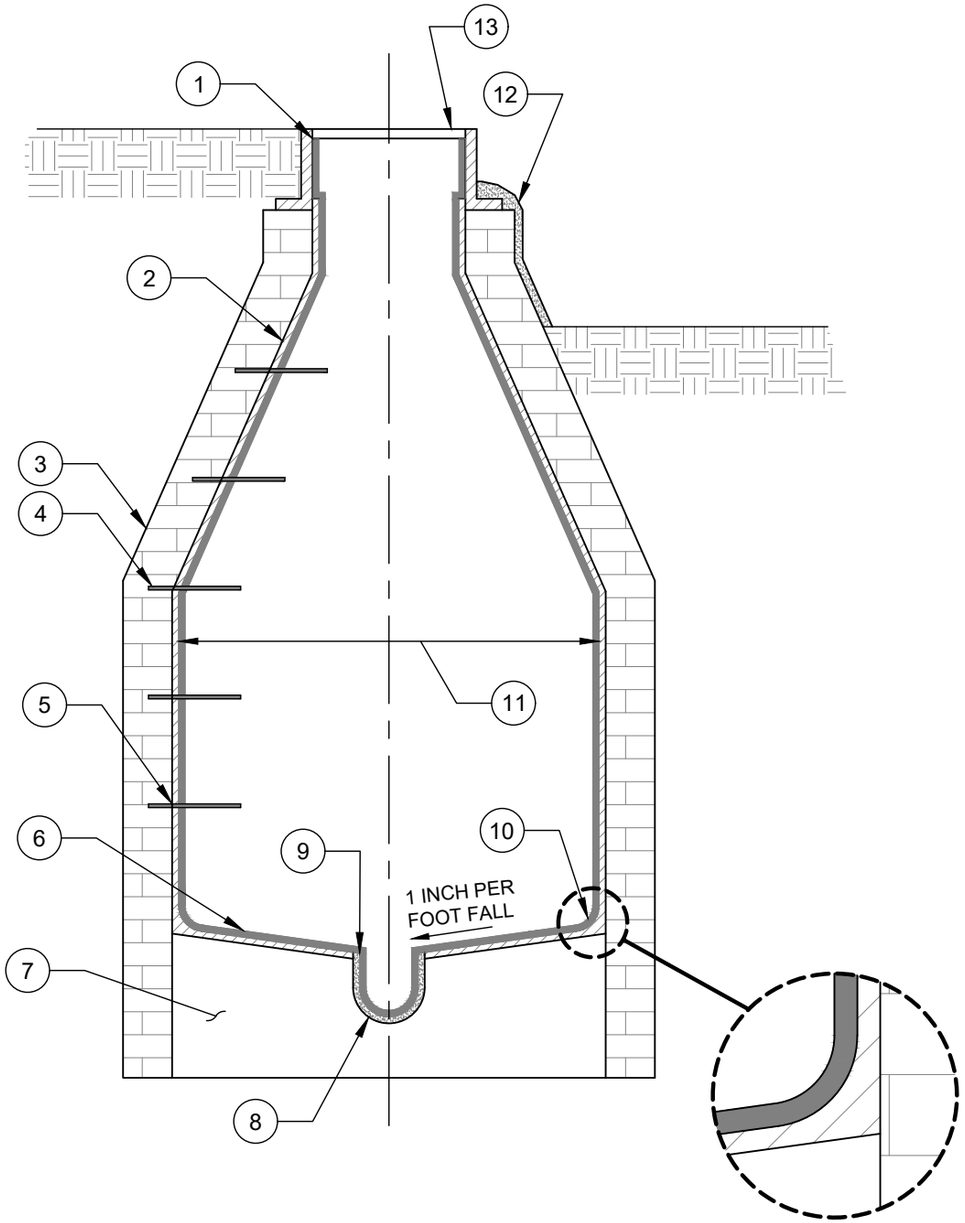


NO.	DESCRIPTION:
1.	EPOXY COATING WHERE SPECIFIED - MIN. 160 MILS THICK. EXTEND EPOXY TO TOP OF FRAME.
2.	MIN. 1 INCH THICK CEMENTITIOUS LINER ON VERTICAL WALL TO 1 INCH ABOVE BOTTOM OF FRAME. SEE NOTES A AND B.
3.	EXISTING MANHOLE WALL.
4.	EXISTING MANHOLE STEPS TO BE REMOVED UNLESS DIRECTED OTHERWISE BY THE SEALING ENGINEER.
5.	PLUG VOIDS AROUND STEPS WITH GROUT PRIOR TO INSTALLING CEMENTITIOUS LINER.
6.	MIN. 1 INCH THICK CEMENTITIOUS LINER ON BENCHING ALL AROUND. SEE NOTE B.
7.	EXISTING BENCHING. REBUILD WITH MIN. 3,600 PSI QUICKSET CONCRETE TO CROWN OF SEWERS WHERE SPECIFIED OR WHERE DIRECTED BY THE SEALING ENGINEER.
8.	EXISTING INVERT CHANNEL.
9.	COAT INVERT CHANNEL WITH GROUT. SEE SPECIFICATIONS.
10.	SEE SPECIFICATIONS PERTAINING TO WALL/BENCH INTERFACE.
11.	MANHOLE DIAMETER VARIES. TO BE DETERMINED IN FIELD. SEE NOTE A.
12.	SPECIAL CEMENTITIOUS MORTAR ON OUTSIDE OF EXPOSED MANHOLE WALLS WHERE SPECIFIED. MIN. 1 INCH THICK AND EXTENDED TO ABOVE AND AROUND FRAME AS SHOWN.
13.	EXISTING FRAME & COVER. RESET, RAISE OR REPLACE PER REHABILITATION OF MANHOLE FRAME AND COVER STD. DETAIL WHERE SPECIFIED.

NOTES:

A. MANHOLE SHOWN IS A TYPICAL SHAPE. HOWEVER, MANHOLE SHAPES WILL VARY.

B. THE SEALING ENGINEER WILL SPECIFY THE REQUIRED MATERIAL FOR EACH MANHOLE.

C. PROVIDE ADDITIONAL CEMENTITIOUS MATERIAL AS NECESSARY TO PROVIDE A 1 INCH PER FOOT FALL FROM THE MANHOLE WALL TO THE INVERT CHANNEL. ANY AND ALL ADDITIONAL CEMENTITIOUS MATERIAL REQUIRED TO PROVIDE THE 1 INCH PER FOOT FALL SHALL BE INCIDENTAL TO THE WORK. THE CONTRACTOR IS ADVISED THAT MOST OF THE EXISTING BENCHES ARE FLAT. PROVIDE CHANNEL IN BENCHING FOR SEWERS ENTERING MANHOLES ABOVE BENCHING. CHANNEL TO PROVIDE SMOOTH TRANSITION TO MAIN INVERT CHANNEL.

