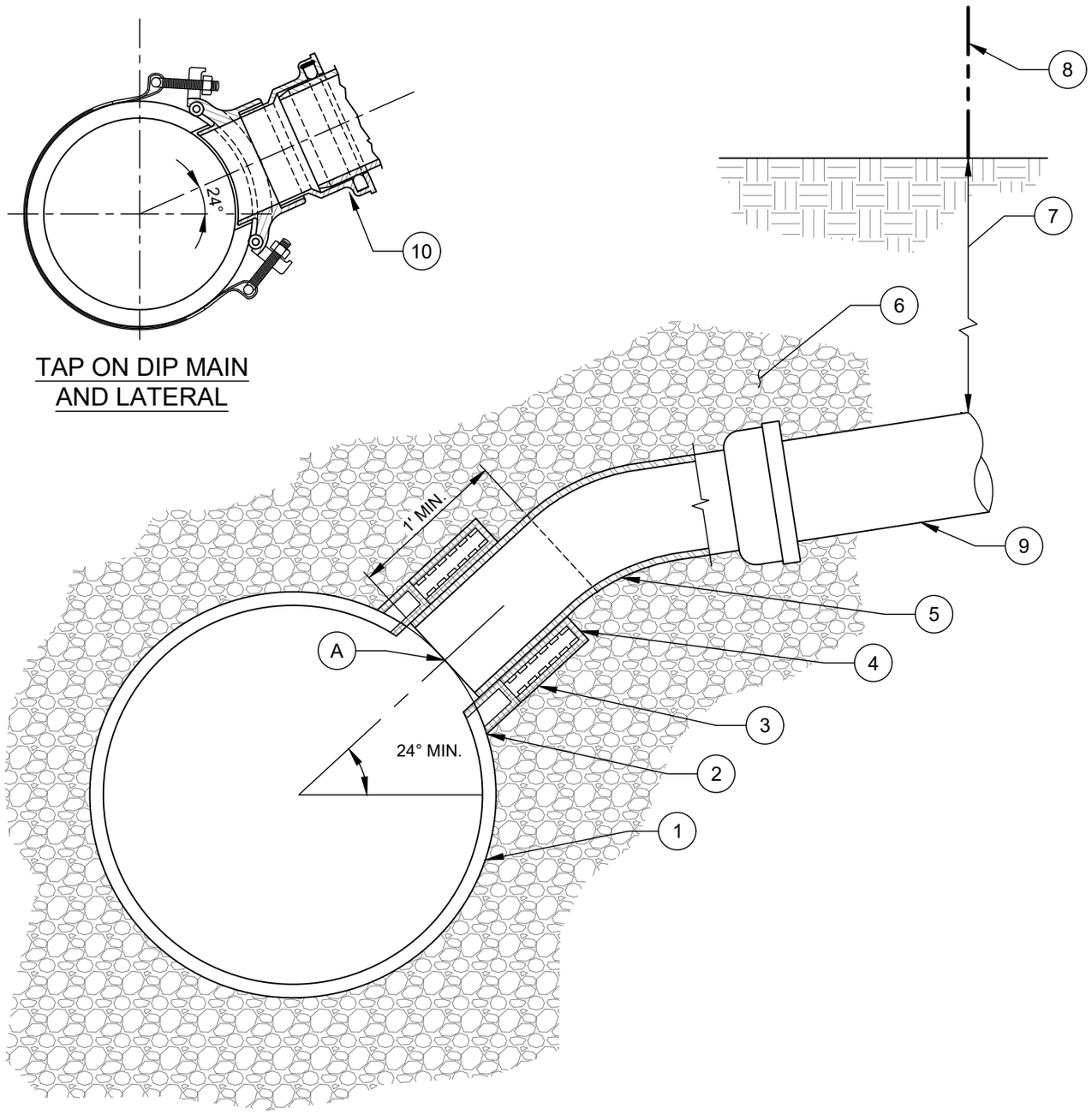


TAP ON DIP MAIN
AND LATERAL

NO.	DESCRIPTION:
1.	EXISTING SEWER MAIN - VCP, PVC, DIP, FRP, OR CONCRETE, ETC.
2.	EPOXY SEALANT AS RECOMMENDED BY TAP SADDLE MANUFACTURER.
3.	SEWER TAP SADDLE AS MANUFACTURED BY PREDCO OR OTHER MANUFACTURERS AS LISTED IN SPECIFICATIONS.
4.	COMPRESSION JOINT SEALER.
5.	22-1/2° BEND (SPIGOT X SLIP JOINT BELL) (C900 DR18 PVC).
6.	#57 STONE BEDDING.
7.	MINIMUM DEPTH OF COVER AT PROPERTY LINE SHALL BE 4'. UNLESS GREATER DEPTH IS REQUIRED TO SERVE THE BUILDING. MINIMUM DEPTH AT SIDE DITCH SHALL BE 2.5'.
8.	PROPERTY LINE, ROAD R/W OR CLTW EASEMENT LINE.
9.	MIN. SLOPE SHALL BE 1.5% FOR 4" PIPE AND 1.25% FOR 6" PIPE.
10.	FOR 4" AND 6" DUCTILE IRON LATERAL, USE A SEALTITE TYPE F TEE SEWER SADDLE AS MANUFACTURED BY THE GENERAL ENGINEERING COMPANY, FREDERICK, MD TO FIT 6.275" TO 17.40" O.D. MAINS.

NOTES:

A. THE OPENING IN PIPE SHALL BE CUT WITH A TAP MACHINE OR HOLE SAW. TAPPING BIT SHALL BE DESIGNED FOR THE PIPE MATERIAL BEING CUT AND ALSO INCLUDE PILOT BIT AND SHELL CUTTER.

B. THE TAP SHALL BE MADE IN THE UPPER HALF OF THE PIPE AT 24° (MIN.) FROM THE HORIZONTAL.

C. TAP SIZE SHALL MATCH LATERAL SIZE. MAXIMUM SIZE TAP SHALL BE 4" OR 6" ONLY. 6" TAPS SHALL BE USED ON 10" AND LARGER MAINS ONLY.

D. TAPPING SADDLE & BEND TO BE FULLY ENCASED WITH #57 CRUSHED STONE.

E. C900 DR18 PVC LATERAL PIPE REQUIRE TYPE 3 GRANULAR BEDDING IF GROUND WATER, ROCK, OR UNSTABLE SOIL IS PRESENT.

F. MIN. CLEARANCE TO PIPE JOINT ON MAIN SHALL BE 1'.

G. THE LATERAL SHALL BE INSTALLED PERPENDICULAR TO THE MAIN.

H. IF THE LATERAL HAS LESS THAN 3' OF COVER, THE LATERAL MUST BE DIP.

I. MIN. DISTANCE BETWEEN SERVICE TAPS SHALL BE 7' CENTER TO CENTER.

J. TRACER WIRE INSTALLED PER CLTW TRACER WIRE DETAIL AS APPLICABLE.

K. MIN. DISTANCE FROM SERVICE TAP TO MANHOLE SHALL BE 7'.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

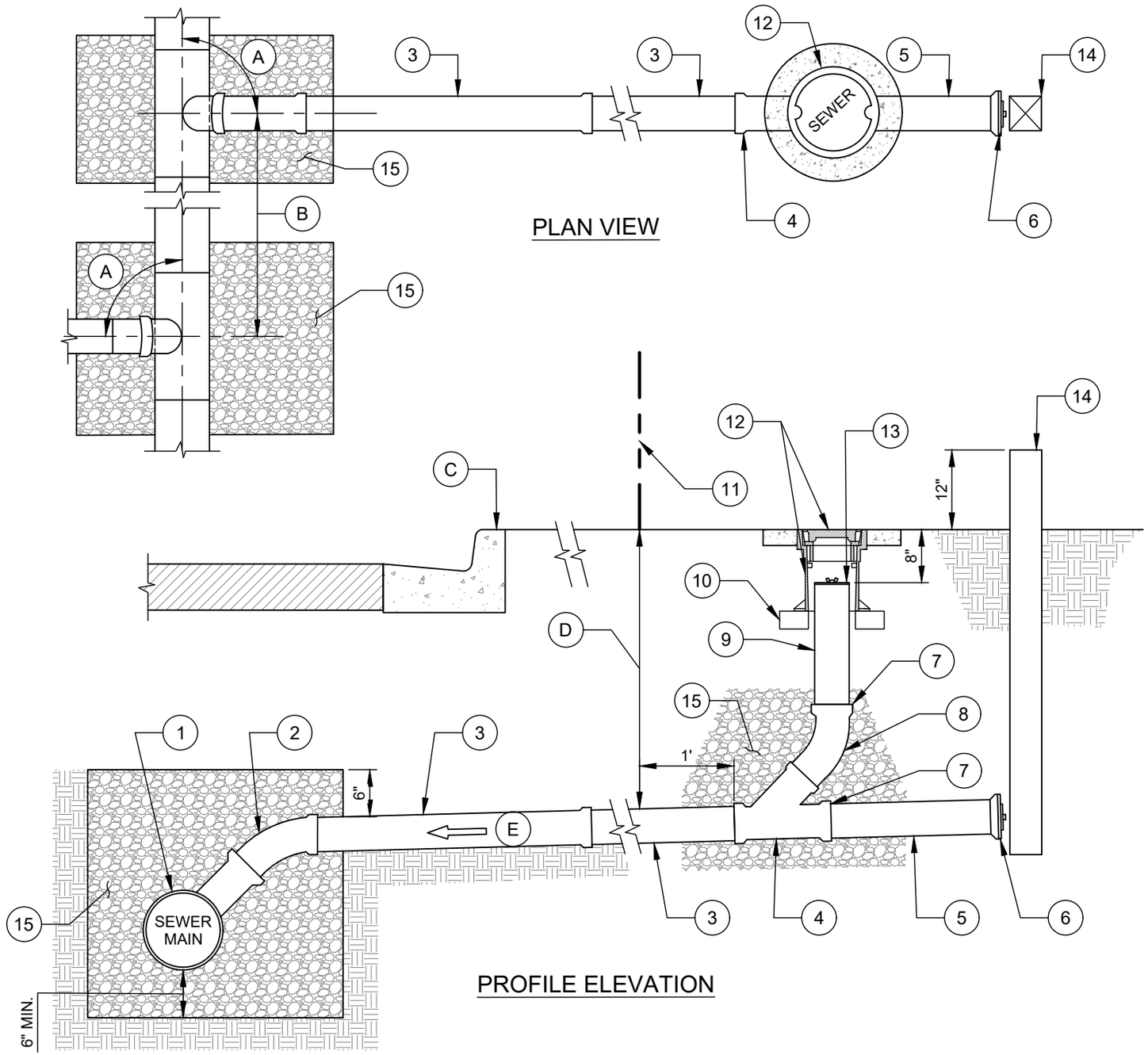
4" AND 6" LATERAL SADDLE TAPS ON EXISTING SEWER MAIN

NO SCALE

VERSION
1.0

DATE
04/2024

DETAIL
11.1.1



NO. DESCRIPTION:

1. RUN x 4" OR 6" ALL BELL TEE (C900 DR18 PVC OR DIP).
2. 22 1/2° OR 45° BEND - SPIGOT X BELL - (C900 DR18 PVC OR DIP).
3. C900 DR18 PVC/PIPE OR DIP.
4. 4" X 4" X 4" OR 6" X 6" X 6" 45° ALL BELL WYE (C900 DR18 PVC).
5. 4" OR 6" PVC PIPE TAILPIECE (SCH 40 PVC - LL + 36" MIN.).
6. TEST-KAP OR END-CAP TEST CAP BY CHERNE INDUSTRIES OR APPROVED EQUAL. SCH 40 GLUE ON CAP.
7. IPS (SCH 40) TRANSITION GASKET.
8. 4" OR 6" SXB 45° BEND (C900 DR18 PVC).
9. 4" OR 6" SCH 40 PVC VERTICAL STANDPIPE.
10. 2 STANDARD CONCRETE BRICKS.
11. PROPERTY LINE, ROAD R/W OR CLTW EASEMENT LINE.
12. SEWER VALVE BOX TOP SECTION, SEWER COVER, AND CONCRETE PAD. PAINT COVER WITH 2 COATS EPOXY ENAMEL-GREEN. FOR 6" CLEANOUTS, VALVE BOX TO BE REPLACED WITH US FOUNDRY MODEL 7610 COVER, EJ CORP #1570Z, OR APPROVED EQUAL.
13. GRIPPER (END OF PIPE- TYPE) PLUG SHALL BE SCH 40 FIPT ADAPTER WITH SCREW CAP.
14. 4" X 4" PRESSURE TREATED LUMBER POST.
15. #57 STONE EMBEDMENT.

NOTES:

A. SEWER CONNECTION SHALL BE CONSTRUCTED 90° TO MAIN (ANGLED CONNECTIONS NOT PERMITTED) AND SHALL TYPICALLY BE PERPENDICULAR TO ROADWAY.

B. MINIMUM SPACING BETWEEN CONNECTIONS SHALL BE 7'.

C. CUT LETTER "S" IN CURB WHERE PIPE CROSSING UNDER CURB AND PAINT WITH GREEN PAINT. IF NO CURB, PAINT LETTER "S" IN PAVEMENT.

D. MINIMUM DEPTH OF COVER AT PROPERTY LINE SHALL BE 4'. UNLESS GREATER DEPTH IS REQUIRED TO SERVE THE BUILDING. MINIMUM DEPTH AT SIDE DITCH SHALL BE 2.5'.

E. MINIMUM SLOPE SHALL BE 1.5% FOR 4" PIPE AND 1.25% FOR 6" PIPE.

F. ALL FITTINGS 12" AND SMALLER SHALL BE MOLDED FITTINGS. FITTINGS LARGER THAN 12" MAY BE MOLDED OR FABRICATED PVC.

G. TYPE 3 GRANULAR BEDDING REQUIRED IF GROUNDWATER, ROCK, OR UNSTABLE SOIL IS ENCOUNTERED.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

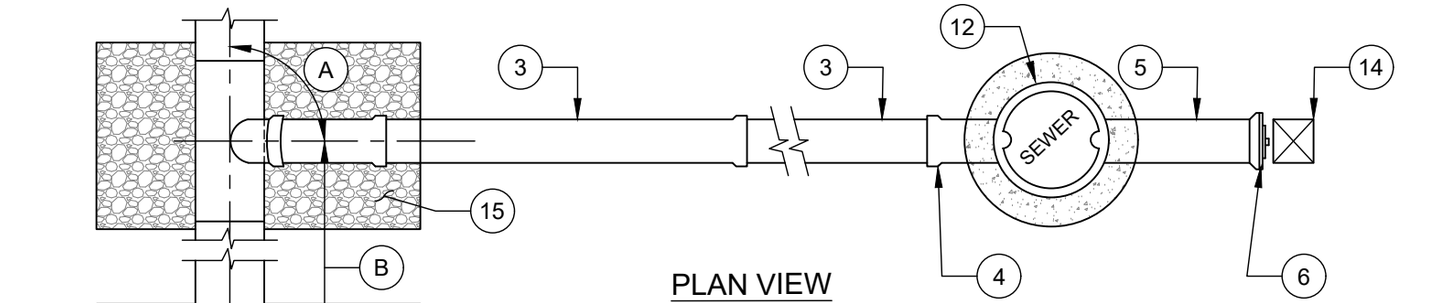
4" AND 6" SERVICE LATERAL TEE ON NEW 8" AND LARGER DR 25 PVC SEWER MAIN

NO SCALE

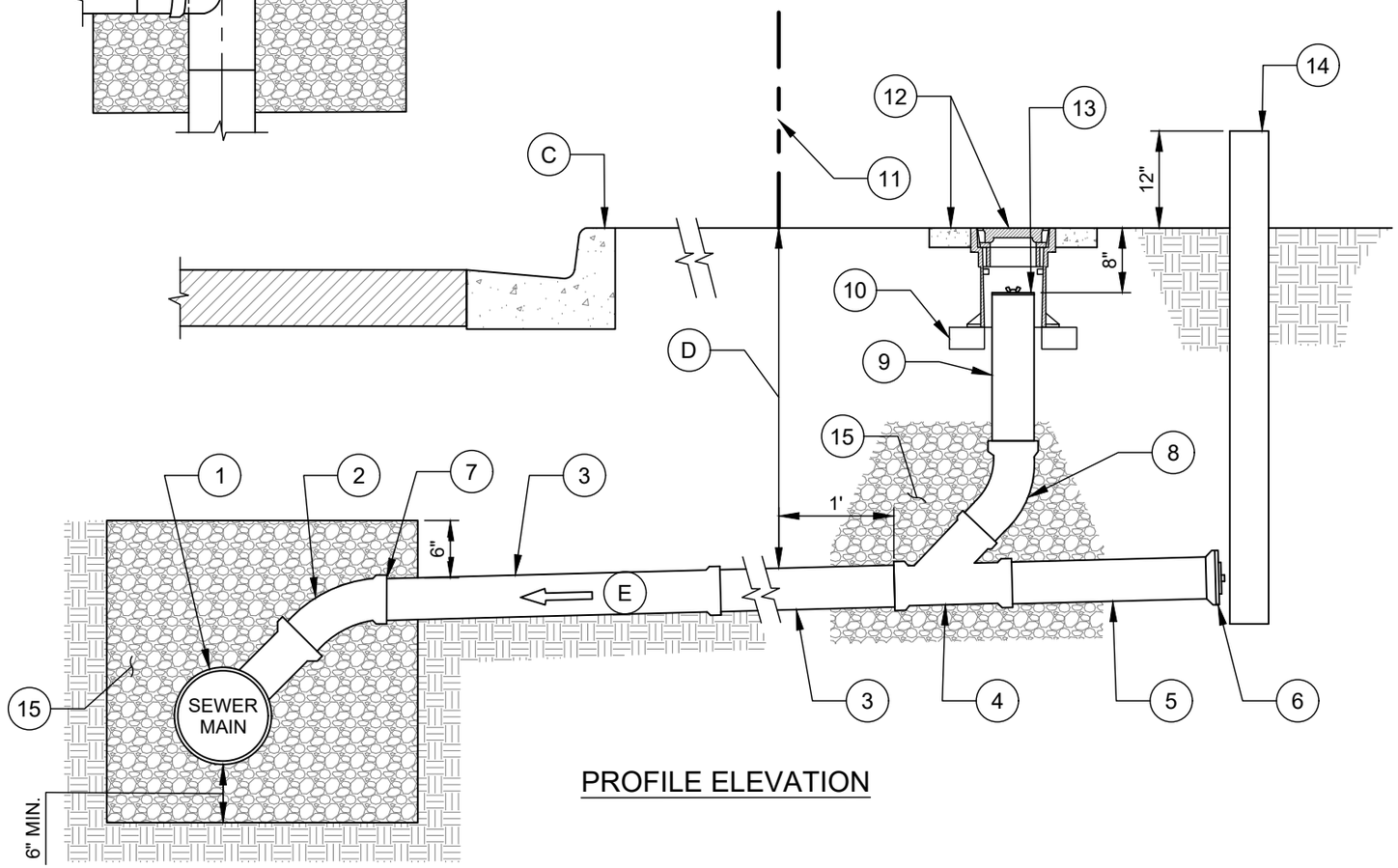
VERSION 1.0

DATE 04/2024

DETAIL 11.1.2



PLAN VIEW



PROFILE ELEVATION

NO.	DESCRIPTION:
1.	8" RUN x 4" OR 6" ALL BELL TEE (SDR 26 PVC OR DIP).
2.	22 1/2° OR 45° BEND - SPIGOT X BELL - (SDR 26 PVC OR DIP).
3.	SOLID WALL SCH 40 PVC/PIPE OR DIP.
4.	4" X 4" X 4" OR 6" X 6" X 6" 45° ALL BELL WYE (SCH 40 PVC).
5.	4" OR 6" PVC PIPE TAILPIECE (SCH 40 PVC - LL + 36" MIN.).
6.	TEST-KAP OR END-CAP TEST CAP BY CHERNE INDUSTRIES OR APPROVED EQUAL. SCH 40 GLUE ON CAP.
7.	IPS (SCH 40) TRANSITION GASKET.
8.	4" OR 6" SXB 45° BEND (SCH 40 PVC).
9.	4" OR 6" SCH 40 PVC VERTICAL STANDPIPE.
10.	2 STANDARD CONCRETE BRICKS.
11.	PROPERTY LINE, ROAD R/W OR CLTW EASEMENT LINE.
12.	SEWER VALVE BOX TOP SECTION, SEWER COVER, AND CONCRETE PAD. PAINT COVER WITH 2 COATS EPOXY ENAMEL-GREEN. FOR 6" CLEANOUTS, VALVE BOX TO BE REPLACED WITH US FOUNDRY MODEL 7610 COVER, EJ CORP #1570Z, OR APPROVED EQUAL.
13.	GRIPPER (END OF PIPE- TYPE) PLUG SHALL BE SCH 40 FIPT ADAPTER WITH SCREW CAP.
14.	4" X 4" PRESSURE TREATED LUMBER POST.
15.	#57 STONE EMBEDMENT.

NOTES:

A. SEWER CONNECTION SHALL BE CONSTRUCTED 90° TO MAIN (ANGLED CONNECTIONS NOT PERMITTED) AND SHALL TYPICALLY BE PERPENDICULAR TO ROADWAY.

B. MINIMUM SPACING BETWEEN CONNECTIONS SHALL BE 7'.

C. CUT LETTER "S" IN CURB WHERE PIPE CROSSING UNDER CURB AND PAINT WITH GREEN PAINT. IF NO CURB, PAINT LETTER "S" IN PAVEMENT.

D. MINIMUM DEPTH OF COVER AT PROPERTY LINE SHALL BE 4'. UNLESS GREATER DEPTH IS REQUIRED TO SERVE THE BUILDING. MINIMUM DEPTH AT SIDE DITCH SHALL BE 2.5'.

E. MINIMUM SLOPE SHALL BE 1.5% FOR 4" PIPE AND 1.25% FOR 6" PIPE.

F. ALL FITTINGS SHALL BE MOLDED FITTINGS.

G. TYPE 3 GRANULAR BEDDING REQUIRED IF GROUNDWATER, ROCK, OR UNSTABLE SOIL IS ENCOUNTERED.

H. THIS STANDARD DETAIL IS FOR USE ON DEVELOPER INSTALLED GRAVITY SEWER PROJECTS ONLY.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

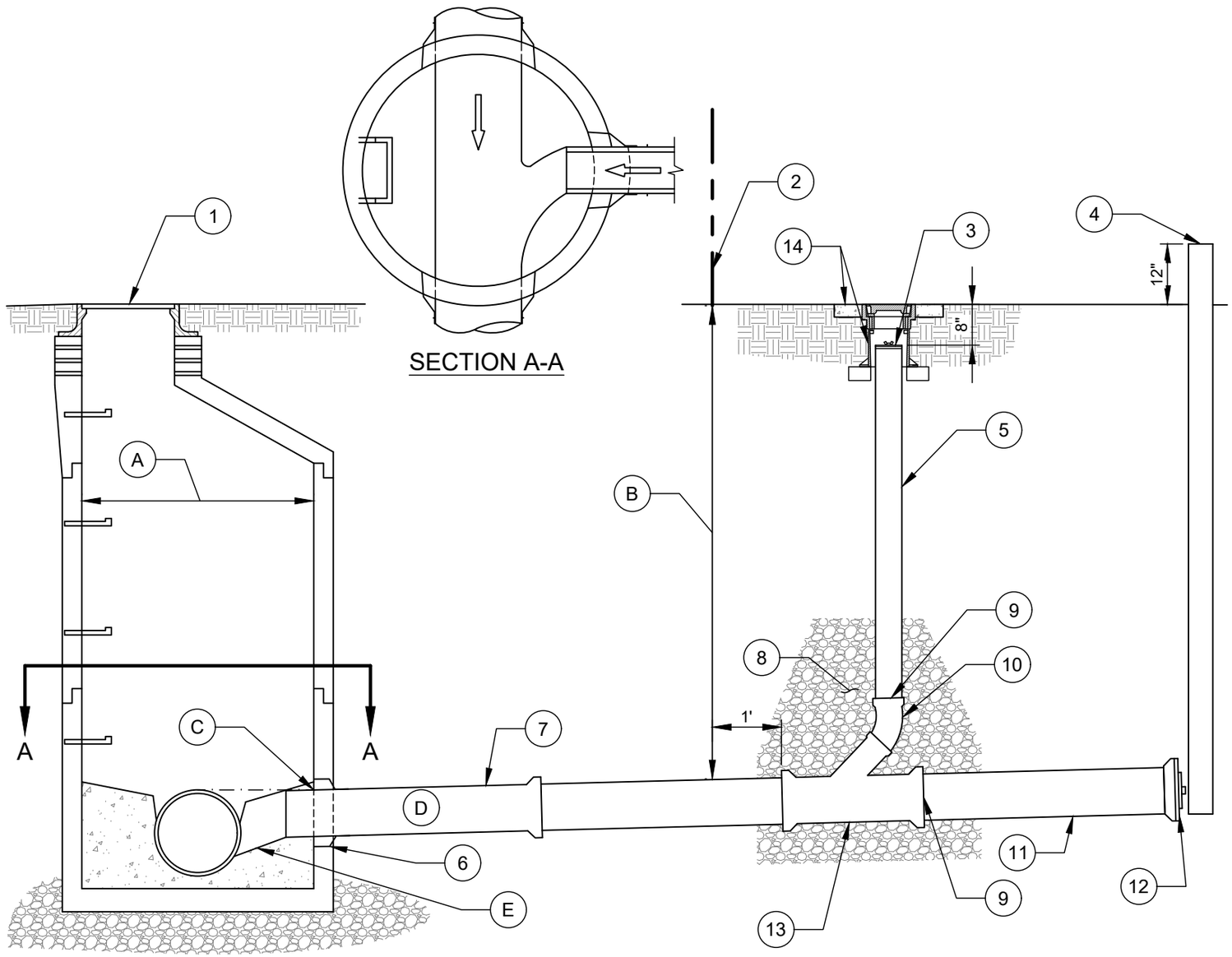
4" AND 6" SERVICE LATERAL TEE ON NEW 8" SDR 26 PVC SEWER MAIN

NO SCALE

VERSION 1.0

DATE 04/2024

DETAIL 11.1.3



NO. DESCRIPTION:

1. EXISTING OR PROPOSED MANHOLE CLTW STANDARD CAST IRON FRAME AND COVER.
2. PROPERTY LINE, ROAD R/W OR CLTW EASEMENT LINE.
3. GRIPPER (END OF PIPE- TYPE) PLUG SHALL BE SCH 40 FIPT ADAPTER WITH SCREW CAP.
4. 4" X 4" PRESSURE TREATED LUMBER POST.
5. 4" OR 6" SCH 40 PVC VERTICAL STANDPIPE.
6. MANHOLE/PIPE BOOT ON PRECAST MANHOLES AND CONCRETE COLLARS ON BRICK OR BLOCK MANHOLES.
7. 4" OR 6" DIP, OR 4" OR 6" DR 18 PVCP.
8. #57 STONE EMBEDMENT.
9. IPS (SCH 40 PVC) TRANSITION GASKET.
10. 4" OR 6" SXB 45° BEND (C900 DR18 PVC).
11. 4" OR 6" PVC PIPE TAILPIECE (SCH 40 PVC - LL + 36" MIN.).
12. TEST-KAP OR END-CAP TEST CAP BY CHERNE INDUSTRIES OR APPROVED EQUAL. SCH 40 GLUE ON CAP.
13. 4" X 4" X 4" OR 6" X 6" X 6" 45° ALL BELL WYE (C900 DR18 PVC).
14. VALVE BOX ASSEMBLY (TYP.). FOR 6" CLEANOUTS AND CONCRETE PAD, VALVE BOX TO BE REPLACED WITH US FOUNDRY MODEL 7610 COVER, EJ CORP #1570Z, OR APPROVED EQUAL.

NOTES:

A. 4' MIN. DIAMETER (5' MIN. DIAMETER FOR INSIDE DROP).

B. MINIMUM DEPTH OF COVER AT PROPERTY LINE SHALL BE 4'. UNLESS GREATER DEPTH IS REQUIRED TO SERVE THE BUILDING. MINIMUM DEPTH AT SIDE DITCH SHALL BE 2.5'.

C. MATCH CROWNS UNLESS THE LATERAL IS THE SAME DIAMETER AS THE MAIN LINE PIPE. THEN A DROP OF 0.2" BETWEEN INVERTS WILL BE PROVIDED.

D. MINIMUM PIPE SLOPES: 4" PIPE IS 1.50% AND 6" PIPE IS 1.25%. MAXIMUM SLOPE FOR ALL PIPE SHALL BE 10%.

E. CONCRETE THROUGH TO BE CUT TO DIRECT FLOW FROM PIPE CONNECTION TO EFFLUENT PIPE.

F. TRACER WIRE INSTALLED PER CLTW TRACER WIRE DETAIL AS APPLICABLE.

G. CUT LETTER "S" IN CURB WHERE PIPE CROSSING UNDER CURB AND PAINT WITH GREEN PAINT. IF NO CURB , PAINT "S" IN PVMT.

H. TYPE 3 GRANULAR BEDDING REQUIRED IF GROUNDWATER, ROCK, OR UNSTABLE SOIL IS ENCOUNTERED.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

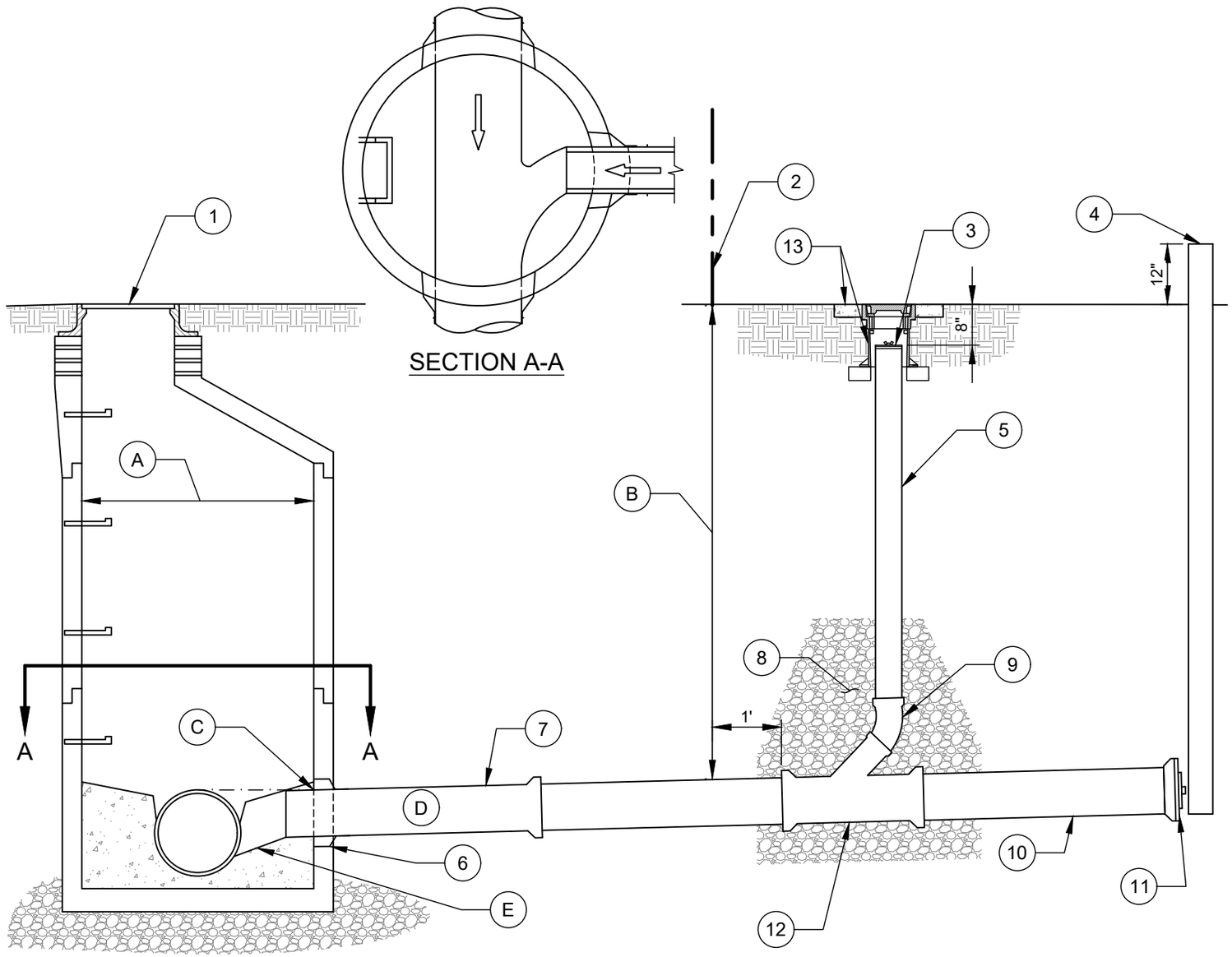
4" AND 6" SANITARY SEWER LATERAL CONNECTIONS TO MANHOLES - ON DR 25 PVC SEWER MAINS

NO SCALE

VERSION
1.0

DATE
04/2024

DETAIL
11.1.4



NO. DESCRIPTION:

1. EXISTING OR PROPOSED MANHOLE CLTW STANDARD CAST IRON FRAME AND COVER.
2. PROPERTY LINE, ROAD R/W OR CLTW EASEMENT LINE.
3. GRIPPER (END OF PIPE- TYPE) PLUG SHALL BE SCH 40 FIPT ADAPTER WITH SCREW CAP.
4. 4" X 4" PRESSURE TREATED LUMBER POST.
5. 4" OR 6" SCH 40 PVC VERTICAL STANDPIPE.
6. MANHOLE/PIPE BOOT ON PRECAST MANHOLES AND CONCRETE COLLARS ON BRICK OR BLOCK MANHOLES.
7. 4" OR 6" DIP, OR 4" OR 6" SCH 40 SOLID WALL PVC PIPE.
8. #57 STONE EMBEDMENT.
9. 4" OR 6" SXB 45° BEND (SCH 40 PVC).
10. 4" OR 6" PVC PIPE TAILPIECE (SCH 40 PVC - LL + 36" MIN.).
11. TEST-KAP OR END-CAP TEST CAP BY CHERNE INDUSTRIES OR APPROVED EQUAL. SCH 40 GLUE ON CAP.
12. 4" X 4" X 4" OR 6" X 6" X 6" 45° ALL BELL WYE (SCH 40 PVC).
13. VALVE BOX ASSEMBLY (TYP.). FOR 6" CLEANOUTS AND CONCRETE PAD, VALVE BOX TO BE REPLACED WITH US FOUNDRY MODEL 7610 COVER, EJ CORP #1570Z, OR APPROVED EQUAL.

NOTES:

A. 4' MIN. DIAMETER (5' MIN. DIAMETER FOR INSIDE DROP).

B. MINIMUM DEPTH OF COVER AT PROPERTY LINE SHALL BE 4'. UNLESS GREATER DEPTH IS REQUIRED TO SERVE THE BUILDING. MINIMUM DEPTH AT SIDE DITCH SHALL BE 2.5'.

C. MATCH CROWNS UNLESS THE LATERAL IS THE SAME DIAMETER AS THE MAIN LINE PIPE. THEN A DROP OF 0.2" BETWEEN INVERTS WILL BE PROVIDED.

D. MINIMUM PIPE SLOPES: 4" PIPE IS 1.50% AND 6" PIPE IS 1.25%. MAXIMUM SLOPE FOR ALL PIPE SHALL BE 10%.

E. CONCRETE THROUGH TO BE CUT TO DIRECT FLOW FROM PIPE CONNECTION TO EFFLUENT PIPE.

F. TRACER WIRE INSTALLED PER CLTW TRACER WIRE DETAIL AS APPLICABLE.

G. CUT LETTER "S" IN CURB WHERE PIPE CROSSING UNDER CURB AND PAINT WITH GREEN PAINT. IF NO CURB , PAINT "S" IN PVMT.

H. TYPE 3 GRANULAR BEDDING REQUIRED IF GROUNDWATER, ROCK, OR UNSTABLE SOIL IS ENCOUNTERED.

I. THIS STANDARD DETAIL IS FOR USE ON DEVELOPER INSTALLED GRAVITY SEWER PROJECTS ONLY.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

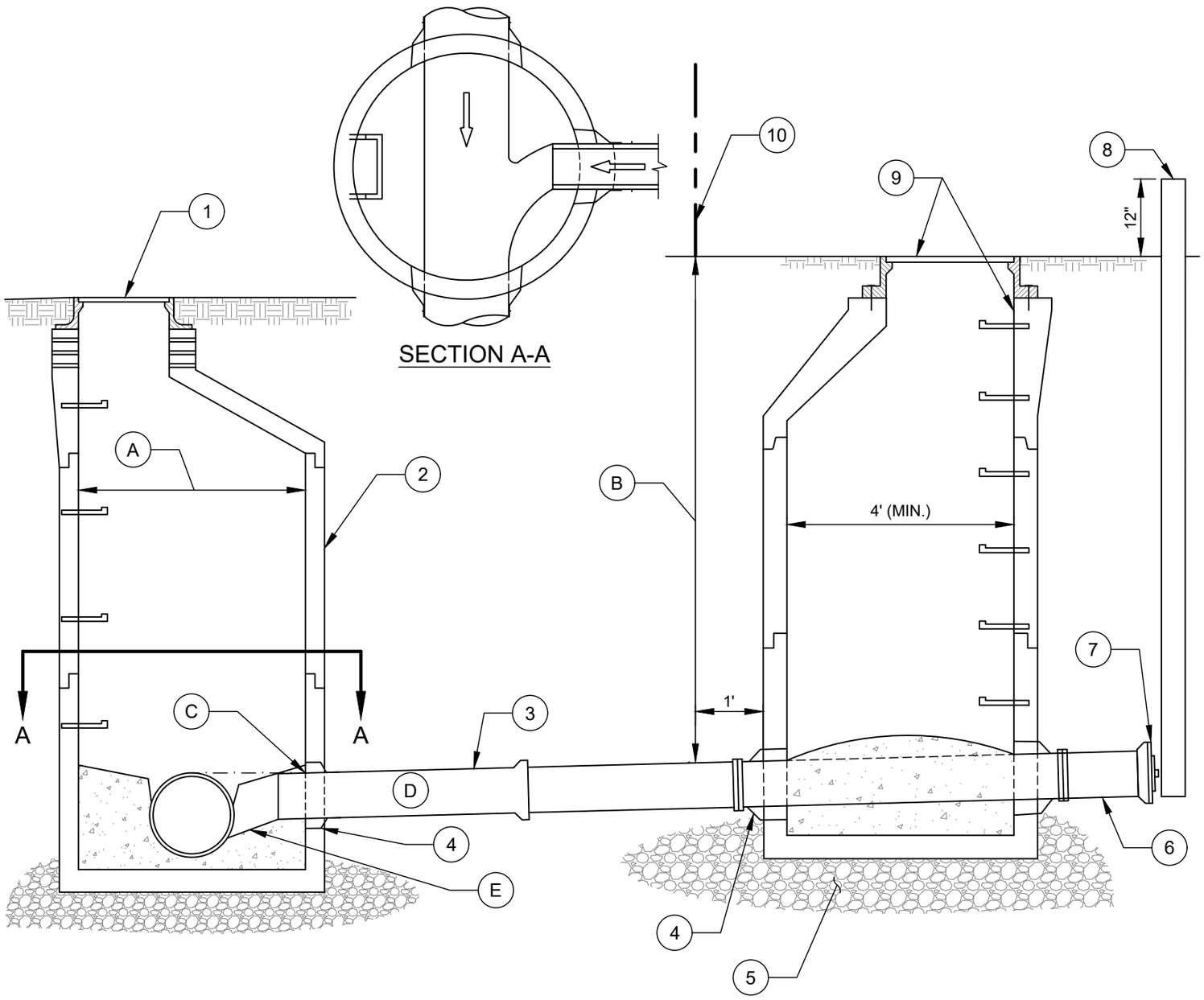
4" AND 6" SANITARY SEWER LATERAL CONNECTIONS TO MANHOLES - ON 8" SDR 26 PVC SEWER MAINS ONLY

NO SCALE

VERSION 1.0

DATE 04/2024

DETAIL 11.1.5



NO. DESCRIPTION:

1. EXISTING OR PROPOSED MANHOLE CLTW STANDARD CAST IRON FRAME AND COVER.
2. MANHOLE ASSEMBLY (TYP.). REFER TO APPROPRIATE CLTW STD. DETAIL.
3. 8"-16" DR 25 PVCP OR DUCTILE IRON PIPE. 8" SDR 26 SOLID WALL PVC PIPE ALLOWED ONLY WHEN THE NEW MAIN IS ALSO 8" SDR 26 PVC PIPE.
4. MANHOLE/PIPE BOOT ON PRECAST MANHOLES AND CONCRETE COLLARS ON BRICK OR BLOCK MANHOLES.
5. #57 STONE EMBEDMENT.
6. PVC PIPE TAILPIECE (SCH 40 PVC - LL + 36" MIN.).
7. TEST-KAP OR END-CAP TEST CAP BY CHERNE INDUSTRIES OR APPROVED EQUAL. SCH 40 GLUE ON CAP.
8. 4" X 4" PRESSURE TREATED LUMBER POST.
9. PRIVATE MANHOLE ASSEMBLY WHERE PRIVATE MANHOLE FRAME AND COVER SHALL NOT BE INTERCHANGEABLE WITH CLTW FRAME AND COVERS.
10. PROPERTY LINE, ROAD R/W OR CLTW EASEMENT LINE.

