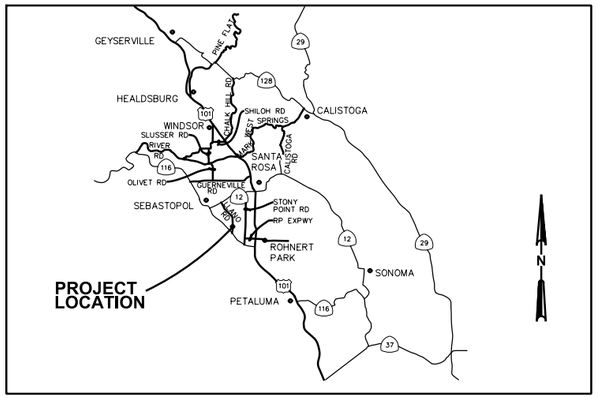
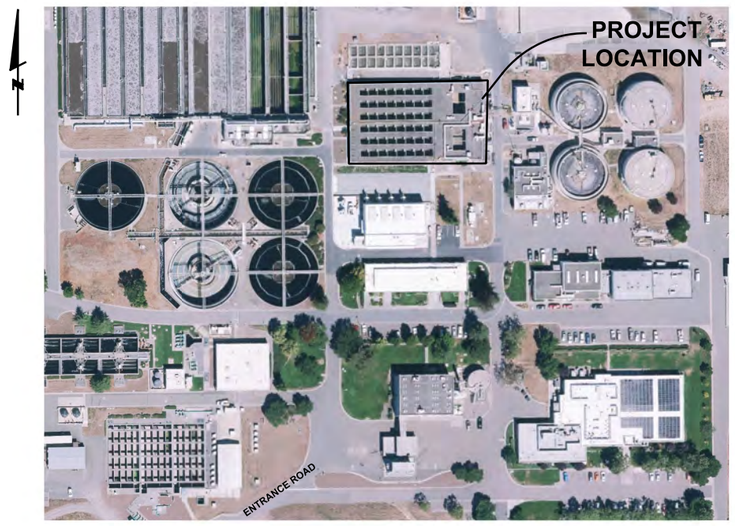
CITY OF SANTA ROSA

REQUEST FOR PROPOSAL
AND STATEMENT OF QUALIFICATION

Laguna Treatment Plant
Ultraviolet (UV) Light Disenfection Equipment System

DRAWING INDEX, SEE G02





LOCATION MAP
NOT TO SCALE

IN ASSOCIATION WITH carollo® Hazen

Design/Construction					
Survey					
Materials Lab					
Subregional Operations					
No.	Date	Revision	By	Dept.	Signature / Date

SCALE: NO SCALE
DWN BY: RYW
DATE: MAY 2016
CHK BY: DW
APPROVED: *Deputy Director – Engineering*
By _____ Date _____
Colleen Ferguson

City of Santa Rosa

LAGUNA TREATMENT PLANT
Ultraviolet (UV) Light Disenfection Equipment System

COVER SHEET

CONTRACT NO.
DRAWING NO. G01
SHEET 1 OF X
FILE NO.

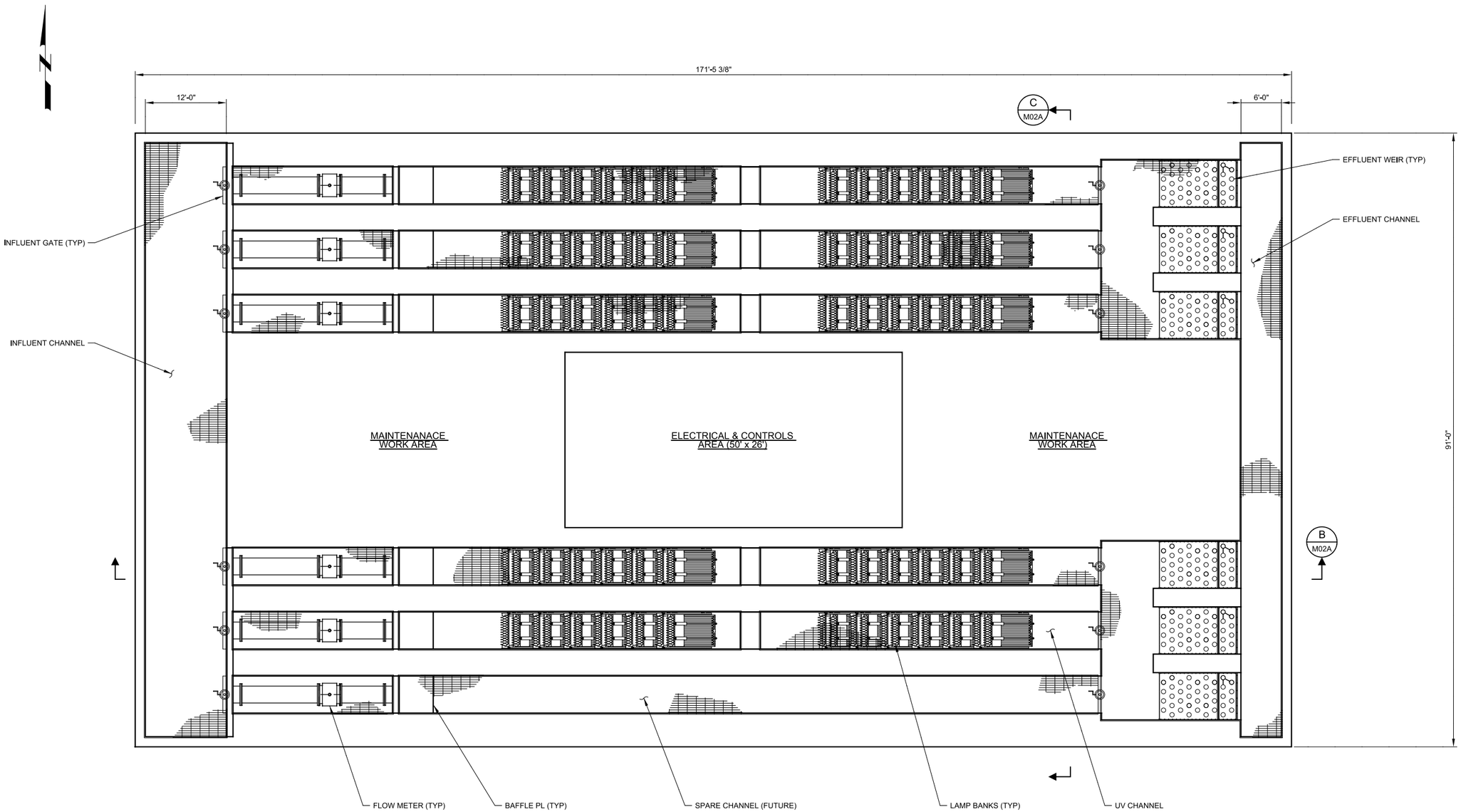
LAGUNA TREATMENT PLANT Ultraviolet (UV) Light Disenfection Equipment System

PROJECT NO. 8871F.10 FILE NAME: 8871G10G001.dgn

REQUEST FOR PROPOSAL
AND STATEMENT OF QUALIFICATIONS

ULTRAVIOLET (UV) LIGHT DISINFECTION EQUIPMENT SYSTEM

Sheet Number	Drawing Number	Drawing Title
		GENERAL
1	G01	COVER SHEET, VICINITY AND LOCATION MAPS
2	G02	DRAWING INDEX
3	G03	ABBREVIATIONS
4	G04	SYMBOLS
		MECHANICAL
5	M01A	TROJAN UV SIGNA (2 ROW) PLAN
6	M02A	TROJAN UV SIGNA (2 ROW) SECTIONS
7	M01B	WEDECO DURON PLAN
8	MO2B	WEDECO DURON SECTIONS
9	MO1C	CALGON CARBON C3500D PLAN
10	MO2C	CALGON CARBON C3500D SECTIONS
11	MO1D	OZONIA AQUARAY 3X PLAN
12	MO2D	OZONIA AQUARAY 3X SECTION
		ELECTRICAL
13	GE01	ELECTRICAL LEGEND
14	GE02	ELECTRICAL ABBREVIATIONS
15	E01	UV SYSTEM SWITCHGEAR ONE-LINE DIAGRAM
16	E02	TROJAN UV SIGNA (2 ROW) ONE-LINE DIAGRAM
17	E03	WEDECO DURON ONE LINE-DIAGRAM
18	E04	CALGON CARBON C3500D ONE-LINE DIAGRAM
19	E05	OZONIA AQUARAY 3X ONE-LINE DIAGRAM
		INSTRUMENTATION
20	GN01	SYMBOLS AND ABBREVIATIONS -II
21	GN02	SYMBOLS AND ABBREVIATIONS -II
22	GN03	SYMBOLS AND ABBREVIATIONS -III
23	GN04	SYMBOLS AND ABBREVIATIONS -IV
24	GN05	SAMPLE LOOP DIAGRAM
25	N01	P&ID - TROJAN UV SIGNA (2 ROW)
26	N02	P&ID - WEDECO DURON
27	N03	P&ID - CALGON CARBON C3500D
28	N04	P&ID - OZONIA AQUARAY 3X



A GENERAL PLAN

SCALE: 1/8" = 1'-0"
FILE: 8871G1SM100

GENERAL NOTES:

1. XXXX

1. PRELIMINARY DESIGN PLAN AND SECTION FOR PURPOSE OF REQUEST FOR PROPOSAL AND STATEMENT OF QUALIFICATIONS. PLAN MAY BE MODIFIED FOR FINAL INSTALLATION CONTRACT DOCUMENTS.
2. SUPPLIER SHALL ASSUME A CONCRETE STRUCTURE TO MATCH SUPPLIER TOLERANCES FOR CONSTRUCTION.
3. UNLESS NOTED OTHERWISE, STRUCTURE, AND OTHER MECHANICAL AND ELECTRICAL EQUIPMENT SHALL BE FURNISHED AND INSTALLED BY INSTALLATION CONTRACTOR.
4. LAYOUTS AND PLANS ARE SPECIFIC TO THE UV EQUIPMENT SUPPLIER MODELS NOTED.

KEY NOTES:

1. SUPPLIED BY UV SYSTEM SUPPLIER.

CONTRACT NO. XXXXXX

VERIFY SCALES
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0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

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NOT FOR CONSTRUCTION

carollo® IN ASSOCIATION WITH Hazen

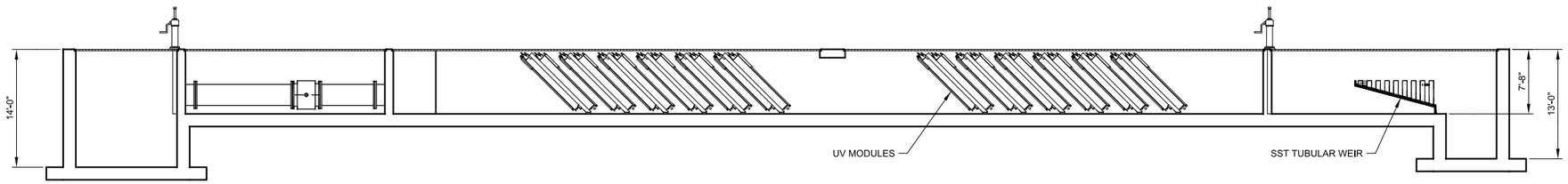
	Date	Revision	By

CITY OF SANTA ROSA

LAGUNA TREATMENT PLANT
ULTRAVIOLET (UV) LIGHT DISINFECTION EQUIPMENT SYSTEM

TROJAN UV SIGNA (2 ROW) PLAN

Date: SEPTEMBER 2016 Scale: AS SHOWN
APPROVED: Deputy Director – Engineering
By _____ Date _____
DWN JLG DATE:
CHK ____ DATE: 5-1-16
DES KTL DATE: 5-1-16
Drw No. M01A
Sheet ___ of XX
File Number: 2016-0018



B SECTION
M01A
SCALE: 1/8" = 1'-0"
FILE: 8871G1SM300

C SECTION
M01A
SCALE: 1/8" = 1'-0"
FILE: 8871G1SM300

GENERAL NOTES:

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KEY NOTES:

(1) SUPPLIED BY UV SYSTEM SUPPLIER.

CONTRACT NO. XXXXXX

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	Date	Revision	By

CITY OF SANTA ROSA

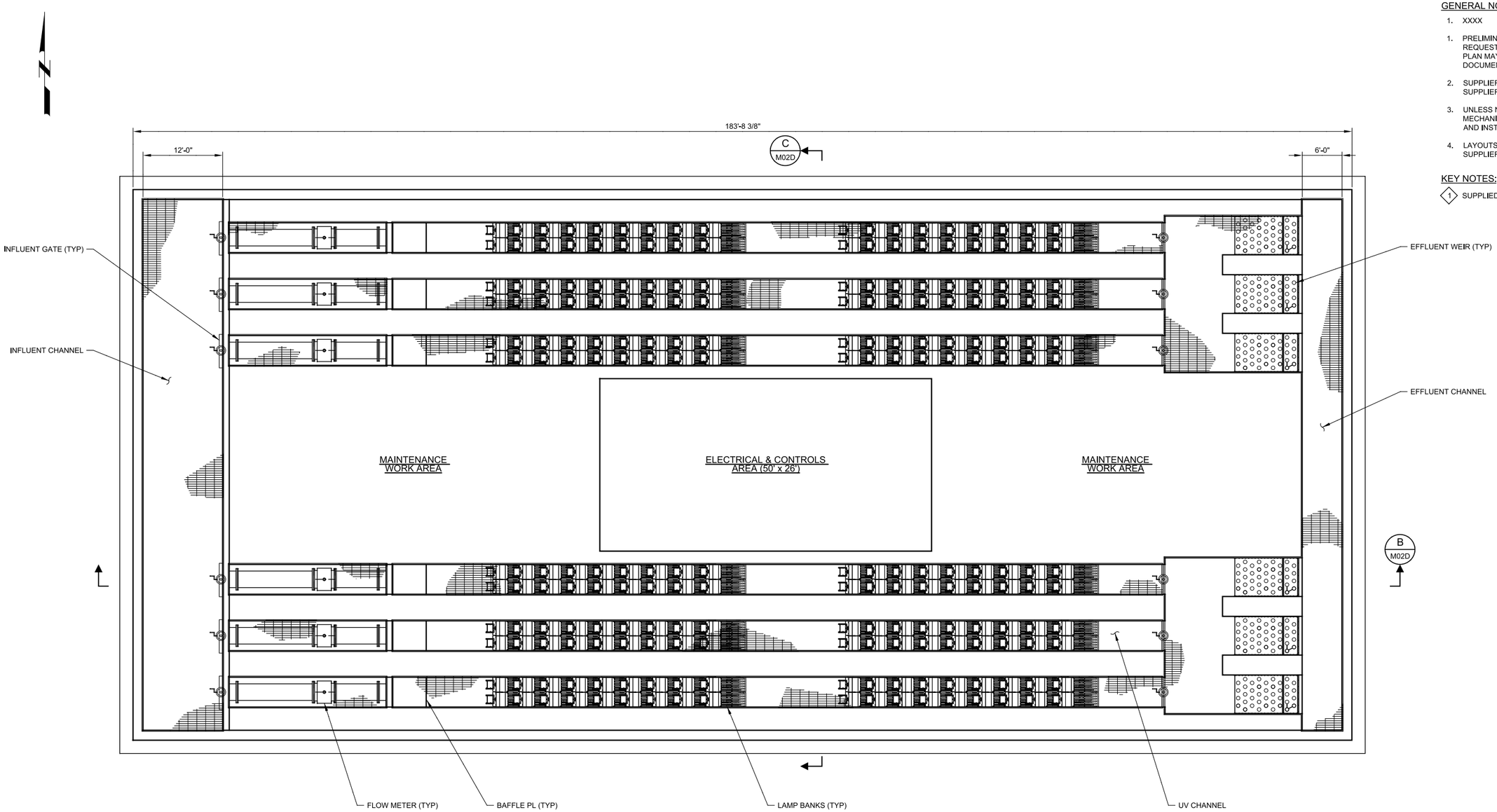
LAGUNA TREATMENT PLANT
ULTRAVIOLET (UV) LIGHT DISINFECTION EQUIPMENT SYSTEM

TROJAN UV SIGNA
(2 ROW) SECTIONS

Date: SEPTEMBER 2016 Scale: AS SHOWN
APPROVED: Deputy Director – Engineering
By _____ Date _____

DWN JLG DATE:
CHK ____ DATE: 5-1-16
DES KTL DATE: 5-1-16

Drw No. M02A
Sheet ___ of XX
File Number: 2016-0018



A GENERAL PLAN

SCALE: 1/8" = 1'-0"
FILE: 8871G1SM103

GENERAL NOTES:

1. XXXX

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KEY NOTES:

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CONTRACT NO. XXXXXX

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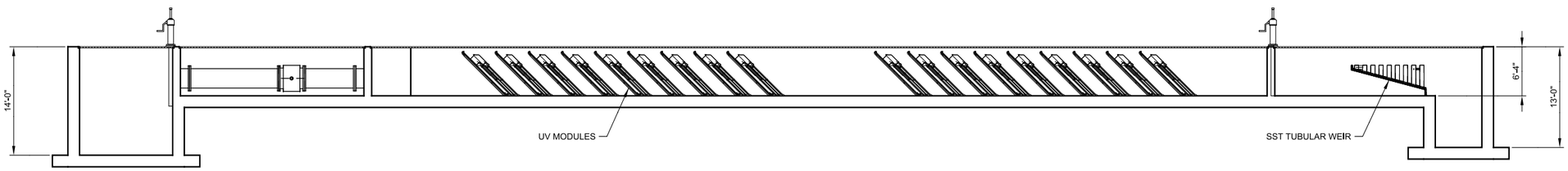
Date	Revision	By

