

MINIMUM MANHOLE ID (NOTE 3)	PIPE SIZE
48"	8"-15"
60"	18"-21"
72"	24"-30"

NOTES:

1. PRECAST CONCRETE MANHOLES SHALL BE MANUFACTURED IN ACCORDANCE WITH ASTM C478 AND AASHTO H-20 LIVELOADS.
2. TYPICAL VERTICAL DROP OF PIPE INVERTS SHALL BE 0.2' FOR PIPES WITH DIRECTION CHANGE AND 0.1' OTHERWISE.
3. A LARGER MANHOLE OR VAULT MAY BE REQUIRED DEPENDING ON NUMBER OF PIPES CONVERGING AND HORIZONTAL PIPE ANGLES.
4. MANHOLE INTERIORS WITH SEWER MAINS 15" AND LARGER SHALL BE COATED IN ACCORDANCE WITH THESE STANDARDS, INCLUDING ALL ADJUSTMENT RINGS, CONES, BARREL SECTIONS AND BASES. COATINGS APPLIED TO BENCHES SHALL CONTAIN SILICA SAND TO PREVENT SLIPPING.
5. PIPES SHALL STUB THROUGH GASKETED BOOTS PRECAST INTO THE CONCRETE (A-LOK Z-LOK OR APPROVED EQUAL) OR GASKETED BOOTS INSTALLED IN CORE-DRILLED PENETRATIONS (A-LOK G-3 OR APPROVED EQUAL). NON-SHRINK GROUT SHALL BE APPLIED AROUND PIPE STUBS AND FILL PENETRATIONS.
6. STUB-OUT PIPES FOR FUTURE CONNECTIONS SHALL USE WATER-TIGHT GASKETED PLUGS.
7. MANHOLE JOINTS (INCLUDING ADJUSTMENT RINGS AND COVER RING) SHALL BE SET USING A FLEXIBLE BITUMASTIC MATERIAL (RAM-NEK) OR EQUAL. INTERIOR JOINTS SHALL BE PLASTERED WITH MORTAR AND EXTEND 4" EACH SIDE OF JOINT. EXTERIOR BARREL SECTION JOINTS SHALL BE WRAPPED WITH JOINT TAPE (CONWRAP OR EQUAL).

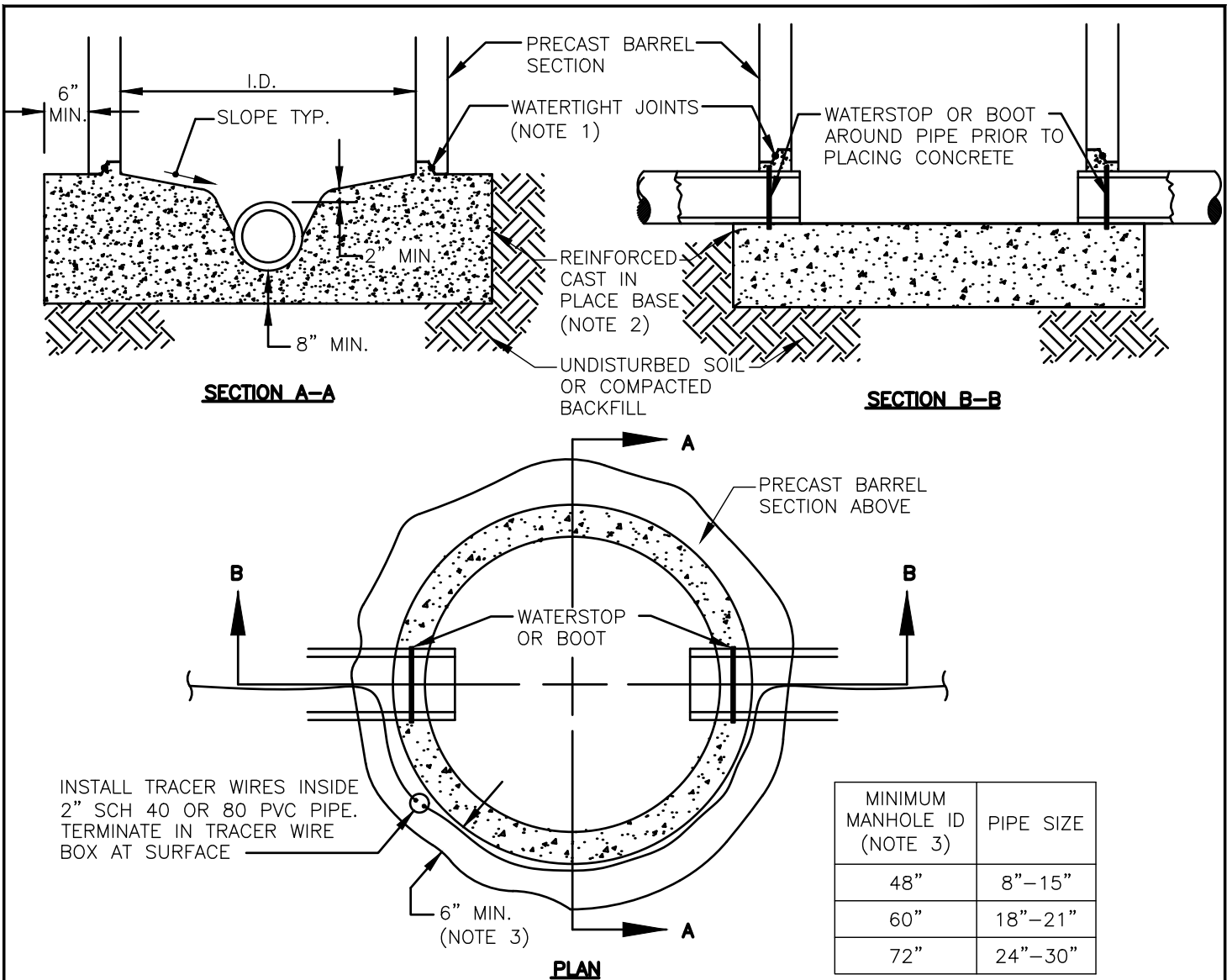


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**STANDARD PRE-CAST
 MANHOLE**

DATE: MARCH 2022

SHEET SS1



NOTES:

- MANHOLE JOINTS (INCLUDING ADJUSTMENT RINGS AND COVER RING) SHALL BE SET USING A FLEXIBLE BITUMASTIC MATERIAL (RAM-NEK) OR EQUAL. INTERIOR JOINTS SHALL BE PLASTERED WITH MORTAR AND EXTEND 4" EACH SIDE OF JOINT. BARREL SECTION EXTERIOR JOINTS SHALL BE WRAPPED WITH JOINT TAPE (CONWRAP OR EQUAL).
- MINIMUM BASE REINFORCEMENT SHALL CONSIST OF A GRID PATTERN OF TIED NO. 4 BARS, 12" ON CENTER WITH 3" MINIMUM COVER. REINFORCEMENT SHALL BE INSPECTED BY THE CITY. SQUARE BASES ARE ACCEPTABLE.
- A LARGER MANHOLE OR VAULT MAY BE REQUIRED DEPENDING ON NUMBER OF PIPES COVERING AND HORIZONTAL PIPE ANGLES.
- TYPICAL VERTICAL DROP OF PIPE INVERTS ACROSS MANHOLE SHALL BE 0.2' FOR PIPES WITH DIRECTION CHANGE AND 0.1' OTHERWISE.
- MANHOLE INTERIORS WITH SEWER MAINS 15" AND LARGER SHALL BE COATED IN ACCORDANCE WITH CHAPTER 4 OF THE CITY STANDARDS, INCLUDING ALL ADJUSTMENT RINGS, CONES, BARREL SECTIONS AND BASES. COATINGS APPLIED TO BENCHES SHALL CONTAIN SILICA SAND TO PREVENT SLIPPING.

