DEPARTMENT OF UTILITY SERVICES
WATER, WASTEWATER, & RECLAIMED WATER
UTILITY CONSTRUCTION STANDARDS

2024

SUPERSEDES ALL PREVIOUS VERSIONS

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LIFT STATION

RECLAIMED WATER

MISCELLANEOUS

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SPECIFICATIONS

I – GENERAL

I. General

Given that industry standards are constantly changing, an update to the construction standards and specifications is essential in order to stay in conformance with American Water Works Association (AWWA) requirements. The infrastructure dedicated to the utility with updated changes will be of a quality that will minimize future maintenance and replacement costs. In so doing, new facilities accepted by Indian River County Department of Utility Services (IRCDUS) will not burden existing customers due to premature failure. Additionally, the procedures contained in the updates provide a detailed description of IRCDUS administrative requirements. This allows projects to be completed as expediently as possible and permits staff to treat all new projects/customers in a uniform and non-discriminatory manner. Staff evaluates new products or product manufacturers and accepts those with merit. Incorporating this kind of change offers a clear and consistent guideline to a contractor providing building services in the County. Similarly, for the Utility Inspector, the construction standards provide a minimum acceptable installation requirement. Ultimately, IRCDUS customers benefit from a reliable system.

IRCDUS has developed a minimum standard for water, wastewater, and reclaimed water utility installation. The WATER, WASTEWATER, AND RECLAIMED WATER UTILITY CONSTRUCTION STANDARDS 2024 Edition was adopted by the Indian River County Board of County Commissioners on _____(date) and henceforth all water, wastewater, and reclaimed water utility installations within Indian River County shall be designed and built in accordance therewith.

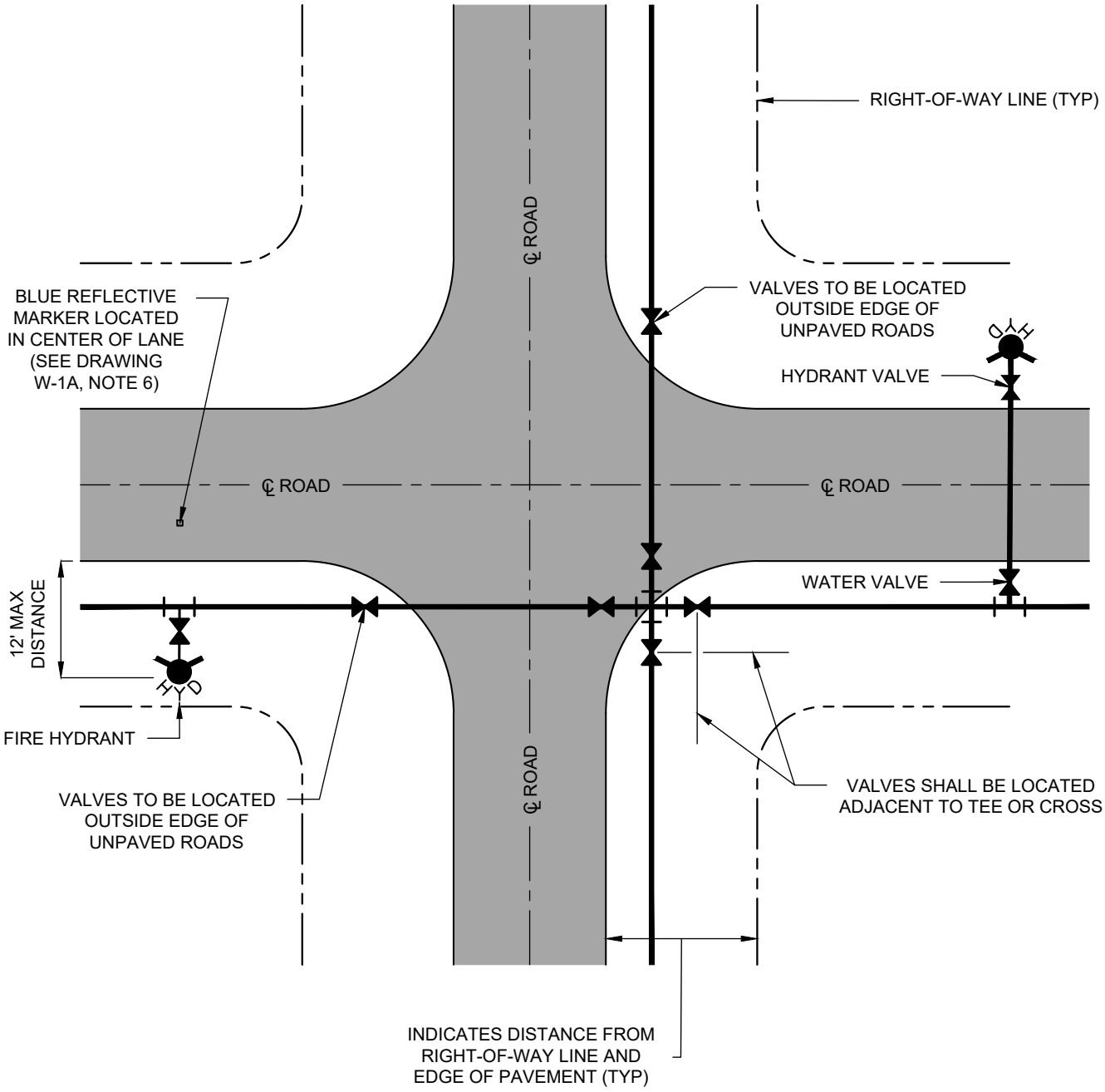
The minimum standards provided herein may be modified for future developments upon approval of the Utilities Director or the Board of County Commissioners upon finding that the public's health and safety is not adversely affected by such modifications. Any proposed modification to the minimum standards must be substantiated by a Florida Registered Engineer's certified study, which would indicate compliance with the intent of the minimum standard as herein provided.

IRCDUS reserves the right to impose additional field requirements not addressed herein, when in the opinion of IRCDUS, those requirements will improve the integrity of the utility system.

This 2024 Edition supersedes all previous versions.

II – DETAIL DRAWINGS

WATER



PLAN VIEW

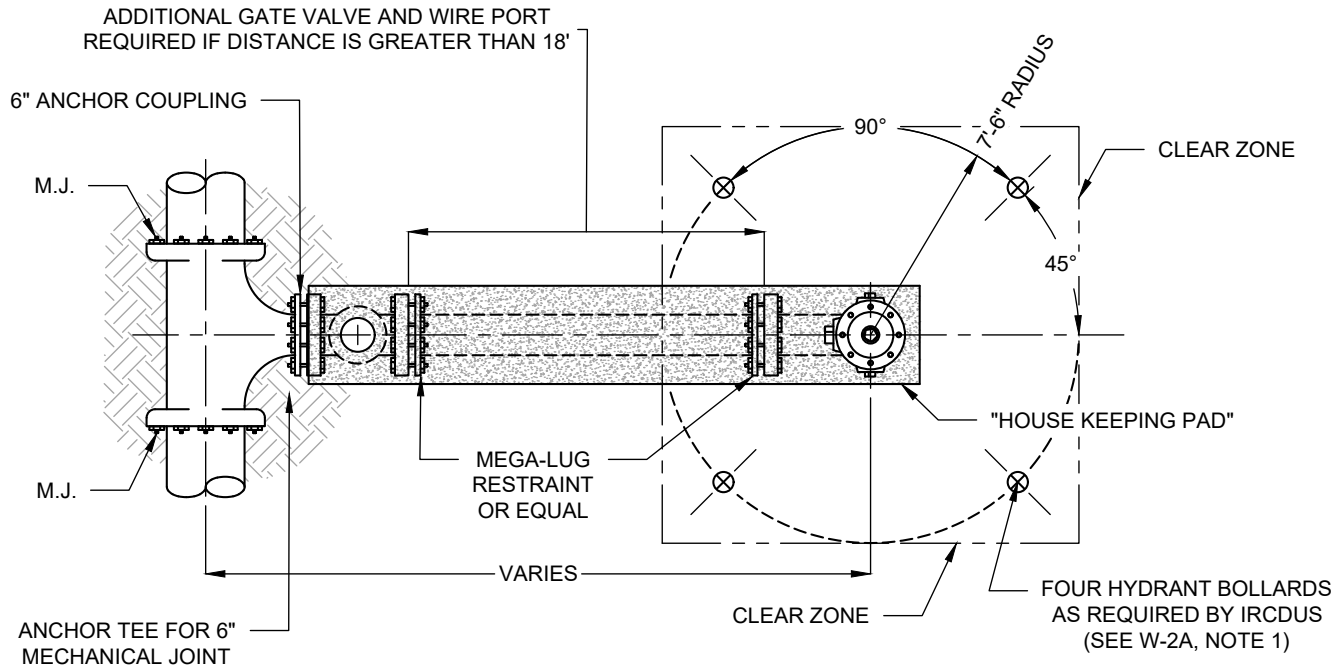
SEE DRAWING W-1A, VALVE NOTES

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	FIRE HYDRANT & VALVE LOCATIONS 2024	DRAWING NO. W-1

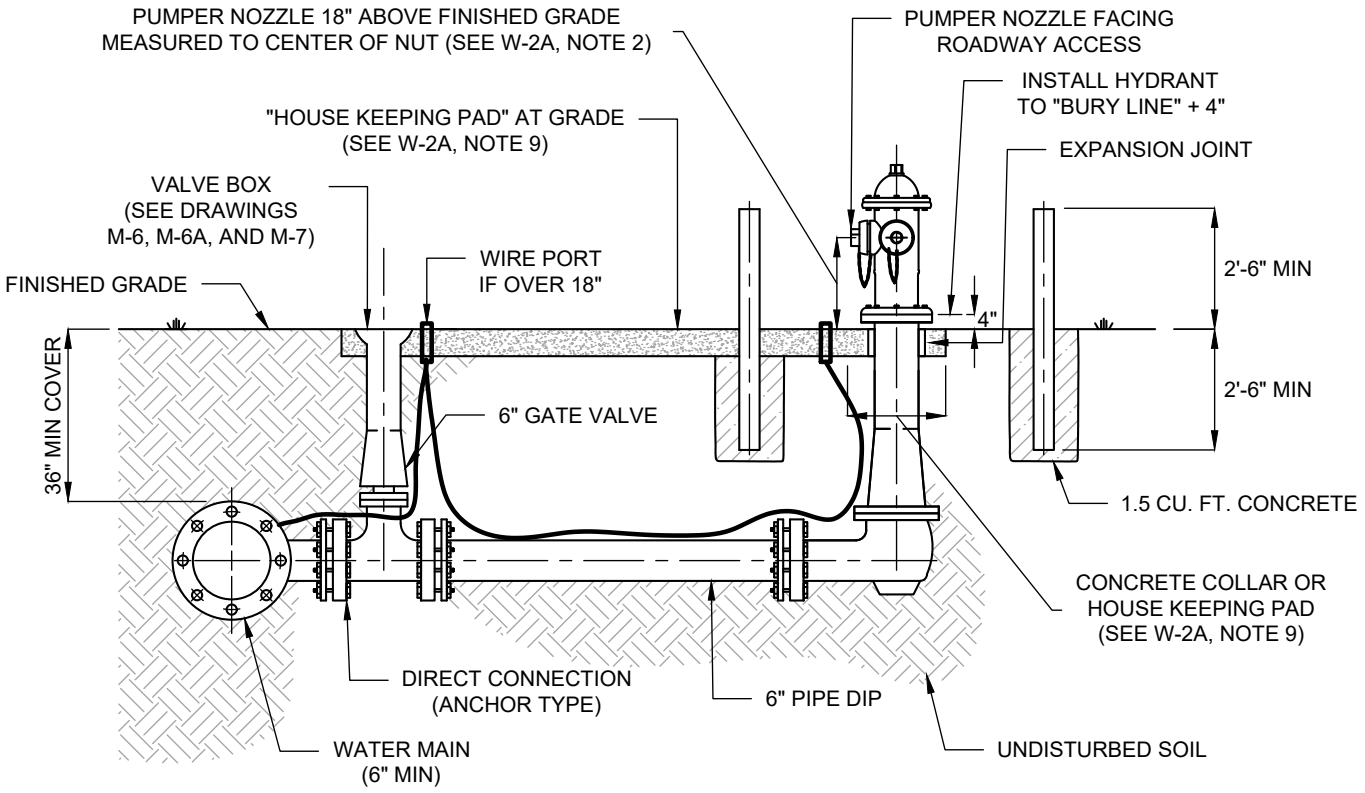
NOTES:

1. VALVE SPACING ON WATER MAINS SHALL NOT EXCEED 1000'.
2. A MINIMUM COVER OF 36" IS REQUIRED ABOVE THE TOP OF ALL PIPE BELLS.
3. DEAD END LINES, VALVES, AND HYDRANTS SHALL BE RESTRAINED.
4. ALL LINES SHALL BE A MINIMUM 10' OFFSET FROM BUILDINGS.
5. SEE DRAWINGS M-6, VALVE AND BOX DETAIL AND M-7, VALVE BOX PAD.
6. ALL IN-LINE VALVE COVERS SHALL BE PAINTED BLUE.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	VALVE NOTES 2024	DRAWING NO. W-1 A



PLAN VIEW



ELEVATION

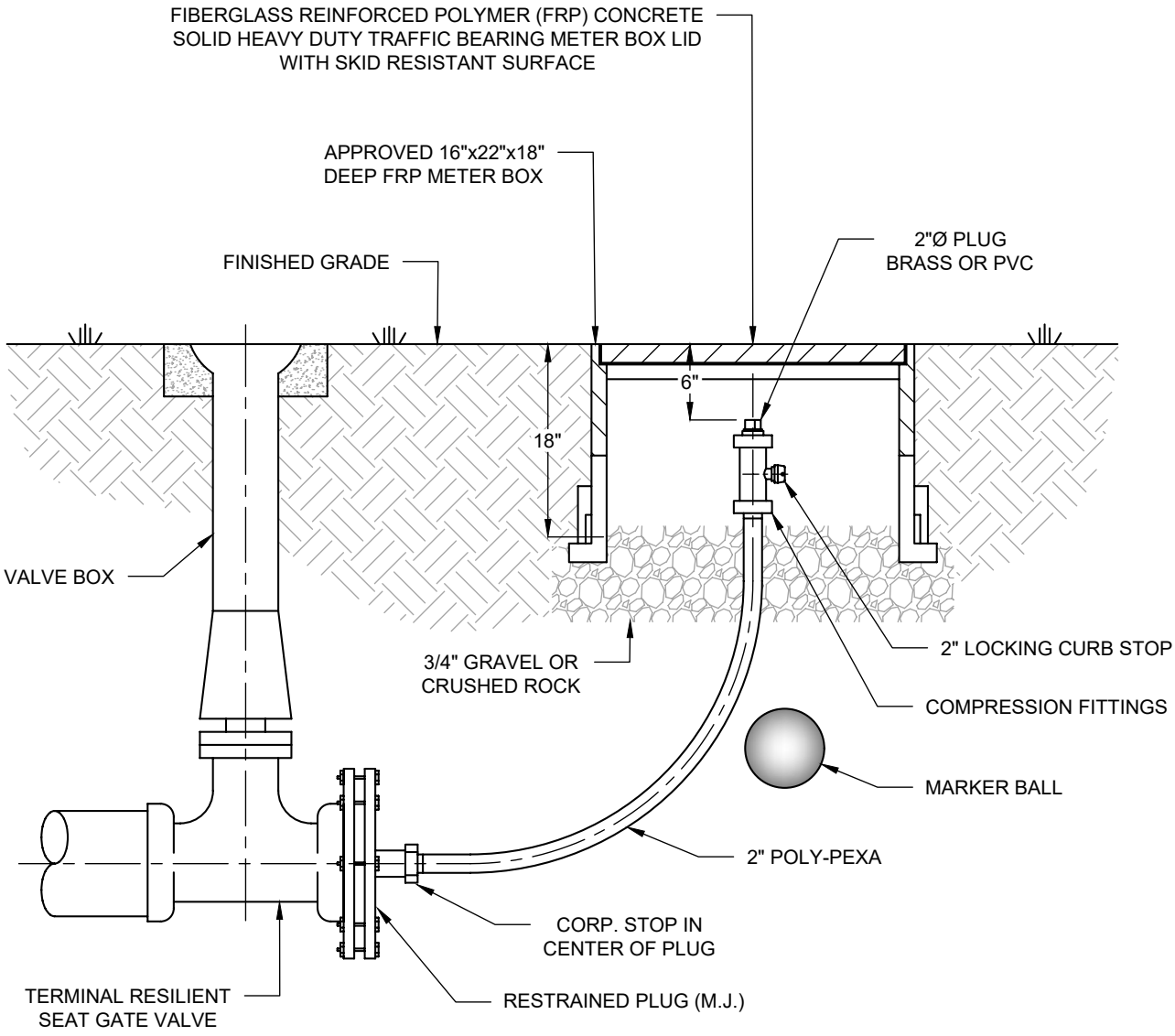
SEE DRAWING W-2A, FIRE HYDRANT DETAIL NOTES

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	FIRE HYDRANT DETAIL 2024	DRAWING NO. W-2

NOTES:

1. HYDRANT BOLLARDS TO BE 4"Ø GALVANIZED STEEL OR DUCTILE IRON PIPE FILLED WITH CONCRETE WHEN REQUIRED BY IRCDUS. BOLLARDS TO BE PAINTED RED, SAME AS HYDRANTS AND VALVE COVER.
2. THE HYDRANT SHOULD BE SET SUCH THAT THE "BURY LINE" ON THE HYDRANT BARREL IS SET AT FINISHED GRADE OR THAT THE OPERATING NUT OF THE PUMPER NOZZLE IS A MINIMUM OF 18" ABOVE FINISHED GRADE.
3. ALL HYDRANTS SHALL BE TRAFFIC BREAKAWAY TYPE.
4. FIRE HYDRANT SHOULD BE LOCATED 3' MINIMUM AND 12' MAXIMUM FROM EDGE OF PAVEMENT WHERE POSSIBLE.
5. ALL MATERIALS ARE TO BE PER IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.
6. TRACE WIRE TO BE INSTALLED AS PER DRAWING M-14, TRACE WIRE DETAILS. (FOR CLARITY THE TRACE WIRE IS NOT SHOWN IN DRAWING W-2, FIRE HYDRANT DETAIL).
7. MAINTAIN CLEAR ZONE RADIUS OF 7'-6" AROUND HYDRANT PERPENDICULAR TO ROADWAY OR CURB FACE (EXAMPLE: MUST BE CLEAR OF SIGNS, TREES, SHRUBS, TRANSFORMERS, UTILITY POLES, ETC.)
8. HYDRANTS AND PROTECTION DEVICES SHALL HAVE CLEARANCES OF 7'-6" IN FRONT AND ON THE SIDES OF THE FIRE HYDRANT, WITH A 4' MINIMUM CLEARANCE TO THE REAR OF THE HYDRANT UNLESS THE AUTHORITY HAVING JURISDICTION (AHJ) REQUIRES A LARGER CLEAR ZONE.
9. HOUSE KEEPING PAD IS REQUIRED. HOUSE KEEPING PAD SHALL BE 6" THICK x 2' WIDE (MINIMUM) AND LOCATED AT FINISHED GRADE. BREAKAWAY FLANGES SHALL BE 4" (OR TO MANUAL SPECIFICATION) ABOVE HOUSEKEEPING PAD. (SEE DRAWING W-2, FIRE HYDRANT DETAIL).
10. CONTRACTOR IS RESPONSIBLE FOR THE INSTALLATION OF BLUE REFLECTIVE MARKERS (RPM) INDICATING A FIRE HYDRANT. BLUE REFLECTIVE MARKER SHALL BE LOCATED IN THE CENTERLINE OF THE LANE CLOSEST TO THE HYDRANT.
11. REFLECTIVE MARKER (RPM'S) FOR FIRE HYDRANTS SHALL BE BLUE.
12. REFLECTIVE MARKERS SHALL BE AFFIXED TO PAVEMENT WITH A FDOT APPROVED PRODUCT.
13. ALL FIRE HYDRANT VALVE COVERS SHALL BE PAINTED RED.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	FIRE HYDRANT DETAIL NOTES 2024	DRAWING NO. W-2 A



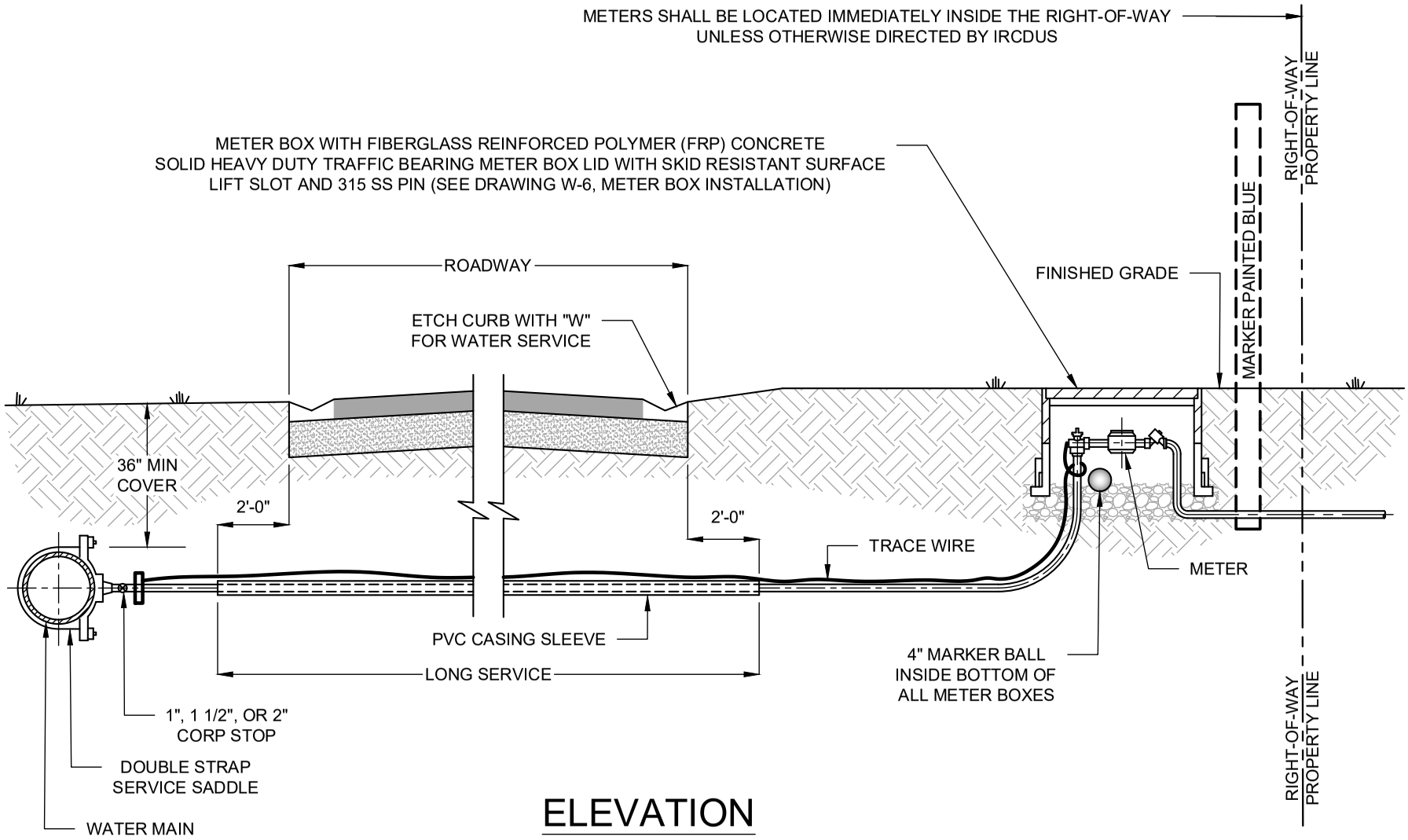
ELEVATION

NOTES:

1. BLOW-OFF TO BE LOCATED AT ALL DEAD END LINES AND ALIGNED WITH PROPERTY LINES AS REQUIRED BY IRCDUS.
2. ALL MATERIALS ARE TO BE PER IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.
3. METHODS OF RESTRAINT AS APPROVED BY IRCDUS.
4. TRACE WIRE TO BE INSTALLED PER DRAWING M-14, TRACE WIRE DETAILS.
5. ELECTRONIC MARKER BALLS ARE TO BE LOCATED ADJACENT TO ALL BOXES AND PLACED IN ALL METER BOXES WITHIN 24" FROM SURFACE.
6. ALL BLOW-OFFS SHALL BE LOCATED 4' TO 6' OF THE TERMINAL VALVE.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	MANUAL 2" BLOWOFF	DRAWING NO. W-3

2024



ELEVATION

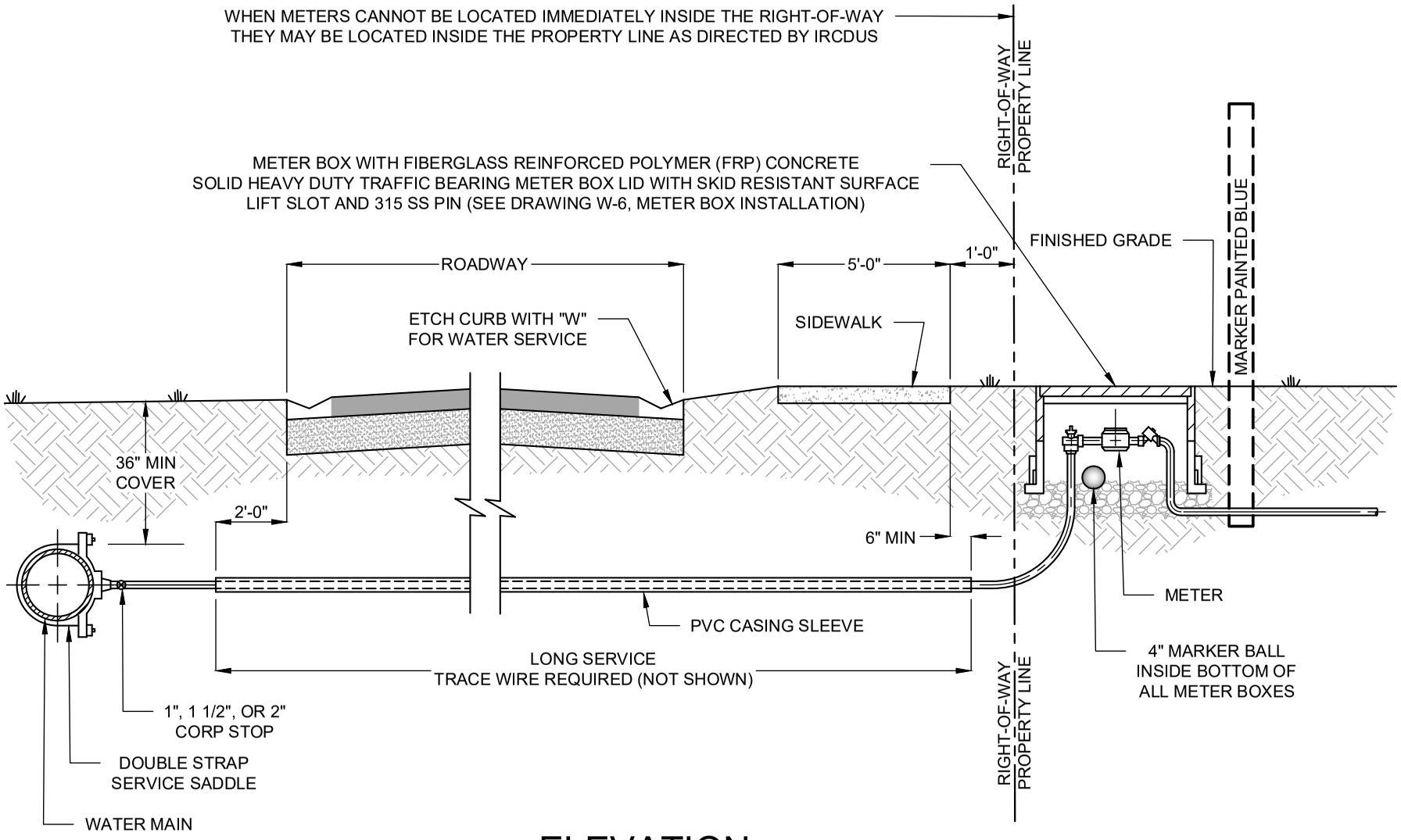
SEE DRAWING W-4B, WATER SERVICE NOTES

2024

DRAWING NO. W-4

INDIAN RIVER COUNTY
DEPARTMENT OF
UTILITY SERVICES

WATER SERVICE INSIDE OF RIGHT OF WAY



ELEVATION

SEE DRAWING W-4B, WATER SERVICE NOTES

2024

DRAWING NO. W-4 A

INDIAN RIVER COUNTY
DEPARTMENT OF
UTILITY SERVICES

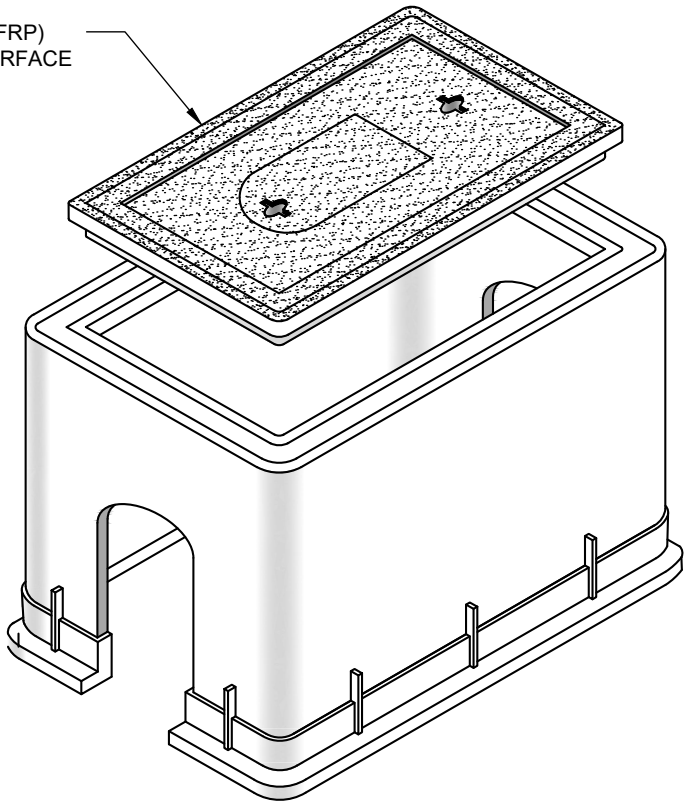
WATER SERVICE OUTSIDE OF RIGHT OF WAY

NOTES:

1. SUCCESSIVE TAPS INTO THE WATER MAIN SHALL BE A MINIMUM OF 18" ON CENTER.
2. ALL SERVICES REQUIRE 36" MINIMUM COVER.
3. MINIMUM SERVICE SIZE SHALL NOT BE LESS THAN 1"Ø. DUAL SERVICES SHALL BE A MINIMUM OF 1 1/2"Ø. TRIPLE SERVICES SHALL BE A MINIMUM OF 2"Ø. QUADRUPLE SERVICES SHALL BE APPROVED BY IRCDUS.
4. 1"Ø AND 1 1/2"Ø SERVICES REQUIRE A 2" MINIMUM I.D. CASING SLEEVE. 2"Ø SERVICES REQUIRE A 3" MINIMUM CASING SLEEVE. CASING SLEEVE SHALL BE SCHEDULE 40 P.V.C.
5. ALL METERS 2"Ø OR SMALLER SHALL BE SUPPLIED AND INSTALLED BY IRCDUS. ALL METERS GREATER THAN 2"Ø SHALL BE SUPPLIED AND INSTALLED BY THE DEVELOPER PROPERTY OWNER. REFER TO APPROVED MANUFACTURERS' PRODUCT LIST FOR METERS GREATER THAN 2"Ø.
6. PIN LOCKS WITH PLASTIC DUST CAPS SHALL BE PURCHASED BY THE DEVELOPER AND/OR CONTRACTOR AND SHALL BE INSTALLED ON ALL LOCKING CURB STOPS INSIDE METER BOX, SAMPLING POINTS, AND WATER SERVICE CONNECTIONS AT THE TIME OF ACTIVATING ALL WATER MAINS OR AT SUCH TIME AS DIRECTED BY IRCDUS.
7. CURB STOPS SHALL BE THE SAME SIZE AS THE METERS THAT ARE INSTALLED.
8. TRACE WIRE TO BE INSTALLED. (SEE DRAWING M-14, TRACE WIRE DETAILS).
9. PLACE A 4" ELECTRONIC MARKER BALL INSIDE BOTTOM OF ALL METER BOXES.
10. ALL RESIDENTIAL AND ONE EQUIVALENT RESIDENTIAL UNIT (ERU) SERVICES SHALL BE 5/8" METERS.
11. ALL METER BOXES TO BE PER IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.
12. AN UNOBSTRUCTED CLEAR ZONE IS REQUIRED AROUND ALL METER BOXES. (SEE DRAWING W-6A, METER BOX ACCESS).

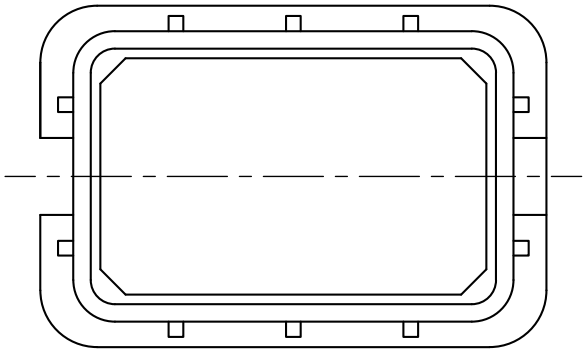
FIBERGLASS REINFORCED POLYMER (FRP)
CONCRETE LID WITH SKID RESISTANT SURFACE

HINGED CAST IRON METER BOX LID

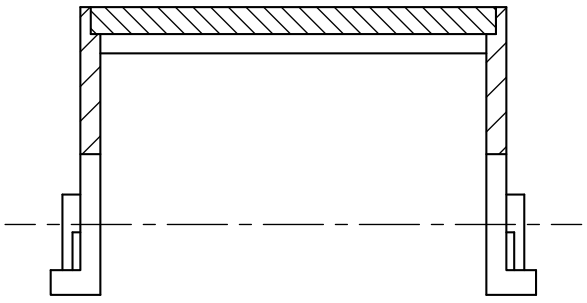


METER BOX WITH LID

FIBERGLASS REINFORCED POLYMER (FPR)
CONCRETE, OPEN BOTTOM METER BOX



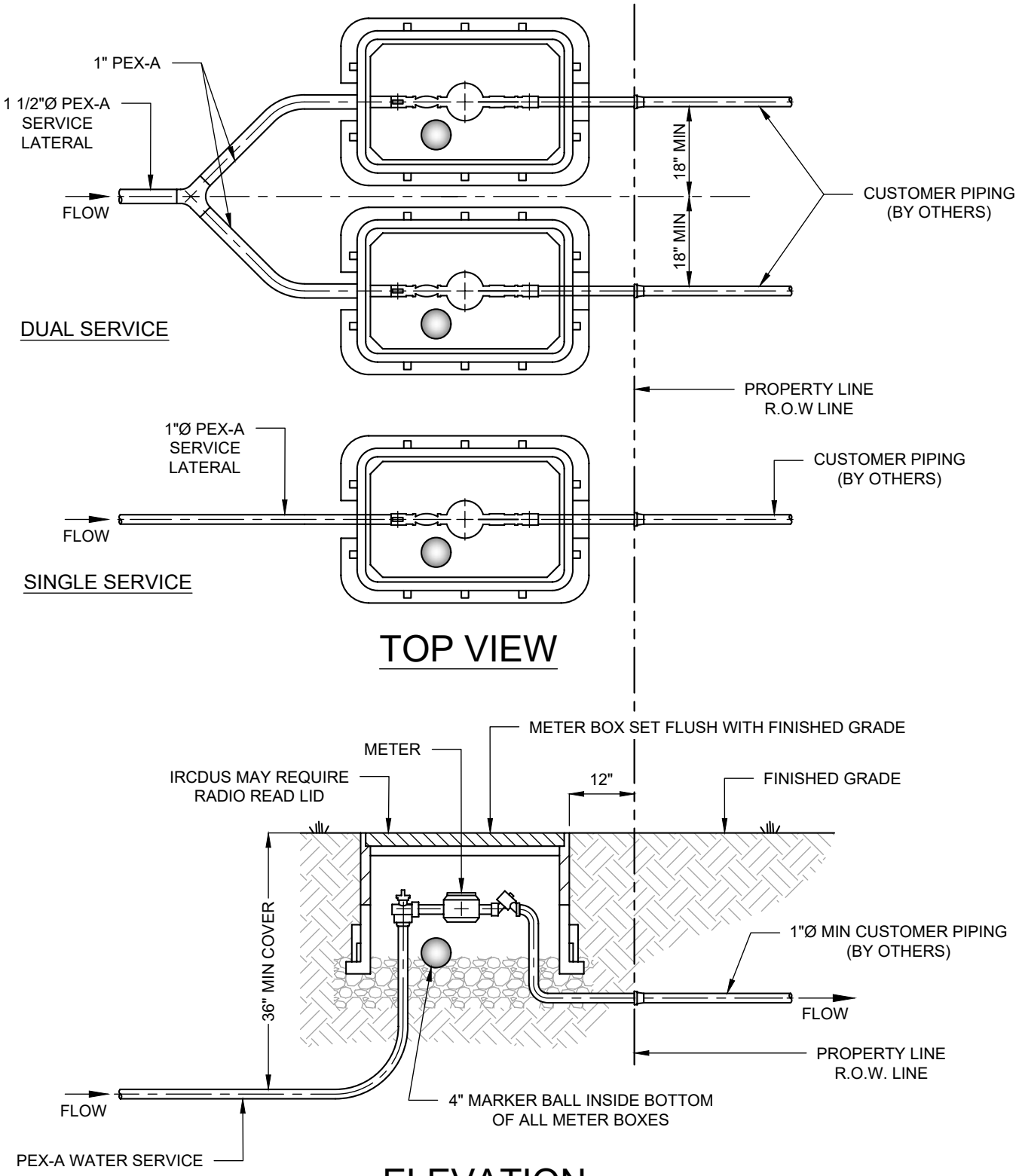
TOP VIEW



SECTION VIEW

SEE DRAWING W-4B, WATER SERVICE NOTES

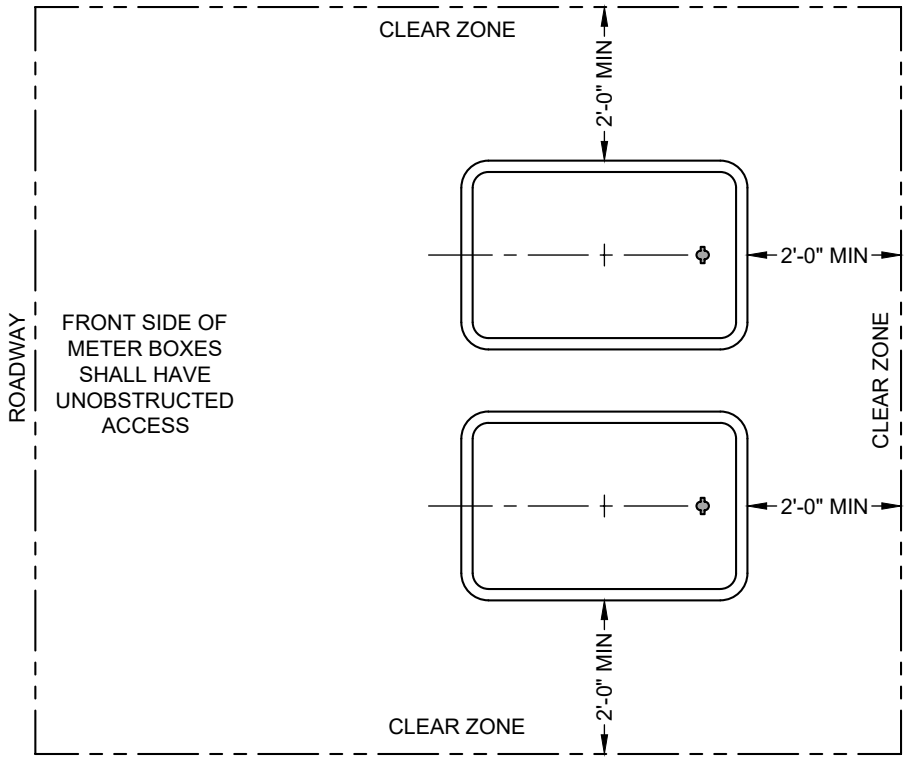
INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	METER BOX TYPICAL OPEN BOTTOM 2024	DRAWING NO. W-5



SEE DRAWING W-4B, WATER SERVICE NOTES

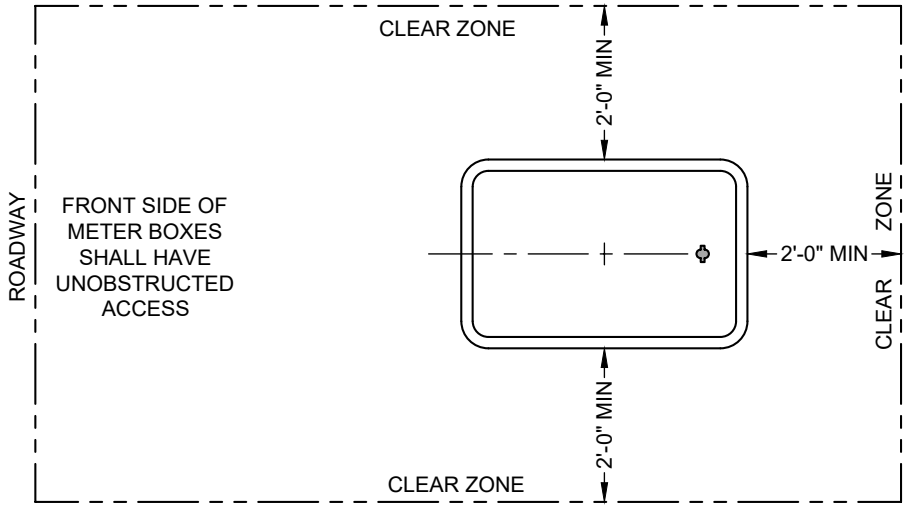
INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	METER BOX INSTALLATIONS	DRAWING NO. W-6

2024



DUAL SERVICE

CLEAR ZONE FOR METER BOXES, FREE OF VEGETATION OTHER THAN SOD

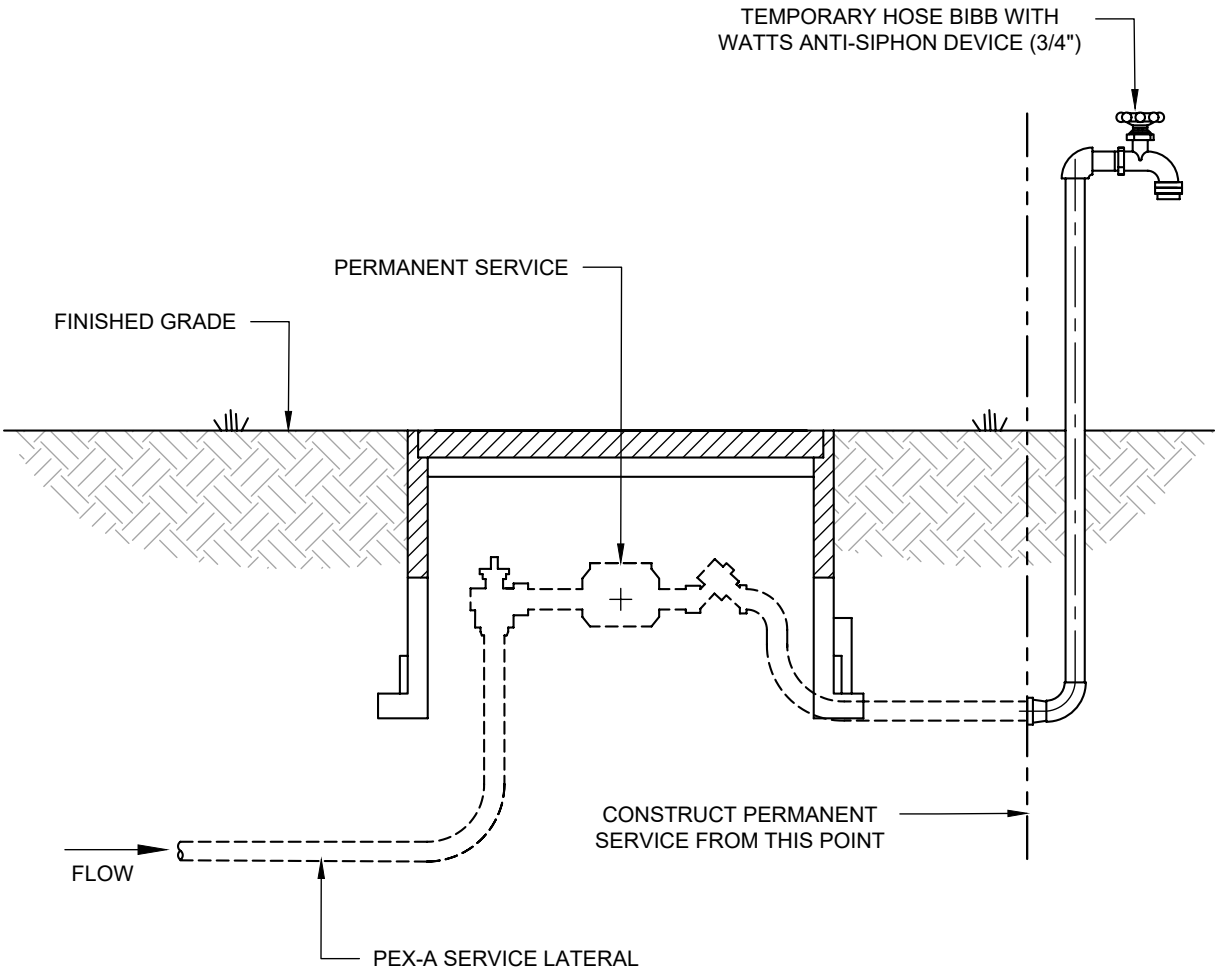


SINGLE SERVICE

TOP VIEW

SEE DRAWING W-4B, WATER SERVICE NOTES, NOTE 12

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	METER BOX ACCESS 2024	DRAWING NO. W-6 A



CUSTOMER RESPONSIBLE FOR PIPING
ON CUSTOMER SIDE OF METER

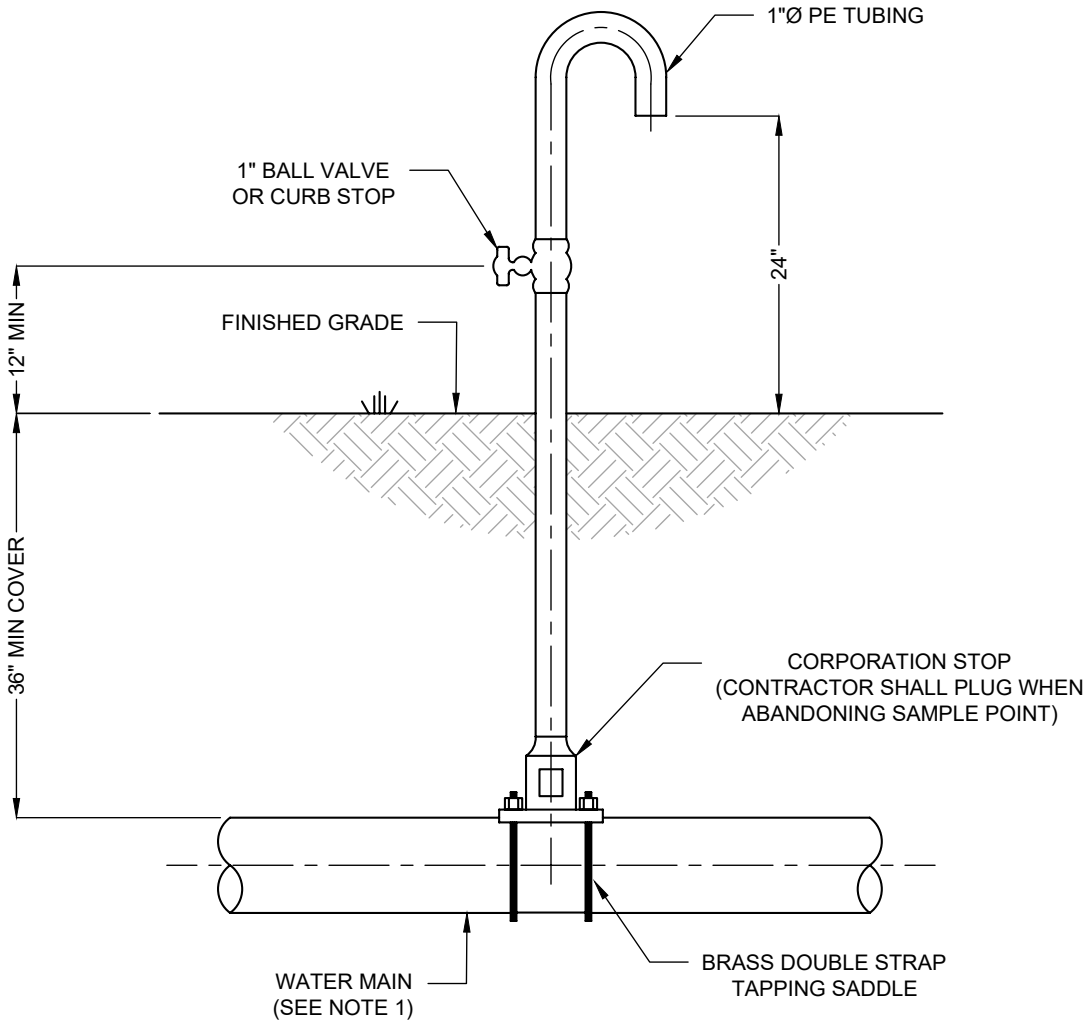
ELEVATION

NOTES:

1. IRCDUS TO INSTALL A TEMPORARY HOSE BIBB TO SUPPLY METERED WATER FOR CONSTRUCTION.
2. PRIOR TO FINAL IRCDUS INSPECTION, THE CONTRACTOR SHALL REMOVE THE TEMPORARY HOSE BIBB AND MAKE WATER CONNECTION TO THE BUILDING PER CURRENT IRCDUS CONSTRUCTION STANDARDS.
3. CONTRACTOR SHALL NOT DISTURB FITTINGS AT METER BOX.
4. CONTRACTOR SHALL REMOVE BIBB RISER AND CONNECT PERMANENT SERVICE AT LOCATION INDICATED.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	TEMPORARY HOSE BIBB (FOR CONSTRUCTION) 2024	DRAWING NO. W-7

A CORPORATION STOP SHALL BE INSTALLED WITH A LENGTH OF 1"Ø
COPPER TUBING EXTENDING ABOVE THE FINISHED GRADE
THE TUBING SHALL BE INSTALLED WITH A 180° DOWNTURN BEND

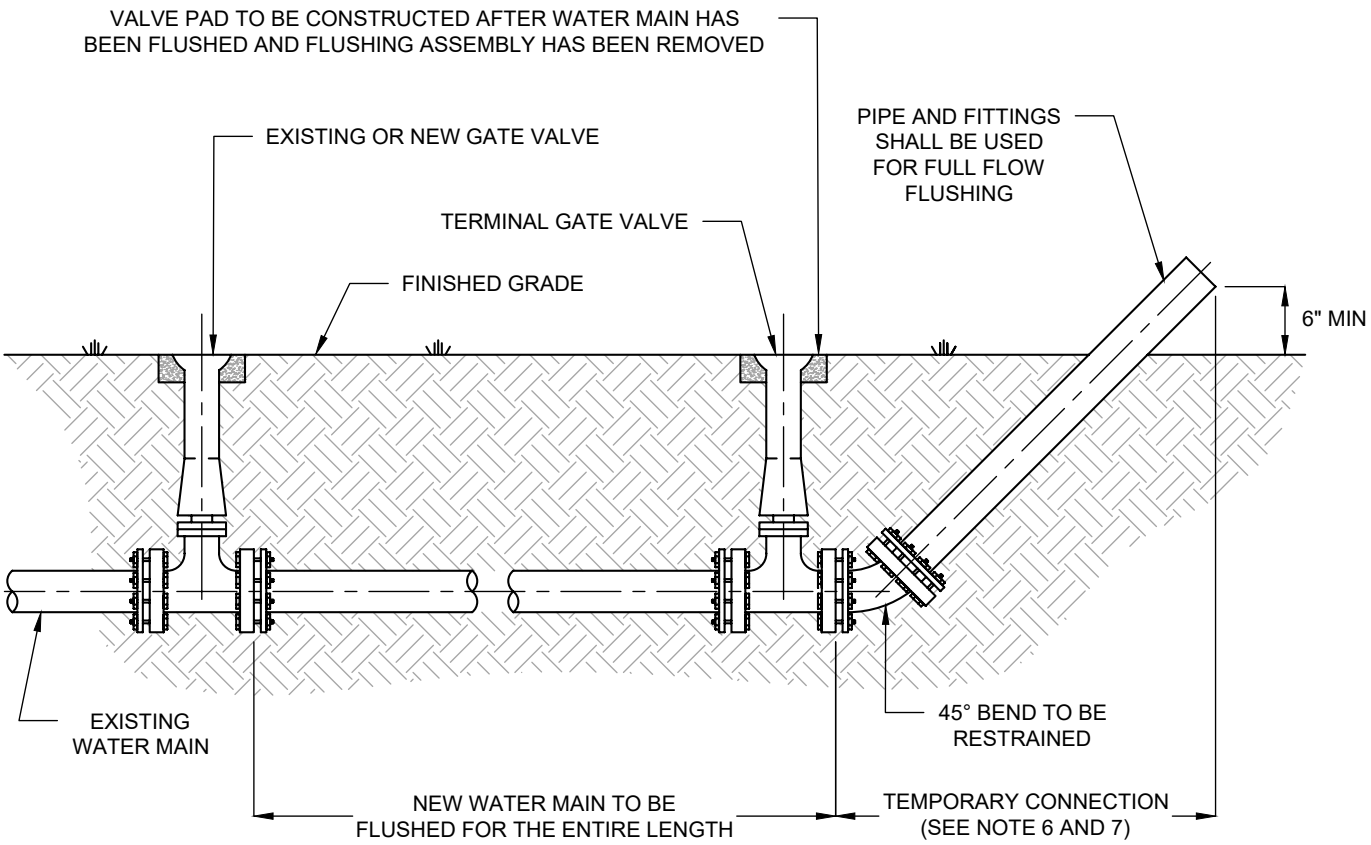


ELEVATION

NOTES:

1. TEMPORARY SAMPLING POINT SHALL BE CONSTRUCTED USING A SERVICE LINE WHEN POSSIBLE. SCHEDULE 40 PVC OR OTHER MATERIALS CAN BE USED, AS APPROVED BY IRCDUS.
2. NO SAMPLE POINTS SHALL BE CONSTRUCTED ON FIRE HYDRANTS.
3. CERTIFICATION OF PRESSURE TEST, TWO CONSECUTIVE DAYS OF SUCCESSFUL BACTERIOLOGICAL TESTS, AND CLEARANCE FROM THE FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION IS REQUIRED BEFORE THE SAMPLE TAP CAN BE ABANDONED.
4. WHEN SAMPLING IS COMPLETE TUBING SHALL BE REMOVED AND CORPORATION STOP PLUGGED.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	TEMPORARY SAMPLING POINT (BACTERIOLOGICAL) 2024	DRAWING NO. W-8



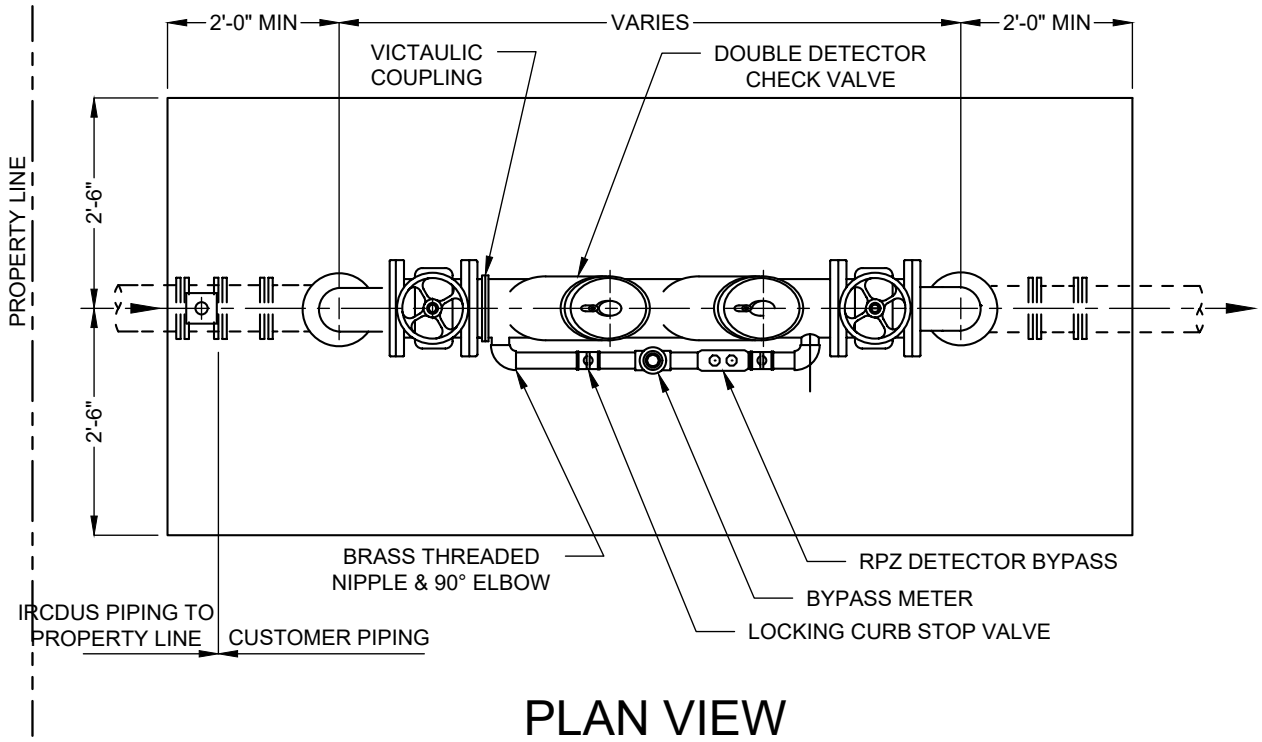
ELEVATION

NOTES:

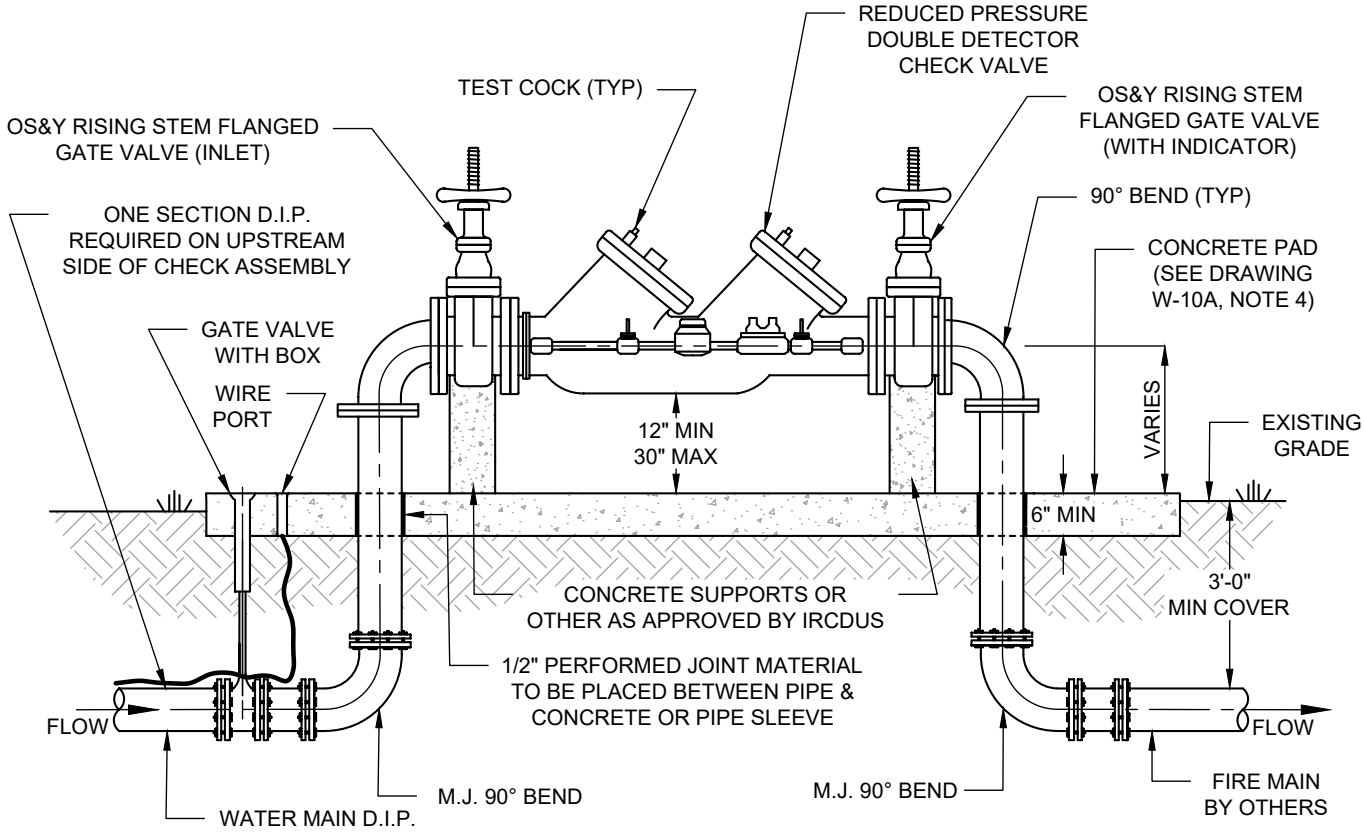
1. ALL MAINS LESS THAN 12"Ø SHALL BE FULL-BORE FLUSHED. PIGGING SHALL BE AT IRCDUS DISCRETION; REQUIRED ON 12" AND LARGER MAINS. ALL FIRE HYDRANTS AND DOUBLE DETECTOR CHECK VALVES SHALL BE INSPECTED AND TESTED TO ENSURE THAT NO FOREIGN OBJECTS IMPEDE THE FLOW OF WATER. (FOR DETAILS ON LINE FILLING, SEE DRAWINGS W-13 AND W-13A, TEMPORARY JUMPER DETAILS).
2. A PRESSURE GAUGE SHALL BE INSTALLED UPSTREAM OF THE FLUSHING POINT. PRESSURE UPSTREAM SHALL NOT FALL BELOW 20 P.S.I.
3. PROVIDE ALL NECESSARY JOINT RESTRAINTS SUCH AS MEGALUGS, RESTRAINED JOINT HARNESS, OR APPROVED EQUAL IN ACCORDANCE WITH IRCDUS CONSTRUCTION STANDARDS.
4. IRCDUS PERSONNEL SHALL BE PRESENT FOR ALL FLUSHING ACTIVITIES AND SHALL OPERATE ALL EXISTING VALVES.
5. TEMPORARY CONNECTION FOR FLUSHING SHALL BE SAME DIAMETER PIPE AS THE NEW MAIN AND VALVE.
6. CONTRACTOR SHALL PROVIDE ADEQUATE PROTECTION AGAINST EROSION DOWNSTREAM OF EXIT PIPE DURING FLUSHING OF MAIN TO MEET THE APPROVAL OF IRCDUS.
7. WHEN FLUSHING IS COMPLETE THE TEMPORARY FLUSHING ASSEMBLY SHALL BE REMOVED AND THE GATE VALVE SHALL BE PLUGGED.
8. FIELD INSPECTION BY IRCDUS IS REQUIRED BEFORE UTILITIES ARE ACCEPTED.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	FULL BORE FLUSHING CONNECTION	DRAWING NO. W-9

2024



PLAN VIEW



ELEVATION

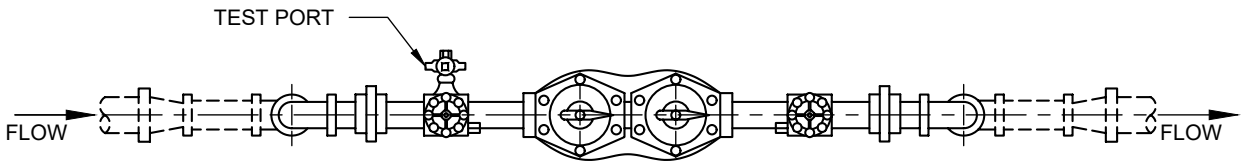
SEE DRAWING W-10A, DOUBLE-DETECTOR CHECK VALVE ASSEMBLY NOTES

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	DOUBLE DETECTOR CHECK VALVE ASSEMBLY (FIRE MAIN SERVICE) 2024	DRAWING NO. W-10

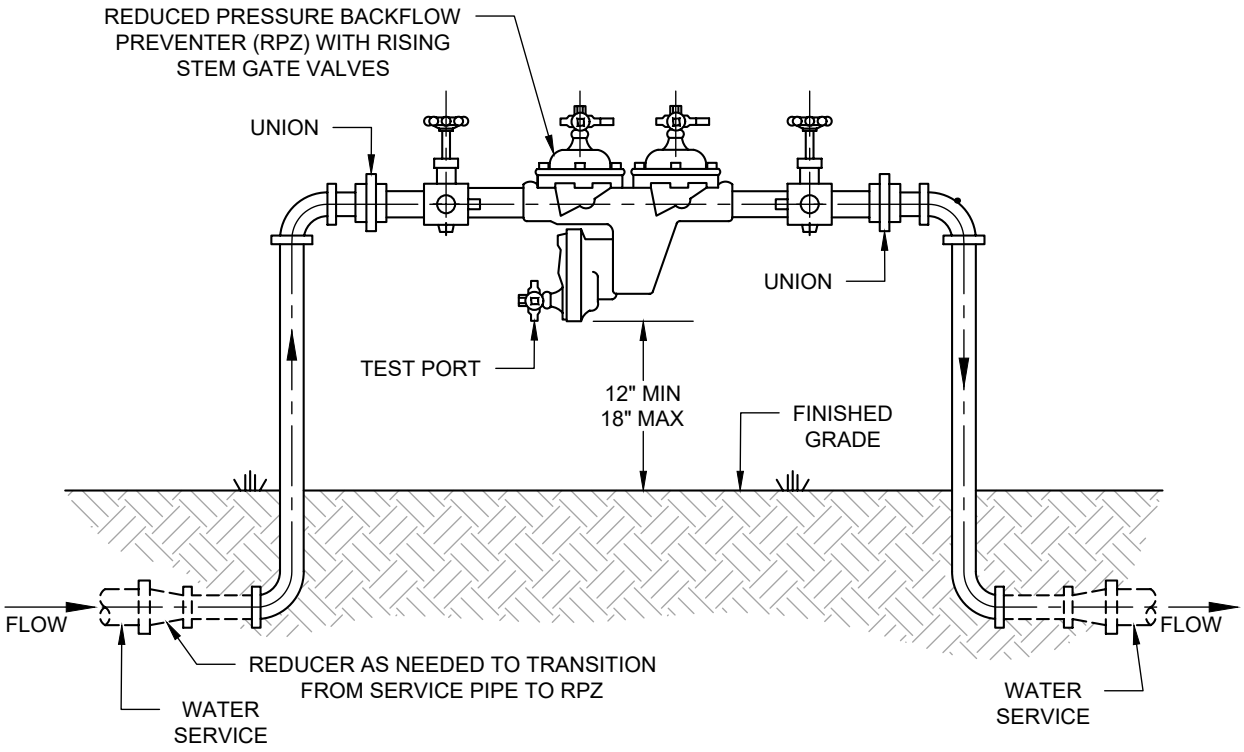
NOTES:

1. ALL BUILDINGS WITH FIRE PROTECTION SYSTEMS MUST HAVE AN IRCDUS APPROVED DOUBLE DETECTOR CHECK VALVE AND METER INSTALLED ON THEIR PROPERTY. DETECTOR CHECKS SHALL BE INSTALLED IN ACCORDANCE WITH STATE FIRE MARSHAL CODE AND IRCDUS STANDARDS. CHECK VALVE AND METER SHALL BE MOUNTED ABOVE GROUND.
2. DOUBLE DETECTOR CHECK VALVE ASSEMBLIES SHALL BE INSPECTED, TESTED, CERTIFIED, AND REPORTED ON AN ANNUAL BASIS IN ACCORDANCE WITH THE INDIAN RIVER COUNTY CROSS CONNECTION CONTROL PROGRAM REQUIREMENTS.
3. THE INDIAN RIVER COUNTY CROSS CONNECTION CONTROL PROGRAM REQUIREMENTS CAN BE FOUND AT: www.indianriver.gov/utilities/cccp.htm
4. CONCRETE PAD SHALL BE CONSTRUCTED WITH 3,000 P.S.I. COMMERCIAL GRADE FIBER MESH CONCRETE AND SHALL BE A MINIMUM 6" THICK (LENGTH AS REQUIRED).
5. MINIMUM 4" SERVICE TAP REQUIRED WITH A 4" GATE VALVE.
6. ALL PIPING AND FITTINGS SHALL BE PER IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.
7. ONE SECTION OF DUCTILE IRON PIPE IS REQUIRED ON EACH SIDE OF DOUBLE-CHECK VALVE ASSEMBLY.
8. ALL ABOVE GROUND PIPING, FITTINGS, GATE VALVES, AND METER ASSEMBLY SHALL BE PAINTED WITH RED POLYURETHANE COATING.
9. DETAILS SHOWN IN DRAWING W-10, DOUBLE-DETECTOR CHECK VALVE ASSEMBLY, CAN BE MODIFIED AND APPROVED BY IRCDUS FOR EACH INDIVIDUAL PROJECT.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	DOUBLE DETECTOR CHECK VALVE ASSEMBLY NOTES (FIRE MAIN SERVICE) 2024	DRAWING NO. W-10 A



