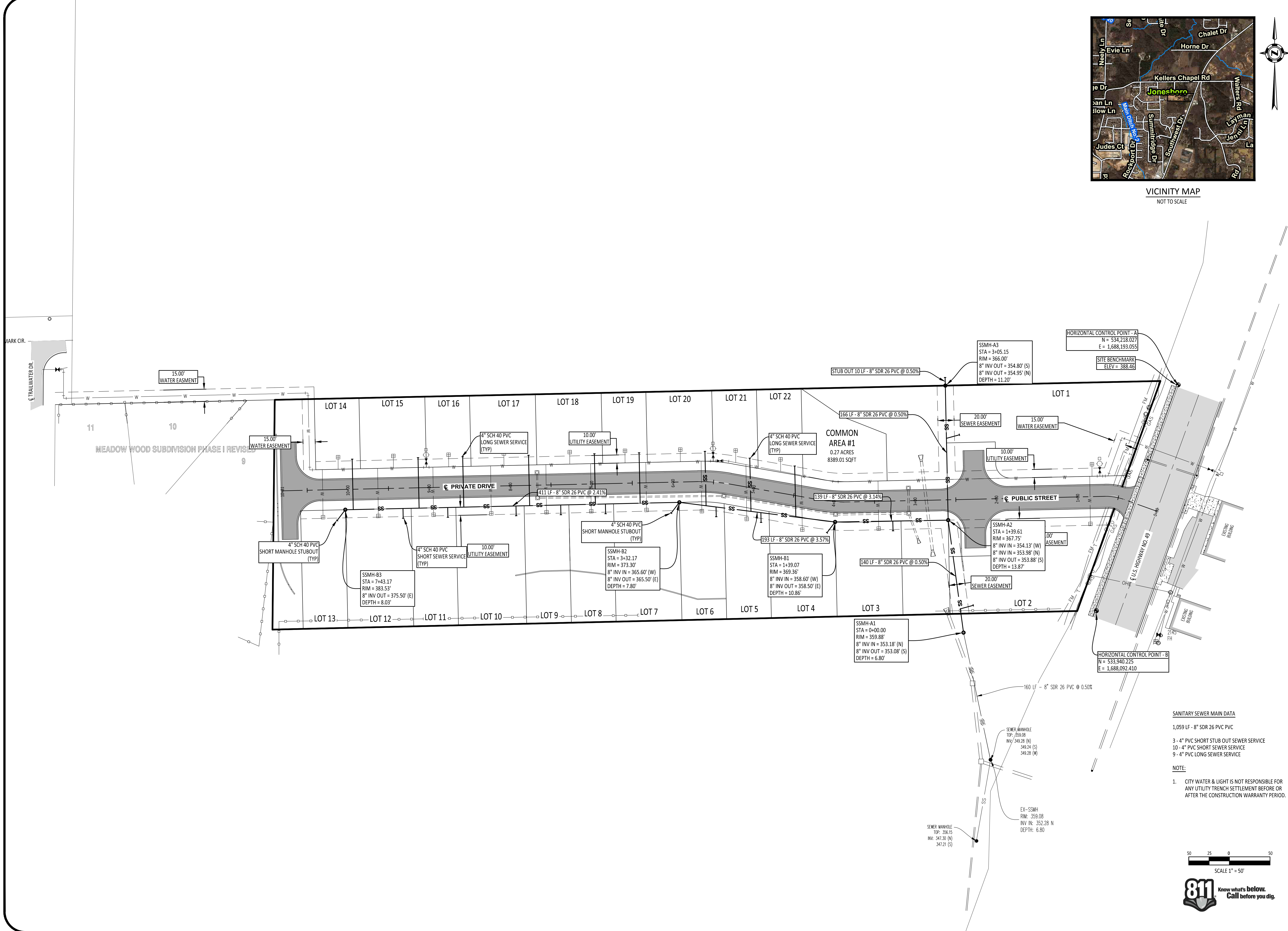
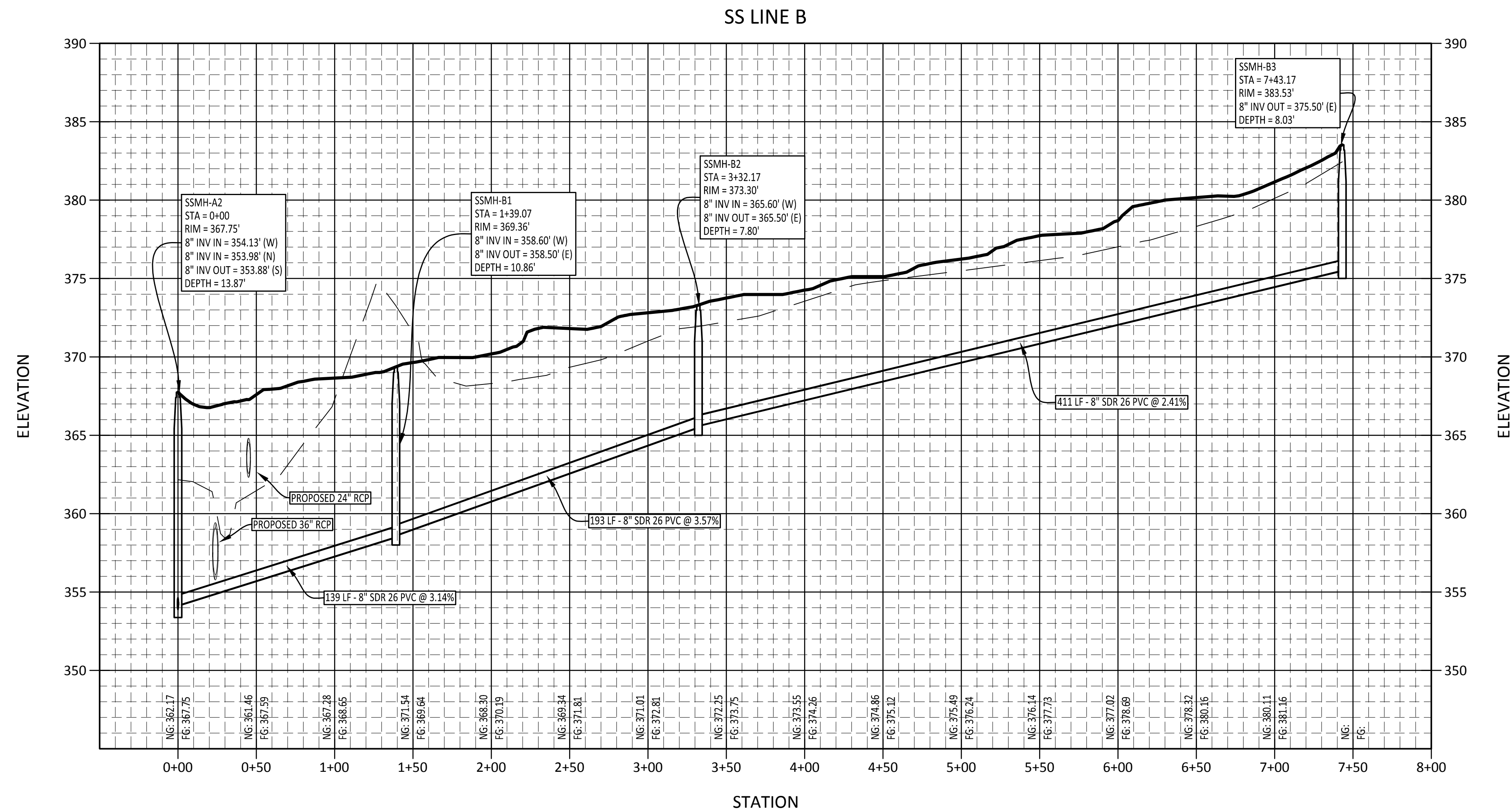
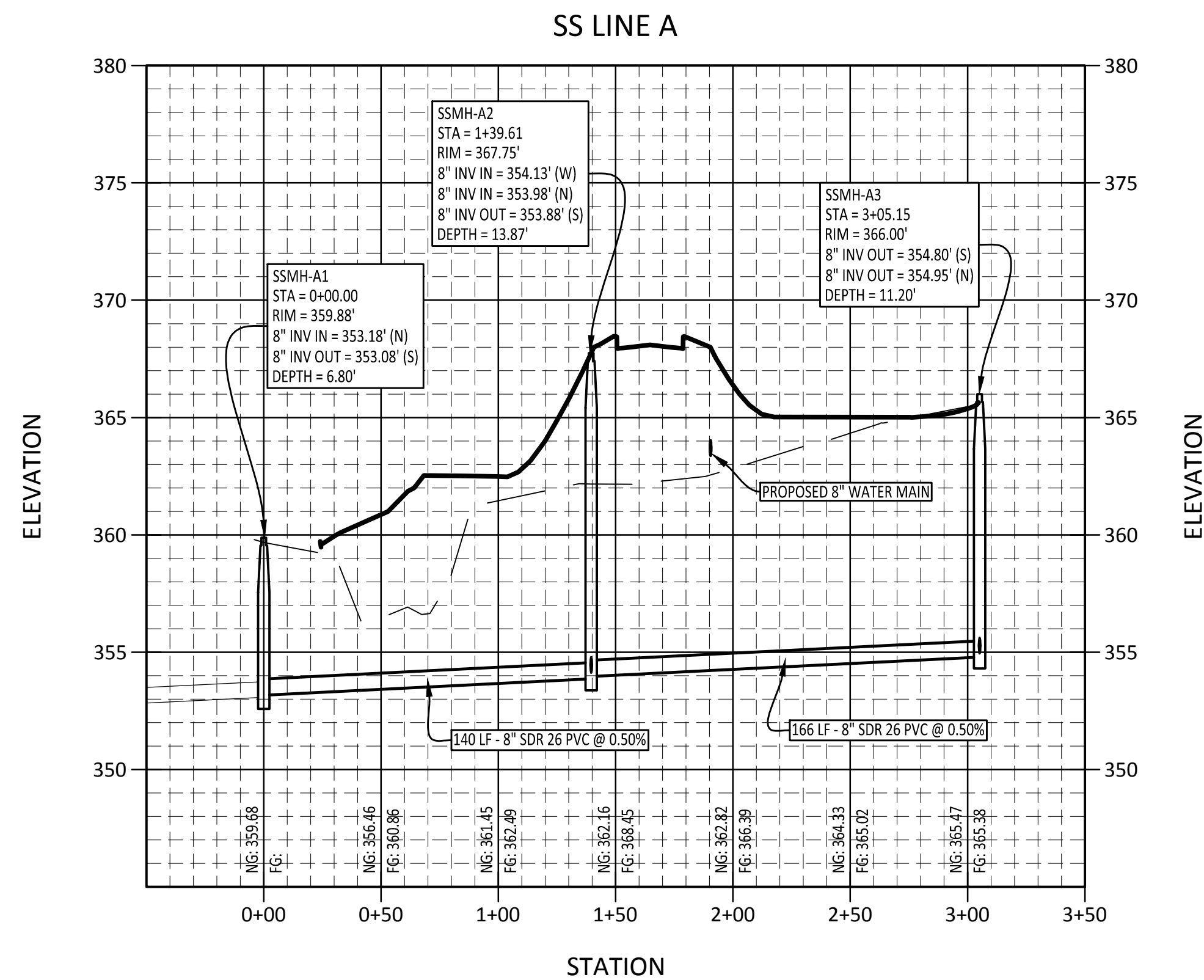
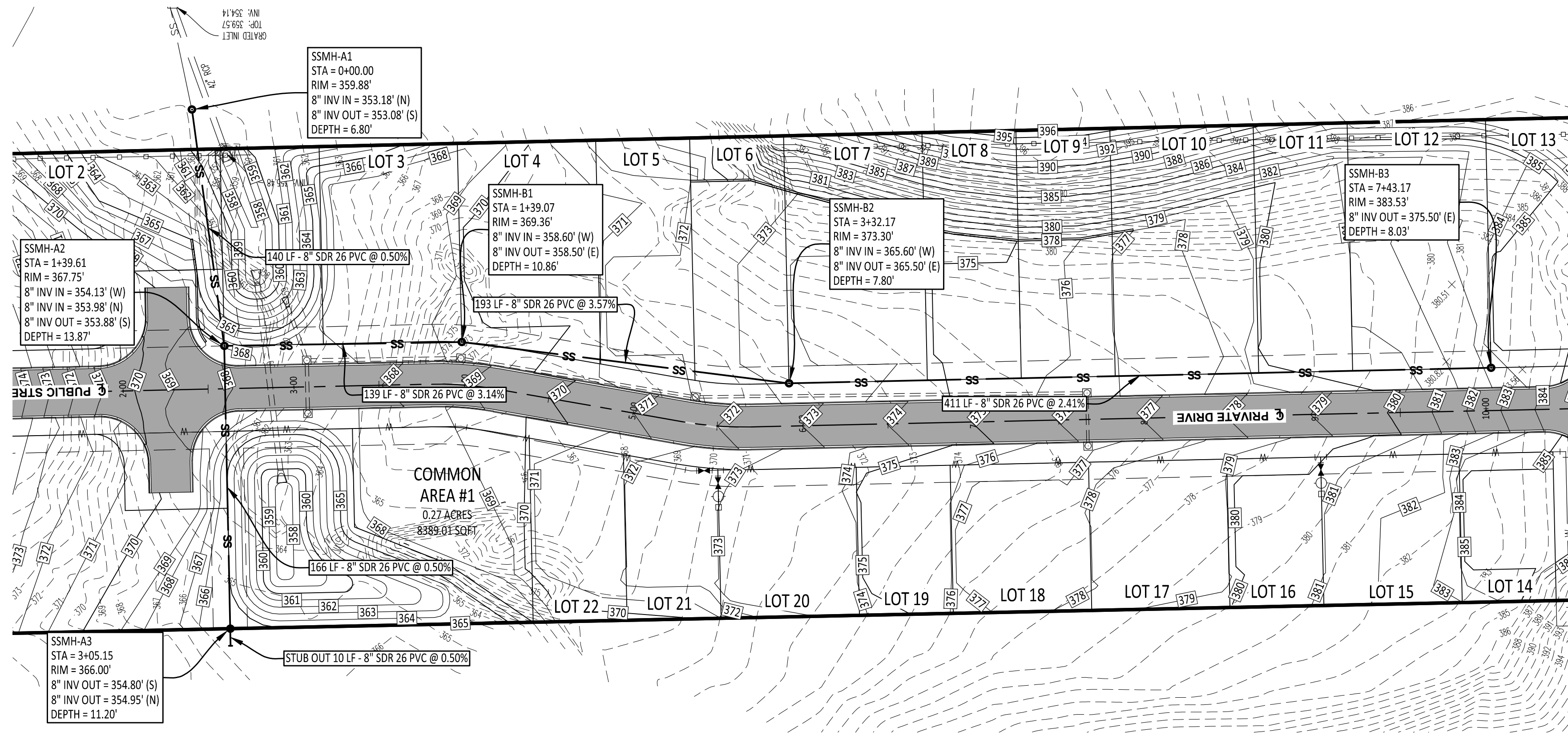
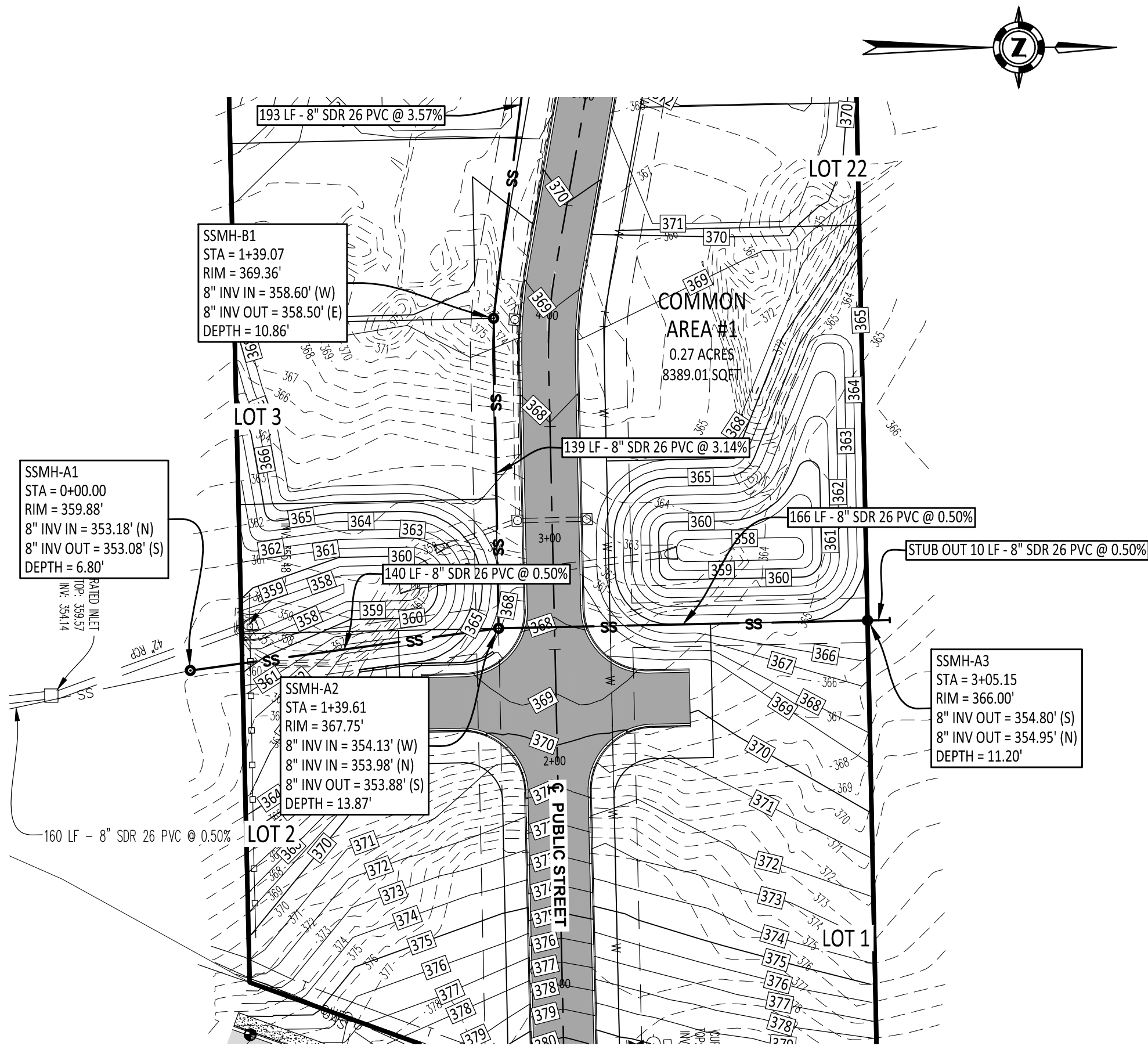