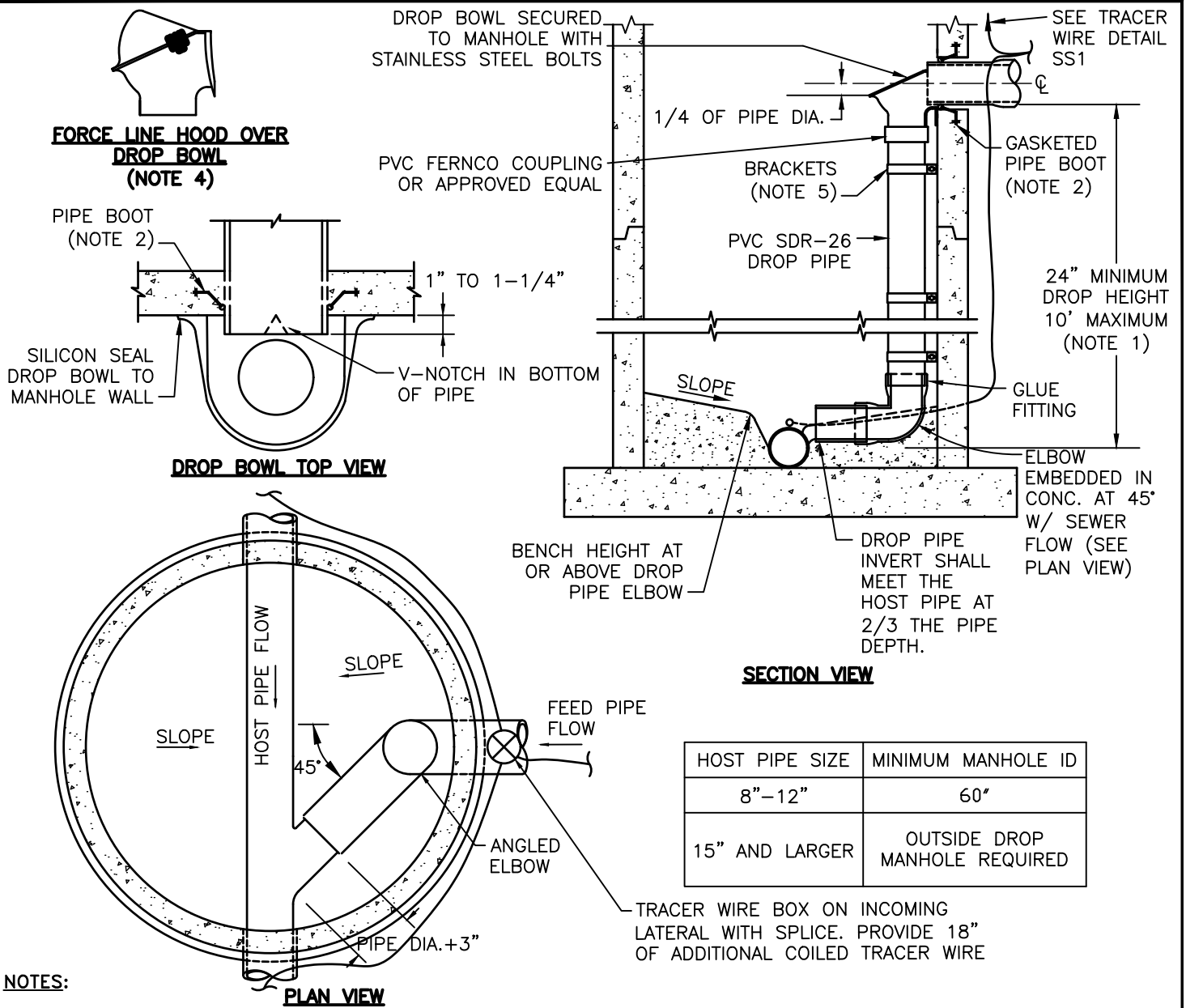


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**CAST-IN-PLACE MANHOLE
 BASE (WHERE APPROVED)**

DATE: MARCH 2022

SHEET SS2



NOTES:

1. DROP CONNECTIONS FOR 12" AND SMALLER FEED PIPES THAT HAVE A DROP HEIGHT OF 24" AND GREATER SHALL USE AN INSIDE DROP BOWL AND DROP PIPE MANUFACTURED BY RELINER-DURAN, INC. OR APPROVED EQUAL. FOR LARGER DIAMETER SEWER MAINS REFER TO DETAIL SS4.
2. PENETRATIONS IN MANHOLE WALLS SHALL HAVE GASKETED BOOTS PRECAST INTO THE CONCRETE (A-LOK Z-LOK OR APPROVED EQUAL) OR GASKETED BOOTS INSTALLED IN CORE-DRILLED PENETRATIONS (A-LOK G-3 OR APPROVED EQUAL).
3. DROP BOWL AND DROP PIPE SHALL MATCH THE INCOMING PIPE DIAMETER.
4. A FORCE LINE HOOD SHALL BE PROVIDED WHEN THE INCOMING LINE IS DOWNSTREAM OF A FORCE MAIN OR PIPE WITH SLOPE OF 3% OR GREATER.
5. SECURE DROP BOWL AND DROP PIPE TO MANHOLE WALL WITH STAINLESS STEEL ADJUSTABLE CLAMPING BRACKETS AND 4" X 3/8" STAINLESS STEEL BOLTS WITH LEAD TAMP-IN ANCHORS AS REQUIRED
6. SEWER SERVICES ARE NOT ALLOWED TO CONNECT WITH AN INSIDE DROP. SERVICES 6" AND LARGER SHALL USE AN OUTSIDE DROP MANHOLE AND 4" SERVICES SHALL CONNECT TO THE SEWER MAIN.

HOST PIPE SIZE	MINIMUM MANHOLE ID
8"-12"	60"
15" AND LARGER	OUTSIDE DROP MANHOLE REQUIRED



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**INSIDE DROP
 MANHOLE**

DATE: MARCH 2022

SHEET SS3

INSTALL TRACER WIRE BOX WITH 18" ADDITIONAL COILED WIRE ON INCOMING LATERAL WITH SPLICE.

REINFORCED BASE SLAB

CONCRETE ENCASEMENT 6" MIN TYP.

12-AWG TRACER WIRE INSTALLED ON EACH PIPE

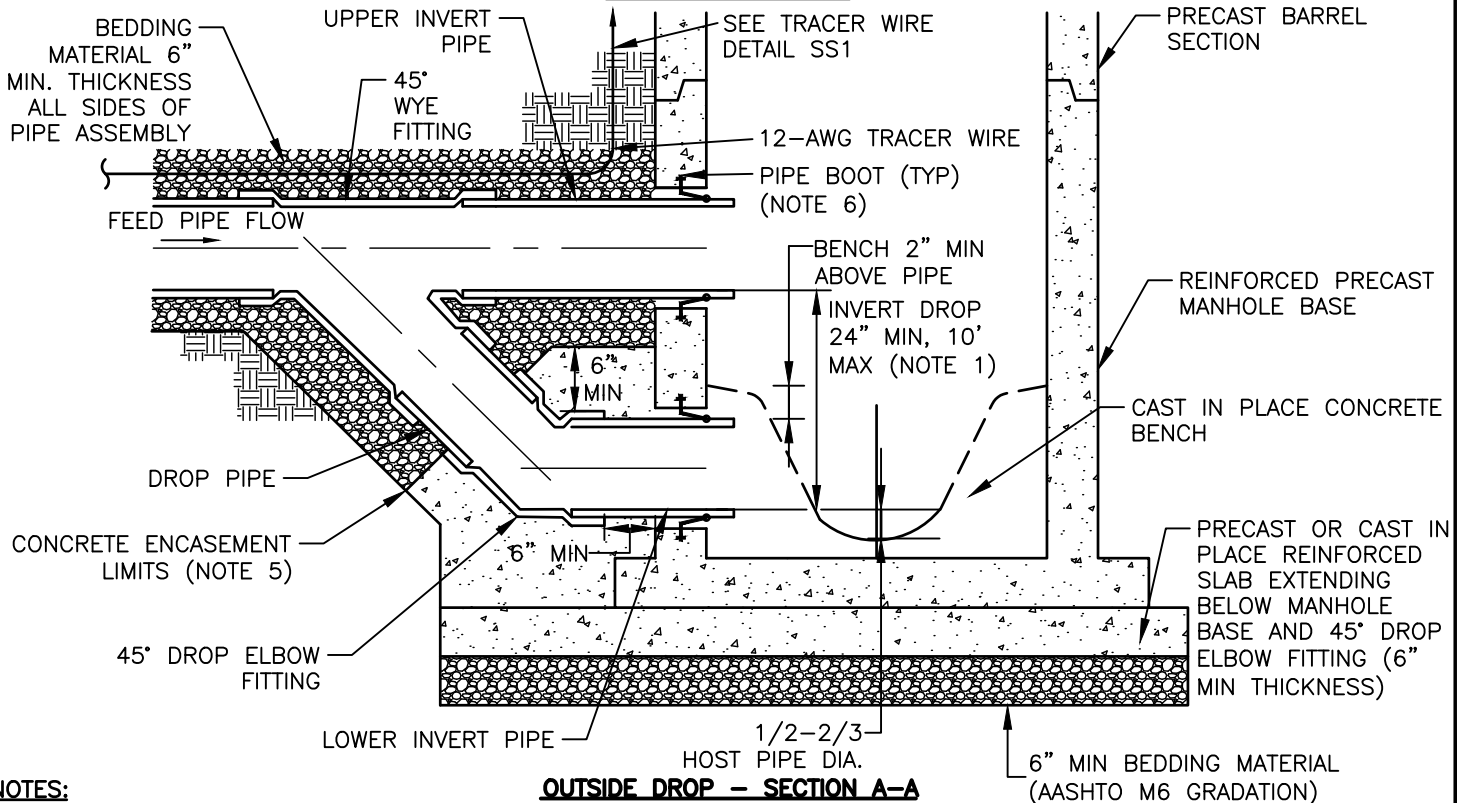
HOST PIPE FLOW

FEED PIPE FLOW

4" MIN TYP.

MINIMUM MANHOLE ID (NOTE 7)	HOST PIPE SIZE
60"	15"-21"
72"	24"-30"

OUTSIDE DROP PLAN



NOTES:

OUTSIDE DROP - SECTION A-A

1. DROP CONNECTIONS FOR 15" AND LARGER FEED PIPES SHALL USE AN OUTSIDE DROP PIPE ASSEMBLY. MINIMUM INVERT DROP OF 24" IS ALLOWED FOR 15" FEED PIPES. LARGER FEED PIPES WILL REQUIRE A GREATER INVERT DROP TO ACCOMMODATE DROP PIPE FITTINGS. DESIGN DRAWINGS SHALL BE PROVIDED FOR REVIEW AND APPROVAL BY THE CITY.
2. MANHOLE BASE AND BARREL SECTION DIMENSIONS AND REINFORCEMENT SHALL BE DESIGNED BY A STRUCTURAL ENGINEER.
3. ALL PIPE AND FITTINGS SHALL BE PVC AND HAVE A MINIMUM SDR OF 35 WITH WATER TIGHT GASKETS.
4. DIAMETER OF THE DROP PIPE AND UPPER AND LOWER INVERT PIPES SHALL NOT BE LESS THAN THE FEED PIPE DIAMETER.
5. CONCRETE ENCASEMENT SHALL BE A MINIMUM OF 6" THICK ALL AROUND THE LOWER INVERT PIPE ASSEMBLY AND UP TO THE LIMITS OF THE 45° DROP ELBOW FITTING SHOWN.
6. PENETRATIONS IN MANHOLE WALLS SHALL HAVE GASKETED BOOTS PRECAST INTO THE CONCRETE (A-LOK Z-LOK OR APPROVED EQUAL) OR GASKETED BOOTS INSTALLED IN CORE-DRILLED PENETRATIONS (A-LOK G-3 OR APPROVED EQUAL).
7. A LARGER MANHOLE OR VAULT MAY BE REQUIRED DEPENDING ON NUMBER OF PIPES CONVERGING AND HORIZONTAL PIPE ANGLES.

