PCMC WATER SYSTEM – CORROSION PROTECTION REQUIREMENTS:

PCMC HAS EXPERIENCED EXTERNAL CORROSION OF WATER DISTRIBUTION MATERIALS IN VARYING DEGREES THROUGHOUT THE CITY. TO MAXIMIZE THE LIFE CYCLE OF WATER SYSTEM IMPROVEMENTS, AS IMPACTED BY THE IMMEDIATE SITE CONDITIONS AND THE SELECTION OF MATERIALS, THE CITY HAS IDENTIFIED KEY DESIGN AND CONSTRUCTION REQUIREMENTS.

- 1. FOR PROJECTS WITH <u>LESS THAN 300 FEET</u> OF NEW WATER PIPE AND APPURTENANCES, CORROSION PROTECTION SHALL BE ADDRESSED IN THE FOLLOWING MANNER:
 - a. IN ADDITION TO THE REQUIRED POLYETHYLENE WRAP, APPLY A WAX TAPE COATING SYSTEM TO VALVE BONNET BOLTS AND <u>ALL</u> OTHER BURIED BOLTS, NUTS, CONNECTORS, RESTAINER GLAND BOLTS, AND COUPLING HARDWARE, AWWA C217. COATING SYSTEM TO INCLUDE A 4-MIL MINIMUM WAX TAPE PRIMER, FILLER MATERIAL, 45-MIL MINIMUM WAX TAPE AND PROTECTIVE OUTER WRAP
 b. WAX TAPE COATING MATERIALS:
 - i. DENSO NORTH AMERICA DENSO PRIMER, DENSYL TAPE AND/OR MASTIC, DENSO FIBER-WRAP
 - ii. TRENTON PRIMER, #1 WAX-TAPE, AND GUARD-WRAP
 - iii. OR APPROVED EQUAL (SUBMITTAL TO CITY AND WRITTEN APPROVAL REQUIRED PRIOR TO INSTALLATION)
- 2. FOR PROJECTS <u>EXCEEDING 300 FEET</u> OF NEW WATER PIPE AND APPURTENANCES, CORROSION PROTECTION SHALL BE ADDRESSED IN THE FOLLOWING MANNER:
 - a. THE DEVELOPER AND ITS' DESIGN ENGINEER, GEOTECHNICAL ENGINEER, AND CORROSION CONSULTANT SHALL PROVIDE A <u>SITE SPECIFIC</u> "CORROSION STUDY REPORT". THE REPORT SHALL INCORPORATE PROJECT SPECIFIC FINDINGS INTO CORROSION PROTECTION RECOMMENDATIONS FOR THE PROPOSED WATER SYSTEM IMPROVEMENTS. THE REPORT SHALL INCLUDE AT A MINIMUM THE FOLLOWING ITEMS:
 - i. DETAILED INFORMATION ON EXISTING CONDITIONS, SOIL TYPES, CLASSIFICATION, ETC.
 - ii. IDENTIFICATION OF STRAY CURRENT SOURCES AND ANY EXISTING CORROSION PROTECTION SYSTEMS IN THE IMMEDIATE AREA
 - iii. IDENTIFICATION OF ANY POTENTIAL FOR HOT SPOTS OR VARYING SOIL CONDITIONS THAT MAY WARRANT CHANGES TO THE CORROSION PROTECTION PLAN DURING CONSTRUCTION.
 - iv. FIELD SAMPLING AND TESTING RESULTS WITHIN THE PROPOSED PIPE ZONE BASED ON REPRESENTATIVE SAMPLING OF THE DEVELOPMENT AREA CONDITIONS
 - v. SOIL RESISTIVITY TESTING RESULTS IDENTIFYING CORROSIVE SOIL CONDITIONS AND LOCATIONS (WENNER 4-PIN SOIL RESISTIVITY TESTS AND SOIL BOX RESISTIVITY TESTS) AT REPRESENTATIVE PIPE INSTALL DEPTHS
 - vI. LABORATORY ANALYSIS OF SOIL SAMPLES FOR PH, CHLORIDES, SULFATES, TOTAL SALTS, AND CONDUCTIVITY
 - vii. DETERMINATION OF THE NEED FOR CORROSION PROTECTION BASED ON SOIL CORROSIVITY CLASSIFICATION/SOIL RESISTIVITY AND RECOMMENDATION OF SUITABLE PIPE, CONSTRUCTION MATERIALS, PIPE PROTECTION METHOD, PIPE EXTERIOR COATINGS, ETC., BASED ON SITE CORROSIVITY. SEE TABLE BELOW.
 - viii. SPECIFY IF THE INVESTIGATION INCLUDES ONLY THE INITIAL PHASE OR ALL FUTURE PHASES

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b. FOLLOWING PCMC'S RECEIPT AND REVIEW OF THE CORROSION STUDY REPORT, THE DEVELOPER WILL BE NOTIFIED OF THE CITY'S DETERMINATION AS TO REQUIRED PROTECTION OR THE DESIGN TEAM WILL BE REQUESTED TO MEET AND REVIEW THE FINDINGS AND ESTABLISH THE FINAL WATER SYSTEM DESIGN CRITERIA. THE CITY'S REVIEW WILL BE BASED ON THE FOLLOWING TABLE 1:

