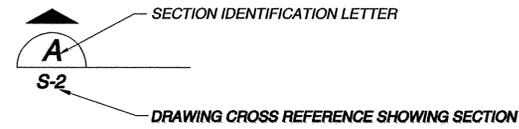


SYMBOL LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	EXISTING		EMERGENCY LIGHTING UNIT		MEDIUM VOLTAGE DISCONNECT SWITCH
	REMOVE		CEILING MOUNTED EXIT SIGN - ARROW AS INDICATED		MEDIUM VOLTAGE DRAWOUT CIRCUIT BREAKER
	NEW WORK		TWO FACED EXIT SIGN		TRANSFORMER (DELTA-WYE CONN.)
	HIDDEN OR BURIED		WALL MOUNTED EXIT SIGN		SHIELDED TRANSFORMER
	HOMERUN CONDUIT		SWITCHBOARD, POWER PANELBOARD		DRAWOUT CIRCUIT BREAKER (TRIP FRAME)
	GROUND PHASE		LIGHTING PANELBOARD		CIRCUIT BREAKER (TRIP FRAME) WITH GROUND FAULT INTERRUPTER
	SWITCHED		TRANSFORMER		MOTOR CIRCUIT PROTECTOR
	NEUTRAL		NON-FUSIBLE SAFETY SWITCH (NUMBER INDICATES SWITCH SIZE)		MOTOR CONTROL CENTER STARTER UNIT
	ISOLATED GROUND		FUSED SAFETY SWITCH (NUMBERS INDICATE FUSE/SWITCH SIZES)		FUSE
	FLEXIBLE CONDUIT		COMBINATION MAGNETIC STARTER AND CIRCUIT BREAKER		GROUND
	CONDUIT TURNING DOWN		MAGNETIC STARTER		GENERATOR
	CONDUIT TURNING UP		ADJUSTABLE SPEED DRIVE		CURRENT TRANSFORMER (NUMBERS INDICATE RATIO AND QUANTITY)
	CONDUIT UP AND DOWN		MOTOR (NUMBER INDICATES HP)		POTENTIAL TRANSFORMER (NUMBER INDICATES QUANTITY)
	CONDUIT SEAL		BELL		AMMETER SWITCH
	CONDUIT CAP		HORN "H" OR SIREN "S"		VOLTMETER SWITCH
	BUSWAY WITH DESCRIPTION		BUZZER		VOLTMETER
	GROUNDING CONDUCTOR		PUSHBUTTON		AMMETER
	CABLE TRAY WITH DESCRIPTION		MANUAL PULL STATION		KILOWATT METER
	CEILING JUNCTION BOX		FIRE ALARM HORN (V=VISUAL SIGNAL)		TRANSFER SWITCH
	WALL JUNCTION BOX		PHOTOELECTRIC SMOKE DETECTOR		KEY INTERLOCK #1
	DUPLEX RECEPTACLE OUTLET		IONIZATION SMOKE DETECTOR		BATTERY
	SINGLE RECEPTACLE OUTLET		THERMAL DETECTOR		NORMALLY CLOSED CONTACT
	DOUBLE DUPLEX RECEPTACLE OUTLET		DUCT SMOKE DETECTOR (PHOTOELECTRIC)		NORMALLY OPEN CONTACT
	GROUND FAULT CIRCUIT INTERRUPTER		MAGNETIC DOOR HOLDER		PROTECTIVE RELAY, SOLENOID COIL
	DUPLEX OUTLET WITH WEATHERPROOF COVER		PRESSURE SWITCH		THERMAL OVERLOAD CONNECTION
	SPLIT WIRED DUPLEX RECEPTACLE		FLOW SWITCH		CROSS, NO CONNECTION
	DUPLEX ISOLATED GROUND		VALVE SUPERVISORY SWITCH		SURGE ARRESTOR
	SPECIAL PURPOSE OUTLET - USE SUBSCRIPT TO IDENTIFY TYPE IN SPECS		FIRE ALARM CONTROL PANEL		TRANSIENT VOLTAGE SURGE SUPPRESSOR
	FLOOR RECEPTACLE OUTLET - USE SUBSCRIPT TO IDENTIFY TYPE IN SPECS		FIRE ALARM RACEWAY		CAPACITOR
	RECEPTACLE RACEWAY		CEILING SPEAKER		CONTROL RELAY #1
	SINGLE POLE SWITCH - USE SUBSCRIPT TO DESIGNATE CONTROL OF PARTICULAR OUTLETS		WALL SPEAKER		BUS PLUG CIRCUIT BREAKER
	DOUBLE POLE SWITCH		TELECOMMUNICATIONS OUTLET		THERMOSTAT
	THREE-WAY SWITCH		FLOOR MOUNTED TELECOMMUNICATIONS OUTLET		KEYED NOTE DESIGNATION
	FOUR-WAY SWITCH		INTERCOM OUTLET		ELECTRICAL EQUIPMENT DESIGNATION (SEE SCHEDULE)
	WEATHERPROOF SWITCH		TELECOMMUNICATIONS RACEWAY		MECHANICAL EQUIPMENT DESIGNATION (SEE SCHEDULE)
	KEY OPERATED SWITCH		PROTECTED TRANSMISSION SYSTEM (PTS) DATA TERMINAL CONNECTION		NAMEPLATE DESIGNATION (SEE SCHEDULE)
	DIMMER SWITCH - NUMBER INDICATES WATTAGE		TELEVISION OUTLET		WEATHERPROOF ABOVE FINISH FLOOR
	OCCUPANCY SENSING SWITCH		CARD READER		
	PHOTOCELL		ELECTRIC DOOR STRIKE		
	REMOTE CONTROL SWITCH 6 POLE, 30 AMPS		DOOR CONTACTS		
	FLUORESCENT LUMINAIRE A=FIXTURE TYPE 1=CIRCUIT NUMBER b=SWITCH CONTROLLING FIXTURE		REMOTE ACCESS PANEL		
	FLUORESCENT STRIP LUMINAIRE		HAND GEOMETRY UNIT		
	WALL MOUNTED FLUORESCENT LUMINAIRE		MOTION DETECTOR		
	CEILING MOUNTED LUMINAIRE		CLOSED CIRCUIT TV CAMERA		
	WALL MOUNTED LUMINAIRE				
	EMERGENCY LUMINAIRE				
	LIGHT POLE WITH LUMINAIRE				

DRAWING DETAIL AND SECTION CROSS-REFERENCE

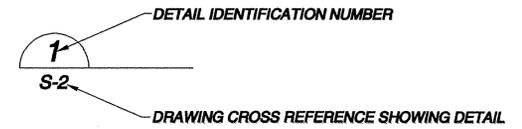
SECTION CUT DESIGNATION AT CROSS REFERENCE



SECTION IDENTIFICATION



DETAIL CALLOUT AT CROSS REFERENCE



DETAIL IDENTIFICATION



INSTALLATION OF SODIUM FLUORIDE CHEMICAL FEED SYSTEMS FOR THE ROBERT W. GOLDSWORTHY DESALTER AND WELL No. 9 (FEAP# 702) **G-02**

REV.	DATE	DESCRIPTION	BY	CHECKED

CITY OF TORRANCE PUBLIC WORKS DEPARTMENT

DRAWN: CHRIS C. COPPINGER	GENERAL NOTES/ ELECTRICAL LEGEND
DESIGNED: MARK D. WILLIAMS	
PROJECT ENGINEER:	APPROVED:
ENGINEERING MANAGER:	SCALE: AS SHOWN SHEET 2 OF 20
	PLAN NO. WP-290

wmi water process engineering
WILLIAMS McCARON, INC.
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LONG BEACH, CA 90804, TEL. 562.597.0400

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PROCESS FLOW DIAGRAMS AND P&ID SYMBOLS (GENERAL INSTRUMENT OR FUNCTION SYMBOLS)

