

**NOTES:**

1. PIPING, VALVES & METER BOX LID TO BE PERMANENTLY IDENTIFIED AS "RECLAIMED WATER SYSTEM" COMPONENTS. PVC SHALL BE SCHEDULE 40 PIPE WITH SCHEDULE 80 FITTINGS.
2. LIMIT OF UNOBSTRUCTED SPACE FROM SIDE OF WATER METER BOX SHALL BE 36" MINIMUM FOR SHRUBS AND SIMILAR OBSTRUCTIONS WITH 60" MINIMUM FOR TREES, WALLS, AND OTHER SIMILAR OBSTRUCTIONS.
3. FOR INSTALLATION OF SERVICES UNDER DRIVEWAYS AND ROADWAYS USE 3" DIAMETER PVC SCH 40 OR HDPE SDR 9 CASING. CASING SHALL EXTEND 24" BEYOND EDGE OF PAVEMENT. END OF CASING TO BE SEALED WITH FOAM SEALANT. CASING TO BE COLOR CODED PURPLE.
4. SUCCESSIVE TAPS INTO THE WATER MAIN SHALL BE SPACED A MINIMUM OF 18" APART AND SHALL NOT BE ON A COMMON LINE PARALLEL TO THE LONGITUDINAL AXIS OF THE PIPE. TAPS ON THE SAME SIDE OF A P.V.C. PIPE SECTION SHALL BE MIN. 10' APART.
5. METER SHALL NOT BE PLACED IN SIDEWALK OR DRIVEWAY AREAS. WATER SERVICE LINES AND TAPS SHALL NOT BE PLACED UNDER DRIVEWAYS WHENEVER POSSIBLE AND IF REQUIRED, ONLY WITH PRIOR DEPARTMENT APPROVAL.
6. CHECK VALVE IS REQUIRED FOR EVERY RECLAIMED WATER SERVICE.
7. MAXIMUM SERVICE LENGTH IS 100' TO METER.
8. BEDDING (MIN. 4") AND COVER (MIN. 4") OVER SERVICE LINE OR CASING SHALL CONSIST OF FINE GRANULAR MATERIAL. UNSUITABLE IN-SITU MATERIALS SUCH AS MUCK, DEBRIS AND LARGER ROCKS SHALL BE REMOVED WITH 2" MAXIMUM SIZE.
9. METER SERVICE WILL NOT BE INSTALLED AND/OR ACTIVATED UNTIL:
  - A. ALL FORM BOARDS FOR DRIVEWAY AND/OR SIDEWALK MUST BE COMPLETELY INSTALLED OR THE DRIVEWAY AND/OR SIDEWALK MUST HAVE BEEN INSTALLED.
  - B. "MINIMUM UNOBSTRUCTED SPACE" AS SHOWN IN NOTE 2 AND ON THE PLAN VIEW IS PROVIDED WITH 12" MINIMUM VERTICAL SEPARATION REQUIRED TO ALL OTHER UTILITIES.
10. METER TO BE SET BY DEPARTMENT.
11. THE DEVELOPER/PROPERTY OWNER OR ASSIGNEE SHALL BE RESPONSIBLE FOR INSTALLATION OF SERVICES BEYOND PRESSURE TEST LIMITS AS SPECIFIED BY THE DEPARTMENT.
12. THREADED AREAS OF CORPORATION STOP AND OTHER FITTINGS SHALL BE SPIRAL WRAPPED WITH TWO (2) WRAPS OF TEFLON TAPE.

**PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS**

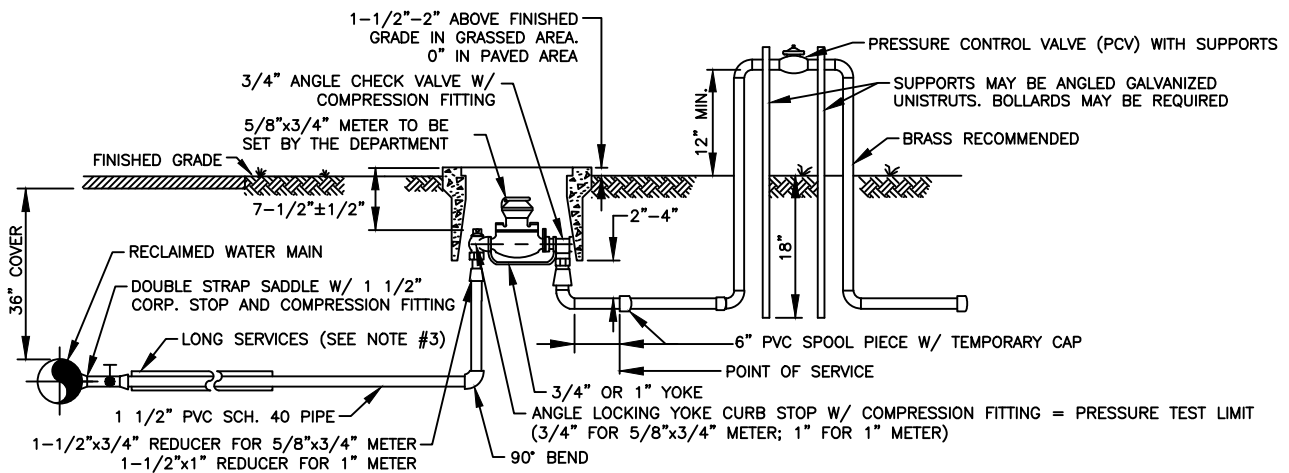
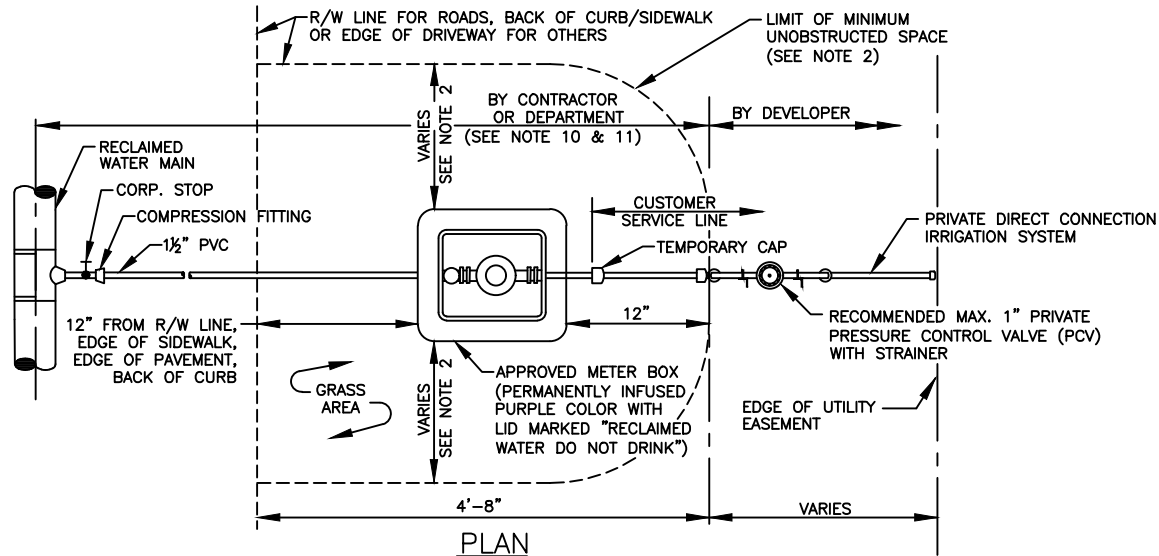
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**RECLAIMED WATER DUAL 5/8" X 3/4" METER SERVICE DETAIL**

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**NOTES:**

1. PIPING, VALVES & METER BOX LID TO BE PERMANENTLY IDENTIFIED AS "RECLAIMED WATER SYSTEM" COMPONENTS. PVC SHALL BE SCHEDULE 40 PIPE WITH SCHEDULE 80 FITTINGS.
2. LIMIT OF UNOBSTRUCTED SPACE FROM SIDE OF WATER METER BOX SHALL BE 36" MINIMUM FOR SHRUBS AND SIMILAR OBSTRUCTIONS WITH 60" MINIMUM FOR TREES, WALLS, AND OTHER SIMILAR OBSTRUCTIONS.
3. FOR INSTALLATION OF SERVICES UNDER DRIVEWAYS AND ROADWAYS USE 3" DIAMETER PVC SCH 40 OR HDPE SDR 9 CASING. CASING SHALL EXTEND 24" BEYOND EDGE OF PAVEMENT. END OF CASING TO BE SEALED WITH FOAM SEALANT. CASING TO BE COLOR CODED PURPLE.
4. SUCCESSIVE TAPS INTO THE WATER MAIN SHALL BE SPACED A MINIMUM OF 18" APART AND SHALL NOT BE ON A COMMON LINE PARALLEL TO THE LONGITUDINAL AXIS OF THE PIPE. TAPS ON THE SAME SIDE OF A P.V.C. PIPE SECTION SHALL BE MIN. 10' APART.
5. METER SHALL NOT BE PLACED IN SIDEWALK OR DRIVEWAY AREAS. WATER SERVICE LINES AND TAPS SHALL NOT BE PLACED UNDER DRIVEWAYS WHENEVER POSSIBLE AND IF REQUIRED, ONLY WITH PRIOR DEPARTMENT APPROVAL.
6. CHECK VALVE IS REQUIRED FOR EVERY RECLAIMED WATER SERVICE.
7. MAXIMUM SERVICE LENGTH IS 100' TO METER.
8. BEDDING (MIN. 4") AND COVER (MIN. 4") OVER SERVICE LINE OR CASING SHALL CONSIST OF FINE GRANULAR MATERIAL. UNSUITABLE IN-SITU MATERIALS SUCH AS MUCK, DEBRIS AND LARGER ROCKS SHALL BE REMOVED WITH 2" MAXIMUM SIZE.
9. METER SERVICE WILL NOT BE INSTALLED AND/OR ACTIVATED UNTIL:
  - A. ALL FORM BOARDS FOR DRIVEWAY AND/OR SIDEWALK MUST BE COMPLETELY INSTALLED OR THE DRIVEWAY AND/OR SIDEWALK MUST HAVE BEEN INSTALLED.
  - B. "MINIMUM UNOBSTRUCTED SPACE" AS SHOWN IN NOTE 2 AND ON THE PLAN VIEW IS PROVIDED WITH 12" MINIMUM VERTICAL SEPARATION REQUIRED TO ALL OTHER UTILITIES.
10. METER TO BE SET BY DEPARTMENT.
11. THE DEVELOPER/PROPERTY OWNER OR ASSIGNEE SHALL BE RESPONSIBLE FOR INSTALLATION OF SERVICES BEYOND PRESSURE TEST LIMITS AS SPECIFIED BY THE DEPARTMENT.
12. THREADED AREAS OF CORPORATION STOP AND OTHER FITTINGS SHALL BE SPIRAL WRAPPED WITH TWO (2) WRAPS OF TEFLON TAPE.

**PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS**

REVISION/ISSUE DATE

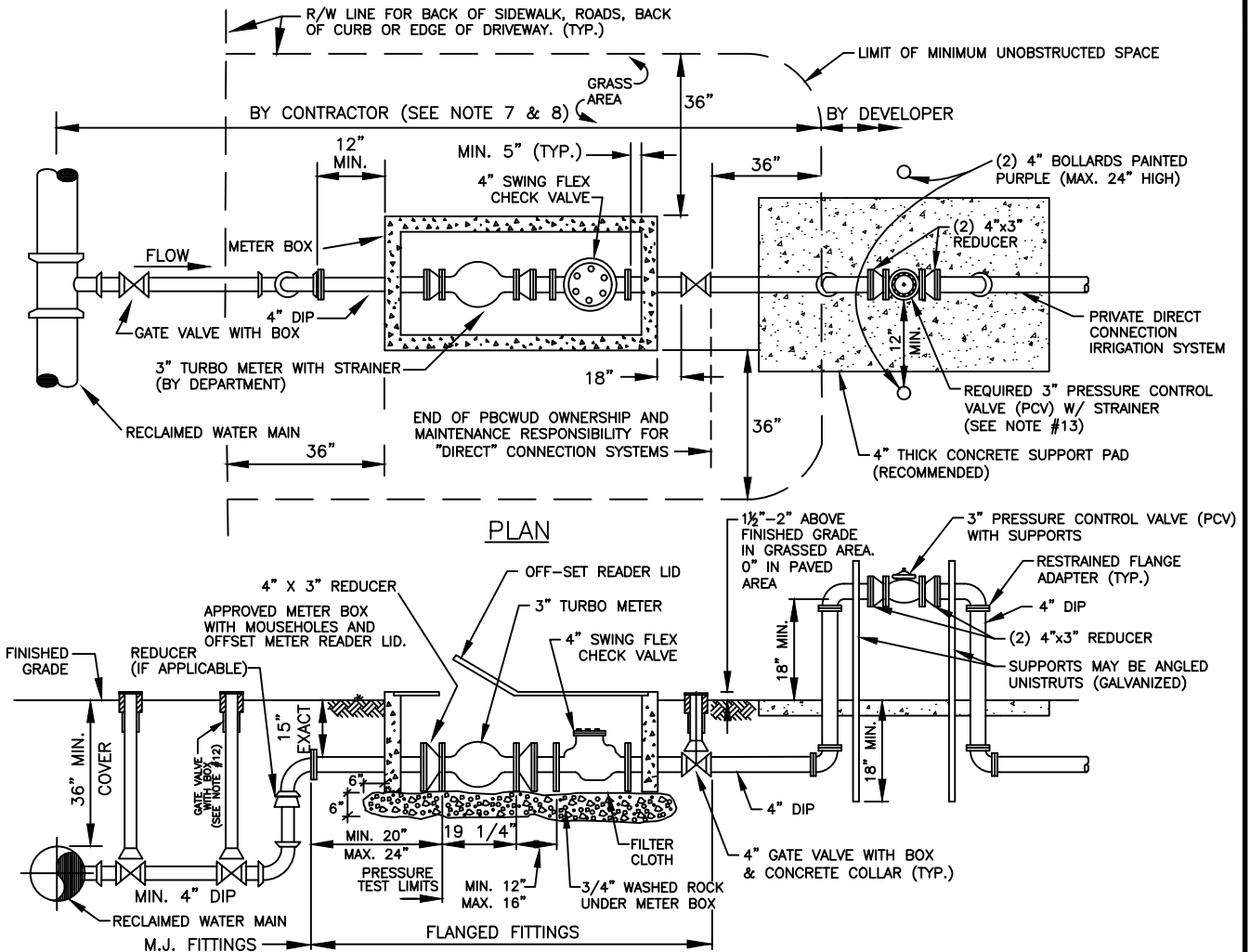
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**RECLAIMED WATER SINGLE 5/8" X 3/4" OR 1" METER SERVICE DETAIL**

PAGE NO.

2R





**NOTES:**

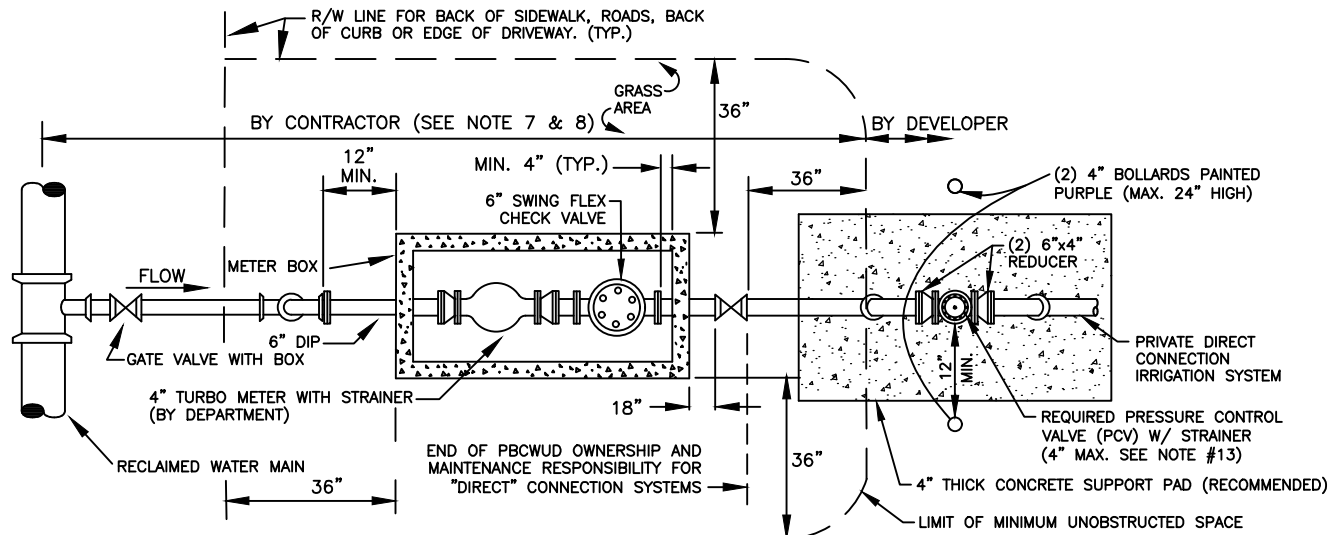
1. ALL SERVICE PIPING SHALL BE DUCTILE IRON.
2. APPROVED METER BOX LID TO BE PERMANENTLY INFUSED PURPLE COLOR OR PAINTED PURPLE AND MARKED "RECLAIMED WATER - DO NOT DRINK".
3. ALL FITTINGS SHALL BE MECHANICAL JOINT OR FLANGED WITH MEGALUGS OR EQUAL.
4. PIPING AND VALVES TO BE IDENTIFIED (TAGGED) AS RECLAIMED WATER SYSTEM COMPONENTS.
5. METER SHALL NOT BE PLACED IN SIDEWALK OR DRIVEWAY AREAS.
6. METER SERVICE WILL NOT BE INSTALLED UNTIL:
  - A) FORM BOARDS FOR DRIVEWAY AND/OR SIDEWALK ARE IN PLACE OR DRIVEWAY OR SIDEWALK IS IN PLACE.
  - B) "MINIMUM UNOBSTRUCTED SPACE" (AS SHOWN) IS PROVIDED. MINIMUM 12" VERTICAL SEPARATION IS REQUIRED TO OTHER UTILITIES.
7. METER SHALL BE INSTALLED BY THE DEPARTMENT.
8. THE DEVELOPER/PROPERTY OWNER OR ASSIGNEE SHALL BE RESPONSIBLE FOR INSTALLATION OF SERVICES BEYOND PRESSURE TEST LIMITS AS SPECIFIED BY THE DEPARTMENT.
9. CONTRACTOR SHALL CONSTRUCT SERVICE COMPONENTS FOR THE METER TO BE INSTALLED "TRUE" AND "PLUMB" AND TO ALLOW METER READING THROUGH THE METER READER LID.
10. ALL HARDWARE FOR FLANGED CONNECTIONS (BOLTS, ETC.) TO BE STAINLESS STEEL.
11. CHECK VALVE TO BE FREE OF OBSTRUCTION FOR PROPER OPERATION.
12. A GATE VALVE WITH BOX IS TO BE LOCATED WITHIN 5 FEET OF THE METER BOX.
13. THE PRESSURE CONTROL VALVE (PCV) SHALL BE PRIVATE FOR SERVICE WITH "DIRECT" CONNECTION TO THE IRRIGATION SYSTEM. SEE SEPARATE DETAILS FOR "LAKE DISCHARGE" CONNECTION.
14. A TIMER AND/OR REMOTE TELEMETRY UNIT MAY BE REQUIRED TO REGULATE THE AVAILABILITY OF RECLAIMED WATER FOR EACH SERVICE CONNECTION.

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

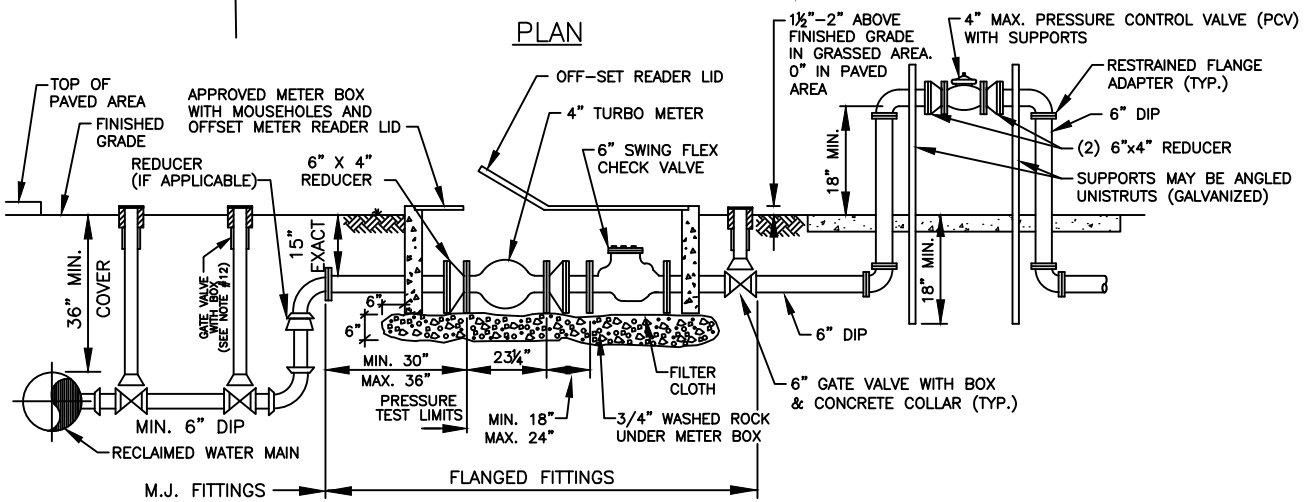
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RECLAIMED WATER 3" METER SERVICE DETAIL  
(DIRECT SERVICE)

PAGE NO.  
4R



PLAN



SECTION

NOTES:

1. ALL SERVICE PIPING SHALL BE DUCTILE IRON.
2. APPROVED METER BOX LID TO BE PERMANENTLY INFUSED PURPLE COLOR OR PAINTED PURPLE AND MARKED "RECLAIMED WATER - DO NOT DRINK".
3. ALL FITTINGS SHALL BE MECHANICAL JOINT OR FLANGED WITH MEGALUGS OR EQUAL.
4. PIPING AND VALVES TO BE IDENTIFIED (TAGGED) AS RECLAIMED WATER SYSTEM COMPONENTS.
5. METER SHALL NOT BE PLACED IN SIDEWALK OR DRIVEWAY AREAS.
6. METER SERVICE WILL NOT BE INSTALLED UNTIL:
  - A) FORM BOARDS FOR DRIVEWAY AND/OR SIDEWALK ARE IN PLACE OR DRIVEWAY OR SIDEWALK IS IN PLACE.
  - B) "MINIMUM UNOBSTRUCTED SPACE" (AS SHOWN) IS PROVIDED. MINIMUM 12" VERTICAL SEPARATION IS REQUIRED TO OTHER UTILITIES.
7. METER SHALL BE INSTALLED BY THE DEPARTMENT.
8. THE DEVELOPER/PROPERTY OWNER OR ASSIGNEE SHALL BE RESPONSIBLE FOR INSTALLATION OF SERVICES BEYOND PRESSURE TEST LIMITS AS SPECIFIED BY THE DEPARTMENT.
9. CONTRACTOR SHALL CONSTRUCT SERVICE COMPONENTS FOR THE METER TO BE INSTALLED "TRUE" AND "PLUMB" AND TO ALLOW METER READING THROUGH THE METER READER LID.
10. ALL HARDWARE FOR FLANGED CONNECTIONS (BOLTS, ETC.) TO BE STAINLESS STEEL.
11. CHECK VALVE TO BE FREE OF OBSTRUCTION FOR PROPER OPERATION.
12. A GATE VALVE WITH BOX IS TO BE LOCATED WITHIN 5 FEET OF THE METER BOX.
13. THE PRESSURE CONTROL VALVE (PCV) SHALL BE PRIVATE FOR SERVICE WITH "DIRECT" CONNECTION TO THE IRRIGATION SYSTEM. SEE SEPARATE DETAILS FOR "LAKE DISCHARGE" CONNECTION.
14. A TIMER AND/OR REMOTE TELEMETRY UNIT MAY BE REQUIRED TO REGULATE THE AVAILABILITY OF RECLAIMED WATER FOR EACH SERVICE CONNECTION.

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

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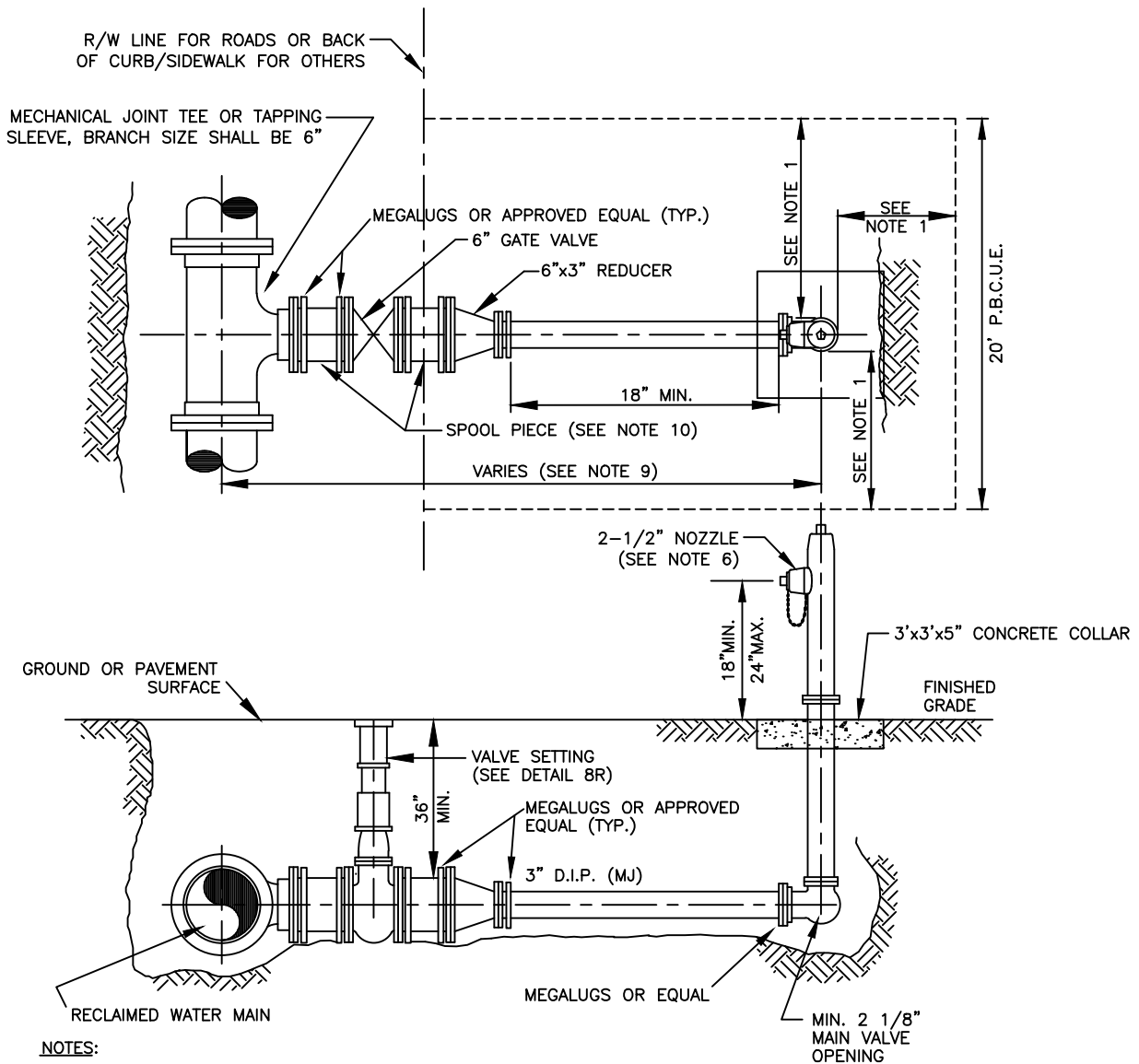
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RECLAIMED WATER 4" METER SERVICE DETAIL  
(DIRECT SERVICE)

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**NOTES:**

1. FLUSHING HYDRANT SHALL BE INSTALLED PLUMB AND TRUE IN UNOBSTRUCTED LOCATION. LIMIT OF UNOBSTRUCTED SPACE FROM SIDE OF HYDRANT SHALL BE 3'(36") MINIMUM FOR SHRUBS AND SIMILAR OBSTRUCTIONS WITH 10'(120") MINIMUM FOR TREES, WALLS, AND OTHER SIMILAR OBSTRUCTIONS. LIMIT OF UNOBSTRUCTED SPACE BEHIND HYDRANT SHALL BE 5' (60") MINIMUM.
2. THE SAME MODEL HYDRANT SHALL BE USED THROUGHOUT CURRENT CONTRACT PHASE, COLOR SHALL BE PURPLE, PANTONE 522C, OR PRIOR APPROVED EQUAL BY THE DEPARTMENT.
3. VALVE SHALL BE PLACED ADJACENT TO MAIN, AND RESTRAINED WITH MEGALUGS OR EQUAL.
4. ALL HYDRANTS SHALL BE TEED OFF OF MAINS
5. HYDRANTS SHALL NOT BE PLACED IN SIDEWALKS, ROADWAYS, OR BIKE PATHS. HYDRANT NOZZLE SHALL BE AT LEAST 24" MINIMUM FROM THE EDGE OF A SIDEWALK OR BIKE PATH.
6. NOZZLE TO FACE ROADWAY.
7. PIPING, VALVES, AND HYDRANTS TO BE IDENTIFIED (TAGGED) AS RECLAIMED WATER SYSTEM COMPONENTS.
8. ALL BURIED HYDRANT HARDWARE SHALL BE STAINLESS STEEL 304.
9. LENGTH OF RECLAIMED WATER MAIN TO FLUSHING HYDRANT VARIES BUT NOT TO EXCEED 20 FEET WITHOUT PRIOR DEPARTMENT APPROVAL.
10. MINIMUM 18" SPOOL PIECE REQUIRED. IF TAPPING SLEEVE IS INSTALLED NO SPOOL PIECE IS REQUIRED BETWEEN SLEEVE AND GATE VALVE.

**PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS**

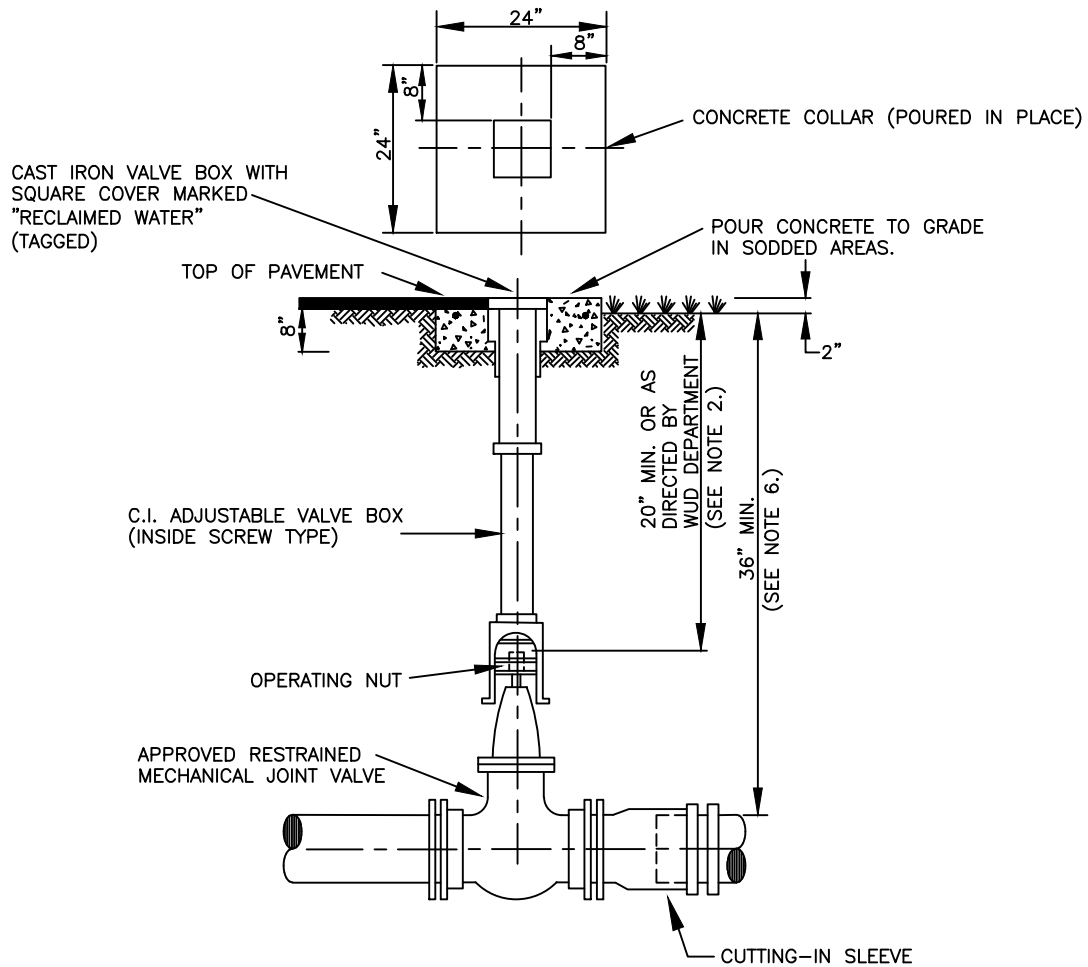
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**RECLAIMED WATER MAIN TYPICAL FLUSHING HYDRANT INSTALLATION**

PAGE NO.

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**NOTES:**

1. CONCRETE COLLAR IS NOT REQUIRED IN PAVED AREAS IF PAVEMENT SURFACE IS FINISHED PRIOR TO CONDITIONAL FINAL INSPECTION.
  2. WHEN OPERATING NUT IS DEEPER THAN 36" A ONE PIECE EXTENSION WILL BE REQUIRED TO BRING OPERATING NUT 20"-30" BELOW FINISHED GRADE. EXTENSION BOLTS & NUTS ARE TO BE STAINLESS STEEL. A HIGH STRENGTH STEEL CENTERING PLATE, WELDED TO THE EXTENSION, IS ALSO REQUIRED.
  3. VALVE BOXES SHALL HAVE SQUARE COVERS MARKED "RECLAIMED WATER".
  4. EXTENSION VALVE BOX TO BE D.I.P. OR C-900 PVC DR 18 (COLOR: PURPLE)
  5. A CUT-IN INSTALLATION SHALL REQUIRE MEGALUGS OR EQUAL THROUGHOUT ASSEMBLY.
  6. IN ORDER TO MAINTAIN ADEQUATE COVER OVER VALVE NUT, THE FOLLOWING MINIMUM COVERS OVER PIPE ARE REQUIRED
- | <u>GATE VALVE SIZE</u> | <u>MIN. COVER OVER PIPE</u> |
|------------------------|-----------------------------|
| 16"                    | 48"                         |
| 20"                    | 54"                         |
| 24"                    | 60"                         |
| 30"                    | 72"                         |
7. PIPE SHALL BE RESTRAINED ON BOTH SIDES OF THE VALVE AS REQUIRED.
  8. VALVES IN ROADWAYS SHALL BE LOCATED OUTSIDE OF WHEEL PATHS.

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

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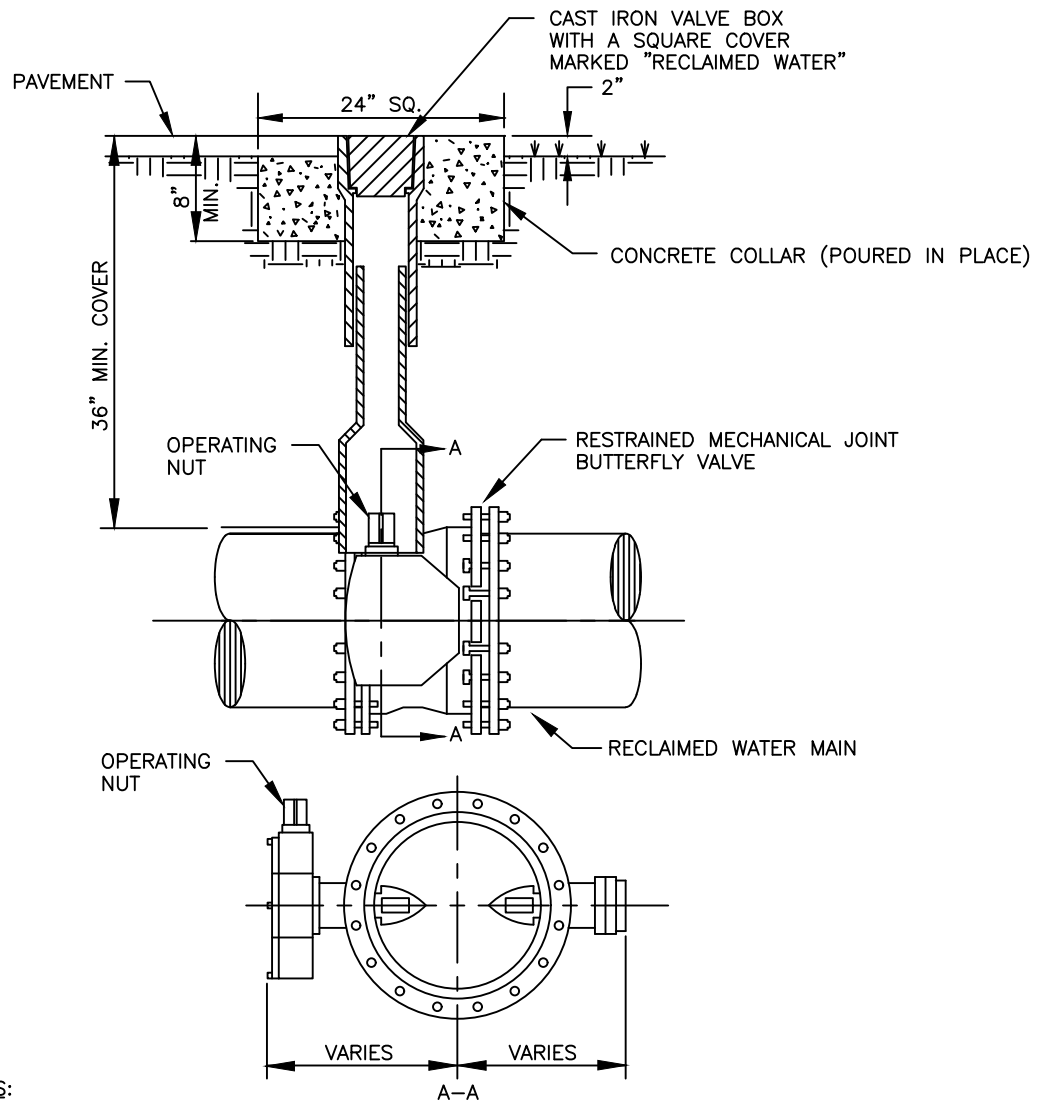
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RECLAIMED WATER MAIN TYPICAL GATE  
VALVE SETTING AND MAIN CUT-IN DETAIL

PAGE NO.

8R





**NOTES:**

1. CONCRETE COLLAR IS NOT REQUIRED IN PAVED AREAS IF PAVEMENT SURFACE IS FINISHED PRIOR TO CONDITIONAL FINAL INSPECTION.
2. WHEN TOP OF OPERATING NUT IS DEEPER THAN 36" AN EXTENSION WILL BE REQUIRED TO BRING OPERATING NUT 24"-30" BELOW FINISHED GRADE. EXTENSION BOLTS & NUTS ARE TO BE STAINLESS STEEL. A HIGH STRENGTH STEEL CENTERING PLATE, WELDED TO THE EXTENSION, IS ALSO REQUIRED.
3. VALVE BOXES SHALL HAVE SQUARE COVER MARKED "RECLAIMED WATER".
4. A CUT-IN INSTALLATION SHALL REQUIRE MEGALUGS OR EQUAL THROUGHOUT ASSEMBLY.
5. EXTENSION VALVE BOX TO BE D.I.P. OR C-900 PVC DR 18 (COLOR: PURPLE)
6. PIPE SHALL BE RESTRAINED ON BOTH SIDES OF THE VALVE AS REQUIRED.
7. VALVES IN ROADWAYS SHALL BE LOCATED OUTSIDE OF WHEEL PATHS.

**PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS**

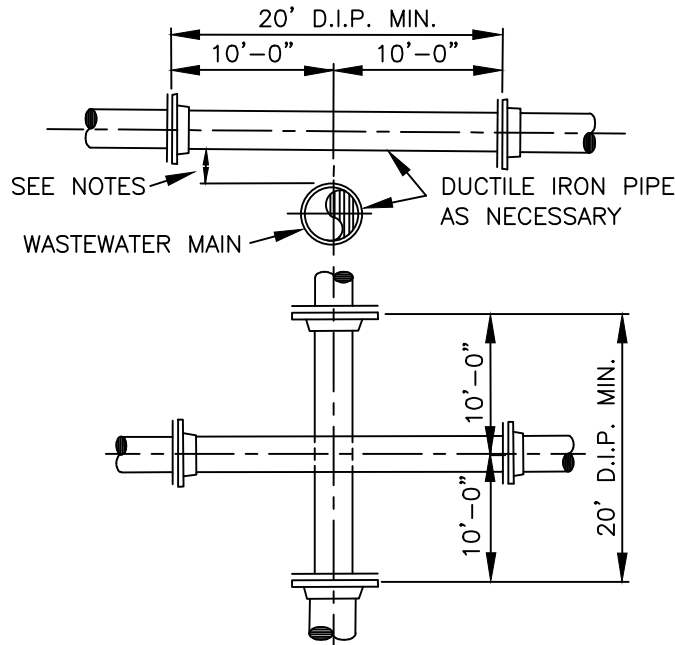
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**RECLAIMED WATER MAIN TYPICAL BUTTERFLY VALVE SETTING**

PAGE NO.

**9R**



**NOTES:**

1. STORM SEWER, GRAVITY WASTEWATER AND RECLAIMED WATER MAIN CROSSING UNDER POTABLE WATER MAINS SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE OF TWELVE (12) INCHES BETWEEN THE INVERT OF THE UPPER PIPE AND THE CROWN OF THE LOWER PIPE. WHERE THIS MINIMUM SEPARATION CANNOT BE MAINTAINED, THE CROSSING SHALL BE ARRANGED SO THAT THE STORM/WASTEWATER/RECLAIMED WATER PIPE JOINTS AND POTABLE WATER MAIN JOINTS ARE EQUIDISTANT FROM THE POINT OF CROSSING WITH NO LESS THAN TEN (10) FEET BETWEEN ANY TWO JOINTS, BOTH PIPES SHALL BE D.I.P., AND THE MINIMUM VERTICAL SEPARATION SHALL BE 6 INCHES. WHERE THERE IS NO ALTERNATIVE TO STORM/WASTEWATER/RECLAIMED WATER PIPES CROSSING OVER A POTABLE WATER MAIN, THE CRITERIA FOR MINIMUM 12" VERTICAL SEPARATION BETWEEN LINES AND JOINT ARRANGEMENT, AS STATED ABOVE, SHALL BE REQUIRED, AND BOTH PIPES SHALL BE D.I.P. IRRESPECTIVE OF SEPARATION. D.I.P. IS NOT REQUIRED FOR STORM SEWERS.
2. WHENEVER POSSIBLE MAINTAIN MIN. TEN (10) FEET HORIZONTAL DISTANCE (WALL TO WALL) BETWEEN POTABLE WATER MAIN AND STORM SEWER, WASTEWATER MAIN, OR FORCE MAIN (A MIN. 6' SEPARATION MAY BE APPROVED ON A CASE BY CASE BASIS). MAINTAIN MIN. THREE (3) FEET HORIZONTAL DISTANCE (WALL TO WALL) BETWEEN RECLAIMED WATER MAIN AND POTABLE WATER MAIN, STORM SEWER, WASTEWATER GRAVITY MAIN OR FORCE MAIN.
3. FORCE MAIN CROSSING POTABLE WATER MAIN OR RECLAIMED WATER MAIN SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE OF TWELVE (12) INCHES BETWEEN THE OUTSIDE OF THE FORCE MAIN AND OUTSIDE OF THE POTABLE WATER MAIN OR RECLAIMED WATER MAIN WITH THE POTABLE WATER MAIN OR RECLAIMED WATER MAIN CROSSING OVER THE FORCE MAIN.
4. WASTEWATER LATERALS SHALL CROSS UNDER POTABLE WATER MAINS WITH A MIN. 12" VERTICAL SEPARATION WHENEVER POSSIBLE. WHERE THIS MINIMUM SEPARATION CANNOT BE MAINTAINED, A 20' SECTION OF DUCTILE IRON PIPE POTABLE WATER MAIN CENTERED ON THE CROSSING IS REQUIRED AND THE MINIMUM VERTICAL SEPARATION SHALL BE 6". WHERE THERE IS NO ALTERNATIVE TO A WASTEWATER LATERAL PIPE CROSSING OVER A POTABLE WATER MAIN, A MINIMUM 12" VERTICAL SEPARATION IS REQUIRED, THE LATERAL SHALL BE P.V.C. C-900 SDR18 OR BETTER, THE POTABLE WATER MAIN SHALL BE D.I.P. AND THE PIPE JOINTS SHALL BE EQUIDISTANT FROM THE POINT OF CROSSING.
5. POTABLE WATER SERVICE LINES SHALL CROSS OVER WASTEWATER MAINS WITH MIN. 12" VERTICAL SEPARATION. WHERE THIS MIN. SEPARATION CAN NOT BE MAINTAINED, THE WATER SERVICE SHALL BE ENCASED IN A MIN. 10' LONG CASING CENTERED OVER THE CROSSING WITH MIN. 6" VERTICAL SEPARATION.
6. WASTEWATER MAINS, WATER MAINS, STORM PIPES AND OTHER UTILITY PIPES SHALL CROSS PERPENDICULAR WHENEVER POSSIBLE.

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

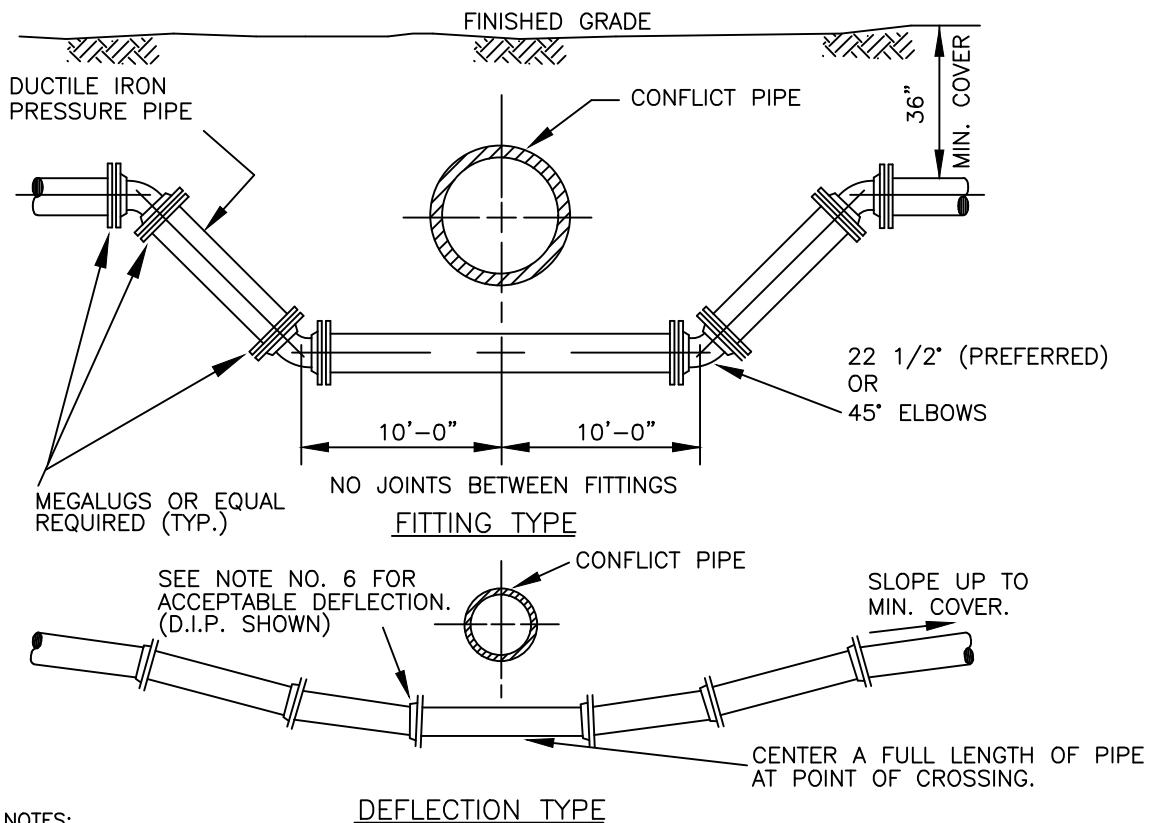
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RECLAIMED WATER, POTABLE WATER,  
WASTEWATER MAIN & STORM SEWER CONFLICT

PAGE NO.

10R



**NOTES:**

1. STORM SEWER, GRAVITY WASTEWATER AND RECLAIMED WATER MAIN CROSSING UNDER POTABLE WATER MAINS SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE OF TWELVE (12) INCHES BETWEEN THE INVERT OF THE UPPER PIPE AND THE CROWN OF THE LOWER PIPE. WHERE THIS MINIMUM SEPARATION CANNOT BE MAINTAINED, THE CROSSING SHALL BE ARRANGED SO THAT THE STORM/WASTEWATER/RECLAIMED WATER PIPE JOINTS AND POTABLE WATER MAIN JOINTS ARE EQUIDISTANT FROM THE POINT OF CROSSING WITH NO LESS THAN TEN (10) FEET BETWEEN ANY TWO JOINTS, BOTH PIPES SHALL BE D.I.P., AND THE MINIMUM VERTICAL SEPARATION SHALL BE 6 INCHES. WHERE THERE IS NO ALTERNATIVE TO STORM/WASTEWATER/RECLAIMED WATER PIPES CROSSING OVER A POTABLE WATER MAIN, THE CRITERIA FOR MINIMUM 12" VERTICAL SEPARATION BETWEEN LINES AND JOINT ARRANGEMENT, AS STATED ABOVE, SHALL BE REQUIRED, AND BOTH PIPES SHALL BE D.I.P. IRRESPECTIVE OF SEPARATION. D.I.P. IS NOT REQUIRED FOR STORM SEWERS.
2. WHENEVER POSSIBLE MAINTAIN MIN. TEN (10) FEET HORIZONTAL DISTANCE (WALL TO WALL) BETWEEN POTABLE WATER MAIN AND STORM SEWER, WASTEWATER MAIN, OR FORCE MAIN (A MIN. 6' SEPARATION MAY BE APPROVED ON A CASE BY CASE BASIS.) MAINTAIN MIN. THREE (3) FEET HORIZONTAL DISTANCE (WALL TO WALL) BETWEEN RECLAIMED WATER MAIN AND POTABLE WATER MAIN, STORM SEWER, WASTEWATER GRAVITY MAIN OR FORCE MAIN.
3. FORCE MAIN CROSSING POTABLE WATER MAIN OR RECLAIMED WATER MAIN SHALL BE LAID TO PROVIDE A MINIMUM VERTICAL DISTANCE OF TWELVE (12) INCHES BETWEEN THE OUTSIDE OF THE FORCE MAIN AND OUTSIDE OF THE POTABLE WATER MAIN OR RECLAIMED WATER MAIN WITH THE POTABLE WATER MAIN OR RECLAIMED WATER MAIN CROSSING OVER THE FORCE MAIN.
4. FITTINGS SHALL BE RESTRAINED.
5. THE DEFLECTION TYPE CROSSING IS PREFERRED.
6. DO NOT EXCEED 75% OF MANUFACTURERS RECOMMENDED MAXIMUM JOINT DEFLECTION FOR DUCTILE IRON PIPE. PVC PIPE CURVATURE MAY ONLY BE ACCOMPLISHED BY INSTALLING APPROPRIATE BENDS.
7. ALL EXPOSED TIE STEEL SHALL BE COATED WITH COAL-TAR EPOXY
8. POTABLE WATER SERVICE LINES SHALL CROSS OVER WASTEWATER MAINS WITH MIN. 12" VERTICAL SEPARATION. WHERE THIS MIN. SEPARATION CAN NOT BE MAINTAINED, THE WATER SERVICE SHALL BE ENCASED IN A MIN. 10' LONG CASING CENTERED OVER THE CROSSING WITH MIN. 6" VERTICAL SEPARATION.
9. WASTEWATER MAINS, WATER MAINS, STORM PIPES AND OTHER UTILITY PIPES SHALL CROSS PERPENDICULAR WHENEVER POSSIBLE.

**PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS**

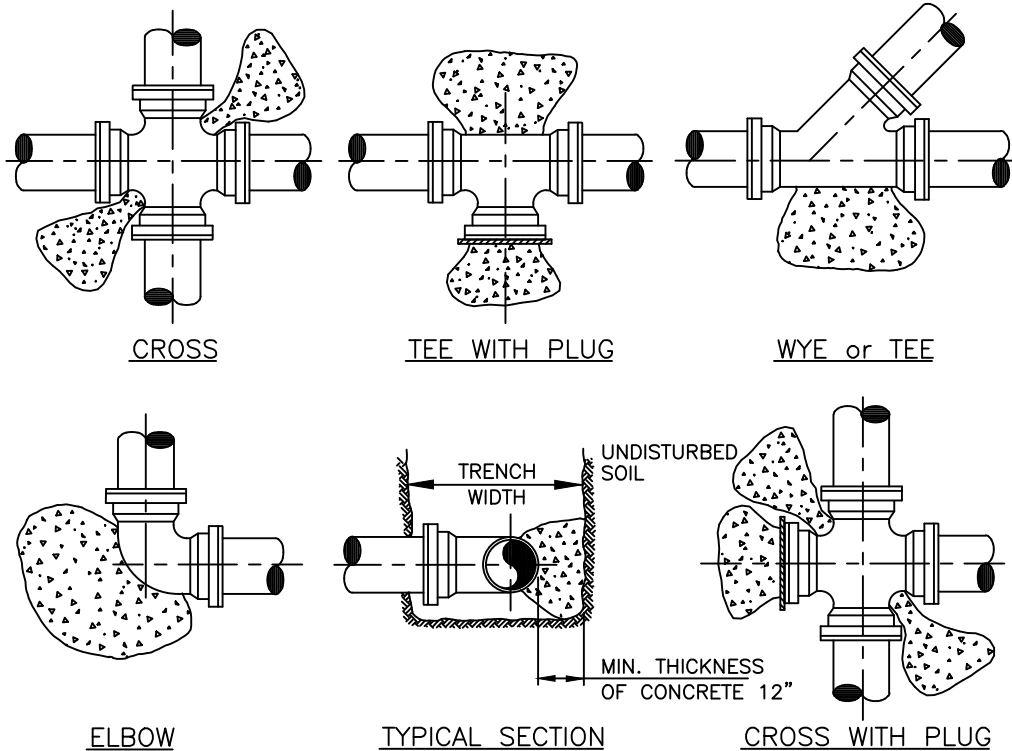
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**RECLAIMED WATER MAIN PRESSURE PIPE  
CONFLICT**

PAGE NO.

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PIPE	THRUST BLOCK AREA REQ'D	REMARKS	NOTE:
4"	2.0 SQ. FT.	VALUES ARE FOR 90° BEND, BASED ON 2000 P.S.F. SAFE BEARING LOAD AND PIPE PRESSURE OF 150 P.S.I. FOR OTHER SOILS & PRESSURES THE AREA REQUIRED IS IN DIRECT PROPORTION	FOR OTHER FITTINGS USE THE FOLLOWING FACTORS.  TEE 100% 45° BEND 71% 22 1/2° BEND 39% 11 1/4° BEND 20% DEAD END 100%
6"	4.0 SQ. FT.		
8"	6.6 SQ. FT.		
10"	10.0 SQ. FT.		
12"	14.0 SQ. FT.		
14"	18.6 SQ. FT.		

**NOTES:**

1. CONCRETE THRUST BLOCKS OR THRUST COLLARS MAY BE UTILIZED ONLY IF NECESSARY FOR CONNECTIONS TO AN EXISTING PIPING SYSTEM, OTHERWISE MECHANICAL RESTRAINTS SHALL BE USED. KEEP "T" BOLTS CLEAR OF CONCRETE, WRAPPED IN VISQUEEN FOR FUTURE ACCESS, WITH A MINIMUM OF 1' THICKNESS BETWEEN THE FITTING AND SOIL.
2. BEFORE POURING CONCRETE, PLUGS SHALL BE WRAPPED WITH VISQUEEN AND A BOARD PLACED IN FRONT.
3. CONCRETE SHALL BE 2500 P.S.I. MINIMUM.
4. THE ENGINEER OF RECORD SHALL SUBMIT A THRUST BLOCK SIZE CALCULATION FOR TEE CONNECTIONS INTO UNRESTRAINED EXISTING MAINS LARGER THAN 14".
5. THE ENGINEER OF RECORD SHALL SUBMIT A PIPE RESTRAINT DESIGN FOR INLINE EXTENSIONS OF A EXISTING UNRESTRAINED MAIN IF MECHANICAL JOINT RESTRAINT CAN NOT BE INSTALLED ON THE EXISTING MAIN.