CITY OF SANTA ROSA

LAGUNA TREATMENT PLANT
ULTRAVIOLET (UV) LIGHT DISINFECTION EQUIPMENT SYSTEM

WEDECO DURON PLAN

Date: SEPTEMBER 2016 Scale: AS SHOWN
APPROVED: Deputy Director – Engineering
By_____ Date _____
DWN JLG DATE:
CHK ____ DATE: 5-1-16
DES KTL DATE: 5-1-16
Drw No. M011 B File Number: 2016-0018
Sheet ___ of XX



B SECTION
M01D
SCALE: 1/8" = 1'-0"
FILE: 8871G1SM303

C SECTION
M01D
SCALE: 1/8" = 1'-0"
FILE: 8871G1SM303

GENERAL NOTES:

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KEY NOTES:

1. SUPPLIED BY UV SYSTEM SUPPLIER.

CONTRACT NO. XXXXXX

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PRELIMINARY DESIGN SUBMITTAL
NOT FOR CONSTRUCTION

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IN ASSOCIATION WITH Hazen

	Date	Revision	By

CITY OF SANTA ROSA

LAGUNA TREATMENT PLANT
ULTRAVIOLET (UV) LIGHT DISINFECTION EQUIPMENT SYSTEM

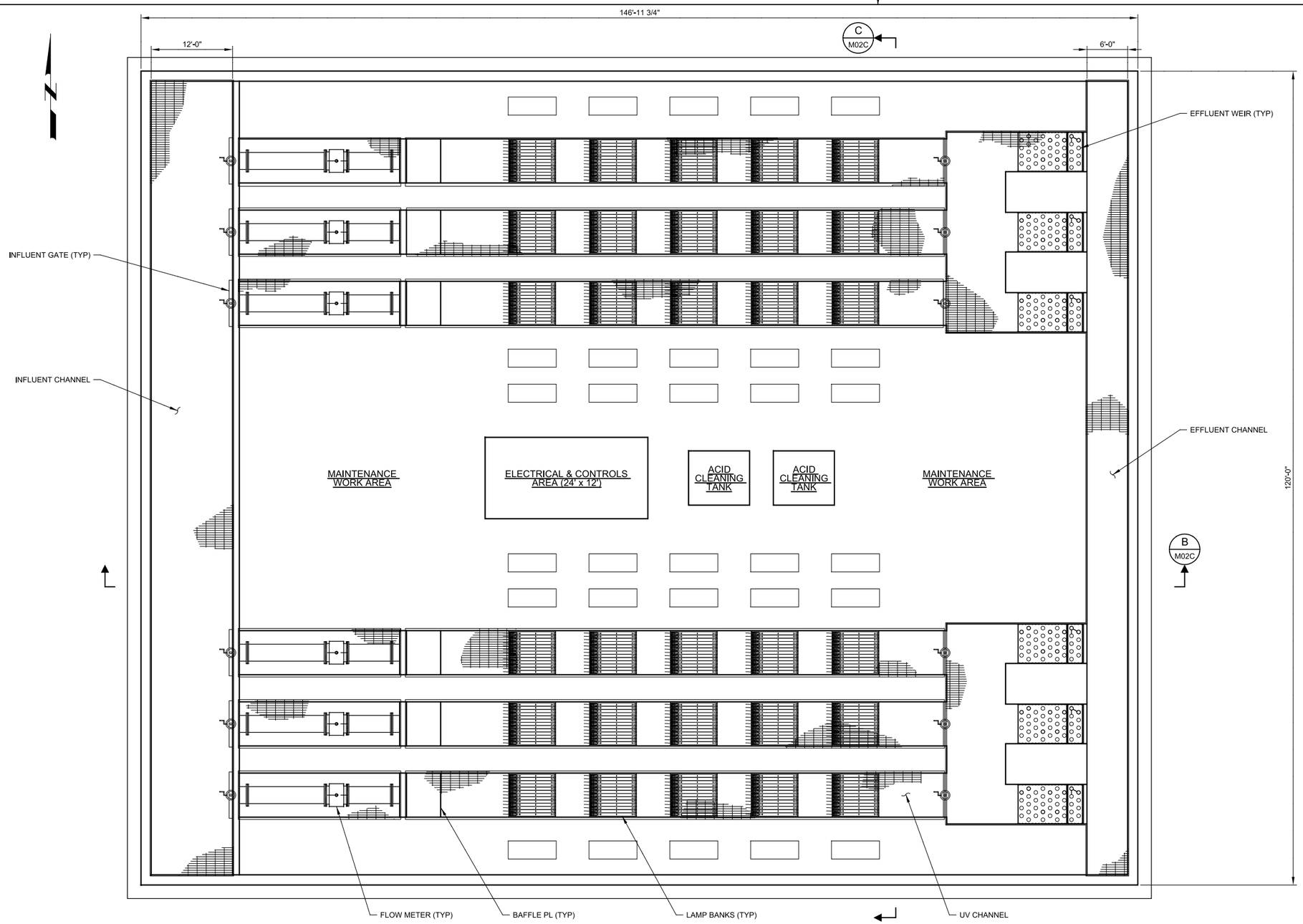
WEDECO DURON SECTIONS

Date: SEPTEMBER 2016 Scale: AS SHOWN
APPROVED: Deputy Director – Engineering
By _____ Date _____

DWN JLG DATE:
CHK ____ DATE: 5-1-16
DES KTL DATE: 5-1-16

Drw No. M02B File Number: 2016-0018
Sheet ___ of XX

LTP PRIMARY TREATMENT STRUCTURE, SEISMIC UPGRADE



A **GENERAL PLAN**
SCALE: 1/8" = 1'-0"
FILE: 8871G1SM102

GENERAL NOTES:

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KEY NOTES:

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CONTRACT NO. XXXXXX

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PRELIMINARY DESIGN SUBMITTAL
NOT FOR CONSTRUCTION

carollo® IN ASSOCIATION WITH Hazen

Date	Revision	By

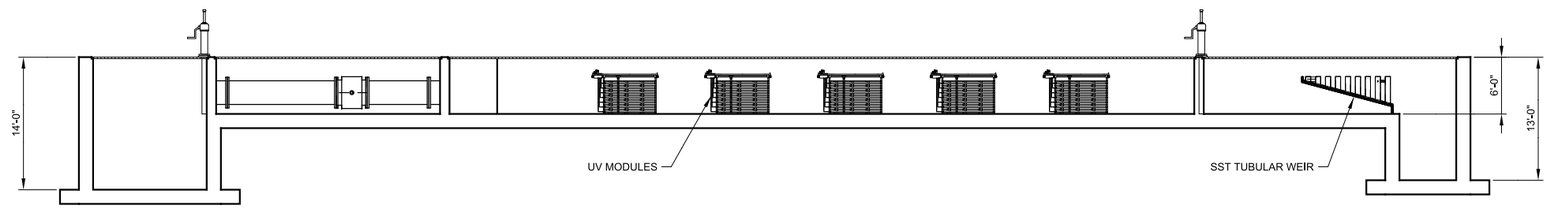
CITY OF SANTA ROSA

LAGUNA TREATMENT PLANT
ULTRAVIOLET (UV) LIGHT DISINFECTION EQUIPMENT SYSTEM

CALGON CARBON C3500D PLAN

Date: SEPTEMBER 2016 Scale: AS SHOWN
APPROVED: Deputy Director – Engineering
By _____ Date _____
DWN JLG DATE:
CHK ____ DATE: 5-1-16
DES KTL DATE: 5-1-16
Drw No. M01C
Sheet ___ of XX
File Number: 2016-0018

LTP PRIMARY TREATMENT STRUCTURE, SEISMIC UPGRADE



B SECTION
M01C
SCALE: 1/8" = 1'-0"
FILE: 8871G1SM302

C SECTION
M01C
SCALE: 1/8" = 1'-0"
FILE: 8871G1SM302

GENERAL NOTES:

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KEY NOTES:

(1) SUPPLIED BY UV SYSTEM SUPPLIER.

CONTRACT NO. XXXXXX

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NOT FOR CONSTRUCTION

carollo®
IN ASSOCIATION WITH Hazen

	Date	Revision	By

CITY OF SANTA ROSA

LAGUNA TREATMENT PLANT
ULTRAVIOLET (UV) LIGHT DISINFECTION EQUIPMENT SYSTEM

CALGON CARBON C3500D SECTIONS

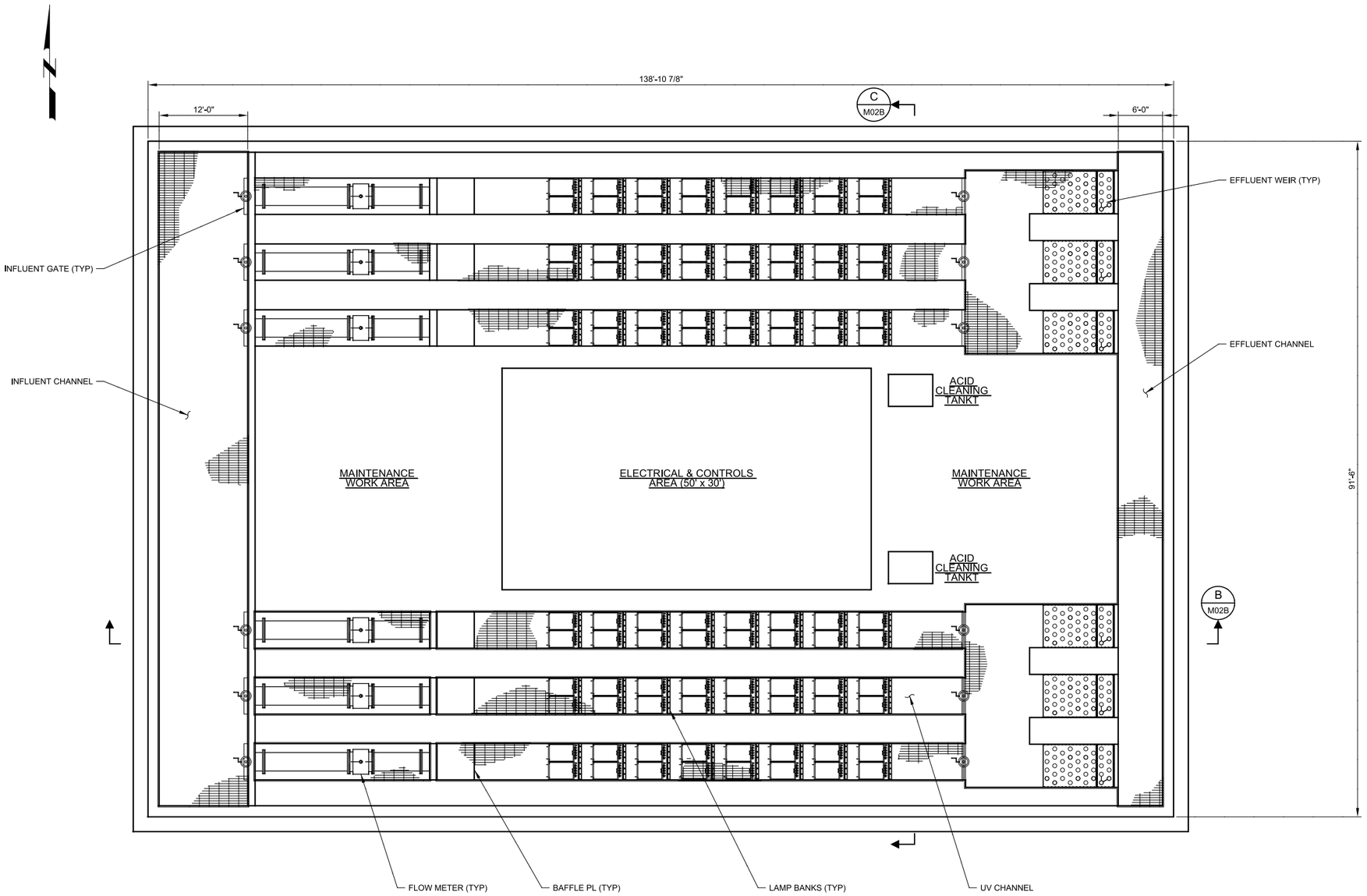
Date: SEPTEMBER 2016 Scale: AS SHOWN
APPROVED: Deputy Director – Engineering
By _____ Date _____

DWN JLG DATE:
CHK ____ DATE: 5-1-16
DES KTL DATE: 5-1-16

Drw No. M02C
Sheet ___ of XX

File Number: 2016-0018

LTP PRIMARY TREATMENT STRUCTURE, SEISMIC UPGRADE



A GENERAL PLAN

SCALE: 1/8" = 1'-0"
FILE: 8871G1SM101

GENERAL NOTES:

1. XXXX

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KEY NOTES:

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CONTRACT NO. XXXXXX

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Date	Revision	By

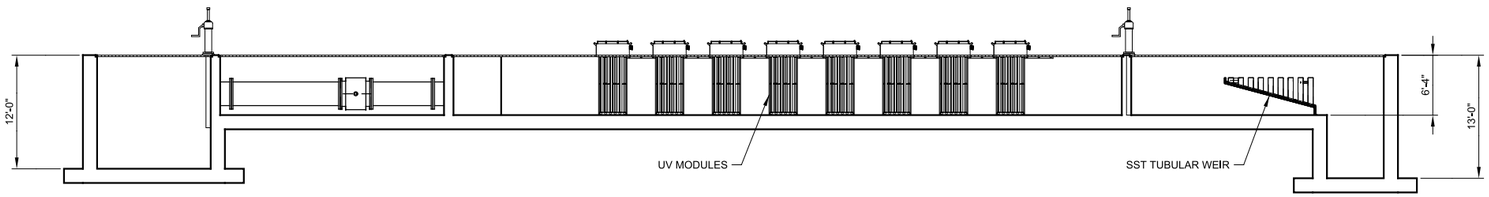
CITY OF SANTA ROSA

LAGUNA TREATMENT PLANT
ULTRAVIOLET (UV) LIGHT DISINFECTION EQUIPMENT SYSTEM

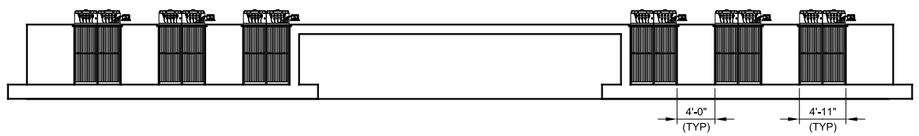
OZONIA AQUARAY 3X
PLAN

Date: SEPTEMBER 2016 Scale: AS SHOWN
APPROVED: Deputy Director – Engineering
By _____ Date _____
DWN JLG DATE:
CHK ____ DATE: 5-1-16
DES KTL DATE: 5-1-16
Drw No. M01 D File Number: 2016-0018
Sheet ___ of XX

LTP PRIMARY TREATMENT STRUCTURE, SEISMIC UPGRADE



B SECTION
M01B
SCALE: 1/8" = 1'-0"
FILE: 8871G1SM301



C SECTION
M01B
SCALE: 1/8" = 1'-0"
FILE: 8871G1SM301

GENERAL NOTES:

1. XXXX

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KEY NOTES:

(1) SUPPLIED BY UV SYSTEM SUPPLIER.

CONTRACT NO. XXXXXX

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	Date	Revision	By

CITY OF SANTA ROSA

LAGUNA TREATMENT PLANT
ULTRAVIOLET (UV) LIGHT DISINFECTION EQUIPMENT SYSTEM

OZONIA AQUARAY 3X SECTIONS

Date: SEPTEMBER 2016 Scale: AS SHOWN
APPROVED: Deputy Director – Engineering
By _____ Date _____
DWN JLG DATE:
CHK ____ DATE: 5-1-16
DES KTL DATE: 5-1-16
Drw No. M02D File Number: 2016-0018
Sheet ___ of XX

LTP PRIMARY TREATMENT STRUCTURE, SEISMIC UPGRADE

ELECTRICAL PLAN SYMBOLS

IDENTIFICATION SYMBOLS

EQUIP # — EQUIPMENT AND INSTRUMENT IDENTIFICATION

EQUIPMENT/INSTRUMENT LOCATOR

LUMINAIRE IDENTIFICATION
a = CIRCUIT DESIGNATION
b = DEVICE SWITCHED FROM
c = MOUNTING HEIGHT IN FEET TO BOTTOM OF FIXTURE

XXXX — CONDUIT IDENTIFICATION
XXXX = CONDUIT NUMBER,
REFER TO CONDUIT SCHEDULE
UNLESS OTHERWISE NOTED, GROUPED CONDUITS ARE LABELED LEFT TO RIGHT OR TOP TO BOTTOM.

INDICATES KEYNOTE X
(PERTAINS ONLY TO SHEET WHERE NOTE IS FOUND)

A — DISCONNECT SWITCH
a = TYPE, REFER TO DISCONNECT SCHEDULE

GROUNDING

UNDERGROUND GROUND CABLE
#4/0 SDBC UNLESS OTHERWISE NOTED

GROUND ROD

GROUND ROD AND GROUND WELL

GROUND CONNECTION

LUMINAIRES

2', 4', OR 8' STRIP

2' X 2' LAY-IN TROFFER

2' X 4' LAY-IN TROFFER

LUMINAIRE POLE MOUNTED

STROBE
a = COLOR
R = RED
G = GREEN
A = AMBER

LUMINAIRE, EMERGENCY BATTERY-POWERED

LUMINAIRE, EMERGENCY/EXIT BATTERY-POWERED

LUMINAIRE, EMERGENCY BATTERY-POWERED REMOTE

LUMINAIRE, SURFACE OR PENDANT MOUNTED

LUMINAIRE, WALL MOUNTED

LUMINAIRE, FLOOD/SPOT

LUMINAIRE, EXIT ONE OR TWO FACES AS INDICATED. ARROW POINTS IN DIRECTION OF EGRESS.

