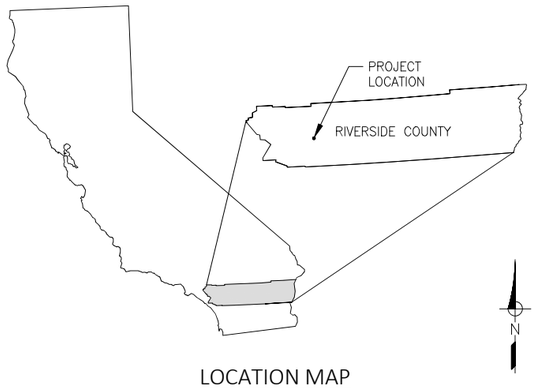
Appendix A1 – 30% Drawings

IDYLLWILD WASTEWATER TREATMENT PLANT

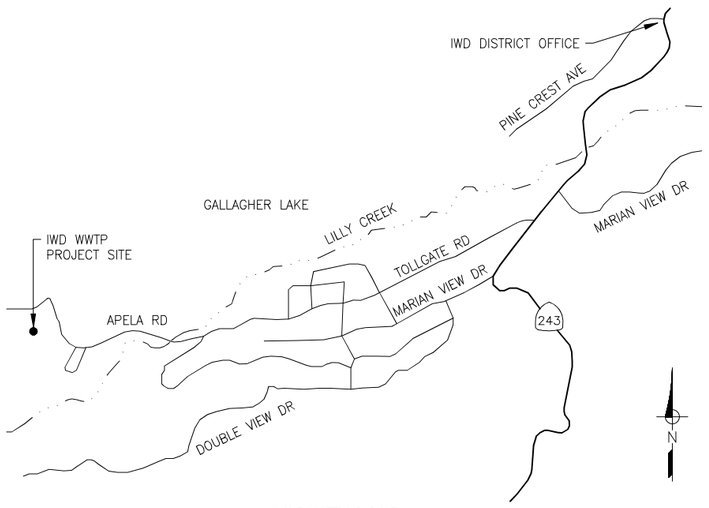
SEPTEMBER 2024

30% DRAFT



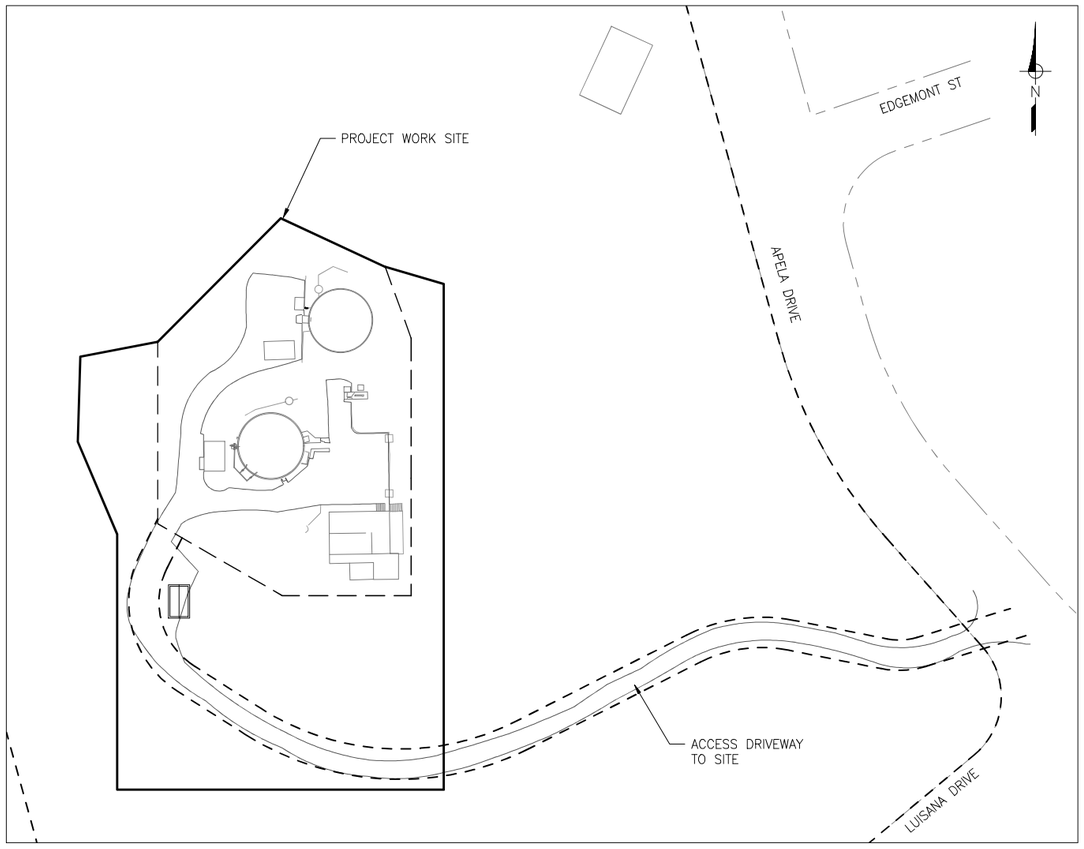
LOCATION MAP

NTS



VICINITY MAP

NTS



PROJECT MAP

1"=50'

PLAN APPROVAL:

REVIEWED FOR CONFORMANCE WITH THE IDYLLWILD.....?? STANDARDS AND REQUIREMENTS. APPROVAL FOR CONSTRUCTION IS SUBJECT TO THE INFORMATION SHOWN HEREIN. THE IDYLLWILD.....?? AND THE UNDERSIGNED ARE NOT RESPONSIBLE FOR ANY ERRORS OR OMISSIONS THAT MAY EXIST IN THESE PLANS.

NAME, TITLE DATE

SHEET INDEX

OWNER

IDYLLWILD WATER DISTRICT
LEO HAVENER, GENERAL MANAGER
25945 HWY 243
IDYLLWILD, CA 92549-0397
OFFICE: (951) 659-2143

ENGINEER

NATHAN THOMAS
SENIOR ENGINEER
1234 NORTH MARKET BLVD
SACRAMENTO, CA 95834
(916) 553-4900

California Rural Water Association

C R W A
1234 N MARKET BLVD
SACRAMENTO, CA 95834
(916) 553-4900

AS NOTED

ONE INCH AT FULL SCALE

DIGALERT

CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG

IDYLLWILD TREATMENT PLANT

COVER SHEET

IDYLLWILD, CA

DRAFT -- NOT FOR CONSTRUCTION

DATE:	9/5/24
DESIGN:	NMT
DRAWN:	MAH
CHECKED:	NMT

NO.	REVISIONS	BY	APP	DATE

SHEET 1 OF X

G1

GENERAL NOTES:

1. ALL DRILLING AND CONSTRUCTION ACTIVITIES SHALL CONFORM TO THE 2019 EDITION OF THE CALIFORNIA BUILDING CODE (CBC) AND THE CONTRACT DOCUMENTS.
2. IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN ALL PERMITS NECESSARY TO COMPLETE THE WORK.
3. THE CONTRACTOR SHALL AT THE TIME OF BIDDING, AND THROUGHOUT THE PERIOD OF THE CONTRACT, RETAIN A CALIFORNIA CONTRACTORS' LICENSE CLASS 'A' IN GOOD STANDING.
4. THE CONTRACTOR SHALL SCHEDULE A PRE-CONSTRUCTION MEETING AT THE JOB SITE WITH THE OWNER, SUBCONTRACTORS, AND AFFECTED AGENCIES AT LEAST TWO WORKING DAYS PRIOR TO STARTING THE WORK.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ACCURATE VERTICAL AND HORIZONTAL CONTROL THROUGHOUT THE PROJECT.
6. CONTRACTOR SHALL CONTROL DUST GENERATED BY DRILLING AND CONSTRUCTION ACTIVITIES.
7. THE OWNER WILL PROVIDE WATER FOR DRILLING. THE CONTRACTOR SHALL COORDINATE WITH THE OWNER PRIOR TO CONNECTING TO WATER. THE MANIPULATION OF EXISTING VALVES SHALL BE DONE BY BOX SPRINGS MWC PERSONNEL.
8. CONTRACTOR SHALL CONTAIN WATER FROM DRILLING AND CONSTRUCTION ACTIVITIES ON-SITE AND DISPOSE OF OFF-SITE AFTER CLARIFICATION.
9. REGULAR HOURS OF WORK WILL BE LIMITED TO 7AM TO 6PM, MONDAY THROUGH FRIDAY. THE CONTRACTOR MUST SUBMIT A WRITTEN REQUEST FOR APPROVAL BY THE OWNER AT LEAST TWO WORKING DAYS IN ADVANCE TO WORK DURING OTHER HOURS, WEEKENDS, OR HOLIDAYS.
10. THE CONTRACTOR MUST MAINTAIN ALL-WEATHER ACCESS TO THE SITE AT ALL TIMES DURING CONSTRUCTION.
11. THE CONTRACTOR'S OPERATIONS SHALL CONFORM TO THE RULES AND REGULATIONS OF U.S. OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA).
12. SITE ENTRY AND EXIT LOCATIONS SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OF MUD OR DEBRIS OR FLOWING SEDIMENT ONTO PUBLIC RIGHT OF WAYS INCLUDING SIDEWALKS AND PLANTED AREAS. ALL SEDIMENT SPILLED, DRILLED, WASHED, OR TRACKED ON A PUBLIC RIGHT OF WAY MUST BE REMOVED IMMEDIATELY. ALL FINES IMPOSED FOR TRACKING ONTO PUBLIC RIGHT OF WAY SHALL BE PAID BY THE CONTRACTOR.
13. THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR OR LIABLE FOR UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND BE APPROVED BY THE PREPARER OF THESE PLANS. THE ENGINEER ASSUMES NO RESPONSIBILITY BEYOND THE ADEQUACY OF THE DESIGN CONTAINED HEREIN.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR REPORTING ALL CONFLICTS, ERRORS, OMISSIONS, ETC. TO THE ENGINEER IMMEDIATELY UPON DISCOVERY. IF SO DIRECTED BY THE ENGINEER, THE CONTRACTOR SHALL STOP WORK UNTIL MITIGATION CAN BE MADE. ANY COSTS INCURRED RESULTING FROM THE CONTRACTOR'S FAILURE TO STOP WORK AS DIRECTED SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR.
15. SHOULD IT APPEAR THAT THE WORK TO BE DONE, OR RELATED ACTIVITY, IS NOT SUFFICIENTLY DETAILED OR EXPLAINED ON THESE PLANS, THE CONTRACTOR SHALL CONTACT CRWA AT (916) 553-4900 FOR FURTHER EXPLANATION.
16. AT THE CONCLUSION OF ITS WORK, THE CONTRACTOR SHALL REPAIR OR REPLACE IN KIND ALL DAMAGED PROPERTY (PUBLIC AND PRIVATE) FOR WHICH HE IS RESPONSIBLE. THE WORK SITE AND ADJACENT AREAS SHALL BE CLEANED UP. THIS REPAIR AND REPLACEMENT, AND CLEAN-UP WORK SHALL BE SUBJECT TO THE APPROVAL AND ACCEPTANCE OF THE OWNER.
17. CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE CALIFORNIA BUILDING CODE (CBC) CURRENT EDITION AND APPLICABLE STATE AND LOCAL CODES.
18. THE CONTRACTOR SHALL BE IN RECEIPT OF APPROVED PLANS PRIOR TO BEGINNING ANY IMPROVEMENTS.
19. WHERE THE DRAWINGS OR SPECIFICATIONS DESCRIBE PORTIONS OF THE WORK IN GENERAL TERMS BUT NOT IN COMPLETE DETAIL, IT IS UNDERSTOOD THAT ONLY THE BEST GENERAL PRACTICE IS TO PREVAIL AND THAT ONLY MATERIALS AND WORKMANSHIP OF THE BEST QUALITY ARE TO BE USED.
20. THE LOCATIONS OF EXISTING UNDERGROUND FACILITIES (INCLUDING UTILITIES) SHOWN ON THESE DRAWINGS WERE OBTAINED BY SEARCH OF AVAILABLE RECORDS. THE CONTRACTOR IS REQUIRED TO TAKE PRECAUTIONARY MEASURES TO PROTECT ANY EXISTING FACILITY WHETHER OR NOT SHOWN, AND IS RESPONSIBLE FOR CORRECTING ANY DAMAGE TO EXISTING FACILITIES. THE CONTRACTOR SHALL CONTACT UNDERGROUND SERVICE ALERT (1-800-422-4133) TO OBTAIN A U.S.A. IDENTIFICATION NUMBER AND TO HAVE EXISTING UTILITIES LOCATED.
21. LOCATION AND ELEVATION OF EXISTING IMPROVEMENTS SHALL BE CONFIRMED BY FIELD MEASUREMENTS PRIOR TO CONSTRUCTION OF NEW WORK. CONTRACTOR SHALL MAKE EXPLORATORY EXCAVATIONS AND LOCATE EXISTING UNDERGROUND FACILITIES. RESOLVE CONFLICTS BETWEEN EXISTING CONDITIONS AND INFORMATION SHOWN ON THE DRAWINGS WITH THE ENGINEER BEFORE PROCEEDING WITH CONSTRUCTION.
22. THE TYPES, LOCATIONS, SIZES, AND DEPTHS OF EXISTING UNDERGROUND UTILITIES SHOWN ON THESE DRAWINGS WERE OBTAINED FROM SOURCES OF VARYING RELIABILITY. THE CONTRACTOR IS CAUTIONED THAT ONLY EXCAVATION WILL REVEAL THE TYPE, EXTENT, SIZE, LOCATION, AND DEPTH OF SUCH UNDERGROUND UTILITIES. A REASONABLE EFFORT HAS BEEN MADE TO LOCATE UNDERGROUND UTILITIES, HOWEVER THE ENGINEER CAN ASSUME NO RESPONSIBILITY FOR THE COMPLETENESS OR ACCURACY OF ITS DELINEATION OF SUCH UNDERGROUND UTILITIES, NOR THE EXISTENCE OF OTHER FACILITIES NOT SHOWN ON THE DRAWINGS.
23. THE CONTRACTOR SHALL BE SOLELY AND COMPLETELY RESPONSIBLE FOR FURNISHING, INSTALLING AND MAINTAINING ALL WARNING SIGNS AND DEVICES NECESSARY TO SAFEGUARD THE GENERAL PUBLIC AND THE WORK, AND TO PROVIDE FOR PROPER AND CONTINUOUS SAFE ROUTING OF VEHICLE AND PEDESTRIAN TRAFFIC DURING WORK. THIS REQUIREMENT SHALL APPLY CONTINUOUSLY AND NOT LIMITED TO WORKING HOURS.
24. ALL CONSTRUCTION EQUIPMENT, STOCKPILES, AND MATERIALS MUST BE CONTAINED IN THE CONSTRUCTION AREAS AS SHOWN IN THE PLANS.
25. WATER LINES SHALL HAVE A MINIMUM OF 30 INCHES OF COVER, UNLESS OTHERWISE NOTED.
26. ALL DIFFERING PIPE MATERIAL SHALL BE DIELECTRICALLY SEPARATED.
27. CONTRACTOR SHALL PROVIDE ALL NECESSARY FITTINGS AND APPURTENANCES. PIPE FITTINGS 4 INCHES AND LARGER SHALL BE DUCTILE IRON, MANUFACTURED IN ACCORDANCE WITH REQUIREMENTS OF AWWA C-110 OR C-153. PROVIDE ASPHALT OUTSIDE COATING ON ALL BURIED DUCTILE IRON FITTINGS, VALVES, AND OTHER APPURTENANCES. USE BITUMINOUS REPAIR COATING OVER EXPOSED HARDWARE AND DAMAGED AREAS. WRAP ALL IN POLYETHYLENE SHEET, LAPPED MINIMUM ONE FOOT, AND TAPED.
28. ALL BOLTED PIPE CONNECTIONS AND FITTINGS WHETHER FLANGE TO FLANGE TYPE OR SPECIALIZED MECHANICAL JOINTS, SHALL USE STAINLESS STEEL BOLTS, WASHERS, AND NUTS. IRON BOLTS WILL BE ACCEPTABLE WHEN SPECIAL BOLTED CONNECTORS, SUCH AS "T" SHAPED BOLTS, ARE NOT AVAILABLE IN STAINLESS STEEL.
29. ALL BURIED PIPING SHALL BE MECHANICALLY RESTRAINED. NO THRUST BLOCKS ARE ALLOWED.
30. WATER SERVICE IS NOT TO BE INTERRUPTED FOR MORE THAN 4 HOURS AT A TIME. THE CONTRACTOR SHALL MEET WITH THE ENGINEER AND BOX SPRINGS MWC ONE WEEK PRIOR TO THE START OF WORK TO DISCUSS CONSTRUCTION REQUIREMENTS AND SERVICE INTERRUPTIONS.
31. THE CONTRACTOR SHALL MAINTAIN EXISTING WATER FACILITIES WITHIN THE CONSTRUCTION AREA UNTIL THE NEW WATER IMPROVEMENTS ARE FUNCTIONING AND ACCEPTED.
32. CONTRACTOR SHALL PROVIDE AT LEAST TWO WORKING DAYS ADVANCE NOTICE TO BOX SPRINGS MWC PRIOR TO CONNECTING TO EXISTING FACILITIES. THE MANIPULATION OF EXISTING VALVES SHALL BE DONE BY BOX SPRINGS MWC PERSONNEL.
33. CONTRACTOR'S OPERATIONS SHALL CONFORM TO THE RULES AND REGULATIONS OF THE STATE OF CALIFORNIA CONSTRUCTION SAFETY ORDERS PERTAINING TO TRENCHES AND EXCAVATIONS.
34. WORK SHALL BE SUBJECT TO THE INSPECTION AND APPROVAL OF BOX SPRINGS MWC. WORK SHALL NOT BE BACKFILLED OR COVERED PRIOR TO INSPECTION AND APPROVAL. REJECTED WORK SHALL BE REDONE AT THE CONTRACTOR'S EXPENSE.
35. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING SURVEY MONUMENTS OR MARKERS. MONUMENTS OR MARKERS DESTROYED, DURING CONSTRUCTION SHALL BE REPLACED AT THE CONTRACTORS EXPENSE.
36. IF ANY CULTURAL FEATURES OR ARCHAEOLOGICAL MATERIALS ARE UNCOVERED DURING GRADING, TRENCHING, OR OTHER EXCAVATION WORK, ALL WORK WITHIN ONE HUNDRED FEET OF THESE MATERIALS SHALL BE STOPPED UNTIL A PROFESSIONAL ARCHAEOLOGIST HAS HAD AN OPPORTUNITY TO EVALUATE THE SIGNIFICANCE OF THE FIND AND APPROPRIATE MITIGATION MEASURES ARE DETERMINED AND IMPLEMENTED.
37. GROUND MEASUREMENTS REPORTED ARE CERTIFIED TO AN ACCURACY OF +/- 0.3' HORIZONTAL AND VERTICAL. VERTICAL DATUM IS NAVD88 BASED ON 6.0 HR STATIC GPS OCCUPATION PROCESSED THROUGH NGS OPUS. TEMPORARY BENCHMARK DESCRIPTIONS ARE AVAILABLE UPON REQUEST TO SONOMA LAND SERVICES (707) 496-1796.
38. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE TO THE ENGINEER RECORD DRAWINGS INCORPORATING FIELD CHANGES. THIS RECORD DRAWINGS PLAN SET SHALL BE USED TO VERIFY ANY MODIFICATIONS TO THE CONTRACT QUANTITIES AND MUST BE SUBMITTED PRIOR TO INVOICING THE FINAL PROGRESS BILLING.

ABBREVIATIONS:

AB	AGGREGATE BASE
AC	ASPHALT CONCRETE
ARV	AIR RELEASE VALVE
BLDG	BUILDING
CLR	CLEARANCE
DDCV	DOUBLE DETECTOR CHECK VALVE
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
(E)	EXISTING
EL	ELEVATION
EM	ELECTROMAGNETIC FLOW METER
EW	EACH WAY
FCA	FLANGE COUPLING ADAPTOR
FG	FINISHED GRADE
FH	FIRE HYDRANT
FL	FLANGED
FT	FEET
GALV	GALVANIZED
GV	GATE VALVE
HP	HORSEPOWER
IE	INVERT ELEVATION
LAT	LATITUDE
LONG	LONGITUDE
LF	LEAD FREE
MFR	MANUFACTURER
MAX	MAXIMUM
MIN	MINIMUM
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DIAMETER
PCC	PORTLAND CEMENT CONCRETE
PSI	POUNDS PER SQUARE INCH
PVC	POLYVINYL CHLORIDE
RAS	RETURN ACTIVATED SLUDGE
REQ'D	REQUIRED
SCH	SCHEDULE
SF	SQUARE FEET
SS	SANITARY SEWER
SST	STAINLESS STEEL
SQ	SQUARE
TEL	TELEPHONE
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
W	WATER
WAS	WASTE ACTIVATED SLUDGE

STANDARD SYMBOLS LEGEND:

PROPOSED:		EXISTING:
12"SD	STORM DRAIN & SIZE	12"SD
6"SS	SANITARY SEWER & SIZE	6"SS
3"SS	SANITARY SEWER FORCEMAIN & SIZE	3"SS
10"W	WATER MAIN & SIZE	10"W
3"A	PRESSURIZED AIR LINE & SIZE	3"A
	MANHOLE	
	DRAIN INLET	
	CLEANOUT	
	FIRE HYDRANT	
	BLOWOFF VALVE	
	WATER METER	
	BACKFLOW ASSEMBLY	
	GATE VALVE	
	CHECK VALVE	
	BUTTERFLY VALVE	
	BLIND FLANGE	
	PLUG VALVE	
E E	ELECTRICAL TRENCH	E
G	GAS TRENCH	G
T	TELEPHONE/CABLE LINE (BURIED)	T
N/A	OVERHEAD ELECTRICAL	OHE
N/A	OVERHEAD TELECOMMUNICATIONS	OHT
N/A	PROPERTY LINE	
N/A	CENTERLINE	
X X	FENCE	X X
	WOOD WALL	
	CONCRETE WALL	
75.5	GROUND ELEVATION	75.5
	SHEET DRAINAGE FLOW	
N/A	POWER POLE	
N/A	ELECTRICAL UTILITY FEATURE	E
N/A	WATER UTILITY FEATURE	W
N/A	GAS METER	G

California Rural Water Association

C R W A
1234 N MARKET BLVD
SACRAMENTO, CA 95834
(916) 553-4900

NO SCALE
ONE INCH AT FULL SCALE

DIGALERT
CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG

IDYLLWILD TREATMENT PLANT

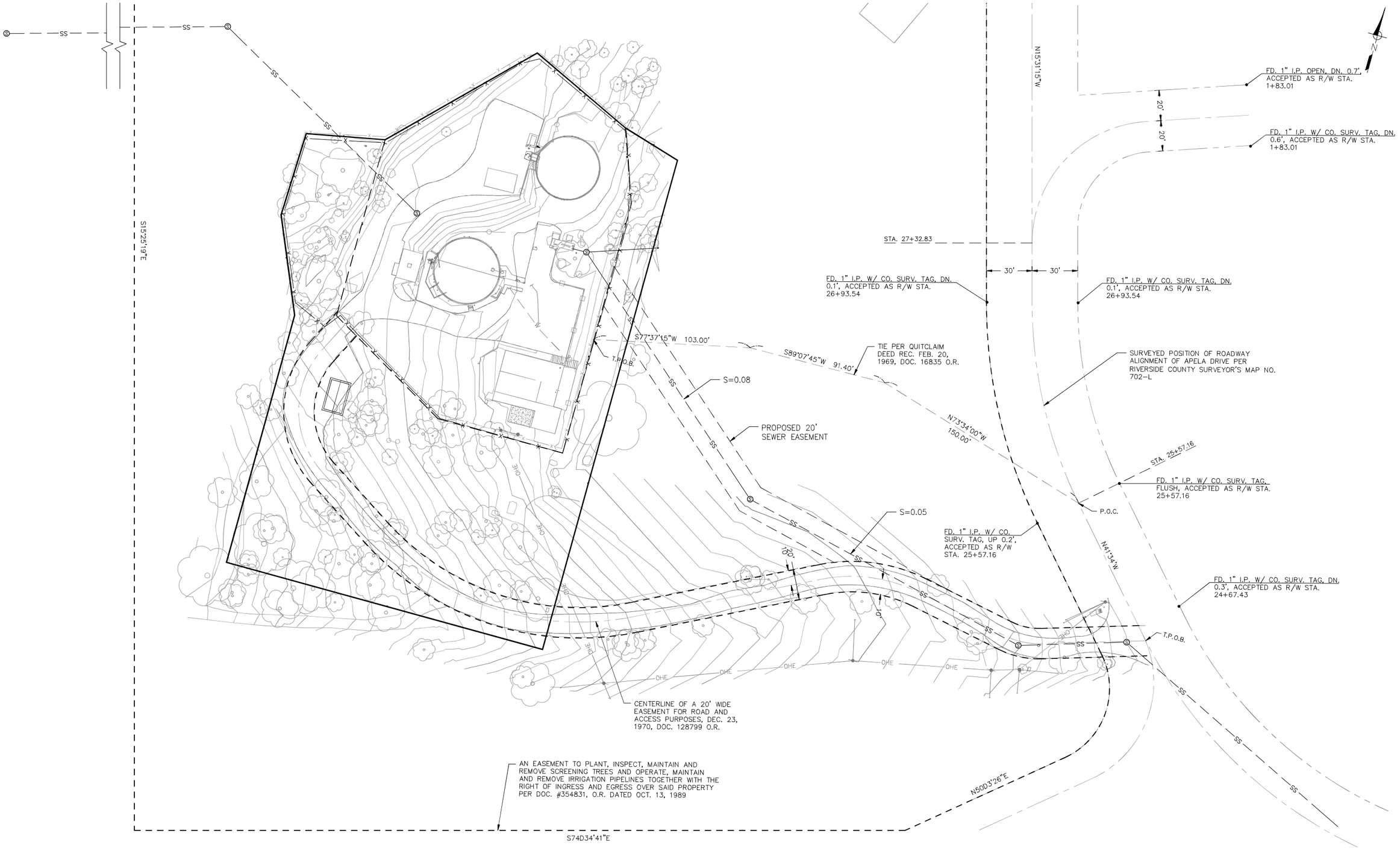
NOTES, LEGEND, & ABBREVIATIONS

IDYLLWILD, CA

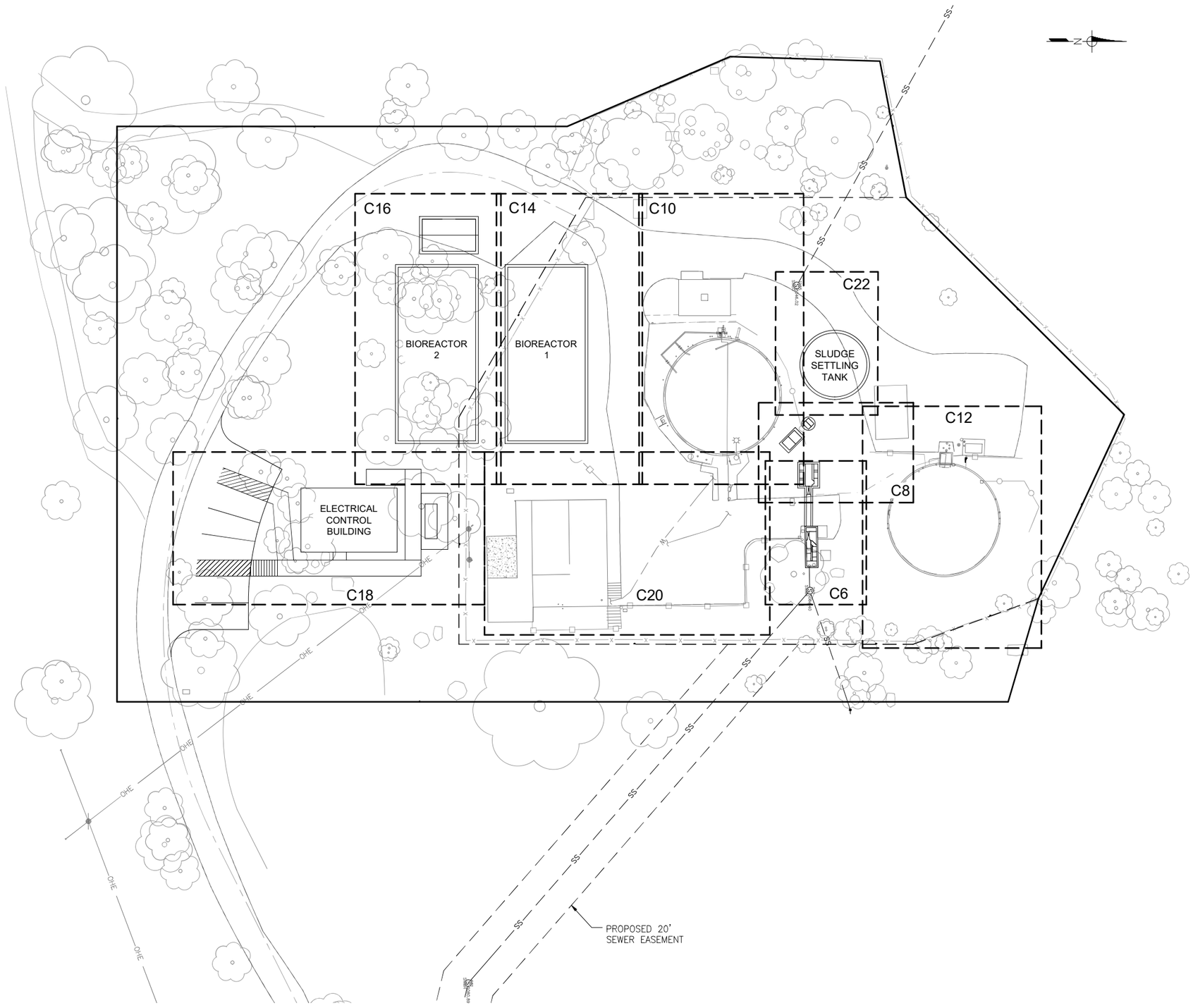
DRAFT -- NOT FOR CONSTRUCTION

DATE:	9/5/24
DESIGN:	NMT
DRAWN:	MAH
CHECKED:	NMT

NO.	REVISIONS	BY	APP	DATE



California Rural Water Association	C R W A 1234 N MARKET BLVD SACRAMENTO, CA 95834 (916) 553-4900	1"=30' ONE INCH AT FULL SCALE	DIGALERT CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG	IDYLLWILD WATER DISTRICT	IDYLLWILD TREATMENT PLANT OVERALL SITE PLAN IDYLLWILD, CA	DRAFT -- NOT FOR CONSTRUCTION	DATE: 9/5/24 DESIGN: NMT DRAWN: MAH CHECKED: NMT	NO.	REVISIONS	BY	APP	DATE	SHEET 3 OF X G3



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1"=20'
ONE INCH AT FULL SCALE

DIGALERT
CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG

IDYLLWILD TREATMENT PLANT
PLAN
SHEET KEY
IDYLLWILD, CA

DRAFT -- NOT FOR CONSTRUCTION

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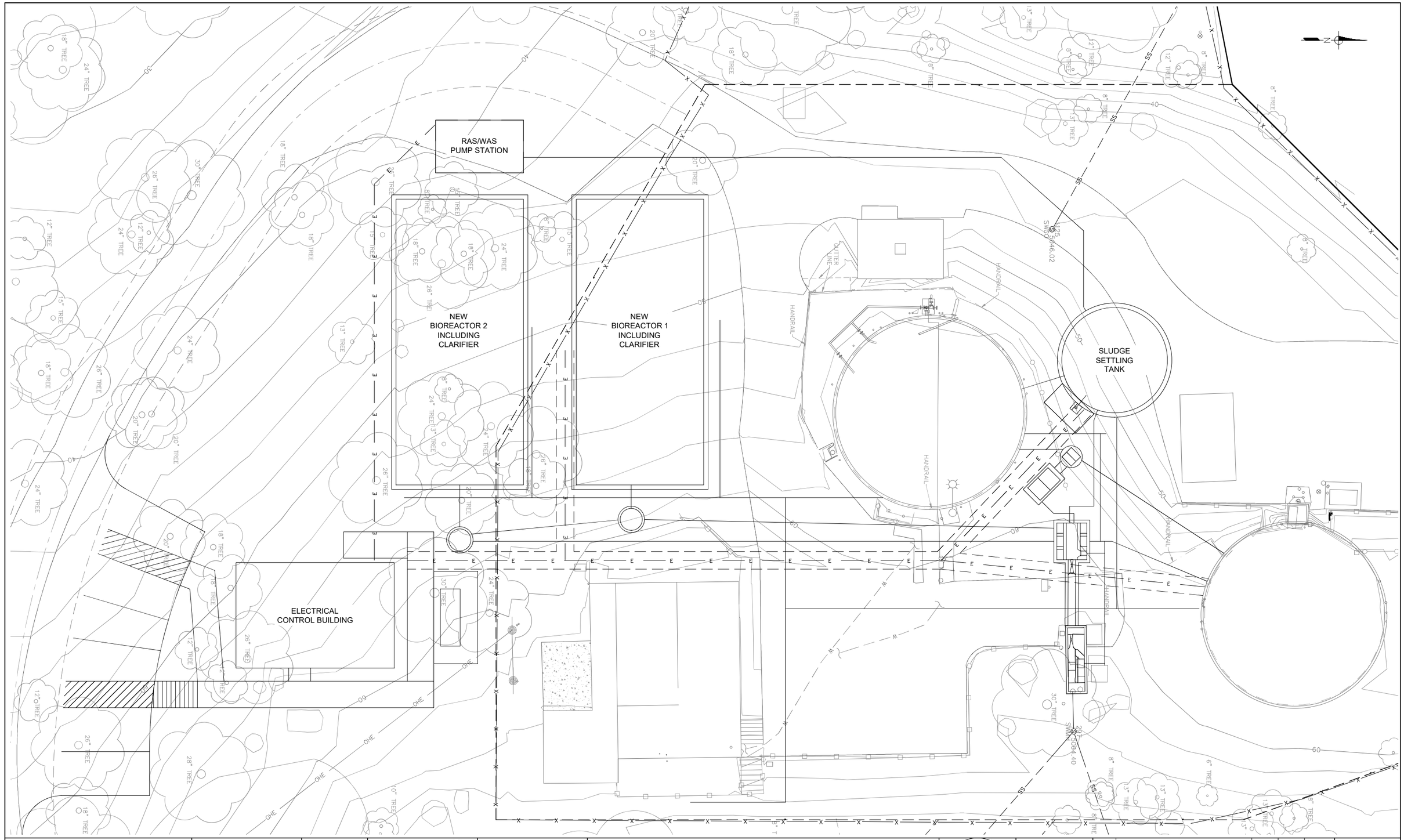
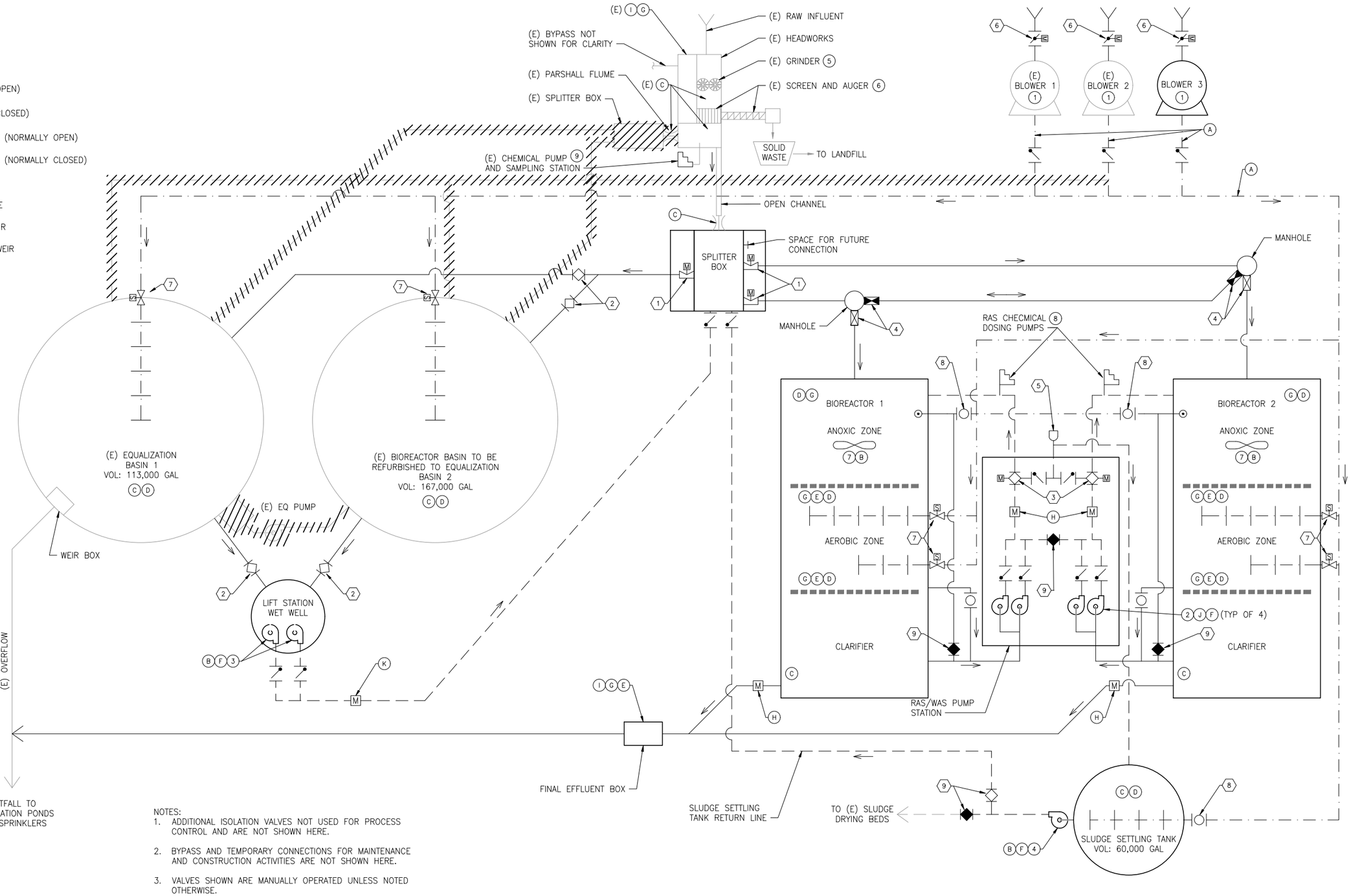


California Rural Water Association	C R W A 1234 N MARKET BLVD SACRAMENTO, CA 95834 (916) 553-4900	1"=10' ONE INCH AT FULL SCALE	DIGALERT CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG	IDYLLWILD WATER DISTRICT	IDYLLWILD TREATMENT PLANT SITE PLAN IDYLLWILD, CA	DRAFT -- NOT FOR CONSTRUCTION	DATE: 9/5/24 DESIGN: NMT DRAWN: MAH CHECKED: NMT	NO.	REVISIONS	BY	APP	DATE	SHEET 5 OF X C2

LEGEND

- PUMP
- PARSHALL FLUME
- FLOW METER
- PLUG VALVE (NORMALLY OPEN)
- PLUG VALVE (NORMALLY CLOSED)
- SLUICE/SLIDE GATE VALVE (NORMALLY OPEN)
- SLUICE/SLIDE GATE VALVE (NORMALLY CLOSED)
- MOTOR ACTUATED VALVE
- SOLENOID ACTUATED VALVE
- MANUALLY ADJUSTIBLE WEIR
- AUTOMATED ADJUSTABLE WEIR
- CHECK VALVE
- BUTTERFLY VALVE
- BALL VALVE
- AIR RELEASE VALVE
- AIR LIFT PUMP
- CHEMICAL DOSING PUMP
- AIR LINE
- GRAVITY FLOW
- FORCEMAIN



NOTES:
1. ADDITIONAL ISOLATION VALVES NOT USED FOR PROCESS CONTROL AND ARE NOT SHOWN HERE.
2. BYPASS AND TEMPORARY CONNECTIONS FOR MAINTENANCE AND CONSTRUCTION ACTIVITIES ARE NOT SHOWN HERE.
3. VALVES SHOWN ARE MANUALLY OPERATED UNLESS NOTED OTHERWISE.

California Rural Water Association

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IDYLLWILD TREATMENT PLANT

PROCESS FLOW DIAGRAM

IDYLLWILD, CA

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SHEET 6 OF X

C3

VALVE SCHEDULE

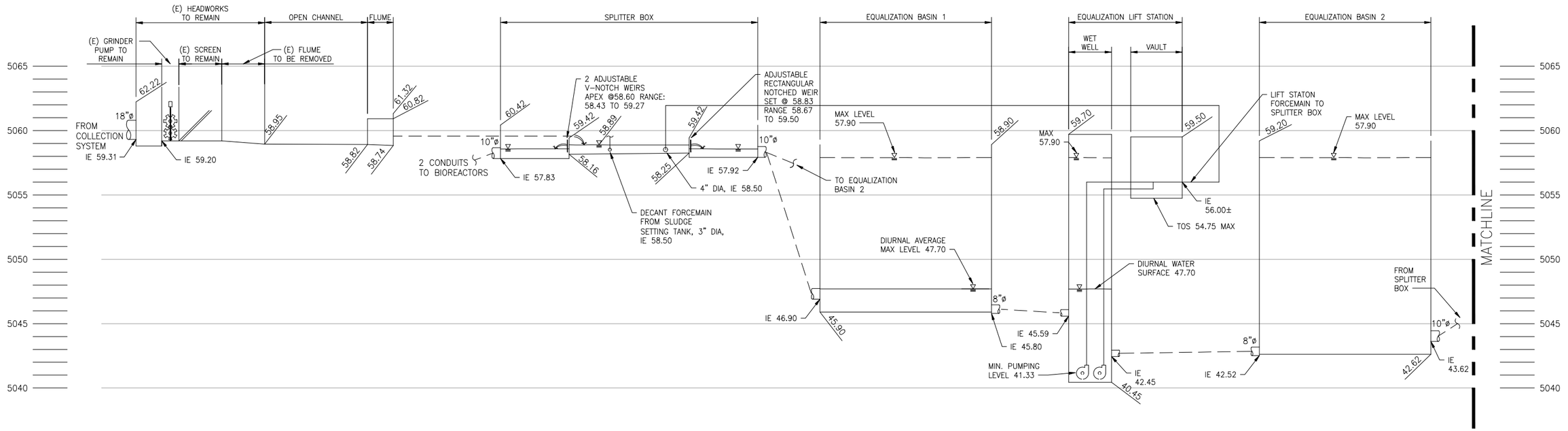
NO.	TYPE	FUNCTION	SIZE	QUANTITY	ACTUATOR	INDICATOR	SECTION
1	V-NOTCH WEIR	PROPORTION FLOW TO BIOREACTORS AND EQUALIZATION		3	ELECTRICALLY ACTUATED WITH REVERSIBLE MOTORS	POSITION SENSOR	
2	PLUG VALVE	MANUAL CONTROL OF FLOW DIRECTION			NON ACTUATED	OPEN/CLOSED ON SOME VALVES	
3	PLUG VALVE, ACTUATED	3 WAY VALVE TO DIRECT RAS/WAS		2	ELECTRICALLY ACTUATED WITH REVERSIBLE MOTORS	OPEN/OPEN	
4	SLIDE GATE	MANUAL CONTROL OF FLOW DIRECTION		4	NON ACTUATED		
5	AIR RELEASE VALVE	PREVENT AIR LOCKING IN FORCEMAINS			NON ACTUATED		
6	BUTTERFLY VALVE	AIR MODULATING VALVES, BLOWERS		3	ELECTRONICALLY ACTUATED WITH REVERSIBLE MOTOR	POSITION SENSOR	
7	SOLENOID	AIR CONTROL VALVES, AUTOMATED AERATORS		TBD	AUTOMATED	REPORT ENERGIZED/OPEN	
8	BALL VALVE	AIR CONTROL VALVES, MANUAL AERATORS			NON ACTUATED		
9	PLUG VALVE	MANUAL CONTROL OF FLOW DIRECTION			NON ACTUATED		

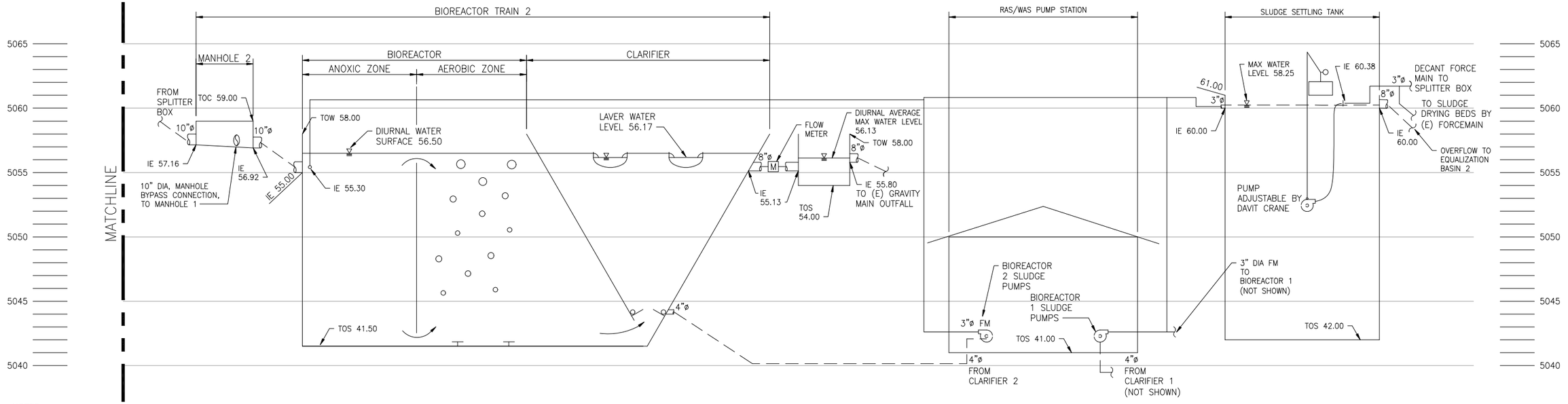
MOTOR SCHEDULE

NO.	UNIT	UNIT TYPE	MOTOR TYPE	QUANTITY	HP	VOLTAGE/ PHASE	VFD
1	BLOWER	CENTRIFUGAL	TEFC, HORIZONTAL, CLOSE COUPLED	3	40	460/3	N
2	RAS/WAS PUMP STATION	CENTRIFUGAL, DRY PIT VERTICAL MOUNTED, SOLIDS HANDLING	SUBMERSIBLE	4	3	460/3	Y
3	EQUALIZATION LIFT STATION PUMPS	CENTRIFUGAL, SOLIDS HANDLING	SUBMERSIBLE	2	3	460/3	N
4	SLUDGE SETTLING TANK PUMP	CENTRIFUGAL, SOLIDS HANDLING	SUBMERSIBLE	1	3	460/3	N
5	(E) GRINDER PUMP			1		460/3	N
6	(E) AUGER			1		460/3	N
7	ANOXIC MIXERS	TBD		2		460/3	
8	CHEMICAL DOSING PUMPS AT RAS PUMPS	PERISTALTIC		2		120/1	Y
9	(E) CHEMICAL DOSING PUMP AT HEADWORKS	PERISTALTIC		1		120/1	Y

INSTRUMENTATION SUMMARY

LETTER	INSTRUMENT	FUNCTION	QUANTITY	RANGE	NOTES
A	PRESSURE TRANSDUCER	MONITOR AIR LINE PRESSURE	4	0-30 PSI	ALARM: LOW PRESSURE
B	MOISTURE SENSOR IN MOTOR	MONITOR MOTOR SEAL	5	Y/N	ALARM: MOISTURE PRESENT
C	RADAR LEVEL SENSOR	MONITOR FLUME WATER LEVEL FOR FLOW CALCULATIONS	5	0-18 IN	ALARM: HIGH LEVEL, NO FLOW OR MALFUNCTION
D	DISSOLVED OXYGEN SENSOR	MONITOR OXYGEN IN TANK	9		ALARM: LOW O2 LEVEL
E	TEMPERATURE SENSOR	MONITOR TEMPERATURE IN TANK	6	35°-80° F	
F	TEMPERATURE SWITCH	MONITOR MOTOR OVER TEMPERATURE	7		ALARM: HIGH TEMPERATURE
G	pH SENSOR	MONITOR pH IN TANK	6		ALARM: LOW pH, HIGH pH
H	ELECTROMAGNETIC FLOW METER	MONITOR FULL PIPE FLOW RATE	4	0-400 GPM	
I	ELECTRICAL CONDUCTIVITY SENSOR	MONITOR CONDUCTIVITY OF WATER	2		ALARM: HIGH CONDUCTIVITY
J	PRESSURE TRANSDUCER	MONITOR FORCEMAIN PRESSURE	4	0-70 PSI	ALARM: HIGH PRESSURE
K	ELECTROMAGNETIC FLOW METER	MONITOR FULL PIPE FLOW RATE	1	0-300 GPM	





NOTES
1. INSTRUMENTATION IS SHOWN ON THIS SHEET FOR REFERENCE ONLY. ACTUAL INSTRUMENTATION IS DETAILED ON I-SHEETS, IN CASE OF CONFLICT I-SHEETS SHALL CONTROL.
2. GROUND ELEVATIONS ARE APPROXIMATE.
3. CONDUITS ARE SHOWN SCHEMATICALLY.
4. ELEVATIONS ARE BASED ON THE HILWIG & GOODROW SURVEY FROM 2021.
5. NOTE: WATER SURFACE ELEVATIONS INDICATED BY CALLOUTS REPRESENT THE DESIGN FLOW (HYDRAULIC GUIDELINE).

California Rural Water Association

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NOT TO SCALE

DIGALERT
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IDYLLWILD TREATMENT PLANT

HYDRAULIC PROFILE

IDYLLWILD, CA

DRAFT -- NOT FOR CONSTRUCTION

DATE:	9/5/24
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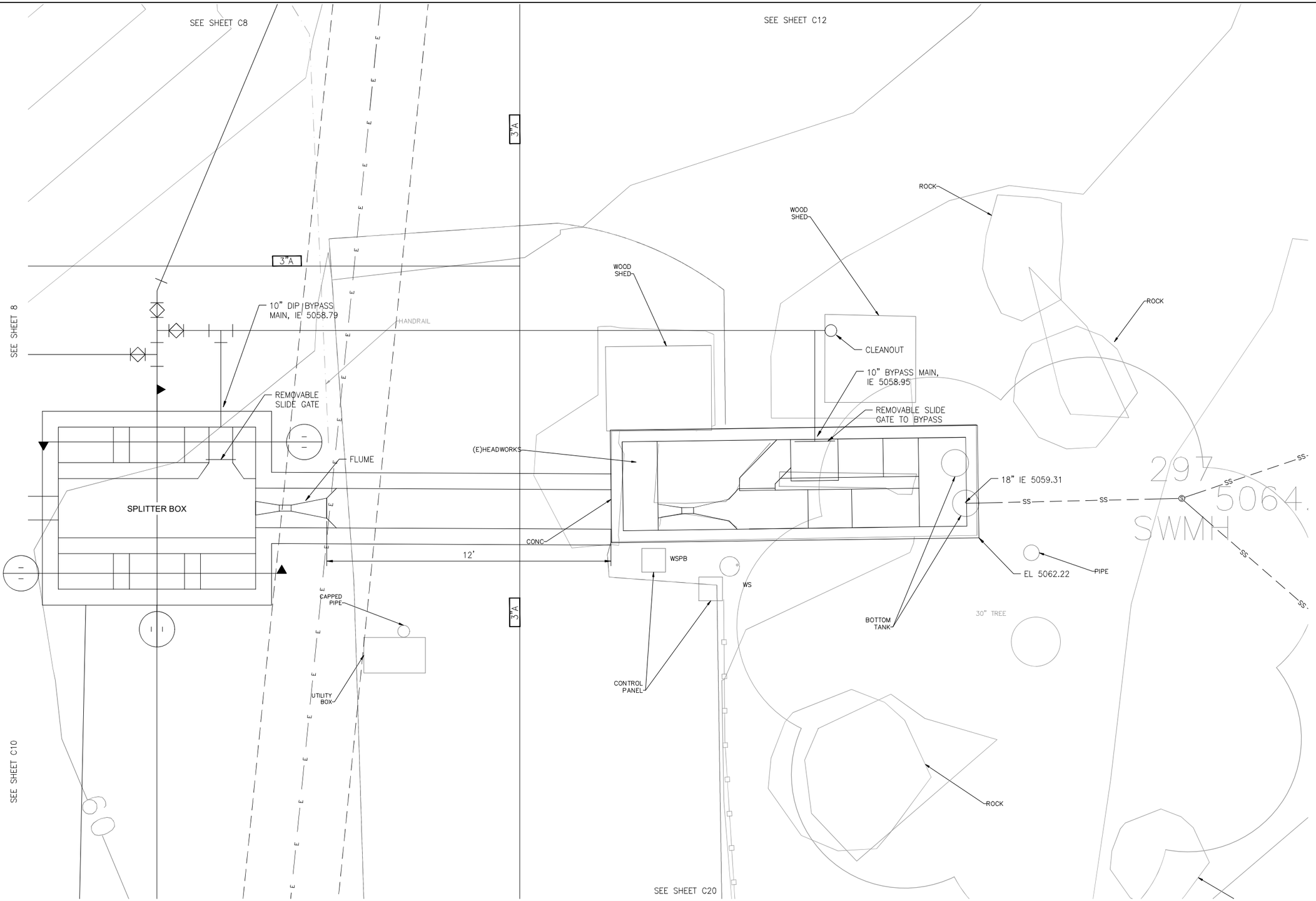
NO.	REVISIONS	BY	APP	DATE

SHEET 8 OF X

C5



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1234 N MARKET BLVD
SACRAMENTO, CA 95834
(916) 553-4900

1"=4'
ONE INCH AT FULL SCALE

DIGALERT
CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG

IDYLLWILD TREATMENT PLANT

HEADWORKS AND SPLITTER BOX PLAN

IDYLLWILD, CA

DRAFT -- NOT FOR CONSTRUCTION

DATE:	9/5/24
DESIGN:	NMT
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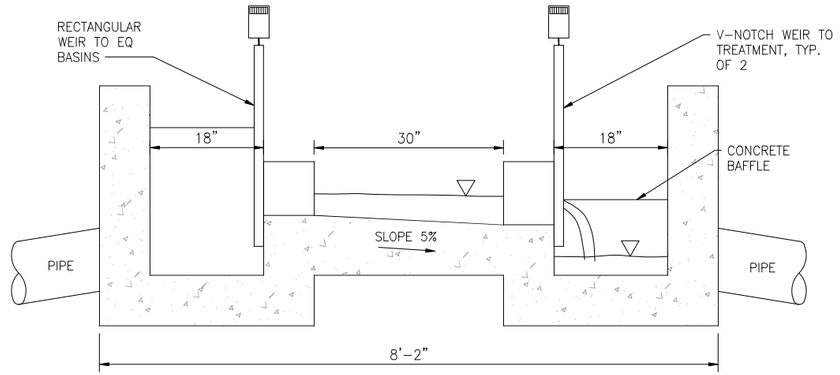
NO.	REVISIONS	BY	APP	DATE

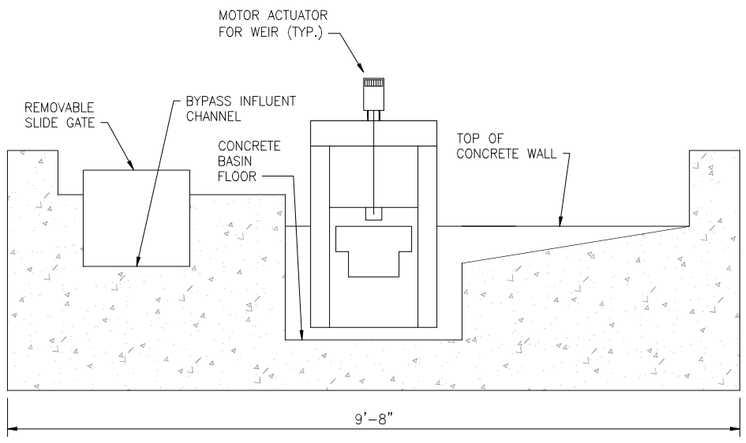
SHEET 9 OF X

C6



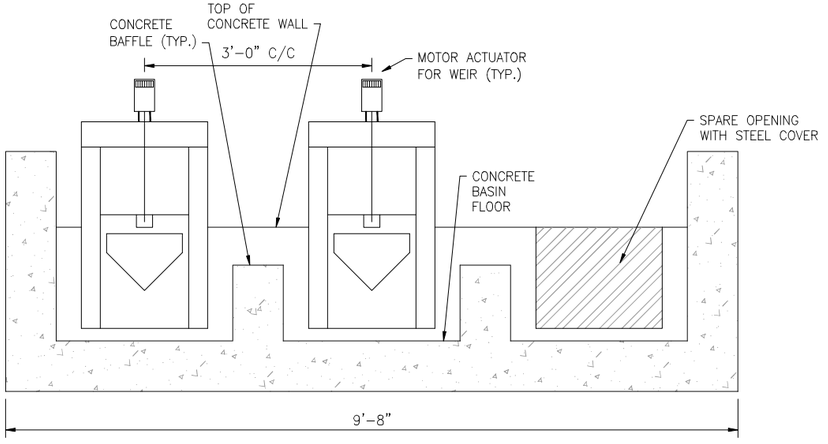
A - SPLITTER BOX SECTION

1"=1'-0"



C - EQUALIZATION WEIR

1"=1'-0"



B - TREATMENT TRAIN WEIRS

1"=1'-0"

California Rural Water Association

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SACRAMENTO, CA 95834
(916) 553-4900

1"=1'

ONE INCH AT FULL SCALE

DIGALERT

CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG

IDYLLWILD TREATMENT PLANT

HEADWORKS AND SPLITTER BOX SECTIONS

IDYLLWILD, CA

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SHEET 9 OF X

C7

SEE SHEET C22

DECANT RETURN FORCEMAIN FROM SLUDGE SETTLING TANK

CLEANOUT

LIFT STATION WET WELL, SEE SHEET C9

EQUALIZATION BASIN 2

EQUALIZATION BASIN 2 EFFLUENT LINE

8"SS

CONCRETE TANK

SEE SHEET C10

POND

3"SS

3"SS

3"SS

3"A

3"A

10"SS

VALVE AND METER VAULT, SEE SHEET C9

EQUALIZATION BASIN 1 EFFLUENT LINE

8"SS

EQUALIZATION BASIN 2 INFLUENT LINE

EQUALIZATION BASIN LIFT STATION FORCEMAIN

3"SS

1'-6"

3"x4" REDUCER

9"

9"

3" DUCKBILL CHECK VALVE

4" DUCKBILL CHECK VALVE

CLEANOUT

EQUALIZATION BASIN 1 INFLUENT LINE

10"SS

SPLITTER BOX, SEE SHEET 6

SEE SHEET C20

UTILITY BOX

DUMPED PILE

SEE SHEET C6

METAL SHED

50

SEE SHEET C12

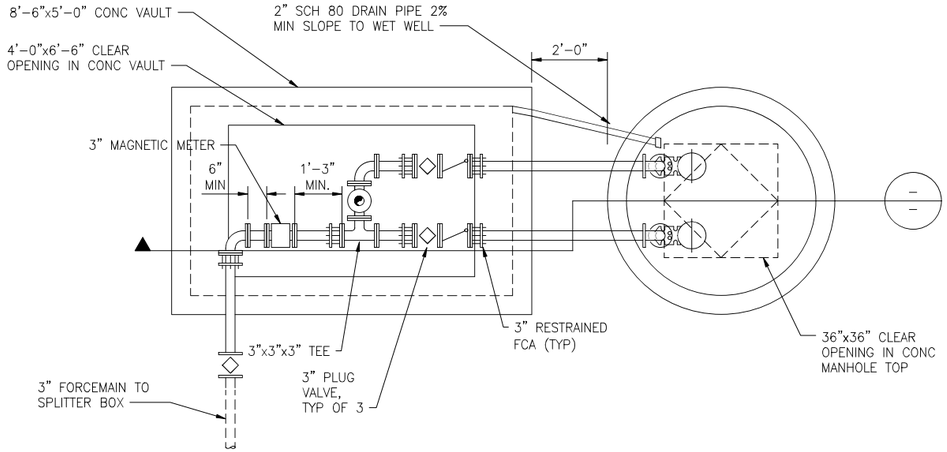
WALL

HANDRAIL

HOSE BIB

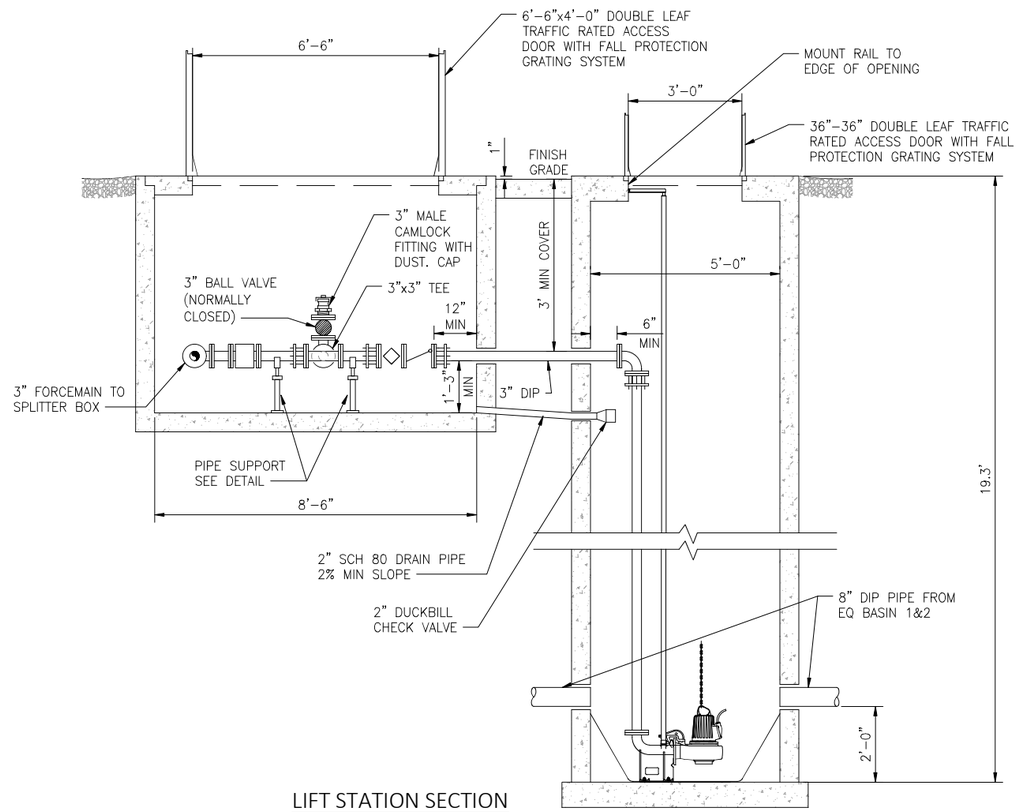
EQUALIZATION BASIN 1

California Rural Water Association	C R W A 1234 N MARKET BLVD SACRAMENTO, CA 95834 (916) 553-4900	1"=2' ONE INCH AT FULL SCALE	DIGALERT CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG	IDYLLWILD WATER DISTRICT	IDYLLWILD TREATMENT PLANT EQUALIZATION LIFT STATION PLAN IDYLLWILD, CA	DRAFT -- NOT FOR CONSTRUCTION	DATE: 9/5/24 DESIGN: NMT DRAWN: MAH CHECKED: NMT	NO.	REVISIONS / BY / APP / DATE	SHEET 9 OF X C8



LIFT STATION PLAN

1/2"=1'-0"



LIFT STATION SECTION

1/2"=1'-0"

California Rural Water Association

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SACRAMENTO, CA 95834
(916) 553-4900

1"=4'

ONE INCH AT FULL SCALE

DIGALERT

CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG

IDYLLWILD WATER DISTRICT

IDYLLWILD TREATMENT PLANT

EQUALIZATION LIFT STATION

IDYLLWILD, CA

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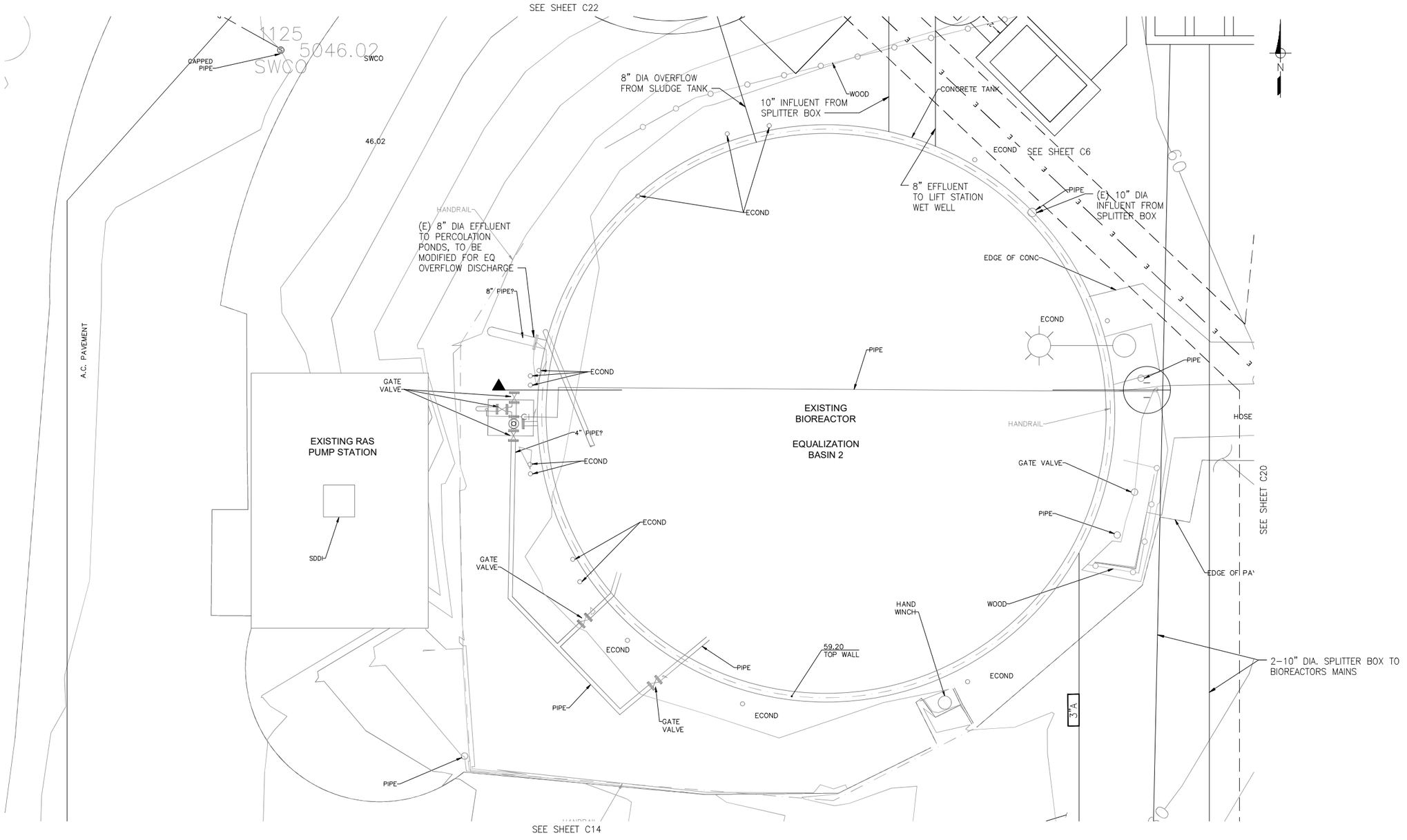
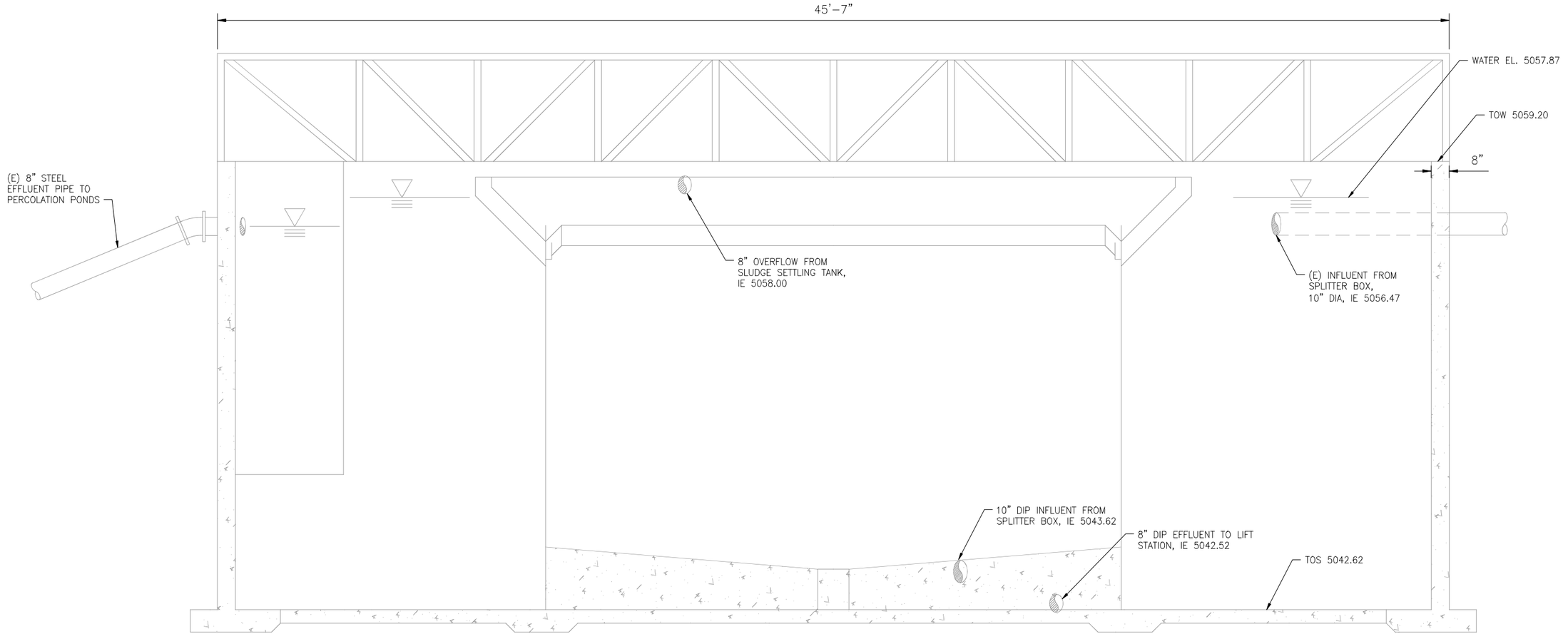
SHEET 9 OF X

C9



California Rural Water Association	C R W A 1234 N MARKET BLVD SACRAMENTO, CA 95834 (916) 553-4900	1"=4' ONE INCH AT FULL SCALE	DIGALERT CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG	IDYLLWILD WATER DISTRICT	IDYLLWILD TREATMENT PLANT EXISTING BIOREACTOR PLAN IDYLLWILD, CA	DRAFT -- NOT FOR CONSTRUCTION	DATE: 9/5/24 DESIGN: NMT DRAWN: MAH CHECKED: NMT	NO.	REVISIONS	BY	APP	DATE	SHEET 11 OF X C10



California Rural Water Association

C R W A
1234 N MARKET BLVD
SACRAMENTO, CA 95834
(916) 553–4900

1"=2'
ONE INCH
AT FULL SCALE

DIGALERT
CALL AT LEAST TWO
WORKING DAYS
BEFORE YOU DIG

IDYLLWILD TREATMENT PLANT

EXISTING BIOREACTOR SECTIONS

IDYLLWILD, CA

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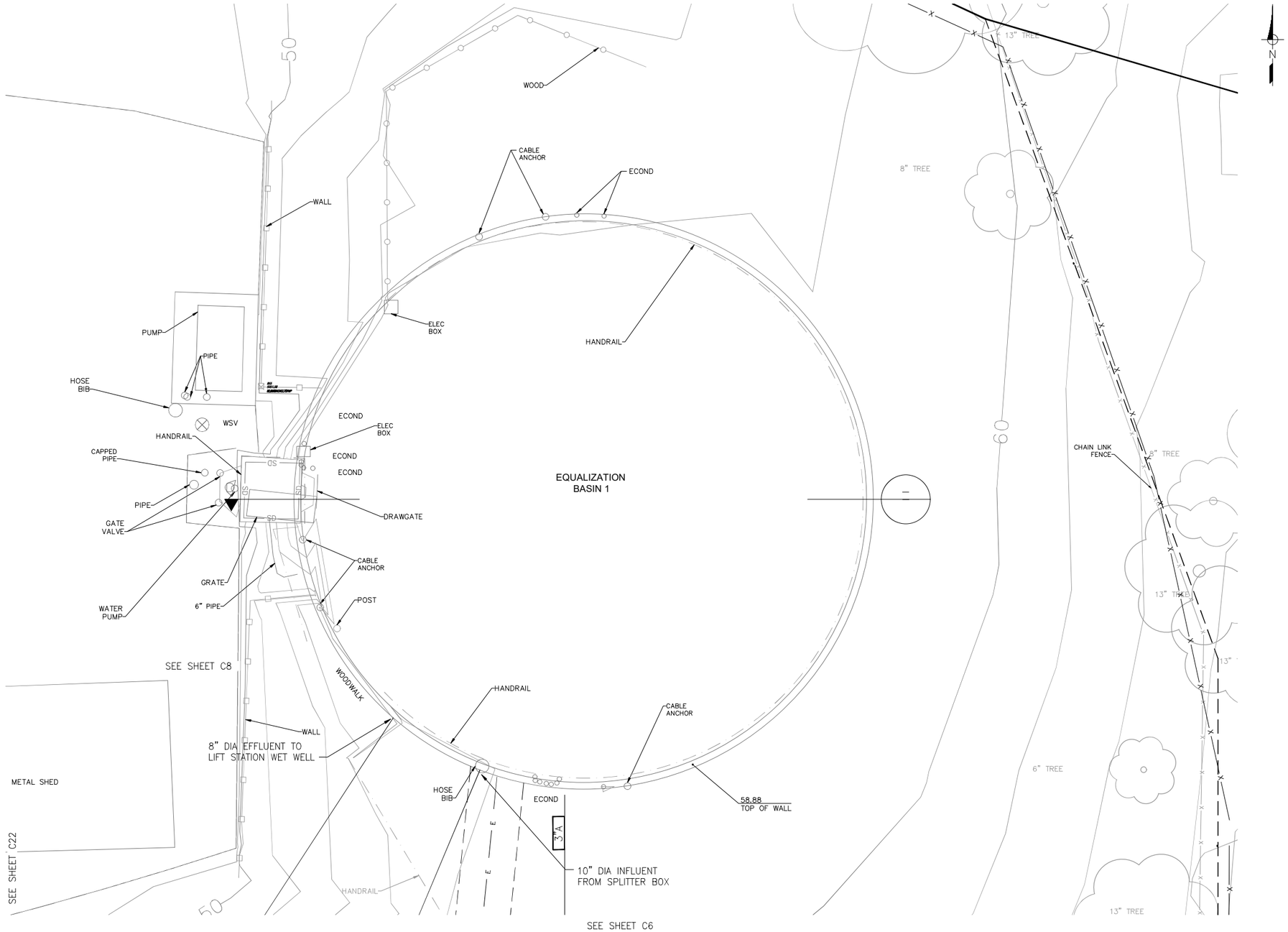
SHEET 11 OF X

C11



California Rural Water Association

C R W A
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SACRAMENTO, CA 95834
(916) 553-4900

1"=4'
ONE INCH AT FULL SCALE

DIGALERT
CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG

IDYLLWILD TREATMENT PLANT

EQUALIZATION TANK ONE PLAN

IDYLLWILD, CA

DRAFT -- NOT FOR CONSTRUCTION

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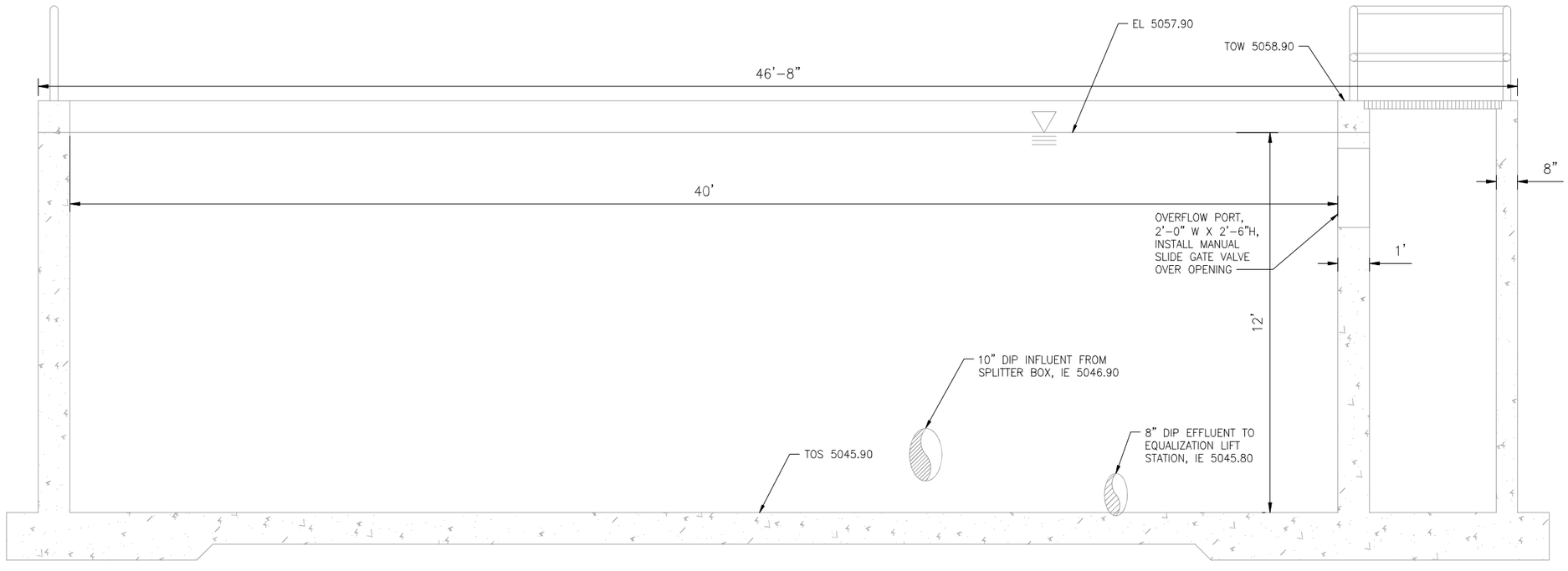
CHECKED:	NMT

NO.	REVISIONS	BY	APP	DATE

SHEET 12 OF X

C12



California Rural Water Association

C R W A
1234 N MARKET BLVD
SACRAMENTO, CA 95834
(916) 553-4900

1"=2'
ONE INCH
AT FULL SCALE

DIGALERT
CALL AT LEAST TWO
WORKING DAYS
BEFORE YOU DIG

IDYLLWILD TREATMENT PLANT

EQUALIZATION TANK ONE SECTIONS

IDYLLWILD, CA

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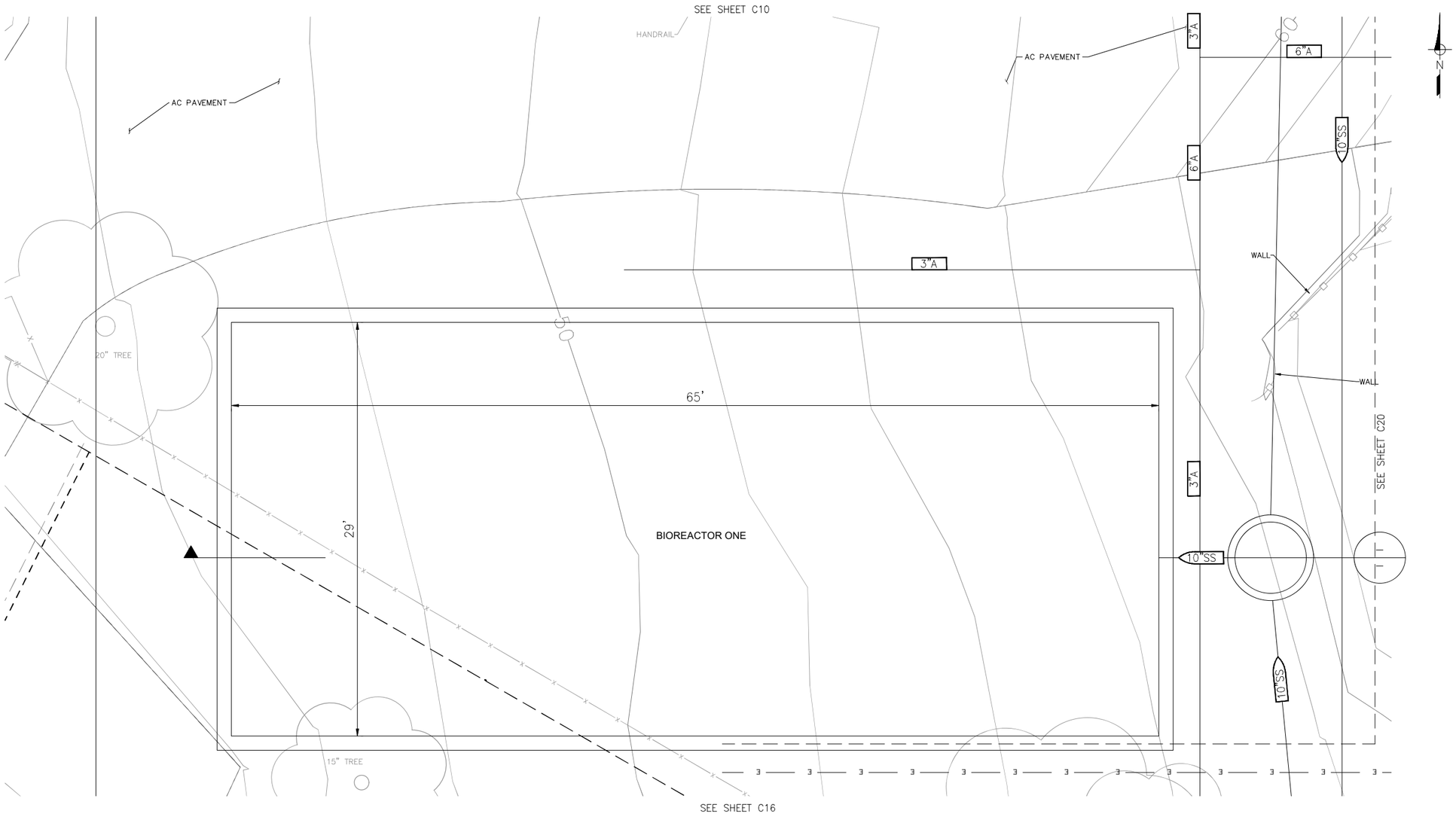
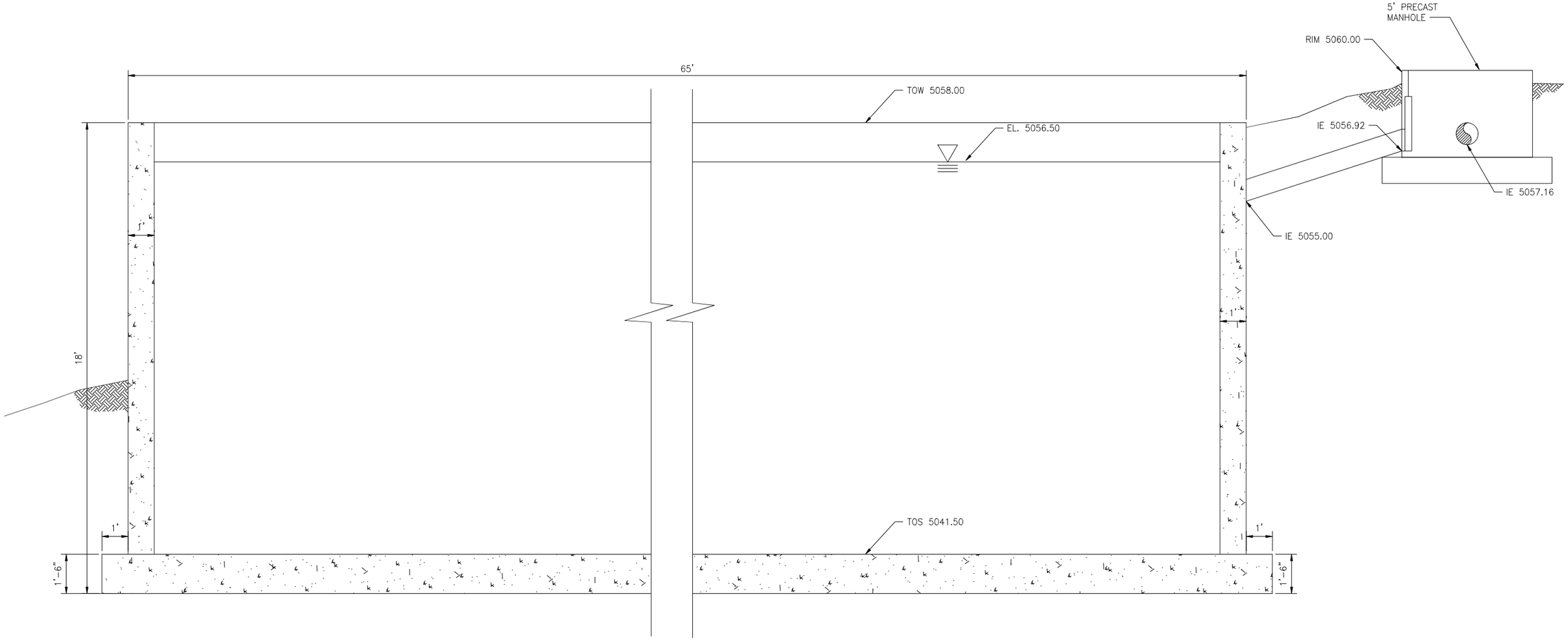
SHEET 12 OF X

C13



California Rural Water Association	C R W A 1234 N MARKET BLVD SACRAMENTO, CA 95834 (916) 553-4900	1"=4' ONE INCH AT FULL SCALE	DIGALERT CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG	IDYLLWILD WATER DISTRICT	IDYLLWILD TREATMENT PLANT BIOREACTOR ONE PLAN IDYLLWILD, CA	DRAFT -- NOT FOR CONSTRUCTION	DATE: 9/5/24 DESIGN: NMT DRAWN: MAH CHECKED: NMT	NO.	REVISIONS	BY	APP	DATE	SHEET 13 OF X C14



California Rural Water Association

C R W A
1234 N MARKET BLVD
SACRAMENTO, CA 95834
(916) 553-4900

1"=2'
ONE INCH
AT FULL SCALE

DIGALERT
CALL AT LEAST TWO
WORKING DAYS
BEFORE YOU DIG

IDYLLWILD TREATMENT PLANT

BIOREACTOR ONE SECTIONS

IDYLLWILD, CA

DRAFT -- NOT FOR CONSTRUCTION

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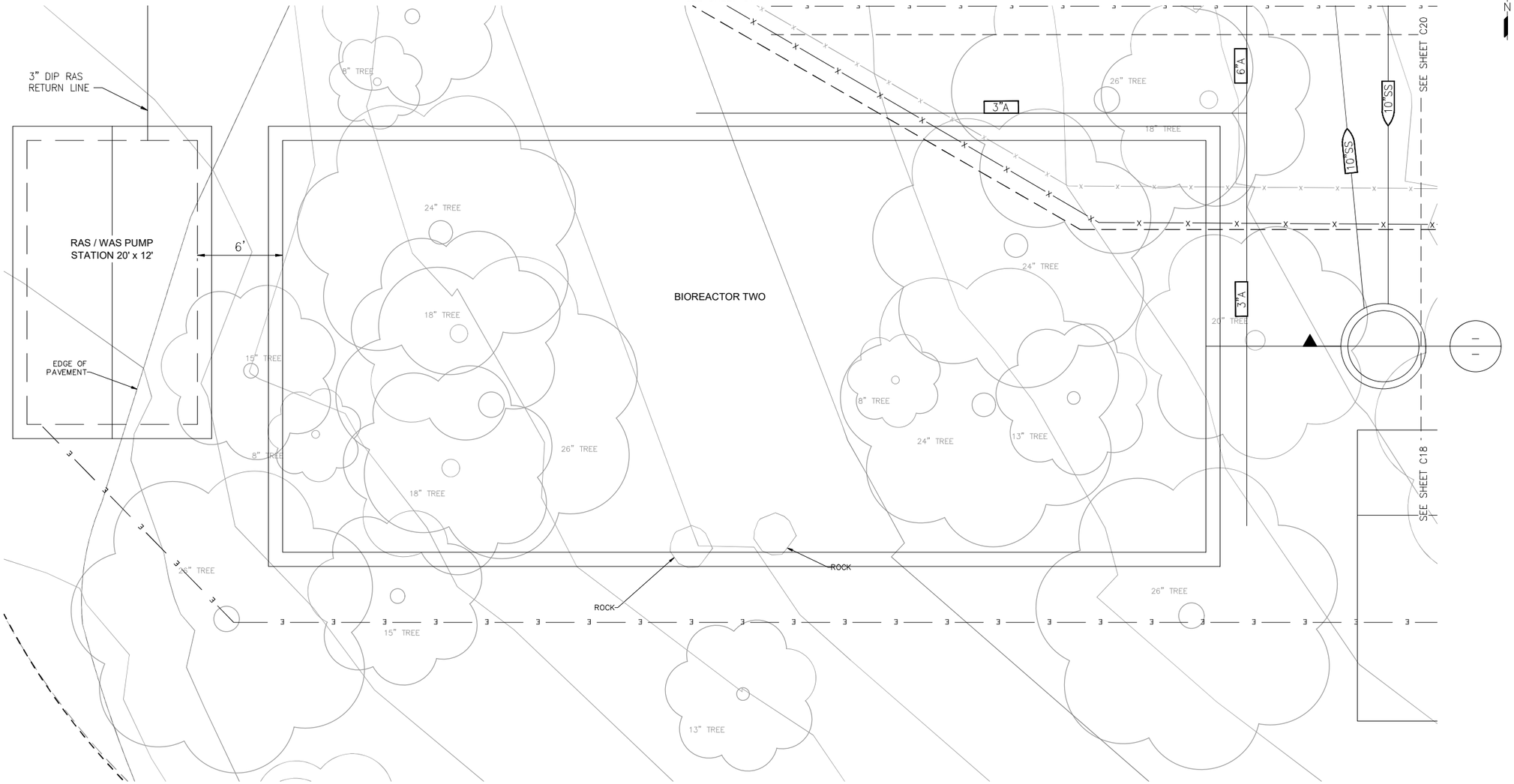
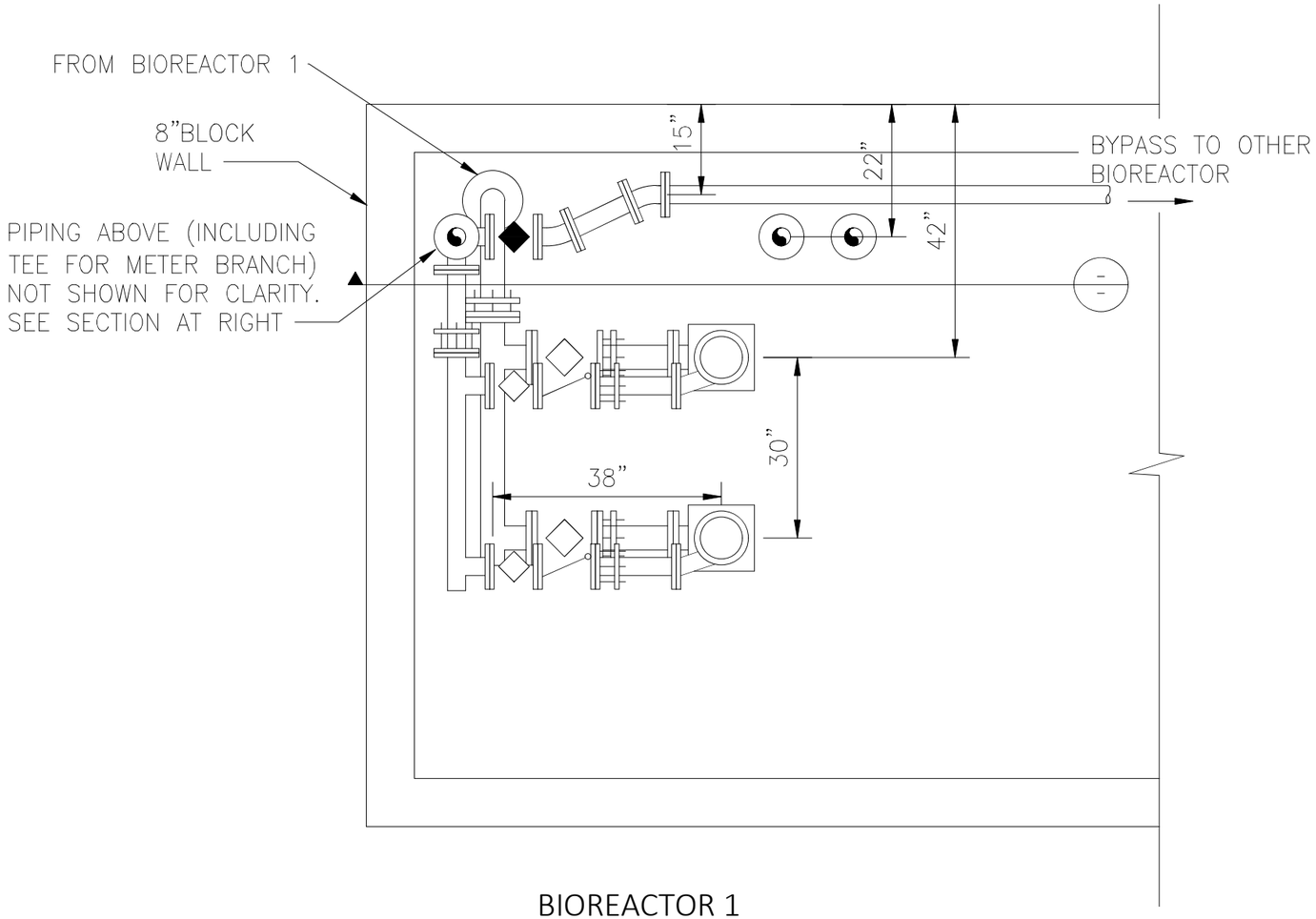
SHEET 13 OF X

C15

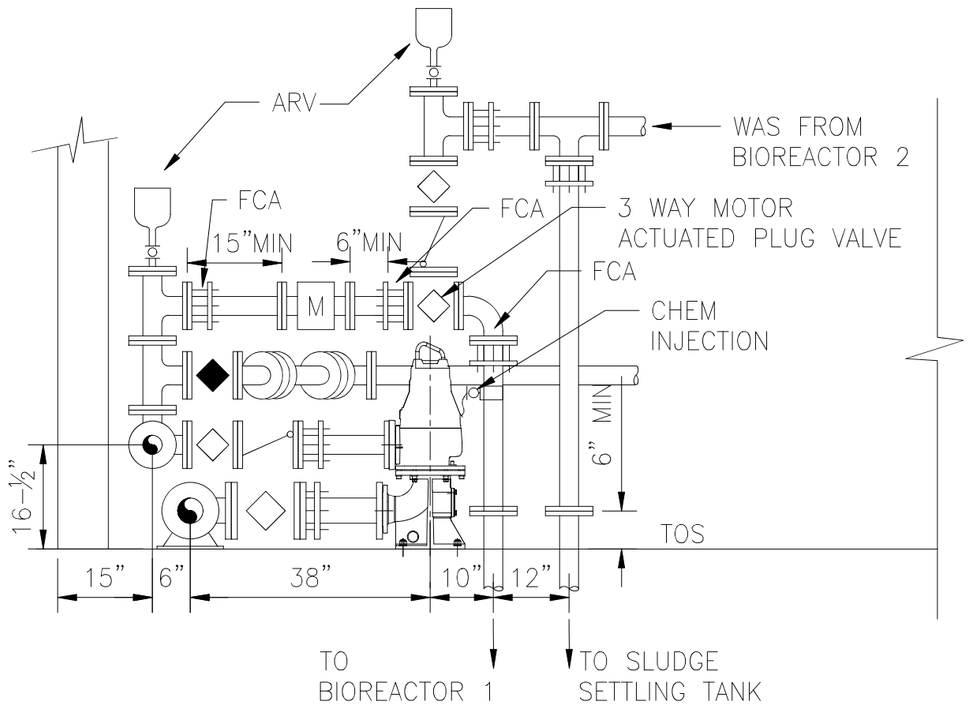


California Rural Water Association	C R W A 1234 N MARKET BLVD SACRAMENTO, CA 95834 (916) 553-4900	1"=4' ONE INCH AT FULL SCALE	DIGALERT CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG	IDYLLWILD WATER DISTRICT	IDYLLWILD TREATMENT PLANT BIOREACTOR TWO PLAN IDYLLWILD, CA	DRAFT -- NOT FOR CONSTRUCTION	DATE: 9/5/24 DESIGN: NMT DRAWN: MAH CHECKED: NMT	NO.	REVISIONS	BY	APP	DATE	SHEET 14 OF X C16



BIOREACTOR 1
RAS PUMPS PLAN

1"=1'-0"



BIOREACTOR 1
RAS PUMPS SECTION

1"=1'-0"

California Rural Water Association

C R W A
1234 N MARKET BLVD
SACRAMENTO, CA 95834
(916) 553-4900

1"=1'
ONE INCH AT FULL SCALE

DIGALERT
CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG

IDYLLWILD TREATMENT PLANT
RAS / WAS PUMP STATION
IDYLLWILD, CA

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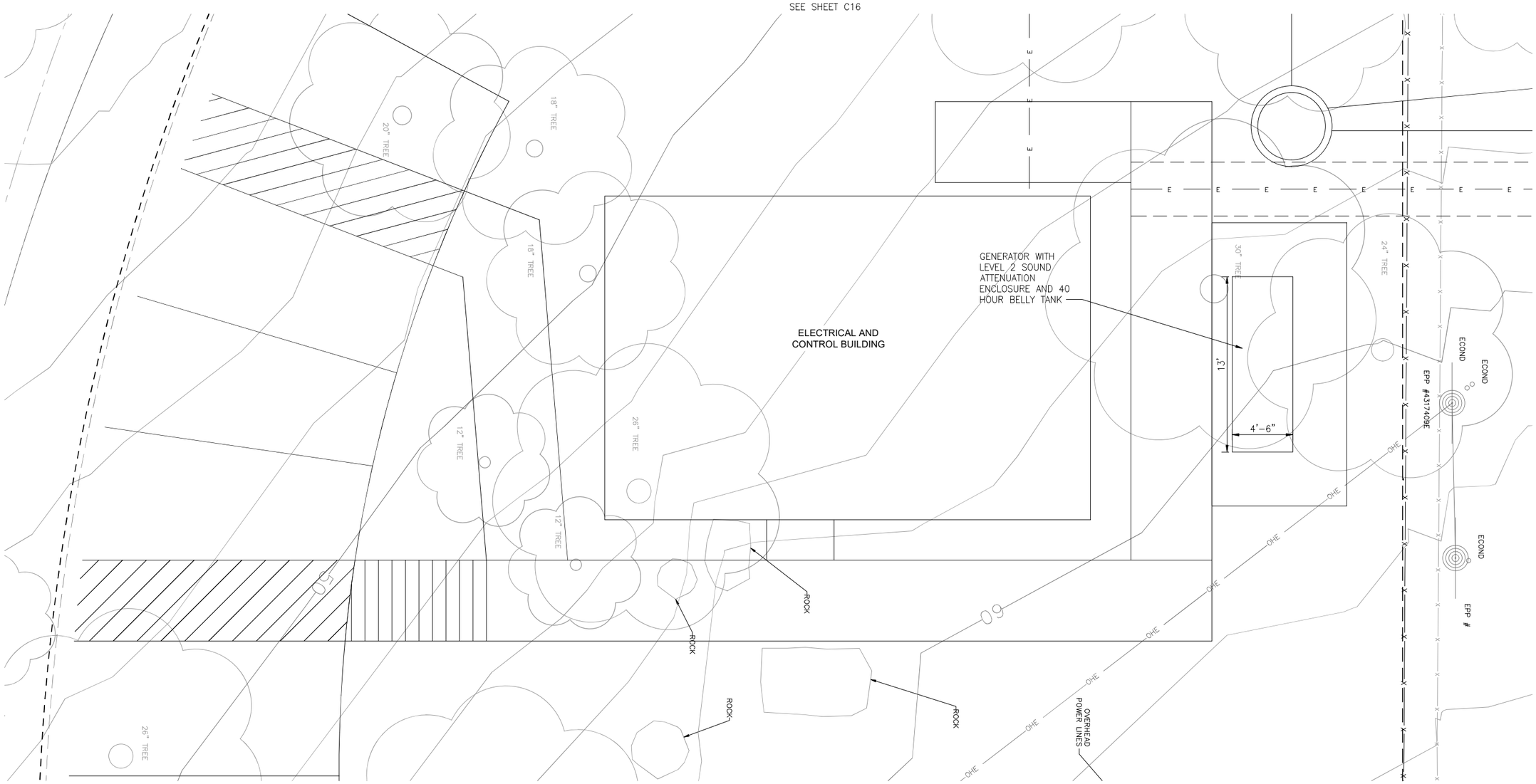
DRAWN:	MAH
CHECKED:	NMT

NO.	REVISIONS	BY	APP	DATE

SHEET 14 OF X

C17



California Rural Water Association

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SACRAMENTO, CA 95834
(916) 553-4900

1"=4'
ONE INCH AT FULL SCALE

DIGALERT
CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG

IDYLLWILD TREATMENT PLANT

ELECTRICAL AND CONTROL BUILDING PLAN

IDYLLWILD, CA

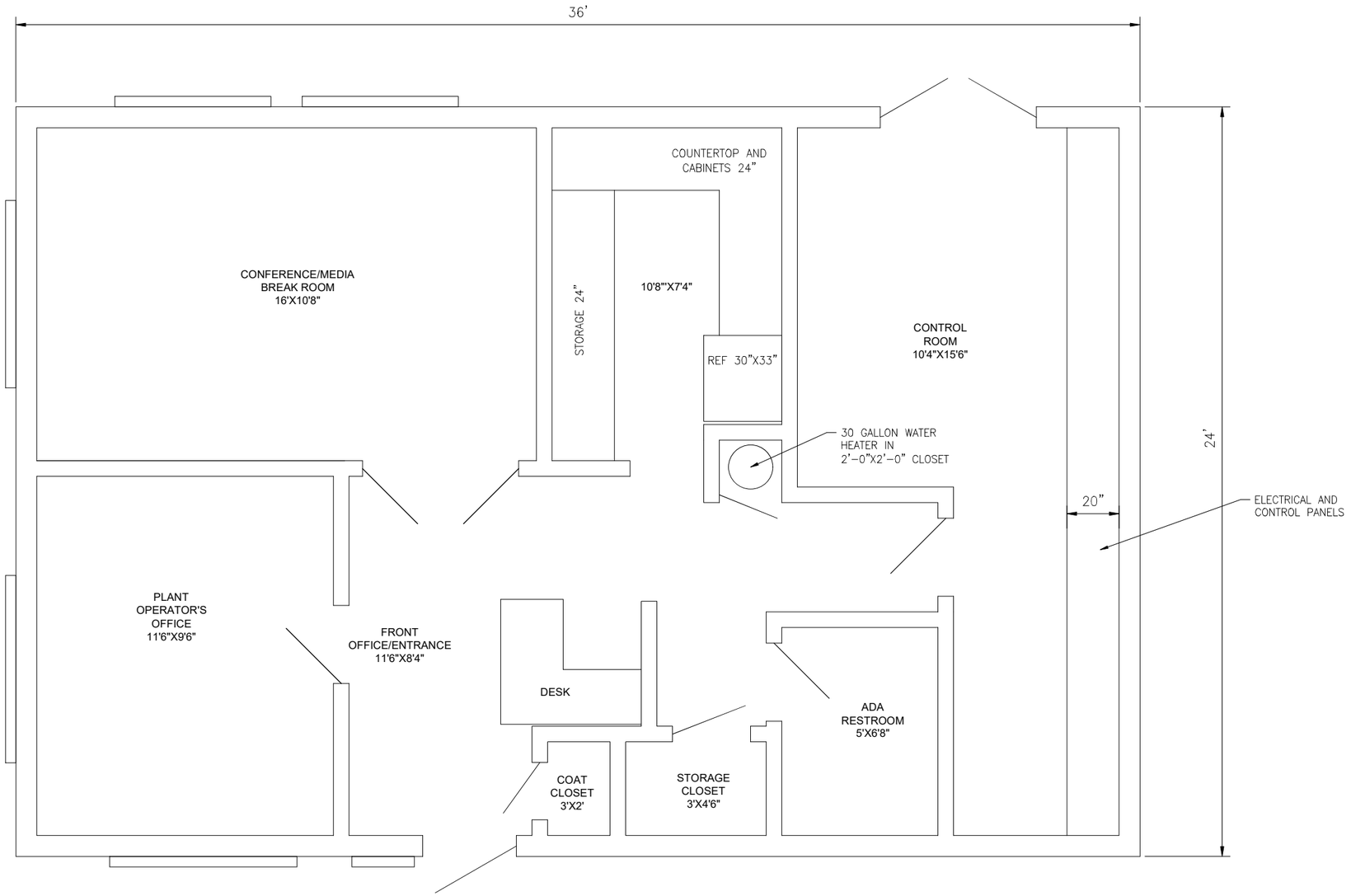
DRAFT -- NOT FOR CONSTRUCTION

DATE:	9/5/24
DESIGN:	NMT
DRAWN:	MAH
CHECKED:	NMT

NO.	REVISIONS	BY	APP	DATE

SHEET 15 OF X

C18



California Rural Water Association

C R W A
1234 N MARKET BLVD
SACRAMENTO, CA 95834
(916) 553-4900

1"=2'
ONE INCH
AT FULL SCALE

DIGALERT
CALL AT LEAST TWO
WORKING DAYS
BEFORE YOU DIG

IDYLLWILD TREATMENT PLANT

ELECTRICAL AND CONTROL BUILDING SECTIONS

IDYLLWILD, CA

DRAFT -- NOT FOR CONSTRUCTION

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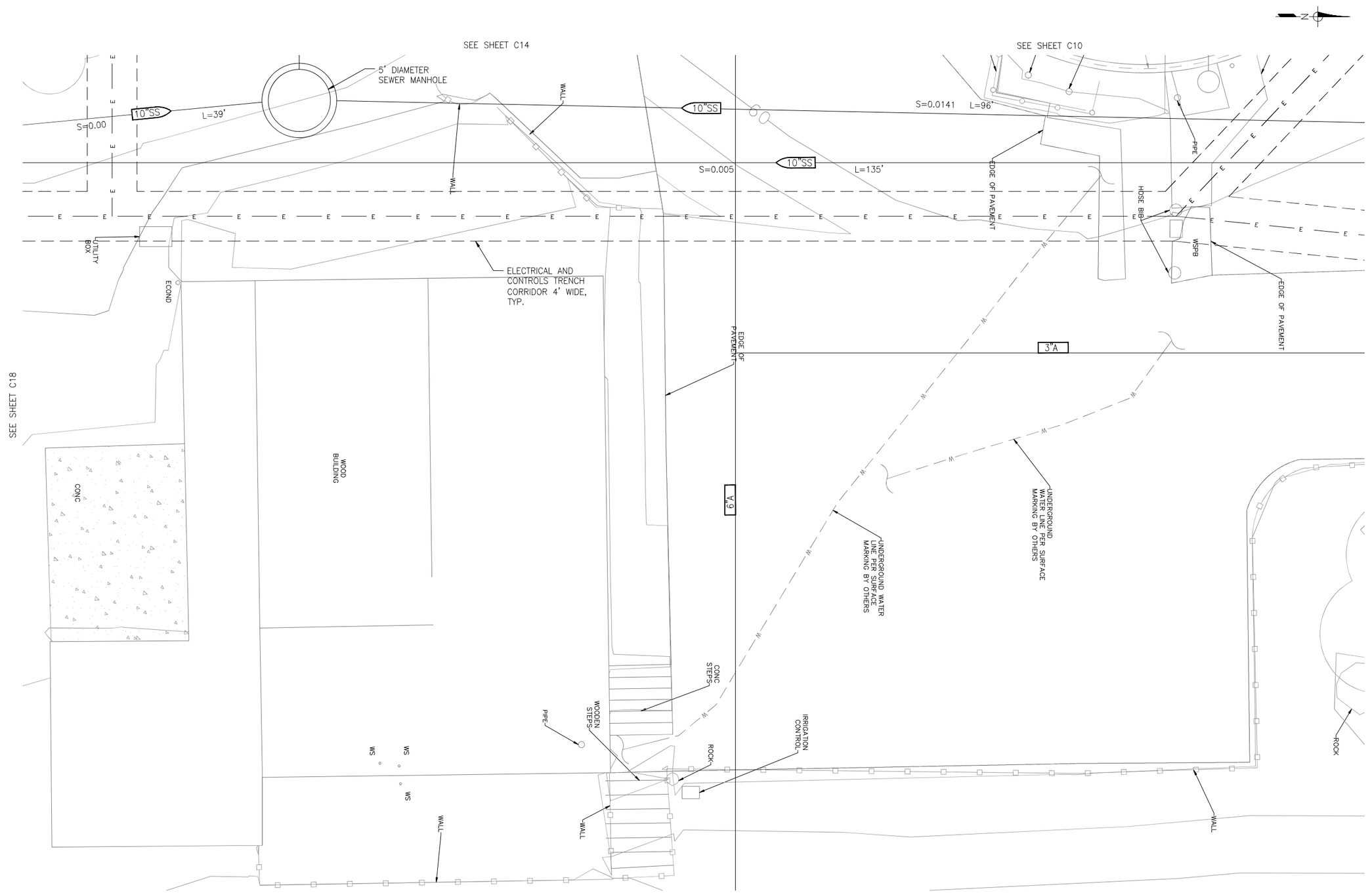
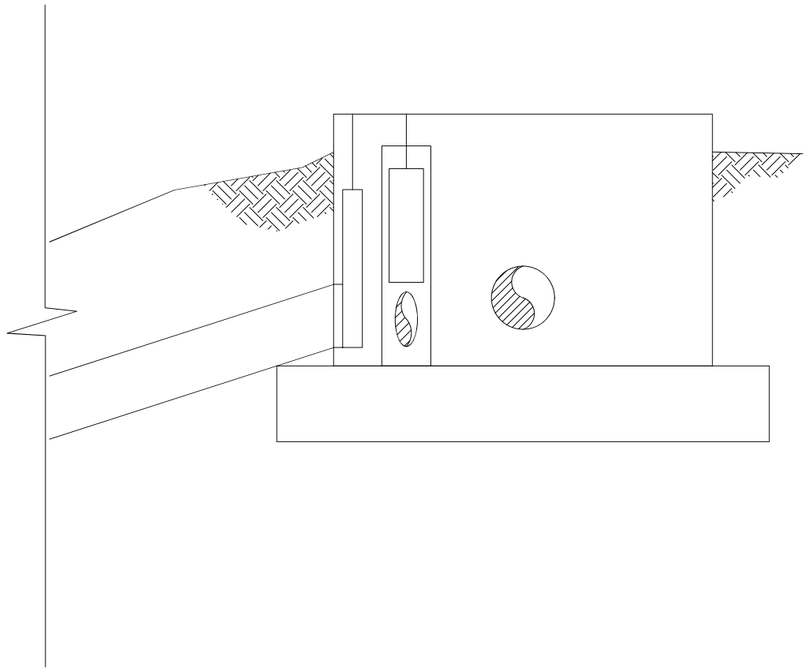
NO.	REVISIONS	BY	APP	DATE

SHEET 15 OF X

C19



California Rural Water Association	C R W A 1234 N MARKET BLVD SACRAMENTO, CA 95834 (916) 553-4900	1"=4' ONE INCH AT FULL SCALE	DIGALERT CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG	IDYLLWILD WATER DISTRICT	IDYLLWILD TREATMENT PLANT YARD TRENCH PLAN IDYLLWILD, CA	DRAFT -- NOT FOR CONSTRUCTION	DATE: 9/5/24 DESIGN: NMT DRAWN: MAH CHECKED: NMT	NO.	REVISIONS	BY	APP	DATE	SHEET 16 OF X C20



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SACRAMENTO, CA 95834
(916) 553-4900

1"=4'
ONE INCH
AT FULL SCALE

DIGALERT
CALL AT LEAST TWO
WORKING DAYS
BEFORE YOU DIG

IDYLLWILD TREATMENT PLANT

YARD TRENCH SECTIONS

IDYLLWILD, CA

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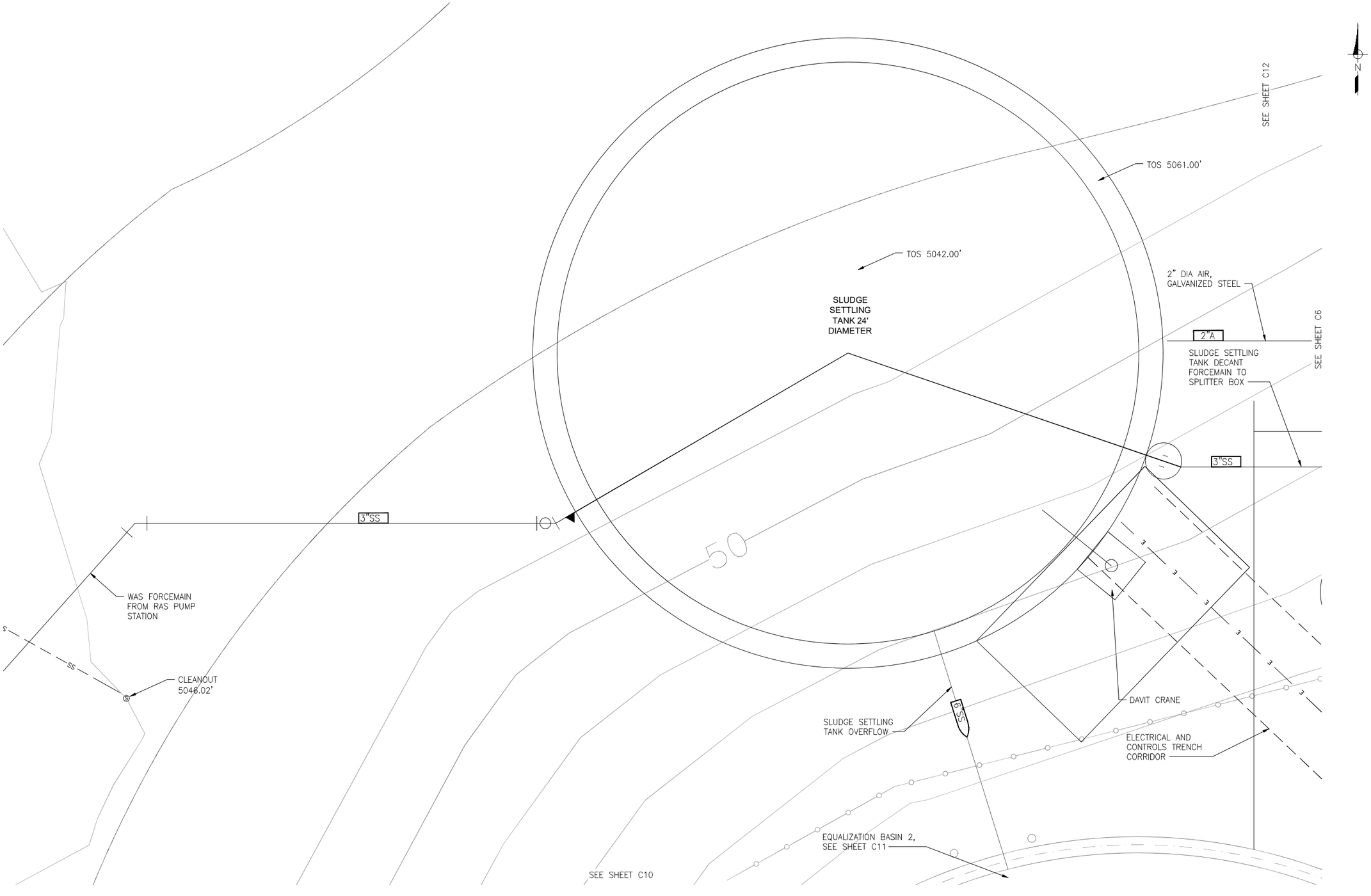
NO.	REVISIONS	BY	APP	DATE

SHEET 16 OF X

C21



California Rural Water Association

C R W A
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SACRAMENTO, CA 95834
(916) 553-4900

1"=2'
ONE INCH AT FULL SCALE

DIGALERT
CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG

IDYLLWILD TREATMENT PLANT
SLUDGE SETTLING TANK PLAN
IDYLLWILD, CA

DRAFT -- NOT FOR CONSTRUCTION

DATE:	9/5/24
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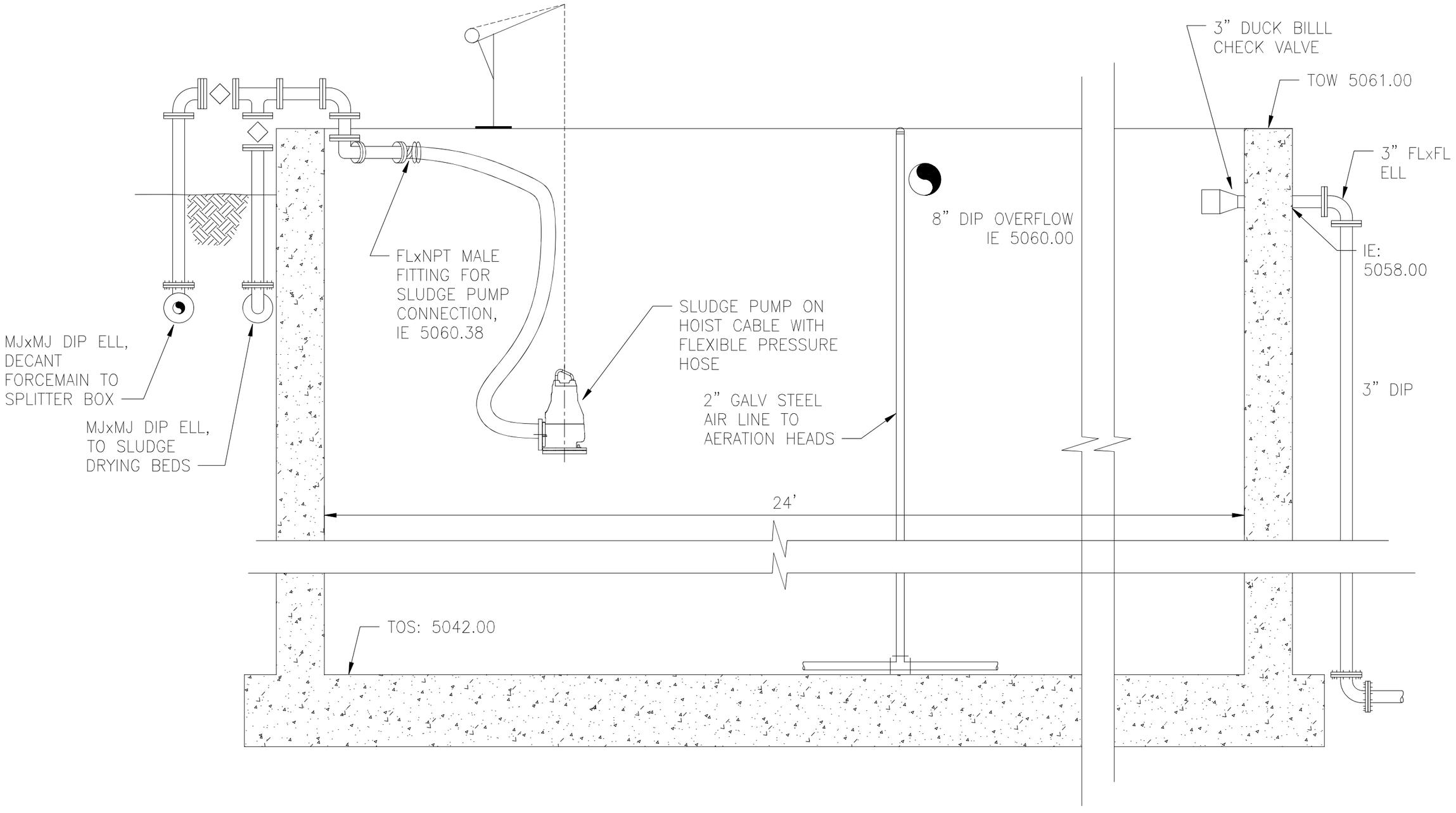
SHEET 10 OF X

C22



SLUDGE SETTLING TANK SECTION

1"=1'-0"

California Rural Water Association

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1234 N MARKET BLVD
SACRAMENTO, CA 95834
(916) 553-4900

1"=1'
ONE INCH AT FULL SCALE

DIGALERT
CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG

IDYLLWILD TREATMENT PLANT
SLUDGE SETTLING TANK SECTIONS
IDYLLWILD, CA

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SHEET 10 OF X

C23

SINGLE LINE DIAGRAM SYMBOLS

THERMAL MAGNETIC CIRCUIT BREAKER
30AT / 100AF — AMP TRIP; AMP FRAME

MCP CIRCUIT BREAKER
100A / MCP — CONTINUOUS AMPS; TRIP SETTING BASED ON MOTOR HORSEPOWER

LOW VOLTAGE DRAWOUT CIRCUIT BREAKER
20AT / 100AF
(LSIG)
L = LONG TIME
S = SHORT TIME
I = INSTANTANEOUS
G = GROUND FAULT

30A / MCP
Y — NEMA X
COMBINATION NEMA RATED MOTOR STARTER
X = NEMA SIZE
Y = TYPE (FVNR, FVR)

X / VFD — VARIABLE FREQUENCY DRIVE
X = HP RATING

X / RVSS — REDUCED VOLTAGE SOLID STATE STARTER
X = HP RATING

X / Y — PACKAGED EQUIPMENT
X = EQUIPMENT SIZE
Y = TYPE (KW, KVA, OR HP AS INDICATED)

K — KEY INTERLOCK

TRANSFER SWITCH (MANUAL OR AUTOMATIC)

AS — AMMETER SWITCH

CS — CONTROL SWITCH

SB — SHORTING BLOCK

VS — VOLTMETER SWITCH

100/5 — X — METERING DEVICE
X = METER TYPE
WHM — WATT HOUR METER
WM — WATT METER
AM — AMMETER
VM — VOLTMETER
PFM — POWER FACTOR METER

(3) — POTENTIAL TRANSFORMER
RATIO AND NUMBER OF PT'S AS INDICATED

(3) — CURRENT TRANSFORMER
RATIO AND NUMBER OF CT'S AS INDICATED

5A — FUSE
SIZE AS INDICATED

X — FLA / SFA — MOTOR
X = HORSEPOWER

DELTA-WYE TRANSFORMER WITH SECONDARY KVA SIZE AND VOLTAGE RATIO AS INDICATED

SINGLE LINE DIAGRAM SYMBOLS (CONT.)

FUSED CONTROL POWER TRANSFORMER

MOV — ELECTRICAL MOTOR OPERATED VALVE, WITH INTEGRAL REVERSING STARTER

30A — DISCONNECT SWITCH SIZE AS INDICATED

30A — DISCONNECT SWITCH WITH EMERGENCY STOP SIZE AS INDICATED

ESTP — DISCONNECT SWITCH WITH EMERGENCY STOP SIZE AS INDICATED

X / Y — FUSED DISCONNECT SWITCH SIZE AS INDICATED
X = DISC SIZE
Y = FUSE SIZE

CAPACITOR

SPD — SURGE PROTECTIVE DEVICE

SSM — SOLID STATE METERING DEVICE

LIGHTNING ARRESTOR AND SURGE CAPACITOR

X — POWER FILTER/CONDITIONER

CONDUIT AND RACEWAY SYMBOLS

EXPOSED OR CONCEALED CONDUIT
CONDUIT RUN (IN CONCRETE)
CONDUIT RUN (UNDERGROUND)
CONDUIT RUN (CHANGE IN ELEVATION)
CONDUIT TURNING UP
CONDUIT TURNING DOWN
CONDUIT GROUPED TOGETHER AND SHOWN AS SINGLE LINE FOR CLARITY
CONDUIT FROM FLOOR ABOVE TO FLOOR BELOW
CONDUIT CAPPED, OR SEALED
HOMERUN TO EQUIPMENT INDICATED (3/4" CONDUIT 2#12, 1#12GND UNLESS INDICATED OTHERWISE)

MISCELLANEOUS SYMBOLS

J — JUNCTION BOX OR FITTING

POWER PANEL

M — MOTOR

T — THERMOSTAT

FIELD DEVICE

FIELD CONTROL STATION / DISCONNECT

GROUNDING SYMBOLS

GROUND ROD AND GROUND WELL

GROUND ROD (3/4" X 10'-0")

CT — GROUND CONNECTION - "C" TAP GROUND CONNECTION

GROUND CONNECTION - EXOTHERMIC TYPE

GROUND CONNECTION - EXOTHERMIC TYPE

BARE COPPER GROUND TO GROUND WIRE IN SLAB, OR UNDERGROUND GROUND GRID

EARTH GROUNDING

SCHEMATIC DIAGRAM SYMBOLS

SINGLE POLE TOGGLE SWITCH

VACUUM OR PRESSURE SWITCH CLOSE/OPEN ON RISING PRESSURE

FLOAT LEVEL SWITCH CLOSE/OPEN ON RISING LEVEL

NORMALLY OPEN/CLOSED

NORMALLY OPEN HELD CLOSED/OPEN

MAINTAINED POSITION

TS1 TS1 — TEMPERATURE SWITCH CLOSE/OPEN ON RISING TEMPERATURE

FLOW SWITCH CLOSE/OPEN ON INCREASING FLOW

TORQUE SWITCH OPEN ON INCREASING TORQUE

SOLENOID VALVE

PLC INPUTS/OUTPUTS

DI — DIGITAL INPUT TO PLC/RTU/DCS

DIGITAL OUTPUT FROM PLC/RTU/DCS NORMALLY OPEN

DIGITAL OUTPUT FROM PLC/RTU/DCS NORMALLY CLOSED

AI — ANALOG INPUT TO PLC/RTU/DCS 4-20 mA (UNLESS INDICATED OTHERWISE)

AO — ANALOG OUTPUT FROM PLC/RTU/DCS 4-20 mA (UNLESS INDICATED OTHERWISE)

OPERATIONAL CONTROLS

E-STOP OR LOS PUSHBUTTON

OPEN — NORMALLY OPEN PUSHBUTTON

STOP — NORMALLY CLOSED PUSHBUTTON

TWO - POSITION SWITCH

OFF ON — NO/NC MAINTAINED PUSHBUTTON

H O A — THREE - POSITION SELECTOR SWITCH

L R — TWO - POSITION SELECTOR SWITCH

THREE - POSITION SPRING RETURN-TO-CENTER MOMENTARY CONTACT SWITCH

SCHEMATIC DIAGRAM SYMBOLS (CONT.)

CONTROL RELAY AND CONTACTS

M1 — CONTROL RELAY OR COIL
X = DEVICE
CR — CONTROL RELAY
TD — TIME DELAY RELAY (TIMING AS INDICATED)
M — MOTOR STARTER
PC — PHOTOCELL

CR — NORMALLY OPEN CONTACT

CR — NORMALLY CLOSED CONTACT

XXXX — NORMALLY OPEN CONTACT LINE REFERENCE

XXXX — NORMALLY CLOSED CONTACT LINE REFERENCE

TIMED DELAY RELAY CONTACTS

ENERGIZED

TD1 — NORMALLY OPEN WITH TIME DELAY CLOSING

TD1 — NORMALLY CLOSED WITH TIME DELAY OPENING

DE-ENERGIZED

TD1 — NORMALLY OPEN WITH INSTANT CLOSING AND TIME DELAY OPENING

TD1 — NORMALLY CLOSED WITH INSTANT OPENING AND TIME DELAY CLOSING

MISCELLANEOUS SYMBOLS

X — PILOT LIGHT
X = LENS COLOR
R — RED
G — GREEN
A — AMBER
W — WHITE

X — PILOT LIGHT (PUSH-TO-TEST)
X = LENS COLOR (SEE ABOVE)

HORN

ETM — ELAPSED TIME METER

HTR — HEATER

GROUND CONNECTION

CROSSING OF CONDUCTORS - NOT CONNECTED

CROSSING OF CONDUCTORS - CONNECTED

FUSE

VOLTAGE SURGE SUPPRESSOR

FAN

CIRCUIT BREAKER

TERMINAL BLOCK - IN MCC

TERMINAL BLOCK - IN FIELD

DEVICE TERMINAL

EARTH GROUNDING

ELECTRICAL FIELD WIRING

ELECTRICAL SCHEMATIC WIRING

EQUIPMENT BOUNDARY

LIGHTING SYMBOLS

X-#a — LUMINAIRE
X = LIGHTING PANEL DESIGNATION
# = CIRCUIT NUMBER
a = SWITCH DESIGNATION

WALL MOUNTED LUMINAIRE

POLE, BRACKET, ARM, AND STREETLIGHT

FLUORESCENT LUMINAIRE

E — EMERGENCY LUMINAIRE
BATTERY OPERATED

EXIT LIGHT, SHOWN WITH TWO ILLUMINATED SIDES, ARROWS INDICATE DIRECTION OF EXIT

A / # — LUMINAIRE CALLOUT
A = LUMINAIRE TYPE
* = APPROXIMATE MOUNTING HEIGHT AFF
CLG = CEILING MOUNT
(SEE LUMINAIRE SCHEDULE FOR MORE DETAILS)

X-#a / $* — LIGHT SWITCH
X = LIGHTING PANEL DESIGNATION
# = CIRCUIT DESIGNATION
a = SWITCH DESIGNATION
* = SWITCH TYPE
3 — 3 WAY
4 — 4 WAY
D — DIMMER
M — MANUAL MOTOR STARTER

X-# — 120V DUPLEX RECEPTACLE, NEMA CONFIGURATION 5-20R (WALL MOUNT)
X = PANELBOARD DESIGNATION
# = CIRCUIT DESIGNATION
* = TYPE
WP — WEATHERPROOF
XP — EXPLOSION PROOF
GFCI — GROUND FAULT CIRCUIT INTERRUPTER

120V DUPLEX RECEPTACLE, NEMA CONFIGURATION 5-20R (FLOOR MOUNT)

X — WELDING RECEPTACLE
X = AMPERAGE

X — SPECIAL PURPOSE RECEPTACLE, 480 VAC
X = AMPERAGE

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IDYLLWILD TREATMENT PLANT

ELECTRICAL SYMBOLS

IDYLLWILD, CA

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SHEET X OF X

E001

ELECTRICAL ABBREVIATIONS

A	AMPERE, AUTOMATIC
AC	ALTERNATING CURRENT
AF	CIRCUIT BREAKER FRAME SIZE
AHF	ACTIVE HARMONIC FILTER
AM	AMMETER
ANN	ANNUNCIATOR
ASD	ADJUSTABLE SPEED DRIVE
AT	AMPERE TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AUTO	AUTOMATIC
AWG	AMERICAN WIRE GAUGE
BATT	BATTERY
BC	BARE COPPER
BKR	BREAKER
C	CONDUIT, CLOSED
CB	CIRCUIT BREAKER
CKT	CIRCUIT
CLF	CURRENT LIMITING FUSE
CLG	CEILING
COM	COMMON
COMM	COMMUNICATIONS
COMP	COMPARTMENT
CP	CONTROL PANEL
CPT	CONTROL POWER TRANSFORMER
CR	CONTROL RELAY, CARD READER
CT	CURRENT TRANSFORMER
DCS	DISTRIBUTED CONTROL SYSTEM
DISC	DISCONNECT
DISTR	DISTRIBUTION
DP	DISTRIBUTION PANEL
DPDT	DOUBLE POLE DOUBLE THROW
DPST	DOUBLE POLE SINGLE THROW
E	EMERGENCY
EMT	ELECTRICAL METALLIC TUBING
ENCL	ENCLOSURE
ETM	ELAPSED TIME METER
EUPS	ENGINE UTILITY PARALLELING SYSTEM
F	FREQUENCY, FUSE, FIXED
FDR	FEEDER
FLA	FULL LOAD AMPS
FLUOR	FLUORESCENT
FM	FREQUENCY METER
FO	FIBER OPTIC
FPR	FEEDER PROTECTION RELAY
FVR	FULL VOLTAGE REVERSING
FVNR	FULL VOLTAGE NON-REVERSING
GEN	GENERATOR
GFCI	GROUND FAULT CIRCUIT
GFP	INTERRUPTER
GND	GROUND FAULT PROTECTION GROUND
H	HAND
HH	HAND HOLE
HID	HIGH INTENSITY DISCHARGE
HOA	HAND-OFF-AUTOMATIC
HPS	HIGH PRESSURE SODIUM
HRN	HORN
HS	HAND SWITCH
HZ	HERTZ
IMC	INTERMEDIATE METALLIC CONDUIT
INCAND	INCANDESCENT
IND	INDICATION
INST	INSTANTANEOUS
I/O	INPUT/OUTPUT
Isc	SHORT CIRCUIT CURRENT, AMPS
ISO	ISOLATION
J,JB	JUNCTION BOX
KA	KILO AMPERES
KAIC	KILO AMP INTERRUPTING CURRENT
KCMIL	KILO CIRCULAR MILS
KV	KILOVOLT
KVA	KILOVOLT AMPERE
KW	KILOWATT
LCP	LOCAL CONTROL PANEL
LCS	LOCAL CONTROL STATION
LOC	LOCAL
LOR	LOCAL-OFF-REMOTE
LOS	LOCKOUT STOP PUSHBUTTON
LP	LIGHTING PANEL
LRA	LOCKED ROTOR AMPS
LS	LEVEL SWITCH
LTCP	LIGHTING CONTROL PANEL
LTG	LIGHTING
LTS	LIGHTS
M	MOTOR CONTACTOR COIL
mA	MILLIAMPERE
MCC	MOTOR CONTROL CENTER
MCP	MOTOR CIRCUIT PROTECTOR
MLO	MAIN LUGS ONLY
MOV	MOTOR OPERATED VALVE
MSC	MANUFACTURER SUPPLIED CABLE
MTS	MANUAL TRANSFER SWITCH
NEUT	NEUTRAL
NP	NAMEPLATE
O	OPEN, OFF
OL	OVERLOAD
PA	PUBLIC ADDRESS
PB	PUSHBUTTON, PULLBOX
PC	PHOTOCELL
PCM	PROCESS CONTROL MODULE
PF	POWER FACTOR
PFM	POWER FACTOR METER
PH	PHASE
PL	PILOT LIGHT
PLC	PANELBOARD
PNLBD	PROGRAMMABLE LOGIC CONTROLLER
PP	POWER PANELBOARD
POS	POSITION
POT	POTENTIOMETER
PRI	PRIMARY
PT	POTENTIAL TRANSFORMER
PTZ	PAN-TILT-ZOOM
PWR	POWER
R	REMOTE
RECPT	RECEPTACLE
RGS	RIGID GALVANIZED STEEL
RMS	ROOT MEAN SQUARE
RTU	REMOTE TERMINAL UNIT
RVSS	REDUCED VOLTAGE SOLID STATE
SEL SW	SELECTOR SWITCH
SEQ	SEQUENCE
SHLD	SHIELDED
SIG	SIGNAL
SP	SPARE
SP HTR	SPACE HEATER
SPD	SURGE PROTECTIVE DEVICE
SPDT	SINGLE POLE DOUBLE THROW
SPST	SINGLE POLE SINGLE THROW
SSM	SOLID STATE METER
SSMP	SOLID STATE MOTOR PROTECTOR
ST, SH	SHUNT TRIP
STB	STANDBY
STR	STARTER
SSTU	SOLID STATE TRIP UNIT
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
TB	TERMINAL BOX
TERM	TERMINAL
TM	REPEAT CYCLE TIMER
TD	TIME DELAY RELAY
TS	TEMPERATURE SWITCH
UPR	UTILITY PROTECTION RELAY
UPS	UNINTERRUPTIBLE POWER SUPPLY
V	VOLTAGE, VOLTS
VA	VOLT AMPERE
VAR	VOLT AMPERE REACTIVE
VM	VOLTMETER
VP	VAPOR PROOF
W	WATTS, WIRE
WM	WATT METER
WP	WEATHERPROOF
XFMR	TRANSFORMER
XMTR	TRANSMITTER
XP	EXPLOSION PROOF

GENERAL ELECTRICAL NOTES

1. ALL RACEWAYS AND EQUIPMENT SHALL BE INSTALLED AND GROUNDED IN ACCORDANCE WITH THE 2020 EDITION OF THE NATIONAL ELECTRICAL CODE AND APPLICABLE LOCAL CODES.
2. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION OF TERMINAL BOXES AND CONDUIT ENTRANCES OF ALL EQUIPMENT AGAINST APPROVED SHOP DRAWINGS BEFORE STUBBING UP CONDUITS.
3. REFER TO SPECIFICATION SECTION 16110 FOR REQUIREMENTS RELATED TO FLEXIBLE CONDUIT INSTALLATION.
4. CONDUIT RUNS ARE SHOWN DIAGRAMMATICALLY ONLY AND SHALL BE INSTALLED IN A MANNER TO PREVENT CONFLICTS WITH EQUIPMENT OR STRUCTURAL CONDITIONS. EXPOSED CONDUIT SHALL BE INSTALLED PARALLEL OR PERPENDICULAR TO BEAMS AND WALLS.
5. CONDUIT STUB-UPS SHALL NOT BE MORE THAN 6 INCHES FROM THE CENTERLINE OF TERMINAL BOXES.
6. IN THE EVENT OF INTERFERENCE BETWEEN ELECTRICAL EQUIPMENT SHOWN ON THE DRAWINGS AND OTHER EQUIPMENT, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IN WRITING.
7. LOCATION OF PULLBOXES ARE APPROXIMATE. THE CONTRACTOR SHALL COORDINATE EXACT LOCATION WITH MECHANICAL PIPING AND SHALL BE 6 INCHES (MINIMUM) AWAY FROM MECHANICAL PIPING FLOW LINES.
8. ONLY MAJOR PULLBOXES ARE SHOWN. THE CONTRACTOR SHALL PROVIDE ADDITIONAL PULLBOXES WHERE REQUIRED TO MAKE A WORKABLE INSTALLATION.
9. THE WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE DETAILS WHETHER OR NOT THEY ARE REFERENCED ON THE DRAWINGS.
10. ALL CONDUIT RUNS CROSSING EXPANSION JOINTS SHALL HAVE EXPANSION OR EXPANSION AND DEFLECTION TYPE FITTINGS. FOR LOCATIONS OF EXPANSION JOINTS, REFER TO THE STRUCTURAL DWGS.
11. LUMINAIRES SHALL BE MOUNTED ACCORDING TO THE MOUNTING HEIGHT GIVEN ON THE DRAWINGS, WITH THE DISTANCE BEING MEASURED FROM THE BOTTOM OF THE LUMINAIRE TO THE FINISHED FLOOR. THE APPROPRIATE MOUNTING BRACKETS AND HARDWARE SHALL BE SUPPLIED.
12. THE WIRING DIAGRAMS, QUANTITY AND SIZE OF WIRES AND CONDUIT REPRESENT A SUGGESTED ARRANGEMENT BASED UPON SELECTED STANDARD COMPONENTS OF ELECTRICAL EQUIPMENT. MODIFICATIONS ACCEPTABLE TO THE ENGINEER MAY BE MADE BY THE CONTRACTOR TO ACCOMMODATE EQUIPMENT ACTUALLY PURCHASED. THE BASIC SEQUENCE AND METHOD OF CONTROL MUST BE MAINTAINED AS INDICATED ON THE DRAWINGS AND/OR SPECIFICATIONS.
13. CONNECTIONS BETWEEN RIGID CONDUIT AND MOTOR TERMINAL BOXES OR SIMILAR EQUIPMENT SUBJECT TO VIBRATION SHALL BE FLEXIBLE LIQUID-TIGHT CONDUIT.
14. CONDUITS SHALL BE TERMINATED SO AS TO PERMIT NEAT CONNECTION TO MOTORS AND OTHER EQUIPMENT.
15. CONDUITS FOR FUTURE EQUIPMENT OR EXTENSIONS SHALL BE TERMINATED AS SHOWN IN DETAIL OR AS SPECIFIED.
16. MCC COMPARTMENT DESIGNATIONS SHALL BE AS FOLLOWS:

    BLANK/SPACE: CONTAINS NECESSARY BUS AND HARDWARE FOR FUTURE ADDITION OF BREAKERS OR STARTERS.

    SPARE: CONTAINS A COMPLETE INSTALLED BREAKER OR STARTER AVAILABLE FOR FUTURE USE.
17. ALL MOTOR STARTER CONTROL POWER TRANSFORMERS SHALL BE SIZED TO PROVIDE SUFFICIENT VOLT-AMPERE CAPACITY FOR OPERATING ALL LOCAL AND REMOTE ELECTRICAL DEVICES ASSOCIATED WITH CONTROL OF THE MOTOR IN ADDITION TO THE STARTER COIL.
18. MOTOR CONTROL CENTERS AND ALL FREE STANDING PANELS SHALL BE SET ON CONCRETE HOUSEKEEPING PADS WITH LEVELING CHANNELS EMBEDDED IN THE PAD.
19. ALL RECEPTACLES IN OUTDOOR AND ANTICIPATED WET AREAS SHALL BE GROUND FAULT CIRCUIT INTERRUPTER RECEPTACLES WITH WEATHERPROOF COVERS.

GENERAL ELECTRICAL NOTES (CONT.)

20. ELECTRICAL CONTRACTOR SHALL VISIT THE SITE PRIOR TO BIDDING THE PROJECT TO VERIFY THE SCOPE OF WORK WITH FIELD CONDITIONS. PARTICULAR ATTENTION SHOULD BE GIVEN TO NEW CONDUIT RUNS IN EXISTING BUILDINGS.
21. EQUIPMENT LOCKOUTS SHALL BE IN STRICT ACCORDANCE WITH OWNER'S REQUIREMENTS.
22. FOR LIGHTING AND RECEPTACLE SYSTEMS, ONLY CIRCUIT NUMBERS ARE SHOWN. CONTRACTOR SHALL PROVIDE ALL NECESSARY CONDUITS, WIRES,FITTINGS, JUNCTION BOXES AND ALL NECESSARY COMPONENTS SHOWN OR NOT SHOWN ON THE DRAWINGS, TO MAKE THE ELECTRICAL INSTALLATION COMPLETE AND OPERATIONAL. ALL CONDUIT RUNS SHALL BE CONCEALED UNLESS INDICATED OTHERWISE. CIRCUIT LOADING SHALL BE AS INDICATED IN THE PANEL SCHEDULES. ALL LIGHTING AND RECEPTACLE CIRCUITS SHALL INCLUDE GROUND WIRE.
23. CONTRACTOR SHALL BE ADVISED THAT EVERY ATTEMPT HAS BEEN MADE TO INCLUDE ALL CONDUITS IN THE DUCTBANK SCHEDULES AND CONDUIT DEVELOPMENT DRAWINGS FOR SPECIFIC FACILITIES, HOWEVER THE CONTRACTOR IS RESPONSIBLE FOR ANY CONDUIT/WIRE THAT IS NOT SHOWN.
24. ALL UNDERGROUND FACILITIES SHALL BE PROTECTED FROM DAMAGE. IF ANY UNDERGROUND FACILITIES ARE DAMAGED, IT SHALL BE REPORTED TO THE ENGINEER AND CONTRACTOR SHALL REPLACE OR REPAIR FACILITIES AT NO COST TO THE OWNER.
25. THE FINAL DESIGN FOR CONCRETE EQUIPMENT PADS AND FOUNDATIONS SHALL BE PROVIDED BY THE CONTRACTOR IN A DESIGN-BUILD FORMAT. REFERENCE SPECIFICATION SECTIONS:
    * 01610: SEISMIC DESIGN CRITERIA
    * 01615: WIND DESIGN CRITERIA
    * 02020: GEOTECHNICAL REPORT

    PROVIDE STAMPED, SIGNED CALCULATIONS AND DRAWING FOR REVIEW AND APPROVAL OF THE ENGINEER BY A REGISTERED CIVIL OR STRUCTURAL ENGINEER N THE STATE OF CALIFORNIA.

ELECTRICAL DEMOLITION NOTES

1. BIDDING CONTRACTORS SHALL VISIT THE SITE TO ASSESS THE SCOPE OF DEMOLITION, REMOVAL AND MODIFICATION WORK.
2. THE ELECTRICAL CONTRACTOR AND THE OWNER SHALL DE-ENERGIZE ALL WIRING PRIOR TO REMOVAL OF EQUIPMENT, DEVICES, MOTORS INSTRUMENTATION, CONTROL PANELS, ETC. CONTRACTOR SHALL OBTAIN PRIOR APPROVAL FROM THE OWNER.
3. EXPOSED RACEWAYS: REMOVE CONDUIT, WIRES, AND BOXES. PATCH TO MATCH EXISTING. FINISH-ALL OPENINGS IN WALLS AND FLOORS.
4. CONCEALED CONDUITS IN THE SLAB: REMOVE EXISTING WIRES TO THE EXTENT POSSIBLE AND ABANDON CONDUITS IN THE SLAB. CUT CONDUIT FLUSH AND PATCH THE FLOOR TO MATCH EXISTING.

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ELECTRICAL ABBREVIATIONS AND GENERAL NOTES

IDYLLWILD, CA

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SHEET X OF X

E002

SHEET NOTES

1. PROVIDE MINIMUM SPACES FOR FUTURE MOTOR CONTROLS AS SHOWN ON MCC-100 ELEVATIONS. REFERENCE SHEET E004.

SERVICE LOAD CALCULATION

LOAD CENTER: MSB-100 (E) — **480 VAC, 3 PHASE** — **4-WIRE**

FED FROM: SCE OH UTILITY

EQUIPMENT NUMBER	EQUIPMENT DESCRIPTION	CONNECTED LOAD AMPS	CONNECTED LOAD (KVA)	UTILITY RUN (KVA)	GENERATOR RUN (KVA)
MCC-100	MOTOR CONTROL CENTER 100	216.9	216.9	219.8	165.7
SUBTOTAL (KVA)			216.9	209.0	165.7
SUBTOTAL (AMPS)			260.9	251.3	199.3

UTILITY:		**GENERATOR:**	
SERVICE SIZE	251 A	**SERVICE SIZE**	199 A
MAIN BREAKER SIZE	400 A	**GEN SIZE (kW)**	**200** 301 A
% LOADED	63%	**% LOADED**	66%

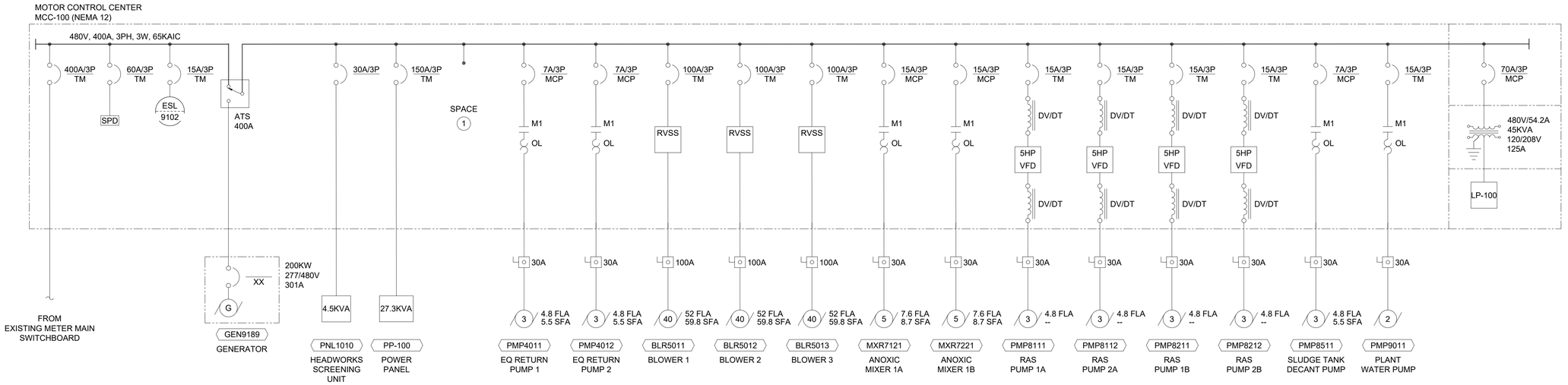
LOAD CALCULATION

LOAD CENTER: MCC-100 — **480 VAC, 3 PHASE SERVICE** — **3-WIRE**

FED FROM: ATS

EQUIPMENT NUMBER	HP KVA	MOTOR CONTROL	EQUIPMENT DESCRIPTION	CONNECTED LOAD (AMPS)	CONNECTED QTY	CONNECTED LOAD (KVA)	UTILITY RUN QTY	UTILITY RUN (KVA)	GENERATOR RUN QTY	GENERATOR RUN (KVA)
PMP4011,2	3	FVNR	EQ LIFT PUMPS 1 & 2	4.8	1	4.0	1	4.0	1	4.0
BLR5011~3	40	SSRV	BLOWERS 1 - 3 (2(E) 1 (N))	52.0	3	129.7	3	129.7	2	86.5
MXR7121	5	FVNR	ANOXIC MIXER 1A	7.6	1	6.3	1	6.3	1	6.3
MXR7221	5	FVNR	ANOXIC MIXER 1B	7.6	1	6.3	1	6.3	1	6.3
PMP8111,2	3	VFD	RAS PUMP 1A - 2A	4.8	2	8.0	2	8.0	2	8.0
PMP8211,2	3	VFD	RAS PUMP 1B - 2B	4.8	2	8.0	2	8.0	2	8.0
PMP8011	3	FVNR	SLUDGE SETTLING TANK PUMP	4.8	1	4.0	1	4.0	1	4.0
PMP9011	2	FVNR	PLANT WATER PUMP	3.4	1	2.8	1	2.8	1	2.8
PP-100		CB	POWER PANEL		1	27.3	1	27.3	1	27.3
LP-100		CB	LIGHTING PANEL		1	12.5	1	12.5	1	12.5
SUBTOTAL						209.0		209.0		165.7
LARGEST MOTOR @ 25%				40	HP			10.8		
TOTAL								219.8		165.7

3 PHASE CURRENT	264 AMPS
	100% MAXIMUM LOAD CURRENT
CALCULATED SERVICE SIZE	264 AMPS
MAIN BREAKER SIZE	400 AMPS
% MAIN BREAKER LOAD	66%



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SINLGE LINE DIAGRAM & LOAD CALCULATIONS

IDYLLWILD, CA

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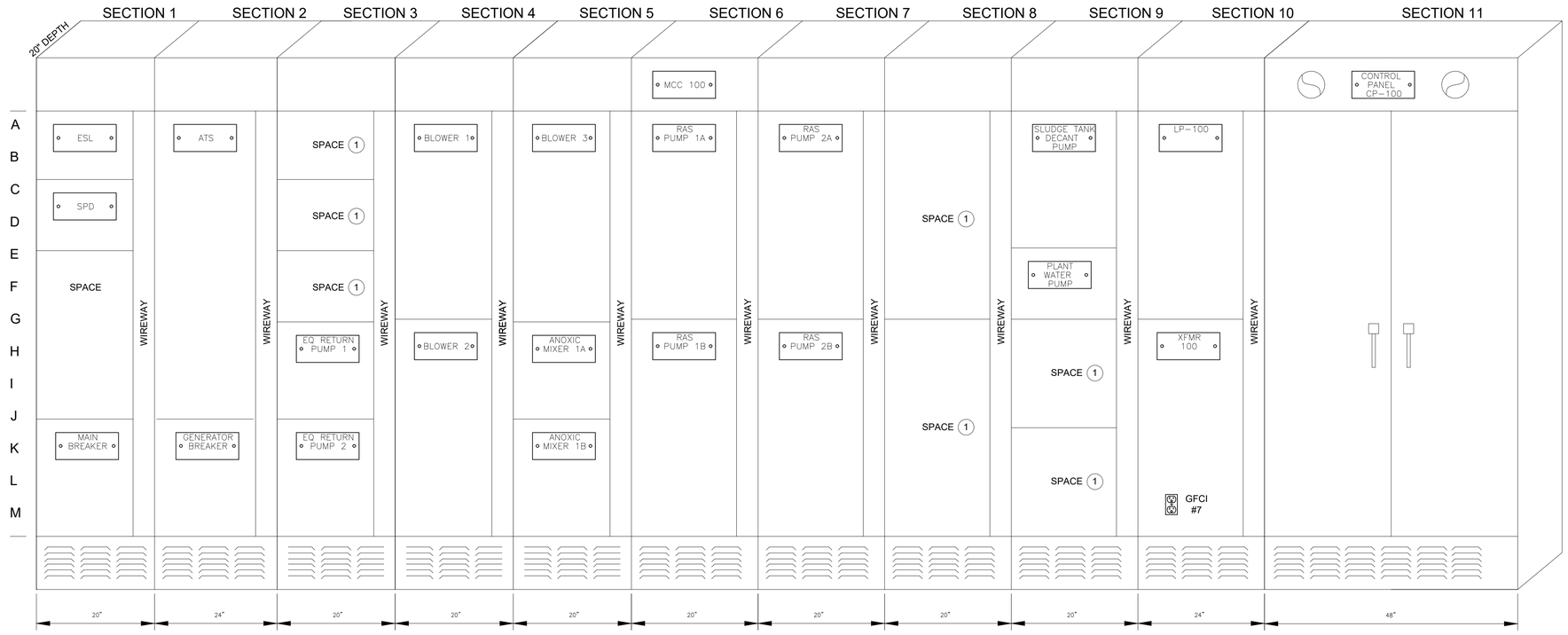
SHEET X OF X

E003

SHEET NOTES

1. SPACES SHALL BE PROVIDED WITH DRAW-OUT BUCKETS AND BLANK HINGED DOORS.



MOTOR CONTROL CENTER (MCC-100) (A)

SCALE:NONE

PANEL SCHEDULE - PP-100

LOCATION ELECTRICAL/CONTROL BUILDIN **MAIN BKR** MLO AMPS
VOLTAGE 480 **SYSTEM** 3Φ, 3W 200
TRIM SURFACE **BUS RATING** 225A

					PHASE LOADS-AMPS							
CKT	LOAD	VA	AMPS	CB	A	B	C	CB	AMPS	VA	LOAD	CKT
1		1000	3.6		7.2				3.6	1000		2
3	MOG2041	1000	3.6	15/3		7.2		15/3	3.6	1000	MOV8141	4
5		1000	3.6				7.2		3.6	1000		6
7		1000	3.6		7.2				3.6	1000		8
9	MOG2042	1000	3.6	15/3		7.2		15/3	3.6	1000	MOV8142	10
11		1000	3.6				7.2		3.6	1000		12
13		1000	3.6		19.9				16.2	4500		14
15	MOG2043	1000	3.6	15/3		19.9		30/3	16.2	4500	HEADWORKS PANEL PNL-1010	16
17		1000	3.6				19.9		16.2	4500		18
19		2500	20.8		41.7				20.8	2500		20
21	LIGHTING TRANSFORM XFMR-LAB	2500	20.8	90/3		41.7		100/3	20.8	2500	MCC-EXISTING PUMP ROOM	22
23		2500	20.8				41.7		20.8	2500		24
25			0.0		0.0				0.0			26
27			0.0			0.0			0.0			28
29			0.0				0.0		0.0			30
31			0.0		0.0				0.0			32
33			0.0			0.0			0.0			34
35			0.0				0.0		0.0			36

Notes		A	B	C		
(L)	Lockout Provision Required	76 A	76 A	76 A		
(H)	HACR - Rated Breaker	9116 VA	9116 VA	9116 VA		
(G)	Ground Fault Interupt Rated Breaker	PHASE LOADS			AVERAGE	76 A
(A)	Arc-Fault Interupt Rated Breaker	100%	100%	100%	TOTAL	27 KVA

PANEL SCHEDULE - LP-100

LOCATION MCC-100 **MAIN BKR** 125A
VOLTAGE 120/208Y **SYSTEM** 3Φ, 4W
TRIM FLUSH **BUS RATING** 125A

					PHASE LOADS-AMPS							
CKT	LOAD	VA	AMPS	CB	A	B	C	CB	AMPS	VA	LOAD	CKT
1	CONTROL PANEL CP 100	640	5.3	20/1	6.3			20/1	1.0	120	LIGHTING-BLDG	2
3	LIGHTING-SITE	180	1.5	20/1		4.5		20/1	3.0	360	RECEPT-BLDG	4
5	RECEPT-SITE	360	3.0	20/1			8.0	20/1	5.0	600	SPARE	6
7	MCC-RECEPT	240	2.0	20/1	3.5			20/1	1.5	180	SPARE	8
9	SPARE	0	0.0	20/1		4.5		20/1	4.5	540	GENERATOR BATTERY CHARGER	10
11	SPARE	0	0.0	15/1			16.7	30/2	16.7	2000		12
13	SPARE	0	0.0	20/1	16.7				16.7	2000	GENERATOR BLOCK HEATER	14
15	SPARE	0	0.0	20/1		22.0		40/2 (H)	22.0	2640		16
17	SPARE	0	0.0	20/1			22.0		22.0	2640	ELECTRICAL BUILDING HVAC	18
19	SPARE	0	0.0	15/1	0.0				0.0	0	SPACE	20
21	SPACE	0	0.0			0.0			0.0	0	SPACE	22
23	SPACE	0	0.0				0.0		0.0	0	SPACE	24
25	SPACE	0	0.0	15/1	0.0			15/1	0.0		SPARE	26
27	SPACE	0	0.0	15/2		0.0		15/1	0.0		SPARE	28
29		0	0.0				0.0	15/1	0.0		SPARE	30
31	SPACE	0	0.0	15/1	0.0			15/1	0.0		SPARE	32
33	SPACE	0	0.0	15/1		0.0		15/1	0.0		SPARE	34
35	SPACE		0.0				0.0	15/1	0.0		SPARE	36
37	SPACE		0.0		0.0				0.0		SPARE	38
39	SPACE		0.0			0.0			0.0		SPARE	40
41	SPACE		0.0				0.0		0.0		SPARE	42

Notes		A	B	C			
(L)	Lockout Provision Required	27 A	31 A	47 A			
(H)	HACR - Rated Breaker	3180 VA	3720 VA	5600 VA			
(GFI)	Ground Fault Interupt Rated Breaker	PHASE LOADS			TOTAL	12500 VA	208 V
(AFI)	Arc-Fault Interupt Rated Breaker	76%	89%	134%	AMPS	35 A	

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IDYLLWILD TREATMENT PLANT

MCC ELEVATIONS AND LOAD CALCULATIONS

IDYLLWILD, CA

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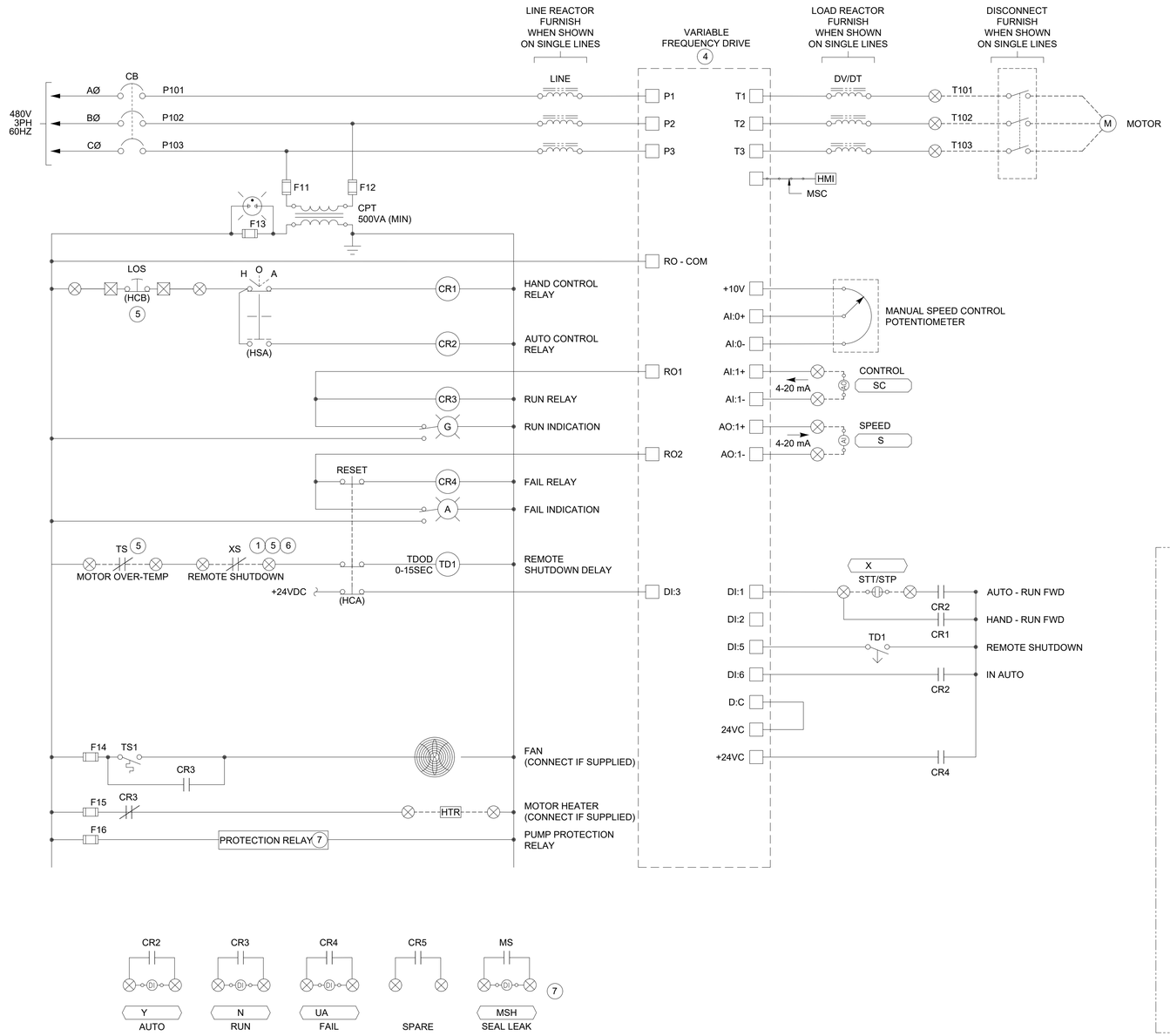
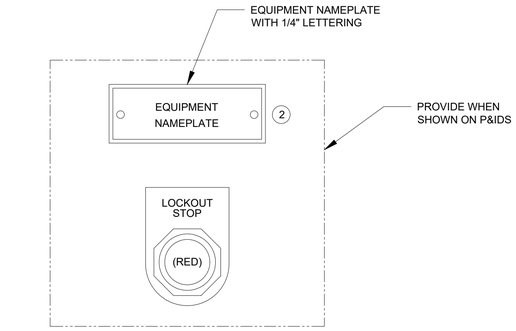
SHEET X OF X

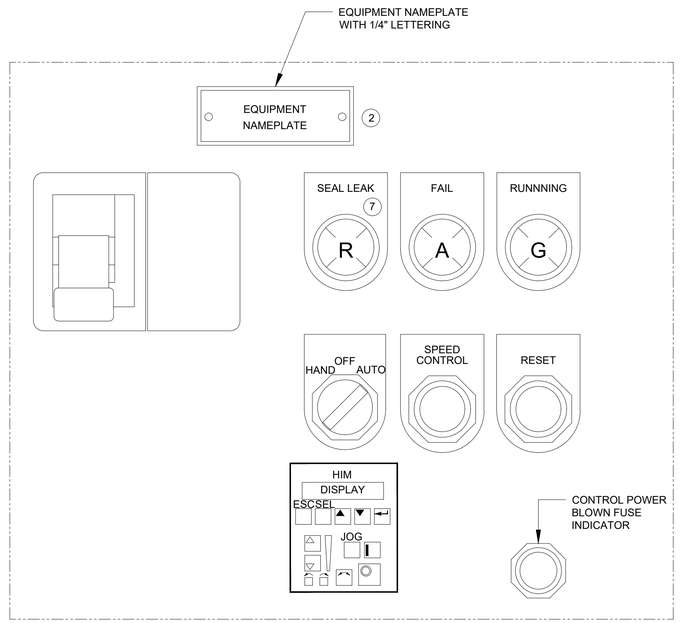
E004



DETAIL 1 - VFD MOTOR CONTROL DIAGRAM (CONTROLLED FROM MCC)
SCALE: NONE



DETAIL 3 - FIELD CONTROL STATION ELEVATION
SCALE: NONE



DETAIL 2 - MCC CUBICAL ELEVATION
SCALE: NONE

GENERAL NOTES

A. THESE DRAWINGS SHOW GENERAL CONTROL PHILOSOPHY AND DEVICES. NOT ALL REQUIRED CONTROL COMPONENTS AND DEVICES ARE SHOWN. CONTRACTOR IS RESPONSIBLE TO PROVIDE COMPLETE AND FUNCTIONAL SYSTEM.

