

SANITARY SEWER STANDARD DETAIL

DRAWING INDEX ISSUE DATE:

Table listing drawing index items (S.01 to S.35) and their corresponding issue dates (3/13/2014).

SANITARY SEWER STANDARD DETAIL

- 1. ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CITY OF OKLAHOMA CITY STANDARD SPECIFICATIONS FOR CONSTRUCTION OF PUBLIC IMPROVEMENTS.
2. ALL WORK NOT CLASSIFIED AS A CONTRACT PAY ITEM SHALL BE CONSIDERED AS AN INCIDENTAL AND NOT PAID FOR DIRECTLY.
...
9.3. THICKNESS - UNLESS OTHERWISE SPECIFIED, DUCTILE IRON PIPE SHALL MEET THE REQUIREMENTS IN THE FOLLOWING TABLE AS SHOWN IN DETAIL S-02.

SANITARY SEWER STANDARD DETAIL

DIP PIPE THICKNESS REQUIREMENTS

Table of DIP Pipe Thickness Requirements showing Depth of Cover (feet) ranges and corresponding Standard Pressure Class (PS-C) and Nominal Thickness (inches) for various pipe diameters.

SANITARY SEWER STANDARD DETAIL

- 1. HIGHWAYS
MINIMUM PIPE CLASSES FOR DIAMETER TWENTY FOUR INCHES (24") TO ONE HUNDRED TWO INCHES (102") MEETING THE REQUIREMENTS OF ASTM C-76 SHALL BE AS FOLLOWS:
2. RAILROADS
MINIMUM PIPE CLASSES FOR E-80 RAILROAD LIVE LOAD FOR PIPE SIZE TWENTY FOUR INCHES (24") TO ONE HUNDRED TWO INCHES (102") IN DIA. MEETING THE REQUIREMENTS OF ASTM C-76, OR ASTM C-655 SHALL BE AS FOLLOWS:

Tables for Highway and Railroad pipe minimum designs, showing Maximum Depth of Cover (FT) vs Minimum Class and Pipe Nominal Size (Inches) vs D0.01 (lb./lineal ft./ft. of inside Ø).

SANITARY SEWER DETAILS INDEX OF DRAWINGS
APPROVED BY: Eric J. Wenger, P.E., City Engineer
DATE: 3/14/14
S-00

GENERAL CONSTRUCTION NOTES 1 of 2
APPROVED BY: Marsha W. Slaughter, P.E., Utilities Director
DATE: 3/14/14
S-01

GENERAL CONSTRUCTION NOTES 2 of 2
APPROVED BY: Marsha W. Slaughter, P.E., Utilities Director
DATE: 3/14/14
S-02

REINFORCED CONCRETE PIPE MINIMUM DESIGN
APPROVED BY: Marsha W. Slaughter, P.E., Utilities Director
DATE: 3/14/14
S-03

SANITARY SEWER STANDARD DETAIL

VITRIFIED CLAY PIPE (VCP) MINIMUM PIPE DESIGN ASTM C-700

Table showing Pipe Nominal Size (Inches), Minimum Three-Edge Bearing Strength (LB/FT), and Maximum Depth of Cover (FT) for Vitrified Clay Pipe.

VITRIFIED CLAY PIPE DESIGN
APPROVED BY: Eric J. Wenger, P.E., City Engineer
DATE: 3/14/14
S-04

SANITARY SEWER STANDARD DETAIL

- 1. GENERAL - WHEN CALLED FOR ON THE PLANS OR SPECIFIED, MANHOLES SHALL BE TESTED, BEFORE ACCEPTANCE, BY EITHER PERFORMING EXFILTRATION OR VACUUM TEST.
2. EXFILTRATION TEST - ALL INCOMING AND OUTGOING LINES (INCLUDING SERVICES) SHALL BE PLUGGED AND THE MANHOLE FILLED WITH WATER UP TO THE BOTTOM OF THE MANHOLE RING.
3. VACUUM TESTING - ALL INCOMING AND OUTGOING SEWER AND SERVICE LINES SHALL BE PLUGGED. THE PLUGS RESTRAINED AND THE VACUUM TESTER HEAD PLACED ON THE MANHOLE RING AND SEALED.

Table for Manhole Depth vs Maximum Allowable Water Loss.

Table for Manhole Internal Diameter vs Time Measured (seconds).

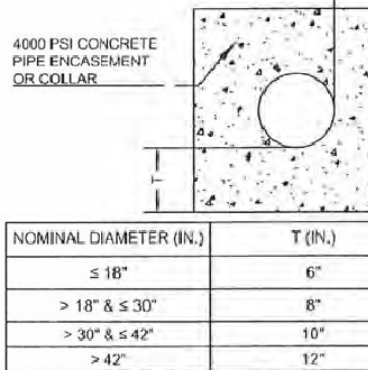
MANHOLE TESTING
APPROVED BY: Marsha W. Slaughter, P.E., Utilities Director
DATE: 3/14/14
S-05

SANITARY SEWER STANDARD DETAIL

TRENCH WIDTH TABLE

Table for Trench Width Requirements based on Pipe Nominal Size and Maximum Trench Width.

PIPE ENCASUREMENT AND COLLAR DETAIL



NOTE: For collars the concrete encasement shall be placed to a minimum of twelve (12) inches on either side of the joint.

EMBEDMENT MATERIAL

EMBEDMENT MATERIAL IS THE MATERIAL TO BE PLACED FROM A MINIMUM OF SIX INCHES (6") BELOW THE BOTTOM OF THE PIPE TO THE SPRINGLINE (HALF THE PIPE DIAMETER) OR TO A MINIMUM OF SIX INCHES (6") ABOVE THE TOP OF THE PIPE FOR RIGID AND FLEXIBLE PIPES, RESPECTIVELY.

MINIMUM MATERIAL REQUIREMENTS
1. GENERAL
EMBEDMENT MATERIAL FOR ALL RIGID AND FLEXIBLE PIPES SHALL BE CRUSHED ROCK MEETING THE REQUIREMENTS EITHER OF ASTM D-2001, CLASS 1A, OR ASTM C-33, NO. 57 OR 67 IN GRADATIONS SHOWN BELOW.

Table for Minimum Material Requirements showing Nominal Sieve Requirement, ASTM D-2001 Class, and Percent Passing.

2. COMPACTION REQUIREMENTS
ALL EMBEDMENT MATERIAL SHALL BE PLACED AND COMPACTED IN SIX INCH (6") LIFTS TO THE FOLLOWING MINIMUM PERCENT OF STANDARD PROCTOR DENSITY AS DETERMINED BY ASTM D-698.

Table for Compaction Requirements showing Compaction Test vs Compaction Requirement.

3. COMPACTION METHODS
ALL EMBEDMENT MATERIAL SHALL BE COMPACTED IN ACCORDANCE WITH THE METHODS DESCRIBED IN PART '3' OF 'BACKFILLING REQUIREMENTS'.

EMBEDMENT MATERIAL & TRENCH WIDTH TABLE
APPROVED BY: Eric J. Wenger, P.E., City Engineer
DATE: 3/14/14
S-06

SANITARY SEWER STANDARD DETAIL

1. DESCRIPTION

BACKFILL IS THAT PORTION OF THE TOTAL TRENCH BACKFILL DOWN TO BUT NOT INCLUDING THE PIPE EMBEDMENT MATERIAL. THE BACKFILL SHALL BE ONLY MATERIAL APPROVED BY THE ENGINEER CONSISTING OF LOOSE EARTH FREE OF CLODS, STONES, ORGANIC MATTER, DEBRIS OR OTHER OBJECTIONABLE MATERIAL.

2. COMPACTION REQUIREMENTS

ALL BACKFILL SHALL BE PLACED AND COMPACTED IN SIX INCH (6") LIFTS OR HAND-TAMPED EQUIPMENT AND THIRTY INCH (30") LIFTS FOR SELF-PROPELLED OR POWER DRIVEN EQUIPMENT TO THE FOLLOWING MINIMUM PERCENT OF STANDARD PROCTOR DENSITY OR RELATED DENSITY AS DETERMINED BY ASTM D-698.

Table for Backfilling Requirements showing General Location, Standard Proctor Density, and Relative Density Test.

BACKFILLING REQUIREMENTS 1 of 2
APPROVED BY: Eric J. Wenger, P.E., City Engineer
DATE: 3/14/14
S-07

Vertical bar on the right side of the sheet containing 'The City of Oklahoma City Utilities Department Engineering Division' logo, 'SANITARY SEWER STANDARD DETAILS', and administrative fields for DATE, DRAWN BY, CHECKED BY, SCALE, and SHEET NUMBER (S-STD-01).



NO. DATE DESCRIPTION

SANITARY SEWER
STANDARD DETAILS

DATE: 03/14/14
DRAWN BY: JDS
CHECKED BY: MWS/EJW

SCALE:
AS SHOWN

SHEET NUMBER
S-STD-02

SANITARY SEWER STANDARD DETAIL

3. COMPACTION METHODS

COMPACTION METHODS MAY VARY DEPENDING ON THE MATERIAL OR AS APPROVED BY THE ENGINEER

A. COHESIVE MATERIALS
COMPACTION OF COHESIVE MATERIALS MAY BE OBTAINED BY USE OF IMPACT TYPE EQUIPMENT IN CONFINED AREAS, PNEUMATIC TAMPERS AND ENGINE DRIVEN RAMMERS MAY ALSO BE USED. IN RELATIVELY NARROW TRENCHES, SELF-PROPELLED RAMMERS MAY BE USED. IN WIDE TRENCHES, SHEEPSFOOT ROLLERS MAY BE USED.

