American River Basin

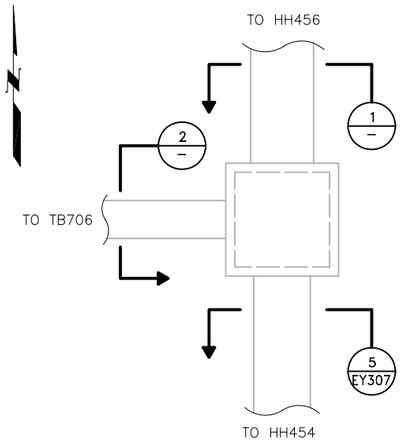
Attachment 3: Work Plan

Supporting Documents

Att3_IG1_ARB_Workplan_7of10 includes the following:

Project No.	Project Name	Supporting Documentation Included	Notes
8	Sacramento Regional County Sanitation District / Sacramento Power Authority Recycled Water Project	SRCSD/SPA Recycled Water Project Feasibility Study	The Feasibility Study for the project also includes the conceptual design drawings for the project.
9	North Antelope Booster Pump Station Project	North Antelope Booster Pump Station Piping Plan	The piping plan and site evaluation function as the conceptual design for the proposed project.
		Preliminary Pump Station Site Evaluation Technical Memorandum	
		Sacramento Suburban Water District Standard Details	The project will follow these included SSWD Standards.
		Sacramento Suburban Water District Improvement Standards and Technical Specifications	

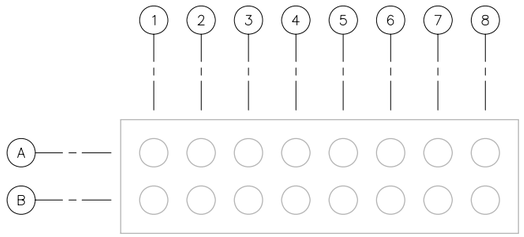
SRCSD/SPA Recycled Water Project Feasibility Study (Part 3 of 3)



HANDHOLE 455

PARTIAL PLAN

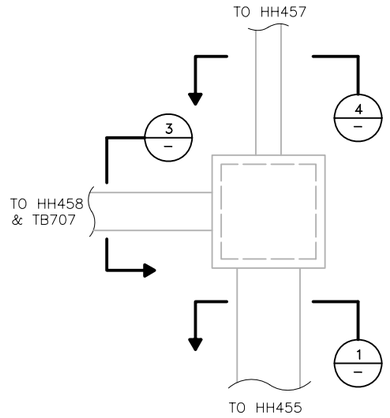
SCALE: 1/4"=1'-0"



LOCATION	CONDUIT NUMBER	LOCATION	CONDUIT NUMBER
A-1	11X4014C	B-1	11S4002D
A-2	11X4009B	B-2	11X4008C
A-3	11S7060E	B-3	11X7070C
A-4	11S7069B	B-4	11X7071C
A-5	11S7121E	B-5	11X7091B
A-6	11S7213F	B-6	11X7092B
A-7	11X7102D	B-7	11X7133C
A-8	11X7245C	B-8	11X7246C

SECTION 1/–

SCALE: NONE



HANDHOLE 456

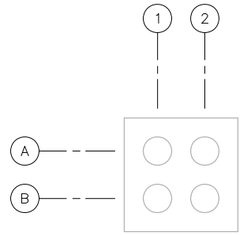
PARTIAL PLAN

SCALE: 1/4"=1'-0"

NOTES:

1.) EXCEPT FOR EXISTING EMPTY CONDUITS, REMOVE ALL WIRES OR CABLES. FROM CONDUITS WHICH ARE REDESIGNATED AND REUSED FOR THIS PROJECT.

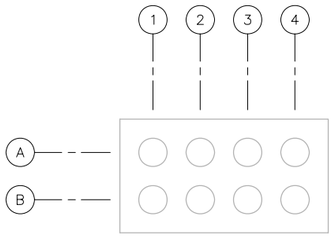
2.) INSTALL WIRES OR CABLES IN EXISTING REDESIGNATED CONDUITS PER SECTION 16993.



LOCATION	CONDUIT NUMBER	LOCATION	CONDUIT NUMBER
A-1	11X4014B	B-1	11S4002E
A-2	11X4009C	B-2	11X4008D

SECTION 4/– 5/EY309

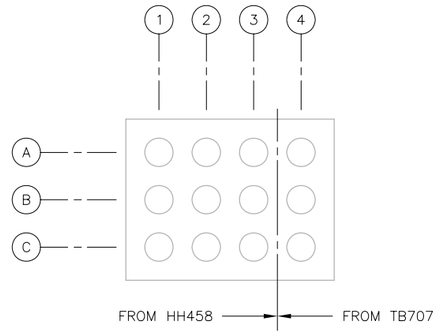
SCALE: NONE



LOCATION	CONDUIT NUMBER	LOCATION	CONDUIT NUMBER
A-1	11S7216D	B-1	11S7255A
A-2	11X7219C	B-2	11X7256A
A-3	11S7225C	B-3	11X7257A
A-4	11S7254C	B-4	11S7254N

SECTION 2/–

SCALE: NONE



LOCATION	CONDUIT NUMBER	LOCATION	CONDUIT NUMBER	LOCATION	CONDUIT NUMBER
A-1	11S7060D	B-1	11X7070D	C-1	11X7071D
A-2	11S7069C	B-2	11X7091C	C-2	11X7092C
A-3	11S7121D	B-3	11X7102E	C-3	11X7133D
A-4	11S7213E	B-4	11X7245B	C-4	11X7246B

SECTION 3/–

SCALE: NONE

PRELIMINARY – NOT FOR CONSTRUCTION

Terada Engineering, Inc.
1570 The Alameda
Suite 221
San Jose,California 95126
(408) 294-1445

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ROBERT TERADA
No. E9236
Exp. 9-30-11
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE EY308
DRAWN L. R. CASTILLO
DESIGNED R. TERADA
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

ELECTRICAL

EXISTING HANDHOLE 455 & 456 AND DUCT BANK SECTIONS

SCALE: NONE

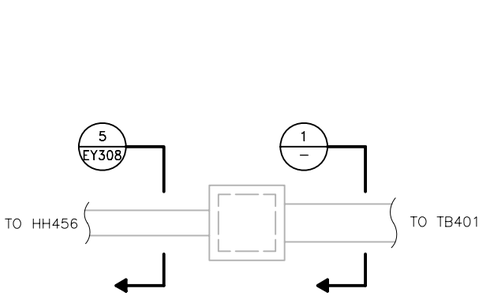
DRAWING NUMBER: EY308

SHEET NUMBER: 158 OF 236

NOTES:

1.) EXCEPT FOR EXISTING EMPTY CONDUITS, REMOVE ALL WIRES OR CABLES. FROM CONDUITS WHICH ARE REDESIGNATED AND REUSED FOR THIS PROJECT.

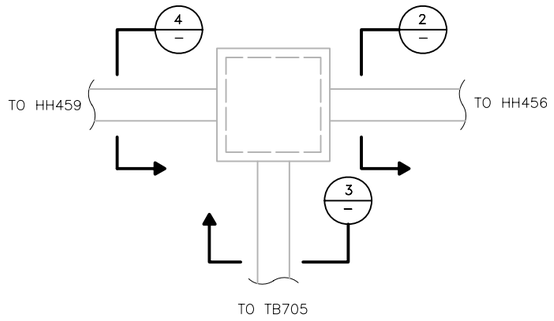
2.) INSTALL WIRES OR CABLES IN EXISTING REDESIGNATED CONDUITS PER SECTION 16993.



HANDHOLE 457

PARTIAL PLAN

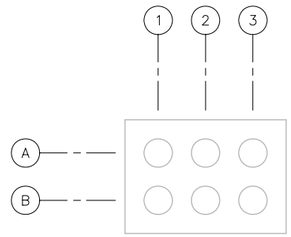
SCALE: 1/4"=1'–0"



HANDHOLE 458

PARTIAL PLAN

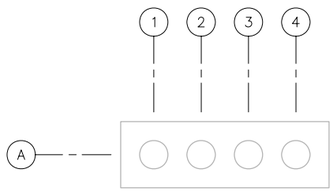
SCALE: 1/4"=1'–0"



LOCATION	CONDUIT NUMBER	LOCATION	CONDUIT NUMBER
A–1	11S7121C	B–1	11X7133E
A–2	11S7132A	B–2	11X7134A
A–3	11X7102F	B–3	11X7135A

SECTION 3 / –

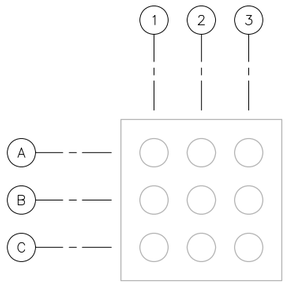
SCALE: NONE



LOCATION	CONDUIT NUMBER
A–1	11X4014A
A–2	11X4009D
A–3	11S4002F
A–4	11X4008E

SECTION 1 / –

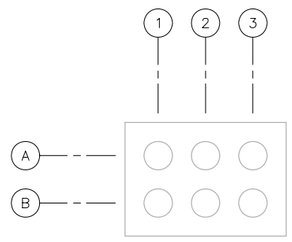
SCALE: NONE



LOCATION	CONDUIT NUMBER	LOCATION	CONDUIT NUMBER	LOCATION	CONDUIT NUMBER
A–1	11S7060D	B–1	11X7070D	C–1	11X7071D
A–2	11S7069C	B–2	11X7091C	C–2	11X7092C
A–3	11S7121D	B–3	11S7102E	C–3	11X7133D

SECTION 2 / –

SCALE: NONE



LOCATION	CONDUIT NUMBER	LOCATION	CONDUIT NUMBER
A–1	11S7060C	B–1	11X7091D
A–2	11S7069D	B–2	11X7092D
A–3	11X7070E	B–3	11X7071E

SECTION 4 / – 4 / EY310

SCALE: NONE

PRELIMINARY – NOT FOR CONSTRUCTION

Terada Engineering, Inc.
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Suite 221
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ROBERT TERADA
No. E9236
Exp. 9–30–11
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STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"–SCALE ACCORDINGLY)

FILE EY309
DRAWN L. R. CASTILLO
DESIGNED R. TERADA
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

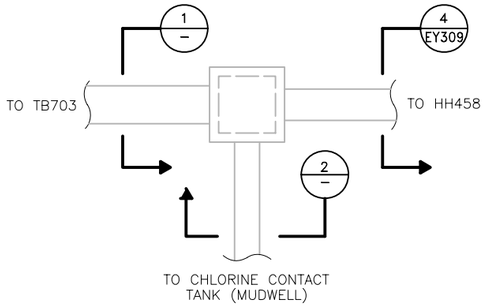
ELECTRICAL

EXISTING HANDHOLE 457 & 458 AND DUCT BANK SECTIONS

SCALE: NONE

DRAWING NUMBER: EY309

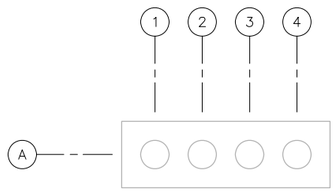
SHEET NUMBER: 159 OF 236



HANDHOLE 459

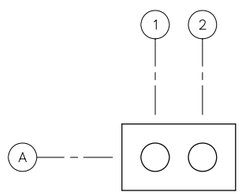
PARTIAL PLAN

SCALE: 1/4"=1'–0"



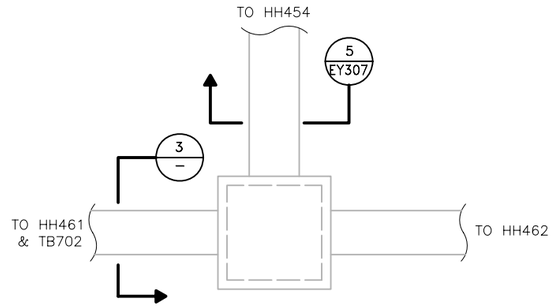
LOCATION	CONDUIT NUMBER
A–1	11S7064C
A–2	11S7069E
A–3	11X7070F
A–4	11X7071F

SECTION 1 – SCALE: NONE



LOCATION	CONDUIT NUMBER
A–1	11X7091E
A–2	11S7060B

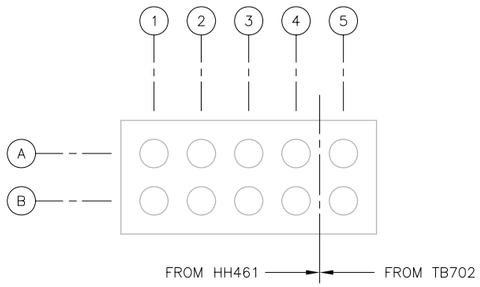
SECTION 2 – SCALE: NONE



HANDHOLE 460

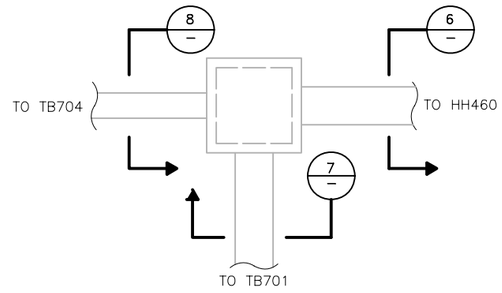
PARTIAL PLAN

SCALE: 1/4"=1'–0"



LOCATION	CONDUIT NUMBER	LOCATION	CONDUIT NUMBER
A–1	11S7054C	B–1	11X7081C
A–2	11X7032B	B–2	11X7033B
A–3	11X7023C	B–3	11X7024B
A–4	11S7012G	B–4	11S7022C
A–5	11S7044B	B–5	11X7045A

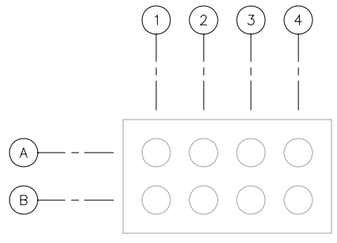
SECTION 3 – SCALE: NONE



HANDHOLE 461

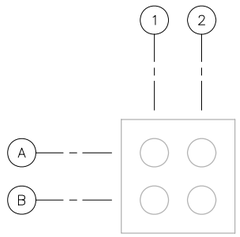
PARTIAL PLAN

SCALE: 1/4"=1'–0"



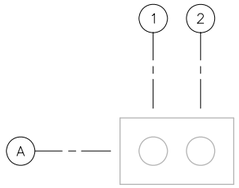
LOCATION	CONDUIT NUMBER	LOCATION	CONDUIT NUMBER
A–1	11S7054C	B–1	11X7081C
A–2	11X7032B	B–2	11X7033B
A–3	11X7023C	B–3	11X7024B
A–4	11S7012G	B–4	11S7022C

SECTION 6 – SCALE: NONE



LOCATION	CONDUIT NUMBER
A–1	11S7022D
A–2	11S7012F
B–1	11X7024A
B–2	11S7023D

SECTION 7 – SCALE: NONE



LOCATION	CONDUIT NUMBER
A–1	11S7054B
A–2	11X7081D

SECTION 8 – SCALE: NONE

NOTES:

1.) EXCEPT FOR EXISTING EMPTY CONDUITS, REMOVE ALL WIRES OR CABLES. FROM CONDUITS WHICH ARE REDESIGNATED AND REUSED FOR THIS PROJECT.

2.) INSTALL WIRES OR CABLES IN EXISTING REDESIGNATED CONDUITS PER SECTION 16993.

PRELIMINARY – NOT FOR CONSTRUCTION

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1570 The Alameda
Suite 221
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(408) 294-1445

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REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	C	100% SUBMITTAL		01/10	

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FILE EY310
DRAWN L. R. CASTILLO
DESIGNED R. TERADA
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

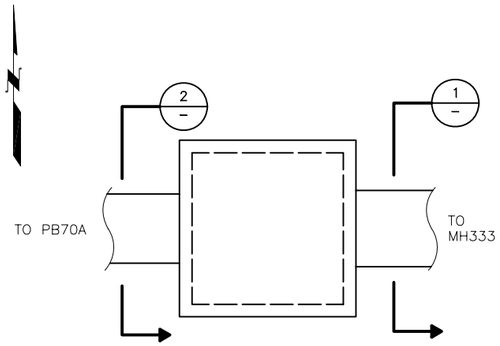
ELECTRICAL

EXISTING HANDHOLE 459, 460 & 461 AND DUCT BANK SECTIONS

SCALE: NONE

DRAWING NUMBER: EY310

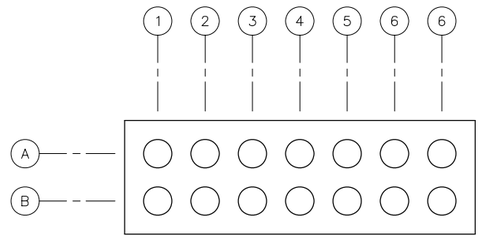
SHEET NUMBER: 160 OF 236



MANHOLE 1002

PARTIAL PLAN

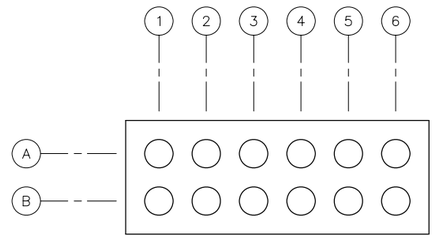
SCALE: 1/4"=1'-0"



LOCATION	CONDUIT NUMBER	LOCATION	CONDUIT NUMBER
A-1	44PC700022A	B-1	44P7LPC30E
A-2	44PC700021A	B-2	44P7LPD32E
A-3	44PC700013A	B-3	44P7LPA18E
A-4	44PC700012A	B-4	44X700144A
A-5	44PC700026A	B-5	44X700145A
A-6	44PC700025A	B-6	44X700146A
A-7	44X700143A	B-7	44P700133B

SECTION 1 –

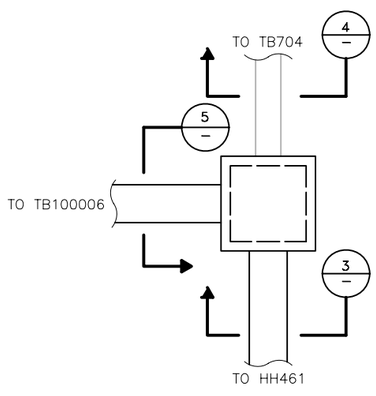
SCALE: NONE



LOCATION	CONDUIT NUMBER	LOCATION	CONDUIT NUMBER
A-1	44PC700022B	B-1	44P7LPC30F
A-2	44PC700021B	B-2	44P7LPD32F
A-3	44PC700013B	B-3	44P7LPA18F
A-4	44PC700012B	B-4	44X700144B
A-5	44PC700026B	B-5	44X700145B
A-6	44PC700025B	B-6	44P700133C

SECTION 2 –

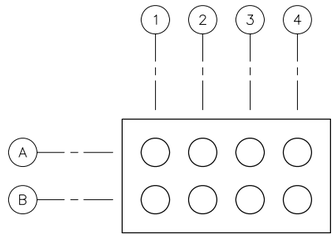
SCALE: NONE



HANDHOLE 100005

PARTIAL PLAN

SCALE: 1/4"=1'-0"

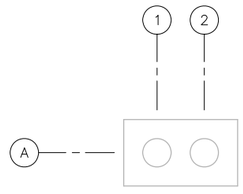


LOCATION	CONDUIT NUMBER	LOCATION	CONDUIT NUMBER
A-1	44S7054B1	B-1	44X700151B
A-2	44X7081D1	B-2	44X700149B
A-3	44S700135A	B-3	44X700150B
A-4	44X700148B	B-4	44S700___B

(PA SPEAKER AT CIP)

SECTION 3 –

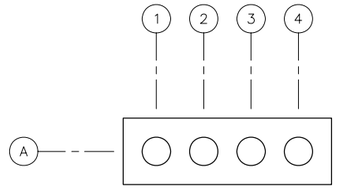
SCALE: NONE



LOCATION	CONDUIT NUMBER
A-1	44S7054B
A-2	11X7081D

SECTION 4 –

SCALE: NONE



LOCATION	CONDUIT NUMBER
A-1	44S700135B
A-2	44X700149A
A-3	44X700150A
A-4	44S700___C

(PA SPEAKER AT CIP)

SECTION 5 –

SCALE: NONE

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1570 The Alameda
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(408) 294-1445

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BBOR342202

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ROBERT TERADA
No. E9236
Exp. 9-30-11
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE EY311
DRAWN R. TERADA
DESIGNED R. TERADA
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

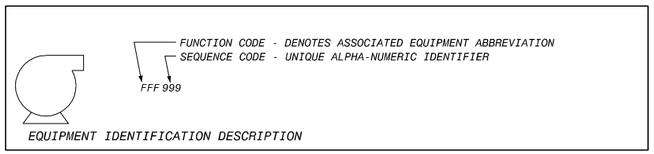
ELECTRICAL

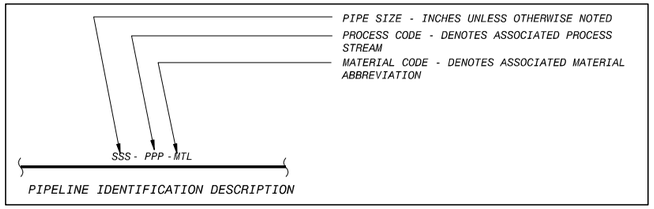
MANHOLE 1002 AND HANDHOLE 100005
AND DUCT BANK SECTIONS

SCALE
NONE

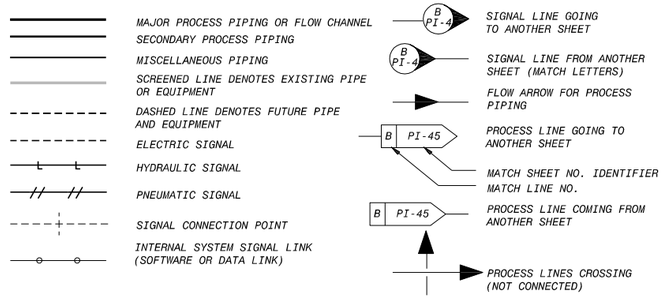
DRAWING NUMBER
EY311

SHEET NUMBER
161 OF 236

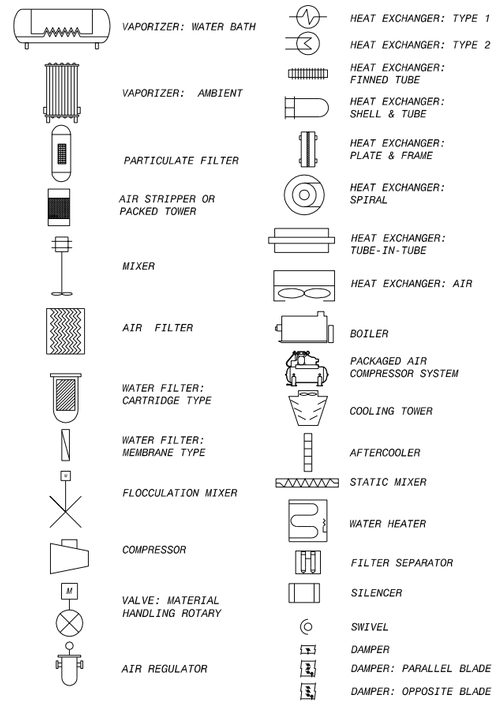




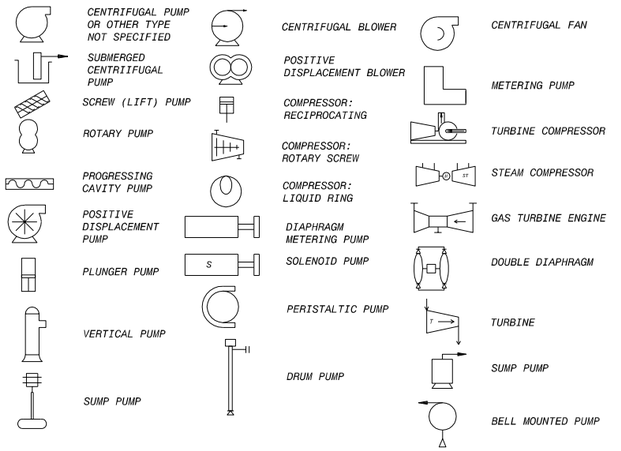
LINE SYMBOLS



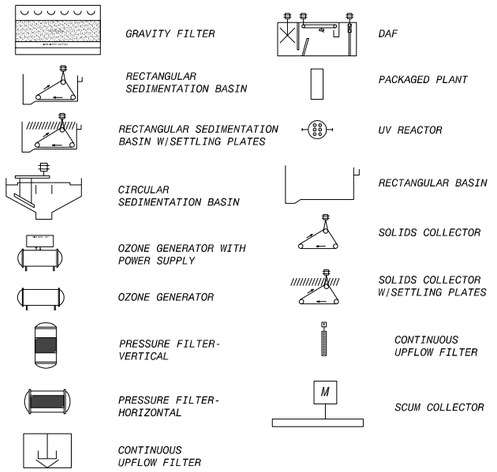
MECHANICAL EQUIPMENT SYMBOLS



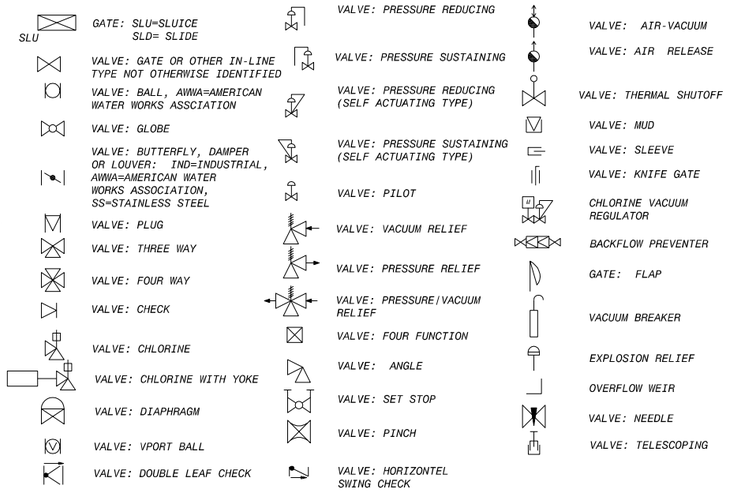
PUMP & BLOWER SYMBOLS



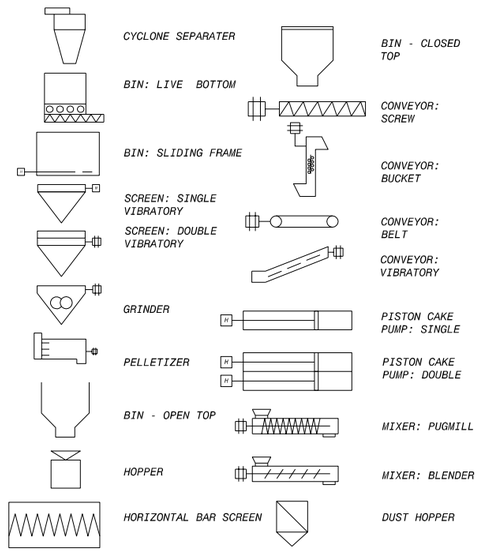
WATER PROCESS SYMBOLS



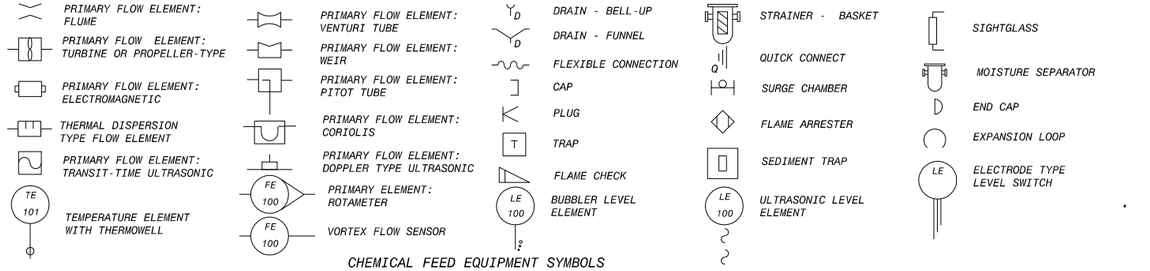
VALVE & GATE SYMBOLS



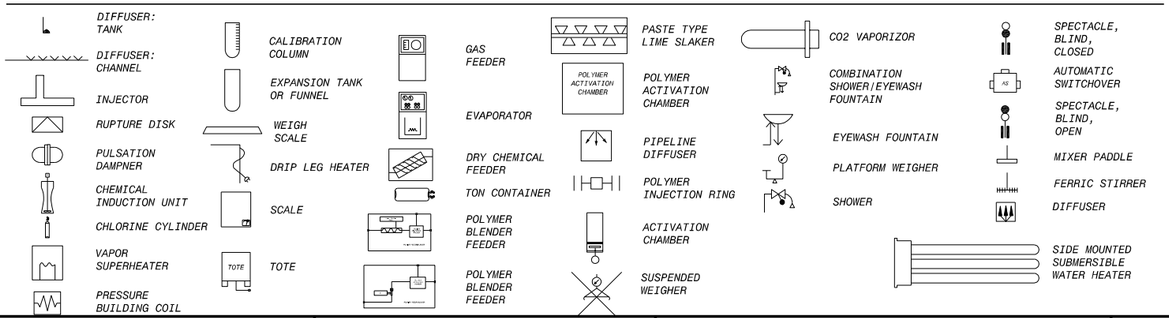
MATERIAL HANDLING EQUIPMENT SYMBOLS

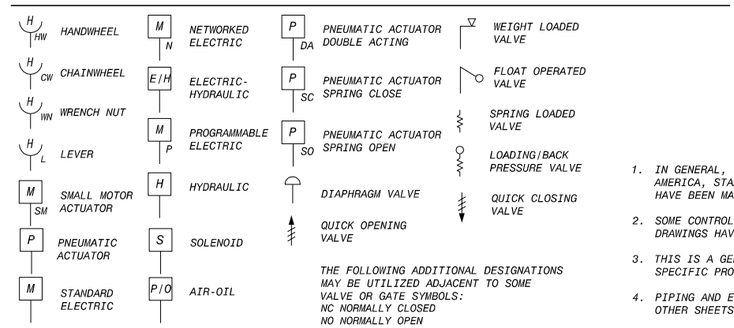


PRIMARY ELEMENT & FITTING SYMBOLS



CHEMICAL FEED EQUIPMENT SYMBOLS





THE FOLLOWING ADDITIONAL DESIGNATIONS MAY BE UTILIZED ADJACENT TO SOME VALVE OR GATE SYMBOLS:
NC NORMALLY CLOSED
NO NORMALLY OPEN
FC FAILS CLOSED
FO FAILS OPEN
FIP FAILS IN LAST POSITION

GENERAL NOTES

1. IN GENERAL, THE P &ID SYMBOLS AND DEVICE IDENTIFICATIONS ARE BASED ON INSTRUMENT SOCIETY OF AMERICA, STANDARD PRACTICE ISA-S5.1 (1988). SOME MODIFICATIONS, ADDITIONS, AND ALTERATIONS HAVE BEEN MADE AS NEEDED TO ACCOMMODATE THE PROJECT REQUIREMENTS.
2. SOME CONTROL AND INTERLOCK REQUIREMENTS WHICH CAN BE MORE CLEARLY ILLUSTRATED ON SCHEMATIC DRAWINGS HAVE BEEN OMITTED FROM THE P & ID DRAWINGS.
3. THIS IS A GENERAL LEGEND SHEET. SOME SYMBOLS AND ABBREVIATIONS MAY NOT BE UTILIZED ON THIS SPECIFIC PROJECT.
4. PIPING AND EQUIPMENT LEGEND APPLIES TO P & ID SHEETS ONLY AND MAY DIFFER FROM LEGENDS FOR OTHER SHEETS.

PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED: 1/13/2010, 6:46:10 PM, Botch Plot
SAVED: OGL22631, 12/21/2009 8:17:16 AM

FBDR342202
BDR342202

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SRCSD

REGISTERED PROFESSIONAL ENGINEER
DEWITT C. SMITH
E 15829
EXP. 12/31/2010
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN JRC
DESIGNED
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

GENERAL
LEGEND & ABBREVIATIONS
SHEET 1 OF 3

SCALE
NONE

DRAWING NUMBER
IG001

SHEET NUMBER
162 OF 236

INSTRUMENT TAG NUMBERS
MEANINGS OF IDENTIFICATION LETTERS

LETTER	FIRST LETTER		SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
C	CONDUCTIVITY (ELECTRICAL)			CONTROL	CLOSED
D	DENSITY (MASS) OR SPECIFIC GRAVITY	DIFFERENTIAL			
E	VOLTAGE (EMF)		PRIMARY ELEMENT		
F	FLOW RATE	RATIO (FRACTION)			
G	USER'S CHOICE		GLASS		
H	HAND (MANUALLY INITIATED)				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME OR TIME-SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	MOISTURE OR HUMIDITY	MOMENTARY			MIDDLE OR INTER-MEDIATE
N	USER'S CHOICE		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
O	USER'S CHOICE		ORIFICE (RESTRICTION)		OPEN
P	PRESSURE OR VACUUM		POINT (TEST CONNECTION)		
Q	QUANTITY	INTEGRATE OR TOTALIZE	INTEGRATE OR TOTALIZE		
R	RADIATION		RECORD OR PRINT		
S	SPEED OR FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION			VALVE, DAMPER, OR LOUVER	
W	WEIGHT OR FORCE		WELL		
X	UNCLASSIFIED		UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE, OR PRESENCE			RELAY OR COMPUTE	
Z	POSITION, DIMENSION			DRIVE, ACTUATOR OR UNCLASSIFIED FINAL CONTROL ELEMENT	

PIPELINE MATERIAL CODE ABBREVIATIONS

PCCP	SECTION 02612, PRESTRESSED CONCRETE CYLINDER PIPE
CBWS	SECTION 02614, CONCRETE BAR-WRAPPED, STEEL CYLINDER PIPE
LHCPP	SECTION 02616, LOW HEAD CONCRETE PRESSURE PIPE
RCP	SECTION 02618, CONCRETE PIPE
PVC	SECTION 15061, POLYVINYL CHLORIDE PIPE
DIP	SECTION 15061, DUCTILE IRON PIPE
SLT	SECTION 15062, STEEL PIPE
LWS-XX	SECTION 15063, LIGHT WALL STEEL PIPE
SS-XX1	SECTION 15064, STAINLESS STEEL PIPE, TUBING, AND ACCESSORIES
CSG-XX	SECTION 15065, MISCELLANEOUS STEEL PIPE, TUBING, AND ACCESSORIES
CS-XX	SECTION 15065, MISCELLANEOUS STEEL PIPE, TUBING, AND ACCESSORIES
FRPE-XX	SECTION 15066, FIBERGLASS REINFORCED PLASTIC PIPE (EXHAUST AIR SERVICE)
FRP-XX	SECTION 15067, MISCELLANEOUS PLASTIC PIPE, TUBING, AND ACCESSORIES
PVC-XX	SECTION 15067, MISCELLANEOUS PLASTIC PIPE, TUBING, AND ACCESSORIES
CPVC-XX	SECTION 15067, MISCELLANEOUS PLASTIC PIPE, TUBING, AND ACCESSORIES
PE-XX	SECTION 15067, MISCELLANEOUS PLASTIC PIPE, TUBING, AND ACCESSORIES
PP-XX	SECTION 15067, MISCELLANEOUS PLASTIC PIPE, TUBING, AND ACCESSORIES
PVDF-XX	SECTION 15067, MISCELLANEOUS PLASTIC PIPE, TUBING, AND ACCESSORIES
RPT-XX	SECTION 15067, MISCELLANEOUS PLASTIC PIPE, TUBING, AND ACCESSORIES
CI-XX	SECTION 15069, CAST IRON SOIL PIPE AND ACCESSORIES
CU-XX	SECTION 15070, COPPER TUBING AND ACCESSORIES
BR-XX	SECTION 15060, MISCELLANEOUS PIPING AND PIPE ASSEMBLY
HS-XX	SECTION 15060, MISCELLANEOUS PIPING AND PIPE ASSEMBLY
TG-XX	SECTION 15060, MISCELLANEOUS PIPING AND PIPE ASSEMBLY
CRP-XX	SECTION 15060, MISCELLANEOUS PIPING AND PIPE ASSEMBLY
HDPE-XX	SECTION 02634, HDPE PRESSURE PIPE

1. XX= numbers 01-20

GENERAL INSTRUMENT SYMBOLS

FIELD MOUNTED INSTRUMENT

FACE MOUNTED INSTRUMENT ON ACC PANEL. OPERATOR ACCESSIBLE

INSTRUMENT MOUNTED ON/IN ACC PANEL. OPERATOR INACCESSIBLE

FACE MOUNTED INSTRUMENT ON FIELD PANEL. OPERATOR ACCESSIBLE.

INSTRUMENT MOUNTED ON/IN FIELD PANEL. OPERATOR INACCESSIBLE

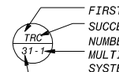
NON-PROGRAMMABLE MULTIFUNCTION INSTRUMENT

I — IX### — HARDWIRED INTERLOCKING OR SEQUENTIAL CONTROL FUNCTION INCORPORATING LOGIC PER CONTROL AND LOGIC DIAGRAM IX###.

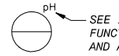
I — IX### — PROGRAMMABLE LOGIC CONTROL INCORPORATING LOGIC PER CONTROL AND LOGIC DIAGRAM IX###.

PROGRAMMABLE LOGIC CONTROLLER. INTERFACE OR OTHER NON-INTERLOCK FUNCTION

TAG NUMBERS AND ADDITIONAL DESIGNATIONS



FIRST LETTER
SUCCEEDING LETTERS
NUMBER AFTER DASH (-1, -2, ETC) DENOTES MULTIPLE DEVICES USED IN IDENTICAL DUPLICATE SYSTEMS.
A LETTER AFTER THE LOOP NUMBER (31A, 31B, ETC) IS USED TO DISTINQUISH MULTIPLE SIMILAR DEVICES IN THE SAME INSTRUMENT LOOP.
LOOP DESIGNATION NUMBER



SEE INSTRUMENT FUNCTIONAL DESIGNATIONS AND ABBREVIATIONS.

DIGITAL SYSTEMS INTERFACE SYMBOLS

NOTE: REFER TO DETAILED SYSTEM SPECIFICATIONS FOR FUNCTIONAL DESCRIPTION. ALSO SEE I/O SCHEDULES FOR COMPLETE INPUT AND OUTPUT LISTINGS.

FUNCTION PERFORMED IN MICROPROCESSOR BASED LOOP CONTROLLER OR OTHER "SHARED CONTROL" DEVICE.

PLC DISCRETE INPUT POINT (NOTE 5)

PLC DISCRETE OUTPUT POINT (NOTE 5)

PLC ANALOG INPUT POINT (NOTE 5)

PLC ANALOG OUTPUT POINT (NOTE 5)

PCC SUFFIX TABLE

A	START,OPEN	ANALYSIS
B	STOP, CLOSE	BURNER (FLAME)
C	START FORWARD SLOW	CONDUCTIVITY
D	START REVERSE SLOW	DENSITY
E		VOLTAGE
F		FLOW
G	VALVE CLOSED, BREAKER OPENED, FIRE, SMOKE	
H	HAND	
I		CURRENT
J		POWER
K		TIME, RATE OF CHANGE
L		LEVEL
M		MOISTURE
N		HYDROGEN - ION (pH)
O		DISSOLVED OXYGEN
P		PRESSURE, VACUUM
Q		QUANTITY
R	RUNNING, RUNNING FORWARD FAST,VALVE OPEN, BREAKER CLOSED	
RR	RUNNING REVERSE FAST	
RS	RUNNING REVERSE SLOW	
S	RUNNING FORWARD SLOW	SPEED
T	TROUBLE	TEMPERATURE
U		
V		VIBRATION
W	READY, AUTO	WEIGHT, FORCE
X		POSITION (X-AXIS)
Y	RESET	POSITION (Y-AXIS)
Z		POSITION (Z-AXIS)

FUNCTION DESIGNATIONS AND ABBREVIATIONS

INSTRUMENT DESIGNATIONS

K	GAIN OR ATTENUATE (INPUT:OUTPUT)
−K	GAIN AND REVERSE
Σ	ADD OR SUM (ADD AND SUBTRACT)
Δ	SUBTRACT (DIFFERENCE)
√‾	EXTRACT SQUARE ROOT
÷	DIVIDE
F(X)	CHARACTERIZE SIGNAL
>	HIGH-SELECT
<	LOW-SELECT
×	MULTIPLY
∫	INTEGRATE (TIME INTEGRAL)
CH_4	METHANE
CL_2	CHLORINE RESIDUAL
CO_2	CARBON DIOXIDE
DO	DISSOLVED OXYGEN
LEL	LOWER EXPLOSIVE LIMIT
MCC	MOTOR CONTROL CENTER
MLSS	MIXED LIQUOR SUSPENDED SOLIDS
O_2	OXYGEN (PURITY)
pH	pH CELL
TURB	TURBIDITY

HAND SWITCH DESIGNATIONS

HOA	HAND-OFF-AUTO
LR	LOCAL REMOTE
OC	OPEN-CLOSE
OO	ON-OFF
LOR	LOCAL-OFF-REMOTE
SRO	START-READY-OFF
OCR	OPEN-CLOSE-REMOTE
OOR	ON-OFF-REMOTE
FR	FORWARD-REVERSE

TRANSDUCER & CONVERTER DESIGNATION

E	VOLTAGE
FSK	FREQUENCY SHIFT KEYING
H	HYDRAULIC
I	CURRENT
P	PNEUMATIC PULSE
PD	PULSE DURATION
PF	PULSE FREQUENCY
R	RESISTANCE (ELECTRICAL)

EXAMPLE: I/P = CURRENT TO PNEUMATIC TRANSDUCER

POWER SUPPLY ABBREVIATIONS

AS	AIR SUPPLY
ES	ELECTRIC SUPPLY
GS	GAS SUPPLY
HS	HYDRAULIC SUPPLY
NS	NITROGEN SUPPLY
SS	STEAM SUPPLY
WS	WATER SUPPLY

AS — POWER SUPPLY SOURCE LABEL. USED ONLY WHERE NECESSARY TO HELP CLARIFY AN INSTRUMENT OR SYSTEM FUNCTION.

GENERAL NOTES

1. IN GENERAL, THE P&ID SYMBOLS AND DEVICE IDENTIFICATIONS ARE BASED ON INTERNATIONAL SOCIETY OF AUTOMATION, STANDARD PRACTICE ISA-S5.1 (1988). SOME MODIFICATIONS, ADDITIONS, AND ALTERATIONS HAVE BEEN MADE AS NEEDED TO ACCOMMODATE THE PROJECT REQUIREMENTS.
2. SOME CONTROL AND INTERLOCK REQUIREMENTS WHICH CAN BE MORE CLEARLY ILLUSTRATED ON CONTROL AND LOGIC DRAWINGS HAVE BEEN OMITTED FROM P&ID DRAWINGS.
3. THIS IS A GENERAL LEGEND SHEET. SOME SYMBOLS AND ABBREVIATIONS MAY NOT BE UTILIZED ON THIS SPECIFIC PROJECT.
4. PIPING AND EQUIPMENT LEGEND APPLIES TO P&ID SHEETS ONLY AND MAY DIFFER FROM LEGENDS FOR OTHER SHEETS.
5. AS SHOWN ON THE P&ID DRAWINGS, THE DISTRICT SYNTAX IS USED FOR I/O WIRED TO EXISTING PLC EQUIPMENT AND PALL CORPORATION SYNTAX FOR I/O WIRED TO NEW PLC EQUIPMENT PROVIDED BY PALL CORPORATION.

PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED: 1/14/2010 7:34:12 PM, Batch Plot
SAVED: OGL22631 1/6/2010 7:19:38 AM

FBDR342202
BDR342202

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SRCSD

REGISTERED PROFESSIONAL ENGINEER
DEWITT C. SMITH
E 15829
EXP 12/31/2010
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN JRC
DESIGNED
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

GENERAL
LEGEND & ABBREVIATIONS
SHEET 2 OF 3

SCALE: NONE
DRAWING NUMBER: IG002
SHEET NUMBER: 163 OF 236

PROCESS CODE ABBREVIATIONS

ACETIC ACID	ACE_X	DIGESTER GAS	DGG_X	METHANOL	MTH_X	SODIUM BISULFITE	SBIS_X
ACETYLENE	ACT_X	DIGESTER GAS MIXING	DGM_X	MIXED LIQUOR	MXL_X	SODIUM CHLORIDE	NCL_X
ACTIVATED CARBON - GRANULAR	GAC_X	DIGESTER SLUDGE	DGS_X	NATURAL GAS	NG_X	SODIUM CHLORITE	NCL2_X
AERATION AIR/PROCESS AIR	AIR_X	DIGESTION - AEROBIC	DGA_X	NITROGEN	NIT_X	SODIUM FLUORIDE	NAF_X
AERATION SYSTEM	AER_X	DIGESTION - ANAEROBIC	DIG_X	NITROUS OXIDE	NIO_X	SODIUM HEXAMETAPHOSPHATE	NAX_X
AIR WASH	ARW_X	DISINFECTION CONTACT BASIN	DCB_X	ODOR CONTROL	ODC_X	SODIUM HYDROXIDE	CSO_X
ALUMINUM SULFATE	ALM_X	DISSOLVED AIR FLOTATION	DAF_X	OIL	FO_X	SODIUM HYPOCHLORITE	SCLS_X
AMMONIUM SULFATE	NSO4_X	DRAINAGE	DRN_X	OIL - FUEL	OTL_X	SODIUM SILICOFLUORIDE	NASF_X
ANHYDROUS AMMONIA	NH3_X	EFFLUENT PUMPING	EFP_X	OZONE	OZN_X	STEAM	STM_X
ANTI-SEALANT	AS_X	ENGINE EXHAUST	EXH_X	OZONE DESTRUCT	OZD_X	STORM SEWER	STS_X
AQUA AMMONIA	NHOH_X	EQUALIZATION BASIN	EQB_X	PHOSPHATE	PPP_X	STORM WATER	STW_X
ARGON	ARG_X	FERRIC CHLORIDE	FEC_X	PHOSPHORIC ACID	PO4_X	SULFUR DIOXIDE	SO2_X
ASH	ASH_X	FERRIC SULFATE	FES_X	POLYALUMINUM CHLORIDE	PCL_X	SULFURIC ACID	HSO4_X
BACKWASH - MEMBRANE/FILTER	BWH_X	FERROUS CHLORIDE	FRC_X	POLYMER	POLF_X	SURFACE WASH	SW_X
BALLASTED FLOCCULATION	BAL_X	FERROUS SULFATE	FRS_X	POTASSIUM PERMANGANATE	KMN_X	TERTIARY TREATMENT	TERT_X
BIOSOLIDS	BNR_X	FILTRATION	FLT_X	POWDERED ACTIVATE CARBON	PAC_X	THICKENED PRIMARY SLUDGE	TPRS_X
BIOTOWER	BIO_X	FLOCCULATION	FLC_X	PRE-AERATION	PAR_X	THICKENED WASTE ACTIVATED SLUDGE	TWAS_X
BLENDED SLUDGE	BIT_X	GASEOUS OXYGEN	GOX_X	PRESEDIMENTATION	PSD_X	THICKENING	THCK_X
BNR	BLS_X	GASOLINE	GSL_X	PRIMARY CLARIFICATION	PRC_X	TREATED WATER	TW_X
BRINE	BRN_X	GREASE	GRS_X	PRIMARY SCUM	PSC_X	TRICKLING FILTER	TF_X
CALCIUM HYPOCHLORITE	CACL_X	GRIT	GRT_X	PRIMARY SLUDGE	PRS_X	ULTRAVIOLET	UV_X
CALCIUM THIOSULFATE	CATS_X	HELIUM	HEL_X	RAW WASTEWATER PUMPING	WWP_X	VACUUM	VAC_X
CARBON DIOXIDE	CO2_X	HYDRAULIC FLUID	HFL_X	RAW WATER PUMPING	RWP_X	WASH WATER	WW_X
CARBON SLURRY	CAS_X	HYDROCHLORIC ACID	HCL_X	RAW WATER STORAGE	RWS_X	WASTE ACTIVATED SLUDGE	WAS_X
CARBONIC ACID	HCO3_X	HYDROFLUOSILIC ACID	HFS_X	RECIRCULATED SLUDGE	RCS_X	WASTE WASH WATER	WWW_X
CENTRATE	CEN_X	HYDROGEN	HYD_X	RECLAIMED WATER	RCW_X	WATER - CONDENSATE	CDW_X
CHEMICAL ENHANCED BACKWASH - MEMBRANE	CEB_X	HYDROGEN PEROXIDE	PER_X	REFRIGERANT	REF_X	WATER - COOLING	COLW_X
CHLORINE	CL2_X	INCINERATION	INC_X	RESIDUALS	RES_X	WATER - DISTILLED WATER	DW_X
CHLORINE DIOXIDE	CLO2_X	INFLUENT PUMPING	INFP_X	RETURN ACTIVATED SLUDGE	RAS_X	WATER - FIRE	FW_X
CITRIC ACID	CTA_X	INTAKE	INT_X	REVERSE OSMOSIS	ROS_X	WATER - IRRIGATION	IRW_X
CLEAN IN PLACE	CIP_X	LAGOON STORAGE	LAG_X	SCREENINGS	SCR_X	WATER - OZONATED	OZW_X
COAGULATION	COA_X	LAND APPLICATION	LAP_X	SECONDARY CLARIFICATION	SCL_X	WATER - SEAL	SWT_X
COMPRESSED AIR - INSTRUMENT	CAI_X	LIME - HYDRATED	CAH_X	SECONDARY EFFLUENT	SE_X	WATER - WATER HEATING	HW_X
COMPRESSED AIR - SERVICE	CMS_X	LIME - QUICKLIME	CAO_X	SETTLED WATER	SEP_X	WATER DEIONIZED	DEIW_X
COPPER SULFATE	CUS_X	LIME STABILIZATION	LIM_X	SEWAGE	SET_X	WATER NON-POTABLE	NPW_X
CORROSION INHIBITOR	CI_X	LIQUID OXYGEN	LOX_X	SODA ASH	SEW_X	WATER PLANT EFFLUENT	PEW_X
DECHLORINATION	DCL_X	LP GAS OR PROPANE GAS	LPG_X	SODIUM ALUMINATE	NAC_X	WATER POTABLE	PW_X
DETERGENT	DET_X	MAGNESIUM HYDROXIDE	MGOH_X	SODIUM ALUMINATE	NAL_X	WATER RAW	RW_X
DEWATERING	DWT_X	MEMBRANE	MEM_X	SODIUM BICARBONATE	NAM_X	WET WEATHER TREATMENT	WWT_X
DIESEL FUEL	FUE_X	METHANE GAS	MEG_X		NBC_X	ZINC ORTHOPHOSPHATE	ZOP_X

X = PROCESS CODE SUFFIX USED TO FURTHER SPECIFY A PROCESS STREAM (I.E. CL2_G FOR CHLORINE GAS OR CL2_S FOR CHLORINE SOLUTION)

FUNCTION CODE ABBREVIATIONS

AF	AIR FILTER
AHU	AIR HANDLING UNIT
B	BLOWER
BE	FLAME ELEMENT
BLR	BOILER
BSN	BAR SCREEN
BRN	BURNER
C	CRANE
CAF	COMBUSTION AIR FAN
CC	COOLING COIL
CDU	CONDENSING UNIT
CFR	CHEMICAL FEEDER
CDU	CONDENSING UNIT
CHR	CHILLER
COF	COOLING AIR FAN
COM	COMMINUTOR
CON	CONVEYOR
CP	COMPRESSOR
CR	CONTRACTOR
CSN	COMMINUTING SCREEN
CTR	CENTRIFUGE
CV	CONTROL VALVE
CYL	CYLINDER
DE	DENSITY METER
DPR	DAMPER
DU	DRIVE UNIT
DX	DIRECT EXPANSION COIL
E	ENGINE
EG	ENGINE ALTERNATIVE UNIT
FA	FLAME ARRESTOR
FD	FIRE DAMPER
FC	FLAME CHECK
FE	FLOW METER
FG	FLAP GATE
FLC	FLOCCULATOR
FLP	FLUID POWER UNIT
FLT	FILTER
FMX	FLASH MIXER
FN	FAN
FP	FILTER PRESS
FRZ	FREEZESTAT
FS	FLOW SWITCH
FSH	FLOW SWITCH HIGH
FSL	FLOW SWITCH LOW
FT	FREEZE TANK
G	POWER ACTUATED GATE
GDR	GRINDER
GEN	GENERATOR
GRV	GRAVITY RELIEF VENT
H	HOIST
HC	HEATING COIL
HEX	HEAT EXCHANGER
HH	HANDHOLE (ELECT)
HRB	HEAT RECOVERY BOILER
HS	HAND SWITCH
HTR	HEATER
ICN	INCINERATOR
I/O	INPUT/OUTPUT
IND	LEAK DETECTOR
IR	INLET RELIEF
JB	JUNCTION BOX (ELECT)
LI	LEVEL INDICATOR
LS	LEVEL SWITCH
LSH	LEVEL SWITCH HIGH
LSL	LEVEL SWITCH LOW
LV	LOUVER
M	MOTOR
MD	MOTORIZED DAMPER
MCC	MOTOR CONTROL CENTER
MEE	MISCELLANEOUS ELECTRICAL EQUIPMENT
MIE	MISCELLANEOUS INSTRUMENTATION EQUIPMENT
MH	MANHOLE
MME	MISCELLANEOUS MECHANICAL EQUIPMENT
MOP	MOTOR OPERATOR
MVU	MOBILE VENTILATION UNIT
MX	MIXER
ORF	ODOR REMOVAL FILTER
ORT	ODOR REMOVAL TOWER
OSC	ODOR SCRUBBER
P	PUMP
PB	PULL BOX (ELECT)
PNL	PANEL
POP	PNEUMATIC OPERATOR
PRV	PRESSURE RELIEF VALVE
PS	PRESSURE SWITCH
PSH	PRESSURE SWITCH HIGH
PSL	PRESSURE SWITCH LOW
PSV	POP SAFETY VALVE
PTT	PUSH TO TEST
PVL	PRESSURE VESSEL
S	SILENCER
SBR	SCRUBBER
SC	SCREEN
SD	SMOKE DETECTOR
SEP	SEPERATOR
SG	SLUICE GATE MANUAL
SI	SPEED INCREASER
SLG	SLIDE GATE
SMX	SLURRY MIXER
SR	SPEED REDUCER
SS	SPEED SELECTOR SWITCH
ST	STEAM TRAP
SUB	SUBSTATION
SV	SOLENOID VALVE
SW	SWITCH
SWB	SWITCHBOARD
T	TANK, THERMOSTAT
TB	TERMINAL BOX (ELECT)
TBN	TURBINE
TCP	TEMPERATURE CONTROL POINT
TFR	TRANSFORMER
TS	TEMPERATURE SWITCH
TSH	TEMPERATURE SWITCH HIGH
TSL	TEMPERATURE SWITCH LOW
TST	THERMOSTAT
UH	UNIT HEATER
V	POWER ACTUATED VALVE ISOLATING OR MANUAL OPERATED WITH LIMIT SWITCH
VAF	VENTILATION AIR FILTER
VDS	DIGESTER SLUDGE VALVE
VFC	VARIABLE FREQUENCY CONTROLLER
VFT	VACUUM FILTER
VHS	HARVESTED SLUDGE VALVE
VP	VACUUM PUMP
VSC	VARIABLE SPEED COUPLING (ECC)
VSN	SUPERNATANT VALVE
VV	VARIABLE VOLUME BOX
WHR	WASHER
WW	WIREWAY
XSW	TRANSFER SWITCH
ZS	POSITION SWITCH

PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED: 1/14/2010 7:34:34 PM, Batch Plot
SAVED: OGL226317 1/14/2010 1:02:10 PM

FBD#342202
BOR342202

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REGISTERED PROFESSIONAL ENGINEER
DEWITT C. SMITH
E 15829
EXP 12/31/2010
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN JRC
DESIGNED
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

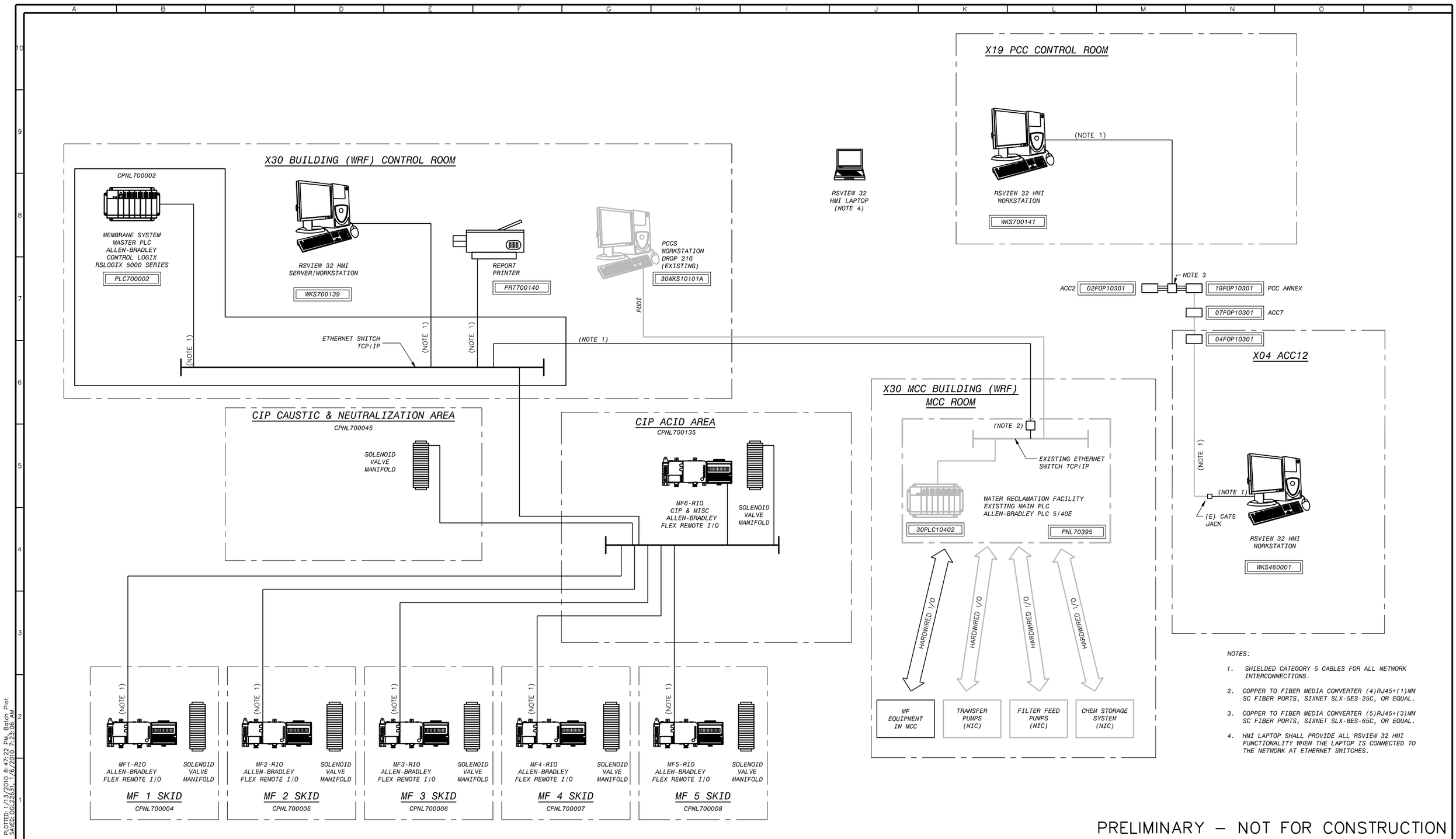
GENERAL

LEGEND & ABBREVIATIONS
SHEET 3 OF 3

SCALE
NONE

DRAWING NUMBER
IG003

SHEET NUMBER
164 OF 236



NOTES:

1. SHIELDED CATEGORY 5 CABLES FOR ALL NETWORK INTERCONNECTIONS.
2. COPPER TO FIBER MEDIA CONVERTER (4)RJ45+(1)MM SC FIBER PORTS, SIXNET SLX-5ES-25C, OR EQUAL.
3. COPPER TO FIBER MEDIA CONVERTER (5)RJ45+(3)MM SC FIBER PORTS, SIXNET SLX-8ES-65C, OR EQUAL.
4. HMI LAPTOP SHALL PROVIDE ALL RSVIEW 32 HMI FUNCTIONALITY WHEN THE LAPTOP IS CONNECTED TO THE NETWORK AT ETHERNET SWITCHES.

PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED: 1/13/2010 6:47:22 PM, Batch Plot
SAVED: OGL22631, 1/6/2010 7:23:06 AM

FBDR342202
BDR342202

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REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN JLH
DESIGNED JLH
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

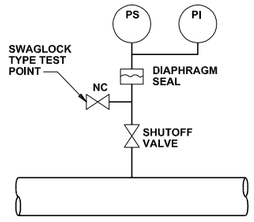
GENERAL

CONTROL SYSTEM NETWORK DIAGRAM

SCALE

DRAWING NUMBER
IG004

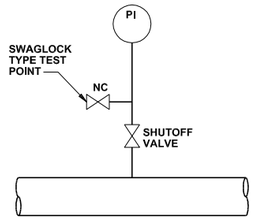
SHEET NUMBER
165 OF 236



TYPICAL FOR: PI700026A, PI700026B, PI700022, PI700024A, PI700024B, LIT700012, LIT700013, LIT700014

DIAPHRAGM SEAL PRESSURE SWITCH AND GAUGE INSTALLATION DETAIL

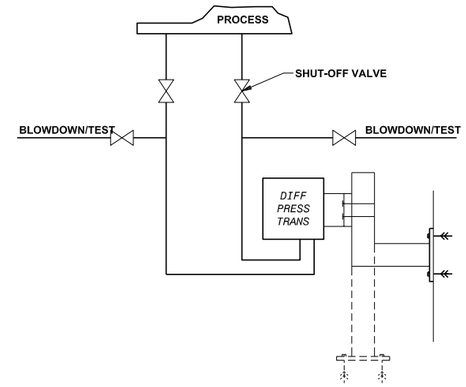
NO SCALE (ALSO REF MECH DETAILS FOR MATERIALS, FITTINGS AND VALVE TYPES)



TYPICAL FOR: PI44991H, PI44I2H, PI4493H, PI4494H, PI700027A, PI700027B, PI700028A, PI700028B, PI700029A, PI700029B, PIT700055, PIT700059, PIT700051, PI70281A, PSH70281A, PI70282A, PSH70282A, PI700011A, PI700011B, PI700025A, PI700025B

PRESSURE SWITCH, PRESSURE TRANSMITTER, AND GAUGE INSTALLATION DETAIL

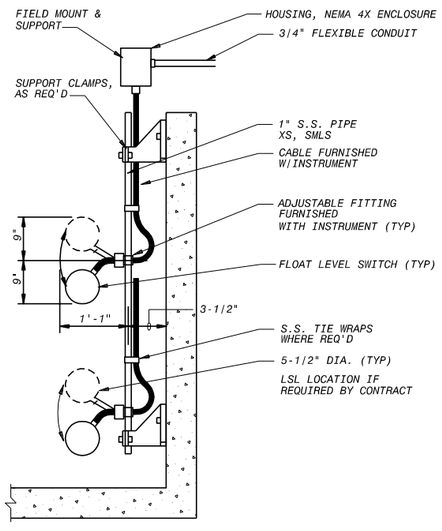
NO SCALE (ALSO REF MECH DETAILS FOR MATERIALS, FITTINGS AND VALVE TYPES)



TYPICAL FOR: DPSH70011

TYPICAL MANUAL STRAINER DIFFERENTIAL PRESSURE SWITCH INSTALLATION DETAIL

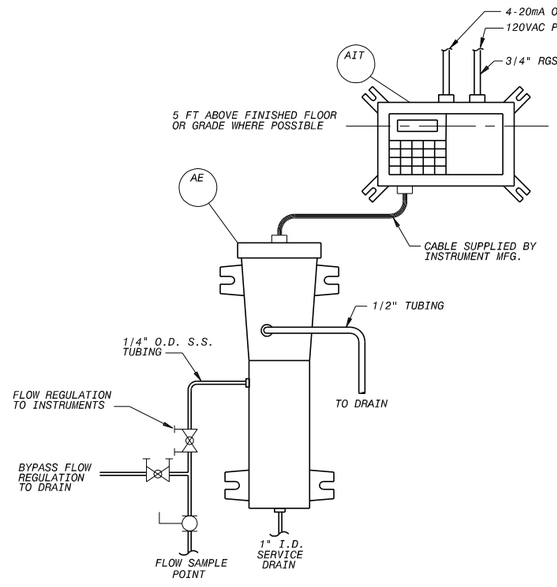
NO SCALE



TYPICAL FOR: LSH700120, LSH700131, LSH700132

HIGH/LOW LEVEL FLOATS INSTALLATION DETAIL

NO SCALE



TYPICAL FOR: AIT700047, AIT 700050

TURBIDITY METER INSTALLATION DETAIL

NO SCALE

PRELIMINARY – NOT FOR CONSTRUCTION

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ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN KPO
DESIGNED WEM
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

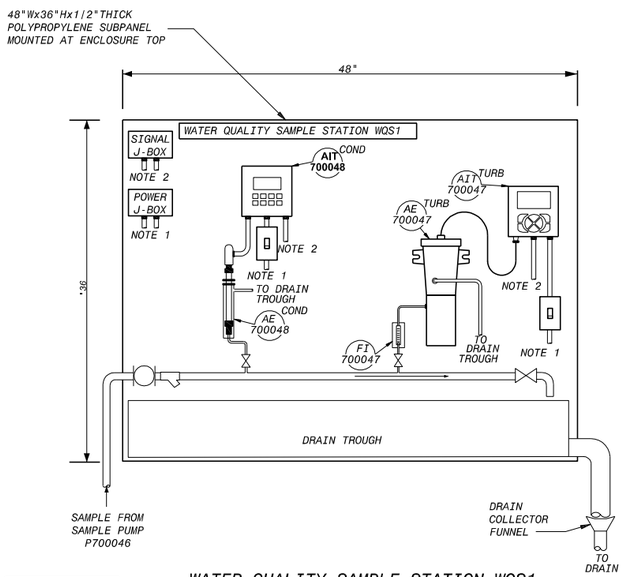
GENERAL

INSTRUMENTATION INSTALLATION DETAILS SHEET 1 OF 2

SCALE: NO SCALE

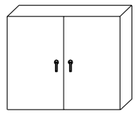
DRAWING NUMBER: IG005

SHEET NUMBER: 166 OF 236



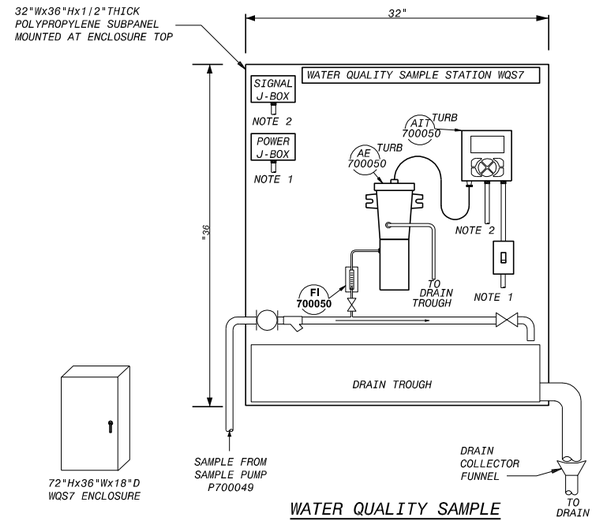
WATER QUALITY SAMPLE STATION WQS1

NO SCALE



72"Hx54"Wx18"D
WQS1 ENCLOSURE

NOTE:
1. ROUTE 120VAC POWER WIRING FROM POWER J-BOX TO EACH INSTRUMENT IN 3/4" CONDUIT. PROVIDE A LOCAL DISCONNECT FOR EACH INSTRUMENT. POWER J-BOX SHALL BE NEMA 4X RATED.
2. ROUTE ANALOG SIGNAL WIRES FROM EACH INSTRUMENT TO SIGNAL J-BOX IN 3/4" CONDUIT. PROVIDE KNIFE DISCONNECT TERMINAL BLOCK WITHIN THE J-BOX PER SRCSD STANDARDS.J-BOX SHALL BE NEMA 2X RATED.
3. PROVIDE AND INSTALL INTERIOR LIGHTING AS SPECIFIED IN SECTION 17100. PROVIDE A PANEL STRIP HEATER AS SPECIFIED IN SECTION 17100. INSTALL THE HEATER SO THAT IT IS PROTECTED FROM SPLASHING OR DRIPPING WATER.
4. INSULATE THE INTERIOR OF THE PANEL WITH A NEOPRENE MATERIAL. PROVIDE AND INSTALL AN ENCLOSURE AIR CONDITIONER AS SPECIFIED IN SECTION 17100.

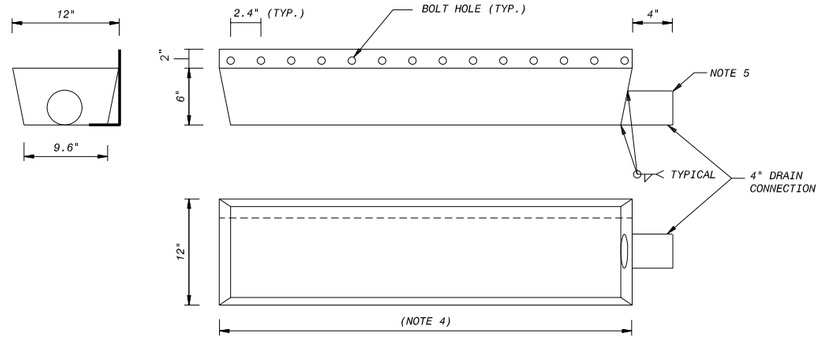


72"Hx36"Wx18"D
WQS7 ENCLOSURE

WATER QUALITY SAMPLE STATION WQS7

NO SCALE

NOTE:
1. ROUTE 120VAC POWER WIRING FROM POWER J-BOX TO EACH INSTRUMENT IN 3/4" CONDUIT. PROVIDE A LOCAL DISCONNECT FOR EACH INSTRUMENT. POWER J-BOX SHALL BE NEMA 4X RATED.
2. ROUTE ANALOG SIGNAL WIRES FROM EACH INSTRUMENT TO SIGNAL J-BOX IN 3/4" CONDUIT. PROVIDE KNIFE DISCONNECT TERMINAL BLOCKS WITHIN THE J-BOX PER SRCSD STANDARDS. SIGNAL J-BOX SHALL BE NEMA 4X RATED.
3. PROVIDE AND INSTALL INTERIOR LIGHTING AS SPECIFIED IN SECTION 17100. PROVIDE A PANEL STRIP HEATER AS SPECIFIED IN SECTION 17100. INSTALL THE HEATER SO THAT IT IS PROTECTED FROM SPLASHING OR DRIPPING WATER.
4. INSULATE THE INTERIOR OF THE PANEL WITH A NEOPRENE MATERIAL. PROVIDE AND INSTALL AN ENCLOSURE AIR CONDITIONER AS SPECIFIED IN SECTION 17100.



WATER QUALITY STATION DRAIN TROUGH DETAILS

NO SCALE

NOTES:
1. CONSTRUCT TROUGH USING 14 GA 304 STAINLESS STEEL.
2. ALL WELDS SHALL BE CONTINUOUS.
3. PROVIDE 1/8" STAINLESS STEEL BOLTS, 2 WASHERS, AND NUT FOR EACH BOLT HOLE FOR CONNECTION TO POLY BOARD.
4. DIMENSION TO COINCIDE WITH POLY BOARD WIDTH.
5. CONNECT TO DRAIN WITH FERNCO FITTING.

PRELIMINARY – NOT FOR CONSTRUCTION

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REGISTERED PROFESSIONAL ENGINEER
DEWITT C. SMITH
E 15829
EXP. 12/31/2010
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN KPO
DESIGNED WEM
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

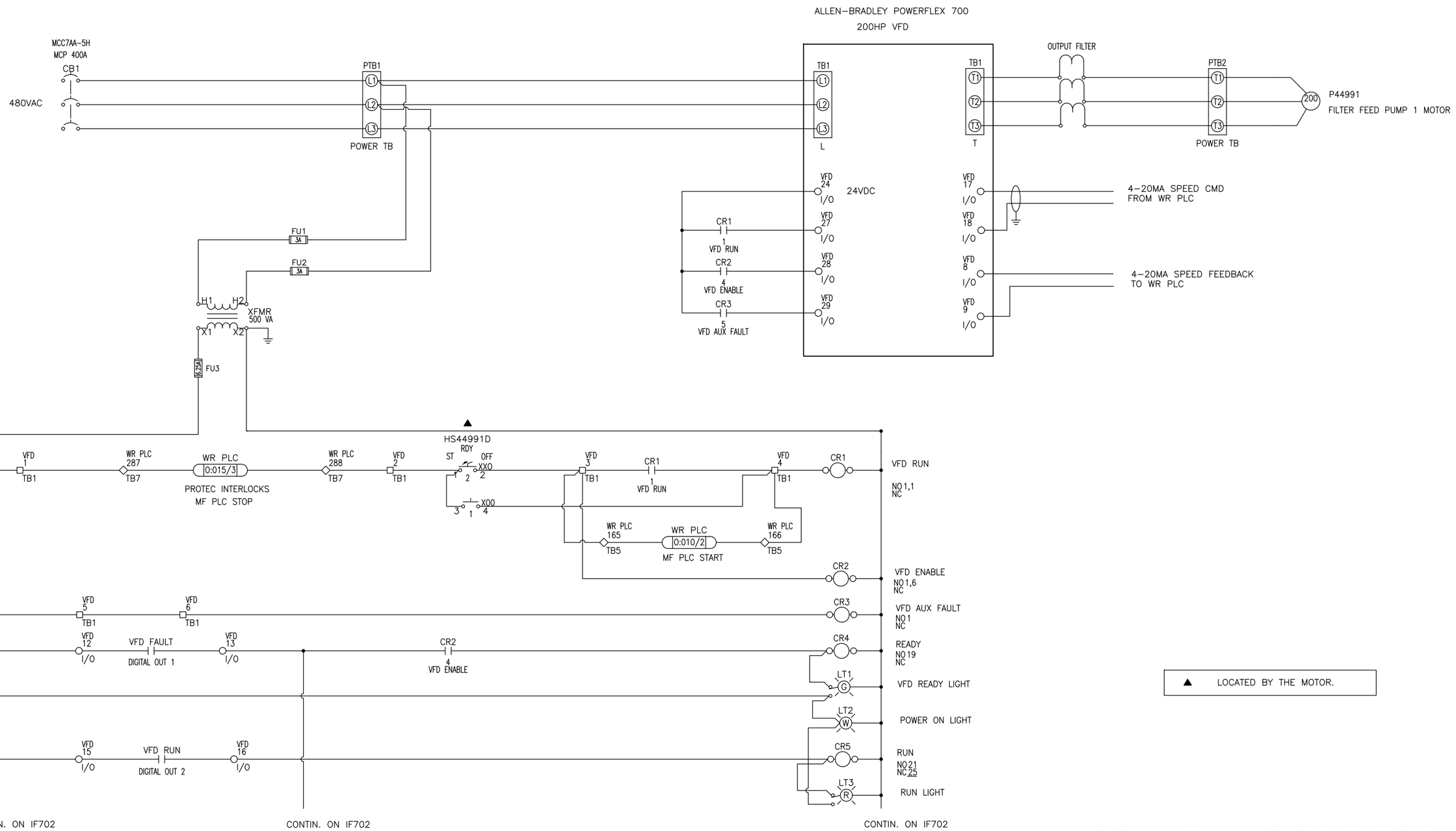
GENERAL

INSTRUMENTATION INSTALLATION DETAILS SHEET 2 OF 2

SCALE
NO SCALE

DRAWING NUMBER
IG006

SHEET NUMBER
167 OF 236



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SAVED:

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REGISTERED PROFESSIONAL ENGINEER
WILLIAM T
NO. 68143
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STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
SANJAY SIVARAJAN
Regist # 16111
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"–SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
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TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

CONTROL AND LOGIC DIAGRAM

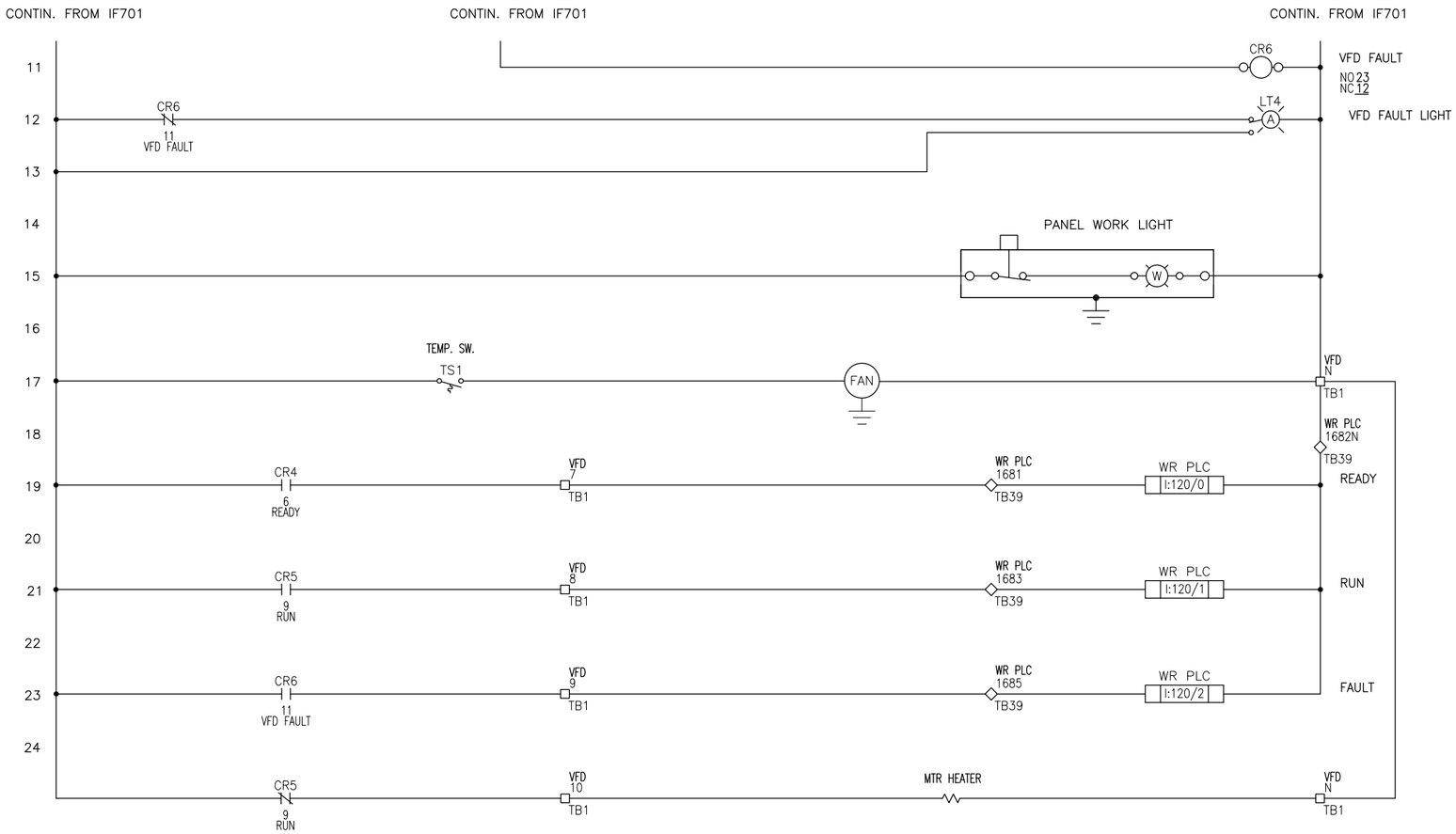
P44991

WR FILTER FEED PUMP 1
SHEET 1 OF 2

SCALE
NO SCALE

DRAWING NUMBER
IF701

SHEET NUMBER
168 OF 236



PRELIMINARY – NOT FOR CONSTRUCTION

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FBOR3422202
BDR3422202

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REGISTERED PROFESSIONAL ENGINEER
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Regist # 16111
Exp. 6-30-12
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

CONTROL AND LOGIC DIAGRAM

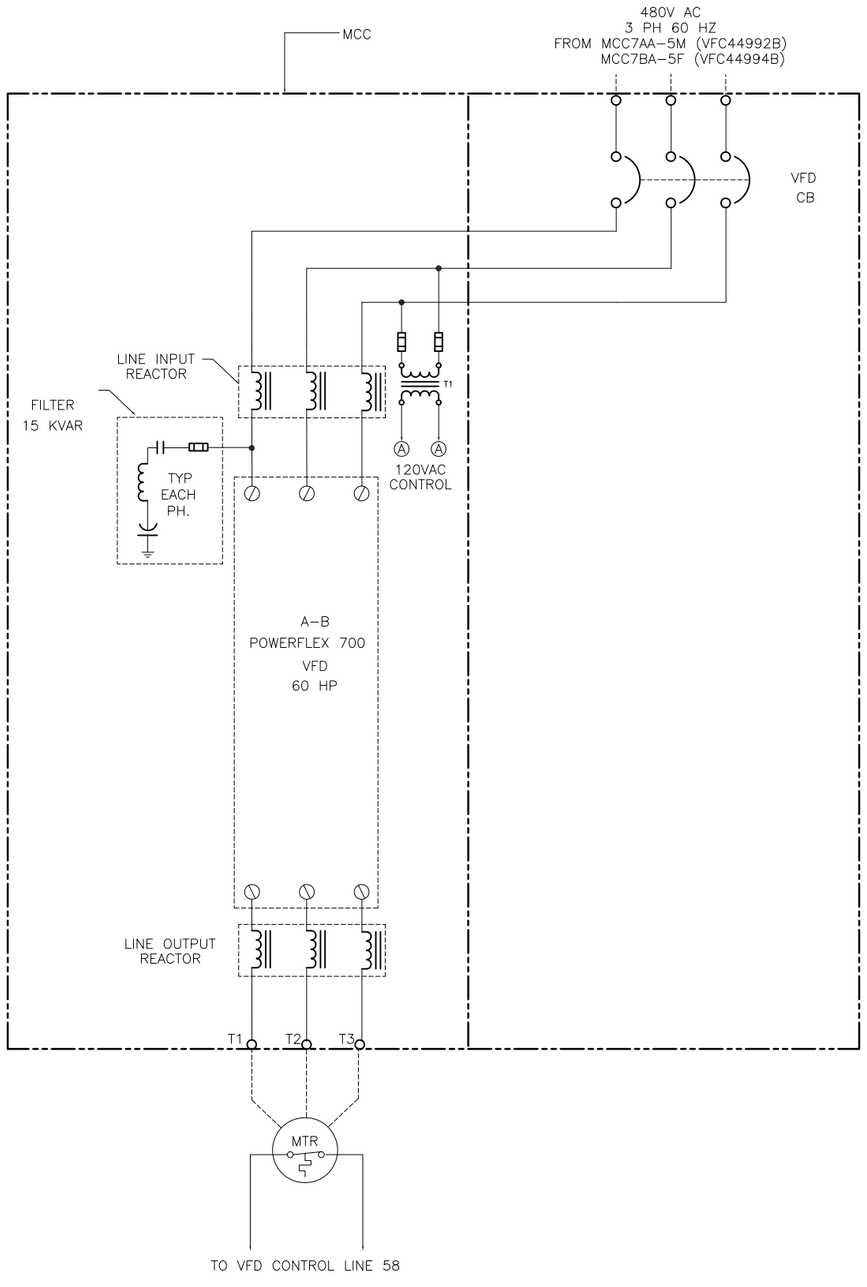
P44991

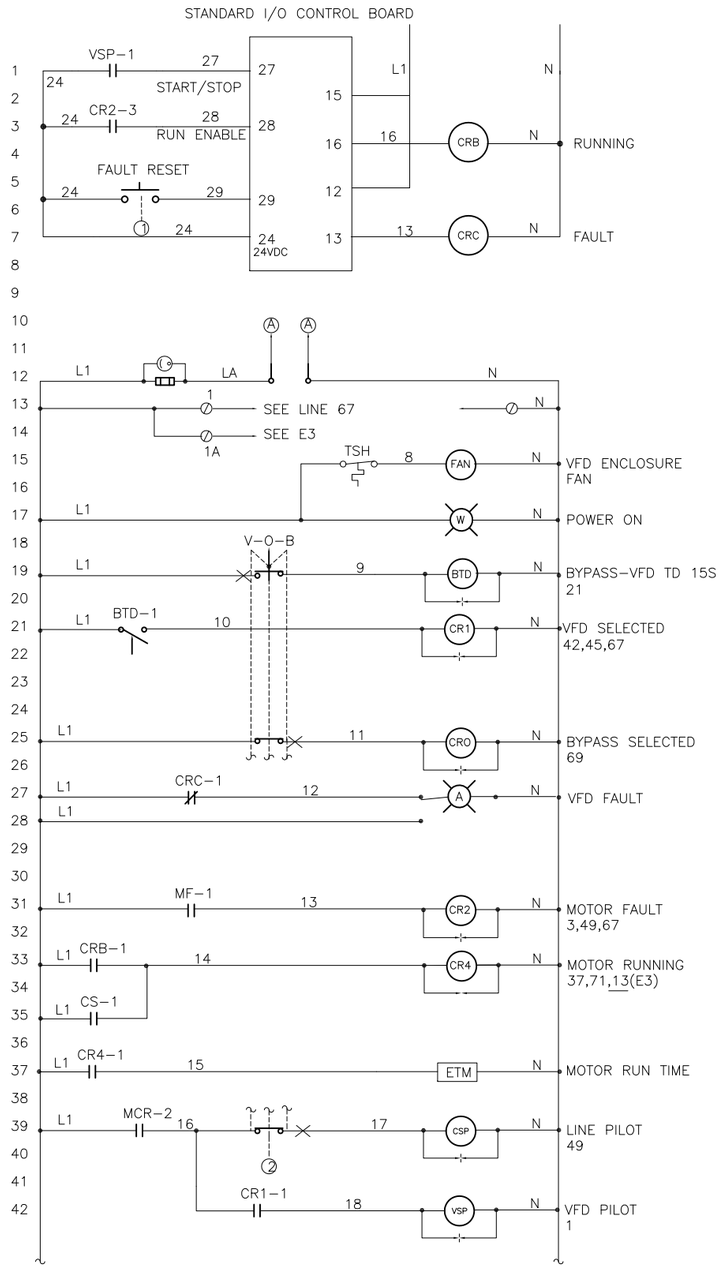
WR FILTER FEED PUMP 1
SHEET 2 OF 2

SCALE
NO SCALE

DRAWING NUMBER
IF702

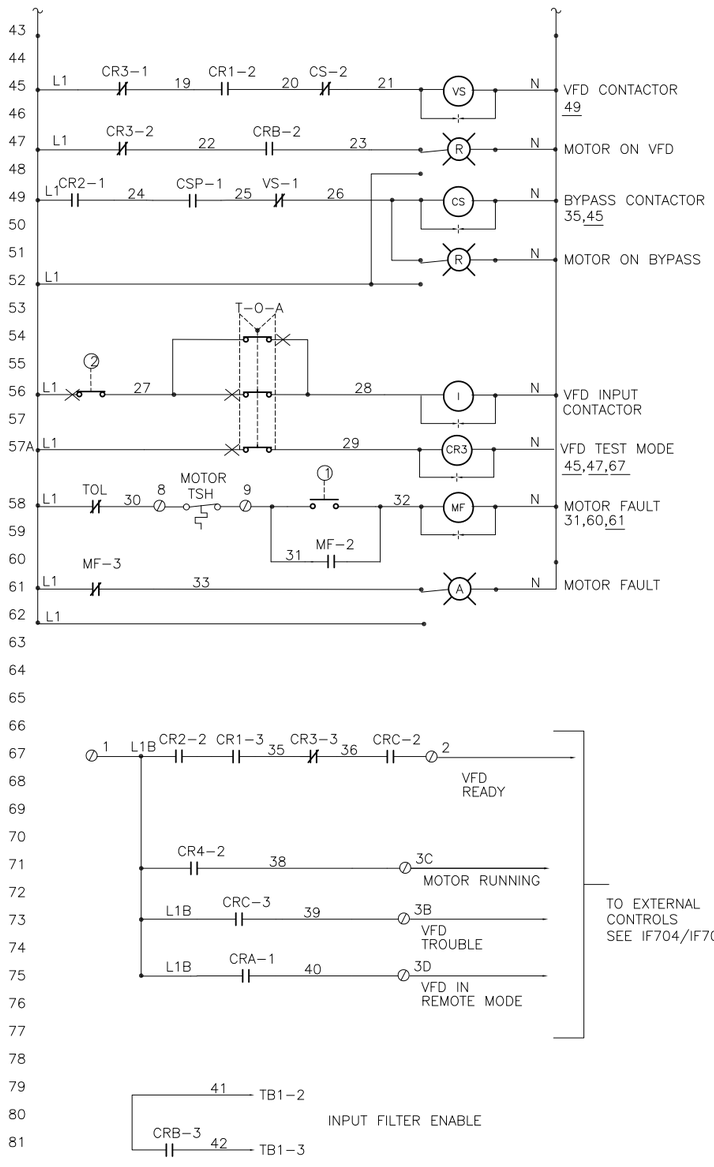
SHEET NUMBER
169 OF 236





NOTE:

VFD BYPASS OPERATION IS DISCONNECTED. ALL POWER WIRING TO I, VS, CS CONTACTORS ARE REMOVED (IN THIS CONTRACT).