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	ANGLE VALVE		RUPTURE DISK OR SAFETY HEAD FOR PRESSURE RELIEF		IN-LINE FILTER		AXIAL FAN		SINGLE DUCT VARIABLE VOLUME BOX
	BUTTERFLY VALVE		PILOT LIGHT X=COLOR R=RED G=GREEN		ATMOSPHERIC FILTER		AXIAL FAN WITH VARIABLE INLET VANES		WING TYPE FACE AND BYPASS DAMPER (A)
	ROTARY VALVE		FLEX CONNECTION (RUBBER)		DOUBLE BASKET STRAINER		2-STAGE RECIPROCATING AIR COMPRESSOR		HW HEATING WATER DX DIRECT EXPANSION CH CHILLED WATER STM STEAM (B)
	3-WAY VALVE		FLEX CONNECTION (STEEL BRAIDED)		HOSE REEL		SINGLE STAGE RECIPROCATING AIR COMPRESSOR		HCL HEATING COIL CCL COOLING COIL
	4-WAY VALVE		SINGLE PITOT TUBE OR PITOT VENTURI TUBE		OPEN DRAIN (SHOWN)				COLLECTION BIN
	OS & Y VALVE		FLOW METER		XX- DRAIN SYSTEM ANNOTATIONS DRAIN (PLAN VIEW)				CYCLONE SEPARATOR
	DIAPHRAGM VALVE		FLOW NOZZLE OR VENTURI		CLEANOUT (PLAN VIEW)				FLUID RECOVERY PUMP
	PRESSURE RELIEF		REDUCER		SANITARY VENT				DUAL SERVICE HEAT EXCHANGER
	DIAPHRAGM ACTUATOR		SCREWED CAP		SILENCER/MUFFLER				MULTI BLADE DAMPER
	TWO-WAY VALVE, FAIL CLOSED		PIPE CAP		SPACE PENETRATIONS				SINGLE BLADE DAMPER
	TWO-WAY VALVE, FAIL OPEN		HOSE CONNECTION		FIXED LOUVERS				MOTOR
	3-WAY VALVE W/DIAPHRAM ACTUATOR		FLANGED CONNECTION (PIPING OR EQUIP)		TRAP XX ANNOTATES FUNCTION				TEST PORT
	4-WAY VALVE W/DIAPHRAM ACTUATOR		FLOW ORIFICE FIXED		LUBRICATOR				PILOT LIGHT
	SPRING-OPPOSED SINGLE-ACTING ACTUATOR		STRAINER WITH VALVE		55 GALLON DRUM				SEPARATOR
	SPRING-OPPOSED DOUBLE-ACTING ACTUATOR		Y-STRAINER		THERMOSTATIC VENT				MIST ELIMINATOR
	ELECTROHYDRAULIC ACTUATOR		COMPRESSED AIR		SPRINKLER ALARM (WATER MOTOR GONG)				HEPA FILTER
	HAND ACTUATOR OR HANDWHEEL		DUCTED AIR FLOW FROM SPACE		FLOW ALARM VALVE				CARBON ABSORBER FILTER
	RESTRICTION ORIFICE IN PROCESS LINE		CAPPED AIR DUCT		COOLING TOWER				FILTER
	RESTRICTION ORIFICE DRILLED IN VALVE		GATE VALVE (OPEN)		CHILLER				SUCTION DIFFUSER
	FLOW STRAIGHTING VANE		GATE VALVE (CLOSED)		HORIZONTAL CENTRIFUGAL PUMP				
	DIAPHRAM PRESSURE-BALANCED		GLOBE VALVE (OPEN)		CENTRIFUGAL FAN WITH VARIABLE INLET VANES				
	PRESSURE-REDUCING REGULATOR, SELF-CONTAINED, WITH HANDWHEEL ADJUSTABLE SET POINT		GLOBE VALVE (CLOSED)		BLOWER/CENTRIFUGAL FAN				
	PRESSURE REDUCING REGULATOR WITH EXTERNAL PRESSURE TAP		NEEDLE VALVE (OPEN)		ROTARY PUMP				
	DIFFERENTIAL-PRESSURE-REDUCING REGULATOR WITH INTERNAL AND EXTERNAL TAPS		NEEDLE VALVE (CLOSED)		VERTICAL WET PIT PUMP				
	BACKPRESSURE REGULATOR, SELF-CONTAINED		PLUG VALVE (OPEN)		PROGRESSIVE CAVITY PUMP				
	BACKPRESSURE REGULATOR WITH EXTERNAL PRESSURE TAP		PLUG VALVE (CLOSED)		VERTICAL SUMP PUMP				
	PRESSURE-REDUCING REGULATOR WITH INTEGRAL OUTLET PRESSURE RELIEF VALVE, AND OPTIONAL PRESSURE INDICATOR		BALL VALVE (OPEN)		HEATER				
	PRESSURE INDICATOR		BALL VALVE (CLOSED)		HEAT EXCHANGER				
	FLOW DIRECTION		CHECK VALVE						
	PRESSURE RELIEF OR SAFETY VALVE		SPRING CHECK VALVE						
	VACUUM RELIEF VALVE		ANGLE VALVE (OPEN)						
	PRESSURE RELIEF OR SAFETY VALVE, STRAIGHT PATTERN, SPRING- OR WEIGHT-LOADED, OR WITH INTEGRAL PILOT		ANGLE VALVE (CLOSED)						
	RUPTURE DISK OR SAFETY HEAD FOR VACUUM RELIEF		SAFETY OR RELIEF VALVE (INLET PORT SHOWN CLOSED)						
			THREE-WAY VALVE (CLOSED PORT DARKENED)						
			FOUR-WAY VALVE (ARROWS INDICATE FLOW DIRECTION)						
			BALL-CHECK VALVE						
			DUAL PURGE VALVE						
			ALARM VALVE						
			AIR INTAKE FILTER						
			ALARM						
			BUBBLE GAUGE						

INSTALLATION OF SODIUM FLUORIDE CHEMICAL FEED SYSTEMS FOR THE ROBERT W. GOLDSWORTHY DESALTER AND WELL No. 9 (FEAP# 702) G-03

REV.	DATE	DESCRIPTION	BY	CHECKED

**CITY OF TORRANCE
PUBLIC WORKS DEPARTMENT**

GENERAL
P&ID LEGEND #1

DRAWN: CHRIS C. COPPINGER

DESIGNED: MARK D. WILLIAMS

PROJECT ENGINEER: *12*

ENGINEERING MANAGER: *ED*

APPROVED: *Elizabeth Overstreet* 7/13/10
Elizabeth Overstreet, Acting City Engineer
RCE No. 53944, exp. 09/30/10

SCALE: AS SHOWN SHEET 3 OF 20

PLAN NO. **WP-290**

wmi water process engineering

WILLIAMS McCARON, INC.
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LONG BEACH, CA 90804. TEL. 562.597.0400

7/12/10

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PROCESS FLOW DIAGRAMS AND P&ID SYMBOLS (GENERAL INSTRUMENT OR FUNCTION SYMBOLS)

SYMBOL	LINE TYPE	DESCRIPTION
	CONTINUOUS	PRIMARY PROCESS FLOW LINE
	CONTINUOUS	SECONDARY PROCESS FLOW LINE
	CONTINUOUS	INSTRUMENT SUPPLY OR CONNECTION TO PROCESS
	CONTINUOUS	UNDEFINED SIGNAL
	CONTINUOUS	PNEUMATIC SIGNAL *
	HIDDENX2	ELECTRIC SIGNAL
	CONTINUOUS	HYDRAULIC SIGNAL
	CONTINUOUS	CAPILLARY TUBE
	CONTINUOUS	ELECTROMAGNETIC OR SONIC SIGNAL ** (GUIDED)
	CONTINUOUS	ELECTROMAGNETIC OR SONIC SIGNAL ** (NOT GUIDED)
	CONTINUOUS	INTERNAL SYSTEM LINK (SOFTWARE OR DATA LINK)
	CONTINUOUS	MECHANICAL LINK
OPTIONAL BINARY (ON-OFF) SYMBOLS		
	CONTINUOUS	PNEUMATIC BINARY SIGNAL
	DASHED2	ELECTRIC BINARY SIGNAL
	CONTINUOUS	ELECTRICAL HEAT TRACING
	CONTINUOUS/DASHED2	STEAM HEAT TRACING
	DASHED2	BURIED LINES
	PHANTOM	EXISTING
	CENTER	FP - FLOOR PENETRATION RP - ROOF PENETRATION WP - WALL PENETRATION SB - SYSTEM BREAK

NOTES:
 "OR" MEANS USER CHOICE. CONSISTANCY IS RECOMMENDED.
 * THE PNEUMATIC SIGNAL SYMBOL APPLIES TO A SIGNAL USING ANY GAS AS THE SIGNAL MEDIUM. IF GAS OTHER THAN AIR IS USED, THE GAS MAY BE IDENTIFIED BY A NOTE ON THE SIGNAL SYMBOL OR OTHERWISE.
 ** ELECTROMECHANIC PHENOMENA INCLUDE HEAT, RADIO WAVES, NUCLEAR RADIATION, AND LIGHT.

SYMBOL	DESCRIPTION
	P = PURGE OR FLUSHING DEVICE R = RESET FOR LATCH-TYPE ACTUATOR I = UNDEFINED INTERLOCK LOGIC
	S = SOLENOID D = DIGITAL P = PILOT T = TRAP M = MAGNETIC FLOWMETER SP = SET POINT
	ROOT EXTRACTION
	BIAS
	MULTIPLY
	HIGH SELECTING
	LOW SELECTING
	HIGH LIMITING
	LOW LIMITING
	PROPORTIONAL
	REVERSE PROPORTIONAL
	SUMMING
	DIVIDING
	EQUIPMENT TAG
	PIPE OR WIRE IS CONTINUED ON DRAWING X (INCLUDING SHEET NUMBER), GRID COORDINATE (Y-#); FLOW IS TO THAT DRAWING.
	PIPE OR WIRE IS CONTINUED ON DRAWING X (INCLUDING SHEET NUMBER), GRID COORDINATE (Y-#); FLOW IS FROM THAT DRAWING.
	PIPE OR WIRE IS CONTINUED ON DRAWING X (INCLUDING SHEET NUMBER), GRID COORDINATE (Y-#); FLOW IS IN BOTH DIRECTIONS