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ENGINEERING

PROJECT:
SIERRA HOLLOW

CLIENT:
SIERRA DEVELOPMENT, LLC

CERTIFICATE OF AUTHORITY
TRALAN
ENGINEERING,
INC.
No. 2480
ARKANSAS

REGISTERED
PROFESSIONAL
ENGINEER
No. 14026
MICHAEL A. BOSS
07/31/2019

REVISIONS		
DATE	BY	DESCRIPTION

DRAWING INFO.

DRAWN BY: MAB

DATE: 07/31/2019

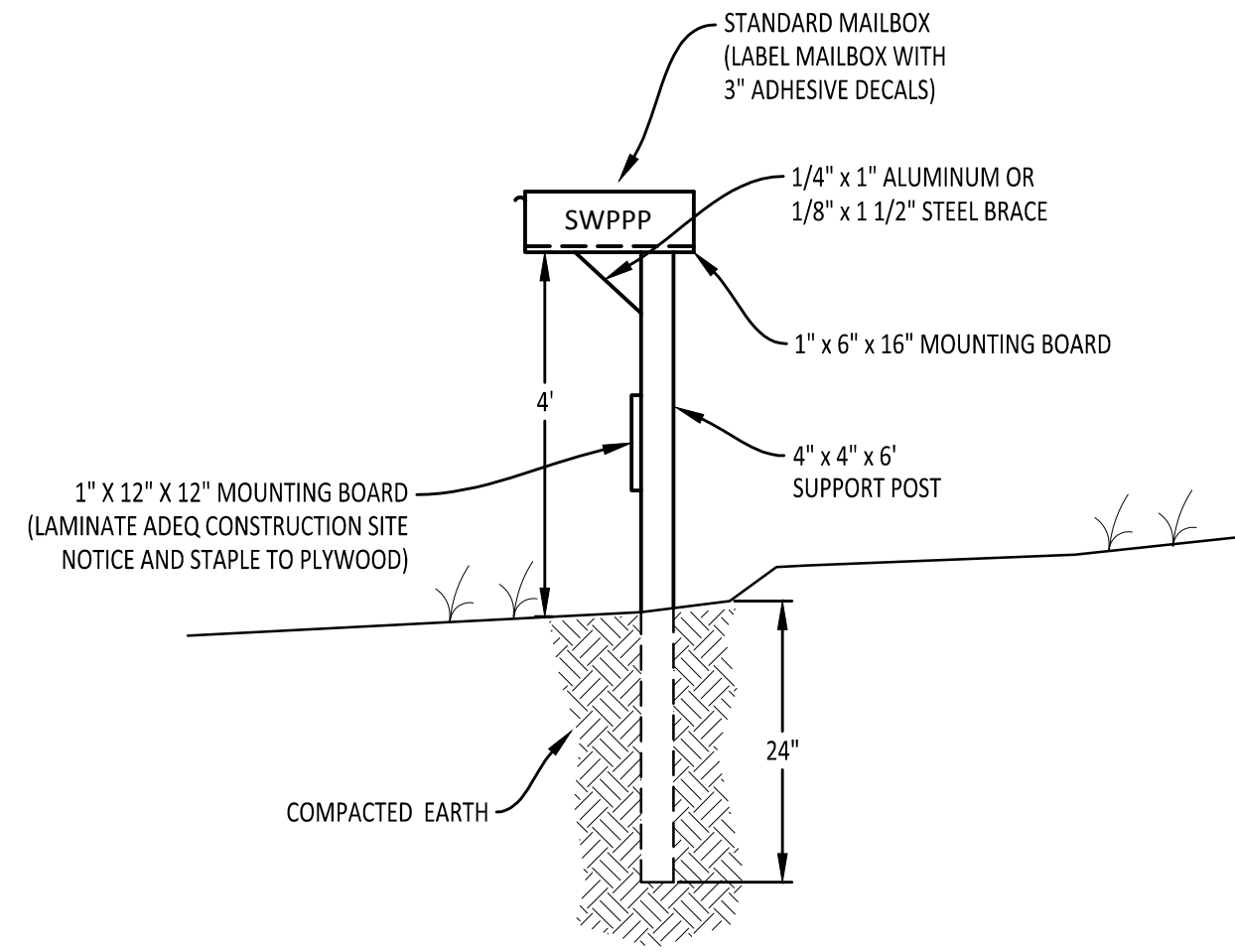
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JOB NO.: 19-036

CAD NO.:

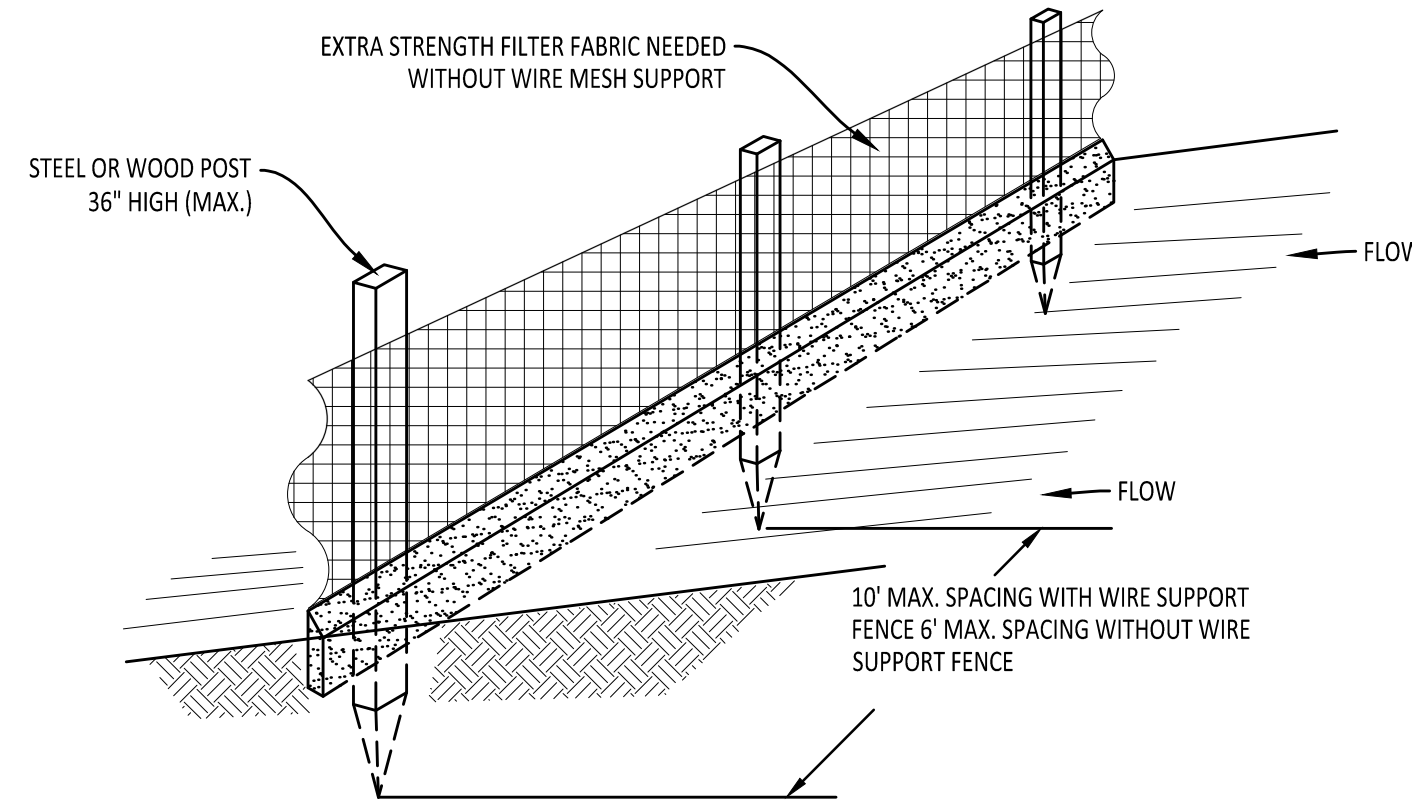
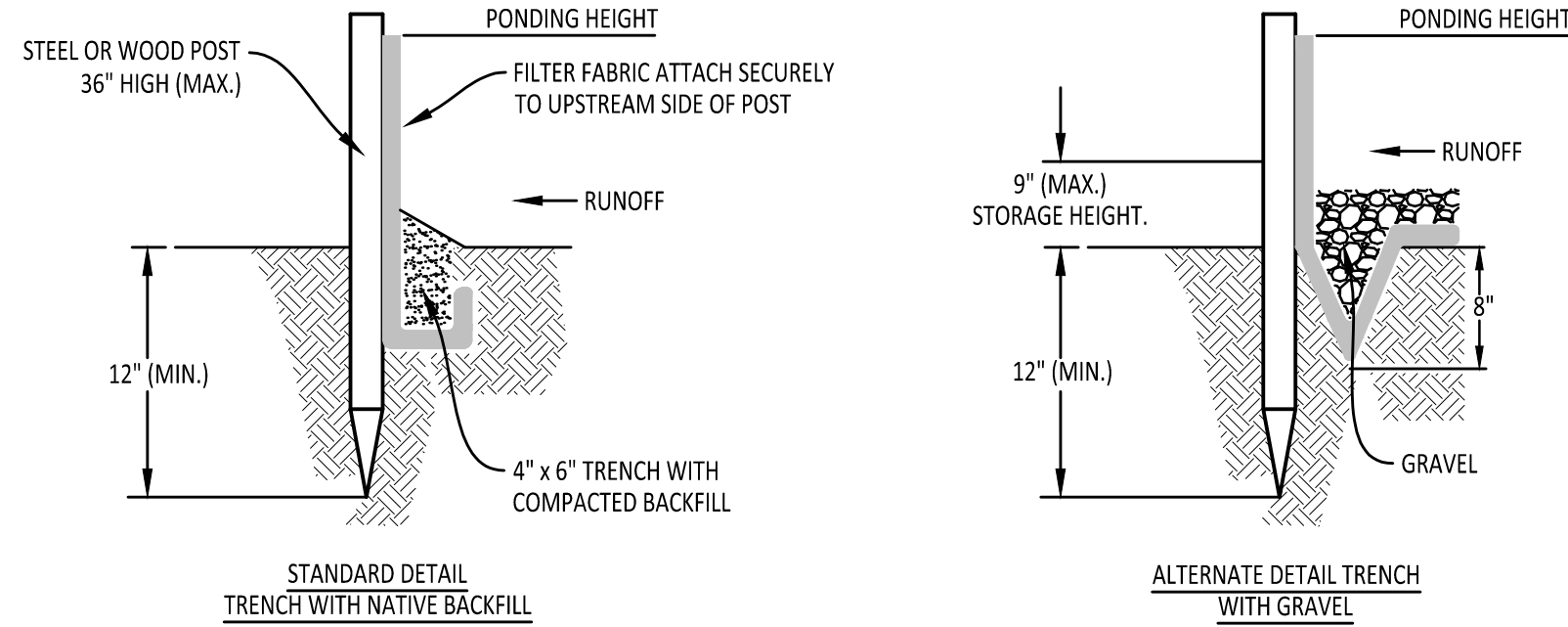
SANITARY SEWER
PLAN AND PROFILE