NOTES:

A. 4' MIN. DIAMETER (5'-0" MIN. DIAMETER FOR INSIDE DROP).

B. MINIMUM DEPTH OF COVER AT PROPERTY LINE SHALL BE 4'. UNLESS GREATER DEPTH IS REQUIRED TO SERVE THE BUILDING. MINIMUM DEPTH AT SIDE DITCH SHALL BE 2.5'.

C. MATCH CROWNS UNLESS THE LATERAL IS THE SAME DIAMETER AS THE MAIN LINE PIPE. THEN A DROP OF 0.2' BETWEEN INVERTS WILL BE PROVIDED.

D. MINIMUM PIPE SLOPES: 8" PIPE IS 0.60%, 10" PIPE IS 0.35%, 12" PIPE IS 0.28%, AND 16" PIPE IS 0.18%. MAXIMUM SLOPE FOR ALL PIPE SHALL BE 10%.

E. CONCRETE THROUGH TO BE CUT TO DIRECT FLOW FROM PIPE CONNECTION TO EFFLUENT PIPE.

F. TRACER WIRE INSTALLED PER CLTW TRACER WIRE DETAIL AS APPLICABLE.

G. CLEANOUTS NOT PERMITTED ON 8" AND LARGER PIPE.

H. CUT LETTER "S" IN CURB WHERE PIPE CROSSING UNDER CURB AND PAINT WITH GREEN PAINT. IF NO CURB , PAINT "S" IN PVMT.

I. TYPE 3 GRANULAR BEDDING REQUIRED.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

8" AND LARGER SANITARY SEWER LATERAL CONNECTIONS TO MANHOLES

NO SCALE

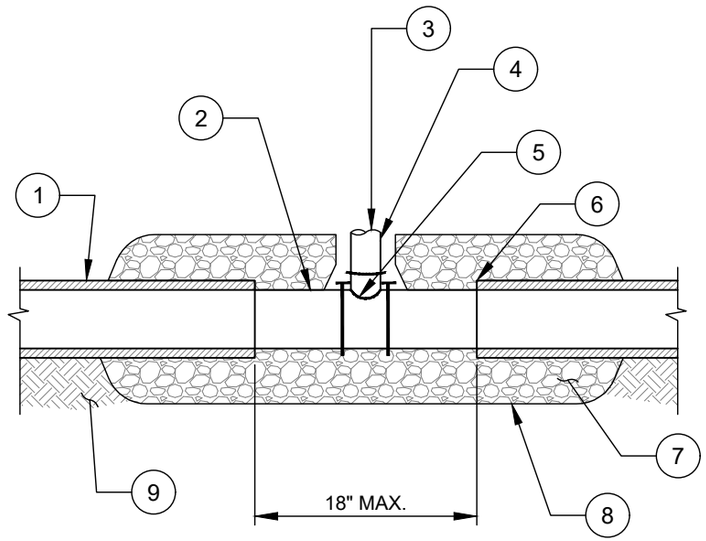
VERSION 1.0

DATE 04/2024

DETAIL 11.1.6

MANUFACTURER:

ROMAC INDUSTRIES, INC. ROMAC "CB" STRAP-ON SADDLE OR APPROVED EQUAL



PLAN

NO.	DESCRIPTION:
1.	EXISTING SEWER MAIN.
2.	CURED-IN-PLACE PIPE LINING (CIPP). SEE NOTE A.
3.	INSTALL NEW SERVICE LATERAL TO LIMITS SPECIFIED.
4.	STRAP-ON SADDLE. SEE NOTES A AND C.
5.	CORE HOLE IN EXISTING CIPP. SEE NOTES A AND D.
6.	CUT EXISTING SEWER. SEE NOTE B.
7.	#57 STONE ALL AROUND (MIN. 8" ABOVE AND BELOW PIPE).
8.	EXCAVATE BELOW THE EXISTING SEWER TO COMPLETE THE WORK. SEE NOTE F.
9.	UNDISTURBED EARTH.

NOTES:

A. REFER TO THIS DETAIL TO CONNECT NEW SERVICE LATERALS AFTER THE SEWERS HAVE BEEN LINED WITH CIPP. THIS DETAIL SHALL ALSO BE USED WHEN RECONNECTING SERVICES FOLLOWING PIPE BURSTING. IN THAT SITUATION, ALL REFERENCES TO CIPP IN THIS DETAIL SHALL BE HDPE. ELECTROFUSE SADDLE MAY BE USED AS AN ALTERNATE TO THE ROMAC SADDLE.

B. NEATLY CUT THE EXISTING SEWER WITH A CUTTER SPECIFICALLY DESIGNED FOR CUTTING THAT SPECIFIC PIPE MATERIAL TO EXPOSE THE CIPP. FOR VCP AND CONCRETE SEWERS, USE A CHAIN CUTTER TO NEATLY SCORE THE PIPE AND THEN BREAK THE PIPE AWAY. REGARDLESS OF THE CUTTER USED, USE EXTREME CAUTION TO PREVENT DAMAGE TO THE CIPP. REPAIR ANY DAMAGE AS APPROVED BY THE ENGINEER.

C. ANY PROPOSED STRAP-ON SADDLE EQUAL SHALL BE SUBMITTED TO THE ENGINEER FOR REVIEW AND APPROVAL. SADDLE SHALL BE PROVIDED FOR THE SPECIFIC TYPE OF LATERAL PIPE BEING INSTALLED.

D. THE FOLLOWING IS APPLICABLE WHERE A LATERAL IS REPLACED WITH A NEW SERVICE (REPLACE-IN-PLACE). CAREFULLY REMOVE THE EXISTING LATERAL TO LIMIT DAMAGE TO THE CIPP, INCREASE THE OPENING IN THE CIPP AS NECESSARY AND TO PROVIDE A CIRCULAR OPENING, BRUSH THE CIPP IN THE OPENING SMOOTH TO REMOVE ALL BURRS, INSTALL STRAP-ON SADDLE, AND REPLACE LATERAL TO THE SPECIFIED LIMITS. WHERE POSSIBLE, IMPROVE THE CONFIGURATION OF THE CONNECTION. A SADDLE IS PREFERABLE TO A TEE.

E. IF THE CIPP IS DAMAGED FROM OVERCUTTING THE NEW SERVICE CONNECTION, THEN THE NEXT LARGER SIZE HOLE SHALL BE CUT AND A SERVICE SADDLE WITH A BELL REDUCER SHALL BE INSTALLED FOR CONNECTING BACK TO THE NEW SERVICE DIAMETER.

F. SUPPORT THE EXISTING SEWER DURING THE WORK AS NECESSARY.

G. DEFECTS IDENTIFIED FROM THE POST-CIPP CCTV INSPECTIONS SHALL BE REPAIRED BY THE CONTRACTOR TO THE SATISFACTION OF THE ENGINEER.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

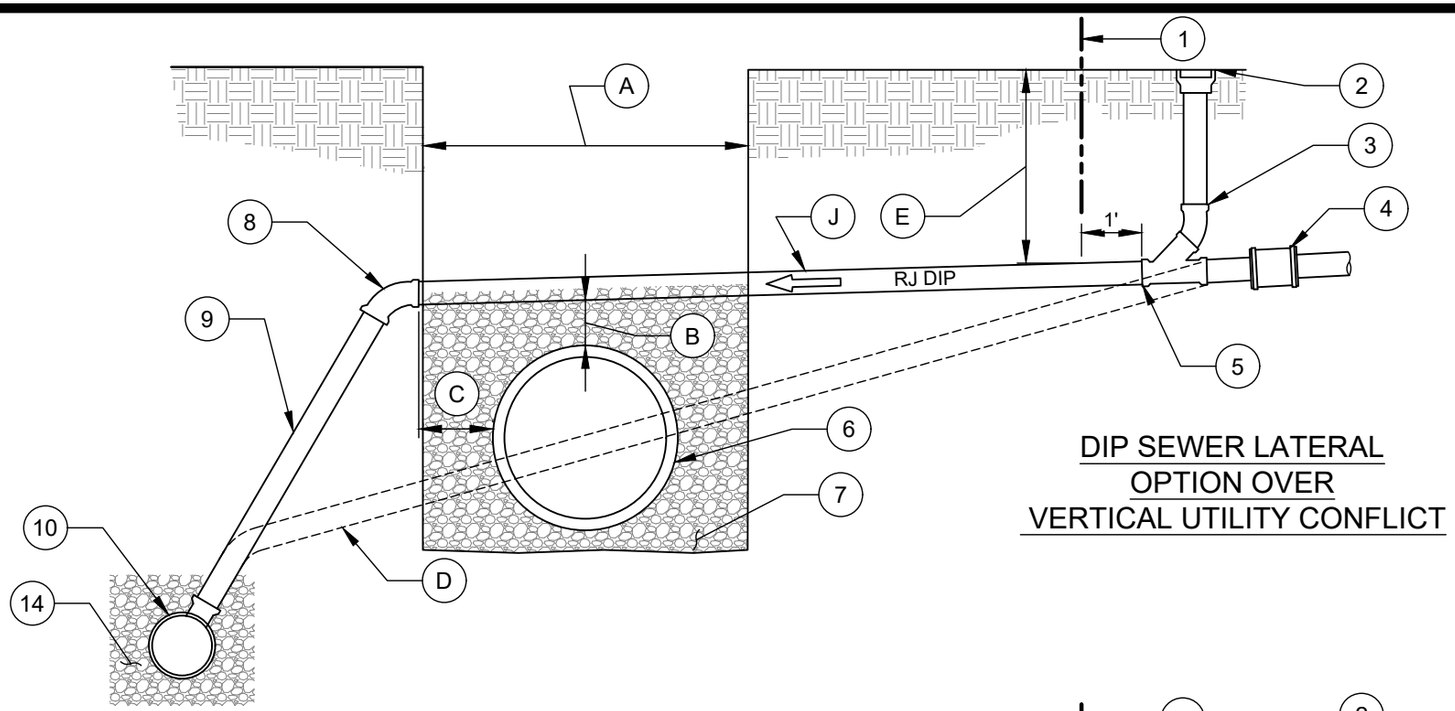
SERVICE LATERAL CONNECTING TO CURED-IN-PLACE PIPE LINING (CIPP)

NO SCALE

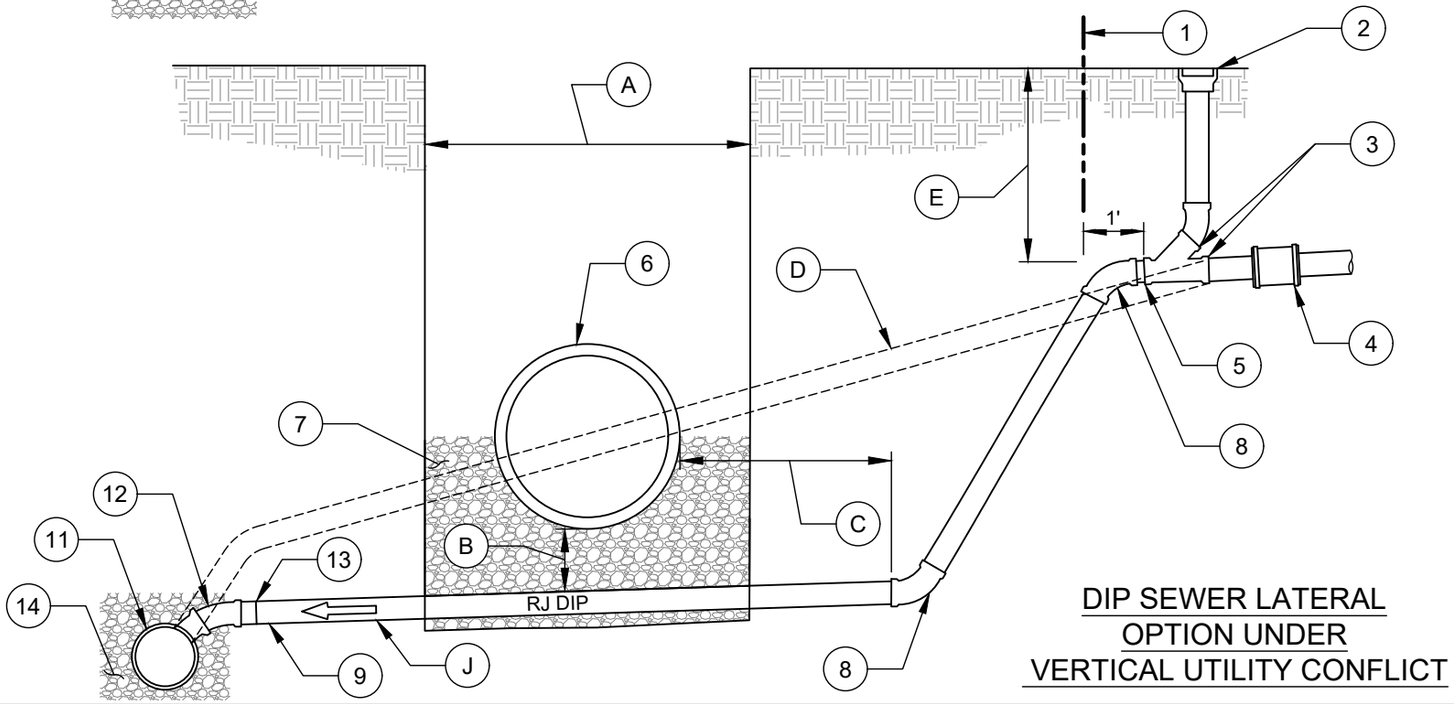
VERSION 1.0

DATE 04/2024

DETAIL 11.1.7



DIP SEWER LATERAL
OPTION OVER
VERTICAL UTILITY CONFLICT



DIP SEWER LATERAL
OPTION UNDER
VERTICAL UTILITY CONFLICT

NO.	DESCRIPTION:
1.	PROPERTY LINE, ROAD R/W OR CLTW EASEMENT LINE.
2.	CLEAN-OUT (SEE CLTW STD. DETAIL).
3.	IPS (SCH 40) TRANSITION GASKET.
4.	ADJUSTABLE REPAIR COUPLING.
5.	TRANSITION FROM DIP TO C900 DR 18 PVC.
6.	NEW UTILITY.
7.	TRENCH BACKFILL - TYPE #3 STONE BEDDING UNDER LOWER PIPE. UP TO SPRINGLINE OF UPPER PIPE.
8.	DUCTILE IRON BEND (45 OR 22.5 DEGREES). ALL BELL BENDS (TYP.).
9.	NEW RJ DIP SEWER LATERAL.
10.	DIP TEE.
11.	CONVENTIONAL TAP OR TEE.
12.	PVC BEND (45° OR 22.5°) (TYP.).
13.	TRANSITION FROM PVC TO DIP.
14.	BEDDING AND EMBEDMENT (WASHED STONE #57).

NOTES:

A. TRENCH FOR NEW CONSTRUCTION.

B. 12" MIN. VERTICAL CLEARANCE BETWEEN PIPES (O.D. TO O.D.). BACKFILL BETWEEN UTILITIES WITH #57 STONE.

C. BENDS 5' MINIMUM OFF OF UTILITY PIPE.

D. REMOVE EXISTING SEWER LATERAL.

E. MINIMUM DEPTH OF COVER AT PROPERTY LINE SHALL BE 4'. UNLESS GREATER DEPTH IS REQUIRED TO SERVE THE BUILDING. MINIMUM DEPTH AT SIDE DITCH SHALL BE 2.5'.

F. IF NEITHER OF THE OPTIONS SHOWN ARE FEASIBLE, THEN THE ELEVATION OF THE NEW FACILITY WILL NEED TO BE ADJUSTED AS REQUIRED.

G. CUMULATIVE BENDS FROM TEE TO CLEAN-OUT SHALL NOT EXCEED 90°.

H. INSTALL BENDS OUTSIDE OF TRENCH FOOTPRINT.

I. TYPE 3 GRANULAR BEDDING REQUIRED IF GROUNDWATER, ROCK, OR UNSTABLE SOIL IS ENCOUNTERED.

J. MINIMUM SLOPE SHALL BE 1.5% FOR 4" PIPE AND 1.25% FOR 6" PIPE.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

4" OR 6" D.I.P. LATERAL WITH BENDS DUE TO VERTICAL UTILITY CONFLICTS

NO SCALE

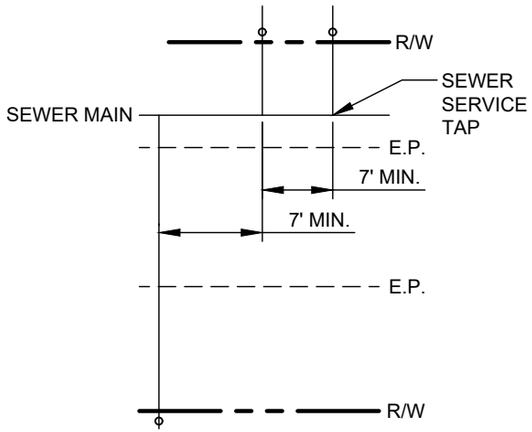
VERSION 1.0

DATE 04/2024

DETAIL 11.1.8

REQUIREMENT 1

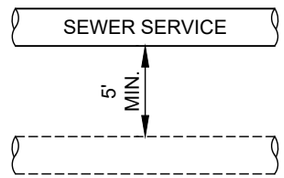
MINIMUM SPACING BETWEEN
SEWER TAPS: 7'



PLAN VIEW
(HORIZONTAL SEPARATION)

REQUIREMENT 2

MINIMUM SPACING BETWEEN SEWER SERVICES
AND PARALLEL STORM PIPES/CATCH BASINS: 5'

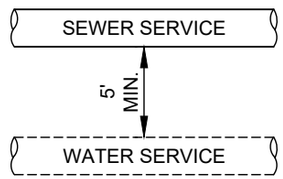


STORM SEWER, STORM WATER
FORCE MAIN, STORM CATCH BASIN

PLAN VIEW
(HORIZONTAL SEPARATION)

REQUIREMENT 3

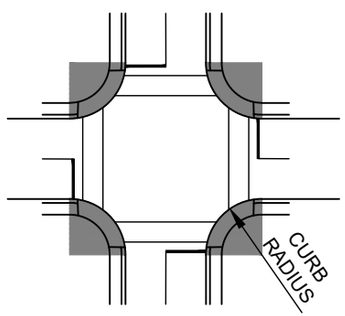
MINIMUM SPACING BETWEEN SEWER SERVICES
AND WATER SERVICES: 5'



PLAN VIEW
(HORIZONTAL SEPARATION)

REQUIREMENT 4

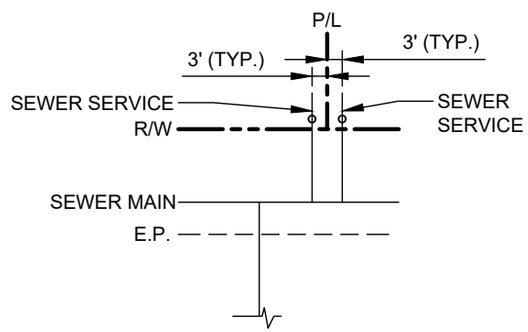
SEWER SERVICES PROHIBITED INSIDE CURB RADIUS
POINT OF PUBLIC AND PRIVATE ROAD INTERSECTIONS



PLAN VIEW

REQUIREMENT 5

MINIMUM CLEARANCE BETWEEN PROPERTY
LINE AND SEWER SERVICE: 3'



PLAN VIEW
(HORIZONTAL SEPARATION)

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS

GRAVITY SEWER

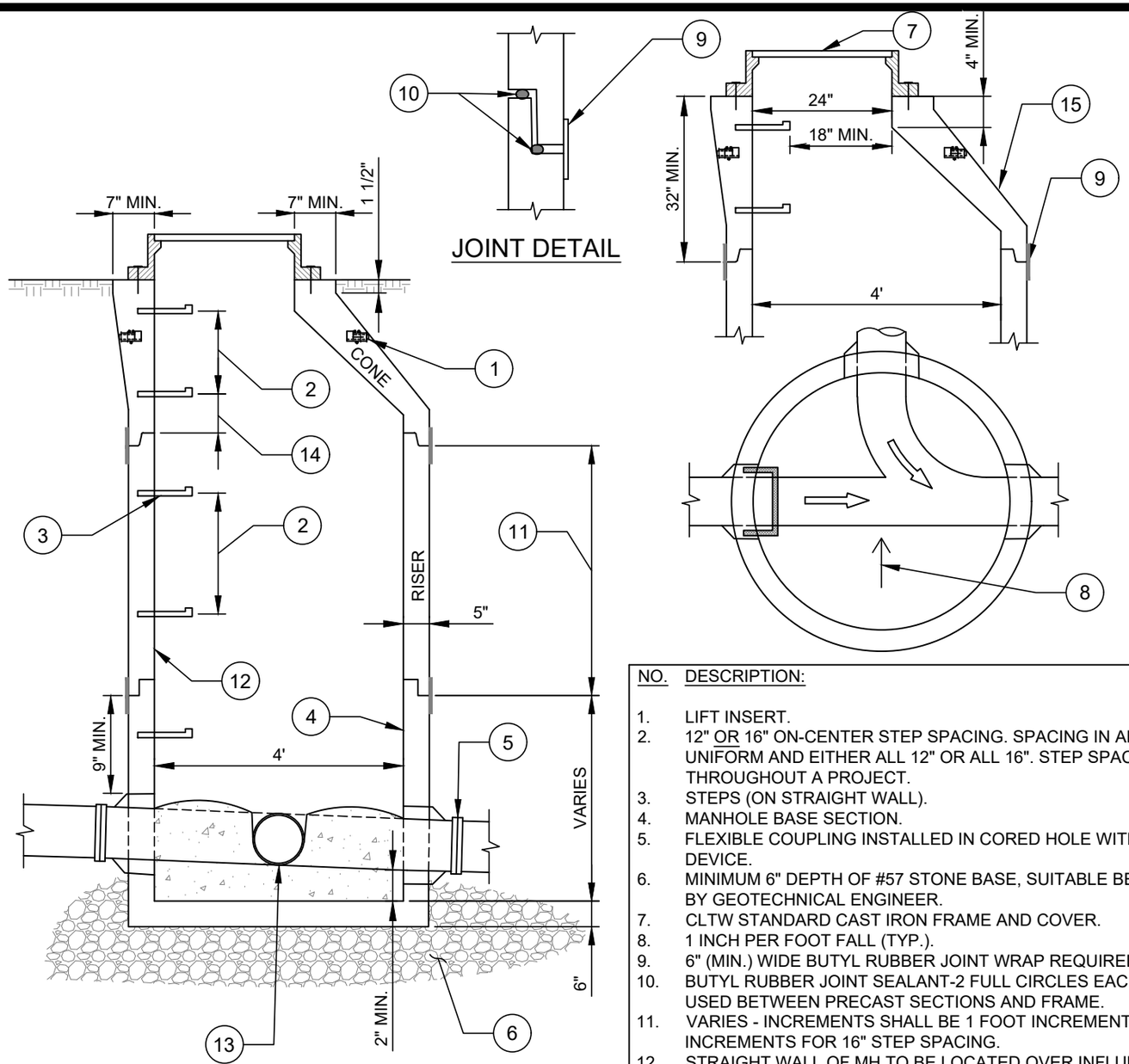
SEWER SERVICES - SCHEMATIC

NO SCALE

VERSION
1.0

DATE
04/2024

DETAIL
11.1.9



JOINT DETAIL

NO.	DESCRIPTION:
1.	LIFT INSERT.
2.	12" OR 16" ON-CENTER STEP SPACING. SPACING IN ANY SINGLE MANHOLE SHALL BE UNIFORM AND EITHER ALL 12" OR ALL 16". STEP SPACING SHALL BE CONSISTENT THROUGHOUT A PROJECT.
3.	STEPS (ON STRAIGHT WALL).
4.	MANHOLE BASE SECTION.
5.	FLEXIBLE COUPLING INSTALLED IN CORED HOLE WITH STAINLESS STEEL COMPRESSION DEVICE.
6.	MINIMUM 6" DEPTH OF #57 STONE BASE, SUITABLE BEARING CAPACITY AS APPROVED BY GEOTECHNICAL ENGINEER.
7.	CLTW STANDARD CAST IRON FRAME AND COVER.
8.	1 INCH PER FOOT FALL (TYP.).
9.	6" (MIN.) WIDE BUTYL RUBBER JOINT WRAP REQUIRED ON EXTERIOR OF ALL JOINTS.
10.	BUTYL RUBBER JOINT SEALANT-2 FULL CIRCLES EACH JOINT COMPRESSED (TYP.). USED BETWEEN PRECAST SECTIONS AND FRAME.
11.	VARIES - INCREMENTS SHALL BE 1 FOOT INCREMENTS FOR 12" STEP SPACING AND 16" INCREMENTS FOR 16" STEP SPACING.
12.	STRAIGHT WALL OF MH TO BE LOCATED OVER INFLUENT PIPE.
13.	FOR 8" AND 10" PIPE, INVERTS ARE TO BE 3/4" OF PIPE OUTSIDE DIAMETER AT TROUGH, FOR 12" AND LARGER PIPE, PROVIDE FULL INVERT AS SHOWN. THE SHELF SHALL SLOPE 1 INCH PER FOOT (MIN.) FROM THE MANHOLE WALL TO THE TROUGH.
14.	STEPS SHALL BE PLACED NO CLOSER THAN 1/2 THE STEP SPACING FROM A JOINT AND SHALL BE NO CLOSER THAN 6".
15.	CONE SLOPE SHALL BE THE FULL CONE HEIGHT AS SHOWN HERE.

NOTES:

A. MANHOLE TO CONFORM WITH ASTM C478 EXCEPT AS MODIFIED BELOW.

B. MANHOLE BASE TO BE REINFORCED WITH A MINIMUM AREA OF 0.20 SQ. IN. PER LINEAR FOOT EACH WAY. WALL REINFORCING TO BE MINIMUM OF 0.12 SQ. IN. PER VERTICAL FOOT. EITHER TONGUE OR GROOVE SHALL HAVE REINFORCING EQUAL IN AREA TO MINIMUM OF WALL SECTION.

C. ALL JOINTS SHALL CONFORM WITH ASTM C990.

D. STEPS TO CONFORM TO CLTW STANDARD DETAIL.

E. ALL PIPE OPENINGS TO BE NO GREATER THAN 4" LARGER THAN OUTSIDE DIAMETER OF PIPE AND ADDITIONALLY REINFORCED WITH A MINIMUM OF 0.20 SQ. IN. OF STEEL AT 90°. (ADDITIONAL REINFORCING NOT REQUIRED FOR CORED OPENINGS).

F. ALL SURFACES SHALL BE SMOOTH EVEN TEXTURED WITH A MINIMUM OF HONEYCOMB, FINS AND OTHER IMPERFECTIONS.

G. PENETRATING LIFTING HOLES SHALL BE PLUGGED WITH EXPANSION GROUT OR HAVE WATERTIGHT PLASTIC INSERTS.

H. INVERTS TO BE PRECAST CONCRETE.

I. ALL MANHOLE SECTIONS SHALL BE DESIGNED FOR H-20 LOADING AND A MINIMUM HEIGHT OF 40 VERTICAL FEET.

J. WIRE TO CONFORM WITH ASTM A1064, LOCATED IN CENTER 1/3 OF WALL.

K. REBAR TO CONFORM WITH ASTM A615 OR A706, GRADE 60.

L. PRODUCT MARKINGS REQUIRED BY ASTM C478 SHALL BE MARKED ON BOTH THE INTERIOR AND EXTERIOR OF EACH PRECAST SECTION.

M. ALL STEPS SHALL BE PULLOUT TESTED TO A MINIMUM LOAD OF 1,000 LBS. TEST REPORTS REQUIRED.

N. PRECAST PRODUCT SHALL NOT BE SHIPPED FROM THE MANUFACTURER UNTIL IT HAS REACHED A MINIMUM OF 4,000 PSI COMPRESSIVE STRENGTH AND NO LESS THAN 7 DAYS AFTER CASTING, WHICHEVER IS GREATER.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

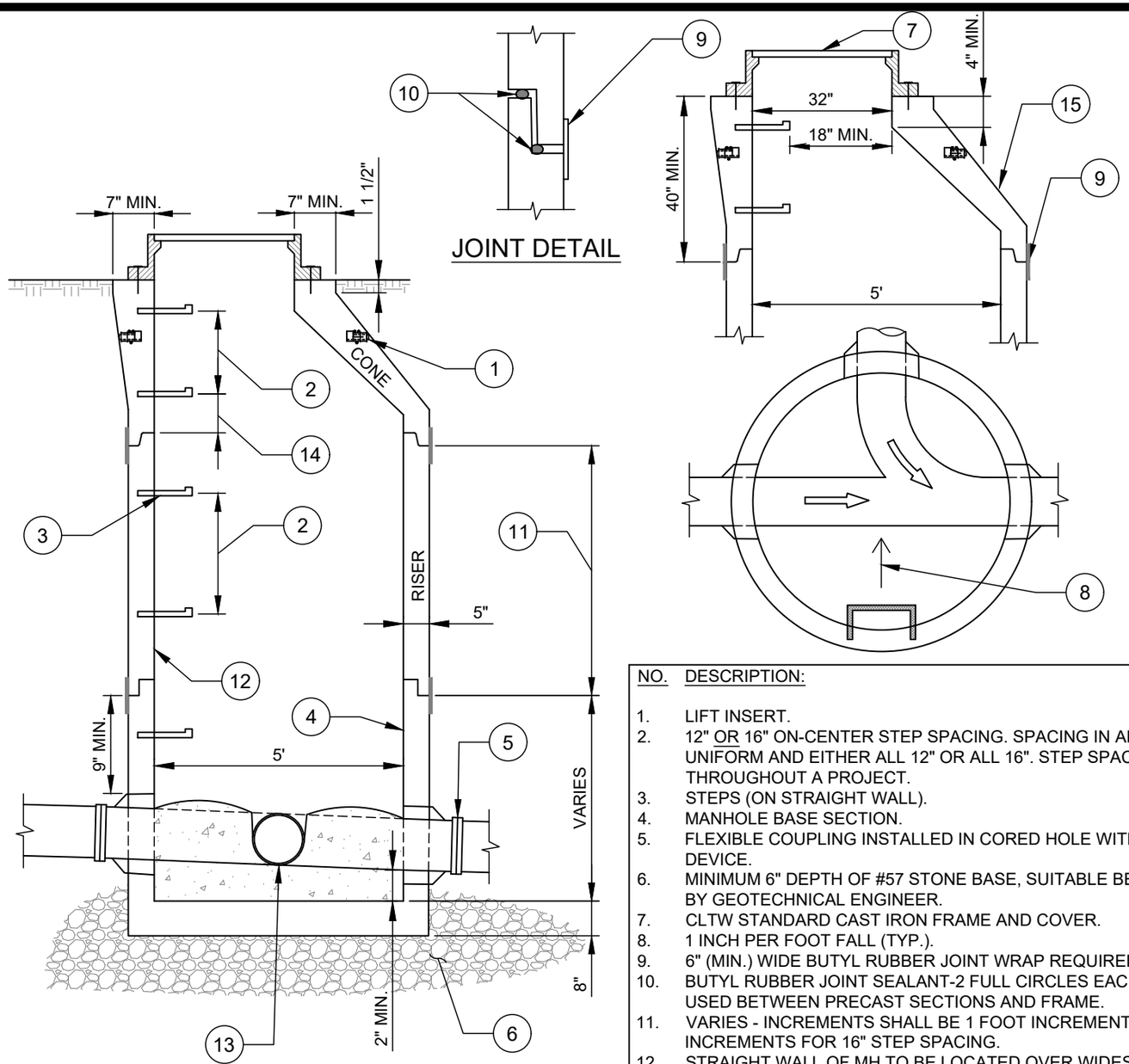
4' DIAMETER PRECAST MANHOLES (FOR 8" THROUGH 16" DIAMETER PIPE)

NO SCALE

VERSION 1.0

DATE 04/2024

DETAIL 11.2.1



JOINT DETAIL

NO.	DESCRIPTION:
1.	LIFT INSERT.
2.	12" OR 16" ON-CENTER STEP SPACING. SPACING IN ANY SINGLE MANHOLE SHALL BE UNIFORM AND EITHER ALL 12" OR ALL 16". STEP SPACING SHALL BE CONSISTENT THROUGHOUT A PROJECT.
3.	STEPS (ON STRAIGHT WALL).
4.	MANHOLE BASE SECTION.
5.	FLEXIBLE COUPLING INSTALLED IN CORED HOLE WITH STAINLESS STEEL COMPRESSION DEVICE.
6.	MINIMUM 6" DEPTH OF #57 STONE BASE, SUITABLE BEARING CAPACITY AS APPROVED BY GEOTECHNICAL ENGINEER.
7.	CLTW STANDARD CAST IRON FRAME AND COVER.
8.	1 INCH PER FOOT FALL (TYP.).
9.	6" (MIN.) WIDE BUTYL RUBBER JOINT WRAP REQUIRED ON EXTERIOR OF ALL JOINTS.
10.	BUTYL RUBBER JOINT SEALANT-2 FULL CIRCLES EACH JOINT COMPRESSED (TYP.). USED BETWEEN PRECAST SECTIONS AND FRAME.
11.	VARIES - INCREMENTS SHALL BE 1 FOOT INCREMENTS FOR 12" STEP SPACING AND 16" INCREMENTS FOR 16" STEP SPACING.
12.	STRAIGHT WALL OF MH TO BE LOCATED OVER WIDEST SHELF.
13.	FOR 8" AND 10" PIPE, INVERTS ARE TO BE 3/4" OF PIPE OUTSIDE DIAMETER AT TROUGH, FOR 12" AND LARGER PIPE, PROVIDE FULL INVERT AS SHOWN. THE SHELF SHALL SLOPE 1 INCH PER FOOT (MIN.) FROM THE MANHOLE WALL TO THE TROUGH.
14.	STEPS SHALL BE PLACED NO CLOSER THAN 1/2 THE STEP SPACING FROM A JOINT AND SHALL BE NO CLOSER THAN 6".
15.	CONE SLOPE SHALL BE THE FULL CONE HEIGHT AS SHOWN HERE.

NOTES:

A. MANHOLE TO CONFORM WITH ASTM C478 EXCEPT AS MODIFIED BELOW.

B. MANHOLE BASE TO BE REINFORCED WITH A MINIMUM AREA OF 0.20 SQ. IN. PER LINEAR FOOT EACH WAY. WALL REINFORCING TO BE MINIMUM OF 0.15 SQ. IN. PER VERTICAL FOOT. EITHER TONGUE OR GROOVE SHALL HAVE REINFORCING EQUAL IN AREA TO MINIMUM OF WALL SECTION.

C. ALL JOINTS SHALL CONFORM WITH ASTM C990.

D. STEPS TO CONFORM TO CLTW STANDARD DETAIL.

E. ALL PIPE OPENINGS TO BE NO GREATER THAN 4" LARGER THAN OUTSIDE DIAMETER OF PIPE AND ADDITIONALLY REINFORCED WITH A MINIMUM OF 0.20 SQ. IN. OF STEEL AT 90°. (ADDITIONAL REINFORCING NOT REQUIRED FOR CORED OPENINGS).

F. ALL SURFACES SHALL BE SMOOTH EVEN TEXTURED WITH A MINIMUM OF HONEYCOMB, FINS AND OTHER IMPERFECTIONS.

G. PENETRATING LIFTING HOLES SHALL BE PLUGGED WITH EXPANSION GROUT OR HAVE WATERTIGHT PLASTIC INSERTS.

H. INVERTS TO BE PRECAST CONCRETE.

I. ALL MANHOLE SECTIONS SHALL BE DESIGNED FOR H-20 LOADING AND A MINIMUM HEIGHT OF 40 VERTICAL FEET.

J. WIRE TO CONFORM WITH ASTM A1064, LOCATED IN CENTER 1/3 OF WALL.

K. REBAR TO CONFORM WITH ASTM A615 OR A706, GRADE 60.

L. PRODUCT MARKINGS REQUIRED BY ASTM C478 SHALL BE MARKED ON BOTH THE INTERIOR AND EXTERIOR OF EACH PRECAST SECTION.

M. ALL STEPS SHALL BE PULLOUT TESTED TO A MINIMUM LOAD OF 1,000 LBS. TEST REPORTS REQUIRED.

N. PRECAST PRODUCT SHALL NOT BE SHIPPED FROM THE MANUFACTURER UNTIL IT HAS REACHED A MINIMUM OF 4,000 PSI COMPRESSIVE STRENGTH AND NO LESS THAN 7 DAYS AFTER CASTING, WHICHEVER IS GREATER.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS

GRAVITY SEWER

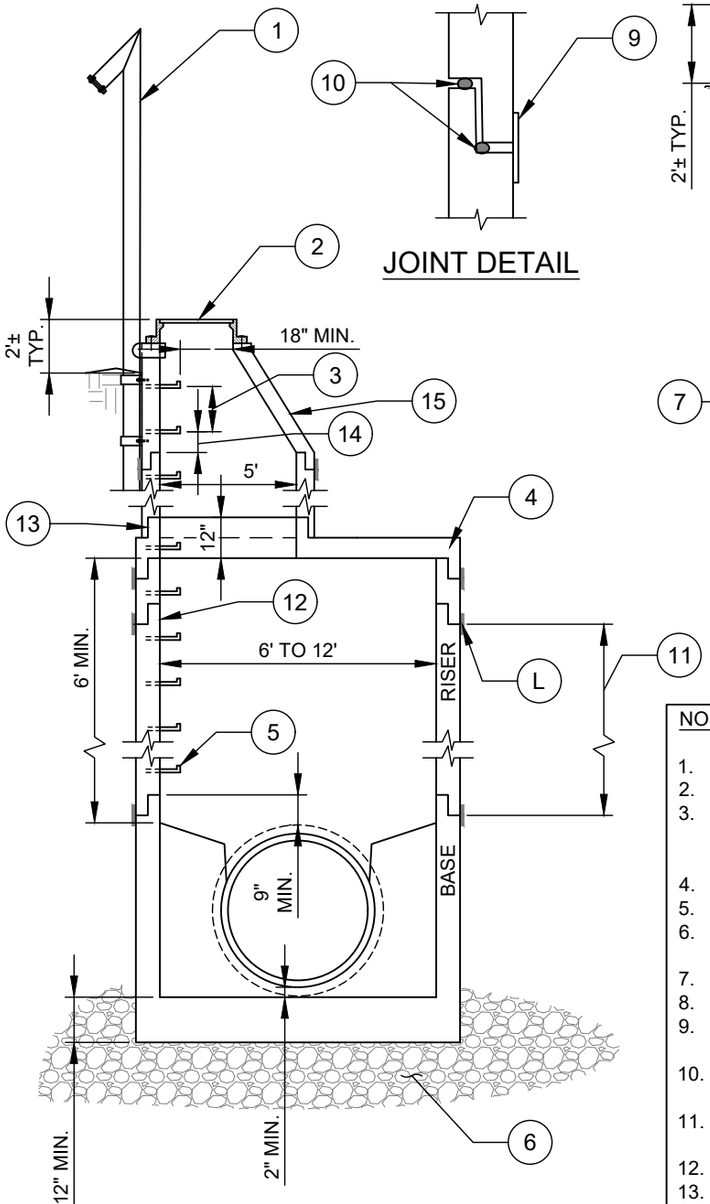
5' DIAMETER PRECAST MANHOLES
(FOR 18" THROUGH 36" DIAMETER PIPE)
(WHEN INSIDE DROPS ARE REQUIRED)

NO SCALE

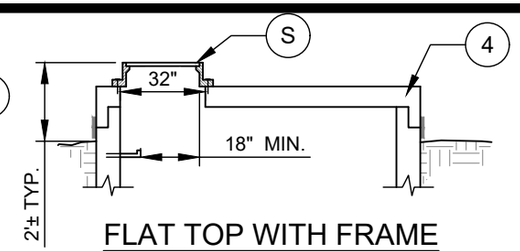
VERSION 1.0

DATE 04/2024

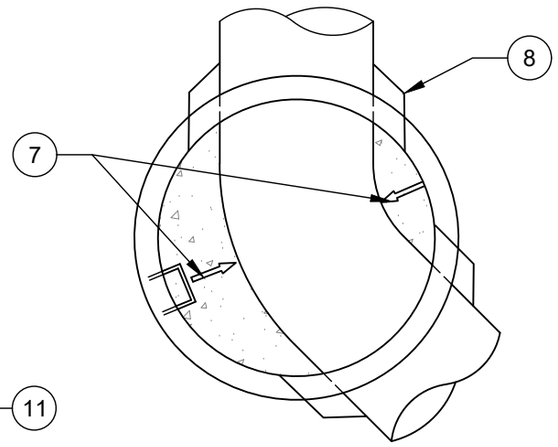
DETAIL 11.2.2



JOINT DETAIL



FLAT TOP WITH FRAME BOLTED TO MANHOLE



NO.	DESCRIPTION:
1.	VENT PER CLTW STANDARD DETAIL.
2.	CLTW STANDARD CAST IRON FRAME AND COVER.
3.	12" OR 16" ON-CENTER STEP SPACING. SPACING IN ANY SINGLE MANHOLE SHALL BE UNIFORM AND EITHER ALL 12" OR ALL 16". STEP SPACING SHALL BE CONSISTENT THROUGHOUT A PROJECT.
4.	TRANSITION OR FLAT TOP SLAB.
5.	STEP PER CLTW STANDARD DETAIL.
6.	6" MINIMUM #57 STONE BASE, SUITABLE BEARING CAPACITY AS APPROVED BY GEOTECHNICAL ENGINEER.
7.	1 INCH PER FOOT SLOPE (TYP.).
8.	FLEXIBLE WATERTIGHT CONNECTOR, (TYP.).
9.	6" (MIN.) WIDE BUTYL RUBBER JOINT WRAP REQUIRED ON EXTERIOR OF ALL JOINTS.
10.	BUTYL RUBBER JOINT SEALANT-2 FULL CIRCLES EACH JOINT COMPRESSED (TYP.). USED BETWEEN PRECAST SECTIONS AND FRAME.
11.	VARIES - INCREMENTS SHALL BE 1 FOOT INCREMENTS FOR 12" STEP SPACING AND 16" INCREMENTS FOR 16" STEP SPACING.
12.	STRAIGHT WALL OF MH TO BE LOCATED OVER WIDEST SHELF.
13.	TRANSITION TOP SHALL HAVE 12" OR 16" VERTICAL LAID LENGTH TO MAINTAIN STEP SPACING. TRANSITION AND FLAT TOP REINFORCEMENT SHALL BE SUBMITTED FOR REVIEW FOR STRUCTURAL INTEGRITY.
14.	STEPS SHALL BE PLACED NO CLOSER THAN 1/2 THE STEP SPACING FROM A JOINT AND SHALL BE NO CLOSER THAN 6".
15.	CONE SLOPE SHALL BE THE FULL CONE HEIGHT AS SHOWN HERE.

