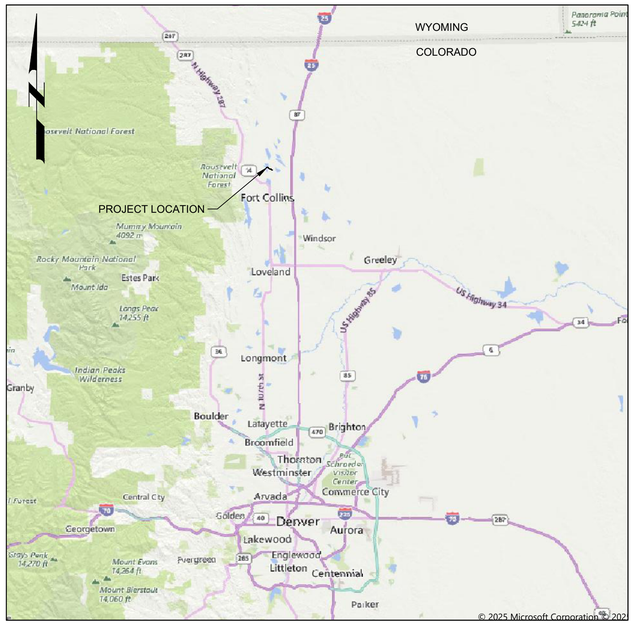
THORNTON WATER PROJECT

SOURCE WATER PUMP STATION

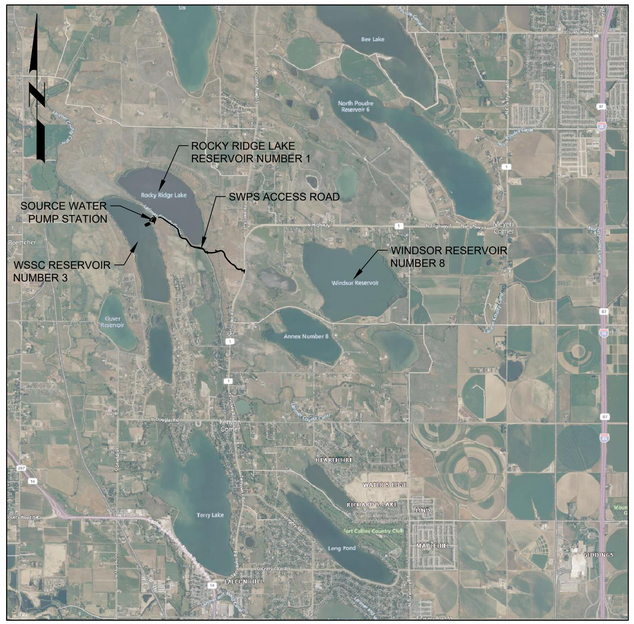
AGENCY REVIEW

OCTOBER 2025

PROJECT #12-777XP



VICINITY MAP



LOCATION MAP

JASON PIERCE, P.E. - PROJECT DIRECTOR DATE

JOHN HIMYAK, P.E - PROJECT ENGINEER DATE

MICHAEL WELKER, P.E. - PROJECT MANAGER DATE

TONY STOUT, P.E. - OWNER'S ADVISOR DATE

carollo®

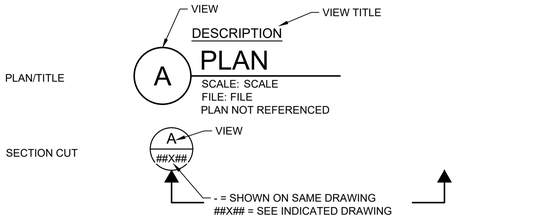
COLORADO LICENSED
MARY LEE GILES
43662
PROFESSIONAL ENGINEER
Digitally signed by Mary L. Giles
DN: cn=Mary Lee Giles, Carollo Engineers, Inc.
Date: 2025.10.31 13:47:07 -06'00'

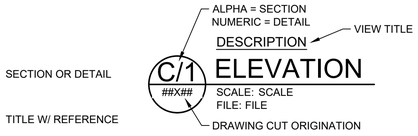
JOB NO.
203505
DRAWING NO.
30G01
SHEET NO.
1 OF 160

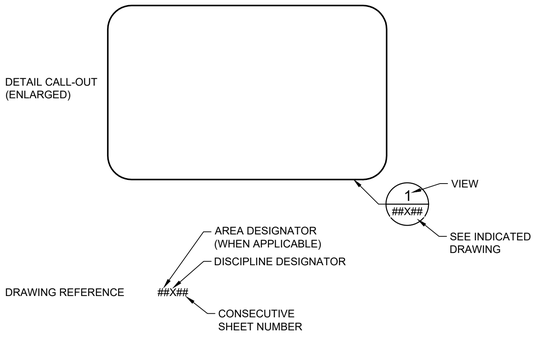
LAST SAVED BY: AVALENZUELA

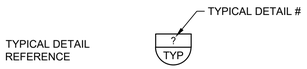
PROJECT NO. 11599A10 FILE NAME: 203505_30G01.DWG

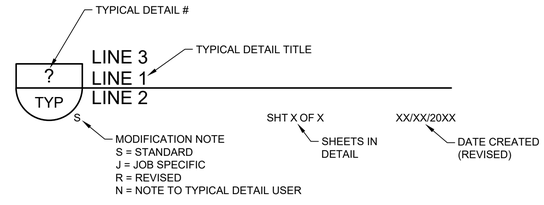
DETAIL REFERENCES



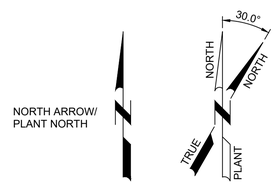


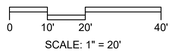


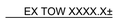


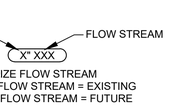


GENERAL SYMBOLS

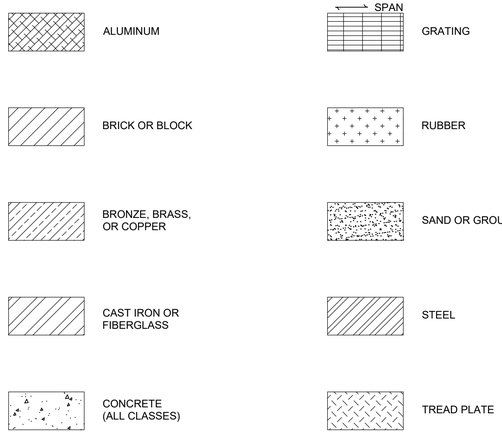








STRUCTURAL HATCH PATTERNS



GENERAL NOTES

1. FOLLOWING NOTES ARE GENERAL AND APPLY TO ALL SHEETS OF THESE CONTRACT DOCUMENTS AS IF THEY WERE WRITTEN IN THEIR ENTIRETY ON EACH SHEET.
2. CONTRACTOR SHALL VERIFY ALL DIMENSIONS BEFORE STARTING WORK AND SHALL IMMEDIATELY NOTIFY THE CONSTRUCTION MANAGER OF ANY DISCREPANCIES. CONTRACTOR SHALL BE RESPONSIBLE FOR FIELD VERIFYING ALL EXISTING CONDITIONS INCLUDING LOCATION AND DIMENSIONS OF ALL EXISTING CONSTRUCTION AND UTILITIES. CONTRACTOR SHALL NOTIFY CONSTRUCTION MANAGER IF THERE IS A CONFLICT BETWEEN THE CONTRACT DOCUMENTS AND EXISTING CONSTRUCTION BEFORE PROCEEDING WITH WORK.
3. UNLESS DETAILED, SPECIFIED, OR OTHERWISE INDICATED ON THE DRAWINGS, CONSTRUCTION SHALL BE AS INDICATED IN THE APPLICABLE TYPICAL DETAILS AND GENERAL NOTES. TYPICAL DETAILS SHALL APPLY EVEN THOUGH NOT REFERENCED AT SPECIFIC LOCATIONS ON DRAWINGS.
4. WHERE NO CONSTRUCTION DETAILS ARE SHOWN OR NOTED FOR ANY PART OF WORK, DETAILS SHALL BE IN THE SAME AS FOR OTHER SIMILAR WORK.
5. THE CONTRACTOR SHALL TAKE ALL PRECAUTIONARY MEASURES NECESSARY TO PROTECT FROM DAMAGE EXISTING FACILITIES AND UTILITIES SHOWN OR NOT SHOWN THAT ARE TO REMAIN IN PLACE. ALL FACILITIES DAMAGED BY THE CONTRACTOR'S OPERATIONS SHALL BE EXPEDITIOUSLY REPAIRED OR RECONSTRUCTED TO THE ORIGINAL OR BETTER CONDITION AT THE CONTRACTOR'S EXPENSE WITHOUT ADDITIONAL COMPENSATION.
6. THE CONTRACTOR IS RESPONSIBLE FOR ARRANGING ALL REQUIRED INSPECTIONS. THE PRESENCE OR ABSENCE OF THE INSPECTOR WILL NOT RELIEVE THE CONTRACTOR OF FULL RESPONSIBILITY FOR THE PROPER PERFORMANCE OF THE WORK.

Know what's below.
Call before you dig.

Call before you Overhead

REV	DATE	BY	DESCRIPTION
			AGENCY REVIEW

DESIGNED CE
DRAWN CE
CHECKED CE
DATE OCTOBER 2025

COLORADO LICENSED
SMIT LEE GILES
43662
Digitally signed by Burt L. Giles
DN: cn=Burt L. Giles, o=Carollo Engineers, P.C., ou=Carollo Engineers, P.C., email=bgiles@carollo.com, c=US
Date: 2025.10.31 13:48:27 -06'00'
PROFESSIONAL ENGINEER

carollo

THORNTON WATER PROJECT

CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
GENERAL
NOTES AND SYMBOLS

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

JOB NO. 203505
DRAWING NO. 30G03
SHEET NO. 3 OF 160

LAST SAVED BY: JENNIFER JACOBSEN

PROJECT NO. 203505 FILE NAME: 203505_30G03.DWG

@	AT (MEASUREMENT)
△	DEFLECTION ANGLE, CENTRAL ANGLE
#	NUMBER (REBAR Ø)

A

AB	ANCHOR BOLT
ABC	AGGREGATE BASE COURSE
ABS	ACRYLONITRILE BUTADIENE STYRENE
AC	ASPHALTIC CONCRETE
ACB	AIR CIRCUIT BREAKER
ACI	AMERICAN CONCRETE INSTITUTE
ACP	ASBESTOS CEMENT PIPE
ACU	AIR CONDITIONING UNIT
AD	AREA DRAIN
ADDL	ADDITIONAL
ADJ	ADJACENT, ADJUST, ADJUSTABLE
ADMIN	ADMINISTRATION
ADR	ACCESS DOOR
AED	AREA EQUIPMENT DRAIN
AER	AERAT(ION)(OR)
AFC	AFTERCOOLER
AFF	ABOVE FINISHED FLOOR
AFM	AIR FLOW MONITOR
AHU	AIR HANDLING UNIT
AIC	AIR COMPRESSOR
AIL	AIR INTAKE LOUVER
ALT	ALTERNATE
AL	ALUMINUM
ANCH	ANCHOR
ANV	ANGLE VALVE
APPROX	APPROXIMATE, APPROXIMATELY
ARCH	ARCHITECTURAL
ARV	AIR RELEASE VALVE
ASSY	ASSEMBLY
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
AV	ACID VENT
AVG	AVERAGE
AVV	AIR AND VACUUM VALVE
AW	ACID WASTE

B

BC	BEGIN CURVE, BRASS CAP, BACK OF CURB, BOLT CIRCLE
BCKR	BACKER BOARD
BCM	BATCHMETER
BD	BOARD
BDD	BACKDRAFT DAMPER
BDR	BASIN DRAIN LINE
BF	BLIND FLANGE
BFG	BELOW FINISHED GRADE
BFP	BELT FILTER PRESS
BFV	BUTTERFLY VALVE
BG	BREAK GLASS HAND SWITCH
BKW	BACKWASH
BLDG	BUILDING
BLK	BLOCK
BLKHD	BULKHEAD
BLR	PROCESS BLOWER
BM	BEAM, BENCH MARK
BO	BOTTOM OF
BOTT	BOTTOM
BOTTS	BOTTOM SLUDGE
BPV	BACK PRESSURE VALVE
BRG	BEARING
BSP	BLACK STEEL PIPE
BTU	BRITISH THERMAL UNITS
BTWN	BETWEEN
BV	BALL VALVE
BWCCP	BAR-WRAPPED CONCRETE CYLINDER PIPE

C

C	CLOSE, CONDUIT CHANNEL (STRUCTURAL)
CA	CONCRETE ANCHOR
CAUSTIC	CAUSTIC SOLUTION (CONCENTRATED OR DILUTE)
CB	CATCH BASIN
CC	CENTER OF CURVATURE, CENTER TO CENTER
CCB	CHLORINE CONTACT BASIN
CD	CEILING DIFFUSER, CONDENSATE DRAIN
CDL	CHEMICAL DRAIN LINE
CDT	CONDUIT
CEF	CEILING EXHAUST FAN
CF	CUBIC FEET
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET PER SECOND
CHEMD	CHEMICAL DRAIN
CHF	CHEMICAL FEEDER
CHKD PL	CHECKERED PLATE
CI	CAST IRON
CIP	CAST IRON PIPE
CIRC	CIRCUMFERENTIAL/CIRCUMFERENCE
CJ	CONSTRUCTION JOINT
CKA	CHECK VALVE, ANGLE
CKB	CHECK VALVE, BALL
CKF	CHECK VALVE, FLAP
CKS	CHECK VALVE, SWING
CL	CENTER LINE
CLK	CHAIN LINK
CLD	CHLORINE LEAK DETECTOR
CLL	CHLORINE LIQUID
CLP	CHLORINE GAS (PRESSURE)
CLR	CLEAR
CLS	CHLORINE SOLUTION
CLSM	CONTROLLED LOW STRENGTH MATERIAL
CLV	CHLORINE GAS (VACUUM)
CML	CEMENT MORTAR LINED
CMLC	CEMENT MORTAR LINED AND COATED
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CNV	CONVEYOR
CO	CLEANOUT
COL(S)	COLUMN(S)
CONC	CONCRETE
CONN	CONNECT, CONNECTION
CONST	CONSTRUCTION
CONT	CONTINUOUS OR CONTINUATION OR (D) (OUS)
CORR	CORRUGATE(D), CORROSION
CP	CONTROL POINT
CPLG	COUPLING
CPT	CARPET
CPVC	CHLORINATED POLYVINYL CHLORIDE
CS	CARBON STEEL, CIRCULATING SLUDGE
CSP	CHEMICAL SUMP PUMP, CORRUGATED STEEL PIPE
CT	CURRENT TRANSFORMER, CERAMIC TILE
CTJ	CONTROL JOINT
CTL	CONTROL
CTR	CENTER, CENTERED
CTSK	COUNTERSUNK
CU	CUBIC
CUP	COPPER PIPE
CV	CHECK VALVE
CW	COLD WATER
CWV	COMBINATION WASTE AND VENT
CY	CUBIC YARD

D

D	DEPTH, DIGITAL OR DISCRETE, DRAIN
D/W	DRIVEWAY
DBL	DOUBLE
DDR	DESICCANT DRYER
DEG or °	DEGREE
DEMO	DEMOLISH, DEMOLITION
DET	DETAIL
DFL	DECANT/FILTRATE
DG	DOOR GRILLE
DIA or Ø	DIAMETER
DIAG	DIAGONAL
DIF	DIFFUSER
DIG	DIGESTER
DIM	DIMENSION
DIP	DUCTILE IRON PIPE
DISCH	DISCHARGE
DIW	DEIONIZED WATER
DL	DEAD LOAD, DRAIN LINE
DLV	DOOR LOUVER
DMP	DAMPER
DMS	DIAPHRAGM SEAL
DN	DOWN
do	DITTO
DO	DOOR OPENING
DP	DEEP (OR DEPTH)
DPV	DIAPHRAGM VALVE
DR	DOOR, DRAIN
DRT	DRIP TRAP
DRV	DRAIN VALVE
DS	DIGESTED SLUDGE, DOWN SPOUT
DSW	DISTILLED WATER, DOOR SWITCH
DUC	DUST COLLECTOR
DUH	DUCT HEATER UNIT
DW	DISTILLED WATER
DWD	DEWATERING DRAIN
DWG(S)	DRAWING(S)
DWL(S)	DOWEL(S)

E

E	EAST
EA	EACH
EC	END OF CURVE
ECC RED	ECCENTRIC REDUCER
ECU	EVAPORATOR COOLING UNIT
ED	EQUIPMENT DRAIN
EF	EXHAUST FAN, EACH FACE
EFF	EFFLUENT
EG	EXHAUST GRILLE
EIFS	EXTERIOR INSULATION AND FINISH SYSTEM
EJ	EXPANSION JOINT
EJR	INJECTOR/EDUCTOR
EL	ELEVATION
ELEC	ELECTRICAL
ELL	ELBOW
EMBED	EMBEDMENT
EMH	ELECTRICAL MANHOLE
EP	EDGE OF PAVEMENT
EPS	EXPANDED POLYSTYRENE
EPV	ECCENTRIC PLUG VALVE
EQ	EQUAL
EQUIP	EQUIPMENT
ER	EXHAUST REGISTER
ES	EACH SIDE
ESEW	EMERGENCY SHOWER AND EYE WASH
ESMT	EASEMENT
ESS	EMERGENCY HAND SWITCH
ET	ELECTRICALLY HEAT TRACED
EUH	ELECTRIC UNIT HEATER
EVR	EVAPORATOR
EW	EACH WAY
EWC	ELECTRIC WATER COOLER
EWEF	EACH WAY EACH FACE
EWH	ELECTRIC WATER HEATER, EXHAUST
EX	EXISTING
EXIST	EXISTING
EXP	EXPANSION, EXPANSION TANK
EXPO	EXPOSED
EXT	EXTERIOR

F

FACT	FACTORY
FAD	FOUL AIR DUCT
FB	FLAT BAR
FBW	FILTER BACKWASH
FC	FACE OF CURB, FLEXIBLE COUPLING
FCA	FLANGE COUPLING ADAPTER
FCO	FLOOR CLEANOUT
FCU	FAN COIL UNIT
FD	FIRE DAMPER, FLOOR DRAIN, FOUND
FDC	FIRE DEPARTMENT CONNECTION
FDL	FLOOR DRAIN LINE
FDR	FEEDER
FEFF	FINAL EFFLUENT
FG	FLAP GATE
FH	FIRE HYDRANT
FILT	FILTRATE
FIN	FINISH
FIN FL	FINISHED FLOOR
FIN GR	FINISHED GRADE
FL	FLOOR, FLOW LINE
FLA	FOUL AIR
FLD	FILTER DRAIN
FLE	FILTER EFFLUENT
FLEX	FLEXIBLE
FLG	FLANGE, OR FLANGED
FLR	FILTER
FM	FORCE MAIN
FND	FOUNDATION
FO	FUEL OIL
FOB	FLAT ON BOTTOM
FOT	FLAT ON TOP
FPM	FEET PER MINUTE
FPP	FLEXIBLE PLASTIC PIPE
FRP	FIBERGLASS REINFORCED PLASTIC
FRPP	FIBERGLASS REINFORCED PLASTIC PIPE
FRS	FROTH SPRAY
FS	FAR SIDE
FSTN	FASTEN(ED)
FT or '	FOOT, FEET
FTG	FOOTING
FUP	FUEL DISPENSER
FV	FLAP VALVE
FW	FLUSHING WATER, FINISHED WATER
FX	FIRE EXTINGUISHER
FXC	FIRE EXTINGUISHER CABINET
FXE	FIRE EXTINGUISHER - ELECTRICAL

G

G	GAS, GROUND, GUTTER
GA	GAUGE or GAGE
GAL	GALLONS
GALV	GALVANIZE(D)
GAV	GRAVITY VENTILATOR
GB	GRADE BREAK
GBT	GRAVITY BELT THICKENER
GC	GROOVED COUPLING
GEL	GRAVITY EXHAUST LOUVER
GEN	GENERAL, GENERATOR
GL	GLASS
GLV	GLOBE VALVE
GM	GAS METER
GND	GROUND
GPD	GALLONS PER DAY
GPM	GALLONS PER MINUTE
GR	GRADE
GRTG	GRATING
GRV	GRAVITY VENTILATOR
GSP	GALVANIZED STEEL PIPE
GV	GATE VALVE
GYP	GYPSUM

H

H	EXPLOSION-PROOF, HIGH, HORIZONTAL
H1E	HOOK ONE END
H2E	HOOK TWO ENDS
HAS	HEADED ANCHOR STUD
HB	HOSE BIBB
HDPE	HIGH DENSITY POLYETHYLENE
HDW	HARDWARE
HDWL	HEADWALL
HEF	HOOD EXHAUST FAN
HGT	HEIGHT
HORIZ	HORIZONTAL
HP	HEAT PUMP, HORSEPOWER, HIGH PRESSURE
HPA	HIGH PRESSURE AIR
HPT	HIGH POINT
HPU	HEAT PUMP UNIT AIR
HR	HANDRAIL, HOSE REEL, HOUR
HSF	HOOD SUPPLY FAN
HSS	HOLLOW STRUCTURAL SECTION (STEEL)
HTX	HEAT EXCHANGER
HV	HOSE VALVE
HW	HOT WATER
HWL	HIGH WATER LEVEL
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
HxW	HEIGHT BY WIDTH
HYD	HYDRANT

I

IA	INSTRUMENT AIR
ID	INSIDE DIAMETER, INSIDE DIMENSION, IDENTIFICATION
I.F.	INSIDE FACE
IN or "	INCHES
INCL	INCLUDE, INCLUDING
INF	INFLUENT
INJ	INJECTOR
INSTR	INSTRUMENTATION
INSUL	INSULAT(E)(ED)(ING)(ION)
INT	INTERIOR
INV	INVERT
IP	IRON PIPE
ISR	INTRINSICALLY SAFE RELAY

J

JST	JOIST
JT	JOINT

K

KGV	KNIFE GATE VALVE

L

L	ANGLE (STRUCTURAL), LENGTH, LOUVER
LAB	LABORATORY
LAV	LAVATORY
LB(S)	POUND(S)
LDF	LIQUID DIESEL FUEL
LDFR	LIQUID DIESEL FUEL RETURN
LF	LINEAL FEET
LG	LONG
LH	LEFT HAND
LHR	LEFT HAND REVERSE
LHRA	LEFT HAND REVERSE ACTIVE
LHRB	LEFT HAND REVERSE BEVEL
LL	LIVE LOAD
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LP	LOW PRESSURE
LPA	LOW PRESSURE AIR
LPG	LIQUIFIED PROPANE GAS
LPT	LOW POINT
LR	LONG RADIUS
LS	LAB SINK
LT	LEFT
LWL	LOW WATER LEVEL