TABLE 1 - SOIL CORROSIVITY CLASSIFICATION VERSUS SOIL RESISTIVITY

CORROSIVITY	RESISTIVITY, OHM-CM	TREATMENT
EXTREMELY CORROSIVE	LESS THAN 1,000	SITE SPECIFIC DESIGN REQUIRED
VERY CORROSIVE	1,000 TO 3,000	SITE SPECIFIC DESIGN REQUIRED
CORROSIVE	3,000 TO 6,000	NON-METALLIC PIPE – WAX TAPE COATING SYSTEM ON BOLTS & NUTS, ANODE PROTECTED FITTINGS AND VALVES
MODERATELY CORROSIVE	6,000 TO 10,000	NON-METALLIC PIPE - WAX TAPE COATING SYSTEM ON BOLTS AND NUTS ON PIPE, FITTINGS, AND VALVES
MILDLY CORROSIVE	MORE THAN 10,000	WAX TAPE COATING SYSTEM ON BOLTS AND NUTS ON PIPE, FITTINGS, AND VALVES

c. REFER TO PERTINENT PCMC WATER STANDARD PLANS OR PROVIDE CONSTRUCTION DRAWING DETAILS ASSOCIATED WITH CORROSION STUDY RECOMMENDATIONS AND THE PCMC FINAL APPROVED WATER SYSTEM

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TERMINAL BOARD WIRING DIAGRAM









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NOTES:

- 1. APPLY DIELECTRIC COATING TO ALL METALLIC FITTINGS, VALVES, PIPE, AND VALVE BOXES UNLESS SPECIFIED OTHERWISE.
- GALVANIC ANODES SHALL BE H1 ALLOY MAGNESIUM ANODES AT THE BARE WEIGHT LISTED IN THE SCHEDULE, SUPPLY PREPACKAGED IN A CLOTH BAG AT 2.5 TIMES BARE WEIGHT IN 75% GYPSUM, 20% BENTONITE, AND 5% SODIUM SULFATE BACKFILL WITH MANUFACTURER'S STANDARD 10-FOOT LONG, NO. 12 AWG LEAD WIRE.
- 3. INSTALL ANODES IN PIPE TRENCH APPROXIMATELY 2 FEET FROM THE FITTING WHERE POSSIBLE, BUT NOT CLOSER THAN 12-INCHES FROM THE METALLIC FITTING.
- 4. ANODE PLACEMENT IS INDICATED BY NUMBER NEXT TO EACH ANODE SHOWN IN DETAILS, FIRST ANODE IS PLACED AT ONE, SECOND AT TWO, ETC.
- 5. LOCATE MULTIPLE ANODES AT EQUAL SPACING ALONG PIPE FITTING ASSEMBLY AND ON OPPOSITE SIDES OF PIPE WHEN MORE THAN FOUR ANODES ARE REQUIRED.
- 6. 32-LB GALVANIC ANODES MAY BE SUBSTITUTED FOR 17-LB ANODES AT THE CONTRACTOR'S OPTION, BUT THE TOTAL QUANTITY OF ANODES REQUIRED WILL NOT CHANGE.
- 7. ANODE QUANTITY AND BARE WEIGHT REQUIRED FOR SOME PIPE AND FITTING COMBINATIONS ARE LISTED IN THE SCHEDULE.
- 8. ADDITIONAL ANODES ARE REQUIRED ON METALLIC PIPE ASSEMBLIES THAT EXCEED THE MAXIMUM COMBINED LENGTH LISTED IN THE SCHEDULE FOR ALL FITTINGS, VALVES, PIPE SPOOLS, AND OTHER METALLIC APPURTENANCES IN THE ASSEMBLY, EXCLUDING THRUST RESTRAINT, ADD ONE ANODE FOR EACH EXTRA PIPE LENGTH AND ONE ANODE FOR FRACTIONAL EXTRA PIPE LENGTH TO THE LISTED QUANTITY OF ANODES.
- 9. PIPE ASSEMBLIES FOR BLOW-OFFS, AIR RELEASE, AND FIRE HYDRANTS ARE BASED ON STANDARD CONSTRUCTION DETAILS AND INCLUDES ONE RESTRAINED MAINLINE TEE FITTING AND ALL OFFSET PIPE, FITTINGS, AND RISERS AS SHOWN ON THE APPLICABLE CONSTRUCTION DETAILS, ADDITIONAL ANODES ARE REQUIRED FOR - 1) OFFSET PIPE LENGTH IN EXCESS OF THE MAXIMUM COMBINED LENGTH FOR THE OFFSET PIPE DIAMETER, AND 2) ADDITIONAL ANODES REQUIRED FOR EXTRA MAINLINE PIPE FITTINGS.
- 10. BOND ALL ADJACENT FITTING JOINTS WHERE MULTIPLE METALLIC FITTINGS ARE INSTALLED TOGETHER WITH JOINT BONDS AS SHOWN IN DETAIL 711-L,M,N.
- 11. BOND WIRES SHALL BE STRANDED COPPER WIRE WITH THHN INSULATION, USE NO. 2 AWG WIRE FOR BONDING OF PIPE OR FITTING JOINTS, USE NO. 8 AWG WIRE FOR BONDING FOLLOWER RINGS AND RESTRAINED JOINT RINGS TO FITTING AS SHOWN.
- 12. COAT ALL THERMITE WELDS, PIPE, AND EXPOSED COPPER WIRE WITH SCOTCHKOTE 206P THERMOPLASTIC PATCH MELT STICK COATING, THERMITE WELD CAP, OR COATING SYSTEM AS SPECIFIED.