B. COHESIONLESS MATERIALS
COHESIONLESS MATERIALS ARE GRANULAR MATERIALS CLASSIFIED AS NON-PLASTIC. IN GENERAL, VIBRATORY EQUIPMENT MAY BE USED FOR PROPER COMPACTION. IN CONFINED AREAS, VIBRATORY PLATES MAY BE USED. FOR WIDER TRENCHES, VIBRATORY ROLLERS MAY BE USED.

C. FLOODING OR JETTING
WHEN APPROVED BY THE ENGINEER, MATERIALS MAY ALSO BE COMPACTED OR SETTLED BY FLOODING WHERE ADEQUATE QUANTITIES OF WATER ARE AVAILABLE FROM THE CITY'S WATER SYSTEM, PRIVATELY OWNED PONDS, CREEKS OR OTHER SOURCES LOCATED WITHIN THREE HUNDRED FEET (300') OF THE TRENCH. WATER SHALL BE USED TO PRODUCE A SEMI-FLUID MASS ALONG AND OUT OF THE TRENCH AT STREAM CROSSINGS OR OTHER PLACES OF ABRUPT CHANGES IN GROUND PROFILE. THE CONTRACTOR SHALL MAKE NECESSARY ARRANGEMENTS WITH THE CITY FOR THE PURCHASE OF WATER FROM THE CITY WATER MAINS, AND WITH OWNERS OF WATER PROCURED FROM PRIVATELY OWNED WATER SOURCES. NO ADDITIONAL COMPENSATION SHALL BE ALLOWED TO THE CONTRACTOR FOR SETTLING THE BACKFILL BY JETTING. THE COST OF SUCH WORK SHALL BE INCLUDED IN THE UNIT PRICE BID FOR TRENCH EXCAVATION AND BACKFILL OR OTHER PAY ITEMS THE CONTRACTOR MAY ELECT.

4. COMPACTION REQUIREMENTS

ALL BACKFILL SHALL BE TESTED BY AN APPROVED LABORATORY FOR COMPLIANCE OF THE COMPACTION REQUIREMENTS.

5. SURFACE RESTORATION

UPON COMPLETION OF BACKFILLING PROCEDURES, THE CONTRACTOR SHALL REPLACE ALL SURFACE MATERIALS AND SHALL RESTORE PAVING, CURBING, SIDEWALKS, GUTTERS, SHRUBBERY, FENCES, SOD AND OTHER SURFACES DISTURBED TO A CONDITION EQUAL TO OR BETTER THAN THE CONDITION BEFORE WORK BEGAN.

SANITARY SEWER STANDARD DETAIL

FLEXIBLE PIPE INSTALLATION DETAIL (DIP, HDPE, PVC & RFP)

RIGID PIPE INSTALLATION DETAIL (RCP & VCP)

OD=PIPE OUTSIDE DIAMETER (IN.)
BEDDING CLASS="B"
LOAD FACTOR=1.8

SANITARY SEWER STANDARD DETAIL

BRICK MASONRY OR PRECAST RING (MORTARED)
CONCENTRIC OR ECCENTRIC CONE
CONCRETE PAD
VARIES (4" MIN.)
6" MIN. CRUSHED ROCK

MINIMUM 1'-0"

NOTES:

- CAST-IN-PLACE NON-REINFORCED CONCRETE AND BRICK MANHOLES
 - THE EXISTING CONE AND WALL, IF NECESSARY, SHALL BE REMOVED TO A LEVEL WHICH WILL ALLOW INSTALLATION OF NEW CONE TO THE PROPER GRADE. THE EXPOSED CUT-OFF SURFACES OF THE EXISTING MANHOLE WALL SHALL BE CLEANED BY REMOVING LOOSE MATERIAL AND WETTED, PRIOR TO CONSTRUCTION OF CONCRETE PAD. ALL LOOSE BACKFILL AROUND THE MANHOLE WALL SHALL BE REMOVED AND REPLACED WITH COMPACTED CRUSHED ROCK. THE NEW CONCRETE PAD SHALL BE CONSTRUCTED, AND A NEW CONE SHALL BE FORMED OR PLACED TO THE PROPER GRADE USING FIFTEEN THOUSAND (15000 PSI) POUNDS PER SQUARE INCH MORTAR.
- PRECAST REINFORCED CONCRETE MANHOLES
 - PRECAST SECTIONS SHALL BE REMOVED TO A LEVEL WHERE THE NEW CONE CAN BE INSTALLED TO THE DESIRED GRADE. INSTALLATION SHALL BE IN ACCORDANCE WITH THE APPROPRIATE STANDARD DETAIL FOR PRECAST MANHOLE CONES. A NEW RUBBER GASKET SHALL BE USED TO SEAL EACH SECTION.

SANITARY SEWER STANDARD DETAIL

ABANDONED MANHOLE
REMOVE EXIST. TOP 2'-0" OF MANHOLE
PLUG
EX. SAN. SEWER
COMPACTED SAND BACKFILL
CONC. FILL BOTTOM OF M.H. TO TOP OF PIPE
PLUG

NOTE: SALVAGED MATERIALS, INCLUDING RING AND COVER SHALL BE DELIVERED TO THE LINE MAINTENANCE DIVISION OF THE WATER AND WASTEWATER UTILITIES DEPARTMENT.

03/13/14 DATE: ERIC J. WENGER, P.E., CITY ENGINEER
APPROVED BY: MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR
DATE: 3/14/14
S-08

03/13/14 DATE: ERIC J. WENGER, P.E., CITY ENGINEER
APPROVED BY: MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR
DATE: 3/14/14
S-09

03/13/14 DATE: ERIC J. WENGER, P.E., CITY ENGINEER
APPROVED BY: MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR
DATE: 3/14/14
S-10

03/13/14 DATE: ERIC J. WENGER, P.E., CITY ENGINEER
APPROVED BY: MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR
DATE: 3/14/14
S-11

SANITARY SEWER STANDARD DETAIL

EMBEDMENT PLUG

NOTES:

TWO TYPES OF EMBEDMENT PLUGS MAY BE USED, AT THE CONTRACTORS OPTION, AS FOLLOWS:

- CLAY PLUGS
 - THE EMBEDMENT AND BACKFILL MATERIAL SHALL BE SELECT CLAY SEPARATED FROM EXCAVATED MATERIAL AND SHALL BE APPROVED BY THE ENGINEER PRIOR TO PLACEMENT. THIS MATERIAL SHALL BE FREE OF CLODS, CLUMPS, DEBRIS, ORGANIC MATERIAL AND STONES. ALL CLAY PLUG MATERIAL SHALL BE COMPACTED TO A MINIMUM OF NINETY (90%) PERCENT OF STANDARD PROCTOR DENSITY (ASTM D-698) AT PLUS OR MINUS THREE (3%) PERCENT OF OPTIMUM MOISTURE CONTENT.
- FLOWABLE FILL PLUGS
 - FLOWABLE FILL PLUGS SHALL CONSIST OF A PORTLAND CEMENT GROUT HAVING A MINIMUM TWENTY-EIGHT (28) DAY COMPRESSIVE STRENGTH OF FIVE HUNDRED (500 PSI) POUNDS PER SQUARE INCH.

SANITARY SEWER STANDARD DETAIL

1. MANHOLES SHALL BE CONSTRUCTED AS SPECIFIED IN ASTM C-478.

2. THE MINIMUM WALL THICKNESS IS SPECIFIED IN THE FOLLOWING TABLE AND SHALL NOT BE LESS THAN ONE-TWELFTH (1/12) OF THE INTERNAL DIAMETER OF THE LARGEST CONE OR RISER OR FIVE-INCHES (5") WHICHEVER IS GREATER.

MANHOLE INTERNAL DIAMETER (FEET)	MINIMUM WALL THICKNESS (INCHES)
4	5
5	5
6	6
7	7
8	8

3. MINIMUM DEPTH OF MANHOLE TO BE 6'-0".

4. ALL LIFTING HOLES PROVIDED IN EACH SECTION SHALL BE REPAIRED WITH A MIXTURE OF CEMENT & SAND GROUT FIRMLY PACKED INTO ENTIRE ORIFICE.

5. ALL INSIDES SURFACES OF PRECAST MANHOLES SHALL BE COATED WITH A DRY FILM THICKNESS OF NOT LESS THAN EIGHT (8) MILS OF TNEPEC SERIES 69 HI-BUILD EPOXOLINE II, OR APPROVED EQUAL.

6. WHEN DIRECTED BY THE ENGINEER, A SET OF THREE (3) CYLINDERS, THREE-INCHES (3") IN DIAMETER SHALL BE CUT FROM RANDOMLY SELECTED MANHOLES AND TESTED FOR COMPRESSIVE STRENGTH.

7. ACCEPTANCE OF THE MANHOLE STRUCTURE SHALL BE BASED ON THE CONFORMANCE AND PERFORMANCE OF MATERIALS REQUIRED IN ASTM C-478 AND THE ENGINEER'S INSPECTION OF THE INSTALLED PRODUCT.

4 FT. - 5 FT. - or 6 FT.
LIFTING HOLES
REINFORCING WIRE PER ASTM C-478
8 FT. - 7 FT. - or 6 FT.

SANITARY SEWER STANDARD DETAIL

NOTE:

- ALL CONCRETE FOR MANHOLE STRUCTURE AND BASE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI
- PRECAST MANHOLES SHALL BE CONSTRUCTED AS PER ASTM C-478
- ALL INSIDE SURFACES OF PRECAST MANHOLES SHALL BE COATED WITH A DRY FILM THICKNESS OF NOT LESS THAN EIGHT (8) MILS OF TNEPEC SERIES 69 HI-BUILD EPOXOLINE II, OR APPROVED EQUAL.
- MINIMUM DEPTH OF MANHOLE TO BE 6'-0".