PLAN VIEW

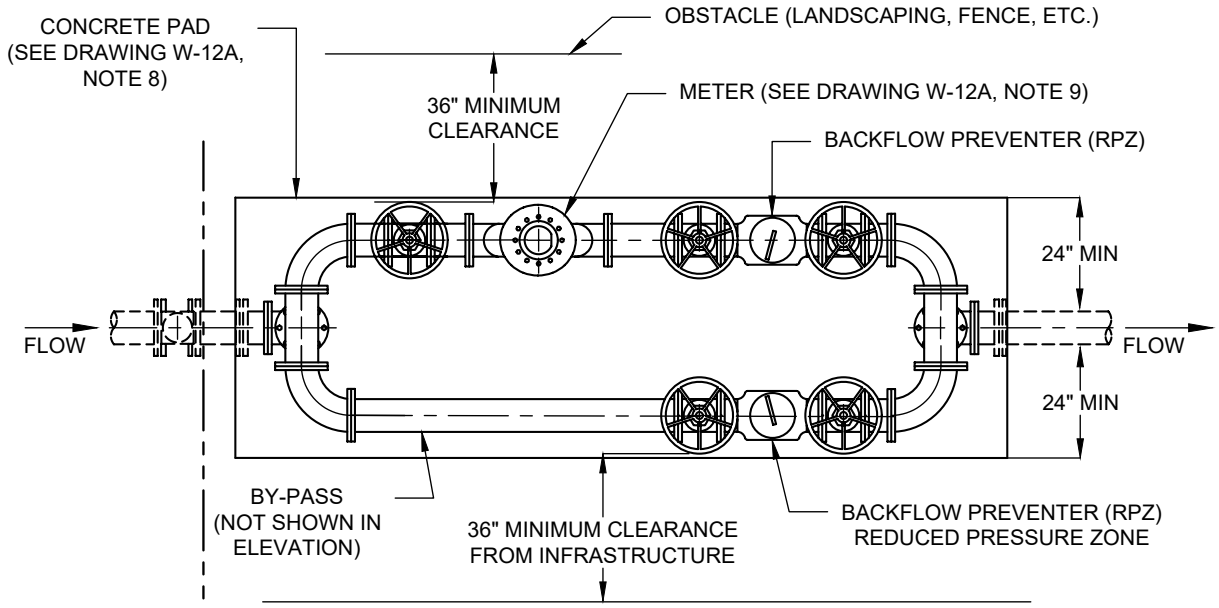


ELEVATION

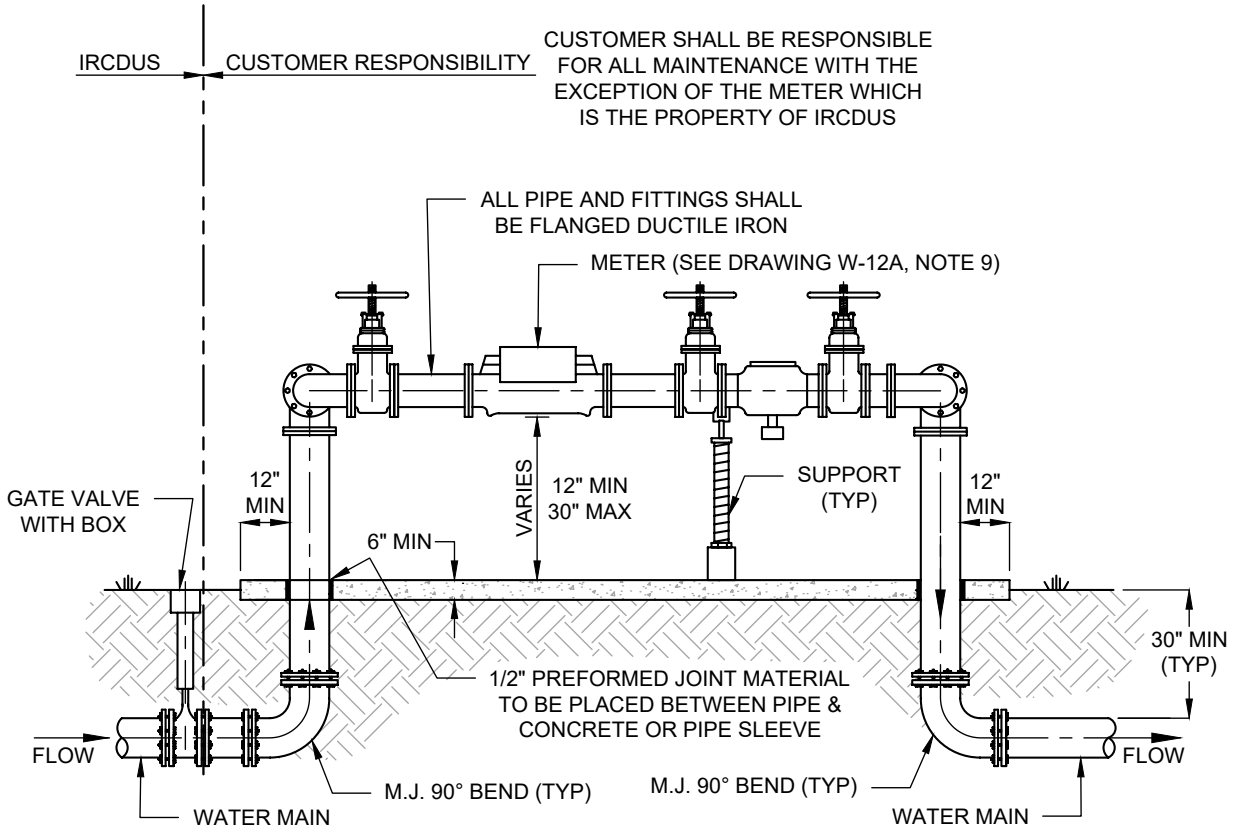
NOTES:

1. ALL BUILDINGS OR USES CONSIDERED HIGH-HAZARD (F.S. 62-555.360) SHALL INSTALL A REDUCED PRESSURE ZONE (RPZ) BACKFLOW PREVENTOR AS DETERMINED BY IRCDUS.
2. ALL FASTENERS SHALL BE 316 STAINLESS STEEL (OR APPROVED EQUAL).
3. APPROVED EQUALS HAVING FULL UL, USC, AND AWWA CERTIFICATIONS MAY BE INSTALLED ONLY AFTER SPECIFIC APPROVAL BY IRCDUS.
4. SUPPORT BACKFLOW PREVENTER FROM WALL, IF REQUIRED, WITH APPROVED PIPE SUPPORT SYSTEM. PIPE SUPPORT SYSTEM SHALL BE BRASS, COPPER OR D.I.P., AS APPROVED BY IRCDUS.
5. PIPING 2 1/2"Ø OR GREATER SHALL BE FLANGED DUCTILE IRON PIPE.
6. ALL MATERIALS ARE TO BE PER IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.
7. RPZ'S SHALL BE INSPECTED, CERTIFIED, AND REPORTED ON AN ANNUAL BASIS IN ACCORDANCE WITH THE INDIAN RIVER COUNTY CONNECTION CONTROL PROGRAM REQUIREMENTS.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	REDUCED PRESSURE BACKFLOW PREVENTER (RPZ) 2024	DRAWING NO. W-11



PLAN VIEW



ONE SECTION D.I.P. REQUIRED ON EACH SIDE OF CHECK VALVE ASSEMBLY

ELEVATION

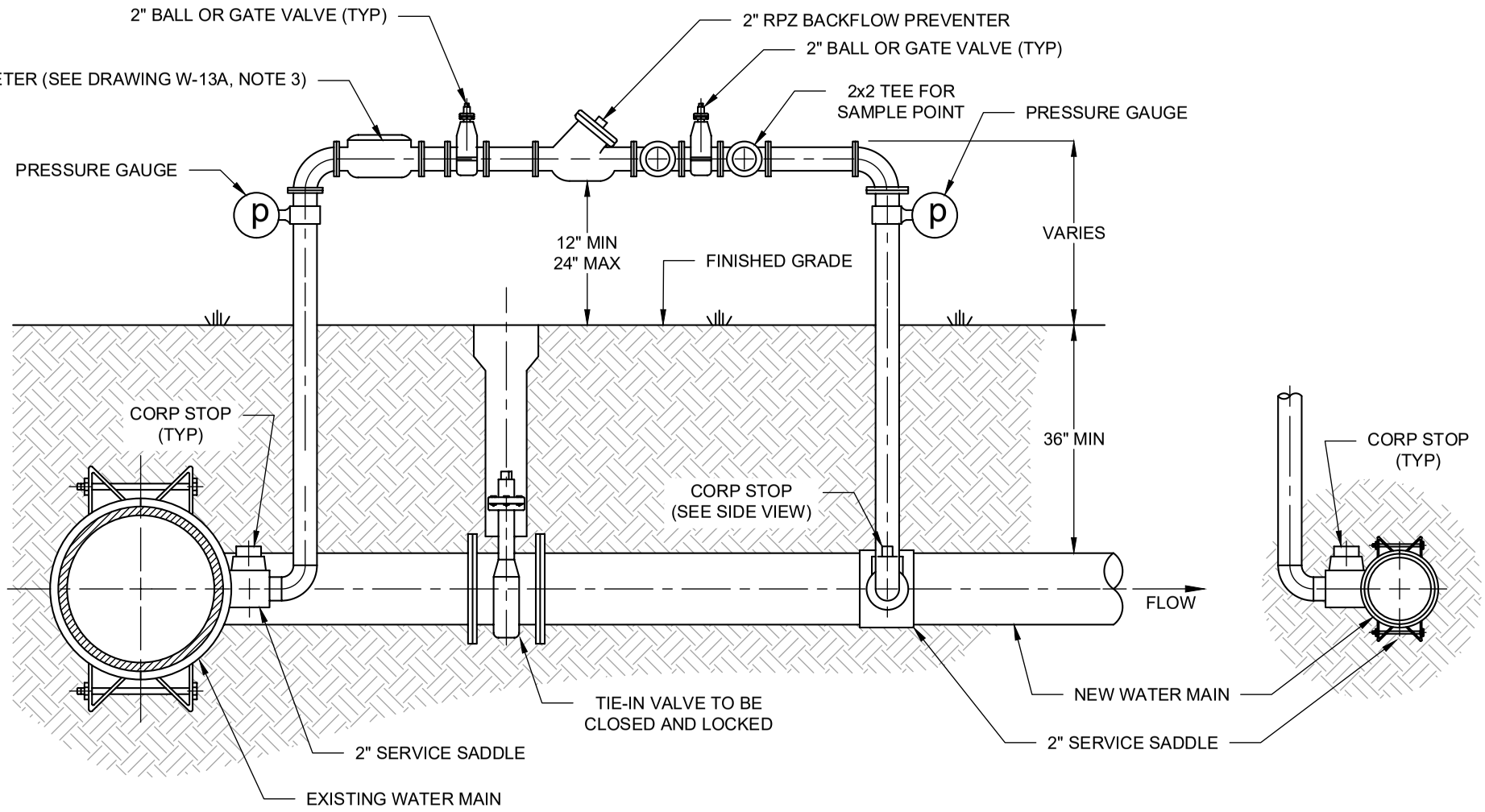
BY-PASS NOT SHOWN FOR CLARITY

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	MASTER METER COMBINATION ASSEMBLY (3" OR LARGER) 2024	DRAWING NO. W-12

NOTES:

1. ALL ABOVE GROUND PIPING SHALL BE FLANGED DUCTILE IRON. ONE SECTION OF DUCTILE IRON PIPE REQUIRED ON EACH SIDE OF CHECK VALVE ASSEMBLY.
2. BY-PASS PIPE DIAMETER SHALL BE DETERMINED PER ENGINEER OF RECORD.
3. FIELD FABRICATED FLANGES MUST BE APPROVED BY IRCDUS INSPECTOR.
4. ASSEMBLY TO BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURERS' INSTRUCTIONS.
5. ASSEMBLY TO BE PRIMED WITH RUST INHIBITIVE PRIMER AND FINISHED PAINTED BLUE AFTER INSTALLATION. (SEE APPROVED MANUFACTURERS' PRODUCT LIST).
6. TO SECURE VALVES: CUSTOMER TO SUPPLY GALVANIZED CHAIN. IRCDUS TO SUPPLY LOCK.
7. RPZ'S SHALL BE INSPECTED, CERTIFIED, AND REPORTED ON AN ANNUAL BASIS IN ACCORDANCE WITH THE INDIAN RIVER COUNTY CROSS CONNECTION PROGRAM REQUIREMENTS.
8. CONCRETE PAD SHALL BE A MINIMUM OF 6" THICK (LENGTH AS REQUIRED).
9. METER SHALL BE PER APL AND APPROVED BY IRCDUS.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	MASTER METER COMBINATION ASSEMBLY NOTES 2024	DRAWING NO. W-12 A



ELEVATION

SIDE VIEW

SEE DRAWING W-13A, TEMPORARY JUMPER NOTES
PRESSURE GAUGES MOUNTED ON TOP OR SIDE (SEE DRAWING W-13A, NOTE 9)

2024

DRAWING NO. W-13

INDIAN RIVER COUNTY
DEPARTMENT OF
UTILITY SERVICES

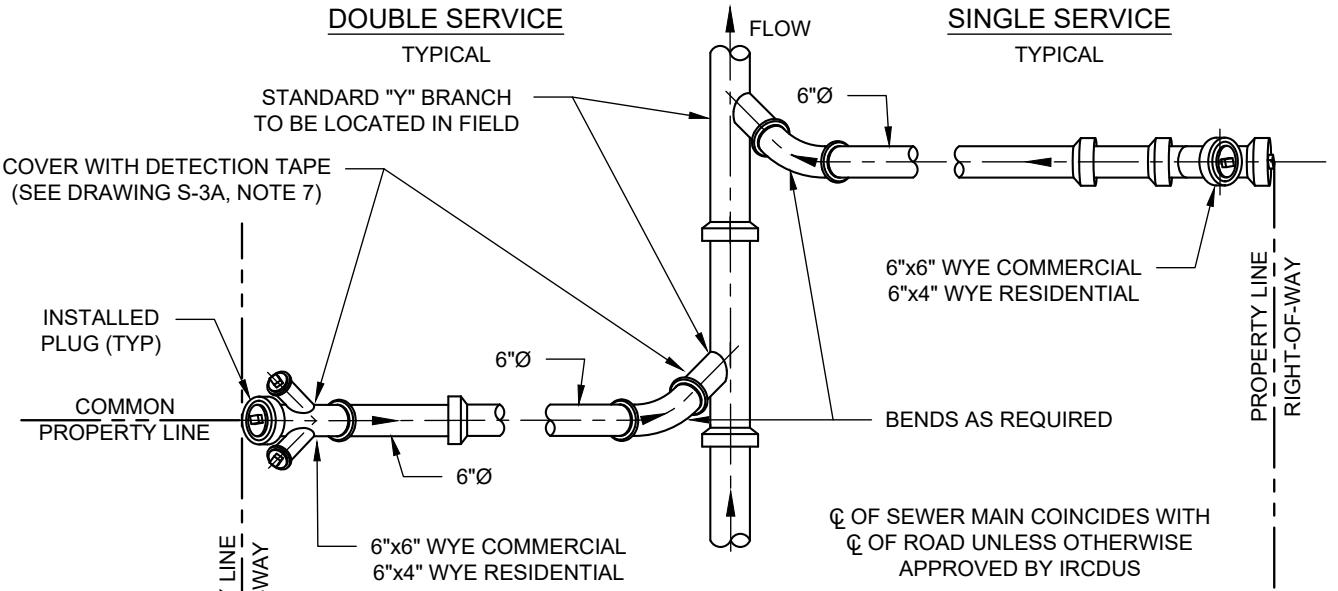
TEMPORARY JUMPER DETAIL

NOTES:

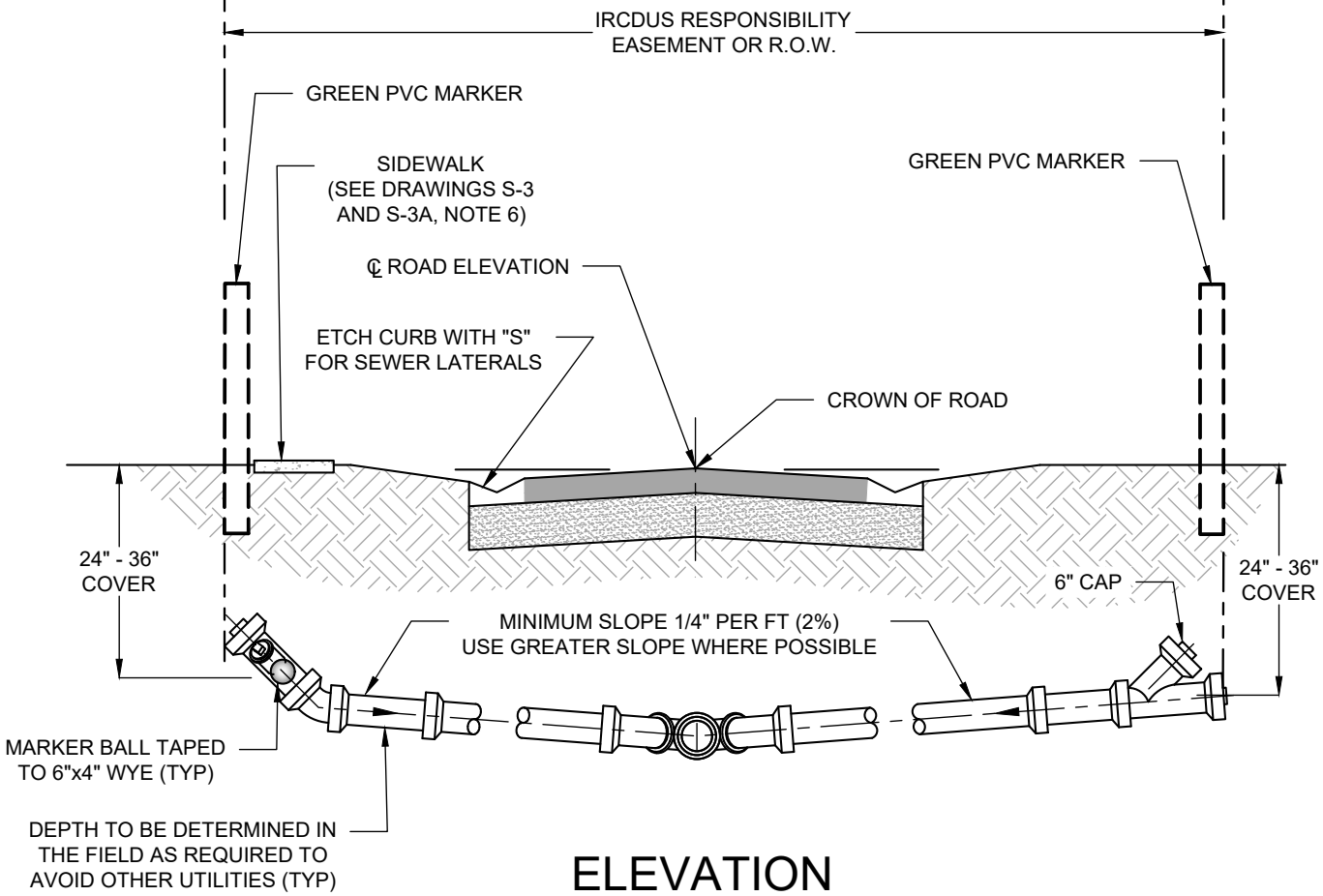
1. A TEMPORARY JUMPER CONNECTION IS TO BE USED FOR FILLING ANY NEW WATER MAIN OF ANY SIZE FROM THE EXISTING ACTIVE WATER MAINS AND FOR THE FLUSHING OF NEW MAINS UP TO 6”Ø (2.5 FPS MINIMUM VELOCITY) AND FOR PULLING BACTERIOLOGICAL SAMPLES FROM ANY NEW WATER MAIN OF ANY SIZE.
2. TIE-IN VALVE SHALL BE OPERATED BY IRCDUS PERSONNEL ONLY AND IN THE PRESENCE OF THE ENGINEER OF RECORD.
3. IRCDUS SHALL PROVIDE METER FOR SERVICE AFTER APPLICATION, DEPOSIT, AND ALL FEES HAVE BEEN PAID.
4. A 2" TEMPORARY JUMPER TO BE USED UNLESS OTHERWISE DIRECTED BY IRCDUS.
5. ALL INSTALLATION AND MAINTENANCE OF THE TEMPORARY JUMPER CONNECTION AND ASSOCIATED BACKFLOW PREVENTION DEVICE, FITTINGS, VALVES, ETC., SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
6. ALL MATERIALS TO BE PER IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.
7. PIPE AND FITTINGS USED FOR CONNECTING THE NEW PIPE TO THE EXISTING PIPE SHALL BE DISINFECTED WITH LIQUID CHLORINE (SODIUM HYPOCHLORITE) PRIOR TO INSTALLATION IN ACCORDANCE WITH AWWA C651, LATEST EDITION. THE TAPPING SLEEVE AND EXTERIOR OF THE MAIN TO BE TAPPED SHALL BE DISINFECTED BY SPRAYING OR SWABBING PER AWWA C651 SECTION TWO. THE USE OF CHLORINE TABLETS IS STRICTLY PROHIBITED.
8. THE JUMPER CONNECTION SHALL ALSO BE USED TO MAINTAIN A MINIMUM PRESSURE OF 20 PSI IN THE NEW MAINS CONTINUOUSLY AFTER DISINFECTION AND UNTIL FDEP CLEARANCE LETTER IS OBTAINED.
9. PRESSURE GAUGES ARE REQUIRED ON EACH SIDE OF THE 2" GATE OR BALL VALVE.
10. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION DEMONSTRATING THAT THE REDUCED PRESSURE ZONE BACKFLOW PREVENTER (RPZ) IS IN GOOD WORKING ORDER AT THE TIME OF INSTALLATION, AND PROVIDE DOCUMENTATION THAT THE RPZ HAS BEEN TESTED BY A QUALIFIED BACKFLOW TECHNICIAN AS APPROVED BY IRCDUS PRIOR TO USE ON EACH PROJECT.
11. EXCEPT AS REQUIRED TO FLUSH LINES GREATER THAN 6"Ø, THE TIE-IN VALVE SHALL REMAIN CLOSED AND SHALL BE LOCKED IN THE CLOSED POSITION BY IRCDUS. THE TIE-IN VALVE SHALL REMAIN LOCKED CLOSED UNTIL THE NEW SYSTEM HAS BEEN CLEARED FOR USE BY THE FDEP.
12. THE JUMPER CONNECTION SHALL BE MAINTAINED UNTIL CLEARANCE FOR USE FROM THE FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION (FDEP) AND OTHER PERTINENT AGENCIES HAS BEEN RECEIVED.
13. UPON RECEIPT OF CLEARANCE FOR USE BY FDEP AND THE DIRECTION OF IRCDUS, THE CONTRACTOR SHALL REMOVE TEMPORARY JUMPER CONNECTION. THE CORPORATION STOPS ARE TO BE CLOSED AND PLUGGED WITH 2” BRASS OR PVC PLUGS.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	TEMPORARY JUMPER DETAIL NOTES 2024	DRAWING NO. W-13 A

WASTEWATER



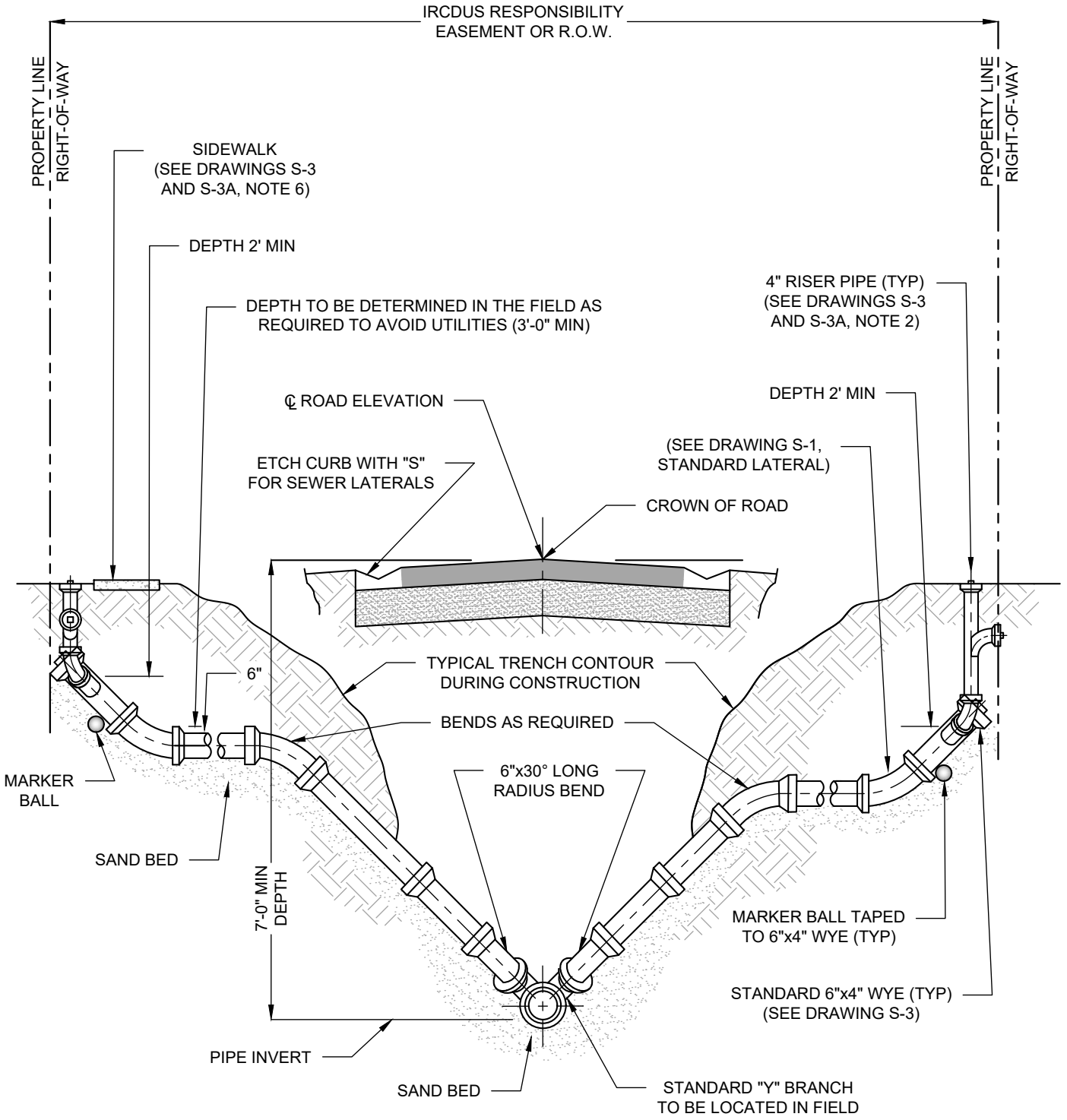
PLAN VIEW



ELEVATION

SEE DRAWING S-3A, SEWER LATERAL NOTES
RISER AND CLEANOUTS NOT SHOWN FOR CLARITY

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	STANDARD LATERAL (SHALLOW SEWER) 2024	DRAWING NO. S-1

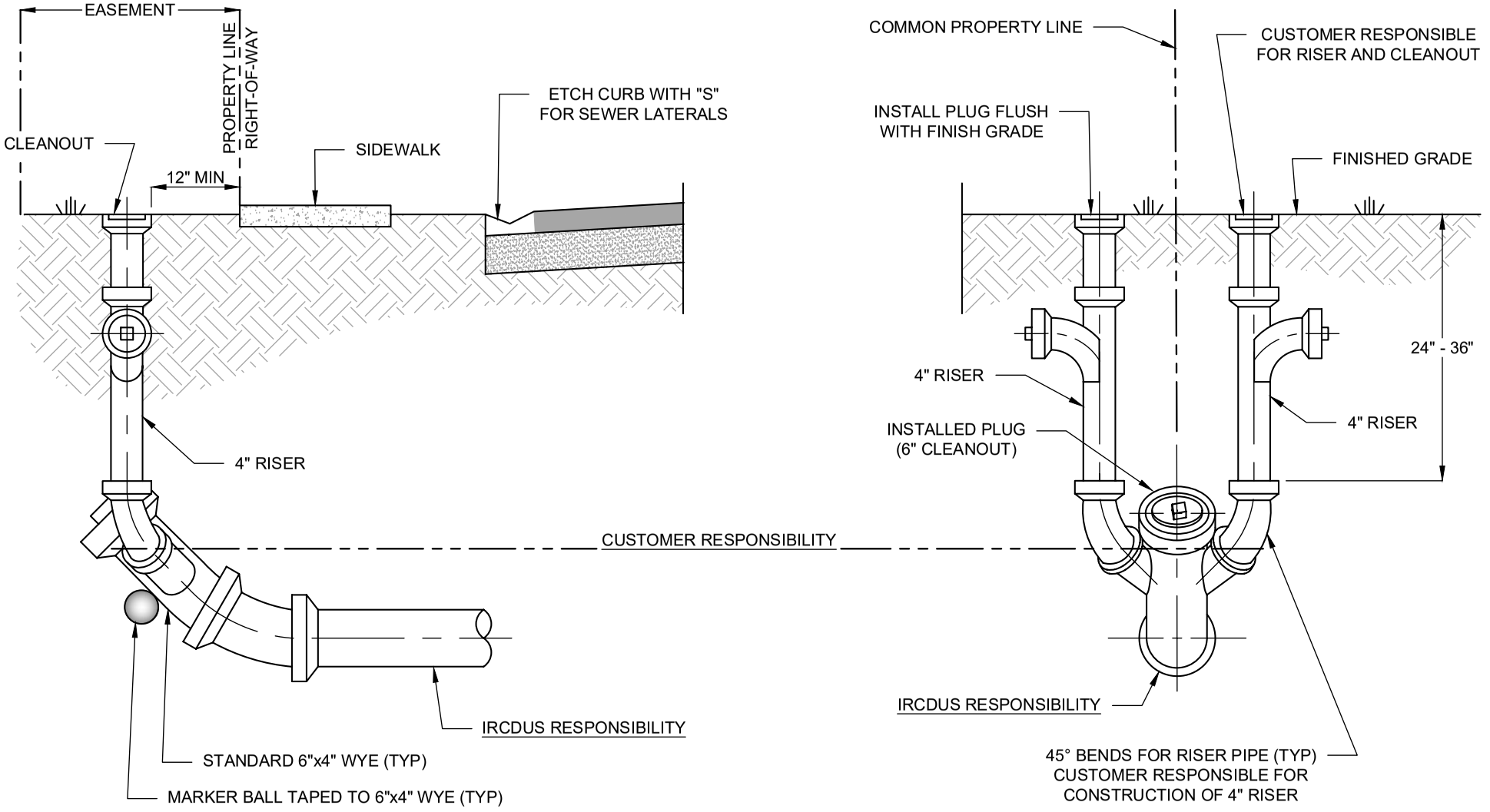


SAND EXCAVATION

ELEVATION

SEE DRAWING S-3A, SEWER LATERAL NOTES

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	MODIFIED RISER LATERAL (DEEP SEWER) 2024	DRAWING NO. S-2



ELEVATION

SEE DRAWING S-3A, SEWER LATERAL NOTES

2024

DRAWING NO. S-3

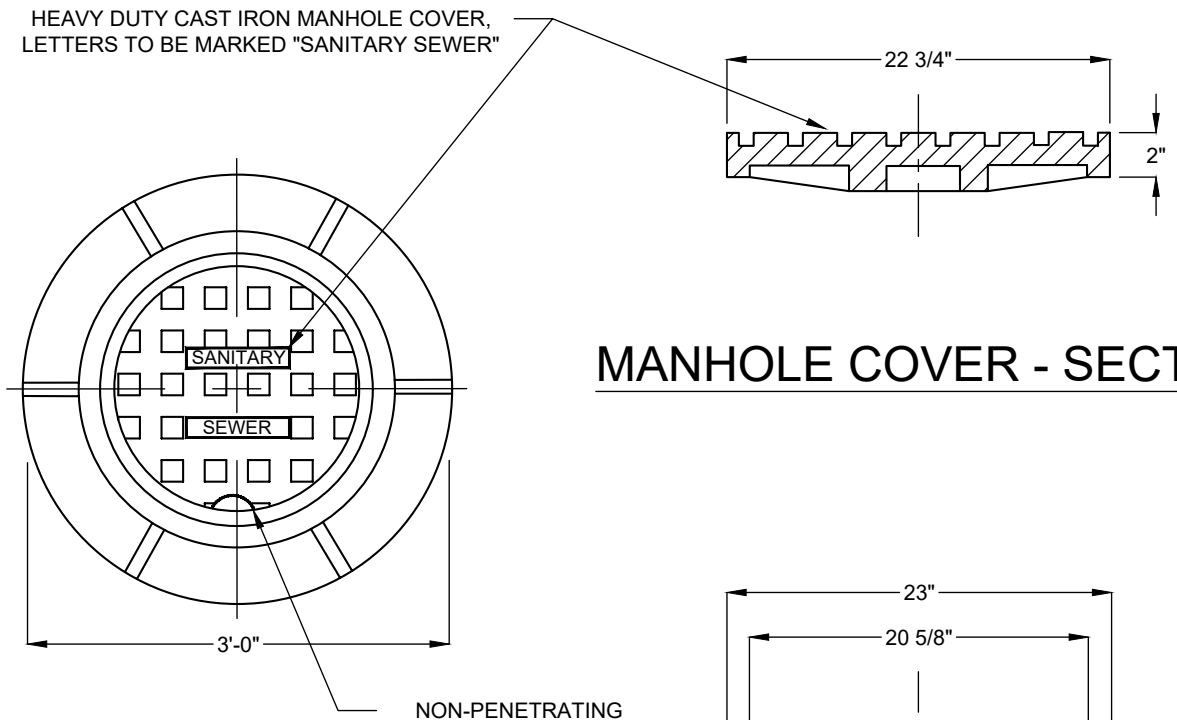
INDIAN RIVER COUNTY
DEPARTMENT OF
UTILITY SERVICES

SEWER LATERAL RISER DETAILS

NOTES:

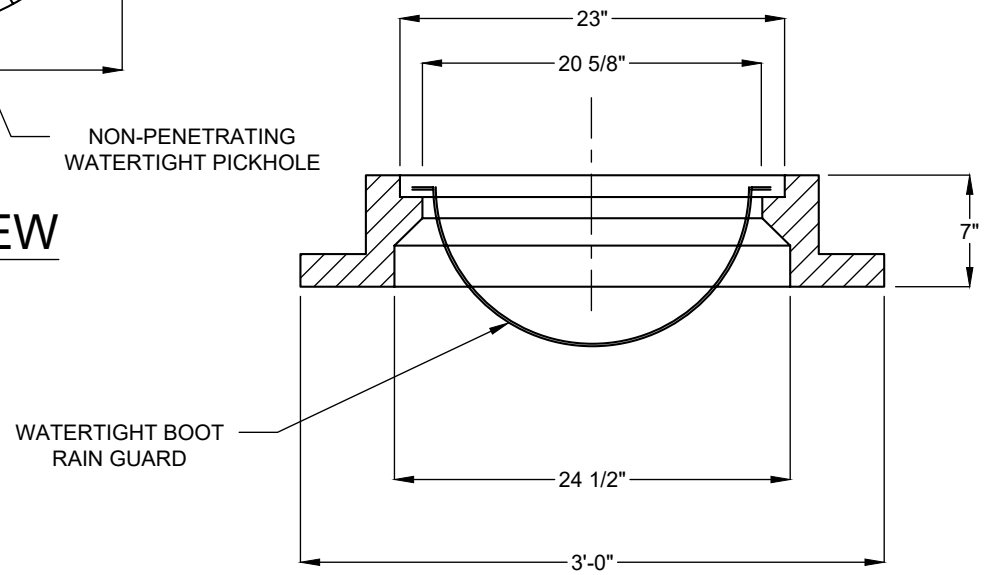
1. ALL SEWER LATERALS (SINGLE OR DOUBLE) SHALL HAVE A RISER PIPE WITH BENDS AS REQUIRED FOR SERVICE CONNECTIONS AND WITH A 4"Ø CLEANOUT AT GRADE.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR RISER PIPE WITH BEND FOR SERVICE CONNECTION AND FOR SETTING 4"Ø SEWER CLEANOUT TO FINISH GRADE PRIOR TO CONNECTION.
3. SANITARY SEWER LATERALS SHALL BE A MINIMUM OF 6" IN DIAMETER.
4. FOR EXCAVATION ON ROCK, SAND BEDDING SHALL BE USED (SEE DRAWING S-2, MODIFIED SEWER LATERAL, DEEP SEWER).
5. FOR CUTTING IN SEWER LATERAL CLEANOUT TO FINISH GRADE (SEE DRAWING S-3, SEWER LATERAL RISER DETAILS).
6. RISERS AND CLEANOUT SHALL NOT BE CONSTRUCTED WITHIN 12" OF SIDEWALK.
7. MAGNETIC DETECTION TAPE SHALL BE INSTALLED OVER TOP OF ALL SEWER MAINS AND SERVICE LATERALS.
8. ELECTRONIC MARKER BALLS SHALL BE TAPED TO 6"x4" WYE.
9. ALL MATERIALS ARE TO BE PER IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	SEWER LATERAL NOTES 2024	DRAWING NO. S-3 A



MANHOLE COVER - SECTION

PLAN VIEW



MANHOLE FRAME - SECTION

NOTES:

1. A WATERTIGHT BOOT RAIN GUARD SHALL BE PROVIDED FOR ALL FRAME/COVERS AND BE APPROVED BY IRCDUS.
2. ALL MATERIALS SHALL BE PER IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	STANDARD MANHOLE CASTING 2024	DRAWING NO. S-4

NOTES:

1. REINFORCING AREA OF 0.20 SQ. IN./FT. FOR WALL SECTION, MINIMUM TO MEET OR EXCEED A.S.T.M. A-185.
2. ALL CEMENT MORTAR TO BE TYPE I OR TYPE II.
3. ALL CEMENT FOR PRECAST MANHOLES TO BE MINIMUM 3,000 P.S.I. TO MEET OR EXCEED A.S.T.M. C-478.
4. BOTTOMS AND CHANNELS OF ALL MANHOLES TO BE A MINIMUM OF 2,500 P.S.I. FILL CONCRETE SHALL BE FINISHED SMOOTH WITH STEEL TROWEL.
5. CONCRETE MANHOLES TO HAVE A MINIMUM WALL THICKNESS OF 8".
6. INSIDE AND OUTSIDE OF MANHOLE SHALL BE COATED WITH TWO COATS OF EP-1 WATER BASED EPOXY, BLACK (CON SEAL), WITH THE IRCDUS INSPECTOR PRESENT.
7. CHANNELS TO BE FORMED IN ALL MANHOLES TO ACCEPT T.V. CAMERA.
8. ORIENT ECCENTRIC CONE AS REQUIRED BY IRCDUS INSPECTOR IN FIELD.
9. BOTTOM SECTION TO BE MONOLITHIC POUR EXCEPT WHERE DROP CONNECTION REQUIRED.
10. CONNECTIONS TO EXISTING MANHOLE AND LIFT STATION WET WELL STRUCTURES SHALL BE BY MEANS OF BORING A PENETRATION IN THE STRUCTURE, RATHER THAN PUNCHING. THE CONTRACTOR SHALL TAKE POSITIVE MEASURES TO PREVENT ANY CONCRETE OR CONSTRUCTION DEBRIS FROM ENTERING THE WASTEWATER SYSTEM.
11. BUOYANCY CALCULATIONS SHALL BE REQUIRED FOR ALL MANHOLES.
12. FOUR (4) REINFORCING BARS, 9" O.C. REQUIRED EACH WAY IN SLAB (TOP AND BOTTOM).
13. 2 COURSES BRICK MINIMUM, 6 COURSES MAXIMUM REQUIRED BETWEEN ALL PRECAST MANHOLE TOPS AND CASINGS.
14. 3/4" CRUSHED STONE FOUNDATION FOR A MINIMUM DEPTH OF 12" SHALL BE PROVIDED AS REQUIRED BY IRCDUS.
15. MANHOLE LID SHALL BE TRAFFIC BEARING (H-20 LOADING).
16. SEWER PIPE INVERTS AT BOTTOM OF MANHOLES SHALL HAVE AS INVERT ELEVATION DIFFERENTIAL OF 0.1' FOR A CHANGE IN DIRECTION AND 0.05' FOR A STRAIGHT RUN.
17. A WATERTIGHT RAIN GUARD BOOT, TO BE PER IRCDUS APPROVED MANUFACTURER'S PRODUCT LIST, SHALL BE PROVIDED FOR ALL MANHOLE FRAME/COVERS.
18. FIBERGLASS LINERS SHALL BE INSTALLED ON ALL PUMP STATION WET WELLS AND MANHOLES RECEIVING PUMPED SEWAGE, PLUS FIVE (5) MANHOLES IN EACH DIRECTION.
19. ALL NEW MANHOLES SHALL BE COATED PER IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.
20. WHERE MANHOLE LINING IS REQUIRED, MATERIALS ARE TO BE PER IRCDUS APPROVED MANUFACTURER'S PRODUCT LIST.
21. PUMP OUT MANHOLE SHALL BE LOCATED WITHIN 20' OF LIFT STATION AND CONSTRUCTED OUTSIDE OF RIGHT-OF-WAY.
22. ALL EXISTING MANHOLES, LIFT STATION WET WELLS, VALVE VAULTS, JOINTS AND COURSES OF BRICK SHALL BE SEALED.
23. SLOPES ON ALL CHANNEL BOTTOMS TO BE EQUAL TO SLOPES OF PIPE ENTERING AND EXITING MANHOLE.
24. DIAMETERS OF MANHOLES SHALL BE:

DEPTH OF MANHOLE	LESS THAN 10'	10' OR GREATER
DIAMETER	4'	5'

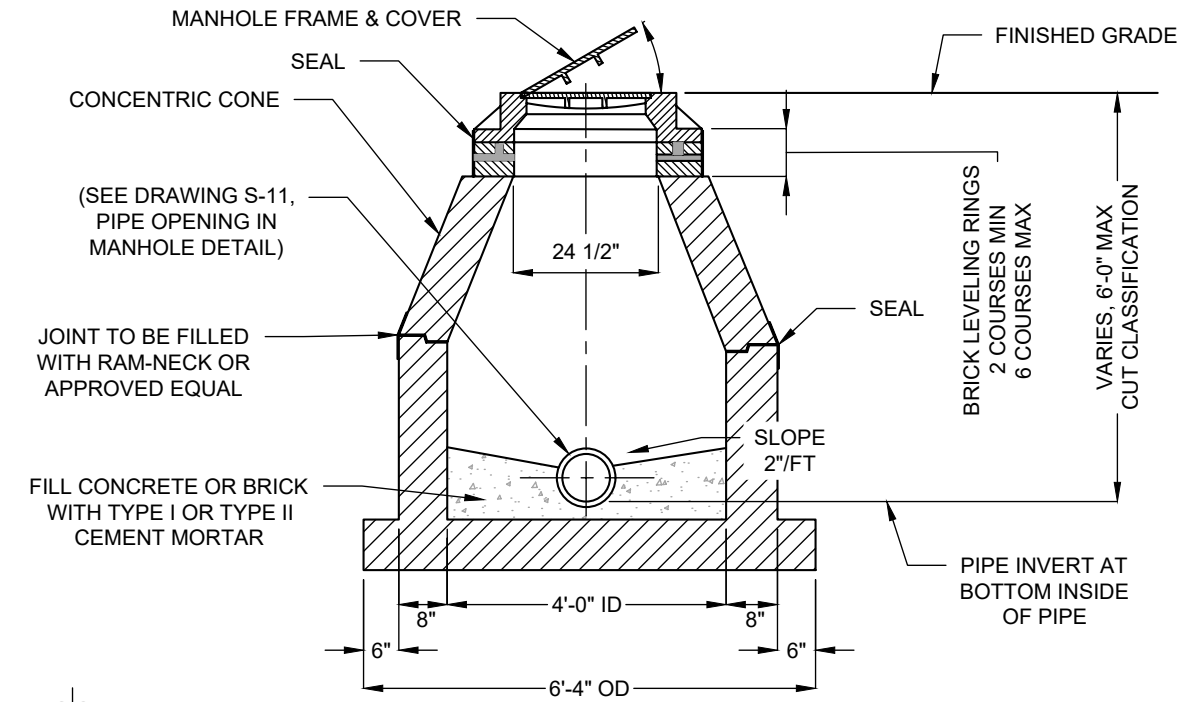
INDIAN RIVER COUNTY
DEPARTMENT OF
UTILITY SERVICES

MANHOLE NOTES

2024

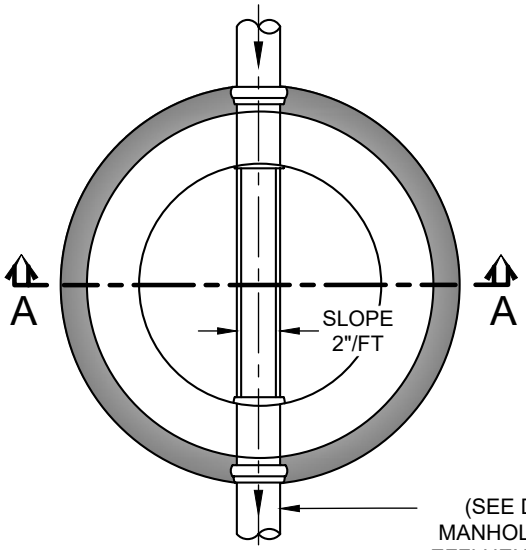
DRAWING NO.

S-5



ELEVATION

SECTION A-A



PLAN VIEW

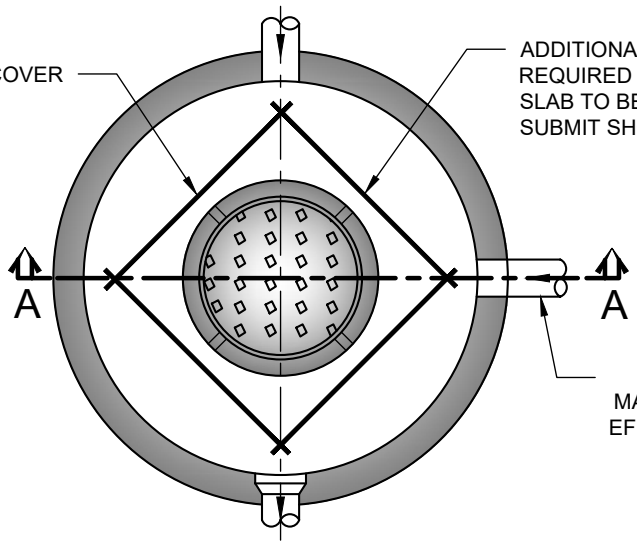
MANHOLE FRAME AND COVER NOT SHOWN FOR CLARITY

TO BE USED WHEN CUT CLASSIFICATION IS 6'-0" OR LESS

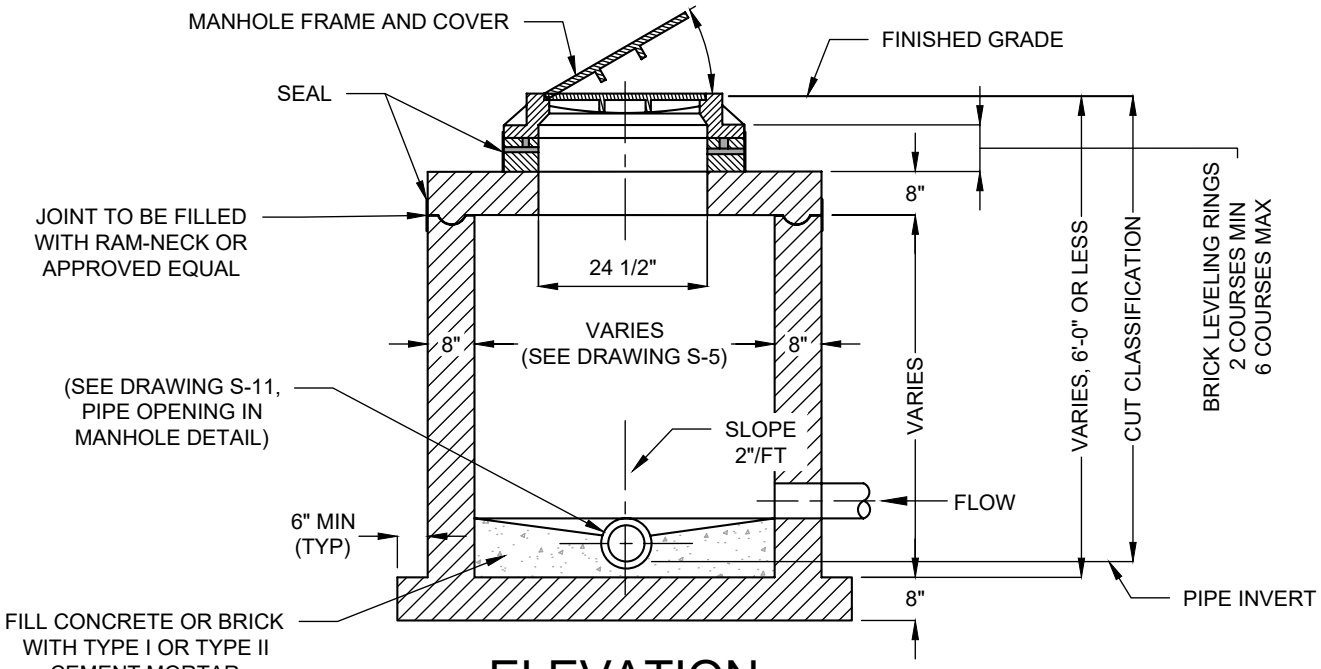
NOTES:

1. SEE DRAWING S-4, STANDARD MANHOLE CASTING.
2. SEE DRAWING S-5, MANHOLE NOTES.
3. SEE DRAWING S-11, PIPE OPENING IN MANHOLE DETAIL .
4. SEE DRAWING S-12, MANHOLE INFLUENT AND EFFLUENT PIPING DETAIL.
5. SEAL SHALL BE USED AT ALL JOINTS. (SEE DRAWING S-5, NOTE 20).

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	MANHOLE STANDARD SHALLOW 2024	DRAWING NO. S-6



PLAN VIEW



ELEVATION

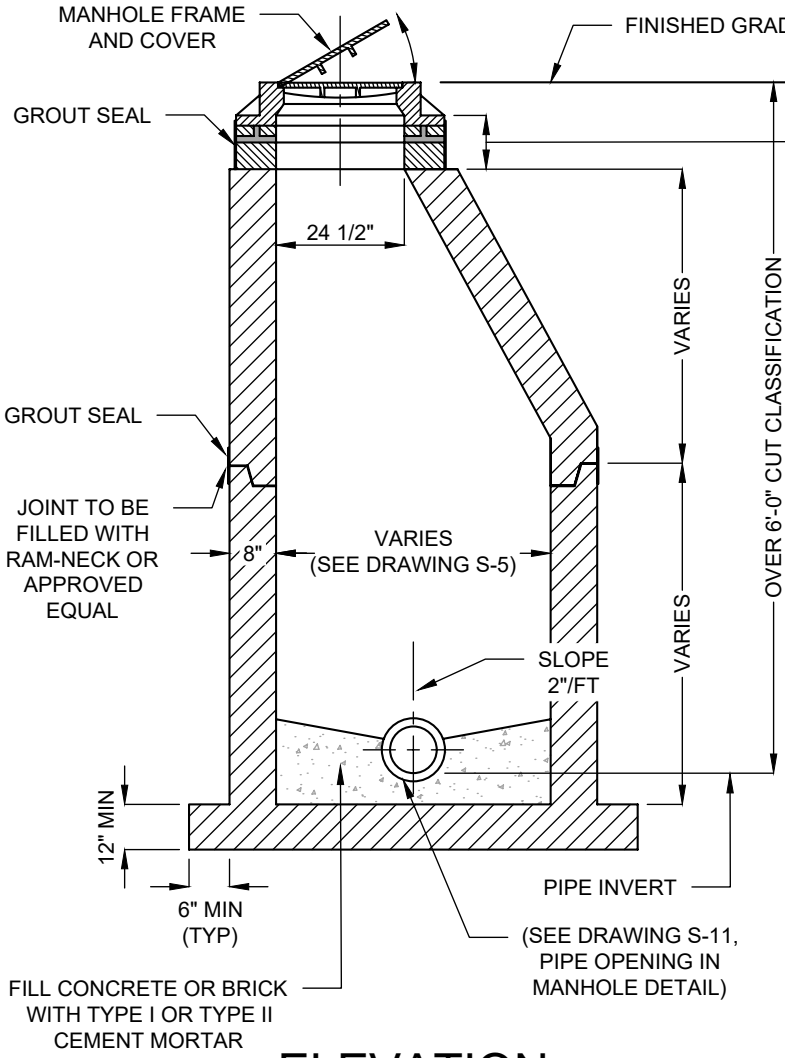
SECTION A-A

TO BE USED WHEN CUT CLASSIFICATION IS 6'-0" OR LESS

NOTES:

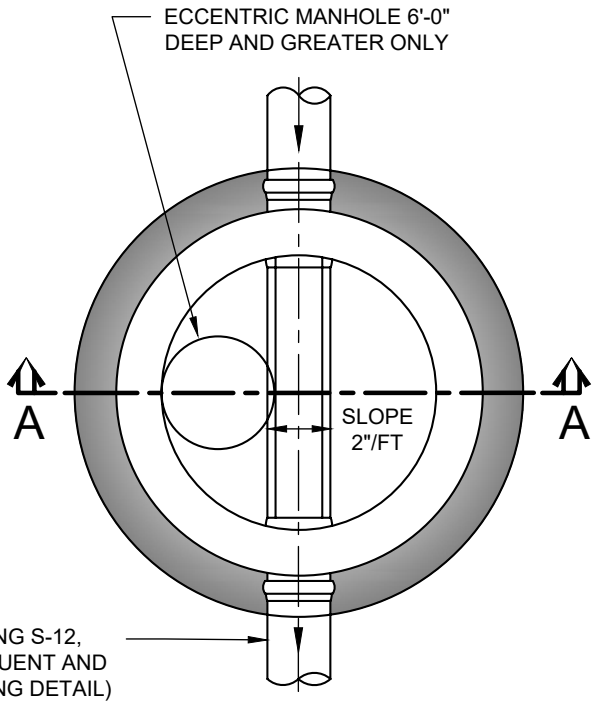
1. SEE DRAWING S-4, STANDARD MANHOLE CASTING.
2. SEE DRAWING S-5, MANHOLE NOTES.
3. SEE DRAWING S-11, PIPE OPENING IN MANHOLE DETAIL.
4. SEE DRAWING S-12, MANHOLE INFLUENT AND EFFLUENT PIPING DETAIL.
5. MANHOLE INSIDE DIAMETER (ID) VARIES DEPENDING ON DEPTH.
6. SEAL SHALL BE USED AT ALL JOINTS. (SEE DRAWING S-5, NOTE 20).

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	MANHOLE SLAB-TOP DETAILS 2024	DRAWING NO. S-7



ELEVATION

SECTION A-A



PLAN VIEW

MANHOLE FRAME & COVER
NOT SHOWN FOR CLARITY

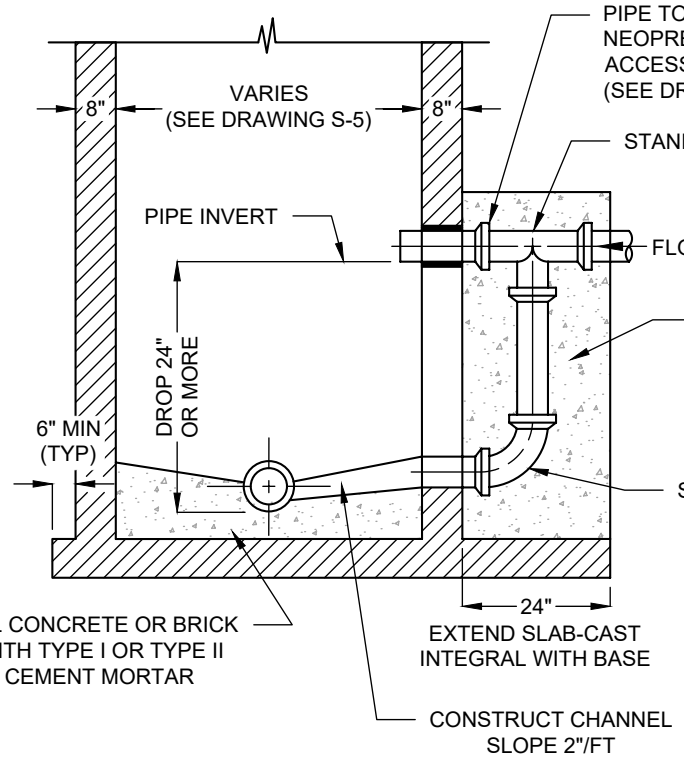
TO BE USED WHEN CUT CLASSIFICATION IS OVER 6'-0" DEEP

NOTES:

1. SEE DRAWING S-4, STANDARD MANHOLE CASTING.
2. SEE DRAWING S-5, MANHOLE NOTES.
3. SEE DRAWING S-11, PIPE OPENING IN MANHOLE DETAIL.
4. SEE DRAWING S-12, MANHOLE INFLUENT AND EFFLUENT PIPING DETAIL.
5. MANHOLE INSIDE DIAMETER (ID) VARIES DEPENDING ON DEPTH.
6. GROUT SEAL SHALL BE USED AT ALL JOINTS. (SEE DRAWING S-5, NOTE 20).

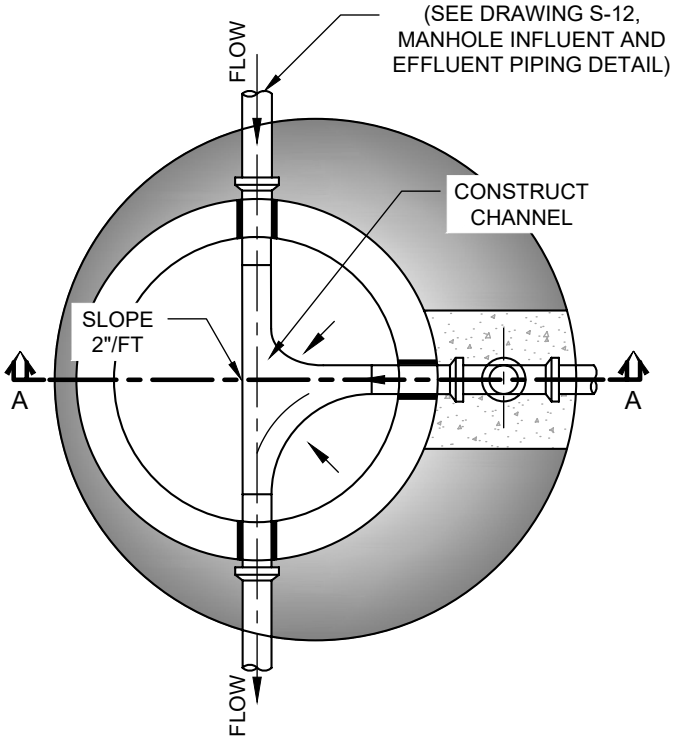
INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	MANHOLE STANDARD DEEP	DRAWING NO. S-8

2024



ELEVATION

SECTION A-A



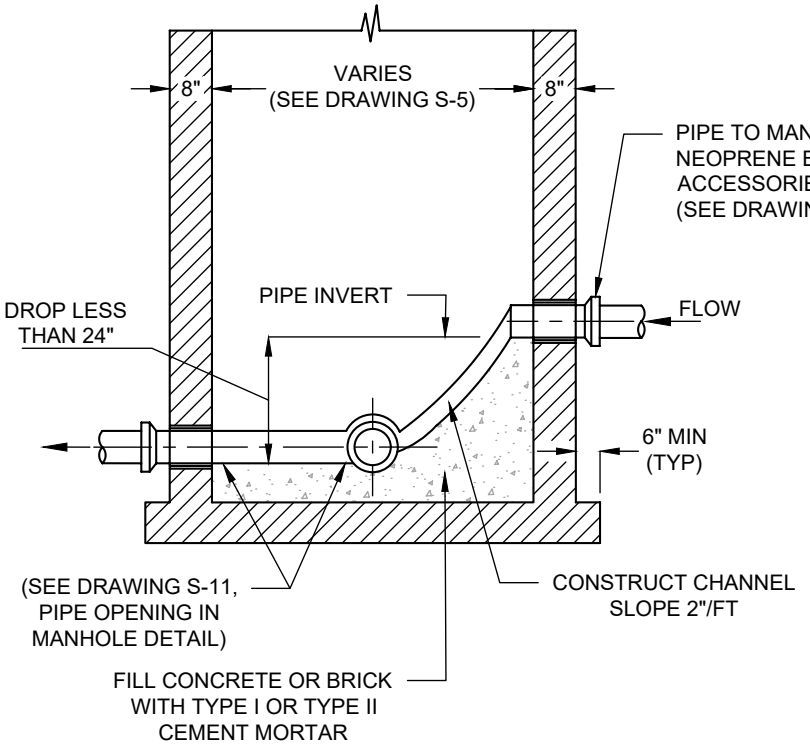
PLAN VIEW

TO BE USED WHERE DROP IS 2'-0" OR MORE

NOTES:

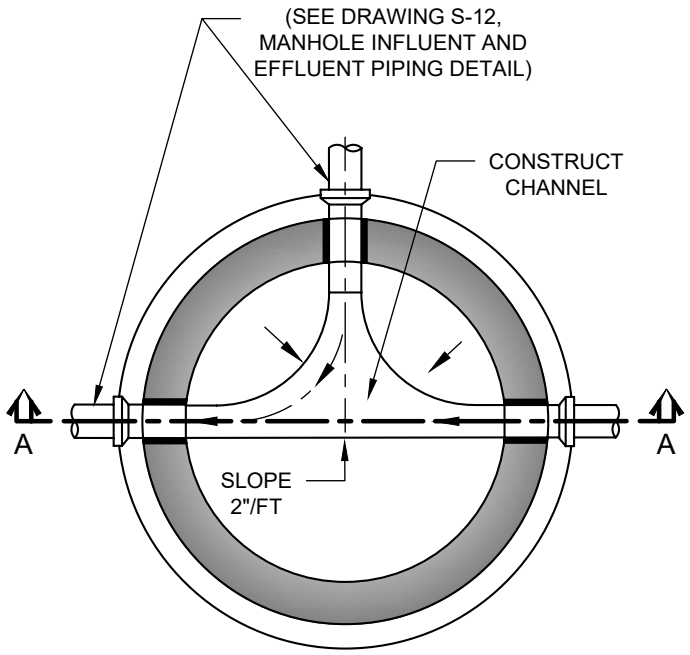
1. SEE DRAWING S-5, MANHOLE NOTES.
2. SEE DRAWING S-11, PIPE OPENING IN MANHOLE DETAIL.
3. SEE DRAWING S-12, MANHOLE INFLUENT AND EFFLUENT PIPING DETAIL.
4. SOLVENT JOINTS SHALL NOT BE USED FOR DROPS.
5. SEWER LATERALS SHALL NOT BE CONNECTED DIRECTLY TO MANHOLES.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	MANHOLE OUTSIDE DROP 2024	DRAWING NO. S-9



ELEVATION

SECTION A-A



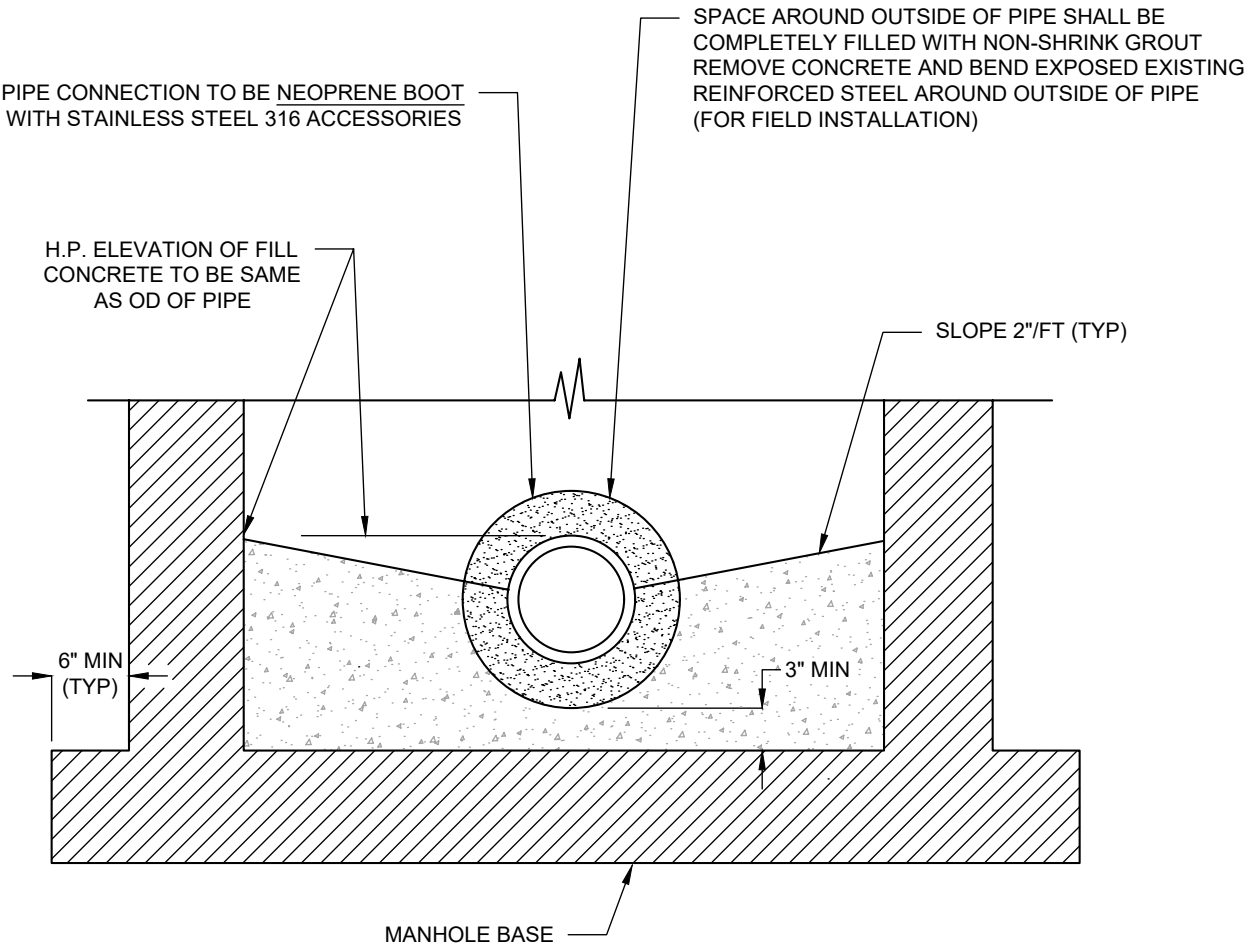
PLAN VIEW

TO BE USED WHERE DROP IS LESS THAN 2'-0"

NOTES:

1. SEE DRAWING S-5, MANHOLE NOTES.
2. SEE DRAWING S-11, PIPE OPENING IN MANHOLE DETAIL.
3. SEE DRAWING S-12, MANHOLE INFLUENT AND EFFLUENT PIPING DETAIL.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	MANHOLE INSIDE DROP 2024	DRAWING NO. S-10