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

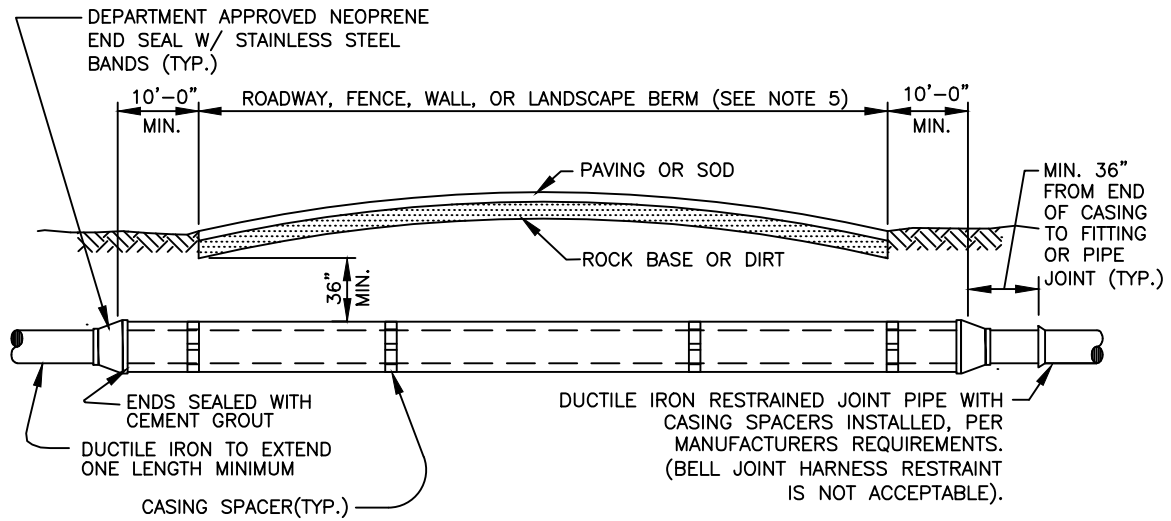
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**TYPICAL THRUST BLOCKS  
FOR PRESSURE PIPE**

PAGE NO.

12R



CARRIER PIPE SIZE	STEEL CASING INSIDE DIAMETER (MIN)	MINIMUM WALL THICKNESS (SEE NOTE 2)
4"	12"	.188
6"	14"	.250
8"	20"	.250
10"	20"	.250
12"	24"	.250
14"	24"	.250
16"	30"	.312
18"	30"	.312
20"	36"	.372
24"	42"	.500
30"	48"	.500
36"	54"	.625
42"	60"	.625
48"	72"	.625

**NOTES:**

1. A PROFILE DRAWING TO SCALE FOR EACH JACK AND BORE, DIRECTIONAL DRILL, OR DIRECT BURIED INSTALLATION IS REQUIRED TO BE APPROVED BY THE DEPARTMENT PRIOR TO INSTALLATION. IF A SPLIT CASING IS REQUIRED THEN SHOP DRAWINGS ARE REQUIRED TO BE SUBMITTED AND APPROVED BY THE DEPARTMENT PRIOR TO CONSTRUCTION AND/OR INSTALLATION.
2. THICKER WALL CASINGS AND LARGER COVER OVER CASING MAY BE REQUIRED BY THE RIGHT-OF-WAY OWNER.
3. STEEL CASING SHALL BE COATED OUTSIDE WITH COAL TAR EPOXY (MIN. 16 MILS DFT) AND BE PAINTED WITH A 4" MINIMUM WIDE CONTINUOUS STRIPE, COLOR CODED TO MATCH THE PIPE INSIDE, ALONG THE TOP AXIS OF THE CASING.
4. PIPE IN CASING SHALL BE PULLED TO FULLY ENGAGE RESTRAINT.
5. STEEL CASING IS REQUIRED FOR ALL RECLAIMED WATER MAIN INSTALLATIONS UTILIZING JACK AND BORE CONSTRUCTION AND WHEN MAINS ARE INSTALLED UNDER FENCES, WALLS, OR LANDSCAPE BERMS. WHEN THE CASING IS INSTALLED UNDER FENCES, WALLS, OR LANDSCAPE BERMS IT SHALL BE CENTERED ON THE PREVIOUS BARRIER AND IS REQUIRED TO EXTEND 10' MINIMUM PAST BARRIER ON EACH SIDE UNLESS OTHERWISE PREVIOUSLY APPROVED BY THE DEPARTMENT.

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

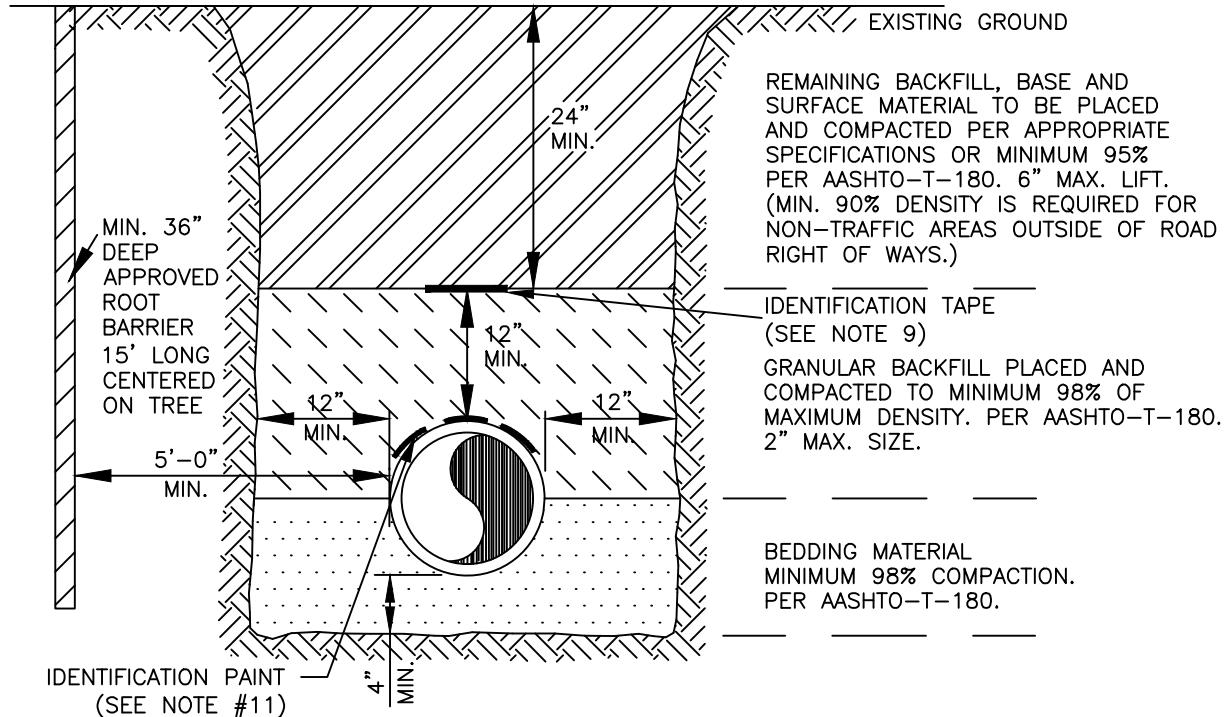
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RECLAIMED WATER MAIN  
CASING INSTALLATION DETAILS

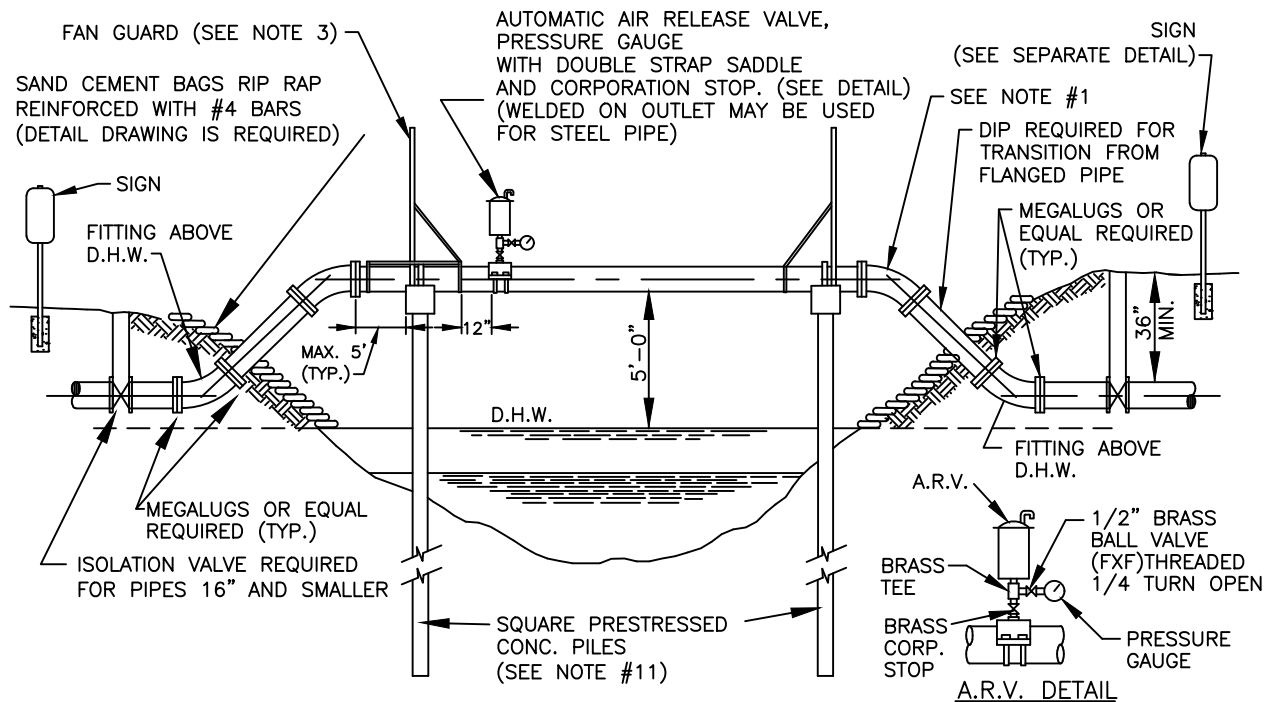
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**NOTES:**

1. BEDDING SHALL CONSIST OF IN-SITU GRANULAR MATERIAL OR WASHED AND GRADED LIMEROCK 3/8"– 7/8" SIZING. UNSUITABLE IN-SITU MATERIALS SUCH AS MUCK, DEBRIS AND LARGER ROCKS SHALL BE REMOVED.
2. THE PIPE SHALL BE FULLY SUPPORTED FOR ITS ENTIRE LENGTH WITH APPROPRIATE COMPACTION UNDER THE PIPE HAUNCHES.
3. THE PIPE SHALL BE PLACED IN A DRY TRENCH.
4. BACKFILL SHALL BE FREE OF UNSUITABLE MATERIAL SUCH AS LARGE ROCK, MUCK AND DEBRIS.
5. DENSITY TESTS ARE REQUIRED IN 1 FOOT LIFTS ABOVE THE PIPE AT INTERVALS OF 400' MAXIMUM, MINIMUM 1 SET OF TESTS FOR EACH WASTEWATER GRAVITY MAIN RUN, OR AS DIRECTED BY THE INSPECTOR.
6. THE DEVELOPER/CONTRACTOR SHALL BE RESPONSIBLE TO COMPLY WITH ALL TRENCH SAFETY LAWS AND REGULATIONS.
7. SEE SEPARATE DETAILS FOR "PIPE INSTALLATION UNDER EXISTING PAVEMENT – OPEN CUT."
8. THE AFFECTED AREA SHALL BE RESTORED TO EQUAL OR BETTER CONDITION OR AS SPECIFIED IN PERMIT/CONTRACT DOCUMENTS.
9. APPROVED MAGNETIC TAPE IS REQUIRED FOR: ALL POTABLE WATER MAINS, FORCE MAINS AND RECLAIMED WATER MAINS. THE TAPE SHALL BE INSTALLED MAX. 24" BELOW FINISHED GRADE.
10. ROOT BARRIER IS REQUIRED FOR APPROVED TREE INSTALLATION CLOSER THAN 10 FEET FROM UTILITY FACILITIES.
11. CONTINUOUS 4" WIDE PAINT STRIPING IS REQUIRED FOR DIP/PCCP WATER MAINS (BLUE), DIP SEWER MAINS (GREEN), AND DIP RECLAIMED WATER MAINS (PURPLE).
12. PERMANENT ABOVE GROUND UTILITY MARKER SHALL BE INSTALLED IF REQUIRED BY PROPERTY OWNER GRANTING THE PIPE INSTALLATION PERMIT.
13. FOR PIPE INSTALLATIONS IN ROAD RIGHTS-OF-WAY, ROAD OWNER'S PERMIT SPECIFICATIONS SHALL APPLY.



**NOTES:**

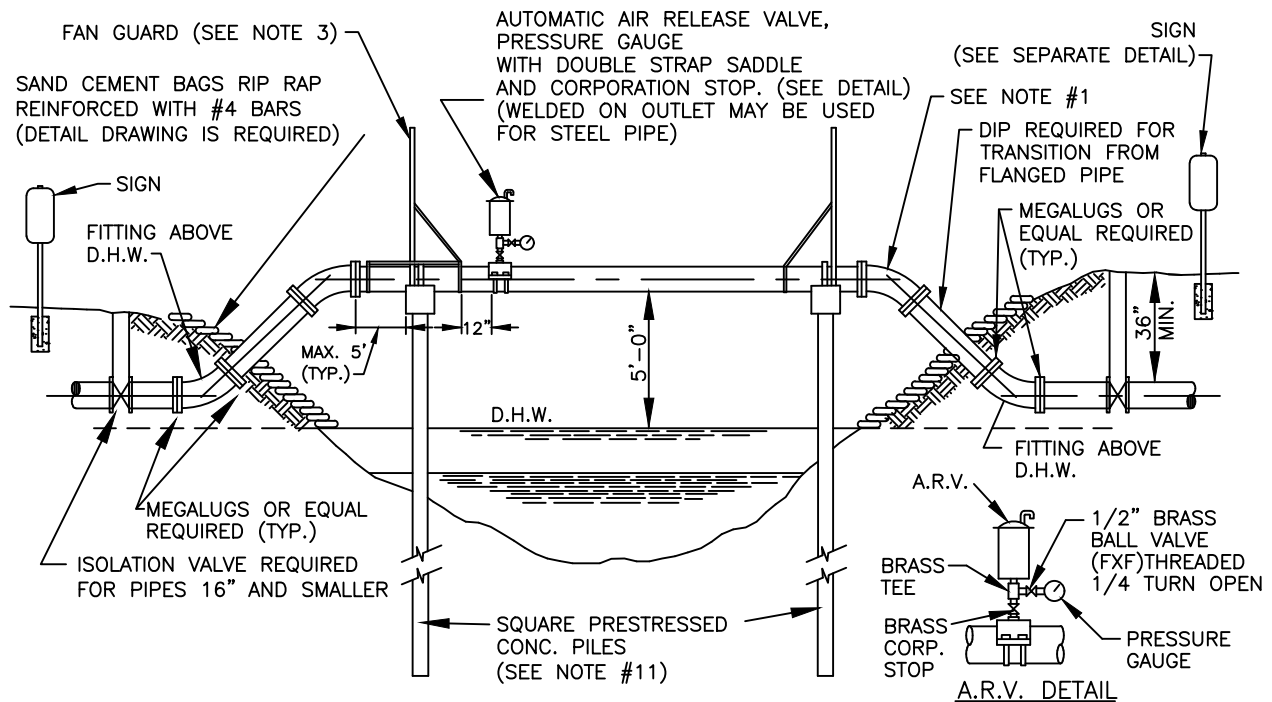
1. ALL EXPOSED PIPE SHALL BE DUCTILE IRON OR PREFABRICATED STEEL WITH FLANGED FITTINGS AND PROFILED GASKETS. RETAINER GLANDS AND UNIFLANGE TYPE FITTINGS ARE NOT TO BE SUBSTITUTED FOR FLANGED FITTINGS. PREFABRICATED FLANGED PIPE SHALL BE FACTORY TESTED. PREFABRICATED STEEL PIPE MAY INCORPORATE WELDED ON LONG RADIUS UPPER BENDS.
2. SPAN LENGTHS AS REQUIRED BY PERMITTING AGENCY
3. FAN GUARDS ARE REQUIRED. SEE FAN GUARD/PILE CAP DESIGN DETAILS, FOR ADDITIONAL REQUIREMENTS. ACCESS PLATFORM AND GATE REQUIRED ON ARV SIDE ONLY.
- 4A. ALL EXPOSED PIPING SHALL BE PAINTED AS SPECIFIED IN THE APPROVED MATERIAL LIST.
- 4B. ALL HARDWARE SHALL BE PAINTED WITH COAL-TAR EPOXY.
5. PIPE SHALL BE CRADLED ON 1/2" THICK NEOPRENE.(DUROMETER GRADE 50,) CURRENT FDOT STANDARDS APPLY. NEOPRENE IS REQUIRED AT ALL STRAPS INSTALLED OVER STEEL PIPE. NEOPRENE SHALL EXTEND MIN. 1" BEYOND THE EDGES OF THE CRADLE AND STRAPS.
6. TIE-DOWN STRAPS MUST PROPERLY FIT AND SECURE PIPE IN CRADLE.
7. PIPE CRADLE IN CAP SHALL CONTACT 1/3 CIRCUMFERENCE OF PIPE. (SEE FAN GUARD DETAIL)
8. SHOW EXISTING CANAL CROSS SECTION ULTIMATE CANAL SECTION AND RELEVANT ELEVATIONS AND DISTANCES ON A TO SCALE DETAIL DRAWING.
9. PILE LIFT CABLE SHALL BE REMOVED BELOW SURFACE; HOLE SHALL BE FILLED WITH EPOXY CEMENT.
10. THREADED AREAS OF BRASS FITTINGS SHALL BE SPIRAL WRAPPED WITH TWO WRAPS OF TEFLON TAPE.
11. THE PILES AND CAP DESIGN SHALL BE SHOWN ON TO SCALE SIGNED AND SEALED DETAIL DRAWINGS. MIN. 12"x12" TYPE 1A FLORIDA DOT INDEX PILES ARE REQUIRED. PILE PENETRATION BELOW CANAL BOTTOM SHALL BE 15' MINIMUM. MINIMUM LOAD CAPACITY OF 20 TONS PER PILE IS REQUIRED (FDOT STANDARDS APPLY). SIGNED AND SEALED SHOP DRAWINGS ARE REQUIRED.
12. RECLAIMED WATER SYSTEM PIPE SHALL BE PAINTED AS SPECIFIED IN THE APPROVED RECLAIMED WATER SYSTEM MATERIAL LIST.
13. PREFABRICATED STEEL PIPE SHALL HAVE WELDED ON BEARING PADS EXTENDING MIN. 1" BEYOND THE PIPE CRADLE. THE PADS SHALL BE INSTALLED BY THE STEEL PIPE MANUFACTURER PRIOR TO PAINTING.
14. RECLAIMED WATER MAIN CROSSINGS OVER BODIES OF WATER MAY BE SUBJECT TO A D.E.P. "NOTICED GENERAL ENVIRONMENTAL RESOURCE PERMIT" (NGP)

**PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS**

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**RECLAIMED WATER MAIN TYPICAL UTILITIES  
CANAL CROSSING – SINGLE PIPE (SINGLE PILES)**

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**NOTES:**

1. ALL EXPOSED PIPE SHALL BE DUCTILE IRON OR PREFABRICATED STEEL WITH FLANGED FITTINGS AND PROFILED GASKETS. RETAINER GLANDS AND UNIFLANGE TYPE FITTINGS ARE NOT TO BE SUBSTITUTED FOR FLANGED FITTINGS. PREFABRICATED FLANGED PIPE SHALL BE FACTORY TESTED. PREFABRICATED STEEL PIPE MAY INCORPORATE WELDED ON LONG RADIUS UPPER BENDS.
2. SPAN LENGTHS AS REQUIRED BY PERMITTING AGENCY
3. FAN GUARDS ARE REQUIRED. SEE FAN GUARD/PILE CAP DESIGN DETAILS, FOR ADDITIONAL REQUIREMENTS. ACCESS PLATFORM AND GATE REQUIRED ON ARV SIDE ONLY.
- 4A. ALL EXPOSED PIPING SHALL BE PAINTED AS SPECIFIED IN THE APPROVED MATERIAL LIST.
- 4B. ALL HARDWARE SHALL BE PAINTED WITH COAL-TAR EPOXY.
5. PIPE SHALL BE CRADLED ON 1/2" THICK NEOPRENE.(DUROMETER GRADE 50,) CURRENT FDOT STANDARDS APPLY. NEOPRENE IS REQUIRED AT ALL STRAPS INSTALLED OVER STEEL PIPE. NEOPRENE SHALL EXTEND MIN. 1" BEYOND THE EDGES OF THE CRADLE AND STRAPS.
6. TIE-DOWN STRAPS MUST PROPERLY FIT AND SECURE PIPE IN CRADLE.
7. PIPE CRADLE IN CAP SHALL CONTACT 1/3 CIRCUMFERENCE OF PIPE. (SEE FAN GUARD DETAIL)
8. SHOW EXISTING CANAL CROSS SECTION ULTIMATE CANAL SECTION AND RELEVANT ELEVATIONS AND DISTANCES ON A TO SCALE DETAIL DRAWING.
9. PILE LIFT CABLE SHALL BE REMOVED BELOW SURFACE; HOLE SHALL BE FILLED WITH EPOXY CEMENT.
10. THREADED AREAS OF BRASS FITTINGS SHALL BE SPIRAL WRAPPED WITH TWO WRAPS OF TEFLON TAPE.
11. THE PILES AND CAP DESIGN SHALL BE SHOWN ON TO SCALE SIGNED AND SEALED DETAIL DRAWINGS. MIN. 12"x12" TYPE 1A FLORIDA DOT INDEX PILES ARE REQUIRED. PILE PENETRATION BELOW CANAL BOTTOM SHALL BE 15' MINIMUM. MINIMUM LOAD CAPACITY OF 20 TONS PER PILE IS REQUIRED (FDOT STANDARDS APPLY). SIGNED AND SEALED SHOP DRAWINGS ARE REQUIRED.
12. RECLAIMED WATER SYSTEM PIPE SHALL BE PAINTED AS SPECIFIED IN THE APPROVED RECLAIMED WATER SYSTEM MATERIAL LIST.
13. PREFABRICATED STEEL PIPE SHALL HAVE WELDED ON BEARING PADS EXTENDING MIN. 1" BEYOND THE PIPE CRADLE. THE PADS SHALL BE INSTALLED BY THE STEEL PIPE MANUFACTURER PRIOR TO PAINTING.
14. RECLAIMED WATER MAIN CROSSINGS OVER BODIES OF WATER MAY BE SUBJECT TO A D.E.P. "NOTICED GENERAL ENVIRONMENTAL RESOURCE PERMIT" (NGP)

**PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS**

REVISION/ISSUE DATE

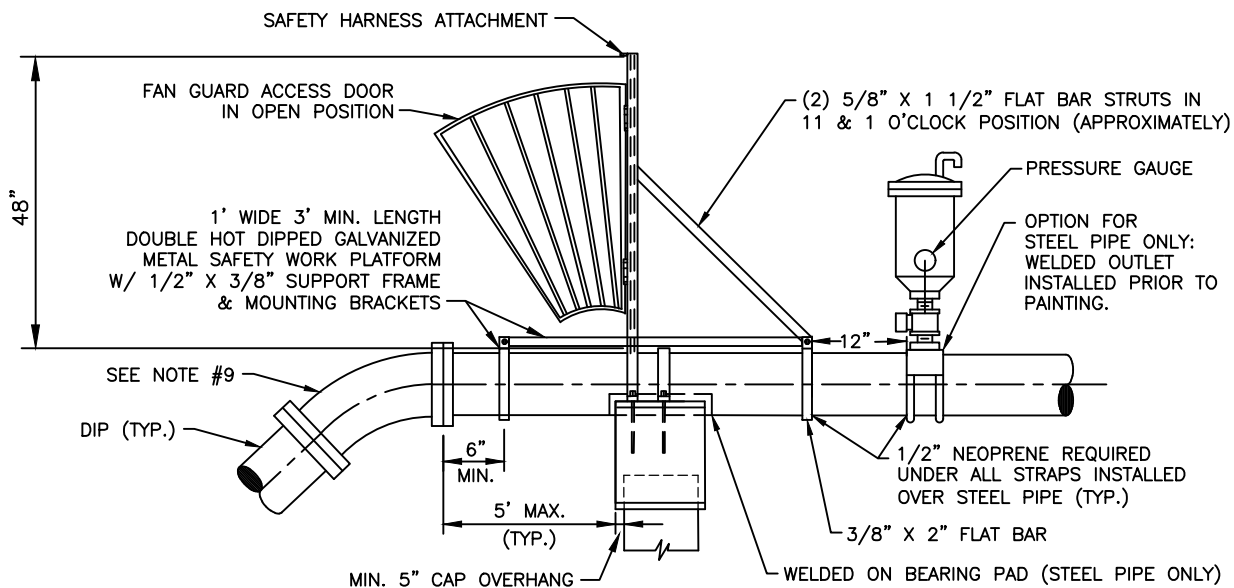
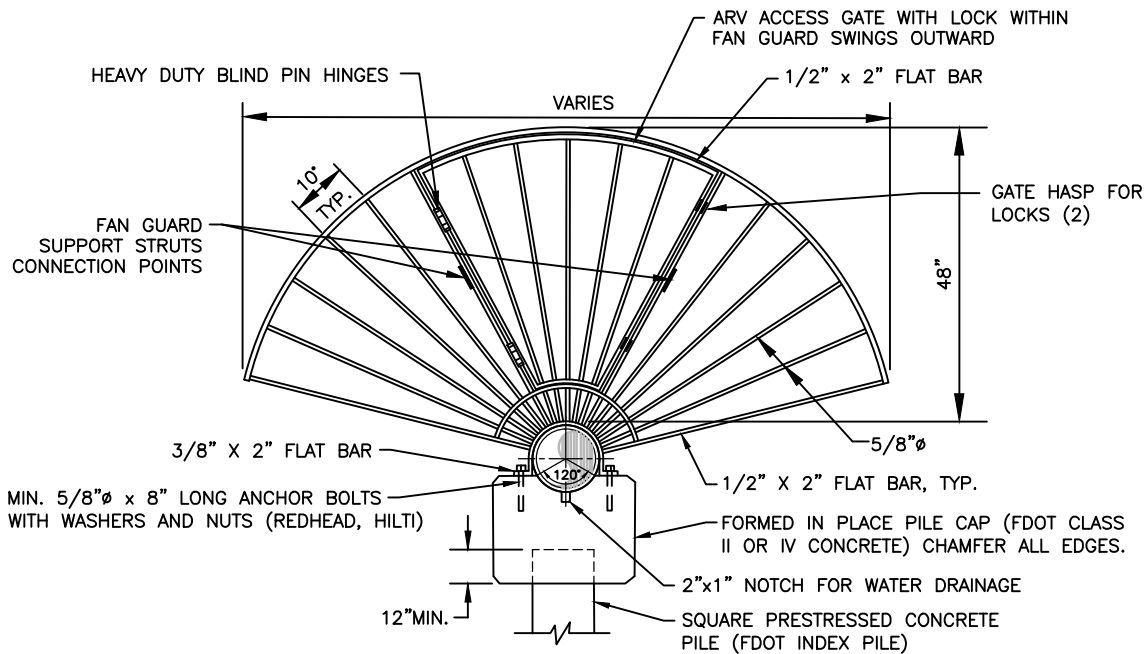
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**RECLAIMED WATER MAIN TYPICAL UTILITIES  
CANAL CROSSING – SINGLE PIPE (SINGLE PILES)**

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**NOTES:**

1. FAN GUARDS SHALL BE PLACED AT EACH END OF CANAL CROSSING.
2. HARDWARE SHALL BE PAINTED WITH COAL TAR EPOXY.
3. FANGUARD WITH HARDWARE SHALL BE FABRICATED FROM DOUBLE HOT DIPPED GALVANIZED STEEL.
4. SHOP DRAWINGS FOR FANGUARDS, CAPS, AND PILES MUST BE SUBMITTED TO PBCWUD FOR REVIEW AND APPROVAL PRIOR TO PRE-CONSTRUCTION MEETING.
5. REINFORCING STEEL SHALL CONFORM TO ASTM A-615, GRADE 60. MIN. 2" CONCRETE COVER OVER ALL STEEL.
6. SEE "TYPICAL CANAL CROSSING DETAIL" FOR ADDITIONAL REQUIREMENTS.
7. NO WELDING OF REBAR TO REBAR OR REBAR TO PILE STRANDS SHALL BE ALLOWED.
8. DESIGN DRAWINGS ARE REQUIRED.
9. LONG RADIUS WELDED ON UPPER BENDS ARE ACCEPTABLE FOR STEEL PIPE.
10. IF A PILE/CAP STEEL CONNECTION IS REQUIRED BY DESIGNING ENGINEER, MIN. (4) #8 REINFORCEMENT BARS SHALL BE DRILLED AND DOWELED (EPOXIED) MIN. 16" DEEP INTO THE PILE AND TIED WITH THE CAP STEEL.
11. ACCESS PLATFORM AND GATE REQUIRED ON ARV SIDE ONLY.