D. THIS DETAIL APPLIES TO BRICK OR PRECAST MANHOLES.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
SEWER REHAB

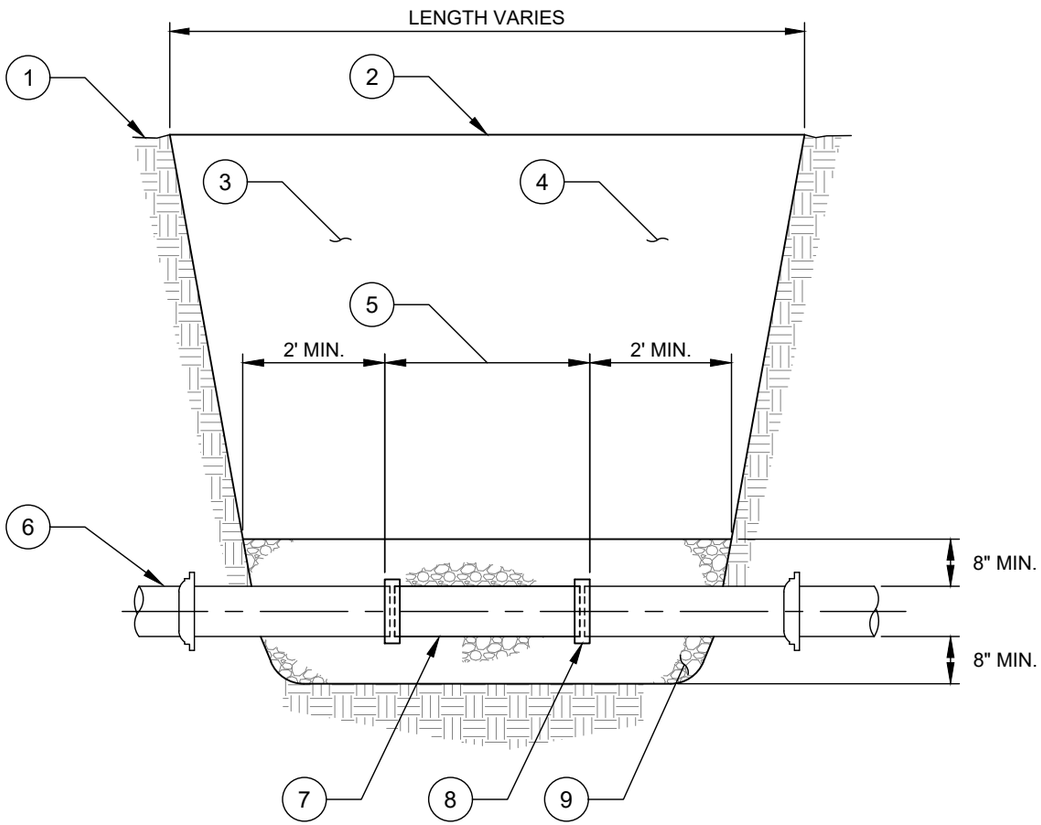
REHABILITATION OF EXISTING MANHOLES

NO SCALE

VERSION
1.0

DATE
04/2024

DETAIL
16.1



NO.	DESCRIPTION:
1.	UNDISTURBED SOIL.
2.	FINISHED GRADE. RESTORE TO MATCH EXISTING CONDITIONS. REFER TO CLTW SPECIFICATIONS AND DETAILS.
3.	REMOVE EXCAVATED MATERIAL UNDER PAVED SURFACES. SEE NOTE B.
4.	COMPACTED SOIL IN GRASSED AREAS/ COMPACTED ABC STONE OR PIT GRAVEL IN PAVED AREAS. COMPACTION TO BE AS SPECIFIED.
5.	POINT REPAIR SEGMENT. SEE NOTES A, C, D, AND E.
6.	EXISTING SEWER PIPE (VARIES).
7.	NEW SEWER PIPE LENGTH VARIES. ALL PIPE USED FOR POINT REPAIRS SHALL BE PVC OR DUCTILE IRON UNLESS OTHERWISE NOTED.
8.	RUBBER SLEEVE COUPLING WITH STAINLESS STEEL COMPRESSION BANDS AND SHEAR RINGS - MISSION ARC, FERNCO STRONGBACK OR APPROVED EQUAL. TYPICAL EACH END, COUPLING TO BE MIN. 6" WIDE.
9.	COMPACTED #57 STONE.

NOTES:

A. THE SEQUENCE OF WORK FOR PERFORMING POINT REPAIRS SHALL BE AS FOLLOWS:
- A.1. BYPASS PUMP FLOWS AROUND POINT REPAIR SEGMENT.
- A.2. EXCAVATE TO 8" BELOW EXISTING SEWER.
- A.3. NEATLY CUT EXISTING SEWER AT EACH END OF POINT REPAIR AND REMOVE EXISTING SEWER COMPLETELY.
- A.4. INSTALL #57 STONE TO SEWER INVERT ELEVATION AND COMPACT.
- A.5. INSTALL NEW SEWER AT A CONSTANT SLOPE BETWEEN THE TWO EXISTING PIPE ENDS. CONNECT THE NEW SEWER TO THE EXISTING WITH SPECIFIED COUPLINGS. REMOVE STONE BEDDING AS REQUIRED TO INSTALL PIPE AND COUPLINGS AND FILL VOIDS UNDER PIPE WITH STONE.
- A.6. RETURN FLOW THROUGH PIPE.
- A.7. BACKFILL AND COMPACT AS SHOWN.

B. UNDER PAVED SURFACES ONLY, CONTRACTOR SHALL REMOVE EXCAVATED SOIL AND DISPOSE OF IT OFFSITE. CONTRACTOR SHALL IMPORT ABC STONE OR PIT GRAVEL FOR BACKFILLING FROM TOP OF #57 STONE TO PAVEMENT SUBGRADE.

C. SERVICE LATERALS LOCATED WITHIN POINT REPAIR SEGMENTS SHALL BE CONNECTED TO NEW SEWER WITH A DIP TEE. REFER TO APPROPRIATE STD. DETAIL.

D. LENGTH OF POINT REPAIR WILL BE DETERMINED BY THE OWNER'S REPRESENTATIVE AFTER REVIEWING THE TELEVISION INSPECTION. THE CONTRACTOR SHALL EXTEND POINT REPAIRS IN THE FIELD AS NECESSARY AND APPROVED BY THE SEALING ENGINEER TO CONNECT TO SOLID PIPE.

E. THE CONTRACTOR SHALL USE A TRENCH BOX OR SHEETING AND SHORING IN ACCORDANCE WITH OSHA REGULATIONS TO SUPPORT THE TRENCH WALLS DURING THIS WORK. THE CONTRACTOR WILL NOT BE ALLOWED TO SLOPE TRENCH WALLS.

F. REFER TO APPROPRIATE STD. DETAIL FOR CONNECTING TO MANHOLES.

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS

SEWER REHAB

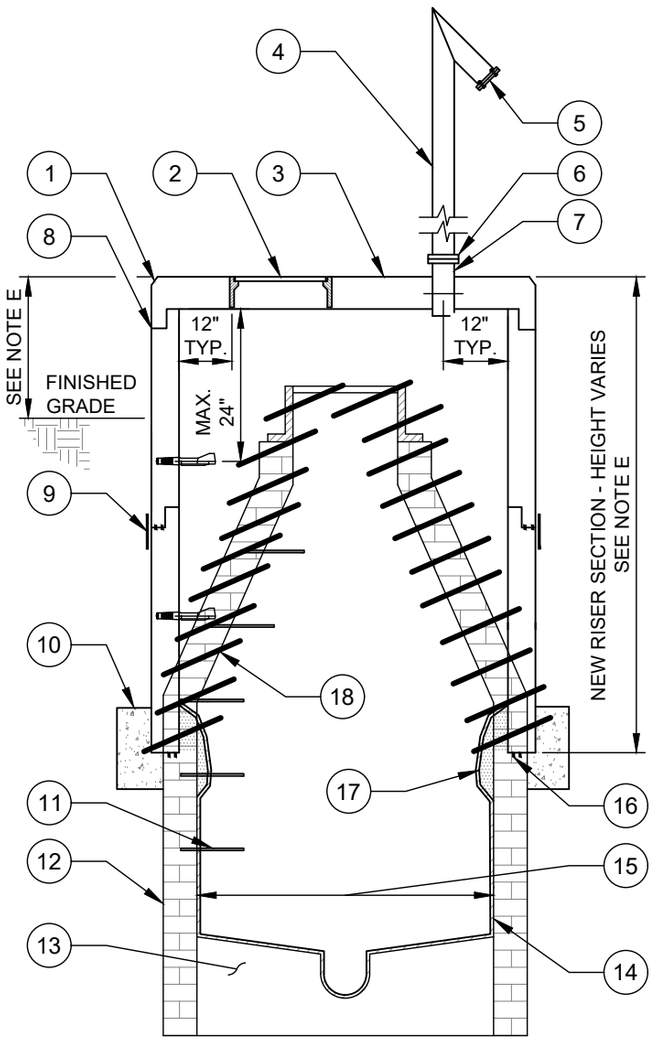
TYPICAL POINT REPAIR

NO SCALE

VERSION
1.0

DATE
04/2024

DETAIL
16.2



NO. DESCRIPTION:

1. 3/4" CHAMFER ALL AROUND.
2. 24" OR 30" CAM-LOCK WATERTIGHT FRAME AND COVER. FRAME CAST INTO FLAT-TOP SECTION. SEE NOTE H.
3. FLAT-TOP MANHOLE SECTION. SEE NOTE G.
4. STEEL VENT PIPE WHEN SPECIFIED. HEIGHT TO BE SPECIFIED BY SEALING ENGINEER. SEE NOTE I.
5. BOLT-ON BIRD SCREEN ON VENT PIPE OPENING.
6. 150# SLIP-ON TYPE WELDING FLANGES (TYP). SEE NOTE I.
7. VENT PIPE STUB-OUT. SEE NOTE I.
8. GROUT ALL OUTSIDE JOINTS ABOVE GRADE WITH NON-SHRINK GROUT.
9. MIN. 6" WIDE BUTYL RUBBER JOINT WRAP ON EXTERIOR OF ALL JOINTS.
10. CONCRETE COLLAR ALL AROUND JOINT. SEE NOTE F.
11. EXISTING MANHOLE STEPS TO BE REMOVED UNLESS DIRECTED OTHERWISE BY THE SEALING ENGINEER.
12. EXISTING MANHOLE WALL. SEE NOTE B.
13. EXISTING BENCHING.
14. MIN. 1 INCH THICK CEMENTITIOUS LINER ON VERTICAL WALL TO 6" ABOVE RISER SECTION. SEE NOTE J.
15. MANHOLE DIAMETER VARIES. CONTRACTOR TO DETERMINE IN FIELD. SEE NOTE C.
16. INSTALL 2 PIECES BUTYL RUBBER UNDER RISER SECTION WHERE POSSIBLE. SEE NOTE F.
17. FILL INSIDE JOINT WITH NON-SHRINK GROUT. SEE NOTE F.
18. REMOVE EXISTING MH. SEE NOTES C AND D.