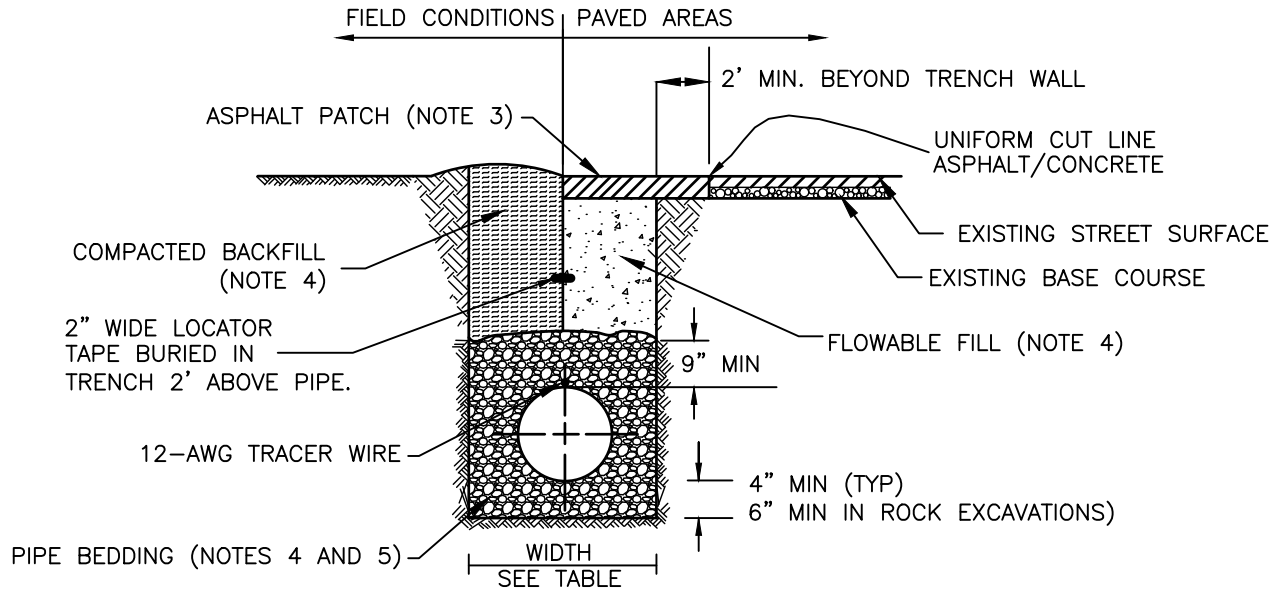


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**OUTSIDE DROP
MANHOLE**

DATE: MARCH 2022

SHEET SS4



TYPICAL TRENCH SECTION

TRENCH WIDTH

PIPE DIAMETER	MINIMUM WIDTH	MAXIMUM WIDTH
4"	20"	30"
6"	22"	30"
8"	24"	32"
12"	28"	36"
16"	32"	40"
20"	36"	44"
24"	40"	60"
30"	48"	66"
36"	54"	62"

NOTES:

1. TRENCHES 5 FT DEEP OR GREATER REQUIRE A "PROTECTIVE SYSTEM" AS DEFINED BY OSHA. TRENCHES 20 FT DEEP OR GREATER REQUIRE THAT THE PROTECTIVE SYSTEM BE DESIGN BY A REGISTERED PROFESSIONAL ENGINEER.
2. MINIMUM COVER OVER PIPE TO BE BELOW APPROVED FINAL GRADE.
3. FOR ASPHALT PATCH DEPTH REQUIREMENTS REFER TO CHAPTER 9 OF THE STANDARDS AND SPECIFICATIONS.
4. FOR BACKFILL, COMPACTION AND MATERIAL SPECIFICATION REQUIREMENTS REFER TO CHAPTER 9 OF THE STANDARDS AND SPECIFICATIONS.
5. PIPE BEDDING SHALL BE PLACED AGAINST UNDISTURBED SOIL IN THE TRENCH BOTTOM. WHERE ADVERSE SOIL IS ENCOUNTERED IN THE TRENCH BOTTOM, SOIL SHALL BE REMOVED AND TRENCH STABILIZATION MATERIAL SHALL BE PLACED IN ACCORDANCE WITH THE RECOMMENDATIONS OF A GEOTECHNICAL ENGINEER.