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

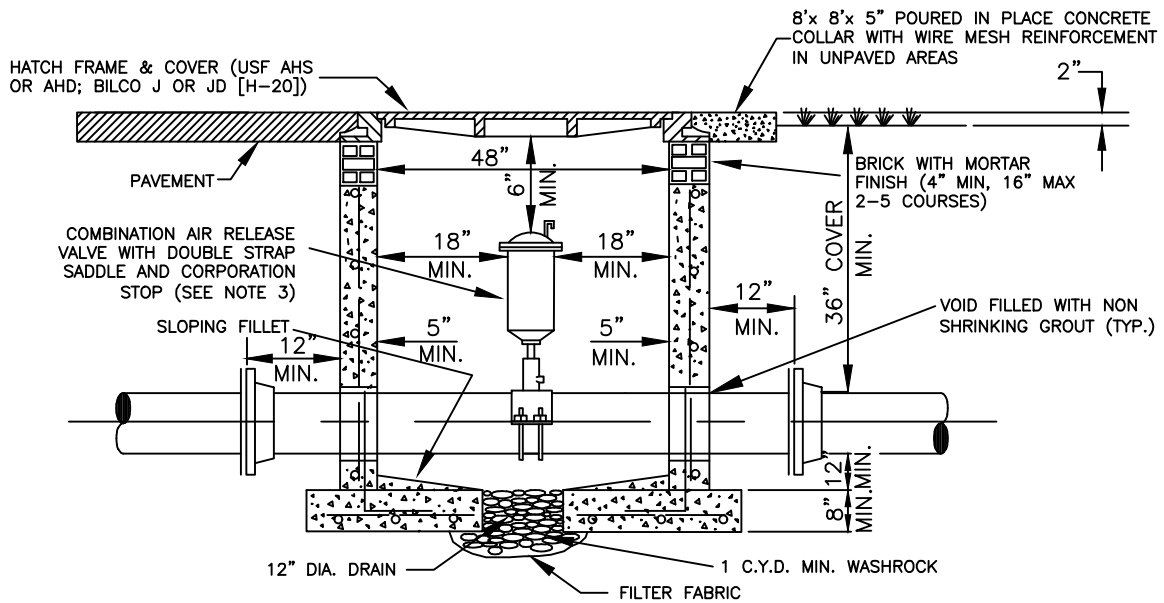
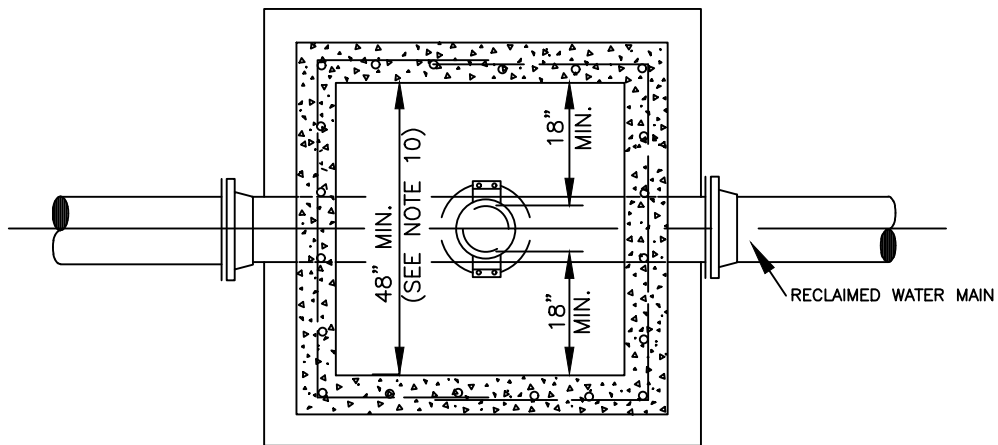
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FAN GUARD/ PILE CAP DESIGN -  
SINGLE PIPE (SINGLE PILES)

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**NOTES:**

1. 4000 P.S.I. TYPE II CONCRETE
2. VAULT SHALL BE PRECAST WITH STEEL REINFORCING. SHOP DRAWING IS REQUIRED TO BE APPROVED BY THE DEPARTMENT PRIOR TO VAULT CONSTRUCTION AND/OR INSTALLATION.
3. COMBINATION AIR RELEASE VALVE (ARV) SHALL BE SIZED APPROPRIATE FOR SERVICE INTENDED ALTHOUGH A 2" MINIMUM SIZED ARV IS REQUIRED ON FORCE MAIN INSTALLATIONS.
4. ALL OPENINGS SHALL BE SEALED WITH WATERPROOF NON-SHRINKING GROUT.
5. ALTERNATE VAULT AND COVER DESIGN MAY BE USED PROVIDED ALTERNATE VAULT AND/OR COVER SHOP DRAWINGS WERE SUBMITTED AND APPROVED BY THE DEPARTMENT PRIOR TO THE VAULT AND/OR COVER BEING INSTALLED.
6. AIR RELEASE VALVE AND PIPING TO BE IDENTIFIED AS "RECLAIMED WATER".
7. DUCTILE IRON PIPE IS REQUIRED THROUGH THE VAULT. NO PIPE JOINTS ARE ALLOWED IN VAULT.
8. THREADED AREAS OF CORPORATION STOP SHALL BE COMPLETELY SPIRAL WRAPPED WITH TWO WRAPS OF TEFLON TAPE.
9. LARGER VAULTS WILL BE REQUIRED FOR PIPES LARGER THAN 12"

PIPE SIZE	MIN. VAULT SIZE
16"-24"	4'X5'
30"-42"	4'X6'

**PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS**

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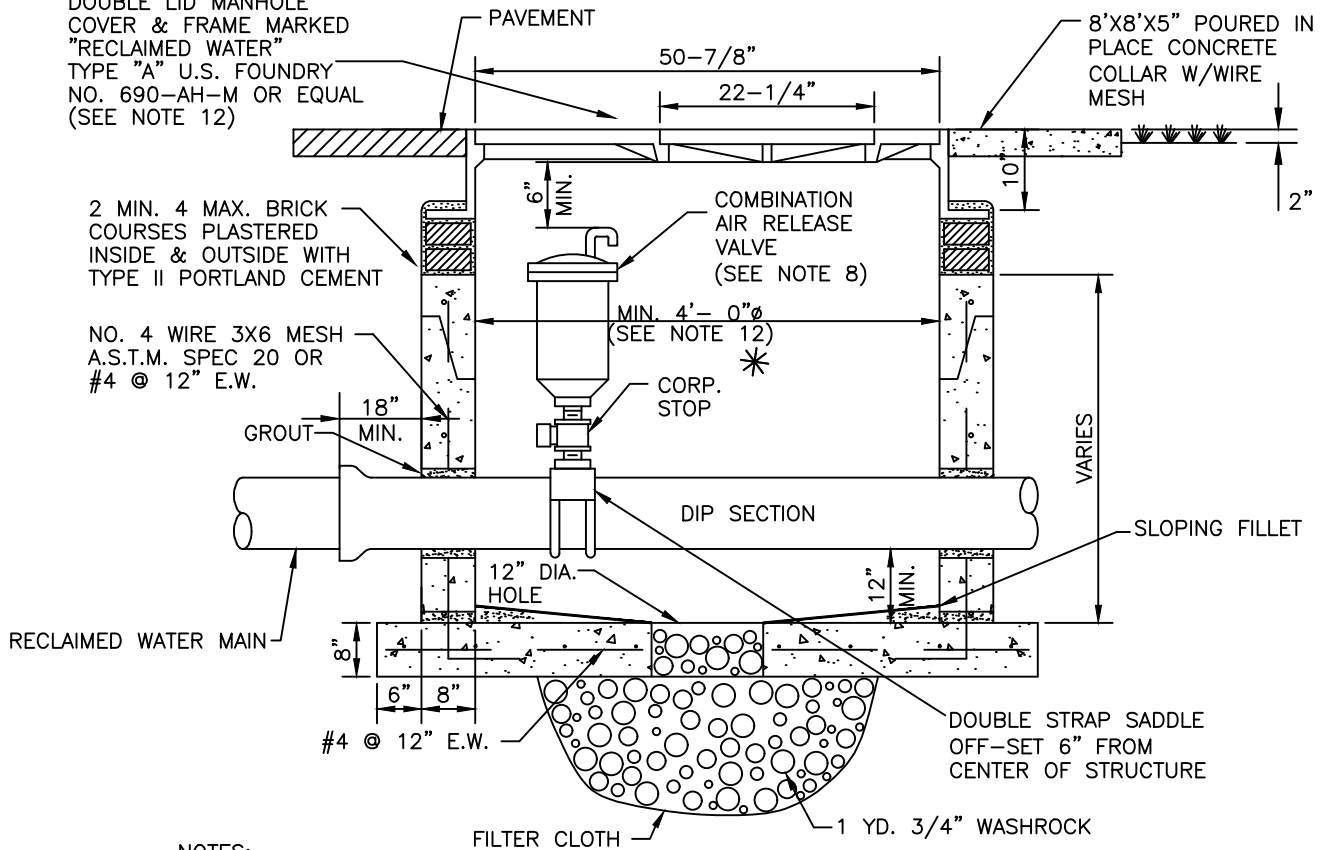
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**RECLAIMED W.M. UNDERGROUND AIR RELEASE VALVE & VAULT IN NON-TRAFFIC AREAS OUTSIDE OF ROAD R/W**

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DOUBLE LID MANHOLE COVER & FRAME MARKED "RECLAIMED WATER" TYPE "A" U.S. FOUNDRY NO. 690-AH-M OR EQUAL (SEE NOTE 12)



**NOTES:**

1. PRECAST 4000 P.S.I. TYPE II CONCRETE STRUCTURE. SHOP DRAWING IS REQUIRED TO BE APPROVED BY THE DEPARTMENT PRIOR TO VAULT CONSTRUCTION AND/OR INSTALLATION.
2. ALL OPENINGS SHALL BE SEALED WITH A WATERPROOF NON-SHRINKING GROUT.
3. LIFT HOLES ARE PERMITTED.
4. ALL PIPE HOLES SHALL BE PRECAST.
5. MANHOLE FABRICATION SHALL BE IN ACCORDANCE WITH A.S.T.M. C-478 LATEST STANDARD.
6. CONCRETE COLLAR REQUIRED WHEN MANHOLE IS OUTSIDE PAVEMENT.
7. AIR RELEASE VALVE SHALL BE TYPE AND SIZE APPROPRIATE FOR SERVICE INTENDED.
8. COMBINATION AIR RELEASE VALVE (ARV) SHALL BE SIZED APPROPRIATE FOR SERVICE INTENDED ALTHOUGH A 2" MINIMUM SIZED ARV IS REQUIRED ON FORCE MAIN INSTALLATIONS.
9. DUCTILE IRON PIPE IS REQUIRED THROUGH THE MANHOLE. NO PIPE JOINTS ARE ALLOWED IN MANHOLE.
10. THREADED AREAS OF CORPORATION STOP SHALL BE COMPLETELY SPIRAL WRAPPED WITH TWO WRAPS OF TEFLON TAPE.
11. RECLAIMED WATER MAINS 12" AND SMALLER, AN ALTERNATIVE VAULT AND COVER DESIGN MAY BE USED PROVIDED ALTERNATE VAULT AND/OR COVER SHOP DRAWINGS WERE SUBMITTED AND APPROVED BY THE DEPARTMENT PRIOR TO THE VAULT AND/OR COVER BEING INSTALLED.
12. LARGER MANHOLES WILL BE REQUIRED FOR PIPES LARGER THAN 12"
 

PIPE SIZE	MIN. MANHOLE DIAMETER
16"-24"	60"
30"-42"	72"
13. MANHOLES IN ROADWAYS SHALL BE LOCATED OUTSIDE OF WHEEL PATHS.

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

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RECLAIMED WATER MAIN AIR RELEASE  
MANHOLE IN PAVED AREA AND IN ROAD R/W

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MAXIMUM QUANTITY OF WATER (GALLONS PER HOUR) THAT MAY BE SUPPLIED TO MAINTAIN PRESSURE WITHIN 5 P.S.I. OF THE SPECIFIED TEST PRESSURE.  
(MECHANICAL OR PUSH-ON JOINT, 18 FT. NOMINAL LENGTHS, PER 1000 FT. OF PIPE)

AVG. TEST PRESSURE PSI	PIPE DIAMETER (INCHES)															
	2	3	4	6	8	10	12	14	16	18	20	24	30	36	42	48
150	0.10	0.14	0.18	0.27	0.37	0.46	0.55	0.64	0.73	0.83	0.92	1.10	1.38	1.65	1.93	2.20
200	0.10	0.15	0.21	0.31	0.42	0.53	0.64	0.74	0.84	0.95	1.06	1.27	1.59	1.91	2.22	2.54

$$\text{FORMULA BASIS: } L = \frac{(S) \times (D) \times (P)^{1/2}}{148,000} \times 1/2$$

L = MAXIMUM QUANTITY OF WATER TO BE ADDED (GALLONS PER HOUR)  
S = LENGTH OF PIPE TESTED (FEET)  
D = DIAMETER OF PIPE (INCHES)  
P = TEST PRESSURE (P.S.I.)

NOTES:

1. TO OBTAIN THE MAXIMUM QUANTITY OF WATER FOR PIPE WITH 20 FT. NOMINAL LENGTHS, MULTIPLY THE QUANTITY CALCULATED FROM THE TABLE BY 0.9
2. THE MAXIMUM QUANTITY OF ADDED WATER FOR A PIPELINE IS CALCULATED BY MULTIPLYING THE QUANTITY PER HOUR AS OBTAINED FROM THE ABOVE TABLE, BY THE DURATION OF THE TEST IN HOURS, AND BY THE TOTAL LENGTH OF THE LINE BEING TESTED DIVIDED BY 1,000. IF THE LINE UNDER TEST CONTAINS SECTIONS OF VARIOUS DIAMETERS, THE MAXIMUM QUANTITY ADDED WILL BE THE SUM OF THE COMPUTED QUANTITIES FOR EACH SIZE.
3. MAXIMUM TEST LENGTH = 2,500 FEET PER SECTION.
4. THIS STANDARD SHALL REFLECT ANY REVISION OF A.W.W.A. C-600. HOWEVER, THE MAXIMUM QUANTITY OF WATER ADDED SHALL NOT EXCEED 50% OF THE RECOMMENDED LIMIT PER APPLICABLE AWWA C-600 STANDARD.
5. STANDARD TEST PRESSURE = 150 P.S.I.
6. PRESSURE TEST DURATION TO BE MIN. 2 HOURS.

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

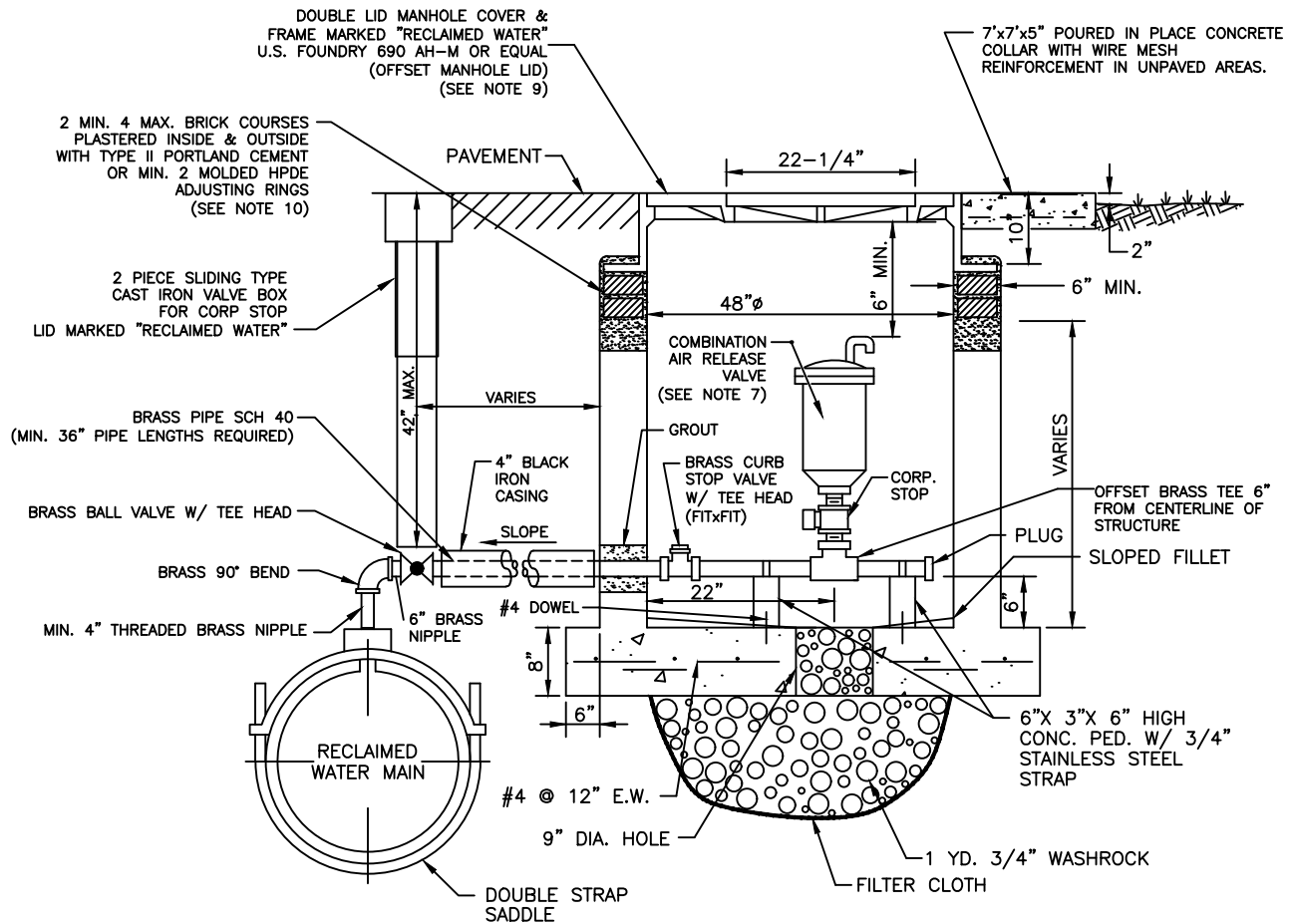
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RECLAIMED WATER MAIN PRESSURE TEST CRITERIA

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**NOTES:**

1. PRECAST MONOLITHIC POURED 4,000 P.S.I. TYPE II CONCRETE STRUCTURE. SHOP DRAWING IS REQUIRED TO BE APPROVED BY THE DEPARTMENT PRIOR TO VAULT CONSTRUCTION AND/OR INSTALLATION.
2. ALL OPENINGS SHALL BE SEALED WITH A WATERPROOF NON-SHRINKING GROUT.
3. ALL PIPE HOLES SHALL BE PRECAST.
4. PIPING AND STRUCTURE TO BE IDENTIFIED AS "RECLAIMED WATER SYSTEM" COMPONENTS.
5. THREADED AREAS OF CORPORATION STOP AND OTHER FITTINGS SHALL BE SPIRAL WRAPPED WITH TWO WRAPS OF TEFLON TAPE.
6. COMBINATION AIR RELEASE VALVE (ARV) SHALL BE SIZED APPROPRIATE FOR SERVICE INTENDED ALTHOUGH A 1" MINIMUM SIZED ARV IS REQUIRED ON RECLAIMED WATER MAIN INSTALLATIONS.
7. CONCRETE COLLAR REQUIRED IN UNPAVED AREAS AND WHEN PAVEMENT IS TO BE INSTALLED IN FUTURE.
8. ALTERNATE VAULT DESIGN MAY BE USED WITH AN APPROVED 32" DIAMETER HINGED MANHOLE COVER IS USED PROVIDED AN ALTERNATE VAULT SHOP DRAWING WAS SUBMITTED AND APPROVED BY THE DEPARTMENT PRIOR TO THE VAULT AND COVER BEING INSTALLED.
9. IN LIEU OF BRICK WORK APPROVED PRECAST CONCRETE ADJUSTING RINGS MAY BE USED WITH INSTALLATION PER MANUFACTURER'S RECOMMENDATION.
10. PIPE AND FITTINGS SHALL BE STANDARD BRASS.
11. MANHOLE SHALL BE INSTALLED OUTSIDE OF TRAFFIC AREA

**PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS**

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**RECLAIMED WATER MAIN OFF-SET  
UNDERGROUND AIR RELEASE VALVE**

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**CONSTRUCTION PROCEDURES**

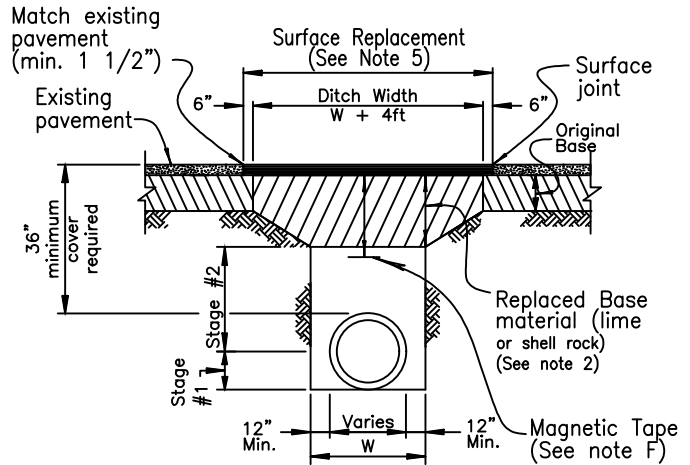
THE BACKFILL FOR THE FIRST AND SECOND STAGES SHALL BE PLACED IN 6" LIFTS (COMPACTED THICKNESS) AND SHALL BE COMPACTED TO 100% OF MAXIMUM DENSITY AS DETERMINED BY AASHTO T-99.

**STAGE 1:**

THE CONTRACTOR SHALL PROVIDE ADEQUATE COMPACTED FILL BENEATH THE HAUNCHES OF THE PIPE, USING MECHANICAL TAMPS SUITABLE FOR THIS PURPOSE. THIS COMPACTION APPLIES TO THE MATERIAL PLACED BENEATH THE HAUNCHES OF THE PIPE AND ABOVE ANY BEDDING REQUIRED.

**STAGE 2:**

THE CONTRACTOR SHALL OBTAIN A WELL-COMPACTED BED AND FILL ALONG THE SIDES OF THE PIPE AND TO A POINT INDICATING THE TOP OF SUB-GRADE MATERIAL.



**REPLACEMENT OF FLEXIBLE PAVEMENT FOR PERMITTED PAVEMENT CUT**

**CONSTRUCTION NOTES**

- 1) BEDDING SHALL CONSIST OF IN-SITU GRANULAR MATERIAL OR WASHED AND GRADED LIMEROCK 3/8" - 7/8" SIZING WITH EQUAL OR GREATER STRUCTURAL ADEQUACY AS EXISTING. UNSUITABLE IN-SITU MATERIALS SUCH AS MUCK, DEBRIS AND LARGER ROCKS SHALL BE REMOVED.
- 2) REPLACED BASE MATERIAL (PER LAND DEVELOPMENT DESIGN STANDARDS) OVER DITCH SHALL BE TWICE THE THICKNESS OF THE ORIGINAL BASE OR 12" MINIMUM, WHICHEVER IS GREATER.
- 3) ASPHALT CONCRETE PAVEMENT JOINTS SHALL BE MECHANICALLY SAWED AND BUTT-JOINED.
- 4) BASE MATERIAL SHALL BE PLACED IN TWO OR THREE LAYERS (6" MAX. PER LAYER) AND EACH LAYER THOROUGHLY ROLLED OR TAMPED TO THE SPECIFIED DENSITY.
- 5) SURFACE MATERIAL WILL BE CONSISTENT WITH THE EXISTING SURFACE OR 1 1/2" SI ASPHALTIC CONCRETE WITH RC-70 PRIME COAT AT 0.10 GAL/SQ. YD.
- 6) PIPE SHALL BE PLACED IN A DRY TRENCH.

**GENERAL NOTES**

- A) ALL ROADWAY REPAIR WORK SHALL BE PERFORMED IN CONFORMANCE WITH APPLICABLE FDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION AND COUNTY PPM# EL-0-3606.
- B) DENSITY TESTS SHALL BE TAKEN IN 1 FT LIFTS ABOVE THE PIPE AT INTERVALS OF 400 FT MAXIMUM (1 SET MINIMUM) OR AS DIRECTED BY THE CONSTRUCTION COORDINATION DIVISION. RESULTS SHALL BE SUBMITTED TO CONSTRUCTION COORDINATION DIVISION AS PART OF THEIR FIELD REVIEW.
- C) ENGINEER-OF-RECORD SHALL PROVIDE FULL-TIME INSPECTION DURING THE ENTIRETY OF THE OPEN-CUT OPERATION, BEGINNING WITH THE EXCAVATION AND CONTINUING THROUGH THE COMPLETION OF THE PAVING.
- D) IF THE PAVEMENT IS NOT COMPLETELY RESTORED IMMEDIATELY FOLLOWING THE OPEN CUT, A SMOOTH TEMPORARY PATCH (MINIMUM 1.25" ASPHALT) SHALL BE INSTALLED, PROPERLY MATCHING THE EXISTING GRADING OF THE ROADWAY. THE TEMPORARY PATCH SHALL BE ALLOWED TO REMAIN IN PLACE AND BE MAINTAINED FOR A PERIOD NO LONGER THAN 45 DAYS. THE COUNTY RETAINS THE RIGHT TO USE POSTED SURETY TO COMPLETE ANY RESTORATION WORK THAT HAS NOT BEEN COMPLETED IN THE 45 DAYS PERIOD. ALTERNATIVE TEMPORARY TRENCH PROTECTION (STEEL PLATES OR OTHERS) MAY BE APPROVED BY THE CONSTRUCTION COORDINATION DIVISION.
- E) FOR THE FINAL RESTORATION, THE ROAD SHALL BE MILLED AND RESURFACED WITH 1-1/2" (ONE AND A HALF INCH) OF SIII OR SI ASPHALT SURFACE COURSE FOR A FULL LANE WIDTH ENCROACHED BY THE TRENCH.
- F) APPROVED MAGNETIC TAPE IS REQUIRED FOR ALL MAIN PRESSURE PIPES AND CONDUIT IN THE COUNTY'S RIGHT-OF-WAY. INSTALL TAPE 24" BELOW FINISHED GRADE.
- G) CONTINUOUS 4" WIDE PAINT STRIPING IS REQUIRED FOR DIP/PCCP WATER MAINS (BLUE), DIP SANITARY MAINS (GREEN), DIP RECLAIMED WATER MAINS (PURPLE), GAS MAINS (YELLOW), OR AS REQUIRED BY THE APWA.

**PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS**

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**OPEN CUT PIPE INSTALLATION  
NON-THOROUGHFARE ROAD**

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**CONSTRUCTION PROCEDURES**

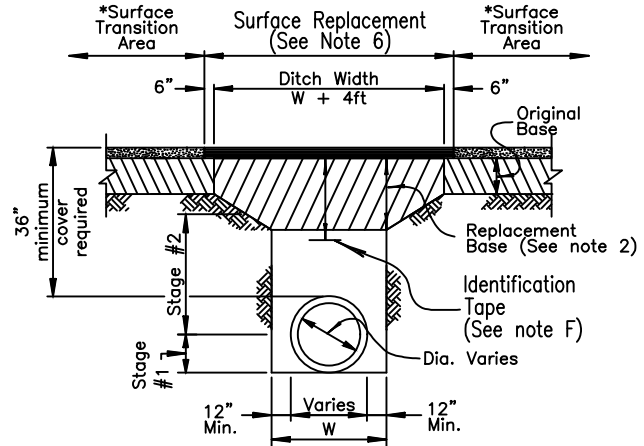
THE BACKFILL FOR THE FIRST AND SECOND STAGES SHALL BE PLACED IN 6" LIFTS (COMPACTED THICKNESS) AND SHALL BE COMPACTED TO 100% OF MAXIMUM DENSITY AS DETERMINED BY AASHTO T-99.