M

M	MOTOR
MAINT	MAINTENANCE
MAN	MANUAL
MASY	MASONRY
MATL	MATERIAL
MAU	MAKE-UP AIR UNIT
MAX	MAXIMUM
MB	MACHINE BOLT
MC	MECHANICAL COUPLING
MCJ	MASONRY CONTROL JOINT
MD	MOTORIZED DAMPER
MECH	MECHANICAL
MET	METAL
MFR	MANUFACTURER
MG/L	MILLIGRAMS PER LITER
MGD	MILLION GALLONS PER DAY
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MIX	MIXER
MJ	MECHANICAL JOINT
MK	MARK
ML	MIXED LIQUOR
MO	MASONRY OPENING
MOD	MODIFIED
MOIST	MOISTURE
MON	MONUMENT
MOS	MOISTURE SEPARATOR
MPM	METERING PUMP
MS	MOP SINK
MTD	MOUNTED

N

N	NORTH, NEUTRAL
NA	NOT APPLICABLE
NC	NORMALLY CLOSED
NEV	VALVE, NEEDLE
NG	NATURAL GRADE, NATURAL OR LP GAS
NIC	NOT IN CONTRACT
NO., #	NUMBER
NOM	NOMINAL
NPT	NATIONAL PIPE THREAD
NPW	NON-POTABLE WATER
NS	NEAR SIDE
NTS	NOT TO SCALE

O

O	OPEN
OBD	OPPOSED BLADE DAMPER
OC	ON CENTER
OD	OUTSIDE DIAMETER, OUTSIDE DIMENSION
OED	OPEN EQUIPMENT DRAIN
O.F.	OUTSIDE FACE
OFL	OVERFLOW
OPNG	OPENING
OPP	OPPOSITE
OPP HND	OPPOSITE HAND
OZ	OUNCE

P

P	POLE
PBL	POLYMER BLENDER
PC	POINT OF CURVATURE
PCC	PLANT CONTROL CENTER
PCCP	PRESTRESSED CONCRETE CYLINDER PIPE
PCP	PROGRESSIVE CAVITY PUMP
PD	POSITIVE DISPLACEMENT, PLANT DRAIN
PD, PLD	PULSATION DAMPENER
PDP	POSITIVE DISPLACEMENT PUMP
PE	PLAIN END
PERP	PERPENDICULAR
PG	PRESSURE GAUGE
PH	PHASE, PHYSICALLY HANDICAPPED
PI	POINT OF INTERSECTION
PIV	POST INDICATOR VALVE
PL	PLATE, PROPERTY LINE
PLAS	PLASTIC
PLCS	PLACES
PLS	POLYMER SOLUTION
PLWD	PLYWOOD
PMP	PUMP
PNL(S)	PANEL(S)
POL	POLYMER
POLY	POLYETHYLENE
POS	POSITION
POW	POTABLE WATER
PP	POWER POLE
PPMV	PARTS PER MILLION (VOLUME)
PRC	POINT OF REVERSE CURVATURE
PREFAB	PREFABRICATED
PRG	PRESSURE REGULATOR
PRI	PRIMARY
PROJ	PROJECTION
PRR	PRESSURE OR VACUUM RELIEF VALVE
PRV	PRESSURE REDUCING VALVE, PRESSURE REGULATION VALVE, PRESSURE RELIEF VALVE
PS	PUMP STATION, PIPE SUPPORT
PSF	POUNDS PER SQUARE FOOT
PSG	PRESSURE GAUGE
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH GAUGE
PT	POINT, POINT OF TANGENCY
PV	PLUG VALVE
PVC	POINT OF VERTICAL CURVATURE, POLYVINYL CHLORIDE
PVDF	POLYVINYLIDENE FLUORIDE
PVI	POINT OF VERTICAL INTERSECTION
PVMT	PAVEMENT
PVT	POINT OF VERTICAL TANGENCY
PLW	PLANT WATER

Q

QTY	QUANTITY

R

R	RISER
R/W or R.O.W.	RIGHT OF WAY
RAD	RADIUS, RADIAL
RAS	RETURN ACTIVATED SLUDGE
RCP	REINFORCED CONCRETE PIPE
RCCP	REINFORCED CONCRETE CYLINDER PIPE
RD	ROOF DRAIN
RDL	ROOF DRAIN LINE
RDOF	ROOF DRAIN OVERFLOW
RECIRC	RECIRCULATING
RED	REDUCER, ROOF EQUIPMENT DRAIN
REF	REFERENCE
REG	REGULATOR, REGULATING
REINF	REINFORCE(D)(ING)(MENT)
REJ	RUBBER EXPANSION JOINT
REQD	REQUIRED
RER	REACTOR
RES	RESERVOIR
REV	REVISION, REVERSE
RF	RETURN FAN
RG	RETURN GRILLE RUBBER GASKET
RH	RIGHT HAND
RHR	RIGHT HAND REVERSE
RHRA	RIGHT HAND REVERSE ACTIVE
RHRB	RIGHT HAND REVERSE BEVEL
RLS	REGISTERED LAND SURVEYOR
RM	ROOM
RO	ROUGH OPENING
ROT	ROTAMETER
RP	RADIUS POINT
RPM	REVOLUTIONS PER MINUTE
RPMP	REINFORCED PLASTIC MORTAR PIPE
RR	RETURN REGISTER
RT	RIGHT
RTF	ROTARY FEEDER
RTU	ROOF TOP UNIT
RUD	RUPTURE DISK
RW	RECLAIMED WATER, REUSE WATER
RWR	RECLAIMED WATER RETURN
RWW	RAW WASTEWATER

S

S/W	SIDEWALK
S	SOUTH, SWITCH, SLOPE
SA	SAMPLE
SC	SECONDARY CLARIFIER
SCB	SCRUBBER
SCD	SMOKE CONTROL DAMPER
SCFM	STANDARD CUBIC FEET PER MINUTE
SCH	SCHEDULE
SCO	SURFACE CLEANOUT
SCR	BAR SCREEN
SCR	SILICON CONTROL RECTIFIER
SD	SMOKE DETECTOR, SPLITTER DAMPER, STORM DRAIN
SDL	SUMP DISCHARGE DRAIN LINE
SDO	SLUDGE DRAWOFF
SE	SECONDARY EFFLUENT
SEC	SECONDARY, SECOND
SECT	SECTION
SED	SEDIMENTATION
SEP	SEPTAGE
SF	SUPPLY FAN
SFW	SOFTENED WATER
SG	SUPPLY GRILLE
SGS	STORE FRONT GLAZING SYSTEM
SHD	SHOWER DRAIN
SHDR	SOLIDS HANDLING-RECYCLE
SHR	SHOWER
SHT	SHEET
SIM	SIMILAR
SK	SKIMMINGS
SL	SLOPE, SLUDGE
SLC	SLUDGE COLLECTOR DRIVE
SLG	SLIDE GATE
SLV	SLEEVE VALVE
SMP	SAMPLER, SUMP PUMP
SN	SUPERNATANT OR SUBNATANT
SOL	SOLUTION
SP	STATIC PRESSURE, SET POINT
SPD	SUMP PUMP DRAIN
SPDT	SINGLE POLE DOUBLE THROW
SPEC(S)	SPECIFICATION(S)
SPL	SPLITTER BOX
SPR	SPARE
SPS	SAMPLE SINK
SPW	SAMPLE WATER
SQ	SQUARE
SQ FT	SQUARE FEET
SQ IN(S)	SQUARE INCH(ES)
SR	SHORT RADIUS, SUPPLY REGISTER
SRL	SCRUBBER RECIRCULATION LIQUID (CAUSTIC)
SS	SANITARY SEWER, SELECTOR SWITCH
SSK	SERVICE SINK
SSL	SECONDARY SLUDGE
SST	STAINLESS STEEL
ST	SLUDGE TRANSFER
STA	STATION
STB	STABILIZER
STD(S)	STANDARDS(S)
STIFF	STIFFENER
STIR	STIRRUPS
STL	STEEL
STM	STEAM
STP	STEEL PIPE
STR	STRAINER
STRUCT	STRUCTURAL
SUG	SLUICE GATE
SUPT	PIPE SUPPORT, SUPPORT
SV	SERVICE VALVE, SHUTOFF VALVE, SOLENOID VALVE
SW	SANITARY WASTE
SWR	SEAL WATER
SYM	SYMMETRICAL
SYN	SYNTHETIC

T

T	TANGENT LENGTH, THERMOSTAT, TIMER, TREAD
T&B	TOP AND BOTTOM
TAS	THREADED ANCHOR STUD
TBM	TEMPORARY BENCHMARK
TC	TOP OF CURB
TCV	TEMPERATURE CONTROL VALVE
TDH	TOTAL DYNAMIC HEAD
TDR	TIME DELAY RELAY, TOWEL DISPENSER/RECEPTACLE
TEL	TELEPHONE
TH	TEST HOLE
THK	THICKENER, THICKNESS, THICK
TKS	THICKENED SLUDGE
TLV	TELESCOPING VALVE
TMH	TELEPHONE MANHOLE
TMP	TEMPERATURE
TNK	TANK
T.O.	TOP OF
TOC	TOP OF CONCRETE
TOG	TOP OF GRATING
TOM	TOP OF MASONRY
TOS	TOP OF STEEL
T.O.W.	TOP OF WALL
TR	TRIAD (THREE CONDUCTOR SHIELDED CABLE), TIMING RELAY
TS	THICKENER SUPERNATANT OR SUBNATANT
TSD	THICKENED SLUDGE DECANT
TSPL	TURBIDIMETER SAMPLE
TSTAT	THERMOSTAT
TTB	TELEPHONE TERMINAL BOARD
TUR	TURBINE
TV	TURNING VANES
TWV	THREE-WAY VALVE
TYP	TYPICAL

U

UC	UNDERCUT
UG	UNDERGROUND
UHMWPE	ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE
UHMW	ULTRA HIGH MOLECULAR WEIGHT
UNO	UNLESS NOTED OTHERWISE
US	UTILITY SINK

V

V	VALVE
VAR	VARIES
VB	VALVE BOX
VCP	VITRIFIED CLAY PIPE
VEC	VINYL ESTER COATING
VERT	VERTICAL
VFR	VOLUMETRIC FEEDER
VG	VACUUM GAUGE, VALLEY GUTTER
VOL	VOLUME
VRV	VACUUM REGULATING VALVE
VTR	VENT THROUGH ROOF

W

W	WEST, WIDTH
W/	WITH
W/O	WITHOUT
WAS	WASTE ACTIVATED SLUDGE
WCO	WALL CLEANOUT
WEF	WALL EXHAUST FAN
WF	WALL FITTING, WASH FOUNTAIN
WH	WATER HEATER
WI	WEIGHT INDICATOR
WL	WALL LOUVER, WATER LEVEL
WM	WATER METER
WOD	WASTE OIL DRAIN
WP	WEATHERPROOF, WATERPROOF
WPT	WORKING POINT
WRG	WEIR GATE
WRS	WATER SOFTENER
WS	WATER SURFACE
WSTP	WATERSTOP
WT	WALK THROUGH, WEIGHT
WTF	WATER TREATMENT FACILITY
WTP	WATER TREATMENT PLANT
WTR	WATER
WV	WATER CONTROL VALVE
WW	WASTEWATER
WWF	WELDED WIRE FABRIC
WWTF	WASTEWATER TREATMENT FACILITY
WWTP	WASTEWATER TREATMENT PLANT

Y

Y	WYE
YCO	YARD CLEANOUT
YH	YARD HYDRANT

REV	DATE	BY	DESCRIPTION
			AGENCY REVIEW

DESIGNED CE
DRAWN CE
CHECKED CE
DATE OCTOBER 2025

COLORADO LICENSED — GARY LEE GILES — 43662 — Digitally signed by Gary L. Giles — Contact Info: Carollo Engineers, Inc. — Date: 2025.10.31 13:48:47 — PROFESSIONAL ENGINEER

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THORNTON WATER PROJECT

CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
GENERAL
ABBREVIATIONS

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

JOB NO. 203505
DRAWING NO. 30G04
SHEET NO. 4 OF 160

LAST SAVED BY: JENNIFER JACOBSEN

PROJECT NO. 203505 FILE NAME: 203505_30G04.DWG

PIPING SYMBOLS

DOUBLE LINE	SINGLE LINE	DESCRIPTION
		WELDED JOINT
		GROOVED END JOINT
		FLANGED JOINT
		HUB & SPIGOT JOINT (RUBBER GASKET)
		PUSH-ON JOINT (RESTRAINED)
		ADAPTER SIDE GROOVED END ADAPTER FLANGE
		FLANGED COUPLING ADAPTER
		FLANGED COUPLING ADAPTER WITH THRUST TIES
		FLEXIBLE COUPLING
		FLEXIBLE COUPLING WITH THRUST TIES
		METAL BELLOWS EXP JOINT
		ELASTOMER BELLOWS EXP JOINT
		FLEXIBLE COUPLING ADAPTER
		DISMANTLING JOINT
		EXPANSION COMPENSATOR
		ELBOW UP
		ELBOW DOWN
		TEE UP
		TEE DOWN
		LATERAL UP
		LATERAL DOWN
		CONCENTRIC REDUCER
		ECCENTRIC REDUCER (FOT. FOB)
		UNION
		CAP
		ANCHOR
		ELBOW, 90 DEGREE
		CROSS
		TEE
		ELBOW, 45 DEGREE
		ELBOW, 22.5 DEGREE
		ELBOW, 11.25 DEGREE
		LATERAL

SINGLE LINE	DESCRIPTION
	GATE VALVE
K	KNIFE GATE VALVE
	BUTTERFLY VALVE
V	CHARACTERIZED BALL CONTROL VALVE
	BALL VALVE
	GLOBE VALVE
	3-WAY GLOBE TYPE MIXING VALVE
	FOUR WAY VALVE
	PINCH VALVE
	DIAPHRAGM VALVE
	PLUG VALVE
	LUBRICATED PLUG VALVE
	ECCENTRIC PLUG VALVE
	CONCENTRIC PLUG VALVE
	SWING CHECK VALVE
	WAFER CHECK VALVE
	BALL CHECK VALVE
	DUAL CHECK VALVE
	CHECK BACKFLOW PREVENTER
	HOSE VALVE
	MUD VALVE (PLAN VIEW)
	NEEDLE VALVE
	CONE VALVE
	PRESSURE RELIEF PRESSURE-REDUCING REGULATOR
	TELESCOPING VALVE
	THREE WAY VALVE AIR OPERATED
M	THREE WAY VALVE MOTOR OPERATED
S	THREE WAY VALVE SOLENOID OPERATED
	VACUUM VALVE
	BACKPRESSURE REGULATOR SELF-CONTAINED
	BACKPRESSURE REGULATOR W/ EXTERNAL PRESSURE TAP
	PRESSURE-REDUCING REGULATOR: SELF-CONTAINED
	PRESSURE-REDUCING REGULATOR W/EXTERNAL PRESSURE TAP

MECHANICAL SYMBOLS

SINGLE LINE	DESCRIPTION
	AIR OR CHEMICAL DIFFUSER
	QUICK DISCONNECT HIGH PRESSURE AIR OR FLUSHING
	BATCHMETER
	AIR VENT
	BASKET STRAINER
	BLOWER
	CALIBRATION COLUMN
	COMPRESSOR/TURBINE
	COMPRESSOR: RECIPROCATING
	DIAPHRAGM SEAL
	DRAIN
	EJECTOR OR EDUCTOR
M	ELECTRIC MOTOR
	EQUIPMENT DRAIN
	EXPANSION JOINT, FLEXIBLE VIBRATION JOINT
	FAN: EXHAUST/SUPPLY
	FILTER
	FIRE HYDRANT
	FLAME ARRESTER
	FLAME ARRESTER WITH THERMALLY OPERATED VALVE
	FLOOR DRAIN
	FLOW SWITCH
	GAUGE: PRESSURE
	GAUGE: DIFFERENTIAL PRESSURE
	WEIR
	MIXER
	OIL OR MOISTURE TRAP
	PRIMARY LEVEL ELEMENT: BUBBLER
	PRIMARY LEVEL ELEMENT: ELECTRODE
	PRIMARY LEVEL ELEMENT: FLOAT SWITCH
	PRIMARY LEVEL ELEMENT: FLUID
	PRIMARY LEVEL ELEMENT: INVERTED COLUMN

SINGLE LINE	DESCRIPTION
	PRIMARY LEVEL ELEMENT: RADAR
	PRIMARY LEVEL ELEMENT: ULTRASONIC
	PRIMARY FLOW ELEMENT: FLUME
X	PRIMARY FLOW ELEMENT: X = C - CORIOLIS X = M - MAGNETIC X = P - PROPELLER X = PT - PITOT TUBE X = R - ROTAMETER X = T - TURBINE X = TH - THERMAL X = U - ULTRASONIC X = D - DENSITY
	PRIMARY FLOW ELEMENT: ORIFICE PLATE
	PRIMARY FLOW ELEMENT: VENTURI TUBE
	PRIMARY FLOW ELEMENT: WEIR
	PULSATION DAMPENER
	PUMP: CENTRIFUGAL
	PUMP: DIAPHRAGM
	PUMP: METERING
	PUMP: PLUNGER
	PUMP: PERISTALTIC TUBE METERING
	PUMP: PROGRESSIVE CAVITY
	PUMP: RECIPROCATING
	PUMP: ROTARY
	PUMP: SCREW
	PUMP: SUBMERSIBLE
	PUMP: VERTICAL LIFT
	PIPE REDUCER: CONCENTRIC
	PIPE REDUCER: ECCENTRIC (FOT, FOB)
	ROTARY CHEMICAL FEEDER
	RUPTURE DISK
	SAMPLE PORT
	SIGHT GLASS
	SLIDE GATE
	SLUICE GATE
	STRAINER: WYE TYPE

SINGLE LINE	DESCRIPTION
	STRAINER: WYE TYPE WITH BLOWOFF
	THERMOMETER
	VALVE: ANGLE
	VALVE: AIR RELIEF
	PIPE MATERIAL CHANGE

IDENTIFICATION SYMBOLS

CHEMICAL INJECTION POINT — CHEMICAL / DWG NO.

PIPE DESIGNATOR — PIPE SIZE, FLOW STREAM, X" XXX

CONTINUATION TAG — UNIQUE IDENTIFIER, CONTINUATION FROM DWG NO., CONTINUATION TO DWG NO., A, B, C

EQUIPMENT / VALVE TAG — XXX-XX-XXXX

KEY TAG — X

LINE SYMBOLS

PIPE ABOVE OR BELOW GROUND

PIPE UNDERNEATH SLAB OR STRUCTURE

FUTURE

EXISTING

DEMO

PROCESS LINE SYMBOLS

PRIMARY PROCESS FLOW IN PIPE

SECONDARY PROCESS FLOW IN PIPE

PRIMARY PROCESS FLOW IN CHANNEL

SECONDARY PROCESS FLOW IN CHANNEL

REV	DATE	BY	DESCRIPTION
			AGENCY REVIEW

DESIGNED MP
DRAWN LRG
CHECKED MZ
DATE OCTOBER 2025

COLORADO LICENSED — MATTHEW E. PRESTON — 0049708 — Digitally signed by Matthew E. Preston — Date: 2025.10.03 15:55:42 -06'00' — PROFESSIONAL ENGINEER

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THORNTON WATER PROJECT

CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
MECHANICAL
GENERAL LEGEND AND SYMBOLS

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

JOB NO. 203505
DRAWING NO. 00GM01
SHEET NO. 10 OF 160

LAST SAVED BY: lgarcia

PROJECT NO. 203505-100000 FILE NAME: 203505_30GM01.dwg

ELECTRICAL PLAN SYMBOLS

IDENTIFICATION SYMBOLS

- EQUIP # — EQUIPMENT / INSTRUMENT IDENTIFICATION
- ■ — EQUIPMENT / INSTRUMENT LOCATOR
- b (X) a / c — LUMINAIRE IDENTIFICATION
  - a = CIRCUIT DESIGNATION
  - b = DEVICE SWITCH FROM
  - c = MOUNTING HEIGHT FROM FINISHED FLOOR TO BOTTOM OF FIXTURE
  - X = LUMINAIRE TYPE, REFER TO THE LUMINAIRE SCHEDULE
- XXX — CONDUIT IDENTIFICATION
  - XXX = CONDUIT NUMBER
  - REFER TO CONDUIT SCHEDULE UNLESS OTHERWISE NOTED.
  - GROUPED CONDUITS ARE LABELED LEFT TO RIGHT OR TOP TO BOTTOM
- (#) — INDICATES KEYNOTE # (PERTAINS ONLY TO SHEET WHERE NOTE IS FOUND)
- DISCONNECT SWITCH
- CAMERA

LUMINAIRES

*SIZE OF BLOCK MAY APPEAR SMALLER OR LARGER DEPENDING ON SCALE OF DRAWINGS

- LINEAR FIXTURE
- 2' X 2' LAY-IN TROFFER
- 2' X 4' LAY-IN TROFFER
- LUMINAIRE POLE MOUNTED
- LUMINAIRE, EMERGENCY BATTERY-POWERED
- LUMINAIRE, EMERGENCY/EXIT BATTERY-POWERED
- LUMINAIRE, EMERGENCY BATTERY-POWERED REMOTE
- LUMINAIRE, SURFACE OR PENDANT MOUNTED
- LUMINAIRE, WALL MOUNTED
- LUMINAIRE, FLOOD / SPOT
- LUMINAIRE, EXIT ONE OR TWO FACES AS INDICATED. ARROW POINTS IN DIRECTION OF EGRESS.