NOTES:

A. ALL WORK AND MATERIALS TO BE IN ACCORDANCE WITH CLTW STANDARD SPECIFICATIONS AND DETAILS.

B. THIS DETAIL DEPICTS AN EXISTING BRICK MANHOLE WITH A TYPICAL CHIMNEY SECTION. SOME MANHOLES MAY BE PRECAST CONCRETE WITH CONE SECTIONS.

C. CONTRACTOR TO MEASURE THE INSIDE DIAMETER OF EXISTING MANHOLE TO SELECT APPROPRIATE DIAMETER OF NEW RISERS.

D. CONTRACTOR TO REMOVE EXISTING WALLS TO SOLID STRUCTURE (TO AT LEAST BELOW THE CONE OR CHIMNEY SECTION) OR TO THE SPECIFIED LOCATION. THE LIMITS OF REMOVAL SHALL BE APPROVED BY THE SEALING ENGINEER IN THE FIELD. CONTRACTOR TO ALSO REMOVE EXISTING FRAMES AND COVERS, VENT PIPES AND ALL APPURTENANCES, STEPS, ETC. CONTRACTOR TO DISPOSE OF ALL MATERIALS OFF-SITE. NO DEBRIS SHALL BE DROPPED INTO THE SEWER. IF DEBRIS ENTERS THE SEWER, THE CONTRACTOR WILL BE REQUIRED TO CLEAN THE SEWER AT NO ADDITIONAL COST TO THE OWNER.

E. CONTRACTOR TO INSTALL NEW RISER SECTIONS AS NECESSARY TO EXTEND THE MANHOLE TO THE SPECIFIED/APPROVED ELEVATION. SEALING ENGINEER SHALL APPROVE FINAL ELEVATIONS IN THE FIELD. BOTTOM RISER TO BE PROVIDED WITH A FLAT JOINT UNLESS OTHERWISE APPROVED.

F. CONTRACTOR TO SEAL NEW RISER SECTION/EXISTING WALL JOINT TO PROVIDE A LEAK-TIGHT JOINT. THE CONTRACTOR SHALL PERFORM ALL WORK NECESSARY TO PROVIDE A LEAK-TIGHT SEAL. WHERE POSSIBLE, BUTYL RUBBER SEALANT SHALL BE PROVIDED UNDER THE NEW RISER SECTION. IN ALL CASES, A CONCRETE COLLAR SHALL BE POURED AROUND THE JOINT. COLLAR TO BE MINIMUM 6 INCHES WIDE AND 12" HIGH CENTERED ON JOINT ALL AROUND. ON THE INSIDE OF THE JOINT, CONTRACTOR TO SEAL JOINT WITH NON-SHRINK GROUT. GROUT TO COMPLETELY FILL JOINT AND SHALL EXTEND AT LEAST 6 INCHES EACH SIDE OF JOINT ALL AROUND. GROUT TO BE TAPERED TO THE EXISTING WALL SECTION BELOW THE JOINT. GROUT TO BE RESISTANT TO HYDROGEN-SULFIDE.

G. NEW FLAT-TOP SECTIONS TO BE INSTALLED ON TOP OF NEW RISER SECTIONS UNLESS SPECIFIED OTHERWISE. FRAMES TO BE CAST INTO FLAT-TOP. SEE NOTE H. IN SOME INSTANCES, THE SEALING ENGINEER MAY SPECIFY THAT A STANDARD CONE SECTION BE INSTALLED INSTEAD OF A FLAT-TOP.

H. FOR FLAT-TOPS, ALL FRAMES SHALL BE CAST INTO THE FLAT-TOP SECTION UNLESS OTHERWISE SPECIFIED. FOR CONE SECTIONS, FRAMES SHALL BE BOLTED TO THE CONE. ALL COVERS SHALL BE CAM-LOCK WATERTIGHT COVERS UNLESS OTHERWISE SPECIFIED/APPROVED.
   - H.1. 24"-DIAMETER FRAMES/COVERS SHALL BE PROVIDED ON MANHOLES FOR SEWERS 24" AND SMALLER.
   - H.2. 30"-DIAMETER FRAMES/COVERS SHALL BE PROVIDED ON MANHOLES FOR SEWERS LARGER THAN 24".

I. WHERE SPECIFIED, FLAT TOP SECTIONS SHALL BE FURNISHED WITH THE VENT PIPE CAST INTO THE TOP SECTION. SEE CLTW STANDARD SPECIFICATIONS AND DETAILS. IF A VENT PIPE IS SPECIFIED, FURNISH VENT PIPE TO THE SPECIFIED HEIGHT (HEIGHT TO VENT OPENING) PER CLTW STANDARD SPECIFICATIONS AND DETAILS.

J. ALL MANHOLES THAT ARE REHABILITATED USING THIS DETAIL SHALL BE COATED WITH CEMENTITIOUS MORTAR TO 6" ABOVE THE EXISTING MANHOLE/NEW RISER SECTION INTERFACE. REFER TO APPROPRIATE STD. DETAIL FOR REHABILITATION OF EXISTING MANHOLES EXCEPT FOR THE LIMIT OF CEMENTITIOUS MORTAR AT THE TOP OF THE MANHOLE.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
SEWER REHAB

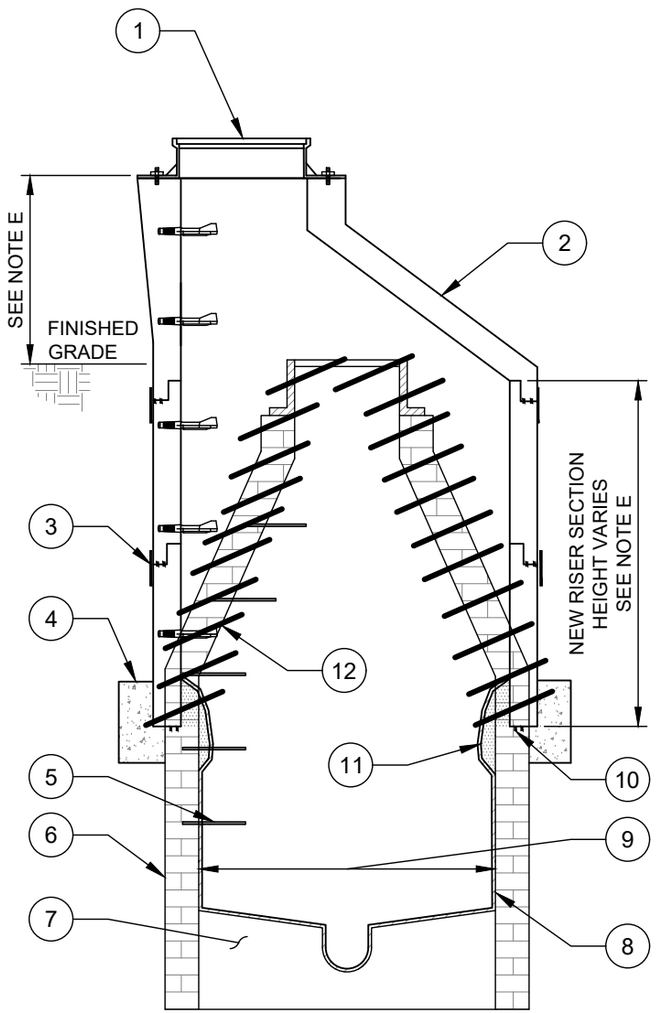
REHABILITATION OF MANHOLE WALLS AND TOP SECTION

NO SCALE

VERSION 1.0

DATE 04/2024

DETAIL 16.3



NO. DESCRIPTION:

1. FRAME AND COVER. SOLID OR WATERTIGHT AS DIRECTED. SEE NOTE H.
2. CONE SECTION. SEE NOTE G.
3. MIN. 6" WIDE BUTYL RUBBER JOINT WRAP ON EXTERIOR OF ALL JOINTS.
4. CONCRETE COLLAR ALL AROUND JOINT. SEE NOTE F.
5. EXISTING MANHOLE STEPS TO BE REMOVED UNLESS DIRECTED OTHERWISE BY THE SEALING ENGINEER.
6. EXISTING MANHOLE WALL. SEE NOTE B.
7. EXISTING BENCHING.
8. MIN. 1 INCH THICK CEMENTITIOUS LINER ON VERTICAL WALL TO 6" ABOVE RISER SECTION. SEE NOTE I.
9. MANHOLE DIAMETER VARIES. CONTRACTOR TO DETERMINE IN FIELD. SEE NOTE C.
10. INSTALL 2 PIECES BUTYL RUBBER UNDER RISER SECTION WHERE POSSIBLE. SEE NOTE F.
11. FILL INSIDE JOINT WITH NON-SHRINK GROUT. SEE NOTE F.
12. REMOVE EXISTING MH. SEE NOTES C AND D.

