Wastewater Construction Details

GRU™
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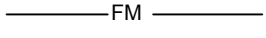
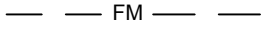
Water and Wastewater Engineering Department

WASTEWATER GRAVITY MAIN, PROPOSED

WASTEWATER GRAVITY MAIN, EXISTING

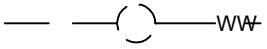


WASTEWATER (PRESSURE) FORCE MAIN, PROPOSED



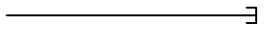
WASTEWATER (PRESSURE) FORCE MAIN, EXISTING

WASTEWATER MANHOLE, PROPOSED



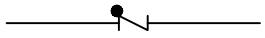
WASTEWATER MANHOLE, EXISTING


PLUG


CAP


GATE VALVE & BOX

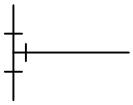

PLUG VALVE


SWING CHECK VALVE

AIR RELEASE VALVE


REDUCER FITTING


SEWER LATERAL W/ CLEAN OUT


FITTING

ELECTRIC TRANSFORMER

Revision Date: 3/12/2012	GRU More than Energy	Gainesville Regional Utilities Wastewater Construction Details SYMBOLS

TABLE 2.01

PVC PIPE SELECTION - WASTEWATER SYSTEMS

NO.	COVER CONDITION	PIPE MATERIAL	PIPE DR RATING	TESTING SPEC	USE
1.	3' < COVER < 6'	PVC	DR 25	AWWA C900	FORCE MAIN (4" DIA. THROUGH 12" DIA.)
2.	3' < COVER < 6'	PVC	DR 18	AWWA C905	FORCE MAIN (16" DIA. & GREATER)
3.	3' < COVER < 20'	PVC	SDR 26	ASTM D 3034	GRAVITY SEWER MAIN
4.	20' < COVER < 25'	PVC	DR 18	AWWA C900 PC150	GRAVITY SEWER MAIN

NOTE: OUTSIDE DIAMETER / WALL THICKNESS = STANDARD DIMENSION RATIO (SDR) OR DIMENSION RATIO (DR)

PIPE SIZE (IN)	PRESSURE CLASS (PSI)	NOMINAL THICKNESS (IN)
4	350	0.25
6	350	0.25
8	350	0.25
10	350	0.26
12	350	0.28
14	250	0.28
	300	0.30
	350	0.31
16	250	0.30
	300	0.32
	350	0.34
18	250	0.31
	300	0.34
	350	0.36
20	250	0.33
	300	0.36
	350	0.38
24	200	0.33
	250	0.37
	300	0.40
	350	0.43

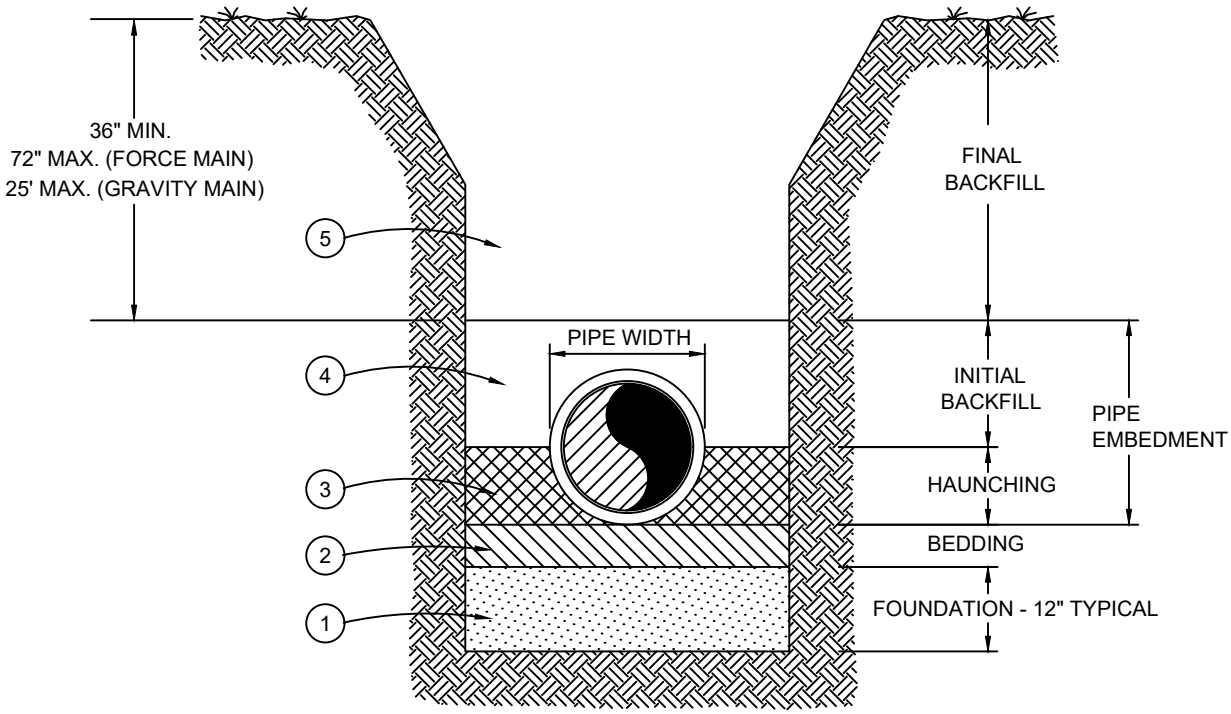
NOTES:

1. THESE PIPES ARE ADEQUATE FOR THE RATED WORKING PRESSURE PLUS A SURGE ALLOWANCE OF 100 PSI. FIGURE INCLUDES 2.0 SAFETY FACTOR TIMES THE SUM OF WORKING PRESSURE AND 100 PSI SURGE ALLOWANCE OF D.I.P.

2. AN ALLOWANCE FOR SINGLE H-20 TRUCK WITH 1.5 IMPACT FACTOR IS INCLUDED FOR ALL SIZES AND ALL DEPTHS OF COVER.

3. MINIMUM ALLOWABLE DEPTH OF COVER IS 3 FEET.
MAXIMUM ALLOWABLE DEPTH OF COVER OVER GRAVITY MAINS IS 25 FEET.
MAXIMUM ALLOWABLE DEPTH OF COVER OVER FORCE MAINS IS 6 FEET.

4. PROTECTO 401 CERAMIC EPOXY LINED D.I. ALLOWED ONLY AT GRU'S DISCRETION.



NOTES:

1. A FOUNDATION MAY BE REQUIRED IN VERY POOR SOIL CONDITIONS. FIELD DETERMINATION WILL BE PROVIDED BY GRU INSPECTOR. TYPICAL FOUNDATION THICKNESS SHALL BE 12", BUT MAY VARY ACCORDING TO NATURAL MATERIAL.

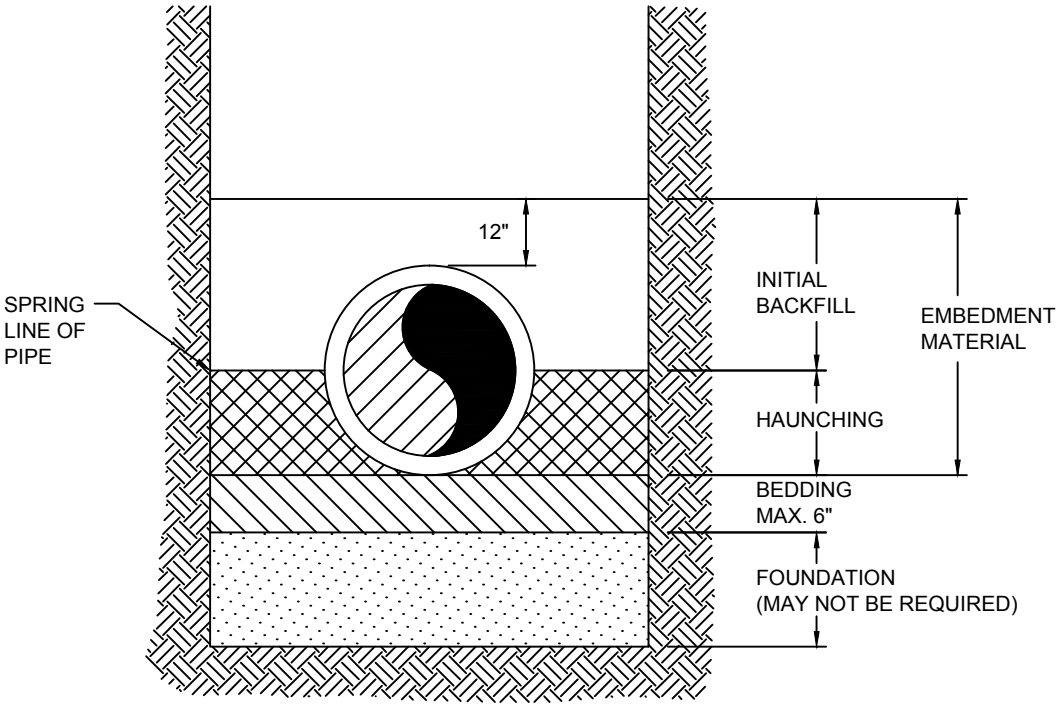
2. BEDDING IS REQUIRED PRIMARILY TO BRING THE TRENCH BOTTOM UP TO GRADE. BEDDING MATERIALS SHALL PROVIDE A UNIFORM AND ADEQUATE LONGITUDINAL SUPPORT UNDER THE PIPE. IN DRY SOIL CONDITIONS CLASS II OR CLASS III MATERIAL SHALL BE HAND PLACED 4" TO 6", LIGHTLY COMPACTED, UNIFORM AND NOT FINER THAN THE FOUNDATION MATERIAL. IN WET SOIL CONDITIONS CLASS I, CLASS II OR CLASS III SHALL BE HAND PLACED, 4" TO 6", UNIFORM AND NOT FINER THAN THE FOUNDATION MATERIAL. WHEN UTILIZING CLASS I MATERIAL, SUFFICIENT AMOUNTS OF CLASS II OR CLASS III MATERIAL SHALL BE ADDED TO FILL ALL VOIDS CREATED BY THE CLASS I MATERIAL.

3. HAUNCHING MATERIAL SHALL BE HAND PLACED TO THE SPRINGLINE OF THE PIPE. CLASS II OR CLASS III MATERIAL SHALL BE CONSOLIDATED UNDER THE PIPE AND HAND TAMPED TO 98% OF MODIFIED PROCTOR (ASTM D1557). DENSITY LOGS ARE REQUIRED.

4. INITIAL BACKFILL MATERIAL SHALL BE CLASS II OR CLASS III. IT SHALL BE HAND PLACED TO 12", ABOVE THE TOP OF THE PIPE. THE SOIL SHALL BE CONSOLIDATED BY HAND TAMPED TO 98% OF MODIFIED PROCTOR (ASTM D1557). DENSITY LOGS ARE REQUIRED.

5. FINAL BACKFILL MATERIAL MAY BE MACHINE PLACED. THE MATERIAL SHALL BE CLASS II OR CLASS III MATERIAL. CLASS IV MATERIAL MAY BE INSTALLED OUTSIDE OF THE ROADWAY. FINAL BACKFILL UNDER ROADWAYS MAY REQUIRE SPECIAL COMPACTION AND DENSITY TESTS. REFER TO CITY, COUNTY, OR FDOT STANDARDS, AS APPLICABLE.

PIPE ZONE TERMINOLOGY



EMBEDMENT MATERIALS

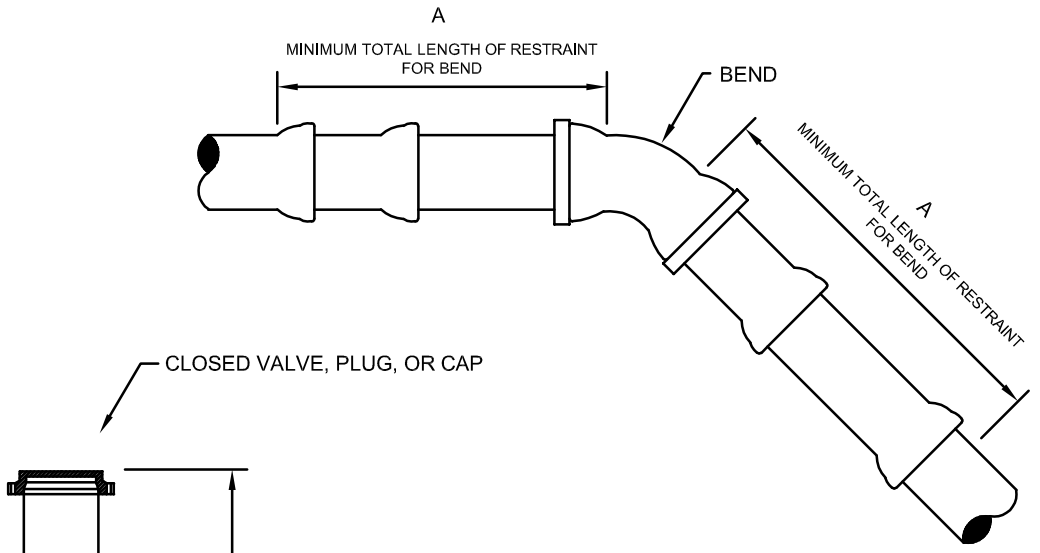
CLASS I: ANGULAR, $\frac{1}{4}$"TO $1\frac{1}{2}$" GRADED STONE, INCLUDING A NUMBER OF FILL MATERIALS THAT HAVE REGIONAL SIGNIFICANCE SUCH AS CORAL, SLAG, CINDERS, CRUSHED STONE AND CRUSHED SHELLS.

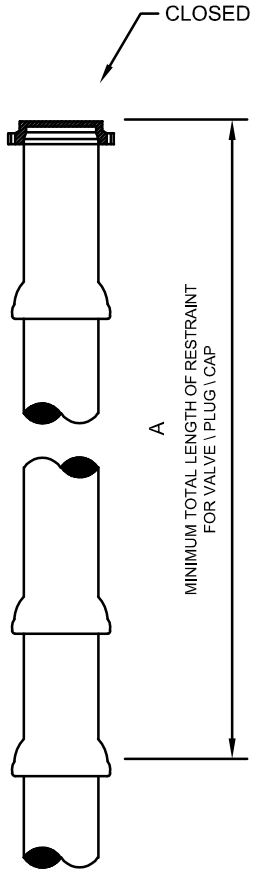
CLASS II: COARSE SANDS AND GRAVELS WITH MAXIMUM PARTICLE SIZE OF $1\frac{1}{2}$" INCLUDING VARIOUS GRADED SANDS AND GRAVELS CONTAINING SMALL PERCENTAGES OF FINES, GENERALLY GRANULAR AND NON-COHESIVE, EITHER WET OR DRY. AASHTO SOIL TYPES A-1 AND A-2 ARE INCLUDED IN THIS CLASS.

CLASS III: FINE SAND AND CLAYEY GRAVELS, INCLUDING FINE SANDS, SAND-CLAY MIXTURES AND GRAVEL-CLAY MIXTURES. AASHTO SOIL TYPES A-3 AND A-4 ARE INCLUDED IN THIS CLASS.

CLASS IV: SILT, SILTY CLAYS, AND CLAYS, INCLUDING INORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY AND LIQUID LIMITS. AASHTO SOIL TYPES A-5, A-6, A-7 AND A-8 ARE INCLUDED IN THIS CLASS. THESE MATERIALS ARE NOT TO BE USED FOR BEDDING, HAUCHING OR INTIAL BACKFILL.

CLASS V: THIS CLASS INCLUDES THE ORGANIC SOILS, AS WELL AS SOILS CONTAINING FROZEN EARTH, DEBRIS, ROCKS LARGER THAN $1\frac{1}{2}$"IN DIAMETER AND OTHER FOREIGN MATERIALS. THESE MATERIALS ARE NOT TO BE USED FOR BEDDING, HAUNCHING OR INITIAL BACKFILL.





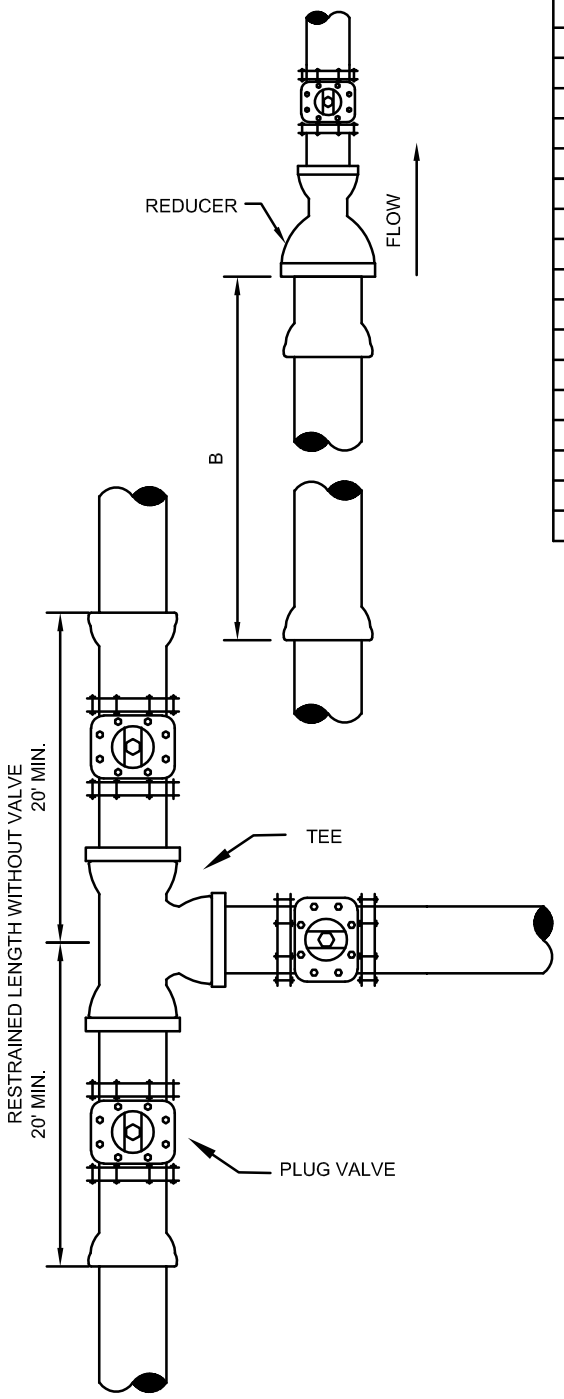
RESTRAIN "A" (LF)									
FITTING	4"	6"	8"	12"	16"	20"	24"	30"	36"
VALVE OR DEAD END	57	78	101	140	176	211	243	286	326
90° BEND	33	45	57	78	97	114	130	150	169
45°/OFFSET	14	19	24	33	41	47	54	63	71
22½° BEND	7	10	12	16	20	23	27	31	35
11¼° BEND	4	6	7	8	11	12	14	16	18

A=MINIMUM FOOTAGE OF PIPE TO BE RESTRAINED.

NOTES:
1. THIS TABLE IS BASED ON THE RESTRAINT CALCULATION SOFTWARE PROVIDED FREE OF CHARGE BY EBAA IRON INC. AT http://www.ebaa.com/engineering.htm AND THE FOLLOWING INPUT VARIABLES:
   A. MAXIMUM TEST PRESSURE OF 150 PSI
   B. LAYING CONDITION TYPE 3 (SEE DETAILS ON PAGE WW-2.6)
   C. POOR SOIL CONDITIONS (SOIL TYPE ML)
   D. USING PVC.
   E. 2 FEET OF COVER (NOTE: 3 FEET OF COVER REQUIRED BY GRU)
   F. HORIZONTAL BENDS ONLY - ENGINEER TO SUBMIT CALCULATIONS FOR VERTICAL RESTRAINTS
   G. SAFETY FACTOR = 1.5 TO 1

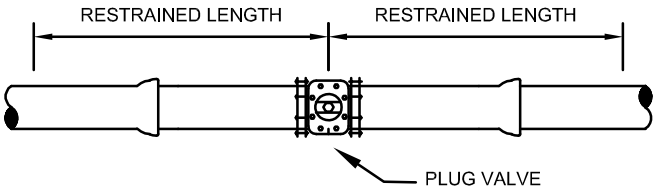
2. RESTRAINED PIPE SHALL BE MANUFACTURED RESTRAINED PIPE, PUSH-ON RESTRAINTS OR PIPE RESTRAINED BY EBAA MEGALUG OR EQUIVALENT.