SHEET NOTES

1. REMOTE SHUTDOWN XS => LSLL, ZSHH, PSHH, ETC., PER P&ID, JUMPER IF NOT USED. THESE ARE TO BE CONTACTS OFF OF AUXILIARY RELAY CONTACTS LOCATED IN MCC CONTROL PANEL DRIVEN FROM FIELD DEVICE.
2. EQUIPMENT NAMEPLATE TO CONTAIN EQUIPMENT DESCRIPTION AND EQUIPMENT NUMBER PER ELEVATION DIAGRAM. MOUNT ON OR ABOVE DEVICE BOX ON FCS.
3. ILLUMINATED PUSH BUTTON RESET, TRIP CAUSE LED STATUS.
4. ELECTRONIC OVERLOAD WITH PHASE LOSS PROTECTION, DIGITAL CURRENT SETTING, GROUND FAULT TRIP, AND SELECTABLE TRIP CLASS.DRIVE TYPE AS SHOWN ON ONE LINE DIAGRAM.
5. JUMPER DEVICE IF NOT REQUIRED.
6. PROVIDE QUANTITY OF LOCKOUT RELAY CONTACTS AS REQUIRED BY P&IDS.
7. PUMP PROTECTION RELAY PROVIDED BY PUMP SUPPLIER INSTALLED BY MCC SUPPLIER WHEN SHOWN ON P&ID'S.

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IDYLLWILD TREATMENT PLANT
VFD DIAGRAM
(CONTROLLED FROM MCC)
IDYLLWILD, CA

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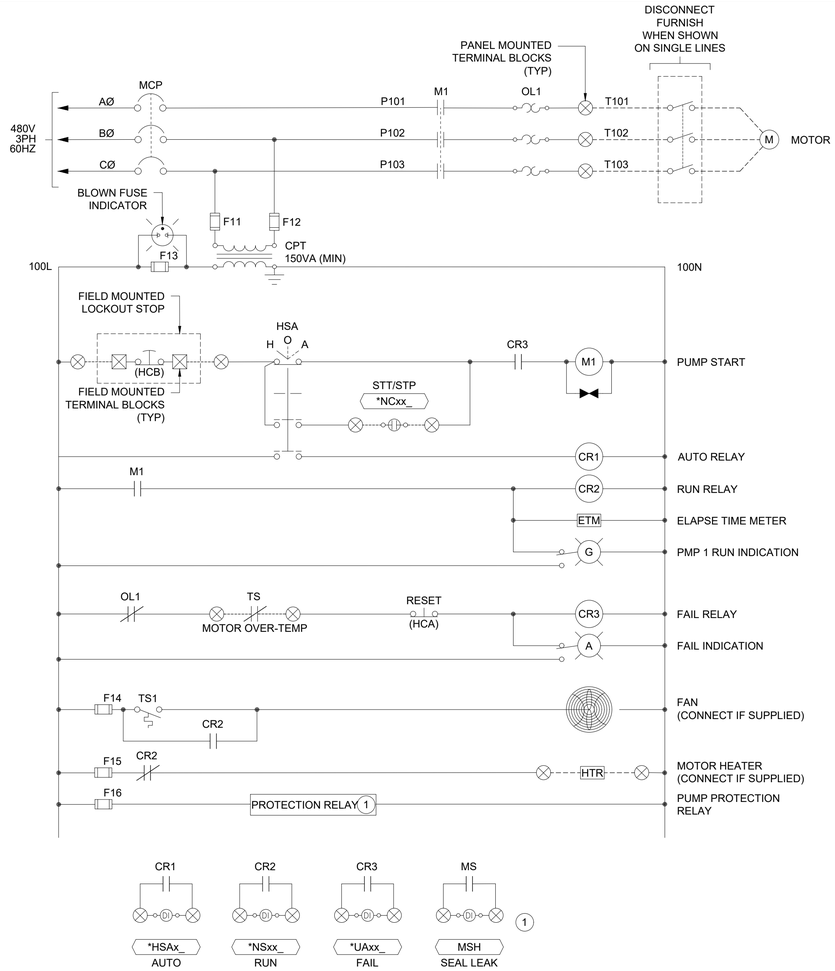
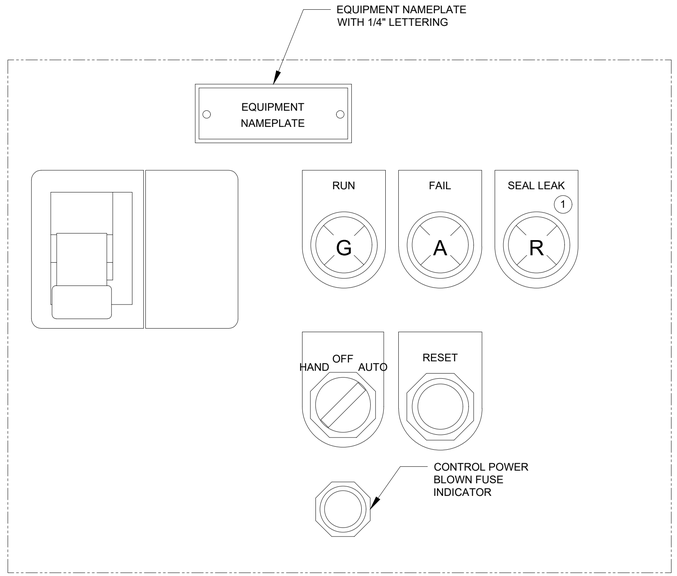
SHEET X OF X

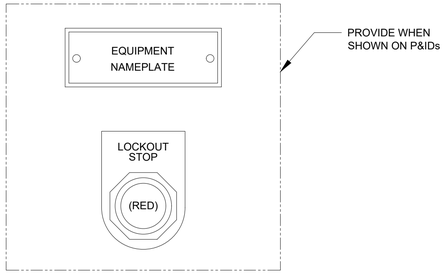
E006



DETAIL 1 - FVNR MOTOR CONTROL DIAGRAM (CONTROLLED FROM MCC)
SCALE: NONE



DETAIL 2 - MCC CUBICAL ELEVATION
SCALE: NONE



DETAIL 3 - FIELD CONTROL STATION ELEVATION
SCALE: NONE

GENERAL NOTES

A. THESE DRAWINGS SHOW GENERAL CONTROL PHILOSOPHY AND DEVICES. NOT ALL REQUIRED CONTROL COMPONENTS AND DEVICES ARE SHOWN. CONTRACTOR IS RESPONSIBLE TO PROVIDE COMPLETE AND FUNCTIONAL SYSTEM.

SHEET NOTES

1. PUMP PROTECTION RELAY PROVIDED BY PUMP SUPPLIER INSTALLED BY MCC SUPPLIER WHEN SHOWN ON P&ID'S.

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IDYLLWILD TREATMENT PLANT
FVNR DIAGRAM
(CONTROLLED FROM MCC)
IDYLLWILD, CA

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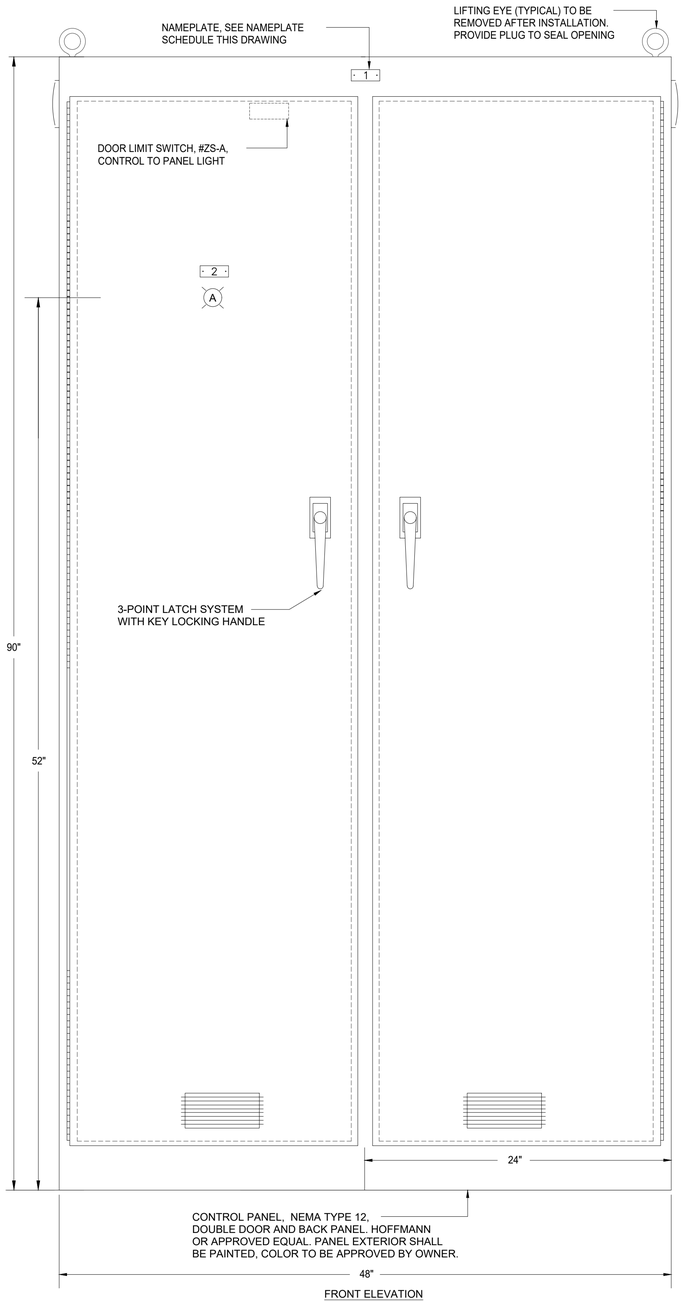
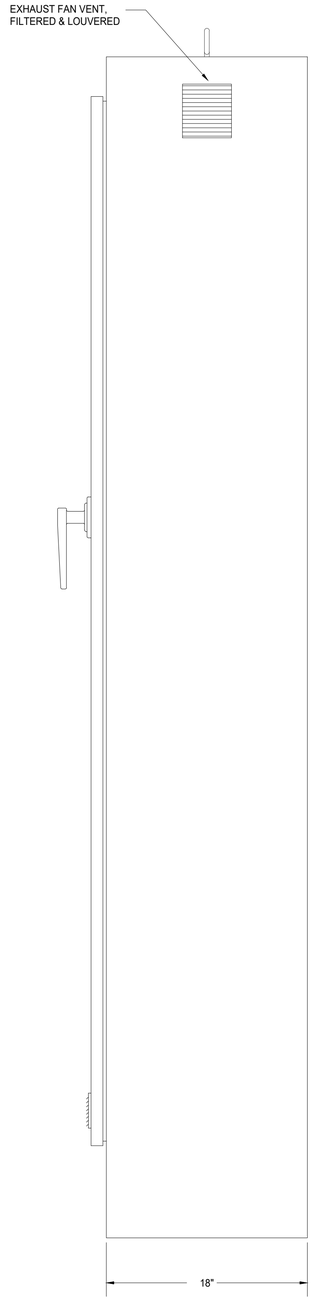
E007



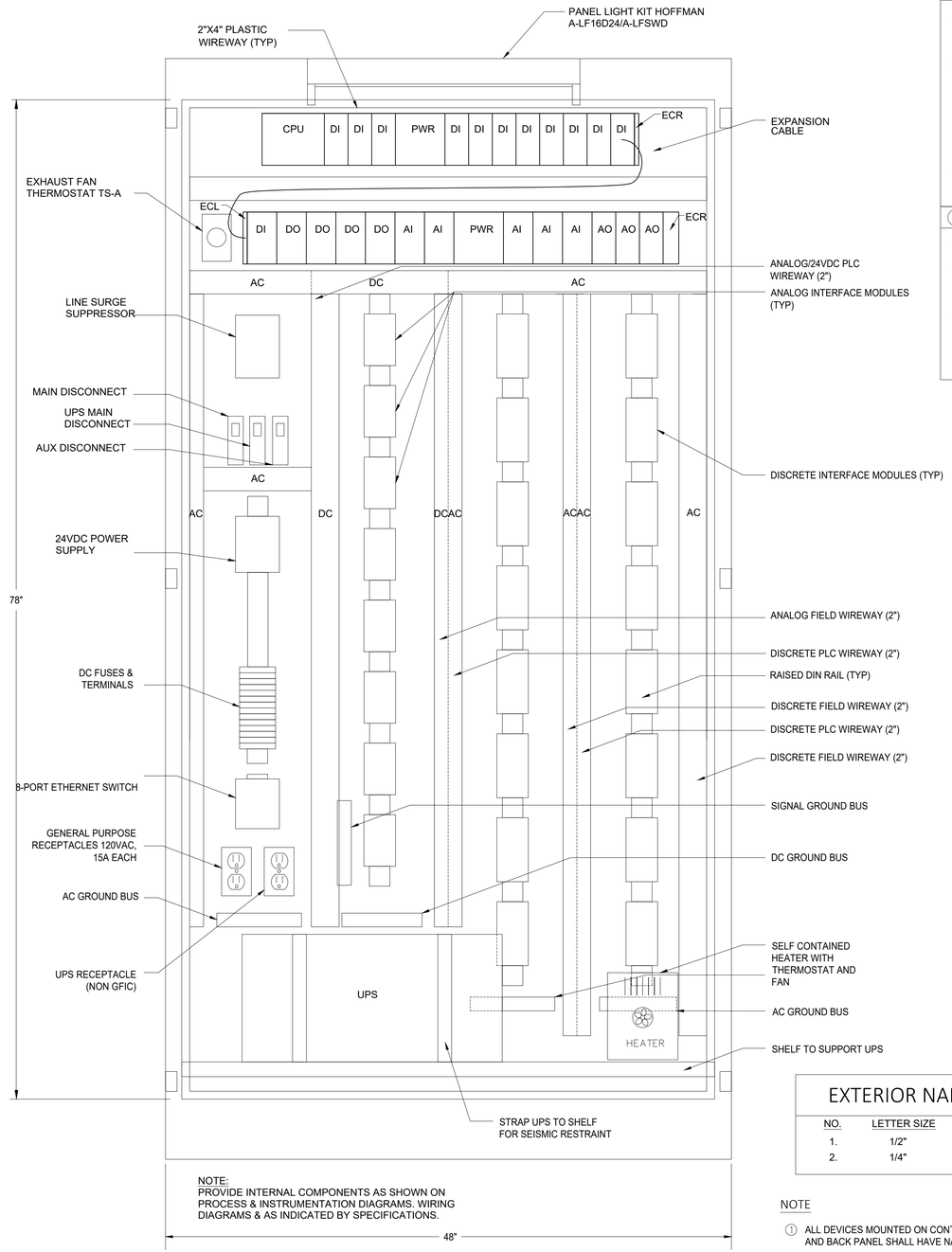
FRONT ELEVATION

TYPICAL CONTROL PANEL EXTERIOR ELEVATION

NO SCALE



RIGHT SIDE ELEVATION



NOTE:
PROVIDE INTERNAL COMPONENTS AS SHOWN ON PROCESS & INSTRUMENTATION DIAGRAMS. WIRING DIAGRAMS & AS INDICATED BY SPECIFICATIONS.

TYPICAL CONTROL PANEL INTERIOR ELEVATION

NO SCALE

GENERAL NOTES

A. ALL DEVICES MOUNTED ON CONTROL PANEL PANEL AND BACK PANEL SHALL HAVE NAME PLATES.

B. THIS DRAWING REPRESENTS A TYPICAL PANEL SIZE AND A GENERAL LAYOUT OF COMPONENTS AND DEVICES. THE ACTUAL ARRANGEMENT OF COMPONENTS AND DEVICES IS THE RESPONSIBILITY OF THE CONTRACTOR. THE ALLOWABLE SIZE FOR THE PANEL IS SHOWN ON THE "E" SERIES DRAWINGS.

C. CONTROL PANEL NEMA RATING PER ELECTRICAL DRAWING REQUIREMENTS.

SHEET NOTES

1. WIRE ALL I/O FROM PLC TO TERMINAL BLOCKS.
2. PROVIDE 6" OF EXTRA DIN RAIL ON EACH DIN RAIL FOR FUTURE TERMINAL BLOCKS AND RELAYS.
3. THE REMOTE I/O CONTROL PANEL FOR THE SLY PARK HILLS BOOSTER PUMPS IN THE FILTER CONTROL BUILDING CAN BE SMALLER THAN 72 INCHES IN WIDTH.

EXTERIOR NAMEPLATE SCHEDULE

NO.	LETTER SIZE	INSCRIPTION
1.	1/2"	CONTROL PANEL CP XXX
2.	1/4"	PLC FAULT/FAIL TO ACKNOWLEDGE

NOTE

① ALL DEVICES MOUNTED ON CONTROL PANEL PANEL AND BACK PANEL SHALL HAVE NAME PLATES.

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IDYLLWILD TREATMENT PLANT

TYPICAL CONTROL PANEL ELEVATIONS

IDYLLWILD, CA

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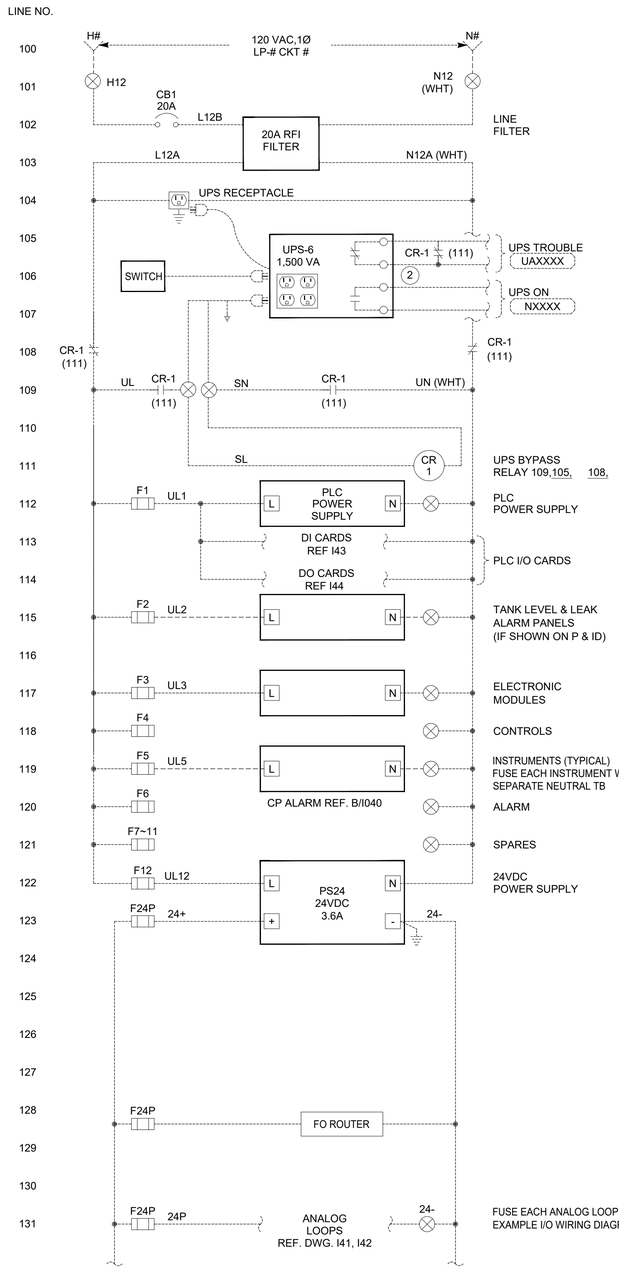
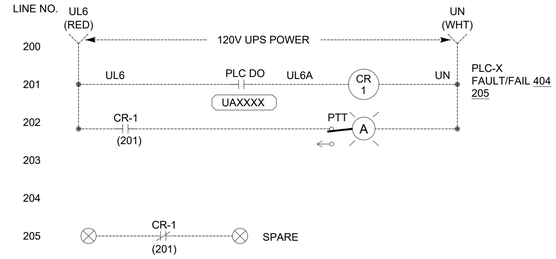
I010



120 VAC TYPICAL POWER DISTRIBUTION DIAGRAM

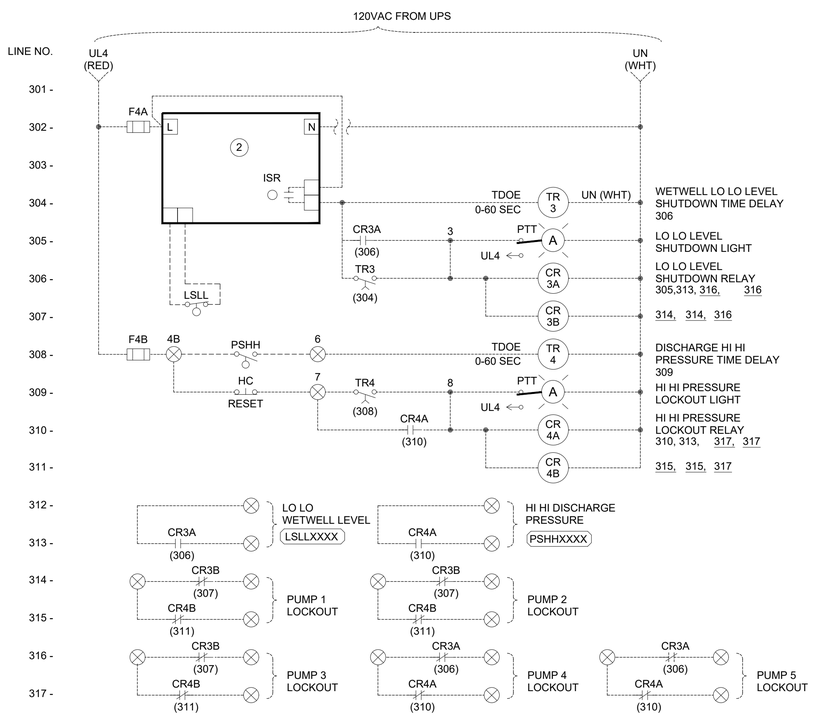
A I011 (1)



CP ALARM ELEMENTARY DIAGRAM

B I011

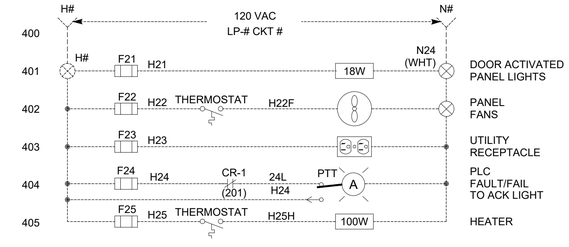
NOTES:
1. WIRES & TERMINALS LABELED PER LOOP DIAGRAMS.
2. ALARMS PER P & ID FOR EACH CONTROL PANEL



TYPICAL PUMP LOCKOUT ELEMENTARY DIAGRAM

C I011 (3)

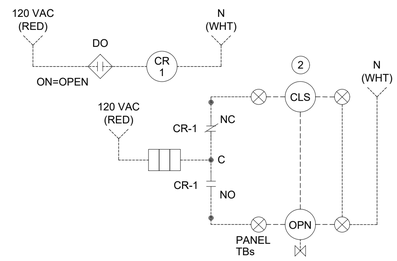
NOTES:
1. WIRES & TERMINALS LABELED PER LOOP DIAGRAMS.
2. IF ISR IS REQUIRED PER P & ID, WIRE ALARM, WIRE TO THIS INPUT.
3. PUMP LOCKED TO BE PROVIDED IF SHOWN ON P & ID.
4. DIAGRAM SHOWN IS FOR TYPICAL PUMP CONTROLS. ADD HIGH LEVEL OR LO LO ALARMS AS SHOWN IN P & ID AND BASED ON THIS TEMPLATE.



CP-TYPICAL UTILITY ELEMENTARY DIAGRAM

D I011

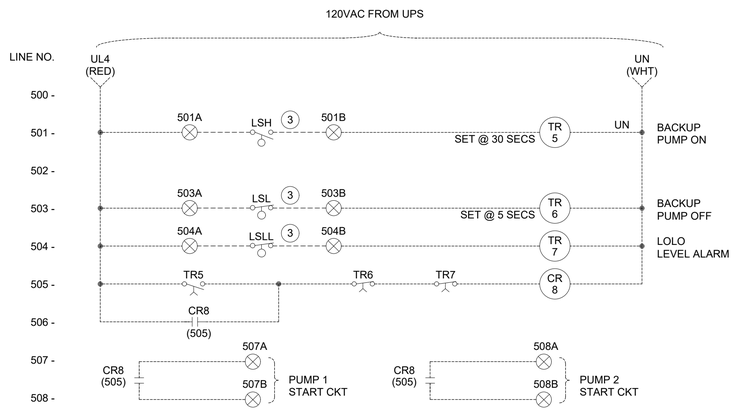
NOTES:
1. SHOWN FOR ALL CONTROL PANELS SUPPLIED UNDER THIS CONTRACT



TYPICAL VALVE DIAGRAM

F I011

NOTES:
1. CIRCUIT IS DIAGRAMMATIC & MEANT TO SHOW BASIC CIRCUIT FUNCTIONALITY'S.
2. IF REQUIRED BY THE P & IDS ADD THIS TYPE OF CIRCUIT TO THE CP.



BACKUP LEVEL FLOAT CONTROL

E I011

NOTES:
1. CIRCUIT IS DIAGRAMMATIC & MEANT TO SHOW BASIC CIRCUIT FUNCTIONALITY'S
2. IF REQUIRED BY THE P & IDS ADD THIS TYPE OF CIRCUIT TO THE CP.
3. IF ISR IS SHOWN ON P&ID ADD ISR RELAY TO CIRCUIT.

TYPICAL CONTROL PANEL ELEMENTARY DIAGRAMS-ALL

NOTES:
1. DISTRIBUTION DIAGRAM REPRESENTATIVE OF MAJOR COMPONENTS ONLY, ADDITION FUSES, CIRCUITS AND COMPONENT CONNECTIONS MAY BE REQUIRED FOR A FUNCTIONAL SYSTEM.
2. PROVIDE & INSTALL INTERFACE RELAYS IF REQUIRED
3. #-CKT # FROM LP PANEL (&). REFERENCE LP SCHEDULE FOR CIRCUIT NUMBERS.
4. XXXX - TAGS PER P & ID DRAWINGS.
5. WIRE NUMBERS SHOWN ARE AN EXAMPLE, ACTUAL WIRE NUMBERS SHALL BE DETERMINED BY THE SUPPLIER.

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IDYLLWILD TREATMENT PLANT

TYPICAL CONTROL PANEL ELEMENTARY DIAGRAM

IDYLLWILD, CA

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I011

GENERAL NOTES

A. THIS IS AN EXAMPLE OF A TYPICAL DIGITAL INTERCONNECTION DIAGRAM AND NOT AN ACTUAL REPRESENTATION FOR THIS PROJECT. REFERENCE DIV 26 FOR INTERCONNECTION DIAGRAM REQUIREMENTS.

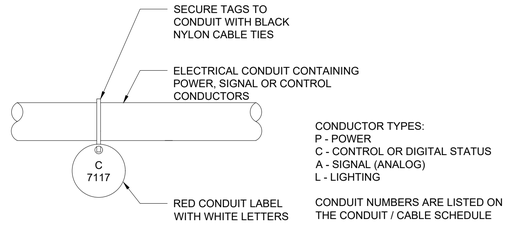
SHEET NOTES

1. CONDUIT SIZE AND TYPE; WIRE FILL FOR CONDUITS TO BE DESIGNATED NEXT TO CONDUIT NUMBER.
2. THESE ARE THE CONTRACTORS DESIGNATED DRAWING NUMBERS.
3. NOT MORE THAN TWO WIRES PER TERMINAL BLOCKS.
4. ALL TERMINAL BLOCKS TO BE PLACED IN NUMERICAL ORDER.
5. ALL NEUTRALS SHALL BE WHITE WIRE COLOR.
6. #12GND TO DEVICE SHALL BE BONDED TO #8 GROUND LUG.

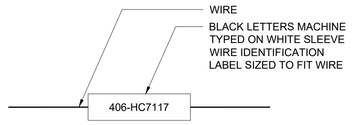
REFERENCE DOCUMENTS

DRAWING #	DESCRIPTION	MANUFACTURER
P712	P&ID DIAGRAM	DESIGN
E717	ELECTRICAL SITE PLAN	DESIGN
PAGE 32, 36	CONDUIT AND CABLE SCHEDULE	DESIGN
(2) 1354-11	LOOP DIAGRAM	CONTRACTOR
(2) 1354-68	ELEMENTARY DIAGRAM	CONTRACTOR

TYPICAL CONDUIT MARKING SYSTEM



TYPICAL WIRE LABEL

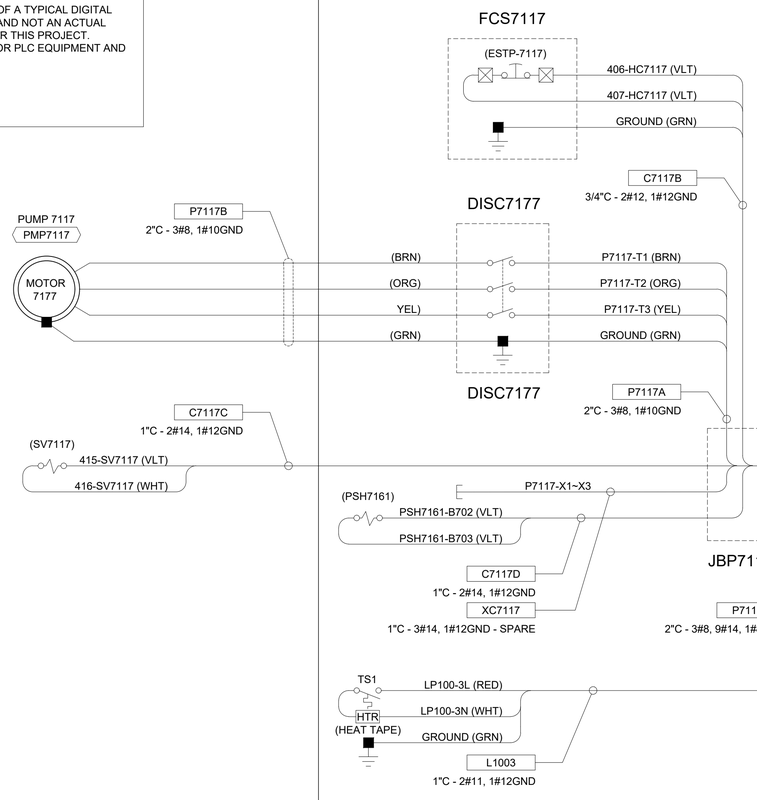


EQUIPMENT

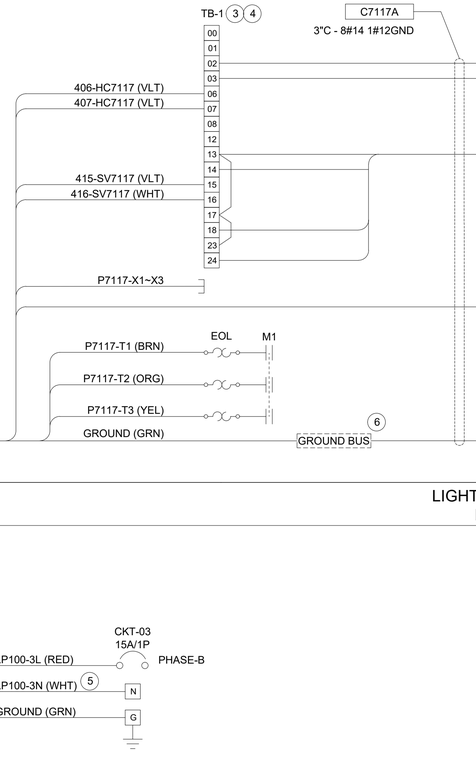
GENERAL NOTES

A. THIS IS AN EXAMPLE OF A TYPICAL DIGITAL INTERFACE MODULE AND NOT AN ACTUAL REPRESENTATION FOR THIS PROJECT. REFERENCE DIV 40 FOR PLC EQUIPMENT AND IO REQUIREMENTS.

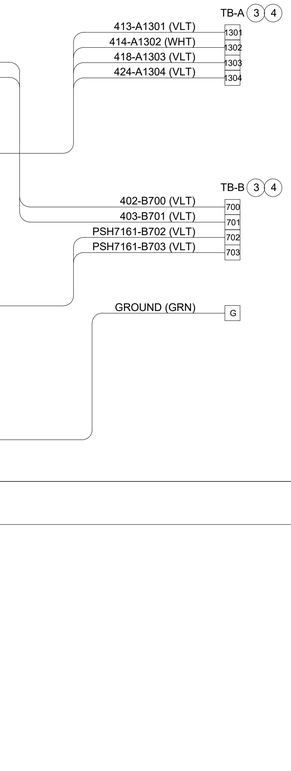
FIELD



MCC100 SECTION-1 CUBICLE-A~E



CONTROL PANEL CP100



LIGHTING PANEL LP100

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IDYLLWILD WATER DISTRICT

IDYLLWILD TREATMENT PLANT

EXAMPLE INTERCONNECT DRAWING

IDYLLWILD, CA

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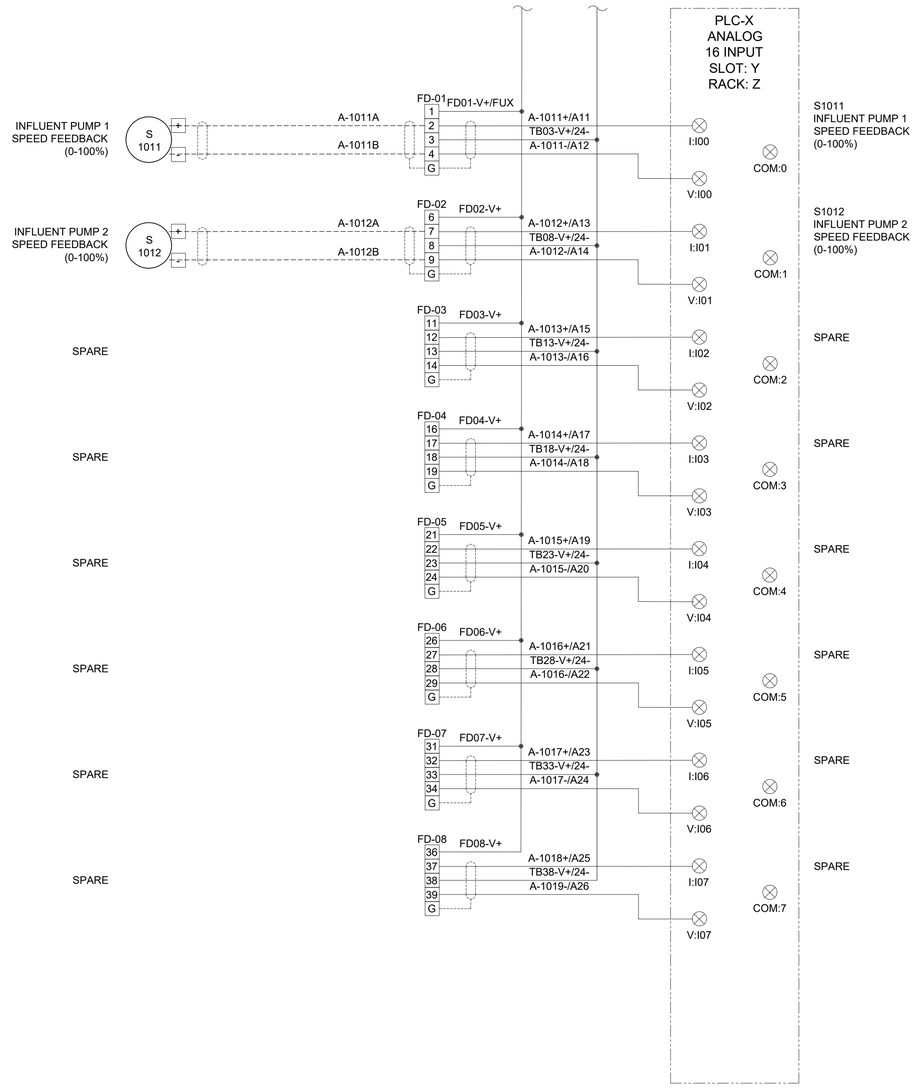
SHEET X OF X

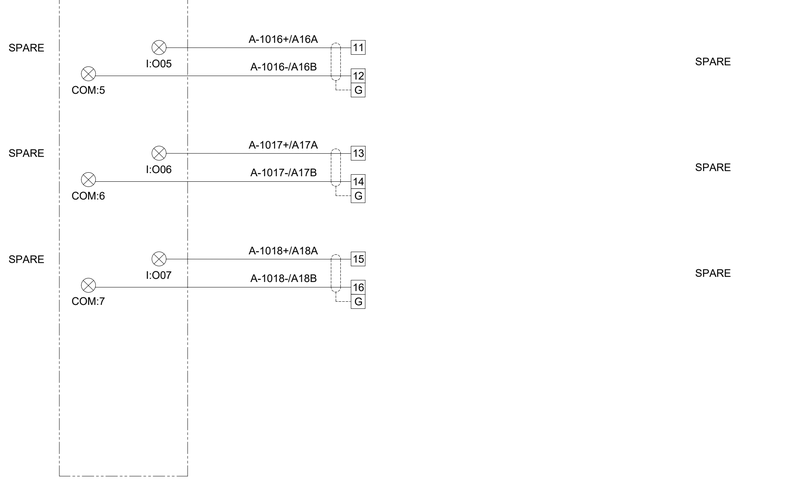
I020

GENERAL NOTES

A. THIS IS AN EXAMPLE OF A TYPICAL ANALOG INTERFACE MODULE AND NOT AN ACTUAL REPRESENTATION FOR THIS PROJECT. REFERENCE DIV 17 FOR PLC EQUIPMENT AND IO REQUIREMENTS.



EXAMPLE AI WIRING DIAGRAM



EXAMPLE AO WIRING DIAGRAM

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IDYLLWILD TREATMENT PLANT

EXAMPLE ANALOG IO MODULE LOOP DIAGRAMS

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I021

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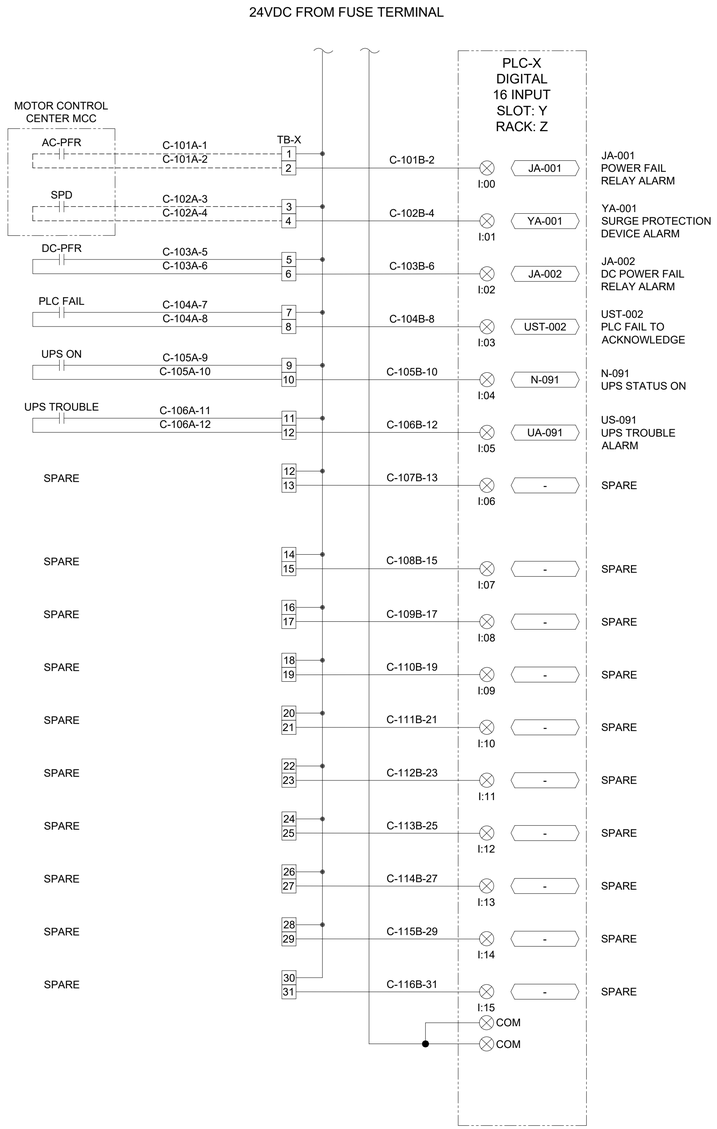
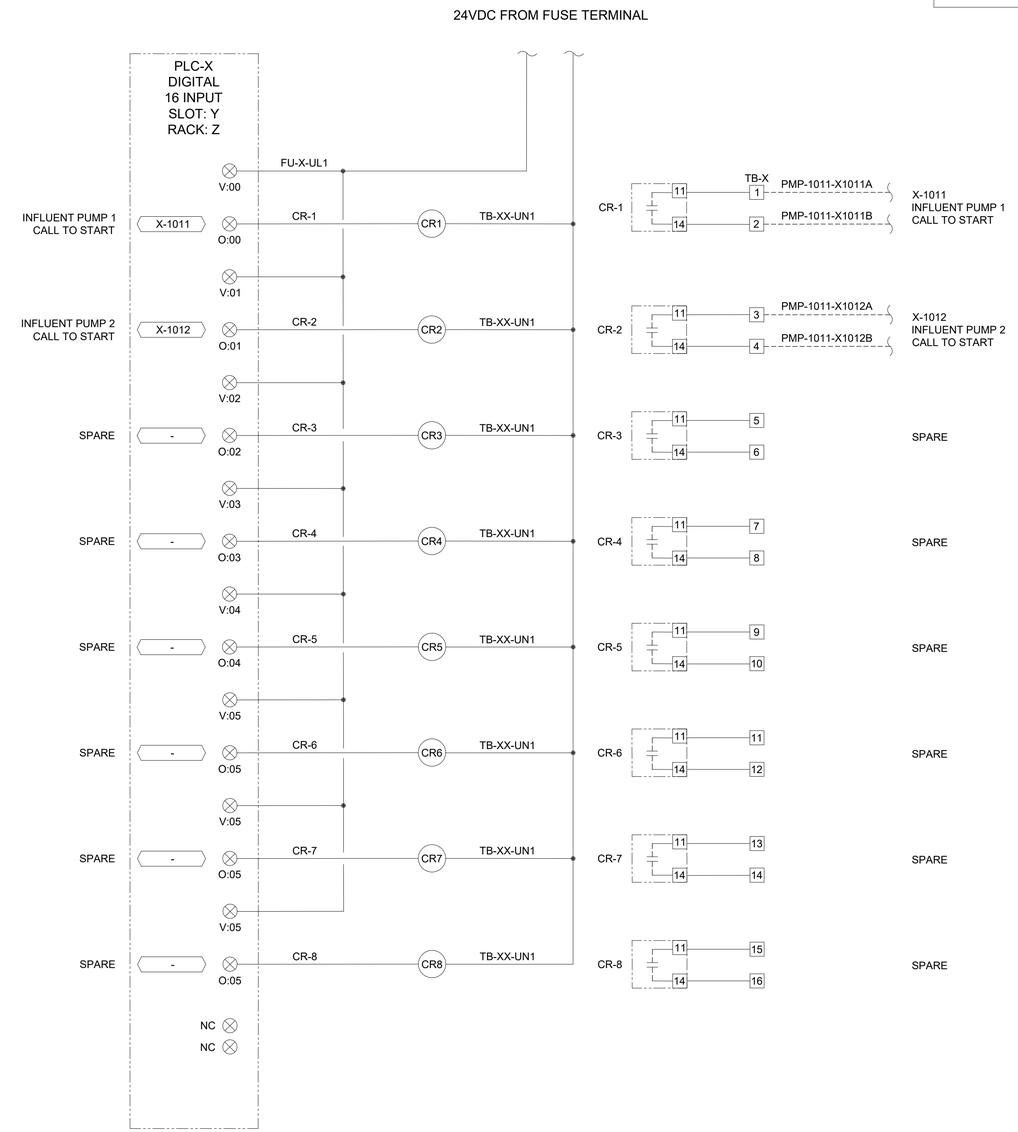
GENERAL NOTES

A. THIS IS AN EXAMPLE OF A TYPICAL DIGITAL INTERFACE MODULE AND NOT AN ACTUAL REPRESENTATION FOR THIS PROJECT. REFERENCE DIV 17 FOR PLC EQUIPMENT AND IO REQUIREMENTS.



EXAMPLE DI WIRING DIAGRAM



EXAMPLE DO WIRING DIAGRAM

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IDYLLWILD TREATMENT PLANT

EXAMPLE DIGITAL IO MODULE LOOP DIAGRAMS

IDYLLWILD, CA

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I022

LEGEND

- PUMP
- PARSHALL FLUME
- FLOW METER
- PLUG VALVE (NORMALLY OPEN)
- PLUG VALVE (NORMALLY CLOSED)
- SLUICE/SLIDE GATE VALVE (NORMALLY OPEN)
- SLUICE/SLIDE GATE VALVE (NORMALLY CLOSED)
- MOTOR ACTUATED VALVE
- SOLENOID ACTUATED VALVE
- MANUALLY ADJUSTIBLE WEIR
- AUTOMATED ADJUSTABLE WEIR
- CHECK VALVE
- BUTTERFLY VALVE
- BALL VALVE
- AIR RELEASE VALVE
- AIR LIFT PUMP
- CHEMICAL DOSING PUMP
- AIR LINE
- GRAVITY FLOW
- FORCEMAIN

(E) I G
(E) RAW INFLUENT
(E) BYPASS NOT SHOWN FOR CLARITY
(E) HEADWORKS
(E) GRINDER 5
(E) PARSHALL FLUME
(E) C
(E) SCREEN AND AUGER 6
(E) SPLITTER BOX
SOLID WASTE
TO LANDFILL
(E) CHEMICAL PUMP 9 AND SAMPLING STATION
(E) BLOWER 1 1
(E) BLOWER 2 1
BLOWER 3 1
OPEN CHANNEL
SPACE FOR FUTURE CONNECTION
SPLITTER BOX
MANHOLE
MANHOLE
RAS CHECMICAL DOSING PUMPS 8
BIOREACTOR 1
ANOXIC ZONE
AEROBIC ZONE
CLARIFIER
BIOREACTOR 2
ANOXIC ZONE
AEROBIC ZONE
CLARIFIER
2 J F (TYP OF 4)
(E) EQUALIZATION BASIN 1
VOL: 113,000 GAL
C D
(E) BIOREACTOR BASIN TO BE REFURBISHED TO EQUALIZATION BASIN 2
VOL: 167,000 GAL
C D
(E) EQ PUMP
WEIR BOX
LIFT STATION WET WELL
B F 3
(E) OVERFLOW
OUTFALL TO PERCOLATION PONDS AND SPRINKLERS
I G E
FINAL EFFLUENT BOX
RAS/WAS PUMP STATION
SLUDGE SETTLING TANK RETURN LINE
TO (E) SLUDGE DRYING BEDS
SLUDGE SETTLING TANK VOL: 60,000 GAL
B F 4

NOTES:
1. ADDITIONAL ISOLATION VALVES NOT USED FOR PROCESS CONTROL AND ARE NOT SHOWN HERE.
2. BYPASS AND TEMPORARY CONNECTIONS FOR MAINTENANCE AND CONSTRUCTION ACTIVITIES ARE NOT SHOWN HERE.
3. VALVES SHOWN ARE MANUALLY OPERATED UNLESS NOTED OTHERWISE.

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PROCESS FLOW DIAGRAM

IDYLLWILD, CA

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I090

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INSTRUMENT SYMBOLS

SYMBOL	DESCRIPTION
XXX / XXX	FIELD MOUNTED INSTRUMENT
XXX / XXX	FACE MOUNTED INSTRUMENT ON LOCAL PANEL, OPERATOR ACCESSIBLE
XXX / XXX	INSTRUMENT MOUNTED IN LOCAL PANEL, OPERATOR INACCESSIBLE
XXX / XXX	FACE MOUNTED INSTRUMENT ON FIELD PANEL, OPERATOR ACCESSIBLE
XXX / XXX	INSTRUMENT MOUNTED IN FIELD PANEL, OPERATOR INACCESSIBLE
I DWG#	OPERATION PERFORMED WITH LOGIC OR HARDWIRED DEVICES - REFERENCE ELEMENTARY DWG. #
X	LAMP INDICATION (STATUS OR ALARM)
R#-C#	ANNUNCIATOR WINDOW R - ROW # C - COLUMN #
XX / X	COMMUNICATIONS POINT
XXXXX	DISCRETE INPUT
	DISCRETE OUTPUT
	ANALOG INPUT
	ANALOG OUTPUT
FY *	INSTRUMENT PANEL MOUNTED WITH COMPUTING, CONVERTING FUNCTION

CONVERT */*

E - VOLTAGE	H - HYDRAULIC
I - CURRENT	O - ELECTROMAGNETIC, SONIC
P - PNEUMATIC	R - RESISTANCE (ELECT.)
A - ANALOG	D - DIGITAL
B - BINARY	

COMPUTE *

SUMMING	Σ	AVERAGING	Σ/n
SUBTRACTOR	−	RATIO	H
MULTIPLYING	X	DIFFERENCE	△
DIVIDING	÷	HIGH SELECTING	>
ROOT EXTRACTION	√	LOW SELECTING	<
PROPORTIONAL	P	INTEGRAL	I
DERIVITIVE	D	INTERLOCK	

XXXXX	VALVE/GATE NUMBER
XXXXX	EQUIPMENT NUMBER
XXX / XXX	PLC OR COMPUTER FUNCTION PERFORMING OPERATION WITH VISUAL INDICATION
XXX / XXX	PLC OR COMPUTER FUNCTION PERFORMING OPERATION WITH VISUAL ALARM INDICATION
XXX / XXX	PLC OR COMPUTER PERFORMING INTERNAL OPERATION
1	AUTODIALER PRIORITY # PC BASED SOFTWARE

SYMBOL	DESCRIPTION
	ELECTRICAL - MSC
	ELECTRICAL - SIGNAL
	ETHERNET
	PNEUMATIC
	CAPILLARY
	ELECTRICAL (PULSE)
	HYDRAULIC SIGNAL
	VENDOR PROVIDED LIMITS
	PANEL LIMITS
	PRIMARY PROCESS
	SECONDARY PROCESS
	EXISTING PRIMARY PROCESS
	EXISTING SECONDARY PROCESS
	FUTURE PROCESS
ES	ELECTRICAL SUPPLY
M	MOTOR
	CENTRIFUGAL PUMP
	BLOWER OR FAN
	SUBMERSIBLE PUMP
	VERTICAL PUMP
	ROTARY LOBE OR GEAR PUMP
	METERING PUMP
	MIXER
	PROGRESSIVE CAVITY PUMP
I001	PAGE THAT LINE IS CONTINUED ON
	AUDIBLE ALARM (BUZZER OR HORN)
	BLIND FLANGE
	CHEMICAL DIFFUSER
	CONTINUED PIPE
D	DRAIN
	DIFFUSER
	DOUBLE CONTAINED PIPE
	FLEXIBLE HOSE
	FLEXIBLE PIPE CONNECTOR
	HOSE BIB
	QUICK CONNECTION COUPLING
	REDUCER/INCREASER
	STATIC MIXER
	Y-STRAINER

SYMBOL	DESCRIPTION
	VALVE ACTUATOR
	DIAPHRAGM OPERATOR
	DIAPHRAGM VALVE
	GATE VALVE OR PINCH VALVE (NORMALLY OPEN)
	GATE VALVE OR PINCH VALVE (NORMALLY CLOSED)
	PLUG VALVE (NORMALLY OPEN)
	PLUG VALVE (NORMALLY CLOSED)
	BALL VALVE (NORMALLY OPEN)
	BALL VALVE (NORMALLY CLOSED)
	BALL CHECK VALVE
	BUTTERFLY VALVE
	CHECK VALVE
	SILENT CHECK VALVE
	SLUICE GATE
	SLIDE GATE
XXX	X = TYPE VRV — VACUUM RELIEF PRV — PRESSURE RELIEF VRV — VACUUM RELIEF VRV/PRV — VACUUM & PRESSURE RELIEF A/V — AIR/VACUUM RELIEF
	PRESSURE REDUCING VALVE
	AIR RELEASE VALVE
	BACKFLOW PREVENTOR
S	SOLENOID VALVE
M	MOTOR OPERATED INTEGRAL MOTOR STARTER (UNLESS SHOWN OTHERWISE)
M	MAGNETIC FLOW METER MAGNETIC FLOW TUBE
C	CORIOLIS FLOW METER
D	SLUDGE DENSITY METER
O	ORIFICE METER
	PROPELLER OR TURBINE FLOW METER
	ULTRASONIC FLOW METER
LE	ULTRASONIC LEVEL ELEMENT
XXX	XXX = DEVICE FUNCTION PER FUNCTIONAL IDENTIFICATION

ABBREVIATIONS

A	AMPERES, AMBER	mA	MILLIAMPERES
AC	ALTERNATING CURRENT	MIN	MINIMUM
ACU	AIR CONDITIONING UNIT	MOA	MANUAL-OFF-AUTO
ADR	AIR DRYER	MOT	MOTOR OVERTEMP SENSOR
AER	AERATOR	MOV	MOTOR OPERATED VALVE
AGR	AGITATOR	MTU	MODULAR TREATMENT UNIT
AI	ANALOG INPUT	MUX	MULTIPLEXER
AO	ANALOG OUTPUT	MWR	MOTORIZED WEIR
B	BLUE	MXR	MIXER
BLR	BLOWER	N	NEUTRAL
C	CLOSE, CONTROL	NC	NORMALLY CLOSED
CFE	CLEARWELL FILTER EFFLUENT	NO	NORMALLY OPEN
CLR	CLARIFIER	O	OPEN
CMP	COMPRESSOR	OAC	OPEN-AUTO-CLOSE
CR	CONTROL RELAY	OCA	OPEN-CLOSE-AUTO
CTF	CENTRIFUGE	PB	PUSHBUTTON
d	DIFFERENTIAL	pH	HYDROGEN ION CONCENTRATION
DC	DIRECT CURRENT	PID	PROPORTIONAL/INTEGRAL/DERIVATIVE
(DDM)	DIGITAL DISPLAY MODULE	PLC	PROGRAMMABLE LOGIC CONTROLLER
DI	DIGITAL INPUT	PMP	PUMP
DO	DIGITAL OUTPUT	PNL	PANEL
DPDT	DOUBLE POLE DOUBLE THROW	POT	POTENTIOMETER
DRV	DRIVE	POV	PNEUMATIC OPERATED VALVE
(E)	EXISTING	PS	PRESSURE SWITCH
ETM	ELAPSED TIME METER	PRV	PRESSURE RELIEF VALVE
(F)	FUTURE	PTT	PUSH TO TEST
FAN	FAN	PV	PROCESS VARIABLE
FC	FAIL CLOSED	R	RED
FE	FLOW METER ELEMENT	(R)	EXISTING TO BE REMOVED OR RELOCATED
FLC	FLOCCULATOR	REF	REFERENCE
FLP	FAIL LAST POSITION	RVSS	REDUCED VOLTAGE SOLID STATE
FLT	FILTER	S	SWITCH
FO	FAIL OPEN	(SIM)	SIGNAL INPUT MODULE
FS	FLOAT SWITCH	SCR	SILICON CONTROLLED RECTIFIER
FVNR	FULL VOLTAGE NON REVERSING	(SOM)	SIGNAL OUTPUT MODULE
G	GREEN	SMP	TYPICAL
G, GND	GROUND	SP	SET POINT
GNR	MACERATOR/GRINDER	SS	SURGE SUPPRESSOR
HMI	HUMAN MACHINE INTERFACE	TDD, TDE	TIME DELAY RELAY
HP AIR	HIGH PRESSURE AIR	TWP	TWISTED PAIR
HOA	HAND-OFF-AUTO	TWSP	TWISTED SHIELDED PAIR
HOG	HYDRAULIC OPERATED GATE	TYP	TYPICAL
I	INTERLOCK	UVC	ULTRAVIOLET CHANNEL
I/0	INPUT/OUTPUT	V	VOLTS, VOLTAGE
ISR	INTRINSICALLY SAFE RELAY	VFD	VARIABLE FREQUENCY DRIVE
LOR	LOCAL/OFF/REMOTE	VLV	VALVE
LOS	LOCK-OUT STOP		
LP AIR	LOW PRESSURE AIR		

P & I DIAGRAM INSTRUMENT FUNCTIONAL IDENTIFICATION

CODE LETTER	FIRST LETTER(S)		SUCCEEDING LETTER(S)		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		AUTO
B	BURNER FLAME				
C	CHLORINE			CONTROL	CLOSE
D	DENSITY	DIFFERENTIAL	DIRECTION		
E	VOLTAGE		ELEMENT, SENSOR		
F	FLOW	RATIO	FUEL		FAILURE
G	GAUGING		VIEWING DEVICE		
H	HAND				HIGH/HAND
I	CURRENT		INDICATE		
J	POWER	SCAN			
K	TIME	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		PILOT LIGHT		LOW/LOCAL
M	MOISTURE/MOTOR	MOMENTARY	MOTOR		MIDDLE/MANUAL
N	STATUS				
O	OPERATOR		ORIFICE		OPEN/OVERLOAD
P	PRESSURE		POINT		
Q	EVENT	TOTALIZE	TOTAL		
R	RESET		RECORD		RUNNING/REMOTE
S	SPEED	SAFETY		SWITCH	STOP/SPEED
T	TEMPERATURE		TEST	TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION		
V	VIBRATION/VALVE			VALVE	
W	FORCE, WEIGHT		WELL		
X	TELEMETRY INTERFACE				
Y	COMPUTER INTERFACE			COMPUTE/RELAY/ CONVERTER	
Z	POSITION			ACTUATE	POSITION

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AS NOTED

ONE INCH AT FULL SCALE

DIGALERT
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IDYLLWILD WATER DISTRICT

IDYLLWILD TREATMENT PLANT

INSTRUMENT SYMBOLS & ABBREVIATIONS

IDYLLWILD, CA

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SHEET X OF X

I001

GENERAL NOTES

A. REFER TO CIVIL AND MECHANICAL DRAWINGS FOR PIPE SIZE.

SHEET NOTES

1. RE-USE (E) INSTRUMENT. INSTALL (N) AO MODULE FOR SIGNALS TO PLC-100.

ALARM CALL-OUT

SCADA OI DISPLAY

PLC-100 FIELD

1

STOP RUNNING

STOP RUNNING

UAT 1010

HEADWORKS SCREENING UNIT

GRINDER RUN Y1011

AUGER RUN Y1012

FAIL UST1010

(E) HEADWORKS SCREENING UNIT

480V

POWER ON A

GRINDER RUN G

AUGER RUN G

FAIL R

E-STOP HC 1010

GRINDER HOA HS 1011

AUGER HOA HS 1012

RESET HC 1010

PNL1020

µs/cm AI 1081 A

pH AI 1081 B

°F AI 1081 C

INFLUENT

ELECTRICAL CONDUCTIVITY A1081A

pH A1081B

TEMPERATURE A1081C

ES

µs/cm/pH/TEMP AIT 1081

% SC 1031

SAMPLER PACING SC1031

MGD FI 1071

INFLUENT FLOW FI1071

MGD FIT 1071 ES

MANUFACTURER SUPPLIED CABLE

PLANT WATER --

AUGER M AUG1012

S SOV1021

DUMPSTER

GRINDER M GND1011

LE 1051

LE 1052

ES SMP1031

D

AE 1081 A

AE 1081 B

AE 1081 C

FE 1071

FME1071

RAW INFLUENT --

BYPASS CHANNEL

I104 TO SPLITTER BOX

I601 FROM CHEM FEED

HEADWORKS

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HEADWORKS P&ID

IDYLLWILD, CA

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I101

GENERAL NOTES

A. REFER TO CIVIL AND MECHANICAL DRAWINGS FOR PIPE SIZE.

SHEET NOTES

ALARM CALL-OUT

SCADA OI DISPLAY

PLC-100

CP-100

FIELD

ZI 1043	UAY 1043	REMOTE / LOCAL	
ZI 1042	UAY 1042	REMOTE / LOCAL	
ZI 1041	UAY 1041	REMOTE / LOCAL	

FLOW CONTROL VALVE

FEEDBACK POSITION	POSITION CONTROL	FAIL TO POSITION	LOCAL/ REMOTE
ZT1043	ZC1043	UA1043	Y1043
ZT1042	ZC1042	UA1042	Y1042
ZT1041	ZC1041	UA1041	Y1041

LOR OCS HS 1043 HS 1043 I G OPEN ZT 1043 ZC 1043 R 480VAC MO CLOSE

LOR OCS HS 1042 HS 1042 I G OPEN ZT 1042 ZC 1042 R 480VAC MO CLOSE

LOR OCS HS 1041 HS 1041 I G OPEN ZT 1041 ZC 1041 R 480VAC MO CLOSE

MOG1043 CONTROL VALVE

MOG1042 CONTROL VALVE

MOG1041 CONTROL VALVE

FROM HEADWORKS I101

FROM EQUALIZATION PUMP STATION I430

FROM SLUDGE SETTLING TANK I850

M SLG1043

M SLG1042

M SLG1041

FUTURE OUTLET

MANHOLE I710 TO BIOREACTOR 1

MANHOLE I720 TO BIOREACTOR 2

I400 TO EQUALIZATION BASIN 1

I400 TO EQUALIZATION BASIN 2

SPLITTER BOX

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IDYLLWILD TREATMENT PLANT

SPLITTER BOX P&ID

IDYLLWILD, CA

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I104

D:\Projects\active\IWDx21-001 - Idyllwild WWTP Modernization Predesign_AutoCAD\ACT\IWDx21-001 - P&ID Drawings.dwg 8-30-24 03:59:23 PM JosephDonati

GENERAL NOTES

A. REFER TO CIVIL AND MECHANICAL DRAWINGS FOR PIPE SIZE.

SHEET NOTES

1. INTERFACE RELAYS AS REQUIRED.

ALARM CALL-OUT

SCADA OI DISPLAY

PLC-100

CP-100

FIELD

(1) LAHH 4152

FT LI 4151 / LAH 4151

(1) LAHH 4252

FT LI 4251 / LAH 4251

CLOSED OPEN

CLOSED OPEN

EQUALIZATION BASIN 1

AERATION COMMAND OC4142

HIGH HIGH LEVEL LSHH4152

SLUDGE SETTLING TANK LEVEL L4151

EQUALIZATION BASIN 2

AERATION COMMAND OC4242

HIGH HIGH LEVEL LSHH4252

SLUDGE SETTLING TANK LEVEL L4251

EQUALIZATION BASIN 1 DRAIN VALVE

OPENED ZO4141

CLOSED ZC4141

EQUALIZATION BASIN 2 DRAIN VALVE

OPENED ZO4241

CLOSED ZC4241

I ISR

FT LIT 4151

LSHH 4152

FROM SPLITTER BOX I104

FROM BLOWERS I501

SOV4142

EQUALIZATION BASIN 1

FT LIT 4251

LSHH 4252

SOV4242

EQUALIZATION BASIN 2

ZO 4241 / ZC 4241

PV4241

ZO 4141 / ZC 4141

PV4141

I430

TO EQUALIZATION RETURN PUMP STATION

EQUALIZATION BASINS

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IDYLLWILD WATER DISTRICT

IDYLLWILD TREATMENT PLANT

EQUALIZATION BASINS P&ID

IDYLLWILD, CA

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SHEET X OF X

I400

GENERAL NOTES

A. REFER TO CIVIL AND MECHANICAL DRAWINGS FOR PIPE SIZE.

SHEET NOTES

1. MOTOR PROTECTION RELAY PROVIDED BY PUMP SUPPLIER INSTALLED BY MCC MANUFACTURER.

ALARM CALL-OUT

SCADA OI DISPLAY

PLC-100

MCC-100

FIELD

LALL 4351 | LAHH 4351 | FT LI 4352 | UAT 4311 | NOT READY / READY | MAH 4311 | UAT 4312 | NOT READY / READY | MAH 4312 | GPM FI 4371 | TOTAL FIQ 4371

EFFLUENT SUMP

LO LO LEVEL LSLL4351 | HI HI LEVEL LSHH4351 | LEVEL L4352

ES — I — ISR

REFERENCE SCHEMATIC I011

BACKUP CONTROLS

LSLL 4351 | LSHH 4351 | LIT 4352

EQUALIZATION RETURN PUMP 1

STT/STP X4311 | RUN N4311 | FAIL UST4311 | READY Y4311 | MOISTURE FAIL MSH4311

RUN G | HOA HS 4311 | FAIL A

ETM 4311 — I — FVNR | RESET HCA 4311

REFERENCE SCHEMATIC E007

RESET HCB 4311 — OVERTEMP/MOISTURE ES — I — 1

MSH 4311 | TSH 4311 | M

EQ RETURN PUMP 1 PMP4311

EQUALIZATION RETURN PUMP 2

STT/STP X4312 | RUN N4312 | FAIL UST4312 | READY Y4312 | MOISTURE FAIL MSH4312

RUN G | HOA HS 4312 | FAIL A

ETM 4312 — I — FVNR | RESET HCA 4312

REFERENCE SCHEMATIC E007

RESET HCB 4312 — OVERTEMP/MOISTURE ES — I — 1

MSH 4312 | TSH 4312 | M

EQ RETURN PUMP 2 PMP4312

VALVE VAULT

EQ RETURN F4371

FIT 4371 — ES

FE 4371 | M

FME4371

FLOW METER VAULT

FROM EQ BASIN 1 — I400

FROM EQ BASIN 2 — I400

I104 TO SPLITTER BOX

EQUALIZATION BASINS RETURN PUMP STATION

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DIGALERT

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IDYLLWILD TREATMENT PLANT

EQUALIZATION BASINS RETURN PUMP STATION P&ID

IDYLLWILD, CA

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SHEET X OF X

I430

GENERAL NOTES

A. REFER TO CIVIL AND MECHANICAL DRAWINGS FOR PIPE SIZE.

SHEET NOTES

ALARM CALL-OUT

SCADA OI DISPLAY

PLC-100

CP-100

FIELD

FLOW CONTROL VALVE 1

ZT 5021 (%) — FEEDBACK POSITION ZT5021

ZAY 5021 — VALVE COMMAND ZC5021

REMOTE / LOCAL — LOCAL/REMOTE Y5021

ZSC5021 — CLOSE STATUS

HS 5021 — L/O/R

HC 5021 — O/S/C

ZT 5021 — I — ZC 5021 — R OPN — G CLSD

480 — MO

BLOWER 1

OFF / RUN — NOT READY / READY — UAT 5011

RUN N5011 — READY Y5011 — START/STOP X5011 — FAIL UA5011

HOA HS 5011 A — RUN G — ETM

I — FVNR — OR — RC 5011 RST

FLOW CONTROL VALVE 2 SIMILAR TO CONTROL VALVE 1 CONTROLS

ZT 5022 (%) — FEEDBACK POSITION ZT5022

ZAY 5022 — VALVE COMMAND ZC5022

REMOTE / LOCAL — LOCAL/REMOTE Y5022

ZSC5022 — CLOSE STATUS

HS 5022 — L/O/R

HC 5022 — O/S/C

ZT 5022 — I — ZC 5022 — R OPN — G CLSD

480 — MO

BLOWER 2 SIMILAR TO BLOWER 1 CONTROLS

OFF / RUN — NOT READY / READY — UAT 5012

READY Y5012 — START/STOP X5012

RUN N5012

FLOW CONTROL VALVE 3 SIMILAR TO CONTROL VALVE 1 CONTROLS

ZT 5023 (%) — FEEDBACK POSITION ZT5023

ZAY 5023 — VALVE COMMAND ZC5023

REMOTE / LOCAL — LOCAL/REMOTE Y5023

ZSC5023 — CLOSE STATUS

HS 5023 — L/O/R

HC 5023 — O/S/C

ZT 5023 — I — ZC 5023 — R OPN — G CLSD

480 — MO

BLOWER 3 SIMILAR TO BLOWER 1 CONTROLS

OFF / RUN — NOT READY / READY — UAT 5013

READY Y5013 — START/STOP X5013

RUN N5013

PAL 5061 — PAH 5061 — PI 5061 (PSI) — PRESSURE P5061

PIT 5061 (PSI)

I400 TO EQUALIZATION BASINS

I700 TO BIOREACTORS

BLOWER 1

FROM ATMOSPHERE — MOV5021 — HC 5011 LOS — TSIH 5011 — PI 5011 PSI — PSH 5011 — TSH 5011 — PRV — BLOWER 1 BLR5011

BLOWER 2

FROM ATMOSPHERE — MOV5022 — HC 5012 LOS — TSIH 5012 — PI 5012 PSI — PSH 5012 — TSH 5012 — PRV — BLOWER 2 BLR5012

BLOWER 3

FROM ATMOSPHERE — MOV5023 — HC 5013 LOS — TSIH 5013 — PI 5013 PSI — PSH 5013 — TSH 5013 — PRV — BLOWER 3 BLR5013

BLOWERS

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IDYLLWILD TREATMENT PLANT

BLOWER P&ID

IDYLLWILD, CA

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SHEET X OF X

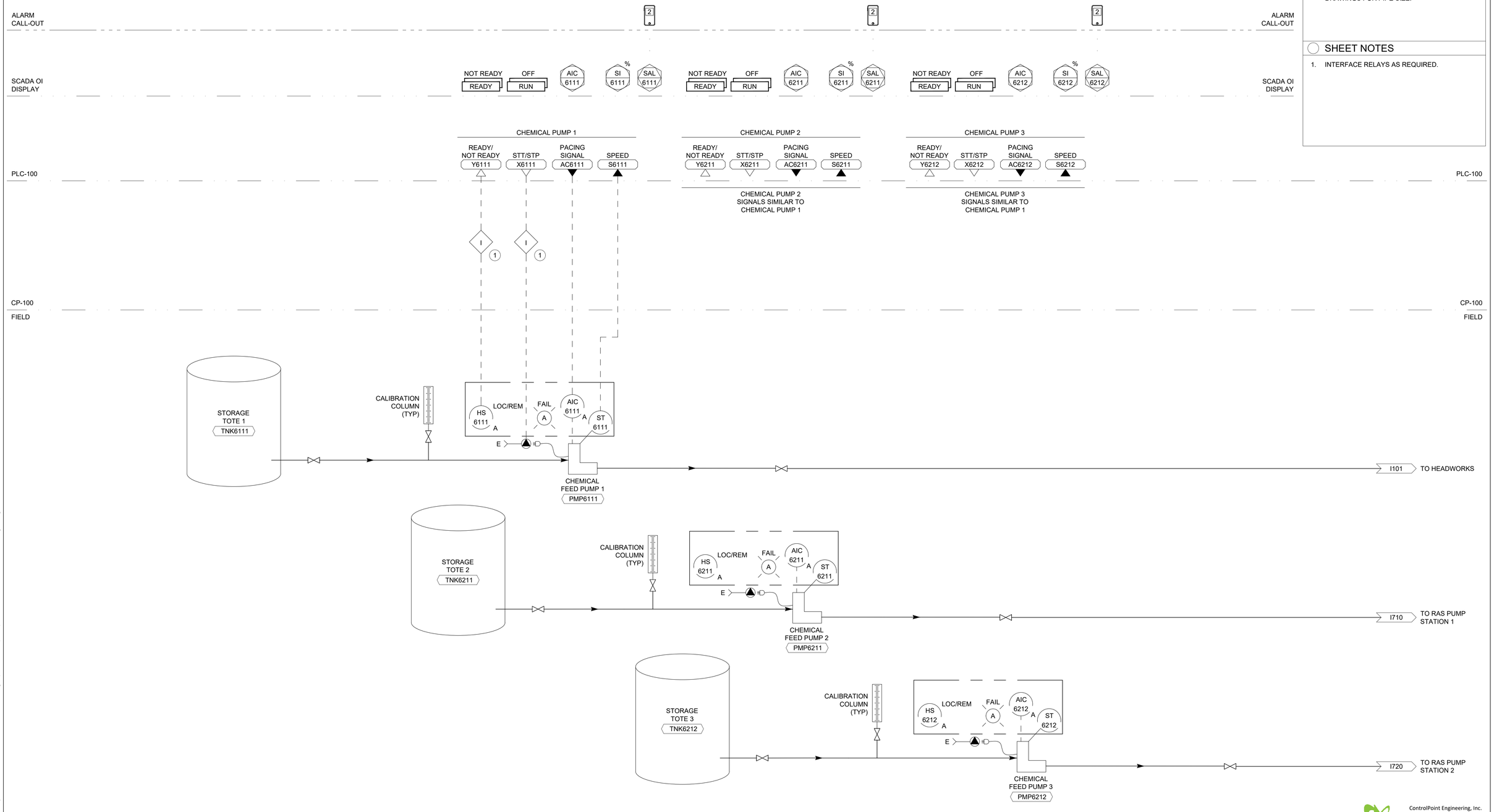
I501

GENERAL NOTES

A. REFER TO CIVIL AND MECHANICAL DRAWINGS FOR PIPE SIZE.

SHEET NOTES

1. INTERFACE RELAYS AS REQUIRED.



CHEMICAL FEED SYSTEM

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IDYLLWILD TREATMENT PLANT

CHEMICAL FEED SYSTEM P&ID

IDYLLWILD, CA

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SHEET X OF X

I601

GENERAL NOTES

A. REFER TO CIVIL AND MECHANICAL DRAWINGS FOR PIPE SIZE.

SHEET NOTES

1. INTERFACE RELAYS AS REQUIRED.
2. MOTOR PROTECTION RELAY PROVIDED BY PUMP SUPPLIER INSTALLED BY MCC MANUFACTURER.

ALARM CALL-OUT

SCADA OI DISPLAY

PLC-100

CP-100

FIELD

DO AI 7181 | pH AI 7181 | °F AI 7181

MAH 7131 (1)

UAT 7131 (1)

NOT READY / READY

OFF / ON

DO AI 7182 | pH AI 7182 | °F AI 7182

DO AI 7183 | pH AI 7183 | °F AI 7183

OFF / ON

FT LI 7151

GPM FI 7171 | TOTAL FIQ 7171

BIOREACTOR 1 ANOXIC ZONE

DISOLVED OXYGEN A7181A | pH A7181B | TEMPERATURE A7181C

ANOXIC ZONE MIXER

MOISTURE FAIL MSH7131 | STT/STP X7131 | RUN N7731 | FAIL UST7131 | READY Y7131

RUN G | HOA HS 7131 | FAIL A

I

ETM 7131

RESET | OVERTEMP/MOISTURE HCB 7131 ES | I (2) | FVNR | HCA 7131 RESET

REFERENCE SCHEMATIC E007

ZONE A OPEN CMD OC7141

BIOREACTOR 1 AERATION ZONE A

DISOLVED OXYGEN A7182A | pH A7182B | TEMPERATURE A7182C

BIOREACTOR 1 AERATION ZONE B

DISOLVED OXYGEN A7183A | pH A7183B | TEMPERATURE A7183C

ZONE B OPEN CMD OC7142

BIOREACTOR 1 LEVEL L7151

FLOW F7171 | FLOW PULSE FQ7171

I (1)

AIT 7181 DO/pH/TEMP

AIT 7182 DO/pH/TEMP

AIT 7183 DO/pH/TEMP

LIT 7151

ES FIT 7171 GPM

FE 7171

M FE7171

AE 7181 A | AE 7181 B | AE 7181 C

AE 7182 A | AE 7182 B | AE 7182 C

AE 7183 A | AE 7183 B | AE 7183 C

MSH 7131 | TSH 7131 | M ANOXIC MIXER MXR7131

ANOXIC ZONE

AERATION ZONE

CLARIFIER

FROM SPLITTER BOX I104

FROM RAS PUMP STATION 1 I810

FROM BLOWERS I501

AIR LIFT PUMP

SV7141

SV7142

TO FINAL EFFLUENT BOX

I810 TO RAS PUMP STATION 1

BIOREACTOR 1

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AS NOTED

ONE INCH AT FULL SCALE

DIGALERT

CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG

IDYLLWILD WATER DISTRICT

IDYLLWILD TREATMENT PLANT

REACTOR 1 P&ID

IDYLLWILD, CA

DRAFT -- NOT FOR CONSTRUCTION

DATE:	6/13/24
DESIGN:	MB
DRAWN:	JD
CHECKED:	JP

NO.	REVISIONS	BY	APP	DATE

SHEET X OF X

I710

GENERAL NOTES

A. REFER TO CIVIL AND MECHANICAL DRAWINGS FOR PIPE SIZE.

SHEET NOTES

1. INTERFACE RELAYS AS REQUIRED.
2. MOTOR PROTECTION RELAY PROVIDED BY PUMP SUPPLIER INSTALLED BY MCC MANUFACTURER.

ALARM CALL-OUT

SCADA OI DISPLAY

PLC-100

CP-100

FIELD

BIOREACTOR 1 ANOXIC ZONE

DISOLVED OXYGEN A7281A | pH A7281B | TEMPERATURE A7281C

AIT 7281 DO/pH/TEMP

AE 7281 A | AE 7281 B | AE 7281 C

ANOXIC ZONE MIXER

MOISTURE FAIL MSH7231 | STT/STP X7231 | RUN N7231 | FAIL UST7231 | READY Y7231

MAH 7231 | UAT 7231

RUN G | HOA HS 7231 | FAIL A

I | ETM 7231

RESET HCB 7231 | OVERTEMP/MOISTURE ES | I 2 | FVNR | HCA 7231 RESET

REFERENCE SCHEMATIC E007

MSH 7231 | TSH 7231 | M ANOXIC MIXER MXR7231

ANOXIC ZONE

ZONE A OPEN CMD OC7241

NOT READY / READY

OFF / ON

BIOREACTOR 2 AERATION ZONE A

DISOLVED OXYGEN A7282A | pH A7282B | TEMPERATURE A7282C

AIT 7282 DO/pH/TEMP

AE 7282 A | AE 7282 B | AE 7282 C

AERATION ZONE

BIOREACTOR 2 AERATION ZONE B

DISOLVED OXYGEN A7283A | pH A7283B | TEMPERATURE A7283C

AIT 7283 DO/pH/TEMP

AE 7283 A | AE 7283 B | AE 7283 C

ZONE B OPEN CMD OC7242

OFF / ON

BIOREACTOR 1 LEVEL L7251

LIT 7251

CLARIFIER

FLOW F7271 | FLOW PULSE FQ7271

I 1

GPM

ES FIT 7271

FE 7271

M FE7271

TO FINAL EFFLUENT BOX

FROM SPLITTER BOX I104

FROM RAS PUMP STATION 2 I820

TO RAS PUMP STATION 2 I820

SV7241 | SV7242

FROM BLOWERS I501

AIR LIFT PUMP

BIOREACTOR 2

ControlPoint Engineering, Inc.
3941 Park Drive, Unit 20
El Dorado Hills, CA 95762
T 916.817.1376
F 916.760.1378 IWDx21-001

California Rural Water Association

C R W A
1234 N MARKET BLVD
SACRAMENTO, CA 95834
(916) 553-4900

AS NOTED

ONE INCH AT FULL SCALE

DIGALERT

CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG

IDYLLWILD WATER DISTRICT

IDYLLWILD TREATMENT PLANT

REACTOR 2 P&ID

IDYLLWILD, CA

DRAFT -- NOT FOR CONSTRUCTION

DATE:	6/13/24
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DRAWN:	JD
CHECKED:	JP

NO.	REVISIONS	BY	APP	DATE

SHEET X OF X

I720

D:\Projects\active\IWDx21-001 - Idyllwild WWTP Modernization Predesign_AutoCAD\ACT\IWDx21-001 - P&ID Drawings.dwg 8-30-24 04:00:09 PM JosephDonati

GENERAL NOTES

A. REFER TO CIVIL AND MECHANICAL DRAWINGS FOR PIPE SIZE.

SHEET NOTES

1. INTERFACE RELAYS AS REQUIRED.
2. PUMP PROTECTION RELAY PROVIDED BY PUMP VENDOR AND INSTALLED BY MCC SUPPLIER.

ALARM CALL-OUT

SCADA OI DISPLAY

PLC-100

MCC-100 FIELD

OFF / RUN
SI 8112 (%) — NOT READY / READY — UAT 8112 — MSH 8112
CONTROL SC8112 — RUN N8112 — FAIL UA8112 — SEAL LEAK MSA8112
SPEED S8112 — READY/NOT READY Y8112 — STT/STP X8112
RAS PUMP 2 SIMILAR TO PUMP 1 CONTROLS

RAS PUMP 1
SI 8111 (%) — OFF / RUN — UAY 8111 — NOT READY / READY — MSH 8111
SPEED S8111 — CONTROL SC8111 — RUN N8111 — FAIL UA8111 — READY/NOT READY Y8111 — STT/STP X8111 — SEAL LEAK MSA8111
HOA HS 8111 A — HMI HUMAN MACHINE INTERFACE
SEAL LEAK A
I — DWG E006
G RUN — A FAIL — VFD — RC 8111 — ETM
I 2 — ES

RAS/WAS FLOW F8171 — RAS/WAS FLOW PULSE FQ8171
MGD FI 8171 — FAL 8171 — RAS TOTAL FIQ 8171 A — WAS TOTAL FIQ 8171 B
I 1
MGD FIT 8171 — ES
FE 8171 — M — FE8171

WAS VALVE
OPEN CONTROL ZO8141 — CLOSE CONTROL ZC8141 — LOCAL/REMOTE Y8141 — VALVE OPENED ZSO8141 — VALVE CLOSED ZSC8141
REMOTE LOCAL — ZAY 8141
HS 8141 L/O/R — HC 8141 O/S/C
I — R OPN — G CLSD
ZC 8141 — 480 — MO
WAS VALVE MOV8141

I601 FROM CHEM FEED
I710 TO BIOREACTOR 1
I800 TO SLUDGE HOLDING TANK
I820 TO/FROM RAS PUMP STATION 2

LOS — HC 8112 — MSH 8112 — TSH 8112 — PI 8112 — PSI — M — RAS PUMP 2 PMP8112
LOS — HC 8111 — MSH 8111 — TSH 8111 — PI 8111 — PSI — M — RAS PUMP 1 PMP8111

FROM BIOREACTOR 1 I710
I820 TO/FROM RAS PUMP STATION 2

RAS PUMP STATION 1

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IWDx21-001

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AS NOTED
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DIGALERT
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IDYLLWILD TREATMENT PLANT

RAS PUMP STATION 1 P&ID

IDYLLWILD, CA

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SHEET X OF X

I810

GENERAL NOTES

A. REFER TO CIVIL AND MECHANICAL DRAWINGS FOR PIPE SIZE.

SHEET NOTES

1. INTERFACE RELAYS AS REQUIRED.
2. PUMP PROTECTION RELAY PROVIDED BY PUMP VENDOR AND INSTALLED BY MCC SUPPLIER.

ALARM CALL-OUT

SCADA OI DISPLAY

PLC-100

MCC-100 FIELD

OFF / RUN

SI 8212 (%) — NOT READY / READY — UAT 8212 — MSH 8212

CONTROL SC8212 — RUN N8212 — FAIL UA8212 — SEAL LEAK MSA8212

SPEED S8212 — READY/NOT READY Y8212 — STT/STP X8212

RAS PUMP 2 SIMILAR TO PUMP 1 CONTROLS

RAS PUMP 1

SI 8211 (%) — OFF / RUN — UAY 8211 — NOT READY / READY — MSH 8211

SPEED S8211 — CONTROL SC8211 — RUN N8211 — FAIL UA8211 — READY/NOT READY Y8211 — STT/STP X8211 — SEAL LEAK MSA8211

HOA HS 8211 A — HMI HUMAN MACHINE INTERFACE — SEAL LEAK A

I — DWG E006 — VFD — RC 8211 — ETM — I 2 — ES

G RUN — A FAIL

MGD — FI 8271 — FAL 8271 — RAS TOTAL FIQ 8271 A — WAS TOTAL FIQ 8271 B

REMOTE / LOCAL — ZAY 8241

RAS/WAS FLOW F8271 — RAS/WAS FLOW PULSE FQ8271

I 1

MGD — ES — FIT 8271 — FE 8271 — M — FE8271

WAS VALVE

OPEN CONTROL ZO8241 — CLOSE CONTROL ZC8241 — LOCAL/REMOTE Y8241 — VALVE OPENED ZSO8241 — VALVE CLOSED ZSC8241

HS 8241 L/O/R — HC 8241 O/S/C — I — R OPN — G CLSD — ZC 8241 — 480 — MO

WAS VALVE MOV8241

M

I601 FROM CHEM FEED

I720 TO BIOREACTOR 2

I800 TO SLUDGE HOLDING TANK

LOS — HC 8212 — MSH 8212 — TSH 8212 — PI 8212 PSI — M — RAS PUMP 2 PMP8212

LOS — HC 8211 — MSH 8211 — TSH 8211 — PI 8211 PSI — M — RAS PUMP 1 PMP8211

FROM BIOREACTOR 2 I720

I810

TO/FROM RAS PUMP STATION 1

I810

RAS PUMP STATION 2

ControlPoint Engineering, Inc.
3941 Park Drive, Unit 20
El Dorado Hills, CA 95762
T 916.817.1376
F 916.760.1378
IWDx21-001

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SACRAMENTO, CA 95834
(916) 553-4900

AS NOTED

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IDYLLWILD WATER DISTRICT

IDYLLWILD TREATMENT PLANT

RAS PUMP STATION 2 P&ID

IDYLLWILD, CA

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SHEET X OF X

I820

GENERAL NOTES

A. REFER TO CIVIL AND MECHANICAL DRAWINGS FOR PIPE SIZE.

SHEET NOTES

1. PUMP PROTECTION RELAY PROVIDED BY PUMP VENDOR AND INSTALLED BY MCC SUPPLIER.

ALARM CALL-OUT

SCADA OI DISPLAY

PLC-100

CP-100 FIELD

mg/L AI 8581 — LAL 8581

UAT 8511 — NOT READY / READY — MAH 8511

FT LI 8551 — LAH 8551 — LAL 8551

SETTLING TANK DISSOLVED OXYGEN A8581

DECANT PUMP

STT/STP X8511 | RUN N8511 | FAIL UST8511 | READY Y8511 | MOISTURE FAIL MSH8511

SLUDGE SETTLING TANK LEVEL L8551

RUN G — HS 8511 HOA — FAIL A

ETM 8511 — I

RESET — OVERTEMP/ MOISTURE HCB 8511 ES — I (1) — FVNR — HCA 8511 RESET

REFERENCE SCHEMATIC E007

ES — mg/L AIT 8581 — AE 8581

LIT 8551

TNK8510

MSH 8511 — TSH 8511 — M

PMP8511 DECANT PUMP

FROM BLOWERS I501

I104 TO SPLITTER BOX

- TO SLUDGE DRYING BEDS

SLUDGE SETTLING TANK

ControlPoint Engineering, Inc.
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IWDx21-001

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(916) 553-4900

AS NOTED

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IDYLLWILD WATER DISTRICT

IDYLLWILD TREATMENT PLANT

SLUDGE SETTLING P&ID

IDYLLWILD, CA

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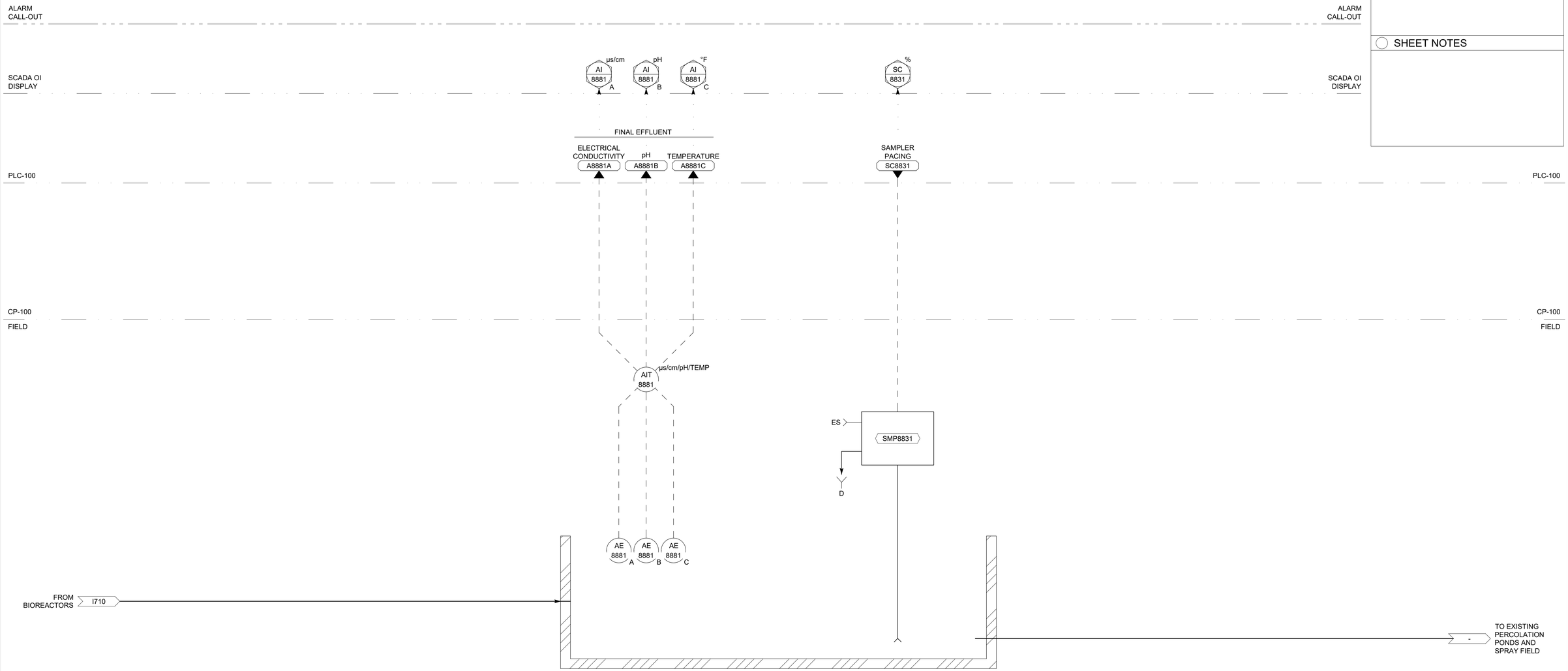
SHEET X OF X

I850

GENERAL NOTES

A. REFER TO CIVIL AND MECHANICAL DRAWINGS FOR PIPE SIZE.

SHEET NOTES



FINAL EFFLUENT BOX

ControlPoint Engineering, Inc.
3941 Park Drive, Unit 20
El Dorado Hills, CA 95762
T 916.817.1376
F 916.760.1378
IWDx21-001

California Rural Water Association

C R W A
1234 N MARKET BLVD
SACRAMENTO, CA 95834
(916) 553-4900

AS NOTED

ONE INCH AT FULL SCALE

DIGALERT

CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG

IDYLLWILD WATER DISTRICT

IDYLLWILD TREATMENT PLANT

FINAL EFFLUENT BOX P&ID

IDYLLWILD, CA

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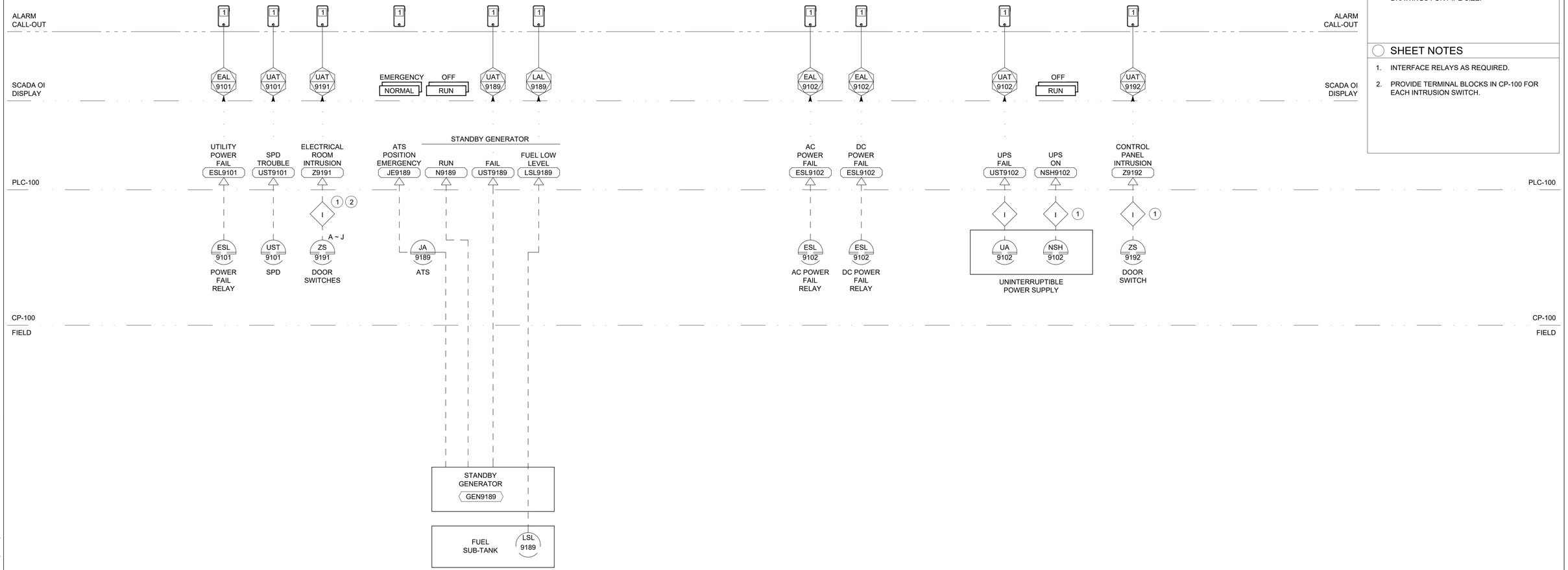
I880



GENERAL NOTES

A. REFER TO CIVIL AND MECHANICAL DRAWINGS FOR PIPE SIZE.

SHEET NOTES

1. INTERFACE RELAYS AS REQUIRED.
2. PROVIDE TERMINAL BLOCKS IN CP-100 FOR EACH INTRUSION SWITCH.

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SACRAMENTO, CA 95834
(916) 553-4900

AS NOTED

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DIGALERT

CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG

IDYLLWILD TREATMENT PLANT

MISCELLANEOUS P&ID

IDYLLWILD, CA

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SHEET X OF X

I910

Appendix A2 – Technical Specifications Table of Contents

IDYLLWILD WATER DISTRICT
WASTEWATER TREATMENT PLANT TECHNICAL SPECIFICATIONS
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DIVISION 09 – FINISHES

DIVISION 10 – SPECIALTIES

DIVISION 11 – EQUIPMENT

DIVISION 21 – FIRE SUPPRESSION SYSTEMS

DIVISION 22 – PLUMBING

DIVISION 23 – HEATING, VENTILATING, AND AIR CONDITIONING

Section 23 11 23	Facility Natural Gas Piping

DIVISION 26 – ELECTRICAL

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Section 26 01 26	Electrical Tests
Section 26 05 48	Seismic Restraints and Supports
Section 26 05 33	Electrical Motors
Section 26 05 33	Electrical Raceway Systems
Section 26 05 43	Underground Electrical Raceway Systems
Section 26 05 15	Industrial Control Panels
Section 26 05 19	Wire and Cabling
Section 26 05 26	Grounding and Bonding
Section 26 05 36	Wiring Devices
Section 26 05 10	Electric Motors
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Section 31 05 16	Aggregates for Earthwork
Section 31 11 00	Site Clearing and Grubbing
Section 31 13 00	Tree Removal, Protection, and Trimming
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Section 31 23 23	Fill and Compaction
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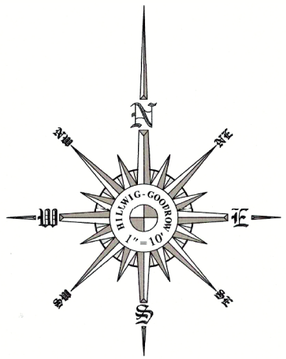
DIVISION 41 – PROCESSING AND HANDLING EQUIPMENT

DIVISION 43 – PROCESS GAS AND LIQUID EQUIPMENT

DIVISION 46 – WATER AND WASTEWATER EQUIPMENT

Appendix B – Site Survey



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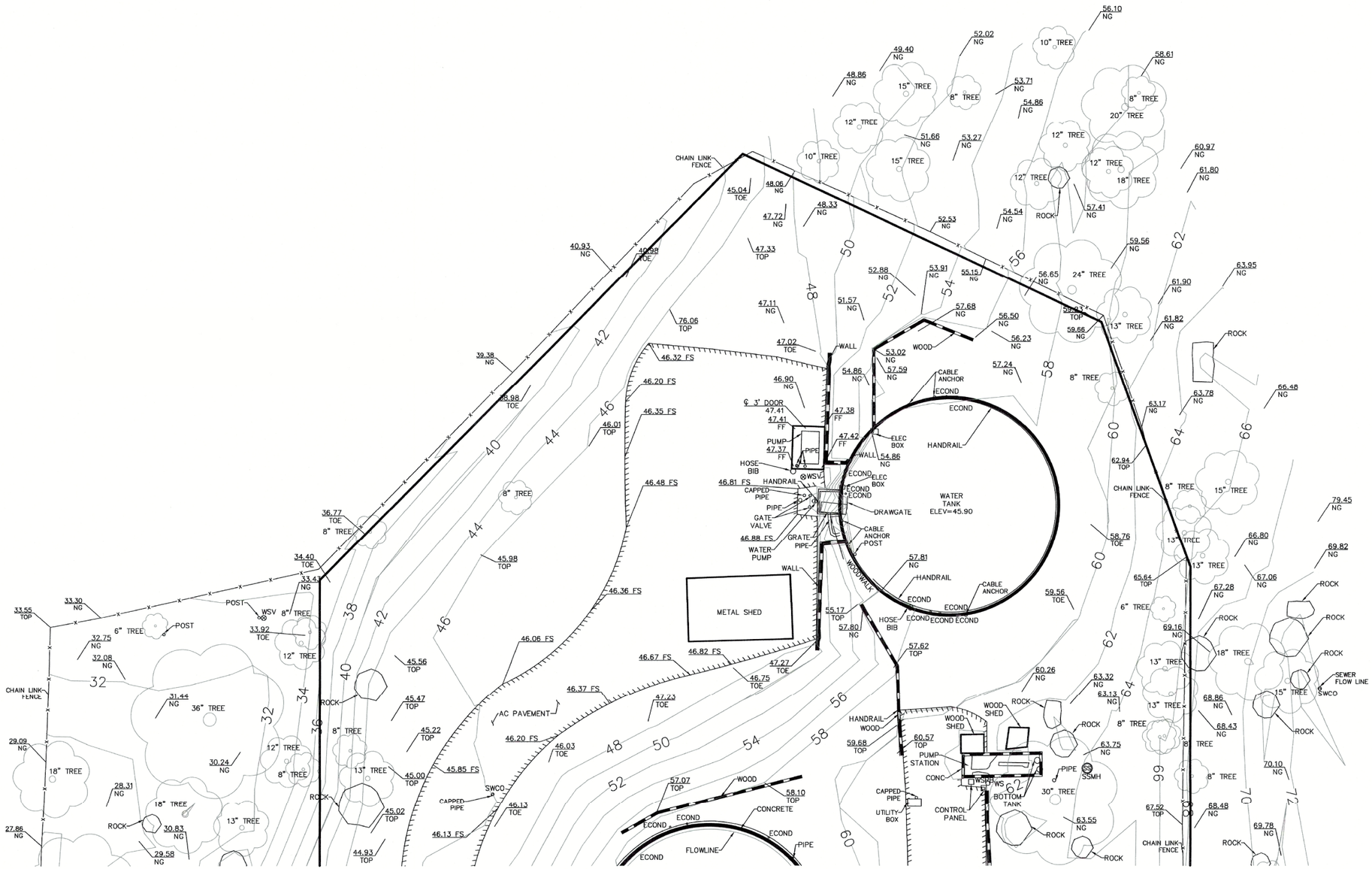
1 inch = 10 ft.

CONTOUR INTERVAL : 2 FEET



MATCH LINE - SEE SHEET 2

LEGEND

AC	ASPHALT
CLF	CHAIN LINK FENCE
CP	CONTROL POINT
ECOND	ELECTRICAL CONDUIT
EGA	GUY ANCHOR
ELEC.	ELECTRIC
EM	ELECTRIC METER
EMH	ELECTRIC MANHOLE
EPP	ELECTRIC POWER POLE
FF	FINISHED FLOOR
FL	FLOW LINE
FS	FINISHED SURFACE
GL	GUTTER LIP
NG	NATURAL GROUND
SD	STORM DRAIN
SDCO	STORM DRAIN CLEAN OUT
SL	STREET LIGHT
SSCO	SEWER CLEAN OUT
SSMH	SEWER MAN HOLE
TRANS.	TRANSFORMER
WS	WATER SERVICE
WSIR	IRRIGATION CONTROLS
WV	WATER VALVE

——— INDICATES PROPERTY LINE
———— INDICATES RIGHT OF WAY
— — — INDICATES CENTERLINE
------ INDICATES EASEMENT

Revisions:				
No.	Date:	By:	Description:	Approved:
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Prepared under the Supervision of:

PROFESSIONAL LAND SURVEYOR
LICENSE NO. 5137

5/10/22
DATE

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Land Surveying - GPS Surveys - Aerial Mapping
31419 Outer Highway 10, Suite 1-200• Redlands, CA 92373 • (909) 794-2673

Scale: 1" = 10'

Date: ----

BENCHMARK: SEE SURVEYOR'S NOTES

TOPOGRAPHIC SURVEY
APN-557-120-001,002

PREPARED FOR:
CALIFORNIA RURAL WATER ASSOCIATION
ATTN: RUBY VIRAMONTES
1234 NORTH MARKET BLVD.
SACRAMENTO, CA 95834

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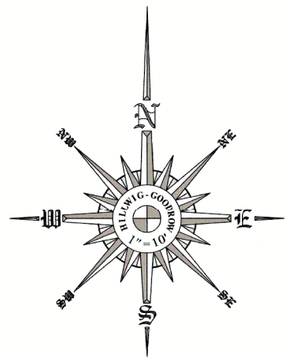
Sheet No. 1 of 6 SHEET

FILE NO. 1071-01

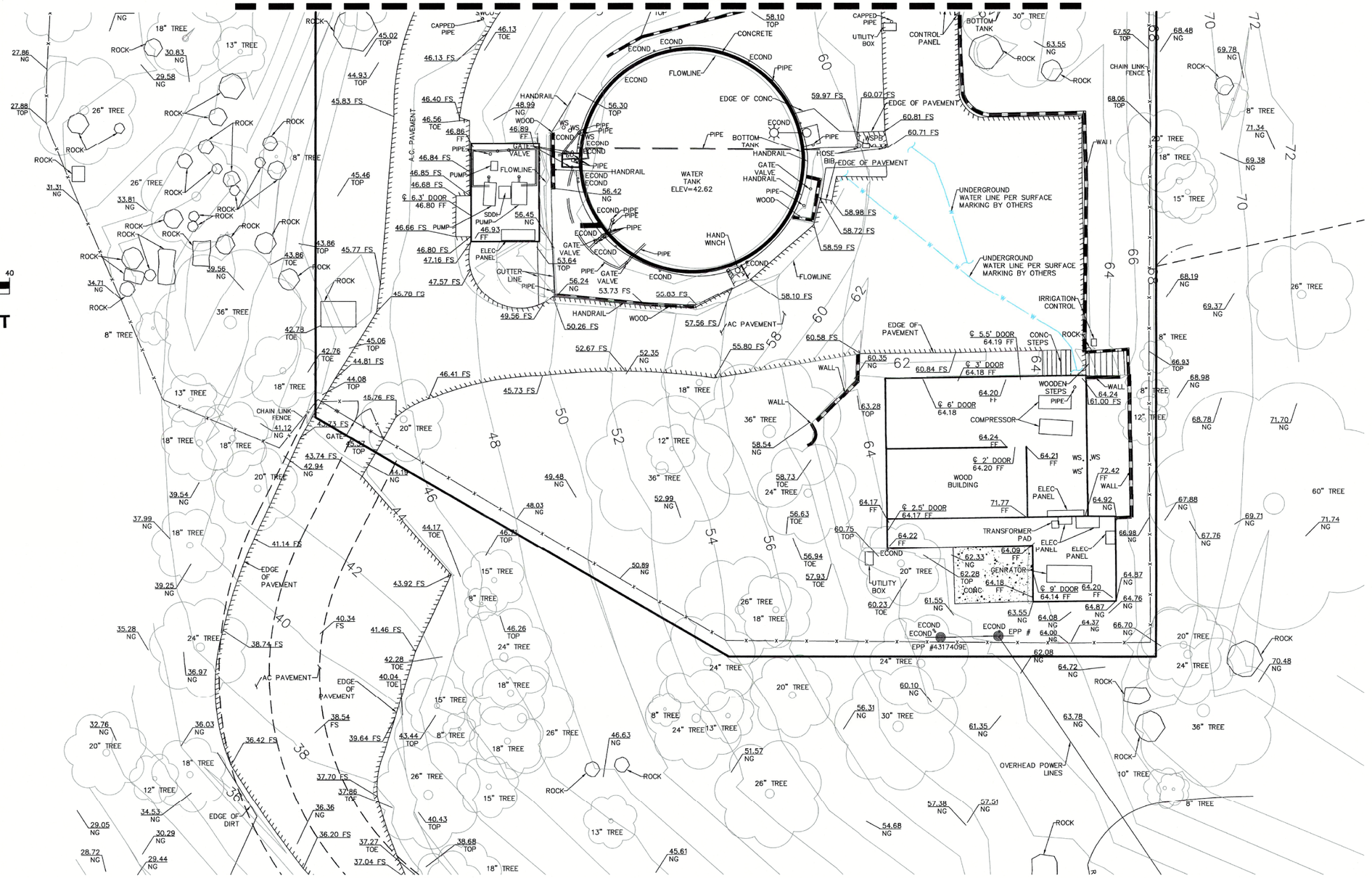


10 0 5 10 20 40

1 inch = 10 ft.

CONTOUR INTERVAL : 2 FEET

MATCH LINE - SEE SHEET 1



MATCH LINE - SEE SHEET 3

LEGEND

AC	ASPHALT
CLF	CHAIN LINK FENCE
CP	CONTROL POINT
ECOND	ELECTRICAL CONDUIT
EGA	GUY ANCHOR
ELEC.	ELECTRIC
EM	ELECTRIC METER
EMH	ELECTRIC MANHOLE
EPP	ELECTRIC POWER POLE
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FL	FLOW LINE
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SDCO	STORM DRAIN CLEAN OUT
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TRANS.	TRANSFORMER
WS	WATER SERVICE
WSIR	IRRIGATION CONTROLS
WV	WATER VALVE

——— INDICATES PROPERTY LINE
———— INDICATES RIGHT OF WAY
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– – – – – – INDICATES EASEMENT

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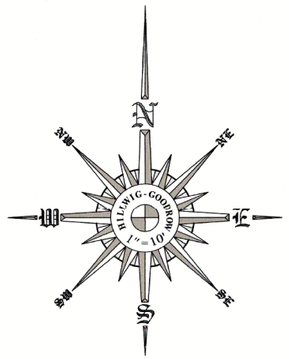


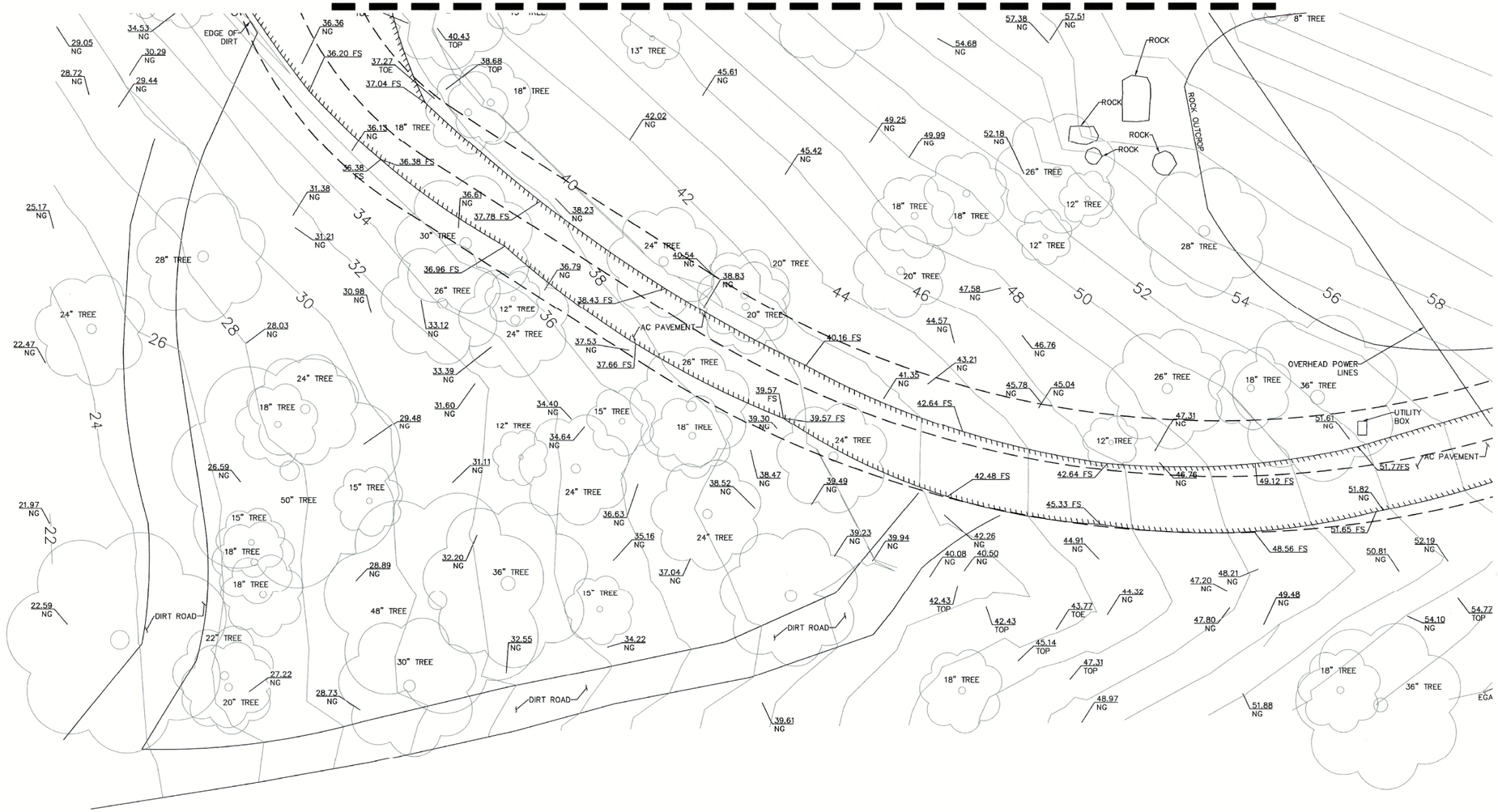
10 0 5 10 20 40

1 inch = 10 ft.

CONTOUR INTERVAL : 2 FEET

MATCH LINE - SEE SHEET 2

MATCH LINE - SEE SHEET 4



LEGEND

AC	ASPHALT
CLF	CHAIN LINK FENCE
CP	CONTROL POINT
ECOND	ELECTRICAL CONDUIT
EGA	GUY ANCHOR
ELEC.	ELECTRIC
EM	ELECTRIC METER
EMH	ELECTRIC MANHOLE
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SSCO	SEWER CLEAN OUT
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TRANS.	TRANSFORMER
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WSIR	IRRIGATION CONTROLS
WV	WATER VALVE

——— INDICATES PROPERTY LINE
———— INDICATES RIGHT OF WAY
— — — INDICATES CENTERLINE
------ INDICATES EASEMENT

Revisions:

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Designed: | Drawn: | Checked: ACH

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Prepared under the Supervision of:

PROFESSIONAL LAND SURVEYOR
LICENSE NO. 5137

5/12/22
DATE

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HILLWIG - GOODROW, INC.

Land Surveying - GPS Surveys - Aerial Mapping

31419 Outer Highway 10, Suite 1-200• Redlands, CA 92373 • (909) 794-2673

Scale: 1" = 10'

BENCHMARK: SEE SURVEYOR'S NOTES

Date: ----

TOPOGRAPHIC SURVEY
APN-557-120-001,002

PREPARED FOR:
CALIFORNIA RURAL WATER ASSOCIATION
ATTN: RUBY VIRAMONTES
1234 NORTH MARKET BLVD.
SACRAMENTO, CA 95834

F.N. | For: | F.B.

Sheet No. 3 OF 6 SHEET

FILE NO. 1071-01

MATCH LINE - SEE SHEET 2

MATCH LINE - SEE SHEET 2

MATCH LINE - SEE SHEET 3

MATCH LINE - SEE SHEET 4

HILLWIG-GOODROW
1" = 10'

10 0 5 10 20 40

1 inch = 10 ft.

CONTOUR INTERVAL : 2 FEET

20" TREE
24" TREE
ROCK
70.48 NG
36" TREE
8" TREE
SSMH
83.87 NG
86.80 NG
81.03 NG
77.74 NG
79.57 FS
82.22 FS
84.84 FS
18" TREE
78.65 FS
81.39 FS
84.09 FS
76.77 FS
76.21 FS
75.13 NG
15" TREE
18" TREE
20" TREE
88.05
71.73 NG
10" TREE
24" TREE
73.04 FS
77.49 NG
82.51 NG
70.79 FS
69.80 NG
EDGE OF PAVEMENT
73.52 FS
EDGE OF DIRT
75.43 NG
73.52 NG
EGA
AC PAVEMENT
70.06 FS
70.46 NG
67.07 FS
63.45 FS
66.23 FS
69.53 NG
ROCK OUTCROP
18" TREE
59.58 FS
62.60 FS
66.23 NG
OVERHEAD POWER LINES
36" TREE
55.51 FS
EDGE OF PAVEMENT
58.99 FS
62.86 NG
65.36 NG
51.61 NG
UTILITY BOX
AC PAVEMENT
51.77FS
18" TREE
20" TREE
18" TREE
62.24 NG
9.12 FS
51.82 NG
26" TREE
55.56 FS
51.65 FS
OVERHEAD POWER LINES
48.56 FS
50.81 NG
52.19 NG
54.41 NG
56.67 NG
60.58 NG
49.48 NG
54.77 TOP
54.10 NG
OVERHEAD POWER LINES
EPP #1834229E
18" TREE
36" TREE
EGA
EGA
EPP #1834230E

LEGEND

AC	ASPHALT
CLF	CHAIN LINK FENCE
CP	CONTROL POINT
ECOND	ELECTRICAL CONDUIT
EGA	GUY ANCHOR
ELEC.	ELECTRIC
EM	ELECTRIC METER
EMH	ELECTRIC MANHOLE
EPP	ELECTRIC POWER POLE
FF	FINISHED FLOOR
FL	FLOW LINE
FS	FINISHED SURFACE
GL	GUTTER LIP
NG	NATURAL GROUND
SD	STORM DRAIN
SDCO	STORM DRAIN CLEAN OUT
SL	STREET LIGHT
SSCO	SEWER CLEAN OUT
SSMH	SEWER MAN HOLE
TRANS.	TRANSFORMER
WS	WATER SERVICE
WSIR	IRRIGATION CONTROLS
WV	WATER VALVE

——— INDICATES PROPERTY LINE
———— INDICATES RIGHT OF WAY
— — — INDICATES CENTERLINE
– – – – – INDICATES EASEMENT

Revisions:

No.	Date:	By:	Description:	Approved:

Designed: | Drawn: | Checked: ACH

Seal: PROFESSIONAL LAND SURVEYOR ALAN C. HILLWIG No. 5137 EXP. 6-30-23 STATE OF CALIFORNIA

Prepared under the Supervision of:

PROFESSIONAL LAND SURVEYOR
LICENSE NO. 5137 — DATE 5/18/22

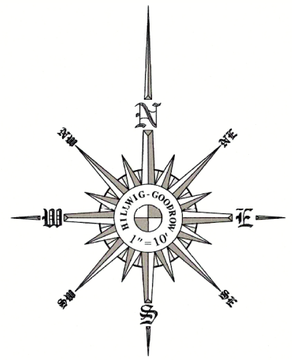
HILLWIG - GOODROW, INC.
Land Surveying - GPS Surveys - Aerial Mapping
31419 Outer Highway 10, Suite 1-200• Redlands, CA 92373 • (909) 794-2673

Scale: 1" = 10'
BENCHMARK: SEE SURVEYOR'S NOTES
Date: -----

TOPOGRAPHIC SURVEY
APN-557-120-001,002
PREPARED FOR:
CALIFORNIA RURAL WATER ASSOCIATION
ATTN: RUBY VIRAMONTES
1234 NORTH MARKET BLVD.
SACRAMENTO, CA 95834

F.N. | For: | F.B.

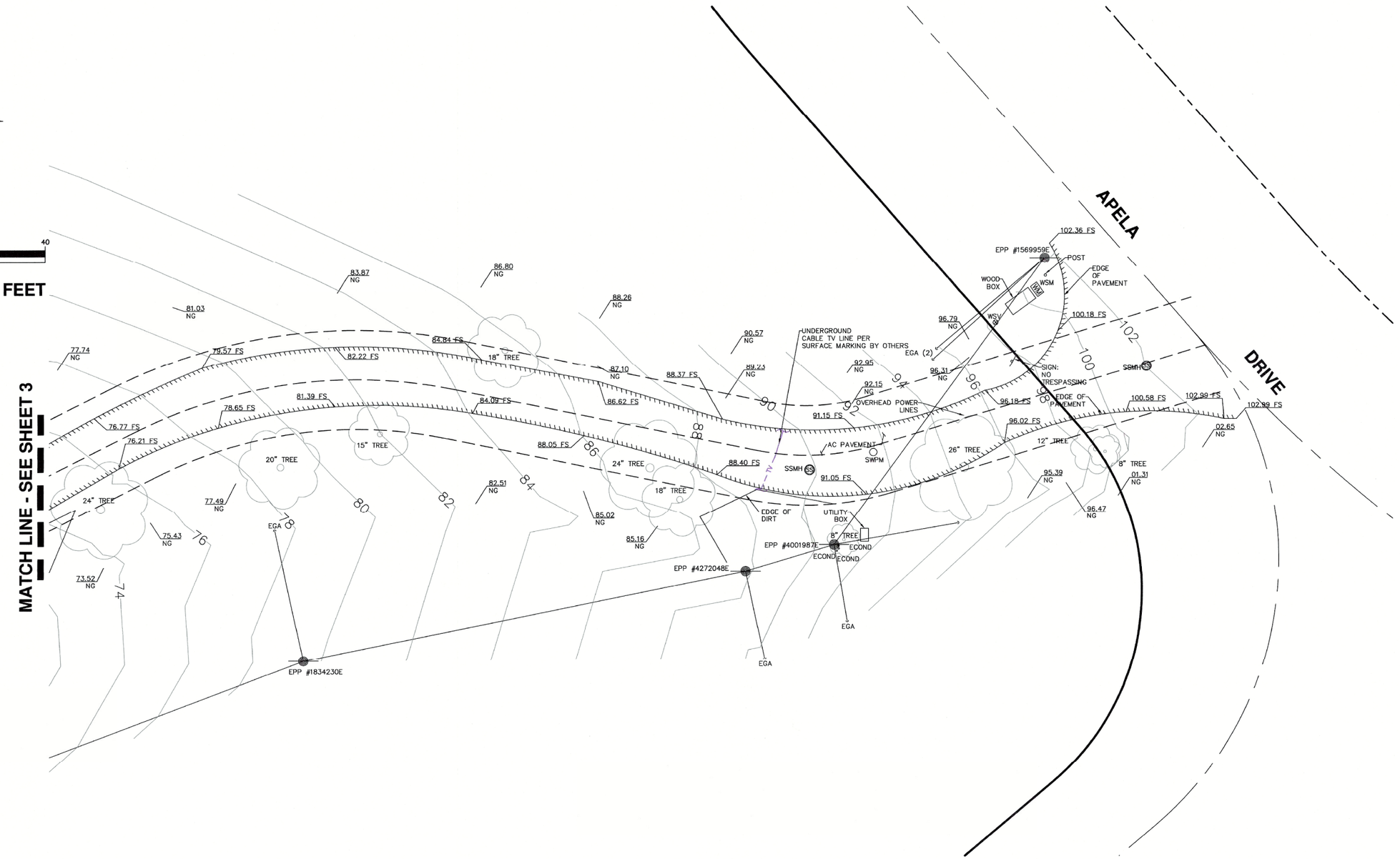
Sheet No. 4 OF 6 SHEET
FILE NO. 1071-01



10 0 5 10 20 40

1 inch = 10 ft.

CONTOUR INTERVAL : 2 FEET



LEGEND

AC	ASPHALT
CLF	CHAIN LINK FENCE
CP	CONTROL POINT
ECOND	ELECTRICAL CONDUIT
EGA	GUY ANCHOR
ELEC.	ELECTRIC
EM	ELECTRIC METER
EMH	ELECTRIC MANHOLE
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WV	WATER VALVE

INDICATES PROPERTY LINE
INDICATES RIGHT OF WAY
INDICATES CENTERLINE
INDICATES EASEMENT

Revisions:				
No.	Date:	By:	Description:	Approved:
Designed:		Drawn:	Checked: ACH	

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HILLWIG - GOODROW LAND SURVEYING · GPS · AERIAL MAPPING

HILLWIG - GOODROW, INC.
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31419 Outer Highway 10, Suite 1-200• Redlands, CA 92373 • (909) 794-2673

Scale: 1" = 10'
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BENCHMARK: SEE SURVEYOR'S NOTES

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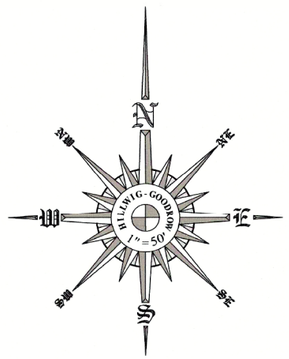
F.N. | For: | F.B.

Sheet No. 5 OF 6 SHEET
FILE NO. 1071-01



50 0 25 50 100 200

1 inch = 50 ft.

LEGEND

AC	ASPHALT
CLF	CHAIN LINK FENCE
CP	CONTROL POINT
ECOND	ELECTRICAL CONDUIT
EGA	GUY ANCHOR
ELEC.	ELECTRIC
EM	ELECTRIC METER
EMH	ELECTRIC MANHOLE
EPP	ELECTRIC POWER POLE
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TRANS.	TRANSFORMER
WS	WATER SERVICE
WSIR	IRRIGATION CONTROLS
WV	WATER VALVE

INDICATES PROPERTY LINE
INDICATES RIGHT OF WAY
INDICATES CENTERLINE
INDICATES EASEMENT

SURVEYOR'S NOTES

OWNERSHIP AND EASEMENT INFORMATION SHOWN HEREON WAS OBTAINED FROM A CONDITION OF TITLE GUARANTEE REPORT PREPARED BY FIDELITY NATIONAL TITLE, ORDER NO. 00139643-991-IE1-BS2 DATED APRIL 4, 2022

INDICATES FEE TITLE LAND HELD BY THE IDYLLWILD COUNTY WATER DISTRICT PER INSTRUMENT NO. 16835, O.R. RECORDED ON FEB. 20, 1969

INDICATES AN EASEMENT FOR ROAD AND ACCESS PURPOSES IN FAVOR OF THE IDYLLWILD COUNTY WATER DISTRICT PER DOC. 128799, O.R. RECORDED DEC. 23, 1970

INDICATES AN EASEMENT FOR PLANTING OF TREES, IRRIGATION AND RIGHT OF INGRESS/EGRESS IN FAVOR OF THE IDYLLWILD COUNTY WATER DISTRICT PER DOC. #354831, O.R. RECORDED OCT. 13, 1989

Revisions:				
No.	Date:	By:	Description:	Approved:
Designed:		Drawn:	Checked: ACH	

Seal: PROFESSIONAL LAND SURVEYOR ALAN C. HILLWIG No. 5137 EXP. 6-30-23 STATE OF CALIFORNIA

Prepared under the Supervision of:

PROFESSIONAL LAND SURVEYOR
LICENSE NO. 5137

5/18/22
DATE

HILLWIG - GOODROW, INC.
Land Surveying - GPS Surveys - Aerial Mapping
31419 Outer Highway 10, Suite 1-200 • Redlands, CA 92373 • (909) 794-2673

Scale: 1" = 50'

BENCHMARK: SEE SURVEYOR'S NOTES

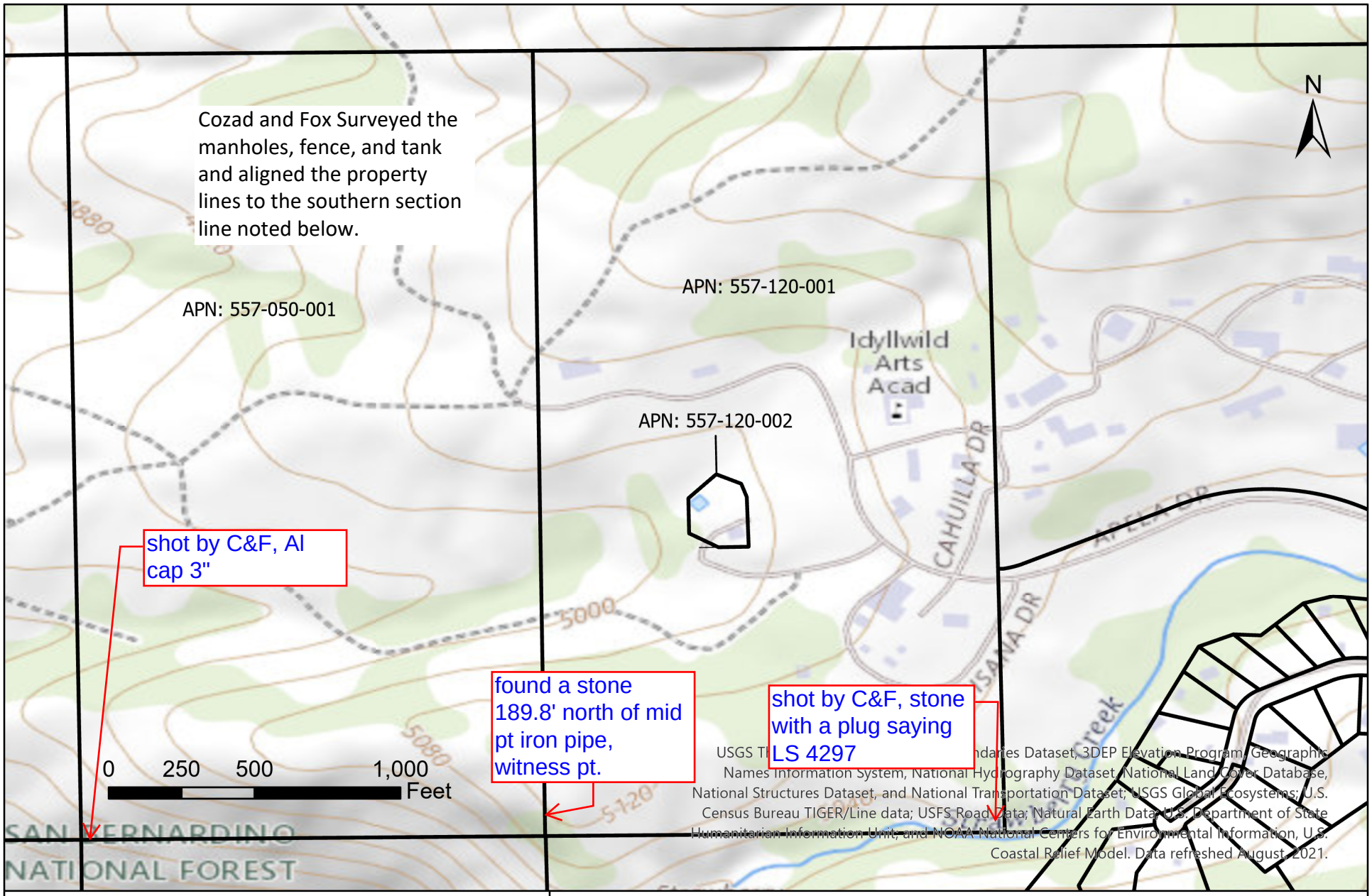
Date: May 17, 2022

TOPOGRAPHIC SURVEY
APN-557-120-001,002
PREPARED FOR:
CALIFORNIA RURAL WATER ASSOCIATION
ATTN: RUBY VIRAMONTES
1234 NORTH MARKET BLVD.
SACRAMENTO, CA 95834

F.N. | For: | F.B.

Sheet No. 6 OF 6 SHEET

FILE NO. 1071-01



California Rural Water Association

Idyllwild Water District Parcel Map

EXHIBIT "A" - LEGAL DESCRIPTION
LOT LINE ADJUSTMENT NO. 23XXXX

PARCEL 1

ALL THAT CERTAIN REAL PROPERTY SITUATED IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS:

THE EAST HALF OF THE SOUTHWEST QUARTER OF SECTION 14, TOWNSHIP 5 SOUTH, RANGE 2 EAST, SAN BERNARDINO BASE AND MERIDIAN.

EXCEPTNG THEREFROM THAT PORTION CONVEYED TO IDYLLWILD WATER DISTRICT, A PUBLIC AGENCY, BY DEED RECORDED NOVEMBER 14, 1968 AS INSTRUMENT NO. 109459 OF OFFICIAL RECORDS.

PARCEL 2

ALL THAT CERTAIN REAL PROPERTY SITUATED IN THE EAST HALF OF THE SOUTHWEST QUARTER OF SECTION 14, TOWNSHIP 5 SOUTH, RANGE 2 EAST, SAN BERNARDINO BASE AND MERIDIAN, IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA. BEING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT ENGINEERS STATION 25+57.16 IN THE CENTERLINE OF APELA DRIVE, AS SHOWN ON RIVERSIDE COUNTY SURVEYOR'S MAP NO. 702–L, SAID STATION BEING THE BEGINNING OF A CURVE, THE TANGENT TO SAID CURVE BEARS NORTH 41°34' WEST,
THENCE NORTH 73°34' WEST 150.00 FEET;
THENCE SOUTH 89°07'45" WEST 91.40 FEET;
THENCE SOUTH 77°37'15" WEST 80.90 FEET TO THE **TRUE POINT OF BEGINNING**;
THENCE SOUTH 00°00'00" WEST 210.24 FEET;
THENCE SOUTH 90°00'00" WEST 215.50 FEET;
THENCE NORTH 00°00'00" WEST 168.53 FEET;
THENCE NORTH 23°08'34" EAST 66.46 FEET;
THENCE NORTH 01°44'33" EAST 56.00 FEET;
THENCE NORTH 79°02'44" EAST 52.00 FEET TO THE NORTH WEST CORNER OF THE IDYLLWILD COUNTY WATER DISTRICT PARCEL;
THENCE A RECORD DISTANCE ALONG SAID PROPERTY LINE NORTH 44°53'25" EAST 115.19 FEET;
THENCE A RECORD DISTANCE SOUTH 65°00'00" EAST 76.00 FT;
THENCE LEAVING SAID PROPERTY LINE, SOUTH 73°39'43" EAST 40.32 FEET;
THENCE SOUTH 00°00'00" WEST 123.41 FEET TO THE **TRUE POINT OF BEGINNING.**

CONTAINING 0.93 NET ACRES, MORE OR LESS

THIS DOCUMENT WAS PREPARED BY
ME OR UNDER MY SUPERVISION:

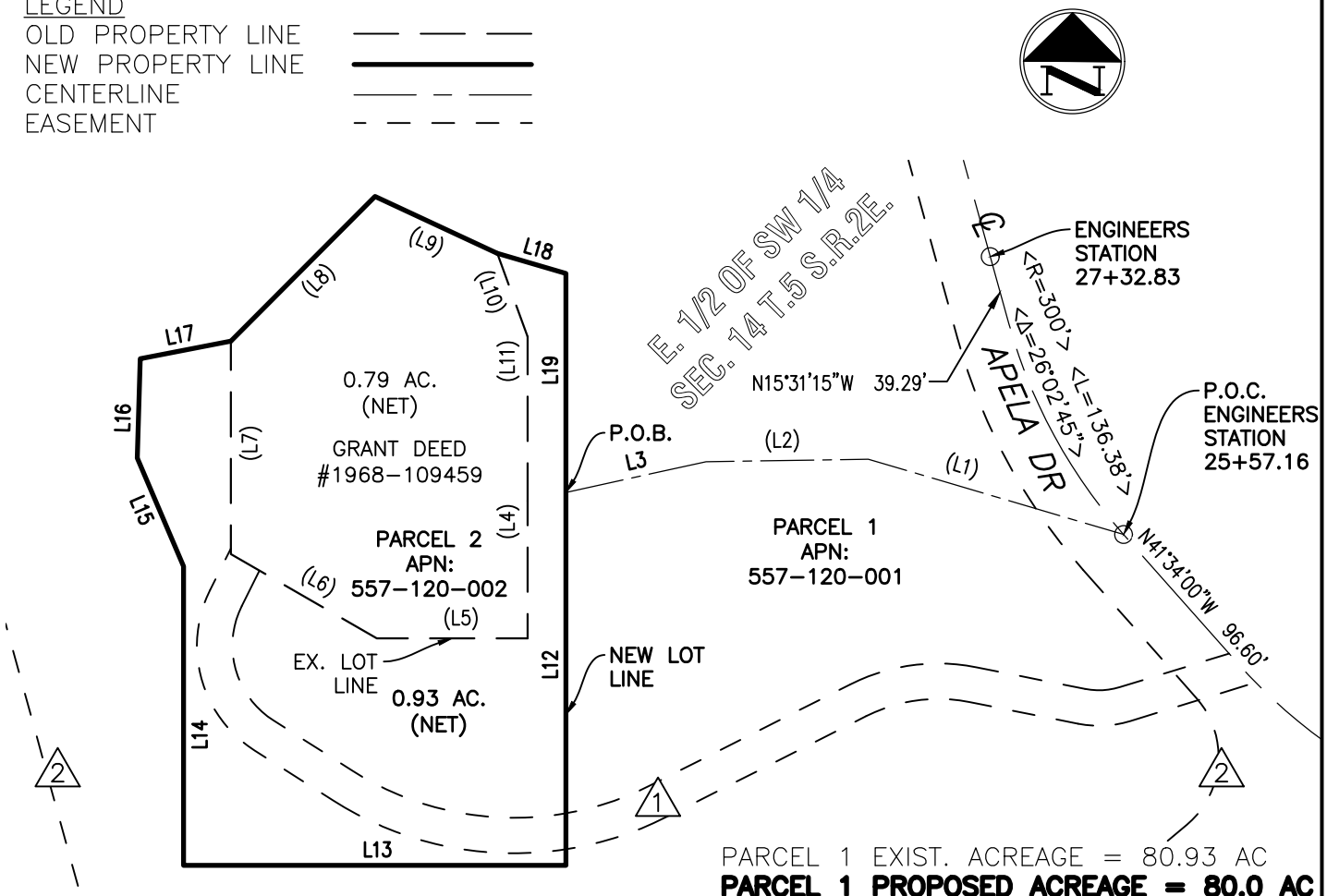
PROFESSIONAL LAND SURVEYOR
ANDREW J. RIECKEN
NO. 9603
STATE OF CALIFORNIA

PRELIMINARY DRAFT

ANDREW J. RIECKEN P.L.S. 9603
REGISTRATION EXPIRES 3–31–2025

EXHIBIT "B" - MAP
LOT LINE ADJUSTMENT NO. 23XXXX

LEGEND
OLD PROPERTY LINE
NEW PROPERTY LINE
CENTERLINE
EASEMENT



PARCEL 1 EXIST. ACREAGE = 80.93 AC
PARCEL 1 PROPOSED ACREAGE = 80.0 AC
PARCEL 2 EXIST. ACREAGE = 0.79 AC
PARCEL 2 PROPOSED ACREAGE = 1.72 AC

NOTE: THE PROPOSED LOT LINE WILL NOT LATERALLY INTERSECT A GRADED MANUFACTURED SLOPE. NO DRAINAGE FORM THE TRIBUTARY AREA ABOVE A MANUFACTURED SLOPE WILL SHEET FLOW OVER THE PROPOSED SLOPE FACE.

EASEMENTS:

1 AN EASEMENT FOR ROAD AND ACCESS PURPOSES PER DOC. RECORDED DEC. 29, 1970 IN BOOK 128, PAGE 799.

2 AN EASEMENT FOR LANDSCAPING WITH THE RIGHT OF INGRESS/EGRESS IN FAVOR OF THE IDYLLWILD WATER DISTRICT.

0 100 200 FEET

SCALE: 1" = 100'
APN'S: 557-120-001/002
SEC. 14 T. 5S., R. 2E. S.B.M.
DATE EXHIBIT PREPARED 07/18/2023

L1	150.00	N73° 34' 00"W
L2	91.40	S89° 07' 45"W
L3	80.90	S77° 37' 15"W
L4	77.50	S00° 00' 00"E
L5	85.00	N90° 00' 00"E
L6	95.00	S60° 00' 00"E
L7	120.00	S00° 00' 00"E
L8	115.19	N44° 53' 25"E
L9	76.00	S65° 00' 00"E
L10	50.00	N20° 00' 00"W
L11	92.50	S00° 00' 00"E
L12	210.24	S00° 00' 00"W
L13	215.50	S90° 00' 00"W
L14	168.53	N00° 00' 00"W
L15	66.46	N23° 08' 34"W
L16	56.00	N01° 44' 33"E
L17	52.00	N79° 02' 44"E
L18	40.32	S73° 39' 43"E
L19	123.41	N00° 00' 00"E
L20	89.68	S41° 34' 00"E

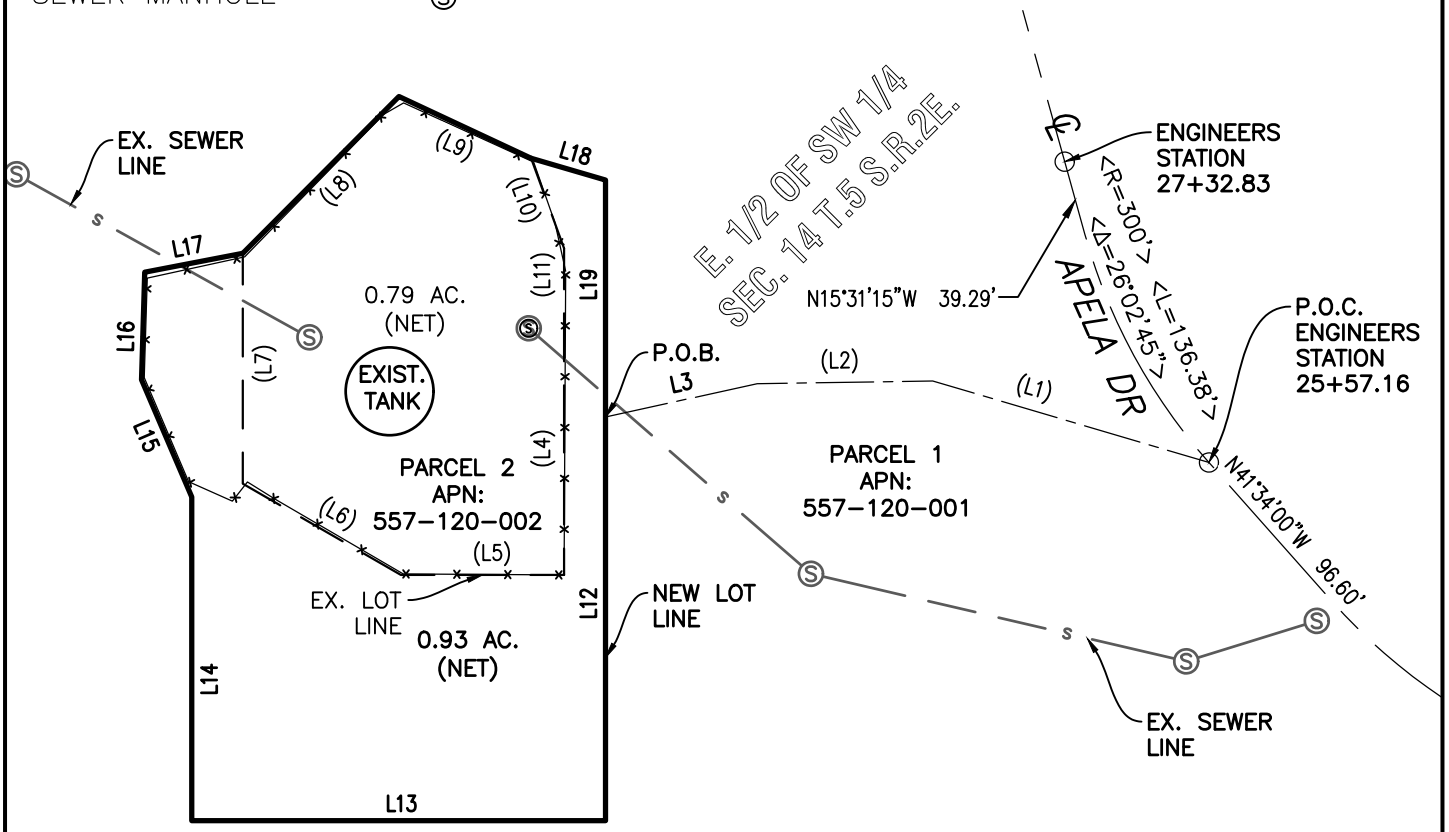
PROFESSIONAL LAND SURVEYOR ANDREW J. RIECHERT 9603 STATE OF CALIFORNIA

PRELIMINARY DRAFT

EXHIBIT "C" - SITE PLAN
LOT LINE ADJUSTMENT NO. 23XXXX

LEGEND
OLD PROPERTY LINE
NEW PROPERTY LINE
CENTERLINE
SANITARY SEWER
CHAIN LINK FENCE
SEWER MANHOLE

() RECORD DATA PER INST. # 1968-109459
<> RECORD DATA PER COUNTY SURVEYORS MAP 702-L



L1	150.00	N73° 34' 00"W
L2	91.40	S89° 07' 45"W
L3	80.90	S77° 37' 15"W
L4	77.50	S00° 00' 00"E
L5	85.00	N90° 00' 00"E
L6	95.00	S60° 00' 00"E
L7	120.00	S00° 00' 00"E
L8	115.19	N44° 53' 25"E
L9	76.00	S65° 00' 00"E
L10	50.00	N20° 00' 00"W
L11	92.50	S00° 00' 00"E
L12	210.24	S00° 00' 00"W
L13	215.50	S90° 00' 00"W
L14	168.53	N00° 00' 00"W
L15	66.46	N23° 08' 34"W
L16	56.00	N01° 44' 33"E
L17	52.00	N79° 02' 44"E
L18	40.32	S73° 39' 43"E
L19	123.41	N00° 00' 00"E
L20	89.68	S41° 34' 00"E

0 100 200 FEET

SCALE: 1" = 100'
APN'S: 557-120-001/002
SEC. 14 T. 5S., R. 2E. S.B.M.
DATE EXHIBIT PREPARED 07/18/2023

PROFESSIONAL LAND SURVEYOR ANDREW J. RIECKEN NO. 9603 STATE OF CALIFORNIA

PRELIMINARY DRAFT

SHEET 3 OF 3

Appendix C – CEQA Documentation

Print Form

Notice of Determination

Appendix D

To:

☒ Office of Planning and Research

U.S. Mail: P.O. Box 3044, Sacramento, CA 95812-3044

Street Address: 1400 Tenth St., Rm 113, Sacramento, CA 95814

☒ County Clerk
County of: Riverside
Address: 2724 Gateway Drive
Riverside, CA 92507

From:

Public Agency: Idyllwild Water District
Address: 25945 Highway 243
Idyllwild, CA 92549
Contact: Bill Rojas - General Manager
Phone: 951-659-2143

Lead Agency (if different from above):

Address:

Contact:
Phone:

SUBJECT: Filing of Notice of Determination in compliance with Section 21108 or 21152 of the Public Resources Code.

State Clearinghouse Number (if submitted to State Clearinghouse): 2024051129

Project Title: Idyllwild Wastwater Treatment Plan Improvement Project

Project Applicant: Idyllwild Water District

Project Location (include county): 52335 Apela Drive Idyllwild, Riverside County, CA

Project Description: The proposed project would improve the Idyllwild WWTP to meet existing and future discharge requirements efficiently and consistently for the Idyllwild community. The proposed project consists of the following improvements: Headworks to include new flume and splitter box; additional equalization for heavy precipitation events/two new secondary treatment bioreactors; new sludge holding tank and new sludge handling system; new supervisory control and data acquisition (SCADA) system to integrate controls for plant; new blowers and associated controls in existing blower room; and, new generator and automatic transfer for standby power.

This is to advise that the Idyllwild Water District has approved the above
(☒ Lead Agency or ☐ Responsible Agency)

described project on July 17, 2024 (date) and has made the following determinations regarding the above described project.

1. The project [☐ will ☒ will not] have a significant effect on the environment.
2. ☐ An Environmental Impact Report was prepared for this project pursuant to the provisions of CEQA.
   ☒ A Negative Declaration was prepared for this project pursuant to the provisions of CEQA.
3. Mitigation measures [☒ were ☐ were not] made a condition of the approval of the project.
4. A mitigation reporting or monitoring plan [☒ was ☐ was not] adopted for this project.
5. A statement of Overriding Considerations [☐ was ☐ was not] adopted for this project.
6. Findings [☐ were ☐ were not] made pursuant to the provisions of CEQA.

This is to certify that the final EIR with comments and responses and record of project approval, or the negative Declaration, is available to the General Public at:
Idyllwild Water District 25945 Highway 243 Idyllwild, CA 92549

Signature (Public Agency): _____ Title: General Manager

Date: July 17, 2024 Date Received for filing at OPR: _____

Authority cited: Sections 21083, Public Resources Code.
Reference Section 21000-21174, Public Resources Code.

Revised 2011

STATE CLEARINGHOUSE NUMBER 2024051129

IDYLLWILD WASTEWATER TREATMENT PLANT IMPROVEMENT PROJECT

~~Draft~~ Final Initial Study with Proposed Mitigated Negative Declaration

~~MAY~~ JULY 2024

Dewberry

SUBMITTED BY
Dewberry Engineers Inc.
11060 White Rock Road, Suite 200
Rancho Cordova, CA 95670-6061

SUBMITTED TO
Idyllwild Water District
25945 CA-23
Idyllwild, California 92549
951-659-2143

Table of Contents

List of Tables

List of Figures

List of Appendices

Initial Study

1) **Project Title**: Idyllwild Wastewater Treatment Plant Improvement Project
2) **Lead Agency Name and Address**:
   Idyllwild Water District
   Desk@idyllwildwater.com
   951-659-2143
   25945 CA-243, Idyllwild, California 92549
3) **Contact Person and Phone Number**:
   Nathan Thomas
   SUSP Engineering
   916-553-4900
4) **Project Location**: 52335 Apela Drive, City of Idyllwild, Riverside County, California, Assessor's Parcel Number(s) 557-120-002 and a portion of 557-120-001.
5) **Project Sponsor's Name and Address**:
   SUSP Engineering
   1234 N Market Boulevard, Sacramento, California
   916-553-4900
6) **General Plan Designation(s)**: Public Facilities (PF)
7) **Zoning Classification(s)**: Controlled Development Area Zone (W-2)

1. Introduction

The Idyllwild Water District (IWD) proposes to improve the Idyllwild Wastewater Treatment Plant (WWTP) (herein referred to as the "proposed project" or "project") that was constructed in 1966 and became operational in 1971. The improvements to the WWTP are needed to continue to adequately receive and treat wastewater from the residents and businesses of Idyllwild while conforming to current local (Riverside County), state and federal wastewater treatment regulations. The project includes upgrades to headworks, equalization, and secondary treatment facilities at the WWTP, installation of new controls and a plant wide Supervisory Control and Data Acquisition (SCADA) system.