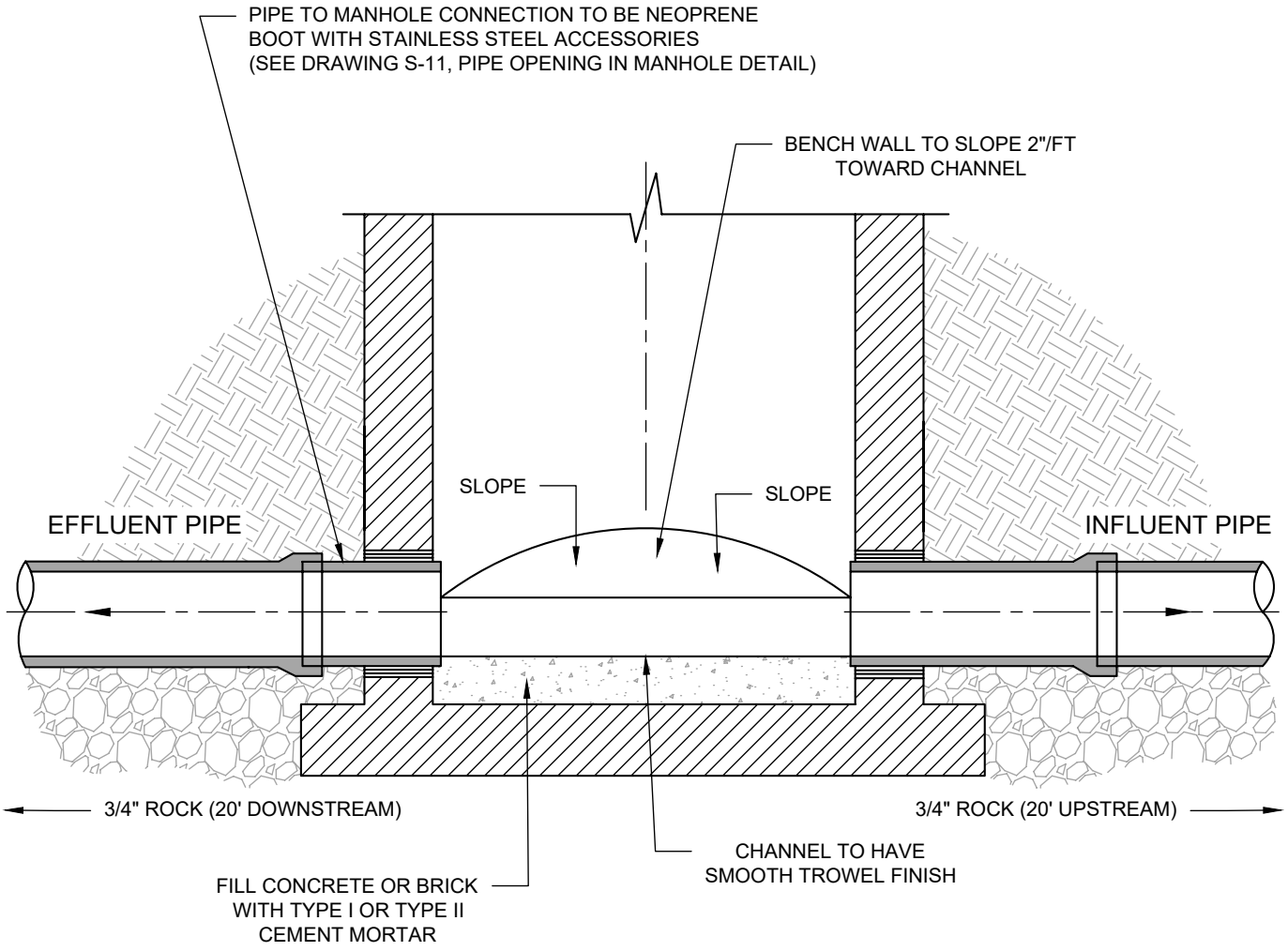
ELEVATION

NOTES:

1. SEE DRAWING S-5, MANHOLE NOTES. NOTES #: 2, 4, 5, 7, 10, AND 16.
2. ALL MATERIALS ARE TO BE PER IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	PIPE OPENING IN MANHOLE DETAIL	DRAWING NO. S-11

2024



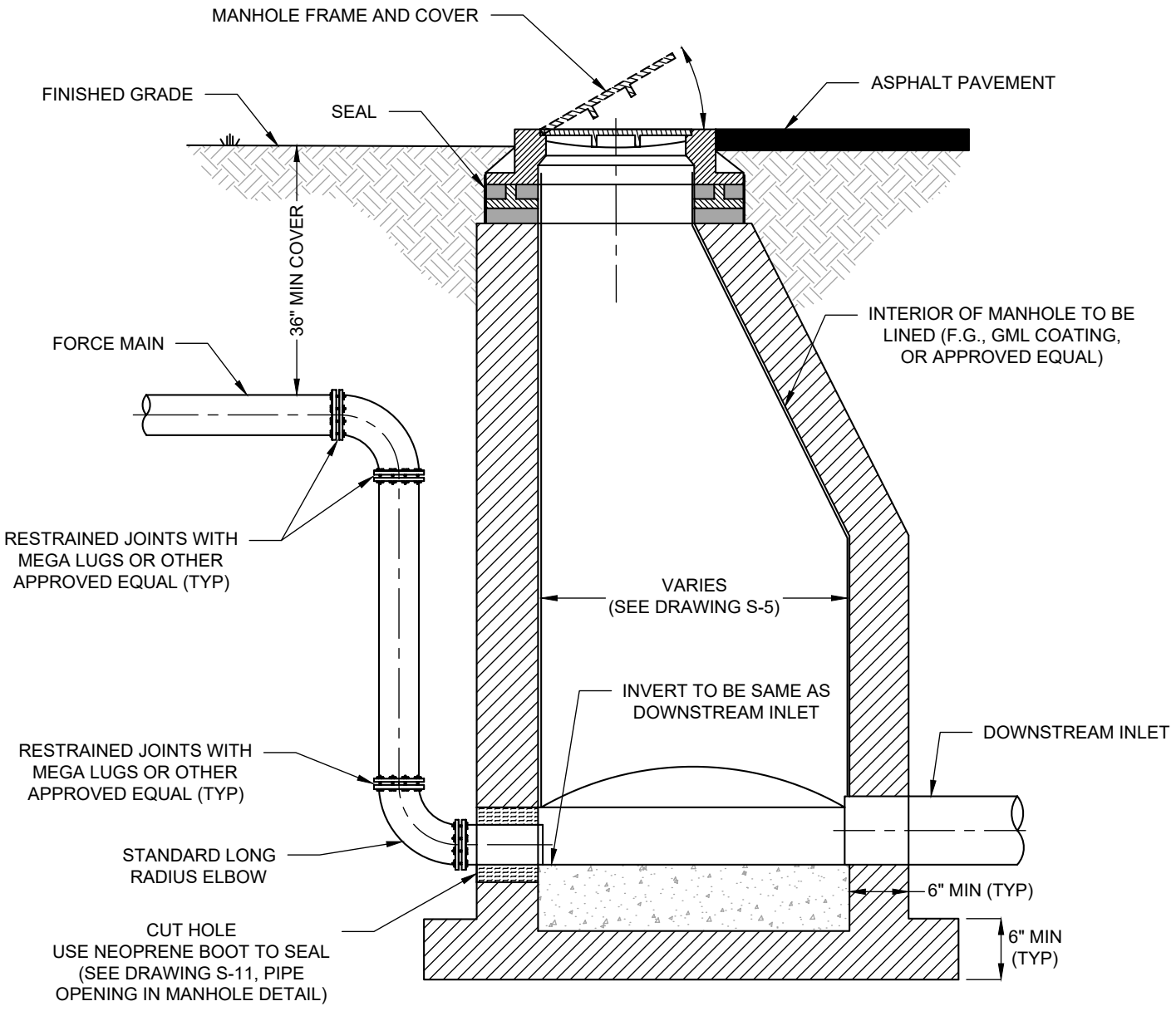
ELEVATION

PIPE JOINT DETAIL AT MANHOLE

NOTES:

1. PIPE JOINT DETAIL IS TYPICAL FOR ALL PIPE TO MANHOLE CONNECTIONS.
2. ALL MATERIALS ARE TO BE PER IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.
3. 3/4" ROCK SHALL BE USED AS BEDDING FOR 20' UPSTREAM AND 20' DOWNSTREAM OF MANHOLE.
4. SEE DRAWING S-5, MANHOLE NOTES, NOTE 16.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	MANHOLE INFLUENT & EFFLUENT PIPING DETAIL 2024	DRAWING NO. S-12

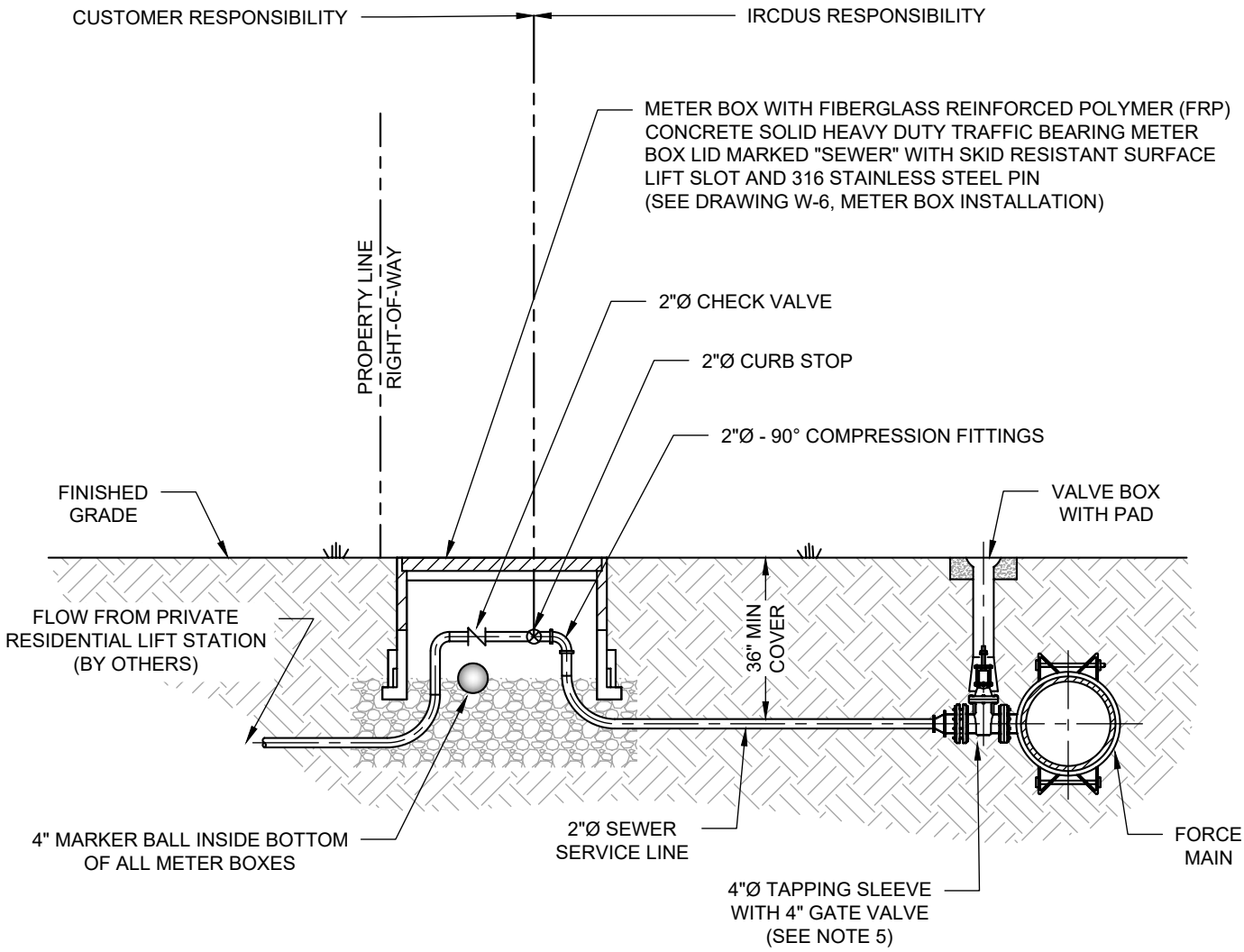


ELEVATION

NOTES:

1. SEE DRAWING S-5, MANHOLE NOTES.
2. SEE DRAWING S-11, PIPE OPENING IN MANHOLE DETAIL.
3. SEE DRAWING S-12, MANHOLE INFLUENT AND EFFLUENT PIPING DETAIL.
4. NO INSIDE DROP WILL BE ACCEPTED FOR FORCE MAIN TIE-INS.
5. WHERE MANHOLE LINING IS REQUIRED, MATERIALS ARE TO BE PER IRCDUS APPROVED MANUFACTURER'S PRODUCT LIST.
6. SEAL SHALL BE USED AT ALL JOINTS. (SEE DRAWING S-5, MANHOLE NOTES, NOTE 20).

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	FORCE MAIN TIE-IN TO MANHOLE 2024	DRAWING NO. S-13



ELEVATION

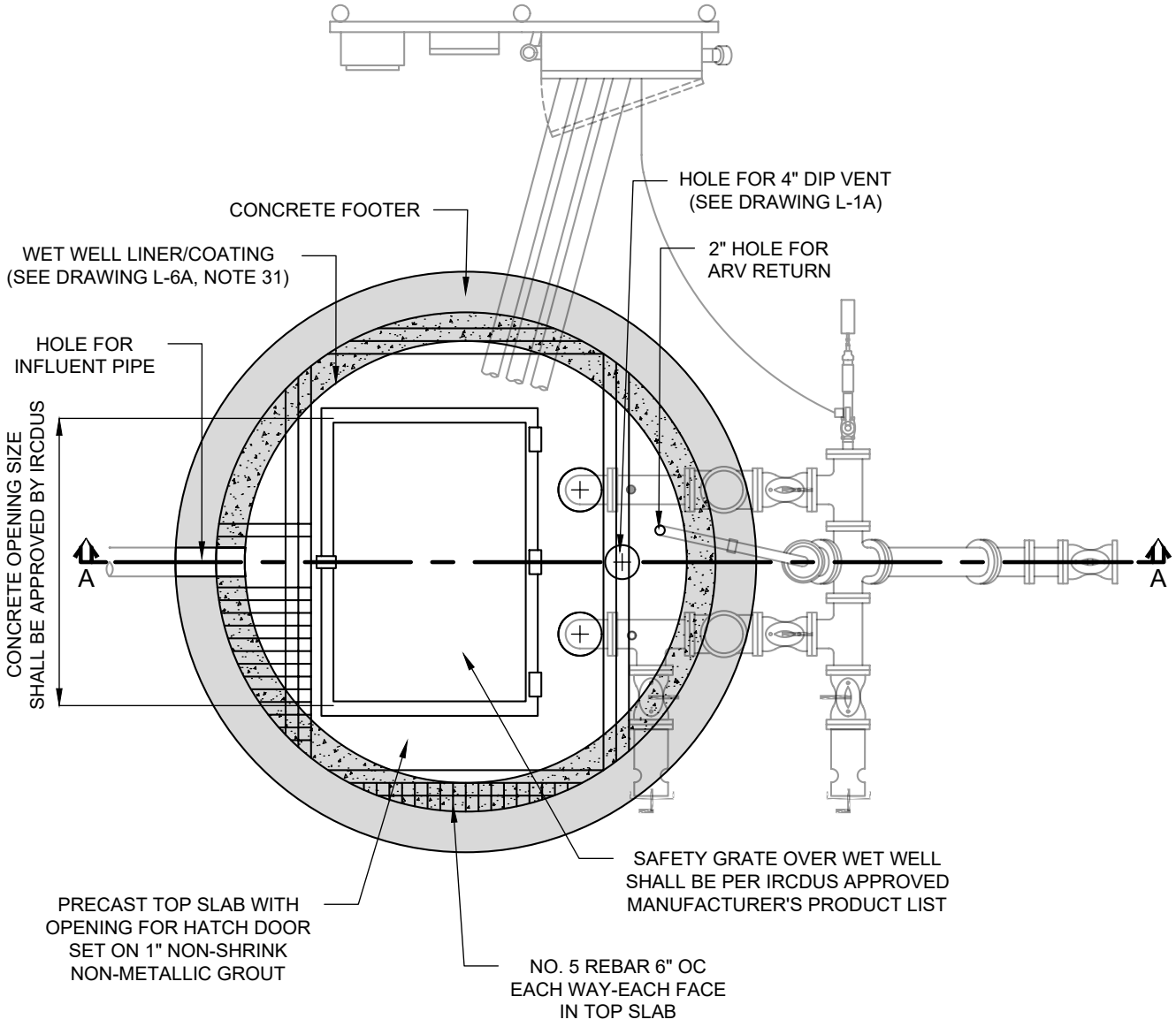
METER BOX SHALL BE LOCATED IMMEDIATELY INSIDE THE RIGHT-OF-WAY, UNLESS OTHERWISE DIRECTED BY IRCDUS

NOTES:

1. PRIVATE PUMPING STATIONS SHALL BE APPROVED BY IRCDUS.
2. PRIVATE PUMPING STATION, INCLUDING PUMP, ALL PIPING TO THE SEWER METER BOX, CONTROLS AND ELECTRICAL CONTROL PANEL SHALL BE CONSTRUCTED BY THE OWNER AT NO EXPENSE TO IRCDUS.
3. OWNER SHALL BE RESPONSIBLE FOR ALL COST ASSOCIATED WITH THE OPERATION AND MAINTENANCE OF A PRIVATE PUMPING STATION.
4. OWNER OF PROPOSED PRIVATE PUMPING STATION SHALL SIGN AN AGREEMENT ACKNOWLEDGING PUMPING STATION IS TO REMAIN PRIVATE.
5. COMMERCIAL PRIVATE PUMPING STATIONS SHALL HAVE A 4"Ø SERVICE TAP CONNECTION TO THE FORCE MAIN WITH A 4" GATE VALVE. RESIDENTIAL PRIVATE PUMPING STATIONS SHALL HAVE A 2"Ø SERVICE TAP CONNECTION WITH A 2"Ø CORP STOP.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	FORCE MAIN SERVICE FOR TYPICAL PRIVATE PUMPING STATION 2024	DRAWING NO. S-14

LIFT STATION

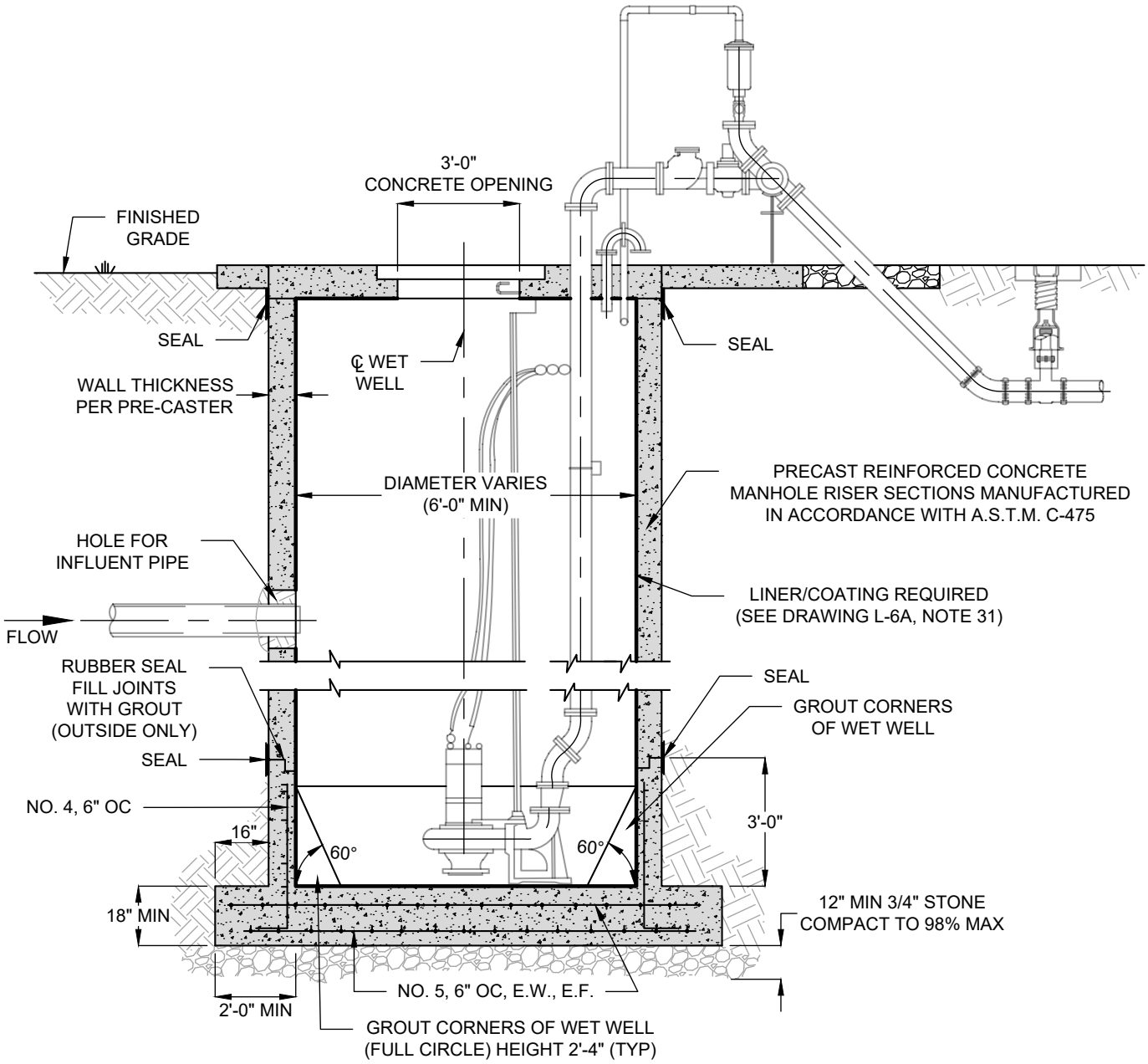


PLAN VIEW

SCHEMATIC:
NOT INTENDED
FOR CONSTRUCTION.
SEE PROJECT PLANS.

(COMPARE TO S-14)

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	CONCRETE STRUCTURE DETAILS - PLAN VIEW 2024	DRAWING NO. L-1



ELEVATION

SECTION A-A

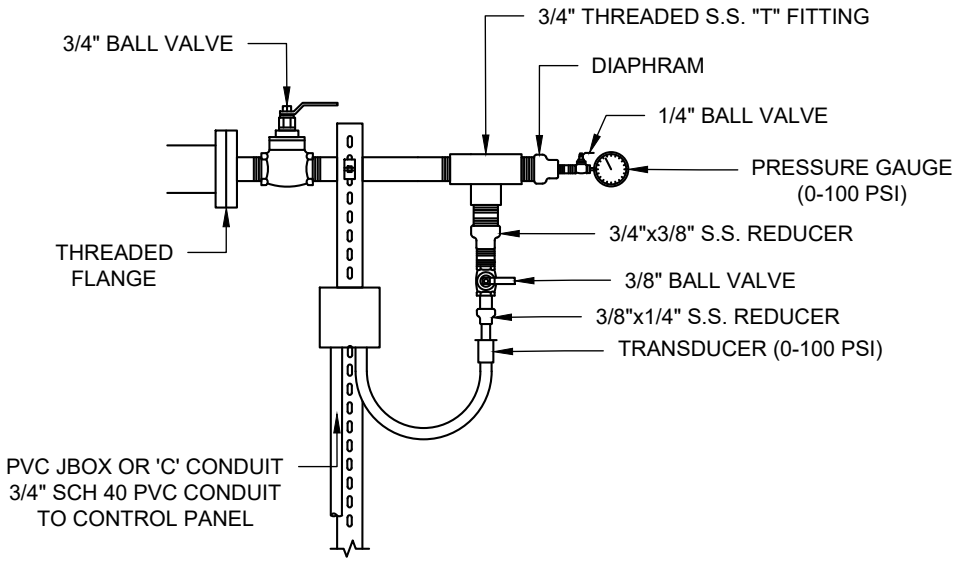
SCHEMATIC:
NOT INTENDED
FOR CONSTRUCTION.
SEE PROJECT PLANS.

(COMPARE TO S-14A)

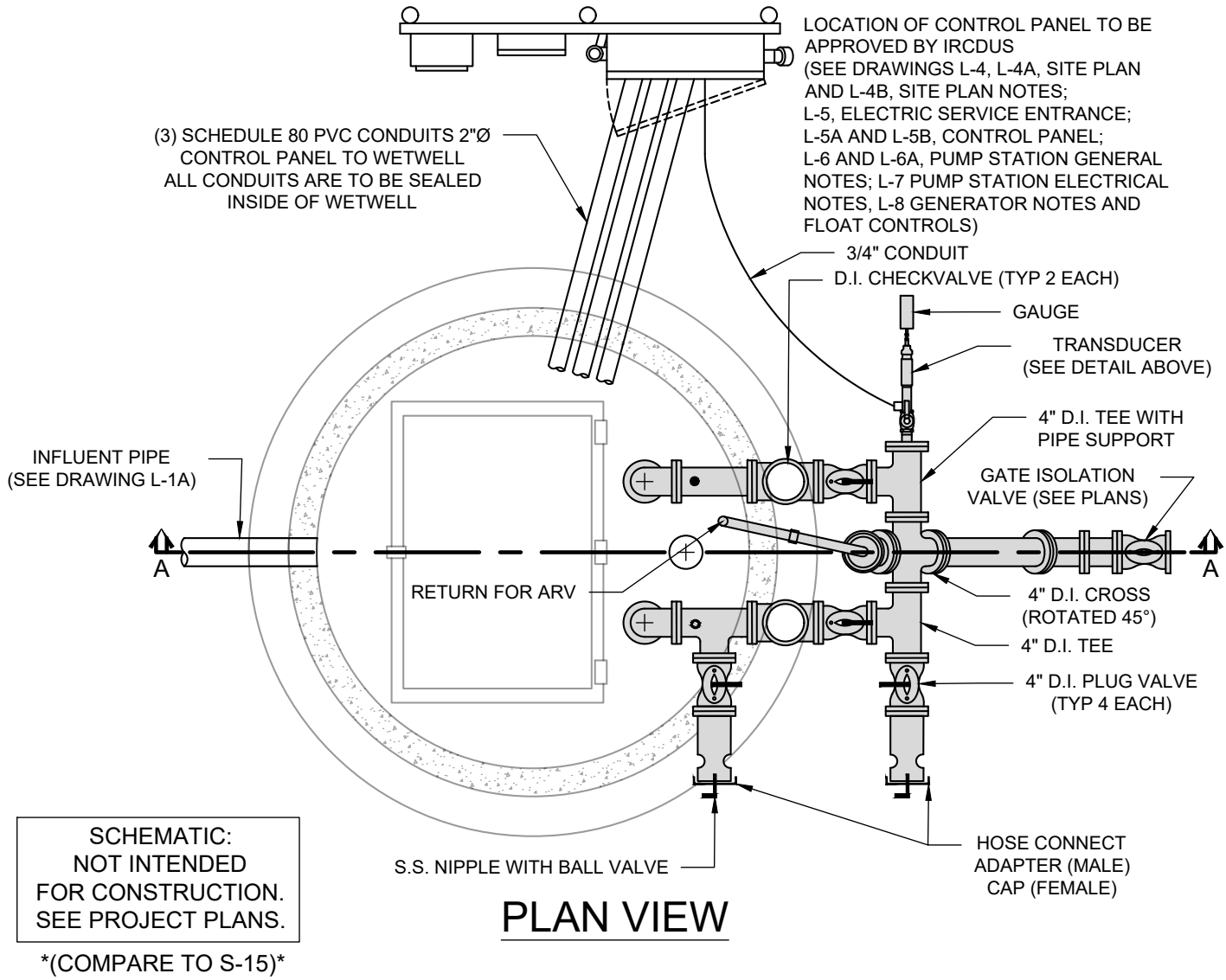
NOTES:

1. SEE DRAWINGS L-6 AND L-6A, PUMPING STATION GENERAL NOTES.
2. 1/2" PREFORMED JOINT MATERIAL TO BE PLACED BETWEEN PIPE AND CONCRETE OR PIPE SLEEVE FOR ALL PIPES ENTERING OR EXITING THE VALVE VAULT AND WET WELL EXCEPT FOR INFLUENT PIPES.
3. ALL HARDWARE (WITH LOCK WASHERS) SHALL BE 316 STAINLESS STEEL.
4. LIFT STATION PAY ITEM INCLUDES ALL COMPONENTS (WET WELL, PUMPS, CONTROL PANEL, PIPING, ETC.) UP TO BUT EXCLUDING THE ISOLATION VALVE.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	CONCRETE STRUCTURE DETAILS - SECTION VIEW 2024	DRAWING NO. L-1 A



ALL HARDWARE
(WITH LOCK WASHERS)
SHALL BE 316 STAINLESS STEEL

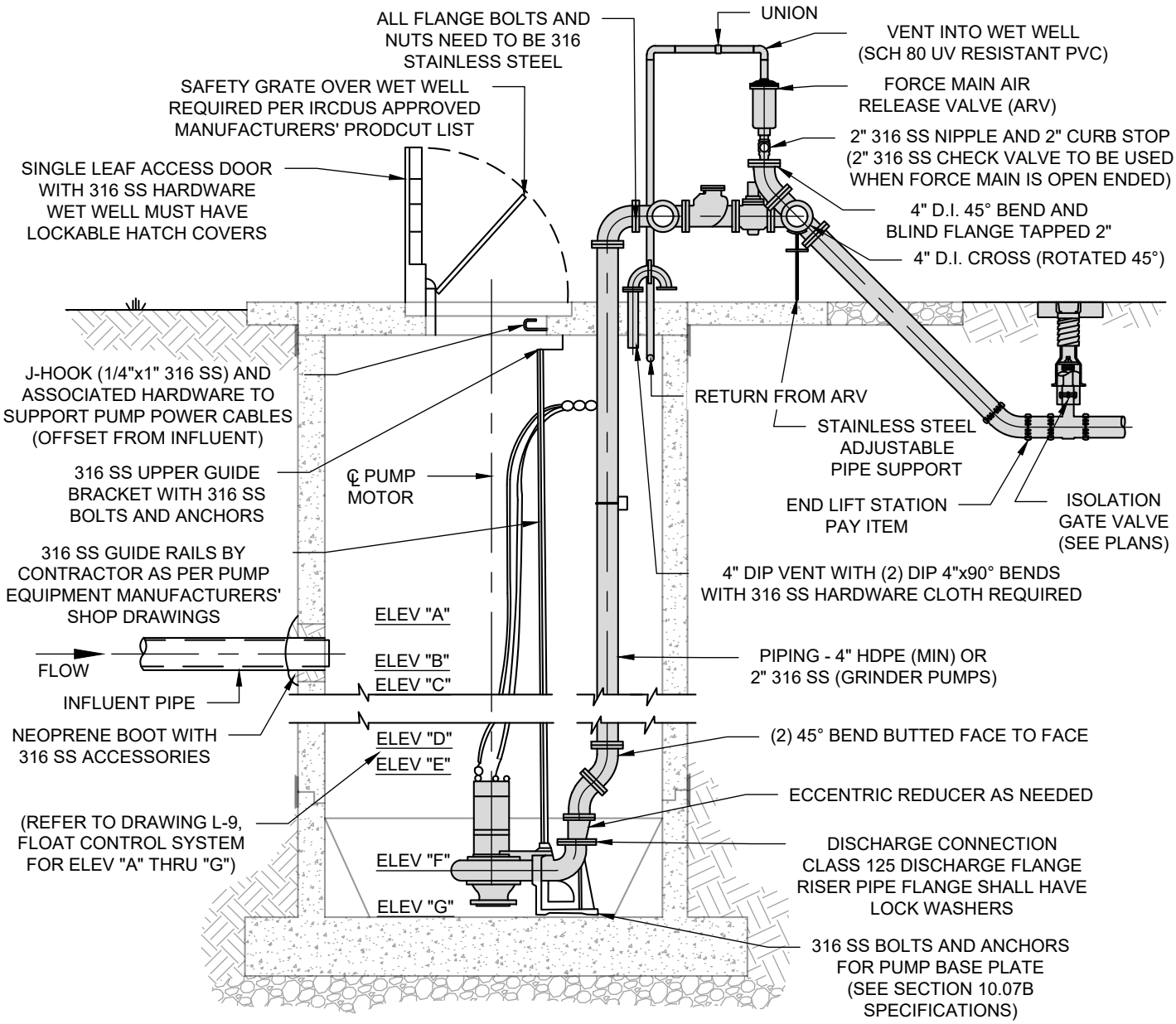


SCHEMATIC:
NOT INTENDED
FOR CONSTRUCTION.
SEE PROJECT PLANS.

(COMPARE TO S-15)

PLAN VIEW

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	PUMP, PIPING, & MECHANICAL DETAILS - PLAN VIEW 2024	DRAWING NO. L-2



SCHEMATIC:
NOT INTENDED
FOR CONSTRUCTION.
SEE PROJECT PLANS.

(COMPARE TO S-15A)

ELEVATION

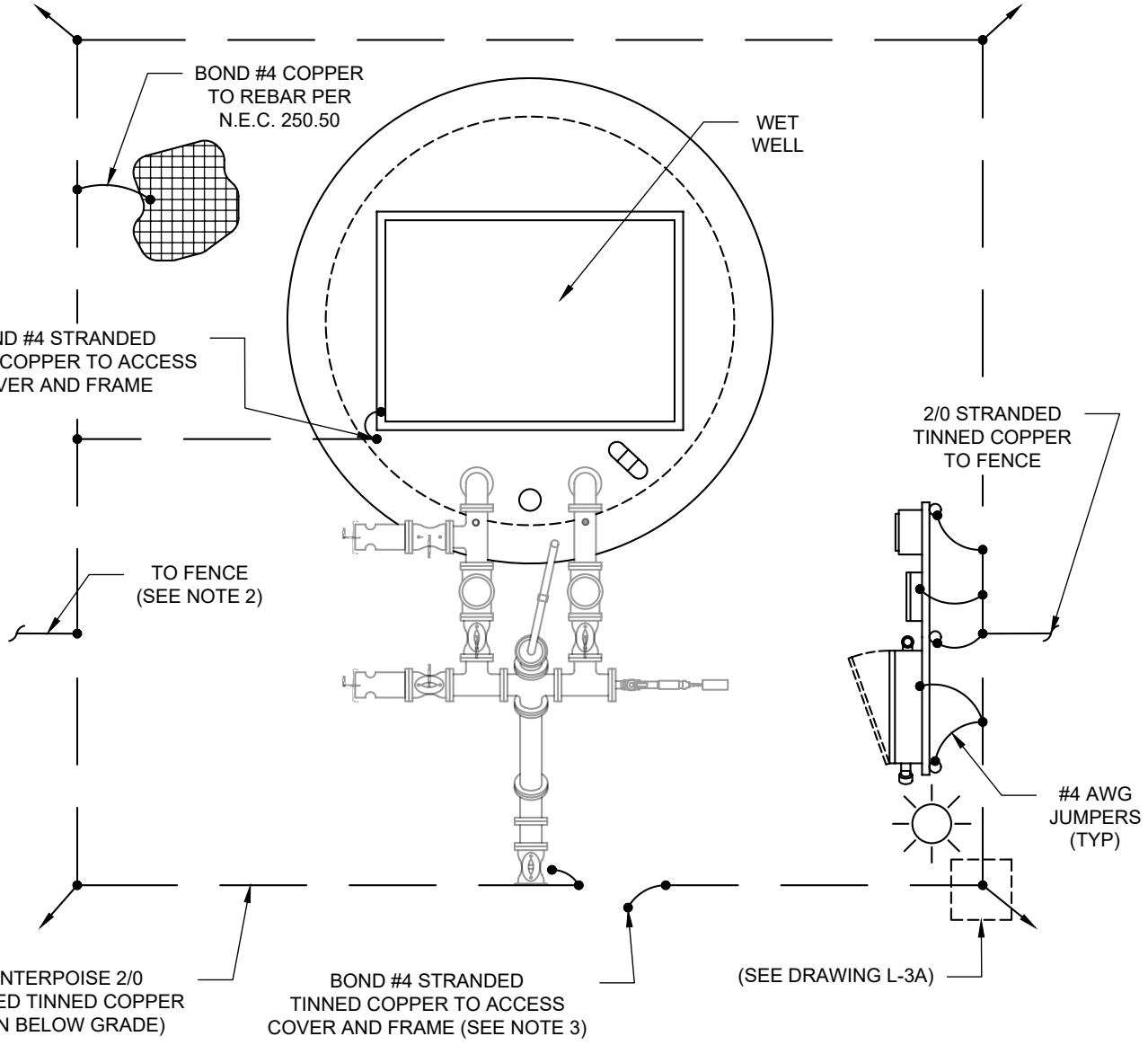
SECTION A-A

NOTES:

1. SEE DRAWINGS L-6 AND L-6A, PUMPING STATION GENERAL NOTES.
2. SEE DRAWINGS L-7 AND L-8, PUMPING STATION ELECTRICAL NOTES AND GENERATOR NOTES AND FLOAT CONTROLS.
3. 1/2" PREFORMED JOINT MATERIAL TO BE PLACED BETWEEN PIPE AND CONCRETE OR PIPE SLEEVE FOR ALL PIPES ENTERING OR EXITING THE VALVE VAULT AND WET WELL EXCEPT FOR INFLUENT PIPES.
4. ALL HARDWARE (WITH LOCK WASHERS) SHALL BE 316 STAINLESS STEEL..
5. ABOVE GROUND PIPES AND FITTINGS TO BE PAINTED PER SECTION 12-AERIAL CROSSINGS.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	PUMP, PIPING, & MECHANICAL DETAILS - SECTION VIEW 2024	DRAWING NO. L-2 A

SCHEMATIC:
NOT INTENDED
FOR CONSTRUCTION.
SEE PROJECT PLANS.

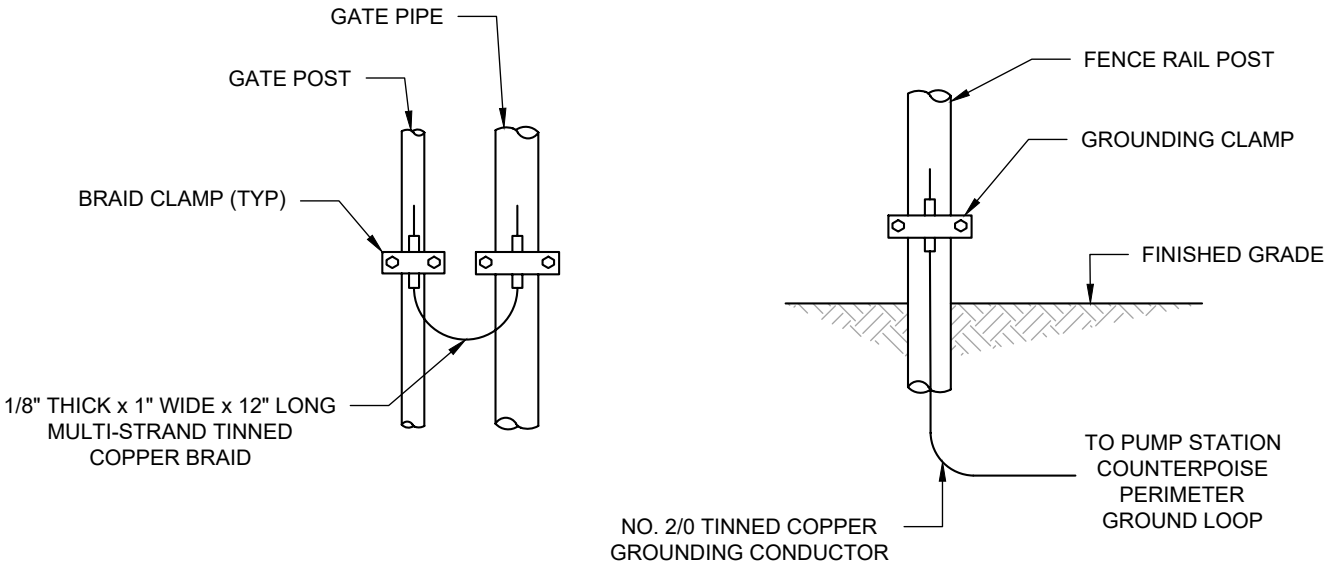


PLAN VIEW

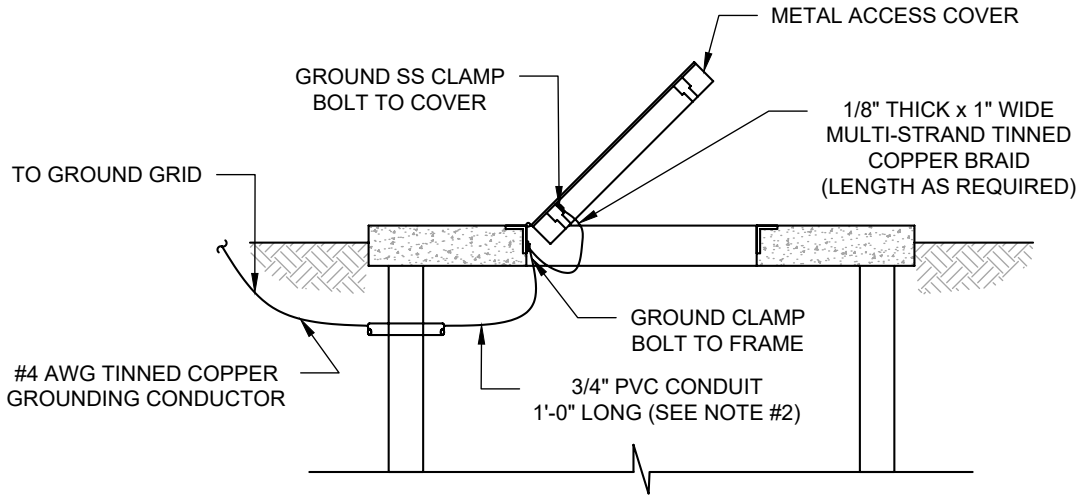
NOTES:

1. TIE TO FENCE, MINIMUM 2 LOCATIONS. NOT REQUIRED WHERE PVC COATED, BLOCK, OR WOOD FENCE IS INSTALLED.
2. PROVIDE EXOTHERMIC WELDS UNLESS NOTED OTHERWISE.
3. TEST WELL TO BE INSTALLED AT EACH GROUNDING ROD. (SEE DRAWING L-3B)

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	PUMP STATION GROUNDING DETAIL 2024	DRAWING NO. L-3



FENCE POST GROUNDING

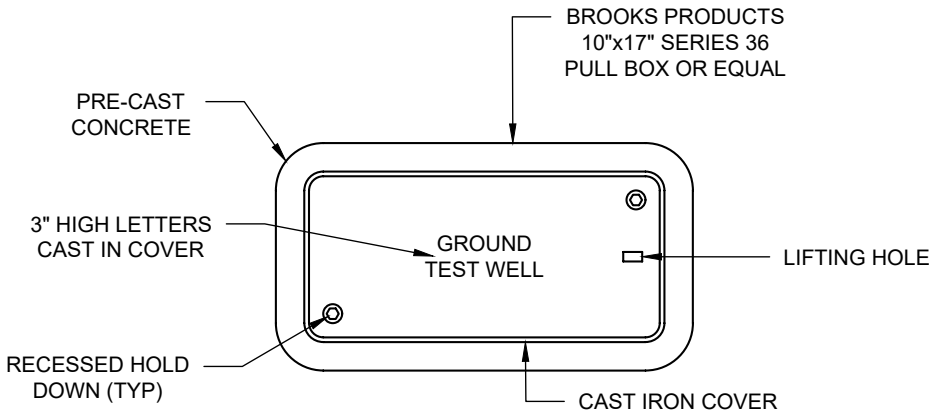


COVER AND DOOR GROUNDING

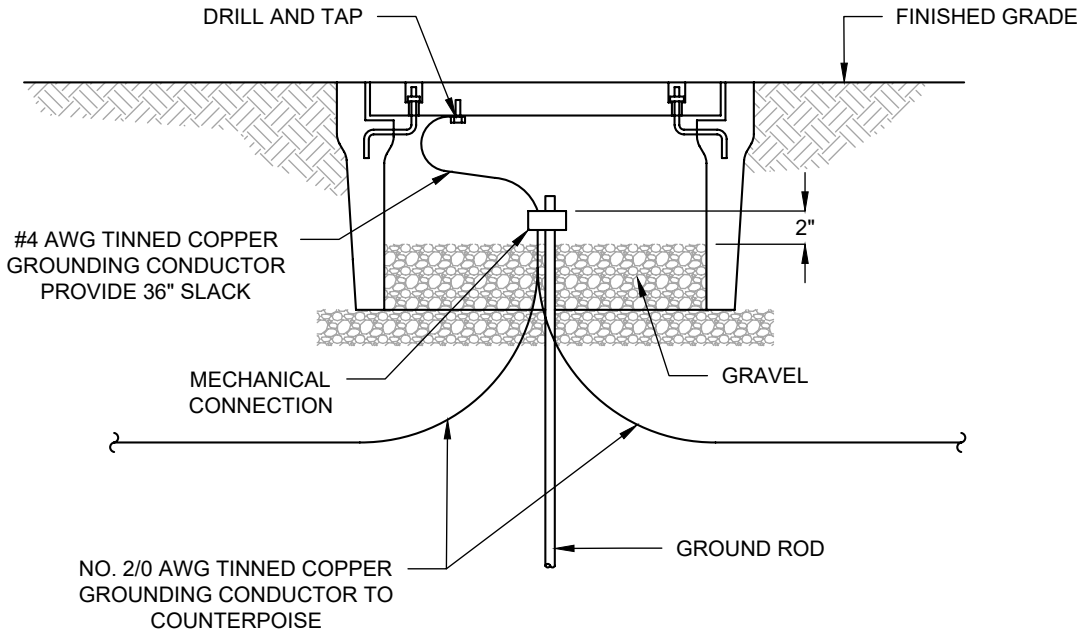
NOTES:

1. ON EACH DOOR PROVIDE WATERPROOF CAULKING WHERE GROUND CABLE AND CONDUIT PENETRATES WET WELL TO PREVENT INTRUSION OF GROUNDWATER AND ESCAPE OF VAPORS FROM WET WELL.
2. INSTALL GROUND WIRE SO THAT IT WILL NOT CROSS CLEAR OPENING OR PREVENT OR IMPEDE NORMAL METHOD OF REMOVING FLOATS OR PUMPS.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	PUMP STATION FENCE POST & COVER GROUNDING 2024	DRAWING NO. L-3 A



PLAN VIEW

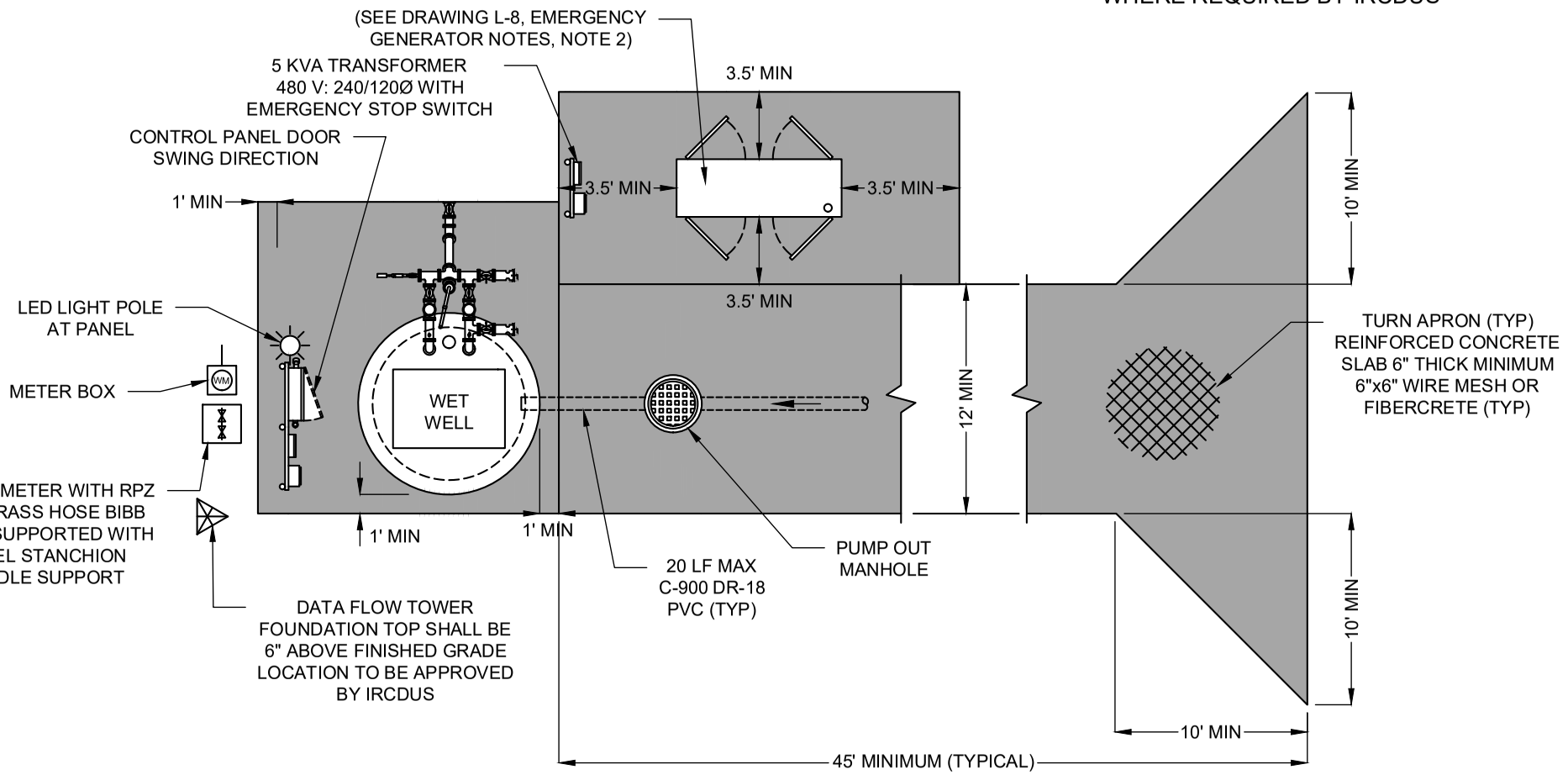


ELEVATION

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	PUMP STATION GROUND TEST WELL 2024	DRAWING NO. L-3 B

REINFORCED CONCRETE SLAB 6" THICK MINIMUM
FINISHED ELEVATION OF PAD TO BE 4" ABOVE
FINISHED GRADE ELEVATION

A 6' HIGH CHAIN LINK FENCE WITH A 12' DOUBLE WIDE GATE ON THE DRIVE IS TO BE INSTALLED WHERE REQUIRED BY IRCDUS



ELEVATION

ALTERNATE "A"

SEE DRAWING L-4B, SITE PLAN NOTES

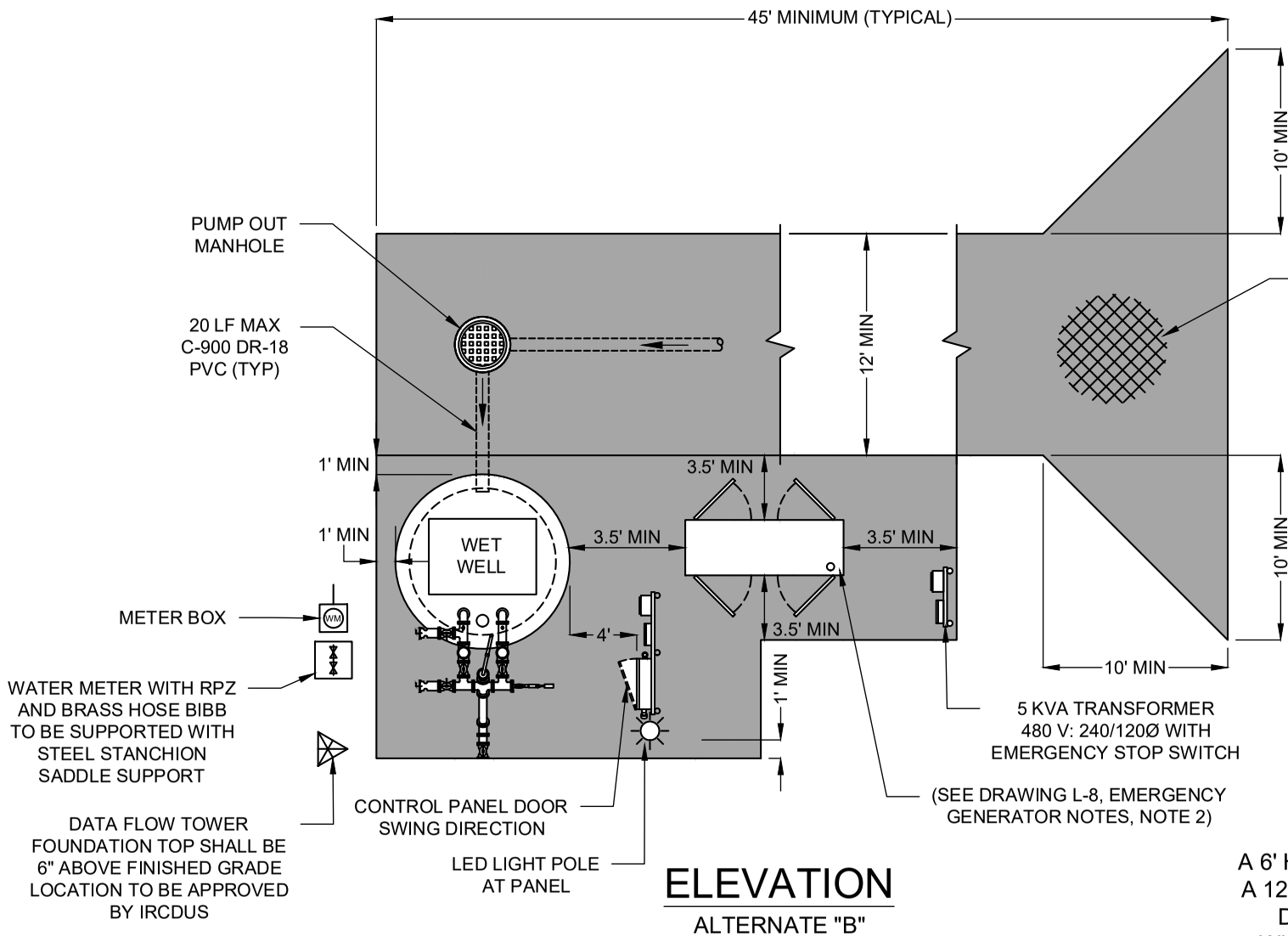
2024

DRAWING NO. L-4

SCHEMATIC: NOT INTENDED FOR CONSTRUCTION. SEE PROJECT PLANS.

INDIAN RIVER COUNTY
DEPARTMENT OF
UTILITY SERVICES

SITE PLAN ALTERNATE "A"



ELEVATION

ALTERNATE "B"

SEE DRAWING L-4B, SITE PLAN NOTES

REINFORCED CONCRETE SLAB 6" THICK MINIMUM FINISHED ELEVATION OF PAD TO BE 4" ABOVE FINISHED GRADE ELEVATION

A 6' HIGH CHAIN LINK FENCE WITH A 12' DOUBLE WIDE GATE ON THE DRIVE IS TO BE INSTALLED WHERE REQUIRED BY IRCDUS

2024

DRAWING NO. L-4 A

SCHEMATIC: NOT INTENDED FOR CONSTRUCTION. SEE PROJECT PLANS.

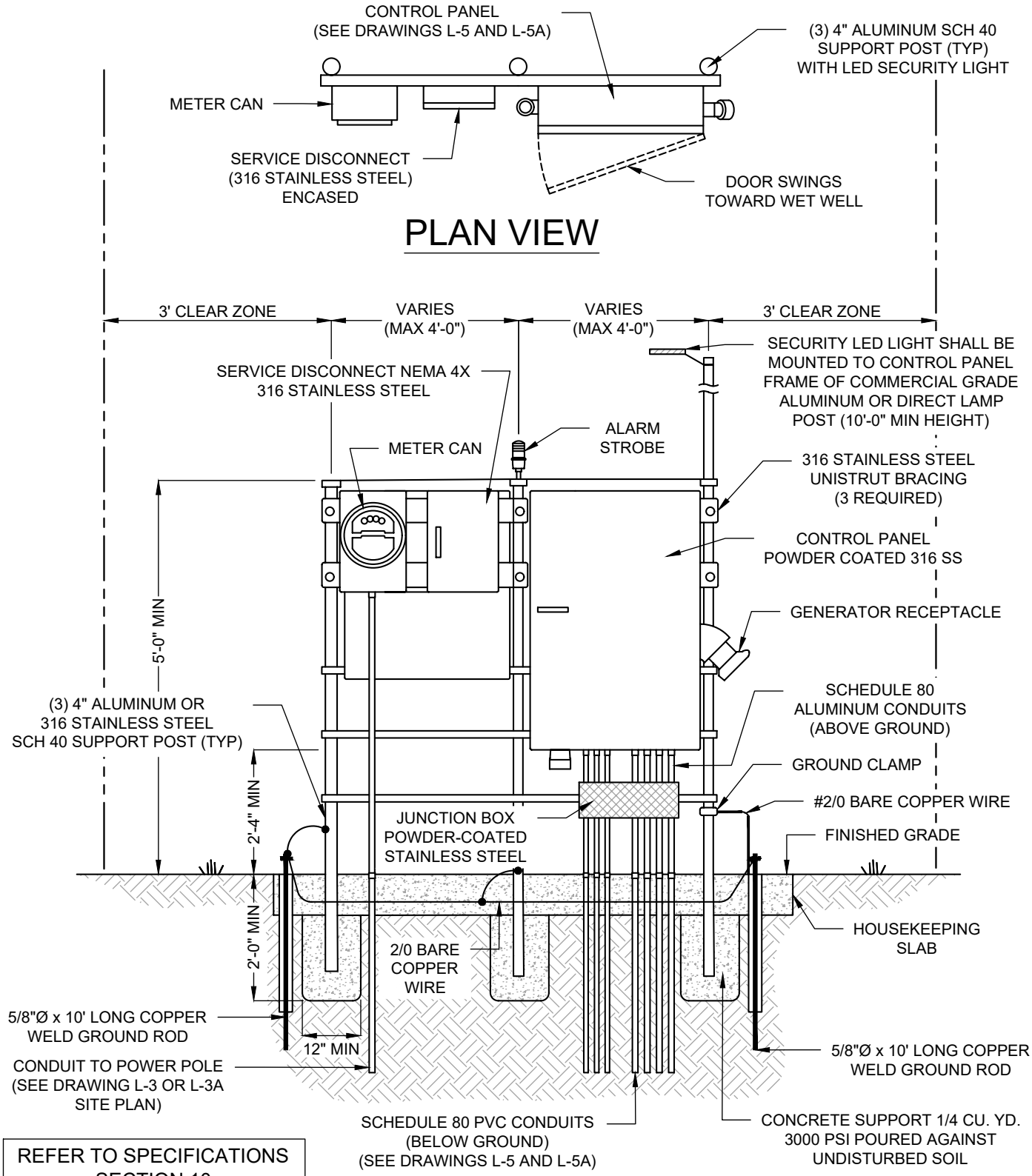
INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES

SITE PLAN ALTERNATE "B"

NOTES:

1. REFER TO SECTION 10 FOR PUMPING STATION SPECIFICATIONS.
2. CONTRACTOR TO CONTACT IRCDUS INSPECTOR PRIOR TO PUMP STATION CONSTRUCTION.
3. REINFORCED CONCRETE SLAB 6" THICK (MINIMUM), SHALL HAVE A FINISHED PAD ELEVATION 4" ABOVE FINISHED GRADE ELEVATION.
4. EXPANSION AND CONTRACTION JOINTS SHALL BE REQUIRED AT WET WELL, VALVE VAULT AND MANHOLE AS APPLICABLE.
5. CONCRETE SLAB CONSTRUCTION TO CONFORM TO ACI 318 STANDARD.
6. LOCATION OF CONTROL PANEL PER IRCDUS INSPECTOR.
7. A 6-FOOT HIGH CHAIN LINK FENCE WITH 12-FOOT WIDE, DOUBLE SWING GATES, ACROSS THE DRIVE IS TO BE INSTALLED WHERE REQUIRED BY IRCDUS.
8. DATA FLOW TOWER FOUNDATION TOP SHALL BE 6" ABOVE FINISHED GRADE. LOCATION TO BE APPROVED BY IRCDUS.
9. SHOW ELECTRICAL LAYOUT ON AS-BUILTS AT LIFT STATIONS TO HELP LOCATORS.
10. AN ACCESS DRIVE SHALL BE PROVIDED TO ALL IRCDUS MAINTAINED LIFT STATIONS. ALL ACCESS DRIVES SHALL BE A MINIMUM OF 12' WIDE, 45' LONG. IF FENCE IS INSTALLED, SWING GATE SHALL HAVE A 12' OPENING.
11. LIFT STATION IS TO BE LOCATED IN A DEDICATED UTILITY EASEMENT, 50' AWAY FROM HOMES, CUL-DE-SACS, AND SURFACE BODY WATER.
12. A WATER SERVICE LINE (1"Ø) WITH REDUCED PRESSURE BACKFLOW PREVENTER, WATER METER, AND HOSE BIBB IS REQUIRED.
13. CONTRACTOR TO INSTALL PERMANENT SIGNAGE WITH CONTACT INFORMATION AND PHONE NUMBER AT ALL IRCDUS AND PRIVATE LIFT STATIONS.
14. CONTRACTOR TO PROVIDE SECURITY FOR PRIVATE LIFT STATIONS PER IRCDUS PLANS REVIEW. SECURITY TO INCLUDE, BUT NOT LIMITED TO, LOCKABLE HATCH COVER LIDS FOR THE WET WELL AND VALVE PIT.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	SITE PLAN NOTES 2024	DRAWING NO. L-4 B

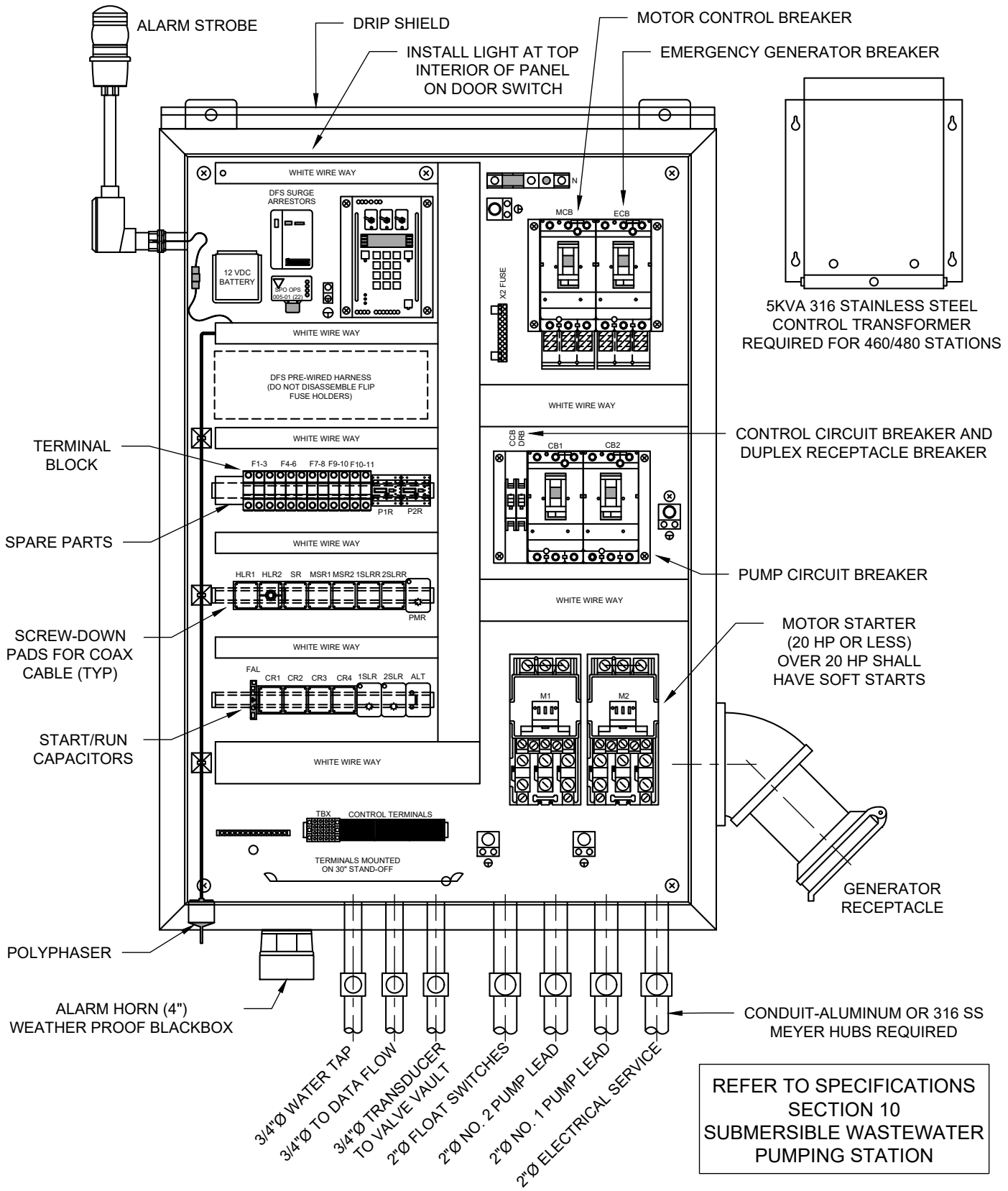


REFER TO SPECIFICATIONS
SECTION 10
SUBMERSIBLE WASTEWATER
PUMPING STATION

FRONT ELEVATION

SERVICE STRUCTURE LOCATION TO BE APPROVED BY IRCDUS
SEE DRAWING L-7, PUMPING STATION ELECTRICAL NOTES

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	ELECTRICAL SERVICE ENTRANCE METER & PANEL BOX 2024	DRAWING NO. L-5

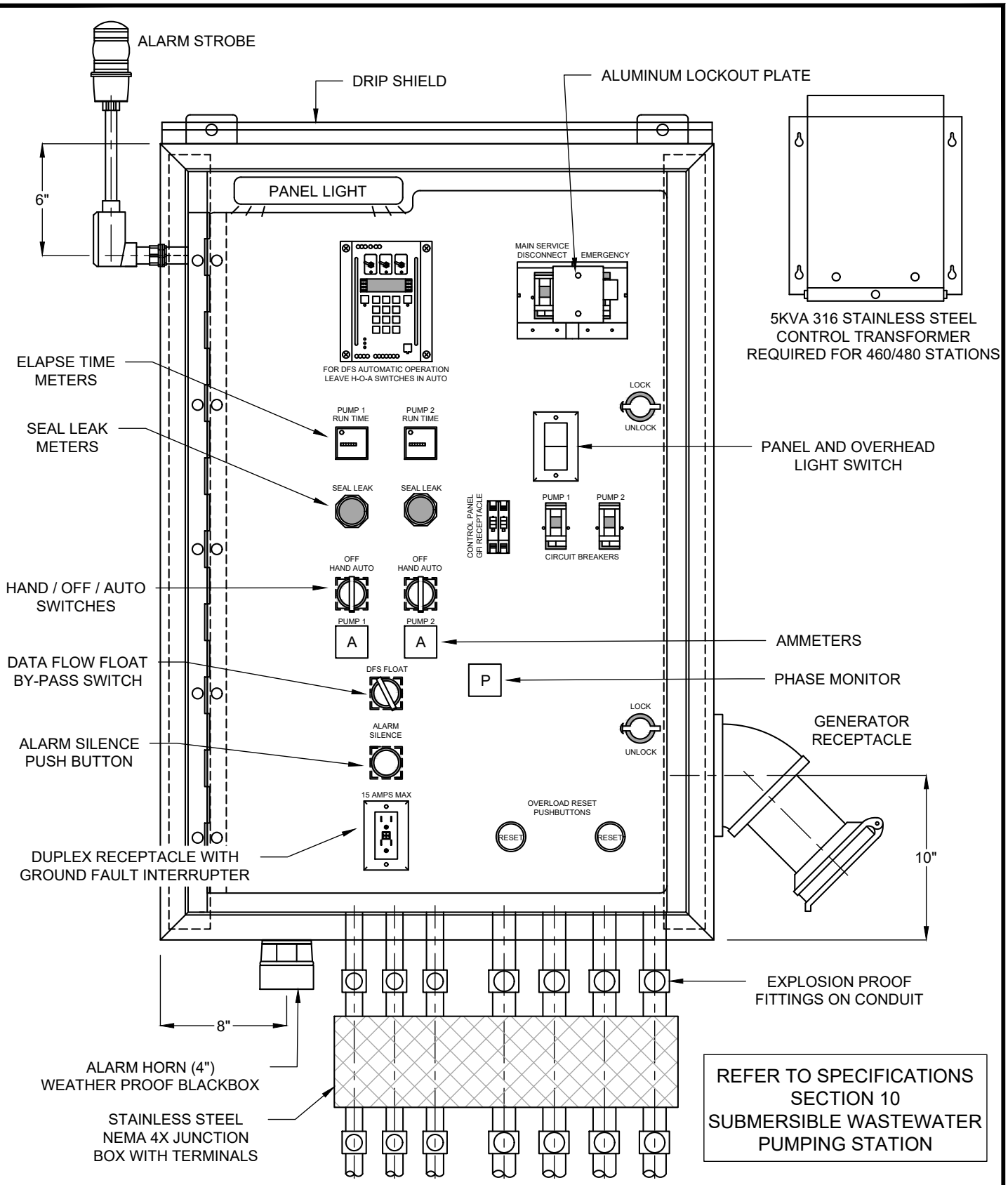


DUPLEX PUMPING STATION

SEE DRAWING L-7, PUMPING STATION ELECTRICAL NOTES

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	CONTROL PANEL LAYOUT	DRAWING NO. L-5 A

2024



REFER TO SPECIFICATIONS SECTION 10 SUBMERSIBLE WASTEWATER PUMPING STATION

DUPLEX PUMPING STATION

SEE DRAWING L-7, PUMPING STATION ELECTRICAL NOTES

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	CONTROL PANEL INNER DOOR LAYOUT 2024	DRAWING NO. L-5 B

NOTES:

1. REFER TO SECTION 10 FOR PUMPING STATION SPECIFICATIONS.
2. CONTRACTOR TO CONTACT IRCDUS INSPECTOR PRIOR TO PUMP STATION CONSTRUCTION.
3. BUOYANCY CALCULATIONS SHALL BE REQUIRED FOR ALL PUMP STATIONS ALONG WITH THE REQUIRED PUMP STATION CALCULATIONS.
4. CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS AGAINST FLOATATION OF WET WELL UNTIL ALL BACKFILL IS IN PLACE.
5. ALL CONCRETE SHALL BE CLASS A-A (4,000 PSI FOR PRECAST AND 3,000 PSI FOR CAST-IN-PLACE), UNLESS OTHERWISE SPECIFIED.
6. REINFORCING STEEL SHALL BE GRADE 60 FABRICATED AND PLACED IN ACCORDANCE WITH ACI CODE SPLICES AND SHALL BE SIX (6) TIMES THE BAR DIAMETER NUMBER SIZE OR 18" MINIMUM UNLESS OTHERWISE NOTED (STAG. SPL., TYP).
7. ALL BACKFILL AROUND THE PUMP STATION SITE SHALL BE COMPACTED @ 98% OF MAXIMUM DENSITY, PER AASHTO-T-180.
8. CHAMFER EXPOSED CONCRETE EDGES 3/4 " (TYP).
9. WET WELL WALL SHALL CONTAIN A MINIMUM OF .022 SQ IN/LINEAR FOOT REINFORCEMENT, EACH WAY TOP TO BOTTOM.
10. ALL PIPING AT THE PUMP STATION SITE SHALL BE RESTRAINED.
11. ALL PUMPS AND PUMPING EQUIPMENT SHALL CONFORM TO IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.
12. STAINLESS STEEL (316) CABLE HOLDER SHALL BE LOCATED ON OPPOSITE SIDE OF WET WELL FROM THE INFLUENT PIPE.
13. NO UNI-FLANGE PIPE CONNECTIONS ALLOWED.
14. MAINTAIN MINIMUM OF 6" BETWEEN ANY PIPING, FITTINGS, ETC. AND PRECAST CONCRETE.
15. ALL WET WELLS SHALL BE LINED. SEE SPECIFICATIONS SECTION 10.
16. LINERS SHALL BE INSTALLED ON ALL PUMP STATION WET WELLS AND MANHOLES RECEIVING PUMPED SEWAGE, PLUS FIVE (5) MANHOLES IN EACH DIRECTION.
17. PUMPS SHALL BE DESIGNED TO PROVIDE A MINIMUM PUMP RUN TIME EQUAL TO HALF THE CYCLE TIME.
18. LIFT STATION SITE SHALL BE DESIGNED TO PROVIDE A MAXIMUM CLEARANCE OF TEN FEET OUTSIDE OF WET WELL FOR FUTURE MAINTENANCE.
19. ALL RE-PUMP STATIONS SHALL HAVE BIO-CUBE ODOR CONTROL SYSTEMS AS REQUIRED BY MANUFACTURER AND APPROVED BY IRCDUS.
20. A SAFETY GRATE WITH STAINLESS STEEL (316) HARDWARE IS REQUIRED FOR ALL WET WELLS.