NOTES:

A. ALL WORK AND MATERIALS TO BE IN ACCORDANCE WITH CLTW STANDARD SPECIFICATIONS AND DETAILS.

B. THIS DETAIL DEPICTS AN EXISTING BRICK MANHOLE WITH A TYPICAL CHIMNEY SECTION. SOME MANHOLES MAY BE PRECAST CONCRETE WITH CONE SECTIONS.

C. CONTRACTOR TO MEASURE THE INSIDE DIAMETER OF EXISTING MANHOLE TO SELECT APPROPRIATE DIAMETER OF NEW RISERS.

D. CONTRACTOR TO REMOVE EXISTING WALLS TO SOLID STRUCTURE (TO AT LEAST BELOW THE CONE OR CHIMNEY SECTION) OR TO THE SPECIFIED LOCATION. THE LIMITS OF REMOVAL SHALL BE APPROVED BY THE SEALING ENGINEER IN THE FIELD. CONTRACTOR TO ALSO REMOVE EXISTING FRAMES AND COVERS, VENT PIPES AND ALL APPURTENANCES, STEPS, ETC. CONTRACTOR TO DISPOSE OF ALL MATERIALS OFF-SITE. NO DEBRIS SHALL BE DROPPED INTO THE SEWER. IF DEBRIS ENTERS THE SEWER, THE CONTRACTOR WILL BE REQUIRED TO CLEAN THE SEWER AT NO ADDITIONAL COST TO THE OWNER.

E. CONTRACTOR TO INSTALL NEW RISER AND CONE SECTIONS AS NECESSARY TO EXTEND THE MANHOLE TO THE SPECIFIED/APPROVED ELEVATION. THE FINAL ELEVATION MAY BE HIGHER THAN, LOWER THAN OR EQUAL TO THE EXISTING ELEVATION. THIS DETAIL ILLUSTRATES A HIGHER ELEVATION. THE CONTRACTOR SHALL DETERMINE THE REQUIRED RISER AND CONE HEIGHTS TO MEET THE SPECIFIED ELEVATION. SEALING ENGINEER SHALL APPROVE FINAL ELEVATIONS IN THE FIELD. BOTTOM RISER TO BE PROVIDED WITH A FLAT JOINT UNLESS OTHERWISE APPROVED.

F. CONTRACTOR TO SEAL NEW RISER SECTION/EXISTING WALL JOINT TO PROVIDE A LEAK-TIGHT JOINT. THE CONTRACTOR SHALL PERFORM ALL WORK NECESSARY TO PROVIDE A LEAK-TIGHT SEAL. WHERE POSSIBLE, BUTYL RUBBER SEALANT SHALL BE PROVIDED UNDER THE NEW RISER SECTION. IN ALL CASES, A CONCRETE COLLAR SHALL BE POURED AROUND THE JOINT. COLLAR TO BE MINIMUM 6 INCHES WIDE AND 12" HIGH CENTERED ON JOINT ALL AROUND.

G. NEW CONE SECTIONS TO BE INSTALLED ON TOP OF NEW RISER SECTIONS UNLESS SPECIFIED OTHERWISE. FRAMES TO BE BOLTED ONTO CONE SECTIONS PER CLTW STANDARD DETAILS. REFER TO APPROPRIATE STD. DETAIL FOR CLEANOUT REPLACEMENT FOR ALL WORK IN PAVED AREAS.

H. COVERS SHALL BE CAM-LOCK WATERTIGHT COVERS OR SOLID COVERS AS DIRECTED BY THE SEALING ENGINEER.

I. ALL MANHOLES THAT ARE REHABILITATED USING THIS DETAIL SHALL BE COATED WITH CEMENTITIOUS MORTAR TO 6" ABOVE THE EXISTING MANHOLE/NEW RISER SECTION INTERFACE. REFER TO APPROPRIATE STD. DETAIL FOR REHABILITATION OF EXISTING MANHOLES EXCEPT FOR THE LIMIT OF CEMENTITIOUS MORTAR AT THE TOP OF THE MANHOLE.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
SEWER REHAB

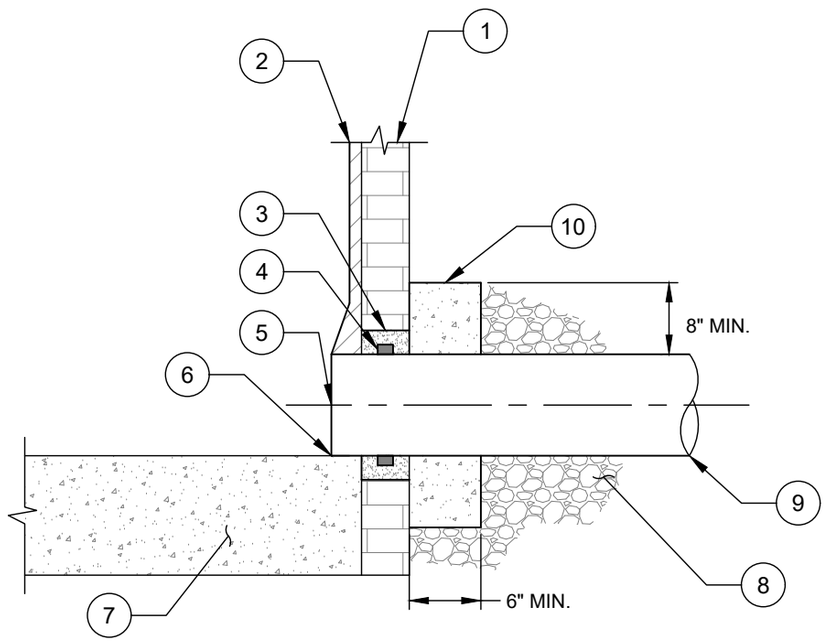
REHABILITATION OF MANHOLE WALLS AND TOP SECTION (WITH CONE SECTION)

NO SCALE

VERSION 1.0

DATE 04/2024

DETAIL 16.4



SECTION VIEW

NO.	DESCRIPTION:
1.	EXISTING MANHOLE WALL.
2.	MIN. 1 INCH THICK LINER TO BE INSTALLED AFTER SEWER REPLACEMENT IS COMPLETE WHERE SPECIFIED. MATCH LINER TO END OF PIPE AS SHOWN. REFER TO APPROPRIATE STD. DETAIL FOR REHABILITATION OF EXISTING MANHOLES.
3.	REMOVE EXISTING PIPE AND MANHOLE WALL AS NECESSARY TO INSTALL NEW PIPE. OPENING IN WALL SHALL BE APPROXIMATELY THE PIPE OD+3" ALL AROUND. AFTER PIPE INSTALLATION, FILL VOIDS AROUND PIPE COMPLETELY WITH NON-SHRINK GROUT.
4.	HYDROPHILIC WATERSTOP (HYDROTITE BY SIKA OR APPROVED EQUAL) WRAPPED AROUND PIPE MIN. 4 TIMES.
5.	EXTEND NEW PIPE MIN. 2" INTO MANHOLE.
6.	MATCH NEW PIPE TO EXISTING INVERT ELEVATION.
7.	EXISTING MANHOLE BASE.
8.	#57 STONE ALL AROUND.
9.	NEW SEWER PIPE.
10.	INSTALL CONCRETE COLLAR ALL AROUND NEW PIPE. CONCRETE SHALL BE MIN 3,600 PSI. PER CLTW STANDARD SPECIFICATIONS.

NOTES:

A. CONTRACTOR SHALL REFER TO THIS DETAIL WHEN CONNECTING NEW SEWER PIPES TO EXISTING MANHOLES. THE NEW PIPES MAY BE INSTALLED FOR A POINT REPAIR, PIPE REPLACEMENT, OR SERVICE LATERAL REPLACEMENT. FOR PIPE BURSTING, REFER TO APPROPRIATE STD. DETAIL.