LUMINAIRE, WALL WASHER

PE — PHOTOCELL

SWITCHES/RECEPTACLES

SINGLE POLE SWITCH
a = CIRCUIT DESIGNATION
b = DEVICE SWITCHED DESIGNATION

c = TYPE
2 = DOUBLE POLE SWITCH
3 = THREE-WAY SWITCH
4 = FOUR-WAY SWITCH
K = KEY OPERATED SWITCH
F = SWITCH AND FUSESTAT HOLDER
P = SWITCH AND PILOT LIGHT
T = THERMOSTAT
D = DIMMER SWITCH
L = LOW VOLTAGE LIGHT SWITCH
M = MANUAL MOTOR STARTER

OCCUPANCY SENSOR
a = CIRCUIT DESIGNATION
b = DEVICE SWITCHED DESIGNATION

SWITCH AND SINGLE RECEPTACLE
a = CIRCUIT DESIGNATION
b = DEVICE TYPE DESIGNATION

DUPLEX RECEPTACLE
a = CIRCUIT DESIGNATION
b = DEVICE TYPE DESIGNATION

QUADRUPLEX RECEPTACLE
a = CIRCUIT DESIGNATION
b = DEVICE TYPE DESIGNATION

IN FLOOR DUPLEX RECEPTACLE
a = CIRCUIT DESIGNATION
b = DEVICE TYPE DESIGNATION

IN FLOOR QUADRUPLEX RECEPTACLE
a = CIRCUIT DESIGNATION
b = DEVICE TYPE DESIGNATION

DUPLEX RECEPTACLE w/SPLIT WIRE
a = CIRCUIT DESIGNATION
b = DEVICE TYPE DESIGNATION

APPLIANCE RECEPTACLE
a = CIRCUIT DESIGNATION
b = DEVICE TYPE DESIGNATION

WELDING RECEPTACLE
a = CIRCUIT DESIGNATION
b = DISCONNECT TYPE

SPECIAL PURPOSE RECEPTACLE
a = CIRCUIT DESIGNATION
b = DEVICE TYPE DESIGNATION

TWIST LOCK RECEPTACLE
a = AMP RATING

TELEPHONE OUTLET
a = CIRCUIT DESIGNATION
b = MOUNTING HEIGHT

DATA COMMUNICATIONS OUTLET
a = CIRCUIT DESIGNATION
b = MOUNTING HEIGHT

FIRE ALARM

SMOKE DETECTOR
a = TYPE
I = IONIZATION
P = PHOTOELECTRIC
d = DUCT DETECTOR

FACP — FIRE ALARM CONTROL PANEL

F — FIRE ALARM PULL STATION

FH — FIRE ALARM HORN/STROBE COMBINATION

FS — FIRE ALARM STROBE

FIRE SPRINKLER
F = FLOW SWITCH
T = TAMPER SWITCH

RACEWAY

EXPOSED CONDUIT

BREAK AND CONTINUATION IN CONDUIT RUN

EXPOSED CONDUIT HIDDEN BEHIND WALLS, FLOORS OR OTHER STRUCTURES

UNDERGROUND CONDUIT, DIRECT BURIED OR IN DUCTBANK

CONDUIT IN SLAB

CONDUIT VERTICAL CHANGE IN DIRECTION

CONDUIT CAP

J — JUNCTION BOX

CONDUIT SEAL

CONDUIT TEE

DUCTBANK
APPROXIMATE DIMENSIONS SHOWN ON DUCTBANK SECTIONS

CONDUIT SIZE AND CONDUCTORS

INDIVIDUAL CONDUCTORS

W"C-(3-X (Ø), 1-Y (N) & 1-Z (G))

W"C (WHERE INDICATED): W = CONDUIT TRADE SIZE

3-X (Ø):
3 = QUANTITY
X = SIZE OF CONDUCTORS
(Ø) = DESIGNATES PHASE CONDUCTORS

1-Y (N)(WHERE INDICATED):
1 = QUANTITY
Y = SIZE OF CONDUCTORS
(N) = DESIGNATES NEUTRAL CONDUCTORS

1-Z (G)(WHERE INDICATED):
1 = QUANTITY
Z = SIZE OF CONDUCTORS
(G) = DESIGNATES GROUND CONDUCTORS

U{3-X (Ø) & 1-X (G)}

U = NUMBER OF PARALLEL RUNS

MULTI CONDUCTOR CABLES

K/2/C#16S
K (WHERE INDICATED) = NUMBER OF PAIRS
2/C#16S = TWO CONDUCTOR, 16 GAUGE, TWISTED SHIELDED PAIR

K/3/C#16S
K (WHERE INDICATED) = NUMBER OF TRIPLETS
3/C#16S = THREE CONDUCTOR, 16 GAUGE, TWISTED SHIELDED TRIPLETS

N/CX
N = NUMBER OF CONDUCTORS IN THE CABLE
X = SIZE OF CONDUCTORS

FIBER OPTIC CABLES

FO/N
N = NUMBER OF INDIVIDUAL FIBERS

ELECTRICAL ONE-LINE SYMBOLS

MEDIUM VOLTAGE

52 — CIRCUIT BREAKER, MEDIUM VOLTAGE
a = CIRCUIT BREAKER NUMBER
b = FRAME SIZE

ANSI RELAY DEVICE
a = ANSI DEVICE FUNCTION
b = QUANTITY

MEDIUM VOLTAGE DISCONNECT SWITCH NON-FUSED CUT OUT

MEDIUM VOLTAGE DISCONNECTING FUSE SINGLE FUSE CUT OUT

MEDIUM VOLTAGE DISCONNECTING FUSE DOUBLE FUSE CUT OUT

MEDIUM VOLTAGE SINGLE FUSE

MEDIUM VOLTAGE DOUBLE FUSE

MEDIUM VOLTAGE LIVE FRONT TERMINATOR

MEDIUM VOLTAGE ELBOW

MEDIUM VOLTAGE TEE

MEDIUM VOLTAGE CONTACTOR

MEDIUM VOLTAGE STARTER

MOV-ELBOW ARRESTER

LOW VOLTAGE

LOW VOLTAGE CIRCUIT BREAKER
a = TYPE
MCP = MOTOR CIRCUIT PROTECTOR
TM = THERMAL MAGNETIC
SS = SOLID STATE
b = FRAME SIZE (MANUFACTURER TO DETERMINE FRAME SIZE UNLESS INDICATED)
c = NUMBER OF POLES
d = TRIP SETTING (AT = AMP TRIP) (AC = MCP CONTINUOUS RATING)
e = DESIGNATION
f = INTERRUPTING RATING

LOW VOLTAGE CIRCUIT BREAKER
AUXILIARY OPERATOR
* = S = SHUNT TRIP
= G = GROUND FAULT INTERRUPTER
= V = SOLENOID KEY RELEASE

A — DISCONNECT SWITCH
A = TYPE, REFER TO DISCONNECT SCHEDULE

B — FUSED DISCONNECT SWITCH
B = TYPE, REFER TO DISCONNECT SCHEDULE
b = FUSE RATING

FUSE

COMBINATION STARTER
a = CIRCUIT BREAKER DISCONNECT, TYPE AS NOTED
b = CONTACTOR TYPE
FVNR = FULL VOLTAGE NON-REVERSING
FVR = FULL VOLTAGE NON-REVERSING
TS1W = TWO SPEED SINGLE WINDING
TS2W = TWO SPEED TWO WINDING
LC = LIGHTING CONTACTOR
c = NEMA STARTER SIZE
d = OVERLOAD

MOTOR STARTER/DRIVES:
a = DEVICE TYPE
VFD-6 = 6-PULSE VFD
VFD-18 = 18-PULSE VFD
RVSS = REDUCED VOLTAGE SOLID STATE STARTER
RVAT = REDUCED VOLTAGE AUTO TRANSFORMER
a/B = DEVICE WITH BYPASS STARTER, REFER TO THE SPECIFICATIONS

b = INPUT OPTIONS
LL = LINE REACTOR
PHF = PASSIVE HARMONIC FILTER

c = OUTPUT OPTIONS
LR = LOAD REACTOR
DV/DT = Dv/dt FILTER
SWF = SINE WAVE FILTER

EQUIPMENT ENCLOSURE

MISCELLANEOUS

HP — MOTOR
HP = HORSEPOWER RATING
FULL LOAD AMPS AS NOTED

PACKAGED EQUIPMENT
LOAD RATING AS INDICATED
a = RATED LOAD
b = UNIT(HP, KW, KVA) AS INDICATED

TRANSFORMER
a = DEVICE I.D.
b = KVA RATING
c = NUMBER OF PHASES
d = PRIMARY VOLTAGE
e = SECONDARY VOLTAGE
f,g = CONNECTION TYPE SYMBOL
h = IMPEDANCE

GROUNDED WYE CONNECTION

DELTA CONNECTION

G — ENGINE-GENERATOR RATINGS AS INDICATED ON THE DRAWINGS
a = KVA/KW
b = VOLTAGE/CONNECTION
c = PHASE
d = WIRE
e = PF

CURRENT TRANSFORMER WITH SHORTING TERMINAL BLOCK
a = QUANTITY
b = RATIO

POTENTIAL TRANSFORMER
a = QUANTITY
b = RATIO
c,d = CONNECTION TYPE SYMBOL

SSM — SOLID STATE MULTIFUNCTION METER

ATP — AMPERE TEST POINT

VTP — VOLTAGE TEST POINT

UTILITY METER

LIGHTNING ARRESTER

SPD — SURGE PROTECTIVE DEVICE

DRAWOUT CONNECTION

GROUND

CAPACITOR

BATTERY

K — KIRK KEY INTERLOCK

LOAD BANK

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CITY OF SANTA ROSA

LAGUNA TREATMENT PLANT
DISINFECTION IMPROVEMENTS PROJECT

ELECTRICAL LEGEND

Date: AUGUST 2016 | Scale: AS SHOWN

APPROVED: Deputy Director – Engineering

By _____ Date _____

DWN LP DATE:
CHK CAC DATE: 5-1-16
DES BS DATE: 5-1-16

Drw No. GE01 | Sheet ___ of XX

File Number: 2016-0018

LTP PRIMARY TREATMENT STRUCTURE, SEISMIC UPGRADE

Plot Date: 18-AUG-2016 1:16:01 PM
User: LPitchley
Model: Layout1 ColorTable: gshade.ctb DesignScript: Carollo_Std_Pen_v0905.pen PlotScale: 2:1

ABBREVIATIONS

A	AMP
ABS	ABSOLUTE
AC	ALTERNATING CURRENT
ACK	ACKNOWLEDGE
ACTR	ACTUATOR
AF	AMP FRAME
AFC	AUTOMATIC FREQUENCY CONTROL
AIC	AMP INTERRUPTING CAPACITY
AM	AMMETER
ANN	ANNUNCIATOR
ANT	ANTENNA
APU	AUXILIARY POWER UNIT
ARM	ARMORED CABLE
AS	AMMETER SWITCH
ASYM	ASYMMETRICAL
AT	AMP TRIP
ATO	AUTOMATIC THROW OVER
ATP	AMMETER TEST POINT
ATS	AUTOMATIC TRANSFER SWITCH
AUTO XFMR	AUTOMATIC TRANSFORMER
AUX	AUXILIARY
AWG	AMERICAN WIRE GAGE
B	BELL
BAT	BATTERY
BFG	BELOW FINISHED GRADE
BHP	BRAKE HORSEPOWER
BKR	BREAKER
BRF	BELOW RAISED FLOOR
C	CONDUIT / CONTINUOUS LOAD
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
CCW	COUNTER CLOCKWISE
CKT	CIRCUIT
COAX	COAXIAL CABLE
COM	COMMON
COMM	COMMUNICATION
CPT	CONTROL POWER TRANSFORMER
CS	CONTROL SWITCH
CT	CURRENT TRANSFORMER
CV	CONTROL VALVE
CW	CLOCKWISE / COOL WHITE
DC	DIRECT CURRENT
DCS	DISTRIBUTED CONTROL SYSTEM
DCU - X	DISTRIBUTED CONTROL UNIT NO. X
DEMO	DEMOLITION
DISC	DISCONNECT SWITCH
DM	DEMAND METER
DPDT	DOUBLE POLE DOUBLE THROW
DPST	DOUBLE POLE SINGLE THROW
DS	DOOR SWITCH
E/G	EMERGENCY GENERATOR
EM	EMERGENCY
EMT	ELECTRICAL METALLIC TUBING
ENCL	ENCLOSURE
ENG	ENGINE
ENT	ELECTRICAL NON-METALLIC TUBING
EP	EXPLOSION PROOF
ETM	ELAPSED TIME METER
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FDR	FEEDER
FLA	FULL LOAD AMPS
FLX	FLEXIBLE CONDUIT
FO	FIBER OPTIC
FRC	FIBERGLASS RIGID CONDUIT
FREQ	FREQUENCY
FU	FUSE
FU	SW FUSED SWITCH
FVNR	FULL VOLTAGE NON-REVERSING
FVR	FULL VOLTAGE REVERSING
FWD	FORWARD
G	GROUND / EQUIPMENT GROUND / GROUND FAULT
GEN	GENERATOR
GRC	GALVANIZED STEEL RIGID CONDUIT
GFCI	GROUND FAULT CIRCUIT INTERRUPTER (RECEPTACLE)
GFI	GROUND FAULT INTERRUPTER (BREAKER)
GFR	GROUND FAULT RELAY
H	HOT-LEG
HF	HIGH FREQUENCY
HP	HORSEPOWER
HPS	HIGH PRESSURE SODIUM
HR	HOUR
HSTAT	HUMIDISTAT
HV	HIGH VOLTAGE
HVAC	HEATING/VENTILATION/AIR CONDITIONING
HZ	HERTZ
I	INSTANTANEOUS LOAD
IC	INTERRUPTING CAPACITY
IJB	INSTRUMENT JUNCTION BOX
IMC	INTERMEDIATE METAL CONDUIT
INST	INSTANTANEOUS
INT	INTERLOCK
INTERCOM	INTERCOMMUNICATION

J	JUNCTION BOX
K	KEY INTERLOCK
KA	KILOAMP
KV	KILOVOLT
KVA	KILOVOLT AMPERE
KVAR	KILOVAR (REACTANCE)
KW	KILOWATT
KWD	KILOWATT DEMAND
KWH	KILOWATT HOUR
L	LONG-TIME
L-B	LINE-BUS
L-G	LINE-GROUND
LA	LIGHTNING ARRESTOR
LBL	LABEL
LC	LIGHTING CONTACT OR
LCP- X	LOCAL CONTROL PANEL NO. X
LL	LEAD-LAG LOAD REACTOR
LP	LIGHT POLE
LP - X	LIGHTING PANEL NO. X
LTG	LIGHTING
LV	LOW VOLTAGE
LVL	LEVEL
M-X	MOTOR CONTROLLER NO. X
MA	MILLIAMPERE
MCA	MOTOR CIRCUIT AMPS
MCC - X	MOTOR CONTROL CENTER NO. X
MCP	MOTOR CIRCUIT PROTECTOR
MH	MANHOLE / MOUNTING HEIGHT
MLO	MAIN LUGS ONLY
MOD	MOTOR OPERATED DAMPER
MOV	METAL OXIDE VARISTOR
MRP	MOTOR PROTECTION RELAY
MS-X	MOTOR STARTER NO. X
MSP	MOTOR STARTING PANEL
MTO	MANUAL THROW OVER
MTR-X	MOTOR NO. X
MTS	MANUAL TRANSFER SWITCH
MV	MEGAVOLT
MVA	MEGAVOLT-AMPERES
MVS	MEDIUM VOLTAGE SWITCH
MW	MEGAWATT
N	NEUTRAL
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NFC	NONMETALLIC FLEXIBLE CONDUIT
NL	NIGHT LIGHT
NO	NORMALLY OPEN
NP	NAMEPLATE
O	OPEN OR OPENED
OH	OVERHEAD
OL	OVERLOAD RELAY
P	POLE
PA	PUBLIC ADDRESS
PB	PUSHBUTTON / PULL BOX
PCS	PVC COATED GALVANIZED STEEL CONDUIT
PCM	PROCESS CONTROL MODULE
PE	PHOTOCELL
PF	POWER FACTOR
PFCC	POWER FACTOR CORRECTION CAPACITOR
PFR	PHASE FAILURE RELAY
PH	PHASE
PNL	PANEL
PPX	POWER PANEL NO. X
PRI	PRIMARY
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE RIGID PLASTIC CONDUIT
PWR	POWER
RAC	RIGID ALUMINUM CONDUIT
RECPT	RECEPTACLE
REV	REVERSE
RF	RADIO FREQUENCY
RMS	ROOT MEAN SQUARED
RVAT	REDUCED VOLTAGE AUTO TRANSFORMER
RVNR	REDUCED VOLTAGE NON-REVERSING
RVSS	REDUCED VOLTAGE SOLID STATE
S	SHIELD / SHORT-TIME
SA	SURGE ARRESTER
SC	SHORT CIRCUIT
SDBC	SOFT DRAWN BARE COPPER
SFL	SUB FEED LUGS
SLT	SEALTIGHT LIQUIDTIGHT FLEXIBLE CONDUIT
SM	SURFACE MOUNTED
SP	SINGLE POLE
SPD	SURGE PROTECTIVE DEVICE
SPDT	SINGLE POLE DOUBLE THROW
SPST	SINGLE POLE SINGLE THROW
SPKR	SPEAKER
SS	SOLID STATE
STB	SHORTING TERMINAL BLOCK
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
SYM	SYMMETRICAL

