APPENDIX D

SANITARY SEWER SYSTEM DETAILS

CITY OF CHARLOTTESVILLE, VIRGINIA

WW 1.0  Pipe Trenching and Bedding—Typical
WW 1.1  Pipe Trench and Bedding—Unstable Soil
WW 2.0  Concrete Manhole — Typical
WW 2.1  Drop Manhole Type “A”
WW 2.2  Drop Manhole Type “B”
WW 2.3  Interior Drop Manhole
WW 2.4  Manhole Frame & Cover
WW 2.5  Watertight Manhole Frame & Cover
WW 2.6  Typical Manhole Showing “Doghouse” Installation
WW 2.8  New Pipe Connection at Manhole
WW 3.0  Steel Casing Installation Under Roadways
WW 3.1  Steel Casing Installation Under Railways
WW 3.2  Pipe Casing Requirements
WW 4.0  Stream Crossing
WW 4.1  Concrete Encasement
WW 5.0  Sewer Lateral Connection — Typical
WW 5.1  Cleanout Detail
WW 5.2  Sanitary Sewer Lateral Connection for CIPP Lined Pipe
WW 5.3  Service Lateral Replacement
WW 6.0  Concrete Anchor
WW 6.1  Concrete Pier
WW 7.0  Manhole Abandonment
WW 7.1  Sewer Lateral Abandonment at Manhole
WW 7.2  Sewer Lateral Abandonment at Main
WW 8.0  Rehab of Existing Manhole
WW 8.1  Typical Point Repair
WW 8.2  Rehab of Manhole Frame and Cover
WW 9.0  Aerial Creek Crossing with Concrete Piers
WW 9.1  Reinforced Concrete Anchor Pier
WW 9.2  Reinforced Concrete Pier
WW 9.3  Pier Footing on Rock
WW 9.4  Pipe Straps for Piers
1. Maintain vertical trench walls from bottom of trench to 24" above crown of pipe. Trench 10" to 24" above crown of pipe. Trench between 6" - 8" min. bedding.

2. For excavations over 5 ft. deep, slope trench width in this area: pipe dia. to 0.0. + 24".

3. Rock shall be removed to a minimum of 6-inch minimum. Clearances around the bottom and 12-inch minimum clearance to the sides of pipe.

NOTES:

1. Select fill.

2. Common fill.

3. PVC pipe.

4. Undisturbed earth.

5. Select fill.


7. Patch pavement as specified.

8. Bituminous pavement.


10. Unpaved surface.

11. Paved surface.

12. See note 1.

13. See note 2.

14. See note 3.
OSHA GUIDELINES.

2. For all excavations, slope trench walls as required and/or provide other safety measures in accordance with overlap of 18".

For all trench excavation, extend full width of trench excavation with minimum fabric. Extend full width of trench excavation with minimum fabric in a high strength concrete. Bongo industrial fabrics. Inc. Ger 3750 or equal. Mats shall extend full max. depth. The foundation mat shall consist of two (2) mats (9" max. each) of voort #1 crushed stone wrapped in 6"-8" min bedding. Before the bottom of pipe bedding to undisrupted stable soil or 18".

NOTES:

1. In unstable soils, provide a foundation mat from the bottom of pipe bedding to undisrupted stable soil.

Ductile Iron Pipe

PVC Pipe

Undisrupted Earth

Foundation

Crushed Stone

Voort #57

Select Fill

Common Fill

Voort #21A

Select Fill

Borimnous

As Specified

Loam and Seed

Unpaved Surface

Paved Surface
Manhole - Typical Concrete

Approved Otherwise:
1. Manholes shall be 9 inches unless close as possible to grade, maximum cone height to stack off manhole as grade allowance. Order base riser and manhole shall be ordered with minimum with center of manhole bottom. Pipes entering manholes shall be aligned.

2. Pipe inlet with 6° cone section are not acceptable.

3. Completely filled with non-shrink grout.

4. Manhole connection shall be neoprene for precast inlets and outlets. Pipe to be neoprene manifold shall be factory coated.