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

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
SEWER REHAB

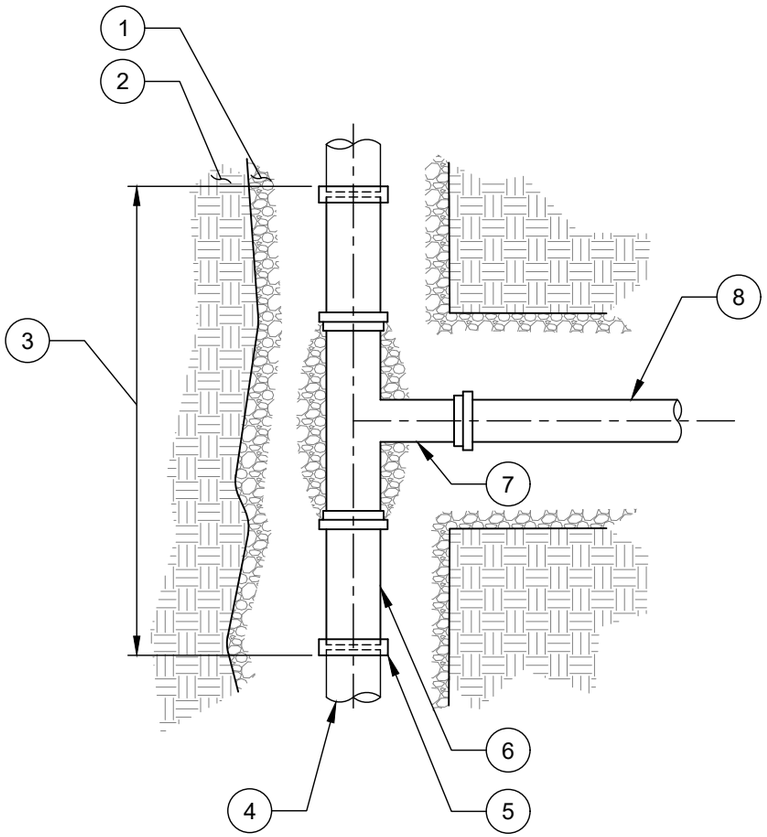
NEW PIPE CONNECTION AT EXISTING MANHOLE

NO SCALE

VERSION
1.0

DATE
04/2024

DETAIL
16.5



PLAN VIEW

NO.	DESCRIPTION:
1.	#57 STONE. SEE NOTE E.
2.	UNDISTURBED EARTH.
3.	CUT AND REMOVE EXISTING SEWER SERVICE CONNECTION AND REPLACE WITH NEW DIP SEWER AND TEE SERVICE CONNECTION. SEE NOTE B. MIN. LENGTH OF REPLACEMENT SHALL BE 7'.
4.	EXISTING SEWER.
5.	RUBBER SLEEVE COUPLING WITH STAINLESS STEEL COMPRESSION BANDS AND SHEAR RINGS - MISSION ARC, FERNCO STRONGBACK OR APPROVED EQUAL. (TYP. EACH END) (MIN. 6" WIDE).
6.	NEW SEWER. LENGTH AS REQUIRED (TYP. EACH END).
7.	NEW DUCTILE IRON TEE. SEE NOTE F.
8.	NEW REPLACEMENT SERVICE LATERAL PIPE. SEE NOTES C AND D.

NOTES:

A. REPLACE EXISTING SERVICE LATERALS WHERE SPECIFIED BY THE SEALING ENGINEER. REPLACEMENT TO INCLUDE THE TEE AND 6 FEET OF SERVICE LATERAL TO RECONNECT TO THE EXISTING LATERAL OR ADDITIONAL LATERAL TO INSTALL THE NEW LATERAL ALL THE WAY TO THE EDGE OF THE PROPERTY LINE OR ROAD R/W. INSTALL A CLEANOUT AT THE END OF THE NEW LATERAL PER THE APPROPRIATE STD. DETAIL WHEN DIRECTED BY THE SEALING ENGINEER. THE SEALING ENGINEER WILL DETERMINE WHICH SERVICES TO REPLACE FROM REVIEW OF TELEVISION INSPECTIONS.

B. INSTALL THE NEW SEWER AT A CONSTANT SLOPE BETWEEN THE TWO EXISTING PIPE ENDS.

C. INSTALL FITTINGS, ADAPTERS AND RUBBER SLEEVE COUPLINGS AS NECESSARY TO CONNECT NEW TEE AND SERVICE LATERAL. NEW SERVICE LATERALS SHALL BE DUCTILE IRON PIPE (DIP) OR POLYVINYL CHLORIDE (PVC). NEW LATERALS AND TEE BRANCHES SHALL BE THE SAME SIZE AS THE EXISTING LATERAL.

D. NEW SERVICE LATERAL SHALL BE INSTALLED AT THE EXISTING LATERAL SLOPE AND IN THE EXISTING LATERAL LOCATION. CONNECT NEW LATERAL TO EXISTING LATERAL WITH RUBBER SLEEVE COUPLINGS WITH STAINLESS STEEL COMPRESSION BANDS AND SHEAR RINGS. BYPASS FLOWS FROM THE LATERAL DURING CONSTRUCTION TO MAINTAIN SEWER SERVICE. DISPOSE OF EXISTING LATERAL PIPE MATERIAL OFFSITE.

E. INSTALL AND COMPACT #57 CRUSHED STONE TO A MIN. OF 1 FOOT ABOVE THE TOP OF THE NEW SEWER PIPE, TEE, FITTINGS AND SERVICE LATERAL PIPES (COMPLETE TO CLEANOUT). IN PAVED AREAS, INSTALL AND COMPACT IMPORTED ABC STONE OR PIT GRAVEL FROM TOP OF STONE TO PAVEMENT SUBGRADE. IN UNPAVED AREAS, INSTALL AND COMPACT COMMON FILL FROM TOP OF STONE TO FINISHED GRADE. RESTORE SURFACE TO MATCH EXISTING CONDITIONS.

F. TEES SHALL BE ROTATED MINIMUM 22 1/2° PER CLTW STANDARDS. INSTALL FITTINGS AS NECESSARY TO RETURN THE NEW LATERAL TO THE EXISTING LATERAL ELEVATION. ALL TEES SHALL BE DUCTILE IRON. REFERENCE SPECIFICATIONS FOR TEE INSTALLATION.

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

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
SEWER REHAB

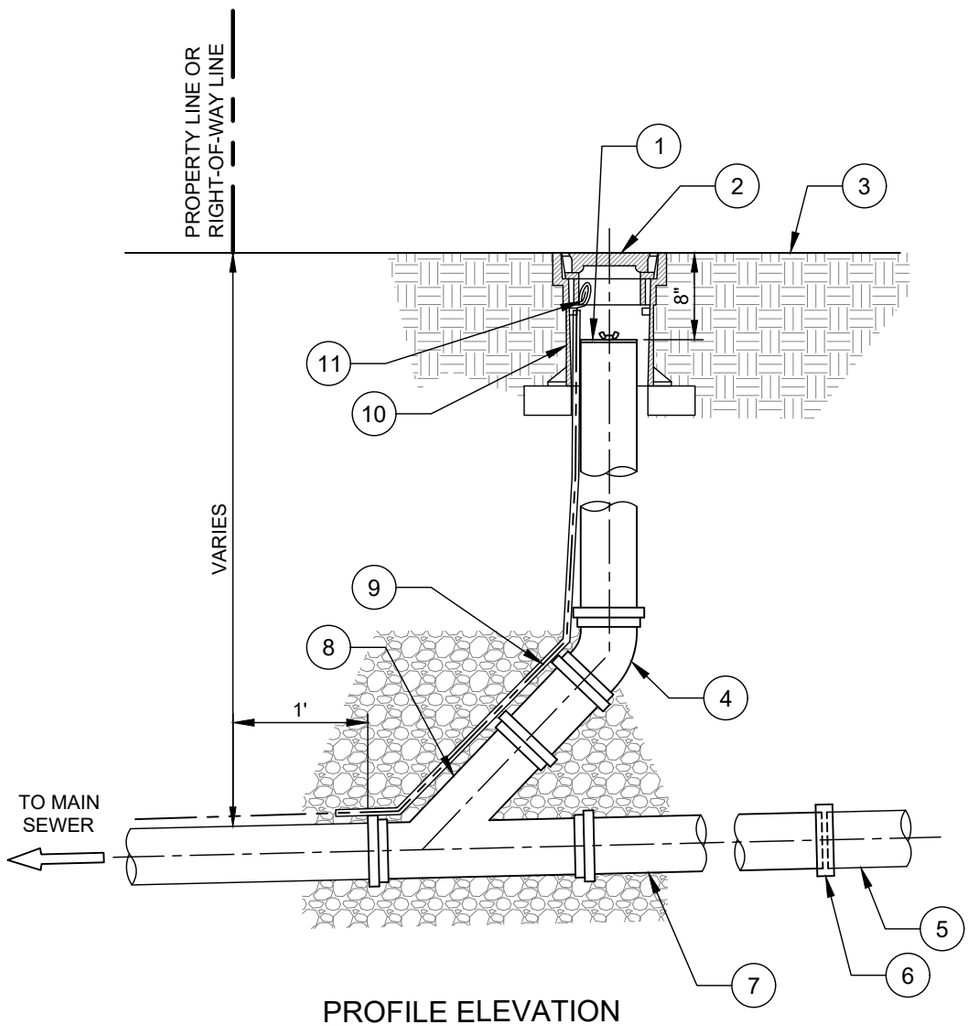
SERVICE LATERAL REPLACEMENT

NO SCALE

VERSION
1.0

DATE
04/2024

DETAIL
16.6



PROFILE ELEVATION

NO. DESCRIPTION:

1. CLEANOUT CAP SHALL BE PLASTIC GRIPPER PLUG, END OF PIPE MODEL, BY CHERNE INDUSTRIES OR APPROVED EQUAL.
2. COVER TO READ "SEWER". SEE NOTE A.
3. FINAL GRADE. SEE NOTE A.
4. 45° BEND.
5. EXISTING SERVICE LATERAL.
6. CONNECT NEW LATERAL PIPE TO EXISTING LATERAL WITH RUBBER SLEEVE COUPLING WITH STAINLESS STEEL COMPRESSION BANDS AND SHEAR RINGS - MISSION ARC, FERNCO STRONGBACK OR APPROVED EQUAL. COUPLING TO BE MIN. 4" WIDE.
7. NEW DIP OR PVC SERVICE LATERAL PIPE. SEE NOTE C.
8. 45° WYE BRANCH.
9. #12 AWG SOLID COPPER TRACER WIRE, WITH 30 MILS GREEN HDPE INSULATION.
10. TWO PIECE CAST IRON VALVE BOX, RATED FOR TRAFFIC LOADING. SEE NOTE D.
11. TRACER WIRE TERMINATION. SEE CLTW STD. DETAIL.

NOTES:

A. CLEANOUT COVER TO BE FLUSH WITH THE FINAL GRADE. RESTORE SURFACE TO MATCH EXISTING CONDITIONS IN ACCORDANCE WITH CLTW STANDARD SPECIFICATIONS AND DETAILS.

B. LOCATION OF CLEANOUT SHALL BE AS DIRECTED BY SEALING ENGINEER.

C. NEW SERVICE LATERAL PIPE, CLEANOUT PIPING AND FITTINGS SHALL BE DIP OR PVC. NEW SERVICE LATERALS SHALL BE INSTALLED TO MATCH THE EXISTING SLOPES AND CONFIGURATIONS UNLESS NOTED OTHERWISE. REFER TO APPROPRIATE STD. DETAIL.

D. FOR 6" CLEANOUTS, VALVE BOX TO BE REPLACED WITH US FOUNDRY MODEL 7621 COVER OR EQUAL.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
SEWER REHAB

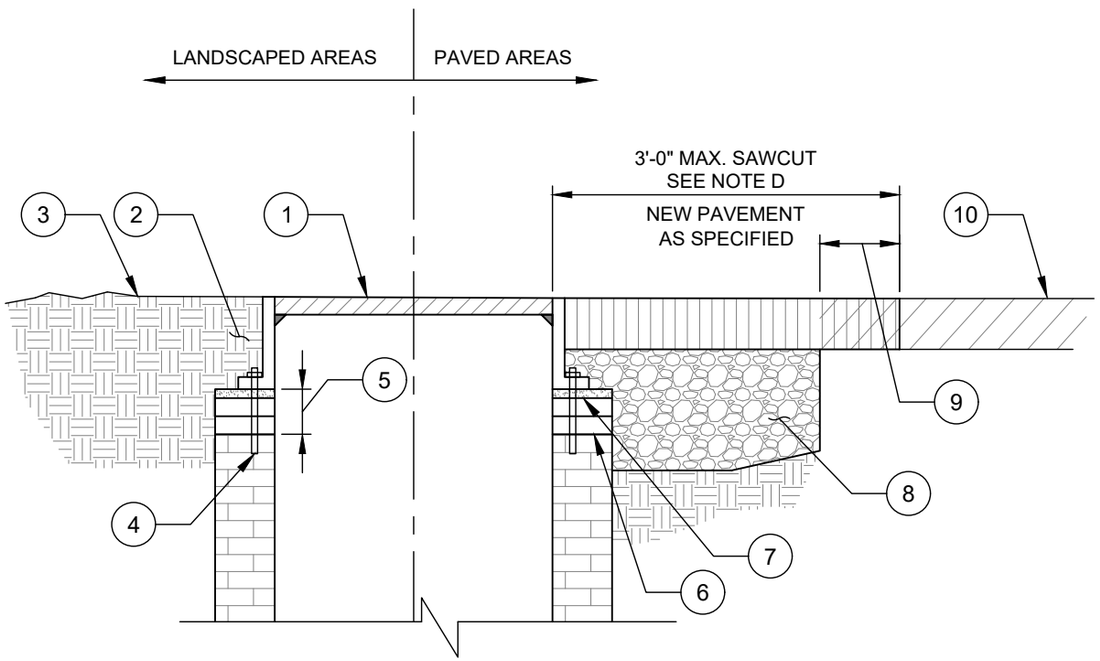
CLEANOUT REPLACEMENT

NO SCALE

VERSION
1.0

DATE
04/2024

DETAIL
16.7



PROFILE VIEW

NO.	DESCRIPTION:
1.	MANHOLE FRAME AND COVER. SEE NOTES A, E, AND F.
2.	COMPACTED SOIL TO GRADE. SEED AND MULCH AS SPECIFIED.
3.	EXISTING GRADE.
4.	ANCHOR BOLTS ALL AROUND. ANCHOR FRAME TO SOLID BRICK, BLOCK, OR CONCRETE.
5.	6" MIN. SEE NOTE B.
6.	NEW MASONRY WORK, CONCRETE, RUBBER OR EXPANDED POLYPROPYLENE ADJUSTING GRADE RINGS. SEE NOTES B AND C.
7.	3:1 SAND/CEMENT MORTAR. MIN. 1/2" THICK ALL AROUND. SEE NOTE C.
8.	INSTALL AND COMPACT ABC STONE TO SUBGRADE. SEE NOTE G.
9.	1 FOOT OVERLAP.
10.	EXISTING PAVEMENT.

NOTES:

A. CONTRACTOR SHALL REFER TO THIS DETAIL WHEN RAISING MANHOLES AND WHEN RESETTING OR REPLACING EXISTING FRAMES AND COVERS. ALL REHABILITATION OF FRAMES AND COVERS SHALL BE COMPLETED PRIOR TO OTHER MANHOLE REHABILITATION WORK. THIS DETAIL ILLUSTRATES MANHOLES AT GRADE. FOR FRAME AND COVERS ABOVE GRADE, WORK SHALL BE IN ACCORDANCE WITH THIS DETAIL AND ALL OTHER REQUIREMENTS IN CLTW STANDARD SPECIFICATIONS AND DETAILS.

B. CONTRACTOR TO REMOVE AT LEAST 6" OF EXISTING BRICK AND/OR MATERIAL PRIOR TO INSTALLING NEW MASONRY OR CONCRETE, RUBBER, OR EXPANDED POLYPROPYLENE ADJUSTING RINGS, TO PROVIDE A NEW SOLID SURFACE FOR SEATING THE FRAME AND TO PROVIDE A LEAK-TIGHT SEAL.

C. REMOVE ALL LOOSE BRICKS AND MORTAR AND PROVIDE A SMOOTH LEVEL SURFACE PRIOR TO INSTALLING MASONRY OR CONCRETE, RUBBER, OR EXPANDED POLYPROPYLENE ADJUSTING RINGS. BRUSH SURFACE WITH STIFF WIRE BRUSH PRIOR TO PLACING MORTAR.

D. REFERENCE CDOT/NCDOT OR OTHER GOVERNING MUNICIPALITIES CURRENT STANDARDS. IN PAVED AREAS, PAVEMENT SHALL BE SAW-CUT NEATLY IN ACCORDANCE WITH APPROPRIATE GOVERNING BODY STANDARD.