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- 13. COATING MATERIAL FOR METALLIC PIPE AND FITTINGS
 - A. GENERAL:
 - 1. ALL METALLIC FITTINGS AND METALLIC HARDWARE ASSOCIATED WITH NON-METALLIC PIPE CONSTRUCTION SHALL BE DIELECTRICALLY COATED WITH A BONDED COATING.
 - 2. PREPARE SURFACE OF ITEMS TO BE COATED IN ACCORDANCE WITH COATING MANUFACTURER'S REQUIREMENTS.
 - B. DIELECTRIC COATING SYSTEMS FOR METALLIC PIPE, FITTINGS, AND APPURTENANCES
 - 1. WAX TAPE COATING SYSTEM
 - a. METALLIC PIPING, FITTINGS, AND APPURTENANCES SHALL BE COATED IN ACCORDANCE WITH AWWA C217.
 - b. APPLY COATING SYSTEM TO ALL BURIED METALLIC PIPE APPURTENANCES, INCLUDING JOINTS, FITTINGS, BOLTS, AND IRREGULARLY SHAPED SURFACES.
 - c. FILLER MATERIAL:
 - (1) SHALL BE COMPRISED OF SATURATED PETROLEUM HYDROCARBONS (PETROLATUM) INERT FILLERS, REINFORCING FIBERS AND THERMAL EXTENDERS. VARIATIONS MAY CONTAIN BEADS OF CELLULAR POLYMER AND FLOW CONTROL ADDITIVES.
 - (2) WAX SHALL BE COLD APPLIED SELF SUPPORTING MASTICS FOR MOLDING AROUND IRREGULAR SHAPED FITTINGS TO PROVIDE A SUITABLE PROFILE FOR APPLYING ANTI-CORROSION TAPES.
 - d. TAPE COATING
 - (1) COMPOSED OF A NON-WOVEN SYNTHETIC FABRIC CARRIER, FULLY IMPREGNATED WITH A NEUTRAL COMPOUND BASED ON SATURATED PETROLEUM COMPOSED OF INERT SILICEOUS FILLERS. APPLY COATING IN ACCORDANCE WITH AWWA C217, EXCEPT AS MODIFIED HEREIN.
 - e. PROTECTIVE OUTER WRAP
 - (1) PROVIDE FIBER MESH FABRIC OUTER WRAP OVER WAX TAPE RESIN COATED, WOVEN FIBER-MESH FABRIC THAT IS .005 INCHES.
 - f. ALL COMPONENTS OF THE WAX TAPE COATING SYSTEM SHALL BE FROM A SINGLE MANUFACTURER AS MANUFACTURED BY DENSO NORTH AMERICAN, TRENTON, OR EQUAL.

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SCHEDULE OF ANODE QUANTITIES AND BARE WEIGHT

	MAX.	PIPEL	INE DIAMET	ER	REFERENCE
DESCRIPTIONS	COMBINED LENGTH	6"-10"	12"-18"	20"-24"	DETAIL
ONE JOINT RESTRAINT ONE FITTING W/0 RESTRAINT ONE FITTING W/ RESTRAINT ONE FLEXIBLE COUPLING 3"-6" AIR RELEASE ASSEMBLY 6" BLOW-OFF PIPE ASSEMBLY 6" OR 8" FIRE HYDRANT BURIED MAINLINE VALVE MULTIPLE FITTINGS VALVED TURNOUT	0' 0' 0' 20' 20' 20' 10' 10'	1 @ 17# 1 @ 17# 1 @ 17# 2 @ 17# 2 @ 17# 2 @ 17# 1 @ 17# 1 @ 17# 1 @ 17#	1 @ 17# 1 @ 17# 1 @ 17# 3 @ 17# 3 @ 17# 3 @ 17# 1 @ 17# 2 @ 17# 2 @ 17#	1 @ 17# 1 @ 17# 1 @ 17# 1 @ 17# 4 @ 17# 4 @ 17# 4 @ 17# 2 @ 17# 2 @ 17# 2 @ 17# 2 @ 17# 2 @ 17# 2 @ 17# 2 @ 17# 2 @ 17# 2 @ 17# 2 @ 17# 3 @ 17# 4 @	A A B A D D C C E
EXTRA PIPE LENGTH:		30 FT	15 FT	10 FT	
2-17 LB ANODES FOR		20 FT	12 FT	8 FT	



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