The IWD is the lead agency under the California Environmental Quality Act (CEQA). The California Rural Water Association (CRWA) is providing technical assistance to the IWD under an agreement with their subsidiary SUSP Engineering. Previously under the Santa Ana Watershed Project Authority (SWAPA) Disadvantaged Community Involvement Program, CRWA performed a feasibly study and general preliminary engineering report supporting the project.

1.1 Circulation Information

The Draft Initial Study/Mitigated Negative Declaration (IS/MND) was submitted to the State Clearinghouse on May 24, 2024, for a 30-day public review period that ended on Monday June 23, 2024. During the public review period, the Draft IS/MND will be available for review at the following locations:

- Idyllwild Water District 25945 CA-243, Idyllwild, California 92549
- Idyllwild Water District Website https://www.idyllwildwater.com/
- Max and Beatrice Krone Library 5200 Temecula Road #38 Idyllwild, California 92549

Comments can be submitted via email to Chris Graham (cgraham@Dewberry.com), subject line: Idyllwild WWTP Improvement Project – Public Comment. Comments can also be sent by mail to:

Idyllwild WWTP Improvement Project – Public Comment
ATT: Chris Graham
11060 White Rock Road
Suite 200
Rancho Cordova, California 95670
Email: cgraham@Dewberry.com

Comments were accepted until 5:00 PM on Monday June 23, 2024.

1.2 Summary of Findings

The Draft IS/MND prepared for the proposed project assesses the potential effects on the environment and the significance of those effects. Based on the result of this IS/MND, the proposed project would not have significant impacts on the environment once mitigation measures, best management practices, and standard project conditions are implemented. The IS/MND supports the following findings:

- The proposed project would have no impact on aesthetics, agriculture and forestry resources, energy, geology and soils (including paleontological resources), hydrology and water quality, land use and planning, mineral resources, population and housing, public services, recreation, utilities, and wildfire.
- The proposed project would have less than significant impacts on air quality, greenhouse gas emissions, hazards and hazardous materials, noise, and transportation.
- Once mitigation measures are implemented, the proposed project would have a less than significant impact on biological resources, cultural resources, and tribal cultural resources.
- No substantial evidence exists that the proposed project would have a significant and unavoidable or adverse effect on the environment.

1.3 Background

The WWTP was constructed in 1966 and became operational in 1971 after the construction of the collection system was completed. Currently, IWD provides water and sewer services to approximately one third of the community of Idyllwild, covering a service area of 2,520 acres through 1,650 water and 587 sewer connections. The remaining residences and businesses are on septic systems as there are no other regulated wastewater treatment operations of similar scale in the area. Due to the geographic constraints, there are currently no plans to incorporate the remaining parts of the service area into the collection system. The geographic distance also precludes the possibility of consolidating with neighboring systems.

The WWTP is an activated sludge plant operated in extended aeration mode for biological removal of nitrogen with a capacity of 0.25 Million Gallons per Day (MGD). The system operates under a National Pollutant Discharge Elimination System (NPDES) Permit No R8- 2015-0028 issued by the Santa Ana Regional Water Quality Control Board (RWQCB) on July 1, 2015.

The District's wastewater collection system is a gravity flow system and consists of approximately 63,000 feet of 4-, 8-, 10-, and 18-inch sewer lines and mains. Pipeline blockages are not uncommon within the collection system. Further, inflow and infiltration is also an issue due to the age of the system (50 years). IWD has instituted a program

to video survey parts of the collection system annually to identify potential leakage issues and fix them as identified. IWD is not a combined sewer system, which means that storm water runoff and sewage collection system are separated. The collection system is meant to collect only wastewater and deliver it to the treatment plant, although all of the storm flow cannot be excluded from the collection system, and the WWTP does see a surge in flows due to periods of heavy rainfall. As a result, inflow and infiltration is a concern at the WWTP resulting in much higher influent flows during rainfall events causing the capacity of treatment units to be exceeded. This results in inadequate retention times, insufficient treatment, and exceedance of permit discharge limits. The existing WWTP has not been upgraded since its construction in 1966, aside from replacement of individual equipment and a headworks modification in 2019. The WWTP is composed of the following main components: Headworks, Equalization Tank, Aeration Tank with Clarifier and Aerobic Digester, RAS/WAS Pumping System and Centrifugal Blowers, Spray Fields and Percolation Ponds, and Sludge Drying Beds. These existing components of the WWTP and the upgrades proposed as part of the project are further discussed below in Section 2.0 Project Description.

2. Project Description

2.1 Project Location

Regionally, the proposed project is located in unincorporated Riverside County within the community of Idyllwild, in the San Bernardino Mountains, approximately 30 miles east of Hemet (**Appendix A: Figure 1-1**). Specifically, the proposed project is located on Assessors' Parcels Number (APNs) 557-120-002 and a portion of 557-120-001, along Apela Drive and Temecula Road in the community of Idyllwild (**Appendix A: Figure 1-2**). The project site has an existing Riverside County land use designation of Public Facilities (PF) and is zoned as Controlled Development Areas (W-2).

The land use pattern in the community of Idyllwild/Pine Cove features small lot residential development and commercial uses, as well as large areas devoted to camps, conference centers, retreats, and higher education in music and the arts. Surrounding General Plan land use designations include Open Space-Conservation Habitat (OS-CH), Open Space-Water (OS-W), Estate Density Residential (EDR), Medium Density Residential (MDR), and Rural Mountainous (RM). Surrounding zoning designations include Watercourse, Watershed and Conservation Zone Areas (W-1), W-2, and rural residential (RR).

2.2 Existing Conditions

The project site is currently occupied by the existing Idyllwild WWTP which is approximately 34,800 square feet and includes a treatment capacity of 0.25 million gallons per day (MGD). The system is operated manually. The major components of the system include headworks, equalization tank, aeration tank with clarifier and aerobic digester, RAS/WAS pumping system and centrifugal blowers, spray fields and percolation ponds, and sludge drying beds. The project site is bounded by access roads to the east and the WWTP to the north, and supports a moderate-to-dense montane hardwood-conifer habitat.

The existing Idyllwild WWTP was constructed in 1966 and became operational in 1971, making it over 50 years old and has now exceeded its design life. The main issues with the existing WWTP that would be addressed by the proposed project include redundancy, permit exceedances, limited equalization capacity, and lack of supervisory control and data acquisition (SCADA) controls.

2.3 Purpose and Need and Project Objectives

The purpose of the project is to modernize the Idyllwild WWTP to meet existing and future discharge requirements efficiently and consistently for the Idyllwild community.

The project is needed because the existing WWTP is old and beyond its useful life and needs to be upgraded to meet current wastewater standards and processes.

The most urgent issue the WWTP faces is the aging infrastructure, lack of redundancy, and declining treatment efficiency at the existing WWTP. Lack of redundancy makes regular maintenance activities difficult to perform and limited to those that can occur within a 24-hour period. Although the flow can be diverted to the existing EQ (equalizing) basin for a brief period for minor repairs, capital maintenance and longer repairs cannot currently be accomplished. Furthermore, adequate removal of biological oxygen demand (BOD), total suspended solids (TSS), and nitrogen is occasionally not being achieved with the existing biological treatment system. Variations in BOD and TSS loading, as well as wet weather events, overload the single treatment unit, resulting in violations of permit regulations. The objectives of the proposed project are to improve the following:

- **Increase Redundancy:** The existing WWTP consists of a single process train with the headworks and the aeration basin. Without any redundancy, bypass, or excess equalization the treatment unit cannot be removed from service for maintenance and repair. As the WWTP ages, system components need to be repaired and replaced more frequently. The current EQ basin size of 113,000 gallons (equal to approximately one day of average daily flow (ADF)) does not allow sufficient time to make repairs or change out parts. Due to recent fluctuations in flows, Idyllwild Water District (IWD) is not confident that treatment can be paused even for 24 hours. Redundancy in treatment is essential for efficient operation and adequate maintenance.
- **Ensure that Permit Thresholds are Not Exceeded:** Generally, the WWTP produces quality effluent but there have been issues with treatment efficiency in the last eight years that have caused effluent samples to be outside permit limits. Weekly and monthly permit limits for BOD and TSS and corresponding removal efficiencies are exceeded periodically either during periods of higher flow (wet weather events) or excessive loading during the summer months. Tin was also reported above reporting limits in five of the 12 months in 2016. Total dissolved solids (TDS) was reported above reporting limits in October 2016, April 2017, and January and February 2019 indicating poor WWTP solids performance. The system needs to improve treatment efficiency for removal of BOD, solids, as well as nitrogen. Treatment efficiency can be improved by maintaining uniform loading in the aeration basins.
- **Improve the Lack of SCADA Controls:** Currently, IWD does not have a supervisory control and data acquisition (SCADA) system that would integrate all facilities under one system and allow modern monitoring and control of the treatment plant, as well as collect system data for future planning and troubleshooting. New instrumentation and controls fully integrated to a data recording computer with the capacity to send out data and alarms automatically would improve operations and help eliminate poor treatment outcomes.

2.4 Proposed Project

The proposed project would improve the Idyllwild WWTP to meet existing and future discharge requirements efficiently and consistently for the Idyllwild community. The proposed project consists of the following improvements:

- **Headworks to include new flume and splitter box:** The headworks includes a Parshall flume and ultrasonic level transducer installed to measure the amount of influent. The Parshall flume that records the influent flowrate at the plant is 26 inches deep and capable of measuring up to 1,001 gallons per minute (gpm) at 26-inch water depth. However, the ultrasonic level sensor is setup to read only up to 10-inches of water depth, which is about 340 gpm. The new headworks and splitter box will manage flows so the aeration basins receive equalized flow within the treatment capacity of 250,000 gallons per day (gpd) and includes a new Parshall flume to cover the full range of flows expected.
- **Additional equalization for heavy precipitation events/Two new secondary treatment bioreactors:** The WWTP currently has a single process train for secondary treatment without any redundancy. This means that the basin cannot be removed from service for maintenance or repair. Two new bioreactors operating in parallel and two equalization basins are planned. The existing treatment bioreactor will be repurposed to be a second equalization basin. The new facilities will allow for repairs and equipment replacement over the design life of the new plant. Additional equalization will buffer the plant for better performance when storm induced influent rate is high due to large storm events.
- **New sludge holding tank and new sludge handling system:** The active volume of the sludge tank is approximately 60,000 gallons, and at 3,800 gallons per day of production, the tank provides about 15 days of storage, following which the thickened sludge is pumped to the sludge drying beds and excess water is decanted to the anoxic tank. The tank would be improved with a sludge grinder pump with stainless streel lift out assemblies for ease of maintenance and repair. Additionally, the tank would be improved with coarse bubble diffusers for aeration and a high level alarm to alert operators of high sludge levels in the tank. No improvements are planned for the sludge drying beds.
- **New SCADA system to integrate controls for the entire plant site**: Currently, Idyllwild Water District does not have a supervisory control and data acquisition (SCADA) system to integrate all facilities under one system and allow monitoring and control of the treatment plant, as well as collect system data for future planning and troubleshooting. New instrumentation and controls fully integrated to a data recording computer with the capacity to send out data and alarms automatically would be installed to improve operations and help eliminate poor treatment outcomes. The SCADA system and controls will be located in a new electrical building at the site.

- **New blowers and associated controls in existing blower room**: Motorized control valves would be installed to control the flow of air to different WWTP tanks as needed. A standby blower unit would be installed as a backup. Blowers would be sized to fulfill aeration air requirements for the following processes: fine bubble diffusers in bioreactors, coarse bubble diffusers in EQ tanks, coarse bubble diffusers for sludge tank, and air required for operation of air lift pumps.
- **New generator and automatic transfer for standby power:** The WWTP includes an emergency Onan power generator installed in the late 1990s rated at 125 kW to run the entire plant in case of a grid failure or power shutoff. An automatic transfer switch is available to ensure a safe transfer from grid to generator during a power shutdown and to resume power from the grid. The generator is nearly 20 years old and does not meet air quality regulations set forth by South Coast Air Quality Management District (AQMD). As such, a new generator (240 kW [or 320 horsepower]) would be installed to replace the existing older generator. A fuel tank would be installed to provide power to the new generator in the event of power outages. The new generator will be housed in the new electrical building (which is a sound attenuation weather proof enclosure) and would operate a total of 50 maintenance hours per year.

The new bioreactors, sludge holding tank, and generator and controls building would be constructed in undeveloped areas on the project site; the remaining improvements would occur on the existing site of the WTTP. **Appendix A: Figure 1-3** depicts the project site plan.

2.4.1 Utility Relocation

Utility relocation would not be required for implementation of the proposed project.

2.4.2 Vegetation/Tree Removal

The portion of the parcel recently acquired for the proposed project is directly adjacent to the existing WWTP and is in a more natural state than the parcel occupied by the WWTP. Construction of the new bioreactors and new electrical building would require the removal of approximately 12,500 square feet of montane hardwood-conifer forest. The proposed project would be subject to the Riverside County Ordinance No. 559 regulating the removal of trees. The County ordinance prohibits the removal of any living native tree on any parcel or property greater than one-half acre in size, located in an area above 5,000 feet in elevation and within the unincorporated area of the County, without first obtaining a permit to do so.

2.4.3 Construction Activities

The proposed project would be constructed partly on the existing WWTP and partly on recently acquired land adjacent to the existing plant. The construction on the existing site would consist of excavation, installation of water facilities via trenching, precast

concrete, and cast in place concrete as well as conduit and electric equipment. The site would be regraded as needed after the construction is completed. Part of the work would entail repurposing existing tanks on the site and all of the work would be done in previously disturbed areas by moderate sized equipment due to the limited space to work in and the limited excavation needed there.

The installation of new components, specifically, the new bioreactors and new electrical building would occur on the recently acquired parcel (new portion of the site). On the newer portion of the site, larger tanks would be installed requiring larger equipment and more effort. The newer portion of the site would have some existing trees cleared and the affected ground grubbed. This would affect approximately one-third of the acquired land, approximately 12,500 square feet. The areas where the tanks are to be built would be excavated to the shallow bedrock on the site, typically about four (4) feet and the areas would be built up to subgrade with engineered fill. The tanks and other facilities may be constructed on bedrock directly if that is more efficient. Most of the construction would be cast in place concrete with a lesser amount of the same construction types as are employed on the existing site. Heavy excavation equipment and a large bulldozer with a ripper may be used to dislodge less than stable rock formations to achieve a solid base to build on. Soils at the site are acceptable for use as engineered fill and for regrading to finish the site. Additional soils may be imported as needed to complete subgrade work and backfilling. Some ancillary paving for the driveway and embankment armoring with riprap may be done to finish the site at the end of construction.

2.4.3.1 Construction Equipment

Table 2.4.3-1: Construction Equipment provides a description of the type of equipment likely to be used during the construction of the proposed project.

Table 2.4.3-1. Construction Equipment

EQUIPMENT	CONSTRUCTION PURPOSE
Hydraulic Hammer	Excavation
Hoe ram	Excavation
Jack Hammer	Demolition
Water Truck	Earthwork construction + dust control
Bulldozer / Loader	Earthwork construction + clearing and grubbing
Haul Truck	Earthwork construction + clearing and grubbing
Front-End Loader	Dirt or gravel manipulation
Grader	Ground grading and leveling
Dump Truck	Fill material delivery
Bobcat	Fill distribution
Excavator	Soil manipulation and placement of rock slope protection
Compaction Equipment	Earthwork
Roller / Compactor	Earthwork and asphalt concrete construction
Backhoe	Soil manipulation + drainage work
Concrete Truck and Pump	Placing concrete

Paver	Asphalt concrete construction
Truck with seed sprayer	Erosion control landscaping
Generators	Power Hand Tools
Chainsaw	Clearing trees
Log truck	Removing felled trees

2.4.3.2 Construction Schedule and Timing

Construction is expected to commence in April 2026 and take approximately 18 to 24 months to complete.

2.5 Permits and Approvals Needed

The following permits, reviews, and approvals, shown in **Table 2.5-1: Permits and Approval Needed,** are required for proposed project construction.

Table 2.5-1. Permits and Approvals Needed

AGENCY	PERMIT/APPROVAL	STATUS
State Water Resources Control Board	National Pollutant Discharge Elimination System (NPDES) Construction General Permit	Prepared after CEQA clearance and during final design.
Regional Water Quality Control Board, Santa Ana Region	Waste Discharge Requirements	Prepared after CEQA clearance and during final design.
Idyllwild Water District	Approval of CEQA IS/MND	Follows public circulation of the CEQA IS/MND.
South Coast Air Quality Management District	Rules and Regulations, Stationary Source Permit for Public and Private Waste Water Treatment Works, Authority to Construction and Permit to Operate	Required during final design prior to commencement of construction.
Riverside County	Building Permit, Tree Removal Permit	Required during final design prior to commencement of construction.
	Erosion Control Permit, Grading Permit	Required prior to commencement of construction.

3. Environmental Factors Potentially Affected

The proposed project could potentially affect the environmental factor(s) checked below. The following pages present a more detailed checklist and discussion of each environmental factor.

☐ Aesthetics	☐ Agriculture and Forestry Resources	☐ Air Quality
☒ Biological Resources	☒ Cultural Resources	☐ Energy
☐ Geology and Soils	☐ Greenhouse Gas Emissions	☐ Hazards and Hazardous Materials
☐ Hydrology and Water Quality	☐ Land Use and Planning	☐ Mineral Resources
☐ Noise	☐ Population and Housing	☐ Public Services
☐ Recreation	☐ Transportation	☒ Tribal Cultural Resources
☐ Utilities and Service Systems	☐ Wildfire	☒ Mandatory Findings of Significance

3.1 Determination: (To be completed by Lead Agency)

On the basis of this initial study:

- ☐ I find that the proposed project COULD NOT have a significant effect on the environment, and a NEGATIVE DECLARATION will be prepared.
- ■ I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because revisions in the project have been made by or agreed to by the project proponent. A MITIGATED NEGATIVE DECLARATION will be prepared.
- ☐ I find that the proposed project MAY have a significant effect on the environment, and an ENVIRONMENTAL IMPACT REPORT is required.
- ☐ I find that the proposed project MAY have a "potentially significant impact" or "potentially significant unless mitigated" impact on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An

ENVIRONMENTAL IMPACT REPORT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although the proposed project could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier EIR or NEGATIVE DECLARATION pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier EIR or NEGATIVE DECLARATION, including revisions or mitigation measures that are imposed upon the proposed project, no further environmental documentation is required.

NAME (PRINT)	DATE
Curt SAUER	5/2/24
SIGNATURE	**FOR**
Curt Sauer	Idyllwild Water District

4. Environmental Analysis

This section of the IS/MND evaluates the potential effects on the physical environment due to implementation of the proposed project. This analysis has been prepared to determine whether any of the conditions in CEQA Guidelines Section 15162 would occur as a result of the proposed project.

The proposed project would result in negligible physical effects and would not cause significant impacts to the following resources. These resources are not discussed further in this IS/MND.

- Aesthetics: Idyllwild is located on a mountainous terrain with the Idyllwild Wastewater Treatment Plant (WWTP) at the lowest elevation within the service area (California Rural Water Association, 2021). The proposed project site is surrounded by many trees and thick ground vegetation which shields views of the WWTP from the adjacent roadways. Given the low visual profile of the existing treatment plant facility and the undeveloped nature of surrounding areas, the existing WWTP is barely visible from any developed areas in the vicinity of the existing facility.

  None of the proposed project upgrades or features would have a substantial adverse effect upon any scenic vistas nor would they degrade any existing scenic resources or the visual character or quality of its surroundings. The proposed project would not create any new sources of substantial light or glare which would affect day or nighttime views in the area. Therefore, the proposed project would have ***no impact*** regarding aesthetics.

- Agriculture and Forestry Resources: The project site and surrounding parcels are not zoned for or have a designated land use of agriculture or forestry resources. The proposed project area and surrounding land is not mapped by the Farmland Mapping and Monitoring Program (FMMP). There are no lands operating under Williamson Act contracts within or adjacent to the proposed project site. The County General Plan does not identify commercially significant timberlands within or adjacent to the proposed project boundaries. Therefore, the proposed project would have ***no impact*** on agriculture and forestry resources.

- Energy: The proposed project would not result in capacity increases for vehicles, increase average daily travel or vehicle miles traveled. Operations of the proposed project would not result in new energy demands over time and would be similar to existing conditions upon completion of construction. More so, the upgrades to existing equipment such as the RAS/WAS pumping system and centrifugal blowers would result in increased energy efficiency of these operations. During construction, BMPs would be implemented to reduce impacts to energy use, such as limiting idling time for construction equipment and require equipment to meet current standards. The proposed project would not result in wasteful, inefficient, or unnecessary consumption of energy resources during construction or operation. Therefore, the proposed project would have ***no impact*** to energy.

- Geology and Soils: The nearest faults to the proposed project area are the Hot

Springs, Clark and South Fork Faults. The Hot Springs Fault is a late quaternary fault and is located approximately two miles southwest of the proposed project area. The Clark Fault is a Halocene fault and is located approximately six miles southwest of the proposed project area. The South Fork Fault is also a Halocene fault and is located approximately five miles south of the proposed project area (California Rural Water Association, 2021). The proposed project site is not within an Alquist-Priolo Fault-Rupture Zone and is not on a known fault; therefore, fault rupture would not occur within the project site (California Geological Survey, 2022). The soil types present at the project site, Wind River-Oak Glen Family and Morical-Wind River Family are not considered hydric soils (California Geological Survey, 2022). The proposed project would comply with federal, state, and local rules, regulations and requirements and implement best management practices (BMPs) pertaining to erosion control prevention. Therefore, the proposed project would have ***no impact*** to geology and soils.

- Hydrology and Water Quality: The proposed project would comply with federal, state, and County requirements and would implement BMPs pertaining to stormwater runoff and erosion control prevention through the development of a Stormwater Pollution Prevention Plan as part of the National Pollutant Discharge Elimination System permit. The tree removal required for implementation of the proposed project would be negligible in changing surface drainage patterns due to the limited size of the project area and because the project area is in a developed area with compacted and disturbed soils. The proposed project would not alter the course of a water body, nor would it alter groundwater recharge, discharge, or flow conditions. Therefore, the proposed project would have ***no impact*** regarding hydrology and water quality.
- Land Use and Planning: The proposed project would upgrade the Idyllwild Wastewater Treatment Plant (WWTP) to meet existing and future discharge requirements efficiently and consistently for the Idyllwild community, as well as meet current wastewater treatment standards and processes. The proposed project would be consistent with existing and future land use designations and zoning classifications in the project area. The proposed project would not divide an existing community. Thus, the proposed project would have ***no impact*** regarding land use and planning.
- Mineral Resources: According to the Riverside County General Plan Multipurpose Open Space Element and the California Geological Survey (CGS), the project site is not within a mineral resource area (MRA) designated area (Riverside County, 2015). The closest MRA, MRZ-3 (significance of mineral deposits undetermined), is located approximately 16 miles west of the proposed project site. Although the County of Riverside has extensive deposits of clay, limestone, iron, sand, and aggregates, there are no known current mineral resources, mineral extraction areas, mineral extraction facilities, or mineral recovery sites within, or adjacent to, the project site. Therefore, the proposed project would have ***no impact*** to mineral resources.
- Population and Housing: The proposed project would upgrade the Idyllwild WWTP to meet existing and future discharge requirements efficiently and consistently for

the Idyllwild community, as well as meet current wastewater treatment standards and processes. The proposed project would not change the land use patterns surrounding the project site and is being improved to support planned growth. The proposed project would not increase the capacity of roadways, nor would it displace people or housing units. Therefore, the proposed project would have ***no impact*** on population and housing.

- Public Services, Recreation and Utilities: The construction and/or operation of the proposed project would not increase the need for additional public services or other utilities in the area. The proposed project would upgrade the Idyllwild WWTP to meet existing and future discharge requirements efficiently and consistently for the Idyllwild community, as well as meet current wastewater treatment standards and processes. As such, the proposed project would not require additional needs from the County, including but not limited to, police, fire, other utilities, parks, and/or recreation facilities. Construction workers are anticipated to come from surrounding areas, and thus would not relocate to the proposed project vicinity. The proposed project would not increase population and would not result in an increased demand for public services, recreation facilities, or utilities. Therefore, the proposed project would have ***no impact*** on these resources.

4.1 Air Quality

Where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied upon to make the following determinations. Would the project:

Issues	Determination
a) Conflict with or obstruct implementation of the applicable air quality plan?	Less Than Significant Impact
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	Less Than Significant Impact
c) Expose sensitive receptors to substantial pollutant concentrations?	Less Than Significant Impact
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	Less Than Significant Impact

4.1.1 Setting

The proposed project is located in the town of Idyllwild, an unincorporated community located in the San Jacinto Mountains, about 45 miles west of Palm Springs in Riverside County. Together with Pine Cove and Fern Valley, it is a part of the Idyllwild/Pine Cove Census Designated Place and covers an area of 13.73 square miles. Riverside County is located within three air basins, including the South Coast Air Basin, Salton Sea Air Basin, and the Mojave Desert Air Basin. Western Riverside County, where the proposed project site is located, is within the South Coast Air Basin (SCAB) (County of Riverside, 2018). The SCAB includes all of Orange County and the non-desert portions of Los Angeles, Riverside and San Bernardino Counties. Air quality conditions in the SCAB are under the jurisdiction of the South Coast Air Quality Management District (SCAQMD). Air quality districts are public health agencies whose mission is to improve the health and quality of life for all residents through effective air quality management strategies.

The federal Clean Air Act (CAA) requires the U.S. Environmental Protection Agency (US EPA) to set National Ambient Air Quality Standards (NAAQS) for major pollutants that could be detrimental to the environment and human health. The California Ambient Air Quality Standards (CAAQS) are the California equivalent of the NAAQS. An air basin is in “attainment” (compliance) when the levels of the pollutant in that air basin are below NAAQS and CAAQS thresholds. **Table 4.1.1-1: NAAQS** provides information on the NAAQS and **Table 4.1.1-2: CAAQS** provides information on the CAAQS.

Table 4.1.1-1: NAAQS

POLLUTANT		STANDARD TYPE	AVERAGING TIME	CONCENTRATION THRESHOLD	FORM
Carbon monoxide (CO)		Primary	8 hours	9 ppm	Not to be exceeded more than once per year
			1 hour	35 ppm	
Lead (Pb)		Primary and secondary	Rolling 3-month average	0.15 µg/m^3	Not to be exceeded
Nitrogen dioxide (NO_2)		Primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Primary and secondary	1 year	53 ppb	Annual mean
Ozone (O_3)		Primary and secondary	8 hours	0.070 ppm	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particulate matter (PM)	$PM_{2.5}$	Primary	1 year	12.0 µg/m^3	Annual mean, averaged over 3 years
		Secondary	1 year	15.0 µg/m^3	Annual mean, averaged over 3 years
		Primary and secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	Primary and secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur dioxide (SO_2)		Primary	1 hour	75 ppb	99th percentile of 1 hour daily maximum concentrations, averaged over 3 years
		Secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

Source: U.S. EPA, 2023

Table 4.1.1-2: CAAQS

POLLUTANT	AVERAGING TIME	CONCENTRATION THRESHOLD
Carbon monoxide (CO)	8 hours	0.09 ppm
	1 hour	0.070 ppm
Lead (Pb)	1.5	0.15 µg/m^3
Nitrogen dioxide (NO_2)	1 hour	0.18 ppm
	Annual arithmetic mean	0.030 ppm
Ozone (O_3)	8 hours	0.09 ppm

POLLUTANT		AVERAGING TIME	CONCENTRATION THRESHOLD
		1 hour	0.070 ppm
Particulate matter (PM)	$PM_{2.5}$	Annual arithmetic mean	12.0 µg/m^3
	PM_{10}	24 hours	50 µg/m^3
		Annual arithmetic mean	20 µg/m^3
Sulfur dioxide (SO_2)		1 hour	0.25 ppm
		24 hours	0.04 ppm
Visibility reducing particles		9 hours	Extinction of 0.23 per kilometer
Sulfates		24 hours	25 µg/m3
Hydrogen sulfide		1 hour	0.03 ppm
Vinyl chloride		24 hours	0.01 ppm

Source: CARB, 2016

According to the Air Quality Management Plan (AQMP) adopted by the SCAQMD for the air basin, the worst air quality problem in the nation occurs in the SCAB (County of Riverside, 2018). With very light average wind speeds, the basin atmosphere has limited capability to disperse air contaminants horizontally. In addition, the vertical dispersion of air pollutants in the SCAB is hampered by the presence of a temperature inversion in the layers of the atmosphere near the earth's surface. The proposed project site is located in an area that is currently in federal and state non-attainment for ozone, $PM_{2.5}$, and PM_{10} (California Air Resources Board [CARB], 2020).

~~South Coast~~ SCAQMD is in the process of developing an "Air Quality Analysis Guidance Handbook" to replace the CEQA Air Quality Handbook approved by the ~~South Coast~~ SCAQMD Governing Board in 1993. While the new Handbook is being prepared, the ~~South Coast~~ SCAQMD provides supplemental information, such as the ~~South Coast~~ SCAQMD Air Quality Significance Thresholds and Localized Significance Thresholds for conducting air quality analysis.

4.1.2 Discussion

a) Would the project conflict with or obstruct implementation of the applicable air quality plan?

The proposed project would upgrade the Idyllwild WWTP to meet existing and future discharge requirements efficiently and consistently for the Idyllwild community, as well as meet current wastewater treatment standards and processes. Operations of the proposed project would not increase automobile capacity or create other permanent new sources of air quality emissions. Operations would be similar to existing conditions upon construction completion.

The primary source of air pollution would occur as a result of construction activities (i.e., grading) and construction vehicle emissions. The proposed project would comply with the ~~South Coast Air Quality Management District's~~ SCAQMD's air quality guidelines and

would implement construction best management practices (BMPs), as described in detail under Impact Section b, below. The proposed project would not conflict with or obstruct implementation of the ~~South Coast~~ SCAQMD Air Quality Significance Thresholds, nor state goals or regulations during construction or operation. This impact is considered ***less than significant***. No mitigation measures are required.

b) Would the project result in a cumulatively considerable net increase of any criteria pollutant for which the project is non-attainment under an applicable federal or state ambient air quality standard?

As stated above, the proposed project is in an area of federal and state non-attainment for ozone, $PM_{2.5}$, and PM_{10} (CARB, 2022). Operations of the proposed project would not increase automobile capacity or create other permanent new sources of emissions. Thus, operations of the proposed project would not result in new sources of emissions of criteria pollutants over time, including $PM_{2.5}$, PM_{10}, and ozone and would not create any additional long-term air quality emissions beyond what currently exists. The primary source of air pollution for the proposed project would occur as a result of construction activities and construction vehicle emissions. The proposed project would contribute temporary incremental increases in emissions; however, the construction emissions would not exceed the SCAQMD thresholds.

Construction emissions were modelled using the California Emissions Estimator Model (CalEEMod). For the purpose of this analysis, it was assumed that construction would last 24 months, the project area would be a total of 1.73 acres, and the maximum area disturbed per day would be less than 1 acre per day. It was also assumed that all on-road equipment used for the proposed project would be year 2010 or newer models, and all construction equipment would meet California Air Resources Board (CARB) Tier 4 requirements for off-road equipment (See **Appendix C** for the CalEEMod results). Estimated criteria air pollutant emissions generated by the proposed project's construction and applicable SCAQMD significance thresholds are provided below in **Table 4.1.2-1: Construction Emissions Estimations**. The proposed project would not exceed the SCAQMD significance thresholds during construction as shown below in **Table 4.1.2-1**.

Table 4.1.2-1: Construction Emissions Estimations

CONSTRUCTION YEAR	POLLUTANT (MPOUNDS PER DAY)					
	VOC	SO_X	NO_X	PM_{10}	$PM_{2.5}$	CO
2025	0.79	0.01	7.10	0.34	0.32	8.70
2026	0.75	0.01	6.61	0.31	0.28	8.67
2027	0.72	0.01	6.26	0.28	0.26	8.68

CONSTRUCTION YEAR	POLLUTANT (MPOUNDS PER DAY)					
	VOC	SO_X	NO_X	PM_{10}	$PM_{2.5}$	CO
SCAQMD Significance Thresholds	75	150	100	150	55	550
Exceed SCAQMD Thresholds?	***No***	***No***	***No***	***No***	***No***	***No***

Source: Dewberry, 2024

Air quality impacts related to construction would be temporary, lasting approximately 24 months, and would cease upon construction completion. The following BMPs would be implemented to further minimize construction emissions.

- Water all exposed surfaces two times daily. Exposed surfaces include, but are not limited to soil piles, graded areas, unpaved parking areas, staging areas, and access roads.
- Cover or maintain at least two feet of free board space on haul trucks transporting soil, sand, or other loose material on the site. Any haul trucks that would be traveling along freeways or major roadways should be covered.
- Use wet power vacuum street sweepers to remove any visible trackout mud or dirt onto adjacent public roads at least once a day. Use of dry power sweeper is prohibited.
- Limit vehicle speeds on unpaved roads to 15 miles per hour (mph).
- All roadways, driveways, sidewalks, parking lots to be paved should be completed as soon as possible. In addition, building pads should be laid as soon as possible after grading unless seeding or soil binders are used.
- Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to 5 minutes [California Code of Regulations, Title 13, sections 2449(d)(3) and 2485]. Provide clear signage that posts this requirement for workers at the entrances to the site.
- Provide current certificate (s) of compliance for CARB's In-Use Off-Road Diesel-Fueled Fleets Regulation [California Code of Regulations, Title 13, sections 2449 and 2449.1].
- Maintain all construction equipment in proper working condition according to manufacturer's specifications. The equipment must be checked by a certified mechanic and determine to be running in proper condition before it is operated.
- The proposed project shall comply with the following SCAQMD Rules (as applicable): Rule 403 – Fugitive Dust; Rule 1166 Volatile Organic Compound Emissions from Decontamination of Soil; Rule 1466 – Control of Particulate Emissions from Soils with Toxic Air Contaminants; Rule 201 – Permit to Construct; Rule 203 – Permit to Operate; Rule 401 – Visible Emissions; Rule 402 – Nuisance; Rule 1110.2 – Emissions from Gaseous- and Liquid Fueled Engines; Rule 1113 – Architectural Coatings; Regulation XIII – New Source Review; Rule 1401 – New Source Review of Toxic Air Contaminants; and, Rule 1470 – Requirements for Stationary Diesel-Fueled Internal Combustion and Other Compression Ignition Engines.

Once improvements are in place, the proposed project would operate similar to existing conditions. A new 240 KW emergency generator (stationary source) would replace the existing 20-year-old inefficient emergency generator and would operate only under emergency power outages or during short monthly testing. The new generator would operate more efficiently than the old 20-year-old generator, would be designed to meet (or exceed) air quality emissions standards, and would only operate an average of 50 hours per year. For these reasons, operation of the improvements associated with the proposed project would not generate air quality emissions that would exceed current emissions generated by the WWTP. Operational impacts would be less than significant.

With implementation of the above referenced BMPs, the proposed project would not result in Appendix C a cumulatively considerable net increase of criteria pollutants during construction. Impacts would be ***less than significant,*** and no mitigation measures are required.

c) Would the project expose sensitive receptors to substantial pollutant concentrations?

Sensitive receptors in the proposed project vicinity include facilities associated with the Idyllwild Arts Amphitheater, located approximately 230 feet from the site. Sensitive receptors would be exposed to temporary construction emissions. As discussed above, under Impact Discussion b, the proposed project would not exceed the ~~South Coast~~ SCAQMD thresholds for emissions during construction (refer to **Table 4.1.2-1**). The sensitive receptors in the vicinity of the project site would experience a brief exposure period, of no more than 24 months. Project construction would not exceed the two-year exposure assumed for health risk analysis for small construction projects and the three-year exposure period assumed for PM_{10} and CO hotspot analysis (Caltrans, 2022). In addition, the proposed project would implement BMPs, as described in Impact Discussion b, during construction of the proposed project, thus lowering exposure of sensitive receptors to pollutants. Therefore, with construction emissions less than SCAQMD thresholds and the implementation of construction BMPs, impacts from construction activities would be ***less than significant***. No mitigation measures are required.

Sensitive receptors would not experience a permanent increase in air pollutant emissions as a result of project operation because the new facility is not an expansion of capacity. Operations would be similar to existing conditions and would not result in new sources of emissions of criteria pollutants over time, including $PM_{2.5}$, PM_{10}, and ozone. The new emergency generator (stationary source) would operate more efficiently and generate less air quality emissions than the 20-year-old emergency generator existing on the project site. The proposed project would not exceed air quality emissions thresholds during operation; therefore, impacts to sensitive receptors would be ***less than significant***. No mitigation measures are required.

d) Would the project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

The proposed project would not create any long-term air quality emissions or odors beyond what is being generated under existing conditions. Operations would be similar to existing conditions upon construction completion.

Project-related odor emissions would be predominately limited to the construction period. Odors would be generated from vehicles and/or equipment exhaust emissions during construction and may be unpleasant in the immediate areas. Such odors would be temporary and would cease at the end of each workday and would rapidly dissipate.

Overall, implementation of the proposed project would not generate other emissions, such as odors, that would adversely affect a substantial number of people during construction and operation. Impacts would be ***less than significant,*** and no mitigation measures are required.

4.1.3 References

California Air Resources Control Board (CARB). 2016. Ambient Air Quality Standards. Online: https://ww2.arb.ca.gov/resources/documents/ambient-air-quality-standards-0. Accessed: July 5, 2023.

California Air Resources Control Board (CARB). 2022. Maps of State and Federal Area Designations. Online: https://ww2.arb.ca.gov/resources/documents/maps-state-and-federal-area-designations. Accessed: November 16, 2023.

California Department of Transportation (Caltrans). 2022. SER Vol 1 Chapter 11 Air Quality. Online: https://dot.ca.gov/programs/environmental-analysis/standard-environmental-reference-ser/volume-1-guidance-for-compliance/ch-11-air-quality. Accessed: January 8, 2024.

California Emissions Estimator Model, California Air Pollution Control Officers Association. Online: https://caleemod.com/. Accessed: January 22, 2024. **Appendix B.**

United States Environmental Protection Agency (U.S. EPA). 2023. National Ambient Air Quality Standards Table (NAAQS). Online: https://www.epa.gov/criteria-air-pollutants/naaqs-table. Accessed: July 5, 2023.

4.2 Biological Resources

Would the project:

Issues	Determination
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, or NOAA Fisheries?	Less Than Significant with Mitigation Incorporated
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?	No Impact
c) Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	No Impact
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	No Impact
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	No Impact
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	No Impact

An evaluation of biological resources was conducted to determine whether any special-status species or sensitive habitat occurs within the proposed project area, totaling approximate 1.7 acres. The evaluation consisted of a background research (i.e., literature search, database queries) and a field survey. Prior to conducting the field survey, the following background research was conducted:

- Review of the USGS 7.5-minute topographic quadrangle for Idyllwild, CA (USGS 2023);
- Review of color aerial photography for vegetative, topographic, and hydrologic signatures;
- Review of the California Natural Diversity Database (CNDDB) Rarefind 5 online program (2023);

- Review of the California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants (online edition online edition, v9.5) (2023);

A field survey was conducted within the proposed project area on December 15, 2023, by Dewberry biologist Jeff Bray to determine the habitats present and to assess potential impacts from the proposed project.

4.2.1 Setting

Topography in the proposed project area is generally flat within the limits of the WWTP and slopes moderately to the west in the rest of the proposed project area. The elevation in the proposed project area ranges from approximately 5,030 to 5,070 feet above mean sea level. The topography in surrounding areas is characterized by steep, mountainous terrain.

4.2.1.1 Vegetation Communities and Land Uses

Vegetation communities in the review area were classified in accordance with a Manual of California Vegetation Online version (2023), as appropriate. The proposed project area includes substantial developed area, consisting of the WWTP and the paved access road. Vegetation communities are dominated by Jeffrey pine forest and woodland alliance; a small area of California rose briar patch is associated with an intermittent stream.

Vegetation communities and land uses area shown on Figure 4.2-1 and summarized in Table 4.2.1-1.

Table 4.2.1-1: Vegetation Communities and Land Uses in the Project Area

VEGETATION COMMUNITY / LAND USES	ACRES
Jeffrey Pine Forest and Woodland	0.816
California rose briar patch	0.074
Riverine – Intermittent Stream	0.007
Developed	0.835
TOTAL	**1.732**

Source: Dewberry, 2023.

4.2.1.1.1 Jeffrey Pine Forest and Woodland

The Jeffrey pine forest and woodland alliance is characterized by Jeffrey pine (*Pinus jeffreyi*) as the dominant or codominant tree species with white fir (Abies concolor), incense cedar (*Calocedrus decurrens*), black oak (*Quercus kelloggi*), and interior live oak (*Q. wislizenii*), and Sierra juniper (Juniperus grandes), among other tree species. The canopy is generally of variable density, the shrub layer is sparse to intermittent, and the herbaceous layer is variable (often grass). This alliance occurs on raised stream benches, all slopes and aspects, ridges, and plateaus. Soils are commonly infertile and shallow. In the proposed project area, this alliance occurs all around the WWTP, except

along the intermittent drainage. Jeffrey pine is the dominant trees species; incense cedar, black oak, and interior live oak also occur intermittently. The understory is open to sparse, consisting of saplings of the tree species, mazanita (*Arctostaphylus* sp.), coffeeberry (*Frangula californica*), and Himalayan blackberry (*Rubus armeniacus*). The herbaceous layer consists of predominantly grasses.

4.2.1.1.2 California Rose Briar Patch

The California rose briar patch alliance is characterized by California rose (*Rosa californica*) as is dominant or co-dominant in the shrub canopy with associated species including, but not limited to, California sage (*Artemisia californica*), coyote brush (*Baccharis pilularis*), arroyo willow (*Salix lasiolepis*), and snowberry (*Symphoricarpos mollis*). This alliance occurs in creek bottoms, stream terraces, and bordering sloughs and channels. Soils typically are mixed alluvium. In the proposed project area, this alliance is located along the intermittent stream (see Section 4.2.1.1.3) and is dominated by California rose; other species present include soft rush (Juncus effusus) Himalayan blackberry, and two arroyo willows.

4.2.1.1.3 Riverine – Intermittent Stream

An intermittent stream flows east to west along the north/northwest boundary of the proposed project area. The intermittent stream is a first degree tributary to Strawberry Creek, which flows into Dry Creek and then into the South Fork San Jacinto River. The active channel averages 1-2 feet wide, with a loamy sand substrate, and was not flowing during the December 15, 2023 site visit.

4.2.1.1.4 Developed

Developed areas include the existing WWTP facility (buildings, equipment, etc.) and the paved access road.

4.2.1.2 Special-Status Wildlife Species

Review of the CNDDB (2023) identified 13 special-status wildlife species in the Idyllwild quadrangle that could potentially occur in the proposed project area. Based on review of the habitat requirements for these species and the findings from the field survey, it was determined that the vegetation communities in the proposed project area do not provide suitable habitat for these special-status wildlife species, and they are not expected to occur.

The vegetation communities in the proposed project area could support nesting birds. Various bird species could utilize the Jeffrey pine forest and woodland and potentially the California rose briar patch communities as nesting habitat. The typical nesting season extends from February 1 to August 31.

4.2.1.3 Special-Status Plant Species

Review of the CNPS (2023) and CNDDB (2023) identified 36 special-status plant species in the Idyllwild quadrangle that could potentially occur in the proposed project area (see **Appendix C**). Based on review of the habitat requirements for these species and the findings from the field survey, it was determined that 23 of the 36 plant species identified could potentially occur in the Jeffrey pine forest and woodland community in the proposed project area; none of these species are formally listed under California Endangered Species Act (CESA) or Federal Endangered Species Act (FESA). The CNDDB does not contain records for any of these species in the proposed project area, but based on the presence of suitable habitat, these species could potentially occur.

4.2.1.4 Aquatic Resources

Aquatic resources in the proposed project area are limited to the intermittent stream and associated vegetation, including some areas vegetated with soft rush that appear to be wetlands. The intermittent drainage would likely be regulated by the U.S. Army Corps of Engineers (USACE), Regional Water Quality Control Board (RWQCB), and California Department of Fish and Wildlife (CDFW).

4.2.1.5 Movement Corridors

Wildlife movement corridors link areas of suitable wildlife habitat that may otherwise be separated by rugged terrain, changes in vegetation, and/or areas of human disturbance or urban development. Topography and other natural factors, in combination with urbanization, can fragment or separate large open-space areas. The fragmentation of natural habitat creates isolated “islands” of habitat that may not provide sufficient area to accommodate sustainable populations and can adversely impact genetic and species diversity. Movement corridors mitigate the effects of this fragmentation by allowing animals to move between remaining habitats, which in turn allows depleted populations to be replenished and promotes genetic exchange between separate populations.

The proposed project area is not located within an established movement corridor. Further, the proposed project area is located west of and adjacent to the Idyllwild Arts Academy and a rural residential subdivision, substantially reducing its value for wildlife movement.

4.2.2 Discussion

a) **Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife, U.S. Fish and Wildlife Service, or NOAA Fisheries?**

This section discusses potential impacts to special-status species, and is limited to the construction of the two new secondary treatment bioreactors and the electrical building.

These two components would be constructed in the Jeffrey pine forest and woodland community; all other components would be constructed within the developed area of the existing WWTP.

4.2.2.1 Special-Status Wildlife Species

Impacts to special-status wildlife species could include direct harm if they were to become trapped in the construction area, encounter construction personnel and/or equipment, or be inhibited from movement through the construction area. The proposed project area does not support suitable habitat for special-status wildlife species. Consequently, the proposed project would not have a substantial adverse effect on special-status wildlife species and no impact would occur.

The project will not directly impact nesting birds as all trees within the impact area will be removed during the non-nesting season (September 1- January 31). If any birds are nesting adjacent to the construction area when construction begins, they could be indirectly impacted from the noise and other disturbance created by the construction activities. However, this is unlikely since the Jeffrey pine and other trees in the construction area are very tall trees, and nests, if present, would be located well above the construction activities. Implementation of **Mitigation Measure BIO-1** would reduce these potential impacts to less than significant levels. Impacts in this regard would be ***less than significant with mitigation incorporated***.

MITIGATION MEASURES

BIO-1: Nesting Birds

- If construction, grading or other project-related activities in the undeveloped portions of the site (i.e., not within the existing WWTP) are scheduled during the nesting season (February 1 to August 31), a preconstruction nesting survey shall be conducted by a qualified biologist within 14 days from the beginning of construction. The preconstruction surveys shall include suitable nesting habitat within 100 feet of the construction.

  If the preconstruction survey does not identify any active nests within areas potentially affected by construction activities, no further mitigation would be required.

  If the preconstruction survey identifies an active nest, a qualified biologist shall establish an appropriate no-work buffer around the active nest(s). The buffer shall be delineated using high visibility fencing. The size of the no-work buffer shall be determined by a qualified biologist based on the species, nest location relative to construction activities, and the nature of the proposed activities. Project activities shall be avoided within the no-work buffer until the nest is deemed no longer active by a qualified biologist.

4.2.2.2 Special-Status Plant Species

As discussed above, it was determined that 23 special-status plant species could potentially occur in the Jeffrey pine forest and woodland community in the proposed project area. If present in the work area, special-status plant species could be directly impacted during construction activities. Implementation of **Mitigation Measure BIO-2** would reduce these impacts to less than significant levels. Impacts in this regard would be ***less than significant with mitigation incorporated***.

MITIGATION MEASURES

BIO-2: Special-Status Plants

- A qualified biologist or botanist shall conduct focused surveys for special-status plants during the normal blooming period for the target species. The surveys shall be conducted within the construction area and prior to any ground disturbing activities. The results of the survey shall be documented in a concise memorandum. If the survey results are negative, work can proceed without additional measures.

- If special-status plant species are identified within the construction area, a salvage and relocation plan shall be prepared to avoid and minimize direct impacts to special-status plants. The plan shall identify the methods of salvage (e.g., seed collection, individual transplants) and the relocation area(s), with onsite relocation areas being preferable. The plan shall also include provisions for long-term protections, monitoring, and management requirements that ensure the salvaged/relocated species are self-sustaining for a minimum of 5 years at a minimum 1:1 compensation-to-impact ratio.

b) Would the project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

The proposed improvements to the WWTP would not impact the intermittent drainage or associated vegetation, as the proposed improvements are located within the existing WWTP developed area and on the opposite side of the proposed project area as the intermittent drainage. The proposed project would not have a substantial adverse effect on any riparian habitat or other sensitive natural community and ***no impact*** would occur.

c) Would the project have a substantial adverse effect on state or federally protected wetlands (including, but not limited to,

marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?

The proposed improvements to the WWTP would not impact the intermittent drainage or any associated potential wetlands vegetation, as the proposed improvements are located within the existing WWTP developed area and on the opposite side of the proposed project area as the intermittent drainage. The proposed project would not have a substantial adverse effect on state or federally protected wetlands and ***no impact*** would occur. No mitigation measures are required.

d) **Would the proposed project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?**

The proposed project area is not located within any known movement corridors and the undeveloped lands in the proposed project area do not provide valuable movement areas for wildlife due to the proximity of the existing WWTP. The proposed project would not substantially remove, degrade, or otherwise interfere with the structure or function of a wildlife movement corridor and ***no impact*** would occur. No mitigation measures are required.

e) **Would the proposed project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?**

Riverside County Ordinance No. 559 Regulating the Removal of Trees prohibits the removal of any living native tree on any parcel or property greater than one-half acre in size, located in an area above 5,000 feet in elevation and within the unincorporated area of the County of Riverside, without first obtaining a permit to do so, unless exempt by provisions listed in Section 4 of the ordinance. The proposed project would be exempt under Section 4.C: Any activities conducted by a public utility, subject to the jurisdiction of the Public Utilities Commission or any other constituted public agency, where, to construct and maintain safe operations of facilities under their jurisdiction, trees are removed, pruned, topped, or braced. The proposed project would not conflict with any local policies or ordinances protecting biological resources and ***no impact*** would occur. No mitigation measures are required.

f) **Would the proposed project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?**

The proposed project area is within the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) area. The District is not a party to the MSHCP but,

as a regional utility provider, could potentially seek coverage as a Participation Special Entity. However, participation in the MSHCP is voluntary, and since the project would not impact special status species (as discussed above), the MSHCP is not applicable to the project. The proposed project would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan and ***no impact*** would occur. No mitigation measures are required.

4.2.3 References

California Natural Diversity Database (CNDDB), Rarefind 5 online program (2023), Website: CNDDB Maps and Data (ca.gov), Accessed January 18, 2024.

California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants (online edition online edition, v9.5) (2023), Website: California Native Plant Society (cnps.org), Accessed January 18, 2024.

Riverside County Ordinance No. 559, Amended 8/27/1997, An Ordinance of the County of Riverside Amending Ordinance No. 559 Regulating the Removal of Trees, Online: Microsoft Word - 559.7.doc (rivcocob.org), Accessed January 22, 2024.

Riverside County Planning Department, Western Riverside County Multiple Species Habitat Conservation Plan, Website: WR-MSHCP | Planning Department Riverside County (rctlma.org), Accessed January 20, 2024.

4.3 Cultural Resources

Would the project:

Issues	Determination
a) Cause a substantial adverse change in the significance of a historical resource pursuant to in §15064.5?	No Impact
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	Less Than Significant with Mitigation Incorporated
c) Disturb any human remains, including those interred outside of dedicated cemeteries?	Less Than Significant with Mitigation Incorporated

Information in this section is summarized from the Cultural Resource Services report for the Idyllwild Wastewater Treatment Plant (WWTP) Improvement Project (Duke Cultural Resources Management, LLC [DUKE CRM], 2024). This study was prepared in compliance with CEQA and the National Historic Preservation Act (NHPA) of 1966. Some information from this study is considered confidential under the California Public Resources Code (PRC) and the Code of Federal Regulations (CFR) in compliance to the Freedom of Information Act and the California Public Records Act in order to protect the integrity of tribal cultural resources, and thus, would not be available to the public (7 PRC 21082.3 and 36 CFR 800.11).

4.3.1 Setting

A cultural resource is a broad term that includes prehistoric, historic, and traditional cultural properties that reflect the physical evidence of past human activity across the landscape. Cultural resources, along with prehistoric and historic human remains and associated grave goods, must be considered under various federal, State, and local regulations, including the CEQA and NHPA. Cultural resources that are listed on, or eligible for inclusion in, the National Register of Historic Places (NRHP) are also considered eligible for listing in the California Register of Historical Resources (CRHR).

4.3.1.1 Record Searches and Field Survey

On December 12, 2023, a records search was conducted at the Eastern Information Center (EIC). The EIC is part of the California Historical Resources Information System (CHRIS) and is located at the University of California, Riverside. The records search included a review of all recorded cultural resources and reports within a 1/2-mile radius of the project site. Review of the EIC data indicates that one (1) cultural resource has been previously identified within the project area. This resource, P-33-014267, is the campus of the Idyllwild Music School. An additional 15 cultural resources have been recorded within the ½-mile search radius. A total of 17 cultural resource reports cover areas within ½-mile of the project area. One (1) of these reports covers the project area, RIV-09044, and identifies P-33-014267 within the project area.

In addition, the California Built Environmental Resources Directory (BERD) was reviewed. The BERD includes the NRHP, CRHR, California Historic Landmarks (CHL), and California Points of Historic Interest (CPHI). The BERD did not identify any cultural resources within the project area.

A site visit was completed on January 5, 2024, and no cultural resources were observed. A boulder outcrop was observed near the southeast corner of the project area. The majority of the boulders are outside of the project site boundary, and no milling features were observed on the boulders within the project site boundary. The surfaces of the boulders were partially or totally obscured by moss.

4.3.1.2 Cultural Setting

4.3.1.2.1 Prehistoric Context

In the history of the Americas, the term “prehistoric period” refers to the time prior to the arrival of non-Indians, when native lifeways and traditions remained intact and viable. It is widely acknowledged that human occupation in what is now the State of California began 8,000-12,000 years ago. In attempting to describe and understand the cultural processes that occurred in the ensuing years, archaeologists have developed a number of chronological frameworks that endeavor to correlate the technological and cultural changes that are observable in archaeological records to distinct time periods. Unfortunately, none of these chronological frameworks have been widely accepted, and none has been developed specifically for the San Jacinto Mountain area, the nearest ones being for the Colorado Desert and Peninsular Ranges area and for the Mojave Desert (CRM TECH, 2012).

The development of an overall chronological framework for the region is hindered by the lack of distinct stratigraphic layers of cultural sequences that could be dated by absolute dating methods to provide concrete dates. Since results from archaeological investigations in this region have yet to be synthesized into an overall chronological framework, most archaeologists tend to follow a chronology adapted from a scheme developed by William J. Wallace in 1955 and modified by others (CRM TECH, 2012). Although the beginning and ending dates of the different horizons or periods may vary, the general framework of prehistory in this region under this chronology consists of the following four periods:

- Early Hunting Stage (ca. 10000 B.C. – 6000 B.C.), which was characterized by human reliance on big game animals, as evidenced by large, archaic-style projectile points and the relative lack of plant-processing artifacts;
- Millingstone Horizon (ca. 6000 B.C. – 1000 A.D.), when plant foods and small game animals came to the forefront of subsistence strategy, and from which a large number of millingstones, especially well-made, deep-basin metates, were left;
- Late Prehistoric Period (ca. 1000-1500 A.D.), during which a more complex social organization, a more diversified subsistence base-as evidenced by smaller

projectile points, expedient millingstones and, later, pottery-and regional cultures and tribal territories began to develop;
- Protohistoric Period (ca. 1500-1700s A.D.), which ushered in long-distance contact with Europeans, and thereby led to the Historic Period.

4.3.1.2.2 Ethnohistoric Context

The San Jacinto Mountains are situated within the traditional territory of the Cahuilla people, which once extended from present-day Riverside eastward well into the Colorado Desert beyond the Salton Sink. A Takic-speaking people of hunters and gatherers, the Cahuilla are divided by modern anthropologists into three groups based on the geographic domains of their homeland: the Pass Cahuilla of the San Gorgonio Pass-Palm Springs area, the Mountain Cahuilla of the San Jacinto and Santa Rosa Mountains and the Cahuilla Valley, and the Desert Cahuilla of the Coachella Valley. The Idyllwild area, thus, is considered a part of the Mountain Cahuilla homeland.

The Cahuilla people did not have a single name that referred to an all-inclusive tribal affiliation. Instead, membership was in terms of lineages or clans. Each lineage or clan belonged to one of two main divisions of the people, known as moieties. Members of clans in one moiety had to marry into clans from the other moiety. Individual clans had villages, or central places, and territories they called their own, for purposes of hunting game, gathering food, or utilizing other necessary resources. They interacted with other clans through trade, intermarriage, and ceremonies.

Population data prior to European contact are almost impossible to obtain, but estimates range from 3,600 to as high as 10,000 persons. During the 19th century, however, the Cahuilla population was decimated because of European diseases, most notably smallpox, for which the Native peoples had no immunity. Today, Native Americans of Mountain Cahuilla heritage are mostly affiliated with one of the three reservations in the project vicinity, Santa Rosa, Cahuilla, and Ramona.

4.3.1.2.3 Historic Context

Situated far away from Alta California's coastal regions, where most of the colonization activities took place during the Spanish and Mexican Periods (1769-1848), the San Jacinto Mountains received only passing interest from European colonizers before the American takeover. The name of the mountain range was derived from a nearby mission rancho that was established at least by 1821 in the San Jacinto Valley. In 1772, Captain Pedro Fages, the Spanish military comandante of Alta California, and a small force of soldiers under his command became the first Europeans to approach the San Jacinto Mountains. Throughout the Spanish and Mexican Periods, however, this high mountain country remained the domain of the Cahuilla people, and there is no evidence that the Europeans extensively explored it.

After the American annexation of Alta California in 1848, with the influx of immigrants from the eastern United States to the fertile but arid plains and valleys of southern California, the San Jacinto Mountains were increasingly recognized as a valuable

deposit of natural resources to be exploited. In the 1860s, shepherds and cattlemen began to penetrate into the mountain range and graze their herds on its lush meadows. Between the 1870s and the early 20th century, the lumber industry thrived at the expense of its rich forest. During the 1880s land boom in southern California, the Lake Hemet reservoir was constructed in the mountains to divert water to the colony of Hemet in the San Jacinto Valley. As in other mountain ranges in California, gold mining also left its mark in the annals of 19th century development in the San Jacinto Mountains. During the 1890s, the largest mining camp in the San Jacinto's, Kenworthy, sprang up but produced little mineral wealth before its demise.

Strawberry Valley, in which the community of Idyllwild is situated, received the first homesteaders at least by 1871. Within the next few years, "Sulphur Springs" Thompson was known to have settled in nearby Fern Valley. During the early 1870s, the valley was a favorite grazing ground for shepherds, followed by cattlemen in the 1880s. Beginning in 1889, Strawberry Valley gained increasing popularity as a summer resort among "flatlanders" in southern California. One of the earliest tourist camps in the valley, Camp Idyllwilde, eventually bestowed its name on the community that gradually grew at that location, albeit with a slightly different spelling.

The effort to create a full-fledge community dates to 1913, when George B. Hannahs subdivided part of his land holdings into 2.5-acre lots. In 1919, Idyllwild, Inc., offered half-acre home lots in what is now the central portion of Idyllwild for sale at $350, ushering a real estate boom that lasted through the 1920s. About a mile to the northeast, the Idyllwild Mountain Park Company developed the community of Fern Valley, intended primarily for summer homes. Despite a brief rivalry, with the area entering a second "golden age" in growth, by the early 1950s the distinction between the two communities diminished to such a degree that both are recognized as Idyllwild. Since then, the twin mountain community has steadily grown with tourism continuing to play a crucial role in the local economy.

4.3.2 Discussion

a) Would the project cause a substantial adverse change in the significance of a historical resource pursuant to in §15064.5?

Review of the EIC data indicated that one (1) cultural resource has been previously identified within the project area. This resource, P-33-014267, is the campus of the Idyllwild Arts Academy high school. The Idyllwild Arts Academy was originally built as a satellite campus of the University of Southern California (USC) during the late 1940s and early 1950s and is considered a historic-period site (CRM TECH, 2012). However, the vast majority of the structures associated with the original USC Campus have been demolished and replaced by more recent, modern structures constructed over the past 40 years. The few USC Campus-related structures that still remain on the campus property have been remodeled extensively with modern facades and interiors, rebuilt with modern electrical and plumbing fixtures, and do not retain any of their original

historic integrity. Cultural resource P-33-014267 or historical elements associated with the Idyllwild Arts Academy is located within or adjacent to the project site.

The segment of Apela Drive traversing the campus that is the closest to the project site is completely modern in appearance, the result of fresh construction in recent years. Implementation of the proposed project thus would not cause a substantial adverse change to a historical resource pursuant to §15064.5. ***No impact*** would occur, and no mitigation measures are required.

b) Would the project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

The project area includes substantial developed and previously disturbed area, consisting of the WWTP and the paved access road. The project area is considered low in sensitivity for subsurface deposits of intact, potentially significant archaeological remains (CRM TECH, 2012). No cultural/archaeological resources were observed during the January 5, 2024, site visit. Nonetheless, there remains a chance that construction activities associated with the proposed project could result in accidentally discovering archaeological resources. If such resources are discovered during ground-disturbing activities, **Mitigation Measure CUL-1** would be implemented. With **Mitigation Measure CUL-1** implemented, impacts to previously undiscovered archaeological resources that may be discovered during construction activities would be ***less than significant.***

MITIGATION MEASURES

CUL-1: If subsurface deposits believed to be cultural or human in origin are discovered during construction, all work must halt within a 100-foot radius of the discovery. Depending on the nature of the find, a qualified professional archaeologist, meeting the Secretary of the Interior's Professional Qualification Standards for prehistoric or historic archaeology, shall be retained to evaluate the significance of the find, and shall have the authority to modify the no work radius as appropriate, using professional judgment. The following notifications shall apply, as necessary:

- If the professional archaeologist determines that the find does not represent a cultural resource, work may resume immediately, and no agency notifications are required.
- If the professional archaeologist determines that the find does represent a cultural resource from any time period or cultural affiliation, he or she shall immediately notify the lead agency. If the find is determined to be eligible for inclusion in the National Register or California Register, the lead agency shall consult on a finding of eligibility and implement appropriate treatment measures. Work may not resume within the no-work radius until the lead agency, through consultation as appropriate, determines that the site either: 1) is not eligible for

the National Register or California Register; or 2) that the treatment measures have been completed to its satisfaction.

- If the find includes human remains, or remains that are potentially human, he or she shall ensure reasonable protection measures are taken to protect the discovery from disturbance (AB 2641). The archaeologist shall notify the San Diego County Coroner (in accordance with § 7050.5 of the Health and Safety Code). The provisions of § 7050.5 of the California Health and Safety Code, § 5097.98 of the California PRC, and AB 2641 will be implemented.
- If the Coroner determines the remains are Native American and not the result of a crime scene, the Coroner will notify the Native American Heritage Commission (NAHC), which then will designate a Native American Most Likely Descendant (MLD) for the project (§ 5097.98 of the PRC). The designated MLD will have 48 hours from the time access to the property is granted to make recommendations concerning treatment of the remains. If the landowner does not agree with the recommendations of the MLD, the NAHC can mediate (§ 5097.94 of the PRC). If no agreement is reached, the landowner must rebury the remains where they will not be further disturbed (§ 5097.98 of the PRC). This will also include either recording the site with the NAHC or the appropriate information center; using an open space or conservation zoning designation or easement; or recording a reinternment document with the county in which the property is located (AB 2641). Work may not resume within the no-work radius until the lead agencies, through consultation as appropriate, determine that the treatment measures have been completed to their satisfaction.

c) Would the project disturb any human remains, including those interred outside of dedicated cemeteries?

No formal cemeteries or human remains were identified during the field investigation and no burial sites are likely to be encountered during construction activities. However, in the event of an unanticipated discovery of human remains, **Mitigation Measure CUL-1** would be implemented. With **Mitigation Measure CUL-1** implemented, impacts to previously unknown human remains that may be discovered during construction activities would be ***less than significant***.

4.3.3 References

Duke Cultural Resources Management (CRM). 2024. Cultural Resource Services for the Idyllwild Wastewater Treatment Plan, City of Idyllwild, County of Riverside, California. Prepared: January 2024.

4.4 Greenhouse Gas Emissions

Would the project:

Issues	Determination
a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	Less Than Significant Impact
b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	Less Than Significant Impact

4.4.1 Setting

Human activities generate greenhouse gasses (GHGs) consisting primarily of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), tetrafluoromethane, hexafluoroethane, sulfur hexafluoride (SF_6), various hydrofluorocarbons (HFCs), halocarbons, and ozone (O_3). CO_2 is the most abundant GHG; while it is naturally occurring and a necessary component of Earth's atmosphere, fossil-fuel combustion is the main source of additional, human generated CO_2 that is the main driver of climate change. The transportation sector generates the largest share of greenhouse gas emissions in the United States.

These GHGs trap solar radiation and the earth's own radiation, preventing it from passing through the earth's atmosphere and into space, resulting in the "Greenhouse effect." GHGs are vital to life on earth since they help keep our planet a suitable temperature; however, increasing GHG concentrations are causing an increase in average global temperatures. In general, CH_4 has 21 times the warming potential of CO_2, and N_2O has 310 times the warming potential of CO_2. CO_2 equivalent (CO_2e) represents CO_2 plus the additional warming potential from CH_4 and N_2O. The common unit of measurement for CO_2e is metric tons ($MTCO_2e$). As the average temperature of the earth increases, climate patterns may be affected, including changes in precipitation patterns and storm intensity, accumulation of snowpack, and intensity and duration of spring snowmelt, as well as intensity in low precipitation and droughts. Human-made GHG emissions occur primarily though the combustion of fuels, mainly associated with transportation, residential energy, and agriculture.

California's primary legislation for reducing GHG emissions is the California Global Warming Solutions Act (AB 32), which set a goal for the state to reduce GHG emissions to 80 percent of 1990 emission levels by 2050. The California Air Resources Board (CARB), among other state agencies, has enacted regulations to achieve these targets. In 2008, CARB adopted a Climate Change Scoping Plan, which contained strategies to achieve reduction of approximately 21.7 percent from the State's projected 2020 CO_2e emission levels under a business-as-usual scenario (CARB, 2008). In December 2022,

CARB finalized the 2022 Scoping Plan for Achieving Carbon Neutrality (2022 Scoping Plan), which lays out a path to achieve targets for carbon neutrality and reduce anthropogenic GHG emissions by 85 percent below 1990 levels no later than 2045, as directed by Assembly Bill (AB) 1279 (CARB, 2022).

The proposed project is located within the SCAB. Air quality conditions in the SCAB are under the jurisdiction of the South Coast Air Quality Management District (SCAQMD). In December 2008, the SCAQMD Governing Board adopted the staff proposal for an interim GHG significance threshold for projects where the SCAQMD is lead agency. The GHG significance thresholds from stationary and industrial projects is less than 10,000 metric tons of Carbon Dioxide equivalent ($MTCO_2e$) per year, including construction emissions.

The proposed project is located in an area that is currently in federal and state non-attainment for ozone, $PM_{2.5}$, and PM_{10} (CARB, 2022).

4.4.2 Discussion

a) Would the project generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

Construction activities, such as site preparation, site grading, on-site heavy-duty construction vehicles, equipment hauling materials to and from the site, and motor vehicles transporting the construction crew would produce combustion emissions from various sources. During proposed project construction, GHGs would be emitted through the operation of construction equipment, worker vehicles, and from supply-vendor vehicles, each of which typically uses fossil-based fuels to operate. Exhaust emissions from on-site construction activities would vary daily as construction activity levels change.

Construction emissions were modelled using the California Emissions Estimator Model (CalEEMod). For the purpose of this analysis, it was assumed that construction would last 24 months, the project area would be a total of 1.73 acres, and the maximum area disturbed per day would be less than 1 acre per day. It was also assumed that all on-road equipment used for the proposed project would be year 2010 or newer models, and all construction equipment would meet California Air Resources Board (CARB) Tier 4 requirements for off-road equipment (See **Appendix B** for the CalEEMod results). **Table 4.4.2-1 Maximum Estimated Construction GHG Emissions** shows the estimated construction GHG emissions that would occur with implementation of the proposed project do not exceed the SCAQMD's Thresholds for GHG.

Table 4.4.2-1: Maximum Estimated Construction GHG Emissions

POLLUTANT	ANNUAL CO_{2E} (TONS/YEAR)	ANNUAL CO_{2E} ($MTCO_{2E}$/YEAR)
CO_2	159	144.24
N_2O	<0.005	<0.005
CH_4	0.01	0.01
Total GHG Emissions	**159.015**	**144.255**
Thresholds of Significance per SCAQMD	--	10,000
Exceed Threshold?	--	***No***

Source: Dewberry, January 2024

The estimated GHG emissions resulting from the project's construction would be a maximum of approximately 159.015 tons of CO_2e per ~~day~~ year, totaling approximately 144.255 $MTCO_2e$ per year for the 24-month construction period. The proposed project would not exceed SCAQMD's GHG significance thresholds, 10,000 MT/yr CO_2e for industrial facilities. In addition, the proposed project would not exceed SCAQMD significance thresholds for criteria pollutants (see **Section 4.1 Air Quality** for construction emissions estimations).

The proposed project would not result in capacity increases for vehicles, increase average daily trips (ADTs) or vehicle miles traveled (VMT); therefore, operations of the proposed project would not result in new energy demands (that generate GHGs) over time and would be similar to existing conditions upon completion of construction. The proposed project would not create new demand for energy, induce changes in the surrounding land uses, or create other permanent sources of GHG emissions. Therefore, GHG impacts associated with the proposed project operations would be ***less than significant***, and no mitigation measures are required.

b) Would the project conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

As discussed above, the proposed project's construction activity would generate an estimated maximum of approximately 159.015 tons of CO_2e per ~~day~~ year, totaling approximately 144.255 $MTCO_2e$ per year for the 24-month construction period. The construction emissions would cease upon construction completion. Operations would be similar to existing conditions upon construction completion and the proposed project would not create new sources of GHG emissions beyond what currently exists. Thus, no long-term impacts to GHG emissions would occur as a result of the proposed project. The proposed project would implement BMPs and comply with local and state policies, rules, and regulations for GHG emissions (see **Section 4.1 Air Quality** for construction BMPs). Thus, the proposed project would not conflict with any identified plans adopted for the reduction of GHG emissions. Impacts would be ***less than significant***.

4.4.3 References

California Air Resources Board (CARB). 2008. Climate Change Scoping Plan – a Framework for Change. Online: https://ww2.arb.ca.gov/sites/default/files/classic/cc/scopingplan/document/adopted_scoping_plan.pdf. Accessed: July 6, 2023.

California Air Resources Control Board (CARB). 2022. Maps of State and Federal Area Designations. Online: https://ww2.arb.ca.gov/resources/documents/maps-state-and-federal-area-designations. Accessed: November 16, 2023.

California Air Resources Board (CARB). 2022. 2022 Scoping Plan for Achieving Carbon Neutrality. Online: https://ww2.arb.ca.gov/sites/default/files/2023-04/2022-sp.pdf. Accessed: August 21, 2023.

4.5 Hazards and Hazardous Materials

Would the project:

Issues	Determination
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	Less Than Significant Impact
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	Less Than Significant Impact
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	Less Than Significant Impact
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	No Impact
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two nautical miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	No Impact
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	No Impact
g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	Less Than Significant Impact

4.5.1 Setting

The hazards and hazardous materials analysis was performed in general conformance with the scope and limitations of the American Society for Testing Materials (ASTM) Practice E 1527-21. The hazards and hazardous materials analysis identifies Recognized Environmental Conditions (RECs) that may adversely affect the project site. RECs are defined by the ASTM Practice E 1527-05 as: the presence or likely presence of any hazardous substances or petroleum products in, on, or at the property: (1) due to any release to the environment; (2) under conditions indicative of a release to the environment; or (3) under conditions that pose a material threat of a future release to the environment. A database report was obtained from Environmental Database Resources, Inc. consisting of information compiled from various government records, such as Geotracker, National Priorities List, and EnviroStor, for information regarding

the proposed project area. Based on the results of the records review, no potential RECs have been found in the proposed project area.

4.5.2 Discussion

a) Would the project create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

The proposed project would modernize the Idyllwild WWTP to meet existing and future discharge requirements efficiently and consistently for the Idyllwild community. The proposed project would include replacement of the existing biological reactors, improving the controls and redundancy of the plant, and improving the equalization capacity. The new bioreactors and electrical building would be constructed in undeveloped areas on the project site; the remainder of the upgrades would be additions or modifications to existing on-site equipment. The proposed project would not be an expansion of treatment capacity of the existing WWTP.

Construction of the proposed project would potentially require the use of various types of quantities of hazardous materials. Hazardous materials that are typically used during construction include, but are not limited to, hydraulic oil, diesel fuel, grease, lubricants, solvents, and adhesives. Although equipment used during construction activities could contain various hazardous materials, these materials would be used in accordance with the manufacturer's specifications and all applicable regulations. Minor fuel or oil spills could occur during construction activities. The release, even if accidental, of hazardous materials into the environment is regulated through existing federal, State, and local laws. These regulations require emergency response from local agencies to contain hazardous materials in the event of an accidental release.

The use of and handling of hazardous materials during construction activities would occur in accordance with applicable federal, state, and local laws, including California Division of Occupational Safety and Health Administration (CalOSHA) requirements. The preparation and implementation of standard construction BMPs, including a Stormwater Pollution Prevention Plan (SWPPP), compliance with vehicle manufacturer's specifications, and compliance with applicable regulations would result in impacts that are ***less than significant***. No mitigation measures would be required.

b) Would the project create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

Operations of the proposed project would be similar to existing conditions. The potential for release of hazardous materials into the environment upon completion of the

proposed project would be similar to existing conditions and impacts would be ***less than significant***.

The proposed project has the potential to use a variety of hazardous materials during construction activities. These materials would be stored, handled, and transported per federal, State, and local regulatory requirements. Implementation of construction BMPs, compliance with vehicle manufacturer's specifications, and compliance with applicable regulations would result in impacts that are ***less than significant***. No mitigation measures would be required.,

c) **Would the project emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?**

The nearest school to the project site is the Idyllwild Arts Academy, which is located approximately 300 feet east of the project site. Although the proposed project is within 0.25 mile from the nearest school, the proposed project would not introduce new permanent health or safety hazards to persons who would attend or would be employed at the school site. The WWTP already exists, and the potential risk or presence of hazardous materials, substances, or waste would continue to be similar to existing conditions upon completion of the proposed project. The emission or handling of hazardous materials, substances, or waste during construction would be temporary and cease upon construction completion. Furthermore, the use of and handling of hazardous materials during construction activities would occur in accordance with applicable federal, state, and local laws, including CalOSHA requirements. Impacts would be ***less than significant*** and no mitigation measures are required.

d) **Would the project be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?**

The proposed project is not included in the list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 (DTSC, 2023). There are no Envirostor sites within 2 miles of the proposed project area (Envirostor, 2023). There are two GeoTracker sites within 2 miles of the proposed project area, one Cleanup Program Site and one LUST cleanup site. Both statuses are completed-case closed. ***No impacts*** would occur, and no mitigation measures are required.

e) **For a project located within an airport land use plan or, where such a plan has not been adopted, within two nautical miles of a public airport or public use airport, would the project result in a**

safety hazard or excessive noise for people residing or working in the project area?

The project site is not located within an airport land use plan or within two miles of a public airport or public use airport. ***No impacts*** would occur, and no mitigation measures are required.

f) Would the project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

The proposed project would modernize the Idyllwild WWTP to meet existing and future discharge requirements efficiently and consistently for the Idyllwild community. Operations would be similar to existing conditions upon construction completion. The proposed project would not increase capacity along any roads in the proposed project area and would not increase traffic or congestion. The proposed project would not impair an adopted emergency response plan or emergency evacuation plan in the long term, as operations of the WWTP would be similar to existing conditions. Therefore, the proposed project would have ***no impact*** to emergency response plans or emergency evacuation plans upon completion of construction.

During the proposed project construction, no detours or temporary lane closures would be necessary. No impacts to circulation or traffic are expected during proposed project construction and access for emergency vehicles, trucks, and other roadway users would be maintained throughout the construction period. The proposed project would not impair an adopted emergency response plan or emergency evacuation plan. There would be ***no impact*** and no mitigation measures are required.

g) Would the project expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?

The proposed project would modernize the Idyllwild WWTP to meet existing and future discharge requirements efficiently and consistently for the Idyllwild community. The proposed project is not capacity increasing and would not result in new additional structures, nor would it increase the number of people within the proposed project area once construction is complete. Therefore, proposed project operations would not expose people or structures to a significant risk from wildland fires, beyond what currently exists. Operational impacts would be ***less than significant***, and no mitigation measures are required.

During construction, workers would be present on site; however, this increase in workers would be temporary in nature. The closest fire station to the project site is Idyllwild Fire Protection District (IFPD) Station 621, located at 54160 Maranatha Drive, approximately 2.5 miles northeast of the project site (Riverside County, 2021). Idyllwild Volunteer Fire Company Station 621 is a non-profit organization dedicated to protecting the mountain community of Idyllwild and to provide professional Fire and EMS assistance through volunteer participants (Idyllwild Fire, 2023). The proposed project would be coordinated with the IFPD, as well as the County's Sheriff Office and

other law enforcement or emergency service providers within the proposed project area. Proposed project coordination with the County and the implementation of BMPs (e.g., installation of fire extinguishers, installation of no smoking signs, education on construction equipment usage and reducing spark potential) would reduce the potential for construction activities to result in the commencement of a wildfire. Impacts would be ***less than significant***, and no mitigation measures are required.

4.5.3 References

Department of Toxic Substances Control (DTSC). 2023. Hazardous Waste and Substances Site List. Online: https://www.envirostor.dtsc.ca.gov/public/search.asp?cmd=search&reporttype=CORTESE&site_type=CSITES,OPEN,FUDS,CLOSE&status=ACT,BKLG,COM&reporttitle=HAZARDOUS+WASTE+AND+SUBSTANCES+SITE+LIST. Accessed: December 13, 2023.

Envirostor. 2023. Online: https://www.envirostor.dtsc.ca.gov/public/map/?myaddress=Idyllwild-Pine+Cove. Accessed: December 13, 2023.

Geotracker. 2023. Online: https://geotracker.waterboards.ca.gov/map/?CMD=runreport&myaddress=Idyllwild-Pine+Cove#. Accessed: December 13, 2023.

Idyllwild Fire, 2023. Idyllwild Volunteer Fire Company 621. Online: https://idyllwildfire.com/volunteer-company-621.html. Accessed: December 8, 2023.

Riverside County. 2021. Riverside County Fire Stations. Online: https://www.rvcfire.org/resources/fire-stations. Accessed: December 6, 2023.

4.6 Noise

Would the project result in:

Issues	Determination
a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	Less Than Significant Impact
b) Generation of excessive groundborne vibration or groundborne noise levels?	Less Than Significant Impact
c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two nautical miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?	No Impact

4.6.1 Setting

Noise is defined as a loud, unexpected, or annoying sound. A logarithmic scale is used to describe sound pressure level, in terms of decibels (dB). The decibel scale alone does not adequately characterize how humans perceive noise. An "A-weighted" sound level (expressed in units of dBA) can be computed by weighting sound levels of individual frequency bands by sensitivity of average human hearing to those frequencies. **Table 4.6.1-1: Typical Noise Levels** describes typical A-weighted noise levels for different activities. It is widely accepted that, in typical noise environments, people can detect changes in sound level at 3 dBA or greater. A 5-dBA change is generally perceived as distinctly noticeable.

Table 4.6.1-1: Typical Noise Levels

COMMON OUTDOOR ACTIVITY	NOISE LEVEL (DBA)	COMMON INDOOR ACTIVITY
Jet flyover at 1,000 feet	110	Rock band
Gas lawnmower at three feet	100	
Diesel truck at 50 feet at 50 mph	90	Food blender at three feet
Noisy urban area, daytime	80	Garbage disposal at three feet
Gas lawnmower, 100 feet Commercial area	70	Vacuum cleaner at ten feet Normal speech at three feet
Heavy traffic at 300 feet; Rural daytime areas	60	Large business office
Quiet urban daytime	50	Dishwasher next room
Quiet urban nighttime Quiet suburban nighttime	40	Theater, large conference room (background)
Quiet rural nighttime	30	Library Bedroom at night, concert hall (background)
	20	Broadcast/recording studio

Lowest threshold of human hearing	0	Lowest threshold of human hearing

Source: Caltrans, 2013

Noise in our daily environment fluctuates over time. The maximum sound level for a given noise source is abbreviated "L_{max}." The average sound level over a period of time (usually one hour) is called the equivalent continuous sound level and is abbreviated "L_{eq}." To characterize sound levels occurring over a 24-hour period, penalties are often applied to nighttime sound levels. When a 5-db penalty is applied to levels occurring between 7 p.m. to 10 p.m. and a 10-dB penalty is applied to levels occurring between a 10 p.m. and 7 a.m., the energy average of the A-weighted sound levels is called the Community Noise Exposure Level (CNEL).

In general, a 3-dBA change in community noise levels is noticeable, while 1-2 dBA changes generally are not perceived. As shown in **Table 4.6.1-1**, quiet suburban areas typically have noise levels in the range of 40 to 50 dBA, while those along arterial streets are in the 50 to 60+ dBA range. Normal human conversational levels are in the 60-65 dBA range and ambient noise levels greater than that can interrupt conversations.

The Riverside County General Plan Noise Element includes the following policies to protect noise-sensitive land uses from noise emitted by outside sources and prevent new projects from generating adverse noise levels on adjacent properties.

- *N 1.3* Consider the following uses noise-sensitive and discourage these uses in areas in excess of 65 CNEL:
    - Schools.
    - Hospitals.
    - Rest Homes.
    - Long Term Care Facilities.
    - Mental Care Facilities.
    - Residential Uses.
    - Libraries.
    - Passive Recreation Uses.
    - Places of Worship.
- *N 1.4* Determine if existing land uses will present noise compatibility issues with proposed project by undertaking site surveys.
- *N 1.5* Prevent and mitigate the adverse impacts of excessive noise exposure on the residents, employees, visitors, and noise-sensitive uses of Riverside County.

- *N 1.6* Minimize noise spillover or encroachment from commercial and industrial land uses into adjoining residential neighborhoods or noise-sensitive uses.
- *N 1.7* Require proposed land uses, affected by unacceptably high noise levels, to have an acoustical specialist prepare a study of the noise problems and recommend structural and site design features that will adequately mitigate the noise problems.
- *N 1.8* Limit the maximum permitted noise levels that cross property lines and impact adjacent land uses, except when dealing with noise emissions from wind turbines.

The Riverside County Code of Ordinances (Section 9.52.020(H)(I)) exempts construction projects generating noise when located one-quarter of a mile or more from an inhabited dwelling and when located within one-quarter of a mile from an inhabited dwelling as long as construction does not occur between the hours of 6:00 p.m. and 6:00 a.m. during the months of June through September and 6:00 p.m. and 7:00 a.m. during the months of October through May.

Existing Conditions

The proposed project is located in the town of Idyllwild, an unincorporated community located in the San Jacinto Mountains, about 45 miles west of Palm Springs in Riverside County. Together with Pine Cove and Fern Valley, it is a part of the Idyllwild/Pine Cove Census Designated Place and covers an area of 13.73 square miles. The proposed project site is located in a mountainous, rural-residential area. The project site has a Public Facilities land use designation pursuant to the Riverside County General Plan (Riverside County, 2021). The Public Facilities land use designation provides for the development of various public, quasi-public, and private uses with similar characteristics, such as governmental facilities, utility facilities including public and private electric generating stations and corridors, landfills, airports, educational facilities, and maintenance yards. Surrounding land use designations include Open Space-Conservation Habitat (OS-CH), Open Space-Water (OS-W), Estate Density Residential (EDR), Medium Density Residential (MDR), and Rural Mountainous (RM). The County Zoning designations within and adjacent to the proposed project site includes Watercourse, Watershed, and Conservation Areas (W-1) and Controlled Development Areas (W-2).

Ambient noise level measurements were not taken at the project site; however, small town or wooded and lightly used residential areas (rural areas) during daytime hours have typical noise levels ranging between 50 and 60 L_{dn}.

Sensitive Receptors

According to 23 Code of Federal Regulations (CFR) 772, sensitive receptors are defined as discrete or representative location of a noise sensitive area(s) within a project area that are considered more sensitive to ambient noise levels than others because of the amount of noise exposure (in terms of both exposure duration and

insulation from noise) and the types of activities typically involved. Within the context of addressing construction-related noise impacts, sensitive receptors include, but are not limited to, the following land use categories: residences, schools, libraries, churches, hospitals, and nursing homes. The Idyllwild Arts Amphitheater is the closest sensitive receptor to the proposed project, approximately 230 feet to the south.

4.6.2 Discussion

a) Would the project result in a generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

The proposed project would upgrade the Idyllwild WWTP to meet existing and future discharge requirements efficiently and consistently for the Idyllwild community, as well as meet current wastewater treatment standards and processes. The proposed project would not increase vehicle capacity on surrounding roadways nor would it generate land use changes in the surrounding environment. For these reasons, the project operation would not permanently increase ambient noise levels in the proposed project area. Sensitive receptors and adjacent land uses would not be exposed to a permanent change in noise levels as a result of the project operation.

The primary source of noise generated by the proposed project would result from construction activities. Noise from construction activities is anticipated to temporarily increase ambient noise levels in the vicinity of the project site. Noise at the construction site would intermittently dominate the noise environment with varying levels of intensity. The degree of construction noise impacts would vary for different areas along the proposed project corridor, and for different construction activities. Noise from construction activities generally attenuate at a rate of 6 dBA per doubling distance.

Construction activities associated with the proposed project are anticipated to last approximately 24 months. During construction, various types of construction equipment will be used, sometimes simultaneously, to improve the existing components at the WWTP, remove trees, and construct the new bioreactors, new sludge holding tank and electrical building. Construction contractors working on the WWTP are anticipated to use (but not be limited to) hydraulic jackhammers, front end loaders, excavators, and chainsaws during the construction period, all of which would be the loudest construction equipment to be used. Front end loaders typically generate a maximum noise level of 80 dBA L_{max} during use and hydraulic jackhammers, excavators and chainsaws typically generate maximum noise level of 85 dBA L_{max} during use from a distance of 50 feet. If all these pieces of construction equipment operated simultaneously as measured from 50-feet, the construction equipment would generate a combined noise level of 90.2 dBA L_{max}. As stated above, the Idyllwild Arts Amphitheater is approximately 230 feet from

where construction activity could occur on the project site. If all four pieces of construction equipment are operating simultaneously, based on the distance to the Idyllwild Arts Amphitheater, the facility could be exposed to maximum temporary noise levels of 76.9 dBA L_{max}.

Construction operations are anticipated during daylight hours only and would adhere to the Riverside County Ordinance (Section 9.52.020(H)(I)) which exempts construction activity located one-quarter of a mile or more from an inhabited dwelling and when located within one-quarter of a mile from an inhabited dwelling as long as construction does not occur between the hours of 6:00 p.m. and 6:00 a.m. during the months of June through September and 6:00 p.m. and 7:00 a.m. during the months of October through May, respectively. Any increase in ambient noise level in the vicinity of the proposed project would be temporary and would cease upon construction completion. Construction activities for the proposed project would comply with federal, state, and local policies related to construction-generated noise, including County noise regulations. The proposed project would also include implementation of best management practices (BMPs) and the project measures discussed below. With implementation of the project measures outlined below, substantial temporary ambient noise levels at nearby sensitive receptors would be minimized. As such, construction noise impacts generated by the proposed project would be ***less than significant*** and no mitigation measures are required.

PROJECT MEASURES

NO-1: The following control measures shall be implemented during construction:

- Use newer equipment with improved muffling and ensure that all equipment items have the manufacturers' recommended noise abatement measures, such as mufflers, engine enclosures, and engine vibration isolators intact and operational. Newer equipment will generally be quieter in operation than older equipment. All construction equipment should be inspected at periodic intervals to ensure proper maintenance and presence of noise control devices (e.g., mufflers and shrouding, etc.).
- Utilize construction methods or equipment that provides the lowest level of noise and ground vibration impact.
- Turn off idling equipment.

b) Would the project result in generation of excessive groundborne vibration or groundborne noise levels?

Equipment associated with high vibration levels (pile drivers) would not be used for project construction. Construction equipment that would be used onsite, specifically the hydraulic jackhammers, front end loader, and excavator, would generate groundborne vibration (chainsaw usage does not generate groundborne vibrations). Front end

loaders and excavators which would generate groundborne vibration (VdB) levels of 90 VdB (0.031 inches per second) at 50 feet from construction areas (Caltrans, 2013) are the types of construction equipment that would be used on site that generate the highest level of groundborne vibrations. The closest sensitive receptor to the proposed project is located approximately 230 feet to the southeast; and therefore, would be exposed to construction vibration levels equating to 70 VdB (or 0.003 peak particle velocity (PPV) inches per second). According to the Federal Transit Authority, institutional land uses with primarily daytime use (such as the Idyllwild Arts Amphitheater) can be exposed to infrequent events (less than 70 events per day) from construction vibration levels of equating to 83 VdB, before damage due to such a use occurs (FTA, 2018). Thus, construction generated vibration would not exceed damage criteria for nearby sensitive receptors. Impacts would be ***less than significant,*** and no mitigation measures are required.

c) **For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two nautical miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels?**

The closest airports to the proposed project site is the Banning Municipal Airport, a city-owned airport located a mile southeast of Banning, in Riverside County, approximately 28 miles northwest of the proposed project area. The project site is not located within an airport land use compatibility plan (ALUC). (Riverside County, 2021). As such, implementation of the proposed project would not expose people residing or working in the project area to excessive airport/airstrip noise levels. ***No impacts*** would occur, and mitigation measures are not required.

4.6.3 References

California Department of Transportation (Caltrans). 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. Online: https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tens-sep2013-a11y.pdf. Accessed: November 11, 2023.

Federal Transit Administration (FTA). 2018.

Riverside County. 2021. County of Riverside General Plan: Land Use Element. Online: https://planning.rctlma.org/sites/g/files/aldnop416/files/migrated/Portals-14-Ch03-Land-20Use-FINAL-209-28-21.pdf. Accessed: November 12, 2023.

United States Environmental Protection Agency (U.S. EPA). 1971. Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances. Online: https://nepis.epa.gov/Exe/ZyNET.exe/9101NN3I.txt?ZyActionD=ZyDocument&Client=EPA&Index=Prior%20to%201976&Docs=&Query=&Time=&EndTime=&Sear

chMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&UseQField=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5CZYFILES%5CINDEX%20DATA%5C70THRU75%5CTXT%5C00000024%5C9101NN3I.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=2. Accessed: January 19, 2024.

4.7 Transportation

Would the project:

Issues	Determination
a) Conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	No Impact
b) Conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?	Less Than Significant Impact
c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	No Impact
d) Result in inadequate emergency access?	No Impact

4.7.1 Setting

The proposed project is located in the town of Idyllwild, an unincorporated community in western Riverside County. Together with Pine Cove and Fern Valley, it is part of the Idyllwild/Pine Cove Census Designated Place and covers an area of 13.73 square miles. Roadways adjacent and in the vicinity of the project site includes Apela Drive, Temecula Road, Cahuilla Drive, and Luisana Drive. The County of Riverside Transportation Department provides an interactive map that has been developed to determine classifications of roads within the County. Apela Drive is classified as a paved surface-county maintained road, and Temecula Road, Cahuilla Drive, and Luisana Drive are classified as non-county roads (County of Riverside Transportation Department, 2021). A private roadway currently exists off of Apela Drive that provides access to the Idyllwild WWTP.

4.7.2 Discussion

a) Would the project conflict with a program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

The proposed project would modernize the Idyllwild WWTP to meet existing and future discharge requirements efficiently and consistently for the Idyllwild community. The proposed project includes replacement of the existing biological reactors, improving the controls and redundancy of the plant, and improving the equalization basin. The new bioreactors and electrical building would be constructed in undeveloped areas on the project site; the remainder of the upgrades would be additions or modifications to existing equipment. The proposed land acquisition is to the south of the existing plant adjacent to the existing plant access road. The proposed project does not involve the construction of new roadways or any improvements to existing roadways. As the

proposed project would not affect existing roadways, it would not result in a conflict with a program plan, ordinance, or policy addressing the circulation system in the area. Therefore, the proposed project would have no long-term impacts.

There are no temporary lane closures or detours anticipated for implementation of the proposed project. A private roadway currently exists off of Apela Drive that leads directly to the Idyllwild WWTP, in which construction workers would use to access the proposed project site. In addition, this private roadway would be used for proposed project activities such as construction equipment movement, and the hauling of construction material and debris to and from the project site. Construction equipment and staging areas would be confined to the project site. Access for vehicles, pedestrians, and bicyclists along roads adjacent and in the vicinity of the project area would be maintained throughout the construction period and there would be no conflict with adjacent land uses.

The proposed project would not conflict with any program, plan, ordinance, or policy addressing the circulation system, including transit, roadway, bicycle, and pedestrian facilities. ***No impact*** would occur, and no mitigation measures are required.

b) Would the project conflict or be inconsistent with CEQA Guidelines section 15064.3, subdivision (b)?

The proposed project would modernize the Idyllwild WWTP. The proposed project would not increase capacity along any road, nor would it increase traffic and congestion. Therefore, the proposed project would not increase vehicle miles traveled (VMT) on the surrounding roadways.

Access for vehicles, pedestrians, and bicyclists along roads within the proposed project area would be maintained throughout the construction period. Access to all adjacent properties would be maintained throughout the construction period as well. In addition, no detours would be required during construction for vehicular traffic. Because the roadways would maintain existing capacity and no detours would be necessary during construction, the project construction activities would not result in an increase in VMT. Construction personnel would be required to commute to the proposed project site; however, it is assumed that construction personnel would come from the surrounding areas. In addition, by nature, construction personnel commute to various construction sites for their job. Therefore, it is not anticipated that the proposed project would increase VMT because of construction personnel trips to the project site.

CEQA Guidelines Section 15064.3 (b) provides criteria for analyzing transportation impacts. As stated in Section 15063.3 (b)(2), transportation projects that reduce, or have no impact on VMT should be presumed to cause a less than significant impact. The proposed project would have no lasting impact on traffic circulation within the area. Operations of the proposed project would be similar to existing conditions upon completion of construction. The proposed project would not increase or decrease future vehicle capacity or create long-term changes to traffic patterns or VMT. Upon the

completion of proposed project construction, no changes in traffic patterns, VMT or average daily traffic (ADT) would result from the proposed project. Impacts would be ***less than significant,*** and no mitigation measures would be required.

c) Would the project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

The proposed project would modernize the Idyllwild WWTP. The proposed project does not involve the construction of new roadways or any improvements to existing roadways and does not include design features such as sharp curves or dangerous intersections, or any incompatible uses that would increase hazards along roadways above existing conditions.

As discussed above, access to adjacent roads and properties would be maintained throughout the construction period. Construction equipment would be confined within the proposed project site and staging areas would not conflict with other vehicles moving along adjacent roadways. Road closures, lane-closures, or detours would not be required during project construction as off-site improvements are not a component of the proposed project. There would be minimal impacts to circulation because of construction-related workforce traffic (employee travel to and from the site), heavy equipment delivery, and material deliveries necessary for project development, but circulation would return to existing conditions upon the completion of the proposed project construction. Implementation of the proposed project would not substantially increase hazards due to geometric features or incompatible uses. ***No impact*** would occur and no mitigation measures are required.

d) Would the project result in inadequate emergency access?

The proposed project would modernize the Idyllwild WWTP. Access to adjacent roads and properties would be maintained during construction and no detour or temporary lane closures would be required. Access to the project site would also be maintained during project construction and once construction operation commences. Furthermore, local law enforcement, fire departments, and emergency service providers would be notified of the construction period of the proposed project by the City of Idyllwild. Thus, implementation of the proposed project would not result in inadequate emergency access. ***No impact*** would occur, and no mitigation measures are required.

4.7.3 References

County of Riverside Transportation Department. 2021. County of Riverside Online Road Book. Online: https://trans.rctlma.org/county-maintained-road-book. Accessed: December 1, 2023.

4.8 Tribal Cultural Resources

Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

Issues	Determination
a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k), or	Less Than Significant with Mitigation Incorporated
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.	Less Than Significant with Mitigation Incorporated

Information in this section is summarized from the *Cultural Resource Services* report for the Idyllwild Wastewater Treatment Plant (WWTP) Improvement Project (Duke Cultural Resources Management, LLC [DUKE CRM], 2024). This study was prepared in compliance with CEQA and the National Preservation Act (NHPA) of 1966. Some information from this study is considered confidential under the California Public Resources Code (PRC) and the Code of Federal Regulations (CFR) in compliance to the Freedom of Information Act and the California Public Records Act in order to protect the integrity of tribal cultural resources, and thus, would not be available to the public (7 PRC 21082.3 and 36 CFR 800.11). Information in this section is also based on AB 52 Letters that were sent out to Tribal representatives that have interest in the project.

4.8.1 Setting

A tribal cultural resource (TCR) is defined as a site, feature, place, cultural landscape, or sacred place or object that has cultural value to California Native American tribes. To be considered a TCR, the resource must be included in or determined eligible for inclusion in the CRHR or is in included in a local register of historical resources. Pursuant to Public Resource Code (PRC) §2107, a TCR is defined as either:

1) A site, feature, place, cultural landscape, sacred place, or object that has cultural value to California Native American Tribes that is included or determined to be eligible for inclusion in the California Register of Historical Resources (California Register) or a local register of historical resources.

2) A resource determined by the lead agency to be significant and is supported by substantial evidence.
3) A geographically defined cultural landscape that meets the criteria set forth in PRC §21074.
4) A historical resource described in PRC §21084.1, a unique archeological resource or "nonunique archaeological resource" described in PRC §21083.2 (g) and (h).

The CEQA Guidelines state that California Native American tribes traditionally and culturally affiliated with a geographic area may have expertise concerning their TCRs. Lead agencies shall consult with these tribes who respond in writing and requests the consultation within 30 days of receipt of the formal notification of the project (PRC §21080.3.1). Traditionally and culturally affiliated tribes of a project area may suggest mitigation measures, including, but not limited to, those recommended in §21084.3.

4.8.1.1 Assembly Bill (AB) 52 Consultation

Assembly Bill 52 (AB 52) went into effect on July 1, 2015, and established a consultation process with all California Native American Tribes on the Native American Heritage Commission (NAHC) List for federal and non-federal tribes (13.5 PRC §§ 21073, 21074, 21083.3, 21084). Once the tribe is notified of a project, the tribe has 30 days to request a consultation. The consultation process ends when either the parties agree to mitigation measures or avoid a significant effect on tribal cultural resources or a party, acting in good faith and after reasonable effect, concludes that mutual agreement cannot be reached.

On January 29, 2024, a Sacred Land File (SLF) and Tribal Consultation List Request was submitted to the NAHC. On February 22, 2024, the NAHC responded that the SLF search was negative and provided a Tribal Consultation List for the project region. Each of the tribes listed were sent an AB 52 Notification letter on March 13, 2024. All letters were sent via certified return receipt, and 2 Return Receipts were received back. Responses were given from the Cahuilla Band of Indians and the Rincon Band of Luiseno Indians.

4.8.1.1.1 The Cahuilla Band of Indians

The Cahuilla Band of Indians responded via email on March 21, 2024 indicating that the project is directly within Cahuilla traditional land use. In their response they requested the commencement of formal AB-52 consultation. IWD met with the Cahuilla Band of Indians representative (Lorrie Gregory) on April 22, 2024 to discuss the project. At the meeting, IWD and Cahuilla agreed on tribal monitoring during earth moving activities of original ground (natural/non-fill soils) through the duration of construction activities. Cahuilla officially closed consultation on April 30, 2024 with a request for a follow up in early June to coordinate an informal visit to the project area.

4.8.1.1.2 The Rincon Band of Luiseno Indians

The Rincon Band of Luiseno Indians responded via email on April 21, 2024 indicating that the project is not located within their Area of Historic Interest (AHI) and that they had no further information to provide. No concerns or requests for consultation resulted from this outreach.

4.8.1.2 Record Searches and Field Survey

On December 12, 2023, a records search was conducted at the Eastern Information Center (EIC). The EIC is part of the California Historical Resources Information System (CHRIS) and is located at the University of California, Riverside. The records search included a review of all recorded cultural resources and reports within a 1/2 -mile radius of the project site. Review of the EIC data indicates that one (1) cultural resource has been previously identified within the project area. This resource, P-33-014267, is the campus of the Idyllwild Music School. An additional 15 cultural resources (six of which are pre-contact age) have been recorded within the ½-mile search radius.

In addition, the California Built Environmental Resources Directory (BERD) was examined. The BERD includes the National Register of Historic Places (NRHP), California Register of Historical Resources (CRHR), California Historic Landmarks (CHL), and California Points of Historic Interest (CPHI). The BERD did not identify any cultural resources within the project area.

A site visit was completed on January 5, 2024, and no cultural resources were observed onsite. A boulder outcrop was observed near the southeast corner of the project site. The majority of the boulders are outside of the project site boundary, and no milling features were observed on the boulders within the project site boundary. The surfaces of the majority of the boulders were partially or totally obscured by moss.

4.8.2 Discussion

a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)?

Review of the EIC data indicated that one built environment cultural resource has been previously identified within the project area. This resource, P-33-014267, is the campus of the Idyllwild Arts Academy high school.

There were also an additional 15 cultural resources that were identified within a 1/2 -mile of the project, of which six were pre-contact age. A SLF and Tribal Consultation List Request was submitted to the NAHC on January 29, 2024. A site visit was completed on January 5, 2024, and no pre-contact cultural resources were observed. On February 22, 2024, the NAHC responded that the SLF search was negative and provided a Tribal Consultation List for the project region. Each of these tribes were sent an AB-52 Notification letter on March 13, 2024. As described above, two Native American Tribes responded, with the Cahuilla Band of Indians requesting formal consultation with IWD due to the potential sensitivity of the project area. IWD and

Cahuilla met and agreed on monitoring during project construction activities associated with native (non-fill) soil. The Cahuilla officially closed AB-52 consultation with agreement to include monitoring mitigation during project construction ground disturbing activities associated with original ground (natural/non-fill soils). Implementation of **Mitigation Measure TCR-1** would reduce potential impacts to tribal cultural resources during construction. If tribal cultural resources are discovered during ground-disturbing activities, **Mitigation Measure CUL-1** would be implemented. With the implementation of **Mitigation Measure TCR-1** and **Mitigation Measure CUL-1**, impacts would be ***less than significant with mitigation incorporated***.

Impacts regarding cultural resources can be found in Section 4.3, Cultural Resources, of this IS/MND.

MITIGATION MEASURES

Implement **Mitigation Measure CUL-1**, as described in Section 4.3, Cultural Resources, of this document and **Mitigation Measure TCR-1**, described below.

TCR-1: A member of the Cahuilla Band of Indians shall be present, as a monitor during all earthmoving activities on original ground (natural/non-fill soils) during project construction activities. If artifacts are found during such activities, implementation of **Mitigation Measure CUL-1** shall occur to ensure that such resources are protected as applicable.

b) **A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.**

As mentioned above, a SLF and Tribal Consultation List Request was submitted to the NAHC on January 29, 2024. On February 22, 2024, the NAHC responded that the SLF search was negative and provided a Tribal Consultation List for the project region. Each of these tribes were sent an AB-52 Notification letter on March 13, 2024. As described above, two Native American Tribes responded, with the Cahuilla Band of Indians requesting formal consultation with IWD. IWD and Cahuilla met and agreed on monitoring during project construction activities associated with native (non-fill) soil. The Cahuilla officially closed AB-52 consultation with agreement to include **Mitigation Measure TRC-1** implemented as part of the project.

In the event that any human remains, or any associated funerary objects are encountered during construction, all work would cease within the vicinity of the discovery, as identified in **Mitigation Measure CUL-1**, as described in Section 4.3, Cultural Resources. In accordance with CEQA (Section 1064.5) and the California Health and Safety Code (Section 7050.5), the county coroner would be contacted

immediately. If the human remains are determined to be Native American, the coroner would notify the Native American Heritage Commission, who would notify and appoint a Most Likely Descendent (MLD). The MLD would work with a qualified archaeologist to decide the proper treatment of the human remains and any associated funerary objects. Thus, with implementation of **Mitigation Measures CUL-1** and **TRC-1**, impacts would be ***less than significant with mitigation incorporated***.

MITIGATION MEASURES

Implement **Mitigation Measure TRC-1**, identified above, and **Mitigation Measure CUL-1**, as described in Section 4.3, Cultural Resources, of this document.

4.8.3 References

Duke Cultural Resources Management (CRM). 2024. Cultural Resource Services for the Idyllwild Wastewater Treatment Plan, City of Idyllwild, County of Riverside, California. Prepared: January 2024.

4.9 Wildfire

If located in or near state responsibility areas or lands classified as very high fire hazard severity zones, would the project:

Issues	Determination
a) Substantially impair an adopted emergency response plan or emergency evacuation plan?	Less Than Significant Impact
b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?	Less Than Significant Impact
c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	Less Than Significant Impact
d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?	Less Than Significant Impact

4.9.1 Setting

The proposed project is located in the town of Idyllwild, an unincorporated community located in the San Jacinto Mountains, about 45 miles west of Palm Springs in Riverside County. Together with Pine Cove and Fern Valley, it is a part of the Idyllwild/Pine Cove Census Designated Place and covers an area of 13.73 square miles. According to the Riverside Extended Mountain Area Plan (REMAP), which includes the proposed project site, the rural and mountainous nature of the plan area as well as the local flora, much of REMAP is subject to wildfire susceptibility at very high and high levels (Riverside County, 2021a). This threat is present in both natural environments and built communities.

According to the Riverside County General Plan Safety Element, fire protection in unincorporated Riverside County is provided by the Riverside County Fire Department and California Department of Forestry and Fire Protection (CAL FIRE) (Riverside County, 2021b). Riverside County contracts with CAL FIRE to provide fire protection and rescue services in the unincorporated areas of the county. The Riverside County Fire Department and CAL FIRE participate in a Cooperative Fire Response Agreement, where fire agencies have agreed to automatically support each other on incidents using the closest available resource. The Idyllwild Fire Protection District also provides firefighting rescue, emergency medical services, and ambulance transport services for the unincorporated communities of Idyllwild and Fern Valley (Riverside County, 2021b). The closest fire station to the project site is the Idyllwild Volunteer Fire Company

(Idyllwild Fire Protection District) station 621, located at 54160 Maranatha Drive, approximately 2.5 miles northeast of the project site.

According to the CAL FIRE, Fire Hazard Severity Zones Map, the project site is located in a Very High Severity Zone in State Responsibility Area (SRA) (CAL FIRE, 2023). Topography in the project area is generally flat within the limits of the project site and slopes moderately to the west in the rest of the project area. The topography in surrounding areas is characterized by steep, mountainous terrain. The project area includes substantial developed area, consisting of the WWTP and the paved access road, and also includes tree cover. Vegetation within the project area consists primarily of mixed native and invasive grasses, manzanita, blackberry vines, and coniferous trees.

a) Would the project substantially impair an adopted emergency response plan or emergency evacuation plan?

Operations would be similar to existing conditions upon construction completion. The proposed project would not increase capacity along any of the adjacent roadways or induce changes in the surrounding land uses that could increase traffic and congestion. Operation of the proposed project would not require temporary lane closures of serving roads nor require road detours. Thus, operation of the proposed project would not substantially impair local emergency response plans or emergency evacuation plans.

A private roadway currently exists off of Apela Drive and provides access to the Idyllwild WWTP, which construction workers would use to access the project site. In addition, this private roadway would be used for proposed project activities such as construction equipment movement, and the hauling of construction material and debris to and from the project site. Access along roads adjacent and in the vicinity of the project area would be maintained throughout the construction period and there would be no conflict with adjacent land uses.

Construction equipment would be confined within the project site and staging areas would not conflict with other vehicles moving along adjacent roadways. Road closures, lane-closures, or detours would not be required during project construction as off-site improvements are not a component of the proposed project. There would be minimal impacts to circulation as a result of construction-related workforce traffic (employee travel to and from the site), heavy equipment delivery, and material deliveries necessary for project development, but circulation would return to existing conditions upon the construction completion. Furthermore, local law enforcement, fire departments, and emergency service providers would be notified of the construction period of the proposed project by the construction contractor. Thus, the proposed project would not impair an adopted emergency response plan or emergency evacuation plan during operation and construction. Impacts would be ***less than significant,*** and no mitigation measures are required.

b) Would the project due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

The proposed project site's slope, prevailing winds, or other factors that exacerbate wildfire risks and expose the project site and surrounding areas to pollutant concentrations from a wildfire or the uncontrolled spread of wildfire would be similar to existing conditions upon completion of construction.

Construction activities involving vehicles, heavy machinery, and personnel smoking at the proposed project site could result in the ignition of a fire. During construction, heavy equipment and passenger vehicles driving on vegetated areas prior to clearing and grading could increase the risk of fire. For example, heated mufflers and the use of chainsaws could potentially cause sparks or improper disposal of cigarettes could ignite surrounding vegetation. The new diesel generator and fuel would be housed in the existing structure that houses the existing generator. Proposed project coordination with the County would reduce the potential for construction activities and project components to exacerbate wildfire risks and thereby expose project occupants to pollutant concentrations (e.g., fuels and hazardous materials would not be stored on site, inspect and maintain vehicles and equipment to prevent the dripping of oil or other fluids). Impacts would be ***less than significant***, and no mitigation is required.

c) Would the project require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

The proposed project site already includes existing utilities, including overhead electrical and underground water and gas lines. The proposed project would not require the installation or maintenance of associated infrastructure that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment beyond what already exists. The proposed project does not require relocating existing utilities within the project site. Existing utilities would remain in service throughout the duration of construction activities. Impacts in this regard would be ***less than significant*** and no mitigation measures are required.

d) Would the project expose people or structures to significant risks, including downslope or downstream flooding or

landslides, as a result of runoff, post-fire slope instability, or drainage changes?

The proposed project would modernize the Idyllwild WWTP to meet existing and future discharge requirements for the community. Operations would be similar to existing conditions upon construction completion. The proposed project would not increase stormwater runoff or result in drainage pattern changes, that would ultimately expose people or structures to significant risks as a result of runoff, post-fire instability, or drainage change.

The new bioreactors and electrical building would be constructed in undeveloped areas on the project site; the remainder of the upgrades would be additions or modifications to existing equipment. Since the project area is already developed, with the existing WWTP and the paved access road, and consists of relatively flat topography, any increase in impervious surface as a result of the proposed project would be negligible in association with drainage changes. In addition, the tree removal required for implementation of the proposed project would be negligible in changing surface drainage patterns due to the limited size of the project area and because the project area is in a developed area with compacted and disturbed soils. During construction, workers would be present on site; however, this increase in workers would be temporary in nature. The risks associated with runoff, slope instability, and drainage changes within the proposed project site during construction would be similar to existing conditions. Thus, the project would not expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope stability, or drainage changes, above and beyond existing conditions. Impacts would be ***less than significant*** and no mitigation measures are required.

4.9.2 References

California Department of Forestry and Fire Protection (CAL FIRE). 2022. Fire Hazard Severity Zone Viewer. Online: https://egis.fire.ca.gov/FHSZ/. Accessed: January 20, 2024.

Riverside Extended Mountain Area Plan (REMAP). 2021a. Online: https://planning.rctlma.org/sites/g/files/aldnop416/files/migrated/Portals-14-genplan-GPA-2022-Compiled-REMAP-4-2022-rev.pdf. Accessed: January 20, 2024.

Riverside County General Plan – Safety Element. 2021b. Online: https://planning.rctlma.org/sites/g/files/aldnop416/files/migrated/Portals-14-genplan-2021-elements-Ch06-Safety-092821.pdf. Accessed: January 20, 2024.

4.10 Mandatory Findings of Significance

Issues	Determination
a) Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	Less Than Significant with Mitigation Incorporated
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)?	Less Than Significant with Mitigation Incorporated
c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	Less Than Significant with Mitigation Incorporated

4.10.1 Setting

Per CEQA regulations and guidelines, the Lead Agency must summarize the findings of significance from earlier sections and must consider potential cumulatively considerable effects for environmental impact reports (EIRs) and in the discussion section below. Even though this environmental document is an IS/MND and not an EIR, the potential for cumulatively considerable effects are analyzed below.

4.10.2 Discussion

a) **Does the project have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?**

The information in Section 4.2, *Biological Resources*, of this IS/MND analyzes the potential effects of the proposed project on biological resources, including habitats, special-status plant species, and special-status wildlife species. The project was

determined to not have suitable habitat for special-status wildlife species and therefore project implementation would have no impact on such biological resources. The Jeffery pine forest and woodland community located on and around the project site has the potential to be occupied by 23 special-status plant species. However, implementation of **Mitigation Measure BIO-2** requiring a focused special-status plant survey during normal blooming periods for the target species prior to commencement of construction activities would reduce impacts to a less than significant level. The project will not directly impact nesting birds as all trees within the impact area will be removed during the non-nesting bird season (September 1-January 31). However, noise and other disturbance caused by construction activities could indirectly impact nearby nesting birds. Implementation of **Mitigation Measure BIO-1** would require a nesting bird survey prior to commencement of construction activities occurring between February 1 to August 31 and installation of a buffer if nests are discovered, thereby reducing impacts to nesting birds to a level that is less than significant. The information in Section 4.3, Cultural Resources, and Section 4.8, Tribal Cultural Resources, of this IS/MND analyze possible proposed project effects on cultural and tribal cultural resources including the possibility of human remains. Section 4.4, Cultural Resources, and Section 4.14, Tribal Cultural Resources, determined that impacts would be less than significant with the incorporation of mitigation measures (**Mitigation Measure CUL-1**).

MITIGATION MEASURES

Implementation of **Mitigation Measures BIO-1** and **BIO-2**, and **CUL-1**, as described in the IS/MND sections above.

b) Does the project have impacts that are individually limited, but cumulatively considerable?

This IS/MND identified impacts in the areas of biological resources, cultural resources, and tribal cultural resources that individually are limited and require mitigation to ensure that the impacts would be reduced to a less than significant level both incrementally and cumulatively. Each resource within this IS/MND evaluates the proposed project impacts and mitigates the impacts to less than significant. The proposed project approval is conditioned upon implementation of these mitigation measures and BMPs that avoid incremental effects. Therefore, with mitigation incorporation, cumulative impacts are less than significant.

MITIGATION MEASURES

Refer to **Mitigation Measures BIO-1** and **BIO-2**, and **CUL-1**, as described in the IS/MND sections above.

c) Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?

The new bioreactors and electrical building would be constructed in undeveloped areas on the project site; the remainder of the upgrades would be additions or modifications to existing equipment. The proposed project would be designed to current federal, State, and local structural standards and building codes. The proposed project would not cause substantial adverse effects on human beings. This IS/MND has identified potential impacts in the areas of biological resources, cultural resources and tribal cultural resources that individually are limited and require mitigation to ensure that the impacts would be reduced to a less than significant level both incrementally and cumulatively. Each resource within this IS/MND evaluates the proposed project impacts and mitigates the impacts to less than significant levels. The proposed project approval is conditioned upon implementation of these mitigation measures and BMPs that avoid incremental effects. Therefore, with mitigation incorporation, cumulative impacts are less than significant.

MITIGATION MEASURES

Refer to **Mitigation Measures BIO-1** and **BIO-2**, and **CUL-1**, as described in the IS/MND sections above.

5. List of Preparers and Reviewers

This Draft IS/MND was prepared by Dewberry in cooperation with the other members of the environmental study team. Dewberry was responsible for project management and Draft IS/MND preparation. The Draft IS/MND technical team and other environmental study team members provided technical expertise, as presented below.

Idyllwild Water District (CEQA Lead Agency)

Interim General Manager	**Curt Sauer**

SUSP Engineering

Senior Engineer, Resource Development Unit	**Nathan Thomas**

Duke Cultural Resource Management

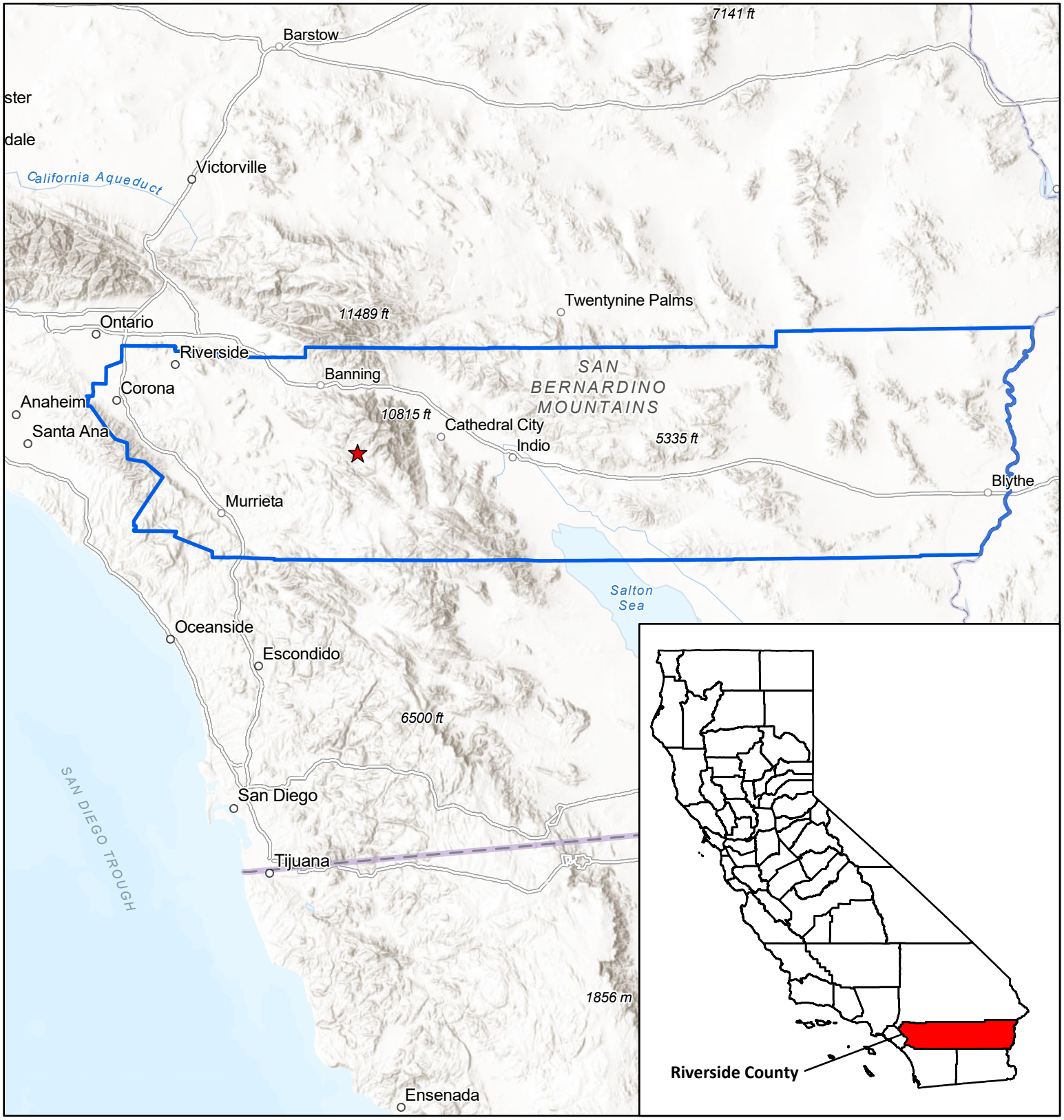
Archaeologist/Field Director	**Alex Bulato**

Dewberry

Environmental Project Manager	**Christa Redd**
Senior Environmental Scientist	**Chris Graham**
Senior Biologist/Environmental Scientist	**Jeff Bray**
Environmental Scientist	**Gianna Gammello**
Graphics/GIS Specialist	**Isabella Ciraulo**

Appendix A: Figures

Regional Location



Idyllwild WWTP Improvement Project

Figure 1-1

Legend

- Project Location
- Riverside County

Dewberry

0 26 Miles

N

Author: I. Ciraulo
Last updated on Thursday, December 28, 2023

Path: \\dewberry.dewberryroot.local\Offices\RanchoCordova\Projects\50128599 - On Call Environmental - CRWA\50128601 - Task Order 2 DEI-IWD 01 Idyllwild CEQA\400 Project Design Files\460 Environ\07 GIS\APRX\ISMND_Idyllwild\ISMND_Idyllwild.aprx

Project Location

Idyllwild WWTP Improvement Project

Figure 1-2

Legend

Project Area (1.73 acres)

0 60 Feet

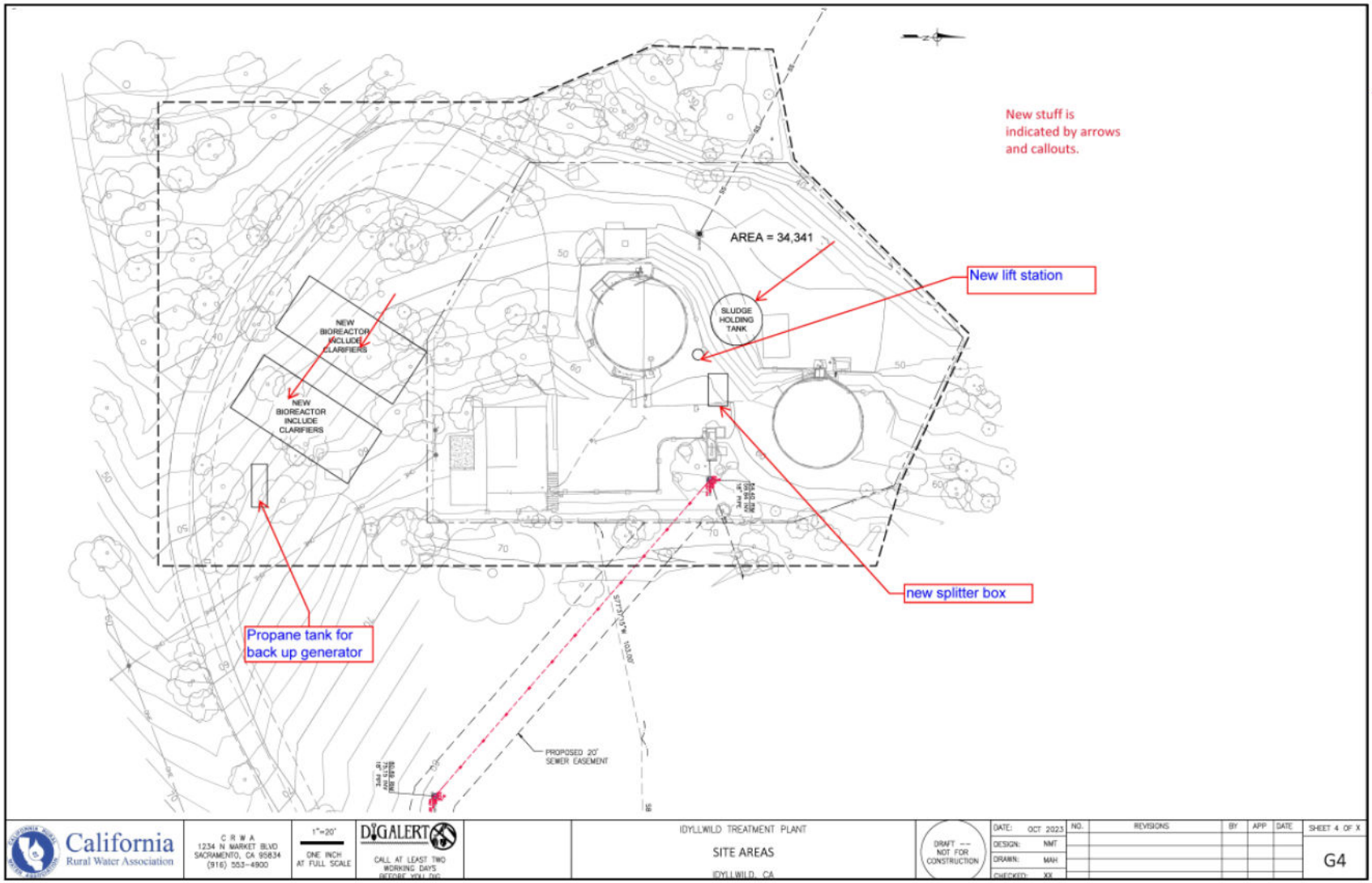
N

Dewberry

Author: I. Ciraulo
Last updated on Thursday, December 28, 2023

Path: \\dewberry.dewberryroot.local\Offices\RanchoCordova\Projects\50128599 - On Call Environmental - CRWA\50128601 - Task Order 2 DEI-IWD 01 Idyllwild CEQA\400 Project Design Files\460 Environ\07 GIS\APRX\ISMND_Idyllwild\ISMND_Idyllwild.aprx

Project Site Plan



Idyllwild Improvement Project

Figure 1-3

Author: A. Piazzoni
Last updated on Monday, January 29, 2024

Dewberry

Path: U:\50128599 - On Call Environmental - CRWA\50128601 - Task Order 2 DEI-IWD 01 Idyllwild CEQA\400 Project Design Files\460 Environ\07 GIS\APRX\Fig1_Fig2\Fig1_Fig2.aprx

Appendix B: Summary of Best Management Practices, Impacts, Mitigation Measures, and Level of Significance

APPENDIX B.

Summary of Best Management Practices (BMPs)

BEST MANAGEMENT PRACTICES (BMPS) TEXT
• Water all exposed surfaces two times daily. Exposed surfaces include, but are not limited to soil poles, graded areas, unpaved parking areas, staging areas, and access roads. • Cover or maintain at least two feet of free board space on haul trucks transporting soil, sand, or other loose material on the site. Any haul trucks that would be traveling along freeways or major roadways should be covered. • Use wet power vacuum street sweepers to remove any visible trackout mud or dirt onto adjacent public roads at least once a day. Use of dry power sweeper is prohibited. • Limit vehicle speeds on unpaved roads to 15 miles per hour (mph). • All roadways, driveways, sidewalks, parking lots to be paved should be completed as soon as possible. In addition, building pads should be laid as soon as possible after grading unless seeding or soil binders are used. • Minimize idling time either by shutting equipment off when not in use or reducing the time of idling to 5 minutes [California Code of Regulations, Title 13, sections 2449(d)(3) and 2485]. Provide clear signage that posts this requirement for workers at the entrances to the site. • Provide current certificate (s) of compliance for CARB's In-Use Off-Road Diesel- Fueled Fleets Regulation [California Code of Regulations, Title 13, sections 2449 and 2449.1]. • Maintain all construction equipment in proper working condition according to manufacturer's specifications. The equipment must be checked by a certified mechanic and determine to be running in proper condition before it is operated. • Use and installation, as applicable, of soil erosion and stormwater runoff control measures, such as but not limited to: chemical stabilization, compost blankets, dust watering during construction, installation of geotextiles, matting and netting on susceptible soil areas, mulching, riprap installation, wind fences, construction track-out controls, fiber rolls, storm drain inlet protection, installation of straw or hay bales. • A Stormwater Pollution Prevention Plan (SWPPP) should be prepared and implemented to address all construction-related activities, equipment, and hazardous materials that have the potential to impact water quality. The SWPPP shall be prepared according to the requirements stated in the NPDES General Permit for Discharges of Storm Water Runoff Associated with Construction Activities (Construction General Permit, Order No. 2022-0057-DWQ, NPDES No. CAS000002), or subsequent permit in effect at the time of construction.

BEST MANAGEMENT PRACTICES (BMPS) TEXT
• An area cleared of vegetation should be designated a smoking area for construction crew. • Fire extinguishers should be located on the project site during project construction activities. • Spark arrestors shall be installed on construction equipment that generate sparks during use. Construction equipment that generates sparks should not be used on days when wind speed is greater than 15 miles per hour (mph). • The construction contractor shall develop and implement a toxic materials control and spill response plan to regulate the use of hazardous materials, such as petroleum-based products used as fuel and lubricants for equipment and other potentially toxic materials associated with project construction. • Fuels and hazardous materials shall not be stored on site or if they are stored on site shall be in a secure area that is not susceptible to release.

Summary of Impacts, Mitigation Measures, and Level of Significance After Mitigation

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
AESTHETICS			
Have a substantial adverse effect on a scenic vista?	No Impact.	None required.	No Impact.
Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	No Impact.	None required.	No Impact.

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
In non-urbanized, areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?	No Impact.	None required.	No Impact.
Create a new source of substantial light or glare which would adversely affect daytime or nighttime views in the area?	No Impact.	None required.	No Impact.
AGRICULTURE AND FORESTRY RESOURCES			
Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	No Impact.	None required.	No Impact.

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Conflict with existing zoning for agricultural use, or a Williamson Act contract?	No Impact.	None required.	No Impact.
Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code section 12220(g)), timberland (as defined by Public Resources Code section 4526), or timberland zoned Timberland Production (as defined by Government Code section 51104(g))?	No Impact.	None required.	No Impact.
Result in the loss of forest land or conversion of forest land to non-forest use?	No Impact.	None required.	No Impact.
Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use?	No Impact.	None required.	No Impact.
AIR QUALITY			
Conflict with or obstruct implementation of the applicable air quality plan?	Less than Significant	None required.	Less than Significant.

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard?	Less than Significant	None required.	Less than Significant.
Expose sensitive receptors to substantial pollutant concentrations?	Less than Significant	None required.	Less than Significant.
Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?	Less than Significant	None required.	Less than Significant.
BIOLOGICAL RESOURCES			
Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	Potentially Significant Impact.	**BIO-1: Nesting Birds:** If construction, grading or other project-related activities in the undeveloped portions of the site (i.e., not within the existing WWTP) are scheduled during the nesting season (February 1 to August 31), a preconstruction nesting survey shall be conducted by a qualified biologist within 14 days from the beginning of construction. The preconstruction surveys shall be included suitable nesting habitat within 100 feet of the construction. If the preconstruction survey does not identify any active nests within areas potentially affected by construction activities, no further mitigation would be required.	Less than Significant with Mitigation Incorporated.

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
		If the preconstruction survey identifies an active nest, a qualified biologist shall establish an appropriate no-work buffer around the active nest(s). The buffer shall be delineated using high visibility fencing. The size of the no-work buffer shall be determined by a qualified biologist based on the species, nest location relative to construction activities, and the nature of the proposed activities. Project activities shall be avoided within the no-work buffer until the nest is deemed no longer active by a qualified biologist. **BIO-2: Special-Status Plants** • A qualified biologist or botanist shall conduct focused surveys for special-status plants during the normal blooming period for the target species. The surveys shall be conducted within the construction area and prior to any ground disturbing activities. The results of the survey shall be documented in a concise memorandum. If the survey results are negative, work can proceed without additional measures. • If special-status plant species are identified within the construction area, a salvage and relocation plan shall be prepared to avoid and minimize direct impacts to special-statue plants. The plan shall identify the methods of salvage (e.g., seed collection, individual transplants) and the relocation area(s), with onsite relocation areas being preferable. The plan shall also include provisions for long-term protections, monitoring, and management requirements	

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
		that ensure the salvaged/relocated species are self-sustaining for a minimum of 5 years at a minimum 1:1 compensation-to-impact ratio.	
Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	No Impact.	None required.	No Impact.
Have a substantial adverse effect on state or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	No Impact.	None required.	No Impact.

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	No Impact.	None required.	No Impact.
Conflict with any local policies or ordinances protecting biological resources, sch as a tree preservation policy or ordinance?	No Impact.	None required.	No Impact.
Conflict with the provisions of an adopted Habitat Conservation plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	No Impact.	None required.	No Impact.
CULTURAL RESOURCES			
Cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?	No Impact.	None. Required.	No Impact.
Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	Potentially Significant.	**CUL-1:** If subsurface deposits believed to be cultural or human in origin are discovered during construction, all work must halt within a 100-foot radius of the discovery. Depending on the nature of the find, a qualified professional archaeologist, meeting the Secretary of the Interior's Professional Qualification Standards for prehistoric or historic archaeology, shall be retained to evaluate the significance of the find, and shall have the authority to modify the no work radius as	Less than Significant with Mitigation Incorporated.

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
		appropriate, using professional judgment. The following notifications shall apply, as necessary: • If the professional archaeologist determines that the find does not represent a cultural resource, work may resume immediately, and no agency notifications are required. • If the professional archaeologist determines that the find does represent a cultural resource from any time period or cultural affiliation, he or she shall immediately notify the lead agency. If the find is determined to be eligible for inclusion in the National Register or California Register, the lead agency shall consult on a finding of eligibility and implement appropriate treatment measures. Work may not resume within the no-work radius until the lead agency, through consultation as appropriate, determines that the site either: 1) is not eligible for the National Register or California Register; or 2) that the treatment measures have been completed to its satisfaction. • If the find includes human remains, or remains that are potentially human, he or she shall ensure reasonable protection measures are taken to protect the discovery from disturbance (AB 2641). The archaeologist shall notify the San Diego County Coroner (in accordance with § 7050.5 of the Health and Safety Code). The provisions of § 7050.5 of the California Health and Safety Code, § 5097.98 of the California PRC, and AB 2641 will be implemented. • If the Coroner determines the remains are Native American and not the result of a crime scene, the Coroner will notify the Native American Heritage Commission (NAHC), which then will designate a Native American Most Likely Descendant (MLD) for the project (§ 5097.98 of the PRC). The designated	

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
		MLD will have 48 hours from the time access to the property is granted to make recommendations concerning treatment of the remains. If the landowner does not agree with the recommendations of the MLD, the NAHC can mediate (§ 5097.94 of the PRC). If no agreement is reached, the landowner must rebury the remains where they will not be further disturbed (§ 5097.98 of the PRC). This will also include either recording the site with the NAHC or the appropriate information center; using an open space or conservation zoning designation or easement; or recording a reinternment document with the county in which the property is located (AB 2641). Work may not resume within the no-work radius until the lead agencies, through consultation as appropriate, determine that the treatment measures have been completed to their satisfaction.	
Disturb any human remains, including those interred outside of formal cemeteries?	Potentially Significant.	Implementation of Mitigation Measure CUL-1.	Less than Significant Impact with Mitigation Incorporated.
ENERGY			
Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of	No Impact.	None required.	No Impact.

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
energy resources, during project construction or operation?			
Conflict with or obstruct a state or local plan for renewable energy or energy efficiency?	No Impact.	None required.	No Impact.
GEOLOGY AND SOILS			
Directly or indirectly cause potential substantial adverse effect, including the risk of loss, injury, or death involving: i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?	No Impact.	None required.	No Impact.
ii. Strong seismic ground shaking?			
iii. Seismic-related ground failure, including liquefaction?	No Impact.	None required.	No Impact.
iv. Landslides?	No Impact.	None required.	No Impact.

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Result in substantial soil erosion or the loss of topsoil?	No Impact.	None required.	No Impact.
Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?	No Impact.	None required.	No Impact.
Be located on expansive soil, as defined in Table 18-1-Bof the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?	No Impact.	None required.	No Impact.
Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	No Impact.	None required.	No Impact.
Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?	No Impact.	None required.	No Impact.
GREENHOUSE GAS EMISSIONS			

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	Less than Significant	None required.	Less than Significant.
Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	Less than Significant	None required.	Less than Significant.
HAZARDS AND HAZARDOUS MATERIALS			
Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	Less than Significant	None required.	Less than Significant.
Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	Less than Significant	None required.	Less than Significant.
Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	No Impact.	None required.	No Impact.
Be located on a site which is included on a list of hazardous materials sites compiled pursuant	No Impact.	None required.	No Impact.

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?			
For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working in the project area?	No Impact.	None required.	No Impact.
Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	No Impact.	None required.	No Impact.
Expose people or structures, either directly or indirectly, to a significant risk of loss, injury or death involving wildland fires?	Less than Significant	None required.	Less than Significant.
HYDROLOGY AND WATER QUALITY			
Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality?	No Impact.	None required.	No Impact.

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Substantially decrease ground water supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?	No Impact.	None required.	No Impact.
Substantially alter the existing drainage pattern of a site or area through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner that would: i. Result in substantial erosion or siltation on- or off-site?	No Impact.	None required.	No Impact.
ii. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?	No Impact.	b) None required.	No Impact.
iii. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide	No Impact.	None required.	No Impact.

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
substantial additional sources of polluted runoff?			
iv. Impede or redirect flood flows?	No Impact.	None required.	No Impact.
In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?	No Impact.	None required.	No Impact.
Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?	No Impact.	None required.	No Impact.
LAND USE AND PLANNING			
Physically divide an established community?	No Impact.	None required.	No Impact.
Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?	No Impact.	None required.	No Impact.
MINERAL RESOURCES			

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	No Impact.	None required.	No Impact.
Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	No Impact.	None required.	No Impact.
NOISE			
Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	Less than Significant	None required.	Less than Significant.
Generate excessive groundborne vibration or groundborne noise levels?	Less than Significant	None required.	Less than Significant.
For a project located within the vicinity of a private airstrip or an airport land use plan, or, where such a plan has not been adopted, in an area within two miles of a public airport or public use airport, would the project	No Impact.	None required.	No Impact.

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
expose people residing or working in the area to excessive noise levels?			
POPULATION AND HOUSING			
Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?	No Impact.	None required.	No Impact.
Displace substantial numbers of existing people or housing units, necessitating the construction of replacement housing elsewhere?	No Impact.	None required.	No Impact.
PUBLIC SERVICES			
Result in substantial adverse physical impacts associated with the provision of, or the need for, new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times, or other performance objectives for any of the following public services:	No Impact.	None required.	No Impact.

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
i. Fire protection?			
ii. Police protection?	No Impact.	None required.	No Impact.
iii. Schools?	No Impact.	None required.	No Impact.
iv. Parks?	No Impact.	None required.	No Impact.
v. Other public facilities?	No Impact.	None required.	No Impact.
RECREATION			
Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated?	No Impact.	None required.	No Impact.
Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment?	No Impact.	None required.	No Impact.
TRANSPORTATION			

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Conflict with a program plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?	No Impact.	None required.	No Impact.
Conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)?	Less than Significant	None required.	Less than Significant.
Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	No Impact.	None required.	No Impact.
Result in inadequate emergency access?	No Impact.	None required.	No Impact.
TRIBAL CULTURAL RESOURCES			
Would the project cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resource Code section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a	Potentially Significant.	Implementation of Mitigation Measure CUL-1. TCR-1: A member of the Cahuilla Band of Indians shall be present, as a monitor during all earthmoving activities of native (non-fill) soils during project construction activities. If artifacts are found during such activities, implementation of Mitigation Measure CUL-1 shall occur to ensure that such resources are protected as applicable.	Less than Significant with Mitigation Incorporated.

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
California Native American tribe, and that is: a) Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)?			
b) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision C, of Public Resources Code Section 5024.1, the lead agency shall consider the significance of the resources to a California Native American tribe.	Potentially Significant.	Implementation of Mitigation Measures CUL-1 and TRC-1.	Less than Significant with Mitigation Incorporated.
UTILITIES AND SERVICE SYSTEMS			

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Require or result in the relocation or construction of new or expanded water, wastewater treatment or storm water drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?	No Impact.	None required.	No Impact.
Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?	No Impact.	None required.	No Impact.
Result in a determination by the wastewater treatment provider that would serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	No Impact.	None required.	No Impact.
Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?	No Impact.	None required.	No Impact.

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?	No Impact.	None required.	No Impact.
WILDFIRE			
Substantially impair an adopted emergency response plan or emergency evacuation plan?	Less than Significant.	None required.	Less than Significant.
Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of wildfire?	Less than Significant.	None required.	Less than Significant.
Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?	Less than Significant.	None required.	Less than Significant.
Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result	Less than Significant.	None required.	Less than Significant.

POTENTIAL IMPACT	LEVEL OR SIGNIFICANCE BEFORE MITIGATION	MITIGATION MEASURES	LEVEL OF SIGNIFICANCE AFTER MITIGATION
of run-off, post0fire slope instability, or drainage changes?			
MANDATORY FINDINGS OF SIGNIFICANCE			
Have the potential to substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?	Potentially Significant Impact.	Implementation of Mitigation Measures BIO-1, BIO-2, and CUL-1.	Less than Significant with Mitigation Incorporated.
Have impacts that are individually limited, but cumulatively considerable?	Potentially Significant Impact.	Implementation of Mitigation Measures BIO-1, BIO-2, and CUL-1.	Less than Significant with Mitigation Incorporated.
Have environmental effects that would cause substantial adverse effects on human beings, either directly or indirectly?	Potentially Significant Impact.	Implementation of Mitigation Measures BIO-1, BIO-2, and CUL-1.	Less than Significant with Mitigation Incorporated.

Appendix C: CalEEMod Air Quality/Greenhouse Gas Output

Idyllwild WWTP Replacement Project Detailed Report

Table of Contents

1. Basic Project Information

1.1. Basic Project Information

Data Field	Value
Project Name	Idyllwild WWTP Replacement Project
Construction Start Date	4/1/2025
Operational Year	2027
Lead Agency	—
Land Use Scale	Project/site
Analysis Level for Defaults	County
Windspeed (m/s)	3.30
Precipitation (days)	18.6
Location	33.73266, -116.748505
County	Riverside-South Coast
City	Unincorporated
Air District	South Coast AQMD
Air Basin	South Coast
TAZ	5636
EDFZ	11
Electric Utility	Southern California Edison
Gas Utility	Southern California Gas
App Version	2022.1.1.21

1.2. Land Use Types

Land Use Subtype	Size	Unit	Lot Acreage	Building Area (sq ft)	Landscape Area (sq ft)	Special Landscape Area (sq ft)	Population	Description

General Light Industry	1.73	1000sqft	1.73	0.00	0.00	0.00	—	WWTP

1.3. User-Selected Emission Reduction Measures by Emissions Sector

Sector	#	Measure Title
Construction	C-1-A	Use Electric or Hybrid Powered Equipment
Construction	C-1-B	Use Cleaner-Fuel Equipment
Construction	C-2*	Limit Heavy-Duty Diesel Vehicle Idling
Construction	C-3	Use Local Construction Contractors
Construction	C-5	Use Advanced Engine Tiers
Construction	C-6	Use Diesel Particulate Filters
Construction	C-7	Use Oxidation Catalyst
Construction	C-8	Use Renewable Diesel
Construction	C-9	Use Dust Suppressants
Construction	C-10-A	Water Exposed Surfaces
Construction	C-11	Limit Vehicle Speeds on Unpaved Roads
Construction	C-12	Sweep Paved Roads

* Qualitative or supporting measure. Emission reductions not included in the mitigated emissions results.

2. Emissions Summary

2.1. Construction Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.94	0.79	7.10	8.70	0.01	0.34	0.00	0.34	0.32	0.00	0.32	—	1,348	1,348	0.05	0.01	0.00	1,352

Mit.	0.94	0.79	7.10	8.70	0.01	0.34	0.00	0.34	0.32	0.00	0.32	—	1,348	1,348	0.05	0.01	0.00	1,352
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.94	0.79	7.10	8.70	0.01	0.34	0.00	0.34	0.32	0.00	0.32	—	1,348	1,348	0.05	0.01	0.00	1,352
Mit.	0.94	0.79	7.10	8.70	0.01	0.34	0.00	0.34	0.32	0.00	0.32	—	1,348	1,348	0.05	0.01	0.00	1,352
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.64	0.53	4.72	6.19	0.01	0.22	0.00	0.22	0.20	0.00	0.20	—	962	962	0.04	0.01	0.00	965
Mit.	0.64	0.53	4.72	6.19	0.01	0.22	0.00	0.22	0.20	0.00	0.20	—	962	962	0.04	0.01	0.00	965
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.12	0.10	0.86	1.13	< 0.005	0.04	0.00	0.04	0.04	0.00	0.04	—	159	159	0.01	< 0.005	0.00	160
Mit.	0.12	0.10	0.86	1.13	< 0.005	0.04	0.00	0.04	0.04	0.00	0.04	—	159	159	0.01	< 0.005	0.00	160
% Reduced	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

2.2. Construction Emissions by Year, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	0.94	0.79	7.10	8.70	0.01	0.34	0.00	0.34	0.32	0.00	0.32	—	1,348	1,348	0.05	0.01	0.00	1,352

2026	0.89	0.75	6.61	8.67	0.01	0.31	0.00	0.31	0.28	0.00	0.28	—	1,347	1,347	0.05	0.01	0.00	1,351
2027	0.85	0.72	6.26	8.68	0.01	0.28	0.00	0.28	0.26	0.00	0.26	—	1,347	1,347	0.05	0.01	0.00	1,352
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	0.94	0.79	7.10	8.70	0.01	0.34	0.00	0.34	0.32	0.00	0.32	—	1,348	1,348	0.05	0.01	0.00	1,352
2026	0.89	0.75	6.61	8.67	0.01	0.31	0.00	0.31	0.28	0.00	0.28	—	1,347	1,347	0.05	0.01	0.00	1,351
2027	0.85	0.72	6.26	8.68	0.01	0.28	0.00	0.28	0.26	0.00	0.26	—	1,347	1,347	0.05	0.01	0.00	1,352
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	0.51	0.42	3.82	4.68	0.01	0.19	0.00	0.19	0.17	0.00	0.17	—	725	725	0.03	0.01	0.00	728
2026	0.64	0.53	4.72	6.19	0.01	0.22	0.00	0.22	0.20	0.00	0.20	—	962	962	0.04	0.01	0.00	965
2027	0.15	0.13	1.11	1.55	< 0.005	0.05	0.00	0.05	0.05	0.00	0.05	—	240	240	0.01	< 0.005	0.00	241
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	0.09	0.08	0.70	0.85	< 0.005	0.03	0.00	0.03	0.03	0.00	0.03	—	120	120	< 0.005	< 0.005	0.00	120
2026	0.12	0.10	0.86	1.13	< 0.005	0.04	0.00	0.04	0.04	0.00	0.04	—	159	159	0.01	< 0.005	0.00	160
2027	0.03	0.02	0.20	0.28	< 0.005	0.01	0.00	0.01	0.01	0.00	0.01	—	39.7	39.7	< 0.005	< 0.005	0.00	39.9

2.3. Construction Emissions by Year, Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Year	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily - Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	0.94	0.79	7.10	8.70	0.01	0.34	0.00	0.34	0.32	0.00	0.32	—	1,348	1,348	0.05	0.01	0.00	1,352
2026	0.89	0.75	6.61	8.67	0.01	0.31	0.00	0.31	0.28	0.00	0.28	—	1,347	1,347	0.05	0.01	0.00	1,351
2027	0.85	0.72	6.26	8.68	0.01	0.28	0.00	0.28	0.26	0.00	0.26	—	1,347	1,347	0.05	0.01	0.00	1,352
Daily - Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

2025	0.94	0.79	7.10	8.70	0.01	0.34	0.00	0.34	0.32	0.00	0.32	—	1,348	1,348	0.05	0.01	0.00	1,352
2026	0.89	0.75	6.61	8.67	0.01	0.31	0.00	0.31	0.28	0.00	0.28	—	1,347	1,347	0.05	0.01	0.00	1,351
2027	0.85	0.72	6.26	8.68	0.01	0.28	0.00	0.28	0.26	0.00	0.26	—	1,347	1,347	0.05	0.01	0.00	1,352
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	0.51	0.42	3.82	4.68	0.01	0.19	0.00	0.19	0.17	0.00	0.17	—	725	725	0.03	0.01	0.00	728
2026	0.64	0.53	4.72	6.19	0.01	0.22	0.00	0.22	0.20	0.00	0.20	—	962	962	0.04	0.01	0.00	965
2027	0.15	0.13	1.11	1.55	< 0.005	0.05	0.00	0.05	0.05	0.00	0.05	—	240	240	0.01	< 0.005	0.00	241
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2025	0.09	0.08	0.70	0.85	< 0.005	0.03	0.00	0.03	0.03	0.00	0.03	—	120	120	< 0.005	< 0.005	0.00	120
2026	0.12	0.10	0.86	1.13	< 0.005	0.04	0.00	0.04	0.04	0.00	0.04	—	159	159	0.01	< 0.005	0.00	160
2027	0.03	0.02	0.20	0.28	< 0.005	0.01	0.00	0.01	0.01	0.00	0.01	—	39.7	39.7	< 0.005	< 0.005	0.00	39.9

2.4. Operations Emissions Compared Against Thresholds

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Un/Mit.	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.06	0.05	0.08	0.82	< 0.005	< 0.005	0.21	0.21	< 0.005	0.05	0.05	1.92	243	245	0.20	0.01	0.77	254
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.06	0.05	0.09	0.66	< 0.005	< 0.005	0.21	0.21	< 0.005	0.05	0.05	1.92	228	230	0.20	0.01	0.02	239
Average Daily (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Unmit.	0.05	0.04	0.08	0.62	< 0.005	< 0.005	0.19	0.19	< 0.005	0.05	0.05	1.92	210	212	0.20	0.01	0.30	220
Annual (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Unmit.	0.01	0.01	0.02	0.11	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	0.32	34.7	35.0	0.03	< 0.005	0.05	36.4

2.5. Operations Emissions by Sector, Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.06	0.05	0.08	0.82	< 0.005	< 0.005	0.21	0.21	< 0.005	0.05	0.05	—	239	239	0.01	0.01	0.77	243
Area	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Water	—	—	—	—	—	—	—	—	—	—	—	0.77	3.97	4.74	0.08	< 0.005	—	7.27
Waste	—	—	—	—	—	—	—	—	—	—	—	1.16	0.00	1.16	0.12	0.00	—	4.04
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	0.06	0.05	0.08	0.82	< 0.005	< 0.005	0.21	0.21	< 0.005	0.05	0.05	1.92	243	245	0.20	0.01	0.77	254
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.06	0.05	0.09	0.66	< 0.005	< 0.005	0.21	0.21	< 0.005	0.05	0.05	—	224	224	0.01	0.01	0.02	227
Area	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Water	—	—	—	—	—	—	—	—	—	—	—	0.77	3.97	4.74	0.08	< 0.005	—	7.27
Waste	—	—	—	—	—	—	—	—	—	—	—	1.16	0.00	1.16	0.12	0.00	—	4.04
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	0.06	0.05	0.09	0.66	< 0.005	< 0.005	0.21	0.21	< 0.005	0.05	0.05	1.92	228	230	0.20	0.01	0.02	239
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.05	0.04	0.08	0.62	< 0.005	< 0.005	0.19	0.19	< 0.005	0.05	0.05	—	206	206	0.01	0.01	0.30	209
Area	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00

Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Water	—	—	—	—	—	—	—	—	—	—	—	0.77	3.97	4.74	0.08	< 0.005	—	7.27
Waste	—	—	—	—	—	—	—	—	—	—	—	1.16	0.00	1.16	0.12	0.00	—	4.04
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	0.05	0.04	0.08	0.62	< 0.005	< 0.005	0.19	0.19	< 0.005	0.05	0.05	1.92	210	212	0.20	0.01	0.30	220
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.01	0.01	0.02	0.11	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	—	34.0	34.0	< 0.005	< 0.005	0.05	34.6
Area	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Water	—	—	—	—	—	—	—	—	—	—	—	0.13	0.66	0.78	0.01	< 0.005	—	1.20
Waste	—	—	—	—	—	—	—	—	—	—	—	0.19	0.00	0.19	0.02	0.00	—	0.67
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	0.01	0.01	0.02	0.11	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	0.32	34.7	35.0	0.03	< 0.005	0.05	36.4

2.6. Operations Emissions by Sector, Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Sector	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.06	0.05	0.08	0.82	< 0.005	< 0.005	0.21	0.21	< 0.005	0.05	0.05	—	239	239	0.01	0.01	0.77	243
Area	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Water	—	—	—	—	—	—	—	—	—	—	—	0.77	3.97	4.74	0.08	< 0.005	—	7.27
Waste	—	—	—	—	—	—	—	—	—	—	—	1.16	0.00	1.16	0.12	0.00	—	4.04
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	0.06	0.05	0.08	0.82	< 0.005	< 0.005	0.21	0.21	< 0.005	0.05	0.05	1.92	243	245	0.20	0.01	0.77	254

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.06	0.05	0.09	0.66	< 0.005	< 0.005	0.21	0.21	< 0.005	0.05	0.05	—	224	224	0.01	0.01	0.02	227
Area	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Water	—	—	—	—	—	—	—	—	—	—	—	0.77	3.97	4.74	0.08	< 0.005	—	7.27
Waste	—	—	—	—	—	—	—	—	—	—	—	1.16	0.00	1.16	0.12	0.00	—	4.04
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	0.06	0.05	0.09	0.66	< 0.005	< 0.005	0.21	0.21	< 0.005	0.05	0.05	1.92	228	230	0.20	0.01	0.02	239
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.05	0.04	0.08	0.62	< 0.005	< 0.005	0.19	0.19	< 0.005	0.05	0.05	—	206	206	0.01	0.01	0.30	209
Area	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Water	—	—	—	—	—	—	—	—	—	—	—	0.77	3.97	4.74	0.08	< 0.005	—	7.27
Waste	—	—	—	—	—	—	—	—	—	—	—	1.16	0.00	1.16	0.12	0.00	—	4.04
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	0.05	0.04	0.08	0.62	< 0.005	< 0.005	0.19	0.19	< 0.005	0.05	0.05	1.92	210	212	0.20	0.01	0.30	220
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Mobile	0.01	0.01	0.02	0.11	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	—	34.0	34.0	< 0.005	< 0.005	0.05	34.6
Area	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Energy	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Water	—	—	—	—	—	—	—	—	—	—	—	0.13	0.66	0.78	0.01	< 0.005	—	1.20
Waste	—	—	—	—	—	—	—	—	—	—	—	0.19	0.00	0.19	0.02	0.00	—	0.67
Refrig.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	0.01	0.01	0.02	0.11	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	0.32	34.7	35.0	0.03	< 0.005	0.05	36.4

3. Construction Emissions Details

3.1. Improvements (2025) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.94	0.79	7.10	8.70	0.01	0.34	—	0.34	0.32	—	0.32	—	1,348	1,348	0.05	0.01	—	1,352
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.94	0.79	7.10	8.70	0.01	0.34	—	0.34	0.32	—	0.32	—	1,348	1,348	0.05	0.01	—	1,352
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.51	0.42	3.82	4.68	0.01	0.19	—	0.19	0.17	—	0.17	—	725	725	0.03	0.01	—	728
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.09	0.08	0.70	0.85	< 0.005	0.03	—	0.03	0.03	—	0.03	—	120	120	< 0.005	< 0.005	—	120
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.2. Improvements (2025) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.94	0.79	7.10	8.70	0.01	0.34	—	0.34	0.32	—	0.32	—	1,348	1,348	0.05	0.01	—	1,352
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.94	0.79	7.10	8.70	0.01	0.34	—	0.34	0.32	—	0.32	—	1,348	1,348	0.05	0.01	—	1,352
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.51	0.42	3.82	4.68	0.01	0.19	—	0.19	0.17	—	0.17	—	725	725	0.03	0.01	—	728
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.09	0.08	0.70	0.85	< 0.005	0.03	—	0.03	0.03	—	0.03	—	120	120	< 0.005	< 0.005	—	120
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.3. Improvements (2026) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.89	0.75	6.61	8.67	0.01	0.31	—	0.31	0.28	—	0.28	—	1,347	1,347	0.05	0.01	—	1,351
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.89	0.75	6.61	8.67	0.01	0.31	—	0.31	0.28	—	0.28	—	1,347	1,347	0.05	0.01	—	1,351
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.64	0.53	4.72	6.19	0.01	0.22	—	0.22	0.20	—	0.20	—	962	962	0.04	0.01	—	965
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.12	0.10	0.86	1.13	< 0.005	0.04	—	0.04	0.04	—	0.04	—	159	159	0.01	< 0.005	—	160
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.4. Improvements (2026) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.89	0.75	6.61	8.67	0.01	0.31	—	0.31	0.28	—	0.28	—	1,347	1,347	0.05	0.01	—	1,351
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.89	0.75	6.61	8.67	0.01	0.31	—	0.31	0.28	—	0.28	—	1,347	1,347	0.05	0.01	—	1,351
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.64	0.53	4.72	6.19	0.01	0.22	—	0.22	0.20	—	0.20	—	962	962	0.04	0.01	—	965
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.12	0.10	0.86	1.13	< 0.005	0.04	—	0.04	0.04	—	0.04	—	159	159	0.01	< 0.005	—	160
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.5. Improvements (2027) - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Off-Road Equipment	0.85	0.72	6.26	8.68	0.01	0.28	—	0.28	0.26	—	0.26	—	1,347	1,347	0.05	0.01	—	1,352
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.85	0.72	6.26	8.68	0.01	0.28	—	0.28	0.26	—	0.26	—	1,347	1,347	0.05	0.01	—	1,352
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	0.13	1.11	1.55	< 0.005	0.05	—	0.05	0.05	—	0.05	—	240	240	0.01	< 0.005	—	241
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.20	0.28	< 0.005	0.01	—	0.01	0.01	—	0.01	—	39.7	39.7	< 0.005	< 0.005	—	39.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

3.6. Improvements (2027) - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Location	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Onsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.85	0.72	6.26	8.68	0.01	0.28	—	0.28	0.26	—	0.26	—	1,347	1,347	0.05	0.01	—	1,352
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.85	0.72	6.26	8.68	0.01	0.28	—	0.28	0.26	—	0.26	—	1,347	1,347	0.05	0.01	—	1,352
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.15	0.13	1.11	1.55	< 0.005	0.05	—	0.05	0.05	—	0.05	—	240	240	0.01	< 0.005	—	241
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Off-Road Equipment	0.03	0.02	0.20	0.28	< 0.005	0.01	—	0.01	0.01	—	0.01	—	39.7	39.7	< 0.005	< 0.005	—	39.9
Onsite truck	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Offsite	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Average Daily	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Worker	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

Vendor	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00
Hauling	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	0.00	0.00	0.00	0.00

4. Operations Emissions Details

4.1. Mobile Emissions by Land Use

4.1.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	0.06	0.05	0.08	0.82	< 0.005	< 0.005	0.21	0.21	< 0.005	0.05	0.05	—	239	239	0.01	0.01	0.77	243
Total	0.06	0.05	0.08	0.82	< 0.005	< 0.005	0.21	0.21	< 0.005	0.05	0.05	—	239	239	0.01	0.01	0.77	243
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	0.06	0.05	0.09	0.66	< 0.005	< 0.005	0.21	0.21	< 0.005	0.05	0.05	—	224	224	0.01	0.01	0.02	227
Total	0.06	0.05	0.09	0.66	< 0.005	< 0.005	0.21	0.21	< 0.005	0.05	0.05	—	224	224	0.01	0.01	0.02	227
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	0.01	0.01	0.02	0.11	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	—	34.0	34.0	< 0.005	< 0.005	0.05	34.6
Total	0.01	0.01	0.02	0.11	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	—	34.0	34.0	< 0.005	< 0.005	0.05	34.6

4.1.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	0.06	0.05	0.08	0.82	< 0.005	< 0.005	0.21	0.21	< 0.005	0.05	0.05	—	239	239	0.01	0.01	0.77	243
Total	0.06	0.05	0.08	0.82	< 0.005	< 0.005	0.21	0.21	< 0.005	0.05	0.05	—	239	239	0.01	0.01	0.77	243
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	0.06	0.05	0.09	0.66	< 0.005	< 0.005	0.21	0.21	< 0.005	0.05	0.05	—	224	224	0.01	0.01	0.02	227
Total	0.06	0.05	0.09	0.66	< 0.005	< 0.005	0.21	0.21	< 0.005	0.05	0.05	—	224	224	0.01	0.01	0.02	227
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	0.01	0.01	0.02	0.11	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	—	34.0	34.0	< 0.005	< 0.005	0.05	34.6
Total	0.01	0.01	0.02	0.11	< 0.005	< 0.005	0.03	0.03	< 0.005	0.01	0.01	—	34.0	34.0	< 0.005	< 0.005	0.05	34.6

4.2. Energy

4.2.1. Electricity Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00

4.2.2. Electricity Emissions By Land Use - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00	0.00	0.00	—	0.00

4.2.3. Natural Gas Emissions By Land Use - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00

4.2.4. Natural Gas Emissions By Land Use - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00

4.3. Area Emissions by Source

4.3.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Consum Products	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00

4.3.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Source	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Landscape Equipment	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Consumer Products	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Architectural Coatings	—	0.00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Landscape Equipme	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00
Total	0.00	0.00	0.00	0.00	0.00	0.00	—	0.00	0.00	—	0.00	—	0.00	0.00	0.00	0.00	—	0.00

4.4. Water Emissions by Land Use

4.4.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	0.77	3.97	4.74	0.08	< 0.005	—	7.27
Total	—	—	—	—	—	—	—	—	—	—	—	0.77	3.97	4.74	0.08	< 0.005	—	7.27
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	0.77	3.97	4.74	0.08	< 0.005	—	7.27
Total	—	—	—	—	—	—	—	—	—	—	—	0.77	3.97	4.74	0.08	< 0.005	—	7.27
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	0.13	0.66	0.78	0.01	< 0.005	—	1.20
Total	—	—	—	—	—	—	—	—	—	—	—	0.13	0.66	0.78	0.01	< 0.005	—	1.20

4.4.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	0.77	3.97	4.74	0.08	< 0.005	—	7.27
Total	—	—	—	—	—	—	—	—	—	—	—	0.77	3.97	4.74	0.08	< 0.005	—	7.27
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	0.77	3.97	4.74	0.08	< 0.005	—	7.27
Total	—	—	—	—	—	—	—	—	—	—	—	0.77	3.97	4.74	0.08	< 0.005	—	7.27
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	0.13	0.66	0.78	0.01	< 0.005	—	1.20
Total	—	—	—	—	—	—	—	—	—	—	—	0.13	0.66	0.78	0.01	< 0.005	—	1.20

4.5. Waste Emissions by Land Use

4.5.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

General Light Industry	—	—	—	—	—	—	—	—	—	—	—	1.16	0.00	1.16	0.12	0.00	—	4.04
Total	—	—	—	—	—	—	—	—	—	—	—	1.16	0.00	1.16	0.12	0.00	—	4.04
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	1.16	0.00	1.16	0.12	0.00	—	4.04
Total	—	—	—	—	—	—	—	—	—	—	—	1.16	0.00	1.16	0.12	0.00	—	4.04
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	0.19	0.00	0.19	0.02	0.00	—	0.67
Total	—	—	—	—	—	—	—	—	—	—	—	0.19	0.00	0.19	0.02	0.00	—	0.67

4.5.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	1.16	0.00	1.16	0.12	0.00	—	4.04
Total	—	—	—	—	—	—	—	—	—	—	—	1.16	0.00	1.16	0.12	0.00	—	4.04
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	1.16	0.00	1.16	0.12	0.00	—	4.04

Total	—	—	—	—	—	—	—	—	—	—	—	1.16	0.00	1.16	0.12	0.00	—	4.04
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	0.19	0.00	0.19	0.02	0.00	—	0.67
Total	—	—	—	—	—	—	—	—	—	—	—	0.19	0.00	0.19	0.02	0.00	—	0.67

4.6. Refrigerant Emissions by Land Use

4.6.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00

4.6.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
General Light Industry	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.00	0.00

4.7. Offroad Emissions By Equipment Type

4.7.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e

Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.7.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.8. Stationary Emissions By Equipment Type

4.8.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.8.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.9. User Defined Emissions By Equipment Type

4.9.1. Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.9.2. Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Equipment Type	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10. Soil Carbon Accumulation By Vegetation Type

4.10.1. Soil Carbon Accumulation By Vegetation Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.2. Above and Belowground Carbon Accumulation by Land Use Type - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.3. Avoided and Sequestered Emissions by Species - Unmitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Sequest	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.4. Soil Carbon Accumulation By Vegetation Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Vegetation	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.5. Above and Belowground Carbon Accumulation by Land Use Type - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Land Use	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

4.10.6. Avoided and Sequestered Emissions by Species - Mitigated

Criteria Pollutants (lb/day for daily, ton/yr for annual) and GHGs (lb/day for daily, MT/yr for annual)

Species	TOG	ROG	NOx	CO	SO2	PM10E	PM10D	PM10T	PM2.5E	PM2.5D	PM2.5T	BCO2	NBCO2	CO2T	CH4	N2O	R	CO2e
Daily, Summer (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Daily, Winter (Max)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Annual	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Avoided	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sequestered	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Removed	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subtotal	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

5. Activity Data

5.1. Construction Schedule

Phase Name	Phase Type	Start Date	End Date	Days Per Week	Work Days per Phase	Phase Description
Improvements	Building Construction	4/1/2025	4/1/2027	5.00	523	—

5.2. Off-Road Equipment

5.2.1. Unmitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Improvements	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Improvements	Tractors/Loaders/Backhoes	Diesel	Average	1.00	6.00	84.0	0.37

Improvements	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Improvements	Graders	Diesel	Average	1.00	8.00	148	0.41
Improvements	Pavers	Diesel	Average	1.00	8.00	81.0	0.42

5.2.2. Mitigated

Phase Name	Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor
Improvements	Generator Sets	Diesel	Average	1.00	8.00	14.0	0.74
Improvements	Tractors/Loaders/Backhoes	Diesel	Average	1.00	6.00	84.0	0.37
Improvements	Excavators	Diesel	Average	1.00	8.00	36.0	0.38
Improvements	Graders	Diesel	Average	1.00	8.00	148	0.41
Improvements	Pavers	Diesel	Average	1.00	8.00	81.0	0.42

5.3. Construction Vehicles

5.3.1. Unmitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Improvements	—	—	—	—
Improvements	Worker	0.00	18.5	LDA,LDT1,LDT2
Improvements	Vendor	0.00	10.2	HHDT,MHDT
Improvements	Hauling	0.00	20.0	HHDT
Improvements	Onsite truck	—	—	HHDT

5.3.2. Mitigated

Phase Name	Trip Type	One-Way Trips per Day	Miles per Trip	Vehicle Mix
Improvements	—	—	—	—
Improvements	Worker	0.00	0.00	LDA,LDT1,LDT2

Improvements	Vendor	0.00	10.2	HHDT,MHDT
Improvements	Hauling	0.00	20.0	HHDT
Improvements	Onsite truck	—	—	HHDT

5.4. Vehicles

5.4.1. Construction Vehicle Control Strategies

Non-applicable. No control strategies activated by user.