**STAGE 1:**

THE CONTRACTOR SHALL PROVIDE ADEQUATE COMPACTED FILL BENEATH THE HAUNCHES OF THE PIPE, USING MECHANICAL TAMPS SUITABLE FOR THIS PURPOSE. THIS COMPACTION APPLIES TO THE MATERIAL PLACED BENEATH THE HAUNCHES OF THE PIPE AND ABOVE ANY BEDDING REQUIRED.

**STAGE 2:**

THE CONTRACTOR SHALL OBTAIN A WELL-COMPACTED BED AND FILL ALONG THE SIDES OF THE PIPE AND TO A POINT INDICATING THE TOP OF SUB-GRADE MATERIAL.



**REPLACEMENT OF FLEXIBLE PAVEMENT FOR PERMITTED PAVEMENT CUT**

**CONSTRUCTION NOTES**

- 1) BEDDING SHALL CONSIST OF IN-SITU GRANULAR MATERIAL OR WASHED AND GRADED LIMEROCK 3/8" - 7/8" SIZING WITH EQUAL OR GREATER STRUCTURAL ADEQUACY AS EXISTING. UNSUITABLE IN-SITU MATERIALS SUCH AS MUCK, DEBRIS AND LARGER ROCKS SHALL BE REMOVED.
- 2) REPLACED BASE MATERIAL OVER DITCH SHALL BE 16" MINIMUM FOR THOROUGHFARE PLAN ROADS.
- 3) ASPHALT CONCRETE PAVEMENT JOINTS SHALL BE MECHANICALLY SAWED AND BUTT-JOINTED.
- 4) BASE MATERIAL (PER ROADWAY PRODUCTION DESIGN STANDARDS) SHALL BE PLACED IN TWO OR THREE LAYERS (6" MAX. PER LAYER) AND EACH LAYER THOROUGHLY ROLLED OR TAMPED TO THE SPECIFIED DENSITY.
- 5) \* SURFACE TRANSITION AREA (SEE PLANS FOR LOCATION). OVERLAY OR MILL/RESURFACE FOR A DISTANCE OF 50' ON BOTH SIDES OF THE OPEN CUT AND FOR A FULL LANE WIDTH.
- 6) 1" SIII ASPHALTIC CONCRETE OVER 1-1/2" SI ASPHALTIC CONCRETE WITH RC-70 PRIME COAT AT 0.10 GAL/SQ. YD.
- 7) PIPE SHALL BE PLACED IN A DRY TRENCH.

**GENERAL NOTES**

- A) ALL ROADWAY REPAIR WORK SHALL BE PERFORMED IN CONFORMANCE WITH APPLICABLE FDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION AND COUNTY PPM# EL-0-3605.
- B) DENSITY TESTS SHALL BE TAKEN IN 1 FT LIFTS ABOVE THE PIPE AT INTERVALS OF 400 FT MAXIMUM (1 SET MINIMUM) OR AS DIRECTED BY THE CONSTRUCTION COORDINATION DIVISION. RESULTS SHALL BE SUBMITTED TO CONSTRUCTION COORDINATION DIVISION AS PART OF THEIR FIELD REVIEW.
- C) ENGINEER-OF-RECORD WILL PROVIDE FULL-TIME INSPECTION DURING THE ENTIRETY OF THE OPEN-CUT OPERATION, BEGINNING WITH THE EXCAVATION AND CONTINUING THROUGH THE COMPLETION OF THE PAVING.
- D) IF THE PAVEMENT IS NOT COMPLETELY RESTORED IMMEDIATELY FOLLOWING THE OPEN CUT, A SMOOTH TEMPORARY PATCH (MINIMUM 1.25" ASPHALT) SHALL BE INSTALLED, PROPERLY MATCHING THE EXISTING GRADING OF THE ROADWAY. THE TEMPORARY PATCH SHALL BE ALLOWED TO REMAIN IN PLACE AND BE MAINTAINED FOR A PERIOD NO LONGER THAN 45 DAYS. THE COUNTY RETAINS THE RIGHT TO USE POSTED SURETY TO COMPLETE ANY RESTORATION WORK THAT HAS NOT BEEN COMPLETED IN THE 45 DAYS PERIOD. ALTERNATIVE TEMPORARY TRENCH PROTECTION (STEEL PLATES OR OTHERS) MAY BE APPROVED BY THE CONSTRUCTION COORDINATION DIVISION.
- E) THE FINAL RESTORATION, THE ROAD SHALL BE MILLED/RESURFACED FOR A FULL LANE WIDTH OF THE TRAVEL LANES ENCROACHED BY THE TRENCH AREA, INCLUDING A TRANSITION AREA OF 50 FT ON EACH SIDE OF THE TRENCH, THE PAVEMENT SHALL BE MILLED AND RESURFACED PER CONSTRUCTION NOTE 6.
- F) APPROVED MAGNETIC TAPE IS REQUIRED FOR ALL MAIN PRESSURE PIPES AND CONDUIT IN THE COUNTY'S RIGHT-OF-WAY. INSTALL TAPE 24" BELOW FINISHED GRADE.
- G) CONTINUOUS 4" WIDE PAINT STRIPING IS REQUIRED FOR DIP/PCCP WATER MAINS (BLUE), DIP SANITARY MAINS (GREEN), DIP RECLAIMED WATER MAINS (PURPLE), GAS MAINS (YELLOW), OR AS REQUIRED BY THE APWA.

**PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS**

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**OPEN CUT PIPE INSTALLATION  
THOROUGHFARE ROAD**

PAGE NO.

22R

**Irrigated With  
Reclaimed Water**



**Water Utilities Department  
Water Reclamation Program**



**DO NOT DRINK  
NO TOMAR**



**CALL (561) 493-6000 FOR INFORMATION**

NOTE:

1. SIGNS SHALL BE 12"X 18", WITH PURPLE AND BLACK IMPRINTS  
IMPRINTS ON WHITE ALUMIMUM (.063 GA.), ROUNDED CORNERS  
(1.25" RAD.), 2 HOLES (13/32" DIAM.) 12" O.C.
2. SIGNS AND MOUNTING HARDWARE PROVIDED BY PBCWUD AND  
INSTALLED BY THE PROPERTY OWNER.

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

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**RECLAIMED WATER IRRIGATION AREA  
IDENTIFICATION SIGN**

PAGE NO.

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**MIN. LENGTH OF PIPE (FEET) TO BE RESTRAINED**

(SOURCES: EBAA IRON RESTRAINT LENGTH CALCULATION PROGRAM FOR PVC PIPE, RELEASE 3.1, AND DIPRA THRUST RESTRAINT FOR DUCTILE IRON PIPE, RELEASE 3.2)

FITTING TYPE	PIPE SIZE								200psi				
	4"	6"	8"	10"	12"	16"	20"	24"	30"	36"	42"	48"	
<b>90° HORIZ. BEND</b>	14	20	25	30	35	45	54	62	98	112	124	135	
<b>45° HORIZ. BEND</b>	6	8	11	13	15	19	22	26	41	46	51	56	
<b>22.5° HORIZ. BEND</b>	3	4	5	6	7	9	11	12	19	22	25	27	
<b>11.25° HORIZ. BEND</b>	1	2	3	3	4	4	5	6	10	11	12	13	
<b>90° VERT. OFFSET</b>	UPPER BEND	29	41	53	64	74	95	115	134	214	246	276	304
	LOWER BEND	7	10	13	16	19	25	30	35	57	66	74	83
<b>45° VERT. OFFSET</b>	UPPER BEND	12	19	24	29	34	39	48	56	89	102	114	126
	LOWER BEND	3	4	6	7	8	10	12	15	23	27	31	34
<b>22.5° VERT. OFFSET</b>	UPPER BEND	6	9	12	14	17	19	23	27	43	49	55	60
	LOWER BEND	1	2	4	4	4	5	6	7	11	13	15	16
<b>11.25° VERT. OFFSET</b>	UPPER BEND	3	4	6	7	8	9	11	13	21	24	27	30
	LOWER BEND	1	1	1	2	2	2	3	3	6	6	7	8
<b>PLUG (DEAD END)</b>	32	45	59	70	83	107	129	151	214	246	276	304	
<b>IN-LINE VALVE</b>	32	45	45	45	45	55	65	80	110	125	140	155	
<b>TEE (BRANCH RESTRAINT)</b>	4"X ∅	23	-	-	-	-	-	-	-	-	-	-	
	6"X ∅	21	35	-	-	-	-	-	-	-	-	-	
	8"X ∅	18	34	47	-	-	-	-	-	-	-	-	
	10"X ∅	16	32	46	58	-	-	-	-	-	-	-	
	12"X ∅	13	30	44	57	69	-	-	-	-	-	-	
	16"X ∅	7	26	41	55	67	90	-	-	-	-	-	
	20"X ∅	1	21	38	52	65	88	109	-	-	-	-	
	24"X ∅	1	16	34	49	62	86	108	129	-	-	-	
	30"X ∅	1	8	28	44	58	83	106	127	208	-	-	
	36"X ∅	1	1	22	39	54	80	103	124	206	240	-	
	42"X ∅	1	1	15	33	49	77	100	122	205	239	270	
48"X ∅	1	1	7	27	44	73	97	120	203	238	269	298	
<b>REDUCER (LARGER PIPE RESTRAINT)</b>	6"X ∅	23	-	-	-	-	-	-	-	-	-	-	
	8"X ∅	38	25	-	-	-	-	-	-	-	-	-	
	10"X ∅	57	43	24	-	-	-	-	-	-	-	-	
	12"X ∅	72	60	44	41	-	-	-	-	-	-	-	
	16"X ∅	99	90	78	75	45	-	-	-	-	-	-	
	20"X ∅	123	116	107	105	81	45	-	-	-	-	-	
24"X ∅	146	140	132	131	111	82	45	-	-	-	-		
<b>200psi</b>	30"X ∅	209	204	197	188	177	153	116	75	-	-	-	
	36"X ∅	243	236	233	226	217	196	168	135	74	-	-	
	42"X ∅	273	270	265	259	252	234	211	183	133	72	-	
	48"X ∅	301	298	294	289	283	268	249	226	183	131	71	

**NOTES:**

- THE DATA IN THE ABOVE TABLE ARE BASED UPON THE FOLLOWING INSTALLATION CONDITIONS:  
 SOIL TYPE-SAND      TEST PRESSURE-150 PSI/200 PSI      DEPTH OF BURY-3'  
 TRENCH TYPE-3      SAFETY FACTOR- 1.5      VERTICAL OFFSET-3'  
 MINIMUM PIPE LENGTH ALONG TEE RUN-5'
- THE RESTRAINED PIPE LENGTHS APPLY TO DUCTILE IRON AND PVC PIPE.
- ALL JOINTS BETWEEN UPPER AND LOWER BENDS SHALL BE RESTRAINED.
- RESTRAINED PIPE LENGTHS APPLY TO PIPE ON BOTH SIDES OF VALVES AND FITTINGS.
- MULTIPLY PIPE LENGTH BY 1.4 FOR POLYETHYLENE ENCASED PIPE.
- RESTRAINED PIPE LENGTHS EQUAL TO AN "IN-LINE VALVE" CONDITION ARE REQUIRED AT EACH END OF A TRANSITION FROM HDPE PIPE TO OTHER PIPE MATERIALS.
- DESIGN ENGINEER IS RESPONSIBLE FOR PROPER RESTRAINT PIPE LENGTHS FOR THE PROJECT.

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

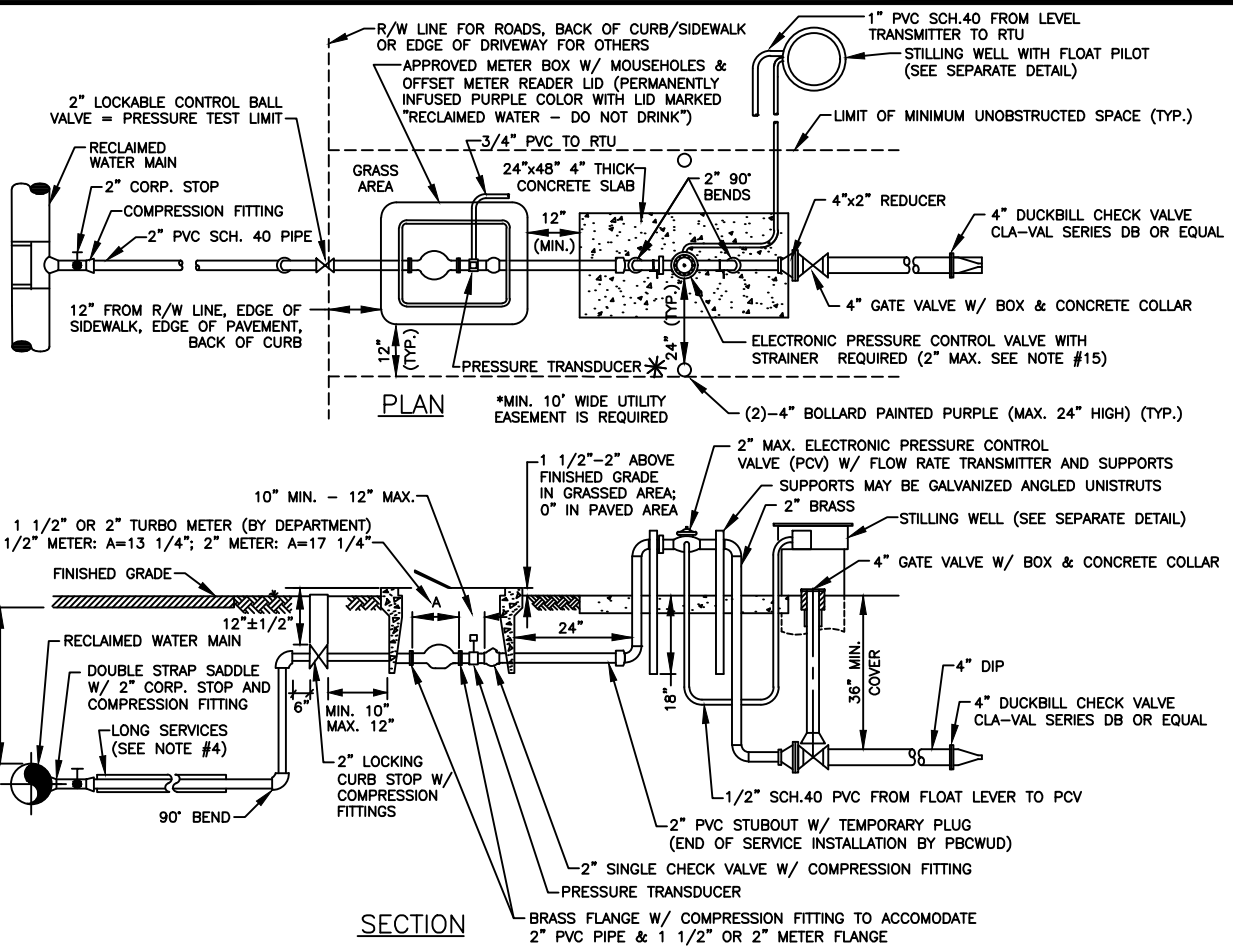
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**MECHANICAL THRUST RESTRAINT  
MINIMUM PIPE LENGTHS**

PAGE NO.

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**NOTES:**

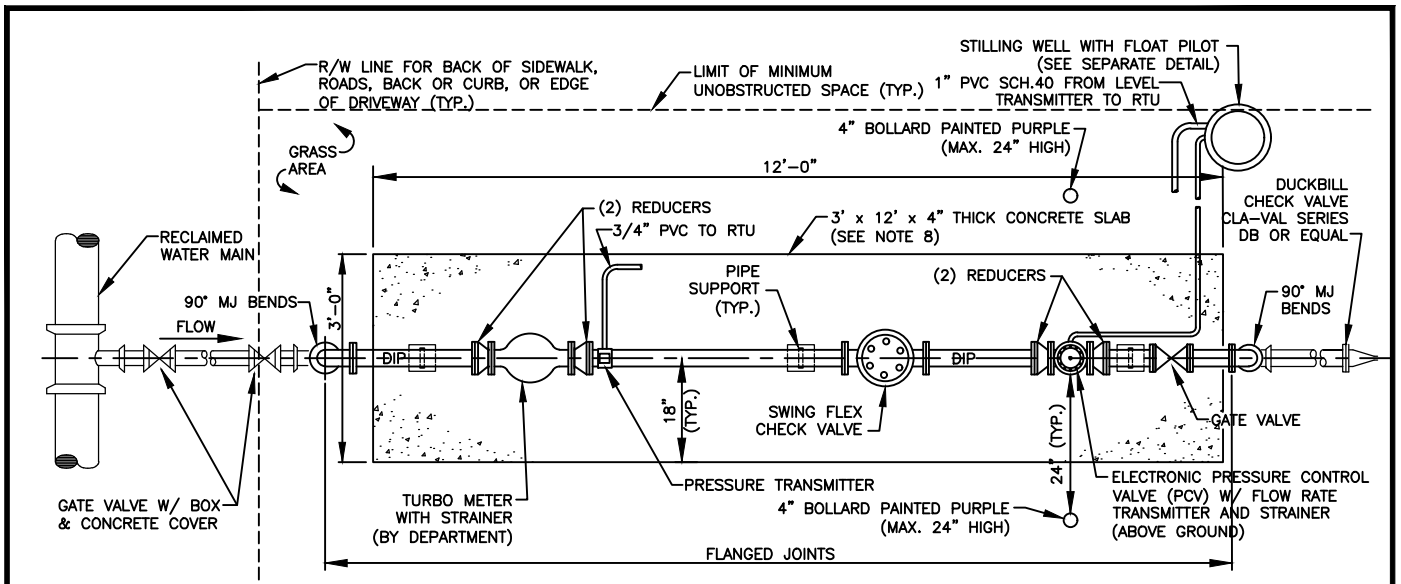
1. PIPING, VALVES, AND BOX LID TO BE PERMANENTLY IDENTIFIED AS "RECLAIMED WATER SYSTEM" COMPONENT. PVC FITTINGS SHALL BE SCHEDULE 80.
2. 12" MINIMUM CLEARANCE TO BE MAINTAINED BETWEEN METER BOX AND ANY OBSTRUCTION.
3. FOR INSTALLATION OF SERVICES UNDER DRIVEWAYS AND ROADWAYS, USE MINIMUM 4" Ø PVC SCH. 40 OR HDPE SDR 9 PURPLE CASING. CASING TO EXTEND MINIMUM 24" BEYOND EDGE OF PAVEMENT. END OF CASING TO BE SEALED WITH CEMENT.
4. SUCCESSIVE TAPS INTO THE WATER MAIN SHALL BE SPACED A MINIMUM OF 18" APART. TAPS SPACED BETWEEN 18" AND 48" SHALL BE OFFSET TO EACH SIDE OF THE MAIN. TAPS ON THE SAME SIDE OF A PVC PIPE SECTION SHALL BE 10' APART.
5. METER SHALL NOT BE PLACED IN SIDEWALK OR DRIVEWAY AREAS. SERVICE LINES AND TAPS SHALL NOT BE PLACED UNDER DRIVEWAYS WHENEVER POSSIBLE.
6. A CHECK VALVE IS REQUIRED FOR ALL RECLAIMED WATER SERVICES.
7. THE MAXIMUM SERVICE LENGTH IS 100' TO METER.
8. BEDDING (MIN. 4") AND COVER (MIN. 4") OVER SERVICE LINE OR CASING SHALL CONSIST OF FINE GRANULAR MATERIAL. UNSUITABLE IN-SITU MATERIALS SUCH AS MUCK, DEBRIS, AND LARGER ROCKS SHALL BE REMOVED WITH 2" MAXIMUM SIZE.
9. METER SERVICE WILL NOT BE INSTALLED UNTIL:
  - A) FORM BOARDS FOR DRIVEWAY AND/OR SIDEWALK ARE IN PLACE OR DRIVEWAY OR SIDEWALK IS IN PLACE.
  - B) "MINIMUM UNOBSTRUCTED SPACE" (AS SHOWN) IS PROVIDED. MINIMUM 12" VERTICAL SEPARATION IS REQUIRED TO OTHER UTILITIES.
  - C) APPROPRIATE BACKFLOW PREVENTER IS INSTALLED ON THE POTABLE WATER SERVICE.
10. METER SHALL BE INSTALLED BY THE DEPARTMENT. UPON REQUEST BY PROPERTY OWNER, THE DEPARTMENT MAY INSTALL THE RECLAIMED WATER SERVICE FROM THE TAP INTO THE MAIN TO THE TEMPORARY PLUG ON THE DISCHARGE SIDE OF THE METER.
11. THE DEVELOPER/PROPERTY OWNER OR ASSIGNEE SHALL BE RESPONSIBLE FOR INSTALLATION OF SERVICE ASSEMBLY (INCLUDING STILLING WELL) BEYOND THE "END OF SERVICE INSTALLATION BY PBCWUD" POINT AS SHOWN.
12. CONTRACTOR SHALL CONSTRUCT SERVICE COMPONENTS FOR THE METER "TRUE" AND "PLUMB" AND TO ALLOW METER READING THROUGH THE METER READER LID.
13. ALL HARDWARE FOR FLANGED CONNECTIONS (BOLTS, ETC.) TO BE STAINLESS STEEL.
14. THREADED AREAS OF CORPORATION STOP AND OTHER FITTINGS SHALL BE SPIRAL WRAPPED WITH TWO (2) WRAPS OF TEFLON TAPE.
15. METER BOX OR CONTROL VALVE ASSEMBLY/STILLING WELL SHALL NOT BE LOCATED IN A LAKE MAINTENANCE EASEMENT.
16. THE ENTIRE LAKE DISCHARGE SERVICE ASSEMBLY, INCLUDING THE METER, PRESSURE CONTROL VALVE (PCV), DISCHARGE PIPE, AND STILLING WELL TO BE OWNED AND MAINTAINED BY PBCWUD. ONLY MATERIALS APPROVED BY PBCWUD MAY BE USED FOR SERVICE INSTALLATION.
17. A REMOTE TELEMETRY UNIT IS REQUIRED TO ALLOW PBCWUD TO MONITOR AND CONTROL THE REUSE WATER DISCHARGE.

**PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS**

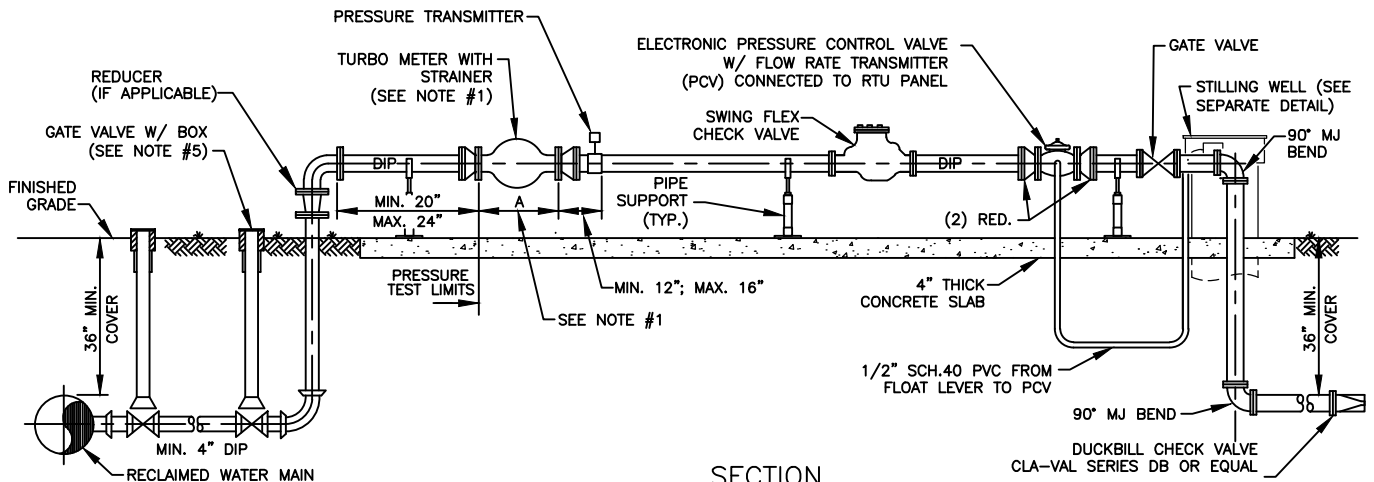
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LAKE DISCHARGE – METER ASSEMBLY  
(1-1/2" AND 2" METERS)

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PLAN



SECTION

NOTES:

1. SIZING REQUIREMENTS FOR PIPE, VALVES AND APPURTENANCES:  
 3" METER: "A" = 19 1/4", 4" SWING FLEX CHECK VALVE, 3" PRESSURE CONTROL VALVE, AND 4" PIPING.  
 4" METER: "A" = 23 1/4", 6" SWING FLEX CHECK VALVE, 4" PRESSURE CONTROL VALVE, AND 6" PIPING.  
 6" METER: "A" = 27 3/8", 8" SWING FLEX CHECK VALVE, 6" PRESSURE CONTROL VALVE, AND 8" PIPING.  
 8" METER: "A" = 30 3/8", 10" SWING FLEX CHECK VALVE, 8" PRESSURE CONTROL VALVE, AND 10" PIPING.
2. ALL PIPING AND APPURTENANCES SHALL BE COLOR CODED PURPLE.
3. VALVE BOX LIDS SHALL BE SQUARE AND MARKED "REUSE WATER".
4. A TO SCALE PLAN AND PROFILE DESIGN AND LOCATION DRAWING IS REQUIRED.
5. METER SHALL NOT BE PLACED IN SIDEWALK OR DRIVEWAY AREAS. SERVICE LINES AND TAPS SHALL NOT BE PLACED UNDER DRIVEWAYS WHENEVER POSSIBLE.
6. A CHECK VALVE IS REQUIRED FOR ALL RECLAIMED WATER SERVICES.
7. UNSUITABLE IN-SITU MATERIALS SUCH AS MUCK, DEBRIS, AND LARGER ROCKS SHALL BE REMOVED WITH 2" MAXIMUM SIZE.
8. CONCRETE PAD FOR WATER METER ASSEMBLY SHALL BE 4" THICK WITH 4"x4" WIRE MESH. CONCRETE PAD IS REQUIRED TO BE BROOM FINISHED AND INSTALLED PRIOR TO THE WATER METER ASSEMBLY.
9. METER SHALL BE INSTALLED BY THE DEPARTMENT. PROPERTY OWNER SHALL BE RESPONSIBLE FOR DESIGN AND INSTALLATION OF THE SERVICE ASSEMBLY, INCLUDING THE STILLING WELL.
10. CONTRACTOR SHALL CONSTRUCT SERVICE COMPONENTS FOR THE METER "TRUE" AND "PLUMB" AND TO ALLOW METER READING THROUGH THE METER READER LID.
11. ALL HARDWARE FOR FLANGED CONNECTIONS (BOLTS, ETC.) TO BE STAINLESS STEEL.
12. METER BOX OR CONTROL VALVE ASSEMBLY/STILLING WELL SHALL NOT BE LOCATED IN A LAKE MAINTENANCE EASEMENT.
13. THE ENTIRE LAKE DISCHARGE SERVICE ASSEMBLY, INCLUDING THE METER, PRESSURE CONTROL VALVE (PCV), DISCHARGE PIPE, AND STILLING WELL TO BE OWNED AND MAINTAINED BY PBCWUD. ONLY MATERIALS APPROVED BY PBCWUD MAY BE USED FOR SERVICE INSTALLATION.
14. A REMOTE TELEMETRY UNIT IS REQUIRED TO ALLOW PBCWUD TO MONITOR AND CONTROL THE REUSE WATER DISCHARGE.