NOTES:

A. MANHOLE TO CONFORM WITH ASTM C478 EXCEPT AS MODIFIED BELOW.

B. MANHOLE BASE TO BE REINFORCED WITH A MINIMUM AREA OF 0.20 SQ. IN. PER LINEAR FOOT EACH WAY. WALL REINFORCING TO BE PER MANHOLE DIAMETER AS LISTED BELOW. EITHER TONGUE OR GROOVE SHALL HAVE REINFORCING EQUAL IN AREA TO MINIMUM OF WALL SECTION.

MANHOLE DIAMETER	MANHOLE REINFORCEMENTS (SQ. IN. PER VERTICAL FOOT)
6'	0.18
7'	0.21
8'	0.24
9'	0.27
10'	0.30
11'	0.33
12'	0.36

C. ALL JOINTS SHALL CONFORM WITH ASTM C990.

D. STEPS TO CONFORM TO CLTW STANDARD DETAIL.

E. ALL PIPE OPENINGS TO BE NO GREATER THAN 4" LARGER THAN OUTSIDE DIAMETER OF PIPE AND ADDITIONALLY REINFORCED WITH A MINIMUM OF 0.20 SQ. IN. OF STEEL AT 90°. (ADDITIONAL REINFORCING NOT REQUIRED FOR CORED OPENINGS).

F. ALL SURFACES SHALL BE SMOOTH EVEN TEXTURED WITH A MINIMUM OF HONEYCOMB, FINS AND OTHER IMPERFECTIONS.

G. PENETRATING LIFTING HOLES SHALL BE PLUGGED WITH EXPANSION GROUT OR HAVE WATERTIGHT PLASTIC INSERTS.

H. INVERTS TO BE PRECAST CONCRETE.

I. ALL MANHOLE SECTIONS SHALL BE DESIGNED FOR H-20 LOADING AND A MINIMUM HEIGHT OF 40 VERTICAL FEET.

J. WIRE TO CONFORM WITH ASTM A1064, LOCATED IN CENTER 1/3 OF WALL (IF IT IS A SINGLE REINFORCEMENT CAGE. IF 2 CAGES ARE USED, THEN EACH CAGE SHALL HAVE A MINIMUM OF 1 INCH COVER TO THE INNER OR OUTER WALL FACE).

K. REBAR TO CONFORM WITH ASTM A615 OR A706, GRADE 60.

L. PRODUCT MARKINGS REQUIRED BY ASTM C478 SHALL BE MARKED ON BOTH THE INTERIOR AND EXTERIOR OF EACH PRECAST SECTION.

M. ALL STEPS SHALL BE PULLOUT TESTED TO A MINIMUM LOAD OF 1,000 LBS. TEST REPORTS REQUIRED.

N. PRECAST PRODUCT SHALL NOT BE SHIPPED FROM THE MANUFACTURER UNTIL IT HAS REACHED A MINIMUM OF 4,000 PSI COMPRESSIVE STRENGTH AND NO LESS THAN 7 DAYS AFTER CASTING, WHICHEVER IS GREATER.

O. FOR 12" AND LARGER PIPE, PROVIDE FULL INVERT AS SHOWN. THE SHELF SHALL SLOPE 1 INCH PER FOOT (MIN.) FROM THE MANHOLE WALL TO THE TROUGH.

P. OUTSIDE DROP SHALL NOT ENTER 5' RISER SECTIONS.

Q. FOR 5' DIAMETER RISER AND CONES SECTIONS, REFER TO 5' DIAMETER MANHOLE DETAILS.

R. INSIDE DROPS OR OUTSIDE DROPS SHALL ONLY ENTER MANHOLE RISER SECTION BELOW THE TRANSITION SLAB.

S. FLUSH CAST IN PLACE FRAMES ARE PREFERRED ON FLAT TOP MANHOLES. BOLT DOWN FRAMES REQUIRE PRIOR APPROVAL BY CLT WATER.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

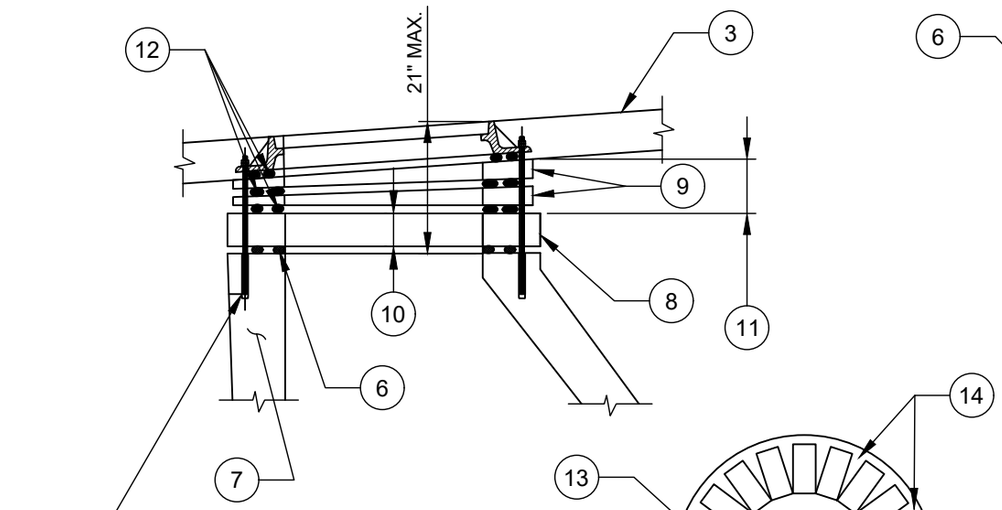
6' - 12' DIAMETER PRECAST MANHOLE (FOR 42" DIAMETER AND LARGER PIPE)

NO SCALE

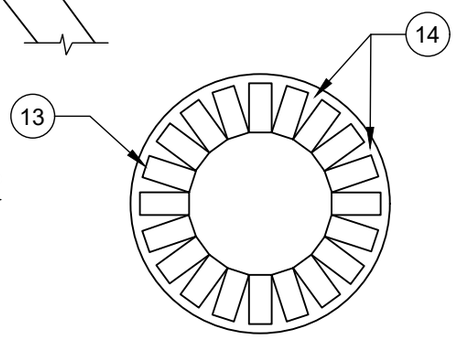
VERSION 1.0

DATE 04/2024

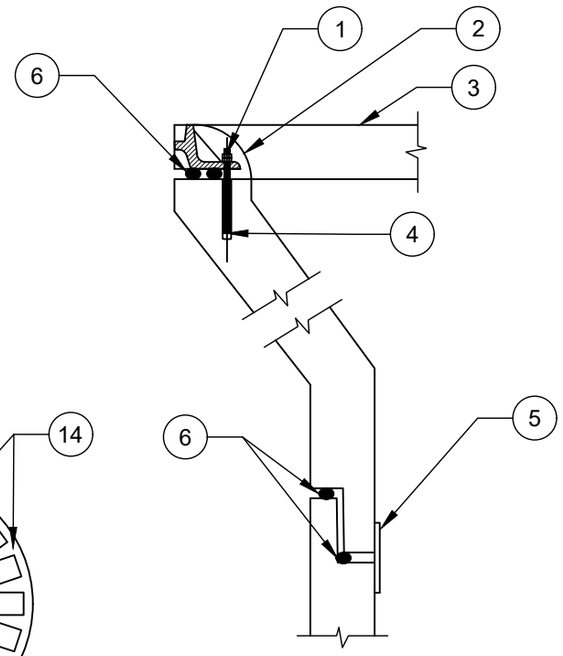
DETAIL 11.2.3



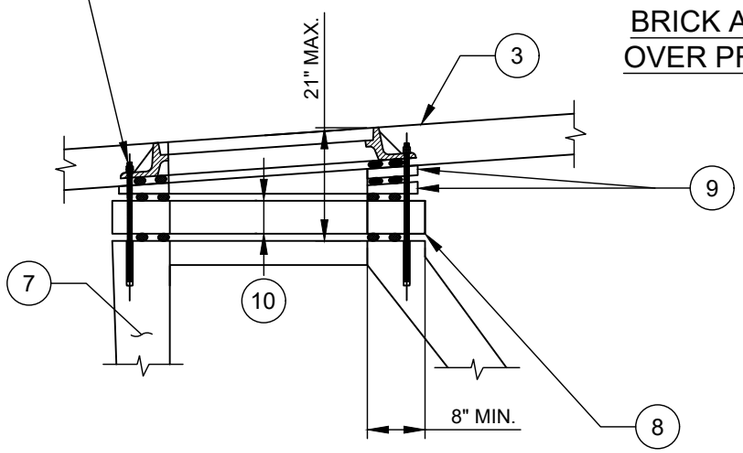
CONCRETE AND EPP GRADE RINGS



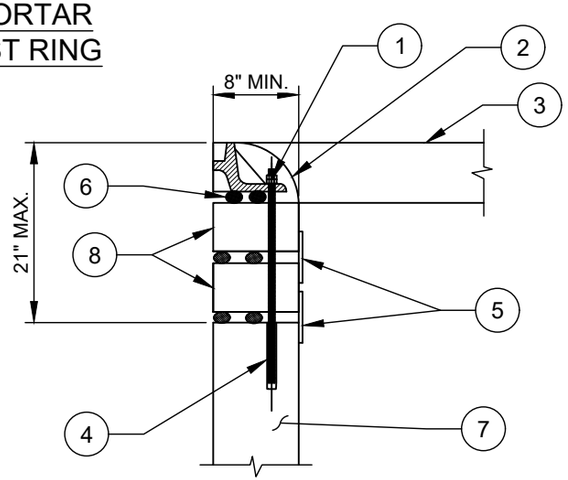
BRICK AND MORTAR OVER PRECAST RING



WITHOUT EPP GRADE RING



CONCRETE AND EPP GRADE RINGS



WITHOUT EPP GRADE RING

NO. DESCRIPTION:

1. 1/2" DIAMETER ZINC PLATED OR HOT DIP GALVANIZED THREADED ROD, 2 NUTS AND 2 DOUBLE WIDE WASHERS.
2. CEMENT MORTAR GROUT. INSTALL AFTER BOLT APPROVAL BY THE INSPECTOR.
3. FINISH GRADE.
4. EPOXY ADHESIVE ANCHORING SYSTEM WITH 5" MINIMUM EMBEDMENT. CLEAN HOLE PER ADHESIVE MANUFACTURING REQUIREMENTS.
5. 6" (MIN.) WIDE BUTYL RUBBER JOINT WRAP REQUIRED ON ALL EXTERIOR JOINTS.
6. BUTYL RUBBER JOINT SEALANT-2 FULL CIRCLES EACH JOINT COMPRESSED (TYP.). USED ONLY BETWEEN PRECAST SECTIONS AND FRAME.
7. CONE SECTION.
8. CONCRETE GRADE RING (2" MIN. HEIGHT) TO CONTAIN ONE RING OF REBAR (STEEL AREA = 0.07 SQ IN PER VERTICAL FOOT) BUT NOT LESS THAN 0.024 SQ IN ANY ONE GRADE RING.
9. RECYCLED RUBBER OR EXPANDED POLYPROPYLENE (EPP) ADJUSTMENT GRADE RING - FLAT, WITH KEYWAY (GROOVE) FOR VERTICAL ALIGNMENT, WITH ADHESIVE TRENCH, AND/OR WITH TAPER-ROTATE FOR SLOPE ADJUSTMENT - OR USE BRICK AND MORTAR OVER PRECAST RING. SEE DETAIL ON THIS SHEET.
10. 2", 4", 6", OR 8" TALL PRECAST GRADE RING SECTIONS.
11. 8" MAXIMUM HEIGHT OF RUBBER OR EXPANDED POLYPROPYLENE ADJUSTMENT RINGS, OTHERWISE USE CONCRETE.
12. EPOXY ADHESIVE USED BETWEEN RUBBER/RUBBER, EXPANDED POLYPROPYLENE/EXPANDED POLYPROPYLENE, FRAME/RUBBER OR EXPANDED POLYPROPYLENE, AND PRECAST SECTIONS/RUBBER OR EXPANDED POLYPROPYLENE. IF CONCRETE GRADE RING, USE BUTYL RUBBER JOINT SEALANT.
13. STANDARD NCDOT CONCRETE BRICK OR FLOOR TILE PAVERS.
14. FILL ALL VOIDS SOLID WITH MORTAR.

NOTES:

A. MINIMUM 8" WIDTH OF ALL GRADE RINGS.
   24" COVER = 40" (GROUND TO O.D.).
   30" COVER = 46" (GROUND TO O.D.).

B. NO MORE THAN 3 GRADE RINGS (21" MAXIMUM) INCLUDING FRAME HEIGHT.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

SEWER MANHOLE GRADE RING

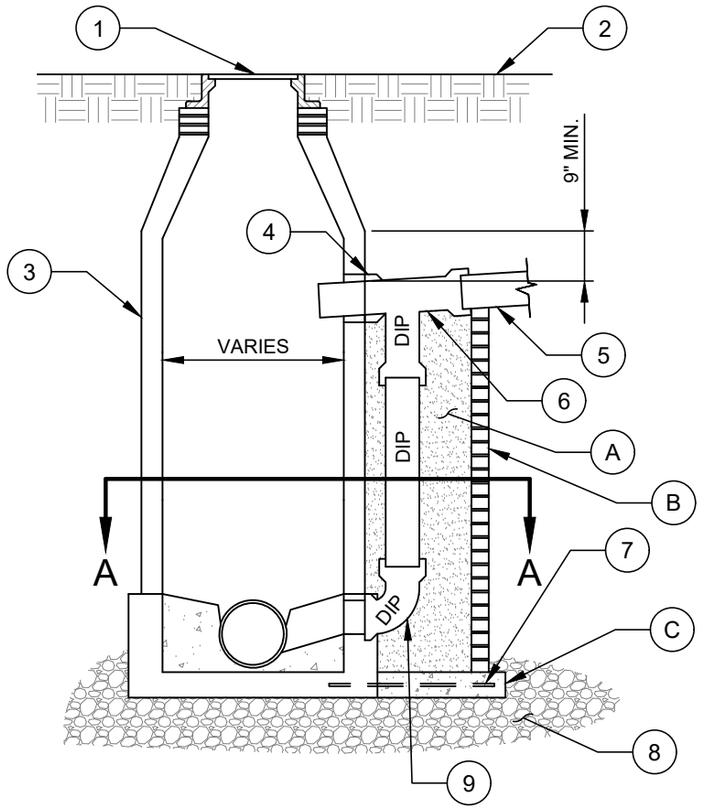
NO SCALE

VERSION 1.0

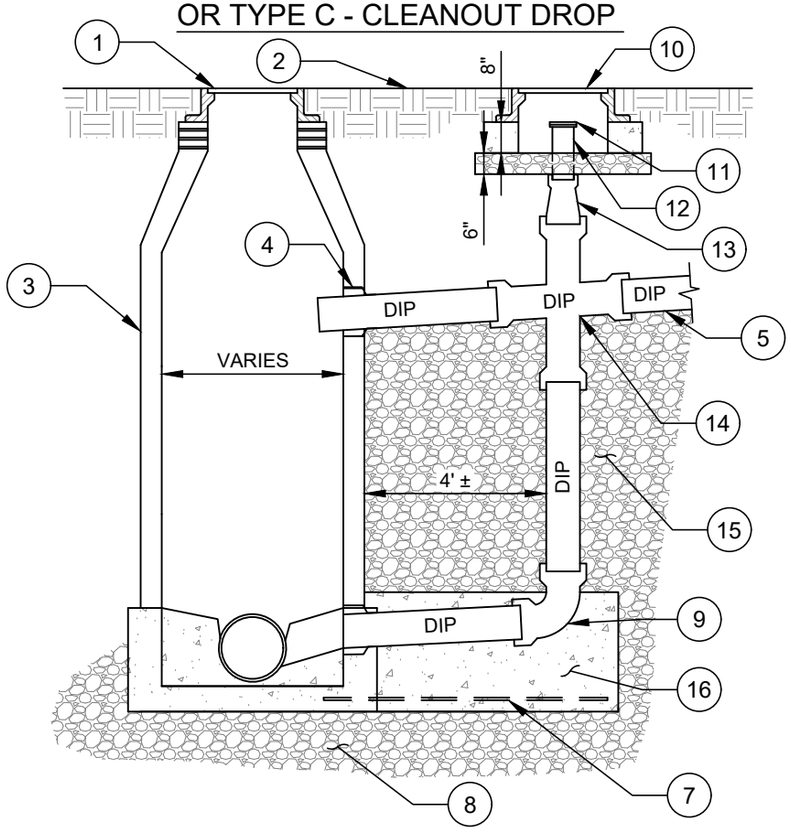
DATE 04/2024

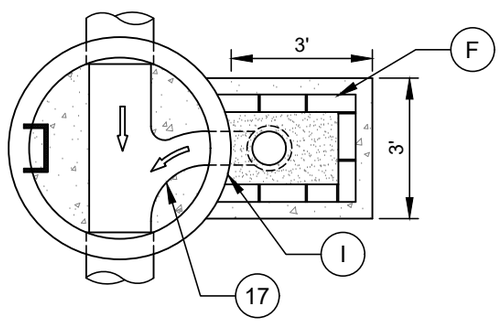
DETAIL 11.2.4

TYPE A - ATTACHED DROP



TYPE B - DETACHED DROP
OR TYPE C - CLEANOUT DROP





SECTION A-A

NOTES:

K. OUTSIDE DROP SHALL NOT ENTER MH IN CONE SECTION.

L. MATCH DROP INFLUENT CROWN TO CROWN WITH EFFLUENT PIPE.

M. DROP PIPING SHALL BE ALL DIP PIPE AND FITTINGS. ALL FITTINGS IN THE DETACHED/CLEANOUT DROP BE RJ.

N. FOR DETACHED DROP, DELETE CLEANOUT AND USE TEE IN LIEU OF CROSS. CLEANOUT DROPS WILL BE SPECIFIED ON CONSTRUCTION PLANS.

O. MAX DROP HEIGHT SHALL BE 10'.

NO.	DESCRIPTION:
1.	STANDARD FRAME AND COVER.
2.	ASPHALT/GROUND.
3.	EXISTING BRICK OR BLOCK MANHOLE.
4.	RUBBER MANHOLE/PIPE CONNECTOR BOOT.
5.	18' JOINT DIP (MIN.) OR DIP TO UNDISTURBED GROUND.
6.	DUCTILE IRON TEE, ALL MJ BEND.
7.	3 - #6 REBARS.
8.	6 INCH MINIMUM OF #57 STONE BASE, SUITABLE BEARING CAPACITY AS APPROVED BY GEOTECHNICAL ENGINEER.
9.	DUCTILE IRON 90° BEND, ALL MJ BELL.
10.	24" STANDARD FRAME AND COVER ON 8" TALL PRECAST CONCRETE GRADE RING AND 6" WASHED #57 STONE.
11.	8" BLIND FLANGE (TYPE 304 S.S. HARDWARE).
12.	8" FL x PE DIP CLEANOUT.
13.	8" REDUCER DUCTILE IRON (OMIT ON 8" MAINS).
14.	DUCTILE IRON CROSS OR TEE, ALL MJ BELL, SEE NOTE N.
15.	BACKFILL WITH #57 STONE-TYPICAL.
16.	3,600 PSI CONCRETE BLOCKING.
17.	RESHAPE INVERT.

NOTES:

A. VOID TO BE MASONRY FILLED OR WASHED STONE AND FLOWABLE FILL.

B. PROTECTIVE WALL FOR OUTSIDE DROP SHALL BE A MINIMUM OF 4" MASONRY.

C. POUR 3' X 3' CONCRETE FOOTING 6" THICK TO SUPPORT DROP STRUCTURE.

D. ALL MASONRY MORTAR SHALL BE PORTLAND CEMENT 1:3 MIX.

E. CARE MUST BE TAKEN TO FORM A SMOOTH FINISHED TROUGH FROM ENTRANCE PIPES TO EXIT PIPE, AND IN CURVED MANHOLES THE TROUGH MUST BE A SMOOTH CIRCULAR ARC TANGENT TO THE INSIDE WALLS OF THE PIPES. AT THEIR ENDS.

F. DROP STRUCTURE MAY BE FORMED AND POURED OF EXCAVATABLE 150 PSI FLOWABLE FILL IN LIEU OF MASONRY.

G. THE SLOPE OF THE OUTSIDE DROP TROUGH SHALL BE 1/4" PER FOOT.

H. ALL PIPE OPENINGS TO BE NO GREATER THAN 4" LARGER THAN O.D. OF PIPE.

I. RAMSET MASONRY TIES EVERY 12" VERTICALLY AND HORIZONTALLY.

J. THREE EQUALLY SPACED #6 REBARS DOWELED INTO MANHOLE BASE 2" FROM TOP OF SLAB. GROUT INTO 8" DEEP HOLES WITH EXPANSION GROUT.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

OUTSIDE DROP ON EXISTING BRICK OR BLOCK MANHOLE

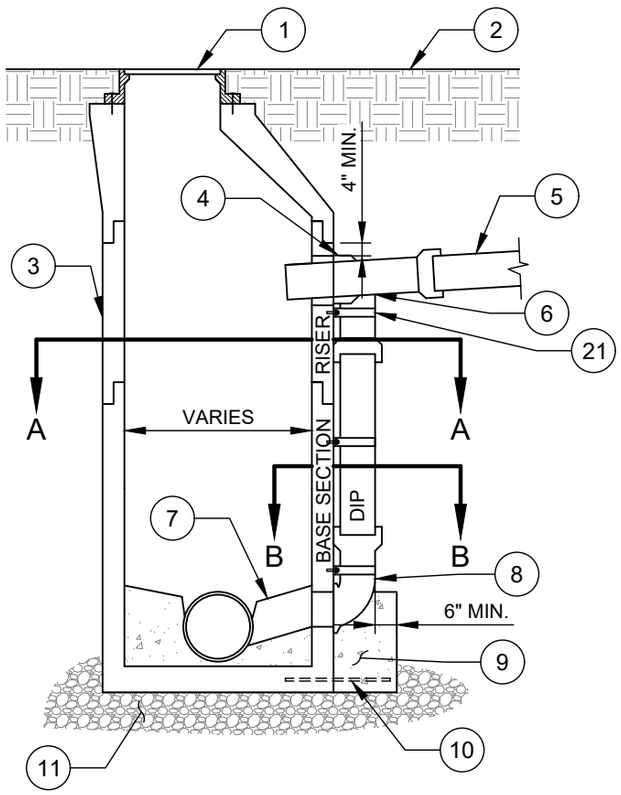
NO SCALE

VERSION 1.0

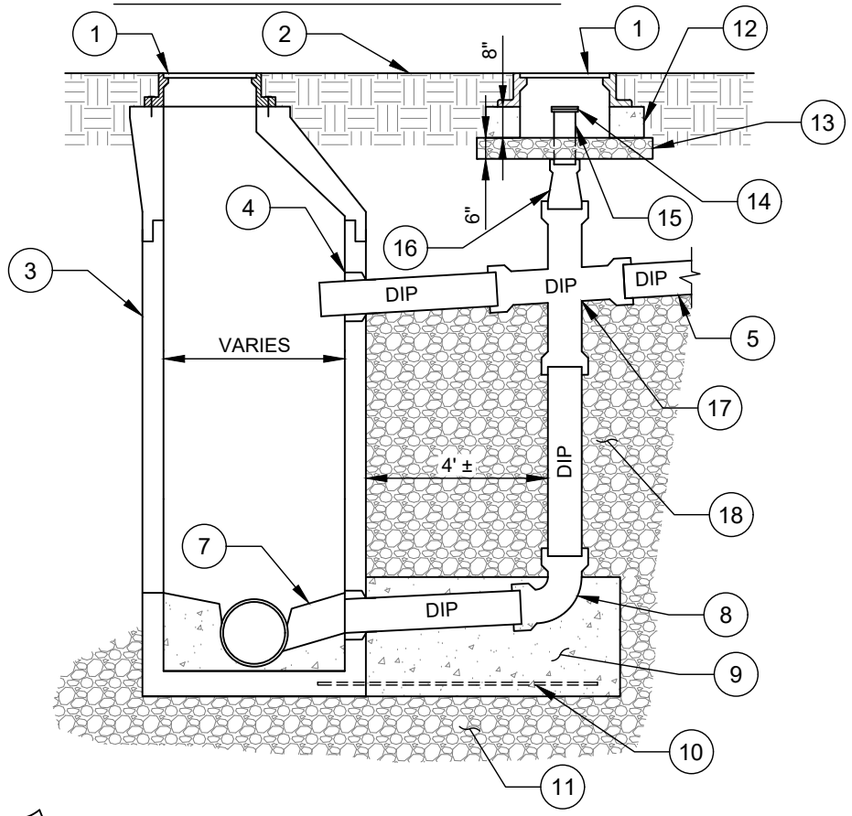
DATE 04/2024

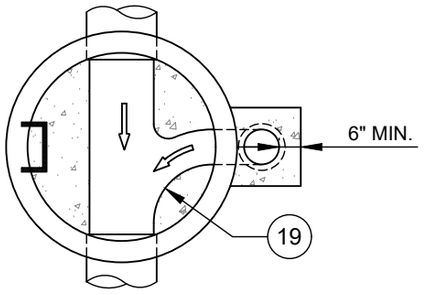
DETAIL 11.2.5

TYPE A - ATTACHED DROP

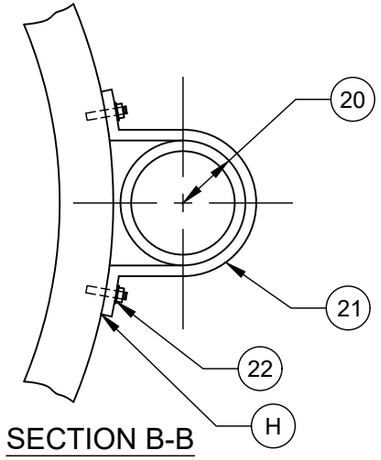


TYPE B - DETACHED DROP
OR TYPE C - CLEANOUT DROP





SECTION A-A



SECTION B-B

NO.	DESCRIPTION:
1.	STANDARD FRAME AND COVER.
2.	ASPHALT/GROUND.
3.	EXISTING OR PROPOSED PRECAST CONCRETE MANHOLE.
4.	RUBBER MANHOLE/PIPE CONNECTOR BOOT.
5.	18' JOINT DIP (MIN.) OR DIP TO UNDISTURBED GROUND.
6.	DUCTILE IRON TEE, BxBxS.
7.	SHELF SHALL SLOPE 1" PER FOOT (MIN.) FROM MANHOLE WALL TO THE TROUGH (TYP.).
8.	DUCTILE IRON 90° BEND, ALL MJ BELL.
9.	3,600 PSI CONCRETE BLOCKING.
10.	3 - #6 REBARS.
11.	6" MINIMUM OF #57 STONE BASE, SUITABLE BEARING CAPACITY AS APPROVED BY GEOTECHNICAL ENGINEER.
12.	8" TALL PRECAST CONCRETE GRADE RING.
13.	6" WASHED #57 STONE.
14.	8" BLIND FLANGE (TYPE 304 S.S. HARDWARE).
15.	8" FL x PE DIP CLEANOUT.
16.	8" REDUCER DUCTILE IRON (OMIT ON 8" MAINS).
17.	DUCTILE IRON CROSS OR TEE, ALL MJ BELL, SEE NOTE F.
18.	BACKFILL WITH #57 STONE-TYPICAL.
19.	RESHAPE INVERT.
20.	R = 1/2 O.D. PIPE BARREL (DROP PIPE).
21.	1/4" x 2" TYPE 304 STAINLESS STEEL STRAP. SEE NOTE H.
22.	1/2" DIAMETER x 3" TYPE 316 S.S. ALL THREAD ANCHOR W/ S.S. NUT AND WASHER. USE EPOXY IN CLEANED DRILLED HOLE. SEE NOTE H.

NOTES:

A. CARE MUST BE TAKEN TO FORM A SMOOTH FINISHED TROUGH FROM ENTRANCE PIPES TO EXIT PIPE, AND IN CURVED MANHOLES THE TROUGH MUST BE A SMOOTH CIRCULAR ARC TANGENT TO THE INSIDE WALLS OF THE PIPES AT THEIR ENDS.

B. THE SLOPE OF THE OUTSIDE DROP TROUGH SHALL BE 1/4" PER FOOT UNLESS PIPES ARE THE SAME DIAMETER.

C. OUTSIDE DROP SHALL NOT ENTER MANHOLE IN CONE SECTION OR WITHIN 4" OF MANHOLE JOINTS.

D. MATCH DROP INFLUENT CROWN TO CROWN WITH EFFLUENT PIPE.

E. PIPE CORES SHALL NOT PENETRATE THE MANHOLE JOINTS. PROVIDE MIN. 4" CLEARANCE.

F. FOR DETACHED DROP, DELETE CLEANOUT AND USE TEE IN LIEU OF CROSS. CLEANOUT DROPS WILL BE SPECIFIED ON CONSTRUCTION PLANS.

G. MAXIMUM DROP HEIGHT SHALL BE 10'.

H. PIPE STRAPS SHALL TIGHTLY COMPRESS DROP TO MANHOLE WALL. GAPS BETWEEN STRAP AND MANHOLE SHALL BE FILLED WITH OVERSIZE S.S. WASHERS. ANCHOR EXTENSIONS ARE NOT ALLOWED. CUSTOM STRAP LENGTHS MAY BE REQUIRED.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

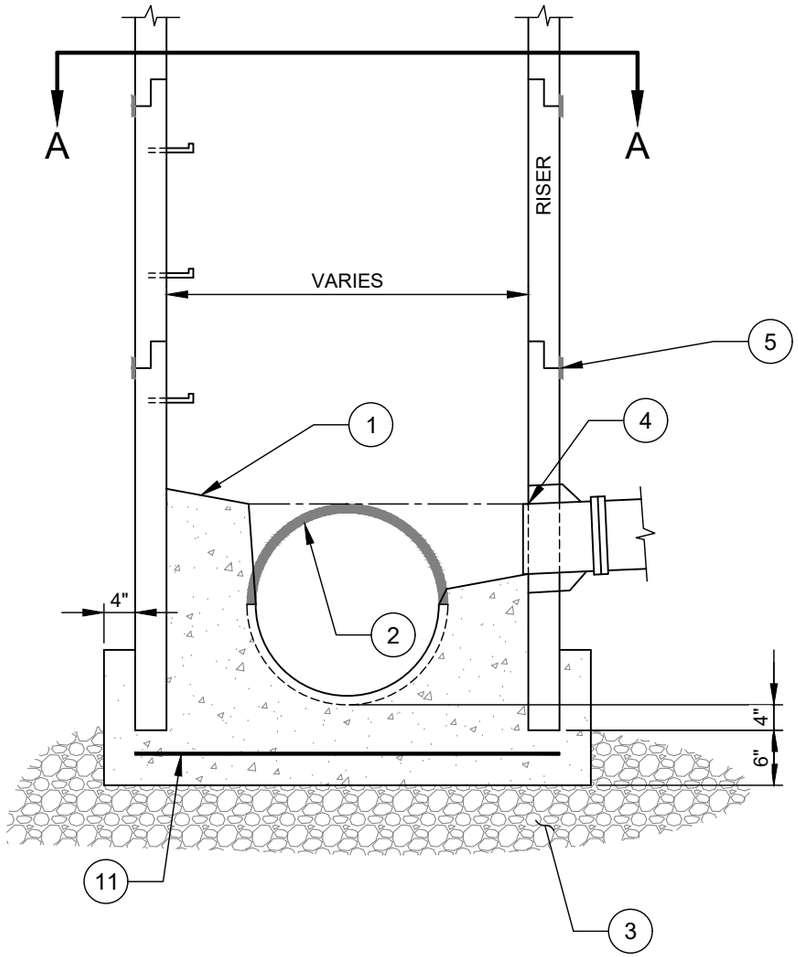
OUTSIDE DROP ON EXIST. OR PROP. PRECAST CONCRETE MANHOLE

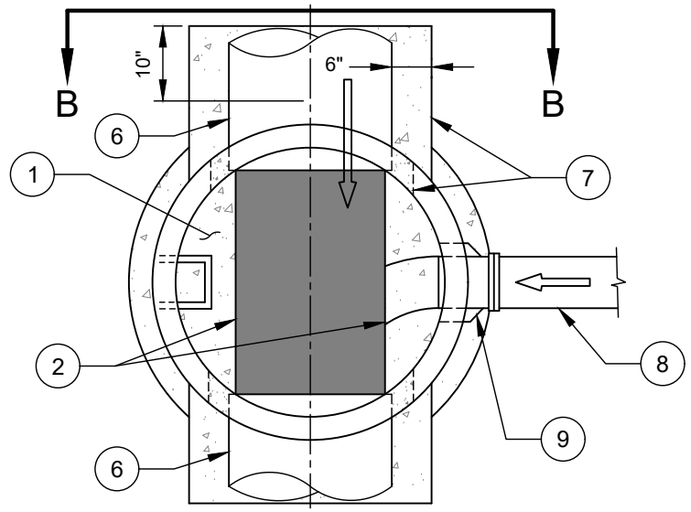
NO SCALE

VERSION 1.0

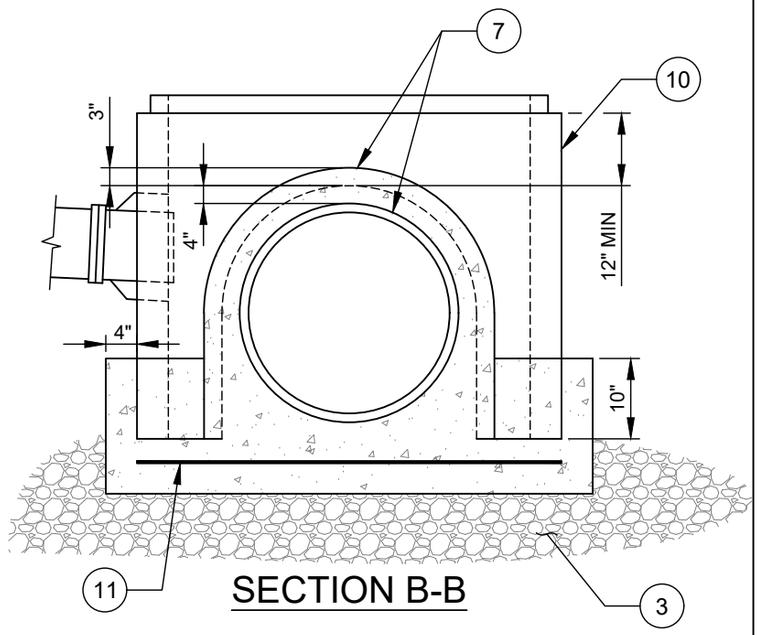
DATE 04/2024

DETAIL 11.2.6





SECTION A-A



SECTION B-B

NO. DESCRIPTION:

1. THE SHELF SHALL SLOPE 1 INCH PER FOOT FROM THE MANHOLE WALL TO THE TROUGH.
2. TOP HALF OF PIPE SHALL BE CUT AND REMOVED FROM MANHOLE WHEN APPROVED BY THE INSPECTOR.
3. 6" MINIMUM #57 STONE BASE, SUITABLE BEARING CAPACITY AS APPROVED BY GEOTECHNICAL ENGINEER.
4. MATCH CROWNS UNLESS THE PIPE IS THE SAME DIAMETER AS THE MAIN LINE PIPE. THEN A DROP OF 0.2' BETWEEN INVERTS WILL BE PROVIDED.
5. 6" (MIN.) WIDE BUTYL RUBBER JOINT WRAP REQUIRED ON EXTERIOR OF ALL JOINTS.
6. EXISTING SEWER PIPE.
7. CONCRETE COLLAR (TYP.).
8. PROPOSED SEWER PIPE OR LATERAL PIPE.
9. FLEXIBLE WATERTIGHT CONNECTOR.
10. SECTION OF PRECAST MANHOLE.
11. #5 REBARS AT 6" ON CENTER EACH WAY.

NOTES:

A. MANHOLES SHALL ALSO COMPLY WITH CLTW STANDARD DETAILS AS APPLICABLE.

B. USE 3,600 PSI CONCRETE.

C. ALL PIPE OPENINGS SHALL BE NO GREATER THAN 4" LARGER THAN OUTSIDE DIAMETER OF PIPE AND SHALL BE ADDITIONALLY REINFORCED WITH A MINIMUM OF 0.20 SQ. IN. OF STEEL AT 90°.