MH WALL SECTION
O-RING SEAL
PIPE OD
REINFORCING WIRE PER ASTM C-478
#4 BARS 8" O.C. BOTH WAYS
2" SLOPE TO TROUGH
INVERT AND BENCH
2 FT MIN. BASE HEIGHT SECTION
6" CRUSHED ROCK FOUNDATION
UNDISTURBED EARTH
"ALOK" GASKET SYSTEM FOR PIPE PENETRATION

SANITARY SEWER STANDARD DETAIL

1. MANHOLES SHALL BE CONSTRUCTED AS SPECIFIED IN ASTM C-478

2. THE MINIMUM WALL THICKNESS IS SPECIFIED IN THE FOLLOWING TABLE AND SHALL NOT BE LESS THAN ONE-TWELFTH (1/12) OF THE INTERNAL DIAMETER OF THE LARGEST CONE OR RISER OF FIVE-INCHES (5") WHICHEVER IS GREATER.

MANHOLE INTERNAL DIAMETER (FEET)	MINIMUM WALL THICKNESS (INCHES)
4	5
5	5
6	6
7	7
8	8

3. MINIMUM DEPTH OF MANHOLE TO BE 6'-0".

4. ALL LIFTING HOLES PROVIDED IN EACH SECTION SHALL BE REPAIRED WITH A MIXTURE OF CEMENT & SAND GROUT FIRMLY PACKED INTO ENTIRE ORIFICE.

5. ALL INSIDE SURFACES OF PRECAST MANHOLES SHALL BE COATED WITH A DRY FILM THICKNESS OF NOT LESS THAN EIGHT (8) MILS OF TNEPEC SERIES 69 HI-BUILD EPOXOLINE II, OR APPROVED EQUAL.

6. WHEN DIRECTED BY THE ENGINEER, A SET OF THREE (3) CYLINDERS, THREE-INCHES (3") IN DIAMETER SHALL BE CUT FROM RANDOMLY SELECTED MANHOLES AND TESTED FOR COMPRESSIVE STRENGTH.

7. ACCEPTANCE OF THE MANHOLE STRUCTURE SHALL BE BASED ON THE CONFORMANCE AND PERFORMANCE OF MATERIALS REQUIRED IN ASTM C-478 AND THE ENGINEER'S INSPECTION OF THE INSTALLED PRODUCT.

BRICK MASONRY OR PRECAST RING (MORTARED)
STANDARD RING & LID
LIFTING HOLES
2 FT. - 6"
4'-0"
REINFORCING WIRE PER ASTM C-478
RUBBER O-RING GASKET MATERIAL
CONCENTRIC CONE
ECCENTRIC CONE

03/13/14 DATE: ERIC J. WENGER, P.E., CITY ENGINEER
APPROVED BY: MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR
DATE: 3/14/14
S-12

03/13/14 DATE: ERIC J. WENGER, P.E., CITY ENGINEER
APPROVED BY: MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR
DATE: 3/14/14
S-13

03/13/14 DATE: ERIC J. WENGER, P.E., CITY ENGINEER
APPROVED BY: MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR
DATE: 3/14/14
S-14

03/13/14 DATE: ERIC J. WENGER, P.E., CITY ENGINEER
APPROVED BY: MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR
DATE: 3/14/14
S-15

PLOTTED: Friday, March 28, 2014 3:10:47 PM
FILE PATH: Z:\STANDARD DETAILS & WATER METER SPECIFICATIONS\UPDATED STANDARD DETAILS 2014\SEWERWORKING\SAN-SEW-STNDS-2014-SIGNED.DWG

PLOTTED: Friday, March 28, 2014 3:10:52 PM
 FILE PATH: Z:\STANDARD DETAILS & WATER METER SPECIFICATIONS\UPDATED STANDARD DETAILS 2014\SEWERWORKING\SAN-SEW-STDNS-2014-SIGNED.DWG

SANITARY SEWER STANDARD DETAIL

- MANHOLES SHALL BE CONSTRUCTED AS SPECIFIED IN ASTM C-478
- THE MINIMUM WALL THICKNESS IS SPECIFIED IN THE FOLLOWING TABLE AND SHALL NOT BE LESS THAN ONE-TWELTH ($\frac{1}{12}$) OF THE INTERNAL DIAMETER OF THE LARGEST CONE OR RISER OR FIVE-INCHES (5") WHICHEVER IS GREATER.

MANHOLE INTERNAL DIAMETER (FEET)	MINIMUM WALL THICKNESS (INCHES)
4	5
5	5
6	6
7	7
8	8

- ALL LIFTING HOLES PROVIDED IN EACH SECTION SHALL BE REPAIRED WITH A MIXTURE OF CEMENT AND SAND GROUT FIRMLY PACKED INTO ENTIRE ORIFICE.
- ALL INSIDE SURFACES OF PRECAST MANHOLES SHALL BE COATED WITH A DRY FILM THICKNESS OF NOT LESS THAN EIGHT (8) MILS OF TNE MEC SERIES 69 HI-BUILD EPOXOLINE II, OR APPROVED EQUAL.
- WHEN DIRECTED BY THE ENGINEER, A SET OF THREE (3) CYLINDERS, THREE-INCHES (3") IN DIAMETER SHALL BE CUT FROM RANDOMLY SELECTED MANHOLES AND TESTED FOR COMPRESSIVE STRENGTH.
- ACCEPTANCE OF THE MANHOLE STRUCTURE SHALL BE BASED ON THE CONFORMANCE AND PERFORMANCE OF MATERIALS REQUIRED IN ASTM C-478 AND THE ENGINEER'S INSPECTION OF THE INSTALLED PRODUCT.

PRECAST MANHOLE WALL DETAIL

APPROVED BY: *Eric J. Wenger* DATE: 3/14/14
 APPROVED BY: *Marsha W. Slaughter* DATE: 3/14/14
 OKLAHOMA CITY UTILITIES DEPARTMENT S-16

SANITARY SEWER STANDARD DETAIL

- MANHOLE TOPS SHALL BE CONSTRUCTED IN ACCORDANCE WITH ASTM C-478 LIFTING HOOKS SHALL BE CONSTRUCTED AS PER MANUFACTURERS RECOMMENDATION.
- ALL INSIDE SURFACES OF PRECAST FLAT TOP SHALL BE COATED WITH A DRY FILM THICKNESS OF NOT LESS THAN EIGHT (8) MILS OF TNE MEC 69 HI-BUILD EPOXOLINE II, OR APPROVED EQUAL.
- WHEN DIRECTED BY THE ENGINEER, A SET OF THREE (3) CYLINDERS, THREE-INCHES (3") IN DIAMETER SHALL BE CUT FROM RANDOMLY SELECTED MANHOLE TOPS AND TESTED FOR A MINIMUM COMPRESSIVE STRENGTH OF 4000 PSI.
- ACCEPTANCE OF THE MANHOLE TOP STRUCTURE SHALL BE BASED ON THE CONFORMANCE AND PERFORMANCE OF MATERIALS REQUIRED IN ASTM C-478 AND THE ENGINEER'S INSPECTION OF THE INSTALLED PRODUCT.

PRECAST REINFORCED CONCRETE FLAT SLAB MANHOLE TOP

APPROVED BY: *Eric J. Wenger* DATE: 3/14/14
 APPROVED BY: *Marsha W. Slaughter* DATE: 3/14/14
 OKLAHOMA CITY UTILITIES DEPARTMENT S-17

SANITARY SEWER STANDARD DETAIL

CAST-IN-PLACE CONCRETE MANHOLE BASE SECTION

PIPE DIAMETER	"B"
8"	1'-8"
10"	1'-10"
12"	2'-1"
15"	2'-4"
18"	2'-8"
21"	3'-0"
24"	3'-3"

APPROVED BY: *Eric J. Wenger* DATE: 3/14/14
 APPROVED BY: *Marsha W. Slaughter* DATE: 3/14/14
 OKLAHOMA CITY UTILITIES DEPARTMENT S-18

SANITARY SEWER STANDARD DETAIL

NOTE:
 1. ALL PIPE CLAMPS SHALL BE STAINLESS STEEL
 2. NEOPRENE EPDM BLENDED COMPOUND BOOT SHALL MEET ASTM C-923

SUGGESTED PIPE O.D. RANGE (IN.)	HOLE & BOOT DIAMETER DIMENSIONS			
	A	B	C	D
3 1/2" - 4 1/2"	7"	6 1/2"	4 1/2"	6"
5 1/4" - 7"	12"	10 1/4"	6 1/2"	8"
7" - 8 1/2"	12"	10 1/4"	8"	8"
8 1/2" - 9 1/2"	12"	10 1/4"	8 1/2"	8"
9 1/2" - 11"	16"	14 1/4"	10 1/2"	8"
10 1/2" - 12"	16"	14 1/4"	12"	8"
12" - 13 1/2"	16"	14 1/4"	13 1/2"	8"
14 1/2" - 16 1/2"	20"	18 1/4"	15 1/2"	8"
15 1/2" - 17 1/2"	20"	18 1/4"	17"	8"
18 1/2" - 21 1/2"	24"	22 1/4"	20 1/2"	8"

MANHOLE PIPE CONNECTION FOR CAST IN PLACE MANHOLES

APPROVED BY: *Eric J. Wenger* DATE: 3/14/14
 APPROVED BY: *Marsha W. Slaughter* DATE: 3/14/14
 OKLAHOMA CITY UTILITIES DEPARTMENT S-19

