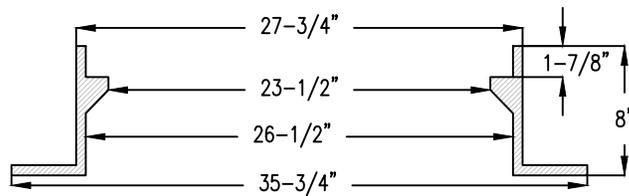
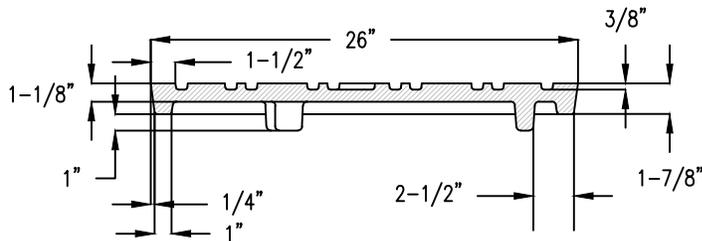
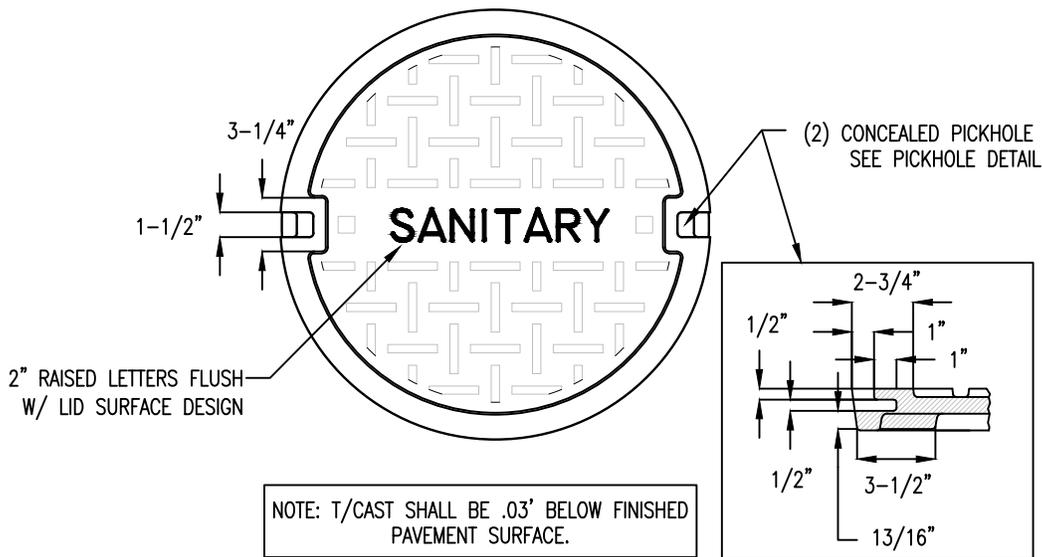


SANITARY SEWER DETAILS

- SAN-1** SANITARY CASTING DETAIL
- SAN-2** TYPICAL SEWER SERVICE CONNECTION
- SAN-2A** SEWER SERVICE CONNECTION FOR CIPP LINED SEWER MAIN
- SAN-3** SANITARY MANHOLE NON-PAVED AREAS
- SAN-3A** CONCRETE ENCASED CASTING COLLAR FOR SANITARY MH IN ROADWAY, WALKS, & DRIVES
- SAN-4** CONSTRUCT INSIDE DROP STRUCTURE
- SAN-5** HDPE SANITARY SEWER PRESSURE LATERAL CONNECTION
- SAN-5A** PRESSURE SANITARY LATERAL TO GRAVITY MAIN CONNECTION
- SAN-6** HDPE FORCEMAIN TO GRAVITY MAIN MANHOLE
- SAN-7** AIR-RELEASE MANHOLE
- SAN-8** PRESSURE SEWER CLEANOUT MANHOLE
- SAN-8A** DEAD END PRESSURE SEWER CLEAN OUT HAND HOLE
- SAN-9** POLYETHYLENE MH ADJUSTING RING - FLAT
- SAN-10** POLYETHYLENE MH ADJUSTING RING - WEDGE
- SAN-11** PRECAST MECHANICAL JOINT SEWER MANHOLE

WGT. 298 LBS		MATERIAL: GRAY IRON CLASS 35B
WGT. 122 LBS	TOTAL WEIGHT 420 LBS.	SPEC.: ASTM A-48-74

NOTE: SUITABLE FOR HS25 WHEEL LOADS



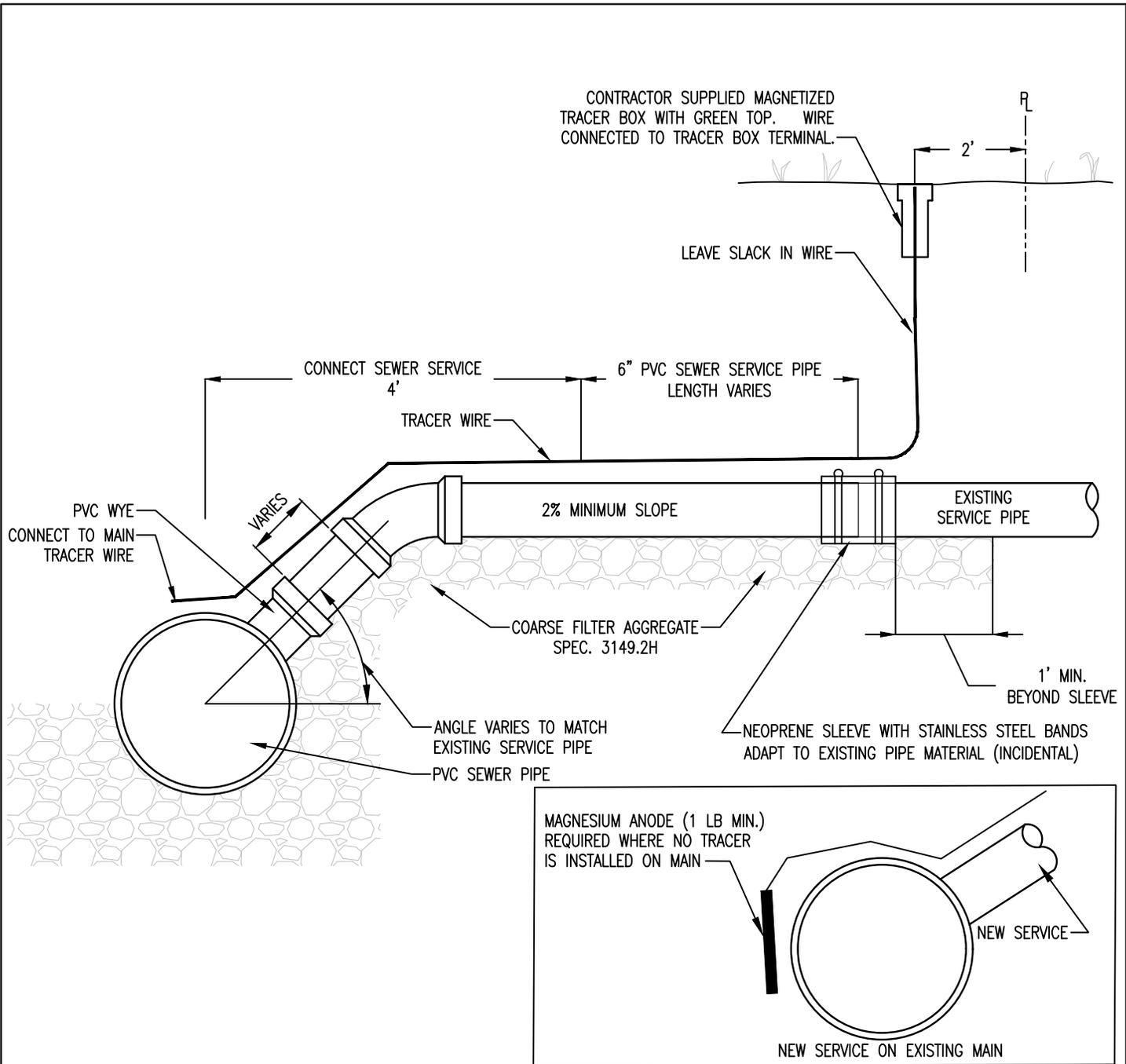
SANITARY CASTING DETAIL

SAN-1

REVISED/APPROVED 02/01/2013

CITY OF DULUTH STANDARD DETAIL
DEPT. OF PUBLIC WORKS AND UTILITIES

NO SCALE



NOTES

1. BID ITEM FOR PVC WYE INCLUDES FURNISHING AND INSTALLING WYE IN SEWER MAIN.
2. CONNECT SEWER SERVICE INCLUDES 6" PVC SEWER SERVICE PIPE (TO 4' FROM C/L) AND ALL FITTINGS
3. 6" PVC SEWER SERVICE PIPE IS INTENDED FOR THE RECONSTRUCTION OF SEWER SERVICES (WHEN FOUND TO BE IN NEED BY THE ENGINEER) COMPLETE IN PLACE FROM 4.0' BEYOND THE C/L OF THE SEWER MAIN TO A POINT DESIGNATED BY THE ENGINEER
4. FOR NEW SERVICES, PIPE TO STOP AT RIGHT OF WAY
5. #12 GAUGE GREEN INSULATED COPPER TRACER WIRE SHALL BE INSTALLED WITH SANITARY SEWER MAINS AND SERVICES. TRACER WIRE TERMINAL BOXES SHALL BE INSTALLED DIRECTLY ABOVE THE SEWER SERVICE OR AS DETERMINED BY THE ENGINEER
6. FOR SERVICES, TRACER WIRE SHALL RUN FROM THE WYE AND TERMINATE IN A FLUSH MOUNTED TRACER BOX WITH A GREEN CAST IRON LOCKABLE TOP.
7. THE TRACER WIRE SHALL REMAIN CONTINUOUS TO THE GREATEST EXTENT POSSIBLE. SPLICES IN THE TRACER WIRE SHOULD BE MADE WITH SPLIT BOLT CONNECTORS. WIRE NUTS SHALL NOT BE USED. A WATER-PROOF CONNECTION IS NECESSARY TO PREVENT CORROSION.