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

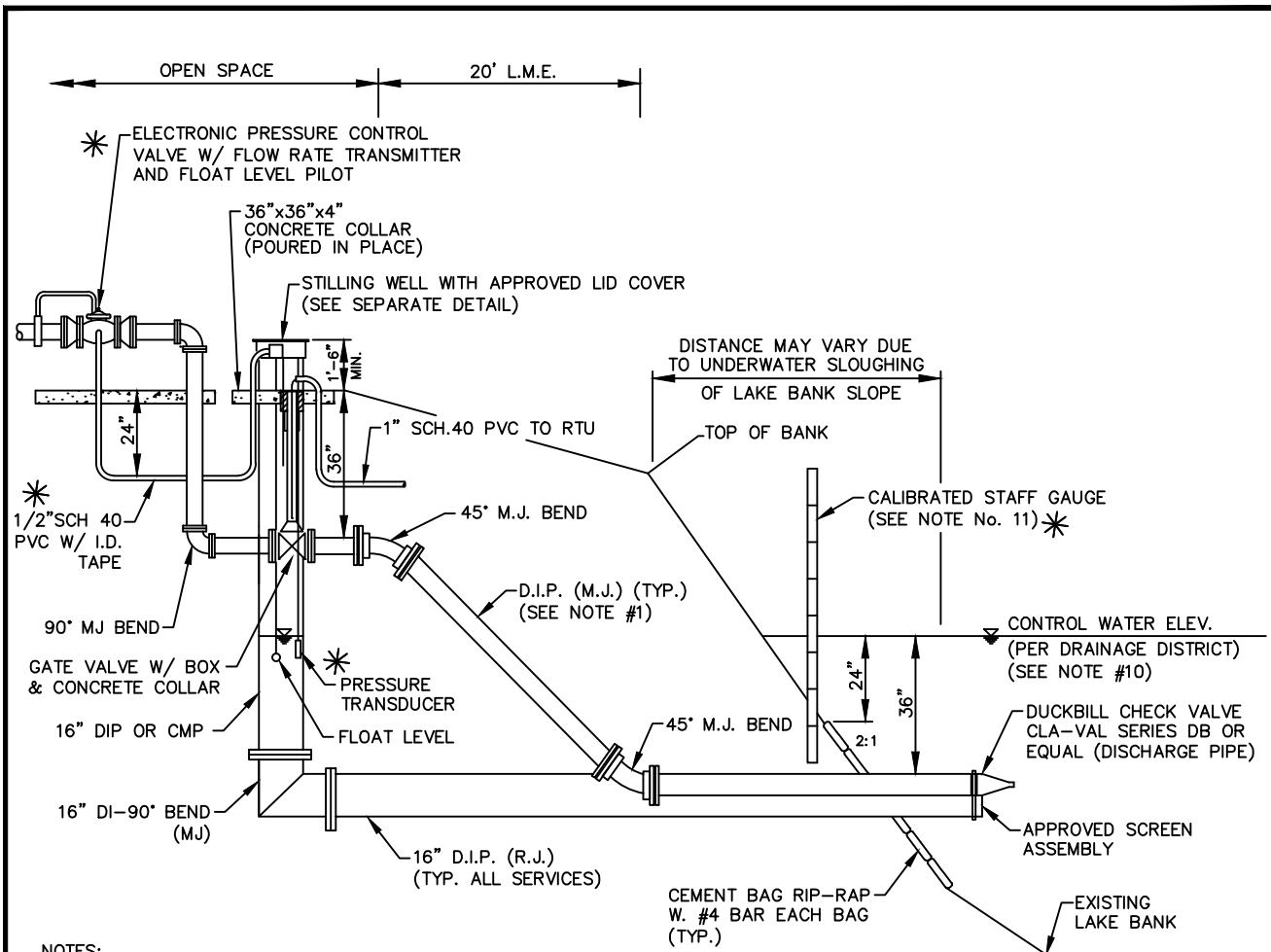
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LAKE DISCHARGE – METER ASSEMBLY  
(3" AND LARGER)

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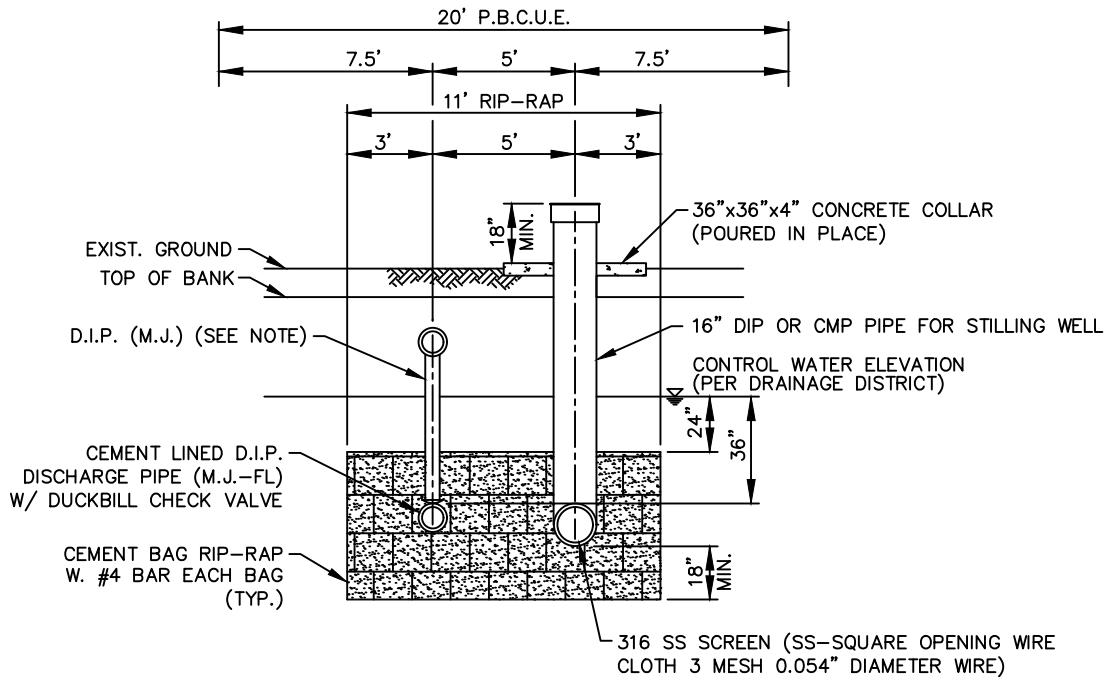


**NOTES:**

1. SIZING REQUIREMENTS FOR PIPING, VALVES, AND APPURTENANCES (DIP REQUIRED):  
 UP TO 2" METER: 2" CHECK VALVE, 2" PRESSURE CONTROL VALVE, 4" GATE VALVE, AND 4" DISCHARGE.  
 3" METER: 4" CHECK VALVE, 3" PRESSURE CONTROL VALVE, 4" GATE VALVE, AND 4" DISCHARGE.  
 4" METER: 6" CHECK VALVE, 4" PRESSURE CONTROL VALVE, 6" GATE VALVE, AND 6" DISCHARGE.  
 6" METER: 8" CHECK VALVE, 6" PRESSURE CONTROL VALVE, 8" GATE VALVE, AND 8" DISCHARGE.  
 8" METER: 10" CHECK VALVE, 8" PRESSURE CONTROL VALVE, 10" GATE VALVE, AND 10" DISCHARGE.
2. ALL PIPING AND APPURTENANCES SHALL BE COLOR CODED AS REQUIRED.
3. METER BOX OR CONTROL VALVE ASSEMBLY/STILLING WELL SHALL NOT BE LOCATED IN A LAKE MAINTENANCE EASEMENT.
4. PROPERTY OWNER SHALL BE RESPONSIBLE FOR DESIGN AND INSTALLATION OF THE SERVICE ASSEMBLY, INCLUDING THE STILLING WELL.
5. THE ENTIRE LAKE DISCHARGE SERVICE ASSEMBLY, INCLUDING THE METER, PRESSURE CONTROL VALVE (PCV), DISCHARGE PIPE, AND STILLING WELL TO BE OWNED AND MAINTAINED BY PBCWUD. ONLY MATERIALS APPROVED BY PBCWUD MAY BE USED FOR SERVICE INSTALLATION.
6. STILLING WELL SHALL BE LOCATED AS CLOSE AS POSSIBLE TO THE PRESSURE CONTROL VALVE ASSEMBLY.
7. MINIMUM 20' WIDE PBCUE IS REQUIRED.
8. A TO SCALE PLAN AND PROFILE DESIGN AND LOCATION DRAWING IS REQUIRED.
9. FLOAT LEVEL TO BE SET AS REQUIRED BY THE DRAINAGE DISTRICT.
10. PROPERTY OWNER SHALL INSTALL A CALIBRATED LAKE WATER LEVEL STAFF GAUGE TO RECORD AND REPORT WATER LEVELS AS REQUIRED BY REGULATORY AGENCIES.
11. STAFF GAUGE TO BE UNOBSTRUCTED, WATER LEVEL SHALL BE EASY TO READ. MUST BE LOCATED OUTSIDE OF LITTORAL ZONE, MUST BE CALIBRATED BY A SURVEYOR.

**PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS**

REVISION/ISSUE DATE	LAKE DISCHARGE – OUTFALL DETAIL (PROFILE)	PAGE NO.
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**NOTES:**

1. DISCHARGE PIPE SIZING REQUIREMENTS:  
 UP TO 2" METER: 4" DISCHARGE DIP.  
 3" METER: 4" DISCHARGE DIP.  
 4" METER: 6" DISCHARGE DIP.  
 6" METER: 8" DISCHARGE DIP.  
 8" METER: 10" DISCHARGE DIP.
2. ALL PIPING AND APPURTENANCES SHALL BE COLOR CODED AS REQUIRED.
3. MINIMUM 36" COVER OVER BURIED PIPE IS REQUIRED.

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

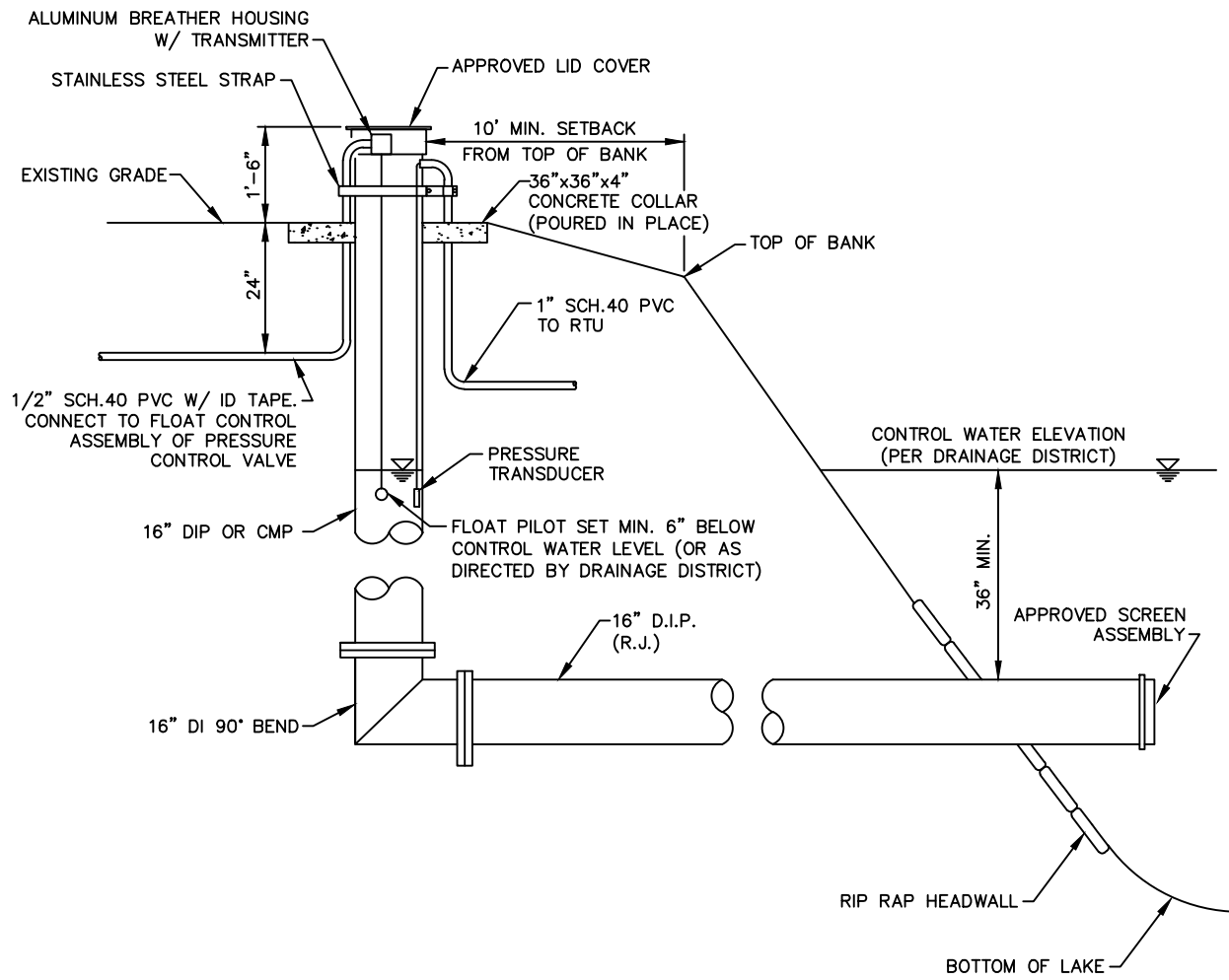
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LAKE DISCHARGE – OUTFALL (FRONT ELEVATION)

PAGE NO.

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**NOTES:**

1. STILLING WELL SHALL NOT BE INSTALLED IN A LAKE MAINTENANCE EASEMENT OR LAKE TRACT.
2. APPROPRIATELY SIZED PALM BEACH COUNTY UTILITY EASEMENTS ARE REQUIRED.
3. ALL PIPING AND APPURTENANCES SHALL BE COLOR CODED AS REQUIRED.
4. A "NO SWIMMING" AND "CATCH AND RELEASE" SIGN SHALL BE INSTALLED AT POTENTIAL PUBLIC ACCESS POINTS TO EACH LAKE BY LAKE OWNER PRIOR TO SERVICE ACTIVATION.
5. TOP RIM ELEVATION OF THE STILLING WELL SHALL BE NOTED (WITH ELEVATION DATUM) ON THE RECORD DRAWINGS.

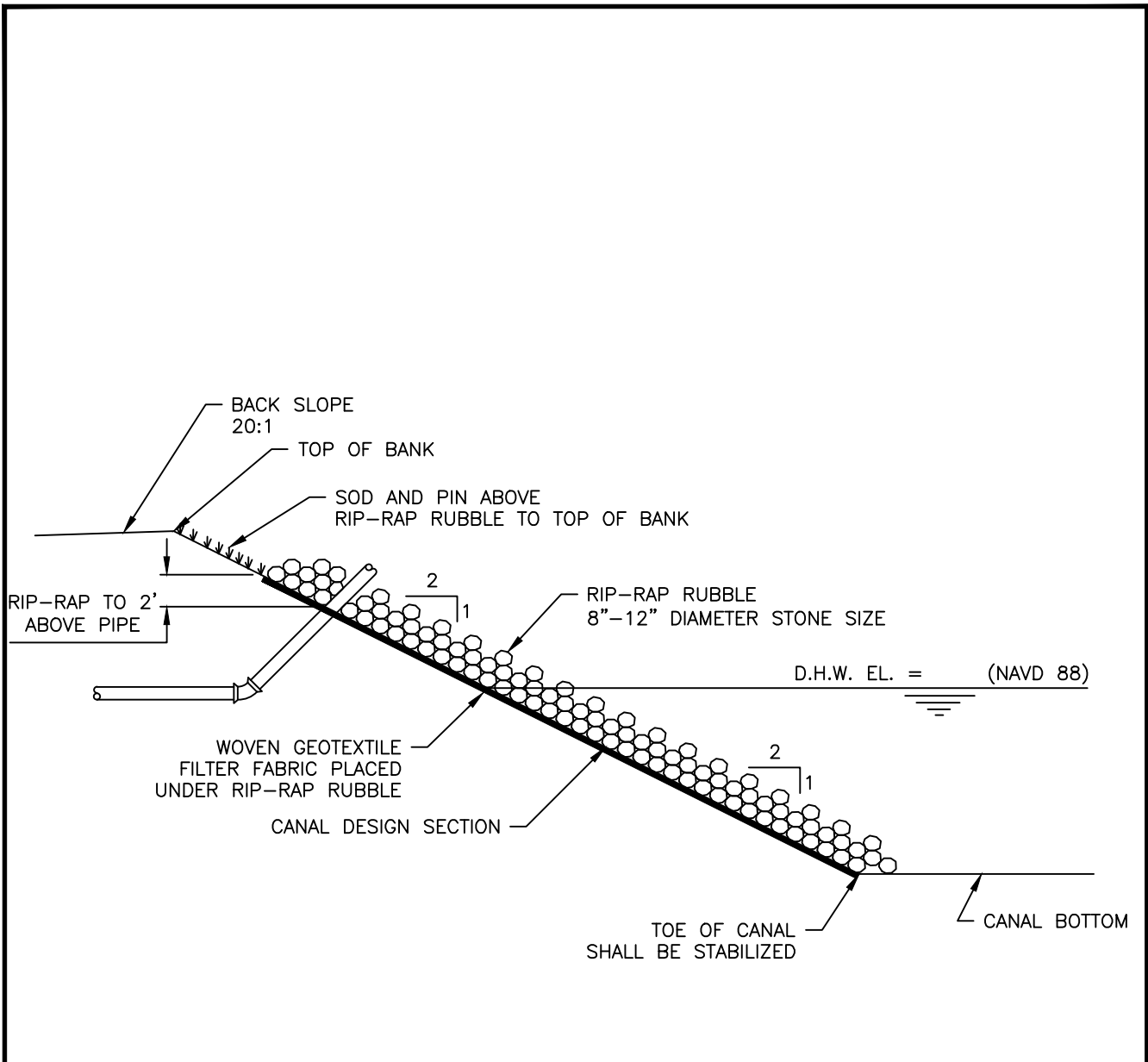
**PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS**

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LAKE DISCHARGE – OUTFALL DETAIL  
(STILLING WELL DETAIL)

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**NOTES:**

1. RIP-RAP RUBBLE AND ITS INSTALLATION MUST MEET CANAL OWNERSHIP SPECIFICATIONS AND PERMITTING REQUIREMENTS.
2. DUMP RUBBLE IN PLACE FORMING A COMPACT LAYER CONFORMING TO THE CANAL DESIGN SECTION SLOPE. ENSURE THAT RUBBLE DOES NOT SEGREGATE SO THAT SMALLER PIECES EVENLY FILL THE VOIDS BETWEEN LARGER PIECES.
3. AN ALTERNATIVE DESIGN WILL BE CONSIDERED AND MUST RECEIVE PRIOR APPROVAL FROM THE CANAL PROPERTY OWNER.

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

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**RIP-RAP RUBBLE DETAIL (N.T.S.)**

PAGE NO.  
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BILL OF MATERIALS (RECLAIMED CONTROL PANEL)

(ALL ELECTRICAL COMPONENTS AND ASSEMBLIES MUST BE UL LISTED/APPROVED)

<u>ITEM</u>	<u>NAME</u>	<u>DESCRIPTION</u>	<u>MANUFACTURER</u>	<u>TYPE</u>
1	Control Panel	24"x24"x12" NEMA 4X 304 SS panel painted white with 3-point latch and SS lockable handle	Hoffman or appr. equal	A24H2412SSLP3PTW see specification.
2	PLC	MICROLOGIX 1400 (24VDC) w/ memory module	Allen-Bradley	1766-L32BXB w/ memory module
3	Expansion Module	Analog expansion module	Allen-Bradley	1769-IF4
4	Radio	5 Watt Ethernet/Serial Radio	MDS	SD4CES-NNSNN
5	Antenna Cable	Low loss coaxial cable	Andrews Heliax	LDF4-50A
6	RF Coaxial Connector	Antenna cable connector	Andrews	L4TNM-PSA or L4TNF-PSA
7	RF Surge Suppressor	RF Lighting Surge Arrester	Polyphaser	IS-50NX-C2
8	Yagi Antenna	UHF 450MHz - 470MHz	Sinclair	SY-307
9	120V Main Circuit Breaker	Thermal Magnetic	Square D	Type QOU, 15A
10	120V TVSS	Din-rail mount TVSS	Atlantic Scientific	MA15
11	240V TVSS	Surge Current 80KA per phase	Square D	HEPD
12	Power Supply	120VAC to 12VDC power supply unit	Allen-Bradley	1606-XLP50B
13	Power Converter	12VDC TO 24VDC Converter	Rhino Converter Concepts Majorpower.com	PSP24-DC12-1 VT25-182-10/XX 12-24VDC majorVTC120i 12-24VDC
14	Terminal block	Copper Tin Plated Double Deck 600V Box Lug	Square D Phoenix	Class 9080 UTTB4- 3044814
15	Ground Terminal	Copper Tin Plated, Ground Bar End Clamp, 20 Pole Bridge 2 Pole Bridge	Square D Phoenix	Class 9080, 1130-PK9GTA CLIPFIX, FBS 20-6 30300365, FBS 2-6 30300365
16	Battery	12V, 18AH battery (for 120VAC) 12V, 55AH battery (for solar powered panel), sealed type	Power sonic TOYO-USP	P12180 6GFM55
17	Level Transmitter	Submersible Range: 0 - 5 feet w/ desiccant	Ametek Drexelbrook Blue Ribbon Birdcage MEAS	SDT-M-B-0006 BC001-10-X KPSI 720-S14B0A (cable length as necessary)
18	Pressure Transmitter	System Pressure (NEMA 4X) 0-150 psig	Endress+Hauser	Cerabar T (PMC131-A22F1Q4R)
19	Flow Transmitter	Insertion Type, 4-20mA output Vary with pipe size	CLA-VAL	X144-e (cable length as necessary)
20	Control Relay	DPDP, 3PDT 8 Pin Base 24 volt	Potter Brumfield Allen Bradley	KRPA-11DG-24 700-HA33Z24-3-4
21	Low voltage Surge	Dual Signal Surge Arrester	EDCO	PC642C-036-X
22	Cat. 5e Cable	Ethernet Cable with connectors (8 Pin Mini Din to 9 Pin)	Allen-Bradley	4PRS, STP 26AWG
23	120VAC Relay	3PDT 11 Pin, Round Base 120VAC	Allen Bradley	700-HA33A1-3-4
24	Antenna Tower	Tower Top Section w/ short base	Rohn	45AG2 w/ SB45G
25	Circuit Breaker	Amp and number of poles vary	Square D	Class 860 Multi 9 C60
26	Load Center	120/240V, 1-Phase, 125A rated, Service Entrance rated load center w/ 50A Main Breaker, 12 spaces NEMA 3R (min. 22 kAIC)	Square D	Q0112L125GRB w/ QOM50VH
27	Solar Panel	Solar Photovoltaic Module 110W	Sunwise Solartech	SW-S110P-D4 SPM110P-FSW
28	Solar Controller	Solar Controller (12V)	Morningstar	Sunsaver SS-20L-12V
29	Power Supply for Solenoid	120VAC to 24VDC (only required at lift sta. & reclaim combined panel)	Allen-Bradley	1606-XLP30E
30	Terminal J-Box	NEMA 4X, 316 S.S. w/ control terminals	Hoffman	A1212CHNFSS6

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

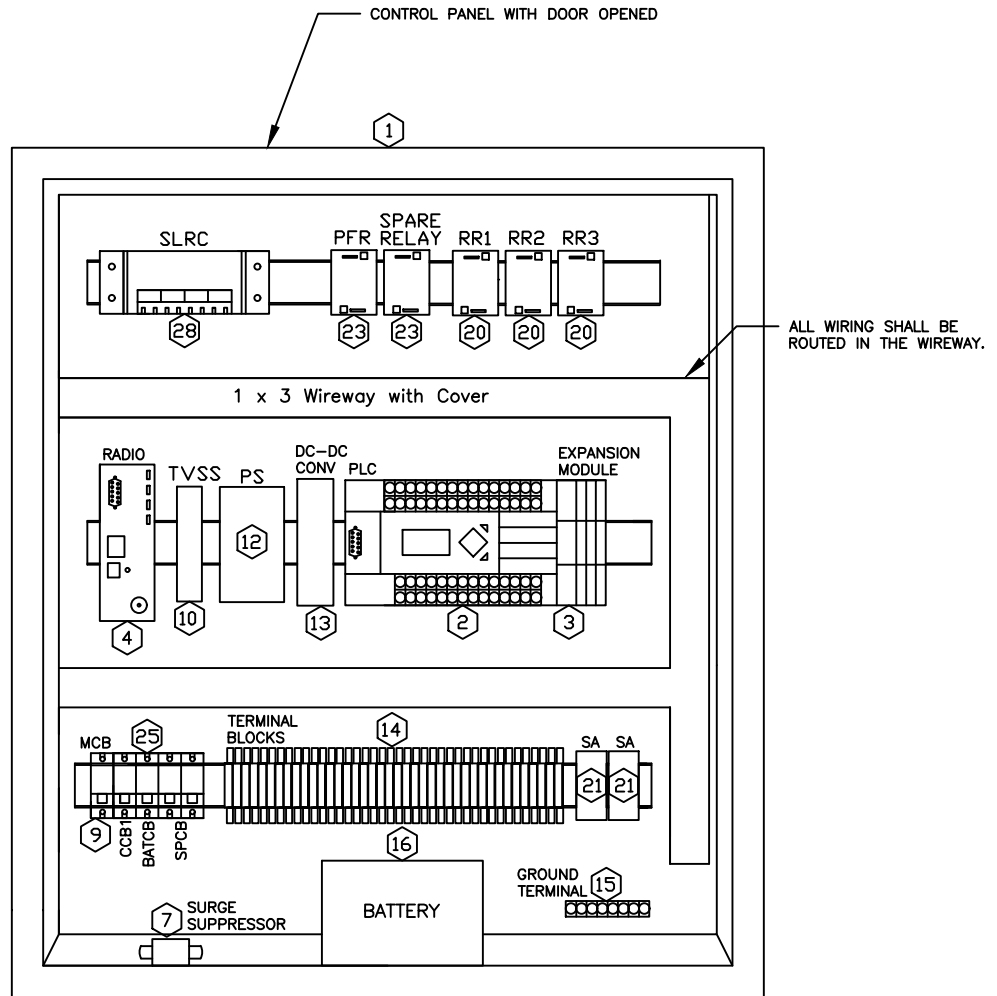
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RECLAIMED WATER SYSTEM RTU CONTROL PANEL

PAGE NO.

32R



FRONT VIEW  
NOT TO SCALE

**NOTES:**

1. SEE BILL OF MATERIALS PAGE NO. 31R.
2. ALL FIELD WIRING SHALL BE CONNECTED TO THE TERMINALS.
3. BATTERY SHALL BE LOCATED ON THE BOTTOM OF THE CONTROL PANEL, AWAY FROM ANY HEAT SOURCE.
4. PANEL BUILDER SHALL ADJUST THE PANEL LAYOUT AS NEEDED.

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RECLAIMED WATER SYSTEM RTU CONTROL PANEL

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A. Panel Builder

1. The panel builder shall be experienced in the construction of control panels/RTU's, shall have a UL approved shop. Panel shall be UL listed and UL labeled.
2. The panel builder shall warrant the panel for one (1) full year minimum from the date of final project certification.
3. The panel builder or qualified technical representative shall check-out and test the panel as part of the reclaimed RTU system start-up.

B. Panel Components

1. The panel components are specified on the drawings with the exception of items described in these specifications. Items are listed by manufacturer and catalog number, other equal quality components may be substituted but they must be preapproved by Utility Department, be UL listed, and be fully interchangeable with those specified in size, function, mounting dimensions, plug in connections, and ampacity. Any substitutions or changes must be approved in advance and in writing by the Utility Department. All components shall be new, with no signs or evidence of corrosion.

C. RTU Enclosure

1. The RTU panel itself shall be 24 inch wide x 24 inch high x 12 inch deep (24"W x 24"H x 12"D). A shop drawing must be submitted prior to preconstruction meeting. The panel shall be of a NEMA 4X construction with the following features:
  - a. Constructed of 304 stainless steel 14 gauge with white powder coated. All seams to be continuously welded, spot welded panels will not be accepted.
  - b. All external hardware shall be stainless steel with piano hinge, 3-point latch with roller fitting top and bottom and single handle with padlock fitting and stainless steel external parts.
  - c. Full length welded drip shield to deflect water from the door, a continuous closed cell neoprene gasket on the door.
  - d. Aluminum back mounting plate for heavy components (min. .090 thickness).
  - e. The outer door is to have nine inch by eleven inch (9" x 11") stainless steel or aluminum pocket for log book, tack weld to door.
  - f. No penetration through the panel will be allowed except for conduits. i.e. no screws through panel, frame, no top penetration.
2. The enclosure shall be the product of a UL approved manufacturer and shall be a NEMA-4X enclosure. Manufacturer shall be Hoffman or approved equal. Enclosure shall have lugs for mounting.