3. ANY ADDITIONAL FITTINGS WITHIN THE RESTRAINED SECTION SHALL BE RESTRAINED ACCORDINGLY TO THE LONGER DIMENSION.



FITTING SIZE	RESTRAIN (LF) REDUCER "B"
6x4	54
8x4	97
8x6	58
12x4	163
12x6	137
12x8	101
16x6	200
16x8	173
16x12	101
20x6	254
20x8	234
20x12	179
20x16	100
24x6	302
24x8	286
24x12	242
24x16	179
24x20	97

FITTING SIZE	RESTRAIN (LF) REDUCER "B"
30x6	365
30x8	353
30x12	319
30x16	270
30x20	210
30x24	136
36x6	423
36x8	412
36x12	385
36x16	348
36x20	299
36x24	240
36x30	134



NOTES:

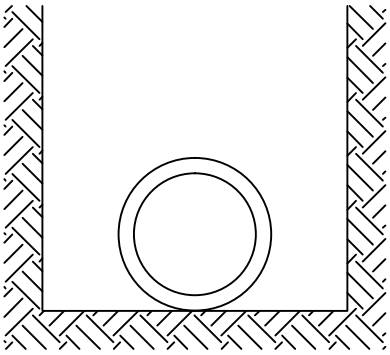
1. THIS TABLE IS BASED ON THE RESTRAINT LENGTH CALCULATOR SOFTWARE PROVIDED FREE OF CHARGE BY EBAA IRON INC. AT http://www.ebaa.com/engineering.htm AND THE FOLLOWING INPUT VARIABLES:
   A. MAXIMUM TEST PRESSURE OF 150 PSI
   B. LAYING CONDITION TYPE 3 (SEE DETAILS ON PAGE WW-2.6)
   C. POOR SOIL CONDITIONS (SOIL TYPE ML)
   D. USING P.V.C.
   E. 2 FEET OF COVER (NOTE: 3 FEET OF COVER REQUIRED BY GRU)
   F. HORIZONTAL BENDS ONLY - ENGINEER TO SUBMIT CALCULATIONS FOR VERTICAL RESTRAINTS
   G. SAFETY FACTOR = 1.5 TO 1

2. RESTRAINED PIPE SHALL BE MANUFACTURED RESTRAINED PIPE, PUSH-ON RESTRAINTS OR PIPE RESTRAINED BY EBAA MEGALUG.

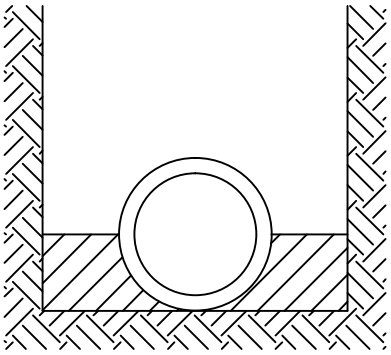
3. ANY ADDITIONAL FITTINGS WITHIN THE RESTRAINED SECTION SHALL BE RESTRAINED ACCORDING TO LONGER DIMENSION.

4. IF EITHER (OR BOTH) RUNS OF A TEE HAVE A VALVE, THEN THE OTHER RUN AND THE BRANCH OF THE TEE SHALL BE TREATED AS AN ELL, AND RESTRAINED ACCORDING TO THE TABLE ON DETAIL WW-2.4.

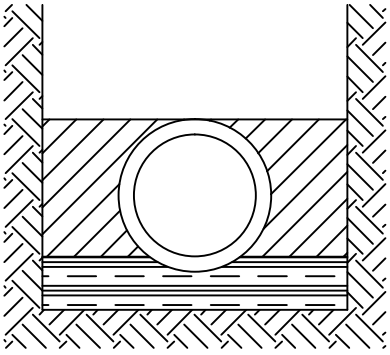
Revision Date:		
1/31/2019	GRU More than Energy	Gainesville Regional Utilities Wastewater Construction Details FORCE MAIN RESTRAINED JOINT STANDARD FOR TEE AND REDUCERS



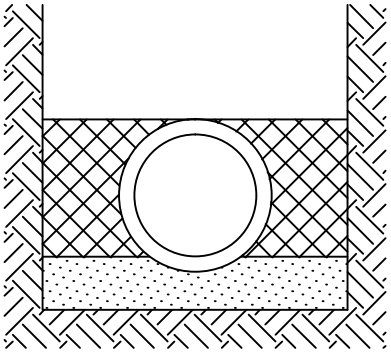
TYPE 1 *
FLAT-BOTTOM TRENCH. ** LOOSE BACKFILL.



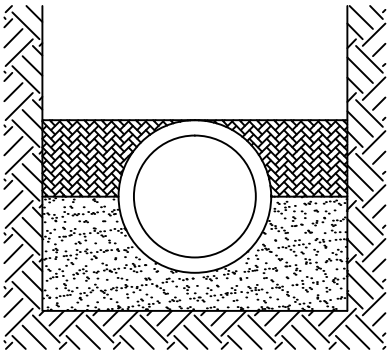
TYPE 2
FLAT-BOTTOM TRENCH. ** BACKFILL LIGHTLY CONSOLIDATED TO CENTERLINE OF PIPE.



TYPE 3
PIPE BEDDED IN 4-INCH MINIMUM LOOSE SOIL. *** BACKFILL LIGHTLY CONSOLIDATED TO TOP OF PIPE.



TYPE 4
PIPE BEDDED IN SAND, GRAVEL, OR CRUSHED STONE TO DEPTH OF 1/8 PIPE DIAMETER, 4-INCH MINIMUM. BACKFILL COMPACTED TO TOP OF PIPE (APPROXIMATELY 80% STANDARD PROCTOR, AASHTO T-99).



TYPE 5
PIPE BEDDED TO ITS CENTERLINE IN COMPACTED GRANULAR MATERIAL, 4-INCH MINIMUM UNDER PIPE. COMPACTED GRANULAR OR SELECT MATERIAL*** TO TOP OF PIPE (APPROXIMATELY 90% STANDARD PROCTOR, AASHTO T-99).

NOTES

CONSIDERATION OF THE PIPE-ZONE EMBEDMENT CONDITIONS INCLUDED IN THIS FIGURE MAY BE INFLUENCED BY FACTORS OTHER THAN PIPE STRENGTH. FOR ADDITIONAL INFORMATION ON PIPE BEDDING AND BACKFILL, SEE ANSI/AWWA C600.

*FOR NOMINAL PIPE SIZES 14-INCH AND LARGER,

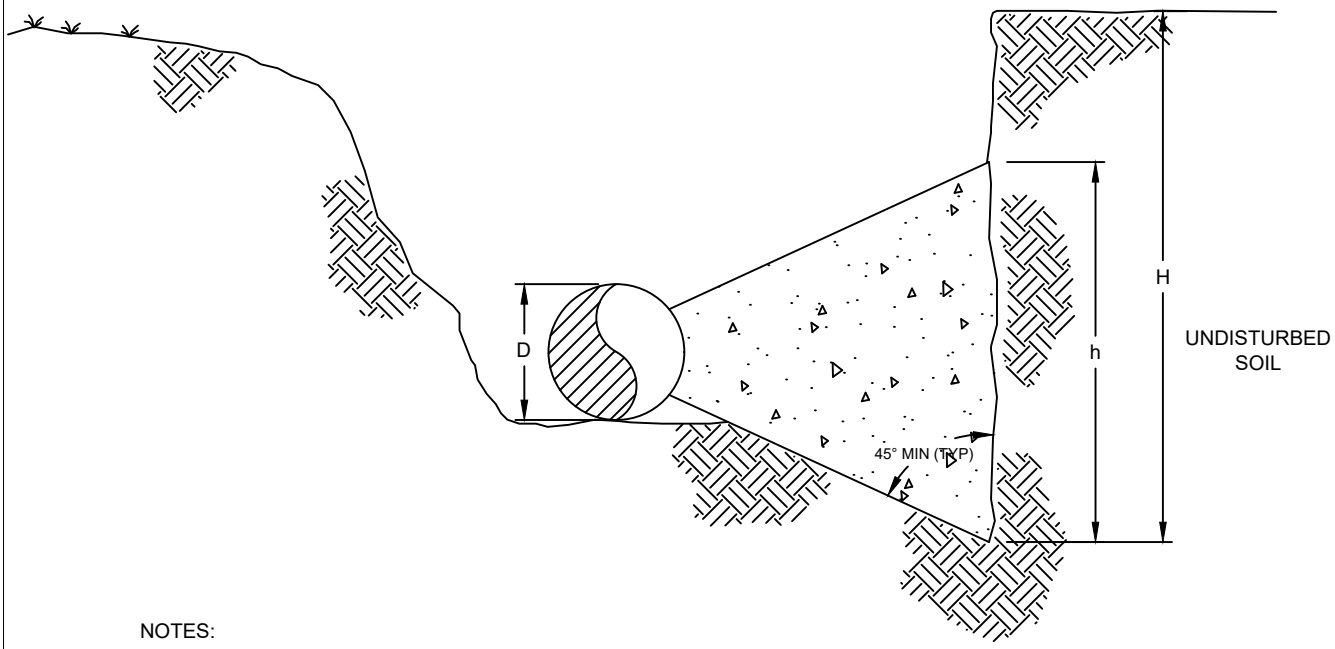
**FLAT BOTTOM IS DEFINED AS UNDISTURBED EARTH CONSIDERATION SHOULD BE GIVEN TO THE USE OF LAYING CONDITIONS OTHER THAN TYPE 1.

***"LOOSE SOIL" OR "SELECT MATERIAL" IS DEFINED AS "NATIVE SOIL EXCAVATED FROM THE TRENCH, FREE OF ROCKS, FOREIGN MATERIAL, AND FROZEN EARTH".

Revision Date:		
2/20/08	GRU More than Energy	Gainesville Regional Utilities Wastewater Construction Details PIPE BEDDING & BACKFILL

NOMINAL PIPE DIAMETER (INCHES)	BEARING AREA REQUIRED (SQ. FT.)				
	DEAD ENDS	11-1/4° BEND	22-1/2° BEND	45° BEND	90° BEND
4	1	1	1	1	2
6	2	1	1	2	3
8	4	1	2	3	5
10	5	1	2	4	7
12	7	2	3	6	10
14	9	2	4	7	13
16	12	3	5	10	17
18	14	3	6	11	20
20	19	4	8	14	26
24	27	6	11	21	37
30	41	8	16	31	57
36	58	12	23	45	82

NOTE: 1. TABLE CALCULATED FOR A SOIL BEARING CAPACITY OF 3000 POUNDS PER SQUARE FOOT AND HYDROSTATIC TEST PRESSURE OF 100 PSI.



NOTES:

1. THE BLOCK HEIGHT (h) SHOULD BE EQUAL TO OR LESS THAN HALF THE DEPTH OF BURY (H). DO NOT ALLOW (h) TO BE LESS THAN (D) THE DIAMETER OF THE PIPE.

2. BEARING AREA = w x h, WHERE (w) IS THE WIDTH OF THE REACTION BLOCK AGAINST UNDISTURBED SOIL. DETERMINE THE BEARING AREA FROM THE TABLE ABOVE AND DIVIDE BY (h), E.G. FOR A 10" PIPE WITH A 45° BEND, THE REQ'D THRUST BLOCK AREA WOULD BE 4 SQ. FT. (FROM TABLE ABOVE). IF H = 4 FT, THEN h MUST BE BETWTEEN 10 IN. (PIPE DIA.) AND 2 FT. (1/2 H). ASSUME h = 2 FT., THEN:
w = BEARING AREA / h = 4 SQ. FT. / 2 FT. = 2 FT.

NOTE: GRU APPROVAL MUST BE OBTAINED BEFORE USING THRUST BLOCKS; MECHANICALLY RESTRAINED JOINTS ARE STANDARD.

TABLE I

NOMINAL PIPE DIAMETER (IN.)	FORCE = THRUST IN POUNDS AT 150 P.S.I.				
	DEAD ENDS	11-1/4° BEND	22-1/2° BEND	45° BEND	90° BEND
4"	2715	533	1059	2078	3840
6"	5609	1100	2189	4293	7932
8"	9648	1892	3764	7385	13644
10"	14516	2846 *	5663	1111	20528
12"	20528	4025	8009	15711	29030
14"	27428	5376	10700	20993	38789
16"	35669	6992	13914	27300	50442
18"	41798	8782	16305	31992	59111
20"	54965	10775	21441	42071	77732
24"	78419	15372	30591	60021	110900
30"	120638	23648	47061	92336	170691
36"	172814	33875	67414	132266	244394

IN COMPUTING THE THRUST FORCE TO BE RESISTED BY FORCE BLOCKING THE FORMULA F = 2PA SIN (0/2) SHALL BE USED FOR DIFFERENT TYPES OF BENDS AND F = PA FOR DEAD END PIPE.

* EXAMPLE: WITH 10" DIA. D.I.P. (11.1" O.D.) & 11-1/4" BEND.
F = 2 x 150 P.S.I. x (PI x (11.1/2) x SIN(11.25/2) = 2846 LBS.

NOTE: GRU APPROVAL MUST BE OBTAINED BEFORE USING THRUST BLOCKS; RESTRAINED JOINTS ARE STANDARD.

NOTES: 1. THE SOIL BEARING CAPACITY VALUE MOST COMMONLY ASSUMED FOR DESIGN PURPOSES WITHIN GRU'S SERVICE AREA IS 3,000 LB./SQ. FT.

2. THE O.D. OF THE PIPE IS USED IN DETERMINING THE AREA BECAUSE THE PRESSURE IS DISTRIBUTED TO THE GASKET FOR MECHANICAL AND SLIP JOINTS.

3. MULTIPLY TABLE I BY 0.67 TO DETERMINE THE THRUST AT 100 PSI.

TABLE I

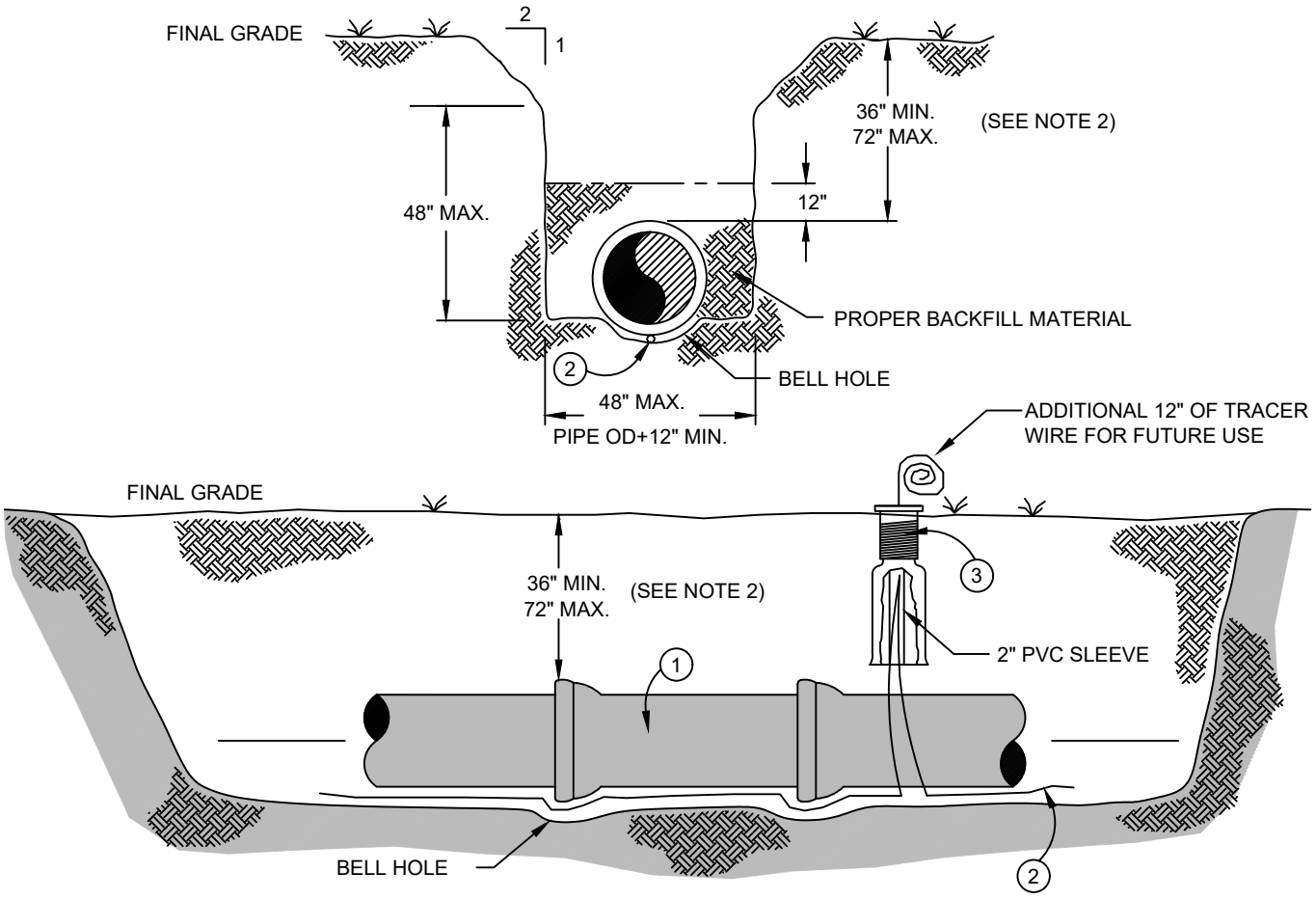
BEARING CAPACITIES OF UNDISTURBED SOIL	
SAFE RANGE IN POUNDS PER SQ. FT.	UNDISTURBED SOIL TYPE
50,000 TO 200,000	LODGE ROCK, GRANITE, TRAP ROCK & SIMILAR
50,000 TO 60,000	ROCK - EQUAL TO GOOD MASONARY
30,000 TO 40,000	ROCK - EQUAL TO BEST BRICK
10,000 TO 20,000	ROCK - EQUAL TO POOR BRICK
8,000 TO 12,000	CLAY - ALWAYS DRY
4,000 TO 8,000	CLAY - MODERATELY DRY
2,000 TO 4,000	CLAY - SOFT
8,000 TO 10,000	HARDPAN, CEMENTED SAND & GRAVEL
8,000 TO 12,000	SAND - COMPACTED FIRM
4,000 TO 8,000	SAND - CLEAN, DRY, MEDIUM, COMPACT
2,000 TO 4,000	SAND - FINE LOOSE
1,000 TO 2,000	QUICK SAND, ALLUVIAL SOIL

IN COMPUTING THE THRUST FORCE TO BE RESISTED BY FORCE BLOCKING THE FORMULA F = 2PA x SIN(0/2) SHALL BE USED FOR DIFFERENT TYPES OF BENDS AND F = PA FOR DEAD END PIPE.

NOTES:

1. THE SOIL BEARING CAPACITY VALVE MOST COMMONLY USED IN OUR AREA IS 3,000lb./SQ. FT.

2. THE O.D. OF THE PIPE IS USED IN DETERMINING THE AREA BECAUSE THE PRESSURE IS DISTRIBUTED TO THE GASKET FOR MECHANICAL AND SLIP JOINTS.



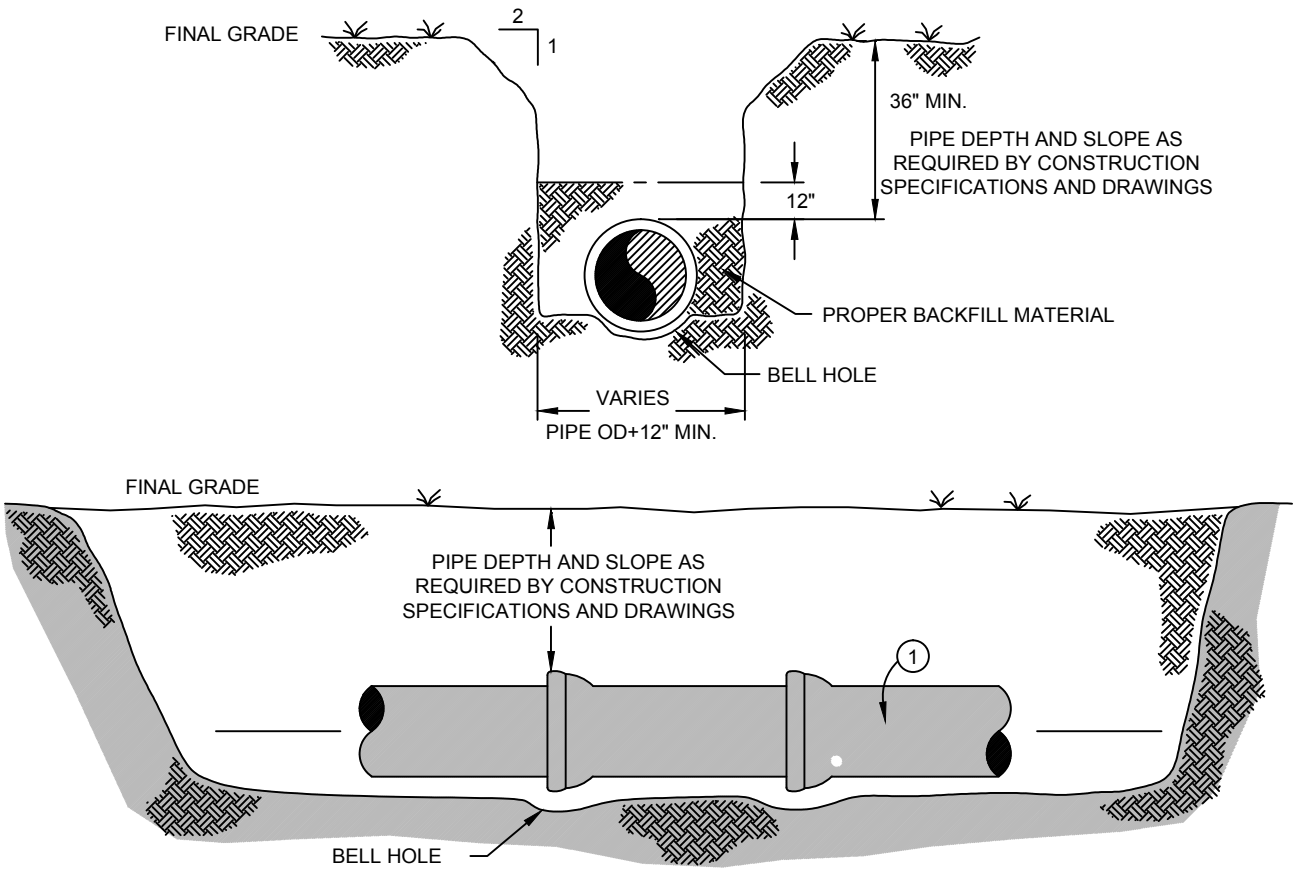
MATERIALS	
ITEM	DESCRIPTION
1	FORCE MAIN PIPE
2	TRACER WIRE, AWG #10, GREEN
3	VALVE BOX

NOTES:

1. PLASTIC PIPE REQUIRES AN INSULATED COPPER WIRE TAPED EVERY 10 FEET ON THE BOTTOM OF THE PIPE. THE WIRE SHALL BE CONTINUOUS, AND ALL SPLICES ARE REQUIRED TO BE MADE WITH TRACER-LOCK PART # TL-LUG-55 CONNECTORS.