SHEET NUMBER:
10 of **15**



SWPPP MAILBOX

1

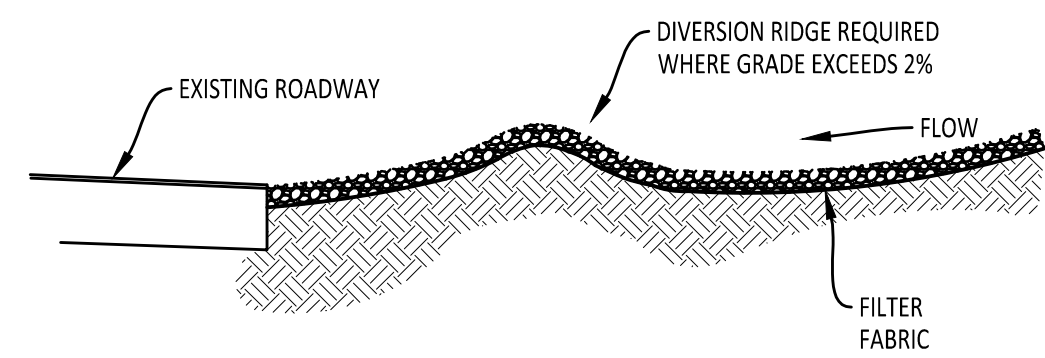
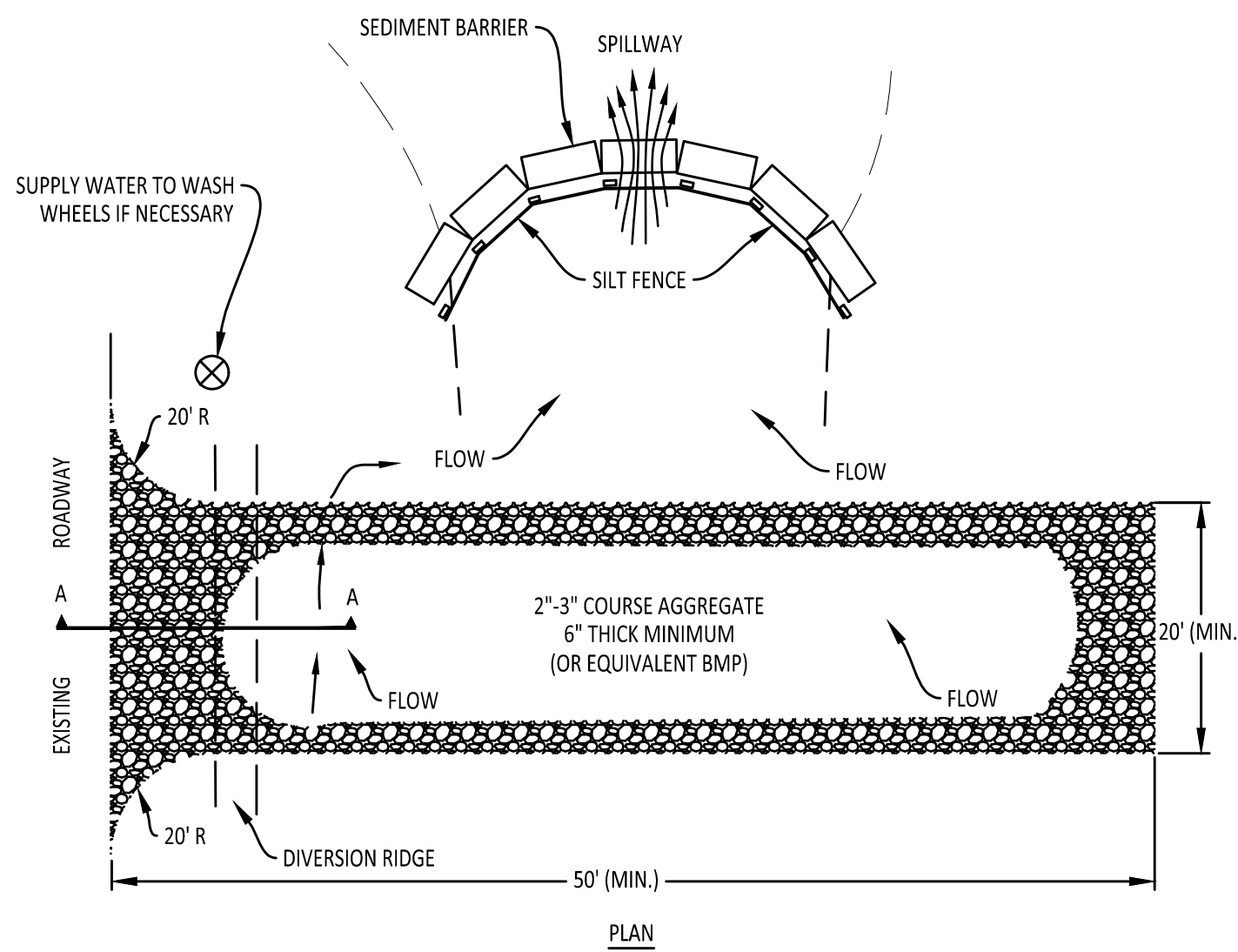


NOTES:

1. INSPECT AND REPAIR FENCE AFTER EACH STORM EVENT AND REMOVE SEDIMENT WHEN NECESSARY.
2. REMOVED SEDIMENT SHALL BE DEPOSITED TO AN AREA THAT WILL NOT CONTRIBUTE SEDIMENT OFF-SITE AND CAN BE PERMANENTLY STABILIZED.
3. SILT FENCE SHALL BE PLACED ON SLOPE CONTOURS TO MAXIMIZE PONDING EFFICIENCY.

SILT FENCE

3

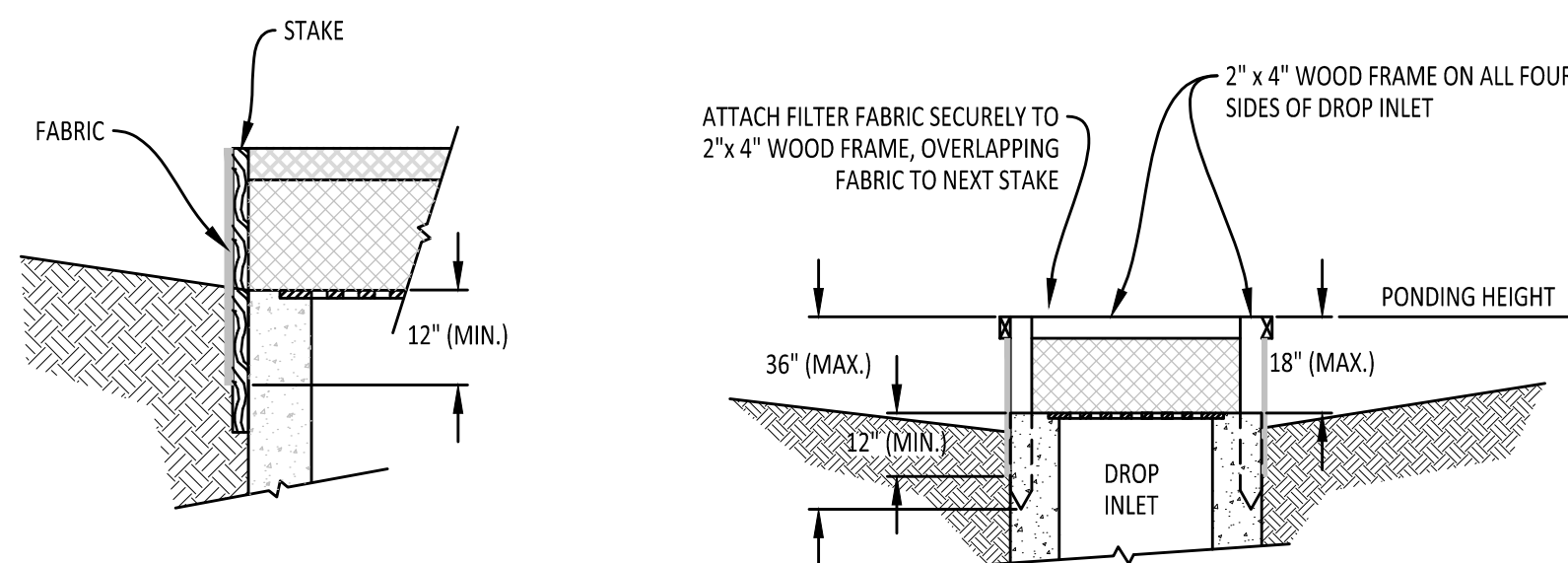


NOTES:

1. THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION THAT WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS-OF-WAY. THIS MAY REQUIRE TOP DRESSING, REPAIR AND/OR CLEANING OF ANY MEASURES USED TO TRAP SEDIMENT.
2. WHEN NECESSARY, WHEELS SHALL BE CLEANED PRIOR TO ENTRANCE ONTO PUBLIC RIGHTS-OF WAY.
3. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON AN AREA STABILIZED WITH CRUSHED STONE THAT DRAINS INTO AN APPROVED SEDIMENT TRAP OR SEDIMENT BASIN.
4. USE SANDBAGS, STRAW BALES OR OTHER APPROVED METHODS TO CHANNEL RUNOFF TO BASIN AS REQUIRED. WHEN STRAW BALES ARE USED IN THIS APPLICATION A SILT FENCE IS TO BE INCLUDED AS SHOWN ON THE UPSTREAM SIDE OF THE SEDIMENT BARRIER.

CONSTRUCTION EXIT
W/ DIVERSION BERM

2

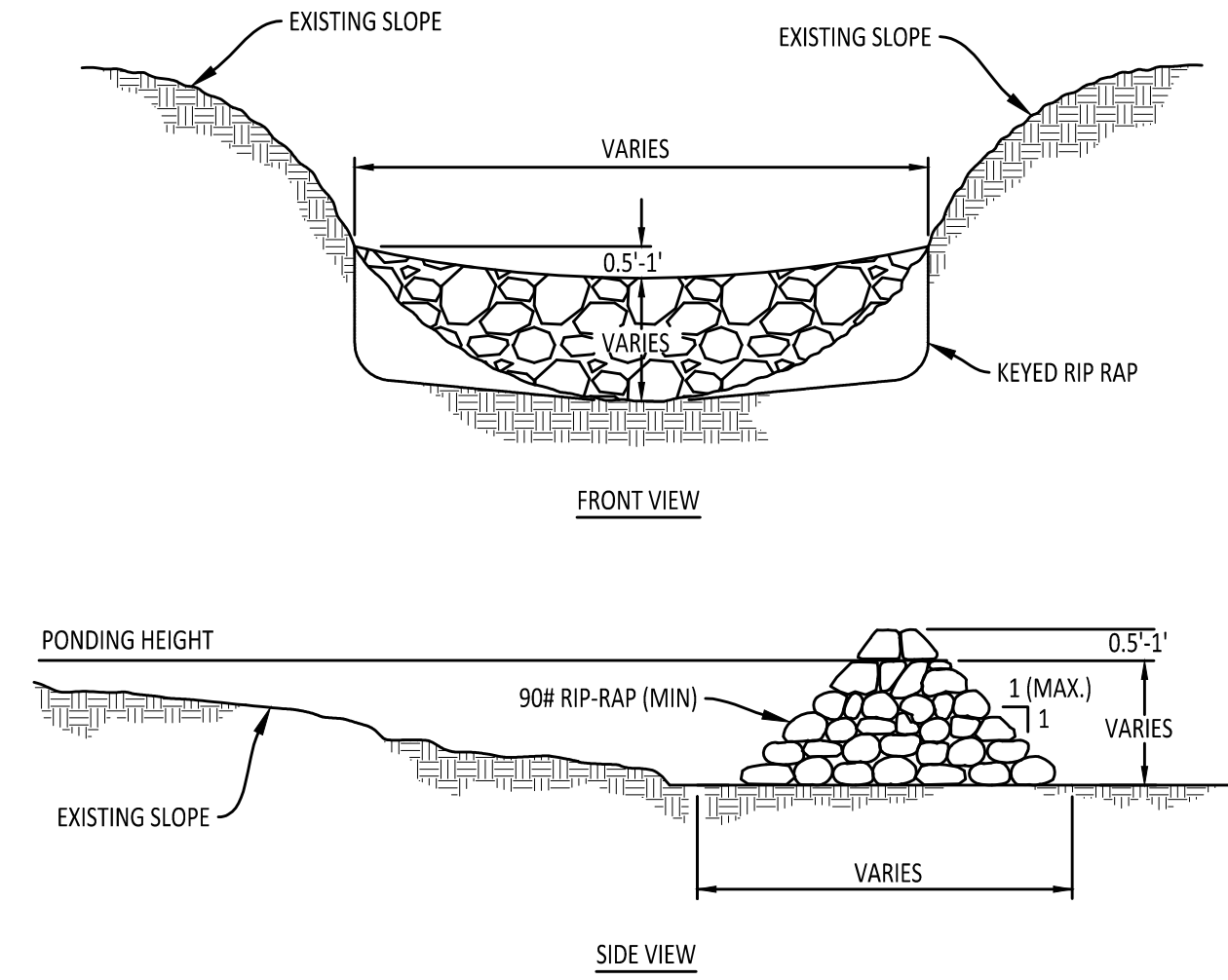


NOTES:

1. DROP INLET SEDIMENT BARRIERS ARE TO BE USED FOR SMALL, NEARLY LEVEL DRAINAGE AREAS. (LESS THAN 5%)
2. USE 2"x 4" WOOD OR EQUIVALENT METAL STAKES. (3 FT. MIN. LENGTH)
3. INSTALL 2"x 4" WOOD TOP FRAME TO INSURE STABILITY.
4. THE TOP OF THE FRAME (PONDING HEIGHT) MUST BE WELL BELOW THE GROUND ELEVATION DOWNSLOPE TO PREVENT RUNOFF FROM BYPASSING THE INLET. A TEMPORARY DIKE MAY BE NECESSARY ON THE DOWNSLOPE SIDE OF THE STRUCTURE.