D. STEPS SHALL BE OVER THE WIDEST SHELF.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

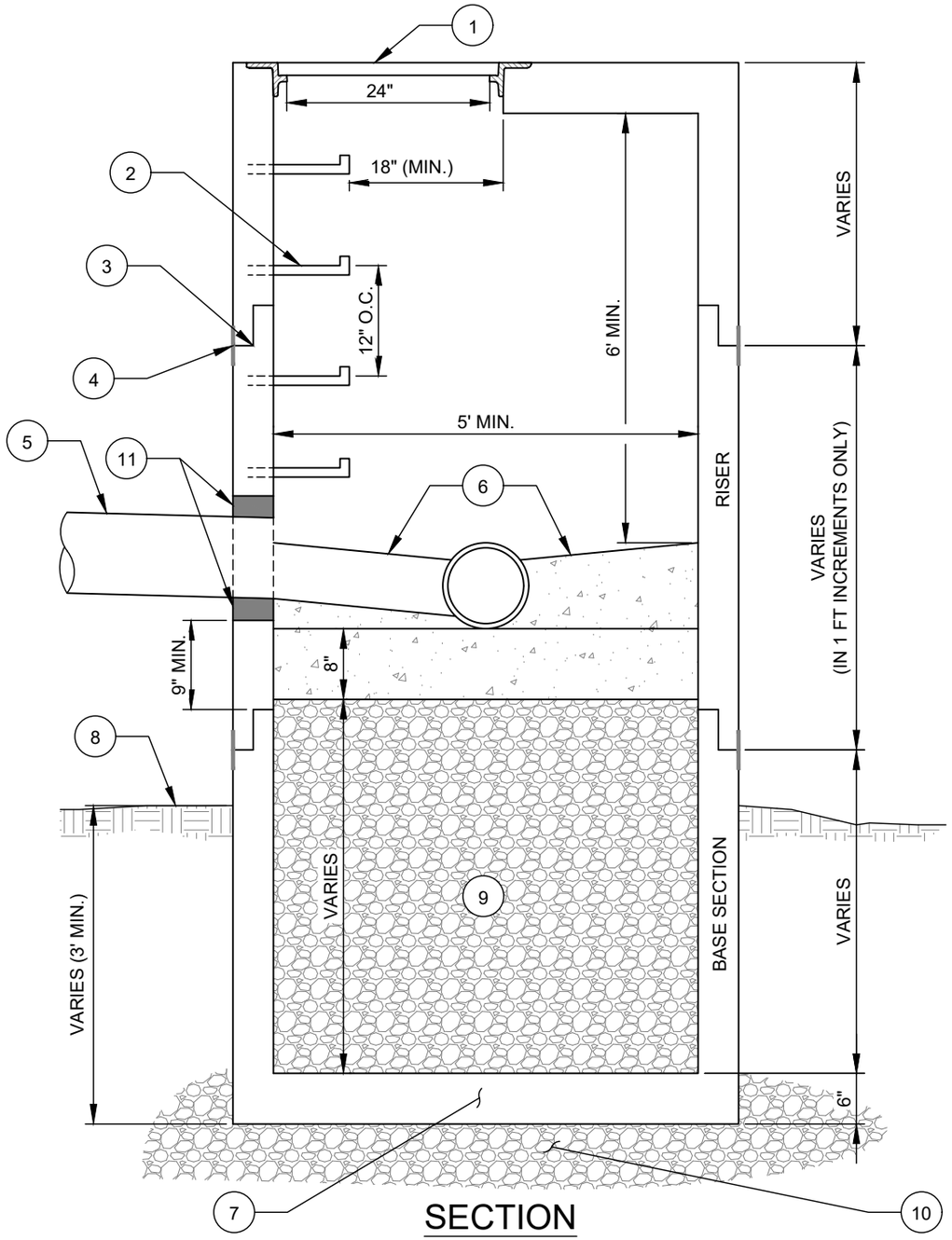
PRECAST STRADDLE (DOGHOUSE) MANHOLE

NO SCALE

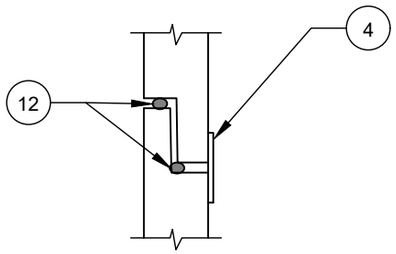
VERSION 1.0

DATE 04/2024

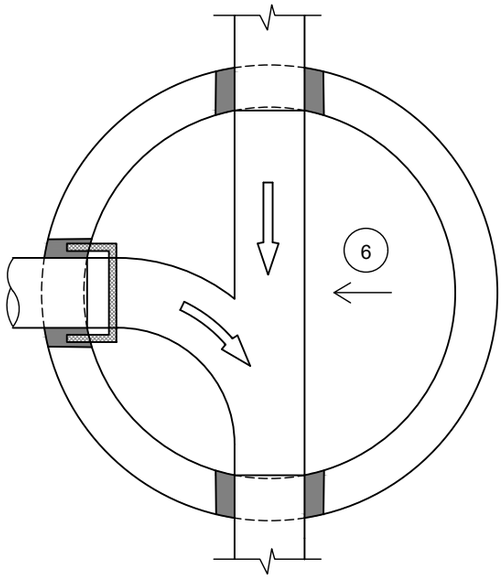
DETAIL 11.2.7



SECTION



JOINT DETAIL



PLAN

NO.	DESCRIPTION:
1.	CLTW STANDARD INVERTED/REVERSIBLE CAST IRON FRAME AND COVER CAST IN PLACE FLUSH WITH TOP OF MANHOLE SLAB.
2.	STEPS PER CLTW STANDARD DETAIL.
3.	JOINT.
4.	6" (MIN.) WIDE BUTYL RUBBER JOINT WRAP REQUIRED ON EXTERIOR OF ALL JOINTS.
5.	STEEL OR DIP.
6.	THE SHELF SHALL SLOPE 1 INCH PER FOOT (MIN.) FROM THE MANHOLE WALL TO THE TROUGH.
7.	MANHOLE BASE SHALL BE REINFORCED WITH A MINIMUM AREA OF 0.20 SQ. IN. PER LINEAR FOOT EACH WAY.
8.	FINISH GRADE.
9.	NON-COMPRESSIBLE MATERIAL (#57 STONE SHOWN).
10.	6" MIN. #57 STONE BASE, SUITABLE BEARING CAPACITY AS APPROVED BY GEOTECHNICAL ENGINEER.
11.	NON-SHRINK GROUT PIPE IN MANHOLE (DO NOT USE RUBBER BOOT).
12.	BUTYL RUBBER JOINT SEALANT-2 FULL CIRCLES EACH JOINT COMPRESSED (TYP.). USED BETWEEN PRECAST SECTIONS AND FRAME.

NOTES:

A. STRAIGHT WALL OF MANHOLE AND STEPS TO BE LOCATED OVER INFLUENT PIPE.

B. THIS DETAIL IS TO BE USED WHERE THE INVERT OF THE MANHOLE IS ABOVE THE EXISTING GROUND.

C. FILLING BETWEEN THE BASE AND ELEVATED FLOOR MAY BE CRUSHED STONE (#57 STONE), BRICK BATS, OR ANY NON-COMPRESSIBLE MATERIAL. THIS FILLING SHALL BE COVERED WITH HDPE OR PVC LINER BEFORE THE CONCRETE IS POURED IN PLACE.

D. MANHOLES SHALL ALSO COMPLY WITH CLTW STANDARD DETAILS AS APPLICABLE.

E. FIELD PLACED CONCRETE TO BE 3,600 PSI.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

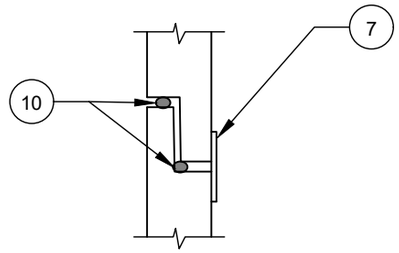
PRECAST MANHOLE
INVERT ABOVE GROUND
(FOR 8" THROUGH 16" DIAMETER PIPE)

NO SCALE

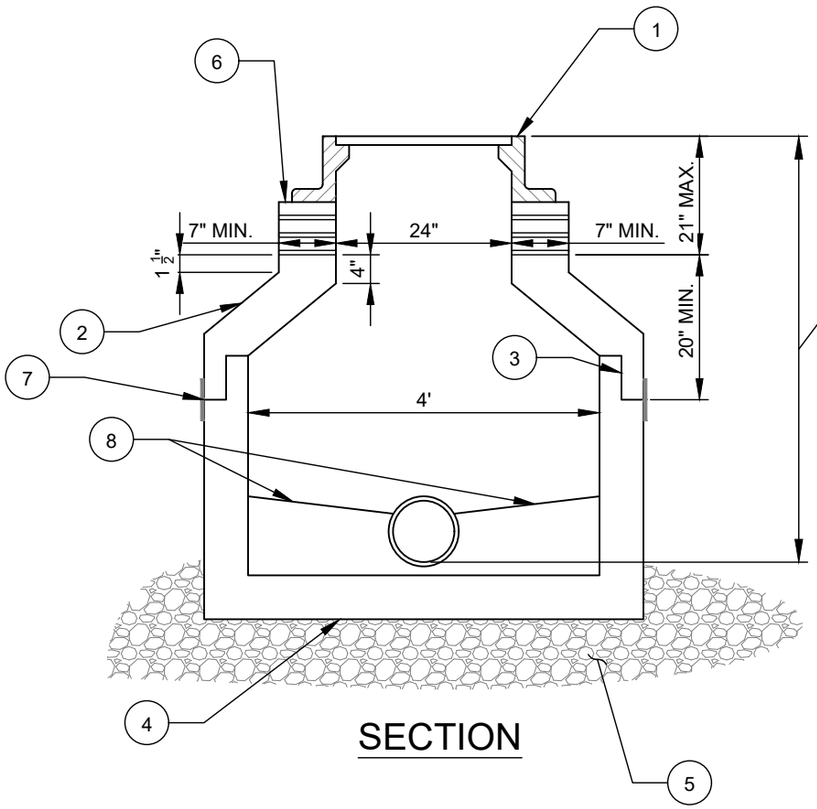
VERSION
1.0

DATE
04/2024

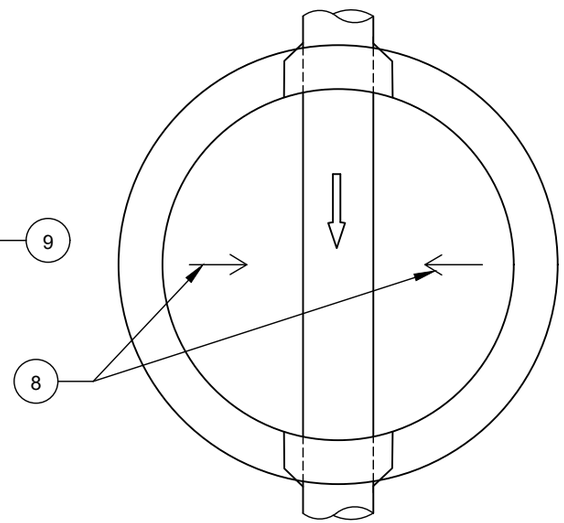
DETAIL
11.2.8



JOINT DETAIL



SECTION



PLAN

NO.	DESCRIPTION:
1.	CLTW STANDARD FRAME AND COVER.
2.	CONCENTRIC CONCRETE CONE SECTION.
3.	JOINT.
4.	MIN. 6" CONCRETE BASE.
5.	6" MIN. #57 STONE BASE, SUITABLE BEARING CAPACITY AS APPROVED BY GEOTECHNICAL ENGINEER.
6.	PRECAST CONCRETE, RUBBER, OR EPP GRADE RINGS PER TECHNICAL SPECIFICATIONS.
7.	6" (MIN.) WIDE BUTYL RUBBER JOINT WRAP REQUIRED ON EXTERIOR OF ALL JOINTS.
8.	THE SHELF SHALL SLOPE 1" PER FOOT (MIN.) FROM THE MANHOLE WALL TO THE TROUGH.
9.	5' MAX. (FROM RIM TO INVERT).
10.	BUTYL RUBBER JOINT SEALANT-2 FULL CIRCLES EACH JOINT COMPRESSED (TYP.). USED BETWEEN PRECAST SECTIONS AND FRAME.

NOTES:

A. MANHOLE TO CONFORM TO ASTM C478 EXCEPT AS MODIFIED BELOW.

B. MANHOLE BASE TO BE REINFORCED WITH A MINIMUM AREA OF 0.20 SQ. IN. PER LINEAR FOOT EACH WAY. WALL REINFORCING TO BE A MINIMUM OF 0.12 SQ. IN. PER LINEAR FOOT. EITHER TONGUE OR GROOVE OF JOINTS SHALL HAVE REINFORCING EQUAL IN AREA TO MINIMUM OF WALL SECTION.

C. ALL JOINTS SHALL CONFORM TO ASTM C443.

D. ALL PIPE OPENINGS TO BE NO GREATER THAN 4" LARGER THAN O.D. OF PIPE AND ADDITIONALLY REINFORCED WITH A MINIMUM OF 0.20 SQ. IN. OF STEEL AT 90°. ADDITIONAL REINFORCING NOT REQUIRED FOR CORED OPENINGS.

E. ALL SURFACES SHALL BE SMOOTH, EVEN TEXTURED WITH A MINIMUM OF HONEYCOMB, FINS AND IMPERFECTIONS.

F. PENETRATING LIFTING HOLES SHALL BE PLUGGED WITH EXPANSION GROUT OR HAVE WATERTIGHT PLASTIC INSERTS.

G. SEE CLTW 4' DIAMETER MANHOLE STANDARD DETAIL FOR ADDITIONAL REQUIREMENTS.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

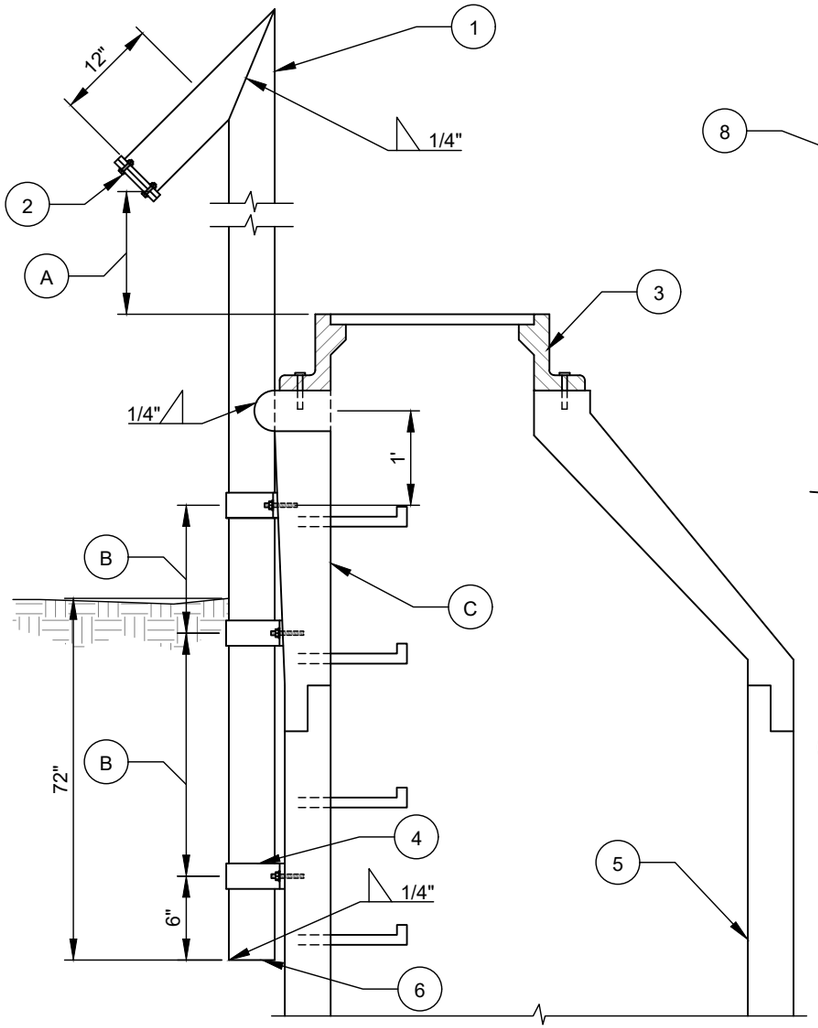
PRECAST SHORT MANHOLE - 4' DIAMETER

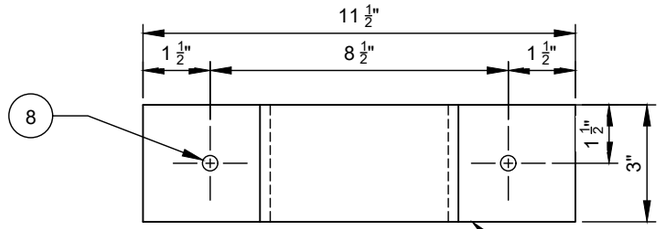
NO SCALE

VERSION 1.0

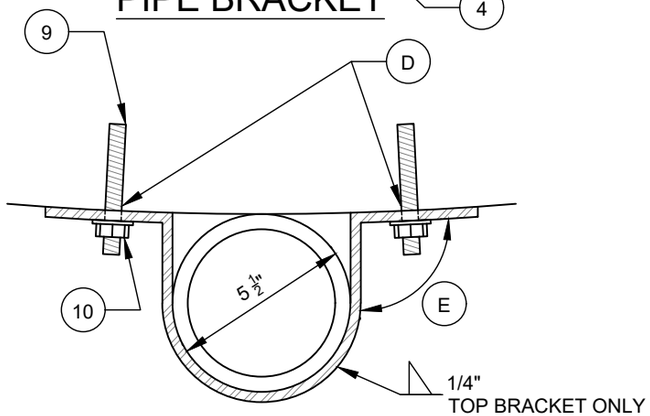
DATE 04/2024

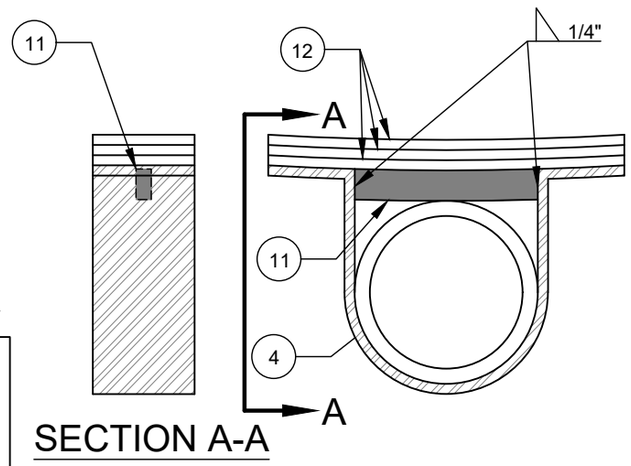
DETAIL 11.2.9



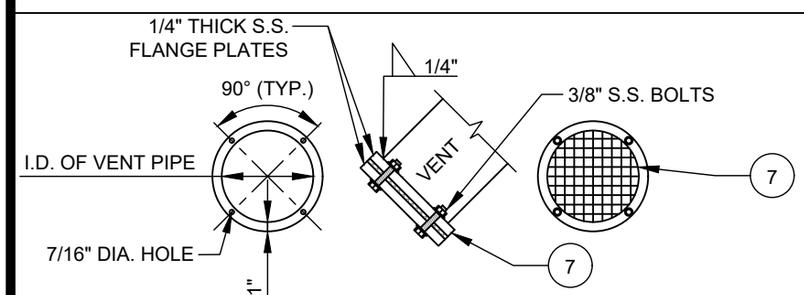


PIPE BRACKET





SECTION A-A



BOLT ON BIRD SCREEN

NO.	DESCRIPTION:
1.	5" DIAMETER STEEL PIPE.
2.	SEE BOLT ON BIRD SCREEN DETAIL THIS SHEET.
3.	WATERTIGHT FRAME AND COVER (BOLTED DOWN).
4.	PIPE BRACKET FABRICATED FROM 1/4" STEEL PLATE (SEE THIS SHEET).
5.	PRECAST CONCRETE MANHOLE.
6.	1/4" STEEL PLUG.
7.	TYPE 316 STAINLESS STEEL MESH BIRD SCREEN BOLTED BETWEEN TWO STAINLESS STEEL PLATES AND WELDED TO VENT PIPE AS SHOWN. USE ALL TYPE 316 STAINLESS STEEL BOLTS, NUTS AND WASHERS. SCREEN SHALL BE CONSTRUCTED OF 1/4" STAINLESS STEEL MESH BIRD SCREEN (WIRE DIAMETER 0.047").
8.	11/16" DIAMETER HOLES DRILLED AS SHOWN.
9.	5/8" x 4" TYPE 316 S.S. ALL THREAD ROD.
10.	TYPE 316 STAINLESS STEEL NUT AND WASHER WITH ANTI-SEIZE COMPOUND.
11.	1/4" TYPE 304 STAINLESS STEEL SPACER PLATE.
12.	1/4" TYPE 304 STAINLESS STEEL WASHER PLATES TO PLUMB VENT.

NOTES:

A. 2' ABOVE 100 YEAR FLOOD ELEV. OR 6' ABOVE FRAME (WHICHEVER IS GREATER).

B. 1'-3" (MAX SPACING). AVOID PLACING PIPE BRACKET AT MANHOLE JOINTS OR STEPS. MINIMUM OF 3 PIPE BRACKETS REQUIRED PER VENT PIPE.

C. STEPS AND VENT INSTALLED ON STRAIGHT WALL OF MANHOLE.

D. USE EPOXY ADHESIVE, IN CLEANED DRILLED HOLE.

E. ANGLE AS REQUIRED TO SEAT SQUARELY ON MANHOLE.

F. VENT SHALL BE ON STRAIGHT WALL SIDE AND POINT DOWNSTREAM.

G. VENT AND BRACKETS SHALL BE PAINTED PER SPECS. VENT SHALL HAVE FACTORY APPLIED INTERIOR LINING.

H. ALL THREAD ROD, WASHER, AND NUT SHALL BE STAINLESS STEEL.

I. ACCORDING TO THE TYPE OF PRECAST MANHOLE, WASHER SPACERS MAY BE REQUIRED ON LOWER BRACKETS. VENT SHALL BE PLUMB AND STRAPS SHALL PULL VENT TIGHT AGAINST THE MANHOLE WALL.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

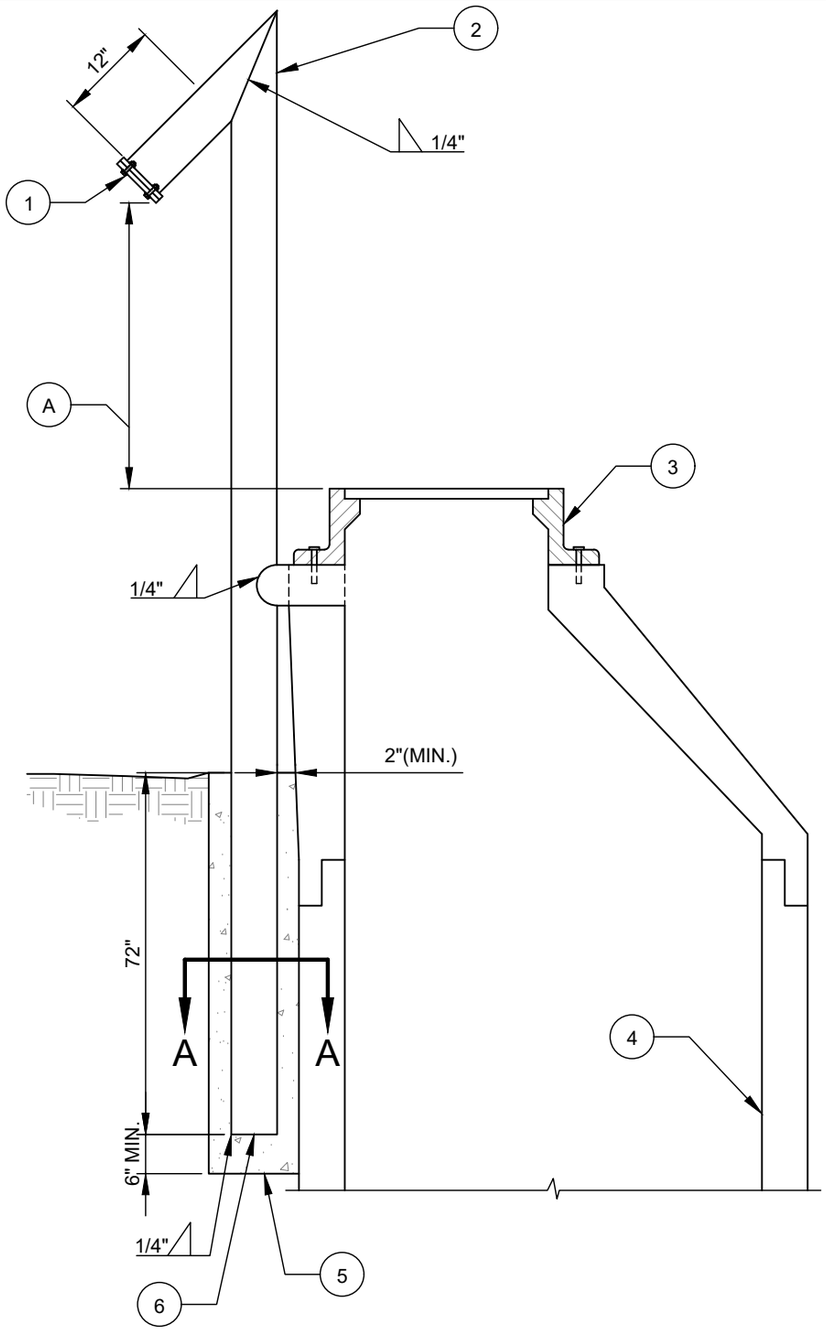
VENT PIPE - PRECAST MANHOLE

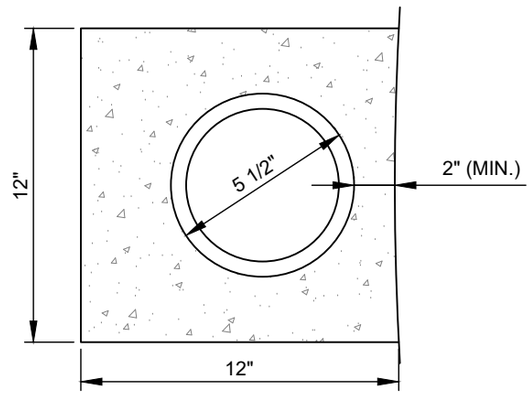
NO SCALE

VERSION 1.0

DATE 04/2024

DETAIL 11.2.10





SECTION A-A

NO. DESCRIPTION:

1. BOLT ON BIRD SCREEN. SEE DETAIL THIS SHEET.
2. 5" DIAMETER STEEL PIPE.
3. WATERTIGHT FRAME AND COVER (BOLTED DOWN).
4. FIBERGLASS OR POLYMER CONCRETE MANHOLE.
5. 3,600 P.S.I. CONCRETE FLUSH WITH GRADE.
6. STEEL PLUG.
7. TYPE 316 STAINLESS STEEL BIRD SCREEN BOLTED BETWEEN TWO STAINLESS STEEL PLATES AND WELDED TO VENT PIPE AS SHOWN. USE ALL TYPE 316 STAINLESS STEEL BOLTS, NUTS AND WASHERS.

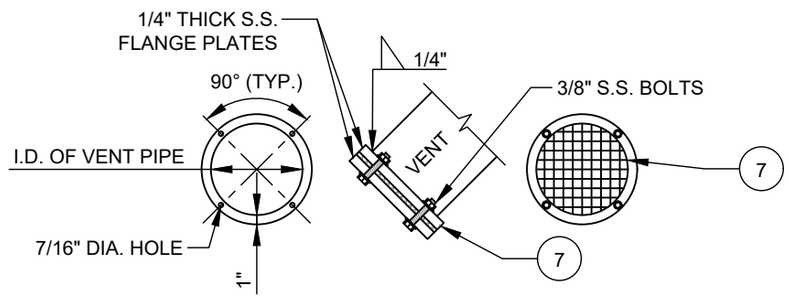
NOTES:

A. 2' ABOVE 100 YEAR FLOOD ELEVATION OR 6' ABOVE FRAME (WHICHEVER IS GREATER).

B. VENT SHALL BE ON STRAIGHT WALL SIDE AND POINT DOWNSTREAM.

C. VENT SHALL BE PAINTED PER SPECS. VENT SHALL HAVE FACTORY APPLIED INTERIOR LINING.

D. STAINLESS STEEL BIRD SCREEN BOLTED BETWEEN TWO STAINLESS STEEL PLATES AND WELDED TO VENT PIPE AS SHOWN. USE ALL STAINLESS STEEL BOLTS, NUTS, AND WASHERS. SCREEN SHALL BE SIZED TO FIT AND INSTALLED SECURELY INSIDE THE HUB OR COUPLING OF THE VENT PIPE. SCREEN SHALL BE CONSTRUCTED OF 1/4" STAINLESS STEEL MESH BIRD SCREEN (WIRE DIAMETER 0.047").



BOLT ON BIRD SCREEN

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

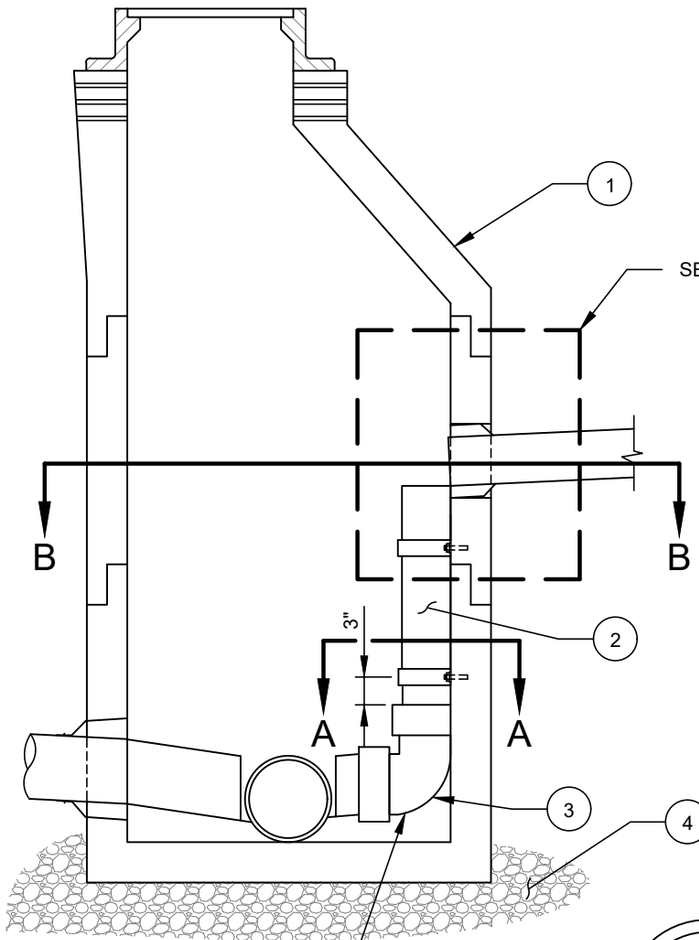
MANHOLE VENT PIPE - FIBERGLASS OR POLYMER CONCRETE MANHOLES

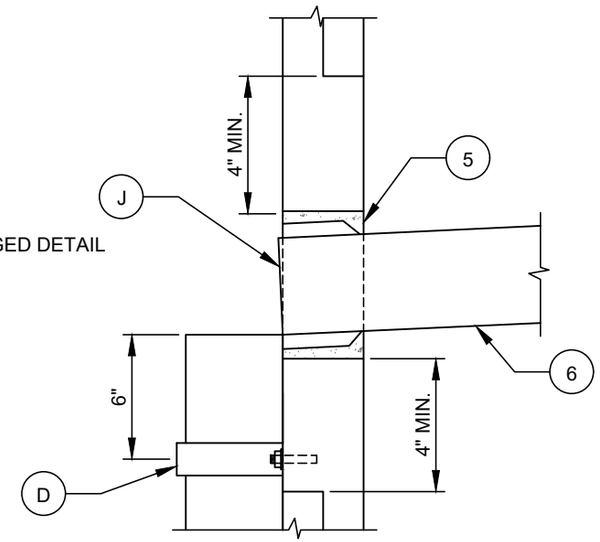
NO SCALE

VERSION 1.0

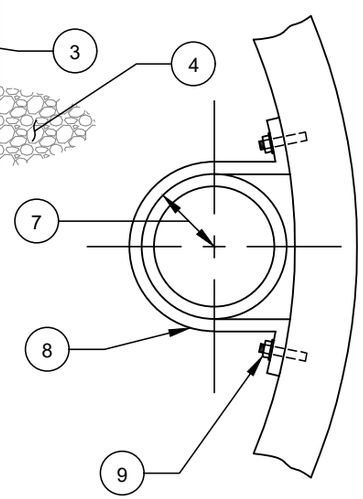
DATE 04/2024

DETAIL 11.2.11

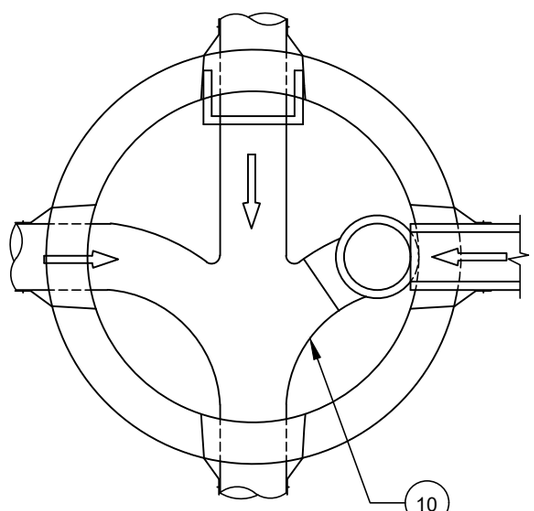




ENLARGED DETAIL



SECTION A-A



SECTION B-B

NO.	DESCRIPTION:
1.	MANHOLE - MIN. 5' DIAMETER.
2.	SCH 40 PVC VERTICAL STANDPIPE. SEE NOTE A.
3.	SCH 40 PVC 90° BEND. SEE NOTE C.
4.	6" MINIMUM OF #57 STONE BASE, SUITABLE BEARING CAPACITY AS APPROVED BY GEOTECHNICAL ENGINEER.
5.	RUBBER MANHOLE/PIPE CONNECTOR BOOT. GROUT IN WITH NON SHRINK GROUT.
6.	MINIMUM 18" LINEAR FEET DIP OR TO UNDISTURBED SUPPORT SOIL.
7.	R = 1/2 O.D. PIPE BARREL.
8.	1/4" X 2" TYPE 304 STAINLESS STEEL STRAP. STRAP SHALL PULL PIPE TIGHT AGAINST THE MANHOLE WALL.
9.	1/2" DIAMETER X 3" TYPE 316 S.S. ALL THREAD ANCHOR W/ S.S. NUT AND WASHER. USE EPOXY IN CLEANED DRILLED HOLE.
10.	RESHAPE INVERT.

NOTES:

A. DROP PIPE AND FITTING SHALL BE ONE PIPE SIZE LARGER THAN INFLUENT PIPE (IE. 4" INFLUENT PIPE REQUIRES 6" DROP PIPE AND FITTINGS).

B. PVC PIPE SHALL BE SCH 40 DWV PER ASTM D2665. PVC FITTINGS SHALL BE SCH 40 DWV MOLDED FITTINGS. PVC PIPE AND FITTINGS SHALL BE SOLVENT WELD.

C. BEND SHALL BE BELL X BELL AND SHALL REST ON CUT INTO THE BENCH. GROUT BEND INTO THE TROUGH. MATCH CROWNS UNLESS THE PIPE IS THE SAME DIAMETER. IF SAME DIAMETER, THEN A DROP OF 0.2' ACROSS INVERTS SHALL BE PROVIDED.

D. LOCATE STRAPS AS SHOWN AT PIPE ENDS. ADD ADDITIONAL STRAPS AS NECESSARY TO MAINTAIN MAXIMUM SPACING OF 5'.

E. HOLE IN MANHOLE WALL SHALL BE MADE USING A CORING MACHINE. INSTALL WATERTIGHT RUBBER MANHOLE PIPE CONNECTOR BOOT.

F. CORE HOLE SHALL NOT ENTER CONE SECTION, OR PENETRATE MANHOLE JOINTS. PROVIDE A MINIMUM 4" CLEAR.

G. STEPS SHALL BE RELOCATED IF THEY CONFLICT WITH THE DROP PIPE.

H. CONE SECTION SHALL BE ROTATED IF NEEDED TO ALIGN STEPS. MAXIMUM OF 2 INSIDE DROPS IN A MANHOLE, UNLESS APPROVED BY CHARLOTTE WATER.

I. MAXIMUM DROP HEIGHT SHALL BE 10'.

J. DIP SHALL END AT THE INSIDE FACE OF THE VERTICAL STANDPIPE.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

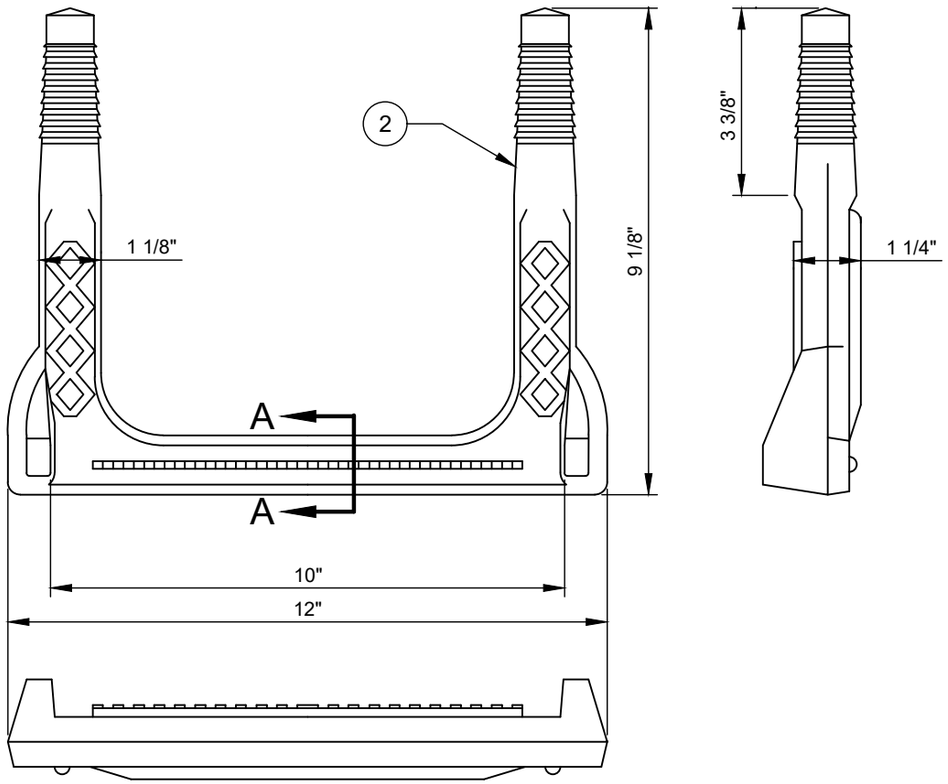
4" THROUGH 12" DIA. INSIDE DROP IN 5 FT. AND LARGER MANHOLE ONLY

NO SCALE

VERSION 1.0

DATE 04/2024

DETAIL 11.2.12



PLASTIC STEP

NO.	DESCRIPTION:
1.	1/2" GRADE 60 STEEL REINFORCEMENT.
2.	COPOLYMER POLYPROPYLENE PLASTIC.

NOTES:

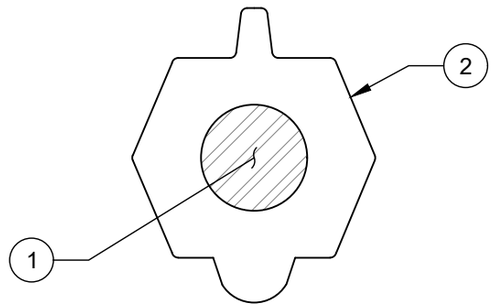
A. MANHOLES STEPS SHALL BE MODEL PS1-PF AS MANUFACTURED BY MA INDUSTRIES, ML-10-NCR BY AMERICAN STEP COMPANY, 93810R BY BOWCO INDUSTRIES, OR APPROVED EQUAL.

B. STEPS MAY BE BLACK, ORANGE, OR GLOW IN THE DARK.

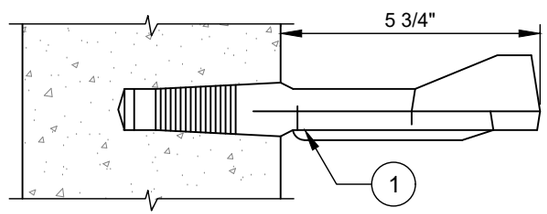
C. STEPS ARE TO BE DRIVEN INTO TAPERED HOLES IN PRECAST MANHOLE SECTIONS. DO NOT USE AS A GROUTED-IN STEP.