2. DEPTH OF PIPE MAY BE FIELD ADJUSTED TO MEET SPECIAL CONDITIONS AS DETERMINED BY GRU ENGINEER OR INSPECTOR, HOWEVER, DIRECTION OF SLOPE SHALL NOT BE CHANGED. THE MAXIMUM ALLOWABLE DEPTH OF COVER FOR WASTEWATER FORCE MAIN PIPING IS SIX FEET.

3. VALVE BOX SHALL BE INSTALLED AT MAXIMUM 500 Ft. INTERVALS FOR ACCESS AND TESTING OF TRACER WIRE.

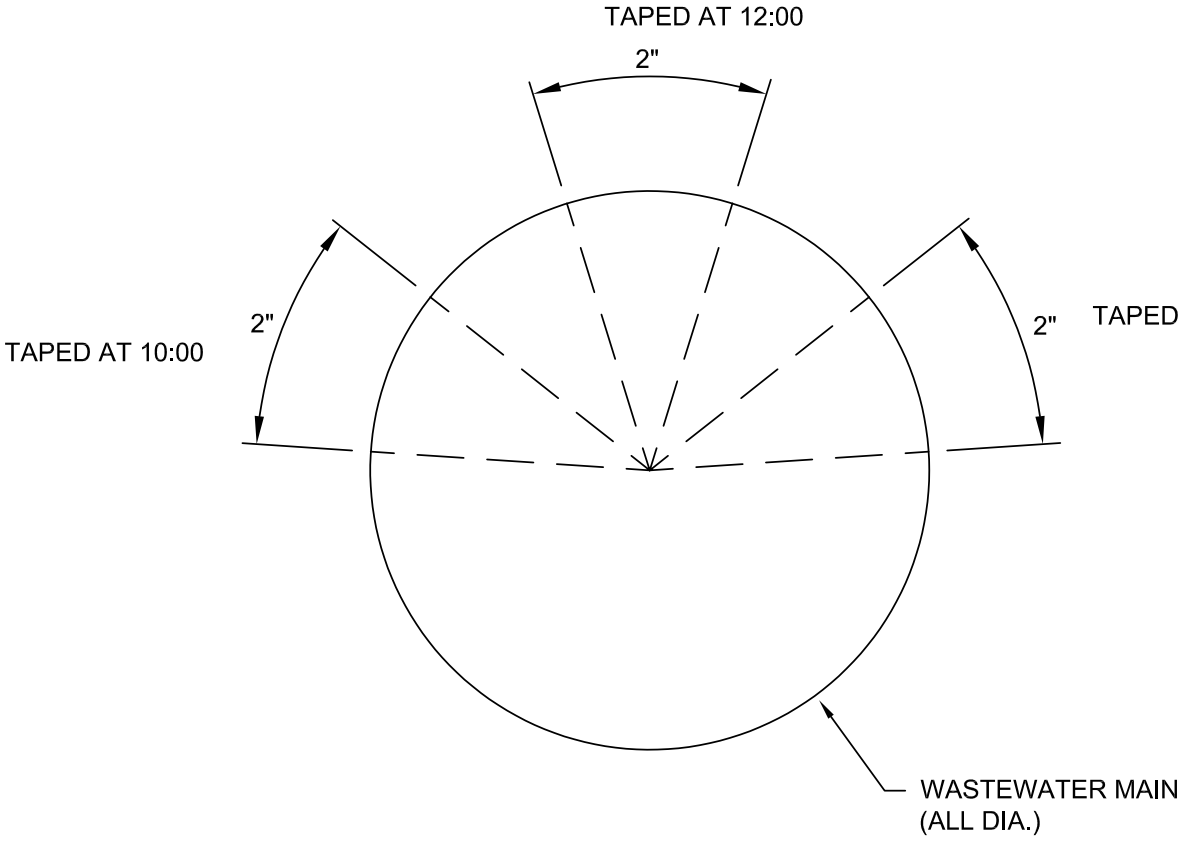


MATERIALS	
ITEM	DESCRIPTION
1	GRAVITY SEWER MAIN PIPE

NOTES:

1. GRAVITY MAIN PIPE SHALL BE INSTALLED AT THE LINE AND GRADE AS SHOWN ON THE GRU APPROVED CONSTRUCTION DRAWINGS.

2. PIPE MATERIAL SHALL CONFORM TO WW-2.0.



NOTES:

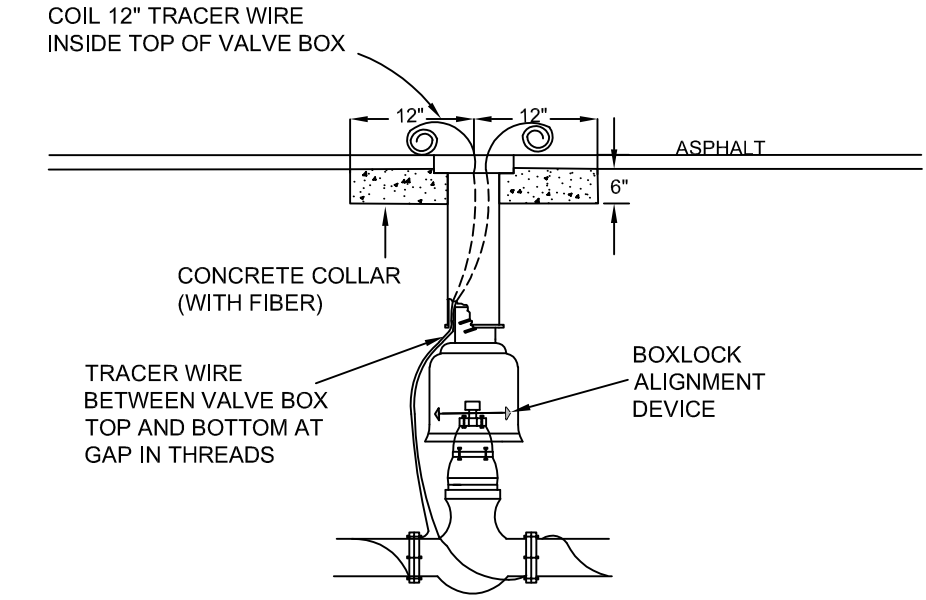
1. PVC PIPE SHALL BE GREEN AND LABELED "WASTEWATER" OR "SEWER."

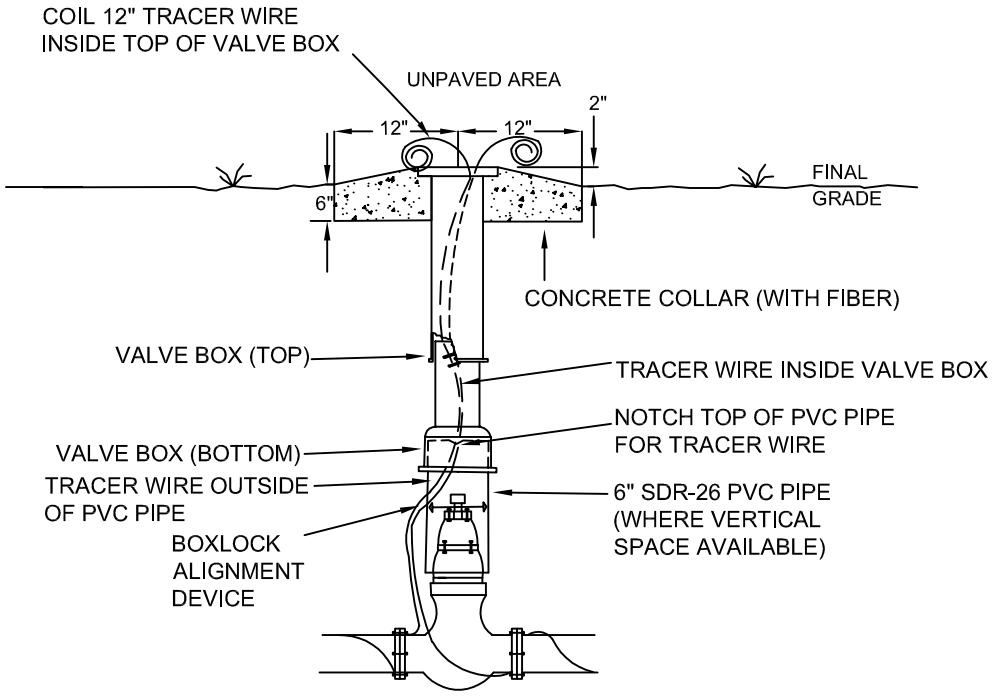
2. ALL OTHER PIPE MATERIAL SHALL BE IDENTIFIED WITH IMBEDDED GREEN STRIPES. HDPE GRAVITY SEWER PIPE SHALL HAVE IMBEDDED EXTERNAL GREEN STRIPES AND BE GREY INSIDE, FOR EFFECTIVE USE OF CCTV FOR INSPECTION.

3. THERE SHALL BE A MINIMUM OF THREE CONTINUOUS COLORED STRIPES ALONG THE PIPE (LOCATED AT 10:00, 12:00, AND 2:00) EACH A MINIMUM OF 2 INCHES WIDE.

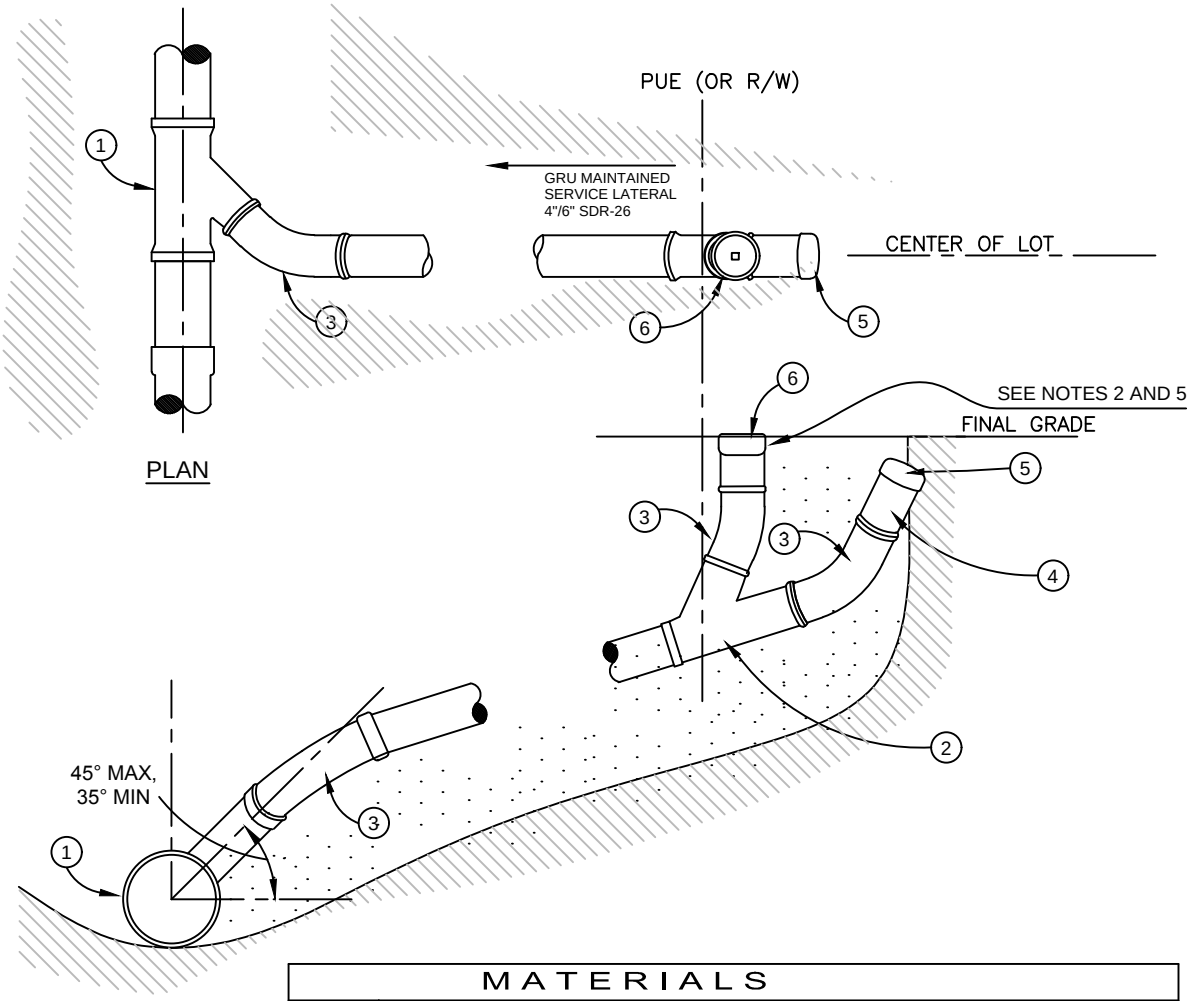
4. THERE SHALL BE A GREEN TRACER WIRE INSTALLED WITH PLASTIC PIPES, NO EXCEPTIONS.

Revision Date:		
3/26/2018	GRU More than Energy	Gainesville Regional Utilities Wastewater Construction Details WASTEWATER MAIN PIPE IDENTIFICATION



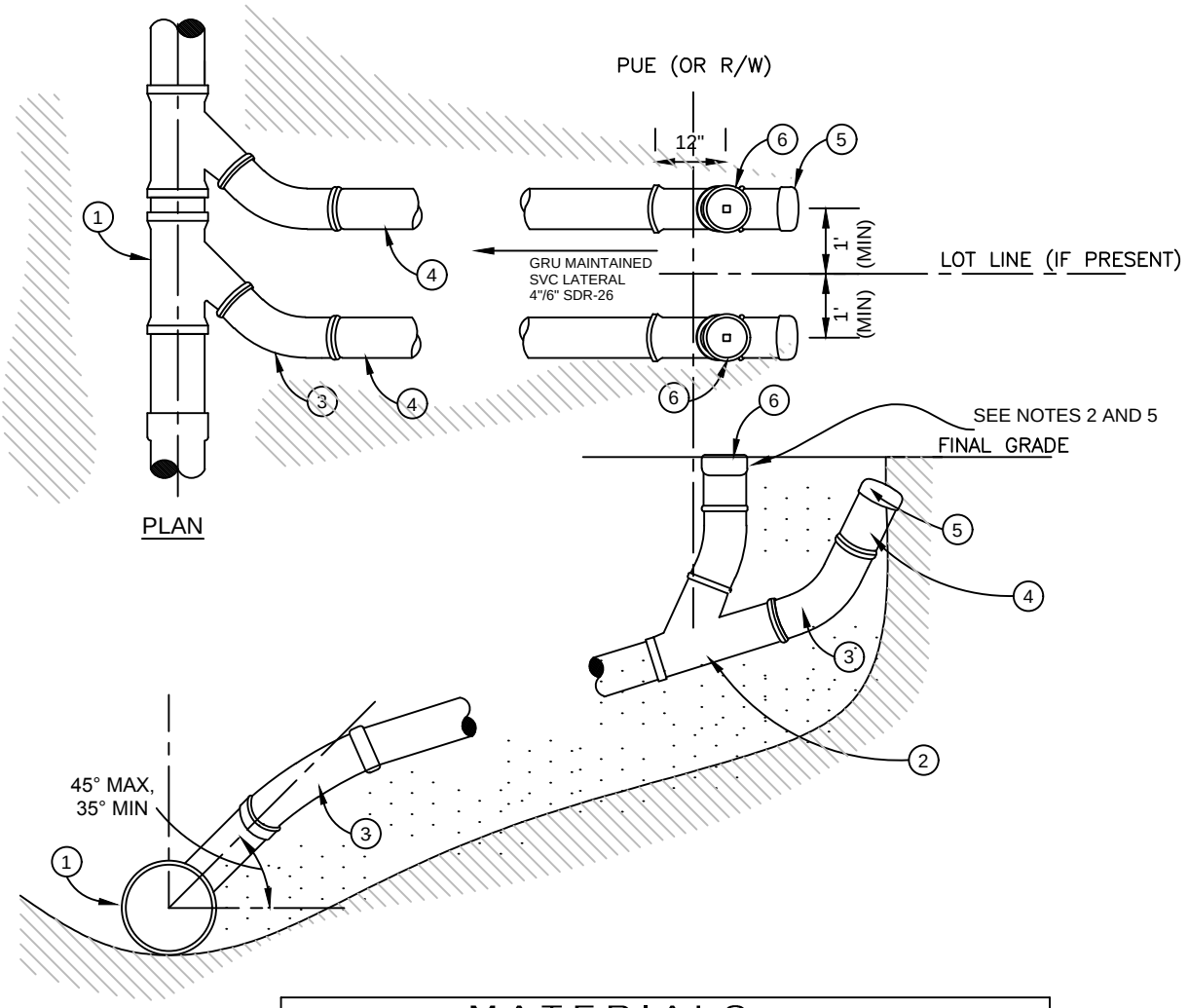


Revision Date:		
5/02/2019	GRU More than Energy	Gainesville Regional Utilities Wastewater Construction Details Valve Box Detail



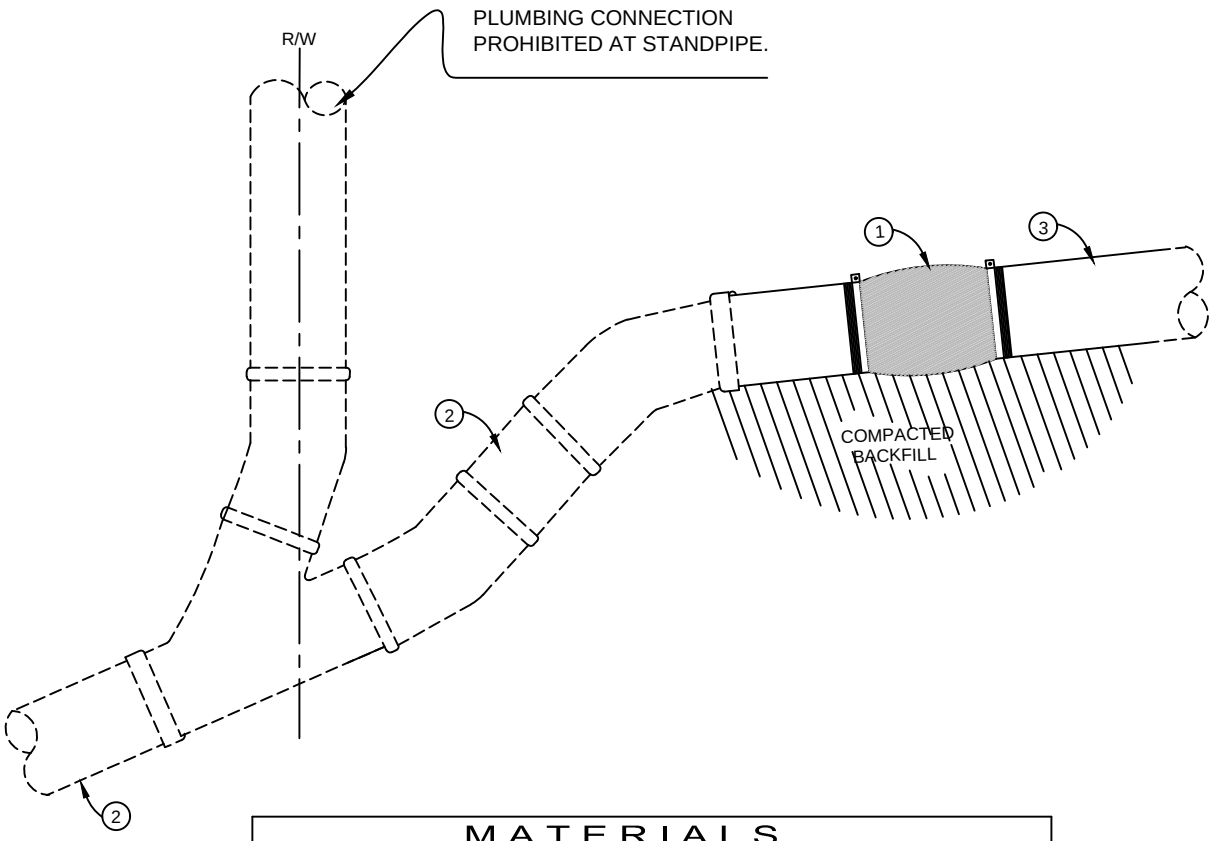
MATERIALS		
ITEM	DESCRIPTION	
1	6" or 8" X 4" OR 6"	GRAVITY MAIN WYE
2	4" or 6"	CLEANOUT WYE
3	4" or 6"	45° BEND
4	4" or 6"	SERVICE LATERAL PIPE CONNECTION
5	4" or 6"	PVC CAP, PLUMBING CONNECTION 1' BELOW GRADE
6	4" or 6"	CLEANOUT ADAPTER W/ THREADED PLUG

NOTES:
1. PVC (SDR-26) WYES ARE ACCEPTABLE. PVC (SDR-26) T-WYE & STANDARD TEES ARE UNACCEPTABLE
2. CLEAN-OUTS SHALL BE INSTALLED 3' ABOVE GRADE FOR SINGLE FAMILY RESIDENCES.
3. WHERE CLEAN-OUT IS WITHIN PARKING LOT AND/OR PAVING OR SIDEWALK, CLEAN-OUT MUST BE INSTALLED 3"-4" BELOW FINAL GRADES WITH TRAFFIC BEARING COVER AT FINAL GRADE.
4. WHERE CLEAN-OUT IS WITHIN SIDEWALK, IT MUST BE INSTALLED FLUSH WITH SURFACE OF SIDEWALK WITH A TRAFFIC LOAD BEARING COVER.
5. PLUMBER SHALL NOT CONNECT TO CLEANOUT STANDPIPE.