REFER TO SPECIFICATIONS
SECTION 10
SUBMERSIBLE WASTEWATER
PUMPING STATION

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	PUMPING STATION GENERAL NOTES 2024	DRAWING NO. L-6

NOTES:

21. SEE PUMPING STATION CONCRETE STRUCTURE, PLAN VIEW AND SECTION VIEW DRAWINGS, L-1 AND L-1A. PUMP, PIPING, AND MECHANICAL DRAWINGS, L-2 AND L-2A. PUMP STATION GROUNDING DETAIL AND SITE PLAN NOTES, L-3 AND L-3A. ELECTRICAL SERVICE ENTRANCE METER AND PANEL BOX DRAWING, L-4. SEE DRAWINGS L-5, L-5A, L-6, L-6A, L-7, L-8 AND L-8A FOR CONTROL PANEL LAYOUTS, PUMPING STATION GENERAL NOTES, AND ELECTRICAL NOTES.
22. STRUCTURE DIMENSIONS MAY VARY UPON APPROVAL BY THE IRCDUS DUE TO BUOYANCY COMPENSATION OR OTHER REQUIREMENTS.
23. GATE VALVE TO BE LOCATED AT LIFT STATION FORCE MAIN JUNCTION.
24. STAINLESS STEEL (316) LIFTING BAILS SHALL BE USED FOR PUMPS IN LIFT STATIONS.
25. SINGLE PHASE PUMPS (I.E. GRINDER) SHALL BE A MAXIMUM OF 5.0 HP, AND BY IRCDUS APPROVAL ONLY.
26. ALL WET WELLS 15' DEEP OR GREATER THAN 10' DIAMETER MUST BE APPROVED BY IRCDUS ENGINEERING.
27. OUTSIDE WALLS AND UNDERSIDE OF WET WELL TOP SLAB AND VALVE BOX SHALL BE PAINTED WITH TWO (2) COATS OF WATER BASE EPOXY.
28. ALL HARDWARE TO BE 316 STAINLESS STEEL.
29. PUMP STATION POWER SUPPLY FROM FLORIDA POWER AND LIGHT ELECTRIC POWER POLE OR TRANSFORMER TO THE PUMP STATION ELECTRIC PANEL SHALL BE INCLUDED ON THE RECORD DRAWING.
30. ALL PROPOSED PRIVATE STATION OWNERS ARE TO SIGN AN AGREEMENT ACKNOWLEDGING STATION IS TO REMAIN PRIVATE UNLESS SUBJECT STATION IS CONSTRUCTED TO IRCDUS STANDARDS.

REFER TO SPECIFICATIONS
SECTION 10
SUBMERSIBLE WASTEWATER
PUMPING STATION

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	PUMPING STATION GENERAL NOTES 2024	DRAWING NO. L-6 A

NOTES:

1. REFER TO SECTION 10 FOR PUMPING STATION SPECIFICATIONS.
2. ALL ELECTRICAL WORK SHALL MEET CURRENT NATIONAL ELECTRICAL CODE (N.E.C.).
3. ELECTRIC SERVICE FOR IRCDUS LIFT STATIONS SHALL BE 3 PHASE.
4. A MINIMUM 3' CLEAR ZONE IS REQUIRED AROUND THE ELECTRICAL AREA. THE MINIMUM WORKSPACE REQUIREMENTS SHALL ADHERE TO THE NATIONAL ELECTRICAL CODE (N.E.C.), SECTION 110.26(A).
5. A 3/4" CONDUIT SHALL BE INSTALLED BETWEEN THE CONTROL PANEL AND THE VALVE VAULT FOR THE TRANSDUCER.
6. THREE SCHEDULE 80 PVC CABLE CONDUITS (2"Ø) REQUIRED FROM WET WELL TO CONTROL PANEL FOR POWER/INSTRUMENTATION. ONE CONDUIT (3/4"Ø) REQUIRED FROM VALVE VAULT TO CONTROL PANEL FOR TRANSDUCER. ONE CONDUIT (1"Ø) FOR TELEMETRY EQUIPMENT. ONE SCHEDULE 80 PVC CABLE CONDUIT (2"Ø) REQUIRED FOR ELECTRICAL SERVICE. TOTAL OF SEVEN (7) CONDUITS.
7. ALL BURIED CONDUIT SHALL BE SCHEDULE 80 PVC. ALL EXPOSED CONDUIT SHALL BE STAINLESS STEEL (316) OR ALUMINUM. CONDUIT TO BE SEALED.
8. A MASTIC COATING IS REQUIRED WHERE PANEL POST AND ALUMINUM OR STAINLESS STEEL (316) CONDUIT IS IN DIRECT CONTACT WITH CONCRETE.
9. THE CONTROL PANEL DOOR MUST OPEN TOWARD THE WET WELL.
10. CONTROL PANEL SHALL BE APPROVED BY IRCDUS BEFORE INSTALLATION.
11. ELECTRICAL CONTROL PANEL SHALL MEET N.E.C. CODE 1.10.26A , BE NEMA 4X, POWDER COATED 316 STAINLESS STEEL, AND SHALL CONFORM TO PUMP MANUFACTURERS' AND SCADA SYSTEM REQUIREMENTS.
12. CONTROL PANEL SHALL MEET THE REQUIREMENTS OF SERVICE ENTRANCE BY PROPER BONDING OR SHALL BE UL SERVICE ENTRANCE RATED.
13. CONTROL PANEL SHALL HAVE A DATA FLOW, FLOAT BY-PASS SWITCH.
14. BOTTOM OF CONTROL PANEL TO BE 28" TO 34" ABOVE GROUND.
15. ALL PENETRATIONS INTO ELECTRIC CONTROL PANEL REQUIRE MEYER HUBS. CORROSIVE MATERIALS WILL NOT BE ALLOWED.
16. DISCONNECT BETWEEN METER AND PANEL TO BE 316 STAINLESS STEEL, NON-FUSABLE. STATIONS WITH GENERATORS SHALL BE FUSED.
17. PUMP STATION CONTROL PANEL SHALL BE PROVIDED WITH APPROPRIATE LIGHTNING ARRESTOR. VERIFY ALL DRIVEN GROUNDING GRIDS PER N.E.C. 250.56 AND SCADA (LATEST STANDARDS).
18. ALARM HORN SHALL BE SEALED TO PREVENT LEAKAGE.
19. ALL HARDWARE AND FASTENERS TO BE STAINLESS STEEL (316).
20. TOOLS AND SPARE PARTS ARE REQUIRED (SEE SECTION 10.05).
21. THE MAXIMUM HORSEPOWER RATING FOR A 120/240 VOLT WASTEWATER PUMPING STATION PANEL IS 20 HP. ANY PUMP SIZE GREATER THAN 20 HP SHALL HAVE 480 VOLT SERVICE AND BE DESIGNED BY AN ELECTRICAL ENGINEER.
22. ALL WIRE TERMINALS SHALL BE TINNED.
23. PROVIDE AN OVERHEAD LIGHT OPERATED BY A SWITCH IN THE CONTROL PANEL. LIGHT SHALL BE LED, TYPE IV, 400W METAL HALIDE EQUAL, MOUNTED AT A HEIGHT OF 12'.
24. FOR 480 V GENERATOR INSTALLATION, PROVIDE A 5 KVA TRANSFORMER AND EMERGENCY STOP SWITCH ON PANEL NEAR GENERATOR SET. SEE SECTION 17.2.08 OF SPECIFICATIONS, ACCESSORIES.
25. PROVIDE GROUNDING TO ALL EQUIPMENT, EQUIPMENT REQUIRED BY N.E.C. 250.

REFER TO SPECIFICATIONS
SECTION 10
SUBMERSIBLE WASTEWATER
PUMPING STATION

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	PUMPING STATION ELECTRICAL NOTES 2024	DRAWING NO. L-7

GENERATOR NOTES:

1. HOUSING DEVELOPMENTS OF 200 OR MORE UNITS SHALL PROVIDE BACKUP GENERATOR SETS FOR EMERGENCY USE AS REQUIRED. GENERATOR SHALL BE PROVIDED WITH AUTOMATIC THROW OVER SWITCH THAT SENSES POWER INTERRUPTION FROM THE MAIN POWER SOURCE, STARTS THE GENERATOR, AND SHIFTS THE POWER SUPPLY TO THE LIFT STATION FROM THE GENERATOR.
2. IF LESS THAN 200 HOMES ARE CONSTRUCTED INITIALLY, BUT IN FUTURE PHASES THE BUILD-OUT IS 200 HOMES ARE GREATER, AN EMERGENCY GENERATOR WILL BE REQUIRED. THE PUMPING STATION SHALL BE CONSTRUCTED WITH SPACE AVAILABLE FOR AN EMERGENCY GENERATOR TO BE INSTALLED WHEN 200 HOMES ARE CONSTRUCTED.
3. IRCDUS MAY CONNECT ADDITIONAL DEVELOPMENTS INTO A PROPOSED PUMPING STATION AND MAY REQUIRE AN EMERGENCY GENERATOR.
4. NATURAL GAS TO BE USED FOR GENERATOR FUEL SOURCE WHERE AVAILABLE.
5. SEE SECTION 17, ENGINE DRIVEN GENERATOR SETS FOR SPECIFICATIONS.

FLOAT CONTROL SYSTEM:

PUMPING STATION DATA TABLE			
LIFT STATION NUMBER			
PRIMARY CONDITION	PUMPING CAPACITY	GPM	0
	TOTAL HEAD ±	FEET	0
	EFFICIENCY	%	0%
PRIMARY CONDITION	PUMPING CAPACITY	GPM	0
	TOTAL HEAD ±	FEET	0
	EFFICIENCY	%	0%
SECONDARY CONDITION	PUMPING CAPACITY	GPM	0
	TOTAL HEAD ±	FEET	0
	EFFICIENCY	%	0%
MINIMUM SOLID PASS. IMPELLER		INCHES	00-00-0
PUMP MODEL NUMBER		NO.	XX-00
PUMP IMPELLER		INCHES	0000
PUMP SPEED (DESIGN)		R.P.M.	0
MOTOR NAMEPLATE H.P.		H.P.	±0.0
MAXIMUM PUMP BRAKE H.P.		H.P.	0000
MAXIMUM NPSHR @ SECONDARY		FEET	0000
MAXIMUM MOTOR SPEED		R.P.M.	00
INTIAL INFLUENT FLOW RATE PEAK		G.P.M.	0000
MINIMUM PUMP CYCLE TIME		MINS.	0.00
ALARM SIGNAL ON ELEVATION		ELEV. "A"	0.00
INFLUENT PIPE INVERT ELEVATION		ELEV. "B"	0.00
LAG PUMP ON ELEVATION		ELEV. "C"	0.00
LEAD PUMP ON ELEVATION ±		ELEV. "D"	0.00
PUMPS OFF ELEVATION		ELEV. "E"	0.00*
ALARM SIGNAL ON ELEVATION		ELEV. "F"	0.00
BOTTOM OF WET WELL		ELEV. "G"	0.00
PUMP MANUFACTURER			

PUMP SHALL OPERATE BETWEEN PRIMARY AND SECONDARY POINTS

SEE DRAWING L-2A, PUMP, PIPING AND MECHANICAL DETAILS - SECTION VIEW FOR GENERAL ARRANGEMENT OF FLOAT CONTROL SWITCHES

* PUMP OFF ELEVATION MUST BE 3" ABOVE TOP OF PUMP

REFER TO SPECIFICATIONS SECTION 10 SUBMERSIBLE WASTEWATER PUMPING STATION

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES

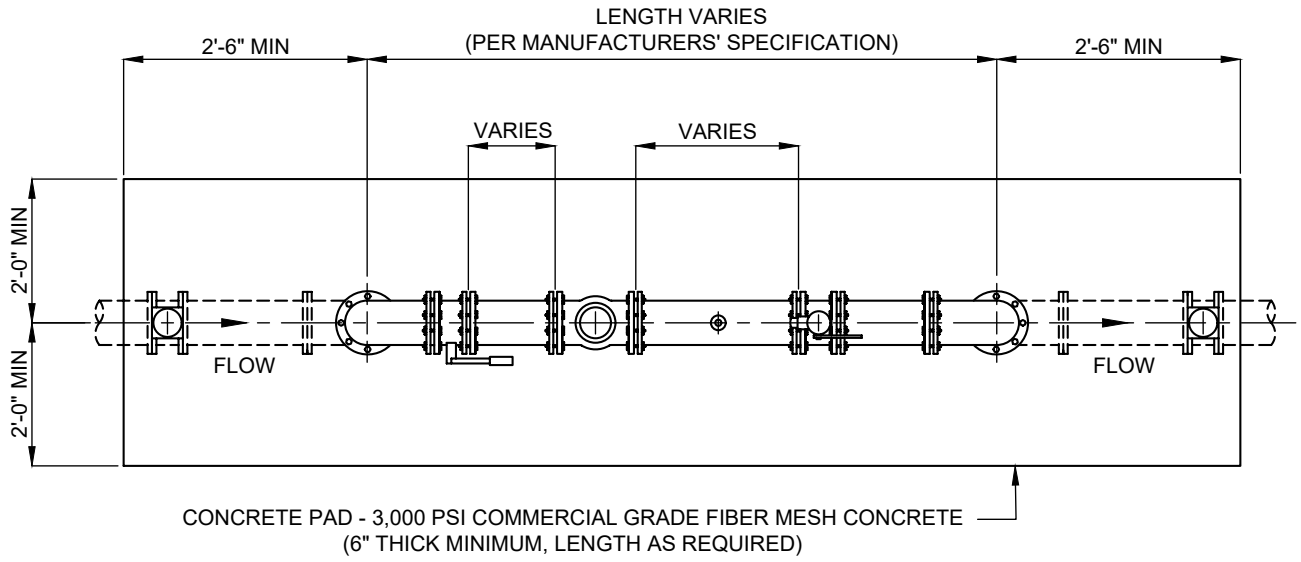
GENERATOR NOTES & FLOAT CONTROLS

2024

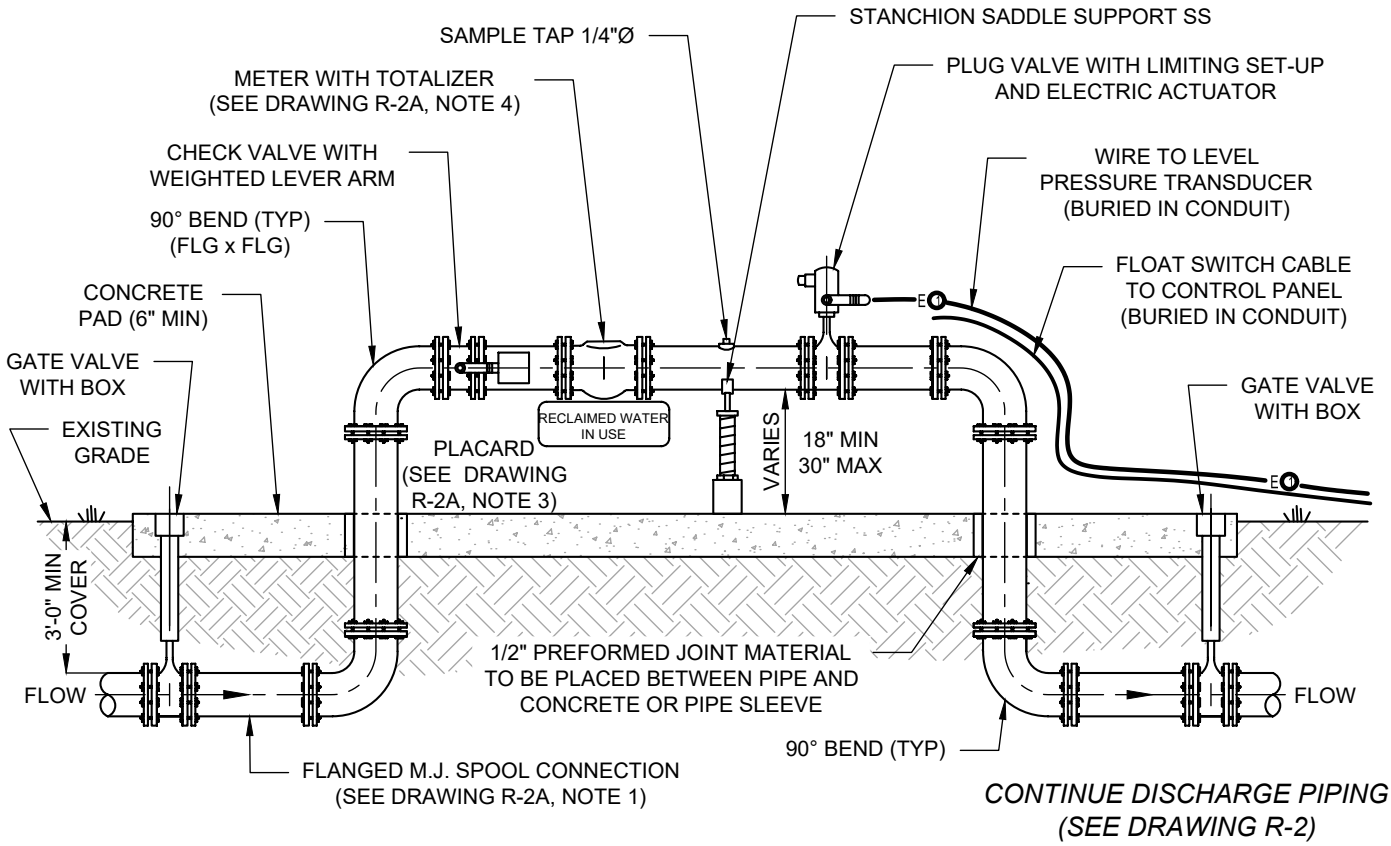
DRAWING NO.

L-8

RECLAIMED WATER



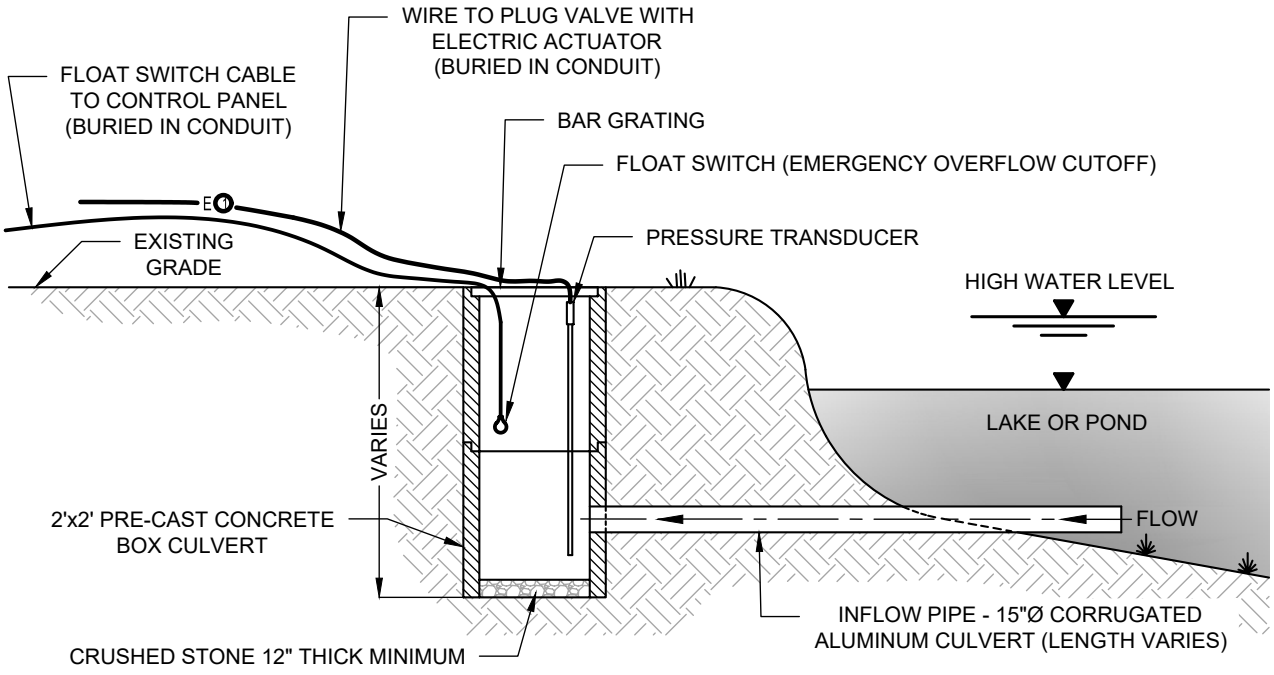
PLAN VIEW



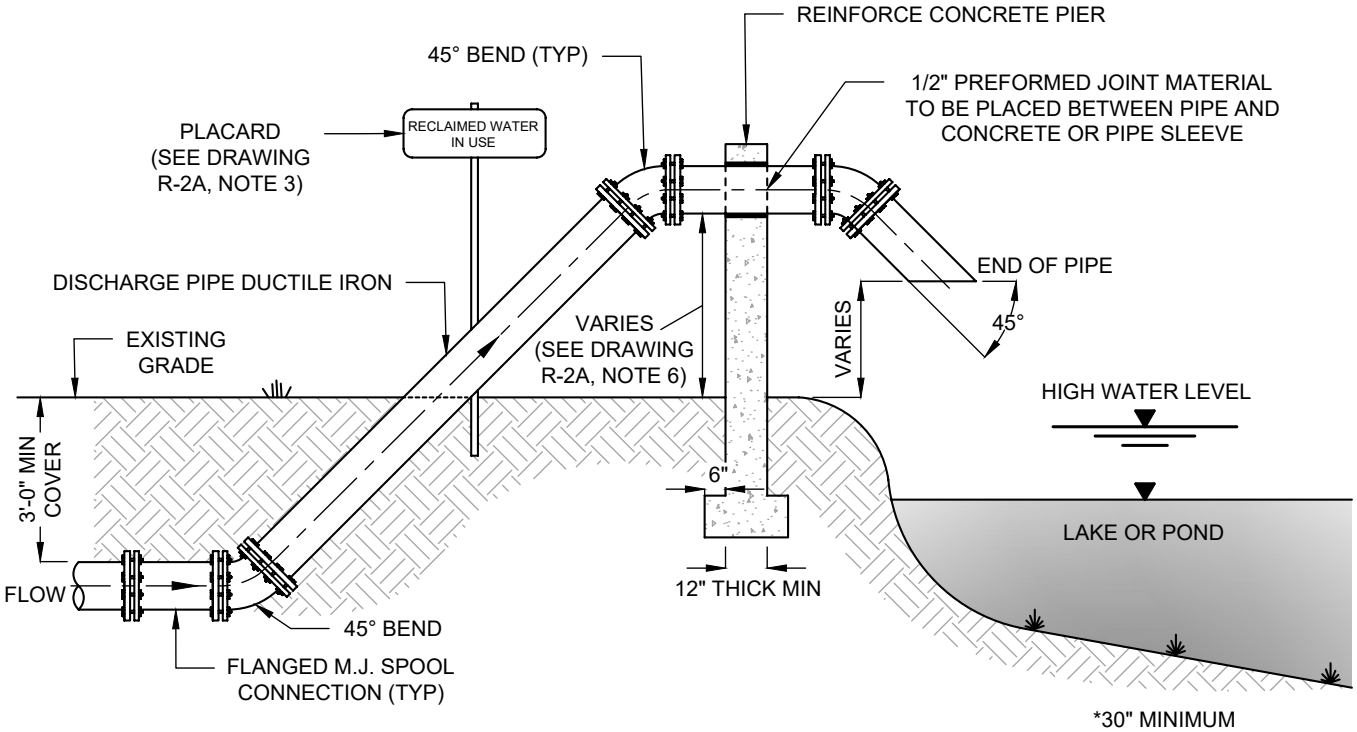
ELEVATION

SEE DRAWING R-2A, RECLAIMED WATER NOTES

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	RECLAIMED WATER METER VALVE ASSEMBLY DETAIL 2024	DRAWING NO. R-1



ELEVATION STILLING WELL



CONTINUE DISCHARGE PIPING (SEE DRAWING R-1)

ELEVATION - DISCHARGE PIPE

SEE DRAWING R-2A, RECLAIMED WATER NOTES

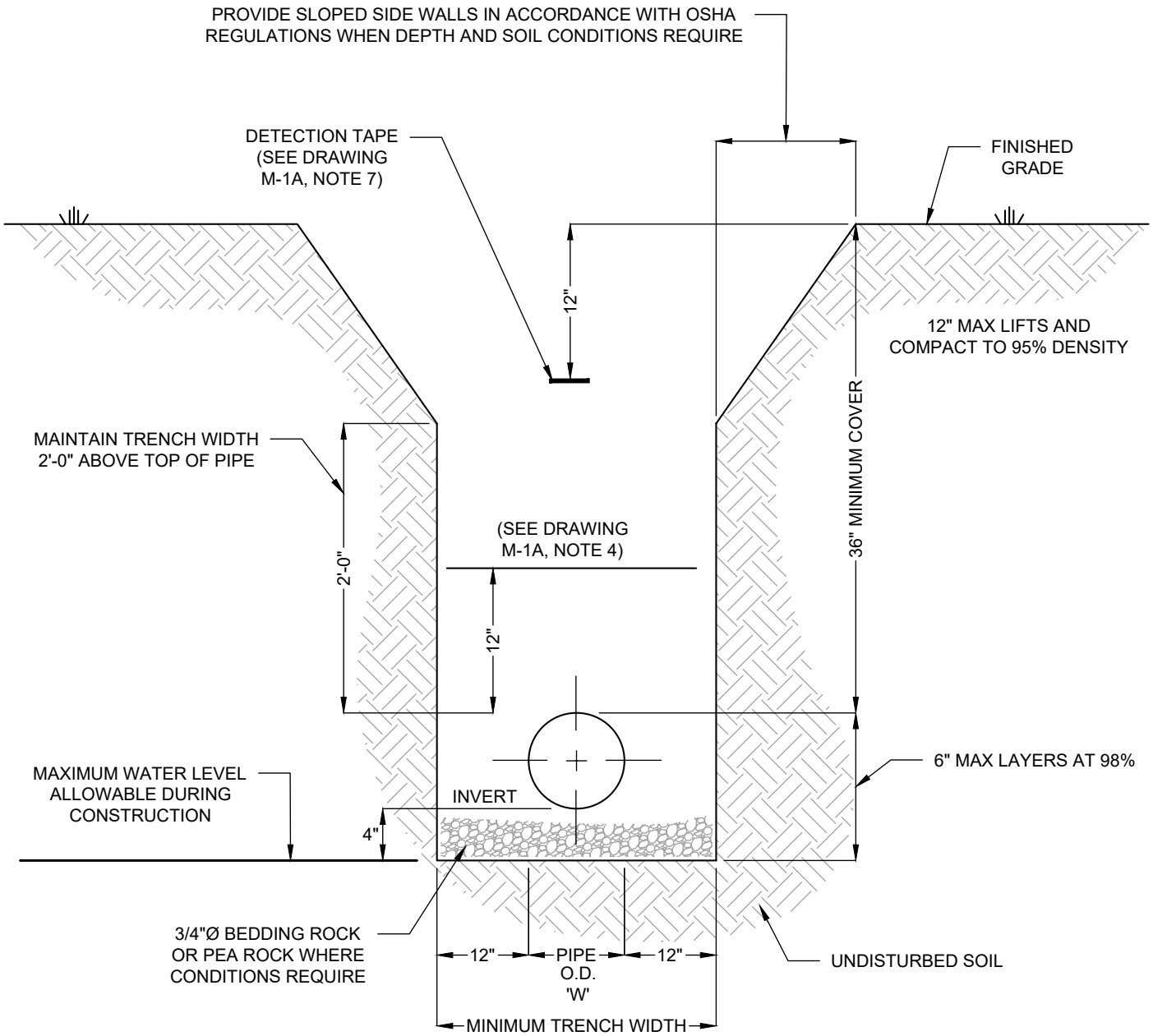
INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	RECLAIMED WATER DISCHARGE & STILLING WELL DETAIL 2024	DRAWING NO. R-2

NOTES:

1. ALL ABOVE GROUND PIPING AND FILLINGS SHALL BE FLANGED DUCTILE IRON PIPE.
2. ALL ABOVE GROUND PIPING, FITTINGS AND VALVE BOX LIDS SHALL BE PAINTED PANTONE PURPLE (522C).
3. PROVIDE PLACARDS MOUNTED ON STANDARD "U" SHAPE SIGN POST, 8' LONG, WITH THE WORDS "RECLAIMED WATER IN USE". PLACARDS SHALL BE PLACED ADJACENT TO THE RECLAIMED WATER METER/VALVE ASSEMBLY AND BY THE DISCHARGE AND STILLING WELL.
4. PROPELLER OR MAG METER SHALL BE LINKED TO IRCDUS REMOTE TRANSMITTING UNIT (RTU) FOR REMOTE MONITORING BY IRCDUS. THE METER SHALL REPORT IN GALLONS PER MINUTE. PLUG VALVE SHALL BE REMOTELY ACTUATED VIA IRCDUS AND BY PRESSURE TRANSDUCER IN LAKE. PLUG VALVE SHALL REPORT "PERCENTAGE OPEN" POSITION. INTEGRATE ALL LOGIC WITH IRCDUS SCADA SYSTEM.
5. A TELEMETRY AND MONITORING DEVICE IS REQUIRED AT DISCHARGE. DEVICE TO BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURERS' INSTRUCTIONS.
6. DISCHARGE INVERT TO BE ONE (1) PIPE DIAMETER ABOVE METER, OR 30" (MINIMUM) ABOVE GRADE , WHICHEVER IS HIGHER.
7. ELECTRICAL PANEL SHALL BE PER LIFT STATION PANEL SPECIFICATIONS. (SEE DETAIL DRAWINGS L-5, L-5A, L-5B, L-6, AND L-6A). ELECTRICAL PANEL TO BE LOCATED AS CLOSE TO THE METER AS PRACTICAL.
8. BAR GRATING OVER TOP OF STILLING WELL SHALL BE ALUMINUM, BEARING BAR SPACING 1.188", CROSS BAR SPACING 4". HEIGHT 1.5" OR AS APPROVED BY IRCDUS.
9. ALL MATERIALS ARE TO BE PER IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	RECLAIMED WATER NOTES 2024	DRAWING NO. R-2 A

MISCELLANEOUS



COMPACTION DENSITY REPORT, SIGNED AND SEALED BY A FLORIDA LICENSED PE, REQUIRED

ELEVATION

SEE DRAWING M-1A, TRENCH DETAIL NOTES

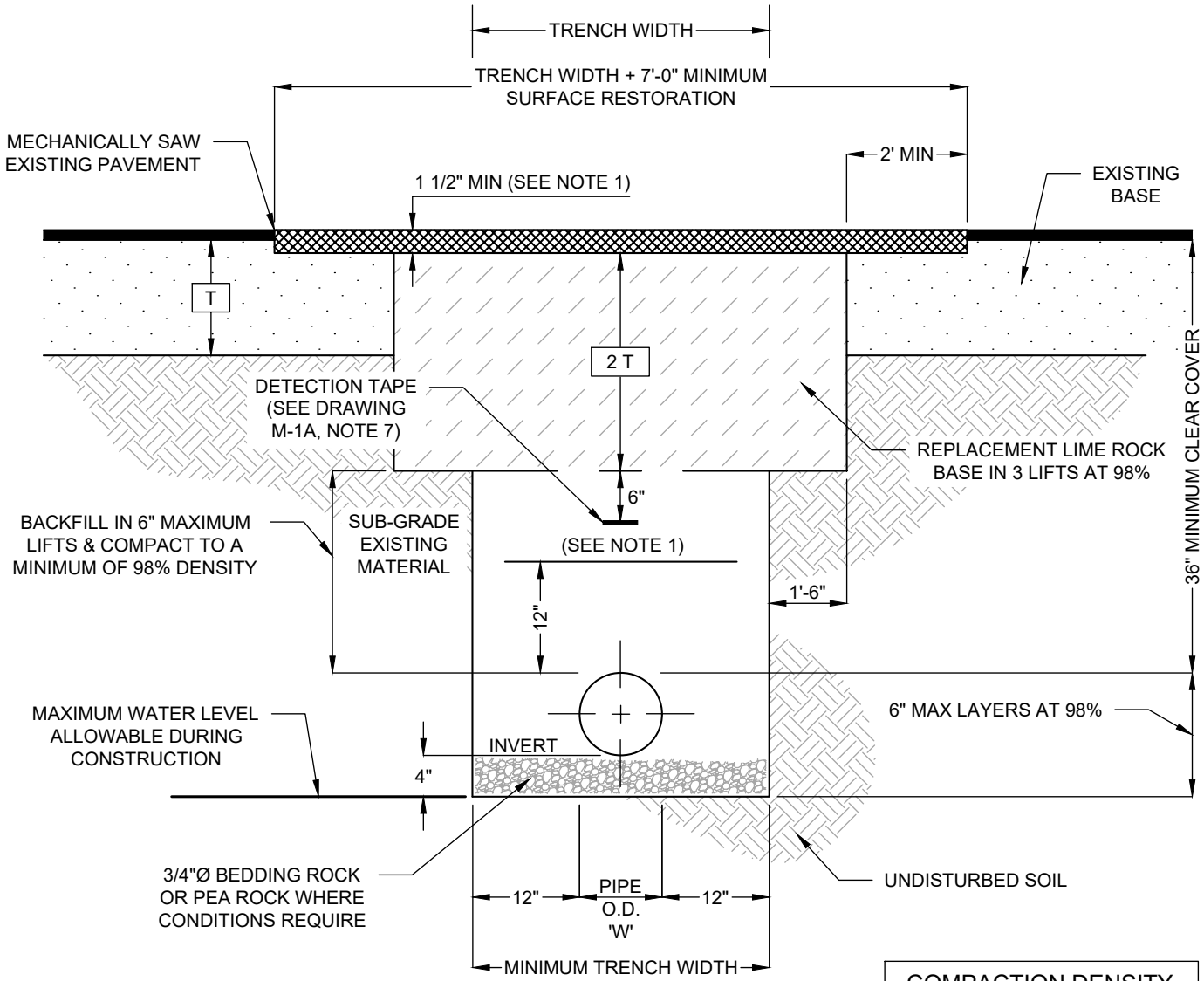
INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	TRENCH DETAIL (UNPAVED EASEMENT)	DRAWING NO. M-1

2024

NOTES:

1. WHERE SOIL CONDITIONS CANNOT BE MAINTAINED AS SHOWN ON DRAWING M-1, PROVIDE METHOD OF CONSTRUCTION TO IRCDUS FOR APPROVAL.
2. SHEETING WILL BE REQUIRED AS DETERMINED IN THE FIELD IN ACCORDANCE WITH OSHA REGULATIONS.
3. COMPACTION PERCENTAGES SHOWN REFER TO AASHTO T-180 MODIFIED PROCTOR METHOD.
4. MECHANICAL COMPACTION NOT ALLOWED BELOW THIS LEVEL OTHER THAN HAND VIBRATORY MEANS.
5. COMPACTION REPORTS REQUIRED.
6. MINIMUM TRENCH WIDTH "W" = PIPE O.D. PLUS 2'-0".
7. 2" DETECTION TAPE WITH METALLIC BACKING TO BE INSTALLED OVER MAIN 6" BELOW BOTTOM OF BASE COURSE. TAPE TO BE MARKED "CAUTION-WATER LINE BELOW", "CAUTION-FORCE MAIN BELOW", OR "CAUTION-REUSE MAIN BELOW". TRACE WIRE SHALL BE USED CONTINUOUSLY ON ALL PIPE. (SEE DRAWING M-14, TRACE WIRE DETAIL).
8. ALL RESTORATION IN EASEMENTS OR RIGHT-OF-WAYS OR WHEN REQUIRED BY OTHER JURISDICTIONAL AGENCIES SHALL CONFORM TO IRCDUS SPECIFICATIONS OR THE OTHER JURISDICTIONAL AGENCY SPECIFICATION, WHICHEVER IS MORE STRINGENT.
9. ALL PIPE TO BE LOCATED A MINIMUM OF 5' O.C. (TYPICAL) FROM EDGE OF PAVEMENT.
10. EXCAVATABLE FLOWABLE FILL IS ALLOWED WITH PRIOR APPROVAL OF PROPOSED MATERIAL STRENGTH BY COUNTY PUBLIC WORKS ENGINEER OR DESIGNEE.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	TRENCH DETAIL NOTES 2024	DRAWING NO. M-1 A



ELEVATION

SEE DRAWING M-1A, TRENCH DETAIL NOTES

NOTES:

1. MECHANICAL COMPACTION NOT ALLOWED BELOW THIS LEVEL OTHER THAN HAND VIBRATORY MEANS.
2. NEW SURFACE MATERIALS SHALL BE CONSISTENT IN DEPTH WITH EXISTING MATERIALS AND SHALL HAVE LAPPED JOINTS, (1 1/2" MINIMUM THICKNESS). PAVEMENT MATERIAL TO BE SPECIFIED.
3. MINIMUM TRENCH WIDTH "W" = PIPE O.D. PLUS 2'-0".
4. EXCAVATABLE FLOWABLE FILL IS ALLOWED WITH PRIOR APPROVAL OF PROPOSED MATERIAL STRENGTH BY COUNTY PUBLIC WORKS ENGINEER OR DESIGNEE.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	TRENCH DETAIL (PAVED AREAS & SHOULDERS)	DRAWING NO. M-2

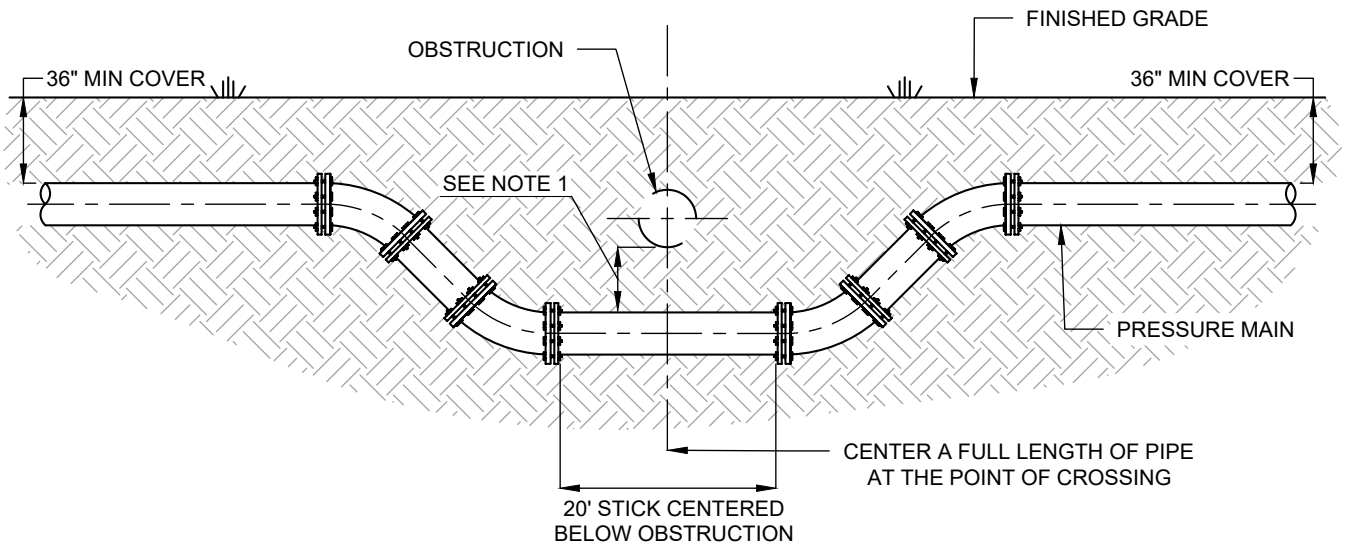
2024

RESTRAINED LENGTH IN FEET EACH SIDE OF BEND								
PIPE DIAMETER (INCHES)	D.I.P.				P.V.C.			
	90°	45°	22 1/2°	11 1/4°	90°	45°	22 1/2°	11 1/4°
3"	30'	15'	10'	5'	40'	20'	10'	5'
4"	35'	15'	10'	5'	55'	25'	15'	10'
6"	55'	25'	10'	5'	80'	35'	20'	10'
8"	65'	30'	15'	10'	90'	40'	20'	10'
10"	80'	35'	20'	10'	110'	50'	25'	15'
12"	95'	40'	20'	10'	130'	55'	30'	15'
16"	120'	50'	25'	15'	165'	70'	35'	20'
20"	150'	65'	30'	15'	200'	85'	40'	20'
24"	180'	70'	35'	20'	210'	90'	45'	25'
30"	190'	80'	40'	20'	250'	105'	50'	25'
36"	220'	95'	45'	25'	0	0	0	0
42"	245'	105'	50'	25'	0	0	0	0
48"	260'	120'	60'	30'	0	0	0	0
RESTRAINED LENGTHS FOR DEAD ENDS & BRANCHES FROM TREES SHALL BE THE SAME AS FOR 90° BEND								

RESTRAINED LENGTH IN FEET EACH SIDE FOR REDUCER										
PIPE DIAMETER (INCHES)										
	3"	4"	6"	8"	10"	12"	16"	20"	24"	30"
3"	0	0	0	0	0	0	0	0	0	0
4"	40'	0	0	0	0	0	0	0	0	0
6"	50'	45'	0	0	0	0	0	0	0	0
8"	75'	70'	40'	0	0	0	0	0	0	0
10"	95'	90'	70'	40'	0	0	0	0	0	0
12"	120'	115'	100'	75'	40'	0	0	0	0	0
16"	160'	155'	140'	125'	100'	70'	0	0	0	0
20"	200'	195'	185'	170'	150'	130'	75'	0	0	0
24"	160'	155'	150'	140'	135'	120'	90'	50'	0	0
30"	195'	190'	185'	180'	170'	160'	120'	105'	70'	0
36"	225'	220'	215'	210'	205'	195'	180'	150'	125'	70'
42"	245'	240'	235'	230'	225'	220'	205'	180'	155'	105'
48"	255'	250'	245'	240'	235'	230'	215'	195'	175'	125'
RESTRAINED LENGTHS FOR LARGER DIAMETER PIPES										

ALL IN-LINE VALVES SHALL BE TREATED AS DEAD END
WITH RESTRAINED PIPE JOINTS UP AND DOWN

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	RESTRAINED PIPE LENGTHS & SCHEDULE NOTES 2024	DRAWING NO. M-3

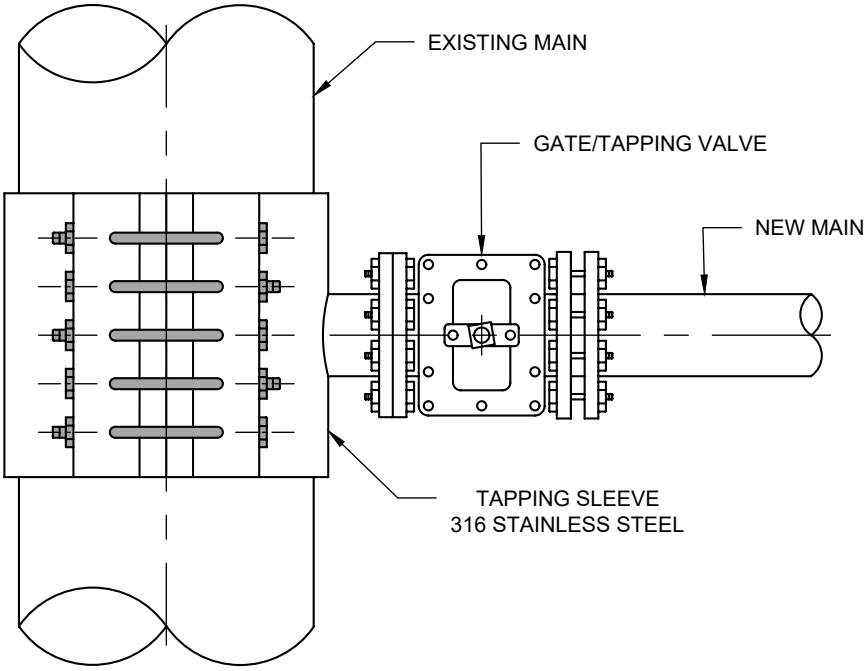


ELEVATION

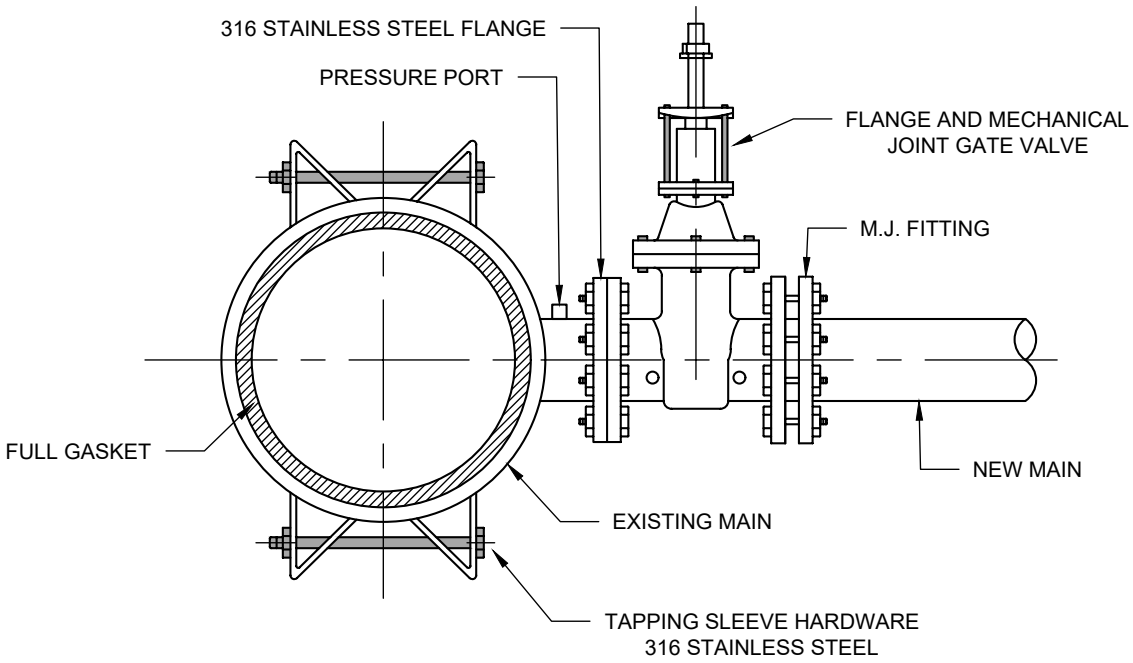
NOTES:

1. NEW OR RELOCATED, UNDERGROUND WATER MAINS CROSSING ANY EXISTING OR PROPOSED GRAVITY, VACUUM TYPE SANITARY SEWER, STORM SEWER, OR PRESSURE TYPE SANITARY SEWER, WASTEWATER, STORMWATER FORCE MAIN, OR PIPELINE CONVEYING RECLAIMED WATER SHALL BE LAID SO THE WATER MAIN IS AT LEAST 6", AND PREFERABLY 12", ABOVE OR A MINIMUM OF 12" BELOW THE OTHER PIPELINE. IT IS PREFERABLE TO LAY THE WATER MAIN ABOVE THE OTHER PIPELINE IF 36" MINIMUM COVER CAN BE MAINTAINED ABOVE THE WATER MAIN AND 6" OF SEPARATION BETWEEN THE WATER MAIN AND THE OTHER PIPELINE.
2. AT UTILITY CROSSINGS, ONE FULL LENGTH OF WATER MAIN PIPE SHALL BE CENTERED ABOVE OR BELOW THE OTHER PIPELINE SO THE WATER MAIN JOINTS WILL BE FAR AS POSSIBLE FROM THE OTHER PIPELINE. ALTERNATIVELY, AT SUCH CROSSINGS, THE PIPES SHALL BE ARRANGED SO THAT ALL WATER MAIN JOINTS ARE AT LEAST 3' FROM ALL JOINTS IN VACUUM TYPE SANITARY SEWERS, STORM SEWERS, STORMWATER FORCE MAINS, OR PIPELINES CONVEYING RECLAIMED WATER, AND AT LEAST 6' FROM ALL JOINTS IN GRAVITY OR PRESSURE TYPE SANITARY SEWERS, WASTEWATER FORCE MAINS, OR PIPELINES CONVEYING RECLAIMED WATER.
3. OTHER METHODS OF RESTRAINT MAY BE USED AS APPROVED BY IRCDUS IN LIEU OF DEFLECTING THE PIPE AS SHOWN ABOVE.
4. TRACE WIRE SHALL BE INSTALLED ABOVE THE PIPE. (SEE DRAWING M-14, TRACE WIRE DETAILS).
5. ALL WATER AND SEWER PIPING SHALL BE LOCATED A MINIMUM HORIZONTAL SEPARATION EQUAL TO THE DEPTH OF THE PIPE PLUS THE DIAMETER OF THE PIPE FROM ANY PERMANENT ABOVE GROUND STRUCTURES (I.E. WALLS, TREES, TRANSFORMER PADS, ETC.) AND A MINIMUM HORIZONTAL SEPARATION EQUAL TO 4' FROM ANY UNDERGROUND UTILITIES (I.E. GAS MAINS, TELEPHONE LINES, CABLE LINES, IRRIGATION MAINS, ETC.)
6. IRCDUS MAY REQUIRE AIR RELEASE VALVES ON EACH SIDE OF A UTILITY CROSSING.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	UTILITY CROSSINGS 2024	DRAWING NO. M-4



PLAN VIEW

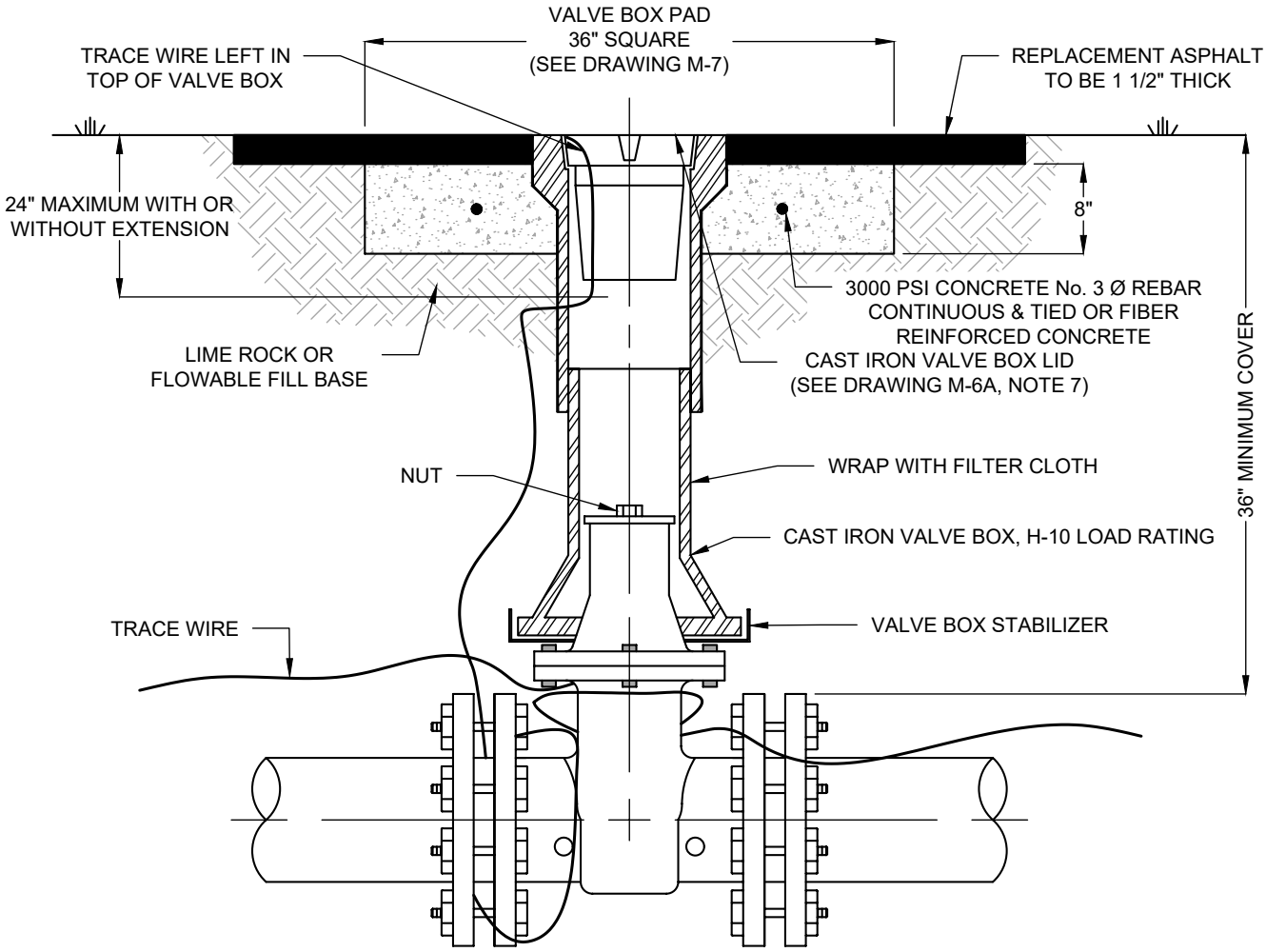


ELEVATION

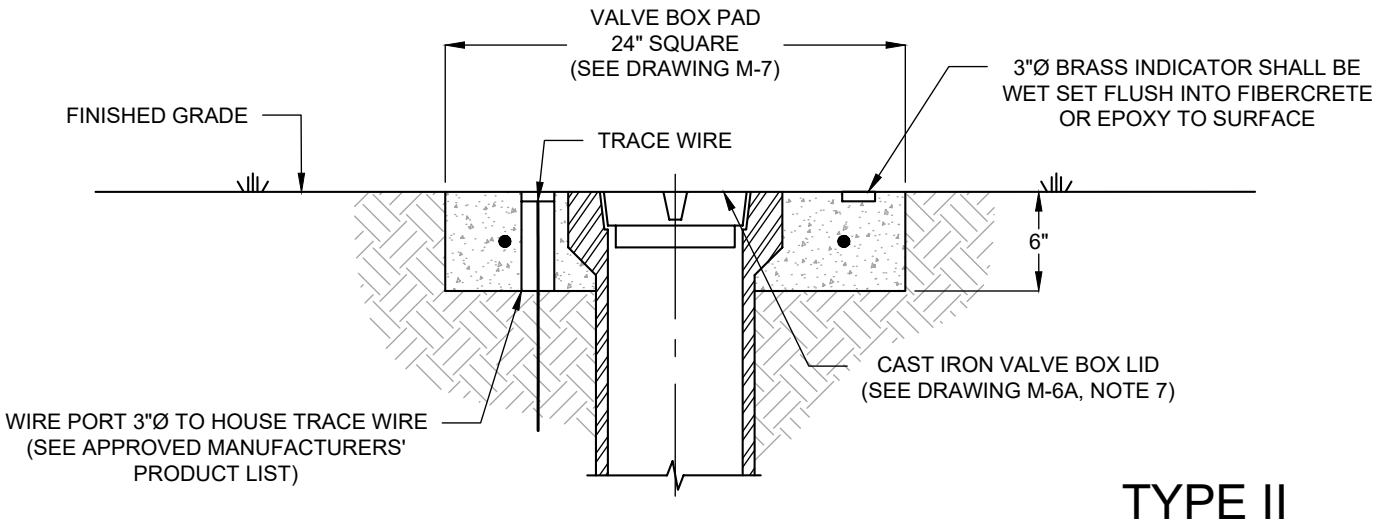
NOTES:

1. NEW MAIN SHALL BE RESTRAINED PER IRCDUS ENGINEERING. THRUST BLOCK ON EXISTING MAIN AT TAPPING SLEEVE LOCATION MAY BE REQUIRED.
2. ALL MATERIALS SHALL BE PER IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	TAPPING SLEEVE & VALVE ASSEMBLY 2024	DRAWING NO. M-5



TYPE I
PAVED AREA



TYPE II
UNPAVED AREA

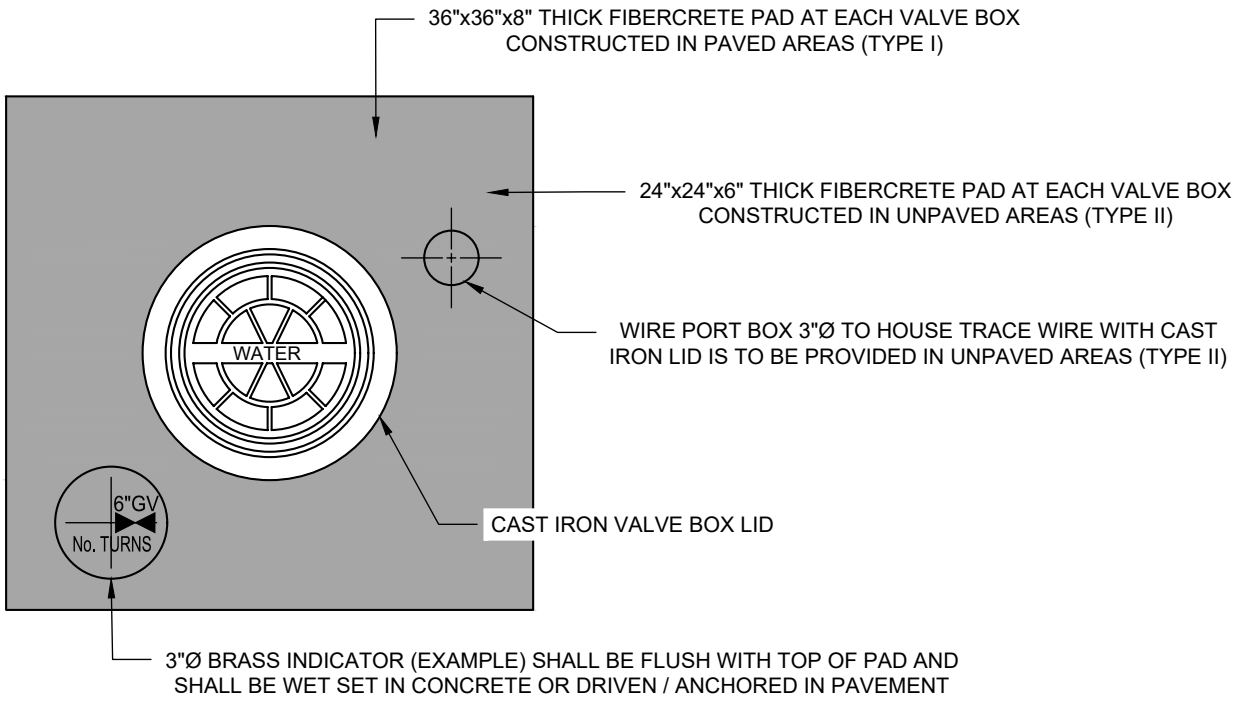
ELEVATION

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	VALVE & BOX DETAIL 2024	DRAWING NO. M-6

NOTES:

1. VALVE BOXES SHALL BE CONSTRUCTED PER MANUFACTURERS' SPECIFICATION.
2. ALL VALVE BOXES SHALL BE SHAFT/SCREW TYPE AND CANNOT REST ON THE VALVE.
3. ALL VALVE BOLTS SHALL BE STAINLESS STEEL WITH BRASS NUTS.
4. VALVE MARKERS ARE TO BE INSTALLED ADJACENT TO ALL VALVES IN UNPAVED AREAS AS DIRECTED BY IRCDUS. (SEE DRAWING M-10, VALVE MARKER).
5. ALL VALVES ARE TO BE LOCATED BY GPS.
6. TRACE WIRE IS REQUIRED. (SEE DRAWING M-14, TRACE WIRE DETAILS).
7. VALVE BOX LID LOCATED IN PAVEMENT SHALL BE A MINIMUM 24 LBS. WITH A MINIMUM 6" LONG THROAT.
8. VALVE BOX SHALL COMPLY WITH FDOT STANDARDS AS APPLICABLE.
9. VALVE EXTENSIONS OVER 36" REQUIRE IRCDUS ENGINEERING APPROVAL. VALVE NUT EXTENSION MAY BE REQUIRED FOR DEEP VALVES.
10. VALVE SPACING ON WATER MAINS SHALL NOT EXCEED 1,000', OR AS DIRECTED.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	VALVE & BOX DETAIL NOTES 2024	DRAWING NO. M-6 A



VALVE BOX PADS IN THE PAVEMENT DO NOT HAVE
WIRE PORT BOXES OR BRASS INDICATORS

PLAN VIEW

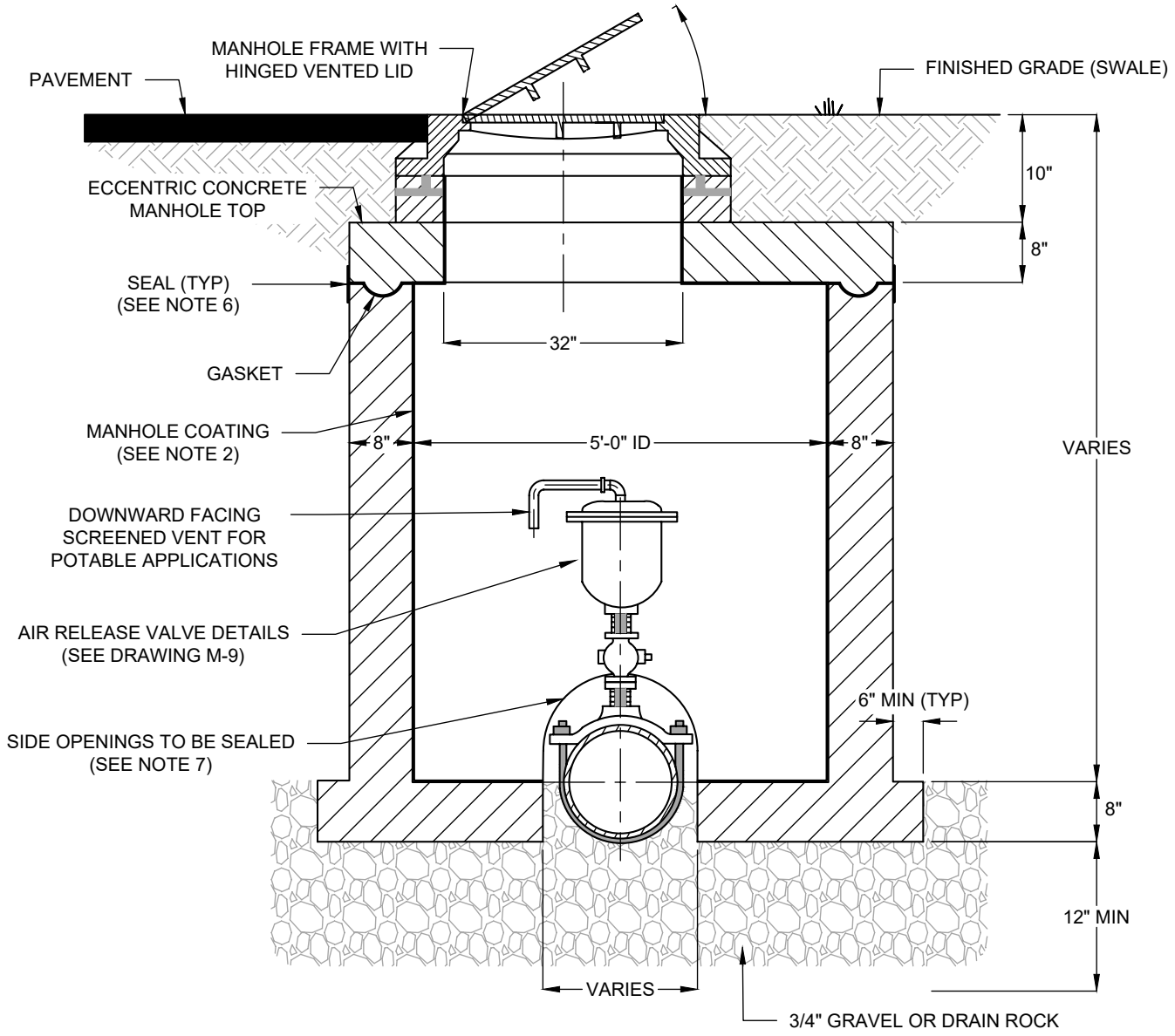
SEE DRAWING M-6, VALVE AND BOX DETAIL

NOTES:

1. VALVE BOX LIDS SHALL BE PAINTED: WATER - BLUE
   FIRE HYDRANTS - RED
   FORCE MAINS - GREEN
   REUSE MAINS - PURPLE
   BRINE - BROWN
2. IN UNPAVED AREAS (SEE DRAWING M-6, TYPE II) A BRASS VALVE INDICATOR IS TO BE PROVIDED. WITH ENGRAVED DIAGRAM OF VALVE LOCATION AND DESCRIPTION. (SEE EXAMPLE ABOVE) INDICATOR SHALL BE FLUSH WITH VALVE PAD.
3. VALVE BOX LID LOCATED IN PAVEMENT SHALL BE A CAST IRON, STAY-PUT COVER, MINIMUM 24 LBS. WITH A MINIMUM 6" LONG THROAT AND SHALL BE MARKED WITH RAISED LETTERS: "WATER", "SEWER", "BRINE", OR "REUSE WATER" AS APPLICABLE.
4. VALVE BOX SHALL COMPLY WITH FDOT STANDARDS AS APPLICABLE.
5. NO VALVE RINGS ARE TO BE USED.
6. IN TYPE I, PAVED AREAS, THE VALVE BOX PAD TOP ELEVATION SHALL BE EVEN WITH THE ROCK GRADE TO ALLOW BOTH LAYERS OF ASPHALT TO COVER THE VALVE BOX PAD WITH THE FINAL ASPHALT LAYER FLUSH WITH THE TOP OF THE VALVE BOX. (SEE DRAWING M-6, VALVE AND BOX DETAIL).