SANITARY SEWER STANDARD DETAIL

- GENERAL -- Cast iron rings, tops, covers, grating and all cast iron fitting shall be sound, true to form and thickness, and neatly finished and shall fit together in a satisfactory manner. Castings shall be clean, uniform and whole without blow or sand holes, deposit, hard spots, shrinkage distortion or any other surface defects which would impair serviceability. Casting surfaces shall be smooth and well-cleaned by shot blasting or other approved cleaning method. Plugging or filling holes or other defects shall not be permitted. Parting fins and pouring gates shall be removed. Sharp edges resulting from fabrication shall be dulled by acceptable method to ensure safety in handling. Casting shall conform to the requirements of the Standard Specification for Grey Iron Fittings ASTM A-48, Class "30 B" for rings and "35 B" for covers and the approved Standard Details for Manhole Rings and Covers.
- ALL RINGS AND COVERS SHALL BE ACCURATELY AND CAREFULLY PLACED. ALL RINGS SHALL BE BEADED IN A SUBSTANTIAL LAYER OF MORTAR, SHALL HAVE A FULL BEARING AND SHALL BE SET TO THE EXACT GRADE. UNLESS OTHERWISE SHOWN, TOP OF COVERS SHALL BE FLUSH WITH OR SLIGHTLY ABOVE THE SURROUNDING SURFACE. WHEN EACH COVER IS PLACED IN ANY POSITION ON THE RING, THE SIDE PLAY SHALL NOT EXCEED ONE-EIGHTH (1/8") INCH IN ANY DIRECTION.
- RINGS -- Rings may be manufactured in accordance with the Standard Detail for Reversible Manhole Rings.
- COVERS --
 - GENERAL -- Manhole covers may be manufactured in accordance with the appropriate Standard Details for Vented or Non-Vented Covers.
 - COATING -- When called for on the plans or specified, the underside of all manhole covers shall be given one (1) coat of asphalt varnish after visual inspection and approval on the job site.
 - APPLICATION -- All lids (covers) in street right-of-way shall be non-vented and include rainguard inflow protectors.
- CASTING WEIGHTS -- The minimum weight of casting will be not less than shown below:

Ring Only	200 LBS
Cover Only	150 LBS
Totals	350 LBS

MANHOLE LID / RING GENERAL NOTES

APPROVED BY: *Eric J. Wenger* DATE: 3/14/14
 APPROVED BY: *Marsha W. Slaughter* DATE: 3/14/14
 OKLAHOMA CITY UTILITIES DEPARTMENT S-20

SANITARY SEWER STANDARD DETAIL

REVERSIBLE MANHOLE RING

APPROVED BY: *Eric J. Wenger* DATE: 3/14/14
 APPROVED BY: *Marsha W. Slaughter* DATE: 3/14/14
 OKLAHOMA CITY UTILITIES DEPARTMENT S-21

SANITARY SEWER STANDARD DETAIL

VENTED MANHOLE COVER

APPROVED BY: *Eric J. Wenger* DATE: 3/14/14
 APPROVED BY: *Marsha W. Slaughter* DATE: 3/14/14
 OKLAHOMA CITY UTILITIES DEPARTMENT S-22

SANITARY SEWER STANDARD DETAIL

VENTED MANHOLE COVER

APPROVED BY: *Eric J. Wenger* DATE: 3/14/14
 APPROVED BY: *Marsha W. Slaughter* DATE: 3/14/14
 OKLAHOMA CITY UTILITIES DEPARTMENT S-23

The City of Oklahoma City
 Utilities Department
 Engineering Division

NO.	DATE	DESCRIPTION

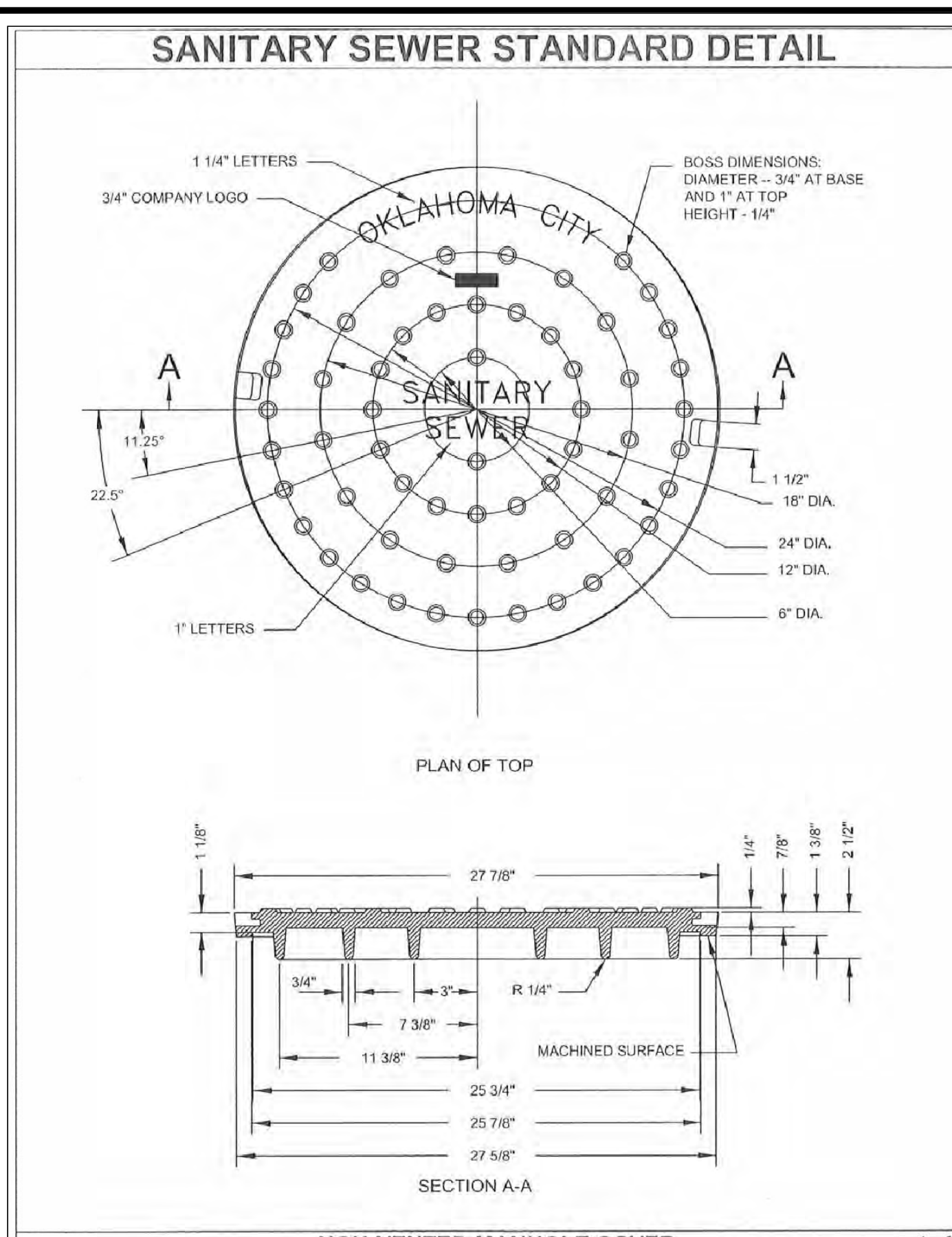
SANITARY SEWER STANDARD DETAILS

DATE: 03/14/14
 DRAWN BY: JDS
 CHECKED BY: MWS/EJW

SCALE: AS SHOWN

SHEET NUMBER: S-STD-03

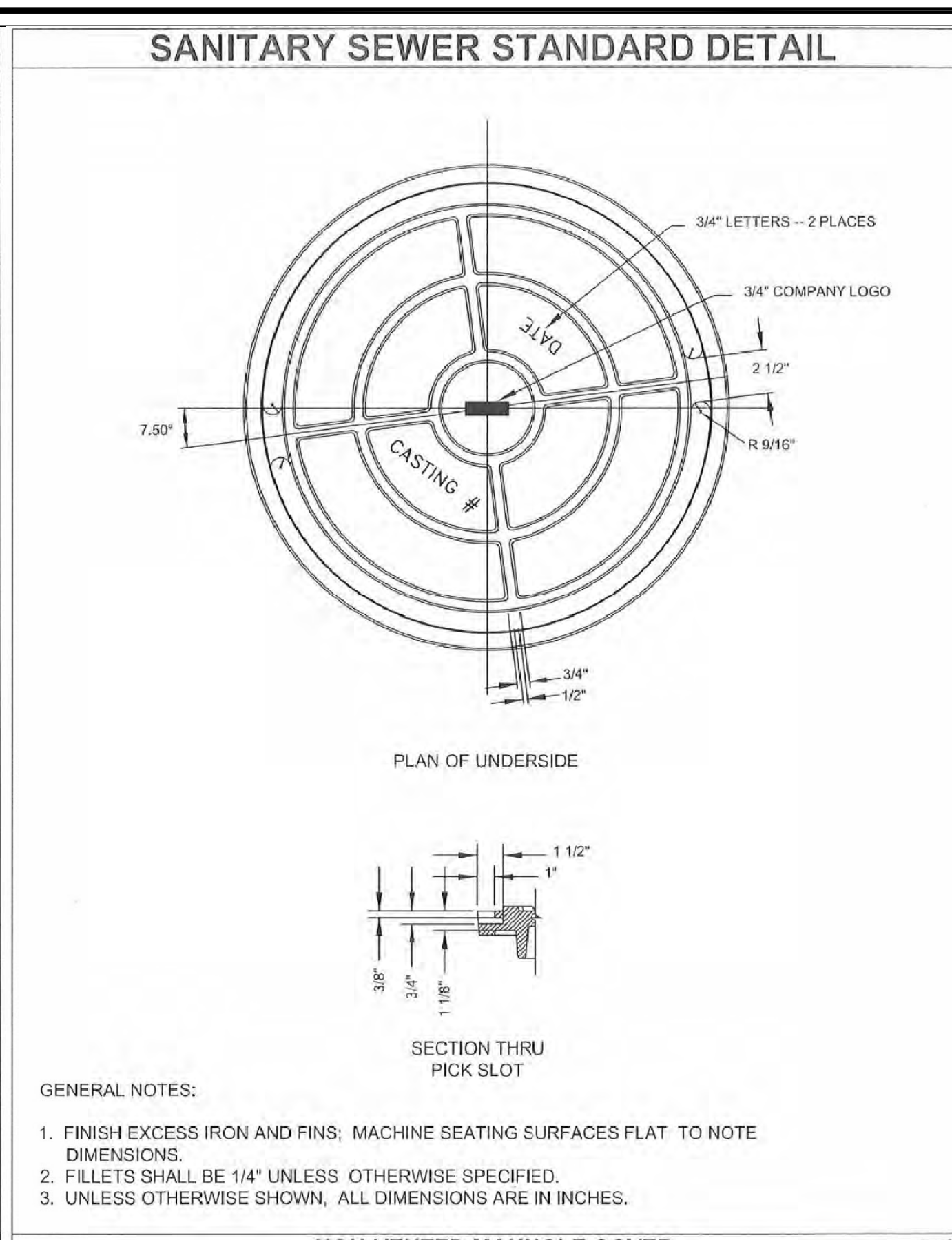
PLOTTED: Friday, March 28, 2014 3:10:57 PM
 FILE PATH: Z:\STANDARD DETAILS & WATER METER SPECIFICATIONS\UPDATED STANDARD DETAILS 2014\SEWERWORKING\SAN-SEW-STDNS-2014-SIGNED.DWG