5. Epoxy manually on-site epoxy coating may consist of one coat coal tar with one coat epoxy coating color gray.

6. Niche of manhole shall be factory coated.

7. Inspection of a robotic camera.

8. Manhole shall be preformed to allow finished smooth with steel trimmell flow constructed of 3000 psi concrete fill.


10. Pipe to manhole.

11. All joints, lift holes, inlets and outlets use NOT Shrink.

12. Frame and seal inside and outside.

13. Total height: 9" max.

14. Watering to seal.

15. Frame & cover.

16. Frame.

17. Bend.

18. "Riser".

19. "Base".

20. "Varies".

21. 6" MAX.

22. 48" MAX.

23. 8" 2-8"
1. All joints, lift holes, inlets and outlets use not shrink.

2. Channels and manhole "shells" to be constructed of 3000 psi concrete. Finished smooth with steel trowel. Flow channels shall be formed to allow inspection of a robotic camera.

3. Inside or manhole shall be coated with one coat epoxy coating. Color gray.

4. For precast inlets and outlet, pipe to be required in some situations.

5. All inlet openings to existing manholes shall be neoprene boot filled with annular space between pipe and manhole wall shall be stainless steel accessories.

6. Drop inlet filled with non-shrink grout.

Acceptable:

Crushed stone 8" - 12" void 57% 6" drop or less
DROP MANHOLE TYPE „B“

NOTES:
1. ALL JOINTS, LIFT HOLES, INLETS AND OUTLETS SHALL BE GROUTED AND SEALED.
2. CHANNELS AND MANHOLE „SHIELD“ TO BE FINISHED SMOOTH WITH STEEL TROWEL.
3. INSIDE OF MANHOLE SHALL BE COATED WITH A UREA-BASED EXPANSIVE EPOXY.
4. FOR PRECAST INLETS AND OUTLETS, PIPE TO BE COMPACTED.
5. ALL INLET OPENINGS TO EXISTING MANHOLES.
6. PIPE INLETS WITHIN „CONES“ SECTION ARE.
7. TOP PIPE TEE AND 90° DEGREE BEND TO MATCH MAIN LINE MATERIAL.
8. 12" VOLT #57 CRUSHED STONE.

NOT ACCEPTABLE.

COURT.
BE COMPLETELY FILLED WITH NON-SHRINK BETWEEN PIPE AND MANHOLE WALL SPACE SHALL BE CORR-DIPPLIED ANNUAL SPACE.

MANHOLE CONNECTIONS SHALL BE CORR-DIPPLIED.

STAINLESS STEEL PIPE STRAPS.

CONCRETE.

THRU-TEGR BLOCK.

NON-SHRINK GROUT.

FLEXIBLE O-RING STEEL.

REINFORCED CONCRETE.

WEB-BEDDING TO SEAL GROUT TO MANHOLE.

TOTAL HEIGHT: 9” MAX.

ADJUSTING RINGS.

WEB-BEDDING TO SEAL GROUT TO THE TOP OF MANHOLE.

FORMED TO BENCH CONCRETE.

8½” VOLT #57 CRUSHED STONE.

2½” 8’
1. Interior drop connections may only be installed where approved by the Department.

2. Inlet opening shall be core-drilled. Void around outside of opening to be completely filled.

3. Only one interior drop connection may be within "cone" section is not acceptable.

4. Height of vertical stack shall not be less than two feet.

5. Drop stack shall be installed within 60' of manhole steps.

6. Vertical stack will be strapped to manhole at each pipe joint no more than 6" from each pipe strapped joint. Pipe size of drop stack shall be stainless steel.

7. Shape invert as needed to provide smooth transition from drop connection discharge.

8. Drop stack shall not be installed within 60' of manhole invert.

9. Crushed stone 8-12" void #57.

10. Top of pipe formed to concrete.
1. Capital Founder of VA Model MH-3000 2.4 Manhole Frame and Cover with Raised Letters MARKED "SANITARY" SEWER OR APPROVED EQUAL. 

2. All Manholes within the 100-Year Floodplain or located in areas subject to localized flooding are to have watertight frame and cover (see detail WW 2.5).