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	VALVE BOX PAD	DRAWING NO. M-7

2024



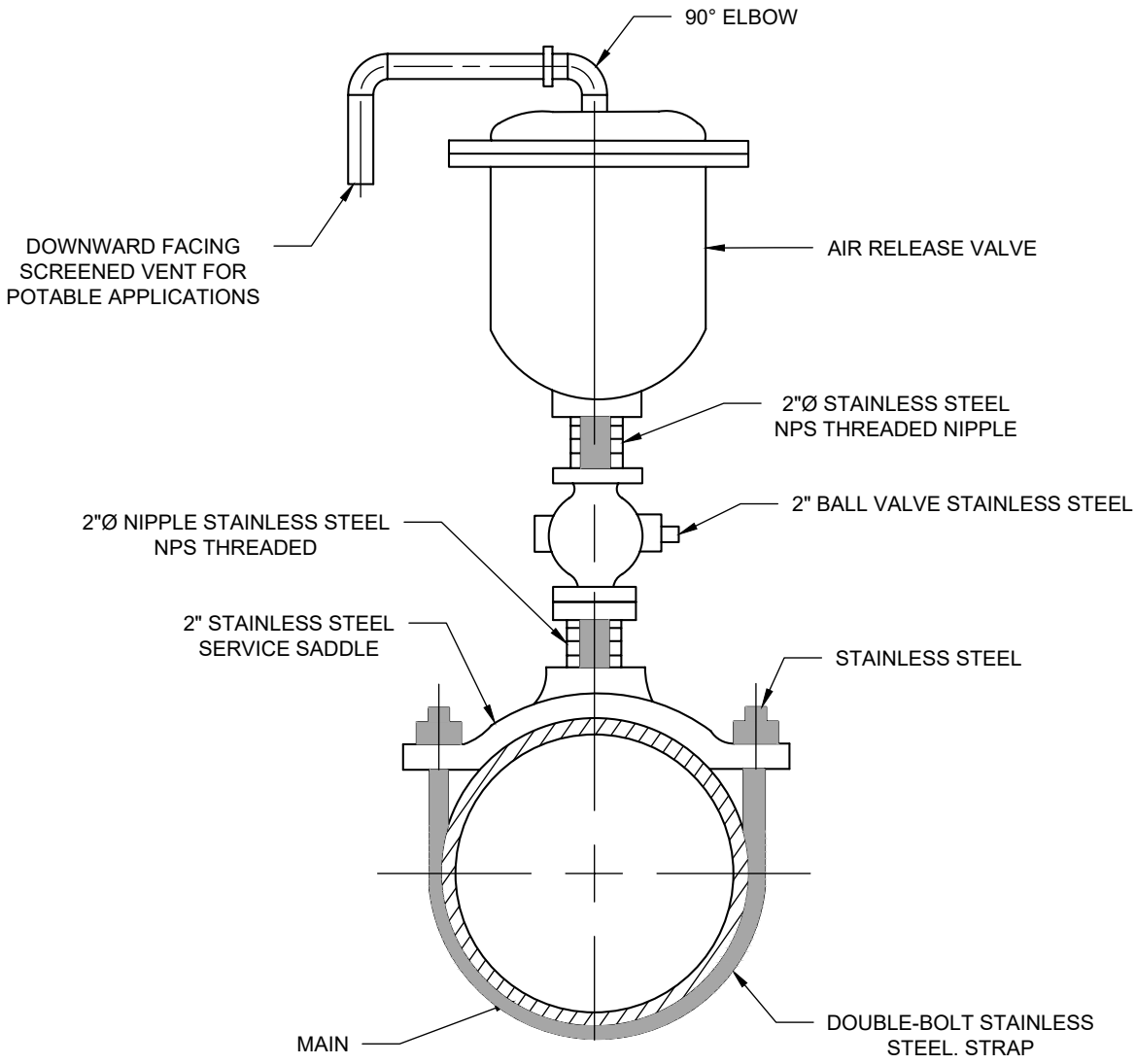
ELEVATION

WATER MAIN/WASTEWATER MAIN

NOTES:

1. AIR RELEASE VALVE IS TO BE LOCATED INSIDE A CONCRETE MANHOLE WITH HINGED LID, PER IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.
2. MANHOLES FOR SEWER FORCE MAINS SHALL BE COATED. ALL COATING MATERIAL SHALL BE PER IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.
3. SEE DRAWING M-9, AIR RELEASE VALVE MANHOLE ABOVE GROUND.
4. SEE DRAWING M-14, TRACE WIRE DETAILS.
5. WASTEWATER LIDS SHALL BE VENTED.
6. SEAL SHALL BE USED AT ALL JOINTS. (SEE DRAWING S-5, MANHOLE NOTES).
7. OPENING AT BOTH SIDES OF THE MANHOLE TO BE SEALED WITH MATERIALS PER IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.
8. COMPOSITE BOXES (TIER 22) MAY BE USED IN NON-TRAFFIC AREAS.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	AIR RELEASE VALVE MANHOLE BELOW GROUND 2024	DRAWING NO. M-8



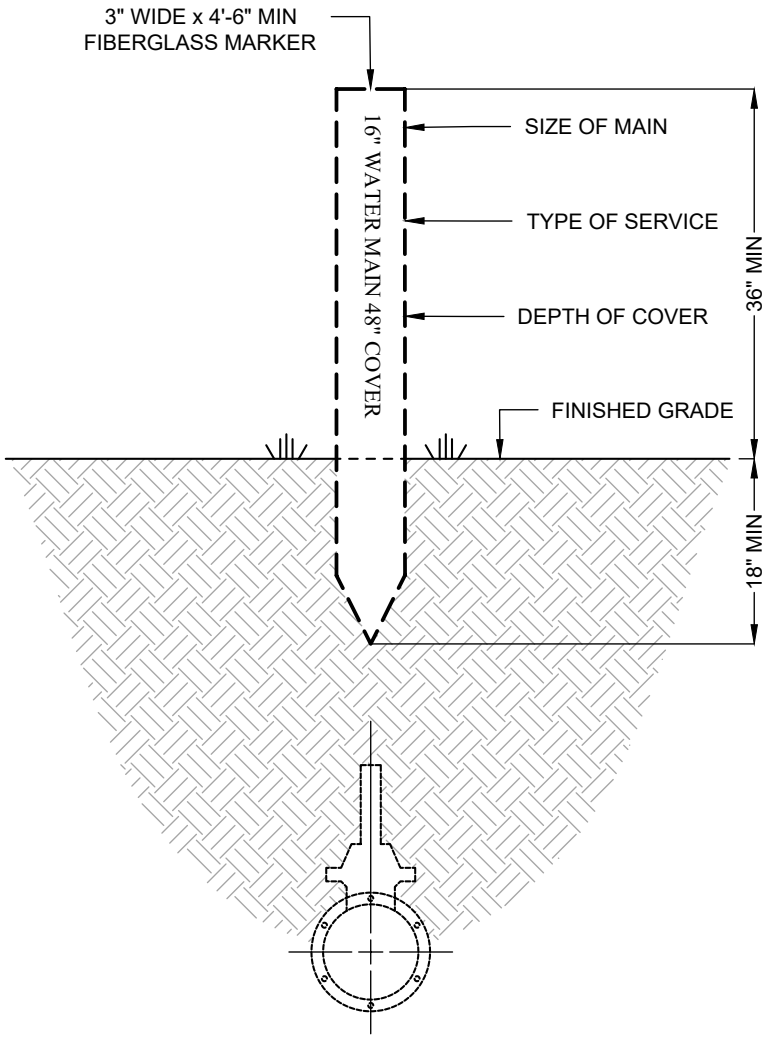
ELEVATION

WATER MAIN/WASTEWATER MAIN

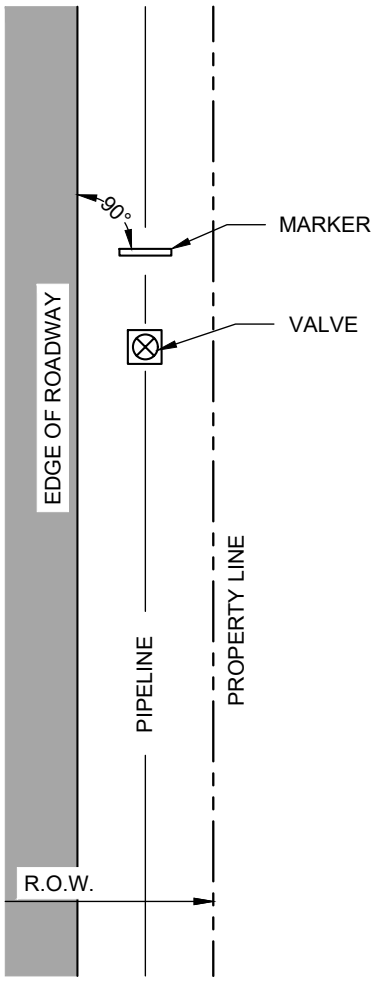
NOTES:

1. AUTOMATIC AIR RELEASE VALVE TO BE LOCATED ONLY WHERE CONDITIONS MAKE IT INACCESSIBLE OR AS REQUIRED BY THE IRCDUS.
2. AIR RELEASE RISERS TO BE IN A VERTICAL PLUMB POSITION AND PLACED AT SUMMITS IN THE SYSTEM. FOR DIRECTIONAL BORES, AIR RELEASE VALVES ARE TO BE PLACED ON EITHER SIDE OF THE CROSSING.
3. SEE DRAWING M-14, TRACE WIRE DETAILS.
4. FOR AIR RELEASE VALVES LARGER THAN 2" CONSULT IRCDUS.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	AIR RELEASE VALVE MANHOLE ABOVE GROUND 2024	DRAWING NO. M-9



ELEVATION



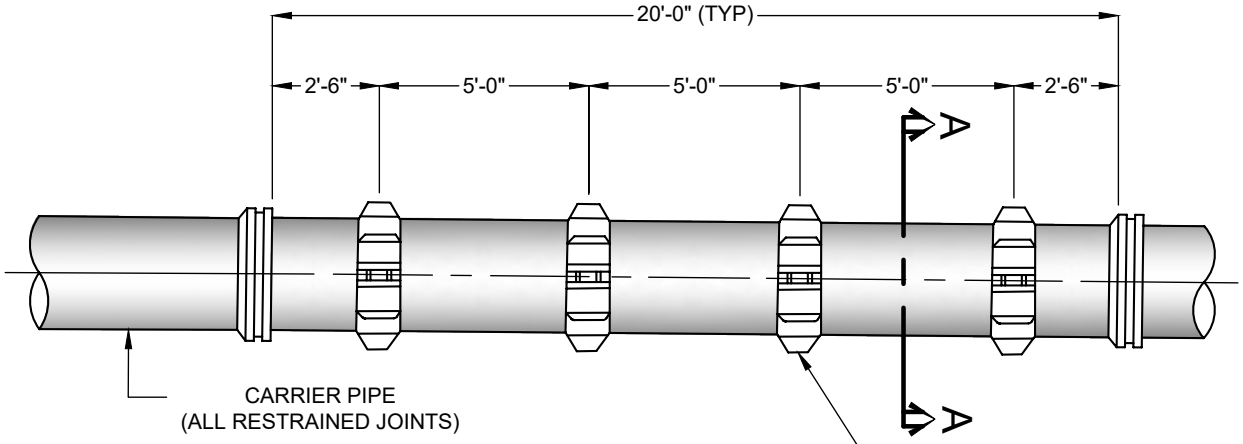
PLAN

NOTES:

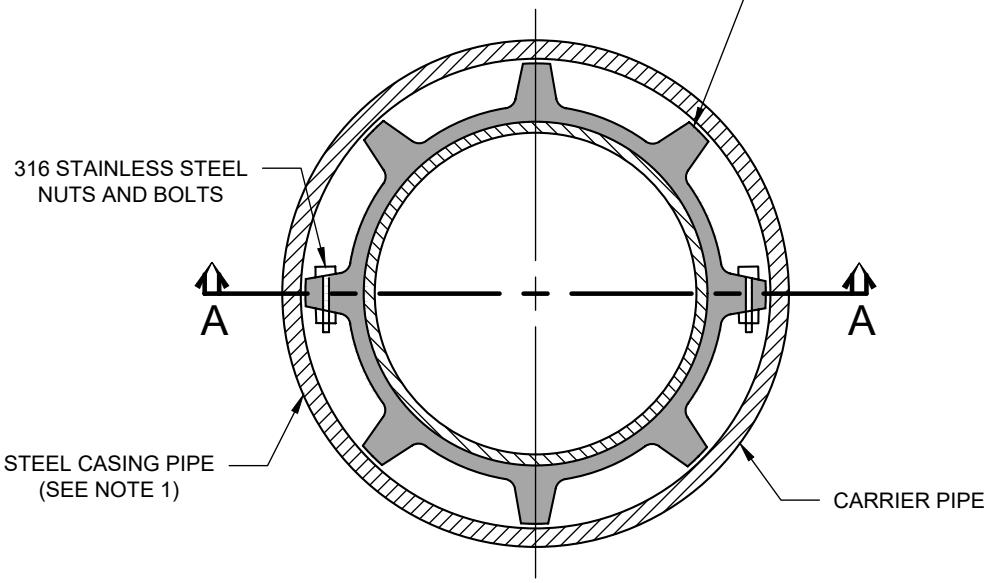
1. MARKER TO BE PLACED PERPENDICULAR, AT A 90° ANGLE, TO ROADWAY AND DIRECTLY OVER PIPE, ADJACENT TO VALVE, AS DIRECTED BY IRCDUS.
2. MARKER TO BE USED AT ALL CANAL CROSSINGS AND AS DIRECTED BY IRCDUS.
3. MARKER TO BE PLACED ADJACENT TO WATER MAIN VALVES, FORCE MAIN VALVES, RE-USE MAIN VALVES, AND BRINE VALVES AS DIRECTED BY IRCDUS.
4. ALL MATERIAL TO BE PER IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.
5. MARKERS SHALL BE PAINTED:
   BLUE - WATER
   RED - FIRE HYDRANTS
   GREEN - FORCE MAINS
   PURPLE - REUSE MAINS
   BROWN - BRINE

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	VALVE MARKER	DRAWING NO. M-10

2024



SIDE VIEW



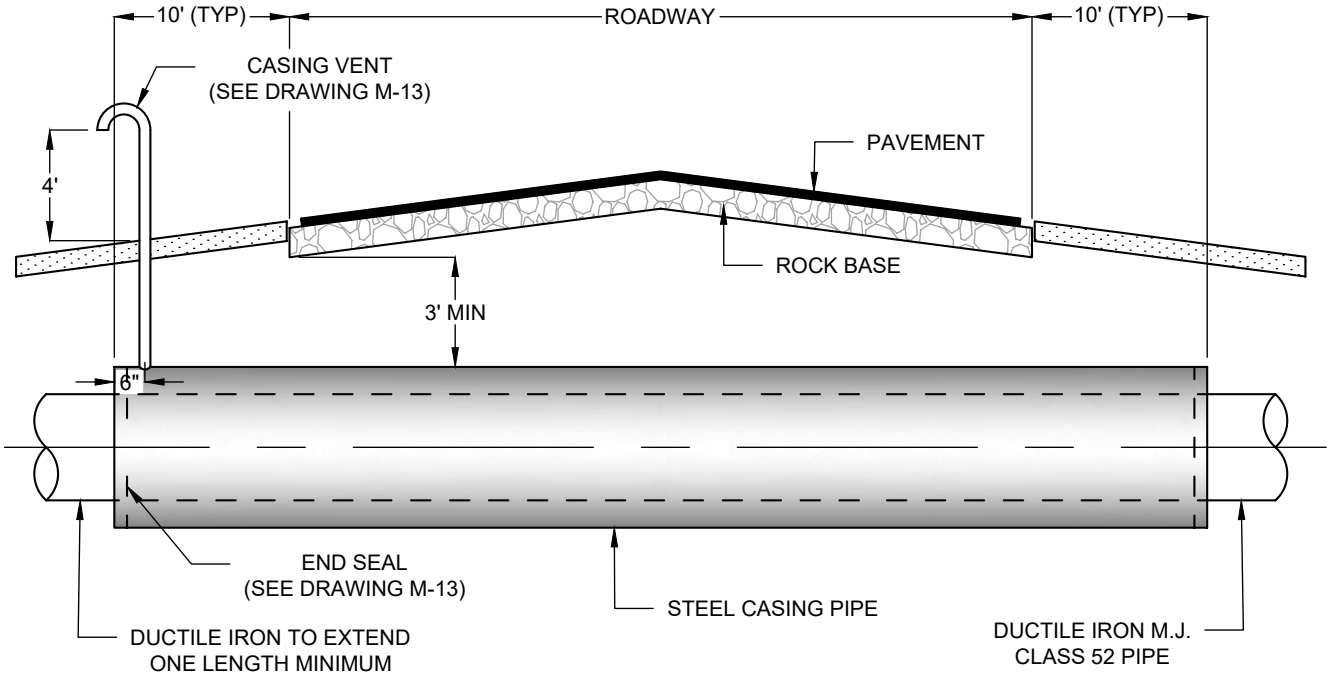
DETAIL

SECTION A-A

NOTES:

1. STEEL CASING PIPE SHALL MEET A.S.T.M. A-139, GRADE B REQUIREMENTS WITH A MINIMUM YIELD STRENGTH OF 35,000 PS.
2. EACH LENGTH OF STEEL CASING PIPE SHALL BE FIELD WELDED TO PROVIDE WATER PROOF JOINTS.
3. INSULATORS OR SPACERS ARE TO BE PER IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	JACK & BORE DETAIL CASING INSULATOR / SPACER 2024	DRAWING NO. M-11



ELEVATION

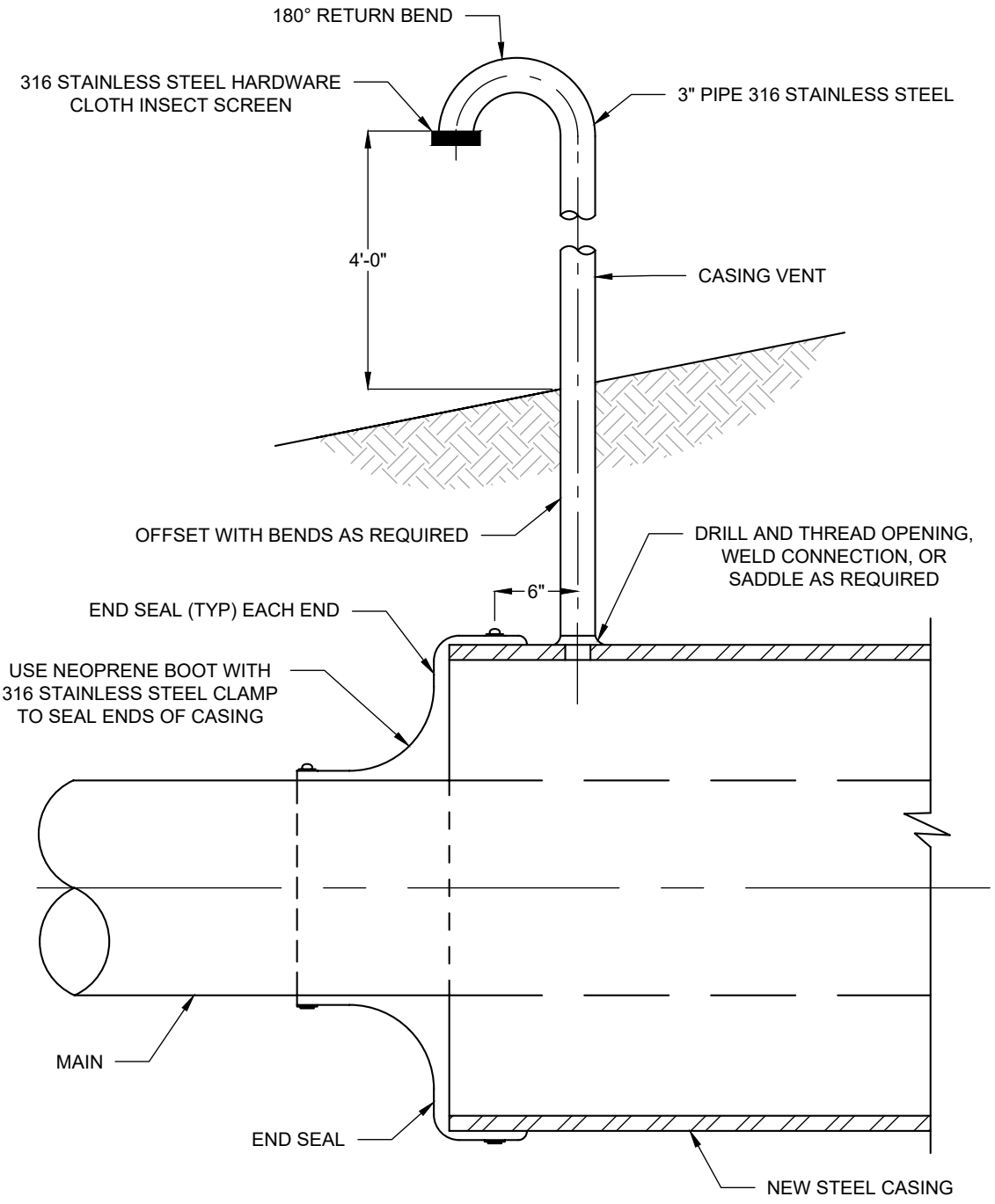
CARRIER PIPE SIZE	STEEL CASING	MINIMUM WALL THICKNESS
4"	12"	0.188
6"	14"	0.250
8"	16"	0.250
10"	20"	0.250
12"	24"	0.250
16"	32"	0.375
20"	40"	0.375
24"	48"	0.500
30"	60"	0.625
36"	72"	0.625
42"	84"	0.625
48"	94"	0.625

NOTES:

1. IF RETAINER GLANDS ARE REQUIRED, THE CASING SIZE SHALL BE ADJUSTED ACCORDINGLY.
2. INSTALL CASINGS BY DRY-BORING THROUGH THE CASING, WHILE SIMULTANEOUSLY JACKING THE CASING.
3. MAINTAIN THE JACKING AND RECEIVING PITS IN A DRY CONDITION BY USE OF PUMPS OR OTHER METHODS APPROVED BY IRCDUS.
4. IF NECESSARY, PROVIDE SHEETING AND SHORING FOR THE JACKING AND RECEIVING IN ACCORDANCE WITH OSHA REGULATIONS.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	CASING INSTALLATION DETAILS	DRAWING NO. M-12

2024

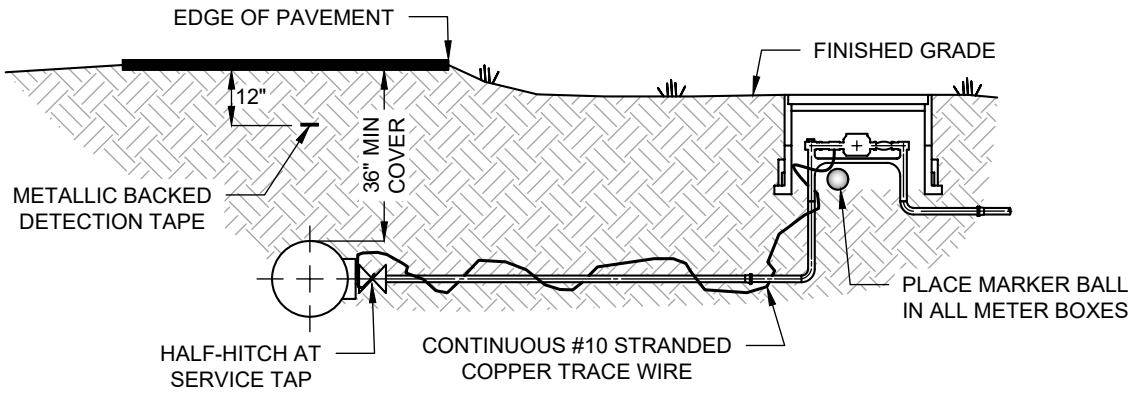


ELEVATION

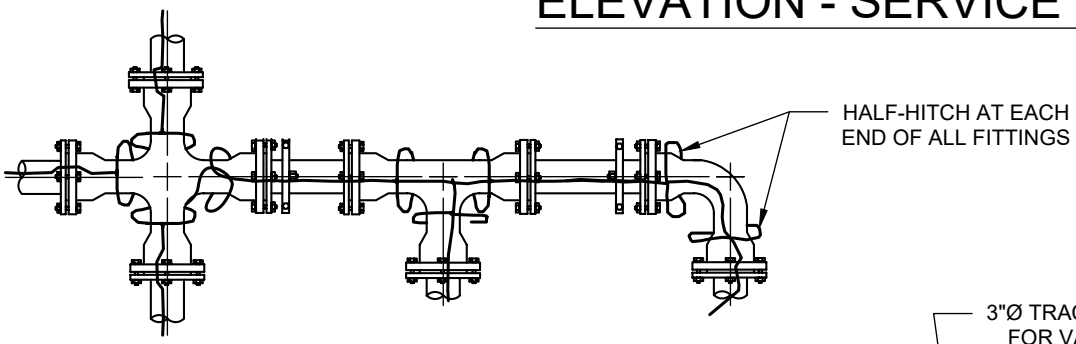
NOTES:

1. LOCATION OF CASING VENTS TO BE DETERMINED BY THE IRCDUS ENGINEER IN THE FIELD. CONTRACTOR TO PROVIDE FITTINGS AS REQUIRED.
2. NEOPRENE END SEAL TO BE PER IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	JACK & BORE CASING VENT & END SEAL DETAILS 2024	DRAWING NO. M-13

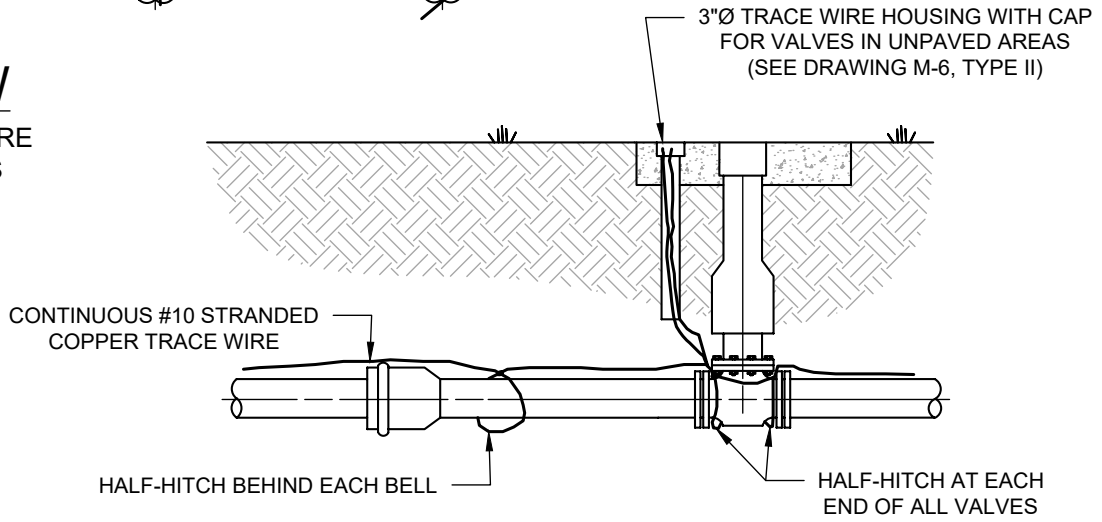


ELEVATION - SERVICE DETAIL



PLAN VIEW

SHOWING TRACE WIRE AROUND FITTINGS



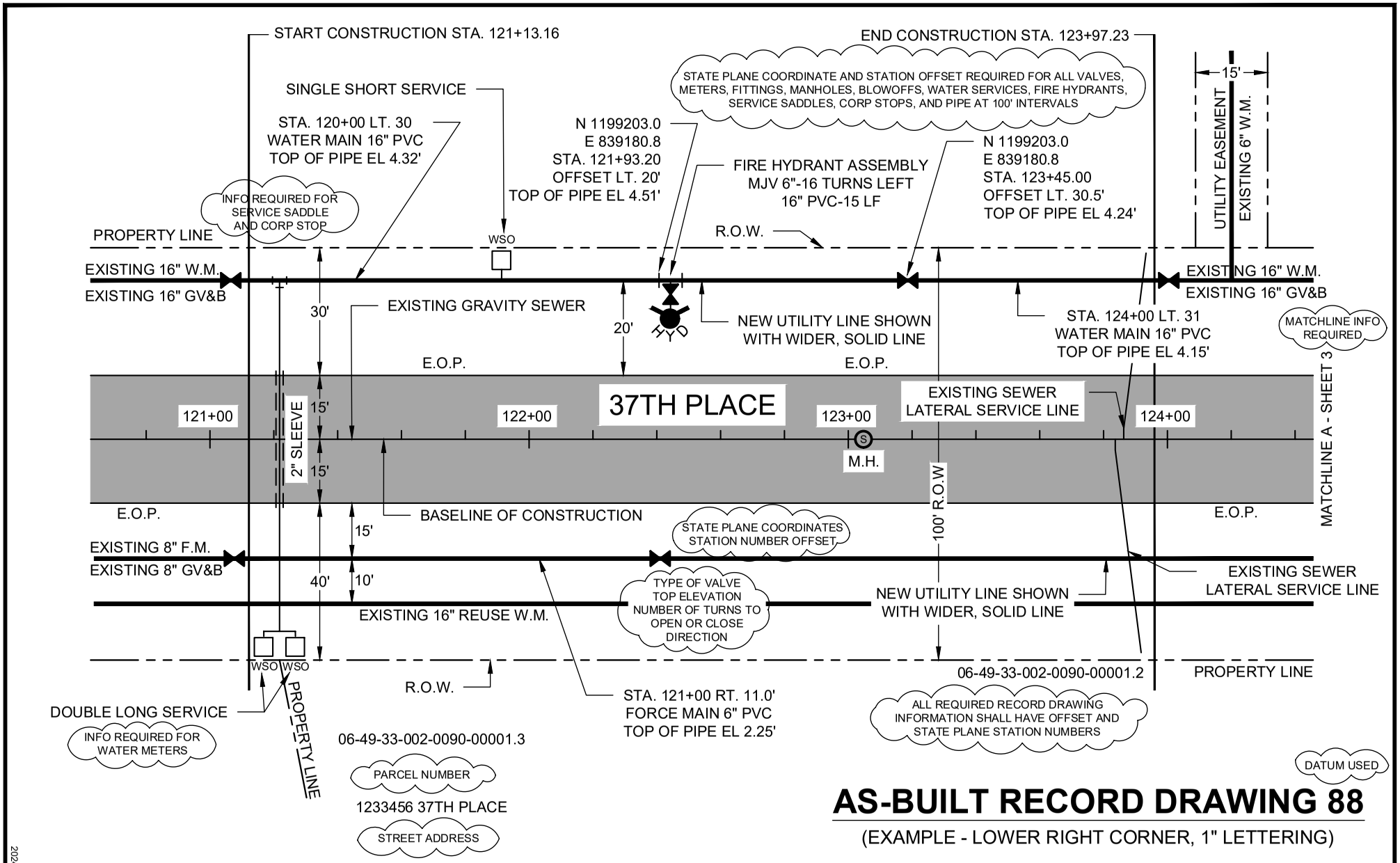
ELEVATION - VALVE BOX DETAIL

NOTES:

1. TRACE WIRE IS REQUIRED ON ALL PIPES REGARDLESS OF MATERIAL.
2. INCLUDE ALL COST OF MATERIAL AND LABOR TO INSTALL TRACE WIRE IN PRICE OF PIPE.
3. CONTRACTOR IS RESPONSIBLE FOR CONTINUITY THROUGHOUT ENTIRE PROJECT OF ALL TRACE WIRE.
4. ALL CONNECTIONS SHALL BE MADE WITH DIRECT BURY CONNECTORS.
5. ALL MATERIALS ARE TO BE PER IRCDUS APPROVED MANUFACTURERS' PRODUCT LIST.
6. COLOR OF TRACE WIRE SHALL BE: BLUE FOR WATER, GREEN FOR SEWER, AND PURPLE FOR RECLAIMED WATER.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES	TRACE WIRE DETAILS	DRAWING NO. M-14

2024



AS-BUILT RECORD DRAWING 88

(EXAMPLE - LOWER RIGHT CORNER, 1" LETTERING)

2024

DRAWING NO. M-15

This represents the basic style and format for As-Built Record Drawings to be received by the Indian River County Department of Utility Services. Refer to drawings M-16 and M-17 for the minimum information requirements to be provided by the engineer of record to IRCDUS.

INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICES

AS-BUILT RECORD DRAWING (EXAMPLE)

NOTES:

1. ALL AS-BUILT RECORD DRAWINGS SHALL BE PREPARED IN ACCORDANCE WITH THE "STANDARDS OF PRACTICE" SET FORTH IN CHAPTER 5J-17, FLORIDA ADMINISTRATION CODE PURSUANT TO SECTION 472.027, FLORIDA STATUTES.

2. ALL AS-BUILT RECORD DRAWINGS SHALL BE CERTIFIED BY THE ENGINEER OR SURVEYOR.

3. ALL AS-BUILT RECORD DRAWINGS SHALL CLEARLY DEPICT UTILITY LINES THAT WERE CONSTRUCTED ALONG THEIR RESPECTIVE EASEMENT (IF REQUIRED). AS-BUILT RECORD DRAWINGS WILL NOT BE ACCEPTED UNLESS THE VERBIAGE "PROPOSED" AND/OR "TO BE CONSTRUCTED" HAVE BEEN DELETED ON THE DRAWING. AS-BUILT RECORD DRAWINGS WITH "PROPOSED" OR "TO BE CONSTRUCTED" TERMINOLOGY WILL NOT BE ACCEPTED.

4. ALL AS-BUILT RECORD DRAWINGS SHALL BE IN FLORIDA STATE PLANE COORDINATES. STATE PLANE COORDINATES SHALL BE BASED ON THE FLORIDA STATE PLANE HORIZONTAL DATA (EAST ZONE); OR FLORIDA HIGH PRECISION GEODETIC NETWORK (SUPERSTATION) AND NAD 83/1999 - FINAL ADJUSTMENT, OR THE MOST CURRENT DATUM ADOPTED BY INDIAN RIVER COUNTY.

5. ALL ELEVATIONS SHOWN SHALL BE BASED ON 1988 NAVD (NORTH AMERICAN VERTICAL DATUM).

6. ALL AS-BUILT RECORD DRAWINGS SHALL BE TIED TO A MINIMUM OF ONE (1) PERMANENT REFERENCE MONUMENT (P.R.M.) AT THE END OF EACH PROJECT. ONE P.R.M. SHALL BE TIED TO A MINIMUM OF ONE (1) SECTION CORNER OR ONE-QUARTER (1/4) SECTION CORNER WHICHEVER IS CLOSEST TO THE PROJECT. STATE PLANE COORDINATES SHALL BE PHYSICALLY SHOWN ON THE DRAWING NEXT TO THE P.R.M. USED.

7. HORIZONTAL CONTROL MONUMENTATION FOR UTILITY LINES SHALL BE A MINIMUM OF TWO (2) POINTS AT A MAXIMUM OF 1,400' BETWEEN POINTS AND SHOWN ON ALL PLANS.

8. VERTICAL CONTROL (WHEN REQUIRED) FOR LINEAR UTILITY LINES, SUCH AS WATER AND SEWER, SHALL HAVE A MAXIMUM OF 1,100' BETWEEN EXISTING CONSTRUCTION OR ESTABLISHED BENCHMARKS.

9. FLORIDA STATE PLANE HORIZONTAL DATA (I.E.: NORTHING AND EASTING) AND STATION AND OFF-SET SHALL BE TIED TO VALVES, METERS, FITTINGS, MANHOLES, BLOW-OFFS, WATER SERVICES, FIRE HYDRANTS, SERVICE SADDLES, CORP STOPS, AND PIPE (PIPE AT 200' INTERVALS).

10. ALL NEW UTILITY CONSTRUCTION LINES ON ALL AS-BUILT RECORD DRAWINGS SHALL BE SHOWN WITH A WIDER, SOLID LINE. EXISTING UTILITY LINES SHALL BE SHOWN WITH A THINNER, DASHED LINE.

11. ALL NEWLY CONSTRUCTED VALVES SHALL BE CLEARLY IDENTIFIED BY SIZE, TYPE, TOP ELEVATION AND DIRECTION/NUMBER OF TURNS TO OPEN.

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NOTES:

12. ALL NEW UTILITY CONSTRUCTION LOCATED WITHIN THE RIGHTS-OF-WAY, EASEMENTS AND ALIKE SHALL BE TIED TO THE RESPECTIVE RIGHTS-OF-WAY, EASEMENTS, ETC. EVERY 1,000' AND CHANGE OF DIRECTION.

13. CONSTRUCTION BASELINE SHALL BE LOCATED ON THE CENTERLINE OF THE ROADWAY, UNLESS CONDITIONS WARRANT AND ARE APPROVED BY IRCDUS. BASELINE STATIONING SHALL BE EVERY 100', CONTROL POINTS SET AT EVERY 500' AND ANGLE CHANGE OF DIRECTION.

14. TOP OF PIPE ELEVATIONS AND STATIONING TO BE TYPED, LISTED, SEALED, AND SUBMITTED BY THE ENGINEER FOR LOCATING THE AIR RELEASE VALVES AS CONSTRUCTION PROCEEDS.

15. UTILITY CONFLICTS SHALL BE CALLED OUT WITH TOP AND BOTTOM ELEVATION OF THE UTILITY, TOP AND BOTTOM ELEVATION OF THE CONFLICTING PIPE, AND VERTICAL SEPARATION (INCHES).

16. SHOW PUMP STATION POWER SUPPLY FROM FP&L POWER POLE OR TRANSFORMER TO THE PUMP STATION ELECTRIC PANEL.

17. ALL AS-BUILT RECORD DRAWINGS SHALL BE COMPLETE AND APPROVED BEFORE COMMENCEMENT OF UTILITIES FIELD TESTING.

18. PRIOR TO SUBMITTING THE ELECTRONIC COPY, ONE (1) DRAFT HARD COPY OF EACH AS-BUILT SHALL BE SUBMITTED TO UTILITIES FOR REVIEW AND APPROVAL.

19. FOLLOWING STAFF APPROVAL OF THE DRAFT, THE AS-BUILTS SHALL BE SUBMITTED TO UTILITIES ON A CD IN PORTABLE DOCUMENT FORMAT (.pdf) WITH ENGINEER'S OR SURVEYOR'S ELECTRONIC SEAL, AND IN AUTOCAD (.dwg) FORMAT. THE CD SHALL BE ACCOMPANIED BY ONE (1) 24”x36” SIGNED AND SEALED HARD COPY.

20. ALL RECORD DRAWINGS SHALL STATE IN 1/2" LETTERING "RECORD DRAWING" AND THE DATUM USED (1/2" LETTERING) IN THE LOWER RIGHT-HAND SIDE OF THE ORIGINAL DRAWING OR COPY ALONG WITH THE AS-BUILT DATE. ALL RECORD DRAWINGS SHALL BE IN A MINIMUM SCALE OF 1"=40'. MINIMUM TEXT SHALL BE 1/8".

21. THE AUTOCAD (.dwg) VERSION OF RECORD DRAWINGS SHALL BE FORMATTED WITH ALL NEWLY CONSTRUCTED IRCDUS UTILITIES IN THE FOLLOWING LAYER STATES:

AUTOCAD LAYER NAME	DATA TO BE CONTAINED IN LAYER
WATER MAIN	WATER MAIN ONLY
WATER FITTINGS	WATER FITTINGS, METERS, VALVES, SERVICE LATERALS, ETC.
GRAVITY SEWER	GRAVITY SEWER MAIN ONLY
SEWER FORCE MAINS	SEWER FORCE MAIN ONLY
SEWER FITTINGS	SEWER FITTINGS, MANHOLES, VALVES, SERVICE LATERALS, ETC.
R/O CONCENTRATE	MAINS, FITTINGS, VALVES, ETC.
RECLAIMED WATER	MAINS, FITTINGS, VALVES, ETC.

NOTES:

1. ALL INCOMING ROUTE SURVEYS THAT ARE REQUIRED FOR ENGINEERING DESIGN USE SHALL BE RECEIVED ON A CD, AS AN ELECTRONIC COPY, AUTOCAD 2015 FORMAT, OR LATEST VERSION. ELECTRONIC COPY OF ROUTE SURVEY SHALL NOT CONTAIN EXCESSIVE AUTOCAD LAYER STATES OR LAYERS WITH INFORMATION THAT DOES NOT PERTAIN TO THE ROUTE SURVEY REQUESTED. ALONG WITH AN ELECTRONIC VERSION, (3) THREE (24"x36") SIGNED AND SEALED COPIES OF ROUTE SURVEYS SHALL BE SUBMITTED AND SHALL BE IN A MINIMUM SCALE OF 1"=40'.
2. ALL SURVEYS THAT ARE REQUIRED FOR ENGINEERING DESIGN USE, AND ARE LOCATED WITHIN A DISTANCE OF ONE (1) MILE FROM ANY INDIAN RIVER COUNTY GLOBAL POSITIONING SYSTEM (G.P.S.) CONTROL PROJECT MONUMENTS, SHALL BE TIED INTO THE GPS MONUMENT FROM ONE (1) PERMANENT REFERENCE POINT OR THE SUBDIVISION CORNER THAT IS ALONG THE SURVEY ROUTE AND SHALL THEN BE TIED TO THE SURVEY BASE LINE.
3. SHOW EXISTING RIGHT-OF-WAY LIMITS AND/OR EASEMENTS WITHIN THE LIMITS OF CONSTRUCTION.
4. SHOW SURVEY BASELINE STATIONING EVERY 100', CONTROL POINTS SET EVERY 500', AND AT ANGLE CHANGE OF DIRECTION.
5. SHOW CROSS SECTION SPOT ELEVATIONS AT GRADE EVERY 100' FOR GRAVITY SEWER LINE CONSTRUCTION AND 100' FOR WATER LINE AND FORCE MAIN CONSTRUCTION. ELEVATIONS THAT REFLECT ANY SIGNIFICANT CHANGE IN GRADE BETWEEN THE PREVIOUSLY STATED FOOTAGE SHALL BE SHOWN ON PLANS.
6. SHOW EXISTING PARCELS, TRACTS, AND LOT CORNER LOCATIONS SHOWN WITH FRONT FOOTAGE DIMENSIONS PER PLAT WHEN PLATTED. IF CONSTRUCTION PROJECT IS ALONG BACK OF LOTS, THEN SHOW BACK LOT DIMENSIONS.
7. SHOW EXISTING ROADWAY EDGE OF PAVEMENT OR EDGE OF DIRT ROAD.
8. SHOW EXISTING UTILITIES AS LOCATED IN FIELD (WATER, SEWER, TELEPHONE, ELECTRIC, CABLE TV, STREET LIGHTS, ETC.) (NOTE: *SUNSHINE 811* TO BE CONTACTED BY SURVEYING FIRM PRIOR TO SURVEY LOCATE; WITH THE INTENT OF COUNTY EXCAVATION).
9. SHOW EXISTING UTILITIES AS ASSOCIATED WITH NOTE 6 ABOVE (EXAMPLE: VALVES, METERS, MANHOLES, ETC.)
10. SHOW EXISTING CURBS, SIDEWALKS, DRIVEWAY WIDTHS AND TYPES.
11. SHOW EXISTING DRAINAGE PIPE CROSSINGS, CATCH BASINS, MANHOLES, AND DRIVEWAY CULVERTS (TYPE, SIZES, AND INVERT ELEVATIONS).
12. SHOW EXISTING SWALES AND/OR DITCHES. TAKE CROSS SECTION SPOT ELEVATIONS EVERY 100' AT TOP AND BOTTOM IF WITHIN AREA OF CONSTRUCTION.

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NOTES:

13. SHOW EXISTING FENCES.
14. SHOW EXISTING TREES AND/OR SHRUBBERY.
15. ALL OTHER NON-MOVABLE ITEMS SUCH AS MAILBOXES, FLAG POLES, ETC.
16. ALL STREET NAMES. STREET NAMES SHALL APPEAR ON EVERY PRINTABLE SHEET.
17. ALL COMMERCIAL AND SINGLE/MULTI FAMILY RESIDENCE MUST HAVE PARCEL I.D. AND STREET ADDRESS INDICATED ON THE PLAN.
18. ALL FIRE HYDRANTS AND FIRE HYDRANT VALVES SHALL BE CLEARLY IDENTIFIED.
19. ALL UTILITY VALVES SHALL BE CLEARLY IDENTIFIED.
20. ROUTE SURVEYS PERFORMED FOR WATER ASSESSMENT PROJECTS MAY REQUIRE RESIDENTIAL WELL LOCATIONS.

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III – SPECIFICATIONS

Section 1

Water Mains - Ductile Iron Pipe (DIP) and Fittings

Section 1

Water Mains – Ductile Iron Pipes (DIP) and Fittings

1.01 General

A. DIP shall be allowed for use as water pipe where compatible with the specific conditions of the project. The use of material other than ductile iron may be required by IRCDUS during construction permit review or by IRCDUS field personnel during construction, if it is determined that DIP is unsuitable for the particular application.

B. All DIP shall be manufactured in accordance with AWWA Specification C151 (A21.51), or latest revision and shall be pressure Class 300 or 350 minimum as depicted on Table 1.1 on page 1-2. All DIP crossings under roadways and other traffic areas shall be pressure Class 350 minimum.

C. Unless specifically indicated otherwise, underground piping shall be manufactured restrained bell and spigot and above ground piping shall be flanged.

D. Cutting of DIP shall be by sawing only.

1.02 Pipe

A. DIP shall be bell and spigot cast in accordance with AWWA Specification C151 (ANSI A21.51), or latest revision. Cast ductile iron shall have a minimum tensile strength of 60,000 psi with a minimum yield strength of 42,000 psi. Pipe wall thicknesses shall be computed in accordance with AWWA Specification C150 (ANSI A21.51), or latest revision, using the physical characteristics cited above with a minimum working pressure of 300 psi and a Laying Condition “Type 2.” Unless otherwise indicated or specified herein, the pipe shall have the minimum wall thickness according to class designation for diameters shown. All pipe shall be given a minimum factory hydrostatic test of 500 psi.

Table 1.1
Pressure Class 300 and 350

Nominal Size Diameter (Inches)	Actual Outside Diameter (Inches)	300 psi Wall Thickness (Inches)	350 psi Wall Thickness (Inches)
3	3.96	---	0.25
4	4.80	---	0.25
6	6.90	---	0.25
8	9.05	---	0.25
10	11.10	---	0.26
12	13.20	---	0.28
14	15.30	0.30	0.31
16	17.40	0.32	0.34
18	19.50	0.34	0.36
20	21.60	0.36	0.38
24	25.80	0.40	0.43
30	32.00	0.45	0.49
36	38.30	0.51	0.56
42	44.50	0.52	0.63
48	50.80	0.64	0.70
54	57.56	0.72	0.79
60	61.61	0.76	0.83
64	65.67	0.80	0.87

1.03 Fittings

A. All underground fittings shall be either push-on, restrained, or mechanical joint. Mechanical joints shall conform to AWWA Specification C110 (ANSI 21.10) or C153 (ANSI 21.53), latest revisions. All aboveground fittings shall be flanged joint.

B. The pressure rating shall be 350 psi (Class 350).

C. Joint restraints, when required, shall be in accordance with IRCDUS Approved Manufacturers' Products List or an approved equal**.**

D. All fittings shall be lined with the same material as specified for the pipe as per paragraph 1.04.

1.04 Lining and Coating

A. Unless otherwise indicated, all DIP shall be factory lined and coated.

B. All pipe shall be cement mortar lined and seal coated in accordance with AWWA Standard C104 (ANSI A21.4), or latest revision unless double lining is required by IRCDUS.

C. Unless specified otherwise, all ductile iron pipe shall be bituminous coated outside to a dry film thickness of at least 1 mil.

D. Anywhere that the coating is removed purposely or accidentally, the area shall be cleaned of any rust, grease, and dirt and re-coated to a minimum dry film as specified for the individual piece.

E. If and where directed by IRCDUS's Engineer, a polyethylene encasement shall be provided around pipe, fittings, and valves. The material, installation, and workmanship shall conform to applicable sections of AWWA C105 (ANSI A21.5), or latest revision. Installation methods A or B shall be employed using flat tube polyethylene. The Contractor shall make provisions to keep the polyethylene from direct exposure to sunlight prior to installation. Backfilling following installation shall be completed without delay to avoid exposure to sunlight.

F. All exposed (i.e. aerial crossings) DIP water mains shall be primed and painted "blue" as per IRCDUS Approved Manufacturers' Products List or equal.

1.05 Bell and Spigot Connections

A. Joints in bell and spigot pipe shall be push-on, mechanical, or restrained joints in accordance with AWWA Standard C111 (ANSI 21.11), latest revision. Pipe restraints shall also be in accordance with IRCDUS Standards or as directed by IRCDUS's Engineer.

1.06 Flanged Connections

A. All flanged pipe barrels shall comply with the physical and chemical requirements as set forth in the Handbook of DIP of the Cast Iron Pipe Research Association, latest revisions. Flanges shall be in accordance with ANSI Specification B16.1 for Class 125 flanges. Bolts shall comply with ANSI Specification B18.2.

B. Flanged pipe shall be faced and drilled to the American Standard Drilling, unless special drilling is called for or required. Where tap or stud bolts are required, flanges shall be tapped. Flanges shall be accurately faced and drilled smooth and true, at right angles to the pipe axis and shall be covered with zinc dust and tallow or a rust preventive compound immediately after facing and drilling.

C. Flanged pipe with screwed-on flanges shall be furnished with long hubs, and the flanges shall be screwed on the threaded end of the pipe in the shop, and the face of the flange and end of pipe refaced together. There shall be no leakage through the pipe threads and the flanges shall be designed to prevent corrosion of the threads from outside.

D. Flanged joints shall be made with bolts or stud bolts and nuts. Bolts, stud bolts, and nuts shall conform to American Standard heavy dimensions, semi-finished with square or hexagonal heads and cold punched hexagonal nuts, meeting the requirements of ASTM Designation A-316SS. Bolt sizes shall be American Standard for the flanges specified, and bolts and nuts shall have good, true threads.

E. Gaskets shall be in accordance with AWWA Standard C115 (ANSI A21.15), latest revision.

1.07 Submittals

A. Before starting fabrication of the DIP and fittings, the Contractor shall submit one set of complete working drawings (shop drawings) to the Engineer of Record and IRCDUS for approval. Such drawings shall show the pipe, fittings, valves, expansion joints, hangers, supports, and other appurtenances to be installed. Where special fittings are required, they shall be shown in large detail with all the necessary dimensions. The Engineer of Record shall review the drawings and notify IRCDUS of the drawings approved and not approved. IRCDUS will also review the drawings and coordinate approvals and disapprovals with the Engineer of Record and Contractor. The drawings submitted shall show flanged jointed sections placed so as to be removable without disturbance to the main pipe sections.

1.08 Marking

A. Number 10 stranded conductor copper trace wire shall be spiral wrapped or affixed to the top of the pipe. See Trace Wire Details Drawing M-14 for specifications regarding installation.

B. Trace wire is required over or around all pipes unless otherwise approved by IRCDUS.

C. Location tape is required over all pipes. Tape is to be installed 12” below proposed grade and additional tape shall be adhered directly on top of the pipe if required by IRCDUS engineering.

1.09 Installation

A. Handling and Protection of Pipe: Unless otherwise noted on the drawings or in other sections of this specification, the pipe shall be handled and installed in strict accordance with the manufacturers’ instructions and with the applicable provisions of AWWA C600, latest revision. If a conflict exists between the manufacturers’ instructions and the AWWA Standards, the manufacturers’ instructions shall govern. The Contractor shall use every precaution during construction to protect the pipe against the entry of non-potable water, dirt, wood, small animals, and any other foreign material that would hinder the operation of the pipeline.

Where the groundwater elevation is above the bottom of the trench, the Contractor shall provide suitable dewatering equipment. All piping shall be placed in a dry trench, unless otherwise approved by IRCDUS.

B. Depth of Cover and Pipe Elevation: Unless otherwise shown on the drawings, or otherwise approved by IRCDUS, all pipe shall have a minimum cover of 36 inches. Contractor shall determine top of pipe elevation and top of ground elevation for every two joints of pipe installed using a level. Pipe must have the minimum cover described above and must be within +/- 0.2 feet of the top of pipe elevation indicated on the drawings. Installed pipe, which does not meet these requirements, shall be reinstalled until it does meet these requirements. Contractor shall record top of pipe and top of ground elevations and the locations of where these elevations were determined and submit this information to IRCDUS. IRCDUS reserves the right to have Contractor excavate and check top of pipe and top of ground elevations to see if they conform to the aforementioned requirements, at no cost to IRCDUS.

END OF SECTION

Section 2

Water Mains

Polyvinyl Chloride (PVC) Pipe and Fittings

Section 2

Water Mains
Polyvinyl Chloride Pipe (PVC) and Fittings

2.01 General

A. PVC pipe shall be allowed for use as potable water pipe where compatible with the specific conditions of the project. IRCDUS may require the use of material other than PVC during construction permit review or by IRCDUS field personnel during construction, if it is determined that PVC pipe is unsuitable for the particular application**.**

B. The pipe shall be identified by its nominal pipe size, plastic pipe material code, SDR class, pressure rating, ASTM Designation, manufacturers' name, production code, and the National Sanitation Foundation seal for potable water (NSF-pw).

2.02 PVC Pipe 3 Inches in Diameter and Smaller

A. PVC pipe 3 inches and smaller in diameter intended for conveying potable water shall conform to ASTM D2241, latest revision.

B. Pipe shall be Iron Pipe Size (IPS), and SDR 21 with a pressure rating of 200 psi.

C. Joint design tested to the requirements of ASTM D3139.

D. Gaskets shall conform to ASTM F477 and D1869.

E. No solvent weld joints are permitted.

F. The pipe shall be "blue" in color.

G. PVC pipe shall be in accordance with IRCDUS Approved Manufacturers' Products List or equal.

2.03 PVC Pipe 4 Inches in Diameter and Larger

A. PVC pipe intended for conveying or transmitting potable water shall conform to AWWA Standard Specifications C900 (or latest revision) and ASTM D1784 Cell Class 12454.

B. Pipe shall be Ductile Iron Pipe Size (DIPS), and SDR 18 with a pressure rating of 235 psi.

C. Joint design tested to the requirements of ASTM D3139. Gaskets shall conform to ASTM F477.

D. Gasket material shall conform to ASTM F477.

E. The pipe shall be “blue” in color.

F. The pipe shall be identified by its nominal pipe size, plastic pipe material code, DR class, pressure rating, ASTM Designation, manufacturers’ name, code, and the National Sanitation Foundation seal for potable water (NSF-pw).

G. PVC pipe shall be in accordance with IRCDUS Approved Manufacturers’ Products List or equal.

2.04 Joints

A. Joints for PVC pipe shall be bell and spigot push-on rubber gasket type only unless otherwise approved by IRCDUS. No solvent weld or threaded joints will be permitted.

B. Restraining joints, when required, shall be in accordance with IRCDUS Approved Manufacturers’ Products List or equal.

2.05 Fittings

A. All fittings shall be ductile iron mechanical joint and shall conform to AWWA Standard Specifications C110/A21.10 or C153/A 21.53, latest revisions. Fittings shall be cement mortar lined and seal-coated in accordance with AWWA Standard Specifications C104/A21.4, or latest revision.

B. The pressure rating shall be 350 psi (3” – 24” diameter), and 250 psi (30” – 48” diameter).

C. Joint restraint, when required, shall be in accordance with IRCDUS Approved Manufacturers’ Products List or equal.

2.06 Submittals

A. Before starting installation of the PVC pipe and fittings, the Contractor shall submit one set of complete working drawings (shop drawings) to the Engineer of Record and IRCDUS for approval. Such drawings shall show the pipe, fittings, valves, hydrants, blow-offs, services, and other appurtenances to be installed. Where special fittings are required, they shall be shown in large detail with all the necessary dimensions. The Engineer of Record shall review the drawings and notify IRCDUS of the drawings approved and not approved. IRCDUS shall also review the drawings and coordinate approvals and disapprovals with the Engineer of Record and Contractor.

2.07 Marking

A. Number 10 stranded conductor copper trace wire shall be spiral wrapped or affixed to the top of the pipe. See Trace Wire Details Drawing M-14 for specifications regarding installation.

B. Trace wire is required over or around all pipes.

C. Location tape is required over all pipes. Tape is to be installed 12" below proposed grade and additional tape shall be adhered directly on top of the pipe if required by IRCDUS engineering.

2.08 Storage

A. PVC pipes are not to be stored where exposed to direct sunlight because of possible ultraviolet light degradation. Pipes stored on the jobsite are to be covered. PVC pipes that exhibit discoloration or fading from their original color will be rejected by IRCDUS field representatives.

2.09 Installation

A. Handling and Protection of Pipe: Unless otherwise noted on the drawings or in other sections of these standards, the pipe shall be handled and installed in strict accordance with the manufacturers' instructions and with the applicable provisions of AWWA Standard Specifications C605, latest revision. If a conflict exists between the manufacturers' instructions and the AWWA Standard Specifications, the manufacturers' instructions shall govern. The Contractor shall use every precaution during construction to protect the pipe against the entry of non-potable water, dirt, wood, small animals, and any other foreign material that would hinder the operation of the pipeline. Where the groundwater elevation is above the bottom of the trench, the Contractor shall provide suitable dewatering equipment. All piping shall be placed in a dry trench, unless approved by IRCDUS.

B. Depth of Cover and Pipe Elevation: Unless otherwise shown on the drawings, or otherwise authorized by IRCDUS, all pipe shall have a minimum depth of cover of 36 inches. Contractor shall determine top of pipe elevation and top of finished grade elevation for every two joints of pipe installed using a level. Pipe must have the minimum cover described above and must be within +/- 0.2 feet of the top of pipe elevation indicated on the drawings. Installed pipe, which does not meet these requirements, shall be reinstalled until it does meet these requirements. Contractor shall record top of pipe and top of ground elevations and the locations of where these elevations were determined and submit this information to Engineer or his representative. IRCDUS reserves the right to have Contractor excavate and check top of pipe and top of ground elevations to see if they conform to the aforementioned requirements.

END OF SECTION

Section 3

Water Services - Crosslinked Polyethylene (PEXa) Tubing
and
Water, Wastewater, and Reclaimed Mains - High Density Polyethylene Pipe (HDPE)

Section 3

Water Services - Crosslinked Polyethylene (PEXa) Tubing and Water, Wastewater, and Reclaimed Mains - High Density Polyethylene Pipe (HDPE)

3.01 Water Services - Crosslinked Polyethylene (PEXa) Tubing 3 inches Diameter and Smaller

3.01.1 General

Crosslinked polyethylene (PEXa) tubing shall be allowed for use as potable water pipe where compatible with the specific conditions of the project. IRCDUS may require the use of material other than PEXa during construction permit review or by IRCDUS field personnel during construction if it is determined that PEXa pipe is unsuitable for the particular application.

3.01.2 Polyethylene (PEXa) Tubing

A. This specification requires PEXa to be designated as PEXa, high pressure peroxide method.

B. PEXa tubing shall comply with applicable requirements for extrusion compound PEXa plastic material as stated in AWWA Standard Specifications C904, or latest revision, and shall comply with the following:

1. Tubing shall have a working pressure of 200 psi at 73.4° F.

2. Tubing surfaces shall be glass smooth and shall be free from bumps and irregularities. Materials must be completely homogeneous and uniform in appearance.

3. Tubing dimensions and tolerances shall correspond with values listed in ASTM D-2239, with a standard outside dimension ratio (SDR) of 9.

4. Tubing shall carry the following markings every (3) feet: Manufacturers' name or trademark, nominal size, PEXa 3306 (material designation) SDR (standard dimension ratio), POTABLE TUBING, ASTM F876/F877/F2080, CSA B137.5, NSF-pw, UP Code 200psi/73.4°F 100psi/180°F, manufacturing date and footage mark.

3.01.3 Joints

A. Joints for PEXa tubing shall be of the compression type or compression-sleeve type, utilizing a totally confined grip seal and coupling nut, unless otherwise approved by IRCDUS. Stainless steel tube stiffener inserts shall also be used for PEXa tubing services.

3.01.4 Installation

A. Backfill shall be free of rocks and debris.

B. Bending radius shall be large enough so that tubing is not crimped or damaged and so that the flow of water is not restricted. Manufacturers' minimum radius recommendations are to be utilized during installation of PEXa tubing.

C. PEXa tubing shall have ability for kink repair using a heat gun.

3.01.5 Marking

A. Number 10 stranded conductor copper trace wire shall be spiral wrapped or affixed to the top of the pipe. See Trace Wire Details M-14 for specifications regarding installation.

B. Trace wire is required over or around all pipes.

C. Location tape is required over all pipes. Tape is to be installed 12" below proposed grade and additional tape adhered directly on top of the pipe if required by IRCDUS engineering.

A. Developer is responsible for compatibility between pipe materials, fittings and appurtenances.

B. The pipe manufacturer shall provide a warranty against manufacturing defects of material and workmanship for a period of ten (10) years after the final acceptance of the project by the IRCDUS. The manufacturer shall replace at no expense to IRCDUS any defective pipe material including labor within the warranty period.

3.02 Water, Wastewater, and Reclaimed Mains – High-Density Polyethylene Pipe (HDPE) 4 inches in Diameter and Larger

3.02.1 General

A. HDPE pipe intended for conveying or transmitting potable water shall conform to AWWA Standard Specifications C906-15 (or latest revision).

B. Pipe shall be Ductile Iron Pipe Size (DIPS) and SDR 11 with a pressure rating of 200 psi.

C. HDPE pipe shall be made from a PE 4710 resin compound conforming to ASTM D3350 with the cell classification 445574/4C/E.

D. Dimensions and workmanship shall be as specified by ASTM F714. HDPE fittings and transitions shall meet ASTM D3261. HDPE pipe shall have a minimum density of 0.955 grams per cubic centimeter. All HDPE pipe and fittings shall have a Hydrostatic Design Basis (HDB) of 1,600 psi.

E. If rework compounds are required, only those generated in the manufacturers' own plant from resin compounds of the same class and type from the same raw material supplier shall be used.

F. The pipe manufacturer must certify compliance, with the above requirements.

G. HDPE flange adapters at pipe material transitions shall be backed up by stainless steel flanges conforming to ANSI B16.1 and shaped as necessary to suit the outside dimensions of the pipe. The flange adapter assemblies shall be connected with corrosion resisting bolts and nuts of Type 316 Stainless Steel as specified in ASTM A726 and ASTM A307. All bolts shall be tightened to the manufacturers' specified torques. Bolts shall be tightened alternatively and evenly.

H. HDPE pipe shall be striped blue for potable water, green for wastewater, and purple for reclaimed/reuse water.

I. HDPE pipe shall be in accordance with IRCDUS Approved Manufacturers' Products List or equal.

3.02.2 Fittings

A. All molded fittings and fabricated fittings shall be fully pressure rated to match the pipe SDR pressure rating to which they are made. All fittings shall be molded or fabricated by the manufacturer. No fabricated fittings shall be used unless approved by IRCDUS.

B. The manufacturer of the HDPE pipe shall supply or specify all HDPE fittings and accessories as well as any adapters and/or specials required to perform the work as shown on the drawings and specified herein.

C. All transitions from HDPE pipe to PVC or ductile iron shall be made per the HDPE, PVC, or ductile iron pipe manufacturers' recommendations and specifications whichever is more stringent. A molded flange connector adapter within a carbon steel back-up ring assembly shall be used for pipe type transitions. Ductile iron back-up rings shall mate with cast iron flanges per ANSI B16.1. A 316 stainless steel back-up ring shall mate with a 316 stainless flange per ANSI B16.1.

D. The pipe manufacturer must certify compliance with the above requirements.

3.02.3 Joints

A. The HDPE pipe shall be joined with butt, heat fusion joints. All joints shall be made in strict compliance with the manufacturers' recommendations.

B. Lengths of pipe shall be assembled into suitable installation lengths by the butt-fusion process. All pipes so joined shall be made from the same class and type of raw material made by the same raw material supplier. Pipe shall be furnished in standard lay lengths not to exceed 50 feet.

C. All above ground HDPE pipe shall have flange adapters. Below ground shall be MJ adapters. Stainless Steel inserts allowed on water main only 4" to 6". FM 4" and larger MJ adapter only with no insert. Pipe material transitions shall be backed up by stainless steel flanges conforming to ANSI B16.1 and shaped as necessary to suit the outside dimensions of the pipe. The flange adapter assemblies shall be connected with corrosion resisting bolts and nuts of Type 316 Stainless Steel as specified in ASTM A726 and ASTM A307. All bolts shall be tightened to the manufacturers' specified torques. Bolts shall be tightened alternatively and evenly.

3.02.4 Pipe Identification

A. The following shall be continuously indent printed on the pipe or spaced at intervals not exceeding 5-ft.

1. Name and/or trademark of the pipe manufacturer.
2. Nominal pipe size and OD base.
3. Material Code
4. Dimension ratio.
5. Pressure Class

6. Current AWWA C906 (if Applicable)
7. Manufacturing standard reference, e.g., ASTM F714 or D-3035, as required.
8. A production code from which the date and place of manufacture can be determined.

B. Number 10 stranded conductor copper trace wire shall be spiral wrapped or affixed to the top of all pipe and fittings. See Trace Wire Details Drawing M-13 for specifications regarding installation.

3.03 Installation by Open Cut Method

A. HDPE Pipe shall be installed in accordance with the instruction of the manufacturer, as shown on the Drawings and as specified herein. A factory qualified joining technician as designated by the pipe manufacturer shall do all heat fusion joints.

B. Care shall be taken in loading, transporting and unloading to prevent injury to the pipe. Pipe or fittings shall not be dropped. All pipe or fittings shall be examined before installation, and no piece shall be installed which is found to be defective. Any damage to the pipe shall be repaired as directed by the Engineer of Record and IRCDUS. If any defective pipe is discovered after it has been installed, it shall be removed and replaced with a sound pipe in a satisfactory manner by the Contractor, at his own expense.

C. Under no circumstances shall the pipe or accessories be dropped into the trench.

D. Care shall be taken during transportation of the pipe such that it will not be cut, kinked, or otherwise damaged.

E. Ropes, fabric, or rubber protected slings and straps shall be used when handling pipes. Chains, cables, or hooks inserted into the pipe ends shall not be used. Two slings spread apart shall be used for lifting each length of pipe.

F. Pipes shall be stored on level ground, preferably turf or sand, free of sharp objects, which could damage the pipe. Stacking of the PE pipe shall be limited to a height that will not cause excessive deformation of the bottom layers of pipes under anticipated temperature conditions. Where necessary due to ground conditions, the pipe shall be stored on wooden sleepers, spaced suitably and of such width as not to allow deformation of the pipe at the point of contact with the sleeper or between supports.

G. Care shall be exercised when lowering pipe into the trench to prevent damage or twisting of the pipe.

H. Pipe shall be laid to lines and grade shown on the Drawings with bedding and backfill as shown on the Drawings.

I. When installation of pipe is not in progress, including lunchtime, the open ends of the pipe shall be closed by fabricated plugs, or by other approved means.

J. Pipe shall be stored on clean level ground to prevent undue scratching or gouging. The handling of the pipe shall be in such a manner that the pipe is not damaged by dragging it over sharp and cutting objects. The maximum allowable depth of cuts, scratches or gouges on the exterior of the pipe is 5 percent of wall thickness. Sections of pipe with cuts, scratches or gouges exceeding five percent of the pipe wall thickness shall be removed completely and the ends of the pipeline rejoined. The interior pipe surface shall be free of cuts, gouges or scratches.

K. HDPE pipe shall be joined by the method of thermal butt fusion, as outlined in ASTM D2657. All joints shall be made in strict compliance with the manufacturers' recommendations.

L. Mechanical connections of the HDPE pipe to auxiliary equipment such as valves, pumps and tanks shall be through flanged connections which shall consist of the following:

1. An HDPE flange shall be thermally butt-fused to the stub end of the pipe. A stainless steel or ductile iron back-up ring shall be used on both sides of the connection prior to thermally butt-fusing the PE flange.
2. A 316 stainless steel back-up ring shall mate with a 316 stainless steel flange.
3. Ductile iron back-up rings shall mate with cast iron flanges.

M. Flange connections shall be provided with a full-face neoprene gasket.

N. All HDPE pipe must be at the temperature of the surrounding soil at the time of backfilling and compaction.

O. No single piece of pipe shall be laid unless it is straight. The centerline of the pipe shall not deviate from a straight line drawn between the centers of the openings at the ends of the pipe by more than 1/16-in per foot of length. If a piece of pipe fails to meet this requirement check for straightness, it shall be rejected and removed from the site. Laying instructions of the manufacturer shall be explicitly followed.

P. If a defective pipe is discovered after it has been installed, it shall be removed and replaced with a sound pipe in a satisfactory manner. All pipe and fittings shall be thoroughly cleaned before

installation, shall be kept clean until they are used in the work and when laid, shall conform to the lines and grades required.

Q. As soon as the excavation is complete to normal grade of the bottom of the trench, bedding shall be placed, compacted and graded to provide firm, uniform and continuous support for the pipe. Bell holes shall be excavated so that only the barrel of the pipe bears upon the bedding. The pipe shall be laid accurately to the lines and grades indicated on the Construction Plans. Blocking under the pipe will not be permitted. Bedding shall be placed evenly on each side of the pipe to mid-diameter and hand tools shall be used to force the bedding under the haunches of the pipe and into the bell holes to give firm continuous support for the pipe. Bedding shall then be placed to 12-in above the top of the pipe. The initial 3 feet of backfill above the bedding shall be placed in 1 foot layers and carefully compacted. Generally, the compaction shall be done evenly on each side of the pipe and compaction equipment shall not be operated directly over the pipe until sufficient backfill has been placed to ensure that such compaction equipment will not have a damaging effect on the pipe. The pipe manufacturers' representative prior to use shall approve equipment used in compacting the initial 3 feet of backfill. Pipe shall be installed per IRCDUS Drawing M-1 or M-2, Trench Details.

R. Good alignment shall be preserved during installation. The deflection at joints shall not exceed that recommended by manufacturer. Fittings, in addition to those shown on the Drawings, shall be provided, if required, in crossing of utilities that may be encountered upon opening the trench.

S. Each length of the pipe shall have the assembly mark aligned with the pipe previously laid and held securely until enough backfill has cramped.

T. Before any joint is made, the pipe shall be checked to assure that a close joint with the next adjoining pipe has been maintained and that the inverts are matched and conform to the required grade. The pipe shall not be driven down to grade by striking it.