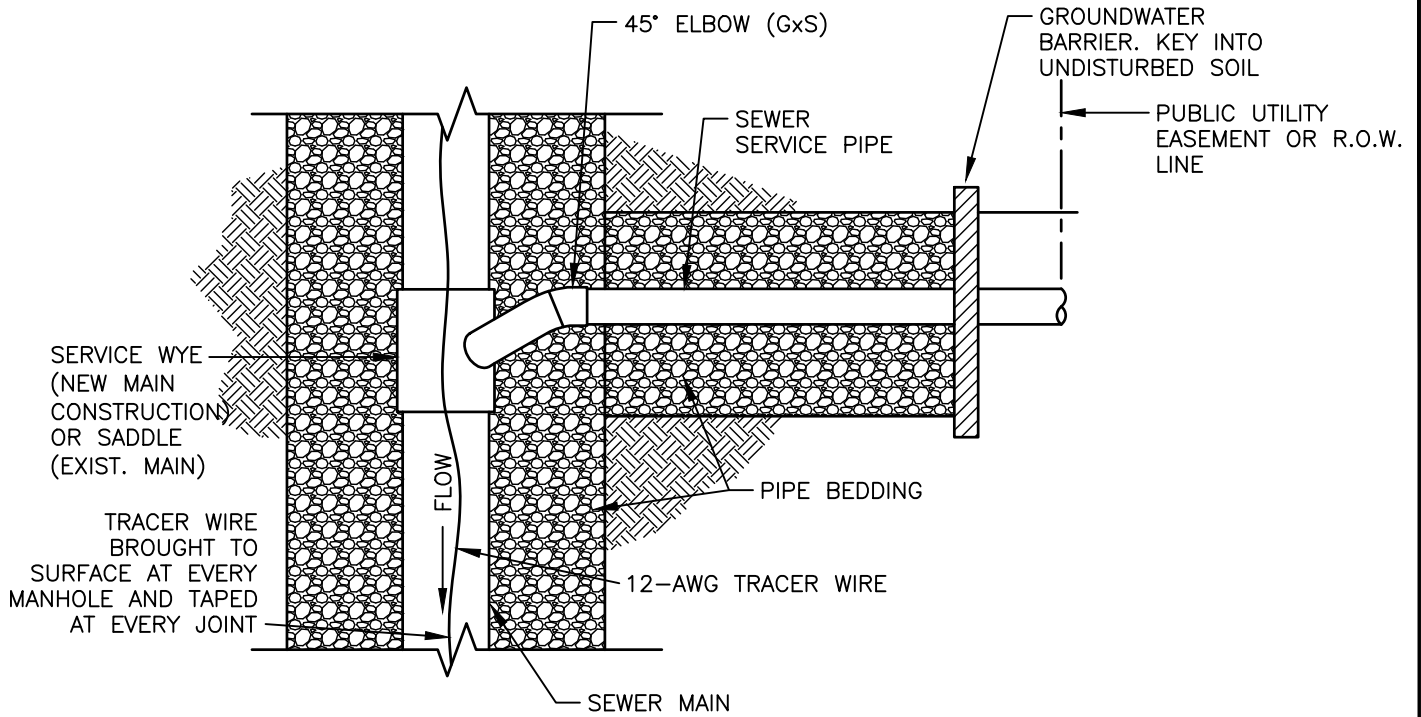


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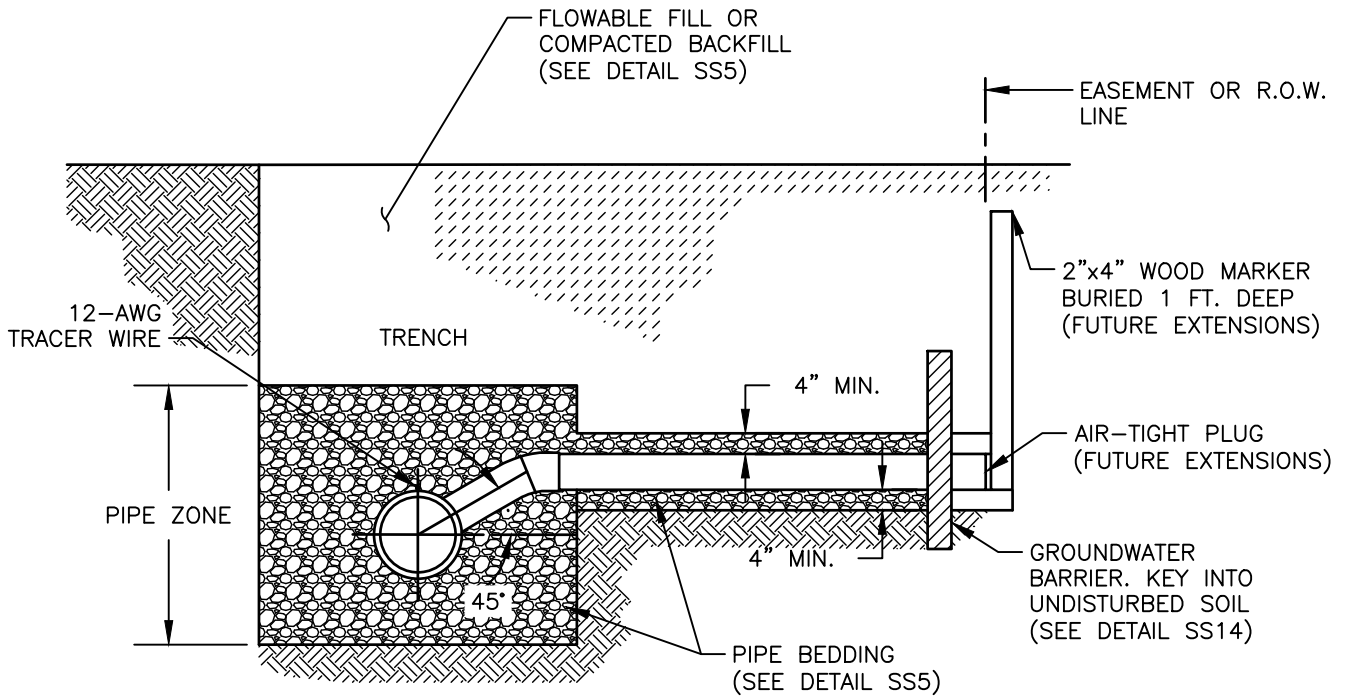
**TYPICAL PIPE
 TRENCH SECTION**

DATE: MARCH 2022

SHEET SS5



PLAN VIEW



CROSS SECTION

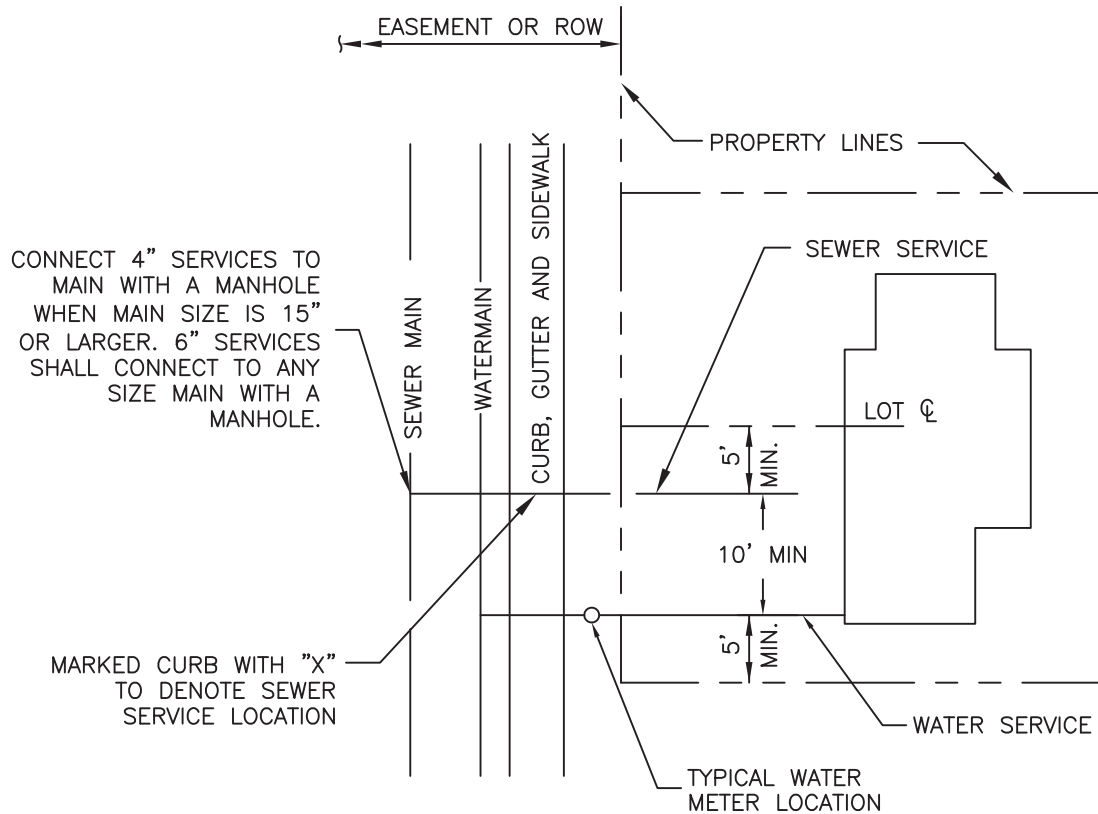


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SEWER SERVICE CONNECTION

DATE: MARCH 2022

SHEET SS6

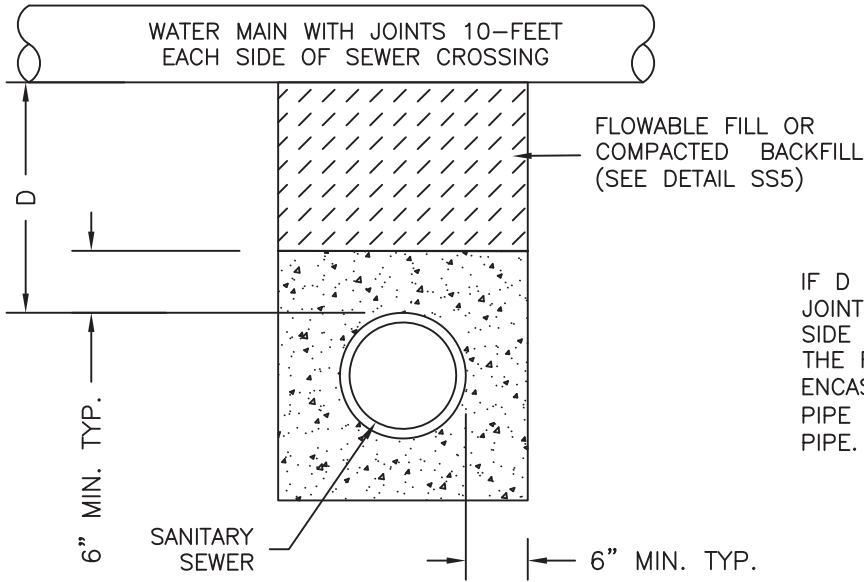


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TYPICAL RESIDENTIAL SERVICE LOCATION

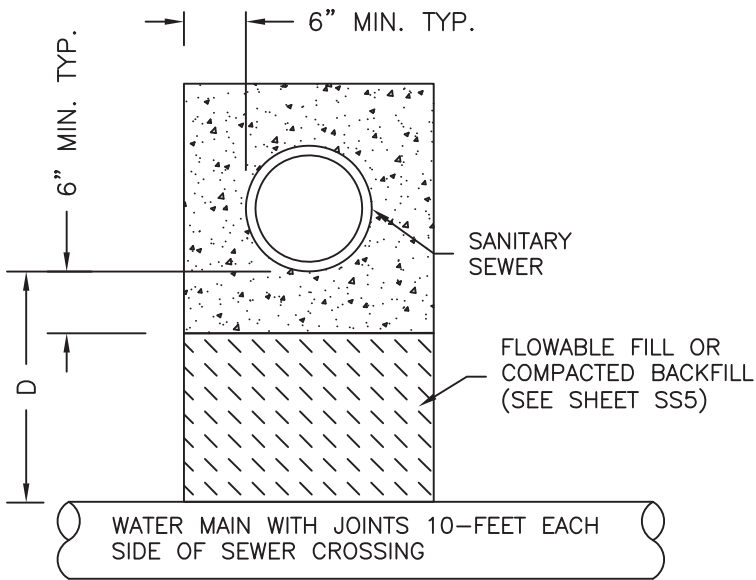
DATE: MARCH 2022

SHEET SS7



IF D IS LESS THAN 18" OR WATERMAIN JOINTS ARE LESS THAN 10 FEET EACH SIDE OF CROSSING THEN PROVIDE ONE OF THE FOLLOWING: FULL CONCRETE ENCASEMENT OR FLOWABLE FILL (NOTE 1), PIPE CASING (NOTE 2), OR FUSIBLE PVC PIPE.

SANITARY SEWER CROSSING UNDER WATER MAIN



IF D IS LESS THAN 18" OR WATERMAIN JOINTS ARE LESS THAN 10 FEET EACH SIDE OF CROSSING THEN PROVIDE ONE OF THE FOLLOWING: FULL CONCRETE ENCASEMENT OR FLOWABLE FILL (NOTE 1), PIPE CASING (NOTE 3), OR FUSIBLE PVC PIPE.