TACH	TACHOMETER
TB - X	TERMINAL BLOCK - UNIT X
TC	THERMOCOUPLE / TIME CLOCK / TRAY CABLE
TD	TEMPERATURE DETECTOR RELAY
TE	TOTALLY ENCLOSED
TEFC	TOTALLY ENCLOSED FAN COOLED
TENV	TOTALLY ENCLOSED NON-VENTILATED
TERM	TERMINAL
TJB	TERMINAL JUNCTION BOX
TM	THERMAL MAGNETIC
TP	TWISTED PAIR
TS	TEMPERATURE SWITCH
TS1W	TWO SPEED CONSEQUENT POLE, ONE WINDING
TS2W	TWO SPEED SEPARATE WINDING
TSTAT	THERMOSTAT
UHF	ULTRA HIGH FREQUENCY
UNG	UNGROUNDED
UPS	UNINTERRUPTABLE POWER SUPPLY
UVR	UNDER VOLTAGE RELAY
V	VOLT
VA	VOLT AMPERE
VAR	VARMETER
VCP	VENDOR CONTROL PANEL
VFD	VARIABLE FREQUENCY DRIVE
VHF	VERY HIGH FREQUENCY
VM	VOLTMETER
VP	VAPORPROOF
VR	VOLTAGE REGULATOR
VS	VOLTAGE SWITCH
VT	VOLTAGE TRANSFORMER
VTP	VOLTAGE TEST POINT
W	WATT / WEST
WT	WATER TIGHT
WP	WEATHER PROOF
XFMR	TRANSFORMER

NOTES:

1. REFER TO SPECIFICATIONS AND OTHER DRAWINGS FOR ADDITIONAL ABBREVIATIONS.

POWER DEVICE FUNCTION NUMBERS

1	MASTER ELEMENT
2	TIME-DELAY STARTING OR CLOSING RELAY
3	CHECKING OR INTERLOCKING RELAY
4	MASTER CONTACTOR
5	STOPPING DEVICE
6	STARTING CIRCUIT BREAKER
7	ANODE CIRCUIT BREAKER
8	CONTROL POWER DISCONNECTING DEVICE
9	REVERSING DEVICE
10	UNIT SEQUENCE SWITCH
11	MULTIFUNCTION DEVICE
12	OVER-SPEED DEVICE
13	SYNCHRONOUS-SPEED DEVICE
14	UNDER-SPEED DEVICE
15	SPEED OR FREQUENCY MATCHING DEVICE
16	DATA COMMUNICATIONS DEVICE
17	SHUNTING OR DISCHARGE SWITCH
18	ACCELERATING OR DECELERATING DEVICE
19	STARTING-TO-RUNNING TRANSITION CONTACTOR
20	ELECTRICALLY OPERATED VALVE
21	DISTANCE RELAY
22	EQUALIZER CIRCUIT BREAKER
23	TEMPERATURE CONTROL DEVICE
24	VOLTS PER HERTZ RELAY
25	SYNCHRONIZING OR SYNCHRONISM-CHECK DEVICE
26	APPARATUS THERMAL DEVICE
27	UNDERVOLTAGE RELAY
27N	GROUND FAULT UNDERVOLTAGE RELAY
28	FLAME DETECTOR
29	ISOLATING CONTACTOR
30	ANNUNCIATOR RELAY
31	SEPARATE EXCITATION DEVICE
32	DIRECTIONAL POWER RELAY
33	POSITION SWITCH
34	MASTER SEQUENCE DEVICE
35	BRUSH-OPERATING OR SLIP-RING SHORT-CIRCUITING DEVICE
36	POLARITY DEVICE
37	UNDERCURRENT OR UNDERPOWER RELAY
38	BEARING PROTECTIVE DEVICE
39	MECHANICAL CONDITION MONITOR
40	FIELD RELAY
41	FIELD CIRCUIT BREAKER
42	RUNNING CIRCUIT BREAKER
43	MANUAL TRANSFER OR SELECTOR DEVICE
44	UNIT SEQUENCE STARTING RELAY
45	ABNORMAL ATMOSPHERIC CONDITION MONITOR
46	REVERSE-PHASE OR BALANCE CURRENT RELAY
47	PHASE-BALANCE OR PHASE-SEQUENCE VOLTAGE RELAY
48	INCOMPLETE SEQUENCE RELAY
49	MACHINE OR TRANSFORMER THERMAL RELAY
50	INSTANTANEOUS OVERCURRENT RELAY
51	AC TIME OVERCURRENT RELAY
52	AC CIRCUIT BREAKER
53	FIELD EXCITATION RELAY
54	TURNING GEAR ENGAGING DEVICE
55	POWER FACTOR RELAY
56	FIELD APPLICATION RELAY
57	SHORT-CIRCUITING OR GROUNDING DEVICE
58	RECTIFICATION FAILURE RELAY
59	OVERVOLTAGE RELAY
60	VOLTAGE OR CURRENT BALANCE RELAY
61	DENSITY SWITCH OR SENSOR
62	TIME-DELAY STOPPING OR OPENING RELAY
63	PRESSURE SWITCH
64	GROUND DETECTOR RELAY
65	GOVERNOR
66	NOTCHING OR JOGGING DEVICE
67	AC DIRECTIONAL OVERCURRENT RELAY
68	BLOCKING OR OUT OF STEP RELAY
69	PERMISSIVE CONTROL DEVICE
70	RHEOSTAT
71	LIQUID LEVEL SWITCH
72	DC CIRCUIT BREAKER
73	LOAD-RESISTOR CONTACTOR
74	ALARM RELAY
75	POSITION CHANGING MECHANISM
76	DC OVERCURRENT RELAY
77	TELEMETERING DEVICE
78	PHASE-ANGLE MEASURING RELAY
79	AC RECLOSING RELAY
80	FLOW SWITCH
81	FREQUENCY RELAY
82	DC LOAD MEASURING RECLOSING RELAY
83	AUTOMATIC SELECTIVE CONTROL OR TRANSFER RELAY
84	OPERATING MECHANISM
85	PILOT COMMUNICATIONS, CARRIER OR PILOT-WIRE RELAY
86	LOCKOUT RELAY
87	DIFFERENTIAL PROTECTIVE RELAY
88	AUXILIARY MOTOR OR MOTOR GENERATOR
89	LINE SWITCH
90	REGULATING DEVICE
91	VOLTAGE DIRECTIONAL RELAY
92	VOLTAGE AND POWER DIRECTIONAL RELAY
93	FIELD-CHANGING CONTACTOR
94	TRIPPING OR TRIP-FREE RELAY

COMMONLY USED SUFFIX LETTERS APPLIED TO POWER DEVICE FUNCTION NUMBERS

A	ALARM ONLY
B	BUS PROTECTION
G	GROUND FAULT PROTECTION (RELAY CT IN A SYSTEM NEUTRAL CIRCUIT OR GENERATOR PROTECTION)
GS	GROUND FAULT PROTECTION (RELAY CT IN TOROIDAL OR GROUND SENSOR TYPE)
L	LINE PROTECTION
M	MOTOR PROTECTION
N	GROUND FAULT PROTECTION (RELAY COIL CONNECTED IN RESIDUAL CT CIRCUIT)
T	TRANSFORMER PROTECTION
V	VOLTAGE
P	PHASE PROTECTION

ABBREVIATIONS

AFD	- ARC FLASH DETECTOR
CLK	- CLOCK OR TIMING SOURCE
DDR	- DYNAMIC DISTURBANCE RECORDER
DFR	- DIGITAL FAULT RECORDER
ENV	- ENVIRONMENTAL DATA
HIZ	- HIGH IMPEDANCE FAULT DETECTOR
HMI	- HUMAN MACHINE INTERFACE
HST	- HISTORIAN
LGC	- SCHEME LOGIC
MET	- SUBSTATION METERING
PDC	- PHASOR DATA CONCENTRATOR
PMU	- PHASOR MEASUREMENT UNIT
PQM	- POWER QUALITY MONITOR
RIO	- REMOTE I/O DEVICE
RTU	- REMOTE TELEMETRY UNIT/REMOTE TERMINAL UNIT
SER	- SEQUENCE OF EVENTS RECORDER
TCM	- TRIP CIRCUIT MONITOR

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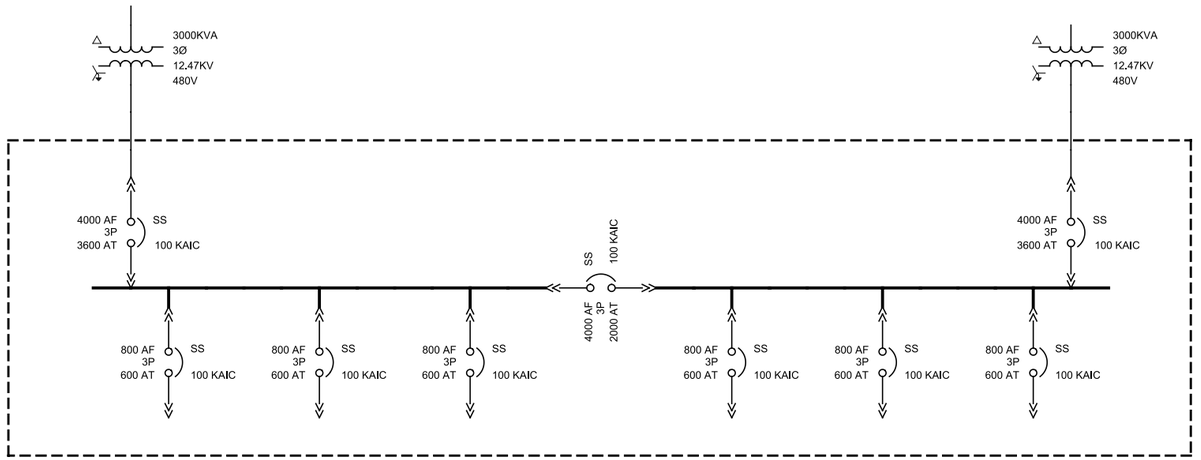
DISINFECTION IMPROVEMENTS PROJECT

ELECTRICAL ABBREVIATIONS

Date: AUGUST 2016 Scale: AS SHOWN
APPROVED: Deputy Director – Engineering
By_____ Date _____
DWN LP DATE:
CHK CAC DATE: 5-1-16
DES BS DATE: 5-1-16
Drw No. GE02 Sheet ___ of XX
File Number: 2016-0018

LTP PRIMARY TREATMENT STRUCTURE, SEISMIC UPGRADE



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DISINFECTION IMPROVEMENTS PROJECT

UV SYSTEM SWITCHGEAR
ONE-LINE DIAGRAM

Date: AUGUST 2016 | Scale: AS SHOWN

APPROVED: Deputy Director – Engineering

By _____ Date _____

DWN MNH DATE:
CHK CAC DATE: 5-1-16
DES BS DATE: 5-1-16

Drw No. E01
Sheet ___ of XX

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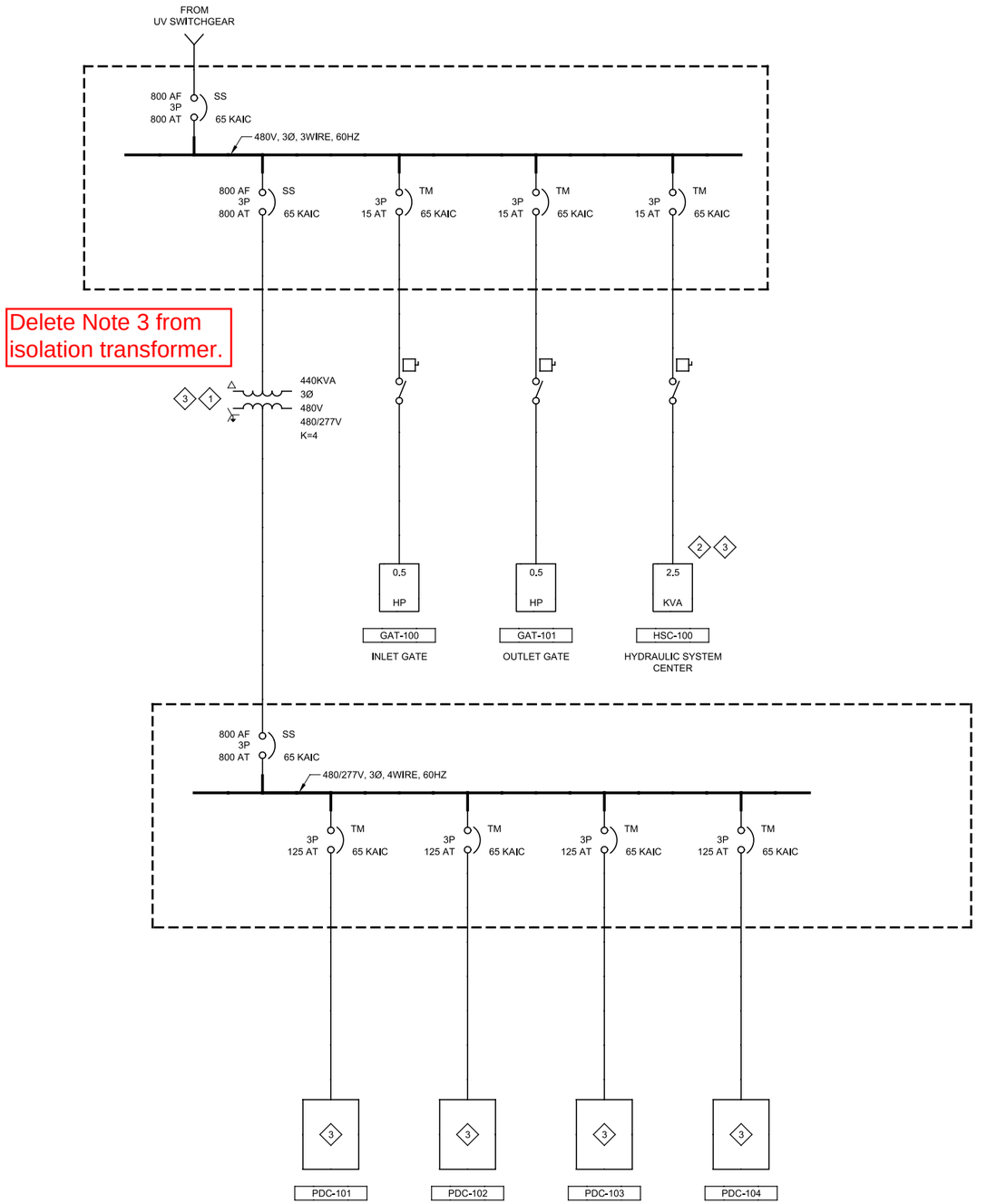

Delete Note 3 from isolation transformer.

GENERAL NOTES:

1. 1 OUT OF 5 CHANNELS SHOWN.
2. 4 POWER DISTRIBUTION CENTERS (PDCs) PER CHANNEL.
3. EACH PDC POWERS 72 UV LAMPS (3 UV BANKS).
4. PDC POWER CONSUMPTION IS 77.4 KVA.
5. SUPPLY TO PDC IS 480/277 VAC, 3Ø, 4W (+GND), 60HZ.

KEY NOTES:

1. K. FACTOR TRANSFORMER WITH K-FACTOR = 4.
2. ONE HYDRAULIC SYSTEM CENTER IS REQUIRED PER CHANNEL.
3. FURNISHED BY THE UV SYSTEM SUPPLIER.

Product Name: Trojan UVSigna (2-Row)

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TROJAN UVSIGNA
ONE-LINE DIAGRAM

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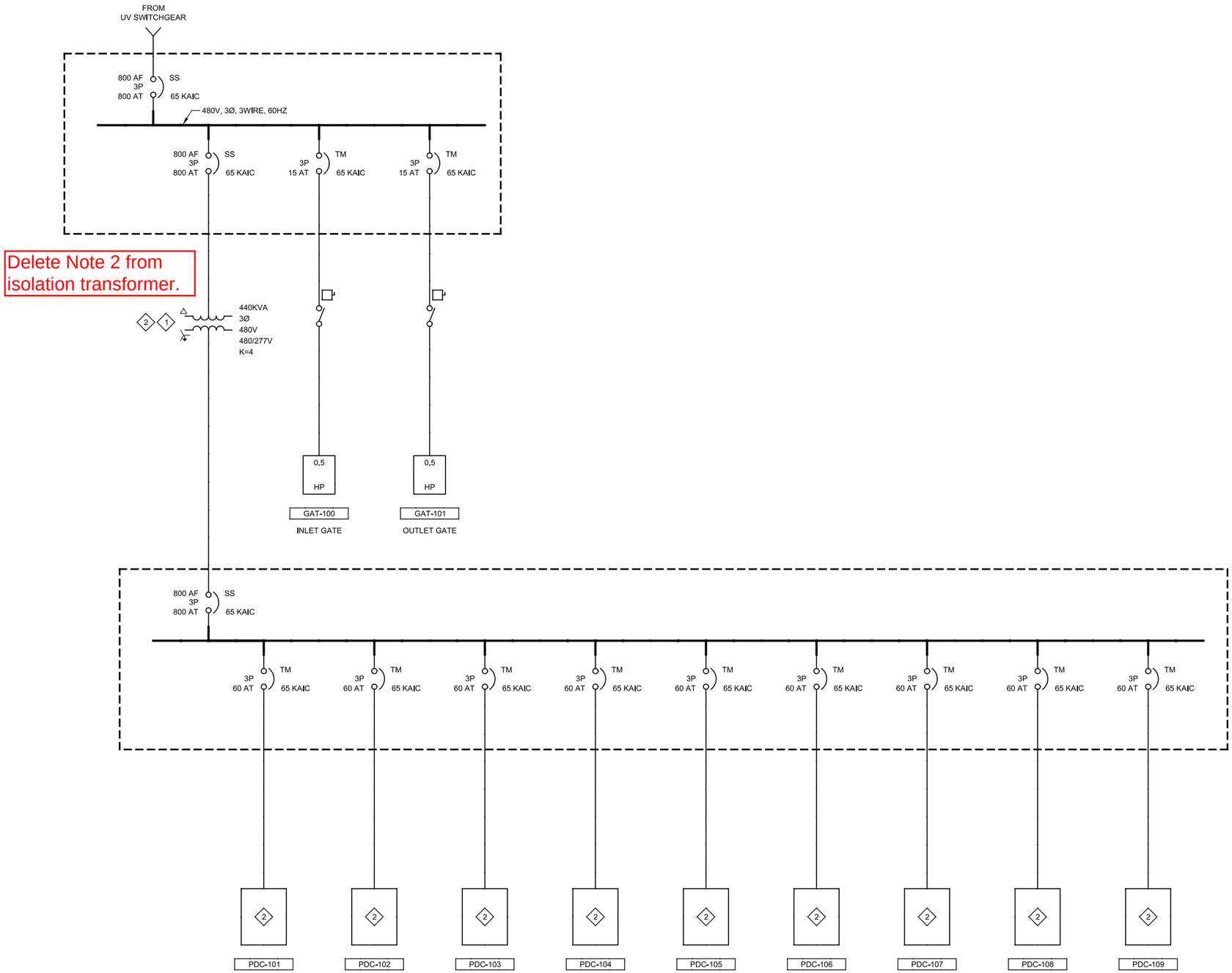
LTP PRIMARY TREATMENT STRUCTURE, SEISMIC UPGRADE



GENERAL NOTES:

1. 1 OUT OF 6 CHANNELS SHOWN.
2. 9 POWER DISTRIBUTION CENTER (PDCs) PER CHANNEL.
3. EACH PDC POWERS 48 UV LAMPS (2 UV BANKS).
4. PDC POWER CONSUMPTION IS 34.5 KVA.
5. SUPPLY TO PDC IS 480/277 VAC, 3Ø, 4W (+GND), 60HZ.