SWITCHES / RECEPTACLES

- c S a b — SINGLE POLE SWITCH
  - a = CIRCUIT DESIGNATION
  - b = DEVICE SWITCHED DESIGNATION
  - c = TYPE
    - 2 = DOUBLE POLE SWITCH
    - 3 = THREE-WAY SWITCH
    - 3P = THREE POSITION SWITCH
    - 4 = FOUR-WAY SWITCH
    - K = KEY OPERATED SWITCH
    - F = SWITCH AND FUSESTAT HOLDER
    - P = SWITCH AND PILOT LIGHT
    - T = THERMOSTAT
    - D = DIMMER SWITCH
    - L = LOW VOLTAGE LIGHT SWITCH
    - M = MANUAL MOTOR STARTER
    - N = NETWORK SINGLE OR MULTIPLE SWITCH LOCATIONS
    - WP = WEATHER PROOF
  - REFER TO ABBREVIATIONS LEGEND FOR ALL OTHER DESIGNATIONS
- b (X) a / c — OCCUPANCY SENSOR
  - a = CIRCUIT DESIGNATION
  - b = DEVICE SWITCH FROM
  - c = MOUNTING HEIGHT FROM FINISHED FLOOR TO BOTTOM OF FIXTURE
  - X = SENSOR TYPE, REFER TO THE LUMINAIRE CONTROL COMPONENT SCHEDULE
- (PE) — PHOTOCELL
- a / b — SWITCH AND SINGLE RECEPTACLE
  - a = CIRCUIT DESIGNATION
  - b = DEVICE TYPE DESIGNATION
- a / b — DUPLEX RECEPTACLE
- a / b — QUADRUPLEX RECEPTACLE
- a / b — IN FLOOR DUPLEX RECEPTACLE
- a / b — IN FLOOR QUADRUPLEX RECEPTACLE
- a / b — DUPLEX RECEPTACLE w/SPLIT WIRE
- a / b — DEDICATED RECEPTACLE
- a / b — SPECIAL PURPOSE RECEPTACLE
- a / b — WELDING RECEPTACLE
  - a = CIRCUIT DESIGNATION
  - b = DISCONNECT TYPE
- a — TWIST LOCK RECEPTACLE
  - a = AMP RATING
- TELEPHONE OUTLET
- a — DATA COMMUNICATIONS OUTLET
  - a = NETWORK SWITCH

GROUNDING

- UNDERGROUND GROUND CABLE #4/0 SDBC UNLESS OTHERWISE NOTED
- GROUND ROD
- GROUND ROD AND GROUND WELL

RACEWAY

- EXPOSED CONDUIT
- EXPOSED CONDUIT HIDDEN BEHIND WALLS, FLOORS OR OTHER STRUCTURES
- CONDUIT IN DUCT BANK
- DIRECT BURIED CONDUIT
- CONDUIT IN SLAB
- CONDUIT VERTICAL CHANGE IN DIRECTION
- BREAK AND CONTINUATION IN CONDUIT RUN
- CONDUIT CAP
- CONDUIT SEAL
- CONDUIT TEE
- JUNCTION BOX
- DUCT BANK
  - APPROXIMATE DIMENSIONS
  - SHOWN ON DUCT BANK SECTIONS

CONDUIT SIZE AND CONDUCTORS

INDIVIDUAL CONDUCTORS

W"C-(3-X (Ø), 1-Y (N) & 1-Z (G)

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

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

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

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

U{3-X (Ø) & 1-X (G)}
- U = NUMBER OF PARALLEL RUNS

VFD CONDUCTORS

U{[N/C-X (Ø) & INTEGRAL (G)]:VFD}
- U = NUMBER OF PARALLEL RUNS
- N/C = NUMBER OF PHASE CONDUCTORS IN CABLE
- X = SIZE OF CONDUCTORS
- VFD = VFD CABLE

MULTI CONDUCTOR CABLES

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

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

U{[N/C-X (Ø) & INTEGRAL (G)]:MC}
- U = NUMBER OF PARALLEL RUNS
- MC = MULTICONDUCTOR CABLE
- N/C = NUMBER OF PHASE CONDUCTORS IN THE CABLE
- X = SIZE OF CONDUCTORS

FIRE ALARM

- FACP — FIRE ALARM CONTROL PANEL

ELECTRICAL ONE-LINE SYMBOLS

MISCELLANEOUS

- HP a — MOTOR
  - HP = HORSE POWER
  - a = RPM
  - FULL LOAD AMPS AS NOTED
- a / b — PACKAGED EQUIPMENT
  - LOAD RATING AS INDICATED
  - a = RATED LOAD
  - b = UNIT (HP, KW, KVA) AS INDICATED
- f g / a b c d e h — TRANSFORMER
  - a = DEVICE I.D.
  - b = KVA RATING
  - c = NUMBER OF PHASES
  - d = PRIMARY VOLTAGE
  - e = SECONDARY VOLTAGE
  - f,g = CONNECTION TYPE SYMBOL
  - h = IMPEDANCE
- △ — DELTA CONNECTION
- GROUND WYE CONNECTION
- G ~ a b c d e f — ENGINE-GENERATOR RATINGS AS INDICATED ON THE DRAWINGS
  - a = DESIGNATION
  - b = KVA/KW
  - c = VOLTAGE/CONNECTION
  - d = PHASE
  - e = WIRE
  - f = PF
- a b — CURRENT TRANSFORMER WITH SHORTING TERMINAL BLOCK
  - a = QUANTITY
  - b = RATIO
- c a d / b — POTENTIAL TRANSFORMER
  - a = QUANTITY
  - b = RATIO
  - c,d = CONNECTION SYMBOL
- SSM a b — SOLID STATE MULTI-FUNCTION METER
  - a = DESIGNATION
  - b = NETWORK PROTOCOL
- SPD a — SURGE PROTECTIVE DEVICE
  - a = DESIGNATION
- ATP — AMPERE TEST POINT
- VTP — VOLTAGE TEST POINT
- a / b — UTILITY METER
  - a = DESIGNATION
  - b = METER TYPE
- LIGHTNING ARRESTOR
- DRAWOUT CONNECTION
- GROUND
- CAPACITOR
- BATTERY
- (K) — KIRK KEY INTERLOCK
- a / b / c — LOAD BANK
  - a = DESIGNATION
  - b = VOLTAGE
  - c = WATTAGE
- a / b / c — RESISTOR
  - a = DESIGNATION
  - b = AMPERAGE
  - c = TIME(S)

LOW VOLTAGE

- b c d / a e f g — LOW VOLTAGE CIRCUIT BREAKER
  - a = TYPE
    - MCP = MOTOR CIRCUIT PROTECTOR
    - TM = THERMAL MAGNETIC
    - SS = SOLID STATE
  - b = FRAME SIZE (MANUFACTURER TO DETERMINE FRAME SIZE UNLESS INDICATED)
  - c = NUMBER OF POLES
  - d = TRIP SETTING
    - AT = AMP TRIP
    - AC = MCP CONTINUOUS RATING
  - e = DESIGNATION
  - f = INTERRUPTING RATING
  - g = NETWORK PROTOCOL
- * — LOW VOLTAGE CIRCUIT BREAKER AUXILIARY OPERATOR
  - * = S = SHUNT TRIP
  - = G = GROUND FAULT INTERRUPTER
  - = V = SOLENOID KEY RELEASE
- DISCONNECT SWITCH
- FUSE
- b / a / c — MOTOR STARTER/DRIVE
  - a = STARTER TYPE
    - VFD-6 = 6-PULSE VFD
    - VFD-18 = 18-PULSE VFD
    - VFD-RH = REDUCED HARMONIC VFD (18-PULSE OR ACTIVE FRONT END AS DEFINED IN THE SPECIFICATIONS
    - RVSS = REDUCED VOLTAGE SOLID STATE STARTER
    - RVAT = REDUCED VOLTAGE AUTO TRANSFORMER
    - a/B = DEVICE WITH BYPASS STARTER REFER TO THE SPECIFICATIONS
    - FVNR = FULL VOLTAGE NON-REVERSING
    - FVR = FULL VOLTAGE REVERSING REFER TO ABBREVIATIONS LEGEND FOR ALL OTHER DESIGNATIONS
  - b = VFD INPUT OPTIONS
    - LL = LINE REACTOR
    - PHF = PASSIVE HARMONIC FILTER
  - c = VFD
    - LR = LOAD REACTOR
    - DV/DT = XX
    - SINEWAVE = XX
  - c = FVNR
    - SIZE # = NEMA STARTER SIZE

ONE-LINE LINETYPES

- ELECTRICAL ONE-LINES
- ONE-LINE CONTROL CABLES
- EQUIPMENT ENCLOSURE

MEDIUM VOLTAGE

- a b c d e f — AUTOMATIC TRANSFER SWITCH
  - a = DESIGNATION
  - b = AMP
  - c = VOLT
  - d = PHASE
  - e = POLES
  - f = KASC RATING
- a / b 52 — CIRCUIT BREAKER, MEDIUM VOLTAGE
  - a = CIRCUIT BREAKER NUMBER
  - b = FRAME SIZE
- a / b — ANSI RELAY DEVICE
  - a = ANSI DEVICE FUNCTION
  - b = QUANTITY
- MEDIUM VOLTAGE DISCONNECT SWITCH NON-FUSED CUT OUT
- MEDIUM VOLTAGE DISCONNECTING FUSE SINGLE FUSE CUT OUT
- MEDIUM VOLTAGE DISCONNECTING FUSE DOUBLE FUSE CUT OUT
- MEDIUM VOLTAGE SINGLE FUSE
- MEDIUM VOLTAGE DOUBLE FUSE
- MEDIUM VOLTAGE LINE FRONT TERMINATOR
- MEDIUM VOLTAGE ELBOW
- MEDIUM VOLTAGE TEE
- MOV-ELBOW ARRESTOR
- MEDIUM VOLTAGE CONTACTOR
- MEDIUM VOLTAGE STARTER

REV	DATE	BY	DESCRIPTION

AGENCY REVIEW

DESIGNED CE
DRAWN CE
CHECKED CE
DATE OCTOBER 2025

COLORADO LICENSED CHRISTOPHER ARNOLD HEGER 47129 PROFESSIONAL ENGINEER
Digitally signed by Christopher Heger
Date: 2025.10.31 10:40:46 -06'00'

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THORNTON WATER PROJECT

CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
ELECTRICAL
LEGEND

VERIFY SCALES
BAR IS ONE INCH ON ORIGINAL DRAWING
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JOB NO. 203505
DRAWING NO. 30GE01
SHEET NO. 13 OF 160

LAST SAVED BY: CGifford

PROJECT NO. 203505-100000 FILE NAME: 203505_30GE01.dwg

ABBREVIATIONS

A	AMP
ABS	ABSOLUTE
AC	ALTERNATING CURRENT
ACK	ACKNOWLEDGE
ACTR	ACTUATOR
AF	AMP FRAME
AFC	AUTOMATIC FREQUENCY CONTROL
AIC	AMP INTERRUPTING CAPACITY
AM	AMMETER
ANN	ANNUNCIATOR
ANT	ANTENNA
APU	AUXILIARY POWER UNIT
ARM	ARMORED CABLE
AS	AMMETER SWITCH
ASYM	ASYMMETRICAL
AT	AMP TRIP
ATO	AUTOMATIC THROW OVER
ATP	AMMETER TEST POINT
ATS	AUTOMATIC TRANSFER SWITCH
AUTO XFMR	AUTOMATIC TRANSFORMER
AUX	AUXILIARY
AWG	AMERICAN WIRE GAUGE
B	BELL
BAT	BATTERY
BFG	BELOW FINISHED GRADE
BHP	BRAKE HORSEPOWER
BKR	BREAKER
BRF	BELOW RAISED FLOOR
C	CONDUIT / CONTINUOUS LOAD
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
CCW	COUNTER CLOCKWISE
CKT	CIRCUIT
COAX	COAXIAL CABLE
COM	COMMON
COMM	COMMUNICATION
CPT	CONTROL POWER TRANSFORMER
CR	CONTROLLED RECEPTACLE
CS	CONTROL SWITCH
CT	CURRENT TRANSFORMER
CV	CONTROL VALVE
CW	CLOCKWISE / COOL WHITE
DC	DIRECT CURRENT
DCS	DISTRIBUTED CONTROL SYSTEM
DCU - X	DISTRIBUTED CONTROL UNIT NO. X
DEMO	DEMOLITION
DISC	DISCONNECT SWITCH
DM	DEMAND METER
DPDT	DOUBLE POLE DOUBLE THROW
DPST	DOUBLE POLE SINGLE THROW
DS	DOOR SWITCH
E/G	EMERGENCY GENERATOR
EM	EMERGENCY
EMT	ELECTRICAL METALLIC TUBING
ENCL	ENCLOSURE
ENG	ENGINE
ENT	ELECTRICAL NON-METALLIC TUBING
EP	EXPLOSION PROOF
ETM	ELAPSED TIME METER
F	SUB-FED
FA	FIRE ALARM
FACP	FIRE ALARM CONTROL PANEL
FDR	FEEDER
FLA	FULL LOAD AMPS
FLX	FLEXIBLE CONDUIT
FO	FIBER OPTIC
FRC	FIBERGLASS RIGID CONDUIT
FREQ	FREQUENCY
FU	FUSE
FU SW	FUSED SWITCH
FVNR	FULL VOLTAGE NON-REVERSING
FVR	FULL VOLTAGE REVERSING
FWD	FORWARD

G	GROUND / EQUIPMENT GROUND / GROUND FAULT
GEN	GENERATOR
GRC	GALVANIZED STEEL RIGID CONDUIT
GFCI	GROUND FAULT CIRCUIT INTERRUPTER (RECEPTACLE)
GFI	GROUND FAULT INTERRUPTER (BREAKER)
GFR	GROUND FAULT RELAY
H	HOT-LEG
HF	HIGH FREQUENCY
HP	HORSEPOWER
HPS	HIGH PRESSURE SODIUM
HR	HOUR
HSTAT	HUMIDISTAT
HV	HIGH VOLTAGE
HVAC	HEATING/VENTILATION/AIR CONDITIONING
HZ	HERTZ
I	INSTANTANEOUS / INTERMITTENT LOAD
IC	INTERRUPTING CAPACITY
IJB	INSTRUMENT JUNCTION BOX
IMC	INTERMEDIATE METAL CONDUIT
INST	INSTANTANEOUS
INT	INTERLOCK
INTERCOM	INTERCOMMUNICATION
J	JUNCTION BOX
K	KEY INTERLOCK
KA	KILOAMP
KV	KILOVOLT
KVA	KILOVOLT AMPERE
KVAR	KILOVAR (REACTANCE)
KW	KILOWATT
KWD	KILOWATT DEMAND
KWH	KILOWATT HOUR
L	LONG-TIME
L-B	LINE-BUS
L-G	LINE-GROUND
LA	LIGHTNING ARRESTOR
LBL	LABEL
LC	LIGHTING CONTACTOR
LCP- X	LOCAL CONTROL PANEL NO. X
LL	LEAD-LAG LOAD REACTOR
LP	LIGHT POLE
LP - X	LIGHTING PANEL NO. X
LTG	LIGHTING
LV	LOW VOLTAGE
LVL	LEVEL
M-X	MOTOR CONTROLLER NO. X
MA	MILLIAMPERE
MCA	MOTOR CIRCUIT AMPS
MCC - X	MOTOR CONTROL CENTER NO. X
MCP	MOTOR CIRCUIT PROTECTOR
MH	MANHOLE / MOUNTING HEIGHT
MLO	MAIN LUGS ONLY
MOD	MOTOR OPERATED DAMPER
MOV	METAL OXIDE VARISTOR
MPR	MOTOR PROTECTION RELAY
MS-X	MOTOR STARTER NO. X
MSP	MOTOR STARTING PANEL
MTO	MANUAL THROW OVER
MTR-X	MOTOR NO. X
MTS	MANUAL TRANSFER SWITCH
MV	MEGAVOLT
MVA	MEGAVOLT-AMPERES
MVS	MEDIUM VOLTAGE SWITCH
MW	MEGAWATT
N	NEUTRAL
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NFC	NONMETALLIC FLEXIBLE CONDUIT
NL	NIGHT LIGHT
NO	NORMALLY OPEN
NP	NAMEPLATE

O	OPEN OR OPENED
OH	OVERHEAD
OL	OVERLOAD RELAY
P	POLE
PA	PUBLIC ADDRESS
PB	PUSHBUTTON / PULL BOX
PCS	PVC COATED GALVANIZED STEEL CONDUIT
PCM	PROCESS CONTROL MODULE
PE	PHOTOCELL
PF	POWER FACTOR
PFCC	POWER FACTOR CORRECTION CAPACITOR
PFR	PHASE FAILURE RELAY
PH	PHASE
PNL	PANEL
PPX	POWER PANEL NO. X
PRI	PRIMARY
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE RIGID PLASTIC CONDUIT
PWR	POWER
RAC	RIGID ALUMINUM CONDUIT
RECPT	RECEPTACLE
REV	REVERSE
RF	RADIO FREQUENCY
RMS	ROOT MEAN SQUARED
RVAT	REDUCED VOLTAGE AUTO TRANSFORMER
RVNR	REDUCED VOLTAGE NON-REVERSING
RVSS	REDUCED VOLTAGE SOLID STATE
S	SHIELD / SHORT-TIME
SA	SURGE ARRESTER
SC	SHORT CIRCUIT
SDBC	SOFT DRAWN BARE COPPER
SFL	SUB FEED LUGS
SLT	SEALTIGHT LIQUIDTIGHT FLEXIBLE CONDUIT
SM	SURFACE MOUNTED
SP	SINGLE POLE
SPD	SURGE PROTECTIVE DEVICE
SPDT	SINGLE POLE DOUBLE THROW
SPST	SINGLE POLE SINGLE THROW
SPKR	SPEAKER
SS	SOLID STATE
STB	SHORTING TERMINAL BLOCK
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
SYM	SYMMETRICAL
TACH	TACHOMETER
TB - X	TERMINAL BLOCK - UNIT X
TC	THERMOCOUPLE / TIME CLOCK / TRAY CABLE
TD	TEMPERATURE DETECTOR RELAY
TE	TOTALLY ENCLOSED
TEFC	TOTALLY ENCLOSED FAN COOLED
TENV	TOTALLY ENCLOSED NON-VENTILATED
TERM	TERMINAL
TJB	TERMINAL JUNCTION BOX
TM	THERMAL MAGNETIC
TP	TWISTED PAIR
TS	TEMPERATURE SWITCH
TS1W	TWO SPEED CONSEQUENT POLE, ONE WINDING
TS2W	TWO SPEED SEPARATE WINDING
TSTAT	THERMOSTAT
UHF	ULTRA HIGH FREQUENCY
UNG	UNGROUNDED
UPS	UNINTERRUPTIBLE POWER SUPPLY
UVR	UNDER VOLTAGE RELAY

V	VOLT
VA	VOLT AMPERE
VAR	VARMETER
VCP	VENDOR CONTROL PANEL
VFD	VARIABLE FREQUENCY DRIVE
VHF	VERY HIGH FREQUENCY
VM	VOLTMETER
VP	VAPORPROOF
VR	VOLTAGE REGULATOR
VS	VOLTAGE SWITCH
VT	VOLTAGE TRANSFORMER
VTP	VOLTAGE TEST POINT
W	WATT / WEST
WT	WATER TIGHT
WP	WEATHER PROOF
XFMR	TRANSFORMER

NOTES:

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

POWER DEVICE FUNCTION NUMBERS

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

COMMONLY USED SUFFIX LETTER APPLIED TO POWER DEVICE FUNCTION NUMBERS

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

ABBREVIATIONS

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

REV	DATE	BY	DESCRIPTION

AGENCY REVIEW

DESIGNED CE
DRAWN CE
CHECKED CE
DATE OCTOBER 2025

COLORADO LICENSED
CHRISTOPHER ARMSTRONG GIFFORD
47129
Digitally signed by Christopher Gifford
Date: 2025.10.30 12:41:27 -06'00'
PROFESSIONAL ENGINEER

carollo

THORNTON WATER PROJECT

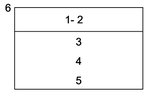
CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
ELECTRICAL
ABBREVIATIONS