NOTES:

- 5/8" Dia. X 3/16"
- 1/5" G. SS
- 3" Lg. X 5/8"
- 7 1/2"
- 26 3/4"
- 27 1/4"
- 0.4"
- 0.24"
- 3.4"

CROSS SECTION

PLAN

IN RECESSED AREA

5/8" RAISED LETTERS

S.S. BAR

1" HOLES

IN RECESSED AREA

PLAN
1. All manholes within the 100-year floodplain or local areas subject to localized flooding shall have waterproof frames and covers.

2. Standard 24" x 7" tall manhole frame and cover.

NOTES:

Pickup Detail:

Cross Section:

Water Tight Detail:

(Aluminum water tight details available in 4".)
**City of Charlottesville**

**Typical Manhole Shwing**

**July 2011**

**Notes:**

1. Construct a formed invert from the existing pipe.
2. Pour a shelf to the lower half of the existing pipe.
3. Cut and remove the top half of the existing pipe.

**Specifications:**

- The invert and wall have been formed in accordance with these.
- The manhole has been fully tested in accordance with these.

** конструкциях:**

- Закройте стул.

**Designation:**

- 3000 psi concrete base
- 12" min. cast-in-place

**Structure:**

- Foundation section view
- Wrap existing pipe with neoprene gasket
- Fill doghouse opening or non-shrinking grout
- Wrap existing pipe with 3000 psi concrete around existing pipe
- Flow a minimum of 0.25" above base shall

**Structures:**

- Doghouse manhole base
- No. 68 stone bedding
- 12" thick void between existing pipe

**Diaphragm:**

- Concrete blocks center 2'/8"x8"x16" and 4"x8"x16" solid
- Pipe outside diameter plus 6" by manufacturer or saw cut to fit
- Doghouse opening shall be prepared
- Set doghouse base on sewer pipe

**City of Standards**

**Scale:** 1/4" to 1'
1. Contractor shall refer to this detail when connecting new sewer pipes to existing manholes. The new pipes may be installed for a point.

Notes:

- Repair, pipe replacement, pipe bursting, or service lateral replacement.
- EXISTING OR NEW MANHOLES. THE NEW PIPES MAY BE INSTALLED FOR A POINT.
- CONTRACTOR SHALL REFER TO THIS DETAIL WHEN CONNECTING NEW SEWER PIPES TO EXISTING MANHOLE BASE.
- MATCH NEW PIPE TO 2” INLET MANHOLE.
- EXTEND NEW PIPE MIN.
- WITH NON-SHRINK CEMENT.
- INSTALL INVERT ELEVATION.
- 2” INLET MANHOLE.
- EXISTING MANHOLE WALL.
- #57 STONE ALL AROUND.
- 8’ MIN.
- SHALL BE MIN 3600 PSI.
- INSTALL CONCRETE COLLAR ALL AROUND NEW PIPE.
- SPECIFIED. MATCH LINER TO END OF PIPE AS SHOWN. SEE DETAIL A.
- REMOVE EXISTING PIPE AND MANHOLE.
5. Carrier Pipe shall be centered within casing.

4. Approved Equal casing Insulators shall be spaced per manufacturer’s instructions (MIN 2 PER CLAUNCHES WHERE APPROVED BY THE CITY.

3. Proprietary Restraint Joint Pipe MAY BE SUBSTITUTED FOR MECHANICAL Joint pipe WITH RESTRAINT.

2. Reference DRAWING WZ 3.2 FOR MINIMUM STEEL CASING SIZE AND WALL THICKNESS.

1. Steel Casing to extend to back of curb, ditch, sidewalk, etc. OR A Minimum of 5' BEYOND THE EDGE OF PAVEMENT, WHICHEVER IS GREATER.

NOTES:

- Typical each end
- Model A.C., A.R. A.W. or Advance Products and Systems, Inc.
- Stainless Steel casing Insulator, model CCS,
- OR Approved Equal
- By Cascade Waterworks, or Approved Equal
- Or Approved Equal

DIMENSIONS

- 36" Min. D.I. Carrier Pipe Min.
- 18" Or 20" Joint
- D.1. Pipe Max.
- MAX.
- 8" Varies
- 2.8 Max.
- 2.8 Max.

Curb

Roadway

Ditch

Pavement
5. Carrier pipe shall be centered within casing.