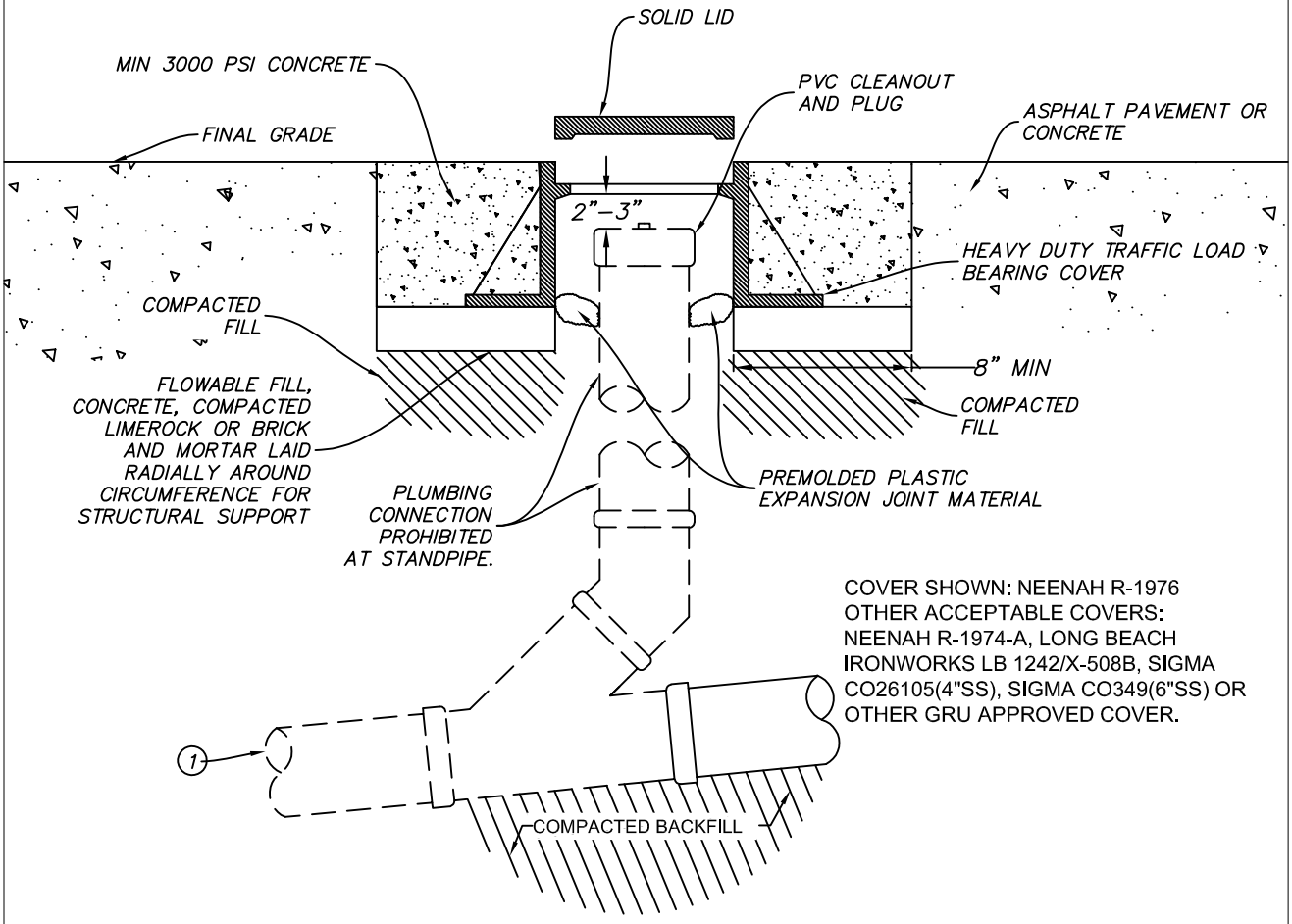
MATERIALS		
ITEM	DESCRIPTION	
1	6" or 8"	GRAVITY MAIN WYE
2	4" or 6"	CLEANOUT WYE
3	4" or 6"	45° BEND
4	4" or 6"	SERVICE LATERAL PIPE
5	4" or 6"	PVC CAP, PLUMBING CONNECTION 1' BELOW GRADE
6	4" or 6"	CLEANOUT ADAPTER W/ THREADED PLUG

NOTES:
1. PVC (SDR-26) WYES ARE ACCEPTABLE. PVC (SDR-26) T-WYE & STANDARD TEES ARE UNACCEPTABLE
2. CLEAN-OUT SHALL BE INSTALLED 3' ABOVE FINAL GRADE FOR SINGLE FAMILY RESIDENCES.
3. WHERE CLEAN-OUT IS WITHIN PARKING LOT AND/OR PAVING OR SIDEWALK, CLEAN-OUT MUST BE INSTALLED 3"-4" BELOW FINAL GRADES WITH TRAFFIC BEARING COVER FLUSH WITH FINAL GRADE.
4. WHERE CLEAN-OUT IS WITHIN SIDEWALK, IT MUST BE INSTALLED FLUSH WITH SURFACE OF SIDEWALK WITH A BRASS PLUG WITH SQUARE RECESS.
5. PLUMBER SHALL NOT CONNECT TO STANDPIPE.



MATERIALS	
ITEM	DESCRIPTION
1	4"x4" FERNCO COUPLING
2	4" PVC SERVICE LATERAL PIPE
3	CUSTOMER'S SERVICE LATERAL PIPE (4" PVC)

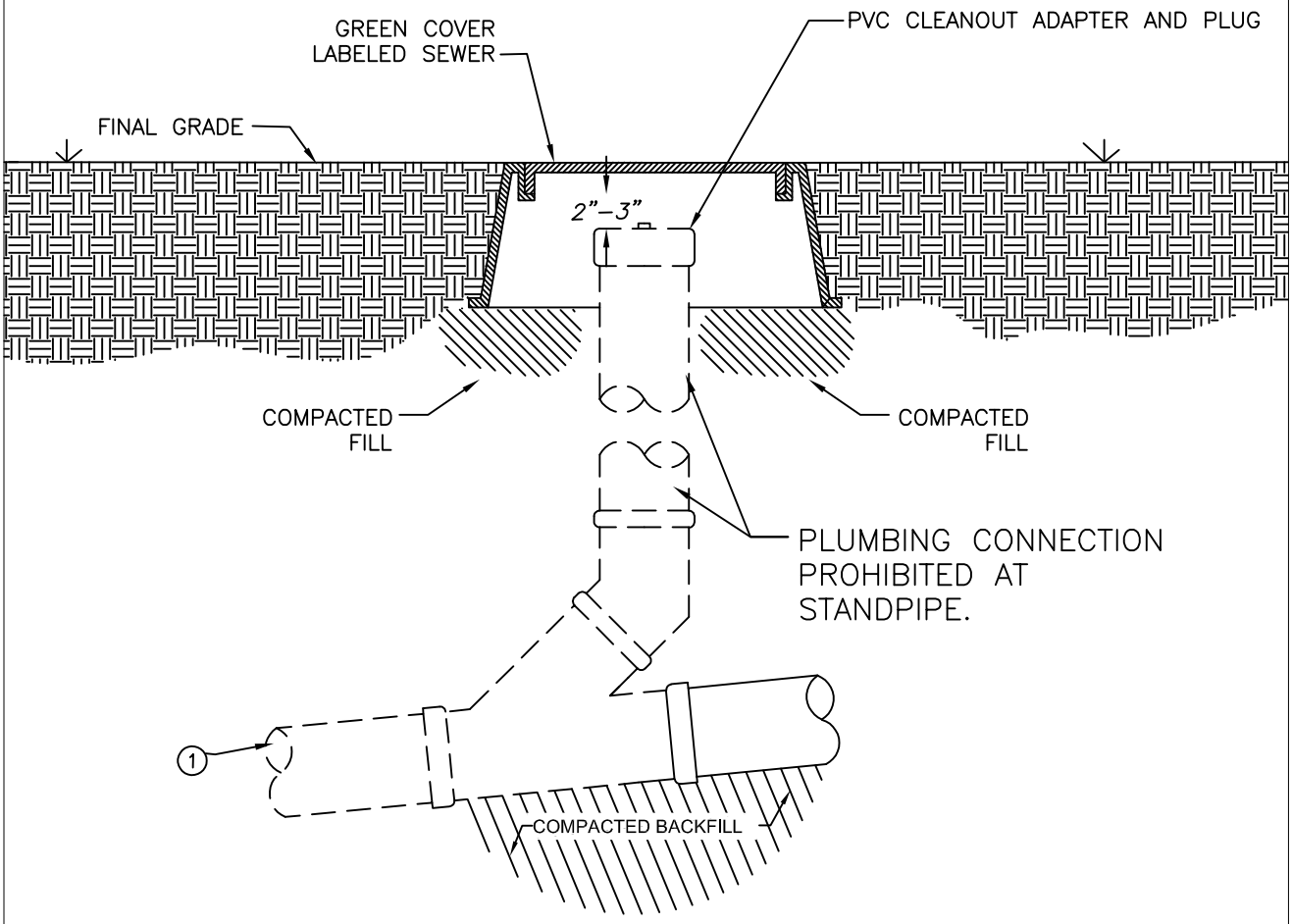
NOTES:
1. OPEN TRENCH INSPECTION REQUIRED BY THE CITY OF GAINESVILLE BUILDING DEPT., CODE ENFORCEMENT DIVISION, FOR ALL PLUMBERS WITHIN THE CITY LIMITS.
2. NO OPEN TRENCH INSPECTION REQUIRED BY ALACHUA COUNTY CODE ENFORCEMENT DEPT. GRU INSPECTOR NOTIFICATION REQUIRED.
3. PLUMBER SHALL NOT CONNECT TO STANDPIPE.



MATERIALS	
ITEM	DESCRIPTION
1	4" OR 6" PVC SERVICE LATERAL PIPE

NOTES: 1. OPEN TRENCH INSPECTION REQUIRED BY THE CITY OF GAINESVILLE BUILDING DEPT., CODE ENFORCEMENT DIVISION, FOR ALL PLUMBERS WITHIN THE CITY LIMITS.
2. NO OPEN TRENCH INSPECTION REQUIRED BY ALACHUA COUNTY CODE ENFORCEMENT DEPT. GRU INSPECTOR NOTIFICATION REQUIRED.
3. PLUMBER SHALL NOT CONNECT TO STANDPIPE.
4. H-20 MINIMUM LOAD RATING REQUIRED.
5. TRAFFIC LOAD BEARING COVER INSTALLATION REQUIRED FOR GRU MAINTAINED AND PRIVATE CLEANOUTS.

Revision Date: 10/5/2011	GRU More Than Energy	**Gainesville Regional Utilites** Wastewater Construction Details
		WASTEWATER CLEANOUT WITH TRAFFIC LOAD BEARING COVER



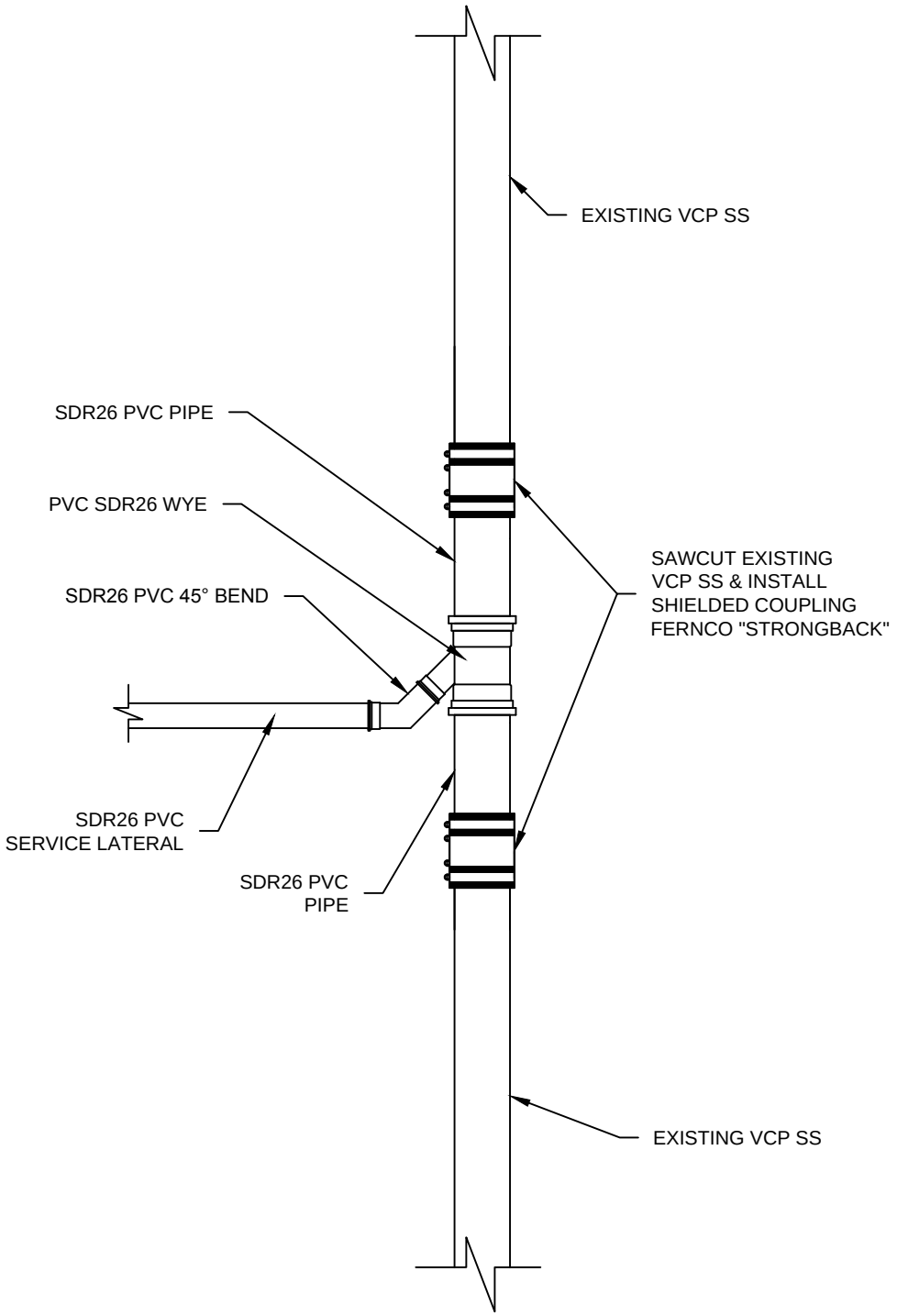
MATERIALS	
ITEM	DESCRIPTION
1	4" OR 6" PVC SERVICE LATERAL PIPE
2	BOX, CLEANOUT, PLASTIC
3	LID, GREEN, SEWER, T-TOP

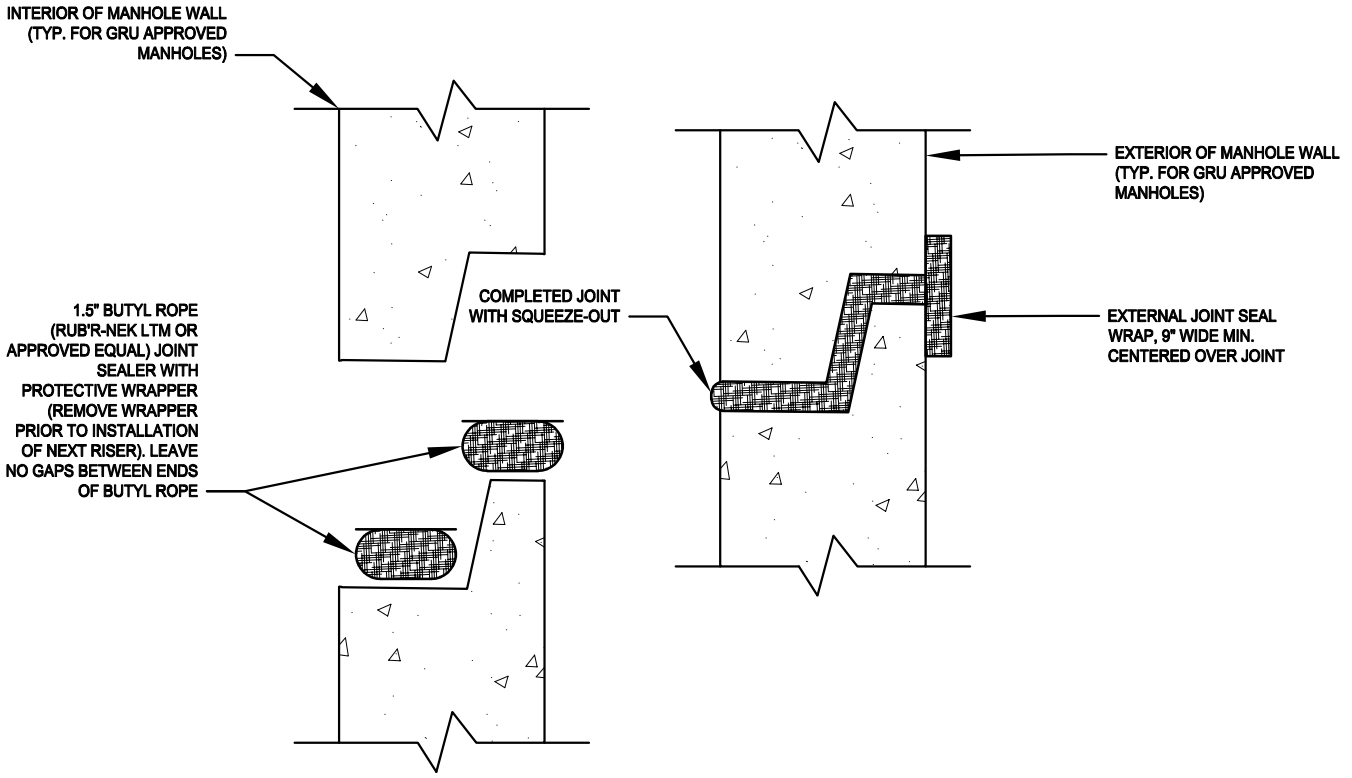
NOTES:
1. PLUMBER SHALL NOT CONNECT TO STANDPIPE.

2. OPEN TRENCH INSPECTION REQUIRED BY ALACHUA COUNTY CODE ENFORCEMENT DEPT. OUTSIDE CITY LIMITS.

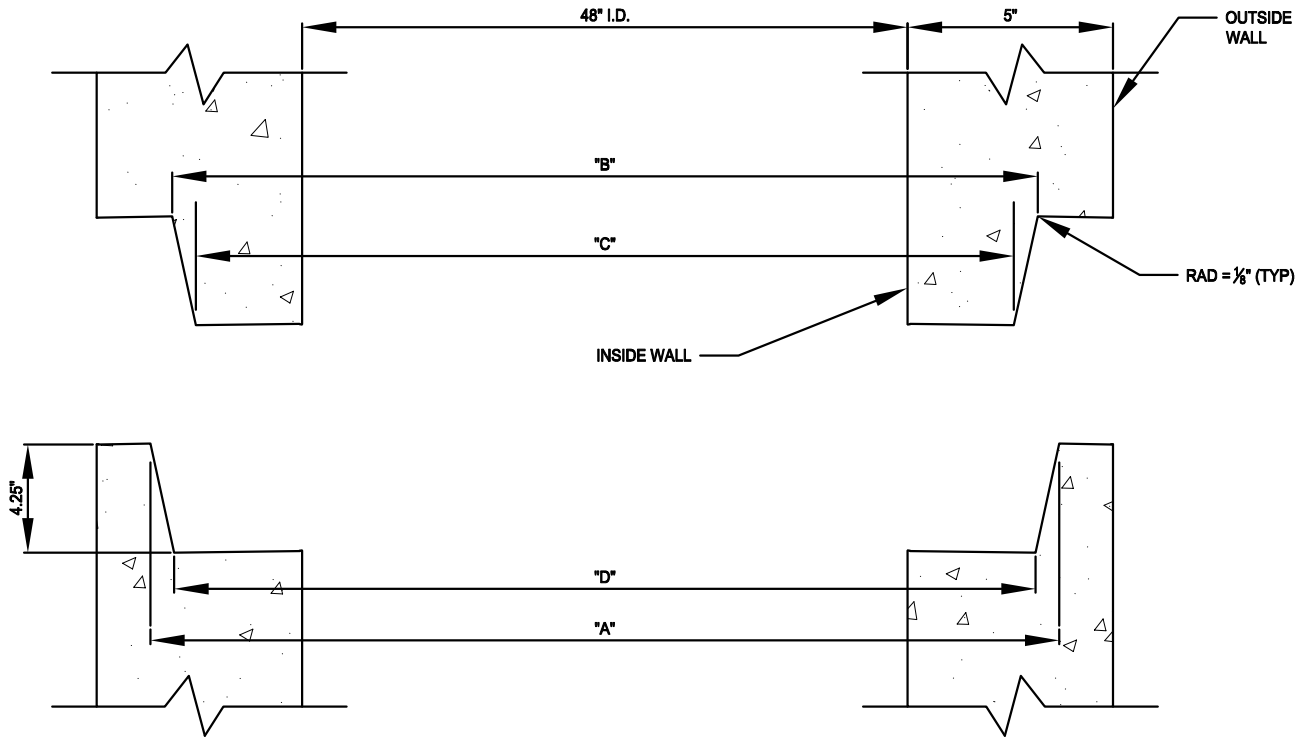
3. OPEN TRENCH INSPECTION REQUIRED BY THE CITY OF GAINESVILLE BUILDING DEPT., CODE ENFORCEMENT DIVISION, FOR ALL PLUMBERS WITHIN THE CITY LIMITS.