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

JOB NO. 203505
DRAWING NO. 30GE02
SHEET NO. 14 OF 160

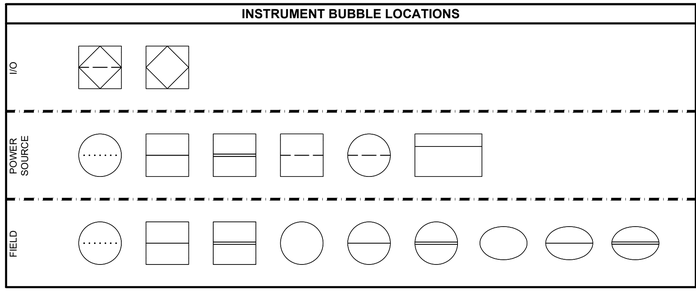
LAST SAVED BY: CGifford

PROJECT NO. 203505-100000 FILE NAME: 203505_30GE02.dwg

SYMBOL	DRAWING VISIBLE FIELDS	FIELD - 1	FIELD - 2	FIELD - 3	FIELD - 4	FIELD - 5	FIELD - 6	FIELD - 7	FIELD - 8
HARDWIRED I/O POINT 	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - DESCRIPTION 5 - LOCATION 6 - EXISTING/FUTURE 7 - IO TABLE	REFER 1 2 4	REFER 3	AI - ANALOG INPUT AO - ANALOG OUTPUT DI - DISCRETE INPUT DO - DISCRETE OUTPUT RTD - RTD INPUT	DESCRIPTION	PAC - PROGRAMMABLE AUTOMATION CONTROLLER NO. PLC - PROGRAMMABLE LOGIC CONTROLLER NO. RIO - REMOTE I/O VCP - VENDOR CONTROL PANEL NO.	E - EXISTING F - FUTURE		
NETWORK / SOFT I/O 	1 - TAG 2 - LOOP NUMBER 3 - PROTOCOL 4 - PANEL 5 - PLC 6 - EXISTING/FUTURE 7 - IO TABLE 8 - SWITCH/SEGMENT	REFER 1 2	REFER 3	COMMUNICATION PROTOCOL CNET - CONTROLNET DNET - DEVICENET EIP - ETHERNET/IP FF - FOUNDATION FIELDBUS HART-IP - HART OVER ETHERNET MANF - MFR. PROPRIETARY MBRTU - MODBUS RTU MB+ - MODBUS PLUS MBTCP - MODBUS TCP DP - PROFIBUS DP PA - PROFIBUS PA PNET - PROFINET SNMP - SNMPv3 HTTP - WEB SERVER (TCP/IP)	DESCRIPTION	PAC - PROGRAMMABLE AUTOMATION CONTROLLER NO. PLC - PROGRAMMABLE LOGIC CONTROLLER NO. RIO - REMOTE I/O VCP - VENDOR CONTROL PANEL NO.	E - EXISTING F - FUTURE		
PILOT DEVICE OPERATOR INTERFACE 	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - DESCRIPTION 5 - LOCATION 6 - EXISTING/FUTURE	REFER 1 2	REFER 3	AM - AUTO/MANUAL BYPASS - BY PASS ESD - EQUIPMENT SHUTDOWN HOA - HAND/OFF/AUTO LOR - LOCAL/OFF/REMOTE LOS - LOCK OUT STOP LS - LEAD/STANDBY LSR - LOCAL/STOP/REMOTE OC - OPEN/CLOSE OO - OFF/ON OSC - OPEN/STOP/CLOSE RST - RESET SEL - SELECT SPD - SPEED SS - START/STOP ST - STOP	DESCRIPTION 2 5	LCP - LOCAL CONTROL PANEL NO. MCC - MOTOR CONTROL CENTER NO. PCM - PROCESS CONTROL MODULE NO. RVSS - REDUCED VOLTAGE SOLID STARTER NO. VCP - VENDOR CONTROL PANEL NO. VFD - VARIABLE FREQUENCY DRIVE NO.	E - EXISTING F - FUTURE		
POWER DEVICE PRIMARY FUNCTION OPERATOR ACCESSIBLE 	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - VOLTAGE-POLE 5 - LOCATION 6 - EXISTING/FUTURE	CB - CIRCUIT BREAKER DISC - DISCONNECT FU - FUSE	REFER 3	TM - THERMAL MAGNETIC CIRCUIT BREAKER	24VDC - 1P 24VDC - 2P 24VAC - 1P 48VDC - 2P 120VAC - 1P 208VAC - 2P 208VAC - 3P 240VAC - 2P 240VAC - 3P 480VAC - 3P 2400VAC - 3P 4160VAC - 3P	DP - DISTRIBUTION PANEL NO. LCP - LOCAL CONTROL PANEL NO. LP - LIGHTING PANEL NO. MCC - MOTOR CONTROL CENTER NO. PCM - PROCESS CONTROL MODULE NO. PP - POWER PANEL NO. VCP - VENDOR CONTROL PANEL NO.	E - EXISTING F - FUTURE		
POWER DEVICE AUXILIARY FUNCTION OPERATOR ACCESSIBLE 	1 - TAG 2 - LOOP NUMBER 3 - DESCRIPTION 4 - DESCRIPTION 5 - DESCRIPTION 6 - EXISTING/FUTURE	DISC - DISCONNECT	REFER 3	DESCRIPTION	DESCRIPTION	DESCRIPTION	E - EXISTING F - FUTURE		
POWER DEVICE PRIMARY FUNCTION OPERATOR INACCESSIBLE 	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - VOLTAGE-POLE 5 - LOCATION 6 - EXISTING/FUTURE	CB - CIRCUIT BREAKER FU - FUSE	REFER 3	MCP - MOTOR CIRCUIT PROTECTOR SS - SOLID STATE CIRCUIT BREAKER TM - THERMAL MAGNETIC CIRCUIT BREAKER	24VDC - 1P 24VDC - 2P 24VAC - 1P 48VDC - 2P 120VAC - 1P 208VAC - 2P 208VAC - 3P 240VAC - 2P 240VAC - 3P 480VAC - 3P 2400VAC - 3P 4160VAC - 3P	DP - DISTRIBUTION PANEL NO. LCP - LOCAL CONTROL PANEL NO. LP - LIGHTING PANEL NO. MCC - MOTOR CONTROL CENTER NO. PCM - PROCESS CONTROL MODULE NO. PP - POWER PANEL NO. VCP - VENDOR CONTROL PANEL NO.	E - EXISTING F - FUTURE		
FIELD EQUIPMENT STARTER / DRIVE CUBICLE / CABINET 	1 - TAG 2 - LOOP NUMBER 3 - TYPE 4 - VOLTAGE-POLE 5 - POWER SOURCE 6 - EXISTING/FUTURE	MS - MOTOR STARTER RVAT - REDUCED VOLTAGE AUTO TRANSFORMER STARTER RVSS - REDUCED VOLTAGE SOLID STATE STARTER VFD - VARIABLE FREQUENCY DRIVE	REFER 3	FVNR - FULL VOLTAGE NON-REVERSING STARTER FVR - FULL VOLTAGE REVERSING STARTER PWS - PART-WINDING STARTER RVAT - REDUCED VOLTAGE AUTO RVSS - REDUCED VOLTAGE SOLID STATE STARTER TS1W - TWO SPEED SINGLE WINDING TS2W - TWO SPEED TWO WINDINGS VFD - VARIABLE FREQUENCY DRIVE	120VAC - 1P 208VAC - 2P 208VAC - 3P 240VAC - 2P 240VAC - 3P 480VAC - 3P 2400VAC - 3P 4160VAC - 3P	LCP - LOCAL CONTROL PANEL NO. MCC - MOTOR CONTROL CENTER NO. PCM - PROCESS CONTROL MODULE NO. VCP - VENDOR CONTROL PANEL NO.	E - EXISTING F - FUTURE		

SYMBOL	DRAWING VISIBLE FIELDS	FIELD - 1	FIELD - 2	FIELD - 3	FIELD - 4	FIELD - 5	FIELD - 6	FIELD - 7	FIELD - 8
INSTRUMENT PRIMARY ELEMENT 	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - FURNISHED BY 5 - LOCATION 6 - EXISTING/FUTURE	REFER 1	REFER 3	DESCRIPTION 5	DESCRIPTION 6 7	AREA NO. BUILDING NO. ROOM NO.	E - EXISTING F - FUTURE		
INSTRUMENT/ CONTROL ELEMENT PRIMARY FUNCTION OPERATOR ACCESSIBLE 	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - FURNISHED BY 5 - DESCRIPTION 6 - EXISTING/FUTURE	REFER 1	REFER 3	DESCRIPTION 5	DESCRIPTION 6 7	DESCRIPTION INT - INTEGRAL REM - REMOTE	E - EXISTING F - FUTURE		OUT - OUTDOOR
INSTRUMENT/ CONTROL ELEMENT AUXILIARY FUNCTION OPERATOR ACCESSIBLE 	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - FURNISHED BY 5 - LOCATION 6 - EXISTING/FUTURE	REFER 1	REFER 3	DESCRIPTION	DESCRIPTION 6 7	DESCRIPTION	E - EXISTING F - FUTURE		
INSTRUMENT/ CONTROL ELEMENT PRIMARY FUNCTION OPERATOR INACCESSIBLE 	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - FURNISHED BY 5 - LOCATION 6 - EXISTING/FUTURE	REFER 1 3 XR - PROTECTION RELAY CR - CONTROL RELAY XR - INTERPOSING RELAY	REFER 3	DESCRIPTION	DESCRIPTION 6 7	DESCRIPTION	E - EXISTING F - FUTURE		
INSTRUMENT/ CONTROL ELEMENT AUXILIARY FUNCTION OPERATOR INACCESSIBLE 	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - FURNISHED BY 5 - LOCATION 6 - EXISTING/FUTURE	REFER 1 3 XR - PROTECTION RELAY CR - CONTROL RELAY XR - INTERPOSING RELAY	REFER 3	DESCRIPTION	DESCRIPTION 6 7	DESCRIPTION	E - EXISTING F - FUTURE		
FIELD EQUIPMENT NON-POWERED 	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION/SIZE 4 - FURNISHED BY 5 - LOCATION 6 - EXISTING/FUTURE	REFER 1	REFER 3	DESCRIPTION	DESCRIPTION 6 7	AREA NO. BUILDING NO. ROOM NO.	E - EXISTING F - FUTURE		
FIELD EQUIPMENT PRIMARY FUNCTION POWERED 	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - FURNISHED BY 5 - LOCATION 6 - EXISTING/FUTURE	REFER 1	REFER 3	DESCRIPTION	DESCRIPTION 6 7	AREA NO. BUILDING NO. ROOM NO.	E - EXISTING F - FUTURE		
FIELD EQUIPMENT AUXILIARY FUNCTION POWERED 	1 - TAG 2 - LOOP NUMBER 3 - FUNCTION 4 - FURNISHED BY 5 - LOCATION 6 - EXISTING/FUTURE	MWH - MOTOR WINDING HEATER TSH - TEMPERATURE SWITCH XSH - TORQUE SWITCH	REFER 3	DESCRIPTION	DESCRIPTION 6 7	DESCRIPTION	E - EXISTING F - FUTURE		

INSTRUMENT BUBBLE LOCATIONS



NOTES

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

REV	DATE	BY	DESCRIPTION
			AGENCY REVIEW

DESIGNED CE
DRAWN CE
CHECKED DJC
DATE OCTOBER 2025

COLORADO LICENSED
JAMES CHARLES RICARDO
67412
PROFESSIONAL ENGINEER

CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
INSTRUMENTATION
SYMBOLS AND ABBREVIATIONS 1

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

JOB NO. 203505
DRAWING NO. 30GN01
SHEET NO. 15 OF 160

10/29/2025 2:09 PM
LAST SAVED BY: DCOSME
PROJECT NO. XXXXXX
FILE NAME: 20350530GN01.DWG

INSTRUMENT TAG IDENTIFICATION LETTERS

	MEASURED VARIABLE / INSTRUMENTATION FUNCTION	ELEMENT	TRANSMITTER	INDICATING TRANSMITTER	CONVERTER TRANSDUCER, RELAY SPECIAL DEVICES	INDICATOR	RECORDER	CONTROL/COMMAND	INDICATING CONTROLLER	RECORDING CONTROLLER	SWITCH	SWITCH LOW LOW	SWITCH LOW	SWITCH HIGH	SWITCH HIGH HIGH	SWITCH COMBINATION HIGH LOW	ACTION	ALARM LOW LOW	ALARM LOW	ALARM HIGH	ALARM HIGH HIGH	TOTALIZE INDICATOR TRANSMITTER	VALVE	GAUGE	LIGHT	SPEED SETTING
A	ANALYSIS	AE	AT	AIT	AY	AI	AR	AC	AIC	ARC	AS	ASLL	ASL	ASH	ASHH	ASHL		AALL	AAL	AAH	AAHH				AL	
C	CONDUCTIVITY	CE	CT	CIT	CY	CI	CR	CC	CIC	CRC	CS	CSLL	CSL	CSH	CSHH	CSHL		CALL	CAL	CAH	CAHH				CL	
D	DENSITY	DE	DT	DIT	DY	DI	DR	DC	DIC	DRC	DS	DSLL	DSL	DSH	DSHH	DSHL		DALL	DAL	DAH	DAHH				DL	
E	VOLTAGE												ESL													
F	FLOW	FE	FT	FIT	FY	FI	FR	FC	FIC	FRC	FS	FSLL	FSL	FSH	FSHH	FSHL		FALL	FAL	FAH	FAHH	FQI	FCV	FG	FL	
H	HAND (MANUAL)*							HC			HS*						HA*						HV		HL	HSS
I	CURRENT		IT	IIT	IY	II	IR	IC	IIC	IRC	IS	ISLL	ISL	ISH	ISHH			IALL	IAL	IAH	IAHH				IL	
J	POWER					JS																				
K	TIME				KY	KI	KR	KC	KIC	KRC	KS	KSLL	KSL	KSH	KSHH			KALL	KAL	KAH	KAHH		KV		KL	
L	LEVEL	LE	LT	LIT	LY	LI	LR	LC	LIC	LRC	LS	LSLL	LSL	LSH	LSHH	LSHL		LALL	LAL	LAH	LAHH		LCV	LG	LL	
M	MOISTURE OR HUMIDITY	ME	MT	MIT	MY	MI	MR	MC	MIC	MRC	MS	MSLL	MSL	MSH	MSHH			MALL	MAL	MAH	MAHH				ML	
N	USER'S CHOICE																									
P	PRESSURE OR VACUUM	PE	PT	PIT	PY	PI	PR	PC	PIC	PRC	PS	PSLL	PSL	PSH	PSHH	PSHL		PALL	PAL	PAH	PAHH		PCV		PL	
PD	DIFFERENTIAL PRESSURE		PDT	PDIT	PDY	PDI	PDR	PDC	PDIC	PDRC	PDS	PDSLL	PDSL	PDSH	PDSHH			PDALL	PDAL	PDAH	PDAHH		PDCV		PDL	
Q	QUANTITY	QE	QT	QIT	QY	QI	QR				QS	QSLL	QSL	QSH	QSHH			QALL	QAL	QAH	QAHH					
R	RADIATION																									
S	SPEED	SE	ST	SIT	SY	SI	SR	SC	SIC	SRC	SS	SSLL	SSL	SSH	SSHH			SALL	SAL	SAH	SAHH					
T	TEMPERATURE	TE	TT	TIT	TY	TI	TR	TC	TIC	TRC	TS	TSLL	TSL	TSH	TSHH	TSHL		TALL	TAL	TAH	TAHH		TCV		TL	
TD	DIFFERENTIAL TEMPERATURE		TDT	TDIT	TDY	TDI	TDR	TDC	TDIC	TDRC	TDS	TDSLL	TDSL	TDSH	TDSHH			TDALL	TDAL	TDAH	TDAHH		TDCV		TDL	
U	MULTIVARIABLE					UI	UR	UC	UIC	URC	US														UL	
V	VISCOSITY	VE	VT	VIT	VY	VI	VR	VC	VIC	VRC	VS	VSLL	VSL	VSH	VSHH			VALL	VAL	VAH	VAHH				VL	
W	WEIGHT	WE	WT	WIT	WY	WI	WR				WS	WSLL	WSL	WSH	WSHH			WALL	WAL	WAH	WAHH					
X	UNCLASSIFIED	XE	XT	XIT	XY	XI	XR	XC	XIC	XRC	XS	XSLL	XSL	XSH	XSHH			XALL	XAL	XAH	XAHH		XCV	XG	XL	
XV	VIBRATION	XVE	XVT		XVY	XVI	XVR				XVS			XVSH	XVSHH					XVAH	XVAHH				XVL	
Y	STATUS					YI																			YL	
Z	POSITION	ZE	ZT	ZIT	ZY	ZI		ZC**			ZS**												ZV		ZL**	

OPERATOR PILOT DEVICE LEGEND

DEVICE TYPE / PILOT DEVICE FUNCTION	LOCAL-OFF-REMOTE (LOR) OR LOCAL-STOP-REMOTE (LSR)	STOP(SP)	START (ST)	HAND-OFF-AUTO (HOA) HAND-OFF-REMOTE (HOR)	OFF-ON (OO)	SELECT (SEL)	OPEN-STOP-CLOSE (OSC)	JOG OPEN-HOLD-CLOSE (JOHC)	SEMIAUTO-AUTO-MANUAL (SAAM)	LEAD-LAG-STANDBY (LLGS)	AUTO-MANUAL (AM)	OPEN-CLOSE (OC)	LOW-HIGH (LH)	RESET (RST)	SPEED (SPD)	START-STOP (STSP)	EQUIPMENT SHUTDOWN (ESD)	BYPASS (BYP)			SILENCE	POSITION (POS)
PILOT DEVICE TAG (HAND SWITCHES)	HSA	HSB	HSC	HSD	HSE	HSF	HSG	HSH	HIS	HSJ	HSM	HSO	HSQ	HSR	HSS	HST	HSU	HSV	HSW	HSX	HSY	HSZ

I/O TYPE DESIGNATIONS

RNG	RUNNING	SPDC	SPEED COMMAND
FAIL	FAILED/FAULT	SPDF	SPEED FEEDBACK
FWD	RUNNING FORWARD	REM	LOR IN REMOTE
FAST	RUNNING HIGH	LOC	LOR IN LOCAL
SLOW	RUNNING LOW	AUTO	HOA IN AUTO
REV	RUNNING REVERSE	HAND	HOA IN HAND
SVC	SOLENOID VALVE CLOSE	RST	RESET
SVO	SOLENOID VALVE OPEN	STOP	STOP
RUN	RUN	VF	VOLTAGE FEEDBACK
SLWC	MOTOR START LOW	AF	CURRENT FEEDBACK
REVC	MOTOR START REVERSE		

INSTRUMENT TYPE DESIGNATIONS

CGD	COMBUSTIBLE GAS DETECTOR	PTOF	PULSE TIME OF FLIGHT
COND	CONDUCTIVITY	RTD	RESISTANCE TEMP DETECTOR
DO	DISSOLVED OXYGEN	SB	SLUDGE BLANKET
FMCW	FREQ. MODULATED CONT. WAVE	SC	STREAMING CURRENT
ISB	INTRINSIC SAFETY BARRIER	SD	SLUDGE DEPTH
LEL	LOWER EXPLOSIVE LIMIT	TDR	TIME DOMAIN REFLECTOMETRY
MLSS	MIXED LIQUOR SUSPENDED SOLIDS	TOC	TOTAL ORGANIC CARBON
ORG	UV 504	TSS	TOTAL SUSPENDED SOLIDS
ORP	OXIDATION REDUCTION POTENTIAL	TURB	TURBIDITY
PSUB	PRESSURE SUBMERSIBLE	UVI	UV INTENSITY
PC	PARTICLE COUNTER	UVT	UV TRANSMITTANCE

SPECIFIC ABBREVIATIONS

HTR	HEATER
HTU	HEAT TRACE UNIT
MWH	MOTOR WINDING HEATER
SV	SOLENOID VALVE
SPD	SURGE PROTECTIVE DEVICE
UPS	UNINTERRUPTIBLE POWER SUPPLY
YLA	STATUS AUTO PILOT LIGHT
YLR	STATUS REMOTE PILOT LIGHT
YL1	STATUS RUNNING PILOT LIGHT
YL2	ALARM FAILED/FAULT PILOT LIGHT

P&ID LINE SYMBOLS

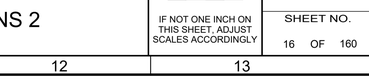
- INSTRUMENT OR CONNECTION TO PROCESS
- PNEUMATIC SIGNAL
- ELECTRIC SIGNAL
- HYDRAULIC SIGNAL
- CAPILLARY TUBE
- INTERNAL SYSTEM LINK (SOFTWARE OR DATA LINK)

PROCESS LINE SYMBOLS

- PRIMARY PROCESS FLOW IN PIPE
- SECONDARY PROCESS FLOW IN PIPE
- PRIMARY PROCESS FLOW IN CHANNEL
- SECONDARY PROCESS FLOW IN CHANNEL
- HEAT TRACE

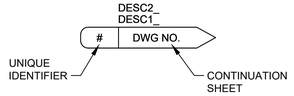
DESIGNATIONS

- EQUIPMENT ENCLOSURE
- EXISTING
- FUTURE

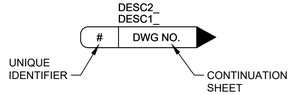


MISCELLANEOUS P&ID SYMBOLS

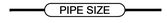
- PROCESS CONTINUATION



- SIGNAL CONTINUATION

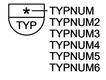


- PIPE CALLOUT



- SCHEMATIC DETAIL

- TYPICAL DETAIL



REV	DATE	BY	DESCRIPTION
			AGENCY REVIEW

DESIGNED CE
DRAWN CE
CHECKED DJC
DATE OCTOBER 2025

COLORADO LICENSED DANIEL CHARLES JACQUEZ 67412 PROFESSIONAL ENGINEER

carollo

THORNTON WATER PROJECT

CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
INSTRUMENTATION
SYMBOLS AND ABBREVIATIONS 2

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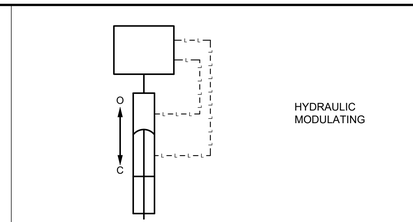
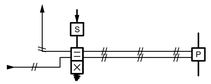
ACTUATORS

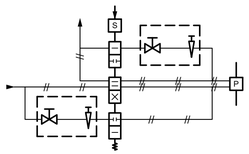
- DIAPHRAGM
- ELECTRIC HYDRAULIC
- ELECTRIC
- HAND
- HYDRAULIC
- MOTOR
- PNEUMATIC
- SOLENOID



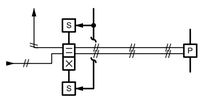
HYDRAULIC MODULATING



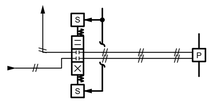
PNEUMATIC SINGLE SOLENOID OPEN/CLOSE



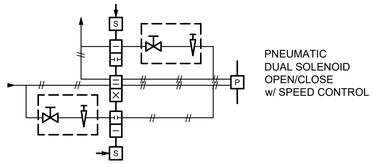
PNEUMATIC SINGLE SOLENOID w/ SPEED CONTROL



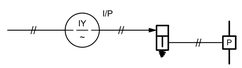
PNEUMATIC DUAL SOLENOID OPEN/CLOSE



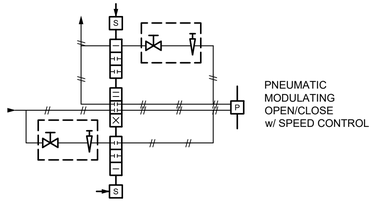
PNEUMATIC DUAL SOLENOID OPEN/HOLD/CLOSE



PNEUMATIC DUAL SOLENOID OPEN/CLOSE w/ SPEED CONTROL



PNEUMATIC MODULATING



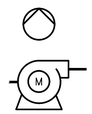
PNEUMATIC MODULATING OPEN/CLOSE w/ SPEED CONTROL

PIPING

- AIR GAP
- BLIND FLANGE
- CAPPED OR PLUGGED
- CONCENTRIC INCREASER
- CONCENTRIC REDUCER
- DRAIN
- ECCENTRIC INCREASER
- FLANGED CONNECTION

- TEE
- UNION
- ECCENTRIC REDUCER
- EXPANSION COUPLING
- EXPANSION JOINT VIBRATION CENTER
- FLEXIBLE CONNECTION
- QUICK DISCONNECT

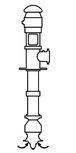
PUMPS



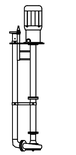
- AIR DRIVEN
- CENTRIFUGAL
- CHEMICAL FEED DIAPHRAGM
- DIAPHRAGM
- GEAR
- LOBE
- PERISTALTIC OR HOSE
- PISTON
- PROGRESSIVE CAVITY