U. Precautions shall be taken to prevent flotation of the pipe in the trench.

V. When moveable trench bracing such as trench boxes, moveable sheeting, shoring or plates are used to support the sides of the trench, care shall be used in placing and moving the boxes or supporting bracing to prevent movement of the pipe, or disturbance of the pipe bedding and the backfill. Trench boxes, moveable sheeting, shoring or plates shall not be allowed to extend below the top of the pipe. As trench boxes, moveable sheeting, shoring or plates are moved, pipe bedding shall be

placed to fill any voids created and the backfill shall again be compacted to provide uniform side support for the pipe.

W. Sheeting and shoring will be required as determined in the field in accordance with OSHA regulations.

3.04 Marking

A. Number 10 stranded conductor copper trace wire shall be spiral wrapped or affixed to the top of the pipe. See Trace Wire Details, M-13 for specifications regarding installation.

B. Trace wire is required over or around all pipes.

C. Location tape is required over all pipes. Tape is to be installed 12" below proposed grade and additional tape shall be adhered directly on top of the pipe if required by IRCDUS.

3.05 Trenchless Installation of High Density Polyethylene (HDPE) Pressure Mains by Horizontal Directional Drill (HDD)

A. Description

1. Portions of the pressure mains shall be installed by the directional bore method within the limits indicated of the contract plans and as specified here in. Generally, as a minimum, the pressure main is to be located within the road right-of-way and shall be installed by directional boring.

2. This section includes material, performance and installation standards, and the contractor's responsibilities associated with the furnishing of labor, material, equipment, and identical required to install, complete, required trenchless installation of pressure mains, as shown on the Drawings and as specified herein.

B. Experience

1. The Contractor must demonstrate expertise in trenchless method by providing a list of ten utility references for which similar work has been performed in the last two years. The references should include a name and phone number where the contact can be made to verify the Contractor's capability. The Contractor must provide documentation showing successful completion of the projects used for reference. Conventional trenching experience will not be considered applicable.

2. Supervisory personnel must be adequately trained and shall have at least four years of experience in directional boring. The Contractor shall submit the names and resumes of all supervisory field personnel prior to construction.

3. Directional boring equipment shall be capable of installing the minimum pipe diameter noted on the drawings.

C. Submittals

1. Submit technical data for equipment including clay slurry material, method of installation with working drawings, and proposed sequence of construction for approval by the IRCDUS.

2. Prior to approval for directional boring, the Contractor must submit the names of supervisory personnel, and history information of the directional boring experience. In addition, the Contractor must submit for approval the nameplate, data for the drilling equipment, mobile spoils removal units and Material Safety Data Sheets (MSDS) for the drilling slurry compounds.

3. The Contractor is required to bring to the attention of the engineer any known design discrepancies with actual tunneling methods that the contractor will be performing. This shall be stated in writing to the Engineer at the pre-construction meeting.

D. Installation

1. Installation shall be in a trenchless manner producing continuous bores.

2. The tunneling system shall be remotely steerable and permit electronic monitoring of tunnel depth and location. Accurate placement of pipe within a +/- 2-inch window is required both horizontally and vertically. Turning capability of 90-degrees radius in 40 feet is required. Continuous monitoring of the boring head is required, including across open water if necessary.

3. The directional boring Contractor shall submit certification, by a Professional Engineer licensed in the State of Florida, that the directional boring has been performed in accordance to the construction drawings, and shall submit signed and sealed drawings. AS-Built Record Drawings shall be provided both in electronic format and hard paper copy.

4. Tunneling shall be performed by a fluid-cutting process (high pressure-low volume) utilizing liquid clay i.e. bentonite. The clay lining will maintain tunnel stability and provide lubrication in order to reduce frictional drag while the pipe is being installed. In addition, the clay fluid must be totally inert and contain no environmental risk. The Contractor must also have a mobile vacuum spoils recovery vehicle on site to remove the drilling spoils from the access pits. The spoils must then be transported from the job site and be properly disposed off the site. The drilling spoils shall not, under any circumstances, be disposed into a sanitary sewer, storm, or other public or private drainage system. Spoils may be transported to the County's Solid Waste Facility and the cost of disposal shall be at the Contractor's expense.

5. Liquid clay type colloidal drilling fluid shall consist of at least 10 percent of high-grade carefully processed bentonite to consolidate cuttings of the soil, to seal the walls of the hole, and to furnish lubrication for subsequent removal of cuttings. The slurry that is heavier than the surrounding material, is high in colloids of the bentonite type and it will deposit a thin filter cake of low permeability material on the walls of the bore. This will allow only a small amount of the fluid to pass into the surrounding soils and will stabilize the bore. The colloidal content of the fluid imparts excellent lubricating qualities to the slurry that is a distinct aid to the removal of the soil cuttings.
6. Pneumatic or water-jetting methods will be considered unacceptable due to the possibility of surface subsidence.

7. After an initial bore has been completed, a reamer will be installed at the termination pit and the pipe shall be pulled back to the starting pit. The reamer shall be capable of discharging liquid clay to facilitate the installation of the pipe into a stabilized and lubricated tunnel.
8. A minimum of two insulated #6 stranded conductor copper tracer wire shall be wrapped or affixed to the top of the pipe and fittings along with the HDPE pipe. The tracer wire shall be tested for continuity or traceability upon completed installation. Should both tracer wires fail to test for continuity then the test shall be considered a failure and the wires shall be replaced.

9. Upon completion of boring and pipe installation, the Contractor shall remove all spoils from the starting and termination pits. All pits shall be restored to their original condition.

10. Restoration shall be as required by IRCDUS. The shoulders, ditches, banks, and slopes of roads and railroads crossed and paralleled shall not wash out before becoming accepted.

END OF SECTION

Section 4

Gravity Sanitary Sewers
Ductile Iron Pipe (DIP) and Fittings

Section 4

Gravity Sanitary Sewers
Ductile Iron Pipe (DIP) and Fittings

4.01 General

A. DIP shall be allowed for use as gravity sewer pipe where compatible with the specific conditions of the project. IRCDUS may require the use of material other than ductile iron during construction permit review or by IRCDUS field personnel during construction, if it is determined that DIP is unsuitable for the particular application.

B. All DIP shall be manufactured in accordance with AWWA Standard Specifications C150/A21.50-96 and C151/A21.51-96, or latest revisions, and shall be pressure Class 300 or 350 minimum, as depicted on Table 4.1 on page 4-2. All DIP crossings under roadways and other traffic areas shall be pressure Class 350 minimum.

C. Cutting of DIP shall be by sawing only.

4.02 Pipe

A. DIP shall be bell and spigot cast in accordance with the latest AWWA Standard Specifications C151/A21.50and C151/A21.51. Cast ductile iron shall have a minimum tensile strength of 60,000 psi with a minimum yield strength of 42,000 psi. Pipe wall thicknesses shall be computed in accordance with AWWA Standard Specifications C150/A21.50-96, latest revision, using the physical characteristics cited above with a minimum working pressure of 300 psi and a Laying Condition “Type 2”. Unless otherwise indicated or specified herein, the pipe shall have the minimum wall thickness according to class designation for diameters shown. All pipes shall be given a minimum factory hydrostatic test of 500 psi.

Table 4.1
Pressure Class 300 and 350

Nominal Size Diameter (Inches)	Actual Outside Diameter (Inches)	300 PSI Wall Thickness (Inches)	350 PSI Wall Thickness (Inches)
3	3.96	---	0.25
4	4.80	---	0.25
6	6.90	---	0.25
8	9.05	---	0.25
10	11.10	---	0.26
12	13.20	---	0.28
14	15.30	0.30	0.31
16	17.40	0.32	0.34
18	19.50	0.34	0.36
20	21.60	0.36	0.38
24	25.80	0.40	0.43
30	32.00	0.45	0.49
36	38.30	0.51	0.56
42	44.50	0.52	0.63
48	50.80	0.64	0.70
54	57.56	0.72	0.79
60	61.61	0.76	0.83
64	65.67	0.80	0.87

4.03 Fittings

A. All underground fittings shall be either push-on, restrained, or mechanical joint. Mechanical joints shall conform to AWWA Standard Specifications C110/A21.10or C153/A21.53, latest revisions. All aboveground fittings shall be flanged joint.

B. The pressure rating shall be 350 psi (Class 350 Pipe).

C. All fittings shall be lined with the same materials as specified for the pipe, as per paragraph 4.04.

D. Joint restraints, when required, shall be in accordance with IRCDUS Approved Manufacturers' Products List or an approved equal.

4.04 Lining and Coating

A. Unless otherwise indicated, all DIP shall be factory lined and coated.

B. For 4" and larger, the interior protective coating shall be an amine cured novalac epoxy (Protecto 401 or similar). The epoxy material shall be applied in 1 coat with a minimum dry film thickness of 40.0 mils and shall be per the Approved Manufacturers' Products List.

C. Unless otherwise specified, the exterior of the pipe shall have a bituminous coating to a minimum dry film thickness of 1.0 mil.

D. Lining Inspection:
   1. All DIP and fitting linings shall be checked for thickness using a magnetic film thickness gauge. The thickness testing shall be done using the method outlined SSPC-PA-2 film thickness rating.
   2. The interior lining of all pipe and fittings shall be tested for pinholes with a nondestructive 2,500-volt test.
   3. Each pipe joint and fitting shall be marked with the date of application of the lining system and with its numerical sequence of application on that date.

E. The pipe or fitting manufacturer must supply a certificate attesting to the fact that the applicator met the requirements of this specification, and that the material used was as specified, and that the material was applied as required by the specification.

F. Anywhere that the coating is removed purposely or accidentally, the area shall be cleaned of any rust, grease, and dirt and re-coated to a minimum dry film as specified for the individual piece.

G. If and when directed by the Engineer of Record and IRCDUS, a polyethylene encasement shall be provided around pipe, fittings, and valves. The material, installation, and workmanship shall conform to applicable sections of AWWA Standard Specifications C105/A21.5, latest revision. Installation methods A or B shall be employed using flat tube polyethylene. The Contractor shall make provisions to keep the polyethylene from direct exposure to sunlight prior to installation. Backfilling following installation shall be completed without delay to avoid exposure to sunlight.

H. All exposed sewer DIP shall be coated (painted) green per the Approved Manufacturers' Product List.

4.05 Bell and Spigot Connections

A. Unless specifically indicated otherwise, restrained push-on joint underground piping shall be manufactured restrained bell and spigot and above ground piping shall be flanged in accordance with AWWA Standard Specifications C111/A21.11-00, or latest revision. Pipe restraints shall also be in accordance with IRCDUS Standards or as directed by Engineer or IRCDUS.

4.06 Submittals

A. Before starting fabrication of the DIP and fittings, the Contractor shall submit one set of complete detailed working drawings (shop drawings) to the Engineer of Record and IRCDUS for approval. Such drawings shall show the pipe, fittings, valves, expansion joints, hangers, supports, and other appurtenances to be installed. Where special fittings are required, they shall be shown in large detail with all the necessary dimensions. The Engineer of Record shall review the drawings and notify IRCDUS of the drawings approved and not approved. IRCDUS shall also review the drawings and coordinate approvals and disapprovals with the Engineer of Record and Contractor. The drawings submitted shall show flanged jointed sections placed so as to be removable without disturbance to the main pipe sections.

4.07 Marking

A. Number 10 stranded conductor copper trace wire shall be spiral wrapped or affixed to the top of the pipe. See Trace Wire Details Drawing M-14 for specifications regarding installation.

B. Trace Wire is required over or around all pipes.

C. Location tape is required over all pipes. Tape is to be installed 12" below proposed finished grade and additional tape shall be adhered directly on top of the pipe if required by IRCDUS.

4.08 Installation

A. Handling and Protection of Pipe: Unless otherwise noted on the drawings or in other sections of these standards, the pipe shall be handled and installed in strict accordance with the manufacturers' instructions. The Contractor shall use every precaution during construction to protect the pipe against the entry of non-potable water, dirt, wood, small animals, and any other foreign material that would hinder the operation of the pipeline. Where the groundwater elevation is above the bottom of the trench, the Contractor shall provide suitable dewatering. All piping shall be placed in a dry trench, unless IRCDUS approves wet trench installation.

B. Depth of Cover and Pipe Elevation: Unless otherwise shown on the drawings, or otherwise authorized by IRCDUS, all pipe shall have a minimum cover of 36 inches. Contractor shall determine top of pipe elevation and top of ground elevation for every two joints of pipe installed using a level. Pipe must have the minimum cover described above and must be within +/- 0.2 feet of the top of pipe elevation indicated on the drawings. Installed pipe, which does not meet these requirements, shall be reinstalled until it does meet these requirements. Contractor shall record top of pipe and top of ground elevations and the locations of where these elevations were

determined and submit this information to IRCDUS. IRCDUS reserves the right to have Contractor excavate and check top of pipe and top of ground elevations to see if they conform to the aforementioned requirements, at no cost to IRCDUS.

END OF SECTION

Section 5

Gravity Sanitary Sewers
Polyvinyl Chloride (PVC) Pipe and Fittings

Section 5

Gravity Sanitary Sewers
Polyvinyl Chloride (PVC) Pipe and Fittings

5.01 General

A. PVC pipe shall be allowed for use as gravity sewer pipe where compatible with the specific conditions of the project. IRCDUS may require the use of material other than PVC during construction permit review or by IRCDUS field personnel during construction, if it is determined that PVC pipe is unsuitable for the particular application.

B. PVC gravity sewer pipe can be used up to a depth of sixteen feet as specified herein. All pipe used for depths greater than 16 feet, shall be approved by IRCDUS.

5.02 Pipe and Fittings

A. Gravity sewer mains and laterals shall be extra strength PVC pipe and shall conform to the latest ASTM Designation D3034-SDR26. Fittings installed in PVC pipe shall conform to the same specifications as the pipe in which they are installed.

B. In addition to the requirements of ASTM specifications, the pipe shall not be out-of-round or crooked in alignment as determined by the Engineer of Record and/or IRCDUS. Any length of pipe 6 inches or greater in diameter whose inside diameters measured at right angles to each other vary more than ¼ inch may be rejected.

C. PVC pipe shall be a maximum of 20 feet in length and shall be in accordance with IRCDUS Approved Manufacturers' Products List.

D. Material shall meet or exceed the requirements of ASTM Designation 1784, Type 1, Grade 1 (12454-B). All P.V.C. materials shall be stored in accordance with the manufacturers' specifications (not in direct sunlight). PVC pipe and fittings, which show signs of ultraviolet degradation, are considered substandard and unfit for use, and will be rejected by the IRCDUS's Engineer.

E. All wyes, fittings, laterals, and manhole couplings shall be manufactured by same manufacturing company as the pipe or approved equal, see Approved Manufacturers' Product List. Adapters shall be compatible to the approved pipe and appurtenances. All joints shall be rubber gasketed.

F. The pipe shall be "green" in color.

5.03 Pipe Joint Seals

A. Joint seals in PVC pipe and fittings shall comply with ASTM Designation D3212.

B. The joint shall remain sealed by its own compression. Adhesives shall not be necessary to weld or fuse the gaskets together. No solvent weld joints are permitted.

C. The compressive stress which is developed in the gasket material shall be as high as is permitted by the strength of the bell in ring tension, with due regard to factor of safety, and this stress shall be at its maximum value when the joint is completely assembled.

5.04 Retrofitting Sewer Laterals

A. Gravity sewer systems shall be designed such that laterals are provided to serve all units and lots. In cases where sewer laterals must be added to a gravity sewer main, connections shall be made by installing a sewer service wye branch and a sleeve-type adapter, whichever is specified by IRCDUS for the particular application.

5.05 Submittals

A. Before starting fabrication of the PVC pipe and fittings, the Contractor shall submit one set of complete working drawings (shop drawings) to the Engineer of Record and IRCDUS for approval. Such drawings shall show the pipe, fittings, manholes, and any other appurtenances to be installed. Where special fittings are required, they shall be shown in large detail with all the necessary dimensions. The Engineer of Record shall review the drawings and notify IRCDUS of the drawings approved and not approved. IRCDUS shall also review the drawings and coordinate approvals and disapprovals with the Engineer of Record and Contractor.

5.06 Marking

A. Location tape is required over all pipes. Tape is to be installed 12” below proposed finished grade and additional tape shall be adhered directly on top of the pipe if required by IRCDUS engineering.

5.07 Storage

A. PVC pipes are not to be stored where exposed to direct sunlight because of possible ultraviolet light degradation. Pipes stored on the jobsite are to be covered. PVC pipes that exhibit discoloration or fading from their original color will be rejected by IRCDUS field representatives.

5.08 Installation

A. Handling and Protection of Pipe: Unless otherwise noted on the drawings or in other sections of this specification, the pipe shall be handled and installed in strict accordance with the manufacturers' instructions. The Contractor shall use every precaution during construction to protect the pipe against the entry of non-potable water, dirt, wood, small animals, and any other foreign material that would hinder the operation of the pipeline. Where the groundwater elevation is above the bottom of the trench, the Contractor shall provide suitable dewatering equipment at no additional cost to the Owner. All piping shall be placed in a dry trench, unless otherwise approved by IRCDUS.

B. Depth of Cover and Pipe Elevation: Unless otherwise shown on the drawings, or otherwise authorized by IRCDUS, all pipe shall have a minimum cover of 36 inches. Contractor shall determine top of pipe elevation and top of ground elevation for every two joints of pipe installed using a level. Pipe must have the minimum cover described above and must be within +/- 0.2 feet of the top of pipe elevation indicated on the drawings. Installed pipe, which does not meet these requirements, shall be reinstalled until it meets these requirements. Contractor shall record top of pipe and top of ground elevations and the locations of where these elevations were determined and submit this information to IRCDUS. IRCDUS reserves the right to have Contractor excavate and check top of pipe and top of ground elevations to see if they conform to the aforementioned requirements, at no additional cost to IRCDUS.

END OF SECTION

Section 6

Wastewater Force Mains
Ductile Iron Pipe (DIP) and Fittings

Section 6

Wastewater Force Mains
Ductile Iron Pipe (DIP) and Fittings

6.01 General

A. DIP shall be allowed for use as wastewater force main pipe where compatible with the specific conditions of the project. The use of material other than ductile iron may be required by IRCDUS during construction permit review or by IRCDUS field personnel during construction, if it is determined that DIP is unsuitable for the particular application.

B. All DIP shall be manufactured in accordance with AWWA Standard Specifications C151/A21.51 and C151/A51, or latest revisions, and shall be pressure Class 300 or 350 minimum as depicted on Table 6.1 on page 6-2. All DIP crossings under roadways and other traffic areas shall be pressure Class 350 minimum.

C. Unless specifically indicated otherwise, restrained push-on underground piping shall be manufactured bell and spigot and above ground piping shall be flanged.

D. Cutting of DIP shall be by sawing.

E. All exposed DIP shall be painted “green” per Approved Manufacturers’ Products List.

6.02 Pipe

A. DIP shall be bell and spigot cast in accordance with AWWA Standard Specifications C150/A21.50and C151/A51, latest revisions. Cast DIP shall have a minimum tensile strength of 60,000 psi with a minimum yield strength of 42,000 psi. Pipe wall thicknesses shall be computed in accordance with AWWA Standard Specification C150/A21.50, latest revision, using the physical characteristics cited above with a minimum working pressure of 300 psi and a Laying Condition “Type 2.” Unless otherwise indicated or specified herein, the pipe shall have the minimum wall thickness according to class designation for diameters shown. All pipe shall be given a minimum factory hydrostatic test of 500 pounds per square inch.

TABLE 6.1
Pressure Class 300 and 350

Nominal Size Diameter (Inches)	Actual Outside Diameter (Inches)	300 PSI Wall Thickness (Inches)	350 PSI Wall Thickness (Inches)
3	3.96	---	0.25
4	4.80	---	0.25
6	6.90	---	0.25
8	9.05	---	0.25
10	11.10	---	0.26
12	13.20	---	0.28
14	15.30	0.30	0.31
16	17.40	0.32	0.34
18	19.50	0.34	0.36
20	21.60	0.36	0.38
24	25.80	0.40	0.43
30	32.00	0.45	0.49
36	38.30	0.51	0.56
42	44.50	0.52	0.63
48	50.80	0.64	0.70
54	57.56	0.72	0.79
60	61.61	0.76	0.83
64	65.67	0.80	0.87

6.03 Fittings

A. All underground fittings shall be either push-on, restrained, or mechanical joint. Mechanical joints shall conform to AWWA Standard Specification C110/A21.10) or C153/A21.53), or latest revisions. All aboveground fittings shall be flanged joint.

B. The pressure rating shall be 350 psi (Class 350 Pipe).

C. All fittings shall be lined with the same material as specified for the pipe, as per paragraph 6.04.

D. Joint restraints, when required, shall be in accordance with IRCDUS Approved Manufacturers' Products List or approved equal.

6.04 Lining and Coating

A. Unless otherwise indicated, all DIP shall be factory lined and coated.

B. For 4 inches and larger, the interior protective coating shall be an amine cured novalac epoxy (Protecto 401 or similar). The epoxy material shall be applied in 1 coat with a minimum dry film

thickness of 40.0 mils, in accordance with IRCDUS Approved Manufacturers' Products List

C. Unless otherwise specified, the exterior of the pipe shall have a bituminous coating to a minimum dry film thickness of 1.0 mil. See Approved Manufacturers' Products list for coating material.

D. Lining Inspection:

1. All DIP and fitting linings shall be checked for thickness using a magnetic film thickness gauge. The thickness testing shall be done using the method outlined SSPC-PA-2 film thickness rating.

2. The interior lining of all pipe and fittings shall be tested for pinholes with a nondestructive 2,500-volt test.

3. Each pipe joint and fitting shall be marked with the date of application of the lining system and with its numerical sequence of application on that date.

E. The pipe or fitting manufacturer must supply a certificate attesting to the fact that the applicator met the requirements of this specification, and that the material used was as specified, and that the material was applied as required by the specification.

F. Anywhere that the coating is removed purposely or accidentally, the area shall be cleaned of any rust, grease, and dirt and re-coated to a minimum dry film as specified for the individual piece.

G. If and when directed by IRCDUS's Engineer, a polyethylene encasement shall be provided around pipe, fittings, and valves. The material, installation, and workmanship shall conform to applicable sections of AWWA Standard Specifications C105/A21.5-99, or latest revision. Installation methods A or B shall be employed using flat tube polyethylene. The Contractor shall make provisions to keep the polyethylene from direct exposure to sunlight prior to installation. Backfilling following installation shall be completed without delay to avoid exposure to sunlight.

6.05 Bell and Spigot Connections

A. Joints in bell and spigot pipe shall be push-on, mechanical, or restrained joints in accordance with AWWA Standard Specifications C111/A21.11-00, or latest revision. Pipe restraints shall also be in accordance with IRCDUS Standards or as directed by IRCDUS's Engineer.

6.06 Flanged Connections

A. All flanged pipe barrels shall comply with the physical and chemical requirements as set forth in the Handbook of Ductile Iron Pipe Research Association. Flanges shall be in accordance with ANSI Specification B16.1 for Class 125 flanges. Bolts shall be 316 stainless steel and comply with ANSI Specification B18.2.

B. Flanged pipes shall be faced and drilled to the American Standard Drilling, unless special drilling is called for or required. Where tap or stud bolts are required, flanges shall be tapped. Flanges shall be accurately faced and drilled smooth and true, at right angles to the pipe axis, and shall be covered with zinc dust and tallow or a rust preventive compound immediately after facing and drilling.

C. Flanged pipe with screwed-on flanges shall be furnished with long hubs, and the flanges shall be screwed on the threaded end of the pipe in the shop and the face of the flange and end of pipe refaced together. There shall be no leakage through the pipe threads and the flanges shall be designed to prevent corrosion of the threads from outside.

D. Flanged joints shall be made with bolts or stud bolts and nuts. Bolts, stud bolts, and nuts shall conform to American Standard heavy dimensions, semi-finished with square or hexagonal heads and cold punched hexagonal nuts, 316SS. Bolt sizes shall be American Standard for the flanges specified, and bolts and nuts shall have good, true threads.

E. Gaskets shall be in accordance with AWWA Standard Specifications C115/A21.15 latest revision.

6.07 Submittals

A. Before starting fabrication of the DIP and fittings, the Contractor shall submit one set of complete working drawings (shop drawings) to the Engineer of Record and IRCDUS for approval. Such drawings shall show the pipe, fittings, valves, expansion joints, hangers, supports, and other appurtenances to be installed. Where special fittings are required, they shall be shown in large detail with all the necessary dimensions. The Engineer of Record shall review the drawings and notify IRCDUS of the drawings approved and not approved. IRCDUS shall also review the drawings and coordinate approvals and disapprovals with the Engineer of Record and Contractor. The drawings submitted shall show flanged jointed sections placed so as to be removable without disturbance to the main pipe sections.

6.08 Marking

A. Number 10 stranded conductor copper trace wire shall be spiral wrapped or affixed to the top of the pipe. See Trace Wire Details Drawing M-14 for specifications regarding installation.

B. Trace Wire is required over or around all pipes.

C. Location tape is required over all pipes. Tape is to be installed 12" below proposed finished grade and additional tape shall be adhered directly on top of the pipe if required by IRCDUS engineering.

6.09 Installation

A. Handling and Protection of Pipe: Unless otherwise noted on the drawings or in other sections of this specification, the pipe shall be handled and installed in strict accordance with the manufacturers' instructions. The Contractor shall use every precaution during construction to protect the pipe against the entry of non-potable water, dirt, wood, small animals, and any other foreign material that would hinder the operation of the pipeline. Where the groundwater elevation is above the bottom of the trench, the Contractor shall provide suitable dewatering equipment at no additional cost to the IRCDUS. All piping shall be placed in a dry trench, unless IRCDUS approves wet trench installation.

B. Depth of Cover and Pipe Elevation: Unless otherwise shown on the drawings, or otherwise authorized by the Engineer, all pipe shall have a minimum cover of 36 inches. Contractor shall determine top of pipe elevation and top of ground elevation for every two joints of pipe installed using a level. Pipe must have the minimum cover described above and must be within +/- 0.2 feet of the top of pipe elevation indicated on the drawings. Installed pipe, which does not meet these requirements, shall be reinstalled until it does meet these requirements. Contractor shall record top of pipe and top of ground elevations and the locations of where these elevations were determined and submit this information to IRCDUS. IRCDUS reserves the right to have Contractor excavate and check top of pipe and top of ground elevations to see if they conform to the aforementioned requirements, at no cost to the IRCDUS.

END OF SECTION

Section 7

Wastewater Force Mains
Polyvinyl Chloride Pipes (PVC) and Fittings

Section 7

Wastewater Force Mains
Polyvinyl Chloride Pipe (PVC) and Fittings

7.01 General

A. PVC pipe shall be allowed for use as wastewater force main pipe where compatible with the specific conditions of the project. IRCDUS may require the use of material, other than PVC, during construction permit review or by IRCDUS field personnel during construction, if it is determined that PVC pipe is unsuitable for the particular application.

B. The pipe used for wastewater shall be “green” in color.

C. All pipe shall be identified by its nominal pipe size, plastic pipe material code, SDR class, pressure rating, ASTM Designation, manufacturers’ name, production code, and the National Sanitation Foundation seal for potable water (NSF-pw).

7.02 Pipe for Sizes 4 inches to 48 inches in Diameter

A. All pipe intended for conveying or transmitting wastewater shall be designed for a minimum working pressure of 150 psi.

B. PVC chloride pressure pipe shall conform to AWWA Standards Specifications C900 latest revision, or C909, latest revision and ASTM D1784 and D2241, latest revision. PVC pressure pipe shall be made from Class 12454-A or Class 12454-B material and conform to the outside diameter of cast iron pipe.

C. PVC pressure pipe less than 4” diameter shall be DR-21, PR-200

D. PVC pipe shall be purchased in accordance with IRCDUS Approved Manufacturers’ Products List.

7.03 Joints

A. Joints for PVC pressure pipe shall be bell and spigot push-on rubber gasket type only. No solvent weld or threaded joints will be permitted.

B. IRCDUS may consider other type joints for specific installation upon submission of specifications and approval.

C. Restraint joints, when required, shall be in accordance with IRCDUS Approved Manufacturers’ Products List.

7.04 Fittings

A. All underground fittings shall be either ductile iron push-on, restrained, or mechanical joint. Mechanical joints shall conform to AWWA Standard Specifications C110/A21.10 or C153/A21.53 latest revisions. Fittings shall be amine cured novalac epoxy (Protecto 401 or similar). The epoxy material shall be applied in 1 coat with a minimum dry film thickness of 40.0 mils l. All aboveground exposed fittings shall be flanged.

B. The pressure rating shall be 350 psi (Class 350).

C. Joint restraint, when required; shall be in accordance with IRCDUS Approved Manufacturers' Products List.

7.05 Submittals

A. Before starting fabrication of the PVC pipe and fittings, the Contractor shall submit one set of complete working drawings (shop drawings) to the Engineer of Record and IRCDUS for approval. Such drawings shall show the pipe, fittings, valves, and other appurtenances to be installed. Where special fittings are required, they shall be shown in large details with all the necessary dimensions. The Engineer of Record shall review the drawings and notify IRCDUS of the drawings approved and not approved. IRCDUS shall also review the drawings and coordinate approvals and disapprovals with the Engineer of Record and Contractor.

7.06 Marking

A. Number 10 stranded conductor copper trace wire shall be spiral wrapped or affixed to the top of the pipe. See Trace Wire Details Drawing M-14 for specifications regarding installation.

B. Trace wire is required over or around all pipes.

C. Location tape is required over all pipes. Tape is to be installed 12" below proposed grade and additional tape shall be adhered directly on top of the pipe if required by IRCDUS engineering.

7.07 Storage

A. PVC pipes are not to be stored where exposed to direct sunlight because of possible ultraviolet light degradation. Pipes stored on the jobsite are to be covered. PVC pipes that exhibit discoloration or fading from their original color will be rejected by IRCDUS field representatives.

7.08 Installation

A. Handling and Protection of Pipe: Unless otherwise noted on the drawings or in other sections of this specification, the pipe shall be handled and installed in strict accordance with the manufacturers' instructions. The Contractor shall use every precaution during construction to protect the pipe against the entry of non-potable water, dirt, wood, small animals, and any other foreign material that would hinder the operation of the pipeline. Where the groundwater elevation is above the bottom of the trench, the Contractor shall provide suitable dewatering equipment at no additional cost to IRCDUS. All piping shall be placed in a dry trench, unless otherwise approved by IRCDUS.

B. Depth of Cover and Pipe Elevation: Unless otherwise shown on the drawings, or otherwise authorized by IRCDUS, all pipe shall have a minimum cover of 36 inches. Contractor shall determine top of pipe elevation and top of ground elevation for every two joints of pipe installed using a level. Pipe must have the minimum cover described above and must be within +/- 0.2 feet of the top of pipe elevation indicated on the drawings. Installed pipe, which does not meet these requirements, shall be reinstalled until it does meet these requirements. Contractor shall record top of pipe and top of ground elevations and the locations of where these elevations were determined and submit this information to IRCDUS. IRCDUS reserves the right to have Contractor excavate and check top of pipe and top of ground elevations to see if they conform to the aforementioned requirements, at no cost to IRCDUS.

END OF SECTION

Section 8

Reclaimed Water Mains
Ductile Iron Pipe (DIP) and Fittings

Section 8
Reclaimed Water Mains
Ductile Iron Pipe (DIP) and Fittings

8.01 General

A. DIP shall be allowed for use as reclaimed water main pipe where compatible with the specific conditions of the project. The use of material other than ductile iron may be required by Indian River County Department of Utility Services (IRCDUS) during construction permit review or by IRCDUS field personnel during construction, if it is determined that DIP is unsuitable for the particular application.

B. All DIP shall be manufactured in accordance with AWWA Standard Specifications C151/A21.51and C151/A51, or latest revisions, and shall be pressure Class 300 or 350 minimum as depicted in Table 6.1 on page 6-2. All DIP crossings under roadways and other traffic areas shall be pressure Class 350 minimum.

C. Unless specifically indicated otherwise, restrained push-on underground piping shall be bell and spigot and above ground piping shall be flanged.

D. Cutting of DIP shall be by sawing.

E. All DIP used for Reclaimed water shall be painted “purple” in accordance with IRCDUS Approved Manufacturers’ Products List.

8.02 Pipe

A. DIP shall be bell and spigot cast in accordance with AWWA Standard Specifications C151/A21.51 and C151/A51, or latest revisions. Cast DIP shall have a minimum tensile strength of 60,000 psi with a minimum yield strength of 42,000 psi. Pipe wall thicknesses shall be computed in accordance with AWWA Standard Specification C150/A21.50-96, or latest revision, using the physical characteristics cited above with a minimum working pressure of 300 psi and a Laying Condition “Type 2.” Unless otherwise indicated or specified herein, the pipe shall have the minimum wall thickness according to class designation for diameters shown. All pipe shall be given a minimum factory hydrostatic test of 500 pounds per square inch.

Table 6.1
Pressure Class 300 and 350

Nominal Size Diameter (inches)	Actual Outside Diameter (inches)	300 PSI Wall Thickness (inches)	350 PSI Wall Thickness (inches)
3	3.96	---	0.25
4	4.80	---	0.25
6	6.90	---	0.25
8	9.05	---	0.25
10	11.10	---	0.26
12	13.20	---	0.28
14	15.30	0.30	0.31
16	17.40	0.32	0.34
18	19.50	0.34	0.36
20	21.60	0.36	0.38
24	25.80	0.40	0.43
30	32.00	0.45	0.49
36	38.30	0.51	0.56
42	44.50	0.52	0.63
48	50.80	0.64	0.70
54	57.56	0.72	0.79
60	61.61	0.76	0.83
64	65.67	0.80	0.87

8.03 Fittings

A. All underground fittings shall be either push-on, restrained, or mechanical joint. Mechanical joints shall conform to AWWA Standard Specification C110/A21.10) or C153/A21.53), or latest revisions. All aboveground fittings shall be flanged joint.

B. The pressure rating shall be 350 psi (Class 350 pipe).

C. All fittings shall be lined with the same material as specified for the pipe, as per paragraph 8.05.

D. Joint restraints, when required, shall be in accordance with IRCDUS Approved Manufacturers' Products List or approved equal.

8.04 Lining and Coating

A. Unless otherwise indicated, all DIP shall be factory lined and coated.

B. For 4 inches and larger, the interior protective coating shall be an amine cured novalac epoxy (Protecto 401 or similar). The epoxy material shall be applied in 1 coat with a minimum dry film

thickness of 40.0 mils, in accordance with IRCDUS Approved Manufacturers' Products List

C. Unless otherwise specified, the exterior of the pipe shall have a bituminous coating to a minimum dry film thickness of 1.0 mil. See IRCDUS Approved Manufacturers' Products List for coating material.

D. Lining Inspection:

1. All DIP and fitting linings shall be checked for thickness using a magnetic film thickness gauge. The thickness testing shall be done using the method outlined SSPC-PA-2 film thickness rating.

2. The interior lining of all pipe and fittings shall be tested for pinholes with a nondestructive 2,500-volt test.

3. Each pipe joint and fitting shall be marked with the date of application of the lining system and with its numerical sequence of application on that date.

E. The pipe or fitting manufacturer must supply a certificate attesting to the fact that the applicator met the requirements of this specification, and that the material used was as specified, and that the material was applied as required by the specification.

F. Anywhere that the coating is removed purposely or accidentally, the area shall be cleaned of any rust, grease, and dirt and re-coated to a minimum dry film as specified for the individual piece.

G. If and when directed by IRCDUS, a polyethylene encasement shall be provided around pipe, fittings, and valves. The material, installation, and workmanship shall conform to applicable sections of AWWA Standard Specifications C105/A21.5, latest revision. Installation methods A or B shall be employed using flat tube polyethylene. The Contractor shall make provisions to keep the polyethylene from direct exposure to sunlight prior to installation. Backfilling following installation shall be completed without delay to avoid exposure to sunlight.

8.05 Bell and Spigot Connections

A. Joints in bell and spigot pipe shall be push-on, mechanical, or restrained joints in accordance with AWWA Standard Specifications C111/A21.11 latest revision. Pipe restraints shall also be in accordance with IRCDUS Standards or as directed by IRCDUS.

8.06 Flanged Connections

A. All flanged pipe barrels shall comply with the physical and chemical requirements as set forth in the Handbook of Ductile Iron Pipe Research Association. Flanges shall be in accordance with ANSI Specification B16.1 for Class 125 flanges. Bolts shall be stainless and comply with ANSI Specification B18.2.

B. Flanged pipes shall be faced and drilled to the American Standard Drilling, unless special drilling is called for or required. Where tap or stud bolts are required, flanges shall be tapped. Flanges shall be accurately faced and drilled smooth and true, at right angles to the pipe axis, and shall be covered with zinc dust and tallow or a rust preventive compound immediately after facing and drilling.

C. Flanged pipe with screwed-on flanges shall be furnished with long hubs, and the flanges shall be screwed on the threaded end of the pipe in the shop and the face of the flange and end of pipe refaced together. There shall be no leakage through the pipe threads and the flanges shall be designed to prevent corrosion of the threads from outside.

D. Flanged joints shall be made with bolts or stud bolts and nuts. Bolts, stud bolts, and nuts shall conform to American Standard heavy dimensions, semi-finished with square or hexagonal heads and cold punched hexagonal nuts, 316SS. Bolt sizes shall be American Standard for the flanges specified, and bolts and nuts shall have good, true threads.

E. Gaskets shall be in accordance with AWWA Standard Specifications C115/A21.15, or latest revision.

8.07 Submittals

A. Before starting fabrication of the DIP and fittings, the Contractor shall submit one set of complete working drawings (shop drawings) to the Engineer of Record and IRCDUS for approval. Such drawings shall show the pipe, fittings, valves, expansion joints, hangers, supports, and other appurtenances to be installed. Where special fittings are required, they shall be shown in large detail with all the necessary dimensions. The Engineer of Record shall review the drawings and notify IRCDUS of the drawings approved and not approved. IRCDUS shall also review the drawings and coordinate approvals and

disapprovals with the Engineer of Record and Contractor. The drawings submitted shall show flanged jointed sections placed so as to be removable without disturbance to the main pipe sections.

8.08 Marking

A. Number 10 stranded conductor copper trace wire shall be spiral wrapped or affixed to the top of the pipe. See Trace Wire Details Drawing M-14 for specifications regarding installation.

B. Trace Wire is required over or around all pipes.

C. Location tape is required over all pipes. Tape is to be installed 12" below proposed finished grade and additional tape adhered directly to top of the pipe if required by IRCDUS engineering.

8.09 Installation

A. Handling and Protection of Pipe: Unless otherwise noted on the drawings or in other sections of this specification, the pipe shall be handled and installed in strict accordance with the manufacturers' instructions. The Contractor shall use every precaution during construction to protect the pipe against the entry of non-potable water, dirt, wood, small animals, and any other foreign material that would hinder the operation of the pipeline. Where the groundwater elevation is above the bottom of the trench, the Contractor shall provide suitable dewatering equipment at no additional cost to the IRCDUS. All piping shall be placed in a dry trench, unless otherwise approved by IRCDUS.

B. Unless otherwise shown on the drawings, or otherwise authorized by the IRCDUS, all pipe shall have a minimum cover of 36 inches. Contractor shall determine top of pipe elevation and top of ground elevation for every two joints of pipe installed using a level. Pipe must have the minimum cover described above and must be within +/- 0.2 feet of the top of pipe elevation indicated on the drawings. Installed pipe, which does not meet these requirements, shall be reinstalled until it does meet these requirements. Contractor shall record top of pipe and top of ground elevations and the locations of where these elevations were determined and submit this information to IRCDUS. IRCDUS reserves the right to have Contractor excavate and check top of pipe and top of ground elevations to see if they conform to the aforementioned requirements, at no cost to the IRCDUS.

END OF SECTION

Section 9

Reclaimed Water Mains
Polyvinyl Chloride (PVC) Pipes and Fittings

Section 9

Reclaimed Water Mains
Polyvinyl Chloride (PVC) Pipes and Fittings

9.01 General

A. PVC pipe shall be allowed for use as reclaimed water pipe where compatible with the specific conditions of the project. IRCDUS may require the use of material other than PVC during construction permit review or by IRCDUS field personnel during construction, if it is determined that PVC pipe is unsuitable for the particular application.

B. The pipe used for reclaimed mains shall be “purple” in color.

C. PVC pipe shall be identified by its nominal pipe size, plastic pipe material code, SDR class, pressure rating, ASTM Designation, Manufacturer’s name, production code, and the National Sanitation Foundation seal for potable water (NSF-pw).

9.02 Pipe for Sizes 4 inches to 48 inches in Diameter

A. All pipe intended for conveying or transmitting reclaimed pipe shall be designed for a minimum working pressure of 150 psi.

B. PVC pressure pipe shall conform to AWWA Standards Specifications C900 latest revision, or C909, latest revision and ASTM D1784 and D2241, latest revision. PVC pressure pipe shall be made from Class 12454-A or Class 12454-B material and conform to the outside diameter of cast iron pipe.

C. PVC pressure pipe less than 4” diameter shall be DR-21, PR-200

D. PVC pipe shall be purchased in accordance with IRCDUS Approved Manufacturers’ Products List.

9.03 Joints

A. Joints for PVC pressure pipe shall be bell and spigot push-on rubber gasket type only. No solvent weld or threaded joints will be permitted.

B. IRCDUS may consider other type joints for specific installation upon submission of specifications and approval.

C. Restraint joints, when required, shall be in accordance with IRCDUS Approved Manufacturers’ Products List.

9.04 Fittings

A. All underground fittings shall be either ductile iron push-on, restrained, or mechanical joint. Mechanical joints shall conform to AWWA Standard Specifications C110/A21.10 or C153/A21.53 latest revisions. Fittings shall be amine cured novalac epoxy (Protecto 401 or similar). The epoxy material shall be applied in 1 coat with a minimum dry film thickness of 40.0 mils I. All aboveground exposed fittings shall be flanged.

B. The pressure rating shall be 350 psi (Class 350).

C. Joint restraint, when required; shall be in accordance with IRCDUS Approved Manufacturers' Products List.

9.05 Submittals

A. Before starting installation of the PVC pipe and fittings, the Contractor shall submit one set of complete working drawings (shop drawings) to the Engineer of Record and IRCDUS for approval. Such drawings shall show the pipe, fittings, valves, hydrants, blowoffs, services, and other appurtenances to be installed. Where special fittings are required, they shall be shown in large detail with all the necessary dimensions. The Engineer of Record shall review the drawings and notify IRCDUS of the drawings approved and not approved. IRCDUS shall also review the drawings and coordinate approvals and disapprovals with the Engineer of Record and Contractor.

9.06 Marking

A. Number 10 stranded conductor copper trace wire shall be spiral wrapped or affixed to the top of the pipe. See Trace Wire Details Drawing M-14 for specifications regarding installation.

B. Trace Wire is required over or around all pipes.

C. Location tape is required over all pipes. Tape is to be installed 12" below proposed finished grade and additional tape shall be adhered directly on top of the pipe if required by IRCDUS.

9.07 Storage

A. PVC pipes are not to be stored where exposed to direct sunlight because of possible ultraviolet light degradation. Pipes stored on the jobsite are to be covered. PVC pipes that exhibit discoloration or fading from their original color will be rejected by IRCDUS field representatives.

9.08 Installation

A. Handling and Protection of Pipe: Unless otherwise noted on the drawings or in other sections of these standards, the pipe shall be handled and installed in strict accordance with the manufacturer's instructions. The Contractor shall use every precaution during construction to protect the pipe against the entry of non-potable water, dirt, wood, small animals, and any other foreign material that would hinder the operation of the pipeline. Where the groundwater elevation is above the bottom of the trench, the Contractor shall provide suitable dewatering equipment at no additional cost to IRCDUS. All piping shall be placed in a dry trench, unless otherwise approved by IRCDUS.

B. Depth of Cover and Pipe Elevation: Unless otherwise shown on the drawings, or otherwise authorized by IRCDUS, all pipe shall have a minimum cover of 36 inches. Contractor shall determine top of pipe elevation and top of ground elevation for every two joints of pipe installed using a level. Pipe must have the minimum cover described above and must be within +/- 0.2 feet of the top of pipe elevation indicated on the drawings. Installed pipe, which does not meet these requirements, shall be reinstalled until it does meet these requirements. Contractor shall record top of pipe and top of ground elevations and the locations of where these elevations were determined and submit this information to IRCDUS. IRCDUS reserves the right to have Contractor excavate and check top of pipe and top of ground elevations to see if they conform to the aforementioned requirements, at no cost to IRCDUS.

END OF SECTION

Section 10

Submersible Wastewater Pumping Station

Section 10

Submersible Wastewater Pumping Station

10.01 General

A. The station shall be complete with pumps, motors, piping, valves, and electrical work, including motor controls, structure, connections and all other needed appurtenances. The station shall be tested and ready for service prior to the sign off or acceptance by IRCDUS. Refer to Section 14.02 for general design requirements.

B. These specifications are intended to give a general description of what is required, but do not cover all details, which will vary in accordance with the requirements of the equipment as offered. It is, however, intended to cover the furnishing, shop testing, delivery and complete installation and field testing of all materials, equipment and appurtenances for the complete pumping units as herein specified, whether specifically mentioned in these specifications or not.

C. For all units, there shall be furnished and installed all necessary and desirable accessory equipment and auxiliaries, whether specifically mentioned in these specifications or not, and as required for an installation incorporating the highest standard for the type of service, including field testing of the entire installation and instructing the IRCDUS's regular operating personnel in the care, operation, and maintenance of all equipment. All Operation and Maintenance Manuals, along with warranty information shall be supplied to IRCDUS.

D. A terminal manhole shall be constructed within 20' upstream of a lift station. There shall be only one pipe connection from this manhole to the lift station. The pipe between the lift station and manhole shall be C-900, DR-18 PVC pipe.

E. Paint outside walls, underside of wetwell top slab and valve vault with two coats of water base epoxy.

10.02 Description of Systems

A. The pump station shall be comprised of a concrete wet well, concrete valve vault, Telemetry Control Unit (TCU), at least two submersible wastewater pumps and controls, discharge piping and all appurtenances as specified herein or needed. The pump station will pump raw, unscreened, domestic wastewater into a force main.

10.03 Qualification

A. To assure unity of responsibility, the motors and control system shall be furnished and coordinated by the pump manufacturer. The Engineer of Record shall assume responsibility for the satisfactory installation and operation of the entire pumping system, including pumps, motors, and controls as specified.

B. The pumps covered by these specifications are intended to be standard pumping equipment of proven ability as manufactured by a reputable manufacturer having extensive experience in the production of such pumps. The pumps furnished shall be designed, constructed and installed in accordance with the best practice and methods, and shall operate satisfactorily when installed. Pumps shall be manufactured in accordance with the Hydraulic Institute Standards.

C. The control system shall have an established record of successful performance for similar service and be approved by IRCDUS.

D. All equipment furnished under this specification shall be new, and shall be the standard product of manufacturers having a successful record of manufacturing and servicing the equipment and systems specified herein for a minimum of five years.

E. The pumps shall be furnished complete with controls and accessories required, and shall be as on the Approved Manufacturers' Products List. Grinder pumps shall be permitted for pumps 5.0 HP or less, unless otherwise approved by IRCDUS. Three phase electrical power will be required for all pumping stations. 120/240 volt service will be required for pump stations up to 20 HP. 277/480 volt service will be required for pump stations larger than 20 HP.

10.04 Operating Instructions

A. Operating and maintenance manuals shall be furnished. The manuals shall be prepared specifically for the installation and shall include all required cut sheets, drawings, equipment lists, descriptions, etc., that are required to instruct operating and maintenance personnel unfamiliar with such equipment.

B. An authorized representative of all major component parts of the lift station, with complete knowledge of proper operation and maintenance, shall be present on start-up of the lift station to instruct IRCDUS personnel on proper operation and maintenance of the station, and to provide operation manuals. If there are difficulties in operation of the equipment due to the manufacturers design or fabrication, the authorized representative shall be responsible for all corrective action to the satisfaction of IRCDUS. This service shall be provided at no cost to IRCDUS.

10.05 Tools and Spare Parts

A. Any special tools required shall be provided.

B. The manufacturer shall furnish a complete set of recommended spare parts necessary for the first three years of operation of the pumping system, which shall include at least the following:

1. One (1) set of upper bearings for the pumps.
2. One (1) set of lower bearings for the pumps.
3. One (1) set of upper and lower shaft seals for the pumps.
4. One (1) relay and phase monitor for each type supplied with the pump control panel for each station.
5. Two (2) sets impeller and bottom plate for grinder pumps (impeller & plate is one set).
6. Two (2) impellers for solids handling pumps.
7. One (1) TCU 800 programmed to the corresponding frequency.
8. One (1) set spare fuses.
9. One (1) alternating relay.

C. Spare parts shall be properly bound and labeled for easy identification without opening the packaging, and suitably protected for long-term storage.

10.06 Warranty

A. The Contractor and the equipment manufacturers shall warrant all equipment supplied under this section for a period of five years. Warranty period shall commence on final date when IRCDUS accepts the project.

B. The equipment shall be warranted to be free from defects in workmanship, design and materials. If any part of the equipment should fail during the warranty period, it shall be replaced in the machine(s) and the unit(s) restored to service at no expense to IRCDUS.

C. The manufacturer’s warranty period shall run concurrently with the Contractor’s warranty period. No exception to the provision shall be allowed.

10.07 Materials and Equipment

A. The pumping units required under this section shall be complete, including pumps and motors with proper alignment and balancing of the individual units. All parts shall be so designed and proportioned as to have liberal strength, stability, and stiffness, and to be especially adapted for the work to be done. Ample room shall be provided for inspection, repairs, and adjustments.

B. Each foundation plate for each pump shall be rigidly and accurately anchored into position. The same pump manufacturer shall furnish all necessary foundation bolts, plates, nuts, and washers for installation by the Contractor. Each foundation plate shall be ½" thick Type 316 stainless steel. Foundation bolts, nuts, washers, and spare parts shall be Type 316 stainless steel.

C. Stainless steel nameplates giving the name of the manufacturer, head, speed, and all other pertinent data shall be attached to each pump and motor.

10.08 Pumps

A. General

1. The pumps shall be totally submersible centrifugal pumps with close-coupled motors designed to pump sewage. The design shall be such that the pumping units shall be automatically connected to the discharge piping when lowered into place on the discharge connection. The pumps shall be easily removable for inspection or service, requiring no bolts, nuts or other fastenings to be removed for this purpose, or need for personnel to enter the wet well. Each pump shall be fitted with a 316 stainless steel lifting cable of adequate strength, and shall be five (5) feet longer than wet well depth to control panel to permit raising the pump for inspection and removal.

2. The impeller shall be constructed of nodular iron SP (spheroidal graphite). The hydraulic design shall incorporate a single vane centrifugal impeller. The design shall permit low liquid velocities and gradual acceleration and change of flow direction of the pumped media. The impeller/casing design shall result in a passage free of surfaces to which solid or fibrous materials can adhere. The overall pump design shall combine high efficiency, low required Net Positive Suction Head (NPSH), large ball passage and the ability to handle high solids concentrations efficiently. All other parts shall be of close grain gray iron construction, with all parts coming into contact with sewage protected by a coat of rubber-asphalt paint. All external bolts and nuts shall be of Type 316

stainless steel. The impeller shall be of a centrifugal type, capable of passing 3-inch minimum diameter solids, fibrous material, and heavy sludge. If riser pipes are less than 3 inches in diameter in the wet well, then the pumps must be grinder pumps.

3. Each pump shall be provided with a tandem double mechanical seal running in an oil reservoir, composed of two separate lapped face seals, each consisting of one stationary and one rotating tungsten-carbide or silicon carbide ring with each pair held in contact by a separate spring, so that the outside pressure assists spring compression in preventing the seal faces from opening. The compression spring shall be protected against exposure to the pumped liquid. The pumped liquid shall be sealed from the oil reservoir by one face seal and sealed from the oil reservoir from the motor chamber by the other. The seals shall require neither maintenance nor adjustment, and shall be easily replaced. Conventional double mechanical seals with a single spring between the rotating faces, requiring constant differential pressure to effect sealing and subject to opening and penetration by pumping forces, shall not be considered equal to tandem seal specified and required.

4. A sliding guide bracket shall be an integral part of the pumping unit, and the pump casing shall have a machined connecting flange to connect with the cast iron discharge connection, which shall be bolted to the floor of the wet well with stainless steel anchor bolts and so designed as to receive the pump connection without the need of any bolts or nuts. Sealing of the pumping units to the discharge connection shall be accomplished by a simple linear downward motion of the pump, with the entire weight of the pumping unit guided by 316 stainless steel guide rails which will press it tightly against the discharge connection. No portion of the pump shall bear directly on the floor of the sump, and no rotary motion of the pump shall be required for sealing.

5. Pump motors shall be housed in an air-filled, watertight casing. Motors shall be a NEMA Design B with a 1.15 service factor. Insulation shall be moisture-resistant NEMA Class F with a maximum temperature rise of 90 degrees Celsius above ambient temperature (4 degrees Celsius). Motor characteristics are noted on the Drawings. Pump motors shall have cooling characteristics suitable to permit continuous operation, in a totally, partially or non-submerged condition. Each motor shall incorporate an ambient temperature compensated overheat sensing device and a moisture sending device wired in series. The

protective devices shall be wired into the pump controls in such a way that if either device operates, the pump will shut down. The devices shall be self-resetting. The cable shall be fixed to the pump using a watertight trumpet assembly. The pump shall be capable of running continuously in a totally dry condition under full load, without damage, for extended periods. Before final acceptance, a field running test demonstrating this ability, with four hours of continuous operation (water supplied by the contractor) under the above conditions, shall be performed for all pumps being supplied, if required by the IRCDUS. Pump motor cables shall be suitable for submersible pump applications and shall be properly sealed.

6. Motor windings shall be treated with a mildew preventative.

B. Each pumping unit and its driving equipment shall be designed and constructed to withstand the maximum turbine runaway speed of the unit due to backflow through the pump.

C. Performance Requirements, refer to IRCDUS Standards, Pumping Station Data Table on Drawing No. L-8.

10.09 Access and Frame Guides

A. The pumping station shall be furnished with the necessary aluminum access frames, complete with hinged and hasp-equipped covers, stainless steel upper guide rail holder, power cable holder and level sensor cable holder. The frames shall be securely mounted above the pumps. Access covers shall have safety locking handles in open position. Access covers shall be of aluminum-checkered plate with 316 stainless steel hinges and hardware. The access cover and frame shall be as sized on the Drawings.

B. Lower guide rail holders shall be integral with the discharge connection. Guide rails shall be of Schedule 40, 2" Welded 316 stainless steel pipe of the size indicated on the Approved Drawings and of the length required by the pump manufacturer.

C. A safety grate with 316 stainless steel hardware is required for all wet wells and shall be in accordance with IRCDUS Approved Manufacturers' Products List.

10.10 Pump Control System-Manual System (Non-remote Telemetry Unit)

A. General

1. A pump controller shall be provided for the wastewater pumping station. The controller shall respond to the liquid

level sensor to automatically start and stop pumps to pace pump station influent flow and shall be approved by IRCDUS.

2. The pump controller shall be the standard system of the manufacturer as modified for this application. The wet well levels to be used in operation are as shown on Detail Drawings L-2A and L-8 of the IRCDUS Standards.

B. Operation Requirements

1. The control panels shall consist of a main circuit breaker and generator breaker with mechanical interlock, an emergency generator receptacle, a motor control breaker (MCB) and magnetic starter for each pump motor, and 20 ampere, 120/240 volt circuit breakers as required. The motor control panel (MCP) shall meet all requirements of service entrance by properly bonding neutral or shall be Underwriters Laboratories service entrance rated. A low and high level alarm and pump shutoff shall be accomplished by float type, liquid level control system, with all components mounted in one common enclosure. Control switches shall provide means to operate each pump manually or automatically. When operated in the automatic mode, the control assembly shall provide means to manually select or automatically alternate the position of the “lead” and “lag” pumps after each pumping cycle. A three position alternate switch labeled “hands-off-auto” (H-O-A) shall be provided to manually select which pump shall be the lead pump, when necessary, and also be able to test the alternator to see if it is still operational.

2. A float type liquid level control system shall continuously monitor wet well liquid level and control operation of the low-level cutoff for the pumps, and shall operate on a 24-volt circuit.

3. A non-fused safety switch shall be installed between the meter and panel. This switch shall be in a NEMA 4X, UL rated, stainless steel waterproof enclosure, in accordance with IRCDUS Approved Manufacturers’ Products List. Amperage shall be at least equal to that of the main breaker.

C. Construction

1. The electrical control equipment shall be mounted within a modified NEMA 4X, UL rated, white powder coated stainless steel (316), dead front enclosure. The enclosure shall be equipped with a door and may incorporate a removable back panel on which control components shall

be mounted. Back panel shall be secured to enclosure with collar studs. All lines entering the enclosure shall be protected by conduit seal bushings (supplied by pump manufacturer) at the source and shall be behind the dead front enclosure, entering from the side or bottom only. The seals shall prevent moisture and gas from entering the enclosure. Two cable connectors (shall be in accordance with IRCDUS Approved Manufacturers' Products List) shall be provided to terminate the motor cables in the control panel. The connectors shall be suitable for a 2" conduit with a seal bushing suitable for the motor cables.

2. Components

a. All motor branch circuit breakers, motor starters, and control relays shall be of highest industrial quality, securely fastened to the removable back panels with screws and lock washers. Back panels shall be tapped to accept all mounting screws. Self-tapping screws shall not be used to mount any component. A non-corrosive material shall be utilized for wire connection locations within the box.

b. A thermal-magnetic air circuit breaker, per Approved Manufacturers' Products List, shall be furnished for the main breaker. The manufacturer shall seal all circuit breakers after calibration to prevent tampering. A Motor Control Breaker (MCB) shall be provided for each motor starter. Each MCB shall be adequately sized to meet the pump motor and station operating conditions.

c. An open frame, across-the-line, NEMA rated, magnetic motor starter, Class 8536, in accordance with IRCDUS Approved Manufacturers' Products List, shall be furnished for each pump motor. Reduced voltage motor starters, Class 8606, per Approved Manufacturers' Products List, are required for all 30 HP and larger motors. All motor starters shall be equipped to provide under-voltage release and overload protection on all three phases. Motor starter contacts shall be easily replaceable without removing the motor starter from its mounted position. Overload reset push buttons shall be located on the inside of the control compartment door.

d. An emergency generator receptacle (EGR) shall be installed in the side of the control panel and connected to the line side of the generator interlock

breaker. The receptacle shall be in accordance with IRCDUS Approved Manufacturers' Products List.

e. Provide surge protector on the utility side of lift station.

f. A ground fault interrupter (GFI) duplex utility receptacle providing 120 volt, 20 amp, 60 hertz, single phase current shall be mounted on the internal door.

g. The control panel shall include an adjustable time delay relay to prevent both pumps from starting simultaneously. Time delay relays shall be electronic type.

h. A light shall be installed in the panel with a door switch. An overhead flood light shall be installed adjacent to the panel operated by a switch in the panel.

3. Operating Controls and Instruments

a. All operating controls and instruments shall be securely mounted on the control compartment door. All controls and instruments shall be clearly labeled to indicate function.

b. Pump mode selector switches shall be Hand-Off-Auto type to permit override of automatic level control and manual actuation of shutdown of either pump motor. Operation of pumps in manual mode shall bypass all safety shutdown circuits except pump motor overload shutdown. Switches shall be oil-tight, in accordance with IRCDUS Approved Manufacturers' Products List, providing three switch positions, each of which shall be clearly labeled according to function. Separate indicator lamps, which shall operate at 115 volts input, shall be provided mounted above H.O.A. selector switches. Lamps shall be easily replaceable from the front of control compartment door without removing switch modules from their mounted positions.

c. Indicator lamps shall be mounted in oil-tight modules, in accordance with IRCDUS Approved Manufacturers' Products List. Lamp modules shall be equipped to operate at 115-volt input. Lamps shall be easily replaceable from the front of the control compartment door without removing lamp module from its mounted position.

d. A six-digit, non-reset elapsed time meter shall be connected to each motor starter to indicate the total running time of each pump in “hours” and “tenth of hours.” The elapsed time meters shall be in accordance with IRCDUS Approved Manufacturers’ Products List.

e. Provide an amperage meter on the control compartment door.

f. Phase Monitor: An 11-pin 3-phase monitor shall be installed and wired to disconnect control power from the motor starters in the event of loss of power, phase reversal, loss of any phase or phase balance, or low voltage. The phase monitor shall automatically reset following any of those conditions.

10.11 Pump Control System (Telemetry Control Unit)

A. A Telemetry Control Unit (TCU) shall be supplied with the pump control system. The TCU shall be capable of acquiring analog and discrete data for transmission to the Central Telemetry Unit (CTU). The TCU shall also be capable of receiving instructions from the CTU for the operation of the pumps.
B. Provide TCU 800 with USB address kit, and TCU 001 address board.
C. Provide solar panel and battery backup.
D. See IRCDUS Approved Manufacturers’ Products List for the separate components.

10.12 Shop Painting

A. Before exposure to weather and prior to shop painting, all surfaces shall be thoroughly cleaned, dry and free from all mill-scale, rust, grease, dirt and other foreign matter.

B. All pumps and motors shall be shop primed with primer compatible with the field painting.

C. All nameplates shall be properly protected during painting.

D. Gears, bearing surfaces, and other similar surfaces obviously not to be painted shall be given a heavy shop coat of grease or other suitable rust-resistant coating. This coating shall be maintained as necessary to prevent corrosion during periods of storage and erection and shall be satisfactory to IRCDUS up to the time of final acceptance test.

E. Control Panels shall be made of stainless steel (316).

10.13 Field Painting

A. The primer and paint used in the shop shall be products of the same manufacturer as the field paint to assure compatibility.

B. All nameplates shall be properly protected during painting.

10.14 Lift Station- General

A. The Lift Station Wet Wells shall conform to the following size:

Depth (ft)	Diameter (ft)
0-10	6
11-15	8
16-20	10
21-25	12

or as approved by IRCDUS's Engineer.

10.15 Lift Station Liners
General

A. A protective liner or coating for the concrete shall be installed in the lift station/wet wells, re-pump lift stations, receiving manholes, drop manholes, and manholes as required by IRCDUS.

B. After the lift station lining/coating operation has been completed, the Contractor in the presence of the IRCDUS's representative shall visually inspect the lift station. In addition, at IRCDUS request, the Contractor shall be required within one year to visually inspect the lift station. The Contractor shall redo any work that has become defective.

HDPE Liners

A. The Lift Station Liner shall be High Density Polyethylene (HDPE) with a minimum thickness of 2 mm. All HDPE liner sheets shall be extruded with a large number of anchoring studs, a minimum of 39 per square foot, manufactured during the extrusion process in one piece with the sheet so there is no welding and no mechanical finishing work to attach the studs to the sheet. The liner shall have a pull out resistance of 112.5 lbs./anchoring stud.

B. Flat liner sheet, non anchored, used for overlapping joints, shall have a minimum thickness of 3mm. All joints shall be sealed by means of thermal welding performed by certified welders.

C. The lining shall have good impact resistance, shall be flexible, and shall have an elongation sufficient to bridge up to a 1/4-inch

settling crack, without damage to the lining. The liner shall be able to bridge any expansion cracks that may occur.

D. Lining shall be repairable at any time during the life of the structure.

E. A certified fabricator shall custom fit the liner to the form work in order to protect the concrete surfaces from sewer gases. The interior surfaces to be protected shall include the walls, ceiling, and pipe entries.

F. For all lined manholes the use of HDPE Grade rings shall be used in lieu of brick or precast grade rings. Grade rings shall meet HS-25 load rating. Butyl sealant shall be used between each ring to make a watertight joint. The first grade ring shall be welded to the liner to provide a gas tight seal.

C. Upon request, the manufacturer shall provide written certification that the liner used meets or exceeds the requirement of this specification.

D. Provide a five-year unlimited warranty on all workmanship and products. The work includes the surface preparation and application of the liner system, shall protect the structure for at least five years from all leaks, and from failure due to corrosion from exposure to corrosive gases such as hydrogen sulfide.

Fiberglass Liners

A. The lift station liner shall meet all requirements of ASTM Specifications D-3753 for glass fiber reinforced polyester manholes or lift stations. See IRCDUS Approved Manufacturers' Products List.

B. Fiberglass liners shall have a three-year warranty period.

Interior Coatings

A. The work shall include the furnishing and installation of an interior protective coating system including all necessary materials, equipment and tools as required for a complete installation. Coating shall be "Green Monster Structural System for Installation on New Structures manufactured by GML Coatings, LLC, or pre-approved equal. The completed system shall provide a waterproof, corrosion resistant liner to prevent any deterioration of concrete surfaces from hydrogen sulfide and other corrosive gases/acids produced by wastewater and to prevent infiltration. To ensure total unit responsibility, all materials and installation thereof shall be approved and furnished by, and coordinated with, GML Coatings LLC.

B. Provide a minimum ten (10) year unlimited warranty on all workmanship and products. The work includes the surface preparation and application of the liner system, shall protect the structure from all leaks, and from failure due to corrosion from exposure to corrosive gases such as hydrogen sulfide.

END OF SECTION

Section 11

Miscellaneous Valves and Appurtenances

Section 11

Miscellaneous Valves and Appurtenances

11.01 General

A. All of the types of valves and appurtenances shall be on the IRCDUS Approved Manufacturers' Products List.

B. All valves and appurtenances shall be designed, constructed, and installed in accordance with the best practices and methods and shall comply with these specifications as applicable.

C. All valves and appurtenances shall have the name of the manufacturer, year manufactured, and the working pressure for which they are designed cast in raised letters upon some appropriate part of the body.

D. All buried valves and appurtenances shall be mechanical joint. All aboveground/exposed valves and appurtenances shall be flanged.

E. Gate valves shall be used on water, sewer, reclaimed, and brine mains.

F. Plug valves may be used in lift station valve vaults as approved by IRCDUS.

G. IRCDUS, on a case-by-case basis, may approve valves and appurtenances other than those specifically called out in this Section for use. Criteria for approval shall include the interchangeability of the valve or appurtenance, or its parts, with those brands specifically called out in these specifications.

H. All exposed valves and appurtenances shall be painted in accordance with IRCDUS Approved Manufacturers' Products List. Water mains shall be painted blue, force mains shall be painted "green", reuse mains shall be painted "purple" and brine shall be painted "brown".

11.02 Gate Valves – 3 Inches and Larger

A. All buried gate valves shall meet the requirements of AWWA Standard Specification C509-C515, or latest revision. Valves shall be rated for 150-psi working pressure and a minimum 300-psi test pressure. Valves shall be ductile iron body, bronze-mounted, resilient seated, non-rising stem type fitted with "O-Ring" seals. All bolts to be used in valve bonnet are to be 316 stainless steel. The operating nuts shall be Standard AWWA 2" square. All valves shall open counterclockwise. Stuffing boxes shall be the "O-Ring" type. Gate valves shall be mechanical joint, ANSI Standards 21.11, except where shown otherwise.

B. Gate valves shall be provided with a valve box, cover, and concrete pad. Box cover opening shall be for valve stem and nut. The Contractor shall provide valve wrenches and extension stems from the same manufacturer as the valve to actuate the valves. The box and cover shall be in accordance with IRCDUS Approved Manufacturers' Products List. (See Drawing M-5 and M-6 for details on the valve box, cover, and concrete pad.)

11.03 Check Valves

A. Check valves for ductile iron pipelines shall be swing type and shall meet the material requirements of AWWA Standard Specifications C508-01, or latest revision. The valves shall be iron body, bronze mounted, single disc, 150 psi working water pressure, non-shock, and non-slam, slow closing, and hydrostatically tested at 300 psi. Ends shall be 125 pound ANSI B16.1 flanges or 125 pound ANSI B2.1 threaded fittings, depending upon location.

B. When there is no flow through the line, the disc shall hang lightly against its seat. When open, the disc shall swing clear of the waterway.

C. Check valves shall have bronze seat and body rings, extended bronze hinge pins, and bronze nuts on the bolts of bolted covers.

D. Valves shall be so constructed that disc and body seat may easily be removed and replaced without removing the valve from the line. Valves shall be fitted with an extended hinge arm with outside lever and weight, as necessary.

E. Check valves for PVC pipe less than 3" in diameter shall be of PVC Type 1, Series BC, with union, socket, threaded, or flanged ends, as required and shall be per the Approved Manufacturers' Products List.

11.04 Plug Valves

A. Plug valves shall be non-lubricated eccentric type with semi-steel bodies, resilient faced plugs, and stainless steel or nickel seats in the body. Port area shall be at least 80 percent of full pipe area for valves 20 inches and smaller. Port area shall be 70 percent for all valves 24 inches and larger. All valves 4 inches and larger shall be of the bolted design. All exposed nuts, bolts, springs, and washers shall be hot dipped galvanized, except exposed hardware for submerged valves shall be of stainless steel. Valve bodies shall be semi-steel with 125-pound ANSI Standard flanged ends for interior or aboveground service; mechanical joint for buried service and for use with threaded cast iron or ductile iron piping shall have screwed end connections. The plug shall be one

piece and of sufficient design so as not to require a stiffening member opposite the face plug.

B. Plug valves 6 inches or greater in diameter shall be equipped with gear actuators, which shall clearly indicate valve position and an adjustable stop shall be provided. Construction of actuator housing shall be semi-steel. All gearing shall be enclosed, suitable for running in oil with seals provided on all shafts to prevent entry of dirt and water into the actuator. All shaft bearings shall be furnished with permanently lubricated bearing bushings.

C. Three-way plug valves shall be non-lubricated gear operated. Valve bodies shall be semi-steel with 125-pound ANSI Standard flanges, and plugs shall be resilient faced. Three-way valves shall be 3-way, 3-port, 270-degree turn.