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EXP. 6-30-11
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
SANJAY SIVAPRASAD
Regist # 18171
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY
SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL
WASTEWATER TREATMENT PLANT
WATER RECLAMATION FAC ILITY

CONTROL AND LOGIC DIAGRAM

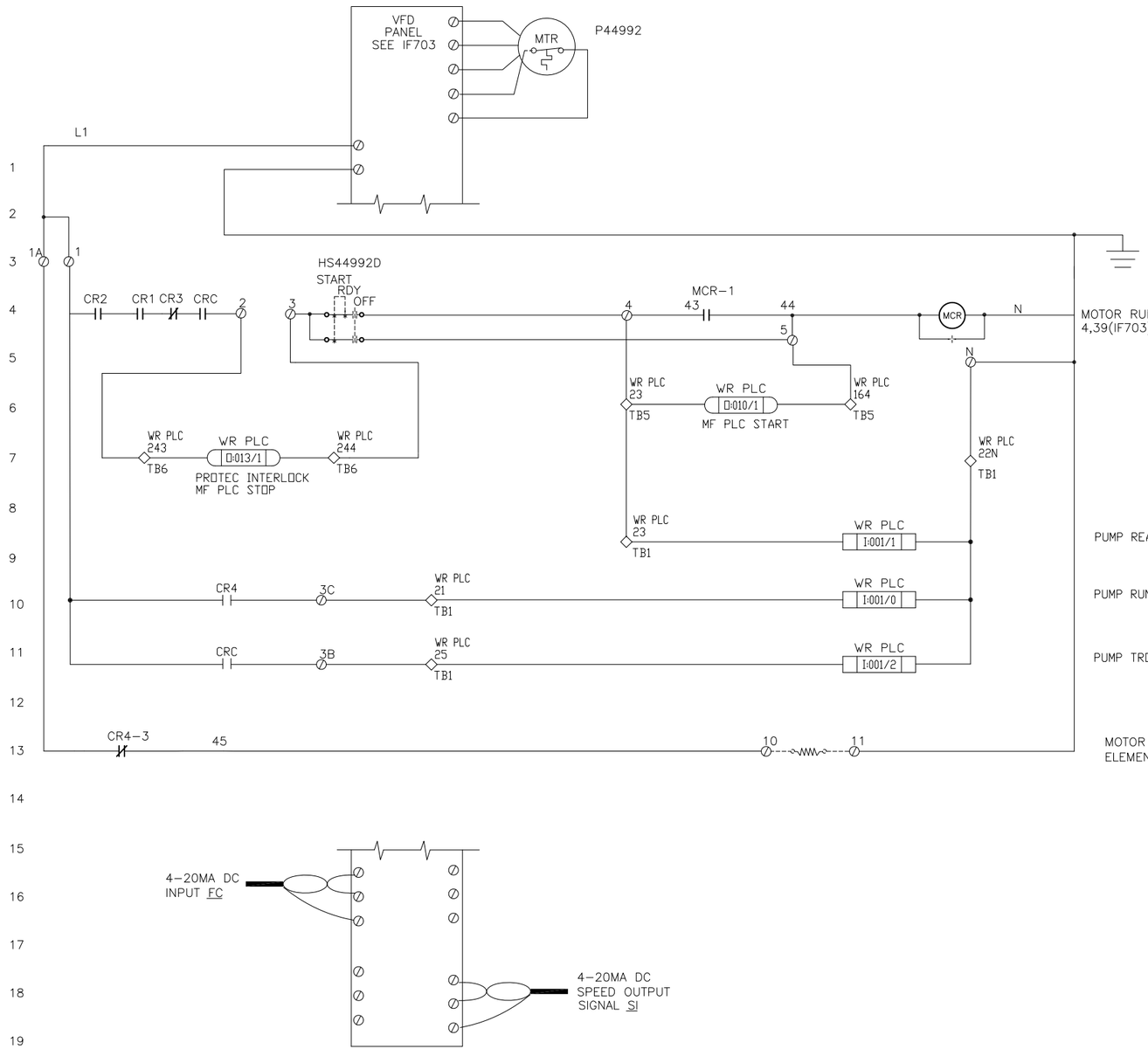
P44992 / P44994
VFC44992B / VFC 44994B

WR FILTER FEED PUMP 2 / PUMP 4
SHEET 1 OF 2

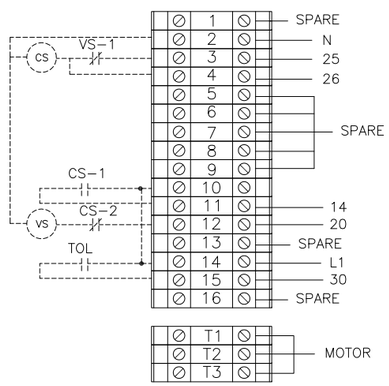
SCALE
NO SCALE

DRAWING NUMBER
IF703

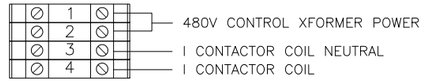
SHEET NUMBER
170 OF 236



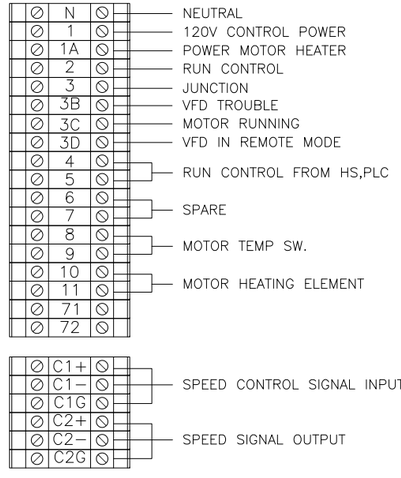
CS/VS CONTACTOR UNIT A3



I CONTACTOR UNIT A4



CVFD/CONTROLS UNIT B1



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SAVED:

FBOR3432202
BDR1342202

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EXP. 6-30-11
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
SANJAY SIVARAJAGOPAL
Regist # 16111
Exp. 6-30-12
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

CONTROL AND LOGIC DIAGRAM

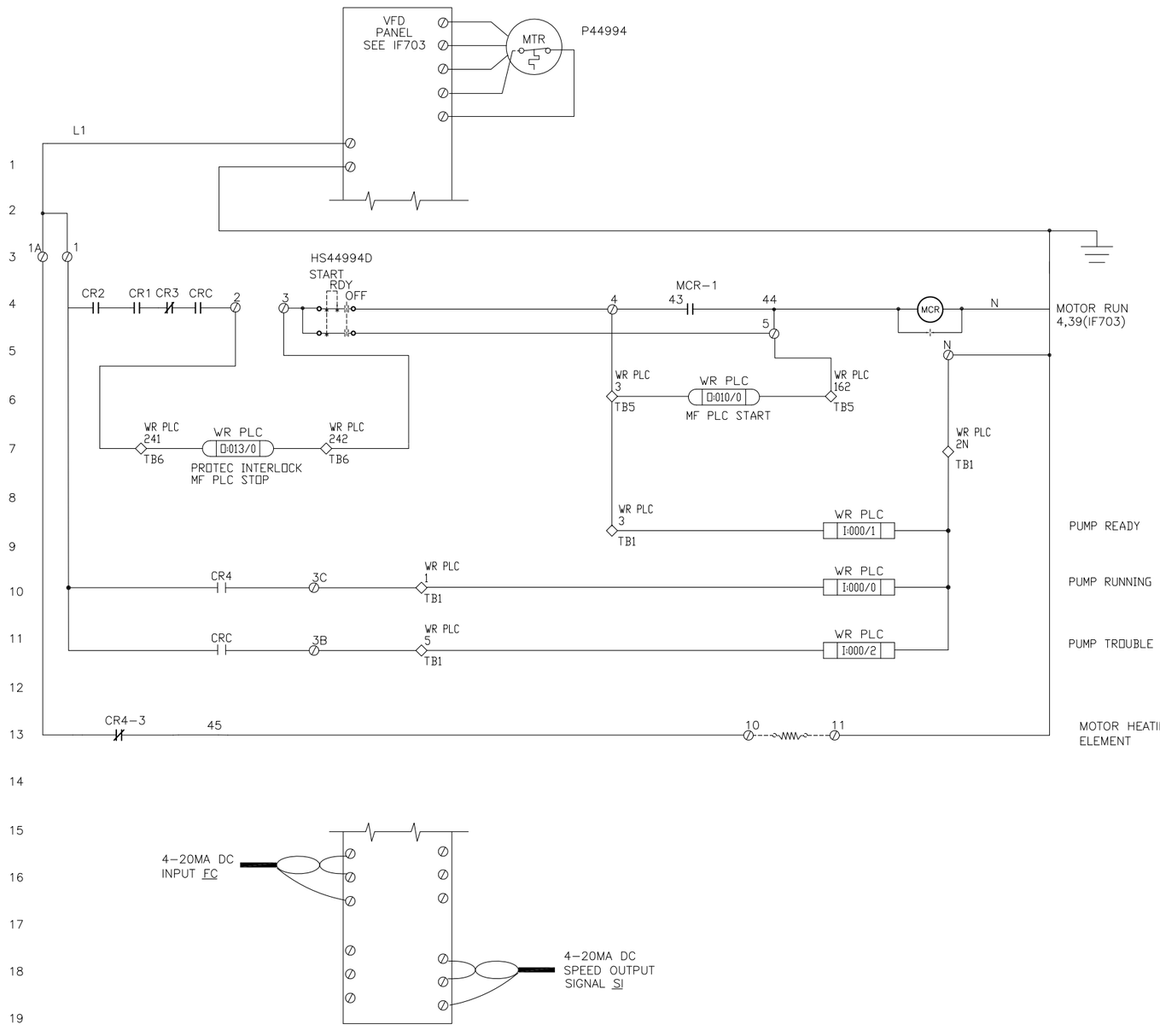
P44992
VFC44992B

WR FILTER FEED PUMP 2
SHEET 2 OF 2

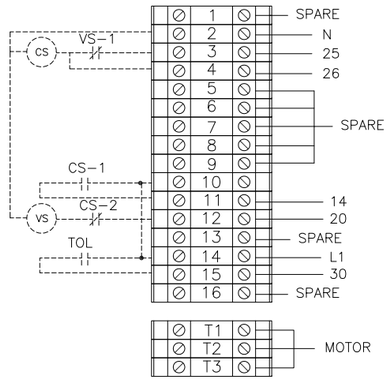
SCALE
NO SCALE

DRAWING NUMBER
IF704

SHEET NUMBER
171 OF 236

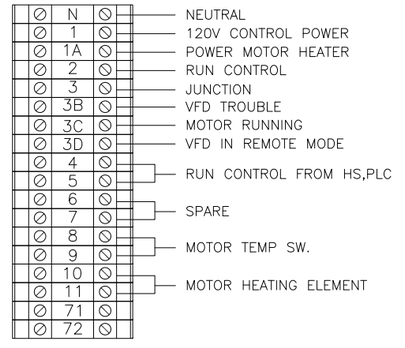


CS/VS CONTACTOR UNIT A3



I CONTACTOR UNIT A4

CVFD/CONTROLS UNIT B1



PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED:
SAVED:

FBDR342202
BDR342202

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REGISTERED PROFESSIONAL ENGINEER
WILLIAM TU
NO. 68143
EXP. 6-30-11
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
SANJAY SIVARAJAN
Regist # 16171
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

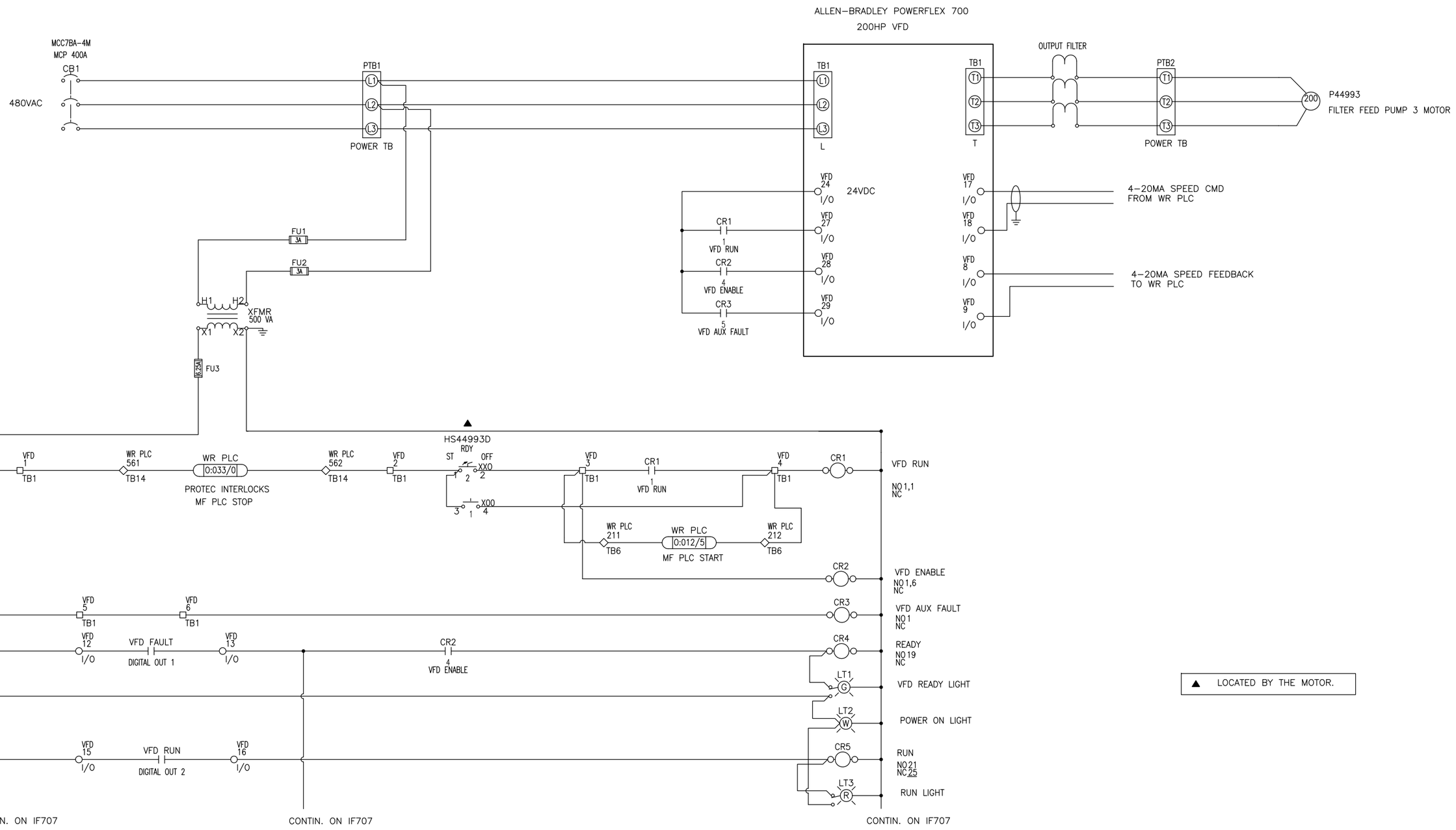
TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

CONTROL AND LOGIC DIAGRAM
P44994
VFC44994B
WR FILTER FEED PUMP 4
SHEET 2 OF 2

SCALE
NO SCALE
DRAWING NUMBER
IF705
SHEET NUMBER
172 OF 236



▲ LOCATED BY THE MOTOR.

PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED:
SAVED:

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BDR342202

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WILLIAM T
NO. 68143
EXP. 6-30-11
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
SANJAY SIVARAJAN
Regist # 161/1
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

CONTROL AND LOGIC DIAGRAM

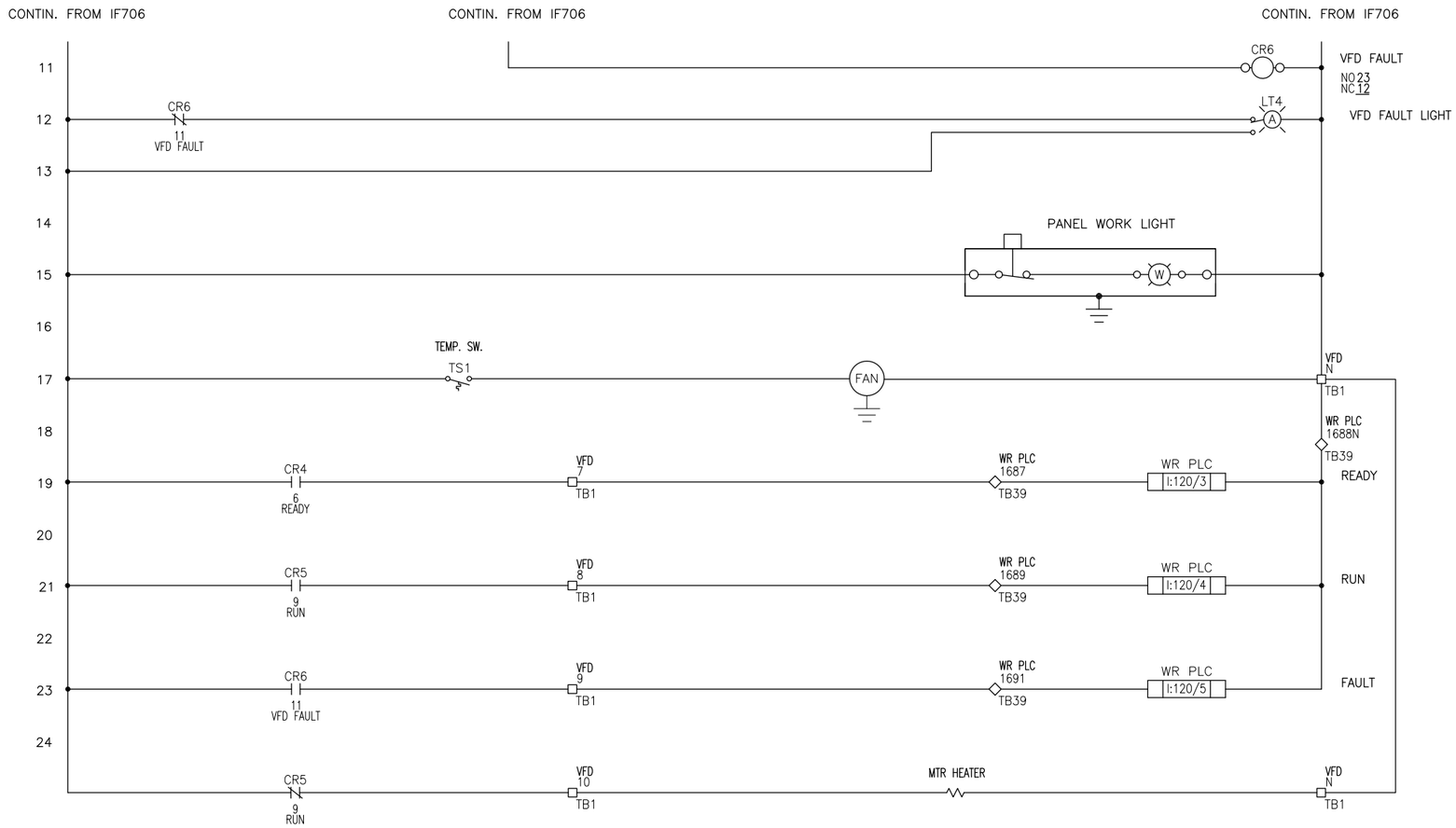
P44993

FILTER FEED PUMP 3
SHEET 1 OF 2

SCALE
NO SCALE

DRAWING NUMBER
IF706

SHEET NUMBER
173 OF 236



PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED:
SAVED:

FBOR3422202
BDR3422202

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WILLIAM TH
NO. 68143
EXP. 6-30-11
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
SANJAY SIVARAJAH
Regist # 16111
Exp. 6-30-12
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY
SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL
WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

CONTROL AND LOGIC DIAGRAM

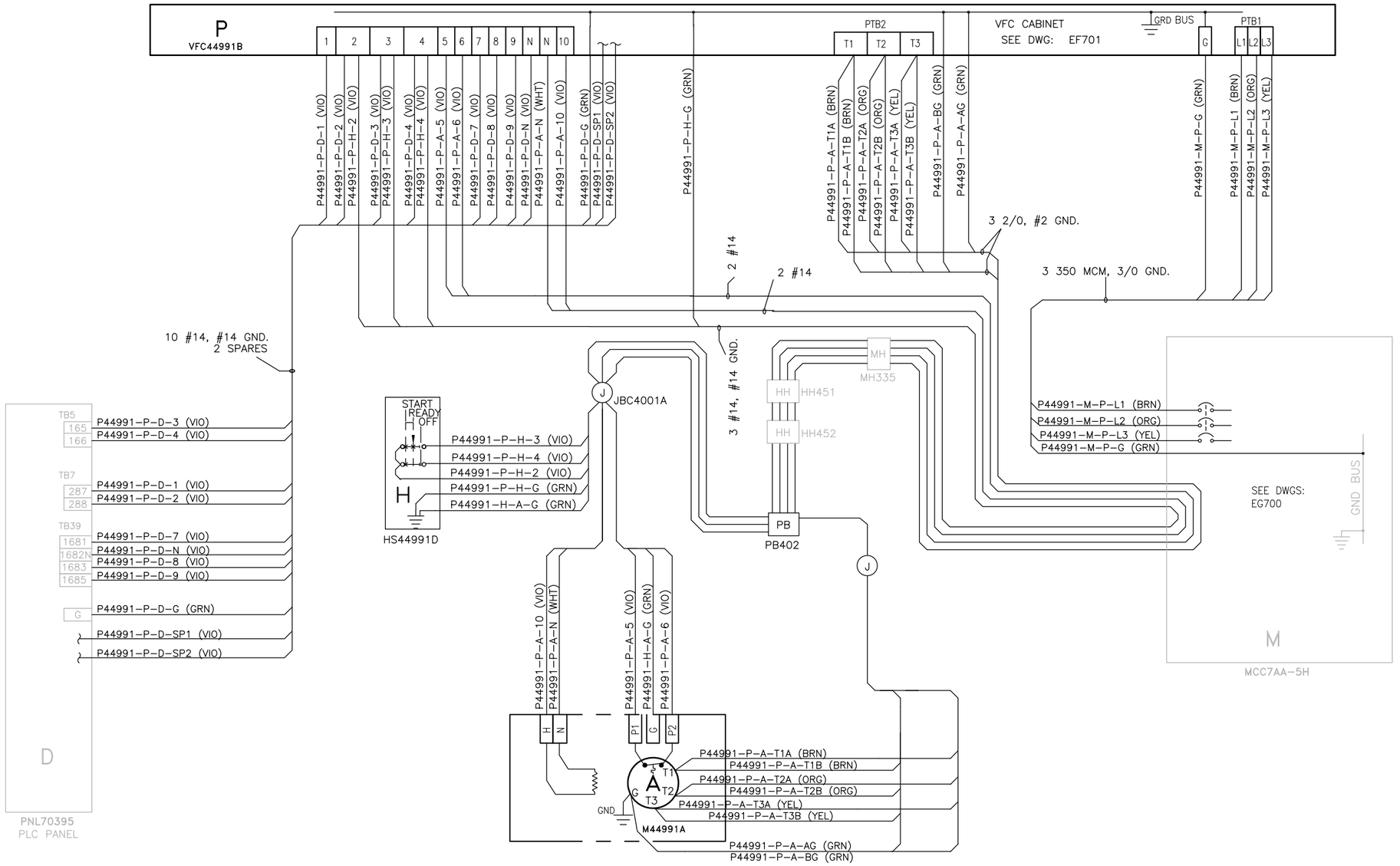
P44993

FILTER FEED PUMP 3
SHEET 2 OF 2

SCALE
NO SCALE

DRAWING NUMBER
IF707

SHEET NUMBER
174 OF 236



DEVICE LEGEND	
A	MOTOR
D	PLC PANEL
H	HAND SWITCH
M	MCC
P	VFC PANEL

EQUIPMENT NO.
P44991

PRELIMINARY – NOT FOR CONSTRUCTION

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NO. 68143
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SANJAY SIVAPRASAD
Regist # 161/1
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL
WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECT DIAGRAM

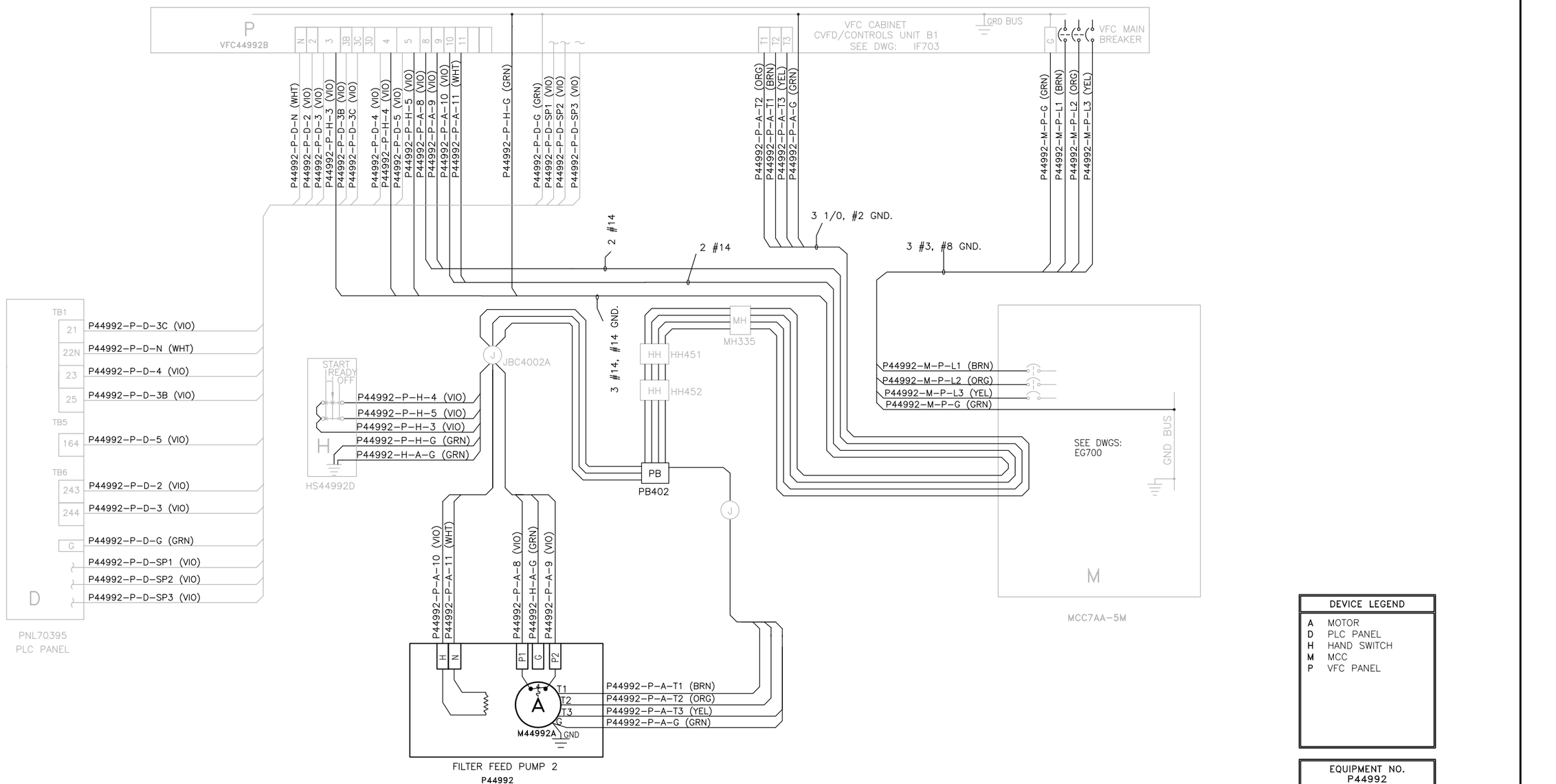
P44991

FILTER FEED PUMP 1

SCALE
NO SCALE

DRAWING NUMBER
IF708

SHEET NUMBER
175 OF 236



DEVICE LEGEND	
A	MOTOR
D	PLC PANEL
H	HAND SWITCH
M	MCC
P	VFC PANEL

EQUIPMENT NO.
P44992

PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED:
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SANJAY SIVARAJAN
Regist # 161/1
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECT DIAGRAM

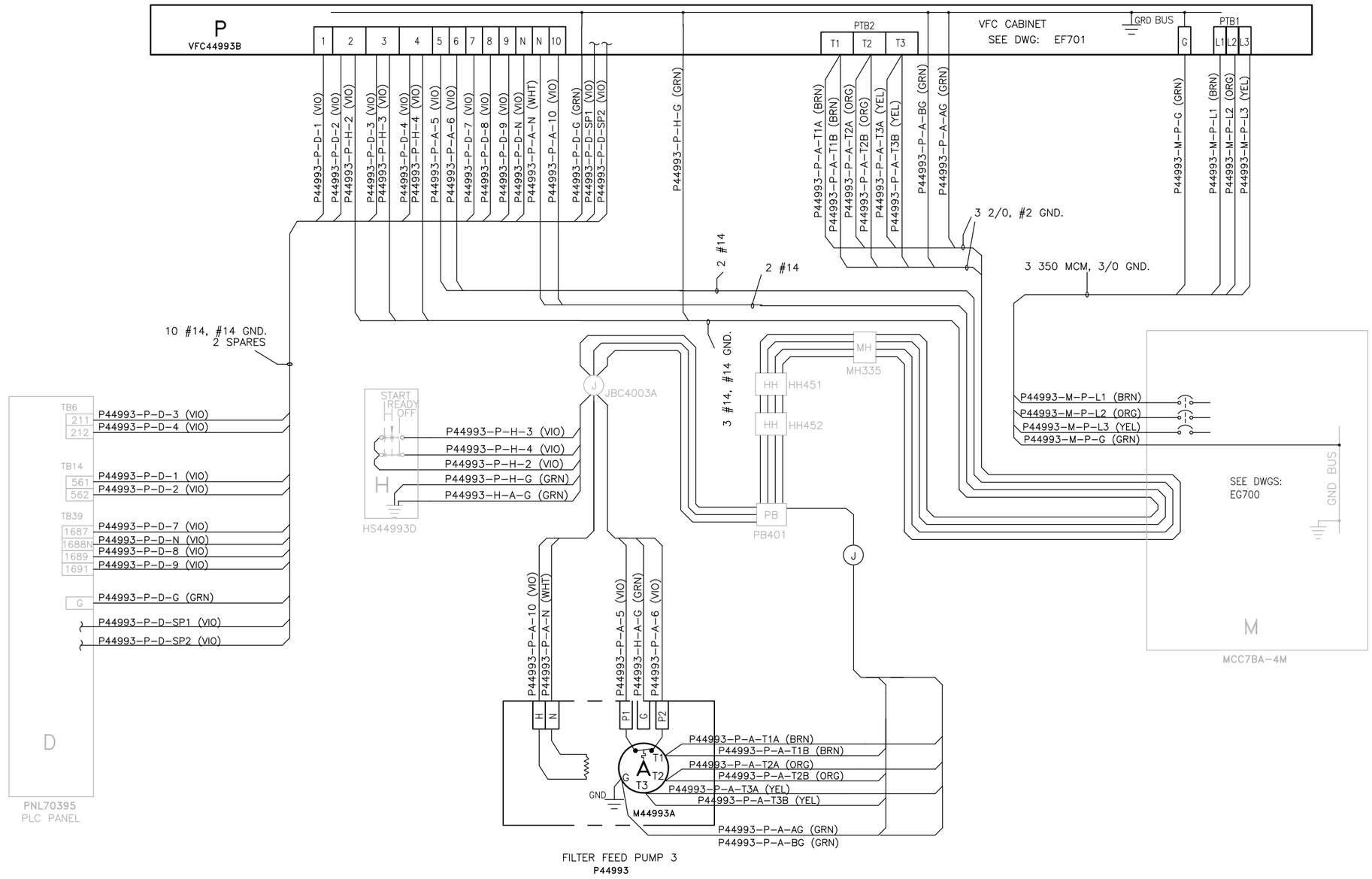
P44992

FILTER FEED PUMP 2

SCALE
NO SCALE

DRAWING NUMBER
IF709

SHEET NUMBER
176 OF 236



DEVICE LEGEND	
A	MOTOR
D	PLC PANEL
H	HAND SWITCH
M	MCC
P	VFC PANEL

EQUIPMENT NO.
P44993

PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED:
SAVED:

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BDR3142202

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SANJAY SIVARAJAH
Regist # 16111
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECT DIAGRAM

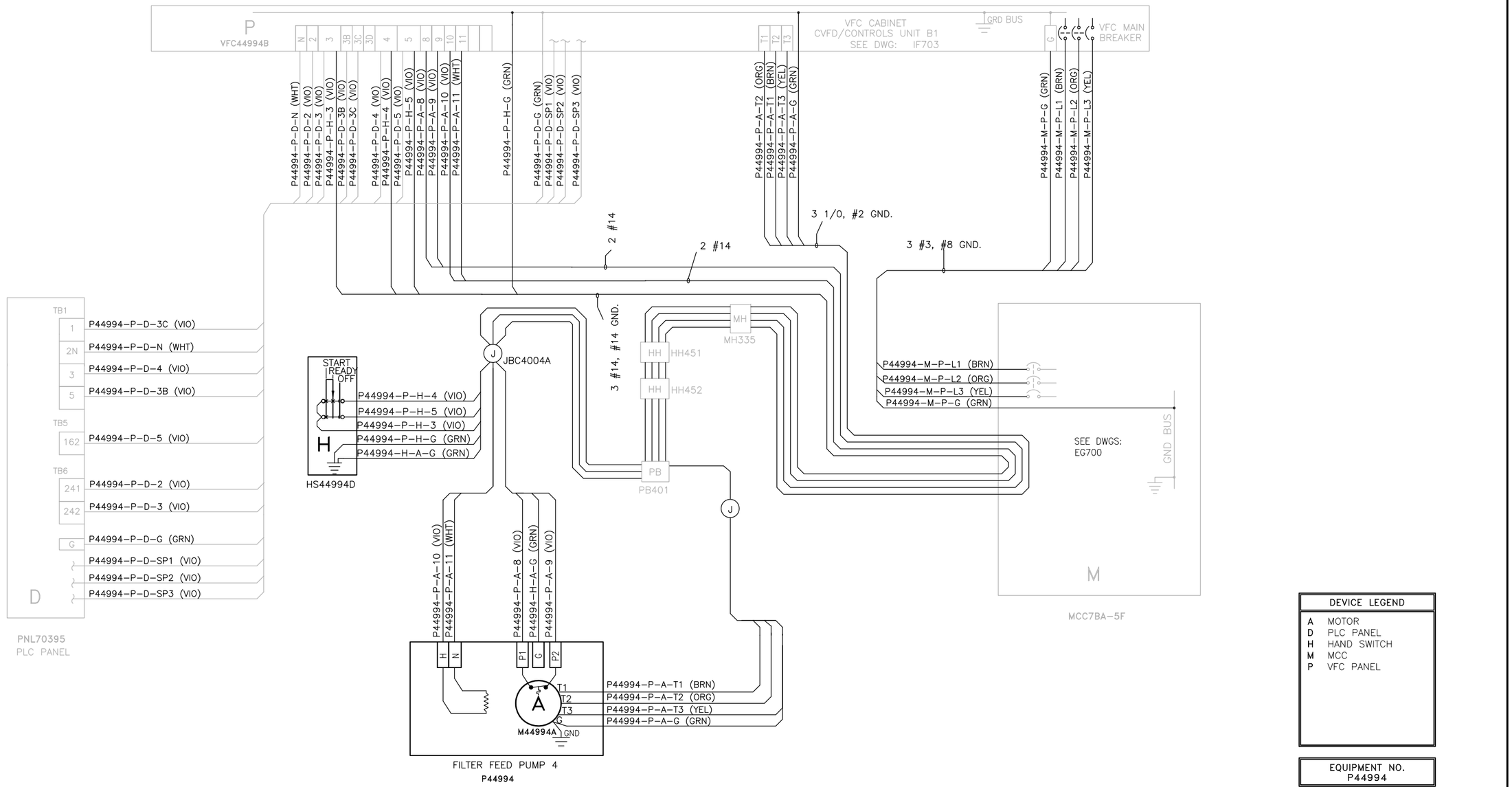
P44993

FILTER FEED PUMP 3

SCALE
NO SCALE

DRAWING NUMBER
IF710

SHEET NUMBER
177 OF 236



DEVICE LEGEND	
A	MOTOR
D	PLC PANEL
H	HAND SWITCH
M	MCC
P	VFC PANEL

EQUIPMENT NO.
P44994

PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED:
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BDR3422202

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WILLIAM T
NO. 68143
EXP. 6-30-11
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
SANJAY SIVARAJAN
Regist # 16171
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECT DIAGRAM

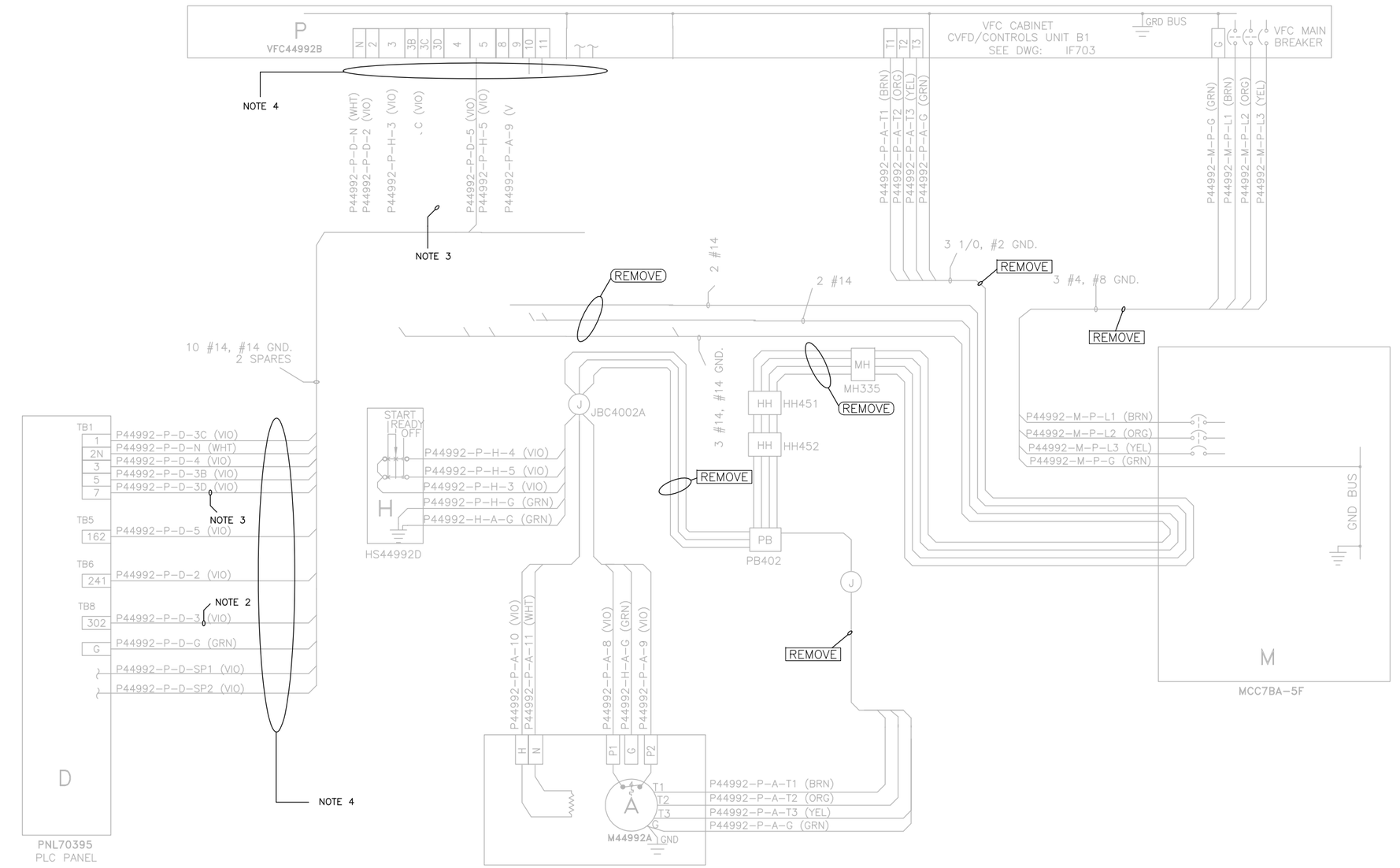
P44994

FILTER FEED PUMP 4

SCALE
NO SCALE

DRAWING NUMBER
IF711

SHEET NUMBER
178 OF 236



NOTE: 1. EXISTING VFC44992B FOR FILTER FEED PUMP NO. 2 WILL BE RENAMED VFC44994B AND WILL POWER FILTER FEED PUMP NO. 4.

2. MOVE CONDUCTOR TO TB6–242.

3. DISCONNECT AND MAKE IT A SPARE.

4. RELABEL CONDUCTORS WITH NEW PUMP NO. EXAMPLE: P44992–P–D–2 BECOMES P44994–P–D–2.

DEVICE LEGEND	
A	MOTOR
D	PLC PANEL
H	HAND SWITCH
M	MCC
P	VFC PANEL

EQUIPMENT NO.
P44992

PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED:
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WILLIAM T
NO. 68143
EXP. 6-30-11
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
SANJAY SIVARAJAN
Regist # 161/1
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"–SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECT DIAGRAM

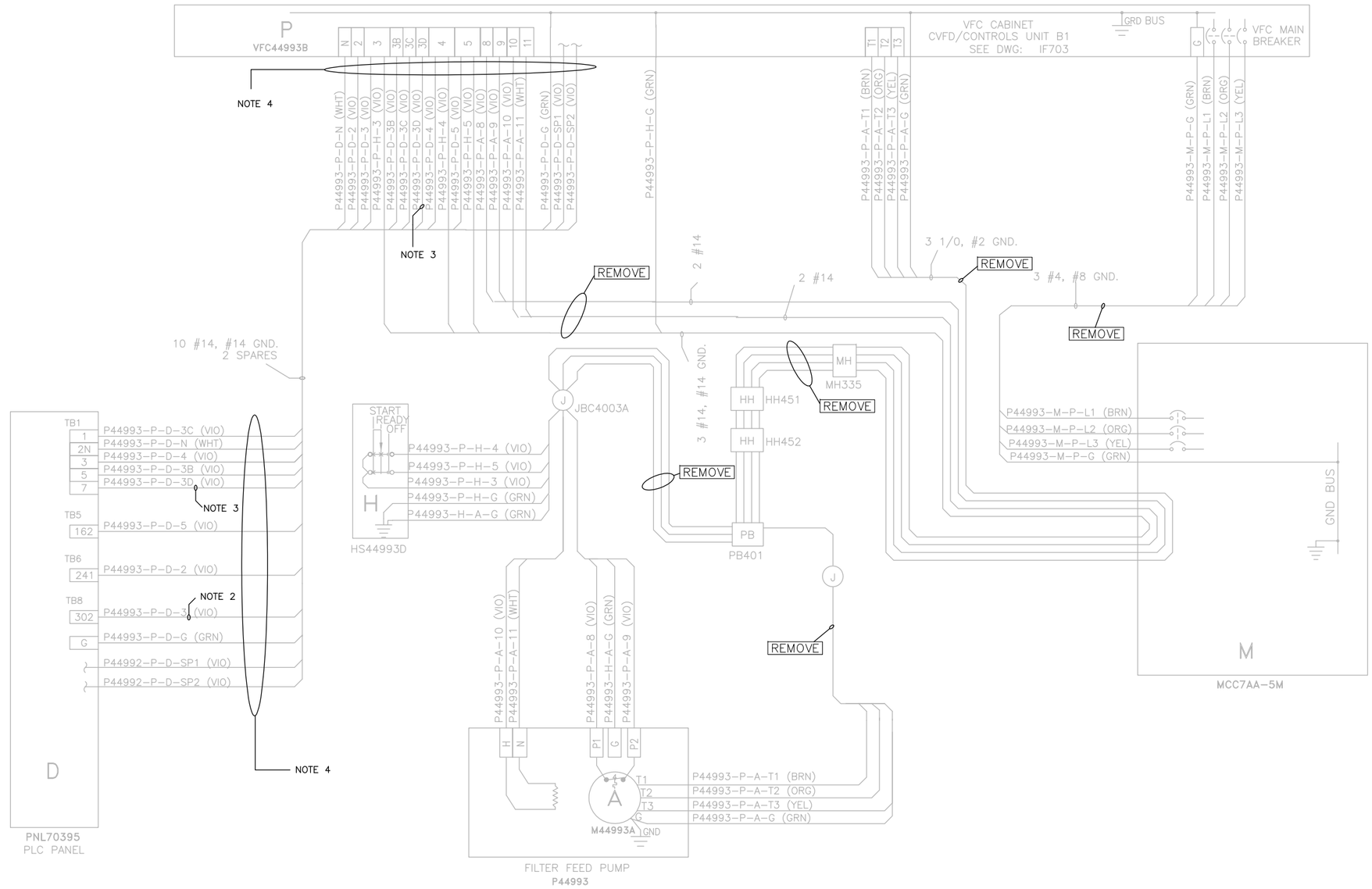
DEMOLITION

P44992
WR FILTER FEED PUMP 2

SCALE
NO SCALE

DRAWING NUMBER
IF712

SHEET NUMBER
179 OF 236



NOTES:

1. EXISTING VFC44993B FOR FILTER FEED PUMP NO. 2 WILL BE RENAMED VFC44992B AND WILL POWER FILTER FEED PUMP NO. 2.
2. MOVE CONDUCTOR TO TB6–244.
3. DISCONNECT AND MAKE IT A SPARE.
4. RELABEL CONDUCTORS WITH NEW PUMP NO. EXAMPLE: P44993-P-D-2 BECOMES P44992-P-D-2.