4. INSTALLATION REQUIRED FOR GRU MAINTAINED AND PRIVATE CLEANOUTS.


EXISTING VCP SS
SDR26 PVC PIPE
PVC SDR26 WYE
SDR26 PVC 45° BEND
SAWCUT EXISTING
VCP SS & INSTALL
SHIELDED COUPLING
FERNCO "STRONGBACK"
SDR26 PVC
SERVICE LATERAL
SDR26 PVC
PIPE
EXISTING VCP SS



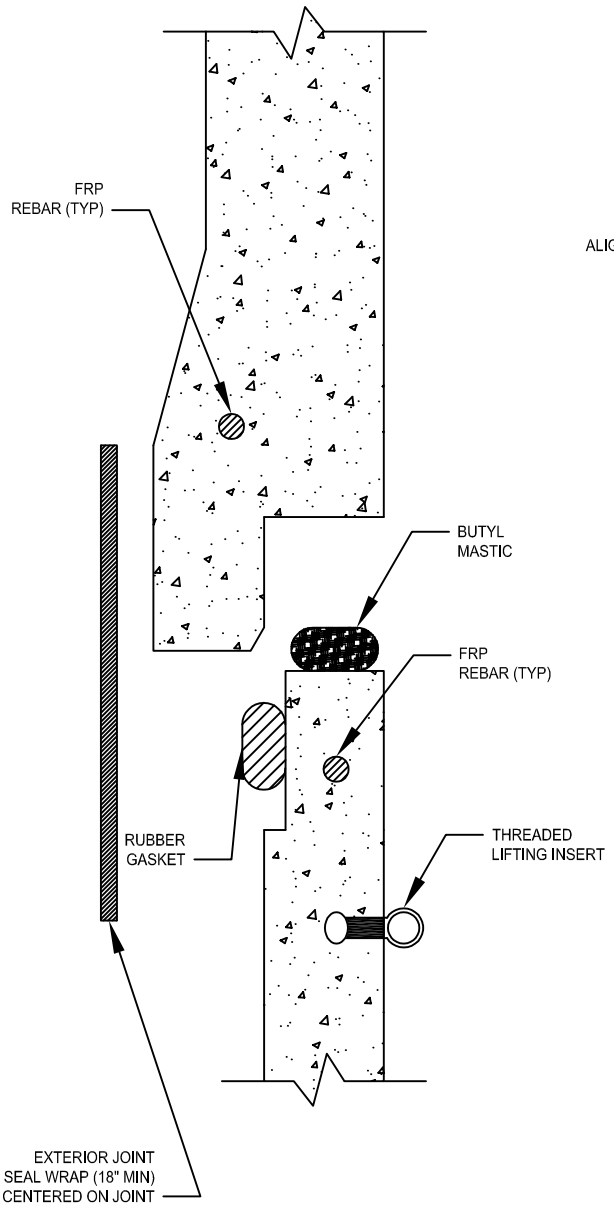
MANHOLE JOINT	"A"	"B"	"C"	"D"
7 ° JOINT ANGLE	53.043	52.543	51.500	52.000



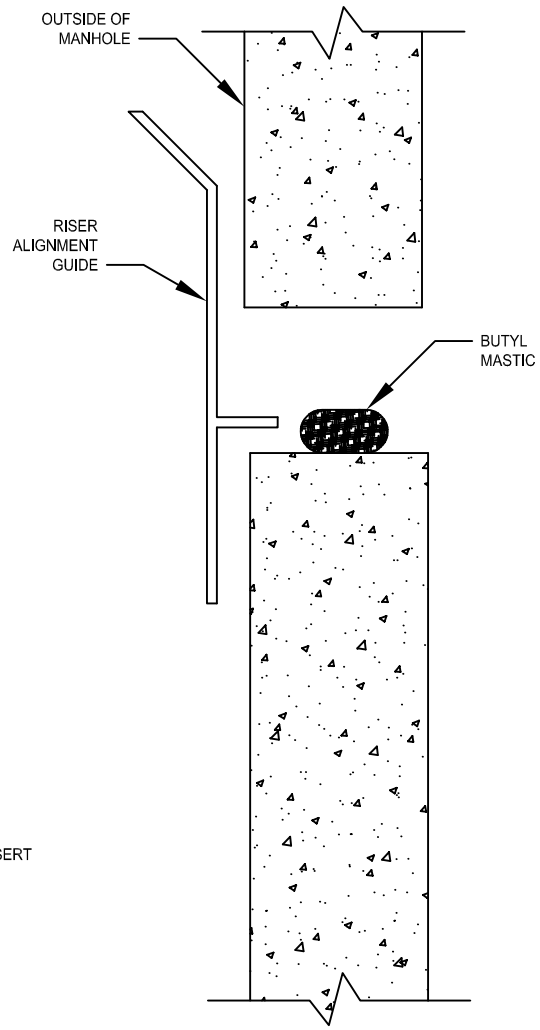
JOINT CONSTRUCTION DETAIL

TYPICAL PRECAST MANHOLE JOINT ARRANGEMENT AND SEALANT

48"-72" JOINT DETAIL FOR NEW MANHOLES

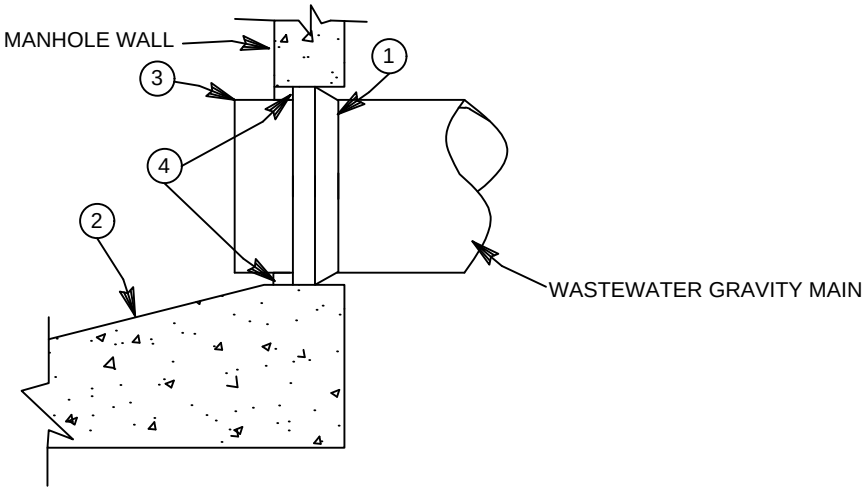


REHAB JOINT DETAIL FOR EXISTING MANHOLES



NOTES:

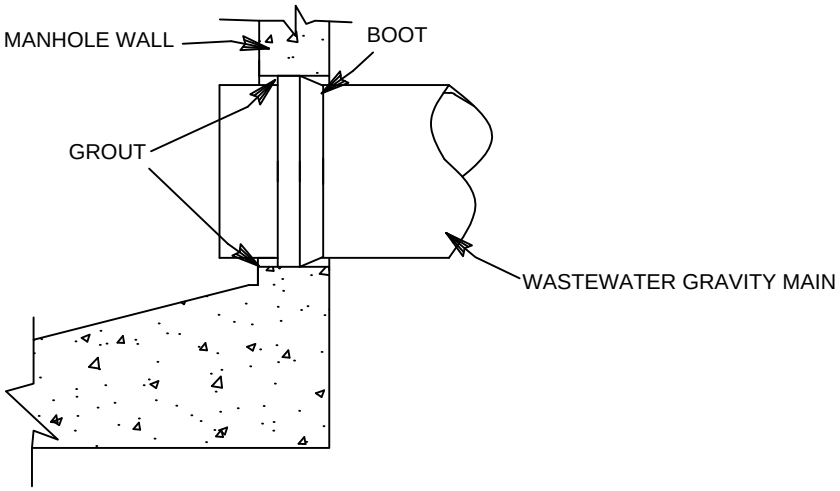
1. REMOVE THREADED LIFTING INSERT ONCE INSTALLATION IS COMPLETED.



NEW PREFABRICATED INVERT SANITARY SEWER MANHOLE

NOTES:

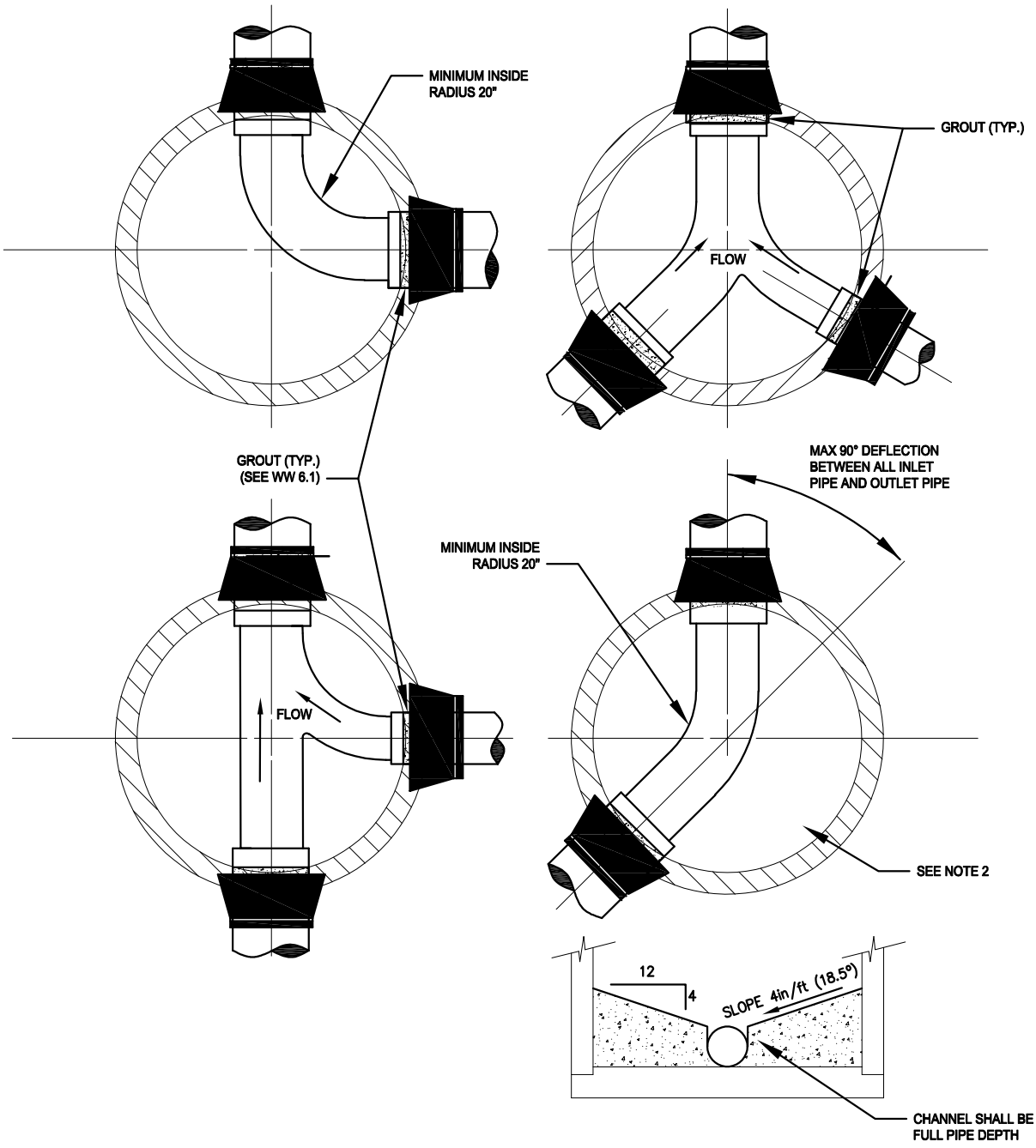
1. PREFABRICATED BOOT SHALL BE INSTALLED BY THE MANUFACTURER OF THE MANHOLE IN ACCORDANCE WITH THE DESIGN PLANS APPROVED BY GAINESVILLE REGIONAL UTILITIES.
2. INSERT/INSTALL PIPE 3"+/- BEYOND INTERIOR WALL OF SANITARY SEWER MANHOLE.
3. GROUT AREA INSIDE OF THE BOOT, FLUSH WITH INSIDE OF MANHOLE.



EXISTING SANITARY SEWER MANHOLE

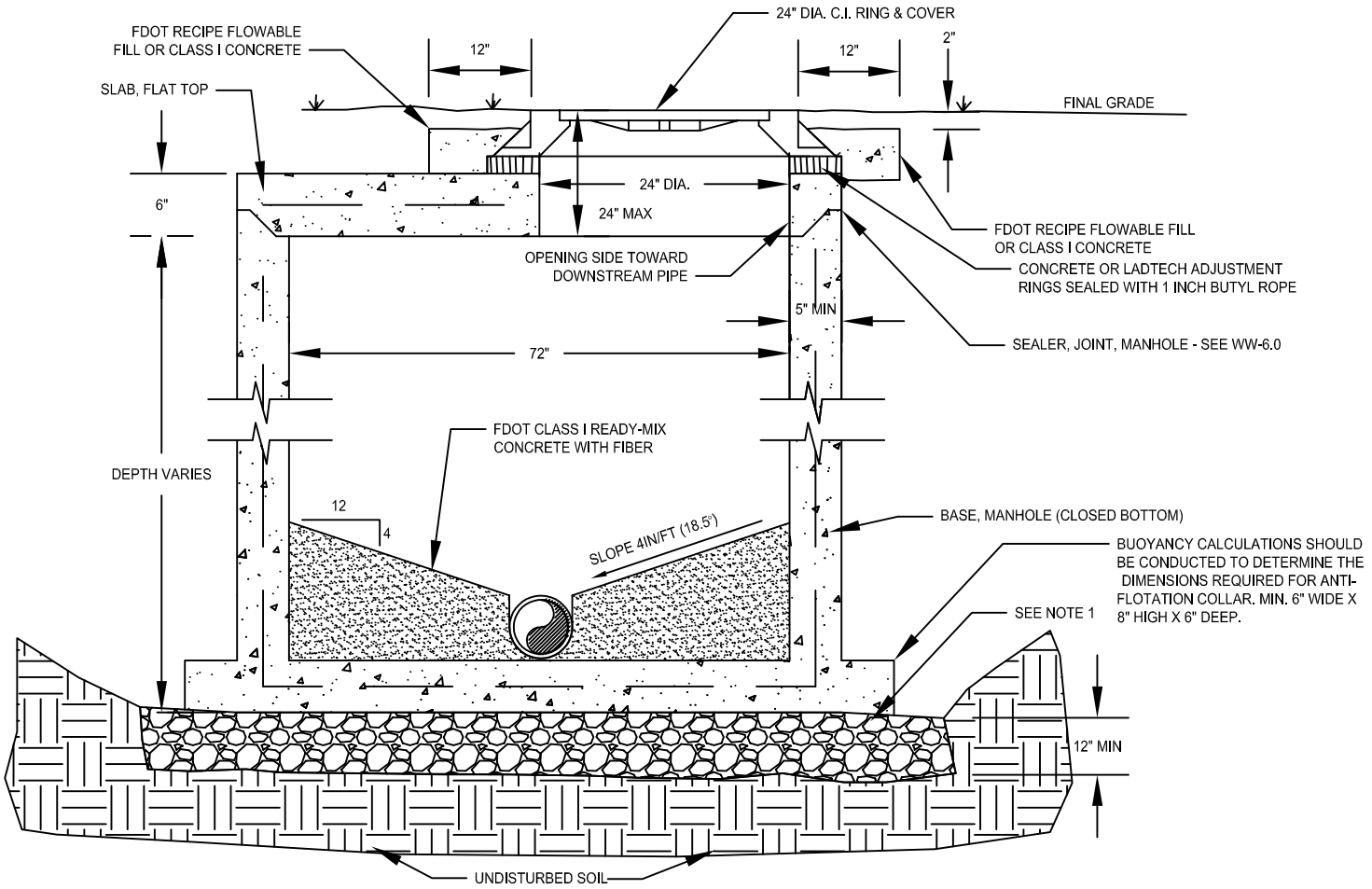
NOTES:

1. CORE BORE EXISTING SANITARY SEWER MANHOLE. ALL SEWER LATERALS AND SEWER MAINS ENTERING EXISTING SANITARY SEWER MANHOLE WALL SHALL BE INSTALLED WITH AN ASTM C-923 COMPLIANT MANHOLE BOOT, DESIGNED FOR SDR-26 PVC PIPE, KOR-N-SEAL, A-LOK G3, OR APPROVED EQUAL. FILL ANNULAR SPACE WITH NON-SHRINK GROUT OR HYDRAULIC CEMENT. COORDINATE WITH GRU WATER & WASTEWATER INSPECTOR 48 HOURS IN ADVANCE.



NOTES:

1. INVERTS SHALL BE CONSTRUCTED WITH 3000 PSI CONCRETE AT MIN 1/10 FT., MAX 2 FT. DROP ACROSS THE INSIDE OF MANHOLE.
2. INVERTS SHALL BE FDOT CLASS I READY-MIX CONCRETE WITH FIBER. BRICK AS FILLER SHALL NOT BE PERMITTED.
3. INVERTS (FLOW CHANNEL) SHALL MATCH PIPE INVERTS OF ALL CONNECTED MAINS.
4. GROUT SHALL BE CONCRETE/MORTAR MIX.

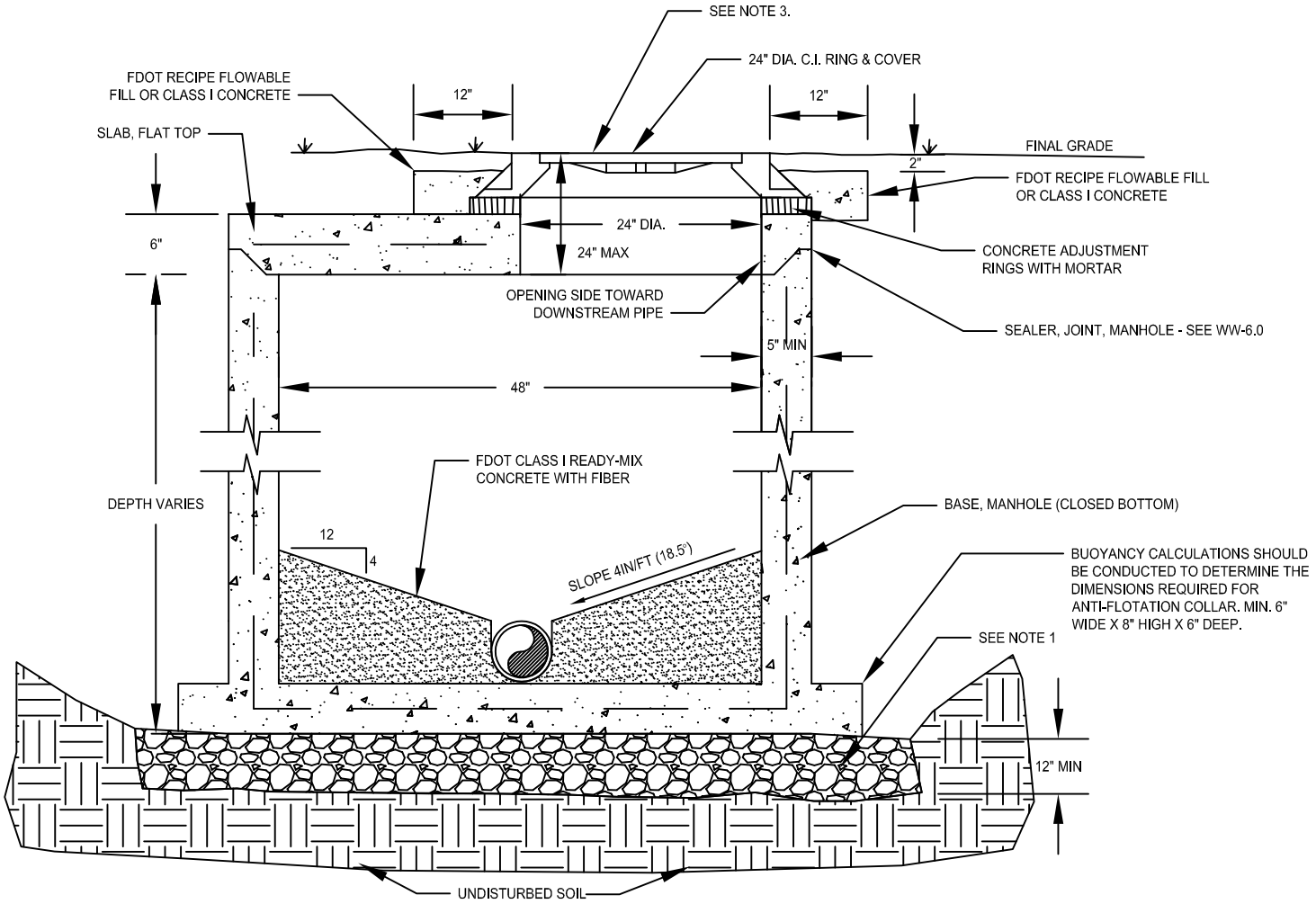


NOTES:

1. TO ESTABLISH A SUB-BASE, A 12" THICK ROCK BEDDING OF CLASS I MATERIAL WRAPPED IN GEO-TEXTILE FILTER-FABRIC WILL BE REQUIRED.
2. THIS TYPE OF CONSTRUCTION SHALL BE LIMITED TO DEPTHS OF (3-6) FEET.
3. ALL LIFT STATION RECEIVING MANHOLES WILL BE POLYMER.