KEY NOTES:

1. K.FACTOR TRANSFORMER WITH K-FACTOR = 4.
2. FURNISHED BY THE UV SYSTEM SUPPLIER.

CONTRACT NO. XXXXXX

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LAGUNA TREATMENT PLANT
DISINFECTION IMPROVEMENTS PROJECT

WEDECO DURON
ONE-LINE DIAGRAM

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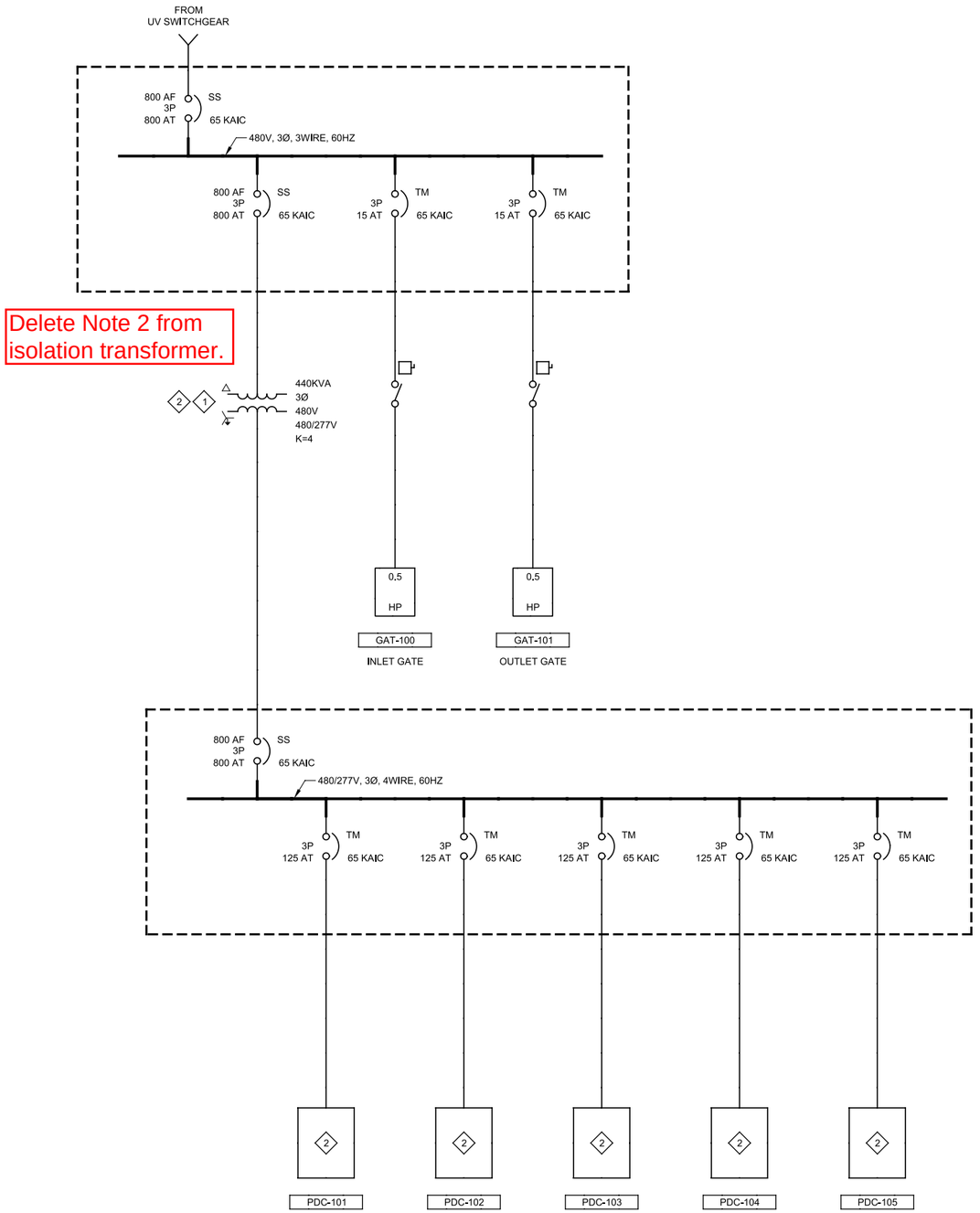
LTP PRIMARY TREATMENT STRUCTURE, SEISMIC UPGRADE



GENERAL NOTES:

1. 1 OUT OF 6 CHANNELS SHOWN.
2. 5 POWER DISTRIBUTION CENTER (PDCs) PER CHANNEL.
3. EACH PDC POWERS 104 UV LAMPS (1 UV BANK).
4. PDC POWER CONSUMPTION IS 67.0 KVA.
5. SUPPLY TO PDC IS 480/277 VAC, 3Ø, 4W (+GND), 60HZ.

KEY NOTES:

1. K. FACTOR TRANSFORMER WITH K-FACTOR = 4.
2. FURNISHED BY THE UV SYSTEM SUPPLIER.

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LAGUNA TREATMENT PLANT
DISINFECTION IMPROVEMENTS PROJECT

CALGON CARBON C³500D
ONE-LINE DIAGRAM

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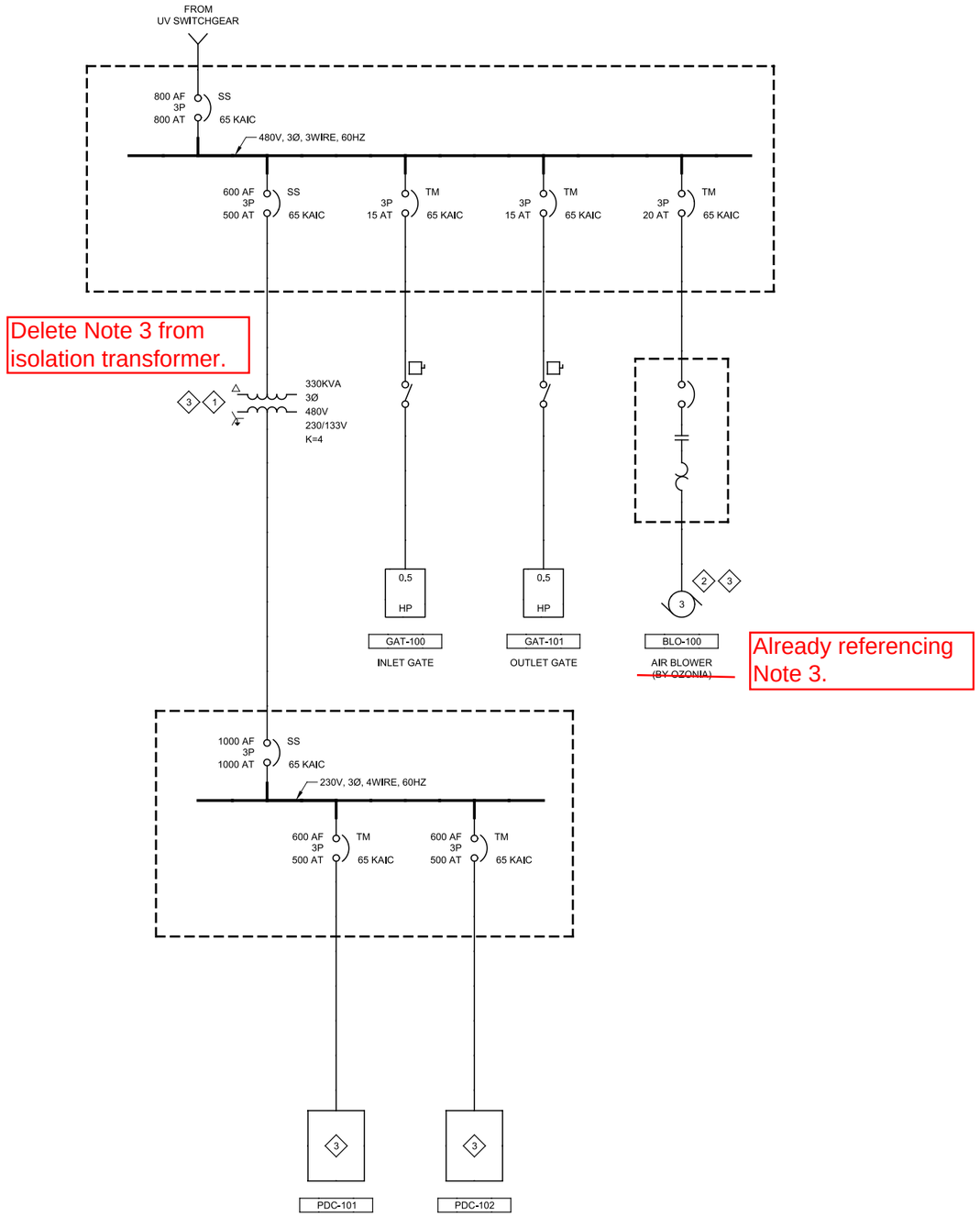
LTP PRIMARY TREATMENT STRUCTURE, SEISMIC UPGRADE



Delete Note 3 from isolation transformer.

Already referencing Note 3.

GENERAL NOTES:

1. 1 OUT OF 6 CHANNELS SHOWN.
2. 2 POWER DISTRIBUTION CENTER (PDCs) PER CHANNEL.
3. EACH PDC POWERS 288 UV LAMPS (4 UV BANKS).
4. PDC POWER CONSUMPTION IS 120.5 KVA.
5. SUPPLY TO PDC IS 230/133 VAC, 3Ø, 4W (+GND), 60HZ.

6. Each PDC also requires 120 VAC, 1 Ph, 20 A supply.

KEY NOTES:

1. K. FACTOR TRANSFORMER WITH K-FACTOR = 4.
2. ONE AIR BLOWER REQUIRED PER ACID CLEANING TANK (2 IN TOTAL).
3. FURNISHED BY THE UV SYSTEM SUPPLIER.

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LAGUNA TREATMENT PLANT
DISINFECTION IMPROVEMENTS PROJECT
OZONIA AQUARAY 3X
ONE-LINE DIAGRAM

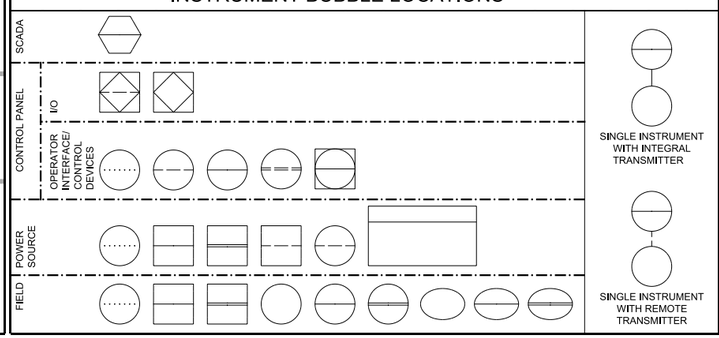
Date: AUGUST 2016 | Scale: AS SHOWN
APPROVED: Deputy Director – Engineering
By _____ Date _____
DWN MNH DATE:
CHK CAC DATE: 5-1-16
DES BS DATE: 5-1-16
Drw No E04 | File Number: 2016-0018
Sheet ___ of XX

LTP PRIMARY TREATMENT STRUCTURE, SEISMIC UPGRADE

SYMBOL	DRAWING VISIBLE FIELDS	FIELD - 1	FIELD - 2	FIELD - 3	FIELD - 4	FIELD - 5	FIELD - 6
SCADA SYSTEM OPERATOR INTERFACE TERMINAL 6 1 2 3 4 5	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - DESCRIPTION 5 - DESCRIPTION 6 - EXISTING/FUTURE	REFER ◇1 ◇2	REFER ◇3	ACTION ALARM NUM - NUMERIC SP - SET POINT STATUS TREND	DESCRIPTION ◇2 ◇5	DESCRIPTION	E - EXISTING F - FUTURE
HARDWIRED I/O POINT 6 1 2 3 4 5	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - DESCRIPTION 5 - LOCATION 6 - EXISTING/FUTURE	REFER ◇1 ◇2 ◇4	REFER ◇3	AI - ANALOG INPUT AO - ANALOG OUTPUT DI - DISCRETE INPUT DO - DISCRETE OUTPUT HSC - HIGH SPEED COUNTER INPUT RTD - RTD INPUT	DESCRIPTION	PAC - PROGRAMMABLE AUTOMATION CONTROLLER NO. PLC - PROGRAMMABLE LOGIC CONTROLLER NO. RIO - REMOTE I/O VCP - VENDOR CONTROL PANEL NO.	E - EXISTING F - FUTURE
DIGITAL BUS I/O REGISTER (FIELDBUS I/O) 6 1 2 3 4 5	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - DESCRIPTION 5 - LOCATION 6 - EXISTING/FUTURE	REFER ◇1 ◇2	REFER ◇3	BUS ID CNET - CONTROLNET DNET - DEVICENET ENET - ETHERNET/IP FF - FOUNDATION FIELDBUS MB - MODBUS RTU MB+ - MODBUS PLUS MBTCP - MODBUS TCP DP - PROFIBUS DP PA - PROFIBUS PA PNET - PROFINET SERIAL - PROPRIETARY PROTOCOL	DESCRIPTION	PAC - PROGRAMMABLE AUTOMATION CONTROLLER NO. PLC - PROGRAMMABLE LOGIC CONTROLLER NO. RIO - REMOTE I/O VCP - VENDOR CONTROL PANEL NO.	E - EXISTING F - FUTURE
HUMAN MACHINE INTERFACE 6 1 2 3 4 5	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - DESCRIPTION 5 - LOCATION 6 - EXISTING/FUTURE	REFER ◇1 ◇2	REFER ◇3	ACTION ALARM NUM - NUMERIC SP - SET POINT STATUS	DESCRIPTION ◇2 ◇5	HMI - HUMAN MACHINE INTERFACE NO. LCP - LOCAL CONTROL PANEL NO. PCM - PROCESS CONTROL MODULE NO. VCP - VENDOR CONTROL PANEL NO.	E - EXISTING F - FUTURE
PILOT DEVICE OPERATOR INTERFACE 6 1 2 3 4 5	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - DESCRIPTION 5 - LOCATION 6 - EXISTING/FUTURE	REFER ◇1 ◇2	REFER ◇3	AM - AUTO/MANUAL BYPASS - BYPASS CL - CLOSE E-STOP - EMERGENCY STOP FRLR - FIXED RATE/LEVEL RATE HOA - HAND /OFF/AUTO JOHC - JOG OPEN/HOLD/CLOSE JOJC - JOG OPEN/JOG CLOSE LH - LOW/HIGH LOR - LOCAL/OFF/REMOTE LOS - LOCK OUT STOP LS - LEAD/STANDBY LSR - LOCAL/STOP/REMOTE NOOT - NO OFFLINE/OFFLINE TRANSITION OC - OPEN/CLOSE OLOL - ON LINE/OFF LINE OO - OFF/ON OP - OPEN OSC - OPEN/STOP/CLOSE RST - RESET SAAM - SEMI AUTO/AUTO/MANUAL SEL - SELECT SP - STOP SPD - SPEED SS - START/STOP ST - START	DESCRIPTION	LCP - LOCAL CONTROL PANEL NO. MCC - MOTOR CONTROL CENTER NO. PCM - PROCESS CONTROL MODULE NO. RVSS - REDUCED VOLTAGE SOLID STARTER NO. VCP - VENDOR CONTROL PANEL NO. VFD - VARIABLE FREQUENCY DRIVE NO.	E - EXISTING F - FUTURE
POWER DEVICE PRIMARY FUNCTION OPERATOR ACCESSIBLE 6 1 2 3 4 5	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - VOLTAGE/PHASE 5 - LOCATION 6 - EXISTING/FUTURE	CB - CIRCUIT BREAKER DISC - DISCONNECT FU - FUSE	REFER ◇3	TM - THERMAL MAGNETIC CIRCUIT BREAKER	24VDC - 1P 120VAC - 1P 208VAC - 2P 208VAC - 3P 240VAC - 3P 240VAC - 2P 480VAC - 3P 2400VAC - 3P 4160VAC - 3P	DP - DISTRIBUTION PANEL NO. LCP - LOCAL CONTROL PANEL NO. LP - LIGHTING PANEL NO. MCC - MOTOR CONTROL CENTER NO. PCM - PROCESS CONTROL MODULE NO. PP - POWER PANEL NO. VCP - VENDOR CONTROL PANEL NO.	E - EXISTING F - FUTURE
POWER DEVICE AUXILIARY FUNCTION FOR OPERATOR ACCESSIBLE DEVICES 6 1 2 3 4 5	1 - TAG 2 - LOOP NUMBER 3 - DESCRIPTION 4 - DESCRIPTION 5 - DESCRIPTION 6 - EXISTING/FUTURE	DISC - DISCONNECT	REFER ◇3	DESCRIPTION	DESCRIPTION	DESCRIPTION	E - EXISTING F - FUTURE
POWER DEVICE PRIMARY FUNCTION OPERATOR INACCESSIBLE 6 1 2 3 4 5	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - VOLTAGE/PHASE 5 - LOCATION 6 - EXISTING/FUTURE	CB - CIRCUIT BREAKER FU - FUSE	REFER ◇3	MCP - MOTOR CIRCUIT PROTECTOR SS - SOLID STATE CIRCUIT BREAKER TM - THERMAL MAGNETIC CIRCUIT BREAKER	24VDC - 1P 120VAC - 1P 208VAC - 2P 208VAC - 3P 240VAC - 2P 240VAC - 3P 480VAC - 3P 2400VAC - 3P 4160VAC - 3P	DP - DISTRIBUTION PANEL NO. LCP - LOCAL CONTROL PANEL NO. LP - LIGHTING PANEL NO. MCC - MOTOR CONTROL CENTER NO. PCM - PROCESS CONTROL MODULE NO. PP - POWER PANEL NO. VCP - VENDOR CONTROL PANEL NO.	E - EXISTING F - FUTURE