ACRONYMS
EQUIPMENT
AHU - AIR HANDLING UNIT ASV - AIR SWITCH VALVE CA - AIR COMPRESSOR CAE - COOLER, AIR EVAPORATIVE D - DAMPER DAD - DESICCANT AIR DRYER DAMD - DUCT AIR MONITOR DEVICE ES - EXHAUST STACK FAB - FILTER AIR BOX FANE - FAN EVALUATOR FAR - FILTER AIR REPLACEABLE FC - FAN CIRCULATING FD - FIRE DAMPER FE - FAN EXHAUST FRA - FAN, RETURN AIR FRL - FILTER AIR ROLL FS - FAN SUPPLY HEPA - HIGH EFFICIENCY PARTICULATE AIR FILTER HX - HEAT EXCHANGER MT - MOISTURE TRAP OIM - OPERATOR INTERFACE MODULE SST - SYSTEM STATIC TOTALIZER TCA - TANK COMPRESSED AIR TK - TANK T - TRAP V - VALVE VFD - VARIABLE FREQUENCY DRIVE/MOTOR CONTROLLER YS - PLC CONTROL OUTPUT
MINOR EQUIPMENT
OPEN DRAIN ANNOTATIONS
AW - ACID WASTE NW - NORMAL WASTE OW - OIL WASTE SW - SANITARY WASTE
LINE VALVE STATUS SYMBOLS
TYPICAL VALVE ANNOTATIONS
FO - FAIL OPEN FC - FAIL CLOSED FL - FAIL LOCKED (POSITION DOES NOT CHANGE) FI - FAIL INDETERMINATE FAI - FAIL AS IS NO - NORMALLY OPEN NC - NORMALLY CLOSED LO - LOCKED OPEN LC - LOCKED CLOSED
MISCELLANEOUS ACRONYMS
WP - WALL PENETRATION FP - FLOOR PENETRATION RP - ROOF PENETRATION AO - ANALOG OUTPUT AI - ANALOG INPUT DI - DIGITAL INPUT RO - RELAY OUTPUT

INSTRUMENT/FUNCTION SYMBOLS	PRIMARY LOCATION NORMALLY ACCESSIBLE TO OPERATOR	FIELD MOUNTED	AUXILIARY LOCATION NORMALLY ACCESSIBLE TO OPERATOR	AUXILIARY LOCATION NORMALLY INACCESSIBLE TO OPERATOR
DISCRETE INSTRUMENTS				
SHARED DISPLAY, SHARED CONTROL				
COMPUTER FUNCTION				
PROGRAMMABLE LOGIC CONTROL				

INSTRUMENTATION IDENTIFICATION TABLE	
	J-1 COMPONENT FUNCTION NUMBER
	J-2 COMPONENT SEQUENCE NUMBER
	J-2A COMPONENT SEQUENCE # CONT'D
	J-3 VENDOR DESIGNATION
	J-4 PANEL NUMBER
	J-5 APPLICABLE NOTES
	J-6 SYSTEM ACRONYM
	J-7 ASME TEST SYMBOL FOR TEST ONLY OR TEST PLUS NORMAL USE
	J-8 SET-POINT(S)
	J-9 FUNCTION (SEE INSTRUMENT/FUNCTION SYMBOLS)

NOTE:
 INSTRUMENTATION FUNCTION IDENTIFIERS (J-1) AND FUNCTION SYMBOLS PER ANSI/ISA 55.1.

INSTALLATION OF SODIUM FLUORIDE CHEMICAL FEED SYSTEMS FOR THE ROBERT W. GOLDSWORTHY DESALTER AND WELL No. 9 (FEAP# 702) G-04

CITY OF TORRANCE PUBLIC WORKS DEPARTMENT

GENERAL
P&ID LEGEND #2

DRAWN: CHRIS C. COPPINGER
 DESIGNED: MARK D. WILLIAMS

PROJECT ENGINEER: *KE*
 APPROVED: *Robert Williams*
 Robert Williams, Acting City Engineer
 RCE No. 63944, exp. 09/30/10

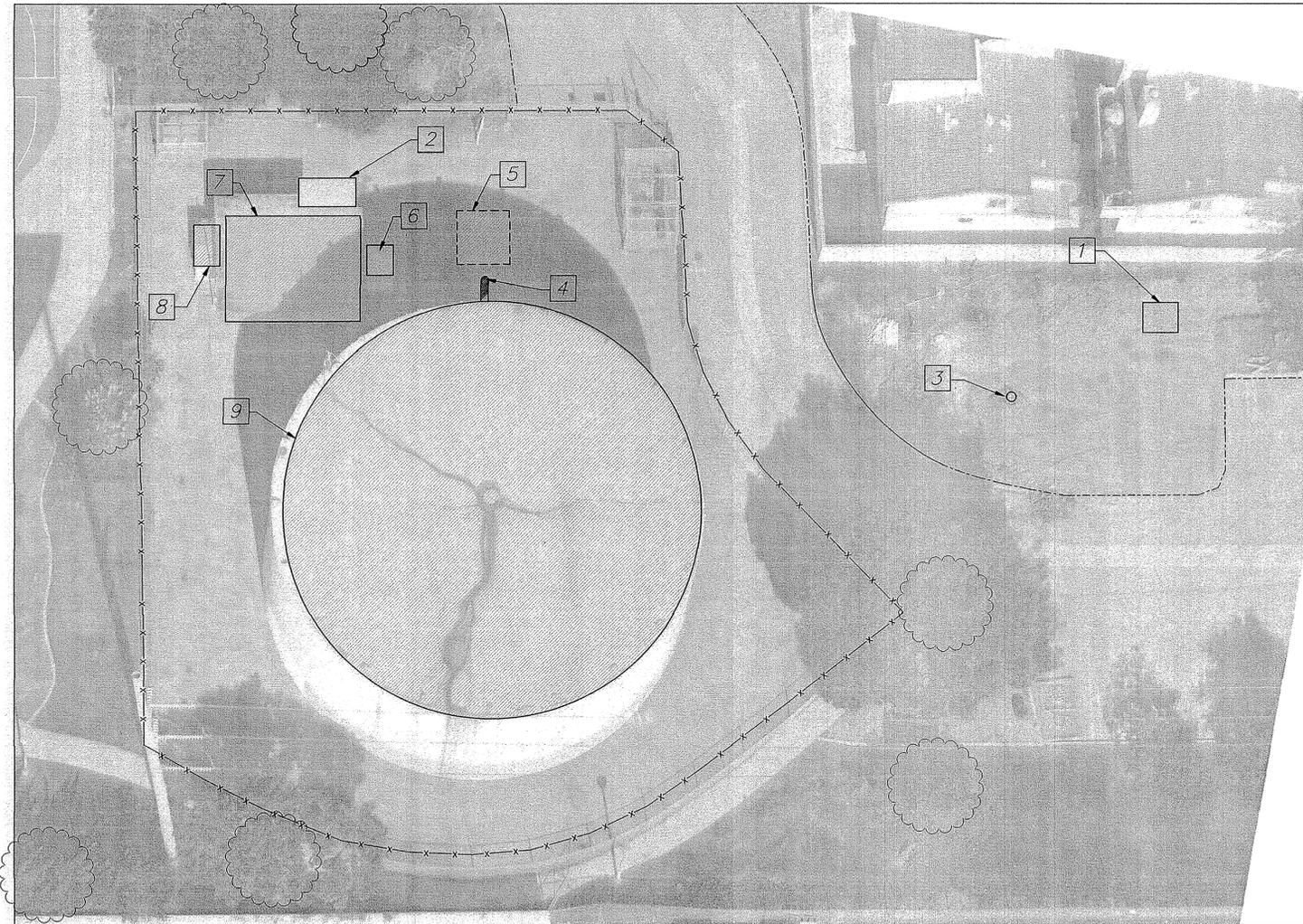
SCALE: AS SHOWN SHEET 4 OF 20
 PLAN NO. **WP-290**

REV.	DATE	DESCRIPTION	BY	CHECKED

wmi water process engineering

WILLIAMS McCARON, INC.
 5175 EAST PACIFIC COAST HIGHWAY, SUITE 402
 LONG BEACH, CA 90804. TEL. 562.597.0400

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DRAWING NOTES:

- 1 TRANSFORMERS
- 2 APPROXIMATE FOOTPRINT OF NEW SODIUM FLUORIDE FEED SKID AND SHED
- 3 WELL NO. 9 WELLHEAD
- 4 RESERVOIR EFFLUENT LINE/AMMONIA INJECTION
- 5 BOOSTER PUMP VAULT
- 6 SHED HOUSING AMMONIA FEED EQUIPMENT
- 7 CHLORINE/CORROSION CONTROL CHEMICAL STORAGE AND FEED AREA; MCC AND PLC; WATER QUALITY TESTING AREA
- 8 STORAGE SHED
- 9 RESERVOIR



APPROXIMATE SCALE (FEET)

INSTALLATION OF SODIUM FLUORIDE CHEMICAL FEED SYSTEMS FOR THE ROBERT W. GOLDSWORTHY DESALTER AND WELL No. 9 (FEAP# 702)

C-02

REV.	DATE	DESCRIPTION	BY	CHECKED

**CITY OF TORRANCE
PUBLIC WORKS DEPARTMENT**

DRAWN: CHRIS C. COPPINGER

CIVIL
WELL NO. 9 SITE PLAN

DESIGNED: MARK D. WILLIAMS

PROJECT ENGINEER:

APPROVED:
Elizabeth Overstreet, Acting City Engineer
RCE No. 63944, exp. 09/30/10

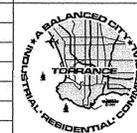
ENGINEERING MANAGER:

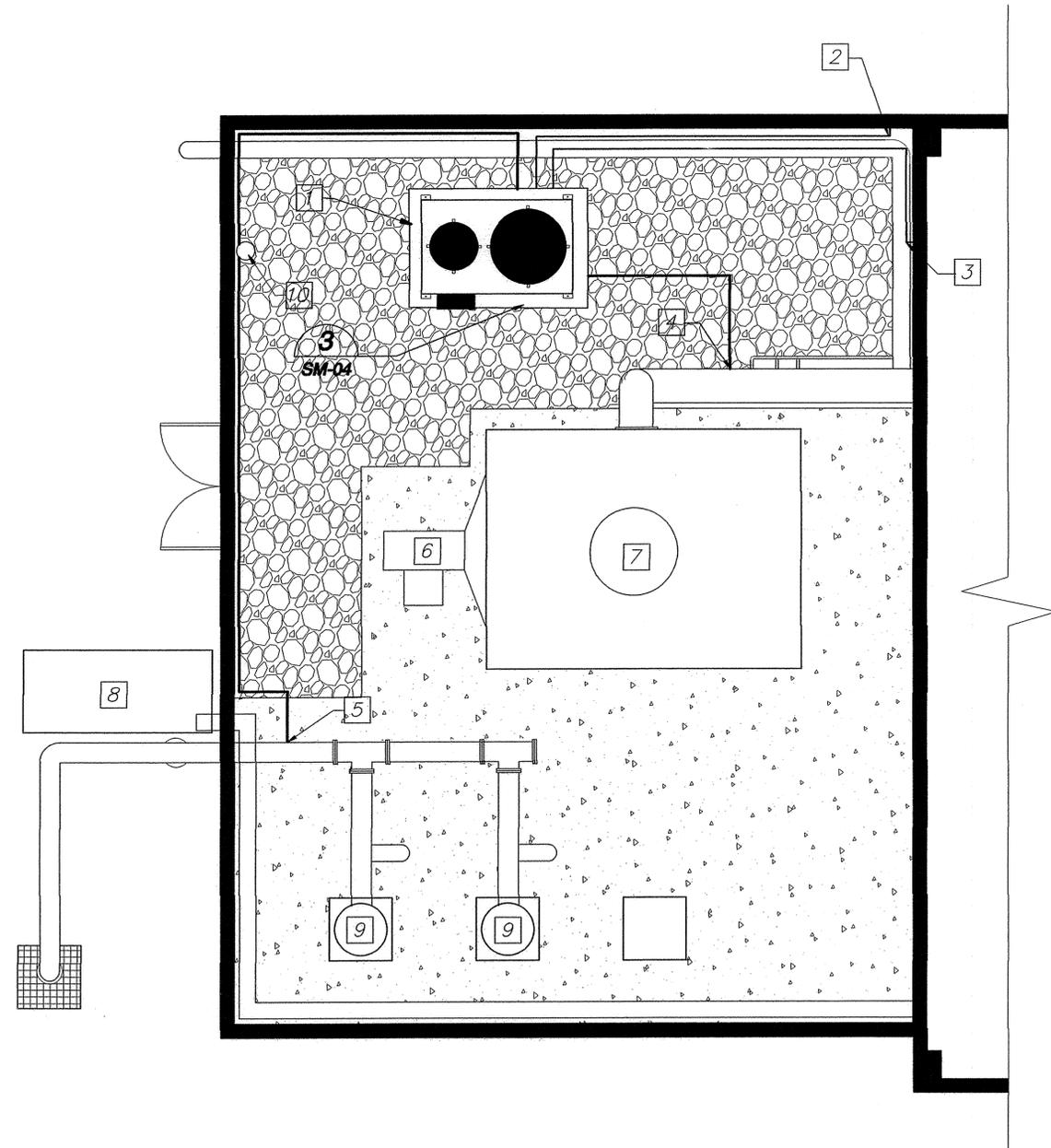
SCALE: AS SHOWN SHEET 7 OF 20

PLAN NO. **WP-290**



wmi water process engineering
WILLIAMS McCARON, INC.
5175 EAST PACIFIC COAST HIGHWAY, SUITE 402
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GENERAL NOTES:

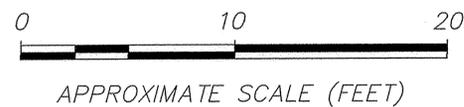
1. CONTRACTOR SHALL FURNISH SODIUM FLUORIDE SATURATOR FEED EQUIPMENT, CONCRETE EQUIPMENT PAD, AND CANOPY SUNSHADE FOR FEED EQUIPMENT
2. SATURATOR FEED WATER SUPPLY SHALL BE TAKEN FROM THE COMBINED RO PRODUCT LINE; OWNER SHALL FURNISH MIXED BED ION EXCHANGE VESSELS FOR WATER SOFTENING; CONTRACTOR SHALL MOUNT MIXED BED ION EXCHANGE VESSELS ALONG WESTERN WALL OF AREA SHOWN
3. CONTRACTOR SHALL FURNISH 120 VAC ELECTRICAL SERVICE FROM EXISTING 120 VAC CIRCUIT
4. CONTRACTOR SHALL FURNISH SHIELDED, MULTI STRAND INSTRUMENTATION CABLE FROM EXISTING PLC AT THE GOLDSWORTHY DESALTER TO THE EQUIPMENT SKID
5. SODIUM FLUORIDE WILL BE ADDED AT EXISTING INJECTION POINT IN CO2 STRIPPING TOWER EFFLUENT
6. CONTRACTOR SHALL PROVIDE BURIED CHEMICAL FEED LINE WHERE REQUIRED; CHEMICAL FEED LINE SHALL CONSIST OF 1/2" POLYETHYLENE TUBING WITHIN A 3/4" SCH. 80 PVC CONDUIT

DRAWING NOTES:

- 1 SODIUM FLUORIDE SATURATOR EQUIPMENT PAD (APPROX 6' X 9')
- 2 120 VAC POWER SUPPLY CONNECTION TO EXISTING CIRCUIT
- 3 INSTRUMENTATION SIGNAL LINES AND CONDUIT TO PLC
- 4 CHEMICAL ADDITION POINT
- 5 SATURATOR WATER SUPPLY FROM RO PRODUCT
- 6 BLOWER FOR CO2 STRIPPER (EXISTING)
- 7 CO2 STRIPPING TOWER (EXISTING)
- 8 TRANSFORMER (EXISTING)
- 9 BOOSTER PUMP (EXISTING)
- 10 MIXED BED SOFTENER FOR SATURATOR FEED WATER SUPPLY

INSTALLATION OF SODIUM FLUORIDE CHEMICAL FEED SYSTEMS FOR THE ROBERT W. GOLDSWORTHY DESALTER AND WELL No. 9 (FEAP# 702)

C-03



wmi water process engineering
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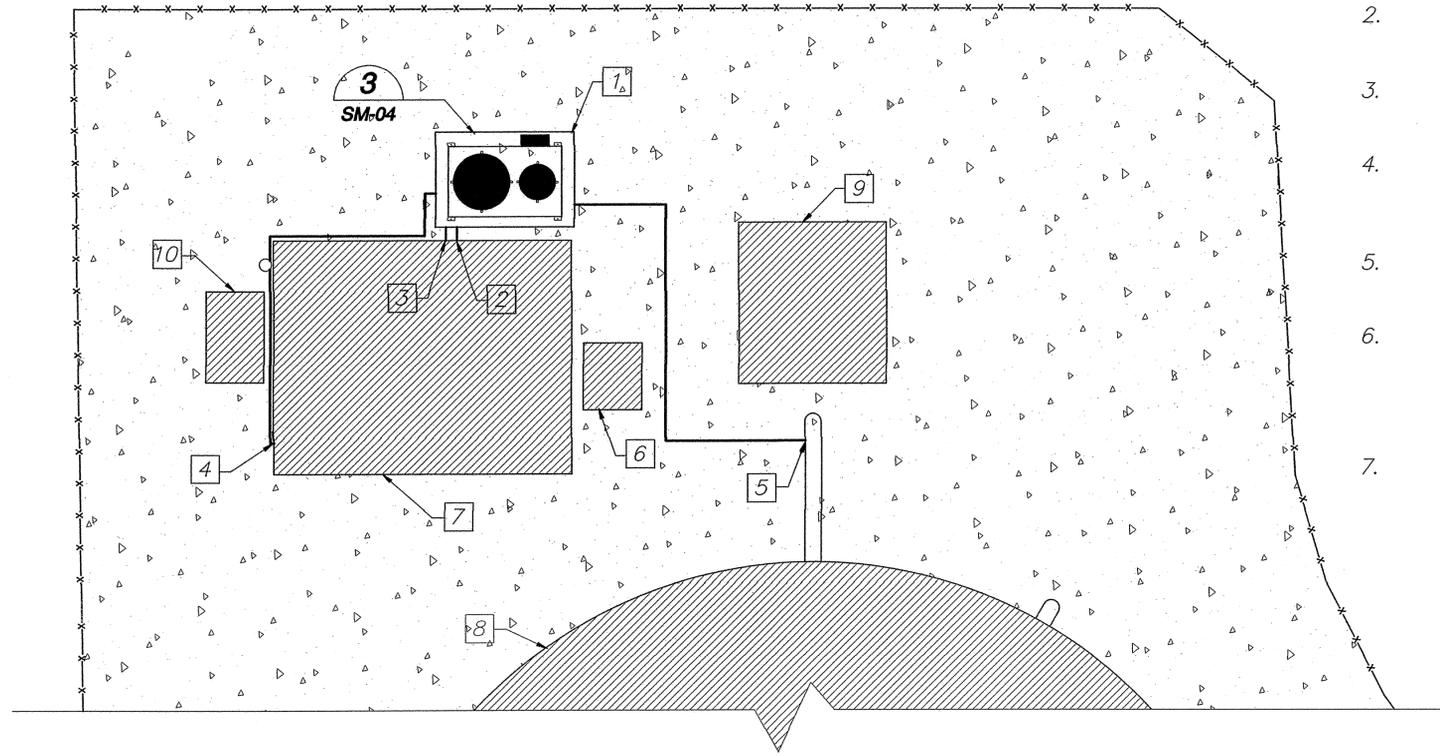
REV.	DATE	DESCRIPTION	BY	CHECKED