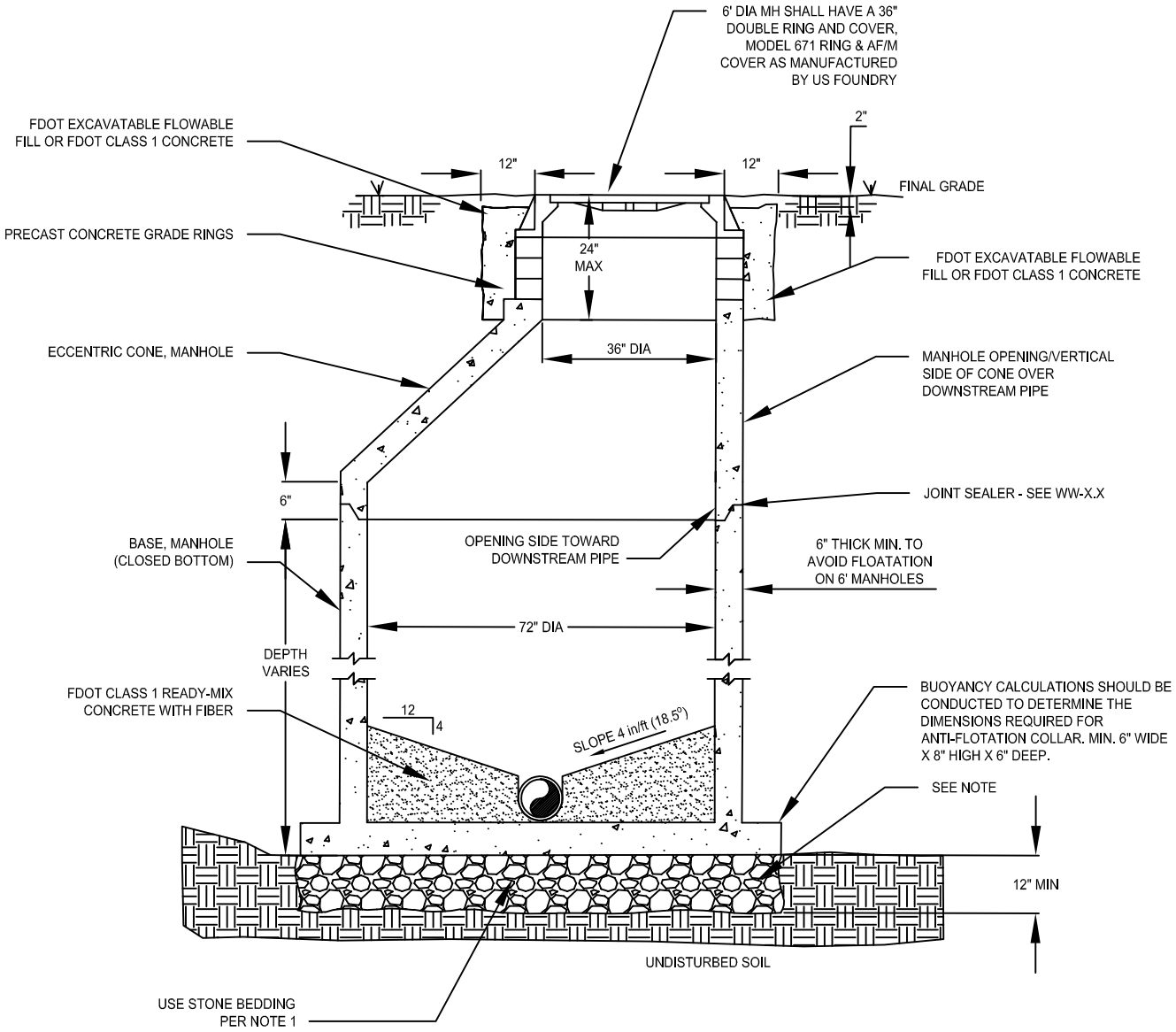
GRU More than Energy

6' MANHOLE SHALLOW CONSTRUCTION (CLOSED BOTTOM)



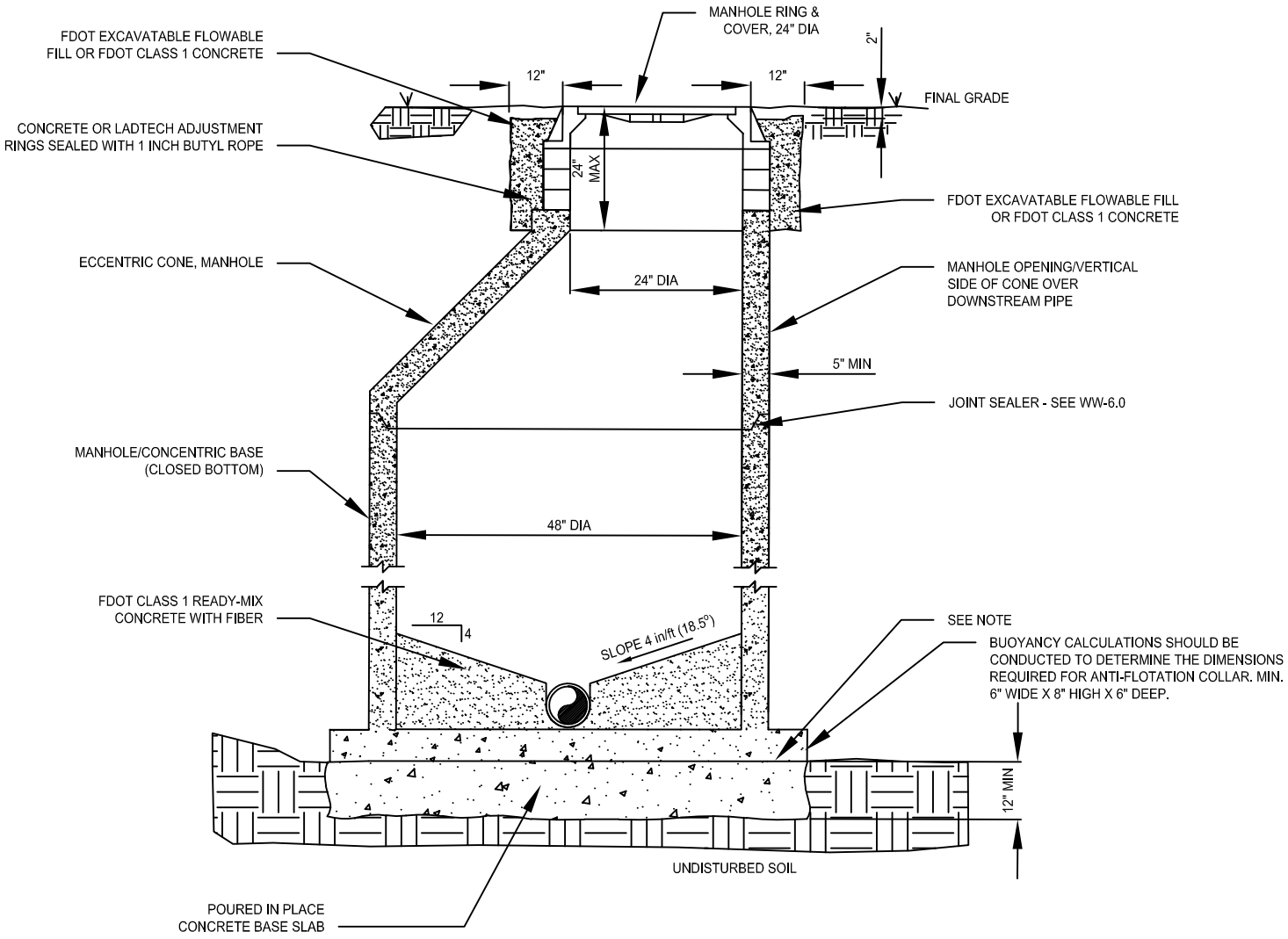
NOTES:

1. TO ESTABLISH A SUB-BASE, A 12" THICK ROCK BEDDING OF CLASS I MATERIAL WRAPPED IN GEO-TEXTILE FILTER-FABRIC WILL BE REQUIRED.
2. THIS TYPE OF CONSTRUCTION SHALL BE LIMITED TO DEPTHS OF (3-6) FEET.
3. ECCENTRIC CONE IS PREFERABLE TO FLAT TOP IN ALL SITUATIONS WHERE APPLICABLE.



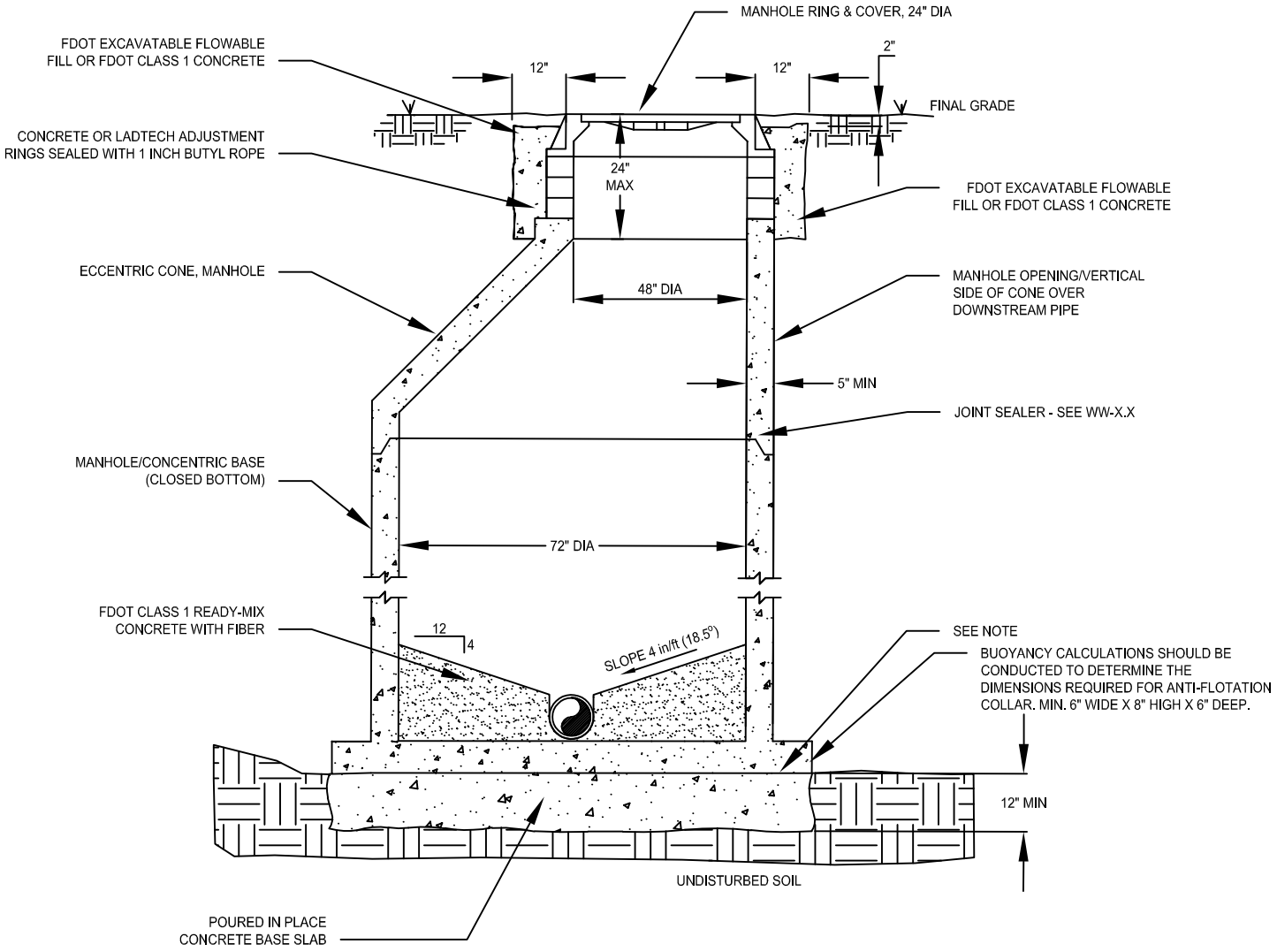
NOTES:

1. A 12" THICK BEDDING OF CLASS 1, ROCK MATERIAL WRAPPED IN GEO-TEXTILE FILTER FABRIC SHALL BE REQUIRED.
2. FOR EXISTING GRAVITY MAINS: CONNECT NEW MAINS USING THIS TYPE MANHOLE. DOGHOUSE (OPEN BOTTOM) MANHOLES SHALL NOT BE INSTALLED.
3. ALL LIFT STATION RECEIVING MANHOLES WILL BE POLYMER



NOTES:

1. A 12" THICK BEDDING OF CLASS 1, ROCK MATERIAL WRAPPED IN GEO-TEXTILE FILTER FABRIC SHALL BE REQUIRED.
2. FOR EXISTING GRAVITY MAINS: CONNECT NEW MAINS USING THIS TYPE MANHOLE. DOGHOUSE (OPEN BOTTOM) MANHOLES SHALL NOT BE INSTALLED.

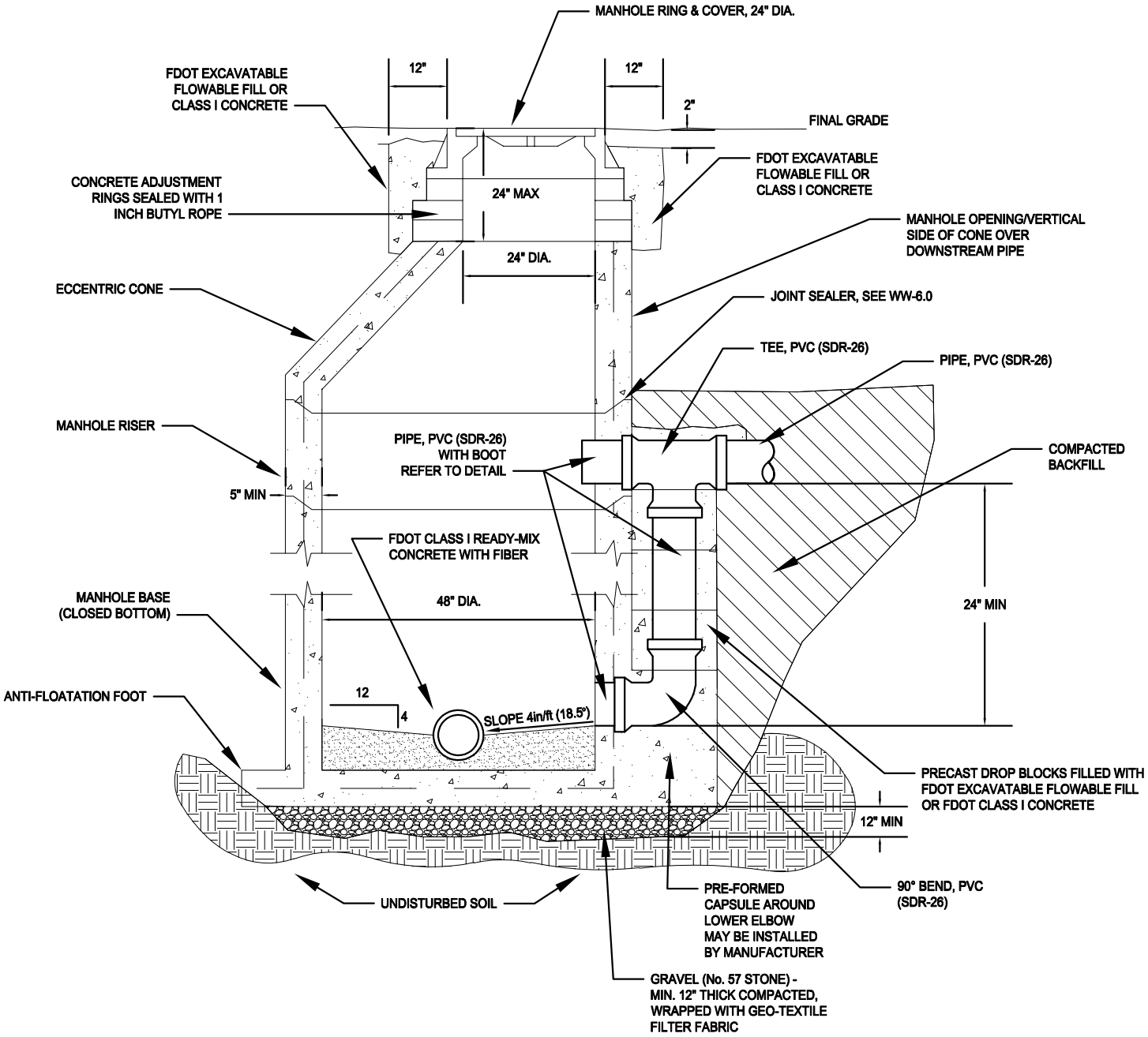


NOTES:

1. A 12" THICK BEDDING OF CLASS 1, ROCK MATERIAL WRAPPED IN GEO-TEXTILE FILTER FABRIC SHALL BE REQUIRED.
2. FOR EXISTING GRAVITY MAINS: CONNECT NEW MAINS USING THIS TYPE MANHOLE. DOGHOUSE (OPEN BOTTOM) MANHOLES SHALL NOT BE INSTALLED.
3. ALL LIFT STATION RECEIVING MANHOLES WILL BE POLYMER

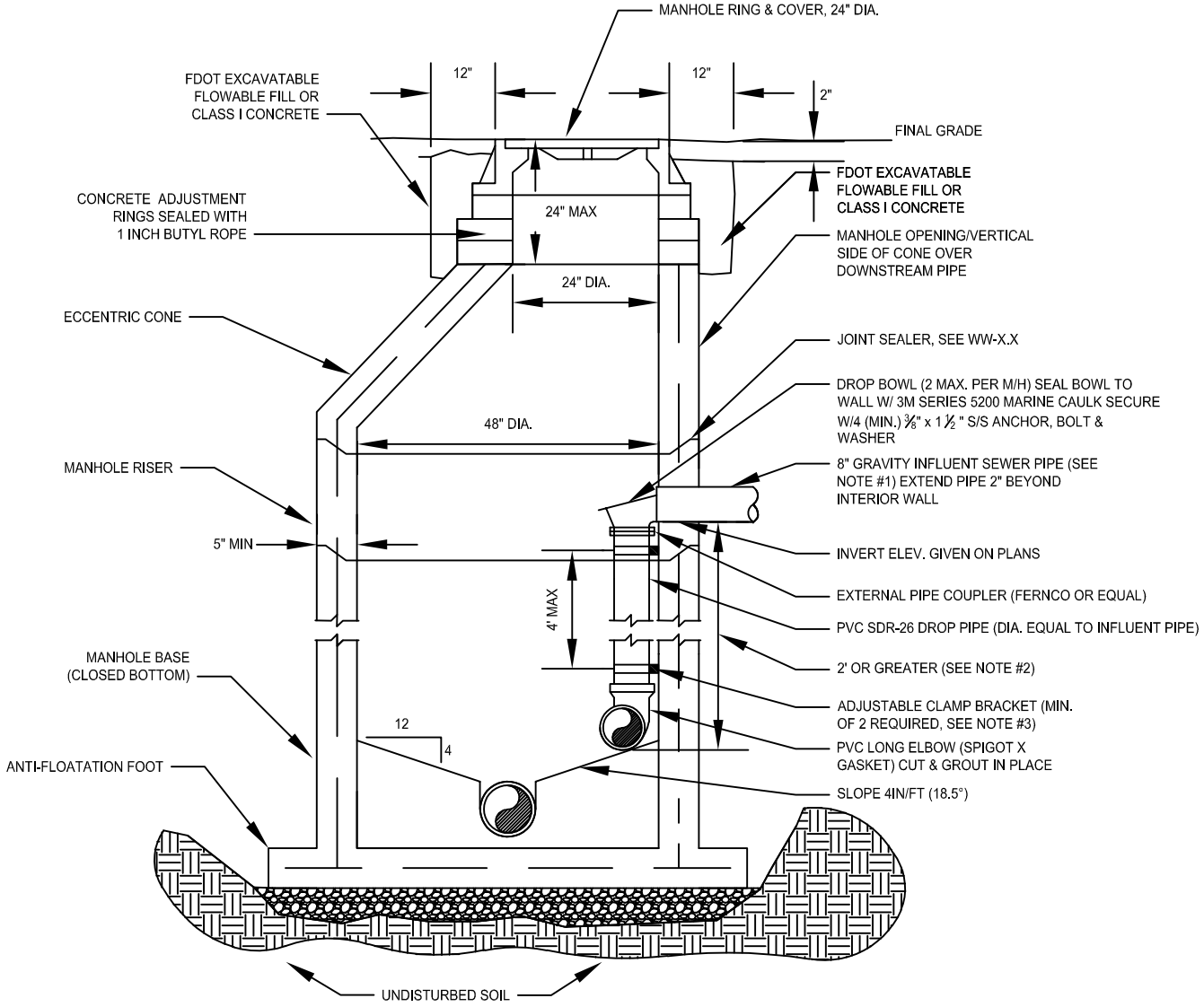
GRU More than Energy

PRECAST POLYMER 6' MANHOLE CONSTRUCTION (CLOSED BOTTOM)