OR

- SUBMERSIBLE



- VERTICAL TURBINE



- VERTICAL CHOPPER

- WATER CHAMP

BLOWERS/ COMPRESSORS/FANS

- CENTRIFUGAL SINGLE STAGE BLOWER/FAN

- CENTRIFUGAL MULTI STAGE BLOWER

- RECIPROCATING COMPRESSOR

- SCREW COMPRESSOR

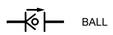
- FAN

- LIQUID RING COMPRESSOR

- ROTARY LOBE BLOWER

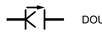
CHECK VALVES

- BACK FLOW PREVENTER

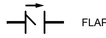


- BALL

- DIAPHRAGM CHECK

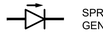


- DOUBLE FLAP

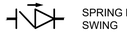


- FLAPPER

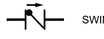
- SLANTING CHECK VALVE



- SPRING LOADED GENERAL



- SPRING LOADED SWING



- SWING

PRESSURE VALVES

- BACKPRESSURE REGULATING SELF CONTAINED

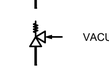
- BACKPRESSURE REGULATING EXTERNAL TAP

- PRESSURE REDUCING SELF CONTAINED

- PRESSURE REDUCING EXTERNAL PRESSURE TAP

- REGULATING

- PRESSURE RELIEF



- VACUUM RELIEF

VALVES

- 3-WAY

- 3-WAY PLUG

- 4-WAY

- AIR-RELIEF

- ANGLE

- BALL

- BALL V-NOTCH

- BUTTERFLY

- BUTTERFLY-BURIED VALVE BOX

- CONE

- DUCKBILL

- DIAPHRAGM

- FLOAT

- GATE

- GATE-BURIED VALVE BOX

- GLOBE

- HOSE

- MISCELLANEOUS

- MUD

- NEEDLE

- PINCH

- PLUG ECCENTRIC

- PLUG ECCENTRIC w-VALVE BOX

- PLUG ECCENTRIC LUBRICATED

- PLUG ECCENTRIC LUBRICATED BURIED VALVE BOX

- PLUG CONCENTRIC

- PLUG CONCENTRIC -BURIED VALVE BOX

- PLUG CONCENTRIC LUBRICATED

- PLUG CONCENTRIC LUBRICATED BURIED VALVE BOX

- PUMP DISCHARGE

- TELESCOPING

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

MISC

- AIR / CHEMICAL DIFFUSER

- BASKET STRAINER

- BLOW-OFF SILENCER

- CALIBRATION COLUMN

- COALESCER

- DESICCANT DRYER

- EDUCTOR/EJECTOR

- EQUIPMENT/ INSTRUMENT LOCATOR

- EYEWASH

- FILTER

- FILTER SEPARATOR

- FINE FILTER

- FIRE ALARM/SENSOR

- FLAME ARRESTER

- FLAME ARRESTER w/THERMALLY OPERATED VALVE

- FLOW CONDITIONER

- GAS CANNON

- GRINDER

- HEAT EXCHANGER

- HOIST

- HORIZONTAL MIXER

- HOSE CONNECTION

- INLET STRAINER

- INLINE STATIC MIXER

- INLINE DUCT BALANCING DAMPER

- LOUVER OR BACKDRAFT DAMPER

- MATERIAL CHANGE

- MIXER

- NOZZLE

- ORIFICE RESTRICTION

- PERISTALTIC COMPOSITE SAMPLER

OR

- PULSATION DAMPENER

- REFRIGERATED DRYER

- RUPTURE DISK

- SAMPLE PORT

- SIGHT TUBE

- SMOKE DETECTOR

- STRAINER - MECHANICALLY CLEANED

- STRAINER WITH BLOW OFF

- STRAINER WYE TYPE

- VAPOR HEATER

- VAPORIZER

- VENT

- VENT TO ATMOSPHERE

REV	DATE	BY	DESCRIPTION
			AGENCY REVIEW

DESIGNED CE
DRAWN CE
CHECKED DJC
DATE OCTOBER 2025

COLORADO LICENSED
DANIEL CHARLES RICHARD
67412
PROFESSIONAL ENGINEER

carollo

THORNTON WATER PROJECT

CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
INSTRUMENTATION
SYMBOLS AND ABBREVIATIONS 3

VERIFY SCALES
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DRAWING NO. 30GN03
SHEET NO. 17 OF 160

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FLOW

- CORIOLIS
- MAGNETIC
- ORIFICE
- PADDLE WHEEL
- PISTON
- ANNUBAR
- PITOT TUBE
- POSITIVE-DISPLACEMENT
- PROPELLER-TURBINE
- ROTAMETER
- SHUTTLE
- THERMAL
- ULTRASONIC
- ULTRASONIC BIOGAS
- V-CONE
- VENTURI TUBE OR FLOW NOZZLE
- VORTEX

FLUMES

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

GATES

SIDE VIEW	PLAN VIEW
SLIDE	FLAP
SLUICE	KNIFE
STOP	SLIDE
	SLUICE
	STOP
	WEIR
	BUTTERFLY

LEVELS

- BUBBLER
- CAPACITANCE
- DIFFERENTIAL PRESSURE (TANK)
- DISPLACEMENT
- ELECTRODE
- BALL FLOAT
- INVERTED COLUMN
- PROBE
- RADAR PTOF
- RADAR (FREQUENCY MODULATED CONTINUOUS WAVE)
- RADAR TDR
- SUSPENDED/ SUBMERSIBLE
- TUNING FORK
- ULTRASONIC

NETWORKS

CABLE CALLOUTS AND ABBREVIATIONS

- 24/FO-SM — F — F — FIBER LINE REPRESENTS ONE 24-STRAND FIBER OPTIC CABLE
- (2) 24/FO-SM — F — F — FIBER LINE REPRESENTS TWO 24-STRAND FIBER OPTIC CABLES
- (1) 24/FO-SM EA. — F F — F F — EACH FIBER LINE REPRESENTS ONE 24-STRAND FIBER OPTIC CABLE
- (4) — C — C — COPPER LINE REPRESENTS FOUR COPPER ETHERNET CABLES
- (2) EA. — F F — F F — EACH COPPER LINE REPRESENTS TWO COPPER ETHERNET CABLES

FIBER ABBREVIATIONS

##/FO-XX
- ## = STRAND COUNT
- FO = FIBER OPTIC

XX = MODE
- SM = SINGLE MODE
- MM = MULTIMODE

NETWORK ABBREVIATIONS

BMS	= BUILDING MANAGEMENT SYSTEM
BSN	= BUSINESS NETWORK
FCN	= FIELD CONTROL NETWORK
MIN	= MAINTENANCE INFORMATION NETWORK
PCN	= PROCESS CONTROL NETWORK
PLCN	= PLC NETWORK
SCN	= SECURITY CONTROL NETWORK
PCN-W	= WIRELESS PROCESS CONTROL NETWORK
NR	= NETWORK RACK
NP	= NETWORK PANEL
ES	= ETHERNET SWITCH
FPP	= FIBER PATCH PANEL

VLAN SYMBOLS

- = BUSINESS NETWORK
- = SECURITY CONTROL NETWORK
- = BUILDING MANAGEMENT SYSTEM
- = PROCESS CONTROL NETWORK
- = WIRELESS PROCESS CONTROL NETWORK
- = MAINTENANCE INFORMATION NETWORK
- = PLC NETWORK
- = FIELD CONTROL NETWORK

PRESSURE/VACUUM

PRESSURE

- PI — GAUGE
- PSH / PE — PRESSURE SWITCH
- PIT / PE — PRESSURE TRANSMITTER
- MANOMETER

DIFFERENTIAL PRESSURE

- PDI — GAUGE DIFFERENTIAL INDICATOR
- PDSL / PDE — DIFFERENTIAL PRESSURE SWITCH
- PDIT / PDE — DIFFERENTIAL PRESSURE TRANSMITTER

PRESSURE SEALS

- SEAL ANNULAR
- SEAL DIAPHRAGM
- SEAL SANITARY

EXAMPLE

PSH / PE — PRESSURE SWITCH

TEMPERATURE

- TEMPERATURE w/THERMOWELL
- TEMPERATURE GAUGE
- T — THERMOMETER

WEIGHT

- PLATFORM SCALE

WEIRS

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

NETWORK LINE SYMBOLS

- COPPER ETHERNET — C C C C C C
- DUPLEX FIBER PATCH — FP FP FP FP FP FP
- FIBER OPTIC ETHERNET — F F F F F F
- WIRELESS — W W W W W W
- PROFIBUS DP — PBD PBD PBD PBD PBD PBD
- PROFIBUS PA — PBA PBA PBA PBA PBA PBA
- SERIAL DATA

MISCELLANEOUS NETWORK SYMBOLS

NETWORK CABLE CONTINUATIONS

TOP OF PAGE STYLE CONTINUATION

DESC 3
DESC 2
DESC 1
DWG NO.
(#)
— CONTINUATION SHEET
— UNIQUE IDENTIFIER

BOTTOM/LEFT OF PAGE STYLE CONTINUATION

(#)
— UNIQUE IDENTIFIER
— CONTINUATION SHEET
DWG NO.
DESC 1
DESC 2
DESC 3

FIELD NETWORK DEVICE

PLC TAG / PANEL TAG — PROTOCOL / SEGMENT #
DEVICE SPECIFIC SYMBOL
TAG
DESC 1
DESC 2
DESC 3
P&ID DRAWING REFERENCE

NETWORK EQUIPMENT CALLOUT

TAG
DESC 1

REV	DATE	BY	DESCRIPTION
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DESIGNED CE
DRAWN CE
CHECKED DJC
DATE OCTOBER 2025

COLORADO LICENSED — DANIEL CHARLES RICARDO — 67412 — PROFESSIONAL ENGINEER

carollo

THORNTON WATER PROJECT

CITY OF THORNTON
THORNTON WATER PROJECT
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SYMBOLS AND ABBREVIATIONS 4

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DRAWING NO. 30GN04
SHEET NO. 18 OF 160

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FILE NAME: 20350530GN04.DWG

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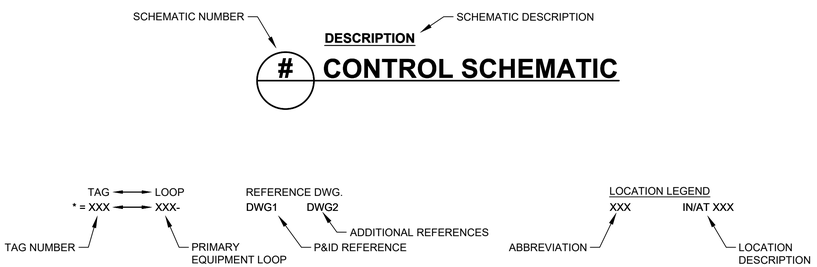
DETAIL, REFERENCE & LOCATION DESIGNATIONS



TYPICAL TAGGING IDENTIFICATION

TAGGING IDENTIFICATION
1 = TAG: REFER TO THE EQUIPMENT AND INSTRUMENT TAGGING TABLES
2 = DESCRIPTION
3 = LOCATION: REFER TO THE LOCATION LEGEND

ADDITIONAL FIELDS, IF ANY, ARE INDICATED NEXT TO THE RESPECTIVE SYMBOLS

RELAYS

RELAY COIL
a = TYPE
CR = CONTROL RELAY
TD = TIME DELAY RELAY
M = MOTOR STARTER COIL
L = MOTOR STARTER COIL - LOW SPEED
H = MOTOR STARTER COIL - HIGH SPEED
F = MOTOR STARTER COIL - FORWARD
R = MOTOR STARTER COIL - REVERSE

b = TIME DELAY STATE
TDON = TIME DELAY ON ENERGIZATION
TDOFF = TIME DELAY ON DEENERGIZATION

c = TIMING RANGE/SETTING

NORMALLY OPEN CONTROL CONTACT

NORMALLY CLOSED CONTROL CONTACT

NCTC — TIME DELAY CONTACT
NCTC = NORMALLY CLOSED TIMED CLOSING

NCTO — TIME DELAY CONTACT
NCTO = NORMALLY CLOSED TIMED OPENING

NOTO — TIME DELAY CONTACT
NOTO = NORMALLY OPEN TIMED OPENING

NOTC — TIME DELAY CONTACT
NOTC = NORMALLY OPEN TIMED CLOSING

INDICATORS

PILOT LIGHT
a = LENS COLOR
R = RED
G = GREEN
W = WHITE
A = AMBER
B = BLUE
Y = YELLOW
C = CLEAR

PUSH-TO-TEST LIGHT

BEACON

HORN

MOTORS

MOTOR - 1 PHASE
a = HORSEPOWER

MOTOR - 3 PHASE

HAND SWITCHES

NORMALLY OPEN MOMENTARY PUSHBUTTON

NORMALLY CLOSED MOMENTARY PUSHBUTTON

MUSHROOM HEAD PUSHBUTTON NORMALLY OPEN

MUSHROOM HEAD PUSHBUTTON NORMALLY CLOSED

PUSH-PULL PUSHBUTTON MAINTAINED CONTACT

PUSH-PULL PUSHBUTTON NORMALLY CLOSED

PADLOCK SWITCH

PULL CORD SWITCH

STOP-LOCKOUT PUSHBUTTON

THREE POSITION SELECTOR SWITCH
a = POSITION 1
b = POSITION 2
c = POSITION 3
x = DENOTES POSITION CONTACTS CLOSED IN

TWO POSITION SELECTOR SWITCH NORMALLY OPEN

TWO POSITION SELECTOR SWITCH NORMALLY CLOSED

SPRING-RETURN

I/O

PLC DISCRETE
a = INPUT/OUTPUT
b = I/O VOLTAGE

PLC ANALOG

DIGITAL BUS
a = PROTOCOL

PROCESS SWITCHES

LEVEL SWITCH CLOSE ON RISING LEVEL

LEVEL SWITCH OPEN ON RISING LEVEL

PRESSURE SWITCH CLOSE ON RISING PRESSURE

PRESSURE SWITCH OPEN ON RISING PRESSURE

TEMPERATURE SWITCH CLOSE ON RISING TEMPERATURE

TEMPERATURE SWITCH OPEN ON RISING TEMPERATURE

FLOW SWITCH CLOSE ON INCREASE IN FLOW

FLOW SWITCH OPEN ON INCREASE IN FLOW

VIBRATION SWITCH OPEN ON RISING VIBRATION

VIBRATION SWITCH CLOSE ON RISING VIBRATION

TORQUE SWITCH OPEN ON HIGH TORQUE

TORQUE SWITCH CLOSE ON HIGH TORQUE

NORMALLY CLOSED LIMIT SWITCH

NORMALLY CLOSED HELD OPEN LIMIT SWITCH

NORMALLY OPEN LIMIT SWITCH

NORMALLY OPEN HELD CLOSED LIMIT SWITCH

MISCELLANEOUS

VARISTOR

CAPACITOR

RESISTOR

BATTERY

DIODE

MOTOR OVERLOAD HEATERS

OVERLOAD CONTACT

DRAWOUT CONNECTION

GROUND

LIGHTNING ARRESTOR

SOLENOID

CIRCUIT BREAKER

DISCONNECT

FUSE

TRANSIENT SURGE PROTECTION

MOTOR WINDING HEATER

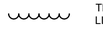
ELAPSED TIME METER

RTD

MISC PORT
a = TYPE

ETHERNET PORT

SURGE PROTECTION DEVICE



TRANSFORMER LINE/LOAD REACTOR

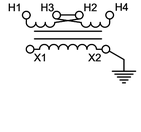
SPEED SWITCH

SPEED POTENTIOMETER

CONNECTION

NO CONNECTION

SHIELDED WIRE



CONTROL POWER TRANSFORMER

REV	DATE	BY	DESCRIPTION

AGENCY REVIEW

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DATE OCTOBER 2025

COLORADO LICENSED — DANIEL CHARLES PACHECO — 67412 — PROFESSIONAL ENGINEER

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THORNTON WATER PROJECT

CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
INSTRUMENTATION
SCHEMATIC SYMBOLS

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

JOB NO. 203505
DRAWING NO. 30GN05
SHEET NO. 19 OF 160

LAST SAVED BY: DCOSME

PROJECT NO. XXXXXX FILE NAME: 20350530GN05.DWG

10/29/2025 2:12 PM

MCC-1201 | PCM-300

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

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

P-01-001 J-BOX P-01-002
C-01-003 J-BOX
MWH H C
PMP T1 T2 T3
TSH NC C

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

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

C-01-001
PE PSH 1 2
(PSH210-1/PCM300-CB1300H2)
(PSH210-2/PCM300-C0001)

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

L-01-001
S-01-001 J-BOX S-01-003
MM FE FIT FQT 1 2 4 5
L N G

LCP-210
S-01-002
HSS P1 P2 P3
HSA OFF LOCAL REMOTE xoo
STOP
HSB
START
HSC oox
1 2 3 4 5 6 7 8

C-01-002

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

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

33 X2 — MWH-210 MOTOR WINDING HEATER
T1 T2 T3 — MOTOR CONNECTION
SS-210 VFD SPEED OUT: 11 12
SB-210 REMOTE SPEED IN: 13 14
MSP-210 REMOTE STOP: 15 16
E-STOP: 23 34
MS-210 REMOTE START: 17 18
1 2 3 4 — LOCAL SPEED IN
HSAL-210 LOCAL MODE: 5 6
HSB-210 LOCAL STOP: 7 8
HSC-210 LOCAL START: 9 10
AUX1-210 RUNNING: 19 20
AUX2-210 FAIL: 21 22

(VFD210-11,12/PCM300-AQ001)
(VFD210-13,14/PCM300-AI001)
(VFD210-15/PCM300-Q001A)
(VFD210-16/PCM300-Q001B)
(VFD210-23/PCM300-C0002)
(VFD210-24/PCM300-C0003)
(PSH210-1/PCM300-C001)
(VFD210-17/PCM300-Q002A)
(VFD210-18/PCM300-Q002B)
(FIT210-L/PCM300-CB1210H)
(FIT210-N/PCM300-CB1210N)
(FIT210-1,2/PCM300-AI002)
(FQT210-4,5/PCM300-FU1300P3; C0004)
(VFD210-19/PCM300-FU13000H3)
(VFD210-20/PCM300-I003)
(VFD210-21/PCM300-FU1300H4)
(VFD210-22/PCM300-I004)
(LCP210-3/PCM300-FU1300H5)
(LCP210-4/PCM300-I006)

TERMINAL | PANEL | PLC

AQ0001+ <BLK-1>
AQ0001- <WHT-1>
SHLD
FU1300-P1
AI001+ <BLK-1>
FU1300-M1 <WHT-1>
SHLD
FU1300-H1
I001 <BLK>
Q001A <BLK>
Q001B <RED>
FU1300-H2
C0002
C0003
C0001
Q002A <BLU>
Q002B
CB1-210H
CB1-210N
GND
FU1300-P2
AI002+ <BLK-2>
FU1300-M2 <WHT-2>
SHLD
FU1300-P3
C0004
SHLD
FU1300-H3
I003 <BLU>
FU1300-H4
I004 <ORG>
FU1300-H5
I006 <YEL>

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

PHOENIX MODEL: XYZ 120 VAC
(C0002) (C0003) (C0001) (CB1300-H6)
3 4 1 CR1 2 5 6
(CB1-300N1) (I005)

120VAC

PHOENIX MODEL: XYZ 120 VAC
(FU1300-M3) (C0004) (CB1300-H7)
3 4 1 CR2 2 5 6
(I002)

FU1-300M FU1-300P 24 VDC
(FU1300-P) (CB1300-H)
CB1-300H 120 VAC CB1-300N (CB1300-N)

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

REV	DATE	BY	DESCRIPTION
			AGENCY REVIEW

DESIGNED CE
DRAWN CE
CHECKED DJC
DATE OCTOBER 2025

COLORADO LICENSED — DANIEL CHARLES ROMANO — 67412 — PROFESSIONAL ENGINEER

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THORNTON WATER PROJECT

CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
INSTRUMENTATION
SAMPLE LOOP DRAWING

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

JOB NO. 203505
DRAWING NO. 30GN06
SHEET NO. 20 OF 160

LAST SAVED BY: DCOSME

PROJECT NO. XXXXXX FILE NAME: 20350530GN06.DWG

EQUIPMENT TAGGING SYSTEM

XXX-AABC

EQUIPMENT DESCRIPTOR			
XXX		**XXX**	
AB	AERATION BASIN	GRC	GRIT CHAMBER
AER	AERATOR	GRI	GRINDER
AHU	AIR HANDLING UNIT	GRD	GRIT DEWATERING UNIT (CYCLONE)
ARC	AIR COMPRESSOR	GRW	GRIT WASHER
ATS	AUTOMATIC TRANSFER SWITCH	GTW	GATEWAY
AUG	AUGER	HPU	HYDRAULIC POWER UNIT
AVR	AIR VACUUM RELIEF	IC	ISOLATION CONTACTOR
BAR	BAR SCREEN	INM	INDUCTION MIXER
BAS	BASIN	MAU	MAKE-UP AIR UNIT
BC	BYPASS CONTACTOR	MIX	MIXER
BFP	BELT FILTER PRESS	MS	MOTOR STARTER
BIT	BIO TOWER	MPR	MOTOR PROTECTION RELAY
BLO	BLOWER	NP	NETWORK PANEL
BOI	BOILER	NR	NETWORK RACK
BUR	BURNER	OZG	OZONE GENERATOR
CB	CIRCUIT BREAKER	PBU	POLYMER BLENDING UNIT
CC	COMMUNICATIONS CABINET	PCM	PROCESS CONTROL MODULE
CEN	CENTRIFUGE	PDC	POWER DISTRIBUTION CENTER
CHI	CHILLER	PMP	PUMP
CHL	CHLORINATOR	PPR	PUMP PROTECTION RELAY
CLA	CLASSIFIER	PQM	POWER QUALITY METER
CLR	CLARIFIER	REC	RECEIVER
COL	COLLECTOR	RVSS	REDUCED VOLTAGE STARTER
CON	CONVEYOR	RIO	REMOTE IO PANEL
COO	COOLER	RES	RESERVOIR
COS	COMPOSITE SAMPLER	RUD	ROLL UP DOOR
CF	CARTRIDGE FILTER	SCB	SCRUBBER
CR	CONTROL RELAY	SCR	SCREEN
CRN	BRIDGE CRANE/HOIST/MONORAIL	SCW	SCREW
CYC	CYCLONE CLASSIFIER	SF	SUPPLY FAN
DAM	DAMPER	SHA	SHAKER
DCD	DC DRIVE	SLA	SLAKER
DEC	DECARBONATOR	SLC	SLUDGE COLLECTOR
DGC	DIGESTER GAS CONDITIONING	SPD	SURGE PROTECTION DEVICE
DIF	DIFFUSER	SRR	STIRRER
DIG	ANAEROBIC DIGESTER	STR	STRAINER
DISC	DISCONNECT	SV	SOLENOID VALVE
DRY	DRYER	SWC	SCREENING WASHER COMPACTOR
DSC	DUST COLLECTOR	THI	THICKENER
EDU	EDUCTOR	TIP	TIPPING TROUGH
EF	EXHAUST FAN	TNK	TANK
ES_	ETHERNET SWITCH	UVB	UV BANK
ERD	ENERGY RECOVERY DEVICE	UVR	ULTRAVIOLET REACTOR
EUH	ELECTRIC UNIT HEATER	VAL	VALVE
EVP	EVAPORATOR	LCP	LOCAL CONTROL PANEL
EXC	EXCHANGER	VCP	VENDOR CONTROL PANEL
FACP	FIRE ALARM CONTROL PANEL	VFD	VARIABLE FREQUENCY DRIVE
FDR	FEEDER	WEL	WELL
FLA	FLARE	*CV	* CONTROL VALVE
FLC	FLOCCULATOR	*V	* VALVE
FLT	FILTER	*CG	* CONTROL GATE
FU	FUSE	*G	* GATE
GAT	GATE		* = A (ANALYTICAL), F (FLOW), L (LEVEL)
GEN	ENGINE GENERATOR		P (PRESSURE), T (TEMPERATURE)

PROCESS EQUIPMENT		
A	**B**	**DESCRIPTION**
SITE		**PUMP STATION**
30	1	PUMP 1 (FUTURE)
	1	PUMP 1 DISCH VALVE (FUTURE)
	2	PUMP 2
	2	PUMP 2 DISCH VALVE
	3	PUMP 3
	3	PUMP 3 DISCH VALVE
	4	PUMP 4 (FUTURE)
	5	PUMP 5
	6	PUMP 6
31	0	PS DISCH VALVE 1
	0	WASHWATER SUMP PUMP
	1	PS DISCH VALVE 2
34	0	RESERVOIR MIDDLE INTAKE HYDRAULIC GATE
	1	RESERVOIR LOWER INTAKE HYDRAULIC GATE