SYMBOL	DRAWING VISIBLE FIELDS	FIELD - 1	FIELD - 2	FIELD - 3	FIELD - 4	FIELD - 5	FIELD - 6
INSTRUMENT PRIMARY ELEMENT 6 1 2 3 4 5	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - FURNISHED BY 5 - LOCATION 6 - EXISTING/FUTURE	REFER ◇1	REFER ◇3	DESCRIPTION ◇5	DESCRIPTION ◇6	AREA NO. BUILDING NO. ROOM NO.	E - EXISTING F - FUTURE
INSTRUMENT/CONTROL ELEMENT PRIMARY FUNCTION OPERATOR ACCESSIBLE 6 1 2 3 4 5	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - FURNISHED BY 5 - DESCRIPTION 6 - EXISTING/FUTURE	REFER ◇1	REFER ◇3	DESCRIPTION ◇5	DESCRIPTION ◇6	DESCRIPTION	E - EXISTING F - FUTURE
INSTRUMENT/CONTROL ELEMENT AUXILIARY FUNCTION OPERATOR ACCESSIBLE 6 1 2 3 4 5	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - FURNISHED BY 5 - DESCRIPTION 6 - EXISTING/FUTURE	REFER ◇1	REFER ◇3	DESCRIPTION	DESCRIPTION ◇6	DESCRIPTION	E - EXISTING F - FUTURE
INSTRUMENT/CONTROL ELEMENT PRIMARY FUNCTION OPERATOR INACCESSIBLE 6 1 2 3 4 5	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - FURNISHED BY 5 - LOCATION 6 - EXISTING/FUTURE	REFER ◇1 ◇3 XR - PROTECTION RELAY CR - CONTROL RELAY IR - INTERPOSING RELAY	REFER ◇3	DESCRIPTION	DESCRIPTION ◇6	LCP - LOCAL CONTROL PANEL NO. MCC - MOTOR CONTROL CENTER NO. PCM - PROCESS CONTROL MODULE NO. VCP - VENDOR CONTROL PANEL NO.	E - EXISTING F - FUTURE
INSTRUMENT/CONTROL ELEMENT AUXILIARY FUNCTION OPERATOR INACCESSIBLE 6 1 2 3 4 5	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - FURNISHED BY 5 - LOCATION 6 - EXISTING/FUTURE	REFER ◇1 ◇3 XR - PROTECTION RELAY CR - CONTROL RELAY IR - INTERPOSING RELAY	REFER ◇3	DESCRIPTION	DESCRIPTION ◇6	LCP - LOCAL CONTROL PANEL NO. MCC - MOTOR CONTROL CENTER NO. PCM - PROCESS CONTROL MODULE NO. VCP - VENDOR CONTROL PANEL NO.	E - EXISTING F - FUTURE
FIELD EQUIPMENT NON-POWERED 6 1 2 3 4 5	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION/SIZE 4 - FURNISHED BY 5 - LOCATION 6 - EXISTING/FUTURE	REFER ◇3	REFER ◇3	DESCRIPTION	DESCRIPTION ◇6	AREA NO. BUILDING NO. ROOM NO.	E - EXISTING F - FUTURE
FIELD EQUIPMENT PRIMARY FUNCTION POWERED 6 1 2 3 4 5	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - FURNISHED BY 5 - LOCATION 6 - EXISTING/FUTURE	REFER ◇3	REFER ◇3	DESCRIPTION	DESCRIPTION ◇6	AREA NO. BUILDING NO. ROOM NO.	E - EXISTING F - FUTURE
FIELD EQUIPMENT AUXILIARY FUNCTION POWERED 6 1 2 3 4 5	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - FURNISHED BY 5 - DESCRIPTION 6 - EXISTING/FUTURE	MWH - MOTOR WINDING HEATER TSH - TEMPERATURE SWITCH XSH - TORQUE SWITCH	REFER ◇3	DESCRIPTION	DESCRIPTION ◇6	DESCRIPTION	E - EXISTING F - FUTURE
FIELD EQUIPMENT STARTER/DRIVE CUBICLE/CABINET 6 1 - 2 3 4 5	1 - TAG 2 - LOOP NUMBER 3 - TYPE 4 - VOLTAGE/PHASE 5 - LOCATION 6 - EXISTING/FUTURE	MS - MOTOR STARTER RVAT - REDUCED VOLTAGE AUTO TRANSFORMER STARTER RVSS - REDUCED VOLTAGE SOLID STATE STARTER VFD - VARIABLE FREQUENCY DRIVE	REFER ◇3	FVNR - FULL VOLTAGE NON-REVERSING STARTER FVR - FULL VOLTAGE REVERSING STARTER PWS - PART-WINDING STARTER RVAT - REDUCED VOLTAGE AUTO TRANSFORMER STARTER RVSS - REDUCED VOLTAGE SOLID STATE STARTER TS1W - TWO SPEED SINGLE WINDING TS2W - TWO SPEED TWO WINDINGS VFD - VARIABLE FREQUENCY DRIVE	120VAC - 1P 208VAC - 2P 208VAC - 3P 240VAC - 2P 240VAC - 3P 480VAC - 3P 2400VAC - 3P 4160VAC - 3P	LCP - LOCAL CONTROL PANEL NO. MCC - MOTOR CONTROL CENTER NO. PCM - PROCESS CONTROL MODULE NO. VCP - VENDOR CONTROL PANEL NO.	E - EXISTING F - FUTURE

INSTRUMENT BUBBLE LOCATIONS



NOTES

1. INSTRUMENT TAG IDENTIFICATION LETTERS TABLE
2. OPERATOR PILOT DEVICE LEGEND
3. EQUIPMENT TAGGING TABLE
4. I/O TYPE DESIGNATIONS TABLE
5. INSTRUMENT TYPE DESIGNATIONS TABLE
6. FURNISHED BY: FBO FURNISHED BY OWNER; FBV FURNISHED BY VENDOR

CONTRACT NO. XXXXXX

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

PRELIMINARY DESIGN SUBMITTAL
NOT FOR CONSTRUCTION

IN ASSOCIATION WITH carollo Hazen

Date	Revision	By

CITY OF SANTA ROSA

LAGUNA TREATMENT PLANT
DISINFECTION IMPROVEMENTS PROJECT

INSTRUMENTATION
SYMBOLS & ABBREVIATIONS – I

Date: AUGUST 2016 | Scale: AS SHOWN
APPROVED: Deputy Director – Engineering
By _____ Date _____
DWN LP DATE:
CHK CAC DATE: 5-1-16
DES BS DATE: 5-1-16
Drw No. GN01 | Sheet ___ of XX | File Number: 2016-0018

Plot Date: 18-AUG-2016 1:17:19 PM
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DesignScript: Carollo_Std_Pen_v0905.pen PlotScale: 2:1
ColorTable: gshade.ctb
Model: Layout1

LTP PRIMARY TREATMENT STRUCTURE, SEISMIC UPGRADE

INSTRUMENT TAG IDENTIFICATION LETTERS

	MEASURED VARIABLE / INSTRUMENT FUNCTION	ELEMENT	TRANSMITTER	INDICATING TRANSMITTER	CONVERTER TRANSDUCER, RELAY SPECIAL DEVICES	INDICATOR	RECORDER	CONTROLLER	INDICATING CONTROLLER	RECORDING CONTROLLER	SWITCH	SWITCH LOW LOW	SWITCH LOW	SWITCH HIGH	SWITCH HIGH HIGH	SWITCH COMBINATION HIGH LOW	ACTION	ALARM LOW LOW	ALARM LOW	ALARM HIGH	ALARM HIGH HIGH	TOTALIZE INDICATOR TRANSMITTER	VALVE	GAUGE	LIGHT	SPEED SETTING
A	ANALYSIS	AE	AT	AIT	AY	AI	AR	AC	AIC	ARC	AS	ASLL	ASL	ASH	ASHH	ASHL		AALL	AAL	AAH	AAHH				AL	
B	BURNER FLAME	BE	BT	BIT	BY	BI	BR	BC	BIC	BRC	BS	BSLL	BSL	BSH	BSHH			BALL	BAL	BAH	BAHH				BL	
C	CONDUCTIVITY	CE	CT	CIT	CY	CI	CR	CC	CIC	CRC	CS	CSLL	CSL	CSH	CSHH	CSHL		CALL	CAL	CAH	CAHH				CL	
D	DENSITY	DE	DT	DIT	DY	DI	DR	DC	DIC	DRC	DS	DSLL	DSL	DSH	DSHH	DSHL		DALL	DAL	DAH	DAHH				DL	
E																										
F	FLOW	FE	FT	FIT	FY	FI	FR	FC	FIC	FRC	FS	FSLL	FSL	FSH	FSHH	FSHL		FALL	FAL	FAH	FAHH	FQI	FCV	FG	FL	
FF	FLOW RATIO				FFY	FFI		FFC	FFIC		FFS														FFL	
G	GAUGING (DIMENSION)																									
H	HAND (MANUAL)*							HC			HS*						HA*						HV		HL	HSS
I	CURRENT		IT	IIT	IY	II	IR	IC	IIC	IRC	IS	ISLL	ISL	ISH	ISHH			IALL	IAL	IAH	IAHH				IL	
J	POWER																									
K	TIME				KY	KI	KR	KC	KIC	KRC	KS	KSLL	KSL	KSH	KSHH			KALL	KAL	KAH	KAHH		KV		KL	
L	LEVEL	LE	LT	LIT	LY	LI	LR	LC	LIC	LRC	LS	LSLL	LSL	LSH	LSHH	LSHL		LALL	LAL	LAH	LAHH		LCV	LG	LL	
M	MOISTURE OR HUMIDITY	ME	MT	MIT	MY	MI	MR	MC	MIC	MRC	MS	MSLL	MSL	MSH	MSHH			MALL	MAL	MAH	MAHH				ML	
N	EMERGENCY SHUTDOWN																									
O																										
P	PRESSURE OR VACUUM	PE	PT	PIT	PY	PI***	PR	PC	PIC	PRC	PS****	PSLL	PSL	PSH	PSHH	PSHL		PALL	PAL	PAH	PAHH		PCV		PL	
PD	DIFFERENTIAL PRESSURE		PDT	PDIT	PDY	PDI	PDR	PDC	PDIC	PDRC	PDS	PDSLL	PDSL	PDSH	PDSHH			PDALL	PDAL	PDAH	PDAHH		PDCV		PDL	
Q	QUANTITY	QE	QT	QIT	QY	QI	QR				QS	QSLL	QSL	QSH	QSHH			QALL	QAL	QAH	QAHH					
R	RADIOACTIVITY																									
S	SPEED	SE	ST	SIT	SY	SI	SR	SC	SIC	SRC	SS	SSLL	SSL	SSH	SSHH			SALL	SAL	SAH	SAHH					
T	TEMPERATURE	TE	TT	TIT	TY	TI	TR	TC	TIC	TRC	TS	TSLL	TSL	TSH	TSHH	TSHL		TALL	TAL	TAH	TAHH		TCV		TL	
TD	DIFFERENTIAL TEMPERATURE		TDT	TDIT	TDY	TDI	TDR	TDC	TDIC	TDRC	TDS	TDSLL	TDSL	TDSH	TDSHH			TDALL	TDAL	TDAH	TDAHH		TDCV		TDL	
U	MULTIVARIABLE					UI	UR	UC	UIC	URC	US														UL	
V	VISCOSITY	VE	VT	VIT	VY	VI	VR	VC	VIC	VRC	VS	VSLL	VSL	VSH	VSHH			VALL	VAL	VAH	VAHH				VL	
W	WEIGHT	WE	WT	WIT	WY	WI	WR				WS	WSLL	WSL	WSH	WSHH			WALL	WAL	WAH	WAHH					
X	UNCLASSIFIED	XE	XT	XIT	XY	XI	XR	XC	XIC	XRC	XS	XSLL	XSL	XSH	XSHH			XALL	XAL	XAH	XAHH		XCV	XG	XL	
XV	VIBRATION	XVE	XVT		XVY	XVI	XVR				XVS			XVSH	XVSHH					XVAH	XVAHH				XVL	
Y	STATUS***					YI***																			YL	
Z	POSITION	ZE	ZT	ZIT	ZY	ZI					ZS**												ZV		ZL**	

* REFER TO OPERATOR PILOT DEVICE LEGEND
** LETTER INDICATES POSITION (O=OPEN, C=CLOSED, R=RAISE, L=LOWER, ETC)
*** PI# # = 1,2,3 ETC. AND REPRESENTS A UNIQUE IDENTIFIER AND IS APPLICABLE TO ALL ITEMS IN THE TABLE ABOVE
**** COULD ALSO BE PIS - FOR PRESSURE INDICATING SWITCH

OPERATOR PILOT DEVICE LEGEND

DEVICE TYPE / PILOT DEVICE FUNCTION	LOCAL-OFF-REMOTE (LOR) OR LOCAL-STOP-REMOTE (LSR)	STOP (SP)	START (ST)	HAND-OFF-AUTO (HOA)	OFF-ON (OO)	SELECT (SEL)	OPEN-STOP-CLOSE (OSC)	JOG OPEN-HOLD-CLOSE (JOHC)	SEMIAUTO-AUTO-MANUAL (SAAM)	LEAD-LAG-STANDBY (LLGS)	JOG OPEN-JOG CLOSE (JOJC)	ONLINE-OFFLINE (OLOF)	AUTO-MANUAL (AM)	FIXED RATE-LEVEL RATE (FRLR)	OPEN-CLOSE (OC)	NO OFFLINE-OFFLINE TRANSITION (NOOT)	LOW-HIGH (LH)	RESET (RST)	SPEED (SPD)	START-STOP (STSP)	E-STOP (E-SP)	BYPASS (BYP)			POSITION (POS)
PILOT DEVICE TAG (HAND SWITCHES)	HSA*	HSB	HSC	HSD*	HSE	HSF	HSG*	HSH*	HSI	HSJ*	HSK*	HSL*	HSM*	HSN	HSO*	HSP	HSQ*	HSR	HSS	HST*	HSU	HSV	HSW	HSX	HSZ
SCADA/HMI TAG (HAND ACTION)	HAA	HAB	HAC	HAD	HAE	HAF	HAG	HAH	HAI	HAJ	HAK	HAL	HAM	HAN	HAO	HAP	HAQ	HAR	HAS	HAT	HAU	HAV	HAW	HAX	HAZ

HSA* SELECTOR SWITCH POSITION EG: HSA(R) R = REMOTE, HSD(A) A = AUTO, ETC

I/O TYPE DESIGNATIONS

AUX1	RUNNING	MSL	MOTOR START LOW
AUX2	FAILED/FAULT	MSM	VALVE MODULATE
AUXF1	RUNNING FORWARD	MSP	MOTOR STOP
AUXH1	RUNNING HIGH	MSR	MOTOR START REVERSE
AUXL1	RUNNING LOW	MST	MOTOR START
AUXR1	RUNNING REVERSE	SS	SPEED SIGNAL
SVC	SOLENOID VALVE CLOSE	ZC	POSITION COMMAND
SVO	SOLENOID VALVE OPEN	ZCC	POSITION COMMAND CLOSE
MS	RUN	ZCO	POSITION COMMAND OPEN
MSF	MOTOR START FORWARD		
MSH	MOTOR START HIGH		