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

3. Restraint glands where approved by the City.

2. Proprietary restraint joint pipe may be custom fitted for mechanical joint pipe with reference drawing W.M. 3.2 for minimum steel casing size and wall thickness.

1. Also refer to the APTA manual for railway engineering - Chapter 1, Part 5.4.

NOTES:

Typical each end
or approved equal
model Ac, as per aw by advance products and systems, inc.

Model Ac, Am or Aw by advance products and systems, Inc.

Stainless steel casing insulator, model cc's

DPI pipe

30 min. dl. carrier pipe, ml.

5" - 6" min.

DPI pipe

Steel casing

Railroad

2" screen steel vent

Typical optional consult

RR crossing permit

2" max

Varies

2'

8'

2'

18', 20', 25'

END SEAL

SCALE: N.S.
STANDARD NUMBER: WW 3.1
REVISION DATE: JAN 2011
CITY OF CHARLOTTESVILLE
STEEL CASING INSTALLATION
CITY STANDARDS
# Pipe Casing Requirements

The casing pipe diameter shall be increased as necessary.

4. Where restraining devices are required for the carrier pipe, over pipe exceeds 15 feet.

3. A minimum of 0.375” thickness is required where ground cover exceeds 12 feet.

2. Increase thickness of casing 0.125” where bore length exceeds through bores shall not be based on minimum grade.

## Notes:

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1. Concrete to be minimum 3000 psi.

2. Pipe encasement to be used only where specified on plans.

NOTES:

8" Min. all around
0.0 Pipe
NOTES:

1. Use ductile iron pipe from sewer main.

2. Sewer lateral tapped into existing sewer main if less than 3.5 ft. cover.

3. Lateral shall not protrude into sewer main.

4. Where the distance "A" is such that more than one pipe joint is required, the pipe slope exceeds 20% and the pipe slope exceeds 20%, contractor shall provide anchorage in accordance with drawing WW 6.0.

5. Sewer lateral connections into existing manholes shall be made in accordance with drawing WW 2.2. Or WW 2.3 as applicable.

6. If main line is lined, see detail WW 5.2.

ELEVATION

Pipe Bedding

12" PER FT MAX.
Slope 1/4" PER FT MIN.

SEE DRAWING WW 5.1

Grade

CLEANOUT

4.5'

PLAN

PROPERTY LINE

90° ELBOW

LATERAL (4" MIN)
SAME SIZE AS
TEE BRANCH SHAL BE
"WYE" TYPE FITTING.
NOTE: CLEANOUT TO BE SAME SIZE AND MATERIAL AS SEWER LINE.

CONCRETE SHALL BE TRAFFIC RATED.

NOTE: CLEANOUTS IN PAVED OR

Grade

12"

TP

8"

Mechanical Plug

Square Laminol Cover

3000 PSI Concrete

PRIVATE PAVED DRIVEWAYS

(length varies)

Connecting Piece

WYE OR CLEANOUT TEE

Crushed Stone

YDGT # 57

45° Bend
City of Charlotteville
City Standards
July 2011

Service Lateral Replacement:
City Inspection shall be included in the unit price bid for the lateral shall be no offset or misaligned joints. The cost for the lateral is replaced to verify proper installation. The new lateral shall be installed after the service to the existing lateral elevation. All tee's shall be dutch iron.

6. Install fittings as necessary to return the new lateral condition.

5. Install and compact #7 crush ed stone to a min of 1 foot.

4. New service lateral shall be installed at the existing lateral.

3. Install fittings. Adapters and rubber sleeve couplings as necessary to connect the new service lateral to the existing lateral. New lateral shall be the same size as the existing lateral. The branches shall be the same size as the new lateral. The service lateral to be reconnected to the existing lateral. The service lateral to be replaced to include the tee and 6 feet of the existing service laterals where specified by the engineer. Will determine which services to replace from review by the engineer. Replace existing service laterals with new lateral specified by the engineer.
CENTER TO CENTER
OVER 35%; >16 FEET
CENTER TO CENTER
20% - 35%; >36 FEET
STRENGTH OF ANCHORS:
2.
BE POURED AGAINST UNDISTURBED EARTH.
1. SIDES AND BOTTOM OF CONCRETE ANCHOR TO

NOTES:

FOR SLOPES OVER 20%
CONCRETE ANCHOR

(MAY BE PRECAST)

CONCRETE ANCHOR

8" IN CONCRETE
1/2" STAINLESS STEEL

1/8" X 2" STAINLESS STEEL STRAP

TRENCH

8"

8"

154 FEET

AS SHOWN ON PLAN
ANCHORS SHALL BE SPACED
1. Pier required when storm drain or other pipes cross over the other.