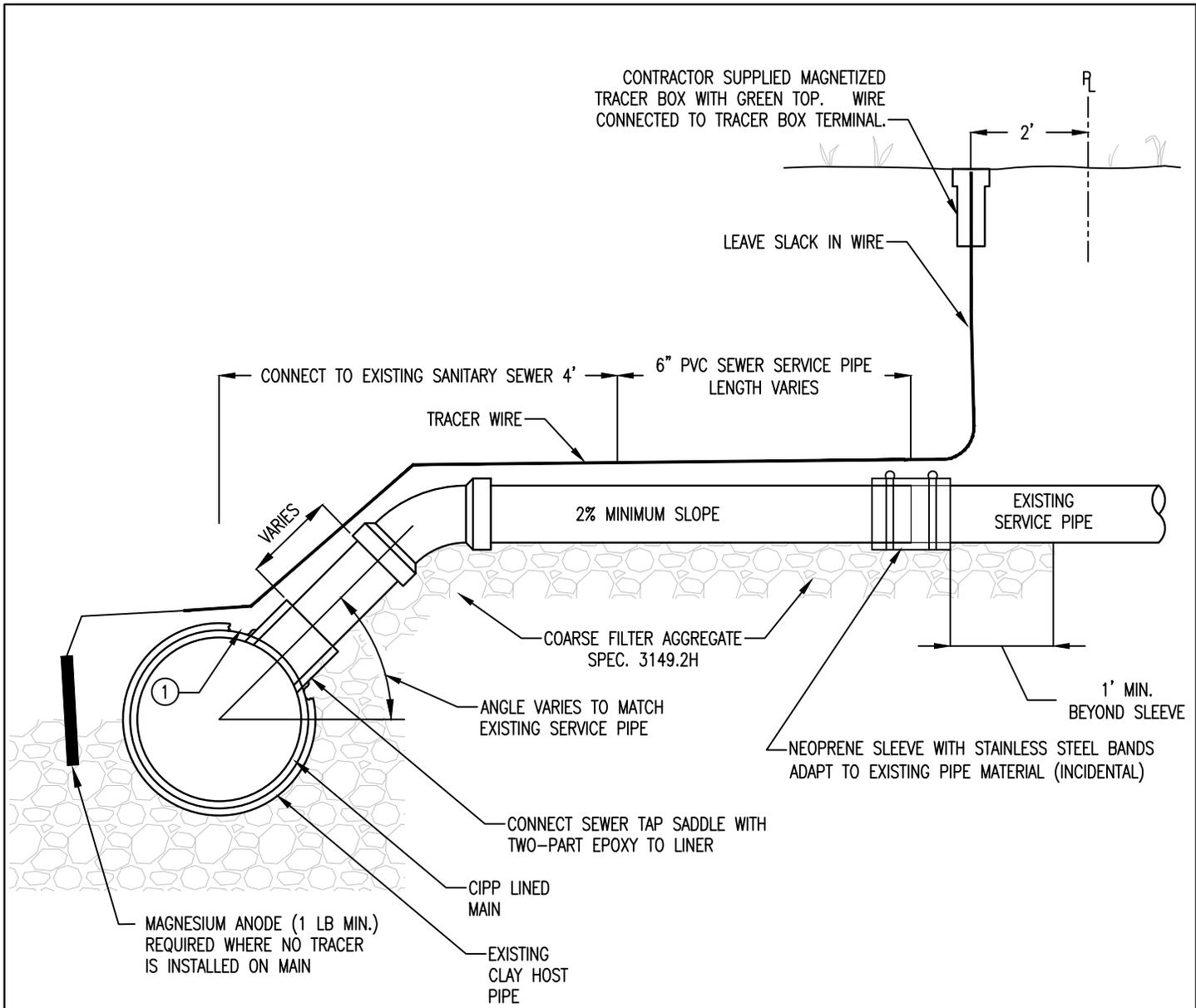
TYPICAL SEWER SERVICE CONNECTION

SAN-2

REVISED/APPROVED 02/19/2015

CITY OF DULUTH STANDARD DETAIL
DEPT. OF PUBLIC WORKS AND UTILITIES

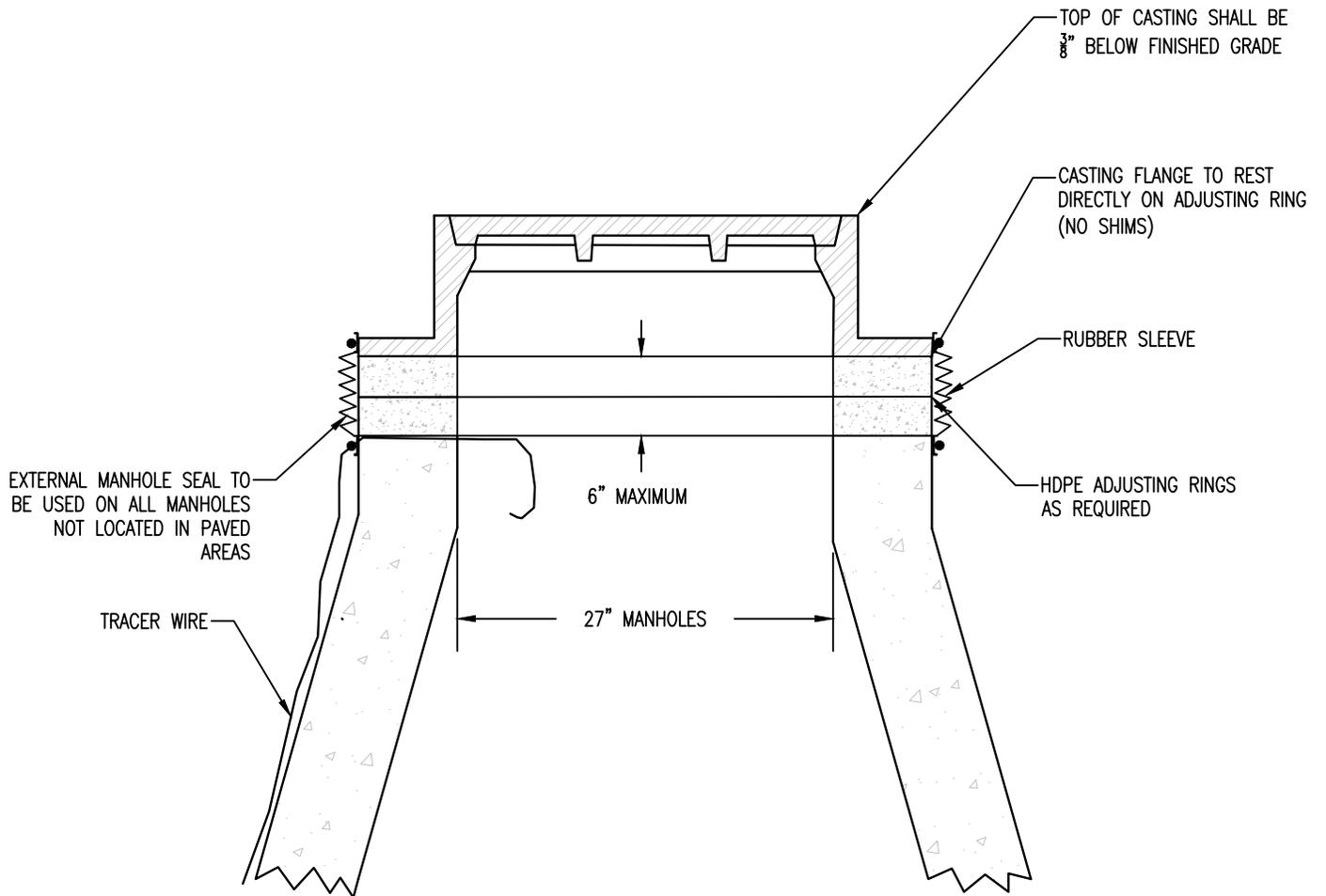
NO SCALE



NOTES

1. REMOVE PORTION OF EXISTING HOST PIPE TO EXPOSE CIPP LINER. CUT CIRCULAR HOLE IN CIPP LINER. WHERE THE EXISTING OPENING OF THE CIPP LINER EXCEEDS THE SIZE FOR A NEW SEWER TAP SADDLE, CONSTRUCT EPOXY LINER PATCH, AND CUT CIRCULAR HOLE IN CURED PATCH.
2. PROVIDE NEW PVC SEWER TAP SADDLE ON IN-PLACE SEWER MAIN LINER CONNECTED BY TWO-PART EPOXY GLUED JOINT FORMING A WATERTIGHT CONNECTION TO CIPP LINER.
3. CONNECT SEWER SERVICE INCLUDES SEWER TAP SADDLE, 6" PVC SEWER SERVICE PIPE (TO 4' FROM C/L) AND ALL FITTINGS.
4. 6" PVC SEWER SERVICE PIPE INTENDED FOR THE RECONSTRUCTION OF SEWER SERVICES (WHEN FOUND TO BE IN NEED BY THE ENGINEER) COMPLETE IN PLACE FROM 4.0' BEYOND THE C/L OF THE SEWER MAIN TO A POINT DESIGNATED BY THE ENGINEER.
5. FOR NEW SERVICES, PIPE TO STOP AT THE RIGHT OF WAY.