DEVICE LEGEND	
A	MOTOR
D	PLC PANEL
H	HAND SWITCH
M	MCC
P	VFC PANEL

EQUIPMENT NO.
P44993

PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED:
SAVED:

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BDR342202

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REGISTERED PROFESSIONAL ENGINEER
WILLIAM TH
NO. 68143
EXP. 6-30-11
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
SANJAY SIVAPRASAD
Regist # 161/1
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECT DIAGRAM

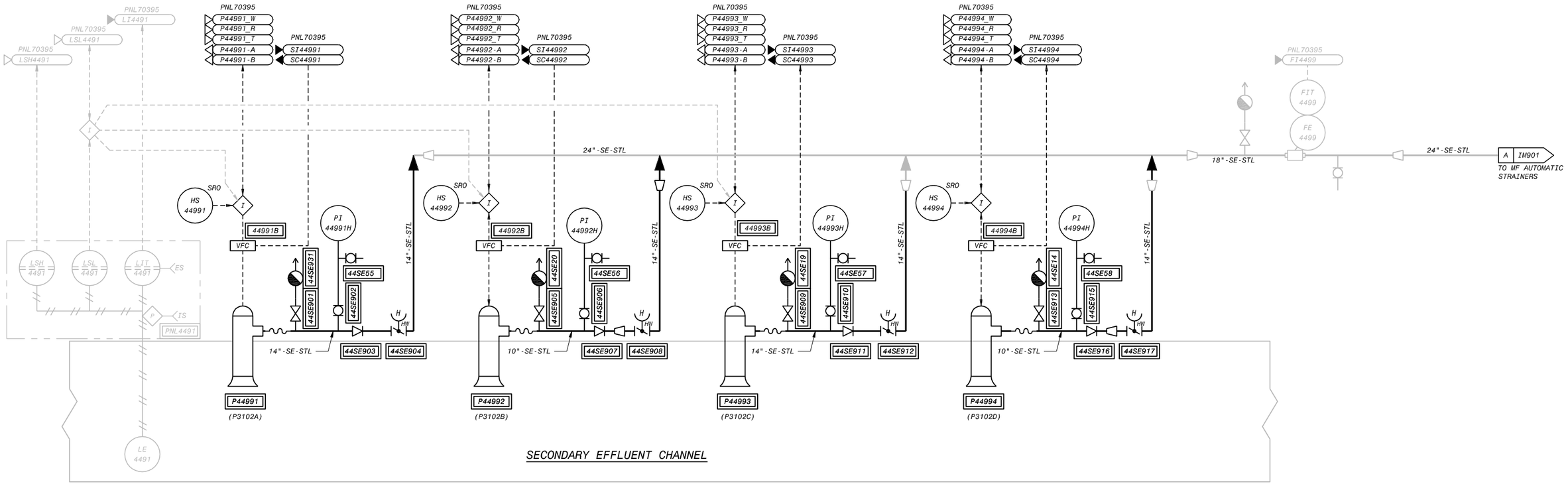
DEMOLITION

P44993
FILTER FEED PUMP 3

SCALE
NO SCALE

DRAWING NUMBER
IF713

SHEET NUMBER
180 OF 236



PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED: 1/14/2010 7:33:50 PM, Batch Plot
SAVED: OGL22631 1/14/2010 1:04:33 PM

FBDR342202
BDR342202

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REGISTERED PROFESSIONAL ENGINEER
DEWITT C. SMITH
E 15829
EXP 12/31/2010
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN JLH
DESIGNED JLH
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

PROCESS & INSTRUMENTATION DIAGRAM

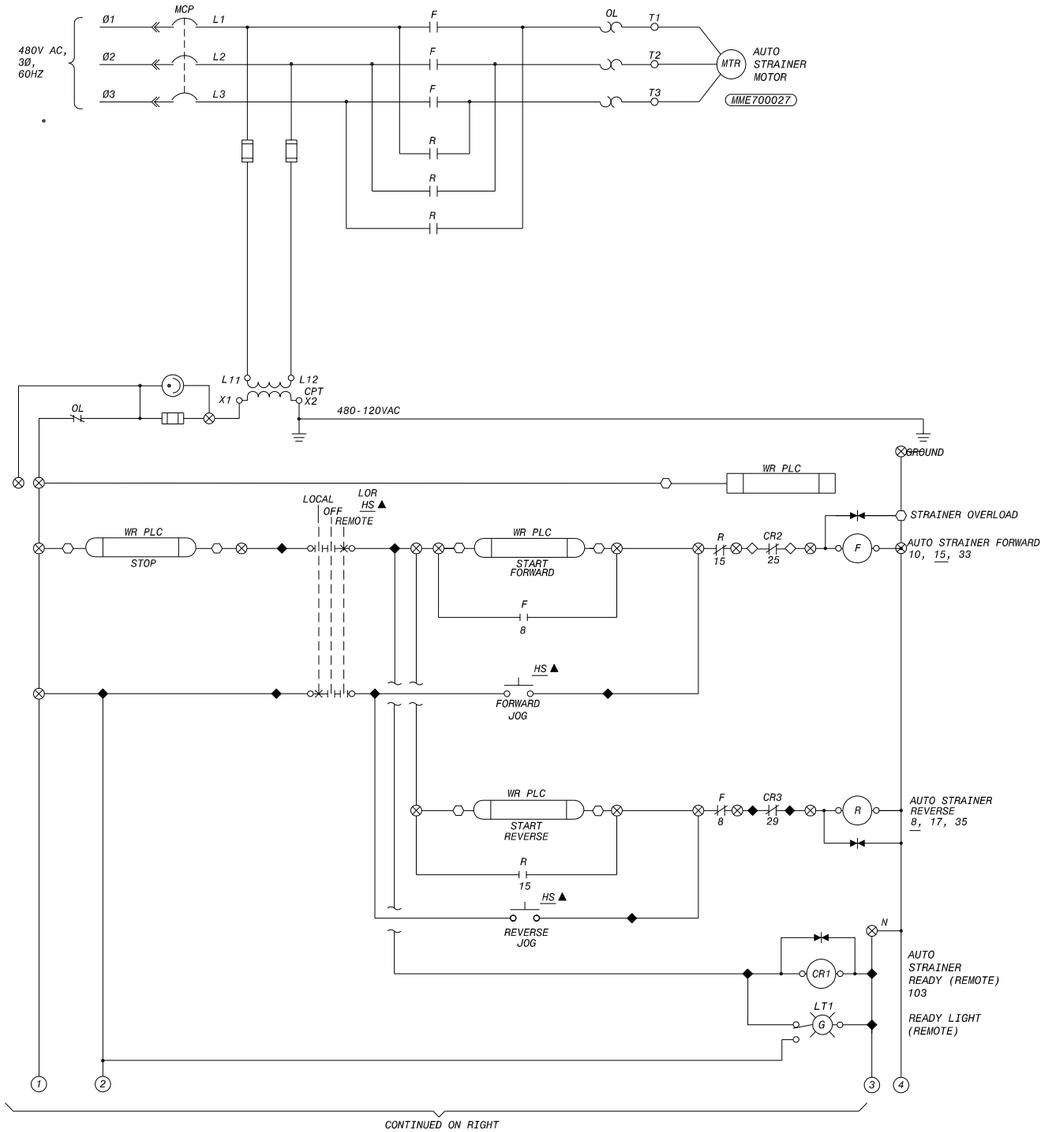
P&ID – FILTER FEED PUMP STATION

SCALE
NONE

DRAWING NUMBER
IF901

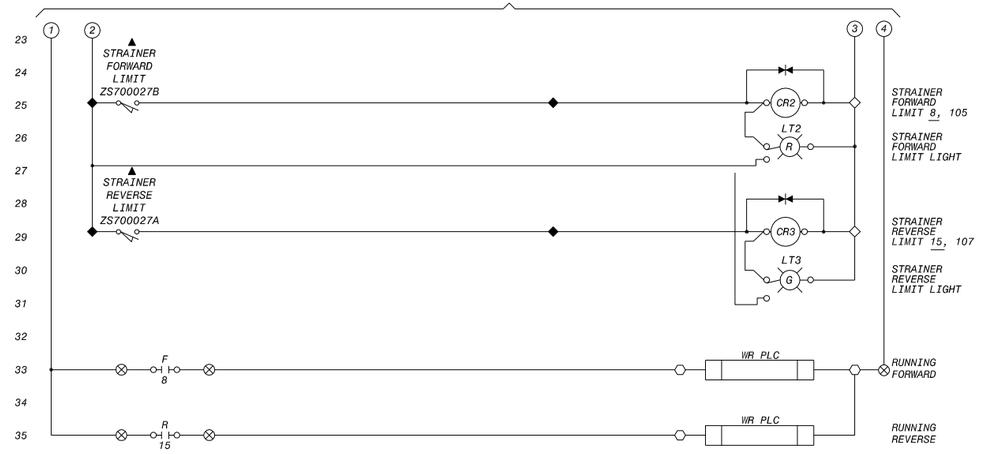
SHEET NUMBER
181 OF 236

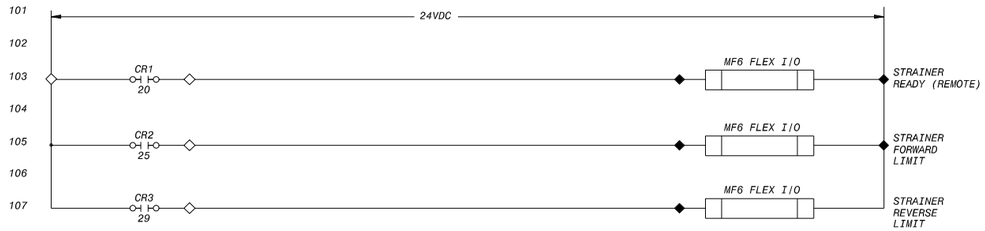
FIELD ELEMENTARY



FIELD ELEMENTARY

CONTINUED FROM LEFT





DESCRIPTION	TERMINAL
MCC CUBICLE TERMINAL	⊗
MCC PLC PANELS	⬡
FIELD PANEL	◇
FIELD MOUNTED DEVICE	▲
MF6 FLEX I/O	◆

DESCRIPTION	EQUIPMENT NUMBER	PALL EQUIPMENT NUMBER	HS	ZS NO.	ZS NO.	PALL ZS NO.	PALL ZS NO.
AUTO STRAINER 1	MME700027	S3201A	HS700027	ZS700027B	ZS700027A	ZSC700027B	ZSC700027A
AUTO STRAINER 2	MME700028	S3201B	HS700028	ZS700028B	ZS700028A	ZSC700028B	ZSC700028A
AUTO STRAINER 3	MME700029	S3201C	HS700029	ZS700029B	ZS700029A	ZSC700029B	ZSC700029A

NOTES:

1. ZS-A IS STRAINER REVERSE LIMIT SWITCH WHICH IS LOCATED THE CLOSEST TO THE STRAINER MOTOR. ZS-B IS THE STRAINER FORWARD LIMIT WHICH IS LOCATED THE FARTHEST FROM THE MOTOR.
2. STRAINER CONTROLS ARE BASED ON AMIAD STRAINERS SPECIFIED IN SECTION 15495, WHERE BOTH AMIAD AND SP KINNEY STRAINERS ARE SPECIFIED. IF SP KINNEY STRAINERS ARE PROVIDED, INCORPORATE ANY CHANGES TO THE DESIGN AS SHOWN ON THIS DRAWING AT NO ADDITIONAL COST TO THE DISTRICT. CHANGES MAY INCLUDE, BUT ARE NOT LIMITED TO, CONDUIT AND WIRING, PLC I/O, PLC PROGRAMMING. INTERCONNECTION DIAGRAMS AND SUBMITTALS SHOWING HOW THE PROPOSED CHANGES ARE PROPOSED TO BE INCORPORATED.
3. COORDINATE WITH THE DISTRICT FOR PANEL TERMINAL ASSIGNMENTS FOR WR PLC I/O.

PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED: 1/14/2010 7:40:26 PM, Batch Plot
SAVED: OGL226431, 1/14/2010 3:26:39 PM
FBDR342202
BDR342202

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REGISTERED PROFESSIONAL ENGINEER
DEWITT C. SMITH
E 15829
EXP. 12/31/2010
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN GT
DESIGNED WEM
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

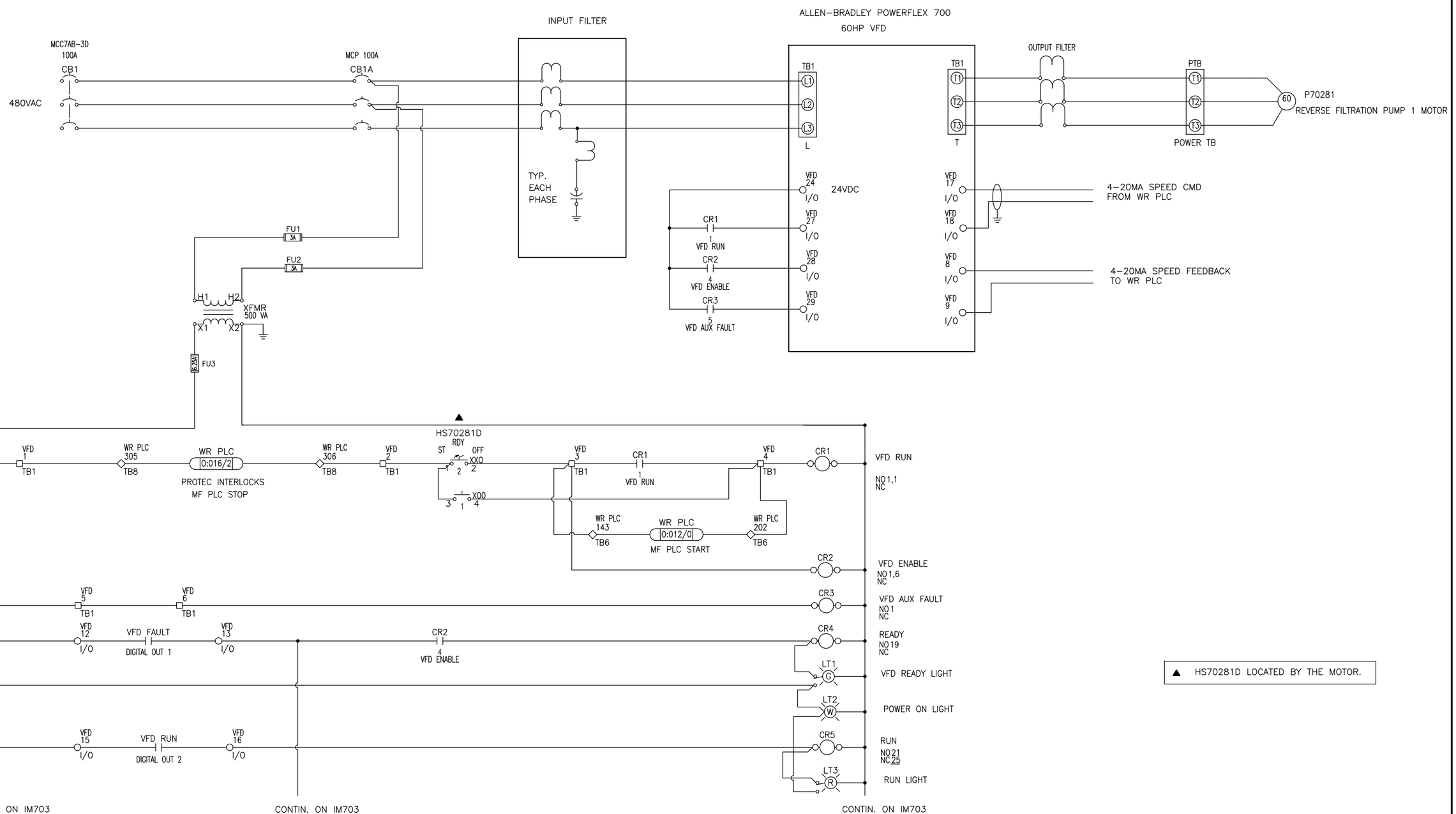
CONTROL AND LOGIC DIAGRAM

AUTOMATIC STRAINERS

SCALE
NONE

DRAWING NUMBER
IM701

SHEET NUMBER
182 OF 236



▲ HS70281D LOCATED BY THE MOTOR.

PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED:
SAVED:

FRD534.2202
BDR342202

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REGISTERED PROFESSIONAL ENGINEER
WILLIAM T
NO. 68143
EXP. 6-30-11
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
SANJAY SIVAPRASAD
Regist # 16171
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"–SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN S. SIVAPRASAD
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

CONTROL AND LOGIC DIAGRAM

P70281

REVERSE FILTRATION PUMP 1
SHEET 1 OF 2

SCALE
NO SCALE

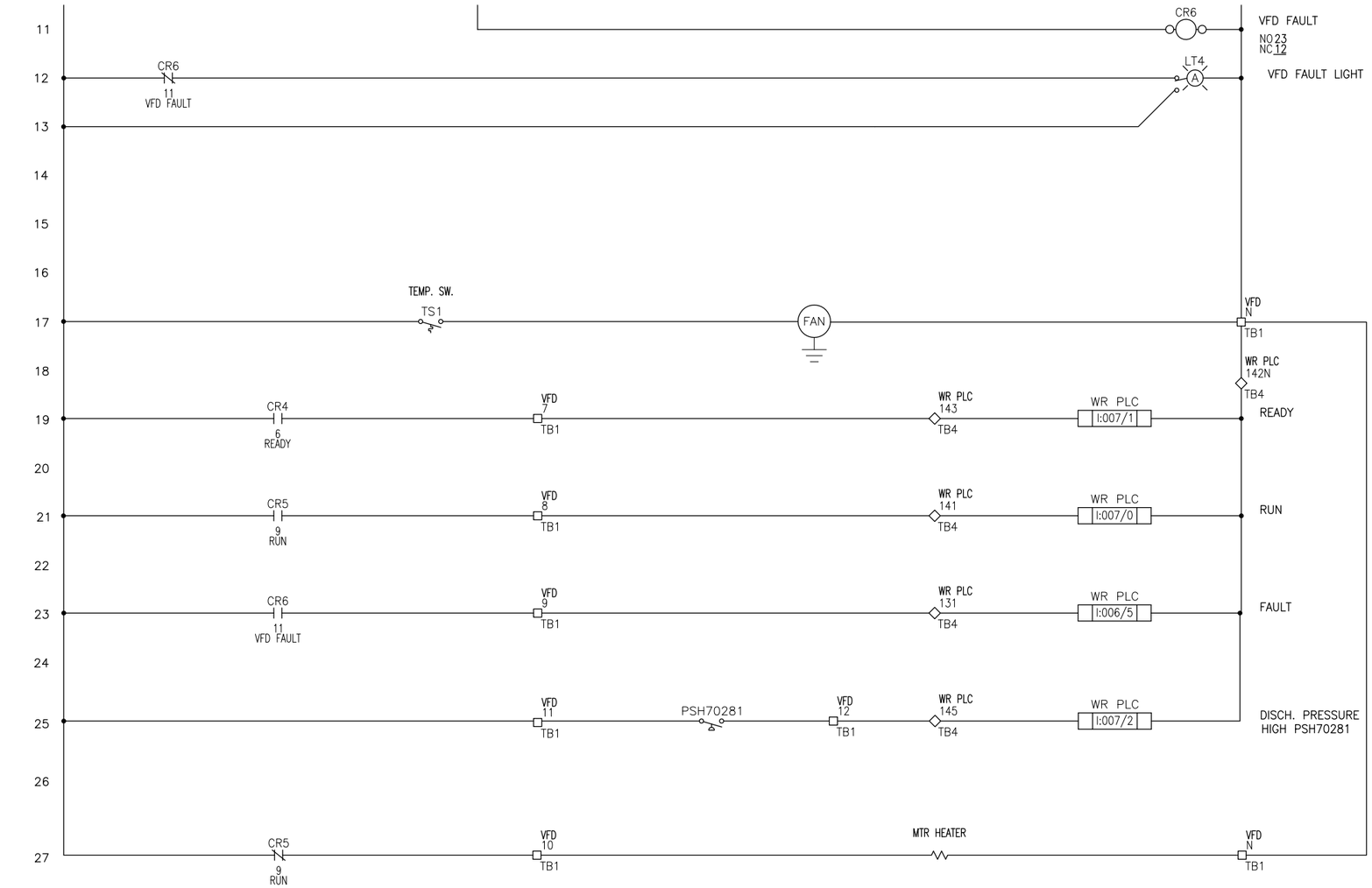
DRAWING NUMBER
IM702

SHEET NUMBER
183 OF 236

CONTIN. FROM IM702

CONTIN. FROM IM702

CONTIN. FROM IM702



PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED:
SAVED:

FBDR3422D2
BDR1422D2

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REGISTERED PROFESSIONAL ENGINEER
WILLIAM YU
NO. 68143
EXP. 6-30-11
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
SANJAY SIVAPRASAD
Regist # 16111
Exp. 6-30-12
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN S. SIVAPRASAD
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

CONTROL AND LOGIC DIAGRAM

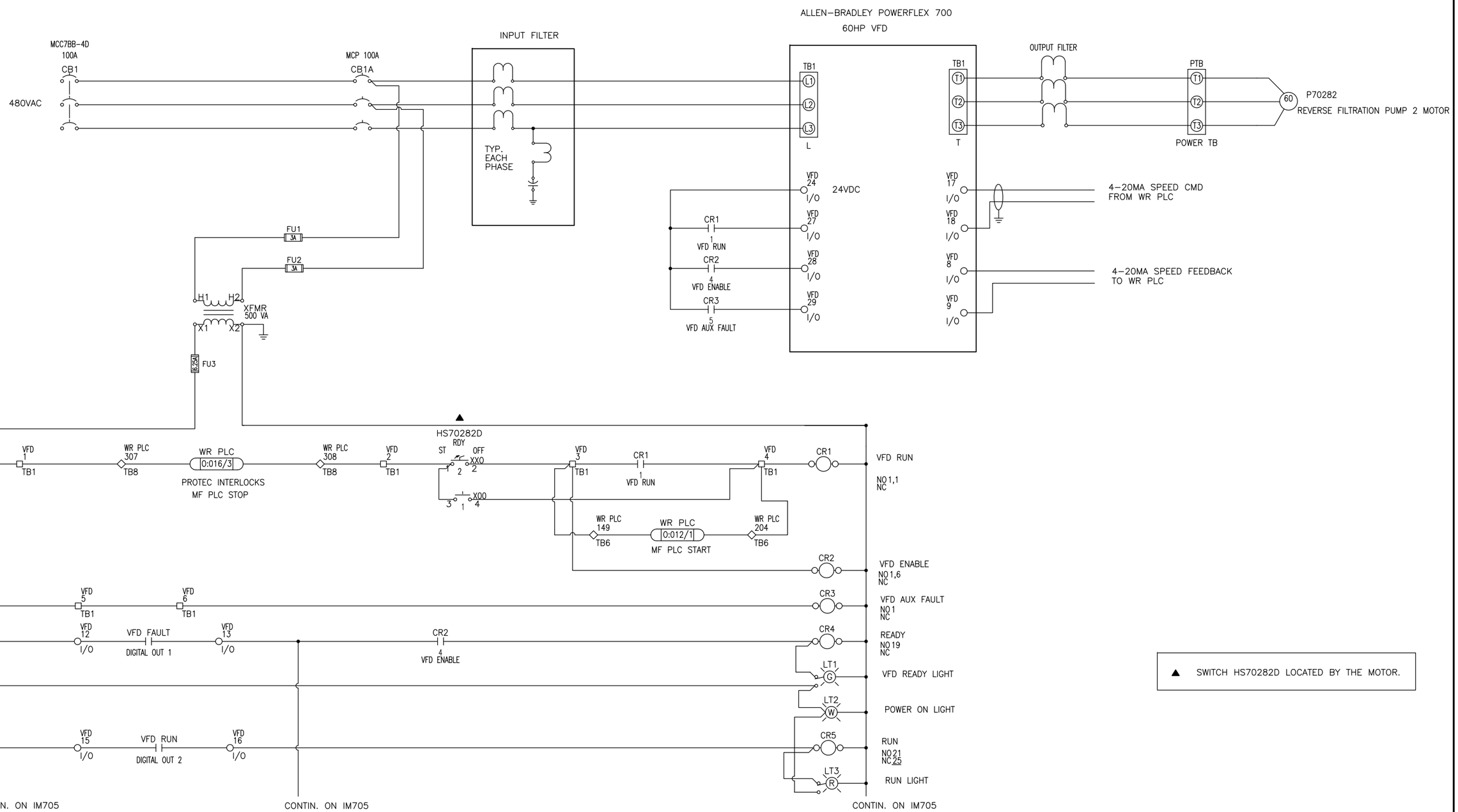
P70281

REVERSE FILTRATION PUMP 1

SCALE
NO SCALE

DRAWING NUMBER
IM703

SHEET NUMBER
184 OF 236



▲ SWITCH HS70282D LOCATED BY THE MOTOR.

PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED:
SAVED:

FRD534.2202
BDR342202

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WILLIAM T
NO. 68143
EXP. 6-30-11
CIVIL
STATE OF CALIFORNIA

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SANJAY SIVAPRASAD
Regist # 161/1
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"–SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN S. SIVAPRASAD
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

CONTROL AND LOGIC DIAGRAM

P70282

REVERSE FILTRATION PUMP 2
SHEET 1 OF 2

SCALE
NO SCALE

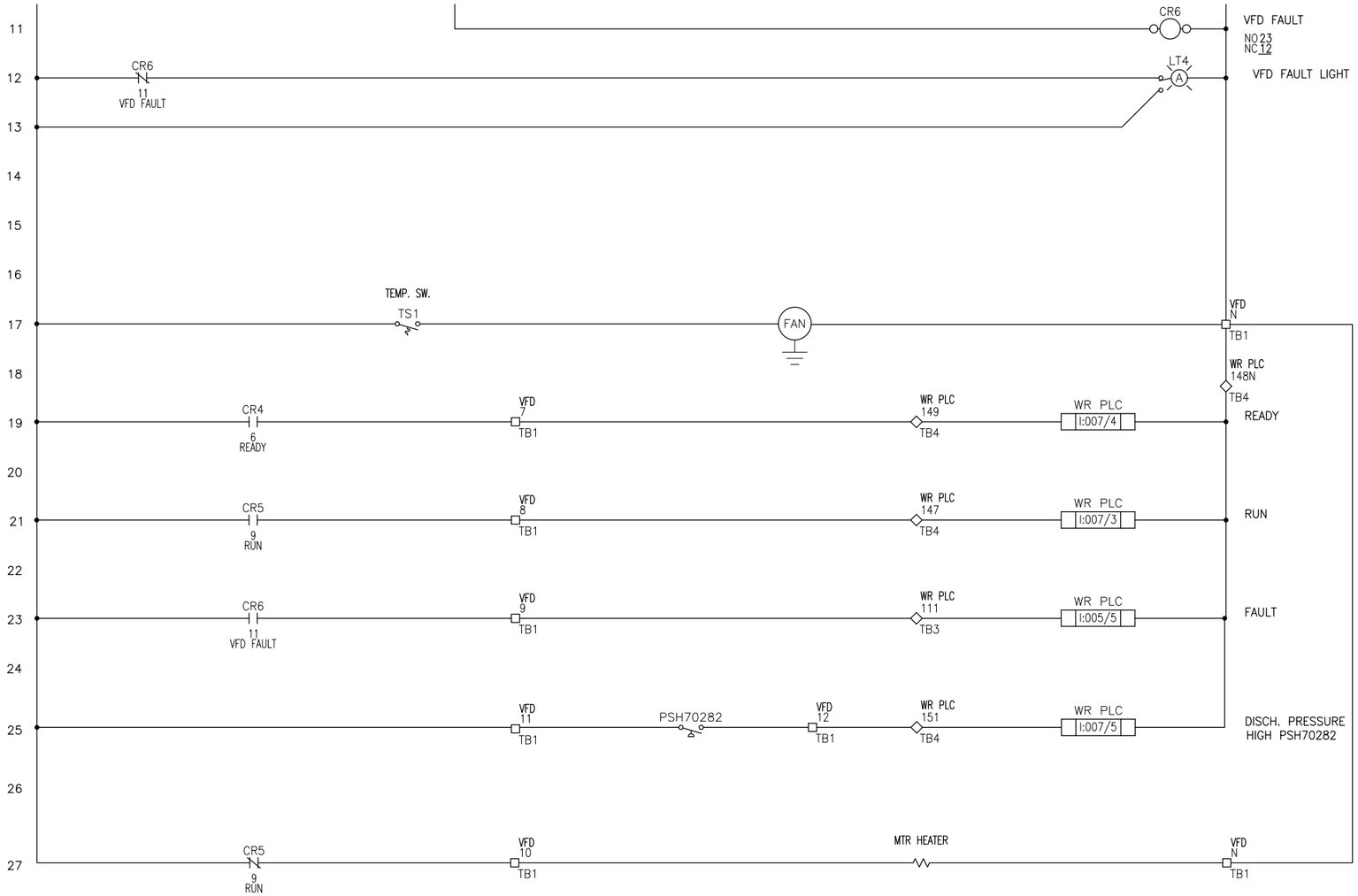
DRAWING NUMBER
IM704

SHEET NUMBER
185 OF 236

CONTIN. FROM IM704

CONTIN. FROM IM704

CONTIN. FROM IM704



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SAVED:

FBDR3422D2
BDR3422D2

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CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
SANJAY SIVAPRASAD
Regist # 16111
Exp. 6-30-12
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
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FILE IM705
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CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT

CONTROL AND LOGIC DIAGRAM

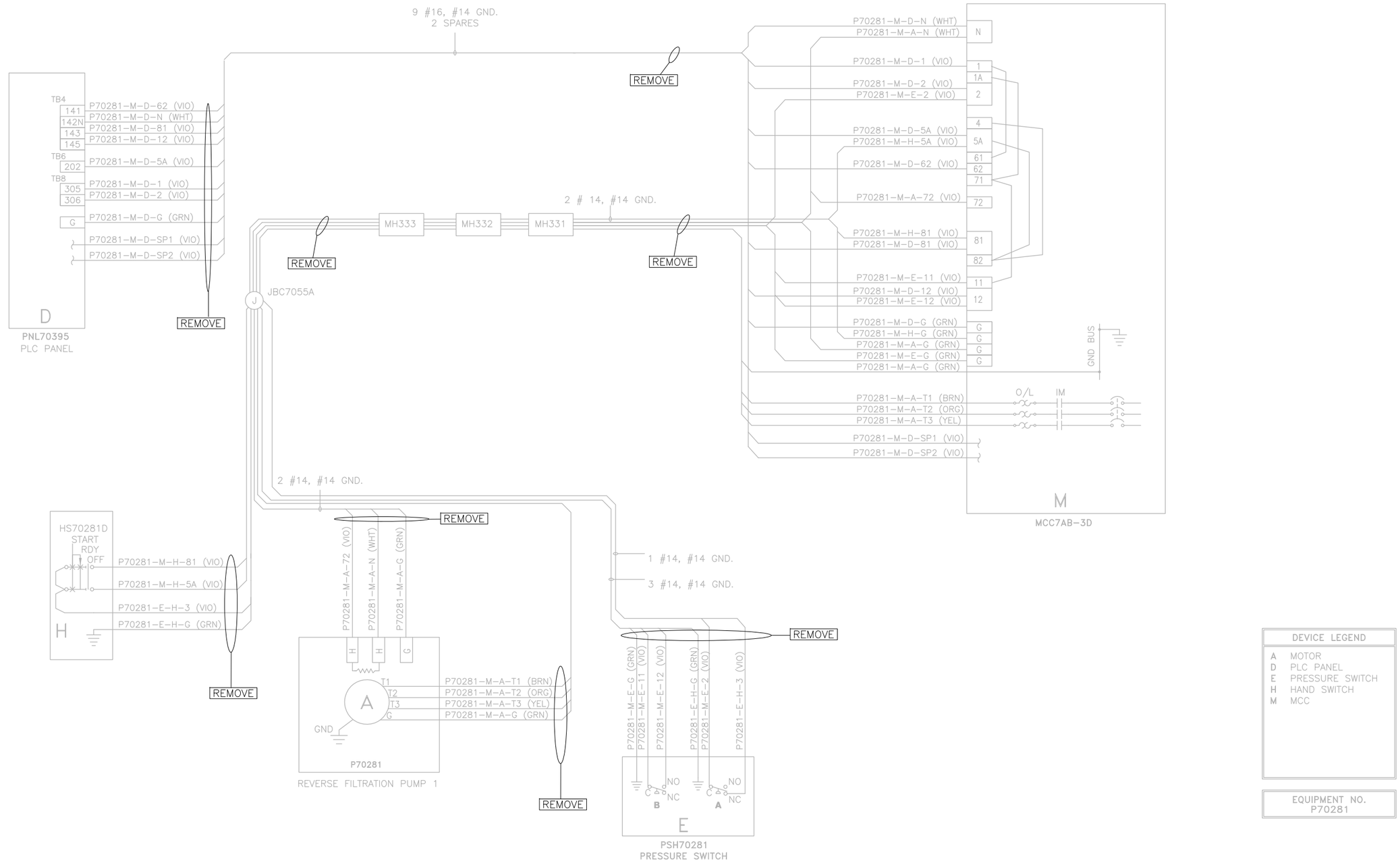
P70282

REVERSE FILTRATION PUMP 2
SHEET 2 OF 2

SCALE
NO SCALE

DRAWING NUMBER
IM705

SHEET NUMBER
186 OF 236



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SANJAY SIVAPRASAD
Regist # 161/1
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STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
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(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

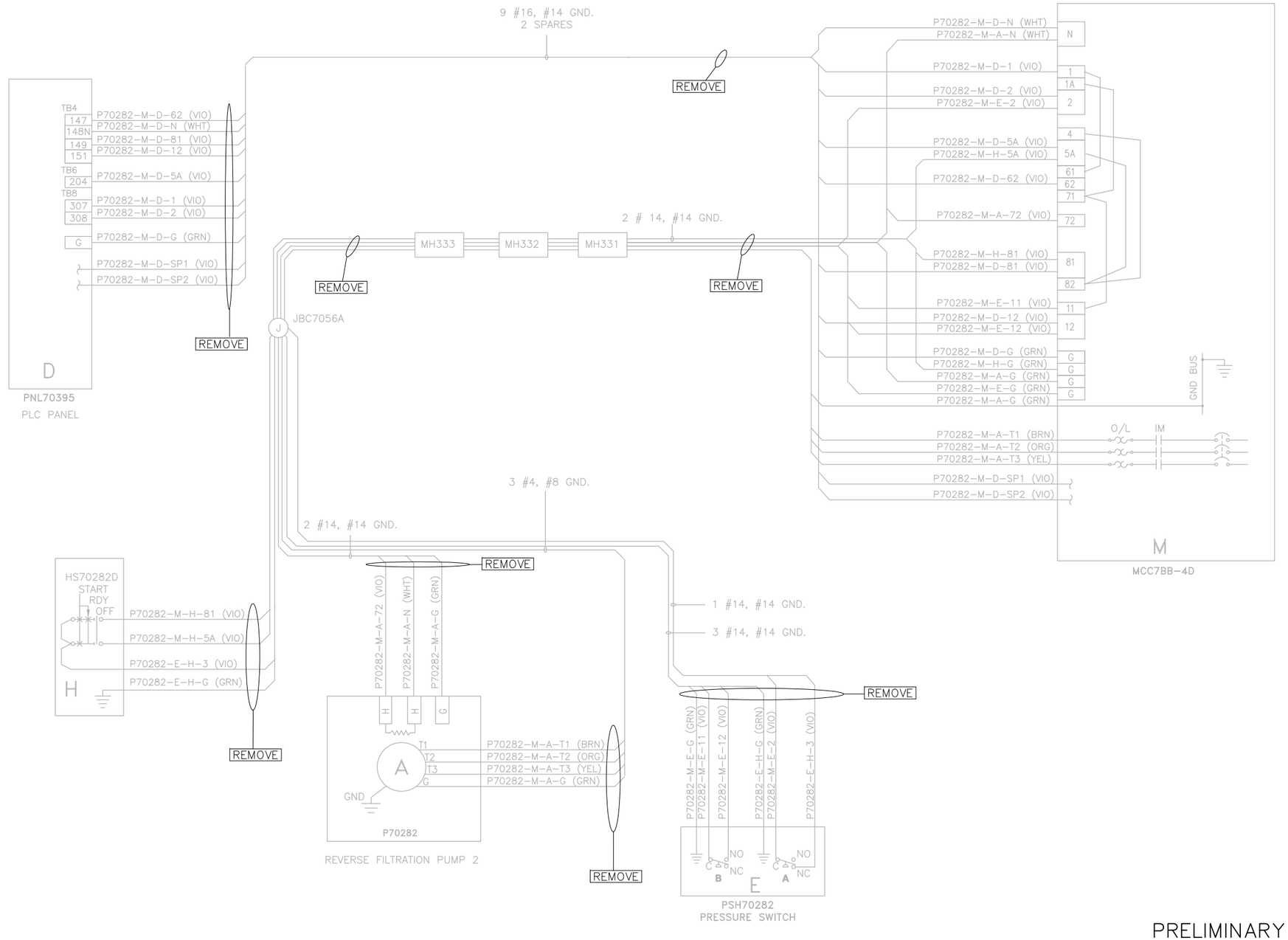
TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECT DIAGRAM
DEMOLITION
P77281
REVERSE FILTRATION PUMP 1

SCALE
NO SCALE
DRAWING NUMBER
IM706
SHEET NUMBER
187 OF 236



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SANJAY SIVAPRASAD
Regist # 161/1
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECT DIAGRAM

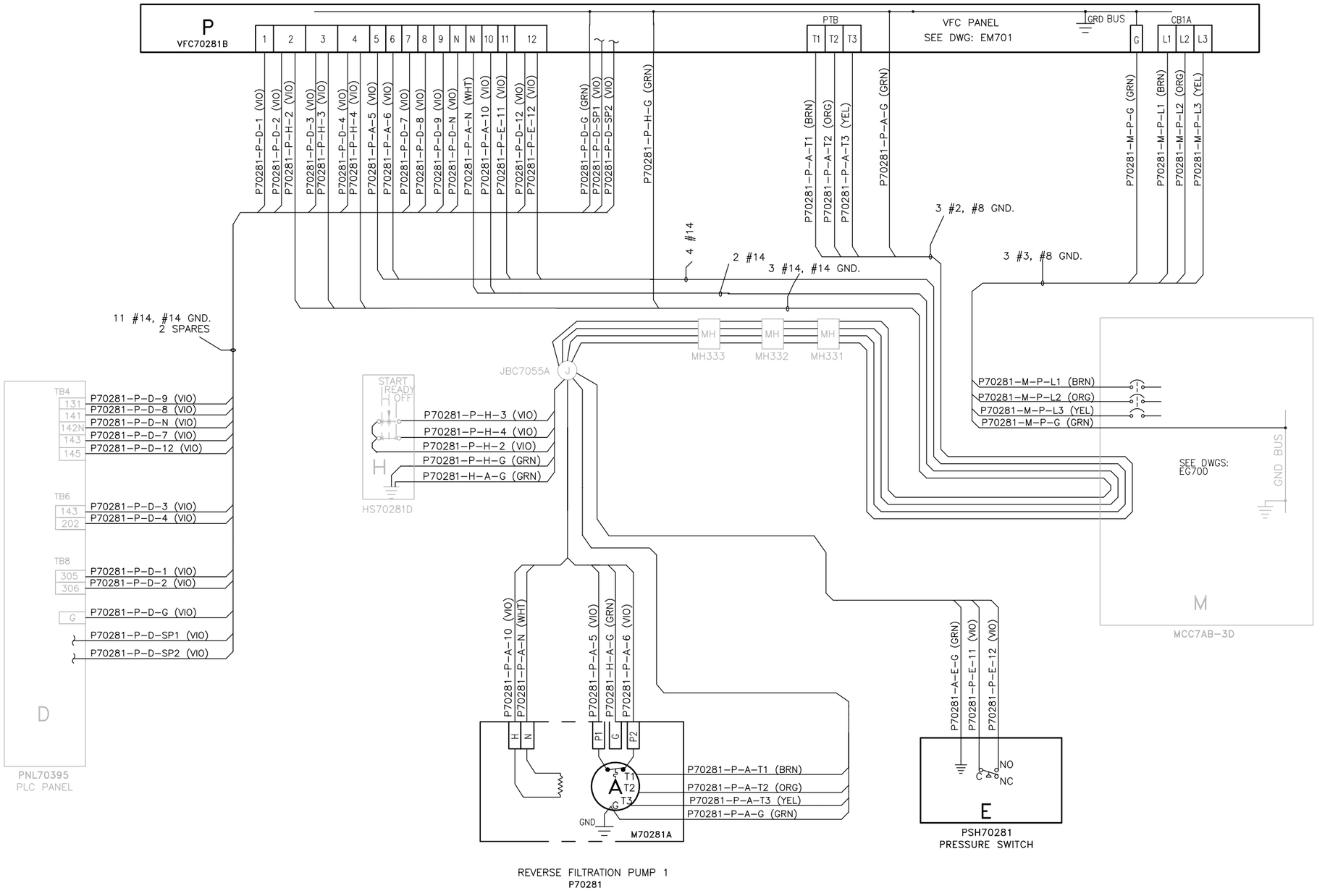
DEMOLITION
P70282

REVERSE FILTRATION PUMP 2

SCALE
NO SCALE

DRAWING NUMBER
IM707

SHEET NUMBER
188 OF 236



DEVICE LEGEND	
A	MOTOR
D	PLC PANEL
H	HAND SWITCH
M	MCC
P	VFC PANEL
E	PRESSURE SWITCH

EQUIPMENT NO.
P70281

PRELIMINARY – NOT FOR CONSTRUCTION

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ELECTRICAL
STATE OF CALIFORNIA

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
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FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL
WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECT DIAGRAM

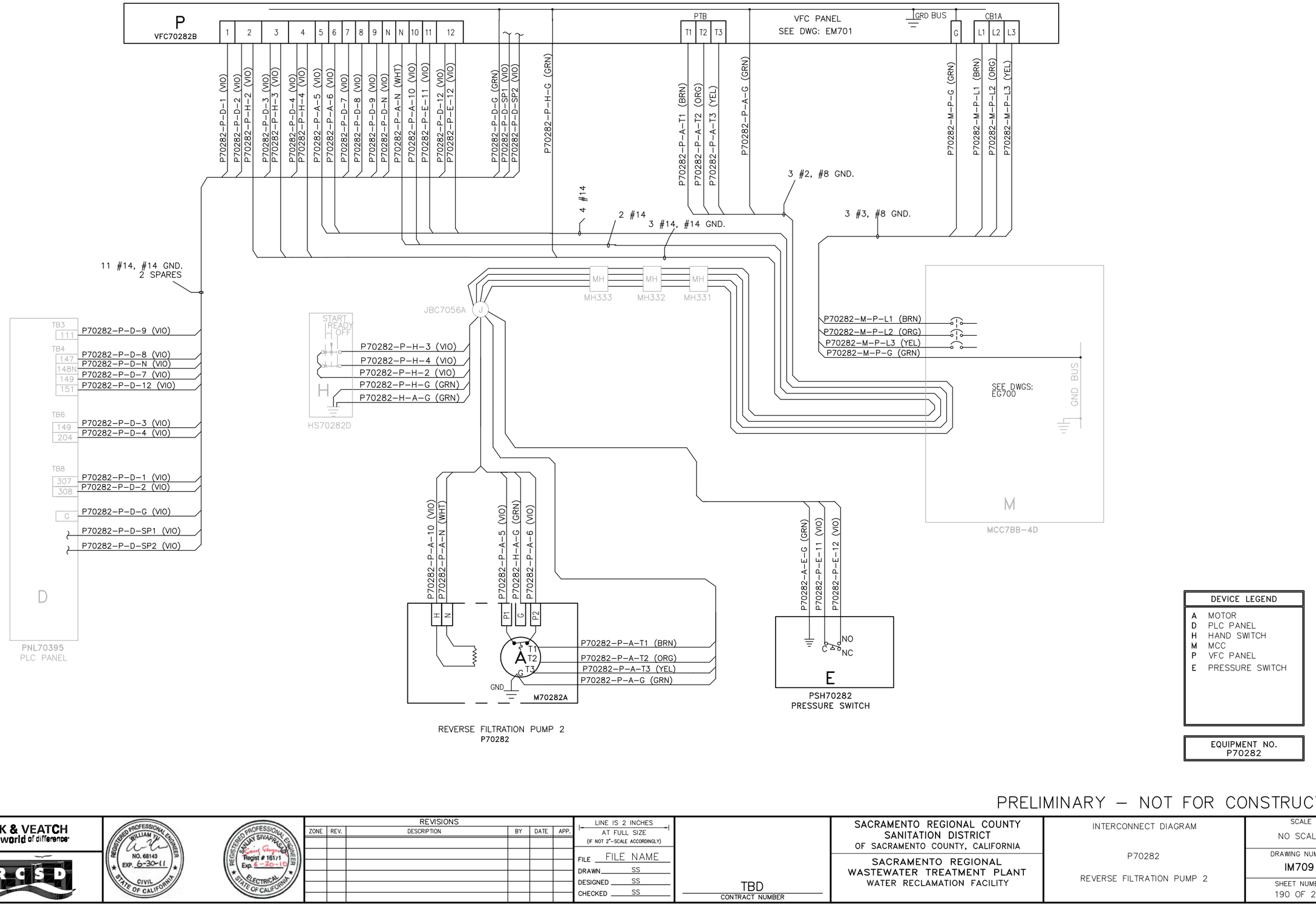
P70281

REVERSE FILTRATION PUMP 1

SCALE
NO SCALE

DRAWING NUMBER
IM708

SHEET NUMBER
189 OF 236



DEVICE LEGEND	
A	MOTOR
D	PLC PANEL
H	HAND SWITCH
M	MCC
P	VFC PANEL
E	PRESSURE SWITCH

EQUIPMENT NO.
P70282

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Regist # 161/1
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

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CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL
WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECT DIAGRAM

P70282

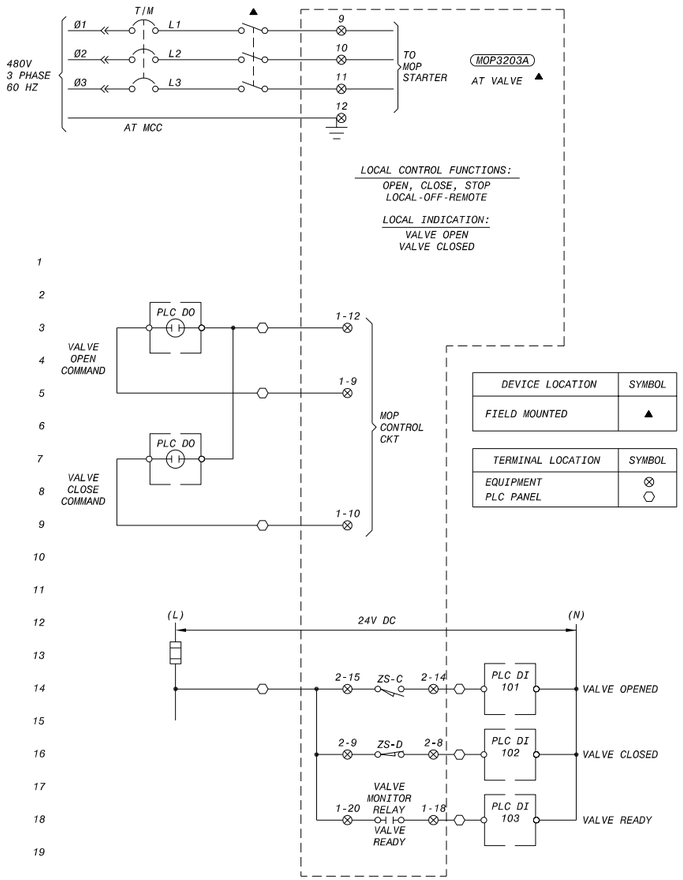
REVERSE FILTRATION PUMP 2

SCALE
NO SCALE

DRAWING NUMBER
IM709

SHEET NUMBER
190 OF 236

FIELD ELEMENTARY



DEVICE LOCATION	SYMBOL
FIELD MOUNTED	▲

TERMINAL LOCATION	SYMBOL
EQUIPMENT	⊗
PLC PANEL	⬡

LIMIT SWITCH CONTACT DEVELOPMENT		
SWITCH	VALVE POSITION	
	FULLY OPEN	FULLY CLOSED
ZS-C	———	
ZS-D		———

DESCRIPTION	EQUIPMENT NUMBER	PALL EQUIPMENT NUMBER
AUTO STRAINER 1 DRAIN VALVE	-	V3203A
AUTO STRAINER 2 DRAIN VALVE	-	V3203B
AUTO STRAINER 3 DRAIN VALVE	-	V3203C

NOTES:

1. "VALVE READY" CONTACT CLOSES WHEN ALL OF THE FOLLOWING CONDITIONS ARE MET:
   a. POWER IS AVAILABLE AND IN CORRECT SEQUENCE.
   b. OVERLOAD TRIP IS RESET.
   c. LOCAL SWITCH IS IN "REMOTE".
2. THE CONTACT IS IN OPEN STATE WHEN THE WP CONTROL VALVE IS SELECTED TO BE IN "PRIMARY SOURCE" MODE AT THE PC WORKSTATION. THE CONTACT CLOSES WHEN THE VALVE IS
3. COORDINATE WITH THE DISTRICT FOR PANEL TERMINAL ASSIGNMENTS FOR WR PLC I/O.