D. MIN. RUNG WIDTH IS 10".

E. 1,000 LB. PULL OUT TEST REPORT REQUIRED ON EACH STEP.



SECTION A-A



SIDE VIEW OF STEP IN MANHOLE WALL

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS

GRAVITY SEWER

PLASTIC STEP PRECAST FORMED HOLE DRIVEN IN PLACE

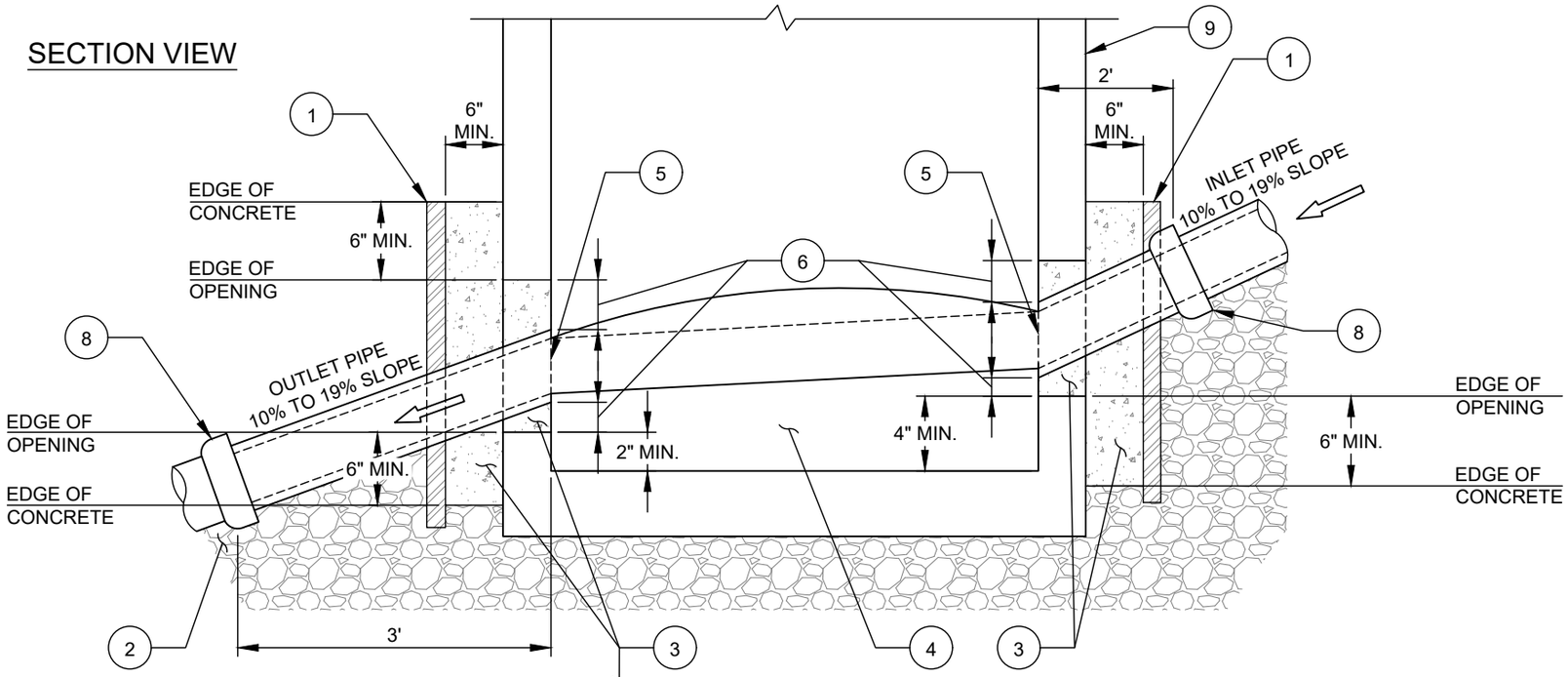
NO SCALE

VERSION
1.0

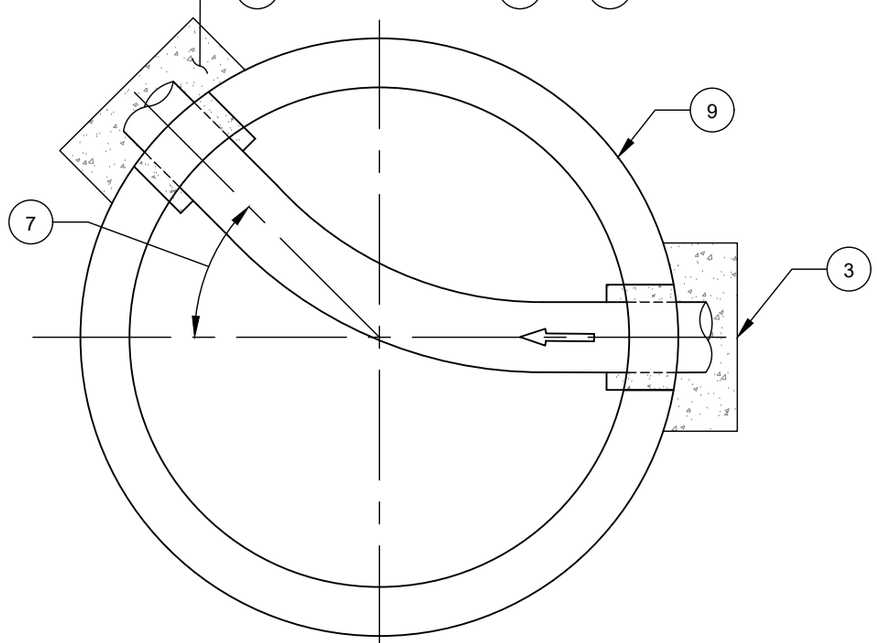
DATE
04/2024

DETAIL
11.2.13

SECTION VIEW



PLAN VIEW



NO.	DESCRIPTION:
1.	PROVIDE FORM FOR CONCRETE. LUMBER MAY REMAIN IN-PLACE.
2.	WASHED STONE (#57) BEDDING.
3.	MONOLITHIC CONCRETE POUR.
4.	CONCRETE CHANNEL.
5.	CUT PIPE AT ENTRY ANGLE.
6.	ANNULAR SPACE BETWEEN PIPE AND MANHOLE OPENING (MINIMUM 2", MAXIMUM 4").
7.	MAXIMUM DEFLECTION ANGLE OF 45 DEGREES.
8.	REQUIRED PIPE JOINT.
9.	PRECAST MANHOLE BASE SECTION.

NOTES:

A. USE THIS DETAIL FOR 8" SEWER PIPE CONNECTIONS TO MANHOLES WHEN SLOPE OF PIPE IS GREATER THAN 10% BUT NOT GREATER THAN 19%.

B. OPENINGS IN MANHOLE SHALL BE IN ACCORDANCE WITH MANHOLE MANUFACTURERS PRE-APPROVED SUBMITTALS AND SIZED TO ACCOMMODATE SEWER PIPE AND ANNULAR SPACE. ENLARGEMENT OF THE HOLE IN THE FIELD WILL BE PERMITTED BY THE MANHOLE MANUFACTURER ONLY.

C. DO NOT PROVIDE FLEXIBLE MANHOLE BOOT CONNECTIONS WHEN THE SLOPE IS GREATER THAN 10 PERCENT.

D. USE ONLY DUCTILE IRON PIPE WITH SPECIAL INTERIOR LINING, SEE SPECIFICATIONS, OR AWWA C900 DR 25 SOLID WALL PVC PIPE.

E. PIPE INVERT ELEVATIONS AT THE MANHOLES ARE SHOWN ON THE CONSTRUCTION PLANS.

F. SLOPE ACROSS THE MANHOLE CHANNEL MAY BE 2 INCHES TO 6 INCHES.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

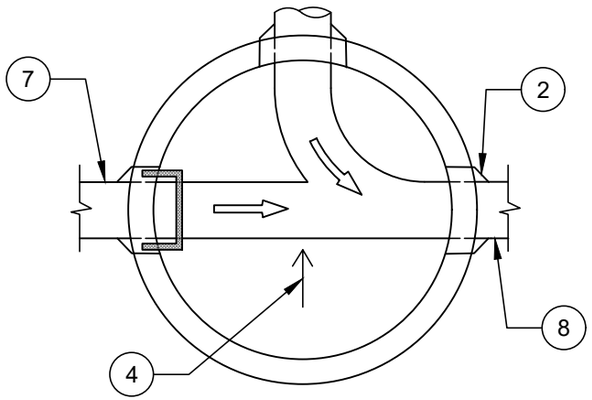
PIPE TO MANHOLE CONNECTION FOR 8-INCH PIPES ON STEEP SLOPES BETWEEN 10% AND 19%

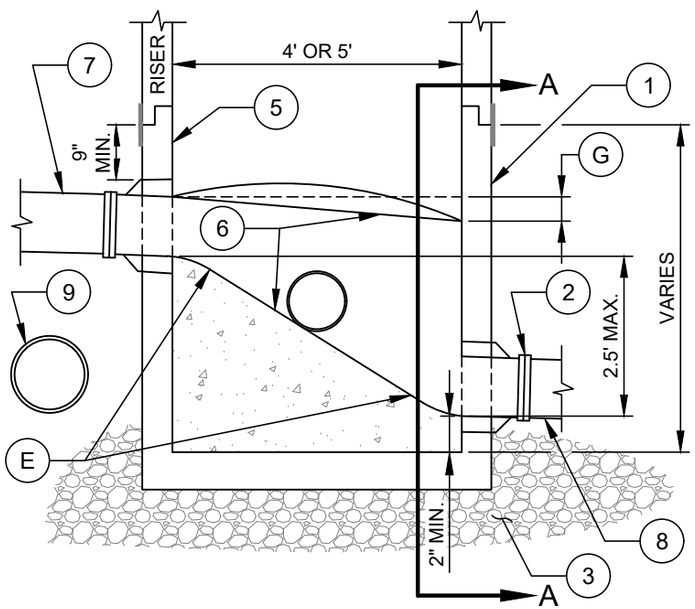
NO SCALE

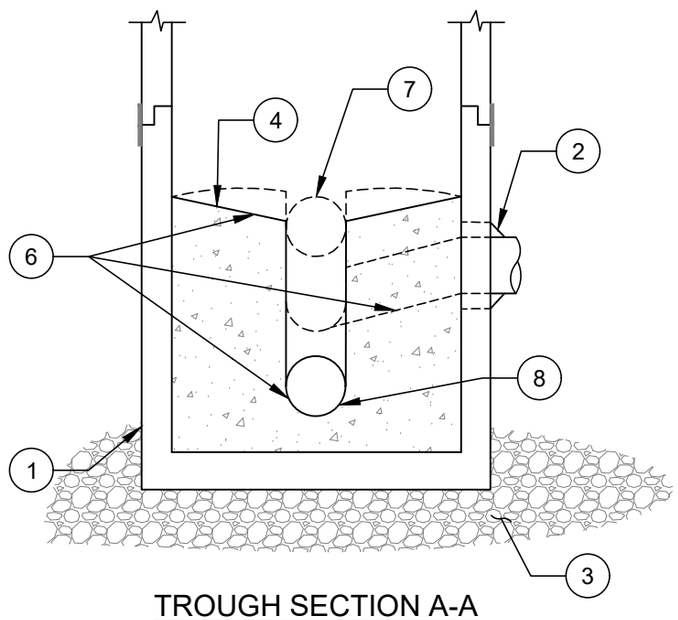
VERSION 1.0

DATE 04/2024

DETAIL 11.2.14







TROUGH SECTION A-A

NO. DESCRIPTION:

1. MANHOLE BASE SECTION.
2. FLEXIBLE COUPLING INSTALLED IN CORED HOLE WITH STAINLESS STEEL COMPRESSION DEVICE.
3. MINIMUM 6" DEPTH OF #57 STONE BASE, SUITABLE BEARING CAPACITY AS APPROVED BY GEOTECHNICAL ENGINEER.
4. 1 INCH PER FOOT FALL (TYP.). THE SHELF SHALL SLOPE 1 INCH PER FOOT (MIN.) FROM THE MANHOLE WALL TO THE TROUGH.
5. STRAIGHT WALL OF MH TO BE LOCATED OVER INFLUENT PIPE (FOR A 4' DIA. MH) AND OVER WIDEST SHELF (FOR 5' DIA. MH).
6. PRECAST CONCRETE (3600 PSI) INVERT/SHELF OR CAST ON SITE.
7. DUCTILE IRON INLET PIPE.
8. OUTLET PIPE.
9. UTILITY CONFLICT.

NOTES:

A. THIS DETAIL SHALL ONLY BE USED WHEN AN INSIDE DROP IS NOT POSSIBLE AND A STEEP SLOPE INVERT IS APPROVED BY THE ENGINEER.

B. THIS DETAIL SHALL ONLY BE USED DUE TO A UTILITY CONFLICT AND WHEN APPROVED BY THE ENGINEER.

C. THIS DETAIL SHALL NOT BE USED WHEN THE CHANGE IN INVERT ELEVATION IS 2.5 FT OR GREATER. REFER TO THE INSIDE DROP STANDARD DETAIL.

D. MANHOLE TO CONFORM WITH ASTM C478 EXCEPT AS MODIFIED. REFER TO MANHOLE STANDARD DETAILS FOR ALL MANHOLE REQUIREMENTS.

E. THE TROUGH SHALL INCLUDE VERTICAL CURVES AS SHOWN AT THE INLET AND OUTLET PIPES TO PROVIDE LAMINAR WATER FLOW.

F. INVERTS TO BE PRECAST CONCRETE OR CAST ON SITE.

G. THE MAXIMUM SHELF DROP ACROSS THE MANHOLE FROM THE INLET PIPE TO THE OUTLET PIPE SHALL BE 5 INCHES.

H. THIS DETAIL SHALL ONLY BE USED WITH 8 INCH PIPE.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

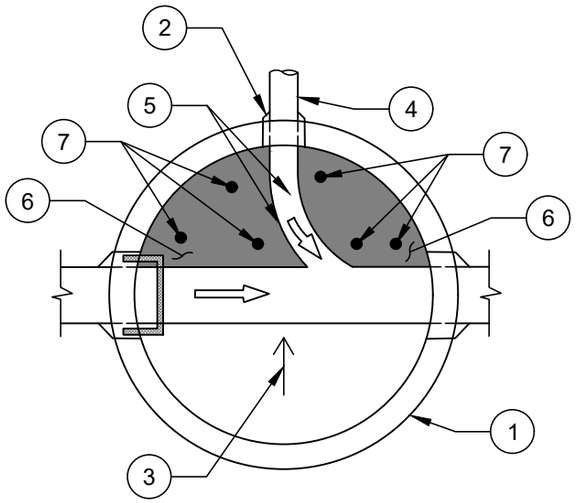
STEEP SLOPE INVERT MANHOLE DUE TO UTILITY CONFLICT

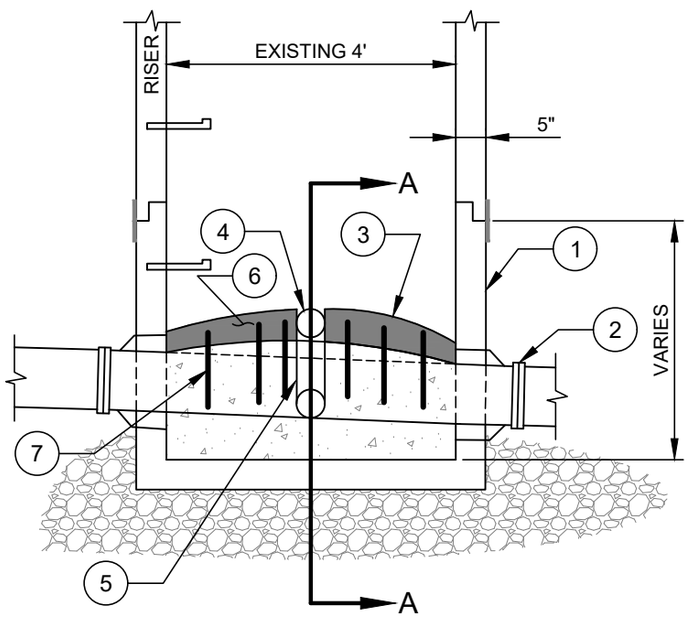
NO SCALE

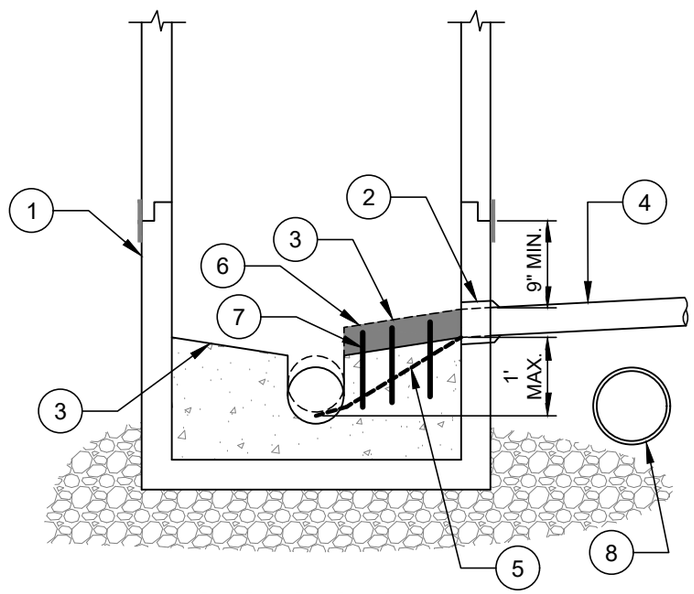
VERSION 1.0

DATE 04/2024

DETAIL 11.2.15







TROUGH SECTION A-A

NO. DESCRIPTION:

1. EXISTING MANHOLE BASE SECTION.
2. FLEXIBLE COUPLING INSTALLED IN CORED HOLE WITH STAINLESS STEEL COMPRESSION DEVICE.
3. 1 INCH PER FOOT FALL (TYP.). THE SHELF SHALL SLOPE 1 INCH PER FOOT (MIN.) FROM THE MANHOLE WALL TO THE TROUGH.
4. 4", 6", OR 8" DUCTILE IRON LATERAL CONNECTION.
5. NEW INVERT TROUGH CUT INTO EXISTING SHELF.
6. NEW CAST IN PLACE CONCRETE (3600 PSI) SHELF.
7. SIX (6) #3 REBARS, GROUTED (OR EPOXIED) IN EXISTING SHELF, MIN. 6" DEEP DRILLED HOLES. EXTEND REBARS TO WITHIN 2 INCHES OF NEW SHELF SURFACE.
8. UTILITY CONFLICT.

NOTES:

A. THIS DETAIL SHALL ONLY BE USED WHEN AN INSIDE DROP IS NOT POSSIBLE AND A STEEP SLOPE INVERT IS APPROVED BY THE ENGINEER.

B. THIS DETAIL SHALL ONLY BE USED DUE TO A UTILITY CONFLICT AND WHEN APPROVED BY THE ENGINEER.

C. THIS DETAIL SHALL NOT BE USED WHEN THE CHANGE IN INVERT ELEVATION IS GREATER THAN ONE FOOT. REFER TO THE INSIDE DROP STANDARD DETAIL.

D. MANHOLE TO CONFORM WITH ASTM C478 EXCEPT AS MODIFIED. REFER TO MANHOLE STANDARD DETAILS FOR ALL MANHOLE REQUIREMENTS.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

LATERAL STEEP SLOPE INVERT DUE TO UTILITY CONFLICT

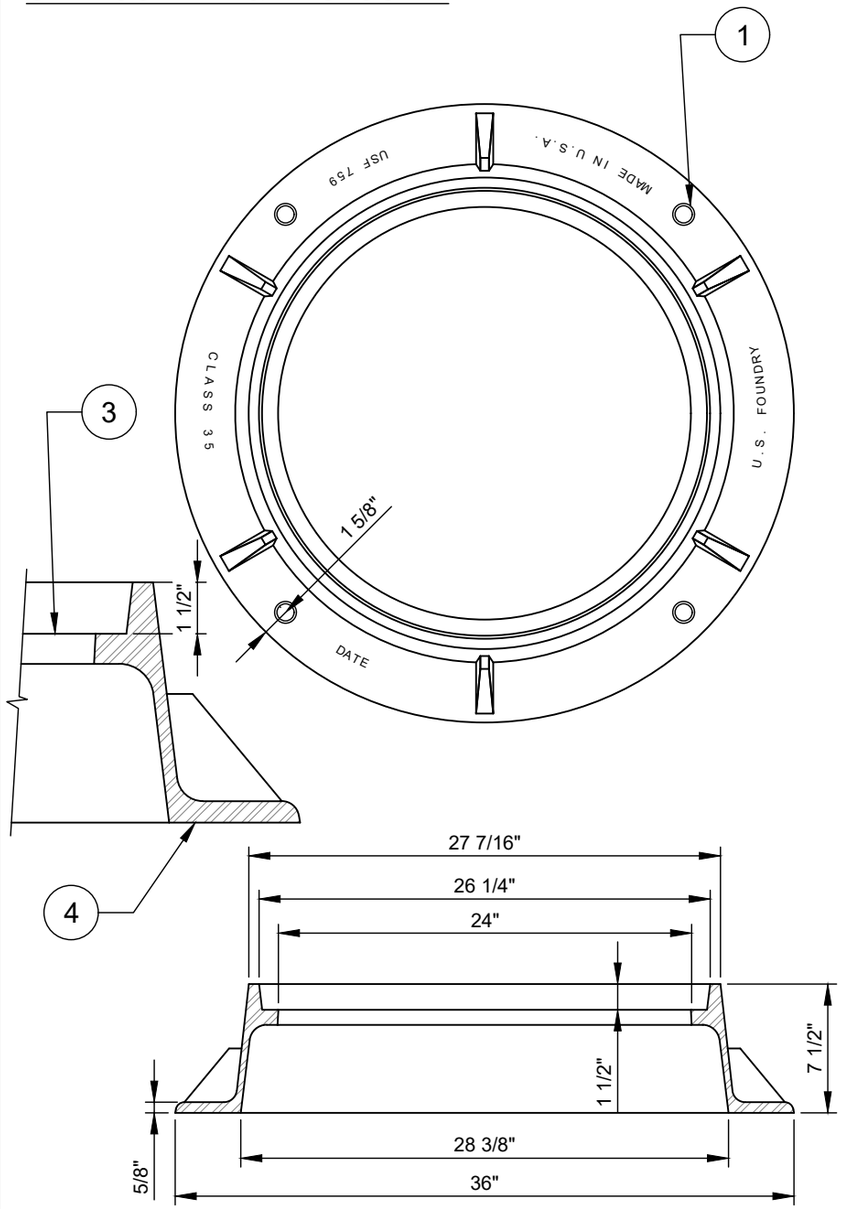
NO SCALE

VERSION 1.0

DATE 04/2024

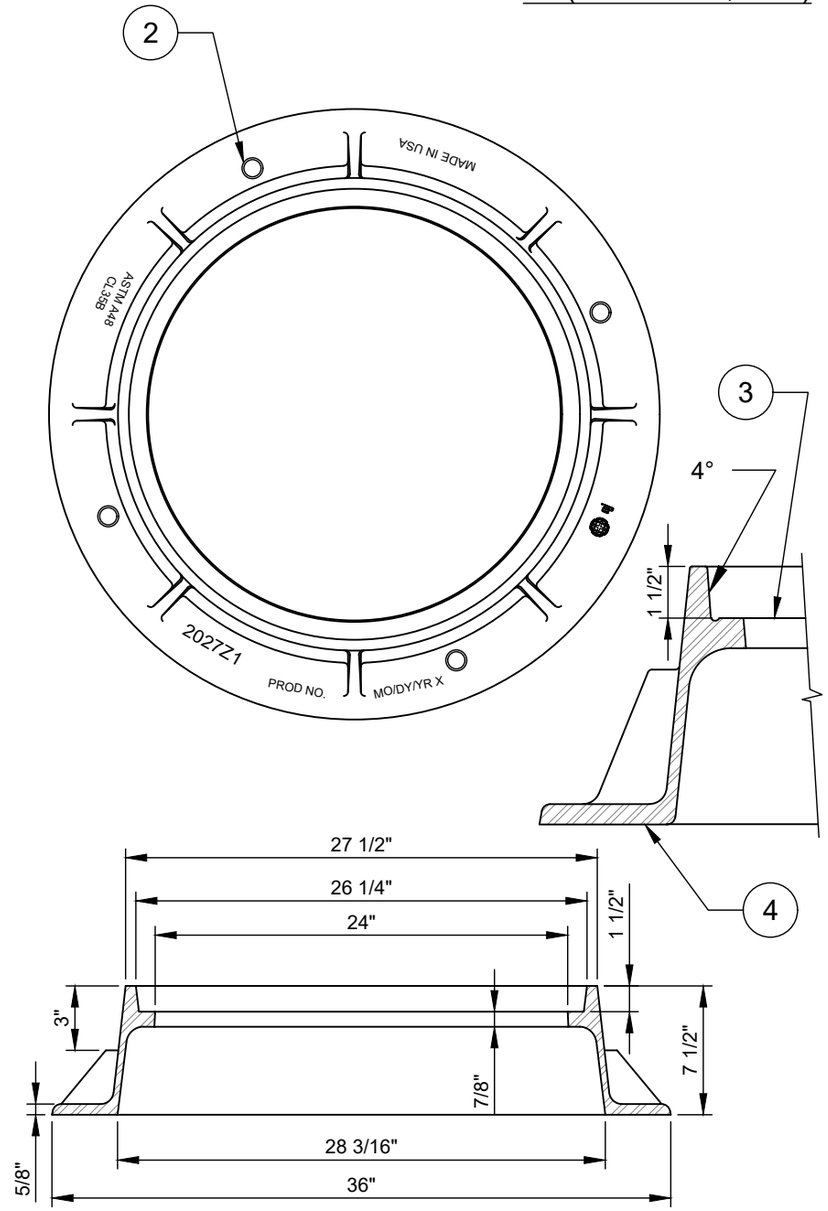
DETAIL 11.2.16

U.S. FOUNDRY & MFG. CORP.



WEIGHT - 170 LB. MIN., 0% MINUS TOLERANCE

EJ (EJ GROUP, INC.)



WEIGHT - 173 LB. MIN., 0% MINUS TOLERANCE

NO.	DESCRIPTION:
1.	(4) - 1 INCH DIAMETER ANCHOR HOLES ON A 32 3/4" DIAMETER B.C.D.
2.	(4) - 1 INCH DIAMETER ANCHOR HOLES ON A 31" DIAMETER B.C.D.
3.	MACHINED SURFACE.
4.	FRAME.

NOTES:

A. LOAD RATING - HEAVY DUTY.

B. MATERIAL - ASTM A48 - CLASS 35 GRAY IRON.

C. COATING - UNDIPPED.

D. FRAME SHALL CONFORM TO DIMENSION AND WEIGHT REQUIREMENTS.

E. FRAME SHALL NOT BE OUT OF ROUND.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS

GRAVITY SEWER

TYPE A MANHOLE FRAME 24-INCHES DIAMETER (CLEAR OPENING) 7 1/2-INCHES TALL

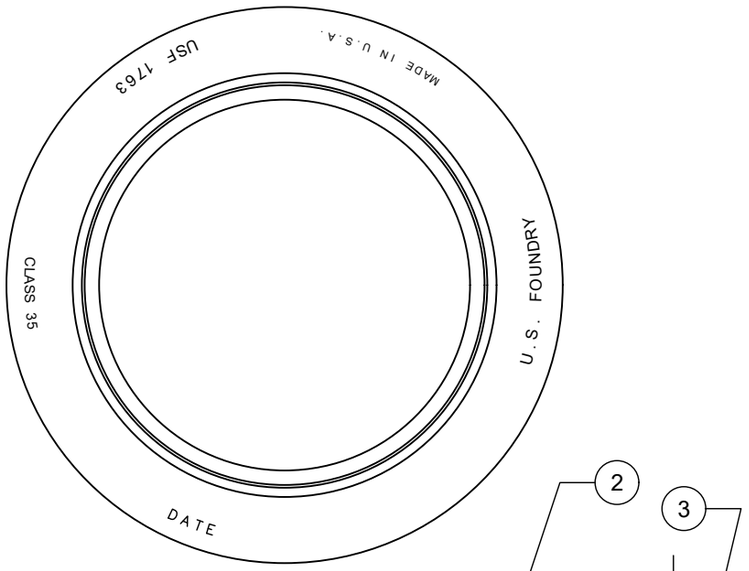
NO SCALE

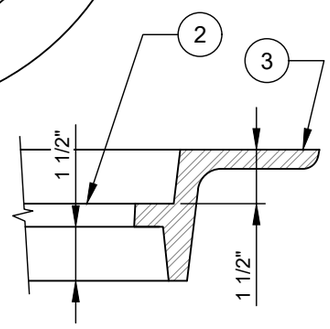
VERSION 1.0

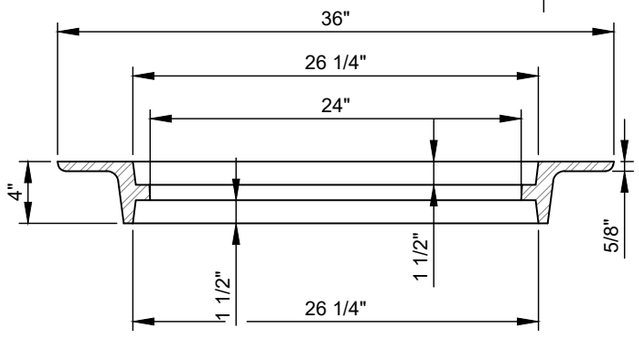
DATE 04/2024

DETAIL 11.3.1

U.S. FOUNDRY & MFG. CORP.

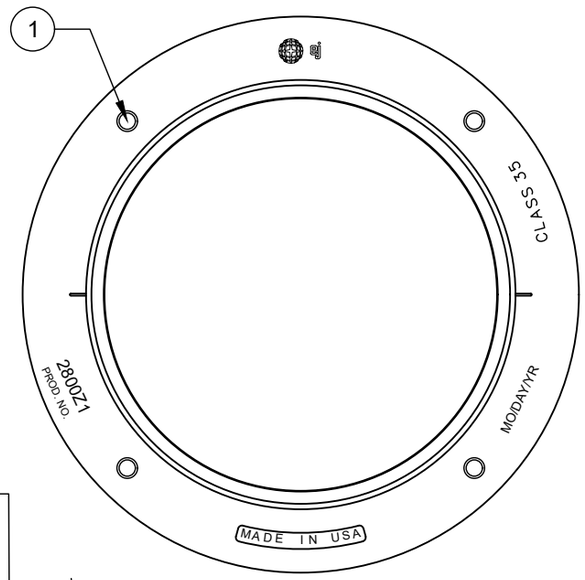


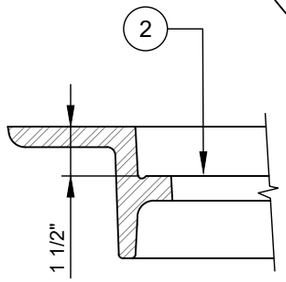


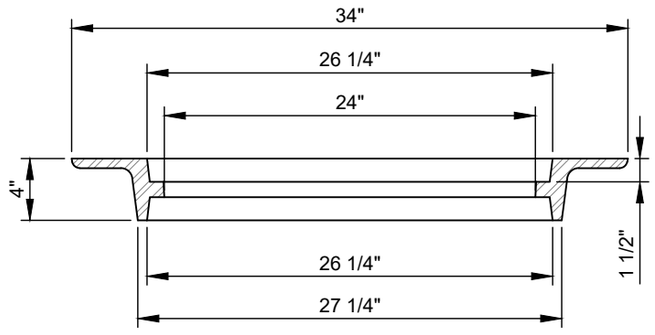


WEIGHT - 150 LB. MIN., 0% MINUS TOLERANCE

EJ (EJ GROUP, INC.)







WEIGHT - 121 LB. MIN., 0% MINUS TOLERANCE

NO.	DESCRIPTION:
1.	(4) -1 INCH DIAMETER ANCHOR HOLES ON A 31" DIAMETER B.C.D.
2.	MACHINED SURFACE.
3.	FRAME.

NOTES:

A. LOAD RATING - HEAVY DUTY.

B. MATERIAL - ASTM A48 - CLASS 35 GRAY IRON.

C. COATING - UNDIPPED.

D. FRAME SHALL CONFORM TO DIMENSION AND WEIGHT REQUIREMENTS.

E. FRAME SHALL NOT BE OUT OF ROUND.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS

GRAVITY SEWER

TYPE C MANHOLE FRAME
24-INCHES DIAMETER (CLEAR OPENING)
4-INCHES TALL - INVERTED (CAST IN)

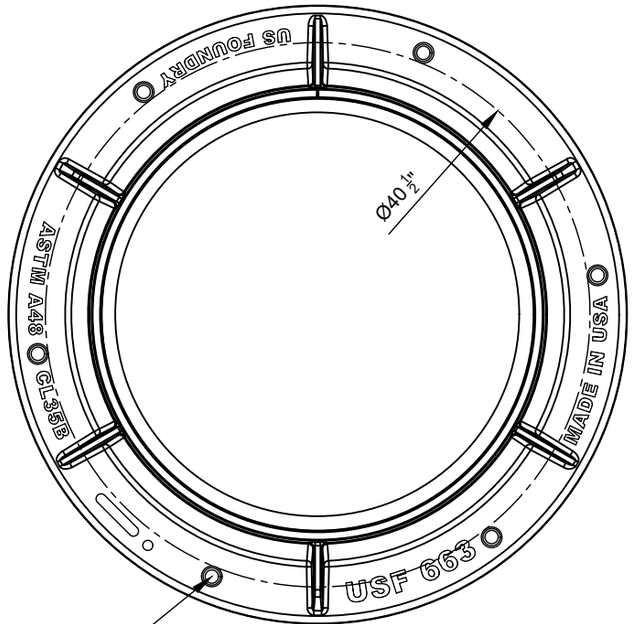
NO SCALE

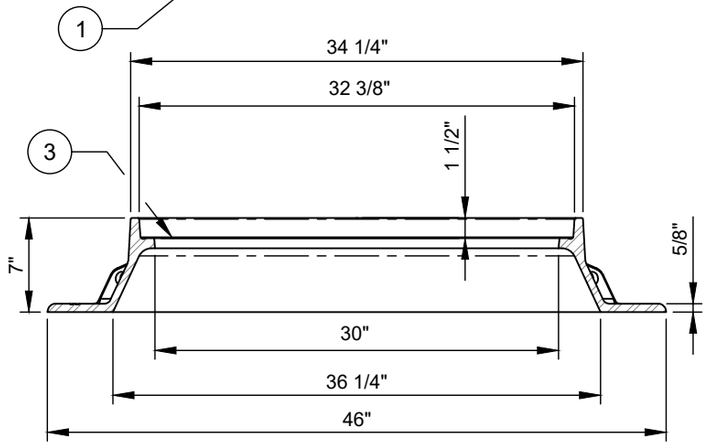
VERSION
1.0

DATE
04/2024

DETAIL
11.3.2

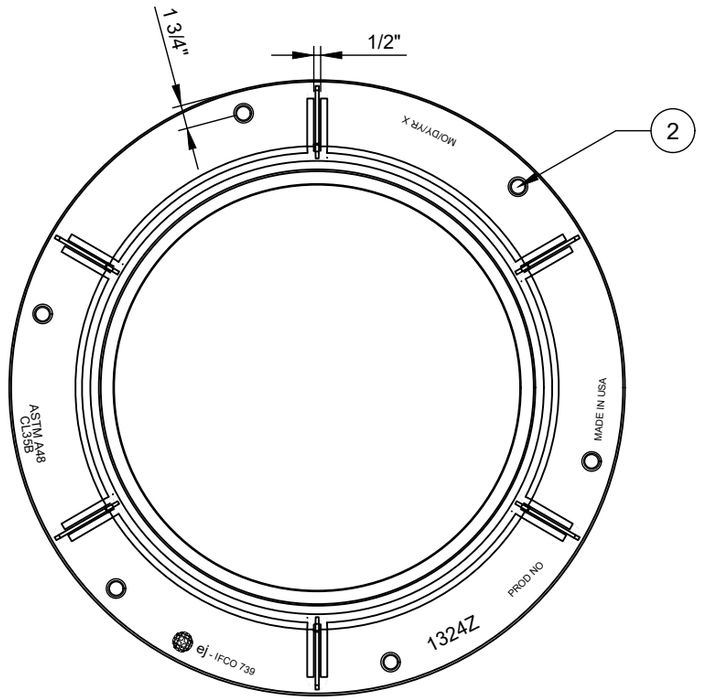
U.S. FOUNDRY & MFG. CORP.

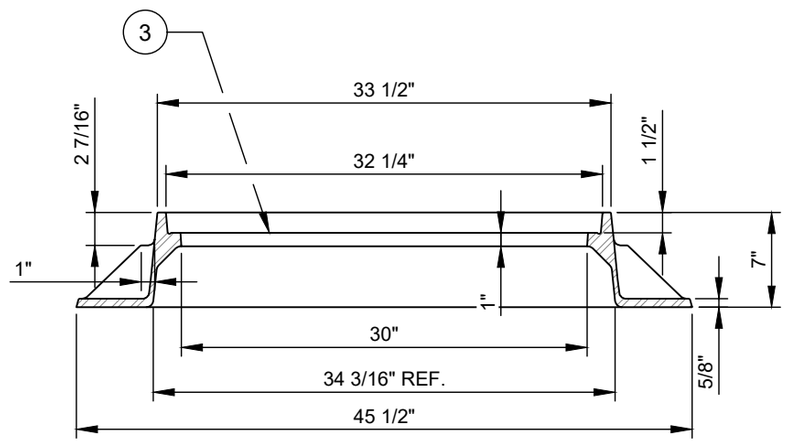




WEIGHT - 320 LB. MIN., 0% MINUS TOLERANCE

EJ (EJ GROUP, INC.)





WEIGHT - 270 LB. MIN., 0% MINUS TOLERANCE

NO.	DESCRIPTION:
1.	(6) - 1 INCH DIAMETER THRU HOLES EQUALLY SPACED ON A 41" DIAMETER B.C.D.
2.	(6) - 1 INCH DIAMETER THRU HOLES EQUALLY SPACED ON A 42" DIAMETER B.C.D.
3.	MACHINED SURFACE.

NOTES:

A. LOAD RATING - HEAVY DUTY.

B. MATERIAL - ASTM A48 - CLASS 35 GRAY IRON.

C. COATING - UNDIPPED.

D. FRAME SHALL CONFORM TO DIMENSION AND WEIGHT REQUIREMENTS.

E. FRAME SHALL NOT BE OUT OF ROUND.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

TYPE D MANHOLE FRAME
30-INCH DIAMETER (CLEAR OPENING)
7-INCHES TALL

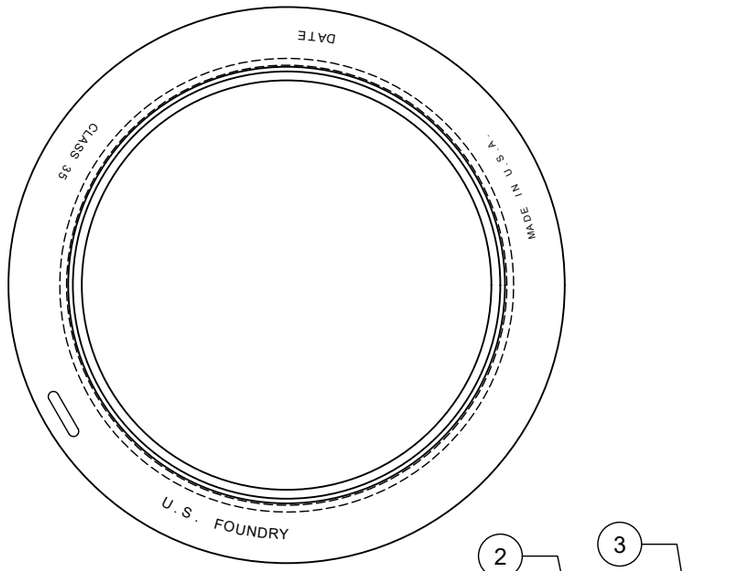
NO SCALE

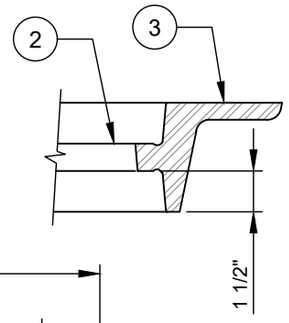
VERSION
1.0

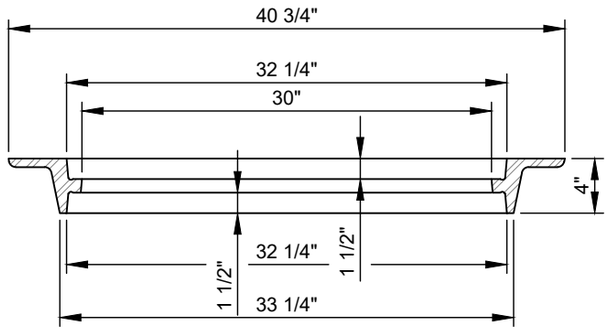
DATE
04/2024

DETAIL
11.3.3

U.S. FOUNDRY & MFG. CORP.

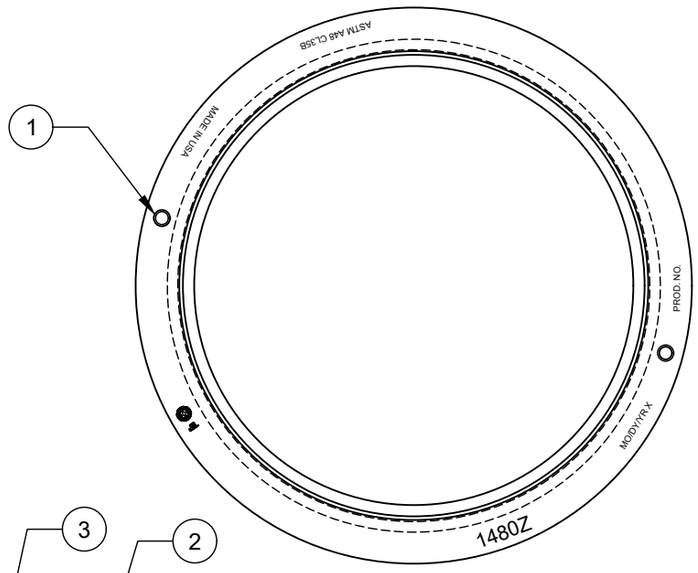


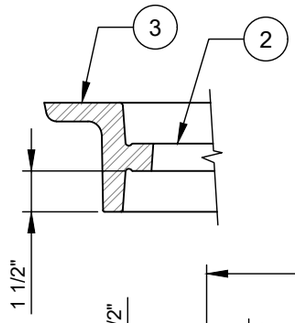


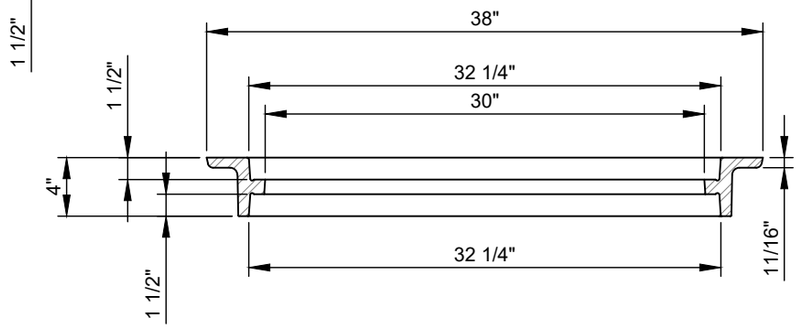


WEIGHT - 175 LB. MIN., 0% MINUS TOLERANCE

EJ (EJ GROUP, INC.)







WEIGHT - 154 LB. MIN., 0% MINUS TOLERANCE

NO.	DESCRIPTION:
1.	(2) - 1 INCH DIAMETER ANCHOR HOLES ON A 35 5/8" DIAMETER B.C.D.
2.	MACHINED SURFACE.
3.	FRAME.