SANITARY SEWER CROSSING OVER WATER MAIN

NOTES:

1. CONCRETE ENCASEMENT OR FLOWABLE FILL AROUND SEWER PIPE TO BE CAST AGAINST UNDISTURBED SOIL OR SHORING AND SHALL EXTEND AT LEAST 10- FEET EACH SIDE OF WATER MAIN CROSSING.
2. SEWER PIPE CASING BELOW A WATER MAIN SHALL CONSIST OF A SINGLE SECTION OF STEEL, DUCTILE IRON OR PVC PIPE AND EXTEND AT LEAST 9- FEET EACH SIDE OF THE WATER MAIN CROSSING. SUITABLE CASING SPACERS AND END SEALS SHALL BE PROVIDED.
3. SEWER PIPE CASING ABOVE A WATER MAIN SHALL CONSIST OF A SINGLE SECTION OF STEEL OR DUCTILE IRON PIPE AND EXTEND AT LEAST 9- FEET EACH SIDE OF THE WATER MAIN CROSSING. SUITABLE CASING SPACERS AND END SEALS SHALL BE PROVIDED.



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UTILITY CROSSINGS

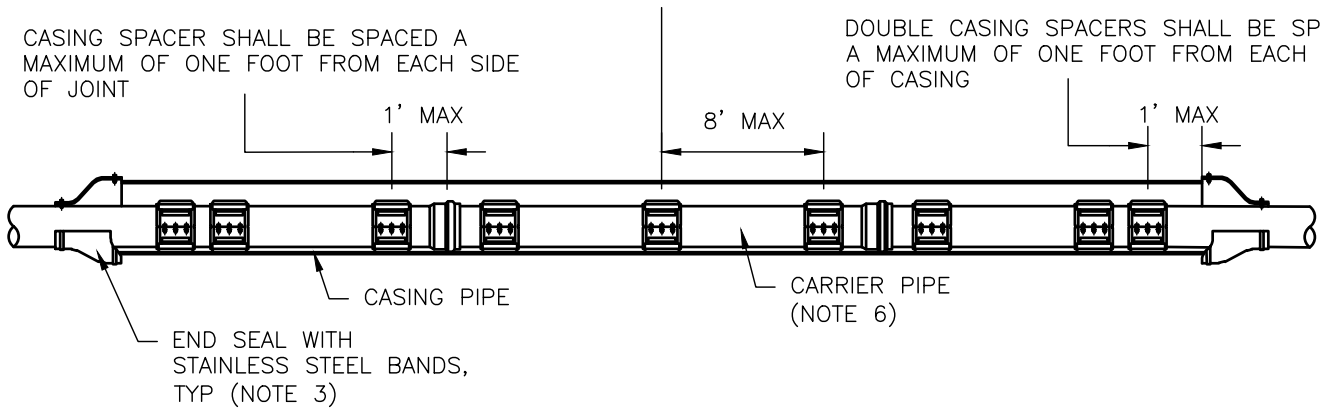
DATE: MARCH 2022

SHEET SS8

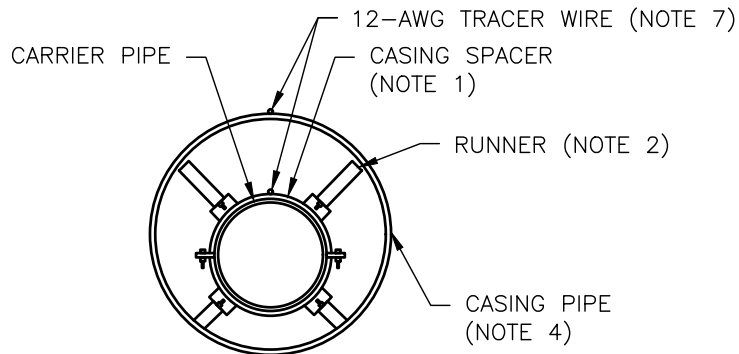
CASING SPACER SHALL BE SPACED IN ACCORDANCE WITH MANUFACTURER'S REQUIREMENTS OR 8 FEET MAX.

CASING SPACER SHALL BE SPACED A MAXIMUM OF ONE FOOT FROM EACH SIDE OF JOINT

DOUBLE CASING SPACERS SHALL BE SPACED A MAXIMUM OF ONE FOOT FROM EACH END OF CASING



TYPICAL CASING SPACER CONFIGURATION



TYPICAL END VIEW

NOTES:

1. CASING SPACER WIDTH SHALL BE 8 INCH FOR PIPES UP TO 24 INCHES AND 12 INCH FOR PIPES 27 INCHES AND LARGER. CASING SPACERS SHALL BE STAINLESS STEEL AND MANUFACTURED BY CCI MODEL CSS, APS MODEL SSI OR APPROVED EQUAL.
2. CASING SPACER RUNNER AND RISER HEIGHTS SHALL BE ADJUSTED ALONG THE CASING PROFILE TO MAINTAIN THE DESIGN SLOPE OF THE CARRIER PIPE. MAXIMUM VOID BETWEEN RISER AND CASING SHALL BE 2 INCHES. QUANTITY OF RUNNERS/RISERS SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.
3. END SEALS SHALL BE 1/8 INCH MINIMUM THICK RUBBER WITH STAINLESS STEEL STRAPS AND MANUFACTURED BY ADS, INC. OR APPROVED EQUAL.
4. CASING PIPE SHALL BE NEW AND HAVE A MINIMUM WALL THICKNESS OF 0.375 INCHES FOR CARRIER PIPES LESS THAN 30 INCHES AND THICKNESS OF 0.500 INCHES FOR CARRIER PIPES 30 INCHES AND LARGER.
5. CATHODIC PROTECTION OF CASING PIPE SHALL BE PROVIDED FOR ALL ROADWAY AND RAILROAD CROSSINGS.
6. JOINT RESTRAINT OF THE CARRIER PIPE SHALL BE REQUIRED INSIDE THE CASING.
7. TRACER WIRE PLACEMENT DEPENDENT UPON CASING INSTALLATION METHOD. TO BE APPROVED BY CITY.