PRELIMINARY – NOT FOR CONSTRUCTION

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	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

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FILE
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SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
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SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

CONTROL AND LOGIC DIAGRAM

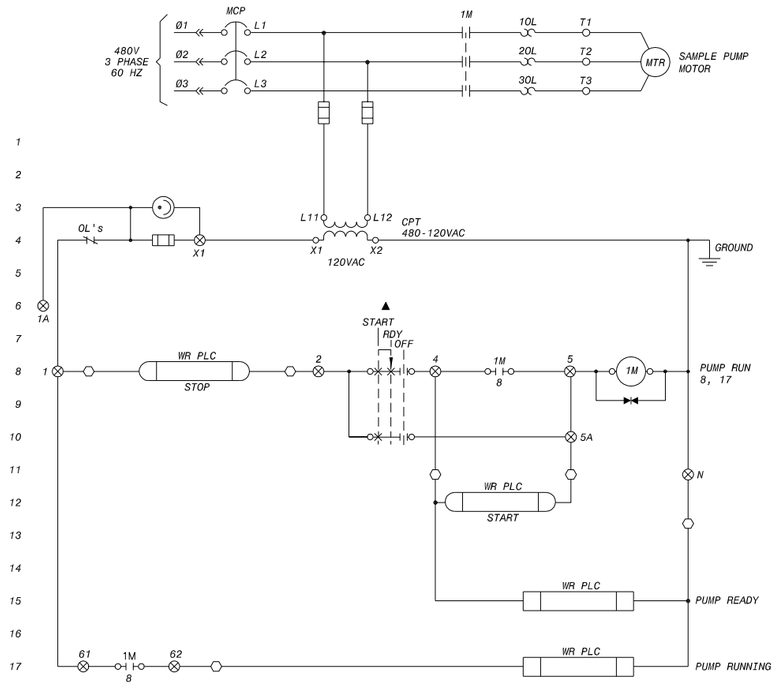
MEMBRANE VALVES & MISCELLANEOUS EQUIPMENT

SCALE
NONE

DRAWING NUMBER
IM710

SHEET NUMBER
191 OF 236

FIELD ELEMENTARY



WATER QUALITY STATION SAMPLE PUMP TABLE

DESCRIPTION	EQUIPMENT NUMBER
WQS1 SAMPLE PUMP	P700046
WQS7 SAMPLE PUMP	P700049

DESCRIPTION	TERMINAL
MCC CUBICLE TERMINAL	⊗
MCC PLC PANELS	⬡
FIELD PANEL	◇
FIELD MOUNTED DEVICE	▲

NOTES:

1. COORDINATE WITH THE DISTRICT FOR PANEL TERMINAL ASSIGNMENTS FOR WR PLC I/O.

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	C	100% SUBMITTAL		01/10	

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CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

CONTROL AND LOGIC DIAGRAM

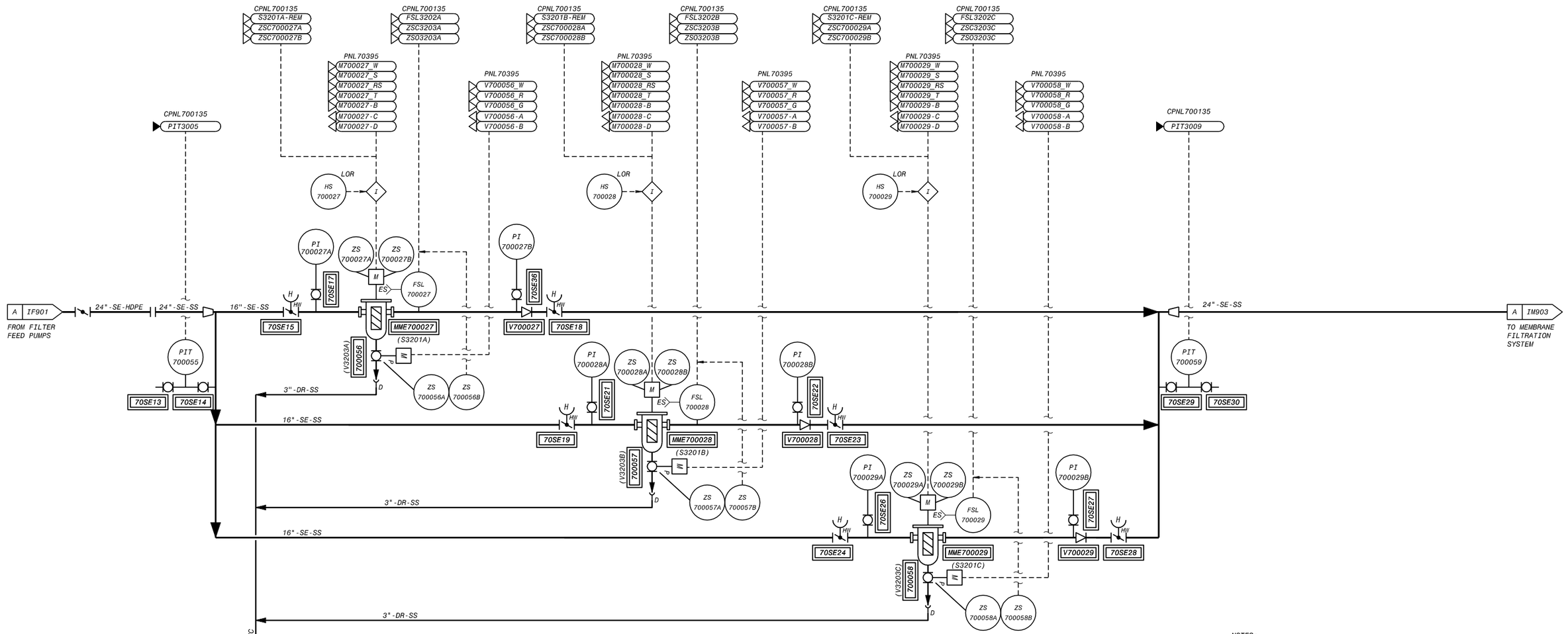
SAMPLE PUMPS

CIP DRAIN & NEUTRALIZATION PUMPS

SCALE
NONE

DRAWING NUMBER
IM711

SHEET NUMBER



AUTOMATIC STRAINERS

NOTES:

1. SEE LEGEND ON DRAWING IG001, IG002, & IG003.
2. LOCAL CONTROL DEVICES SUCH AS INDICATING LIGHTS AND SWITCHES, LOCATED AT EQUIPMENT, MAY NOT BE INDICATED ON THIS P&ID.
3. FOR POINT IDENTIFICATIONS INSIDE THE PLC I/O SYMBOLS, THE DISTRICT SYNTAX IS USED FOR I/O WIRED TO EXISTING PLC EQUIPMENT AND PALL CORPORATION SYNTAX IS USED FOR I/O WIRED TO NEW PLC EQUIPMENT PROVIDED BY PALL CORPORATION.

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BDR342202

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	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE
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DESIGNED JLH
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CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

PROCESS & INSTRUMENTATION DIAGRAM
P&ID – MF
AUTOMATIC STRAINERS

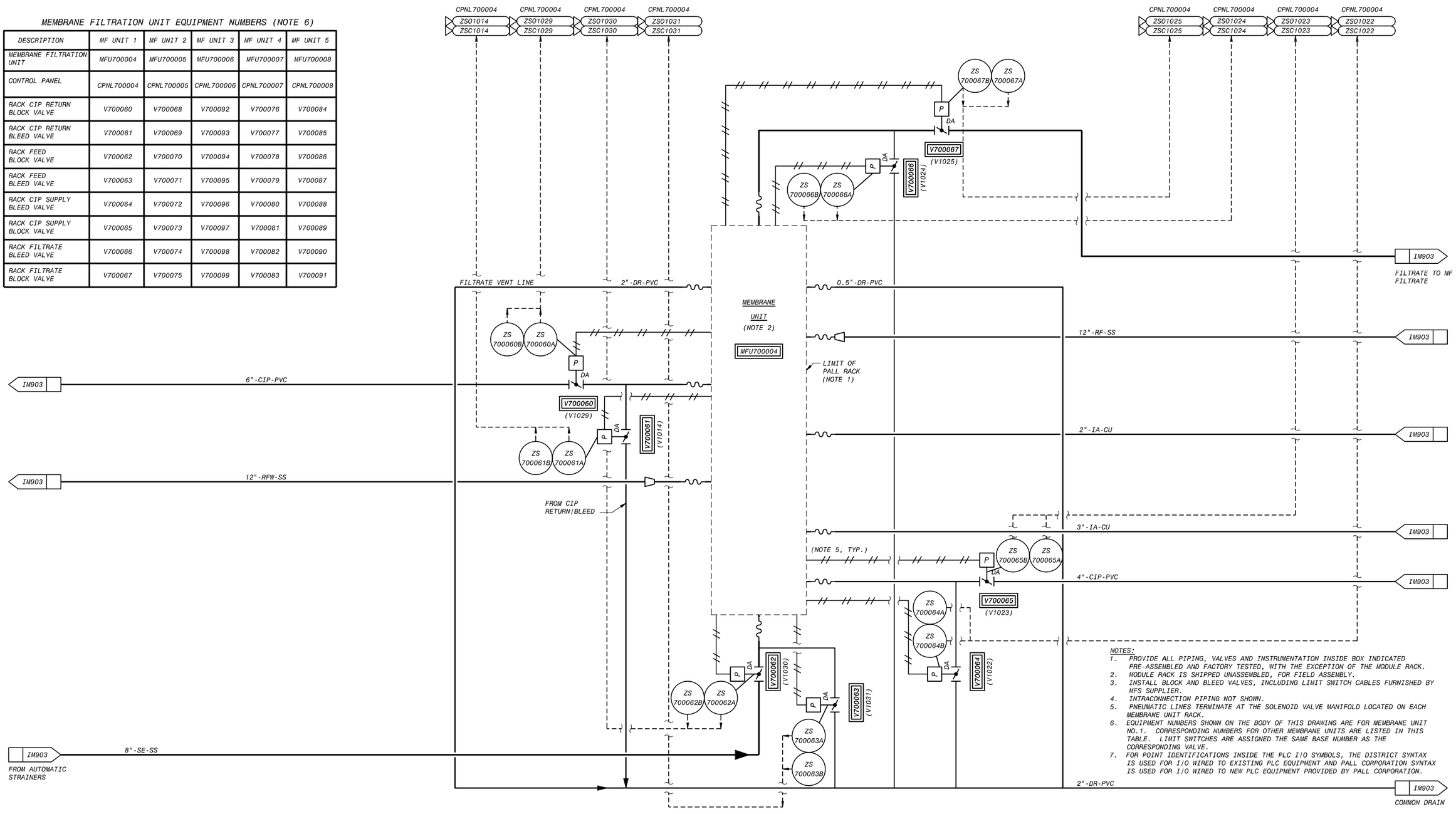
SCALE
NONE

DRAWING NUMBER
IM901

SHEET NUMBER
193 OF 236

MEMBRANE FILTRATION UNIT EQUIPMENT NUMBERS (NOTE 6)

DESCRIPTION	MF UNIT 1	MF UNIT 2	MF UNIT 3	MF UNIT 4	MF UNIT 5
MEMBRANE FILTRATION UNIT	MFU700004	MFU700005	MFU700006	MFU700007	MFU700008
CONTROL PANEL	CPNL700004	CPNL700005	CPNL700006	CPNL700007	CPNL700008
RACK CIP RETURN BLOCK VALVE	V700060	V700068	V700092	V700076	V700084
RACK CIP RETURN BLEED VALVE	V700061	V700069	V700093	V700077	V700085
RACK FEED BLOCK VALVE	V700062	V700070	V700094	V700078	V700086
RACK FEED BLEED VALVE	V700063	V700071	V700095	V700079	V700087
RACK CIP SUPPLY BLEED VALVE	V700064	V700072	V700096	V700080	V700088
RACK CIP SUPPLY BLOCK VALVE	V700065	V700073	V700097	V700081	V700089
RACK FILTRATE BLEED VALVE	V700066	V700074	V700098	V700082	V700090
RACK FILTRATE BLOCK VALVE	V700067	V700075	V700099	V700083	V700091



NOTES:
1. PROVIDE ALL PIPING, VALVES AND INSTRUMENTATION INSIDE BOX INDICATED PRE-ASSEMBLED AND FACTORY TESTED, WITH THE EXCEPTION OF THE MODULE RACK.
2. MODULE RACK IS SHIPPED UNASSEMBLED, FOR FIELD ASSEMBLY.
3. INSTALL BLOCK AND BLEED VALVES, INCLUDING LIMIT SWITCH CABLES FURNISHED BY MFS SUPPLIER.
4. INTRACONNECTION PIPING NOT SHOWN.
5. PNEUMATIC LINES TERMINATE AT THE SOLENOID VALVE MANIFOLD LOCATED ON EACH MEMBRANE UNIT RACK.
6. EQUIPMENT NUMBERS SHOWN ON THE BODY OF THIS DRAWING ARE FOR MEMBRANE UNIT NO.1. CORRESPONDING NUMBERS FOR OTHER MEMBRANE UNITS ARE LISTED IN THIS TABLE. LIMIT SWITCHES ARE ASSIGNED THE SAME BASE NUMBER AS THE CORRESPONDING VALVE.
7. FOR POINT IDENTIFICATIONS INSIDE THE PLC I/O SYMBOLS, THE DISTRICT SYNTAX IS USED FOR I/O WIRED TO EXISTING PLC EQUIPMENT AND PALL CORPORATION SYNTAX IS USED FOR I/O WIRED TO NEW PLC EQUIPMENT PROVIDED BY PALL CORPORATION.

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	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN JLH
DESIGNED JLH
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

PROCESS & INSTRUMENTATION DIAGRAM

P&ID – MF UNIT DETAIL

SCALE: NONE

DRAWING NUMBER: IM902

SHEET NUMBER: 194 OF 236

PNL70395
P700046_R
P700046_W
P700046-B
P700046-A

CPNL700135
TT3008
AIT3008

CPNL700135
AI73006

3"-1A-COPPER
FROM COMPRESSED AIR RECEIVER (BY PALL)

2"-1A-COPPER
FROM COMPRESSED AIR RECEIVER (BY PALL)

A IM905
12"-RF-SS
FROM REVERSE FILTRATION PUMPS

70WRF177

70WRF178

FILTRATE

24"-WRF-SS

PNL70395
P700049_R
P700049_W
P700049-B
P700049-A

CPNL700135
PIT4003

PIT 700051

70WRF179

70WRF180

CPNL700135
AIT4001

CPNL700049
TURB
AIT 700050
ES
TURB
AE 700050
D

HS 700049
SRO
I

70WRF183

70WRF182

WATER QUALITY STATION (WQS7)

P700049
SAMPLE PUMP

70WRF181

TO CHLORINE CONTACT TANK

NOTE 3

D IW901
REVERSE FILTRATION WASTE LOCKOUT ON HIGH MUDWELL LEVEL

CPNL700046
TEMP
TT 700048
pH
AIT 700048
ES
TURB
AIT 700047
ES
pH
AE 700048
D
TURB
AE 700047
D
WATER QUALITY SAMPLE STATION SUB-PANEL (WQS1)

HS 700046
SRO
I

70SE31
70SE32
70SE33

P700046
SAMPLE PUMP

TRAIN 1
MFU 700004
TRAIN 2
MFU 700005
TRAIN 3
MFU 700006
TRAIN 4
MFU 700007
TRAIN 5
MFU 700008

NOTE 4

A II905
4"-CIP-PVC
FROM CIP SYSTEM

70SE34

70SE35

A IM901
24"-SE-SS
FROM MF AUTOMATIC STRAINERS

2"-PVC-DR (GRAVITY DRAIN)
TO SEWER

70WFBW12

6"-CIP-PVC
B II905
TO CIP SYSTEM

70WFBW11

14"-RFW-STL
C IW901
MF REVERSE FILTRATION WASTE
TO MUD WELL

NOTES:

1. SEE LEGEND ON DRAWINGS IG001, IG002, AND IG003.
2. LOCAL CONTROL DEVICES SUCH AS INDICATING LIGHTS AND SWITCHES, LOCATED AT EQUIPMENT, MAY NOT BE INDICATED ON THIS P&D. SEE PALL'S P&ID'S FOR MORE DETAILS.
3. ALL EQUIPMENT AND PIPING SHALL BE PROVIDED BY THE MEMBRANE SYSTEM SUPPLIER. SEE PALL P&ID'S FOR DETAILS.
4. SEE MF UNIT DETAIL DRAWING IM902 FOR BLOCK AND BLEED DETAILS.
5. FOR POINT IDENTIFICATIONS INSIDE THE PLC I/O SYMBOLS, THE DISTRICT SYNTAX IS USED FOR I/O WIRED TO EXISTING PLC EQUIPMENT AND PALL CORPORATION SYNTAX IS USED FOR I/O WIRED TO NEW PLC EQUIPMENT PROVIDED BY PALL CORPORATION.

MICROFILTRATION MEMBRANE UNITS

PRELIMINARY – NOT FOR CONSTRUCTION

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	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

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DESIGNED JLH
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SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

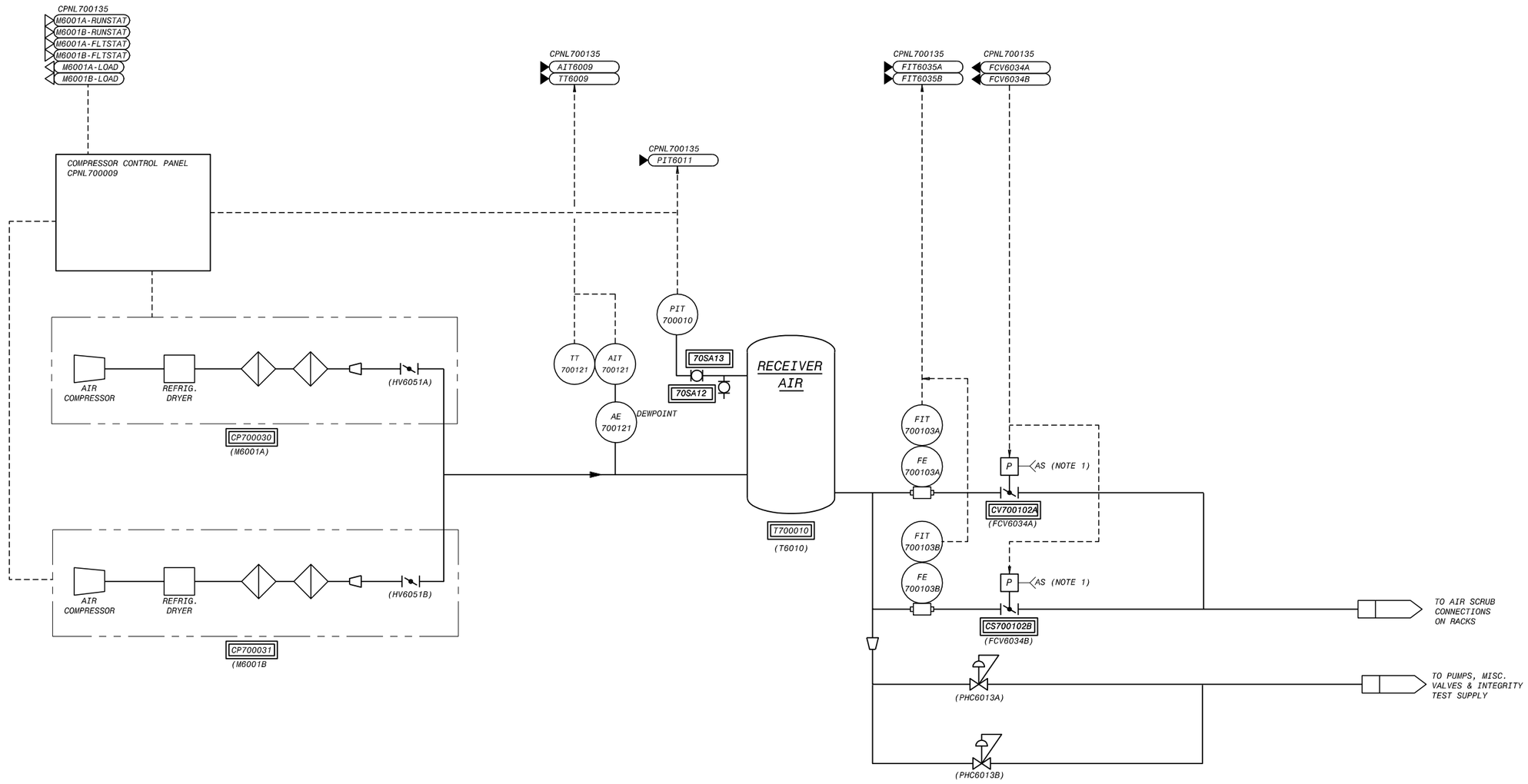
PROCESS & INSTRUMENTATION DIAGRAM

P&ID – MF
SYSTEM OVERVIEW

SCALE
NONE

DRAWING NUMBER
IM903

SHEET NUMBER
195 OF 236



NOTES
1. AIR SUPPLY FOR PNEUMATIC ACTUATOR SHALL BE SUPPLIED FROM THE MF COMPRESSED AIR SYSTEM.
2. THIS DRAWING IS A SIMPLIFIED VERSION OF THE COMPRESSED AIR SYSTEM SHOWING CONTROL SYSTEM INPUTS AND OUTPUTS. SEE THE MEMBRANE SYSTEM SUPPLIER P&ID FOR A DETAILED DEPICTION OF THE EQUIPMENT.
3. FOR POINT IDENTIFICATIONS INSIDE THE PLC I/O SYMBOLS, THE DISTRICT SYNTAX IS USED FOR I/O WIRED TO EXISTING PLC EQUIPMENT AND PALL CORPORATION SYNTAX IS USED FOR I/O WIRED TO NEW PLC EQUIPMENT PROVIDED BY PALL CORPORATION.

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REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN JLH
DESIGNED JLH
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

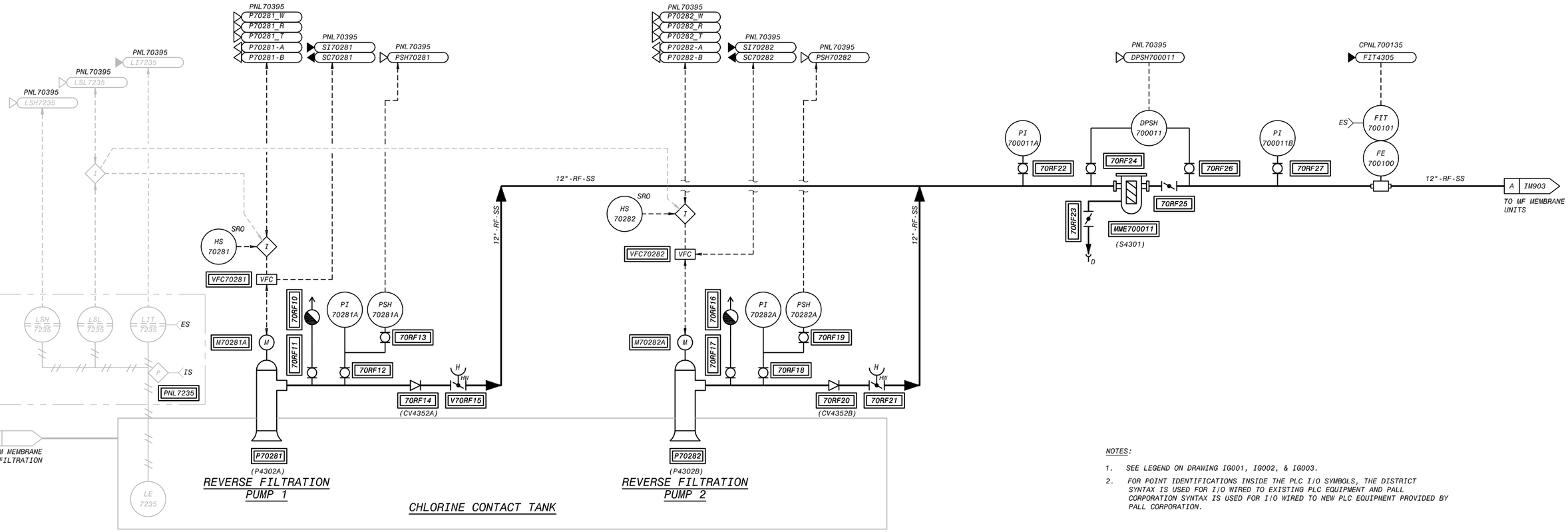
PROCESS & INSTRUMENTATION DIAGRAM

P&ID – COMPRESSED AIR SYSTEM

SCALE
NONE

DRAWING NUMBER
IM904

SHEET NUMBER
196 OF 236



NOTES:

1. SEE LEGEND ON DRAWING IG001, IG002, & IG003.
2. FOR POINT IDENTIFICATIONS INSIDE THE PLC I/O SYMBOLS, THE DISTRICT SYNTAX IS USED FOR I/O WIRED TO EXISTING PLC EQUIPMENT AND PALL CORPORATION SYNTAX IS USED FOR I/O WIRED TO NEW PLC EQUIPMENT PROVIDED BY PALL CORPORATION.

PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED: 1/14/2010 7:44:33 PM, Batch Plot
SAVED: OGL22631, 1/14/2010 2:40:51 PM

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BOR342202

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REGISTERED PROFESSIONAL ENGINEER DEWITT C. SMITH E 15829 EXP 12/31/2010 ELECTRICAL STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN JLH
DESIGNED JLH
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

PROCESS & INSTRUMENTATION DIAGRAM

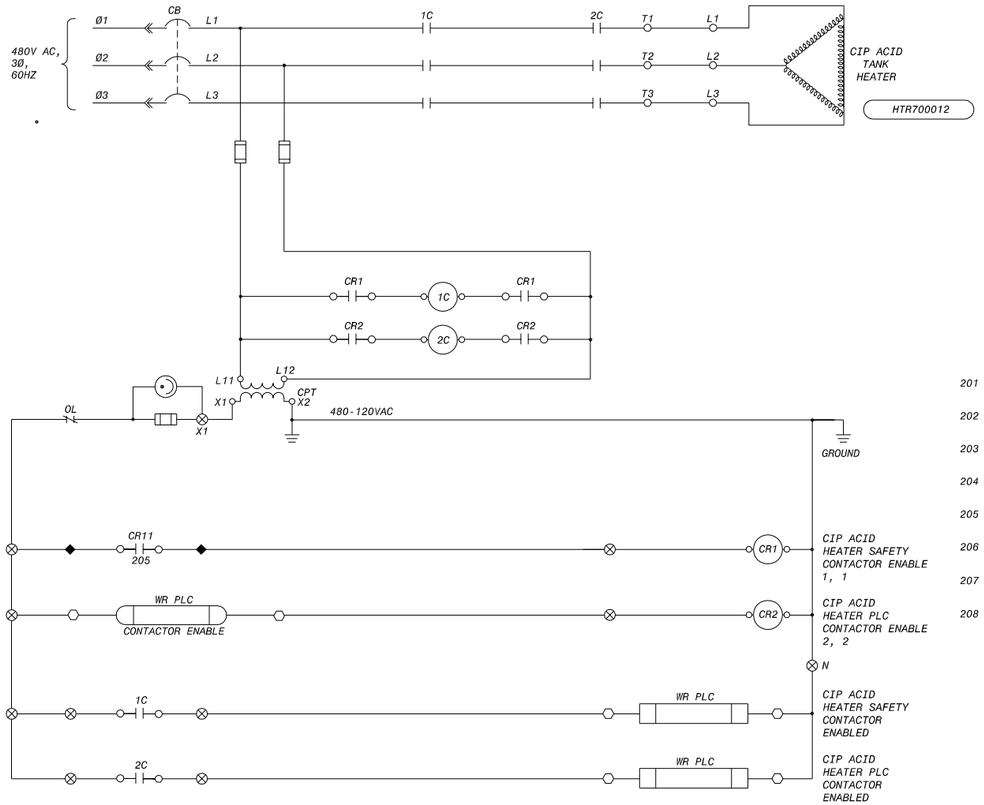
P&ID – REVERSE FILTRATION PUMPS

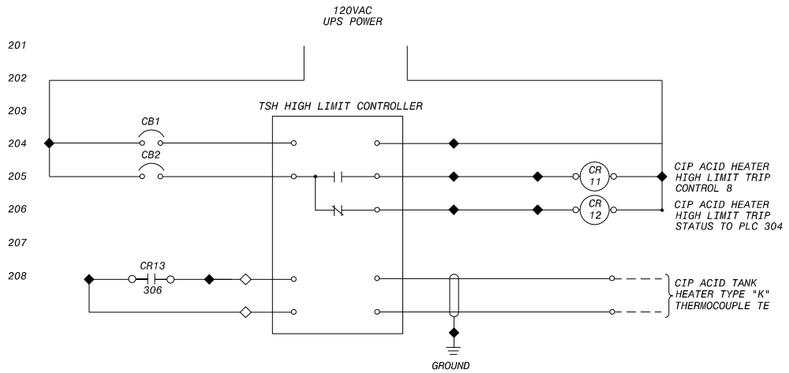
SCALE: NONE

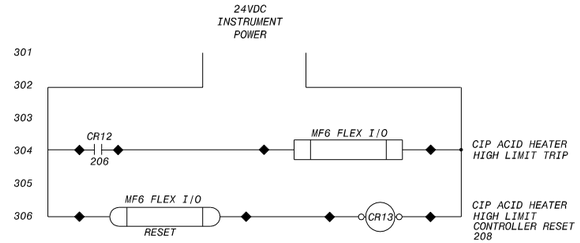
DRAWING NUMBER: IM905

SHEET NUMBER: 197 OF 236

FIELD ELEMENTARY







DESCRIPTION	TERMINAL
MCC CUBICLE TERMINAL	⊗
MCC PLC PANELS	⬡
FIELD MOUNTED DEVICE	▲
MF6 FLEX I/O	◆

NOTES:

1. *THIS DIAGRAM SHOWS THE CIP ACID TANK HEATER CONTROL. THE CONTROL FOR THE CIP CAUSTIC TANK HEATER IS THE SAME EXCEPT FOR THE PLC I/O ASSIGNMENTS (SEE THE EQUIPMENT TABLE).*
2. *COORDINATE WITH THE DISTRICT FOR PANEL TERMINAL ASSIGNMENTS FOR WR PLC I/O.*

CIP HEATER EQUIPMENT TABLE

EQUIPMENT NO.	PALL NO.	DESCRIPTION	TE	PALL TE NO.	TSH	PALL TSH NO.
HTR700012	HTR5104	CIP ACID TANK HEATER	TE700012	TE5134	TSH700012	TSH5134
HTR700013	HTR5004	CIP CAUSTIC TANK HEATER	TE700013	TE5034	TSH700013	TSH5034

PRELIMINARY – NOT FOR CONSTRUCTION

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DEWITT C. SMITH
E 15829
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ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE
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CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

CONTROL AND LOGIC DIAGRAM

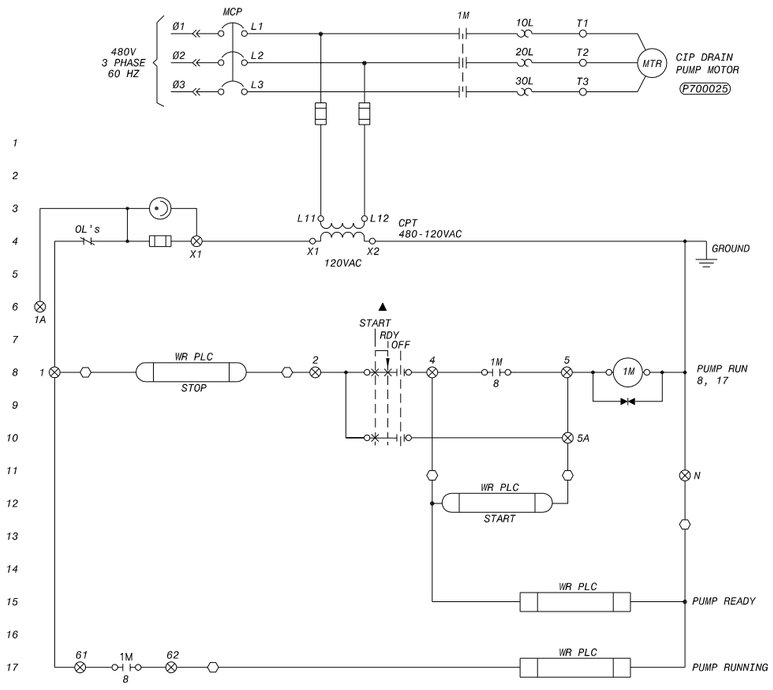
CIP ACID & CAUSTIC TANK HEATERS

SCALE
NONE

DRAWING NUMBER
I1701

SHEET NUMBER
198 OF 236

FIELD ELEMENTARY



DESCRIPTION	EQUIPMENT NUMBER	PALL EQUIPMENT NUMBER
CIP DRAIN PUMP	P700025	P5214
CIP NEUTRALIZATION PUMP	P700026	P5609

DESCRIPTION	TERMINAL
MCC CUBICLE TERMINAL	⊗
MCC PLC PANELS	⬡
FIELD PANEL	◇
FIELD MOUNTED DEVICE	▲

NOTES:

1. COORDINATE WITH THE DISTRICT FOR PANEL TERMINAL ASSIGNMENTS FOR WR PLC I/O.

PRELIMINARY – NOT FOR CONSTRUCTION

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ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN GT
DESIGNED WEM
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

CONTROL AND LOGIC DIAGRAM

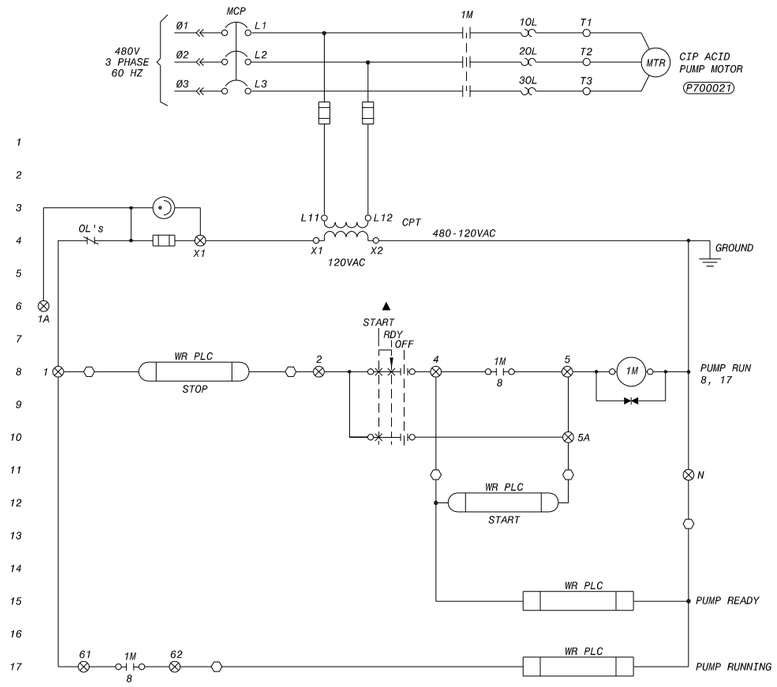
CIP DRAIN &
NEUTRALIZATION PUMPS

SCALE
NONE

DRAWING NUMBER
I1702

SHEET NUMBER
199 OF 236

FIELD ELEMENTARY



DESCRIPTION	EQUIPMENT NUMBER	PALL EQUIPMENT NUMBER
CIP ACID CIRCULATION PUMP	P700021	P5204A
CIP CAUSTIC CIRCULATION PUMP	P700022	P5204B

NOTES:

1. COORDINATE WITH THE DISTRICT FOR PANEL TERMINAL ASSIGNMENTS FOR WR PLC I/O.

PRELIMINARY – NOT FOR CONSTRUCTION

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	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN
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CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

CONTROL & LOGIC DIAGRAM

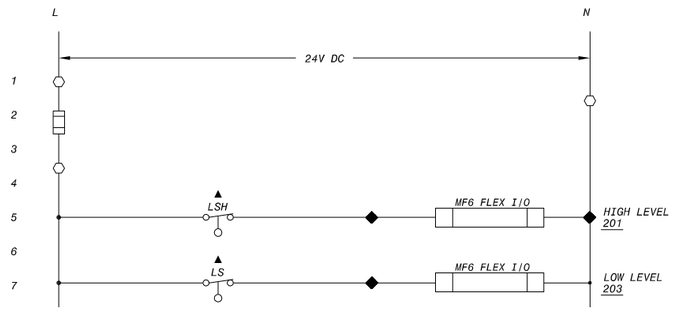
CIP ACID &
CAUSTIC CIRCULATION PUMPS

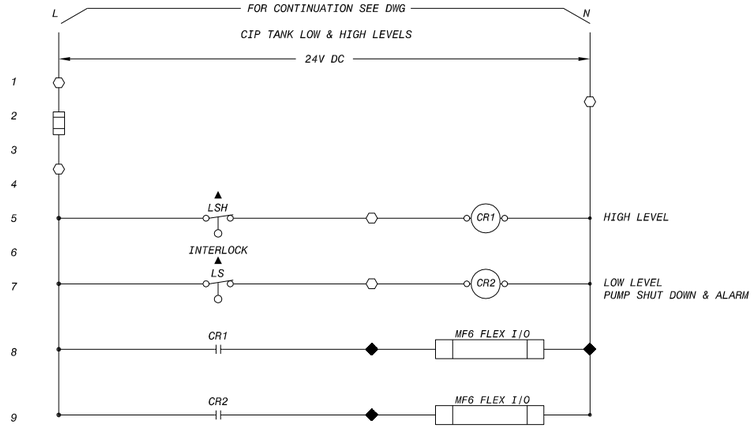
SCALE
NONE

DRAWING NUMBER
11703

SHEET NUMBER
200 OF 236

FIELD ELEMENTARY





DESCRIPTION	TERMINAL
MCC CUBICLE TERMINAL	⊗
ACC INSTRUMENT PANELS	□
MCC PLC PANELS	⬡
FIELD PANEL	◇
VFC PANEL	⊘
FIELD MOUNTED DEVICE	▲
MF6 FLEX I/O	◆

DESCRIPTION	LSL NO	LSH NO	PALL LSL NO	PALL LSH NO	PUMP SHUT DOWN CONTACT REFERENCES
CIP ACID TANK LOW AND HIGH LEVEL	LSL700012	LSH700012	LSL5103	LSH5102	II703
CIP CAUSTIC TANK LOW AND HIGH LEVEL	LSL700013	LSH700013	LSL5003	LSH5002	II703
CIP NEUTRALIZATION TANK LOW AND HIGH LEVEL	LSL700014	LSH700014	LSL5604	LSH5603	II702

NOTES:

1. COORDINATE WITH THE DISTRICT FOR PANEL TERMINAL ASSIGNMENTS FOR WR PLC I/O.

PRELIMINARY – NOT FOR CONSTRUCTION

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	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE
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DESIGNED WEM
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CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

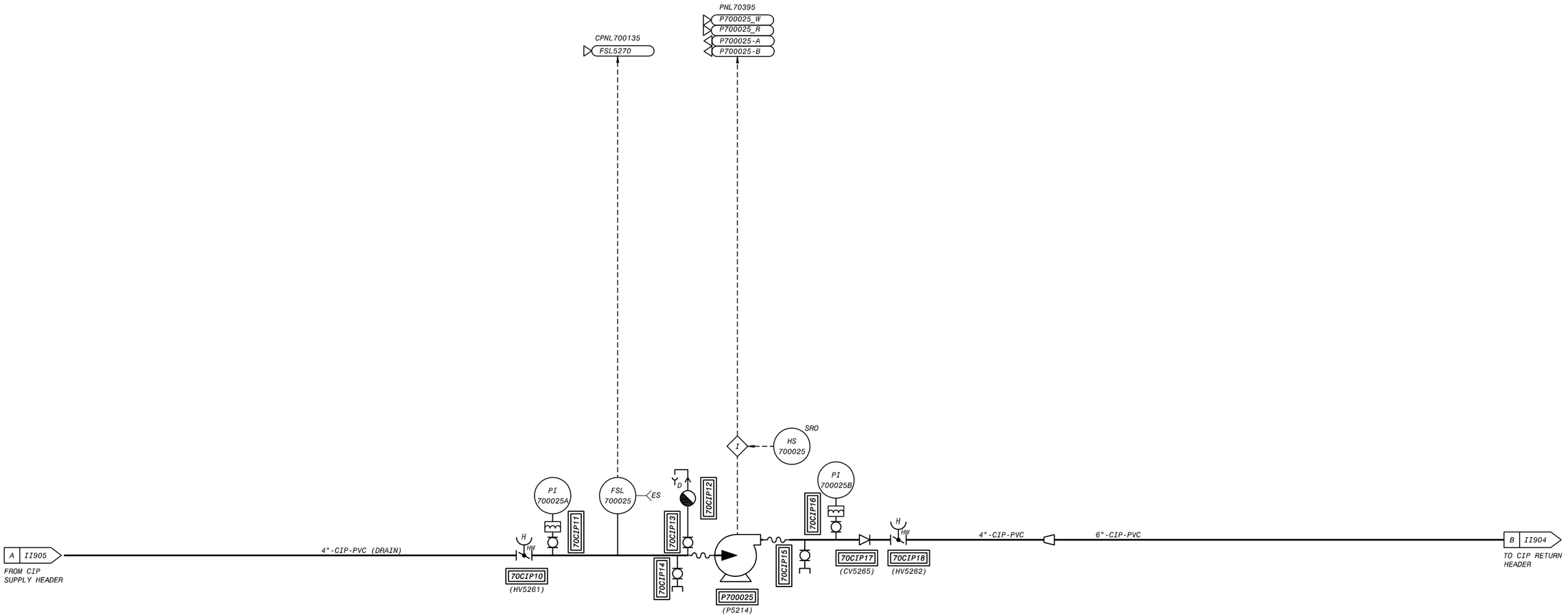
CONTROL AND LOGIC DIAGRAM

CIP LOW AND HIGH LEVEL ALARMS

SCALE
NONE

DRAWING NUMBER
II704

SHEET NUMBER
201 OF 236



CIP DRAIN PUMP

NOTES:

1. FOR POINT IDENTIFICATIONS INSIDE THE PLC I/O SYMBOLS, THE DISTRICT SYNTAX IS USED FOR I/O WIRED TO EXISTING PLC EQUIPMENT AND PALL CORPORATION SYNTAX IS USED FOR I/O WIRED TO NEW PLC EQUIPMENT PROVIDED BY PALL CORPORATION.

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ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN JLH
DESIGNED JLH
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

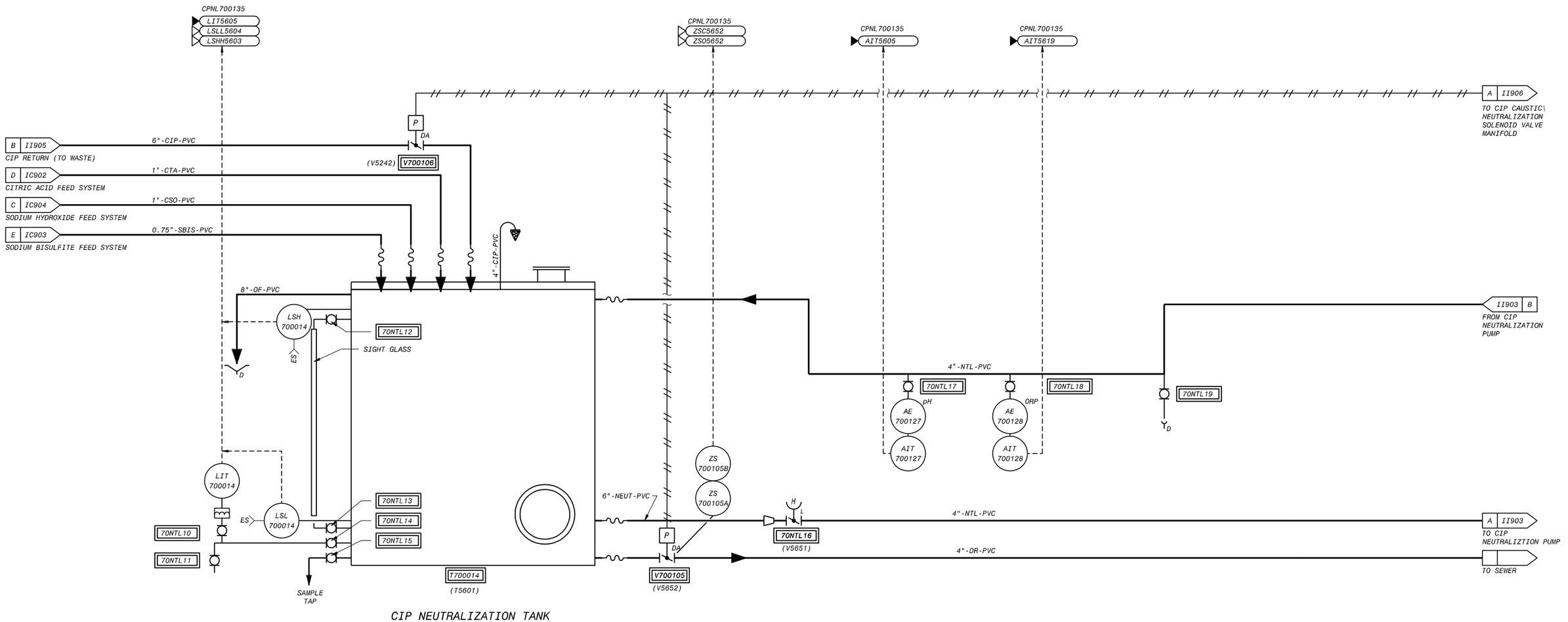
PROCESS & INSTRUMENTATION DIAGRAM

P&ID – CIP DRAIN PUMP

SCALE

DRAWING NUMBER
II901

SHEET NUMBER
202 OF 236



CIP NEUTRALIZATION TANK

NOTES:

1. FOR POINT IDENTIFICATIONS INSIDE THE PLC I/O SYMBOLS, THE DISTRICT SYNTAX IS USED FOR I/O WIRED TO EXISTING PLC EQUIPMENT AND PALL CORPORATION SYNTAX IS USED FOR I/O WIRED TO NEW PLC EQUIPMENT PROVIDED BY PALL CORPORATION.

PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED: 1/14/2010 7:36:45 PM, Batch Plot
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REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN JLH
DESIGNED JLH
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

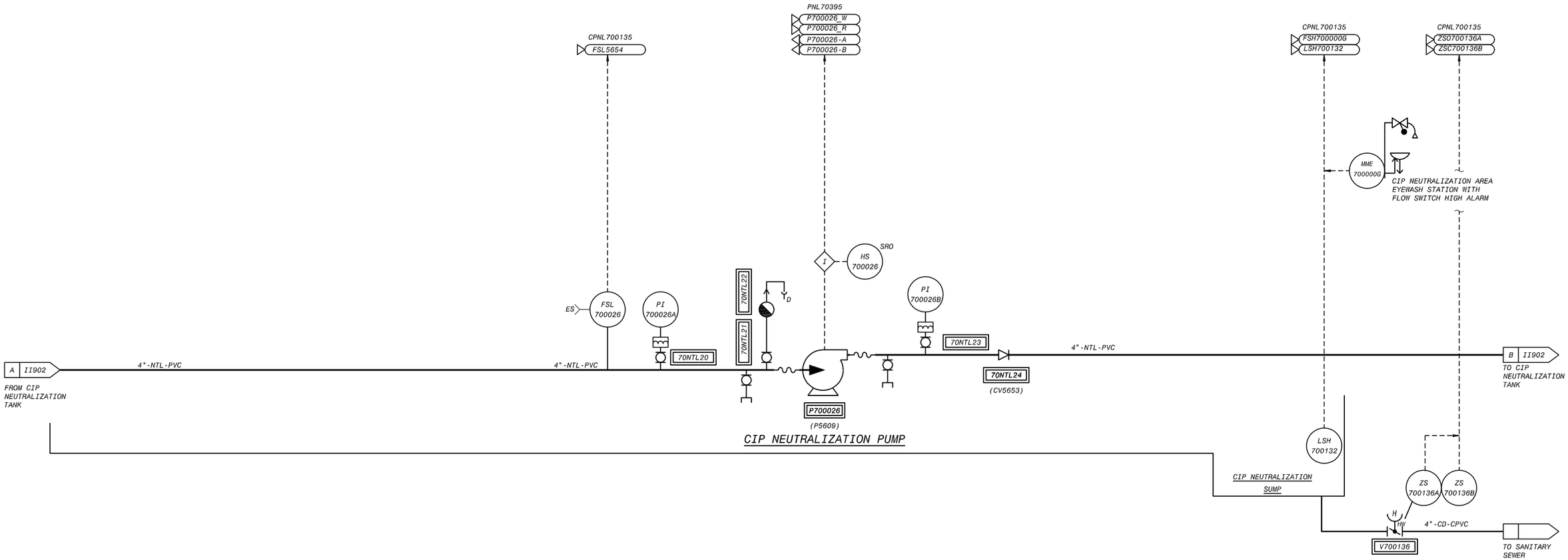
PROCESS & INSTRUMENTATION DIAGRAM

P&ID – CIP
NEUTRALIZATION TANK

SCALE

DRAWING NUMBER
II902

SHEET NUMBER
203 OF 236



NOTES:

1. FOR POINT IDENTIFICATIONS INSIDE THE PLC I/O SYMBOLS, THE DISTRICT SYNTAX IS USED FOR I/O WIRED TO EXISTING PLC EQUIPMENT AND PALL CORPORATION SYNTAX IS USED FOR I/O WIRED TO NEW PLC EQUIPMENT PROVIDED BY PALL CORPORATION.