2. Pier to be built on undisturbed earth.

3. Concrete to be ready mix, class A3.

Allowed with a waiver from the director of public works.
Utility with a vertical clearance of less than 12" (less than 12" only
when required when storm drain or other pipes cross over the other

NOTES:

SANITARY SEWER OR WATER

STORM SEWER

COMPACTED GRAVEL NO 57

SANITARY SEWER OR WATER

PIER AT NEAREST JOINT ON EACH SIDE

STORM SEWER OR OTHER PIPES

L = LENGTH OF PIPE SECTION

L/2
Punch or drill holes in base for drainage.

Cement: or as directed by DPU.
Setting volume stable. Waterproofed with a premixed, fast-setting material on both the manhole and the pipe.

Remove adjusting rings. Remove manhole frame & cover.

Cement: the manhole and the pipe.

All connections to manhole shall be cut outside the manhole and the pipe.

Fill with sand or void #57 stone.

Precast manholes. Remove cone section from block or brick manholes.

Conditions:
Restored similar to surrounding.
In pavement, area will be graded and standardized. For manholes not located in accordance with City of Charlottetown Standards of Void #57.

Note: where manhole is located in pavement, pavement will be restored.
SEWER LATERAL ABANDONMENT

EXISTING BENCHING AND PROVIDE
FIELD CHANNEL TO MATCH
NON-SHRINK GROUT, SMOOTH
COMPLETELY WITH CONCRETE OR
LATERAL INSIDE MANHOLE
COMPLETELY FOR SERVICE

SMOOTH TRANSITION.

FREE UP MANHOLE TO
Screw Plug Installed
EXISTING SERVICE
(Abandon In Place)

LEAK-MOTH PLUG
ABANDONED
LATERAL BENDING
COMPLETELY PLUG
COMPLETELY WITH
EXISTING BENCHING

EXISTING SEWER
3. Support the existing sewer during this work.

If the existing main sewer is damaged during the removal of the existing lateral and the saddle connection will not backfill as specified.

Min. 3000 psf concrete - encasement to extend to 8" each side of the lateral/saddle and 6" beyond the cap.

Permot 3 and 4. 4" to 8" long stub-out. Install a cap on the stub-out and encase the saddle. Put-up and cap in the existing lateral at least 5 feet from the main sewer. Plug the remaining pipe with concrete. Install a saddle.

Notes:
1. Refer to this detail when abandoning existing service laterals. Service laterals shall be abandoned when a new lateral is being installed to serve a property and the new lateral is being connected to the main sewer at a different location. A building is being demolished or is directed by utilities engineer, contractor, or public utilities.

2. (434-970-3800) A minimum of 48 hours in advance for inspection prior to backfill.

3. Concrete encasement 6" beyond cap.

4. To 8" long stub-out.

5. Min. 5 feet from main.

6. Straps on saddle – Rombac "cp" or approved equal. See notes 1 & 3.

7. Install cap on sewer stub-out. Same.

8. Below pipe.

#67 stone all around.

Excavate below the existing sewer.

Remove existing service lateral.

From main sewer. See note 2.

Undisturbed earth.

Existing sewer main.

Existing sewer main (min. 5 ft from main).

Plug existing service lateral with.

Concrete (min. 5 ft from main).

Concrete (min. 5 ft from main).
6. Refer to detail no. E for connecting to manholes.

Insured in the unit price bid for the point repair.

Pipe connection and any connecting service laterals, the cost for the city inspection shall be
and local shall be submitted to the engineer for review and approval and shall clearly show each
shall be corrected prior to acceptance by the engineer. The city inspection shall
after performing repair to

3. Service laterals located within repair segments shall be connected to new sewer with a double iron
paved surfaces during the work.