6. #12 GAUGE GREEN INSULATED SOLID COPPER WIRE SHALL BE INSTALLED WITH SANITARY SEWER MAINS AND SERVICES. TRACER WIRE TERMINAL BOXES SHALL BE INSTALLED DIRECTLY ABOVE THE SEWER SERVICE OR AS DIRECTED BY ENGINEER.
7. FOR SERVICES, TRACER WIRE SHALL RUN FROM A 1 POUND MAGNESIUM ANODE PLACE ADJACENT TO THE SADDLE TAP CONNECTION AT THE MAIN AND TERMINATE IN A FLUSH MOUNTED TRACER BOX.
8. THE TRACER WIRE SHALL REMAIN CONTINUOUS TO THE GREATEST EXTENT POSSIBLE. SPLICES IN TRACER WIRE SHALL BE WITH SPLIT BOLT CONNECTORS. WIRES NUTS ARE NOT ACCEPTABLE. A WATER-PROOF CONNECTION IS NECESSARY TO PREVENT CORROSION.

SEWER SERVICE CONNECTION FOR CIPP LINED SEWER MAIN		SAN-2A
REVISED/APPROVED 04/05/2019	CITY OF DULUTH STANDARD DETAIL DEPT. OF PUBLIC WORKS AND UTILITIES	NO SCALE



- NOTE:
1. ALL SEALS SHALL EXTEND FROM THE CASTING TO THE CONE
 2. TRACER WIRE REQUIRED ON ALL SANITARY SEWER MAINS

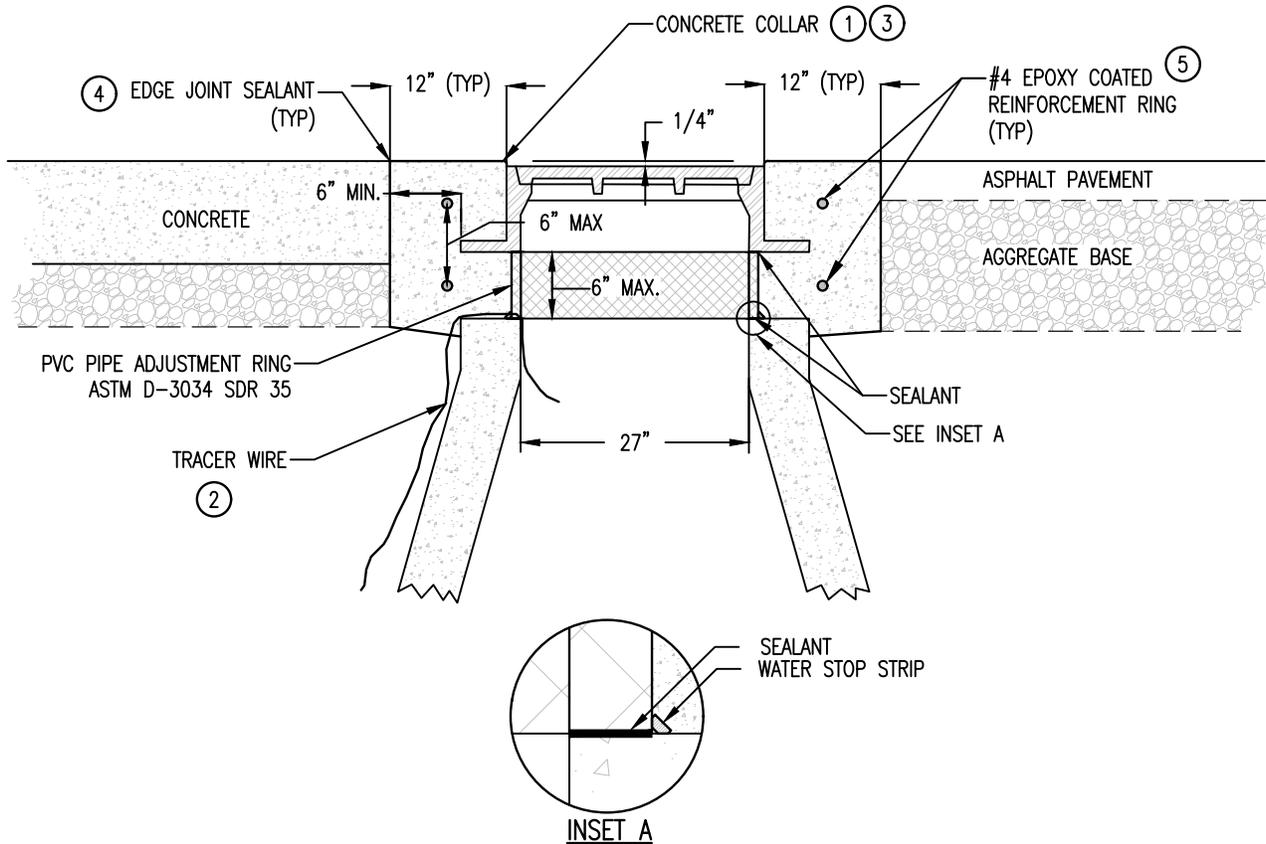
SANITARY MANHOLE NON-PAVED AREAS

SAN-3

REVISED/APPROVED 04/05/2019

CITY OF DULUTH STANDARD DETAIL
DEPT. OF PUBLIC WORKS AND UTILITIES

NO SCALE



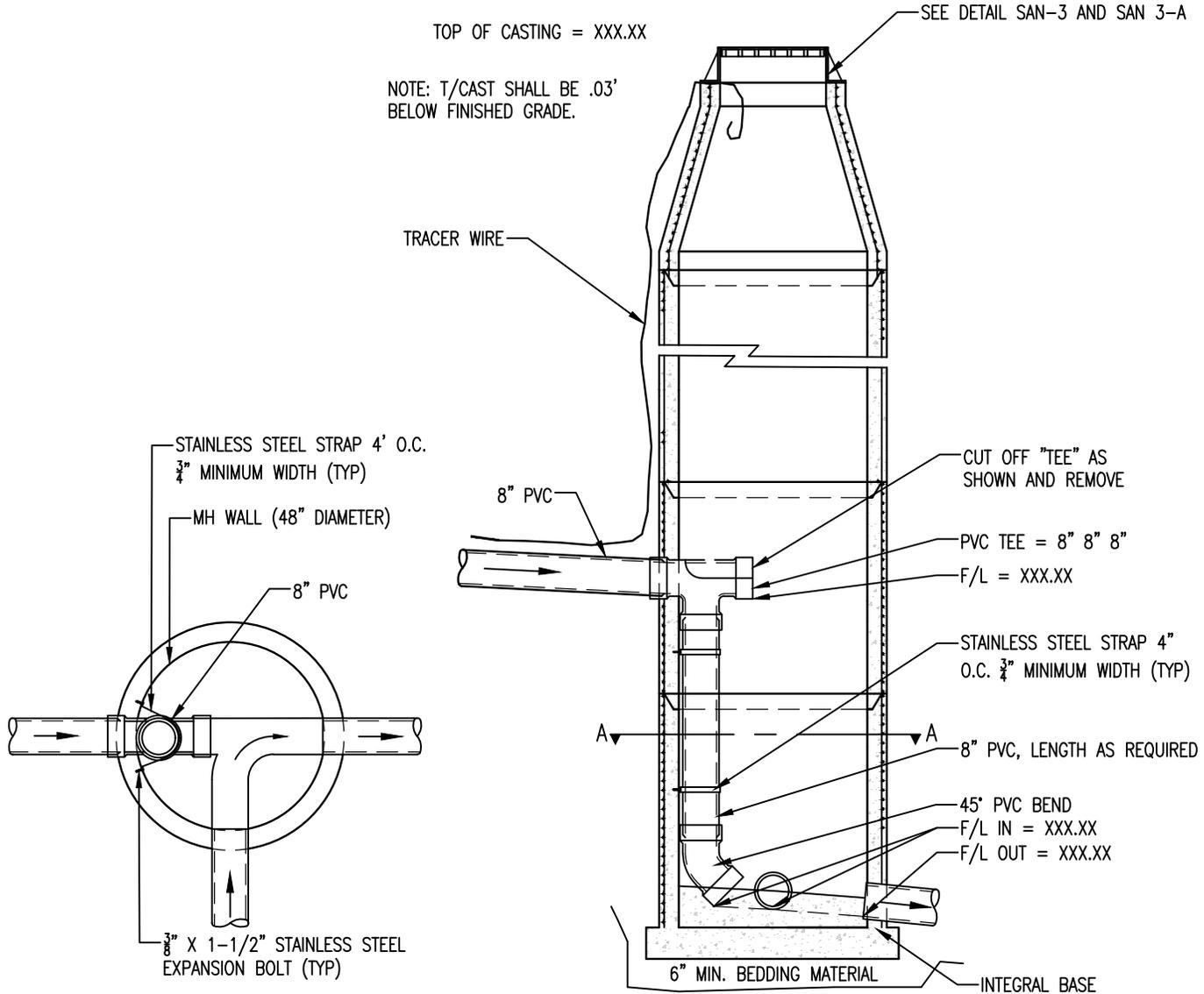
NOTES:

- ① CONCRETE (MIX NO. 3G52) COLLAR TO ENCASE CASTING AND ADJUSTMENT RING.
- ② TRACER WIRE REQUIRED ON ALL SANITARY SEWER MAINS.
- ③ CONCRETE COLLAR SHALL BE CIRCULAR LAYOUT. PAVEMENT AND BASE SHALL BE CUT OUT WITH ROTATING CUTTING DEVICE
- ④ FINISH CONCRETE EDGE WITH 1/4" RADIUS. SEAL JOINT BETWEEN PAVEMENT AND COLLAR.
- ⑤ MAINTAIN 3.5" COVER ON REINFORCEMENT.

NOT TO SCALE

CONCRETE ENCASED CASTING COLLAR FOR SANITARY MH IN ROADWAY, WALKS, & DRIVES		SAN-3A
REVISED/APPROVED 04/05/2019	CITY OF DULUTH STANDARD DETAIL DEPT. OF PUBLIC WORKS AND UTILITIES	NO SCALE

TOP OF CASTING = XXX.XX
 NOTE: T/CAST SHALL BE .03' BELOW FINISHED GRADE.



NOTES: REFER TO PLAN/PROFILES FOR ELEVATIONS

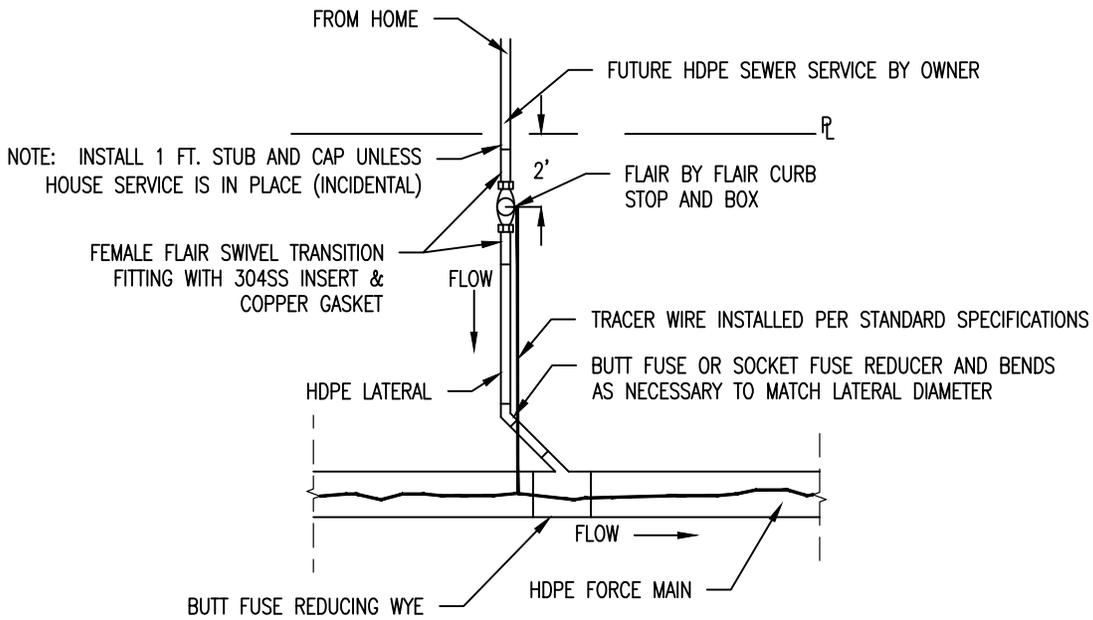
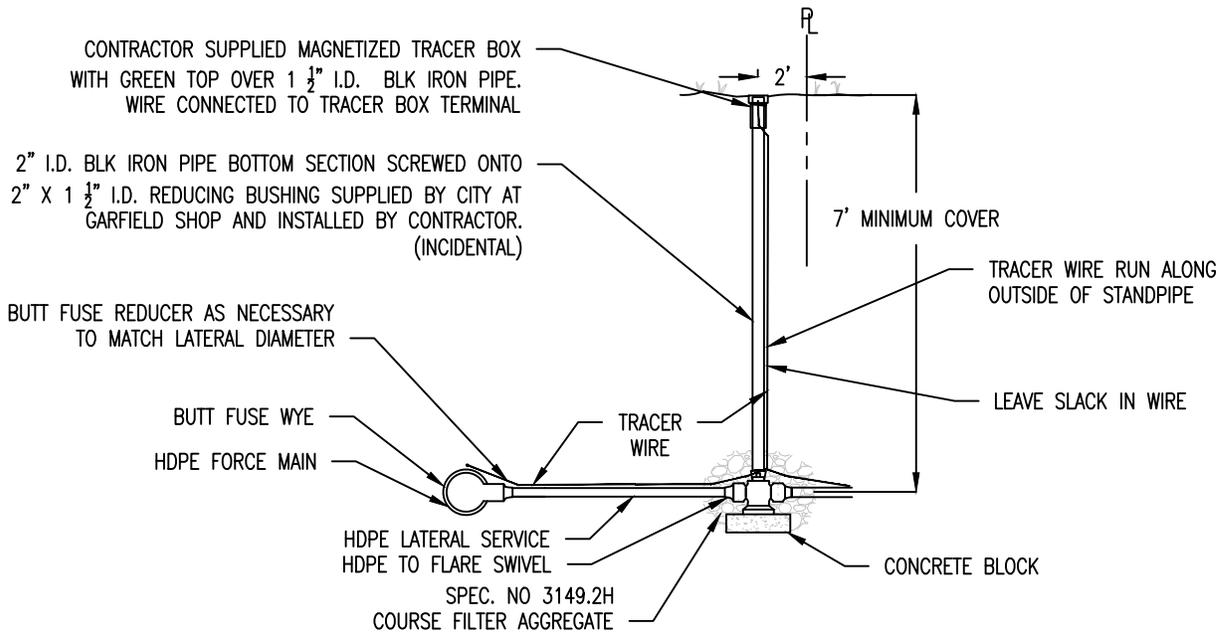
CONSTRUCT INSIDE DROP STRUCTURE

SAN-4

REVISED/APPROVED 04/05/2019

CITY OF DULUTH STANDARD DETAIL
 DEPT. OF PUBLIC WORKS AND UTILITIES

NO SCALE



NOTES:

1. #12 GAUGE GREEN INSULATED COPPER TRACER WIRE SHALL BE INSTALLED WITH THE NON-CONDUCTIVE SERVICE PIPE. TRACER WIRE INSTALLATION REQUIRES TRACER BOXES AT LEAST EVERY 300 FEET.
2. THE TRACER WIRE SHALL REMAIN CONTINUOUS TO THE GREATEST EXTENT POSSIBLE. SPLICES IN THE TRACER WIRE SHOULD BE MADE WITH SPLIT BOLT CONNECTORS. WIRE NUTS SHALL NOT BE USED. A WATER-PROOF CONNECTION IS NECESSARY TO PREVENT CORROSION.
3. TRACER WIRE SHALL RUN FROM THE WYE AND TERMINATE IN A FLUSH MOUNTED TRACER BOX WITH A GREEN CAST IRON TOP.