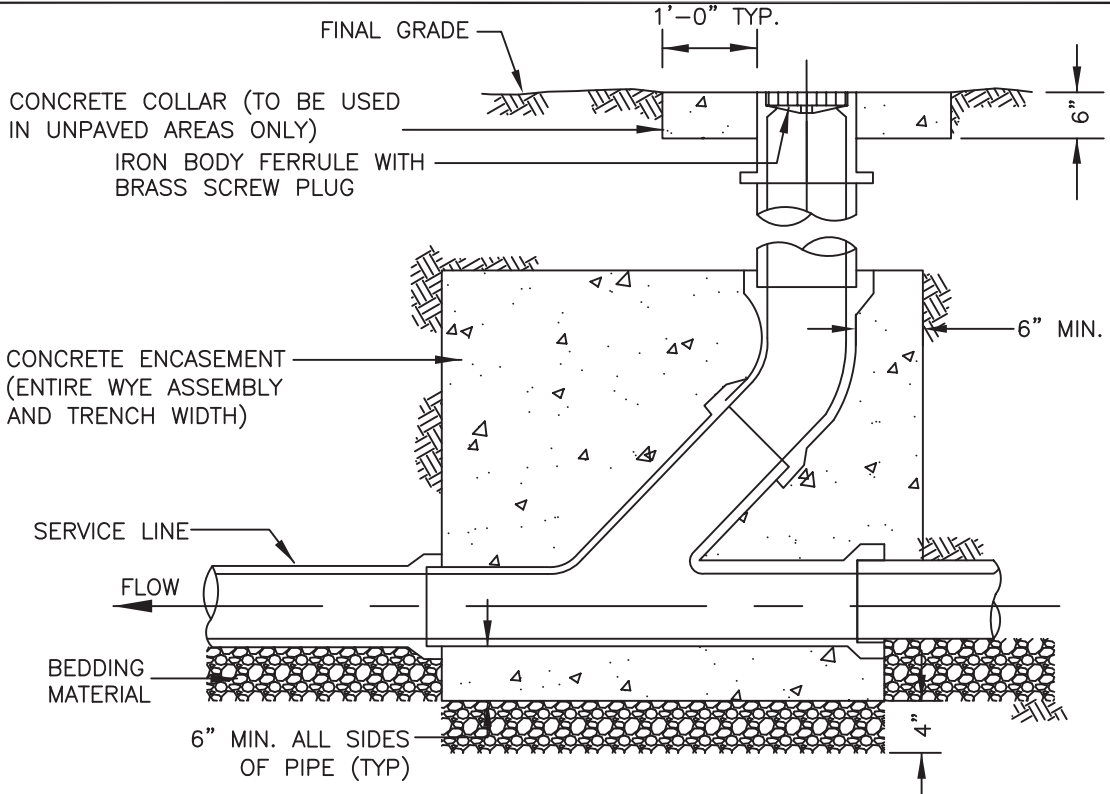


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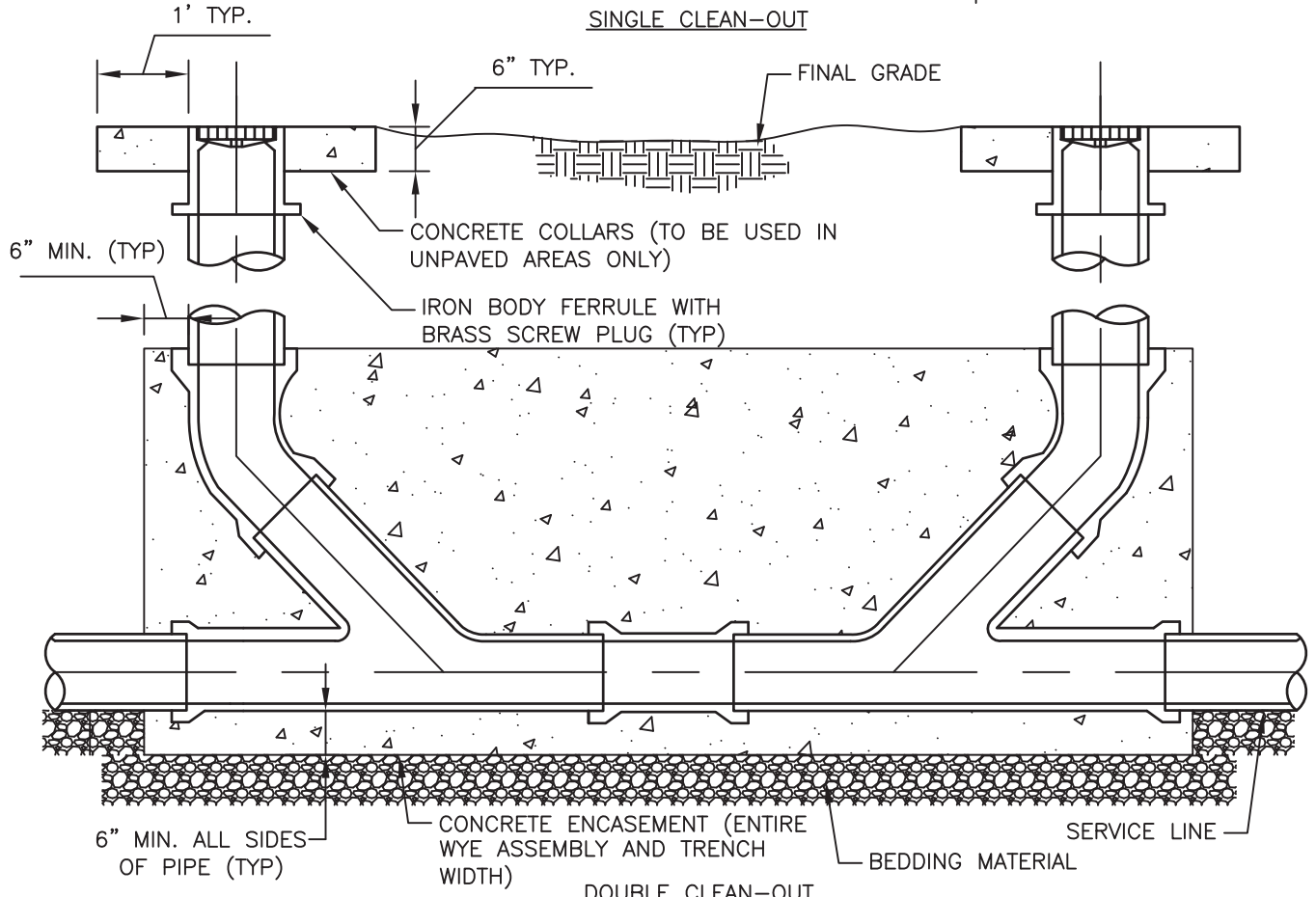
SANITARY SEWER
CASING DETAILS

DATE: MARCH 2022

SHEET SS9



SINGLE CLEAN-OUT



DOUBLE CLEAN-OUT

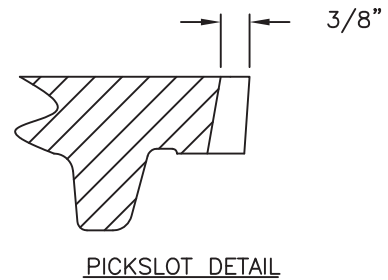
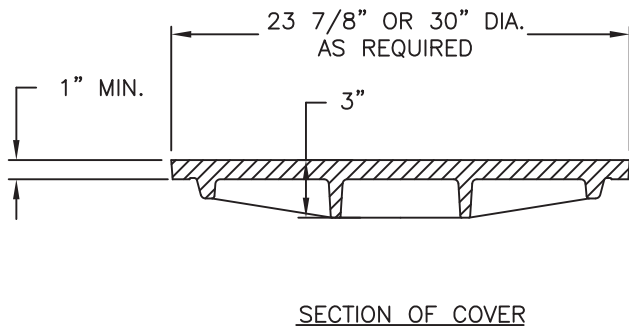
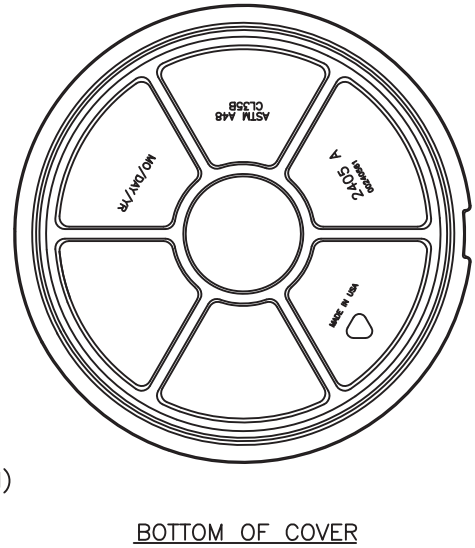
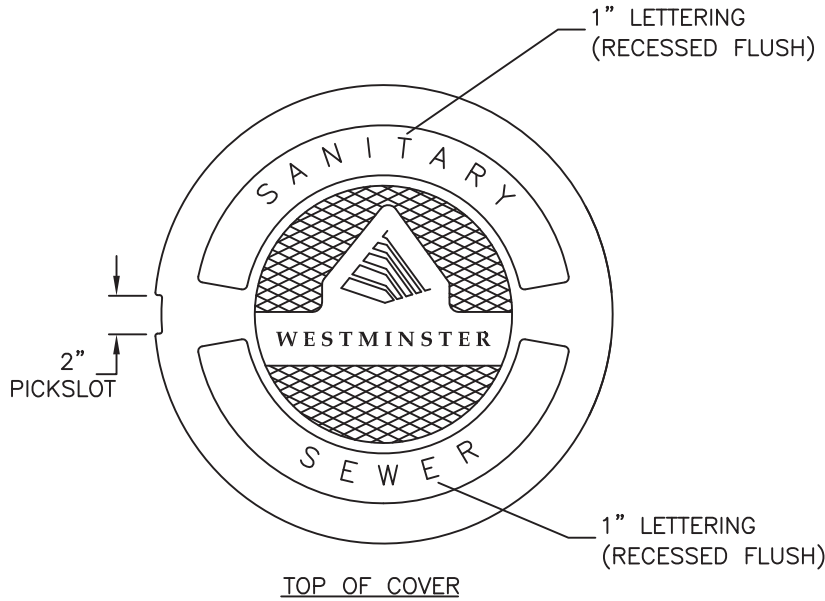


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**STANDARD CLEAN-OUT
 DETAILS**

DATE: MARCH 2022

SHEET SS10



1. STANDARD 23-7/8" COVERS SHALL BE USED WITH 21" AND SMALLER SEWER MAINS.
STANDARD 30" COVERS SHALL BE USED WITH 24" AND LARGER SEWER MAINS.
2. STANDARD (NON-HINGED) COVERS SHALL BE REQUIRED IN ALL PAVED AREAS.
3. CASTINGS SHALL BE GRAY IRON AND CONFORM TO THE REQUIREMENTS OF ASTM A48 CL35B AND HAVE AASHTO H-20 LOAD RATING.