REV	DATE	BY	DESCRIPTION
			AGENCY REVIEW

DESIGNED CE
DRAWN CE
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DATE OCTOBER 2025

COLORADO LICENSED — DANIEL CHARLES RICARDO — 67412 — PROFESSIONAL ENGINEER

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THORNTON WATER PROJECT

CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
INSTRUMENTATION
EQUIPMENT TAGGING

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

JOB NO. 203505
DRAWING NO. 30GN07
SHEET NO. 21 OF 160

10/29/2025 2:13 PM
LAST SAVED BY: DCOSME
PROJECT NO. XXXXXX
FILE NAME: 20350530GN07.DWG

ATS_1						
AUTOMATIC TRANSFER SWITCH						
PROTOCOL: SNMPv3						
DESCRIPTION	**CONTROL**	**HISTORIZE**	**INDICATE**	**ALARM**	**TREND**	**INTERLOCK**
START	✓	✓	✓			
STOP	✓	✓	✓			

SWBD_1						
SWITCHBOARD						
PROTOCOL: MODBUS TCP						
DESCRIPTION	**CONTROL**	**HISTORIZE**	**INDICATE**	**ALARM**	**TREND**	**INTERLOCK**
A PH V		✓	✓		✓	
B PH V		✓	✓		✓	
C PH V		✓	✓		✓	
A PH CURRENT		✓	✓		✓	
B PH CURRENT		✓	✓		✓	
C PH CURRENT		✓	✓		✓	
A PH DEMAND CURRENT		✓	✓			
B PH DEMAND CURRENT		✓	✓			
C PH DEMAND CURRENT		✓	✓			
3 PH AVG DEMAND CURRENT		✓	✓		✓	
WATTS		✓	✓		✓	
VARS		✓	✓		✓	
VA		✓	✓		✓	
VA DEMAND		✓	✓		✓	
W DEMAND		✓	✓		✓	
ENERGY		✓	✓		✓	
FREQUENCY		✓	✓			
POWER FACTOR		✓	✓		✓	
BREAKER OPEN		✓	✓			
BREAKER TRIPPED		✓	✓	✓		
POWER FAIL ON BUS		✓	✓	✓		
ON UTIL POWER		✓	✓			

SWGR_1						
SWITCHGEAR						
PROTOCOL: SNMPv3						
DESCRIPTION	**CONTROL**	**HISTORIZE**	**INDICATE**	**ALARM**	**TREND**	**INTERLOCK**
A PH V		✓	✓		✓	
B PH V		✓	✓		✓	
C PH V		✓	✓		✓	
A PH CURRENT		✓	✓		✓	
B PH CURRENT		✓	✓		✓	
C PH CURRENT		✓	✓		✓	
A PH DEMAND CURRENT		✓	✓			
B PH DEMAND CURRENT		✓	✓			
C PH DEMAND CURRENT		✓	✓			
3 PH AVG DEMAND CURRENT		✓	✓		✓	
WATTS		✓	✓		✓	
VARS		✓	✓		✓	
VA		✓	✓		✓	
VA DEMAND		✓	✓		✓	
W DEMAND		✓	✓		✓	
ENERGY		✓	✓		✓	
FREQUENCY		✓	✓			
POWER FACTOR		✓	✓		✓	
BREAKER OPEN		✓	✓			
BREAKER TRIPPED		✓	✓	✓		
POWER FAIL ON BUS		✓	✓	✓		
ON UTIL POWER		✓	✓			

UPS_1						
CABINET UPS						
PROTOCOL: SNMPv3						
DESCRIPTION	**CONTROL**	**HISTORIZE**	**INDICATE**	**ALARM**	**TREND**	**INTERLOCK**
UPS SWITCHED TO BATTERY POWER		✓	✓	✓	✓	
AC POWER RESTORED		✓	✓			
UPS INTERNALLY BYPASSED		✓	✓	✓	✓	
UPS BYPASS UNAVAILABLE		✓	✓	✓		
UPS OUTPUT OFF			✓			
UPS RETURNED TO UTILITY POWER		✓	✓		✓	
REPLACE BATTERY WARNING		✓	✓	✓		
UPS BATTERY TEST IN PROGRESS			✓			
LOW BATTERY ALARM		✓	✓	✓		
UPS OUTPUT OVERLOADED		✓	✓	✓		
UPS HARDWARE FAILED		✓	✓	✓	✓	
UPS BATTERY DISCHARGED		✓	✓	✓		
UPS INVERTER FAILED		✓	✓	✓		
UTILITY POWER FAULTED		✓	✓	✓		
UPS SHUTDOWN IMMINENT		✓	✓			
UPS CIRCUIT BREAKER ALARM		✓	✓	✓		
COMMUNICATION WITH UPS LOST		✓	✓	✓		
UPS TEMPERATURE ALARM		✓	✓	✓	✓	
UPS SWITCHED TO BATTERY POWER		✓	✓	✓		
LOW BATTERY ALARM		✓	✓	✓		
UPS FAULTED		✓	✓	✓		

◇1

VFD_1						
SOURCE WATER PUMP						
PROTOCOL: HARDWIRED						
DESCRIPTION	**CONTROL**	**HISTORIZE**	**INDICATE**	**ALARM**	**TREND**	**INTERLOCK**
LOCAL			✓			
OFF	✓		✓			
REMOTE			✓			
STOP	✓		✓			
START	✓		✓			
SPEED	✓		✓			
SPEED FEEDBACK		✓	✓		✓	
RESET ELAPSED TIME	✓		✓			
RUNNING		✓	✓		✓	
TOTAL STARTS		✓	✓			
DAILY STARTS		✓	✓			
ELAPSED TIME		✓	✓			
DAILY RUN TIME		✓	✓			
PH V		✓	✓		✓	
PH CURRENT		✓	✓		✓	
POWER KVA		✓	✓		✓	
CURRENT ALARM HIGH			✓	✓		✓
OVERLOAD			✓	✓		✓
FAULT		✓	✓	✓		✓
FAIL TO RESPOND			✓	✓		✓
EQUIPMENT SHUTDOWN			✓			✓
LOW FLOW		✓	✓	✓		✓
LOW LOW LEVEL		✓	✓	✓		✓
ESD OK	✓	✓	✓	✓		✓

GENERAL NOTES:

1. DIGITAL NETWORK TABLE IS TYPICAL FOR ONE PIECE OF EQUIPMENT, REFER TO P&IDS FOR EQUIPMENT COUNT AND TOTAL NUMBER OF TABLES NEEDED.

◇# KEY NOTES:

1. THE VARIABLE FREQUENCY DRIVES WILL BE CONNECTED VIA HARD WIRED SIGNALS ONLY. THE DRIVES WILL HAVE ETHERNET RJ45 CONNECTIONS FOR POTENTIAL FUTURE USE.

REV	DATE	BY	DESCRIPTION
			AGENCY REVIEW

DESIGNED CE
DRAWN CE
CHECKED DJC
DATE OCTOBER 2025

COLORADO LICENSED
DANIEL CHARLES JACOBS
67412
PROFESSIONAL ENGINEER

carollo

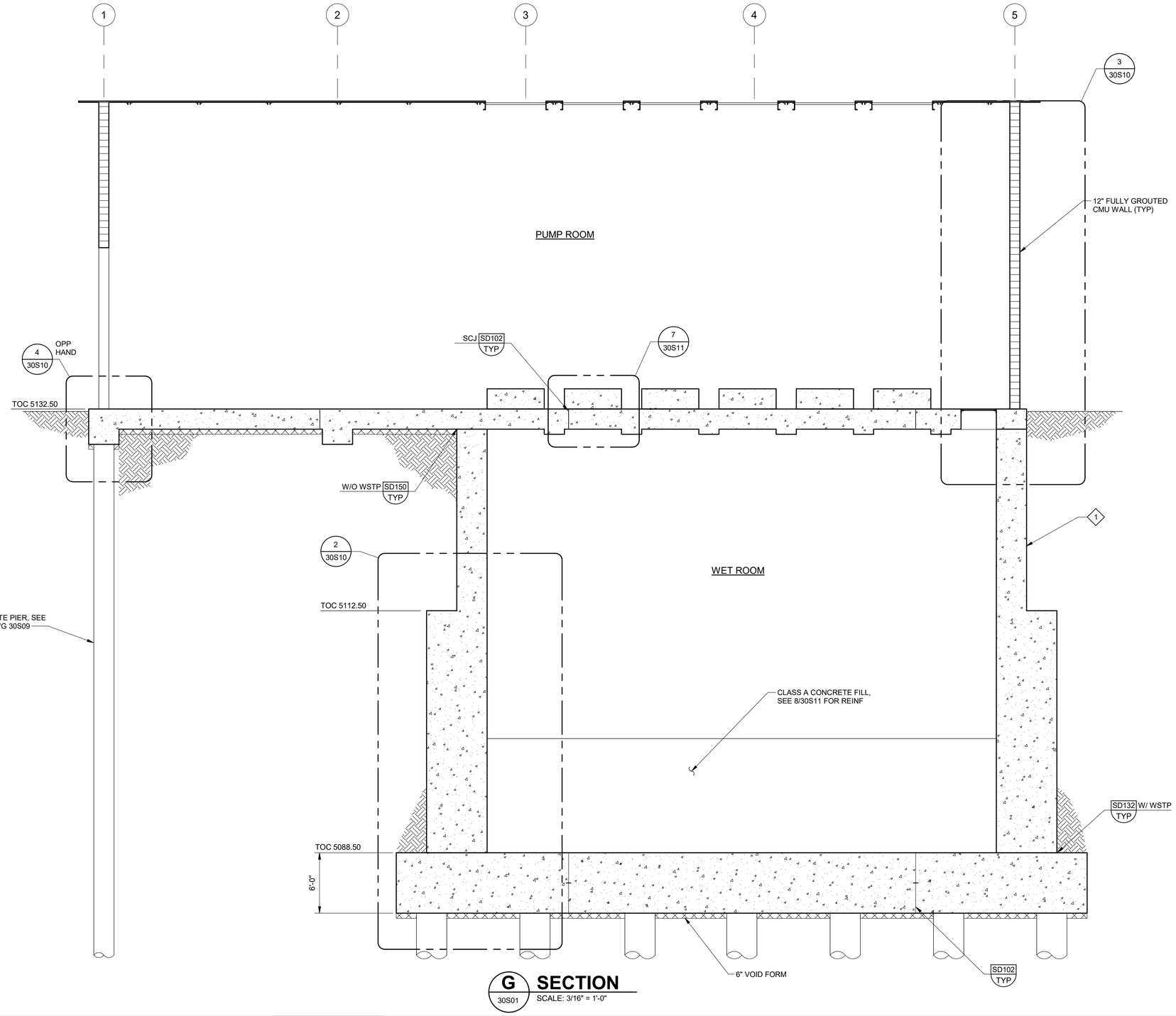
THORNTON WATER PROJECT

CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
INSTRUMENTATION
DIGITAL NETWORK TABLES

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

JOB NO. 203505
DRAWING NO. 30GN08
SHEET NO. 22 OF 160

10/29/2025 2:13 PM
LAST SAVED BY: DCOSME
PROJECT NO. XXXXXX
FILE NAME: 20350530GN08.DWG



G 30S01 **SECTION**
SCALE: 3/16" = 1'-0"

GENERAL NOTES:

1. FOR STRUCTURAL GENERAL NOTES SEE DRAWING 30GS01.

KEY NOTES:

1. APPLY DAMPPROOFING COATING ON THE EXTERIOR SURFACE OF BELOW GRADE STRUCTURE PER SPECIFICATION 07_11_00 - DAMPPROOFING.

REV	DATE	BY	DESCRIPTION
			AGENCY REVIEW

DESIGNED NV
DRAWN JBB
CHECKED MAK
DATE OCTOBER 2025

COLORADO REGISTERED
MARK ALAN KAELIN
34300
Digitally signed by Mark Alan Kaelin
Date: 2025.10.28 13:48:18 -06'00'
PROFESSIONAL ENGINEER

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THORNTON WATER PROJECT

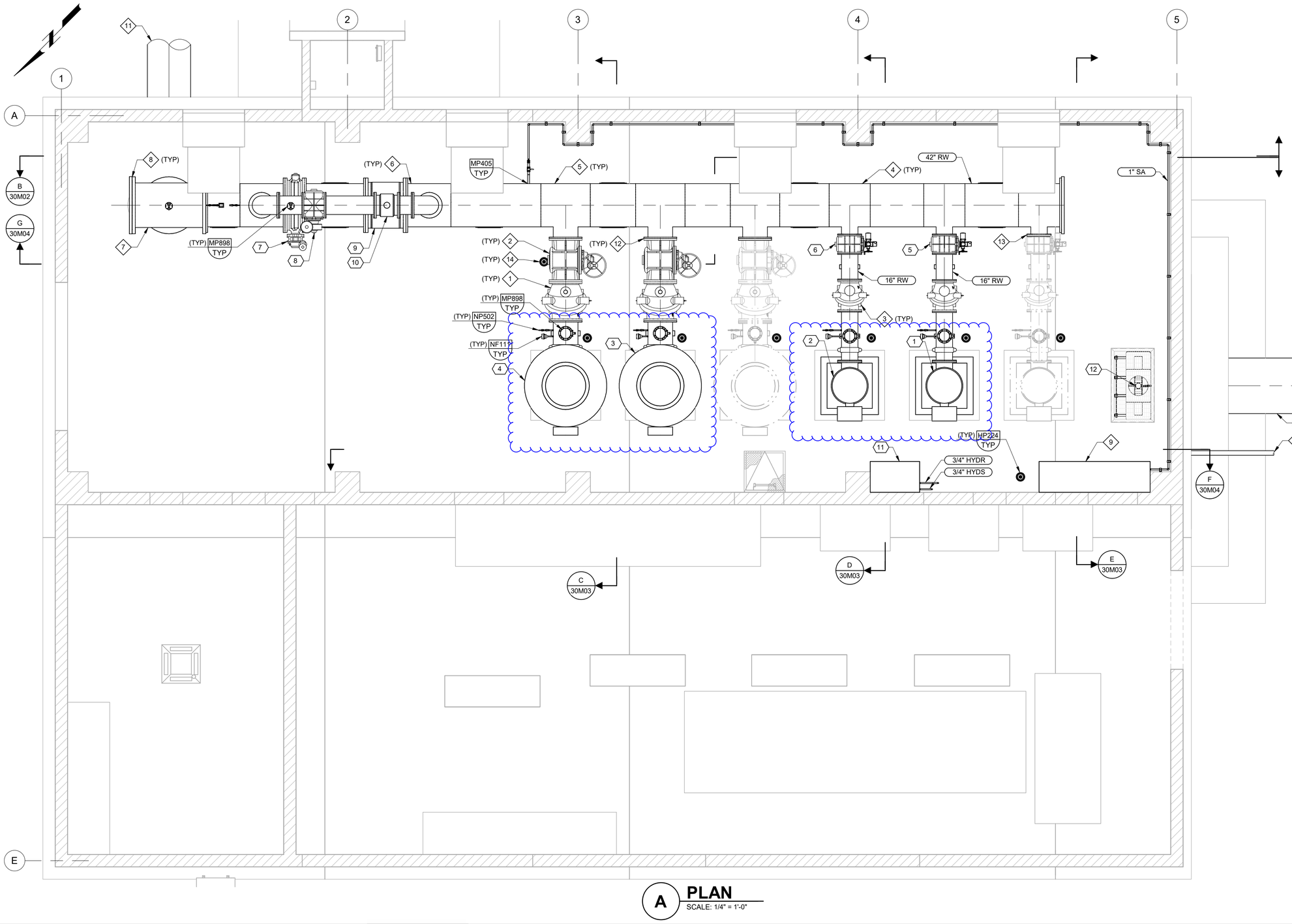
CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
STRUCTURAL
SOURCE WATER PUMP STATION
SECTION 1

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

JOB NO. 203505
DRAWING NO. 30S08
SHEET NO. 60 OF 160

PLOT DATE: 10/28/2025 2:06:41 PM

FILE NAME: Autodesk Docs://Thornton - 203505/203505_30S0801.rvt



A **PLAN**
SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. ALL FLANGES SHALL BE AWWA C207 CLASS E UNLESS OTHERWISE INDICATED.
2. ALL PIPING BENEATH BUILDING FOUNDATION SHALL BE CONCRETE ENCASED PER TYPICAL DETAILS MP003, MP005, AND MP022.
3. ALL BURIED PIPING SHALL BE DIELECTRICALLY SEPARATED PER THE CATHODIC PROTECTION DRAWINGS.
4. PROVIDE WALL MOUNTED EYEWASH, HAWS MODEL 7501 CONFIGURATION STD-9083.

KEY NOTES:

1. 24" TILTED DISC CHECK VALVE
2. 24" PLUG VALVE W/ HANDWHEEL
3. 16" TILTED DISC CHECK VALVE
4. 42" x 42" x 16" TEE
5. 42" x 42" x 24" TEE
6. 42" x 42" x 18" TEE
7. 42"X42"X42" TEE, SEE DETAIL 3 ON SHEET 30M06
8. 42" BLIND FLANGE, DETAIL B 30M08
9. SAMPLING PANEL SEE INSTRUMENTATION DETAILS
10. 3/4" HYDS AND 3/4" HYDR INSIDE 4" HDPE CARRIER PIPE OUT TO INTAKE STRUCTURES. SEE CIVIL DRAWINGS FOR CONTINUATION.
11. INSTALL DEFLECTION JOINT PER TYPICAL DETAIL PER MP582, SEE CIVIL DRAWINGS FOR STATIONING.
12. PROVIDE 24" BLIND FLANGE AT FUTURE CONNECTION.
13. PROVIDE 18" BLIND FLANGE AT FUTURE CONNECTION.
14. 4" FLOOR DRAIN, PROVIDE ZURN Z521 OR APPROVED EQUAL. SLOPE DRAIN LINE AT A MINIMUM OF 1/8" PER FOOT IN THE DIRECTION OF FLOW. DRAIN LINE TO TERMINATE IN WET WELL.
15. 4" FLOOR DRAIN, PROVIDE ZURN Z521 OR APPROVED EQUAL. DRAIN LINE TO TERMINATE IN WET WELL DIRECTLY BELOW DRAIN.

KEY TAGS:

1	PMP-302	600 HP PUMP
2	PMP-303	600 HP PUMP
3	PMP-305	3000 HP PUMP
4	PMP-306	3000 HP PUMP
5	FCV-302	16" PLUG MODULATING VALVE
6	FCV-303	16" PLUG MODULATING VALVE
7	FV-310	42" ISOLATION BUTTERFLY VALVE
8	FV-311	18" ISOLATION PLUG VALVE
9	FE-300	42" MAGNETIC FLOW METER
10	FE-311	18" MAGNETIC FLOW METER
11	PMP-316	HYDRAULIC POWER UNIT
12	VAL-320	54" KNIFE GATE VALVE

REV	DATE	BY	DESCRIPTION
			AGENCY REVIEW

DESIGNED MP
DRAWN LRG
CHECKED MZ
DATE OCTOBER 2025

COLORADO LICENSED
MATTHEW E. REYNOLDS
0049708
Digitally signed by Matthew E. Reynolds
Date: 2025.10.29 07:33:07 -06'00'
PROFESSIONAL ENGINEER

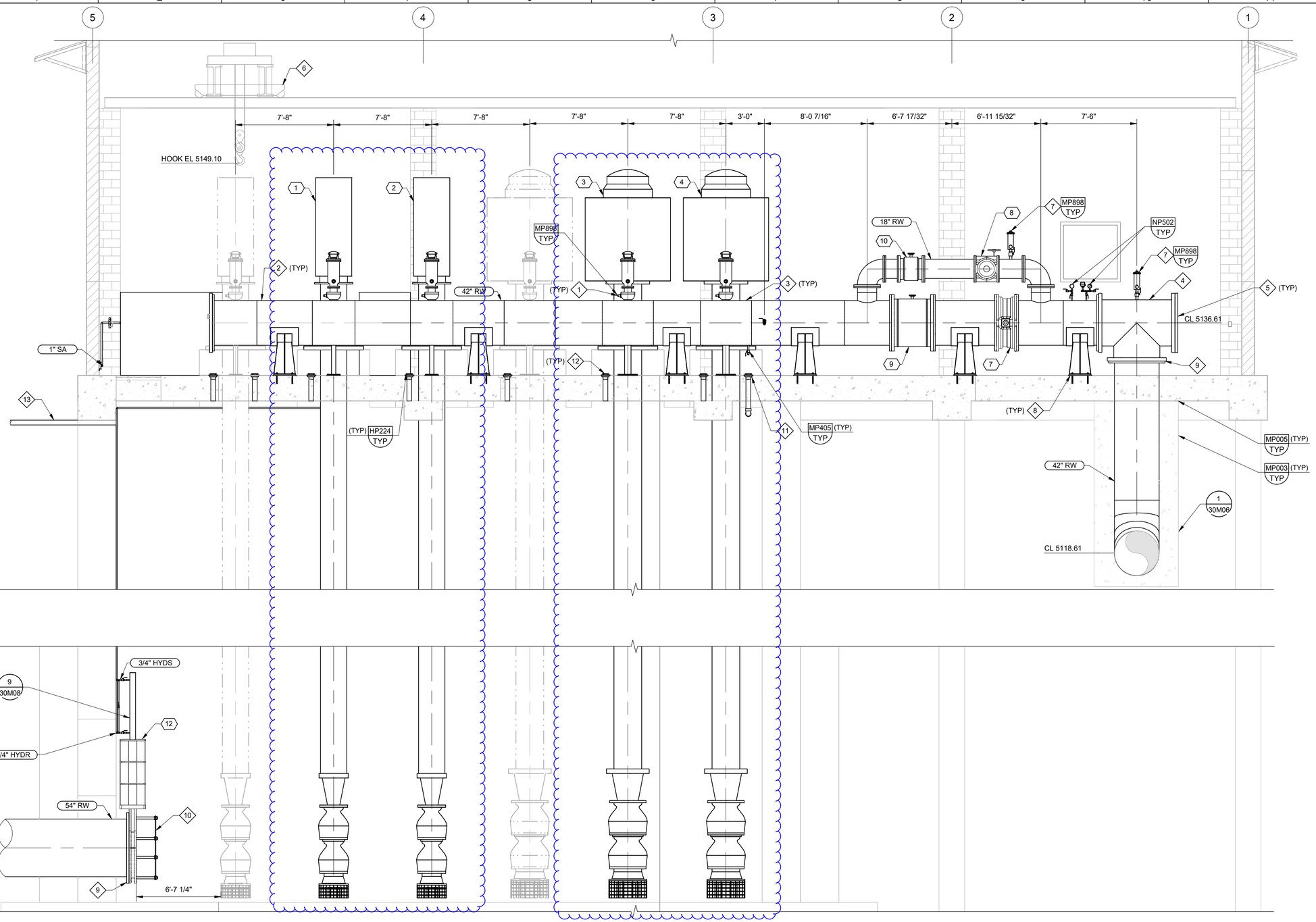
CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
MECHANICAL
PUMP STATION
UPPER PLAN

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

JOB NO. 203505
DRAWING NO. 30M01
SHEET NO. 69 OF 160

PLOT DATE: 10/29/2025 7:33:31 PM

FILE NAME: Autodesk Docs://Thornton - 203505/203505_30M0801.rvt



B SECTION
30M01
SCALE: 1/4" = 1'-0"

GENERAL NOTES:

1. VERTICAL TURBINE PUMPS SHALL BE EQUIPPED WITH A FLOW CONDITIONER

KEY NOTES:

1. 6" AIR VACUUM VALVE
2. 42" x 42" x 16" TEE
3. 42" x 42" x 24" TEE
4. 42" x 42" x 42" SEE DETAIL 3 ON SHEET 30M06
5. 42" BLIND FLANGE
6. 17.5 TON BRIDGE CRANE
7. 2" AIR RELIEF VALVE
8. 42" STEEL PIPE SUPPORT SEE DETAIL 5 ON SHEET 30M06
9. DIELECTRIC FLANGE ISOLATION KIT
10. DELECTOR BAFFLE SEE DETAIL 8 ON 30M08
11. 4" FLOOR DRAIN, PROVIDE ZURN Z521 OR APPROVED EQUAL. SLOPE DRAIN LINE AT A MINIMUM OF 1/8" PER FOOT IN THE DIRECTION OF FLOW. DRAIN LINE TO TERMINATE IN WET WELL.
12. 4" FLOOR DRAIN, PROVIDE ZURN Z521 OR APPROVED EQUAL. DRAIN LINE TO TERMINATE IN WET WELL DIRECTLY BELOW DRAIN.
13. 3/4" HYDS AND 3/4" HYDR INSIDE 4" HDPE CARRIER PIPE OUT TO INTAKE STRUCTURES. SEE CIVIL DRAWINGS FOR CONTINUATION.