D. Wiring

1. All wiring shall be copper THWN or approved equal, AWG 14 minimum. Color code wires as follows:
 

Ground	—	Green
Neutral	—	White
120 Volt Power	—	Black
24 Volt Control	—	Violet
Analog Signal	—	Black and White
Special	—	Blue

Different control wiring colors are acceptable if clearly identified. Power wiring shall be kept separate from control wiring, and shall be identified by phase.
2. All wires shall be numbered with machine made plastic wrap around labels at both ends.
3. All external connection and internal connections, where shown on the drawings, shall be brought to the numbered terminals.

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**RECLAIMED WATER SYSTEM RTU PANEL  
SPECIFICATIONS (SHEET 1 OF 2)**

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<b>34R</b>

4. Wiring shall be enclosed in panduct or equivalent wireways and wiring between the doors and the panel shall be enclosed in a spiral wrap or approved equal with sufficient slack to allow full opening of the door.
  5. Wiring shall be secured with screw-on tabs, tabs with adhesives shall not be used.
  6. All wiring shall be front accessible.
  7. All electrical wiring must meet or exceed National Electric Code and Local Code Standards.
  8. Any place that electrical wire passes through a metal cover or shield, insulating grommet is required to protect the wire.
- E. Component Mounting
1. All components shall be securely mounted with stainless steel hardware. Self tapping screws are not acceptable.
  2. All relay bases shall be front mounted with screw terminals, no soldered connections shall be used. All base terminals shall be numbered to correspond to relay numbers. Where plug-in components are not firmly secured in bases, hold down clamps shall be provided.
- F. Identification
1. All components shall be identified in accordance with the schematic diagram, using permanent name tags on the panel of laminated micarta or approved equal. The permanent name tags shall be securely attached and in a position where they are clearly visible.
  2. All operator's controls shall be provided with laminated micarta name tags attached with stainless steel screws, with minimum lettering height of 1/8 inch.
  3. Provide a laminated schematic drawing attached to the inside of the outer door – minimum size 11 inches by 17 inches (11" x 17").
- G. Drawings
1. Panel builder shall provide the following drawings:
    - a. Schematic drawing showing all components. Components shall be properly identified by number and function. All connections shall be numbered to correspond to the component numbers. All wires and terminals shall be clearly numbered and identified.
    - b. Bill of material listing all parts as follows, in tabular form:
 

1)	Drawing Reference
2)	Description
3)	Manufacturer
4)	Catalog Number
5)	Type
6)	Notes
    - c. Layout drawing showing the front with the operators panel and with the panel open. Layout drawings shall also show the outside dimensions of the panels and dimensioned mounting supports.
    - d. Plastic encased drawing inside the panel as previously noted herein.
  2. Drawings shall be clear and readable and a minimum of 11 inches by 17 inches (11" x 17"). "Fuzzy" reductions will be rejected.
- H. See Remote Telemetry Units (RTU specifications) for programmable logic controller (PLC), I/O expansion module, Radio, solar power system, etc. requirements.

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**RECLAIMED WATER SYSTEM RTU PANEL  
SPECIFICATIONS (SHEET 2 OF 2)**

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1. REMOTE TELEMETRY UNITS AND APPURTENANCES (R.T.U.)

A. The Remote Telemetry Units shall be microprocessor based, user programmable, Programmable Logic Controllers (PLC's) which shall serve as an interface to accumulate, process, transmit and receive discrete and analog status and control messages between the RTU base stations and the remote RTU sites located within a ten mile radius of the base station.

B. Each RTU shall be PLC based, with sufficient battery backed RAM, or EEPROM non-volatile backup memories to provide all discrete and analog status, monitoring and control functions and shall be designed to operate in an outdoor industrial environment.

C. The programmable controller shall be designed to operate in an industrial environment. The PLC shall be capable of operation in an ambient temperature range of 0°-60°C and a relative humidity of 5-95 percent, non-condensing. The PLC shall be capable of operation on supply voltages of 24VDC.

D. All components of the PLC system shall be of the same manufacturer who is regularly engaged in the manufacture of programmable controllers. The manufacturer shall have fully tested units similar to that being furnished in an industrial environment with associated electrical noise. The processing unit shall perform the operations functionally described herein based on the program stored in memory and the status of the inputs and outputs.

E. The processor and its associated memory shall be enclosed in a modular sheet metal enclosure. Memory shall consist of battery-backed RAM, which shall retain the control program in the event of AC power loss. Memory shall be not less than 8K user logic for any PLC and shall be adequate for all control functions specified. A minimum of 1920 on-board registers shall be addressable.

F. The relay logic instructions of the programmable controller shall include normally open; normally closed; transitional positive and negative contacts; timers in .01, .1, and 1.0- second resolution; and up/down counters. Register and table instructions shall include block moves, table to register, register to table, FIFO, table search, and table to table. Register matrix operations shall include bit sense, bit set/clear, and, or, exclusive or, bit rotate, and complement.

G. LED-type indicating lights shall be provided as follows: READY, RUN.

H. Programmable controllers and accessory equipment shall be Allen Bradley MicroLogix 1400/1766-L32BxB, with memory module and analog extension module.

I. All RTUs shall be powered with either 120VAC through a power supply or 12VDC from solar controller capable of float charging sealed Gel-cell batteries. In a 120VAC powered panel, solar panel and solar controller are not required. For 120V, it shall include an AC power loss alarm output to the RTU on loss of AC power. Power supply shall be of sufficient capacity to provide all required DC power to all RTU equipment, discrete and analog input/output circuitry, under full load, communications interface equipment, PC modems, radios and other radio interface/conditioning equipment and appurtenances as required. The primary power supply for radio and battery backup shall be 12VDC. A 12V to 24V Converter is required for the PLC and I/O use. The batteries shall not be older than (3) months at the time of RTU acceptance and shall be lead acid sealed, 12 volt, 18 ampere-hour, model Power Sonic PS-12180. The battery charger/power supply shall be compatible with the battery, type 1606-XLP50B by Allen Bradley and set the output voltage at 13.6V. The 12V to 24V converter shall be model: PSP24-DC12-1 by Automation Direct or approved equal. In a Solar powered panel, provide a Solar Panel with all necessary components including a solar controller. Solar panel shall be mounted on the antenna pole with stainless steel U-bolts. The solar panel Installation shall meet 150MPH wind loading requirements. Solar panel shall be 110 watts, 12V Sunwize SW-S110P-D4 or Solartech SPM110P-FSW with pole mount kit Sunwize 007954 or by DPW Solar. The solar controller shall be Morningstar Sun saver SS-20L-12V. See wiring schematics.

J. Spare parts are not required.

K. All analog inputs shall be furnished with lightning surge protection devices. Sufficient I/O shall be provided for each RTU to accommodate the scheduled I/O .

1. Digital inputs shall be 24VDC from dry contacts.

2. All outputs shall be wired through interposing relays.

3. Analog input circuits shall be isolated, 15-bit resolution type. Analog inputs shall be coordinated with the receivers but shall generally be isolated 24V 4-20 mA inputs powered from the PLC. Analog input hardware shall be provided as required for all types of analog inputs being transmitted to the PLC.

L. The RTU hardware shall be assembled to a back plate mounted inside the RTU control panel. All components shall be mechanically secured and fully wired. A bonding wire #12 AWG with crimped end terminals is required between the back plate and control panel.

M. The summary of approved remote telemetry equipment/materials and manufacturers are listed in the Bill of Materials.

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

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RECLAIMED WATER SYSTEM RTU SPECIFICATIONS (SHEET 1 OF 4)

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I/O List:

Power Loss Alarm (Spare in Solar)	digital input I/O (only for 120VAC panel)
Valve Open Command	digital output O/0
Valve Close Command	digital output O/1
Reclaimed Water Pressure	analog Input IV1 (extension module)
Lake Level	analog Input IV2 (extension module)
Reclaimed Water Flow	analog input IV3 (extension module)

2. RTU COMMUNICATIONS INTERFACE

A. Bi-directional communications of status, commands and radio diagnostics between the RTUs and the RTU base station shall be provided by the RTU communications interface subsystem. The PLC MODBUS serial interface port shall serve as the RTU communications interface. The data transmission rate shall be set to operate at 9600 Baud (synchronous) in ASCII mode.

B. The RTU communications interface shall control the modem during the polling sequence. It shall be possible to assign a base address to each RTU through the data interface. The addressing scheme shall allow a minimum of 247 RTUs for each data link. The communications protocol shall be master-slave MODBUS ASCII for Central and South Towers, and be master-slave MODBUS RTU for North Tower.

3. RTU RADIO SECTION AND APPURTENANCES

A. The radio section shall consist of a Microwave Data Systems model MDS SD4CES-NNSNN 5-watt (continuous) Ethernet/Serial radio transceiver with integral RF modem, RS-232 synchronous serial interface and cable, private line coded squelch and carrier defeat timer to inhibit communications lockup. Radio transceiver shall include automatic frequency, control, loop-back and SMART diagnostics remote maintenance module to monitor; power out, RSSI, voltage level, internal temperature and forward/reflected power. Radio enclosure shall include RF shield. The interface cable from radio to RF surge suppressor shall be 24" long, RG142 cable with TNC (Threaded Neill-Concelman) and N. Male RF connectors.

B. Remote terminal unit antenna shall be a heavy-duty, pole-mounted, grounded, 450 MHz - 470MHz Yagi, directional type furnished with a minimum of 20 feet of Andrews Heliac (LDF4-50A) low loss coaxial antenna cable or approved equal, line adapter, lightning protector and appurtenances. Antenna and accessories shall be an SY-307 as manufactured by Sinclair or approved equal. Dual phase array Yagi antennae shall be required if the Remote Receive Signal Strength (RSSI) is less than 95 dbm. Minimum antenna height shall be 12 feet above grade, unless otherwise instructed by the Utility Department. Antenna tower shall be made of galvanized steel. RF lightning surge suppressor shall be IS-50NX-C2 by Polyphaser Corporation or approved equal. RF coaxial connectors shall be of the compression type and be a L4TNM-PSA or L4TNF-PSA by Andrews or approved equal. The antennae orientation toward the receiving communication tower shall be set using appropriate instruments.

C. The complete communications subsystem including all interconnecting cables shall contain lightning, surge and transient protection. All antennae masts shall be grounded.

D. Radios shall be pre-programmed by the factory for the frequency of the tower that the radio will be communicating with. See attached RTU Schedule for location of stations. Frequencies are as follows:

1. North Tower - Remote transmit-465.1500 MHz - Receive-460.1500 MHz  
For stations located north of Lantana Rd., south of Roebuck Rd., and east of S.R. 7  
2956 Pinehurst Dr., Greenacres, FL (Coordinates: 26°38.017'N, 80°09.352'W)
2. Central Tower - Remote transmit-465.750 MHz - Receive-460.750 MHz  
For stations located south of Lantana Rd. and North of Clint Moore Rd.  
12751 Hagen Ranch Rd., Delray Beach, FL (Coordinates: 26°29.260'N, 80°10.018'W)
3. South Tower - Remote transmit-465.025 MHz - Receive-460.025 MHz  
For stations located south of Clint Moore Rd.  
22438 S.W. 7th Street, Boca Raton, FL (Coordinates: 26°20.586'N, 80°11.840'W)
4. West Tower - Remote transmit-465.525 MHz - Receive-460.525 MHz  
For stations located north of S.R. 80 and west of S.R. 7; plus all stations located north of Roebuck Rd.  
20 S.R. 880, Loxahatchee, FL (Coordinates: 26°41.05'N, 80°23.37'W)

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RECLAIMED WATER SYSTEM RTU  
SPECIFICATIONS (SHEET 2 OF 4)

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4. RTU ELECTRICAL TRANSIENT PROTECTION

A. All electrical and electronic elements shall be protected against damage due to electrical transient induced in interconnecting lines from lightning discharges and nearby electrical systems.

B. Manufacturer's Requirements: All surge suppressor devices shall be manufactured by a company that has been engaged in the design, development, and manufacture of such devices for at least 5 years.

C. Suppressor Locations: As a minimum, provide surge suppressors at the following locations:

1. At main breaker of the RTU control panel for 120VAC power panel.
2. At the field, panel, or assembly connections of all analog signal circuits that have any portion of the circuit extending outside of a protecting building.
3. Between the radio and external mounted antenna.

D. Surge Suppressor Assemblies for 120-Volt AC Power Supply Connectors: Surge suppressors for connections to ac power supply circuits shall be assemblies that:

1. Pluggable, Din-rail mounting AC power protection.
2. Power on and protection status indicator.
3. Hybrid MOV and RFI filtering components.
4. UL 1449, 3rd edition and 10 year product warranty.
5. The suppressor shall be of the type MA15 by Atlantic Scientific.

E. Surge Suppressors for Analog Signal Connections: Surge suppressors for analog signal circuits shall:

1. Have four lead devices with a threaded mounting/grounding stud.
2. Have a circuit consisting of a 3-electrode gas tube and silicone avalanche devices to clamp each line to ground. High-energy gas tube and silicone avalanche devices shall be separated by series impedance.
3. Be epoxy encapsulated with a nonflammable phenolic enclosure. Epoxy encapsulation shall be flame retardant.
4. Limit line-to-ground and line-to-line voltage to 36 volts on 24V dc circuits.
5. Meet or exceed the following performance criteria based on a test surge wave with 8-microsecond rise time and 20-microsecond exponential decay time:
  - a. Recovery: Automatic
  - b. Peak Source Current: 10,000 amps
  - c. Pulse Lift Before Failure: 100 occurrences
  - d. Minimum Voltage Clamp Rating: 36 volts
  - e. Series Impedance: 24 ohms total
  - f. Temperature Range: -20 degrees C to +85 degrees C
  - g. Operating Voltage: Less than 36V dc
  - h. Operating Current: 4 to 20 mA dc
  - i. Resistance Line-to-Ground: Greater than 1 mega-ohm

6. The suppressor shall be of the type PC 642C-036 by EDCO Inc. or approved equal.

F. RF Surge Suppressors: RF surge suppressors shall:

1. Meet or exceed the following technical specifications:
  - a. Surge: 50kA IEC 1000-4-5 8/20ms Waveform 500 Joules
  - b. Turn on: 600 VDC +/-20%
  - c. Turn on time: 2.5ns for 2kV/ns
  - d. Frequency Range: 125MHz to 1GHz
  - e. VSWR: ≤1.1 to 1 over frequency range
  - f. Insertion Loss: ≤0.1 dB over frequency range
  - g. Temperature: -45°C to +85°C Storage/Operating +50°C
  - h. Unit Impedance: 50 Ohm
  - i. Mounting: Flange

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

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RECLAIMED WATER SYSTEM RTU  
SPECIFICATIONS (SHEET 3 OF 4)

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2. The suppressor shall be of the type IS-50NX-C2 by PolyPhaser Inc. or approved equal.

5. RTU CORROSION PROTECTION

A. All indoor and outdoor cabinets, panels and consoles shall be fitted with vapor phase corrosion inhibitor capsules capable of protecting 5-cubic feet of space for one year; Hoffman Model A-HC15E, ZERUST Model VC-6-2 or approved equal. Capsules shall be labeled with the date of activation.

6. RTU FABRICATION

A. Cabinets and panels shall provide mounting for power supplies, control equipment, input/output subsystems, panel mounted equipment and appurtenances. Ample space shall be provided between equipment to facilitate servicing and cooling.

B. Terminal blocks shall be factory assembled on a miniature mounting channel and the channel bolted to the steel strap. Terminals shall be miniature screw type with integral fuse holder unless otherwise required. Terminal blocks shall provide access to screw terminals without disabling the fuses.

C. The terminals shall be marked vertically with a permanent, continuous marking strip from top to bottom. One side of each terminal strip shall be reserved exclusively for field incoming conductors. Common connections and jumpers required for internal wiring shall not be made on the field side of the terminal. Subject to the approval of the Owner, a vendor's pre-engineered and prefabricated wiring termination system will be acceptable.

D. Wiring shall comply with accepted standard instrumentation and electrical practices and codes. For each pair of parallel terminal blocks, the field wiring shall be between the blocks. Solder-less horseshoe (spade) connectors, with insulating sleeves, shall be used for connecting wires to terminal blocks.

E. All wiring shall be bundled and run open or enclosed in vented plastic wire way, as required. All conductors run open shall be bundled and bound at regular intervals, not exceeding 12 inches, with nylon cable ties. Care shall be taken to separate electronic signal, discrete signal, and power wiring. A copper ground bus shall be installed the full length of each panel. Interior panel wiring and field wiring shall be tagged at all terminations with machine-printed plastic sleeves. The wire number shall be the ID number listed in the input/output schedules.

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

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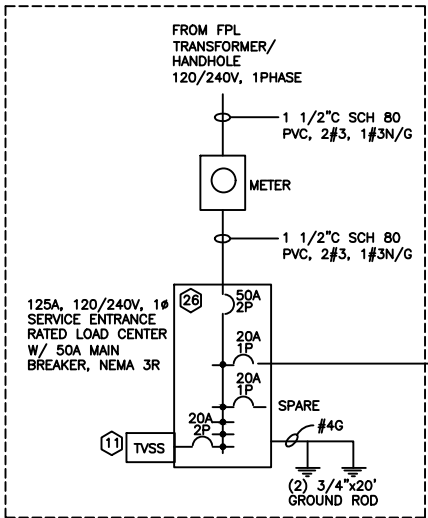
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SPECIFICATIONS (SHEET 4 OF 4)

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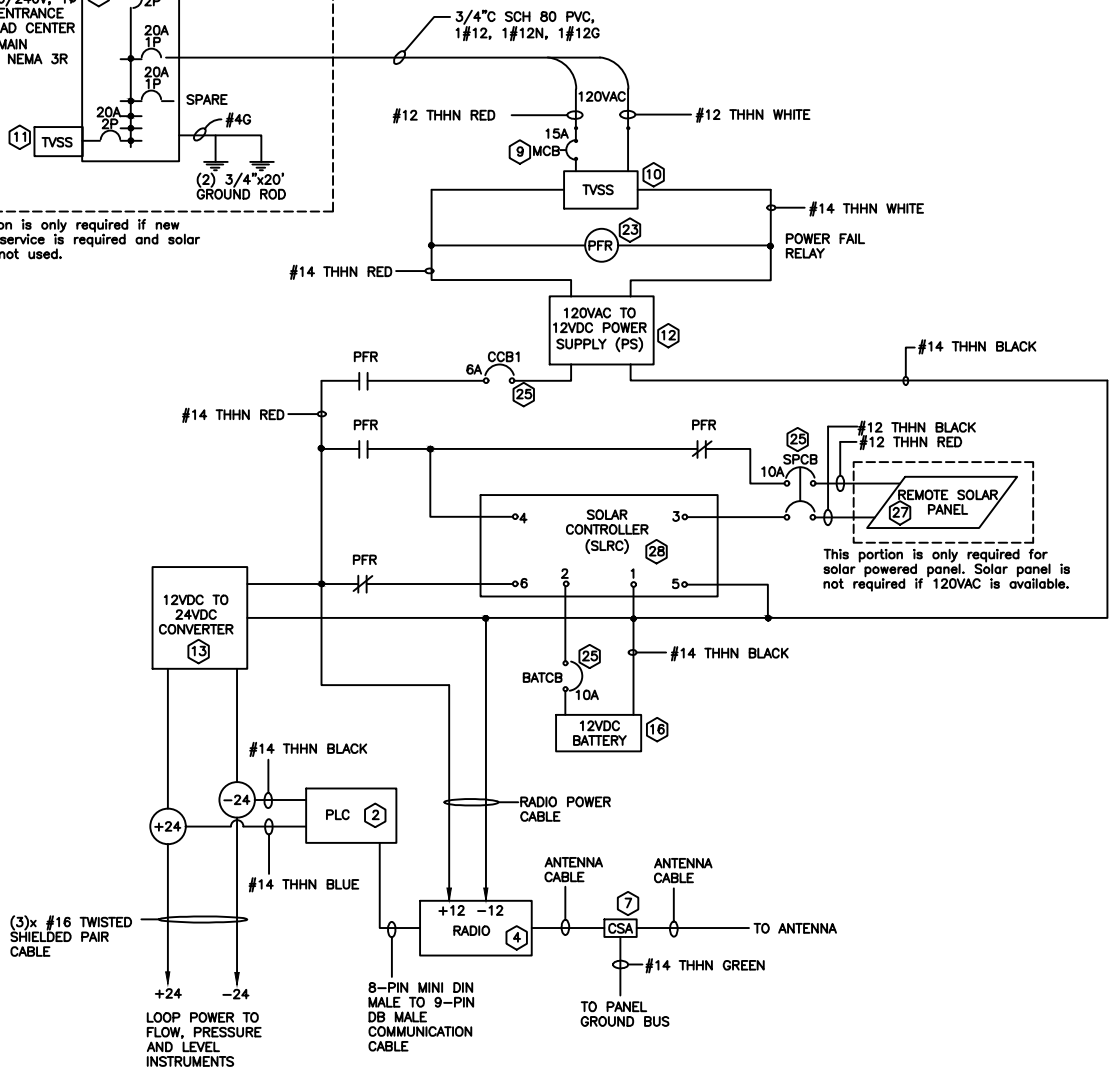


This portion is only required if new electrical service is required and solar power is not used.

SERVICE CALCULATION 120/240V, 1-PHASE

50WATT POWER SUPPLY	1.0 A
FUTURE LOAD	5.0 A
TOTAL LOADS	6.0 A
25% OF CONTINUOUS LOAD	1.5 A
TOTAL LOADS (AMP)	7.5 A

SERVICE LOADS (KVA) AT 240V, 1 $\phi$  = 1.8 KVA



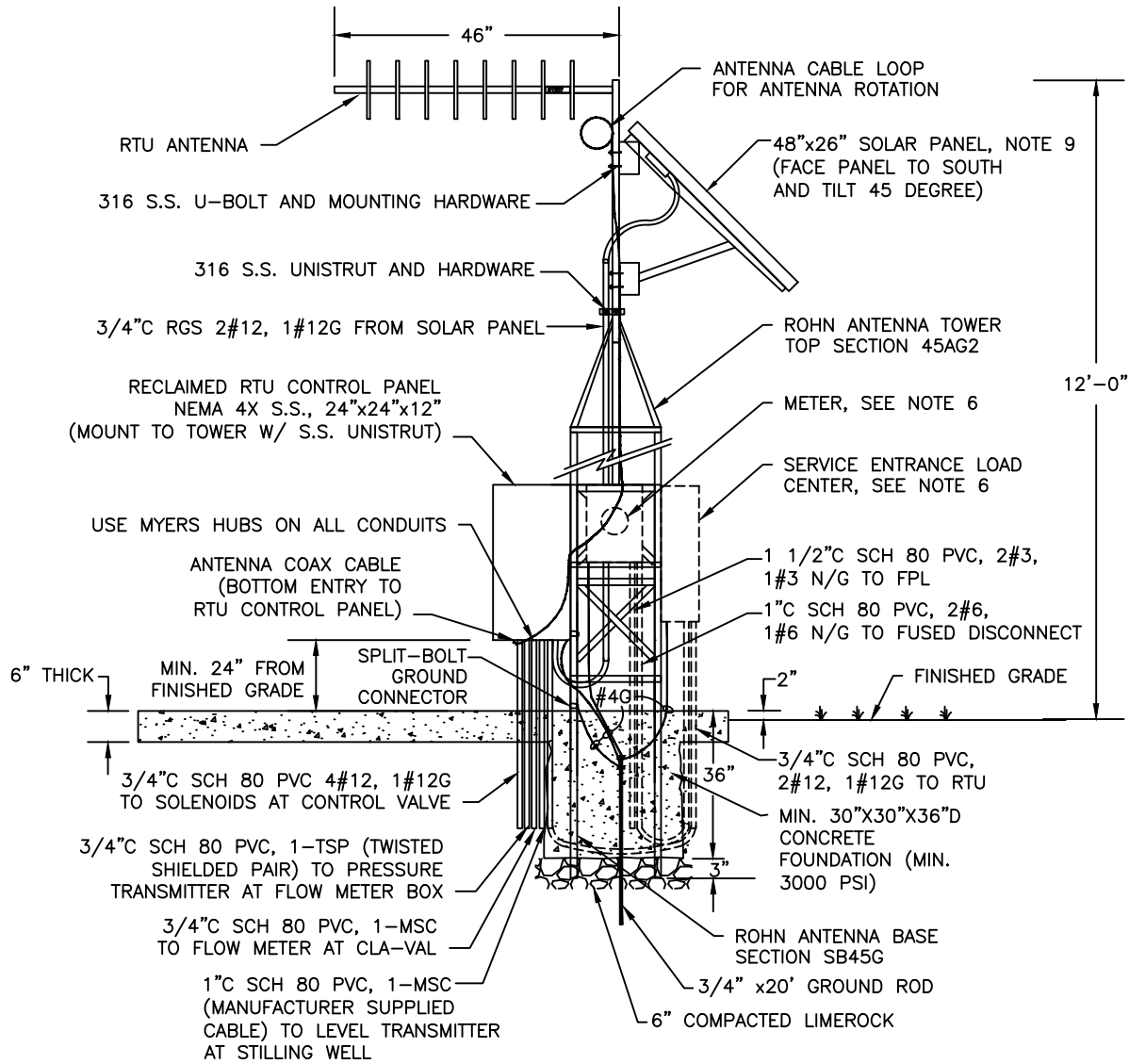
NOTES:

1. SEE BILL OF MATERIALS ON PAGE NO. 31R.
2. ALL FIELD WIRING SHALL BE CONNECTED TO THE TERMINALS.

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**RECLAIMED WATER SYSTEM RTU CONTROL PANEL  
POWER WIRING DIAGRAM**

PAGE NO.  
**40R**



RECLAIMED RTU MOUNTING DETAIL – SIDE VIEW  
NOT TO SCALE

**NOTES:**

1. MAST AND METAL STRUCTURE SHALL BE GROUNDED IN ACCORDANCE WITH NEC SECTION 810-21.
2. ANTENNA INSTALLATION SHALL MEET THE WIND LOADING REQUIREMENT PER FLORIDA BUILDING CODE.
3. MINIMUM ANTENNA HEIGHT SHALL BE 12 FEET. IF ANY OBSTRUCTION IS LOCATED BETWEEN THE RADIO COMMUNICATION PATH, ANTENNA HEIGHT SHALL BE HIGHER THAN THOSE OBSTRUCTIONS.
4. CONDUITS SHALL NOT ENTER THE TOP OF CONTROL PANEL.
5. ALL ELECTRICAL PANELS SHALL BE GROUNDED.
6. METER AND SERVICE ENTRANCE RATED LOAD CENTER ARE NOT REQUIRED IF THE RTU IS SUPPLIED BY SOLAR POWER OR NEARBY LIFT STATION POWER.
7. ALL MOUNTING HARDWARE SHALL BE 316 STAINLESS STEEL.
8. MAINTAIN 36" CLEARANCE IN FRONT OF ALL ELECTRICAL PANELS.
9. SOLAR PANEL IS NOT REQUIRED IF 120 VAC POWER IS AVAILABLE.
10. ELECTRICAL PANEL SUPPORT STRUCTURE / ANTENNA TOWER HAS BEEN DESIGNED IN ACCORDANCE WITH THE FLORIDA BUILDING CODE 2010 FOR THE FOLLOWING CRITERIA:
  - RISK CATEGORY IV
  - EXPOSURE CATEGORY "C"
  - WIND VELOCITY,  $V_{ult} = 181$  MPH

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

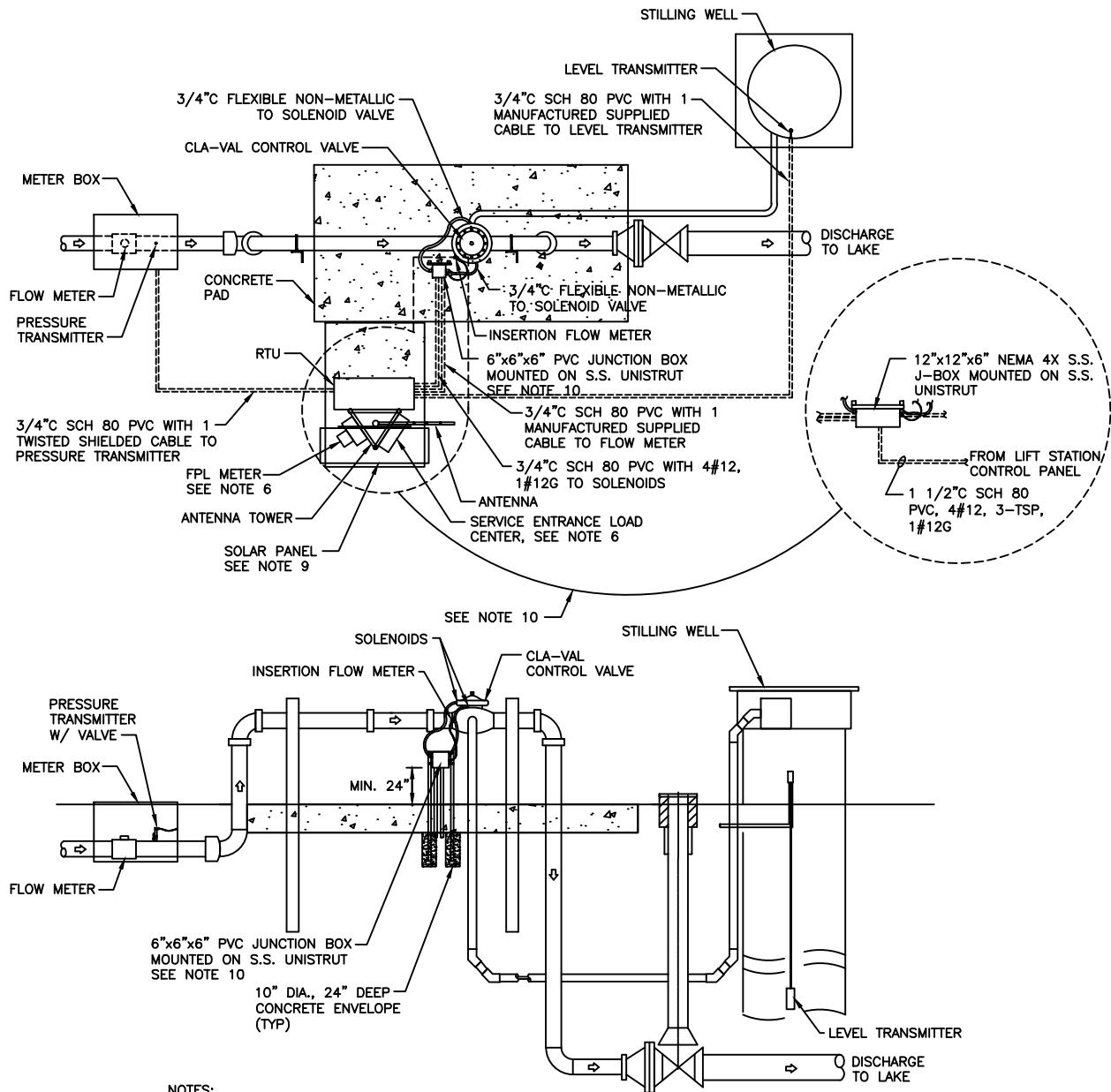
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RECLAIMED WATER SYSTEM  
RTU ANTENNA AND PANEL MOUNTING DETAIL

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**NOTES:**

1. MAST AND METAL STRUCTURE SHALL BE GROUNDED IN ACCORDANCE WITH NEC SECTION 810-21.
2. ANTENNA INSTALLATION SHALL MEET THE WIND LOADING REQUIREMENT PER FLORIDA BUILDING CODE.
3. MINIMUM ANTENNA HEIGHT SHALL BE 12 FEET. IF ANY OBSTRUCTION IS LOCATED BETWEEN THE RADIO COMMUNICATION PATH, ANTENNA HEIGHT SHALL BE HIGHER THAN THOSE OBSTRUCTIONS.
4. CONDUITS SHALL NOT ENTER THE TOP OF CONTROL PANEL.
5. ALL ELECTRICAL PANELS SHALL BE GROUNDED.
6. METER AND SERVICE ENTRANCE RATED LOAD CENTER ARE NOT REQUIRED IF THE RTU IS SUPPLIED BY SOLAR POWER OR NEARBY LIFT STATION POWER.
7. ALL MOUNTING HARDWARE SHALL BE 316 STAINLESS STEEL.
8. MAINTAIN 36" CLEARANCE IN FRONT OF ALL ELECTRICAL PANELS.
9. SOLAR PANEL IS NOT REQUIRED IF 120 VAC POWER IS AVAILABLE.
10. FOR SHARE RTU/POWER CONFIGURATION, TOWER, METER AND LOAD CENTER ARE NOT REQUIRED. A LARGER 12"x12"x6" NEMA 4X S.S. J-BOX IS REQUIRED IN LIEU OF 6"x6"x6" J-BOX. SEE PAGE 44R FOR RTU SHARING BETWEEN LIFT STATION AND RECLAIMED WATER.