NOTES:

A. LOAD RATING - HEAVY DUTY.

B. MATERIAL - ASTM A48 - CLASS 35 GRAY IRON.

C. COATING - UNDIPPED.

D. FRAME SHALL CONFORM TO DIMENSION AND WEIGHT REQUIREMENTS.

E. FRAME SHALL NOT BE OUT OF ROUND.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

TYPE E MANHOLE FRAME
30-INCHES DIAMETER (CLEAR OPENING)
4-INCHES TALL - INVERTED (CAST IN)

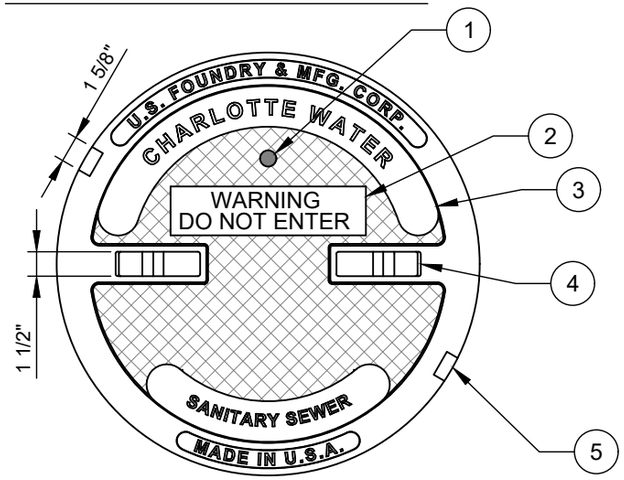
NO SCALE

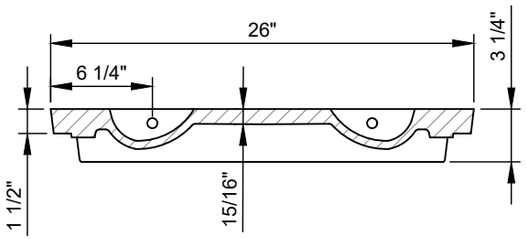
VERSION 1.0

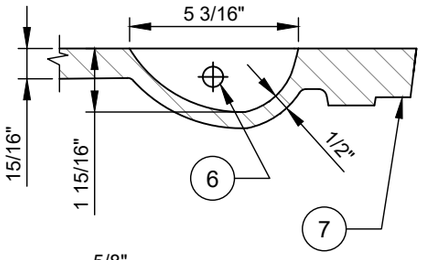
DATE 04/2024

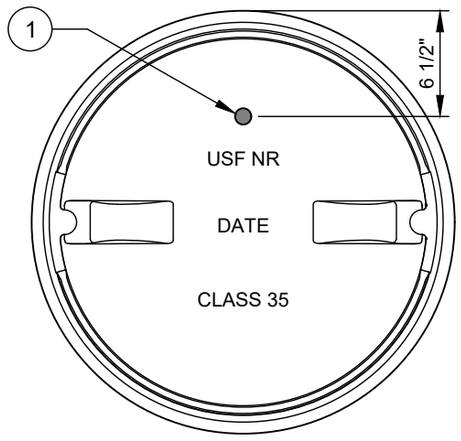
DETAIL 11.3.4

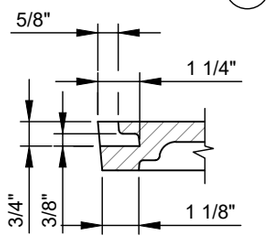
U.S. FOUNDRY & MFG. CORP.







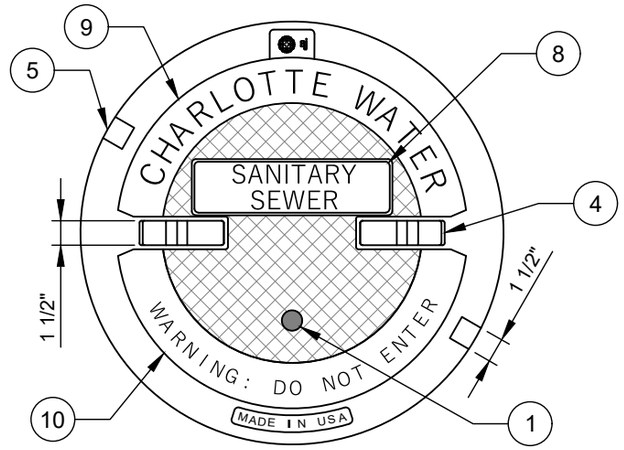


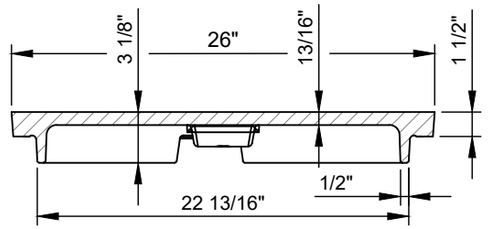


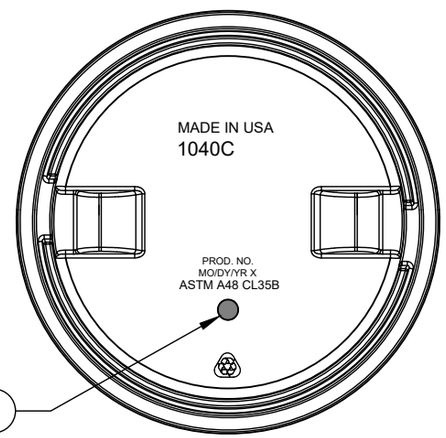
PICK HOLE DETAIL

WEIGHT - 150 LB. MIN., 0% MINUS TOLERANCE

EJ (EJ GROUP, INC.)







WEIGHT - 145 LB. MIN., 0% MINUS TOLERANCE

NO.	DESCRIPTION:
1.	1 INCH DIAMETER VENT HOLE.
2.	1 INCH ARIAL TEXT.
3.	5/8" ARIAL STYLE TEXT.
4.	(2) - LIFTING BARS.
5.	(2) - NON PENETRATING PICK HOLES.
6.	5/8" TYPE 304 S.S. ROD.
7.	MACHINED SURFACE.
8.	1 INCH SHARP FACE GOTHIC TEXT.
9.	1 1/4" SHARP FACE GOTHIC TEXT.
10.	3/4" SHARP FACE GOTHIC TEXT.

NOTES:

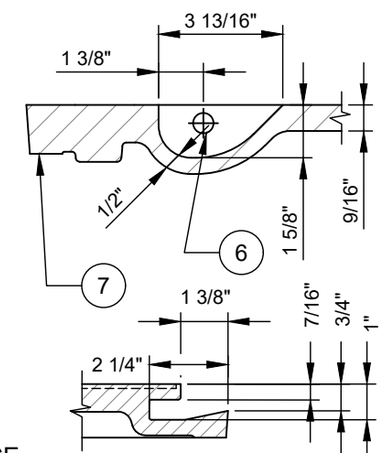
A. LOAD RATING - HEAVY DUTY.

B. MATERIAL - ASTM A48 - CLASS 35 GRAY IRON.

C. COATING - UNDIPPED.

D. COVER SHALL CONFORM TO DIMENSION AND WEIGHT REQUIREMENTS.

E. COVER SHALL NOT BE OUT OF ROUND.



PICK HOLE DETAIL

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

TYPE 1 MANHOLE COVER
24-INCHES DIAMETER (CLEAR OPENING)
VENTED-ONE VENT HOLE, NO GASKET, NO CAM LOCK

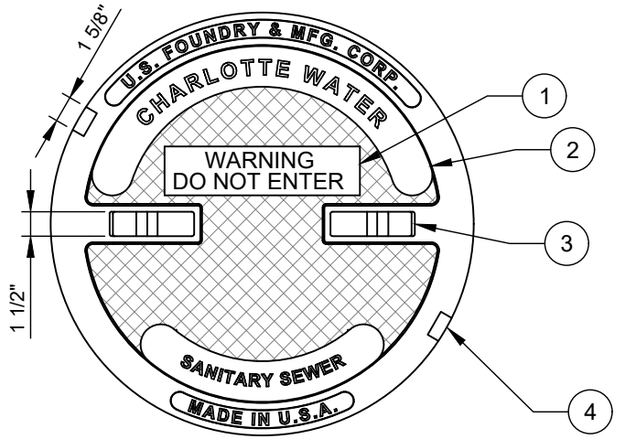
NO SCALE

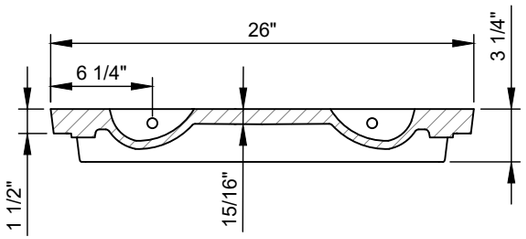
VERSION
1.0

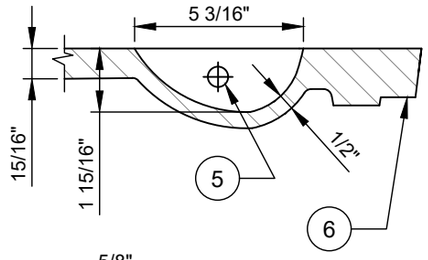
DATE
04/2024

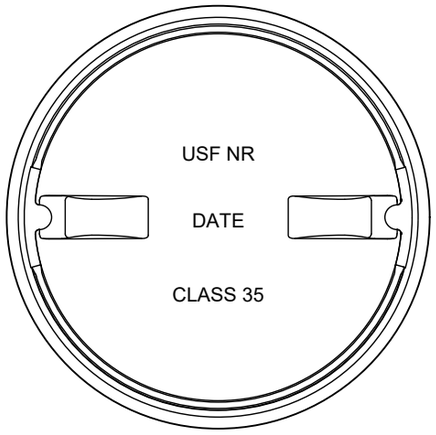
DETAIL
11.3.5

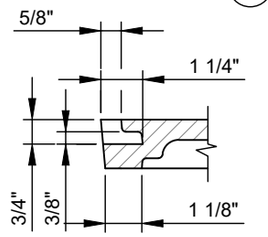
U.S. FOUNDRY & MFG. CORP.







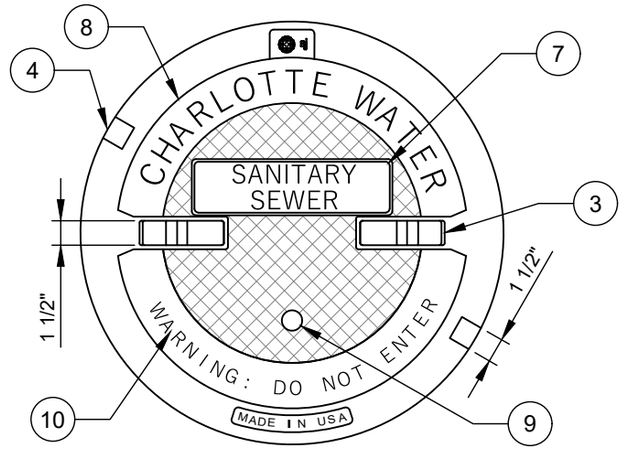


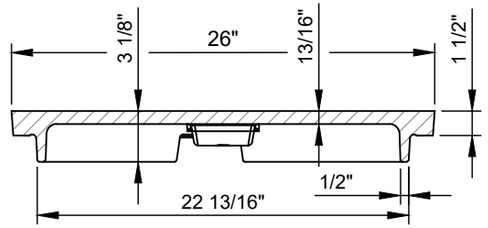


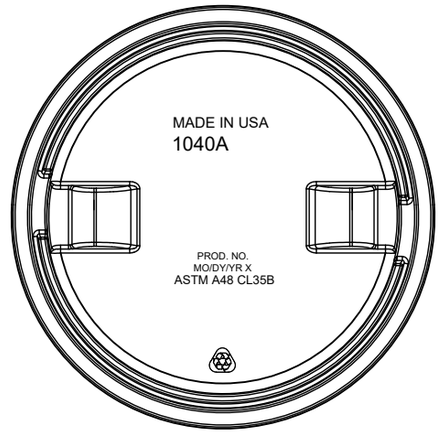
PICK HOLE DETAIL

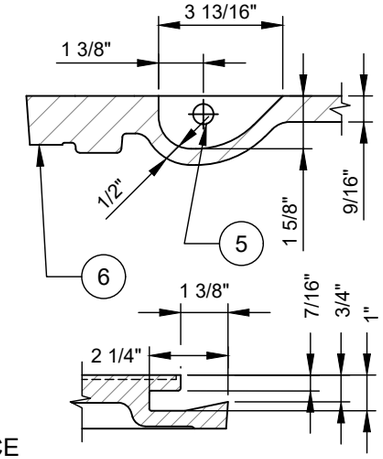
WEIGHT - 150 LB. MIN., 0% MINUS TOLERANCE

EJ (EJ GROUP, INC.)









PICK HOLE DETAIL

WEIGHT - 145 LB. MIN., 0% MINUS TOLERANCE

NO.	DESCRIPTION:
1.	1 INCH ARIAL TEXT.
2.	5/8" ARIAL STYLE TEXT.
3.	(2) - LIFTING BARS.
4.	(2) - NON PENETRATING PICK HOLES.
5.	5/8" TYPE 304 S.S. ROD.
6.	MACHINED SURFACE.
7.	1 INCH SHARP FACE GOTHIC TEXT.
8.	1 1/4" SHARP FACE GOTHIC TEXT.
9.	1 1/8" BOSS.
10.	3/4" SHARP FACE GOTHIC TEXT.

NOTES:

A. LOAD RATING - HEAVY DUTY.

B. MATERIAL - ASTM A48 - CLASS 35 GRAY IRON.

C. COATING - UNDIPPED.

D. COVER SHALL CONFORM TO DIMENSION AND WEIGHT REQUIREMENTS.

E. COVER SHALL NOT BE OUT OF ROUND.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

TYPE 2 MANHOLE COVER
24-INCHES DIAMETER (CLEAR OPENING)
SOLID - NO VENT HOLE, NO GASKET, NO CAM LOCK

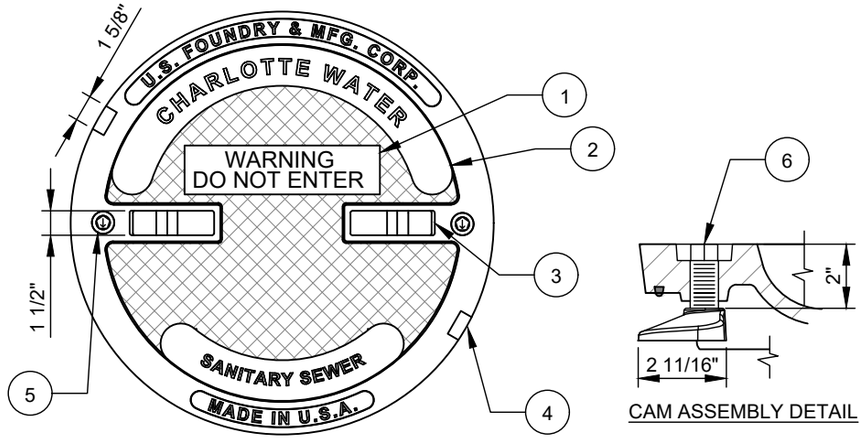
NO SCALE

VERSION 1.0

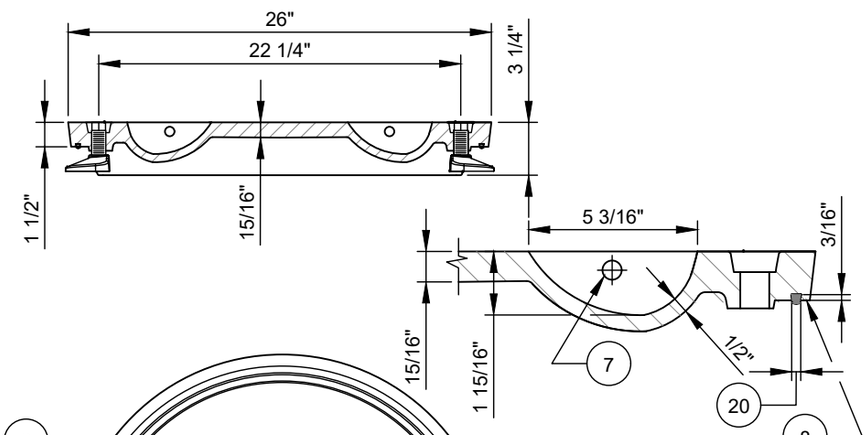
DATE 04/2024

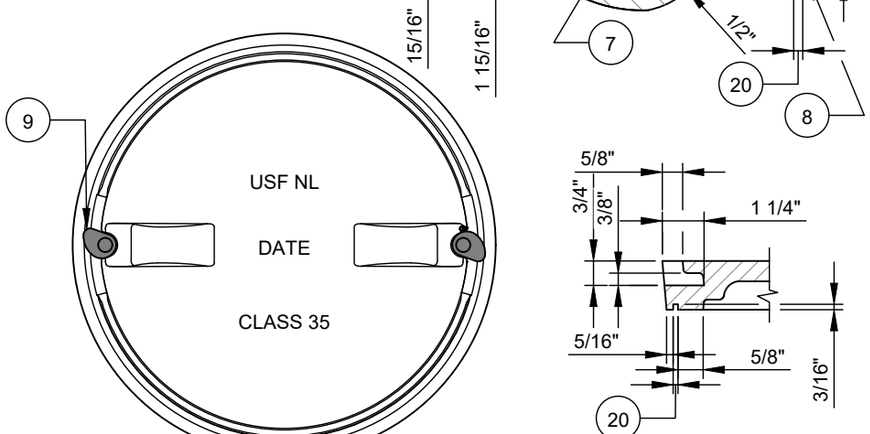
DETAIL 11.3.6

U.S. FOUNDRY & MFG. CORP.



CAM ASSEMBLY DETAIL

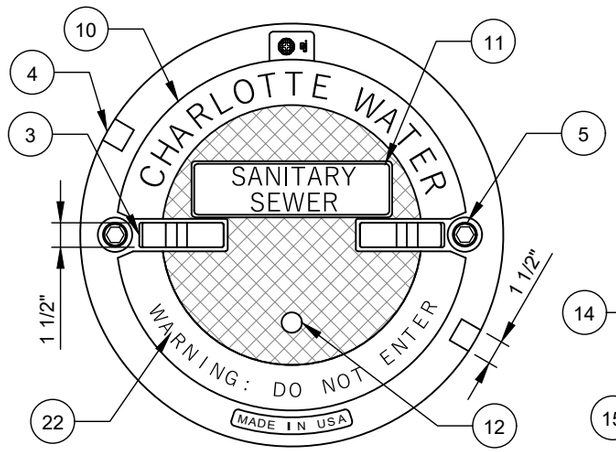


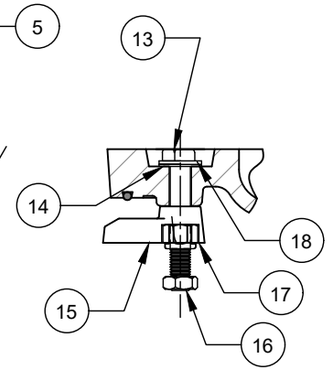


PICK HOLE DETAIL

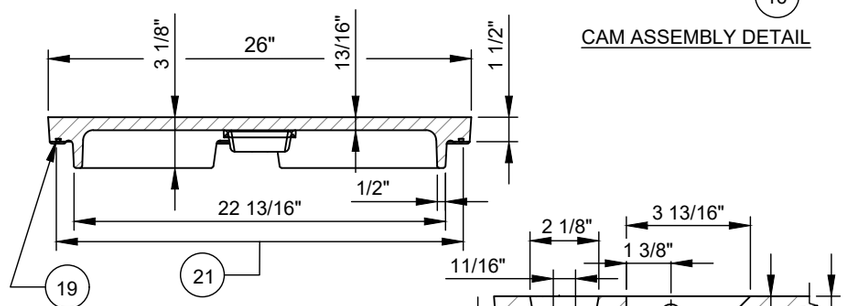
WEIGHT - 150 LB. MIN., 0% MINUS TOLERANCE

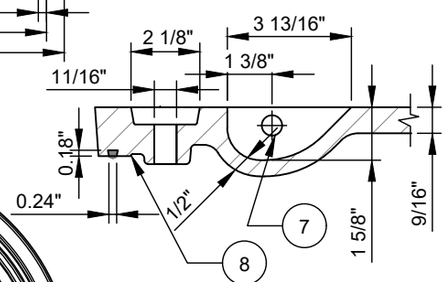
EJ (EJ GROUP, INC.)

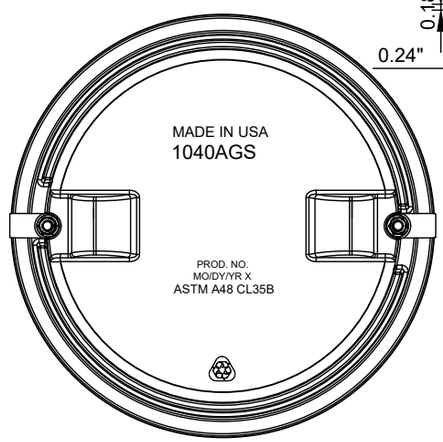


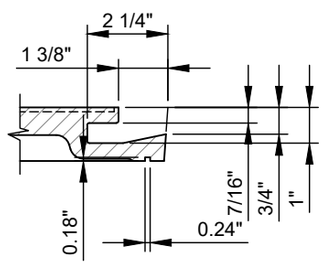


CAM ASSEMBLY DETAIL









PICK HOLE DETAIL

WEIGHT - 145 LB. MIN., 0% MINUS TOLERANCE

NO.	DESCRIPTION:
1.	1 INCH ARIAL TEXT.
2.	5/8" ARIAL STYLE TEXT.
3.	(2) - LIFTING BARS.
4.	(2) - NON PENETRATING PICK HOLES.
5.	CAM LOCK SEE ASSEMBLY DETAIL.
6.	USF WEDGE LOC 5/8" HEX HEAD BOLT ALL GRADE S.S. TYPE 304.
7.	5/8" TYPE 304 S.S. ROD.
8.	MACHINED SURFACE.
9.	7/8" DIA. CAM LOCK HOLE @ 22" DIA.
10.	1 1/4" SHARP FACE GOTHIC TEXT.
11.	1 INCH SHARP FACE GOTHIC TEXT.
12.	1 1/8" BOSS.
13.	BOLT HEX 5/8"-11 X 4" TYPE 304 S.S.
14.	WASHER 1/16" X 5/8" X 1 1/2" RUBBER.
15.	LOCK LUG.
16.	NUT HEX JAM 5/8"-11 TYPE 304 S.S.
17.	NUT HEX 5/8"-11 TYPE 304 S.S. NYLK.
18.	WASHER 5/8" ID1.50 OD TYPE 304 S.S.
19.	1/4" NEOPRENE GASKET.
20.	3/16" DOVETAIL GROOVE.
21.	25" DIAMETER (O.D. OF GKT GROOVE).
22.	3/4" SHARP FACE GOTHIC TEXT.

NOTES:

A. LOAD RATING - HEAVY DUTY.

B. MATERIAL - ASTM A48 - CLASS 35 GRAY IRON.

C. COATING - UNDIPPED.

D. COVER SHALL CONFORM TO DIMENSION AND WEIGHT REQUIREMENTS.

E. COVER SHALL NOT BE OUT OF ROUND.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

TYPE 3 MANHOLE COVER
24-INCHES DIAMETER (CLEAR OPENING)
WATERTIGHT - NO VENT HOLE, GASKET, CAM LOCK

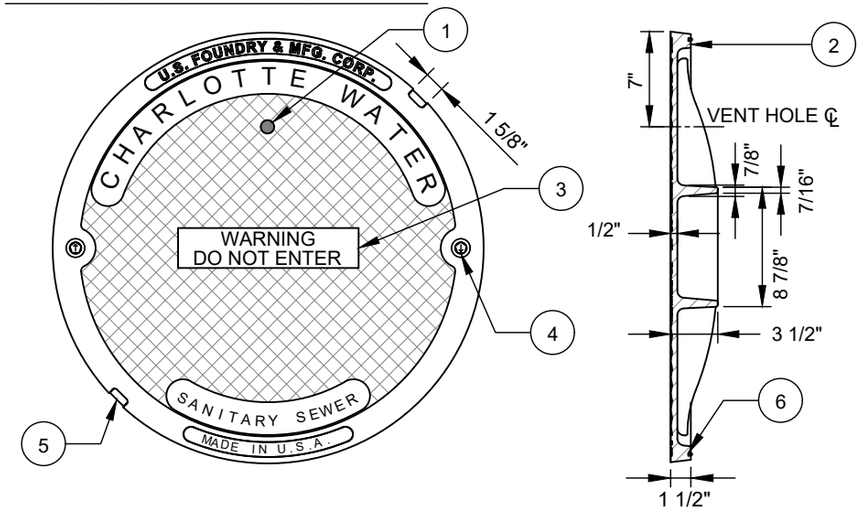
NO SCALE

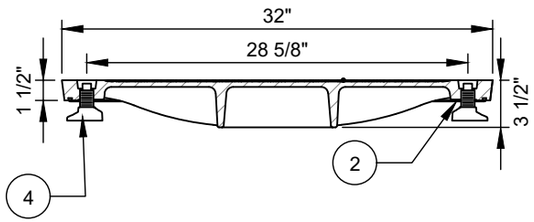
VERSION 1.0

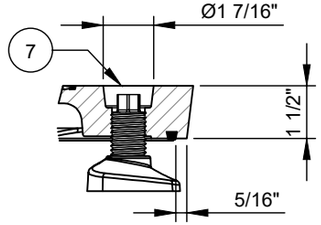
DATE 04/2024

DETAIL 11.3.7

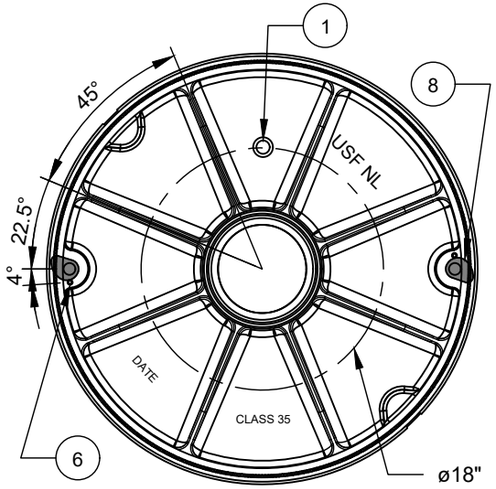
U.S. FOUNDRY & MFG. CORP.

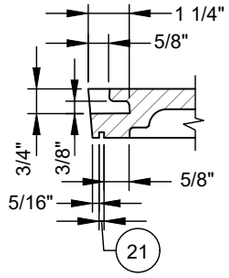






CAM ASSEMBLY DETAIL



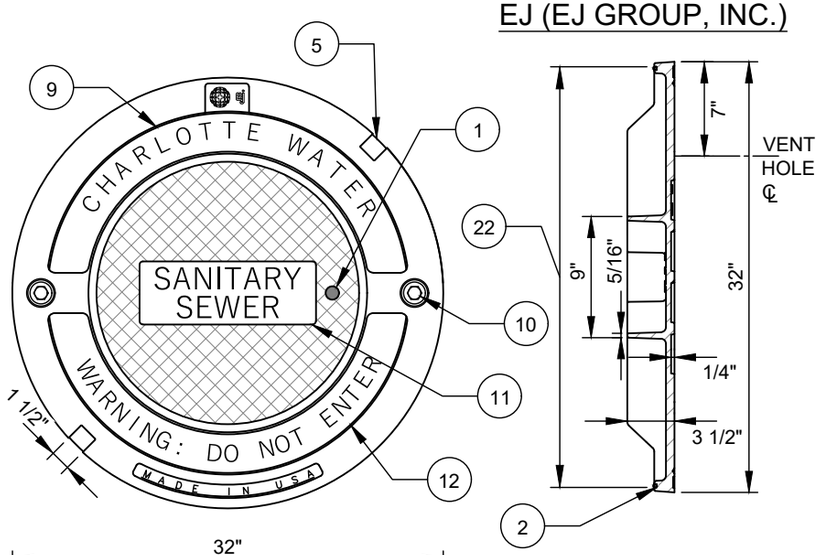


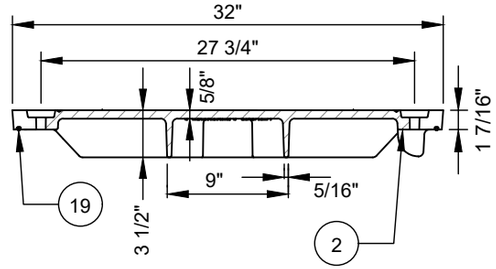
PICK HOLE DETAIL

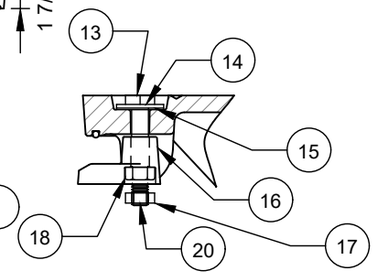
WEIGHT - 165 LB. MIN., 0% MINUS TOLERANCE

MATERIAL - ASTM A48 CLASS 35 - CAST IRON

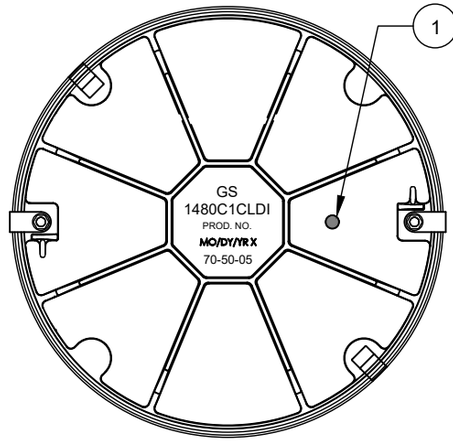
EJ (EJ GROUP, INC.)

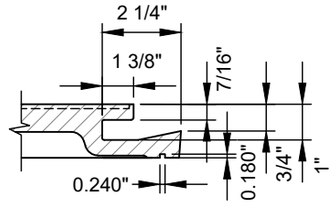






CAM ASSEMBLY DETAIL





PICK HOLE DETAIL

WEIGHT - 173 LB. MIN., 0% MINUS TOLERANCE

MATERIAL - ASTM A536 DUCTILE IRON - GRADE 70-50-05

NO.	DESCRIPTION:
1.	1 INCH DIAMETER VENT HOLE.
2.	MACHINED SURFACE.
3.	1 INCH ARIAL STYLE TEXT TYP.
4.	WEDGE CAM LOCK. SEE ASSEMBLY DETAIL.
5.	(2)-NON PENETRATING PICKHOLES.
6.	ORS GASKET NEOPRENE RUBBER 60 DUROMETER.
7.	USF WEDGE LOC 5/8" HEX HEAD BOLT ALL GRADE S.S. TYPE 304.
8.	ø7/8" CAM LOCK HOLE @ 28 5/8" DIAMETER.
9.	1 INCH SHARP FACE GOTHIC TEXT.
10.	(2) CAMS (SEE DETAIL).
11.	1 3/4" SHARP FACE GOTHIC TEXT.
12.	1 INCH SHARP FACE GOTHIC TEXT.
13.	5/8"-11 X 3 1/2" LG TYPE 304 SS HEX BOLT.
14.	5/8" I.D. 1 1/2" O.D. TYPE 304 SS FLAT WASHER.
15.	5/8" I.D. 1 1/2" O.D. SS FLAT WASHER AND RUBBER WASHER.
16.	BRONZE LOCK LUG.
17.	5/8" HEX JAM NUT TYPE 304 SS.
18.	5/8" - 11 TYPE 304 SS NYLOK NUT.
19.	1/4" NEOPRENE GASKET.
20.	WELD ON JAM NUT OR PEEN END THREADS ON BOLT.
21.	3/16" DOVETAIL GROOVE.
22.	31 1/4" (OUTSIDE OF GROOVE).

NOTES:

A. LOAD RATING - HEAVY DUTY.

B. MATERIAL - DUCTILE IRON OR CAST IRON AS INDICATED IN THE DETAIL.

C. COATING - UNDIPPED.

D. COVER SHALL CONFORM TO DIMENSION AND WEIGHT REQUIREMENTS.

E. COVER SHALL NOT BE OUT OF ROUND.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS

GRAVITY SEWER

TYPE 4 MANHOLE COVER
30-INCHES DIAMETER (CLEAR OPENING)
VENTED - ONE VENT HOLE, GASKET, CAM LOCK

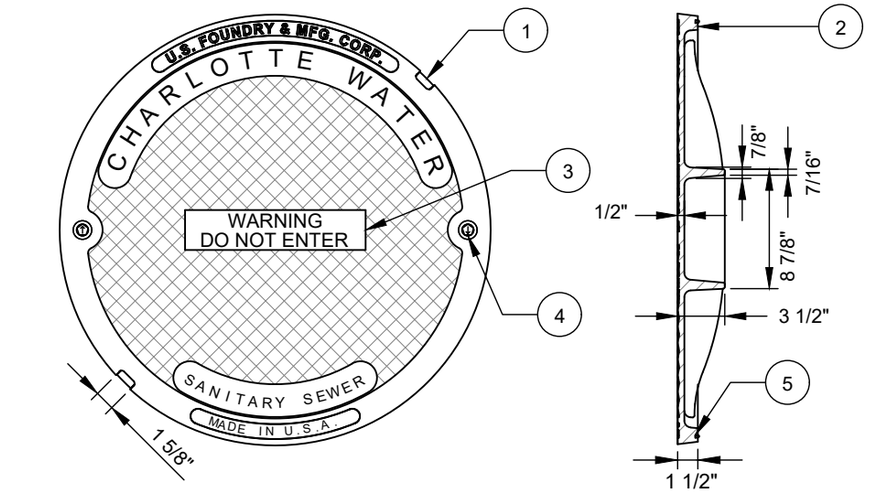
NO SCALE

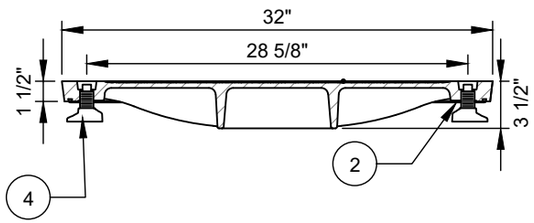
VERSION 1.0

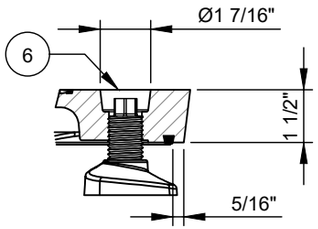
DATE 04/2024

DETAIL 11.3.8

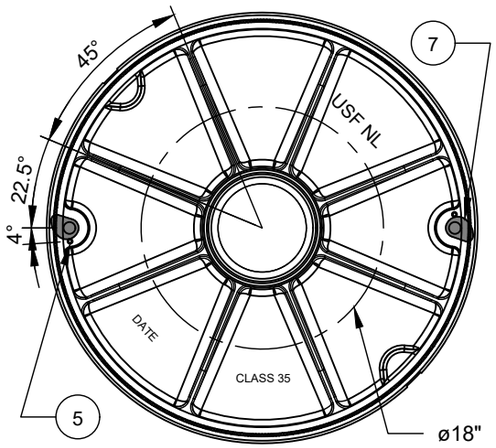
U.S. FOUNDRY & MFG. CORP.

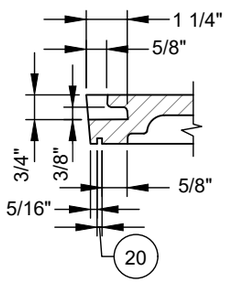






CAM ASSEMBLY DETAIL



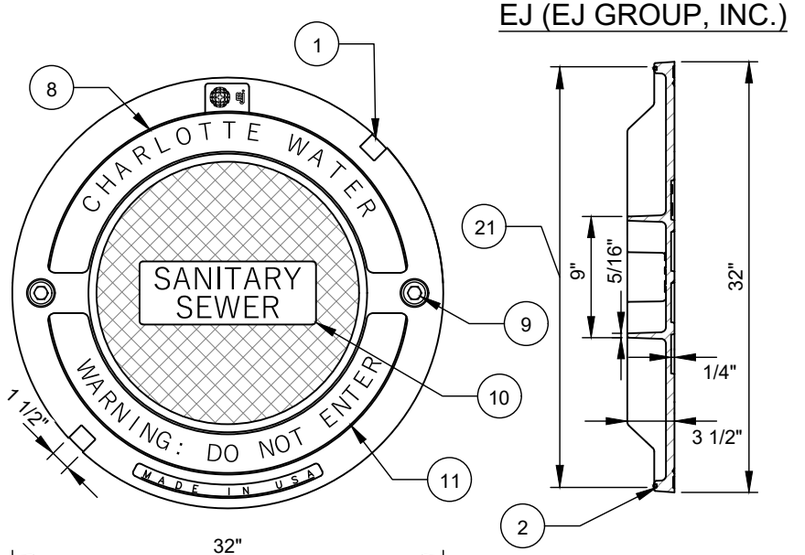


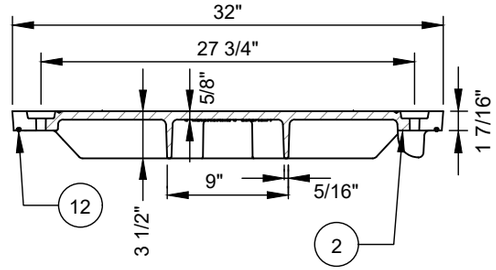
PICK HOLE DETAIL

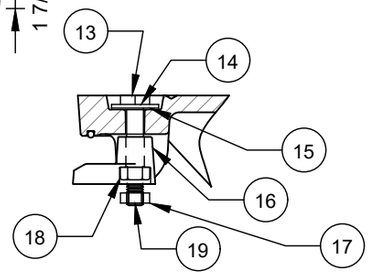
WEIGHT - 165 LB. MIN., 0% MINUS TOLERANCE

MATERIAL - ASTM A48 CLASS 35 - CAST IRON

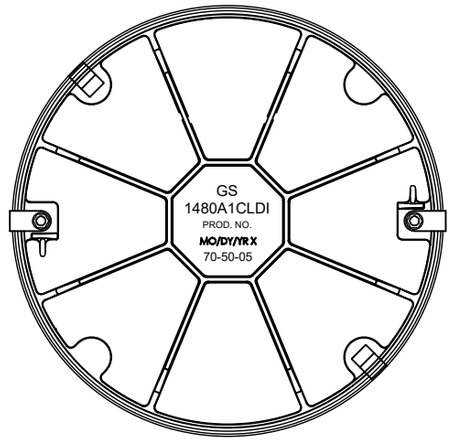
EJ (EJ GROUP, INC.)

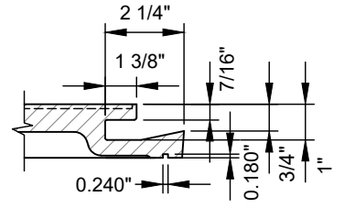






CAM ASSEMBLY DETAIL





PICK HOLE DETAIL

WEIGHT - 173 LB. MIN., 0% MINUS TOLERANCE

MATERIAL - ASTM A536 DUCTILE IRON - GRADE 70-50-05

NO.	DESCRIPTION:
1.	(2)-NON PENETRATING PICKHOLES.
2.	MACHINED SURFACE.
3.	1 INCH ARIAL STYLE TEXT TYP.
4.	WEDGE CAM LOCK. SEE ASSEMBLY DETAIL.
5.	ORS GASKET NEOPRENE RUBBER 60 DUROMETER.
6.	USF WEDGE LOC 5/8" HEX HEAD BOLT ALL GRADE S.S. TYPE 304.
7.	7/8" DIAMETER CAM LOCK HOLE @ 28 5/8" DIAMETER.
8.	1 INCH SHARP FACE GOTHIC TEXT.
9.	(2) CAMS (SEE DETAIL).
10.	1 3/4" SHARP FACE GOTHIC TEXT.
11.	1 INCH SHARP FACE GOTHIC TEXT.
12.	1/4" NEOPRENE GASKET.
13.	5/8"-11 X 3 1/2" LG TYPE 304 SS HEX BOLT.
14.	5/8" I.D. 1 1/2" O.D. TYPE 304 SS FLAT WASHER.
15.	5/8" I.D. 1 1/2" O.D. SS FLAT WASHER AND RUBBER WASHER.
16.	BRONZE LOCK LUG.
17.	5/8" HEX JAM NUT TYPE 304 SS.
18.	5/8"-11 TYPE 304 SS NYLOK NUT.
19.	WELD ON JAM NUT OR PEEN END THREADS ON BOLT.
20.	3/16" DOVETAIL GROOVE.
21.	31 1/4" (OUTSIDE OF GROOVE).