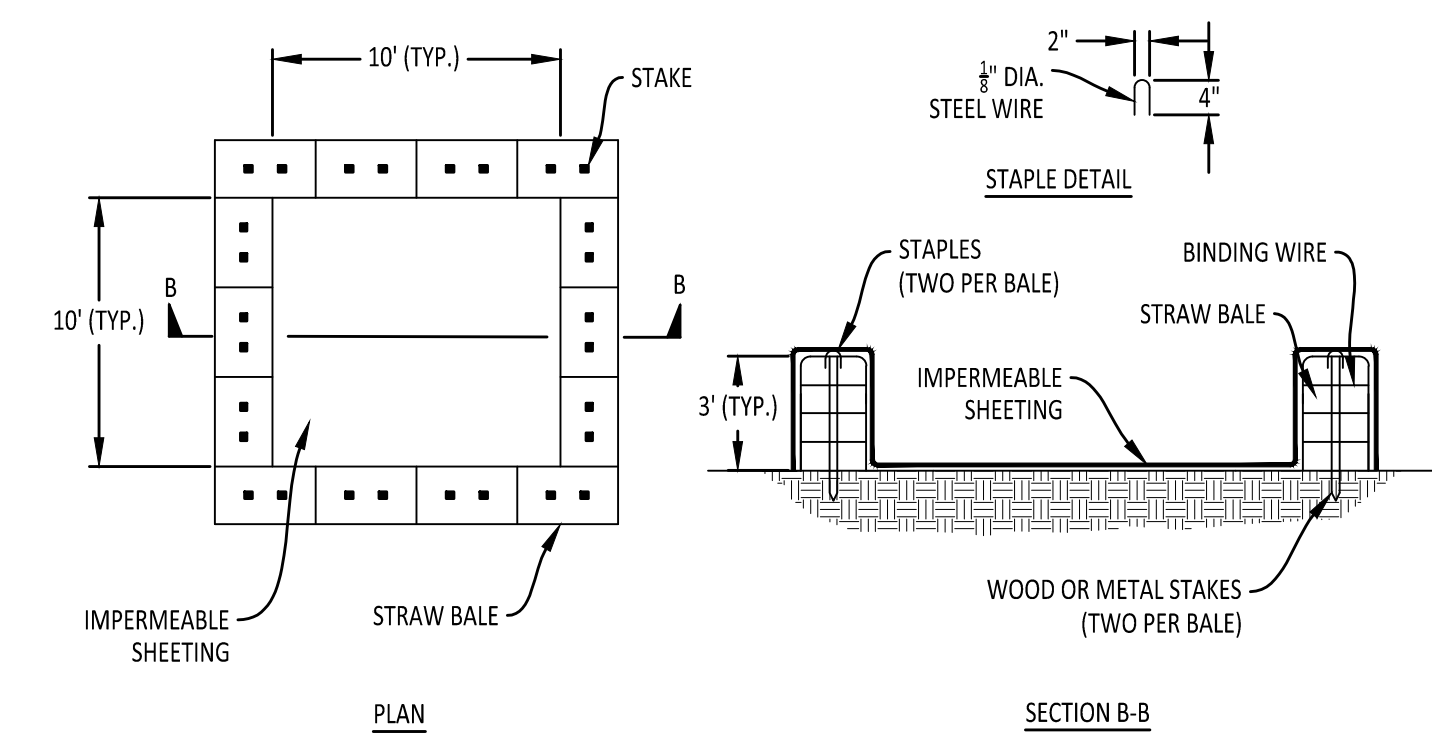
SEDIMENT BARRIER AT DROP INLET

4



RIP RAP CHECK DAM

5

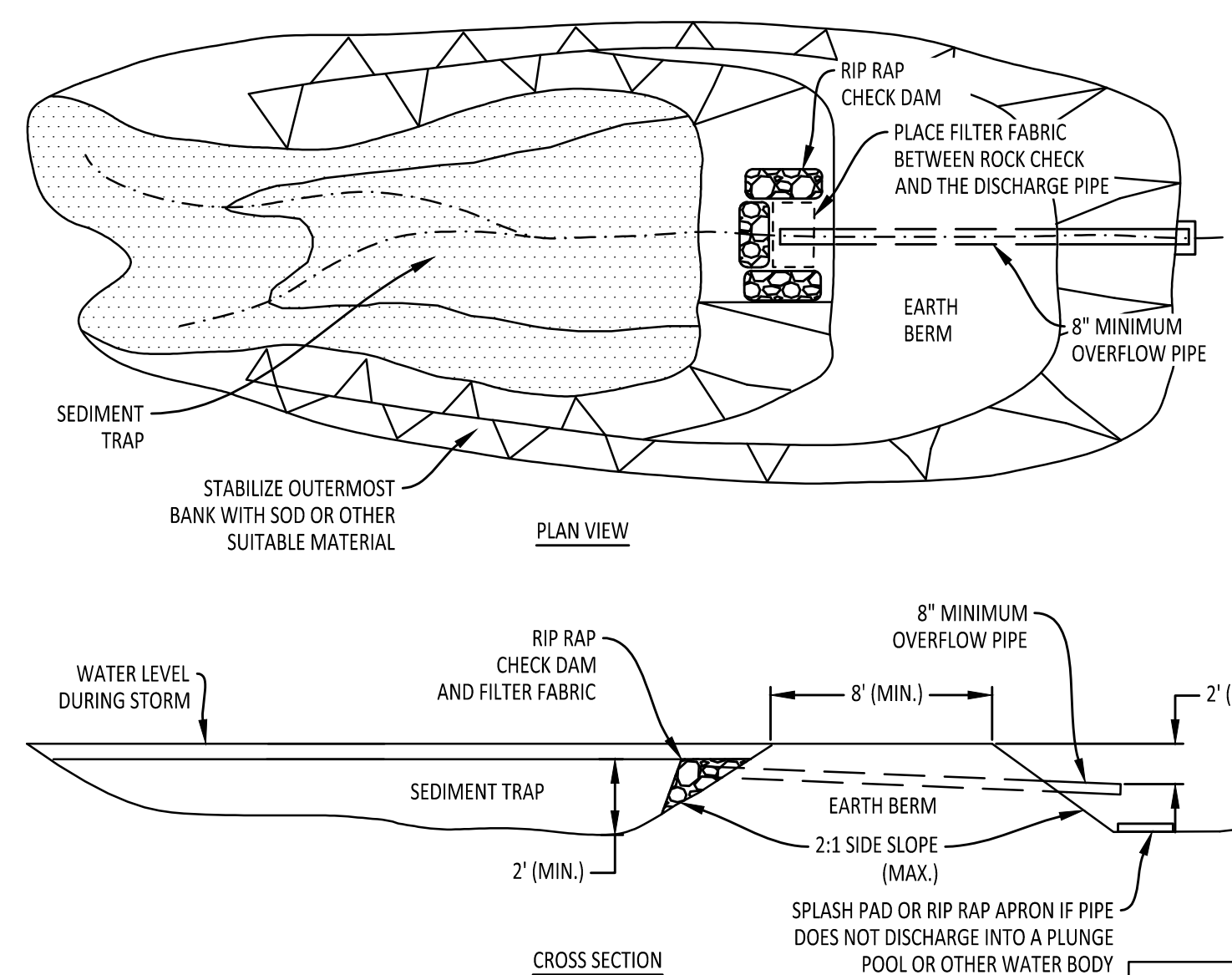


NOTES:

1. LOCATE WASHOUT STRUCTURE A MINIMUM OF 50 FEET AWAY FROM OPEN CHANNELS, STORM DRAIN INLETS, SENSITIVE AREAS, WETLANDS, BUFFERS AND WATER COURSES AND AWAY FROM CONSTRUCTION TRAFFIC.
2. SIZE WASHOUT STRUCTURE FOR VOLUME NECESSARY TO CONTAIN WASH WATER AND SOLIDS AND MAINTAIN AT LEAST 4 INCHES OF FREEBOARD. TYPICAL DIMENSIONS ARE 10 FEET X 10 FEET X 3 FEET DEEP.
3. PREPARE SOIL BASE FREE OF ROCKS OR OTHER DEBRIS THAT MAY CAUSE TEARS OR HOLES IN THE LINER. FOR LINER, USE 10 MIL OR THICKER UV RESISTANT, IMPERMEABLE SHEETING, FREE OF HOLES AND TEARS OR OTHER DEFECTS THAT COMPROMISE IMPERMEABILITY OF THE MATERIAL.
4. PROVIDE A SIGN FOR THE WASHOUT IN CLOSE PROXIMITY TO THE FACILITY.
5. KEEP CONCRETE WASHOUT STRUCTURE WATER TIGHT. REPLACE IMPERMEABLE LINER IF DAMAGED [E.G., RIPPED OR PUNCTURED]. EMPTY OR REPLACE WASHOUT STRUCTURE THAT IS 75 PERCENT FULL, AND DISPOSE OF ACCUMULATED MATERIAL PROPERLY. DO NOT REUSE PLASTIC LINER. WET VACUUM STORED LIQUIDS THAT HAVE NOT EVAPORATED AND DISPOSE OF IN AN APPROVED MANNER. PRIOR TO FORECASTED RAINSTORMS, REMOVE LIQUIDS OR COVER STRUCTURE TO PREVENT OVERFLOWS. REMOVE HARDENED SOLIDS, WHOLE OR BROKEN UP, FOR DISPOSAL OR RECYCLING. MAINTAIN RUNOFF DIVERSION AROUND EXCAVATED WASHOUT STRUCTURE UNTIL STRUCTURE IS REMOVED.