5.5. Architectural Coatings

Phase Name	Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)

5.6. Dust Mitigation

5.6.1. Construction Earthmoving Activities

Phase Name	Material Imported (cy)	Material Exported (cy)	Acres Graded (acres)	Material Demolished (sq. ft.)	Acres Paved (acres)

5.6.2. Construction Earthmoving Control Strategies

Non-applicable. No control strategies activated by user.

5.7. Construction Paving

Land Use	Area Paved (acres)	% Asphalt
General Light Industry	0.00	0%

5.8. Construction Electricity Consumption and Emissions Factors

kWh per Year and Emission Factor (lb/MWh)

Year	kWh per Year	CO2	CH4	N2O

2025	0.00	532	0.03	< 0.005
2026	0.00	532	0.03	< 0.005
2027	0.00	532	0.03	< 0.005

5.9. Operational Mobile Sources

5.9.1. Unmitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
General Light Industry	8.58	3.44	8.65	2,868	295	118	297	98,480

5.9.2. Mitigated

Land Use Type	Trips/Weekday	Trips/Saturday	Trips/Sunday	Trips/Year	VMT/Weekday	VMT/Saturday	VMT/Sunday	VMT/Year
General Light Industry	8.58	3.44	8.65	2,868	295	118	297	98,480

5.10. Operational Area Sources

5.10.1. Hearths

5.10.1.1. Unmitigated

5.10.1.2. Mitigated

5.10.2. Architectural Coatings

Residential Interior Area Coated (sq ft)	Residential Exterior Area Coated (sq ft)	Non-Residential Interior Area Coated (sq ft)	Non-Residential Exterior Area Coated (sq ft)	Parking Area Coated (sq ft)
0	0.00	0.00	0.00	—

5.10.3. Landscape Equipment

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	250

5.10.4. Landscape Equipment - Mitigated

Season	Unit	Value
Snow Days	day/yr	0.00
Summer Days	day/yr	250

5.11. Operational Energy Consumption

5.11.1. Unmitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
General Light Industry	0.00	532	0.0330	0.0040	0.00

5.11.2. Mitigated

Electricity (kWh/yr) and CO2 and CH4 and N2O and Natural Gas (kBTU/yr)

Land Use	Electricity (kWh/yr)	CO2	CH4	N2O	Natural Gas (kBTU/yr)
General Light Industry	0.00	532	0.0330	0.0040	0.00

5.12. Operational Water and Wastewater Consumption

5.12.1. Unmitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)

General Light Industry	400,063	0.00

5.12.2. Mitigated

Land Use	Indoor Water (gal/year)	Outdoor Water (gal/year)
General Light Industry	400,063	0.00

5.13. Operational Waste Generation

5.13.1. Unmitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
General Light Industry	2.15	—

5.13.2. Mitigated

Land Use	Waste (ton/year)	Cogeneration (kWh/year)
General Light Industry	2.15	—

5.14. Operational Refrigeration and Air Conditioning Equipment

5.14.1. Unmitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
General Light Industry	Other commercial A/C and heat pumps	R-410A	2,088	0.30	4.00	4.00	18.0

5.14.2. Mitigated

Land Use Type	Equipment Type	Refrigerant	GWP	Quantity (kg)	Operations Leak Rate	Service Leak Rate	Times Serviced
General Light Industry	Other commercial A/C and heat pumps	R-410A	2,088	0.30	4.00	4.00	18.0

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.15.2. Mitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor

5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)

5.17. User Defined

Equipment Type	Fuel Type

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1.2. Mitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

5.18.1. Biomass Cover Type

5.18.1.1. Unmitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.1.2. Mitigated

Biomass Cover Type	Initial Acres	Final Acres

5.18.2. Sequestration

5.18.2.1. Unmitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

5.18.2.2. Mitigated

Tree Type	Number	Electricity Saved (kWh/year)	Natural Gas Saved (btu/year)

6. Climate Risk Detailed Report

6.1. Climate Risk Summary

Cal-Adapt midcentury 2040–2059 average projections for four hazards are reported below for your project location. These are under Representation Concentration Pathway (RCP) 8.5 which assumes GHG emissions will continue to rise strongly through 2050 and then plateau around 2100.

Climate Hazard	Result for Project Location	Unit
Temperature and Extreme Heat	32.2	annual days of extreme heat

Extreme Precipitation	8.10	annual days with precipitation above 20 mm
Sea Level Rise	—	meters of inundation depth
Wildfire	51.3	annual hectares burned

Temperature and Extreme Heat data are for grid cell in which your project are located. The projection is based on the 98th historical percentile of daily maximum/minimum temperatures from observed historical data (32 climate model ensemble from Cal-Adapt, 2040–2059 average under RCP 8.5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Extreme Precipitation data are for the grid cell in which your project are located. The threshold of 20 mm is equivalent to about ¾ an inch of rain, which would be light to moderate rainfall if received over a full day or heavy rain if received over a period of 2 to 4 hours. Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.
Sea Level Rise data are for the grid cell in which your project are located. The projections are from Radke et al. (2017), as reported in Cal-Adapt (Radke et al., 2017, CEC-500-2017-008), and consider inundation location and depth for the San Francisco Bay, the Sacramento-San Joaquin River Delta and California coast resulting different increments of sea level rise coupled with extreme storm events. Users may select from four scenarios to view the range in potential inundation depth for the grid cell. The four scenarios are: No rise, 0.5 meter, 1.0 meter, 1.41 meters
Wildfire data are for the grid cell in which your project are located. The projections are from UC Davis, as reported in Cal-Adapt (2040–2059 average under RCP 8.5), and consider historical data of climate, vegetation, population density, and large (> 400 ha) fire history. Users may select from four model simulations to view the range in potential wildfire probabilities for the grid cell. The four simulations make different assumptions about expected rainfall and temperature are: Warmer/drier (HadGEM2-ES), Cooler/wetter (CNRM-CM5), Average conditions (CanESM2), Range of different rainfall and temperature possibilities (MIROC5). Each grid cell is 6 kilometers (km) by 6 km, or 3.7 miles (mi) by 3.7 mi.

6.2. Initial Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	5	0	0	N/A
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	0	0	N/A
Wildfire	1	0	0	N/A
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	0	0	0	N/A

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores do not include implementation of climate risk reduction measures.

6.3. Adjusted Climate Risk Scores

Climate Hazard	Exposure Score	Sensitivity Score	Adaptive Capacity Score	Vulnerability Score
Temperature and Extreme Heat	5	1	1	4
Extreme Precipitation	N/A	N/A	N/A	N/A
Sea Level Rise	1	1	1	2
Wildfire	1	1	1	2
Flooding	N/A	N/A	N/A	N/A
Drought	N/A	N/A	N/A	N/A
Snowpack Reduction	N/A	N/A	N/A	N/A
Air Quality Degradation	1	1	1	2

The sensitivity score reflects the extent to which a project would be adversely affected by exposure to a climate hazard. Exposure is rated on a scale of 1 to 5, with a score of 5 representing the greatest exposure.
The adaptive capacity of a project refers to its ability to manage and reduce vulnerabilities from projected climate hazards. Adaptive capacity is rated on a scale of 1 to 5, with a score of 5 representing the greatest ability to adapt.
The overall vulnerability scores are calculated based on the potential impacts and adaptive capacity assessments for each hazard. Scores include implementation of climate risk reduction measures.

6.4. Climate Risk Reduction Measures

7. Health and Equity Details

7.1. CalEnviroScreen 4.0 Scores

The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Exposure Indicators	—
AQ-Ozone	91.1
AQ-PM	8.75
AQ-DPM	1.99
Drinking Water	94.5
Lead Risk Housing	48.4
Pesticides	34.1

Toxic Releases	9.44
Traffic	2.40
Effect Indicators	—
CleanUp Sites	0.00
Groundwater	35.0
Haz Waste Facilities/Generators	16.6
Impaired Water Bodies	0.00
Solid Waste	83.3
Sensitive Population	—
Asthma	25.8
Cardio-vascular	55.3
Low Birth Weights	83.5
Socioeconomic Factor Indicators	—
Education	10.3
Housing	45.0
Linguistic	—
Poverty	61.1
Unemployment	81.7

7.2. Healthy Places Index Scores

The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

Indicator	Result for Project Census Tract
Economic	—
Above Poverty	30.18093161
Employed	34.62081355
Median HI	31.1176697
Education	—

Bachelor's or higher	61.5167458
High school enrollment	100
Preschool enrollment	1.873476197
Transportation	—
Auto Access	89.83703323
Active commuting	69.22879507
Social	—
2-parent households	65.95662774
Voting	71.97484922
Neighborhood	—
Alcohol availability	90.09367381
Park access	81.35506224
Retail density	10.74040806
Supermarket access	34.31284486
Tree canopy	91.35121263
Housing	—
Homeownership	75.87578596
Housing habitability	81.53471064
Low-inc homeowner severe housing cost burden	32.73450533
Low-inc renter severe housing cost burden	82.80508148
Uncrowded housing	66.9190299
Health Outcomes	—
Insured adults	34.33850892
Arthritis	0.0
Asthma ER Admissions	39.5
High Blood Pressure	0.0
Cancer (excluding skin)	0.0

Asthma	0.0
Coronary Heart Disease	0.0
Chronic Obstructive Pulmonary Disease	0.0
Diagnosed Diabetes	0.0
Life Expectancy at Birth	51.7
Cognitively Disabled	58.3
Physically Disabled	18.7
Heart Attack ER Admissions	3.5
Mental Health Not Good	0.0
Chronic Kidney Disease	0.0
Obesity	0.0
Pedestrian Injuries	91.9
Physical Health Not Good	0.0
Stroke	0.0
Health Risk Behaviors	—
Binge Drinking	0.0
Current Smoker	0.0
No Leisure Time for Physical Activity	0.0
Climate Change Exposures	—
Wildfire Risk	85.1
SLR Inundation Area	0.0
Children	55.0
Elderly	12.9
English Speaking	84.4
Foreign-born	25.7
Outdoor Workers	28.0
Climate Change Adaptive Capacity	—

Impervious Surface Cover	99.2
Traffic Density	1.1
Traffic Access	23.0
Other Indices	—
Hardship	46.1
Other Decision Support	—
2016 Voting	89.4

7.3. Overall Health & Equity Scores

Metric	Result for Project Census Tract
CalEnviroScreen 4.0 Score for Project Location (a)	42.0
Healthy Places Index Score for Project Location (b)	45.0
Project Located in a Designated Disadvantaged Community (Senate Bill 535)	No
Project Located in a Low-Income Community (Assembly Bill 1550)	Yes
Project Located in a Community Air Protection Program Community (Assembly Bill 617)	No

a: The maximum CalEnviroScreen score is 100. A high score (i.e., greater than 50) reflects a higher pollution burden compared to other census tracts in the state.
b: The maximum Health Places Index score is 100. A high score (i.e., greater than 50) reflects healthier community conditions compared to other census tracts in the state.

7.4. Health & Equity Measures

No Health & Equity Measures selected.

7.5. Evaluation Scorecard

Health & Equity Evaluation Scorecard not completed.

7.6. Health & Equity Custom Measures

No Health & Equity Custom Measures created.

8. User Changes to Default Data

Screen	Justification

Land Use	Improvements to WWTP
Construction: Construction Phases	One construction phase for 24 months
Construction: Off-Road Equipment	Construction specific equipment

Appendix D: ~~Reserved -~~Responses to Public Comments

Response to Public Comment

This appendix provides a summary of comments received during the public review for the Initial Study and Mitigated Negative Declaration (IS/MND) for the Idyllwild Wastewater Treatment Plant Improvement Project (project) located in the community of Idyllwild in Riverside County. In accordance with the California Environmental Quality Act (CEQA), Idyllwild Water District (IWD) prepared the IS/MND, Notice of Completion (NOC), and Notice of Availability (NOA), which were submitted to the California State Clearinghouse (SCH) (SCH Number 2024051129) on May 24, 2024. The IS/MND was circulated for State and local public review for 30 days, ending June 24, 2024. The IWD mailed an NOA to their standard mailing radius (properties within 300 feet of the project site) announcing the public review period start date of the IS/MND. The NOA was also posted to the IWD website on May 24, 2024.

Comments Received

IWD received one agency comment letter on the Draft IS/MND from South Coast Air Quality Management District (SCAQMD). No other public comments from other agencies or individuals were received during the Draft IS/MND public review period.

Responses to Comments

Table D-1, below, provides the letter number, a summary of the comments, and a brief reply to each comment. Any revisions to the IS/MND resulting from the comment letter are identified below in the Conclusion section, and provided in the appropriate IS/MND section. Deleted text is shown in strikeout (e.g. ~~text)~~ and new text is shown in double underline (e.g., <u>new text</u>).

Table D-1: Public Review Comment Summary

Comment Number	Comment Summary	Response
Letter A: South Coast Air Quality Management District		
A-1	The SCAQMD identifies several rules that are applicable to the project, permits that may be required for construction and operation activities.	The IWD will coordinate with SCAQMD to obtain any permits required and to comply with the SCAQMD Rules applicable to the project. Edits to the IS/MND have been made on page 20 adding a bullet to reflect that IWD would abide by SCAQMD Rules and obtain permits as applicable.
A-2	The SCAQMD states that if new stationary sources are proposed that air permits would need to be obtained by the project proponent and SCAQMD would be a Responsible Agency under CEQA Guidelines	The proposed project will operate in the same manner as existing conditions. A new emergency generator (240 kilowatt) would replace the existing 20-year-old inefficient emergency generator.

	Section 15086. A discussion about new stationary equipment requiring SCAQMD Permits should be added to the IS/MND.	This new emergency generator would operate on an as needed basis during emergency power outages. The new emergency generator will be more efficient and will generate less air quality emissions when compared to the existing 20-year-old generator. A short qualitative operational discussion has been added under Threshold B, page 21, and edits have been provided under Threshold C, page 21, discussions.
A-3	SCAQMD requests that the Final IS/MND include calculations for operation emissions for new stationary sources, specifically the new generator proposed as part of the improvements.	Operational air quality emissions of the WWTP will not exceed what is being generated under existing conditions. A new emergency generator will replace the existing 20-year-old emergency generator. The new generator will operate more efficiently and is designed to reduce emissions generation. For these reasons, a qualitative operational analysis presented under Thresholds B and C is justified and a quantitative analysis is not warranted.
A-4	SCAQMD requests that Table 4.1.2-1 include construction emissions estimates for SO_x and VOC compared to SCAQMD's thresholds for these emissions.	Table 4.1.2-1 of the IS/MND has been updated to add construction emissions results of SO_x and VOC compared to the SCAQMD's thresholds of the same emissions. The project will not exceed the SCAQMD's thresholds. Revisions for Table 4.1.2-1 are on page 19 and 20.
A-5	SCAQMD notes a consistency issue with emissions calculation of CO_{2e} of 159 *tons per day* vs what appears in Table 4.4.2-1 159 *tons per year.* SCAQMD requests that this consistency be revised in the Final IS/MND.	Revisions have been made to delete "day" and replace with "year" to two sentences on page 39 under Thresholds A and B discussions.

Public Hearing

The IWD Board of Supervisors will conduct a Public Hearing to consider adoption of the IS/MND on July 17 ~~18~~, 2024 at 25945 Highway 243 Idyllwild, California 92549 at 6:00 p.m.

Conclusion

Minor editorial revisions were made in the IS/MND in the following sections:

- Cover
- Project Description
- Appendix B
- Appendix D (Added)
- Appendix E (Added)

Revisions to the IS/MND based on the SCAQMD comment letter (Letter A) received:

- **Revisions associated with comment A-1:** Page 20 of the IS/MND in Section 4.1 Air Quality, under the Threshold B analysis included the addition of text to the bulleted list of Best Management Practices, as follows.

  "The proposed project shall comply with the following SCAQMD Rules (as applicable): Rule 403 – Fugitive Dust; Rule 1166 Volatile Organic Compound Emissions from Decontamination of Soil; Rule 1466 – Control of Particulate Emissions from Soils with Toxic Air Contaminants; Rule 201 – Permit to Construct; Rule 203 – Permit to Operate; Rule 401 – Visible Emissions; Rule 402 – Nuisance; Rule 1110.2 – Emissions from Gaseous- and Liquid Fueled Engines; Rule 1113 – Architectural Coatings; Regulation XIII – New Source Review; Rule 1401 – New Source Review of Toxic Air Contaminants; and, Rule 1470 – Requirements for Stationary Diesel-Fueled Internal Combustion and Other Compression Ignition Engines."

- **Revisions associated with Comments A-2 and A-3:** The following qualitative operational analysis was added to the IS/MND under Section 4.1.2 Threshold B and C analysis:

  Threshold B – "Once improvements are in place, the proposed project would operate similar to existing conditions. A new 240 KW emergency generator (stationary source) would replace the existing 20-year-old inefficient emergency generator and would operate only under emergency power outages or during short monthly testing. The new generator would operate more efficiently than the old 20-year-old generator, would be designed to meet (or exceed) air quality emissions standards, and would only operate an average of 50 hours per year. For these reasons, operation of the improvements associated with the proposed project would not generate air quality emissions that would exceed current emissions

generated by the WWTP. Operational impacts would be less than significant.

Threshold C- "Sensitive receptors would not experience a permanent increase in air pollutant emissions as a result of project operation because the new facility is not an expansion of capacity. Operations would be similar to existing conditions and would not result in new sources of emissions of criteria pollutants over time, including PM2.5, PM10, and ozone. The new emergency generator (stationary source) would operate more efficiently and generate less air quality emissions than the 20-year-old emergency generator existing on the project site. The proposed project would not exceed air quality emissions thresholds during operation; therefore, impacts to sensitive receptors would be less than significant. No mitigation measures are required.

- **Revisions associated with Comment A-4:** Table 4.1.2-1 of the IS/MND has been revised to add emission estimates for SO_x and VOC, added SCAQMD Thresholds for SO_x and VOC, and added text indicating if the estimated emissions of SO_x and VOC exceed the SCAQMD Thresholds for these emissions. Revisions are shown below:

Table 4.1.2-1: Construction Emissions Estimations

CONSTRUCTION YEAR	POLLUTANT (MPOUNDS PER DAY)					
	VOC	SO_x	NO_x	PM_{10}	$PM_{2.5}$	CO
2025	0.79	0.01	7.10	0.34	0.32	8.70
2026	0.75	0.01	6.61	0.31	0.28	8.67
2027	0.72	0.01	6.26	0.28	0.26	8.68
SCAQMD Significance Thresholds	75	150	100	150	55	550
Exceed SCAQMD Thresholds?	***No***	***No***	***No***	***No***	***No***	***No***

Source: Dewberry, 2024

- **Revisions associated with comment A-5:** Under Threshold A analysis of Section 4.4.2, first paragraph under Table 4.4.2-1, the following sentence was revised to remove "day" and add "year":

"The estimated GHG emissions resulting from the project's construction would be a maximum of approximately 159.015 tons of CO_2e per ~~day~~ year, totaling approximately 144.255 $MTCO_2e$ per year for the 24-month construction period."

Under Threshold B analysis of Section 4.4.2, first sentence on page 39, the following sentence was revised to remove "day" and add "year":

> "As discussed above, the proposed project's construction activity would generate an estimated maximum of approximately 159.015 tons of CO_2e per ~~day~~ year, totaling approximately 144.255 $MTCO_2e$ per year for the 24-month construction period."

The lead agency, IWD, has carefully considered the IS/MND, has considered public comments received, and has determined that no new information has been added to the IS/MND in response to the public comment. As defined by Section 15073.5(a) of CEQA, the environmental document, while having minor edits, will not require any "substantial revisions." Pursuant to Section 15073.5(c) of CEQA, the environmental document does not require recirculation.

Letter A

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

SENT VIA E-MAIL: June 21, 2024
cgraham@Dewberry.com
Chris Graham, Senior Environmental Scientist
Idyllwild Water District
11060 White Rock Road, Suite 200
Rancho Cordova, CA 95670

Mitigated Negative Declaration (MND) for the Idyllwild Wastewater Treatment Plant Improvement Project (Proposed Project) (SCH No. 2024051129)

South Coast Air Quality Management District (South Coast AQMD) staff appreciates the opportunity to review the above-mentioned document. The Idyllwild Water District (IWD) is the California Environmental Quality Act (CEQA) Lead Agency for the Proposed Project. To provide context, South Coast AQMD staff (Staff) has provided a brief summary of the project information and prepared the following comments.

South Coast AQMD Staff's Summary of Project Information in the MND

Based on information provided in the MND, the Proposed Project consists of construction and operation of improvements to the Idyllwild Wastewater Treatment Plant (WWTP) located approximately 255 feet north of the Idyllwild Arts Amphitheater in Idyllwild, CA 92549.[1] The Proposed Project would occur partly within the existing WWTP and on recently acquired land adjacent to the existing WWTP for a total Proposed Project site area of 1.73 acres.[2] The existing WWTP has a treatment capacity of 0.25 million gallons per day (MGD), was constructed in 1966 and became operational in 1971 (making it over 50 years old), and has now exceeded its intended design life.[3,4] The purpose of the Proposed Project improvements would be to: 1) address existing lack of redundancy to provide time for system maintenance; 2) address removal efficiencies for biological oxygen demand (BOD) and total suspended solids (TSS) to avoid permit exceedances; 3) expand equalization capacity to handle high precipitation events; and 4) integrate all facilities under one system and allow modern monitoring and control of the treatment plant. The Proposed Project will not be an expansion of the treatment capacity of the existing WWTP.[5] The Proposed Project's specific workplan consists of the following: 1) improvements to the headworks to include new flume and splitter box; 2) additional equalization for heavy precipitation events/two new secondary treatment bioreactors; 3) new sludge holding tank and new sludge handling system; 4) new supervisory control and data acquisition (SCADA) system to integrate controls for plant; 5) new blowers and associated controls in existing blower room; and 6) new generator and automatic transfer for standby power. Construction of the

[1] Draft Initial Study/Mitigated Negative Declaration for the Idyllwild Wastewater Treatment Plant Improvement Project (IS/MND). Pages 5 and 6.
[2] *Ibid*. Page 13 and Figure 1-2.
[3] *Ibid*. Page 19.
[4] *Ibid*. Page 5.
[5] *Ibid*. Page 42.

Proposed Project is anticipated to commence in the second quarter of 2025, last 24 months, and be completed by the second quarter of 2027.[6]

South Coast AQMD Staff's Comments on the MND

Proposed Project May Be Subject to the Following Permitting and Compliance Requirements

1. During any activities capable of generating fugitive dust (including but not limited to earthmoving activities), actions to prevent, reduce, or mitigate fugitive dust emissions for compliance with South Coast AQMD Rule 403 – Fugitive Dust may be required.

2. Excavation/grading work associated with preparation and/or construction of the Proposed project may be subject to South Coast AQMD Rule 1166 – Volatile Organic Compound Emissions from Decontamination of Soil and as such may require a Rule 1166 VOC contaminated soil mitigation plan. In addition, if certain toxic air contaminants are identified in the soil, compliance with South Coast AQMD Rule 1466 – Control of Particulate Emissions from Soils with Toxic Air Contaminants may also be required.

3. A Permit to Construct/Operate application will be required for the proposed alterations/modifications to the existing wastewater treatment system.

4. A Permit to Construct/Operate application will be required for any new or modified air pollution control systems associated with the plant improvements. **A-1**

5. A Permit to Construct/Operate application may be required for prime and/or emergency stationary engines powering pumps, generators, compressors, etc., if the engines are rated above 50 brake horsepower (BHP).

6. A Permit to Construct/Operate application may be required for any sludge holding tanks with safety relief valves that may potentially release air contaminates/odors.

7. Permit to Construct/Operate applications or the use of equipment with appropriate portable equipment permits may be required for equipment used for vegetation/tree removal and associated material handling, such as a chipper, grinder, or screener. Also note that if the chipper, grinder, or screener is powered by an engine, the engine will require a separate permit application consistent with item No. 5 above.

In addition to the aforementioned South Coast AQMD Rules 403, 1166, and 1466, the following South Coast AQMD rules and regulations are the most pertinent to the Proposed Project and include but are not limited to: Rule 201 – Permit to Construct, Rule 203 – Permit to Operate, Rule 401 – Visible Emissions, Rule 402 – Nuisance, Rule 1110.2 – Emissions from Gaseous- and Liquid-Fueled Engines, Rule 1113 – Architectural Coatings, Regulation XIII – New Source Review, Rule 1401 – New Source Review of Toxic Air Contaminants, and Rule 1470 – Requirements for Stationary Diesel-Fueled Internal Combustion and Other Compression Ignition Engines.

[6] *Ibid.* Appendix C: CalEEMod Air Quality/Greenhouse Gas Output, p. 46/60.

South Coast AQMD Air Permits and Role as a Responsible Agency

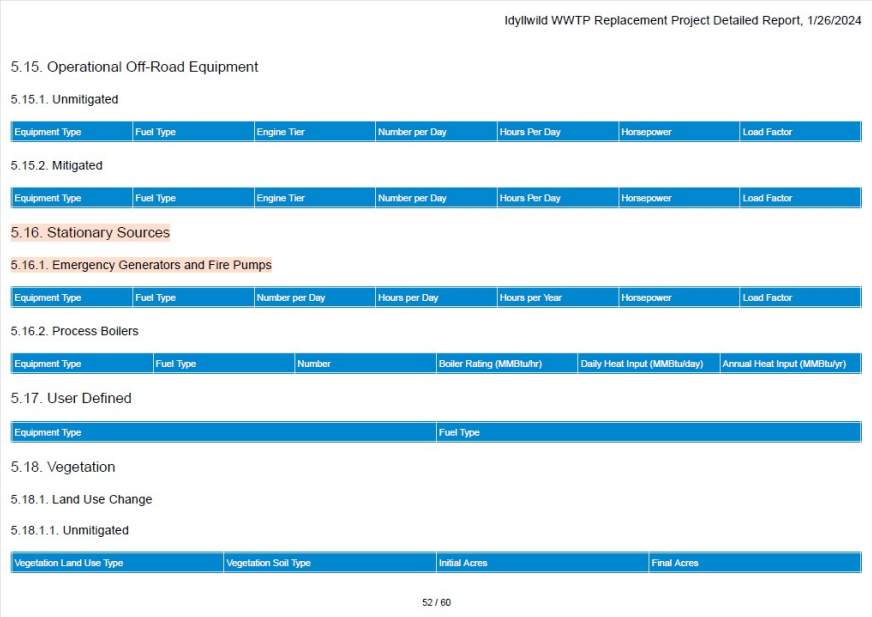
As mentioned earlier in this letter, Staff notes that the Proposed Project will be equipped with a new emergency generator to be housed in a new electrical building and that a fuel tank will also be installed to provide power to the new generator.[7] The Lead Agency states that the new generator will replace the currently operating emergency Onan power generator rated at 125 kilowatts (kW).[8] The Lead Agency also states that South Coast AQMD Permits to Construct and Operate for Public and Private Waste Water Treatment Works may be required [9] If implementation of the Proposed Project would require the use of new stationary sources, including but not limited to emergency generators, fire water pumps, boilers, etc., air permits from South Coast AQMD will be required and the role of South Coast AQMD would change from a Commenting Agency to a Responsible Agency under CEQA. In addition, if South Coast AQMD is identified as a Responsible Agency, per CEQA Guidelines Section 15086, the Lead Agency is required to consult with South Coast AQMD. Furthermore, CEQA Guidelines Section 15096 sets forth specific procedures for a Responsible Agency, including making a decision on the adequacy of the CEQA document for use as part of evaluating the applications for air permits. For these reasons, the Final MND should include a discussion about any new stationary equipment requiring South Coast AQMD air permits and identify South Coast AQMD as a Responsible Agency for the Proposed Project.

A-2

The Final MND should also include calculations and analyses for construction and operation emissions for any new stationary sources, as this information will also be relied upon as the basis for the permit conditions and emission limits for the air permit(s). Based on the CalEEMod output files in Appendix C (see Figure 1) and additional technical data files provided to Staff upon request (email communication with Chris Graham, June 11, 2024), it appears that emission calculations and associated analyses for the Proposed Project's new emergency generator were not included in the MND. Please contact South Coast AQMD's Waste Management Engineering and Permitting staff at (909) 396-3627 for questions regarding what types of equipment would require applications for new air permits. For more general information on permits, please visit South Coast AQMD's webpage at: http://www.aqmd.gov/home/permits.

A-3

[7] *Ibid.* Page 8.
[8] *Ibid.* Page 8.
[9] *Ibid.* Page 10.



Idyllwild WWTP Replacement Project Detailed Report, 1/26/2024

5.15. Operational Off-Road Equipment

5.15.1. Unmitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.15.2. Mitigated

Equipment Type	Fuel Type	Engine Tier	Number per Day	Hours Per Day	Horsepower	Load Factor

5.16. Stationary Sources

5.16.1. Emergency Generators and Fire Pumps

Equipment Type	Fuel Type	Number per Day	Hours per Day	Hours per Year	Horsepower	Load Factor

5.16.2. Process Boilers

Equipment Type	Fuel Type	Number	Boiler Rating (MMBtu/hr)	Daily Heat Input (MMBtu/day)	Annual Heat Input (MMBtu/yr)

5.17. User Defined

Equipment Type	Fuel Type

5.18. Vegetation

5.18.1. Land Use Change

5.18.1.1. Unmitigated

Vegetation Land Use Type	Vegetation Soil Type	Initial Acres	Final Acres

52 / 60

Figure 1. Screenshot of Appendix C: CalEEMod Air Quality/Greenhouse Gas Output, p. 52/60

Additional comments for consideration:

- In Section 4.1.2, the Proposed Project's calculated construction regional emissions have been compared to South Coast AQMD's CEQA regional pollutant emissions significance thresholds for **NOx, PM10, PM2.5**, and **CO** to determine the Proposed Project's air quality impacts as shown in Figure 2.[10]

Table 4.1.2-1: Construction Emissions Estimations

CONSTRUCTION YEAR	POLLUTANT (MPOUNDS PER DAY)			
	NO_X	PM_{10}	$PM_{2.5}$	CO
2025	7.10	0.34	0.32	8.70
2026	6.61	0.31	0.28	8.67
2027	6.26	0.28	0.26	8.68
SCAQMD Significance Thresholds	100	150	55	550
Exceed SCAQMD Thresholds?	***No***	***No***	***No***	***No***

Source: Dewberry, 2024

Figure 2. Table 4.1.2-1: Construction Emissions Estimations. MND, p. 19-20.

South Coast AQMD recommends, however, that a Proposed Project's calculated construction regional emissions also be compared to South Coast AQMD's CEQA regional pollutant emissions significance thresholds for **SOx** and **VOC**.[11] Although the

A-4

[10] *Ibid.* Table 4.1.2-1: Construction Emissions Estimations. Pages 19 and 20.

[11] South Coast AQMD's CEQA regional pollutant emissions significance thresholds can be found at: https://www.aqmd.gov/docs/default-source/ceqa/handbook/south-coast-aqmd-air-quality-significance-thresholds.pdf

SOx and **VOC** emissions were calculated in CalEEMod for the Proposed Project as can be seen in Appendix C, they were omitted in the Air Quality analysis section of the MND.[12] Staff recommends the Lead Agency include the **SOx** and **VOC** emissions analysis and update the Final MND accordingly. **A-4 con.**

- In Section 4.4.2, the estimated Greenhouse Gas (GHG) emissions calculation of CO_{2E}, listed as 159 tons per *day*, does not appear to be consistent with Table 4.4.2-1 which shows an annual CO_{2E} estimate of 159 tons per *year*.[13] Staff recommends that the Lead Agency review these calculations and update the Final MND accordingly with the appropriate corrections. **A-5**

Conclusion

The Lead Agency is recommended to revise the CEQA analysis to address the aforementioned comments and provide the necessary evidence to sufficiently support the conclusions reached. If the requested information and analysis are not included in the final CEQA document, either the Final MND or other type of CEQA document, the Lead Agency should provide reasons for not doing so. Pursuant to California Public Resources Code Section 21092.5(b) and CEQA Guidelines Section 15074, prior to approving the Proposed Project, the Lead Agency shall consider the MND for adoption together with any comments received during the public review process and notify each public agency when any public hearings are scheduled. Please provide South Coast AQMD with written responses to all comments contained herein prior to the adoption of the Final MND. When responding to issues raised in the comments, detailed reasons supported by substantial evidence in the record to explain why specific comments and suggestions are not accepted must be provided. In addition, if the Lead Agency decides to adopt the Final MND, please provide South Coast AQMD with a notice of any scheduled public hearing(s).

Thank you for the opportunity to provide comments. South Coast AQMD staff is available to work with the Lead Agency to address any air quality questions that may arise from this comment letter. Please contact Evelyn Aguilar, Air Quality Specialist, at eaguilar@aqmd.gov should you have any questions.

Sincerely,

Sam Wang

Sam Wang
Program Supervisor, CEQA IGR
Planning, Rule Development & Implementation

BR:AS:SW:EA
RVC240524-03
Control Number

[12] IS/MND. Pages 18 through 26.
[13] *Ibid.* Pages 38 and 39.

Appendix E: Mitigation Monitoring and Reporting Plan

MITIGATION MEASURE	TIMING	IMPLEMENTING PARTY	MONITORING PARTY	FREQUENCY AND DURATION	PERFORMANCE CRITERIA
BIO-1: Nesting Birds: If construction, grading or other project-related activities in the undeveloped portions of the site (i.e., not within the existing WWTP) are scheduled during the nesting season (February 1 to August 31), a preconstruction nesting survey shall be conducted by a qualified biologist within 14 days from the beginning of construction. The preconstruction surveys shall be included suitable nesting habitat within 100 feet of the construction. If the preconstruction survey does not identify any active nests within areas potentially affected by construction activities, no further mitigation would be required. If the preconstruction survey identifies an active nest, a qualified biologist shall establish an appropriate no-work buffer around the active nest(s). The buffer shall be delineated using high visibility fencing. The size of the no-work buffer shall be determined by a qualified biologist based on the species, nest location relative to construction activities, and the nature of the proposed activities. Project activities shall be avoided within the no-work buffer until the nest is deemed no longer active by a qualified biologist.	Prior to construction	Qualified Biologist/Construction Contractor	IWD Staff	14 days prior to construction commencement	
BIO-2: Special-Status Plants • A qualified biologist or botanist shall conduct focused surveys for special-status plants during the normal blooming period for the target species. The surveys shall be conducted within the construction area and prior to any ground disturbing activities. The results of the survey shall be documented in a concise memorandum. If the survey results are negative, work can proceed without additional measures. • If special-status plant species are identified within the construction area, a salvage and relocation plan shall be prepared to avoid and minimize direct impacts to special-statue plants. The plan shall identify the methods of salvage (e.g., seed collection, individual transplants) and the relocation area(s), with onsite relocation areas being preferable. The plan shall also include provisions for long-term protections, monitoring, and management requirements that ensure the salvaged/relocated species are self-sustaining for a minimum of 5 years at a minimum 1:1 compensation-to-impact ratio.	Prior to construction	Qualified Biologist or Botanist/Construction Contractor	IWD Staff	During normal blooming period prior to construction commencement	
CUL-1: If subsurface deposits believed to be cultural or human in origin are discovered during construction, all work must halt within a 100-foot radius of the discovery. Depending on the nature of the find, a qualified professional archaeologist, meeting the Secretary of the Interior's Professional Qualification Standards for prehistoric or historic archaeology, shall be retained to evaluate the significance of the find, and shall have the authority to modify the no work radius as appropriate, using professional judgment. The following notifications shall apply, as necessary:	During construction activities.	Construction Contractor/Qualified Professional Archaeologist	IWD Staff	During construction, specifically earthmoving activities.	
TCR-1: A member of the Cahuilla Band of Indians shall be present, as a monitor during all earthmoving activities of native (non-fill) soils during project construction activities. If artifacts are found during such activities, implementation of Mitigation Measure CUL-1 shall occur to ensure that such resources are protected as applicable.	During construction activities.	Construction Contractor/Cahuilla Band of Indians staff member/Qualified	IWD Staff	During construction, specifically earthmoving	

MITIGATION MEASURE	TIMING	IMPLEMENTING PARTY	MONITORING PARTY	FREQUENCY AND DURATION	PERFORMANCE CRITERIA
		Professional Archaeologist		activities of native (non-fill) soils	

Appendix D – Geotechnical Report

LOR GEOTECHNICAL GROUP, INC.
Soil Engineering ▲ Geology ▲ Environmental

PRELIMINARY GEOTECHNICAL INVESTIGATION
IDYLLWILD TREATMENT PLANT
IDYLLWILD, CALIFORNIA

PROJECT NO. 63980.1
JANUARY 19, 2024

Prepared For:

SUSP Engineering
1234 North Market Boulevard
Sacramento, California 95834

Attention: Mr. Nathan Thomas

January 19, 2024

SUSP Engineering
1234 North Market Boulevard
Sacramento, California 95834

Project No. 63980.1

Attention: Mr. Nathan Thomas

Subject: Preliminary Geotechnical Investigation, Idyllwild Treatment Plant, Idyllwild, California.

LOR Geotechnical Group, Inc., is pleased to present this report summarizing our geotechnical investigation for the above referenced project. This report was based upon a scope of services generally outlined in our Work Authorization Agreement, dated September 19, 2023, and other written and verbal communications with you.

In summary, it is our opinion that the site can be developed from a geotechnical perspective, provided the recommendations presented in the attached report are incorporated into design and construction. The following executive summary reviews some of the important elements of the project. However, this summary should not be solely relied upon.

It is our opinion that the existing fill and colluvial soils will not provide uniform and/or adequate support for the proposed structures. Therefore, all fill and colluvial soils should be removed from structural areas and areas to receive structural fills. The data developed during this investigation indicates that removals on the order of 3 to 8 feet will be required within currently proposed development areas. It is recommended that a compacted fill mat be constructed beneath footings and slabs. As an alternative to construction of the compacted fill mat, the foundations may be constructed such that they extend down into the underlying competent bedrock and this depth will be approximately 3 to 8 feet beneath the existing surface of the site, but may be deeper locally.

On-site soils are considered to have very low expansion potential and contain a negligible soluble sulfate content. Near completion and/or at the completion of site grading, foundation soils should be sampled and tested, as necessary, to verify their expansion potential and soluble sulfate content.

LOR Geotechnical Group, Inc.

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INTRODUCTION

During December of 2023 and January of 2024, a Preliminary Geotechnical Investigation was performed by LOR Geotechnical Group, Inc., for the proposed improvements to the existing Idyllwild water treatment facility located at 52335 Apela Drive, in the Idyllwild area of Riverside County, California. The purpose of this investigation was to provide a technical evaluation of the geologic setting of the site and to provide geotechnical design recommendations for the proposed development. The scope of our services included:

- Review of available geotechnical literature, reports, maps, and agency information pertinent to the study area;
- Geologic field reconnaissance to verify the areal distribution of earth units and significance of surficial features as compiled from documents, literature, and reports reviewed;
- A subsurface field investigation to determine the physical soil conditions as related to the proposed development;
- Laboratory testing of selected soil samples obtained during the field investigation;
- Development of geotechnical recommendations for site grading and foundation design; and
- Preparation of this report summarizing our findings, and providing conclusions and recommendations for site development.

The approximate location of the site is shown on the attached Index Map, Enclosure A-1, within Appendix A.

To orient our investigation at the site, we were provided with a Site Plan prepared by California Rural Water Association (undated). This drawing was utilized to develop a base map for plotting our data. A copy of this map is presented as our Site Plan, Enclosure A-2, within Appendix A.

PROJECT CONSIDERATIONS

Information furnished to this firm indicates the proposed project will consist of the construction of two, rectangular, concrete bioreactors, a wet well, a sludge holding tank, and a head works. Cuts on the order of approximately 16 feet may be proposed within the area of the two concrete bioreactors. Minor fills of less than few feet are anticipated. Light to moderate foundation loads are anticipated with the proposed structures.

EXISTING SITE CONDITIONS

The subject site consists of a roughly rectangular, approximately 1.9 acre site. The northern portion of the property is currently developed with a waste water treatment facility comprised of two circular clarifiers, a maintenance building, a shed, and the associated improvements. Overall, the site consists of hillside land that rises moderately to the east-northeast. Vegetation is sparse in the developed portion of the site with the remainder of the site containing pine trees. Several outcrops of igneous bedrock are present in the southern portion of the site.

The adjacent land is vacant, undeveloped land.

AERIAL PHOTOGRAPH ANALYSIS

The aerial photographs reviewed consisted of vertical aerial photographs of varying scales. We reviewed imagery available from Google Earth (2023) and from Historic Aerials (2023). The earliest aerial photographs of the site and vicinity, from the mid 1970's to 1990's are difficult to discern due to poor quality and vegetation. However the photograph from 1975 shows the existing structure and one clarifier are present. The second clarifier appears to be present in the 1996 photograph. The existing shed in the north portion of the site appears in the 2017 photograph. Our review of the aerial photographs did not reveal any adverse geologic conditions, such as possible faults, landslides, rockfall paths, or debris flow channels as being present at or projecting into the project area.

FIELD EXPLORATION PROGRAM

Our subsurface field exploration program was conducted on December 21, 2023, and consisted of advancing 3 exploratory borings using a track-mounted drill rig equipped with 8-inch diameter hollow stem augers. The approximate locations of our exploratory borings are presented on the attached Site Plan, Enclosure A-2 within Appendix A.

The subsurface conditions encountered in the exploratory borings were logged by a State licensed geologist from this firm. The borings were drilled to practical refusal depths ranging from approximately 18 to 20 feet below the existing ground surface. Relatively undisturbed and bulk samples were obtained at a maximum depth interval of 5 feet, and returned to our geotechnical laboratory in sealed containers for further testing and evaluation. A detailed description of the field exploration program and the hand auger boring logs are presented in Appendix B.

LABORATORY TESTING PROGRAM

Selected soil samples obtained during the field investigation were subjected to laboratory testing to evaluate their physical and engineering properties. Laboratory testing included moisture content, laboratory compaction characteristics, direct shear, sieve analysis, sand equivalent, R-value, expansion index, and corrosion analysis. Physical testing was conducted in our geotechnical laboratory and chemical testing was conducted by our subconsultant, Project X Corrosion Engineering. A detailed description of the geotechnical laboratory testing program and the test results are presented in Appendix C.

GEOLOGIC CONDITIONS

Regional Geologic Setting

The subject site is located within a natural geomorphic province of southern California known as the Peninsular Ranges. The Peninsular Ranges consist of one of the largest geologic units in western North America, extending from the Los Angeles Basin south to the Mexican border and beyond to the tip of Baja California. These mountains consist predominantly of Cretaceous igneous rock with isolated remnants of volcanic rocks and marine and non-marine sediments. The San Jacinto Mountains, where the site is located, is a structural block within this province. These mountains are thought to have been uplifted by compressional tectonic activity between the San Jacinto and San Andreas fault zones which border the southern and northern flanks of the mountains, respectively. The geomorphology of much of the San Jacinto Mountains indicates that the range is very young, from a geologic standpoint, most likely having been uplifted tectonically during the last one or two million years. Current tectonic activity suggests that this compression may still be uplifting the mountains (Norris and Webb, 1990).

As mapped by Dibblee and Minch (2008) and as shown on Enclosure A-3, the northwest portion of the site area is shown to be underlain by crystalline granitic rock comprised of quartz diorite to granodiorite (map symbol qdi). These rocks are generally described as being Cretaceous in age and contain roughly one third quartz and two thirds feldspar.

Site Geologic Conditions

As noted within our exploratory borings, the site is underlain by fill materials, locally, and igneous bedrock at relatively shallow depths. These units are described in further detail in the following sections:

Fill: As observed during our investigation, local fill soils are present in the area of our exploratory boring B-3 within the currently developed portion of the site that have been created through past development of the site. These were noted to be on the order of 7 feet in thickness. All of the noted fill soils are undocumented fills and are considered to be un-engineered fills.

Colluvium: Colluvial materials were encountered within two of our exploratory borings, B-1 and B-2, to a depth of approximately 3 feet. These materials were comprised of silty sand which was dark brown, dry to damp, contained roots and some pinhole porosity, and was in a loose to medium dense state.

Bedrock: As observed during our investigation, relatively shallow bedrock is present across the site. The bedrock was observed to be comprised of quartz diorite and was noted to be highly to severely weathered upon first encounter, become much less weathered quickly with depth. Practical refusal was experienced within our excavations at depths of approximately 18 to 20 feet. It should be noted that one excavation, boring B-1, was attempted twice due to the difficult drilling experienced in order to obtain depths of that currently proposed in that area of the site.

Groundwater Hydrology

Groundwater was not encountered in any of our exploratory borings, nor was any groundwater seepage observed during our site reconnaissance.

Groundwater well data is not readily available for the local area (CDWR, 2023). Although groundwater may seep into the bedrock beneath the site along fractures and joints within the bedrock, the presence of hard bedrock beneath the site generally precludes the development of groundwater conditions or a groundwater table in these areas. Any groundwater that might be encountered during site development would likely be the result of infiltration of surface waters/melting snow traveling downward into the bedrock along these joints and fractures. Strawberry Creek, mapped as perennial stream on topographic maps of the area, is located approximately 1,900 feet to the south-southeast of the site. However, it is considered unlikely that the presence of this nearby creek is creating shallow groundwater conditions at the site. Because bedrock was encountered within our exploratory borings at shallow depth, it is anticipated that bedrock is present at fairly shallow depth across the site area and the presence of shallow bedrock generally precludes the conditions required to develop shallow groundwater conditions that could influence the proposed improvements.

Surface Runoff

Current surface runoff of precipitation waters across the site is generally as sheetflow from slope areas in the east and then across gently sloping terrain to the west-southwest.

Mass Movement

Although located within an area of relatively steep slopes, there are no known or mapped landslides within the site vicinity. During our review of aerial photographs of the site and vicinity and during our site reconnaissance, we did not observe any evidence for mass movements.

Faulting

No active or potentially active faults are known to exist at the subject site. In addition, the subject site does not lie within a current State of California Earthquake Fault Zone (Hart and Bryant, 2003) nor does the site lie within a County of Riverside fault zone. No evidence of faulting projecting into or crossing the site was noted during our aerial photograph review or our review of published geologic maps.

The San Jacinto fault is the closest active fault and it is located approximately 2.5 kilometers (1.6 miles) to the southwest. Other active large faults nearby include the San Andreas fault zone, located approximately 22.8 kilometers (14.1 miles) to the northeast.

The San Jacinto fault is one of the major tectonic features in the region, second only to the San Andreas in terms of length, slip rate, and potential earthquakes. The fault extends from the east end of the San Gabriel Mountains southeast into Mexico. Within the Peninsular Ranges Province, this fault serves as the eastern boundary of the aforementioned Perris Block. It is one of the most active faults in California. It is believed that the San Jacinto fault is capable of producing an earthquake magnitude on the order of 6.7 or greater.

The San Andreas fault is considered to be the major tectonic feature of California, separating the Pacific plate from the North American plate. While estimates vary, the San Andreas fault is generally thought to have an average slip rate on the order of 24 mm/year and capable of generating large magnitude events on the order of 7.5 or greater.

Current standards of practice have included a discussion of all potential earthquake sources within a 100 kilometer (62 mile) radius. However, while there are other large

earthquake faults within a 100 kilometer (62 mile) radius of the site, none of these are considered as relevant to the site as the faults described above, due to their greater distance and smaller anticipated event magnitudes.

Historical Seismicity

In order to obtain a general perspective of the historical seismicity of the site and surrounding region a search was conducted for seismic events at and around the area within various radii. This search was conducted utilizing the historical seismic search website of the U.S.G.S. (2023). This website conducts a search of a user selected cataloged seismic events database, within a specified radius and selected magnitudes, and then plots the events onto a map. At the time of our search, the database contained data from January 1, 1932 through January 9, 2024.

In our first search, the general seismicity of the region was analyzed by selecting an epicenter map listing all events of magnitude 4.0 and greater, recorded since 1932, within a 100 kilometer (62 mile) radius of the site, in accordance with guidelines of the California Division of Mines and Geology. This map illustrates the regional seismic history of moderate to large events. As depicted on Enclosure A-4, within Appendix A, the site lies within a relatively active region of southern California.

In the second search, the micro seismicity of the area lying within a 10 kilometer (6.2 mile) radius of the site was examined by selecting an epicenter map listing events on the order of 2.0 and greater since 1978. The results of this search is a map that presents the seismic history around the area of the site with much greater detail, not permitted on the larger map. The reason for limiting the time period for the events on the detail map is to enhance the accuracy of the map. Events recorded prior to the mid to late1970's are generally considered to be less accurate due to advancements in technology. As depicted on this map, the San Jacinto fault to the southwest contains numerous events.

In summary, the historical seismicity of the site entails numerous small to medium magnitude earthquake events occurring in the region around the subject site. Any future developments at the subject site should anticipate that moderate to large seismic events could occur very near the site.

Secondary Seismic Hazards

Other secondary seismic hazards generally associated with severe ground shaking during an earthquake include liquefaction, seiches and tsunamis, earthquake induced flooding, landsliding and rockfalls, and seismic-induced settlement.

Liquefaction: The potential for liquefaction generally occurs during strong ground shaking within loose granular sediments where the depth to groundwater is usually less than 50 feet. As the site is underlain by granitic bedrock at shallow depth, the possibility of liquefaction at the site is considered to be nil.

Seiches/Tsunamis: Due to the presence of the onsite clarifiers, the potential for the site to be affected by a seiche or tsunami (earthquake generated wave) cannot be completely ruled out. However, due to the relatively shallow nature of this tank, the possibility of a seiche or tsunami from this source is very low.

Flooding (Water Storage Facility Failure): There are two water storage facilities located on the site which could possibly rupture during in earthquake and affect the site by flooding. The affect of such should be evaluated by the project engineer.

Seismically-Induced Landsliding: No landslides are known to exist or have been mapped at or within the vicinity of the site. The potential for seismically-induced landsliding at the site is considered to be very low.

Rockfalls: Although there are natural outcrops of bedrock within the site and vicinity, no areas containing large, loose, boulders which could become dislodged during an earthquake event and impact the site were note to be present in the immediate area. Therefore, the potential for the site to be adversely impacted by rockfalls is considered to be very low.

Seismically-Induced Settlement: Settlement generally occurs within areas of loose, granular soils with relatively low density. The near surface soils at the site are loose and, left as is, these materials could be subject to seismically induced settlement. However, the earthwork operations recommended to be conducted during the development of the site will mitigate any near surface loose soil conditions.

SOILS AND SEISMIC DESIGN CRITERIA (California Building Code 2022)

Design requirements for structures can be found within Chapter 16 of the 2022 California Building Code (CBC) based on building type, use, and/or occupancy. The classification of use and occupancy of all proposed structures at the site, shall be the responsibility of the building official.

Site Classification

Chapter 20 of the ASCE 7-16 defines six possible site classes for earth materials that underlie any given site. Bedrock is assigned one of three of these six site classes and these are: A, B, or C. Soil is assigned as C, D, E, or F. Per ASCE 7-16, Site Class A and Site Class B shall be measured on-site or estimated by a geotechnical engineer, engineering geologist or seismologist for competent rock with moderate fracturing and weathering. Site Class A and Site Class B shall not be used if more than 10 feet of soil is between the rock surface and bottom of the spread footing or mat foundation. Site Class C can be used for very dense soil and soft rock with Ñ values greater than 50 blows per foot. Site Class D can be used for stiff soil with Ñ values ranging from 15 to 50 blows per foot. Site Class E is for soft clay soils with Ñ values less than 15 blows per foot. Our current investigation, mapping by others, and our experience in the site region indicates that the materials beneath the site are considered Site Class C very dense soil/soft rock.

CBC Earthquake Design Summary

Earthquake design criteria have been formulated in accordance with the 2022 CBC and ASCE 7-16 for the site based on the results of our investigation to determine the Site Class and an assumed Risk Category III. However, these values should be reviewed and the final design should be performed by a qualified structural engineer familiar with the region. In addition, the building official should confirm the Risk Category utilized in our design (Risk Category III). Our design values are provided below:

CBC 2022 SEISMIC DESIGN SUMMARY* Site Location (USGS WGS84) 33.7325, -116.7485 Risk Category III	
Site Class Definition Chapter 20 ASCE 7	C
$\mathbf{S_s}$ Mapped Spectral Response Acceleration at 0.2s Period	1.525
$\mathbf{S_1}$ Mapped Spectral Response Acceleration at 1s Period	0.600
$\mathbf{S_{MS}}$ Adjusted Spectral Response Acceleration at 0.2s Period	1.83

CBC 2022 SEISMIC DESIGN SUMMARY* Site Location (USGS WGS84) 33.7325, -116.7485 Risk Category III	
S_{M1} Adjusted Spectral Response Acceleration at 1s Period	0.840
S_{DS} Design Spectral Response Acceleration at 0.2s Period	1.220
S_{D1} Design Spectral Response Acceleration at 1s Period	0.560
F_a Short Period Site Coefficient at 0.2s Period	1.2
F_v Long Period Site Coefficient at 1s Period	1.4
PGA_M Site-modified peak ground acceleration	0.777
Seismic Design Category	D
*Values obtained from OSHPD Seismic Design Maps tool	

CONCLUSIONS

General

This investigation provides a broad overview of the geotechnical and geologic factors which are expected to influence future site planning and development. On the basis of our field investigation and testing program, it is the opinion of LOR Geotechnical Group, Inc., that the proposed garage building construction is feasible from a geotechnical standpoint, provided the recommendations presented in this report are incorporated into design and implemented during grading and construction.

It should be noted that the subsurface conditions encountered in our exploratory borings are indicative of the locations explored. The subsurface conditions may vary. If conditions are encountered during the construction of the project that differ significantly from those presented in this report, this firm should be notified immediately in order that we may assess the impact to the recommendations provided.

Rippability of Bedrock Units

The rippability of the bedrock units at the subject site was estimated based on the relative ease, or lack of, excavation during our boring exploration. The bedrock units that underlie the site are anticipated to be rippable to marginally rippable by conventional earthmoving equipment down to the depths explored. Excavations deeper than this may require specialized methods, such as D8R or larger dozer using a multi or single shank ripper.

It is also anticipated that some larger non-rippable rock "floaters" may be encountered. These may require special handling. Excavations in these materials may require specialized methods.

If a more precise estimation of the rippability of the bedrock units is required, a seismic refraction investigation should be conducted at the site. Such a study should involve the measuring of the seismic velocities of the underlying bedrock units, as they increase with depth, then comparing these to estimates of velocities verses ease of excavation charts.

In summary, the most important consideration for the proposed grading should include selecting an experienced, well-qualified contractor. The success to excavating the bedrock materials at the site will require the contractor to have knowledge of the appropriate ripper-equipment selection (i.e., down pressure available at the tip, tractor flywheel horsepower, tractor gross weight, etc.), ripping techniques (i.e., single- or multi-shank teeth, pass spacing, tandem pushing, etc.). It should also be noted that while in some areas where deeper cuts may be possible with standardized earthmoving equipment, specialized methods may increase the speed of the excavations at the site.

Foundation Support

Based upon the field investigation and test data, it is our opinion that the existing upper fill and colluvial soil materials will not, in their present condition, provide uniform and/or adequate support for the proposed structures. Therefore, we recommend that the proposed structure be founded on a compacted fill mat or entirely within competent bedrock. This mat should extend to a minimum depth of two feet below the bottom of the foundations and should extend 5 feet outside of the footprint of the structure. As an alternative to construction of the compacted fill mat, the foundations may be constructed such that they extend down into the underlying competent bedrock and this depth will average approximately 4 feet beneath the existing surface of the site, but may be deeper locally.

Soil Expansiveness

Our expansion index testing of the on-site soils indicates a very low expansion potential. Therefore, conventional design and construction should be applicable for the project.

Careful evaluation of on-site soils and any import fill for their expansion potential should be conducted during the grading operation.

Corrosion

Select representative samples from our borings were taken to Project X Corrosion Engineering for full corrosion series testing. Results and recommendations from the soil corrosivity testing completed by Project X Corrosion Engineering are presented within Appendix D.

Geologic Mitigations

No special geologic recommendation methods are deemed necessary at this time, other than the geotechnical recommendations provided in the following sections.

Seismicity

Seismic ground rupture is generally considered most likely to occur along pre-existing active faults. Since no known faults are known to exist at, or project into the site, the probability of ground surface rupture occurring at the site is considered nil.

Due to the site's close proximity to the faults described above, it is reasonable to expect a strong ground motion seismic event to occur during the lifetime of the proposed development on the site. Large earthquakes could occur on other faults in the general area, but because of their lesser anticipated magnitude and/or greater distance, they are considered less significant than the faults described above from a ground motion standpoint.

The effects of ground shaking anticipated at the subject site should be mitigated by the seismic design requirements and procedures outlined in Chapter 16 of the California Building Code. However, it should be noted that the current building code requires the minimum design to allow a structure to remain standing after a seismic event, in order to allow for safe evacuation. A structure built to code may still sustain damage which might ultimately result in the demolishing of the structure (Larson and Slosson, 1992).

RECOMMENDATIONS

Geologic Recommendations

No special geologic recommendation methods are deemed necessary at this time, other than the geotechnical recommendations provided in the following sections.

General Site Grading

It is imperative that no clearing and/or grading operations be performed without the presence of a qualified geotechnical engineer. An on-site, pre-job meeting with the owner, the developer, the contractor, and geotechnical engineer should occur prior to all grading related operations. Operations undertaken at the site without the geotechnical engineer present may result in exclusions of affected areas from the final compaction report for the project.

Grading of the subject site should be performed in accordance with the following recommendations as well as applicable portions of the California Building Code, and/or applicable local ordinances.

All areas to be graded should be stripped of significant vegetation and other deleterious materials.

It is our recommendation that all existing fills and loose colluvial soils under any proposed flatwork and paved areas be removed and replaced with engineered compacted fill. If this is not done, premature structural distress (settlement) of the flatwork and pavement may occur. Any undocumented fills encountered during grading should be completely removed and cleaned of significant deleterious materials. Such materials are anticipated in significant amounts, locally, in the current locations of the existing improvements of the site. However, the cost and/or feasibility of complete fill and colluvium removal should be compared to possible higher maintenance costs if only partial removal and recompaction is done. It is our opinion that decreased settlement will result from increasing the amount of fill removed. An economic analysis of the relationship between current construction costs and ongoing maintenance costs should be undertaken to evaluate the most cost effective amount of fill to be removed. The fill may then be reused as engineered compacted fill.

Cavities created by removal of subsurface obstructions should be thoroughly cleaned of loose soil, organic matter and other deleterious materials, shaped to provide access for construction equipment, and backfilled as recommended in the following Engineered Compacted Fill section of this report.

Initial Site Preparation

It is our recommendation that all fill and existing loose to medium dense colluvial soils be removed from areas to receive engineered compacted fill. Based upon the information

obtained during this investigation, removals on the order of 3 to 8 feet below existing grades will be required to expose competent bedrock units upon which fills can be placed.

Preparation of Building Pad Areas

All foundations should rest upon a minimum of 24 inches of properly compacted fill material placed over competent bedrock or entirely upon competent bedrock. In areas where the required fill thickness is not accomplished by the removal of the existing fill and colluvial materials and site rough grading, the foundation areas should be further subexcavated to a depth of at least 24 inches below the proposed footing base grade, with the subexcavation extending at least 5 feet beyond the foundation lines. Where deeper removals in excess of 5 feet are required, these removals should extend laterally at a 1:1 ratio.

As previously mentioned, the proposed structures may be constructed directly upon the underlying bedrock in lieu of constructing the compacted fill mat beneath the structure(s). The depth to competent bedrock beneath the site is anticipated to be approximately 4 feet, but may be deeper locally.

To provide adequate support, concrete slabs-on-grade should bear on a minimum of 12 inches of compacted soil. During rough grading, the remedial removals recommended above will most likely provide the recommended 12 inches of compacted soil for adequate support of concrete slabs-on-grade. The final pad surfaces should be rolled to provide smooth, dense surfaces upon which to place the concrete.

Engineered Compacted Fill

The on-site soil materials should provide adequate quality fill material, provided they are free from significant organic matter and other deleterious materials. Unless approved by the geotechnical engineer and local governing agency, rock or similar irreducible material with a maximum dimension greater than 6 inches should not be buried or placed in fills.

Import fill, if required, should be inorganic, non-expansive granular soils free from rocks or lumps greater than 6 inches in maximum dimension. Sources for import fill should be approved by the geotechnical engineer prior to their use. Fill should be spread in maximum 8-inch uniform, loose lifts, each lift brought to near optimum moisture content, and compacted to a relative compaction of at least 90 percent in accordance with ASTM D 1557.

Short-Term Excavations

Following the California Occupational and Safety Health Act (CAL-OSHA) requirements, excavations 5 feet deep and greater should be sloped or shored. All excavations and shoring should conform to CAL-OSHA requirements.

Short-term excavations 5-feet deep and greater shall conform to Title 8 of the California Code of Regulations, Construction Safety Orders, Section 1504 and 1539 through 1547. Based on our exploratory borings, it appears that Type C soil and Stable Rock are the predominant type of soil/rock on the project and all short-term excavations should be based on this type of soil. Deviation from the standard short-term slopes are permitted using Option 4, Design by a Registered Professional Engineer (Section 1541.1).

Short-term slope construction and maintenance are the responsibility of the contractor, and should be a consideration of his methods of operation and the actual soil conditions encountered.

Slope Construction

Preliminary data indicates that cut and fill slopes should be constructed no steeper than two horizontal to one vertical. Fill slopes should be overfilled during construction and then cut back to expose fully compacted soil. A suitable alternative would be to compact the slopes during construction, then roll the final slopes to provide dense, erosion-resistant surfaces.

Slope Protection

Since the native materials are susceptible to erosion by running water, measures should be provided to prevent surface water from flowing over slope faces. Slopes at the project should be planted with a deep rooted ground cover as soon as possible after completion. The use of succulent ground covers such as iceplant or sedum is not recommended. If watering is necessary to sustain plant growth on slopes, the watering operation should be monitored to assure proper operation of the irrigation system and to prevent over watering.

Foundation Design

If the site is prepared as recommended, the proposed structures may be safely founded on conventional foundations, utilizing individual spread footings and/or continuous wall footings, bearing on a minimum of 24 inches of engineered compacted fill. All foundations

should have a minimum width of 12 inches and should be established a minimum of 12 inches below lowest adjacent grade.

As an alternative, the proposed structures may be constructed directly upon the underlying competent bedrock in lieu of constructing the compacted fill mat beneath the structures.

For the minimum width and depth, footings may be designed using a maximum soil bearing pressure of 2,000 pounds per square foot (psf) for dead plus live loads. This value may be increased by 300 psf for each additional foot of width and by 700 psf for each additional foot of depth, to a maximum of 4,000 psf.

The above values are net pressures; therefore, the weight of the foundations and the backfill over the foundations may be neglected when computing dead loads. The values apply to the maximum edge pressure for foundations subjected to eccentric loads or overturning. The recommended pressures apply for the total of dead plus frequently applied live loads, and incorporate a factor of safety of at least 3.0. The allowable bearing pressures may be increased by one-third for temporary wind or seismic loading. The resultant of the combined vertical and lateral seismic loads should act within the middle one-third of the footing width. The maximum calculated edge pressure under the toe of foundations subjected to eccentric loads or overturning should not exceed the increased allowable pressure.

Resistance to lateral loads will be provided by passive earth pressure and base friction. For footings bearing against compacted fill, passive earth pressure may be considered to be developed at a rate of 400 pounds per square foot per foot of depth. Base friction may be computed at 0.40 times the normal load. Base friction and passive earth pressure may be combined without reduction.

Settlement

Total settlement of individual foundations will vary depending on the width of the foundation and the actual load supported. Maximum settlement of shallow foundations designed and constructed in accordance with the preceding recommendations are estimated to be on the order of 0.5 inch. Differential settlements between adjacent footings should be about one-half of the total settlement. Settlement of all foundations is expected to occur rapidly, primarily as a result of elastic compression of supporting soils as the loads are applied, and should be essentially completed shortly after initial application of the loads.

Building Area Slab-On-Grade Design

To provide adequate support, concrete floor slabs-on-grade should bear on a minimum of 24 inches of engineered fill compacted soil. The final pad surfaces should be rolled to provide smooth, dense surfaces.

Slabs to receive moisture-sensitive coverings should be provided with a moisture vapor retarder/barrier. We recommend that a vapor retarder/barrier be designed and constructed according to the American Concrete Institute 302.1R, Concrete Floor and Slab Construction, which addresses moisture vapor retarder/barrier construction. At a minimum, the vapor retarder/barrier should comply with ASTM E1745 and have a nominal thickness of at least 10 mils. The vapor retarder/barrier should be properly sealed, per the manufacturer's recommendations, and protected from punctures and other damage. Per the Portland Cement Association, for slabs with vapor-sensitive coverings, a layer of dry, granular material (sand) should be placed under the vapor retarder/barrier. For slabs in humidity-controlled areas, a layer of dry, granular material (sand) should be placed above the vapor retarder/barrier.

The slabs should be protected from rapid and excessive moisture loss which could result in slab curling. Careful attention should be given to slab curing procedures, as the site area is subject to large temperature extremes, humidity, and strong winds.

Exterior Flatwork

To provide adequate support, exterior flatwork improvements should rest on a minimum of 12 inches of soil compacted to at least 90 percent (ASTM D 1557).

Since very low expansive soils are anticipated to underlie flatwork areas, no particular geotechnical and/or structural mitigation measures to counteract expansive soil problems will be required.

Flatwork surface should be sloped a minimum of 1 percent away from buildings and slopes, to approved drainage structures.

Wall Pressures

The design of footings for retaining structures should be performed in accordance with the recommendations described earlier under Preparation of Foundation Areas and Foundation Design. For design of retaining wall footings, the resultant of the applied loads

should act in the middle one-third of the footing, and the maximum edge pressure should not exceed the basic allowable value without increase.

For design of retaining walls unrestrained against movement at the top, we recommend an active pressure of 30 pounds per square foot (psf) per foot of depth be used. This assumes level backfill consisting of recompacted, very low expansive, native soils placed against the structures and with the backcut slope extending upward from the base of the stem at 35 degrees from the vertical or flatter.

For design of retaining walls restrained against movement at the top, we recommend an active pressure of 40 pounds per square foot (psf) per foot of depth be used. This assumes level backfill consisting of recompacted, non-square expansive, native soils placed against the structures and with the backcut slope extending upward from the base of the stem at 35 degrees from the vertical or flatter.

The pseudo-static earth pressure developed at a rate of 15 psf per foot of depth should be utilized for flexible walls. The pseudo-static earth pressure developed at a rate of 20 psf per foot of depth should be utilized for rigid retaining wall conditions. The pseudo-static earth pressures do not include static earth pressures. The maximum pseudo-static earth pressure increases with depth and can be approximated by a triangular distribution. The point of application of the pseudo-static earth pressure force should be at H/3 above the base wall.

To avoid overstressing or excessive tilting during placement of backfill behind walls, heavy compaction equipment should not be allowed within the zone delineated by a 45 degree line extending from the base of the wall to the fill surface. The backfill directly behind the walls should be compacted using light equipment such as hand operated vibrating plates and rollers. No material larger than 3-inches in diameter should be placed in direct contact with the wall.

Wall pressures should be verified prior to construction, when the actual backfill materials and conditions have been determined. Recommended pressures are applicable only to level, non-expansive, properly drained backfill (with no additional surcharge loadings). If inclined backfills are proposed, this firm should be contacted to develop appropriate active earth pressure parameters. Toe bearing pressure for non-structural walls on soils, not prepared as described earlier under Preparation of Foundation Areas, should not exceed California Building Code values.

Preliminary Pavement Design

Testing and design for preliminary onsite pavement was conducted in accordance with the California Highway Design Manual.

Based upon our preliminary sampling and testing, and upon an assumed Traffic Index generally used for similar projects, it appears that the structural section tabulated below should provide satisfactory pavements for the subject on-site pavement improvements:

AREA	T.I.*	DESIGN R-VALUE	PRELIMINARY SECTION
On site vehicular parking	5.0	50	0.25' AC / 0.35' AB

AC - Asphalt Concrete
AB - Class 2 Aggregate Base
*actual TI to be provided by the project engineer

The above structural sections are predicated upon 90 percent relative compaction (ASTM D 1557) of all utility trench backfills and 95 percent relative compaction (ASTM D 1557) of the upper 12 inches of pavement subgrade soils and of any aggregate base utilized. In addition, the aggregate base should meet Caltrans specifications for Class 2 Aggregate Base.

It should be noted that all of the above pavement design was based upon the results of preliminary sampling and testing, and should be verified by additional sampling and testing during construction when the actual subgrade soils are exposed.

Soil Corrosivity

The results and recommendations from the soil corrosivity testing completed by Project X Corrosion Engineering are presented within Appendix D.

Construction Monitoring

Post investigative services are an important and necessary continuation of this investigation. Project plans and specifications should be reviewed by the project geotechnical consultant prior to construction to confirm that the intent of the

recommendations presented herein have been incorporated into the design. Additional expansion index and soluble sulfate testing may be required after the site is rough graded.

During construction, sufficient and timely geotechnical observation and testing should be provided to correlate the findings of this investigation with the actual subsurface conditions exposed during construction. Items requiring observation and testing include, but are not necessarily limited to, the following:

1. Site preparation-stripping and removals.

2. Excavations, including geologic observations and approval of the bottom of excavations prior to filling.

3. Subgrade preparation for pavements and slabs-on-grade.

4. Placement of engineered compacted fill and backfill, including approval of fill materials and the performance of sufficient density tests to evaluate the degree of compaction being achieved.

5. Foundation excavations.

LIMITATIONS

This report contains geotechnical conclusions and recommendations developed solely for use by SUSP Engineering, and their design consultants, for the purposes described earlier. It may not contain sufficient information for other uses or the purposes of other parties. The contents should not be extrapolated to other areas or used for other facilities without consulting LOR Geotechnical Group, Inc.

The recommendations are based on interpretations of the subsurface conditions concluded from information gained from subsurface explorations and a surficial site reconnaissance. The interpretations may differ from actual subsurface conditions, which can vary horizontally and vertically across the site. If conditions are encountered during the construction of the project which differ significantly from those presented in this report, this firm should be notified immediately in order that we may assess the impact to the recommendations provided. Due to possible subsurface variations, all aspects of field construction addressed in this report should be observed and tested by the project geotechnical consultant.

If parties other than LOR Geotechnical Group, Inc., provide construction monitoring services, they must be notified that they will be required to assume responsibility for the geotechnical phase of the project being completed by concurring with the recommendations provided in this report or by providing alternative recommendations.

The report was prepared using generally accepted geotechnical engineering practices under the direction of a state licensed geotechnical engineer. No warranty, expressed or implied, is made as to conclusions and professional advice included in this report. Any persons using this report for bidding or construction purposes should perform such independent investigations as deemed necessary to satisfy themselves as to the surface and subsurface conditions to be encountered and the procedures to be used in the performance of work on this project.

TIME LIMITATIONS

The findings of this report are valid as of this date. Changes in the condition of a property can, however, occur with the passage of time, whether they be due to natural processes or the work of man on this or adjacent properties. In addition, changes in the Standards-of-Practice and/or Governmental Codes may occur. Due to such changes, the findings of this report may be invalidated wholly or in part by changes beyond our control.

Therefore, this report should not be relied upon after a significant amount of time without a review by LOR Geotechnical Group, Inc., verifying the suitability of the conclusions and recommendations.

CLOSURE

It has been a pleasure to assist you with this project. We look forward to being of further assistance to you as construction begins. Should conditions be encountered during construction that appear to be different than indicated by this report, please contact this office immediately in order that we might evaluate their effect.

Should you have any questions regarding this report, please do not hesitate to contact us as your convenience.

Respectfully submitted,
LOR Geotechnical Group, Inc.

Andrew A. Tardie, CEG 2794
Vice President

John P. Leuer, GE 2030
President

AAT:JPL:ss

Distribution: Addressee (2) and via email nthomas@calruralwater.org

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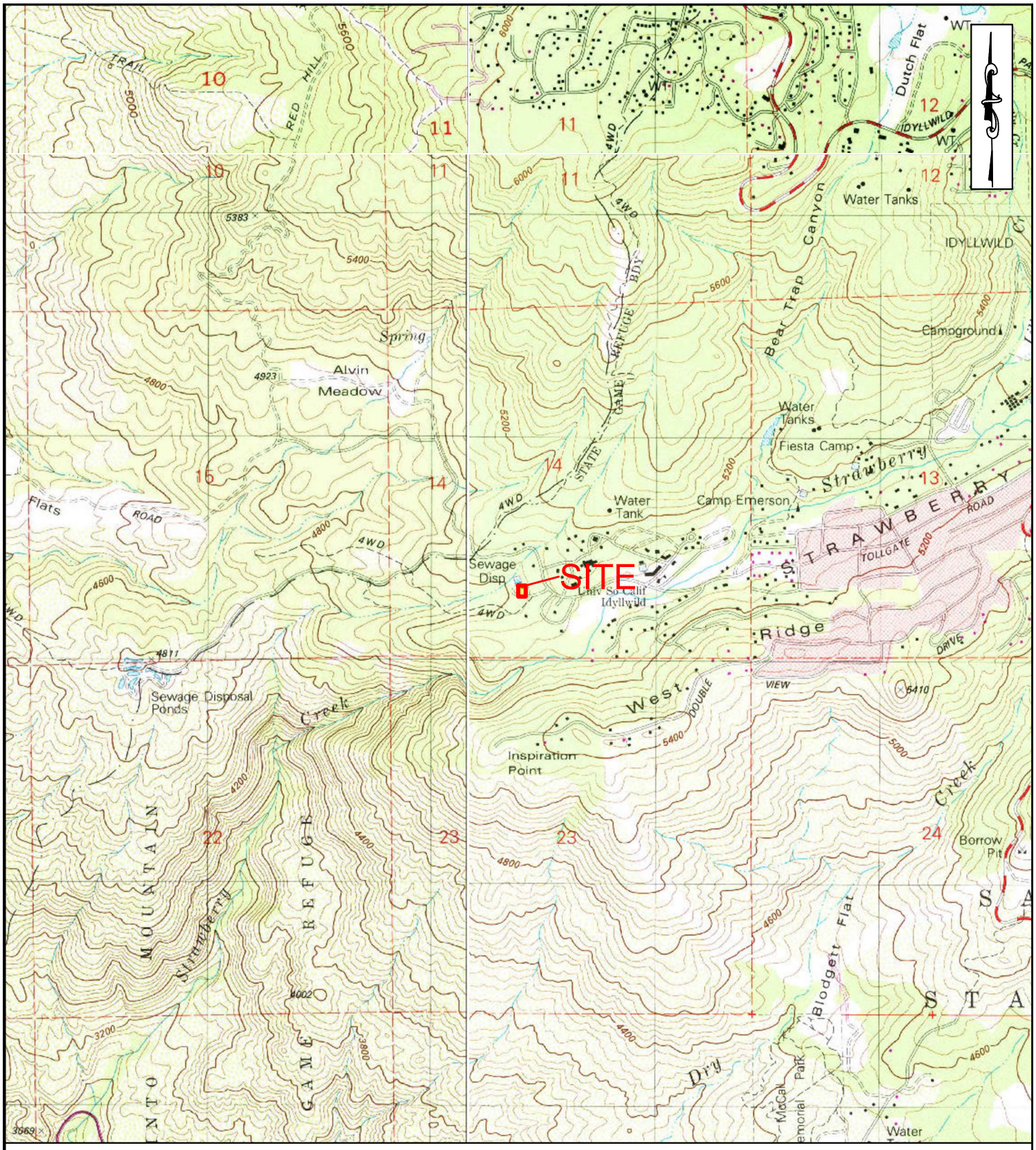
APPENDIX A

Index Map, Site Plan, Regional Geologic Map, and Historical Seismicity Maps



INDEX MAP

PROJECT:	Idyllwild Treatment Plant, Idyllwild, California	**PROJECT NO.:**	63980.1
CLIENT:	SUSP Engineering	**ENCLOSURE:**	A-1
LOR GEOTECHNICAL GROUP, INC.		**DATE:**	January 2024
		SCALE:	1" ≈ 2,000'

Legend

(Locations Approximate)

Map Symbols

B-3 - Exploratory Boring

California Rural Water Association

C R W A
1234 N MARKET BLVD
SACRAMENTO, CA 95834
(916) 553-4900

1"=20'
ONE INCH AT FULL SCALE

DIGALERT
CALL AT LEAST TWO WORKING DAYS BEFORE YOU DIG

IDYLLWILD TREATMENT PLANT
SITE AREAS
IDYLLWILD, CA

DRAFT -- NOT FOR CONSTRUCTION

DATE:	OCT 2023
DESIGN:	NMT
DRAWN:	MAH
CHECKED:	XX

NO.	REVISIONS	BY	APP	DATE

SHEET 4 OF X

G4

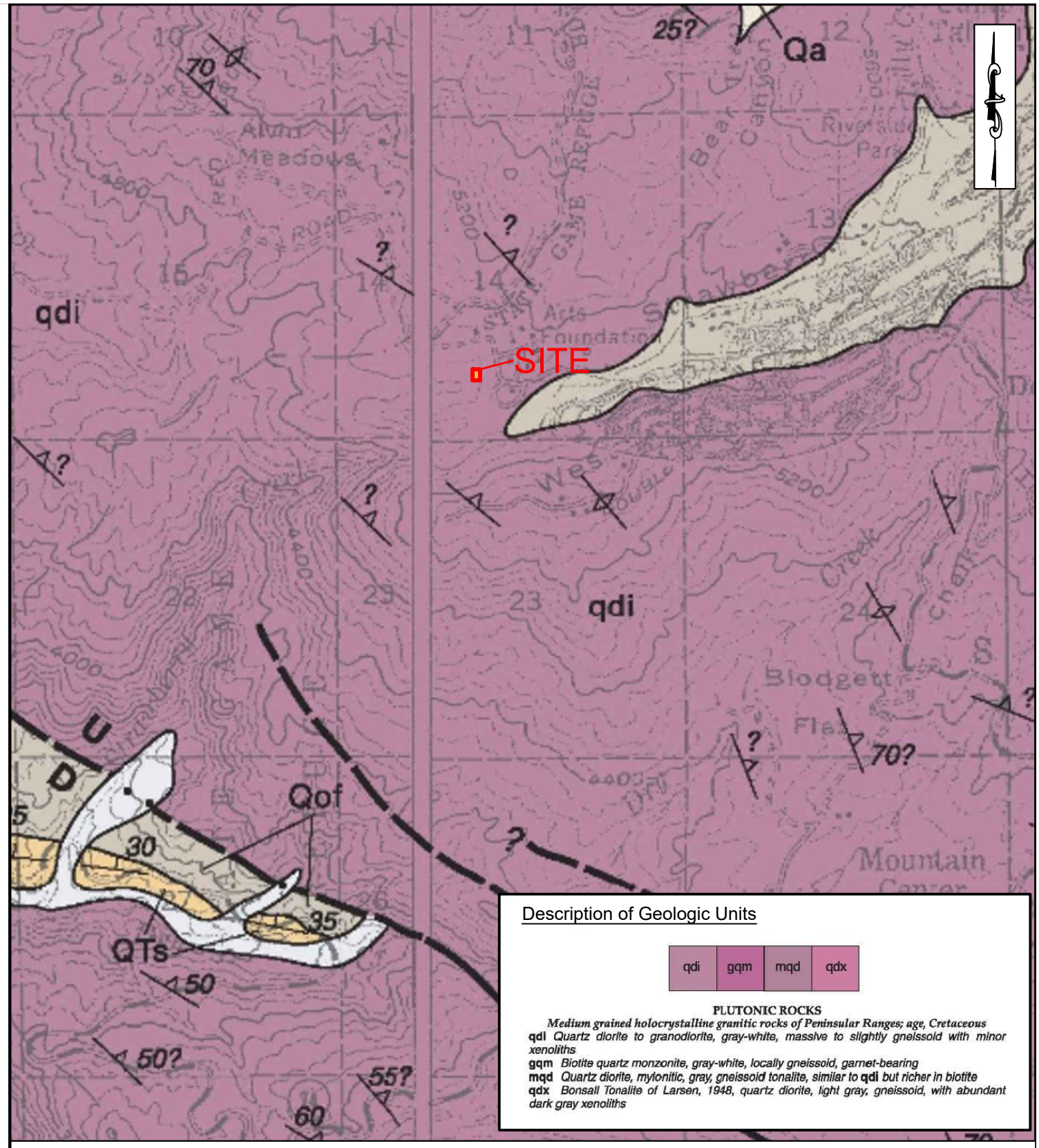
SITE PLAN

PROJECT: Idyllwild Treatment Plant, Idyllwild, California

CLIENT: SUSP Engineering

PROJECT NO.:	63980.1
ENCLOSURE:	A-2
DATE:	January 2024
SCALE:	1" ≈ 45'

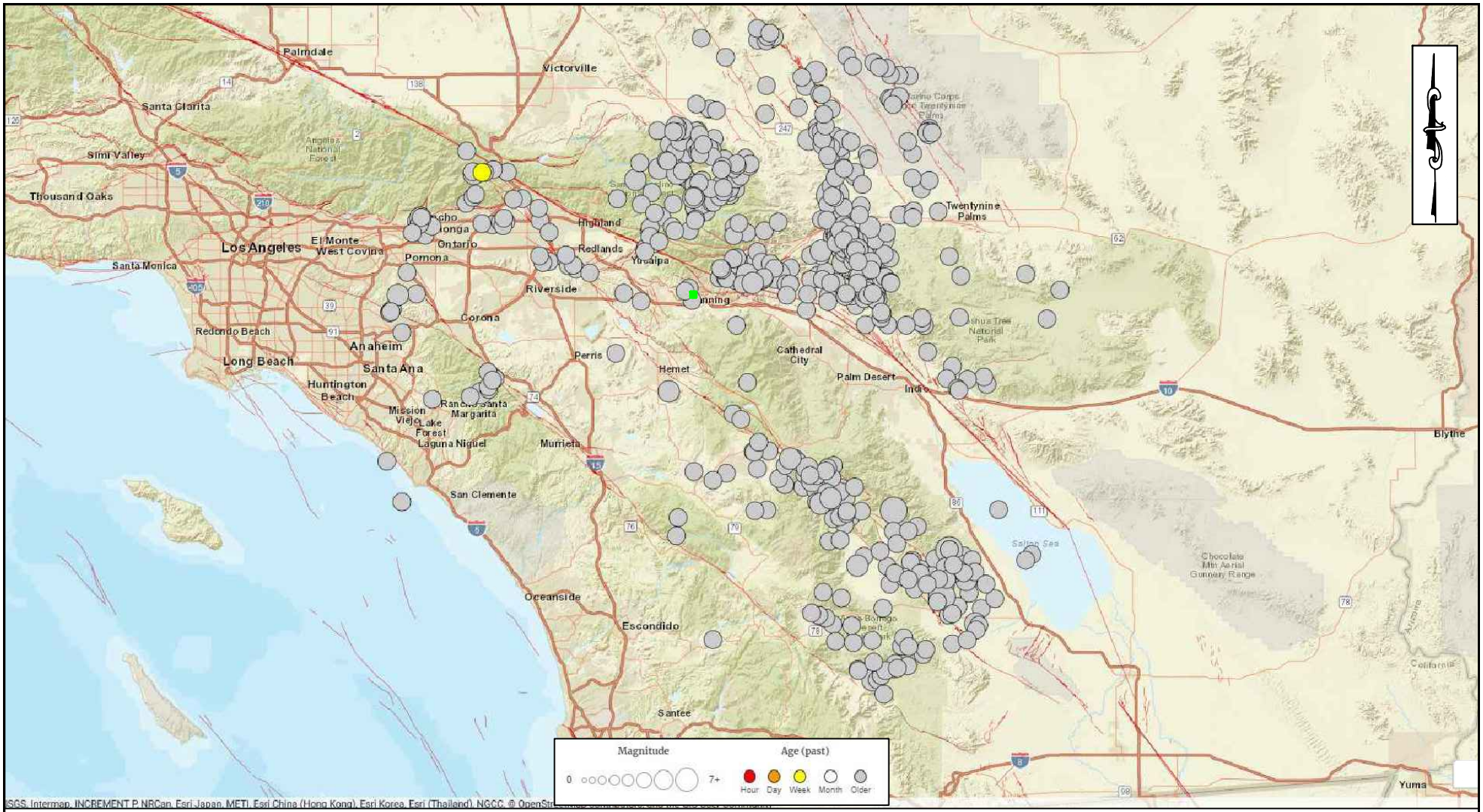
LOR GEOTECHNICAL GROUP, INC.



REGIONAL GEOLOGIC MAP

(Dibblee and Minch, 2008)

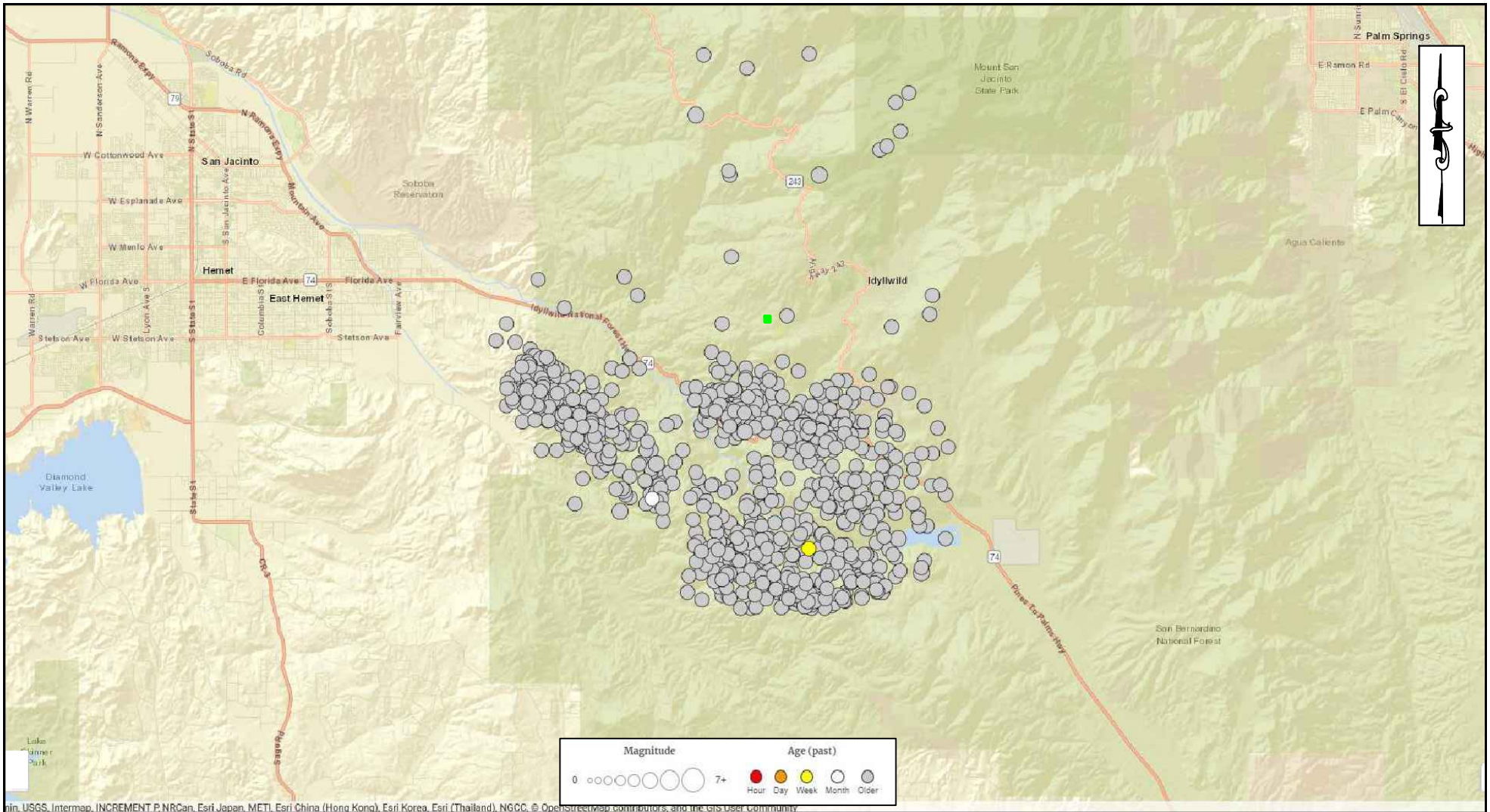
PROJECT:	Idyllwild Treatment Plant, Idyllwild, California	**PROJECT NO.:**	63980.1
CLIENT:	SUSP Engineering	**ENCLOSURE:**	A-3
LOR GEOTECHNICAL GROUP, INC.		**DATE:**	January 2024
		SCALE:	1" ≈ 2,000'



U.S. Geologic Survey (2024) real-time earthquake epicenter map. Plotted are 558 epicenters of instrument-recorded events from 01/01/32 to present (01/09/24) of local magnitude 4+ within a radius of ~62 miles (100 kilometers) of the site. Location accuracy varies. The site is indicated by the green square (■). The selected magnitude corresponds to a threshold intensity value where very light damage potential begins. These events are also generally widely felt by persons. Red lines mark the surface traces of known Quaternary-age faults.

HISTORICAL SEISMICITY MAP - 100km Radius

PROJECT:	Idyllwild Treatment Plant, Idyllwild, California	**PROJECT NO.:**	63980.1
CLIENT:	SUSP Engineering	**ENCLOSURE:**	A-4
LOR GEOTECHNICAL GROUP, INC.		**DATE:**	January 2024
		SCALE:	1" ≈ 40km



U.S. Geologic Survey (2024) real-time earthquake epicenter map. Plotted are 856 epicenters of instrument-recorded events from 01/01/78 to present (01/09/24) of local magnitude 2+ within a radius of ~6.2 miles (10 kilometers) of the site. Location accuracy varies. The site is indicated by the green square (■). The selected magnitude corresponds to a threshold intensity value where very light damage potential begins. These events are also generally widely felt by persons. Red lines mark the surface traces of known Quaternary-age faults.

HISTORICAL SEISMICITY MAP - 10km Radius

PROJECT:	Idyllwild Treatment Plant, Idyllwild, California	**PROJECT NO.:**	63980.1
CLIENT:	SUSP Engineering	**ENCLOSURE:**	A-5
LOR GEOTECHNICAL GROUP, INC.		**DATE:**	January 2024
		SCALE:	1" ≈ 10km

APPENDIX B

Field Investigation Program and Boring Logs

APPENDIX B
FIELD INVESTIGATION

Our subsurface exploration of the site consisted of drilling 3 exploratory borings to depths of approximately 18 to 20 feet below the existing ground surface using a CME-55 drill rig on December 21, 2023. The approximate locations of the borings are shown on Enclosure A-2 within Appendix A.

The drilling exploration was conducted using a track-mounted CME-55 drill rig equipped with 8-inch diameter hollow stem augers. The soils were continuously logged by a geologist from this firm who inspected the site, created detailed logs of the borings, obtained undisturbed, as well as disturbed, soil samples for evaluation and testing, and classified the soils by visual examination in accordance with the Unified Soil Classification System.

Relatively undisturbed samples of the subsoils were obtained at a maximum interval of 5 feet. The samples were recovered by using a California split barrel sampler of 2.50 inch inside diameter and 3.25 inch outside diameter or a Standard Penetration Sampler (SPT) from the ground surface to the total depth explored. The samplers were driven by a 140 pound automatic trip hammer dropped from a height of 30 inches. The number of hammer blows required to drive the sampler into the ground the final 12 inches were recorded and further converted to an equivalent SPT N-value. Factors such as efficiency of the automatic trip hammer used during this investigation (80%), borehole diameter (8"), and rod length at the test depth were considered for further computing of equivalent SPT N-values corrected for field procedures (N60) which are included in the boring logs, Enclosures B-1 through B-3.

The undisturbed soil samples were retained in brass sample rings of 2.42 inches in diameter and 1.00 inch in height, and placed in sealed plastic containers. Disturbed soil samples were obtained at selected levels within the borings and placed in sealed containers for transport to our geotechnical laboratory.

All samples obtained were taken to our geotechnical laboratory for storage and testing. Detailed logs of the borings are presented on the enclosed Boring Logs, Enclosures B-1 through B-3. A Boring Log Legend is presented on Enclosure B-i A Soil Classification Chart is presented as Enclosure B-ii.

CONSISTENCY OF SOIL

SANDS

SPT BLOWS	CONSISTENCY
0-4	Very Loose
4-10	Loose
10-30	Medium Dense
30-50	Dense
Over 50	Very Dense

COHESIVE SOILS

SPT BLOWS	CONSISTENCY
0-2	Very Soft
2-4	Soft
4-8	Medium
8-15	Stiff
15-30	Very Stiff
30-60	Hard
Over 60	Very Hard

SAMPLE KEY

Symbol	Description
	INDICATES CALIFORNIA SPLIT SPOON SOIL SAMPLE INDICATES BULK SAMPLE INDICATES SAND CONE OR NUCLEAR DENSITY TEST INDICATES STANDARD PENETRATION TEST (SPT) SOIL SAMPLE

TYPES OF LABORATORY TESTS

1	Atterberg Limits
2	Consolidation
3	Direct Shear (undisturbed or remolded)
4	Expansion Index
5	Hydrometer
6	Organic Content
7	Proctor (4", 6", or Cal216)
8	R-value
9	Sand Equivalent
10	Sieve Analysis
11	Soluble Sulfate Content
12	Swell
13	Wash 200 Sieve

BORING LOG LEGEND

PROJECT:	Idyllwild Treatment Plant, Idyllwild, California	**PROJECT NO.:**	63980.1
CLIENT:	SUSP Engineering	**ENCLOSURE:**	B-i
LOR GEOTECHNICAL GROUP, INC.		**DATE:**	January 2024

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO.200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

PARTICLE SIZE LIMITS

BOULDERS	COBBLES	GRAVEL		SAND			SILT OR CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE	
12"	3"	3/4"	No. 4	No. 10	No. 40	200	

(U.S. STANDARD SIEVE SIZE)

SOIL CLASSIFICATION CHART

PROJECT:	Idyllwild Treatment Plant, Idyllwild, California	**PROJECT NO.:**	63980.1
CLIENT:	SUSP Engineering	**ENCLOSURE:**	B-ii
LOR GEOTECHNICAL GROUP, INC.		**DATE:**	January 2024

LOG OF BORING B-1

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
0									@ 0 feet, PLANT LITTER: mostly pine needles, pine cones
	20	3, 4, 7, 8, 9, 10	3.2		105.8			SM	@ 0.33 feet, COLLUVIUM: SILTY SAND, approximately 10% coarse grained sand, 20% medium grained sand, 35% fine grained sand, 35% silty fines, dark brown, damp, loose. @ 1 foot, SILTY SAND, approximately 15% coarse grained sand, 25% medium grained sand, 40% fine grained sand, 20% silty fines, tan, dry, abundant pinhole porosity, some roots.
5	18		2.2		114.7				@ 3 feet, IGNEOUS BEDROCK: QUARTZ DIORITE, highly weathered, friable, coarse grained, speckled white-brown, dry.
	43 for 2"		5.2		119.9				@ 6 feet, becomes much less weathered, fresh to slightly weathered, hard.
10	65 for 2"		9.6						@ 8 feet, difficult to drill, very hard, water added to facilitate drilling, moisture content tests affected. @ 10 feet, remains coarse grained, speckled gray-white, very difficult to drill, very slow progress.
15	65 for 2"		2.0						@ 12 feet, practical refusal; boring moved ~8'west for second attempt. SECOND ATTEMPT: similar, not quite has hard but remains difficult to drill. @ 16 feet, becomes very difficult to drill, very slow progress.
20									@ 19 feet, practical refusal. END OF BORING @ 19' due to practical refusal No fill No groundwater Bedrock @ 3'
25									

TEST DATA

PROJECT:	Proposed New Water Treatment Facilities	**PROJECT NO.:**	63980.1	
CLIENT:	SUSP Engineering	**ELEVATION:**	5,050	
LOR GEOTECHNICAL GROUP, INC.		**DATE DRILLED:**	December 21, 2023	
		EQUIPMENT:	CME 55	
		HOLE DIA.: 8"	**ENCLOSURE:**	B-1

LOG OF BORING B-2

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
0									@ 0 feet, PLANT LITTER: mostly pine needles, pine cones
	10		11.0		88.8			SM	@ 0.33 feet, COLLUVIUM: SILTY SAND, approximately 10% coarse grained sand, 20% medium grained sand, 30% fine grained sand, 40% silty fines, dark brown, damp, loose.
			6.1		114.6				@ 2 feet, abundant roots, sample nearly entirely root.
5	14								@ 3 feet, IGNEOUS BEDROCK: QUARTZ DIORITE, highly weathered, friable, coarse to medium grained, speckled white-brown, damp.
	43 for 1"		6.8		125.1				@ 7 feet, much less weathered, hard, speckled white-gray, somewhat difficult to drill, water added to facilitate drilling, moisture content tests affected.
10	65 for 5"		10.4						@ 10 feet, difficult to drill.
15	65 for 2"		8.7						@ 15 feet, very slow drilling.
									@ 18 feet, practical refusal.
									END OF BORING @ 18'
20									No fill No groundwater Bedrock @ 3'
25									

PROJECT:	Proposed New Water Treatment Facilities	**PROJECT NO.:**	63980.1
CLIENT:	SUSP Engineering	**ELEVATION:**	5,054
		DATE DRILLED:	December 21, 2023
LOR GEOTECHNICAL GROUP, INC.		**EQUIPMENT:**	CME 55
		HOLE DIA.: 8"	**ENCLOSURE:** B-2

LOG OF BORING B-3

DEPTH IN FEET	SPT BLOW COUNTS	LABORATORY TESTS	MOISTURE CONTENT (%)		DRY DENSITY (PCF)	SAMPLE TYPE	LITHOLOGY	U.S.C.S.	DESCRIPTION
0		7, 9, 10						SM SP SM	@ 0 feet, 3/4" gravel underlain by visqueen. @ 0.16 feet, FILL: SILTY SAND, approximately 15% coarse grained sand, 20% medium grained sand, 35% fine grained sand, 30% silty fines, brown, damp. @ 1 foot, POORLY GRADED SAND, approximately 10% medium grained sand, 85% fine grained sand, 5% silty fines, tan, damp.
5	8		13.8		102.2				@ 2 feet, SILTY SAND, approximately 20% coarse grained sand, 25% medium grained sand, 30% fine grained sand, 25% silty fines, brown, dry, micaceous, some roots. @ 4 feet, slightly coarser grained, moist.
	12		9.0		112.4				@ 7 feet, IGNEOUS BEDROCK: QUARTZ DIORITE, severely weathered, medium grained, very friable, tan, damp to moist.
10	61 for 9"		9.7		108.1				@ 10 feet, much less weathered, coarse grained, tan, damp, somewhat difficult to drill.
	78 for 10"		5.2		118.8				
15	65 for 4"		5.7						@ 15 feet, becomes speckled gray-white, damp, very difficult to drill, water added to facilitate drilling.
20	73 for 4"		4.4						END OF BORING @ 20.33' Fill to 7' No groundwater Bedrock @ 7' **client representative potholed to 5 feet prior to drilling**
25									

TEST DATA

PROJECT:	Proposed New Water Treatment Facilities	**PROJECT NO.:**	63980.1
CLIENT:	SUSP Engineering	**ELEVATION:**	5,060
		DATE DRILLED:	December 21, 2023
LOR GEOTECHNICAL GROUP, INC.		**EQUIPMENT:**	CME 55
		HOLE DIA.: 8"	**ENCLOSURE:** B-3

APPENDIX C

Laboratory Testing Program and Test Results

APPENDIX C
LABORATORY TESTING

General

Selected soil samples obtained from the borings were tested in our geotechnical laboratory to evaluate the physical properties of the soils affecting foundation design and construction procedures. The laboratory testing program performed in conjunction with our investigation included in-place moisture content and dry density, laboratory compaction characteristics, direct shear, sieve analysis, sand equivalent, R-value, expansion index, and corrosion. Descriptions of the laboratory tests are presented in the following paragraphs:

Moisture Density Tests

The moisture content and dry density information provides an indirect measure of soil consistency for each stratum, and can also provide a correlation between soils on this site. The dry unit weight and field moisture content were determined for selected undisturbed samples, in accordance with ASTM D 2921 and ASTM D 2216, respectively, and the results are shown on the boring logs, Enclosures B-1 through B-3 for convenient correlation with the soil profile.

Laboratory Compaction

A selected soil sample was tested in the laboratory to determine compaction characteristics using the ASTM D 1557 compaction test method. The results are presented in the following table:

LABORATORY COMPACTION				
Boring Number	**Sample Depth (feet)**	**Soil Description (U.S.C.S.)**	**Maximum Dry Density (pcf)**	**Optimum Moisture Content (percent)**
B-1	0-3	(SM) Silty Sand	129.5	8.0
B-3	1-4	(SM) Silty Sand	120.5	9.0

Direct Shear Test

Shear tests are performed in general accordance with ASTM D 3080 with a direct shear machines at a constant rate-of-strain (0.04 inches/minute). The machine is designed to test a sample partially extruded from a sample ring in single shear. Samples are tested at varying normal loads in order to evaluate the shear strength parameters, angle of internal friction and cohesion. Samples are tested in remolded condition (90 percent relative compaction per ASTM D 1557) and soaked, to represent the worse case conditions expected in the field.

The results of the shear test on a selected soil sample is presented in the following table:

DIRECT SHEAR TEST				
Boring Number	**Sample Depth (feet)**	**Soil Description (U.S.C.S.)**	**Apparent Cohesion (psf)**	**Angle of Internal Friction (degrees)**
B-1	0-3	(SM) Silty Sand	200	35

Sieve Analysis

A quantitative determination of the grain size distribution was performed for selected samples in accordance with the ASTM D 422 laboratory test procedure. The determination is performed by passing the soil through a series of sieves, and recording the weights of retained particles on each screen. The results of the grain size distribution analyses are presented graphically on Enclosure C-1.

Sand Equivalent

The sand equivalent of selected soils were evaluated using the California Sand Equivalent Test Method, Caltrans Number 217. The results of the sand equivalent tests are presented with the grain size distribution analyses on Enclosure C-1.

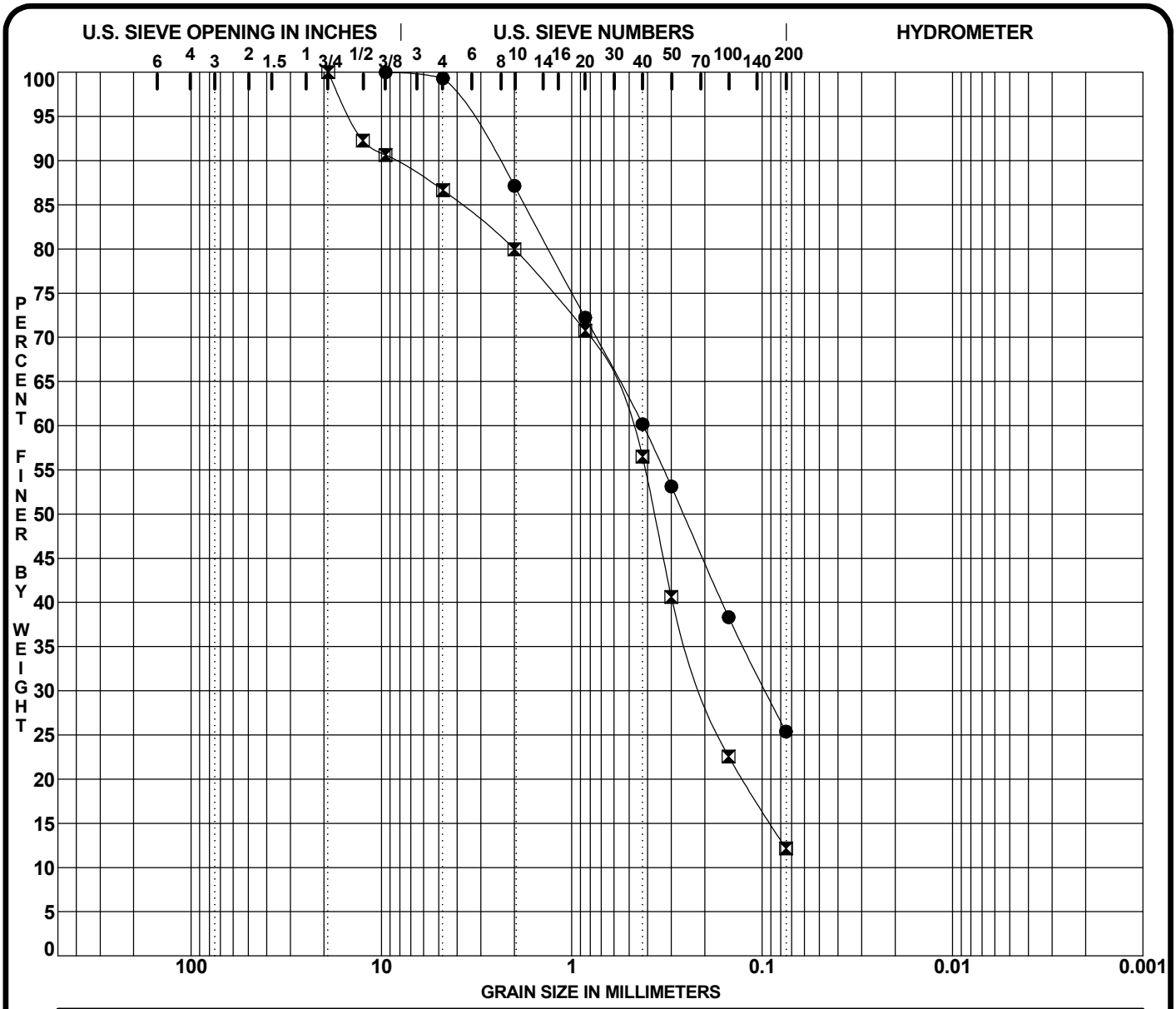
R-Value Test

Based on the indicator testing above, a soil sample was selected and tested to determine its R-value using the California R-Value Test Method, Caltrans Number 301. The results of the R-value test is presented on Enclosure C-1.

Expansion Index Test

Remolded samples are tested to determine their expansion potential in accordance with the Expansion Index (EI) test. The test is performed in accordance with the Uniform Building Code Standard 18-2. The test result for a select soil sample is presented in the following table:

EXPANSION INDEX TEST				
Boring Number	**Sample Depth (feet)**	**Soil Description (U.S.C.S.)**	**Expansion Index (EI)**	**Expansion Potential**
B-1	0-3	(SM) Silty Sand	0	Very Low
Expansion Index:	0-20 Very low	21-50 Low	51-90 Medium	91-130 High



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Soil Classification	SE	RV	PL	PI	Cc	Cu
●	B-1	@ 0-3 ft	(SM) Silty Sand	20	59				
⊠	B-3	@ 1-4 ft	(SM) Silty Sand	34	--			1.22	7.8

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	B-1	@ 0-3 ft	9.50	0.42	0.096		0.7	73.9	25.4	
⊠	B-3	@ 1-4 ft	19.00	0.50	0.200		13.3	74.5	12.2	

PROJECT:	Proposed New Water Treatment Facilities	**PROJECT NO.:**	63980.1
CLIENT:	SUSP Engineering	**DATE:**	February 2024

GRADATION CURVES

LOR GEOTECHNICAL GROUP, INC.

ENCLOSURE: C-1

APPENDIX D

Project X Corrosion Engineering

Soil Corrosivity Evaluation Report for Idyllwild Wastewater Plant

January 18, 2024

Prepared for:
Andrew Tardie
LOR Geotechnical
6121 Quail Valley Ct
Riverside, 92507 CA
atardie@lorgeo.com

Project X Job #: S240110E
Client Job or PO #: 63980.1

Contents

1 Executive Summary

A corrosion evaluation of the soils at Idyllwild Wastewater Plant was performed to provide corrosion control recommendations for general construction materials. The site is located at Idyllwild, CA Wastewater Plant . Two (2) samples were tested to a depth of 5.0 ft. Site ground water and topography information was provided by LOR Geotechnical. Groundwater depth was determined to be greater than 50 feet below finished grade.

Every material has its weakness. Aluminum alloys, galvanized/zinc coatings, and copper alloys do not survive well in very alkaline or very acidic pH environments. Copper and brasses do not survive well in high nitrate or ammonia environments. Steels and irons do not survive well in low soil resistivity and high chloride environments. High chloride environments can even overcome and attack steel encased in normally protective concrete. Concrete does not survive well in high sulfate environments. And nothing survives well in high sulfide and low redox potential environments with corrosive bacteria. This is why Project X tests for these 8 factors to determine a soil's corrosivity towards various construction materials. **Depending solely on soil resistivity or Caltrans corrosion guidelines (which concentrate on concrete/steel highways), will over-simplify descriptions as corrosive or non-corrosive. This approach will not detect these other factors attacking other metals because it is possible to have bad levels of corrosive ions and still have greater than 1,100 ohm-cm soil resistivity. We have observed this fact on thousands of soil samples tested in our laboratory.**

It should not be forgotten that import soil should also be tested for all factors to avoid making your site more corrosive than it was to begin with.

The recommendations outlined herein are not a substitute for any design documents previously prepared for the purpose of construction and apply only to the depth of samples collected.

Soil samples were tested for minimum resistivity, pH, chlorides, sulfates, ammonia, nitrates, sulfides and redox.

As-Received soil resistivities ranged between 321,600 ohm-cm and 368,500.0 ohm-cm. This data would be similar to a Wenner 4 pin test in the field and used in the design of a cathodic protection or grounding bed system. This resistivity can change seasonally depending on the weather and moisture in the ground. This is why minimum resistivity is more important for categorizing soil corrosivity. An as-received reading alone can be misleading because condensation or minor water leaks will occur underground along pipe surfaces creating a saturated soil environment in the trench on infrastructure surfaces. This is why minimum or saturated soil resistivity measurements are more important than as-received resistivities. This is also mentioned in AWWA C105 Appendix A "*The interpretation of the results of resistivity measurements is extremely important. A determination based on a four-pin reading with dry topsoil averaged with wetter subsoil would probably be inaccurate. Only by determining the resistivity in soil at pipe depth can an accurate interpretation be made. Also, the local situation should be determined concerning groundwater table, the presence of shallow groundwater, and the approximate percentage of time the soil is likely to be water saturated.*

In making field determinations of resistivity, temperature is important. Resistivity increases as the temperature decreases. As the water in the soil approaches freezing, resistivity increases greatly and, therefore, is not reliable. Field determinations under frozen soil conditions should be avoided. Reliable results under these conditions can be obtained only by the collection of suitable subsoil samples for analysis in laboratory conditions at a proper temperature.".

Saturated soil resistivities ranged between 18,760 ohm-cm to 46,900 ohm-cm. The worst of these values is considered to be mildly corrosive to general metals.

PH levels ranged between 7.3 to 7.5 pH. PH levels were determined to be at levels not detrimental to copper or aluminum alloys. The pH of these samples can allow corrosion of steel and iron in moist environments.

Chlorides ranged between 9 mg/kg to 17 mg/kg. Chloride levels in these samples are low and may cause insignificant corrosion of metals.

Sulfates ranged between 10 mg/kg to 11 mg/kg. Sulfate levels in these samples are negligible for corrosion of cement. Any type of cement can be used that does not contain encased metal.

Ammonia ranged between 0.1 mg/kg to 0.3 mg/kg. Nitrates ranged between 2.7 mg/kg to 2.9 mg/kg. Concentrations of these elements were not high enough to cause accelerated corrosion of copper and copper alloys such as brass.

Sulfides presence was determined to be negative. REDOX ranged between + 160 mV to + 174 mV. The probability of corrosive bacteria was determined to be low due to the sulfide and positive REDOX levels determined in these samples.

Import soil should ideally have the following properties to avoid significant corrosion controls:

1. A minimum resistivity greater than 3,000 ohm-cm
2. Sulfates less than 1,000 mg/kg
3. Chlorides less than 300 mg/kg
4. pH between 6.5 and 8.5
5. Ammonia less than 10 mg/kg
6. Nitrates less than 50 mg/kg
7. Sulfides less than 1 mg/kg
8. REDOX potential greater than 100 mV.

2 Corrosion Control Recommendations

The following recommendations are based upon the results of soil testing.

2.1 Cement

The highest reading for sulfates was 11 mg/kg or 0.0011 percent by weight.

Per ACI 318-14, Table 19.3.1.1, sulfate levels in these samples categorized as S0 and are negligible for corrosion of metals and cement. Per ACI 318-14 Table 19.3.2.1 any type of cement not containing steel or other metal can be used.

2.2 Steel Reinforced Cement/ Cement Mortar Lined & Coated (CML&C)

Chlorides in soil can overcome the corrosion inhibiting property of cement for steel, as it can also break through passivated surfaces of aluminum and stainless steels.[1,2] The highest concentration of chlorides was 17 mg/kg.

[1] Design Manual 303: Cement Cylinder Pipe. Ameron. p.65
[2] *Chapter 19, Table 1904.2.2(1), 2012 International Building Code*

Chloride levels in these samples are not significantly corrosive to metals not in tension. Standard cement cover may be used in these soils.

Though soils at some locations are significantly corrosive to various metals, per ACI 318-14 Chapter 19 Table 19.3.1.1, all slabs on this site exposure categories and class for **Corrosion Protection of Reinforcement (C) would be considered C1** as Concrete exposed to moisture [mud/rain] (slab sides and bottom) but not to an external source of chlorides. Though there are chlorides in the soil, ACI 318's definition of "external source of chlorides" consists of deicing chemicals, salt, brackish water, seawater, or spray from these sources. The chloride levels in seawater are typically over 19,000 mg/L or 19,000 ppm.

When concrete is tested for water-soluble chloride ion content, the tests should be made at an age of 28 to 42 days. The limits in Per ACI 318-14 Table 5.3.2.1 are to be applied to chlorides contributed from the concrete ingredients, not those from the environment surrounding the concrete.[3]

2.3 Stainless Steel Pipe/Conduit/Fittings

Stainless steels derive their corrosion resistance from their chromium content and oxide layer which needs oxygen to regenerate if damaged. Thus stainless steel is not good for deep soil applications where oxygen levels are extremely low. Stainless steels should not be installed deeper than a plant root zone. Stainless steels typically have the same nobility as copper on the galvanic series and can be connected to copper. If stainless steel must be used, it must be backfilled with soil having greater than 10,000 ohm-cm resistivity and excellent drainage. 304 Stainless steel will also corrode if in contact with carbon materials such as activated carbon. Stainless steel welds should be pickled.

The soil at this site has low probability for anaerobic corrosive bacteria and low chloride levels. Per Nickel Institute guidelines, 304 or 316 Stainless steels can be used in these soils.

2.4 Steel Post Tensioning Systems

The proper sealing of stressing holes is of utmost importance in PT Systems. Cut off excess strand 1/2" to 3/4" back in the hole. Coat or paint exposed anchorage, grippers, and stub of strands with "Rust-o-leum" or equal. After tendons have been coated, the cement contractor shall dry pack blockouts within ten (10) days. A non-shrink, non-metallic, non-porous moisture-insensitive grout (Master EMACO S 488 or equivalent), or epoxy grout shall be used for this purpose. If an encapsulated post-tension system is used, regular non-shrink grout can be used.

Due to the low chloride concentrations measured on samples obtained from this site, post-tensioned slabs should be protected in accordance with soil considered normal (non-corrosive).[4,5] Addition of grease caps to the cut strand at live end anchors can deter construction defect accusations but are not needed.

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[3] ACI 381-14., BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE (ACI 318-14) AND COMMENTARY (ACI 318R-14)

[4] *Standard Requirements for Design and Analysis of Shallow Post-Tensioned Concrete Foundations on Expansive Soils, PTI DC10.5-12,Table 4.1, pg 16*

[5] *Specification for Unbonded Single Strand Tendons. Post-tensioning Institute (PTI), Phoenix, AZ, 2000.*

2.5 Steel Piles

Steel piles are most susceptible to corrosion in disturbed soil where oxygen is available. Further, a dissimilar environment corrosion cell would exist between the steel embedded in cement, such as pile caps and the steel in the soil. In the cell, the steel in the soil is the anode (corroding metal), and the steel in cement is the cathode (protected metal). This cell can be minimized by coating the part of the steel piles that will be embedded in cement to prevent contact with cement and reinforcing steel.

Piles driven into soils without disturbing soils will avoid oxygen introduction and low corrosion rates unless there is a probability for corrosive anaerobic bacteria. Galvanized steel's zinc coating can provide significant protection for driven piles. In corrosive soils in which normal zinc coatings are not enough, the life of piles can be extended by increasing zinc coating thickness, using sacrificial metal, or providing a combination of epoxy coatings and cathodic protection. Corrosion has been observed to be extremely localized even at and below underground water tables. Pit depths of this magnitude do not have an appreciable effect on the strength or useful life of piling structures because the reduction in pile cross section is not significant.[6] Pitting is of more importance to pipes transporting liquids or gases which should not be leaked into the ground.

The following recommendations are recommended to achieve desired life. We defer to structural engineers to use our estimated corrosion rates and to choose from the corrosion control options listed below.

1) Sacrificial metal by use of thicker piles per non-disturbed soil corrosion rates, or
2) Galvanized steel piles per non-disturbed soil corrosion rates, or
3) Combination of galvanized and sacrificial metal per non-disturbed soil corrosion rates, or
4) For no loss of metal, coat entire pile with abrasion resistant epoxy coating such as 3M Scotchkote 323, or PowercreteDD, or equivalent, or
5) Use high yield steel which will corrode at the same rate as mild steel but have greater yield strength and thus be able to suffer more material loss than mild steel.

2.5.1 Expected Corrosion Rate of Steel and Zinc in disturbed soil

In general, the corrosion rate of metals in soil depends on the electrical resistivity, the elemental composition, and the oxygen content of the soil. Soils can vary greatly from one acre to the next, especially at earthquake faults. The better a soil is for farming; the easier it will be for corrosion to take place. Expansive soils will also be considered disturbed simply because of their nature from dry to wet seasons.

In Melvin Romanoff's NBS Circular 579, the corrosion rates of carbon steels and various metals was studied over long term periods. Various metals were placed in various soil types to gather corrosion rate data of all metals in all soil types. Samples were collected and material loss measured over the course of 20 years in some sites. The following corrosion rates were estimated by comparing the worst results of soils tested with similar soils in Romanoff's studies

[6] Melvin Romanoff, Corrosion of Steel Pilings in Soils, National Bureau of Standards Monograph 58, pg 20.

and Highway Research Board's publications.[7] The corrosion rate of zinc in disturbed soils is determined per Romanoff studies and King Nomograph.[8]

Expected Corrosion Rate for Steel = 0.50 mils/year for one sided attack

Expected Corrosion Rate for Zinc = 0.08 mils/year for one sided attack.

Note: 1 mil = 0.001 inch

In undisturbed soils, a corrosion rate of 0.50 mil/year for steel is expected with little change in the corrosion rate of zinc due to it's low nobility in the galvanic series.

Per CTM 643: Years to perforation of corrugated galvanized steel culverts

- 104.5 Years to Perforate 18 gage (0.052in)metal
- 135.8 Years to Perforation for a 16 gage metal culvert
- 167.2 Years to Perforation for a 14 gage metal culvert
- 229.8 Years to Perforation for a 12 gage metal culvert
- 292.5 Years to Perforation for a 10 gage metal culvert
- 355.2 Years to Perforation for a 8 gage metal culvert

2.5.2 Expected Corrosion Rate of Steel and Zinc in Undisturbed soil

Expected Corrosion Rate for Steel = 0.50 mils/year for one sided attack

Expected Corrosion Rate for Zinc = 0.08 mils/year for one sided attack.

Note: 1 mil = 0.001 inch

2.6 Steel Storage tanks

Underground fuel tanks must be constructed and protected in accordance with California Underground Storage Tank Regulations, CCR, Title 23, Division 3, Chapter 16. Metals should be protected with cathodic protection or isolated from backfill material with an epoxy coating.

2.7 Steel Pipelines

Though a site may not be corrosive in nature at the time of construction, **installation of corrosion test stations and electrical continuity joint bonding should be performed during construction** so that future corrosion inspections can be performed. If steel pipes with gasket joints or other possibly non-conductive type joints are installed, their joints should be bonded across by welding or pin brazing a #8 AWG copper strand bond cable. Electrical continuity is necessary for corrosion inspections and for cathodic protection.

Corrosion test stations should be installed every 1,000 feet of pipeline.

Test stations shall have two #8 HMWPE copper strand wire test leads welded or pin brazed to the underground pipe, brought up into the test station hand hole and marked CTS. Wires should be brought into test station hand hole at finished grade with 12 inches of wire coiled within test station.

[7] Field test for Estimating Service Life of Corrugated Metal Culverts, J.L. Beaton, Proc. Highway Research Board, Vol 41, P. 255, 1962
[8] King, R.A. 1977, Corrosion Nomograph, TRRC Supplementary Report, British Corrosion Journal

At isolation joints and pipe casings, 4 wire test stations shall be installed using #8 HMWPE copper strand wire test leads. Use different color wires to distinguish which wires are bonded to one side of isolation joint or to casing. Wires should be brought into test station hand hole at finished grade with 12 inches of wire coiled within test station.

Prevent dissimilar metal corrosion cells per NACE SP0286:

1) Electrically isolate dissimilar metal connections
2) Electrically isolate dissimilar coatings (Epoxy vs CML&C) segments connections
3) Electrically isolate river crossing segments
4) Electrically isolate freeway crossing segments
5) Electrically isolate old existing pipelines from new pipelines
6) Electrically isolate aboveground and underground pipe segments with flange isolation joint kits per NACE SP0286 to avoid galvanic corrosion cells. **These are especially important for fire risers.**

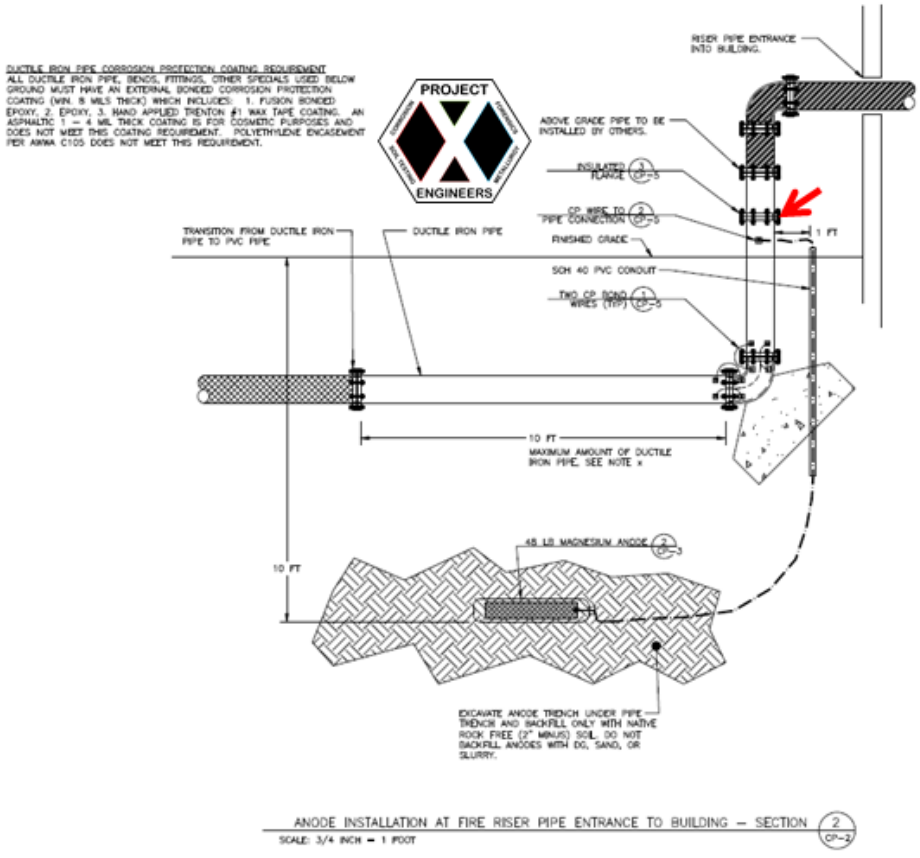


Figure 1- Fire Riser Detail: Install Isolation joint at red arrow

The bare steel surfaces, the corrosivity at this site is mildly corrosive to steel. The corrosion control options for this site are as follows:

1) Apply impermeable dielectric coating such as minimum 10 mil thick polyethylene, or
2) Tape coating system per AWWA C214, or

3) Wax tape all metallic surfaces per AWWA C217, or
4) Coal tar enamel per AWWA C203, or
5) Fusion bonded epoxy per AWWA C213, or
6) For bare steel surfaces, such as welded pipe joints, apply 3 inch thick field coating of Type II cement or high pH slurry that will maintain pH higher than 12. Cement is both a corrosion inhibitor and a coating for ferrous metals. Cement naturally holds a pH of 12 or higher for many years if not exposed to high levels of carbon dioxide. (For CML&C pipes, CML&C factory applied 3/4 inch thick coating is equivalent and needs no extra thickness added.)

It is critical for the life of the pipe that the protective wrap contains no openings or holes. Prevent damage to the protective sleeve during backfilling of the pipe trench. Penetrations of any kind within these or other protective materials generally leads to accelerated corrosion failure due to the fact that the corrosion attack is concentrated at the location of these penetrations. Cathodic protection will protect these defects. The better the coating, the less expensive a cathodic protection system will be in anode material and power requirement if needed.

2.8 Steel Fittings

The corrosivity at this site is mildly corrosive to steel. The corrosion control options for this site can be one of the following:

1) Apply impermeable dielectric coating such as minimum 10 mil thick polyethylene, or
2) Tape coating system per AWWA C214, or
3) Wax tape all metallic surfaces per AWWA C217, or
4) Coal tar enamel per AWWA C203, or
5) Fusion bonded epoxy per AWWA C213
6) Use powder coated steel with minimum 60 micron (2-3 mil) thick coating[9], or
7) Galvanized steel, or
8) Apply standard concrete cover of Type II cement or high pH slurry that will maintain pH higher than 12. Cement is both a corrosion inhibitor and a coating for ferrous metals. Cement naturally holds a pH of 12 or higher for many years if not exposed to high levels of carbon dioxide.

It is critical for the life of the metal that the protective wrap contains no openings or holes. Prevent damage to the protective sleeve during backfilling of the pipe trench. Penetrations of any kind within these or other protective materials generally leads to accelerated corrosion failure due to the fact that the corrosion attack is concentrated at the location of these penetrations. Cathodic protection will protect these defects. The better the coating, the less

[9] Manish Kumar Bhadu, Akshya Kumar Guin, Veena Singh, Shyam K. Choudhary, "Corrosion Study of Powder-Coated Galvanised Steel", International Scholarly Research Notices, vol. 2013, Article ID 464710, 9 pages, 2013

expensive a cathodic protection system will be in anode material and power requirement if needed.

2.9 Ductile Iron (DI) & Cast Iron Fittings

AWWA C105 developed a 10 point system to classify sites as aggressive or non-aggressive to ductile iron materials. It is a tool to help in deciding whether or not to use polyethylene encasement [AWWA C105 Appendix A]. The 10-point system does not, and was never intended to; quantify the corrosivity of a soil. It is a tool used to distinguish nonaggressive from aggressive soils relative to iron pipe. Soils <10 points are considered nonaggressive to iron pipe, whereas soils ≥10 points are considered aggressive. A 15 and a 20 point soil are both considered aggressive to iron pipe, however, because of the nature of the soil parameters measured, the 20 point soil may not necessarily be more aggressive than the 15 point soil. The criterion is based upon soil resistivities, soil drainage, pH, sulfide presence, and reduction-oxidation (REDOX) potential. The soil samples tested for this site resulted in a score of 1 out of 25.5. A score greater or equal to 10 points classifies soils as aggressive to iron materials and would recommend the use of polyethylene encasement or other coating. The black coating on iron pipes is purely for aesthetic purposes and should not be relied upon for underground corrosion protection.[10]

The corrosivity at this site is mildly corrosive to iron. The corrosion control options for this site are as follows:

1) Apply impermeable dielectric coating such as minimum 10 mil thick polyethylene, or
2) Tape coating system per AWWA C214, or
3) Wax tape all metallic surfaces per AWWA C217, or
4) Coal tar enamel per AWWA C203, or
5) Fusion bonded epoxy per AWWA C213
6) Apply standard concrete cover of Type II cement or high pH slurry that will maintain pH higher than 12. Cement is both a corrosion inhibitor and a coating for ferrous metals. Cement naturally holds a pH of 12 or higher for many years if not exposed to high levels of carbon dioxide.

It is critical for the life of the metal that the protective wrap contains no openings or holes. Prevent damage to the protective sleeve during backfilling of the pipe trench. Penetrations of any kind within these or other protective materials generally leads to accelerated corrosion failure due to the fact that the corrosion attack is concentrated at the location of these penetrations. Cathodic protection will protect these defects. The better the coating, the less expensive a cathodic protection system will be in anode material and power requirement if needed.

[10] https://www.dipra.org/ductile-iron-pipe-resources/frequently-asked-questions/corrosion-control

2.10 Ductile Iron & Cast Iron Pipe

AWWA C105 developed a 10 point system to classify sites as aggressive or non-aggressive to ductile iron materials. The 10-point system does not, and was never intended to, quantify the corrosivity of a soil. It is a tool used to distinguish nonaggressive from aggressive soils relative to iron pipe. Soils <10 points are considered nonaggressive to iron pipe, whereas soils ≥10 points are considered aggressive. A 15 and a 20 point soil are both considered aggressive to iron pipe, however, because of the nature of the soil parameters measured, the 20 point soil may not necessarily be more aggressive than the 15 point soil. The criterion is based upon soil resistivities, soil drainage, pH, sulfide presence, and reduction-oxidation (REDOX) potential. The soil samples tested for this site resulted in a score of 1 out of 25.5. A score greater or equal to 10 points classifies soils as aggressive to iron materials. The black coating on iron pipes is purely for aesthetic purposes and should not be relied upon for corrosion protection.[11]

Though a site may not be corrosive in nature at the time of construction, **installation of corrosion test stations and electrical continuity joint bonding should be performed during construction** so that future corrosion inspections can be performed. If steel pipes with gasket joints or other possibly non-conductive type joints are installed, their joints should be bonded across by welding or pin brazing a #8 AWG copper strand bond cable. Electrical continuity is necessary for corrosion inspections and for cathodic protection. **If using thermite, perform one test bond using a half-charge then pressure test to confirm excess heat and pinholes were not created.**

Pea gravel is used by plumbers to lay pipes and establish slopes. If the gravel has more than 200 ppm chlorides or is not tested, a 25 mil plastic should be placed between the gravel and pipe to avoid corrosion.

Corrosion test stations should be installed every 1,000 feet of pipeline.

Test stations shall have two #8 HMWPE copper strand wire test leads welded or pin brazed to the underground pipe, brought up into the test station hand hole and marked CTS. Wires should be brought into test station hand hole at finished grade with 12 inches of wire coiled within test station.

At isolation joints and pipe casings, 4 wire test stations shall be installed using #8 HMWPE copper strand wire test leads. Use different color wires to distinguish which wires are bonded to one side of isolation joint or to casing. Wires should be brought into test station hand hole at finished grade with 12 inches of wire coiled within test station.

Prevent dissimilar metal corrosion cells per NACE SP0286:

1) Electrically isolate dissimilar metal connections
2) Electrically isolate dissimilar coatings (Epoxy vs CML&C) segments connections
3) Electrically isolate river crossing segments
4) Electrically isolate freeway crossing segments
5) Electrically isolate old existing pipelines from new pipelines

[11] https://www.dipra.org/ductile-iron-pipe-resources/frequently-asked-questions/corrosion-control

6) Electrically isolate aboveground and underground pipe segments with flange isolation joint kits per NACE SP0286**. These are especially important for fire risers.**

The corrosivity at this site is mildly corrosive to iron. The corrosion control options for this site are as follows:

1) Apply impermeable dielectric coating such as minimum 10 mil thick polyethylene, or
2) Tape coating system per AWWA C214, or
3) Wax tape all metallic surfaces per AWWA C217, or
4) Coal tar enamel per AWWA C203, or
5) Fusion bonded epoxy per AWWA C213
6) Apply standard concrete cover of Type II cement or high pH slurry that will maintain pH higher than 12. Cement is both a corrosion inhibitor and a coating for ferrous metals. Cement naturally holds a pH of 12 or higher for many years if not exposed to high levels of carbon dioxide.

It is critical for the life of the metal that the protective wrap contains no openings or holes. Prevent damage to the protective sleeve during backfilling of the pipe trench. Penetrations of any kind within these or other protective materials generally leads to accelerated corrosion failure due to the fact that the corrosion attack is concentrated at the location of these penetrations. Cathodic protection will protect these defects. The better the coating, the less expensive a cathodic protection system will be in anode material and power requirement if needed.

2.11 Copper Materials

Copper is an amphoteric material which is susceptible to corrosion at very high and very low pH. It is one of the most noble metals used in construction thus typically making it a cathode when connected to dissimilar metals. Copper's nobility can change with temperature, similar to the phenomenon in zinc. When zinc is at room temperature, it is less noble than steel and can provide cathodic protection to steel. But when zinc is at a temperature above 140F such as in a water heater, it becomes more noble than the steel and the steel becomes the sacrificial anode. This is why zinc is not used in steel water heaters or boilers. Cold copper has one native potential, but when heated it develops a more electronegative electro-potential aka open circuit potential. Thus hot and cold copper pipes should be electrically isolated from each other to avoid creation of a thermo-galvanic corrosion cell.

2.11.1 Copper Pipes

The lowest pH for this area was measured to be 7.3. Copper is greatly affected by pH, ammonia and nitrate concentrations[12]. The highest nitrate concentration was 2.9 mg/kg and the highest ammonia concentration was 12.6 mg/kg at this site.

These soils were determined mildly corrosive to copper and copper alloys such as brass.

[12] Corrosion Data Handbook, Table 6, Corrosion Resistance of copper alloys to various environments, 1995

Underground, aboveground, cold water, and hot water pipes should be electrically isolated from each other by use of dielectric unions and plastic in-wall pipe supports per NACE SP0286. The following are corrosion control options for underground copper water pipes.

1) Cover cold copper piping with minimum 8 mil polyethylene and backfill with clean sand with 2 inch minimum cover above and below tubing. Backfill should have a pH between 6 and 8 with electrical resistivity greater than 2,000 ohm-cm
2) Heat increases corrosion rates. Hot water pipes should be installed within PVC piping to prevent soil contact, or
3) Cover hot water pipes with minimum 8 mil polyethylene sleeve or incase in double 4-mil thick polyethylene sleeves over a suitable primer

It is critical for the life of the metal that the protective wrap contains no openings or holes. Prevent damage to the protective sleeve during backfilling of the pipe trench. Penetrations of any kind within these or other protective materials generally leads to accelerated corrosion failure due to the fact that the corrosion attack is concentrated at the location of these penetrations. Cathodic protection will protect these defects. The better the coating, the less expensive a cathodic protection system will be in anode material and power requirement if needed.

2.11.2 Brass Fittings

Brass fittings should be electrically isolated from dissimilar metals by use of dielectric unions or isolation joint kits per NACE SP0286.

These soils were determined to be mildly corrosive to copper and copper alloys such as brass.

The following are corrosion control options for underground brass.

1) Cover with minimum 10 mil polyethylene or other impermeable coating and backfill with clean sand with 4 inch minimum cover above and below brass. Backfill should have a pH between 6 and 8 with electrical resistivity greater than 2,000 ohm-cm, or
2) Wrap fitting or valves in wax tape

It is critical for the life of the metal that the protective wrap contains no openings or holes. Prevent damage to the protective sleeve during backfilling of the pipe trench. Penetrations of any kind within these or other protective materials generally leads to accelerated corrosion failure due to the fact that the corrosion attack is concentrated at the location of these penetrations. Cathodic protection will protect these defects. The better the coating, the less expensive a cathodic protection system will be in anode material and power requirement if needed.

2.11.3 Bare Copper Grounding Wire

It is assumed that corrosion will occur at all sides of the bare wire, thus the corrosion rate is calculated as a two sided attack determining the time it takes for the corrosion from two sides to meet at the center of the wire. The estimated life of bare copper wire for this site is the following:[13]

[13] Soil-Corrosion studies 1946 and 1948: Copper Alloys, Lead, and Zinc, Melvin Romanoff, National Bureau of Standards, Research Paper RP2077, 1950

Size (AWG)	**Diameter (mils)**	**Est. Time to penetration (Yrs)**
14	64.1	1068.3
13	72	1200.0
12	80.8	1346.7
11	90.7	1511.7
10	101.9	1698.3
9	114.4	1906.7
8	128.5	2141.7
7	144.3	2405.0
6	162	2700.0
5	181.9	3031.7
4	204.3	3405.0
3	229.4	3823.3
2	257.6	4293.3
1	289.3	4821.7

If the bare copper wire is being used as a grounding wire connected to less noble metals such as galvanized steel or carbon steel, the less noble metals will provide additional cathodic protection to the copper reducing the corrosion rate of the copper.

It is recommended that a corrosion inhibiting and water-repelling coating be applied to aboveground and belowground copper-to-dissimilar metal connections to reduce risk of dissimilar corrosion. This can be wax tape, or other epoxy coating.

Tinned copper wiring or laying copper wire in conductive concrete can protect against chemical attack in soils with high nitrates, ammonia, sulfide and severely low soil electrical resistivity.

2.12 Aluminum Pipe/Conduit/Fittings

Aluminum is an amphoteric material prone to pitting corrosion in environments that are very acidic or very alkaline or high in chlorides.

Conditions at this site are safe for aluminum.

Aluminum derives its corrosion resistance from its oxide layer which needs oxygen to regenerate if damaged, similar to stainless steels. Thus aluminum is not good for deep soil applications. Since aluminum corrodes at very alkaline environments, it cannot be encased or placed against cement or mortar such as brick wall mortar up against an aluminum window frame.

Aluminum is also very low on the galvanic series scale making it most likely to become a sacrificial anode when in contact with dissimilar metals in moist environments. Avoid electrical continuity with dissimilar metals by use of insulators, dielectric unions, or isolation joints per NACE SP0286. Pooling of water at post bottoms or surfaces should be avoided by integrating good drainage.

2.13 Carbon Fiber or Graphite Materials

Carbon fiber or other graphite materials are extremely noble on the galvanic series and should always be electrically isolated from dissimilar metals. They can conduct electricity and will create corrosion cells if placed in contact within a moist environment with any metal.

2.14 Plastic and Vitrified Clay Pipe

No special precautions are required for plastic and vitrified clay piping from a corrosion viewpoint.

Protect all metallic fittings and pipe restraining joints with wax tape per AWWA C217, cement if previously recommended, or epoxy.

3 CLOSURE

In addition to soils chemistry and resistivity, another contributing influence to the corrosion of buried metallic structures is stray electrical currents. These electrical currents flowing through the earth originate from buried electrical systems, grounding of electrical systems in residences, commercial buildings, and from high voltage overhead power grids. Therefore, it is imperative that the application of protective wraps and/or coatings and electrical isolation joints be properly applied and inspected.

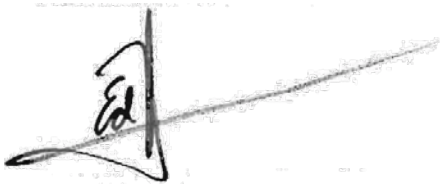
It is the responsibility of the builder and/or contractor to closely monitor the installation of such materials requiring protection in order to assure that the protective wraps or coatings are not damaged.

The recommendations outlined herein are in conformance with current accepted standards of practice that meet or exceed the provisions of the Uniform Building Code (UBC), the International Building Code (IBC), California Building Code (CBC), the American Cement Institute (ACI), Nickel Institute, National Association of Corrosion Engineers (NACE International), Post-Tensioning Institute Guide Specifications and State of California Department of Transportation, Standard Specifications, American Water Works Association (AWWA) and the Ductile Iron Pipe Research Association (DIPRA).

Our services have been performed with the usual thoroughness and competence of the engineering profession. No other warranty or representation, either expressed or implied, is included or intended.

Please call if you have any questions.

Respectfully Submitted,



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NACE Corrosion Technologist #16592
Professional Engineer
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4 SOIL ANALYSIS LAB RESULTS

Client: LOR Geotechnical
Job Name: Idyllwild Wastewater Plant
Client Job Number: 63980.1
Project X Job Number: S240103Z
January 18, 2024

	Method	ASTM D4327		ASTM D4327		ASTM G187		ASTM G51	ASTM G200	SM 4500-D	ASTM D4327	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D4327	ASTM D4327
Bore# / Description	**Depth**	**Sulfates** SO_4^{2-}		**Chlorides** Cl^-		**Resistivity** As Rec'd | Minimum		**pH**	**Redox**	**Sulfide** S^{2-}	**Nitrate** NO_3^-	**Ammonium** NH_4^+	**Lithium** Li^+	**Sodium** Na^+	**Potassium** K^+	**Magnesium** Mg^{2+}	**Calcium** Ca^{2+}	**Fluoride** F_2^-	**Phosphate** PO_4^{3-}
	(ft)	(mg/kg)	(wt%)	(mg/kg)	(wt%)	(Ohm-cm)	(Ohm-cm)		(mV)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
RV-2 - B-3 (SM) Silty Sand	1-4	9.6	0.0010	9.2	0.0009	321,600	46,900	7.3	174	0.3	2.9	0.1	0.0	12.3	3.8	8.2	42.0	1.5	3.3
R-2 - B-1 Bedrock	5.0	10.9	0.0011	16.8	0.0017	368,500	18,760	7.5	160	0.4	2.7	0.3	0.0	24.8	2.0	9.5	50.3	1.9	131.3

Unk = Unknown
NT = Not Tested
ND = 0 = Not Detected
mg/kg = milligrams per kilogram (parts per million) of dry soil weight
Chemical Analysis performed on 1:3 Soil-To-Water extract
Anions and Cations tested via Ion Chromatograph except Sulfide.

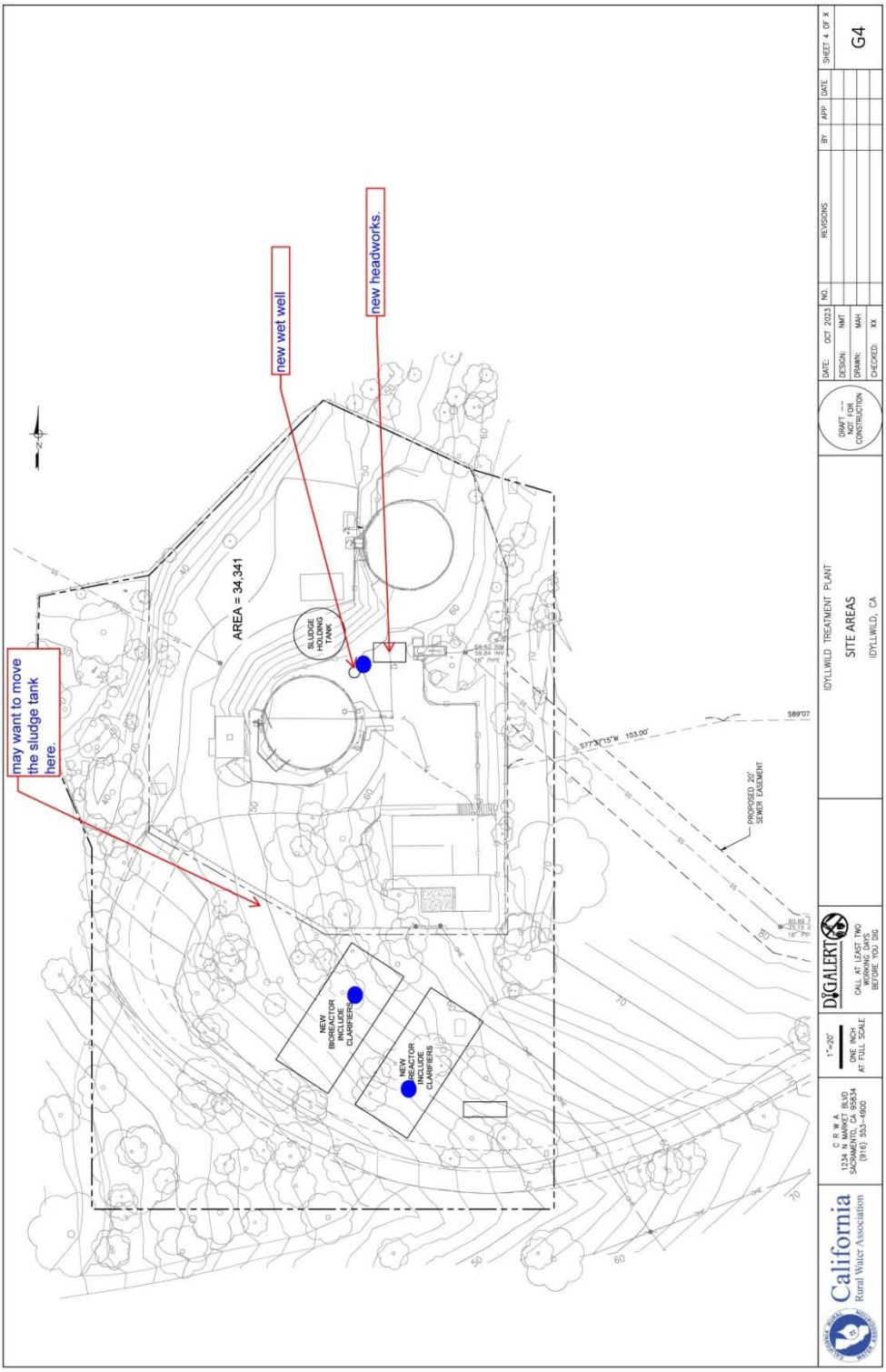


Figure 2- Soil Sample Locations, Idyllwild-Pine Cove, CA 92549

(33°45'20.7"N 116°44'07.9"W)

Figure 3- Vicinity Map, Idyllwild-Pine Cove, CA 92549

(33°45'20.7"N 116°44'07.9"W)

5 Corrosion Basics

In general, the corrosion rate of metals in soil depends on the electrical resistivity, the elemental composition, and the oxygen content of the soil. Soils can vary greatly from one acre to the next, especially at earthquake faults. The better a soil is for farming; the easier it will be for corrosion to take place. Expansive soils should be considered disturbed simply because of their nature from dry to wet seasons.

5.1 Pourbaix Diagram – In regards to a material's environment

All metals are unique and have a weakness. Some metals do not like acidic (low pH) environments. Some metals do not like alkaline (high pH) environments. Some metals don't like either high or low pH environments such as aluminum. These are called amphoteric materials. Some metals become passivated and do not corrode at high pH environments such as steel. These characteristics are documented in Marcel Pourbaix's book "Atlas of electrochemical equilibria in aqueous solutions"

In the mid 1900's, Marcel Pourbaix developed the Pourbaix diagram which describes a metal's reaction to an environment dependent on pH and voltage conditions. It describes when a metal remains passive (non-corroding) and in which conditions metals become soluble (corrode). Steels are passive in pH over 12 such as the condition when it is encased in cement. If the cement were to carbonate and its pH reduce to below 12, the cement would no longer be able to act as a corrosion inhibitor and the steel will begin to corrode when moist.

Some metals such as aluminum are amphoteric, meaning that they react with acids and bases. They can corrode in low pH and in high pH conditions. Aluminum alloys are generally passive within a pH of 4 and 8.5 but will corrode outside of those ranges. This is why aluminum cannot be embedded in cement and why brick mortar should not be laid against an aluminum window frame without a protective barrier between them.

