

INSTRUMENTATION AND CONTROLS SYMBOLS

ELECTRICAL FOR CONTROL WIRING DIAGRAMS

	COIL OR CONTROL RELAY, TIMING RELAY OR MOTOR STARTER HOLDING COIL		PRESSURE SWITCH, NORMALLY OPEN CONTACT
	ALARM BELL, (AH) ALARM HORN		PRESSURE SWITCH, NORMALLY CLOSED CONTACT
	PILOT LIGHT, PUSH TO TEST		DIFFERENTIAL PRESSURE SWITCH, NORMALLY OPEN CONTACT
	PILOT LIGHT, NON PUSH TO TEST (ON-OFF)		DIFFERENTIAL PRESSURE SWITCH, NORMALLY CLOSED CONTACT
	RELAY CONTACT, NORMALLY OPEN		SOLENOID VALVE
	RELAY CONTACT, NORMALLY CLOSED		FREEZESTAT NORMALLY OPEN CONTACT HELD CLOSED
	START PUSH BUTTON		TEMPERATURE SWITCH - NORMALLY CLOSED CONTACT
	STOP PUSH BUTTON		TEMPERATURE SWITCH - NORMALLY OPEN CONTACT
	"ON DELAY" TIMING RELAY CONTACT - NORMALLY OPEN TIMED CONTACT, TIMED CLOSED AFTER COIL ENERGIZATION		250 OHM HIGH-PRECISION RESISTOR (0.01%)
	"ON DELAY" TIMING RELAY CONTACT - NORMALLY CLOSED TIMED CONTACT, TIMED OPEN AFTER COIL ENERGIZATION		TERMINAL BLOCK
	"OFF DELAY" TIMING RELAY CONTACT - NORMALLY OPEN TIMED CONTACT, TIMED OPEN AFTER COIL DE-ENERGIZATION		FUSE
	"OFF DELAY" TIMING RELAY CONTACT - NORMALLY CLOSED TIMED CONTACT, TIMED CLOSED AFTER COIL DE-ENERGIZATION		SINGLE-PHASE MOTOR
	THREE-POSITION SELECTOR SWITCH		THREE-PHASE MOTOR WITH A FIELD MOUNTED DISCONNECT
	TWO-POSITION SELECTOR SWITCH		ALARM BEACON (EXPLOSION-PROOF)
	FLOW SWITCH, NORMALLY OPEN CONTACT		
	FLOW SWITCH, NORMALLY CLOSED CONTACT		
	LEVEL SWITCH, NORMALLY OPEN CONTACT		
	LEVEL SWITCH, NORMALLY CLOSED CONTACT		
	LIMIT SWITCH, NORMALLY OPEN		
	LIMIT SWITCH, NORMALLY OPEN HELD CLOSED		
	LIMIT SWITCH, NORMALLY CLOSED		
	LIMIT SWITCH, NORMALLY CLOSED HELD OPEN		