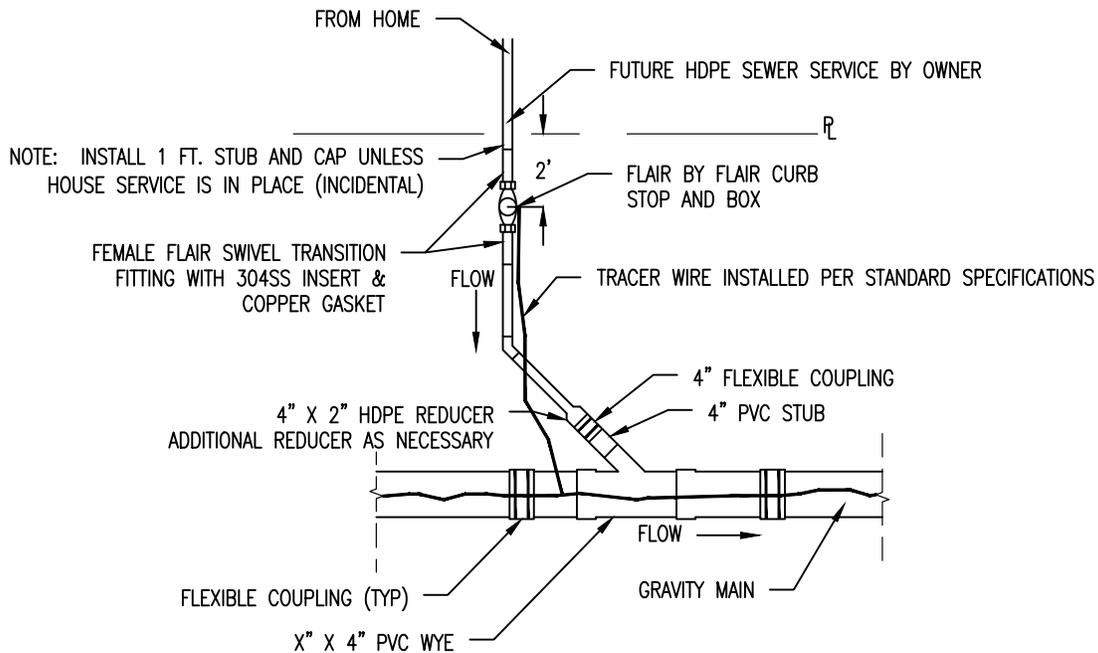
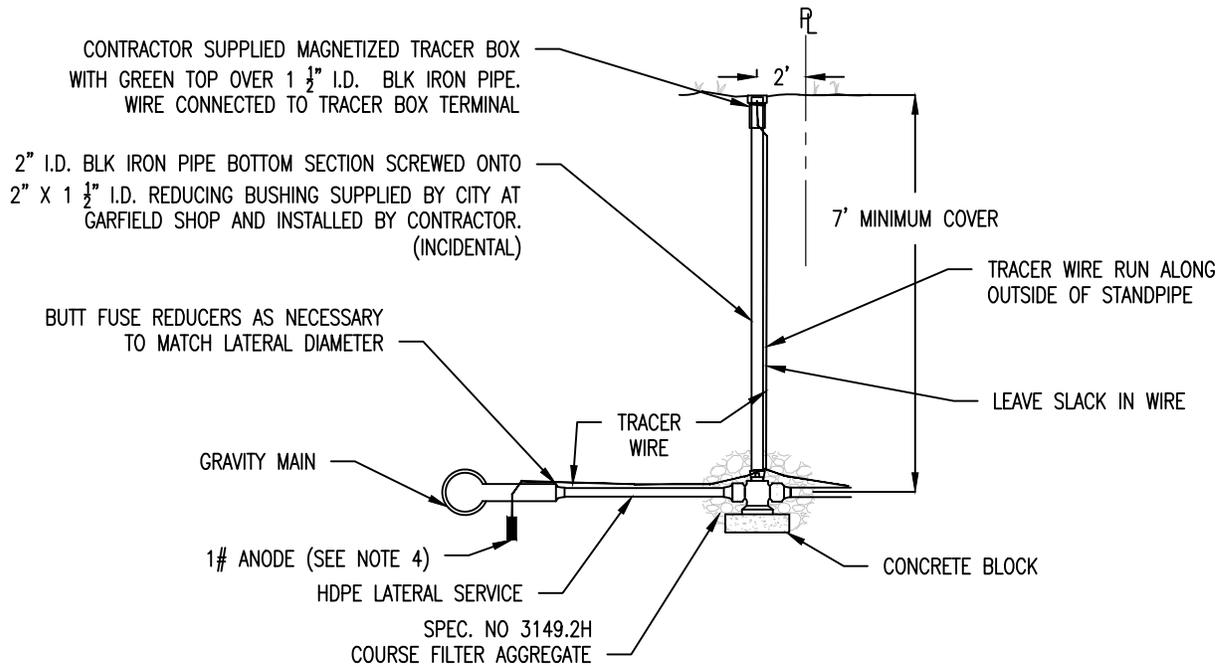
HDPE SANITARY SEWER PRESSURE LATERAL CONNECTION

SAN-5

REVISED/APPROVED 02/25/2026

CITY OF DULUTH STANDARD DETAIL
DEPT. OF PUBLIC WORKS AND UTILITIES

NO SCALE



NOTES:

1. #12 GAUGE GREEN INSULATED COPPER TRACER WIRE SHALL BE INSTALLED WITH THE NON-CONDUCTIVE SERVICE PIPE. TRACER WIRE INSTALLATION REQUIRES TRACER BOXES AT LEAST EVERY 300 FEET.
2. THE TRACER WIRE SHALL REMAIN CONTINUOUS TO THE GREATEST EXTENT POSSIBLE. SPLICES IN THE TRACER WIRE SHOULD BE MADE WITH SPLIT BOLT CONNECTORS. WIRE NUTS SHALL NOT BE USED. A WATER-PROOF CONNECTION IS NECESSARY TO PREVENT CORROSION.
3. TRACER WIRE SHALL RUN FROM THE WYE AND TERMINATE IN A FLUSH MOUNTED TRACER BOX WITH A GREEN CAST IRON TOP.
4. IF NO MAIN TRACER WIRE EXISTS INSTALL 1# ANODE

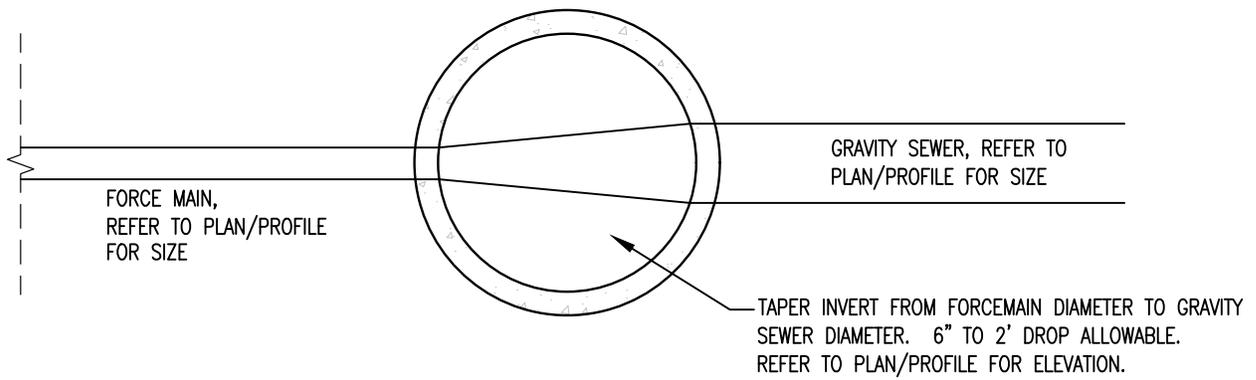
PRESSURE SANITARY LATERAL TO GRAVITY MAIN CONNECTION