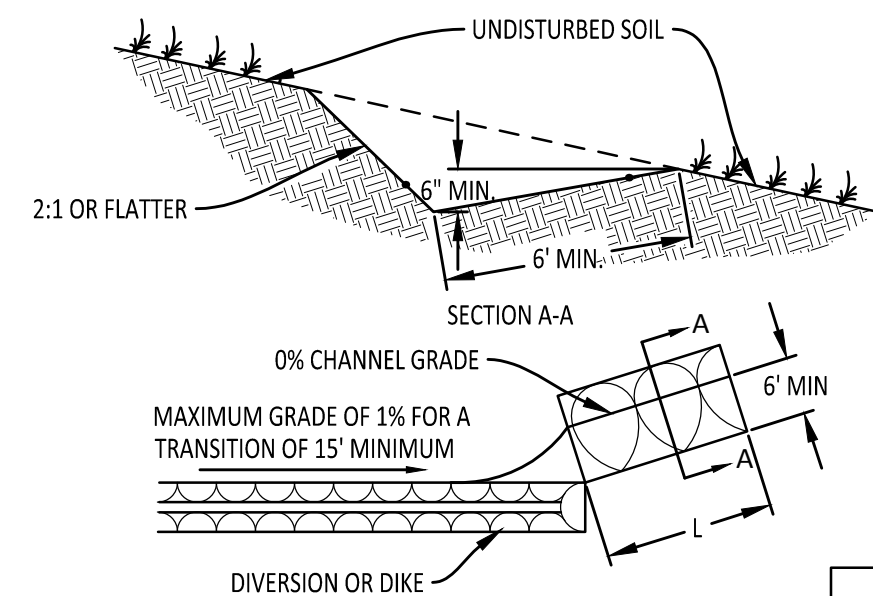
CONCRETE WASHOUT

6



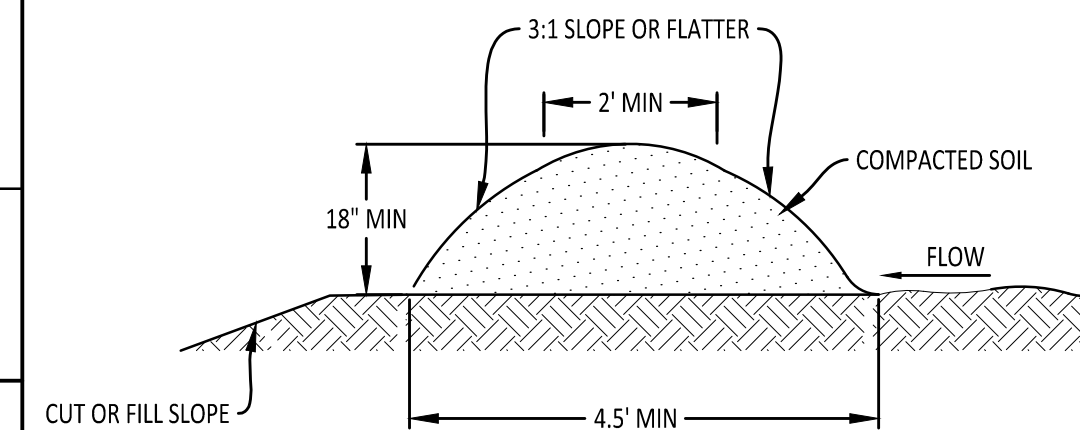
EROSION CONTROL SEDIMENT BASIN

7



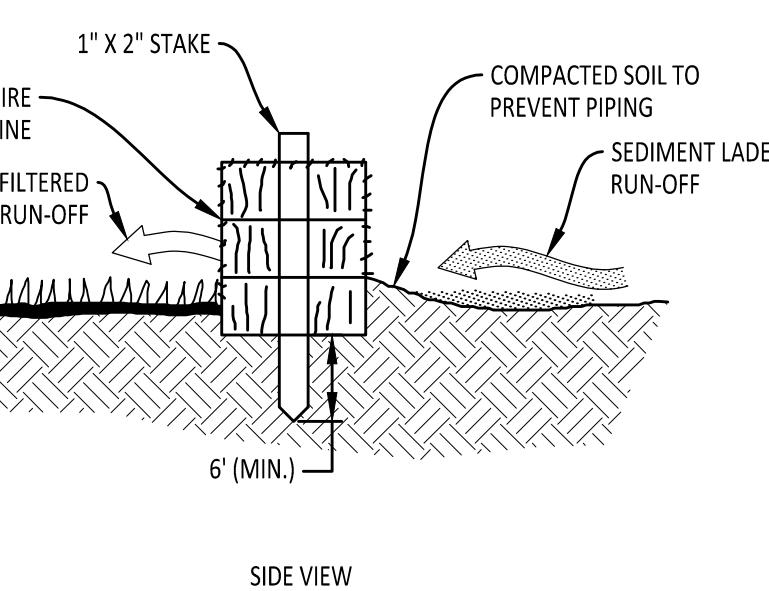
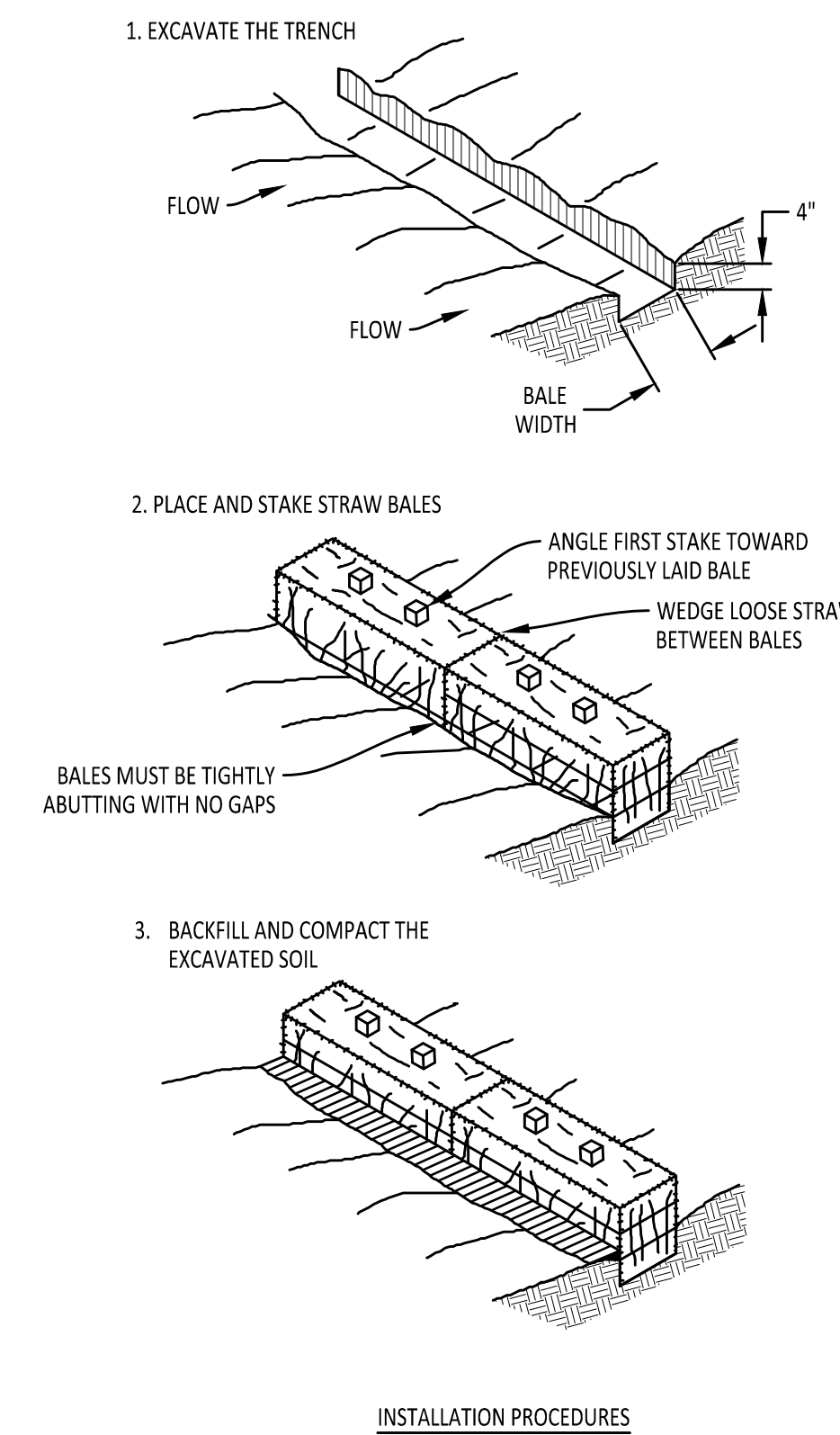
LEVEL SPREADER

8



TEMPORARY DIVERSION DIKE

9



STRAW BALE BARRIER

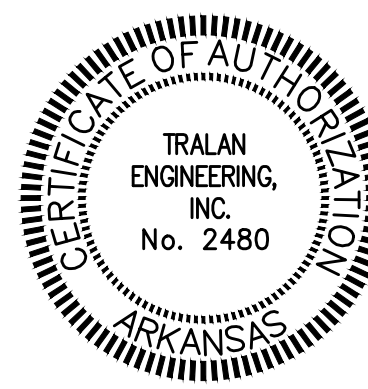
10

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CLIENT:
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CAD NO.:		

SWPPP
DETAILS

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1



2



3



EXPANSION JOINT (EJ)

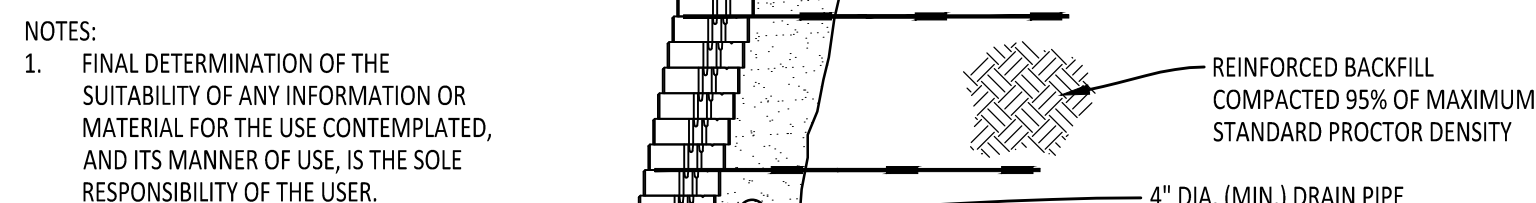
CONSTRUCTION JOINT DETAILS

N.T.S.

NOTE:

1. PROVIDE EXPANSION JOINT WHERE CONCRETE ABUTTS EXISTING CONCRETE, SUCH AS CURB AND NEXT TO STRUCTURES AND DRIVEWAYS.
2. JOINT SPACING ON CURBS TO BE MAXIMUM 15'.
3. JOINT SPACING ON SIDEWALKS TO BE EQUAL TO THE SIDEWALK WIDTH.

4



TYPICAL SECTION-REINFORCED RETAINING WALL

N.T.S.

5



N.T.S.

6



N.T.S

V1 BARS

BENDING DIAGRAM

BAR SIZE	K	PIN DIA.
#4	4 1/2"	2 1/2"

NOTES:

1. CONSTRUCTION CONTROL JOINTS SHALL BE PLACED ON 20' TO 25' CENTERS USING 3/4" CHAMFER STRIPS. EXPANSION JOINTS SHALL BE PLACED ON 60' TO 75' CENTERS WITH 1/2" DOWEL, AND 1/2" PREMOLDED EXPANSION JOINT FILLER.
2. WEEP HOLES SHALL HAVE GALVANIZED WIRE MESH SCREEN INSTALLED BETWEEN 4" WEEP HOLE TUBING AND GRAVEL AT FACE OF WALL. GRAVEL SHALL BE CONTINUOUS WITH LENGTH OF WALL SECTION.
3. RETAINING WALLS GREATER THAN 6'-0" HIGH REQUIRE INDIVIDUAL DESIGN.

RETAINING WALL NOTES

N.T.S.

7

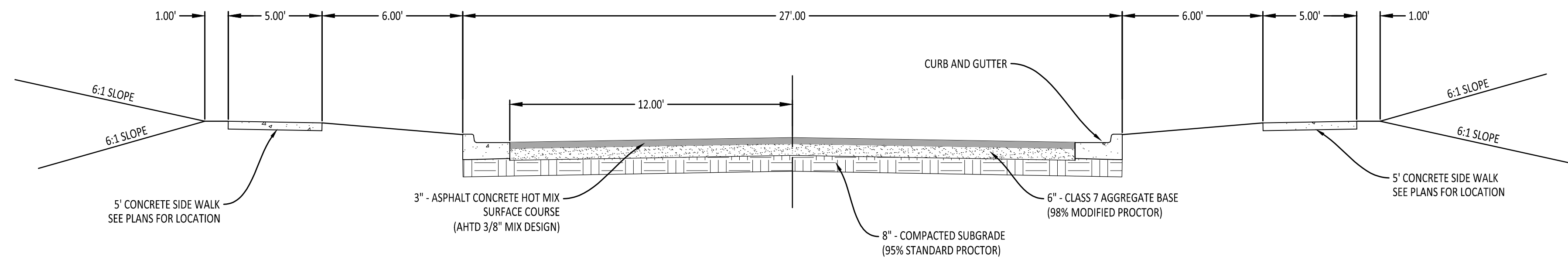


N.T.S.

NOTE:
INLETS MORE THAN 3'-0" DEEP SHALL HAVE STANDARD MANHOLE STEPS PLACED AT 15" O.C.
- MANHOLE FRAME AND COVER SHALL BE PLACED ADJACENT TO THE WALL WITH THE STEPS

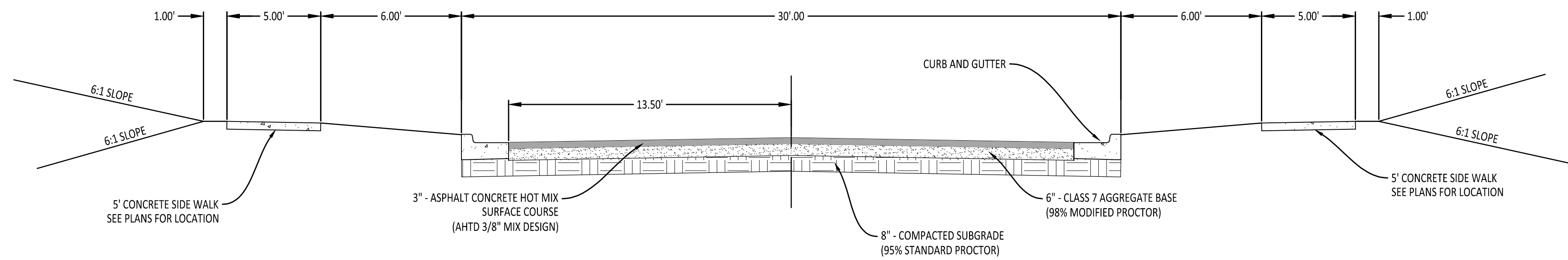
AS APPROVED BY ENGINEER, WALLS MAY BE 8" BLOCK WITH 1/2" MORTAR. FILL CELLS WITH CONCRETE AND WITH #4 @ 16" O.C. MINIMUM DISTANCE FROM WALL TO PIPE SHALL BE 8" IF BLOCK WALLS ARE CONSTRUCTED.

8



TYPICAL STREET SECTION
N.T.S.

1



TYPICAL COMMERCIAL STREET SECTION
N.T.S.