INSTRUMENTATION AND CONTROLS ABBREVIATIONS

INSTRUMENT AND CONTROL DEVICE DESIGNATORS

AE	ANALYSIS ELEMENT, AS DEFINED	UA	MULTI-VARIABLE ALARM FUNCTION (DEFINED ON DRAWING)
AIC	ANALYSIS INDICATING CONTROLLER	UR	MULTI-VARIABLE RECORDER
AIT	ANALYSIS INDICATING TRANSMITTER, AS DEFINED	UY	MULTI-VARIABLE COMPUTATION OR LOGIC FUNCTION
AY	ANALYSIS LOGIC, COMPUTATION OR OUTPUT DEVICE		
CV	CONTROL VALVE (LIMITED USE)	VAH	VIBRATION ALARM HIGH
D	DAMPER	VSH	VIBRATION SWITCH HIGH
DCPS	120VAC TO 24VDC POWER SUPPLY	ZS	POSITION SWITCH
DDC	DIRECT DIGITAL CONTROLLER	ZSC	POSITION SWITCH, CLOSED (POSITION)
DM	DAMPER ACTUATOR	ZSO	POSITION SWITCH, OPEN (POSITION)
DP	DIFFERENTIAL PRESSURE SWITCH	ZY	POSITION LOGIC, COMPUTATION OR OUTPUT DEVICE
DPS	DRAIN VALVE (LIMITED USE)		
ES	UNMANAGED ETHERNET SWITCH	I/P	CURRENT-TO-PNEUMATIC TRANSDUCER OR CURRENT-TO-PNEUMATIC TRANSDUCER/POSITIONER AS INDICATED BY THE DAMPER SYMBOL
FAH	FLOW ALARM HIGH	P/I	PNEUMATIC-TO-CURRENT TRANSDUCER
FAL	FLOW ALARM LOW	P/P	PNEUMATIC POSITIONER
FALH	FLOW ALARM LIGHT HIGH		
FALL	FLOW ALARM LIGHT LOW		
FE	FLOW ELEMENT		
FI	FLOW INDICATOR		
FIC	FLOW INDICATING CONTROLLER		
FIT	FLOW INDICATING TRANSMITTER		
FQI	FLOW TOTALIZER		
FQY	FLOW INTEGRATOR		
FR	FLOW RECORDER		
FS	FLOW SWITCH		
FSH	FLOW SWITCH HIGH		
FSL	FLOW SWITCH LOW		
FT	FLOW TRANSMITTER		
FCV	FLOW CONTROL VALVE, SELF-CONTAINED		
FV	FLOW CONTROL VALVE		
FY	FLOW LOGIC, COMPUTATION OR OUTPUT DEVICE		
HIC	AUTO/MANUAL INDICATING CONTROL STATION		
HMI	HUMAN MACHINE INTERFACE		
HS	MANUAL SELECTOR SWITCH		
IR	INDUCTION RELAY		
KOI	RUNNING TIME METER		
LAH	LEVEL ALARM HIGH		
LAL	LEVEL ALARM LOW		
LALH	LEVEL ALARM LIGHT HIGH		
LALL	LEVEL ALARM LIGHT LOW		
LC	LEVEL CONTROLLER		
LE	LEVEL ELEMENT		
LI	LEVEL INDICATOR		
LIT	LEVEL INDICATING TRANSMITTER		
LS	LEVEL SWITCH		
LSHH	LEVEL SWITCH HIGH HIGH		
LSH	LEVEL SWITCH HIGH		
LSL	LEVEL SWITCH LOW		
LSLL	LEVEL SWITCH LOW LOW		
LT	LEVEL TRANSMITTER		
LCV	LEVEL CONTROL VALVE, SELF-CONTAINED		
LV	LEVEL CONTROL VALVE		
LY	LEVEL LOGIC, COMPUTATION OR OUTPUT DEVICE		
MC	MOISTURE CONTROLLER		
ME	MOISTURE ELEMENT		
MT	RELATIVE HUMIDITY TRANSMITTER		
MTT	DEWPOINT OR SPECIFIC HUMIDITY TRANSMITTER, AS INDICATED		
MY	MOISTURE LOGIC, COMPUTATION OR OUTPUT DEVICE		
NI	TONNAGE INDICATOR, REFRIGERATION		
NY	TONNAGE LOGIC OR COMPUTATION DEVICE		
PAH	PRESSURE ALARM HIGH	AB	ALARM BEACON
PAL	PRESSURE ALARM LOW	AH	ALARM HORN
PALH	PRESSURE ALARM LIGHT HIGH	CB	CIRCUIT BREAKER
PALL	PRESSURE ALARM LIGHT LOW	CR	CONTROL RELAY
PDI	PRESSURE DIFFERENTIAL INDICATOR	CRL	LATCHING RELAY
PDIC	PRESSURE DIFFERENTIAL INDICATING CONTROLLER	CT	CURRENT TRANSFORMER
PDIS	PRESSURE DIFFERENTIAL INDICATING SWITCH	DISC	DISCONNECT
PDS	PRESSURE DIFFERENTIAL SWITCH	DCPS	AC TO DC POWER SUPPLY
PDSH	PRESSURE DIFFERENTIAL SWITCH HIGH	DPDT	DOUBLE POLE, DOUBLE THROW
PDSL	PRESSURE DIFFERENTIAL SWITCH LOW	FU	FUSE
PDT	PRESSURE DIFFERENTIAL TRANSMITTER	HOA	HAND/OFF/AUTO SELECTOR SWITCH
PDCV	PRESSURE DIFFERENTIAL CONTROL VALVE, SELF-CONTAINED	HTR	THERMOSTATICALLY CONTROLLED HEATER
PDV	PRESSURE DIFFERENTIAL CONTROL VALVE	ISB	INTRINSIC SAFETY BARRIER
PI	PRESSURE INDICATOR	ISR	INTRINSICALLY SAFE RELAY
PIC	PRESSURE INDICATING CONTROLLER	M	MOTOR STARTER (OR MOTOR)
PS	PRESSURE SWITCH	MV	MOTORIZED VALVE
PSH	PRESSURE SWITCH HIGH	OCA	OPEN/CLOSE/AUTO SELECTOR SWITCH
PSL	PRESSURE SWITCH LOW	OL	OVERLOAD
PT	PRESSURE TRANSMITTER	PB	PUSHBUTTON
PCV	PRESSURE CONTROL VALVE, SELF-CONTAINED	PL	PILOT LIGHT
PV	PRESSURE CONTROL VALVE	PT	POTENTIAL TRANSFORMER
PY	PRESSURE LOGIC, COMPUTATION OR OUTPUT DEVICE	REC	DUPLEX RECEPTACLE
		SA	SURGE ARRESTOR
SA	SURGE ARRESTOR	SCRN	WASTEWATER SCREENING UNIT
SD	SMOKE DETECTOR	SHLD	SHIELDED
SV	SOLENOID VALVE	SFDT	SINGLE POLE, DOUBLE THROW
		SPST	SINGLE POLE, SINGLE THROW
TAH	TEMPERATURE ALARM HIGH	SS	SELECTOR SWITCH
TAL	TEMPERATURE ALARM LOW	SV	SOLENOID VALVE
TAH	TEMPERATURE ALARM HIGH	T	THERMOSTAT
TAL	TEMPERATURE ALARM LOW	TB	TERMINAL BLOCK
TALH	TEMPERATURE ALARM LIGHT HIGH	TC	TIME CLOCK
TALL	TEMPERATURE ALARM LIGHT LOW	TR	TIMING RELAY
TC	TEMPERATURE CONTROLLER	TRA	AMPERE TRANSDUCER
TE	TEMPERATURE ELEMENT	TRHZ	FREQUENCY TRANSDUCER
TI	TEMPERATURE INDICATOR	TRP	POWER FACTOR TRANSDUCER
TR	TEMPERATURE RECORDER	TRV	KVAR TRANSDUCER
TS	TEMPERATURE SWITCH	TRW	KILOWATT TRANSDUCER
TSH	TEMPERATURE SWITCH HIGH	VTR	VOLTAGE TRANSDUCER
TSL	TEMPERATURE SWITCH LOW	WHM	WATT HOUR METER
TT	TEMPERATURE TRANSMITTER		
TCV	TEMPERATURE CONTROL VALVE, SELF-CONTAINED		
TV	TEMPERATURE CONTROL VALVE		
TY	TEMPERATURE LOGIC, COMPUTATION OR OUTPUT DEVICE		