NON-VENTED MANHOLE COVER 1 of 2

APPROVED BY: *[Signature]* DATE: 3/14/14
 ERIC J. WENGER, P.E., CITY ENGINEER MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR

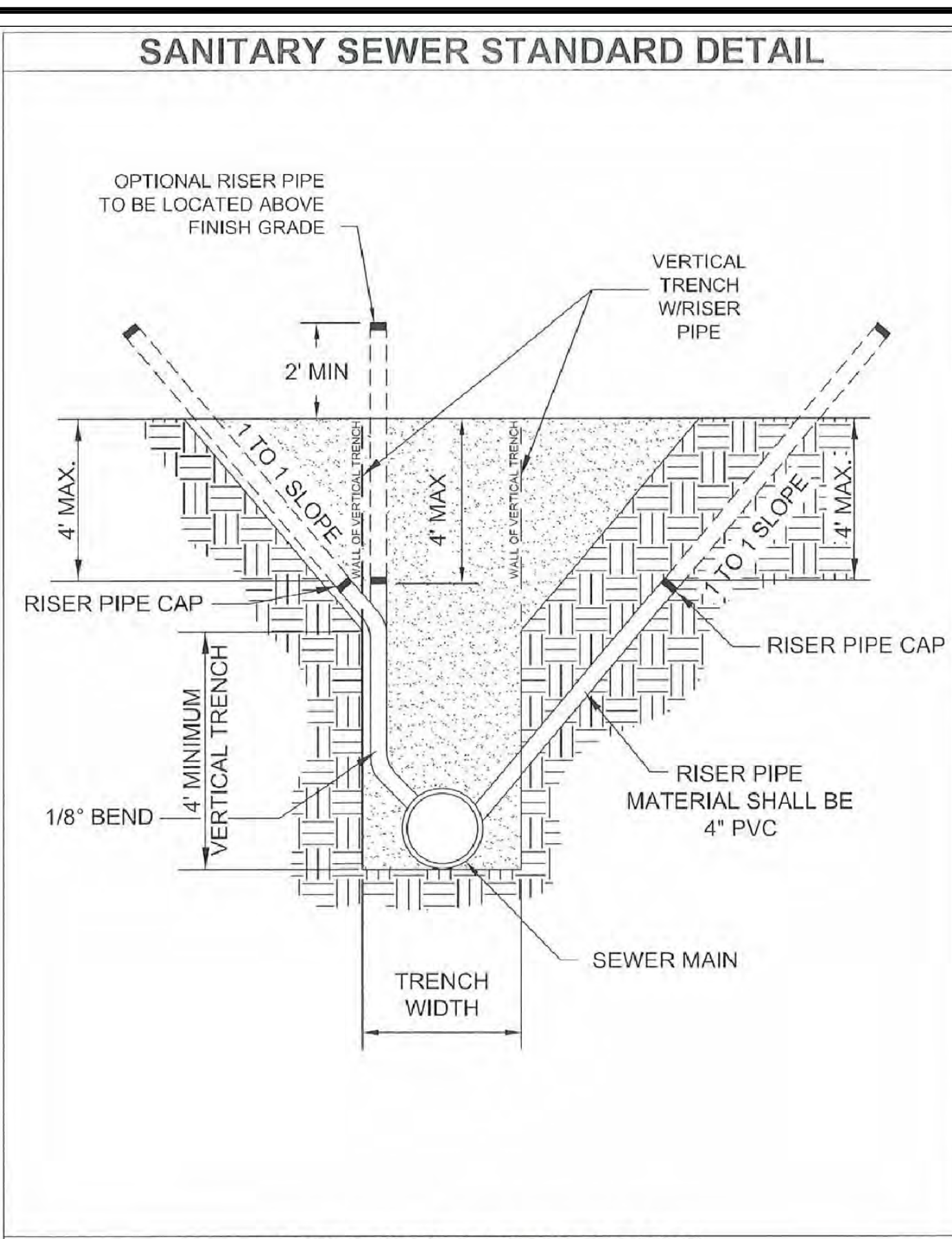
OKLAHOMA CITY UTILITIES DEPARTMENT



NON-VENTED MANHOLE COVER 2 of 2

APPROVED BY: *[Signature]* DATE: 3/14/14
 ERIC J. WENGER, P.E., CITY ENGINEER MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR

OKLAHOMA CITY UTILITIES DEPARTMENT



SERVICE CONNECTION INSTALLATION S-26

APPROVED BY: *[Signature]* DATE: 3/14/14
 ERIC J. WENGER, P.E., CITY ENGINEER MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR

OKLAHOMA CITY UTILITIES DEPARTMENT

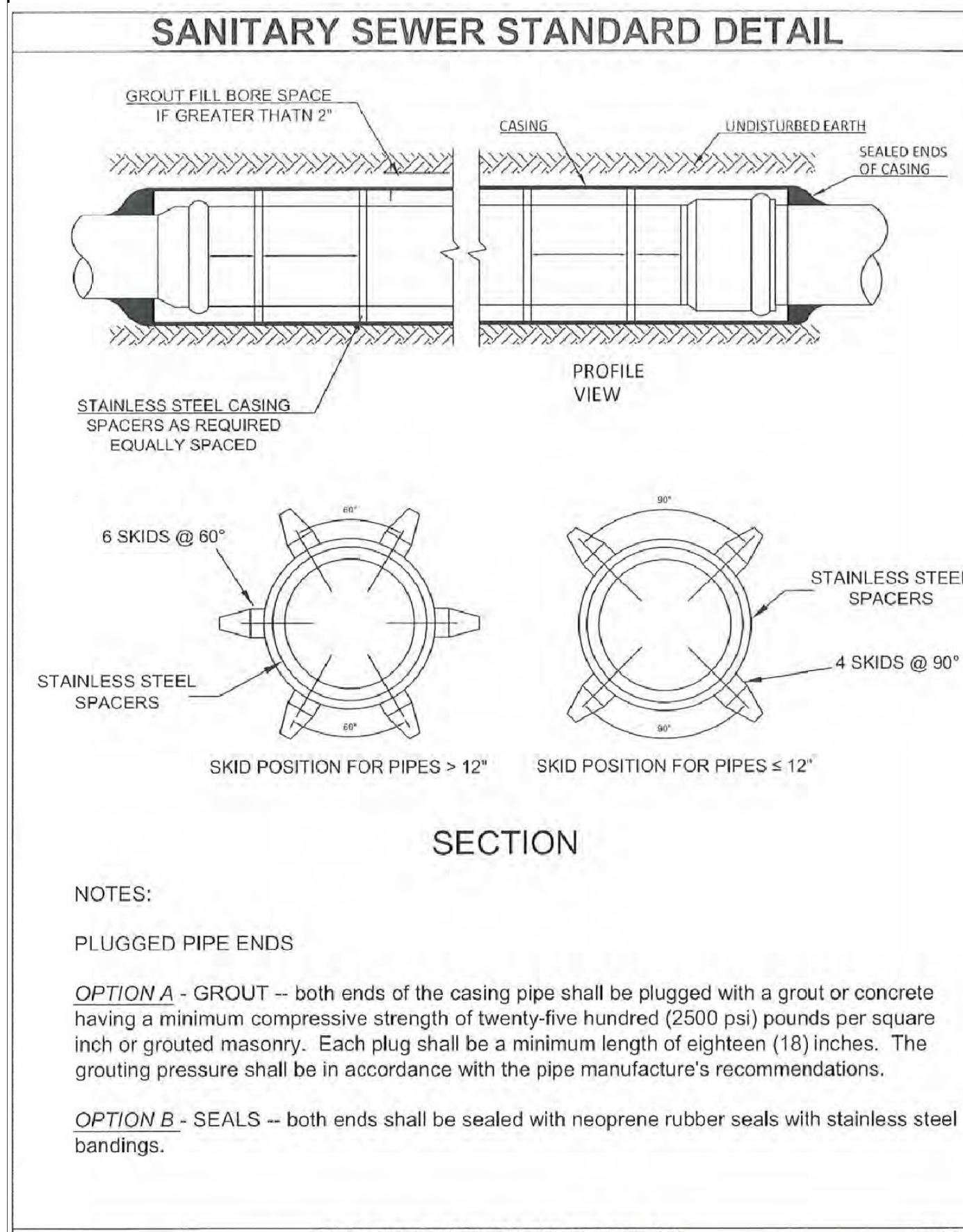
SANITARY SEWER STANDARD DETAIL

- EXTERNAL CONNECTIONS FOR NEW CONSTRUCTION
 - WYE BRANCHES -- For new construction there shall be installed wye branches of size and type shown on the plans with six (6") inch openings at locations shown on the plans or as described by the Engineer.
 - ELECTRO FUSION BONDED SADDLES -- For new construction using "Trenchless Construction" technology with HDPE pipe, service connections shall be installed with an electro fusion bonded saddle.
- EXTERNAL CONNECTION TO EXISTING MAIN -- Connections to existing main may be accomplished as follows:
 - SADDLES -- Connections may be made by excavating the existing main and cutting a hole using approved equipment and installing a saddle. Sewer service connections constructed with saddles shall include straps, a one-eighth (1/8") degree bend, and a closure piece. When existing main has been rehabilitated by trenchless method of construction, the saddle connection shall be made to the pipe/or liner.
 - TEES -- Connections may be made by removing a section of existing pipe and installing a wye branch. Fittings and closure assembly shall be used to make the connection and shall be supplied in a normal diameter or six (6") inches. The external connection shall be considered complete when backfilling and surface restoration is complete. Service connections constructed with wye branches shall include a one-eighth (1/8") degree bend, elbow, and when required, a closure piece.
- RISER
 - INSTALLATION -- The pipe may be installed in one of four ways shown on "Service Connection Details." Vertical installation is only approved if approved by the City Engineer.
 - SIZE AND MATERIAL -- The riser pipe shall be four inch (4") PVC.
- LOCATOR TAPE -- A locator tape, green in color stating "CAUTION -- SANITARY SEWER RISER BURIED BELOW" shall be attached to the sanitary sewer riser and extended to a minimum of two (2') feet above the ground, the tape shall be three (3") inch wide DuraTac as manufactured by THOR Enterprises, Inc., of Sun Prairie, Wisconsin or approved equal.

SERVICE CONNECTION INSTALLATION S-27

APPROVED BY: *[Signature]* DATE: 3/14/14
 ERIC J. WENGER, P.E., CITY ENGINEER MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR

OKLAHOMA CITY UTILITIES DEPARTMENT



BORE AND ENCASEMENT DETAIL 1 of 2

APPROVED BY: *[Signature]* DATE: 3/14/14
 ERIC J. WENGER, P.E., CITY ENGINEER MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR

OKLAHOMA CITY UTILITIES DEPARTMENT

SANITARY SEWER STANDARD DETAIL

2. CASING PIPE SIZE -- Steel casing pipe shall have the following suggested minimum diameters:

PIPE NOMINAL SIZE (inches)	SUGGESTED CASING PIPE INSIDE DIAMETER (inches)
4	6 to 10
6	10 to 12
8	14 to 16
10	16 to 18
12	18 to 20
15	20 to 22
18	24 to 26
24	31 to 33
27	33 to 36
30	36 to 42
36	42 to 48
42	54 to 60
48	60 to 66

3. CASING PIPE THICKNESS -- Steel casing pipe shall have the following minimum thickness(es), in inches, for the indicated maximum depth of cover(s), in feet or as required by the railroad at the time of construction:

OUTSIDE DIAMETER (INCHES)	UNDER HIGHWAY		UNDER RAILROAD	
	WALL THICKNESS (INCHES)	MAXIMUM COVER (FEET)	BNSF (UNCOATED) WALL THICKNESS (INCHES)	UNION PACIFIC WALL THICKNESS (INCHES)
≤ 12	0.1880	30	0.2500	0.2500
16	0.2500	30	0.3125	0.3125
18	0.2500	30	0.3125	0.3125
20	0.2500	30	0.3750	0.3750
24	0.2500	30	0.4375	0.4375
30	0.3220	30	0.5000	0.5000
36	0.3750	30	0.5625	0.5625
42	0.3750	25	0.5625	0.5625
48	0.4380	25	0.6250	0.6250
54	0.4380	25	OVER 48" MUST BE APPROVED BY BNSF RR	OVER 48" MUST BE APPROVED BY U.P.R.R.CO.
60	0.4380	25		
66	0.4380	20		

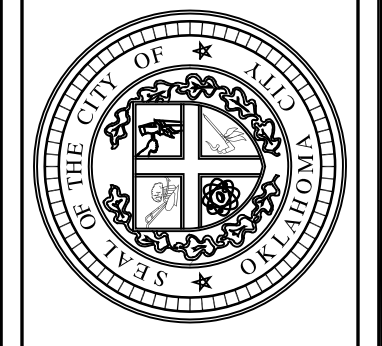
4. CASING MATERIAL -- Steel casing pipe shall conform with ASTM A-139, Standard Specification for Electric-Fusion (ARC)-Welded Steel Pipe (NPS4 and over). The steel material shall be new, smooth wall, carbon steel, Grade B, with a minimum tensile strength, and minimum thirty-five-thousand (35,000 psi) pounds per square inch yield strength.

BORE AND ENCASEMENT DETAIL 2 of 2

APPROVED BY: *[Signature]* DATE: 3/14/14
 ERIC J. WENGER, P.E., CITY ENGINEER MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR

OKLAHOMA CITY UTILITIES DEPARTMENT

The City of
Oklahoma City
 Utilities Department
 Engineering Division



NO.	DATE	DESCRIPTION

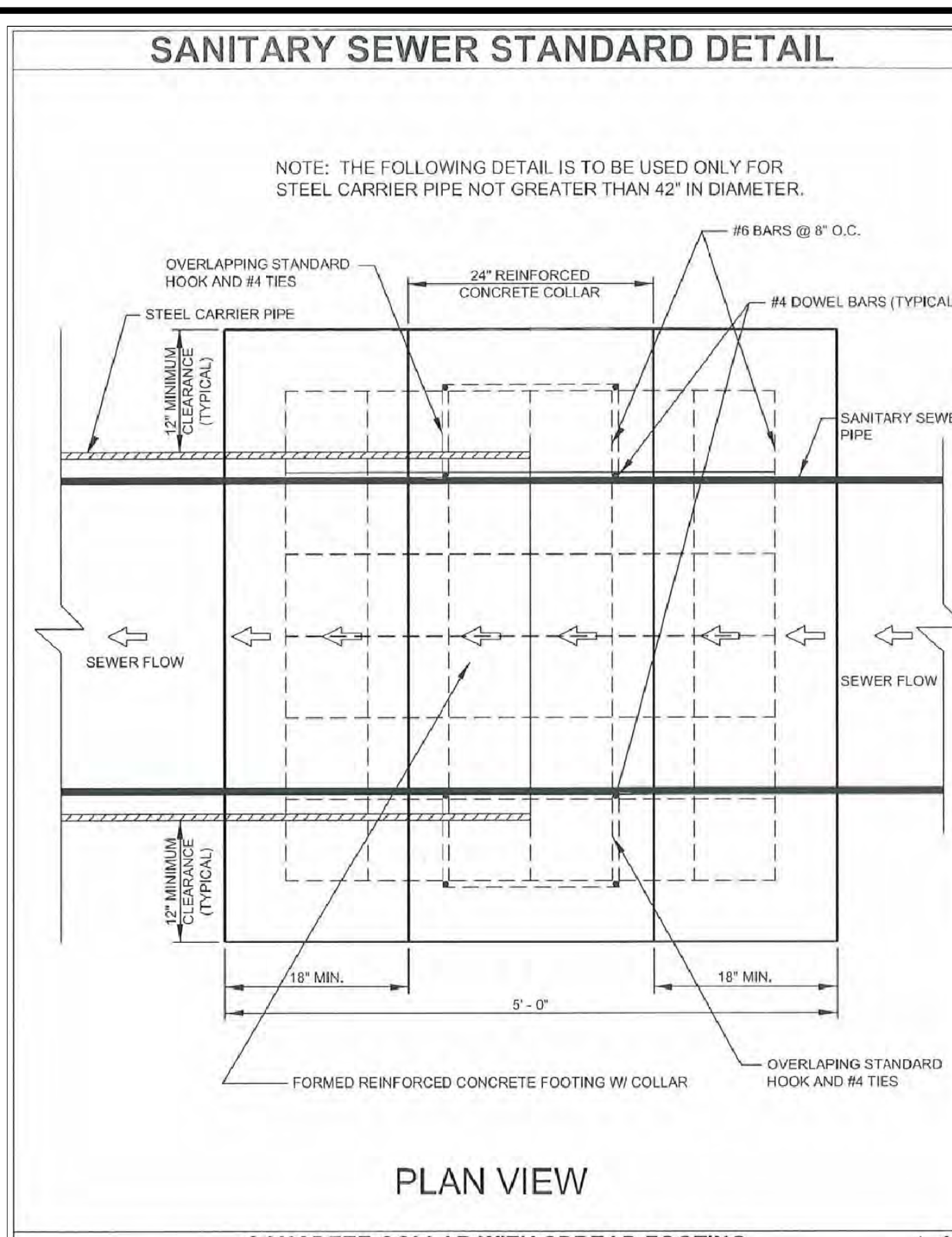
SANITARY SEWER STANDARD DETAILS

DATE: 03/14/14
 DRAWN BY: JDS
 CHECKED BY: MWS/EJW

SCALE:
 AS SHOWN

SHEET NUMBER
S-STD-04

PLOTTED: Friday, March 28, 2014 3:11:01 PM
 FILE PATH: Z:\STANDARD DETAILS & WATER METER SPECIFICATIONS\UPDATED STANDARD DETAILS 2014\SEWERWORKING\SAN-SEW-STNDS-2014-SIGNED.DWG