5.2 Galvanic Series – In regards to dissimilar metal connections

All metals have a natural electrical potential. This electrical potential is measured using a high impedance voltmeter connected to the metal being tested and with the common lead connected to a copper copper-sulfate reference electrode (CSE) in water or soil. There are many types of reference electrodes. In laboratory measurements, a Standard Hydrogen Electrode (SHE) is commonly used. When different metal alloys are tested they can be ranked into an order from most noble (less corrosion), to least noble (more active corrosion). When a more noble metal is connected to a less noble metal, the less noble metal will become an anode and sacrifice itself through corrosion providing corrosion protection to the more noble metal. This hierarchy is known as the galvanic series named after Luigi Galvani whose experiments with electricity and muscles led Alessandro Volta to discover the reactions between dissimilar metals leading to the early battery. The greater the voltage difference between two metals, the faster the corrosion rate will be.

Table 1- Dissimilar Metal Corrosion Risk

	Zinc	Galvanized Steel	Aluminum	Cast Iron	Lead	Mild Steel	Tin	Copper	Stainless Steel
Zinc	None	Low	Medium	High	High	High	High	High	High
Galvanized Steel	Low	None	Medium	Medium	Medium	High	High	High	High
Aluminum	Medium	Medium	None	Medium	Medium	Medium	Medium	High	High
Cast Iron	High	Medium	Medium	None	Low	Low	Low	Medium	Medium
Lead	High	Medium	Medium	Low	None	Low	Low	Medium	Medium
Mild Steel	High	High	Medium	Low	Low	None	Low	Medium	Medium
Tin	High	High	Medium	Low	Low	Low	None	Medium	Medium
Copper	High	High	High	Medium	Medium	Medium	Medium	None	Low
Stainless Steel	High	High	High	Medium	Medium	Medium	Medium	Low	None

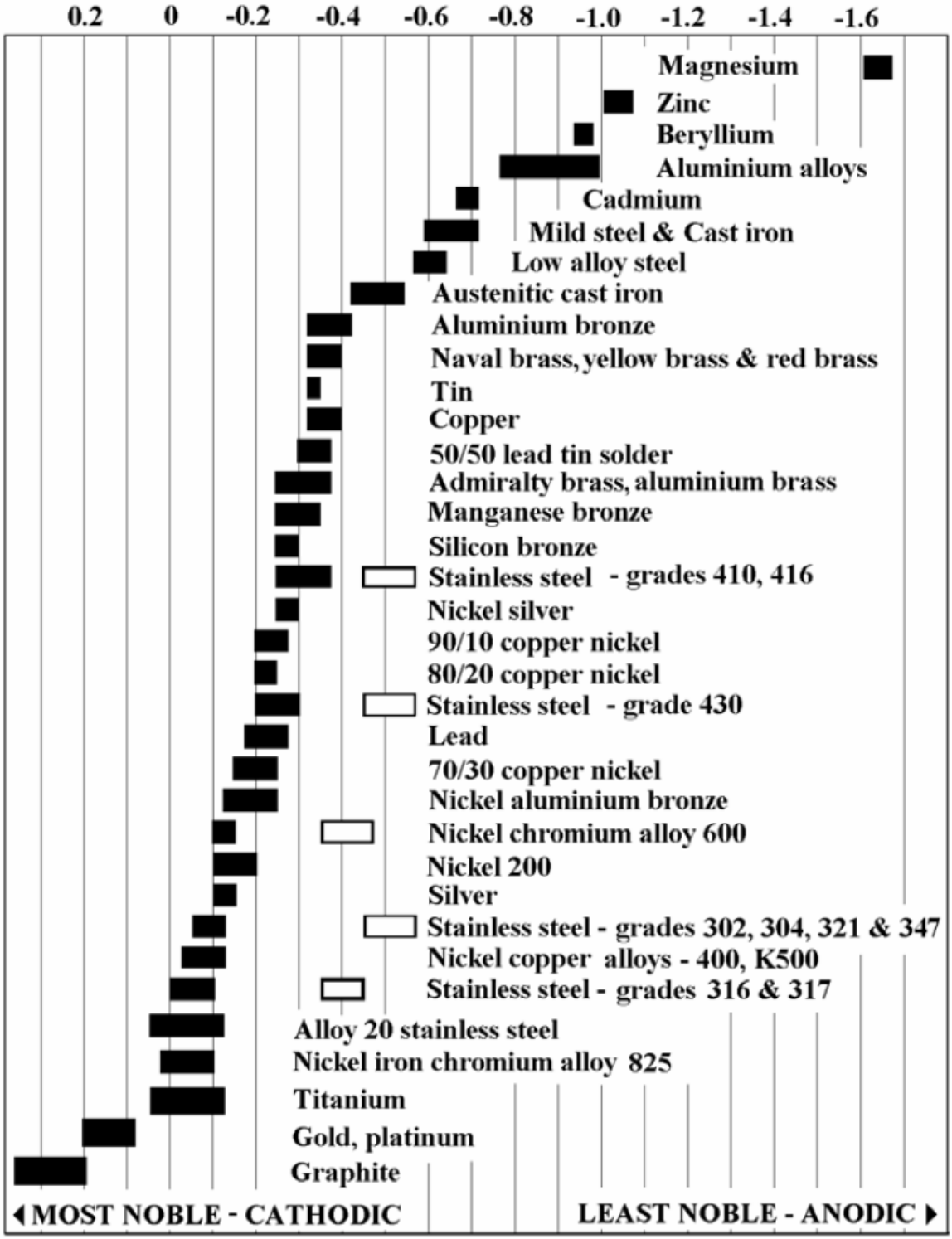
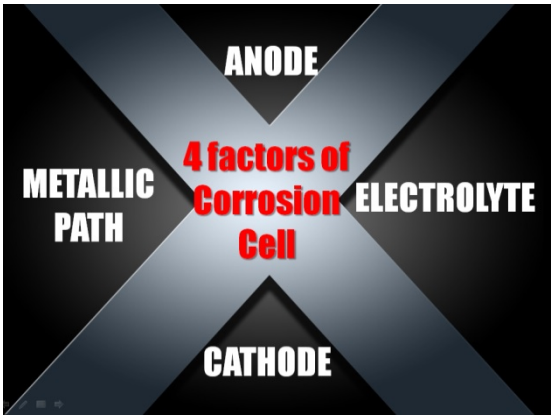


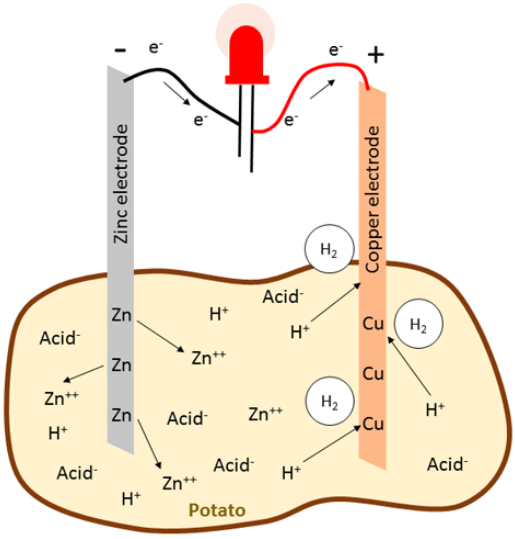
Figure 4 - Galvanic series of metals relative to CSE half cell.

5.3 Corrosion Cell

In order for corrosion to occur, four factors must be present. (1) The anode (2) the cathode (3) the electrolyte and (4) the metallic or conductive path joining the anode and the cathode. If any one of these is removed, corrosion activity will stop. This is how a simple battery produces electricity. An example of a non-metallic yet conductive material is graphite. Graphite is similar in nobility to gold. Do not connect graphite to anything in moist environments.



The anode is where the corrosion occurs, and the cathode is the corrosion free material. Sometimes the anode and cathode are different materials connected by a wire or union. Sometimes the anode and cathode are on the same pipe with one area of the pipe in a low oxygen zone while the other part of the pipe is in a high oxygen zone. A good example of this is a post in the ocean that is repeatedly splashed. Deep underwater, corrosion is minimal, but at the splash zone, the corrosion rate is greatest.



Low oxygen zones and crevices can also harbor corrosive bacteria which in moist environments will lead to corrosion. This is why pipes are laid on backfill instead of directly on native cut soil in a trench. Filling a trench slightly with backfill before installing pipe then finishing the backfill creates a uniform environment around the entire surface of the pipe.

The electrolyte is generally water, seawater, or moist soil which allows for the transfer of ions and electrical current. Pure water itself is not very conductive. It is when salts and minerals dissolve into pure water that it becomes a good conductor of electricity and chemical reactions. Metal ores are turned into metal alloys which we use in construction. They naturally want to return to their natural metal ore state but it requires energy to return to it. The corrosion cell, creates the energy needed to return a metal to its natural ore state.

The metallic or conductive path can be a wire or coupling. Examples are steel threaded into a copper joint, or an electrician grounding equipment to steel pipes inadvertently connecting electrical grid copper grounding systems to steel or iron underground pipes.

The ratio of surface area between the anode and the cathode is very important. If the anode is very large, and the cathode is very small, then the corrosion rate will be very small and the anode may live a long life. An example of this is when short copper laterals were connected to a large and long steel pipeline. The steel had plenty of surface area to spread the copper's attack, thus corrosion was not

noticeable. But if the copper was the large pipe and the steel the short laterals, the steel would corrode at an amazing rate.

5.4 Design Considerations to Avoid Corrosion

The following recommendations are based upon typical observations and conclusions made by forensic engineers in construction defect lawsuits and NACE International (Corrosion Society) recommendations.

5.4.1 Testing Soil Factors (Resistivity, pH, REDOX, SO, CL, NO3, NH3)

As previously mentioned, different factors can cause corrosion. The most useful and common test for categorizing a soil's corrosivity has been the measure of soil resistivity which is typically measured in units of (ohm-cm) by corrosion engineers and geologists. Soil resistivity is the ability of soil to conduct or resist electrical currents and ion transfer. The lower the soil resistivity, the more conductive and corrosive it is. The following are "generally" accepted categories but keep in mind, the question is not "Is my soil corrosive?", the question should be, "What is my soil corrosive to?" and to answer that question, soil resistivity and chemistry must be tested. Though **soil resistivity is a good corrosivity indicator for steel materials, high chlorides or other corrosive elements do not always lower soil resistivity, thus if you don't test for chlorides and other water soluble salts, you can get an unpleasant surprise.** The largest contributing factor to a soil's electrical resistivity is its clay, mineral, metal, or sand make-up.

Table 2 - Corrosion Basics- An Introduction, NACE, 1984, pg 191

(Ohm-cm)	Corrosivity Description
0-500	Very Corrosive
500-1,000	Corrosive
1,000-2,000	Moderately Corrosive
2,000-10,000	Mildly Corrosive
Above 10,000	Progressively less corrosive

Testing a soil's pH provides information to reference the Pourbaix diagram of specific metals. Some elements such as ammonia and nitrates can create localized alkaline conditions which will greatly affect amphoteric materials such as aluminum and copper alloys.

Excess sulfates can break-down the structural integrity of cement and high concentrations of chlorides can overcome cement's corrosion inhibiting effect on encased ferrous metals and break down protective passivated surface layers on stainless steels and aluminum.

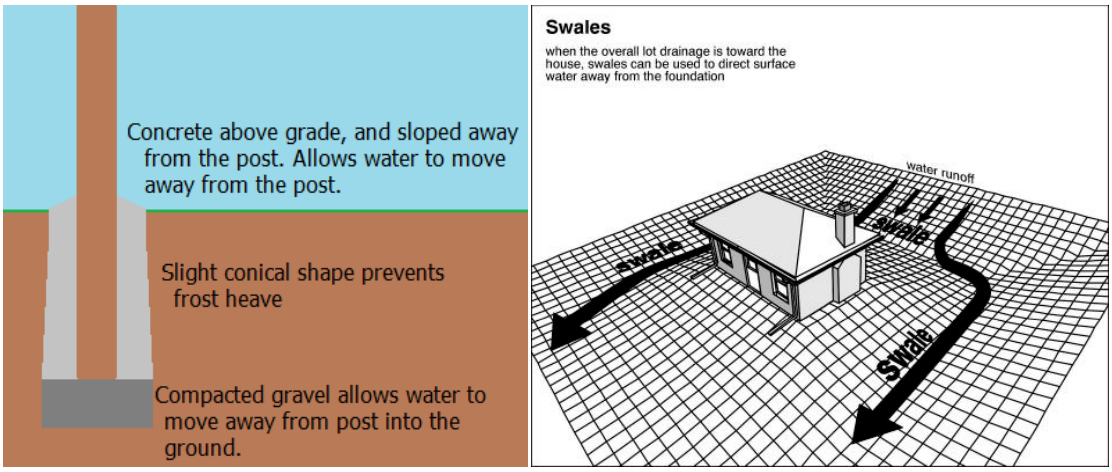
Corrosive bacteria are everywhere but can multiply significantly in anaerobic conditions with plentiful sulfates. The bacteria themselves do not eat the metal but their by-products can form corrosive sulfuric acids. The probability of corrosive bacteria is tested by measuring a soil's oxidation-reduction (REDOX) electro-potential and by testing for the presence of sulfides.

Only by testing a soil's chemistry for minimum resistivity, pH, chlorides, sulfates, sulfides, ammonia, nitrate, and redox potential can one have the information to evaluate the corrosion risk to construction materials such as steel, stainless steel, galvanized steel, iron, copper, brass, aluminum, and concrete.

5.4.2 Proper Drainage

It cannot be emphasized enough that pooled stagnant water on metals will eventually lead to corrosion. This stands for internal corrosion and external corrosion situations. In soils, providing good drainage will lower soil moisture content reducing corrosion rates. Attention to properly sealing polyethylene wraps around valves and piping will avoid water intrusion which would allow water to pool against metals. Above ground structures should not have cupped or flat surfaces that will pond water after rain or irrigation events.

Buildings typically are built on pads and have swales when constructed to drain water away from buildings directing it towards an acceptable exit point such as a driveway where it continues draining to a local storm drain. Many homeowners, landscapers and flatwork contractors appear to not be aware of this and destroy swales during remodeling. The majority of garage floor and finished grade elevations are governed by drainage during design.[14,15]



5.4.3 Avoiding Crevices

Crevices are excellent locations for oxygen differential induced corrosion cells to begin. Crevices can also harbor corrosive bacteria even in the most chemically treated waters. Crevices will also gather salts. If water's total alkalinity is low, its ability to maintain a stable pH can also become more difficult within a crevice allowing the pH to drop to acidic levels continuing a pitting process. Welds in extremely corrosive environments should be complete and well filleted without sharp edges to avoid crevices. Sharp edges should be avoided to allow uniform coating of protective epoxy. Detection of crevices in welds should be treated immediately. If pressures and loads are low, sanding and rewelding or epoxy patching can be suitable repairs. Damaged coatings can usually be repaired with Direct to Metal paints. **Scratches and crevice corrosion are like infections, they should not be left to fester or the infection will spread making things worse.**

[14] https://www.fencedaddy.com/blogs/tips-and-tricks/132606467-how-to-repair-a-broken-fence-post

[15] http://southdownstudio.co.uk/problme-drainage-maison.html

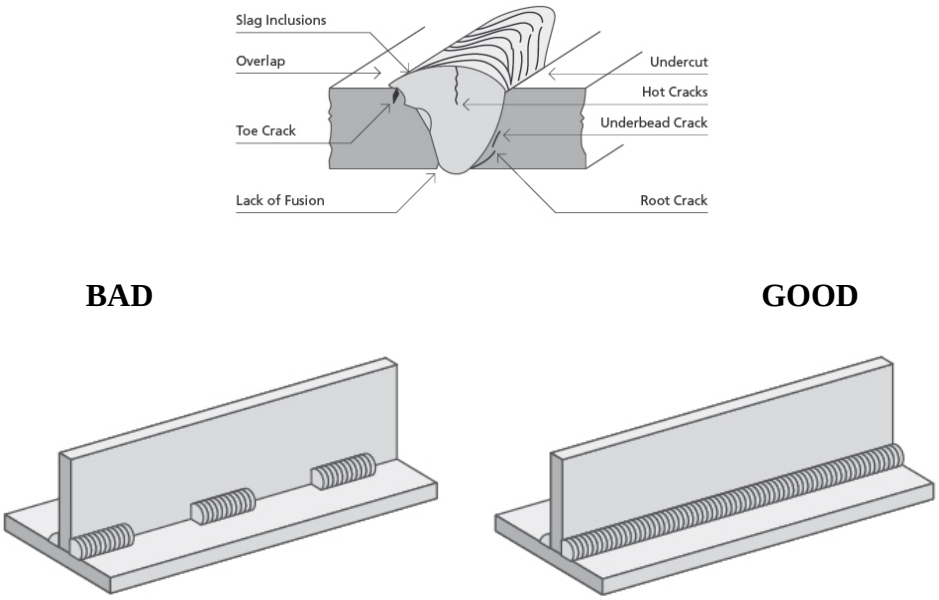


Figure 5- Defects which form weld crevices[16]

5.4.4 Coatings and Cathodic Protection

When faced with a corrosive environment, the best defense against corrosion is removing the electrolyte from the corrosion cell by applying coatings to separate the metal from the soil. During construction and installation, there is always some scratch or damage made to a coating. NACE training recommends that coatings be used as a first line of defense and that sacrificial or impressed current cathodic protection is used as a 2nd line of defense to protect the scratched areas. Use of a good coating dramatically reduces the amount of anodes a CP system would need. If CP is not installed as a 2nd line of defense in an extremely corrosive environment, the small scratched zones will suffer accelerated corrosion. CP details such as anode installation instructions must be designed by corrosion engineers or vessel manufacturers on a per project basis because it depends on electrolyte resistivity, surface area of infrastructure to be protected, and system geometry.

There are two types of cathodic protection systems, a Galvanic Anode Cathodic Protection (GACP) system and an Impressed Current Cathodic Protection (ICCP) system. A Galvanic Anode Cathodic Protection (GACP) system is simpler to install and maintain than an Impressed Current Cathodic Protection (ICCP) system. To protect the metals, they must all be electrically continuous to each other. In a GACP system, sacrificial zinc or magnesium anodes are then buried at locations per the CP design and connected by wire to a structure at various points in system. At the connection points, a wire connecting to the structure and the wire from the anode are joined in a Cathodic Protection Test Station hand hole which looks similar in size and shape to an irrigation valve pull box. By coating the underground structures, one can reduce the number of anodes needed to provide cathodic protection by 80% in many instances.

An ICCP system requires a power source, a rectifier, significantly more trenching, and more expensive type anodes. These systems are typically specified when bare metal is requiring protection

[16] http://www.daroproducts.co.uk/makes-good-weld/

in severely corrosive environments in which galvanic anodes do not provide enough power to polarize infrastructure to -850 mV structure-to-soil potential or be able to create a 100 mV potential shift as required by NACE SP169 to control corrosion. In severely corrosive environments, a GACP system simply may not last a required lifetime due to the high rate of consumption of the sacrificial anodes. ICCP system rectifiers must be inspected and adjusted quarterly or at a minimum bi-annually per NACE recommendations. Different anode installations may be possible but for large sites, anodes are placed evenly throughout the site and all anode wires must be trenched to the rectifier. For a large site, it may be beneficial to use two or more rectifiers to reduce wire lengths or trenching.

To simplify, a GACP system can be installed and practically forgotten with minor trenching because the anodes can be installed very close to the structures. An ICCP system must be inspected annually and anode wires run back to the rectifier which itself connects to the pile system. If any type of trenching or development is expected to occur at the site during the life of the site, it is a good idea to inspect the anode connections once a year to make sure wires are not cut and that the infrastructure is still being provided adequate protection. A common situation that occurs with ICCP systems is that a contractor accidently cuts the wires during construction then reconnects them incorrectly, turning the once cathode, into a sacrificing anode.

Design of a cathodic protection system protecting against soil side corrosion requires that Wenner Four Pin ground resistance measurements per ASTM G57 be performed by corrosion engineers at various locations of the site to determine the best depths and locations for anode installations. Ideally, a sample pile is installed and experiments determining current requirement are conducted. Using this data, the decision is made whether a GACP system is feasible or if an ICCP must be used.

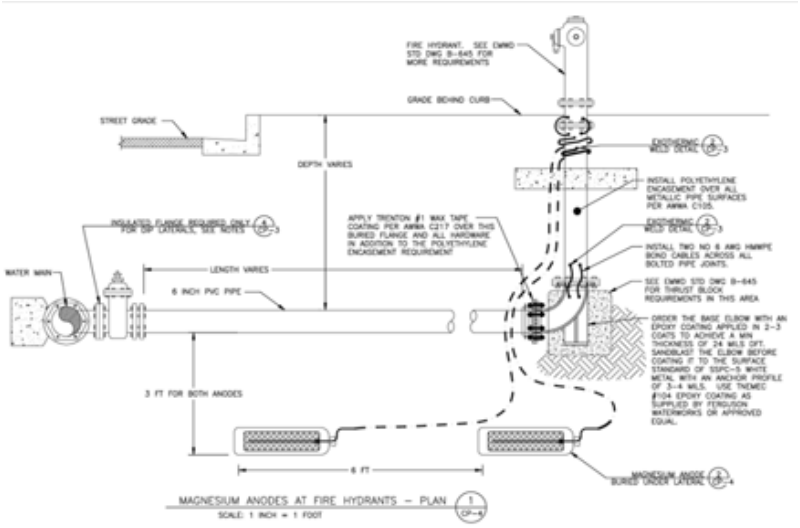


Figure 6- Sample anode design for fire hydrant underground piping

Vessels such as water tanks will have protective interior coatings and anodes to protect the interior surfaces. Anodes can also be buried on site and connected to system skid supports to protect the metal in contact with soil. A good example of a vessel cathodic protection system exists in all home water heaters which contain sacrificial aluminum or magnesium anodes. In environments that exceed 140F, zinc anodes cannot be used with carbon steel because they become the aggressor (Cathodic) to

the steel instead of sacrificial (anodic). Anodes in vessels containing extremely brackish water with chloride levels over 2,000 ppm should inspect or change out their anodes every 6 months.

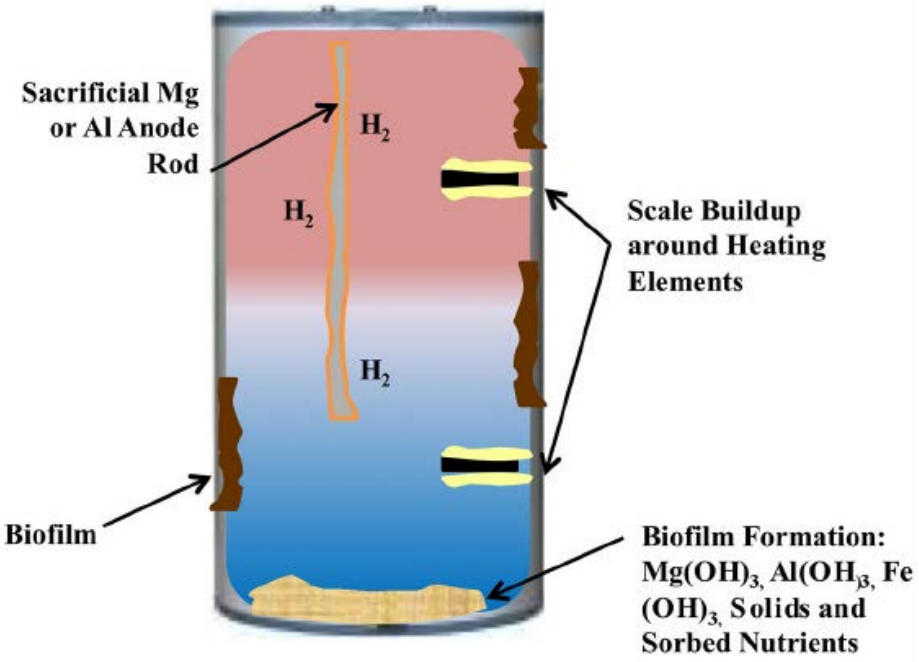


Figure 7- Cross section of boiler with anode

Cathodic protection can only protect a few diameters within a pipeline thus it is not recommended for small diameter pipelines and tubing internal corrosion protection. Anodes are like a lamp shining light in a room. They can only protect along their line of sight.

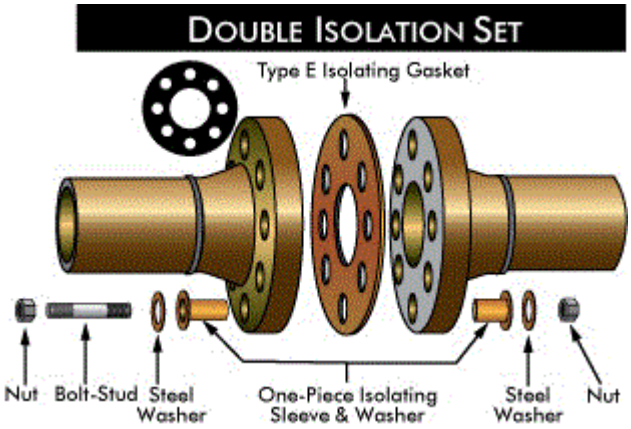
5.4.5 Good Electrical Continuity

In order for cathodic protection to protect a long pipeline or system of pipes from external soil side corrosion, they must all be electrically continuous to each other so that the electric current from the anode can travel along the pipes, then return through the earth to the anode. Electrical continuity is achieved by welding or pin brazing #8 AWG copper strand bond cable to the end of pipe sticks which have rubber gaskets at bell and spigots. If steel pipes are joined by full weld, bonding wires are not needed.

Electrical continuity between dissimilar metals is not desirable. Isolation joints or di-electric unions should be installed between dissimilar metals, such as steel pipes connecting to a brass valve per NACE SP0286. Bonding wires should then be welded onto the steel pipes by-passing the brass valve so that the cathodic protection system's current can continue to travel along the steel piping but isolate the brass valve from the steel pipeline. Another option would be to provide a separate cathodic protection system for steel pipes on both sides of the brass valve.

Typically, water heater inlets and outlets, gas meters and water meters have dielectric unions installed in them to separate utility property from homeowner property. This also protects them in the case that a home owner somehow electrically connects water pipes or gas pipes to a neighborhood electrical grounding system which can potentially have less noble steel in soil now connected to much

more noble copper in soil which will then create a corrosion cell. This is exactly how a lemon powered clock works when a galvanized zinc nail and a steel nail are inserted into a lemon then connected to a clock. The clock is powered by the corrosion cell created.



5.4.6 Bad Electrical Continuity

Bad electrical continuity is when two different materials or systems are made electrically continuous (aka shorted) when they were not designed to be electrically continuous. Examples of this would be when gas lines are shorted to water lines or to electrical grounding beds. Very often, fire risers are shorted to electrical grounding systems, and water pipes at business parks. Since fire risers usually have a very short ductile iron pipe in the ground which connects to PVC pipe systems, they tend to experience leaks after 7 to 10 years of being attacked by underground copper systems.

It is absolutely imperative that any copper water piping or other metal conduits penetrating cement slab or footings, not come in contact with the reinforcing steel or post-tensioning tendons to avoid creation of galvanic corrosion cells.

5.4.7 Corrosion Test Stations

Corrosion test stations should be installed every 1,000 feet along pipelines in order to measure corrosion activity in the future. For a simple pipeline, two #8 AWG copper strand bond cable welded or pin brazed onto the pipeline are run up to finished grade and left in a hand hole. Corrosion test stations are used to measure pipe-to-soil electro potential relative to a copper copper-sulfate reference electrode to determine if the pipe is experiencing significant corrosion activity. By measuring test stations along a pipeline, hot spots can be determined, if any. The wires also allow for electrical continuity testing, condition assessment, and a multitude of other types of tests.

At isolation joints and pipe casings, two wires should be welded to either side of the isolation joint for a total of 4 wires to be brought up to the hand hole. This allows for future tests of the isolation joint, casing separation confirmation, and pipe-to-soil potential readings during corrosion surveys.

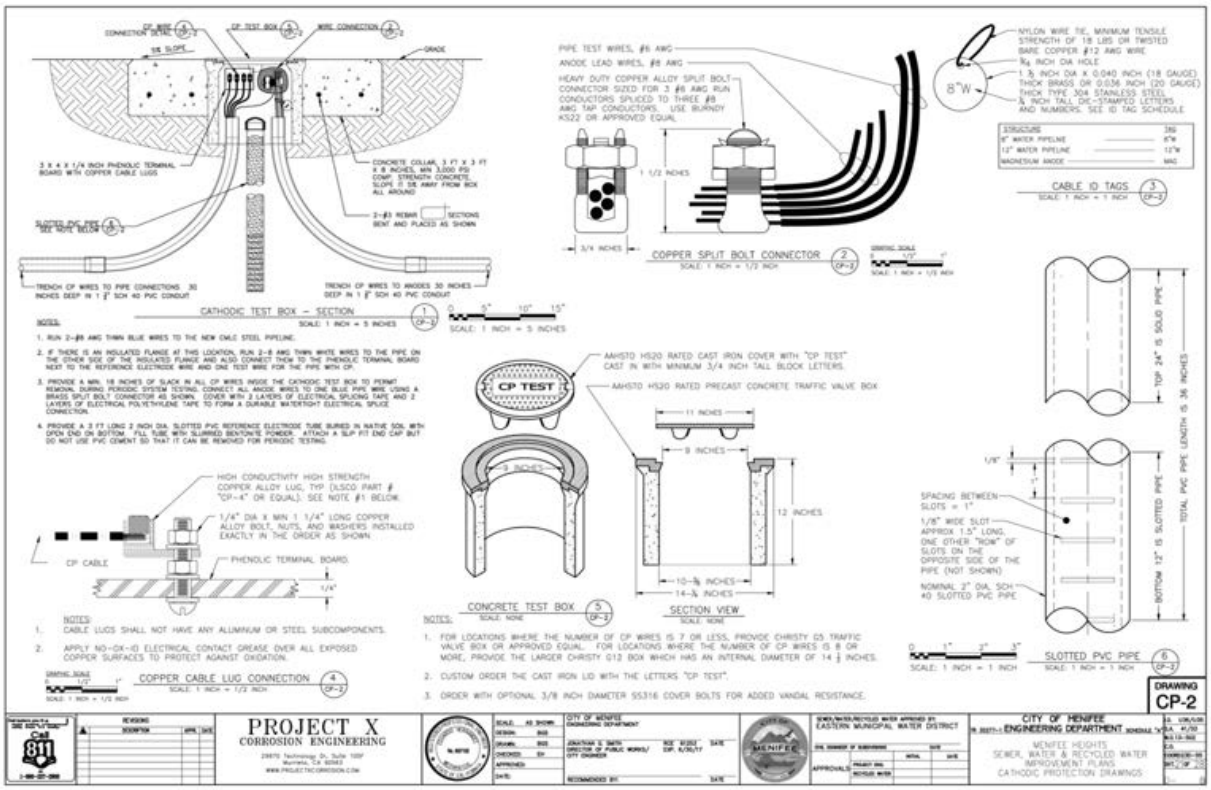


Figure 8- Sample of corrosion test station specification drawing

5.4.8 Excess Flux in Plumbing

Investigations of internal corrosion of domestic water plumbing systems almost always finds excess flux to be the cause of internal pitting of copper pipes. Some people believe that there is no such thing as too much flux. Flux runs have been observed to travel up to 20 feet with pitting occurring along the flux run. Flushing a soldered plumbing system with hot water for 15 minutes can remove significant amounts of excess flux left in the pipes. If a plumbing system is expected to be stagnant for some time, it should be drained to avoid stagnant water conditions that can lead to pitting and dezincification of yellow brasses.

5.4.9 Landscapers and Irrigation Sprinkler Systems

A significant amount of corrosion of fences is due to landscaper tools scratching fence coatings and irrigation sprinklers spraying these damaged fences. Recycled water typically has a higher salt content than potable drinking water, meaning that it is more corrosive than regular tap water. The same risk from damage and water spray exists for above ground pipe valves and backflow preventers. Fiber glass covers, cages, and cement footings have worked well to keep tools at an arm's length.

5.4.10 Roof Drainage splash zones

Unbelievably, even the location where your roof drain splashes down can matter. We have seen drainage from a home's roof valley fall directly down onto a gas meter causing it's piping to corrode at an accelerated rate reaching 50% wall thickness within 4 years. It is the same effect as a splash

zone in the ocean or in a pool which has a lot of oxygen and agitation that can remove material as it corrodes.

5.4.11 Stray Current Sources

Stray currents which cause material loss when jumping off of metals may originate from direct-current distribution lines, substations, or street railway systems, etc., and flow into a pipe system or other steel structure. Alternating currents may occasionally cause corrosion. The corrosion resulting from stray currents (external sources) is similar to that from galvanic cells (which generate their own current) but different remedial measures may be indicated. In the electrolyte and at the metal-electrolyte interfaces, chemical and electrical reactions occur and are the same as those in the galvanic cell; specifically, the corroding metal is again considered to be the anode from which current leaves to flow to the cathode. Soil and water characteristics affect the corrosion rate in the same manner as with galvanic-type corrosion.

However, stray current strengths may be much higher than those produced by galvanic cells and, as a consequence, corrosion may be much more rapid. Another difference between galvanic-type currents and stray currents is that the latter are more likely to operate over long distances since the anode and cathode are more likely to be remotely separated from one another. Seeking the path of least resistance, the stray current from a foreign installation may travel along a pipeline causing severe corrosion where it leaves the line. Knowing when stray currents are present becomes highly important when remedial measures are undertaken since a simple sacrificial anode system is likely to be ineffectual in preventing corrosion under such circumstances.[17] Stray currents can be avoided by installing proper electrical shielding, installation of isolation joints, or installation of sacrificial jump off anodes at crossings near protected structures such as metal gas pipelines or electrical feeders.

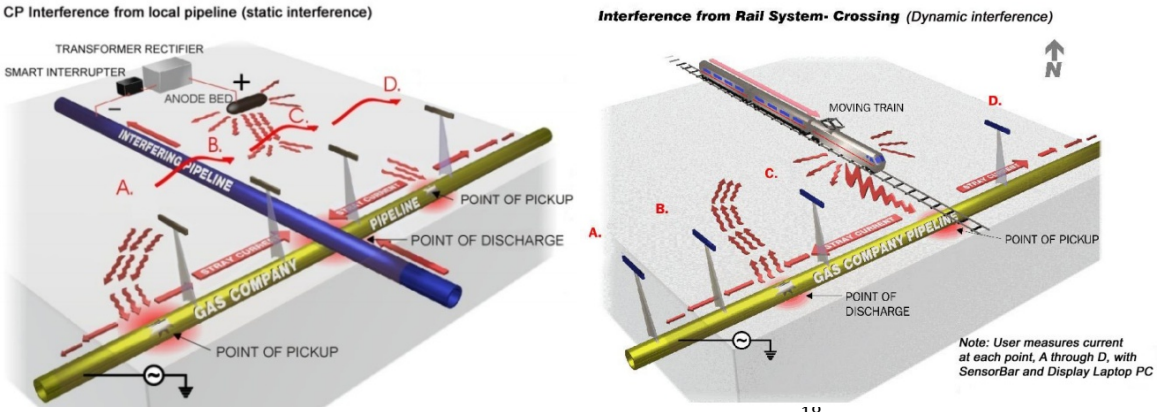


Figure 9- Examples of Stray Current[18]

[17] http://corrosion-doctors.org/StrayCurrent/Introduction.htm

[18] http://www.eastcomassoc.com/

Project X Corrosion Engineering

Lab Request Sheet Chain of Custody
Phone (213) 928-7213 Fax (951) 226-1720 www.projectxcorrosion.com
Ship Samples To: 29990 Technology Dr, Suite 13, Murrieta, CA 92563

Project X Job Number: S240110E LOR 63980.1 Idyllwild WP 2Full+Rpt

IMPORTANT: Please complete Project and Sample Identification Data as you would like it to appear in report & include this form with samples.

Company Name:	LOR Geotechnical Group, Inc.	Contact Name:	Andrew Tardie
Phone No:	951-653-1760		
Mailing Address:	6121 Quail Valley	Contact Email:	atardie@lorgeo.com
Accounting Contact:	John Leuer	Invoice Email:	atardie@lorgeo.com
Client Project No:	63980.1	Project Name:	Idyllwild Wastewater Plant
P.O. #:	--		

(Business Days) Turn Around Time:	3-5 Day Standard	3 Day Guarantee 50% mark-up	24 Hour RUSH 100% mark-up
	●		

METHOD ANALYSIS REQUESTED (Please circle)

For Corrosion Control Recommendations (350g soil sample):
NEED (1) Groundwater depth and
(2) Soil Sample Locations Map

FOR THERMAL RESISTIVITY PROVIDE (1,500g soil sample):
(1) Optimal Moisture %
(2) Dry Density{PCF}
(3) Desired Compaction
Date & Received By:

Default Method

Group	Test	Methods
Full Corrosion Series / Geo Quad	Soil Resistivity	Caltrans CTM643; AASHTO 12888; ASTM G187
Full Corrosion Series / Geo Quad	pH	Caltrans CTM643; AASHTO T289; ASTM G51
Full Corrosion Series / Geo Quad	Sulfate	Caltrans CTM417; AASHTO T290; ASTM D4327
Full Corrosion Series / Geo Quad	Chloride	Caltrans CT422; AASHTO T291; ASTM D4327
Full Corrosion Series	Redox Potential	SM 2580B; ASTM G200
Full Corrosion Series	Sulfide	SM 4500-S2
Full Corrosion Series	Ammonia	SM 4500-NH3; ASTM D4327
Full Corrosion Series	Nitrate	SM 4500-NO3; ASTM D4327
Full Corrosion Series	Flouride	SM 2320B
Full Corrosion Series	Phosphate	ASTM D4327
Full Corrosion Series	Lithium	ASTM D4327
Full Corrosion Series	Sodium	ASTM D4327
Full Corrosion Series	Potassium	ASTM D4327
Full Corrosion Series	Magnesium	ASTM D4327
Full Corrosion Series	Calcium	ASTM D4327
	Full Corrosion Series	350g Sample
Reports	Soil Corrosivity Evaluation Report	*Req: Min. 3 Samples, site map, and groundwater info
Reports	Water Corrosivity Mini Report	
	Moisture Content	ASTM D2216
	Total Alkalinity	SM 2320B
	Soil Remolding	ASTM D2216; ASTM D698
	Thermal Resistivity	ASTM D5334 8-inch; IEEE 442 6-inch
	(ANC) Alk Neutr Cap	1,500g Sample
	(SRB) Sulfate Reducing	HACH BART
	Puckorius Index	
	XRF Elemental Analysis	ASTM A751; ASTM E322; ASTM E1621
	Water Hardness	

Margin	#	SAMPLE ID - BORE # - Description	DEPTH (ft)	DATE COLLECTED	Soil Resistivity	pH	Sulfate	Chloride	Redox Potential	Sulfide	Ammonia	Nitrate	Flouride	Phosphate	Lithium	Sodium	Potassium	Magnesium	Calcium	Full Corrosion Series	Soil Corrosivity Evaluation Report	Water Corrosivity Mini Report	Moisture Content	Total Alkalinity	Soil Remolding	Thermal Resistivity	(ANC) Alk Neutr Cap	(SRB) Sulfate Reducing	Puckorius Index	XRF Elemental Analysis	Water Hardness
62	1	RV-2 - B-3 - (SM) Silty Sand	1-4	12/21/2023																●	●										
63	2	R-2 - B-1 - Bedrock	5	12/21/2023																●	●										
	3	SPT - 2 - Bedrock (circled: no sample left to test)	15																	●	●										
	4																														
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Appendix E – Equipment and Product Data

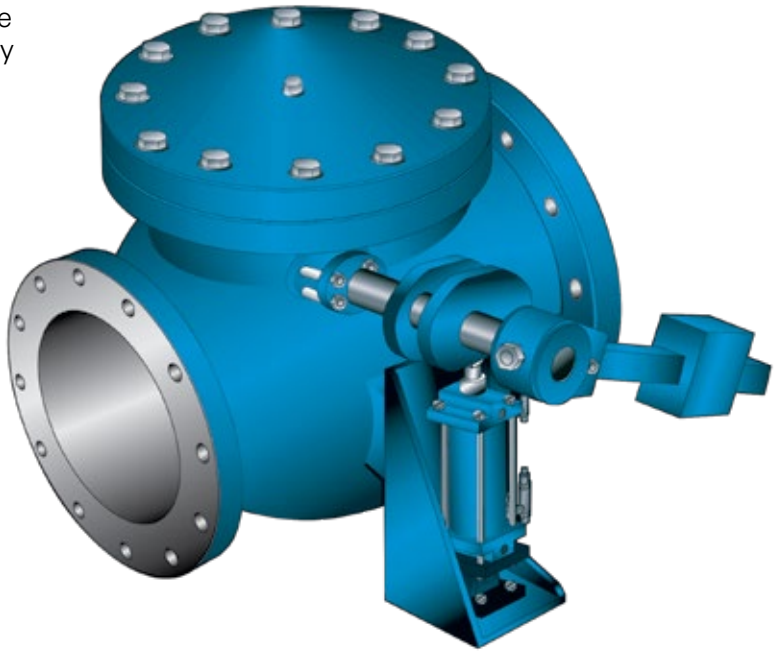
Table of Contents:

APCO CVS-250/250A SWING CHECK VALVES

Design and Construction

APCO CVS-250/250A Swing Check Valves are used to prevent the backflow of fluid by closing before flow reversal. They are installed in clean and dirty applications including sewage treatment, water treatment, water distribution, industrial water and wastewater services.

The APCO Swing Check Valves CVS-250/250A are constructed with a heavy ductile iron body, a stainless steel body seat ring, and a single continuous stainless steel shaft for the attachment of the outside closure control devices. Closure devices include air cushion side mounted cylinder with lever and weight, lever and weight, or a lever and spring.



Wide Size Range

APCO CVS-250/250A Swing Check Valves are available in sizes 2-42" (50-1100mm).

AWWA C508 Compliant

APCO CVS-250/250A Swing Check Valves are manufactured and tested per the requirements of AWWA standard C508-09 *Swing Check Valves for Waterworks Service 2" through 24" (50mm through 600mm).*

Rated to 250 psi (1724 kPa)

All APCO CVS-250/250A Swing Check Valves are rated to 250 psi (1724 kPa) CWP.

Efficient Full Waterway Flow

The valve provides an efficient flow path with an area equal to or greater than the area of the nominal valve size. As a result, the APCO CVS-250/250A Swing Check Valves have lower head loss than other check valves.

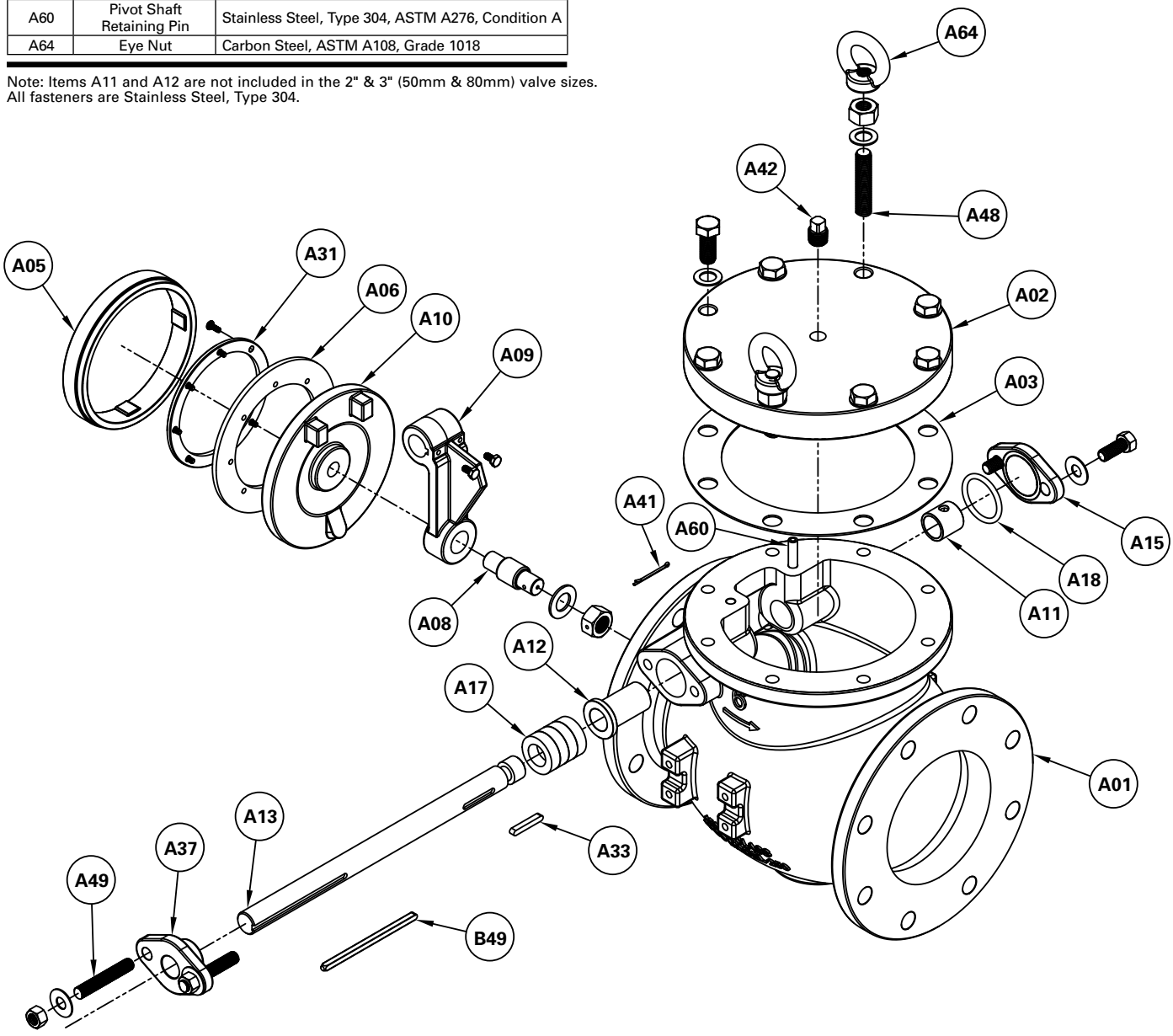
Drip Tight Shut-Off

The APCO CVS-250/250A resilient seat provides drip tight shut-off up to the full rating of the valve.

Materials of Construction

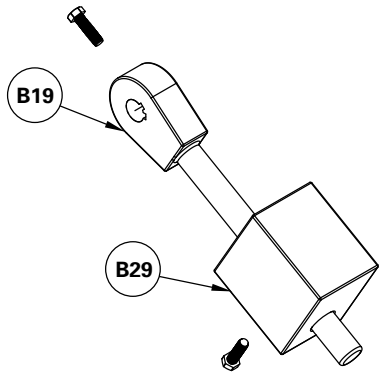
Item	Description	Material
A01	Body	Ductile Iron, ASTM A536, Grade 65-45-12
A02	Cover	Ductile Iron, ASTM A536, Grade 65-45-12
A03	Cover Gasket	Acrylonitrile-Butadiene (NBR)
A05	Body Seat Ring	Stainless Steel, Type CF-8M, ASTM A743
A06	Disc Seat	Acrylonitrile-Butadiene (NBR)
A08	Disc Stem	Stainless Steel, Type 303, ASTM A582, Condition A
A09	Disc Arm	Ductile Iron, ASTM 536, Grade 65-45-12
A10	Disc	Ductile Iron, ASTM 536, Grade 65-45-12
A11	Straight Bushing	Stainless Steel, Type 304
A12	Flanged Bushing	Stainless Steel, Type 304
A13	Pivot Shaft	Stainless Steel, Type 303, ASTM A582, Condition A
A15	Pivot Shaft Cover	Ductile Iron, ASTM A536, Grade 65-45-12
A17	Packing	Virgin PTFE
A18	Shaft Cover Seal	Acrylonitrile-Butadiene (NBR)
A31	Seat Retaining Ring	Stainless Steel, Type 304, ASTM A276, Condition A
A33	Pivot Shaft Disc Key	Stainless Steel, Type 304, ASTM A276, Condition A
A37	Packing Gland	Ductile Iron, ASTM A536, Grade 65-45-12
A41	Cotter Pin	Stainless Steel
A42	Pipe Plug	Stainless Steel, Type 304
A48	Stud	Stainless Steel, Type 304
A49	Stud	Stainless Steel, Type 304
A60	Pivot Shaft Retaining Pin	Stainless Steel, Type 304, ASTM A276, Condition A
A64	Eye Nut	Carbon Steel, ASTM A108, Grade 1018

Note: Items A11 and A12 are not included in the 2" & 3" (50mm & 80mm) valve sizes.
All fasteners are Stainless Steel, Type 304.

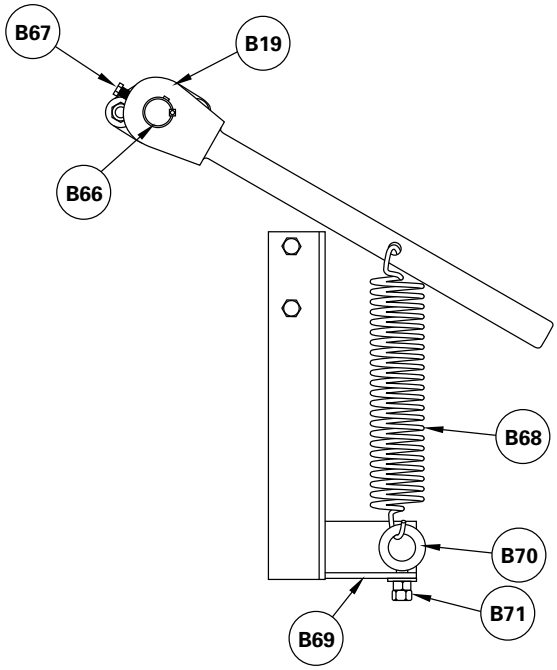


Item	Description	Material
B19	Counter Weight Arm Assembly	Ductile Iron, ASTM A536, Grade 65-45-12
B20	Cylinder Assembly	Aluminum Alloy
B24	Cylinder Bracket	Ductile Iron, ASTM A536, Grade 65-45-12
B27	Cushion Lever	Ductile Iron, ASTM A536, Grade 65-45-12
B29	Counter Weight	Ductile Iron, ASTM A536, Grade 65-45-12
B30	Flow Control Valve	Aluminum Alloy
B34	Pivot Shaft Key	Stainless Steel, Type 304
B46	Reducer Bushing 8-42" (200-1100mm)	Stainless Steel, Type 304
B47	Pipe Nipple	Stainless Steel, Type 304
B48	Pipe Elbow	Stainless Steel, Type 304
B58	Air Breather	Bronze
B59	Cushion Lever Clevis Pin	Stainless Steel, Type 304
B60	Retaining Ring	Stainless Steel, Type 304
B61	Clevis Pin	Steel, Zinc Plated
B62	Retaining Ring	Stainless Steel, Type 304
B63	Male Clevis Bracket	Aluminum Alloy
B64	Female Clevis Bracket	Aluminum Alloy
B65	Yoke	Steel, Black Powder Coated
B66	Spring Lever Arm Key	Stainless Steel, Type 304
B67	Sprng Lever Arm Retaining Screw	Stainless Steel, Type 304
B68	Spring	Steel
B69	Spring Bracket	Steel, ASTM A36
B70	Eye Screw	Alloy Steel, Heat Treated
B71	Eye Screw Retaining Nut	Steel, ASTM A563, Grade A

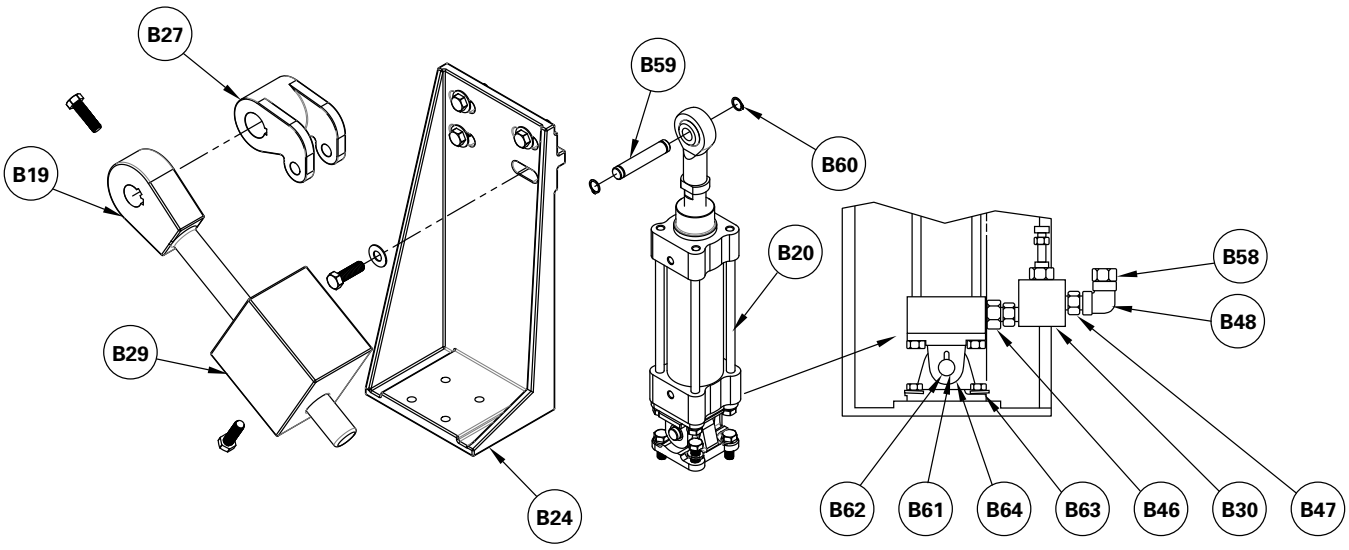
Lever and Weight



Lever and Spring



Air Cushion Cylinder with Speed Control Assembly



Valve Selection

Applicable Standards

APCO CVS-250/250A Swing Check Valves are designed and/or tested to meet the following standards:	
AWWA C508-09	Conforms to *Swing Check Valves for Waterworks Service, 2-24"*
ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings, 125 lbs. (60 kg) Conforms to related flange drilling dimensions.
ANSI B16.5	Carbon Steel Flanges and Flanged Fittings, 150 lbs. (70 kg) Conforms to related flange drilling dimensions.

Shut-Off Capabilities

Resilient Seat	Drip tight shut-off

Pressure Ratings (Ambient Temperature)

Valve Size	Direct Pressure
2-42" 50-1100mm	250 psi CWP 1724 kPa CWP

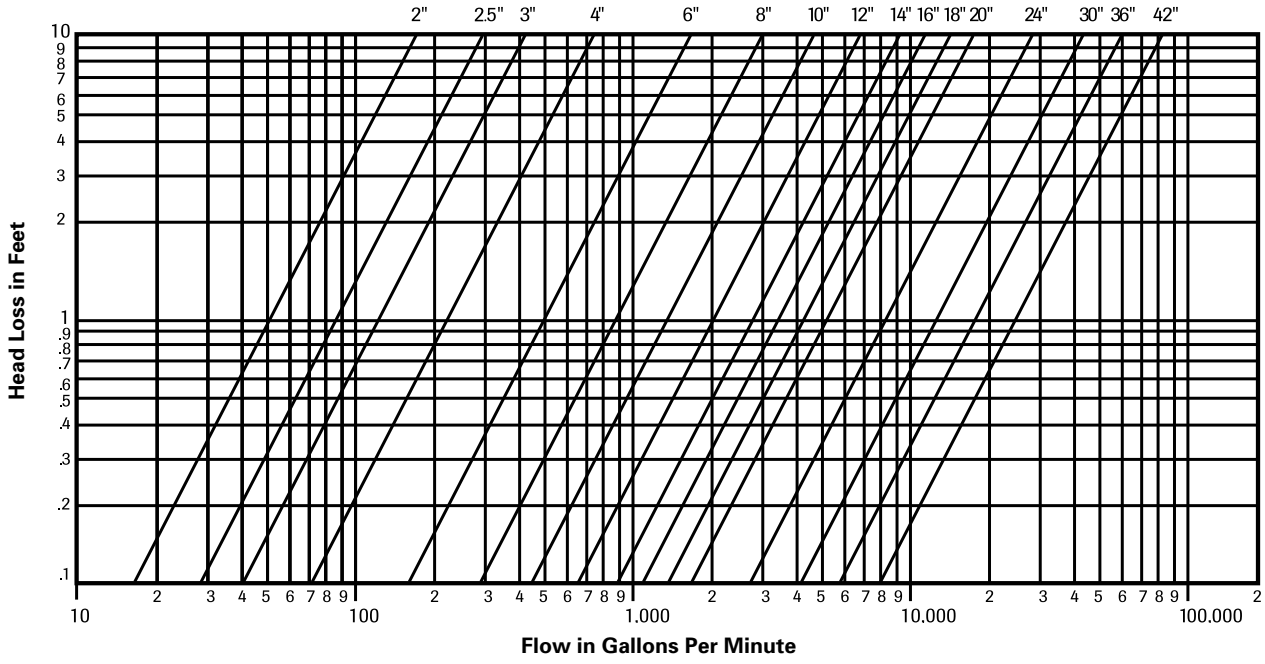
Note: Contact DeZURIK for higher pressures and larger sizes.

Valve and Air Cushioned Cylinder Weights

Valve Size	Weight
3" 80mm	110 50
4" 100mm	145 66
6" 150mm	205 93
8" 200mm	330 150
10" 250mm	500 227
12" 300mm	800 363
14" 350mm	1260 672
16" 400mm	1600 726
18" 450mm	2100 963
20" 500mm	2500 1134
24" 600mm	3700 1678
30" 750mm	6000 2722
36" 900mm	9100 4128
42" 1100mm	Contact DeZURIK

Lbs
Kgs

Head Loss Characteristics for Swing Check Valves



Ordering

To order, simply complete the valve order code from information shown. An ordering example is shown for your reference.

Valve Style
Give valve style code as follows:

CVS	=	Swing Check Valves

Valve Size
Give valve size code as follows:

2	=	2"	(50mm)	14	=	14"	(350mm)
2.5	=	2.5"	(65mm)	16	=	16"	(400mm)
3	=	3"	(80mm)	18	=	18"	(450mm)
4	=	4"	(100mm)	20	=	20"	(500mm)
6	=	6"	(150mm)	24	=	24"	(600mm)
8	=	8"	(200mm)	30	=	30"	(750mm)
10	=	10"	(250mm)	36	=	36"	(900mm)
12	=	12"	(300mm)	42	=	42"	(1100mm)

Body Style
Give body style code as follows:

250A	=	Series 250A 2-14" (50-350mm)
250	=	Series 250 16-42" (400-1100mm)

End Connection
Give end connection code as follows:

F1	=	Flanged, ANSI 125/150

Body Material
Give body material code as follows:

DIF	=	Ductile Iron, 12 mils Fusion Bonded Blue Epoxy Lined & 8 mils coated, Body Style 250 or 250A

Trim Combination

Disc Material
Give disc material code as follows:

DI	=	Ductile Iron

Shaft Material
Give shaft material code as follows:

S1	=	304 Stainless Steel, Body Style 250 or 250A

Body Seat Material
Give body seat material code as follows:

S2	=	316 Stainless Steel, Body Style 250 or 250A

Disc Seat Material
Give disc seat material code as follows:

NBR	=	Acrylonitrile-Butadiene -70 to 250° F (-57 to 121° C)

Closure Control Devices
Give operating device code as follows:

AC	=	Air Cushion Side Mounted Cylinder (Lever & Weight)
LS	=	Lever & Spring
LW	=	Lever & Weight

Accessories
Give accessory code as follows:
250 or 250A Body Style

SEL22	=	Limit Switch - DPDT AB H802T-DTP
SEL30	=	Proximity Switch - SPDT GO 73-13526-B2
VP	=	Vertical Flow Up Position Installation

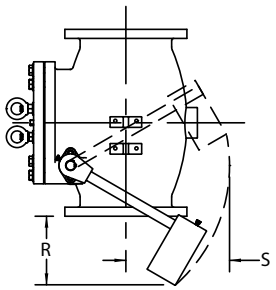
Ordering Example:

CVS,8,250A,F1,DIF,DI-S1-S2-NBR*AC,SEL22

Dimensions

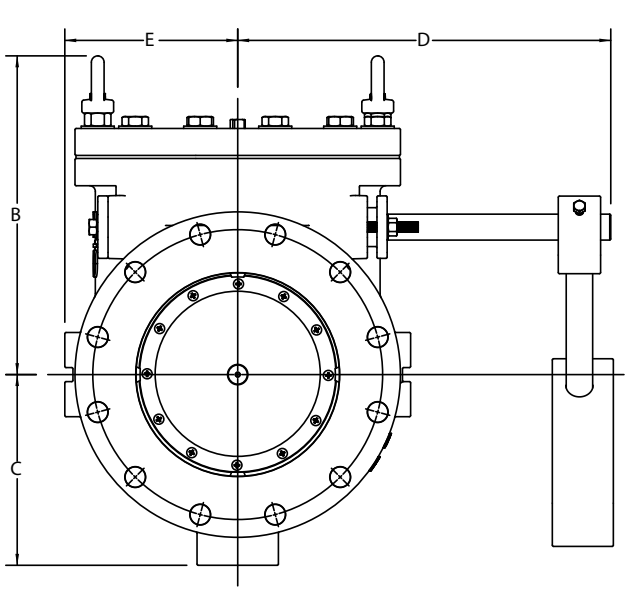
Lever and Weight

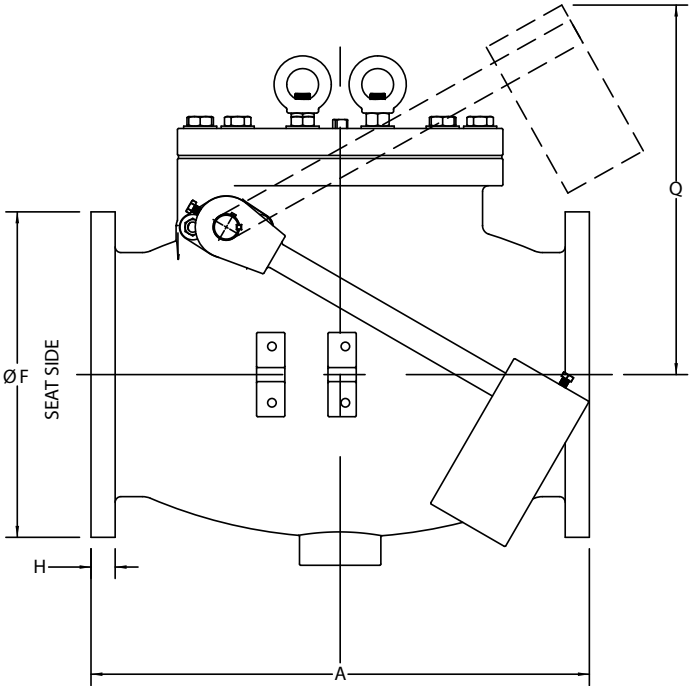
Valve Size	A	B	C	D	E	F	H	Q	R	S
2"	8.00	9.25	3.50	10.92	4.12	6.00	0.63	10.00	6.00	9.38
50mm	203	235	89	277	105	152	16	254	152	238
2.5"	8.50	9.72	3.50	10.92	4.12	7.00	0.88	9.88	6.13	9.38
65mm	216	247	89	277	105	178	22	251	156	238
3"	9.50	10.00	4.50	11.00	4.00	7.50	0.75	10.13	5.50	9.25
80mm	241	254	114	279	102	191	19	257	140	235
4"	11.50	10.75	5.00	11.75	5.00	9.00	0.94	10.75	4.88	8.75
100mm	292	273	127	299	127	229	24	273	124	222
6"	14.00	11.75	5.75	13.50	6.50	11.00	1.00	11.63	4.63	7.88
150mm	356	299	146	343	165	279	25	295	118	200
8"	19.50	13.75	7.25	17.00	7.50	13.50	1.13	15.50	5.88	10.38
200mm	495	349	184	432	191	343	29	394	149	264
10"	24.50	15.00	9.38	16.25	9.00	16.00	1.19	18.38	9.00	13.63
250mm	622	381	238	413	229	406	30	467	229	346
12"	27.50	19.00	11.00	18.25	11.00	19.00	1.25	21.13	9.00	14.25
300mm	699	483	279	464	279	483	32	537	229	362
14"	31.00	22.50	13.50	26.00	14.00	21.00	1.38	25.88	11.75	18.75
350mm	787	572	343	660	356	533	35	657	299	476
16"	36.00	24.50	14.25	29.50	15.00	23.50	1.44	32.00	7.25	15.88
400mm	914	622	362	749	381	597	37	813	184	403
18"	40.00	26.50	17.38	31.00	18.63	25.00	1.56	36.00	9.25	21.25
450mm	1016	673	441	787	473	635	40	914	235	540
20"	40.00	28.75	17.63	32.38	18.63	27.50	1.69	41.00	—	—
500mm	1016	730	448	822	473	699	43	1041		
24"	48.00	32.50	20.13	34.00	21.00	32.00	1.88	38.00	8.75	19.25
600mm	1219	826	511	864	533	813	48	965	222	489
30"	56.00	44.13	29.75	39.00	24.00	38.75	2.13	53.13	15.50	24.00
750mm	1422	1121	756	991	610	984	54	1349	394	610
36"	63.00	50.50	33.50	42.00	27.00	46.00	2.38	57.50	15.00	21.00
900mm	1600	1283	851	1067	686	1168	60	1461	381	533
42" 1100mm	Contact DeZURIK									



VP, VERTICAL FLOW UP
POSITION INSTALLATION
LEVER ARM SWING

Inches
Millimeters



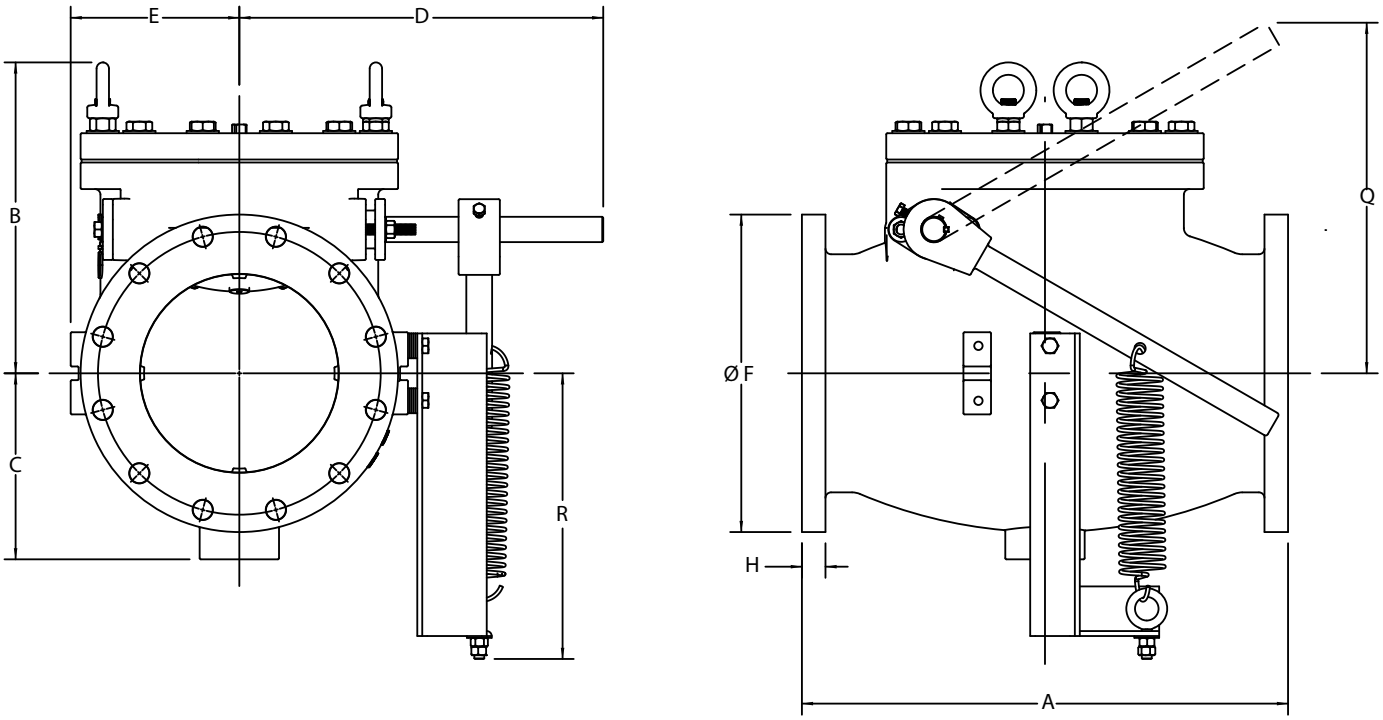


Dimensions

Lever and Spring

Valve Size	A	B	C	D	E	F	H	Q	R
2"	8.00	9.25	3.50	10.92	3.83	6.00	0.63	9.25	9.83
50mm	203	235	89	277	97	152	16	235	250
2.5"	8.50	9.72	3.50	10.92	3.83	7.00	0.88	9.25	9.83
65mm	216	247	89	277	97	178	22	235	250
3"	9.50	10.00	4.50	11.00	4.00	7.00	0.75	9.39	10.64
80mm	241	254	114	279	102	178	19	239	270
4"	11.50	10.75	5.00	11.75	5.00	9.00	0.94	10.00	9.50
100mm	292	273	127	299	127	229	24	254	241
6"	14.00	11.75	5.75	13.50	6.50	11.00	1.00	10.90	9.50
150mm	356	299	146	343	165	279	25	277	241
8"	19.50	13.75	7.25	17.00	7.50	13.50	1.13	14.84	6.50
200mm	495	349	184	432	191	343	29	377	165
10"	24.50	15.00	9.38	16.25	9.00	16.00	1.19	17.63	13.24
250mm	622	381	238	413	229	406	30	448	336
12"	27.50	19.00	11.00	18.25	11.00	19.00	1.25	20.40	13.25
300mm	699	483	279	464	279	483	32	518	336
14"	31.00	22.50	13.50	26.00	14.00	21.00	1.38	25.22	18.75
350mm	787	572	343	660	356	533	35	641	476
16"	36.00	24.50	14.25	29.50	15.00	23.50	1.44	32.00	15.50
400mm	914	622	362	749	381	597	37	813	394
18"	40.00	26.50	17.38	31.00	18.63	25.00	1.56	36.00	19.45
450mm	1016	673	441	787	473	635	40	914	494
20"	40.00	28.75	17.63	32.38	18.63	27.50	1.69	41.00	14.50
500mm	1016	730	448	822	473	699	43	1041	368
24"	48.00	32.50	20.13	34.00	21.00	32.00	1.88	38.00	20.83
600mm	1219	826	511	864	533	813	48	965	529
30"	56.00	44.13	29.75	39.00	24.00	38.75	2.13	53.13	17.71
750mm	1422	1121	756	991	610	984	54	1349	450
36"	63.00	50.50	33.50	42.00	27.00	46.00	2.38	57.50	13.45
900mm	1600	1283	851	1067	686	1168	60	1461	342
42" 1100mm	Contact DeZURIK								

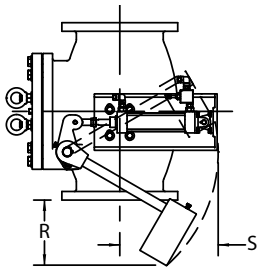
Inches
Millimeters



Dimensions

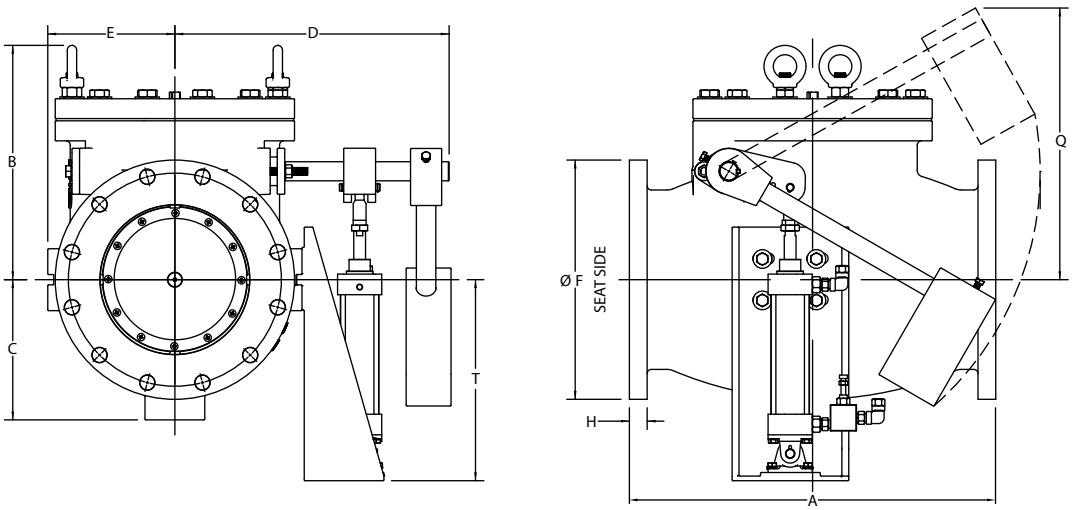
Air Cushion Side Mounted Cylinder (Lever and Weight)

Valve Size	A	B	C	D	E	F	H	Q	R	S	T
2"	8.00	9.25	3.50	10.92	3.83	6.00	0.63	10.00	6.00	9.38	11.25
50mm	203	235	89	277	97	152	16	254	152	238	286
2.5"	8.50	9.72	3.50	10.92	3.83	7.00	0.88	9.88	6.13	9.38	11.13
65mm	216	247	89	277	97	178	22	251	156	238	283
3"	9.50	10.00	4.50	11.00	4.00	7.50	0.75	10.13	5.50	9.25	12.00
80mm	241	254	114	279	102	191	19	257	140	235	305
4"	11.50	10.75	5.00	11.75	5.00	9.00	0.94	10.75	4.88	8.75	10.88
100mm	292	273	127	299	127	229	24	273	124	222	276
6"	14.00	11.75	5.75	13.50	6.50	11.00	1.00	11.63	4.63	7.88	10.88
150mm	356	299	146	343	165	279	25	295	118	200	276
8"	19.50	13.75	7.25	17.00	7.50	13.50	1.13	15.50	5.88	10.38	13.50
200mm	495	349	184	432	191	343	29	394	149	264	343
10"	24.50	15.00	9.38	16.25	9.00	16.00	1.19	18.38	9.00	13.63	13.50
250mm	622	381	238	413	229	406	30	467	229	346	343
12"	27.50	19.00	11.00	18.25	11.00	19.00	1.25	21.13	9.00	14.25	13.50
300mm	699	483	279	464	279	483	32	537	229	362	343
14"	31.00	22.50	13.50	26.00	14.00	21.00	1.38	25.88	11.75	18.75	13.50
350mm	787	572	343	660	356	533	35	657	299	476	343
16"	36.00	24.50	14.25	29.50	15.00	23.50	1.44	32.00	7.25	15.88	14.50
400mm	914	622	362	749	381	597	37	813	184	403	368
18"	40.00	26.50	17.38	31.00	18.63	25.00	1.56	36.00	9.25	21.25	13.00
450mm	1016	673	441	787	473	635	40	914	235	540	330
20"	40.00	28.75	17.63	32.38	18.63	27.50	1.69	41.00	—	—	14.50
500mm	1016	730	448	822	473	699	43	1041			368
24"	48.00	32.50	20.13	34.00	21.00	32.00	1.88	38.00	8.75	19.25	11.75
600mm	1219	826	511	864	533	813	48	965	222	489	299
30"	56.00	44.13	29.75	39.00	24.00	38.75	2.13	53.13	15.50	24.00	17.25
750mm	1422	1121	756	991	610	984	54	1349	394	610	438
36"	63.00	50.50	33.50	42.00	27.00	46.00	2.38	57.50	15.00	21.00	13.00
900mm	1600	1283	851	1067	686	1168	60	1461	381	533	330
42" 1100mm	Contact DeZURIK										



VP, VERTICAL FLOW UP
POSITION INSTALLATION
LEVER ARM SWING

Inches
Millimeters



Sales and Service

For information about our worldwide locations, approvals, certifications and local representative:
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Thern
Winches & Cranes

STATIONARY DAVIT CRANE

CAPTAIN® 2000 SERIES

Made in USA

ISO 9001:2015 CERTIFIED

thern.com
(507) 454-2996

CAPTAIN® 5FT20

STATIONARY DAVIT CRANE

Thern Winches & Cranes

STATIONARY LIFTING POWER

with Extended Reach

The 5FT20 Captain 2000 stationary davit crane (up to 2,000 pounds) is designed for permanent installation. It features a telescoping boom to reach, lift, and rotate very heavy loads 360 degrees—smoothly and easily. A screw jack comes standard to facilitate boom angle adjustments. For long or heavy lifts, add a Thern power winch for greater speed. Red-enamel finish and stainless-steel hardware resist wear in harsh conditions or environments. It's perfect for water/wastewater, manufacturing, marine, construction, and oil and gas applications.

Product Shown:
5FT20-E2

360° Rotation & Flexible Operation

- Tapered roller bearing enhances smooth, 360-degree rotation under load for precise load placement. Integral 12-position (every 30 degrees) boom rotation lock facilitates heavy lifting and stabilizes unloading
- Rotation handle design does not interfere with boom angle adjustment for easier operation
- Telescoping boom length and adjustable boom angles accommodate a variety of height and reach requirements
- Choose from manual, drill-drive, or powered winch (electric, pneumatic, or hydraulic motors) operation to accommodate a variety of speed and power requirements. DC motors and various voltage AC motors available

STANDARD CONFIGURATIONS

Series	IMPERIAL/METRIC Description	Up To Capacity
5FT20-M1	Red-enamel crane and ratchet jack with M4312PB-K spur gear hand winch	2,000 lbs / 907 kg
5FT20-M2	Red-enamel crane and ratchet jack with 4WM2V-K worm gear hand winch	2,000 lbs / 907 kg
5FT20X-M2X	Gray-epoxy crane and ratchet jack with gray-epoxy 4WM2VEGRA-K worm hand winch	2,000 lbs / 907 kg
5FT20-E2	Red-enamel crane and ratchet jack with 4WP2-K electric winch	2,000 lbs / 907 kg
5FT20X-E2X	Gray-epoxy crane and ratchet jack with gray-epoxy 4WP2EGRA-K electric winch	2,000 lbs / 907 kg

Durable Construction & Finish

- Boom, mast, and base are fabricated from heavy-gauge steel that limits deflection and meets/exceeds ASTM standards
- Red-enamel finish and stainless-steel fasteners resist the elements for long service life
- Epoxy finishes are available for corrosive enviornments

NOTICE: These products are not for lifing people or things over people.

Refer to technical pages for detailed performance information.

Winona, MN USA | (507) 454-2996 | THERN.COM

TECHNICAL DRAWINGS & SPECIFICATIONS

CAPTAIN® 2000
STATIONARY DAVIT CRANE

CONFIGURATIONS

Model	Description	Approx. Ship Wt.	
		(lb)	(kg)
Popular Configurations			
5FT20-M1	up to 2,000 lb capacity with M4312PB-K spur gear hand winch and black defender-coated ratchet jack—red-enamel crane	376	171
5FT20-M2	up to 2,000 lb capacity with 4WM2V-K worm gear hand winch and black defender-coated ratchet jack—red-enamel crane	387	176
5FT20X-M2X	up to 2,000 lb capacity with 4WM2VEGRA-K worm spur gear hand winch and black defender-coated ratchet jack—gray-epoxy crane	387	176
5FT20-E2	up to 2,000 lb capacity with 4WP2-K electric winch and black defender-coated ratchet jack—red-enamel crane	423	192
5FT20X-E2X	up to 2,000 lb capacity with 4WP2EGRA-K electric winch and black defender-coated ratchet jack—gray-epoxy crane	423	192
Crane Only			
5FT20	up to 2,000 lb capacity—black defender-coated ratchet jack—red-enamel crane	350	159
5FT20X	up to 2,000 lb capacity—black defender-coated ratchet jack—gray-epoxy crane	350	159
Winch Only			
M1	M4312PB-K—spur gear hand winch only—black defender coating	26	12
M2	4WM2V-K worm gear hand winch only—powder-coat finish	37	17
M2X	4WM2VEGRA-K worm gear hand winch only—gray-epoxy finish	37	17
M3	M4312PBSS-K—spur gear hand winch only—stainless-steel finish	26	12
M4	2W40V-BM-K—worm gear hand winch—enamel finish	120	55
E2	4WP2-K electric winch—115/1/60 VAC with 6 ft pendant control—enamel finish	73	33
E2X	4WP2EGRA-K electric winch—115/1/60 VAC with 6 ft pendant control—gray-epoxy finish	73	33
E3	3WG4B-K electric winch—115/1/160 VAC with 6 ft pendant control—enamel finish	193	88
E4	4771-K electric winch—115/1/60 VAC with 6 ft pendant control—enamel finish	89	41
E4X	4771EGRA-K electric winch—115/1/60 VAC with 6 ft pendant control—gray-epoxy finish	89	41
E4DC	4771DC-K electric winch—12 volt DC with 10 ft pendant control—enamel finish	107	49
E4DCX	4771DCEGRA-K electric winch—12 volt DC with 10 ft pendant control—gray-epoxy finish	107	49

Wire Rope Assemblies—sold separately

Galvanized or stainless steel wire rope assemblies with swivel hook and latch complete with swaged-ball fitting to work with the quick-disconnect anchor on the winch. 316 stainless steel assemblies available—contact factory.

Wire Rope Length		Galvanized Aircraft Cable	304 Stainless Steel Wire Rope
		1/4" Dia. (6.4 mm)	1/4" Dia. (6.4 mm)
(ft)	(m)	Model No.	Model No.
28	8.5	WA25-28NS	WS25-28NS
36	10.9	WA25-36NS	WS25-36NS
45	13.7	WA25-45NS	WS25-45NS
60	18.2	WA25-60NS	WS25-60NS
75	22.8	WA25-75NS	WS25-75NS

PERFORMANCE

Captain 2000 5FT20 Series
Lift Below Floor[1] Level

Lift Below Floor[2]				Wire Rope Diameter		Wire Rope Length[3]		Winch Configurations Maximum Winch Rating											
Minimum (D4)		Maximum (D1)						M1		M2		M3		M4		E2		E3		E4	
(ft)	(m)	(ft)	(m)	(in)	(mm)	(ft)	(m)	(lbs)	(kg)	(lbs)	(kg)	(lbs)	(kg)	(lbs)	(kg)	(lbs)	(kg)	(lbs)	(kg)	(lbs)	(kg)
-7	-2.1	-2	-0.6	1/4"	6	20	6.0	2,000	907	2,000	907	2,000	907	2,000	907	2,000	907	2,000	907	2,000	907
1	0.3	6	1.8	1/4"	6	28	8.5	2,000	907	2,000	907	2,000	907	2,000	907	2,000	907	2,000	907	2,000	907
9	2.7	14	4.2	1/4"	6	36	10.9	1,800	816	1,700	771	1,800	816	2,000	907	1,700	771	2,000	907	1,800	816
18	5.4	23	7.0	1/4"	6	45	13.7	1,600	725	1,500	680	1,600	725	2,000	907	1,500	680	2,000	907	1,800	816
33	10.0	38	11.5	1/4"	6	60	18.2	1,400	635	1,300	589	1,400	635	2,000	907	1,300	589	2,000	907	1,600	725
48	14.6	53	16.1	1/4"	6	75	22.8	–	–	1,300	589	–	–	2,000	907	1,300	589	2,000	907	1,400	635
63	19.2	68	20.7	1/4"	6	90	27.4	–	–	–	–	–	–	2,000	907	–	–	2,000	907	1,400	635
93	28.3	98	29.8	1/4"	6	120	36.5	–	–	–	–	–	–	2,000	907	–	–	2,000	907	1,300	589
-7	-2.1	-2	-0.6	5/16"	8	20	6.0	1,900	861	2,000	907	1,900	861	2,000	907	2,000	907	2,000	907	2,000	907
1	0.3	6	1.8	5/16"	8	28	8.5	1,600	725	1,600	725	1,600	725	2,000	907	1,600	725	2,000	907	2,000	907
9	2.7	14	4.2	5/16"	8	36	10.9	1,600	725	1,600	725	1,600	725	2,000	907	1,600	725	2,000	907	1,700	771
18	5.4	23	7.0	5/16"	8	45	13.7	1,400	635	1,400	635	1,400	635	2,000	907	1,400	635	2,000	907	1,500	680
33	10.0	38	11.5	5/16"	8	60	18.2	–	–	–	–	–	–	2,000	907	–	–	2,000	907	1,500	680
48	14.6	53	16.1	5/16"	8	75	22.8	–	–	–	–	–	–	2,000	907	–	–	2,000	907	1,300	589
63	19.2	68	20.7	5/16"	8	90	27.4	–	–	–	–	–	–	2,000	907	–	–	2,000	907	1,200	544
93	28.3		29.8	5/16"	8	120	36.5	–	–	–	–	–	–	2,000	907	–	–	2,000	907	–	–

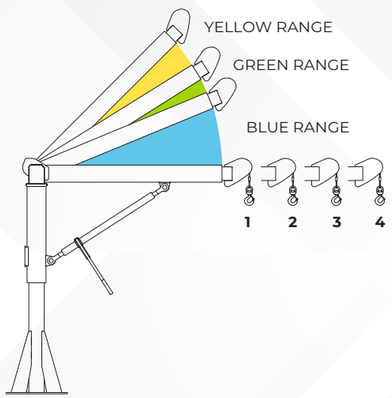
[1] Performance characteristics are for standard products referred to in this manual. Non-standard products may vary from the original design. Contact Thern, Inc. for this information.
[2] Lift below floor level varies depending on boom position and base configuration. For longer lifts, please contact factory.
[3] Wire rope assemblies include a hook and a swaged-ball fitting to work with quick-disconnect anchor on winches, and 316SS wire rope is also available. Please contact the factory.

Winch Configurations

Winona, MN USA | (507) 454-2996 | THERN.COM

Captain 2000
Performance Ratings

	Boom Position	1st Layer Load Rating	
		(lb)	(kg)
BLUE RANGE	1	1,700	700
	2	1,400	635
	3	1,200	540
	4	1,000	450
GREEN RANGE	1	1,800	815
	2	1,500	680
	3	1,350	610
	4	1,100	500
YELLOW RANGE	1	2,000	905
	2	1,650	750
	3	1,500	680
	4	1,200	540

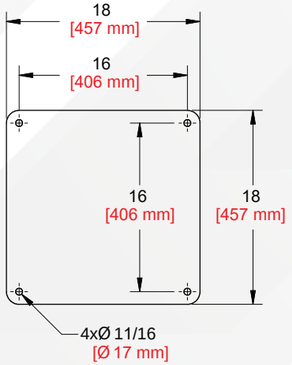


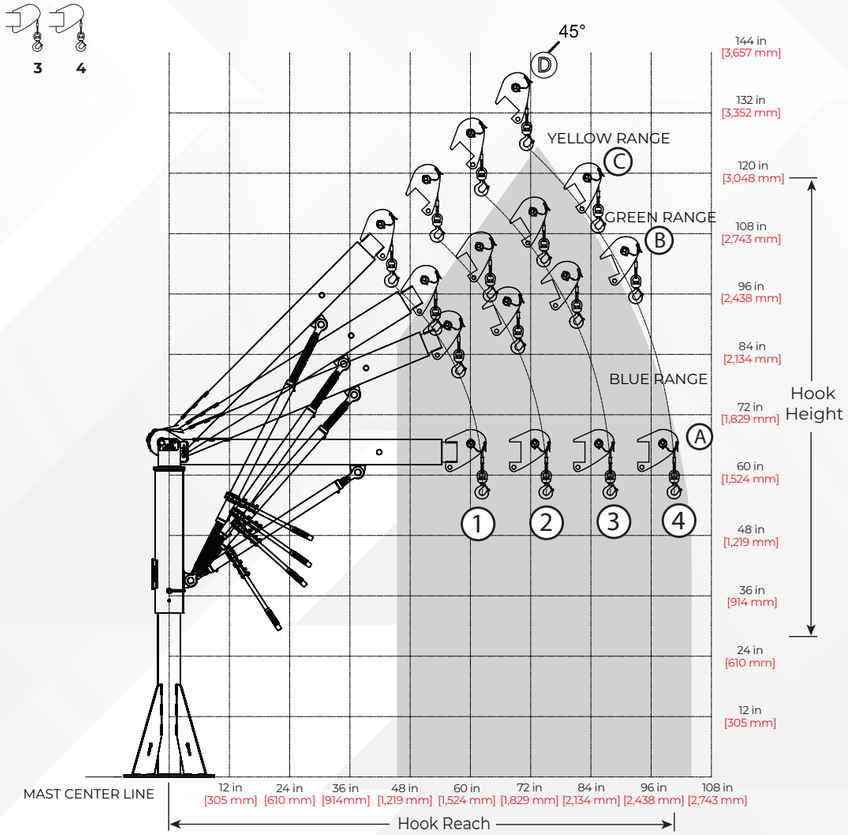
Captain 2000
Reach & Height Above Floor

Boom Position	Hook Reach		Hook Height	
	(in)	(mm)	(in)	(mm)
A-1	62	1,574	56	1,422
A-2	75	1,905	56	1,422
A-3	87	2,210	56	1,422
A-4	100	2,540	56	1,422
B-1	57	1,447	80	2,032
B-2	69	1,752	85	2,159
B-3	81	2,057	90	2,286
B-4	93	2,362	94	2,387
C-1	53	1,346	88	2,235
C-2	64	1,625	95	2,413
C-3	74	1,879	102	2,590
C-4	85	2,159	108	2,743
D-1	45	1,443	98	2,489
D-2	54	1,371	107	2,717
D-3	63	1,600	116	2,946
D-4	72	1,828	125	3,175

Dimensions are for reference only and subject to change without notice.

Base Dimensions





CRANE
OPTIONS & ACCESSORIES

Base Anchor Kit

Model	Description
AN50A-5	(4) Hilti® zinc-plated steel fasteners 1/2” X 5.50” STL (5PA5, 5PF5, and 5PT5 cranes)
AN50A-5S	(4) Hilti® 304 stainless-steel fasteners 1/2” X 5.50” SST304 (5PA5, 5PF5, and 5PT5 cranes)
AN50A-5S316	(4) Hilti® 316 stainless-steel fasteners 1/2” X 5.50” SST316 (5PA5, 5PF5, and 5PT5 cranes)
AN62A-6	(4) Hilti® zinc-plated steel fasteners 5/8” X 6.00” STL (5PA10, 5PT10, 5PT20, and 5FT20 cranes)
AN62A-6S	(4) Hilti® 304 stainless-steel fasteners 5/8” X 6.00” SST304 (5PA10, 5PT10, 5PT20, and 5FT20 cranes)
AN62A-6S316	(4) Hilti® 316 stainless-steel fasteners 5/8” X 6.00” SST316 (5PA10, 5PT10, 5PT20, and 5FT20 cranes)

Rotational Lock

Model	Description
5P5LCK	For pedestal, wall, and flush-mount bases, 316 stainless steal—available for use 5PA5, 5PF5, and 5PT5

Cable Spooler

Model	Description
RW50	316 stainless-steel reel winds up wire rope when detached from crane

Wire Rope Keeper

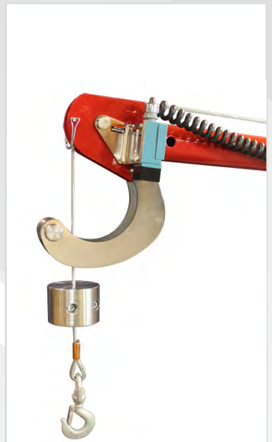
Model	Description
RK19-25S	304 Stainless-steel bracket holds free end of the wire rope when detached from the crane
RK19-25S316	316 Stainless-steel bracket holds free end of the wire rope when detached from the crane

Roller Ball Bearing for 5PT10 Series Crane

Model	Description
5PT10BRG	Red electrostatic, powder-coat paint finish
5PT10BRG-S	304 stainless-steel, electro-polished finish for added protection against corrosion
5PT10BRG-S316	Stainless-steel, electro-polished finish for maximum protection against corrosion
5PT10BRG-SS	304 stainless steel, for use with stainless-steel base only
5PT10BRG-SS316	316 stainless steel, for use with stainless-steel base only

Roller Ball Bearing for 5PT20 Series Crane

Model	Description
5PT20BRG	Red electrostatic, powder-coat paint finish
5PT20BRG-S	304 stainless-steel, electro-polished finish for added protection against corrosion
5PT20BRG-S316	Stainless-steel, electro-polished finish for maximum protection against corrosion
5PT20BRG-SS	304 stainless steel, for use with stainless-steel base only
5PT20BRG-SS316	316 stainless steel, for use with stainless-steel base only



Limit Switch Ready Winch Options

Model	Description
NOTE: Limit switch winch option requires purchase of Limit Switch and Headache Ball (sold separately)	
For 5PF5, 5PA5, 5PA10, 5PT5, 5PT10 , 5PT20 Series Cranes (sold separately)	
E2L (5PA5, 5PA10)	4WP2V-KL electric winch – 115/1/60 VAC with 6 ft pendant control – enamel
E2LX (5PA5, 5PA10)	4WP2VEGRA-KL electric winch – 115/1/60 VAC with 6 ft pendant control – epoxy gray
E4L	4777-KL electric winch – 115/1/60 VAC with 6 ft pendant control – enamel
E4LX	4777EGRA-KL electric winch – 115/1/60 VAC with 6 ft pendant control – epoxy gray
E4DCL	4777DC-KL electric winch – 12 volt DC with 10 ft pendant control – enamel
E4DCLX	4777DCEGRA-KL electric winch – 12 volt DC with 10 ft pendant control – epoxy gray
For 5FT20 Series Crane Only (sold separately)	
E2L	4WP2-KL electric winch – 115/1/60 VAC with 6 ft pendant control – enamel
E2LX	4WP2EGRA-KL electric winch – 115/1/60 VAC with 6 ft pendant control – epoxy gray
E4L	4771-KL electric winch – 115/1/60 VAC with 6 ft pendant control – enamel finish
E4LX	4771EGRA-KL electric winch – 115/1/60 VAC with 6 ft pendant control – gray-epoxy finish
E4DCL	E4DCL 4771DC-KL electric winch – 12 volt DC with 10 ft pendant control – enamel finish
E4DCLX	4771DCEGRA-KL electric winch – 12 volt DC with 10 ft pendant control – gray-epoxy finish
For 5PT30, 5FT25, 5FT40 Series Crane Only (sold separately)	
E2L	3WG4B-KL electric winch - 115/1/160 VAC with 6 ft pendant control – enamel finish
E2LX	3WG4BEGRA-KL electric winch - 115/1/160 VAC with 6 ft pendant control – epoxy gray finish
E2TL	3WG4BMT-K electric winch - 115/1/160 VAC with 6 ft pendant control – enamel finish (Unavailable for use with 5FT40)
E2TLX	3WG4MTX-KL electric winch - 115/1/160 VAC with 6 ft pendant control – epoxy gray finish

Drill Drive Kit

Model	Description
ED330-DW11	120 VAC, 11-amp, 330 rpm drill motor to power drive the hand winch. Only available for cranes configured with the M2 winch option. Includes 1-1/8” hex drive socket
ED300-DW06	Cordless drill kit, 60 V brushless motor, 300 rpm drill motor to power drive the M2 hand winch option. Includes 1-1/8” hex drive socket
ED400-DW09	Heavy-duty cordless drill kit, 60 V brushless motor, 400 rpm drill motor to power drive the M2 hand winch option. Includes 1-1/8” hex drive socket

Headache Ball

Model	Description
HB10-12-25	Red enamel painted 10 lb fits 1/8” to 1/4” rope
HB10-25-38	Red enamel painted 10 lb fits 1/4” to 3/8” rope
HB10S-12-25	Stainless-steel 10 lb fits 1/8” to 1/4” rope
HB10S-25-38	Stainless-steel 10 lb fits 1/4” to 3/8” rope
HB10S-44-50	Stainless-steel 10 lb fits 7/16” to 1/2” rope

Base Extension

Model	Description
5BE5-15 5BE10-15 5BE20-15	Available on 5PF5, 5PT5, 5PT10, and 5PT20 with powder-coat, galvanized, 304 & 316 stainless-steel, and epoxy finishes

Thern Winches & Cranes

Winona, MN USA | (507) 454-2996 | THERN.COM

MADE IN USA

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PS5FT20-A-0221

DeZURIK

BULLETIN
JUNE 2021

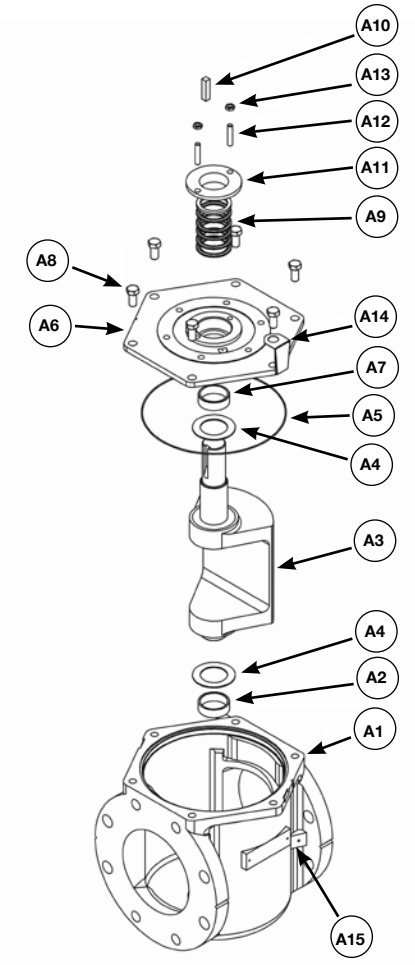
12.60-1B

DeZURIK PEF 100% PORT ECCENTRIC PLUG VALVES TECHNICAL SPECIFICATIONS

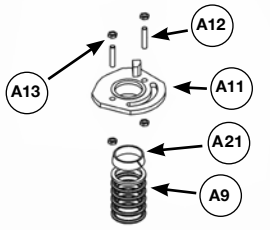
Materials of Construction

A1	Body	Cast Iron, ASTM A126, Class B
		Ductile Iron, ASTM A536
A2	Body Bearing	316L Stainless Steel. Sintered Stainless Steel
A3	Plug	Metal, (Ductile Iron, ASTM A536, Grade 65-45-12)
		CR Chloroprene
		NBR Acrylonitrile-Butadiene
		CIIR Chloro-Isobutene-Isoprene
A4	Grit Excluder	PTFE
A5	O-Ring	Non-asbestos filler in Styrene-Butadiene Rubber binder (NBR)
A6	Bonnet	Same as body material 3-24"; Ductile Iron ASTM A536 30" & 36"
A7	Bonnet Bearing	316L Stainless Steel, Sintered Stainless Steel
A8	Bonnet Screws	Carbon Steel, Class 8.8, Zinc Plated
		Stainless Steel, Grade A2, (18-8)
		Stainless Steel, Grade A4, (316)
A9	Packing	NBR Acrylonitrile-Butadiene, V-Type
		PTFE
A10	Key	Steel, ASTM A108
A11	Gland	Cast Iron, ASTM A126, Class B
A12	Gland Stud	Carbon Steel, Class 8.8, Zinc Plated
		Stainless Steel, Grade A2, (18-8)
		Stainless Steel, Grade A4, (316)
A13	Nut	Carbon Steel, Zinc Plated
		Stainless Steel, A2, (18-8)
		Stainless Steel, A4, (316)
A14	Caution Tag	Stainless Steel
A15	Pipe Plug (optional)	Galvanized Carbon Steel
A16	O-Ring	Non-asbestos filler in Styrene-Butadiene Rubber binder (NBR)
A17	Journal Cover	Cast Iron, ASTM A126, Class B
		Carbon Steel, ASTM A36 (Used with DI Body)
A18	Screw	Carbon Steel, Class 8.8, Zinc Plated
		Stainless Steel, Grade A2, (18-8)
		Stainless Steel, Grade A4, (316)
A21	Friction Cone	Ryton
A23	Pipe Plug (optional)	Galvanized Carbon Steel
		316 Stainless Steel

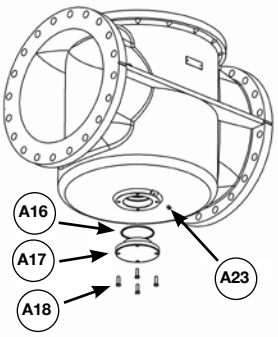
Flanged Construction
3" (80mm) and Larger



Valve Assembly
3" - 36" Valves



Gland Detail
3"-8" Valves
w/NT Nut Actuator



Journal Cover Detail
24" - 36" Valves

Applicable Standards

DeZURIK PEF 100% Port Eccentric Plug Valves are designed and/or tested to meet the following standards:

AWWA C517-16 Resilient-Seated Cast-Iron Eccentric Plug Valve.

ASME flange drilling conforms to ASME B16.1 Class 125, ASME B16.5 Class 150, and ASME B16.42 Class 150.
Mechanical-joint end connections conform to AWWA C111/A21.11.

MSS-SP91 guidelines for manual operation of valves.

Metric 10 bar flange drilling conforms to the NP 10 requirements of International Standard ISO 2084, to the 10 bar requirements of British Standard 4504, and to the NP 10 requirements of German Standard DIN 2532.

Metric 16 bar flange drilling conforms to the NP 16 requirements of International Standard ISO 2084, to the 16 bar requirements of British Standard 4504, and to the NP 16 requirements of German Standard DIN 2533.

British Table D flange drilling and Table E flange drilling conform to British Standard BS 10.

Japanese 10 bar flange drilling conforms to Japanese Industrial Standard JIS B 0203.

* Patent Pending

Valve Selection

Pressure Ratings

C.W.P. Non-Shock Working Pressure Ratings

Material	Valve Size	
	3–12" (80–300mm)	14–36" (350–900mm)
Cast Iron or Ductile Iron	175 psi 1210 kPa	150 psi 1035 kPa

* Cast Iron conforms to ASME B16.1 Class 125 Hydrostatic Test.

Cv/Kv Values

Valve Size	Cv* Kv*
3" 80mm	880 760
4" 100mm	1160 1000
5 & 6" 125 & 150mm	1960 1700
8" 200mm	3100 2680
10" 250mm	4540 3930
12" 300mm	6300 5450
14" 350mm	7560 6530
16" 400mm	9840 8500
18" 450mm	12500 10800
20" 500mm	15400 13300
24" 600mm	41400 35800
30" 750mm	65500 56600
36" 900mm	95100 82200

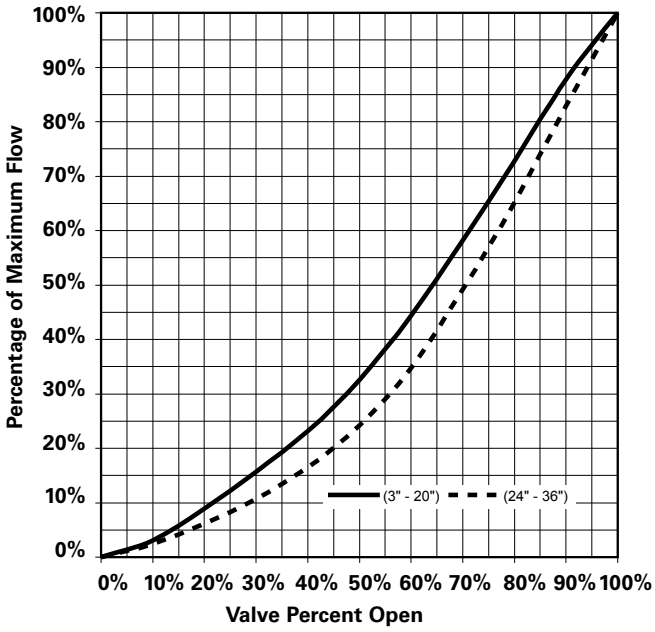
*Cv = Flow in GPM of water at 1 psi pressure drop.
*Kv = Flow in m^3/hr. of water at 100 kPa pressure drop.

Basic Valve Weights

Valve Size	Flanged lbs/kg	Mechanical Joint lbs/kg
3" 80mm	57 26	60 27
4" 100mm	72 33	82 37
5" 125mm	120 54	N/A
6" 150mm	120 54	138 63
8" 200mm	185 84	207 94
10" 250mm	264 120	296 134
12" 300mm	375 170	395 179
14" 350mm	555 252	595 270
16" 400mm	698 317	784 356
18" 450mm	1015 460	1091 495
20" 500mm	1340 608	1389 630
24" 600mm	3160 1433	2984 1354
30" 750mm	5305 2406	5145 2334
36" 900mm	8225 3731	8110 3679

Note: Basic Valve – is a fully assembled bare shaft valve

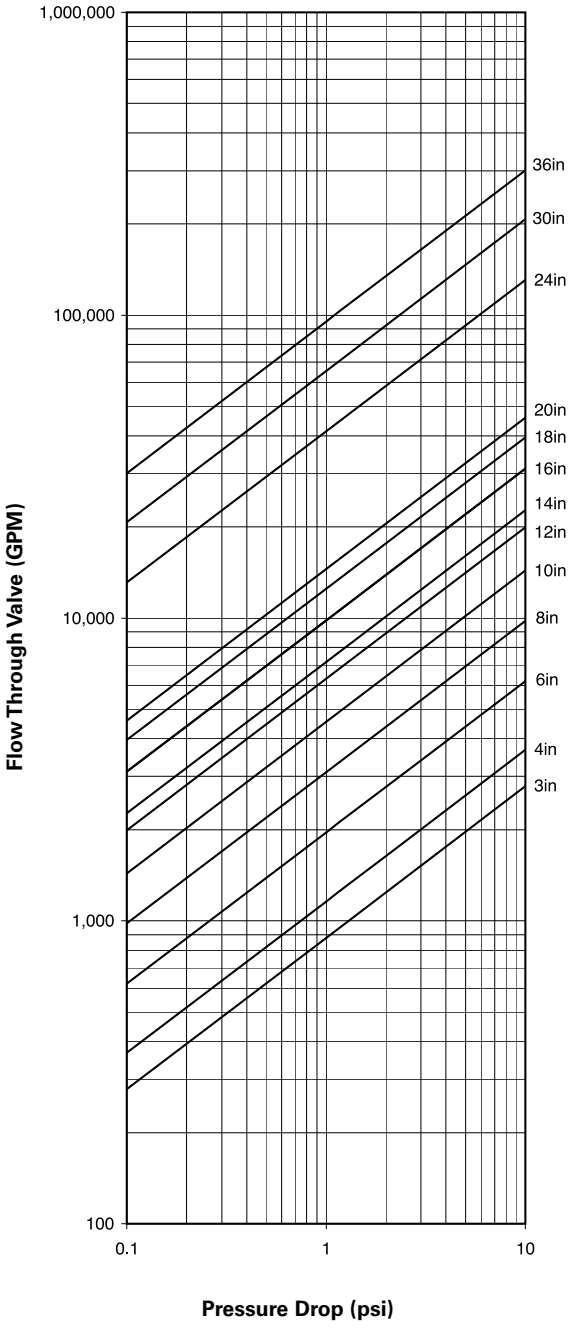
Flow Characteristic



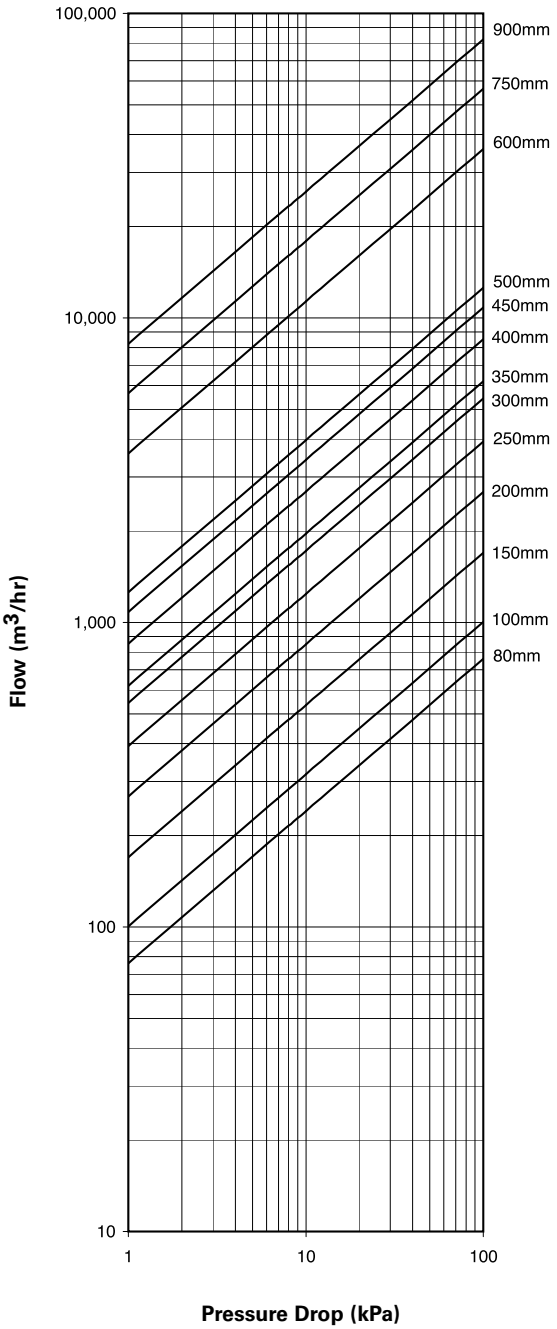
Valve Selection

Flow Charts

Valve Fully Open



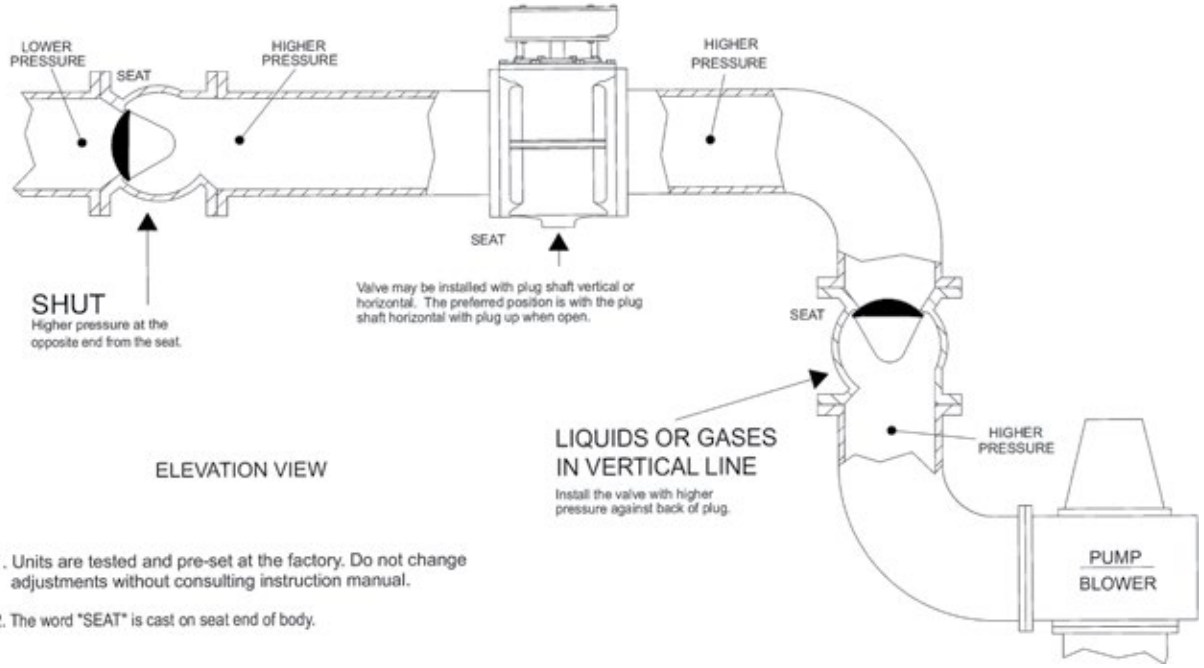
Valve Fully Open - Metric



Installation Instructions

Clean Liquids and Clean Gases

The proper installation of a DeZURIK PEF 100% Eccentric Plug Valve in clean liquids and gases applications is with the higher pressure against the end opposite the seat.

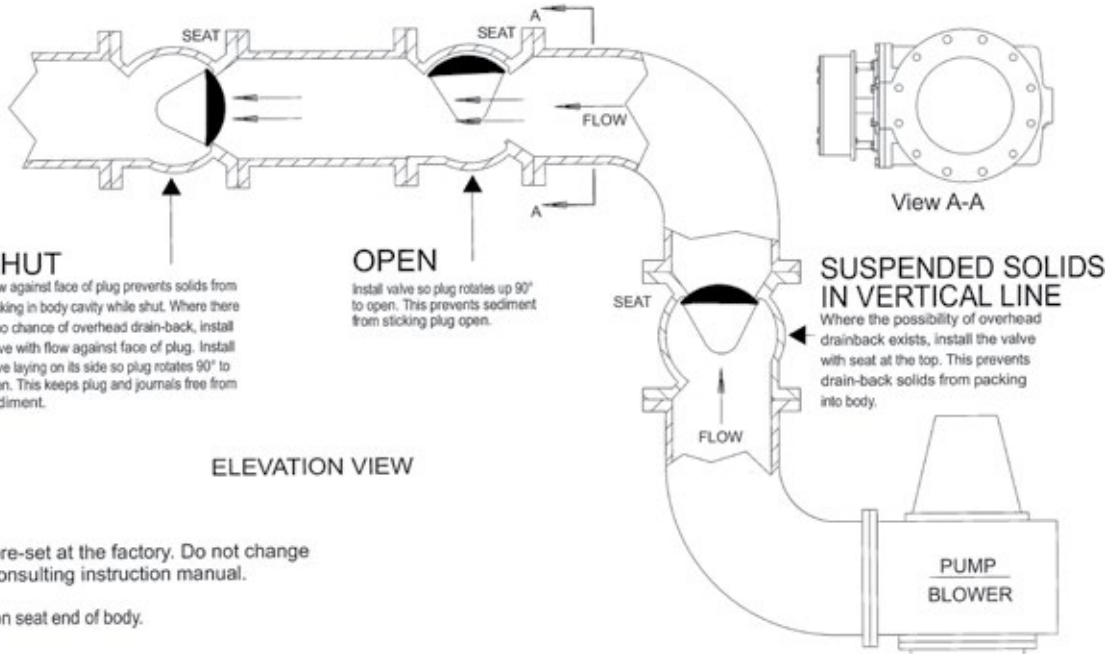


NOTE - 1. Units are tested and pre-set at the factory. Do not change adjustments without consulting instruction manual.

2. The word "SEAT" is cast on seat end of body.

Liquids with Suspended Solids and Dirty Gases

The proper installation of a DeZURIK PEF 100% Eccentric Plug Valve in suspended solids applications such as raw sewage is critical to prevent solids from packing into the valve body, restricting the plug movement. This can be accomplished by installing the valve with the flow against the face of the plug in the closed position and the valve on its side with the plug rotating to the top of the pipeline in the open position.
For pump isolation service, install the discharge valve with the seat downstream from the pump and the plug rotating to the top of the pipeline in the open position.



NOTE - 1. Units are tested and pre-set at the factory. Do not change adjustments without consulting instruction manual.

2. The word "SEAT" is cast on seat end of body.

Ordering

To order, simply complete the valve order code from information shown. An ordering example is shown for your reference.

Valve Style
Give valve style code as follows:

PEF	=	100% Port Eccentric Plug

Valve Size
Give valve size code as follows:

3	=	3"	(80mm)	14	=	14"	(350mm)
4	=	4"	(100mm)	16	=	16"	(400mm)
5	=	5"	(125mm)	18	=	18"	(450mm)
6	=	6"	(150mm)	20	=	20"	(500mm)
8	=	8"	(200mm)	24	=	24"	(600mm)
10	=	10"	(250mm)	30	=	30"	(750mm)
12	=	12"	(300mm)	36	=	36"	(900mm)

End Connection
Give end connection code as follows:

F1	=	Flanged, ANSI Class 125/150
F110	=	Flanged, ANSI Class 150, DIN 10 or B54504/10
F116	=	Flanged, ANSI Class 150, DIN 16 or B54504/16
F1D	=	Flanged, ANSI Class 150, BS Table D
F1E	=	Flanged, ANSI Class 150, BS Table E
F1J1	=	Flanged, ANSI Class 150, JIS Drilling
MJ	=	Mechanical Joint (Not Available on 5")

Body Material
Give body material code as follows:

CI	=	Cast Iron
DI	=	Ductile Iron

Note: The limiting factor in valve selection is the lowest temperature limit of the packing or seat.

Packing
Give packing code as follows:

NBR	=	Acrylonitrile-Butadiene V-Type Multiple V-Ring -20 to 250°F (-29 to 121°C)
T	=	PTFE -20 to 450°F (-29 to 232°C)

Plug Facing
Give plug facing code as follows:
Standard facings:

CR	=	Chloroprene (RS 16/17) -20 to 180°F (-29 to 83°C)
CIIR	=	Chloro-Isobutene Isoprene (RS55/56) -20 to 250°F (-29 to 121°C)
NBR	=	Acrylonitrile-Butadiene (RS24/25) -20 to 180°F (-29 to 83°C)

Options

AIS	=	Valves conform to H.R. 3547 Consolidated Appropriations Act, 2014 Section 436
BAA	=	Buy American Act
CMC	=	Certificate of Material Conformance
DST	=	Dry Seat Test
DTR	=	DeZURIK Standard Certified Production Hydrostatic Shell & Seat Test Report
PD	=	1/4" Pipe Tap Downstream
PU	=	1/4" Pipe Tap Upstream
PDU	=	1/4" Pipe Tap Downstream & Upstream
ST3	=	Pennsylvania Steel Procurement Act
GL	=	Glass Lining 4-24" (Ductile Iron Body Material with CR & NBR plug facings only)
GR	=	Grease Fittings in Body & Bonnet (Flanged Valves only) not available with ENK extension
TB	=	Certified Seat Leak Test Both Directions per AWWA C517
TD	=	Certified Seat Leak Test Direct Pressure per AWWA C517
TR	=	Certified Seat Leak Test Reverse Pressure per AWWA C517

Ordering Example:
PEF,8,F1,CI,NBR,CR*GS-6A-HD8

Manual Actuators

Pressure Ratings

Direct shutoff pressure differentials for nut or lever actuated valves must not exceed the limits shown below. If valves must seal higher pressure, use gear actuators. Gear or powered actuators are recommended on 6" (150mm) and larger valves as well as on applications where pipeline velocities are high and where sudden valve closure may cause water hammer. Valves for gas service must be furnished with gear or cylinder actuator.

2" Square Nut (NT)

Furnished as standard on 3-8" (80-200mm) valves. Must be ordered to use VB, ENLVA, EF, LVA, CHA, LVF, and WRT. To order, add code NT to basic valve code.

Ordering Example:
PEF,4,F1,CI,NBR,CR*NT

Nut Actuators, Direct Pressure

Valve Size	Max. Shutoff Pressure Differential psi/kPa	
	40 Lb Lever Pull	80 Lb Lever Pull
3" 75mm	125 850	175 1200
4" 100mm	25 170	125 800
5" 125mm	25 170	50 340
6" 150mm	25 170	50 340
8" 200mm	N/A	**75 500

** Exceeds AWWA C517 Shaft Torque Limits

Nut Actuators, Reverse Pressure

Valve Size	Max. Shutoff Pressure Differential psi/kPa	
	40 Lb Lever Pull	80 Lb Lever Pull
3" 75mm	25 170	175 1200
4" 100mm	N/A	50 340
5" 125mm	N/A	25 170
6" 150mm	N/A	25 170
8" 200mm	N/A	**25 170

Manual Actuator Accessories

Adjustable Memory Stop

All 3–8" (80-200mm) lever actuated valves are furnished with an adjustable, open position memory stop as standard. Adjustment of the stop to the desired open position allows the valve to be closed and reopened to the same throttling position.

Lever (LVA)

For use with NT actuators on 3-8" (80-200mm) valves. Lever must be ordered separately.

Order Code	Size
ACC*LVA-3	3" (80mm)
ACC*LVA-4	4" (100mm)
ACC*LVA-5	5" (125mm)
ACC*LVA-6	6" (150mm)
ACC*LVA-8	8" (200mm)

Ordering Example:
ACC*LVA-4

Stainless Steel Bolting

Specify bolting requirements by giving code SB18 for 18-8 Stainless Steel or SB16 for 316 Stainless Steel.

Ordering Example:
PEF,8,FI,CI,NBR,CR*GS-6A-HD8,SB16

Chain Handle (CHA)

For use on 3-8" (80-200mm) valves with NT Nut. Chain Handle must be ordered separately by giving code ACC*CHA followed by a dash and valve size.

Order Code	Size
ACC*CHA-3	3" (80mm)
ACC*CHA-4	4" (100mm)
ACC*CHA-5	5" (125mm)
ACC*CHA-6	6" (150mm)
ACC*CHA-8	8" (200mm)

Ordering Example:
ACC*CHA-4

Chain (CN) for Chain Handle or Chainwheel Actuator

Order as a separate item by giving code per chart. Specify number of feet required and number of pieces.

Order Code	Description
ACC*CN102	Standard 3/16" Coil
ACC*CN103	Galvanized 3/16" Coil
ACC*CN104	316 Stainless Steel 3/16" Coil

Ordering Example:
ACC*CN102
Chain 1 piece 10 feet long.

Manual Gear Actuators

The G-Series and MG manual actuators construction are totally enclosed and sealed, protecting moving parts from damage or corrosion. Continual lubrication is not required for operational ease. Heavy duty, corrosion-resistant actuator bearings provide lasting, easy valve operation and overall reliability. Rugged actuator castings, gears and shafts also add to reliability by assuring permanent alignment of moving parts for smooth operation.

To order, add the appropriate actuator code from the sizing tables to the valve order code. Order codes in charts are for weatherproof nut actuator. For Buriable Actuator, change GS to GB or MG to MGB. Buriable actuators have ductile iron gear sector, completely enclosed mounting bracket and actuator cover.

Manual Gear with Nut

Direct Pressure, Resilient Plug, Metal Seat

Valve Size	Order Code	Max. Shutoff Pressure Differential psi/kPa
3-12" 80-300mm	GS-6A-N	175 1210
14 & 16" 350 & 400mm	GS-12A-N	150 1030
18" 450mm	GS-12A-N	125 860
	MG-WR1L-N	150 1030
20" 500mm	GS-12A-N	75 520
	MG-WR1L-N	150 1030
24" 600mm	MG-WR1L-N	75 520
	MG-WR3L-N	150 1030
30" 750mm	MG-WR3L-N	75 520
	MG-WR4L-N	150 1030
36" 900mm	MG-WR5L-N	150 1030

Reverse Pressure, Resilient Plug, Metal Seat

Valve Size	Order Code	Max. Shutoff Pressure Differential psi/kPa
3-12" 80-300mm	GS-6A-N	175 1210
14 & 16" 350 & 400mm	GS-12A-N	150 1030
18" 450mm	GS-12A-N	75 520
	MG-WR1L-N	150 1030
20" 500mm	GS-12A-N	50 340
	MG-WR1L-N	100 690
	MG-WR3L-N	150 1030
24" 600mm	MG-WR1L-N	25 170
	MG-WR3L-N	125 860
	MG-WR4L-N	150 1030
30" 750mm	MG-WR3L-N	75 520
	MG-WR4L-N	150 1030
36" 900mm	MG-WR4L-N	50 340
	MG-WR5L-N	150 1030

Handwheel Actuators

Direct Pressure, Resilient Plug, Metal Seat

Valve Size	Order Code	Max. Shutoff Pressure Differential psi/kPa
3-8" 80-200mm	GS-6A-HD8**	175 1210
10" 250mm	GS-6A-HD8**	75 520
	GS-6A-HD12	125 860
	GS-12A-HD12	175 1210
12" 300mm	GS-6A-HD12	75 520
	GS-12A-HD12	125 860
	GS-12A-HD16	175 1210
14" 350mm	GS-12A-HD12	50 340
	GS-12A-HD16	100 690
	GS-12A-HD20	150 1030
16" 400mm	GS-12A-HD16	50 340
	GS-12A-HD20	75 520
	GS-12A-HD24*	150 1030
18" 450mm	GS-12A-HD20	25 170
	GS-12A-HD24*	50 340
	GS-12A-HD30*	125 860
	MG-WR1L-HD24	150 1030
20" 500mm	GS-12A-HD24*	25 170
	GS-12A-HD30*	75 520
	MG-WR1L-HD32*	150 1030
24" 600mm	MG-WR1L-HD32*	75 520
	MG-WR3L-HD32*	150 1030
30" 750mm	MG-WR4L-HD36*	150 1030
36" 900mm	MG-WR5L-HD32	150 1030

* Mounting positions 90 and 270° not available.
** If FSDIR or FSDIU is required use HD12 in place of HD8.

ORDERING EXAMPLE:
PEF,8,F1,CI,NBR,CR*GS-6A-HD8

Reverse Pressure, Resilient Plug, Metal Seat

Valve Size	Order Code	Max. Shutoff Pressure Differential psi/kPa
3-6" 80-150mm	GS-6A-HD8**	175 1210
8" 200mm	GS-6A-HD8**	125 860
	GS-6A-HD12	175 1210
10" 250mm	GS-6A-HD12	75 520
	GS-12A-HD12	150 1030
	GS-12A-HD16	175 1210
12" 300mm	GS-6A-HD12	25 170
	GS-12A-HD12	75 520
	GS-12A-HD16	150 1030
	GS-12A-HD20	175 1210
14" 350mm	GS-12A-HD12	25 170
	GS-12A-HD16	75 520
	GS-12A-HD20	100 690
	GS-12A-HD24*	150 1030
16" 400mm	GS-12A-HD16	25 170
	GS-12A-HD20	50 340
	GS-12A-HD24*	125 860
	MG-WR1L-HD24	150 1030
18" 450mm	GS-12A-HD20	25 170
	GS-12A-HD24*	50 340
	GS-12A-HD30*	75 520
	MG-WR1L-HD32*	150 1030
20" 500mm	GS-12A-HD30*	50 340
	MG-WR1L-HD32*	100 690
	MG-WR3L-HD32*	150 1030
24" 600mm	MG-WR1L-HD32*	25 170
	MG-WR3L-HD36*	125 860
	MG-WR4L-HD32*	150 1030
30" 750mm	MG-WR3L-HD36*	75 520
	MG-WR4L-HD36*	150 1030
36" 900mm	MG-WR4L-HD32*	50 340
	MG-WR5L-HD32	150 1030

Chainwheel Actuators

Direct Pressure, Resilient Plug, Metal Seat

Valve Size	Order Code	Max. Shutoff Pressure Differential psi/kPa
3-8" 80-200mm	GS-6A-CW8	175 1210
10" 250mm	GS-6A-CW8	75 520
	GS-6A-CW12	125 860
	GS-12A-CW12	175 1210
12" 300mm	GS-6A-CW12	75 520
	GS-12A-CW12	125 860
	GS-12A-CW20	175 1210
14" 350mm	GS-12A-CW12	50 340
	GS-12A-CW20	150 1030
16" 400mm	GS-12A-CW20	75 520
	GS-12A-CW24*	150 1030
18" 450mm	GS-12A-CW20	25 170
	GS-12A-CW24*	50 340
	GS-12A-CW30*	125 860
	MG-WR1L-CW24	150 1030
20" 500mm	GS-12A-CW24*	25 170
	GS-12A-CW30*	75 520
	MG-WR1L-CW30	150 1030
24" 600mm	MG-WR1L-CW30*	75 520
	MG-WR3L-CW30*	150 1030
30" 750mm	MG-WR3L-CW30*	75 520
	MG-WR4L-CW30*	125 860
	MG-WR5L-CW30*	150 1030
36" 900mm	MG-WR5L-CW30*	150 1030

* Mounting positions 90° and 270° not available.

ORDERING EXAMPLE:
PEF,36,F1,CI,NBR,CR*MG-WR5L-CW30

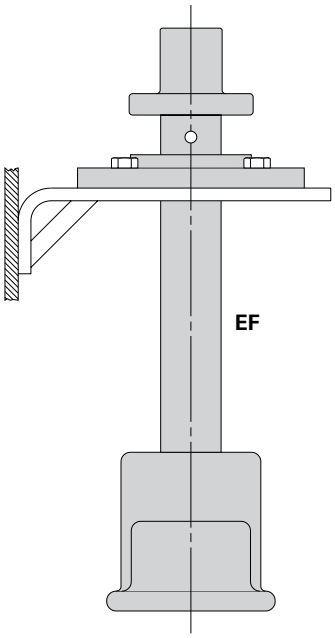
Reverse Pressure, Resilient Plug, Metal Seat

Valve Size	Order Code	Max. Shutoff Pressure Differential psi/kPa
3-6" 80-150mm	GS-6A-CW8	175 1210
8" 200mm	GS-6A-CW8	125 860
	GS-6A-CW12	175 1210
10" 250mm	GS-6A-CW12	75 520
	GS-12A-CW12	150 1030
	GS-12A-CW20	175 1210
12" 300mm	GS-6A-CW12	25 170
	GS-12A-CW12	50 340
	GS-12A-CW20	175 1210
14" 350mm	GS-12A-CW12	25 170
	GS-12A-CW20	100 690
	GS-12A-CW24*	150 1030
16" 400mm	GS-12A-CW20	50 340
	GS-12A-CW24*	125 860
	MG-WR1L-CW20	150 1030
18" 450mm	GS-12A-CW20	25 170
	GS-12A-CW24*	50 340
	GS-12A-CW30*	75 520
	MG-WR1L-CW30*	150 1030
20" 500mm	GS-12A-CW30*	50 340
	MG-WR1L-CW30*	100 690
	MG-WR3L-CW30*	150 1030
24" 600mm	MG-WR1L-CW30*	25 170
	MG-WR3L-CW30*	75 520
	MG-WR4L-CW30*	150 1030
30" 750mm	MG-WR3L-CW30*	50 340
	MG-WR4L-CW30*	125 860
	MG-WR5L-CW30*	150 1030
36" 900mm	MG-WR4L-CW30*	50 340
	MG-WR5L-CW36*	150 1030

Manual Actuator Extensions

EFA Extension for Nut Actuated Valves

For use on 3–8" (80–200mm) valves. Includes extension pipe, bearing plate and couplings. Valves for use with EFA extensions must be ordered with NT actuators. Order Extension Assembly as a separate item. Specify length from centerline of valve to bottom of bearing plate. When ordering for use with FS101 Floor Stand, give dimension from centerline of valve to base of floor stand.

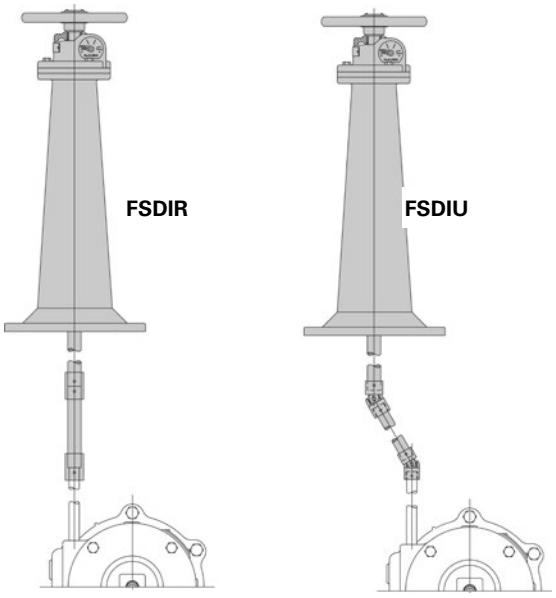


Ordering Example:
ACC*EF-4
Centerline of valve to bottom of bearing plate 110" (2795mm).

FSDIR and FSDIU Floor Stand for Gear Actuated Valves

For use on 3–36" (80–900mm) handwheel actuated valves. Includes floor stand, couplings, extension rod, and handwheel mounted on floor stand, with dial position indicator. Order floor stand by adding FSDIR or FSDIU to the valve actuator code.

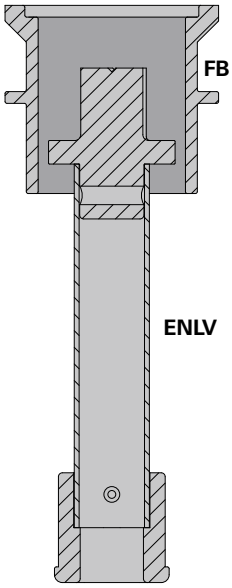
Ordering Example:
PEF,6,F1,NBR,CR*,GS-6A-HD12,FSDIR



Centerline of valve to base of floor stand 90" (2400mm).

FB Floor Box for Nut Actuated Valves

Includes floor box and cover only. Can be used with valves having operating nut mounted on the valve or extended with top of nut 2" (50mm) from top of floor box. All valves for use with floor boxes are Tee Wrench actuated (order separately). Order extended operating nuts (ENLVA) separately. Floor box requires NT actuators (order seperately). Order floor boxes separately. Specify ACC*FB and depth of floor box in 1" (25mm) increments from 6–18" (150–455mm). Standard depth is 6" (150mm).



Ordering Example:
ACC*FB6

ENLVA Extended Nut for Nut Actuated Valves

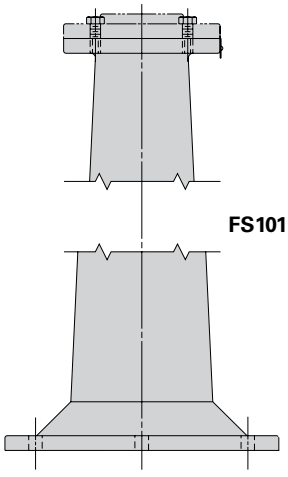
For use on 3–8" (80–200mm) nut actuated valves. Includes operating nut, couplings and pipe. Valves for use with ENLVA Extended Nut must be ordered with NT actuators. All valves for use with ENLVA are Tee Wrench activated (order seperately). Order as a separate item by giving ACC*ENLVA followed by a dash and valve size. Give required length from centerline of valve to top of nut. Note dimensions in table.

Valve Size	Minimum Dimension C/L of Valve to Top of Nut
3" 80mm	16.19" 411mm
4" 100mm	16.69" 424mm
5–6" 125–150mm	19.12" 486mm
8" 2000mm	22.38" 570mm

Ordering Example:
ACC*ENLVA-8
Centerline of valve to top of valve nut 126" (3200mm).

FS101 Floor Stand for Nut Actuated Valves

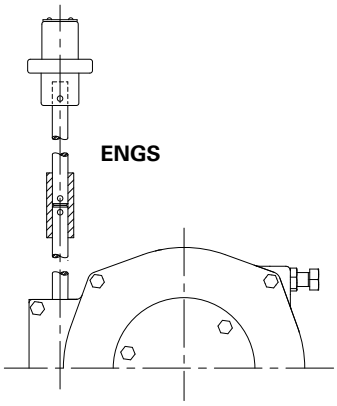
For use on 3–8" (80–200mm) nut actuated valves. Includes floor stand only. For extension pipe and fittings, order EFA Extension Assembly. Lever actuated valves for use with EFA Extension and FS101 Floor Stand must be ordered NT actuators. Order floor stands as a separate item.



Ordering Example:
ACC*FS101

Manual Actuator Extensions

ENGS Extended 2" (50mm) Nut for Gear Actuated Valves



The ENGS is for use on 3–36" (80–900mm) PEF Eccentric Plug Valves with G-Series and MG Handwheel Manual Actuator. Includes couplings, extension rod and 2" (50mm) square nut. If used with valve box, top of nut must be 6" (150mm) below grade. If used with floor box, top of nut must be 2" (50mm) below floor surface. Handwheels are not furnished on actuators ordered with ENGS. Order by adding ENGS to the valve actuator code. Specify required length from centerline of valve to top of nut as second line information.

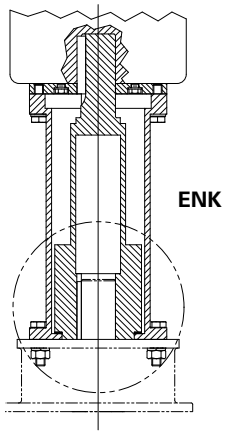
Ordering Example:
PEF,6,F1,CI,NBR,CR*GB-6A-N,ENGS
Centerline of valve to top of nut 72" (1830mm).

WRT Tee Wrench

For use on 3–8" (80–200mm) nut or gear actuated valves with 2" (50mm) nut. Valves for Tee Wrench operation must be ordered with NT actuator. Contact factory to order Tee Wrenches.

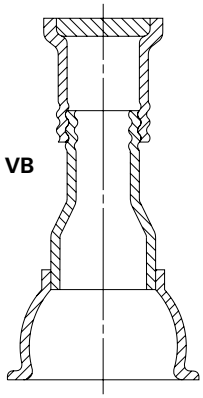
ENK Neck Extension for G-Series Actuators

Valves for buried or submerged service can be furnished with handwheel or cylinder actuators extended above the ground. Furnish service information for recommendations.



VB Valve Box for Nut Actuated Valves

Valve boxes for use on 3–8" (80–200mm) valves require a nut (NT) or extended nut (ENLV) type actuator. Valve boxes for use on 3–36" (80–900mm) valves with a gear actuator (GB) require a 2" (50mm) Nut (N) or extended 2" (50mm) Nut (ENGS) actuator. Extended nut must be 6" (150mm) from the top of the valve box. Contact factory to order.



Cylinder Actuators

G-Series cylinder actuators feature a rack and pinion design for larger size rotary valves where constant torque capability throughout the stroke is required. They are engineered for high flow, high cycle applications. The G-Series line of actuators provides long service life and features a rugged, heavy cast gear sector. The cast iron actuator housing is sealed to prevent the entry of dirt, moisture and corrosive contaminants. The G-Series actuator also features adjustable position stops, rugged cylinder construction and corrosion-resistant bearings.

Double-Acting Cylinder Actuators

To order double-acting cylinder actuators for PEF Eccentric Plug Valves, add the order code from the proper table to the valve order code. Actuators can be mounted at 90 degree increments clockwise from standard. Specify mounting positions other than standard as second line information. When using hydraulic supply media, specify type.

Double-Acting Cylinder Actuators

Direct Pressure, Resilient Plug, Metal Seat
50 psi (340 kPa) Air Supply

Valve Size	Actuator Code	Maximum Shutoff
3 & 4" 80 & 100mm	GS-6A-PC4*	175 1210
	GS-6A-PC6	175 1210
5 & 6" 125 & 150mm	GS-6A-PC6	125 860
	GS-6A-PC8	175 1210
8" 200mm	GS-6A-PC6	50 340
	GS-6A-PC8	150 1030
	GS-12A-PC6	175 1210
10" 250mm	GS-6A-PC8	150 1030
	GS-12A-PC6	100 690
	GS-12A-PC8	175 1210
12" 300mm	GS-6A-PC8	25 170
	GS-12A-PC8	100 690
	GS-12A-PC10	175 1210
14" 350mm	GS-12A-PC8	50 340
	GS-12A-PC10	125 860
	O/A	150 1030
16" 400mm	GS-12A-PC10	50 340
	O/A	150 1030
18" 450mm	GS-12A-PC10	25 170
	O/A	150 1030
20-36" 500-900mm	O/A	150 1030

* PC4 Cylinder not recommended with positioner

Reverse Pressure, Resilient Plug, Metal Seat
50 psi (340 kPa) Air Supply

Valve Size	Actuator Code	Maximum Shutoff
3" 80mm	C4*	175 1210
	GS-6A-PC6*	175 1210
4" 100mm	GS-6A-PC4*	100 690
	GS-6A-PC6	175 1210
5 & 6" 125 & 150mm	GS-6A-PC6	100 690
	GS-6A-PC8	175 1210
8" 200mm	GS-6A-PC6	25 170
	GS-6A-PC8	100 690
	GS-12A-PC6	125 860
	GS-12A-PC8	175 1210
10" 250mm	GS-6A-PC8	25 170
	GS-12A-PC6	50 340
	GS-12A-PC8	125 860
	GS-12A-PC10	175 1210
12" 300mm	GS-12A-PC8	75 520
	GS-12A-PC10	150 1030
14" 350mm	GS-12A-PC8	25 170
	GS-12A-PC10	75 520
	O/A	150 1030
16" 400mm	GS-12A-PC10	25 170
	O/A	150 1030
18" 450mm	O/A	150 1030
20-36" 500-900mm	O/A	150 1030

* PC4 Cylinder not recommended with positioner

Double-Acting Cylinder Actuators

Direct Pressure, Resilient Plug, Metal Seat 80 psi (550 kPa) Air Supply

Valve Size	Actuator Code	Maximum Shutoff
3 & 4" 80 & 100mm	GS-6A-PC4*	175 1210
	GS-6A-PC6	175 1210
5 & 6" 125 & 150mm	GS-6A-PC4*	75 250
	GS-6A-PC6	175 1210
8" 200mm	GS-6A-PC6	125 860
	GS-6A-PC8	175 1210
10" 250mm	GS-6A-PC6	50 340
	GS-6A-PC8	125 860
	GS-12A-PC6	150 1030
	GS-12A-PC8	175 210
12" 300mm	GS-6A-PC6	25 170
	GS-6A-PC8	75 520
	GS-12A-PC6	100 690
	GS-12A-PC8	175 1210
14" 350mm	GS-12A-PC8	125 860
	GS-12A-PC10	150 1030
16" 400mm	GS-12A-PC8	50 340
	GS-12A-PC10	125 860
	O/A	150 1030
18" 450mm	GS-12A-PC8	25 170
	GS-12A-PC10	50 340
	O/A	150 1030
20" 500mm	GS-12A-PC10	25 170
	O/A	150 1030
24-36" 600-900mm	O/A	150 1030

* PC4 Cylinder not recommended with positioner

Reverse Pressure, Resilient Plug, Metal Seat 80 psi (550 kPa) Air Supply

Valve Size	Actuator Code	Maximum Shutoff
3 & 4" 80 & 100mm	GS-6A-PC4*	175 1210
	GS-6A-PC6	175 1210
5 & 6" 125 & 150mm	GS-6A-PC4*	25 170
	GS-6A-PC6	175 1210
8" 200mm	GS-6A-PC6	75 520
	GS-6A-PC8	175 1210
10" 250mm	GS-6A-PC6	25 170
	GS-6A-PC8	75 520
	GS-12A-PC6	125 860
	GS-12A-PC8	175 1210
12" 300mm	GS-6A-PC8	25 170
	GS-12A-PC6	50 340
	GS-12A-PC8	150 1030
	GS-12A-PC10	175 1210
14" 350mm	GS-12A-PC8	75 520
	GS-12A-PC10	150 1030
16" 400mm	GS-12A-PC8	25 170
	GS-12A-PC10	100 690
	O/A	150 1030
18" 450mm	GS-12A-PC10	25 170
	O/A	150 1030
20" 500mm	GS-12A-PC10	25 170
	O/A	150 1030
24-36" 600-900mm	O/A	150 1030

* PC4 Cylinder not recommended with positioner

Spring-Return Cylinder Actuators

To order spring-return cylinder actuators, add the order code from the proper chart to the basic valve order code. Specify actuator action as second line information.

Actuators can be mounted at 90 degree increments clockwise from standard. Specify mounting positions other than standard as second line information.

Resilient Plug, Metal Seat, Direct Pressure or Reverse Pressure Less Than 25 psi (170 kPa)

Spring-To-Close (Air-To-Open) Air Supply, 50 psi (340 kPa)

Valve Size	Order Code	Maximum Shutoff Pressure Differential
3 & 4" 80 & 100mm	GS-6A-SC8	125 860
5 & 6" 125 & 150mm	GS-6A-SC8	25 170
8" 200mm	GS-12A-SC10	50 340

Spring-To-Open (Air-To-Close) Air Supply, 50 psi (340 kPa)

Valve Size	Order Code	Maximum Shutoff Pressure Differential
3 & 4" 80 & 100mm	GS-6A-SC6-A	175 1210
5 & 6" 125 & 150mm	GS-6A-SC6-A	25 170
	GS-6A-SC8-A	100 690
8" 200mm	GS-12A-SC10-A	175 1210
10" 250mm	GS-12A-SC10-A	125 860
12" 300mm	GS-12A-SC10-A	75 520

Note: Contact Application Engineering for actuator sizing when reverse pressures are greater than 25 psi (170 kPa). Furnish service conditions.

Ordering Example:
PEF,6,F1,CI,NBR,CR*GS-6A-SC8-A

Accessories – Cylinder Actuators

Positioners

For use on all cylinder actuators. Refer to DeZURIK's website for more information.

3- & 4-Way Solenoid Valve (3V & 4V)

For use on cylinder actuators. To order solenoids, refer to bulletin 84.00-1.

4-Way Control Valve (CV)

For use on double-acting cylinder actuators. Order as a separate item by giving ACC* followed by appropriate 3-digit code from the table below. To order as part of a complete valve/actuator assembly, enter code from table below to the valve/actuator order code.

Pneumatic Actuators

Valve Size	NPT Size	Order Code
All Sizes	.25" 6.4mm	CV201

Hydraulic Actuators

Valve Size	NPT Size	Order Code
3-8" 80-200mm	.375" 9.5mm	CV202
10-36" 250-900mm	.5" 13mm	CV203

Ordering Example:
ACC*CV201 (separate item)
Ordering Example:
PEF,6,F1,CI,NBR,CR*GS-6A-PC6,CV201

Position Indicating Switches (SEH)

For use on G-Series Actuators. To order switches, refer to bulletin 83.00-1.

Air Filter Regulator (AFR2)

For use on all pneumatic actuators. To order, refer to bulletin 83.00-2.

Filter/Strainer (FH/FP)

Filter for pneumatic actuators, strainer for hydraulic actuators. Order as a separate item per table below (not mounted).

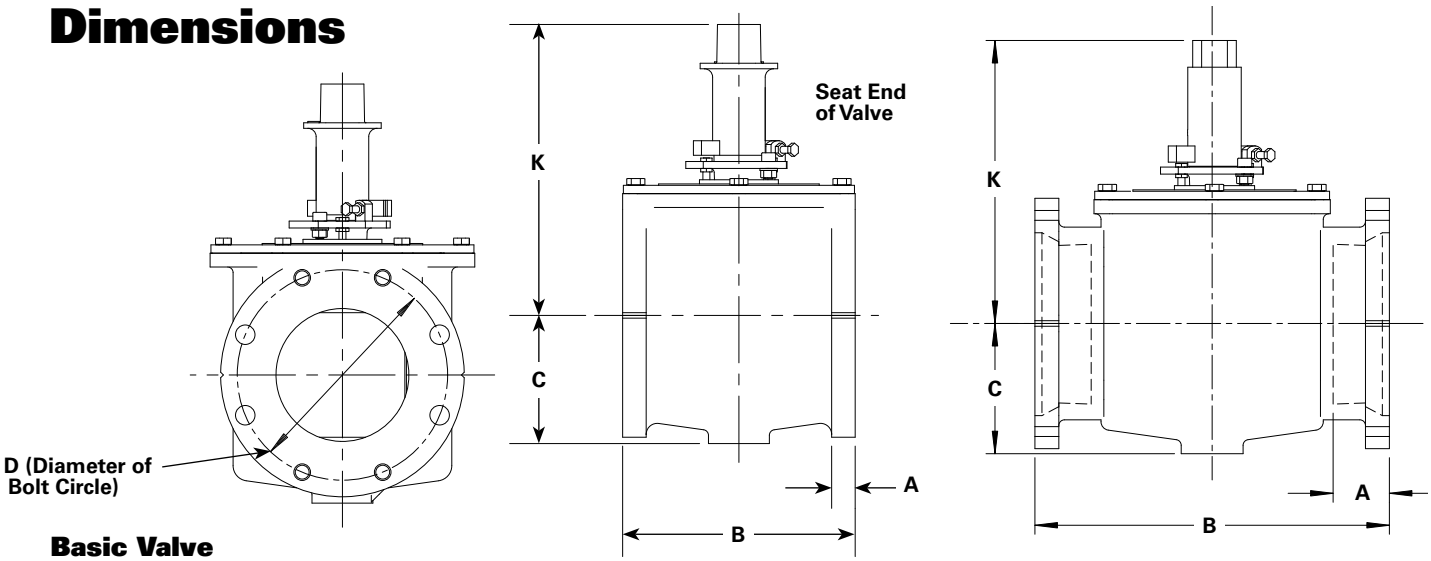
Description	Order Code
Pneumatic Filter	ACC*PCFP
Hydraulic Strainer	ACC*PCFH

Ordering Example:
ACC*PCFP

Electric Motors

DeZURIK offers a variety of electric motor actuators on PEF Eccentric Plug valves. When ordering, please specify valve function, installation location, line fluid, maximum fluid temperature, pipe connection, line size, normal and maximum working pressure, normal and maximum wide open valve flow, and flow range desired if throttling or modulating control.

Dimensions



Basic Valve

Valve Size	A		B		C	D
	Flanged	Mechanical Joint	Flanged	Mechanical Joint		Flanged
3" 80mm	0.83 21	2.50 63	8.00 203	11.50 292	3.56 90	6.00 152
4" 100mm	1.02 26	2.50 63	9.00 229	14.25 362	4.43 113	7.50 191
5 & 6" 125 & 150mm	1.04 26	2.50 63	10.50 267	15.75 400	5.79 147	5" (125mm): 8.50 216 6" (150mm): 9.50 241
8" 200mm	1.23 31	2.50 63	11.50 292	17.38 441	7.65 194	11.75 298
10" 250mm	1.30 33	2.50 63	13.00 330	19.38 492	9.19 233	14.25 362
12" 300mm	1.36 35	2.50 63	14.00 355	20.75 527	11.53 293	17.00 432
14" 350mm	1.50 38	3.50 89	17.00 431	24.50 622	12.06 306	18.75 476
16" 400mm	1.55 39	3.50 89	17.75 450	27.25 692	14.13 359	21.25 540
18" 450mm	1.68 43	3.50 89	21.50 546	29.25 743	15.57 395	22.75 578
20" 500mm	1.76 45	3.50 89	23.50 596	31.00 787	16.81 427	25.00 635
24" 600mm	2.06 52	3.50 89	42.00 1067	42.00 1067	19.31 490	29.50 749
30" 750mm	2.53 64	4.00 102	51.00 1295	51.00 1524	21.75 552	36.00 914
36" 900mm	2.78 71	4.00 102	60.00 1524	60.00 1524	26.38 670	42.75 1086

Inch
Millimeter

Nut Actuated Valves (NT) 3-8" (80-200mm)

Valve Size	K
3" 80mm	9.38 203
4" 100mm	9.88 219
5 & 6" 125 & 150mm	12.31 313
8" 200mm	15.56 395

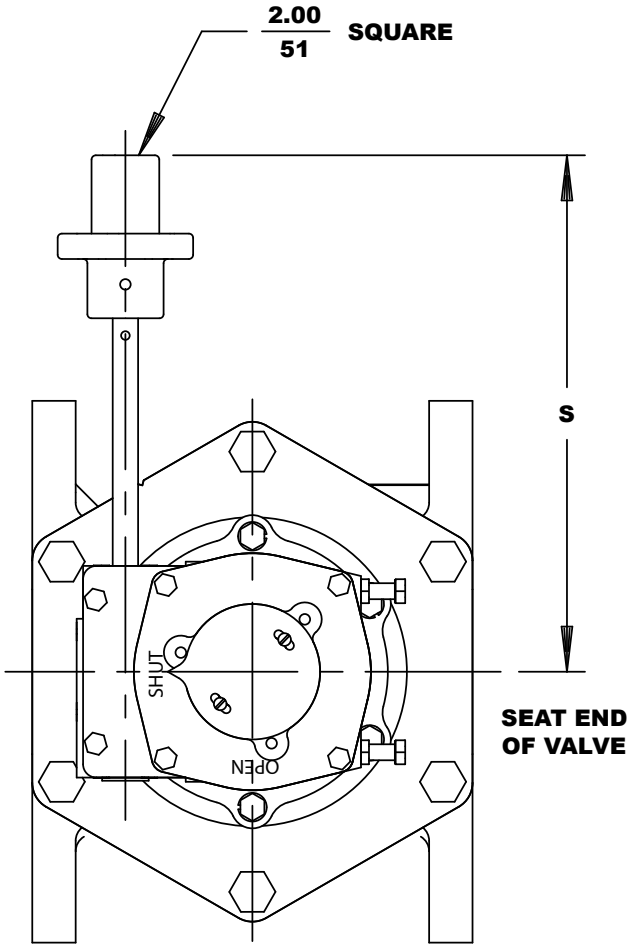
Inch
Millimeter

Note: All dimensions are subject to change without notice.
Request certified drawings for use in preparing piping layout.