CONTROL, OPERATIONAL OR FUNCTIONAL DESIGNATORS

ATC	AIR-TO-CLOSE	NCHO	NORMALLY CLOSED, HELD OPEN
ATO	AIR-TO-OPEN	NOHC	NORMALLY OPEN, HELD CLOSED
ATO	AIR-TO-OPEN	NCTO	NORMALLY CLOSED, TIMED OPEN
C	COMMON	NCTC	NORMALLY CLOSED, TIMED CLOSED
CC	CONTACT CLOSURE	NOTO	NORMALLY OPEN, TIMED OPEN
CA	CRITICAL ALARM	NOTC	NORMALLY OPEN, TIMED CLOSED
MA	MAINTENANCE ALARM	PB	PROPORTIONAL BAND
DA	DIRECT ACTING	PV	PROCESS VARIABLE
RA	REVERSE ACTING	R/L	REMOTE/LOCAL
I	INTERLOCK	RSP	REMOTE SETPOINT
L	LATCH	SP	SETPOINT
U	UNLATCH	TR	THROTTLING RANGE
FC	FAIL CLOSED		
FO	FAIL OPEN		
NC	NORMALLY CLOSED		
NO	NORMALLY OPEN		
NCHO	NORMALLY CLOSED, HELD OPEN		
NOHC	NORMALLY OPEN, HELD CLOSED		
NCTO	NORMALLY CLOSED, TIMED OPEN		
NCTC	NORMALLY CLOSED, TIMED CLOSED		
NOTO	NORMALLY OPEN, TIMED OPEN		
NOTC	NORMALLY OPEN, TIMED CLOSED		
PB	PROPORTIONAL BAND		
PV	PROCESS VARIABLE		
R/L	REMOTE/LOCAL		
RSP	REMOTE SETPOINT		
SP	SETPOINT		
TR	THROTTLING RANGE		

EQUIPMENT AND DEVICE LOCATION DESIGNATORS

A	ANNUNCIATOR
DDC	DIRECT DIGITAL CONTROLLER PANEL
E	FIELD LOCATED EQUIPMENT
EMAC	FACILITIES MONITORING AND CONTROL (SYSTEM)
G	GRAPHIC
LCP	LOCAL CONTROL PANEL
M	MOTOR STARTER
MCC	MOTOR CONTROL CENTER
MCP	MASTER CONTROL PANEL
MECP	MAIN ELECTRICAL CONTROL PANEL
ELC	PROGRAMMABLE LOGIC CONTROLLER
RCP	REMOTE CONTROL PANEL
RST	REMOTE STATION, DIGITAL INPUT/OUTPUT PANEL