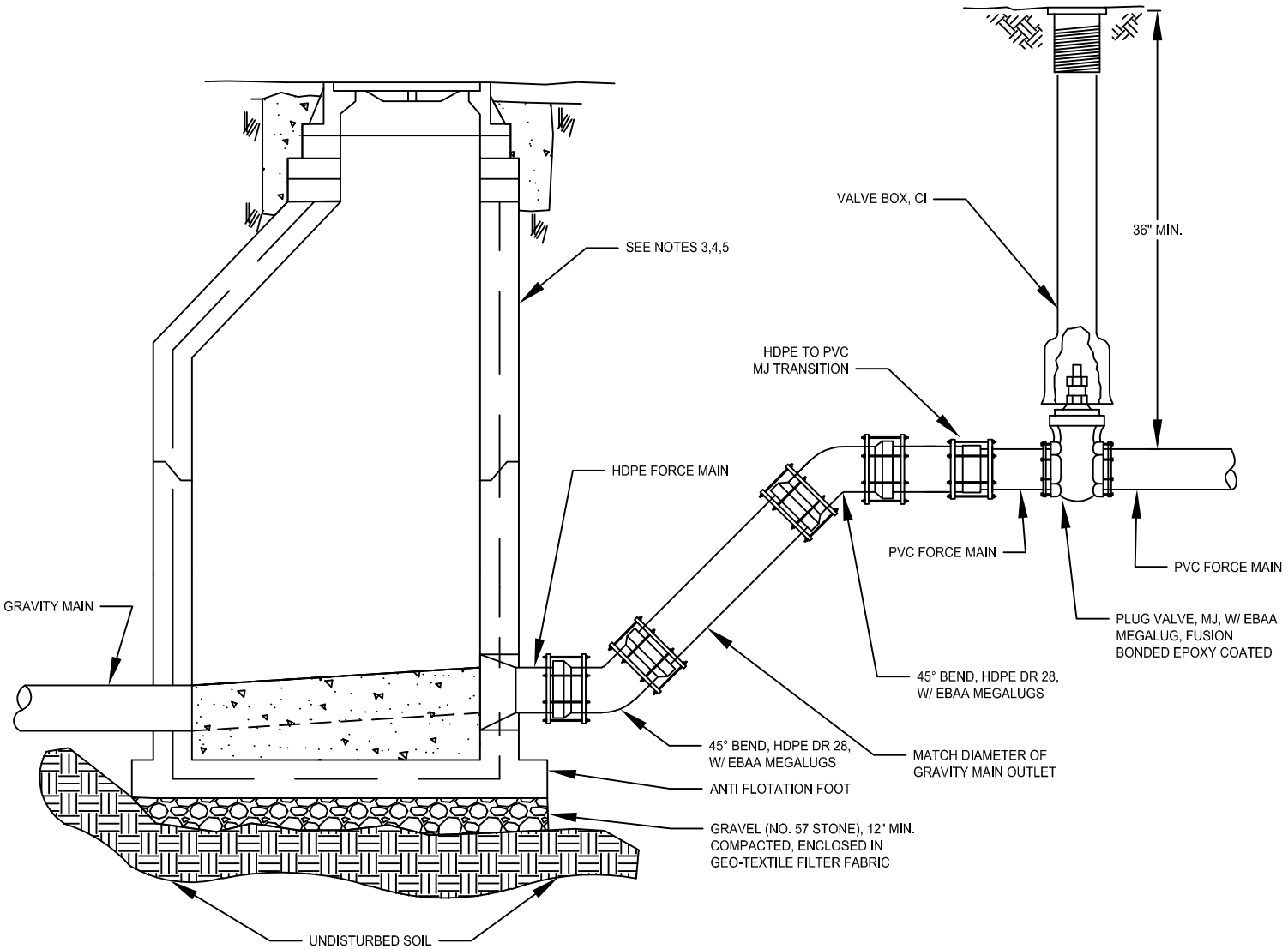
GRU More than Energy

MANHOLE OUTSIDE DROP CONSTRUCTION - SEWER MAIN



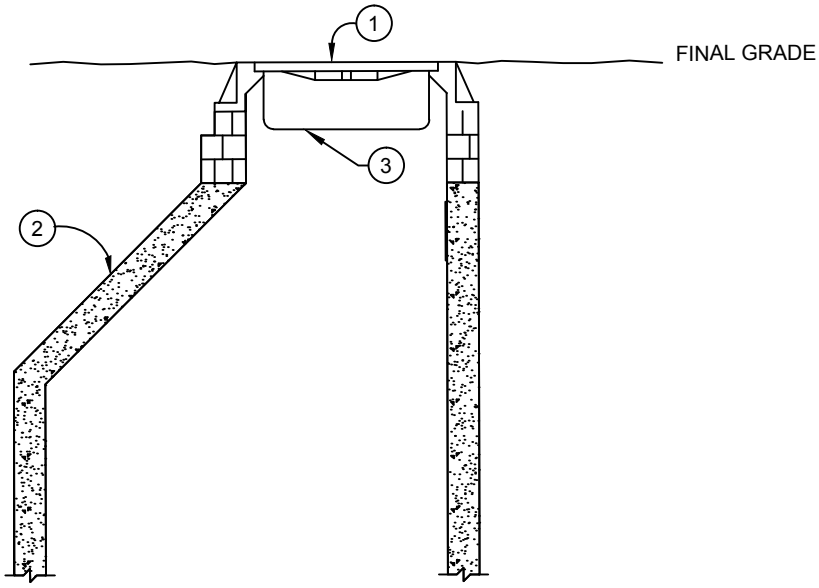
NOTES:

1. TO ESTABLISH A SUB-BASE, A 12" THICK ROCK BEDDING OF CLASS I MATERIAL WRAPPED IN GEO-TEXTILE FILTER-FABRIC WILL BE REQUIRED.
2. THIS DETAIL FOR 2' OR GREATER ELEVATIONS DIFFERENCE BETWEEN INVERT OF INCOMING PIPE AND ELBOW OUTLET.
3. ADJUSTABLE CLAMPING BRACKET (MIN. 2 PER DROP BOWL ASSY.) TO M/H WALL PER BRACKET ASSY. ALL 304 OR 316 STAINLESS STEEL MATERIALS.
4. THIS ASSEMBLY IS FOR 8" GRAVITY INFLUENT LINES ONLY. NO DROPS ALLOWED FOR FORCE MAINS. DROP BOWL BY RELINER OR APPROVED EQUAL REQUIRED.
5. FOR POLYMER MANHOLES, INSIDE DROP IS PREFERRED APPLICATION.



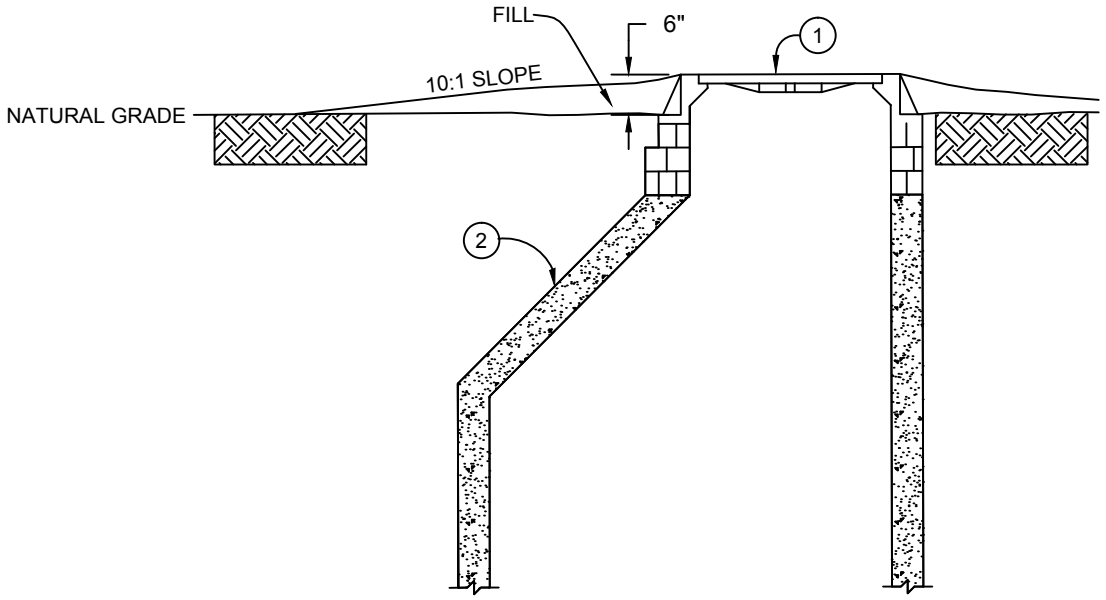
NOTES:

1. CONNECT FORCE MAIN AT BOTTOM OF SANITARY SEWER MANHOLE, OPPOSITE OUTLET PIPE (MAX. 45° OFFSET).
2. PVC FORCE MAIN SHALL BE DR-18. A FUSED HDPE ASSEMBLY IS PREFERRED BETWEEN THE FORCE MAIN VALVE AND THE MANHOLE.
3. IF AN EXISTING CONCRETE MANHOLE, A POLYMER INSERT MUST BE USED.
4. IF A NEW MANHOLE, MUST BE POLYMER.
5. IF AN EXISTING BRICK MANHOLE, MUST BE REPLACED WITH POLYMER MANHOLE.
6. PVC SHALL BE GREEN FOR ALL FORCE MAIN APPLICATIONS.



MATERIALS	
ITEM	DESCRIPTION
1	MANHOLE RING & COVER
2	ECCENTRIC CONE
3	MANHOLE PAN (PARSON MANHOLE INSERT - VP2, PARSON ENVIRONMENTAL PRODUCTS, INC, OR EQUAL)

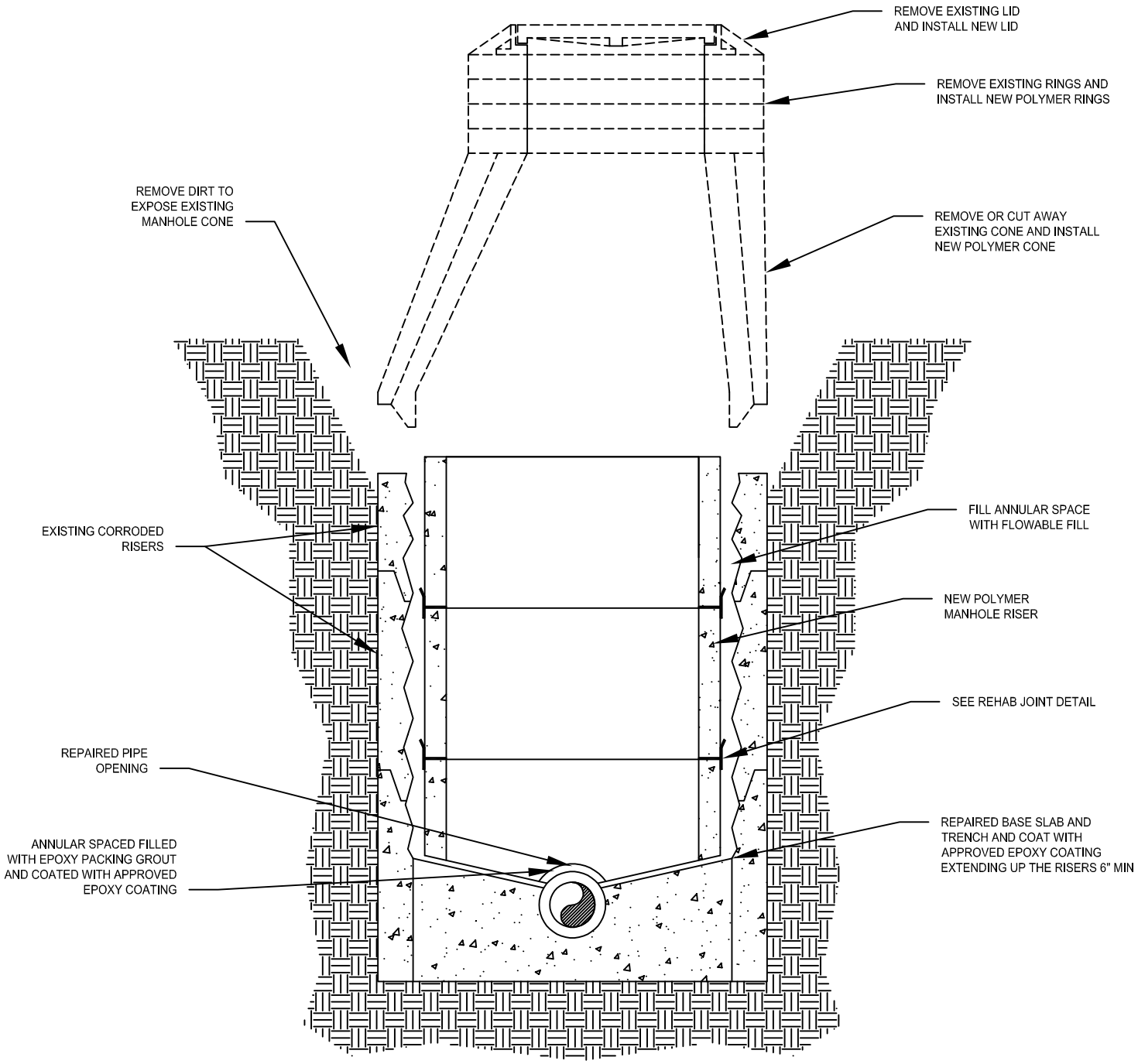
NOTE: IN LOCATIONS WHERE STORMWATER INFILTRATION MAY BE POSSIBLE, A MANHOLE PAN WILL BE REQUIRED, AT GRU'S DISCRETION.



NOTE: WHEN MANHOLE IS OUTSIDE PAVEMENT, THE RIM ELEVATION SHALL BE 6" ABOVE NATURAL GRADE, WITH FILL ADDED FOR A 10:1 SLOPE TO NATURAL GRADE.

MATERIALS	
ITEM	DESCRIPTION
1	MANHOLE RING & COVER
2	ECCENTRIC CONE

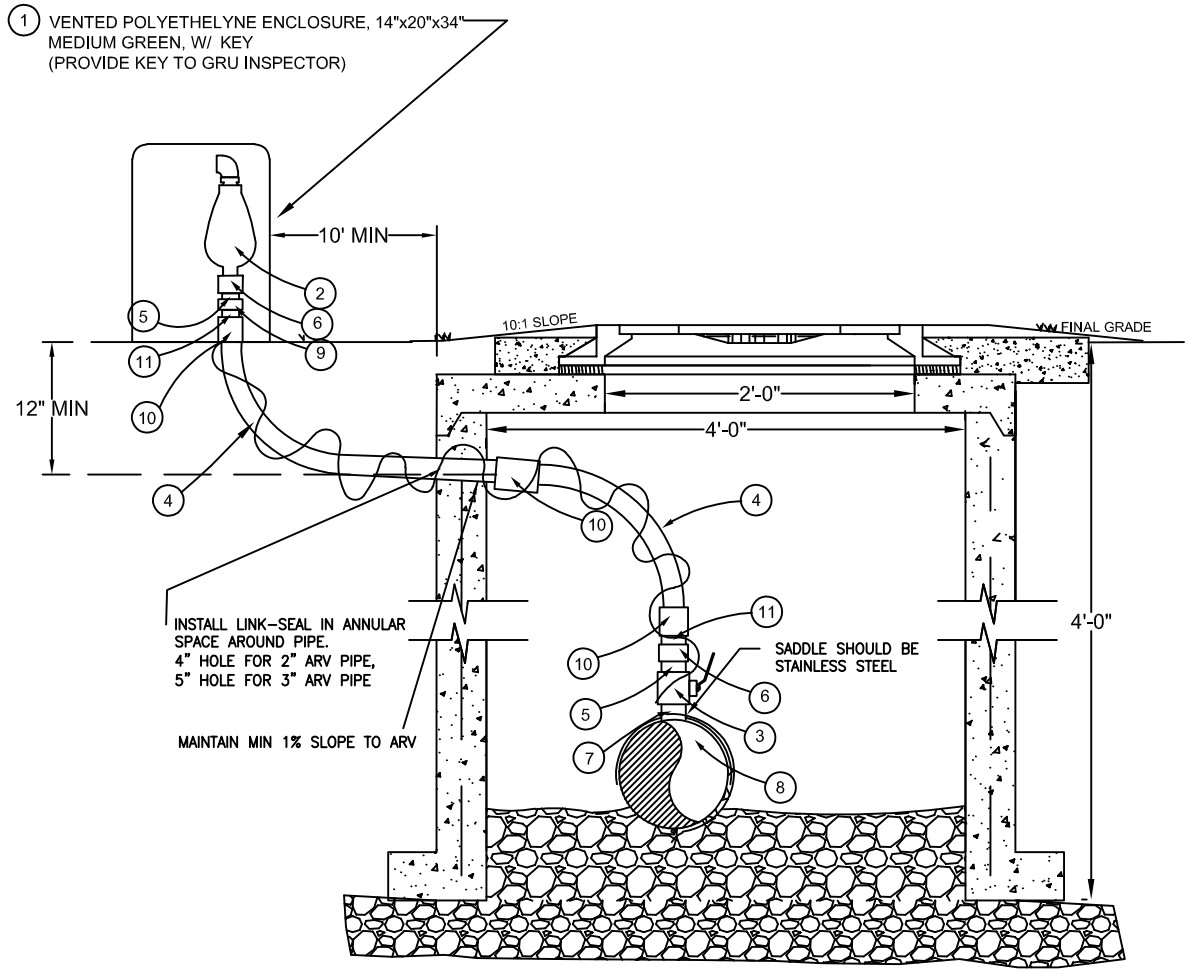
NOTE: IN LOCATIONS WHERE STORMWATER INFILTRATION MAY BE POSSIBLE, A MANHOLE PAN WILL BE REQUIRED, AT GRU'S DISCRETION.



SECTION VIEW

NOTES:

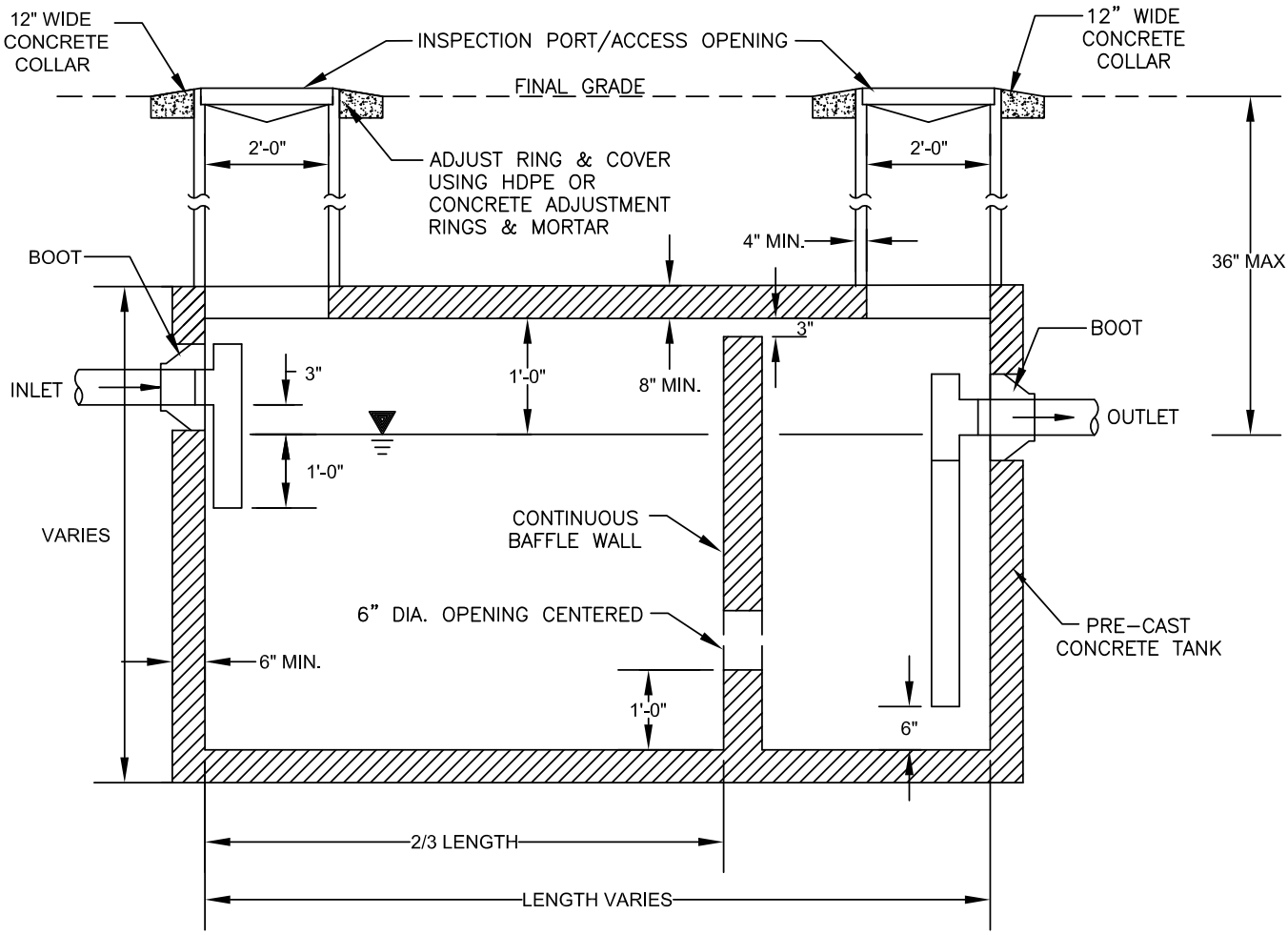
1. AFTER INSTALLING THE POLYMER BASE AND RISER ATTACHED, GUIDE AND ADD ADDITIONAL RISERS AS REQUIRED.
2. CONTRACTOR SHALL FOLLOW ALL CONFINED SPACE REGULATIONS AND PROSECUTES.
3. FILL ANNULAR SPACE BETWEEN THE OLD AND NEW MANHOLE WITH "FLOWABLE FILL" AND BACK FILL AS REQUIRED TO EXISTING GRADE.