E. MANHOLE COVER TO BE FLUSH WITH EXISTING GRADE UNLESS NOTED OTHERWISE.

F. ALL NEW FRAME AND COVERS (WHERE REQUIRED) SHALL BE SOLID OR WATERTIGHT AS SPECIFIED BY THE SEALING ENGINEER.

G. FOR COVERS IN PAVED AREAS, FILL AROUND FRAME AND EXPOSED MANHOLE WALL COMPLETELY WITH ABC STONE. ABC STONE TO EXTEND TO EXISTING PAVEMENT - NEW PAVEMENT (TO MATCH OR EXCEED EXISTING) TO BE INSTALLED FROM TOP OF ABC STONE TO TOP OF FRAME.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
SEWER REHAB

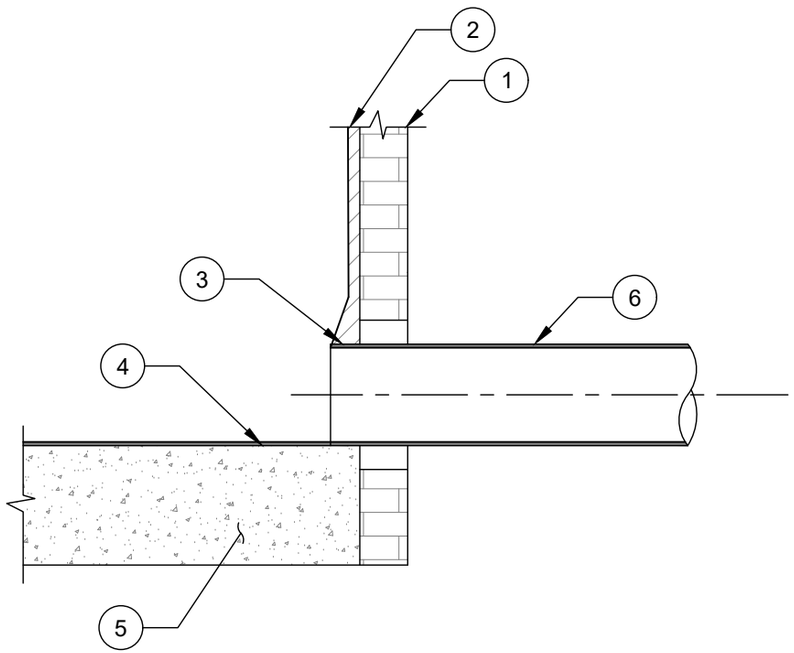
REHABILITATION OF MANHOLE FRAME AND COVER

NO SCALE

VERSION
1.0

DATE
04/2024

DETAIL
16.8



SECTION VIEW

NO.	DESCRIPTION:
1.	EXISTING MANHOLE WALL.
2.	NEW CEMENTITIOUS LINER. SEE APPROPRIATE STD. DETAIL. SEE NOTES B AND C.
3.	LINER PIPES SHALL BE NEATLY CUT 2" FROM THE MANHOLE WALL.
4.	BUILD UP EXISTING INVERT WITH NON-SHRINK GROUT TO MATCH NEW LINER INVERTS. PROVIDE CONSTANT SLOPE FROM INLET TO OUTLET PIPES. BYPASS FLOWS AROUND MANHOLE WHEN PERFORMING THIS WORK UNTIL GROUT HAS CURED. SEE APPROPRIATE STD. DETAIL FOR REHABILITATION OF EXISTING MANHOLES.
5.	EXISTING MANHOLE BASE.
6.	NEW LINER PIPE INSIDE EXISTING SEWER PIPE. SEE NOTE D.

NOTES:

A. CONTRACTOR SHALL REFER TO THIS DETAIL WHEN TERMINATING LINER PIPES IN MANHOLES.

B. CONTRACTOR SHALL FILL ANY VOIDS BETWEEN EXISTING SEWER PIPE AND MANHOLE WALL AND BETWEEN THE EXISTING SEWERS AND LINER PIPES WITH NON-SHRINK GROUT PRIOR TO INSTALLING CEMENTITIOUS LINER. SEE NOTE D.

C. THIS DETAIL SHOWS THE LINER TERMINATION IN A REHABILITATED MANHOLE. IF MANHOLE IS NOT REHABILITATED AS NOTED ON DRAWINGS, CONTRACTOR SHALL CUT LINER PIPE 2" FROM THE EXISTING WALL, FILL VOIDS AROUND EXISTING PIPE AND LINER PIPE WITH GROUT, AND COAT THE EXISTING INVERT CHANNEL TO MATCH LINER PIPE AND/OR EXISTING SEWER PIPES. SEE NOTE D.

D. WATERSTOP MATERIAL (HYDROTITE BY SIKA OR APPROVED EQUAL) BETWEEN THE EXISTING SEWER AND CIPP IS NOT SHOWN FOR CLARITY - REFER TO THE MATERIAL SPECIFICATIONS. WATERSTOP TO BE INSTALLED AROUND THE CIPP APPROXIMATELY 6" FROM THE INSIDE OF THE MANHOLE WALL.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS

SEWER REHAB

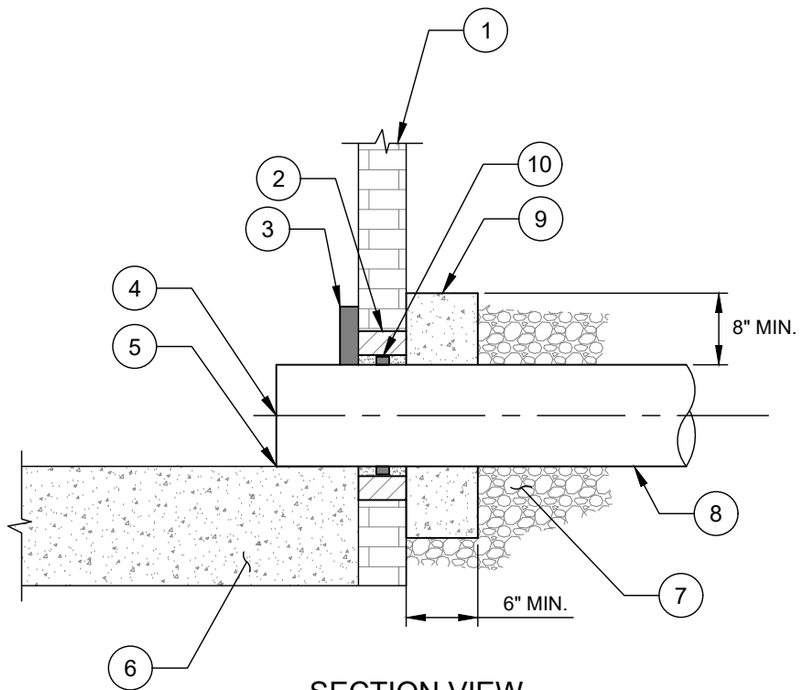
LINER CONNECTION AT MANHOLE

NO SCALE

VERSION
1.0

DATE
04/2024

DETAIL
16.9



SECTION VIEW

NO. DESCRIPTION:

1. EXISTING MANHOLE WALL.
2. REMOVE EXISTING PIPE AND MANHOLE WALL AS NECESSARY TO INSTALL NEW PIPE. MAX OPENING IN WALL SHALL BE PIPE OD+3" ALL AROUND. AFTER PIPE INSTALLATION, FILL VOIDS AROUND PIPE COMPLETELY WITH NON-SHRINK GROUT.
3. ELECTROFUSION FLEX RESTRAINT(S) BY GEORG FISCHER CENTRAL PLASTICS, HARCO, OR PERFORMANCE PIPE, FUSED TO PIPE ON INSIDE OF MANHOLE TO PREVENT MOVEMENT. SEE NOTE B.
4. EXTEND PIPE INTO MH. SEE NOTE C.
5. MATCH NEW PIPE TO EXISTING INVERT ELEVATION.
6. EXISTING MANHOLE BASE.
7. #57 STONE ALL AROUND.
8. NEW HDPE PIPE INSTALLED VIA PIPE BURSTING.
9. INSTALL CONCRETE COLLAR ALL AROUND NEW PIPE. CONCRETE SHALL BE MIN 3,600 PSI.
10. HYDROPHILIC WATERSTOP (HYDROTITE BY SIKA OR APPROVED EQUAL) WRAPPED AROUND PIPE MIN. 4 TIMES.

NOTES:

A. CONTRACTOR SHALL REFER TO THIS DETAIL WHEN CONNECTING NEW HDPE SEWER PIPES INSTALLED VIA PIPE BURSTING TO EXISTING OR NEW MANHOLES.

B. INSTALL FLEX RESTRAINTS AFTER HDPE HAS FULLY RELAXED. RESTRAINT TO BE LOCATED AGAINST MANHOLE WALL. PROVIDE 1 RESTRAINT FOR 8" AND 10" PIPE, 2 RESTRAINTS FOR 12" PIPE AND 3 RESTRAINTS FOR 16" AND 18" PIPE.