Excavate soil and dispose of in offsite and import #24 of backfilling from top of #5
under root and city paved surfaces. The engineer may specify that the contractor remove the

G. Backfill and compact as shown.

F. Return flow trough pipe.

E. Required to install pipe and connect new sewer at a constant slope between the two existing pipe ends. Connect the

D. Install #78 stone to sewer invert elevation and compaction

C. Neatly cut existing sewer at each end of repair segment and remove existing sewer completely.

B. Excavate to at least 8" below existing sewer.

A. Bypass pump flows around repair segment or plug line the entire time the repair is being made.

1. The sequence of work for performing repairs shall be as follows:

NOTES:
7. Refer to the standard specifications and details for further requirements.

6. All new manholes and covers (where required) shall be sold or waterproof as specified by the engineer.

5. Manhole cover to be flush with existing grade unless noted otherwise.

4. In paved areas, pavement shall be saw-cut neatly in a square around existing manholes.

3. Remove all loose bricks and mortar and provide a smooth level surface prior to installing masonry or concrete adjusting rings. Brush surface with still water brush prior to placing mortar.

2. Contractor to remove at least 6" of existing brick and/or material prior to installing new masonry and to provide a leak-tight seal.

1. Contractor shall refer to this detail when raising manholes and when repairing or replacing covers above grade. Work shall be in accordance with this detail and all other requirements in this detail illustrate an adjustment work. This detail illustrates an adjustment work. All rehabilitation of manholes and covers shall be completed prior to installation of adjusting rings and covers and frames and covers.

Notes:

See notes 2 and 3 for adjusting rings.

New masonry work or existing masonry work.

Concrete adjusting rings.

New masonry work or existing masonry work.

See note 3.
ANCHOR PIER
REINFORCED CONCRETE

NOTES:
1. ALL CONCRETE TO BE 4000 PSI MINIMUM.
2. FOOTING THICKNESS SAME 12" BASE THICKNESS OF PIER.
3. PIER FOOTING TO BE DETERMINED BY ENGINEER.
4. PIER TO BE BUILT WITH LONG SIDE OF FOOTING.
5. REINFORCING STEEL TO BE PLACED WITH A MINIMUM 1" CLEARANCE OF 3" WITH THE SURFACE OF THE CONCRETE.
6. THE CREEK UPRSTREAM AND DOWNSTREAM OF THE AERAL.
7. IN SOME INSTANCES WHEN POOR SOILS AND SUBGRADES
   TO PROPERLY SUPPORT THE PIER. THE ENGINEER
   EXIST THE FOOTING MAY HAVE TO BE EXTENDED EACH WAY.
   TO DETERMINE WHEN TO EXTEND THE FOOTING LENGTH.
   FOOTING TO AT LEAST EQUAL THE FOOTING LENGTH.
   PERPENDICULAR TO THE CREEK (SHOWN IN THIS DETAIL).
   ALL DREDGED BANKS MUST BE RAAPED.
   FROM REGULATORY AGENCIES TO STANDARDS CREEK STANDARDS
   INSTALLATION OF THE PIER. APPROVAL MAY BE REQUIRED.
Plan View

Notes:
1. Footing may be poured with concrete for leveling.
2. Footing thickness.
3. Clear.
4. #8 bars grouped in 2" dia. holes.

Material:
- #8 bars (typical)

Details:
- Concrete shall be 4000 psi minimum.
- Same as base thickness of pier.
- Minimum thickness of footing above rock to be inserted between rock. Must be level on top of rock.
- Footing details in detail no. 1 and 7 for rock.
- This detail specifies how to the footings to normal footing thickness.
PIECE STRAPS FOR PIER

NOTES:

1. ANCHOR BOLTS AND STRAPS SHALL BE GALVANIZED AND HOT ASPHALT DIPPED.

2. GALVANIZED STEEL OR IRON CAN BE USED.

3. PROVIDE WASHERS UNDER STRAP SUCH THAT HOLES TO BE DRILLED IN STRAP.

4. AND 1/16" Dia. Hole in Strap.

5. PIPE IS PULLED DOWN TIGHT.

PLAN

ELEVATION

1.3/16" (TP)

1/2"

3/4" Dia. Bolt

3/4" Dia. Bolt

1/2"

4"