Dimensions

Nut

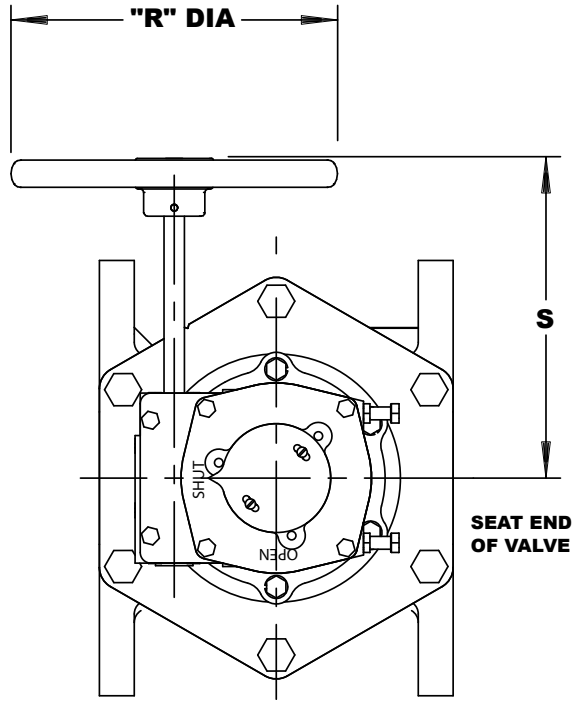
Valve Size	Actuator Code	K	L	S
3" 80mm	GS-6A-N	8.00 203	10.69 272	15.25 387
4" 100mm	GS-6A-N	8.62 219	11.31 287	15.25 387
5 & 6" 125 & 150mm	GS-6A-N	9.75 248	12.44 316	15.25 387
8" 200mm	GS-6A-N	12.09 307	14.78 375	15.25 387
10" 250mm	GS-6A-N	13.50 343	16.19 411	15.25 387
	GS-12A-N	14.88 378	17.62 500	16.69 424
12" 300mm	GS-6A-N	15.56 395	18.25 464	15.25 387
	GS-12A-N	16.94 430	19.69 500	16.69 424
14" 350mm	GS-12A-N	18.25 464	21.00 533	19.69 500
16" 400mm	GS-12A-N	19.69 500	22.44 570	19.69 500
18" 450mm	GS-12A-N	20.94 532	23.69 602	19.69 500
	MG-WR1L-N	23.31 592	26.75 679	14.34 364
20" 500mm	GS-12A-N	22.75 578	25.50 648	19.69 500
	MG-WR1L-N	25.12 638	28.56 725	14.34 364
	MG-WR3L-N	25.31 643	28.75 730	14.38 365
24" 600mm	MG-WR1L-N	28.50 642	31.94 811	14.34 364
	MG-WR3L-N	28.50 642	31.94 811	14.38 365
	MG-WR4L-N	30.88 784	34.31 871	20.50 521
30" 750mm	MG-WR3L-N	30.94 786	34.38 873	14.38 365
	MG-WR4L-N	33.31 846	36.75 933	20.50 521
36" 900mm	MG-WR4L-N	37.81 960	41.25 1048	20.50 521
	MG-WR5L-N	40.63 1032	44.13 1121	22.22 564

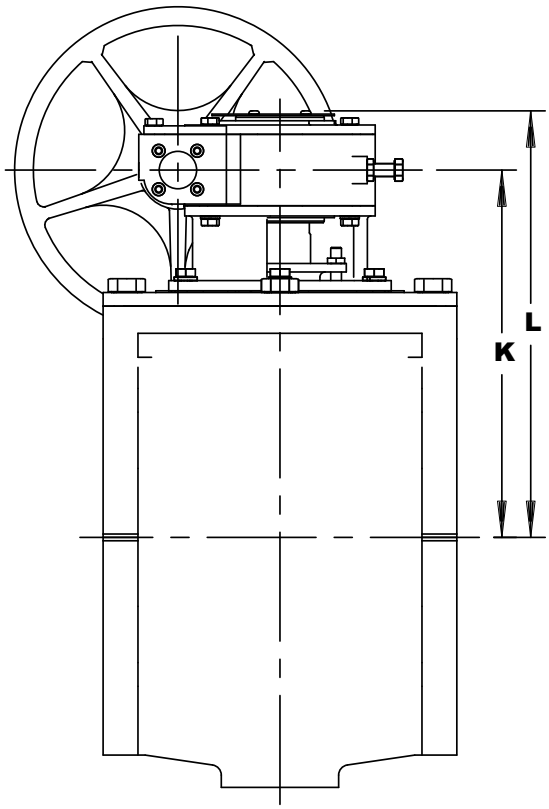


Dimensions

Handwheel Actuator

Valve Size	Actuator Code	K	L	R	S
3" 80mm	GS-6A-HD8	8.00 203	10.69 272	8.00 203	11.81 300
4" 100mm	GS-6A-HD8	8.62 219	11.31 287	8.00 203	11.81 300
5 & 6" 125 & 150mm	GS-6A-HD8	9.75 248	12.44 316	8.00 203	11.81 300
8" 200mm	GS-6A-HD8	12.09 307	14.78 375	8.00 203	11.81 300
	GS-6A-HD12	12.09 307	14.78 375	12.00 305	11.81 300
10" 250mm	GS-6A-HD8	13.50 343	16.19 411	8.00 203	11.81 300
	GS-6A-HD12	13.50 343	16.19 411	12.00 305	11.81 300
	GS-12A-HD12	14.88 378	17.62 500	12.00 305	15.12 384
	GS-12A-HD16	14.88 378	17.62 500	16.00 406	15.48 393
12" 300mm	GS-6A-HD12	15.56 395	18.25 464	12.00 305	11.81 300
	GS-12A-HD12	16.94 430	19.69 500	12.00 305	15.12 384
	GS-12A-HD16	16.94 430	19.69 500	16.00 406	15.48 393
	GS-12A-HD20	16.94 430	19.69 500	20.00 508	15.48 393
14" 350mm	GS-12A-HD12	18.25 464	21.00 533	12.00 305	18.12 460
	GS-12A-HD16	18.25 464	21.00 533	16.00 406	18.50 470
	GS-12A-HD20	18.25 464	21.00 533	20.00 508	18.50 470
	GS-12A-HD24	18.25 464	21.00 533	24.00 610	22.19 564
16" 400mm	GS-12A-HD16	19.69 500	22.44 570	16.00 406	18.50 470
	GS-12A-HD20	19.69 500	22.44 570	20.00 508	18.50 470
	GS-12A-HD24	19.69 500	22.44 570	24.00 610	22.19 564
	MG-WR1L-HD24	22.06 560	25.50 648	24.00 610	16.34 415
18" 450mm	GS-12A-HD20	20.94 532	23.69 602	20.00 508	18.50 470
	GS-12A-HD24	20.94 532	23.69 602	24.00 610	22.19 564
	GS-12A-HD30	20.94 532	23.69 602	30.00 762	23.69 602
	MG-WR1L-HD24	23.31 592	26.75 679	24.00 610	16.34 415
	MG-WR1L-HD32*	23.31 592	26.75 679	31.50 800	16.34 415
20" 500mm	GS-12A-HD24	22.75 578	25.50 648	24.00 610	22.19 564
	GS-12A-HD30	22.75 578	25.50 648	30.00 762	23.69 602
	MG-WR1L-HD32*	25.12 638	28.56 725	31.50 800	16.34 415
	MG-WR3L-HD32*	25.31 643	28.75 730	31.50 800	16.60 422
24" 600mm	MG-WR1L-HD32*	28.50 724	31.94 811	31.50 800	16.34 415
	MG-WR3L-HD32*	28.50 724	31.94 811	31.50 800	26.38 670
	MG-WR4L-HD32*	30.88 784	34.31 871	31.50 800	22.69 576
30" 750mm	MG-WR3L-HD32*	30.94 786	34.38 873	31.50 800	26.38 670
	MG-WR4L-HD36*	33.31 846	36.75 933	36.00 914	26.76 680
36" 900mm	MG-WR4L-HD32*	37.81 960	41.25 1048	31.50 800	22.69 576
	MG-WR5L-HD32	40.63 1032	44.21 1123	31.50 800	33.67 855





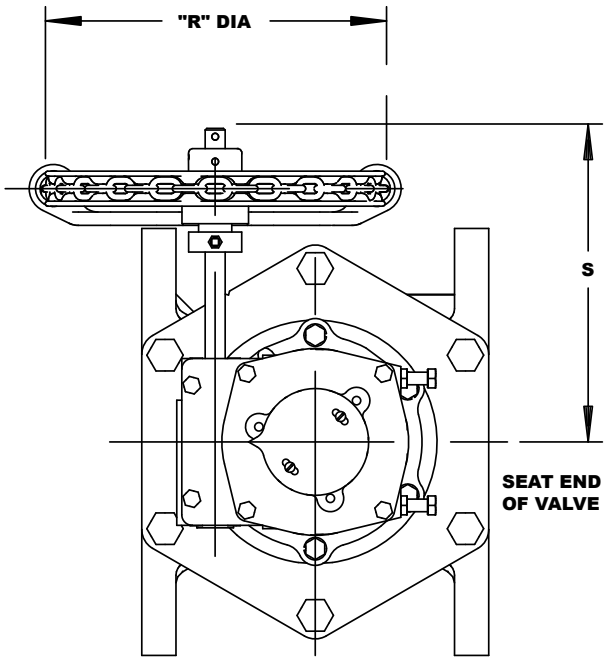
* Mounting positions 90° and 270° not available.

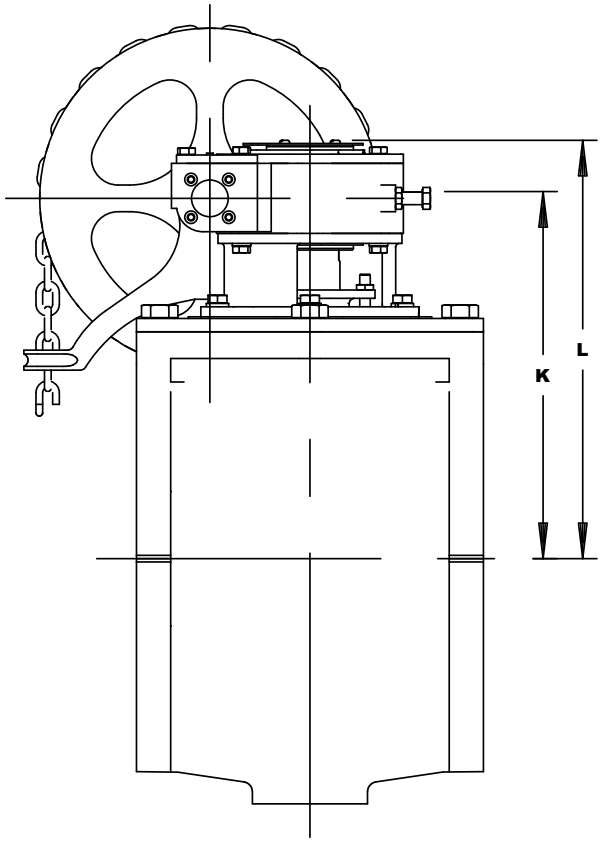
Dimensions

Chainwheel Actuator

Valve Size	Actuator Code	K	L	R	S
3" 80mm	GS-6A-CW8	8.00 203	10.69 272	8.00 203	11.75 298
4" 100mm	GS-6A-CW8	8.62 219	11.31 287	8.00 203	11.75 298
5 & 6" 125 & 150mm	GS-6A-CW8	9.75 248	12.44 316	8.00 203	11.75 298
8" 200mm	GS-6A-CW8	12.09 307	14.78 375	8.00 203	11.75 298
	GS-6A-CW12	12.09 307	14.78 375	12.00 305	11.75 298
10" 250mm	GS-6A-CW8	13.50 343	16.19 411	8.00 203	11.75 298
	GS-6A-CW12	13.50 343	16.19 411	12.00 305	11.75 298
	GS-12A-CW12	14.88 378	17.62 500	12.00 305	14.38 365
	GS-12A-CW20	14.88 378	17.62 500	20.00 508	14.38 365
12" 300mm	GS-6A-CW12	15.56 395	18.25 464	12.00 305	11.75 298
	GS-12A-CW12	16.94 430	19.69 500	12.00 305	14.38 365
	GS-12A-CW20	16.94 430	19.69 500	20.00 508	14.38 365
14" 350mm	GS-12A-CW12	18.25 464	21.00 533	12.00 305	17.38 441
	GS-12A-CW20	18.25 464	21.00 533	20.00 508	17.38 441
	GS-12A-CW24	18.25 464	21.00 533	24.00 610	17.38 441
16" 400mm	GS-12A-CW20	19.69 500	22.44 570	20.00 508	17.38 441
	GS-12A-CW24	19.69 500	22.44 570	24.00 610	17.38 441
	MG-WR1L-CW20	22.06 560	25.50 648	20.06 510	21.38 543
18" 450mm	GS-12A-CW20	20.94 532	23.69 602	20.00 508	17.38 441
	GS-12A-CW24	20.94 532	23.69 602	24.00 610	17.38 441
	GS-12A-CW30	20.94 532	23.69 602	30.00 762	17.38 441
	MG-WR1L-CW24	23.31 592	26.75 679	24.44 621	21.38 543
	MG-WR1L-CW30*	23.31 592	26.75 679	29.75 756	21.38 543
20" 500mm	GS-12A-CW24	22.75 578	25.50 648	24.00 610	17.38 441
	GS-12A-CW30	22.75 578	25.50 648	30.00 762	17.38 441
	MG-WR1L-CW30	25.12 638	28.56 725	29.75 756	21.38 543
	MG-WR3L-CW30*	25.31 643	28.75 730	29.75 756	21.38 543
24" 600mm	MG-WR1L-CW30*	28.50 724	31.94 811	29.75 756	21.38 543
	MG-WR3L-CW30*	28.50 724	31.94 811	29.75 756	29.00 737
	MG-WR4L-CW30*	30.86 784	34.31 871	29.75 756	34.88 886
30" 750mm	MG-WR3L-CW30*	30.44 773	33.88 861	29.75 756	29.00 737
	MG-WR4L-CW30*	33.31 846	36.75 933	29.75 756	34.88 886
	MG-WR5L-CW30*	36.12 917	39.68 1008	29.75 756	33.66 855
36" 900mm	MG-WR5L-CW30*	40.65 1033	44.21 1123	29.75 756	33.66 855

* Mounting positions 90° and 270° not available.

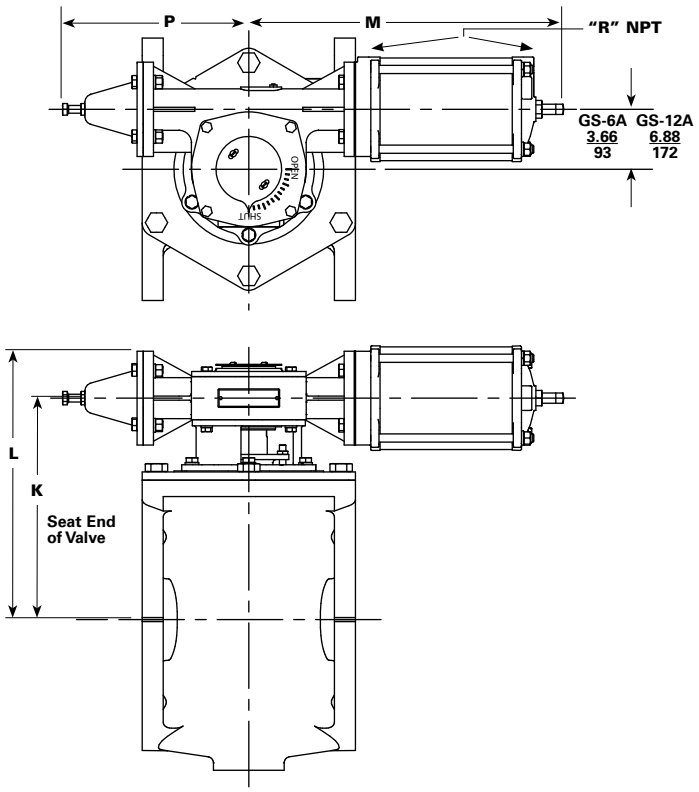




Dimensions

Double-Acting Cylinder Actuated Valves

Valve Size	Actuator Code	K	L	M	N	R (NPT)	P
3" 80mm	GS-6A-PC4	8.00 203	10.88 276	18.88 480	2.19 56	¼	11.35 288
	GS-6A-PC6	8.00 203	10.88 276	19.12 486	3.19 81	½	11.35 288
4" 100mm	GS-6A-PC4	8.62 219	11.50 292	18.88 480	2.19 56	¼	11.35 288
	GS-6A-PC6	8.62 219	11.50 292	19.12 486	3.19 81	½	11.35 288
5 & 6" 125 & 150mm	GS-6A-PC4	9.75 248	12.62 321	18.88 480	2.19 56	¼	11.35 288
	GS-6A-PC6	9.75 248	12.62 321	19.12 486	3.19 81	½	11.35 288
	GS-6A-PC8	9.75 248	12.62 321	19.38 492	4.56 116	½	11.35 288
8" 200mm	GS-6A-PC6	12.09 307	14.97 380	19.12 486	3.19 81	½	11.35 288
	GS-6A-PC8	12.09 307	14.97 380	19.38 492	4.56 116	½	11.35 288
	GS-12A-PC6	12.78 325	16.41 417	30.56 776	3.25 83	½	17.50 445
	GS-12A-PC8	12.78 325	16.41 417	30.88 784	4.25 108	½	17.50 445
10" 250mm	GS-6A-PC6	13.50 343	16.38 416	19.12 486	3.19 81	½	11.35 288
	GS-6A-PC8	13.50 343	16.38 416	19.38 492	4.56 116	½	11.35 288
	GS-12A-PC6	14.19 360	17.81 452	30.56 776	3.25 83	½	17.50 445
	GS-12A-PC8	14.19 360	17.81 452	30.88 784	4.25 108	½	17.50 445
12" 300mm	GS-6A-PC6	15.56 395	18.44 468	19.12 486	3.19 81	½	11.35 288
	GS-6A-PC8	15.56 395	18.44 468	19.38 492	4.56 116	½	11.35 288
	GS-12A-PC6	16.25 413	19.88 505	30.56 776	3.25 83	½	17.50 445
	GS-12A-PC8	16.25 413	19.88 505	30.88 784	4.25 108	½	17.50 445
	GS-12A-PC10	16.25 413	19.88 505	31.00 787	5.25 133	¾	17.50 445
14" 350mm	GS-12A-PC6	17.56 446	21.19 538	30.56 776	3.25 83	½	17.50 445
	GS-12A-PC8	17.56 446	21.19 538	30.88 784	4.25 108	½	17.50 445
	GS-12A-PC10	17.56 446	21.19 538	31.00 787	5.25 133	¾	17.50 445
16" 400mm	GS-12A-PC6	19.00 483	22.62 575	30.56 776	3.25 83	½	17.50 445
	GS-12A-PC8	19.00 483	22.62 575	30.88 784	4.25 108	½	17.50 445
	GS-12A-PC10	19.00 483	22.62 575	31.00 787	5.25 133	¾	17.50 445
18" 450mm	GS-12A-PC8	20.25 514	23.88 607	30.88 784	4.25 108	½	17.50 445
	GS-12A-PC10	20.25 514	23.88 607	31.00 787	5.25 133	¾	17.50 445
20" 500mm	GS-12A-PC10	22.06 560	25.69 653	31.00 787	5.25 133	¾	17.50 445



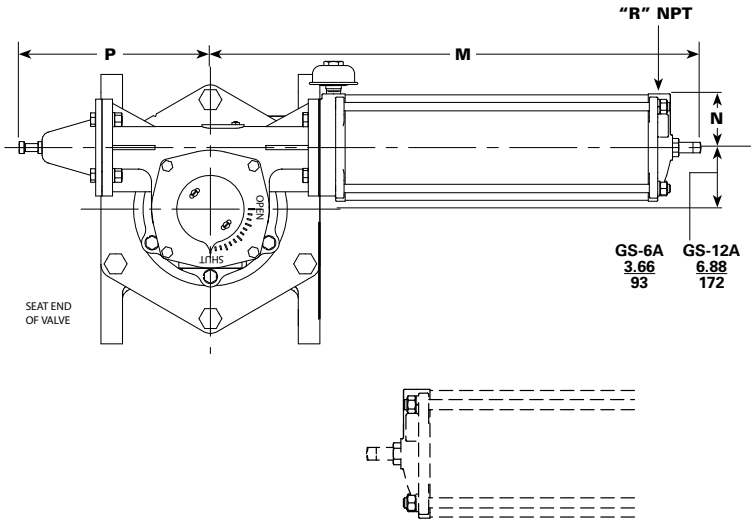
Inch
Millimeter

Note: All dimensions are subject to change without notice.
Request certified drawings for use in preparing piping layout.

Dimensions

Spring-Return Cylinder Actuated Valves

Valve Size	Actuator Code	K	L	M	N	R (NPT)	P
3" 80mm	GS-6A-SC6	8.00 203	10.88 276	30.00 762	3.19 81	1/2	11.35 298
	GS-6A-SC8	8.00 203	10.88 276	32.19 818	4.56 116	1/2	11.35 298
4" 100mm	GS-6A-SC6	8.62 219	11.50 292	30.00 762	3.19 81	1/2	11.35 298
	GS-6A-SC8	8.62 219	11.50 292	32.19 818	4.56 116	1/2	11.35 298
5 & 6" 125 & 150mm	GS-6A-SC6	9.75 248	12.62 321	30.00 762	3.19 81	1/2	11.35 298
	GS-6A-SC8	9.75 248	12.62 321	32.19 818	4.56 116	1/2	11.35 298
8" 200mm	GS-6A-SC6	12.09 307	14.97 380	30.00 762	3.19 81	1/2	11.35 298
	GS-6A-SC8	12.09 307	14.97 380	32.19 818	4.56 116	1/2	11.35 298
	GS-12A-SC10	12.78 325	16.41 417	46.00 1168	5.25 133	3/4	17.50 445
10" 250mm	GS-12A-SC10	14.19 360	17.81 452	46.00 1168	5.25 133	3/4	17.50 445
12" 300mm	GS-12A-SC10	16.25 413	19.88 505	46.00 1168	5.25 133	3/4	17.50 445



DRAWING SHOWS ACTUATOR IN SPRING TO CLOSE POSITION. DASHED LINES SHOW ACTUATOR IN SPRING TO OPEN POSITION.

Inch
Millimeter

Note: All dimensions are subject to change without notice.
Request certified drawings for use in preparing piping layout.

Sales and Service

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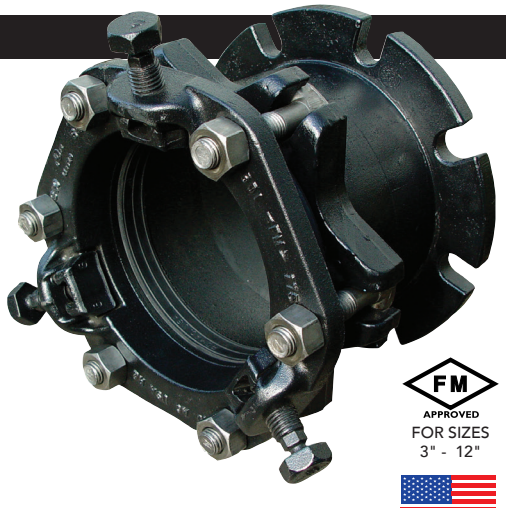
ROMAC INDUSTRIES, INC. RFCA (RESTRAINED FLANGED COUPLING ADAPTER)

MATERIAL SPECIFICATIONS



FLANGE BODY: Ductile (nodular) iron, meeting or exceeding ASTM A536, Grade 65-45-12. Flange meets the dimensional requirements of ANSI Class 125 and 150 bolt circles. See page 10-6 for optional filler flange.

GASKETS: Compounded for water and sewer service in accordance with ASTM D2000 (Flange gasket is o-ring style, NBR standard). Other compounds available for petroleum, chemical, or high temperature service.

GLAND: Romac RomaGrip™. See page 8-6.

RESTRAINING BOLTS: 7/8 –9 roll thread, Ductile (nodular) iron, meeting or exceeding ASTM A536.

RESTRAINING LUGS: Ductile (nodular) iron, meeting or exceeding ASTM A536. Heat treated using a proprietary process.

LUG LOCATORS: Polyurethane, a thermal plastic.

GLAND BOLTS AND NUTS: High strength low alloy steel T-head bolt. National coarse rolled thread and heavy hex nut. Steel meets AWWA C111 composition specifications. Stainless steel bolts and nuts available on request, this option will be provided as all thread rod and two nuts.

COATINGS: Shop coat applied to cast parts for corrosion protection in transit. Romacoat – FB body and Romabond Polyester RG available on request.

USE: Ductile Iron Pipe 3" - 24", cast iron pipe 3"- 24" (same O.D.'s as ductile iron) and IPS size steel pipe 3" - 12" a minimum thickness per ASTM A53 std. weight class pipe. For use on 3" IPS size std. steel pipe, 3" - MJ x IPS Transition Gasket is required. Please contact Romac to purchase this gasket.

FM APPROVED FOR SIZES 3" - 12"

MADE IN U.S.A.

NSF Certified to NSF/ANSI 61 & 372 — NSF61 certified upon request.

MEETS AWWA C219

NOM. PIPE SIZE	GASKET RANGE	LENGTH	GLAND BOLTS QTY: SIZE	CATALOG NUMBER	LIST PRICE SHOPCOAT w/STD. B&N	LIST PRICE SHOPCOAT w/304 SS B&N	LIST PRICE FUSION EPOXY w/STD. B&N	LIST PRICE FUSION EPOXY w/304 SS B&N	WEIGHT (lbs.)
3"	3.96*	8.00"	4: ⅝" x 3"	RFCA - 3.96	$380.15	$411.80	$431.52	$463.14	21
4"	4.50-4.80	9.00"	4: ¾" x 3½"	RFCA -4.80	479.14	547.35	543.31	611.55	29
6"	6.63-6.90	9.25"	6: ¾" x 3½"	RFCA - 6.90	627.31	729.65	714.22	816.55	43
8"	8.63-9.05	9.25"	6: ¾" x 3½"	RFCA - 9.05	824.84	927.19	929.99	1,032.33	57
10"	10.75-11.10	10.25"	8: ¾" x 3½"	RFCA - 11.10	1,521.01	1,590.91	1,750.33	1,886.81	83
12"	12.75-13.20	10.25"	8: ¾" x 3½"	RFCA - 13.20	1,652.16	1,788.61	1,933.71	2,070.18	106
14"	15.30	11.70"	10: ¾" x 4½"	RFCA -15.30	2,307.29	2,476.09	2,667.31	2,836.09	164
16"	17.40	11.70"	12: ¾" x 4½"	RFCA -17.40	3,204.13	3,405.34	3,685.83	3,887.01	195
18"	19.50	11.80"	12: ¾" x 4½"	RFCA -19.50	3,737.29	3,946.22	4,278.77	4,487.71	217
20"	21.60	11.80"	14: ¾" x 4½"	RFCA - 21.60	4,128.75	4,375.07	4,812.03	5,058.34	240
24"	25.80	12.00"	16: ¾" x 5"	RFCA - 25.80	5,008.67	5,318.69	5,782.20	6,092.24	305

Some initial axial movement may occur in lug style restraints as the lugs seat. Movement is directly related to the size of the piping system and the system pressure. In general terms movement of approximately 0.25" can be expected in restraints under 16". For larger sizes, movement of approximately 0.4" may be seen. If this is critical to your application please contact Romac Engineering for additional information.

*For use on 3" IPS size std. steel pipe, 3" - MJ x IPS Transition Gasket is required. Please contact Romac to purchase this gasket.

TO ORDER: Specify catalog number.

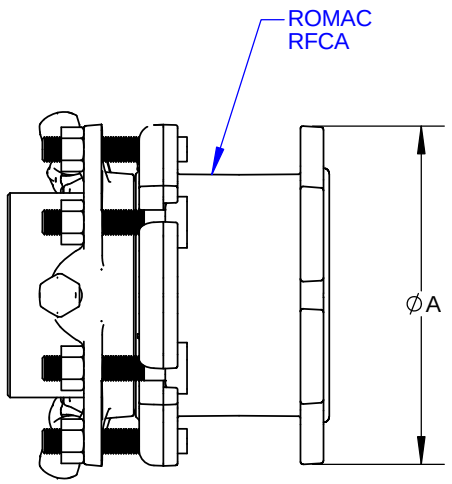
EXAMPLE: For a 12" RFCA Order: **RFCA - 13.20**

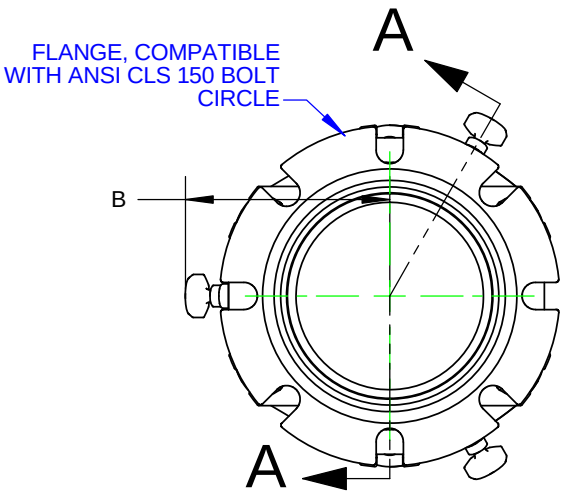
NOTE: 3" - 12" special Romac gasket works on both steel and D.I. O.D.s.

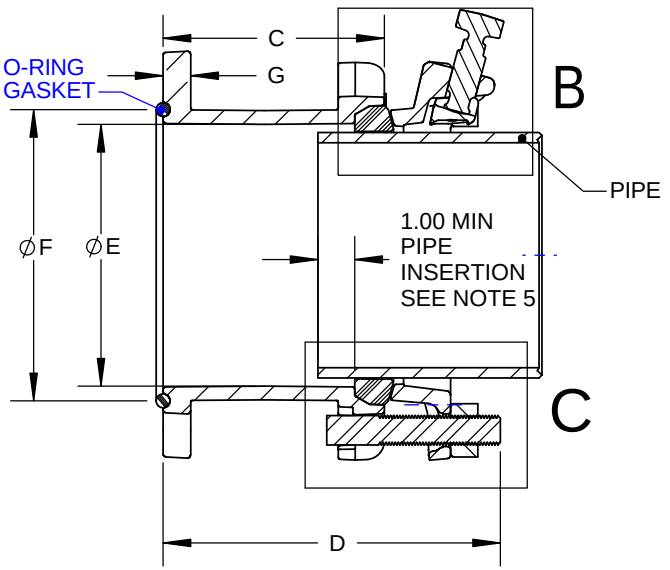
Not for use on PVC, HDPE pipe or plain-end mechanical joint fittings.
For applications on PVC pipe, see page 4-8.

B2111-A

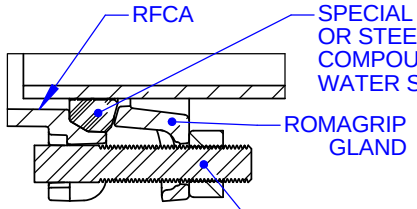
REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
0	INITIAL RELEASE	22/NOV/02	NST III
1	"E" DIM. INCORRECT. ADDED NOTE 5 AND 1.0" MIN DIM.	27/JAN/03	NST III
2	ADDED PVC PIPE TO NOTE 4	18/APR/03	NST III
3	ADDED DIM. "F"	3/JUN/03	NST III
4	ADDED DIM. "G"	7/MAY/04	NST III
5	REVISED NOTE 1 TO CLARIFY APPLICATION OF NSF RATING	10/MAY/11	SH



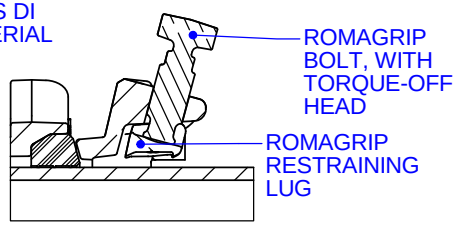




SECTION A-A



DETAIL C
SCALE 1 : 4



DETAIL B
SCALE 1 : 4

NOTES:

1. COATING: ROMAC SHOPCOAT PAINT. NSF 61 CERTIFIED FUSION BONDED EPOXY AVAILABLE.
2. PRESSURE RATING: SEE TABLE.
3. DUCTILE IRON AND T-BOLTS PER AWWA C111. STAINLESS STEEL FASTENERS AVAILABLE.
4. FOR USE WITH DUCTILE IRON PIPE, STEEL PIPE. AND PVC PIPE (A ROMAC RG-PVC RESTRAINER IS REQUIRED WHEN USED ON PVC)
5. THE MINIMUM PIPE INSERTION IS 1.0" AT BOTH ZERO DEFLECTION AND AT MAXIMUM DEFLECTION VALUES (SEE TABLE).

NOM. SIZE	DEFL. (deg)	FLG OD A	RG MAX B	T BOLTS QTY	T BOLTS SIZE	T BOLTS LGTH	PRESS. (PSIG) WKG	PRESS. (PSIG) TEST	DIMENSIONS C	D	E	F	G	WGT, LBS
3	2.0	7.5	5.3	4	5/8"	3.75	275	412.5	4.88	8.00	4.04	4.66	0.75	21
4	3.5	9.0	5.7	4	3/4"	4.25	275	412.5	5.50	9.00	5.00	6.00	0.75	29
6	3.5	11.0	6.7	6	3/4"	4.25	275	412.5	6.00	9.25	7.10	7.90	0.75	40
8	3.3	13.5	7.8	6	3/4"	4.25	275	412.5	6.00	9.25	9.25	10.00	0.75	53
10	3.0	16.0	8.8	8	3/4"	4.25	275	412.5	6.75	10.25	11.30	12.40	0.75	82
12	3.0	19.0	9.9	8	3/4"	4.25	275	412.5	6.81	10.25	13.40	15.12	0.81	110

UNLESS OTHERWISE SPECIFIED

DIMENSIONS ARE IN INCHES

TOLERANCES ARE ON:
1 PL DECIMALS ± .060
2 PL DECIMALS ± .030
3 PL DECIMALS ± .010
ANGLES ± 1°
FRACTIONS ± 1/64

SIGNATURES

DRAWN

CHECKED

APPROVAL ORGANIZATIONS
ENGINEERING

ROMAC INDUSTRIES INC.,
BOTHELL, WA

TITLE
3"-12" RFCA
RESTRAINED FLANGE
COUPLING ADAPTER

DWG. NO.	SIZE	REV. NO.	SCALE	SHEET
B2111-A	A	5	NTS	1 OF 1

DRAWING FILE NAME: B2111 RFCA 3-12 | MODEL NAME: 6 inch DJ assembly | CONFIGURATION NAME:Default | AUTHOR: NST III

FLANGED FITTINGS

Import Ductile and Cast Iron Fittings - C110

Metalfit

U.S. PIPE

A QUIKRETE® COMPANY

PIPE

FABRICATION

RESTRAINED JOINTS

FITTINGS

GASKETS

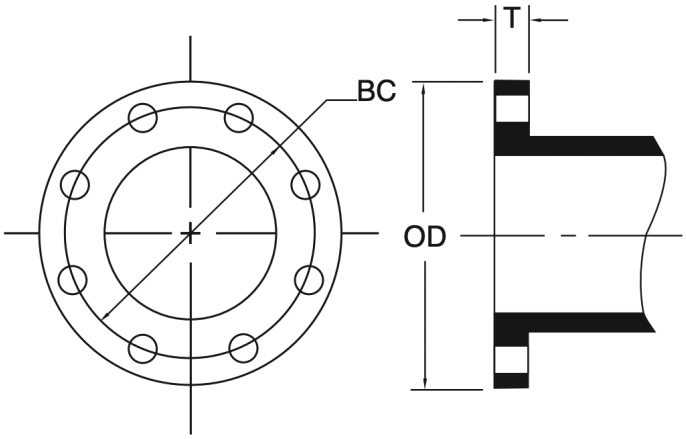
COATINGS & LININGS

CONTENTS

Flanged Joint Dimensions
ANSI/AWWA C110/A21.10

SIZE	OD	BC	T	HOLE DIA.	BOLT SIZE	NO. of BOLTS
2	6.00	4.75	0.62	0.75	5/8 x 2-1/4	4
2-1/2	7.00	5.50	0.69	0.75	5/8 x 2-1/2	4
3	7.50	6.00	0.75	0.75	5/8 x 2-1/2	4
4	9.00	7.50	0.94	0.75	5/8 x 3	8
5	10.00	8.50	0.94	0.88	3/4 x 3	8
6	11.00	9.50	1.00	0.88	3/4 x 3-1/2	8
8	13.50	11.75	1.12	0.88	3/4 x 3-1/2	8
10	16.00	14.25	1.19	1.00	7/8 x 4	12
12	19.00	17.00	1.25	1.00	7/8 x 4	12
14	21.00	18.75	1.38	1.12	1 x 4-1/2	12
16	23.50	21.25	1.44	1.12	1 x 4-1/2	16
18	25.00	22.75	1.56	1.25	1-1/8 x 5	16
20	27.50	25.00	1.69	1.25	1-1/8 x 5	20
24	32.00	29.50	1.88	1.37	1-1/4 x 5-1/2	20
30	38.75	36.00	2.12	1.37	1-1/4 x 6-1/2	28
36	46.00	42.75	2.38	1.62	1-1/2 x 7	32
42	53.00	49.50	2.62	1.62	1-1/2 x 7-1/2	36
48	59.50	56.00	2.75	1.62	1-1/2 x 8	44

Dimensions in inches. Weights in pounds.

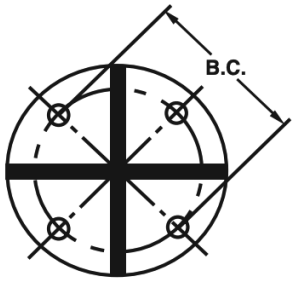


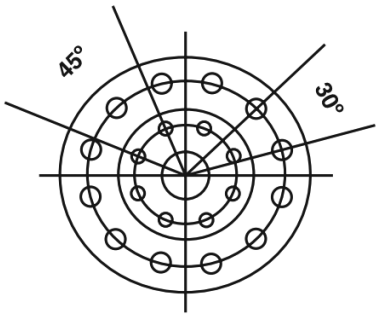
Note:
Flange working pressure rating 250psi, 4" through 24". Flange working pressure can be 350psi with special gasket, i.e Flange TYTE gasket. Flange facing and drilling patter match ASME B16.1, Class 125. Flanges 30-48" have 250psi working pressure rating.

Base Dimensions

SIZE	BC	HOLE DIA.	NO. of BOLTS
3	3.88	0.62	4
4	4.75	0.75	4
6	5.50	0.75	4
8	7.50	0.75	4
10	7.50	0.75	4
12	9.50	0.88	4
14	9.50	0.88	4
16	9.50	0.88	4
18	11.75	0.88	4
20	11.75	0.88	4
24	11.75	0.88	4
30	14.25	1.00	4
36	17.00	1.00	4
42	21.25	1.12	4
48	22.75	1.25	4

Dimensions in inches.





Installation Note:
Drilling Templates are furnished in multiples of four. Standard flanged reducers, with a different number of holes in each flange, will have only two centerlines which are common to the drilling templates of both flanges.

SPECIFICATIONS
ENGINEERING SUBMITTAL DATA

ENGINEERING SUBMITTAL DATA

U.S. Pipe / Metalfit manufactures Ductile Iron and Gray Cast Iron Flanged Fittings for both Waterworks and Industrial applications and conforms fully to the required industry standards. Flanged Fittings are manufactured in accordance with ANSI/AWWA C110/A21.10 and ANSI B16.1, Class 125. Metalfit 2″ through 12″ Flanged Fittings are also listed by Underwriters Laboratories for fire protection service. Additionally, **Metalfit hydrostatically tests every fitting to ensure quality casting integrity**. These tests are performed at 1.5 times the rated working pressure.

MECHANICAL PROPERTIES	WATER WORKING PRESSURE
Cast Iron to ASTM A48 Minimum Tensile Strength 31,000 psi	**Gray Cast Iron** 2″ – 12″ CI Fittings rated 250 psi 14″ – 42″ CI Fittings rated 150 psi
Ductile Iron to ASTM A 536 Minimum Tensile Strength 70,000 psi Yield Strength 50,000 psi Elongation 5%	**Ductile Iron** All DI Fittings Rated 250 psi As noted in ANSI/AWWA C111/A21/11, ductile iron flanged joints in the 24″ and smaller sizes may be rated to 350 psi with the use of "special" gaskets.
Ductile Iron to ASTM A 536 Reference AWWA C110, section 5.4.2.1.1.	

COATINGS & LININGS

Interior Linings:
Flanged fittings are furnished cement lined and seal coated per ANSI/AWWA C104/A21.4. Fittings are also available unlined for air service or with other special linings for particular service conditions.

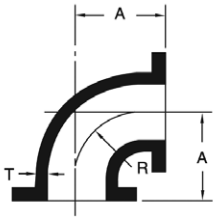
Exterior Coatings:
Flanged fittings are furnished standard with a red epoxy primer or tar coated at the customer's discretion. Special primer coatings are also available for particular service conditions.

All standard coatings and linings are provided in full accordance with ANSI/NSF 61.

COMMITMENT TO QUALITY

U.S. Pipe / Metalfit takes pride in producing the finest quality Flanged Fittings available in today's market. Our manufacturing standards and a strict adherence to the quality control procedures, developed over many years, make certain that we abide by our commitment to be the best.

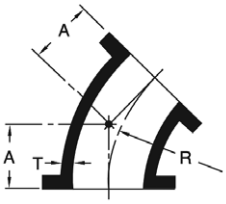
SPECIFICATIONS
BENDS & BASE BENDS



BENDS, 1/4 (90°)

SIZE	Wt.	A	R	T
2	14	4.5	3.0	0.31
2-1/2	22	5.0	3.5	0.31
3	25	5.5	4.0	0.48
4	45	6.5	4.5	0.52
5	52	7.5	5.5	0.52
6	65	8.0	6.0	0.55
8	105	9.0	7.0	0.60
10	165	11.0	9.0	0.68
12	235	12.0	10.0	0.75
14	290	14.0	11.5	0.66
16	370	15.0	12.5	0.70
18	450	16.5	14.0	0.75
20	580	18.0	15.5	0.80
24	900	22.0	18.5	0.89
30	1430	25.0	21.5	1.03
36	2135	28.0	24.5	1.15
42	3055	31.0	27.5	1.28
48	4095	34.0	30.5	1.42

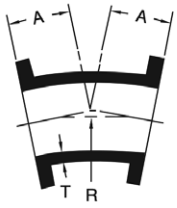
Dimensions in inches. Weights in pounds.



BENDS, 1/8 (45°)

SIZE	Wt.	A	R	T
2	12	2.5	2.41	0.31
2-1/2	18	3.0	3.02	0.31
3	20	3.0	3.62	0.48
4	40	4.0	4.81	0.52
5	45	4.5	6.04	0.52
6	55	5.0	7.25	0.55
8	90	5.5	8.44	0.60
10	130	6.5	10.88	0.68
12	195	7.5	13.25	0.75
14	220	7.5	12.06	0.66
16	280	8.0	13.25	0.70
18	325	8.5	14.50	0.75
20	430	9.5	16.88	0.80
24	630	11.0	18.12	0.89
30	1120	15.0	27.75	1.03
36	1755	18.0	35.00	1.15
42	2600	21.0	42.45	1.28
48	3580	24.0	49.50	1.42

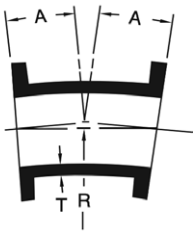
Dimensions in inches. Weights in pounds.



BENDS, 1/16 (22-1/2°)

SIZE	Wt.	A	R	T
2	12	2.5	6.04	0.31
2-1/2	18	3.0	6.80	0.31
3	20	3.0	7.56	0.48
4	40	4.0	10.06	0.52
5	45	4.5	10.86	0.52
6	55	5.0	15.06	0.55
8	90	5.5	17.62	0.60
10	135	6.5	22.62	0.68
12	205	7.5	27.62	0.75
14	225	7.5	25.12	0.66
16	285	8.0	27.62	0.70
18	335	8.5	30.19	0.75
20	435	9.5	35.19	0.80
24	640	11.0	37.69	0.89
30	1135	15.0	57.81	1.03
36	1790	18.0	72.88	1.15
42	2665	21.0	88.00	1.28
48	3665	24.0	103.06	1.42

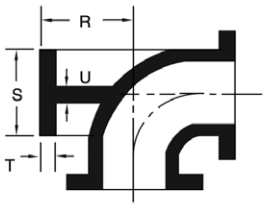
Dimensions in inches. Weights in pounds.



BENDS, 1/32 (11-1/4°)

SIZE	Wt.	A	R	T
2	12	2.5	12.69	0.31
3	20	3.0	15.25	0.48
4	40	4.0	20.31	0.52
5	45	4.5	22.85	0.52
6	55	5.0	30.50	0.55
8	90	5.5	35.50	0.60
10	135	6.5	45.69	0.68
12	205	7.5	55.81	0.75
14	225	7.5	50.75	0.66
16	285	8.0	55.81	0.70
18	335	8.5	60.94	0.75
20	435	9.5	71.06	0.80
24	645	11.0	76.12	0.89
30	1150	15.0	116.75	1.03
36	1805	18.0	147..25	1.15
42	2680	21.0	177.69	1.28
48	3695	24.0	208.12	1.42

Dimensions in inches. Weights in pounds.

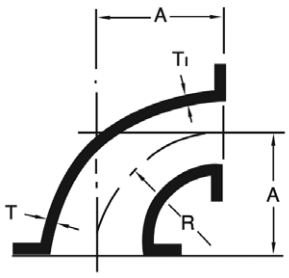


BASE BENDS

SIZE	WEIGHT		R	S	T	U	BC
	Base Bend	Base Only					
3	35	10	4.88	5.00	0.56	0.50	3.88
4	55	10	5.50	6.00	0.62	0.50	4.75
6	85	20	7.00	7.00	0.69	0.62	5.50
8	145	40	8.38	9.00	0.94	0.88	7.50
10	210	45	9,75	9.00	0.94	0.88	7.50
12	300	65	11.25	11.00	1.00	1.00	9.50
14	360	70	12.50	11.00	1.00	1.00	9.50
16	445	75	13.75	11.00	1.00	1.00	9.50
18	565	115	15.00	13.50	1.12	1.12	11.75
20	700	120	16.00	13.50	1.12	1.12	11.75
24	1030	130	18.50	13.50	1.12	1.12	11.75
30	1625	190	23.00	16.00	1.19	1.15	14.25
36	2385	250	26.00	19.00	1.25	1.15	17.00
42	3465	410	30.00	23.50	1.44	1.28	21.25
48	4610	515	34.00	25.00	1.56	1.42	22.75

Dimensions in inches. Weights in pounds.

SPECIFICATIONS
REDUCING, SIDE OUTLET & RETURN BENDS

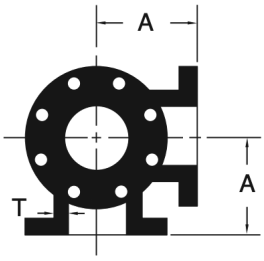


REDUCING 90° BENDS

SIZE	Wt.	A	R	T	T_1
2-1/2 x 2	18	5.0	3.5	0.31	0.31
3 x 2	22	5.5	4.0	0.48	0.31
3 x 2-1/2	23	5.5	4.0	0.48	0.31
4 x 2	27	6.6	4.5	0.52	0.31
4 x 2-1/2	29	6.6	4.5	0.52	0.31
4 x 3	29	6.6	4.5	0.52	0.48
5 x 4	51	7.5	5.5	0.52	0.52
6 x 3	45	8.0	6.0	0.55	0.48
6 x 4	55	8.0	6.0	0.55	0.52
6 x 5	65	8.0	6.0	0.55	0.52
8 x 4	75	9.0	7.0	0.60	0.52
8 x 5	80	9.0	7.0	0.60	0.52
8 x 6	85	9.0	7.0	0.60	0.55
10 x 4	110	11.0	9.0	0.68	0.52
10 x 6	135	11.0	9.0	0.68	0.55
10 x 8	150	11.0	9.0	0.68	0.60
12 x 4	140	12.0	10.0	0.75	0.52
12 x 6	160	12.0	10.0	0.75	0.55
12 x 8	180	12.0	10.0	0.75	0.60
12 x 10	210	12.0	10.0	0.75	0.68
14 x 6	144	14.0	11.5	0.66	0.55
14 x 8	200	14.0	11.5	0.66	0.60
14 x 10	240	14.0	11.5	0.66	0.68
14 x 12	270	14.0	11.5	0.66	0.75
16 x 6	220	15.0	12.5	0.70	0.55
16 x 8	240	15.0	12.5	0.70	0.60
16 x 10	280	15.0	12.5	0.70	0.68
16 x 12	310	15.0	12.5	0.70	0.75
16 x 14	330	15.0	12.5	0.70	0.66
18 x 6	260	16.5	14.0	0.75	0.55
18 x 8	280	16.5	14.0	0.75	0.60
18 x 10	320	16.5	14.0	0.75	0.68
18 x 12	350	16.5	14.0	0.75	0.75
18 x 14	370	16.5	14.0	0.75	0.66
18 x 16	410	16.5	14.0	0.75	0.70
20 x 6	320	18.0	15.5	0.80	0.55
20 x 8	345	18.0	15.5	0.80	0.60

SIZE	Wt.	A	R	T	T_1
20 x 10	385	18.0	15.5	0.80	0.68
20 x 12	415	18.0	15.5	0.80	0.75
20 x 14	435	18.0	15.5	0.80	0.66
20 x 16	475	18.0	15.5	0.80	0.70
20 x 18	515	18.0	15.5	0.80	0.75
24 x 6	480	22.0	18.5	0.89	0.55
24 x 8	505	22.0	18.5	0.89	0.60
24 x 10	545	22.0	18.5	0.89	0.68
24 x 12	575	22.0	18.5	0.89	0.75
24 x 14	595	22.0	18.5	0.89	0.66
24 x 16	635	22.0	18.5	0.89	0.70
24 x 18	675	22.0	18.5	0.89	0.75
24 x 20	740	22.0	18.5	0.89	0.80
30 x 12	840	25.0	21.5	1.03	0.75
30 x 14	860	25.0	21.5	1.03	0.66
30 x 16	900	25.0	21.5	1.03	0.70
30 x 18	940	25.0	21.5	1.03	0..75
30 x 20	1005	25.0	21.5	1.03	0.80
30 x 24	1165	25.0	21.5	1.03	0.89
36 x 12	1195	28.0	24.5	1.15	0.75
36 x 14	1215	28.0	24.5	1.15	0.66
36 x 16	1255	28.0	24.5	1.15	0.70
36 x 18	1295	28.0	24.5	1.15	0.75
36 x 20	1360	28.0	24.5	1.15	0.80
36 x 24	1520	28.0	24.5	1.15	0.89
36 x 30	1785	31.0	27.5	1.28	1.03
42 x 14	1675	31.0	27.5	1.28	0.66
42 x 16	1715	31.0	27.5	1.28	.070
42 x 18	1755	31.0	27.5	1.28	0.75
42 x 20	1820	31.0	27.5	1.28	0.80
42 x 24	1980	31.0	27.5	1.28	0.89
42 x 30	2245	31.0	27.5	1.28	1.03
42 x 36	2600	31.0	27.5	1.28	1.15
48 x 24	3240	34.0	30.5	1.42	0.89
48 x 30	3600	34.0	30.5	1.42	1.03
48 x 36	3255	34.0	30.5	1.42	1.15
48 x 42	4685	34.0	30.5	1.42	1.28

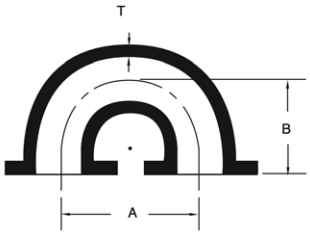
Dimensions in inches. Weights in pounds.



SIDE OUTLET BENDS

SIZE	Wt.	A	T
3	36	5.5	0.48
4	60	6.5	0.50
6	96	8.0	0.55
8	150	9.0	0.60
10	235	11.0	0.68
12	335	12.0	0.80
14	405	14.0	0.66
16	490	15.0	0.70
18	580	16.5	0.75
20	740	18.0	0.80
24	1145	22.0	0.89

Dimensions in inches.
Weights in pounds.

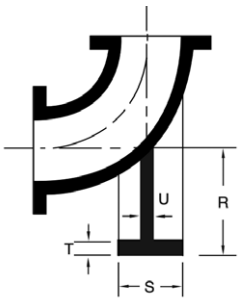


RETURN BENDS

SIZE	Wt.	A	T
4	60	6.5	0.52
6	95	8.0	0.55
8	165	9.0	0.60
10	260	11.0	0.68
12	395	12.0	0.75

Dimensions in inches.
Weights in pounds.

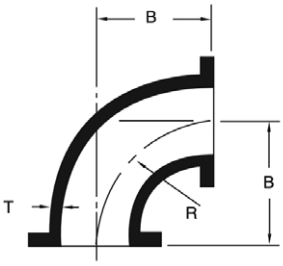
SPECIFICATIONS
LONG RADIUS BENDS



LONG RADIUS BASE BENDS

SIZE	WEIGHT		R	S	T	U	BC
	Base Bend	Base Only					
3	48	18	4.88	5.00	0.56	0.50	3.88
4	73	23	5.50	6.00	0.62	0.50	4.75
6	120	40	7.00	7.00	0.69	0.62	5.50
8	205	65	8.38	9.00	0.94	0.88	7.50
10	295	80	9,75	9.00	0.94	0.88	7.50
12	435	95	11.25	11.00	1.00	1.00	9.50
14	490	105	12.50	11.00	1.00	1.00	9.50
16	615	110	13.75	11.00	1.00	1.00	9.50
18	800	170	15.00	13.50	1.12	1.12	11.75
20	985	175	16.00	13.50	1.12	1.12	11.75
24	1430	190	18.50	13.50	1.12	1.12	11.75
30	2400	295	23.00	16.00	1.19	1.15	14.25
36	3680	395	26.00	19.00	1.25	1.15	17.00

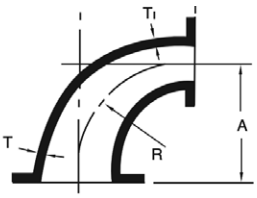
Dimensions in inches. Weights in pounds.



LONG RADIUS BENDS

SIZE	Wt.	B	T	R
2	20	6.50	0.31	5.0
2-1/2	22	7.00	0.31	6.0
3	30	7.75	0.48	6.0
4	50	9.00	0.52	7.0
6	80	11.50	0.55	9.5
8	140	14.00	0.60	12.0
10	215	16.50	0.68	14.5
12	325	19.00	0.75	17.0
14	385	21.50	0.66	19.0
16	505	24.00	0.70	21.0
18	630	26.50	0.75	24.0
20	810	29.00	0.80	26.5
24	1240	34.00	0.89	30.5
30	2105	41.50	1.03	38.0
36	3285	49.00	1.15	45.5
45	4865	56.50	1.28	53.0

Dimensions in inches. Weights in pounds.



LONG RADIUS REDUCING BENDS

SIZE	Wt.	H	J	T	T_1
4 x 3	32	9.0	0.52	0.48	7.0
6 x 4	61	11.5	0.55	0.52	9.5
8 x 4	100	14.0	0.60	0.52	12.0
8 x 6	110	16.5	0.60	0.55	12.0
10 x 4	195	16.5	0.68	0.52	14.5
10 x 6	180	16.5	0.68	0.55	14.5
10 x 8	215	16.5	0.68	0.60	14.5
12 x 6	235	19.0	0.75	0.55	17.0
12 x 8	285	19.0	0.75	0.60	17.0
12 x 10	325	19.0	0.75	0.68	17.0
14 x 8	285	21.5	0.66	0.60	19.0
14 x 10	325	21.5	0.66	0.68	19.0
14 x 12	370	21.5	0.66	0.75	19.0
16 x 8	395	24.0	0.70	0.60	21.5
16 x 10	395	24.0	0.70	0.68	21.5
16 x 12	415	24.0	0.70	0.75	21.5
16 x 14	460	24.0	0.70	0.66	21.5
18 x 10	465	26.5	0.75	0.68	24.0
18 x 12	585	26.5	0.96	0.75	24.0
18 x 14	535	26.5	0.75	0.66	24.0
18 x 16	585	26.5	0.75	0.70	24.0
20 x 10	640	29.0	0.80	0.68	26.5
20 x 12	630	29.0	0.80	0.75	26.5
20 x 14	770	29.0	0.80	0.66	26.5
20 x 16	695	29.0	0.80	0.70	26.5
20 x 18	905	29.0	0.80	0.75	26.5
24 x 12	855	34.0	0.89	0.75	30.5
24 x14	875	34.0	0.89	0.66	30.5
24 x 16	940	34.0	0.89	0.70	30.5
24 x 20	1080	34.0	0.89	0.80	30.5
30 x 16	1400	41.5	1.03	0.70	38.0
30 x 20	1575	41.5	1.03	0.80	38.0
30 x 24	1675	41.5	1.37	1.16	38.0
36 x 20	2835	49.0	1.15	0.80	45.5
36 x 24	3140	49.0	1.15	0.89	45.5
36 x 30	3675	49.0	1.58	1.37	45.5
42 x 30	4905	56.5	1.28	1.03	53.0
42 x 36	4270	56.5	1.28	1.15	53.0

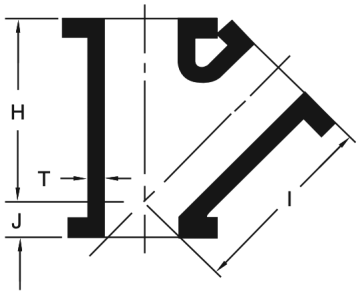
Dimensions in inches. Weights in pounds.

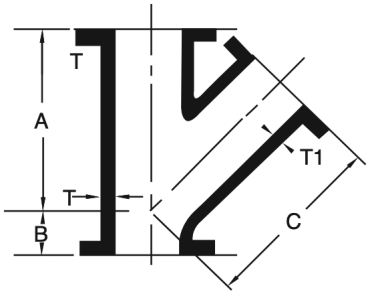
SPECIFICATIONS
LATERAL WYES

45° LATERAL WYES

SIZE	Wt.	H	J	I	T
3	45	10.0	3.0	10.0	0.48
4	75	12.0	3.0	12.0	0.52
6	120	14.5	3.5	14.5	0.55
8	200	17.5	4.5	17.5	0.60
10	335	20.5	5.0	20.5	0.80
12	515	24.5	5.5	24.5	0.87
14	605	27.0	6.0	27.0	0.66
16	805	30.0	6.5	30.0	0.70
18	980	32.0	7.0	32.0	0.75
20	1265	35.0	8.0	35.0	0.80
24	1905	40.5	9.0	40.5	0.89
30	3225	49.0	10.0	49.0	1.03
36	5740	60.0	19.5	60.0	1.15

Dimensions in inches. Weights in pounds.





45° REDUCING LATERAL WYES

SIZE	Wt.	A	B	C	T	T_1
4 x 3	65	12.0	3.0	12.0	0.52	0.48
6 x 4	105	14.5	3.5	14.5	0.55	0.52
8 x 4	165	17.5	4.5	17.5	0.60	0.52
8 x 6	175	17.5	4.5	17.5	0.60	0.55
10 x 4	235	20.5	5.0	20.5	0.68	0.52
10 x 6	250	20.5	5.0	20.5	0.68	0.55
10 x 8	270	20.5	5.0	20.5	0.68	0.60
12 x 4	350	24.5	5.5	24.5	0.75	0.52
12 x 6	365	24.5	5.5	24.5	0.75	0.55
12 x 8	390	24.5	5.5	24.5	0.75	0.60
12 x 10	470	24.5	5.5	24.5	0.75	0.68
14 x 6	475	27.0	6.0	27.0	0.66	0.55
14 x 8	500	27.0	6.0	27.0	0.66	0.60
14 x 10	525	27.0	6.0	27.0	0.66	0.68
14 x 12	570	27.0	6.0	27.0	0.66	0.75
16 x 6	620	30.0	6.5	30.0	0.70	0.55
16 x 8	645	30.0	6.5	30.0	0.70	0.60
16 x 10	675	30.0	6.5	30.0	0.70	0.68
16 x 12	715	30.0	6.5	30.0	0.70	0.75
16 x 14	755	30.0	6.5	30.0	0.70	0.66
18 x 8	780	32.0	7.0	32.0	0.75	0.60
18 x 10	810	32.0	7.0	32.0	0.75	0.68
18 x 12	850	32.0	7.0	32.0	0.75	0.75
18 x 14	885	32.0	7.0	32.0	0.75	0.66

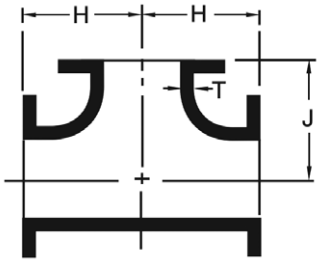
SIZE	Wt.	A	B	C	T	T_1
18 x 16	935	32.0	7.0	32.0	0.75	0.70
20 x 8	995	35.0	8.0	35.0	0.80	0.60
20 x 10	1025	35.0	8.0	35.0	0.80	0.68
20 x 12	1065	35.0	8.0	35.0	0.80	0.75
20 x 14	1110	35.0	8.0	35.0	0.80	0.66
20 x 16	1155	35.0	8.0	35.0	0.80	0.70
20 x 18	1315	35.0	8.0	35.0	0.80	0.75
24 x 8	1470	40.5	9.0	40.5	0.89	0.60
24 x 10	1505	40.5	9.0	40.5	0.89	0.68
24 x 12	1550	40.5	9.0	40.5	0.89	0.75
24 x 14	1590	40.5	9.0	40.5	0.89	0.66
24 x 16	1640	40.5	9.0	40.5	0.89	0.70
24 x 18	1685	40.5	9.0	40.5	0.89	0.75
24 x 20	1750	40.5	9.0	40.5	0.89	0.80
30 x 12	2795	49.0	10.0	49.0	1.03	0.75
30 x 14	2850	49.0	10.0	49.0	1.03	0.66
30 x 16	2905	49.0	10.0	49.0	1.03	0.70
30 x 18	2960	49.0	10.0	49.0	1.03	0.75
30 x 20	3040	49.0	10.0	49.0	1.03	0.80
30 x 24	3205	49.0	10.0	49.0	1.03	0.89
36 x 16	4455	54.0	15.3	54.0	1.15	0.70
36 x 18	4505	54.0	15.3	54.0	1.15	0.75
36 x 20	4575	54.0	15.3	54.0	1.15	0.80
36 x 24	4725	54.0	15.3	54.0	1.15	0.89

Dimensions in inches. Weights in pounds.

TEES

SIZE	Wt.	H	J	T
2	20	4.5	4.5	0.31
2-1/2	27	5.0	5.0	0.31
3	40	5.5	5.5	0.48
4	65	6.5	6.5	0.52
5	85	7.5	7.5	0.52
6	95	8.0	8.0	0.55
8	155	9.0	9.0	0.60
10	270	11.0	11.0	0.80
12	385	12.0	12.0	0.87
14	435	14.0	14.0	0.66
16	550	15.0	15.0	0.70
18	665	16.5	16.5	0.75
20	855	18.0	18.0	0.80
24	1330	22.0	22.0	0.89
30	2150	25.0	25.0	1.03
36	3160	28.0	28.0	1.15
42	5580	31.0	31.0	1.78
42 (150 psi)	4470	31.0	31.0	1.28

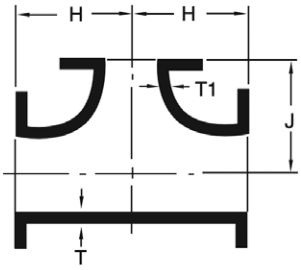
Dimensions in inches. Weights in pounds.



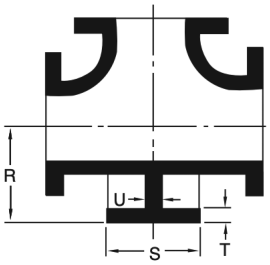
REDUCING TEES

SIZE	Wt.	H	J	T	T_1
3 x 2	35	5.5	5.5	0.48	0.31
3 x 2-1/2	37	5.5	5.5	0.48	0.31
4 x 2	50	6.5	6.5	0.52	0.31
4 x 2-1/2	55	6.5	6.5	0.52	0.31
4 x 3	60	6.5	6.5	0.52	0.48
5 x 4	80	7.5	7.5	0.52	0.52
6 x 2	85	8.0	8.0	0.55	0.31
6 x 2-1/2	85	8.0	8.0	0.55	0.31
6 x 3	85	8.0	8.0	0.55	0.48
6 x 4	90	8.0	8.0	0.55	0.52
6 x 5	95	8.0	8.0	0.55	0.52
8 x 3	135	9.0	9.0	0.60	0.48
8 x 4	140	9.0	9.0	0.60	0.52
8 x 6	145	9.0	9.0	0.60	0.55
10 x 3	200	11.0	11.0	0.68	0.48
10 x 4	205	11.0	11.0	0.68	0.52
10 x 6	215	11.0	11.0	0.68	0.55
10 x 8	225	11.0	11.0	0.68	0.60
12 x 3	280	12.0	12.0	0.75	0.48
12 x 4	290	12.0	12.0	0.75	0.52
12 x 6	295	12.0	12.0	0.75	0.55
12 x 8	310	12.0	12.0	0.75	0.60
12 x 10	360	12.0	12.0	0.87	0.80
14 x 4	365	14.0	14.0	0.66	0.52
14 x 6	375	14.0	14.0	0.66	0.55
14 x 8	390	14.0	14.0	0.66	0.60
14 x 10	400	14.0	14.0	0.66	0.68
14 x 12	425	14.0	14.0	0.66	0.75
16 x 4	440	15.0	15.0	0.70	0.52
16 x 6	465	15.0	15.0	0.70	0.55
16 x 8	475	15.0	15.0	0.70	0.60
16 x 10	495	15.0	15.0	0.70	0.68
16 x 12	520	15.0	15.0	0.70	0.75
16 x 14	530	15.0	15.0	0.70	0.66
18 x 6	480	13.0	15.5	0.75	0.55
18 x 8	495	13.0	15.5	0.75	0.60
18 x 10	510	13.0	15.5	0.75	0.68
18 x 12	535	13.0	15.5	0.75	0.75
18 x 14	630	16.5	16.5	0.75	0.66
18 x 16	650	16.5	16.5	0.75	0.70
20 x 6	610	14.0	17.0	0.80	0.55
20 x 8	620	14.0	17.0	0.80	0.60
20 x 10	635	14.0	17.0	0.80	0.68
20 x 12	660	14.0	17.0	0.80	0.75
20 x 14	665	14.0	17.0	0.80	0.66
20 x 16	810	18.0	18.0	0.80	0.70
20 x 18	820	18.0	18.0	0.80	0.75
24 x 6	845	15.0	19.0	0.89	0.55
24 x 8	860	15.0	19.0	0.89	0.60
24 x 10	880	15.0	19.0	0.89	0.68
24 x 12	890	15.0	19.0	0.89	0.75
24 x 14	900	15.0	19.0	0.89	0.66
24 x 16	915	15.0	19.0	0.89	0.70
24 x 18	1220	22.0	22.0	0.89	0.75
24 x 20	1255	22.0	22.0	0.89	0.80
30 x 6	1460	18.0	23.0	1.03	0.55
30 x 8	1470	18.0	23.0	1.03	0.60
30 x 10	1480	18.0	23.0	1.03	0.68
30 x 12	1490	18.0	23.0	1.03	0.75
30 x 14	1490	18.0	23.0	1.03	0.66
30 x 16	1505	18.0	23.0	1.03	0.70
30 x 18	1515	18.0	23.0	1.03	0.75
30 x 20	1540	18.0	23.0	1.03	0.80
30 x 24	2025	25.0	25.0	1.03	0.89
36 x 12	2170	20.0	26.0	1.15	0.75
36 x 14	2175	20.0	26.0	1.15	0.66
36 x 16	2185	20.0	26.0	1.15	0.70
36 x 18	2190	20.0	26.0	1.15	0.75
36 x 20	2210	20.0	26.0	1.15	0.80
36 x 24	2255	20.0	26.0	1.15	0.89
36 x 30	3000	28.0	28.0	1.15	1.03
42 x 12	3165	23.0	30.0	1.28	0.75
42 x 14	3170	23.0	30.0	1.28	0.66
42 x 16	3180	23.0	30.0	1.28	0.70
42 x 18	3185	23.0	30.0	1.28	0.75
42 x 20	3205	23.0	30.0	1.28	0.80
42 x 24	3245	23.0	30.0	1.28	0.89
42 x 30	4125	31.0	31.0	1.28	1.03
42 x 36	5360	31.0	31.0	1.78	1.58
48 x 12	4315	26.0	34.0	1.42	0.75
48 x 14	4315	26.0	34.0	1.42	0.66
48 x 16	4330	26.0	34.0	1.42	0.70
48 x 18	4330	26.0	34.0	1.42	0.75
48 x 20	4350	26.0	34.0	1.42	0.80
48 x 24	4385	26.0	34.0	1.42	0.89
48 x 30	4455	26.0	34.0	1.42	1.03

Dimensions in inches. Weights in pounds.



SPECIFICATIONS
TEES



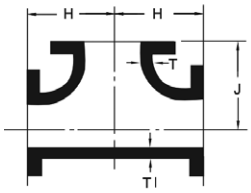
BASE TEES

SIZE	WEIGHT		R	S	T	U	BC
	Base Tee	Base Only					
3	45	5	4.88	5.00	0.56	0.50	3.88
4	75	10	5.50	6.00	0.62	0.50	4.75
6	110	15	7.00	7.00	0.69	0.62	5.50
8	185	30	8.38	9.00	0.94	0.88	7.50
10	300	30	9,75	9.00	0.94	0.88	7.50
12	430	45	11.25	11.00	1.00	1.00	9.50
14	485	50	12.50	11.00	1.00	1.00	9.50
16	600	50	13.75	11.00	1.00	1.00	9.50
18	740	75	15.00	13.50	1.12	1.12	11.75
20	930	75	16.00	13.50	1.12	1.12	11.75
24	1410	80	18.50	13.50	1.12	1.12	11.75
30	2270	120	23.00	16.00	1.19	1.15	14.25
36	3320	160	26.00	19.00	1.25	1.15	17.00
42	5850	270	30.00	23.50	1.44	1.28	21.25

Dimensions in inches. Weights in pounds.

BULLHEAD TEES

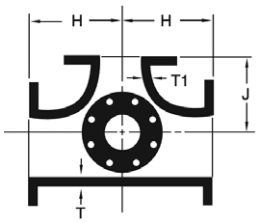
SIZE	Wt.	H	J	T_1	T
2-1/2 x 2-1/2 x 3	36	5.5	5.5	0.31	0.48
3 x 3 x 4	49	6.5	6.5	0.48	0.52
4 x 4 x 6	88	8.0	8.0	0.52	0.55
6 x 6 x 8	142	9.0	9.0	0.55	0.60
8 x 8 x 10	240	11.0	11.0	0.60	0.68
10 x 10 x 12	340	12.0	12.0	0.80	0.87
12 x 12 x 16	425	15.0	15.0	0.75	0.75
12 x 12 x 24	845	22.0	22.0	0.75	0.89
16 x 16 x 24	993	22.0	22.0	0.70	0.89



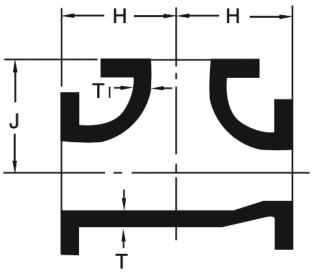
Dimensions in inches. Weights in pounds.

SIDE OUTLET TEES

SIZE	Wt.	H	J	T_1	T
4	82	6.5	6.5	0.52	0.52
6	135	8.0	8.0	0.55	0.55
8	210	9.0	9.0	0.60	0.60
10	330	11.0	11.0	0.68	0.80
12	470	12.0	12.0	0.75	0.87
14	650	14.0	14.0	0.66	0.66
16	850	15.0	15.0	0.70	0.70
18	1040	16.5	16.5	0.75	0.75
20	1330	18.0	18.0	0.80	0.80
24	2080	22.0	22.0	0.89	0.89



Dimensions in inches. Weights in pounds.

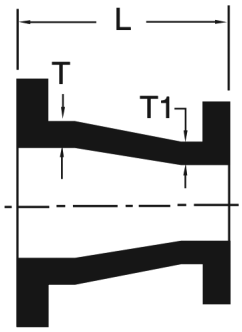


REDUCING TEES ON RUN

SIZE	Wt.	H	J	T	T_1
4 x 2 x 4	50	6.5	6.5	0.52	0.48
4 x 3 x 3	53	6.5	6.5	0.52	0.48
4 x 3 x 4	55	6.5	6.5	0.52	0.52
6 x 3 x 4	85	8.0	8.0	0.55	0.52
6 x 3 x 6	91	8.0	8.0	0.55	0.55
6 x 4 x 3	86	8.0	8.0	0.55	0.48
6 x 4 x 4	90	8.0	8.0	0.55	0.52
6 x 4 x 6	95	8.0	8.0	0.55	0.52
8 x 4 x 6	140	9.0	9.0	0.60	0.55
8 x 4 x 8	135	9.0	9.0	0.60	0.60
8 x 6 x 4	125	9.0	9.0	0.60	0.55
8 x 6 x 6	145	9.0	9.0	0.60	0.55
8 x 6 x 8	160	9.0	9.0	0.60	0.55
10 x 6 x 10	234	11.0	11.0	0.80	0.80
10 x 8 x 6	210	11.0	11.0	0.80	0.55
10 x 8 x 8	227	11.0	11.0	0.80	0.60
10 x 8 x 10	248	11.0	11.0	0.80	0.80
12 x 6 x 12	300	12.0	12.0	0.87	0.80
12 x 8 x 8	275	12.0	12.0	0.87	0.80
12 x 8 x 12	310	12.0	12.0	0.75	0.60
12 x 10 x 10	325	12.0	12.0	0.87	0.80
12 x 10 x 12	350	12.0	12.0	0.87	0.87
14 x 10 x 10	380	14.0	14.0	0.66	0.68
14 x 10 x 12	400	14.0	14.0	0.66	0.68
14 x 10 x 14	425	14.0	14.0	0.66	0.68
16 x 10 x 10	490	15.0	15.0	0.70	0.68
16 x 12 x 12	525	14.0	14.0	0.70	0.66
16 x 12 x 16	600	15.0	15.0	0.70	0.75
16 x 14 x 16	630	14.0	14.0	0.70	0.66
20 x 12 x 20	660	18.0	18.0	0.80	0.75
20 x 14 x 20	680	18.0	18.0	0.80	0.66
24 x 16 x 24	915	22.0	22.0	0.89	0.70
36 x 24 x 36	2255	28.0	28.0	1.15	0.89

Dimensions in inches. Weights in pounds.

SPECIFICATIONS
CONCENTRIC REDUCERS



CONCENTRIC REDUCERS

SIZE	Wt.	L	T	T_1
2-1/2 x 2	14	5.5	0.31	0.31
3 x 2	16	6.0	0.48	0.31
3 x 2-1/2	20	6.0	0.48	0.31
4 x 2	25	7.0	0.52	0.31
4 x 2-1/2	28	7.0	0.52	0.31
4 x 3	30	7.0	0.52	0.48
5 x 3	38	8.0	0.52	0.48
5 x 4	40	8.0	0.52	0.52
6 x 2	35	9.0	0.55	0.31
6 x 2-1/2	38	9.0	0.55	0.31
6 x 3	40	9.0	0.55	0.48
6 x 4	45	9.0	0.55	0.52
6 x 5	50	9.0	0.55	0.52
8 x 3	60	11.0	0.60	0.48
8 x 4	65	11.0	0.60	0.52
8 x 5	70	11.0	0.60	0.52
8 x 6	75	11.0	0.60	0.55
10 x 4	85	12.0	0.68	0.52
10 x 5	88	12.0	0.68	0.52
10 x 6	90	12.0	0.68	0.55
10 x 8	110	12.0	0.68	0.60
12 x 4	120	14.0	0.75	0.52
12 x 6	130	14.0	0.75	0.55
12 x 8	145	14.0	0.75	0.60
12 x 10	170	14.0	0.75	0.68
14 x 4	150	16.0	0.66	0.52
14 x 6	155	16.0	0.66	0.55
14 x 8	175	16.0	0.66	0.60
14 x 10	190	16.0	0.66	0.68
14 x 12	220	16.0	0.66	0.75
16 x 4	180	18.0	0.70	0.52
16 x 6	190	18.0	0.70	0.55
16 x 8	210	18.0	0.70	0.60
16 x 10	235	18.0	0.70	0.68
16 x 12	265	18.0	0.70	0.75
16 x 14	280	18.0	0.70	0.66
18 x 6	230	19.0	0.75	0.55
18 x 8	240	19.0	0.75	0.60
18 x 10	265	19.0	0.75	0.68
18 x 12	295	19.0	0.75	0.75
18 x 14	310	19.0	0.75	0.66
18 x 16	340	19.0	0.75	0.70
20 x 6	300	20.0	0.80	0.55
20 x 8	305	20.0	0.80	0.60
20 x 10	310	20.0	0.80	0.68
20 x 12	345	20.0	0.80	0.75
20 x 14	355	20.0	0.80	0.66
20 x 16	390	20.0	0.80	0.70
20 x 18	410	20.0	0.80	0.75
24 x 8	460	24.0	0.89	0.60
24 x 10	470	24.0	0.89	0.68
24 x 12	480	24.0	0.89	0.75
24 x 14	490	24.0	0.89	0.66
24 x 16	525	24.0	0.89	0.70
24 x 18	550	24.0	0.89	0.75
24 x 20	590	24.0	0.89	0.80
30 x 18	810	30.0	1.03	0.75
30 x 20	870	30.0	1.03	0.80
30 x 24	970	30.0	1.03	0.89
36 x 20	1230	36.0	1.15	0.80
36 x 24	1345	36.0	1.15	0.89
36 x 30	1555	36.0	1.15	1.03
42 x 24	1820	42.0	1.28	0.89
42 x 30	2060	42.0	1.28	1.03
42 x 36	2345	42.0	1.28	1.15
48 x 30	2625	48.0	1.42	1.03
48 x 36	2950	48.0	1.42	1.15
48 x 42	3320	48.0	1.42	1.28

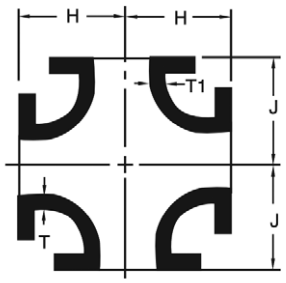
Dimensions in inches. Weights in pounds.

SPECIFICATIONS
CROSSES

REDUCING CROSSES

SIZE	Wt.	H	J	T	T_1
3 x 2	45	5.5	5.5	0.48	0.31
4 x 2	60	6.5	6.5	0.52	0.31
4 x 2-1/2	65	6.5	6.5	0.52	0.31
4 x 3	70	6.5	6.5	0.52	0.48
6 x 2	90	8.0	8.0	0.55	0.31
6 x 3	95	8.0	8.0	0.55	0.48
6 x 4	110	8.0	8.0	0.55	0.52
8 x 4	155	9.0	9.0	0.60	0.52
8 x 6	165	9.0	9.0	0.60	0.55
10 x 4	220	11.0	11.0	0.68	0.52
10 x 6	240	11.0	11.0	0.68	0.55
10 x 8	265	11.0	11.0	0.68	0.60
12 x 4	310	12.0	12.0	0.75	0.52
12 x 6	320	12.0	12.0	0.75	0.55
12 x 8	345	12.0	12.0	0.75	0.60
12 x 10	415	12.0	12.0	0.87	0.80
14 x 6	400	14.0	14.0	0.66	0.55
14 x 8	425	14.0	14.0	0.66	0.60
14 x 10	460	14.0	14.0	0.66	0.68
14 x 12	505	14.0	14.0	0.66	0.75
16 x 6	490	15.0	15.0	0.70	0.55
16 x 8	520	15.0	15.0	0.70	0.60
16 x 10	555	15.0	15.0	0.70	0.68
16 x 12	605	15.0	15.0	0.70	0.75
16 x 14	620	15.0	15.0	0.70	0.66
18 x 6	505	13.0	15.5	0.75	0.55
18 x 8	535	13.0	15.5	0.75	0.60
18 x 10	560	13.0	15.5	0.75	0.68
18 x 12	610	13.0	15.5	0.75	0.75
18 x 14	720	16.5	16.5	0.75	0.66
18 x 16	765	16.5	16.5	0.75	0.70
20 x 6	635	14.0	17.0	0.80	0.55
20 x 8	665	14.0	17.0	0.80	0.60
20 x 10	685	14.0	17.0	0.80	0.68
20 x 12	735	14.0	17.0	0.80	0.75
20 x 14	745	14.0	17.0	0.80	0.66
20 x 16	915	18.0	18.0	0.80	0.70
20 x 18	945	18.0	18.0	0.80	0.75
24 x 6	875	15.0	19.0	0.89	0.55
24 x 8	895	15.0	19.0	0.89	0.60
24 x 10	930	15.0	19.0	0.89	0.68
24 x 12	960	15.0	19.0	0.89	0.75
24 x 14	975	15.0	19.0	0.89	0.66
24 x 16	1010	15.0	19.0	0.89	0.70
24 x 18	1365	22.0	22.0	0.89	0.75
24 x 20	1430	22.0	22.0	0.89	0.80
30 x 12	1565	18.0	23.0	1.03	0.75
30 x 14	1570	18.0	23.0	1.03	0.66
30 x 16	1605	18.0	23.0	1.03	0.70
30 x 18	1615	18.0	23.0	1.03	0.75
30 x 20	1670	18.0	23.0	1.03	0.80
30 x 24	2245	25.0	25.0	1.03	0.89
36 x 12	2240	20.0	26.0	1.15	0.75
36 x 14	2240	20.0	26.0	1.15	0.66
36 x 16	2270	20.0	26.0	1.15	0.70
36 x 18	2280	20.0	26.0	1.15	0.75
36 x 20	2325	20.0	26.0	1.15	0.80
36 x 24	2405	20.0	26.0	1.15	0.89
36 x 30	3300	28.0	28.0	1.15	1.03
42 x 12	3240	23.0	30.0	1.28	0.75
42 x 16	3270	23.0	30.0	1.28	0.70
42 x 18	3275	23.0	30.0	1.28	0.75
42 x 20	3320	23.0	30.0	1.28	0.80
42 x 24	3395	23.0	30.0	1.28	0.89
42 x 30	4375	31.0	31.0	1.28	1.03
42 x 36	5720	31.0	31.0	1.78	1.58
48 x 10	4350	34.0	26.0	1.42	0.68
48 x 12	4390	34.0	26.0	1.42	0.75
48 x 14	4385	34.0	26.0	1.42	0.66
48 x 16	4415	34.0	26.0	1.42	0.70
48 x 18	4420	34.0	26.0	1.42	0.75
48 x 20	4460	34.0	26.0	1.42	0.80
48 x 24	4535	34.0	26.0	1.42	0.89
48 x 30	4670	34.0	26.0	1.42	1.03

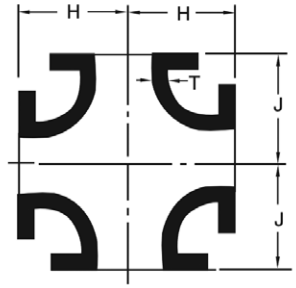
Dimensions in inches. Weights in pounds.

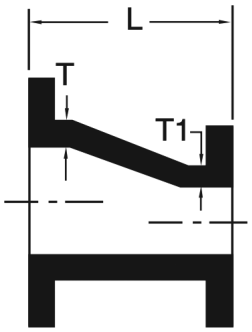


CROSSES

SIZE	Wt.	H	J	T
2	30	4.5	4.5	0.31
2-1/2	41	5.0	5.0	0.31
3	50	5.5	5.5	0.48
4	80	6.5	6.5	0.52
6	120	8.0	8.0	0.55
8	195	9.0	9.0	0.60
10	330	11.0	11.0	0.80
12	460	12.0	12.0	0.87
14	530	14.0	14.0	0.66
16	665	15.0	15.0	0.70
18	795	16.5	16.5	0.75
20	1015	18.0	18.0	0.80
24	1570	22.0	22.0	0.89
30	2500	25.0	25.0	1.03
36	3620	28.0	28.0	1.15
42 (150 psi)	5060	31.0	31.0	1.28

Dimensions in inches. Weights in pounds.





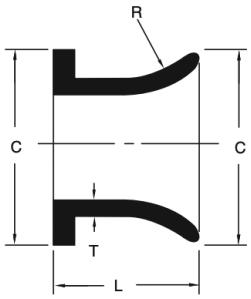
ECCENTRIC REDUCERS

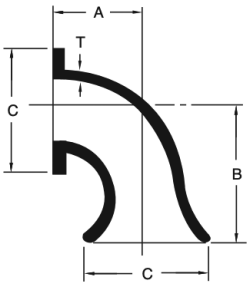
SIZE	Wt.	L	T	T_1
3 x 2	16	6.0	0.48	0.31
3 x 2-1/2	20	6.0	0.48	0.31
4 x 2	26	7.0	0.52	0.31
4 x 2-1/2	28	7.0	0.52	0.31
4 x 3	30	7.0	0.52	0.48
6 x 2	35	9.0	0.55	0.31
6 x 2-1/2	38	9.0	0.55	0.31
6 x 3	40	9.0	0.55	0.48
6 x 4	45	9.0	0.55	0.52
6 x 5	50	9.0	0.55	0.52
8 x 4	65	11.0	0.60	0.52
8 x 5	70	11.0	0.60	0.52
8 x 6	75	11.0	0.60	0.55
10 x 4	85	12.0	0.68	0.52
10 x 6	90	12.0	0.68	0.55
10 x 8	110	12.0	0.68	0.60
12 x 4	120	14.0	0.75	0.52
12 x 6	130	14.0	0.75	0.55
12 x 8	145	14.0	0.75	0.60
12 x 10	170	14.0	0.75	0.68
14 x 6	155	16.0	0.66	0.55
14 x 8	175	16.0	0.66	0.60
14 x 10	190	16.0	0.66	0.68
14 x 12	220	16.0	0.66	0.75
16 x 6	190	18.0	0.70	0.55
16 x 8	210	18.0	0.70	0.60
16 x 10	235	18.0	0.70	0.68
16 x 12	265	18.0	0.70	0.75
16 x 14	280	18.0	0.70	0.86

SIZE	Wt.	L	T	T_1
18 x 8	240	19.0	0.75	0.60
18 x 10	265	19.0	0.75	0.68
18 x 12	295	19.0	0.75	0.75
18 x 14	310	19.0	0.75	0.66
18 x 16	340	19.0	0.75	0.70
20 x 10	310	20.0	0.80	0.68
20 x 12	345	20.0	0.80	0.75
20 x 14	355	20.0	0.80	0.66
20 x 16	390	20.0	0.80	0.70
20 x 18	410	20.0	0.80	0.75
24 x 12	480	24.0	0.89	0.75
24 x 14	490	24.0	0.89	0.66
24 x 16	525	24.0	0.89	0.70
24 x 18	550	24.0	0.89	0.75
24 x 20	590	24.0	0.89	0.80
30 x 18	810	30.0	1.03	0.75
30 x 20	870	30.0	1.03	0.80
30 x 24	970	30.0	1.03	0.89
36 x 18	1200	36.0	1.15	0.75
36 x 20	1230	36.0	1.15	0.80
36 x 24	1345	36.0	1.15	0.89
36 x 30	1555	36.0	1.15	1.03
42 x 24	1820	42.0	1.28	0.89
42 x 30	2060	42.0	1.28	1.03
42 x 36	2345	42.0	1.28	1.15
48 x 30	2625	48.0	1.42	1.03
48 x 36	2950	48.0	1.42	1.15
48 x 42	3320	48.0	1.42	1.28

Dimensions in inches. Weights in pounds.

SPECIFICATIONS
STRAIGHT FLARE PIECES & FLARE BENDS





STRAIGHT FLARE PIECES

SIZE	Wt.	T	C	L	R
3	20	0.40	7.50	8	6
4	30	0.40	9.00	8	6
6	40	0.45	11.00	8	6
8	70	0.53	13.50	10	8
10	95	0.55	16.00	10	10
12	155	0.60	19.00	12	12
14	165	0.65	21.00	12	14
16	240	0.70	23.50	16	16
18	275	0.75	25.00	16	18
20	355	0.80	27.50	18	20
24	480	0.90	32.00	18	24
30	1100	1.07	38.75	24	30
36	1460	1.19	46.00	24	36
42	1900	1.28	53.00	30	42
48	2375	1.42	59.50	18	48

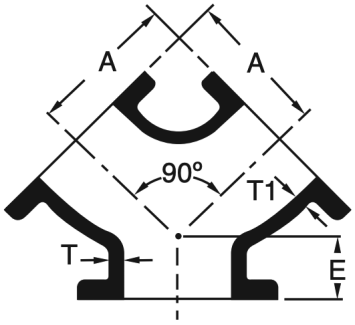
Dimensions in inches. Weights in pounds.

90° FLARE BENDS

SIZE	Wt.	T	C	A	B
3	25	0.40	7.50	5.5	11
4	40	0.40	9.00	6.5	12
6	70	0.45	11.00	8.0	12
8	110	0.53	13.50	9.0	14
10	175	0.55	16.00	11.0	17
12	245	0.60	19.00	12.0	18
14	340	0.65	21.00	14.0	20
16	460	0.70	23.50	15.0	21
18	560	0.75	25.00	16.5	22.5
20	700	0.80	27.50	18.0	24
24	1100	0.90	32.00	22.0	28
30	1840	1.07	38.75	25.0	32
36	2700	1.19	46.00	28.0	35
42	3250	1.28	53.00	31.0	38
48	4425	1.42	59.50	34.0	41

Dimensions in inches. Weights in pounds.

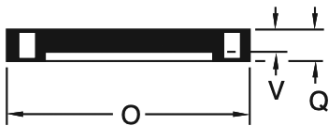
SPECIFICATIONS
TRUE WYES & BLIND FLANGES



TRUE WYES

SIZE	Wt.	T	T_1	A	E
4	55	0.52	0.52	6.5	3.0
6	85	0.55	0.55	8.0	3.5
8	140	0.60	0.60	9.0	4.5
10	205	0.68	0.68	11.0	5.0
12	300	0.75	0.75	12.0	5.5
14	435	0.66	0.66	14.0	6.0

Dimensions in inches. Weights in pounds.

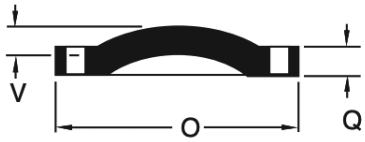


10" and smaller

FLAT BLIND FLANGES

SIZE	Wt.	O	Q	V
12	85	19.0	1.25	1.25
14	120	21.0	1.38	1.38
16	155	23.5	1.44	1.44
18	190	25.0	1.56	1.56
20	250	27.5	1.69	1.69
24	380	32.0	1.88	1.88

Dimensions in inches. Weights in pounds.



12" and larger

BLIND FLANGES*

SIZE	Wt.	O	Q	V
3	9	7.50	0.75	0.69
4	16	9.00	0.94	0.88
6	25	11.00	1.00	0.94
8	42	13.50	1.12	1.06
10	63	16.00	1.19	1.12
12	85	19.00	1.25	0.81
14	120	21.00	1.38	0.88
16	145	23.50	1.44	1.00
18	185	25.00	1.56	1.06
20	245	27.50	1.69	1.12
24	370	32.00	1.88	1.25
30	500	38.75	2.12	1.44
36	790	46.00	2.38	1.62
42	1175	53.00	2.62	1.81

Dimensions in inches. Weights in pounds.

*Blind Flanges can be provided tapped according to customer's requirement.

BLIND FLANGES with 2" TAP

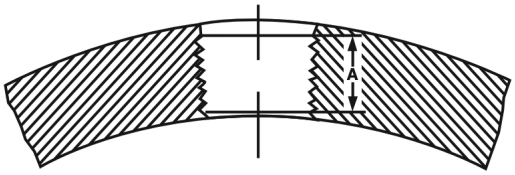
SIZE	Wt.	O	Q	V
3	9	7.50	0.75	0.69
4	16	9.00	0.94	0.88
6	25	11.00	1.00	0.94
8	42	13.50	1.12	1.06
10	63	16.00	1.19	1.12
12	85	19.00	1.25	0.81
14	120	21.00	1.38	0.88
16	145	23.50	1.44	1.00
18	185	25.00	1.56	1.06
20	245	27.50	1.69	1.12
24	370	32.00	1.88	1.25
30	500	38.75	2.12	1.44
36	790	46.00	2.38	1.62
42	1175	53.00	2.62	1.81

Dimensions in inches. Weights in pounds.

SPECIFICATIONS
TAPS & BOSSES

TAPS & BOSSES

Flanged Fittings may be drilled and tapped if the fitting wall thickness will provide the effective thread length as shown in the following table.



DRAIN TAPPINGS

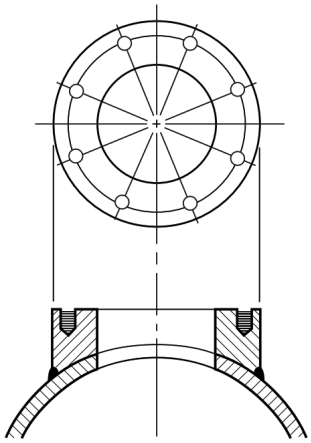
TAP SIZE	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
LENGTH of THREAD "A"	0.41"	0.53"	0.55"	0.68"	0.71"	0.72"	0.76"

These lengths are in accordance with the effective thread length as required in ANSI B2.1. If the tap size is too large to be accommodated by the standard fitting wall thickness, an integrally cast boss may be required to provide the necessary thickness for tapping.

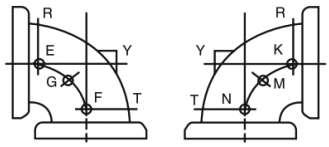
The following will serve as a guideline for maximum tap sizes into standard fitting wall thicknesses for ANSI/AWWA C110/A21.10 Flanged Fittings:

FITTING SIZE	MAXIMUM TAP SIZE without BOSS
3"	1/2"
4" - 6"	3/4"
8"	1-1/4"
10" - 16"	1-1/2"
18" x 42"	2"

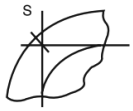
To accommodate larger size holes that are impractical to thread, it may be necessary to integrally cast a flanged boss to the fitting. In this case, a boss the size of a flange shall be integrally cast. The hole shall be cored or drilled at our option. The flange boss shall be faced and the bolt holes drilled and blind tapped so as not to interfere with the fitting wall thickness.



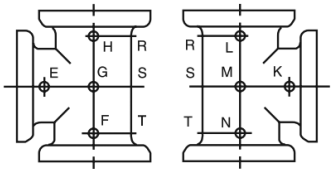
METHODS OF DESIGNATING LOCATION OF TAPPED HOLES FOR DRAINS WHEN SPECIFIED



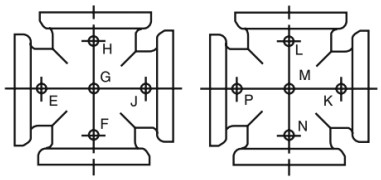
90° ELBOW
STRAIGHT SIZE



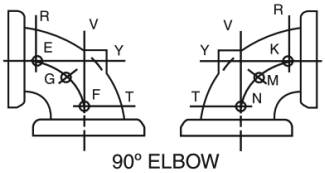
90° ELBOW



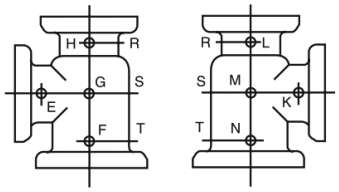
TEE
STRAIGHT SIZE



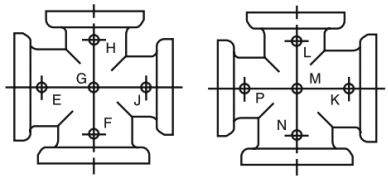
CROSS
STRAIGHT SIZE



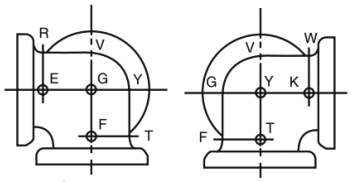
90° ELBOW
REDUCING SIZE



TEE
REDUCING SIZE

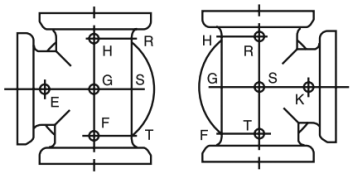


CROSS
REDUCING SIZE



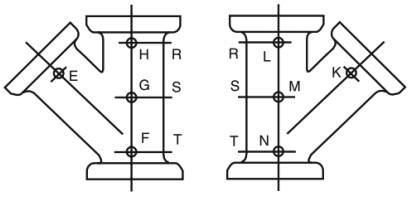
FRONT VIEW SIDE VIEW

SIDE OUTLET 90° ELBOW
STRAIGHT SIZE

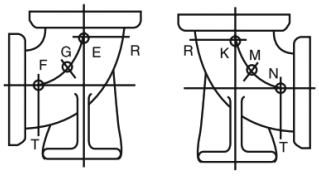


FRONT VIEW SIDE VIEW

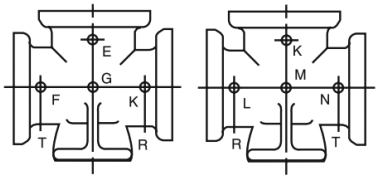
SIDE OUTLET TEE
STRAIGHT SIZE



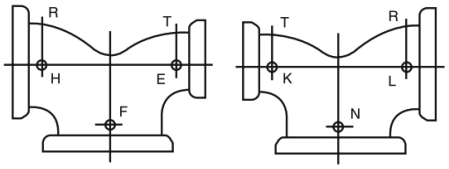
45° LATERAL
STRAIGHT SIZE



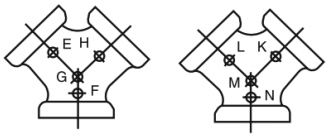
90° BASE ELBOW



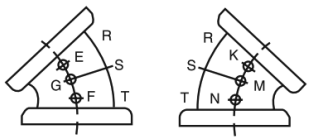
BASE TEE



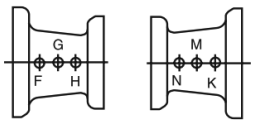
DOUBLE BRANCH ELBOW



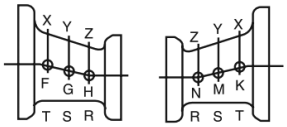
TRUE "Y"



45° ELBOW



REDUCER



ECCENTRIC REDUCER

NOTES

NOTES

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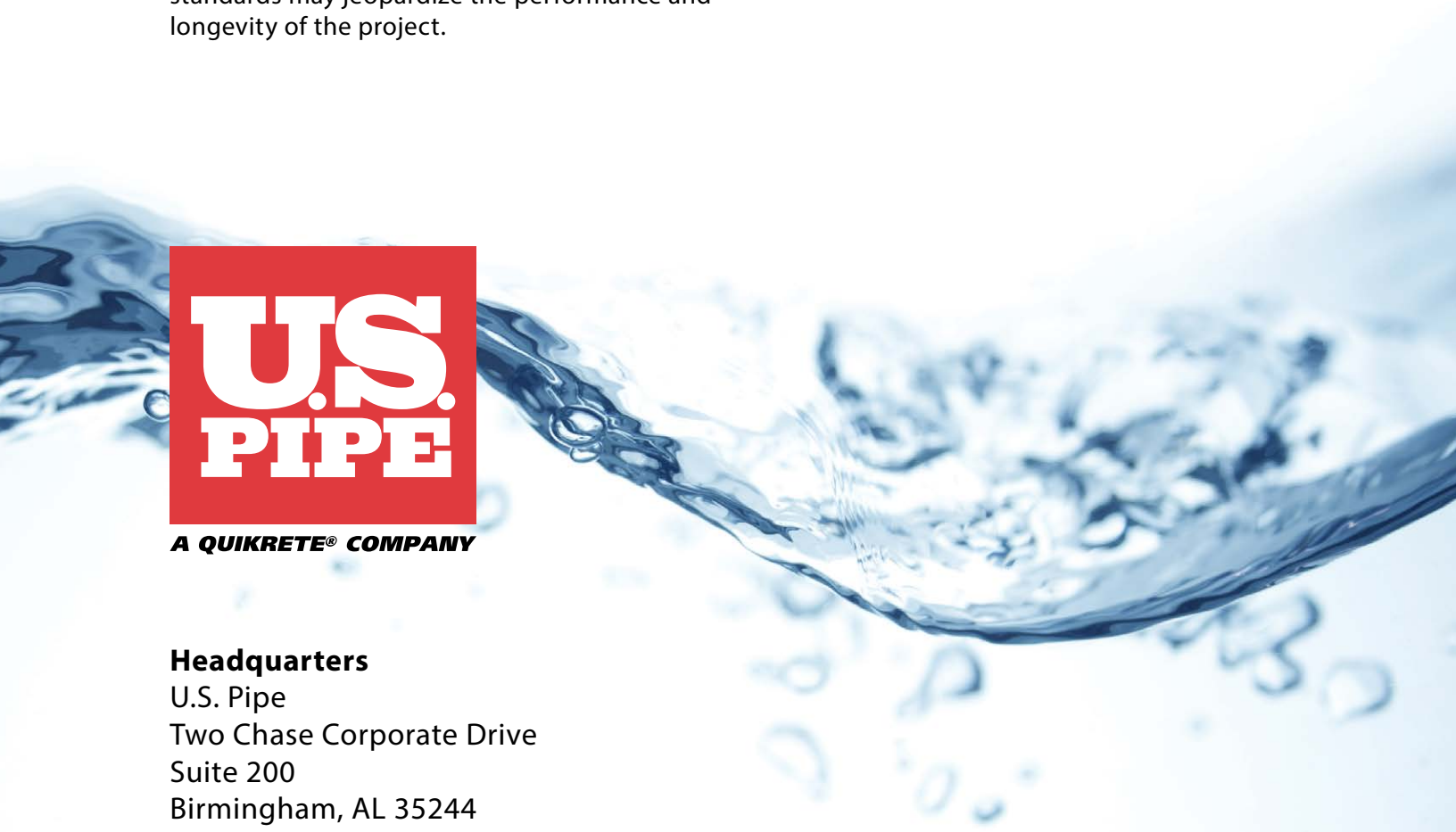
Flanged Fittings-C110 Submittal Document *(Rev. 06/2022)* Materials and specifications are subject to change without notice.

Our products are manufactured in conformance with national standards so that our customers may be assured of getting the performance and longevity they expect. Use of accessories or other appurtenances that do not comply with recognized standards may jeopardize the performance and longevity of the project.



U.S. PIPE

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Design Features and Accessories

Convenient Features & Accessories

Weir Box/Manhole Standard Features:

- Energy Absorbing Basins
- Pipe Stubs with Neoprene Boots and Stainless Steel Bands
- Head Gage in 100ths of a Foot and Centimeters
- Two Vial Bubble Level
- Energy Absorbing Basins
- Stilling Wells Integral or Detached
- Premium Grade Isophthalic Gel Coat

Weir Box/Manhole customization options:

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- Permanent Cross Ties
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- Capacitance Probe Side Cavity with Stainless Steel Ground Plate
- Top Grating or Solid Cover
- Slide Gate configuration with automated level adjustment

Weir Plates standard with:

- Pre-drilled Mounting Holes
- UV stabilized pigmented resin for long term corrosion resistance
- Standard 1/4" thick FRP
-

Optional Accessories:

- Head Gage
- Guide Frame for exchange of Plates/Gates
- Custom handles/grips
- Custom mounting accessories
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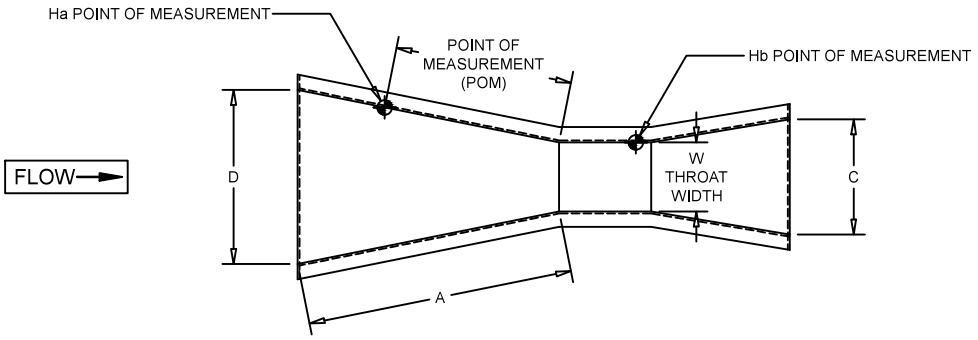
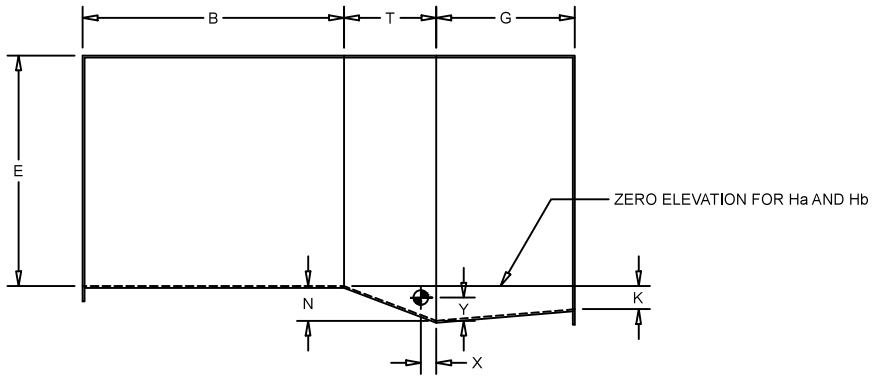


PLAN VIEW



ELEVATION VIEW

W (SIZE)	A	POM	B	C	D	E	T	G	K	N	X	Y
1" [2.54 CM]	1'-2 9/32" [36.27 CM]	9 17/32" [24.21 CM]	1'-2" [35.56 CM]	3 21/32" [9.29 CM]	6 19/32" [16.75 CM]	9" [22.86 CM]	3" [7.62 CM]	8" [20.32 CM]	3/4" [1.91 CM]	1 1/8" [2.86 CM]	5/16" [0.79 CM]	1/2" [1.27 CM]
2" [5.08 CM]	1'-4 5/16" [41.43 CM]	10 7/8" [27.62 CM]	1'-4" [40.64 CM]	5 5/16" [13.49 CM]	8 13/32" [21.35 CM]	10" [25.4 CM]	4 1/2" [11.43 CM]	10" [25.4 CM]	7/8" [2.22 CM]	1 11/16" [4.29 CM]	5/8" [1.59 CM]	1" [2.54 CM]
3" [7.62 CM]	1'-6 3/8" [46.67 CM]	1'-0 1/4" [31.12 CM]	1'-6" [45.72 CM]	7" [17.78 CM]	10 3/16" [47.23 CM]	2' [60.96 CM]	6" [15.24 CM]	1' [30.48 CM]	1" [2.54 CM]	2 1/4" [5.72 CM]	1" [2.54 CM]	1 1/2" [3.81 CM]
6" [15.24 CM]	2'-0 7/16" [62.07 CM]	1'-4 5/16" [41.44 CM]	2' [60.96 CM]	1'-3 1/2" [38.74 CM]	1'-3 5/8" [39.69 CM]	2' [60.96 CM]	1' [30.48 CM]	2' [60.96 CM]	3" [7.62 CM]	4 1/2" [11.43 CM]	2" [5.08 CM]	3" [7.62 CM]
9" [22.86 CM]	2'-10 5/8" [87.95 CM]	1'-11 1/8" [58.74 CM]	2'-10" [86.36 CM]	1'-3" [38.1 CM]	1'-10 5/8" [57.47 CM]	2'-6" [76.2 CM]	1' [30.48 CM]	1'-6" [45.72 CM]	3" [7.62 CM]	4 1/2" [11.43 CM]	2" [5.08 CM]	3" [7.62 CM]
12" [30.48 CM]	4'-6" [137.2 CM]	3' [91.44 CM]	4'-4 7/8" [134.3 CM]	2' [60.96 CM]	2'-9 1/4" [84.46 CM]	3' [91.44 CM]	2' [60.96 CM]	3' [91.44 CM]	3" [7.62 CM]	9" [22.86 CM]	2" [5.08 CM]	3" [7.62 CM]
18" [45.72 CM]	4'-9" [144.8 CM]	3'-2" [96.52 CM]	4'-7 7/8" [141.9 CM]	2'-6" [76.2 CM]	3'-4 3/8" [102.6 CM]	3' [91.44 CM]	2' [60.96 CM]	3' [91.44 CM]	3" [7.62 CM]	9" [22.86 CM]	2" [5.08 CM]	3" [7.62 CM]
24" [60.96 CM]	5' [152.4 CM]	3'-4" [101.6 CM]	4'-10 7/8" [149.5 CM]	3' [91.44 CM]	3'-11 1/2" [120.7 CM]	3' [91.44 CM]	2' [60.96 CM]	3' [91.44 CM]	3" [7.62 CM]	9" [22.86 CM]	2" [5.08 CM]	3" [7.62 CM]
36" [91.44 CM]	5'-6" [167.6 CM]	3'-8" [111.8 CM]	5'-4 3/4" [164.5 CM]	4' [121.9 CM]	5'-1 7/8" [157.2 CM]	3' [91.44 CM]	2' [60.96 CM]	3' [91.44 CM]	3" [7.62 CM]	9" [22.86 CM]	2" [5.08 CM]	3" [7.62 CM]
48" [121.9 CM]	6' [182.9 CM]	4' [121.9 CM]	5'-10 5/8" [179.4 CM]	5' [152.4 CM]	6'-4 1/4" [193.7 CM]	3' [91.44 CM]	2' [60.96 CM]	3' [91.44 CM]	3" [7.62 CM]	9" [22.86 CM]	2" [5.08 CM]	3" [7.62 CM]
60" [22.86 CM]	6'-6" [198.1 CM]	4'-4" [132.1 CM]	6'-4 1/2" [194.3 CM]	6' [182.9 CM]	7'-6 5/8" [230.2 CM]	3' [91.44 CM]	2' [60.96 CM]	3' [91.44 CM]	3" [7.62 CM]	9" [22.86 CM]	2" [5.08 CM]	3" [7.62 CM]
72" [182.9 CM]	7' [213.4 CM]	4'-8" [142.2 CM]	6'-10 3/8" [209.2 CM]	7' [213.4 CM]	8'-9" [266.7 CM]	3' [91.44 CM]	2' [60.96 CM]	3' [91.44 CM]	3" [7.62 CM]	9" [22.86 CM]	2" [5.08 CM]	3" [7.62 CM]
84" [213.4 CM]	7'-6" [228.6 CM]	5' [152.4 CM]	7'-4 1/4" [224.2 CM]	8' [243.8 CM]	9'-11 3/8" [303.2 CM]	3' [91.44 CM]	2' [60.96 CM]	3' [91.44 CM]	3" [7.62 CM]	9" [22.86 CM]	2" [5.08 CM]	3" [7.62 CM]
96" [243.8 CM]	8' [243.8 CM]	5'-4" [162.6 CM]	7'-10 1/8" [239.1 CM]	9' [274.3 CM]	11'-1 3/4" [339.7 CM]	3' [91.44 CM]	2' [60.96 CM]	3' [91.44 CM]	3" [7.62 CM]	9" [22.86 CM]	2" [5.08 CM]	3" [7.62 CM]
120" [304.8 CM]	14'-3 21/64" [435.2 CM]	6' [182.9 CM]	14' [426.7 CM]	12' [365.8 CM]	15'-7 1/4" [475.6 CM]	4' [121.9 CM]	3' [91.44 CM]	6' [182.9 CM]	6" [15.24 CM]	1'-1 1/2" [34.29 CM]	1' [30.48 CM]	9" [22.86 CM]
144" [365.8 CM]	16'-3 51/64" [497.3 CM]	6'-8" [203.2 CM]	16' [487.7 CM]	14'-8" [447.0 CM]	18'-4 3/4" [560.7 CM]	5' [152.4 CM]	3' [91.44 CM]	8' [243.8 CM]	6" [15.24 CM]	1'-1 1/2" [34.29 CM]	1' [30.48 CM]	9" [22.86 CM]

REV	REVISION DESCRIPTION	BY	DATE
1			

NOTES:
1) FLOW IS FROM LEFT TO RIGHT
2) 30" [76.2 CM] AND 42" [106.7 CM] SIZES ARE NOT ASTM / ISO STANDARD AND ARE NOT PROVIDED
3) 1-INCH [2.54 CM] AND 2-INCH [5.08 CM] SIZES SHOULD NOT BE USED ON SANITARY FLOWS

OPENCHANNELFLOW
BOISE | ATLANTA

DWG NO. PARSHALL FLUME MASTER | DATE 7.23.16

PARSHALL FLUME MASTER DIMENSIONS

Unless otherwise indicated, dimensions are in feet and inches, with centimeters indicated in [ ]. Angles are in degrees.

THE 3-INCH PARSHALL FLUME

Flume (/blog/category/flume)

In this article: parshall (/blog/tag/parshall), flume (/blog/tag/flume), flow (/blog/tag/flow), flow rate (/blog/tag/flow+rate), flow equation (/blog/tag/flow+equation), free flow (/blog/tag/free+flow), submerged flow (/blog/tag/submerged+flow), submergence

(/blog/tag/submergence), submergence transition (/blog/tag/submergence+transition), dimensions (/blog/tag/dimensions)

The 3-inch Parshall Flume (https://www.openchannelflow.com/flumes/parshall-flumes) is one of the last flumes developed in the Parshall series. The flume can be used equally well to measure sanitary flows as well as surface waters.

It is important to note that the 3-inch Parshall flume is the smallest Parshall Flume size that can be used on unscreened sanitary flows. The 1 and 2-inch Parshall flumes will clog on these flows.

Applications

3-inch Parshall Flumes can be found monitoring:

- Dam seeps
- Industrial pre-treatment
- Acid mine discharge
- Smaller surface waters
  - Creeks
  - Springs
- Packaged wastewater treatment plants
  - Headworks
  - Discharge
  - Inter-plant flows
- Small water rights & apportionment

Configurations

The 3-inch Parshall flume is available in several configurations:

- Standard (transitions by others)

- End adapters (https://www.openchannelflow.com/blog/new-parshall-flume-inlet-end-adapters) (connecting to pipes and flanges)
  - Stubs and flanges up to 16-inches [40.64 cm] can be accommodated
  - Staged end adapters to fit into existing manholes
- Metering manholes (https://www.openchannelflow.com/manholes/packaged-metering-manholes/flume-manholes) (factory integration of a flume into a fiberglass manhole)
  - 3-inch Parshall Flumes can be integrated into manholes 48-inch [1.22 m] and larger in diameter
- Wing Walls
  - To span rectangular channels

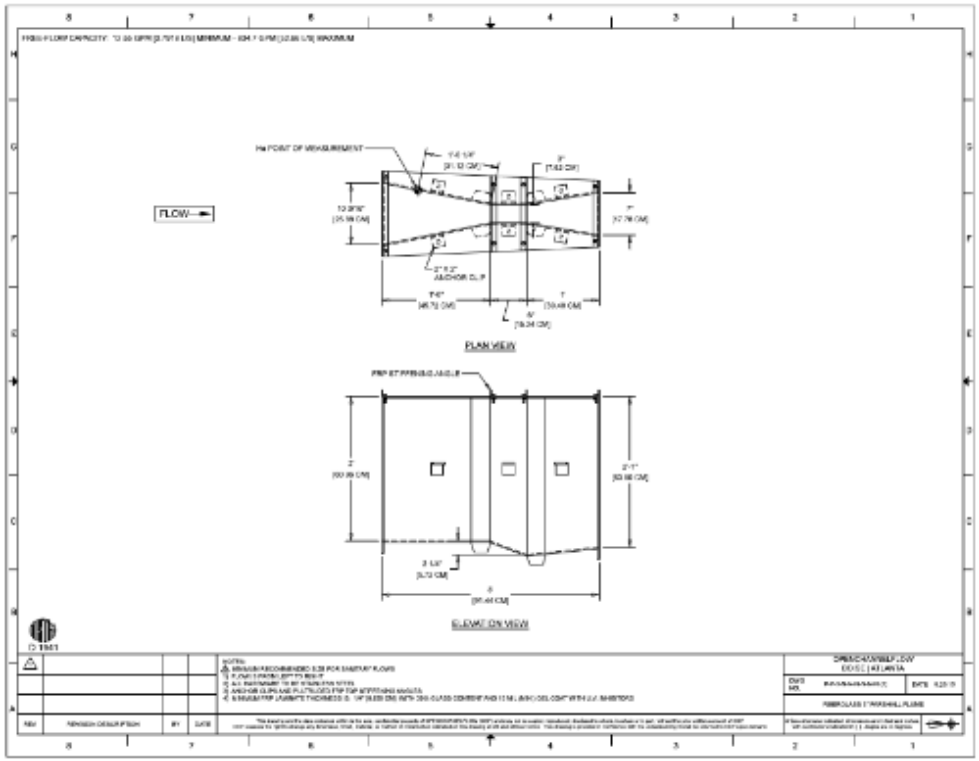
Flume Accuracy

Under lab conditions, a Parshall Flume can be accurate to within +/-2% but practically speaking, once approach conditions, installation errors, and construction tolerances are considered, the flume's free-flow accuracy is normally closer to +/-5% (ASTM D1941 (http://www.astm.org/Standards/D1941.htm)).

A universal flow equation (https://www.openchannelflow.com/blog/universal-equation-parshall-flume-submergence) is available to correct the flow rate in a 3-inch Parshall Flume should it become submerged.

Likewise, a correction (https://www.openchannelflow.com/flumes/parshall-flumes/settling) for settling has been developed.

Flume Dimensions



(https://www.openchannelflow.com/assets/uploads/documents/fiberglass-3-inch-parshall-flume-dimensions.pdf)

Parshall Flumes are not scale models of each - particularly the smaller sizes. Never use intermediate or untested sizes.

Also, unlike the first (6 to 96-inches) and second (120-inches and up) series of Parshall Flumes developed, the 3-inch flume does not have defined sidewalls heights but instead is listed with a range.

Openchannelflow 3-inch Parshall Flumes are provided with 24-inch [60.96 cm] high sidewalls for maximum operating range.

Free-Flow Equation

The free-flow equation for Parshall Flumes is:

$$Q = KH_a^n$$

Q = free-flow rate (cfs / m3/s)
K = flume discharge constant (varies by flume size / system of units)
Ha = depth at the point of measurement (feet / meters)
n = discharge component (dimensionless, depends upon flume size)

For the 3-inch Parshall Flume, the values are:

Minimum Head (ft)	0.10	Minimum Head (m)	0.0305
Minimum Flow Rate (cfs)	0.0280	Minimum Flow Rate (l/s)	0.7918
Maximum Head (ft)	1.50	Maximum Head (m)	0.4572
Maximum Flow Rate (cfs)	1.860	Maximum Flow Rate (l/s)	52.67
Equation (cfs, ft)	$0.992*H^{1.55}$	Equation (l/s, m)	$176.5*H^{1.55}$

Contact Us (/support/contact-us)

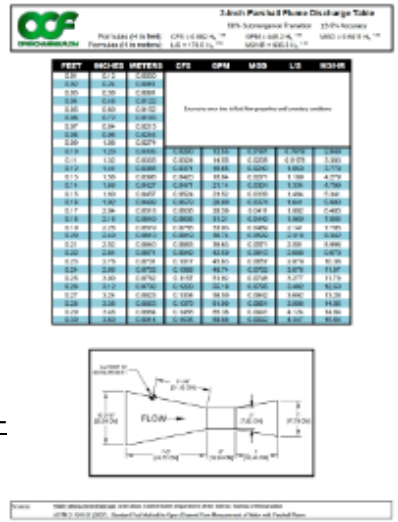
Discharge Table

(https://www.openchannelflow.com/assets/uploads/documents/3-inch_parshall_flume_discharge_table.pdf)Openchannelflow's free-flow discharge table for the 3-inch Parshall is available for download (https://www.openchannelflow.com/assets/uploads/documents/3-inch_parshall_flume_discharge_table.pdf).

The table provides:

- A plan view showing the primary point of measurement ($H_{a)}$
- Discharge equations in a variety of Imperial and SI units
- Flume accuracy

- Submergence Transition (S_t)
- Table source



Materials

The 3-inch Parshall Flume from Openchannelflow is available in several different materials:

- Aluminum (https://www.openchannelflow.com/flumes/parshall-flumes/aluminum-parshall-flumes)
- Fiberglass (FRP) (https://www.openchannelflow.com/flumes/parshall-flumes/fiberglass-frp-parshall-flumes)
- Galvanized steel (https://www.openchannelflow.com/flumes/parshall-flumes/galvanized-steel-parshall-flumes)
- Stainless steel (https://www.openchannelflow.com/flumes/parshall-flumes/stainless-steel-parshall-flumes)

Of these materials, fiberglass is the most easily customized.

Submergence Transition

The Submergence Transition (S_t) (https://www.openchannelflow.com/flumes/parshall-flumes/submergence) of a flume is that point at which the downstream conditions sufficiently reducer the discharge out of the flume that the indicated flow rate needs to be corrected.

$$S = \frac{H_b}{H_a}$$

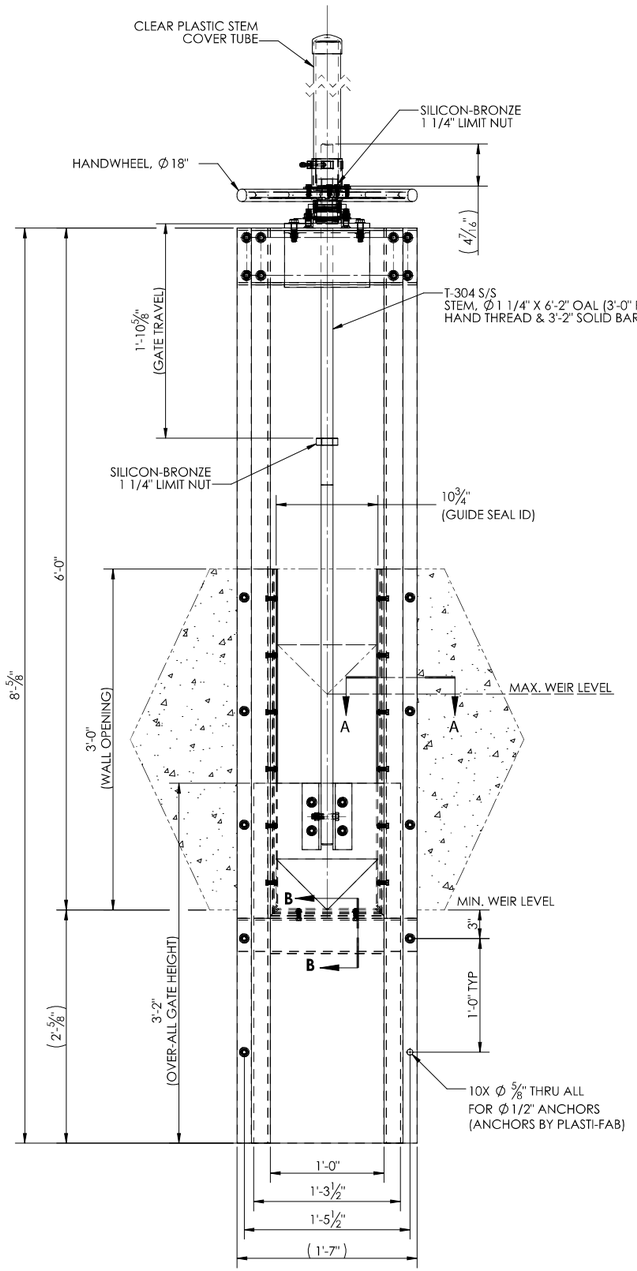
S = submergence ratio
S_t = submergence transition
Ha = depth at the primary point of measurement (feet / meters)
Hb = depth at the primary point of measurement (feet / meters)

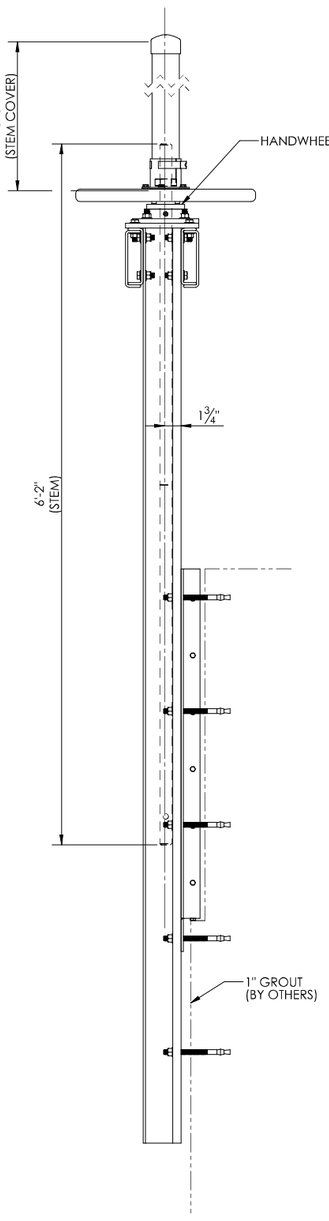
The Submergence Transition for the smaller Parshall Flumes (1, 2, 3-inch) is 50%. At this point and the discharge needs to be adjusted to reflect the actual flow rate.

Contact Us (/support/contact-us)

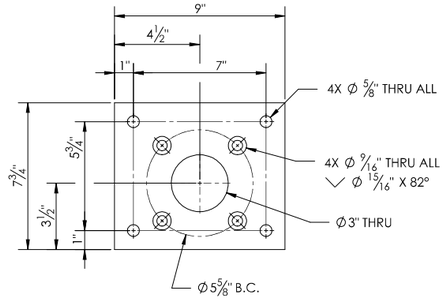
RELATED ARTICLES

(https://www.openchannelflow.com/blog/2-methods-of-keeping-parshall-flumes-free-of-algae)

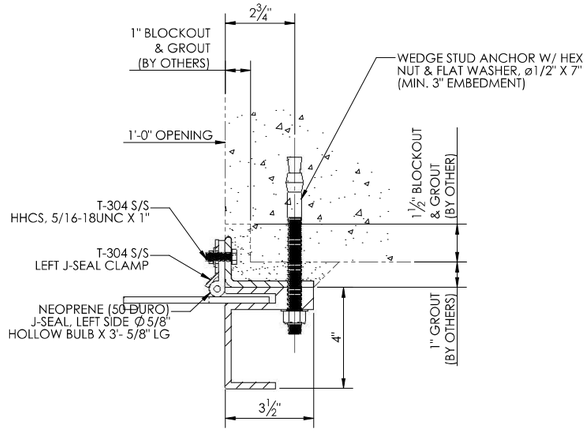




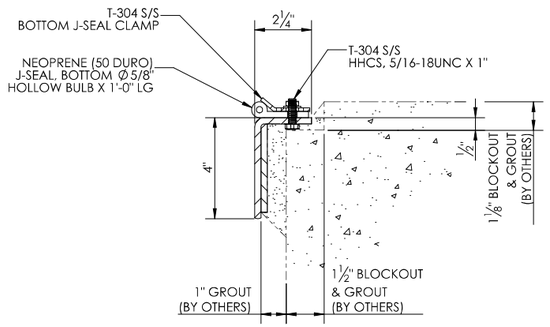
DOWNWARD OPENING WEIR GATE DETAIL



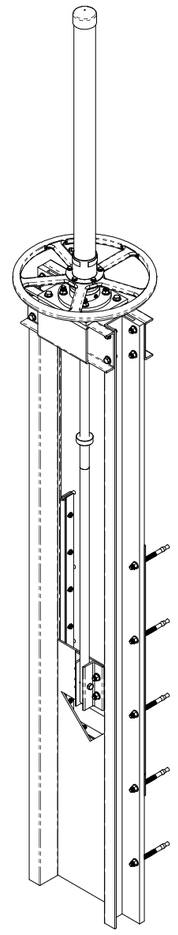
STAINLESS STEEL TOP PLATE DETAIL



SECTION A-A
SCALE 1 : 3



SECTION B-B
SCALE 1 : 3



NOTES:

1. GATE COLOR IS GRAY.
2. GATE IS FRP (FIBERGLASS REINFORCED PLASTIC).
3. GUIDE FRAME MATERIAL IS PULTRUDED FRP (FIBERGLASS REINFORCED PLASTIC).
4. ALL JOINTS ARE BONDED WITH PLEXUS MA-300.
5. ALL NUTS, BOLTS, & WASHERS ARE T-304 S/S.

PROJECT:	Plasti-Fab® TUALATIN, OR.	**PLASTI-FAB PART NUMBER:**	**TITLE:** FRP DOWNWARD OPENING WEIR GATE ASSEMBLY
CUSTOMER:	UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN FEET/INCHES	**MATERIAL INFORMATION:** -	QUANTITY (1) ONLY
REP:		**SPECIAL FINISH REQUIREMENT:**	
P.O. NO:	TOLERANCES UNLESS OTHERWISE SPECIFIED.		
PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF PLASTI-FAB. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSIONOF PLASTI-FAB IS PROHIBITED.	≤ 6'-0" ± 1/16"	NAME: DATE:	SIZE DRAWING NO.: REV.
	> 6'-0" AND ≤ 25'-0" ± 1/8"	DRAWN BY:	
	> 25'-0" ± 1/2"	CHECKED BY:	WEIGHT: 193 SCALE: 1:8 SHEET:

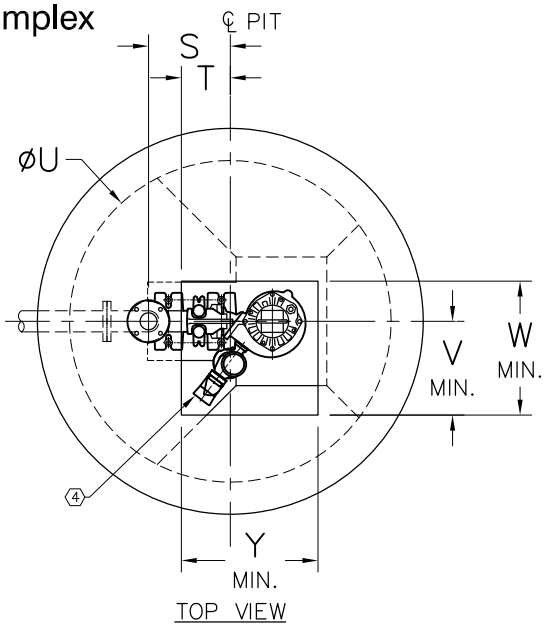
EQUALIZATION LIFT STATION

CP/DP/NP-3085

NOTES:

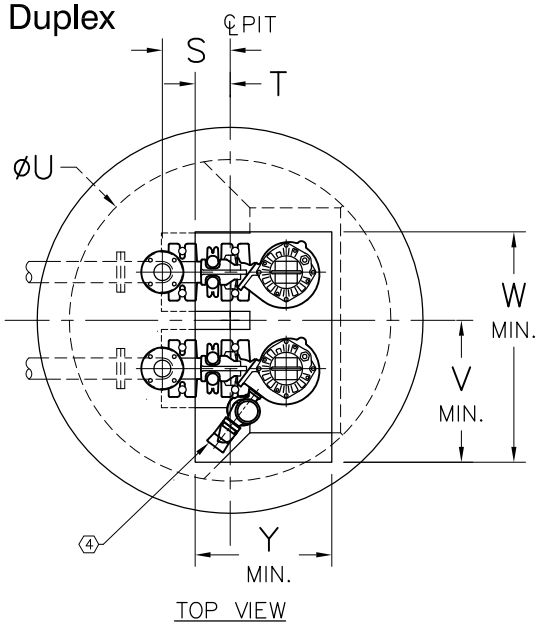
1. CONFIGURATION AND DIMS. SHOWN ARE SUGGESTED REQUIREMENTS ONLY. ALL DETAILS, INCLUDING SIZING OF PIT, TYPE, LOCATION AND ARRANGEMENT OF VALVES AND PIPING, ETC. ARE TO BE SPECIFIED BY THE CONSULTING ENGINEER AND ARE SUBJECT TO THEIR APPROVAL.
2. REFERENCE GENERIC DUPLEX LIFT STATION LAYOUT FOR ELEVATION VIEW.
3. LOCATE ANCHOR BOLTS USING INSIDE EDGE OF CLEAR OPENING AND PUMP CENTERLINE AS REFERENCE POINT. BOLT LOCATIONS MUST BE HELD TO MAINTAIN EXACT POSITION OF PUMP TO CLEAR OPENING.
4. FLYGT MIX-FLUSH VALVE.

Simplex

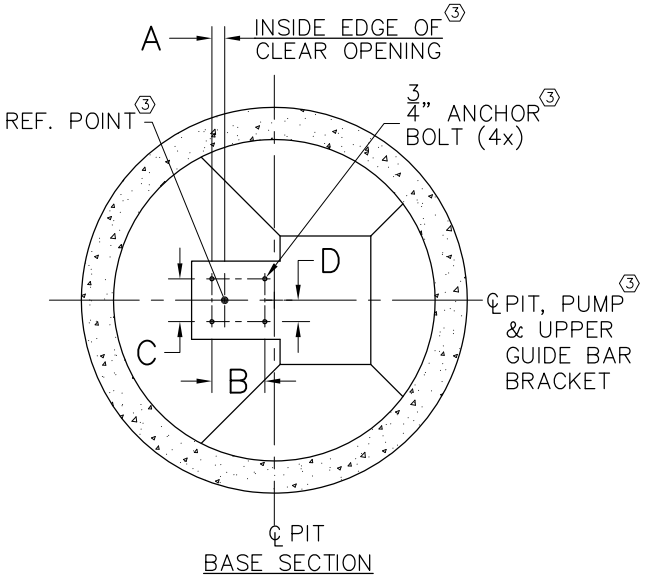


TOP VIEW

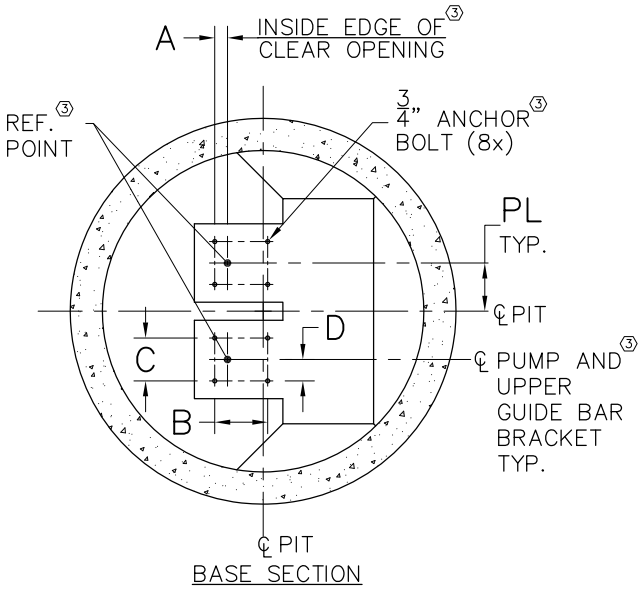
Duplex



TOP VIEW



BASE SECTION



BASE SECTION

ALL DIMENSIONS ARE IN INCHES

MODEL	NOM. SIZE	VERSION	A	B	C	D	SIMPLEX S	T	U	V	W	Y	DUPLEX S	T	U	PL	V	W	Y
NP	3"	SH	2 3/8	9 7/8	8	4	15 1/4	9 1/8	60	17 1/2	15	24 1/2	13	6 7/8	60	8	25 1/2	31	24 1/2
CP	3"	HT	2 3/8	9 7/8	8	4	15 1/4	9 1/8	60	17 1/2	25	24 1/2	13	6 7/8	60	8	25 1/2	41	24 1/2
DP	3"	HT	2 3/8	9 7/8	8	4	15 1/4	9 1/8	60	7 1/2	15	24 1/2	13	6 7/8	60	8	15 1/2	31	24 1/2
CP/DP/NP	3"	MT	2 3/8	9 7/8	8	4	15 1/4	9 1/8	60	17 1/2	25	25 1/2	12 5/8	6 1/2	60	9	26 1/2	43	25 1/2
CP/DP/NP	4"	MT	2 3/4	9 7/8	8	4	13 3/4	7 1/4	60	17 1/2	25	25 1/2	10 7/8	4 3/8	60	9	26 1/2	43	25 1/2

Flygt C-pumps 3068–3800

SUBMERSIBLE WASTE AND RAW WATER PUMPS

FLYGT
a xylem brand

Flygt submersible pumps for a variety of applications

Submersibles Flygt pumps operate directly in the liquid being pumped, which means they require neither special housing nor a superstructure to support them, considerably reducing construction costs. They are smaller than non-submersible counterparts as the motor and hydraulics are integrated into one compact unit, resulting in smaller pumping stations that are less complex to build. Operating submerged they take up less space, and noise and cooling problems are virtually eliminated.

This series of pumps has an extensive performance range and can be used in a variety of applications:

- **Pumping sewage in municipal applications**
- **Irrigation**
- **Industrial effluent**
- **Cooling water**
- **Storm water**
- **Process water**
- **Raw water**

An extensive range of hydraulic units, such as impeller and volute, are available to handle different types of media. The application ranges up to approx. 3000 l/s.
A variety of drive units, with motor ratings up to 680 kW 50 Hz, 1040 hp/775 kW 60 Hz are also available. The standard version of these pumps are made in cast iron and for more demanding applications the pumps can be supplied in industrial configurations. Explosion-proof versions are also available.

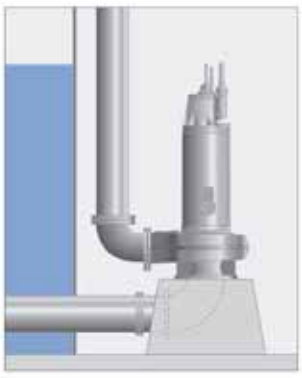
Methods of installation

To reduce the cost of installation Xylem has standardized many of the main elements of pumping stations so that they can be combined to match specific site conditions.

The examples illustrated here show the flexibility of the system, and provide some guidelines for optimizing the design of your own station.

CP – For semi-permanent wet well installations. The pump is installed with twin guide bars on a discharge connection.

CS – A semi-permanent, free-standing installation. Transportable version with pipe or hose connection.



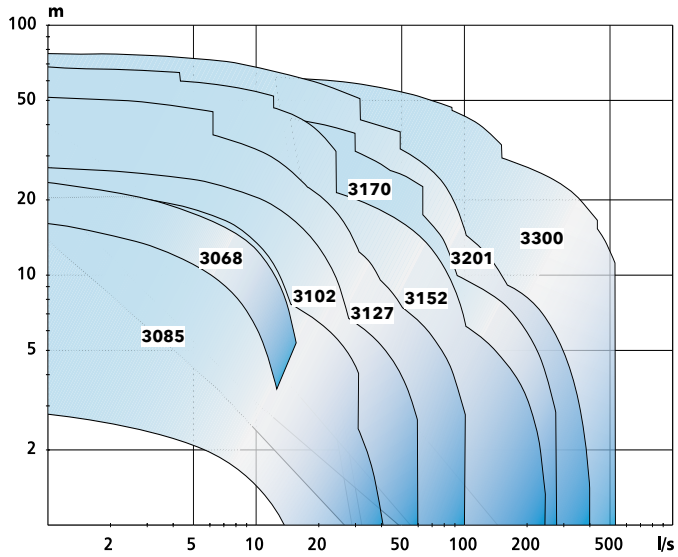
CT – A vertically-mounted, permanent dry well or in-line installation with flange connections for suction and discharge pipe work.

CZ – A horizontally-mounted, permanent dry well or in-line installation with flange connections for suction and discharge pipe work.

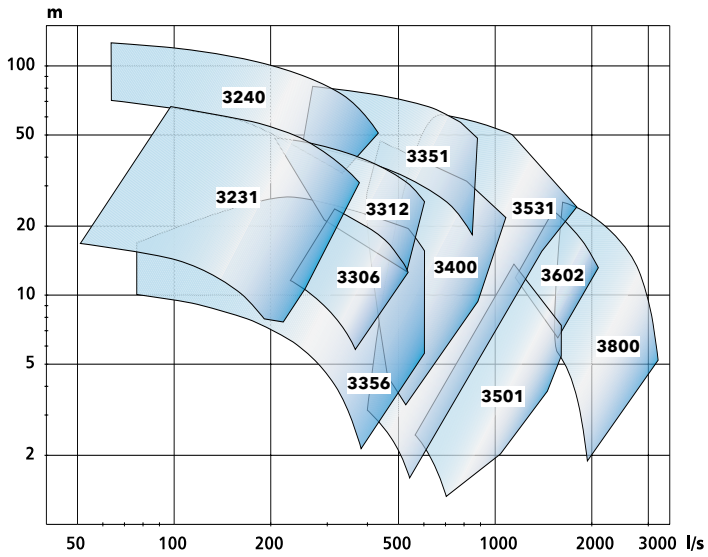
General performance range up to 3000 l/s

Flygt C-pumps

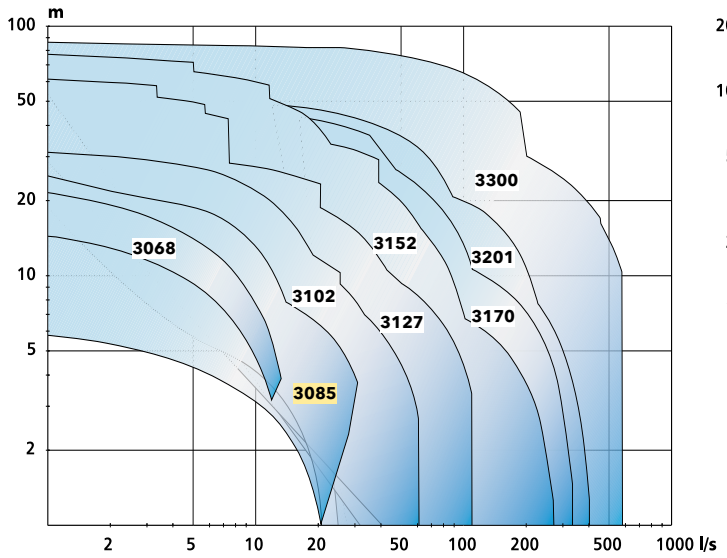
C3000 50Hz



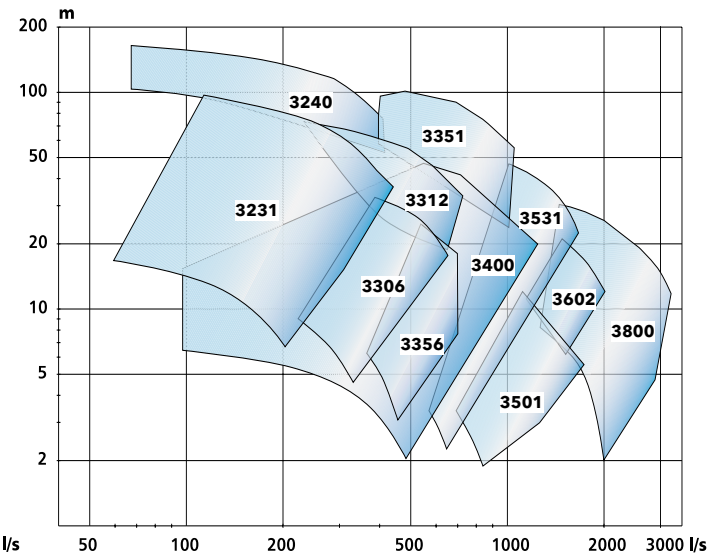
C3001 50Hz



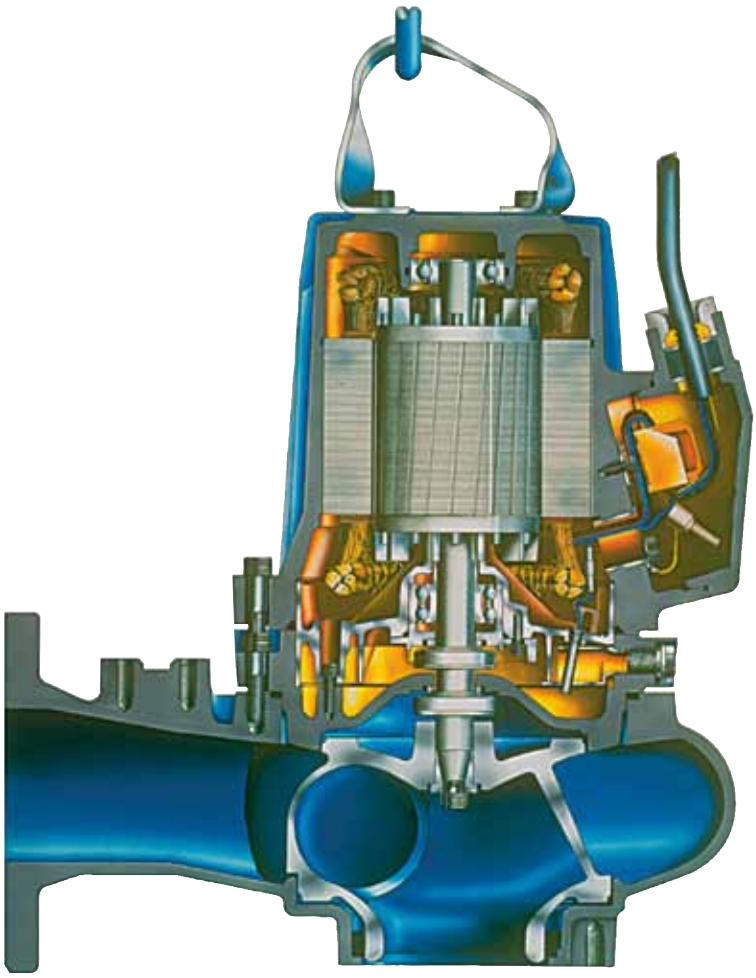
C3000 60Hz



C3001 60Hz



Product quality in every detail



Motor

Squirrel cage, high performance induction motor, specially designed and manufactured by Xylem for submersible use. Stator windings are trickle impregnated in resin to class H insulation and rated at 180° C (355° F). Many units provide up to 30 starts per hour.

Shaft

A short overhang of the shaft virtually eliminates shaft deflection. This results in significantly increased seal and bearing life, low vibration and quiet operation.

Seals

Two sets of mechanical shaft seals that work independently for double security. Designed, patented and manufactured by Xylem.

Oil housing

In addition to lubricating the seals, the food-grade oil filled compartment diffuses heat from the motor and the bearings. The housing also provides additional security against penetration by liquids.

Impeller

The Flygt Nevaclog® impeller is designed specially for smaller Flygt C-pumps. Our Flygt Nevaclog® has exellent flow passing properties, because parts that might cause clogging in the impeller channel have been eliminated. This, coupled with the volute's design is what enables wastewater to flow freely.

Seal wear protection

Spin-out™ is a patented design that protects the outer seal by expelling abrasive particles from the seal chamber. As an integral part of the cast-iron housing, Spin-out™ is as simple as it is effective.

Monitoring

Thermal sensors embedded in the stator windings help prevent overheating. Leakage sensors in the stator and oil housings, together with external monitoring equipment, are available as options.

Cable entry

The cable entrance is designed to incorporate both a seal and a strain relief function.

International standards approvals

All pumps are tested and approved in accordance with national and international standards (IEC 34-1 CSA). They are also available in explosion-proof versions – Factory Mutual and European Norm (FM and EN) approvals.

Cooling System

In normal applications the surrounding liquid cools the pump motor. In more demanding applications, or when dry installed, the pumps can be fitted with an integrated cooling system.

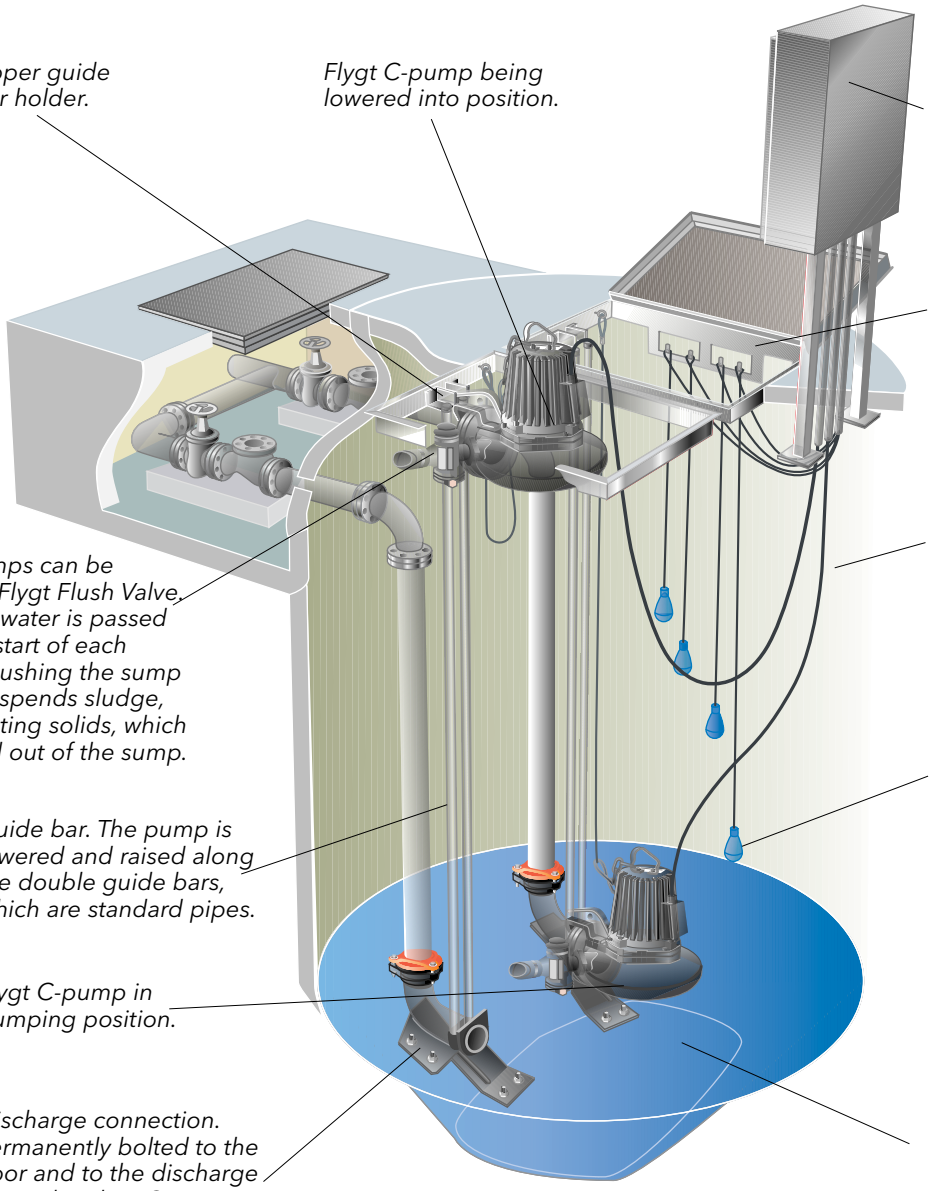
Impeller

The multi-vane impellers for bigger pumps are designed for optimum hydraulic efficiency. The impellers are dynamically balanced and machined to match the requested duty point.
The area in the pump housing at the upper and lower shroud of the impeller has a labyrinth seal design to prevent leakage and clogging, thus improve the efficiency. Replaceable wear rings are standard.

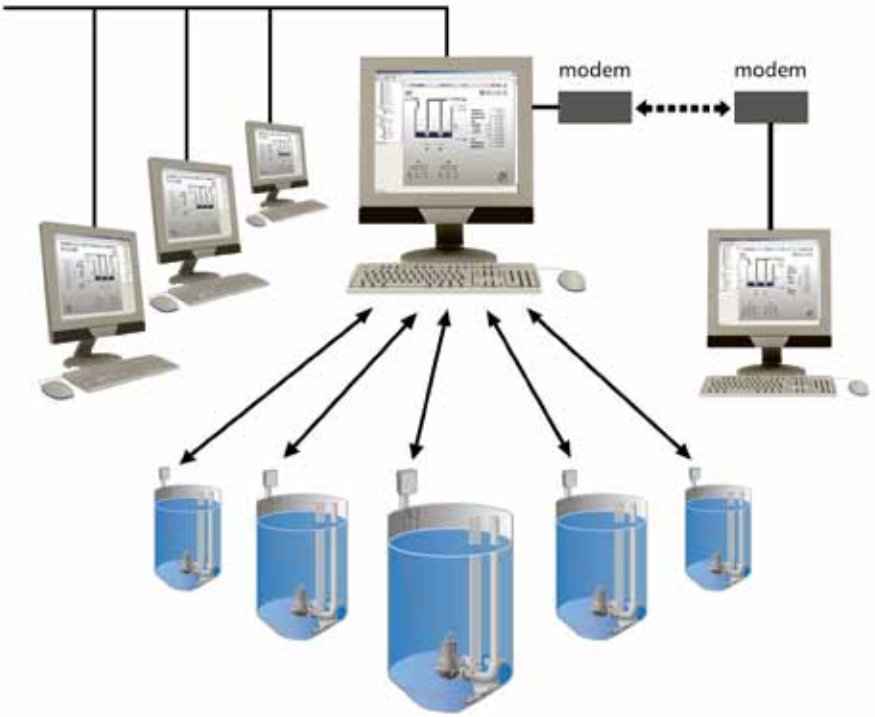
Accessories for trouble-free, efficient pumping

Supplying customers with problem-free solutions is our goal at Xylem – and that means more than simply supplying the correct pump for your particular application.

The following are examples of some of the ancillary equipment and systems which we can supply as aids to improving the all-round efficiency of your operation.



Monitoring and control equipment



Intelligent systems for pumps and mixers

At Xylem we produce monitoring and control systems for a wide range of pumps and mixers. Our systems offer lower maintenance costs, reliability, long life and reduced energy consumption.

As well as supplying the hardware, such as pump controllers, sensors, electrical start equipment and cables, we also have software for running the system. The Flygt AquaView supervision software provides the PC-based SCADA know-how.

Our systems can be used to run and monitor applications working in sewage treatment plants, sewage and drainage pumping and mixing.

World-wide service, world-class value

No two pumping stations and systems will be alike, so the level of maintenance and support that you require from your service partner will differ according to your situation. With Xylem, you can choose the type of support package that precisely meets your needs.

From simply supplying pumps to your specifications, to full service assistance on system planning, design, construction, implementation, operation or maintenance: Xylem's total service concept means that you get the service you need, on your terms.

15-year spare parts guarantee

We guarantee availability of spare parts for at least 15 years after we stop production of a pump model. This is just one of the ways in which Xylem meets its long-term commitment to customers.

Xylem [ˈzīləm]

1) The tissue in plants that brings water upward from the roots
2) A leading global water technology company

We're 12,000 people unified in a common purpose: creating innovative solutions to meet our world's water needs. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. We move, treat, analyze, and return water to the environment, and we help people use water efficiently, in their homes, buildings, factories and farms. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise, backed by a legacy of innovation.

For more information on how Xylem can help you, go to xyleminc.com.

xylem
Let's Solve Water

Flygt is a brand of Xylem. For the latest version of this document and more information about Flygt products visit **www.flygt.com**

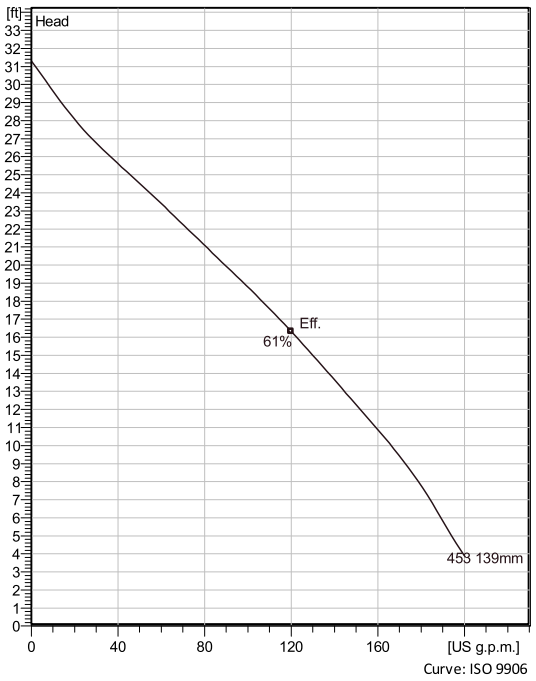
894002 . C-pumps . 1 . Master . 1 . 20111121

NP 3085 SH 3~ Adaptive 453

Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Modular based design with high adaptation grade.