PRELIMINARY – NOT FOR CONSTRUCTION

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ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN JLH
DESIGNED JLH
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

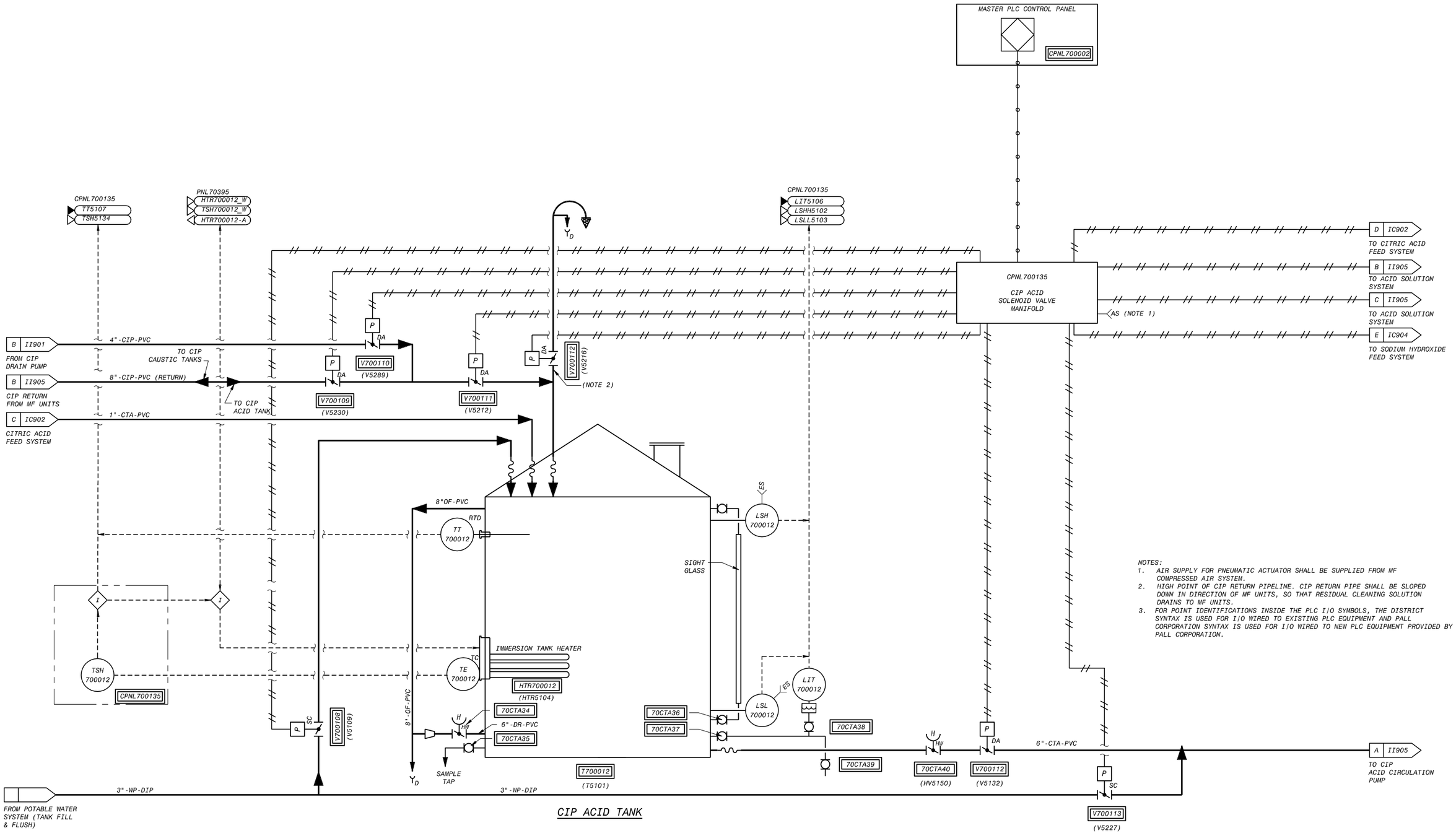
PROCESS & INSTRUMENTATION DIAGRAM

P&ID – CIP CHEMICAL NEUTRALIZATION PUMP

SCALE

DRAWING NUMBER
II903

SHEET NUMBER
204 OF 236



NOTES:
1. AIR SUPPLY FOR PNEUMATIC ACTUATOR SHALL BE SUPPLIED FROM MF COMPRESSED AIR SYSTEM.
2. HIGH POINT OF CIP RETURN PIPELINE. CIP RETURN PIPE SHALL BE SLOPED DOWN IN DIRECTION OF MF UNITS, SO THAT RESIDUAL CLEANING SOLUTION DRAINS TO MF UNITS.
3. FOR POINT IDENTIFICATIONS INSIDE THE PLC I/O SYMBOLS, THE DISTRICT SYNTAX IS USED FOR I/O WIRED TO EXISTING PLC EQUIPMENT AND PALL CORPORATION SYNTAX IS USED FOR I/O WIRED TO NEW PLC EQUIPMENT PROVIDED BY PALL CORPORATION.

PRELIMINARY – NOT FOR CONSTRUCTION

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REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE
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FILE
DRAWN JLH
DESIGNED JLH
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

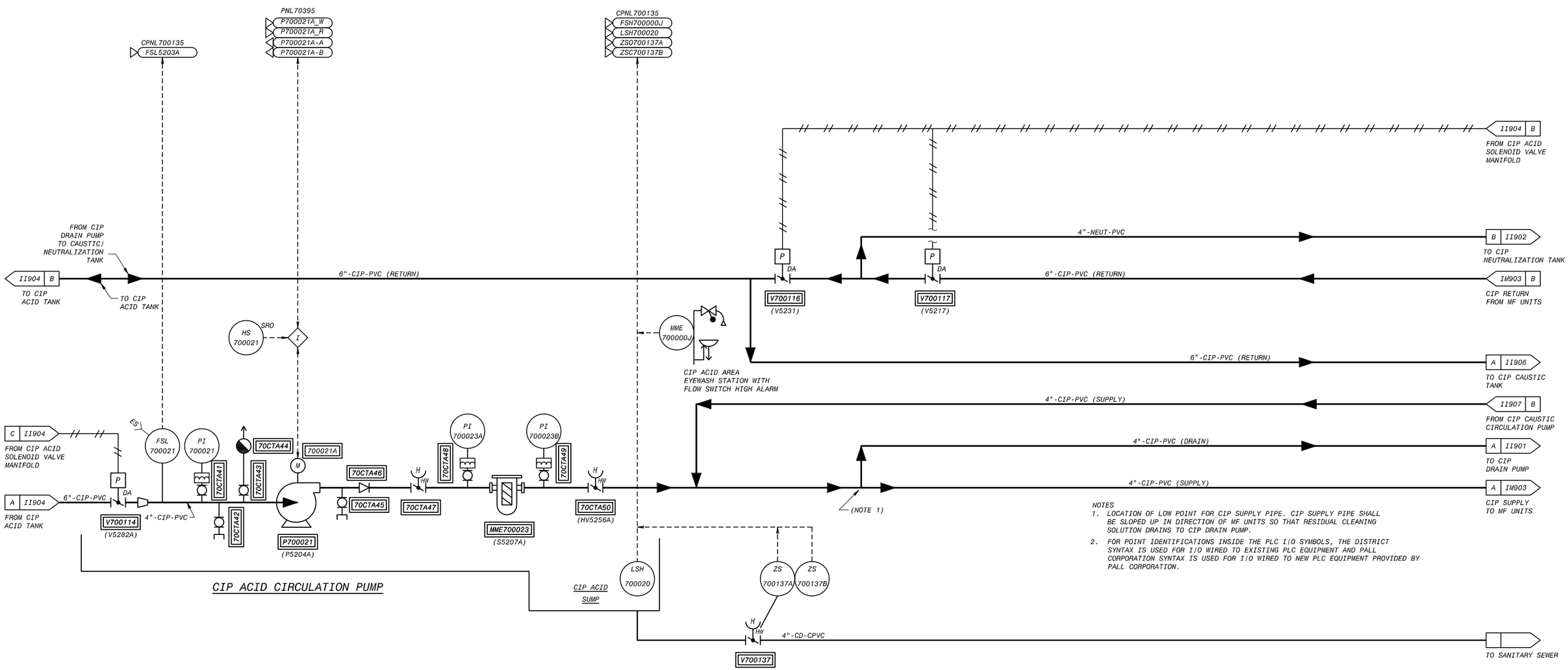
PROCESS & INSTRUMENTATION DIAGRAM

P&ID – CIP ACID TANK

SCALE

DRAWING NUMBER
II904

SHEET NUMBER
205 OF 236



NOTES
1. LOCATION OF LOW POINT FOR CIP SUPPLY PIPE. CIP SUPPLY PIPE SHALL BE SLOPED UP IN DIRECTION OF MF UNITS SO THAT RESIDUAL CLEANING SOLUTION DRAINS TO CIP DRAIN PUMP.
2. FOR POINT IDENTIFICATIONS INSIDE THE PLC I/O SYMBOLS, THE DISTRICT SYNTAX IS USED FOR I/O WIRED TO EXISTING PLC EQUIPMENT AND PALL CORPORATION SYNTAX IS USED FOR I/O WIRED TO NEW PLC EQUIPMENT PROVIDED BY PALL CORPORATION.

PRELIMINARY – NOT FOR CONSTRUCTION

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REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE
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FILE
DRAWN JLH
DESIGNED JLH
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

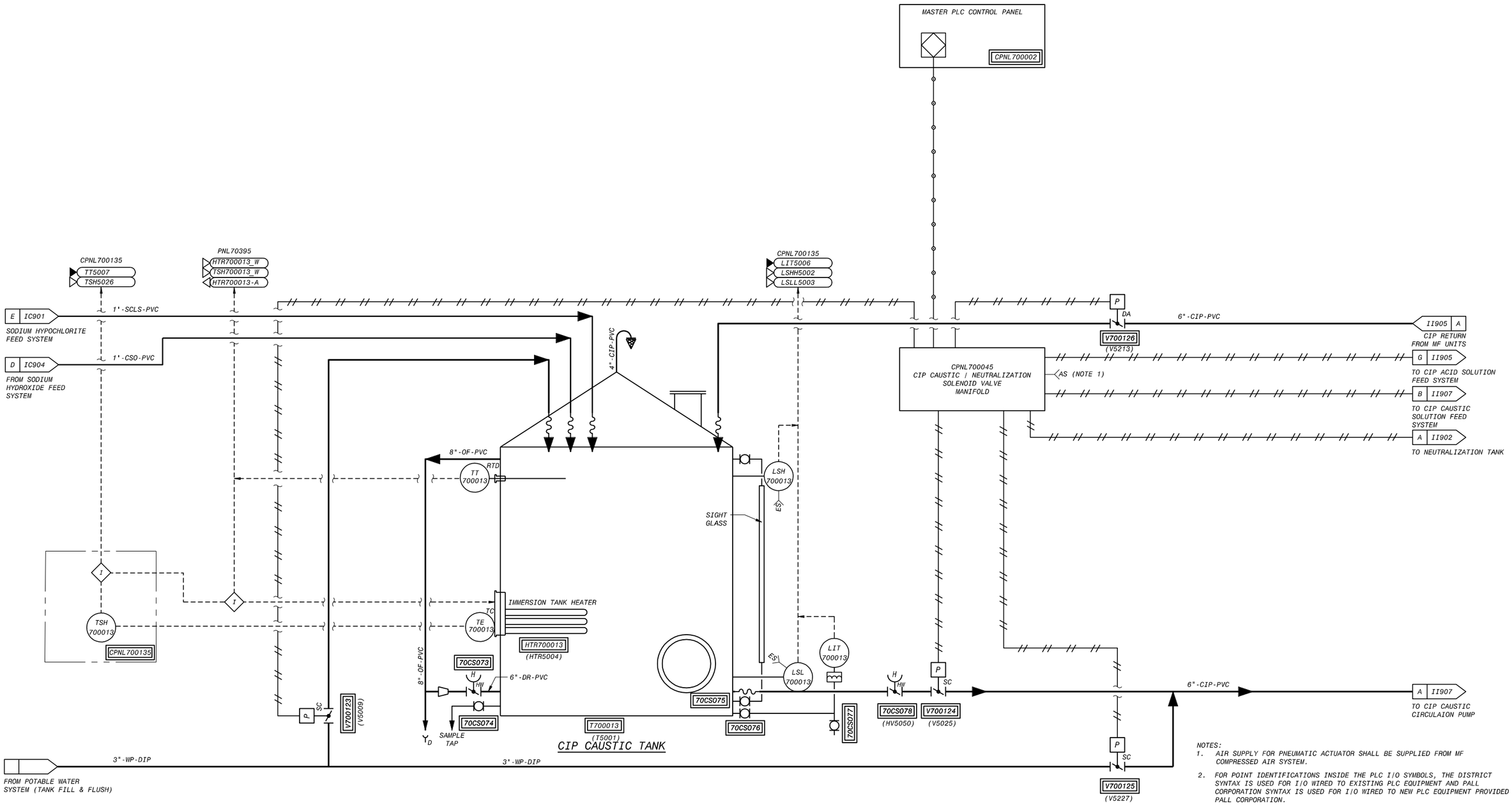
PROCESS & INSTRUMENTATION DIAGRAM

P&ID – CIP ACID SOLUTION FEED SYSTEM

SCALE

DRAWING NUMBER
II905

SHEET NUMBER
206 OF 236



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REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
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LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN JLH
DESIGNED JLH
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

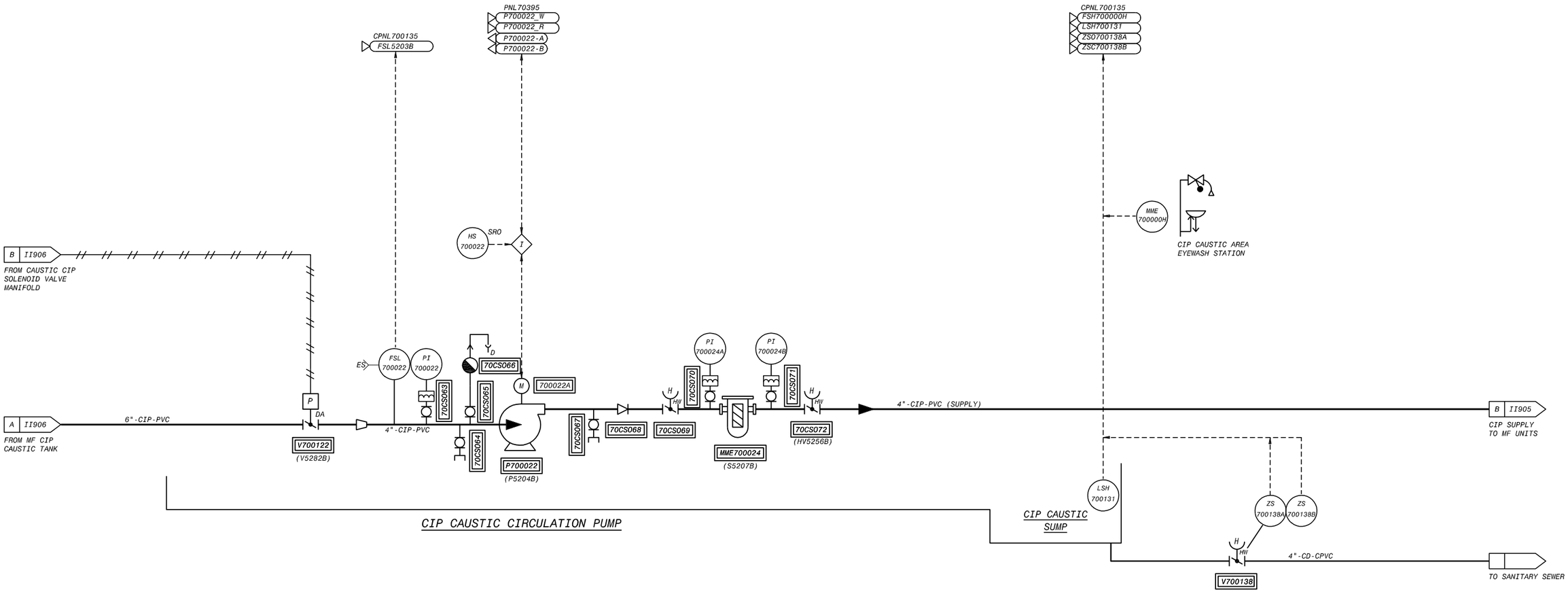
PROCESS & INSTRUMENTATION DIAGRAM

P&ID – CIP CAUSTIC TANK

SCALE

DRAWING NUMBER
II906

SHEET NUMBER
207 OF 236



NOTES:

1. FOR POINT IDENTIFICATIONS INSIDE THE PLC I/O SYMBOLS, THE DISTRICT SYNTAX IS USED FOR I/O WIRED TO EXISTING PLC EQUIPMENT AND PALL CORPORATION SYNTAX IS USED FOR I/O WIRED TO NEW PLC EQUIPMENT PROVIDED BY PALL CORPORATION.

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STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN JLH
DESIGNED JLH
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

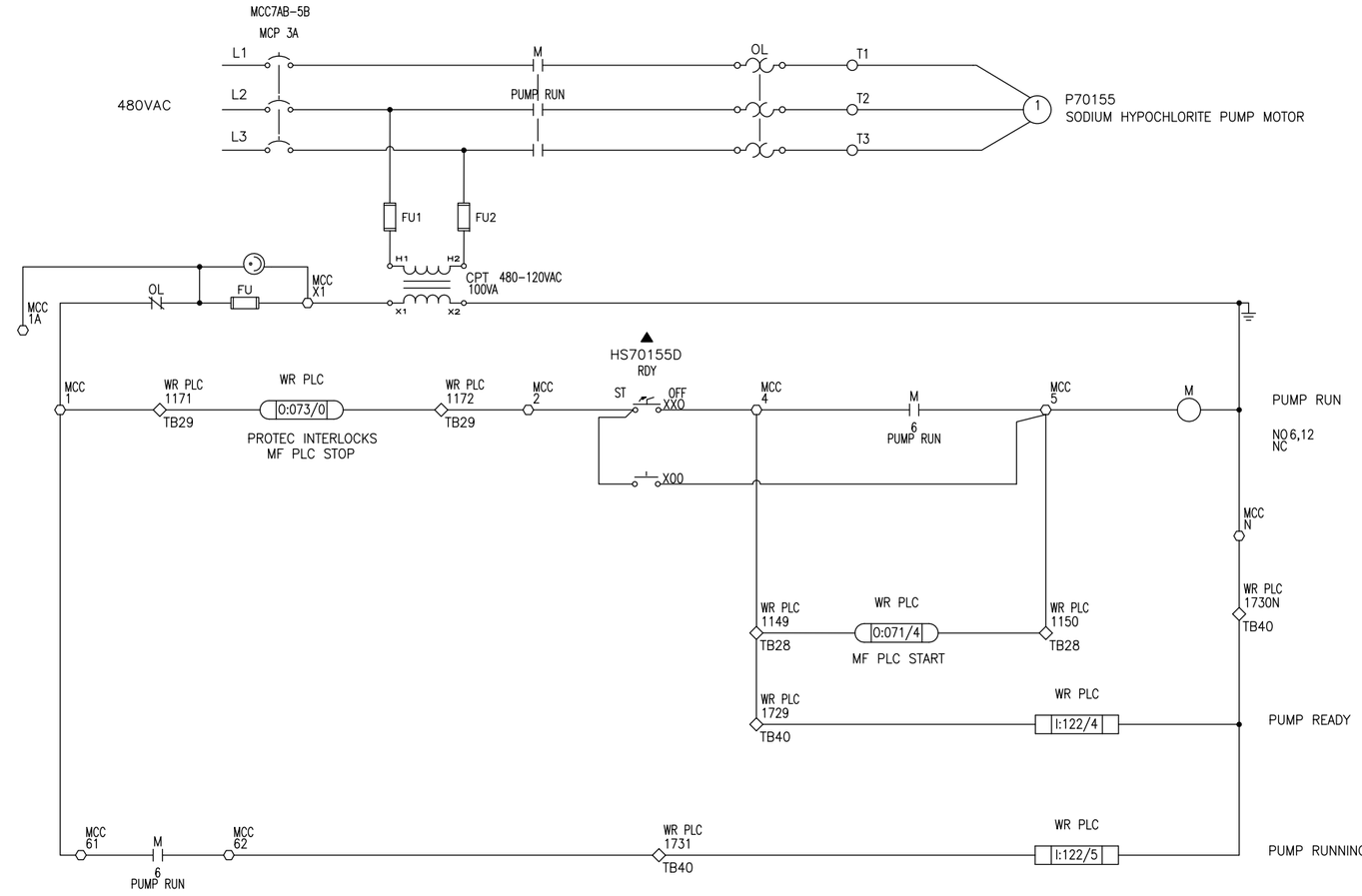
PROCESS & INSTRUMENTATION DIAGRAM

P&ID – CIP CAUSTIC SOLUTION FEED SYSTEM

SCALE

DRAWING NUMBER
II907

SHEET NUMBER
208 OF 236



PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED:
SAVED:

FRDR142202
BDR342202

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REGISTERED PROFESSIONAL ENGINEER
WILLIAM TU
NO. 68143
EXP. 6-30-11
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
SANJAY SIVAPRASAD
Regist # 161/1
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN S. SIVAPRASAD
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

CONTROL AND LOGIC DIAGRAM

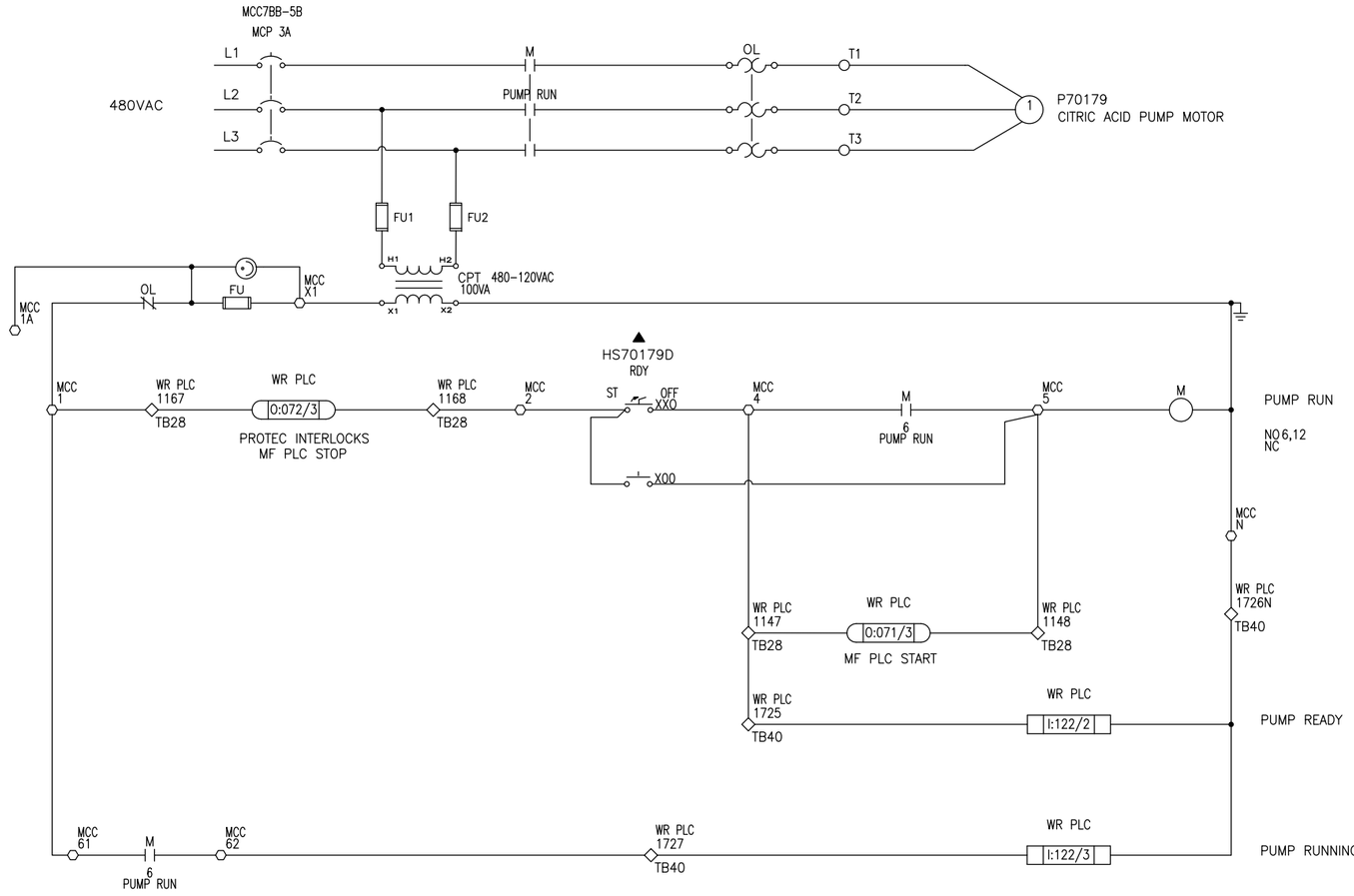
P70155

SODIUM HYPOCHLORITE PUMP
SHEET 1 OF 1

SCALE
NO SCALE

DRAWING NUMBER
IC701

SHEET NUMBER
209 OF 236



▲ LOCATED BY THE MOTOR

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Regist # 161/1
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STATE OF CALIFORNIA

REVISIONS					
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FILE FLIE NAME
DRAWN S. SIVAPRASAD
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

CONTROL AND LOGIC DIAGRAM

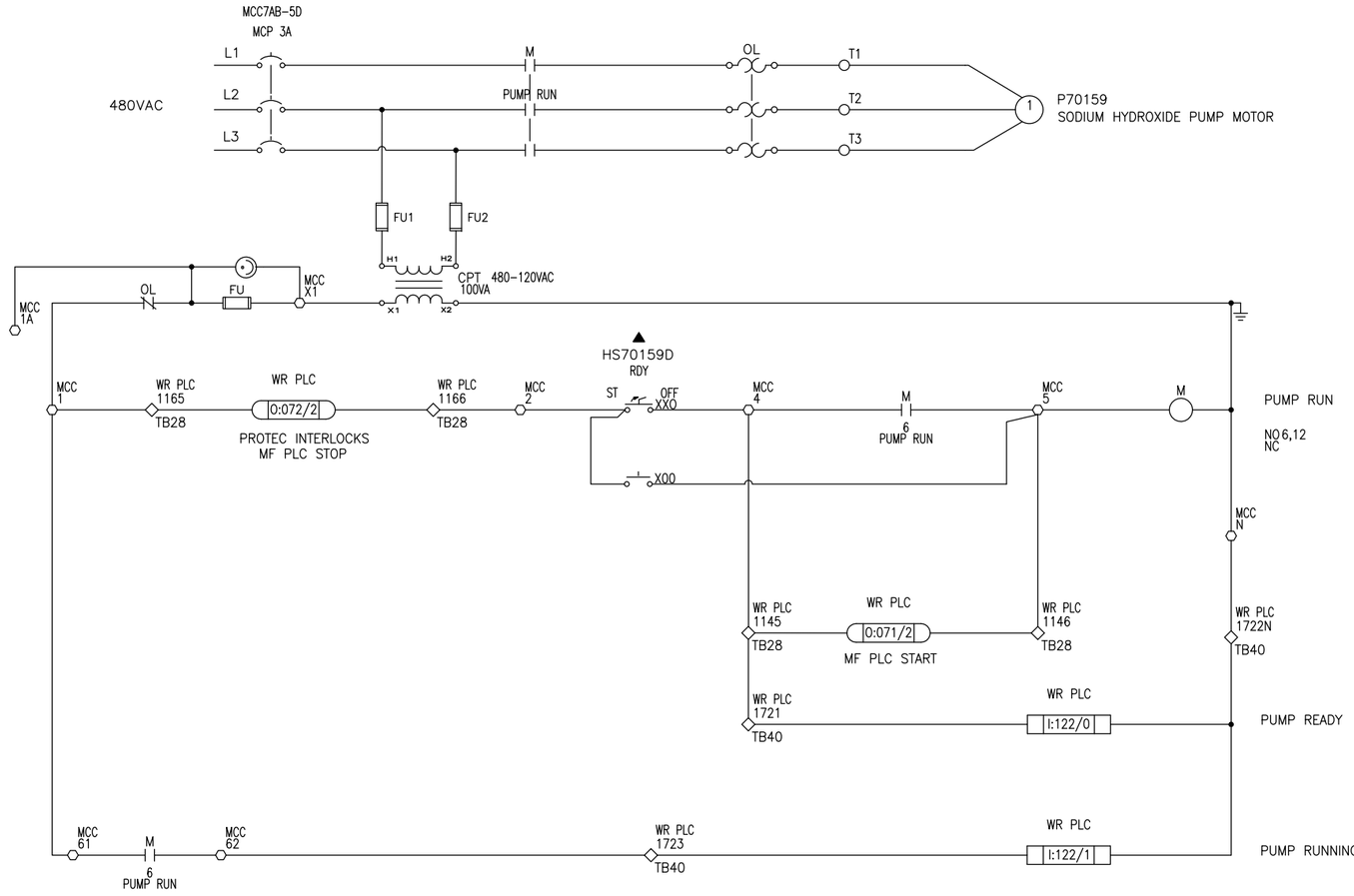
P70179

CITRIC ACID PUMP
SHEET 1 OF 1

SCALE
NO SCALE

DRAWING NUMBER
IC702

SHEET NUMBER
210 OF 236



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REGISTERED PROFESSIONAL ENGINEER
SANJAY SIVAPRASAD
Regist # 16171
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN S. SIVAPRASAD
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

CONTROL AND LOGIC DIAGRAM

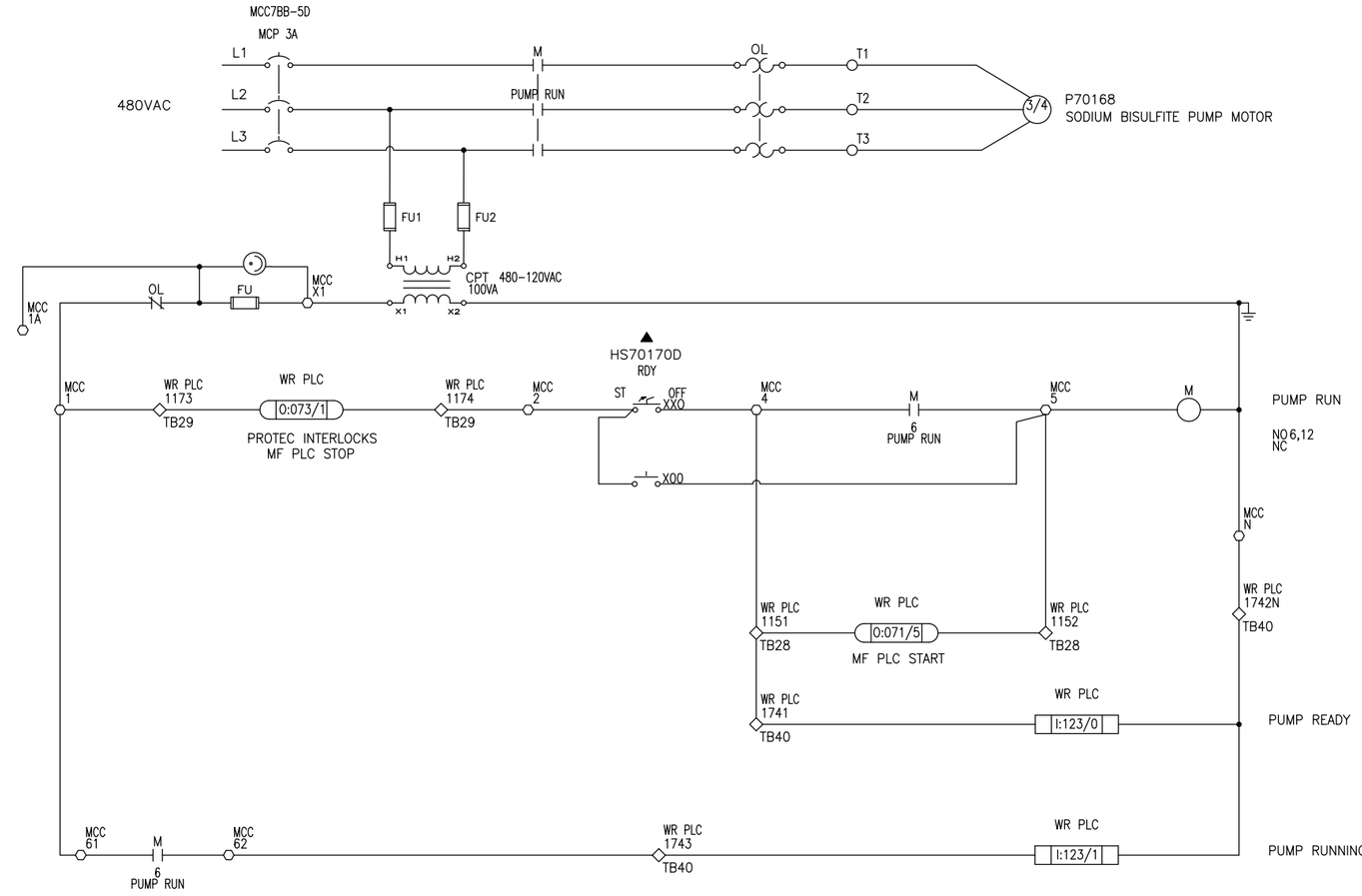
P70159

SODIUM HYDROXIDE PUMP
SHEET 1 OF 1

SCALE
NO SCALE

DRAWING NUMBER
IC703

SHEET NUMBER
211 OF 236



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ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
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LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN S. SIVAPRASAD
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

CONTROL AND LOGIC DIAGRAM

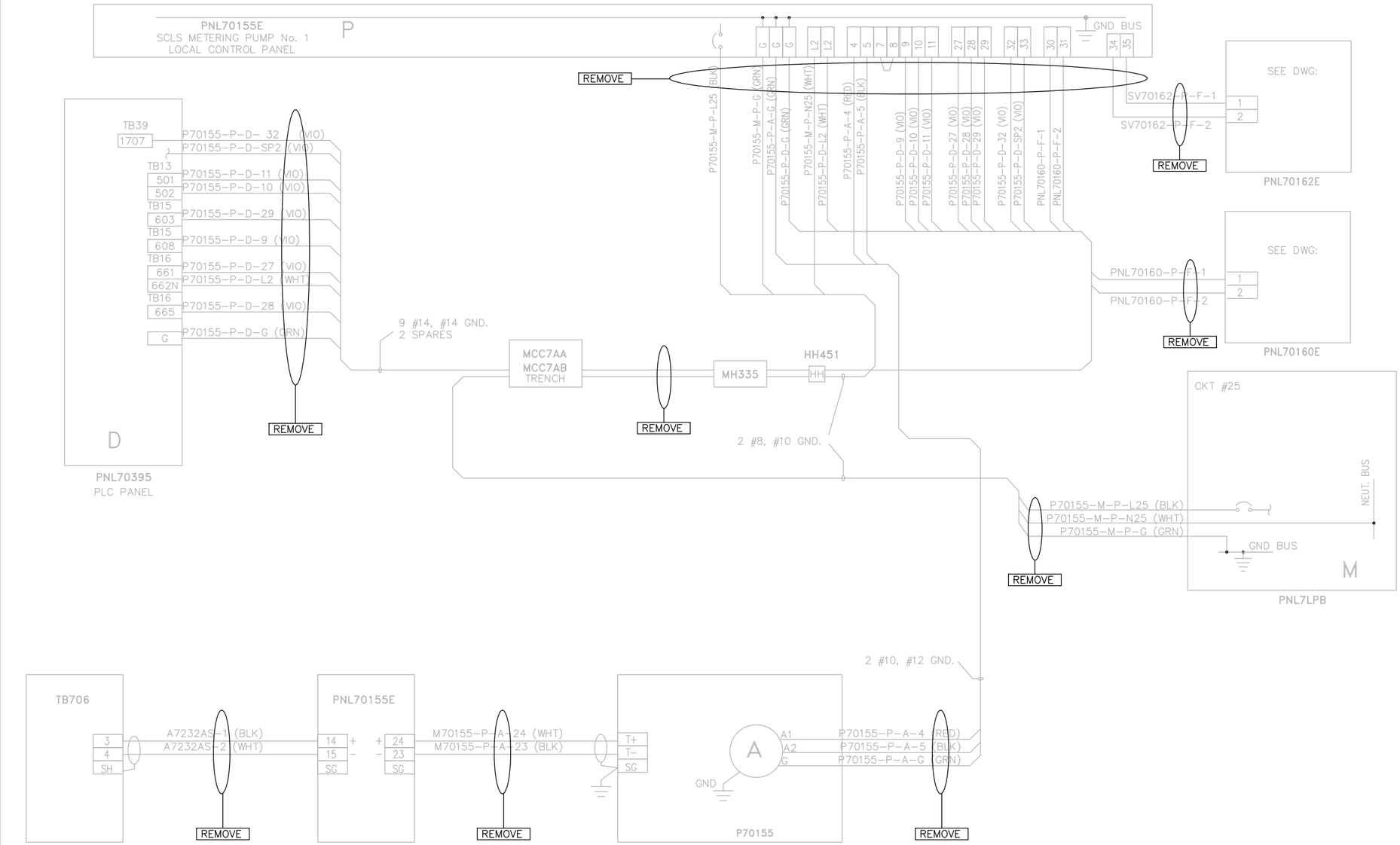
P70168

SODIUM BISULFITE PUMP
SHEET 1 OF 1

SCALE
NO SCALE

DRAWING NUMBER
IC704

SHEET NUMBER
212 OF 236



DEVICE LEGEND	
A	MOTOR
D	PLC PANEL
M	PANEL BOARD
P	SCLS METERING PUMP PANEL

PRELIMINARY – NOT FOR CONSTRUCTION

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Regist # 161/1
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
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LINE IS 2 INCHES
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FILE FILE NAME
DRAWN S. SIVAPRASAD
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

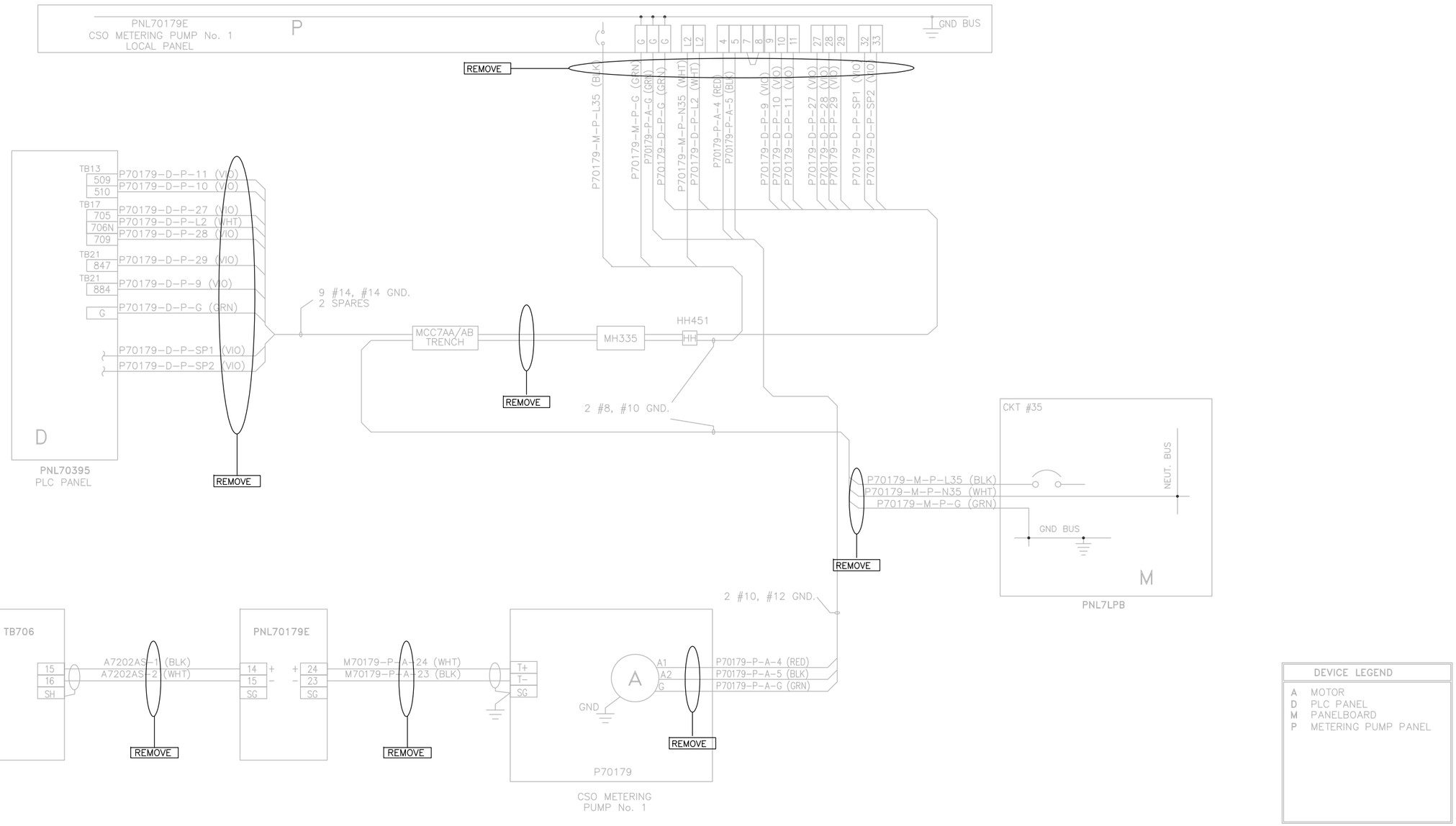
SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECT DIAGRAM
DEMOLITION
P70155
SCLS METERING PUMP NO. 1

SCALE
NO SCALE

DRAWING NUMBER
IC705

SHEET NUMBER
213 OF 236



DEVICE LEGEND	
A	MOTOR
D	PLC PANEL
M	PANELBOARD
P	METERING PUMP PANEL

EQUIPMENT NO.
P70179

PRELIMINARY – NOT FOR CONSTRUCTION

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SANJAY SIVAPRASAD
Regist # 18111
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN S. SIVAPRASAD
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECT DIAGRAM

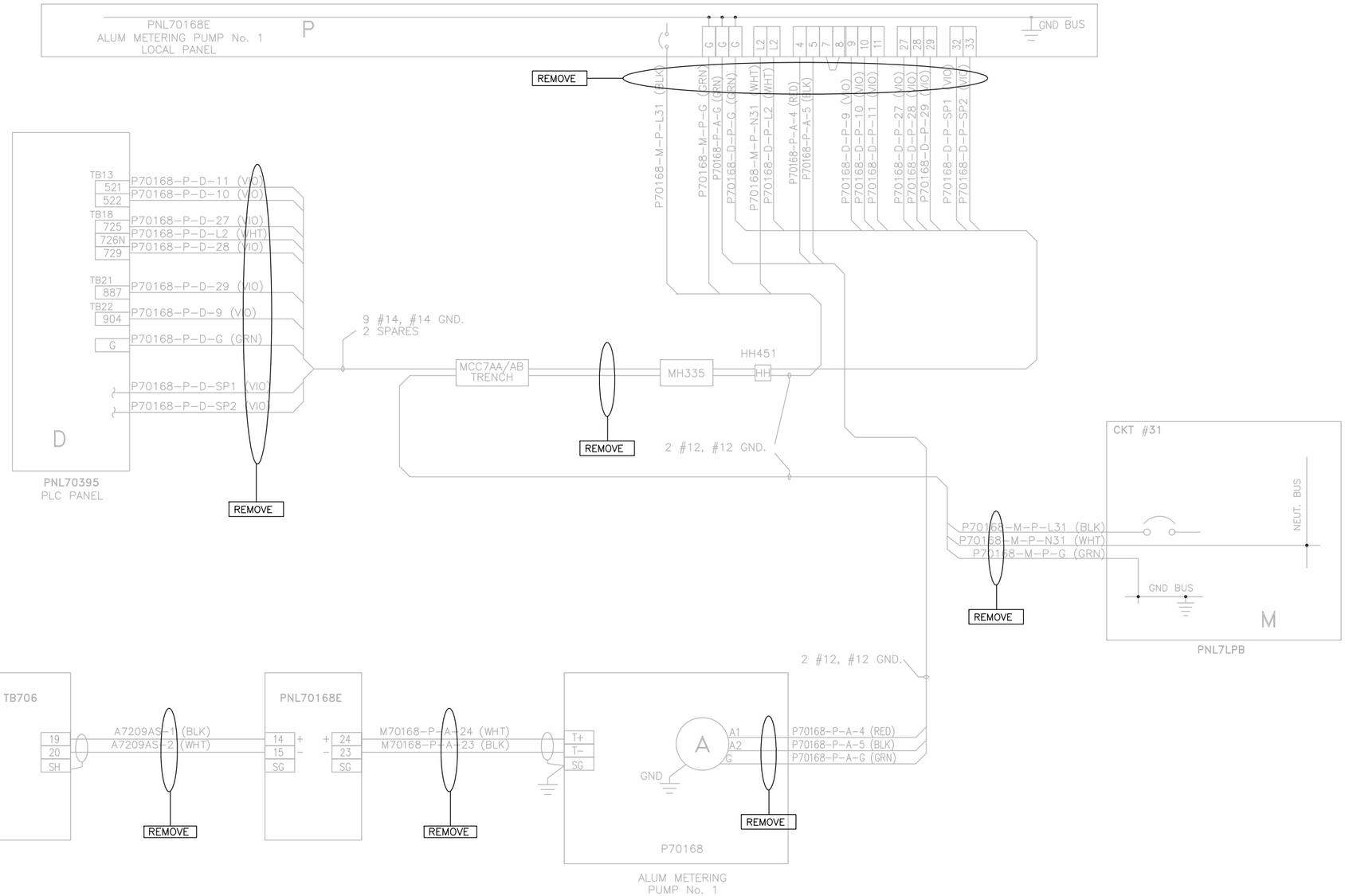
DEMOLITION

P70179
CSO METERING PUMP NO. 1

SCALE
SS

DRAWING NUMBER
IC706

SHEET NUMBER
214 OF 236



DEVICE LEGEND	
A	MOTOR
D	PLC PANEL
M	PANELBOARD
P	METERING PUMP PANEL

EQUIPMENT NO.
P70168

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Regist # 161/1
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REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
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FILE FILE NAME
DRAWN S. SIVAPRASAD
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