KEY TAGS:

1	PMP-302	600 HP PUMP
2	PMP-303	600 HP PUMP
3	PMP-305	3000 HP PUMP
4	PMP-306	3000 HP PUMP
7	FV-310	42" ISOLATION BUTTERFLY VALVE
8	FV-311	18" ISOLATION PLUG VALVE
9	FE-300	42" MAGNETIC FLOW METER
10	FE-311	18" MAGNETIC FLOW METER
12	VAL-320	54" KNIFE GATE VALVE

REV	DATE	BY	DESCRIPTION
			AGENCY REVIEW

DESIGNED MP
DRAWN LRG
CHECKED MZ
DATE OCTOBER 2025

COLORADO LICENSED MATTHEW E. ZOLTEK 0049708 PROFESSIONAL ENGINEER
Digitally signed by Matthew E. Zoltek
DN: cn=Matthew E. Zoltek, o=Carollo Engineers, Inc., ou=Project Info: Carollo Engineers, Inc., email=mzoltek@carollo.com, c=US
Date: 2025-10-29 15:57:17 -06'00'

carollo®

THORNTON WATER PROJECT

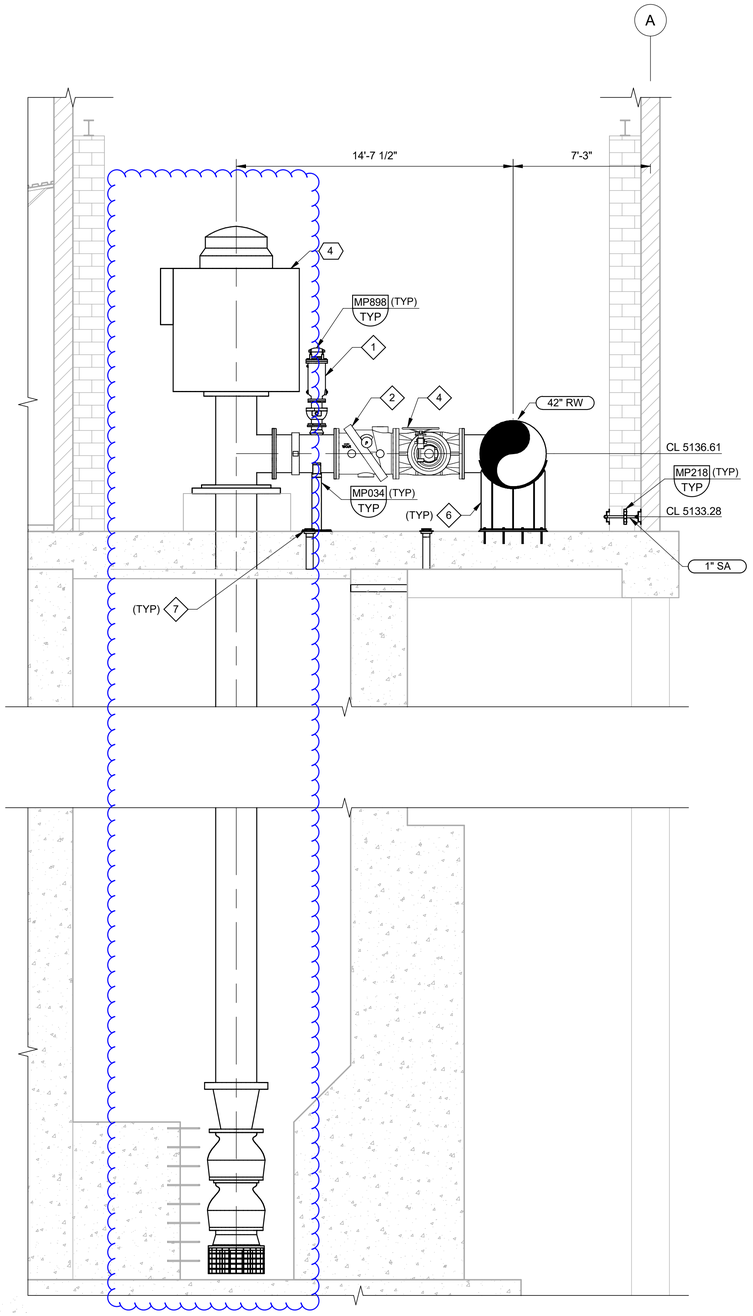
CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
MECHANICAL
PUMP STATION
SECTIONS 1

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

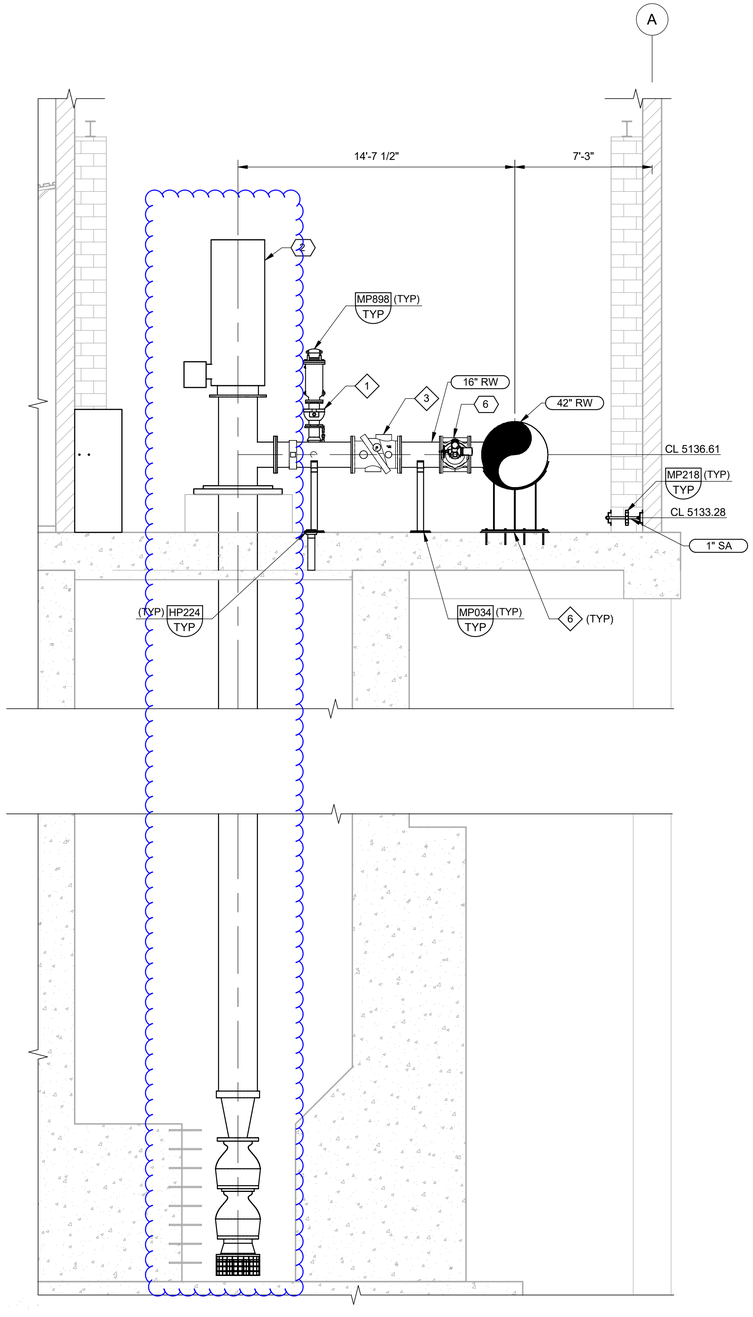
JOB NO. 203505
DRAWING NO. 30M02
SHEET NO. 70 OF 160

PLOT DATE: 10/29/2025 7:33:44 PM

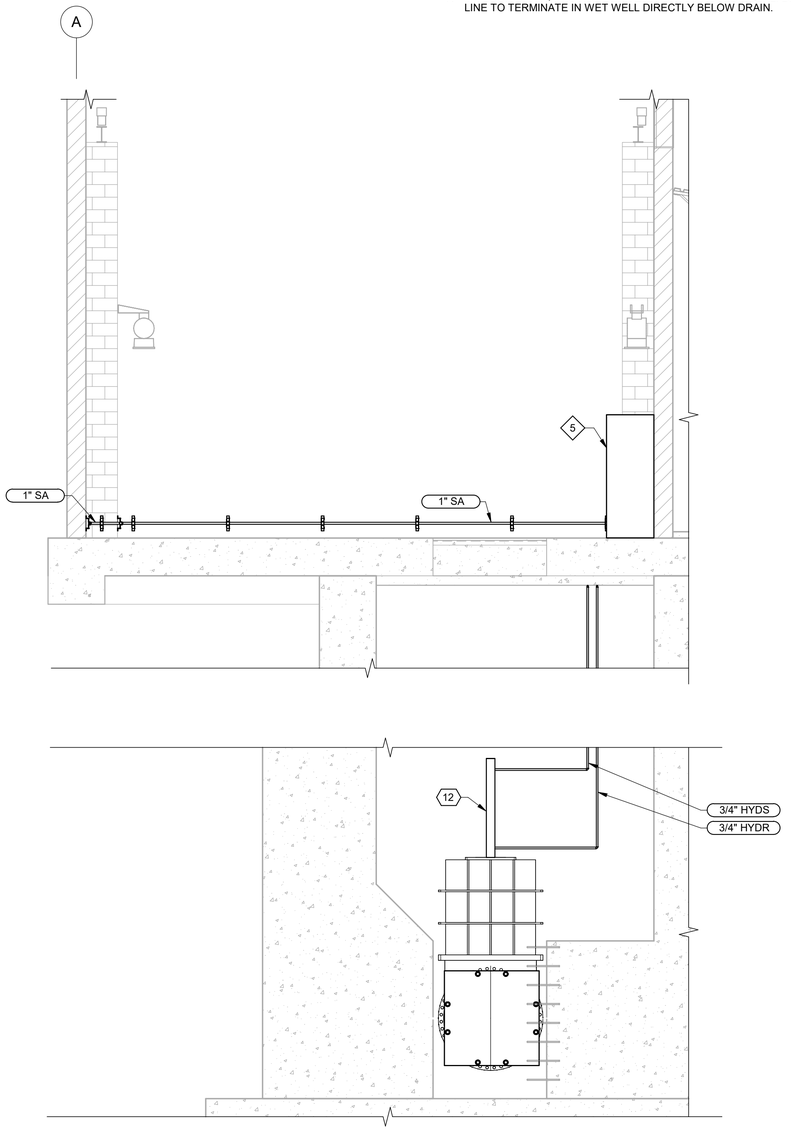
FILE NAME: Autodesk Docs://Thornton - 203505/203505_30M0801.rvt



C SECTION
30M01 SCALE: 1/4" = 1'-0"



D SECTION
30M01 SCALE: 1/4" = 1'-0"



E SECTION
30M01 SCALE: 1/4" = 1'-0"

#	KEY TAGS:	
2	PMP-303	600 HP PUMP
3	PMP-305	3000 HP PUMP
6	FCV-303	16" PLUG MODULATING VALVE
12	VAL-320	54" KNIFE GATE VALVE

KEY NOTES:

1. 6" AIR VACUUM VALVE
2. 24" TILTED DISC CHECK VALVE
3. 16" TILTED DISC CHECK VALVE
4. 24" PLUG VALVE W/ HANDWHEEL
5. SAMPLING PANEL SEE INSTRUMENTATION DETAILS
6. 42" STEEL PIPE SUPPORT SEE DETAIL 5 ON SHEET 30M06
7. 4" FLOOR DRAIN, PROVIDE ZURN Z521 OR APPROVED EQUAL. DRAIN LINE TO TERMINATE IN WET WELL DIRECTLY BELOW DRAIN.

REV	DATE	BY	DESCRIPTION

AGENCY REVIEW

DESIGNED MP
DRAWN LRG
CHECKED MZ
DATE OCTOBER 2025

COLORADO LICENSED
MATTHEW E. ZOLLER
0049708
PROFESSIONAL ENGINEER
Digitally signed by Matthew E. Zoller
Contact Info: Carollo Engineers, Inc.
Date: 2025.10.29 14:33:07 -06'00'

carollo®

THORNTON WATER PROJECT

CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
MECHANICAL
PUMP STATION
SECTIONS 2

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

JOB NO. 203505
DRAWING NO. 30M03
SHEET NO. 71 OF 160

PLOT DATE: 10/29/2025 2:13:32 PM

FILE NAME: Autodesk Docs://Thornton - 203505/203505_30M0801.rvt

PVREA UTILITY CIRCUIT 1

SWGR-UT1

SSM

52-U1 1200A 52

XFMR-SW1
7500 KVA
3 PH
12470 V
4160Y/2400V

PVREA UTILITY CIRCUIT 2

SWGR-UT2

SSM

FUTURE

52-U2 1200A 52

XFMR-SW2
7500 KVA
3 PH
12470 V
4160Y/2400V

52-M1 1200A 52

SWGR-SW, 1200 AMPS, 4160 V, 3Ø, 3 WIRE, 60HZ, 25KASC

52-T1 1200A 52

52-T2 1200A 52

52-M2 1200A 52

52-11 1200A 52

52-12 1200A 52

52-13 1200A 52

52-14 1200A 52

52-21 1200A 52

52-22 1200A 52

52-23 1200A 52

52-24 1200A 52

XFMR-PP1
750 KVA
3 PH
4160 V
480Y/277V

800 AF 3P 800 AT SS-LSIG 65 KASC

SS-LSIG 65 KASC

SWBD-SW, 800A, 480V, 3 PHASE, 3W, 65 KASC

1200 AF 3P 1000 AT

250 AF 3P 250 AT SS-LSIG 65 KASC

250 AF 3P 250 AT SS-LSIG 65 KASC

800 AF 3P 800 AT SS-LSIG 65 KASC

XFMR-PP2
750 KVA
3 PH
4160 V
480Y/277V

FUTURE

FUTURE

MTS-PP
250 A
480 V
3 PH
3P
65 KASC

250 AF 3P 250 AT 42 KASC

PP-SW, 250AMPS, 480V, 3Ø, 65KASC

150 AF 3P 125 AT 65 KASC

225 AF 3P 150 AT 65 KASC

XFMR-LP-SW
45 KVA
3 PH
480 V
208/120 V

150 AF 100 AT 22 KAIC

LP-SW, 208/120V, 3Ø, 4W, 22KAIC

MCC-SW, 600A, 480V, 3Ø, 3W, 65KASC

FUTURE

VFD

600

VFD-301 (F)

PMP-301 (F)

PUMP 1

VFD

600

VFD-302

PMP-302

PUMP 2

VFD

3000

VFD-306

PMP-306

PUMP 6

FUTURE

VFD

600

VFD-303

PMP-303

PUMP 3

VFD

3000

VFD-305

PMP-305

PUMP 5

VFD

3000

VFD-304 (F)

PMP-304 (F)

PUMP 4

REV	DATE	BY	DESCRIPTION

AGENCY REVIEW

DESIGNED JD
DRAWN EYV
CHECKED TDH
DATE OCTOBER 2025

COLORADO LICENSED
CHRISTOPHER HARRISON
47129
PROFESSIONAL ENGINEER

carollo

THORNTON WATER PROJECT

CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
ELECTRICAL
OVERALL ONE-LINE DIAGRAM

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

JOB NO. 203505
DRAWING NO. 30E03
SHEET NO. 87 OF 160

LAST SAVED BY: FOsorio

PROJECT NO. 203505-100000 FILE NAME: 203505_30E03.dwg

PVREA UTILITY CIRCUIT 1

SWGR-UT1, 1200A, 12470V, 3(Ø), 3 WIRE, 60HZ, 18KASC

7.65kV L-N
LA

3
120V
SSM
C C TO PLC

3
1200:5

3
600:5

52-U1
1200A
52
86T

87T 50 51 F F TO PLC

3(3-350KCMIL, 15-kV, MV-105 (Ø) & 1-1/0, 600V (G))

7.65kV L-N
LA

XFMR-SW1
7500 KVA
3 PHASE
12470 V
4160 Y / 2400 V
5.75%Z

2.55kV L-N
LA

4(3-350KCMIL, 5-kV, MV-105 (Ø) & 1-350KCMIL (N) & 1-#2 (G))

2.55kV L-N
LA

3
1200:5

HIGH IMPEDANCE BUS DIFFERENTIAL RELAY
87B
C C TO PLC

3
4200:120

86B
TRIP

52-M1
1200 A
52
86

1

27
59
47N
50
51
C C TO PLC

3
1200:5
C100

3
1200:5

SWITCHGEAR REMOTE CONTROL PANEL
VCP-111

CONTINUED ON NEXT DRAWING

SWGR-SW, 1200 AMPS, 4160 V, 3 (Ø), 3 WIRE, 60HZ, 25KASC

1200:5
52-T1
52

52-T2
52
1200:5

CONTINUED ON NEXT DRAWING

52-11
1200A
52
86

52-12
1200A
52
86

52-13
1200A
52
86

52-14
1200A
52
86

3
300:5
3
1200:5
50 50N 51 51N
C C TO PLC

3
300:5
3
1200:5
50 50N 51 51N
C C TO PLC

3
600:5
3
1200:5
50 50N 51 51N
C C TO PLC

3
450:5
3
1200:5
50 50N 51 51N
C C TO PLC

TO VFD 301
(FUTURE)

3-#1/0, 5-kV, MV-105 (Ø) & 1-#6 (G)

TO VFD 302
CONTINUED ON
30E06

2(3-350KCMIL, 5-kV, MV-105 (Ø) & 1-#1 (G))

TO VFD 306
CONTINUED ON
30E06

3-350KCMIL, 5-kV, MV-105 (Ø) & 1-#4 (G))

XFMR-PP1
750 KVA
4.16KV
480/277V

3(3-300KCMIL (Ø) & 1-#1/0 (G))

TO SWBD-SW
CONTINUED ON
30E07

KEY NOTES:

1. PROGRAM RELAY TO SHOW ALARM ONLY TO SCADA AND NOT TO TRIP BREAKER FOR FUNCTION 27.

LAST SAVED BY: CGilford

REV	DATE	BY	DESCRIPTION
			AGENCY REVIEW

DESIGNED JD
DRAWN CWG
CHECKED TDH
DATE OCTOBER 2025

COLORADO LICENSED
CHRISTOPHER ARMSTRONG HAGER
47129
Digitally signed by Christopher Hager
Date: 2025.10.20 13:42:30 -06'00'
PROFESSIONAL ENGINEER

carollo

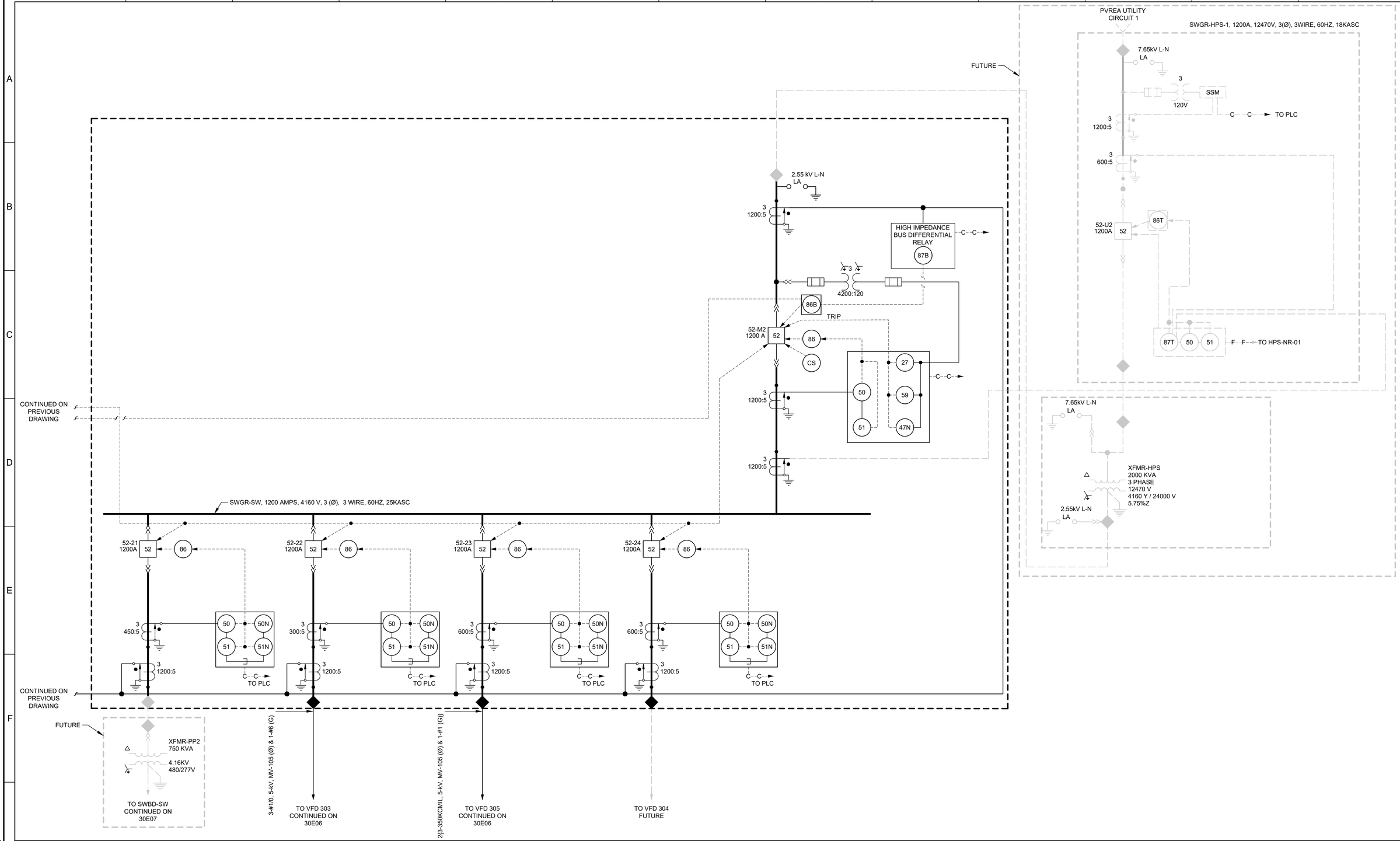
THORNTON WATER PROJECT

CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
ELECTRICAL
SWGR-SW ONE-LINE DIAGRAM 1