CITY OF TORRANCE PUBLIC WORKS DEPARTMENT	
DRAWN: CHRIS C. GOPPINGER DESIGNED: MARK D. WILLIAMS	CIVIL SODIUM FLUORIDE SYSTEM SITE PLAN-GOLDSWORTHY DESALTER
PROJECT ENGINEER:	APPROVED: 7/13/10 <small>Elizabeth Overstreet, Acting City Engineer RCE No. 63944, exp. 09/30/10</small>
ENGINEERING MANAGER:	SCALE: AS SHOWN SHEET 8 OF 20 PLAN NO. WP-290



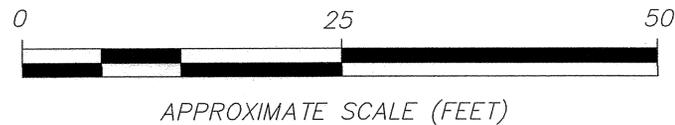
GENERAL NOTES:

1. CONTRACTOR SHALL FURNISH SODIUM FLUORIDE SATURATOR FEED EQUIPMENT, CONCRETE EQUIPMENT PAD, AND A SHED TO HOUSE THE SODIUM FLUORIDE FEED EQUIPMENT
2. SHED SHALL BE PLASTIFAB OR EQUIV.; SHED SHALL BE A MINIMUM 8' X 10'; SEE DETAILS ON SHEET 14
3. SATURATOR FEED WATER SUPPLY SHALL BE TAKEN FROM A CONNECTION FROM THE POTABLE WATER SUPPLY ON SITE
4. CONTRACTOR SHALL FURNISH 120 VAC ELECTRICAL SERVICE FROM EXISTING PANEL; CONTRACTOR SHALL SECURE PERMIT FOR ELECTRICAL IMPROVEMENTS FROM CITY BUILDING & SAFETY DEPARTMENT
5. CONTRACTOR SHALL FURNISH SHIELDED, MULTI STRAND INSTRUMENTATION CABLE FROM PLC AT RESERVOIR SITE TO FEED EQUIPMENT
6. SODIUM FLUORIDE WILL BE ADDED AT ABOVE-GROUND PORTION OF RESERVOIR EFFLUENT PIPELINE; CONTRACTOR SHALL PROVIDE A NEW 1" NPT PROCESS CONNECTION ON RESERVOIR EFFLUENT PIPELINE AND SHALL PROVIDE 1/2" CHEMICAL INJECTOR ASSEMBLY WITH CORPORATION STOP
7. CONTRACTOR SHALL PROVIDE BURIED CHEMICAL FEED LINE WHERE REQUIRED; CHEMICAL FEED LINE SHALL CONSIST OF 1/2" POLYETHYLENE TUBING WITHIN A 3/4" SCH. 80 PVC CONDUIT



DRAWING NOTES:

- 1 SODIUM FLUORIDE SATURATOR EQUIPMENT PAD
- 2 120 VAC POWER SUPPLY TO SKID
- 3 INSTRUMENTATION SIGNAL LINES AND CONDUIT TO PLC
- 4 SATURATOR WATER SUPPLY
- 5 SODIUM FLUORIDE ADDITION POINT IN RESERVOIR EFFLUENT UPSTREAM OF BOOSTER PUMPS
- 6 AMMONIA FEED SYSTEM (EXISTING)
- 7 BUILDING HOUSING CHLORINE FEED AND PLC (EXISTING)
- 8 RESERVOIR (EXISTING)
- 9 BOOSTER PUMP (EXISTING)
- 10 MIXED BED SOFTENER FOR SATURATOR FEED WATER SUPPLY

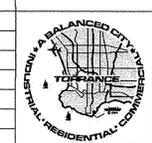


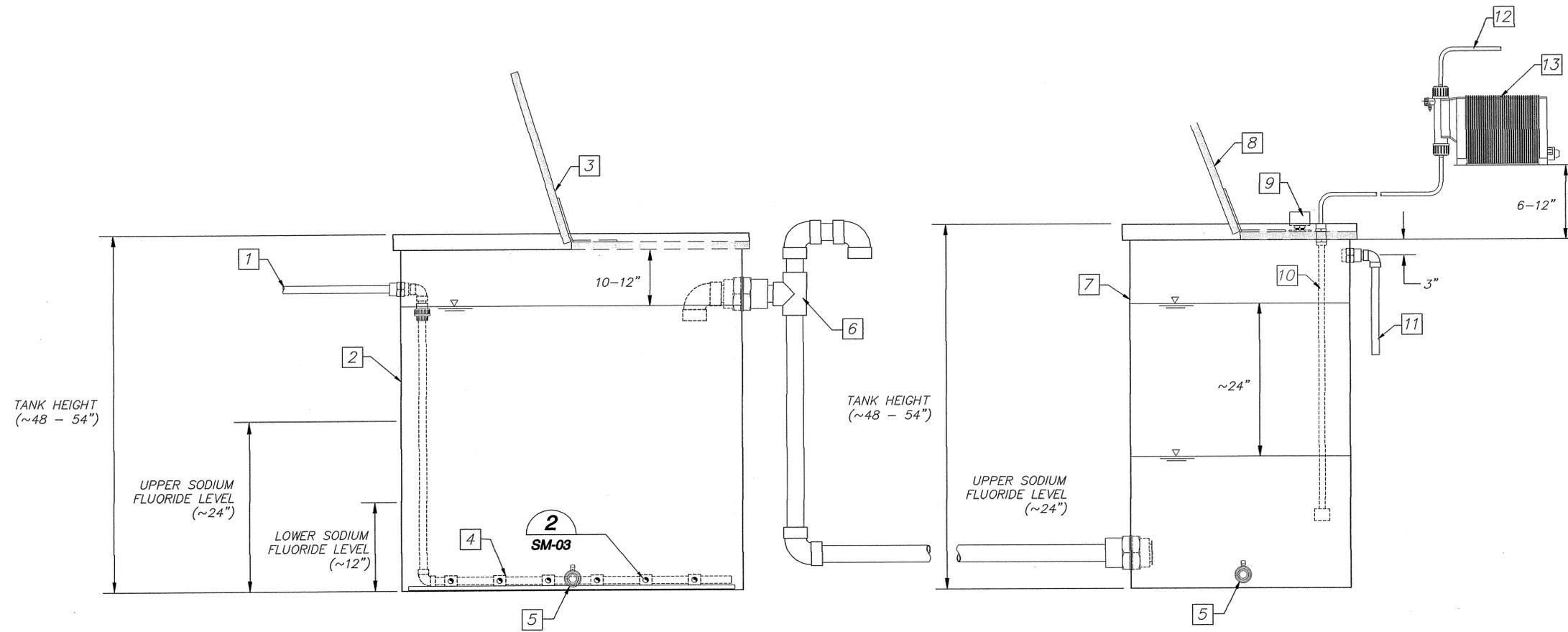
INSTALLATION OF SODIUM FLUORIDE CHEMICAL FEED SYSTEMS FOR THE ROBERT W. GOLDSWORTHY DESALTER AND WELL No. 9 (FEAP# 702) C-04

REV.	DATE	DESCRIPTION	BY	CHECKED	CITY OF TORRANCE PUBLIC WORKS DEPARTMENT	
					DRAWN: CHRIS C. COPPINGER	
					DESIGNED: MARK D. WILLIAMS	
					PROJECT ENGINEER: <i>EC</i>	APPROVED: <i>Elizabeth Overstreet</i> 1/13/10 <small>Elizabeth Overstreet, Acting City Engineer RCE No. 63944, exp. 09/30/10</small>
					ENGINEERING MANAGER: <i>EC</i>	SCALE: AS SHOWN SHEET 9 OF 20
					PLAN NO. WP-290	



wmi water process engineering
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5175 EAST PACIFIC COAST HIGHWAY, SUITE 402
LONG BEACH, CA 90804, TEL. 562.597.0400





1 **DETAIL: SODIUM FLUORIDE SATURATOR AND DAY TANK**
I-01

DRAWING NOTES:

- 1 SOFTENED WATER SUPPLY TO SODIUM FLUORIDE SATURATOR TANK
- 2 SODIUM FLUORIDE SATURATOR TANK; 350-400 GAL; ~48" HEIGHT; HEAVY DUTY POLYETHYLENE
- 3 HINGED TANK LID SECURED TO TANK; HINGED OPENING SHALL PROVIDE ACCESS TO >50% OF TANK AREA
- 4 DISTRIBUTION MANIFOLD FOR SATURATOR WATER SUPPLY
- 5 TANK DRAIN; 1"
- 6 SATURATOR OVERFLOW SUPPLY TO DAY TANK
- 7 SATURATED SODIUM FLUORIDE SOLUTION DAY TANK; 150-200 GAL TOTAL VOLUME; > 48-54" HIGH; HEAVY DUTY POLYETHYLENE
- 8 HINGED TANK LID SECURED TO TANK; HINGED OPENING SHALL PROVIDE ACCESS TO >50% OF TANK AREA
- 9 ULTRASONIC LEVEL TRANSMITTER MOUNTED TO FLANGE ON TANK LID
- 10 RIGID PUMP INTAKE SUCTION LINE AND STRAINER
- 11 TANK VENT/OVERFLOW
- 12 SATURATED SODIUM FLUORIDE SOLUTION TO PROCESS ADDITION POINT
- 13 SODIUM FLUORIDE METERING PUMP