NOTES:

A. LOAD RATING - HEAVY DUTY.

B. MATERIAL - DUCTILE IRON OR CAST IRON AS INDICATED IN THE DETAIL.

C. COATING - UNDIPPED.

D. COVER SHALL CONFORM TO DIMENSION AND WEIGHT REQUIREMENTS.

E. COVER SHALL NOT BE OUT OF ROUND.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS

GRAVITY SEWER

TYPE 5 MANHOLE COVER
30-INCHES DIAMETER (CLEAR OPENING)
WATERTIGHT - NO VENT HOLE, GASKET, CAM LOCK

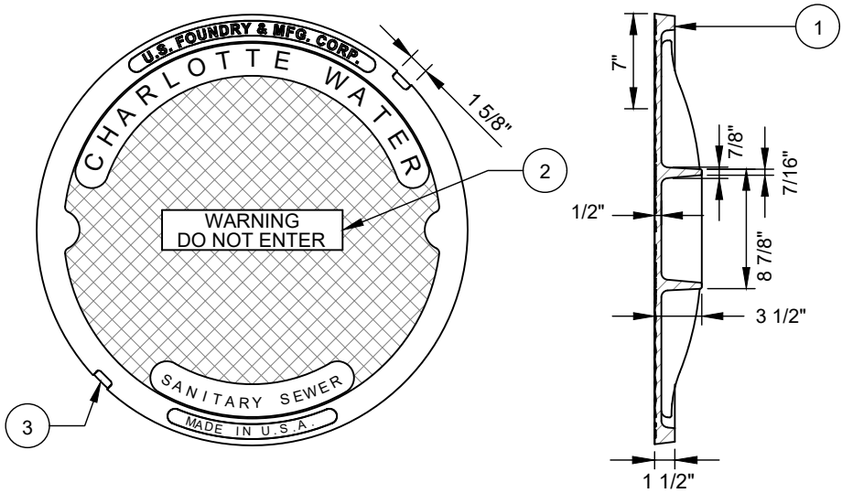
NO SCALE

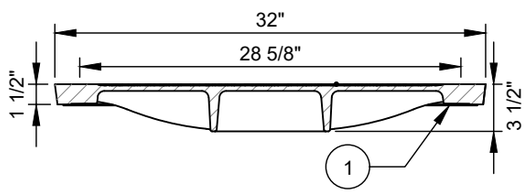
VERSION 1.0

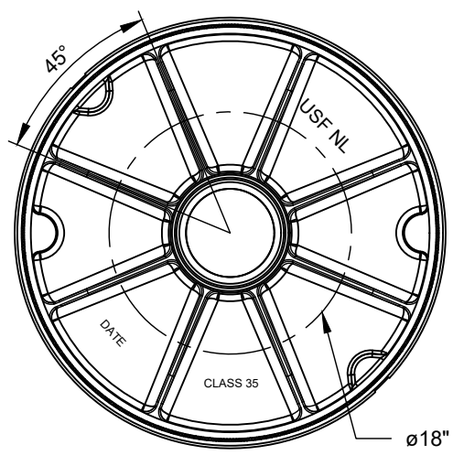
DATE 04/2024

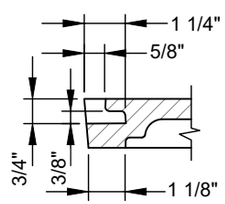
DETAIL 11.3.9

U.S. FOUNDRY & MFG. CORP.







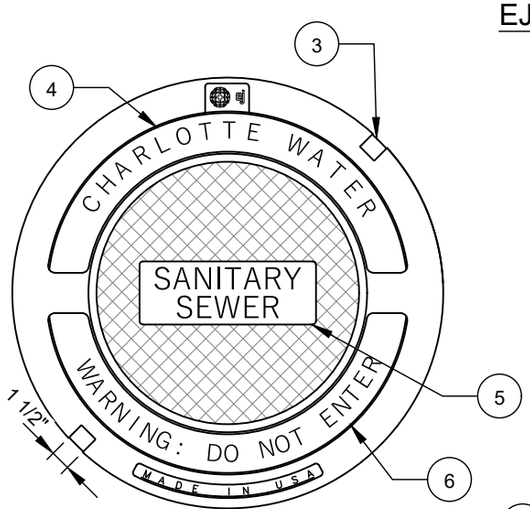


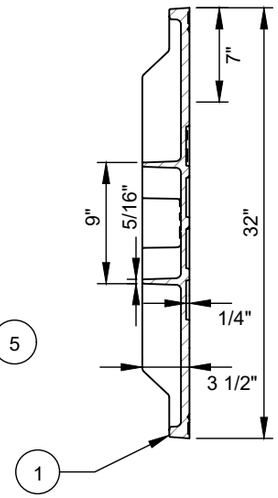
PICK HOLE DETAIL

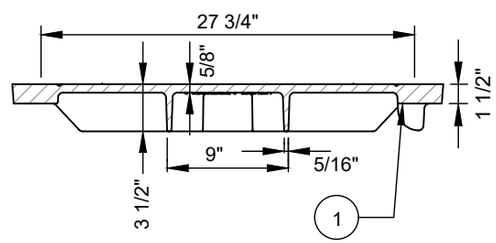
WEIGHT - 165 LB. MIN., 0% MINUS TOLERANCE

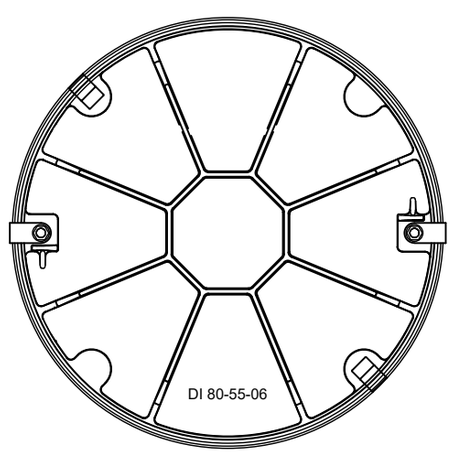
MATERIAL - ASTM A48 CLASS 35 - CAST IRON

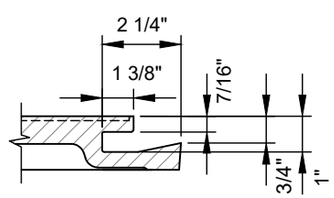
EJ (EJ GROUP, INC.)











PICK HOLE DETAIL

WEIGHT - 150 LB. MIN., 0% MINUS TOLERANCE

MATERIAL - ASTM A536 DUCTILE IRON - GRADE 80-55-06

NO.	DESCRIPTION:
1.	MACHINED SURFACE.
2.	1 INCH ARIAL STYLE TEXT TYP.
3.	(2)-NON PENETRATING PICKHOLES.
4.	1 INCH SHARP FACE GOTHIC TEXT.
5.	1 3/4" SHARP FACE GOTHIC TEXT.
6.	1 INCH SHARP FACE GOTHIC TEXT.

NOTES:

A. LOAD RATING - HEAVY DUTY.

B. MATERIAL - DUCTILE IRON OR CAST IRON AS INDICATED IN THE DETAIL.

C. COATING - UNDIPPED.

D. COVER SHALL CONFORM TO DIMENSION AND WEIGHT REQUIREMENTS.

E. COVER SHALL NOT BE OUT OF ROUND.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS

GRAVITY SEWER

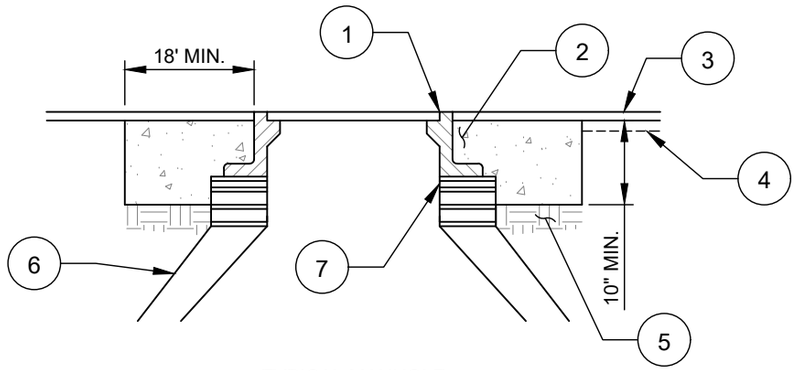
TYPE 6 MANHOLE COVER
30-INCHES DIAMETER (CLEAR OPENING)
SOLID - NO VENT HOLE, NO GASKET, NO CAM LOCK

NO SCALE

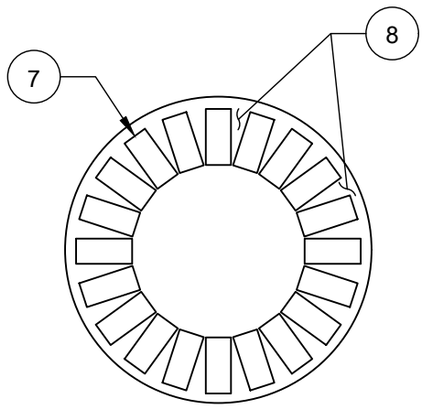
VERSION 1.0

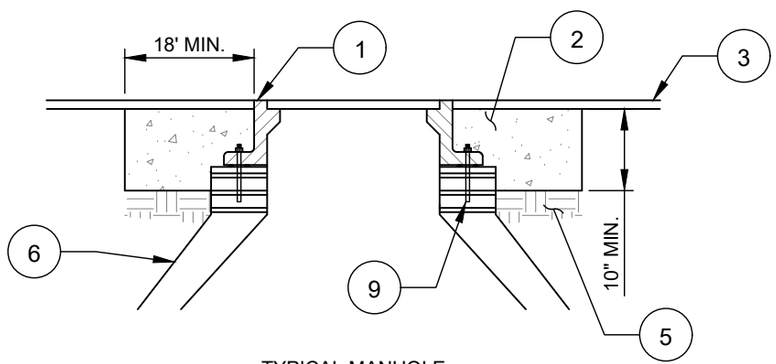
DATE 04/2024

DETAIL 11.3.10



TYPICAL MANHOLE





TYPICAL MANHOLE

NO.	DESCRIPTION:
1.	CLTW STANDARD FRAME AND COVER.
2.	CONCRETE - 3,600 PSI.
3.	NEW ASPHALT OVERLAY.
4.	OLD PAVEMENT.
5.	COMPACTED SUBGRADE.
6.	MANHOLE CONE.
7.	USE MIN. 1/2" BRICK PAVERS FOR ADJUSTMENT WITH 1/4" MORTAR JOINTS.
8.	FILL ALL VOIDS SOLID WITH MORTAR.
9.	4 ANCHOR BOLTS ANCHOR FRAME TO SOLID BRICK, BLOCK OR CONCRETE. SET FRAME ON 2 RINGS OF BUTYL RUBBER MASTIC ROPE.

NOTES:

A. FOR TYPICAL MANHOLES, REMOVE AND REPLACE ANCHOR NUTS AND WASHERS. REMOVE OLD BUTYL RUBBER MASTIC AS APPROVED.

B. MANHOLE ADJUSTMENTS WILL BE COMPLETED AT LEAST 36 HOURS BEFORE RESURFACING.

C. 18" MINIMUM WIDTH OF EXCAVATION AROUND MANHOLE.

D. DISTURBED AREAS AROUND STRUCTURE ADJUSTMENTS ARE TO BE TAMPED AND FILLED WITH 3,600 PSI "HIGH EARLY" PORTLAND CEMENT CONCRETE.

E. MORTAR USED TO ADJUST STRUCTURES IS TO COMPLY WITH THE N.C. DEPARTMENT OF TRANSPORTATION'S STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES.

F. BRICK PAVERS USED TO ADJUST STRUCTURES MUST HAVE A MINIMUM THICKNESS OF 1/2 INCH AND A COMPRESSIVE STRENGTH OF AT LEAST 6,000 PSI.

G. WOODEN WEDGES DRIVEN INSIDE THE BASE OF THE MANHOLE RING SHALL BE UTILIZED TO PREVENT THE STRUCTURE FROM SETTLING BEFORE CONCRETE AND MORTAR SET.

H. THE BRICK PAVERS WILL BE LAID ON A FULL MORTAR BED SO THAT THE LONGEST DIMENSION OF THE BRICK WILL BE PERPENDICULAR TO THE MANHOLE STRUCTURE WALL. ALL VOIDS BETWEEN PAVERS SHALL BE FILLED WITH MORTAR.

I. NO MORE THAN A 3/8 INCH JOINT WILL BE ALLOWED BETWEEN THE BRICK.

J. ALL DAMAGED OR DETERIORATED STRUCTURE WALL ARE TO BE REPORTED TO THE INSPECTOR OTHERWISE CONTRACTOR ASSUMES RESPONSIBILITY FOR STRUCTURE FAILURE.

K. IF THE SUM OF PREVIOUS ADJUSTMENTS PLUS THE NEW ONE ARE EQUAL OR GREATER THAN A STANDARD BRICK COURSE, OLD MORTAR AND SHIMS SHALL BE REMOVED DOWN TO THE PREVIOUS FULL BRICK COURSE AND A NEW STANDARD BRICK LAYER SHALL BE INSTALLED.

L. ALL CONCRETE SHALL BE VIBRATED IN ACCORDANCE WITH N.C. DEPARTMENT OF TRANSPORTATION SPECIFICATIONS.

M. CONCRETE ON MANHOLE TO BE POURED TO THE BOTTOM OF THE FIRST FULL COURSE OF BRICK OR 10" MINIMUM.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

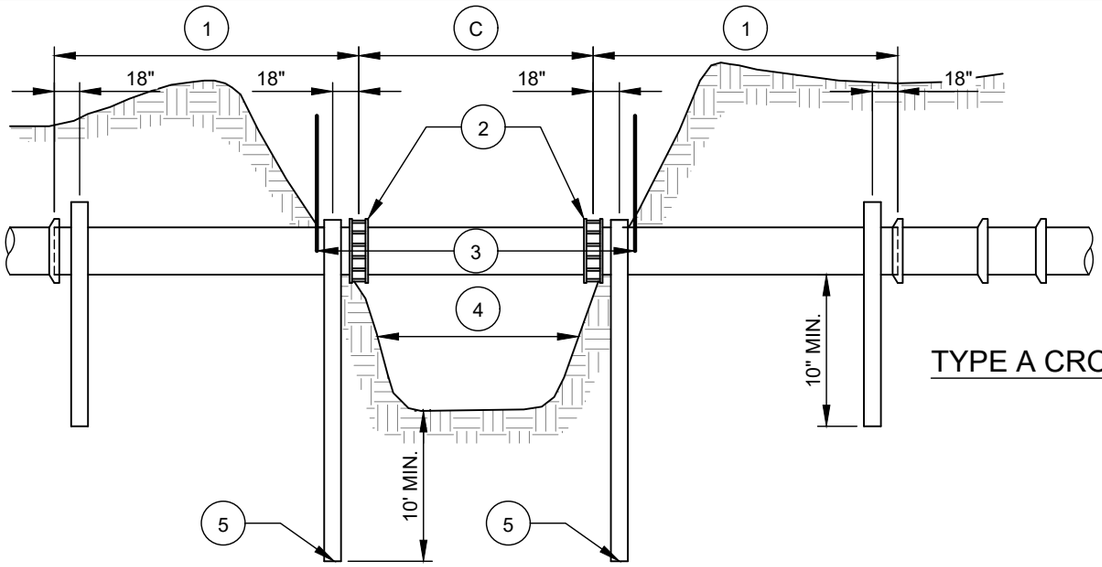
RESURFACING VERTICAL FRAME AND COVER ADJUSTMENT FOR PAVEMENT

NO SCALE

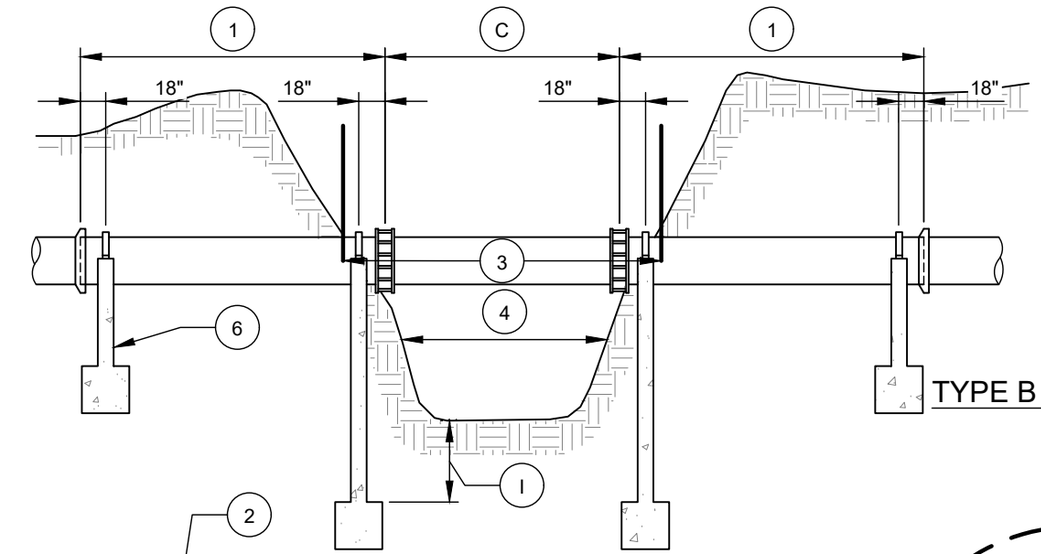
VERSION 1.0

DATE 04/2024

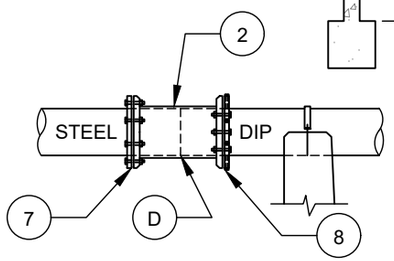
DETAIL 11.3.11



TYPE A CROSSING



TYPE B CROSSING



ENLARGED DETAIL

NOTES FOR TYPE A CROSSING:

A. MINIMUM DEPTH IS BASED ON BLOW COUNTS/BEARING CAPACITY AS SPECIFIED.

B. MAXIMUM HEIGHT FROM PIPE TO UNDISTURBED SOIL IS 20'.

NOTES FOR TYPE A AND B CROSSING:

C. VARIES (40' MAX. 8" & 10" PIPE) (50' MAX. 12" AND LARGER PIPE) "HIGH STRENGTH" STEEL PIPE WITH LINING/COATING PER SPECIFICATIONS (SEE NOTE E).

D. END OF STEEL PIPE TO BE CENTERED INSIDE COUPLING.

E. STEEL PIPE MUST BE SEAMLESS OR STRAIGHT SEAM OR SPIRAL WELD.

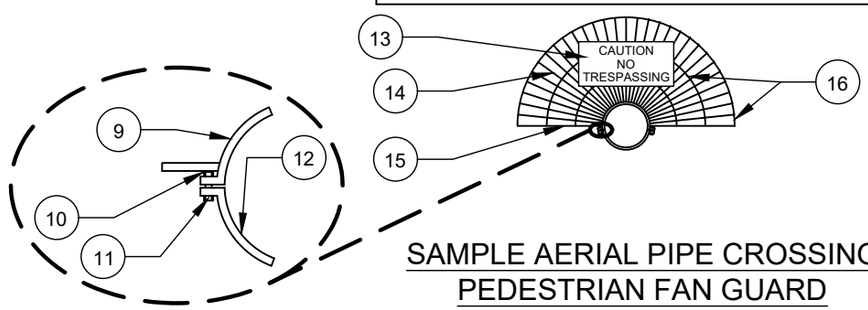
F. TRANSITION COUPLING SHALL BE A LONG PATTERN SOLID SLEEVE AND RESTRAINED ON D.I.P. END.

G. FOR CREEK CHANNELS LESS THAN 20' IN WIDTH, THE PIPE CAN BE R.J. D.I.P. WITHOUT TRANSITION COUPLINGS.

H. TERMINATE TRACER WIRE AT PEDESTRIAN GUARD OR PIPE.

NOTES FOR TYPE B CROSSING:

I. 4' MINIMUM. FOOTING DEPTH SHALL BE TO SUITABLE GRADE AS DETERMINED BY THE ENGINEER, SHALL NOT BE LESS THAN SHOWN (EXCEPT WHERE PIER IS ANCHORED TO SOLID ROCK. TOP OF FOOTING SHALL NOT BE ABOVE TOP OF SOLID ROCK).



SAMPLE AERIAL PIPE CROSSING
PEDESTRIAN FAN GUARD

NO.	DESCRIPTION:
1.	FULL JOINT DIP.
2.	LONG PATTERN SLEEVE. LENGTH VARIES DEPENDING ON PIPE DIAMETER.
3.	PEDESTRIAN FAN GUARD (SEE DET. ON THIS SHEET). INSTALLATION AS PER CLTW.
4.	CREEK CHANNEL.
5.	STEEL H-PILE PIERS. SEE CLTW STD. DETAIL.
6.	REINFORCED CONCRETE PIER. SEE CLTW STD. DETAIL.
7.	NON-RESTRAINED JOINT (STANDARD MJ GLAND PACK) WITH OVERSIZE (IPS) TRANSITION GASKET.
8.	WEDGE ACTION JOINT RESTRAINT (MEGA-LUG).
9.	3/8" X 3" STEEL BAR.
10.	ADEQUATE CLEARANCE FOR BOLTS.
11.	5/8" X 3" BOLTS.
12.	O.D. OF PIPE.
13.	"NO TRESPASSING" SIGN.
14.	31-5/8" DIAMETER RODS @ 6" O.C.. WELD EACH ROD TO PIPE CLAMP.
15.	EPOXY COATING (TYP.).
16.	5/8" DIAMETER ROD WELDED TO END OF EACH RADIAL ROD (TYP.).

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

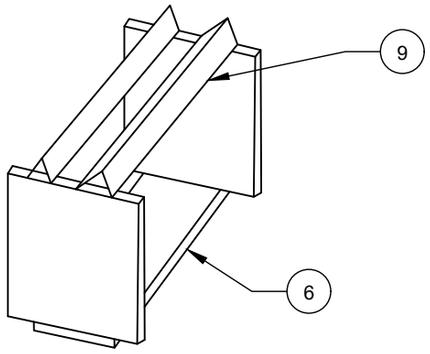
ELEVATED CREEK CROSSING

NO SCALE

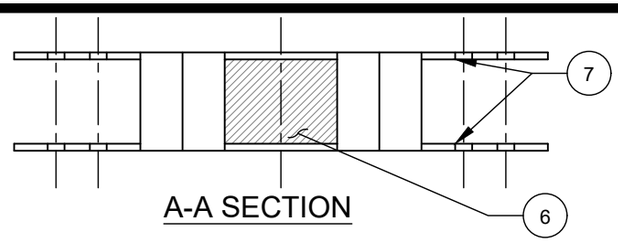
VERSION
1.0

DATE
04/2024

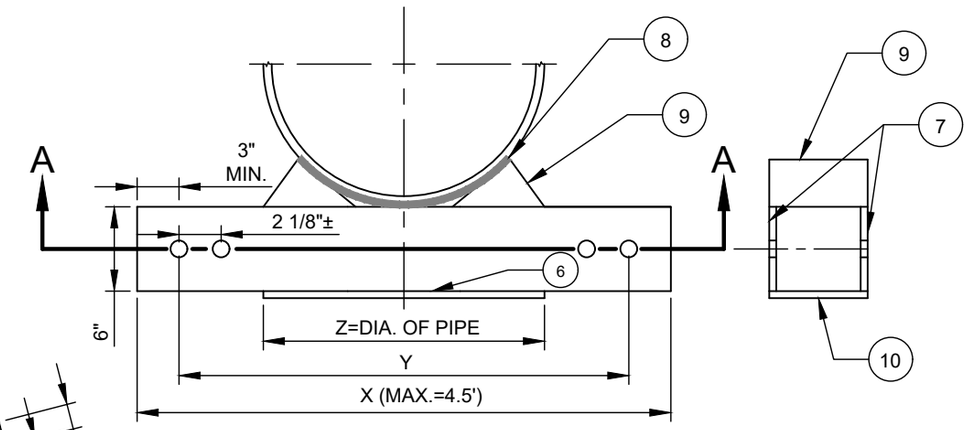
DETAIL
11.4.1



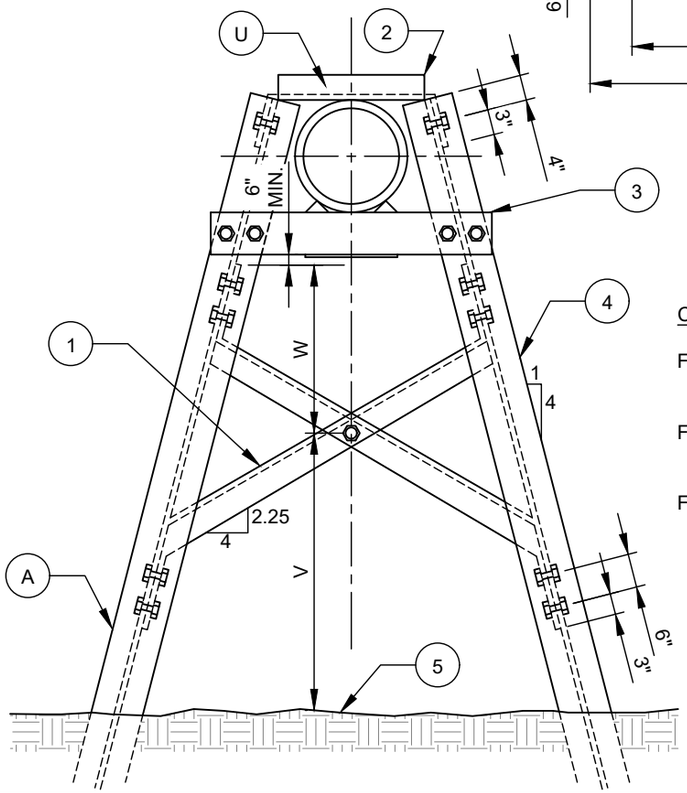
CRADLE ISOMETRIC VIEW



A-A SECTION



CRADLE DETAIL



CROSS BRACING SIZES

FOR 12" PIPE AND SMALLER:
USE 3" X 3" X 7/16" ANGLES

FOR 15"-18" PIPE:
USE 4" X 4" X 5/16" ANGLES

FOR 20"-24" PIPE:
USE 5" X 5" X 3/8" ANGLES

NO.	DESCRIPTION:
1.	CROSS BRACING (CUT WEB AND BEND).
2.	C 6x10.5 TOP BRACE (CUT FLANGE AND BEND WEB).
3.	CRADLE (SEE CRADLE DETAIL).
4.	HP 8 X 36, HP 10 X 42, HP 12 X 53, HP 12 X 69 OR HP 12 X 74 OR W 8 X 8 X 48, W 8 X 8 X 58, W 10 X 10 X 60, W 10 X 10 X 68, W 12 X 12 X 72 OR W 12 X 12 X 79 PILES.
5.	FINISHED GRADE.
6.	1/2" STEEL BOTTOM PLATE.
7.	3/4" STEEL PLATE.
8.	1/4" NEOPRENE PAD.
9.	1/2" STEEL ANGLE WITH EQUAL SIDES.

NOTES:

A. ALL FIELD CUTS BY TORCH SHALL BE GROUND TO FLAT TRUE 90° ANGLES.

B. DIMENSIONS X AND Y VARY ACCORDING TO PIPE SIZE AND ELEVATION OF PIPE. THE MAXIMUM LENGTH OF X IS 4.5'.

C. DIMENSION Z IS EQUAL TO THE DIAMETER OF THE PIPE.

D. ALL STEEL PLATES SHALL MEET ASTM A36.

E. FOR 8" TO 18" PIPE, ALL BOLTS SHALL BE 7/8" IN DIAMETER AND MEET ASTM A325. FOR 24" PIPE, BOLTS ON THE CRADLE SHALL BE 1 INCH IN DIAMETER AND MEET ASTM A490. BOLTS SHALL BE AT LEAST 2 1/2" LONG. PLAIN ROUND WASHERS WILL BE REQUIRED.

F. BOLT HOLES SHALL BE 1/16" LARGER THAN THE DIAMETER OF THE BOLT AND SHALL BE DRILLED.

G. THIS CRADLE SHALL NOT BE USED FOR PIPE LARGER THAN 24" IN DIAMETER.

H. ATTACH THE CRADLE TO THE PILES WITH 4 BOLTS ON EACH SIDE [TOTAL OF 8 BOLTS].

I. ATTACH BOTTOM PLATE TO CRADLE SIDES WITH A CONTINUOUS 3/8" FILLET WELD.

J. THE 1/2" STEEL ANGLES SHALL BE SPOT WELDED TO THE SIDES OF THE CRADLE AND SHALL BE 1/4TH OF THE PIPE DIAMETER.

K. ADD 1/4" NEOPRENE PAD OR SIMILAR TO PROTECT PIPE FROM CRADLE.

L. MAXIMUM HEIGHT FROM PIPE TO UNDISTURBED SOIL IS 20'.

M. PIPE SHALL FIT SNUGLY.

N. V SHALL EQUAL W OR AS APPROVED.

O. SEE STEEL H-PILE SPECIFICATIONS.

P. PILES SHALL BE DRIVEN TO A MINIMUM DEPTH OF 10' BELOW GROUND OR AS DIRECTED BY THE ENGINEER.

Q. PILES SHALL BE DRIVEN TO A DEPTH AT WHICH PILE BEARING CAPACITY IS 20 TONS OR AS APPROVED BY THE ENGINEER.

R. THESE PIERS SHALL BE USED FOR DUCTILE IRON PIPE OR HIGH STRENGTH STEEL PIPE ONLY.

S. ALL STEEL TO BE HOT DIP GALVANIZED. SEE GALVANIZED SPECIFICATIONS.

T. PAINTING IN BLACK OVER THE HOT DIP GALVANIZED COMPONENTS IS ACCEPTABLE TO CLTW.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

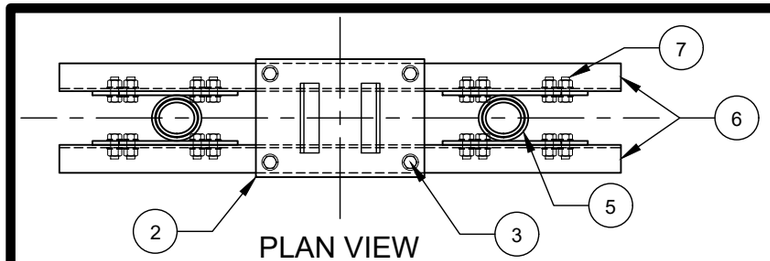
STEEL H-PILE PIERS FOR 24" PIPE AND SMALLER

NO SCALE

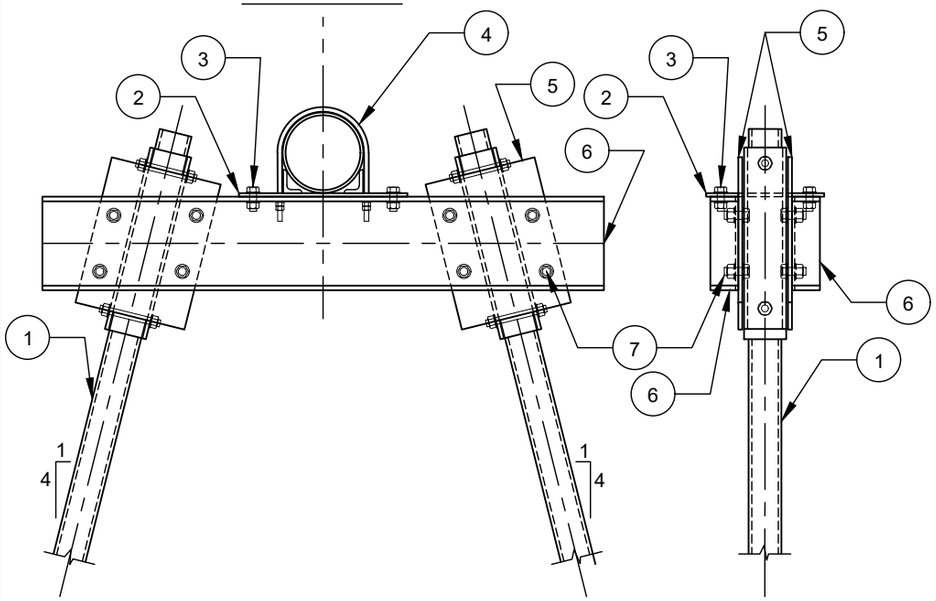
VERSION 1.0

DATE 04/2024

DETAIL 11.4.2



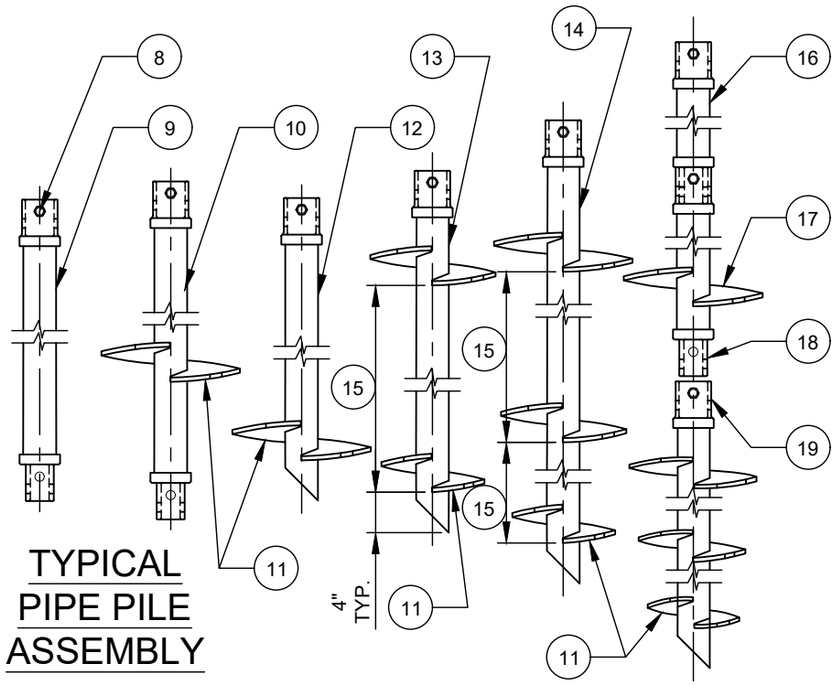
PLAN VIEW



ELEVATION VIEW

SIDE VIEW

TWO-PILE HELICAL PIER PILE CAP



TYPICAL PIPE PILE ASSEMBLY

NO.	DESCRIPTION:
1.	HELICAL PIER.
2.	PIPE SADDLE COMPRISED OF STEEL ANGLE AND STEEL PLATE.
3.	BOLTS AT PIPE SADDLE CONNECTION.
4.	CLAMPING U-ROD WITH THREADED ENDS.
5.	COLLAR ASSEMBLY INSTALLED OVER HELICAL PIER LEAD SECTION AFTER CUTTING SQUARE END JOINT OFF LEAD.
6.	CHANNEL INSTALLED ON EASCH SIDE OF COLLAR ASSEMBLY.
7.	BOLTS AT CHANNEL TO COLLAR CONNECTION EACH SIDE AT EACH COLLAR. HOLES IN CHANNEL WEB TO BE FIELD DRILLED.
8.	HEX HEAD BOLT & NUT.
9.	PIPE PILE EXTENSION.
10.	PIPE PILE EXTENSION WITH HELIX.
11.	HELIX.
12.	SINGLE HELIX LEAD.
13.	DOUBLE HELICES LEAD.
14.	TRIPLE HELICES LEAD.
15.	3 X LOWER HELIX DIAMETER.
16.	EXTENSION SHAFT.
17.	SINGLE HELIX EXTENSION.
18.	CAST STEEL MALE COUPLING.
19.	CAST STEEL FEMALE COUPLING.

NOTES:

A. SINGLE OR MULTI HELIX, NUMBER AND DIAMETER OF HELIX PLATE(S) VARY DEPENDING ON PIER LOAD AND SOIL CONDITIONS.

B. FINISH TO BE HOT DIP GALVANIZED.

C. DIMENSIONS OF THE CENTRAL SHAFT AND THE NUMBER, SIZE, SPACING, AND THICKNESS OF THE HELICAL BEARING PLATES SHALL BE DESIGNED AND FABRICATED TO SUPPORT SPECIFIED DESIGN LOADS.

D. HELICAL PIERS MAY ONLY BE USED ON MINOR CREEKS NEAR THE CREEK HEADWATERS WITHOUT A 100 YEAR FLOODPLAIN ELEVATION.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS

GRAVITY SEWER

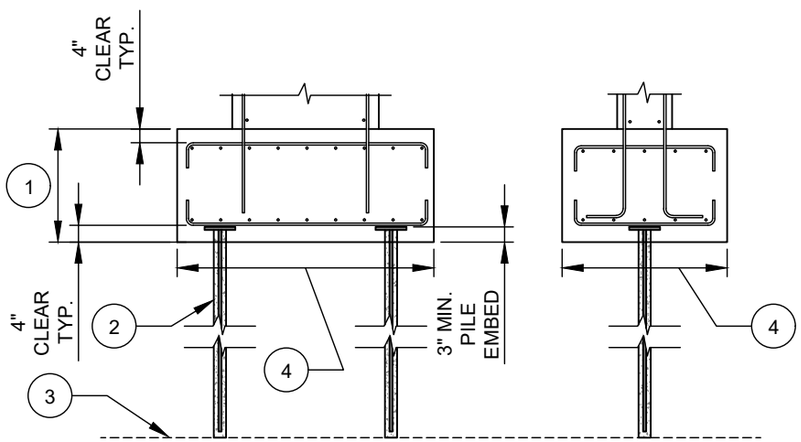
HELICAL STEEL PILE FOR USE ON 8 INCH PIPE ONLY

NO SCALE

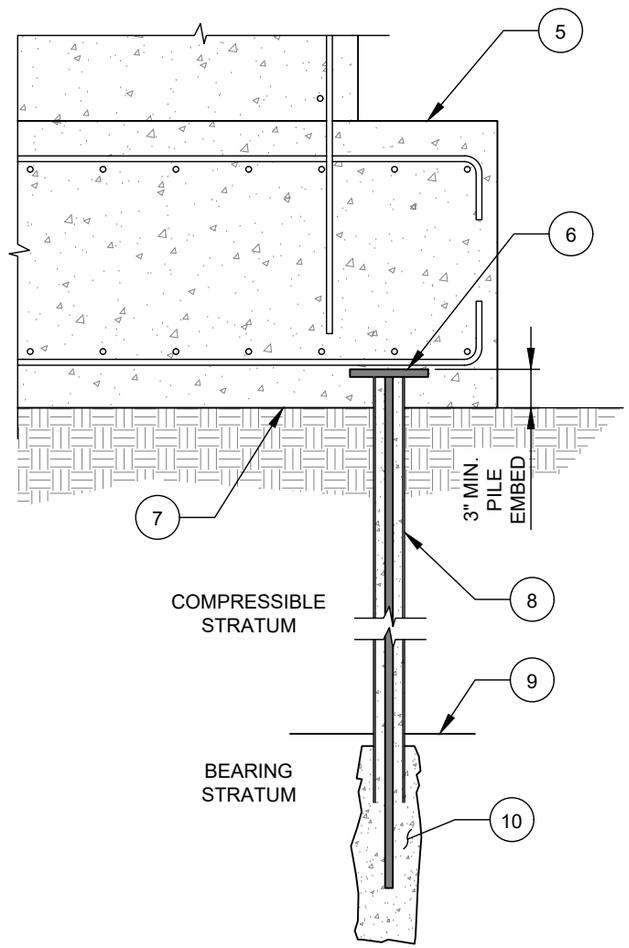
VERSION 1.0

DATE 04/2024

DETAIL 11.4.3



PIER W/ MICROPILE



MICROPILE

NO.	DESCRIPTION:
1.	PILE CAP THICKNESS. SEE NOTE B.
2.	MICROPILE.
3.	PILE DEPTH.
4.	PILE CAP LENGTH OR WIDTH. SEE NOTE B.
5.	TOP OF FOOTING.
6.	PILE CAP ANCHORAGE.
7.	BOTTOM OF FOOTING.
8.	TEMPORARY CASING. UPON COMPLETION OF PILE, CASING MAY BE LEFT IN PLACE THROUGH THE COMPRESSIBLE STRATUM.
9.	TOP OF DENSE ROCK/SOIL.
10.	GROUT.