D. Plug valves and actuators shall be as per the Approved Manufacturers' Products List.

11.05 Air Release Valves

A. The air release valves shall be installed as shown on the Drawings. Valves shall be provided with a vacuum check to prevent air from re-entering the line. Above ground air release valves for wastewater shall be per the Approved Manufacturers' Products List. (See Drawing M-9.)

B. The fittings shall be threaded. Belowground air release valves for wastewater shall be as on the Approved Manufacturers' Products List. (See Drawing M-9.) Air release valves for water lines shall be as per the Approved Manufacturers' Products List.

11.06 Fire Hydrants

Fire hydrants shall be traffic type, 5¼" valve opening and manufactured per the Approved Manufacturers' Products List. (See Drawing W-2 A.) Fire hydrants shall comply with the current AWWA Standard Specification C502-94, or latest revision, for fire hydrants for water works service. Each hydrant shall have 6" mechanical joint ends with harnessing lugs ("dog ears") and shall open by turning to the left (counterclockwise). Fire hydrant shall be of ample length for 18" clearance between the center of all nozzles and finished grade. Hydrant should be set so that the "bury line" on the barrel is set at finished grade. It shall be provided with two 2½" hose nozzles and one 5¼" pumper nozzle, all having National Standard hose threads. Nozzles shall have caps attached by chains. Operating nuts shall be AWWA Standard (pentagonal, measuring 1½" point to flat). Fire hydrants shall be equipped with "O-Ring" packing. Fire hydrant shall be painted "Federal Safety Red".

11.07 Backflow Preventers

All backflow preventers shall be mounted aboveground, in non-traffic areas on the customer's side of the meter. Above ground piping shall be flanged ductile iron. Brass or Copper pipe may be used for pipe 2" in diameter or smaller. Backflow preventers shall be of reduced pressure/double check type with two (2) independently operating check valves, and shall be designed to operate in a horizontal flow mode. An independent relief valve shall be located between the two check valves. Reduced pressure feature shall be included in all commercial applications. Preventers shall be University of Southern California (USC) approved as per the Approved Manufacturers' Products List.

11.08 Valve Boxes

A. All buried valves shall have cast iron two or three-piece valve boxes with cast iron covers. Valve boxes shall be provided with suitable heavy bonnets and extend to match finished grade surface as directed by the Engineer. The barrel shall be one or two-piece, screw or slide type, having 5¼" shaft. Covers shall have "WATER" cast into the top for all water mains, "SEWER" cast into the top for all wastewater force mains and "REUSE" cast into the top for all reuse mains. All valves shall have actuating nuts extended to within 24 inches of the top of the valve box cover. (See Drawing M-6.)

B. Valve boxes shall be provided with a concrete pad around the top of the box. A nameplate with a suitable anchor for casting in concrete shall be installed in valve pads in unpaved areas. Nameplate shall be 3" diameter brass disk with engraved lettering 1/8" deep, as shown on the Drawing M-6. and manufactured per the Approved Manufacturers' Products List.

C. A 3" diameter wire port box to house the trace wire shall be installed in valve boxes in unpaved areas.

D. Valve boxes shall be installed in a concrete pad, as specified in Drawings Detail M-6 & M-6 A.

E. Valve boxes shall be manufactured domestically (i.e.: "Made in USA") per the Approved Manufacturer's List.

11.09 Water Service

A. All water service fittings, including saddles, corporation stops, curb stops, and angled meter stops shall be no-lead brass or bronze suitable for 150 psi operating pressure, shall be iron pipe or AWWA tapered thread design, shall be of sizes required and/or noted on the Drawings, and comply with the Approved Manufacturer's Products List.

B. Saddles shall be no-lead brass/bronze bodies with double stainless steel strap.

11.10 Flexible Couplings

A. Flexible couplings shall be either the split type or the sleeve type.

1. Split type coupling shall be used with all interior piping and with exterior piping as noted. The couplings shall be mechanical type for radius groove piping. The couplings shall mechanically engage and lock grooved pipe ends in a positive couple and allow for angular deflection and contraction and expansion.

2. Couplings shall consist of ductile iron, ASTM Specification A47, Grade 32510 housing clamps in two or more parts, a single chlorinated butyl composition sealing gasket with a "C" shaped cross-section and internal sealing lips projecting diagonally inward, and two or more oval track head type bolts with hexagonal heavy nuts conforming to ASTM Specification A183 and A194 to assemble the housing clamps. Bolts and nuts shall be 316 stainless steel.

3. Sleeve type couplings shall be used with all buried piping. The couplings shall be of ductile iron and shall be per the Approved Manufacturers' Products List. The coupling shall be provided with 316 stainless steel bolts and nuts, unless indicated otherwise.

4. All couplings shall be furnished with the pipe stop removed.

5. Couplings shall be provided with gaskets of a composition suitable for exposure to the liquid within the pipe.

6. Ductile iron followers and middle rings conform to ASTM A-536, Grade 65-45-12, NSF-61 fusion bonded powder epoxy coating, testing per AWWA C-219 (ANSI A21-11), rating 200 psi working pressure per AWWA C-219, compounded gaskets conform to compression test ASTM D-395 Method A & B, approved for water application.

11.11 Steel Casing Pipe

A. Steel casings shall conform to the requirements of ASTM Designation A139 Grade "B" with a minimum yields strength of 35,000 psi and shall be coated inside and outside by a black bituminous coating, minimum 5 mils thick. The casing pipes shall

have the minimum nominal diameter and wall thickness as indicated below.

Casing Pipe Inside Diameter Inches	Casing Pipe Wall Thickness Inches
6-16	.250
18-20	.312
22-24	.375
26-28	.437
30-34	.500
36-38	.562
40-50	.625
52-58	.750
60-78	.813
84-90	.875
96-102	.937
108-114	1.000
120	1.125

B. Field and shop welds of the casing pipes shall conform to the American Welding Society Standard Specifications. Field welds shall be complete penetration, single-vee groove or single-bevel groove type joints.

11.12 Tapping Sleeves and Valves

A. See Section 11.02 for Tapping (Gate) Valves.
B. Tapping sleeves shall be fully-passivated stainless steel wraparound type per the Approved Manufacturers' Products List.
C. All force main taps shall be a minimum of 4" diameter.
D. All taps shall be performed under supervision of IRCDUS Inspector. A pre-construction meeting may be held on-site at Inspector's discretion.
E. Tapping contractor MUST be approved by IRCDUS.
F. Tapping machine shall be disinfected prior to tap per AWWA C651.
G. No taps will be performed on Fridays or days preceding holidays.
H. Tapping saddle and valve shall be hydrostatically tested at a minimum 150 psi for 15 minutes duration. Any loss of pressure during the test period shall indicate failure.

END OF SECTION

Section 12

Aerial Crossings

Section 12

Aerial Crossings - New and/or Replacement

12.01 General

A. There are two industry-accepted methods of constructing aerial crossings: ductile iron and welded steel. Joints are usually constructed using flanges or push-on pipe. In the case of ductile iron, flanges are screwed onto the pipe. For steel pipe, all flanges are to be factory welded. No field welding is allowed.

B. Where there is a new or existing utility bridge shelf, the aerial crossing shall be constructed of flanged or push-on Ductile Iron Pipe (D.I.P). The crossing shall be constructed in place on concrete cradles. Pre-assembly of ductile iron pipe and then lifting into place will not be allowed. DIP shall be saw cut only; no torch cutting is allowed.

C. Where there is a bridge hanger installed for the aerial crossing, steel pipe with factory welded flanges shall be used. All flanges are to be joined using 316 stainless steel bolts, nuts and washers. The steel pipe crossing will be preassembled and then lifted into place onto the hangers. If the total span length is such that it cannot be shipped without special conditions, the span shall be constructed in two or more sections having factory-welded flanges on both ends.

12.02 Pipe

A. DIP specifications for ductile iron utility pipe are given in Sections 1 and 4 of the standards.

B. Steel pipe for aerial crossings shall be the size as shown on construction plans and shall be in shop-finished lengths. No field cutting and fitting will be allowed. If no plans are available, it will be specified by the design engineer. If an existing aerial pipe is to be replaced and exact finished length cannot be determined without lifting the steel section into place for measurement, the flanged steel section length will be estimated and assembled leaving it about 3 feet short of the total span length. A 5 to 10 feet section of flanged DIP shall be secured to the end of the steel flange for measurement and cut to fit. The plain end of the DIP will be secured to a mechanical joint fitting using a gasket and mega lug restraint.

C. Pipe shall be seamless carbon steel pipe ASTM A53, Grade B, Schedule 80 with a circumferential weld meeting the requirements of AWWA Standard C200 “Steel Water Pipe 6” and Larger”. Steel Pipe and Flanges (welded to the pipe by the

manufacturer) are to be welded by a certified welder. Flanges are to be AWWA C207-07, 150# E-Ring Plate, FF-SO. In all cases, the minimum wall thickness of pipe shall be ½ inch.

12.03 Lining and Coating

A. All coatings and linings shall be factory installed.

B. Lining: All DIP water pipe shall be cement mortar lined as described in Section 1 and sewer pipe shall be epoxy lined as described in Section 4. All linings shall be factory installed. Steel pipe shall be prepared for linings/coatings per the manufacturers' recommendations. Lining shall be Tnemec Pota-Pox N140 or V140 or approved equal.

C. DIP shall be coated according to specifications described in Sections 1 and 4. Steel pipe shall be polyurethane coating, or approved equal, per AWWA C222 and paint manufacturers' recommendations. Coating repairs shall be per AWWA C222 and paint manufacturers' recommendations.

D. Ferrous, Nonferrous Metals, and Galvanized Metals; Exterior Non-submerged:

1. Surface Preparation: Outside surface of pipe to be cleaned and/or blasted per the paint manufacturers' recommendation.

2. Product and Manufacturer-Provide one of the following:

a. Tnemec:

1) Shop Primer: 66-1211 Epoxy – 1 or 2 coats, 3.0-5.0 dry mils per coat.

2) Shop Primer: 90-97 & H90-97 – 1 or 2 coats zinc-rich "lead free" primer 2.5-3.5 dry mils per coat.

3) Shop Primer or Field Touch-Up (Top Coat): 66-1211 Epoxy - 1 coat, 3.0-5.0 dry miles per coat.

4) Shop Finish or Field Touch-Up (Top Coat): 66 H.B. Epoxoline - 2 coats, 3.0-4.0 dry mils per coat.

5) Shop Finish (Top Coat): Endura-Shield II 1074 & 1074U 2 coats 2 to 5 dry mils.

b. KOP-COAT:

1) Shop Primer:

a) Ferrous Metals: 340 Gold Epoxy – 1.5-2.0 dry mils per coat.

b) Nonferrous and Galvanized: None.

2) Intermediate: Hi-Gard - 1 coat, 4.0-5.0 dry mils.

3) Shop Finish or Field Touch-Up: 1122BRS Polyester Polyurethane - 1 coat, 1.5-2.5 dry mils per coat, 360-540 square feet per gallon.

c. MAB Paint:

1) Shop Primer: Ply-Tile 520-W-45 - 1 coat, 2.0-3.0 dry mils per coat.

2) Field Primer or Touch-up (Top Coat): Ply-Tile 520-W-45 - 1 coat, 2.0-3.0 dry mils per coat

3) Shop Finish or Field Touch-Up (Top Coat): Series 031 Ply-Tile 520 HB Epoxy - 2 coats, 6.0-8.0 dry mils per coat.

d. Or approved equal.

3. Color of Pipe Lines:

a. All pipelines and equipment shall be painted in conformity with the requirements of this section. Final coats of paint shall be color-coded.

b. General Color Code

Pipe Line	Color
Finished or Potable	Blue
Sewer (Sanitary or Other)	Black or Green
Reclaim	Purple
Brine	Brown

END OF SECTION

Section 13

Testing and Inspection of Water Mains, Reclaimed Mains, Wastewater Force Mains, and Gravity Sewer Lines

Section 13

Testing and Inspection of Water Mains, Reclaimed Mains, Wastewater Force Mains, and Gravity Sewer Lines

13.01 Pressure and Leakage Tests of Underground Pressure Piping

A. No testing will be permitted until record drawings have been submitted and approved by IRCDUS.

B. Prior to conducting pressure and leakage tests, all new water and reclaimed water pipelines shall be full bore flushed (see Drawing W-9) and all pipelines including wastewater force mains shall be thoroughly cleaned to remove all dirt, stones, pieces of wood, and any other materials that may have entered the pipeline during construction, and all dirty water and/or discolored water from the pipelines. After this cleaning, if any obstructions remain, they shall be removed. All debris cleaned from the pipelines shall be removed from the job site. Hydrostatic pressure and leakage tests shall conform to AWWA Standard Specifications C-605-94, or latest edition, for PVC pipe. Hydrostatic pressure and leakage tests shall conform to AWWA Standard Specifications C-600-99, or latest revision, for DIP. The Contractor shall furnish all gauges, meters, pressure pumps and other equipment needed to test the line. IRCDUS shall be present during all testing, televising, and final inspections.

The pressure required for the field hydrostatic pressure test shall be not less than 150 psi for water mains, reclaimed water mains and for sewer force mains. The Contractor shall provide temporary plugs and blocking necessary to maintain the required test pressure. Corporation cocks at least 1 inch in diameter, pipe riser and angle globe valves shall be provided at each pipe dead-end in order to bleed air from the line. Duration of pressure test shall be at least 2 hours.

Allowable amount of makeup water for expansion during the pressure test of the pipe shall conform to Plastic Pipe Institute (PPI) Handbook of Polyethylene Pipe; Inspection, Tests, and Safety Considerations, unless otherwise approved by IRCDUS. The Operating Safety Considerations, Post Installation, Hydrostatic Testing, Monitored Make-up Water Test, Table III, is on Pages 24 and 25 of the Handbook.

C. The leakage test may be conducted concurrently with the hydrostatic pressure test and shall be of not less than 2 hours duration. All leaks evident at the surface shall be repaired and leakage eliminated regardless of total leakage as shown by test. Lines that fail to meet tests shall be repaired and re-tested as necessary until satisfactory test requirements are complied. Defective materials, pipes, valves and accessories shall be removed and replaced. The pipelines shall be tested in such sections as may be directed by IRCDUS by shutting valves or installing temporary plugs as required. The line shall be filled with water and all air removed and the test pressure shall be maintained in the pipe for the entire test period by means of a force pump to be furnished by the

Contractor. Accurate means shall be provided for measuring the water required to maintain this pressure. The amount of water required is a measure of the leakage. Testing shall be in accordance with the applicable provisions as set forth in Section 13 of AWWA Standard Specification C-600-99, or latest revision. The allowable rate of leakage shall be less than the number of gallons per hour determined by the following formula:

$$L = \frac{ND \times (P)^{1/2}}{7400}$$

L = allowable leakage in gallons per hour

N = number of joints in the section tested

D = nominal diameter of the pipe in inches

P = average test pressure maintained during the leakage test in pounds per square inch gauge

D. The Contractor shall remove and adequately dispose of all blocking material and equipment after completion and acceptance of the field hydrostatic test, unless otherwise directed by IRCDUS. The Contractor shall repair any damage to the pipe coating. Lines shall be totally free and clean prior to final acceptance.

E. IRCDUS must be present during testing.

F. If thrust blocks have been approved for use, thrust blocks shall not be backfilled until inspected by IRCDUS.

G. At the beginning of the testing period, thoroughly clean all new pipelines by whatever means necessary, including flushing, to remove all dirt, stones, pieces of wood, other material that may have entered during the construction period, and any dirty or discolored water from the lines. If, after this cleaning, any obstructions remain, they shall be removed. All debris cleaned from the lines shall be removed from the job site.

H. All PE water mains and service lines shall be field-tested. The Contractor shall supply all labor, equipment, material, gauges, pumps, meters and incidentals required for testing. The Contractor shall pressure test each water main upon completion of the pipe laying and backfilling operations, including placement of any required temporary roadway surfacing.

I. All water mains shall be tested to a minimum of 150 psi. The test pressure shall be measured on site in the presence of IRCDUS personnel during the test period.

J. Testing shall be conducted after backfilling has been completed and before placement of permanent surface.

K. Allowable amount of makeup water for expansion during the pressure test of the pipe shall conform to Plastic Pipe Institute (PPI) Handbook of Polyethylene Pipe; Inspection, Tests, and Safety Considerations, unless otherwise approved by IRCDUS. The Operating Safety Considerations, Post Installation, Hydrostatic Testing, Monitored Make-up Water Test, Table III, is on Pages 24 and 25 of the Handbook.

L. In any test of pipe laid, disclosed leakage or significant pressure drop greater than that allowed, the Contractor shall, at its own expense, locate and repair the cause of leakage and retest the line. The amount of leakage that may be permitted shall be in accordance with AWWA Standard Specifications.

M. All visible leaks are to be repaired regardless of the amount of leakage.

13.02 Disinfecting Potable Water Lines

A. Before being placed in service, all potable water pipelines shall be disinfected in accordance with AWWA Standard Specifications C-651-99, or latest revision. The location of the chlorination and sampling points will be as shown on the drawings. The Contractor shall uncover and backfill taps for chlorination and sampling, as required.

B. The general procedure for chlorination shall be first to flush all dirty or discolored water from the lines, and then introduce chlorine in approved dosages in accordance with Table 10-1 through a tap at one end, while water is being withdrawn at the other end of the line. The chlorine solutions shall remain in the pipeline for no less than 24 hours.

C. The use of chlorine tablets is strictly prohibited.

D. Following the chlorination period, all treated water shall be flushed from the lines at their extremities and replaced with water from the distribution system. The Contractor's lab shall then make bacteriological sampling and analysis of the replacement water in full accordance with AWWA Standard Specifications C-651, or latest revision. The Contractor will be required to re-chlorinate, if necessary. The line shall not be placed in service until all the requirements of the Florida Department of Environmental Protection are met and a letter of clearance issued with a copy provided to IRCDUS.

E. Special disinfecting procedures shall be used in connections to existing mains where the method outlined above is not practical.

F. The Contractor shall make all arrangements necessary with an independent commercial laboratory approved by the National Environmental Laboratory Accreditation Program (NELAP) for the collection and examination of samples of water from disinfected water mains. Note: The Contractor may not collect his own samples. These samples shall be examined for compliance with the Florida Department of Environmental Protection's requirements. Sampling shall be made daily

and continuously until two successive examinations are found satisfactory. Should one examination be found unsatisfactory, the line shall be flushed and disinfected again. Certified copies of all laboratory analyses shall be provided to the IRCDUS. The cost of all sampling, flushing and disinfecting shall be included in the contract price. IRCDUS shall operate all valves and be present to determine and control the volume of water used for flushing.

Table 10-1

Chlorine Required to Produce a 25 mg/l Concentration in 100 feet of Pipe

Pipe Diameter (inches)	100% Chlorine (pounds)	1% Chlorine Solution (gallons)
4	0.013	0.16
6	0.030	0.36
8	0.054	0.65
10	0.085	1.02
12	0.120	1.44
16	0.217	2.60
Greater than 16	See AWWA Standards Specifications C-651-99	

13.04 Testing of Gravity Sewer Lines

A. No testing will be permitted until record drawings have been submitted and approved by IRCDUS.

B. Leakage test by exfiltration and infiltration, as described below, shall be made on all pipes.

C. Exfiltration tests shall be made on all pipes after backfilling. All sewers shall be tested such that water is filled to the rim of the lowest manhole being tested within each section being tested, as directed by the IRCDUS. Mechanical plugs shall be used on the gravity sewer system in such a manner that the air can be released from the sewer while it is being filled with water. The test shall be continued for one hour and provisions shall be made for measuring the amount of water required to maintain the water at a constant level during this period. If test results are unsatisfactory, IRCDUS may direct that additional test be made on any section or the entire pipe.

D. If any joint shows an appreciable amount of leakage, the jointing material shall be removed and joint remade. If any pipe is defective, it shall be removed and replaced. If the quantity of water required to maintain a constant level in the sewer for one hour does not exceed 100 gallons per inch of diameter per day per mile of sewer and if all the leakage is not

confined to a few joints, the workmanship shall be considered satisfactory. If the amount of leakage indicates defective joints or broken pipes, the Contractor shall correct them.

E. Pipe shall be tested for infiltration after the backfill has been placed. Infiltration tests shall be made under the supervision IRCDUS. The length of line to be tested shall be as directed by IRCDUS. The allowable infiltration shall be 100 gallons per inch of diameter per day per mile of sewer.

F. Rate of infiltration shall be determined by means of V-notch weirs, pipe spigot or by plugs in the end of the pipe, to be provided and installed by the Contractor in an approved manner and at such times and locations as may be directed by IRCDUS.

G. In an inspection of the completed sewer or any part thereof shows any manholes, pipes or joints that allow the infiltration of water in a noticeable stream or jet, the defective work or material shall be replaced or repaired, as directed by IRCDUS.

H. Leakage between two adjacent manholes may be double the amount above stated, provided the average leakage for a total length of any size does not exceed the amount first stated and provided there are not gushing or spurting leaks.

I. All water used in testing and flushing shall be furnished at the Contractor's expense. The minimum amount of water to be used is two times the volume of the pipe.

J. The Contractor may use an air test in lieu of the exfiltration test as described above. If he elects to do this, he shall submit his proposed method to the IRCDUS for approval.

K. If the results of the air test are unsatisfactory, as determined by IRCDUS, the Contractor shall be required to perform the exfiltration test as outlined above.

L. At the conclusion of the work, the Contractor shall thoroughly clean the entire inside of the pipe by flushing with water or other means to remove all dirt, stones, and pieces of wood or other material that may have entered during the construction period. Debris cleaned from the lines shall be removed from the lowest outlet. If, after this outlet cleaning, obstructions remain, they shall be removed. After the pipe is cleaned and if the groundwater level is above the pipe, or following a heavy rain, the IRCDUS will examine the pipe for leaks. If defective pipes or joints are discovered at this time, the Contractor shall repair them at no expense to IRCDUS.

M. Upon completion of the work, the sewer system or selected sections therein shall be subjected to a final test and inspection. All work in the system or sections therein being tested shall be complete, cleaned and

ready for use. Tests shall be as specified herein and shall meet all requirements as to line, grade, clean lines, infiltration, exfiltration and workmanship.

N. Inspection of mains shall be by use of a self-contained television system and lamping upon satisfactory completion and acceptance of final road base material. The facilities shall be provided and operated by the Contractor as specified below:

The Contractor shall provide IRCDUS with a video record, on CD format, of the interior of all main line gravity sewers and the interior of all sewer laterals. The CD shall be contained in a proper container to prevent damage to the CD. The video shall be obtained by pulling a television camera through the line along the axis of the pipe. The television equipment shall consist of a self-contained camera and a monitoring unit connected by a coaxial cable. These videos shall be done during the inspection of the mains. Monitors shall be available to IRCDUS during these inspections. Monitors shall also be provided with a stop action camera, so that as may be requested by IRCDUS. Photographs shall be made of a particular portion of the main being viewed. The video shall be properly exposed and the camera shall be in proper focus so that good, clear recordings showing detail are produced. The visual recordings shall be identified by audio recordings noting the manhole numbers, distances to service lateral connections, direction of lateral connection and any leaks, cracks or pipe defects. Each CD shall be clearly marked as to the contents and number, with an index of all CD's. The CD's of the completed mains shall be delivered to IRCDUS. The Contractor shall provide any assistance required by the IRCDUS.

O. A maximum tolerance of ½" dip will be accepted in gravity sewer construction.

END OF SECTION

SECTION 14

GENERAL DESIGN and CONSTRUCTION DATA

SECTION 14

GENERAL DESIGN DATA

14.01 GRAVITY SEWERS

A. A terminal manhole shall be constructed no more than 20 feet upstream of the lift station. There shall be only one pipe connection from the manhole to the lift station. The pipe between the lift station and the manhole shall be C-900 PVC, DR18 pipe.

B. All sanitary sewers shall be constructed as required by the IRCDUS. Design to be done according to Recommended 10 State Standards for Wastewater Facilities, latest edition, and current regulatory agencies requirements.

C. Gravity sewers shall be designed for estimated peak flow at build-out of development, which shall be the product of a selected peaking factor and the projected or known average daily flow at ultimate system development.

D. Projections of average daily flow shall be made using a per capita sewage flow of 100 gallons per day and in accordance with Indian River County ordinances. Peak hour (design) flows shall be estimated using a peaking factor as outlined within Recommended 10 State Standards for Wastewater Facilities, latest edition.

E. All sewers shall be sized to provide ample capacity for peak design flows. The minimum allowable pipe size shall be 8-inch for collection lines and 6-inch for service laterals. Sewers shall be designed at slopes providing minimum velocities of 2 feet per second when flowing full or half-full, using a Manning's Roughness Coefficient (n) of 0.013. In general, the following minimum slopes shall be provided for sewer sizes 8-inch to 24-inch or approved by IRCDUS:

Pipe Diameter (inches)	Design Slope	Min Constructed
8	0.35%*	0.30%
10	0.28%	0.22%
12	0.22%	0.17%
16	0.15%	0.12%
18	0.12%	0.10%
24	0.08%	0.07%

The minimum design slope for the upper run of an 8-inch gravity sewer main is 0.40% with the minimum acceptable constructed slope being 0.35%.

F. Manholes shall be installed at the end of each line, at all changes in grade, size or alignment, at all junctions (excluding service laterals) and at distances no greater than 400 feet apart.

G. Sewer laterals shall not be connected directly into manholes unless approved by IRCDUS. IRCDUS will direct industrial wastewater into manholes on case-by-case basis.

H. Gravity sewers must be installed in front (under driveway/roadway pavement) of new buildings and/or under roadway pavement in dedicated Right-of-Way, all accessible to maintenance equipment.

I. Gravity mains shall be installed a minimum of 10 feet from any existing or proposed structure (walls, trees, transformer pads, etc.).

J. All sanitary manholes shall have a rain guard installed. Rain guards shall be corrosion proof, and have a relief valve, lifting strap and insert gasket. The relief valve shall relieve at a pressure of 1 psi and have a water leak rate of not more than 5 gallons per 24 hours.

14.02 WASTEWATER PUMPING STATIONS

A. A Remote Telemetry Unit (RTU) shall be included in all pump stations that are to be dedicated to Indian River County.

B. Wastewater pumping stations shall be designed to peak ultimate development flow from all contributory areas, in accordance with the Indian River County Wastewater Master Plan. Design average daily flow and peak hour flow shall be as set forth in Section 14.01.

C. Design of private lift stations that may be dedicated to the County at a later date shall meet IRCDUS design standards and shall be approved by IRCDUS. Any private station that does not meet IRCDUS design standards will not be taken over by the IRCDUS. Owners of private stations shall sign a form acknowledging future upgrade requirements if Owner is to dedicate a private station to the IRCDUS at a later date.

D. The County allows owners of single commercial properties, who wish to manage their own sewage collection on-site and transfer to the County's regional distribution collection system, to install and maintain a private lift station. The County <u>does not</u> permit more than one property to connect to a private lift station or private gravity sewer system, regardless if all the properties involved are owned by the same entity or not. If a developer proposes to extend sewer laterals from a private sanitary sewage collection system to other properties, then the properties must be unified as one parcel. If the properties cannot be unified, then each property must have their own private lift station, or the developer may install and dedicate to the County, a regional lift station that is constructed in accordance to IRCDUS design standards.

E. At least 2 pumps shall be provided for stations handling flows of 700 gallons per minute (gpm) or less. A minimum of 3 pumps shall be provided in stations where peak design flow exceeds 700 gpm unless otherwise approved by IRCDUS. In

all cases, standby-pumping capability shall be provided such that if any one pump is out of service, an alternate unit is available at equal or greater capacity.

F. The sewage pump system shall be capable of pumping the design peak flow at the maximum computed system total dynamic head. Maximum residual head within existing force mains shall be obtained and coordinated through IRCDUS.

G. Pumps shall be capable of passing spheres of at least 3-inches in diameter, and pump suction and discharge piping shall be at least 4-inches in diameter. Grinder pumps shall be used when riser pipes in wet well are less than 3-inches. Minimum valve (all types) size is 4-inches.

H. Wet wells shall be a minimum of 6-feet in diameter (ID). All wet wells shall be sized to provide a minimum pump cycle of 15 minutes. Pumps shall be designed to provide a minimum pump run time equal to half the cycle time. Additionally, wet wells shall provide sufficient space for installed equipment and required suction pipe submergence and spacing. The wet well floor shall have a minimum slope of one-to-one to the hopper bottom.

I. A separate valve vault shall be provided to house the gate valves, check valves and the emergency pump connection. The vault shall be of sufficient size to allow for installation, removal and maintenance of the valves. The top of the valve vault shall be a minimum of 12-inches above the high water level of the associated development. The wet well top elevation and the valve vault top elevation shall be a minimum of 12-inches above the associated elevations shown on the FIRM (Flood Insurance Rate Map) or 12 inches above the 25-year – 24-hour storm event elevation, whichever is greater.

J. In IRCDUS maintained lift station, pumps shall be per the Approved Manufacturers' Product List. If a grinder pump is proposed, see Approved Manufacturers' Product List. Only grinder pumps under 5.0 hp are permitted unless approved by IRCDUS.

K. Lift Station Calculation Checklist (all assumptions shall be listed in calculations and in an orderly fashion):

1. Design flow
2. Downstream force main size & down stream head pressure (in psi or feet of water)
3. Total Dynamic Head (TDH) of pumps shall exceed system head curve
4. Pump selection make, model, HP, impeller
5. a. Wet well dimensions
   b. Operating cycle and draw down time
6. Buoyant Computations Documentation:
   a. Buoyant force
   b. Downward force
   c. Safety factor
   d. Depth to water table
7. Designer name, date, design firm, Indian River County project number, project name, designer name of revisions

L. Only one influent gravity main is allowed into the lift station. The first upstream manhole from the lift station must be located within 20 feet +/- 1-foot of the lift station and as approved by IRCDUS.

M. The owner of a private lift station must have a maintenance agreement with a qualified firm (individual) to maintain the lift station. A label must be posted on the lift station stating the name and 24-hour phone number of the responsible firm before lift station may be placed into operation. A copy of a maintenance contract is to be submitted prior to issuance of the Utility Construction Permit. Maintenance contract must be renewed annually with copies of said contract submitted to IRCDUS

14.03 WATER DISTRIBUTION

A. All water mains shall be constructed in accordance with the Indian River County Water Master Plan, latest edition, or current AWWA Standard Specifications and current regulatory agencies requirements.

B. All distribution systems shall be properly looped, where feasible, and valved to provide maximum flexibility in providing service.

C. Design shall be based on an average daily consumption of 100-gallons per capita per day, a maximum day (MD) factor of 2.25 times average day and a peak hour factor of 4.5 times average day, per Indian River County Ordinance.

D. Distribution systems shall be sized to provide for 100 percent of the combined required fire flow and maximum day demand rate, while maintaining a 20-psi residual pressure in the distribution system.

E. All water mains shall be designed to provide a minimum pressure of 25-psi at ground level at all points in the distribution system under all conditions of flow (except as noted in D above).

F. Dead-end 4-inch water distribution system mains may be used to serve up to 10 ERU's, but shall not exceed 300 linear feet and down stream of last Fire Hydrant Assembly.

G. Fire flow requirements shall be as outlined within the Insurance Service Office (ISO) Fire Flow Requirements.

H. The minimum size main in diameter serving fire hydrants shall not be less than 6-inches in diameter for residential (single family) areas and 8-inches in diameter for commercial areas and multifamily residential areas.

I. Maximum fire hydrant spacing shall not exceed 1000-feet in single-family residential areas and 600-feet in commercial areas and multiple-family residential areas. No fire hydrant shall be over 500-feet from a single-family residence, multifamily residence, or commercial building.

J. All public fire hydrants shall be painted **"Federal Safety Red"**. Private fire hydrants shall have the body painted red with a white painted bonnet.

K. All fire mains shall be equipped with a double detector check valve assembly as shown in IRCDUS Standards Detail W-10.

L. A gate valve must be installed on the same water main as the fire hydrant. An additional gate valve is required if the distance between the first gate valve and the hydrant is greater than 18-feet as shown in IRCDUS Standards Detail W-2.

M. It shall be demonstrated that the water distribution system can supply the required demand rate and fire flow prior to acceptance by IRCDUS, and an on-site fire flow test shall be conducted by the Indian River County Fire Department or EMS. Prior to acceptance by IRCDUS, the fire hydrant shall be bagged as "OUT OF SERVICE".

N. Service connections and fittings shall be located outside of pavement, concrete curb, and/or concrete sidewalk areas unless otherwise approved by the IRCDUS.

O. Water mains and services shall be installed in front easements or in dedicated Rights-of-Way (not under pavement) accessible to maintenance equipment.

14.04 EARTHWORK AND BACKFILL

A. Excavation for all utilities and/or house connections shall be adequately guarded with barricades and lights, so as to protect the public from hazard. Streets, sidewalks, driveways, curbs, parkways and other public property disturbed in the course of the work shall be restored in a manner satisfactory to the IRCDUS and/or Public Works.

B. Foundation material used for pipe bedding, from a minimum 6-inch distance below the pipe invert to the bottom 12-inches above the top of the pipe, shall be bank run sand and gravel.

C. All gravity sewer installation procedures must be in accordance with pipe manufacturers' recommendations. All mains shall be installed to have a minimum depth of 36-inches to the top of the pipe. Installation of gravity sewers shall be controlled by use of a laser to maintain proper grade. A maximum tolerance of ½" dip will be accepted in gravity sewer construction.

1. Trench – Trench width shall be kept to a minimum necessary for pipe installation and shall comply with current OSHA requirements. The trench bottom shall be graded uniformly to match the slope of the pipe.

2. Backfill – Only good quality backfill, free of stones, hardpan materials, roots, rocks, broken cement or other debris that might be damaging to the pipe shall be used. Backfill shall be placed in the trench in uniform lifts of 12-inches (maximum).

3. Compaction – All pipe must be compacted by hand tamping to the centerline, under the pipe. Backfill shall be compacted in lifts up to the surface to achieve a minimum compaction of 98% of maximum density in

roadways and shoulders. Easements shall be 95% density, in accordance with AASHTO Specifications T-180 and ASTM D-2167.

4. Dewatering – Construction shall be accomplished in a dry trench. Well pointing may be required, as necessary. All water entering excavations or other parts of the work shall be contained, collected and pumped to suitable places for disposal as permitted by the Local, State or Water Management District.

5. Sheeting – Sheeting and shoring shall be installed as may be necessary for the protection of the work, preservation of adjacent property and structures and the safety of employees. Sheeting and bracing shall be uniform to OSHA requirements.

D. Installation of force mains (sewer or reused water) shall be in accordance with latest AWWA Standard Specifications C-600 and the installation specifications for water lines in the Water Distribution Section, irrespective of the type of pipe selected. Location tape shall be placed continuously in the trench over all pipes, 12-inches below grade. Trace wire shall be wrapped on all pipes, valves, fittings, and all appurtenances, per Detail M-14.

1. Trench – Trench width shall be kept to a minimum necessary for pipe installation and shall comply with current OSHA requirements. The trench bottom shall be graded and alignment shall be parallel with roadway, where possible.

2. Backfill – Only good quality backfill, free of stones, roots, rocks, broken cement or other material that might be damaging to the pipe shall be used. Backfill shall be placed in the trench in uniform lifts of 12-inches (maximum).

3. Compaction – All pipe must be compacted by hand tamping to the centerline, under the pipe. Backfill shall be compacted in lifts up to the surface to achieve a minimum compaction of 98% of maximum density in roadways and shoulders. Easements shall be 95% density, in accordance with AASHTO Specifications T-180 and ASTM D-2167.

4. Dewatering – Construction shall be accomplished in a dry trench. Well pointing may be required, as necessary. All water entering excavations or other parts of the work shall be contained, collected and pumped to suitable places for disposal as permitted by the Local, State or Water Management District.

5. Sheeting – Sheeting and shoring shall be installed as may be necessary for the protection of the work, preservation of adjacent property and structures and the safety of employees. Sheeting and bracing shall be uniform to OSHA requirements.

E. Installation of water mains and brine mains must be in accordance with latest AWWA Standard Specifications C-600 Series, irrespective of the type of pipe selected. All installation procedures must also be in conformance with pipe

manufacturers' recommendations. Minimum depth of cover shall be 36-inches over the top of the pipe. Location tape shall be placed continuously in the trench over all pipes, 12-inches below grade. Trace wire shall be wrapped on all pipes, valves, fittings, and all appurtenances, per Detail M-14. Allowable deflection of the pipe joints and curvature of PVC pipe shall not exceed the manufacturers' specifications.

1. Trench – Trench width shall be kept to a minimum necessary for pipe installation and shall comply with current OSHA requirements. The trench bottom shall be graded and alignment shall be parallel with roadway, where possible.

2. Backfill – Only good quality backfill, free of stones, roots, rocks, broken cement or other material that might be damaging to the pipe shall be used. Backfill shall be placed in the trench in uniform lifts of 12-inches (maximum).

3. Compaction – All pipe must be compacted by hand tamping to the centerline, under the pipe. Backfill shall be compacted in lifts up to the surface to achieve a minimum compaction of 98% of maximum density in roadways and shoulders. Easements shall be 95% density, in accordance with AASHTO Specifications T-180 and ASTM D-2167.

4. Dewatering – Construction shall be accomplished in a dry trench. Well pointing may be required, as necessary. All water entering excavations or other parts of the work shall be contained, collected and pumped to suitable places for disposal as permitted by the Local, State or Water Management District.

5. Sheeting – Sheeting and shoring shall be installed as may be necessary for the protection of the work, preservation of adjacent property and structures and the safety of employees. Sheeting and bracing shall be uniform to OSHA requirements.

14.05 RESTRAINED JOINTS

A. Restrained joints shall be used on lines per the Table of the IRCDUS Standards Drawing M-3. Section of piping having restrained joints or those requiring restrained joints shall be constructed using pipe and fittings with restrained "locked-type" joints and the joints shall be capable of holding against withdrawal for line pressures up to 150 pounds per square inch (psi). The pipe fittings shall be as shown for restrained push-on joints or restrained mechanical joints on Page 416 in Section VI, in the Handbook of Cast Iron Pipe, 4th Edition. In all cases, restrained joints must be used per Section C below, with thrust blocks, per contract drawings.

B. Restrained pipe joints that achieve restraint by incorporating cutout sections installed in the bell of the pipe shall have a minimum wall thickness at the point of cutout that corresponds with the minimum specified wall thickness for the rest of the pipe.

C. The minimum number of restrained joints required for resisting forces at fittings and changes in direction of pipe shall be determined from the length of restrained pipe on each side of fittings and changes in direction necessary to develop adequate resisting friction with the soil. Drawing and formula below are provided for the Contractor as a guideline.

Where:

$$L = \frac{1.5PA(1-COS\ X)}{Fw}$$

L = Length of pipe on each side of fittings or change in direction

P = 150 psi, unless otherwise noted

A = Cross-sectional area in square inches based on outside diameter (O.D.) of pipe

X = Angle of bend or change in direction in degrees

f = Coefficient of friction = 0.4 (maximum)

W = W (earth) + W (pipe) + W (water in pipe) W (earth) = unit weight of soil in pounds = (density of soil*) (depth of cover in feet) (O.D. in feet)
W (pipe) = unit weight of pipe in pounds
W (water in pipe) = unit weight of water in pipe

* Maximum 12-lbs/cubic ft above maximum water table elevation and 60-lbs/cubic ft below maximum water table

D. Bolts and nuts for restrained joints shall be 304 stainless steel.

E. The Contractor shall also provide restrained joints in accordance with the above criteria wherever below ground fittings are on lines 12-inches in diameter or less.

14.06 HORIZONTAL SEPARATION

A. All water, reclaimed water and/or sewer utilities shall be located a minimum horizontal separation equal to the depth of the pipe plus the diameter of the pipe from any permanent above ground structures (i.e., walls, trees, transformer pads, etc.).

B. A minimum 4-feet separation is required between water/sewer utilities and other underground utilities such as telephone, gas, cable, irrigation, etc.

C. All water and/or sewer utilities shall be located a minimum horizontal separation equal to 2 times the depth of the pipe plus the diameter of the pipe from the top of bank of any bodies of water (I.e., storm water ponds, canals, etc.).

D. All water mains shall be located a minimum horizontal separation of 3 ft. from storm sewer, stormwater force main or reclaimed water main.

E. All water mains shall be located a minimum horizontal separation of 3 ft., with 10 ft. preferred, from vacuum sanitary sewer mains.

F. All water mains shall be located a minimum horizontal separation of 6 ft., with 10 ft. preferred, from gravity or pressure sanitary sewer, sanitary sewer force main or reclaimed water main.

14.07 VERTICAL SEPARATION

A. Maintain 18” vertical clearance between any water/sewer utility and any other underground utilities such as telephone, gas, cable, irrigation, etc.

B. All water mains shall maintain a minimum 6” vertical clearance between storm sewer, vacuum sewer system and gravity sewer with 12” vertical clearance preferred. A 12” vertical clearance shall be maintained between all water mains and pressure sewer systems, stormwater force mains and reclaimed water mains.

END OF SECTION

Section 15

Procedures for Submittal, Permitting, Construction and Acceptance of Private Development Projects

Section 15

Procedures for Submittal, Permitting, Construction and Acceptance of Private Development Projects

15.01 Submittal

A. The applicant shall submit the following items for a project to be considered for a utility construction permit:

1. Completed Utility Construction Permit application, copy of Department of Environmental Protection (FDEP) permit applications (if applicable), copy of Department of Transportation (FDOT) permit application (if applicable), Indian River County Right-of-Way permit, legal description, and proof of payment of all applicable fees.

2. Three sets of 24 inch x 36 inch construction plans, signed and sealed by a Professional Engineer registered in the State of Florida, shall be submitted with application. Plans shall include a plan view of the water, wastewater, and/or reclaimed systems with all elevations and inverts, sewer profiles (gravity and force mains), all appropriate details, the location of all existing and/or proposed drainage facilities including catch basins, manholes, pipes, and top elevations and pipe inverts for same, and water line profiles where the water main crosses other utilities. All IRCDUS utility lines shall be stationed on the plans. All existing and proposed rights-of-ways, easements, and property lines shall be shown. Also, an accurate location map is to be provided. The limits of proposed dedication of the system(s) to IRCDUS shall be specified on the plans.

3. A complete engineer's design report, signed and sealed by a Professional Engineer registered in the State of Florida, setting forth the basis of design, shall contain the following, as a minimum:

   a. Water distribution system:
      (1) Description of geographic area to be served.
      (2) Existing and predicted population of areas to be served.
      (3) The effect of the proposed water distribution system on existing or proposed water distribution facilities.
      (4) The estimated daily flow.
      (5) Fire flow calculations for all hydrants being fed by lines smaller than 8 inch, or as required by IRCDUS.
      (6) Description of materials to be used.
      (7) A preliminary cost estimate.
      (8) An estimated completion date.
      (9) Any other factors which would affect design and use of the water distribution system.

b. Gravity sewer system:
   (1) Description of geographic area to be served.
   (2) Existing and predicted population of areas to be served.
   (3) The effect of the proposed gravity sewer collection system on existing and proposed gravity sewer collection systems or pumping stations and force mains. Pump stations shall be modeled, and all in-line pumping stations and force mains receiving these additional flows shall be considered.

c. The effect of the proposed gravity sewer collection system on the wastewater treatment plant receiving the flows.
   (1) The estimated daily flow.
   (2) Description of materials to be used.
   (3) A preliminary cost estimate.
   (4) Any other factors which would affect design and use of the sewer system.

d. Pumping station and force main system:
   (1) Description of geographical area to be served.
   (2) Existing and predicted population of area to be served.
   (3) Calculations for projected flows, wet well sizing, pump sizing and selection, force main sizing, and buoyancy of wet well.
   (4) The effect of the proposed pumping station and force main system on existing or proposed pumping station and force main systems or gravity sewer systems receiving these additional flows. Pump stations shall be hydraulically modeled, along with all in-line pumping stations and force mains.
   (5) The effects of the proposed pumping station and force main systems on the wastewater treatment plant receiving these flows.
   (6) Description of materials to be used.
   (7) A preliminary cost estimate.
   (8) The estimated completion date
   (9) Any other factor which would affect design and use of the pumping station and force main system.

4. A review fee, as set forth in the current rate schedule.

5. One original signed and sealed Department of Environmental Protection permit application for IRCDUS records.

15.02 Construction Permit

A. Prior to permit issuance and scheduling of a pre-construction meeting, three sets of construction plans and specifications shall be submitted, signed and sealed by a Professional Engineer registered in the State of Florida, to be approved, stamped, and signed by IRCDUS. One set shall be retained for

IRCDUS records, one set shall be delivered to the IRCDUS inspector, and one set shall be returned to the Engineer of Record.

B. Utility Construction Permits expire one year from the date of issuance and may be granted an extension for one year thereafter for a fee of $150. Only one extension will be granted. After the extension has expired, the Utility Construction Permit process will start over. IRCDUS reserves the right to request changes or modifications to utility designs that have been previously approved.

C. Payment of fees shall not constitute automatic approval of original plans.

D. The Utility Construction Permit does not constitute a permit for operation.

E. Construction shall not begin until the IRCDUS Utility Construction Permit is approved, and a copy of the Indian River County Right-of-Way Permit, Florida Department of Environmental Protection Permit, and any other required permits are submitted to IRCDUS.

15.03 Construction

A. Any contractor or sub-contractor constructing public underground water, sewer, and reclaimed utilities must be a licensed Underground Utility Contractor or licensed General Contractor in the State of Florida and Indian River County. A sub-contractor shall not qualify for an IRCDUS construction contract under the license of another General Contractor or Underground Utility Contractor. Any contractor or sub-contractor must qualify on their own merits.

B. IRCDUS reserves the right to request references and a list of projects performed in the last three years that are similar in nature to the project in which the contractor is proposing to construct.

C. The Engineer of Record shall have a pre-construction meeting with IRCDUS a minimum of five working days before beginning construction, whereupon construction plans shall be reviewed, and a minimum of three sets of shop drawings shall be provided. One set is to be provided to Indian River County Utilities Department, one set to the IRCDUS inspector and the remaining set to the Engineer of Record. No appurtenances shall be installed until approved by IRCDUS.

D. The Contractor and Engineer of Record shall notify IRCDUS a minimum of 48 hours prior to beginning construction or performing any system tests.

E. The water distribution system shall be constructed, flushed, disinfected, and tested in accordance with FDEP and IRCDUS Specifications.

F. All fire hydrant assemblies shall be bagged and tagged as “Out of Service” until final acceptance.

G. All equipment, materials, and workmanship shall meet or exceed all current Indian River County Water, Wastewater and Reclaimed Water Utility

Construction Standards and shall be subject to the unconditional inspection and approval by IRCDUS.

H. The Engineer of Record shall have an on-site inspector who shall witness and document all materials used, installation procedures, problems encountered, and witness and certify all tests specified by the operation permit checklists. Daily construction reports shall be submitted monthly to IRCDUS, and no later than seven days after completion of the construction. Indian River County has unconditional rights to inspect the construction and materials at any time.

I. Where water outages will occur, a minimum of five (5) working days notice to IRCDUS and the public is required. The IRCDUS water plant operator shall be notified a minimum of five (5) working days prior to flushing of lines. Five (5) working days' notice is required for access to private property.

J. The Property Owner, Developer, Engineer of Record, and Contractor shall hold Indian River County harmless in any suits, claims, and/or liabilities arising from subject construction.

K. All connections to the IRCDUS water system shall be made in the presence of IRCDUS. For the purpose of flushing, testing, and putting the system on line, IRCDUS shall operate all valves on the IRCDUS systems.

15.04 Acceptance

A. No system shall be cleared for use by IRCDUS until all requirements of the operation permit checklist have been satisfied and approved by IRCDUS. See Part IV of these Standards for the requirements for IRCDUS Utility Construction Check Lists for Potable Water Distribution System and Wastewater Collection/Distribution System.

B. When a constructed potable water system or sewer system lies dormant for a period of more than six months, regardless of having received FDEP clearance or not, the system will be subjected to rigorous inspection, testing and cleaning, by methods to be determined by IRCDUS and in accordance with AWWA Standards C-651-99 or latest revision. Pressure testing, flushing and chlorination will be required. No potable water main shall be placed into service until bacteriological sampling and analysis have been made. Any constructed gravity sanitary sewer main and/or sewer lift station will be subject to the same methods as stated above, including but not limited to cleaning, television inspection, infiltration/exfiltration, or other methods to be determined by IRCDUS. Any deficiencies in construction shall be corrected immediately upon discovery and shall meet current IRCDUS Water and Wastewater Standards.

END OF SECTION

Section 16

Water and Wastewater Treatment Plants

Section16

Water and Wastewater Treatment Plants

16.01 General

This section sets forth the general requirements for design and installation of water and wastewater treatment plants to be constructed within Indian River County, hereinafter referred to as the "County".

16.02 Design Standards

Facilities shall comply with the design and installation requirements as established by the Florida Department of Environmental Protection and additional specific requirements stated in these standards. The criteria set forth in the "Ten State Standards-Recommended Standards for Water Works", latest edition, should be used as a design guide for water treatment facilities. The criteria set forth in the "Ten State Standards-Recommended Standards for Wastewater Facilities", latest edition, shall be used as a design guide for sewage treatment facilities.

16.03 Standard Requirements

A. Building and Structure Sites

1. Clear and remove obstructions within building sites only as necessary to provide adequate workspace and/or facilitate the specified construction. The removal of trees or permanent structures within the specified construction areas shall be done only as approved or directed by the County. Should the removal of valuable trees or shrubs be required, this work shall be done in cooperation with the local communities in which the work takes place in order that they may be replanted, if so desired.

2. Grubbing shall be performed where required, including, but not limited to, areas where fill will be placed, structures erected, or where other installation is required. It shall include the complete removal of all obstructions resting on or protruding through the surface of the existing ground to a depth of three feet below finished grade. Where excavation is done, all stumps, roots and deleterious material thereby exposed shall be removed to a depth of three feet minimum below the excavated surface.

3. All refuse from clearing and grubbing operations shall be disposed of either by burning or removal to a dump area approved by the County. Burning shall be done at locations, and at times as directed, in a manner that will avoid all hazards. Permits shall be obtained from all applicable authorities for burning and burning shall be kept under constant attendance until the fires have burned out or have been extinguished. Burning operations shall be done in compliance with all applicable regulations.

4. All muck or other unsuitable material within the limits of building sites, or other designated areas, shall be excavated and removed. Depth of removal shall be that required to reach an approved suitable material. Removal and subsequent backfilling shall be maintained within the limits of the designated construction area unless specifically approved otherwise by the County. Sheeting shall be installed and left in place along the site boundary, where required, in order to preclude infringement on adjacent property and prevent damage by future de-mucking. The Contractor shall dispose of muck or other unsuitable material.

5. Suitable fill material shall be placed and compacted where muck or other unsuitable material has been removed and as required to elevate the site to finished grade. Fill material shall conform to the Florida Department of Transportation and as approved by a testing laboratory and the Indian River County Public Works Division. Fill shall be placed in successive layers of not more than 12 inches, loose measure, and suitably compacted to 95% minimum of maximum density, as determined by AASHTO Specifications T-180, unless higher percentage is necessary in specific locations, especially under structure sites where a minimum of 98% of maximum density is required. Side slopes shall not exceed 3 horizontal to 1 vertical, unless otherwise approved by IRCDUS, and shall be protected from erosion by staggered solid grass sodding, or other approved method. An approved, Florida State Certified testing laboratory shall make density tests for determination of the specified compaction.

6. All building sites shall be properly graded, including all cutting and filling necessary for the construction. Finish building site elevations shall be as required to preclude flooding and shall receive prior approval from IRCDUS. Filling shall be accomplished, if necessary, to provide acceptable site elevations. Finish surface grades shall eliminate potholes, abrupt changes in grade and bring the ground to an even surface, and shall provide adequate drainage for the complete site. The grade shall be sloped evenly to provide drainage away from the building walls in all directions at ¼ inch per foot minimum (2%) for at least 10 feet from the building walls. Drainage swales shall have a minimum flow-line grade of not less than 1/8 inch per foot (1%). Rounding shall be provided at top and bottom of banks and at other breaks in grade.

7. Driveways, parking locations and other vehicular traffic areas at building sites shall be paved with an asphaltic concrete surface course of a 1 inch minimum thickness, Type II, having a prime coat of RC-70 or RC-250 (rapid curing cutback asphalt) applied at a rate of 0.10 gallons per square yard. The dimensions for said surfacing shall be in accordance with good engineering practice and suitable for the designated service. Roadbed stabilization

shall be 6 inch minimum below the base course and shall have a minimum Limerock Bearing Ratio of 100 pounds per square inch. Base course shall be limerock or soil-cement, placed to 6-inch minimum thickness.

8. In order to provide an all-weather surface for foot traffic ways, concrete walks shall be provided between points of frequent travel. Walks shall be minimum 4 feet wide by 4 inches thick. The base material shall be thoroughly compacted to 95% of maximum density per AASHTO Specification T-180. Walks shall be provided with expansion joints at structures and/or intervals not exceeding 18 feet, with dummy groove joints at 6-feet intervals. A broom finish shall be provided. Concrete shall be a minimum compressive strength of 2500 psi with fiber mesh reinforcement.

9. Fencing

    a. All building sites shall be totally enclosed by protective fencing, unless specifically excluded from this requirement by the County. Said fence shall consist of 6 feet high chain link fabric. Fence shall be fabricated and installed in accordance with good standard practices and shall be complete, including top rail; stretcher bars and clips; all end, corner, pull and gate posts; post braces; ornamental post tops; and other necessary items. All fencing materials shall be hot dipped galvanized as specified below in 9b. The fence shall include a minimal of one gate opening 12 feet in width, consisting of two 6 feet wide locking, 180 degree, swing gates, with total height equal to the fence.

    b. Fencing shall be fabricated in compliance with the following minimum material standards:

        Chain Link Fabric – 2” mesh woven from 9 gage steel wire.

        End, Corner and Pull posts – 2-½” Schedule 40 steel pipe.

        Gate Posts – 6” maximum width: 2-½” Schedule 40 steel pipe; and, 6’ to 12’ width; 3-½” Schedule 40 steel pipe.

        Gate Frames and Intermediate Posts – 1.875” outside diameter (O.D.), 2.71 pounds per foot (Lb./Ft.) steel tube.

        Post Braces and Top Rails – 1.625” O.D., 2.27 Lb./Ft. steel tube.

        Accessories – Steel.

        Coatings – Hot dip galvanized with 1.2 ounces of zinc per square foot, applied after weaving for fabric and following fabrication for all other ferrous metal items.

Concrete – 2,500 pounds per square inch compressive strength.

c. The fencing shall be installed to proper grade, alignment and plumb, with corner posts and bracing provided at all angles in alignment. Posts shall be set 2 feet deep in concrete footings: 1 foot 4 inches in diameter for line posts and 2 feet in diameter for gate and corner posts.

10. Landscaping and Grassing

a. Building sites shall be suitably landscaped in order to be harmonious with the existing or projected adjacent development, provide screening plants and, in general, present a pleasing appearance. Plants shall equal or exceed Standards for Florida No. 1, as given in "Grades and Standards for Nursery Plants," Part I (1963) and Part II, State of Florida Department of Agriculture. The landscaper shall install the approved planting (grass, trees and shrubbery) in accordance with Indian River County Code Type A buffer and maintain said items until hardy growth has been established.

1 The Contractor shall provide IRCDUS with landscaping plans for approval prior to installation. Said plan shall be prepared by an experienced landscaping company and shall include only such plants which are established for the area of construction and which require minimal maintenance.

2 The Contractor shall place solid sod, where not covered by structures or surfacing, over the total area of small facility sites (pumping stations, etc.) and over the prime area of large sites (Treatment Facilities), with additional placement, as required for erosion control. Where not solid-sodded, balance of the site area shall be totally grassed by plugging. Unless approved otherwise by the IRCDUS, the grass shall be Argentine Bahia. Sod and plugs shall be fresh and uninjured to time of installation, and sod shall be clean, have a well-matted root system, and have a minimum thickness of 2 inches.

11. Buildings and Structures

a. Excavation shall not proceed until building lines have been surveyed and staked. The Contractor shall remove and dispose of all unwanted material, supply all fill material, and install all dewatering facilities, shoring and/or bracing needed.

Bearing capacity of surfaces in excavations or on compacted fill shall be adequate to support the building or structure to be placed thereon. IRCDUS shall require testing by an independent testing laboratory to verify adequacy of the foundation design and/or to require special foundation features, such as larger footings, piles, increased compactions, etc.

Fill and backfill shall be compacted to a minimum of 98% of maximum density at optimum moisture, as determined by ASTM D-1557, Method D, or AASHTO Specification Method T-180.

Building site shall be kept clear of rubble and any material, which may be hazardous to persons or impede construction progress.

b. When structures are to be constructed of, or are to contain, any wood or wood products, soil treatment shall be required for termite control.

   Chemicals shall be one of the following water-based emulsions, uniform in composition, containing a dye that will be readily seen to the naked eye after application to the soil, and containing in concentration by weight:

   1 Dieldrin, 0.5 percent
   2 Aldrin, 0.5 percent
   3 Heptochlor, 0.5 percent
   4 Or equal

   Application of chemical selected shall be made to all areas along foundation walls, around piers and under all concrete slabs at the following rates:

   5 Foundation walls and piers, all sides, 4 gallons per 10 linear feet, mixed with backfill, to a depth of one foot below finished grade for concrete; for masonry, increase application rate proportionately by depth of foundation or piers.
   6 Within voids of masonry foundation walls or piers, apply to void at or near bottom of foundation at rate of 2 gallons for each 10 linear feet.
   7 Under all concrete slabs less than 6 feet below finish grade, one gallon per 10 square feet.

c. Design, material, workmanship and practices shall conform to American Concrete Institute Manual of Standard Practice (ACI 315) and the Code of Standard Practice of the Concrete Reinforcing Steel Institute (CRSI).

Field and laboratory tests shall be conducted by independent testing laboratory on structural concrete pours for buildings to ascertain that concrete design slumps and strengths are attained.

Applicable standards shall include latest editions of the following:

1 Southern Standard Building Code
2 Building Code Requirements for Reinforced Concrete – ACI 318
3 Concrete proportions and placing – ACI 211.1 and ACI 301
4 Concrete design for sanitary engineering structures – ACI Committee 350 Report 68-50
5 Formwork – ACI 347
6 Reinforcing bars – ASTM A-615, Grade 60
7 Stirrups and ties – ASTM A-615, Grade 40
8 Welded wire fabric – ASTM A-185
9 Cement for concrete not exposed to sewage – ASTM C-150, Type I
10 Cement for concrete exposed to sewage – ASTM C-150, Type II, or ASTM C-150, Type I, with sulfate resistant properties equal to Type II if Type II is not available and the design engineer affirms the acceptability of Type I
11 Watertight and chemical resistant concrete – ACI 614
12 Aggregate – ASTM C-33, salt free
13 Water – potable (free from oil, alkali, acid, salt, organic matter, etc.)
14 Ready-mix – ASTM C-94
15 Slump test – ASTM C-143
16 Compression Test – ASTM C-39, at cylinder ages of 7 days, 28 days and finally, if indicated and directed by design engineer, at extended time period, not to exceed 45 days
17 Test Cylinders-ASTM C-31 minimum of 3 per 50 cubic yard of pour or fraction thereof.

Water stops and vapor barriers shall be provided as follows:

18 Water stops shall be installed at all construction joints in concrete structures retaining liquid and at all construction joints at or below ground level in concrete structures required to remain dry.
19 Damp check or waterproof membranes shall be installed under and around all concrete slabs to be placed against soil, with joints lapped a minimum of 6 inches.

d. Concrete masonry units shall be of a modular design and conform to ASTM C-90, Grade U-1.

Brick masonry units shall be clay and conform to ASTM C-216, Grade SW for below groundwork and grade MW for the above groundwork.

Reinforcement of all masonry unit walls shall be provided at alternate courses with “Dur-O-Wall,” “Wal-lock,” “Block-Lok” or approved equal.

Anchors and ties shall be of ferrous metal, with zinc coating conforming to ASTM A-153, Class B-1, B-2, or B-3, as appropriate, and as follows:

1 Rigid steel: 1 inch x ¼ inch x 24 inch, with ends turned down 3 inches
2 Wire mesh: 16 gage, ½-inch mesh, 3 inches x 16 inches
3 Veneer ties: No. 6 W & M gage wire bent 90 degrees to form 2 inch hook for mortar embedment, or 22 U.S. gage corrugated sheet metal.
4 Spacing of ties shall be such that each tie shall not support more than 3 square feet of wall area with vertical spacing not more than 24 inches, and with additional ties at wall openings.

Mortar shall conform to ASTM C-270 (except that slag cements shall not be used), Type M or S. Type N may be used for non-bearing interior walls and partitions above grade.

e. Waterproofing

Waterproofing shall be provided in two coats on all exterior surfaces of subgrade concrete or masonry walls, with outside lap of vapor barriers, damp checks or waterproof membranes thoroughly sealed into the sidewall waterproofing material.

Waterproofing material shall be an asphalt base coating applied in accordance with manufacturers’’ recommendations – Tnemec Co. No. 461, “Foundation Coating” (black) or approved equal.

Minimum film thickness when dry after application shall be 8.0 mils for the first coat and 6.0 mils for the second coat.

f. Complete architecture plans and specifications for building shall be submitted for approval by the County prior to construction. In no case shall a structure be planned or designed without regard to aesthetic appearance and maintenance costs.

Exterior wall finishes for permanent above-grade buildings or structures shall comply with one or more of the following selection of materials:

1 Stucco/stucco brick
2 Rubbed concrete
3 Brick, over masonry or sturdy wood frame
4 Stone aggregate on masonry
5 Stone
6 Asbestos-cement on masonry substrate

g. Steel or other ferrous materials shall conform to the following:

1 Structural shapes and plates – ASTM A-36
2 Pipe – ASTM A-53
3 Bolts, machine – ASTM A-307
4 Bolts, high tensile – ASTM A-325
5 Galvanizing – ASTM A-123 or A-153, as applicable
6 Iron castings – ASTM A-48, Class 25
7 Abrasive cast iron (nosings) – American Abrasive Metals Co. “Feralun,” or approved equal.
8 Cast steel – ASTM A-27, Grade N2
9 Stainless steel – Type 304, unless otherwise required or specified
10 Fabrication and erection – AISC Manual of Steel Construction.

Aluminum materials shall conform to the following:

11 Rolled shapes, smooth or checkered plates and extruded pipe – ALCOA 6061-T6 or approved equal
12 Other extruded shapes – ALCOA 6063-T5 or approved equal
13 Sheets -- ALCOA 3003 or approved equal
14 Pipe hand railing – ASTM B-429

h. Natural light is preferred for all buildings, and use of common sizes, spaced for adequate natural lighting of interiors is encouraged.

Windows and frames shall conform to quality standards ANSI A-34 and AAMS 30 for high performance series.

Frames shall be basic aluminum 6063-T5 with fasteners of aluminum or stainless steel.

Plate glass shall be a minimum thickness of 7/32” and set in vinyl glazing material.

All windows shall be sealed all around, both sides, with a non-shrink silicone-base caulk.

i. Door frames shall be a combination buck and frame type, with adjustable anchors for masonry applications. Frames shall be filled with sand-cement grout when installed.

Doors shall be constructed of honeycomb material with metal laminated facing. Minimum door thickness is 1 ¾". Height is 6'–8".

All doors and frames shall be mortised and reinforced to receive hardware. Non-ferrous metal should be used at all areas exposed to corrosive atmosphere.

All door frames shall be sealed all around, both sides, with a non-shrink silicone base caulk.

j. Finished Hardware shall be heavy duty type with non-magnetic accessories and compatible with door and frame materials.

Panic exit devices shall be provided in all areas of corrosive or hazardous atmosphere that may be encountered by occupants.

Finished hardware shall include:

1 Locksets – cylinder type with dead latch, suitable for master keying
2 Butt hinges – 1 ½ pairs per door, ball bearing type preferred
3 Door closers, holders and silencers
4 Thresholds – aluminum
5 Flush bolts
6 Panic exit devices, as indicated

k. All carpentry components shall be of high quality, with galvanized fasteners and treated wood where in contact with all masonry, metal or exposed to weather.

Rough Carpentry of construction grade lumber shall conform to standards as follows:

1 National Lumber Association – Specification for stress grade lumber and its fasteners
2 American Institute of Timber Construction - Uniform Specifications
3 Truss Plate Institute Specifications

Finish carpentry or millwork shall be of "B" or better yard grade seasoned lumber, conforming to applicable requirements of

the Architectural Woodwork Institute. Shelving, cabinet doors, tops and ends shall be a minimum of ¾" plywood with all exposed edges trimmed with hardwood. Joints shall be tight and formed to conceal shrinkage.

l. Moisture controls methods and materials for roofing shall be similar to Johns-Manville or Bird Specifications or approved equal for built-up and shingle roofs.

Flat roofs shall have a minimum slope of 1/16 inch per foot, with 5 ply built-up roofing meeting the requirements for a 20 year bond. All built-up roofs on concrete slabs or metal decking shall be applied to 1 inch rigid insulation board.

Pitched shingle roofs shall have a minimum pitch of 3-½ inches vertical to 12 inch horizontal, with seal down type asphalt or fiberglass shingles at 300 lb. per square on two) layers of 15 pound underlayment, meeting requirements for a minimum of 15 year warranty. As an alternative to shingle roofs, metal roofs are acceptable upon approval by IRCDUS and the County Building Department.

Fascia, gravel stops and soffits shall be of low maintenance materials, architectural metal or masonry preferred.

Flashing and trim shall be either galvanized steel, 24 gage minimum thickness, conforming to Fed. Spec. QQ-S775, Type I, Class C; or aluminum 0.019" minimum thickness.

Gutters and downspouts shall be provided on all permanent buildings. Screen protection from debris and concrete splash blocks are required for all downspouts. Materials shall be as follows:

1 Gutters shall be 24 gage galvanized steel or 0.032" anodized aluminum
2 Downspouts shall be 26 gage galvanized steel or 0.025" anodized aluminum
3 Hanger straps shall be the same material as gutters, and 3 feet on centers, with blocking behind downspouts

m. Stairs shall be of reinforced concrete or all-welded structural aluminum. Nosing and treads shall be non-skid. Tread widths and riser heights shall conform to applicable codes wherever possible. The use of ship-ladders or vertical ladders is discouraged.

Handrails shall be of all-welded 1 ½ inch outside diameter aluminum pipe, 42 inches high with intermediate rails. Rail

post spacing shall not exceed 8 feet. Kick plates shall be used on all areas above the first floor.

Grating and checkered plate shall be of aluminum, and designed to carry a uniform live load of 200 pounds per square foot with a safety factor of 5, based on ultimate strength. Reinforcing shall be utilized to preclude deflections greater than 1/160 of span. All grating and plates shall have non-skid surfaces.

Plumbing fixtures shall include, but not necessarily be limited to water closets and lavatories. IRCDUS may require shower, water heater and drinking fountain at larger facilities. Appropriate toilet partitions and stainless steel accessories shall be provided as indicated. Provide handicap facilities as required.

Fire extinguishers shall be 10 pound type ABC rechargeable units, provided and spaced as applicable in all buildings and structures.

Other safety equipment shall be provided wherever hazardous materials or equipment are utilized, such as eyewash fountains, gas masks, emergency lighting, etc.

16.04 Painting

A. General

This section includes the general requirements for painting materials and workmanship, as applicable to all sewer and water facilities.

Painting materials shall be delivered to the work site in the original and unbroken containers, marked with the manufacturer name, type of material and analysis of the product, and stored at one location. Special care shall be exercised in the handling and maintenance of painting materials, and all applicable safety regulations shall be followed.

Table 1 on page 16-14 shall be included in the project specifications for specific facility items and surfaces. Said schedule shall include, but not be limited to, the specific surface to be coated and specified painting system, with minimum dry mil thickness per coat required.

1. Materials

All paints and painting materials shall be high-grade products of manufacturers of established reputation and shall be "Approved" for the intended use.

To ensure a satisfactory end product, it is essential that paint coats be mutually compatible; both shop and field applications. To this end, insofar as possible, all paints applied to a given surface shall be the product of a single manufacturer.

The paint material set forth in Table 1 shall be the minimum acceptable type for the application indicated.

2. Application

The Contractor shall do a complete painting job throughout the project in accordance with generally approved modern practice for work of high quality. Additionally, surface preparation and application shall be in strict compliance with the manufacturers'' recommendations, and paint shall not be extended or modified.

Factory finish coatings shall be inspected following installation and any mars or blemishes shall be touched up in the field with the original color and type of paint.

3. Painting Requirements

Table I, on page 16-14, specifies in general the surfaces to be painted; service conditions for the indicated surfaces; finish paint coating for the specific surface and service condition; and other special requirements. The total painting system (surface treatment, primer, finish coat and other necessary applications) and minimum dry mil thickness per coat required to achieve the specified finish for the specific surface and service condition shall be in strict compliance with the paint manufacturers'' recommendations.

For convenience of description and as a standard for a quality comparative reference, Table 1 indicates the finish coating by name, number, or both, for products manufactured by Tnemec Company, Inc. or an approved equal, for the subject manufacturer, and approved equal products are acceptable.

In addition to the data contained herein, painting for water storage tanks shall comply with AWWA Standard Specifications D102-97, or latest revision, "Coatings for Steel Water Storage Tanks."