INSTALLATION OF SODIUM FLUORIDE CHEMICAL FEED SYSTEMS FOR THE ROBERT W. GOLDSWORTHY DESALTER AND WELL No. 9 (FEAP# 702) **SM-01**

REV.	DATE	DESCRIPTION	BY	CHECKED

**CITY OF TORRANCE
PUBLIC WORKS DEPARTMENT**

STRUCTURAL/MECHANICAL
**SATURATOR TANK AND DAY
TANK DETAILS**

DRAWN: CHRIS C. COPPINGER

DESIGNED: MARK D. WILLIAMS

PROJECT ENGINEER: *KE*

ENGINEERING MANAGER: *ED*

APPROVED: *Elizabeth Overstreet* 7/13/10
Elizabeth Overstreet, Acting City Engineer
RCE No. 63944, exp. 09/30/10

SCALE: AS SHOWN SHEET 10 OF 20

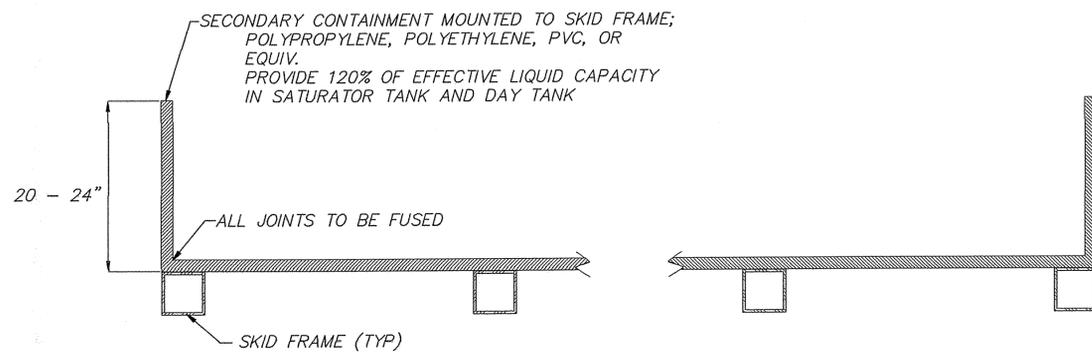
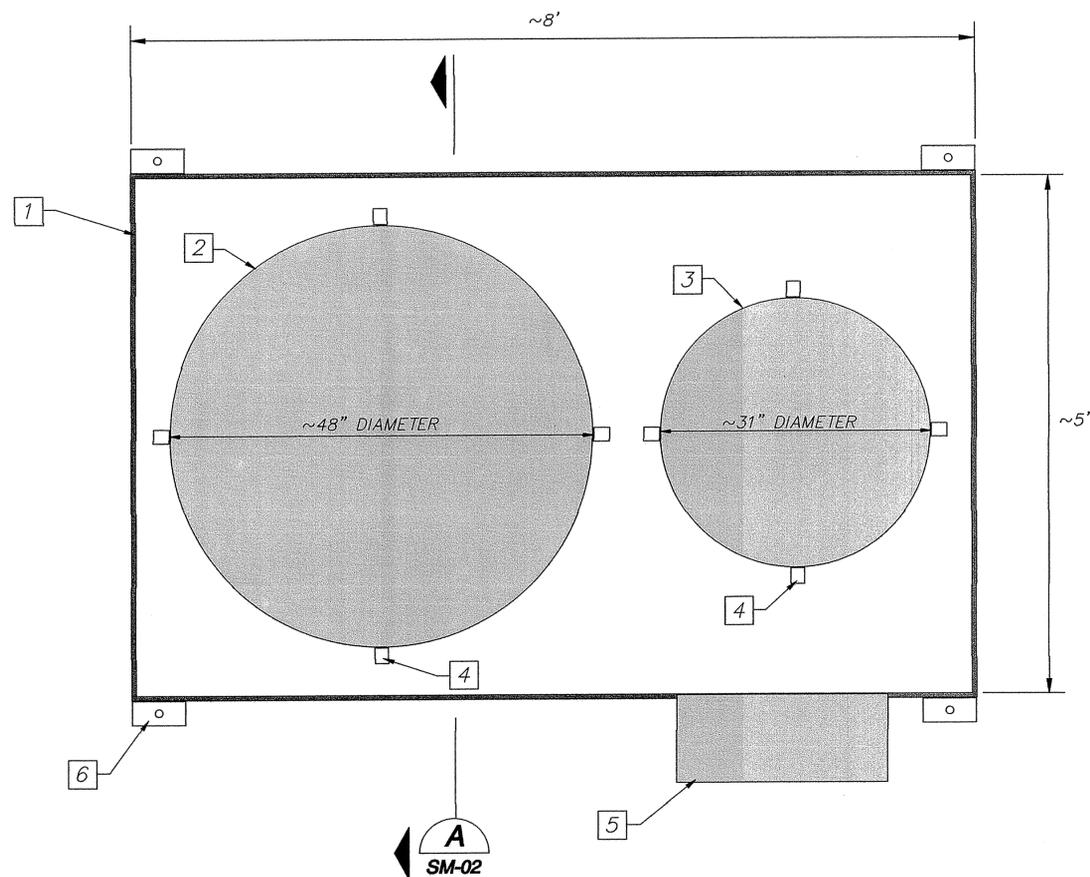
PLAN NO. **WP-290**

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REGISTERED PROFESSIONAL ENGINEER
MARK D. WILLIAMS
No. 68138
Exp. 09/29/11
CIVIL
STATE OF CALIFORNIA
7/12/10





A
SM-02 SECTION: SKID FRAME AND SECONDARY CONTAINMENT
not to scale

GENERAL NOTES:

1. ALL EQUIPMENT SHALL BE SKID MOUNTED INCLUDING TANKS, PUMPS, INSTRUMENTATION, LOCAL ELECTRICAL CONTROLS, AND PIPING;
2. EQUIPMENT SKID AND SUPPORTS SHALL BE FABRICATED FROM TUBULAR STAINLESS STEEL;
3. EQUIPMENT SKID SHALL HAVE SECONDARY CONTAINMENT AROUND THE FLUORIDE SATURATOR, DAY TANK, PUMP, AND CONNECTING PIPING; SECONDARY CONTAINMENT SHALL HAVE 120% OF THE COMBINED CAPACITY OF THE SATURATOR TANK AND DAY TANK; SECONDARY CONTAINMENT STRUCTURE SHALL BE COMPATIBLE WITH SATURATED SODIUM FLUORIDE SOLUTION;
4. TANKS SHALL BE SECURED TO EQUIPMENT SKID BY A MINIMUM OF FOUR (4) VERTICAL POSTS TO PREVENT OVERTURNING AND SHALL BE SECURED AT THE BASE TO PREVENT MOVEMENT;
5. ELECTRICAL AND INSTRUMENTATION ENCLOSURE SHALL BE NON-METALLIC AND HAVE A NEMA 4X RATING;
6. SKID SHALL HAVE DRILLED PLATES AT EACH CORNER FOR MOUNTING TO EQUIPMENT SLAB;
7. SATURATOR FEED TANK SHALL BE MOUNTED SO THAT IT CAN BE FILLED EITHER FROM THE END OF THE SKID OR THE SIDE OF THE SKID;
8. FEED PUMP SHALL BE MOUNTED SO THAT THE DISPLAY AND CONTROLS CAN BE SEEN AND EASILY ACCESSED WHEN STANDING IN FRONT OF THE SKID AND;
9. SATURATOR FEED WATER SUPPLY LINE, SATURATOR OVERFLOW PIPING, AND TANK DRAIN SHALL BE ROUTED SUCH THEY DO NOT INTERFERE WITH ACCESSING THE TANK TO ADD SODIUM FLUORIDE.
10. SKID SHALL HAVE LIFTING EYELETS FOR LIFTING FROM A CRANE AND HAVE THE CAPACITY TO BE LIFTED USING A FORKLIFT

DRAWING NOTES:

- 1 SKID SUPPORT FRAME AND SECONDARY CONTAINMENT
- 2 SODIUM FLUORIDE SATURATOR TANK
- 3 DAY TANK FOR SATURATED SODIUM FLUORIDE SOLUTION
- 4 TANK SUPPORTS
- 5 ELECTRICAL/PLC CABINET
- 6 PLATE FOR SECURING EQUIPMENT TO SLAB

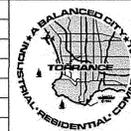
INSTALLATION OF SODIUM FLUORIDE CHEMICAL FEED SYSTEMS FOR THE ROBERT W. GOLDSWORTHY DESALTER AND WELL No. 9 (FEAP# 702)