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

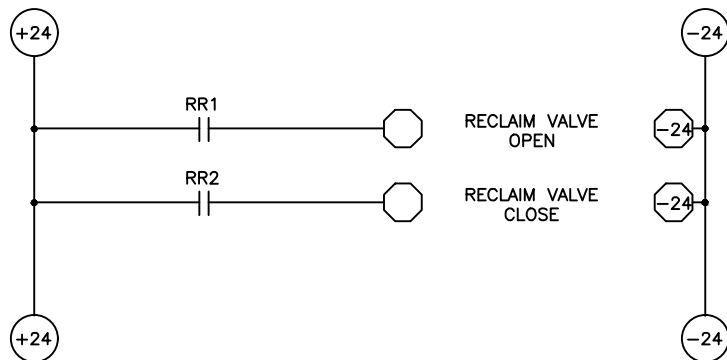
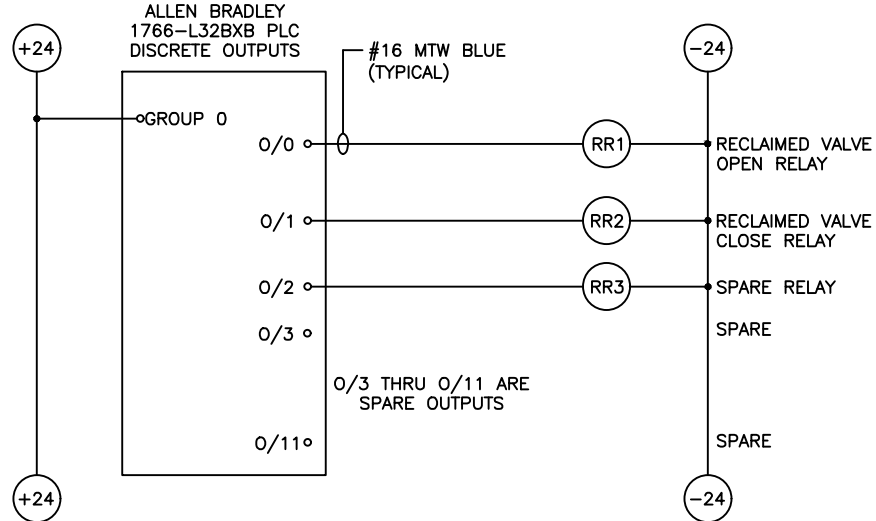
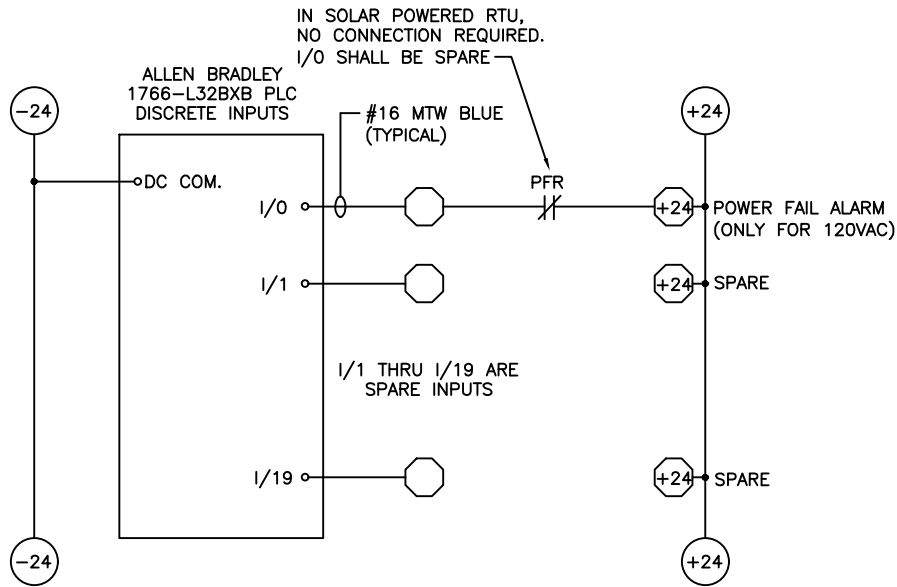
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RECLAIMED WATER SYSTEM  
ELECTRICAL LAYOUT

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PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

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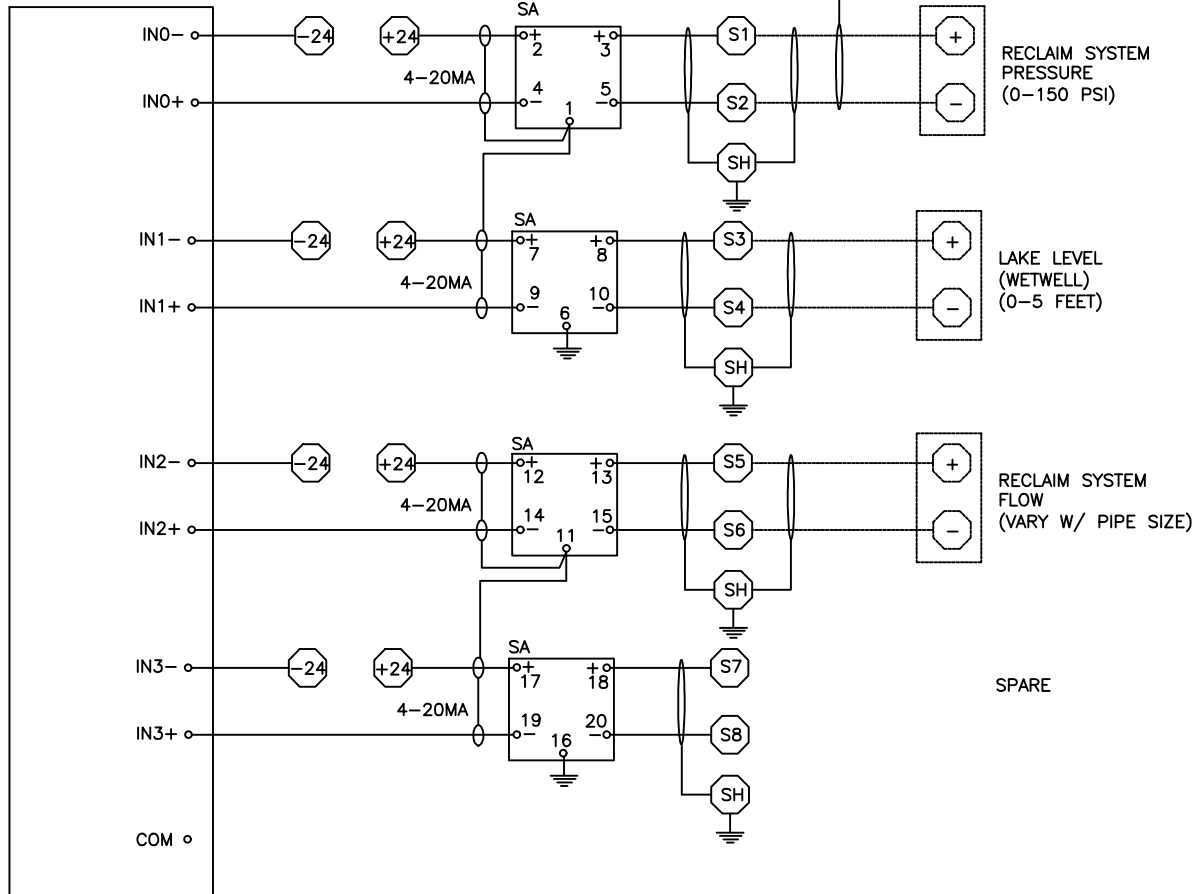
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RECLAIMED WATER SYSTEM  
PLC INPUT/OUTPUT WIRING (SHEET 1 OF 2)

PAGE NO.

43R

ALLEN BRADLEY  
1762-IF4  
EXPANSION  
ANALOG INPUTS



PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

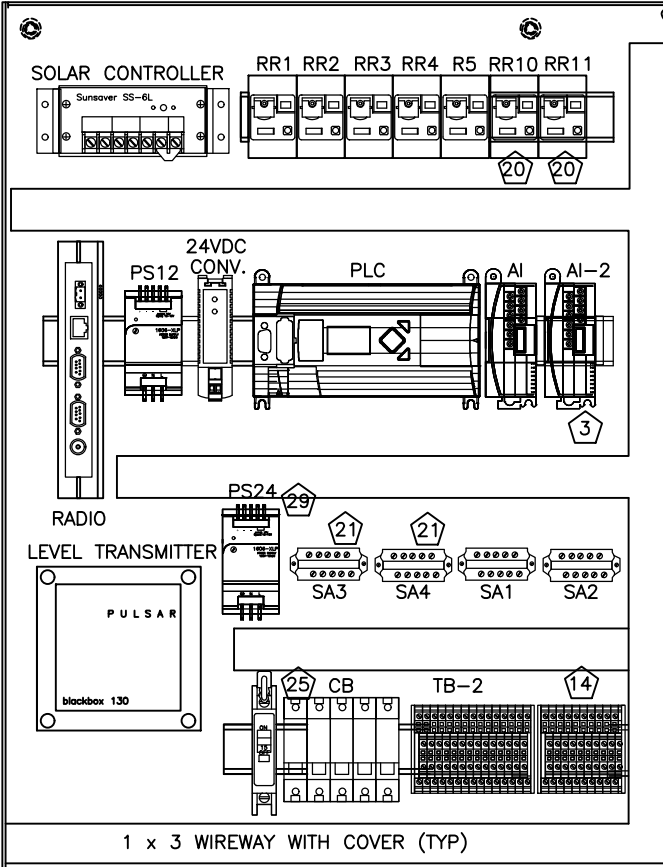
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RECLAIMED WATER SYSTEM  
PLC INPUT/OUTPUT WIRING (SHEET 2 OF 2)

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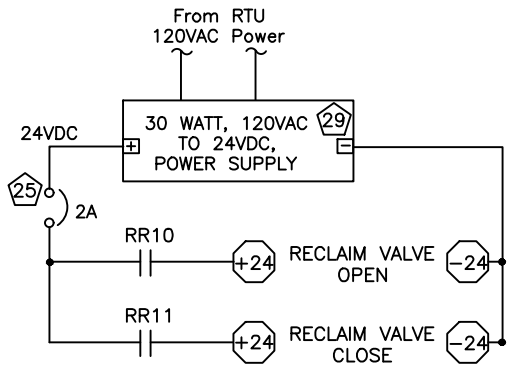


LIFT STATION CONTROL PANEL/RTU WITH ADDED COMPONENTS FOR RECLAIMED WATER SYSTEM  
NOT TO SCALE

PLC I/O List:

(See additional I/O on Lift Station Standards)

Valve Open Command	digital output O/10
Valve Close Command	digital output O/11
Reclaimed Water Pressure	analog Input IV1 (extension module AI-2)
Lake Level	analog Input IV2 (extension module AI-2)
Reclaimed Water Flow	analog input IV3 (extension module AI-2)



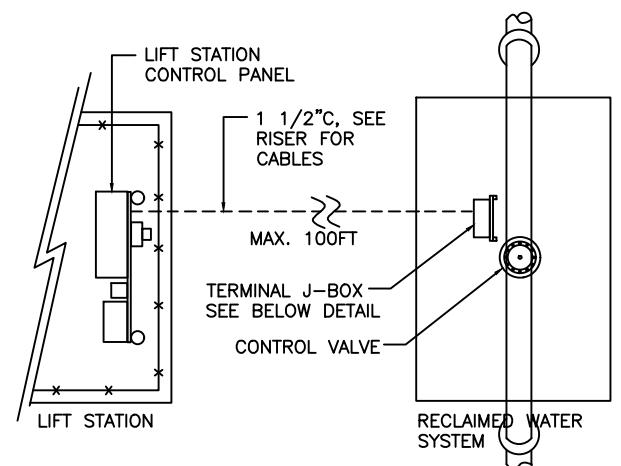
RECLAIMED CONTROL VALVE WIRING  
NOT TO SCALE

LINE WEIGHT

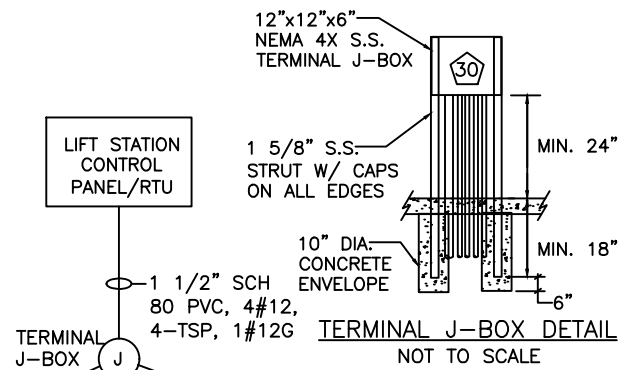
- COMPONENTS FOR LIFT STATION INSIDE LIFT STATION CONTROL PANEL/RTU (SEE LIFT STATION STANDARDS)
- NEW ADDED COMPONENTS FOR RECLAIMED WATER SYSTEM INSIDE LIFT STATION CONTROL PANEL/RTU

LEGEND

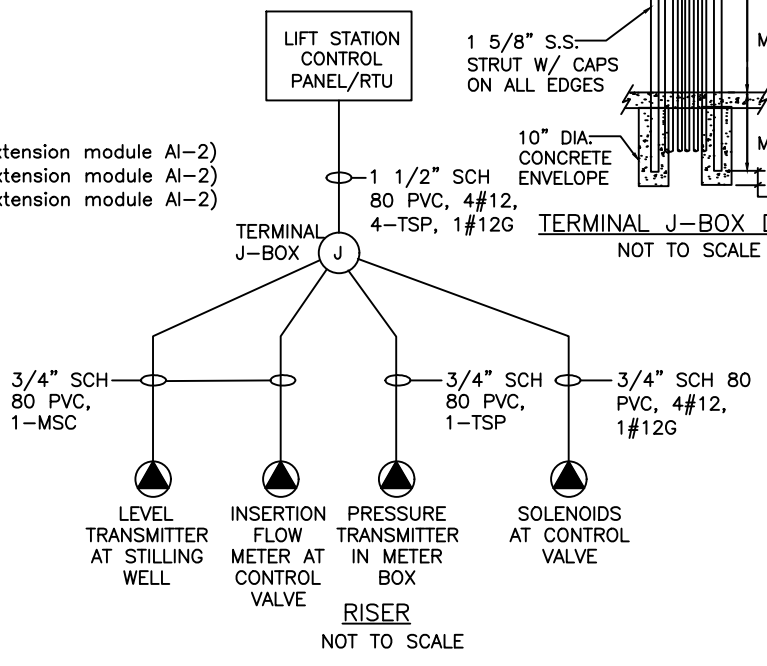
- TSP TWISTED SHIELDED PAIR CABLE (16 AWG, 600V WITH DRAIN WIRE)
- MSC MANUFACTURER SUPPLIED CABLE



LIFT STATION AND RECLAIMED WATER SYSTEM LOCATED NEXT TO EACH OTHER  
NOT TO SCALE



TERMINAL J-BOX DETAIL  
NOT TO SCALE



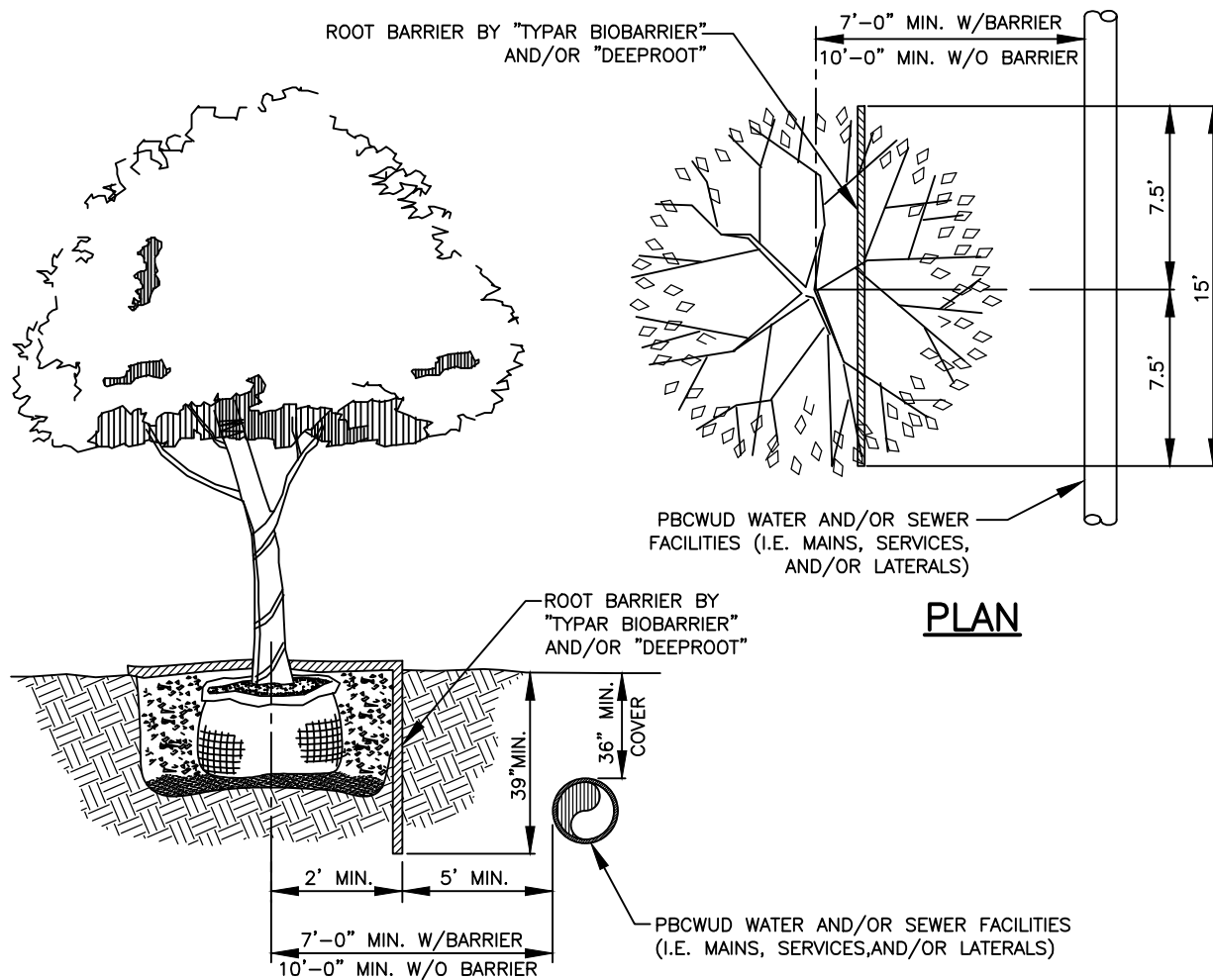
RISER  
NOT TO SCALE

**PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS**

REVISION/ISSUE DATE  
**6/2019**

**RTU SHARING BETWEEN LIFT STATION AND RECLAIMED WATER SYSTEM**

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**45R**



**SECTION**

**PLAN**

**NOTES:**

1. TREES SHOWN ON THIS PLAN ARE FOR GRAPHIC REPRESENTATION ONLY. TREE SPACING IS BASED ON DESIGN REQUIREMENTS AND THE TREES SHOWN ON THESE PLANS ATTEMPT TO ACCOMPLISH THAT SPACING WHILE MAINTAINING THE REQUIRED SETBACKS FROM UTILITIES. TREES MAY BE FIELD ADJUSTED TO AVOID CONFLICTS WITH DRIVEWAYS AND UNDERGROUND UTILITIES. IN ANY CASE THE TREES SHALL BE LOCATED IN THE FIELD IN ACCORDANCE WITH THE PLANTING DETAILS SHOWN HEREON.
2. TREES ARE TO BE INSTALLED WITH A TEN FOOT (10') SEPARATION FROM ANY WATER OR SEWER MAIN AND/OR SERVICE, HYDRANTS, AND LIFT STATIONS. IF A TEN FOOT (10') SEPARATION CANNOT BE ACHIEVED, THE TREE CAN BE INSTALLED WITH A ROOT BARRIER SYSTEM. HOWEVER, IN NO CASE SHALL A TREE ENCROACH INTO A PBCUE WITHOUT PRIOR DEPARTMENT APPROVAL.
3. ONLY SOD CAN BE INSTALLED WITHIN 7.5' MINIMUM OF A FLUSHING HYDRANT UNLESS OTHERWISE APPROVED BY THE FIRE MARSHAL AND THE DEPARTMENT.
4. SOD ONLY SHALL BE INSTALLED WITHIN 5.0' MINIMUM OF ANY DEPARTMENT RECLAIMED WATER METER.

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

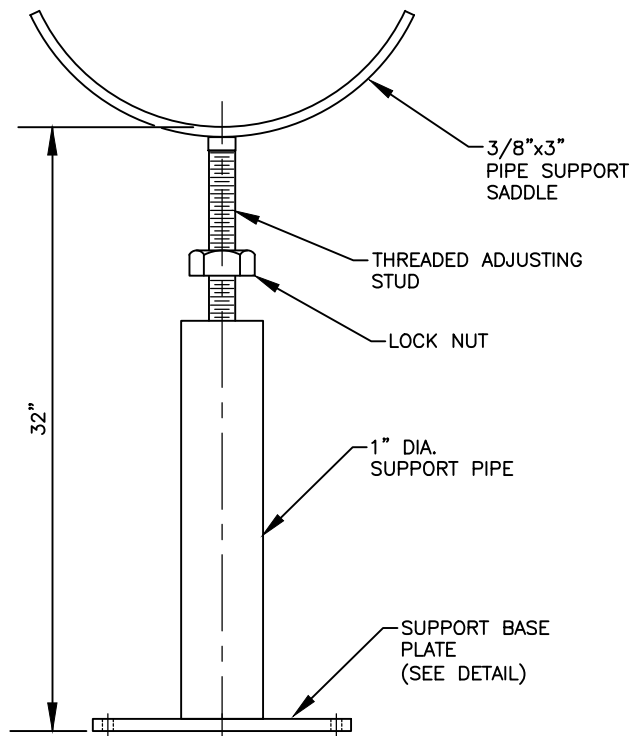
REVISION/ISSUE DATE

6/2019 \*

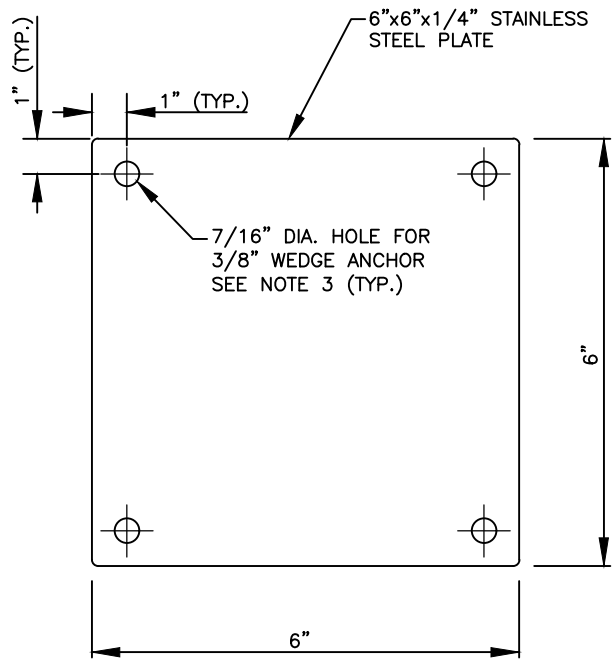
LANDSCAPE AND  
ROOT BARRIER DETAIL

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PIPE SUPPORT



SUPPORT BASE PLATE DETAIL

NOTES:

1. SHOP DRAWING FOR THE METER ASSEMBLY PIPE SUPPORT IS REQUIRED TO BE SUBMITTED FOR APPROVAL BY THE DEPARTMENT PRIOR TO THE PIPE SUPPORT BEING CONSTRUCTED AND/OR INSTALLED. ALL PIPE SUPPORTS FOR EACH METER ASSEMBLY INSTALLATION SHALL BE THE SAME.
2. ALL PIPE SUPPORT MATERIALS AND MOUNTING HARDWARE ARE REQUIRED TO BE 304 STAINLESS STEEL.
3. THE REQUIRED WEDGE ANCHORS FOR EACH SUPPORT SHALL BE 3/8" DIAMETER WITH NOMINAL EMBEDMENT OF 2-3/8". EACH ANCHOR SHALL HAVE A WASHER, LOCK WASHER, AND NUT.

PALM BEACH COUNTY CONSTRUCTION STANDARDS & DETAILS

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ABOVE GROUND WATER METER INSTALLATION  
PIPE SUPPORT

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