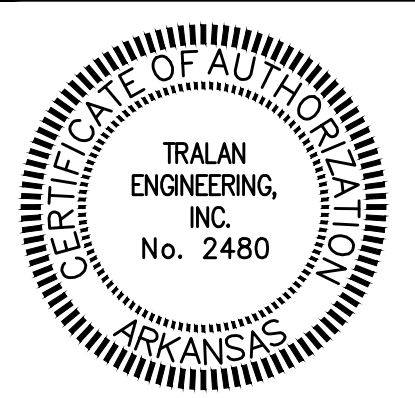
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CAD NO.:	

CONSTRUCTION
DETAILS

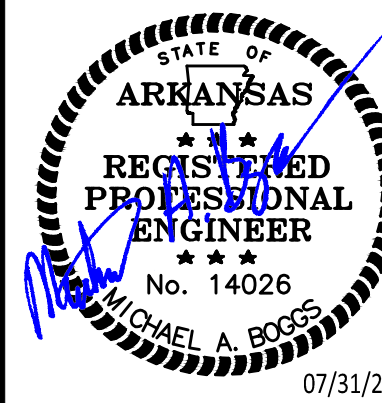
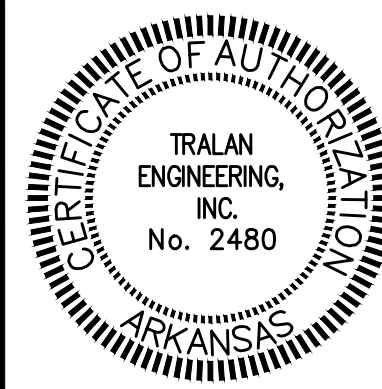
SHEET NUMBER:
13 of 15

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CWL WATER
DETAILS

SHEET NUMBER:

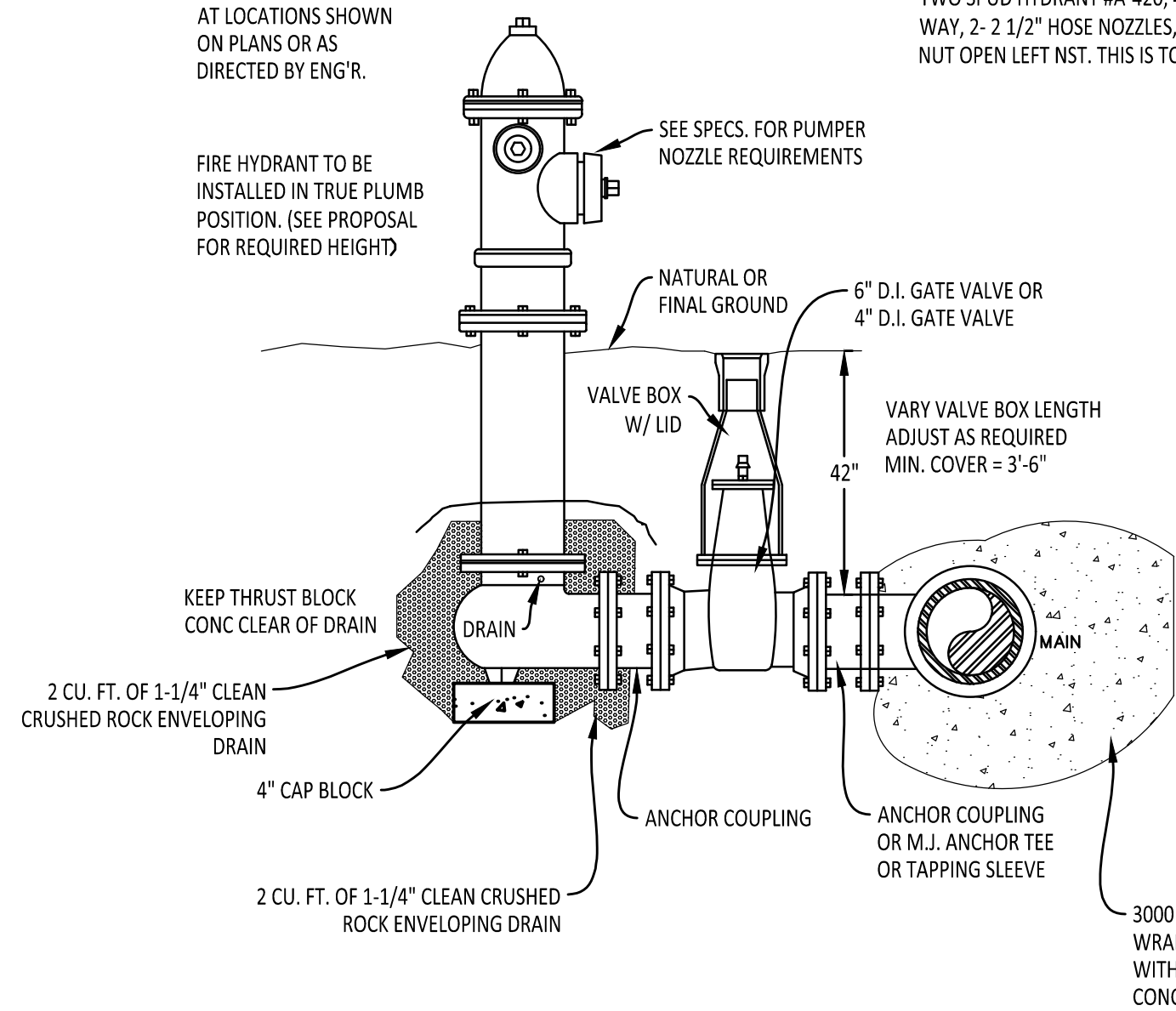
14 of 15

FIRE HYDRANT SHALL BE MULLER TYPE ONLY

- THREE SPUD HYDRANT #A-423, 5-1/4" MAIN VALVE OPENING, 3 WAY, 2- 2 1/2" HOSE NOZZLES, 1-4 1/2" PUMPER NOZZLE, 4"0" BURY, 6" M.J. SHOE PENTAGON NUT OPEN LEFT NST.
- TWO SPUD HYDRANT #A-422, 5-1/4" MAIN VALVE OPENING, 2 WAY, 2- 2 1/2" HOSE NOZZLES, 4"0" BURY, 6" M.J. SHOE PENTAGON NUT OPEN LEFT NST.
- TWO SPUD HYDRANT #A-420, 4-1/2" MAIN VALVE OPENING, 2 WAY, 2- 2 1/2" HOSE NOZZLES, 4"0" BURY, 4" M.J. SHOE PENTAGON NUT OPEN LEFT NST. THIS IS TO BE USED ON 4" MAINS.

PLACE FIRE HYDRANT
AT LOCATIONS SHOWN
ON PLANS OR AS
DIRECTED BY ENGR.

FIRE HYDRANT TO BE
INSTALLED IN TRUE PLUMB
POSITION. (SEE PROPOSAL
FOR REQUIRED HEIGHT)



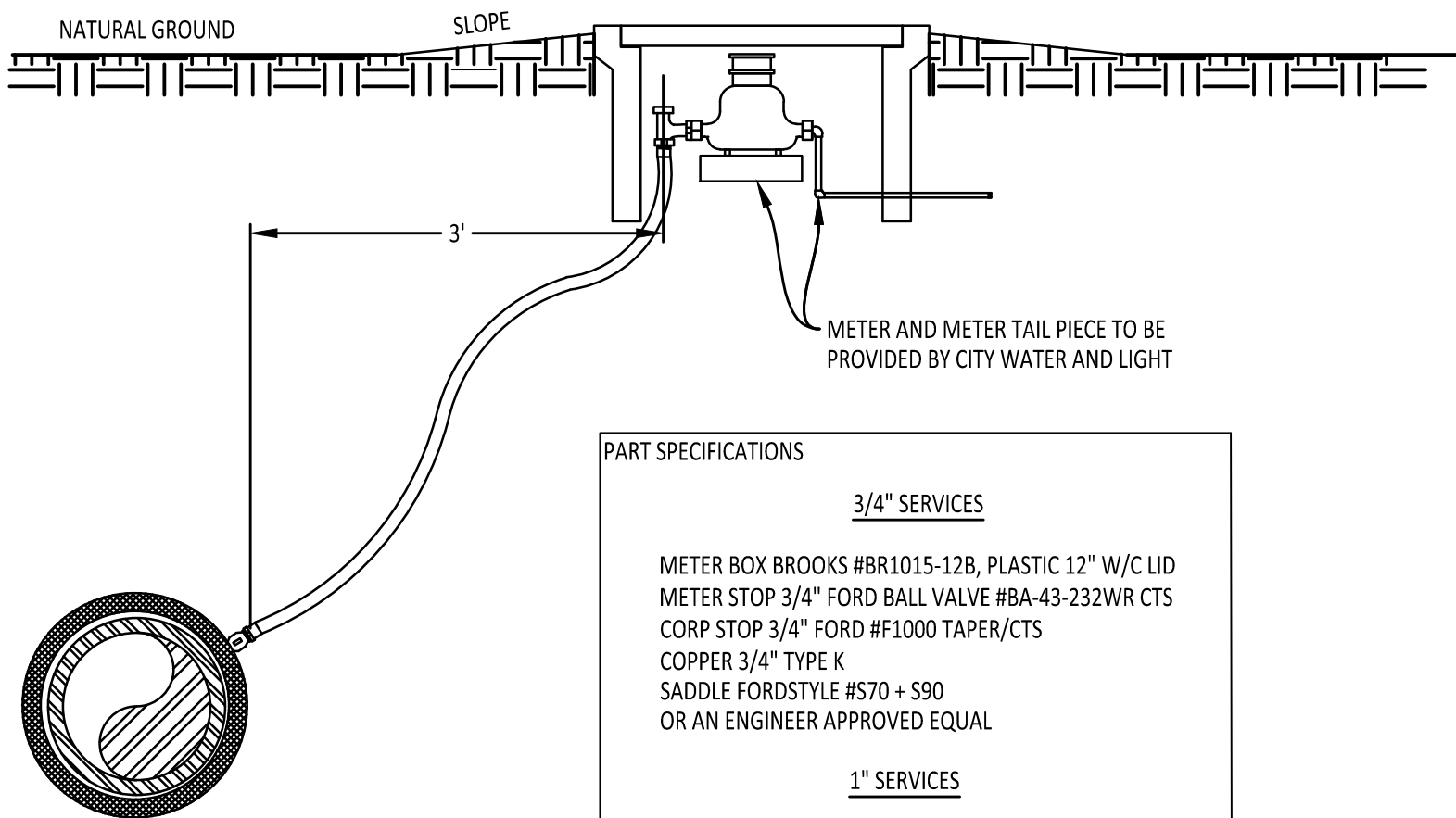
NOTES:
(1) PROVIDE TWO (2) MECHANICAL JOINT ANCHORING COUPLINGS VALVE BOXES AND TEES.

FIRE HYDRANT DETAIL WITH ANCHOR COUPLING

N.T.S.

NOTE: ONLY 3/4" SERVICES TO BE USE OUTSIDE CITY LIMITS

NOTE: 1" SERVICES TO BE USE WHEN WATER PRESSURE IS BELOW 60 PSI



PART SPECIFICATIONS

3/4" SERVICES

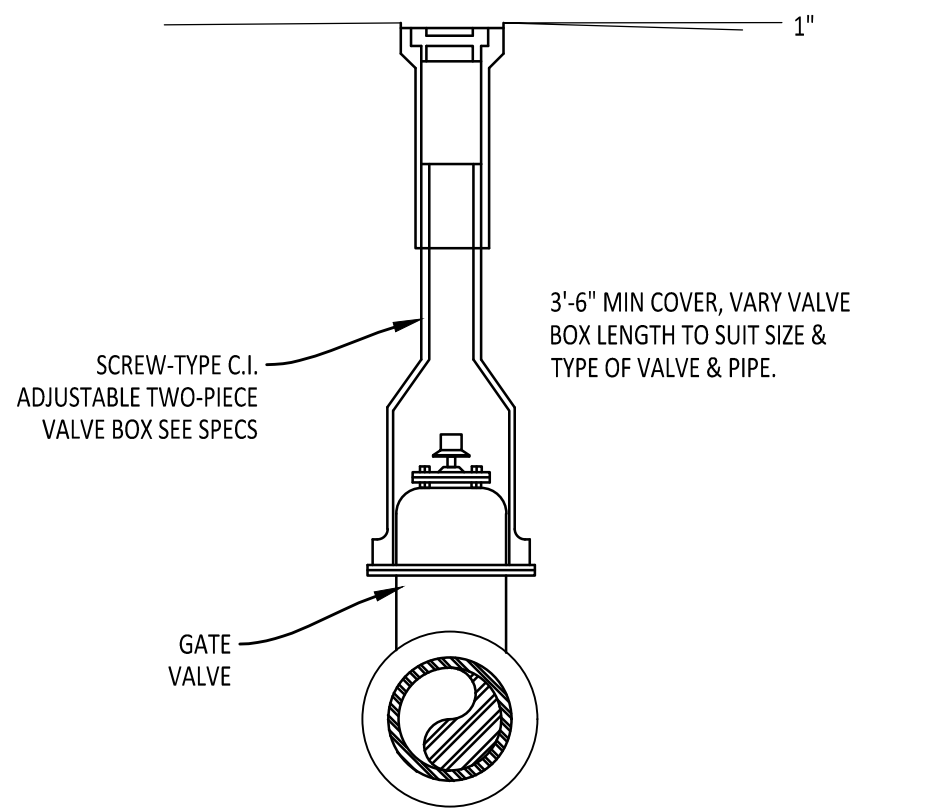
METER BOX BROOKS #BR1015-12B, PLASTIC 12" W/C LID
METER STOP 3/4" FORD BALL VALVE #BA-43-232WR CTS
CORP STOP 3/4" FORD #F1000 TAPER/CTS
COPPER 3/4" TYPE K
SADDLE FORDSTYLE #570 + \$90
OR AN ENGINEER APPROVED EQUAL

1" SERVICES

METER BOX BROOK #BR1520-12B, PLASTIC W/C LID
METER STOP 1" FORD BALL VALVE #BA-43-444W CTS
CORP STOP FORD #F1000 TAPER/CTS
COPPER 1" TYPE K
SADDLE FORD STYLE #570 + \$90
OR AN ENGINEER APPROVED EQUAL

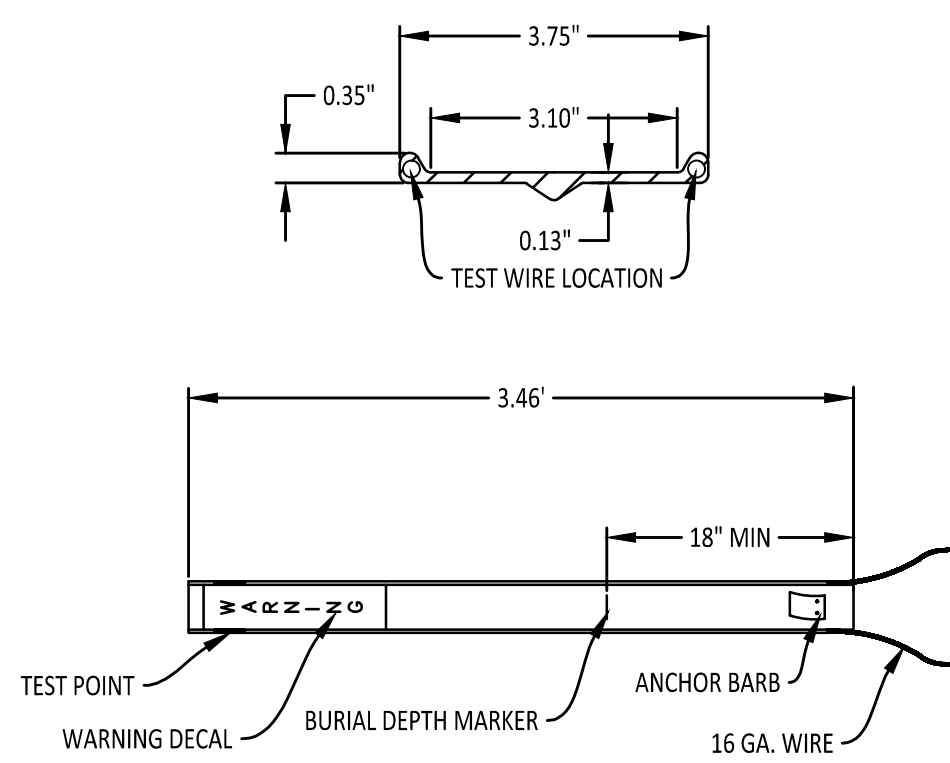
SERVICE CONNECTION AND METER SETTING

N.T.S.