SAN-5A

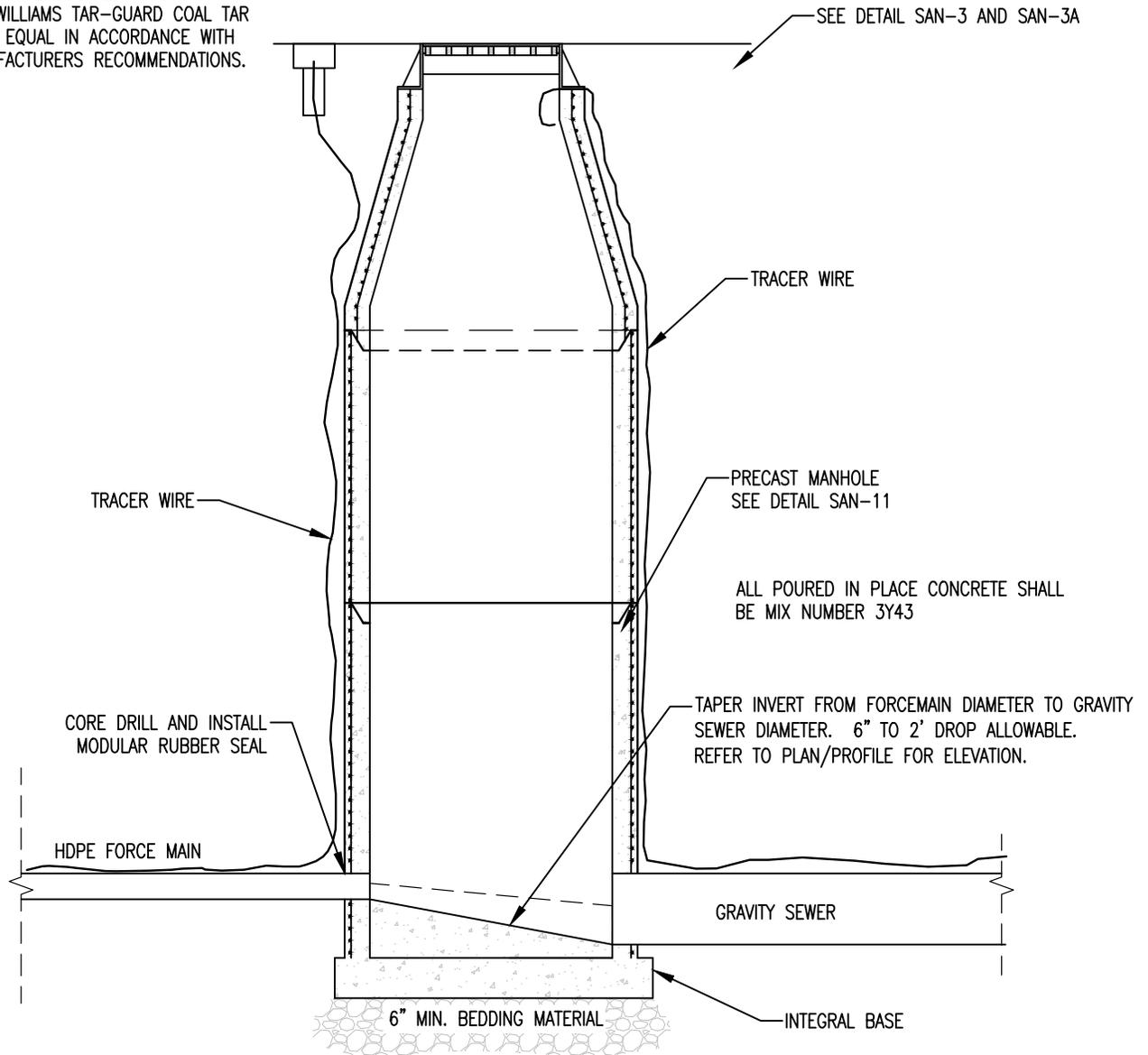
REVISED/APPROVED 02/25/2026

CITY OF DULUTH STANDARD DETAIL
DEPT. OF PUBLIC WORKS AND UTILITIES

NO SCALE



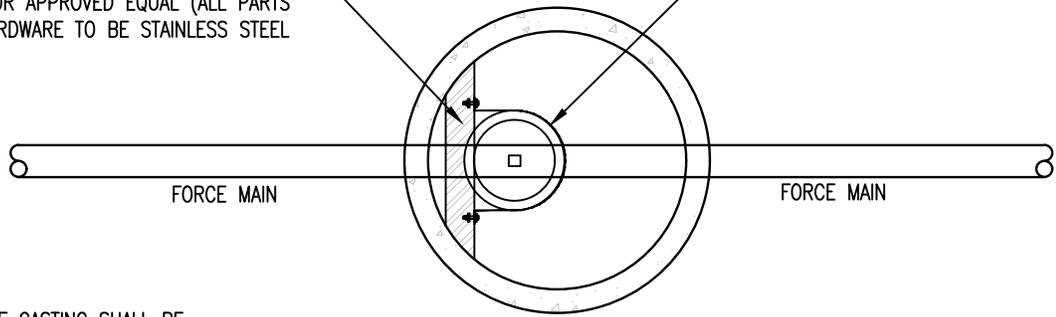
NOTE:
 ALL CONCRETE SURFACES INSIDE OF
 MANHOLES TO BE COATED WITH
 SHERWIN-WILLIAMS TAR-GUARD COAL TAR
 EPOXY OR EQUAL IN ACCORDANCE WITH
 THE MANUFACTURERS RECOMMENDATIONS.



HDPE FORCEMAIN TO GRAVITY MAIN MANHOLE		SAN-6
REVISED/APPROVED 01/08/2016	CITY OF DULUTH STANDARD DETAIL DEPT. OF PUBLIC WORKS AND UTILITIES	NO SCALE

1 1/2" X 1 1/2" S.S. SUPPORT BRACKETS WITH S.S. BAND OR APPROVED EQUAL (ALL PARTS AND HARDWARE TO BE STAINLESS STEEL)

AIR VACUUM RELEASE VALVE



NOTE: TOP OF CASTING SHALL BE .03' BELOW FINISHED GRADE

SEE DETAIL SAN-3 AND SAN-3A

MAGNETIZED TRACER WIRE BOX

6" POLYSTYRENE INSULATION BOARD (DOW STYROFOAM HI 40, CERTIFOAM 40, OR EQUIVALENT)

1/2" TREATED PLYWOOD SUPPORTED BY 1" S.S. ANGLE IRON W/ STAINLESS LAG BOLTS

INCIDENTAL

LEAVE SLACK IN WIRE

SPLIT BOLT

8' X 8' X 3" POLYSTYRENE INSULATION

TOP SECTION SHALL BE FULL SECTION WITH PRECAST TOP, MNDOT STANDARD PLATE 4020

3" X 12" X 4' INSULATION STRIPS

TRACER WIRE

TRACER WIRE

AIR VACUUM RELEASE VALVE APCO MODEL 443, VAL-MATIC 801WA, OR APPROVED EQUAL

1 1/2" X 1 1/2" S.S. SUPPORT BRACKET WITH S.S. BAND OR APPROVED EQUAL

2"-6" MAIN: 2" AWWA (CC) X FEMALE NTP CORPORATION STOP

8" AND GREATER MAIN: 2" BRASS BODIED BALL VALVE

304SS PIPE NIPPLE

2"-6" MAIN: 2" ELECTORFUSION SERVICE SADDLE

CORE DRILL AND INSTALL MODULAR RUBBER SEAL

8" AND GREATER MAIN: BUTT FUSED BRANCH TEE WITH BUTT FUSE CAP WITH 2" FEMALE NPT TRANSITION INSERTED

HDPE FORCE MAIN

HDPE FORCE MAIN

CONCRETE SUPPORT, MIN. 8" HIGH

6" MIN. BEDDING MATERIAL

INTEGRAL BASE

NOTE: MANHOLE TO MEET ALL REQUIREMENTS OF SAN-11

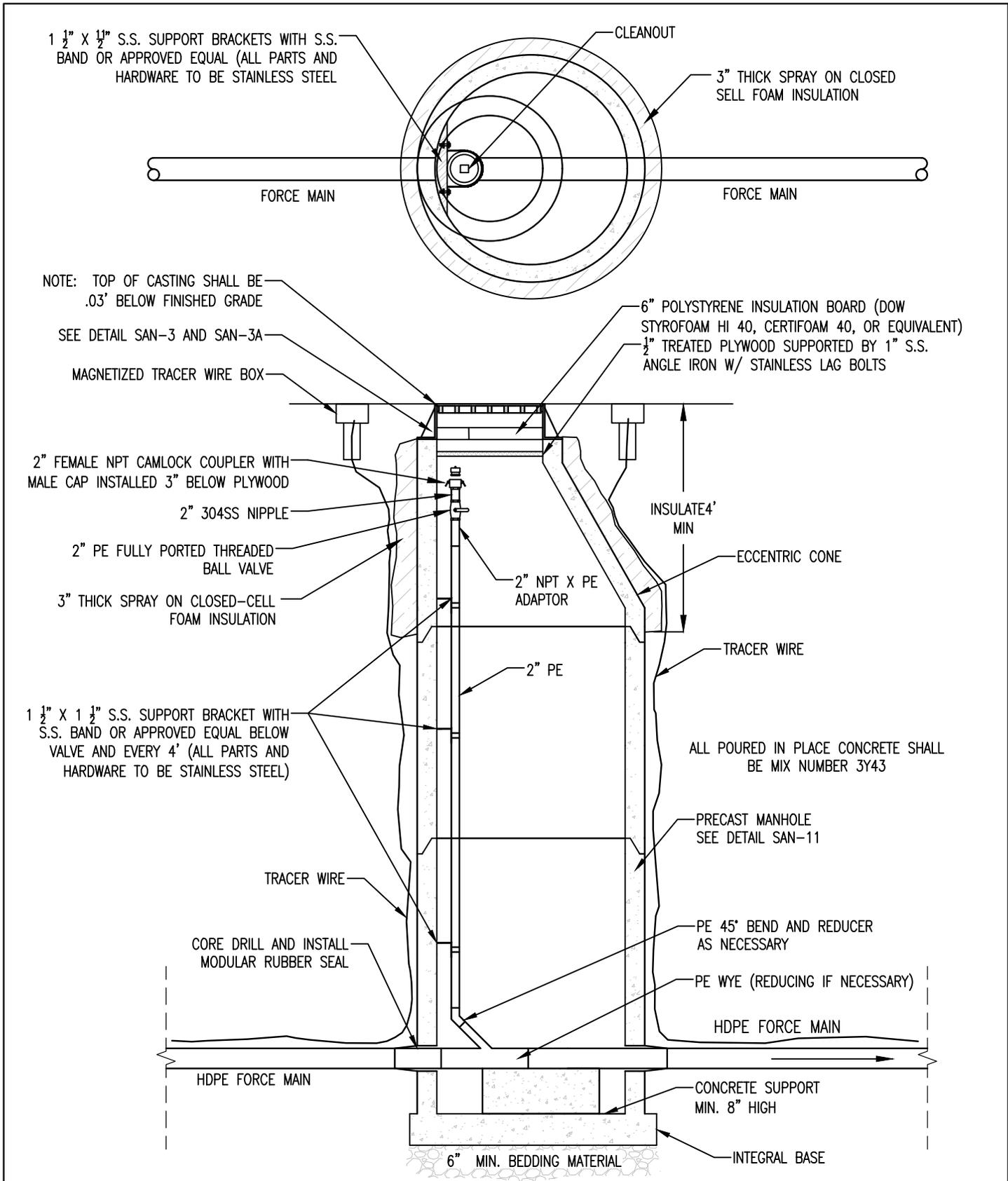
AIR-RELEASE MANHOLE

SAN-7

REVISED/APPROVED 02/25/2026

CITY OF DULUTH STANDARD DETAIL
DEPT. OF PUBLIC WORKS AND UTILITIES

NO SCALE



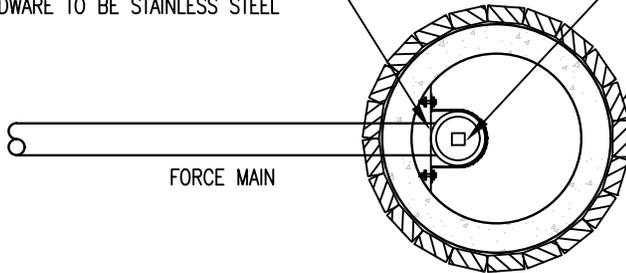
NOTE: ALL WORK WITHIN THIS DETAIL IS CONSIDERED INCLUDED FOR PAYMENT TO THE APPLICABLE MANHOLE PAY ITEM