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

JOB NO. 203505
DRAWING NO. 30E04
SHEET NO. 88 OF 160

PROJECT NO. 203505-100000 FILE NAME: 203505_30E04.dwg



REV	DATE	BY	DESCRIPTION

AGENCY REVIEW

DESIGNED JD
DRAWN CWG
CHECKED TDH
DATE OCTOBER 2025

COLORADO LICENSED
CHRISTOPHER ARMAND MEGER
47129
PROFESSIONAL ENGINEER
Digitally signed by Christopher Meger
Date: 2025.10.20 11:42:39 -06'00'

carollo

THORNTON WATER PROJECT

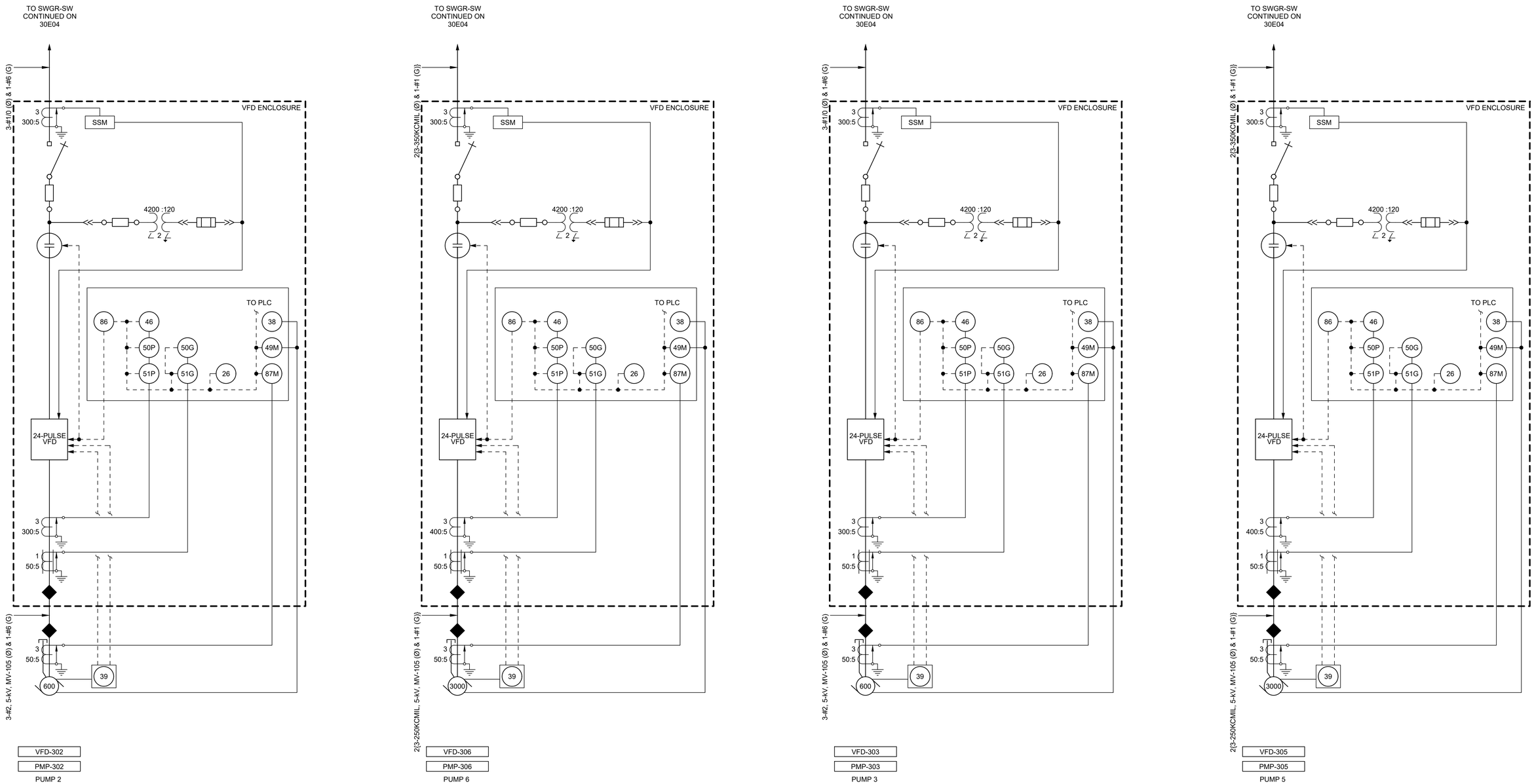
CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
ELECTRICAL
SWGR-SW ONE-LINE DIAGRAM 2

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

JOB NO. 203505
DRAWING NO. 30E05
SHEET NO. 89 OF 160

LAST SAVED BY: CGilford

PROJECT NO. 203505-100000 FILE NAME: 203505_30E05.dwg



LAST SAVED BY: CGilford

REV	DATE	BY	DESCRIPTION
			AGENCY REVIEW

DESIGNED JD
DRAWN CWG
CHECKED TDH
DATE OCTOBER 2025

COLORADO LICENSED
CHRISTOPHER WARNER GILFORD
47129
Digitally signed by Christopher Warner Gilford, Cassidy Engineering, PLLC
Date: 2025.10.20 13:43:23 -06'00'
PROFESSIONAL ENGINEER

carollo

THORNTON WATER PROJECT

CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
ELECTRICAL
PUMPS 1-5
ONE-LINE DIAGRAMS

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

JOB NO. 203505
DRAWING NO. 30E06
SHEET NO. 90 OF 160

PROJECT NO. 203505-100000 FILE NAME: 203505_30E06.dwg

10/29/2025 2:16 PM

KEY NOTES:

1. PROVIDE A TOTAL OF TWO VIBRATION TRANSMITTERS - ONE INLINE WITH DISCHARGE AND THE OTHER PERPENDICULAR TO THE FIRST VIBRATION TRANSMITTER.
2. CONNECTION BETWEEN MPR AND VFD TO BE COMPATIBLE WITH MANUFACTURERS EQUIPMENT.

I/O

POWER SOURCE

FIELD

FLOAT LEVELS 14 30N24

PUMP 3 15 30N26

MPR_1 MBTCP — MPR 302 PLC-SW

VFD_1 HARDWIRED — VFD 302 PLC-SW

RNG 302 DI RUNNING PLC-SW

RDY 302 DI READY PLC-SW

REM 302 DI REMOTE PLC-SW

SPDF 302 AI SPEED FBK PLC-SW

SPDC 302 AO SPEED CMD PLC-SW

RUN 302 DO RUN PLC-SW

VF 302 AI VOLTAGE FBK PLC-SW

AF 302 AI AMPS FBK PLC-SW

YA1 302 DI VFD OK PLC-SW

P 302 AI PLC-SW

ZSO1 302 DI OPENED PLC-SW

ZSC1 302 DI CLOSED PLC-SW

ZCO 302 DO JOG OPEN PLC-SW

ZCC 302 DO JOG CLOSE PLC-SW

ZSO 302 DI OPENED PLC-SW

ZSC 302 DI CLOSED PLC-SW

REM1 302 DI REMOTE PLC-SW

Z 302 AI POSITION PLC-SW

MPR 302

VFD-302 — VFD-RH 4160VAC-3P SWGR-SW

CB 302 TM 4160VAC-3P SWGR-SW

CB 302 TM 480VAC-3P PP-SW

LCP 302 — HSU2 302 E-STOP

VIBRATION TERMINATION BOX (FBV)

RTD TERMINATION BOX (FBV)

TE7 302 MOTOR UPPER BEARING RTD

TE8 302 MOTOR LOWER BEARING RTD

TE1 302 MOTOR WINDING PHASE A RTD

TE4 302 MOTOR WINDING PHASE A RTD

TE2 302 MOTOR WINDING PHASE B RTD

TE5 302 MOTOR WINDING PHASE B RTD

TE3 302 MOTOR WINDING PHASE C RTD

TE6 302 MOTOR WINDING PHASE C RTD

XVT1 302 VIB — XVE1 302 VIB (1)

XVT2 302 VIB — XVE2 302 VIB (1)

PMP 302 — MWH 302

FSL 302 — FE 302 THERMAL

PI 302 — PIT 302 — PE 302 INT PRESSURE

ZSOC1 302

ZT 302 — HSA 302 LSR — HSG 302 OSC — ZSOC 302 — FCV 302 — DISC 302

M — VAL 302

SOURCE WATER PIPELINE 2 30N30

CONTINUED ON DWG 30N24

CONTINUED ON DWG 30N26

MPR-302
MOTOR PROTECTION RELAY

PMP-302
PUMP 2
600HP 4160VAC 3PH
3 30N09

FE-302
PUMP 2 LOW FLOW
2000 GPM

NF111 * TYP

PE-302
PUMP 2 PRESSURE TRANSMITTER
0-400 PSIG

NP501 * TYP

FCV-302
PUMP 2 DISCH VALVE
5HP 480VAC 3PH

PI-302
PUMP 2 PRESSURE INDICATOR
0-400 PSIG

REV	DATE	BY	DESCRIPTION
			AGENCY REVIEW

DESIGNED ANW
DRAWN KMM
CHECKED DJC
DATE OCTOBER 2025

COLORADO LICENSED — DANIEL CHARLES RICHARDS — 67412 — PROFESSIONAL ENGINEER

CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
INSTRUMENTATION
PUMP NO. 2 P&ID

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

JOB NO. 203505
DRAWING NO. 30N25
SHEET NO. 120 OF 160

LAST SAVED BY: DCOSME

PROJECT NO. XXXXXX FILE NAME: 20350530N25.DWG

10/29/2025 2:16 PM

KEY NOTES:

1. PROVIDE A TOTAL OF TWO VIBRATION TRANSMITTERS - ONE INLINE WITH DISCHARGE AND THE OTHER PERPENDICULAR TO THE FIRST VIBRATION TRANSMITTER.
2. CONNECTION BETWEEN MPR AND VFD TO BE COMPATIBLE WITH MANUFACTURERS EQUIPMENT.

I/O

POWER SOURCE

FIELD

FLOAT LEVELS 15 30N25

PUMP 4 16 30N27

MPR_1 MBTCP — MPR 303 PLC-SW

VFD_1 HARDWIRED — VFD 303 PLC-SW

RNG 303 DI RUNNING PLC-SW

RDY 303 DI READY PLC-SW

REM 303 DI REMOTE PLC-SW

SPDF 303 AI SPEED FBK PLC-SW

SPDC 303 AO SPEED CMD PLC-SW

RUN 303 DO RUN PLC-SW

VF 303 AI VOLTAGE FBK PLC-SW

AF 303 AI AMPS FBK PLC-SW

YA1 303 DI VFD OK PLC-SW

P 303 AI PLC-SW

ZSO1 303 DI OPENED PLC-SW

ZSC1 303 DI CLOSED PLC-SW

ZCO 303 DO JOG OPEN PLC-SW

ZCC 303 DO JOG CLOSE PLC-SW

ZSO 303 DI OPENED PLC-SW

ZSC 303 DI CLOSED PLC-SW

REM1 303 DI REMOTE PLC-SW

Z 303 AI POSITION PLC-SW

MPR 303

VFD-303
VFD-RH
4160VAC-3P
SWGR-SW

CB 303 TM 4160VAC-3P SWGR-SW

CB 303 TM 480VAC-3P PP-SW

2

LCP 303

HSU2 303 E-STOP

VIBRATION TERMINATION BOX (FBV)

RTD TERMINATION BOX (FBV)

TE7 303 MOTOR UPPER BEARING RTD

TE8 303 MOTOR LOWER BEARING RTD

TE1 303 MOTOR WINDING PHASE A RTD

TE4 303 MOTOR WINDING PHASE A RTD

TE2 303 MOTOR WINDING PHASE B RTD

TE5 303 MOTOR WINDING PHASE B RTD

TE3 303 MOTOR WINDING PHASE C RTD

TE6 303 MOTOR WINDING PHASE C RTD

XVT1 303 VIB

XVE1 303 VIB 1

XVT2 303 VIB

XVE2 303 VIB 1

PMP 303

MWH 303

FSL 303

FE 303

PI 303 THERMAL

PIT 303 INT PRESSURE

PE 303

ZSOC1 303

ZT 303

HSA 303 LSR

HSG 303 OSC

ZSOC 303

FCV 303

DISC 303

M

VAL 303

SOURCE WATER PIPELINE 3 30N30

CONTINUED ON DWG 30N25

CONTINUED ON DWG 30N27

MPR-303
MOTOR PROTECTION RELAY

PMP-303
PUMP 3
600HP 4160VAC 3PH
3 30N09

FE-303
PUMP 3 LOW FLOW
2000 GPM

NF111 * TYP

PE-303
PUMP 3 PRESSURE TRANSMITTER
0-400 PSIG

NP501 * TYP

FCV-303
PUMP 3 DISCH VALVE
5HP 480VAC 3PH

PI-303
PUMP 3 PRESSURE INDICATOR
0-400 PSIG

REV	DATE	BY	DESCRIPTION
			AGENCY REVIEW

DESIGNED ANW
DRAWN KMM
CHECKED DJC
DATE OCTOBER 2025

COLORADO LICENSED — DANIEL CHARLES RICHARDS — 67412 — PROFESSIONAL ENGINEER

carollo

THORNTON WATER PROJECT

CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
INSTRUMENTATION
PUMP NO. 3 P&ID

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

JOB NO. 203505
DRAWING NO. 30N26
SHEET NO. 121 OF 160

LAST SAVED BY: DCOSME

PROJECT NO. XXXXXX FILE NAME: 20350530N26.DWG

10/29/2025 2:17 PM

KEY NOTES:

1. PROVIDE A TOTAL OF TWO VIBRATION TRANSMITTERS - ONE INLINE WITH DISCHARGE AND THE OTHER PERPENDICULAR TO THE FIRST VIBRATION TRANSMITTER.
2. CONNECTIONS BETWEEN MPR AND VFD TO BE COMPATIBLE WITH MANUFACTURERS EQUIPMENT.

I/O

POWER SOURCE

FIELD

MPR_1 MBTCP
MPR 305 PLC-SW

VFD_1 HARDWIRED
VFD 305 PLC-SW

RNG 305 DI RUNNING PLC-SW
RDY 305 DI READY PLC-SW
REM 305 DI REMOTE PLC-SW

SPDF 305 AI SPEED FBK PLC-SW
SPDC 305 AO SPEED CMD PLC-SW
RUN 305 DO RUN PLC-SW

VF 305 AI VOLTAGE FBK PLC-SW
AF 305 AI AMPS FBK PLC-SW
YA1 305 DI VFD OK PLC-SW

P 305 AI PLC-SW

PSH 305 DI HIGH PRESSURE PLC-SW

ZSO1 305 DI OPENED PLC-SW
ZSC1 305 DI CLOSED PLC-SW

FLOAT LEVELS 17 30N27

PUMP 6 18 30N29

MPR 305

VFD-305
VFD-RH
4160VAC-3P
SWGR-SW

CB 305 TM 4160VAC-3P SWGR-SW

2

LCP 305
HSU2 305
E-STOP

VIBRATION TERMINATION BOX (FBV)

RTD TERMINATION BOX (FBV)

TE7 305 MOTOR UPPER BEARING RTD
TE8 305 MOTOR LOWER BEARING RTD
TE1 305 MOTOR WINDING PHASE A RTD
TE4 305 MOTOR WINDING PHASE A RTD
TE2 305 MOTOR WINDING PHASE B RTD
TE5 305 MOTOR WINDING PHASE B RTD
TE3 305 MOTOR WINDING PHASE C RTD
TE6 305 MOTOR WINDING PHASE C RTD

XVT1 305 VIB
XVE1 305 VIB 1
XVT2 305 VIB
XVE2 305 VIB 1

PMP 305
MWH 305

FSL 305
FE 305 THERMAL

PI1 305
PIT 305 INT PRESSURE
PE1 305

PI2 305
PSH 305 HIGH PRESSURE INT MECHANICAL
PE2 305

ZSOC1 305

SOURCE WATER PIPE LINE 5 30N30

CONTINUED ON DWG 30N27

CONTINUED ON DWG 30N29

MPR-305
MOTOR PROTECTION RELAY

PMP-305
PUMP 5
3000HP 4160VAC 3PH
3 30N09

FE-305
PUMP 5 LOW FLOW
3000 GPM
NF111 TYP

PE1-305
PUMP 5 PRESSURE TRANSMITTER
0-400 PSIG
NP501 TYP

PE2-305
PRESSURE SWITCH HIGH
___ PSIG OPEN
NP501 TYP

PI1-305
PUMP 5 PRESSURE INDICATOR
0-400 PSIG

PI2-305
PRESSURE INDICATOR
0-400 PSI

REV	DATE	BY	DESCRIPTION
			AGENCY REVIEW

DESIGNED ANW
DRAWN KMM
CHECKED DJC
DATE OCTOBER 2025

COLORADO LICENSED
DANIEL CHARLES RICHARDS
67412
PROFESSIONAL ENGINEER

carollo

THORNTON WATER PROJECT

CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
INSTRUMENTATION
PUMP NO. 5 P&ID

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

JOB NO. 203505
DRAWING NO. 30N28
SHEET NO. 123 OF 160

LAST SAVED BY: DCOSME

PROJECT NO. XXXXXX FILE NAME: 20350530N28.DWG

10/29/2025 2:17 PM

KEY NOTES:

1. PROVIDE A TOTAL OF TWO VIBRATION TRANSMITTERS - ONE INLINE WITH DISCHARGE AND THE OTHER PERPENDICULAR TO THE FIRST VIBRATION TRANSMITTER.
2. CONNECTIONS BETWEEN MPR AND VFD TO BE COMPATIBLE WITH MANUFACTURERS EQUIPMENT.

I/O

MPR_1 MBTCP
MPR 306 PLC-SW

VFD_1 HARDWIRED
VFD 306 PLC-SW

RNG 306 DI RUNNING PLC-SW
RDY 306 DI READY PLC-SW
REM 306 DI REMOTE PLC-SW

SPDF 306 AI SPEED FBK PLC-SW
SPDC 306 AO SPEED CMD PLC-SW
RUN 306 DO RUN PLC-SW

VF 306 AI VOLTAGE FBK PLC-SW
AF 306 AI AMPS FBK PLC-SW
YA1 306 DI VFD OK PLC-SW

P 306 AI PLC-SW

PSH 306 DI HIGH PRESSURE PLC-SW

ZSO1 306 DI OPENED PLC-SW
ZSC1 306 DI CLOSED PLC-SW

FLOAT LEVELS 18 30N28

POWER SOURCE

MPR 306

VFD-306
VFD-RH
4160VAC-3P
SWGR-SW

CB 306 TM 4160VAC-3P SWGR-SW

2

FIELD

LCP 306
HSU2 306 E-STOP

VIBRATION TERMINATION BOX (FBV)

RTD TERMINATION BOX (FBV)

TE7 306 MOTOR UPPER BEARING RTD
TE8 306 MOTOR LOWER BEARING RTD
TE1 306 MOTOR WINDING PHASE A RTD
TE4 306 MOTOR WINDING PHASE A RTD
TE2 306 MOTOR WINDING PHASE B RTD
TE5 306 MOTOR WINDING PHASE B RTD
TE3 306 MOTOR WINDING PHASE C RTD
TE6 306 MOTOR WINDING PHASE C RTD

XVT1 306 VIB
XVE1 306 VIB 1
XVT2 306 VIB
XVE2 306 VIB 1

PMP 306
MWH 306

FSL 306
FE 306 THERMAL

PI1 306
PIT 306 INT PRESSURE
PE1 306

PI2 306
PSH 306 HIGH PRESSURE INT MECHANICAL
PE2 306

ZSOC1 306

SOURCE WATER PIPE LINE 6 30N30

CONTINUED ON DWG 30N28

MPR-306
MOTOR PROTECTION RELAY

PMP-306
PUMP 6
3000HP 4160VAC 3PH
3 30N09

FE-306
PUMP 6 LOW FLOW
3000 GPM
NF111 TYP

PE1-306
PUMP 6 PRESSURE TRANSMITTER
0-400 PSIG
NP501 TYP

PE2-306
PRESSURE SWITCH HIGH
___ PSIG OPEN
NP501 TYP

PI1-306
PUMP 6 PRESSURE INDICATOR
0-400 PSIG

PI2-306
PRESSURE INDICATOR
0-400 PSI

REV	DATE	BY	DESCRIPTION
			AGENCY REVIEW

DESIGNED ANW
DRAWN KMM
CHECKED DJC
DATE OCTOBER 2025

COLORADO LICENSED DANIEL CHARLES RICHARDS 67412 PROFESSIONAL ENGINEER

carollo

THORNTON WATER PROJECT

CITY OF THORNTON
THORNTON WATER PROJECT
SOURCE WATER PUMP STATION
INSTRUMENTATION
PUMP NO. 6 P&ID

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

JOB NO. 203505
DRAWING NO. 30N29
SHEET NO. 124 OF 160

LAST SAVED BY: DCOSME

PROJECT NO. XXXXXX FILE NAME: 20350530N29.DWG