Technical specification

Curves according to: Water, pure Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

Configuration

Motor number
N3085.070 15-10-4AL-W 3hp

Installation type
P - Semi permanent, Wet

Impeller diameter
139 mm

Discharge diameter
3 inch

Pump information

Impeller diameter
139 mm

Discharge diameter
3 inch

Inlet diameter
80 mm

Maximum operating speed
1700 rpm

Number of blades
2

Max. fluid temperature
40 °C

Material

Impeller
Hard-Iron ™

Stator housing material
Grey cast iron

Project	Xylect-20260235	**Created by**	Carlos Miranda		
Block		**Created on**	7/2/2024	**Last update**	7/2/2024

NP 3085 SH 3~ Adaptive 453

Technical specification

Motor - General

Motor number N3085.070 15-10-4AL-W 3hp	**Phases** 3~	**Rated speed** 1700 rpm	**Rated power** 3 hp
ATEX approved FM	**Number of poles** 4	**Rated current** 4.3 A	**Stator variant** 12
Frequency 60 Hz	**Rated voltage** 460 V	**Insulation class** H	**Type of Duty** S1
Version code 070			

Motor - Technical

Power factor - 1/1 Load 0.83	**Motor efficiency - 1/1 Load** 78.1 %	**Total moment of inertia** 0.216 lb ft²	**Starts per hour max.** 30
Power factor - 3/4 Load 0.77	**Motor efficiency - 3/4 Load** 79.1 %	**Starting current, direct starting** 22 A	
Power factor - 1/2 Load 0.66	**Motor efficiency - 1/2 Load** 77.4 %	**Starting current, star-delta** 7.34 A	

Project	Xylect-20260235	**Created by**	Carlos Miranda		
Block		**Created on**	7/2/2024	**Last update**	7/2/2024

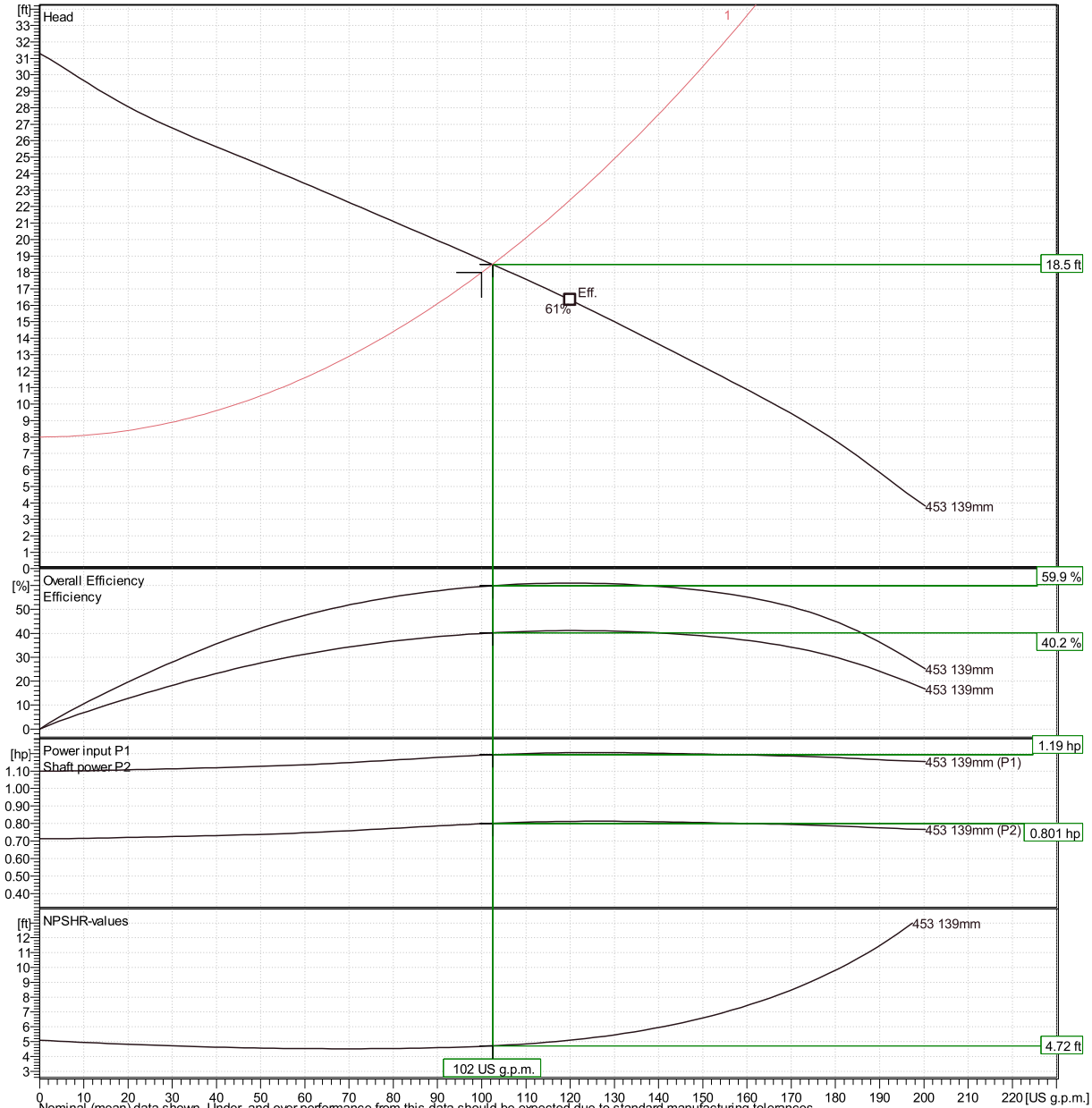
NP 3085 SH 3~ Adaptive 453

Performance curve

Duty point

Flow	Head
102 US g.p.m.	18.5 ft

Curves according to: Water, pure Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

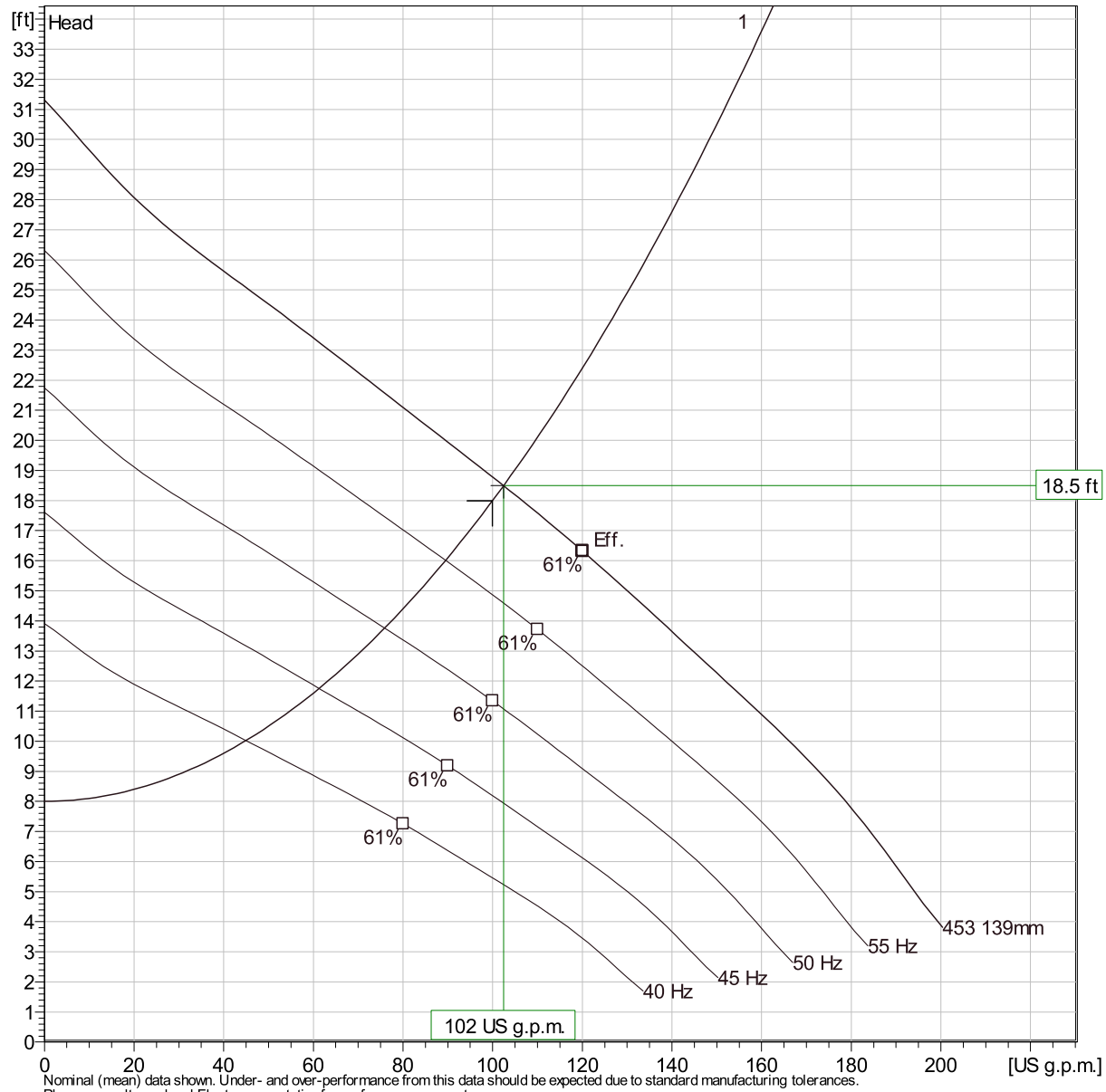
Curve: ISO 9906

Xylect-20260235	Carlos Miranda		
Created on	7/2/2024	**Last update**	7/2/2024

NP 3085 SH 3~ Adaptive 453

Duty Analysis

Curves according to: Water, pure [100%] ; 39.2°F; 62.42lb/ft³; 1.6891E-5ft²/s



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

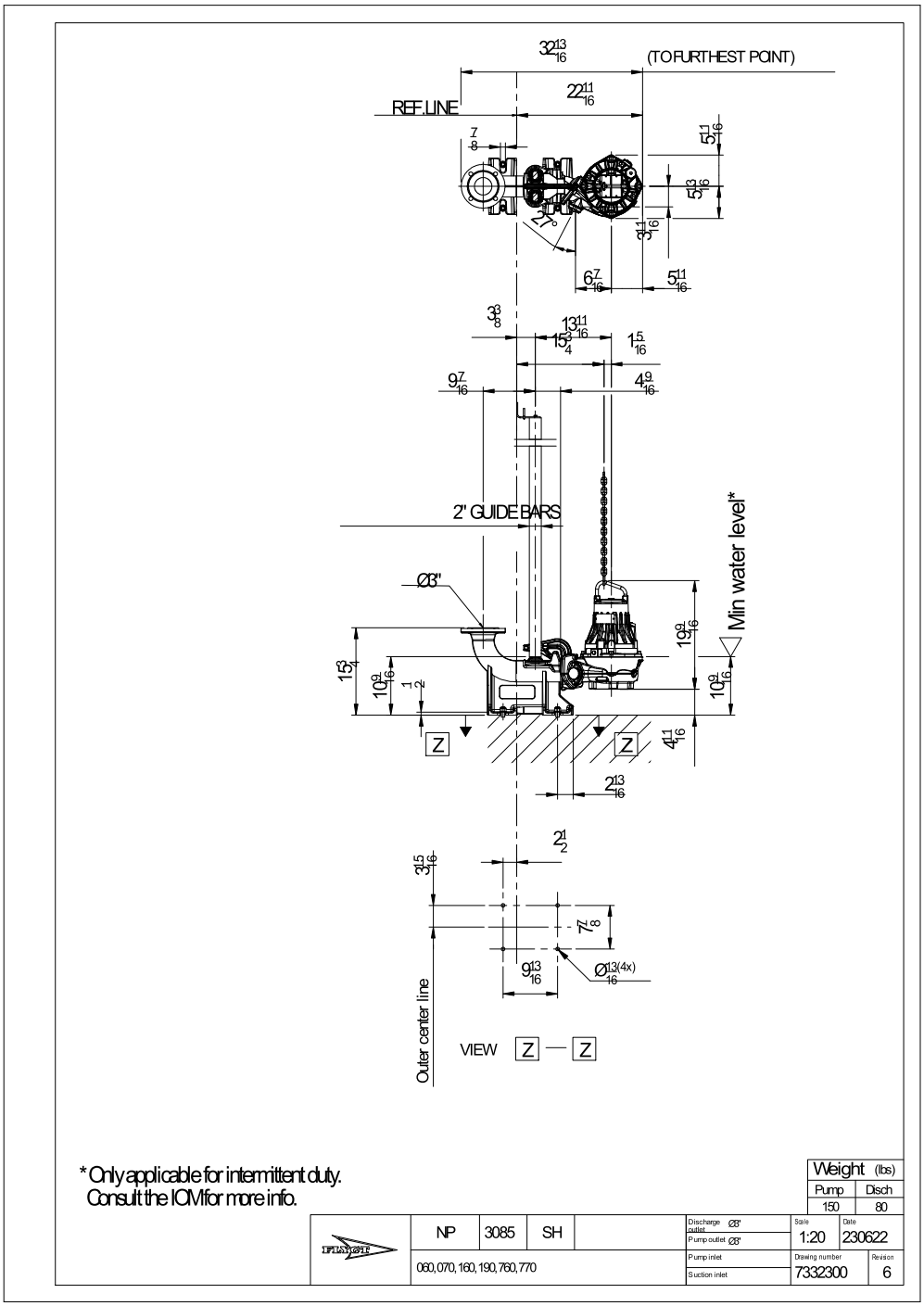
Operating characteristics

Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Spec. Energy	NPSHre
	US g.p.m.	ft	hp	US g.p.m.	ft	hp		kWh/US MG	ft
1	102	18.5	0.801	102	18.5	0.801	59.9 %	145	4.72

Project		**Created by**	Carlos Miranda		
Block	Xylect-20260235	**Created on**	7/2/2024	**Last update**	7/2/2024

NP 3085 SH 3~ Adaptive 453

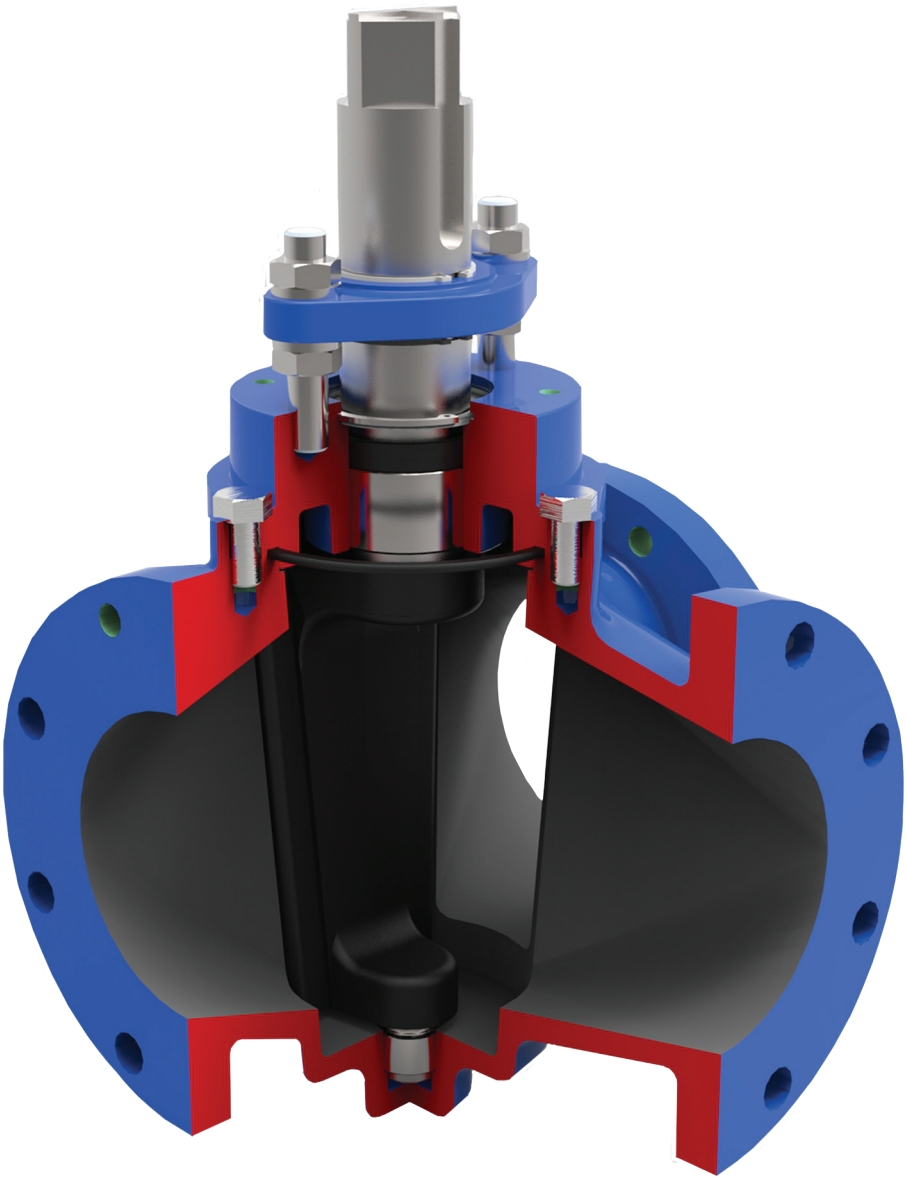
Dimensional drawing



Project	Xylect-20260235	**Created by**	Carlos Miranda
Block		**Created on**	7/2/2024 **Last update** 7/2/2024

RAS/WAS PUMP STATION

MILLIKEN®



MILLCENTRIC®
100% Port 3-WAY PLUG VALVE

Milliken® Millcentric® 100% Port 3-way Plug Valve

Quality, reliability, safety and value are the criteria embodied in the Millcentric 100% Port 3-Way plug valve.

High quality manufacturing processes from advanced CAD engineering to CNC machining ensure reliable operation with high flow capability.

The Millcentric 100% Port 3-Way plug valve is designed for regulation, diversion and isolation of water (clean or dirty) and sludge and slurries. The single tapered plug design can be arranged to provide a wide selection of flow configurations.

High flow and large solids passage is a key feature of the Millcentric 100% Port 3-Way valve; a 3" round solid can pass through a 4" valve without compression.

Although the regular usage of a Millcentric 3-Way valve is for flow diversion applications, the valve can provide tight shut-off, which is factory set when requested at order placement. (Not available with double-style plug or on 14" and 16" valves).

Body & Seat

The Millcentric 3-Way valve body is a high integrity casting in cast iron ASTM A126 Class B. The precision machined, internal tapered surface of the body is the valve seat which is provided with a corrosion and erosion resistant epoxy coating. Other materials are available.

End Connections

The 3-flanges are to ASME/ANSI B16.1 Class 125 flat faced.

Certain sizes of valve require some tapped bolt holes because of limited access for nuts behind the flange, details are shown on page 5.

Plug

The ductile iron plug is totally encapsulated (3" thru 12") with a molded and vulcanized elastomer providing sealing and tight shut-off. For tight shut-off applications, it is advisable that the flow is against the rear of the plug. Tight shut-off not available with double-style plug or on 14" and 16" valves.

A large-diameter stem and upper and lower trunnion are integral with the plug casting. The upper end of the stem has a 2" square drive for wrench operation and also 2 keyways for maximum versatility when mounting gear operators. A cast marking on the end of the shaft indicates the plug face orientation.

The single style plug is standard in the Millcentric 3-Way valve to provide straight-through and 90º flow paths. A double-style plug is optionally available upon request (not tight shut-off).

Bearings

The plug rotates in permanently lubricated, corrosion resistant stainless steel bearings in the body and bonnet.

Bonnet Seal

The bolted bonnet is assembled in a precision location in the body and uses superior 'O'-Ring sealing, with metal to metal contact, providing lower stress compared to traditional gaskets.

Stem Seal

Multiple self-adjusting U-cup seals provide positive stem sealing with trouble-free service.

Operation

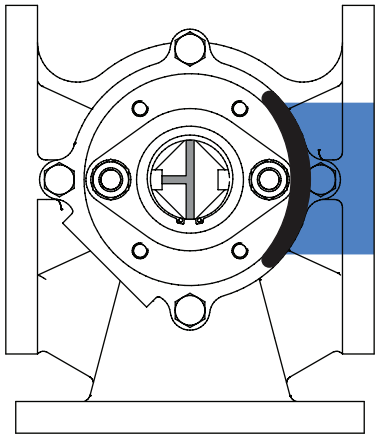
Manual operation by lever or gear available on all sizes. Chainwheel operation is also available.

Electric or pneumatic actuation is available on request.

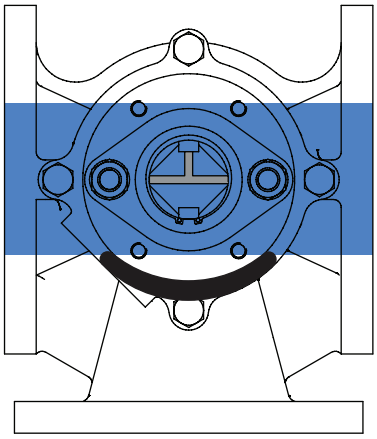
Coating

The valve interior and exterior surfaces are coated with 10-12 mils of 2-Part epoxy.

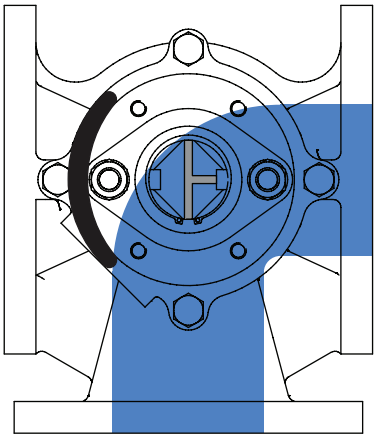
Available Flow Paths



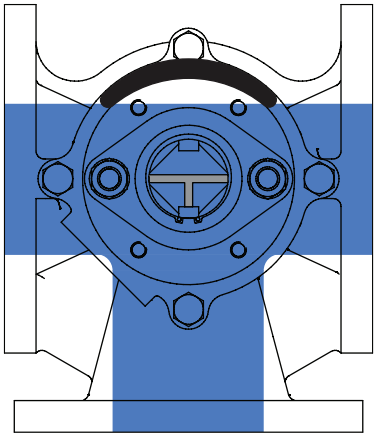
Valve in closed position*



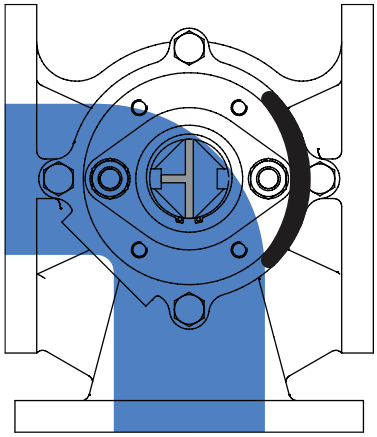
Flow straight through valve



Flow through 90° to side port



All 3 ports connected and open



Flow through 90° to side port

*It is advisable that the flow is against the rear side of the plug for tight shut-off applications. Not available with double-style plug.

Pressure/Temperature ratings

Flange rating to ASME/ANSI B16.1 Class 125, the maximum cold working pressure for all sizes is 175psi.

The operating temperature of the valve may depend on the elastomer used for the plug and seals. Refer to the elastomer selection guide on page 4.

Installation

The Millcentric® 3-Way valve can be installed in any orientation although it is advisable to have the valve stem vertical for ease of access.

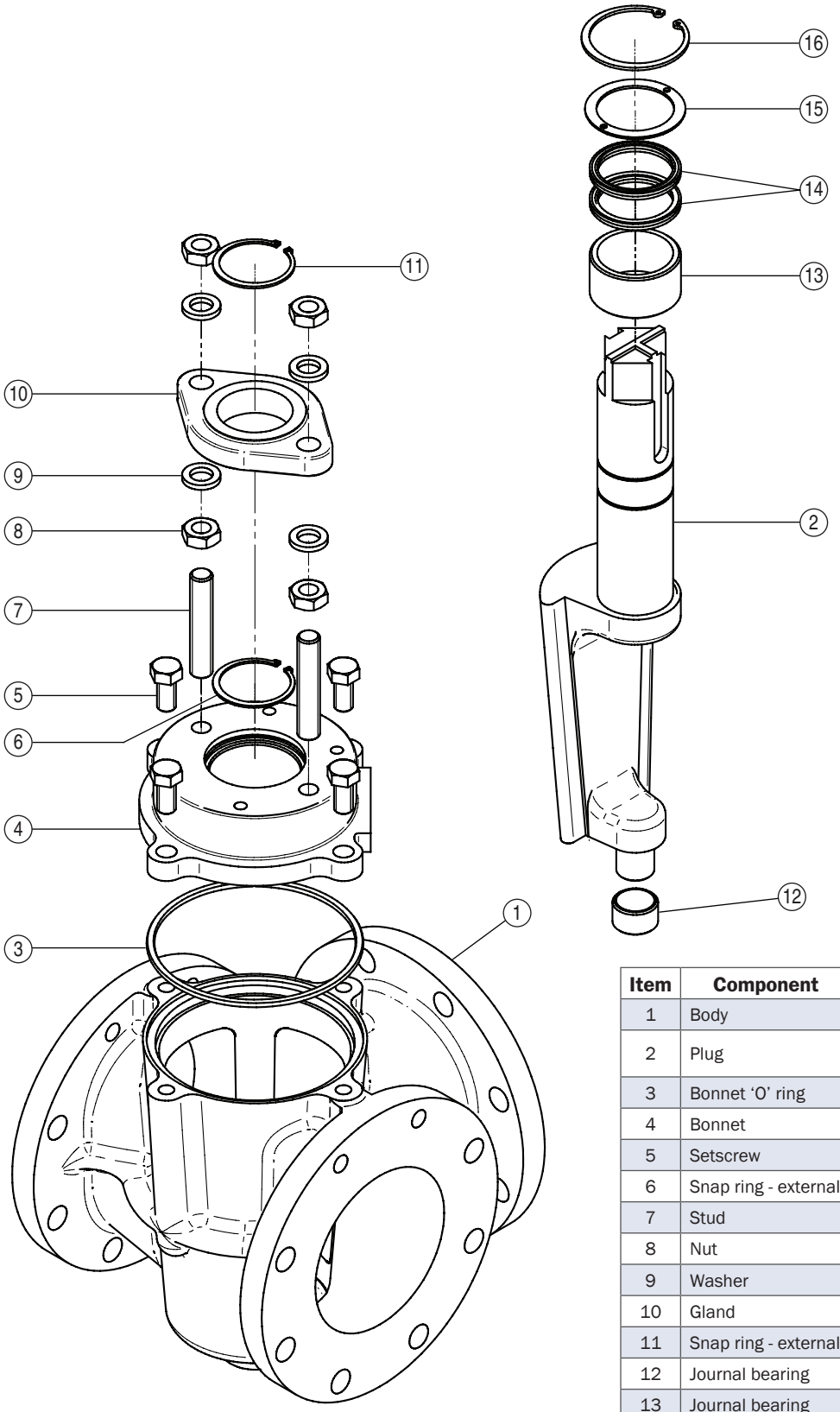
If the valve has been supplied for tight shut-off, the flow path and therefore the upstream pressure should be against the rear side of the plug.

In-Line Maintenance

In the unlikely event of gland leakage, the stem seals can be replaced without removing the bonnet. Access to the inside of the body for inspection or cleaning does not require removal of the valve from the line.

If wear should occur between the plug face and the seat, the plug can be adjusted externally.

Standard Materials of Construction - 3” to 16”



Item	Component	Material
1	Body	Cast iron A126 Class B
2	Plug	Ductile iron ASTM A536 Rubber coated
3	Bonnet ‘O’ ring	Elastomer as specified
4	Bonnet	Cast iron A126 Class B
5	Setscrew	Steel - zinc plated
6	Snap ring - external	Steel
7	Stud	Steel - zinc plated
8	Nut	Steel - zinc plated
9	Washer	Steel - zinc plated
10	Gland	Ductile iron ASTM A536
11	Snap ring - external	Steel
12	Journal bearing	Stainless Steel
13	Journal bearing	Stainless Steel
14	‘U’ cup seal	Elastomer as specified
15	Seal retaining ring	Brass
16	Snap ring - internal	Steel

Elastomers Available for Millcentric® 100% Port 3-Way Valves

• NBR - Nitrile

A general purpose material sometimes referred to as BUNA N with a temperature range -20°F to 212°F. Used on sewage, water, air, hydrocarbon and mineral oils.

• EPDM

An excellent polymer for use on chilled water through to LP steam applications, having a temperature range of -20°F to 250°F. Resistance to many acids, alkalies, detergents, phosphate esters, alcohols and glycols is an added benefit. Use on hydrocarbons must be avoided.

• CR - Neoprene

This versatile material shows outstanding resistance to abrasion and ozone. Chemical resistance to a wide range of petroleum based products and dilute acids and alkalies. Temperature range -20°F to 225°F.

• FKM - Viton®

Retention of mechanical properties at high temperature is an important feature of this elastomer: temperature range is -10°F to 300°F. It also has excellent resistance to oils, fuels, lubricants and most mineral acids and aromatic hydrocarbons. NOT suitable for water or steam applications.

Pressure Rating

Size	Drilling	Pressure
3" to 16"	Class 125	175 psig

Body (Shell) Hydrotest = 1.5 x rated pressure

Seat hydrotest = 1.0 x rated pressure (for tight shut-off applications only)

Ordering Information

Valve Types	Designation
Class 125 Flanged Cast Iron	604
Class 125 Flanged Ductile Iron	614
Class 125 Flanged 316 Stainless Steel	604S

Seat

Epoxy (604/614)	E
Stainless Steel (604S)	S

Elastomer Trim

EPDM	0
Nitrile (Buna)	1
Viton	2
Neoprene	3

Gear Operators

Gearbox complete with handwheel AGHW

Available in 90°, 180°, 270° and 360° configurations.

Style

Available port positions as shown on page 8.

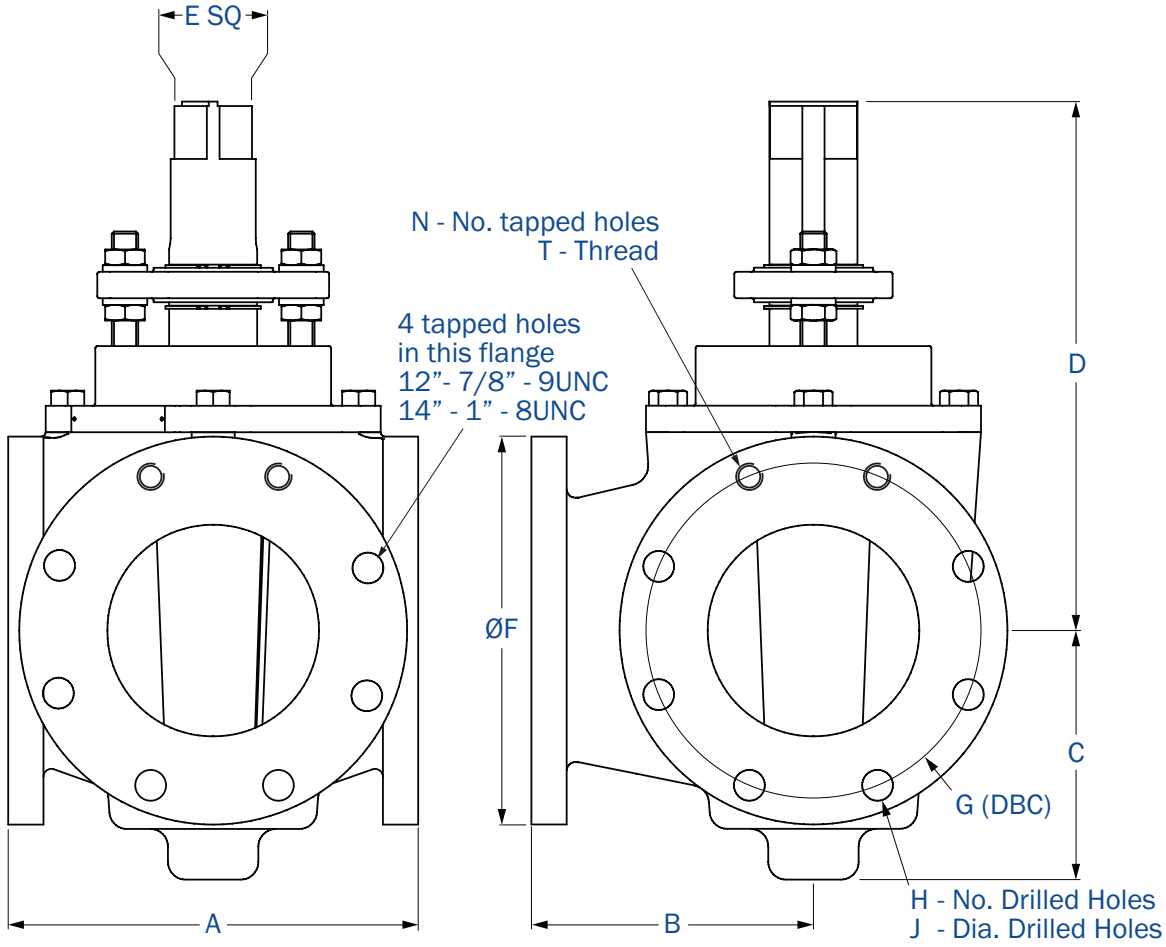
The style can be factory set and should be requested at time of order.

• Elastomer Selection Chart

Service	Elastomer	Average Useful Temperature Range	Service	Elastomer	Average Useful Temperature Range	Service	Elastomer	Average Useful Temperature Range
Acetone	EPDM	-35˚F to 250˚F	Copper Sulphate	EPDM	-35˚F to 250˚F	Oil Mobil Therm 600	Viton	10˚F to 250˚F
Alcohol, Amyl	EPDM	0˚F to 212˚F	Creosote (Coal)	Nitrile	-20˚F to 212˚F	Oil Mobil Therm 603	Nitrile	-20˚F to 212˚F
Alcohol, Aromatic	Viton	10˚F to 250˚F	Coal Slurry	Nitrile	-20˚F to 212˚F	Oil Lubricating	Nitrile	-20˚F to 212˚F
Alcohol, Butyl	Neoprene	-20˚F to 225˚F	Diesel Fuel No. 3	Nitrile	-20˚F to 212˚F	Oil Vegetable	Nitrile	-20˚F to 212˚F
Alcohol, Denatured	Nitrile	-20˚F to 212˚F	Diethylene Glycol	EPDM	-35˚F to 250˚F	Paint Latex	Nitrile	-20˚F to 212˚F
Alcohol, Ethyl	EPDM	-35˚F to 250˚F	Ethylene Glycol	EPDM	-35˚F to 250˚F	Phosphate Ester	EPDM	-35˚F to 250˚F
Alcohol, Grain	Nitrile	-20˚F to 212˚F	Fatty Acid	Nitrile	-20˚F to 212˚F	Propane	Nitrile	-20˚F to 212˚F
Alcohol, Isospropyl	Neoprene	-20˚F to 225˚F	Fuel Oil No. 2	Nitrile	-20˚F to 212˚F	Rape Seed Oil	EPDM	-35˚F to 250˚F
Alcohol, Methyl	EPDM	-35˚F to 250˚F	Fertilizer Liquid ($H_4N_2O_2$)	EPDM	-35˚F to 250˚F	Sewage with Oil	Nitrile	-20˚F to 212˚F
Ammonia, Anhydrous	Neoprene	-20˚F to 225˚F	Gasoline Keg	Nitrile	-20˚F to 212˚F	Sodium Hydroxide 20%	EPDM	-35˚F to 250˚F
Ammonia, Nitrate	EPDM	-35˚F to 250˚F	Gas Natural	Nitrile	-20˚F to 212˚F	Starch	EPDM	-35˚F to 250˚F
Ammonia, Water	EPDM	-35˚F to 250˚F	Glue Animal	Nitrile	-20˚F to 212˚F	Steam 250˚F	EPDM	-35˚F to 250˚F
Animal Fats	Nitrile	-20˚F to 212˚F	Green Liquor	EPDM	-20˚F to 212˚F	Stoffard Solvent	Nitrile	-20˚F to 80˚F
Black Liquor	EPDM	-35˚F to 250˚F	Hydraulic oil	Nitrile	-20˚F to 212˚F	Sulphuric Acid 10% 50%	Neoprene	-20˚F to 158˚F
Blast Furnace Gas	Neoprene	-20˚F to 225˚F	Hydrogen	Nitrile	-20˚F to 212˚F	Sulphuric Acid 100%	Viton	10˚F to 300˚F
Butane	Nitrile	-20˚F to 212˚F	JP4 JP5	Viton	-20˚F to 212˚F	Trichlorethylene Dry	Viton	10˚F to 300˚F
Bunker Oil "C"	Nitrile	-20˚F to 212˚F	Kerosene	Nitrile	0˚F to 212˚F	Triethanol Amine	EPDM	-35˚F to 250˚F
Calcium Chloride	EPDM	-35˚F to 250˚F	Ketone	EPDM	-35˚F to 250˚F	Varnish	Viton	10˚F to 300˚F
Carbon Dioxide	EPDM	-35˚F to 250˚F	Lime Slurry	EPDM	-35˚F to 250˚F	Water, Fresh	EPDM	-35˚F to 250˚F
Carbon Monoxide (Cold)	Neoprene	-20˚F to 150˚F	Methane	Nitrile	-20˚F to 212˚F	Water, Salt	EPDM	-35˚F to 250˚F
Carbon Monoxide (Hot)	Viton	10˚F to 300˚F	Methyl Ethyl Ketone	EPDM	-35˚F to 250˚F	Xylene	Viton	10˚F to 300˚F
Carbon Tetrachloride	Viton	10˚F to 300˚F	Naptha (Berzin)	Nitrile	-20˚F to 212˚F			
Caustic Soda	EPDM	-35˚F to 250˚F	Oil Animal	Nitrile	-20˚F to 212˚F			
Cement Slurry	EPDM	-35˚F to 250˚F	Oil Mobil Therm Light	Viton	10˚F to 250˚F			

NOTE: Above elastomer/temperature chart are guidelines only. Contact factory for specific applications.

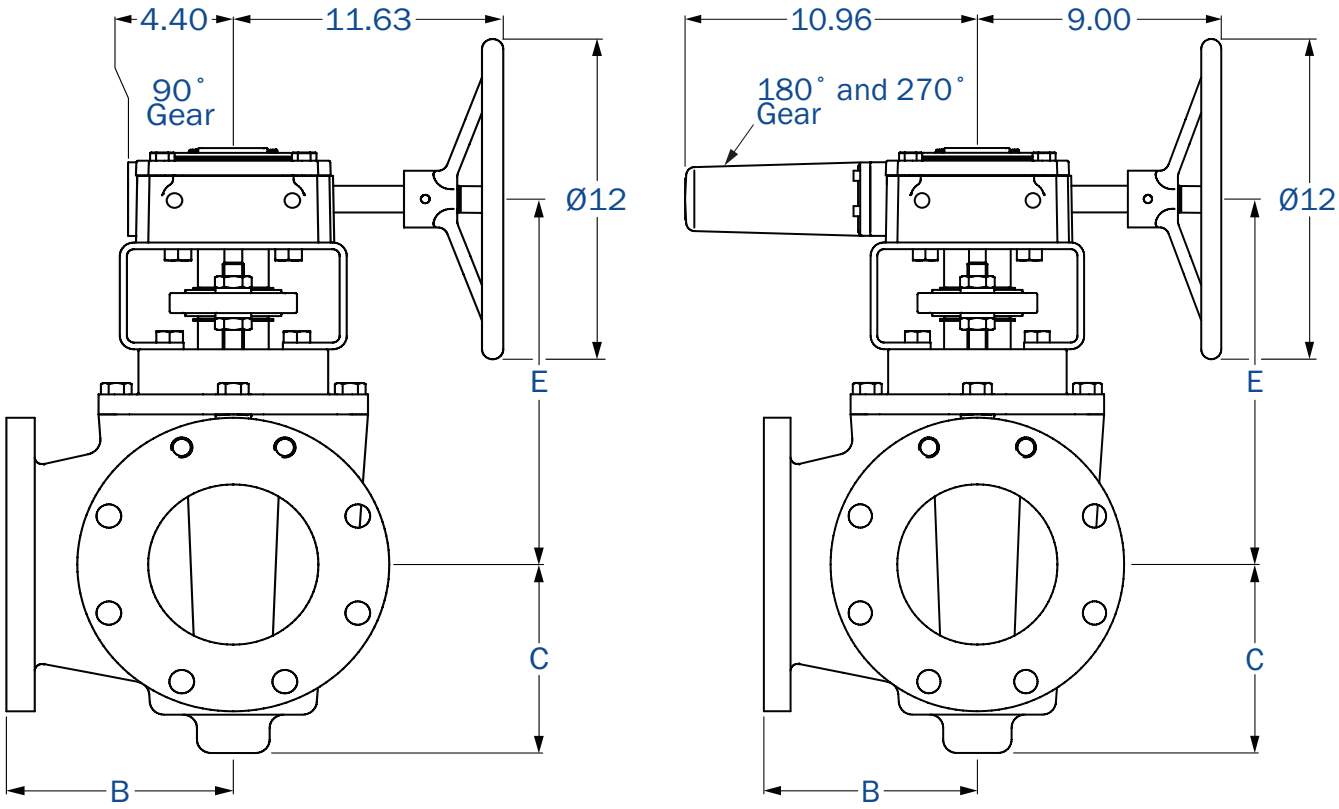
Series 604 Millcentric® 100% Port 3-Way Plug Valve



Flanged End - Fig. 604 - Class 125								
Dimensions in	Nominal Valve Size							
	3”	4”	6”	8”	10”	12”	14”	16”
A	8	9.88	11.63	13.88	16.75	19	21	23.75
B	5.5	6.5	8	9	11	11.56	12.5	15.13
C	4.81	5.94	7.06	10.94	10.94	12.88	14.19	14.75
D	9.04	13.36	15.04	18.69	18.69	21.20	21.10	22.00
E	1*	2	2	2	2	2	2	2
F	7.50	9.00	11.00	13.50	16.00	19.00	21.00	23.50
G	6.00	7.50	9.50	11.75	14.25	17.00	18.75	21.25
H	4	6	6	4	12	12	10	16
J	0.75	0.75	0.88	0.88	1	1	1.13	1.13
N	-	2	2	4	-	-	2	-
T	-	⅝” - 11 UNC	¾” - 10 UNC	¾” - 10 UNC	-	-	1” - 8 UNC	-
Weight - lb	65	120	170	325	380	475	850	970

Note: Drawings are for information purposes only; please request certified drawings before preparing piping drawings.
* Adaptor available to convert to 2” Nut.

Series 604AGHW Millcentric® 100% Port 3-Way Plug Valve



Flanged End - Fig. 604AGHW - Class 125							
Dimensions in	Nominal Valve Size						
	4”	6”	8”	10”	12”	14”	16”
A*	9.88	11.63	13.88	16.75	19	21	23.75
B	6.50	8	9	11	11.56	12.50	15.13
C	5.94	7.06	10.94	10.94	12.88	14.19	14.75
E	12.94	14.06	17.75	17.75	19.50	20.38	21.06
Weight - lb	200	250	405	460	555	937	1053

Note: 3” gear operated valve details upon request.
Drawings are for information purposes only; please request certified drawings before preparing piping drawings.
* Face to face dimension and flange drilling see page 5.

Accessories

Wrench

Wrench operators are available for all sizes (for tight shut-off, we recommend the use of a gear operator).

Power operation

Pneumatic, electric and hydraulic operation is available, complete with limit switches and solenoid valves when required.

Styling Ring (for wrench operated valves)

The valve may be ordered with the plug positions pre-set at the factory to suit the port flow requirements. This is achieved by fitting a styling ring to the valve stem.

Gear operators

Gear operators are available for all sizes.

They can be provided with 90˚, 180˚ or 270˚ travel and are fitted with travel stops. 360˚ travel is also available.

Locking device

Factory fitted locking devices are available for wrench operated and gear operated valves.

Double-style plug

To provide 90º flow paths only, a double-style plug is available which operates through 90º travel and isolates either straight-through port (Style A90 only).

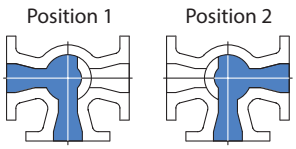
Styling Ring

Gear Operator

Shown with 180˚/270˚ Gear

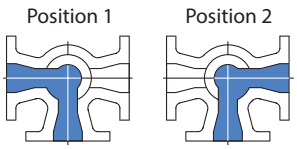
3-Way Valve Port Positions

Port Positions Viewed from Above



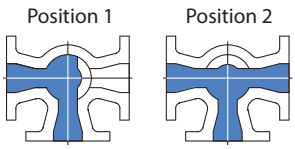
3 way, 3 port, 180˚ turn

Style A180



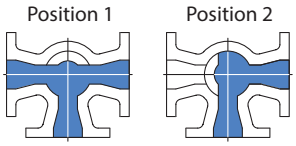
3 way, 2 port, 90˚ turn

Style A90*



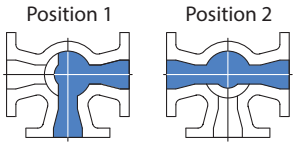
3 way, 3 port, 90˚ turn

Style C



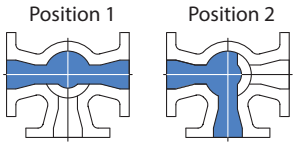
3 way, 3 port, 90˚ turn

Style D



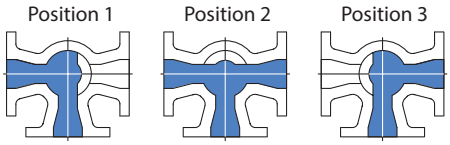
3 way, 3 port, 90˚ turn

Style E



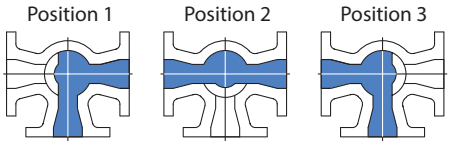
3 way, 3 port, 90˚ turn

Style F



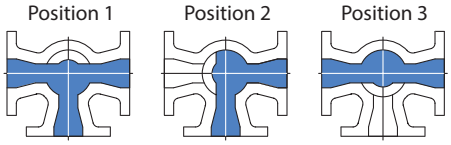
3 way, 3 port, 180˚ turn

Style G



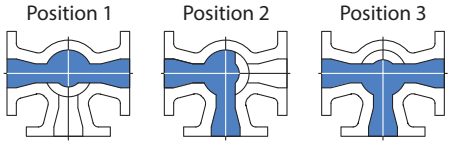
3 way, 3 port, 180˚ turn

Style H



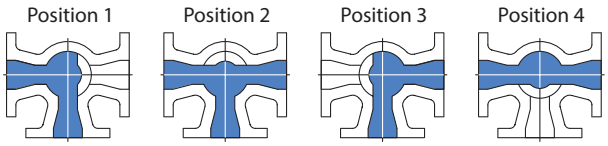
3 way, 3 port, 180˚ turn

Style I



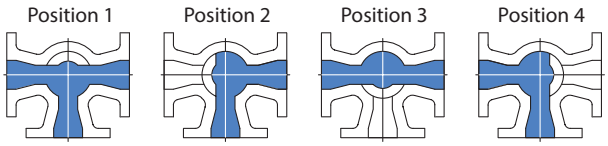
3 way, 3 port, 180˚ turn

Style J



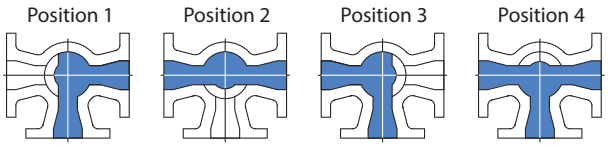
3 way, 3 port, 270˚ turn

Style K



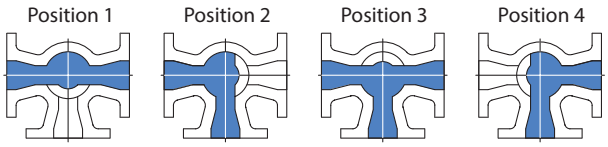
3 way, 3 port, 270˚ turn

Style L



3 way, 3 port, 270˚ turn

Style M



3 way, 3 port, 270˚ turn

Style N

*Requires Double-Style Plug. Not tight shut-off. Consult factory for special pricing and availability.

HOW TO ORDER

When ordering 3-Way Valves, specify style letter of the port position required.

Technical Specification

Millcentric® 100% Port 3-Way Plug Valves

Valves shall be of the 100% Port 3-Way non-lubricated concentric type with a totally encapsulated plug. The elastomer shall be suitable for the service intended.

Valve flanges shall comply with ASME/ANSI B16.1 Class 125, including facing, drilling and thickness. Valves shall be designed for a maximum working pressure of 175 CWP.

The valve body and bonnet shall be in cast iron to ASTM A126 Class B and the plug shall be ductile iron to ASTM A536 Grade 65-45-12. The axial position of the plug shall be held by the adjustable gland, and the valve shall operate without the need to lift the plug prior to turning.

Replaceable sleeve-type bearings, manufactured in oil-impregnated stainless steel shall be fitted in the body and bonnet. Stem seals shall be self-adjusting U-cup type and be replaceable without removing the bonnet from the valve.

The valve stem shall be provided with a 2" square nut for use with removable levers or extended T-handles. Wrench operated valves shall be capable of being converted to gear or automated operation without removing the bonnet from the valve.

Where required, gear operators shall be of heavy duty construction with a ductile iron quadrant supported by upper and lower oil-impregnated bronze bearings. The worm gear and shaft shall be manufactured in hardened steel and run in high efficiency roller bearings. Gear operators shall require single handwheel operation only.

100% Port 3-Way plug valves shall be Millcentric Series 604.

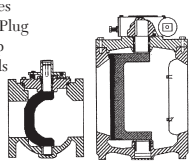
Notes

Milliken® Products Guide

Series 600/601
Eccentric Plug Valve

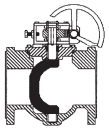
Welded Nickel Seat
Stainless Steel Bearings
ANSI-B16.1 Flanges
Solid Ductile Iron Plug
Low Pressure Drop
Flanged & MJ Ends
Sizes 2"-72" FL
Sizes 3"-48" MJ

Flanged and MJ



Series 601SS
Eccentric Plug Valve

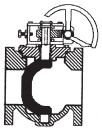
Integral Stainless Seat
Stainless Bearings
Stainless Steel Body
ANSI B16.5 Class 150 Flanges
Solid Stainless Steel Plug
Low Pressure Drop
Size: 1/2"-24"



Series 601RL
Eccentric Plug Valve

Soft or Hard Rubber Lining
Stainless Steel Bearings
ANSI B16.1 Flanges
Solid Ductile Iron Plug
Low Pressure Drop
Sizes 3"-54"
Metal Plugs Available
– Consult Factory

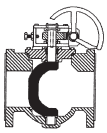
Rubber Lined



Series 602
Eccentric Plug Valve

Welded Nickel Seat
Stainless Steel Bearings
ANSI B16.1 Class 250 Flanges
Solid Ductile Iron Plug
Low Pressure Drop
Sizes 2-1/2"-54"

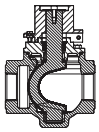
High Pressure



Series 613A
Eccentric Plug Valve

Ductile Iron Construction
Round Port
Stainless Steel Bearings
Low Pressure Drop
Memory Stop
NPT End Connections
Sizes 1/2"-2"

Threaded End



Series 604E
Eccentric Plug Valve

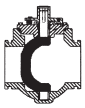
Epoxy Seat
Solid Ductile Iron Plug
Stainless Steel Bearings
Low Pressure Drop
Lift & Turn NOT Required
High Solids & Flow Capacity
Sizes 3"-16"

Three Way Valve

Series 606
Eccentric Plug Valve

Welded Nickel Seat
Stainless Steel Bearings
AWWA C-606 Grooved
Solid Ductile Iron Plug
Low Pressure Drop
Ductile or Steel Pipe
Sizes 3"-24"

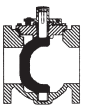
Grooved End



Series 611/610
Eccentric Plug Valve

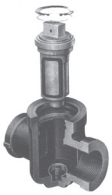
Ductile Iron Body
ANSI B16.1 Flanges
MJ AWWA C111
Welded Nickel Seat
Solid Ductile Iron Plug
Low Pressure Drop
Sizes 2"-72" FL
Sizes 3"-48" MJ

Flanged and MJ



Model 625
Eccentric Plug Valve

Available in Threaded
and Flanged Ends
Rated for 175 psi
Sizes 1/2"-4"
UL/CGA Listed



Series 600FP/601FP
Eccentric Plug Valve

Full/100% PORT
Welded Nickel Seat
Stainless Steel Bearings
ANSI-B16.1 Flanges
Solid Ductile Iron Plug
Low Pressure Drop
Flanged & MJ Ends
Sizes 2"-48" FL
Sizes 3"-48" MJ

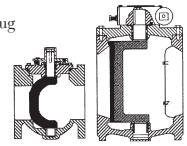


Figure 396/397
General Service
Butterfly Valve

Meets MSS SP 67
Ductile Iron Body
DI-NP Disc
Other Materials Upon Request
Wrench or Gear
Operated Available
2"-48" Size Range

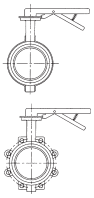
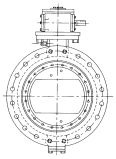


Figure 510A/511A
AWWA Butterfly Valve

Complies with AWWA C-504
Class 150B Flanged or MJ
Cast iron body and disc
Seat in body
Flow through disc on
24" and larger
Epoxy Paint on all sizes
standard
3" -72"



Series 8500
AWWA Swing Check

Full waterway
Ductile Iron Construction
Weight or Spring
Air Cushion
SS body seat ring
Buna disc insert
Sizes 3"-24"

Series 8000
AWWA Swing Check

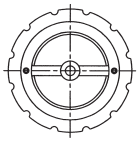
Full waterway
Weight or Spring
Bronze/SS Body Seat Ring
Bronze/Buna/EPDM disc insert
Sizes 2"-36"

Series 9000
AWWA Swing Check

Clear waterway
Weight or Spring
Air or Oil Cushion
Bronze/SS Body seat ring
Bronze/Buna/EPDM disc insert
Sizes 3"-72"

Model 720A
Wafer Check Valve

Center Guided
Check Valve
Rated for 250 psi
SS Disc/EPDM Seat
Sizes 2"-12"



Series 700
Wafer Check Valve

ANSI Class 125/150
High Flow Capacity
Narrow Face-to-Face
Sizes 3"-12"
316 SS Internals
Disc Position Indicator

Wafer Check Valve

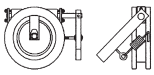


Figure 851
Flex Check

Million Cycle Certification
Complete Ductile Iron Construction
250 psi Pressure Rating
Fully Epoxy Lined Interior
No Internal Shafts, Bearings or Bushings
No External Levers, Weights or Springs
Mechanical Indicator (3"-16")
2"-24" Size Range
Backflush Devices
Proximity Switches

Figure 740A
Double Disc Check Valve

Wafer pattern
check valve
rated for 250 psi.
Available in sizes
2"-36" with a
SS Disc/EPDM Seat

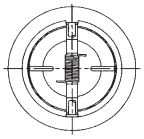
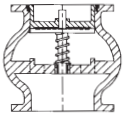


Figure 821A
Globe Style Check Valve

Center guided
check valve.
SS Disc/EPDM Seat
and is available
in sizes 2"-24".



MILLIKEN®

Mueller Co.
Reliable Connections™

Form 13694 11/16

The new small pump range from the wastewater experts

NOW AVAILABLE WITH OUR PATENTED ADAPTIVE N™ TECHNOLOGY, 1-10 kW

FLYGT
a xylem brand

Leave clogging behind

If you're looking for a small pump that's easy to install and just keeps on working, look no further. The wastewater experts at Flygt have developed their most complete range of 1-10 kW pumps ever. Now available with clog-free patented Adaptive N™ hydraulics, you can rest assured of reliable, trouble-free operation for any type of wastewater application. Just install and forget.

With more than a million Flygt small pumps and millions more larger models installed, we've learned a lot over the years. New customers often tell us the top challenges with small pumps are clogging, overheating and a rapid loss of pumping efficiency. In many cases they'd rather replace a small pump than repair it, which becomes a costly proposition over time. The best solution, of course, is to avoid these problems in the first place.

Pumping innovation for you
To achieve this, our wastewater experts have developed a trouble-free range of small pumps capable of taking on the toughest wastewater challenges. Having invented the world's first submersible pump in 1947 and later pioneered the N-pump and self-cleaning Adaptive N impeller, we wanted to include some of these professional "big pump" features in our small pump range as well.

More impeller material options
So whether you're working in municipal sewage or building construction, you can always find a top-performing small pump for all requirements. With our Adaptive N impeller you can also choose the optimal material type for your needs: Hard-Iron, grey iron or stainless steel. Flygt's patented Hard-Iron alloy is developed specifically for tough wastewater applications. Hard-Iron is highly resistant to abrasive wear and erosion-corrosion which makes it ideal for challenging modern wastewater media.

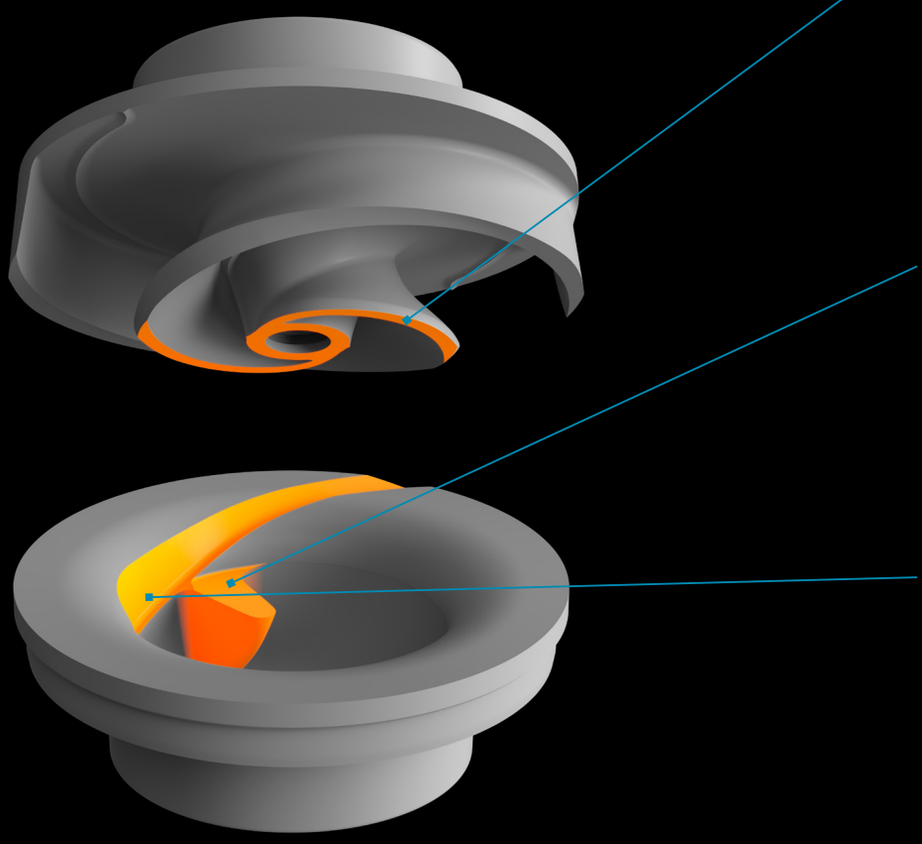
A pump for every need
If energy savings and sustainable long-term operations are your focus, our new Adaptive N impeller for small pumps allows for continuous, trouble-free pumping with an energy reduction of up to 25%.

Modern wastewater is getting tougher
Today, with urbanization on the rise, the content of wastewater is changing dramatically. Our customers report finding everything from fibrous Wettex® rags and baby wipes to T-shirts, cans, stuffed animals, plastic bottles, carcases and greasy food waste.

Adaptive N™– the groundbreaking clog-free technology for small pumps

Smaller pumps are often susceptible to clogging when pumping fluids high in solids and fibrous content. The main problem generally lies in the hydraulic design of the impeller – an area where we've been innovating for years in our more advanced municipal pumps and are now embedding these technologies in all our smaller pumps as well.

As shown below, the key innovation is our Adaptive N impeller and Adaptive N hydraulic technologies, which combine a unique geometry, dual-blade impeller and other patented features to give you sustained high efficiency and smooth operations. The self-cleaning design allows for up to 25% lower energy consumption, independent of impeller speed or duty point. The unique geometry is also designed to minimize vibrations, resulting in a longer life span of the mechanical components.

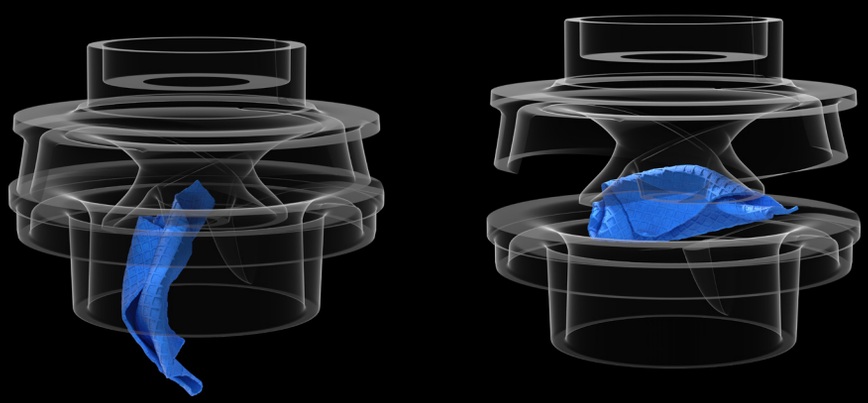


1. Backswept leading edges – ensures no sticking
When solids enter the pump, they are met by our dual-blade N impeller. The optimized blade geometry, with its horizontal machined backswept leading edges, ensures that no material sticks to the impeller.

2. Integrated guide pin – clears the center
Integrated into the insert ring, a guide pin clears the center of the impeller by pushing solids along the leading edges towards the periphery of the impeller for removal.

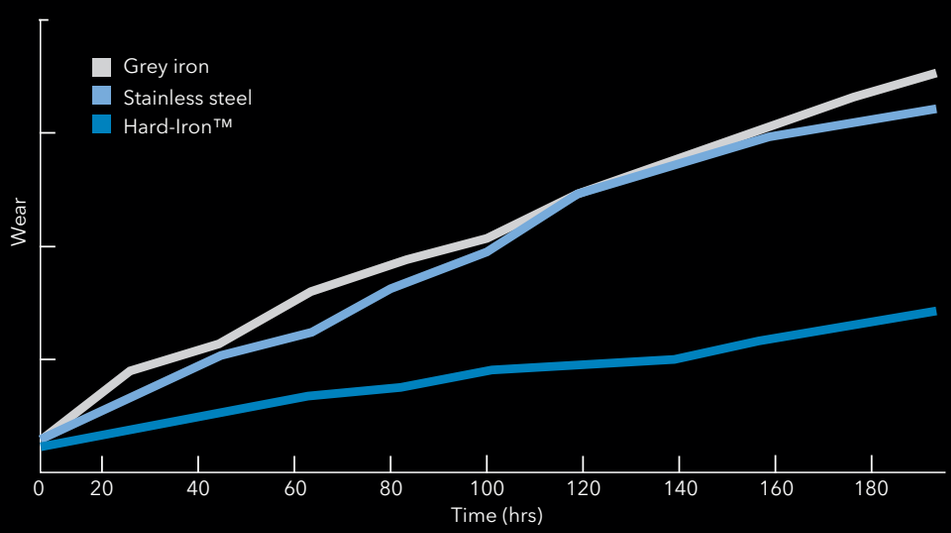
3. Relief groove – facilitates transport
When solids arrive at the perimeter of the inlet, they are transported inside the relief groove, guided along the edge of the impeller vane, through the volute and out of the pump.

The symbol of self-cleaning efficiency
The η (Eta) symbol is the seventh letter of the Ancient Greek alphabet symbolizing efficiency. It was introduced by Flygt engineers in 1999 to signify the sustained efficiency of self-cleaning in N-Technology impellers. Today, the logo encompasses our innovative Adaptive N™ technology, introduced in 2009.



4. Adaptive N - lifts up for large objects
When larger objects enter the pump, the impeller lifts up due to the forces from these solid objects passing through. This avoids clogging and assures continuous, energy-efficient pumping.

Adaptive N™ hydraulic materials - accelerated wear test



After 200 hours, the Hard-Iron impeller proved to be five times more wear resistant than the grey iron version. The stainless steel impeller showed wear comparable to the standard grey iron material.

One solution. One supplier. One easy-to-buy package.

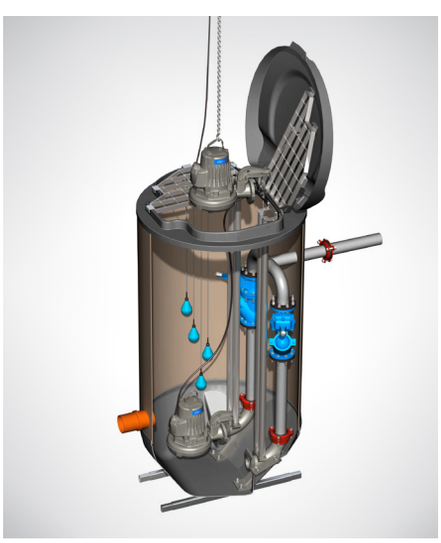
Designed to cover a broad range of pumping capacities and applications, our small pump range offers a diversity of model options, power ratings, flow rates and discharge sizes. The pumps can be delivered either freestanding or as part of a complete modular pumping solution. You decide how you want it supplied.

If you are installing a pump for a difficult municipal application or at a commercial building site with special requirements, you might want to look into one of our integrated Packaged Pump Stations. Available in a range of designs and sizes, they come with all the necessary equipment for ease and speed of installation and commissioning. Many of the designs come with a sloped sump floor with simplified self-cleaning functionality.

Pre-engineered control systems
More than just pumps, we provide a wide range of monitoring and control systems that can be rapidly commissioned. These are pre-engineered solutions designed specifically for water and wastewater applications. That's because we believe you shouldn't need to know hundreds of protocols to commission a small pump. So say goodbye to complex protocols and bulky control systems.

Service that's close to you
As a knowledgeable partner with more than 60 years in the business and 130 wholly-owned maintenance and repair facilities around the world, we have the local presence to provide fast, expert support should you need it. Not that this should be a problem with our small pumps, but our service technicians are never far away with the right spare part and the right competence if needed.

User-friendly monitoring and control interfaces
Our monitoring and control systems are designed for easy, out-of-the-box installations. Example below: Flygt FGC 400.



Packaged Pump Stations
We can design and deliver Packaged Pump Stations pre-engineered to conform to all local regulations on pipework, pump and control specifications. Example above: Flygt TOP Station.

Adaptive N versions shown below from left to right - 3085, 3069, 3127 and 3102

Many choices, one reliable partner

At the heart of any pump station setup or package is the pump itself. Our small pump range comprises four main series (3069, 3085, 3102 and 3127). Altogether there are 12 different units in our range, with four pictured above. Specification and performance details can be found on pages 8 and 11.

Install it exactly the way you want it

In our small pump family, the Flygt 3069 stands out as a unique pump in its class and a reliable all-round workhorse. Not only is it available with our patented Adaptive N technology or, alternatively, the Vortex and Grinder hydraulics, but it features our flexible installation concept. This means you can customize the configuration to fit your needs exactly.

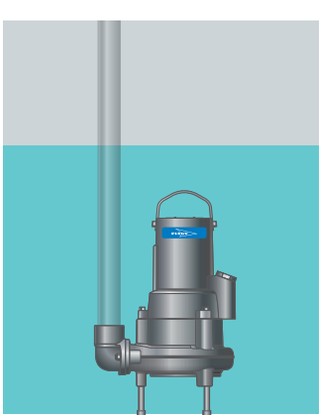
With the flexible installation concept, the bare pump is always your starting point. Then simply choose from among four predefined installation kits (F,H,P or S). Designed to cover every pump model and outlet size, the kits are carefully pre-checked to ensure nothing is missing.

No more searching for parts
As a result, there is no need to spend valuable time searching for individual parts. You also avoid potential order errors relating to small parts since nothing is forgotten. This modular approach also means you can do late product configurations or even multiple installation configurations using the bare pump as the base. Finally, for your convenience, all components required for installation are included in one part number.

Flygt 3069 Series
Our 3069 Series with Adaptive N covers all wastewater applications and is the preferred hydraulic option in our small pump range.

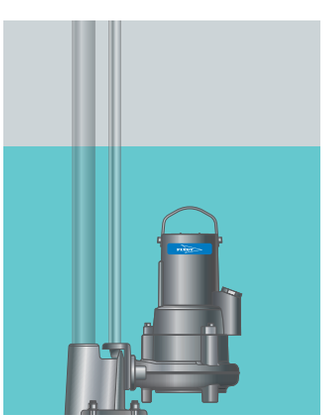
Flygt flexible installation

F-installation
Free standing, the pump is equipped with supporting legs. Can be connected to a hose or pipe.

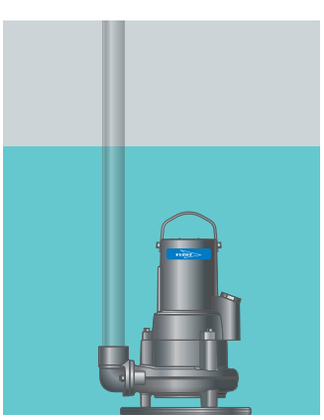


H-installation
Stationary wet installation suspended from the discharge pipe. The quick connection joint has an integrated non-return valve applicable for Flygt Compit pump stations.

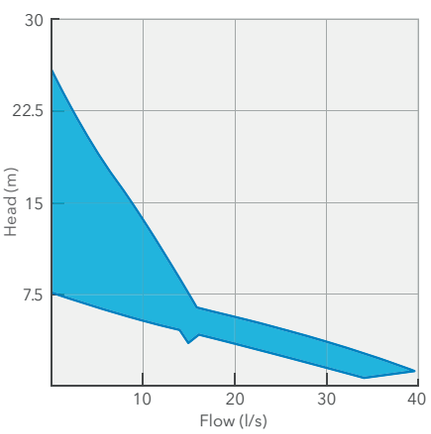
P-installation
For semi-permanent wet well installations. The pump is installed between guide bars on a discharge connection.



S-installation
Semi-permanent freestanding installation. Easy to transport with its pipe or hose connection.

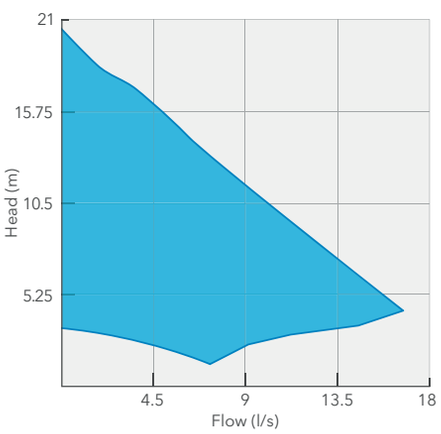


Flygt 3069 Adaptive N™



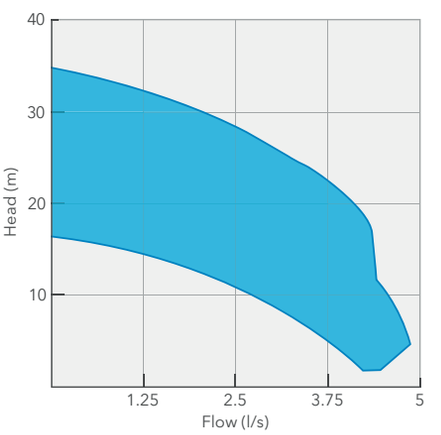
The 3069 model is now available with our patented Adaptive N technology, well tested in thousands of installations. Normally available on larger N pumps, this state-of-the-art technology not only prevents clogging and reduces stress on the shaft, seals and bearings, but it enables up to 25% sustained lower energy usage. You can also choose from different impeller material options: Hard-Iron, grey iron or stainless steel.

Flygt 3069 Vortex



Robust and highly reliable, our powerful Vortex model has an open recessed impeller design to allow free flow-through passage of solids and liquids. It is capable of handling sludge concentration with up to 4% of dry solids.

Flygt 3069 Grinder



When it comes to superior shredding and cutting, our enhanced designed grinder model is often used when high efficiency is a must in uneven terrain. This pump type is excellent in reducing solids to a fine slurry that can then be pumped through small-diameter pipes. The beauty of the grinder is that it adjusts to the actual system conditions without producing a very high pressure. It also requires very low maintenance.

Flygt 3069 Series Range

	Adaptive N	Vortex	Grinder
Power rating, kW	1.5 – 2.4	1.5 – 2.4	1.5 – 2.4
Discharge size, mm	50, 65, 80	50, 65, 80	50
Flexible installation	X	X	-
Hydraulic material options			
Grey iron	X	X	X
Hard-Iron™	X	X	–
Stainless steel	X	–	–

A small pump for every wastewater application

Our aim is to ensure that you get just the right pump for your application needs. In addition to the Flygt 3069 specifications on the previous pages, the 3085, 3102 and 3127 series also offer continuous pumping performance – ideal for both smaller municipal sewage and commercial applications.

Flygt 3085 Series
Robust, compact and highly efficient, the Flygt 3085 Series is available in a variety of power ratings, from as low as 1 kW on up to 2.4 kW. With an 80 mm discharge size, this pump series is available with Adaptive N, Grinder or Vortex hydraulics. With the Adaptive N version, it also includes a range of impeller material options: Hard-Iron, grey iron or stainless steel.

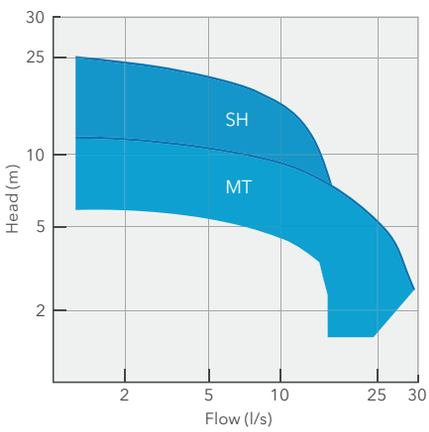
Flygt 3102 Series
The Flygt 3012 Series is a well-proven solution for continuous trouble-free pumping. Flygt 3102 pumps have power ratings from 2.5 kW on up to 4.4 kW, depending on your preferred model. This pump series is available with Adaptive N, Grinder or Vortex hydraulics. With the Adaptive N version, it also includes a range of impeller material options: Hard-Iron, grey iron or stainless steel.

Flygt 3127 Series
Designed for slightly higher flow rates, the Flygt 3127 Series handles power ratings from 4 kW on up to 10.9 kW. Discharge sizes are also larger, from 75 on up to 200 mm. This pump series is available with our Adaptive N, Grinder or Vortex hydraulics. With the Adaptive N version, it also includes a range of impeller options: Hard-Iron, grey iron or stainless steel.

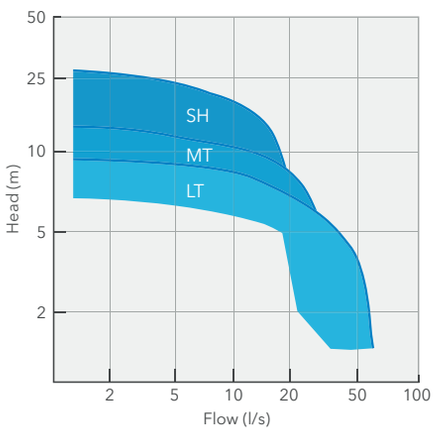
Key benefits

- State-of-the-art pumping with Adaptive N technology
- Sustained highly efficient operation
- Modular-based design with high adaptation grade
- Lowers your energy bill and reduces unplanned maintenance costs
- Reduces the total life cycle cost of your installation

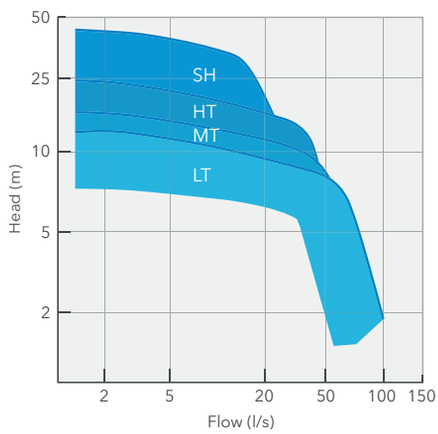
Flygt 3085 Series



Flygt 3102 Series

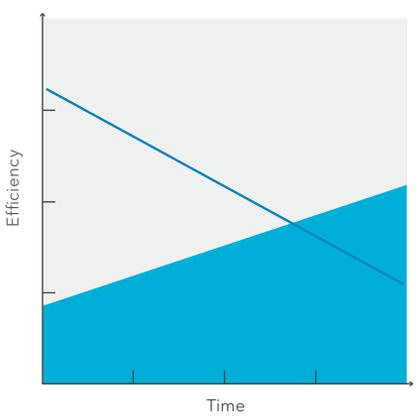


Flygt 3127 Series

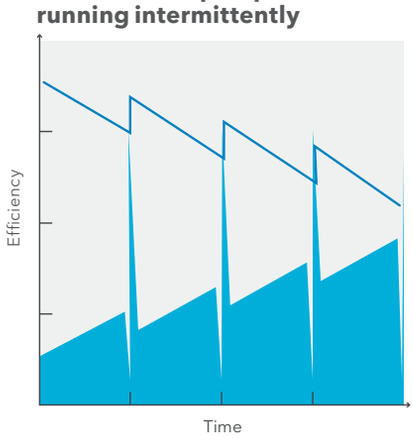


Pressure Characteristics: SH – Super High Pressure, HT – High Pressure, MT – Medium Pressure, LT – Low Pressure

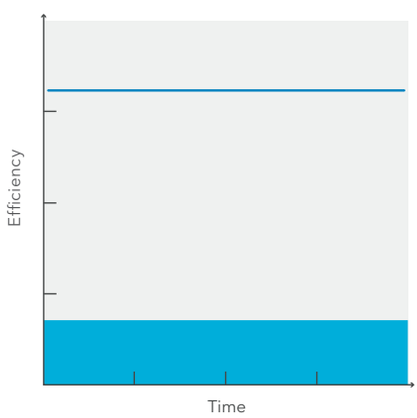
Conventional pump



Conventional pump running intermittently



Flygt N pump



Hydraulic efficiency Energy consumption

Small pump range overview

Model	3085	3102	3127	
				**Impeller material options**
Power rating, kW*	1 – 2.4	2.4 – 4.4	4.0 – 10.9	
Discharge size, mm*	80	75-150	75-200	
Adaptive N™ impeller	X	X	X	Hard-Iron™, grey iron, stainless steel
Grinder	X	X	X	Grey iron
Vortex	X	X	X	Grey iron

* Specific power ratings and discharge sizes vary per model. For details, see the technical specifications relating to the individual models.

Xylem |'zīləm|

1) The tissue in plants that brings water upward from the roots;
2) a leading global water technology company.

We're 12,000 people unified in a common purpose: creating innovative solutions to meet our world's water needs. Developing new technologies that will improve the way water is used, conserved, and re-used in the future is central to our work. We move, treat, analyze, and return water to the environment, and we help people use water efficiently, in their homes, buildings, factories and farms. In more than 150 countries, we have strong, long-standing relationships with customers who know us for our powerful combination of leading product brands and applications expertise, backed by a legacy of innovation.

For more information on how Xylem can help you, go to www.xyleminc.com

xylem
Let's Solve Water

Flygt is a brand of Xylem. For the latest version of this document and more information about Flygt products visit **www.flygt.com**

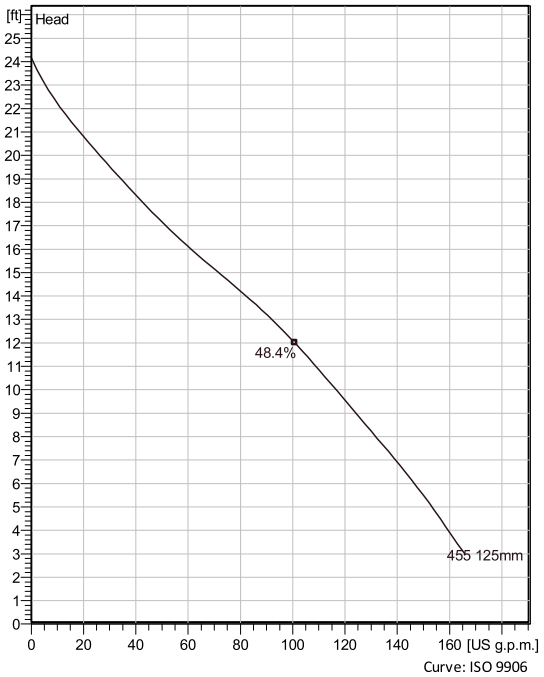
2515 . Small pumps . 1. Master. 1. 20170411

NT 3085 SH 3~ Adaptive 455

Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Modular based design with high adaptation grade.

Technical specification

Curves according to: Water, pure Water, pure [100%], 39.2 °F, 62.42 lb/ft³, 1.6891E-5 ft²/s



Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

Configuration

Motor number
N3085.070 15-10-4AL-D 1.6hp

Installation type
T - Vertical Permanent, Dry

Impeller diameter
125 mm

Discharge diameter
3 inch

Pump information

Impeller diameter
125 mm

Discharge diameter
3 inch

Inlet diameter
80 mm

Maximum operating speed
1755 rpm

Number of blades
2

Max. fluid temperature
40 °C

Material

Impeller
Hard-Iron ™

Stator housing material
Grey cast iron

Project	Xylect-20280042	**Created by**	Alan Dahlqvist		
Block		**Created on**	7/6/2024	**Last update**	7/6/2024

NT 3085 SH 3~ Adaptive 455

Technical specification

Motor - General

Motor number N3085.070 15-10-4AL-D 1.6hp	**Phases** 3~	**Rated speed** 1755 rpm	**Rated power** 1.6 hp
ATEX approved FM	**Number of poles** 4	**Rated current** 3.1 A	**Stator variant** 62
Frequency 60 Hz	**Rated voltage** 460 V	**Insulation class** H	**Type of Duty** S1
Version code 070			

Motor - Technical

Power factor - 1/1 Load 0.63	**Motor efficiency - 1/1 Load** 76.8 %	**Total moment of inertia** 0.204 lb ft²	**Starts per hour max.** 30
Power factor - 3/4 Load 0.54	**Motor efficiency - 3/4 Load** 73.6 %	**Starting current, direct starting** 26 A	
Power factor - 1/2 Load 0.43	**Motor efficiency - 1/2 Load** 67.1 %	**Starting current, star-delta** 8.67 A	

Project	Xylect-20280042	**Created by**	Alan Dahlqvist		
Block		**Created on**	7/6/2024	**Last update**	7/6/2024

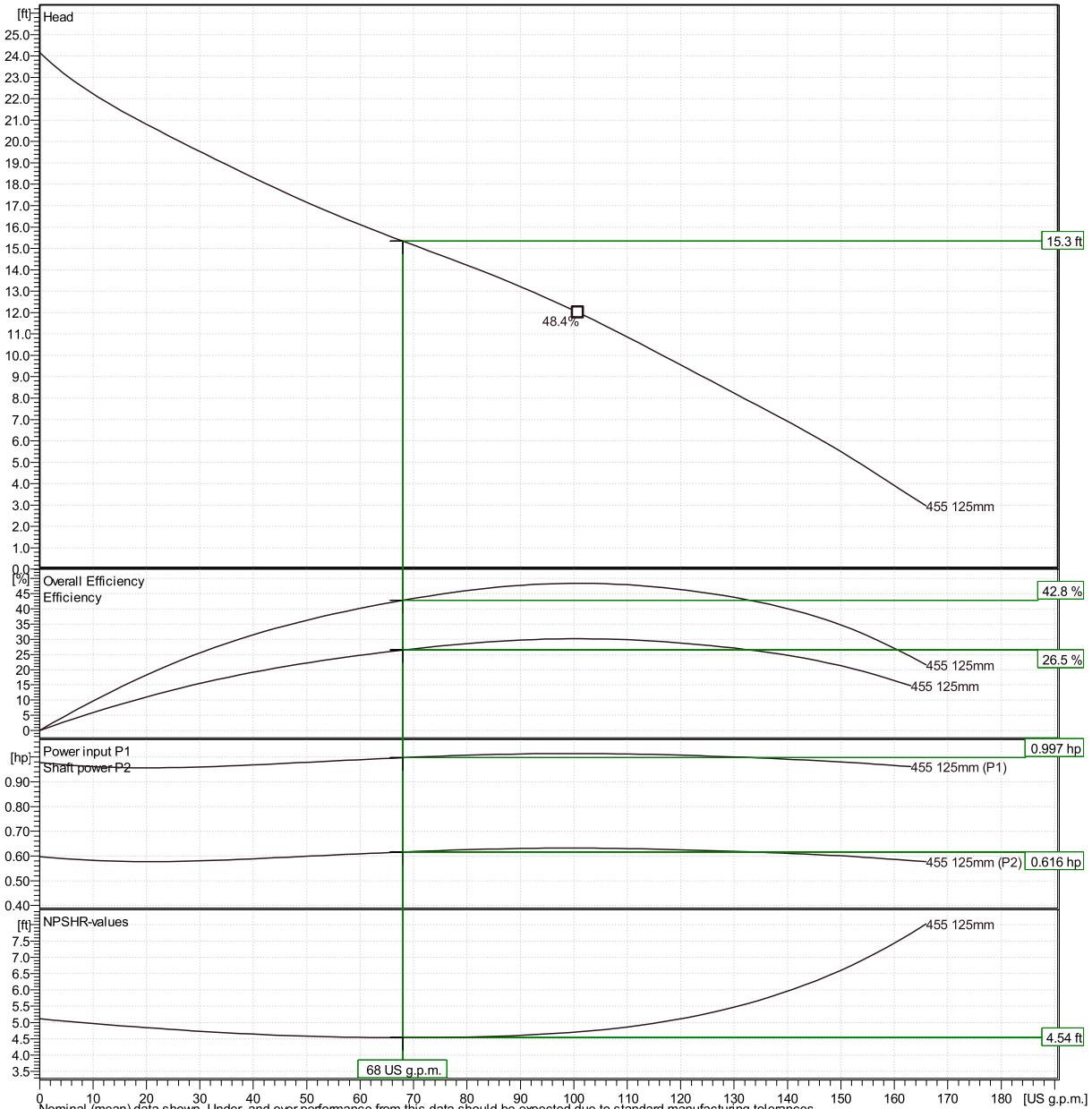
NT 3085 SH 3~ Adaptive 455

Performance curve

Duty point

Flow	Head
68 US g.p.m.	15.3 ft

Curves according to: Water, pure Water, pure [100%],39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

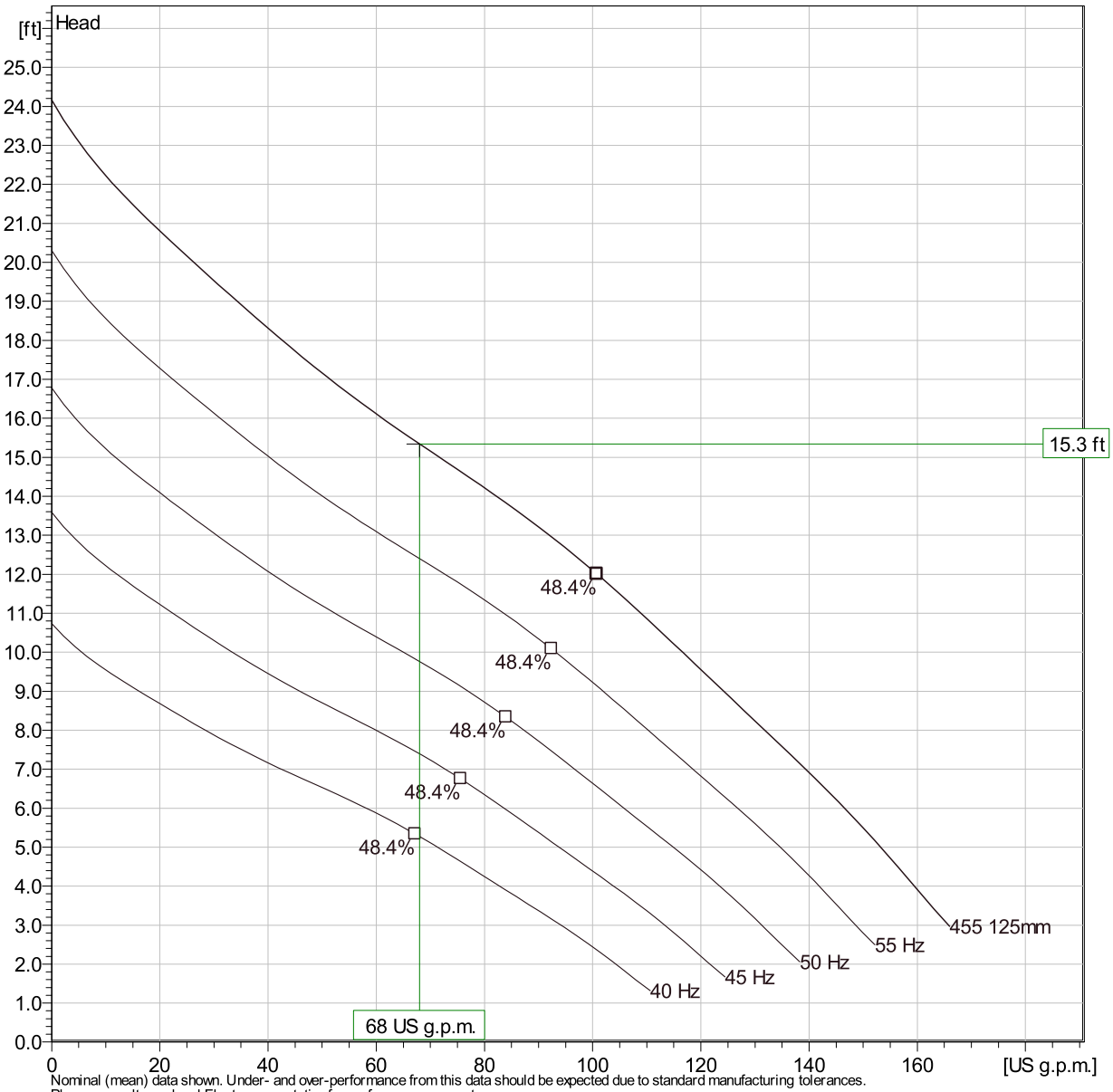
Curve: ISO 9906

Xylect-20280042		Alan Dahlqvist	
	Created on	7/6/2024	**Last update** 7/6/2024

NT 3085 SH 3~ Adaptive 455

Duty Analysis

Curves according to: Water, pure [100%] ; 39.2°F; 62.42lb/ft³; 1.6891E-5ft²/s



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

Operating characteristics

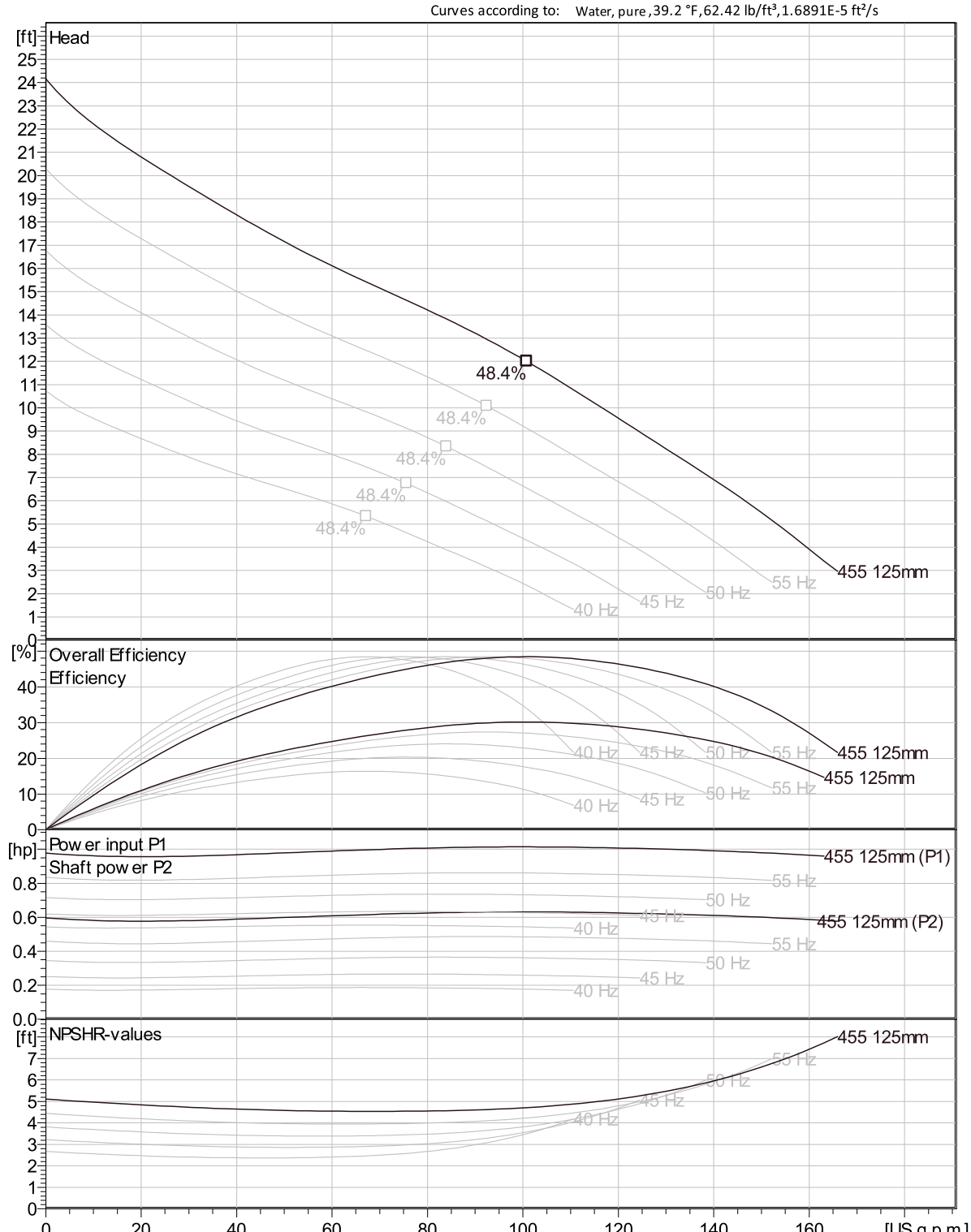
Pumps / Systems	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Spec. Energy	NPSHre
	US g.p.m.	ft	hp	US g.p.m.	ft	hp		kWh/US MG	ft
1	68	15.3	0.616	68	15.3	0.616	42.8 %	182	4.54

Project		**Created by**	Alan Dahlqvist		
Block	Xylect-20280042	**Created on**	7/6/2024	**Last update**	7/6/2024

NT 3085 SH 3~ Adaptive 455

VFD Curve

Curves according to: Water, pure ,39.2 °F,62.42 lb/ft³,1.6891E-5 ft²/s



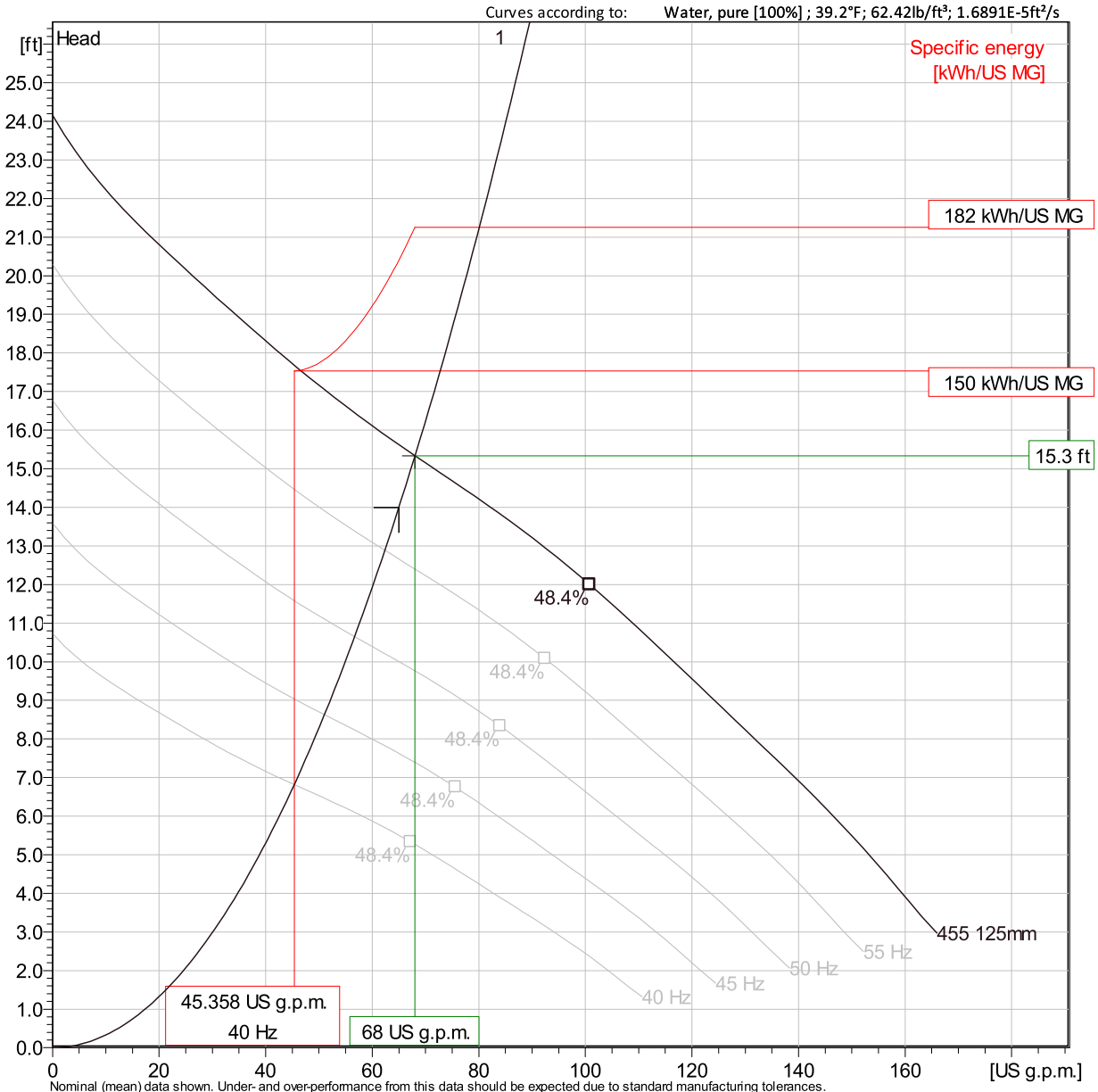
Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

Curve: ISO 9906

Project	Xylect-20280042	**Created by**	Alan Dahlqvist		
Block		**Created on**	7/6/2024	**Last update**	7/6/2024

NT 3085 SH 3~ Adaptive 455

VFD Analysis



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

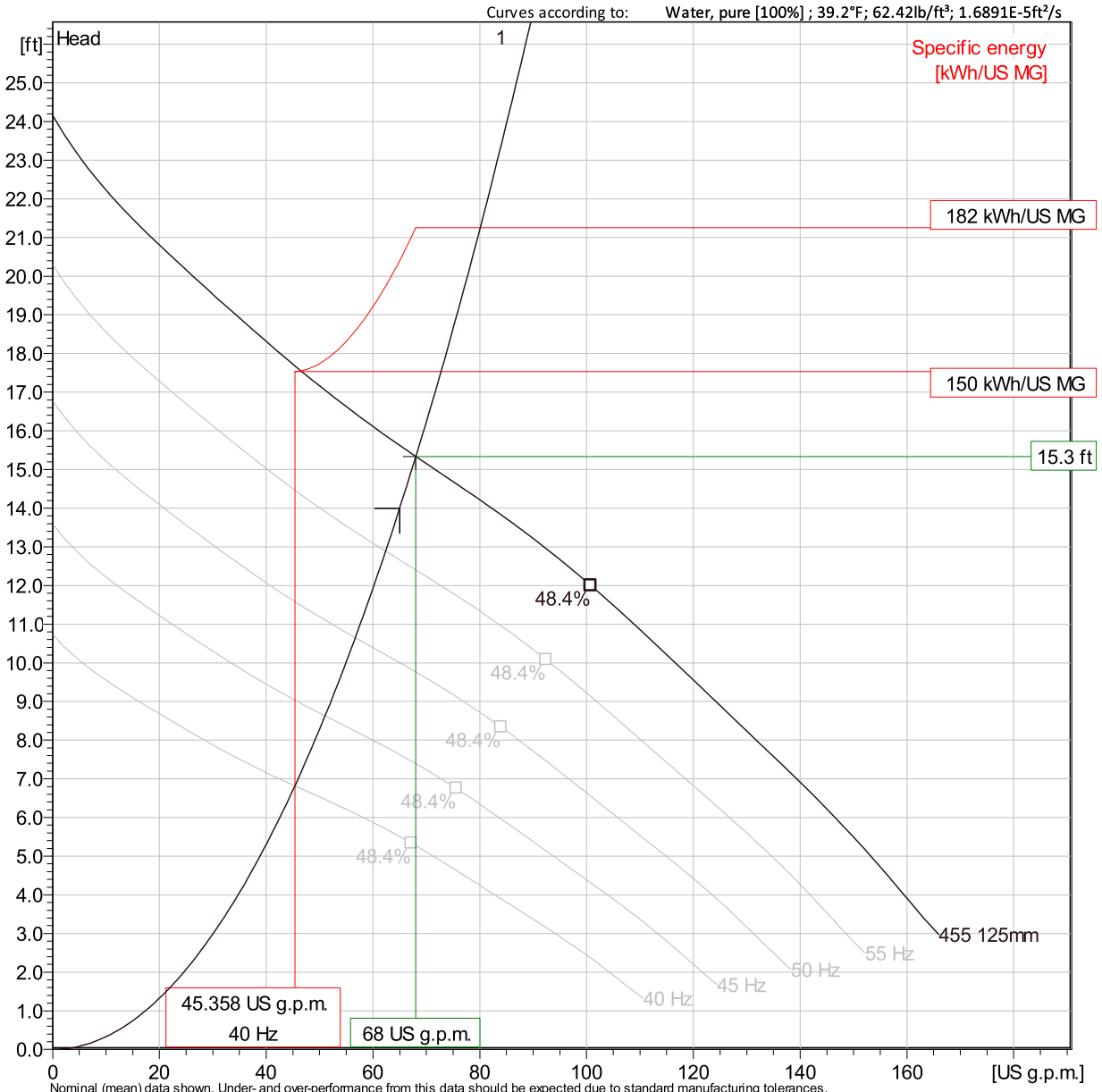
Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific energy	NPSHre
		US g.p.m.	ft	hp	US g.p.m.	ft	hp		kWh/US MG	ft
1	60 Hz	68	15.3	0.616	68	15.3	0.616	42.8 %	182	4.54
1	55 Hz	62.4	12.9	0.475	62.4	12.9	0.475	42.8 %	169	3.95
1	50 Hz	56.7	10.7	0.357	56.7	10.7	0.357	42.8 %	159	3.39
1	45 Hz	51	8.63	0.26	51	8.63	0.26	42.8 %	153	2.86

Project	Xylect-20280042	**Created by**	Alan Dahlqvist		
Block		**Created on**	7/6/2024	**Last update**	7/6/2024

NT 3085 SH 3~ Adaptive 455

VFD Analysis



Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

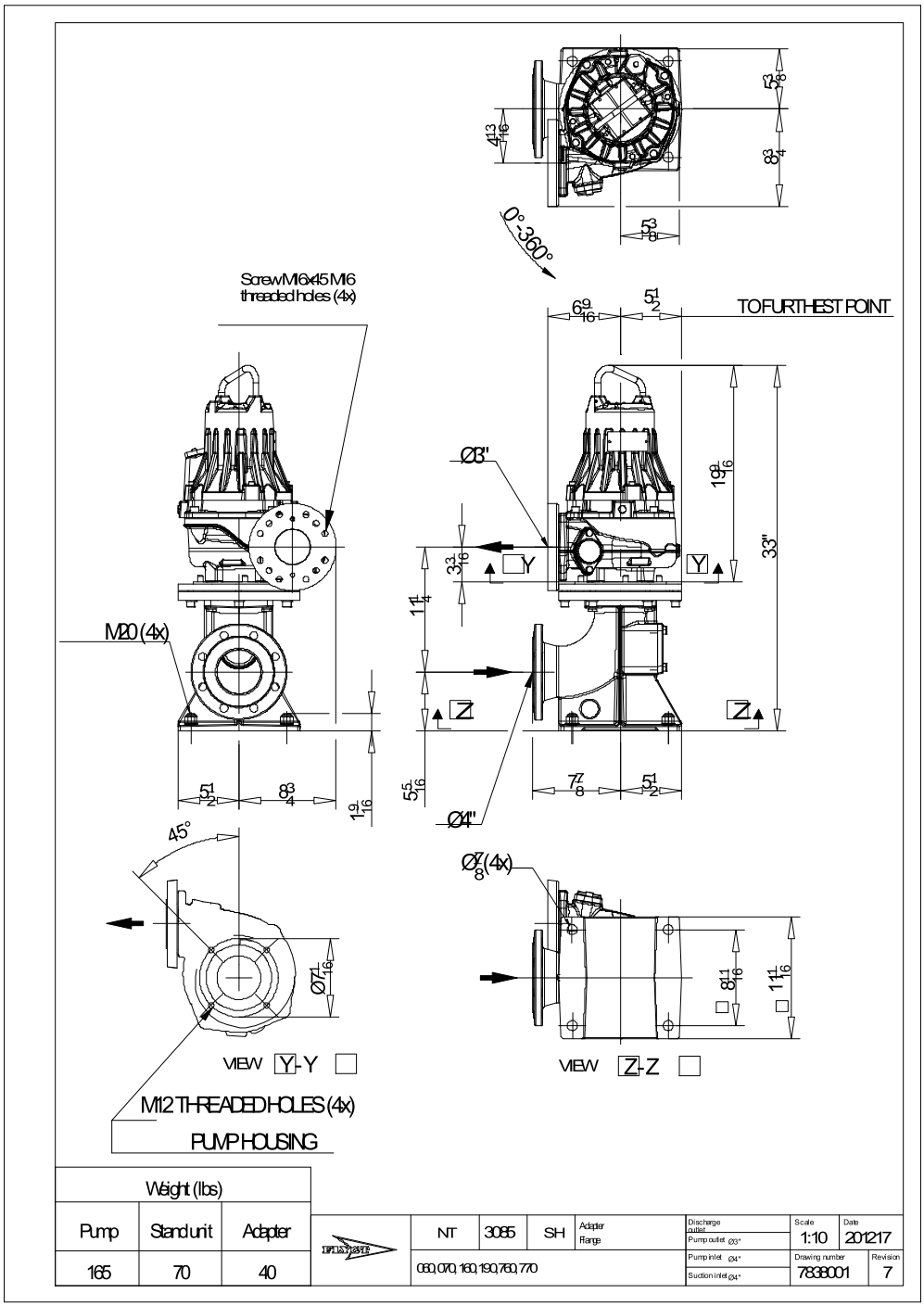
Operating Characteristics

Pumps / Systems	Frequency	Flow	Head	Shaft power	Flow	Head	Shaft power	Hydr.eff.	Specific energy	NPSHre
		US g.p.m.	ft	hp	US g.p.m.	ft	hp		kWh/US MG	ft
1	40 Hz	45.4	6.82	0.183	45.4	6.82	0.183	42.8 %	150	2.37

Project	Xylect-20280042	**Created by**	Alan Dahlqvist		
Block		**Created on**	7/6/2024	**Last update**	7/6/2024

NT 3085 SH 3~ Adaptive 455

Dimensional drawing



Weight (lbs)		
Pump	Standunit	Adapter
165	70	40

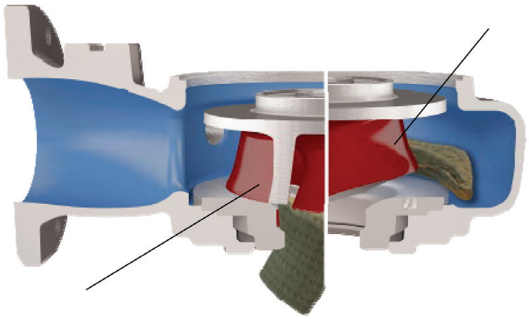
NT	3085	SH	Adapter Range	Discharge outlet Pump outlet Ø3"	Scale 1:10	Date 201217
060,070,160,190,760,770				Pump inlet Ø4" Suction inlet Ø4"	Drawing number 7838001	Revision 7

Project	Xylect-20280042	**Created by**	Alan Dahlqvist
Block		**Created on**	7/6/2024 **Last update** 7/6/2024

Adaptive Impeller

Description

The adaptive N-impeller is a new innovation which further improves the self cleaning characteristics of the N-concept. The impeller can move axially in the last stage of the cleaning cycle to make it easier for everything from big rags to stones to go through the volute. This makes these pumps more reliable than with any other impeller. Our lab tests clearly show that this impeller simply does not clog.



The technique is quite simple. First, the guide pin and the relief groove guide debris from the center to the perimeter of the inlet. The relief groove and swept back impeller edges push the debris through the volute. If the torque of the impeller is not large enough to push the debris through, the debris pushes the impeller upwards which enables it to be guided more easily through the relief groove. After the debris has passed through, the hydraulic pressure on the impeller pushes the impeller down to its original position.
The dampening effect of the axially moving impeller also reduces stress on the shaft and bearings as well as reducing wear on the impeller edges.

Benefits:

- High original efficiency
- No partial blockages
- Less wear on impeller = Sustained high efficiency. We guarantee 25% energy savings.
- No complete blockages
- Less stress on bearings, shaft and seals
- Less wear on impeller = Reliability and prolonged service intervals

Longer service intervals due to superior non-clogging compared to anything on the market today. The impeller solves the problem only when needed compared to, for example, a vortex impeller that solves the problem when needed and when it is unnecessary. This gives this pump excellent hydraulic efficiency not only in clean water but in the toughest of applications (compared to the competition).

Available on the following models:

N-3085
N-3102
N-3127

ELECTRICAL AND CONTROLS

HACH®
Be Right™

Digital Controller SC4500

Applications
- Wastewater
- Drinking Water
- Industrial
- Other

Claros Enabled

Service Protected

Ready for Now. Ready for the Future.

Technologies are advancing rapidly, providing new levels of convenience, accuracy, and efficiency. Which is exactly why the SC4500 Controller from Hach® is designed to integrate easily into your current system while allowing you to upgrade as your capabilities advance, without having to replace inventory. With a wide range of analog and digital connectivity options and the availability of intelligent instrument and data management features, the SC4500 unlocks the future, today.

Easy Adoption

The familiar experience of a modern touchscreen, the ability to use your current Hach sensors, and the same footprint as the SC200, make installation and integration of the SC4500 Controller seamless.

No Time for Downtime

The SC4500's built-in predictive diagnostic software ensures measurement confidence and reduces the risk of unexpected equipment downtime by enabling proactive maintenance planning via MSM, including step-by-step instructions.

The Connectivity Options You Need

The Controller provides local communication to SCADA or a PLC, as well as remote access through a secure, cloud-based connectivity option to integrate with Claros, the Water Intelligence System from Hach. From analog and advanced digital protocols to Wi-Fi, cellular or LAN, the SC4500 gives you the flexibility to adapt in a rapidly changing world.

The power of Hach's real time controls (RTC) software is now hosted on the SC4500 controller. Take advantage of the potential energy, chemical and labor savings, from a simple and environmentally friendly solution.

Technical Data*

Description	Microprocessor-controlled and menu-driven controller that operates the sensor
Dimensions	½ DIN - 144 x 144 x 192 mm (5.7 x 5.7 x 7.6 in.)
Weight	3.7 lb (controller only, w/o modules)
Display	3.5-inch TFT colour display with capacitive touchpad
Enclosure Rating	UL50E type 4X, IEC/EN 60529–IP 66, NEMA 250 type 4X Metal enclosure with a corrosion-resistant finish
Operating Temperature Range	-20 to 60 °C (-4 to 140 °F) (8 W (AC)/9 W (DC) sensor load) -20 to 45 °C (-4 to 113 °F) (28 W (AC)/20 W (DC) sensor load) Linear derating between 45 and 60 °C (-1.33 W/°C)
Storage Conditions	-20 - 70 °C (-4 - 158 °F), 0 - 95% relative humidity, non-condensing
Altitude	3000 m (9842 ft) maximum
Installation Category	Category II
Indoor/Outdoor	Outdoor installation in direct sunlight or UV radiation requires UV protection screen and/or sunroof
Pollution Degree	4
Protection Class	I, connected to protective earth
Power requirements	AC controller: 100-240 VAC ±10%, 50/60 Hz; 1 A (28 W sensor load) DC controller: 24 VDC +15% -20%; 2.5 A (20 W sensor load)
Measurements	Two device digital SC connectors
Relays	Two relays (SPDT); Wire gauge: 0.75 to 1.5 mm^2 (18 to 16 AWG) AC controller Maximum switching voltage: 100 - 240 VAC Maximum switching current: 5 A Resistive/1 A Pilot Duty Maximum switching power: 1200 VA Resistive/360 VA Pilot Duty DC controller Maximum switching voltage: 30 VAC or 42 VDC Maximum switching current: 4 A Resistive/1 A Pilot Duty Maximum switching power: 125 W Resistive/28 W Pilot Duty
Communication (optional)	Analog: Five 0-20 mA or 4-20 mA analog outputs on each analog output module Up to two analog Input modules (0-20 mA or 4-20 mA). Each input module replaces a digital sensor input. Digital: Profibus DPV1 module Modbus TCP Profinet IO module Ethernet IP module
Network Connectivity	LAN: Two Ethernet connectors (10/100 Mbps) Cellular: External 4G Wi-Fi
USB Port	Used for data download and software upload. The controller records approximately 20,000 data points for each connected sensor.
Compliance Certifications	CE. ETL certified to UL and CSA safety standards (with all sensor types), FCC, ISED, KC, RCM, EAC, UKCA, SABS, C (Morocco)
Warranty	12 months
Compatible Network Technologies	GSM 3G/4G (e.g. AT&T, T-Mobile, Rogers, Vodafone etc.) CDMA (e.g. Verizon)

**Subject to change without notice.*

Compatible Instruments / Software Version (Release Year)

Compatible Sensors and Analysers / Software Version (Release Year)

Amtax sc / V2.30 (2018) or higher

A-ISE sc / V1.02 or higher

AN-ISE sc / V1.08 (2013) or higher

N-ISE sc / V1.02 or higher

Nitratax clear sc, Nitratax eco sc, Nitratax plus sc / V3.13 (2013) or higher

NT3100sc/NT3200sc

Phosphax sc / V2.30 (2018) or higher

Phosphax sc LR/MR/HR / V1.01 (2018) or higher

TSS sc / V41.73 (2013) or higher

Solitax sc / V2.20 (2013) or higher

TU5300sc, TU5400sc / V1.34 (2017) or higher

SS7 sc (in Bypass) / V1.01 (2006) or higher

Ultraturb sc / V3.06 (2017) or higher

1720E / V2.10 (2006) or higher

Sonatax sc / V1.15 (2016) or higher

CL17sc / V2.7 (2019) or higher

CL10sc / V1.14 (2013) or higher

9184sc, 9185sc, 9187sc* / V2.03 (2013) or higher

Uvas plus sc / V3.01 (2017) or higher

LDO 2 sc* / V1.22 (2013) or higher

3798sc* / V2.03 (2013) or higher

3700sc + Inductive Conductive Digital 6120800 / V3.00 (2017) or higher

3422sc + Contacting Conductive Digital 6120700 / V3.00 or higher

3700 analog + Conductivity Module LXZ525.99.D0004

3400 analog + Conductivity Module LXZ525.99.D0004

pHD sc*, pHD-S sc / V3.10 (2016) or higher

1200-S sc* / V2.04 (2013) or higher

pHD analog + Digital Gateway 6120500 / V3.00 (2017) or higher

pHD analog + pH/ORP Module LXZ525.99.D0003

RC and PC analog sensor + Digital Gateway for conventional analog pH and ORP sensors 6120600 / V3.00 (2017) or higher

RC and PC analog + pH/ORP Module LXZ525.99.D0003

8362sc* / V3.00 (2017) or higher

Polymetron pH/ORP analog + Ultrapure pH/ORP Module LXZ525.99.D0007

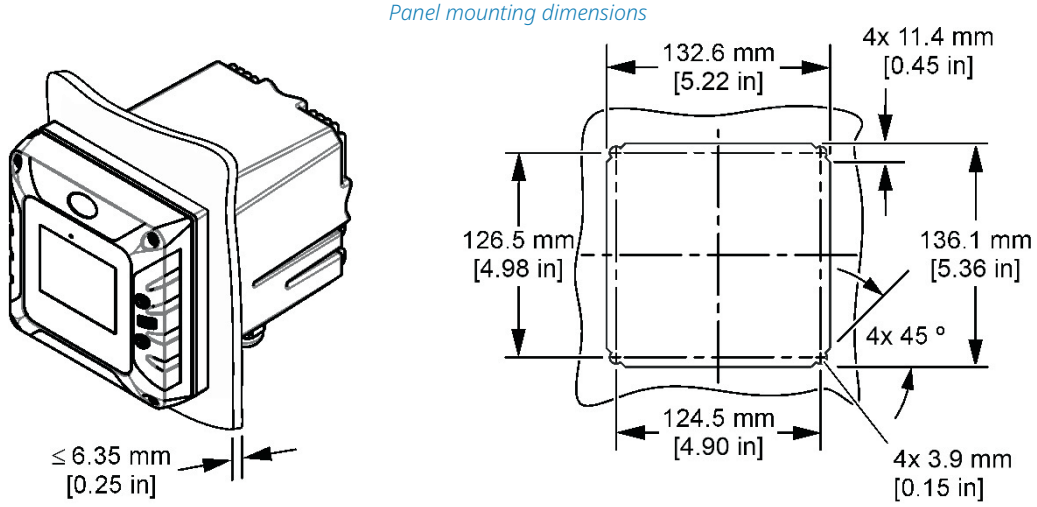
Polymetron Conductivity analog + Ultrapure Conductivity Module LXZ525.99.D0006

GS1440 and GS2440EX Sensors H_2S FP360 sc / V1 or higher

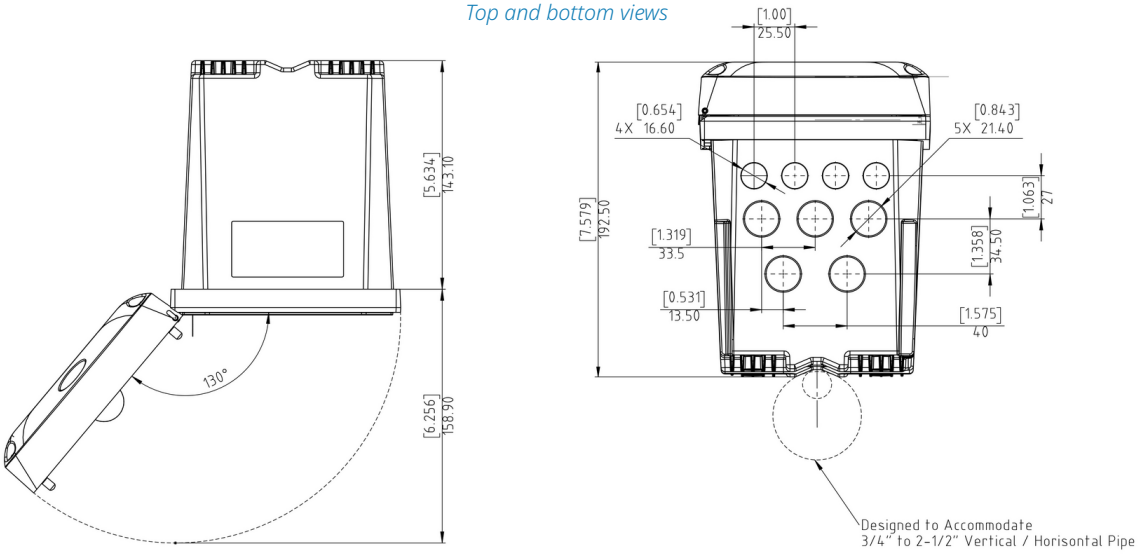
**Hardware Version1 of instrument is not supported*

Dimensions

Panel mounting dimensions



Top and bottom views



Door Opening Details

Order Information

Controller

LXV525.99A11551	SC4500 Controller, Prognosys, 5x mA Output, 2 digital Sensors, without plug
LXV525.99E11551	SC4500 Controller, Prognosys, 5x mA Output, 2 digital Sensors, US plug
LXV525.99A11541	SC4500 Controller, Prognosys, 5x mA Output, 1 digital Sensor, 1 mA Input, without plug
LXV525.99E11541	SC4500 Controller, Prognosys, 5x mA Output, 1 digital Sensor, 1 mA Input, US plug
LXV525.99AA1551	SC4500 Controller, Claros-enabled, 5x mA Output, 2 digital Sensors, without plug
LXV525.99EA1551	SC4500 Controller, Claros-enabled, 5x mA Output, 2 digital Sensors, US plug
LXV525.99AA1541	SC4500 Controller, Claros-enabled, 5x mA Output, 1 digital Sensor, 1 mA Input, without plug
LXV525.99EA1541	SC4500 Controller, Claros-enabled, 5x mA Output, 1 digital Sensor, 1 mA Input, US plug

Additional configurations are available. Please contact Hach Technical Support or your Hach representative.

Accessories

LXZ524.97.00042	SC4x00 Input Module
LXZ525.99.D0002	SC4x00 mA Output Module (5 Outputs)
LXZ525.99.C0002	SC4500 Ethernet IP Upgrade Kit
LXZ525.99.C0003	SC4500 Modbus TCP/IP Upgrade Kit
LXZ525.99.00026	SC4500 Ethernet Cable M12 to M12 / C1D2, 10 m
LXZ525.99.00017	SC4500 USB Stick
LXZ524.99.00004	SC4x00 UV Protection Screen
LXZ524.99.00005	SC4x00 UV Protection Screen with Sunroof
LXZ524.99.00033	SC4x00 Sunroof Visor
LXZ524.99.00036	SC4x00 Mounting Hardware Sunroof with Visor
LXZ524.99.00037	SC4x00 Sunroof with Visor
LXZ525.99.D0003	SC4500 pH/ORP module
LXZ525.99.D0004	SC4500 Conductivity module
LXZ525.99.D0006	SC4500 Ultrapure pH/ORP module
LXZ525.99.D0007	SC4500 Ultrapure Conductivity module

Claros Enabled

This instrument connects to Claros, Hach's innovative Water Intelligence System. Claros allows you to seamlessly connect and manage instruments, data, and process – anywhere, anytime. The result is greater confidence in your data and improved efficiencies in your operations. To unlock the full potential of Claros, insist on Claros Enabled instruments.

Service Protected

With Hach Service, you have a global partner who understands your needs and cares about delivering timely, high-quality service you can trust. Our Service Team brings unique expertise to help you maximize instrument uptime, ensure data integrity, maintain operational stability, and reduce compliance risk.

HACH®

World Headquarters: Loveland, Colorado USA | hach.com

United States **800-227-4224** fax: 970-669-2932 email: orders@hach.com
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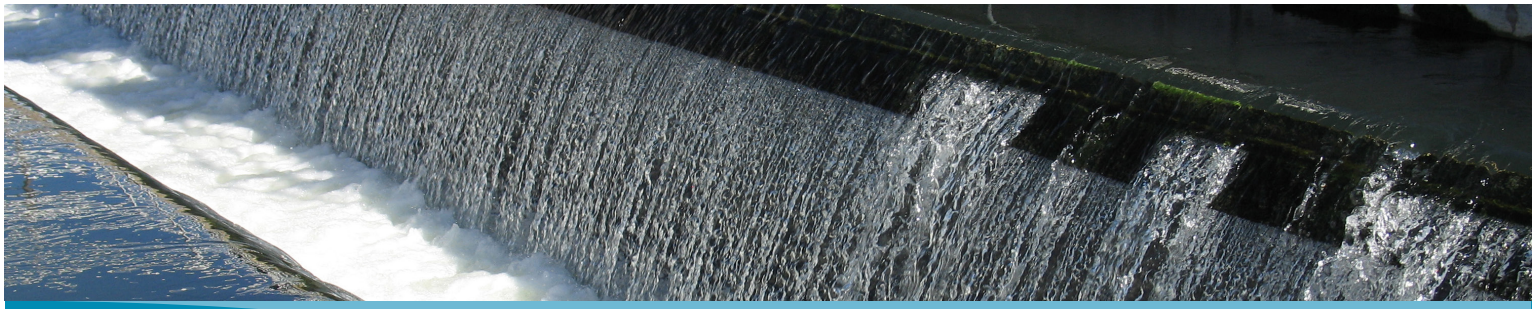


MJK Float Switch 7030

2.71

MERCURY FREE WITH BREAK RESISTANT CABLE

General

The exceptional reliability of the MJK Float Switch 7030 makes it very suitable for many highly automated systems to provide additional protection against control system failures, preventing pumps from running dry, etc.

MJK uses only up-to-date, environmentally friendly materials in the Float Switch 7030. The extra durability of the potted switching components - strong multi-fiber flexible cable and rugged polypropylene enclosure - allows the Float Switch 7030 to deliver reliable results where other float switches fail.

5 YEAR WARRANTY

Features

- Environmental friendly - no mercury
- Unmatched rugged construction for durability
- Riable electromechanical contact system - guaranteed for up to 20 million operations
- Unique counterweight system
- UL approved 250 VAC/16 A switch
- 39, 65, 100 or 150 ft. oil resistant PVC cable and polypropylene cable bracket
- SPDT relay allowing normally open or normally closed configurations - selected based on how it is wired.

Applications

- Waste water pumping stations
- Sewage treatment plants
- Drinking water reservoirs.

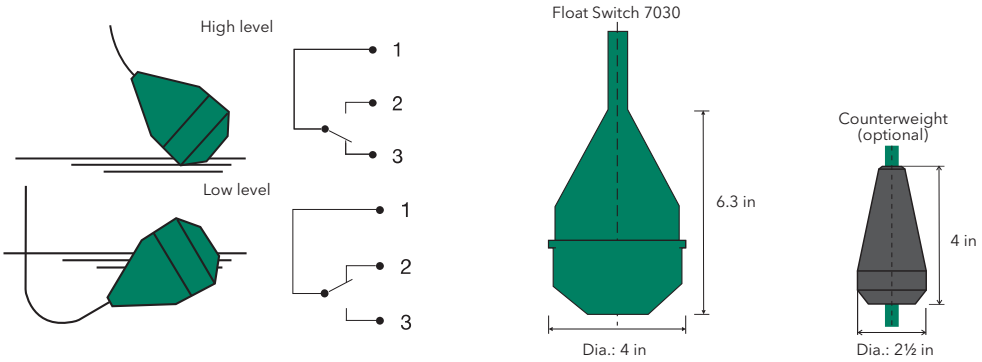
Functions

A hermetically sealed microswitch is activated by a moving counterweight when the float changes its position in the fluid. The changeover hysteresis can be adjusted by means of a counterweight placed on the cable. The counterweight also ensures that Float Switch 7030 is always correctly positioned and makes the bend of the cable less sharp.

mjk
a xylem brand

MJK Float Switch 7030

Connections and Dimensions



Specifications

Float Switch 7030	
Contact system	Mechanical change-over switch (SPDT)
Max. load	16 A @ 200 VAC, 0.5 A @ 220 VDC
Temperature	- 5 to + 150 °F
Materials	Polypropylene/Oil resistant PVC (float housing/cable)
Cable	3 X AWG 17, oil resistant PVC insulation. Dia. 1/3 in.
Approvals	Switch UL U83 161 3 (16A 125VAC). CE: EN61000-6-4 2007/EN61000-6-2 2005

Order Numbers

Float Switch 7030	
MJK202810	Float Switch 7030 with 12m/39 ft. cable
MJK202811	Float Switch 7030 with 20m/65 ft. cable
MJK202811-100	Float Switch 7030 with 30,5m/100 ft. cable
MJK202811-150	Float Switch 7030 with 46m/150 ft. cable
Float Switch 7030 incl. counter weight	
MJK202814	Float Switch 7030 202810 incl. 560917 with 12m/39ft cable
MJK202814-65	Float Switch 7030 202811 incl. 560917 with 20m/65ft cable
MJK202814-100	Float Switch 7030 202810 incl. 560917 with 30,5m/100ft cable

Float Switch 7030 acessories	
MJK560914	Plastic mounting bracket for cable Ø6-10mm
MJK560917	Counter weight f. level switch 400 gr.

Specification sheet

VEGAPULS 6X

Radar sensor for continuous level measurement of liquids and bulk solids

- Overview

Application area

VEGAPULS 6X is a radar sensor for continuous level measurement of liquids and bulk solids.

The small process fittings offer particular advantages for liquids in small tanks or tight mounting spaces. The very good signal focusing ensures the use in vessels with many installations such as stirrers and heating spirals.

For bulk solids under most different process conditions, the device is ideal for level measurement in very high silos, large bunkers and segmented vessels. The VEGAPULS 6X is equipped with an encapsulated plastic antenna or a lens antenna integrated into the metal flange for this.

Applications

The VEGAPULS 6X can be used in almost all industrial areas and applications. It is selected and adapted simply by an application-orientated configuration and setup.

Your benefit

- Maintenance-free operation thanks to non-contact measuring principle
- High plant availability, because wear and maintenance free
- Exact measuring results independent of process conditions

Function

The device sends a continuous radar signal or extremely short microwave pulses, depending on its measuring frequency, via its antenna. The transmitted signal is reflected by the medium and received as an echo by the antenna.

The frequency difference between the transmitted and the received signal or the time from transmitting to receiving the signals is proportional to the distance and depends on the filling height.

The thus determined filling height is transformed into an appropriate output signal and output as a measured value.

Technical data

Measuring range	up to 120 m (393.7 ft)
Deviation	≤ 1 mm
Beam angle depending on antenna	3°
Measuring frequency	W-band – 80 GHz, C-band – 6 GHz, K-band – 26 GHz technology
Process fitting	Mounting straps, compression flanges from DN 80, 3", thread from G¾, ¾ NPT, encapsulated antenna system, flanges from DN 20, 2", flange with swivelling holder from DN 100, 4"
Process pressure	-1 … 160 bar (-100 … 16000 kPa/-14.5 … 2320 psig)
Process temperature	-196 … +450 °C (-321 … +842 °F)
Ambient, storage and transport temperature	-40 … +80 °C (-40 … +176 °F)
Bluetooth standard	Bluetooth 5.0
Bluetooth range	typically 25 m (82 ft)
Operating voltage	12 … 35 V DC
Output signal	4 … 20 mA/HART, Profibus PA, Foundation Fieldbus, Modbus
Protection rating	IP66/IP67, IP66/IP68 (0.2 bar)/IP69, IP66/68 (1 bar) – acc. to IEC 60529; Type 4X, Type 6P – acc. to NEMA

Materials

The wetted parts of the instrument are made of 316L, PP, PTFE or PEEK. The process seal is made of FKM, FFKM, EPDM or PTFE.

A complete overview of the available materials and seals can be found on our homepage under "*Products*".

Housing versions

The housings are available as single or double chamber version in plastic, stainless steel or Aluminium. They are available in protection class IP68 (1 bar).

Electronics versions

The device is available in different electronic versions.

- 4 … 20 mA/HART in two or four-wire version
- Profibus PA, Foundation Fieldbus, Modbus protocol
- Integrated overvoltage arrester, additional current output, integrated radio module PLICSMOBILE 81

Approvals

Worldwide approvals are available for VEGA instruments, e.g. for use in hazardous areas, on ships or in hygienic applications.

For approved devices (e.g. with Ex approval) the technical data in the respective safety instructions are applicable.

You can find detailed information in the available approvals on our homepage under "*Downloads*".

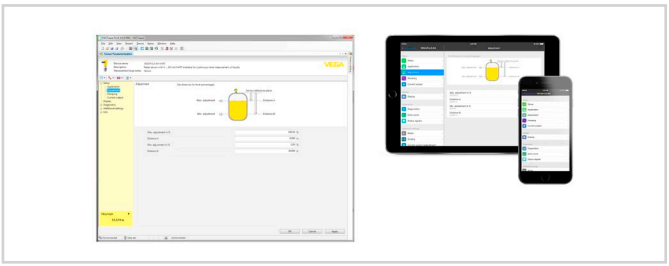
Adjustment

Adjustment directly at the measuring point
The adjustment of the instrument is carried out via the optional display and adjustment module PLICSCOM or via a PC with the adjustment software PACTware and corresponding DTM.

Wireless adjustment via Bluetooth
The Bluetooth version of display and adjustment module enables a wireless connection to standard adjustment units. This can be smartphones/tablets with iOS or Android operating system or PCs with PACTware and Bluetooth USB adapter.

Wireless connection to standard operating devices

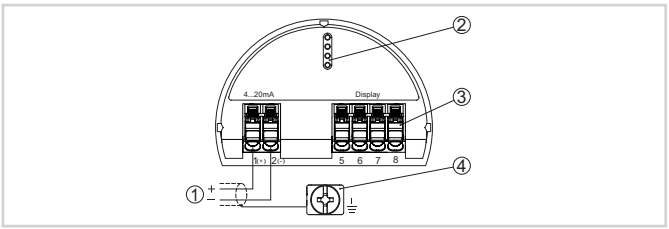
Adjustment is hence carried out via a free-of-charge app from the Apple App Store or the Google Play Store or the adjustment software PACTware and respective DTM.



Adjustment via PACTware or app

Adjustment via remote systems
Further adjustment options are possible via a HART Communicator as well as manufacturer-specific programs such as AMS™ or PDM.

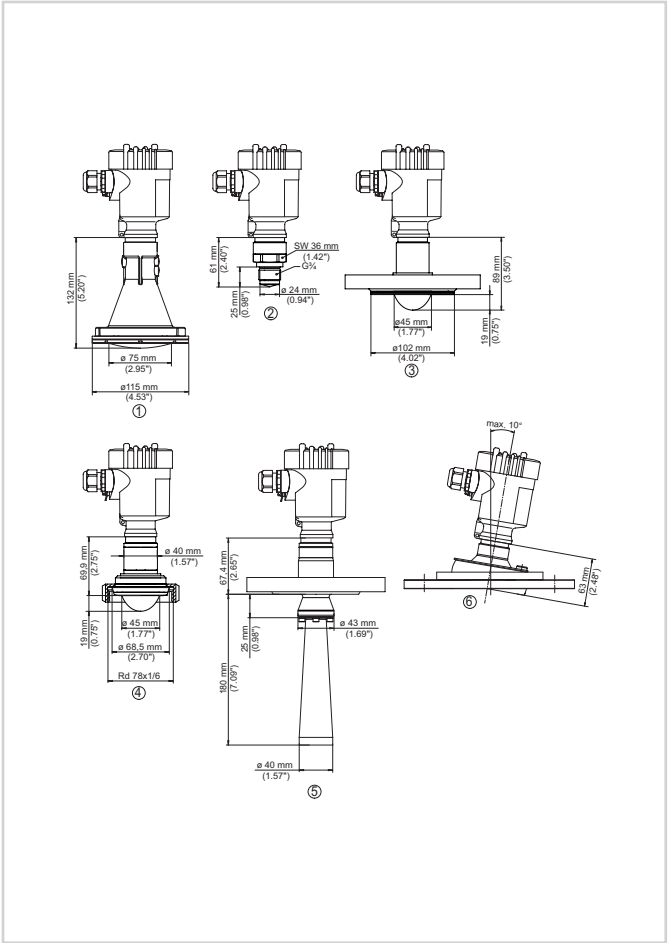
Electrical connection



Electronics and connection compartment, single chamber housing (example)

1 *Voltage supply/Signal output*
2 *For display and adjustment module or interface adapter*
3 *For external display and adjustment unit*
4 *Ground terminal for connection of the cable screening*

Dimensions



Dimensions and antenna versions VEGAPULS 6X

1 *Plastic horn antenna*
2 *Thread with integrated antenna system*
3 *Flange with encapsulated antenna system*
4 *Hygienic fitting*
5 *Horn antenna*
6 *Flange with lens antenna*

Information

You can find further information on the VEGA product line on our homepage.

In the download section of our homepage you'll find operating instructions, product information, industry brochures and approval documents as well as device and adjustment software.

Instrument selection

On our homepage under "*Products*" you can select the suitable measuring principle and instrument for your application.

There you will also find detailed information on the available device versions.

Contact

You can find your personal contact person at VEGA on our homepage under "*Contact*".

Rosemount 3051T In-Line Transmitter ordering information

Rosemount 3051T In-Line Pressure Transmitters are the industry standard for gage and absolute pressure measurement. The in-line, compact design allows the transmitter to be connected directly to a process for quick, easy and cost effective installation.

- Loop Integrity and Plugged Impulse Line Diagnostics detect issues that might compromise the integrity of the output signal (code DA1).
- Bluetooth® Connectivity enables efficient, reliable, and safe configuration and maintenance (code BLE).
- Back-lit Graphical Display with Local Language Capability (code M6).
- Safety certification and proof testing (code QT and T9).

CONFIGURE > VIEW PRODUCT >

Online product configurator

Many products are configurable online using our Product Configurator. Select the **Configure** button or visit our website to start. With this tool's built-in logic and continuous validation, you can configure your products more quickly and accurately.

Specifications and options

See the Specifications and options section for more details on each configuration. Specification and selection of product materials, options, or components must be made by the purchaser of the equipment. See the Material selection section for more information.

Model codes

Model codes contain the details related to each product. Exact model codes will vary; an example of a typical model code is shown in Figure 2.

Figure 2: Model Code Example

3051TG3A2B21A (1) **WR5M6BLEDA1** (2)

1. Required model components (choices available on most)
2. Additional options (variety of features and functions that may be added to products)

Optimizing lead time

The starred offerings (★) represent the most common options and should be selected for the fastest delivery times. The non-starred offerings are subject to additional delivery lead time.

Required model components

Model

Code	Description	
3051T	In-Line Pressure Transmitter	★

Pressure type

Code	Description	
G	Gage	★
A(1)	Absolute	★

(1) *Wireless output (code X) available in absolute measurement type (code A) with only range 1–5, with 14-NPT process connection (code 2B) and housing (code P).*

Pressure range

Code	Gage (Rosemount 3051TG)(1)	Absolute (Rosemount 3051TA)	
0	–5 to 5 psi (-344.74 to 344.74 mbar)	N/A	★
1	–14.7 to 30 psi (-1.01 to 2.06 bar)	0 to 30 psia (0 to 2.06 bar)	★
2	–14.7 to 150 psi (-1.01 to 10.34 bar)	0 to 150 psia (0 to 10.34 bar)	★
3	–14.7 to 800 psi (-1.01 to 55.15 bar)	0 to 800 psia (0 to 55.15 bar)	★
4	–14.7 to 4000 psi (-1.01 to 275.79 bar)	0 to 4000 psia (0 to 275.79 bar)	★
5	–14.7 to 10000 psi (-1.01 to 689.47 bar)	0 to 10000 psia (0 to 689.47 bar)	★
6(2)	–14.7 to 20000 psi (–1.01 to 1378.95 bar)	0 to 20000 psia (0 to 1378.95 bar)	

(1) *Rosemount 3051TG lower range limit assumes atmospheric pressure of 14.7 psig.*
(2) *Not available with PROFIBUS PA or Low Power 1–5 Vdc transmitter output (option code W or M), inert sensor fill fluid (option code 2), NSW drinking water approval (option code DW), or assemble to manifolds (option code S5).*

Transmitter output

Code	Description	
A	4–20 mA with digital signal based on HART® Protocol	★
F	FOUNDATION™ Fieldbus Protocol	★
W(1)	PROFIBUS® PA Protocol	★
X(2)	Wireless (requires wireless options and engineered polymer housing)	★
M(3)	Low-power, 1–5 Vdc with digital signal based on HART Protocol	

(1) *For local addressing and configuration, M4 (LOI) is required. Not available with product certification codes E4, EM, EP, I6, IM, KD, KL, KM, KP, KS, and N3.*
(2) *This option is only available with intrinsically safe approvals.*

(3) *Only available with C6, E2, E5, I5, K5, KB, EM, IM, KM, EP, and E8 product certifications.*

Process connection style

Code	Description	
2B	½-14 NPT female (range 0-5 only)	★
2C[1]	G½ A EN837-1 male (range 0-4 only)	★
2F[2]	Coned and threaded, compatible with autoclave Type F-250-C (range 5-6 only)	
61[3][4]	Non-threaded instrument flange (range 1-4 only)	

(1) *Not available with S1, S5, or WSM. Wireless output (code X) not available with absolute pressure type or C-276 diaphragm material.*
(2) *Not available with wireless (output code X) for range 5.*
(3) *Not available with wireless (output code X).*
(4) *Only available with 316L stainless steel isolating diaphragm.*

Isolating diaphragm

Materials of Construction comply with recommendations per NACE MR0175/ISO 15156 for sour oil field production environments. Environmental limits apply to certain materials. Consult latest standard for details. Selected materials also conform to NACE MR0103 for sour refining environments.

Code	Isolating diaphragm	Process connection wetted parts material	
2	316L stainless steel	316L stainless steel	★
3	Alloy C-276	Alloy C-276	★
7	Gold-plated 316 stainless steel	316L stainless steel	

Sensor fill fluid

Code	Description	
1	Silicone	★
2[1]	Inert	

(1) *Not available with wireless (output code X).*

Housing material

Code	Housing material	Conduit entry size	
A	Aluminum	½-14 NPT	★
B	Aluminum	M20 x 1.5	★
E	Aluminum, ultra low copper	½-14 NPT	
F	Aluminum, ultra low copper	M20 x 1.5	
J	Stainless steel	½-14 NPT	★
K	Stainless steel	M20 x 1.5	
P[1]	Engineered polymer	No conduit entries	★
D[2]	Aluminum	G½	
M[2]	Stainless steel	G½	

(1) *Only available with wireless (output code X). Only available with gauge pressure ranges 1-4.*

Industrial Application Software Platform for:

SCADA, HMI, IIoT, MES, Alarming, Reporting & More

Ignition!®

by inductive automation

The Unlimited SCADA Platform of the Future

Trusted By:

Coca-Cola · Shell · FCA Fiat Chrysler Automobiles · Johnson & Johnson · Starbucks · Walt Disney

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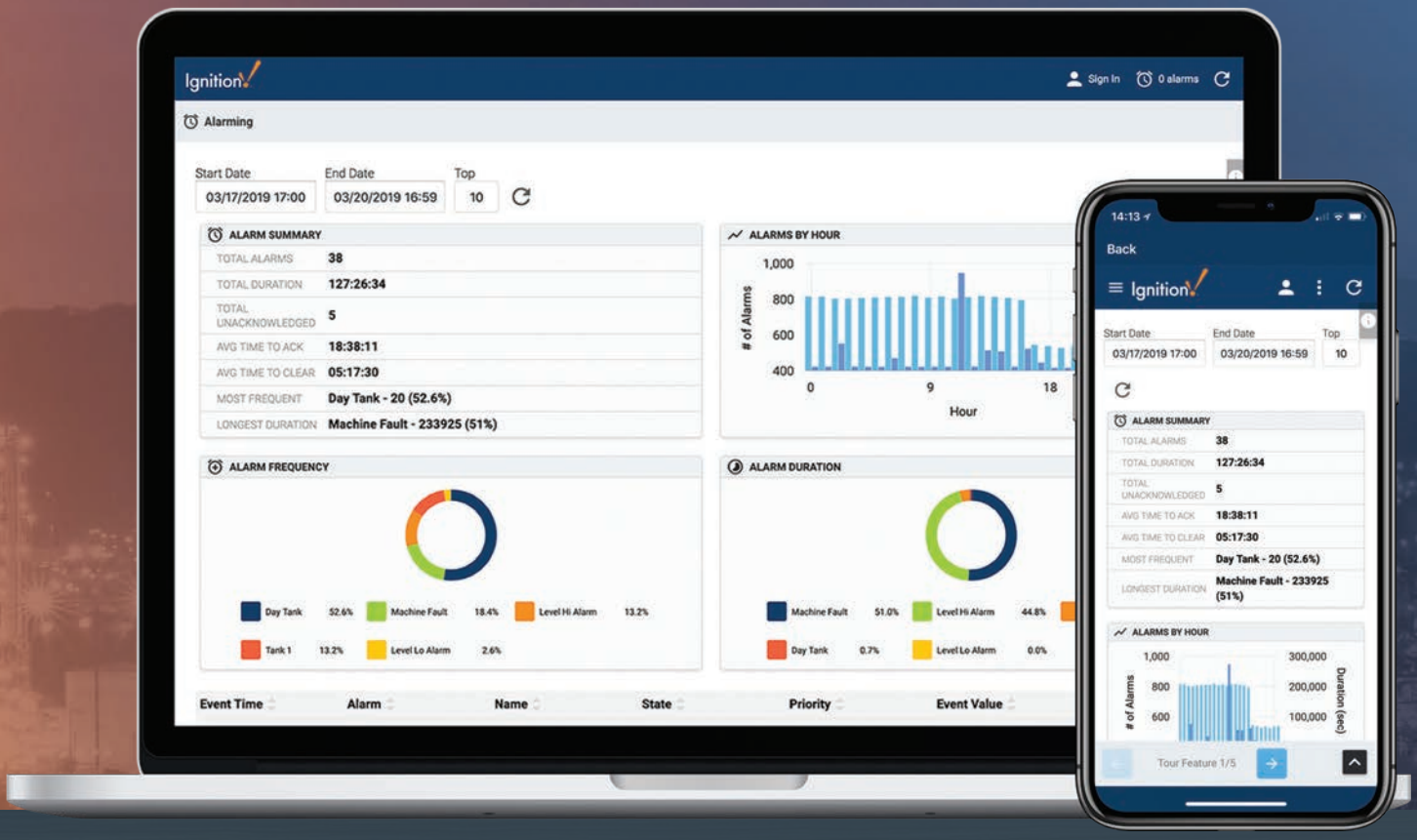


Ignition by Inductive Automation is the world's first universal industrial application platform that lets you seamlessly collect all your data, design any kind of industrial application with ease, and instantly web-deploy clients to anyone, anywhere – without limits.

With Ignition it's as easy as "connect, design, and deploy" to get your important industrial data to anyone in your organization.

Connect

Ignition is server software that acts as the hub for everything on your plant floor for total system integration.

Design

With Ignition you can easily extend the functionality of your system by adding hot-pluggable software modules that give you the power to build the exact system you need without slowing down your operations.

Deploy

With Ignition, you can instantly launch an unlimited number of web clients on any device with a browser including laptops, industrial displays, and mobile devices.

"Once we took Ignition on as one of our enterprise platforms, everything improved exponentially across the board from an operational standpoint."

– Hugh Roddy, Chobani

Unlimited Licensing

Everything You Need for One Affordable Price.

Ignition is unlimited, so for the low cost of one server license you can seamlessly connect all your data, design any kind of industrial application with ease, and instantly web-deploy unlimited industrial and mobile clients to anyone, anywhere — all from one universal platform for industrial automation.

Unlimited Clients

With unlimited runtime clients at no additional cost, you can get your important data and analytics to your entire team, across your whole company.

Unlimited Tags

Ignition allows you to create and use as many tags as you need for devices, OPC servers, and anything else, without limits.

Unlimited Connections

Using open technologies like OPC UA and SQL, Ignition easily connects to practically any PLC, database, device, and enterprise system so you can get your whole enterprise connected.

Unlimited Designers

You can get your whole team developing projects in Ignition, even at the same time, without paying for extra designers.

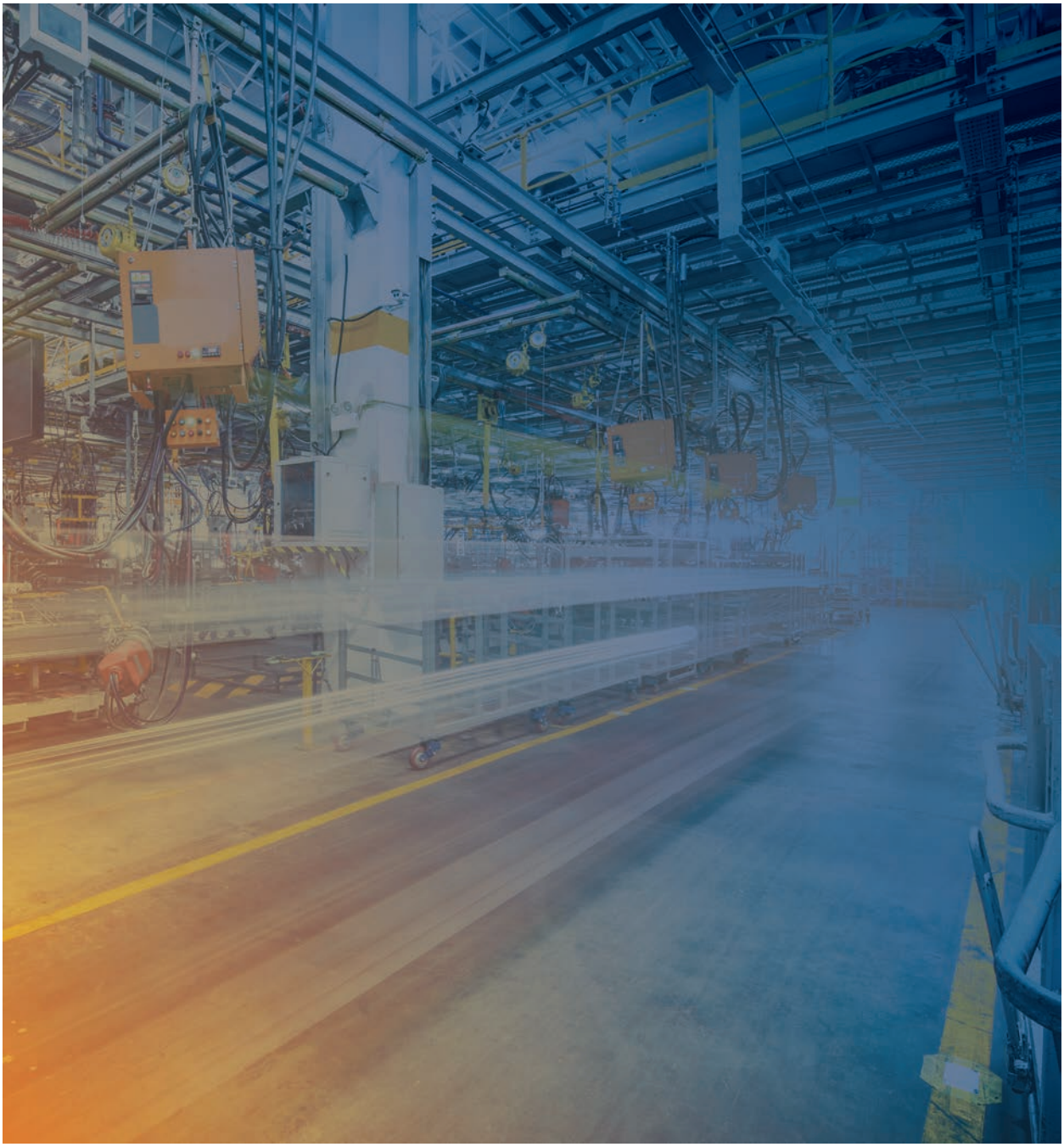
Unlimited Scalability

Ignition grows along with your company, so you can buy one license to connect your entire facility, or multiple licenses to connect multiple facilities.

"There are no licensing limits on screens, no licensing limits on tags. That's a wow moment."

– Chris VanRemoortel, Bixby International

Unlimited Possibilities



SCADA, IIoT, MES and Beyond – All On One Platform.

Ignition is the world's first truly universal industrial application platform because it empowers you to rapidly develop any type of industrial application, and scale your system in any way — all on one platform.

SCADA

Easily control, track, display, and analyze your processes.

IIoT

Make your data more accessible and efficient.

MES

Track your production, manage recipes, calculate OEE, and more.

HMI

Build optimized screens to monitor and control your machinery.

Alarming

Build complex alarming systems with ease and get notifications instantly.

Reporting

Easily create and deliver dynamic, database-driven industrial reports.

Edge Computing

Capture and visualize critical data at the remote edge of your network.

Enterprise

Empower your teams with better data to make smarter decisions.

Mobile

Build mobile-responsive industrial applications using HTML5.

"Pretty much whatever we think of doing, we do it in Ignition."

– David Lewis, Sierra Nevada Brewing Co.

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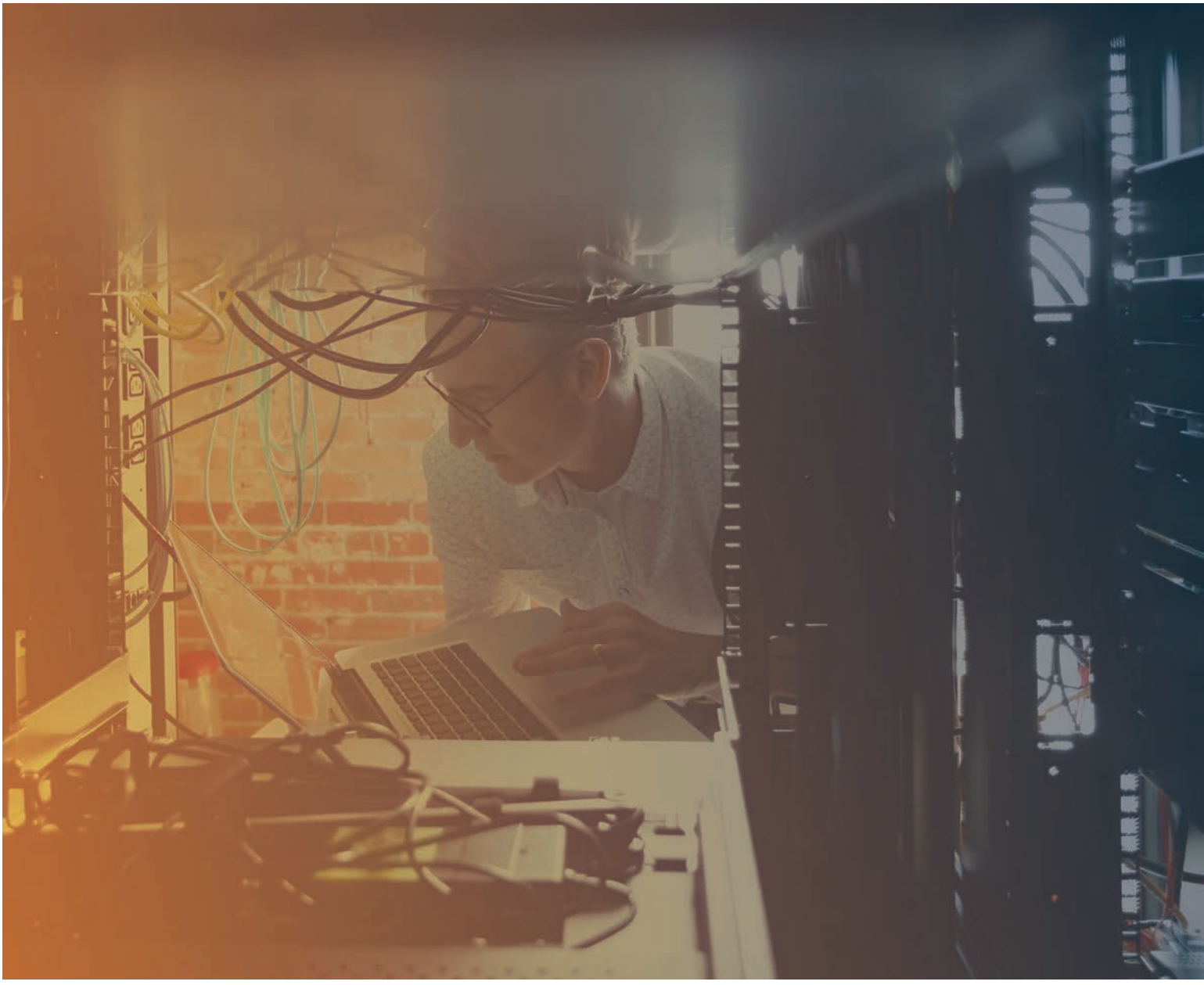


This booklet will take you on a tour of benefits and features that make the Ignition platform so special, as well as the amazing solutions your company can easily build with Ignition.

The Ignition Platform

Ignition is the world's first truly universal industrial application platform because it empowers you to connect all of the data across your entire system in any way, without limits.

Connect

One Central Hub for Everything on the Plant Floor

Ignition is server software that acts as the hub for everything on your plant floor to achieve total system integration. No matter what brand, model, or platform, it talks to your plant-floor equipment just as naturally as it talks to SQL databases, seamlessly bridging the gap between production and IT.

The One and Only Universal Industrial Application Platform

Ignition is the world's first truly universal industrial application platform because it empowers you to connect all of the data across your entire enterprise, rapidly develop any type of industrial automation system, and scale your system in any way, without limits. Here are the amazing features that make Ignition the first and only universal Industrial Application Platform:

Unlimited Licensing Model

Add unlimited clients, screens, tags, connections, and devices at no additional cost.

Server-Centric Web-Deployment

Easily deploy clients from a central server at one site, multiple sites, or in the cloud.

Modular Configurability

Use integrated software modules to build any kind of industrial application to fit your processes.

Cross-Platform Compatibility

Installs on any major operating system including mobile OSes like iOS and Android.

View on Any Device

View clients on any device including desktops, industrial displays, and mobile devices.

Built on Open Standard Technologies

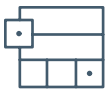
Based on easy-to-support IT standards like SQL, Python, MQTT, and OPC UA.

Connects to Anything

Connects to any major database and PLC, bridging the gap between IT and OT.

Universal Designer

One integrated development environment to build applications for HMI, SCADA, MES, and more.



Rapid Development and Deployment

Get all your tools in one place so you can build and deploy applications quickly and easily.

Design

Create Any Kind of Industrial Application for Any Industry

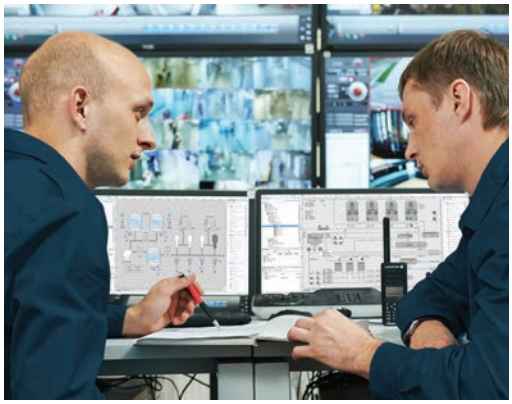
Ignition comes with everything you need to create any kind of industrial application for desktops, industrial displays, and mobile screens. The Ignition Designer combines a rich component library, easy data-binding, and powerful tools for drawing and scripting, into one fully integrated development environment.

One Unified Designer

The Ignition Designer is built into the Ignition platform so it comes standard, at no extra cost, with every Ignition installation. The Designer brings all your data, systems, and developers together into one beautifully simple, integrated development environment specifically designed to help you build industrial applications more quickly.

Accelerate Application Development

With a clean, intuitive design and a straightforward project management system, the Ignition Designer makes ease-of-use a priority. If you can dream it, Ignition can do it — fast!



Unlimited Design Clients

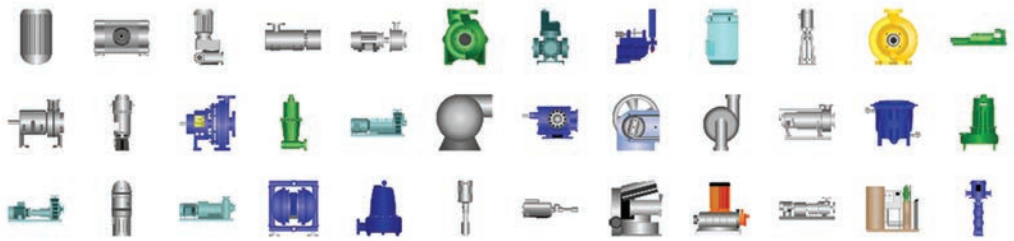
You can launch an infinite number of Designers, and have multiple people work simultaneously on the same project without locking anyone out of shared project resources.

"Ignition is my engine of innovation because that's my framework for what I build upon. When my boss asks me to dream up something new, I almost always turn to Ignition."