PRESSURE SEWER CLEANOUT MANHOLE		SAN-8
REVISED/APPROVED 02/25/2026	CITY OF DULUTH STANDARD DETAIL DEPT. OF PUBLIC WORKS AND UTILITIES	NO SCALE

1-1/2" X 1-1/2" S.S. SUPPORT BRACKETS
WITH S.S. BAND OR APPROVED EQUAL (ALL
PARTS AND HARDWARE TO BE STAINLESS STEEL)

CLEANOUT (DEAD END)

3" THICK CLOSED-CELL FOAM INSULATION
AROUND STRUCTURE



FORCE MAIN

NOTE: TOP OF CASTING SHALL BE
.03' BELOW FINISHED GRADE

SEE DETAIL SAN-3/SAN-3A

MAGNETIZED TRACER WIRE BOX

6" POLYSTYRENE INSULATION
BOARD (DOW STYROFOAM HI 40,
CERTIFOAM 40, OR EQUIVALENT)

1/2" TREATED PLYWOOD SUPPORTED
BY 1" S.S. ANGLE IRON W/
STAINLESS LAG BOLTS

2" FEMALE NPT CAMLOCK COUPLER WITH
MALE CAP INSTALLED 3" BELOW PLYWOOD

2" NPT X PE ADAPTOR

REDUCER AS NECESSARY

2" 304SS NIPPLE

2" PE FULLY PORTED THREADED
BALL VALVE

48" DEEP 30" DIAMETER PRECAST MANHOLE
(MNDOT STANDARD PLATE 4005M) DESIGN "F"
W/O CONCRETE BASE

3" THICK SPRAY ON CLOSED-CELL
FOAM INSULATION

6" MIN. BEDDING MATERIAL

1-1/2" X 1-1/2" S.S. SUPPORT BRACKET
WITH S.S. BAND OR APPROVED EQUAL
BELOW VALVE (ALL PARTS AND HARDWARE
TO BE STAINLESS STEEL)

BEDDING MATERIAL WRAPPED
IN GEOTEXTILE FABRIC
TYPE 5 (NON WOVEN)

HDPE SANITARY FORCEMAIN

GRANULAR BACKFILL

TRACER WIRE

HDPE FORCE MAIN

NOTE: ALL WORK WITHIN THIS DETAIL IS CONSIDERED INCLUDED FOR PAYMENT TO THE
APPLICABLE MANHOLE PAY ITEM. HDPE PIPE IS PAID SEPERATELY.

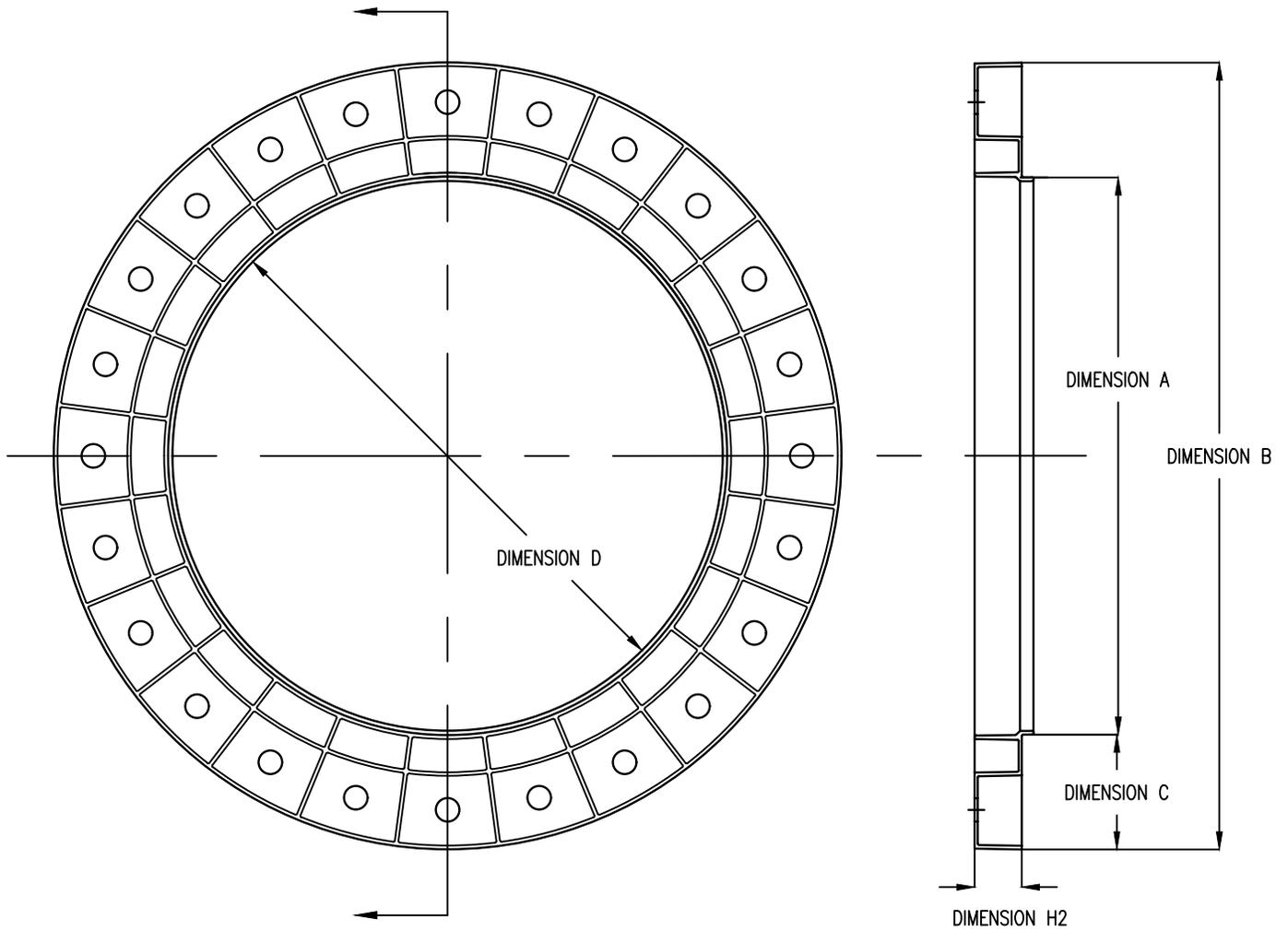
DEAD END PRESSURE SEWER CLEANOUT HAND HOLE

SAN-8A

REVISED/APPROVED 02/25/2026

CITY OF DULUTH STANDARD DETAIL
DEPT. OF PUBLIC WORKS AND UTILITIES

NO SCALE



DIMENSION SCHEDULE

CONE SIZE	DIMENSION A	DIMENSION B	DIMENSION C	DIMENSION D	DIMENSION H1
27.00	26.75	36.50	5.00	26.25	1.20, 1.50, 2.00, 4.00

DESCRIPTION

1. PLASTIC INJECTION MOLDED ADJUSTMENT RING
2. MOLDED FROM HIGH DENSITY POLYETHYLENE AS DEFINED IN ASTM SPECIFICATION D1248
3. ACTUAL RESIN PROPERTIES WILL VARY ALLOWING FOR THE UTILIZATION OF A MAXIMUM PERCENT OF RECYCLED MATERIAL
4. THE PERCENT OF POST CONSUMER WASTE TO INDUSTRIAL WASTE WILL VARY WITH AVAILABILITY AND PROPERTY RETENTION NEEDS
5. COLOR, SHADE AND UNIFORMITY WILL VARY WITH THE MIX OF THE POST CONSUMER AND INDUSTRIAL WASTE MATERIALS
6. DIMENSIONS SHOWN ARE NOMINAL - ACTUAL SIZE WILL VARY WITHIN ALLOWABLE TOLERANCE AND REQUIRED FIT

