESTRAINED JOINT
1. Leaks, Leaks shall be repaired prior to backfill.
2. Corporation Stops shall be completely closed and checked for
   meter to be removed by the city.

NOTES:

OR Foam,
with non-shrink grout
if galvanized seal end
end of service lateral
clamp and bend over cut
if copper service line.

3' MIN
MAIN
WATER
CORP STOP
CLOSED

SERVICE LATERAL MIN
CUT AND REMOVE

OF 3' FROM MAIN.
1. Blow off assembly to be installed at dead-end water lines.

NOTES:

- 6" minimum bedding
- 8" stone
- Over 5' deep

- Precast manhole section(s) if brass or bronze.
- Copper or brass fittings to 2" pipe to be rigid.
- "Street El" frame & cover
- Capital Foundry MH-3000
- Centerline of vault

Accordance with W.2.4
Restrain joints in thrust block or drill & tap M1.5 plug

12" square head
- 2" bronze gate valve
- 2" nipple and finger-tight cap

From assembly to [additional text not fully visible]
1. Steel casing to extend 10' back of curb, ditch, sidewalk, etc. or a minimum of 6' beyond.

2. Reference drawing W 9.3 for minimum steel casing size and wall thickness.

3. Proprietary restraints joint pipe may be substituted for mechanical joint pipe with the edge of pavement, whichever is greater.

4. Approved equal casing insulations shall be spaced per manufacturer's instructions.

5. Carrier pipe shall be centered within casing.

NOTES:

- Model Ac, Am or Ac by advance products and systems, inc. or approved equal.

- By Cascade Waterworks or approved equal.

- Stainless steel casing insulator model ccs.

- 36" Min. 1" carrier pipe size.

- 18" Max. 2" joint.

- 8" Varies.

- 2.8 Max. 2 TP.

- TP Max. 1 TP.

- End seal.
4. Approved Equal Casings Insulators shall be spaced per manufacturer's instructions.
3. Property Restraint Glade may be substituted for mechanical.
2. Reference Drawing W.9.3 for minimum steel casing size and wall thickness.

Typical Each End.

End Seal

Model AC, AM or AW by Advance Products and Systems Inc. or Approved Equal.
By Cascade Waterworks or Approved Equal.
Stainless Steel Casing Insulator, Model CS.

W/Restraint Gland

D.1 Pipe

Steel Casing

Max 8.2

Max 2.7

18" O.R. 20" Joint

2.0 Varies

36" Min

D.1 Casing Pipe M

5'-6" Min

2" Screened

Steel Vent

Railroad

25" Min

19" Min

3.0 Pipe TP

TP MAX
Diameter shall be increased as necessary.

3. Where restricting devices are required for the carrier pipe, the casing pipe exceeds 15 feet.

2. A minimum of 0.375" thickness is required when ground cover over pipe exceeds 12 feet.

1. Increase thickness of casing 0.125" where bore length exceeds 12 feet.

**NOTES:**

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Pipe casing:

- Steel
- Minimum wall thickness

City of Charlotteville
1. Backfill from top of pipe bedding to bottom of existing bank.
2. Compacted earth backfill within extents of stream channel with void # 2.A crushed stone.
4. Riprap backing shall extend from top of # 2.A backfill.
5. MLI = ASMI D 698.
6. Density per ASMI D 698 compact to 95% maximum.
7. Trench to top of trench. Compact to 95% maximum.
8. Designated Stream buffer (see city code, Chap. 10).
9. The Runnells River, or any other stream that has a riprap backing.
10. ANY PIPE CROSSING MEADOW CREEK, MANN'S CREEK.
11. MUST HAVE CONCRETE ENCASMENT. SEE DETAIL WW. 4.1.
12. VDOR # 57.
13. Pipe bedding.
14. VDOR # 2.A.
CONCRETE ANCHOR

CENTER TO CENTER
OVER 35%: ≥16 FT
CENTER TO CENTER
20% - 35%: ≥36 FT

2. SPACING OF ANCHORS: SLOPE:

BE POURED AGAINST UNDISTURBED EARTH:

1. SIDES AND BOTTOM OF CONCRETE ANCHOR TO

NOTES:

FOR SLOPES OVER 20% CONCRETE ANCHOR

ELEVATION

ANCHOR BOTTOM OF UNDISTURBED SOIL
15# FELT
STEEL STRAP
1/8" x 2" STAINLESS

8" PER CONCRETE
8" IN CONCRETE
ANCHOR BOLT IS EMBEDDED
1/2" STAINLESS STEEL

PLAN

(MAY BE PRECAST)
CONCRETE ANCHOR

STAINLESS STEEL
1/8" x 2"

D+4.4"

ANCHORS SHALL BE SPACED AS SHOWN ON PLAN

15# FELT
TRENCH
Typical Water Pressure Test Rig

- Tank
- 55 Gallon
- Fill Water (usually 3/4 copper)
- Pump
- PRV
- Check Valve
- Gate Valve
- Air Release
- Pressure Gauge
- Water Line
- Corp. Stop
TYPICAL SPRINKLER SERVICE

- Installed Above Ground
- RPZ Backflow Preventer
- During Winter Months
- Pipe Union for Removal of Pry
- Freezeless Yard Hydrant
- 5/8" x 3/4" Meter
1. Pier required when storm drain or other pipes cross over the other utility with a vertical clearance of less than 12". (Less than 12"")

2. Pier to be built on undisturbed earth.

3. Concrete to be ready mix, Class A3.

NOTE:

THE DIRECTOR OF PUBLIC WORKS

SANITARY SEWER OR WATER

STORM SEWER

COMPACTED GRAVEL NO 57

MIN 16"

MIN 12"

MIN 8"

MIN 6"

MIN 6"

MIN 6"

STORM SEWER

PROPOSED

OR OTHER PIPES

L = LENGTH OF PIPE SECTION

L/2

L