NOTES:
1. OFFSET DISTANCE FROM ARV TO FM VARIES PER GRU APPROVED DRAWINGS, MINIMUM 10' DIAMETER OF ARV, PIPE AND BALL VALVE PER APPROVED PLANS.
2. TRACER WIRE SHALL BE USED ON ALL PLASTIC PIPE AND CONNECTED USING TRACER-LOCK PART# TL-LUG-SS CONNECTOR.
3. A BEDDING OF No. 57 STONE WRAPPED IN GEO-TEXTILE FABRIC SHALL BE REQUIRED.
4. BOTTOM OF MANHOLE SHALL BE FILLED WITH ADDITIONAL 4" OF No. 57 STONE.

MATERIALS	
ITEM	DESCRIPTION
1	VENTED POLYETHYLENE ENCLOSURE
2	2" VENTOMAT AIR RELEASE VALVE W/ 1" 316 SS BALL VALVE
3	SS FULL PORT BALL VALVE, QUARTER TURNED
4	SDR 11 HDPE 90 DEGREE ELBOW
5	MNPT SCH 40 SS NIPPLE
6	FNPT SS 316 COUPLING
7	SS TAPPING SLEEVE W/ THREADED OUTLET
8	PVC FORCE MAIN PIPE (AS SPECIFIED BY GRU APPROVED DWGS.)
9	MPT 316L SS TRANSITION COUPLING
10	DR 11 ELECTROFUSION PLASTIC COUPLING
11	HDPE SDR 11 PLASTIC PRESSURE PIPE

Revision Date:		
11/16/2023	GRU More than Energy	Gainesville Regional Utilities Wastewater Construction Details AIR RELEASE VALVE (OFFSET VALVE)



NOTES:

1. TANK VOLUME TO BE DETERMINED BY GRU UPON APPLICATION BY OWNER, STRUCTURAL DESIGN SHALL BE THE RESPONSIBILITY OF THE TANK MANUFACTURER.

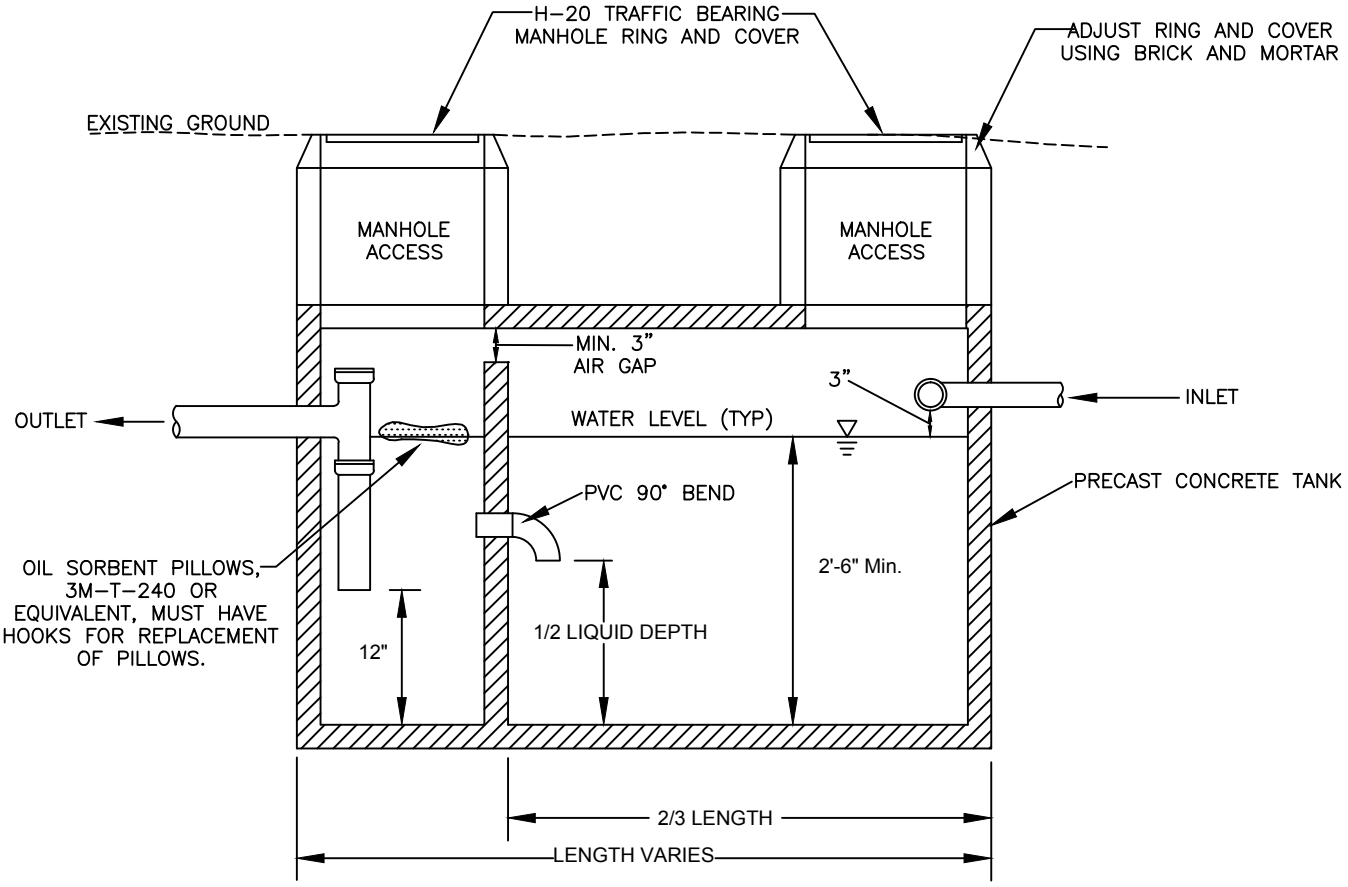
2. ONLY KITCHEN WASTE SHALL BE DISCHARGED INTO THE GREASE TRAP. ALL DOMESTIC WASTE (i.e. RESTROOMS) SHALL BE CONNECTED DOWNSTREAM OF THE GREASE TRAP.

3. MANHOLES WHICH ARE NOT INSTALLED UNDER PAVEMENT SHALL HAVE A RIM ELEVATION AT LEAST 6" ABOVE FINISHED GRADE, AND A 10:1 SLOPE TO FINISHED GRADE.

4. GREASE TRAP ASSEMBLY TO BE H-20 TRAFFIC LOAD RATED - INCLUDING TANK, TANK LID, CHIMNEYS AND MANHOLE RING & COVER.

5. NO CAPPED TEES.

Revision Date:		
01/09/19	GRU More than Energy	Gainesville Regional Utilities Wastewater Construction Details GREASE TRAP

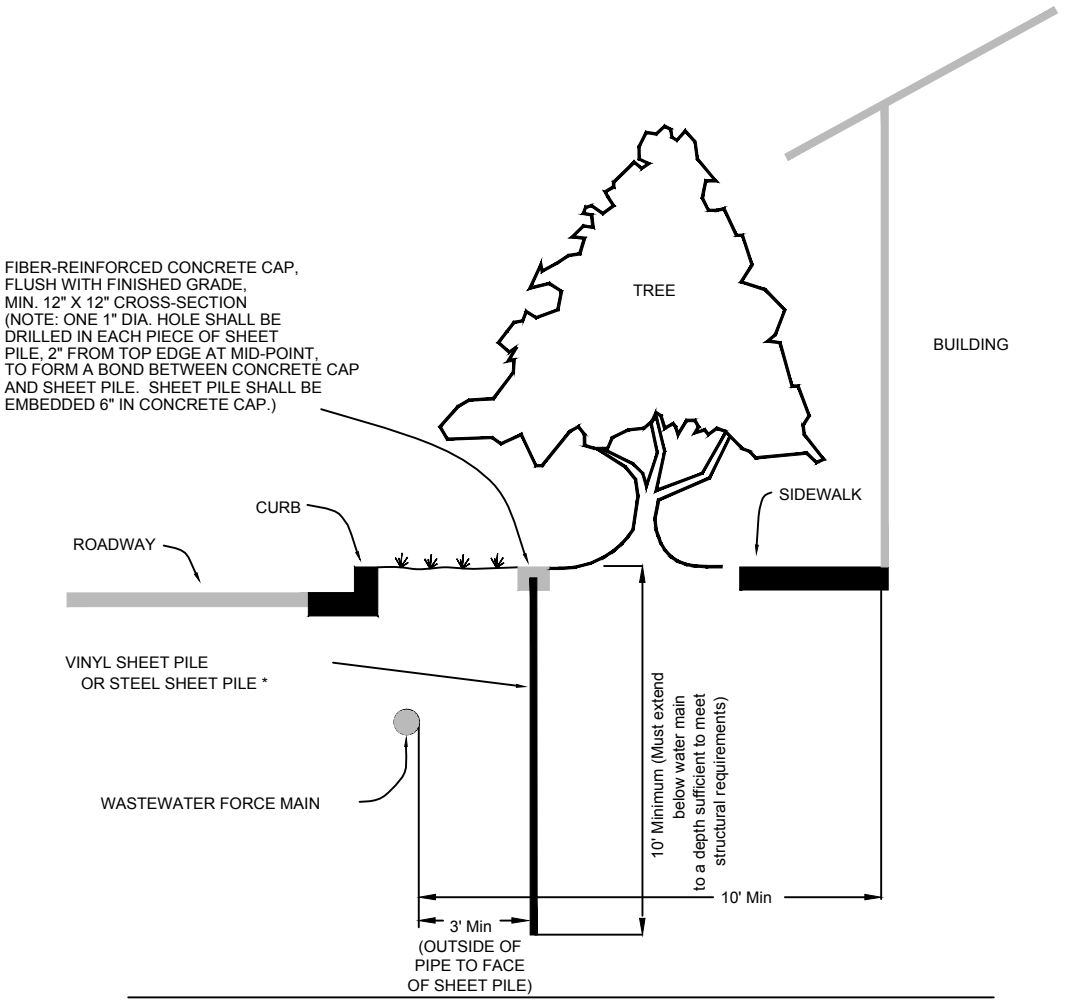


NOTES:

1. VOLUME TO BE DETERMINED BY GRU UPON APPLICATION BY OWNER, STRUCTURAL DESIGN SHALL BE THE RESPONSIBILITY OF THE TANK MANUFACTURER.

Revision Date:		
8/22/2016	GRU More than Energy	Gainesville Regional Utilities Wastewater Construction Details OIL AND SAND INTERCEPTOR

TREE - WASTEWATER FORCE MAIN SEPARATION



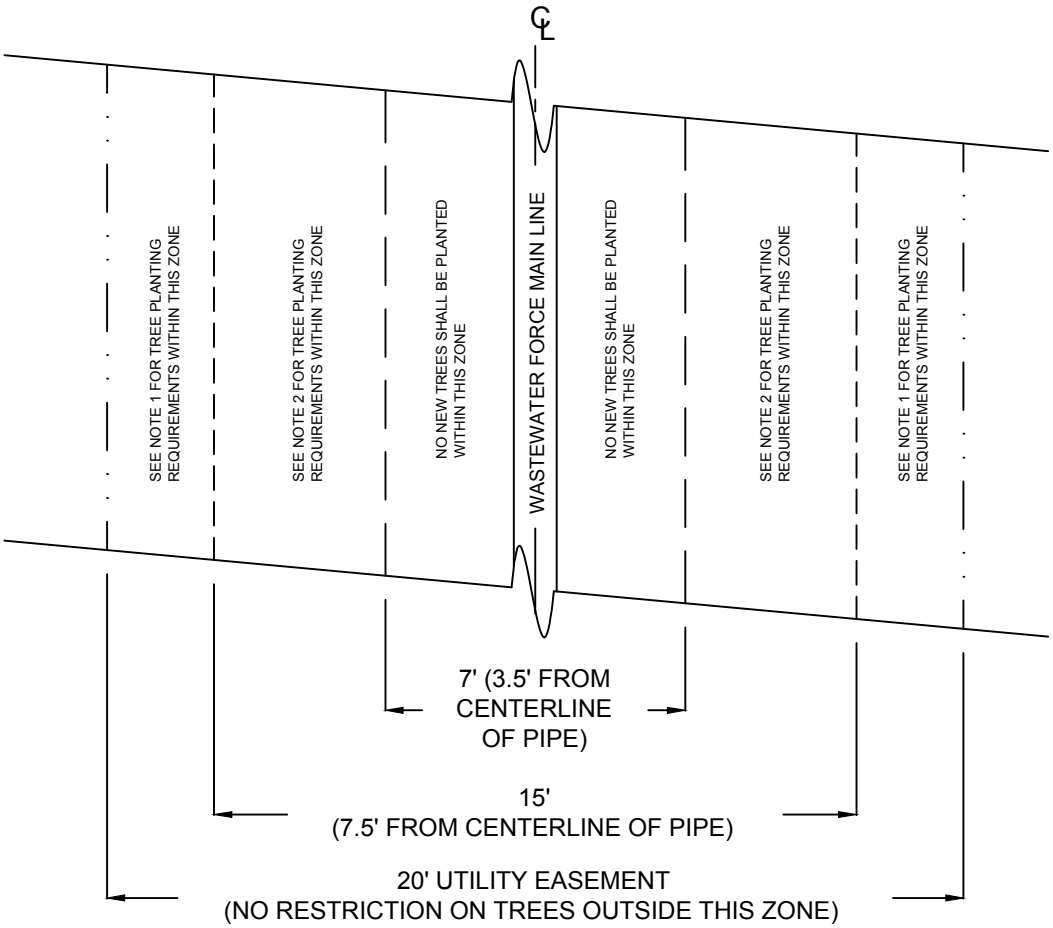
SHEET PILE

ALTERNATIVE PIPE PROTECTION FOR SEPARATIONS LESS THAN 7.5 FEET FROM TREES.

ALL DISTURBED EARTH OR NEW BACKFILL SHALL BE COMPACTED TO 95% OF MODIFIED PROCTOR (ASTM D 1557)

*Sheet pile joints to be filled with 50 year silicone caulk prior to placement. (If installation is open trench)

Revision Date: 7/14/09	GRU More than Energy	Gainesville Regional Utilities Wastewater Construction Details SHEETPILE DETAIL



ALL TREES PLANTED WITHIN THE UTILITIY EASEMENT SHALL CONFORM TO THE GRU PLANTING MATRIX (SEE APPENDIX C)

NOTE 1:

IF “TREES OF SPECIAL INTEREST” ARE EXISTING WITHIN THIS ZONE, TRENCHLESS INSTALLATION TECHNIQUES, SUCH AS DIRECTIONAL BORING OR JACKING AND BORING OF A CASING PIPE SHALL BE USED THROUGHOUT THE TREE'S ROOT ZONE OF INFLUENCE, IF REQUIRED BY CITY ARBORIST .

NOTE 2:

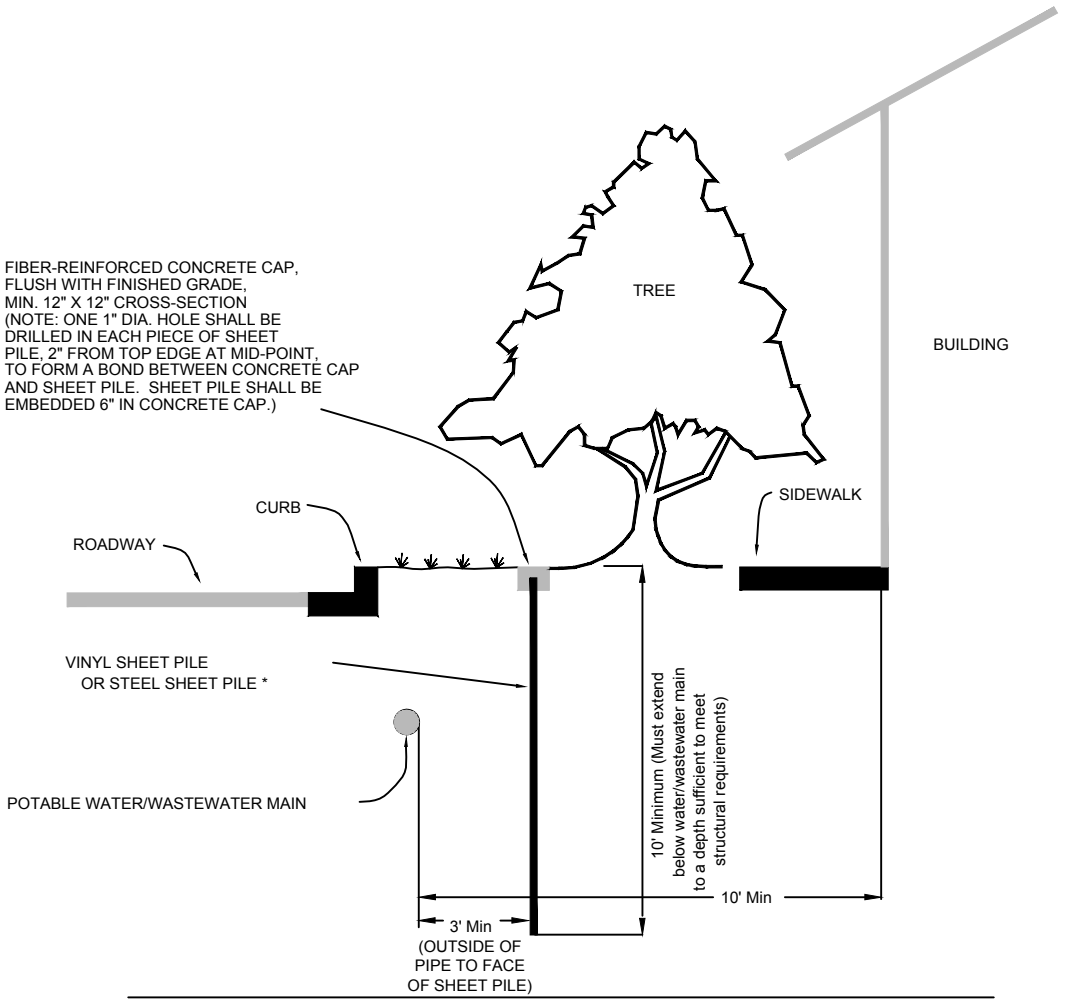
FOR NEW TREES PLANTED WITHIN THIS ZONE (SEE GRU PLANT MATRIX (APPENDIX C), ONE OF THE FOLLOWING SHALL BE USED IN ORDER TO DETER THE INTRUSION OF ROOTS INTO THE SOIL ZONE AROUND THE UNDERGROUND INFRASTRUCTURE:

1. SOILS IMMEDIATELY ADJACENT TO THE UNDERGROUND LINES SHALL BE COMPACTED TO A DENSITY OF 98% MODIFIED PROCTOR. THREE DENSITY TESTS SHALL BE TAKEN AT EACH TREE LOCATION, SPACED 7.5 FEET APART, CENTERED ON THE TREE. RESULTS SHALL BE SUBMITTED TO GRU FOR APPROVAL; OR
2. ENCASE LINE WITH EXCAVATABLE, FLOWABLE FILL IN ACCORDANCE WITH SECTION 121 - FLOWABLE FILL, FDOT STANDARDS SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION; OR
3. WRAP TRENCH WITH GEO-TEXTILE FABRIC IMPREGNATED WITH INTEGRAL ROOT BARRIER NODULES, OR
4. SOLID STRUCTURAL BARRIERS SUCH AS CAST-IN-PLACE OR PRE-CAST CONCRETE PANEL, STEEL OR HIGH DENSITY PLASTIC SHEET-PILE WALL, OR STEEL CASING SIZED PER SECTION VIII.E.1 OF THE DESIGN STANDARDS
5. FOR EXISTING TREES, IF ALLOWED TO REMAIN, TRENCHLESS INSTALLATION TECHNIQUES, SUCH AS DIRECTIONAL BORING OR JACKING AND BORING OF A CASING PIPE WILL BE REQUIRED THROUGHOUT THE TREE'S ROOT ZONE OF INFLUENCE.

FOR EACH OF THESE FIVE OPTIONS, THE METHOD SHALL BE USED FOR A MINUMUM HORIZONTAL DISTANCE OF 15 FEET, CENTERED ON THE TREE.

Revision Date:	Gainesville Regional Utilities
8/31/09	GRU More than Energy Wastewater Construction Details
	TREE SEPARATION FROM WASTEWATER FORCE MAINS (IN CITY LIMITS)

TREE - WATER/WASTEWATER MAIN SEPARATION



SHEET PILE

ALTERNATIVE PIPE PROTECTION FOR SEPARATIONS LESS THAN 10 FEET FOR SMALL AND MEDIUM TREES, AND 15 FEET FOR BIG (LIVE OAK) TREES

ALL DISTURBED EARTH OR NEW BACKFILL SHALL BE COMPACTED TO 95% OF MODIFIED PROCTOR (ASTM D 1557)

*Sheet pile joints to be filled with 50 year silicone caulk prior to placement.
(If installation is open trench)

Revision Date:		
9/8/08	GRU More than Energy	Gainesville Regional Utilities Wastewater Construction Details SHEETPILE DETAIL