NOTES:

A. CONCRETE PIER TO BE MIN. 4,000 P.S.I. CONCRETE.

B. ENGINEER OF RECORD TO DETERMINE EXTENT OF PILE CAP REQUIRED AND REINFORCEMENT REQUIRED WITHIN PILE CAP.

C. MICROPILE SPACING AND PLACEMENT SHALL BE DETERMINED BY THE DESIGN ENGINEER.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

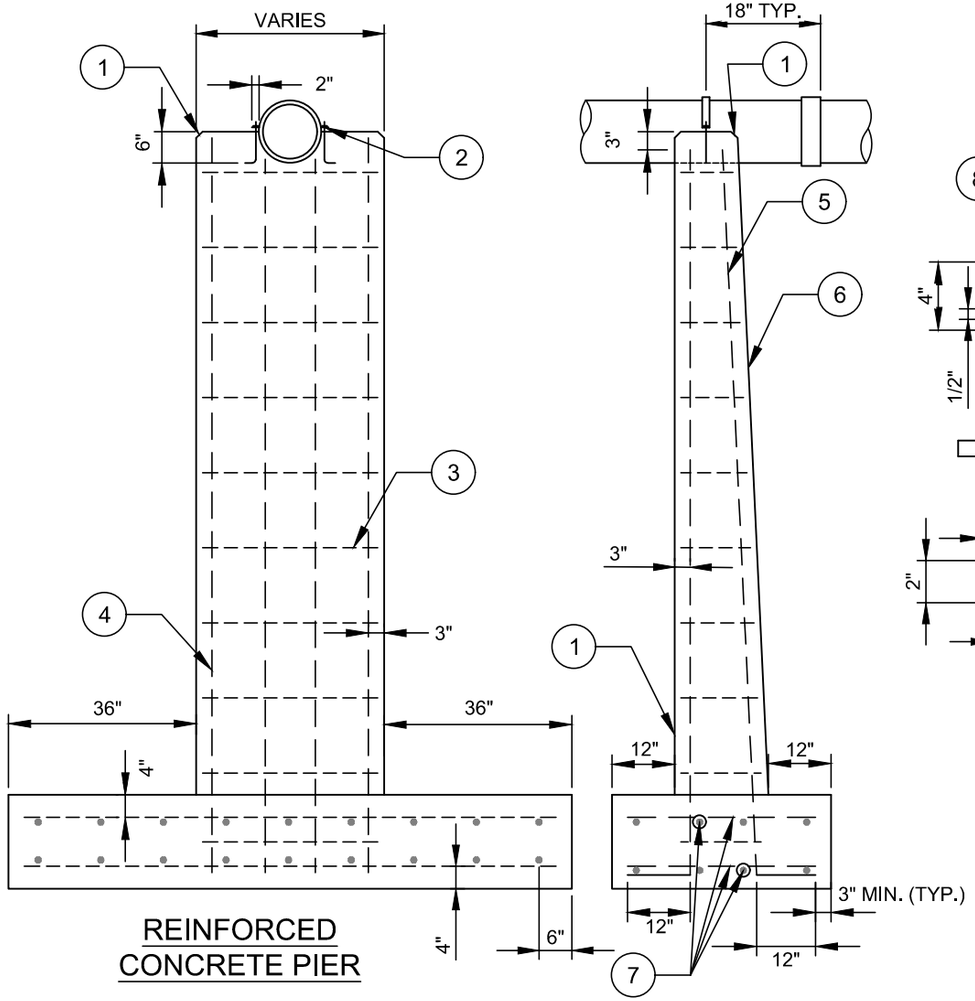
MICROPILE

NO SCALE

VERSION
1.0

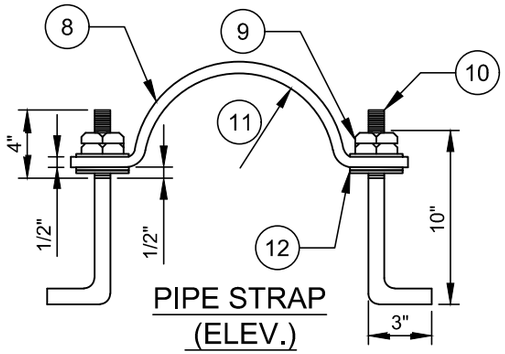
DATE
04/2024

DETAIL
11.4.4

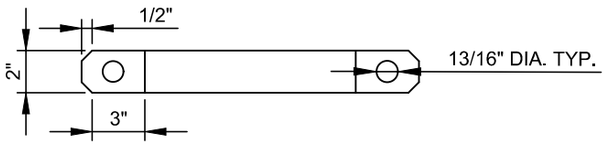


REINFORCED CONCRETE PIER

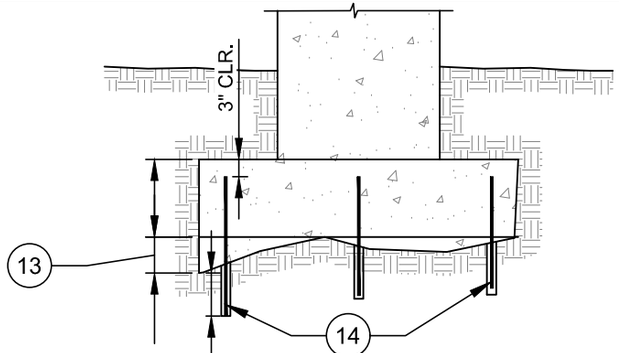
PIPE SIZE	PIER WIDTH FOR 90° CROSSING
15"	3'-0"
18"	3'-6"
24"	4'-0"
30"	4'-9"
36"	5'-6"
42"	6'-6"
48"	7'-0"



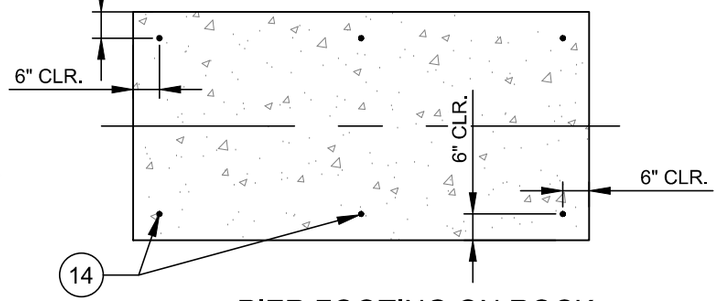
PIPE STRAP (ELEV.)



PIPE STRAP (PLAN)



PIER FOOTING ON ROCK (ELEV.)



PIER FOOTING ON ROCK (PLAN)

NO. DESCRIPTION:

1. 1 INCH CHAMFER ALL CORNERS.
2. PIPE STRAPS FOR PIERS AND BOLT (ELEVATION AND PLAN VIEW ON THIS SHEET).
3. #3 REBAR TIES @ 12" O.C.
4. #6 REBAR @ 10" O.C.
5. LAP REBAR 24" IF SPLICE IS REQUIRED.
6. TAPER 1 INCH PER FOOT (TOWARD CREEK).
7. #6 REBAR @ 12" O.C.
8. 2" x 1/2" STRAP - 304 S.S.
9. DOUBLE JAM NUT 316 STAINLESS STEEL.
10. 3/4" DIAMETER ANCHOR BOLT - 316 S.S.
11. R=1/2 OUTSIDE DIAMETER PIPE BARREL.
12. PROVIDE MULTIPLE 316 S.S. WASHERS UNDER STRAP SUCH THAT STRAP IS PULLED DOWN TIGHT ON PIPE AND PIER.
13. CONCRETE FOR LEVELING MAY BE POURED WITH FOOTING.
14. #8 REBAR DOWELS, TYPICAL. GROUT DOWELS WITH NON-SHRINK GROUT IN 2" DIAMETER HOLES. HOLES TO BE CLEANED WITH WATER AND COMPRESSED AIR.

NOTES:

A. MAT STEEL FOR FOOTING SHALL BE TIED TO DOWELS.
B. ALL CONCRETE TO BE 3,600 PSI.
C. MAXIMUM HEIGHT REINFORCED CONCRETE PIERS TO BE 20'.
D. FOOTING THICKNESS SAME AS BASE THICKNESS OF PIER, BUT NOT TO EXCEED 2'.
E. PIERS TO BE BUILT WITH LONG SIDE PARALLEL TO CREEK FLOW.
F. PIER TO BE CENTERED ON FOOTING WHEN PIPE IS PARALLEL TO CREEK.
G. PIPE TO BE SET 1/2 IN PIER AND 1/2 PROTRUDING ABOVE PIER. WHEN PIERS ARE PLACED PARALLEL TO THE FLOW OF THE CREEK AND THE PIPE IS ON A SKEW WITH THE PIER, HOLDING STRAPS MAY STILL BE PLACED AT RIGHT ANGLES TO THE PIPE, PROVIDING THE ANCHOR BOLTS ARE NOT SET WITH A CLEARANCE OF LESS THAN 2" TO THE SURFACE OF THE PIER.
H. NO REINFORCING STEEL TO BE PLACED WITH A CLEARANCE OF LESS THAN 3" TO THE SURFACE OF THE PIER.
I. ANCHOR BOLTS, NUTS, WASHERS, AND STRAPS SHALL BE STAINLESS STEEL.
J. STAINLESS STEEL ANTI-SEIZE COMPOUND SHALL BE LIBERALLY APPLIED TO THE THREADS.
K. FOR PIPES 24" AND LARGER, USE 1 INCH DIAMETER BOLTS AND 1 1/16" DIAMETER HOLE IN STRAP.
L. HOLES TO BE DRILLED IN STRAP.
M. PROVIDE MULTIPLE WASHERS UNDER STRAP SUCH THAT STRAP IS PULLED DOWN TIGHT ON THE PIPE AND PIER.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

REINFORCED CONCRETE PIER

NO SCALE

VERSION 1.0

DATE 04/2024

DETAIL 11.4.5

NO.	DESCRIPTION:
1.	18" (UNLESS FIELD CONDITIONS DICTATE OTHERWISE).
2.	CONCRETE OR COMPACTED CLAY (BENTONITE). COMPACTED CLAY MINIMUM 12" THICK LAYER OUTSIDE TRENCH SHALL BE 95% OF THE STANDARD PROCTOR DRY DENSITY TO MINIMUM OF 5% OF THE OPTIMUM COMPACTION MOISTURE CONTENT.
3.	TRENCH.
4.	PIPE O.D..
5.	TRACER WIRE INSTALLED OVER TOP OF COLLAR PER CLTW STANDARD DETAIL.

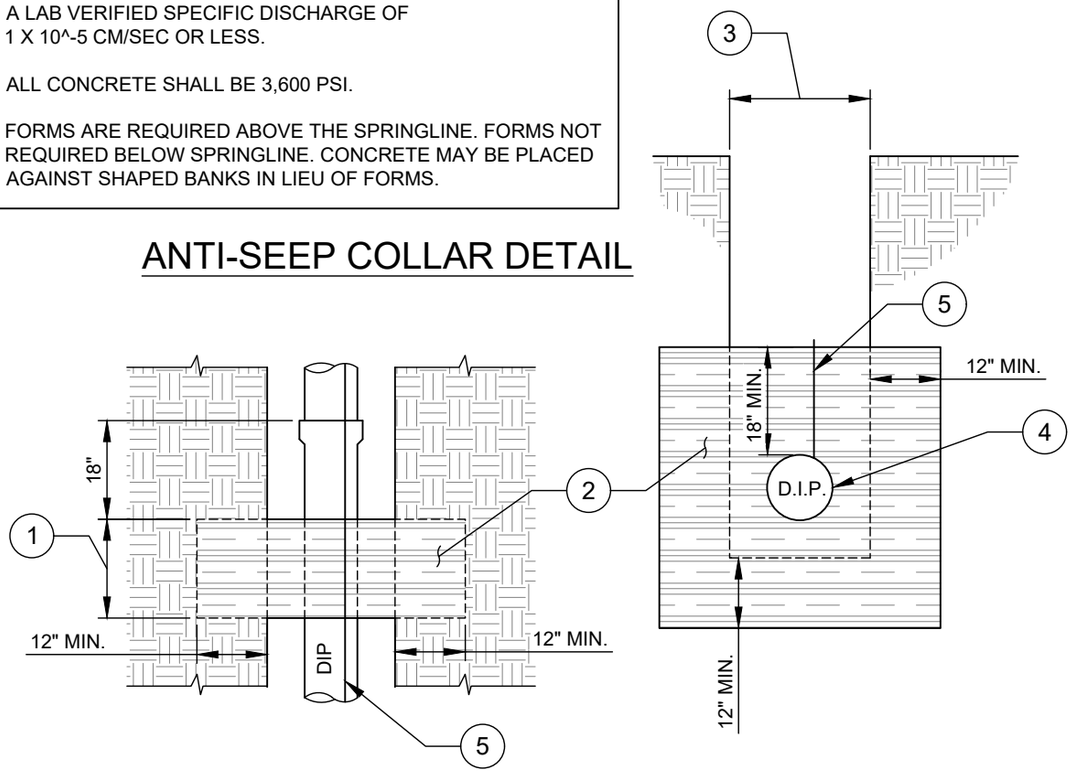
NOTES:

A. THE CLAY SHALL BE TESTED BY AN INDEPENDENT SOILS LAB TO VERIFY ITS SUITABILITY. COMPACTED CLAY SHALL HAVE A LAB VERIFIED SPECIFIC DISCHARGE OF 1 X 10^-5 CM/SEC OR LESS.

B. ALL CONCRETE SHALL BE 3,600 PSI.

C. FORMS ARE REQUIRED ABOVE THE SPRINGLINE. FORMS NOT REQUIRED BELOW SPRINGLINE. CONCRETE MAY BE PLACED AGAINST SHAPED BANKS IN LIEU OF FORMS.

ANTI-SEEP COLLAR DETAIL



PLAN VIEW

VERTICAL VIEW

NO.	DESCRIPTION:
1.	CONCRETE TO BE 3,600 PSI.
2.	3 No. 4 REBARS.
3.	CONCRETE PLACED ON UNDISTURBED SOIL AS APPROVED BY THE ENGINEER.
4.	PIPE O.D..
5.	INSTALL 1" CONDUIT FOR TRACER WIRE TO RUN THROUGH. TRACER WIRE INSTALLED PER CLTW STANDARD DETAIL.

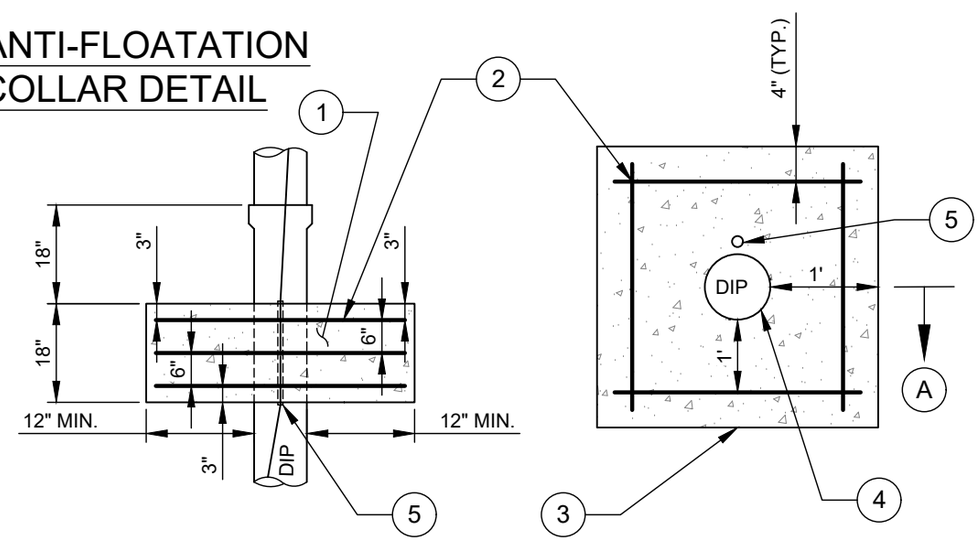
NOTES:

A. FORMS ARE REQUIRED ABOVE THE SPRINGLINE. FORMS NOT REQUIRED BELOW SPRINGLINE. CONCRETE MAY BE PLACED AGAINST SHAPED BANKS IN LIEU OF FORMS.

B. PROVIDE PE STAMPED ANTI-FLOATATION CALCULATION. A LARGER CONCRETE COLLAR MAY BE REQUIRED IF BUOYANCY IS NOT PREVENTED.

C. NO PIPE JOINTS IN THE CONCRETE BLOCK. JOINTS SHALL BE 18" BEHIND THE BELL.

ANTI-FLOATATION COLLAR DETAIL



PLAN VIEW

VERTICAL VIEW

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

ANTI-SEEP COLLAR & ANTI-FLOATATION COLLAR

NO SCALE

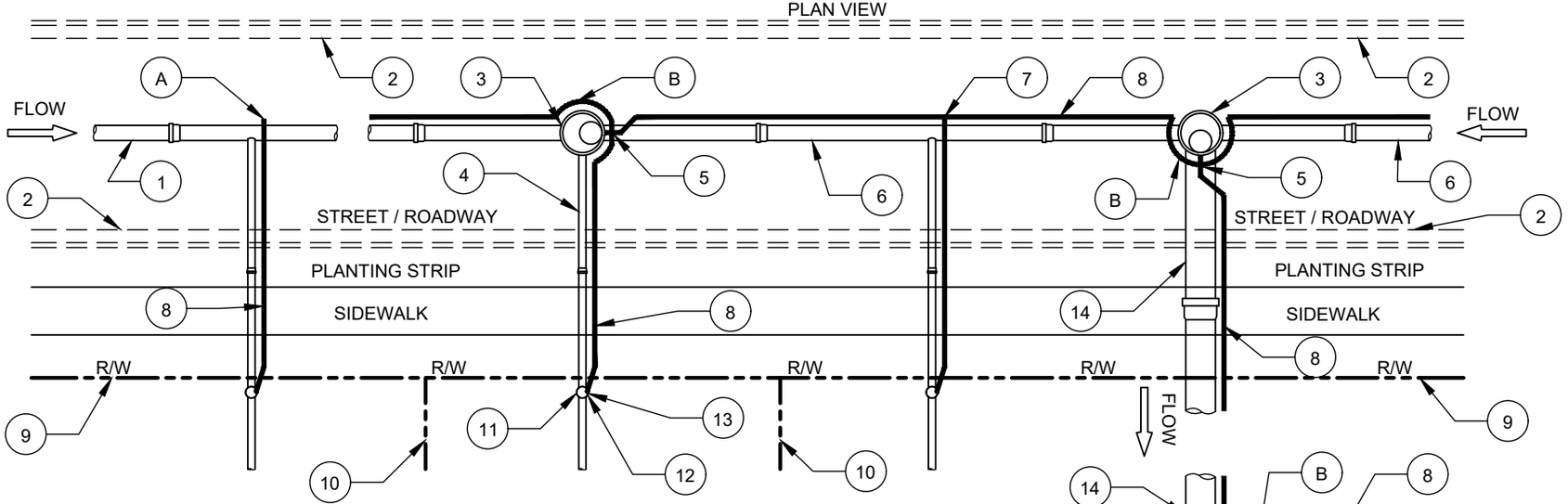
VERSION 1.0

DATE 04/2024

DETAIL 11.4.6

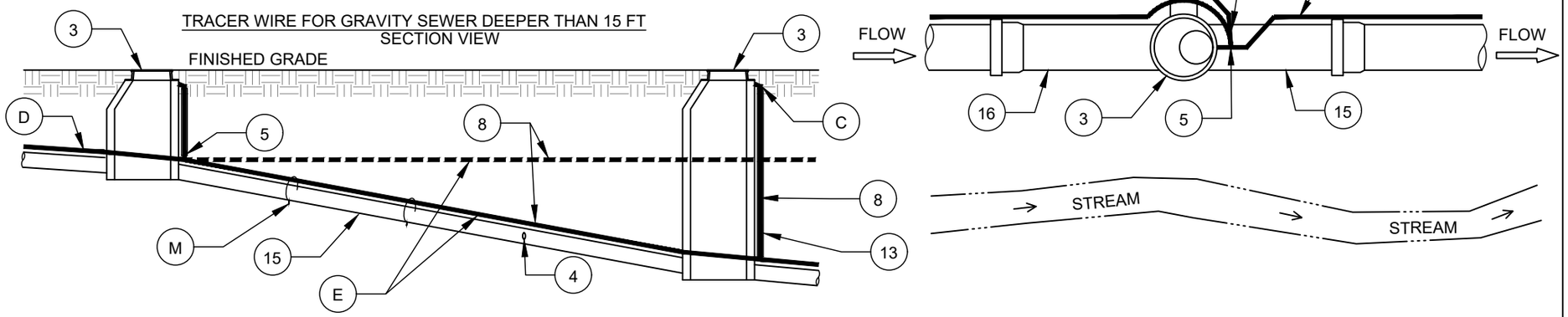
STREET VIEW - GRAVITY SEWER TRACER WIRE

PLAN VIEW



TRACER WIRE FOR GRAVITY SEWER DEEPER THAN 15 FT

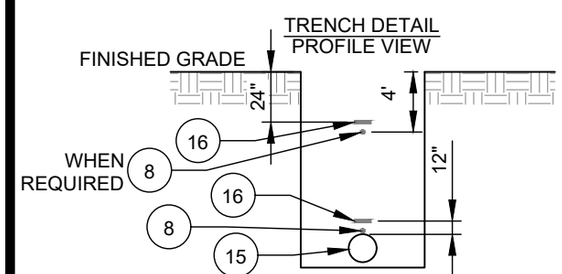
SECTION VIEW



NO.	DESCRIPTION:
1.	EXISTING SEWER MAIN LINE WITHOUT TRACER WIRE.
2.	CURB.
3.	SEWER MANHOLE (TYP.).
4.	SEWER SERVICE LATERAL (TYP.).
5.	NO SPLICE.
6.	SEWER MAIN LINE.
7.	SPLICE (SEE CLTW STD. DETAIL).
8.	#12 GAUGE SOLID COPPER TRACER WIRE WITH 30 MILS GREEN HDPE INSULATION (TYP.).
9.	R/W / EASEMENT LINE (TYP.).
10.	PROPERTY / EASEMENT LINE.
11.	CLEANOUT (TYP.).
12.	VALVE BOX ASSEMBLY (TYP.) (SEE CLTW STD. DETAIL).
13.	CONDUIT FOR VERTICAL WIRE
14.	SEWER TRUNK LINE.
15.	SEWER PIPE.
16.	6" WIDE GREEN SEWER WARNING TAPE.

TRENCH DETAIL

PROFILE VIEW



NOTES:

A. FOR NEW SERVICE ON EXISTING MAIN WHERE NO TRACER WIRE IS LOCATED ON SEWER MAIN, PLACE TRACER WIRE END AT BOTTOM EDGE OF TRENCH AWAY FROM MAIN AND LATERAL.

B. WRAP TRACER WIRE AROUND OUTSIDE OF MANHOLE (SEE CLTW STD. DETAIL).

C. SEE MANHOLE CONNECTION DETAIL.

D. GRAVITY SEWER MAIN LESS THAN 15' DEPTH TRACING WIRE SHALL BE ATTACHED TO PIPE.

E. GRAVITY SEWER MAIN AND LATERAL GREATER THAN 15' DEPTH. TRACER WIRE SHALL BE ATTACHED TO PIPE AND PLACED AT A DEPTH OF 4' BELOW GROUND DIRECTLY ABOVE SEWER PIPE.

F. TRACER WIRE SHOWN AWAY FROM PIPE FOR CLARITY. TRACER WIRE SHALL BE INSTALLED IMMEDIATELY ADJACENT TO THE SEWER PIPE. TRACER WIRE SHALL BE FASTENED TO THE PIPE WITH ZIP TIES OR DUCT TAPE AT 10' INTERVALS.

G. TRACER WIRE SHALL BE SOLID COPPER #12 GAUGE WITH 30 MILS GREEN HDPE INSULATION.

H. TRACER WIRE SHALL BE CONTINUOUS FROM MANHOLE TO MANHOLE WITHOUT IN-LINE SPLICES EXCEPT WHERE REQUIRED FOR SEWER SERVICE LATERALS.

I. SPLICED CONNECTIONS SHALL BE ALLOWED BETWEEN THE MAIN LINE TRACER WIRE AND THE SERVICE LATERAL TRACER WIRE.

J. TRACER WIRE SHALL BE PROTECTED FROM DAMAGE DURING THE EXECUTION OF THE WORK. NO BREAKS OR CUTS IN THE TRACER WIRE OR INSULATION SHALL BE PERMITTED.

K. PRIOR TO ACCEPTANCE (POST PUNCH LIST) EACH WIRE SEGMENT SHALL PASS A CONDUCTIVITY TEST, WITNESSED BY THE ENGINEER OR ENGINEER'S REPRESENTATIVE.

L. FOR INSTALLING A NEW SERVICE LINE ON AN EXISTING MAIN WITH TRACER WIRE, INCLUDE 2' OF SLACK IN NEW TRACER WIRE AT THE SPLICE. THE CLEANOUT SHALL SERVE AS THE TEST PORT.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

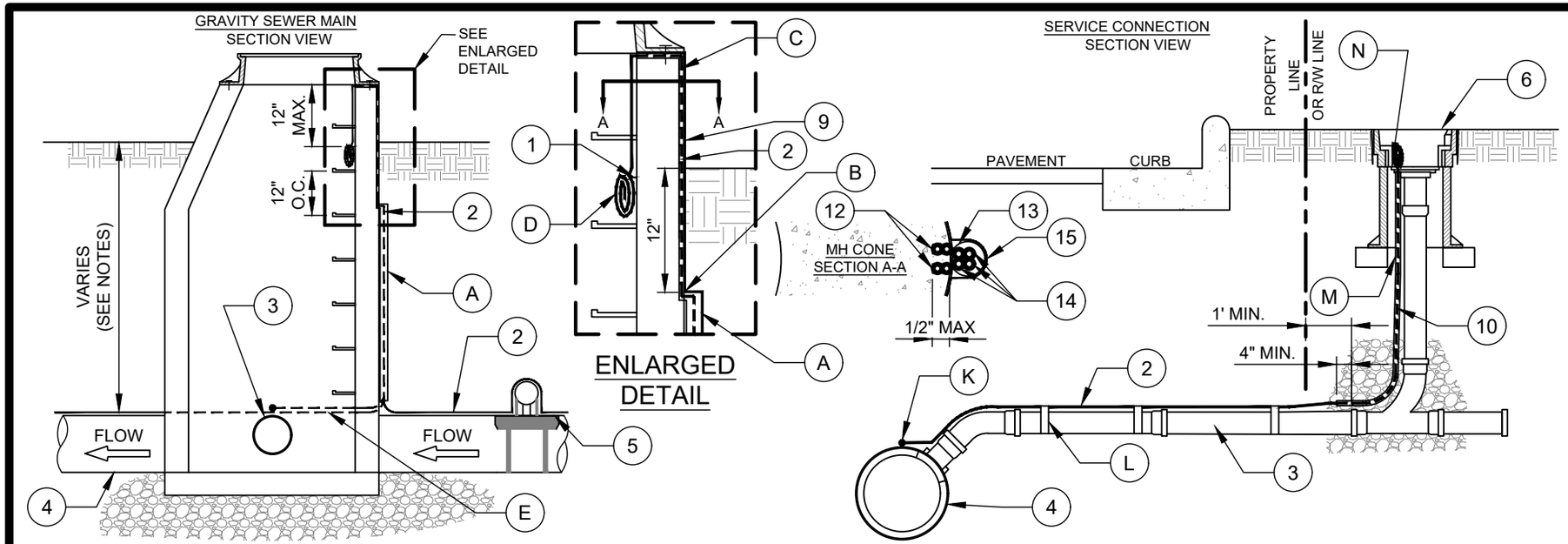
TRACER WIRE

NO SCALE

VERSION 1.0

DATE 04/2024

DETAIL 11.5.1



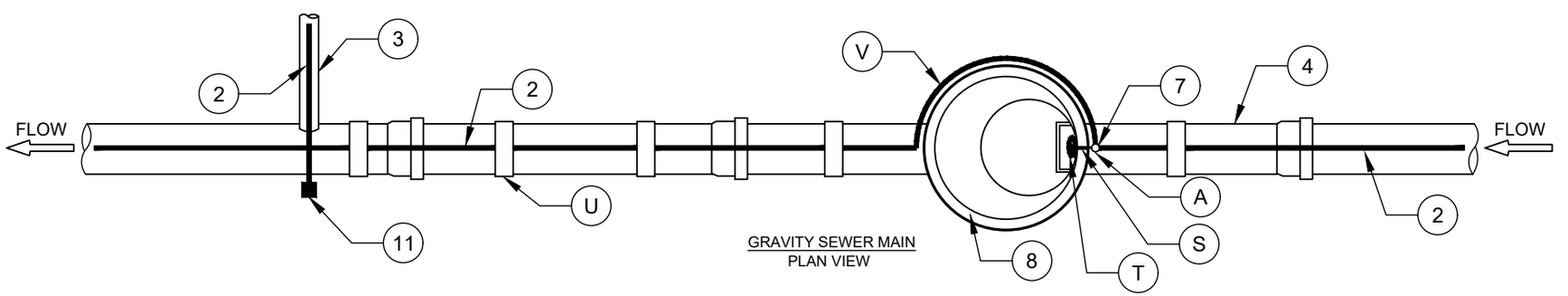
NO.	DESCRIPTION:
1.	NON-CORROSIVE FASTENER FOR TRACER WIRE (TYP.) 12" MAX. FROM TOP OF CONE.
2.	#12 GAUGE SOLID COPPER TRACER WIRES WITH 30 MILS GREEN HDPE INSULATION (TYP.).
3.	SEWER LATERAL.
4.	GRAVITY SEWER MAIN.
5.	SEWER SADDLE TAP.
6.	VALVE BOX ASSEMBLY (SEE CLTW STD. DETAIL).
7.	NO SPLICE.
8.	SEWER MANHOLE.
9.	6" WIDE BUTYL RUBBER JOINT SEALANT.
10.	1/4" OR 3/8" SDR9 PEX TUBING CONDUIT.
11.	ANODE.
12.	NOTCH CUT INTO CONCRETE.
13.	1" PVC CONDUIT.
14.	MULTIPLE TRACER WIRES.
15.	6" WIDE BUTYL RUBBER JOINT WRAP.

NOTES FOR GRAVITY SEWER MAIN (SECTION VIEW):

A. ALL VERTICAL WIRES AT MANHOLES SHALL BE PLACED IN 1 INCH ID PVC ELECTRICAL CONDUIT.
B. EXTEND CONDUIT UP AND TURN INTO NOTCH. TURN IN CONDUIT 12" BELOW GRADE FOR ALL MANHOLES. NEED 12" SO THE CONDUIT IS NOT IN ASPHALT IN ROADWAYS.
C. 1/2" MAX. DEEP NOTCH INTO CONCRETE (SIDE OF MANHOLE). ADD NOTCH IN TOP OF CONE FOR WIRE BETWEEN FRAME AND CONE. COVER NOTCH AND CONDUIT WITH 6" WIDE BUTYL RUBBER JOINT WRAP.
D. COIL AND SECURE WIRE TO FASTENER. LEAVE ENOUGH FREE WIRE TO EXTEND A MIN. OF 24".
E. WRAP EACH TRACER WIRE WIRE AROUND OUTSIDE OF MANHOLE (NO SPLICE).
F. TRACER WIRE SHALL BE AWG #12 GAUGE SOLID COPPER WITH 30 MILS GREEN HDPE INSULATION.
G. FOR GRAVITY MAIN AND OR LATERAL INSTALLATIONS LESS THAN 15', THE TRACING WIRE SHALL BE ATTACHED TO THE PIPE. TRACER WIRE SHALL BE LAID FLAT AND SECURELY AFFIXED TO THE PIPE AT 10' INTERVALS USING ZIP TIES OR DUCT TAPE. FOR GRAVITY MAIN AND OR LATERAL INSTALLATION DEEPER THAN 15', THE TRACING WIRE SHALL BE ATTACHED TO THE PIPE AND PLACED AT A DEPTH OF 4' DIRECTLY ABOVE THE SEWER PIPE. THE WIRE SHALL BE PROTECTED FROM DAMAGE DURING THE EXECUTION OF THE WORK. NO BREAKS OR CUTS IN THE TRACER WIRE OR INSULATION SHALL BE PERMITTED.
H. WHERE LATERAL TAPS ARE MADE BY SERVICE SADDLES, THE TRACER WIRE SHALL NOT BE PLACED BETWEEN THE SADDLE AND MAIN.
I. SPLICES IN THE PRIMARY TRACER WIRE ALONG THE SEWER MAIN SHALL INCLUDE 2' OF SLACK WIRE ON EACH SIDE OF EACH SPLICE.
J. FOR INSTALLING A NEW LATERAL ON AN EXISTING MAIN WITH TRACER WIRE, ONLY SPLICE TO EXISTING WIRE WITH 2' OF SLACK ON NEW LATERAL.

NOTES FOR SERVICE CONNECTION (SECTION VIEW):

K. SPLICE TO PRIMARY MAIN TRACER WIRE FOR SERVICE LATERAL. THE TRACER WIRE SHALL BE CONTINUOUS TO THE GREATEST EXTENT POSSIBLE. WHERE SPLICES ARE NECESSITATED IN THE WIRE, THE SPLICES SHALL BE SECURELY BONDED TOGETHER WITH AN APPROVED INDUSTRIAL CONNECTOR TO PROVIDE ELECTRICAL CONTINUITY. CONNECTOR SHALL BE COPPER AND INSULATION SHALL BE REPAIRED TO SEAL OUT MOISTURE AND CORROSION AND SHALL BE INSTALLED IN A MANNER SO AS TO PREVENT ANY UNINSULATED WIRE EXPOSURE. (SEE CLTW STD. DETAIL).
L. FASTEN TRACER WIRE TO PIPE WITH ZIP TIES OR DUCT TAPE AROUND THE CIRCUMFERENCE OF PIPE AT 10' INTERVALS. (TYP.)
M. ALL VERTICAL WIRE AT CLEANOUTS SHALL BE PLACED IN 1/4" OR 3/8" ID CONDUIT SDR 9 PEX TUBING - ASTM F876. (TYP.)
N. EXTEND CONDUIT TO JUST ABOVE CLEANOUT PLUG. PROVIDE 24" NEATLY COILED WIRE IN BOX.
O. THE CLEANOUT AT THE RIGHT OF WAY AND OR EASEMENT SHALL SERVE AS THE TEST PORT.
P. SPLICED CONNECTIONS SHALL BE ALLOWED BETWEEN THE PRIMARY MAIN LINE TRACER WIRE AND THE LATERAL TRACER WIRE.
Q. FOR NEW SEWER TAPS ON EXISTING MAINS VOID OF ANY TRACER WIRE, PROVIDE AN ANODE FOR THE TRACING WIRE TERMINATION AT THE POINT OF THE NEW TAP ON THE EXISTING SEWER MAIN. PLACE ANODE AT BOTTOM EDGE OF TRENCH AWAY FROM MAIN & LATERAL.
R. PRIOR TO ACCEPTANCE (POST PUNCH LIST) EACH WIRE SEGMENT SHALL PASS A CONDUCTIVITY TEST, WITNESSED BY THE ENGINEER OR ENGINEER'S REPRESENTATIVE.



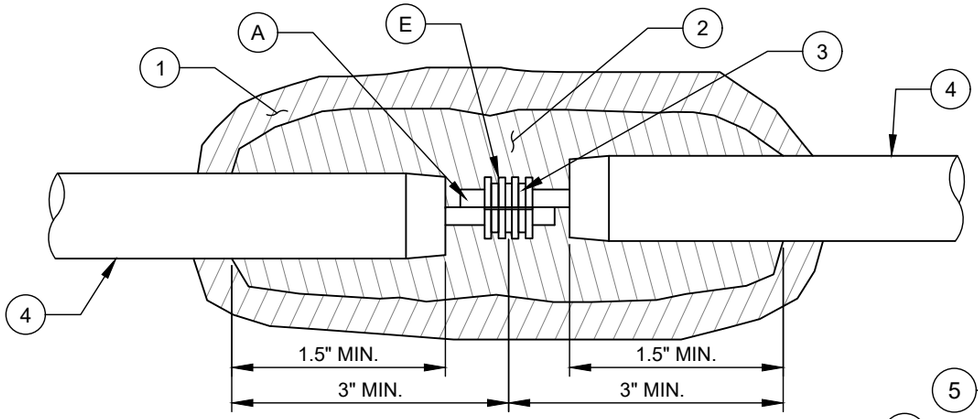
NOTES FOR GRAVITY SEWER MAIN (PLAN VIEW):

S. NOTCH ON TOP OF CONE (BETWEEN CONE AND FRAME) FOR TRACER WIRE.
T. MULTIPLE COILED AND SECURED WIRES.
U. FASTEN TRACER WIRE TO PIPE WITH ZIP TIES OR DUCT TAPE AROUND THE CIRCUMFERENCE OF PIPE OR AT 10' INTERVALS (TYP.).
V. WRAP TRACER WIRE AROUND OUTSIDE OF MANHOLE.

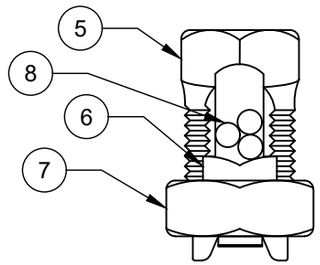
CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
GRAVITY SEWER

TRACER WIRE - GRAVITY SEWER

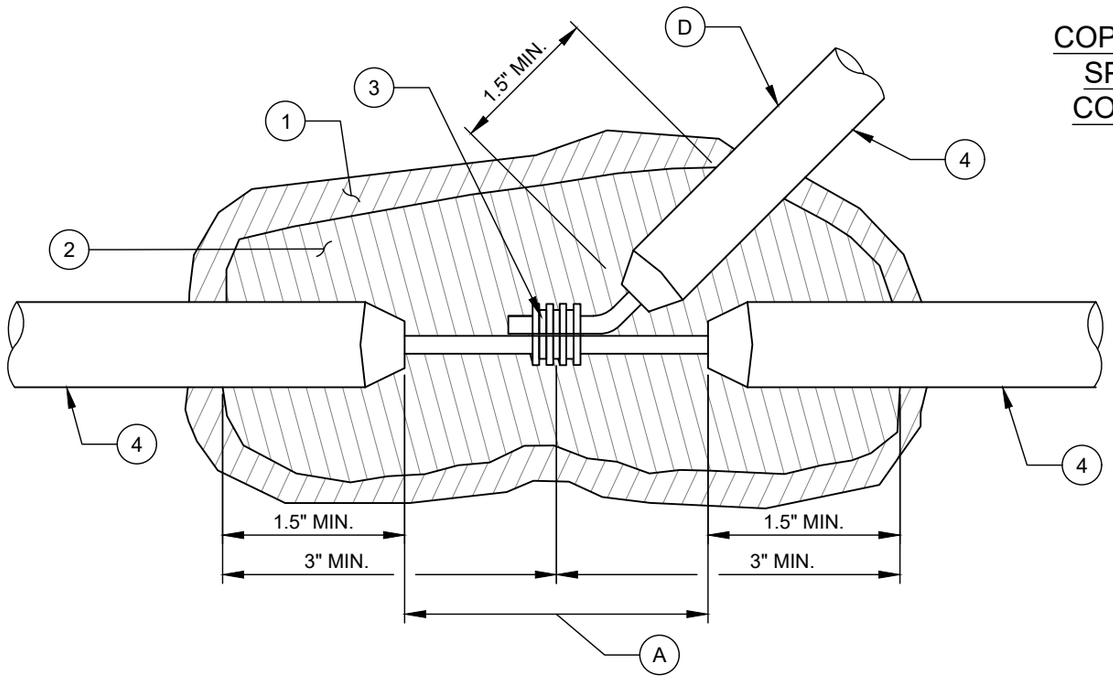
NO SCALE
VERSION 1.0
DATE 04/2024
DETAIL 11.5.2



IN-LINE OR REPAIR SPLICE



COPPER ALLOY SPLIT BOLT CONNECTOR



BRANCH IN-LINE SPLICE FOR SERVICE LATERAL

NO.	DESCRIPTION:
1.	3-LAYERS OF HALF LAPPED VINYL TAPE.
2.	3-LAYERS OF HALF LAPPED RUBBER TAPE.
3.	COPPER CRIMP CONNECTOR OR COPPER ALLOY SPLIT BOLT CONNECTOR.
4.	SOLID COPPER WITH 30 MILS GREEN HDPE INSULATION (AWG #12 TRACER WIRE).
5.	COPPER ALLOY SPLIT BOLT.
6.	COPPER ALLOY PRESSURE BAR.
7.	COPPER ALLOY HEX NUT.
8.	SOLID COPPER TRACER WIRES.

NOTES:

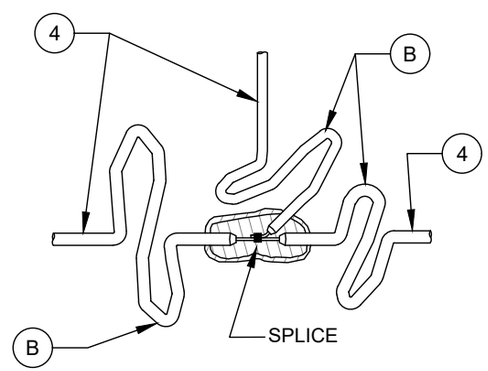
A. REMOVE MAINLINE (PRIMARY) TRACER WIRE INSULATION MATERIAL TO EXPOSE COPPER CORE WIRE.

B. IN LINE SPLICES SHALL BE LIMITED TO THE GREATEST EXTENT POSSIBLE. TRACER WIRE SHALL BE AS CONTINUOUS AS POSSIBLE WITHOUT SPLICES.

C. SPLICES SHALL INCLUDE 2' OF SLACK WIRE ON EACH SIDE OF EACH SPLICE (SEE DETAIL ON THIS SHEET).

D. 4 WAY WIRE SPLICES ARE ACCEPTABLE, WHERE NEEDED FOR 2 LATERALS CLOSELY SPACED, TO REDUCE THE NUMBER OF SPLICES.

E. THE CRIMPING TOOL USED TO COMPLETE THE CRIMP SHALL BE DESIGNED SPECIFICALLY FOR USE WITH THE CONNECTOR USED. GENERIC CRIMPING TOOLS ARE NOT ACCEPTABLE.



SPLICES WITH 2 FEET OF SLACK WIRE

CHARLOTTE WATER

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A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS

GRAVITY SEWER

TRACER WIRE - SPLICE

NO SCALE

VERSION 1.0

DATE 04/2024

DETAIL 11.5.3