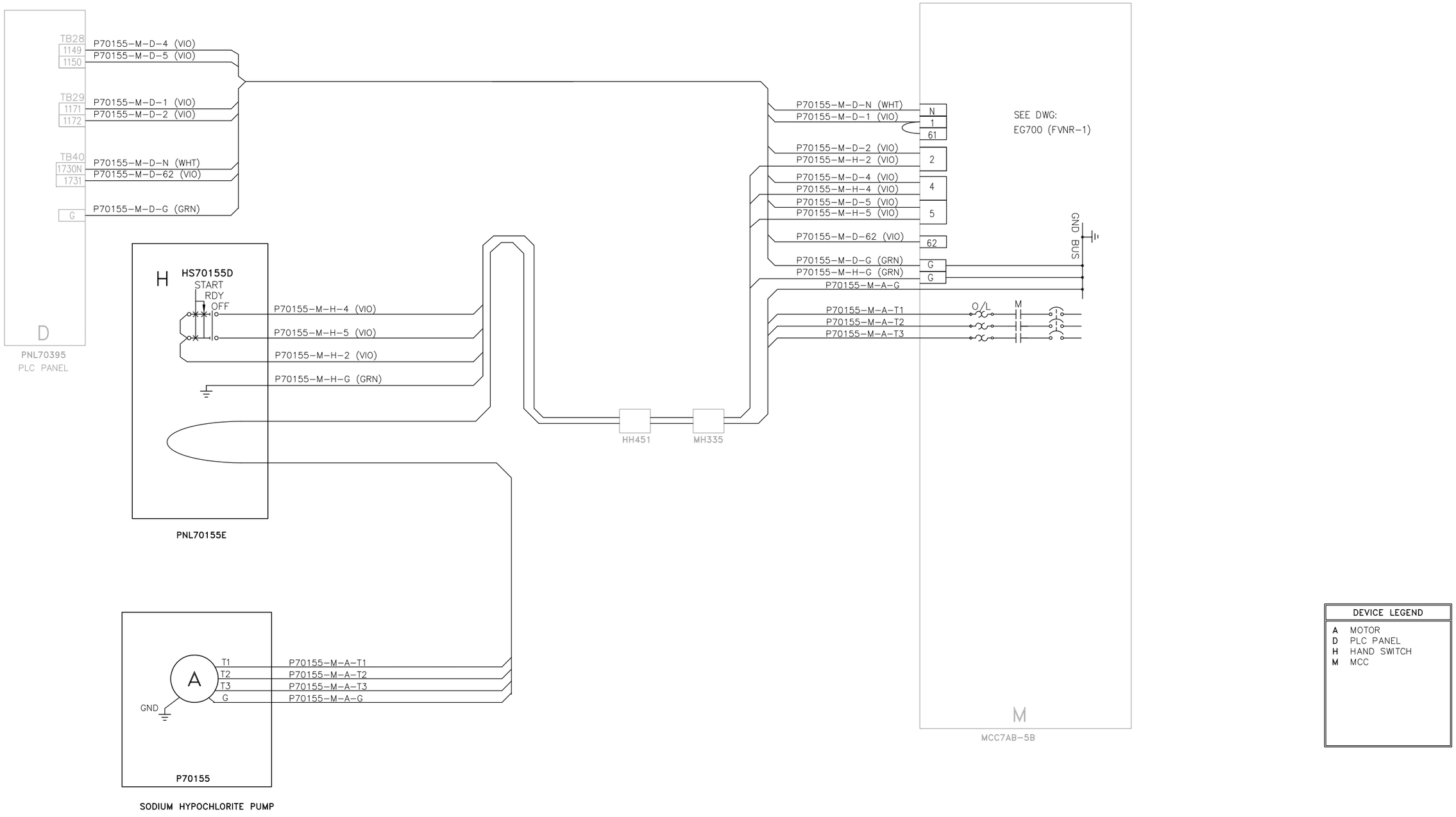
SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECT DIAGRAM
DEMOLITION
P70168
ALUM METERING PUMP NO. 1

SCALE
NO SCALE

DRAWING NUMBER
IC707

SHEET NUMBER
215 OF 236



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Regist # 161/1
Exp. 6-30-10
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STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE IC709
DRAWN S. SIVAPRASAD
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT

INTERCONNECT DIAGRAM

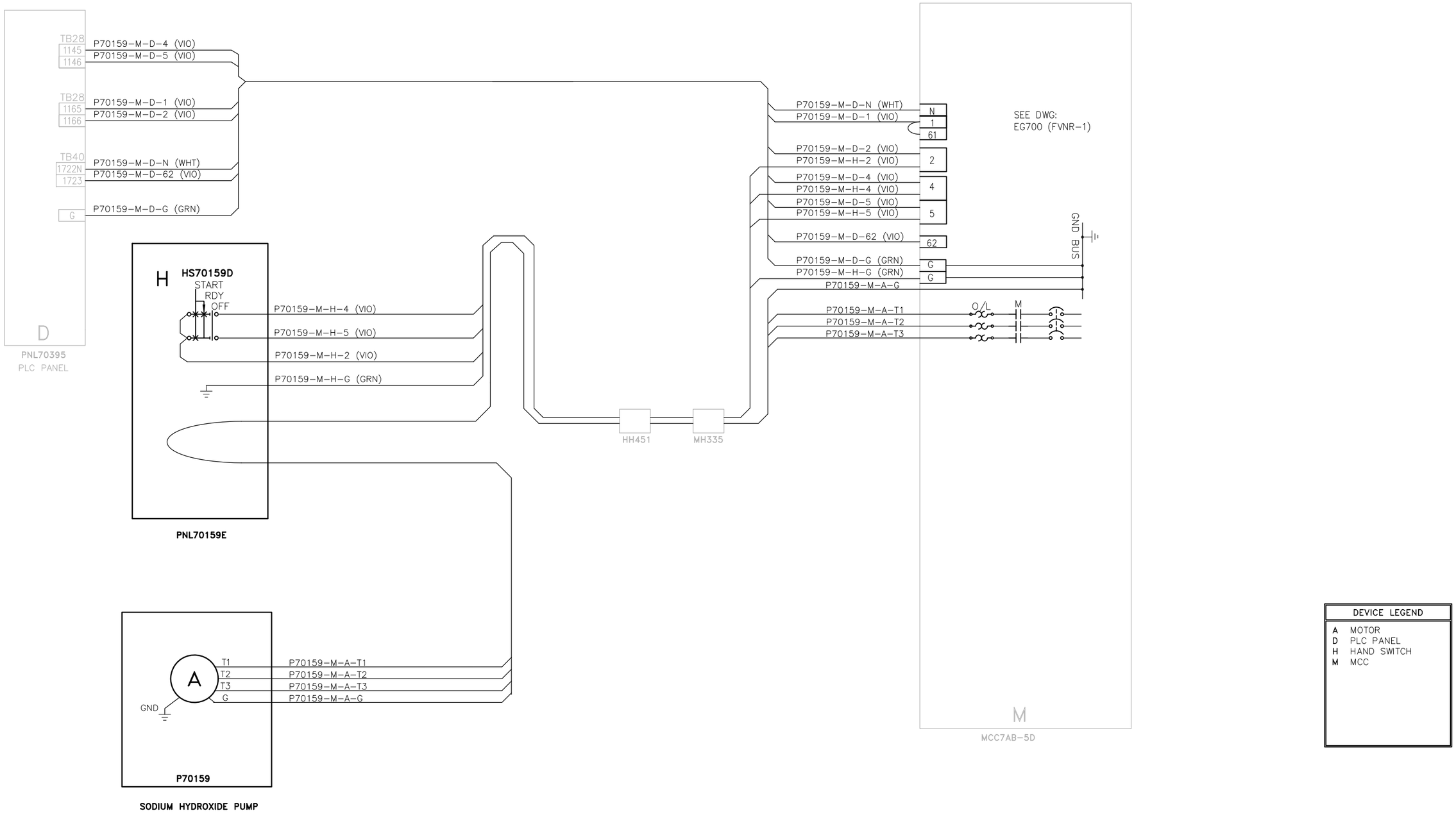
P70155

SODIUM HYPOCHLORITE PUMP

SCALE

DRAWING NUMBER
IC709

SHEET NUMBER
216 OF 236



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REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN S. SIVAPRASAD
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECT DIAGRAM

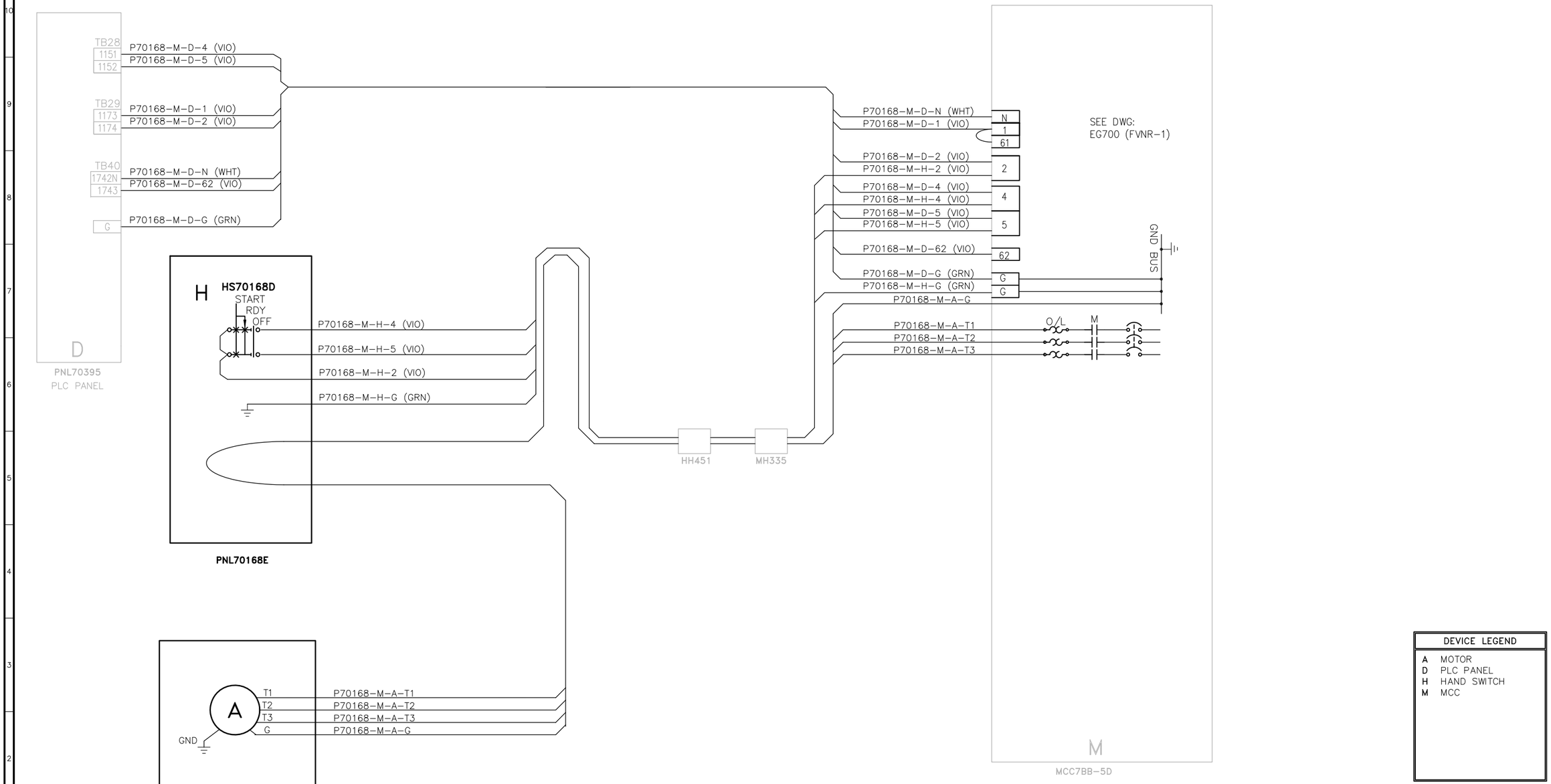
P70159

SODIUM HYDROXIDE PUMP

SCALE
NO SCALE

DRAWING NUMBER
IC710

SHEET NUMBER
217 OF 236



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BDR342202

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EXP. 6-30-11
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STATE OF CALIFORNIA

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SANJAY SIVAPRASAD
Regist # 161/1
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

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AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN S. SIVAPRASAD
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECT DIAGRAM

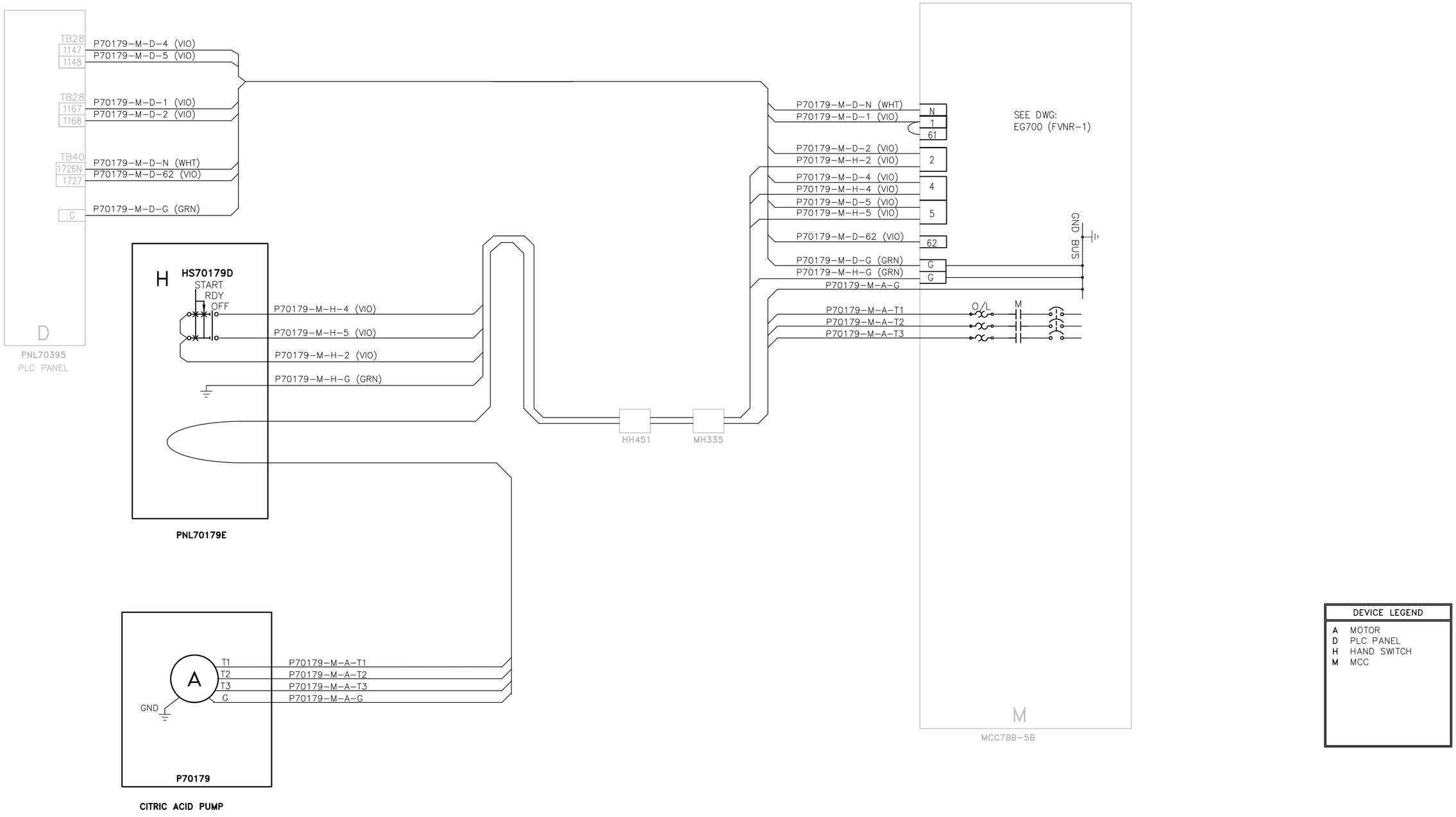
P70168

SODIUM BISULFITE PUMP

SCALE
NO SCALE

DRAWING NUMBER
IC711

SHEET NUMBER
218 OF 236



DEVICE LEGEND	
A	MOTOR
D	PLC PANEL
H	HAND SWITCH
M	MCC

PRELIMINARY – NOT FOR CONSTRUCTION

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BDR342202

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REVISIONS					
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FILE FILE NAME
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CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECT DIAGRAM

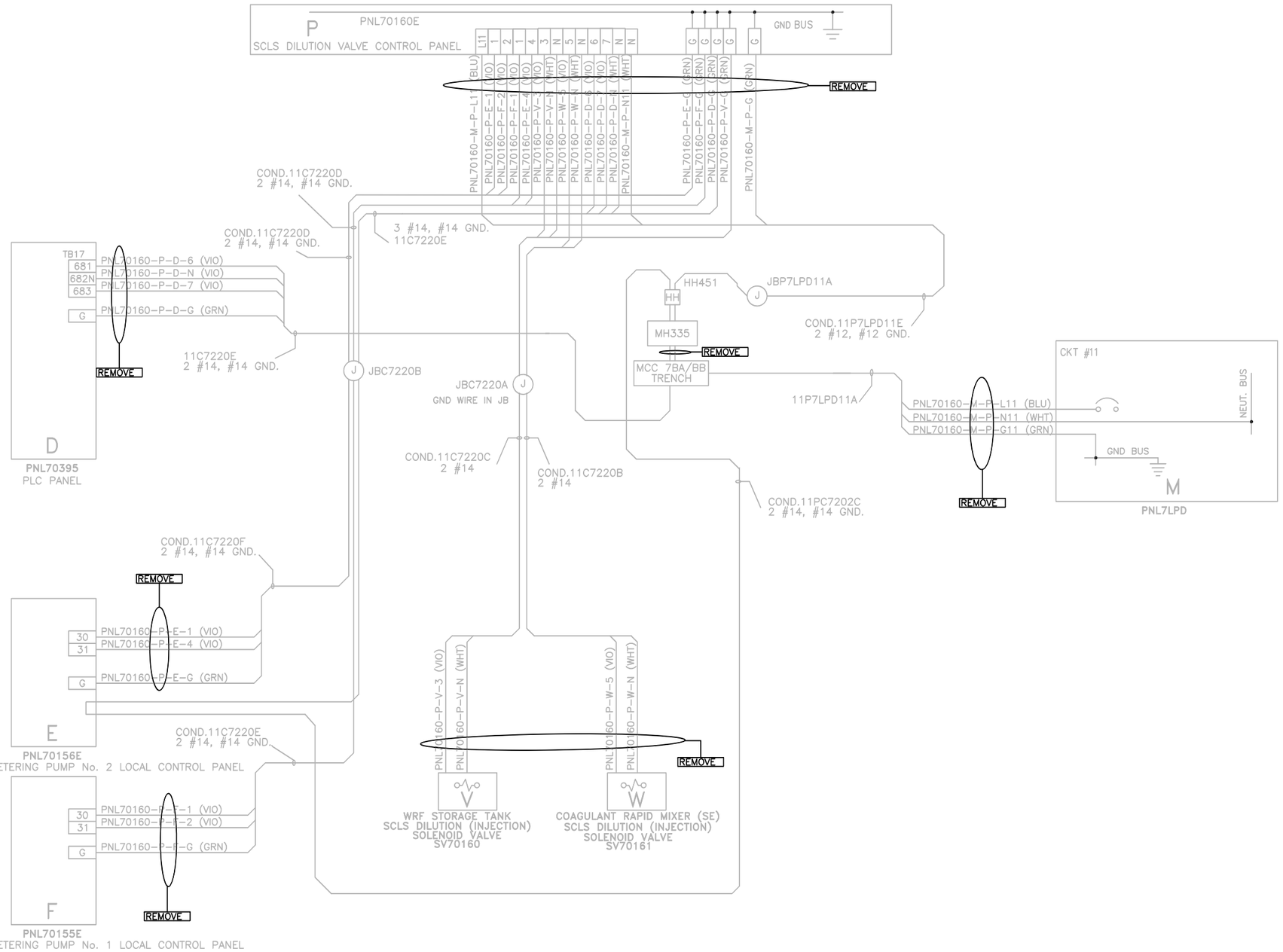
P70179

CITRIC ACID PUMP

SCALE
NO SCALE

DRAWING NUMBER
IC712

SHEET NUMBER
219 OF 236



DEVICE LEGEND	
D	PLC PANEL
E	METERING PUMP No. 1 PANEL
F	METERING PUMP No. 2 PANEL
M	PANELBOARD
P	SCLS VALVE PANEL
V	SOLENOID VALVE
W	SOLENOID VALVE

EQUIPMENT NO.
SV70160 & SV70161

PRELIMINARY – NOT FOR CONSTRUCTION

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BDR342202

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WILLIAM TI
NO. 68143
EXP. 6-30-11
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SANJAY SIVARAMAN
Regist # 161/1
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECTION DIAGRAM

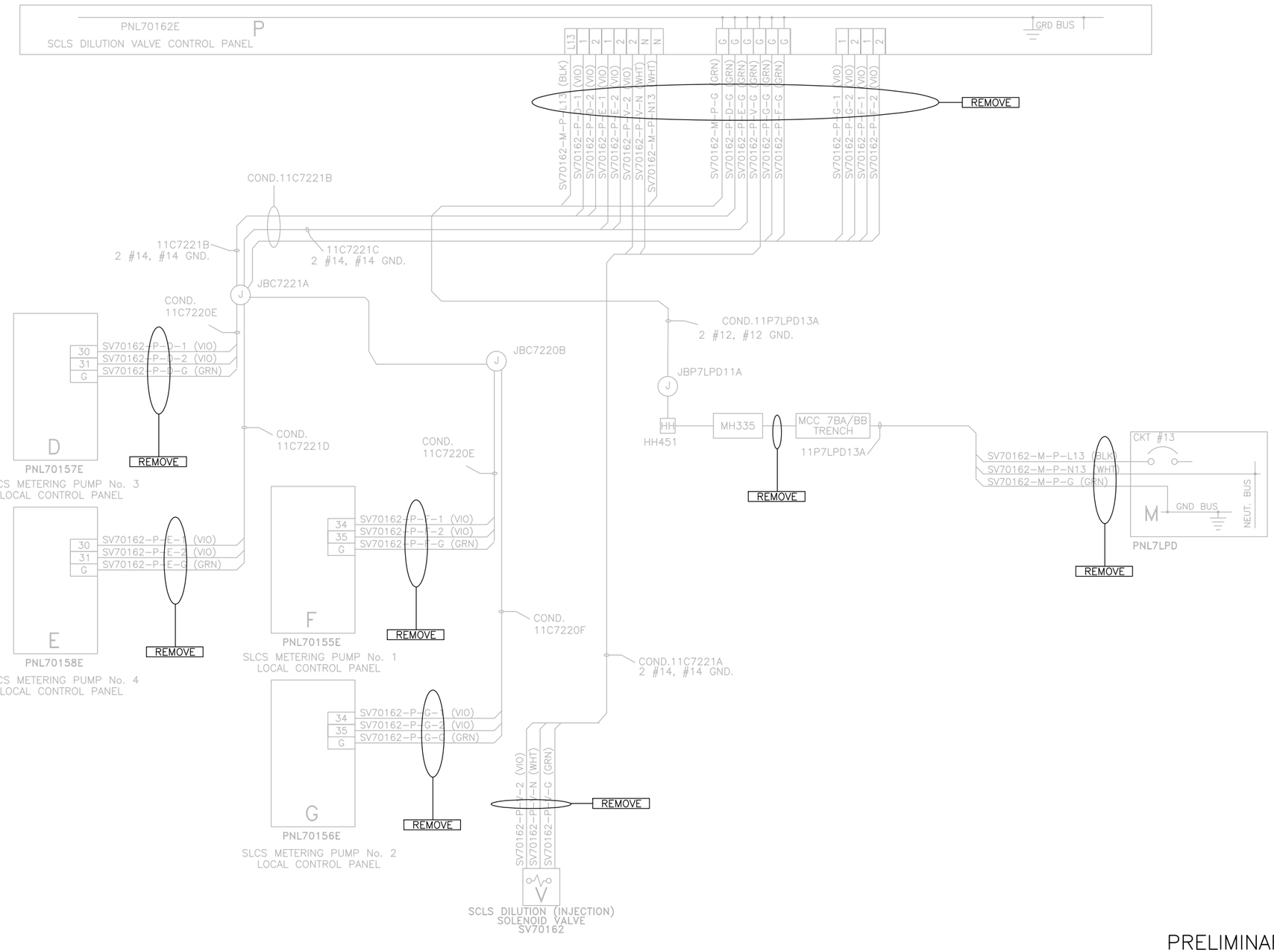
DEMO,LITION

SV70160 AND SV70161

SCALE
NO SCALE

DRAWING NUMBER
IC713

SHEET NUMBER
220 OF 236



DEVICE LEGEND	
D	METERING PUMP No. 3 PANEL
E	METERING PUMP No. 4 PANEL
F	METERING PUMP (FUTURE)
M	PANELBOARD
P	VALVE PANEL
V	SOLENOID VALVE

EQUIPMENT NO.
SV70162

PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED:
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BDR342202

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WILLIAM T
NO. 68143
EXP. 6-30-11
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
SANJAY SIVAPRASAD
Regist # 16171
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECTION DIAGRAM

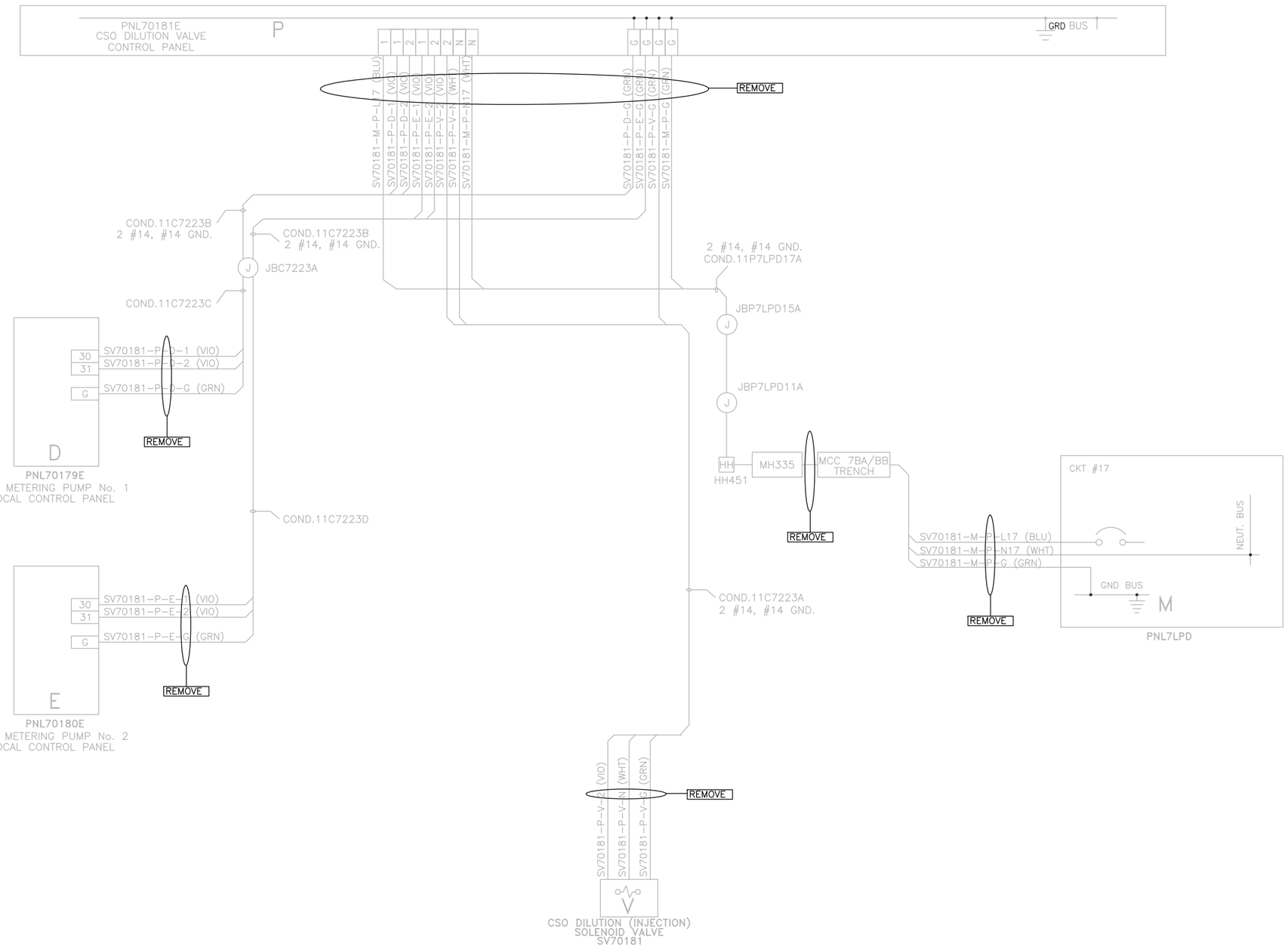
DEMOLITION

SV70162

SCALE
NO SCALE

DRAWING NUMBER
IC714

SHEET NUMBER
221 OF 236



DEVICE LEGEND	
D	METERING PANEL PUMP No. 1
E	METERING PANEL PUMP No. 2
M	PANELBOARD
P	VALVE PANEL
V	SOLENOID VALVE

EQUIPMENT NO.
SV70181

PRELIMINARY – NOT FOR CONSTRUCTION

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REGISTERED PROFESSIONAL ENGINEER
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Regist # 16171
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STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY
SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL
WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECT DIAGRAM

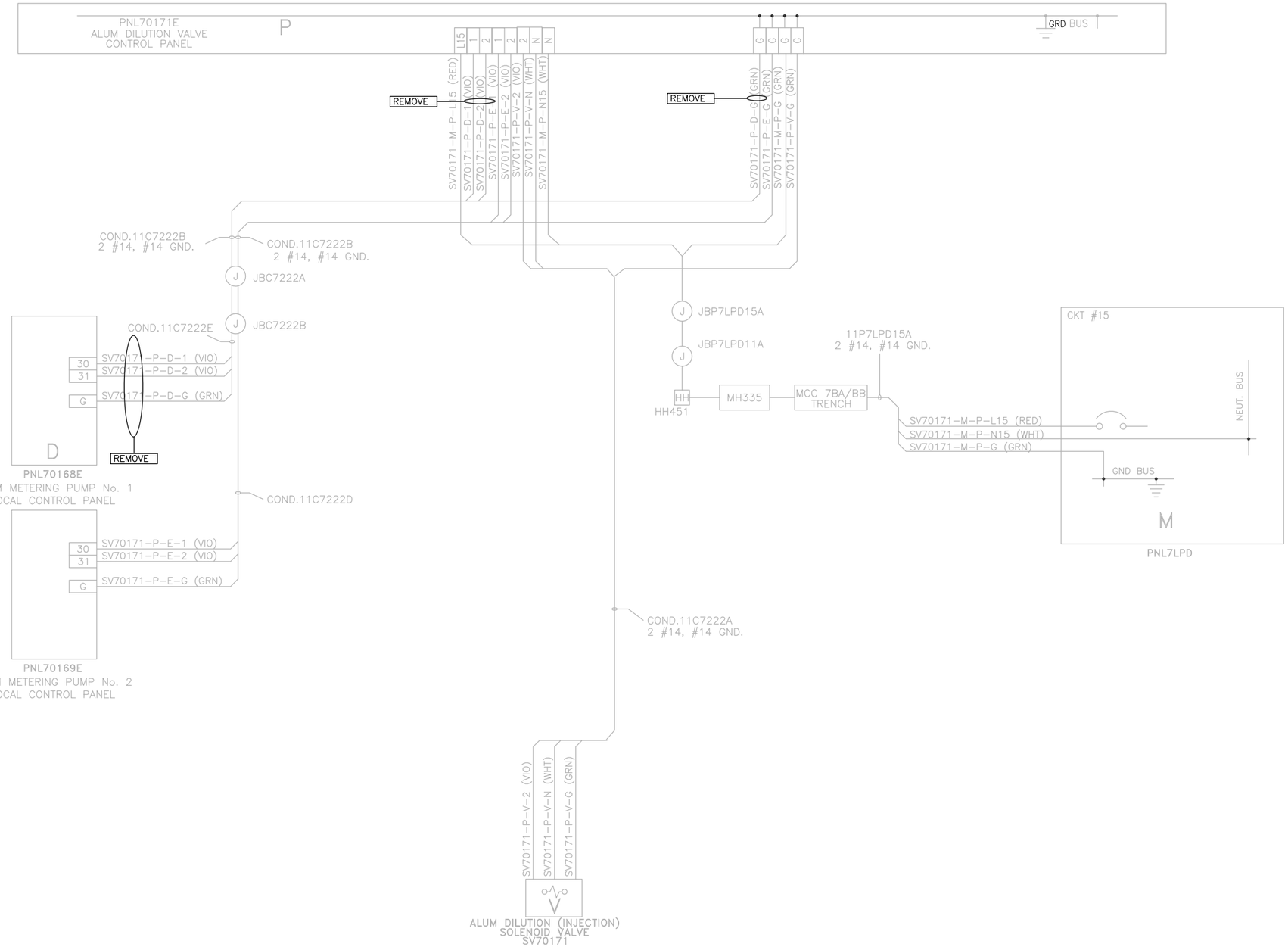
DEMOLITION

SV70181

SCALE
NO SCALE

DRAWING NUMBER
IC715

SHEET NUMBER
222 OF 236



DEVICE LEGEND	
D	METERING PUMP No. 1 PANEL
E	METERING PUMP No. 2 PANEL
F	METERING PUMP (FUTURE)
M	PANELBOARD
P	VALVE PANEL
V	SOLENOID VALVE

EQUIPMENT NO.
SV70171

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BDR342202

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STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
SANJAY SIVAPRASAD
Regist # 16171
Exp. 6-30-10
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STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
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(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY
SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL
WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECT DIAGRAM

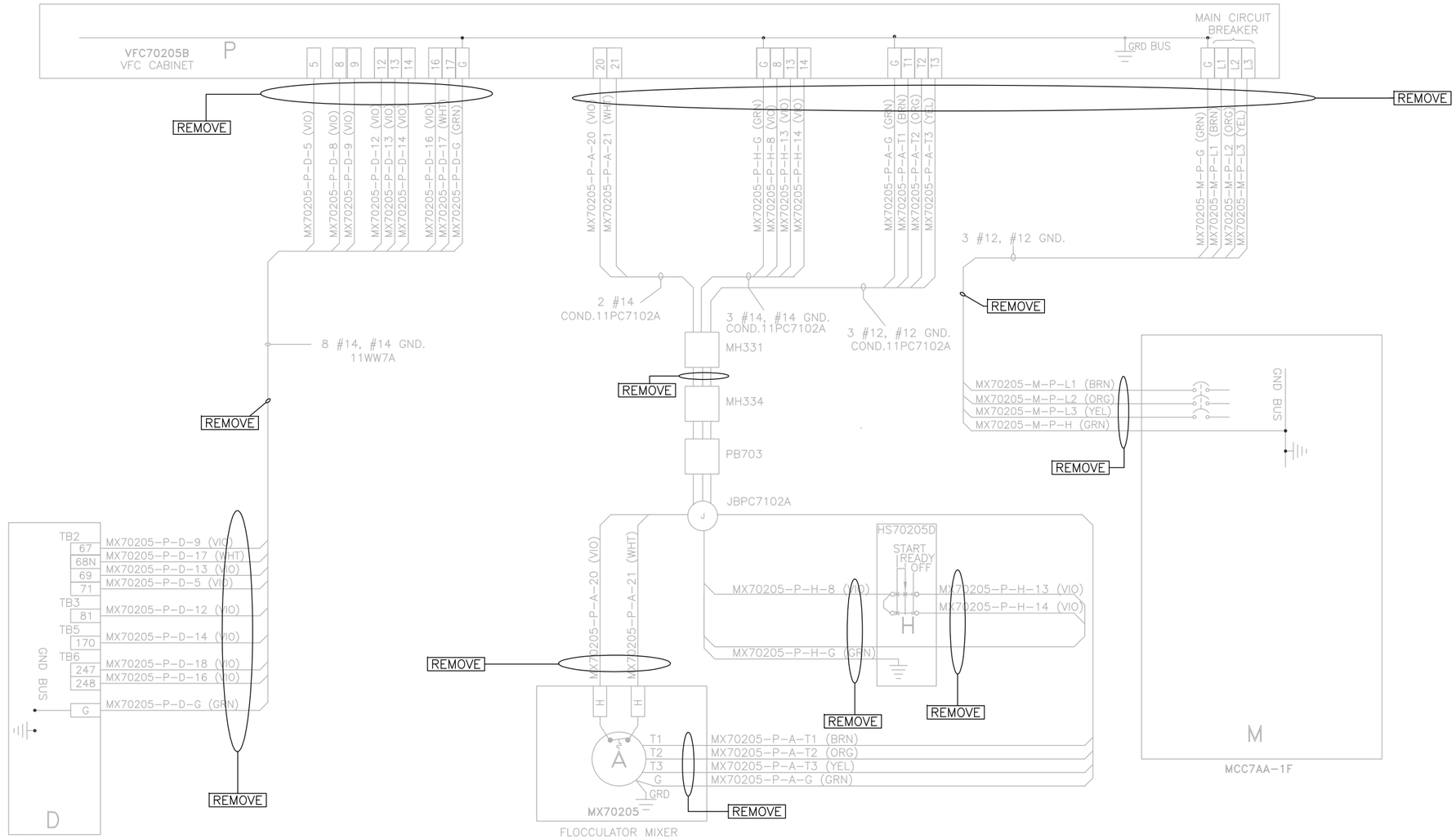
MODIFICATIONS

SV70171

SCALE
NO SCALE

DRAWING NUMBER
IC716

SHEET NUMBER
223 OF 236



DEVICE LEGEND	
A	MOTOR
D	PLC PANEL
H	HAND SWITCH
M	MCC
P	VFC PANEL
S	SPEED POT

EQUIPMENT NO.
MX70205

PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED:
SAVED:

FBDR342202
BDR342202

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WILLIAM TI
NO. 68143
EXP. 6-30-11
CIVIL
STATE OF CALIFORNIA

REGISTERED PROFESSIONAL ENGINEER
SANJAY SIVAPRASAD
Regist # 16171
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN SS
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL
WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECTION DIAGRAM

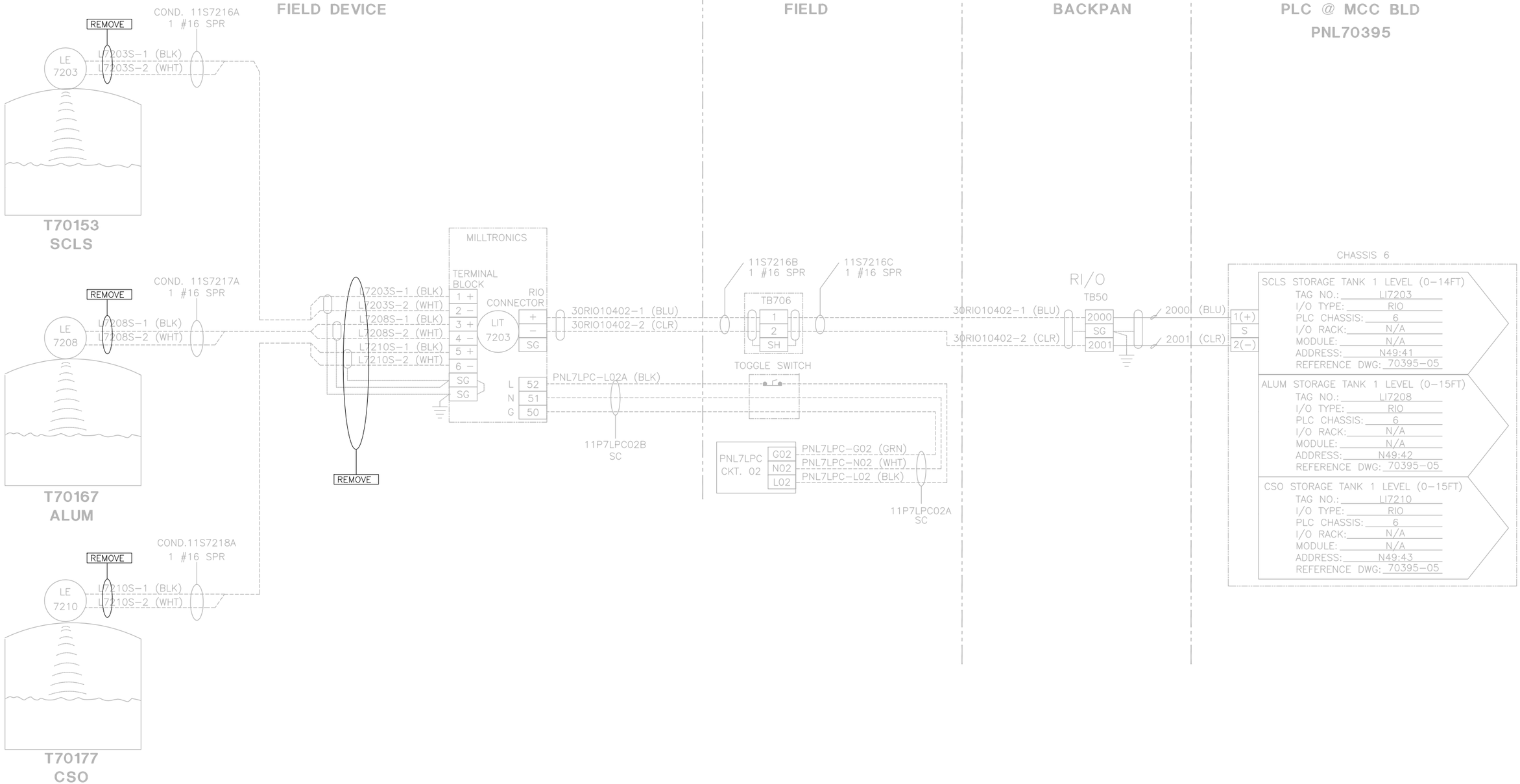
DEMOLITION

MX70205

SCALE
NO SCALE

DRAWING NUMBER
IC717

SHEET NUMBER
224 OF 236



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BR0R34202

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WILLIAM YU
NO. 68143
EXP. 6-30-11
CIVIL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
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(IF NOT 2"-SCALE ACCORDINGLY)

FILE IC718
DRAWN SS
DESIGNED SS
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECT DIAGRAM
DEMOLITION
CHEMICAL TANK LEVEL TRANSMITTERS

SCALE
NO SCALE

DRAWING NUMBER
IC718

SHEET NUMBER
225 OF 236

FIELD DEVICE

FIELD

BACKPAN

PLC @ MCC BLD
PNL70395

COND.44S7216B
1 #16 SPR

LE 7203
L7203S-1 (BLK)
L7203S-2 (WHT)

T70153
SODIUM HYPOCHLORITE

COND.44S7217A
1 #16 SPR

LE 7208
L7208S-1 (BLK)
L7208S-2 (WHT)

T70167
SODIUM BISULFITE

COND.44S7218B
1 #16 SPR

LE 7210
L7210S-1 (BLK)
L7210S-2 (WHT)

T70177
CITRIC ACID

COND.44S7216C
1 #16 SPR

LE 7204
L7204S-1 (BLK)
L7204S-2 (WHT)

T70154
SODIUM HYDROXIDE

COND.44S7218C
1 #16 SPR

LE 7211
L7211S-1 (BLK)
L7211S-2 (WHT)

T70178
ALUM

MILLTRONICS

TERMINAL BLOCK

1 +	L7203S-1 (BLK)
2 –	L7203S-2 (WHT)
3 +	L7208S-1 (BLK)
4 –	L7208S-2 (WHT)
5 +	L7210S-1 (BLK)
6 –	L7210S-2 (WHT)
7 +	L7204S-1 (BLK)
8 –	L7204S-2 (WHT)
9 +	L7211S-1 (BLK)
10 –	L7211S-2 (WHT)
SG	
SG	
SG	
SG	

RIO CONNECTOR

LIT 7203
+
–
SG

30RIO10402-1 (BLU)
30RIO10402-2 (CLR)

11S7216B
1 #16 SPR

11S7216C
1 #16 SPR

TB706
1
2
SH

TOGGLE SWITCH

L 52
N 51
G 50

PNL7LPC-L02A (BLK)

11P7LPC02B
SC

PNL7LPC CKT. 02
G02
N02
L02

PNL7LPC-G02 (GRN)
PNL7LPC-N02 (WHT)
PNL7LPC-L02 (BLK)

11P7LPC02A
SC

RI/O

TB50
2000
SG
2001

30RIO10402-1 (BLU) 2000 (BLU)
30RIO10402-2 (CLR) 2001 (CLR)

1(+)
S
2(–)

CHASSIS 6

SODIUM HYPOCHLO. TANK LEVEL (0–14FT)
TAG NO.: LI7203
I/O TYPE: RIO
PLC CHASSIS: 6
I/O RACK: N/A
MODULE: N/A
ADDRESS: N49:41
REFERENCE DWG: 70395-05

SODIUM BISULFITE TANK LEVEL (0–15FT)
TAG NO.: LI7208
I/O TYPE: RIO
PLC CHASSIS: 6
I/O RACK: N/A
MODULE: N/A
ADDRESS: N49:42
REFERENCE DWG: 70395-05

CITRIC ACID TANK LEVEL (0–15FT)
TAG NO.: LI7210
I/O TYPE: RIO
PLC CHASSIS: 6
I/O RACK: N/A
MODULE: N/A
ADDRESS: N49:43
REFERENCE DWG: 70395-05

SODIUM HYDROXIDE TANK LEVEL (0–15FT)
TAG NO.: LI7204
I/O TYPE: RIO
PLC CHASSIS: 6
I/O RACK: N/A
MODULE: N/A
ADDRESS:
REFERENCE DWG:

ALUM TANK LEVEL (0–15FT)
TAG NO.: LI7211
I/O TYPE: RIO
PLC CHASSIS: 6
I/O RACK: N/A
MODULE: N/A
ADDRESS:
REFERENCE DWG:

PRELIMINARY – NOT FOR CONSTRUCTION

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NO. 68143
EXP. 6-30-11
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REGISTERED PROFESSIONAL ENGINEER
SANJAY SIVAPRASAD
Regist # 161/1
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
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FILE FILE NAME
DRAWN SS
DESIGNED SS
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CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