– Jason Hamlin, Plant Instrument Technician

Rapidly Build and Easily Customize Large Projects

Ignition's simple project inheritance file system makes it easy to define an overarching corporate project that shares resources such as templates, scripts, and themes across multiple applications.

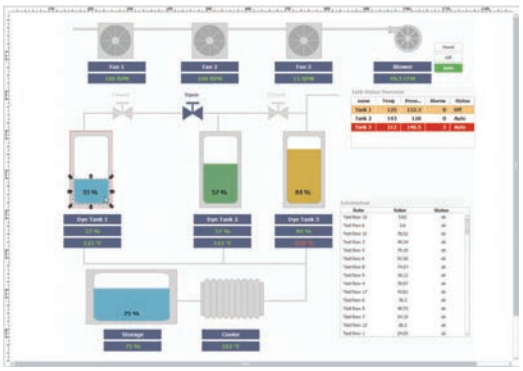


Create Custom Graphics and Animations

Use powerful 2D vector drawing and animation tools to create any shape with a variety of line strokes, color fills, patterns, and gradients, or import your own Scalable Vector Graphics (SVG).

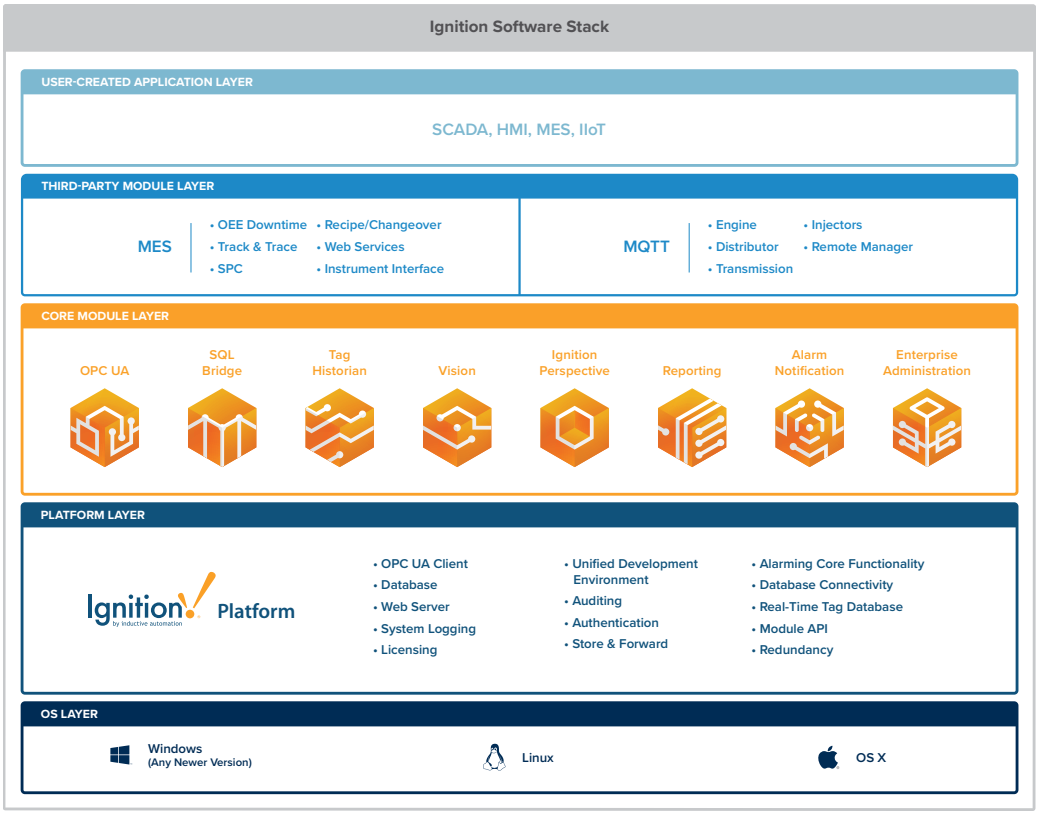
Easy Drag-and-Drop Design

Use simple drag-and-drop data binding to easily create links between properties of on-screen components and data tags from PLC values, SQL queries, expressions, and more.



Fully Integrated Software Modules

Ignition is a universal industrial application platform capable of unlimited extensibility through the addition of fully integrated software modules. All modules are hot-pluggable so they can be installed, removed, and upgraded without impacting your operations in any way, and they all work together seamlessly.



Build the Exact System You Need

With a full suite of powerful Ignition Core and third-party modules available for the Ignition platform, you can easily develop industrial applications perfectly customized to your unique processes.

"The modules, integration, and flexibility of the Ignition platform let us build an application that's easily adopted in production."

– Enrico Aramini, HTC High Tech Consultant SRL

Inductive Automation Modules

Inductive Automation makes a full line of powerful Ignition Core modules that empower companies to create virtually any kind of industrial application.

Ignition Core Modules

With the Ignition Core modules, users can add features such as charts and tables, mobile access, voice notifications for alarms, transaction management, sophisticated logic systems, enterprise administration, and much more.

Vision Module

The visualization module for plant-floor and desktop screens. Launch unlimited rich, web-deployed clients anywhere on the network. Display charts, graphs, trends, HMI screens, and more.

Ignition Perspective Module

The visualization module for mobile-first industrial applications. Easily build pure-web, mobile-responsive, visually stunning applications for monitoring and control using HTML5.

SQL Bridge Module

Easily log data, call stored procedures, and synchronize data bi-directionally.

Tag Historian Module

Turn a SQL database into a high-performance time-series tag historian.

Reporting Module

Create dynamic, database-driven PDF reports with pixel-perfect layout — with ease.

Alarm Notification Module

Configure the logic for how, why, and when alarm notifications are delivered, manage alarm notification for groups of users, and send notifications via email.

Enterprise Administration Module (EAM)

Secure and manage many Ignition installations from one location.

OPC UA Module

Connect to most major programmable logic controllers (PLCs) with the Ignition OPC UA Module. This module serves as a totally cross-platform OPC UA server with an open, pluggable driver system. Drivers for OPC UA Module: Modbus Driver, UDP and TCP Drivers Module, Allen-Bradley Driver Suite, Siemens Driver, DNP3 Realtime Driver, Omron Driver

Strategic Partner Modules

Inductive Automation's Strategic Third-Party Module Partner Program enables third-party software providers to create modules for the Ignition platform in their area of expertise.

sepasoft

Use the Sepasoft manufacturing execution system (MES) modules to bridge the gap between the plant floor and the executive level.

OEE Downtime Module for Ignition

Combines both OEE calculations and downtime tracking to give operations managers a robust software package that measures efficiency and insight into how to boost OEE.

Track & Trace Module for Ignition

Provide production control and track product from the raw materials to the finished state, access genealogy data, and set up a centralized operator interface for all MES information.

SPC Module for Ignition

Reduce or eliminate late or missing sample collection, inaccurate sample data and other issues leading to quality problems and deliver and analyze your SPC data in real-time.

Recipe/Changeover Module for Ignition

Expertly build, manage and monitor recipes and quickly and accurately change machine, process or system recipes.

Instrument Interface Module for Ignition

Capture raw textual data from instrument type devices via serial, text files, OPC devices and more, and parse out that data to Ignition, databases or other systems.

Web Services Module for Ignition

Configure web service operations and data types, and invoke web service operations from the HMI, SCADA or MES system to read or write data to web-services-supported systems, such as ERP.

MES Enterprise Module for Ignition

Connect multiple MES Ignition Gateways across your entire enterprise to form a large, centrally managed MES solution.

Cirrus Link SOLUTIONS

With the Cirrus Link IIoT Modules, you can set up a secure MQTT message-oriented middleware infrastructure that increases data availability.

MQTT Engine Module for Ignition

Bi-directionally communicate with edge-of-network devices securely via an MQTT Server. Create one pipeline for all your IIoT data that increases data throughput and efficiencies.

MQTT Distributor Module for Ignition

Adds an MQTT server to the Ignition platform that enables MQTT clients to securely connect, publish, and subscribe to data.

MQTT Transmission Module for Ignition

Use Ignition to publish data from the edge of the network by taking Ignition tag change events and publish them as MQTT messages to an MQTT server.

AWS, Azure, IBM & Google Cloud Platform Injector Modules for Ignition

These Injector modules enable end users of Ignition to select tag data from the Ignition platform to be sent into the Amazon Web Services, Microsoft Azure, IBM Cloud, and Google Cloud Platform cloud infrastructure for analytics.

MQTT Recorder Module for Ignition

The MQTT Recorder Module receives record objects via MQTT/Sparkplug and automatically generates and populates database tables with records as they are received.

Deploy

Web-Deploy Clients to Any Desktop, Industrial Display, or Mobile Device

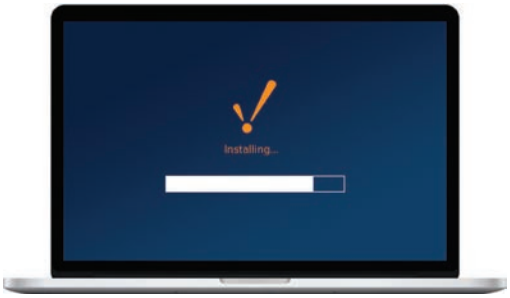
Ignition gets your vital real-time data to anyone, anywhere, on any device with a web browser. With Ignition's server-centric web-deployment model, you can instantly launch an unlimited number of web clients from an on-premise or cloud-based server.

Runs on Everything

Ignition is totally cross-platform and installs in minutes onto servers, laptops, mobile phones, and embedded devices.

Quick and Easy to Install and Update

The Ignition platform is designed specifically for industrial applications so it's stable, secure, and streamlined. Getting started with Ignition only takes one simple, 3-minute installation. Install it once, in one place on the server, and then instantly deploy and update client screens to any device from one central location.



For the Plant Floor and Your Phone

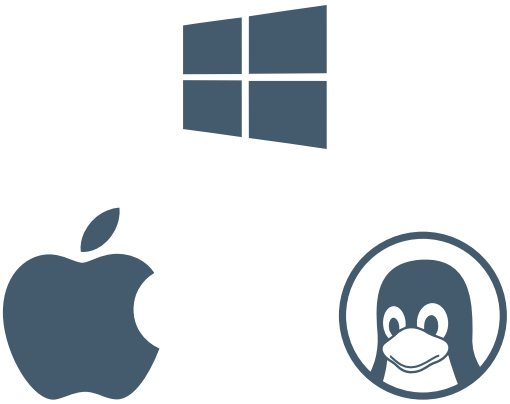
With the Ignition Vision Module, you can easily create and web-deploy rich clients that are perfect for dedicated plant-floor displays and HMIs. With the Ignition Perspective Module, you can also have the tools to build first-class, mobile-responsive industrial applications that run natively in HTML5 on any device with a web browser.

"It used to just be in the control room, but now we're able to take it down to everywhere throughout the plant, everybody in the offices, everybody on their tablets even."

– Chris McLaughlin, Vertech

Cross-Platform Clients

Ignition clients are totally cross-platform: They run on Windows, macOS, and Linux, and with the Ignition Perspective Module, clients can also run on iOS and Android. Whether on a laptop or mobile device, Ignition can go anywhere you need, to get the data you want.



Ignition Onboard

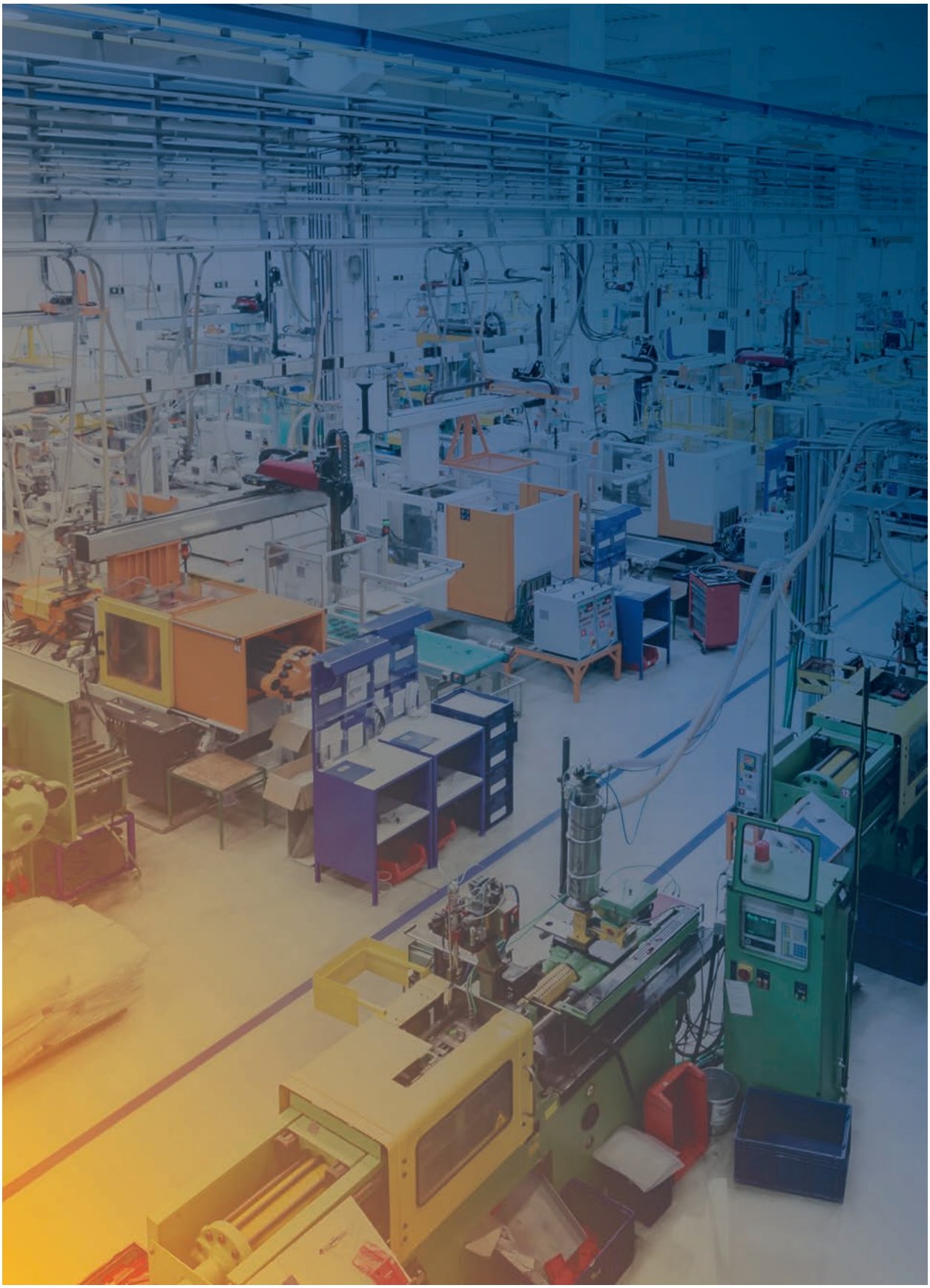
The Ignition platform is flexible enough to work on just about any device; it can even be embedded on devices on the edge of the network. That's why a number of companies are pre-installing Ignition Edge onboard their products.

Companies Onboard with Ignition Edge

These vendors pre-install Ignition Edge software on select products:

OPTO 22 FREEWAVE B+B SmartWorx Powered by ADVANTECH

MOXA EZAutomation Division of AVG

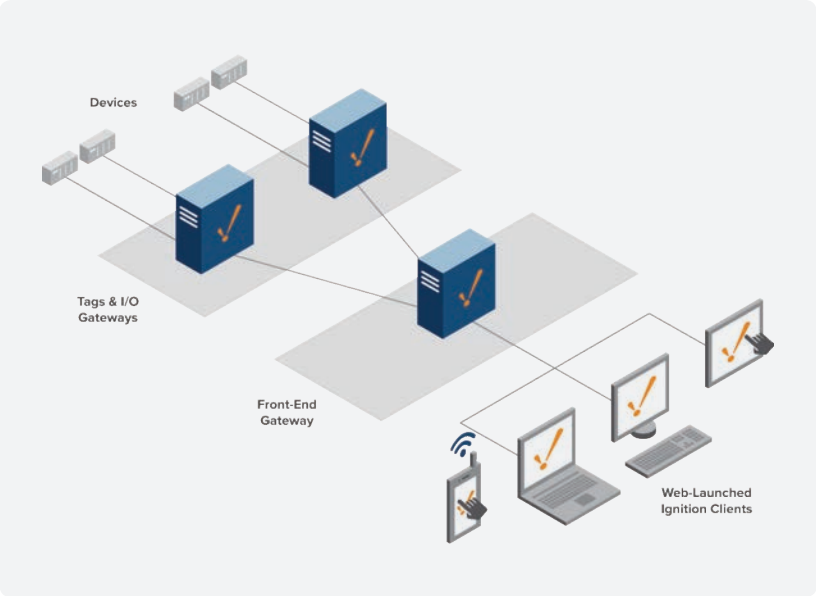


Fits Any Architecture

Ignition's server-centric web-deployment model is flexible and scalable enough for architectures of any type or size. Ignition can be configured to fit just about any architecture; here are some of the most common architectures it is used in.

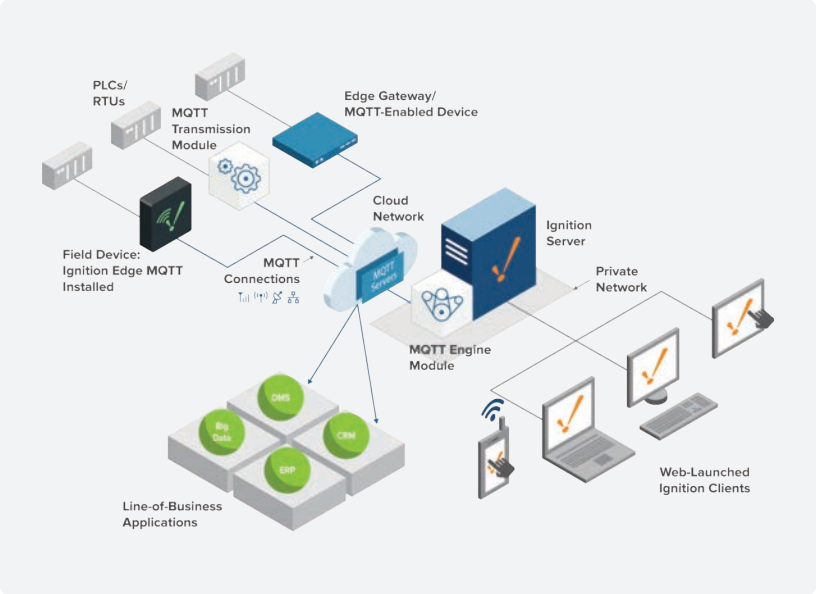
Ignition Scale-Out Architecture

The scale-out architecture links together several Ignition Gateways to form a decentralized system.



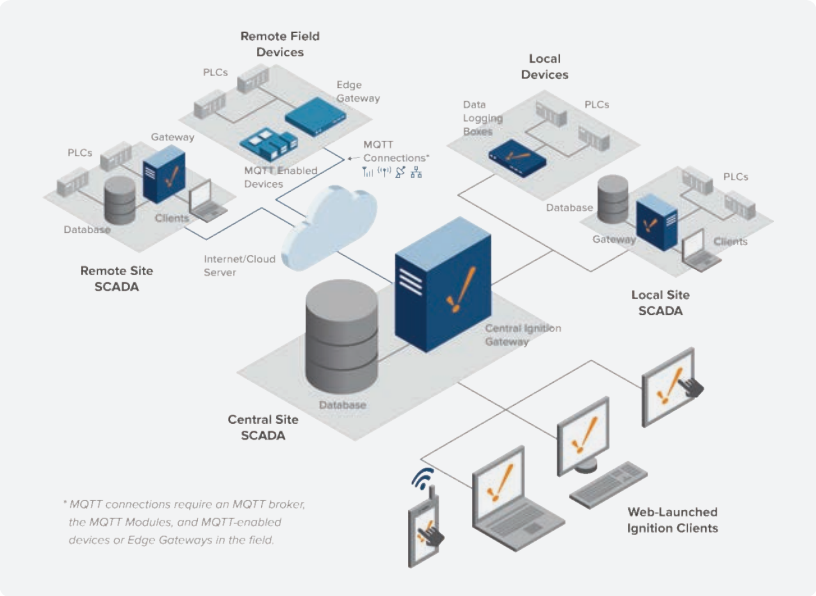
Ignition IIoT Architecture

With the Ignition IIoT architecture you can set up a secure MQTT Message-Oriented Middleware (MOM) infrastructure in the cloud, on a private on-premise network, or a hybrid of both.



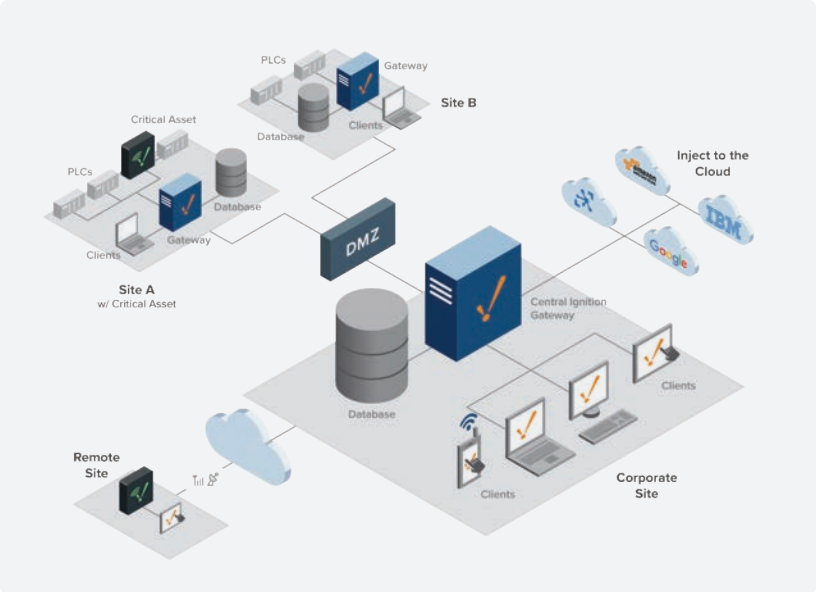
Ignition Hub & Spoke Architecture

In the hub-and-spoke architecture, multiple local and remote sites are linked together by a central Ignition Gateway.



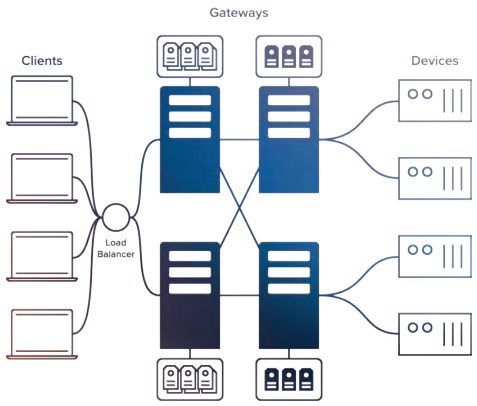
Ignition Enterprise Architecture

With the Ignition enterprise architecture, you can send data from independent local sites and remote sites up to a centralized corporate site and to cloud services.



Infinitely Scalable

Ignition is perfect for enterprise-wide implementations because it is scalable enough to handle large systems and secure enough to protect your critical data.



Unlimited Scalability

In addition to being used for smaller, centrally managed single-server architectures, Ignition can scale gracefully for use in larger distributed architectures where one Controller Gateway is used to manage multiple Agent Gateways, or in scale-out architectures where the workload is distributed between multiple Gateways.

Handle Huge Amounts of Data

The tag system in Ignition is optimized for top speed and performance in large enterprise systems. Ignition lets you handle larger amounts of data more easily and quickly than any other solution. You can even make dynamic changes during runtime and update UDTs without slowing down your system.

Easily Manage Large Multi-Site Projects

Ignition 8 has a new project system that makes it easy to define overarching corporate projects that share resources like windows, scripts, and themes that can be inherited by the local sites. Changes at the top can cascade down to all projects or be overridden and customized at each local site.

Industrial-Strength Security

Ignition provides strong security for today's world, protecting your data with ultra-secure SSL technology and support for modern cybersecurity protocols.

Built on Trusted Technologies

Ignition gives you all the tools necessary to make your system as secure as you need it to be. Ignition is built on a solid, unified architecture and proven, industrial-grade security technology, which is why industrial organizations all over the world have been trusting Ignition for years with their mission-critical systems.

Keep Your Data Secure with SSL Technology

Ignition supports modern protocols like SSL so you can seamlessly integrate your Ignition system with your existing security strategy. We know that your industrial data is vital to your business: that's why Ignition comes with the ability to safeguard your data with ultra-secure SSL technology. SSL is used by financial institutions all over the world to encrypt data and the communications channel it passes through.

Powerful Client Authentication

Ignition supports modern, web-based authentication strategies such as federated identity, multi-factor authentication (MFA), and single sign-on (SSO). With Ignition you can centralize identity management through trusted federated identity technologies such as SAML and OpenID Connect. Ignition gives you the power to assign user roles natively or to integrate with corporate network security using Microsoft Active Directory™. You can grant access to system areas for different users, and turn access on and off with the click of a button.

Keep Informed with Easy System Auditing

Ignition's built-in user auditing gives administrators incredible insights about what is happening in the system, when and where it is happening, and who is doing what. This enables you to quickly resolve issues and mitigate costly downtime incidents.

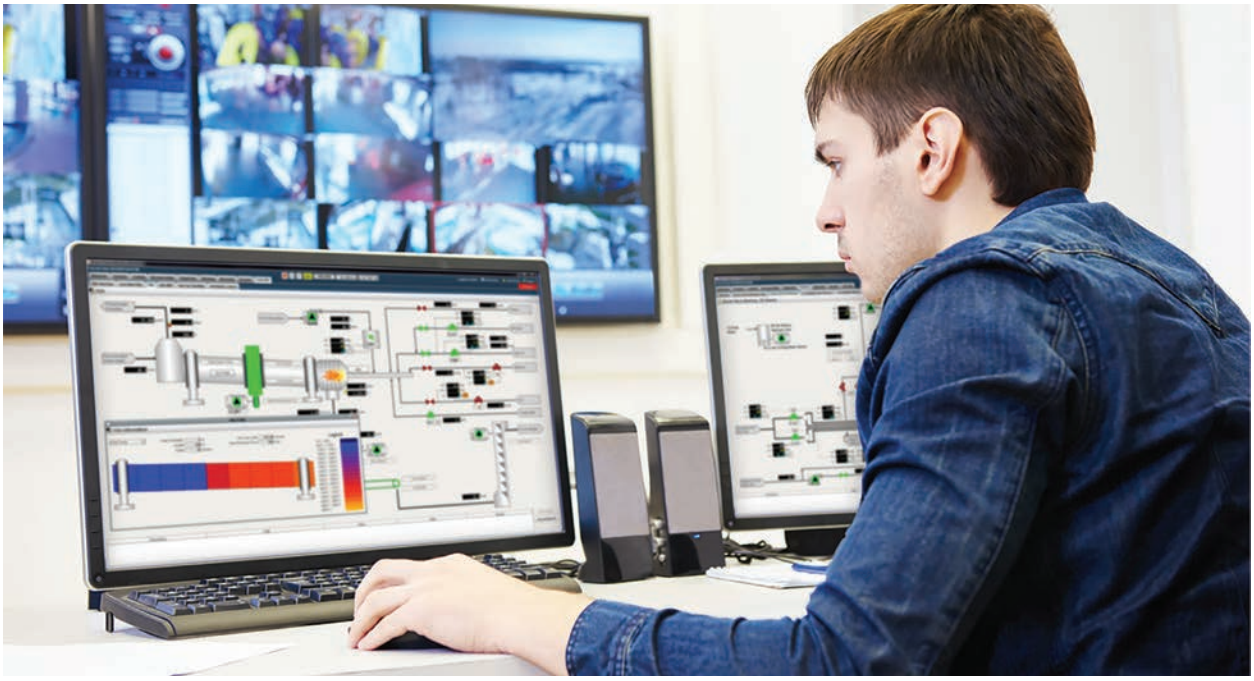
Ignition Solutions

Ignition is a powerful integrated development environment with everything you need to create virtually any kind of industrial application – SCADA, IIoT, MES and beyond – all on one platform.

SCADA

See, Control, and Analyze All Your Data, in One Place

Ignition is The New SCADA because it solves all the major pain points of traditional SCADA like strict hardware requirements and slow installations. Ignition empowers your business to easily control your processes, and track, display, and analyze all your data, without limits.



"Ignition has been a very flawless SCADA system for us ... it's been very reliable and it supports all our needs now and in the future."

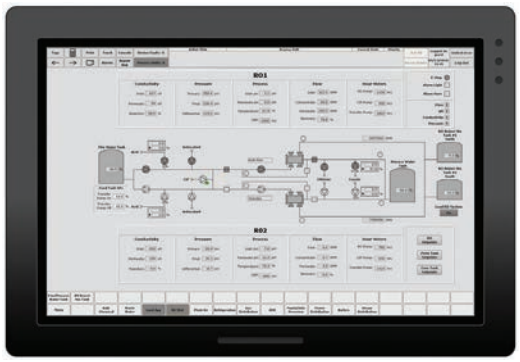
– Dennis Pickle, St. Lucie West Services District

Take Data Acquisition to the Next Level

Ignition SCADA software comes standard with a comprehensive set of data acquisition tools which includes built-in OPC UA to connect to practically any PLC, and the ability to seamlessly connect to any SQL database. Ignition can also turn any SQL database into a high-performance industrial historian and connects to IIoT devices through MQTT.

True Real-Time Monitoring

Ignition is engineered to streamline data-throughput so you can see real-time tag values. Ignition's real-time monitoring gives you the power to quickly see the status of your facility, on any device.



Control Your Process with Powerful HMIs

With Ignition, you can easily start and stop processes, monitor multiple data points at multiple locations, and check the status of the entire plant floor at any given moment. Ignition comes standard with the Ignition Designer, the industry's most powerful IDE, so you can effortlessly create optimized HMI screens to do whatever you need.

Powerful Visualization Tools

Easily create dynamic SCADA dashboards with powerful tools for data analysis. Stay on top of your business objectives with a full library of customizable charts and tables to monitor key performance indicators, see at-a-glance trending, and more.

Build Fully Mobile-Responsive SCADA Applications

Get all the tools you need to build full-fledged, totally mobile-responsive SCADA applications that put the full overview and control of your plant floor right on your phone, tablet, and desktop— all with one application.

Build Next-Generation Smart SCADA Applications

Ignition lets you leverage the power of your mobile device's intuitive touch inputs, sensors, cameras, and GPS to create the next generation of SCADA applications. With Ignition, you can create pure-web SCADA applications that use HTML5 and CSS3 to run natively inside any major web browser.

More Features

Symbol Factory
Choose from thousands of customizable graphics for your project.

SCADA Alarming
Easily stay aware of what's happening at your facility, wherever you are.

Dynamic Reporting
Create a full range of dynamic, data-rich reports and send them anywhere.

Transaction Management
Easily log data, call stored procedures, and synchronize data bi-directionally.

Industrial Historian
Turn a SQL database into a high-performance time-series tag historian.

Store-and-Forward
Store-and-forward historical data so you never lose it.

HMI

HMI Software That is Powerful and Easy to Use

Ignition makes working with HMIs easy, it installs in minutes on virtually any device, and updating an HMI with Ignition is fast and painless. With the included Ignition Designer, you can build HMIs with historical trending, alarming, and more with drag-and-drop ease.

"I've used almost every major HMI package that's out there ... I wanted to pick the winner, and I feel strongly that I picked the right product with Ignition."

– John Pegram, Integrated Security Controls

Connect to Any PLC

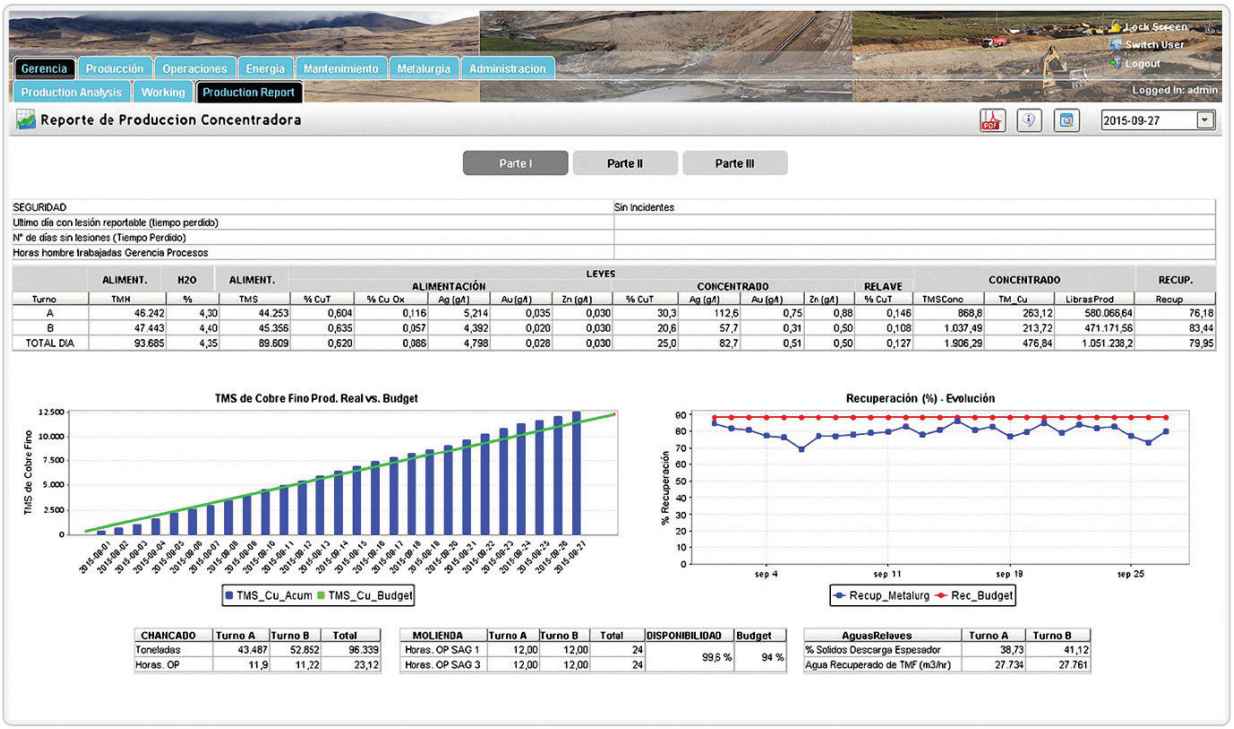
Ignition is equipped with OPC UA so it can easily connect to third-party OPC servers. It also has available driver suites for Modbus, Siemens, Allen-Bradley, and more, so you can easily connect to virtually any kind of industrial device.

Turn Any Screen Into an HMI

Ignition works on any version of Windows, macOS, Linux, and more, so you can install it on any industrial HMI or device. With support for ARM processors, it can also run on the latest generation of efficient edge-of-network devices.

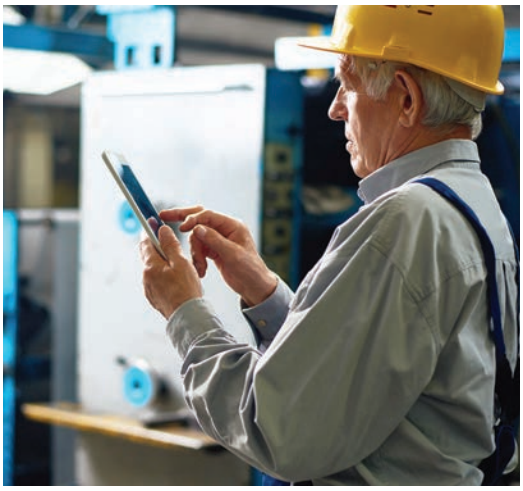
See and Control Your Processes

Quickly see the status of your machines in real-time, monitor multiple data points at multiple locations, and start and stop processes with the push of a button.



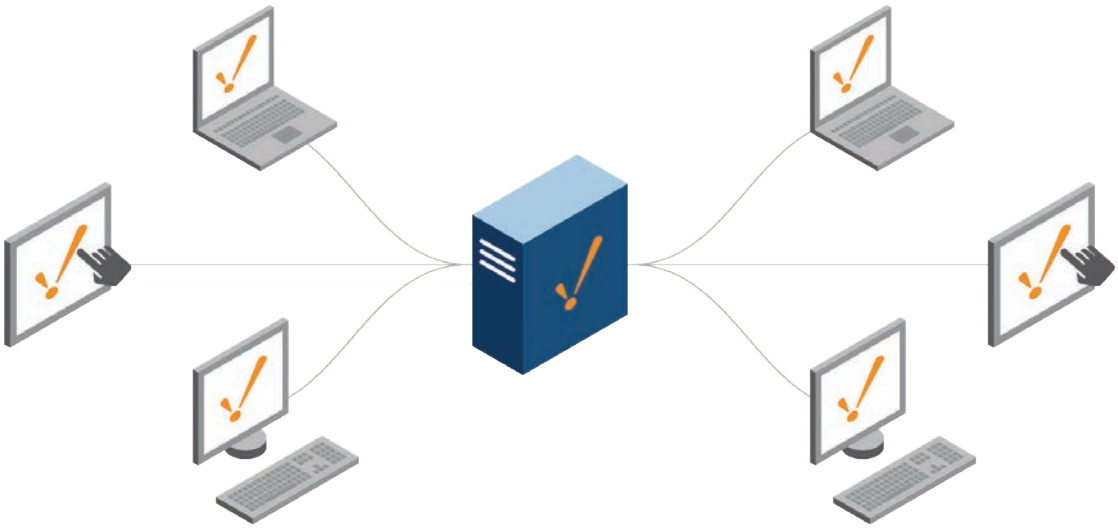
Analyze Historical Data

Easily connect to a SQL database to store and display historical data on customizable charts, tables, and graphs to view trends and track KPIs at-a-glance.



Build Fully Mobile-Responsive HMI Applications

Get all the tools you need to build beautiful, totally mobile-responsive HMI applications that put the full control of your plant floor right on your phone or mobile device. Ignition lets you leverage the power of your mobile device's intuitive touch inputs, sensors, cameras, and GPS to create the next generation of HMI applications. With Ignition, you can create pure-web HMI applications that use HTML5 and CSS3 to run natively inside any major web browser.



Enterprise-Wide HMIs

Ignition works great as a single standalone HMI software solution. Additionally, Ignition has the unique ability to connect all your HMIs together into one enterprise-wide solution that you can centrally manage, update, and deploy.

More Features

Alarm Notification

Easily stay aware of what's happening at your facility, wherever you are.

Local-Client Fallback

With a built-in data buffer, you'll never have to worry about losing your critical data.

Symbol Factory

Choose from thousands of customizable graphics for your project.

Rock-Solid Reliability

Ignition is built to just work so you never have downtime due to faulty HMI screens.

Single File Restoration

With single file restoration, you can get your HMIs back into action quickly.

Instant Installs and Updates

Install on a device or server in just 3 minutes; push updates to clients everywhere, instantly.

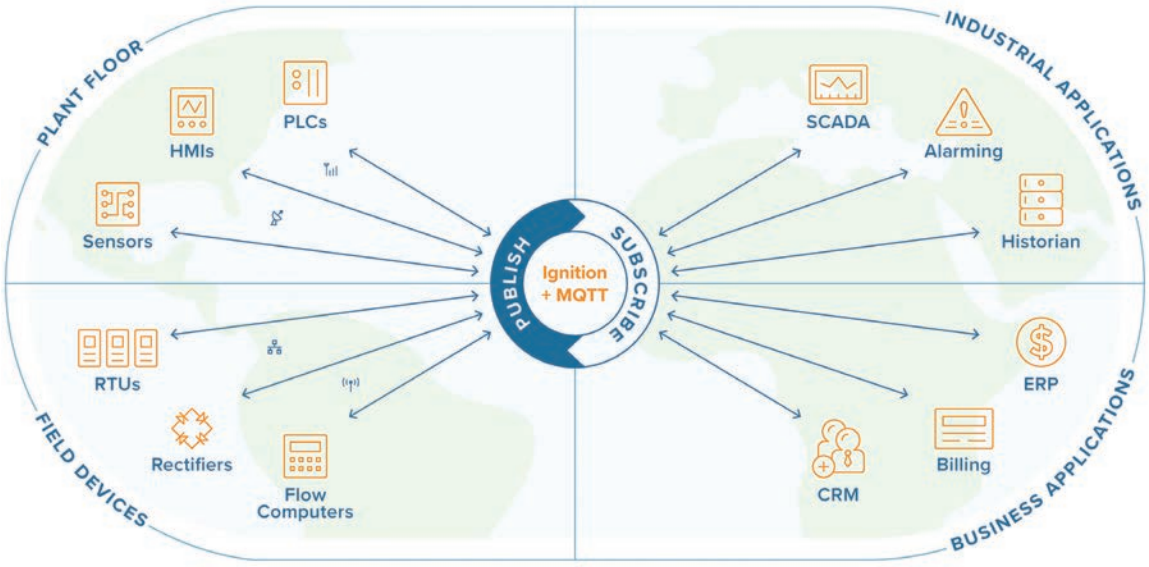
IIoT

Make Your Data More Accessible, Powerful, and Efficient with MQTT

Ignition IIoT by Inductive Automation is an end-to-end Industrial Internet of Things (IIoT) solution that combines the amazing efficiency of the MQTT data-transfer protocol with the unlimited data acquisition and development power of the Ignition industrial application platform.

"I've waited 17 years for a platform like Ignition to come along. Now with MQTT and Ignition, IIoT is a reality."

– Arlen Nipper, Co-Inventor of MQTT

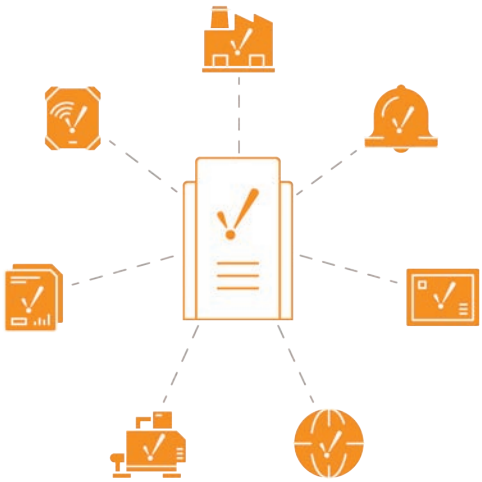


Instantly Subscribe to Your Industrial Data

By leveraging the MQTT protocol's publish-and-subscribe methodologies, Ignition decouples devices from applications and pushes the polling to the edge of the network. This creates one streamlined data pipeline that frees data to be instantly accessible to the entire enterprise, without straining data bandwidth.

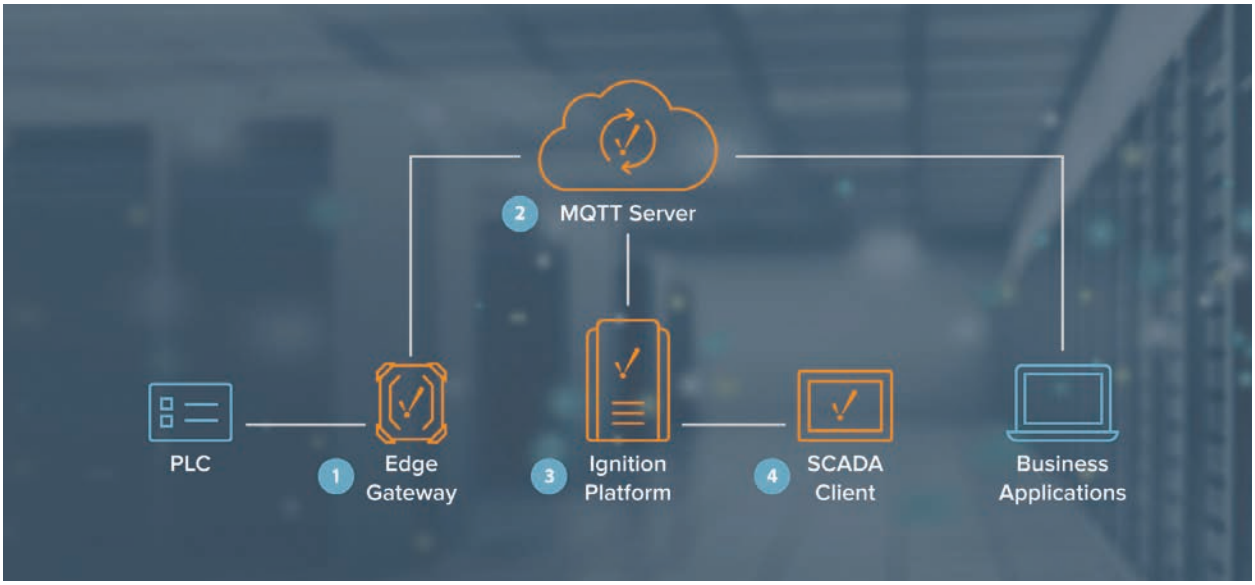
One Universal Platform for IIoT, SCADA and More

Ignition is the only IIoT platform with built-in tools for creating full-featured SCADA systems. Ignition is modular, so you can easily add fully integrated software modules for building industrial applications such as SCADA, alarming, reporting and more.



Add Integrated MQTT Software Modules

Cirrus Link Solutions is a strategic third-party module partner of Inductive Automation with years of experience developing top-quality IIoT solutions. With software modules for transmitting data from the field via MQTT, launching an MQTT server in the cloud, and connecting that data to industrial and business applications, the Cirrus Link IIoT modules for Ignition empower organizations to create one streamlined pipeline for all their IIoT data.



Ignition IIoT Architecture

Adding the Cirrus Link MQTT Modules to the Ignition platform empowers companies to set up their own IIoT solution. There are four main features to an Ignition IIoT architecture.

1. Publish Data from The Network's Edge
2. Publish and Subscribe to Data Through MQTT
3. Connect Ignition to an MQTT Server
4. Build and Deploy Ignition Applications

Flexible & Scalable Architectures: In the Cloud, On-Premise, or Both

The architecture of Ignition IIoT is flexible: you can set it up in the cloud, on a private on-premise network, or a hybrid of both. Ignition is also easily scalable so you can grow from a small system to an enterprise-wide solution with ease.

More Features

Industrial-Grade Protocol

MQTT was designed specifically to meet the demands of industrial control systems, so it's extremely lightweight (2-byte header), bi-directional, stateful, and secured with TLS technology.

Third-Party IIoT Platform Integration

Full integration with other IIoT platforms: Azure, AWS IoT, Watson IoT, Google, and more.

Exceptional Redundancy and Security

Security, disaster recovery, and high availability are native capabilities of MQTT infrastructures.

Seamless Integration with Ignition SCADA

All Ignition solutions work seamlessly together for easy system integration.

HMIs and Dashboards

Create high-performance HMIs and enterprise dashboards to display your data.

Get Mobile Access

Get mobile access to your industrial applications via smartphones and tablets.

MES

Tools for Tracking Production, Eliminating Downtime, and More

In order to ensure effective execution of manufacturing operations and improve production output, you need a manufacturing execution system (MES) solution to connect, monitor, and control complex systems and data flows on the factory floor. Ignition by Inductive Automation is the ideal platform for MES because it gives you all the tools you need to create your own customized MES solutions or you can standardize your process by using powerful third-party applications from the MES experts at Sepasoft.

"Reporting, graphs, charts, all the brewing information, information from the lab, even tracking the trucks coming in and out of the yard: we see it all in real time using the Ignition software."

– Ron Mayfield, Sierra Nevada Brewing Co.

Customizing Your Own MES Solution

Using the power of the Ignition's Designer and core modules, you can develop your own MES solutions and customize it to fit your unique processes. This is a great option if you're looking to add basic MES functions such as tracking production and downtime, and adding MES dashboards to your existing SCADA system. Using this approach offers a huge amount of development flexibility and it's cost-effective because you can build your system as you go.

Standardizing Your MES Process

With pre-built applications for OEE (Overall Equipment Effectiveness) and downtime, track and trace, SPC (Statistical Process Control), recipes, changeover and more, the powerful suite of Sepasoft MES software modules offers a great option for those who are looking to standardize their MES process. The MES experts at Sepasoft built all their MES applications up to the rigorous ISA 95 standard for enterprise control-system integration. Choosing Sepasoft modules for your MES solution is a perfect option if you're looking for an out-of-the-box MES solution to standardize your operations enterprise-wide.

Improve Efficiency and Productivity

Ignition gives industrial organizations many ways to reduce unplanned downtime, cut waste, and increase productivity, which can save thousands of dollars of revenue. Find the vital information you need in seconds instead of hours so you can identify and eliminate inefficiencies quickly.

Connect to All Operational Data

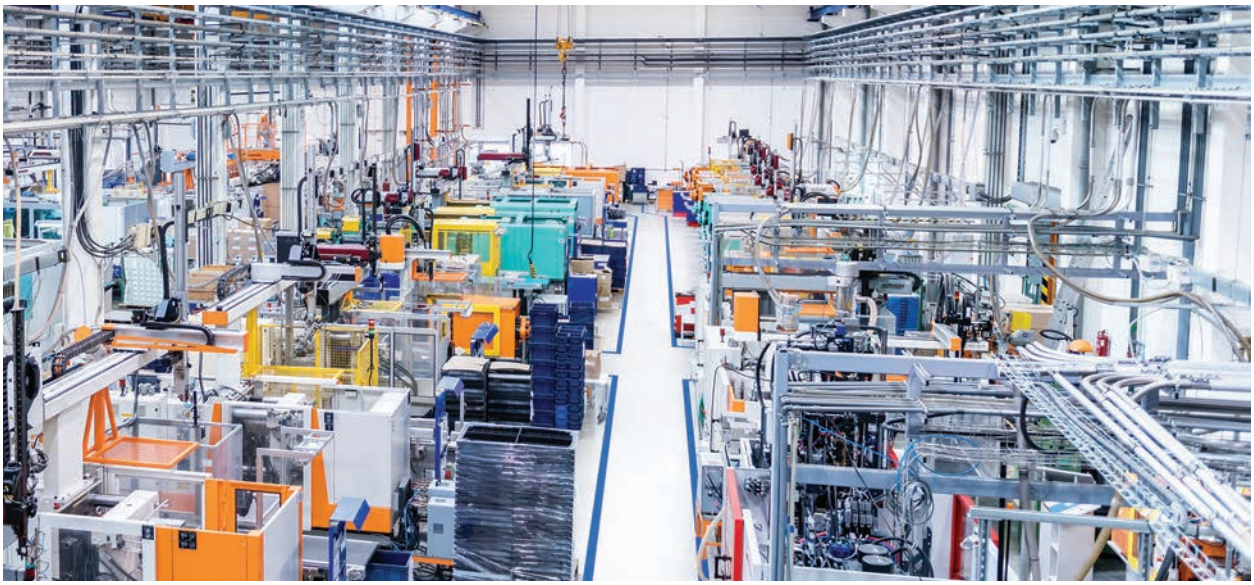
Ignition software comes with a comprehensive set of tools for data acquisition, including built-in SQL-database integration and OPC UA for easy connectivity to practically any PLC through third-party OPC servers. Ignition can connect to virtually any industrial historian. Also, Ignition has software modules that enable connections to serial devices, such as scanners, scales, and sensors.

Flexible ERP Connectivity

With full SQL integration out-of-the-box, Ignition comes standard with the ability to seamlessly connect to any SQL database. Ignition also has the ability to enable connections to web services, including REST and SOAP. It's possible to connect to virtually any enterprise system, including ERP systems such as SAP, JD Edwards, and many more.

Create Dynamic MES Reports

Easily generate dynamic MES reports, like OEE, downtime tracking, production management, historical data analysis, quality assurance, and SPC. Instantly deliver your reports automatically to anyone you'd like.



Track and Analyze All Your MES Data

With Ignition, you can bring all of your important data together into robust enterprise dashboards with powerful visualization and analysis tools. By allowing you to turn raw data into actionable information and share it with your whole team, Ignition enables better decision-making across the enterprise.

More Features

Track and Analyze All Your MES Data

Bring all of your important data together into powerful enterprise dashboards.

Dynamic Reports

Create a full range of dynamic, data-rich reports and send them anywhere.

SCADA Alarming

Easily stay aware of what's happening at your facility, wherever you are.

Industrial Historian

Turn a SQL database into a high-performance time-series tag historian.

Easily Scalable

Scale from a single client installation to an enterprise-wide system with ease.

Store-and-Forward

Store-and-forward historical data so you never lose it.

Mobile

Ignition Perspective: The Plant Floor in Your Pocket

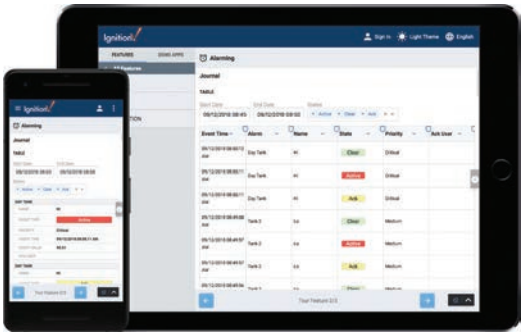
Bring new levels of visualization and accessibility to your industrial processes with the Ignition Perspective Module. Easily build full-fledged, mobile industrial applications in HTML5 for the monitoring and control of your process directly from your mobile phone. Whether for SCADA, HMI, or another purpose, the applications you build in Perspective will look beautiful, and run natively in any major browser.

"The Perspective Module opens up the power of the web and finally gets industrial automation systems up to the level of the rest of the world. Whereas before, everyone was fighting just to get into 2009, Perspective finally takes industrial automation to 2019 and sets it up for growth from there."

– Alex Marcy, Corso Systems

Ignition Perspective Responds to You

Ignition Perspective is totally mobile-responsive. It automatically adapts to fit screens of any size, giving you a personalized view into your unique processes, optimized for whatever device you're using.

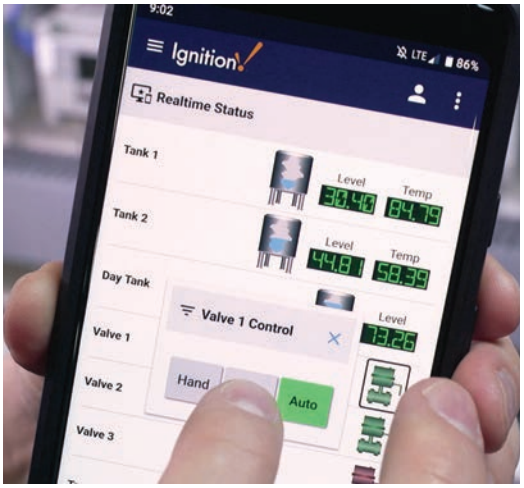


Design for Any Size of Screens

Streamline your development process with robust design components and features that enable you to design for mobile, desktop, and display screens all at the same time. With new mobile-optimized container types, you can easily customize the user experience in the Ignition Designer with a simple selection.

Real Control, With a Swipe

Ignition Perspective puts your plant operations at your fingertips. Visualize, monitor, and control systems with ease on your phone or tablet. See your whole system at a glance, and control your processes with intuitive touch commands. Experience complete, instantaneous plant-floor control with Perspective's bi-directional data binding.



Add the Magic of Mobile to Your Applications

Harness the full power of your mobile device's GPS, accelerometer, camera, barcode scanner, touch gestures, and other sensors to create the next generation of smart industrial applications. With Perspective, you can add the ability in your project to take photos of a faulty machine, easily scan a QR code into your SCADA system, tag readings in the field with GPS, pinch and zoom around a map of your site, and much more. Perspective unlocks the power of your mobile phone to open up a new world of possibilities for your industrial applications.

Unlimited Accessibility

Ignition Perspective runs on any device with a browser, including phones, tablets, laptops, desktops, and TV screens. Deployment has never been easier — you can deploy an unlimited number of Ignition Perspective clients from any location with a single click. You can even send secure web links to your application that anyone can view in a web browser. Perspective is compatible with Chrome, Firefox, Safari, and Microsoft Edge, fully HTML5 and CSS3 compliant, and does not require Java installation or plug-ins.

More Features

Leverage CSS3 for Cross-Project Styling

Use strong and flexible CSS3 styles to change the appearance or position of anything in your application, and enable changes throughout the entire system.

Instantly Update Your Applications

Data is delivered directly to a Perspective application over a persistent communications channel so that any visualization or tag changes show up instantly in your application.

Use Any Major OS — Even iOS and Android

Ignition Perspective clients can run on any major OS and run natively on iOS and Android with the Ignition Perspective App.

Alarming

Build Advanced Alarming Systems with Drag-and-Drop Ease

Filter, escalate, and route alarms with drag-and-drop graphical pipelines. Produce comprehensive analytics and reports on alarms and user actions. Fast to install, easy to use, and infinitely scalable, Ignition is an unbeatable alarming solution at an incredible price.

"The opportunities for what this system can do are endless."

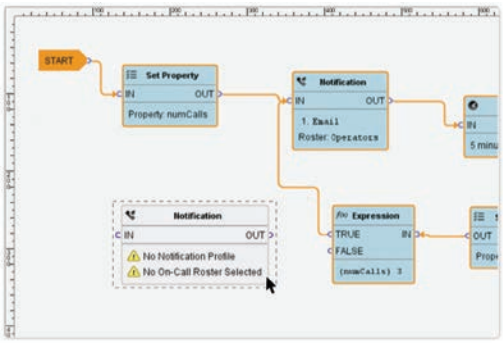
– Hugh Roddy, Chobani

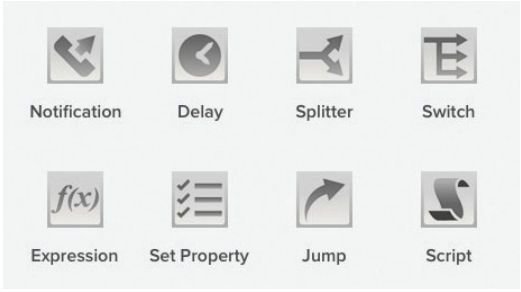
Build Any Kind of Alarming System

With powerful, easy-to-use tools for development and connectivity, Ignition is ideal for building virtually any kind of alarming system. Ignition is perfect for alarm notification, SCADA alarms, remote monitoring, and event notification.

Drag-and-Drop Alarm Notification Pipeline Builder

Quickly configure alarms, pipelines, or any other aspect of the system with drag-and-drop ease with Ignition's innovative graphical alarm notification pipeline builder. Even create and configure thousands of alarms simultaneously with multi-editing functionality.





Develop Advanced Notification Systems with Ease

With the freeform alarm notification pipeline builder, you can simply drag and drop blocks to create custom pipelines for conditional routing, splits, escalation, and multiple other alarm notification methods. Pipelines are instantiated per alarm and persistent so you never miss an alarm.

VoIP Support

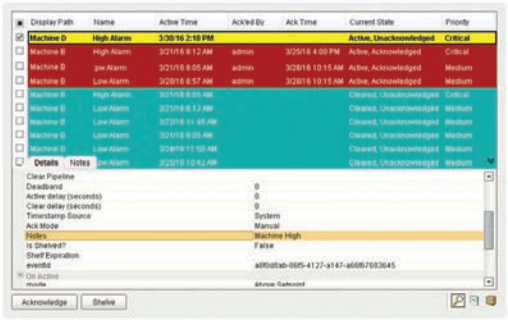
Ignition supports VoIP, which is easy to install and use, Ethernet-based, and provides IP telephony capabilities for a fraction of the cost of a Dialogic card. If your organization already has a VoIP system, Ignition connects to it easily. Through VoIP, Ignition can connect to SIP Gateways, and Skype, providing budget-friendly options for voice, and text-based alarm notifications.

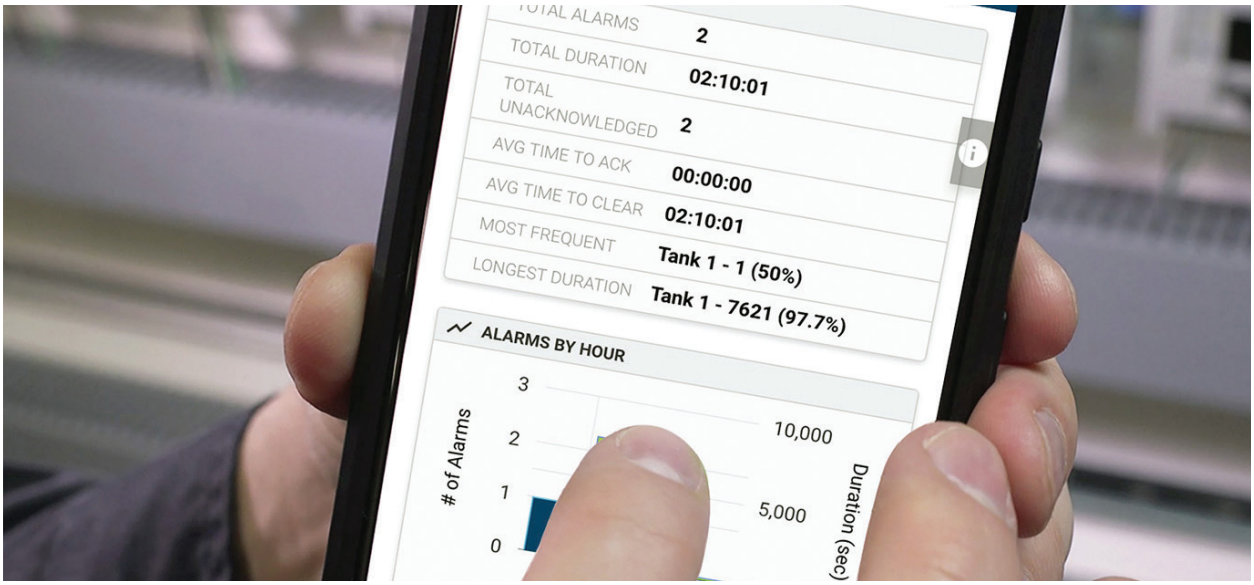
Reliable 2-Way Notification

Receive and acknowledge alarm notifications via email, voice (over VOIP), or text (Twilio). Separate notification pipelines are available for active, clear, and acknowledged alarm states and every step, action, and user reaction is logged and timestamped for accountability purposes.

Dynamic Customizable Alarms

Alarms support shelving, notes, separate pipelines for different alarm states, dynamic custom messages by alarm notification method, time and value deadbands, consolidation and more. Each alarm has multiple properties with values that can be assigned dynamically so you can customize your system. Customized alarms can be based on criteria such as users, schedules, tag type, and much more.





Build Fully Mobile-Responsive Alarming Applications

Get all the tools you need to build full-fledged, totally mobile-responsive alarming applications that put the full power to see and respond to alarm notifications right on your phone or mobile device. Ignition lets you leverage the power of your mobile device's intuitive touch inputs, sensors, cameras, and GPS to create the next generation of alarming applications. With Ignition, you can create pure-web alarming applications that use HTML5 and CSS3 to run natively inside any major web browser.

More Features

Mobile Clients Without Apps

See and acknowledge alarms, and more, from any mobile device — no app necessary.

Powerful Alarm Analysis & Reporting

Use powerful analysis and dynamic reporting tools to get the most of your alarming system.

Remote Alarm Provider

Send and acknowledge alarms from a remote location through a central Gateway.

Seamless Integration with Ignition SCADA

All Ignition solutions work seamlessly together for easy system integration.

Instant Installs and Updates

Install on a server in just 3 minutes; push updates to clients everywhere, instantly.

Totally Cross-Platform

Works on Windows, macOS, Linux and more.

Reporting

Easily Create Dynamic, Database-Driven Industrial Reports

With Ignition, you can easily pull together all your data and create any kind of industrial report with ease. With powerful tools for visualization and more, create reports in any major format and automatically deliver them to anyone.

"The Ignition software has given us a number of advantages from a business standpoint as well as an operational standpoint."

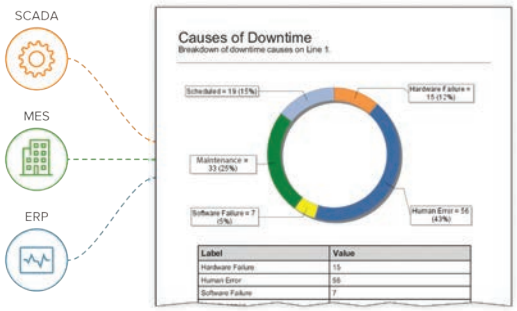
– Kevin Bouchard, Enerchem International Inc.

Build Any Kind of Industrial Report

With powerful, easy-to-use tools for building dynamic, database-driven PDF reports with pixel-perfect layouts, Ignition is perfect for creating virtually any kind of industrial report, including: SCADA reporting, industrial project reports, production management reports, OEE and downtime tracking, SPC reports, QA reports, compliance reports, historical data analysis reports, and more.

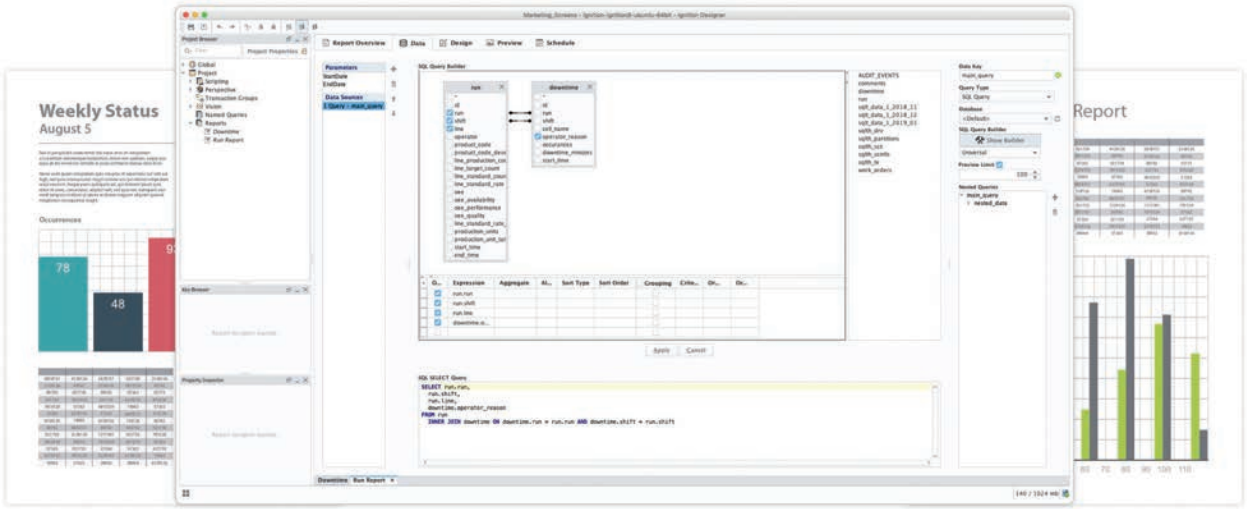
Connect to All Your Data

Ignition is a cross-platform communications hub built on trusted IT standards so it can connect to all your data. Ignition has full SQL-database integration built right in, and it can connect to practically any PLC through OPC UA, and to ERP systems through web services, so you can access data from virtually any industrial device or enterprise system. Plus, Ignition comes standard with unlimited tags, and device and database connections, so you won't break the bank doing it.



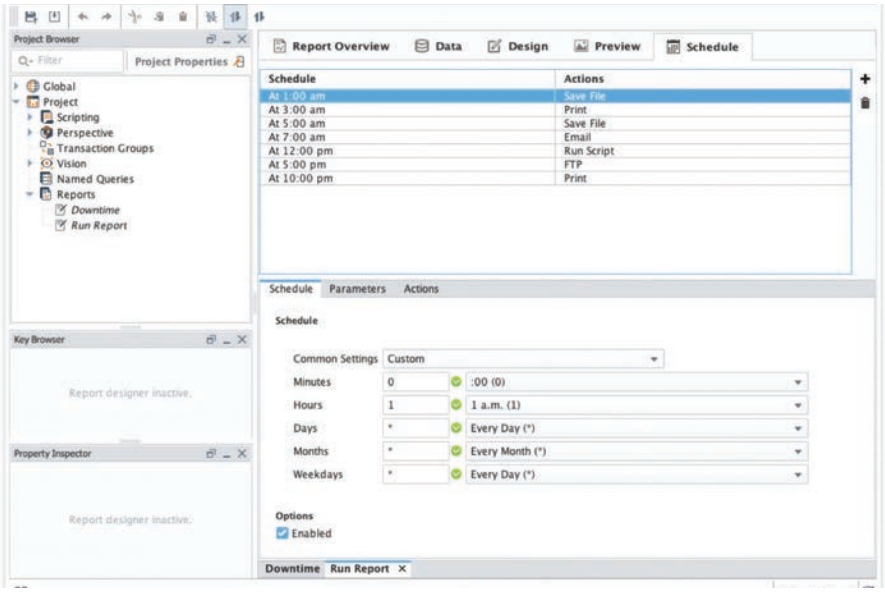
Combine All Your Data Together

Ignition combines all your data from multiple sources — SCADA, MES, ERP, and more — with powerful report-building tools into one integrated development environment. Pull together and combine your data from across your enterprise into one report, so you can see and stay connected with your processes like never before.



Get Incredible Insights with Query Tools

Ignition empowers you to ask your data more questions, which leads to better-informed decisions. Build complex SQL queries easily using the drag-and-drop query interface. Also, its query structure lets you correlate relational data and process-historian data seamlessly.



Easily Set Up Automatic Reporting

In addition to running reports on-demand you can also easily schedule reports to run automatically, or on event triggers, whether or not your client is open. You can also schedule reports to be delivered automatically via print, email, or as a file to save or upload to a chosen location.

Build Fully Mobile-Responsive Reporting Applications

Get all the tools you need to build full-fledged, totally mobile-responsive reporting applications that put the overview and analysis of your plant floor right on your phone or mobile device. Ignition lets you leverage the power of your mobile device's intuitive touch inputs, sensors, cameras, and GPS to create the next generation of reporting applications.

More Features

Export to Any Format

Easily export reports in PDF, HTML, CSV, RTF, JPEG, PNG, and XML file formats.

Backwards-Compatibility

Easily import existing reports and convert legacy reports.

Seamless Integration with Ignition SCADA

All Ignition solutions work seamlessly together for easy system integration.

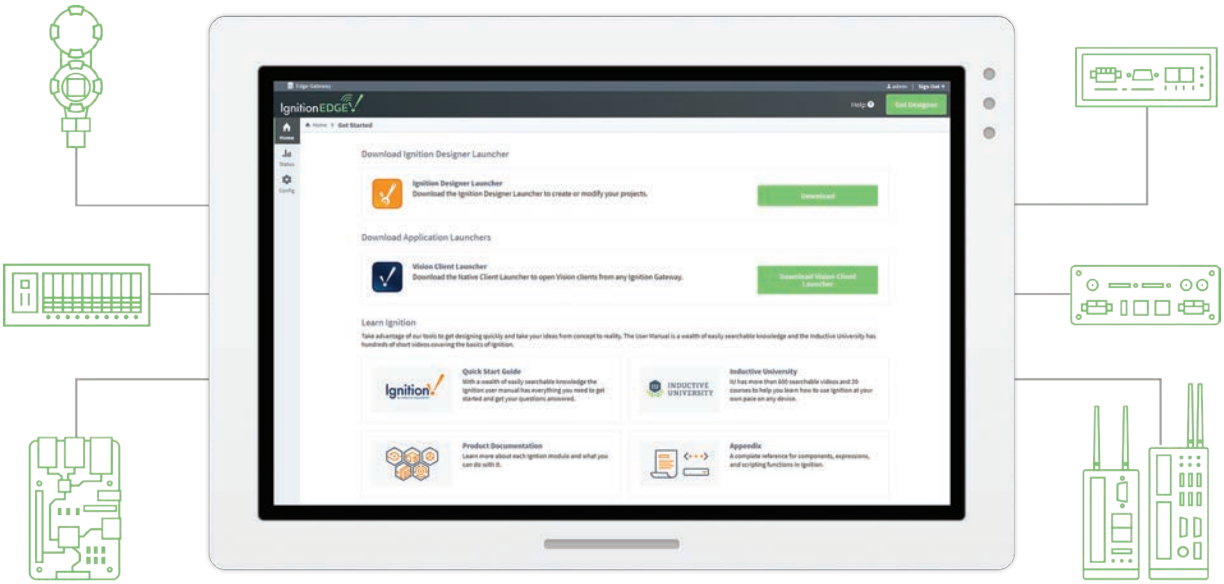
Edge Computing

Data Collection and HMI Software for the Network's Edge

Capturing and visualizing critical data at the remote edge of the network can be difficult and expensive. Ignition Edge by Inductive Automation® is a line of lightweight, limited, low-cost Ignition software solutions designed specifically for embedding into field and OEM devices at the edge of the network.

"Having the power of Ignition extend down to edge devices in the field offers a disruptive approach to how industrial network infrastructures are designed, deployed, and managed."

– Arlen Nipper, Co-Inventor of MQTT



Install on Virtually Any Device

The Ignition Edge solutions work on Linux, any version of Windows, on macOS, and more, so you can install them on virtually any industrial device, even on a Raspberry Pi. With support for ARM processors, Ignition Edge can also run on the latest generation of edge-of-network devices.

Access Data from PLCs & OPC UA Servers

For easy PLC connections, all Ignition Edge solutions come with unlimited tags and are equipped with OPC UA, along with drivers for Modbus, TCP, and Siemens, and the Allen-Bradley suite of drivers. Other drivers supported by Ignition, such as DNP3 and Modbus RTU, can be added onto Ignition Edge solutions for an additional cost.

Poll Data at the Source

Ignition Edge makes edge computing easy. Install Edge right onto, or next to, devices on the plant floor or in the field so you can process data as close to the source as possible. This allows you to make device data the one source of truth, improving data reliability and reducing latency.

Ignition EDGE! ONBOARD

Ignition Edge is powerful, MQTT-enabled, and designed specifically for embedding on industrial devices. That's why a growing number of OEMs offer products that come standard with Ignition Edge onboard.

Companies Onboard with Ignition Edge

These vendors pre-install Ignition Edge software on select products.

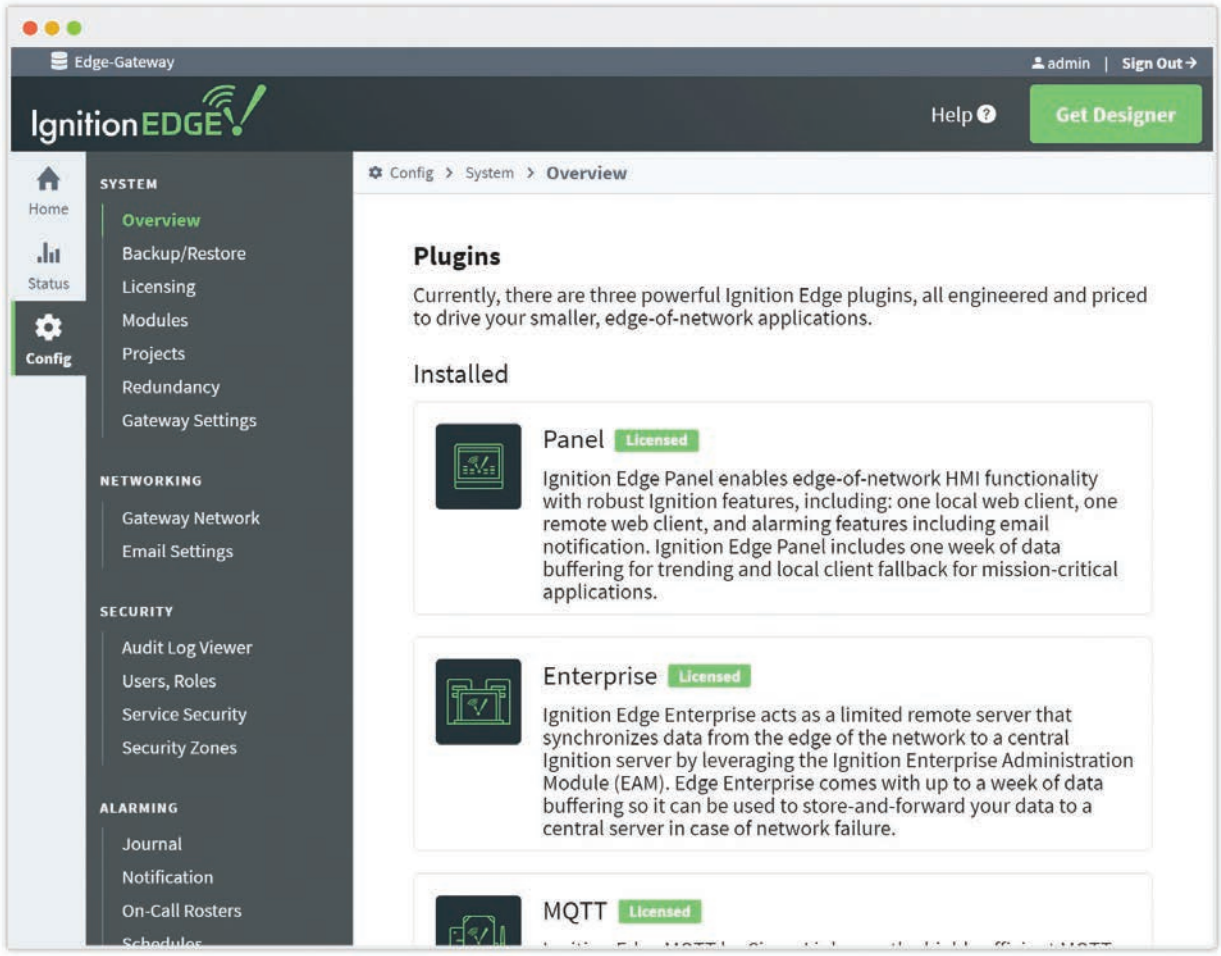
OPTO 22

FREEWAVE

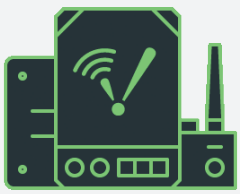
B+B SmartWorx Powered by Advantech

MOXA

EZAutomation Division of AVG



Ignition Edge Solutions: Mix and Match
3 Ignition Edge Solutions



Ignition Edge MQTT by Cirrus Link:

Turn any device into an edge gateway that publishes data to an MQTT broker.

Ignition Edge Panel:

Create a standalone HMI at the edge of the network with a one-week data buffer.

Ignition Edge Enterprise:

Use as an Agent Gateway that can synchronize data to a central Ignition Gateway.

Cost Of Ownership

“Using the ‘infinite clients’ Ignition feature, we could create new clients without spending any additional money.”

– Alexis Nazareno Chialvo, Autex

Return on Investment

Powerful Software at an Unbelievable Value

Not only does Ignition offer the most advanced, comprehensive technologies on an open platform, but its unlimited licensing model allows companies to grow their systems over time at significantly less cost than other options in the industry.

"We haven't used any capital funding since deploying Ignition ... Ignition has freed up our resources to help me address the issues of my aging infrastructure, control my SCADA costs, and create a sustainable SCADA solution."

– Henry Palechek, Information & Process Control Supervisor, Water District in California

Unlimited Innovation = Unlimited Savings

With limitless tags, clients, and connections for the affordable cost of one server license, companies can put more time and money into innovating cost-saving solutions instead of exorbitant software costs.

"We went from spending 160 hours per month and hundreds of thousands of dollars creating and checking our reports to about 4 hours per month ... now they are automatically generated by Ignition."

– Nicholas Graue, Public Utilities Engineer, Park City Utilities

Pay Only for What You Need

Ignition is modular, so you only need to pay for the functions you need. This approach makes it easy and affordable to build the exact system you need and buy new features only if and when you need them.

"I would recommend Ignition to companies that are looking for a software solution that is highly customizable, rapidly deployed, not a huge licensing cost for multiple instances of it."

– Jonathan Swisher, Systems Analyst, Sierra Nevada Brewing Co.

Who Uses Ignition

Ignition by the Numbers

Thousands of companies worldwide in a wide variety of industries depend on Ignition every day.

48%
Fortune 100 companies using Ignition

100+
Countries with Ignition installations

15+
Years in the industry

- Thousands of installations in 100+ countries
- 1,900+ integrators worldwide
- 28% of Fortune 500 companies use Ignition
- Highly diversified customer base across many industries
- Inductive Automation has about 100 employees
- Profitable every year since 2008
- No outside investors

Top Industries


Food & Beverage


Manufacturing


Oil & Gas

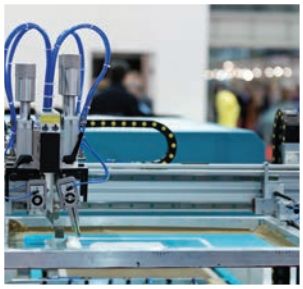

Water & Wastewater


Transportation















Download Ignition

Discover the Unlimited Power Of Ignition

Download Ignition Today at: *inductiveautomation.com*

To learn more about Ignition, contact:

Inductive Automation / Toll-Free: 1-800-266-7798 / Outside US: 1-916-456-1045

Email: sales@inductiveautomation.com

Companies that Trust Ignition

Try the Online Ignition Demo Now!

Scan this QR code with your phone or visit demo.ia.io

inductive automation

1-800-266-7798
inductiveautomation.com

SD200 | 8.7L | 200 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

Standby Power Rating
200 kW, 250 kVA, 60 Hz

Prime Power Rating*
180 kW, 225 kVA, 60 Hz

*EPA Certified Prime ratings are not available in the US or its Territories

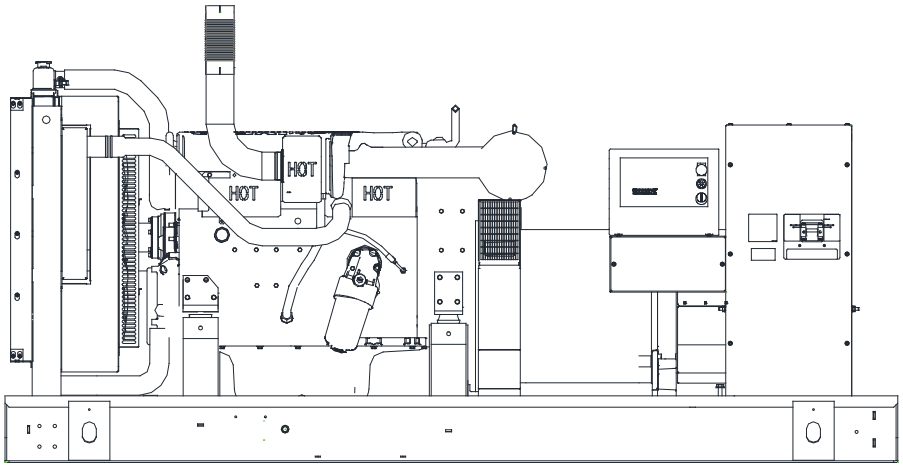


Image used for illustration purposes only

Codes and Standards

Generac products are designed to the following standards:

UL2200, UL508, UL142, UL489

CSA 22.2

BS5514 and DIN 6271

SAE J1349

NFPA 37, 70, 99, 110

NEC700, 701, 702, 708

ISO 3046, 7637, 8528, 9001

NEMA ICS10, MG1, 250, ICS6, AB1

ANSI C62.41

IBC 2009, CBC 2010, IBC 2012, ASCE 7-05, ASCE 7-10, ICC-ES AC-156 (2012)

Powering Ahead

For over 50 years, Generac has provided innovative design and superior manufacturing.

Generac ensures superior quality by designing and manufacturing most of its generator components, including alternators, enclosures and base tanks, control systems and communications software.

Generac gensets utilize a wide variety of options, configurations and arrangements, allowing us to meet the standby power needs of practically every application.

Generac searched globally to ensure the most reliable engines power our generators. We choose only engines that have already been proven in heavy-duty industrial applications under adverse conditions.

Generac is committed to ensuring our customers' service support continues after their generator purchase.

SD200 | 8.7L | 200 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

GENERAC | INDUSTRIAL POWER

STANDARD FEATURES

ENGINE SYSTEM

- Oil Drain Extension
- Air Cleaner
- Fan Guard
- Stainless Steel Flexible Exhaust Connection
- Factory Filled Oil
- Radiator Duct Adapter (Open Set Only)
- Critical Exhaust Silencer (Enclosed Only)

Fuel System

- Fuel Lockoff Solenoid
- Primary Fuel Filter

Cooling System

- Closed Coolant Recovery System
- UV/Ozone Resistant Hoses
- Factory-Installed Radiator
- Radiator Drain Extension
- 50/50 Ethylene Glycol Antifreeze
- 120 VAC Coolant Heater

Electrical System

- Battery Charging Alternator
- Battery Cables
- Battery Tray
- Rubber-Booted Engine Electrical Connections
- Solenoid Activated Starter Motor

ALTERNATOR SYSTEM

- GENprotect™
- 12 Leads (3-Phase, Non 600V)
- Class H Insulation Material
- Vented Rotor
- 2/3 Pitch
- Skewed Stator
- Auxiliary Voltage Regulator Power Winding
- Permanent Magnet Excitation
- Sealed Bearings
- Automated Manufacturing (Winding, Insertion, Lacing, Varnishing)
- Rotor Dynamically Spin Balanced
- Amortisseur Winding
- Full Load Capacity Alternator
- Protective Thermal Switch

GENERATOR SET

- Internal Genset Vibration Isolation
- Separation of Circuits - High/Low Voltage
- Separation of Circuits - Multiple Breakers
- Wrapped Exhaust Piping
- Standard Factory Testing
- 2 Year Limited Warranty (Standby Rated Units)
- 1 Year Limited Warranty (Prime Rated Units)
- Silencer Mounted in the Discharge Hood (Enclosed Only)

ENCLOSURE (If Selected)

- Rust-Proof Fasteners with Nylon Washers to Protect Finish
- High Performance Sound-Absorbing Material (Sound Attenuated Enclosures)
- Gasketed Doors
- Stamped Air-Intake Louvers
- Upward Facing Discharge Hoods (Radiator and Exhaust)
- Stainless Steel Lift Off Door Hinges
- Stainless Steel Lockable Handles
- RhinoCoat™ - Textured Polyester Powder Coat

TANKS (If Selected)

- UL 142
- Double Wall
- Vents
- Sloped Top
- Sloped Bottom
- Factory Pressure Tested (2 psi)
- Rupture Basin Alarm
- Fuel Level
- Check Valve In Supply and Return Lines
- RhinoCoat™ - Textured Polyester Powder Coat
- Stainless Steel Hardware

CONTROL SYSTEM

Digital H Control Panel—Dual 4x20 Display

Program Functions

- Programmable Crank Limiter
- 7-Day Programmable Exerciser
- Special Applications Programmable Logic Controller
- RS-232/485 Communications
- 3-Phase Sensing Digital Voltage Regulator
- 2-Wire Start Capability
- Date/Time Fault History (Event Log)
- Isochronous Governor Control
- Waterproof/Sealed Connectors
- Audible Alarms and Shutdowns
- Not in Auto (Flashing Light)
- Auto/Off/Manual Switch
- E-Stop (Red Mushroom-Type)
- NFPA110 Level I and II (Programmable)
- Customizable Alarms, Warnings, and Events
- Modbus® Protocol
- Predictive Maintenance Algorithm
- Sealed Boards
- Password Parameter Adjustment Protection
- Single Point Ground
- 16 Channel Remote Trending
- 0.2 msec High Speed Remote Trending
- Alarm Information Automatically Annunciated on the Display

Full System Status Display

- Power Output (kW)
- Power Factor
- kW Hours, Total, and Last Run
- Real/Reactive/Apparent Power
- All Phase AC Voltage
- All Phase Currents
- Oil Pressure
- Coolant Temperature
- Coolant Level
- Engine Speed
- Battery Voltage
- Frequency

Alarms and Warnings

- Oil Pressure
- Coolant Temperature
- Coolant Level
- Low Fuel Pressure Alarm
- Engine Overspeed
- Battery Voltage
- Alarms and Warnings Time and Date Stamped
- Snap Shots of Key Operation Parameters During Alarms and Warnings
- Alarms and Warnings Spelled Out (No Alarm Codes)

SD200 | 8.7L | 200 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

CONFIGURABLE OPTIONS

ENGINE SYSTEM

- Oil Make-Up System
- Oil Heater
- Industrial Exhaust Silencer (Open Set)

FUEL SYSTEM

- Flexible Fuel Lines
- Primary Fuel Filter

ELECTRICAL SYSTEM

- 10A UL Battery Charger
- 2.5A Battery Charger
- Battery Warmer

ALTERNATOR SYSTEM

- Alternator Upsizing
- Anti-Condensation Heater
- Tropical Coating

CIRCUIT BREAKER OPTIONS

- Main Line Circuit Breaker
- 2nd Main Line Circuit Breaker
- Shunt Trip and Auxiliary Contact
- Electronic Trip Breakers

GENERATOR SET

- Gen-Link Communications Software (English Only)
- Extended Factory Testing
- IBC Seismic Certification
- 12 Position Load Center

ENCLOSURE

- Standard Enclosure
- Level 1 Sound Attenuation
- Level 2 Sound Attenuation
- Level 2 Sound Attenuation with Motorized Dampers
- Steel Enclosure
- Aluminum Enclosure
- Up to 200 MPH Wind Load Rating*
- AC/DC Enclosure Lighting Kit

CONTROL SYSTEM

- 21-Light Remote Annunciator
- Remote Relay Panel (8 or 16)
- Oil Temperature Sender with Indication Alarm
- Remote E-Stop (Break Glass-Type, Surface Mount)
- Remote E-Stop (Red Mushroom-Type, Surface Mount)
- Remote E-Stop (Red Mushroom-Type, Flush Mount)
- Remote Communication-Modem
- 10A Run Relay
- Ground Fault Indication and Protection Functions

TANKS (Size On The Last Page)

- Electric Fuel Level
- Mechanical Fuel Level
- 8” Fill Extension
- 13” Fill Extension
- 19” Fill Extension

WARRANTY (Standby Gensets Only)

- 2 Year Extended Limited Warranty
- 5 Year Limited Warranty
- 5 Year Extended Limited Warranty
- 7 Year Extended Limited Warranty
- 10 Year Extended Limited Warranty

ENGINEERED OPTIONS

ENGINE SYSTEM

- Coolant Heater Ball Valves
- Fluid Containment Pans
- Block Heaters

CONTROL SYSTEM

- Spare Inputs (x4) / Outputs (x4)
- Battery Disconnect Switch

ALTERNATOR SYSTEM

- 3rd Breaker System

GENERATOR SET

- Special Testing

ENCLOSURE

- Door Switch for Intrusion Alarm
- Enclosure Ambient Heaters

TANKS

- Overfill Protection Valve
- UL2085 Tank
- ULC S-601 Tank
- Special Fuel Tanks
- Vent Extensions

* Consult factory for availability

SD200 | 8.7L | 200 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

APPLICATION AND ENGINEERING DATA

ENGINE SPECIFICATIONS

General

Make	Iveco/FPT
EPA Emissions Compliance	Stationary Emergency
EPA Emissions Reference	See Emission Data Sheet
Cylinder #	6
Type	In-Line
Displacement - L (cu. in)	8.7 (530.91)
Bore - mm (in)	117 (4.61)
Stroke - mm (in)	135 (5.31)
Compression Ratio	16.5:1
Intake Air Method	Turbocharged/Aftercooled
Cylinder Head	4-Valve
Piston Type	Aluminum
Crankshaft Type	Dropped Forged Steel

Engine Governing

Governor	Electronic Isochronous
Frequency Regulation (Steady State)	±0.25%

Lubrication System

Oil Pump Type	Gear
Oil Filter Type	Full Flow
Crankcase Capacity - L (qts)	28 (29.57)

Cooling System

Cooling System Type	Closed Recovery
Water Pump Type	Pre-Lubed, Self Sealing
Fan Type	Pusher
Fan Speed (rpm)	2,538
Fan Diameter - mm (in)	762 (30.0)

Fuel System

Fuel Type	Ultra Low Sulfur Diesel Fuel #2
Fuel Specifications	ASTM
Fuel Filtering (Microns)	5
Fuel Inject Pump Make	Electronic
Fuel Pump Type	Engine Driven Gear
Injector Type	Common Rail
Engine Type	Direct Injection
Fuel Supply Line - mm (in.)	12.7 (0.5) NPT
Fuel Return Line - mm (in.)	12.7 (0.5) NPT

Engine Electrical System

System Voltage	24 VDC
Battery Charger Alternator	Standard
Battery Size	See Battery Index 0161970SBY
Battery Voltage	(2) - 12 VDC
Ground Polarity	Negative

ALTERNATOR SPECIFICATIONS

Standard Model	Generac 520 mm
Poles	4
Field Type	Revolving
Insulation Class - Rotor	H
Insulation Class - Stator	H
Total Harmonic Distortion	<5% (3-Phase)
Telephone Interference Factor (TIF)	< 50
Standard Excitation	Permanent Magnet Excitation
Bearings	Single Sealed Cartridge
Coupling	Direct Via Flexible Disc
Prototype Short Circuit Test	Yes
Voltage Regulator Type	Digital
Number of Sensed Phases	All
Regulation Accuracy (Steady State)	±0.25%

SD200 | 8.7L | 200 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

OPERATING DATA

POWER RATINGS

		Standby
Single-Phase 120/240 VAC @1.0pf	200 kW	Amps: 833
Three-Phase 120/208 VAC @0.8pf	200 kW	Amps: 694
Three-Phase 120/240 VAC @0.8pf	200 kW	Amps: 601
Three-Phase 277/480 VAC @0.8pf	200 kW	Amps: 301
Three-Phase 346/600 VAC @0.8pf	200 kW	Amps: 241

STARTING CAPABILITIES (sKVA)

sKVA vs. Voltage Dip

	277/480 VAC								208/240 VAC							
Alternator	kW	10%	15%	20%	25%	30%	35%		Alternator	kW	10%	15%	20%	25%	30%	35%
Standard	200	187	280	373	467	560	653		Standard	200	140	210	280	350	420	490
Upsize 1	300	303	454	605	757	908	1,059		Upsize 1	300	277	341	454	568	681	794
Upsize 2	350	383	575	767	958	1,150	1,342		Upsize 2	350	280	410	535	640	770	900

FUEL CONSUMPTION RATES*

Fuel Pump Lift- ft (m)
3 (1)

Total Fuel Pump Flow (Combustion + Return) - gal/hr (l/hr)
26 (98)

Diesel - gal/hr (l/hr)

Percent Load	Standby
25%	4.4 (16.7)
50%	8.3 (31.4)
75%	11.9 (45)
100%	14.8 (56)

* Fuel supply installation must accommodate fuel consumption rates at 100% load.

COOLING

		Standby
Coolant Flow per Minute	gal/min (l/min)	63.3 (240)
Coolant System Capacity	gal (l)	12.7 (49.2)
Heat Rejection to Coolant	BTU/hr	545,646
Inlet Air	cfm (m^3/hr)	8,872 (251)
Maximum Operating Ambient Temperature	°F (°C)	122 (50)
Maximum Operating Ambient Temperature (Before Derate)	See Bulletin No. 0199280SSD	
Maximum Radiator Backpressure	in H_2O (kPa)	0.5 (0.12)

COMBUSTION AIR REQUIREMENTS

	Standby
Flow at Rated Power cfm (m^3/min)	595 (16.8)

ENGINE

		Standby
Rated Engine Speed	rpm	1,800
Horsepower at Rated kW**	hp	320
Piston Speed	ft/min	1,593
BMEP	psi	265

EXHAUST

		Standby
Exhaust Flow (Rated Output)	cfm (m^3/min)	1,345 (38.1)
Max. Backpressure (Post Silencer)	inHg (Kpa)	1.5 (5.1)
Exhaust Temp (Rated Output - Post Silencer)	°F (°C)	920 (493)

** Refer to “Emissions Data Sheet” for maximum bHP for EPA and SCAQMD permitting purposes.

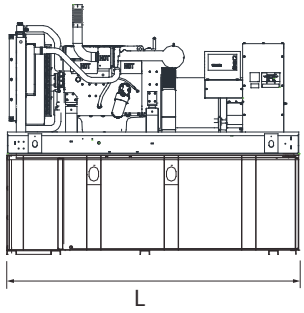
Deration – Operational characteristics consider maximum ambient conditions. Derate factors may apply under atypical site conditions.
Please consult a Generac Power Systems Industrial Dealer for additional details. All performance ratings in accordance with ISO3046, BS5514, ISO8528 and DIN6271 standards.
Standby - See Bulletin 0187500SSB
Prime - See Bulletin 0187510SSB

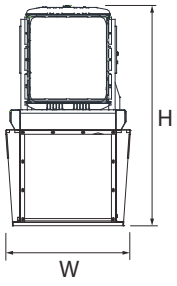
SD200 | 8.7L | 200 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

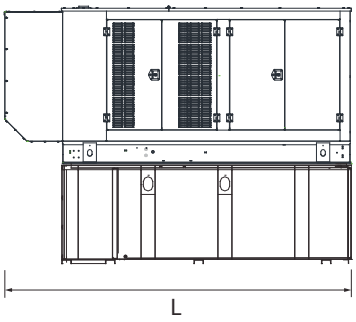
DIMENSIONS AND WEIGHTS*

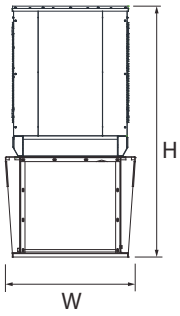




OPEN SET (Includes Exhaust Flex)

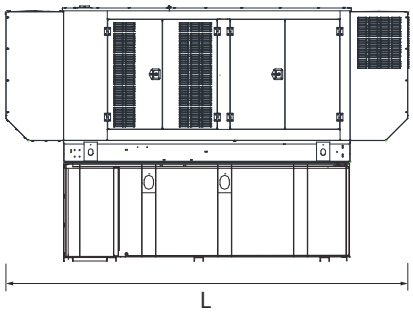
Run Time Hours	Usable Capacity Gal (L)	L x W x H (in (mm)	Weight lbs (kg)
No Tank	-	128 (3,251) x 54 (1,372) x 58 (1,473)	4,465 (2,025)
10	153 (579.2)	128 (3,251) x 54 (1,372) x 71 (1,803)	5,470 (2,481)
25	372 (1,407)	128 (3,251) x 54 (1,372) x 83 (2,108)	5,892 (2,673)
40	589 (2,227)	128 (3,251) x 54 (1,372) x 95 (2,413)	6,309 (2,862)
47	693 (2,623.3)	136 (3,454) x 54 (1,372) x 95 (2,413)	6,060 (2,749)
64	946 (3,581)	208 (5,283) x 54 (1,372) x 99 (2,515)	7,490 (3,397)
90	1,325 (5,015.7)	278 (7,061) x 54 (1,372) x 99 (2,515)	8,505 (3,858)

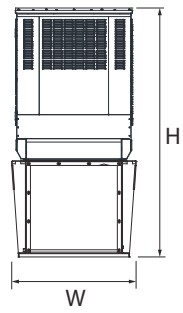




STANDARD ENCLOSURE

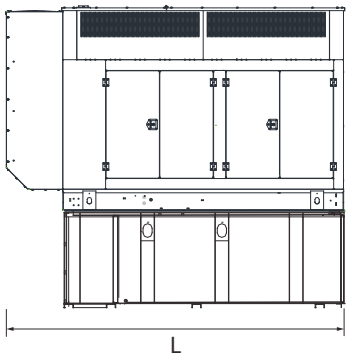
Run Time Hours	Usable Capacity Gal (L)	L x W x H (in (mm)	Weight lbs (kg) Enclosure Only	
			Steel	Aluminum
No Tank	-	155 (3,937) x 54 (1,372) x 70 (1,778)	941 (427)	474 (215)
10	153 (579.2)	155 (3,937) x 54 (1,372) x 83 (2,108)		
25	372 (1,407)	155 (3,937) x 54 (1,372) x 95 (2,413)		
40	589 (2,227)	155 (3,937) x 54 (1,372) x 107 (2,718)		
47	693 (2,623.3)	155 (3,937) x 54 (1,372) x 107 (2,718)		
64	946 (3,581)	208 (5,283) x 54 (1,372) x 111 (2,819)		
90	1,325 (5,015.7)	278 (7,061) x 54 (1,372) x 111 (2,819)		

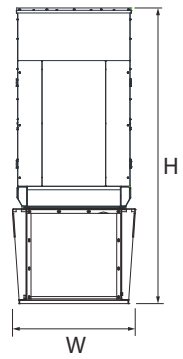




LEVEL 1 ACOUSTIC ENCLOSURE

Run Time Hours	Usable Capacity Gal (L)	L x W x H (in (mm)	Weight lbs (kg) Enclosure Only	
			Steel	Aluminum
No Tank	-	180 (4,572) x 54 (1,372) x 70 (1,778)	1,246 (565)	606 (275)
10	153 (579.2)	180 (4,572) x 54 (1,372) x 83 (2,108)		
25	372 (1,407)	180 (4,572) x 54 (1,372) x 95 (2,413)		
40	589 (2,227)	180 (4,572) x 54 (1,372) x 107 (2,718)		
47	693 (2,623.3)	180 (4,572) x 54 (1,372) x 107 (2,718)		
64	946 (3,581)	234 (5,944) x 54 (1,372) x 111 (2,819)		
90	1,325 (5,015.7)	304 (7,722) x 54 (1,372) x 111 (2,819)		





LEVEL 2 ACOUSTIC ENCLOSURE

Run Time Hours	Usable Capacity Gal (L)	L x W x H (in (mm)	Weight lbs (kg) Enclosure Only	
			Steel	Aluminum
No Tank	-	155 (3,937) x 54 (1,372) x 93 (2,362)	1,482 (672)	708 (321)
10	153 (579.2)	155 (3,937) x 54 (1,372) x 106 (2,692)		
25	372 (1,407)	155 (3,937) x 54 (1,372) x 118 (2,997)		
40	589 (2,227)	155 (3,937) x 54 (1,372) x 130 (3,302)		
47	693 (2,623.3)	155 (3,937) x 54 (1,372) x 130 (3,302)		
64	946 (3,581)	208 (5,283) x 54 (1,372) x 132 (3,353)		
90	1,325 (5,015.7)	278 (7,061) x 54 (1,372) x 132 (3,353)		

* All measurements are approximate and for estimation purposes only.

Specification characteristics may change without notice. Dimensions and weights are for preliminary purposes only. Please consult a Generac Power Systems Industrial Dealer for detailed installation drawings.

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P: (262) 544-4811

Part No 0K5097
Rev. B 08/14/17

Flow sensor MAG 5100 W

Overview

The SITRANS F M MAG 5100 W is an electromagnetic flow sensor designed to meet ground water, drinking water, waste water, sewage or sludge applications.

Benefits

- DN 15 to DN 1200 / 2000 (½" to 48" / 78")
- Stock program of MAG 5100 W secures short delivery time
- Connection flanges EN 1092-1 (DIN 2501), ANSI, AWWA, AS and JIS.
- NBR Hard Rubber and Ebonite Hard Rubber liner for all water applications
- EPDM liner with drinking water approvals
- Hastelloy integrated grounding and measuring electrodes
- Increased low flow accuracy for water leak detection, due to coned liner design (Order No. 7ME6520, DN 15 to 300 mm (½" to 12")).
- Drinking water approvals
- Suitable for direct burial and constant flooding
- Custody transfer approvals
- Build-in length according to ISO 13359
- Easy commissioning, SENSORPROM unit automatically uploads calibration values and settings.
- Designed so patented in-situ verification can be conducted. Using SENSORPROM fingerprint.
- Custody Transfer option for water billing, with type approval after OIML R49 and verified according to MI-001 for DN 50 (2") to DN 300 (12")
  - Pattern approval OIML R 49 (Denmark, Germany)
  - conforms to ISO 4064 and EN 14154
  - MI-001 Custody Transfer approval for billing (EU)
- Meets EEC directives: PED, 97/23/EC pressure directive for EN1092-1 flanges
- Simple onsite or factory upgrade to IP68/NEMA 6P of a standard sensor
- MCERTS approval for UK environmental market

Application

The main applications of the SITRANS F M electromagnetic flow sensors can be found in the following fields:

- Water abstraction
- Water treatment
- Water distribution network (leak detection management)
- Custody transfer water meters
- Irrigation
- Waste water treatment
- Filtration plant (e.g. reverse osmosis and ultra filtration)
- Industrial water applications

Mode of operation

The flow measuring principle is based on Faradays law of electromagnetic induction according to which the sensor converts the flow into an electrical voltage proportional to the velocity of the flow.

Integration

The complete flowmeter consists of a flow sensor and an associated transmitter SITRANS F M MAG 5000, MAG 6000 or MAG 6000 I.

The flexible communication concept USM II simplifies integration and update to a variety of fieldbus systems, e.g. HART, DeviceNet, PROFIBUS DP and PA, FOUNDATION Fieldbus H1, Modbus RTU/RS485.

Technical specifications

Product characteristic	Mainly for the European market (7ME6520) EPDM or NBR lining	Mainly for the non-European market (7ME6580) Ebonite lining
Design and nominal size	Coned sensor: DN 15 ... 300 (½" ... 12") Full bore sensor: DN 350 ... 1200 (14" ... 48")	Full bore sensor: DN 25 ... 2000 (1" ... 78")
Measuring principle	Electromagnetic induction	Electromagnetic induction
Excitation frequency (Mains supply: 50/60 Hz)	DN 15 ... 65 (½" ... 2½"): 12.5 Hz/15 Hz DN 80 ... 150 (3" ... 6"): 6.25 Hz/7.5 Hz DN 200 ... 300 (8" ... 12"): 3.125 Hz/3.75 Hz DN 350 ... 1200 (14" ... 48"): 1.5625 Hz/1.875 Hz	DN 25 ... 65 (1" ... 2½"): 12.5 Hz/15 Hz DN 80 ... 150 (3" ... 6"): 6.25 Hz/7.5 Hz DN 200 ... 1200 (8" ... 48"): 3.125 Hz/3.75 Hz DN 1400 ... 2000 (54" ... 78"): 1.5625 Hz/1.875 Hz
Process connection		
Flanges		
• EN 1092-1	PN 10 (145 psi) : DN 200 ... 300 (8" ... 12") Flat face flanges PN 10 (145 psi): DN 350 ... 1200 (14" ... 48") Raised face flanges PN 16 (232 psi): DN 50 ... 300 (2" ... 12") Flat face flanges PN 16 (232 psi): DN 350 ... 1200 (14" ... 48") Raised face flanges PN 40 (580 psi): DN 15 ... 40 (½" ... 1½") Flat face flanges	Raised face (EN 1092-1, DIN 2501 and BS 4504 have the same mating dimensions) PN 6 (87 psi): DN 1400 ... 2000 (54" ... 78") PN 10 (145 psi): DN 200 ... 2000 (8" ... 78") PN 16 (232 psi): DN 65 ... 600 (2½" ... 24") PN 40 (580 psi): DN 25 ... 50 (1" ... 2")
• ANSI B16.5	Class 150 lb: ½" ... 24"	Class 150 lb: 1" ... 24"
• AWWA C-207	Class D: 28" ... 48", flat face	Class D: 28" ... 78", flat face
• AS4087	PN 16 (DN 50 ... 1200), (2" ... 48") 16 bar (232 psi)	PN 16 (DN 50 ... 1200), (2" ... 48") 16 bar (232 psi)
• JIS B 2220:2004	-	K10 (1" ... 24")
Rated Operation conditions		
Ambient temperature		
• Sensor	-40 ... +70 °C (-40 ... +158 °F)	-20 ... +70 °C (-4 ... +158 °F)
• With compact transmitter MAG 5000/6000	-20 ... +60 °C (-4 ... +140 °F)	-20 ... +60 °C (-4 ... +140 °F)
• With compact transmitter MAG 6000 I	-20 ... +60 °C (-4 ... +140 °F)	-20 ... +60 °C (-4 ... +140 °F)
Operating pressure (Abs) [abs. bar] (Maximum operating pressure depending on flange standard, decreases with increasing operating temperature)	DN 15 ... 40 (½" ... 1½"): 0.01 ... 40 bar (0.15 ... 580 psi) DN 50 ... 300 (2" ... 12"): 0.03 ... 20 bar (0.44 ... 290 psi) DN 350 ... 1200 (14" ... 48"): 0.01 ... 16 bar (0.15 ... 232 psi)	DN 25 ... 50 (1" ... 2"): 0.01 ... 40 bar (0.15 ... 580 psi) DN 65 ... 1200 (2½" ... 48"): 0.01 ... 16 bar (0.15 ... 232 psi) DN 1400 ... 2000 (54" ... 78"): 0.01 ... 10 bar (0.15 ... 145 psi)
Enclosure rating		
• Standard	IP67 to EN 60529 / NEMA 4X/6 (1 mH_2O for 30 min)	IP67 to EN 60529 / NEMA 4X/6 (1 mH_2O for 30 min)
• Option	IP68 to EN 60529 / NEMA 6P (10 mH_2O continuously)	IP68 to EN 60529 / NEMA 6P (10 mH_2O continuously)
Pressure drop	DN 15 and 25 (½" and 1"): Max. 20 mbar (0.29 psi) at 1 m/s (3 ft/s). DN 40 ... 300 (1½" ... 12"): Max 25 mbar (0.36 psi) at 3 m/s (10 ft/s) DN 350 ... 1200 (14" ... 48"): Insignificant	Insignificant
Test pressure	1.5 x PN (where applicable)	1.5 x PN (where applicable)
Mechanical load (vibration)	18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 Sensor: 3.17 grms Sensor with compact MAG 5000/6000 mounted transmitter: 3.17 grms Sensor with compact MAG 6000 I mounted transmitter: 1.14 grms	18 ... 1000 Hz random in x, y, z, directions for 2 hours according to EN 60068-2-36 Sensor: 3.17 grms Sensor with compact MAG 5000/6000 mounted transmitter: 3.17 grms Sensor with compact MAG 6000 I mounted transmitter: 1.14 grms

Flow sensor MAG 5100 W

Product characteristic	Mainly for the European market (7ME6520) EPDM or NBR lining	Mainly for the non-European market (7ME6580) Ebonite lining
Medium conditions		
Temperature of medium		
• NBR	-10 ... +70 °C (14 ... 158 °F)	-
• EPDM	-10 ... +70 °C (14 ... 158 °F)	-
• EPDM (MI-001)	0.1 ... 30 °C (32 ... 76 °F)	-
• Ebonite	-	-10 ... +70 °C (14 ... 158 °F)
EMC	2004/108/EC	2004/108/EC
Design		
Material		
• Housing and flanges	Carbon steel, with corrosion-resistant two-component epoxy coating (min. 150 µm) Corrosivity category C4, according to ISO 12944-2	Carbon steel ASTM A 105, with corrosion-resistant two-component epoxy coating (min. 150 µm) Corrosivity category C4, according to ISO 12944-2
• Measuring pipe	AISI 304 (1.4301)	AISI 304 (1.4301)
• Electrode	Hastelloy C	Hastelloy C
• Grounding electrode	Hastelloy C	Hastelloy C
• Terminal box	Fibre glass reinforced polyamide	Fibre glass reinforced polyamide
Certificates and approvals		
Calibration		
• Standard production calibration, calibration report shipped with sensor	Zero-point, 2 x 25 % and 2 x 90 % for sizes DN 15 -300 Zero-point, 1 x 25 % and 1 x 90 % for sizes DN 350-1200	Zero-point, 2 x 25 % and 2 x 90 %
Custody Transfer (only together with MAG 6000 CT)	OIML R 49 pattern approval cold water (Denmark and Germany): DN 50 ... 300 (2“ ... 12") MI 001 cold water (EU): DN 50 ... 300 (2“ ... 12")	
Drinking water approvals	EPDM liner: NSF/ANSI Standard 61 (Cold water, US) WRAS (WRc, BS6920 cold water, GB) ACS (F), DVGW W270 (D) Belgaqua (B)	NSF/ANSI Standard 61 (Cold water, US) WRAS (WRc, BS6920 cold water, GB)
Other approvals	MCERTS PED conforming: All EN1092-1 flanges and ANSI Class 150 (< DN 300 (<12")) – 97/23 EC[1)] CRN CSA Class 1, Div 2 FM Class 1, Div 2	PED (All EN1092-1 flanges conforms to PED) – 97/23 EC[1)] (only ≤ DN 600 (≤ 24")) FM Class 1, Div 2 CSA Class 1, Div 2

[1)] For sizes larger than 600 mm (24") in PN 16 PED conformity is available as a cost-added option. The basic unit will carry the LVD (Low Voltage Directive) and EMC approval. All products sold outside of EU and EFTA are excluded from the directive, also products sold into certain market sectors are excluded. These include:
a) Meters used in networks for the supply, distribution and discharge of water.
b) Meters used in pipelines for the conveyance of any fluid from offshore to onshore.
c) Meters used in the extraction of petroleum or gas, including Christmas tree and manifold equipment.
d) Any meter mounted on a ship or mobile offshore platform.

MAG 5100 W (7ME6520) with MAG 6000 CT (Revenue program) MI-001

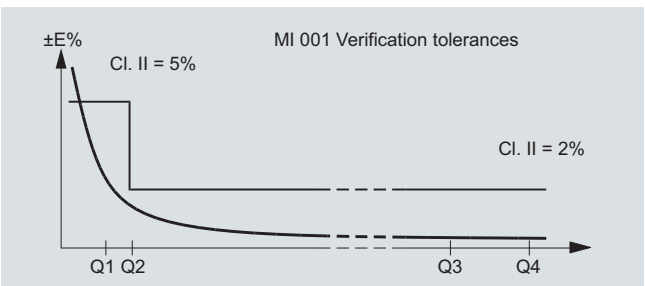
MAG 5100 W CT program is type approved according to international water meter standard OIML R 49. Since the first November 2006 the MI-001 water meter directive is in force, which means that all water meters can be sold across the EU borders if the water meters contain a MI-001 label.

The MAG 5100 W MI-001 verified and labeled products are a Class II approval according to Directive 2004/22/EC of the European Parliament and Council of March 31, 2004 on measuring instruments (MID), Annex MI-001 in the sizes from DN 50 to DN 300 (Order No. 7ME6520).

The MID certification is obtained as a modul B + D module approval according to the above mentioned directive.

Module B : Type approval according to OIML R 49

Module D : Quality insurance approval of production



MAG 5100 W (7ME6520) MI-001 verified and labeled products at a given Q3 and Q3/Q4 = 1.25 and Q2/Q1 = 1.6 measuring ranges see table below:

DN	**50 (2“)**	**65 (2½“)**	**80 (3“)**	**100 (4“)**	**125 (5“)**	**150 (6“)**	**200 (8“)**	**250 (10“)**	**300 (12“)**
„R“ Q3/Q1	25	25	25	25	25	25	25	25	25
Q4 [m^3/h]	20	31.25	50	78.75	125	200	312.5	500	787.5
Q3 [m^3/h]	**16**	**25**	**40**	**63**	**100**	**160**	**250**	**400**	**630**
Q2 [m^3/h]	1.02	1.6	2.6	4.03	6.4	10.24	16	25.6	40.32
Q1 [m^3/h]	0.64	1.00	1.60	2.52	4.0	6.4	10.0	16.0	25.2

DN	**50 (2“)**	**65 (2½“)**	**80 (3“)**	**100 (4“)**	**125 (5“)**	**150 (6“)**	**200 (8“)**	**250 (10“)**	**300 (12“)**
„R“ Q3/Q1	63	63	63	63	63	63	63	63	63
Q4 [m^3/h]	20	31.25	50	78.75	125	200	312.5	500	787.5
Q3 [m^3/h]	**16**	**25**	**40**	**63**	**100**	**160**	**250**	**400**	**630**
Q2 [m^3/h]	0.41	0.63	1.02	1.6	2.54	4.06	6.35	10.2	16.0
Q1 [m^3/h]	0.25	0.40	0.63	1.00	1.59	2.54	3.97	6.35	10.0

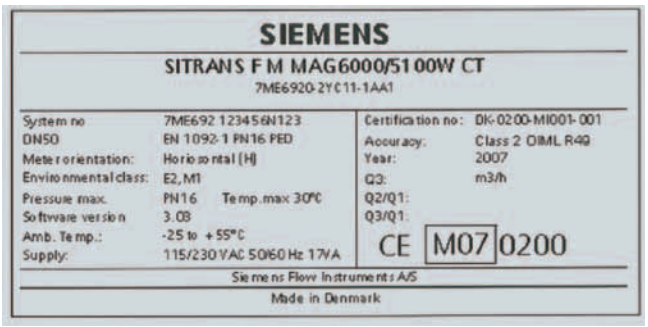
DN	**50 (2“)**	**65 (2½“)**	**80 (3“)**	**100 (4“)**	**125 (5“)**	**150 (6“)**	**200 (8“)**	**250 (10“)**	**300 (12“)**
„R“ Q3/Q1	80	80	80	80	80	80	80	80	80
Q4 [m^3/h]	20	31.25	50	78.75	125	200	312.5	500	787.5
Q3 [m^3/h]	**16**	**25**	**40**	**63**	**100**	**160**	**250**	**400**	**630**
Q2 [m^3/h]	0.32	0.50	0.80	1.20	2.00	3.20	5.0	8.0	12.6
Q1 [m^3/h]	0.20	0.31	0.50	0.75	1.25	2.00	3.13	5.0	7.90

DN	**50 (2“)**	**65 (2½“)**	**80 (3“)**	**100 (4“)**	**125 (5“)**	**150 (6“)**	**200 (8“)**	**250 (10“)**	**300 (12“)**
„R“ Q3/Q1	160	160	160	160	160	160	160	160	160
Q4 [m^3/h]	50	78.75	125	200	312.5	500	787.5	1250	2000
Q3 [m^3/h]	**40**	**63**	**100**	**160**	**250**	**400**	**630**	**1000**	**1600**
Q2 [m^3/h]	0.40	0.63	1.00	1.60	2.50	4.00	6.3	10.0	16.0
Q1 [m^3/h]	0.25	0.39	0.63	1.00	1.56	2.50	3.94	6.3	10.0

DN	**50 (2“)**	**65 (2½“)**	**80 (3“)**	**100 (4“)**	**125 (5“)**	**150 (6“)**	**200 (8“)**	**250 (10“)**	**300 (12“)**
„R“ Q3/Q1	200	200	200	200	200	200	200	200	200
Q4 [m^3/h]	50	78.75	125	200	312.5	500	787.5	1250	2000
Q3 [m^3/h]	**40**	**63**	**100**	**160**	**250**	**400**	**630**	**1000**	**1600**
Q2 [m^3/h]	0.32	0.50	0.80	1.28	2.00	3.20	5.0	8.0	12.8
Q1 [m^3/h]	0.20	0.32	0.50	0.80	1.25	2.00	3.15	5.0	8.0

DN	**50 (2“)**	**65 (2½“)**	**80 (3“)**	**100 (4“)**	**125 (5“)**	**150 (6“)**	**200 (8“)**	**250 (10“)**	**300 (12“)**
„R“ Q3/Q1	250	250	250	250	250	250	250	250	250
Q4 [m^3/h]	50	78.75	125	200	312.5	500	787.5	1250	2000
Q3 [m^3/h]	**40**	**63**	**100**	**160**	**250**	**400**	**630**	**1000**	**1600**
Q2 [m^3/h]	0.26	0.40	0.64	1.02	1.60	2.56	4.0	6.4	10.24
Q1 [m^3/h]	0.16	0.25	0.40	0.64	1.00	1.60	2.52	4.0	6.4

The Label is placed on the side of the encapsulation. An example of the product label is shown below:



OIML R 49 / MI 001 approvals valid for:

- DN 50 to 300 mm (2" to 12")
- Horizontal installation
- Compact or remote with max. 3 m cable
- Power supply 115/230 V AC

Other restrictions may apply (see certificate)

Flow sensor MAG 5100 W

Selection and Ordering data		Order No.
Sensor SITRANS F M MAG 5100 W		7 M E 6 5 2 0 -
Hastelloy electrodes, carbon steel flanges, EU water markets and low flow applications		1 - 2
Diameter		
DN 15 (½“)	◆	1 V
DN 25 (1“)	◆	2 D
DN 40 (1½“)	◆	2 R
DN 50 (2“)	◆	2 Y
DN 65 (2½“)	◆	3 F
DN 80 (3“)	◆	3 M
DN 100 (4“)	◆	3 T
DN 125 (5“)	◆	4 B
DN 150 (6“)	◆	4 H
DN 200 (8“)	◆	4 P
DN 250 (10“)	◆	4 V
DN 300 (12“)	◆	5 D
DN 350 (14“)	◆	5 K
DN 400 (16“)	◆	5 R
DN 450 (18“)	◆	5 Y
DN 500 (20“)	◆	6 F
DN 600 (24“)	◆	6 P
DN 700 (28“)	◆	6 Y
DN 750 (30“)		7 D
DN 800 (32“)		7 H
DN 900 (36“)		7 M
DN 1000 (40“)		7 R
(42“)		7 U
(44“)		7 V
DN 1200 (48“)		8 B
Flange norm and pressure rating		
to EN 1092-1		
PN 10 (DN 200 ... 1200/8“ ... 48“)	◆	B
PN 16 (DN 50 ... 1200/2“ ... 48“)	◆	C
PN 16, non PED (DN 700 ... 1200/28“ ... 48“)		D
PN 40 (DN 25 ... 40/1“ ... 1½“)	◆	F
to ANSI B16.5		
class 150 (1“ ... 24“)	◆	J
to AWWA C-207		
Class D (28“ ... 48“)		L
to AS 4087		
PN 16 (DN 50 ... 1200/2“ ... 48“)		N
Liner material		
EPDM	◆	2
NBR Hard Rubber	◆	3
Transmitter		
Sensor for remote transmitter (Order transmitter separately)	◆	A
MAG 6000 I, Aluminum, 18 ... 90 V DC, 115 ... 230 V AC	◆	C
MAG 6000, Polyamid, 11 ... 30 V DC/11 ... 24V AC	◆	H
MAG 6000, Polyamid, 115 ... 230 V AC	◆	J
MAG 5000, Polyamid, 11 ... 30 V DC/11 ... 24V AC	◆	K
MAG 5000, Polyamid, 115 ... 230 V AC	◆	L
MAG 6000 CT, Polyamid, 115 ... 230 V AC	◆	M

Selection and Ordering data		Order No.
Sensor SITRANS F M MAG 5100 W		7 M E 6 5 2 0 -
Hastelloy electrodes, carbon steel flanges, EU water markets and low flow applications		1 - 2
Communication		
None	◆	A
HART	◆	B
PROFIBUS PA Profile 3 (only MAG 6000/MAG 6000 I)	◆	F
PROFIBUS DP Profile 3 (only MAG 6000/MAG 6000 I)	◆	G
Modbus RTU/RS 485 (only MAG 6000/MAG 6000 I)	◆	E
FOUNDATION Fieldbus H1 (only MAG 6000/ MAG 6000 I)	◆	J
Cable glands/terminal box		
Metric/Polyamid terminal box or 6000 I compact	◆	1
½" NPT/Polyamid terminal box or 6000 I compact	◆	2

This device is shipped with a Quick Start guide and the SITRANS F manual CD containing the complete manual library. Printed Operating Instructions are available for purchase via PMD

◆ Short lead time (details in PMD)

Selection and Ordering data	Order code
Additional information	
Please add **"-Z"** to Order No. and specify Order code(s) and plain text.	
Factory certificate according to EN 10204-2.2	**C14**
Factory certificate according to EN 10204-2.1	**C15**
Approval/Verification[2] (MI-001 : DN 50-300, EPDM liner, EN 1092-1 PN10 and PN16 flanges with MAG 6000 CT)	
• Without verification according to OIML 49	**P10**
• MI001 Q3/Q1 = 25	**P11**
• MI001 Q3/Q1 = 63	**P12**
• MI001 Q3/Q1 = 80	**P13**
• MI001 Q3/Q1 = 160	**P16**
• MI001 Q3/Q1 = 200	**P17**
• MI001 Q3/Q1 = 250	**P18**
Tag name plate, stainless steel fixed with SS wire (add plain text)	**Y17**
Tag name plate, plastic (self-adhesive)	**Y18**
Customer-specific converter setup	**Y20**
Sensor cables wired (specify cable order no.)	**Y40**
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable order no.)	**Y41**
Other postproduction requirements (add desired text)	**Y99**
Additional Calibrations	
Matched pair - (Standard production calibration where sensor and transmitter are calibrated together)	**On request**[1]
Accredited Siemens Flow Instruments matched pair Calibration acc. to ISO/IEC 17025:2005	**On request**[1]
Customer specified calibration up to 10 point	**On request**[1]
Customer witnessed calibration Any of above calibration	**On request**[1]

[1] Ordering On request as dedicated information from the customer on the individual sensors is required. Please fill in the calibration form found on pi.khe.siemens.de/index.aspx?Nr=17460 and send together with the order. (Size dependent restriction on maximum flow rates may apply)

[2] For more details and references of the ranges please see the tables on page 4/71.

Operating instructions for SITRANS F M MAG 5100 W

Description	Order No.
Operating instructions for SITRANS F M MAG 5100 W	
• English	**A5E03063678**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Description	Order No.
Potting kit for terminal box of SITRANS F M sensors for IP68/NEMA 6P (Not for Ex)	◆ **FDK-085U0220**

◆ Short lead time (details in PMD)

MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place. MAG 6000 I transmitters and sensors are delivered compact mounted from factory.
Communication module will be pre-mounted in the transmitter.

Please use online Product selector to get latest updates.

Product selector link:
www.pia-selector.automation.siemens.com

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

Flow sensor MAG 5100 W

Selection and Ordering data		Order No.
Sensor SITRANS F M MAG 5100 W		**7ME6580-**
Hastelloy electrodes, carbon steel flanges, Non EU water markets		■■■■■-■■■■
Diameter		
DN 25 (1“)	◆	2D
DN 40 (1½“)	◆	2R
DN 50 (2“)	◆	2Y
DN 65 (2½“)	◆	3F
DN 80 (3“)	◆	3M
DN 100 (4“)	◆	3T
DN 125 (5“)	◆	4B
DN 150 (6“)	◆	4H
DN 200 (8“)	◆	4P
DN 250 (10“)	◆	4V
DN 300 (12“)	◆	5D
DN 350 (14“)	◆	5K
DN 400 (16“)	◆	5R
DN 450 (18“)	◆	5Y
DN 500 (20“)		6F
DN 600 (24“)		6P
DN 700 (28“)		6Y
DN 750 (30“)		7D
DN 800 (32“)		7H
DN 900 (36“)		7M
DN 1000 (40“)		7R
(42“)		7U
(44“)		7V
DN 1200 (48“)		8B
DN 1400 (54“)		8F
DN 1500 (60“)		8K
DN 1600 (66“)		8P
DN 1800 (72“)		8T
DN 2000 (78“)		8Y
Flange norm and pressure rating		
to EN 1092-1		
PN 6 (DN 1400 ... 2000 (54“ ... 78“))		A
PN 10 (DN 200 ... 2000 (8“ ... 78“))	◆	B
PN 16 (DN 65 ... 600 (2½“ ... 24“)	◆	C
PN 16, non PED (DN 700 ... 1200/28“ ... 48“) (pending)		D
PN 40 (DN 25 ... 50 (1“ ... 2“))	◆	F
to ANSI B16.5		
class 150 (1“ ... 24“)		J
to AWWA C-207		
Class D (28“ ... 78“)		L
to AS 4087		
PN 16 (DN 50 ... 1200 (2" ... 48"))		N
to JIS		
B 2220:2004 K10 (1" ... 24")		R
Flange material		
Carbon steel flanges ASTM A 105		1
Liner material		
Ebonite Hard Rubber		4
Electrode material		
Hastelloy		2

Selection and Ordering data		Order No.
Sensor SITRANS F M MAG 5100 W		**7ME6580-**
Hastelloy electrodes, carbon steel flanges, Non EU water markets		■■■■■-■■■■
Transmitter with display		
Sensor for remote transmitter (Order transmitter separately)	◆	A
MAG 6000, Polyamid, 11 ... 30 V DC/11 ... 24V AC	◆	H
MAG 6000, Polyamid, 115 ... 230 V AC	◆	J
MAG 5000, Polyamid, 11 ... 30 V DC/11 ... 24V AC	◆	K
MAG 5000, Polyamid, 115 ... 230 V AC	◆	L
Communication		
No communication, add-on possible	◆	A
HART	◆	B
PROFIBUS PA Profile 3 (only MAG 6000/ MAG 6000 I)	◆	F
PROFIBUS DP Profile 3 (only MAG 6000/ MAG 6000 I)	◆	G
Modbus RTU/RS 485 (only MAG 6000/ MAG 6000 I)	◆	E
FOUNDATION Fieldbus H1 (only MAG 6000/ MAG 6000 I)	◆	J
Cable glands/terminal box		
Metric	◆	1
½" NPT	◆	2

◆ Short lead time (details in PMD)

Selection and Ordering data	Order code
Additional information	
Please add **“-Z“** to Order No. and specify Order code(s) and plain text.	
Customer-specific converter setup	
Factory certificate according to EN 10204-2.2	**C14**
Factory certificate according to EN 10204-2.1	**C15**
Tag name plate, stainless steel fixed with SS wire	**Y17**
Tag name plate, plastic (self-adhesive)	**Y18**
Customer-specific converter setup	**Y20**
Sensor cables wired (specify cable order no.)	**Y40**
Sensor for remote transmitter's junction box potted to IP68 with wired cable (specify cable order no.)	**Y41**
Other postproduction requirements (add desired text)	**Y99**

Operating instructions for SITRANS F M MAG 5100 W

Description	Order No.
Operating instructions for SITRANS F M MAG 5100 W • English	**A5E03063678**

This device is shipped with a Quick Start guide and a CD containing further SITRANS F literature.

All literature is also available for free at:
http://www.siemens.com/flowdocumentation

Description		Order No.
Potting kit for terminal box of SITRANS F M sensors for IP68/NEMA 6P (Not for Ex)	◆	**FDK-085U0220**

◆ Short lead time (details in PMD)

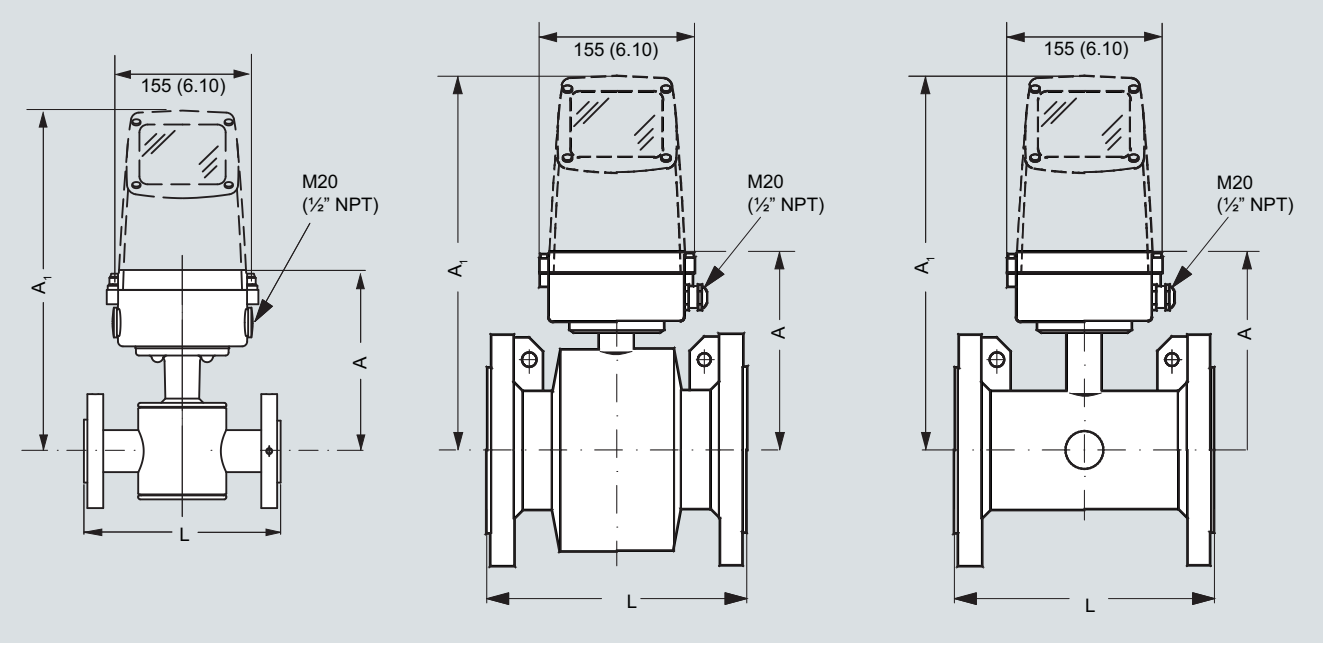
MAG 5000/6000 transmitters and sensors are packed in separate boxes, the final assembly takes place during installation at the customer's place. MAG 6000 I transmitters and sensors are delivered compact mounted from factory.
Communication module will be pre-mounted in the transmitter.

Please use online Product selector to get latest updates.

Product selector link: www.pia-selector.automation.siemens.com

Please also see www.siemens.com/SITRANSFordering for practical examples of ordering

Dimensional drawings

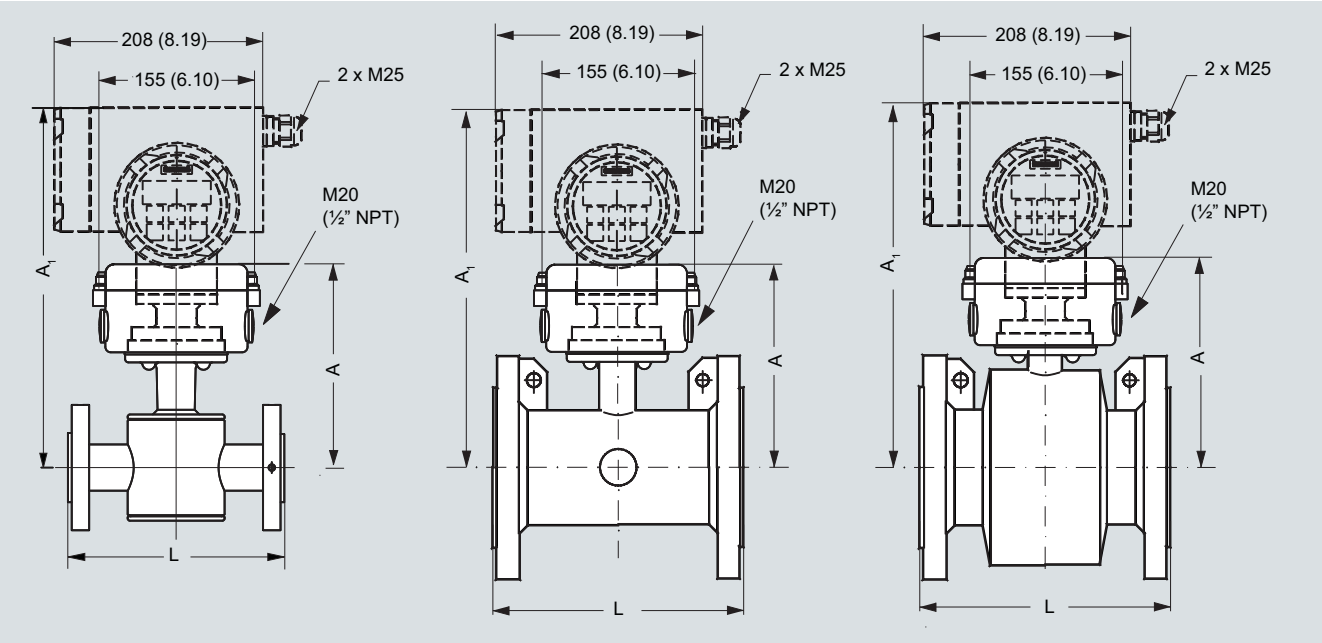


Nominal size		A				L													
		7ME6520 NBR or EPDM liner		7ME6580 Ebonite liner		PN 6[1], PN 10		PN 16		PN 16 non PED		PN 40		Class 150 / AWWA		JIS 10K		AS	
[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
15	½	177	7.0	-	-	-	-	-	-	-	-	200	7.9	200	7.9	-	-	-	-
25	1	187	7.4	187	7.4	-	-	-	-	-	-	200	7.9	200	7.9	200	7.9	200	7.9
40	1½	202	8.0	197	7.8	-	-	-	-	-	-	200	7.9	200	7.9	200	7.9	200	7.9
50	2	188	7.4	205	8.1	-	-	-	-	-	-	200	7.9	200	7.9	200	7.9	200	7.9
65	2½	194	7.6	212	8.3	-	-	200	7.9	-	-	-	-	200	7.9	200	7.9	200	7.9
80	3	200	7.9	222	8.7	-	-	200	7.9	-	-	-	-	200	7.9	200	7.9	200	7.9
100	4	207	8.1	242	9.5	-	-	250	9.8	-	-	-	-	250	9.8	250	9.8	250	9.8
125	5	217	8.5	255	10.0	-	-	250	9.8	-	-	-	-	250	9.8	250	9.8	-	-
150	6	232	9.1	276	10.9	-	-	300	11.8	-	-	-	-	300	11.8	300	11.8	300	11.8
200	8	257	10.1	304	12.0	350	13.8	350	13.8	-	-	-	-	350	13.8	350	13.8	350	13.8
250	10	284	11.2	332	13.1	450	17.7	450	17.7	-	-	-	-	450	17.7	450	17.7	450	17.7
300	12	310	12.2	357	14.1	500	19.7	500	19.7	-	-	-	-	500	19.7	500	19.7	500	19.7
350	14	382	15.0	362	14.3	550	21.7	550	21.7	-	-	-	-	550	21.7	550	21.7	550	21.6
400	16	407	16.0	387	15.2	600	23.6	600	23.6	-	-	-	-	600	23.6	600	23.6	600	23.6
450	18	438	17.2	418	16.5	600	23.6	600	23.6	-	-	-	-	600	23.6	600	23.6	600	23.6
500	20	463	18.2	443	17.4	600	23.6	600	23.6	-	-	-	-	600	23.6	600	23.6	600	23.6
600	24	514	20.2	494	19.4	600	23.6	600	23.6	-	-	-	-	600	23.6	600	23.6	600	23.6
700	28	564	22.2	544	21.4	700	27.6	700	27.6	700	27.6	-	-	700	27.6	-	-	700	27.6
750	30	591	23.3	571	22.5	-	-	-	-	-	-	-	-	750	29.5	-	-	750	-
800	32	616	24.3	606	23.9	800	31.5	800	31.5	800	31.5	-	-	800	31.5	-	-	800	31.5
900	36	663	26.1	653	25.7	900	35.4	900	35.4	900	35.4	-	-	900	35.4	-	-	900	35.4
1000	40	714	28.1	704	27.7	1000	39.4	1000	39.4	1000	39.4	-	-	1000	39.4	-	-	1000	39.4
	42	714	28.1	704	27.7	-	-	-	-	-	-	-	-	1000	39.4	-	-	-	-
	44	765	30.1	755	29.7	-	-	-	-	-	-	-	-	1100	43.3	-	-	-	-
1200	48	820	32.3	810	31.9	1200	47.2	1200	47.2	1200	47.2	-	-	1200	47.2	-	-	1200	47.2
1400	54	-	-	925	36.4	1400	55.1	-	-	1400	55.1	-	-	1400	55.1	-	-	-	-
1500	60	-	-	972	38.2	1500	59.1	-	-	1500	59.1	-	-	1500	59.1	-	-	-	-
1600	66	-	-	1025	40.4	1600	63.0	-	-	1600	63.0	-	-	1600	63.0	-	-	-	-
1800	72	-	-	1123	44.2	1800	70.9	-	-	1800	70.9	-	-	1800	70.9	-	-	-	-
2000	78	-	-	1223	48.1	2000	78.7	-	-	2000	78.7	-	-	2000	78.7	-	-	-	-

[1] PN 6 only in size DN 1400 ... DN 2000 (54" ... 78")
- not available

Flow sensor MAG 5100 W

MAG 5100 W / 6000 I Compact



Nominal size		A				A_1				L															
		7ME6520 NBR or EPDM liner		7ME6580 Ebonite liner		7ME6520 NBR or EPDM liner		7ME6580 Ebonite liner		PN 10		PN 16		PN 16 non PED		PN 40		Class 150 / AWWA		JIS 10K		AS	
[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]	[mm]	[inch]
15	½	177	7.0	-	-	-	-	-	-	-	-	-	-	-	-	200	7.9	200	7.9	-	-	-	-
25	1	187	7.4	187	7.4	340	13.4	338	13.3	-	-	-	-	-	-	200	7.9	200	7.9	200	7.9	200	7.9
40	1½	202	8.0	197	7.8	350	13.8	348	13.7	-	-	-	-	-	-	200	7.9	200	7.9	200	7.9	200	7.9
50	2	188	7.4	205	8.1	341	13.4	356	14.0	-	-	-	-	-	-	200	7.9	200	7.9	200	7.9	200	7.9
65	2½	194	7.6	212	8.3	347	13.7	363	14.3	-	-	200	7.9	200	7.9	-	-	200	7.9	200	7.9	200	7.9
80	3	200	7.9	222	8.7	353	13.9	373	14.7	-	-	200	7.9	200	7.9	-	-	200	7.9	200	7.9	200	7.9
100	4	207	8.1	242	9.5	360	14.2	393	15.5	-	-	250	9.8	250	9.8	-	-	250	9.8	250	9.8	250	9.8
125	5	217	8.5	255	10.0	370	14.6	406	16.0	-	-	250	9.8	250	9.8	-	-	250	9.8	250	9.8	-	-
150	6	232	9.1	276	10.9	385	15.2	427	16.8	-	-	300	11.8	300	11.8	-	-	300	11.8	300	11.8	300	11.8
200	8	257	10.1	304	12.0	410	16.1	455	17.9	350	13.8	350	13.8	350	13.8	-	-	350	13.8	350	13.8	350	13.8
250	10	284	11.2	332	13.1	437	17.2	483	19.0	450	17.7	450	17.7	450	17.7	-	-	450	17.7	450	17.7	450	17.7
300	12	310	12.2	357	14.1	463	18.2	508	20.0	500	19.7	500	19.7	500	19.7	-	-	500	19.7	500	19.7	500	19.7
350	14	382	15.0	362	14.3	535	21.1	513	20.2	550	21.7	550	21.7	550	21.7	-	-	550	21.7	550	21.7	550	21.7
400	16	407	16.0	387	15.2	560	22.1	538	21.2	600	23.6	600	23.6	600	23.6	-	-	600	23.6	600	23.6	600	23.6
450	18	438	17.2	418	16.5	591	23.3	569	22.4	600	23.6	600	23.6	600	23.6	-	-	600	23.6	600	23.6	600	23.6
500	20	463	18.2	443	17.4	616	24.3	594	23.4	600	23.6	600	23.6	600	23.6	-	-	600	23.6	600	23.6	600	23.6
600	24	514	20.2	494	19.4	667	26.3	645	25.4	600	23.6	600	23.6	600	23.6	-	-	600	23.6	600	23.6	600	23.6
700	28	564	22.2	544	21.4	717	28.2	695	27.4	700	27.6	700	27.6	700	27.6	-	-	700	27.6	-	-	700	27.6
750	30	591	23.3	571	22.5	744	29.3	722	28.4	-	-	-	-	-	-	-	-	750	29.5	-	-	750	-
800	32	616	24.3	606	23.9	779	30.7	757	29.8	800	31.5	800	31.5	800	31.5	-	-	800	31.5	-	-	800	31.5
900	36	663	26.1	653	25.7	826	32.5	804	31.7	900	35.4	900	35.4	900	35.4	-	-	900	35.4	-	-	900	35.4
1000	40	714	28.1	704	27.7	877	34.5	906	35.7	1000	39.4	1000	39.4	1000	39.4	-	-	1000	39.4	-	-	1000	39.4
	42	714	28.1	704	27.7	877	34.5	-	-	-	-	-	-	-	-	-	-	1000	39.4	-	-	-	-
	44	765	30.1	755	29.7	928	36.5	906	35.7	-	-	-	-	-	-	-	-	1100	43.3	-	-	-	-
1200	48	820	32.3	810	31.9	983	38.7	961	37.8	1200	47.2	1200	47.2	1200	47.2	-	-	1200	47.2	-	-	1200	47.2
1400	54	-	-	925	36.4	-	-	1076	42.4	1400	55.1	-	-	1400	55.1	-	-	1400	55.1	-	-	-	-
1500	60	-	-	972	38.2	-	-	1123	44.2	1500	59.1	-	-	1500	59.1	-	-	1500	59.1	-	-	-	-
1600	66	-	-	1025	40.4	-	-	1176	46.3	1600	63.0	-	-	1600	63.0	-	-	1600	63.0	-	-	-	-
1800	72	-	-	1123	44.2	-	-	1274	50.2	1800	70.9	-	-	1800	70.9	-	-	1800	70.9	-	-	-	-
2000	78	-	-	1223	48.1	-	-	1374	54.1	2000	78.7	-	-	2000	78.7	-	-	2000	78.7	-	-	-	-

- not available

Weight

		7ME6520 NBR or EPDM liner										7ME6580 Ebonite liner	
Nominal size		**PN 10**		**PN 16**		**PN 40**		**Class 150/AWWA**		**AS**		**PN 16**	
[mm]	**[inch]**	**[kg]**	**[lbs]**	**[kg]**	**[lbs]**	**[kg]**	**[lbs]**	**[kg]**	**[lbs]**	**[kg]**	**[lbs]**	**[kg]**	**[lbs]**
15	½	-	-	-	-	4	9	4	9	4	9	5	11
25	1	-	-	-	-	6	12	5	11	4	9	5	11
40	1½	-	-	-	-	8	18	7	15	7	15	8	17
50	2	-	-	9	20	-	-	8	20	9	20	9	20
65	2½	-	-	10.7	24	-	-	11	24	10.7	24	11	24
80	3	-	-	11.6	26	-	-	13	28	11.6	26	12	26
100	4	-	-	15.2	33	-	-	19	41	15.2	33	16	35
125	5	-	-	20.4	45	-	-	24	52	-	-	19	42
150	6	-	-	26	57	-	-	29	64	26	57	27	60
200	8	48	106	48	106	-	-	56	124	48	106	40	88
250	10	64	141	69	152	-	-	79	174	69	152	60	132
300	12	76	167	86	189	-	-	110	243	86	189	80	176
350	14	104	229	125	274	-	-	139	307	115	254	110	242
400	16	119	263	143	314	-	-	159	351	125	277	125	275
450	18	136	299	173	381	-	-	182	400	141	311	175	385
500	20	163	359	223	491	-	-	225	495	189	418	200	440
600	24	236	519	338	744	-	-	320	704	301	664	287	633
700	28	270	595	314	692	-	-	273	602	320	704	330	728
750	30	-	-	-	-	-	-	329	725	-	-	360	794
800	32	346	763	396	873	-	-	365	804	428	944	450	992
900	36	432	951	474	1043	-	-	495	1089	619	1362	530	1168
1000	40	513	1130	600	1321	-	-	583	1282	636	1399	660	1455
	42	-	-	-	-	-	-	687	1512	-	-	-	-
	44	-	-	-	-	-	-	763	1680	-	-	1140	2513
1200	48	643	1415	885	1948	-	-	861	1896	813	1789	1180	2601
1400	54	1592	3510	-	-	-	-	-	-	-	-	1600	3528
1500	60	-	-	-	-	-	-	-	-	-	-	2460	5423
1600	66	2110	4652	-	-	-	-	-	-	-	-	2525	5566
1800	72	2560	5644	-	-	-	-	-	-	-	-	2930	6460
2000	78	3640	8025	-	-	-	-	-	-	-	-	3665	8080

- not available

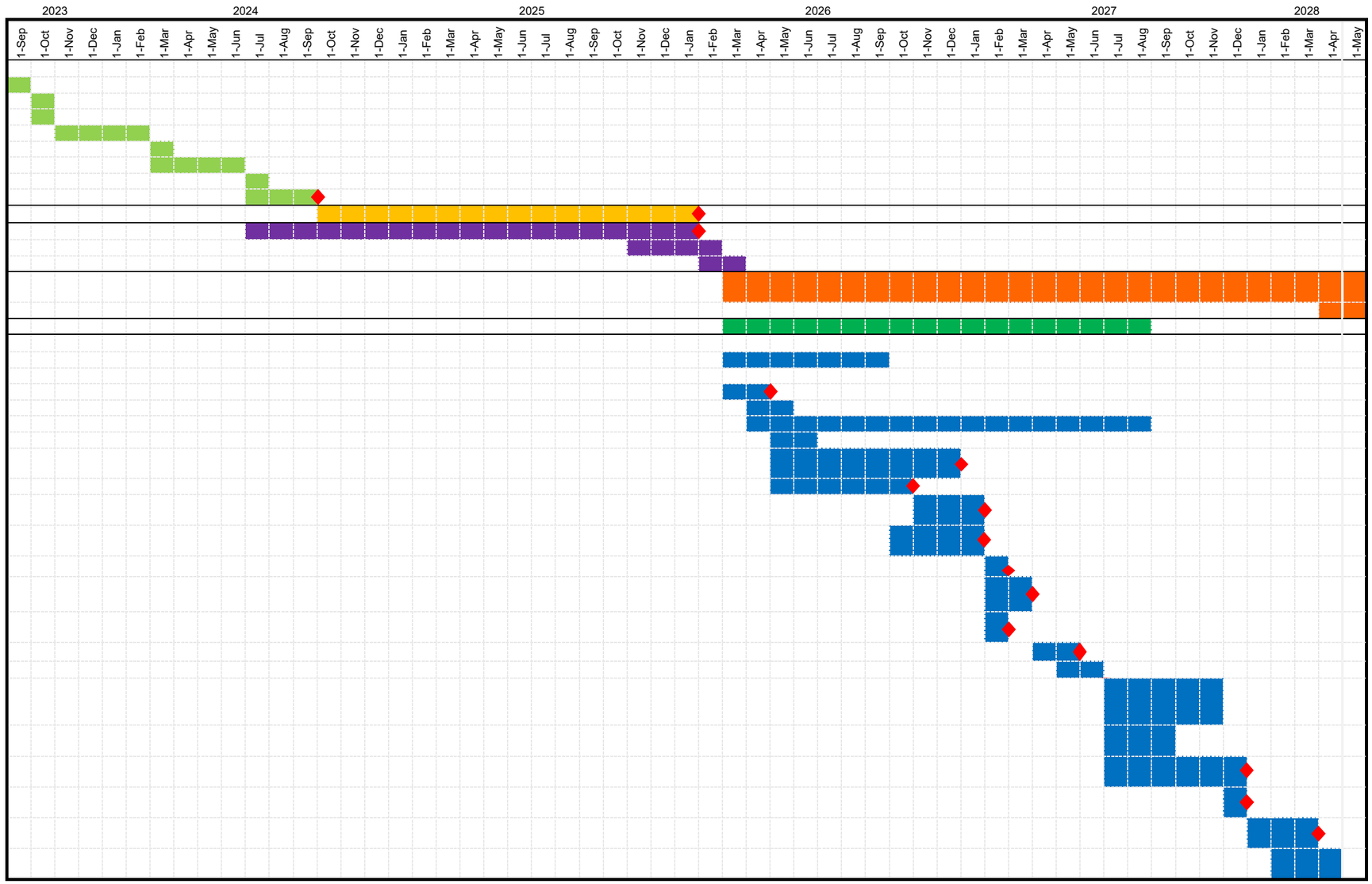
With transmitter MAG 5000 and MAG 6000 compact, weight is increased by approximately 0.8 kg (1.8 lbs), with MAG 6000 I, weight is increased by 5.5 kg (12.1 lb).

Appendix F – Anticipated Project Schedule

IDYLLWILD WASTEWATER TREATMENT PLANT UPGRADES

TASK	START	END	DAYS
Engineering Design			
Preliminary Engineering & 30% Design	8/2/2021	9/10/2024	1135
IWD Review	9/10/2024	10/1/2024	21
Address IWD Comments	10/1/2024	10/25/2024	24
60% Design	10/31/2024	2/28/2025	120
IWD Review	3/1/2025	3/15/2025	14
90% Design and Specs	3/1/2025	6/30/2025	121
IWD Review	7/1/2025	7/15/2025	14
100% Plan and Specs	7/1/2025	9/30/2025	91
Grant Funding Application	10/15/2024	1/15/2026	457
Permitting	6/30/2025	1/31/2026	215
Bidding and Award	11/15/2025	2/15/2026	92
Award and Notice to Proceed	2/15/2026	3/15/2026	28
Construction Administration and Engineering Services During Construction	2/15/2026	5/31/2028	836
Owners Acceptance	4/1/2028	5/31/2028	60
CEQA Compliance Monitoring	2/15/2026	8/31/2027	562
Construction			
Submittals	3/15/2026	9/15/2026	184
Site Preparation			
Clearing Trees and Grub	3/1/2026	4/30/2026	60
Site Surveying and Staking	4/15/2026	5/15/2026	30
Temporary Existing Operations	4/15/2026	8/15/2027	487
Secure Site	5/15/2026	6/15/2026	31
Construct bioreactor tanks, air supply system, and RAS / WAS pump station	5/1/2026	12/31/2026	244
Construct controls building and generator	5/15/2026	10/31/2026	169
Commission and test controls and backup power	11/1/2026	1/31/2027	91
Construct the splitter box, flume, and influent mains and manholes	10/1/2026	1/31/2027	122
Commission pump station	2/1/2027	2/28/2027	27
Commission and startup new blowers and swap over existing bioreactor	2/1/2027	3/31/2027	58
Commission and startup new splitter box and swap over (E) bioreactor	2/1/2027	2/28/2027	27
Commission and startup Biorector #1	4/1/2027	5/15/2027	44
Commission and startup Biorector #2	5/15/2027	6/30/2027	46
Remove the existing bioreactor and generator from service, keep the sludge processing portion online temporarily.	7/1/2027	11/30/2027	152
Renovate existing RAS pump house per plans	7/1/2027	9/30/2027	91
Construct equalization lift station and sludge settling tank	7/15/2027	12/15/2027	153
Commision and startup lift station and sludge tank	12/15/2027	12/31/2027	16
Decommission the existing bioreactor tank and renovate to be an equalization basin	1/1/2028	3/31/2028	90
Complete all improvements, grading, and landscaping to the satisfaction of IWD	2/1/2028	4/30/2028	89

SCHEDULE



Appendix G – Construction Cost Estimate

SUSP
SPECIALIZED UTILITIES SERVICES PROGRAM
ENGINEERING

Appendix G

Preliminary Construction Estimate

Owner: **Idyllwild Water District**
Project: **Wastewater Treatment Plant Project**

Date: 9/2/2024
Prepared By: TP/DD/NT

No.	Item	Quantity	Unit	Unit Cost	Cost
1	Mobilization / Demobilization	10%	LS	-	$632,000
2	Project Site and Earthworks	1	LS	$193,900	$193,900
3	Headworks and Splitter Box	1	LS	$96,100	$96,100
4	Equalization Basin 1 Renovation	1	LS	$98,400	$98,400
5	Equalizaton Basin 2 Renovation	1	LS	$152,200	$152,200
6	Equalization Lift Station and Vault	1	LS	$261,100	$261,100
7	Air Supply System	1	LS	$615,100	$615,100
8	Influent Mains to Bioreactors	1	LS	$97,300	$97,300
9	Bioreactor Tanks and Appurtenances	1	LS	$686,700	$686,700
10	Secondary Clarifiers	1	LS	$242,700	$242,700
11	RAS / WAS Pump Station	1	LS	$304,400	$304,400
12	Sludge Settling Tank	1	LS	$198,100	$198,100
13	Plant Control Building	1	LS	$518,400	$518,400
14	Temproary Operations Support	1	LS	$446,400	$446,400
15	Renovate Existing Office and Lab Building and RAS Pump Station	1	LS	$424,000	$424,000
16	Site Grading, Paving, and Landscaping	1	LS	$371,900	$371,900
17	Site Power	1	LS	$696,400	$696,400
18	Backup Power	1	LS	$148,500	$148,500
19	SCADA Integration	1	LS	$290,000	$290,000
20	Instrumentation	1	LS	$334,000	$334,000
21	Power, Instruments, and Controls Project Management (Contractor)	1	LS	$140,000	$140,000
22		1	LS	$0	$0
23		1	LS	$0	$0
24		1	LS	$0	$0
25		1	LS	$0	$0
26		1	LS	$0	$0
27		1	LS	$0	$0
28		1	LS	$0	$0
29		1	LS	$0	$0
30		1	LS	$0	$0

NOTES:
10% of non-administrative items

SUB-TOTAL ESTIMATED BID COST =	$6,948,000	
Sub-total Plus Contingency =	**$9,032,000**	
PROJECT ADMINISTRATION COSTS:		
Bidding, Advertising, and Construction Administration	$208,440	3%
Eng. Svc. During Construction Incl Inspection:	$416,880	6%
Construction Management:	$104,220	1.5%
Labor Compliance Program:	$17,370	0.25%
Grant Management and System Administration Costs	$86,850	1.25%
PRE-DESIGN LEVEL CONTINGENCY @ 30% =	$2,335,000	
ESTIMATED PROJECT COST:	**$9,908,000**	