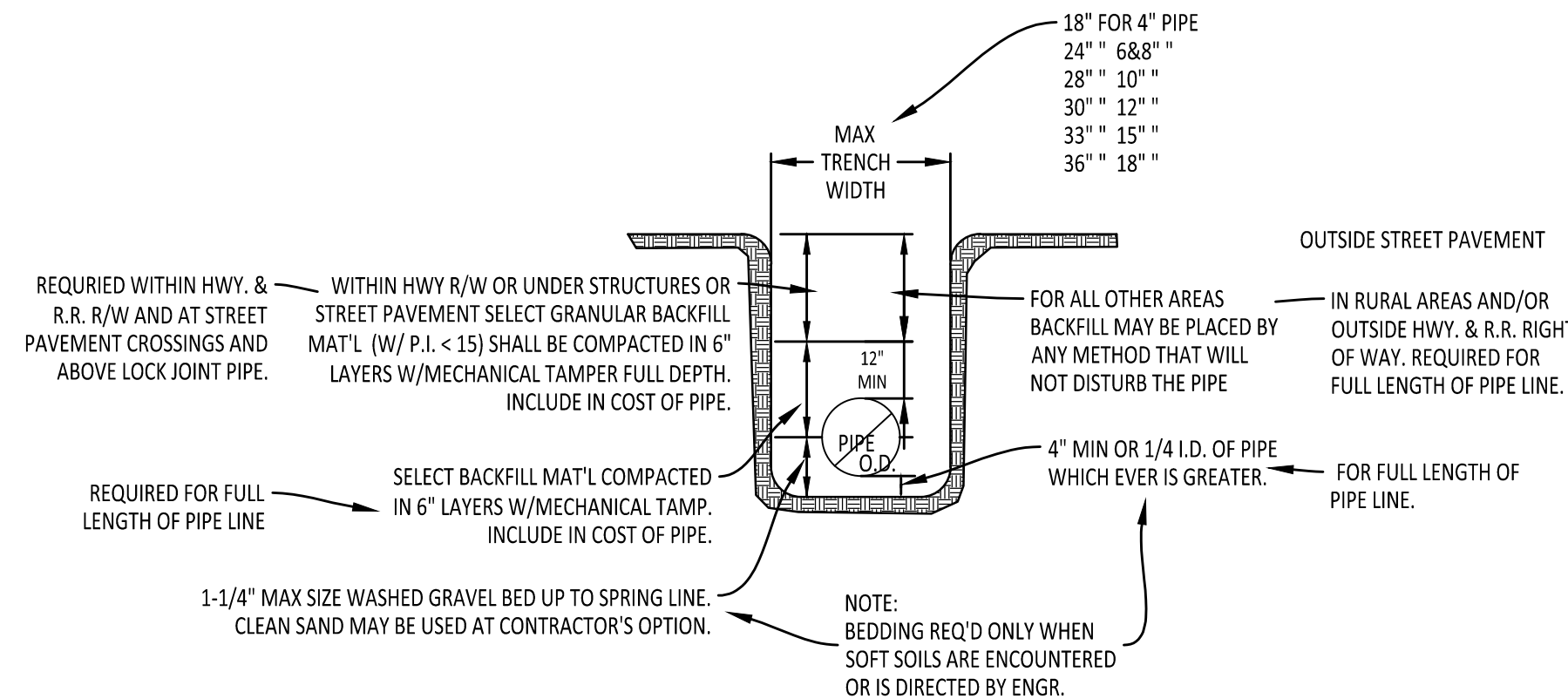
VALVE BOX DETAIL

N.T.S.



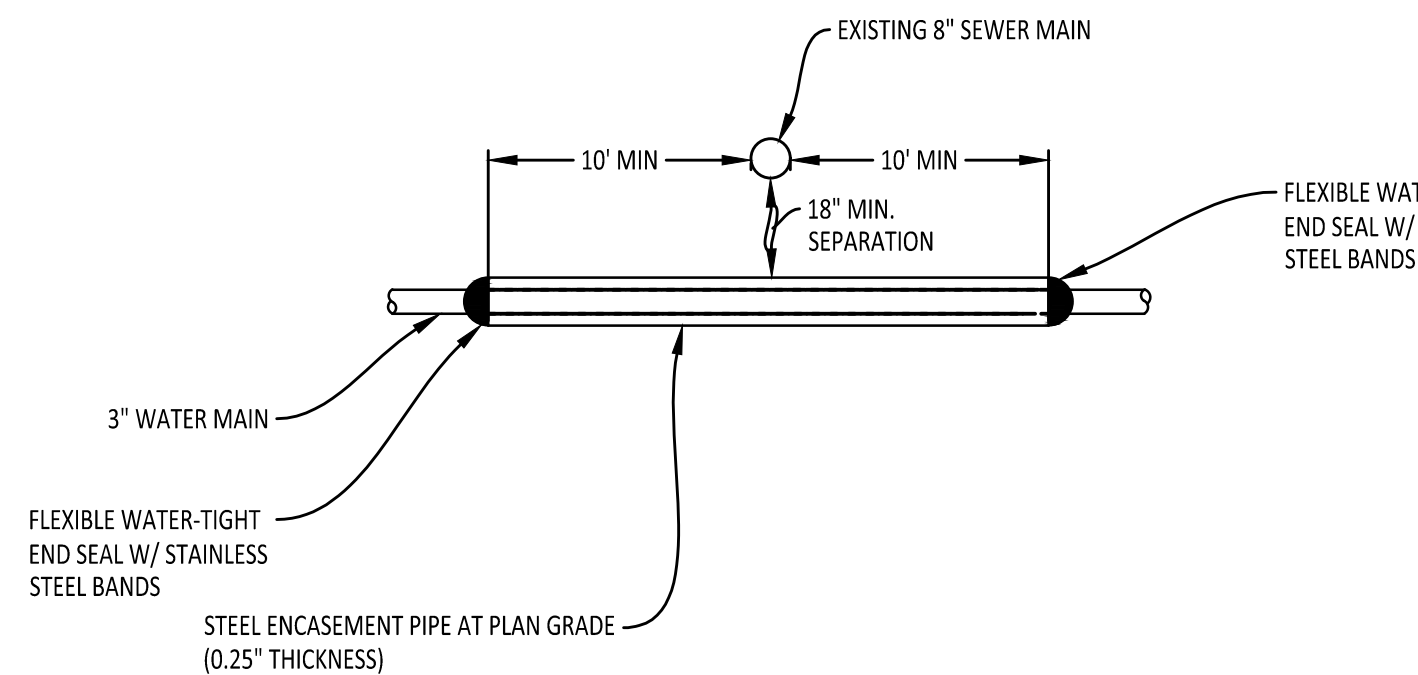
WATER LINE & FORCE MAIN MARKER DETAIL

N.T.S.



TYPICAL WATER PIPE BEDDING AND BACKFILL DETAIL

N.T.S.

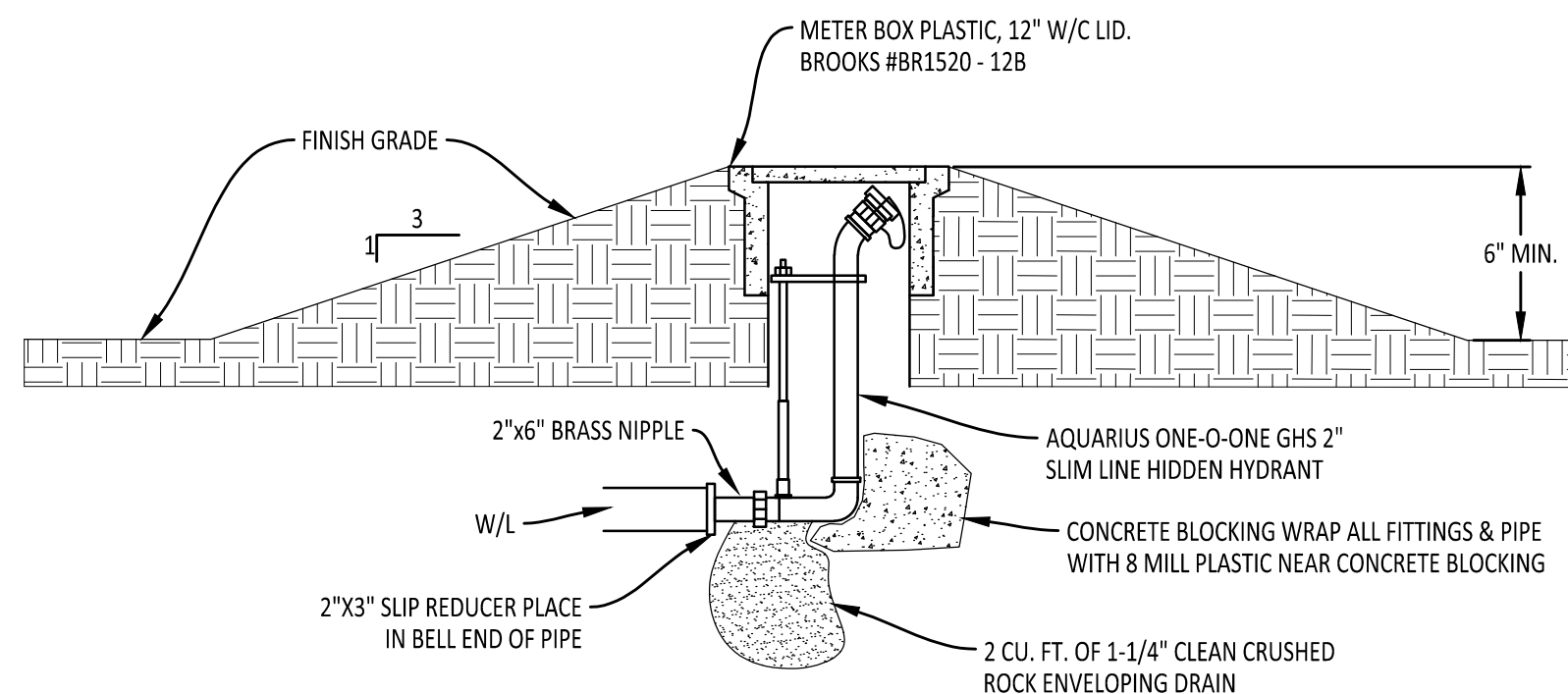


ENCASED WATER AND SEWER CROSSING

N.T.S.

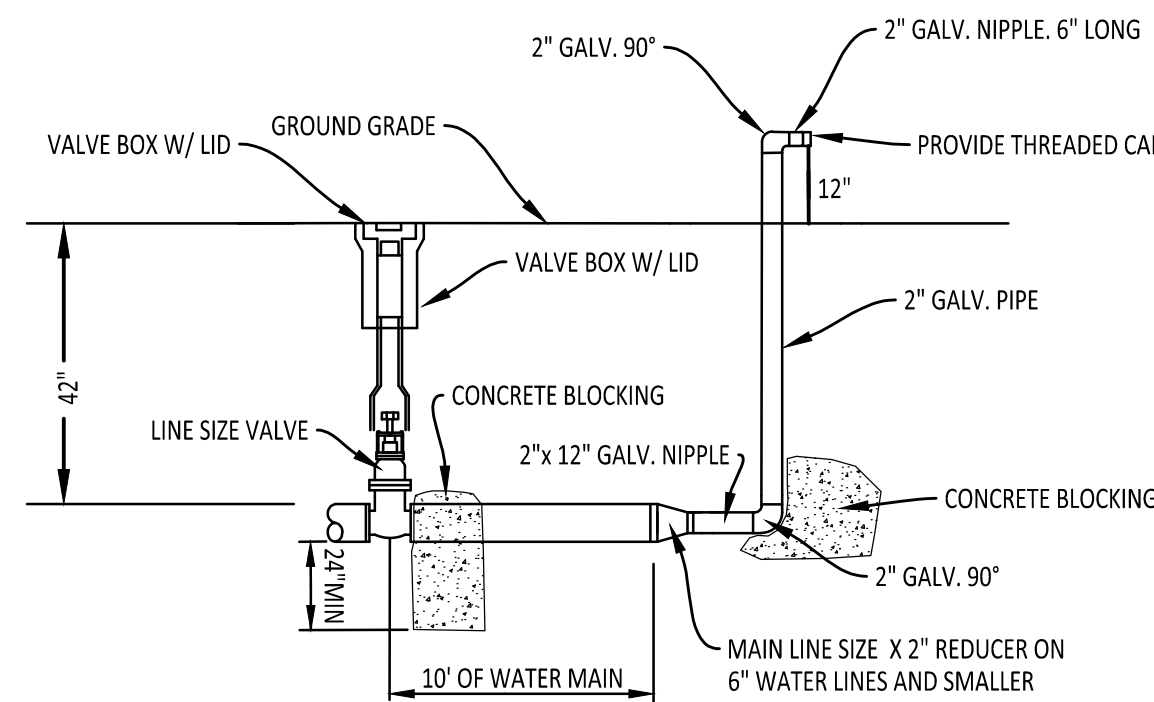
NOTE:

- WHEN THE WATER UNAVOIDABLY PASSES BENEATH THE SEWER MAIN A MINIMUM OF 18" OF SEPARATION BETWEEN THE TOP OF THE WATER MAIN AND THE BOTTOM OF THE SEWER MAIN.
- ENCASEMENT PIPE SHALL AT A MINIMUM EXTEND 10' EITHER SIDE OF SEWER MAIN
- END SEAL SHALL BE A CASCADE MODEL CCES OR EQUIVALENT



UNDERGROUND WASHOUT ASSEMBLY FOR COVES AND DEAD END LINES WITH NO FUTURE EXTENSION

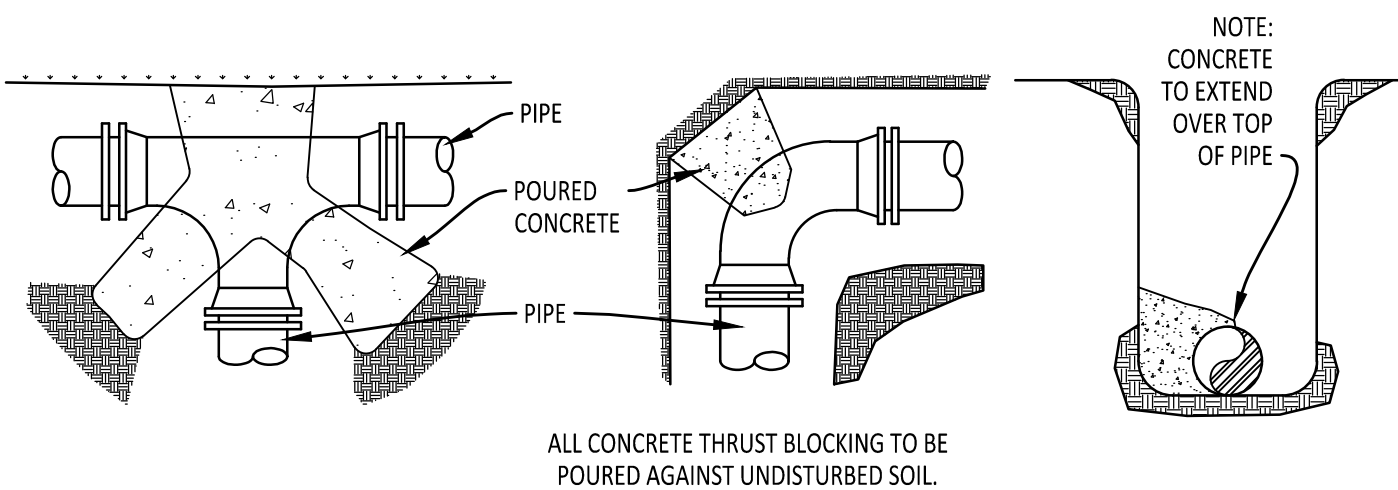
N.T.S.



NOTE: ALL 2" GALVANIZED PIPE AND FITTINGS ARE TO BE SCH 40

BLOW-OFF ASSEMBLY DETAIL

N.T.S.



ALL CONCRETE THRUST BLOCKING TO BE
POURED AGAINST UNDISTURBED SOIL.

NOTES:

- ALL BLOCKING SHALL BE AGAINST UNDISTURBED HAND DUG SOIL.
- WHERE SOIL CONDITIONS MAKE IT NECESSARY TO POUR CONCRETE BLOCKING OVER JOINTS. THE ENDS OF THE ADJACENT PIPES MUST HAVE A BRACE BLOCK TO RESIST MOVEMENT OF THESE JOINTS.
- ALL FITTINGS & PIPE SHALL BE COVERED WITH 8 MILL PLASTIC WHEN BLOCKING TO PREVENT BONDING OF CONCRETE.
- WHERE SHEAR IS HIGH PROPER REINFORCING MUST BE INSTALLED INTO THE BLOCKING AS DIRECTED BY ENGINEER.
- COVER SHALL BE A MINIMUM OF 3' BELOW NATURAL GRADE.
- CLEARANCE FROM OIL & GAS COMPANIES LINES SHALL BE A MINIMUM OF 18".
- THRUST BLOCKING DIMENSIONS SHALL BE 150% OF THE THRUST CALCULATED FROM THE FORMULA (THRUST=2 AP SINØ. WHERE A=PIPE END AREA, P=PRESSURE PRODUCED BY PUMPING LIQUID, & Ø=ANGLE OF BEND TO BE BLOCKED) AND SOIL BEARING CAPACITY OF 1500 PSF.
- ALL CONCRETE SHALL BE 3000 PSI AT 28 DAY STRENGTH.

THRUST BLOCKING REQUIREMENTS AT STANDARD FITTINGS

Thrust Exerted and Minimum Required Thrust Block Area Per 100 PSI of Water Pressure With a Minimum Soil Bearing Capacity of 2000 PSF (Factor of Safety = 1.5)

Pipe Size (in)	Pipe Area (sq in)	Thrust at Plug/Tee (lb)	Area of Thrust Block (sq ft)	Thrust at 90° Bend (lb)	Area of Thrust Block (sq ft)	Thrust at 45° Bend (lb)	Area of Thrust Block (sq ft)	Thrust at 22.5° Bend (lb)	Area of Thrust Block (sq ft)	Thrust at 11.25° Bend (lb)	Area of Thrust Block (sq ft)
3	7.07	707	0.50	1,000	0.75	541	0.50	276	0.25	139	0.00
4	12.57	1,257	1.00	1,777	1.25	962	0.75	490	0.25	246	0.25
6	28.27	2,827	2.00	3,999	3.00	2,164	1.50	1,103	0.75	554	0.50
8	50.27	5,027	3.75	7,109	5.25	3,847	3.00	1,961	1.50	985	0.75
10	78.54	7,854	6.00	11,107	8.25	6,011	4.50	3,064	2.25	1,540	1.25
12	113.10	11,310	8.50	15,994	12.00	8,656	6.50	4,413	3.25	2,217	1.75
16	201.06	20,106	15.00	28,434	21.25	15,389	11.50	7,845	6.00	3,942	3.00

Thrust Exerted and Minimum Required Thrust Block Area Per 100 PSI of Water Pressure With a Minimum Soil Bearing Capacity of 1500 PSF (Factor of Safety = 1.5)

Pipe Size (in)	Pipe Area (sq in)	Thrust at Plug/Tee (lb)	Area of Thrust Block (sq ft)	Thrust at 90° Bend (lb)	Area of Thrust Block (sq ft)	Thrust at 45° Bend (lb)	Area of Thrust Block (sq ft)	Thrust at 22.5° Bend (lb)	Area of Thrust Block (sq ft)	Thrust at 11.25° Bend (lb)	Area of Thrust Block (sq ft)
3	7.07	707	0.75	1,000	1.00	541	0.50	276	0.25	139	0.25
4	12.57	1,257	1.25	1,777	1.75	962	1.00	490	0.50	246	0.25
6	28.27	2,827	2.75	3,999	4.00	2,164	2.25	1,103	1.00	554	0.50
8	50.27	5,027	5.00	7,109	7.00	3,847	3.75	1,961	2.00	985	1.00
10	78.54	7,854	7.75	11,107	11.00	6,011	6.00	3,064	3.00	1,540	1.50
12	113.10	11,310	11.25	15,994	16.00	8,656	8.75	4,413	4.50	2,217	2.25
16	201.06	20,106	20.00	28,434	28.50	15,389	15.50	7,845	7.75	3,942	4.00

Thrust Exerted and Minimum Required Thrust Block Area Per 100 PSI of Water Pressure With a Minimum Soil Bearing Capacity of 1000 PSF (Factor of Safety = 1.5)

Pipe Size (in)	Pipe Area (sq in)	Thrust at Plug/Tee (lb)	Area of Thrust Block (sq ft)	Thrust at 90° Bend (lb)	Area of Thrust Block (sq ft)	Thrust at 45° Bend (lb)	Area of Thrust Block (sq ft)	Thrust at 22.5° Bend (lb)	Area of Thrust Block (sq ft)	Thrust at 11.25° Bend (lb)	Area of Thrust Block (sq ft)
3	7.07	707	1.00	1,000	1.50	541	0.75	276	0.50	139	0.25
4	12.57	1,257	2.00	1,777	2.75	962	1.50	490	0.75	246	0.25
6	28.27	2,827	4.25	3,999	6.00	2,164	3.25	1,103	1.75	554	0.75
8	50.27	5,027	7.50	7,109	10.75	3,847	5.75	1,961	3.00	985	1.50
10	78.54	7,854	11.75	11,107	16.75	6,011	9.00	3,064	4.50	1,540	2.25
12	113.10	11,310	17.00	15,994	24.00	8,656	13.00	4,413	6.50	2,217	3.25
16	201.06	20,106	30.25	28,434	42.75	15,389	23.00	7,845	11.75	3,942	6.00

THRUST BLOCK DETAIL

N.T.S.

1. MANHOLE BASES TO BE 4000 PSI, 28 DAY STRENGTH, LIMESTONE MIX CONCRETE ON UNDISTURBED SUB-GRADE OR ON COMPACTED SELECT FILL MATERIAL AS AUTHORIZED.
2. MANHOLE SIDEWALL MATERIAL TO BE CONCRETE IN ACCORDANCE WITH PROPOSAL FORM REQUIREMENTS.
 - a. 4" I.D. FOR SEWER SIZES 6" THRU 24"
 - b. 5" I.D. FOR SEWER SIZES 24" THRU 30"
 - c. 6" I.D. FOR SEWER SIZES 36" THRU 42"
3. SET MANHOLE TOPS AS FOLLOWS:
 - a. IN STREETS, ROADS, HIGHWAYS, AND OTHER PAVED AREAS: FLUSH WITH FINISHED PAVING GRADE.
 - b. UNDEVELOPED AREAS, SUCH AS FIELDS, WOODS, ETC.: 12" ABOVE GROUND.
 - c. OTHER AREAS: 1" ABOVE GROUND.
4. MANHOLE FRAMES SHALL HAVE MIN. OPENING OF 22" DIA.



N.T.S

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- Diagram illustrating the cross-section of a street construction, showing various layers and materials:
- ROUND FOR SETTLING** (42" width, (54" MAX) depth)
 - COMPACT 8" (MIN) CLASS 7 IN PARKING AREAS, TO 98% MODIFIED PROCTOR**
 - COMPACT BACKFILL IN PARKING AREAS AND PROPOSED STREET CROSSINGS TO 95% MODIFIED PROCTOR W/ GRANULAR BASE FILL (P.I. < 15) OR SB-2 (USE NATIVE SOIL EXCAVATED IN AREAS NOT IN PROPOSED STREET, PARKING AREAS, AND EXISTING STREETS)**
 - COARSE AGGREGATE BEDDING CLASS 5 (3/4" MINUS LESTONE) TO SPRINGLINE OF PIPE** (PLACE BEDDING TO TOP OF PIPE WHEN EXCAVATION IS >14" DEEP AND/OR IF LARGE ROCK IS IN EXCAVATION)
 - 8" DIA** (Circular feature)
 - 4" MIN** (Vertical dimension)
- NON-EXISTING STREET LOCATIONS

PVC TRENCH DETAIL

N.T.S.

Diagram illustrating the construction details for a curb and flowable fill. The diagram shows a cross-section of a concrete curb and the flowable fill material below it.

EXISTING SURFACE MUST BE CUT WITH A SAW OR AIR CHISEL (EXCEPT GRAVEL STREET) AND REPLACED W/ SAME TYPE SURFACE

EXISTING SURFACE

6X6/6-6 W.W.M. (MIN.) IN CONCRETE ONLY

FLOWABLE FILL SHALL HAVE MIN. 8" FLOW & 110#/CU.FT. & SHALL CONSIST OF 80-100# CEMENT 220-300# FLY ASH 65 GAL. OF WATER BALANCE VOLUME OF SAND TO MAKE 1 CUBIC YARD

VARIABLE

6" MAX

8" MIN

8" MIN

EXISTING STREET LOCATIONS



N.T.S

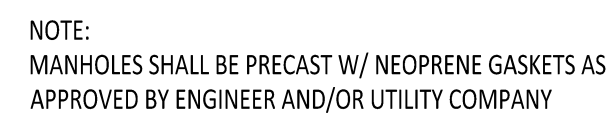


N.T.S



N.T.S

(USE SAME CONFIGURATION FOR MANHOLE STUBOUTS)



STANDARD MANHOLE DETAIL

N.T.S.



N.T.S

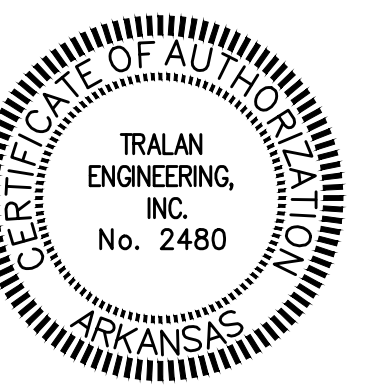


N.T.S

NOTE:
ENCASEMENT PIPE MUST PRESSURE CLASS 350 DUCTILE IRON AND WRAP DUCTILE IRON PIPE WITH 8 MILL PLASTIC NOTE: WHEN 18" SEPARATION CANNOT BE MAINTAINED, JOINTS SHALL BE LOCATED SUCH THAT THEY ARE EQUAL DISTANCE BEFORE AND AFTER CROSSING.

PROJECT:
SIERRA HOLLOW

CLIENT: SIERRA DEVELOPMENT, LLC



7/31/2019

REVISIONS

DATE	BY	DESCRIPTION

DRAWING INFO.

DRAWN BY:	MAB
DATE:	07/31/2019
SCALE:	
JOB NO.:	19-036
CAD NO.:	

SEWER

DETAILS

SHEET NUMBER:

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