ELECTRICAL CONTROL DEVICE DESIGNATORS

AB	ALARM BEACON
AH	ALARM HORN
CB	CIRCUIT BREAKER
CR	CONTROL RELAY
CRL	LATCHING RELAY
CT	CURRENT TRANSFORMER
DISC	DISCONNECT
DCPS	AC TO DC POWER SUPPLY
DPDT	DOUBLE POLE, DOUBLE THROW
FU	FUSE
HOA	HAND/OFF/AUTO SELECTOR SWITCH
HTR	THERMOSTATICALLY CONTROLLED HEATER
ISB	INTRINSIC SAFETY BARRIER
ISR	INTRINSICALLY SAFE RELAY
M	MOTOR STARTER (OR MOTOR)
MV	MOTORIZED VALVE
OCA	OPEN/CLOSE/AUTO SELECTOR SWITCH
OL	OVERLOAD
PB	PUSHBUTTON
PL	PILOT LIGHT
PT	POTENTIAL TRANSFORMER
REC	DUPLEX RECEPTACLE
SA	SURGE ARRESTOR
SCRN	WASTEWATER SCREENING UNIT
SHLD	SHIELDED
SFDT	SINGLE POLE, DOUBLE THROW
SPST	SINGLE POLE, SINGLE THROW
SS	SELECTOR SWITCH
SV	SOLENOID VALVE
T	THERMOSTAT
TB	TERMINAL BLOCK
TC	TIME CLOCK
TR	TIMING RELAY
TRA	AMPERE TRANSDUCER
TRHZ	FREQUENCY TRANSDUCER
TRP	POWER FACTOR TRANSDUCER
TRV	KVAR TRANSDUCER
TRW	KILOWATT TRANSDUCER
VTR	VOLTAGE TRANSDUCER
WHM	WATT HOUR METER

INSTRUMENTATION AND CONTROLS DRAWING LIST

THE DRAWING LIST SHOWN REPRESENTS DRAWINGS ASSOCIATED WITH THIS PROJECT.

DRAWING NUMBER	DRAWING TITLE
I-1	INSTRUMENTATION & CONTROLS SYMBOLS, ABBREVIATIONS AND DRAWING LIST
I-2	INSTRUMENTATION & CONTROLS LIFT STATION CONTROL PANEL AND SUBPLATE LAYOUT
I-3	INSTRUMENTATION & CONTROLS LIFT STATION CONTROL PANEL BILL OF MATERIALS
I-4	INSTRUMENTATION & CONTROLS LIFT STATION CONTROL PANEL POWER WIRING DIAGRAM
I-5	INSTRUMENTATION & CONTROLS LIFT STATION CONTROL PANEL PLC I/O WIRING DIAGRAM
I-6	INSTRUMENTATION & CONTROLS LIFT STATION CONTROL PANEL PLC I/O WIRING DIAGRAM
I-7	INSTRUMENTATION & CONTROLS LIFT STATION CONTROL PANEL PLC I/O WIRING DIAGRAM
I-8	INSTRUMENTATION & CONTROLS LIFT STATION CONTROL PANEL ANALOG LOOP WIRING DIAGRAM
I-9	INSTRUMENTATION & CONTROLS LIFT STATION MOTOR STARTER WIRING DETAILS

DATE	ADDITIONS AND/OR REVISIONS
06-18-08	NMOCD
05-28-08	OWNER REVIEW
04-10-08	OWNER REVIEW
DESIGNED	T.W.H.
DRAWN	T.W.H.
CHECKED	K.L.C.
APPROVED	M.A.O.

MISCELLANEOUS DESIGNATORS

AI	ANALOG INPUT
AO	ANALOG OUTPUT
DI	DIGITAL INPUT
DO	DIGITAL OUTPUT
I/O	INPUT/OUTPUT

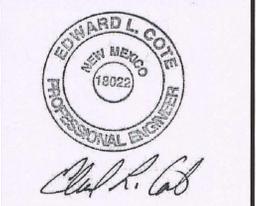
GENERAL NOTES

1. ALL SYMBOLS AND ABBREVIATIONS SHOWN ON THIS SHEET MAY NOT BE USED ON THIS PROJECT. ONLY THOSE SYMBOLS SHOWN ON PLANS AND DIAGRAMS APPLY.



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WESTERN REFINING - GALLUP

SANITARY WASTEWATER LIFT STATION

JAMESTOWN NEW MEXICO 87347

INSTRUMENTATION & CONTROLS SYMBOLS, ABBREVIATIONS AND DRAWING LIST

HRC JOB NO. 20070465	SCALE NONE
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