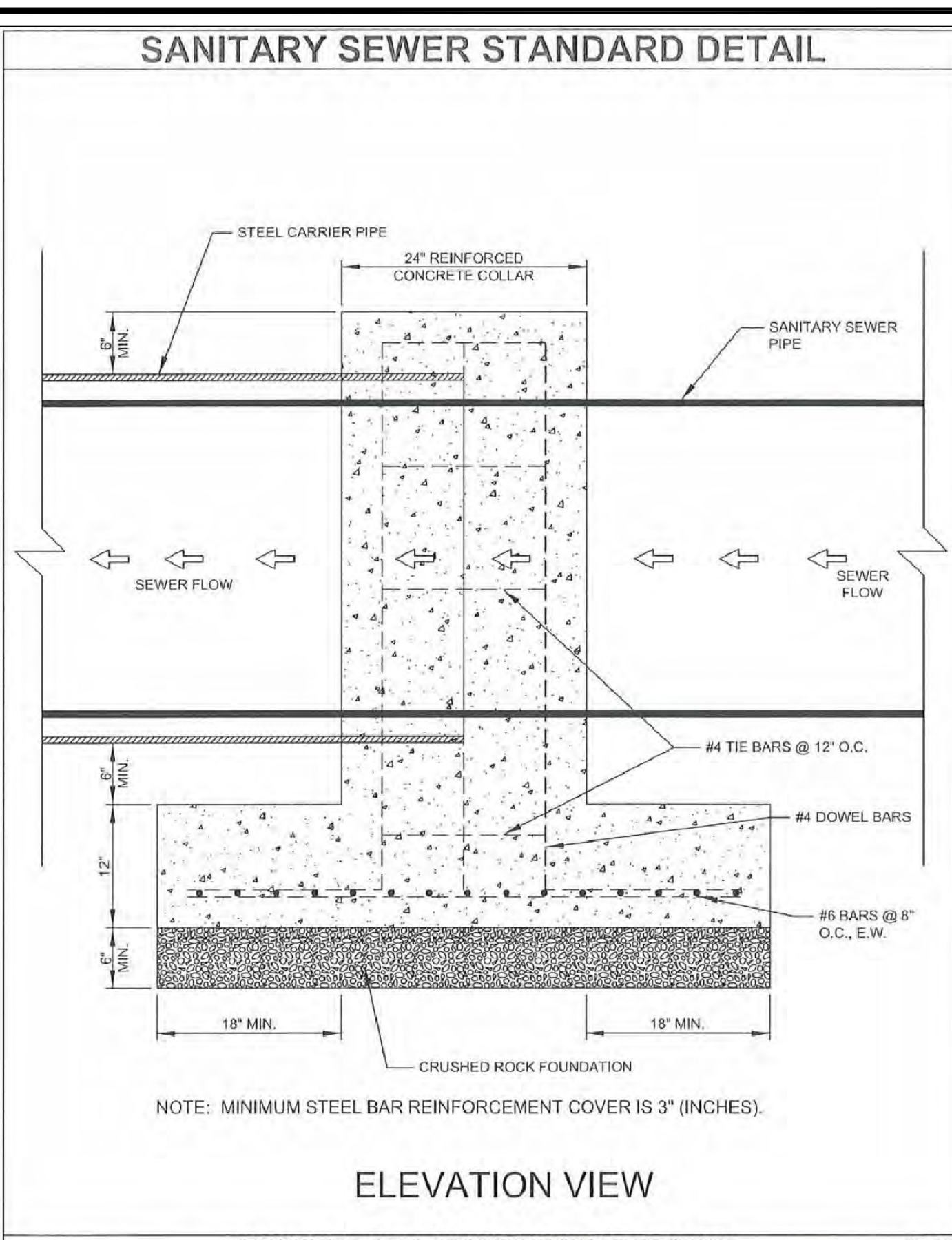


03/13/14 DATE: APPROVED BY: ERIC J. WENGER, P.E., CITY ENGINEER DATE: 3/14/14 DATE: 3/14/14 DATE: S-30

APPROVED BY: MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR

OKLAHOMA CITY UTILITIES DEPARTMENT

1 of 2

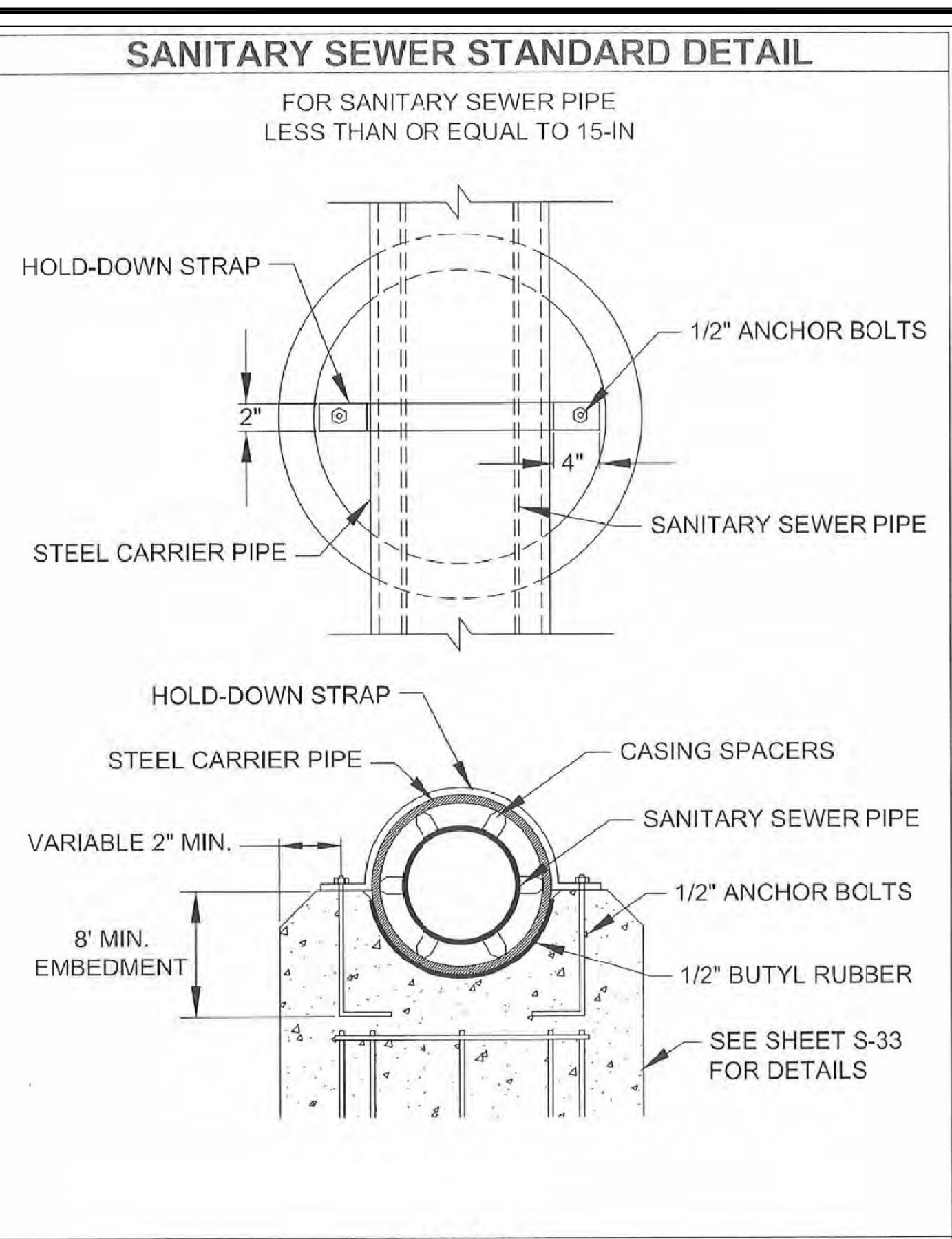


03/13/14 DATE: APPROVED BY: ERIC J. WENGER, P.E., CITY ENGINEER DATE: 3/14/14 DATE: 3/14/14 DATE: S-31

APPROVED BY: MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR

OKLAHOMA CITY UTILITIES DEPARTMENT

2 of 2

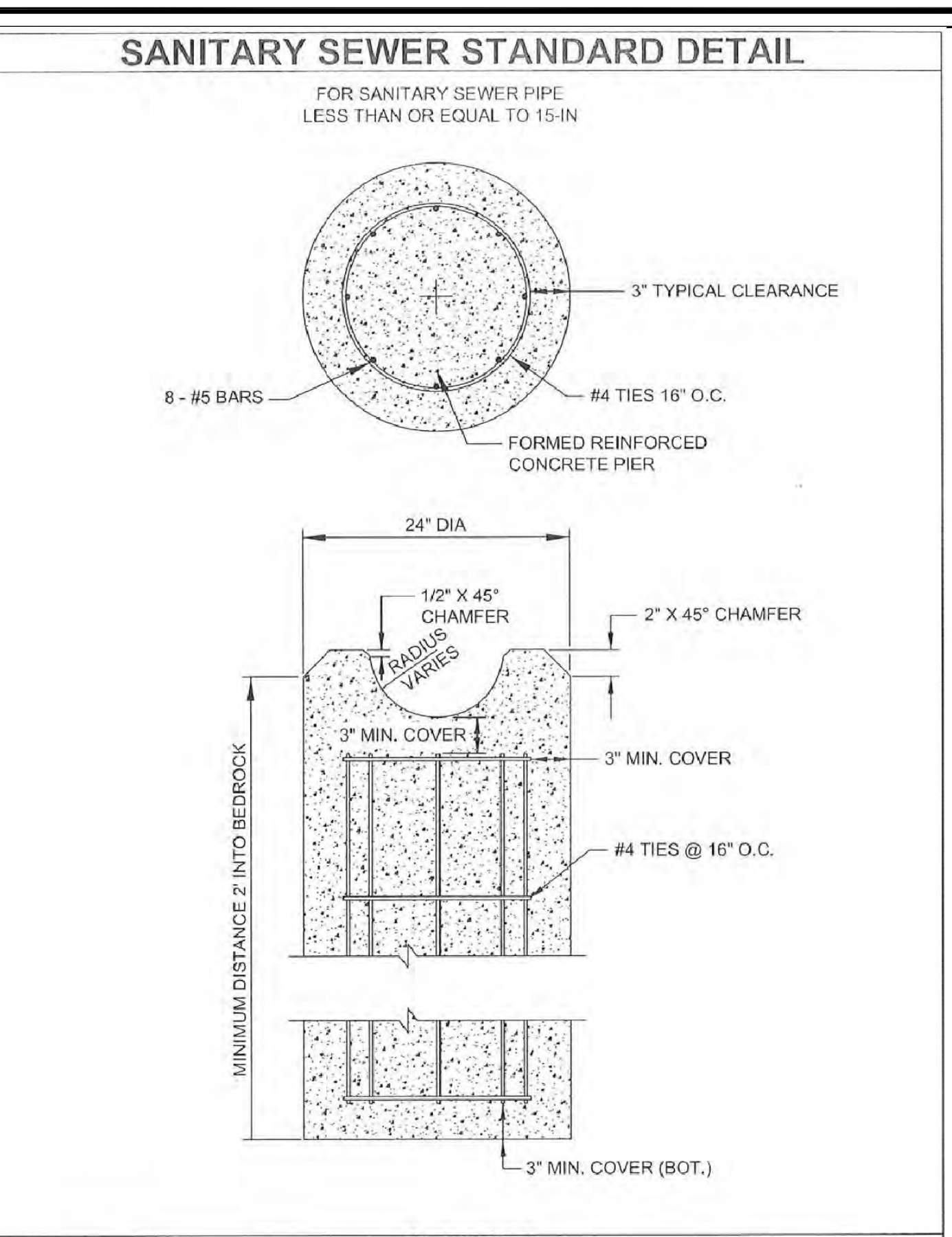


03/13/14 DATE: APPROVED BY: ERIC J. WENGER, P.E., CITY ENGINEER DATE: 3/14/14 DATE: 3/14/14 DATE: S-32

APPROVED BY: MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR

OKLAHOMA CITY UTILITIES DEPARTMENT

1 of 2

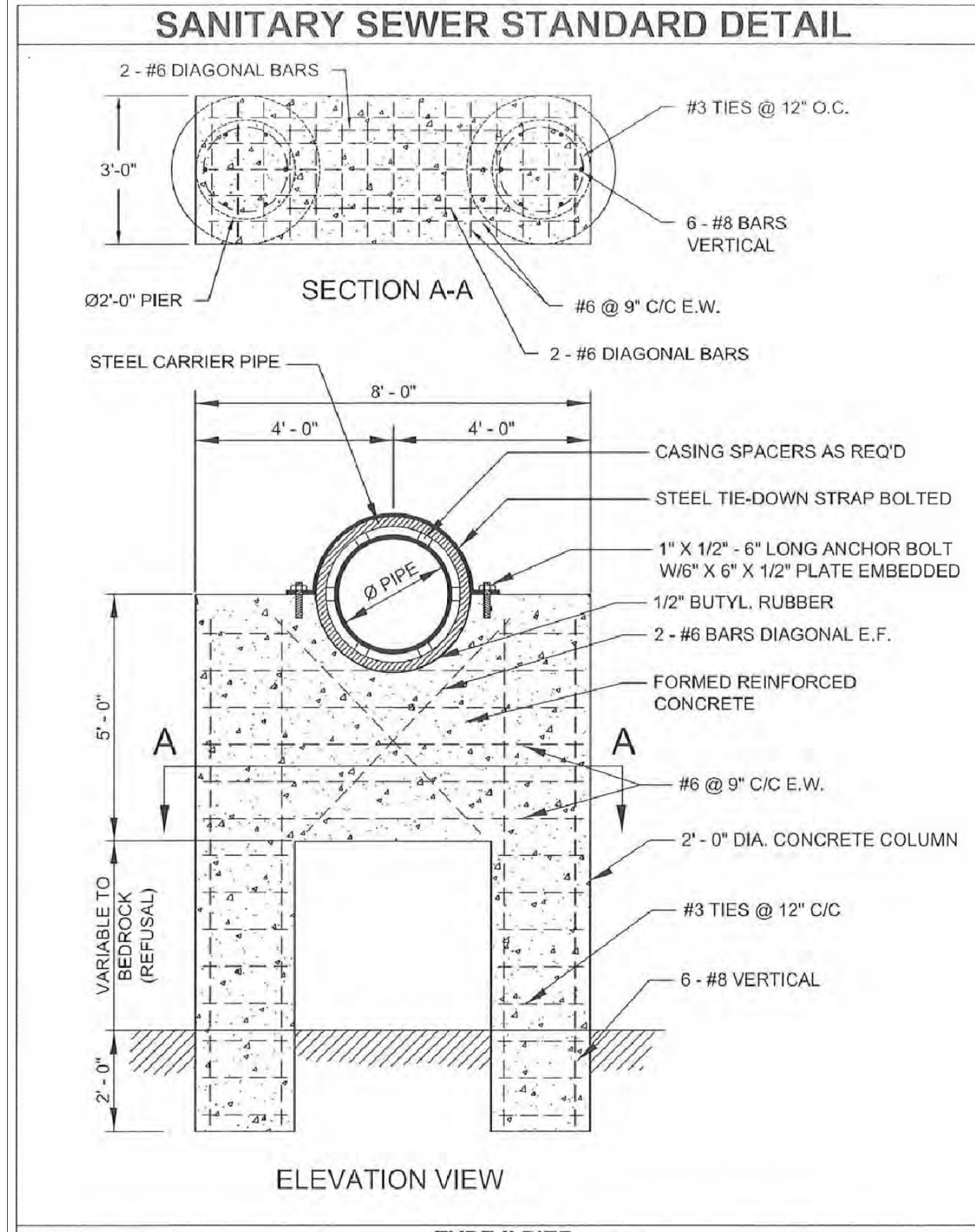


03/13/14 DATE: APPROVED BY: ERIC J. WENGER, P.E., CITY ENGINEER DATE: 3/14/14 DATE: 3/14/14 DATE: S-33

APPROVED BY: MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR

OKLAHOMA CITY UTILITIES DEPARTMENT

2 of 2



03/13/14 DATE: APPROVED BY: ERIC J. WENGER, P.E., CITY ENGINEER DATE: 3/14/14 DATE: 3/14/14 DATE: S-34

APPROVED BY: MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR

OKLAHOMA CITY UTILITIES DEPARTMENT

SANITARY SEWER STANDARD DETAIL

TABLE OF STEEL CARRIER PIPE SIZES

Nominal Size [in]	Wall Thickness [in]									
	3/16	1/4	5/16	3/8	7/16	1/2	5/8	3/4	7/8	1
Span Length - [ft]										
6	36	40	44							
8	38	42	45							