INSTRUMENT TYPE DESIGNATIONS

AM	AMMONIA	O3	OZONE	SC	STREAMING CURRENT
CAP	CAPACITANCE	ORP	OXIDATION REDUCTION POTENTIAL	SH	SODIUM HYPOCHLORITE
CG	COMBUSTIBLE GAS	P	PRESSURE	TDR	TIME DOMAIN REFLECTOMETRY
CL	CHLORINE	P-SUB	PRESSURE SUBMERSIBLE	TH	THERMAL
COND	CONDUCTIVITY	PC	PARTICLE COUNTER	TSS	TOTAL SUSPENDED SOLIDS
DO	DISSOLVED OXYGEN	PO	PHOSPHOROUS	TURB	TURBIDITY
FMCW	FREQ. MODULATED CONT. WAVE	PTOF	PULSE TIME OF FLIGHT	US	ULTRASONIC
HSF	FLUORIDE	R/I	RESISTANCE TO CURRENT	UVI	UV INTENSITY
IS	INTRINSIC SAFETY BARRIER	ROT	ROTAMETER	UVT	UV TRANSMITTANCE
LEL	LOWER EXPLOSIVE LIMIT	RTD	RESISTANCE TEMP DETECTOR	VAC	VACUUM
MAG	MAGNETIC				

SPECIFIC ABBREVIATIONS

APH	A PHASE	MWH	MOTOR WINDING HEATER
BPH	B PHASE	SSG	SECONDARY SWITCHGEAR
BRB	BEARING BOTTOM	SV*	SOLENOID VALVE
BRT	BEARING TOP	SPD	SURGE PROTECTIVE DEVICE
BTFLY	BUTTERFLY	UPS	UNINTERRUPTABLE POWER SUPPLY
CPH	C PHASE	YA	STATUS AUTO
CC*	CALIBRATION COLUMN * = 1, 2, 3, ETC.	YR	STATUS REMOTE
HTR	HEATER	Y1	STATUS RUNNING
HTU	HEAT TRACE UNIT	Y2	ALARM FAILED/FAULT

* CC# AND SV# # = 1, 2, 3 ETC. AND REPRESENTS A UNIQUE IDENTIFIER

INSTRUMENT LINE SYMBOLS

INSTRUMENT OR CONNECTION TO PROCESS
PNEUMATIC SIGNAL
ELECTRIC SIGNAL
HYDRAULIC SIGNAL — L — L — L — L — L —
CAPILLARY TUBE — X — X — X — X — X — X —
ELECTROMAGNETIC OR SONIC SIGNAL (GUIDED)
ELECTROMAGNETIC OR SONIC SIGNAL (NOT GUIDED)
INTERNAL SYSTEM LINK (SOFTWARE OR DATA LINK) — o — o — o — o — o — o —
COPPER ETHERNET — C — C — C — C — C —
FIBER OPTIC ETHERNET — F — F — F — F — F —
WIRELESS ETHERNET — W — W — W — W — W —
PROFIBUS DP — PBD — PBD — PBD — PBD — PBD —
PROFIBUS PA — PBA — PBA — PBA — PBA — PBA —
DEVICENET — DN — DN — DN — DN — DN —
FOUNDATION FIELDBUS — FF — FF — FF — FF — FF —

PROCESS LINE SYMBOLS

PRIMARY PROCESS FLOW IN PIPE
SECONDARY PROCESS FLOW IN PIPE
PRIMARY PROCESS FLOW IN CHANNEL
SECONDARY PROCESS FLOW IN CHANNEL

DESIGNATIONS

EQUIPMENT ENCLOSURE
EXISTING
FUTURE — FUTURE

MISCELLANEOUS P&ID SYMBOLS

CHEMICAL INJECTION POINT — CHEMICAL — SHEET NO.

CONTINUATION TAG — A — B — C — UNIQUE IDENTIFIER — CONTINUATION FROM SHEET — CONTINUATION TO SHEET

PIPE CALLOUT — PIPE SIZE

SIGNAL CONTINUATION — TO DRAWING — FROM DRAWING

CONTRACT NO. XXXXXX

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
0 — 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY

PRELIMINARY DESIGN SUBMITTAL
NOT FOR CONSTRUCTION

carollo® IN ASSOCIATION WITH Hazen

Date	Revision	By

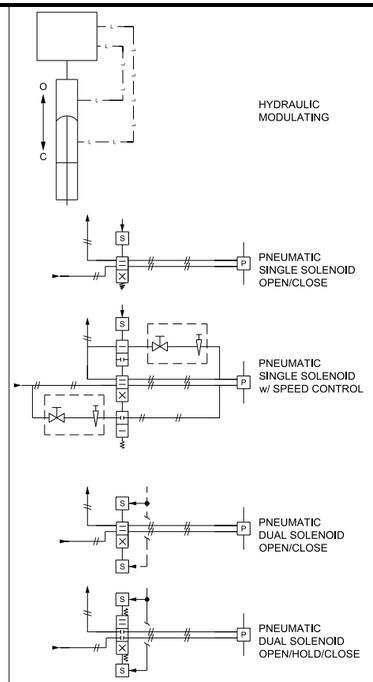
CITY OF SANTA ROSA
LAGUNA TREATMENT PLANT
DISINFECTION IMPROVEMENTS PROJECT

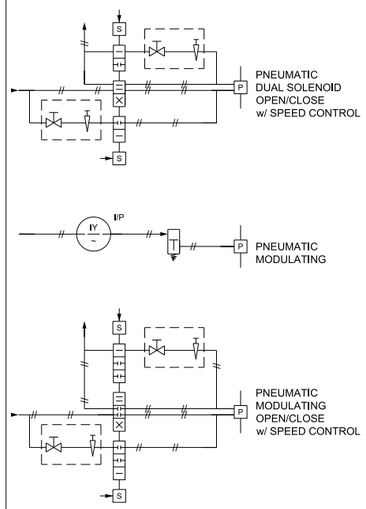
INSTRUMENTATION SYMBOLS & ABBREVIATIONS – II

Date: AUGUST 2016 Scale: AS SHOWN
APPROVED: Deputy Director – Engineering
By _____ Date _____
DWN LP DATE:
CHK CAC DATE: 5-1-16
DES BS DATE: 5-1-16
Drw No. GN02 Sheet ___ of XX
File Number: 2016-0018

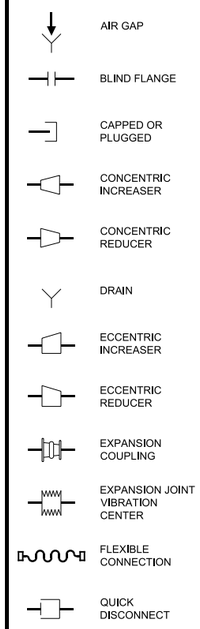
ACTUATORS

- DIAPHRAGM
- ELECTRIC DISCRETE
- ELECTRIC MODULATING
- ELECTRIC HYDRAULIC
- HAND
- HYDRAULIC
- PNEUMATIC
- SOLENOID

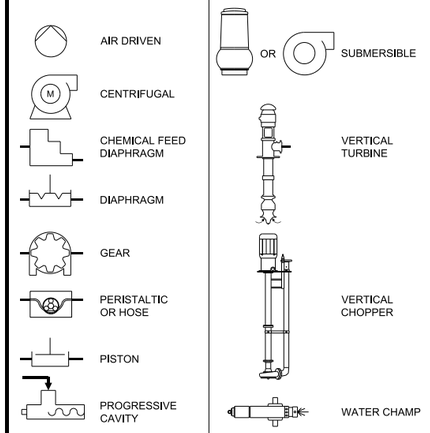




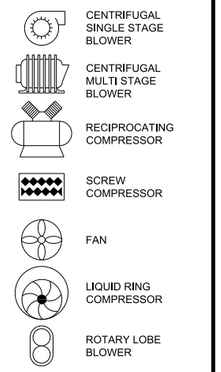
PIPING



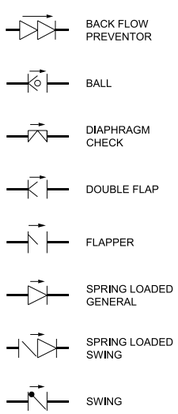
PUMPS



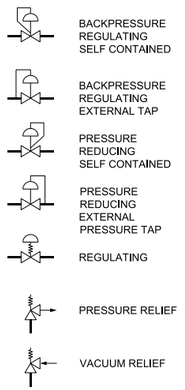
BLOWERS/ COMPRESSORS



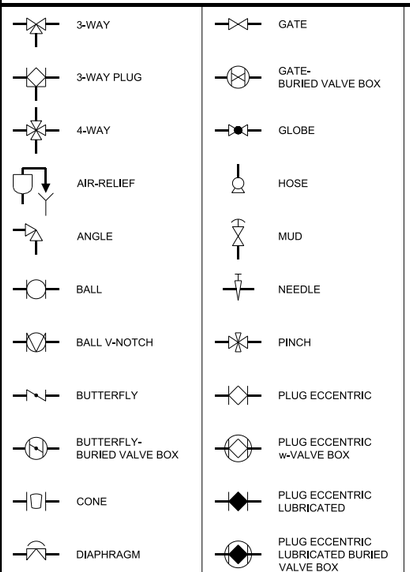
CHECK VALVES



PRESSURE VALVES

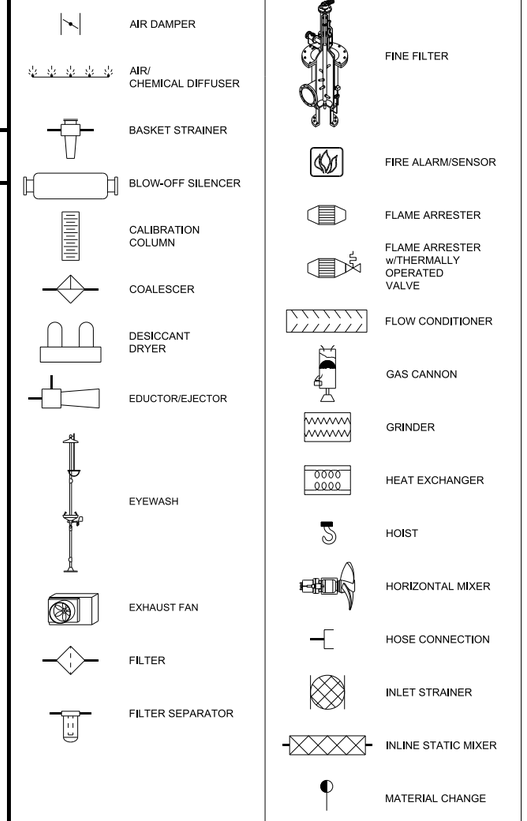


VALVES



VALVE DESIGNATIONS	
NO	NORMALLY OPEN
NC	NORMALLY CLOSED
FO	FAIL OPEN
FC	FAIL CLOSE
FLP	FAIL LAST POSITION

MISC



CONTRACT NO. XXXXXX

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carollo® IN ASSOCIATION WITH Hazen

Date	Revision	By

CITY OF SANTA ROSA

LAGUNA TREATMENT PLANT
DISINFECTION IMPROVEMENTS PROJECT

INSTRUMENTATION SYMBOLS & ABBREVIATIONS – III

Date: AUGUST 2016 Scale: AS SHOWN
APPROVED: Deputy Director – Engineering
By _____ Date _____

DWN LP DATE:
CHK CAC DATE: 5-1-16
DES BS DATE: 5-1-16

Drw No. GN03 File Number: 2016-0018
Sheet ___ of XX

LTP PRIMARY TREATMENT STRUCTURE, SEISMIC UPGRADE

GATES

SIDE VIEW

- SLIDE
- SLUICE
- STOP

PLAN VIEW

- FLAP
- KNIFE
- SLIDE
- SLUICE
- STOP
- WEIR

FLUMES

- LEOPOLD-LAGCO
- PALMER-BOWLUS
- PARSHALL
- REGULAR CUTTHROAT
- TRAPEZOIDAL

FLOW

- BATCH
- CORIOLIS
- MAGNETIC
- ORIFICE
- PADDLE WHEEL
- PITOT TUBE AVERAGING
- PITOT TUBE/ ANNUBAR
- POSITIVE-DISPLACEMENT
- PROPELLER-TURBINE
- ROTAMETER
- THERMAL
- ULTRASONIC DOPPLER
- ULTRA-SONIC TRANSIT TIME
- V-CONE
- VENTURI TUBE OR FLOW NOZZLE
- VORTEX

LEVEL

- BUBBLER
- CAPACITANCE
- DIFFERENTIAL PRESSURE (TANK, PDE, LDIT)
- ELECTRODE
- FLOAT
- INVERTED COLUMN
- RADAR PTOF
- RADAR TDR
- SUSPENDED/ SUBMERSIBLE
- TUNING FORK
- ULTRASONIC

TEMPERATURE

- TEMPERATURE w/THERMOWELL
- TEMPERATURE GAUGE
- THERMOMETER (T)

WEIGHT

- HYDRAULIC
- STRAIN GAUGE

WEIRS

- RECTANGULAR w/o END CONTRACTIONS
- RECTANGULAR w/ END CONTRACTIONS
- V-NOTCH (TRIANGULAR)
- TRAPEZOIDAL (CIPOLLETTI)

PRESSURE/VACUUM

PRESSURE

- GAUGE (PI)
- MANOMETER
- PRESSURE SWITCH (PSH, PE)
- PRESSURE TRANSMITTER (PIT, PE)

DIFFERENTIAL PRESSURE

- GAUGE DIFFERENTIAL INDICATOR (PDI)
- DIFFERENTIAL PRESSURE SWITCH (PDSL, PDE)
- DIFFERENTIAL PRESSURE TRANSMITTER (PDIT, PDE)

PRESSURE SEALS

- SEAL ANNULAR
- SEAL DIAPHRAGM
- SEAL SANITARY

EXAMPLE

- PRESSURE SWITCH (PSH, PE)

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CITY OF SANTA ROSA

LAGUNA TREATMENT PLANT
DISINFECTION IMPROVEMENTS PROJECT

INSTRUMENTATION
SYMBOLS & ABBREVIATIONS – IV

Date: AUGUST 2016 Scale: AS SHOWN
APPROVED: Deputy Director – Engineering
By _____ Date _____

DWN LP DATE:
CHK CAC DATE: 5-1-16
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Drw No. GN04 File Number: 2016-0018
Sheet ___ of XX

LTP PRIMARY TREATMENT STRUCTURE, SEISMIC UPGRADE

MCC-1201

PCM-300

TERMINAL | PANEL | PLC

PMP-210
UTILITY WATER PUMP
MOTOR:
25HP, 480VAC, 3Ø
INV, DUTY, TEFC
TOSHIBA MODEL: XYZ

PUMP
200 GPM @ 20 FT TDH
900-1800 RPM
GOULD MODEL: XYZ

P-01-001 J-BOX P-01-002

MWH 210 (H, C)
PMP 210 (T1, T2, T3)
TSH 210 (NC, C)

(MWH210-H/VFD210-33)
(MWH210-C/VFD210-X2)
(PMP210-T1/VFD210-T1)
(PMP210-T2/VFD210-T2)
(PMP210-T3/VFD210-T3)
(TSH210-NC/PCM300-CB1300H1)
(TSH210-C/PCM300-I001)

C-01-003 J-BOX

PE/PSH-210
UTILITY WATER HIGH PRESSURE
MODEL: XYZ
RANGE: 0-200 PSIG
SETPOINT: 50 PSIG

PE 210 PSH 210

C-01-001

(PSH210-1/PCM300-CB1300H2)
(PSH210-2/PCM300-C0001)

L-01-001

FE/FIT/FQT-210
UTILITY WATER FLOW METER
ENDRESS HAUSER
CAT NO,: XYZ
FLOW RANGE: 200-2500 GPM
FLOW TOTAL: 1 PULSE/500 GAL

FE 210 FIT 210 FQT 210

S-01-001 J-BOX S-01-003

S-01-002

LCP-210
HSS 210 (P1, P2, P3)
HSA 210 (OFF / LOCAL / REMOTE, xoo, oox)
HSB 210 (STOP)
HSC 210 (START)

C-01-002

(LCP210-P1/VFD210-1)
(LCP210-P2/VFD210-2)
(LCP210-P3/VFD210-3)
(LCP210-1/VFD210-5)
(LCP210-2/VFD210-6)
(LCP210-5/VFD210-7)
(LCP210-6/VFD210-8)
(LCP210-7/VFD210-9)
(LCP210-8/VFD210-10)

VFD-210
SECTION - 3
CUBICLE - 2
30HP, 480VAC, 42 AMPS

33 / X2 — MWH-210 MOTOR WINDING HEATER
T1 / T2 / T3 — MOTOR CONNECTION
SS-210 VFD SPEED OUT (11, 12)
SB-210 REMOTE SPEED IN (13, 14)
MSP-210 REMOTE STOP (15, 16)
E-STOP (23, 24)
MST-210 REMOTE START (17, 18)
AUX1-210 RUNNING (19, 20)
AUX2-210 FAIL (21, 22)
1, 2, 3, 4 — LOCAL SPEED IN
5, 6 — HSAL-210 LOCAL MODE
7, 8 — HSB-210 LOCAL STOP
9, 10 — HSC-210 LOCAL START

(VFD210-11,12/PCM300-AQ001)
(VFD210-13,14/PCM300-AI001)
(VFD210-15/PCM300-Q001A)
(VFD210-16/PCM300-Q001B)
(PSH210-1/PCM300-CB1300H2)
(VFD210-23/PCM300-C0002)
(VFD210-24/PCM300-C0003)
(PSH210-1/PCM300-C001)
(VFD210-17/PCM300-Q002A)
(VFD210-18/PCM300-Q002B)
(FIT210-L/PCM300-CB1210H)
(FIT210-N/PCM300-CB1210N)
(FIT210-1,2/PCM300-AI002)
(FQT210-4,5/PCM300-FU1300P3; C0004)
(VFD210-19/PCM300-CB13000H3)
(VFD210-20/PCM300-I003)
(VFD210-21/PCM300-CB1300H4)
(VFD210-22/PCM300-I004)
(LCP210-3/PCM300-CB1300H5)
(LCP210-4/PCM300-I006)