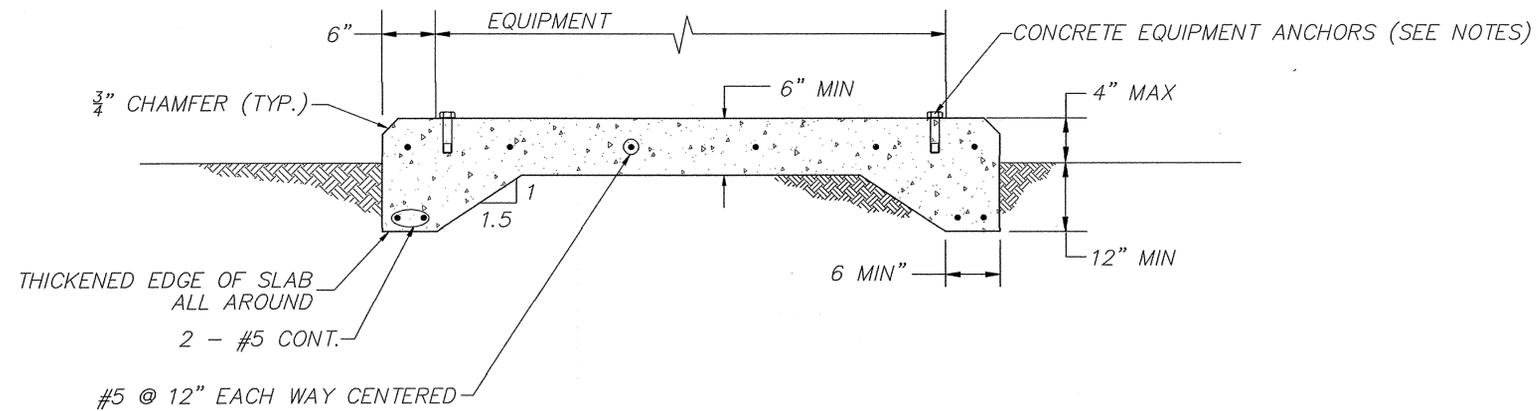
SM-02

REV.	DATE	DESCRIPTION	BY	CHECKED	CITY OF TORRANCE PUBLIC WORKS DEPARTMENT	
					STRUCTURAL/MECHANICAL SODIUM FLUORIDE FEED SYSTEM SKID DETAILS	
					DRAWN: CHRIS C. COPPINGER	APPROVED: <i>Elizabeth Overstreet</i> 7/13/10 Elizabeth Overstreet, Acting City Engineer PCE No. 63044, exp. 09/30/10
					DESIGNED: MARK D. WILLIAMS	
					PROJECT ENGINEER: <i>ME</i>	SCALE: AS SHOWN SHEET 11 OF 20
					ENGINEERING MANAGER: <i>Ed</i>	PLAN NO. WR-290



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3
C-3 **DETAIL: CONCRETE EQUIPMENT PAD**

GENERAL NOTES:

- EQUIPMENT PAD AT THE ROBERT W. GOLDSWORTHY DESALTER SHALL BE SIZED TO ACCOMMODATE SODIUM FLUORIDE FEED EQUIPMENT AND SUNSHADE CANOPY
- EQUIPMENT PAD AT WELL #9 RESERVOIR SITE SHALL BE SIZED TO ACCOMMODATE THE EQUIPMENT SHED
- WEDGES, SHIMS, OR LEVELING NUTS SHALL BE USED TO SUPPORT THE BASE WHILE THE NON-SHRINK GROUT IS PLACED. WEDGES OR SHIMS THAT ARE LEFT IN PLACE SHALL NOT BE EXPOSED TO VIEW
- AT CONTRACTOR'S OPTION, CONCRETE ANCHORS MAY BE USED IN LIEU OF CAST-IN-PLACE ANCHOR BOLTS FOR EQUIPMENT ANCHOR BOLTS LESS THAN 3/4" DIAMETER WHEN APPROVED BY THE EQUIPMENT MANUFACTURER AND APPROVED BY THE ENGINEER. ANCHORS SHALL BE INSTALLED WITH A 4" MINIMUM DISTANCE IN EACH DIRECTION
- WHERE APPROVED BY THE ENGINEER, EQUIPMENT MAY BE SUPPORTED BY LEVELING NUTS INSTALLED ON CONCRETE ANCHORS PRIOR TO EQUIPMENT PAD CONCRETE PLACEMENT

GENERAL NOTES:

- REINFORCED CONCRETE REQUIREMENTS:
REINFORCED CONCRETE $f'_c = 3,250$ PSI (MIN)
PORTLAND CEMENT SHALL CONFORM TO ASTM C 150 , TYPE II, LOW ALKALI , EXCEPT AS SPECIFIED OTHERWISE
EXCEPT AS OTHERWISE SPECIFIED, AGGREGATE SHALL BE IN ACCORDANCE WITH ASTM C33
- REINFORCING BARS TO BE IMBEDDED IN CONCRETE: GRADE 60 DEFORMED BARS IN ACCORDANCE WITH ASTM A 615
- SOIL BEARING PRESSURE: $f' = 2,000$ PSI

INSTALLATION OF SODIUM FLUORIDE CHEMICAL FEED SYSTEMS FOR THE ROBERT W. GOLDSWORTHY DESALTER AND WELL No. 9 (FEAP# 702)

SM-04

REV.	DATE	DESCRIPTION	BY	CHECKED

**CITY OF TORRANCE
PUBLIC WORKS DEPARTMENT**

DRAWN: CHRIS C. COPPINGER

DESIGNED: MARK D. WILLIAMS

PROJECT ENGINEER: *[Signature]*

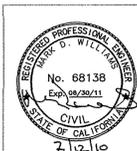
ENGINEERING MANAGER: *[Signature]*

STRUCTURAL/MECHANICAL
EQUIPMENT PAD

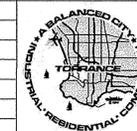
APPROVED: *[Signature]* 7/19/15
Elizabeth Orentlicher, Acting City Engineer
PCE No. 63844, exp. 09/30/10

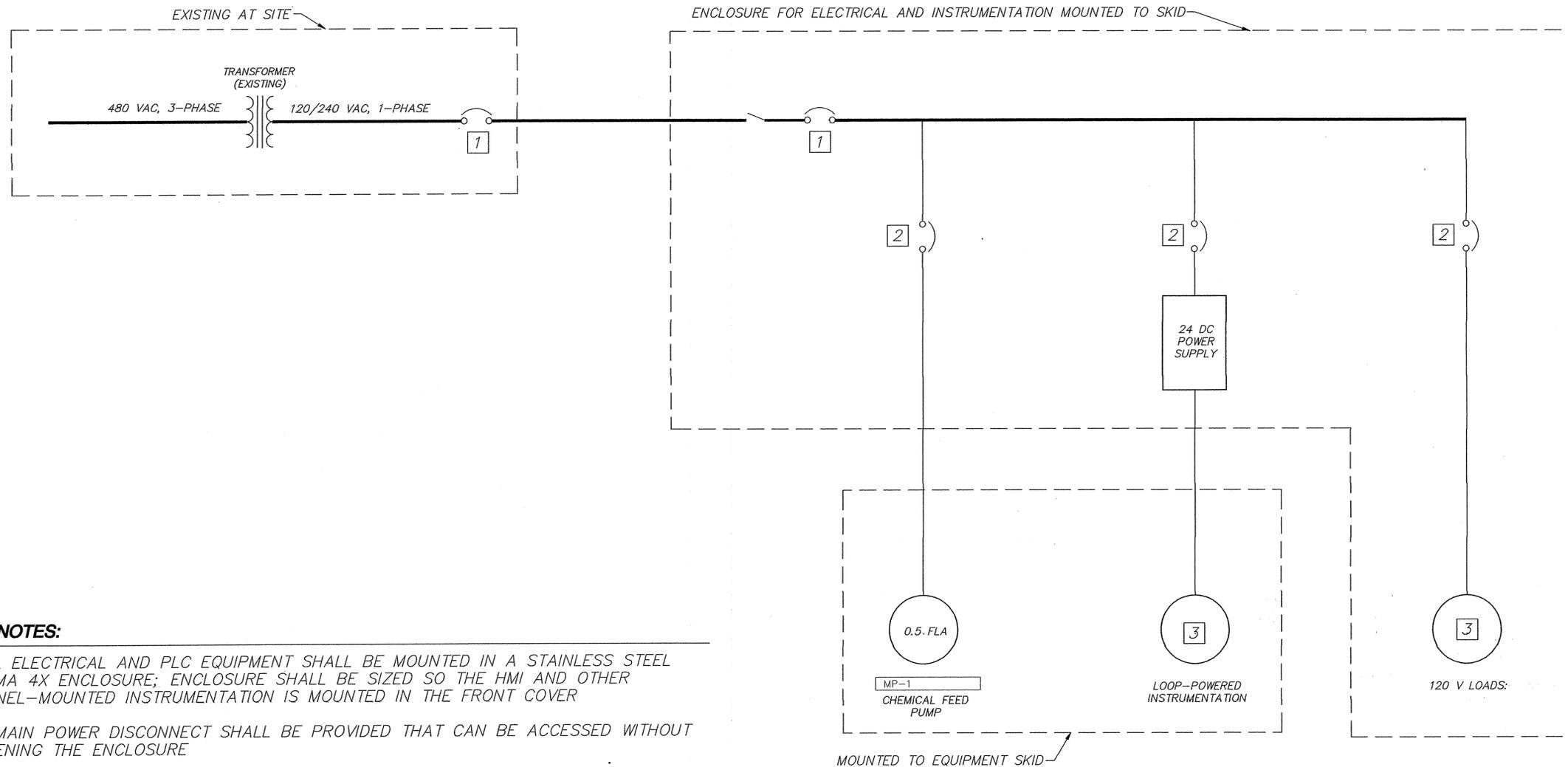
SCALE: AS SHOWN SHEET 13 OF 20

PLAN NO. **WP-290**



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GENERAL NOTES:

1. ALL ELECTRICAL AND PLC EQUIPMENT SHALL BE MOUNTED IN A STAINLESS STEEL NEMA 4X ENCLOSURE; ENCLOSURE SHALL BE SIZED SO THE HMI AND OTHER PANEL-MOUNTED INSTRUMENTATION IS MOUNTED IN THE FRONT COVER
2. A MAIN POWER DISCONNECT SHALL BE PROVIDED THAT CAN BE ACCESSED WITHOUT OPENING THE ENCLOSURE