C. EXTEND PIPE INTO MH A SUFFICIENT LENGTH TO ALLOW INSTALLATION OF FLEX RESTRAINTS AND TO ACCOMMODATE MH REHAB IF SPECIFIED. PIPE SHALL NOT IMPEDE FLOW THROUGH MANHOLE. COORDINATE WITH SEALING ENGINEER.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
SEWER REHAB

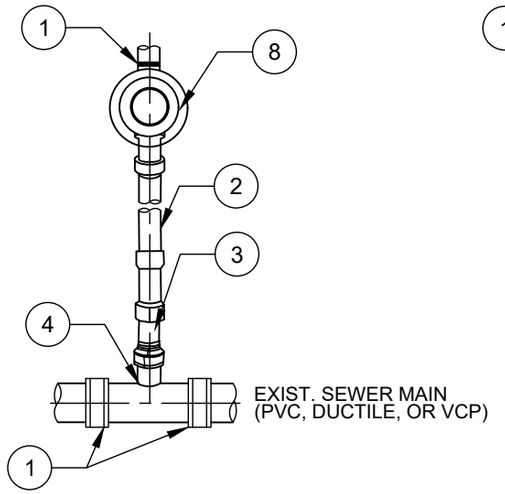
HDPE PIPE CONNECTION AT MANHOLE FOR PIPE BURSTING

NO SCALE

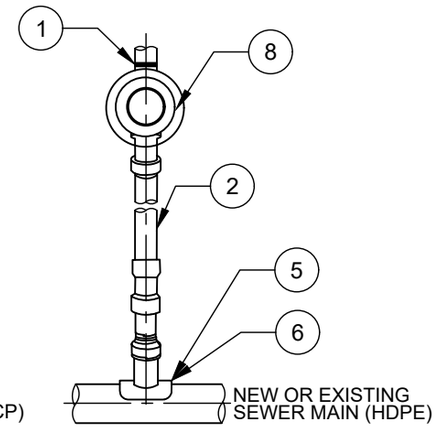
VERSION
1.0

DATE
04/2024

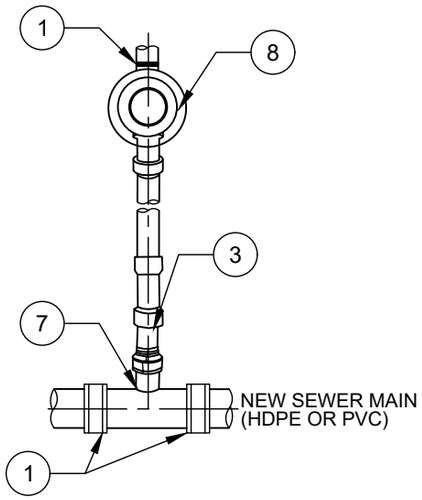
DETAIL
16.10



NEW HDPE LATERAL INTO
EXISTING SEWER



NEW HDPE LATERAL INTO
NEW OR EXISTING HDPE SEWER



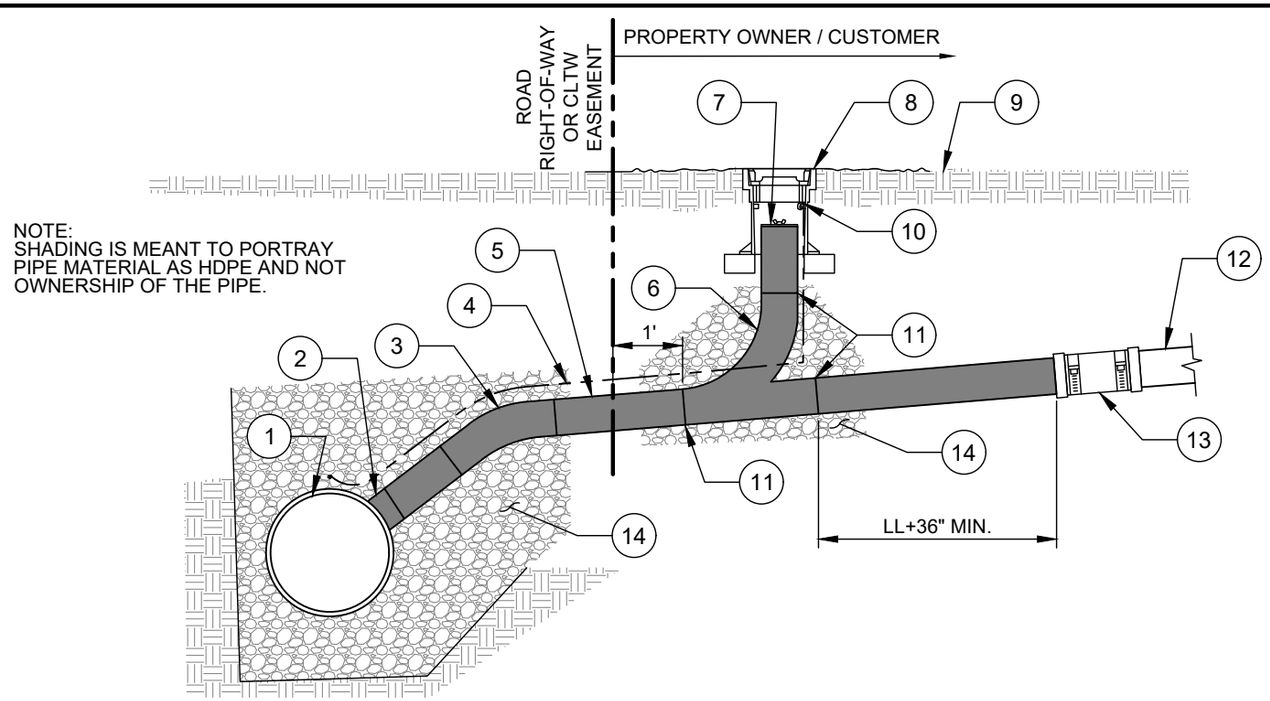
EXISTING LATERAL INTO
NEW HDPE OR PVC SEWER

NO. DESCRIPTION:

1. RUBBER COUPLING.
2. NEW HDPE SEWER LATERAL (DR 17).
3. TRANSITION COUPLING.
4. EPOXY SADDLE.
5. ELECTROFUSION SADDLE.
6. STRAPPED RUBBER SADDLE (PVC HUB, RUBBER SADDLE, AND SS BAND).
7. FABRICATED HDPE TEE.
8. CLEAN OUT.

NOTES:

A. RUBBER COUPLINGS SHALL BE SHIELDED TYPE WITH STAINLESS STEEL SERIES 300 BANDSCREW AND HOUSING WITH SHEAR BAND.
B. RUBBER SADDLES SHALL BE SEALED WITH AN ELASTOMERIC SEALANT. SEE SPECIFICATIONS.
C. CHANGES IN PIPE TYPE AND CONNECTIONS ARE NOTED ON THE DRAWINGS
D. IF ADDITIONAL COUPLINGS ARE NEEDED TO MAKE A CONNECTION, THE CONTRACTOR SHALL USE ELECTROFUSION COUPLINGS
E. ELECTROFUSION SADDLES SHALL CONSIST OF A FUSION SADDLE WITH AN INTEGRAL FUSION COUPLER AT ITS OUTLET.



NO. DESCRIPTION:

1. HDPE SEWER MAIN INSTALLED BY PIPE BURSTING.
2. ELECTROFUSION SADDLE TEE.
3. BEND - 22.5° OR 45°.
4. TRACER WIRE-CONTINUOUS AWG #12 GAUGE SOLID COPPER TRACER WIRE WITH 30 MIL THICK GREEN HDPE INSULATION.
5. HDPE GRAVITY SEWER PIPE - DR17, BUTT FUSED OR ELECTROFUSED.
6. HDPE LONG RADIUS WYE.
7. PLASTIC GRIPPER (END OF PIPE-TYPE) PLUG.
8. CAST IRON SEWER VALVE BOX TOP SECTION AND LID.
9. FINISH GRADE.
10. TRACER WIRE TERMINATION. SEE STANDARD DETAIL.
11. ELECTROFUSION COUPLING OR BUTT FUSION JOINT.
12. CUSTOMER SEWER LATERAL.
13. FLEXIBLE, SHIELDED, COUPLING WITH SHEAR BAND.
14. SEWER MAIN, SADDLE TEE, AND BEND SHALL BE COMPLETELY EMBEDDED WITH #57 WASHED STONE.

NOTES:

A. MINIMUM LATERAL SLOPE SHALL BE 1.0%.
B. BASED ON SITE CONDITIONS, CLTW MAY APPROVE THE CLEANOUT INSIDE THE ROAD RIGHT-OF-WAY.

CHARLOTTE WATER

CHARLOTTE WATER
A CITY OF CHARLOTTE DEPARTMENT
STANDARD DETAILS
SEWER REHAB

4-INCH TO 6-INCH SEWER CLEANOUT AND LATERAL ON HDPE PIPE BY PIPE BURSTING

NO SCALE

VERSION
1.0

DATE
04/2024

DETAIL
16.11