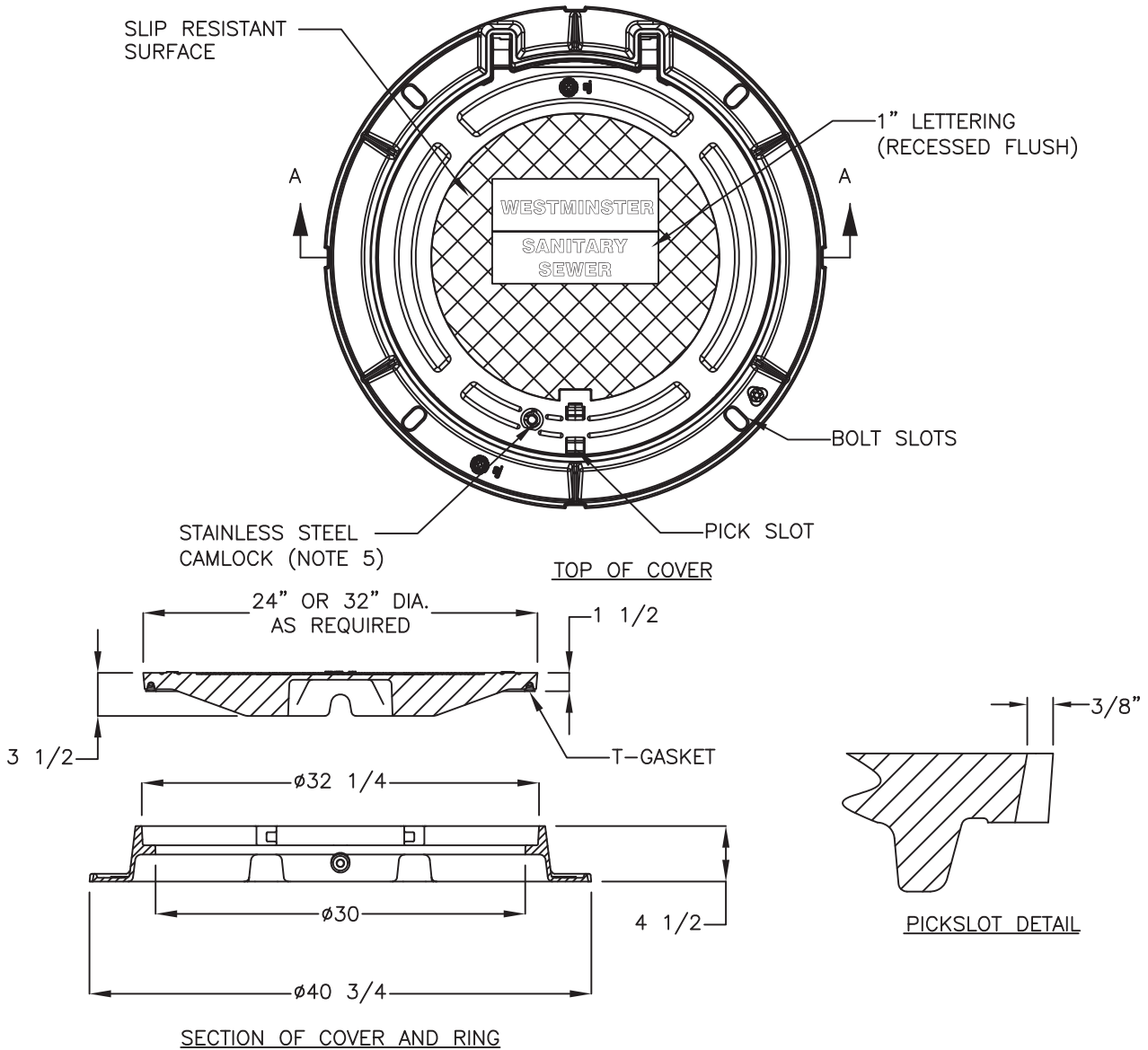


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STANDARD SANITARY SEWER COVER IN PAVED AREAS

DATE: MARCH 2022

SHEET SS11



1. LOCKING AND HINGED 24" NOMINAL DIAMETER RING AND COVERS SHALL BE USED WITH 21" AND SMALLER SEWER MAINS.
 LOCKING AND HINGED 32" NOMINAL DIAMETER RING AND COVERS SHALL BE USED WITH 24" AND LARGER SEWER MAINS.
2. LOCKING AND HINGED RING AND COVERS SHALL BE REQUIRED IN ALL FIELD INSTALLATIONS (NON-PAVED AREAS).
3. CASTINGS SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M105 AND M306 AND ASTM A536.
4. HINGED COVERS SHALL LOCK IN THE 90° POSITION AND REST IN THE 120° POSITION AND SHALL BE REMOVABLE FROM THE RING AS NEEDED.
5. STAINLESS STEEL CAM LOCK SHAFT SHALL BE COMPATIBLE WITH THE CITY'S CURRENT KEY CONFIGURATION.
6. FOR STABILITY, RINGS SHALL BE BOLTED TO MANHOLE TOP SECTIONS PRIOR TO POURING CONCRETE COLLARS.

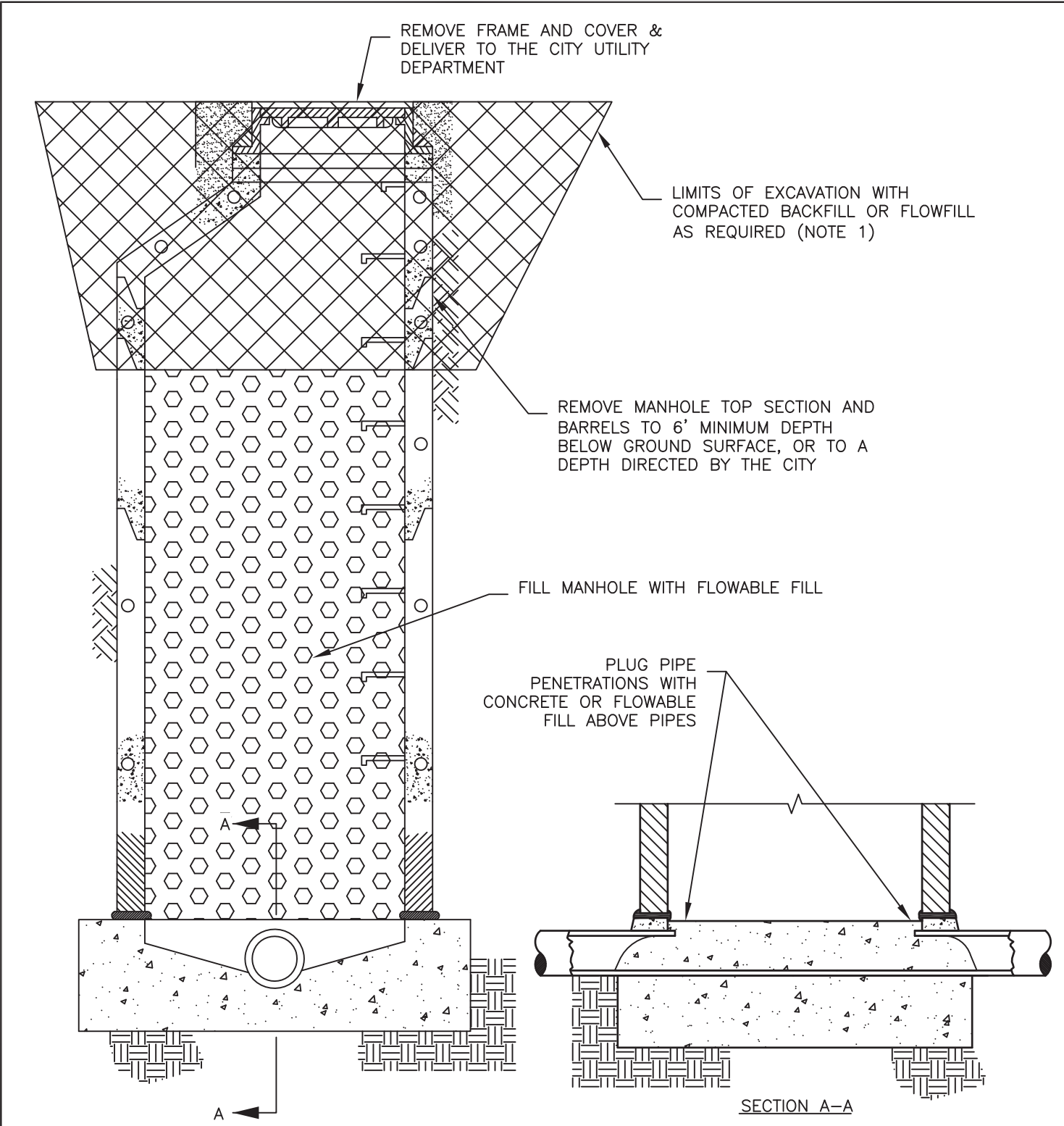


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LOCKING HINGED SANITARY SEWER COVER IN NON-PAVED AREAS

DATE: MARCH 2022

SHEET SS12



NOTE:

- EXCAVATIONS WITHIN PAVED AREAS SHALL BE BACKFILLED WITH FLOWABLE FILL OR FLOWABLE FLYASH MATERIAL. REFER TO CHAPTER 9 OF THE CITY STANDARDS AND SPECIFICATIONS FOR TRENCH BACKFILL AND COMPACTION REQUIREMENTS.