10	39	43	46							
12	40	44	47							
14	40	44	47							
16	41	45	48							
18	41	46	49	52						
20	42	46	50	53						
22	42	46	51	54						
24	42	48	52	55	58	60				
26	43	48	52	56	59	61				
28	43	48	53	56	59	62				
30	43	49	53	57	60	63				
32	44	49	54	57	61	64				
34	44	49	54	58	61	64				
36	44	50	54	58	62	65	70			
38	44	50	55	59	62	65	70			
40	44	50	55	59	63	66	71			
42	44	50	55	59	63	66	72			
45		51	55	60	63	67	72			
48		51	56	60	64	67	73	78		
51		51	56	60	64	68	74	79		
54		51	56	61	65	68	74	79		
57		51	57	61	65	69	75	80		
60		51	57	61	65	69	75	80		
63		52	57	62	66	69	76	81		
66		52	57	62	66	70	76	81	86	90
72		52	58	62	66	70	77	82	87	92

Reference: AWWA M11, 4th Edition, 2004, "Steel Pipe - A Guide for Design and Installation." - Table 7-1.

STEEL CARRIER PIPE SIZES MAXIMUM SPAN LENGTH

03/13/14 DATE: APPROVED BY: ERIC J. WENGER, P.E., CITY ENGINEER DATE: 3/14/14 DATE: 3/14/14 DATE: S-35

APPROVED BY: MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR

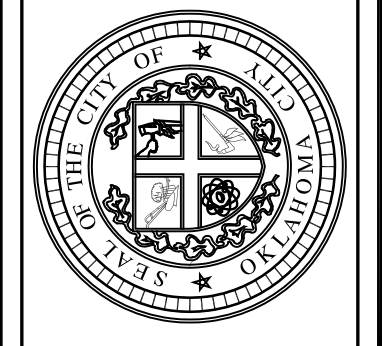
OKLAHOMA CITY UTILITIES DEPARTMENT

03/13/14 DATE: APPROVED BY: ERIC J. WENGER, P.E., CITY ENGINEER DATE: 3/14/14 DATE: 3/14/14 DATE: S-35

APPROVED BY: MARSHA W. SLAUGHTER, P.E., UTILITIES DIRECTOR

OKLAHOMA CITY UTILITIES DEPARTMENT

The City of
Oklahoma City
 Utilities Department
 Engineering Division



NO.	DATE	DESCRIPTION

SANITARY SEWER
 STANDARD DETAILS

DATE: 03/14/14
 DRAWN BY: JDS
 CHECKED BY: MWS/EJW

SCALE:
 AS SHOWN

SHEET NUMBER
S-STD-05