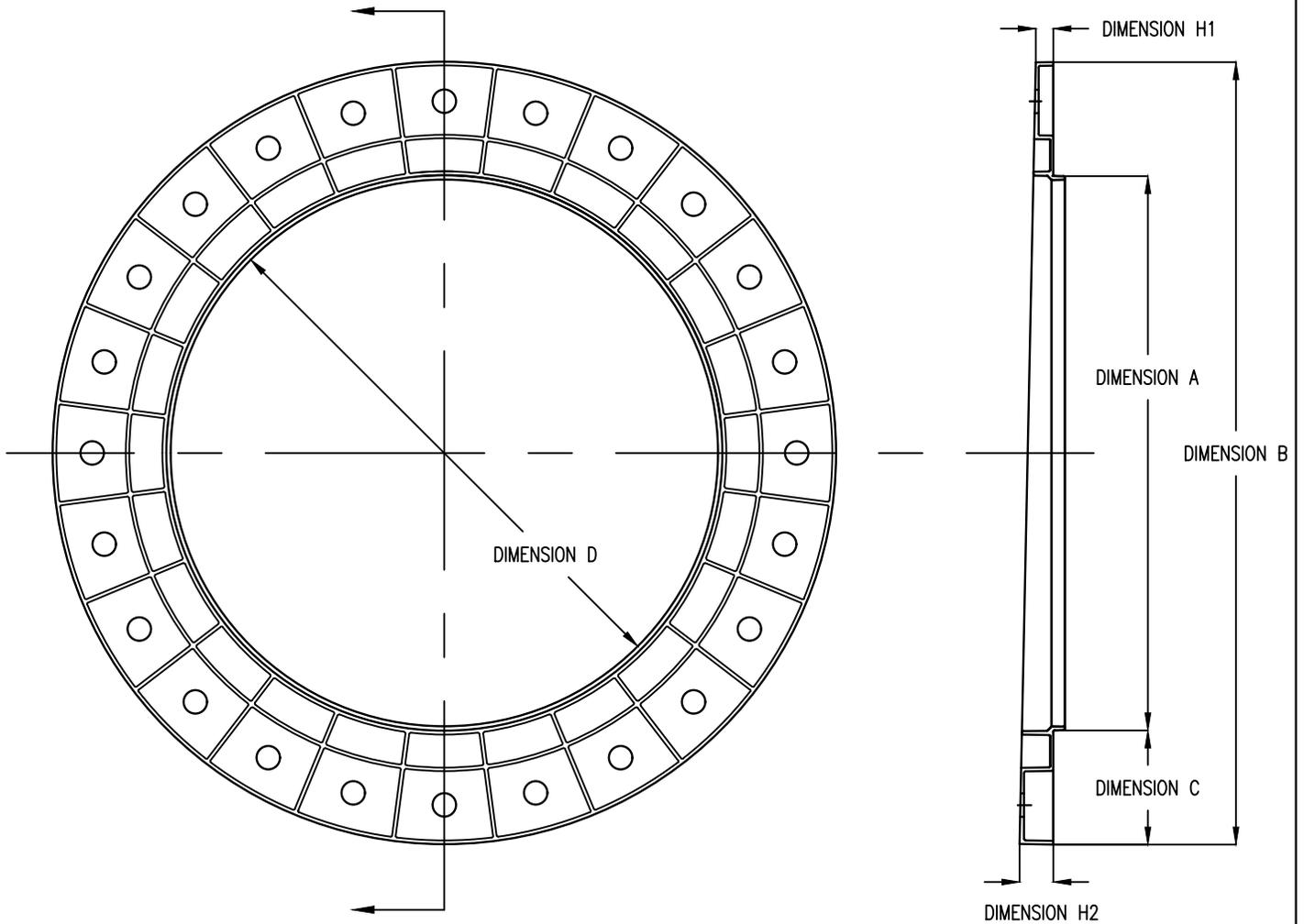
POLYETHYLENE MH ADJUSTING RING - FLAT

SAN-9

REVISED/APPROVED 02/01/2013

CITY OF DULUTH STANDARD DETAIL
DEPT. OF PUBLIC WORKS AND UTILITIES

NO SCALE



DIMENSION SCHEDULE

CONE SIZE	DIMENSION A	DIMENSION B	DIMENSION C	DIMENSION D	DIMENSION H1-H2
27.00	26.75	36.50	5.00	26.25	0.75 - 1.50

DESCRIPTION

1. PLASTIC INJECTION MOLDED ADJUSTMENT RING
2. MOLDED FROM HIGH DENSITY POLYETHYLENE AS DEFINED IN ASTM SPECIFICATION D1248
3. ACTUAL RESIN PROPERTIES WILL VARY ALLOWING FOR THE UTILIZATION OF A MAXIMUM PERCENT OF RECYCLED MATERIAL
4. THE PERCENT OF POST CONSUMER WASTE TO INDUSTRIAL WASTE WILL VARY WITH AVAILABILITY AND PROPERTY RETENTION NEEDS
5. COLOR, SHADE AND UNIFORMITY WILL VARY WITH THE MIX OF THE POST CONSUMER AND INDUSTRIAL WASTE MATERIALS
6. DIMENSIONS SHOWN ARE NOMINAL - ACTUAL SIZE WILL VARY WITHIN ALLOWABLE TOLERANCE AND REQUIRED FIT

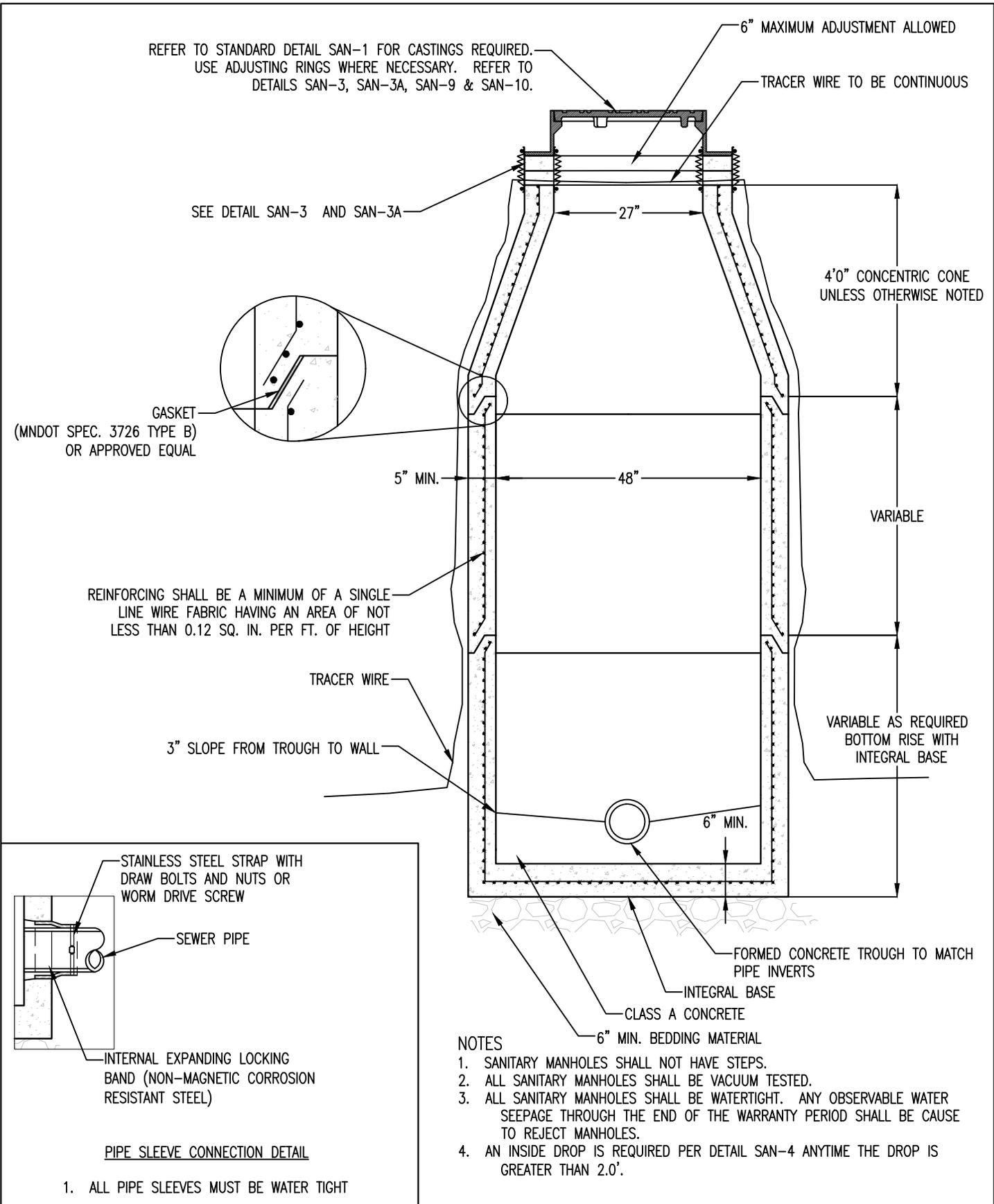
POLYETHYLENE MH ADJUSTING RING - WEDGE

SAN-10

REVISED/APPROVED 02/01/2013

CITY OF DULUTH STANDARD DETAIL
DEPT. OF PUBLIC WORKS AND UTILITIES

NO SCALE



PRECAST MECHANICAL JOINT SEWER MANHOLE

SAN-11

REVISED/APPROVED 02/25/2026

CITY OF DULUTH STANDARD DETAIL
DEPT. OF PUBLIC WORKS AND UTILITIES

NO SCALE