DRAWING NOTES:

1. CONTRACTOR SHALL VERIFY CAPACITY OF EXISTING 120/240 VAC CIRCUITS AT THE GOLDSWORTHY DESALTER SITE AND WELL #9; IF AN EXISTING 120/240 VAC CIRCUIT WITH SUFFICIENT EXCESS CAPACITY IS NOT AVAILABLE, THEN CONTRACTOR SHALL PROVIDE A NEW CIRCUIT BREAKER IN THE EXISTING 120/240 VAC PANEL AND PROVIDE POWER SERVICE TO THE SKID
2. CIRCUIT BREAKERS SHALL BE SIZED ACCORDING TO EQUIPMENT LOADS
3. POWER REQUIREMENTS TO BE DETERMINED BY VENDOR

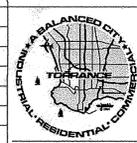
INSTALLATION OF SODIUM FLUORIDE CHEMICAL FEED SYSTEMS FOR THE ROBERT W. GOLDSWORTHY DESALTER AND WELL No. 9 (FEAP# 702)

E-01



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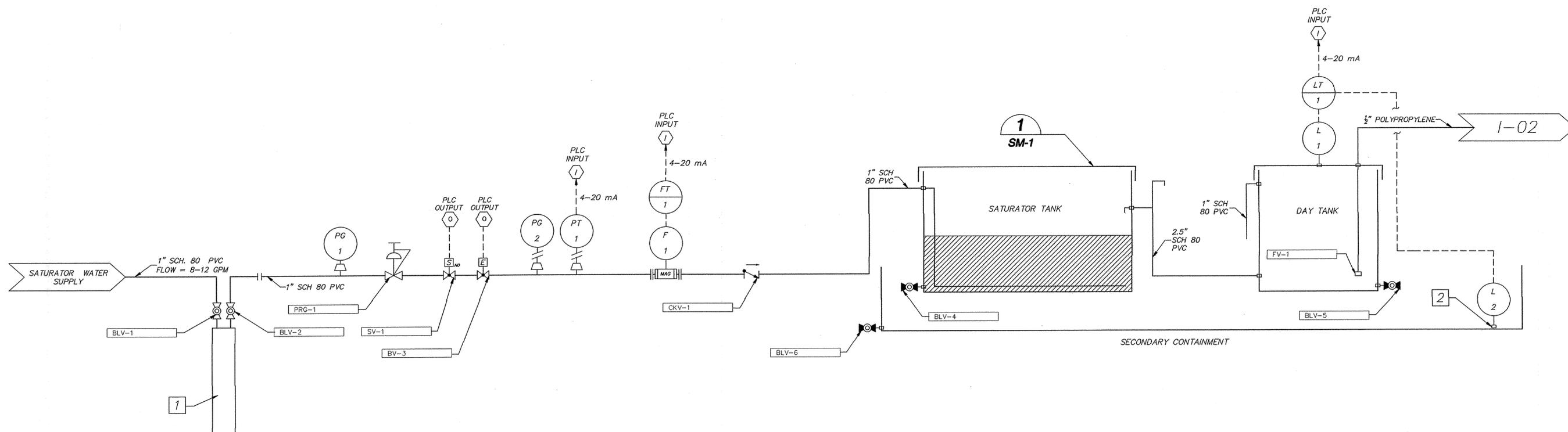
**CITY OF TORRANCE
 PUBLIC WORKS DEPARTMENT**

DESIGNED: MARK D. WILLIAMS
 PROJECT ENGINEER: *[Signature]*
 ENGINEERING MANAGER: *E0*

**ELECTRICAL
 FLUORIDE FEED SKID
 ONE-LINE DIAGRAM**

APPROVED: *[Signature]*
 Elizabeth Overstreet, Acting City Engineer
 RCE No. 63944, exp. 09/30/10

SCALE: AS SHOWN SHEET 15 OF 20
 PLAN NO. **WP-290**



DRAWING NOTES:

- 1 MIXED BED ION EXCHANGE SOFTENER VESSELS WILL BE PROVIDED BY OWNER AND INSTALLED BY CONTRACTOR
- 2 OPTICAL SPILL DETECTION SENSOR SHALL BE INSTALLED IN SECONDARY CONTAINMENT

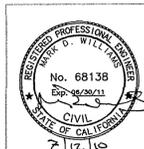
INSTALLATION OF SODIUM FLUORIDE CHEMICAL FEED SYSTEMS FOR THE ROBERT W. GOLDSWORTHY DESALTER AND WELL No. 9 (FEAP# 702)

I-01

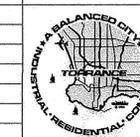
REV.	DATE	DESCRIPTION	BY	CHECKED

**CITY OF TORRANCE
PUBLIC WORKS DEPARTMENT**

INSTRUMENTATION SODIUM FLUORIDE FEED SKID P&ID #1	
DRAWN: CHRIS C. COPPINGER	APPROVED: <i>Elizabeth Overstreet</i> Elizabeth Overstreet, Acting City Engineer RCE No. 63044, exp. 02/30/10
DESIGNED: MARK D. WILLIAMS	SCALE: AS SHOWN SHEET 16 OF 20
PROJECT ENGINEER: <i>Ed</i>	PLAN NO. WP-290
ENGINEERING MANAGER: <i>Ed</i>	



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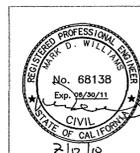
SCREEN NO.	DESCRIPTION	GRAPHICAL COMPONENTS	INSTRUMENT SIGNALS	CALCULATED PARAMETERS/ TREND GRAPHS	ALARMS	CONTROL FUNCTIONS/ USER INPUT/ SET POINTS
1	SODIUM FLUORIDE SYSTEM OVERVIEW	P&ID SHOWING MAJOR COMPONENTS	SATURATOR WATER SUPPLY FLOW RATE	SODIUM FLUORIDE DOSE	LOW FEED WATER PRES. TO SATURATOR	SYSTEM RUN/STOP
			SATURATOR WATER SUPPLY PRESSURE	DAILY VOL. ADDED TO SATURATOR	SATURATOR SUPPLY VALVE FAIL	SODIUM FLUORIDE DOSE SET POINT
			DAY TANK LEVEL	AVERAGE PROCESS FLOW RATE	HIGH LEVEL IN DAY TANK	DAY TANK HIGH LEVEL SET POINT
			FEED PUMP FLOW RATE	AVERAGE DAILY VOL. DOSED	LOW LEVEL IN DAY TANK	DAY TANK LOW LEVEL SET POINT
			WATER PROCESS FLOW RATE		HIGH WATER FLOW TO SATURATOR	SATURATOR WATER SUPPLY MANUAL OPEN/CLOSE
					LOW WATER FLOW TO SATURATOR	MAX. FLOW RATE TO SATURATOR
					LEAK INTO SECONDARY CONTAINMENT	MIN. FLOW RATE TO SATURATOR

GENERAL NOTES: PLC REQUIREMENTS

1. A PLC AND TOUCH-SCREEN HMI SHALL BE PROVIDED AS AN INTEGRATED PART OF THE SODIUM FLUORIDE FEED SYSTEM
2. THE PLC SHALL BE MODICON MOMENTUM SERIES OR EQUIVALENT APPROVED BY THE ENGINEER
3. THE TOUCH-SCREEN HMI SHALL BE AB;E TO DISPLAY COLORED GRAPHICS AND SHALL BE A MINIMUM 12 IN.
4. THE PLC SHALL OFFER A TIGHTLY-COUPLED PROJECT DEVELOPMENT AND RUN-TIME SOFTWARE ENVIRONMENT
5. THE PLC SHALL ENABLE GRAPHICAL CONFIGURATION OF OBJECT-ORIENTED CONTROL LOGIC FOR I/O CONTROL AND GENERATION OF HMI GRAPHIC
6. THE SYSTEM SHOULD INCLUDE CAPABILITIES SUCH AS BUILT-IN DIAGNOSTICS AND ON-LINE MODIFICATIONS
7. THE SOFTWARE SHOULD EMPLOY OBJECT-ORIENTED TECHNOLOGY TO CREATE CONTROL DEVICES AND DEVICE TEMPLATES. THE USER SHOULD BE ABLE TO CONFIGURE DEVICE LOGIC, TAG DEFINITIONS, AND RUN-TIME GRAPHICAL BEHAVIOR FOR CONTROL DEVICES AND STORE THIS DEVICE DEFINITIONS IN RE-USABLE DEVICE TEMPLATES.

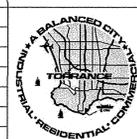
INSTALLATION OF SODIUM FLUORIDE CHEMICAL FEED SYSTEMS FOR THE
ROBERT W. GOLDSWORTHY DESALTER AND WELL No. 9 (FEAP# 702)

I-05



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REV.	DATE	DESCRIPTION	BY	CHECKED



CITY OF TORRANCE PUBLIC WORKS DEPARTMENT	
DRAWN: CHRIS C. COPPINGER DESIGNED: MARK D. WILLIAMS PROJECT ENGINEER: <i>RE</i> ENGINEERING MANAGER: <i>ED</i>	INSTRUMENTATION PLC REQUIREMENTS AND OPERATOR SCREENS APPROVED: <i>Elizabeth Overstreet</i> <small>Elizabeth Overstreet, Acting City Engineer RCE No. 63944, exp. 09/30/10</small> SCALE: AS SHOWN SHEET 20 OF 20 PLAN NO. WP-290