Unless specifically indicated under "Pipe Color Code", the color for surfaces to be painted shall be as selected by the IRCDUS and in compliance with OSHA regulation. The finish paint color for exposed sewerage and water facilities piping shall be as follows for the specified service:

Pipe Color Code:

Sewage—Gray (Solid)

Sludge—Brown (Solid)
Potable Water—Blue (Solid)
Raw Water (water facilities)—Blue (with 2-inch bright orange bands spaced 24 inches apart)
Reclaim-Pantone Purple
Brine-Orange
Non-Potable Water (Plant)—(Bright Orange (Solid)
Gas or Fuel Oil—Red (Solid)
Compressed Air—Green (Solid)
Chlorine Gas—Yellow (Solid)
Chlorine or other chemical solutions—Yellow (with 24 inch red bands spaced 24 inches apart)
Other Services—As directed by the County
Note: Banding shall be accomplished by painting or approved durable plastic adhesive tape.

Surfaces which shall not require painting (unless service color coding, or other specific coatings are required), are as follows: exterior piping, below ground; factory finished equipment; galvanized fencing; stainless steel; aluminum and brass; plastic or rubber; concrete floors and stair treads; interior of concrete below grade dry pits; and exterior concrete surfaces.

Table 1

Paint Schedule

General Applications

Surface to be Painted	Service Conditions	Finish Paint Coating
Masonry and Concrete, Walls and Ceilings	Interior Above Grade Normal Conditions	Series 6 or 7
Masonry and Concrete, Buildings and Tanks	Exterior Above Grade Normal Conditions	Series 6 or Series 156/157
Wood	Interior Normal Conditions	Ponkote 300 Enamel Primer 36-601 Finish Series 66
Wood	Exterior Normal Conditions	Finish Series 73
Metal, Machinery, Piping, Systems, etc.	Interior, Normal Conditions Non-submerged	Primer 50-330 Finish Series 66
Metal, Machinery, Piping, Systems, etc.	Exterior, Normal Conditions	Primer 50-30 Finish Series 73
Metal, Machinery, Piping, Systems, etc.	Severe Moisture and Condensation	Primer 50-30 Finish Series 73
Metal, Large areas, Tank Structural Steel, etc.	Exterior- Moderate to Normal Conditions	Primer 66-1211 Finish Series 73

Wastewater Facilities

Surface to be Painted	Service Conditions	Finish Paint Coating
Concrete, Wet well,	Submerged or Severe Conditions	Series 46-413 Coal
Channels, etc.		Color-Rigortex 3324 Enamel Tar 104-Series 104
Metal, Equipment, Piping, Tanks, Etc.	Submerged, Intermittently Submerged	Primer 66-1211 Finish 46-413 (2 Coats, 8 mils each) or Finish 46H (1 coat 16 mils)
Metal, Moving parts Chains, Gates, etc.	Submerged Intermittently Submerged	Grease coating

Water Facilities

Surface to be Painted	Service Conditions	Finish Paint Coating
Concrete, Tanks, Troughs, Basins, etc.	Submerged Intermittently Submerged	Primer 20-1255 Beige 3-5 mils Filler Series 63-1500 Finish 20-BB82 4-6 mils
Metal, Tanks, Piping, Equipment, etc.	Submerged Intermittently Submerged	Primer 20-1255 Beige 3-5 mils Filler Series 63-1500 Finish 20-BB82 4-6 mils

Special Notes:

1. All galvanized or other nonferrous surfaces requiring painting shall be pretreated with an approved conditioner or passivator, as recommended by the paint manufacturer, prior to application of the painting system.

2. Bituminous coated pipe shall be coated with Inertol Tar Stop or approved equal, as recommended prior to application of the painting system.

3. Metal surfaces, in contact with concrete or masonry, shall be protected with Tnemec46-413 Coal Tar coating or approved equal, as recommended. This provision shall not apply to concrete reinforcement, piping and fittings, or conduits and accessories.

16.05 Electric

A. General

The provisions of this Section, including other specific design considerations, shall be the minimum standards as applicable to all sewage and water facilities.

It shall be the responsibility of the Contractor to advise the Florida Power and Light Company or the City of Vero Beach regarding the proposed facility prior to installation and to make the necessary provisions for service thereto.

In accordance with the provisions of the General Conditions, complete shop drawings and technical data shall be submitted to IRCDUS including, but not limited to, motor control centers and control systems, with wiring diagrams and components; manufacturers'' data for switches, transformers, relays, lighting fixtures and other accessories; panel boards; and all other applicable information.

B. Materials, Equipment and Installation

General Requirements: Materials, equipment and workmanship shall conform to the applicable portions of the codes, specifications, standards and statutes listed below:

National Fire Protection Association:
NFPA No. 70 National Electrical Code

Local Codes:
At the place of the work, all applicable local codes, regulations and ordinances that are in effect will apply.

National Electrical Manufacturers Association:

AB 1	Circuit Breakers – Molded Case
FB 1	Conduit Fittings, Cable Fittings and Accessories
IC 1	Industrial Control
SGB 1	Connectors – Electric Power
KS 1	Enclosed Switches
PB 1	Panel boards
TR 1	Transformers
SG 8.2	Connectors for Copper Conductors
IC 4	Industrial Enclosures
WC 5	Thermoplastic – Insulated Wire & Cable

American National Standards Institute:

C80.1	Rigid Steel Conduit
C6.1	Terminal Markings for Electrical Apparatus

Underwriters' Laboratories, Inc.

Standards for Cabinets and Boxes
Standards for Service Equipment
Standard for Industrial Control Equipment
Standard for Thermoplastic-Insulated Wire

Illuminating Engineering Society:

IES Lighting Handbook

United States Federal Government:

Williams–Steiger Occupational Safety and Health Act of 1970 (OSHA)

C. Special Requirements:

Phase rotation of electrical service shall be: L1, L2, L3 (A, B, C) left to right when facing equipment.

Generator receptacles for portable emergency power connection shall be provided for all electrically operated facilities and shall be as described in the lift station portion of the standards. (Refer to Section 10.10 “B1” and Section 10.10 “C2d” and Drawing S-18).

Motors shall have enclosure types which provide safe protection from exposure to unusual environments such as chemical fumes, damp places, outdoors, poorly ventilated rooms or places with restricted air circulation. In general, enclosures shall be NEMA standardized motor types.

Motor insulation materials shall be Class F Systems.

Motors for non-submersible service shall be sized such that the nameplate horsepower rating shall not be less than 1.2 times the required shaft brake horsepower output. Appropriate NEMA design shall be used to provide torque and/or other load requirements.

Motor electrical rating shall be compatible with station electrical service.

Motor mounts shall be of standard NEMA design and shall be compatible with the driven apparatus.

Motors shall be controlled by NEMA standard controllers for all across the line or reduced voltage starting. Where variable speed pumping is required, the specifications or variable speed pumping is required, the specifications or variable speed control equipment shall be coordinated with the County. In general, motors shall be equipped with all necessary controls and devices for complete and operable systems.

END OF SECTION

Section 17

Engine Driven Generator Sets

Section 17

Engine Driven Generator Sets

17.1.01 General

A. This specification defines the requirements for an emergency or standby Electric Generator Set for wastewater pumping stations. The generator set shall consist of a diesel or natural gas-powered engine directly coupled to an electric generator, together with the necessary controls and accessories to provide electric power for the duration of any failure of the normal power supply.

Any and all local or state requirements for standby power systems not covered by this specification will be the responsibility of the Contractor, supplier and manufacturer to meet.

B. Housing developments of 200 or more units shall provide backup generator sets for emergency use as required (Note #2 on Drawing L-8). Generator shall be provided with automatic throw over (transfer) switch that senses power interruption from the main power source, starts the generator and shifts the power supply to the lift station from the generator.

17.1.02 Design Standards

A. The equipment covered by these specifications shall be designed, tested, rated, assembled and installed in strict accordance with all applicable standards of ANSI, NEC, ISO, U.L., IEEE and NEMA.

B. The Contractor shall provide a complete integrated emergency generator system. The system consists of a diesel generator set with related component accessories and Automatic Transfer Switch(es) as specified herein.

C. The generator set shall have the following characteristics:

Voltage	240/480 (As Required By Power Supply)
Phase	3
Connection	Y
Wire	4
Hertz	60
Power Factor	0.8

The generator set shall be capable of starting and running the existing loads and proposed loads without exceeding the maximum voltage and frequency variations specified herein, or the maximum temperature limitations of the engine and generator. The generator set shall be capable of starting all motor loads, with the non-inductive load applied first.

A. Terminals on all terminal blocks shall be individually identified.

17.1.03 Acceptable Manufacturers

A. Quality and Experience: All materials and parts of the generator set shall be new and unused. Each component shall be of current manufacture from a firm regularly engaged in the production of such equipment, as listed in the Approved Manufacturers' Products List, Section 18. Units and components offered under these specifications shall be covered by the manufacturers'' standard warranty on new machines, a copy of which shall be included in the submittal.

B. There shall be one source responsibility for warranty, parts and service through a local representative with factory trained service personnel.

17.1.04 Submittals

A. Engine-generator submittals shall include the following information:
   1. Factory published specification sheet indicating standard and optional accessories, ratings, etc.
   2. Manufacturers'' catalog cut sheets of all auxiliary components such as Automatic Transfer Switches, battery charger, control panel, enclosure, main circuit breaker, etc.
   3. Dimensional elevation and layout drawings of the generator set, enclosure and transfer switchgear and related accessories.
   4. Weights of all equipment.
   5. Concrete pad recommendation, layout and stub-up locations of electrical and fuel systems.
   6. Interconnect wiring diagram of complete emergency system, including generator, switchgear, day tank, remote pumps, battery charger, jacket water heater, remote alarm indications.
   7. The bidder shall submit with his submittal an estimate of engine mechanical data including heat rejection, exhaust gas flows, combustion air and ventilation air flows, noise data, fuel consumption, etc. when operating at 100% load. These estimates shall be based on manufacturers'' data.
   8. Generator electrical data including temperature and insulation data, cooling requirements, excitation ratings, voltage regulation, voltage regulator, efficiencies, waveform distortion and telephone influence factor.
   9. Generator resistances, reactances, and time constants.
   10. Generator motor starting capability.
   11. Control panel schematics.
   12. Oil sampling analysis, laboratory location, and information.
   13. Manufacturers'' and dealer's written warranty.

B. Operation and Maintenance Information. The system supplier shall furnish five sets of operating, maintenance and parts manuals to IRCDUS covering all components for the generator set system. The supplier shall also instruct the Owner and/or IRCDUS in operation and maintenance of the unit.

17.1.05 Warranty

A. The manufacturers'' standard warranty shall in no event be for a period of less than five (5) years from date of initial start-up of the system and shall include repair parts, labor, reasonable travel expense necessary for repairs at the job site, and expendables (lubricating oil, filters, antifreeze, and other service items made unusable by the defect) used during the course of repair. Submittals received without written warranties as specified will be rejected in their entirety.

17.1.06 Parts and Service Qualifications

A. Engine driven generator sets which can be properly maintained and serviced without causing IRCDUS either to carry expensive parts stock or to be subjected to the inconvenience of long periods of interrupted service because of lack of available parts. The supplier shall specify the nearest location of permanent parts outlets from which parts may be obtained.

B. The engine-generator supplier shall have service facilities within 75 miles of the project site and maintain 24-hour parts and service capability. The distributor shall stock parts as needed to support the generator set package for this specific project.

C. The dealer shall maintain qualified, factory trained service personnel that can respond to an emergency call within 2 hours of notification, 24 hours per day.

PART 2 – PRODUCTS

17.2.01 GENERAL REQUIREMENTS

A. The equipment supplied and installed shall meet the requirements of the NEC and all applicable local codes and regulations. All equipment shall be of new and current production by a MANUFACTURER who has 25 years of experience building this type of equipment. Units and components offered under these specifications shall be covered by the manufacturers'' standard warranty on new machines, a copy of which shall be included in the submittal. Manufacturer shall be ISO9001 certified.

B. The system shall be free of injurious torsional and bending vibrations within a speed range from 10% below to 10% above synchronous speed.

C. The system shall be adequately guarded both physically and electrically for protection of operating personnel.

17.2.02 ENGINE

A. General Description. The engine shall be of the internal combustion type equipped to operate on natural gas, at locations where natural gas is available or No. 2 diesel fuel.

B. Engine Power Rating. The rated net horsepower of the engine at the generator synchronous speed, with all accessories, shall not be less than that required to produce the KW required. The horsepower rating shall take into account generator efficiency and all parasitic losses such as fan, battery charger, etc. The generator set shall be capable of producing the required KW (without overload) for the duration of the power outage (standby rating), under the following ambient conditions:

Altitude, feet	1000
Ambient temperature range, ^{o}F	0-100
Humidity at max. ambient temp. %	80

C. Fuel and Oil Consumption. Accompanying the supplier's bid, the bidder shall supply fuel and oil consumption estimates based on engine manufacturers'' data, a copy of which shall be included in the submittal.

D. Governor (Engine Speed Control). The engine shall be equipped with a suitable governor to maintain frequency within limits, as specified below, by controlling engine and generator speed.

1. Type: isochronous
2. Stability: 1/4% maximum steady state frequency variation at any constant load from no load to full load.
3. Regulation: 1/4% maximum frequency deviation between no-load steady state and full-load steady state.
4. Transient: 5% maximum frequency dip on most severe motor starting condition.
5. Transient: 2 seconds maximum recovery time for maximum motor start.
6. The manual speed adjusting control shall be mechanical or electrical if located on the generator set or electrical if located in a remote control panel.

E. Engine Crank-Start System. The engine shall be electric start, provided with a solenoid energized motor, with either positive engagement or clutch drive to the engine.

1. Lead-calcium batteries shall be furnished to provide power to the engine cranking motor. The batteries shall be designed for operation at a minimum ambient temperature of 0 °F.
2. The voltage shall be as required by the engine manufacturer.
3. The batteries shall be capable of a minimum of four crank cycles (rolling) of the specified prime mover and have sufficient current available for "break-away" currents for the particular engine used at the specified worse case temperature.
4. A float type battery charger, compatible with the batteries selected, shall be furnished which shall maintain the starting batteries at full charge. The charging system shall permit charging from either the normal or the emergency power source. It shall have a high rate and low rate charging system. A voltmeter shall indicate the charge rate and the circuit will be protected by either fuses or circuit breakers. The charger or charging circuit shall be so designed that it will not be damaged during the engine cranking, achieved, for example, by a current limiting charger or a crank disconnect relay. It shall also be capable of recharging a discharged battery in 12 hours while carrying normal loads.

F. Engine Cooling System. The engine shall be liquid cooled. The type of liquid cooling system shall be a unit mounted radiator. The radiator capacity shall be suitable for operation in the ambient temperature specified in paragraph 17.2.02, plus the air temperature rise across the engine.

G. Air Supply/Exhaust System.

1. Cleaner: An air cleaner and silencer shall be furnished as recommended by the engine manufacturer and shall be located and mounted as recommended by the engine manufacturer.
2. Exhaust: An exhaust system of suitable size, configuration and material in accordance with engine manufacturers'' recommendations shall connect the exhaust outlet of the engine to the silencer. The type of silencer shall meet the requirements of engine manufacturers and shall be residential silencing type.
   a. The exhaust system and silencer shall have the configuration shown on the drawings, and shall be of such size that back pressure on the system will not exceed the back pressure permitted by the manufacturers'' recommendation. A flexible connection shall be mounted at the engine exhaust outlet and the discharge end of the exhaust line shall be protected against entry of precipitation. Piping within reach of personnel shall be protected by screening or suitable lagging. All exhaust piping shall be gas tight.

H. Engine Protective Devices. The following engine protective devices shall be provided, and an indicator light shall be supplied for use with each device specified.

1. Alarm system for high water temperature and/or low oil pressure.
2. Automatic engine shutdown for high water temperature and/or low oil pressure.
3. Combination alarm and shutdown system for high water temperature and/or low oil pressure.
4. Engine overspeed automatic shutdown device.
5. Engine failed to start indicator light (overcrank).
6. Alarm for low coolant level.
7. A shunt trip and undervoltage trip shall be incorporated to cause the circuit breaker to open simultaneously with any automatic shutdown of the engine.

I. Fuel Supply for Engine.

1. Main Fuel Storage Tank:

   A fuel storage tank shall be manufactured of corrosion resistant material and sized to allow full capacity generator operation for a minimum of seventy-two hours without refilling with a maximum fuel capacity of 500 gallons. A fuel storage tank shall be located in the place indicated on the plans and shall be complete with all piping and fittings connected. The tank shall be new and unused, and no galvanized material shall be used in the tank or system. The tank shall be furnished with faucet valve located in the supply pipe of the tank and a check valve incorporated to ensure prime is maintained. The tank shall be vented to atmosphere. Location and installation of the fuel storage shall be in accordance with applicable government, insurance restrictions, and local building code. A fuel level gauge shall be located at the tank.)

2. Main Fuel Delivery System: A system shall be supplied to deliver an adequate amount of fuel to the engine from the storage tank. Pipe sizes shall be no smaller than the minimum recommended by the engine manufacturer to avoid fuel flow restriction. The engine supply and return line shall be equipped with a length of flexible fuel lines, unions and gate valves. No copper lines are acceptable.

3. The system shall include an engine driven transfer pump of sufficient lift and capacity to deliver fuel at the maximum required rate from the storage tank to the engine. A check valve shall be furnished in supply line at engine.

17.2.03 GENERATOR

A. Description. The generator shall meet all requirements of NEMA MG-1, Part 22, in design, performance and factory test procedures. The regulator shall be factory wired and tested with the generator. The generator shall have the characteristics and ratings required by paragraph 22.10.

B. Excitation System. The generator shall be equipped with a permanent magnet generator (PMG) excitation system. Both the PMG and the rotating brushless exciter shall be mounted outboard of the bearing. The system shall supply a minimum short circuit support current of 300% of the standby rating for 10 seconds. The rotating exciter shall use a three phase full wave rectifier assembly with hermetically sealed silicon diodes protected against abnormal transient conditions by a multi-plate selenium surge protector.

C. Construction. The insulation system of both the rotor and stator shall be of NEMA Class H materials and shall be synthetic and non-hygroscopic. Field windings shall be on the rotor, and the rotor core shall be shrunk-fit and keyed to the shaft. The stator winding shall be of 2/3 pitch design to eliminate the third harmonic. Units rated above 1500 kW or 601 volts or higher shall be form wound.

    1. The temperature rise of both the rotor and the stator shall be in accordance with the applicable sections of NEMA MG-1-22, BS-5000 part 99, or CSA C22.2, for the type of service intended. The generator shall be self-ventilated.

D. Conduit Box. Load connections shall be made in the front-end mounted junction box. The generator construction will allow connection to the load through the top, bottom or either side of the junction box.

    1. The conduit box shall contain two compartments: one to house the rotating rectifier and PMG, and the other to house the connection area and regulator. This is to separate the rotating elements from the load connection and voltage regulator adjustments.

E. Verification of Performance. All performance and temperature rise data submitted by the bidder shall be the result of the actual test of the same or duplicate generators. Temperature rise data shall be the result of full load, 0.8 power factor heat runs at the rated voltage and hertz. All performance testing shall be done in accordance with MIL-STD-705 and/or IEEE Standard-115.

F. Efficiency. The generator efficiency shall be determined in accordance with NEMA MG-1, paragraph 22.44. All test results shall be submitted to the Engineer for approval.

17.2.04 VOLTAGE REGULATION

A. The generator shall be equipped with a voltage regulator to maintain voltage within limits as specified below:

1. Stability: 1/2% maximum voltage variation at any constant load from no load to full load.
2. Regulation: 1% maximum voltage between no load steady state and full load steady state.
3. Transient: 20% maximum voltage dip in most severe motor starting condition. See paragraph 1.01.
4. Transient: Two (2) seconds maximum voltage recovery time with application or removal of 0.8 power factor full load.

B. The regulator shall be a solid state type using transistors or SCR's. The unit shall include volts/hertz underspeed protection, three-phase RMS sensing, and overexcitation protection. The regulator shall also provide loss of sensing protection, regulator current limit, temperature protection and an engine unloading circuit. EMI suppression shall be provided meeting MIL-STD-461B, part 9 standards.

17.2.05 GENERATOR FULL MAIN LINE CIRCUIT BREAKER

A. A generator main circuit breaker shall be provided rated at manufacturers recommended amperes minimum frame size, and volts, 100% rated. The interrupting capability shall be greater than the generator short circuit capability, but not less than 60,000/30,000 symmetrical amperes at 240/480 volts. The breaker continuous current trip rating shall be selected to provide overload protection for the generator.

B. The breaker shall be provided with a shunt trip device. The generator starting circuit battery system will be used as the power source for the shunt trip circuit. The shunt trip coil voltage shall be suitable for use on the starting circuit.

C. The breaker shall include three (3) normally open and three (3) normally closed auxiliary contacts.

D. The breaker shall be a NEMA 4X.

17.2.06 AUTOMATIC START AND STOP CONTROLS

A. General Description. Automatic starting and stopping controls shall be furnished to start the engine automatically when the normal electric power fails or falls below specific limits and to stop the engine automatically after the normal power supply resumes. The signal for starting or stopping the engine shall be from an external auxiliary

contact. The controls shall be capable of operating at 50% of normal DC system supplied voltage.

B. Engine Cranking Control. Crank control and time delay relays shall provide at least one cranking period. If only one cranking period is provided, its duration shall be at least 15 seconds. If more than one cranking attempt is provided, each cranking period shall be for at least seven (7) seconds, and the cranking attempts shall be separated by appropriate rest periods. A sensing device shall automatically disconnect the starting circuit when the engine has started. If the engine has not started at completion of the starting program, the overcranking signal shall so indicate. The engine starting controls shall be locked out and no further starting attempts shall take place until the overcranking device has been manually reset.

C. Selector Switch. A selector switch shall be incorporated in the automatic engine start and stop controls. It shall include an "off" position that prevents manual or automatic starting of the engine, a "manual" or "handcrank" position that permits the engine to be started manually by the pushbutton on the control cabinet and run unloaded; an "automatic" position which readies the system for automatic start or stop on demand of the automatic load transfer switch or a programmed exerciser.

D. Manual Test Operation. It shall be possible to start the engine manually and run it unloaded by a manual pushbutton on the control cabinet that causes the engine to start, run and stop through the automatic start and stop controls.

17.2.07 INSTRUMENTATION

B. Instruments and Controls. The following engine and generator instruments and controls shall be furnished and installed:

1. A.C. ammeter
2. A.C. voltmeter
3. Governor speed adjusting control
4. Water temperature gauge
5. Oil Pressure gauge
6. Manual start/stop control
7. Voltmeter/ammeter phase selector switch
8. Elapsed time meter
9. Panel lights
10. Indicator lights for engine alarm

All wiring and interconnections shall be in accordance with commercial electrical standards.

C. Location

1. All of the foregoing instruments, lights and controls shall be mounted in a control panel on the generator set. All instrumentation must be isolated from engine generator set vibration.
2. In addition, an ammeter, voltmeter, and “generator ready" light, a start/stop control, and an audible alarm and alarm light shall be provided in a generator control panel to be remotely wall mounted. The audible alarm and alarm light shall operate for any of the engine or generator alarms provided on the local control panel. Cable between the local and remote-control panels shall be provided.

D. Panel Design. All instruments, controls and indicating lights shall be properly identified. All wires shall be individually identified and must agree with wiring diagrams provided.

17.2.08 ACCESSORIES

A. Enclosure. The entire engine-generator assembly, including the battery, battery charger, day tank, lift pump, control panel, and radiator shall be enclosed in an aluminum sound attenuated enclosure suitable for an outdoor environment. The enclosure shall attenuate to a decibel level of 65-70 dB at a distance of 7 meters horizontally in any direction around the entire generator enclosure. The enclosure shall meet all local, state and federal wind load standards. Provisions shall be made on the enclosure for mounting the engine exhaust silencer. Louvers or dampers shall be provided to allow adequate radiator ventilation during operation without reducing the rating of the engine-generator unit. Doors shall be provided as required for access to the engine and control panel. Generator pad / platform shall have a maintenance walk a minimum of 3’-0” wide around three sides of the generator, also see plans. Stairs shall be provided from grade to the pad / platform where the elevation difference is greater than 1’ – 0” from final grade to the top of the generator pad / platform.

B. Block Heater. An engine block heater shall be provided to keep the engine coolant at a temperature of 85° F with the ambient temperature at the minimum specified in paragraph 2.02. The heater shall be suitable for operation at 120/240 **(NOTE TO DESIGNER Select desired voltage)** volts AC, single phase.

480v, 3-phase Lift Stations: A 5 kVA transformer shall be provided to power the block heater and 120v, 20 amp receptacle. This transformer will be in addition to the panel transformer.

C. Control Panel Heater. A heater shall be provided in the control panel to keep the interior of the panel above 40° F when at the minimum ambient temperature specified in paragraph 17.2.02. The heater shall be operated by a thermostat, and shall be suitable for operation at 120 volts

ac, single phase.

17.2.09 TRANSFER SWITCH

A. Automatic Transfer (Throw Over) Switches required with a stainless steel 4X breaker disconnect cabinet, as approved by IRCDUS Engineer.

17.2.10 TELEMETRY

A. Telemetry equipment required as approved by IRCDUS Engineer.

PART 3 – EXECUTION

17.3.01 INSTALLATION

A. Install equipment in accordance with manufacturers'' recommendations, the project drawings and specifications, and all applicable codes. Installation of the system includes but is not limited to pouring a concrete pad for the generator set and automatic transfer switch, receiving and offloading the equipment, providing all labor, permits and material to install the total system.

B. Mounting. The mounting of the generator set shall be sufficiently rigid to maintain alignment and to minimize the engine and generator stresses. The floor loading shall not exceed 5000 lbs. per sq. ft. A suitable number of spring type, vibration, rubber type, and fiberglass isolators shall be inserted between the engine generator set and the floor.

C. Placement on Site. Refer to Drawing L-4 and L-5 for typical placement of emergency generators on wastewater pumping station sites in Plan Views "A" and "B".

17.3.02 START-UP AND TESTING

A. Acceptance Test. A complete system load test shall be performed after all equipment is installed. The extent of testing shall be at the discretion of the engineer. The completed generator set shall be tested at 1.0 power factor for a period of one hour at full load prior to shipment to the job site. In addition, the generator set supplier shall include in his bid the cost of an on site, full load test (using portable resistive type load banks or building load or combination thereof) for a minimum of four hours in the presence of a representative of the Owner and/or Engineer before final acceptance.

B. Coordinate all start-up and testing activities with the Engineer, Owner, and IRCDUS.

C. After installation is complete and normal power is available, the

manufacturers'' local dealer shall perform the following:

1. Verify that the equipment is installed properly.
2. Check all auxiliary devices for proper operation, including battery charger, jacket water heater(s), generator space heater, remote annunciator, etc.
3. Test all alarms and safety shutdown devices for proper operation and annunciation.
4. Check all fluid levels.
5. Start engine and check for exhaust, oil, fuel leaks, vibrations, etc.
6. Verify proper voltage and phase rotation at the transfer switch before connecting to the load.
7. Connect the generator to building load and verify that the generator will start and run all designated loads in the plant.

D. Perform a 4 hour load bank test at full nameplate load using a load bank and cables supplied by the local generator dealer. Observe and record the following data at 15 minute intervals:

1. Service meter hours
2. Volts AC - All phases
3. Amps AC - All phases
4. Frequency
5. Power factor or Vars
6. Jacket water temperature
7. Oil Pressure
8. Fuel pressure
9. Ambient temperature

E. Operation and Maintenance Manuals

1. Provide TWO (2) sets of operation and maintenance and manuals covering the generator, switchgear, and auxiliary components. Include parts manuals, final as-built wiring interconnect diagrams, start-up test reports, and recommended preventative maintenance schedules.
2. Ventilation Requirements. The bidder shall submit with his submittal an estimate of air flow requirements for cooling and combustion, plus an estimate of heat rejection of the engine and generator when operating at 100% load. These estimates shall be based on manufacturers'' data.

F. Training

1. Provide one day of on-site training to instruct the Owner's personnel in the proper operation and maintenance of the equipment. Review operation and maintenance manuals, parts manuals, and emergency service procedures.

G. The CONTRACTOR shall provide a full tank of diesel fuel for the completion of all testing.

END OF SECTION

SECTION 18

Approved Manufacturers' Products List

Air Release Valves – Sewer

- A.R.I.

Air Release Valves – Water

- APCO
- A.R.I.
- GA Industries
- Val-Matic

Backflow Preventer (RPZ) and Double Detector Check Valves with RPZ Assembly

- AMES Fire and Waterworks -Silver Bullet Series
- FEBCO
- Watts
- Wilkins

Blow-Off Valves

- John C. Kupferle Foundry Co. – Model Eclipse #85 or approved equal

Bronze Gate Valves

- American Valve Inc.
- East Jordan
- NIBCO
- Red-White Valve Corp.
- United Brass Works

Casing Spacers/Insulators

- APS- Advance Product &Systems
- Cascade Waterworks Mfg.
- GPT
- Raci North America

Check Valves- Weight & Lever Resilient Seat

- American Darling
- Clow Valve Company
- Kennedy Valve
- M&H Valve
- Mueller Co.
- Val-Matic

Corporation Stops

- A.Y. McDonald Mfg. Co
- The Ford Meter Box Co. Inc. - FB1100 x G-NL Style, FB1700
- Mueller Co. Part #'s H-15028 & H10046

Couplings

- EBAA-Iron
- Krausz-HYMAX
- Smith-Blair (Pump Stations EZ with Seal and Restraint)
- Wal-Rich Dresser™ Pipeline Solutions

Curb Stops

- The Ford Meter Box Co. Inc. - KV43-342WG, KV43444WG, BA43342WG, BA43444WG, B41666WG, B41777WG, BFA43-666WG *& BFA43777WG - NL
- AY McDonald: (Equal to Ford Part Numbers)
- Mueller: (Equal to Ford Part Numbers)

Ductile Iron Pipe

Water: Cement Lined Class 350/50
Sewer/Force Main: Protecto 401 Lines Class 350/50

- American Pipe and Supply
- Clow Valve Co.
- Griffin Pipe Products Co.
- McWane
- U.S. Pipe

Ductile Iron Fittings

Water: Cement Lined Class 350/50
Sewer/Force Main: Protecto 401 Lines Class 350/50

- American Valve
- Clow
- McWane Ductile
- Star Pipe Products
- Tyler Union
- U.S. Pipe

Electrical Equipment as listed or approved equal

- Crouse-Hinds
  1. Cable Connectors "CGB" Series
  2. Emergency Power Receptacle – 3W, No. AR1042-S22 with AR610 Panel Adaptor for pumps less than 25hp, AR2042-S22 with AR610 Panel Adaptor for pumps greater than 25hp

- Eagle Signal Bulletin 705
  1. HK series Elapsed Timer Meter

- Square D
  1. Unfused Safety Switch
  2. Thermal Magnetic Air Circuit Breaker
  3. Magnetic Motor Starter
  4. Reduced Voltage Motor Starter
  5. Pump Mode Selector Switch
  6. Indicator Lamps

Fire Hydrants 5 ¼" Valve Opening

- Clow – Medallion F2545
- East Jordan Iron Works – Part no. 5CD250
- Mueller-Centurion 250

Generator Sets

1000 KW or Greater
- Caterpillar
- Cummins/Onan
- Detroit Diesel

1000 KW or Less
- Atlas-Copco
- Katolight
- Kohler Power
- Tradewinds Power
- Winco

Lift Station Access Door

- Bilco – Type J-AL Single Leaf with Stainless Steel Hardware-Waterproof
- Halliday Products – Single Leaf with Stainless Steel Hardware-Waterproof

Lift Station Control Panels

- ECS (Economy Control Systems, Jacksonville, FL)

Lift Station Joint Sealer

- Marbri Supply Co.
  1. Embeco 636 Grout
  2. Embeco 885 Grout

Lift Station Liners and Coatings

- AP/M Permaform
- Associated Fiberglass Enterprises
- GU Florida
- LF Manufacturing Co. Inc.
- Agru Sure-Grip
- Green Monster Liner (GML)
- Sewper Coat

Lift Station Submersible Pumps

- ABS Pump - If a grinder pump is proposed, only ABS type grinder pumps under 5.0 hp are permitted. ABS V2 Piranha Grinder Pumps are not permitted
- Xylem Flygt.

Lift Station Valve Pit Access Door

- Bilco
- Halliday Products

Lift Station Valve Pit Quick Disconnect

- Kamloc Male Kwik Disconnect
- Kamloc Coupler 4”

Lift Station Valve Pit Safety Grate

- Halliday Products
- Bilco

Line Setter for Meter Boxes

6” – Part # Retro-2BVBHH-NL
5/8” X 3/4” Meter Retrosetter

12” – Part # VHH42-12W-NL
5/8” X 3/4" Meter Retrosetter
No Lead 3/4" Key Valve

By Dual Check Valve

- Ford Meter Box

Marker Balls Electronic

- 3M – Water 3M 1403XR, Sewer 3M 1404XR

Manhole Frames and Covers

- U. S. Foundry – Drawing No. 420-C
- PAM –Pamrex Hinged Manhole Cover and Frame

Manholes Flexible Plastic Gaskets

- Press Seal Gasket Corp
- Ram-Nek

Manhole Sealants and Coatings

- Pro-Tech EW-1 Water Base Epoxy
- CANUSA WRAPID SEAL
- ConSeal CS-55
- AP/M Permaform
- Associated Fiberglass Enterprises
- GU Florida
- LF Manufacturing Co. Inc.
- Agru Sure-Grip
- Green Monster Liner (GML)

Manhole Pipe Connection (Boot)

- Kor-N-Seal –Neoprene Boot with Stainless Steel Accessories
- PBX (Press Seal Gasket Corp)

Manhole Watertight Rain Guard Boot

- LF Manufacturing Co. Inc.
- Parson Environmental Products

Mechanical Joint Restraints

- EBAA –Megalugs and Bell Restraints
- SIGMA Corp
- Star Pipe Products
- U.S. Pipe – Field Lock Gaskets

Meter Boxes

Polymer Concrete & Fiberglass sizes 11”X18”, 13”X24”, 17”X30”, 24”X36”

- CDR Systems Corp.
- GlasMasters, Pre-Plumbed Box
- Hubbell

Meters for Potable Water

- Octave (Stainless Steel Body)

Meters for Sewer Force Mains and Reuse Mains

- Mag-Meter (on a case by case basis)

- The Abb Group/Fisher Porter

PE Pipe & Tubing

3/4”to 2” SDR 9 CTS
3” to 48” DR11 DIPS

- Chevron-Phillips
- Flying W Plastics Inc.
- JM Eagle
- Municipex
- Polypipe

Plug Valves

- Clow Valve Co
- DeZurik-Series 100
- Henry Pratt Co.
- Kennedy Valve
- M&H Valve Co.
- Val-Matic-Series 1500

PVC Pipe & Fittings

Water/Force Main - DR18 C900/C909 (for Fittings, see Ductile Iron Fittings on Page 18-2)
Sewer - SDR 26 3034 (for Fittings, see Sewer Fittings ASTM D-3034 on Page 18-7)

- Diamond Plastics
- ETI Pipe and Supply
- Freedom Plastics
- J-M Manufacturing Co. Inc.
- National Pipe and Plastic
- North American Pipe Corp.

Reduce Pressure Backflow Preventer Assembly

- AMES Fire and Waterworks - 400SS & 4000SS
- Wilkins –Part No. 975
- FEBCO- Part No. LF825Y
- Watts – Part No. LF909

Remote Telemetry Unit

- DataFlow Systems Inc. - Model TAC II telemetry unit, complete with Model PCU-001 pump control module, BPR backpack radio/TAC pack, power supply with battery backup, Model RTU-03 enclosure, cable and antenna

Resilient Seat Gate Valves

- American Flow Control
- Clow Valve Co.
- Kennedy Valve
- M&H Valve Co.
- Mueller Co.

Service Saddles-Stainless Steel Straps

- The Ford Meter Box Co.
- JCM Industries
- Romac Industries Inc.

Sewer Fittings ASTM D-3034

- The Harrington Corp./HARCO
- Multi Fittings
- Royal Building Products

Sleeve Type Couplings

- The Ford Meter Box Co.
- Smith-Blair - Style 413
- JCM Industries

Tapping Sleeves- Stainless Steel

- The Ford Meter Box Co. – Style FTSS
- JCM Industries- Model 432
- Smith-Blair – Style 663
- Romac Industries Inc.

Tie Rods

All tie rods shall be stainless steel all-thread rods

Trace Wire Covering

- King Innovation –Dryconn Weatherproof Connectors
- SKRINK WRAP
    a) 3M-ScotchKote Weatherproofing Compound
    b) 3M- Scotch 33 tape

Trace Wire Port

- Snake Pit (Cast Iron Cover)

Valve Boxes (Domestic Heavy Duty)

- Bingham & Taylor
- East Jordan Iron Works – Long Throat Lid General Foundries Inc
- Tyler Union-USA
- U. S. Foundry

Valve Name Plate

- LF Mfg. Co
- Shiedow Bronze Corp.
- Wager Co.

IV – PERMIT APPLICATIONS AND CHECKLISTS

INDIAN RIVER COUNTY
DEPARTMENT OF UTILITY SERVICES

MAJOR USER WASTEWATER AND/OR WATER
UTILITIES CONSTRUCTION PERMIT
APPLICATION FORM

A. APPLICANT

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP CODE _____

TELEPHONE (__) _____

B. OWNER/AUTHORIZED REPRESENTATIVE (IF DIFFERENT FROM APPLICANT)

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP CODE _____

TELEPHONE (__) _____

C. PROJECT

PROJECT NAME _____

PARCEL ID _____

LEGAL DESCRIPTION _____

TYPE OF PROJECT _____

_____

HOURS OF OPERATION _____

ANTICIPATED CONSTRUCTION SCHEDULE START/FINISH _____

ESTIMATED CONSTRUCTION COST OF
FACILITIES TO BE DEDICATED TO IRC:

WATER (LABOR & MATERIALS ONLY) $_____

SEWER (LABOR & MATERIALS ONLY) $_____

HAS PROJECT HAS BEEN REVIEWED BY PLANNING BOARD, PRE-APPLICATION AND TECHNICAL REVIEW COMMITTEES YES _____
NO _____

PRE-APPLICATION AND/OR PROJECT No. ASSIGNED BY PLANNING BOARD
No. _____

ALL PROJECTS WILL REQUIRE AN ENGINEERING REPORT SUBMITTED WITH THE UTILITY APPLICATION PERMIT DEFINING THE PROPOSED PROJECT'S IMPACT ON THE INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICE SYSTEM _____(INITIAL)

THE SCOPE OF THE ENGINEERING REPORT SHALL BE DEPENDENT ON THE COMPLEXITY OT THE PROPOSED PROJECT FOLLOWING CUSTOMARY ENGINEERING STANDARDS. GUIDELINES WILL BE MADE AVAILABLE AT THE INDIAN RIVER COUNTY DEPARTMENT OF UTILITY SERVICE _____(INITIAL)

D. METHOD (S) OF FLOW DERIVATION (CHECK APPROPRIATE LINE (S)

( ) EQUIVALENT RESIDENTIAL UNIT DETERMINATION TABLE
( ) SPECIFIC REQUIREMENTS FOR INDUSTRIAL USE
( ) EXISTING FACILITY/PREVIOUS RECORDS

1. ERU DETERMINATION TABLE (COPY ATTACHED):

TYPE OF ESTABLISHMENT _____

SQUARE FEET _____

APPLICABLE UNITS _____

WATER:
PROJECTED FLOW _____(ERUs) x 250 GALLONS / DAY = _____ GPD(ADF)

WASTEWATER:
PROJECTED FLOW _____(ERUs) x 250 GALLONS / DAY = _____ GPD (ADF)

2. SPECIFIC INDUSTRIAL USE:

TYPE (S) OF USE _____

WATER:
PROJECT FLOW _____

WASTEWATER:
PROJECT FLOW _____

3. EXISTING FACILITY/PREVIOUS RECORDS:

THE INDIAN RIVER COUNTY UTILITIES DEPARTMENT MAY CONSIDER THE PAST RECORDS OF AN EXISTING OPERATIONAL FACILITY FOR DETERMINING PROPOSED FLOW REQUIREMENTS FOR A NEW DEVELOPMENT, PROVIDED THE APPLICANT SUBMITS SUFFICIENT INFORMATION TO ALLOW THE DEPARTMENT TO DETERMINE ANTICIPATED FLOW. THIS INFORMATION SHALL INCLUDE, BUT NOT BE LIMITED TO, TWENTY-FOUR MONTHS OF PREVIOUS WATER BILLS AND A COMPLETE LISTING OF THE DIFFERENCES IN THE EXISTING AND PROPOSED FACILITY SUCH AS SIZE, HOURS OF OPERATION, TYPE OF USES, NUMBER OF EMPLOYEES, ETC.

E. GENERAL:

ADDITIONAL WATER FLOW ANTICIPATED FOR PROJECT PHASING, BUT NOT REQUESTED

(ESTIMATED) _____

ADDITIONAL WASTEWATER FLOW ANTICIPATED FOR PROJECT PHASING, BUT NOT REQUESTED

(ESTIMATED) _____

HIGH STRENGTH WASTE - YES* _____ NO _____
** IF YES, COMPLETE AN INDUSTRIAL WASTE PERMIT APPLICATION*

B O D (BIOCHEMICAL OXYGEN DEMAND) _____

S S (SUSPENDED SOLIDS) _____

PHOSPHORUS _____

F. <u>OTHER REQUIREMENTS:</u>

1. WILL THE DEVELOPMENT UTILIZE THE FOLLOWING?

RETROFIT EXISTING PLUMBING FIXTURES WITH
WATER SAVING DEVICES _____ YES _____ NO

IRRIGATION REUSE SYSTEMS _____ YES _____ NO

IF YES, PLEASE ATTACH A STATEMENT CERTIFIED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF FLORIDA INDICATING THE EXTENT OF SAVINGS, TO INCLUDE SUPPORTING THE DOCUMENTED HISTORICAL DATA.
PLEASE NOTE: MANUFACTURERS LITERATURE IS NOT ADEQUATE.

2. ZONING

EXISTING ZONING ON PROPERTY TO BE DEVELOPED _____

IS EXISTING ZONING APPROPRIATE FOR PROPOSED DEVELOPMENT?
_____YES _____NO

3. PLATTING

IS THE PROPERTY PLATTED APPROPRIATELY TO SUPPORT THE PROPOSED

DEVELOPMENT? _____ YES _____ NO

IF YES, PLEASE INDICATE THE PLAT BOOK AND PAGE NUMBER

PLAT BOOK_____ PAGE_____

4. FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

IS A WATER OR SEWER EXTENSION REQUIRED? _____ YES _____ NO

IF YES, THE APPLICANT MUST OBTAIN THE REQUIRED FDEP PERMIT PRIOR TO THE ISSUANCE OF A COUNTY PERMIT

5. SITE PLAN

YOU ARE REQUIRED TO SUBMIT A SITE PLAN INDICATING ANY ON OR OFF-SITE SANITARY SEWER AND/OR POTABLE WATER LINE CONSTRUCTION AND THE POINT OF CONNECTION(S) TO THE COUNTY'S EXISTING SANITARY SEWER AND/OR POTABLE WATER SYSTEM.

6. ITEMS SUBMITTED WITH CHECK LIST

- ❑ PROPERTY APPRAISERS MAP/EQUIVALENT (FOR LOCATION)
- ❑ SITE PLAN (REQUIRED)
- ❑ BUILDING PLANS
- ❑ FDEP PERMIT APPLICATION WITH CONSTRUCTION PLANS AND SPECIFICATIONS

7. SEE ATTACHED PROJECT CHECKLIST OF ITEMS REQUIRED FOR FINAL PROJECT C.O.

SIGNED _____ DATE _____

TYPE OR PRINT _____
APPLICANT: NAME AND TITLE

INDUSTRIAL USER WASTEWATER SURVEY AND PERMIT APPLICATION

SECTION A – GENERAL INFORMATION

A.1 Facility Name:_____

a. Operator Name: _____

b. Is the Operator identified in A.1.a the owner of the facility? YES☐ NO☐

If no, provide the name and address of the operator and submit a copy of the contract and/or other documents indicating the operator's scope of responsibility for the facility.

A.2 Facility Address:

Street: _____

City: _____ State: _____ Zip: _____

A.3 Business Mailing Address:

Street: _____

City: _____ State: _____ Zip: _____

A.4 Designated Signatory Authority of the Facility:

Name: _____

Title: _____

Address: _____

City: _____ State: _____ Zip: _____

Phone #: _____

A.5 Designated Facility Contact:

Name: _____

Title: _____

Phone #: _____

SECTION B – BUSINESS ACTIVITY

B.1 If your facility employs or will be employing processing in any of the industrial categories or business activities listed below (regardless of whether they generate wastewater, waste sludge, or hazardous wastes), place a check besides the category of business activity (check all that apply).

Industrial Categories:

- ☐ Aluminum Forming
- ☐ Asbestos Manufacturing
- ☐ Battery Manufacturing
- ☐ Can Making
- ☐ Canned and Preserved Fruit and Vegetable Processing
- ☐ Canned and Preserved Seafood
- ☐ Carbon Black Manufacturing
- ☐ Centralized Waste Treatment
- ☐ Coal Mining
- ☐ Coil Coating
- ☐ Concentrated Animal Feeding Operation and Feedlots
- ☐ Concentration Aquatic Animal production'
- ☐ Copper Forming
- ☐ Dairy Product Processing or Manufacturing
- ☐ Electric and Electronic Components Manufacturing
- ☐ Electroplating
- ☐ Explosives Manufacturing
- ☐ Fertilizer Manufacturing
- ☐ Ferroalloy Manufacturing
- ☐ Foundries (Metal Molding and Casing)
- ☐ Glass Manufacturing
- ☐ Grain Mills
- ☐ Gum and Wood Chemicals Manufacturing
- ☐ Hospital
- ☐ Ink Formulation
- ☐ Inorganic Chemicals
- ☐ Iron and Steel
- ☐ Landfill
- ☐ Leather Tanning and Finishing
- ☐ Meat and Poultry Products
- ☐ Metal Finishing
- ☐ Metal Products and Machinery
- ☐ Mineral Mining and Processing
- ☐ Nonferrous Metals Forming
- ☐ Nonferrous Metals Manufacturing
- ☐ Oil and Gas Extraction
- ☐ Ore Mining
- ☐ Organic Chemicals Manufacturing
- ☐ Paint and ink Formulating
- ☐ Paving and Roofing Manufacturing
- ☐ Pesticides Chemical Manufacturing, Formulating and/or Packaging

- ☐ Petroleum Refining
- ☐ Pharmaceutical Manufacturing
- ☐ Phosphate Manufacturing
- ☐ Photographic Processing
- ☐ Plastic and Synthetic Materials Manufacturing
- ☐ Porcelain Enameling
- ☐ Printed Circuit Board Manufacturing
- ☐ Pulp, Paper, and Fiberboard Manufacturing
- ☐ Rubber Manufacturing
- ☐ Soap and Detergent Manufacturing
- ☐ Steam Electric power Generating
- ☐ Sugar Processing
- ☐ Textile Mills
- ☐ Timber Products
- ☐ Transportation Equipment Cleaning
- ☐ Waste Combustors
- ☐ Other (Describe)

B.2. Give a brief description of all operations at this facility including primary products or services (attach additional sheets if necessary).

B.3. Indicate applicable North American Industry Classification System (NAICS) for all processes:

a.
b.
c.
d.
e.

B.4. Production Rate:

Product	Past Calendar Year Amounts per Day (Daily Units)		Estimate This Calendar Year Amounts Per Day (Daily Units)	

B.5. For Production-Based Categorical IU's only, what is the facility's long term average categorical production rate?

SECTION C – WATER SUPPLY

C.1 Water Sources: (Check as many as are applicable)
- ☐ Private Well
- ☐ Surface Water
- ☐ Municipal Water Utility
- ☐ Other (Specify)

C.2 Name (as listed on the water bill):

Street: _____

City: _____ State: _____ Zip: _____

C.3 Water Service Account Number: _____

C.4 List average water usage on premises (new facilities may estimate)

Type	Average Water Usage (GPD)	Indicate Estimated (E) or Measured (M)
a. Contact Cooling Water		
b. Non-Contact Cooling Water		
c. Boiler Feeding		
d. Process		
e. Sanitary		
f. Air Pollution Control		
g. Contained in Product		
h. Plant and Equipment Washdown		
i. Irrigation and Lawn Watering		
j. Other		
k. Total of a through j		

SECTION D – SEWER INFORMATION

D.1 a. For an existing business:
Is the Building presently connected to the Public Sanitary Sewer System?
YES ☐ Sanitary Sewer Account Number: _____
NO ☐ Have you applied for a Sanitary Sewer hookup YES☐ NO☐

b. For a new business:
(i) Will you be occupying an existing vacant building? YES☐ NO☐
(ii) Have you applied for a building permit if new facility will be constructed? YES☐ NO☐
(iii) Will you be connected to the Public Sanitary Sewer System? YES☐ NO☐

D.2 List size, descriptive location and flow of each discharge pipe or discharge point which connects to the County's sewer system (attach additional sheets if necessary)

Descriptive Location of Sewer Connection or Discharge Point	Average Flow (GPD)

SECTION E – WASTEWATER DISCHARGE INFORMATION

E.1 Does (or will) this facility discharge any wastewater other than from Restrooms to the County's sewer?

YES ☐ If the answer to this question is YES, complete the remainder of the application
NO ☐ If the answer to this question is NO, skip to SECTION I.

E.2 Provide the following information on Wastewater Flow Rate. (New facilities may estimate)

a. Hours/Day Discharged (e.g., 8 hours/day)
M T W Th F Sat Sun

b. Hours of Discharge (e.g., 9am to 5 pm)
M T W Th F Sat Sun

c. Peak Hourly Flow Rate (GPD)

d. Maximum Daily Flow Rate (GPD)

e. Annual Daily Average (GPD)

E.3 If batch discharge occurs or will occur, indicate: (New Facilities May Estimate)

a. Number of batch discharges (per day)

b. Average discharge per batch (GPD)

c. Time of batch discharges (days of week) (hours of day)

d. Flow rate (gallons per minute)

e. Percent of total discharge

E.4 Schematic Flow Diagram – For each major activity in which wastewater is or will be generated, draw a diagram of the **flow of materials, products, water and wastewater** from the start of the acrtivity to its completion, showing all unit processes. Indicate which processes use water and which generate wastestreams. Include the average daily volume and maximum daily volume of each wastestream (new facilities may estimate). If estimates are used for flow data, this **must** be indicated. **Number each unit process** having wastewater discharges to the community sewer. Use these numbers when showing this unit processes in the building layout in SECTION H. (May include as attachment)

E.5 List average wastewater discharge, maximum discharge, and type of discharge (batch, continuous, or process), for each plant process. Include the reference number from the process schematic that corresponds to each process. (New facilities should provide estimates for each discharge).

No.	Process Description	Average Flow (GPD)	Maximum Flow (GPD)	Type of Discharge (batch, continuous, none)

E.6 List the average wastewater discharge, maximum discharge, and type of discharge (batch, continuous, or both) for each non-process wastewater flows (i.e., cooling tower blowdown, boiler blowdown)

No.	Process Description	Average Flow (GPD)	Maximum Flow (GPD)	Type of Discharge (batch, continuous, none)

E.7 Do you have, or plan to have, automatic sampling equipment or continuous wastewater flow equipment at this facility?

		YES	NO	N/A
Current	Flow Metering	☐	☐	☐
	Sampling Equipment	☐	☐	☐
Planned	Flow Metering	☐	☐	☐
	Sampling Equipment	☐	☐	☐

If so, please indicate the present or future location of this equipment on the sewer schematic and describe equipment below:

E.8 Are any process changes or expansions planned during the next three years that could alter wastewater volumes or characteristics? Consider production processes as well as air or water pollution treatment that may affect discharge.

☐ YES ☐ NO (skip to SECTION E.10)

E.9 Briefly describe these changes and their effects on the wastewater volume and characteristics: (attach additional sheets if necessary)

E.10 Are any recycling or reclamation systems in use or planned?

☐ YES ☐ NO

E.11 Briefly describe recovery process, substance recovered, percent recovered, and the concentration in the spent solution. Submit a flow diagram for each process (attach additional sheets if needed):

SECTION F – CHARACTERISTICS OF DISCHARGE

All current industrial users are required to submit monitoring data on all pollutants that are regulated specific to each process. Use the tables provided in this section to report the analytical results. Do not leave blanks. For all other (non-regulated) pollutants, indicate whether the pollutant is known to be present (P), suspected to be present (S), or known not to be present (O), by placing the appropriate letter in the column for average reported values. Indicate on either the top of each table, or on a separate sheet, if necessary, the sample location and type of analysis used. Be sure methods conform to 40 CFR Part 136; if they do not, indicate what method was used.

New Discharges should use the table to indicate what pollutants will be present or are suspected to be present in proposed wastestreams by placing a P (expected to be present), S (may be present), or O (will not be present) under the average reported values.

Pollutant	Detection Level Used	Maximum Daily Value		Average of Analyses		Number of Analyses	Units	
		Conc.	Mass	Conc.	Mass		Conc.	Mass
Acenaphthene								
Acrolein								
Acrylonitrile								
Benzene								
Benzidine								
Carbon tetrachloride								
Chlorobenzene								
1,2,4-Trichlorobenzene								
Hexachlorobenzene								
1,2-Dichloroethane								
1,1,1-Trichloroetane								
1,1,2,2-Tetrachloroethane								
Chloroethane								
Bis(2-Chloroethyl)ether								
17-bis(chloro-methyl) ether								
2-Chloroethylvinyl ether								
2-Chloronaphthalene								
2,4,6-Trichlorophenol								
Parachlorometa cresol								
Chloroform								
2-Chlorophenol								
1,2-Dichlorobenzene								
1,3- Dichlorobenzene								
1,4-Dichlorobenzene								
3,3'-Dichlorobenzidine								
1,1-Dichloroethylene								
1,2-Trans-dichloroethylene								
2,4-Dichlorophenol								

1,2-Dichloropropane								
1,2-Dichloropropylene								
1,3-Dichloropropylene								
2,4-Dimethylphenol								
2,4-Dinitrotoluene								
2,6-Dinitrotoluene								
1,2-Diphenylhydrazine								
Ethylbenzene								
Fluoranthene								
4-Chlorophenyl ether								
4-Bromophenyl ether								
Bis(2-chloroethyl) ether								
Bis(2-chloroethoxy)methane								
Methylene Chloride								
Bromoform								
Dichlorobromomethane								
Chlorodibromomethane								
Hexachlorobutadiene								
Hexachlorocyclopentadiene								
Isophorone								
Naphthalene								
Nitrobenzene								
2-Nitrophenol								
4-Nitrophenol								
2,4-Dinitrophenol								
4,6-Dinitro-O-Cresol								
N-Nitrosodimethylamine								
N-Nitrosodiphenylamine								
N-Nitrosodi-N-propylamine								
Pentachlorophenol								
Phenol								
Bis(2-ethylhexyl)phthalate								
Butylbenzylphthalate								
Di-N-Butylphthalate								
Di-N-Octylphthalate								
Diethyl phthalate								
Dimethylphthalate								
Benzo(a)anthracene								
Benzo(a)pyrene								
3,4-Benzofluoranthene								
Benzo(k)fluoranthene								
Chrysene								
Acenaphthalene								
Anthracene								

Benzo(g,h,i)perylene								
Fluorene								
Phenanthrene								
Dibenzo(a.h)anthracene								
Indeno(1,2,3-cd)pyrene								
Pyrene								
Tetrachloroethylene								
Toluene								
Trichloroethylene								
Vinyl chloride								
Aldrin								
Dieldrin								
Chlordane								
4,4'-DDT								
4,4'-DDE								
4,4'-DDD								
Alpha-Endosulfan								
Beta-Endosulfan								
Endosulfan sulfate								
Endrin								
Endrin aldehyde								
Heptachlor								
Heptachlor epoxide								
Alpha-BHC								
Beta-BHC								
Gamma-BHC								
Delta-BHC								
PCB-1242								
PCB-1254								
PCB-1221								
PCB-1232								
PCB-1248								
PCB-1260								
PCB-1016								
Toxaphene								
Dioxn(TCDD)								
Asbestos								
Acidity								
Alkalinity								
Bacteria								
BOD5								
Chloride								
Chlorine								
Fluoride								

Hardness								
Magnesium								
Ammonia								
Oil and Grease								
Total Suspended Solids								
Total Organic Carbon								
Total Kjeldahl Nitrogen								
Nitrate as N								
Nitrite as N								
Organic Nitrogen								
Phosphorus								
Sodium								
Specific Conductivity								
Sulfate								
Sulfide								
Sulfite								
Antimony								
Arsenic								
Barium								
Beryllium								
Cadmium								
Chromium								
Copper								
Cyanide								
Lead								
Mercury								
Nickel								
Selenium								
Silver								
Thallium								
Zinc								
Any additional pollutants regulated by State								

SECTION G – TREATMENT

G.1 Is any form of wastewater treatment (see list below) practiced at this facility?

☐ YES ☐ NO

G.2 Is any form of wastewater treatment (or changes to an existing wastewater treatment) planned for this facility within the next three years?

☐ NO ☐ YES, Describe:

G.3 Treatment devices or processes used or proposed for treating wastewater or sludge (check as many as appropriate)

- ☐ Air flotation
- ☐ Centrifuge
- ☐ Chemical precipitation
- ☐ Chlorination
- ☐ Cyclone
- ☐ Filtration
- ☐ Flow equalization
- ☐ Grease or oil Separation, type:
- ☐ Grease trap
- ☐ Grinding filter
- ☐ Grit removal
- ☐ Ion exchange
- ☐ Neutralization, pH correction
- ☐ Ozonation
- ☐ Reverse Osmosis
- ☐ Screen
- ☐ Sedimentation
- ☐ Septic tank
- ☐ Solvent separation
- ☐ Spill protection
- ☐ Sump
- ☐ Rainwater diversion or storage
- ☐ Biological treatment, type:
- ☐ Other chemical treatment, type:
- ☐ Other physical treatment, type:
- ☐ Other, type:

G.4 Is process wastewater mixed with non-process wastewater prior to the sampling point?

☐ NO ☐ If YES, describe:

G.5 Describe the pollutant loadings, flow rates, design capacity, physical sixe, and operating procedures of each treatment facility checked in G.3

G.6 Attach a process flow diagram for each existing treatment system. Include process equipment, by-products, by-product disposal method, waste and by-product volumes, and design and operating conditions.

G.7 Describe any changes in treatment or disposal methods planned or under construction for the wastewater discharge to the sanitary sewer. Please include estimated completion dates.

G.8 Do you have a treatment operator? ☐ YES ☐ NO

(if YES) Name: _____

Title: _____

Phone: _____

Full time (specify hours): _____

Part time (specify hours): _____

G.9 Do you have a manual on the correct operation of your treatment equipment? ☐ YES ☐ NO

G.10 Do you have a written maintenance schedule for your treatment equipment? ☐ YES ☐ NO

SECTION H – FACILITY OPERATOIONAL CHARACTERISTICS

H.1 Shift Information

Work Days		Mon	Tue	Wed	Thur	Fri	Sat	Sun
Shifts per Work Day								
Employees per shift	1st							
	2nd							
	3rd							
Shift start and end times	1st							
	2nd							
	3rd							

H.2 Indicate whether the business activity is:
☐ Continuous through the year, or
☐ Seasonal (circle the months of the year during which the business occurs):

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Comments:

H.3 Indicate whether the facility discharge is:
☐ Continuous through the year, or
☐ Seasonal (circle the months of the year during which the business occurs):

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Comments:

H.4 Does operation shut down for vacation, maintenance, or other reasons?
☐ NO ☐ YES, indicate reasons and period when shutdown occurs:

H.5 List types and amounts (mass or volume per day) of raw materials used or planned for use (attach list if needed):

H.6 List types and quantity of chemicals used or planned for use (attach list if needed). Include copies of Material Safety Data Sheets (if available) for all chemicals identified.

Chemical	Quantity

H.7 Building Layout – Draw to scale the location of each building on the premises. Show map, orientation and location of all water meters, storm drains, numbered unit processes (from schematic flow diagram), public sewers, and each facility sewer line connected to the public sewers. Number each sewer and show existing and proposed sampling locations.

A blueprint or drawing of the facilities showing the above items may be attached in lieu of submitting a drawing on this sheet.

SECTION I – SPILL PREVENTION

I.1 Do you have chemical storage containers, bins, or ponds at your facility?

☐ NO ☐ If YES, please give a description of their location, contents, size, type, and frequency and method of cleaning. Also indicate in a diagram or comment on the proximity of these containers to a sewer or storm drain. Indicate if buried metal containers have cathodic protection.

I.2 Do you have floor drains in your manufacturing or chemical storage are(s)?

☐ NO ☐ If YES, where do they discharge to?

I.3 If you have chemical storage containers, bins, or ponds in manufacturing area, could an accidental spill lead to a discharge to (check all that apply):

☐ an on-site disposal system
☐ public sanitary sewer system (e.g., through a floor drain)
☐ storm drain
☐ to ground
☐ other, specify:
☐ not applicable, no possible discharge to any of the above routes

I.4 Do you have an accidental spill prevention plan (ASPP) to prevent spills of chemicals or slug discharges from entering the Control Authority's collection systems?

☐ YES (Please enclose a copy with this application)
☐ NO
☐ N/A, since there are no floor drains and/or the facility discharge(s) only domestic wastes.

I.5 Please describe below any previous spill events and remedial measures taken to prevent their reoccurrence.

SECTION J – BEST MANAGEMENT PRACTICES

J.1 Describe the types of best management practices (BMPs) you employ to prevent pollutants from entering a facility's wastestream or from reaching a discharge point. BMPs are management and operational procedures such as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to implement the general and specific prohibitions listed in 40 CFR 403.5(a)(1) and (b). BMPs also include treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw materials storage.

J.2 Do you have the potential for a slug discharge to the sewer system? A slug discharge is any discharge of a non-routine episodic nature, including but not limited to an accidental spill or non-customary batch discharge, which has a reasonable potential to cause interference or pass through, or in any other way violate the POTWs regulations, local limits or permit conditions (40 CFR 403.8(f)(2)(v). ☐ YES ☐ NO

Please describe the type of the potential slug discharge, including quality and content.

Please describe current mechanisms for preventions of slug discharges.

Please describe where and how raw materials are stored.

SECTION K – NON-DISCHARGED WASTES

K.1 Are any waste liquids or sludges generated and not disposed of in the sanitary sewer system?

☐ YES, Please describe below

☐ NO, Skip the remainder of SECTION K.

Waste Generated	Quantity (per year)	Disposal Method

K.2 Indicate which wastes identified above are disposed of at an off-site treatment facility and which are disposed of on-site.

K.3 If any of your wastes are sent off to an off-site centralized waste treatment facility, identify the waste and the facility.

K.4 If an outside firm removed any of the above checked wastes, state the name(s) and address(es) of all waste haulers:

a. _____ b. _____

_____ _____

_____ _____

Permit # (if applicable): _____ Permit # (if applicable): _____

K.5 Have you been issued any Federal, State or Local Environmental Permits?

☐ YES

☐ NO

If YES, please list the permit(s):

K.6 Describe where and how waste liquids and sludges are stored.

SECTION L – AUTHORIZED SIGNATURES

Compliance certification:

L.1 Are all applicable Federal, State or Local pretreatment standards and requirements being met on a consistent basis?

- ☐ YES
- ☐ NO
- ☐ NOT YET DISCHARGING

L.2 If NO:

a. What additional operations and maintenance procedures are being considered to bring the facility into compliance? Also, list additional treatment technology or practice being considered in order to bring the facility into compliance.

b. Provide a schedule for bringing the facility into compliance. Specify major events planned along with reasonable completion dates. Note that if the Control Authority issues a permit to the applicant, it may establish a schedule for compliance different from the one submitted by the facility.

Milestone Activity	Completion Date

Indian River County
Department of Utility Services

Authorized Representative Statement

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

_____ _____
Name(s) Title(s)

_____ _____ _____
Signature(s)* Date Phone

* To be signed by an authorized representative, as defined in Indian River County Ordinance 2012-007, after completion of this form.

INDIAN RIVER COUNTY
DEPARTMENT OF UTILITY SERVICES

UTILITY CONSTRUCTION PERMIT CHECKLIST

WATER CHECKLIST

Project Name:_____ UCP #_____

Received	Description
	1. One (1) signed and dated, approved or red-lined set of as-built construction drawings by the project's County Inspector for approval by Utilities Engineering, prior to the submittal of the Final Record Drawings. Submittal of Final Record Drawings should consist of one (1) set of reproducible mylars, one (1) electronic disc and three (3) sets of blue/black line prints signed and sealed by the Engineer-of-Record or Licensed Surveyor. The Engineer-of-Record must be registered to practice in the State of Florida.
	2. Copy of a satisfactory hydrostatic pressure test signed by the Engineer-of-Record.
	3. One complete set of daily field inspection records prepared by the on-site inspector certified by the Engineer-of-Record to be submitted seven (7) days after completion of that portion requiring clearance.
	4. Copy of a satisfactory bacteriological main clearance (bactees) certified by the Engineer-of-Record.
	5. Copy of a satisfactory trench backfill and compaction density test reports signed by the Engineer-of-Record.
	6. Certification by the Engineer-of-Record that the water line was sanitized in accordance with County specifications.
	7. Certification by the Engineer-of-Record that the construction of the water distribution system is complete and in accordance with County construction and material specifications. Any deviation from the approved construction drawings or County specifications must be specifically identified and justified by the Engineer.
	8. Copy of the Notice of Acceptance of Completion from the Florida Department of Environmental Protection (FDEP) authorizing the water distribution system to be placed into service.
	9. Backflow Preventer Certification(s), which includes domestic and fire lines and proof that the certification has been filed with Backflow Solutions Inc. in accordance with the County Cross Connection Control Program's Backflow Management and Inspection Database. See http://www.ircutilities.com/CCCP.htm for further information.

Received	Description
	10. Easement & Bill of Sale - Dedication of the water distribution system and accompanying easements. The dedication is to include an itemized list of all materials along with total materials, construction and engineering costs. ***This will be coordinated through the IRC Attorney's Office once authorized by IRCDUS.***
	11. Bill of Sale - Where the water distribution system is located in established easements or road rights-of-way, the attached bill of sale is to be executed along with an itemized list of all materials to include materials and construction costs. ***This will be coordinated through the IRC Attorney's Office once authorized by IRCDUS.***
	12. Complete on-site inspection by a County utility inspector with confirmation that the water distribution system appears acceptable.
	13. Arrangements for payment of all capacity charges and other costs of connections.
	14. Release of lien(s) from each Contractor, Subcontractor and Vendor.
	15. A one-year maintenance bond in an amount equaling 25% of the total cost for construction of the system if construction costs exceed $10,000. If total construction costs are less than $10,000, then a one-year warranty letter is required. The warranty letter can be issued by the developer or contractor.

INDIAN RIVER COUNTY
DEPARTMENT OF UTILITY SERVICES

UTILITY CONSTRUCTION PERMIT CHECKLIST

WASTEWATER CHECKLIST

Project Name:_____ UCP #_____

Received	Description
	1. One (1) signed and dated, approved or red-lined set of as-built construction drawings by the project's County Inspector for approval by Utilities Engineering, prior to the submittal of the Final Record Drawings. Final Record Drawings submittal should consist of one (1) set of reproducible mylars, one (1) electronic disc and three (3) sets of blue/black line prints signed and sealed by the Engineer-of-Record or Licensed Surveyor. The Engineer-of-Record must be registered to practice in the State of Florida.
	2. Copy of a satisfactory hydrostatic pressure test or infiltration/exfiltration test signed by the Engineer-of-Record.
	3. One complete set of daily field inspection records prepared by the on-site inspector certified by the Engineer-of-Record to be submitted seven (7) days after completion of construction of that portion requiring clearance.
	4. Copy of a satisfactory television test and a certified report by the Engineer-of-Record.
	5. Copy of a satisfactory trench backfill and compaction density test reports signed by the Engineer-of-Record.
	6. Certification by the Engineer-of-Record that the construction of the wastewater collection/transmission system is complete and in accordance with County construction and material specifications. Any deviation from the approved construction drawings or County specifications must be specifically identified and justified by the Engineer.
	7. Copy of the Notice of Acceptance of Completion from the Florida Department of Environmental Protection (FDEP) authorizing the wastewater collection/transmission system to be placed into service.
	8. Bill of Sale & Easement - Dedication of the wastewater collection/transmission system and accompanying easements. The dedication is to include an itemized list of all materials along with total materials, construction and engineering costs. ***This should be coordinated through the IRC Attorney's Office.***
	9. Bill of Sale - Where the wastewater collection/transmission system is located in established easements or road rights-of-way, the attached bill of sale is to be executed

Received	Description
	along with an itemized list of all materials to include materials and construction costs. ***This should be coordinated through the IRC Attorney's Office***.
	10. Complete on-site inspection by a County utility inspector with confirmation that the wastewater collection/transmission system appears acceptable.
	11. Arrangements for payment of all capacity charges and other costs of connections.
	12. Release of lien(s) from each Contractor, Subcontractor and Vendor.
	13. A one-year maintenance bond in an amount equaling 25% of the total cost for construction of the system if construction costs exceed $10,000. If total construction costs are less than $10,000, then a one-year warranty letter is required. The warranty letter can be issued by the developer or contractor.
	14. A set of lift station specifications (if applicable), two sets of operations and maintenance manuals, warranty, and all spare parts as required by IRCDUS standards.
	15. Transfer of lift station's electric account from Developer to County.
	16. If a PRIVATE Lift Station, an acknowledgment letter from Engineer/Owner, and copy of 24/7 lift station maintenance agreement with a qualified service and repair company having lift station maintenance experience.