TERMINAL: AQ0001+, AQ0001-, SHLD, FU1300-P1, AI001+, FU1300-M1, SHLD, CB2300-H1, I001, Q001A, Q001B, CB2300-H2, C0002, C0003, C0001, Q002A, Q002B, CB1-210H, CB1-210N, GND, FU1300-P2, AI002+, FU1300-M2, SHLD, FU1300-P3, C0004, SHLD, CB1300-H3, I003, CB1300-H4, I004, CB1300-H5, I006, FU1-300M, FU1-300P, CB1-300H, CB1-300N

<BLK-1> <WHT-1> <BLK-1> <WHT-1> <BLK> <BLK> <RED> <BLU> <BLK-2> <WHT-2> <BLU> <ORG> <YEL>

(FU1300-M3) (C0004) (CB1300-H7) (I002)

PHOENIX MODEL: XYZ 120 VAC — CR1 210 (3, 1, 5, 4, 2, 6)
PHOENIX MODEL: XYZ 120 VAC — CR2 210 (3, 1, 5, 4, 2, 6)

(C0002) (C0003) (C0001) (CB1300-H6) (CB1-300N1) (I005)

120VAC

(FU1300-P) (CB1300-H) 24 VDC 120 VAC (CB1300-N)

PLC:
1, 2 — SS 210 — %AQ001 SPEED OUT — RACK 1 SLOT 2
1, 2 — SB 210 — %AI001 SPEED IN — RACK 1 SLOT 3
1, 2 — TSH 210 — %I001 MTR TEMP — RACK 1 SLOT 4
1, 2 — MSP 210 — %Q001 STOP — RACK 1 SLOT 5
9, 10 — PSH 210 — %I005 HI PRESS — RACK 1 SLOT 4
3, 4 — MST 210 — %Q002 START — RACK 1 SLOT 5
3, 4 — F 210 — %AI002 FLOW — RACK 1 SLOT 2
3, 4 — FQ 210 — %I002 FLOW TOT — RACK 1 SLOT 4
5, 6 — AUX1 210 — %I003 RUNNING — RACK 1 SLOT 4
7, 8 — AUX2 210 — %I004 FAIL — RACK 1 SLOT 4
11, 12 — HRAR 210 — %I006 REMOTE — RACK 1 SLOT 4

THE ABOVE DRAWING IS INCLUDED AS AN EXAMPLE ONLY AND IS NOT PROJECT SPECIFIC. CONTRACT SHALL FURNISH LOOP DIAGRAMS FOR THE ENTIRE FACILITY. PRELIMINARY DETAILED LOOP DIAGRAMS TO BE SUBMITTED FOR REVIEW PRIOR TO BEGINNING CONSTRUCTION. THE LOOP DIAGRAM SHOWN ABOVE DISPLAYS THE LEVEL OF EXPECTED DETAIL.

CONTRACT NO. XXXXXX

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Date	Revision	By

CITY OF SANTA ROSA

LAGUNA TREATMENT PLANT
DISINFECTION IMPROVEMENTS PROJECT

INSTRUMENTATION
SAMPLE LOOP DRAWING

Date: AUGUST 2016 Scale: AS SHOWN
APPROVED: Deputy Director – Engineering
By _____ Date _____
DWN LP DATE:
CHK CAC DATE: 5-1-16
DES BS DATE: 5-1-16
Drw No. GN05 Sheet ___ of XX
File Number: 2016-0018

LTP PRIMARY TREATMENT STRUCTURE, SEISMIC UPGRADE

GENERAL NOTES:

1. ONLY QUANTITY 1 OF 5 CHANNELS ARE SHOWN.

KEY NOTES:

1. HYDRAULIC LINES ARE SHOWN BUNDLED, BUT PROVIDE INDIVIDUAL HYDRAULIC LINES AS REQUIRED.
2. THERE ARE QUANTITY OF 4 PDC'S PER CHANNEL INSTRUMENTATION IS THE SAME FOR EACH PDC, ONLY TAG NUMBERS ARE DIFFERENT. FIRST AND LAST PDC AND BANK ARE SHOWN PER CHANNEL.
3. INSERT PIPE AND MAG METER AS SHOWN ON CALGON CARBON P&ID.

SCADA

CONTROL PANEL
PLC I/O

UV 100 — ENET/ IP — PLANT PLC

OPERATOR INTERFACE/ CONTROL DEVICES

ETHERNET/IP

POWER SOURCE

CB 100 — TM 120VAC–1P
CB 100 — TM 480VAC–3P
CB 101 — TM 480VAC–3P
CB 104 — TM 480VAC–3P
CB 100 — TM 480VAC–3P
CB 101 — TM 480VAC–3P

FIELD

SCC 100 FBV — SYSTEM CONTROL CENTER

HMI 100 FBV — HMI

LSL not LIT

POWER

AIT 100 FBV
AE 100 UVT FBV
LIT 100 FBV
LE 100 ULTRASONIC FBV
ZSOC 100
HSG 100 OSC
HSA 100 LSR
EDR 100
DISC 100
LSH 101 FBV
LSL 101 FBV
LE 101 FBV
LIT 102 FBV
LE 102 ULTRASONIC FBV
HSC 100 FBV
ZSOC 101
HSG 101 OSC
HSA 101 LSR
EDR 101
DISC 101

RS-485

PDC 101 FBV
PDC 104 FBV

AIT 101 FBV — AE 101 UVI FBV — ZSC 101 FBV
AIT 102 FBV — AE 102 UVI FBV — ZSC 102 FBV
AIT 103 FBV — AE 103 UVI FBV — ZSC 103 FBV
AIT 110 FBV — AE 110 UVI FBV — ZSC 110 FBV
AIT 111 FBV — AE 111 UVI FBV — ZSC 111 FBV
AIT 112 FBV — AE 112 UVI FBV — ZSC 112 FBV

BANK 1A — BANK 1B — BANK 1C — BANK 1J — BANK 1K — BANK 1L

E/M

SLG 100 — SLG 101

INFLUENT CHANNEL — BAFFLE PLATE — UV CHANNEL 1

CONTRACT NO. XXXXXX

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Date	Revision	By

CITY OF SANTA ROSA

LAGUNA TREATMENT PLANT
DISINFECTION IMPROVEMENTS PROJECT

P&ID UV DISINFECTION
TROJAN UVSIGNA(2 ROW)

Date: AUGUST 2016 | Scale: AS SHOWN
APPROVED: Deputy Director – Engineering
By _____ Date _____
DWN AD DATE:
CAC DATE: 5-1-16
BS DATE: 5-1-16
Drw N N01
Sheet ___ of XX
File Number: 2016-0018

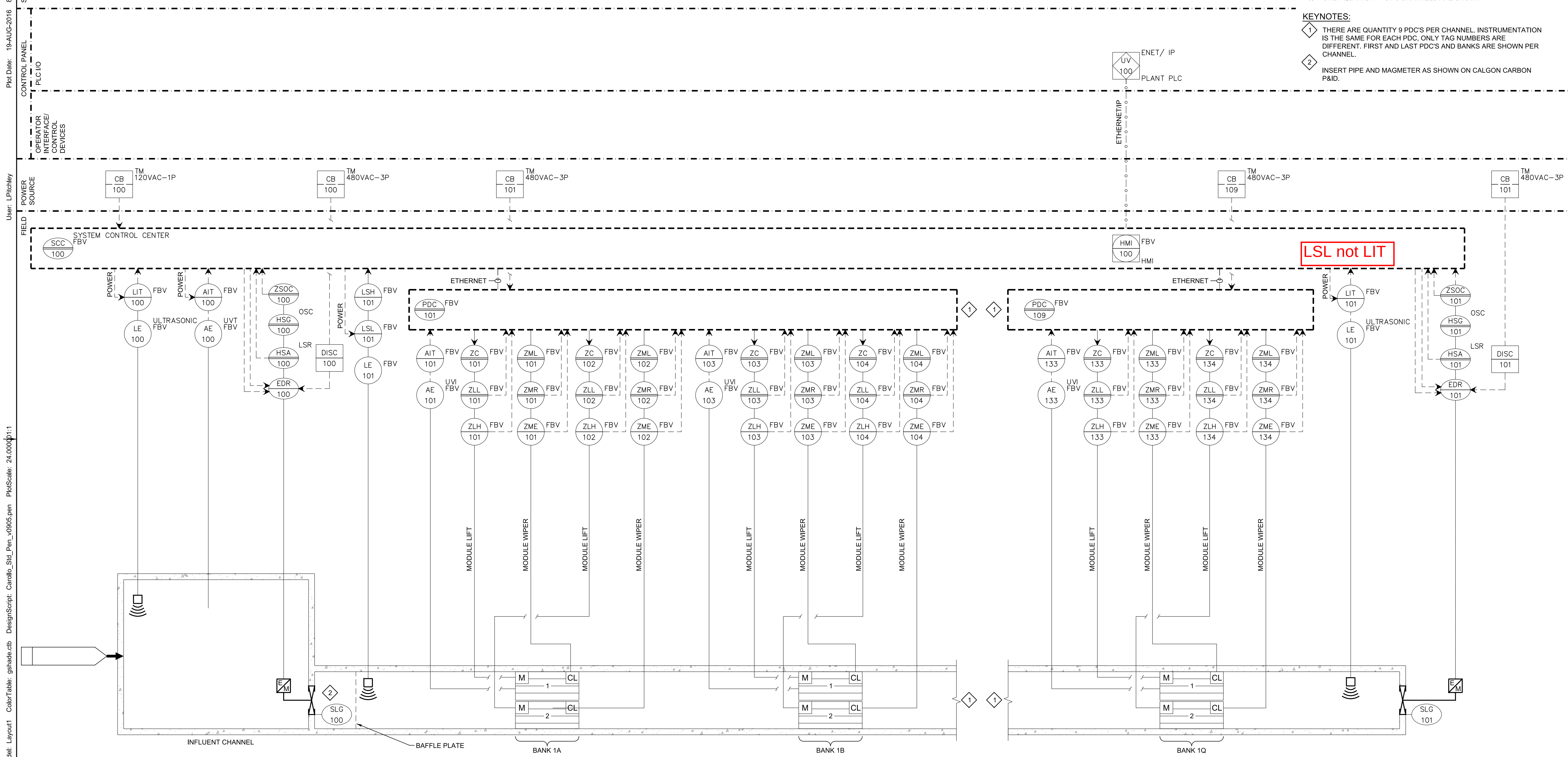
LTP PRIMARY TREATMENT STRUCTURE, SEISMIC UPGRADE

GENERAL NOTES:

1. PROVIDE LIFT AND WIPING CONTROL MODULES, ALONG WITH ASSOCIATED JUNCTION AND CONTROL (NOT SPECIFICALLY SHOWN), TO FACILITATE LIFT AND CLEANING FUNCTIONS.
2. LAST PDC ONLY HAS 1 UV BANK NOT 2.
3. ONLY QUANTITY 1 OF 6 CHANNELS ARE SHOWN

KEYNOTES:

1. THERE ARE QUANTITY 9 PDC'S PER CHANNEL. INSTRUMENTATION IS THE SAME FOR EACH PDC, ONLY TAG NUMBERS ARE DIFFERENT. FIRST AND LAST PDC'S AND BANKS ARE SHOWN PER CHANNEL.
2. INSERT PIPE AND MAGMETER AS SHOWN ON CALGON CARBON P&ID.



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Date	Revision	By

CITY OF SANTA ROSA

LAGUNA TREATMENT PLANT

DISINFECTION IMPROVEMENTS PROJECT

P&ID UV DISINFECTION WEDECO DURON

Date: AUGUST 2016 Scale: AS SHOWN

APPROVED: Deputy Director – Engineering

By____ Date ____

DWN AD DATE:

CHK CAC DATE: 5–1–16

DES BS DATE: 5–1–16

Drw No. N02

Sheet ___ of XX

File Number: 2016–0018

LTP PRIMARY TREATMENT STRUCTURE, SEISMIC UPGRADE

Model: Layout1 ColorTable: gshade.ctb DesignScript: Carollo_Std_Pen_v0905.pen PlotScale: 24.000001:1 User: LPitchley Plot Date: 19-AUG-2016 8:41:18 AM

GENERAL NOTES:

1. CL = CLEANING UNIT
2. UVR = UV REACTOR
3. ONLY QUANTITY 1 OF 6 CHANNELS ARE SHOWN.

KEY NOTES:

1. THERE ARE QUANTITY 5 PDC'S PER CHANNEL. INSTRUMENTATION IS THE SAME FOR EACH PDC, ONLY TAG NUMBERS ARE DIFFERENT. FIRST AND LAST PDC AND BANK ARE SHOWN PER CHANNEL.

SCADA

CONTROL PANEL PLC I/O

UV 001 — ENET/ IP — PLANT PLC

OPERATOR INTERFACE/ CONTROL DEVICES

ETHERNET/IP

POWER SOURCE

CB 001 — TM 120VAC–1P

CB 100 — TM 480VAC–3P

CB 123 — TM 480VAC–3P

CB 101 — TM 480VAC–3P

FIELD

PLC 001 FBV — UV SYSTEM MASTER PLC – PARTIAL

HMI 001 FBV — HMI

PLC 110 FBV — UV CHANNEL NO. 1 PLC

POWER

AIT 100 FBV — AE 100 UVT FBV

LIT 100 FBV — LE 100 ULTRASONIC FBV

ZSOC 100 — OSC — HSG 100 — LSR — HSA 100 — EDR 100 — DISC 100

FIT 103 FBV — FE 103 MAGNETIC FBV

LSH 104 FBV — LE 104 ULTRASONIC FBV

PDC 101 FBV — POWER DISTRIBUTION CENTER 1–1

LSL 115 FBV — LE 115 ULTRASONIC FBV

AIT 113 FBV — AE 113 UVT FBV

ZML 114 FBV — ZMR 114 FBV — ZME 114 FBV

1 — 1

PDC 105 FBV — POWER DISTRIBUTION CENTER 1–5

ZML 124 FBV — ZMR 124 FBV — ZME 124 FBV

LSL 125 FBV — LE 125 ULTRASONIC FBV

AIT 123 FBV — AE 123 UVT FBV

ZSOC 101 — OSC — HSG 101 — LSR — HSA 101 — EDR 101 — DISC 101

INFLUENT CHANNEL

E/M — SLG 100

MM

BAFFLE PLATE

CHANNEL NO. 1

UVR — UV BANK 1A

CL

1

UVR — UV BANK 1E

E/M — SLG 101

EFFLUENT CHANNEL

OUTFALL

Move LE/LSL in front of banks

CONTRACT NO. XXXXXX

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Date	Revision	By

LTP PRIMARY TREATMENT STRUCTURE, SEISMIC UPGRADE

GENERAL NOTES:

1. MOTORIZED CONTROL OF CLEANING SYSTEM.
2. THERE ARE 2 PDC'S PER CHANNEL AND EACH PDC POWERS QUANTITY 4 UV BANKS. EACH PDC AND UV BANK IS AS SHOWN.
3. ONLY QUANTITY 1 OF 6 CHANNELS ARE SHOWN.

KEY NOTES:

1. INSERT PIPE AND MAG METER AS SHOWN ON CALGON CARBON P&ID.

SCADA

CONTROL PANEL PLC I/O

UV 100 — ENET/ IP — PLANT PLC

OPERATOR INTERFACE/ CONTROL DEVICES

ETHERNET/IP

POWER SOURCE

CB 100 — TM 120VAC–1P — LP–UV

CB 100 — TM 480VAC–3P

CB 101 — TM 480VAC–3P

CB 101 — TM 480VAC–3P

FIELD

SCC 100 — SYSTEM CONTROL CENTER FBV

HMI 100 — FBV — HMI

LSL not LIT

POWER

LIT 100 — FBV — ULTRASONIC FBV — LE 100

AIT 100 — FBV — UVT FBV — AE 100

ZSOC 100 — HSG 100 — OSC — HSA 100 — LSR — EDR 100 — DISC 100

LSH 101 — FBV — LSL 101 — FBV — LE 101 — FBV

ETHERNET

PDC 101 — FBV

XY 102 — FBV — AIT 101 — FBV — UVI FBV — AE 101 — XY 101 — FBV

ZSC 101 — FBV — ZSC 102 — FBV

XY 104 — FBV — AIT 103 — FBV — UVI FBV — AE 103 — XY 103 — FBV

ZSC 103 — FBV — ZSC 104 — FBV

LIT 101 — FBV — ULTRASONIC FBV — LE 101

ZSOC 101 — HSG 101 — OSC — HSA 101 — LSR — EDR 101 — DISC 101

BAFFLE PLATE

E/M — 3 — SLG 100

M — 1 — M — 2 — BANK 1A

M — 1 — M — 2 — BANK 1B

E/M — SLG 101

INFLUENT CHANNEL

CONTRACT NO. XXXXXX

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CITY OF SANTA ROSA

LAGUNA TREATMENT PLANT
DISINFECTION IMPROVEMENTS PROJECT

P&ID UV DISINFECTION
OZONIA AQUARAY 3X

Date: AUGUST 2016 | Scale: AS SHOWN

APPROVED: Deputy Director – Engineering

By _____ Date _____

DWN AD DATE:
CHK CAC DATE: 5–1–16
DES BS DATE: 5–1–16

Drw No. N04 | Sheet ___ of XX | File Number: 2016–0018

LTP PRIMARY TREATMENT STRUCTURE, SEISMIC UPGRADE