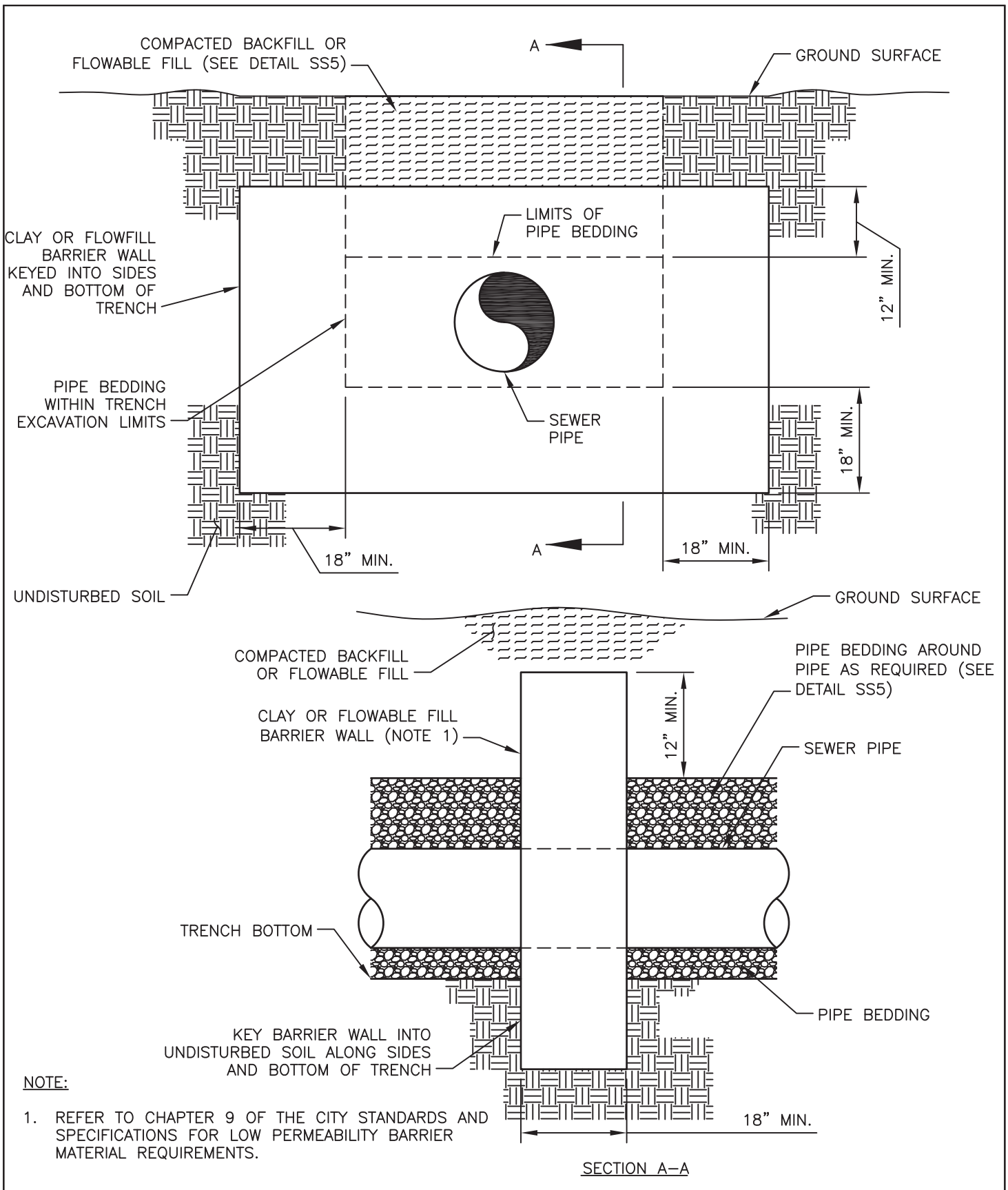


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**SEWER MANHOLE
 ABANDONMENT**

DATE: MARCH 2022

SHEET SS13

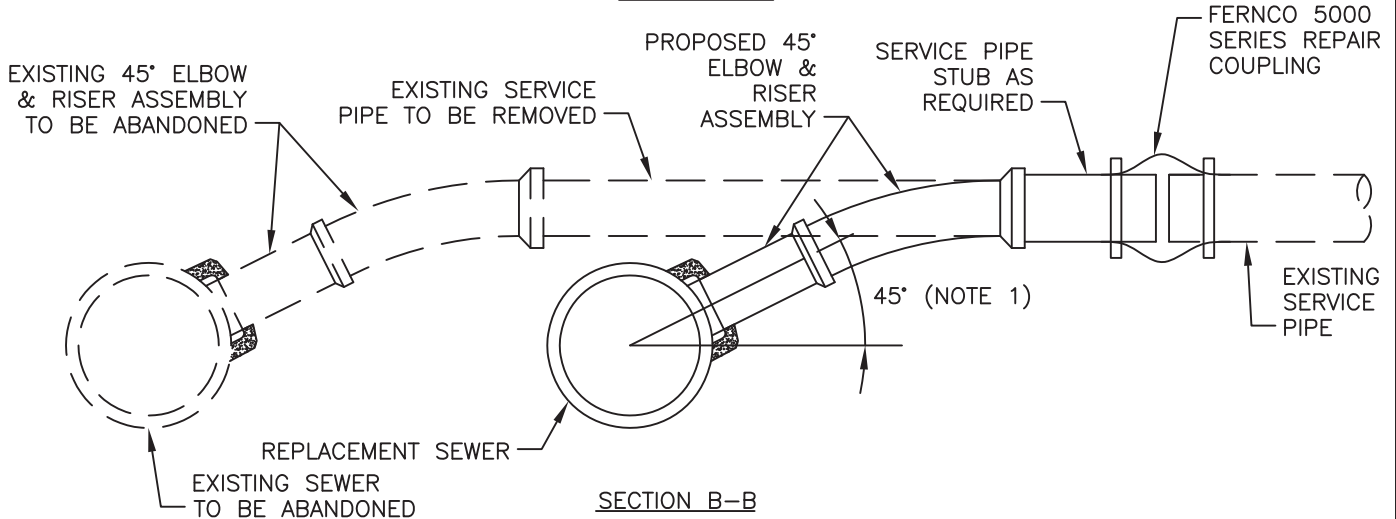
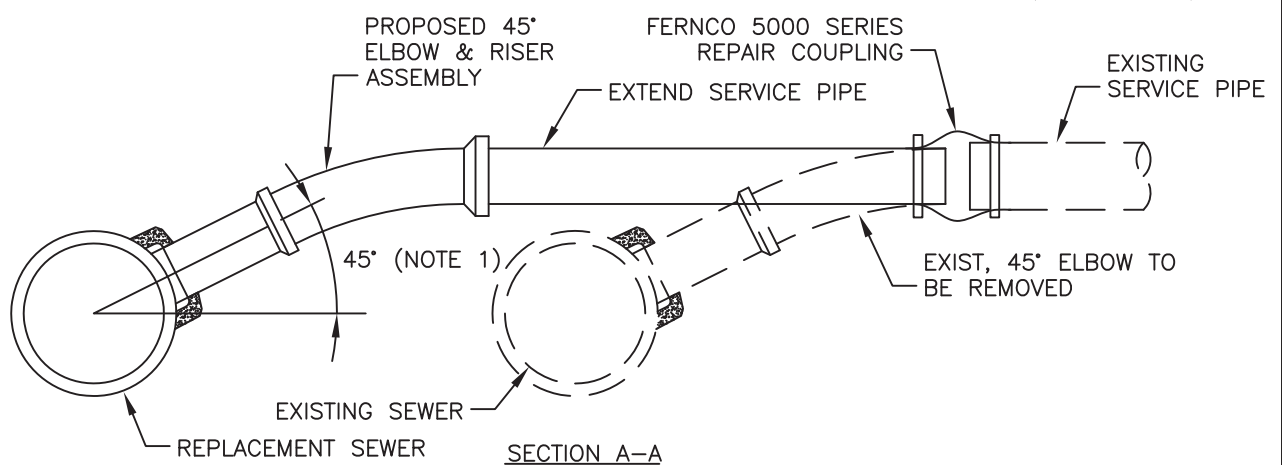
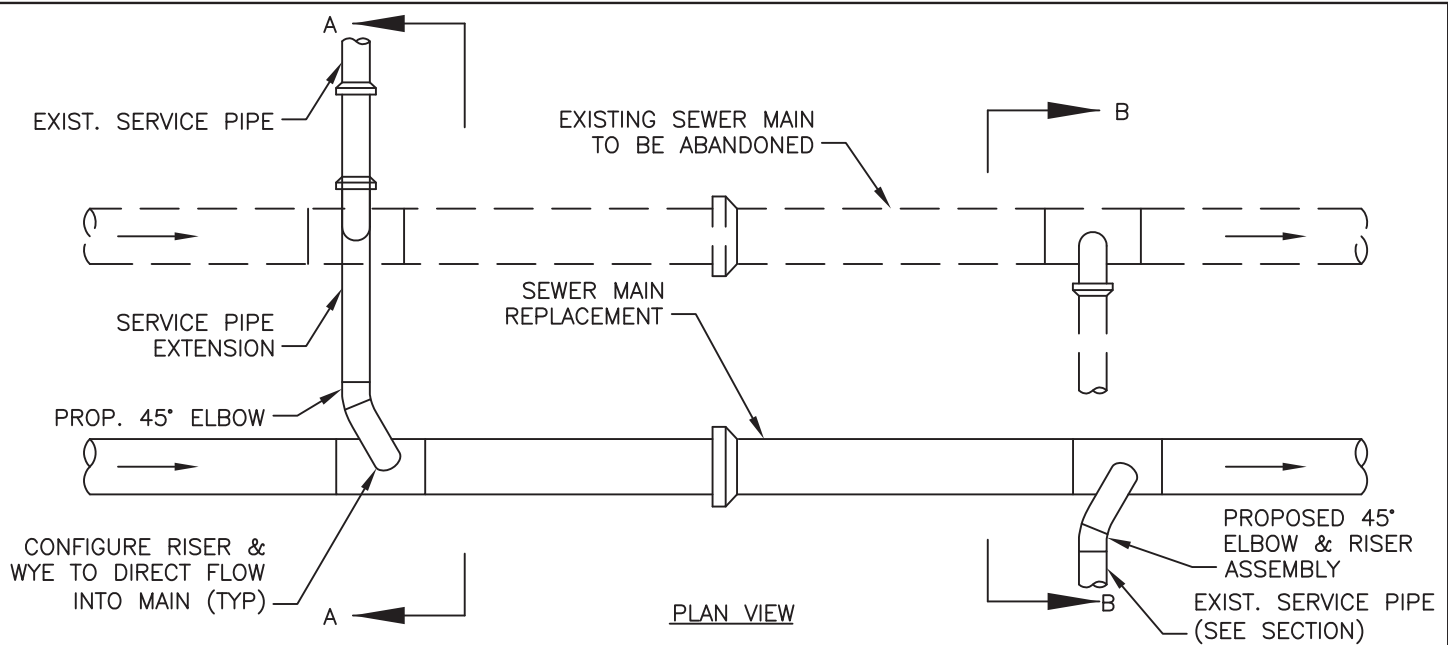


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GROUNDWATER BARRIER WALL DETAIL

DATE: MARCH 2022

SHEET SS14



NOTE:
 1. FOR SHALLOW SERVICE PIPES, ADJUST ANGLES ON WYE AND RISER ASSEMBLY TO MAINTAIN EXISTING SERVICE PIPE SLOPES.



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TYPICAL SERVICE RECONNECTION DETAIL

DATE: MARCH 2022

SHEET SS15