INTERCONNECTION DIAGRAM

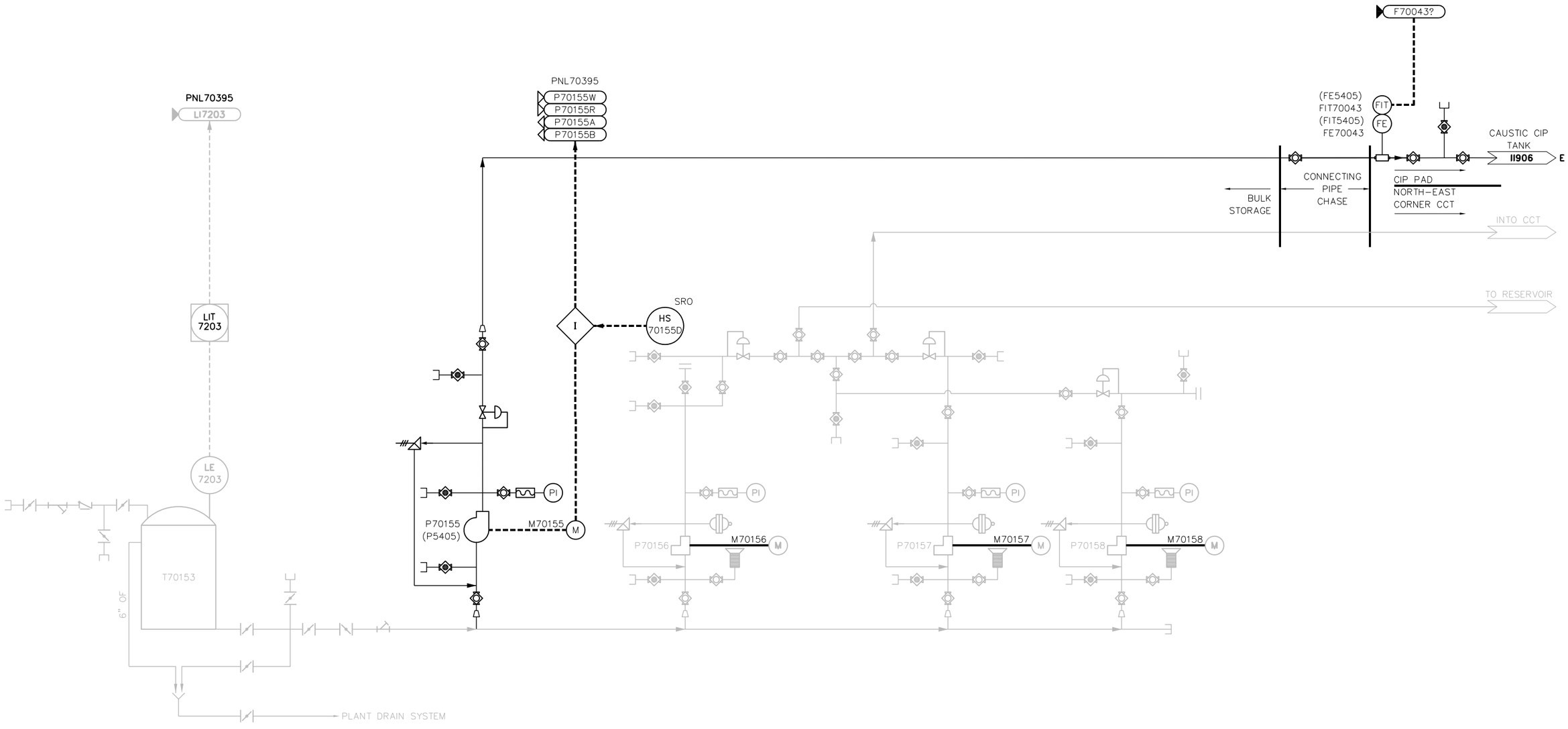
MODIFICATIONS

CHEMICAL TANK LEVEL TRANSMITTERS

SCALE
NO SCALE

DRAWING NUMBER
IC719

SHEET NUMBER
226 OF 236



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SANJAY SIVAPRASAD
Regist # 16171
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

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CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

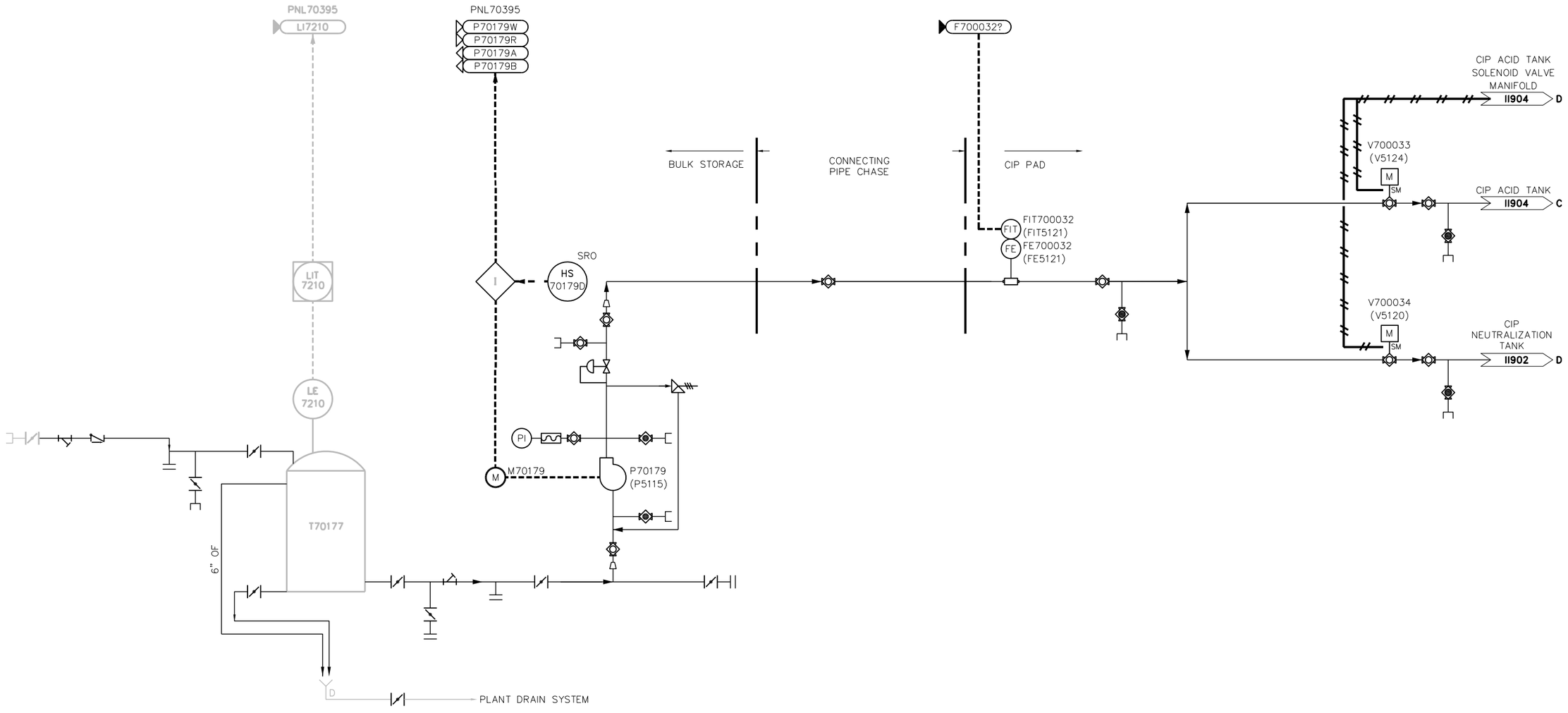
PROCESS AND INSTRUMENTATION DIAGRAM

SODIUM HYPOCHLORITE FEED SYSTEM

SCALE
NO SCALE

DRAWING NUMBER
IC901

SHEET NUMBER
227 OF 237



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SANJAY SIVAPRASAD
Regist # 161/1
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
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FILE FILE NAME
DRAWN TULLENSVANG
DESIGNED TU
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL
WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

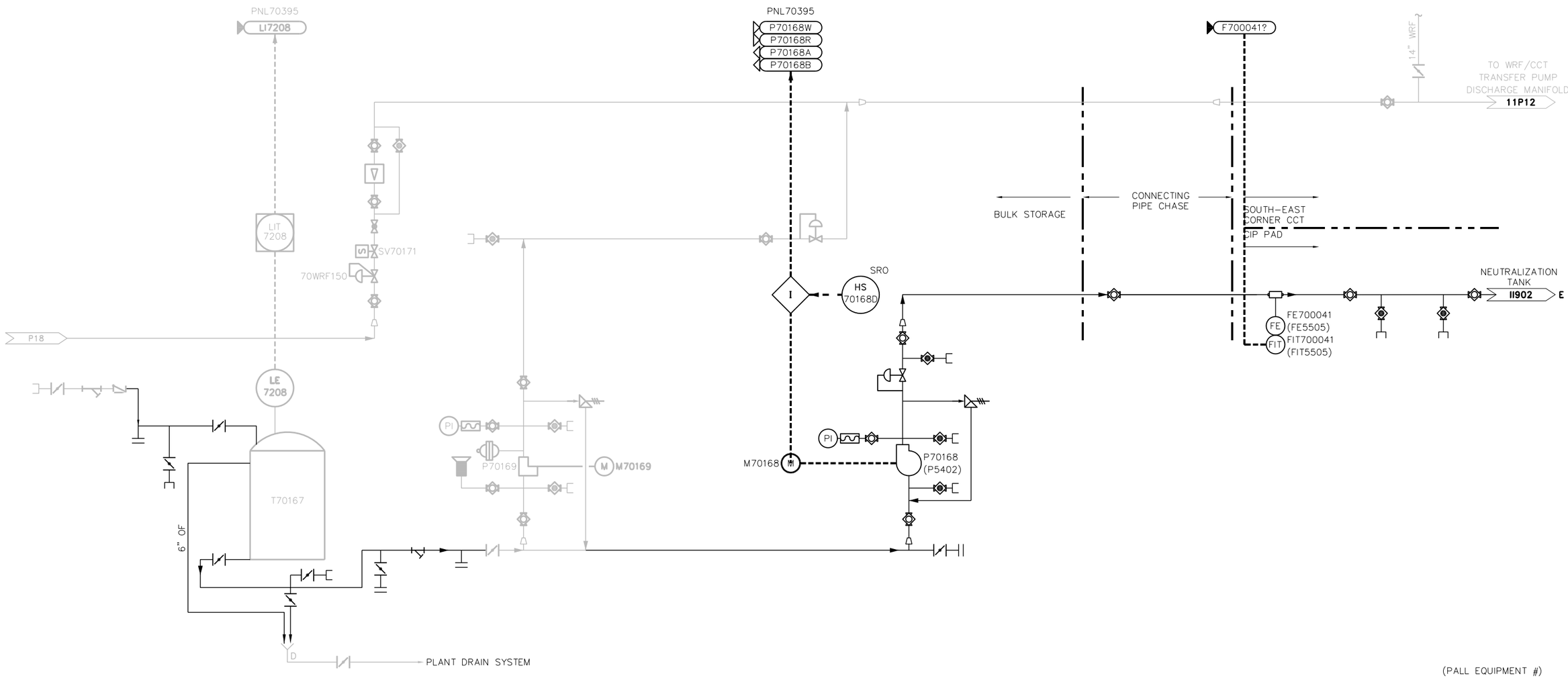
PROCESS AND INSTRUMENTATION DIAGRAM

CITRIC ACID FEED SYSTEM

SCALE
NO SCALE

DRAWING NUMBER
IC902

SHEET NUMBER
228 OF 236



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FILE FILE NAME
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DESIGNED TU
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

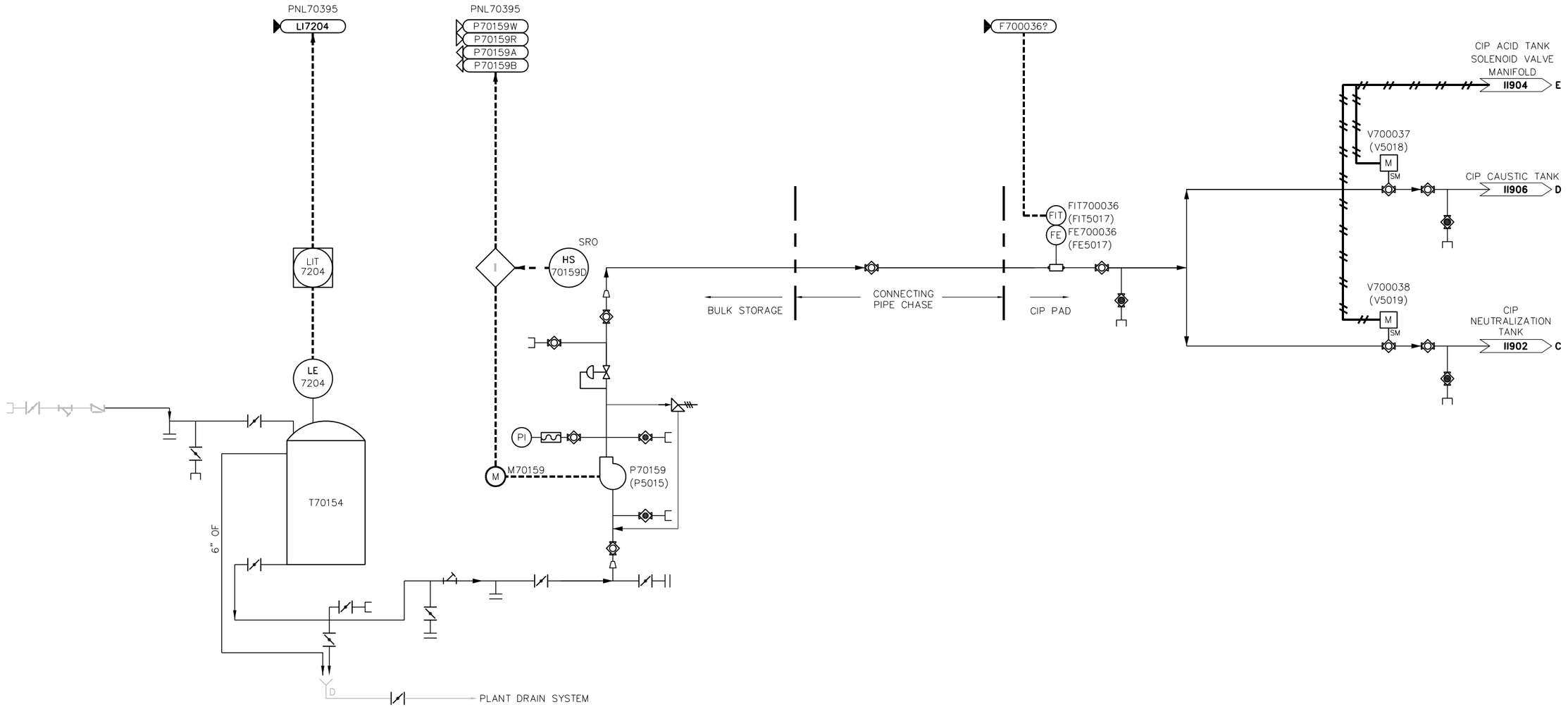
PROCESS AND INTRUMENTATION DIAGRAM

SODIUM BISULFITE FEED SYSTEM

SCALE
NO SCALE

DRAWING NUMBER
IC903

SHEET NUMBER
229 OF 236



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Regist # 16171
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN TULLENSVANG
DESIGNED TU
CHECKED SS

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CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL
WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

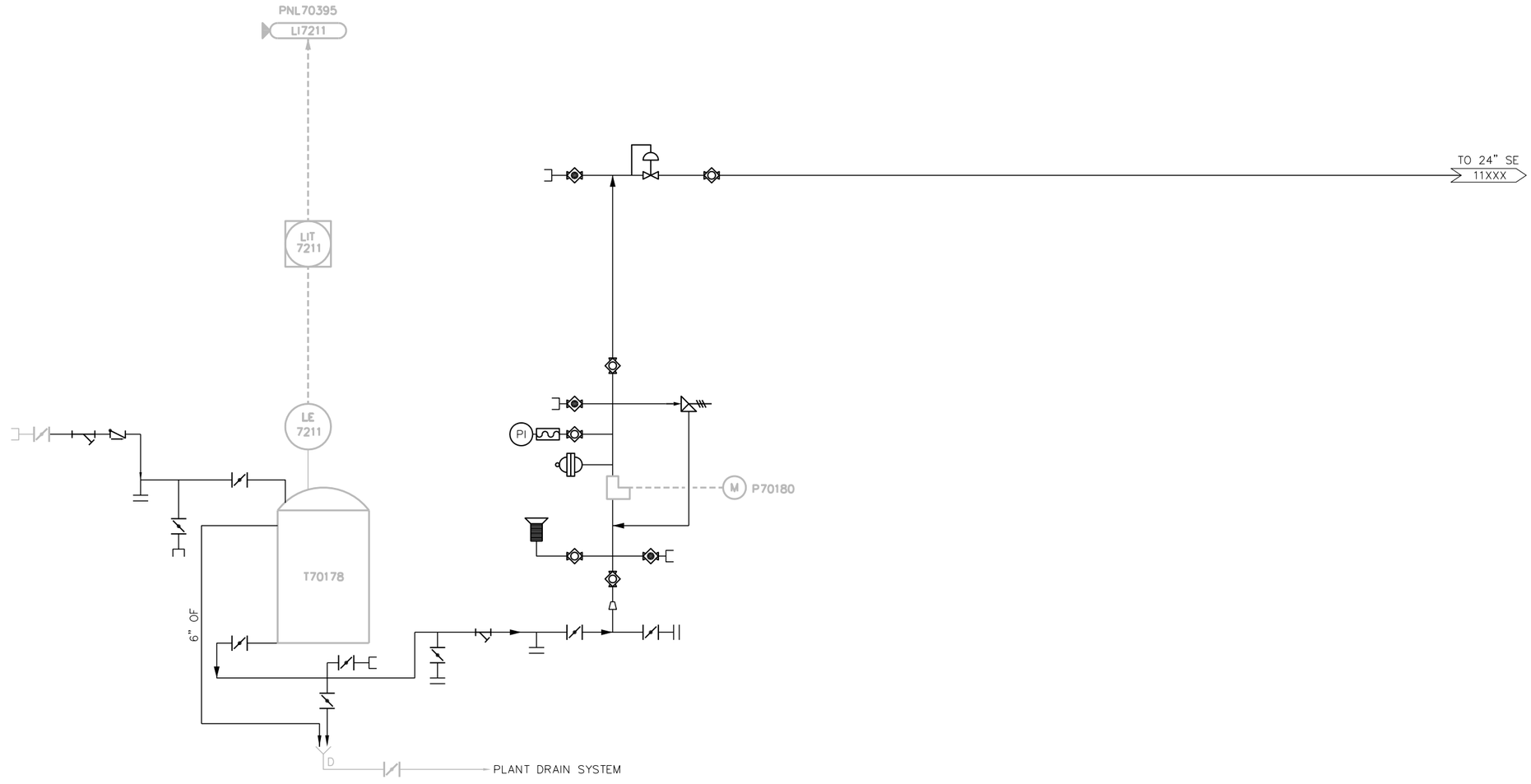
PROCESS AND INSTRUMENTATION DIAGRAM

SODIUM HYDROXIDE FEED SYSTEM

SCALE
NO SCALE

DRAWING NUMBER
IC904

SHEET NUMBER
230 OF 236



(PALL EQUIPMENT #)

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STATE OF CALIFORNIA

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SANJAY SIVAPRASAD
Regist # 161/1
Exp. 6-30-10
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE FILE NAME
DRAWN TULLENSVANG
DESIGNED TU
CHECKED SS

TBD
CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY

PROCESS AND INSTRUMENTATION DIAGRAM

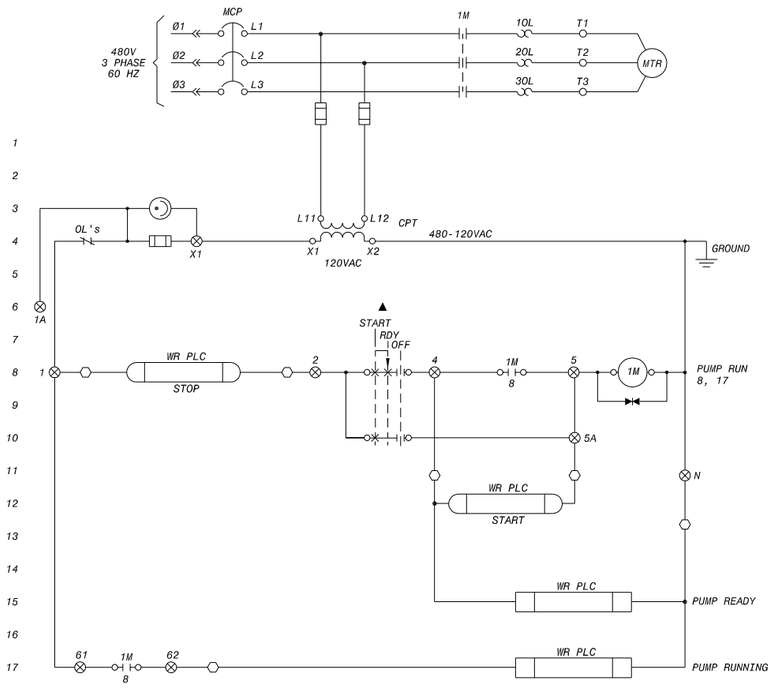
ALUM FEED SYSTEM

SCALE
NO SCALE

DRAWING NUMBER
IC919

SHEET NUMBER
231 OF 236

FIELD ELEMENTARY



DESCRIPTION	EQUIPMENT NUMBER
MUDWELL PUMP 1	P70274
MUDWELL PUMP 2	P70275

DESCRIPTION	TERMINAL
MCC CUBICLE TERMINAL	⊗
MCC PLC PANELS	⬡
FIELD PANEL	◇
FIELD MOUNTED DEVICE	▲

NOTES:

1. COORDINATE WITH THE DISTRICT FOR PANEL TERMINAL ASSIGNMENTS FOR WR PLC I/O.

PRELIMINARY – NOT FOR CONSTRUCTION

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SAVED: OGL22631, 1/14/2010 2:19:41 PM

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E 15829
EXP 12/31/2010
ELECTRICAL
STATE OF CALIFORNIA

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN GT
DESIGNED WEM
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CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

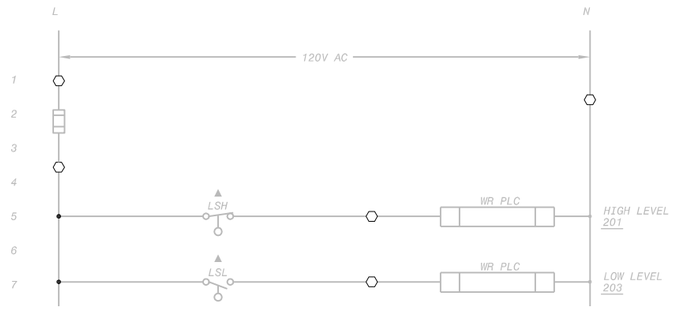
CONTROL AND LOGIC DIAGRAM
MUDWELL PUMPS

SCALE
NONE

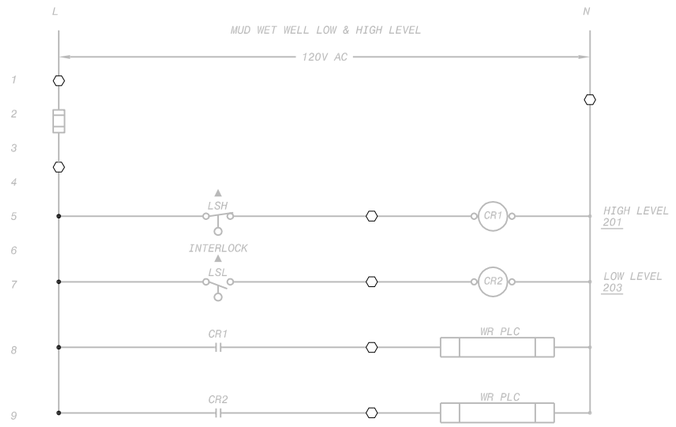
DRAWING NUMBER
IW701

SHEET NUMBER
232 OF 236

FIELD ELEMENTARY



MUD WET WELL LOW & HIGH LEVEL



DESCRIPTION	TERMINAL
MCC CUBICLE TERMINAL	⊗
ACC INSTRUMENT PANELS	□
MCC PLC PANELS	⬡
FIELD PANEL	◇
VFC PANEL	⊘
FIELD MOUNTED DEVICE	▲

DESCRIPTION	LSL	LSH	CONTACT REFERENCES
MUDWELL PUMP STATION LOW AND HIGH LEVEL	7234	7234	LSL (IW901) LSH (IW901)

NOTES:

1. COORDINATE WITH THE DISTRICT FOR PANEL TERMINAL ASSIGNMENTS FOR WR PLC I/O.

PRELIMINARY – NOT FOR CONSTRUCTION

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SAVED: OGL226311/14/2010 2:20:05 PM

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ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN GT
DESIGNED WEM
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

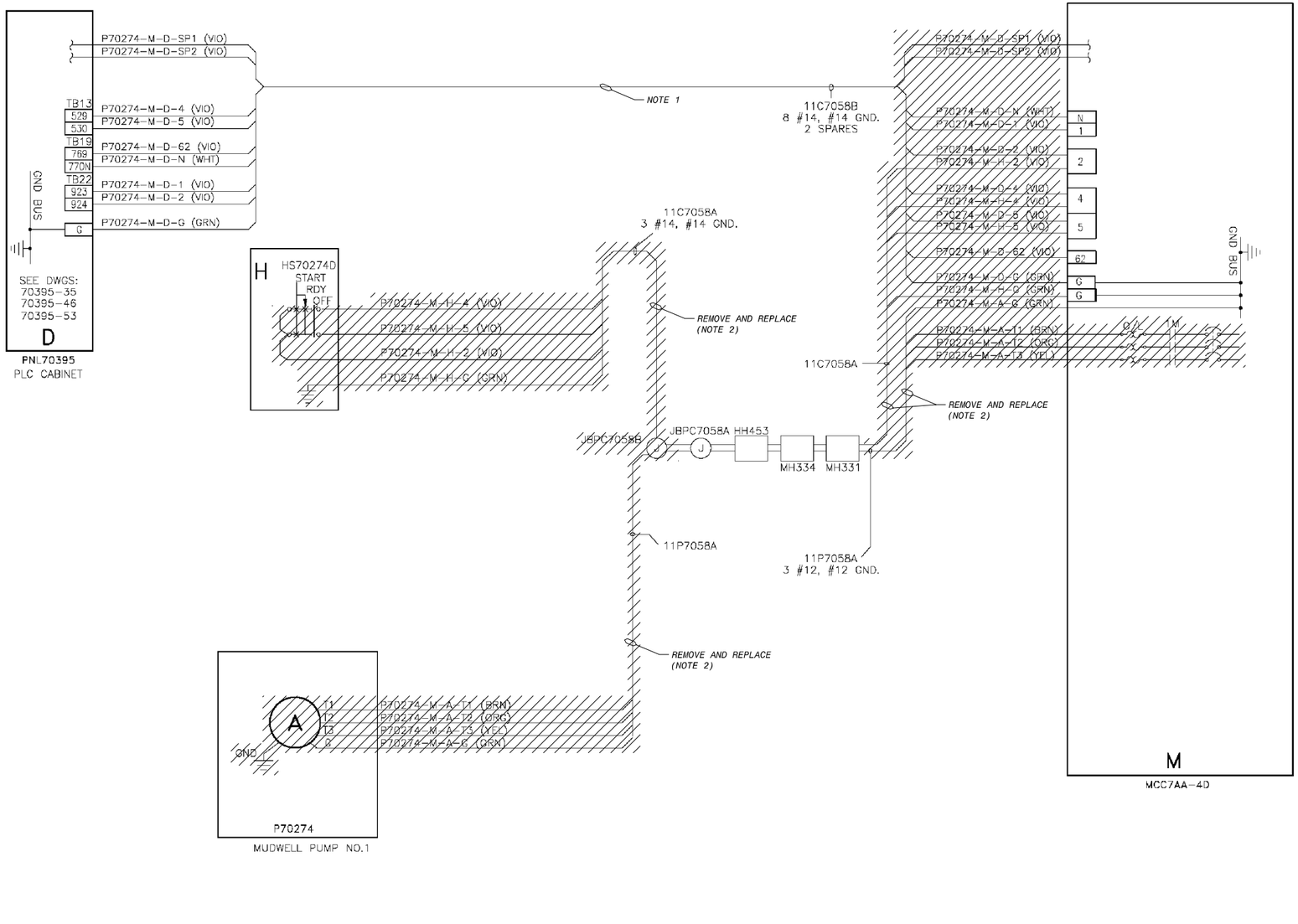
SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

CONTROL AND LOGIC DIAGRAM
MUDWELL LOW AND HIGH LEVEL ALARMS

SCALE
NONE

DRAWING NUMBER
IW702

SHEET NUMBER
233 OF 236



REFERENCE DOCUMENTS

DRAWING #	DESCRIPTION
EE500	EXISTING MCC MODIFICATIONS
EM101	CHLORINE CONTACT TANK PARTIAL PLAN 1 - DEMOLITION

NOTES:

1. *DISCONNECT SIGNAL AND CONTROL WIRE AT MCC. RETERMINATE AFTER NEW MCC EQUIPMENT HAS BEEN INSTALLED.*
2. *SEE DRAWING EM101 FOR DEMOLITION IN THE VICINITY OF THE MUDWELL PUMPS.*
3. *INSTALL AND TERMINATE NEW CONDUCTORS BETWEEN THE MCC AND THE MUDWELL MOTOR AND HAND SWITCH.*

DEVICE LEGEND
A MOTOR
D PLC PANEL
H HAND SWITCH
M MCC

EQUIPMENT NO.
P70274

PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED: GGL22631, 1/19/2010, 2:43:44 PM
SAVED: GGL22631, 1/19/2010, 1:20:56 PM

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ELECTRICAL
STATE OF CALIFORNIA

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN
DESIGNED
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

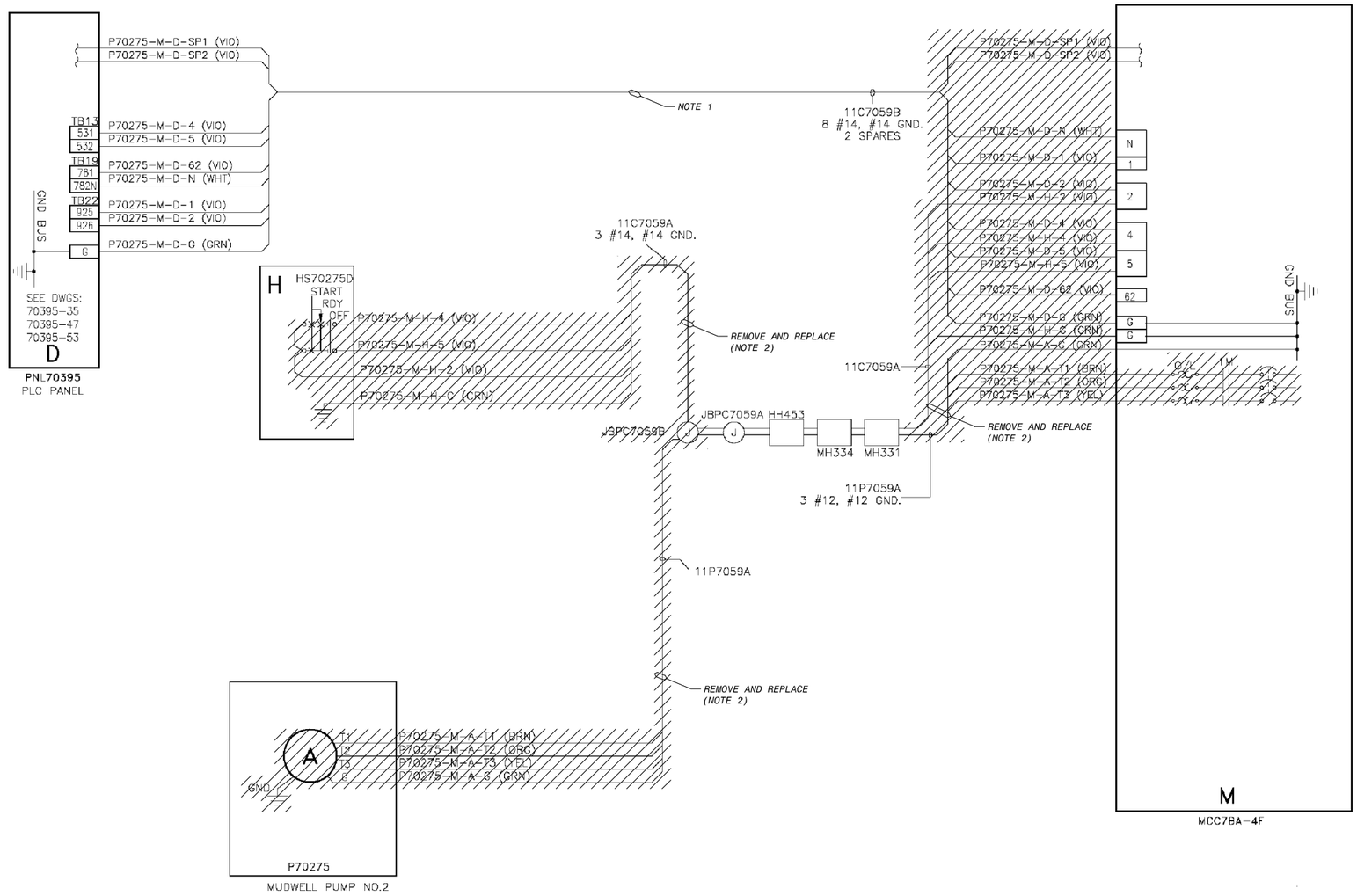
SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

INTERCONNECT DIAGRAM
DEMOLITION MUDWELL PUMP 1

SCALE

DRAWING NUMBER
IW703

SHEET NUMBER
234 OF 236



REFERENCE DOCUMENTS

DRAWING #	DESCRIPTION
EE500	EXISTING MCC MODIFICATIONS
EM101	CHLORINE CONTACT TANK PARTIAL PLAN 1 - DEMOLITION

NOTES:

1. *DISCONNECT SIGNAL AND CONTROL WIRE AT MCC. RETERMINATE AFTER NEW MCC EQUIPMENT HAS BEEN INSTALLED.*
2. *SEE DRAWING EM101 FOR DEMOLITION IN THE VICINITY OF THE MUDWELL PUMPS.*
3. *INSTALL AND TERMINATE NEW CONDUCTORS BETWEEN THE MCC AND THE MUDWELL MOTOR AND HAND SWITCH.*

DEVICE LEGEND
A MOTOR
D PLC PANEL
H HAND SWITCH
M MCC

EQUIPMENT NO.
P70275

PRELIMINARY – NOT FOR CONSTRUCTION

PLOTTED: OGL22631, 1/19/2010 2:44:43 PM
SAVED: OGL22631, 1/19/2010 1:22:31 PM

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STATE OF CALIFORNIA

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES
AT FULL SIZE
(IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN
DESIGNED
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

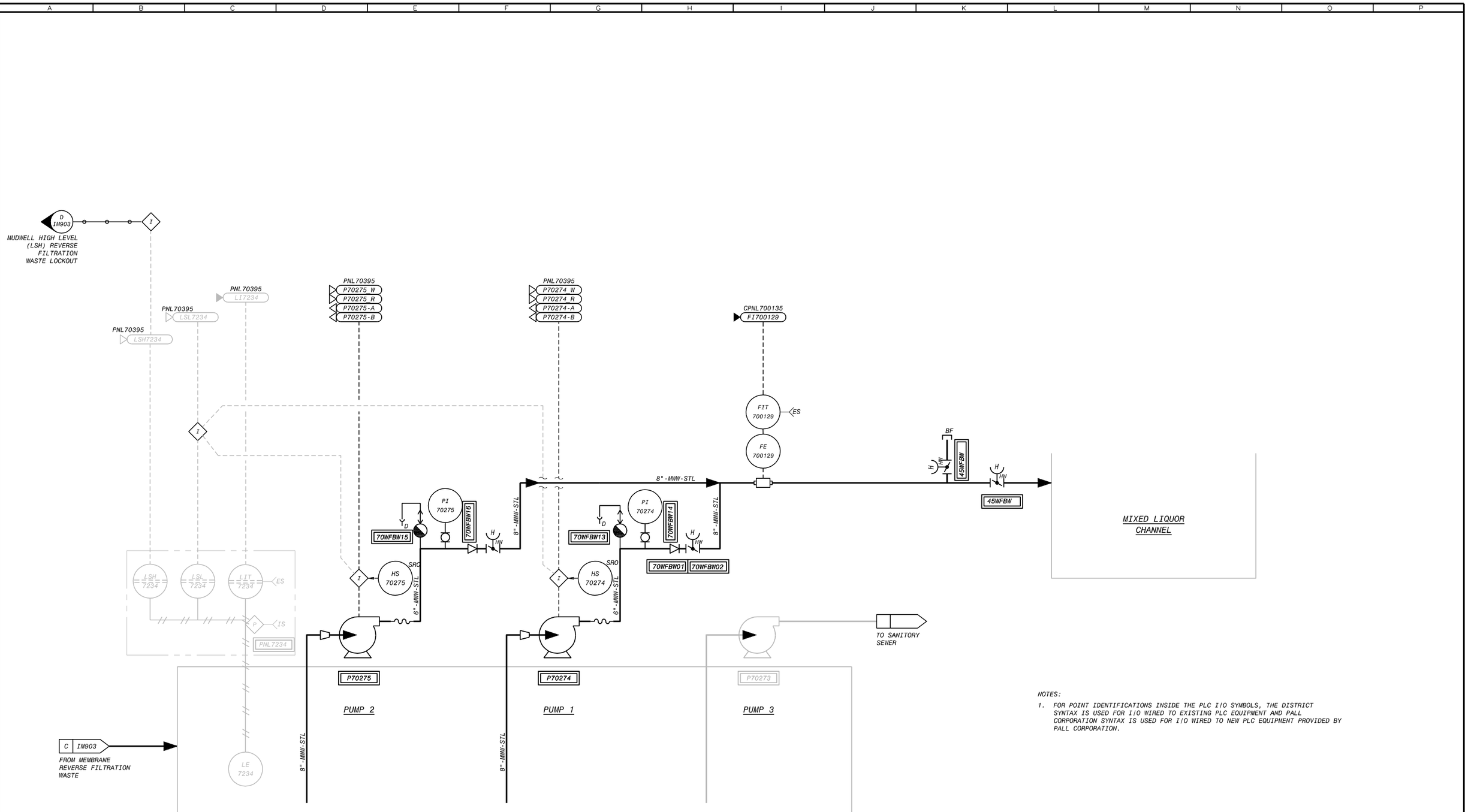
SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

INTERCONNECT DIAGRAM
DEMOLITION MUDWELL PUMP 2

SCALE

DRAWING NUMBER
IW704

SHEET NUMBER
235 OF 236



NOTES:

1. FOR POINT IDENTIFICATIONS INSIDE THE PLC I/O SYMBOLS, THE DISTRICT SYNTAX IS USED FOR I/O WIRED TO EXISTING PLC EQUIPMENT AND PALL CORPORATION SYNTAX IS USED FOR I/O WIRED TO NEW PLC EQUIPMENT PROVIDED BY PALL CORPORATION.

PRELIMINARY – NOT FOR CONSTRUCTION

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STATE OF CALIFORNIA

REVISIONS					
ZONE	REV.	DESCRIPTION	BY	DATE	APP.
	A	50% SUBMITTAL		09/09	
	B	90% SUBMITTAL		11/09	
	C	100% SUBMITTAL		01/10	

LINE IS 2 INCHES AT FULL SIZE (IF NOT 2"-SCALE ACCORDINGLY)

FILE
DRAWN JLH
DESIGNED JLH
CHECKED

CONTRACT NUMBER

SACRAMENTO REGIONAL COUNTY SANITATION DISTRICT
OF SACRAMENTO COUNTY, CALIFORNIA

SACRAMENTO REGIONAL WASTEWATER TREATMENT PLANT
WATER RECLAMATION FACILITY
EXPANSION PROJECT – PHASE II

PROCESS & INSTRUMENTATION DIAGRAM

P&ID – MUD WELL & PUMPS

SCALE

DRAWING NUMBER
IW901

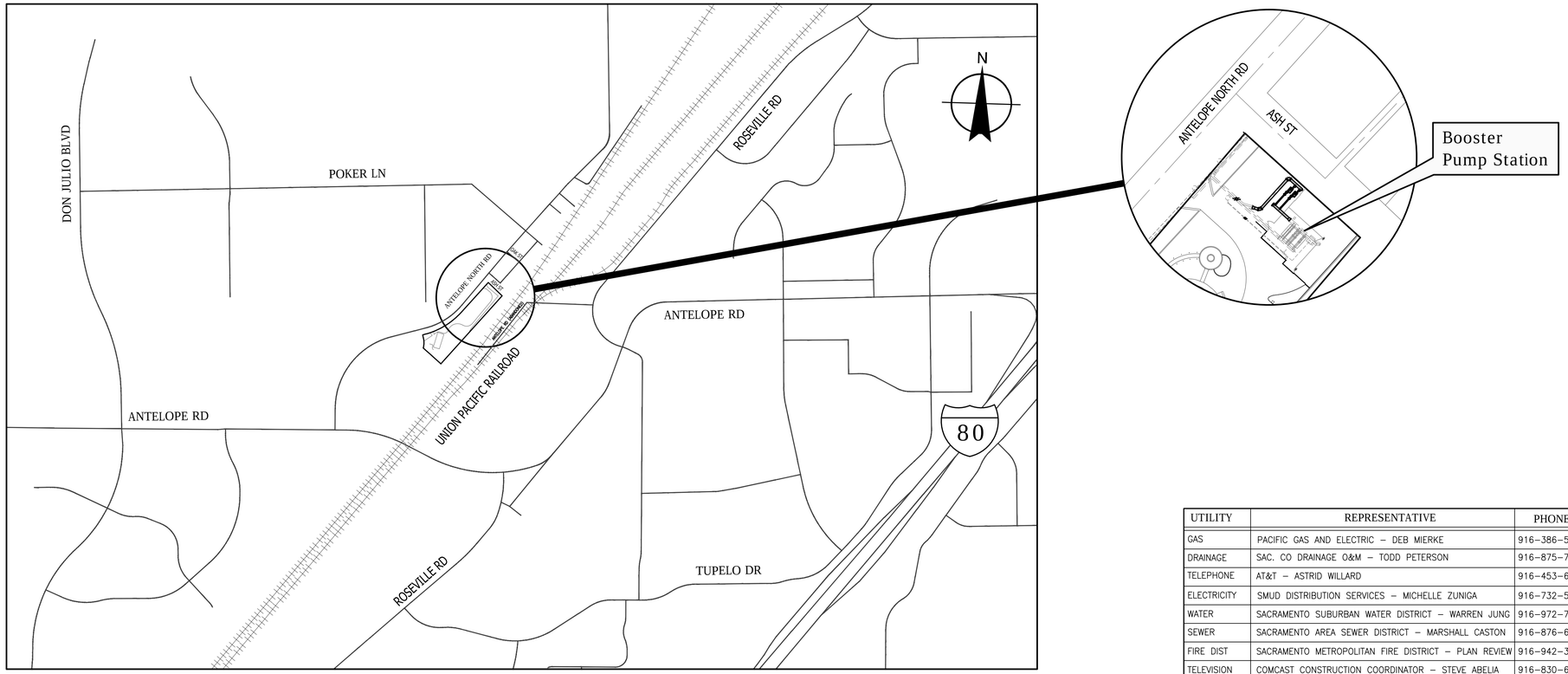
SHEET NUMBER
236 OF 236

North Antelope Booster Pump Station Piping Plan

Sacramento Suburban Water District

Sacramento County, California

North Antelope Booster Pump Station Project



A 1/4 VICINITY MAP
NO SCALE

SACRAMENTO SUBURBAN WATER DISTRICT GENERAL NOTES

1. SACRAMENTO SUBURBAN WATER DISTRICT IS A MEMBER OF U.S.A. ONE CALL PROGRAM. CALL FOR PUBLIC WATER SYSTEM INFORMATION.
2. ALL MATERIALS USED AND WORK PERFORMED IN WATER SYSTEM CONSTRUCTION AND INSTALLATION SHALL COMPLY WITH APPROVED PLANS, SPECIAL CONDITIONS AND THE DISTRICT STANDARDS AND SPECS. ANY AND ALL DEVIATIONS FROM THESE DOCUMENTS SHALL REQUIRE PRIOR WRITTEN APPROVAL BY THE GENERAL MANAGER OF THE DISTRICT.
3. TEN (10) DAYS PRIOR TO PRE-CONSTRUCTION MEETING, THE CONTRACTOR SHALL FURNISH TO THE DISTRICT, A LIST OF MATERIALS PROPOSED TO BE USED IN CONSTRUCTING THE WATER SYSTEM, INCLUDING MANUFACTURER, ACTUAL LOCATION OF MANUFACTURER AND MODEL NUMBER.
4. AN ON-SITE MEETING WITH THE DISTRICT INSPECTOR, CONSULTING ENGINEER, COUNTY INSPECTOR AND CONTRACTOR MUST BE HELD AT LEAST TWO (2) DAYS IN ADVANCE OF CONSTRUCTION TO INSPECT MATERIALS, SCHEDULE INSPECTIONS, REVIEW THE APPROVED WATER SYSTEM PLANS AND SCHEDULE ANY TIE-IN CONNECTIONS. PRE-CONSTRUCTION MEETINGS WILL NOT BE SCHEDULED UNTIL ALL DISTRICT COSTS AND FEES HAVE BEEN PAID IN FULL AS WELL AS SUBMITTALS OF ALL MATERIAL LISTS, GUARANTEE LETTERS, ENCROACHMENT/MAINTENANCE BONDS, FINAL SIGNED PLANS, REPRODUCIBLE PLANS AND ELECTRONIC FILE OF PROJECT.
5. NO WORK SHALL BEGIN UNTIL ITEMS IN GENERAL NOTES "3" & "4" ARE COMPLETED.
6. ALL WATER SYSTEM SHUTDOWNS SHALL BE MADE ONLY BY DISTRICT PERSONNEL. UNDER NO CIRCUMSTANCES SHALL ANYONE OTHER THAN THE DISTRICT OPEN OR CLOSE ANY VALVE IN THE DISTRICT SYSTEM. SHUTDOWNS FOR THE PURPOSE OF MAKING CONNECTIONS TO EXISTING MAINS MUST BE SCHEDULED AT LEAST THREE (3) DAYS IN ADVANCE, AND ARE ONLY PERMITTED ON TUESDAY, WEDNESDAY OR THURSDAY. THE HOURS OF THE SHUTDOWN SHALL BE DETERMINED BY THE DISTRICT. ALL CONNECTIONS WILL BE SUPERVISED AND CONTROLLED BY THE DISTRICT.
7. THE FINISH GRADE SHALL BE ESTABLISHED, STAKED AND MARKED AT EACH WATER SERVICE CONNECTION AND HYDRANT LOCATION. PERMANENT PROPERTY CORNER MARKERS SHALL BE PLACED BY A LICENSED CIVIL ENGINEER OR SURVEYOR.
8. A SEPARATE WATER SERVICE CONNECTION MUST BE INSTALLED FOR EACH LOT, PARCEL OR PREMISE, AND SHALL BE ONE INCH IN DIAMETER UNLESS OTHERWISE SPECIFIED ON THE APPROVED WATER PLAN. NO SERVICE SHALL BE PERMITTED WITHIN 20' OF A BLOW OFF ASSEMBLY.
9. THE COMPLETED WATER SYSTEM MUST BE DISINFECTED, HYDRO-TESTED AND FLUSHED.
10. NO WATER SERVICE WILL BE PROVIDED AND NO CONNECTIONS TO WATER SERVICE WILL BE PERMITTED UNTIL THE REQUIREMENTS FOR TEMPORARY WATER APPROVAL HAVE BEEN COMPLETED.
11. AT THE TIME OF FINAL ACCEPTANCE BY THE DISTRICT, THE COMPLETED WATER SYSTEM AND MAIN EXTENSIONS WITH ALL APPURTENANCES, APPARATUS, FITTINGS AND EQUIPMENT SHALL BECOME AND FOREVER REMAIN THE PROPERTY OF THE DISTRICT.
12. ALL EXISTING WATER SERVICES NOT REQUIRED FOR THIS PROJECT SHALL BE ABANDONED ACCORDING TO THE FOLLOWING. THE EXACT METHOD SHALL BE DETERMINED BY THE DISTRICT INSPECTOR.
    A. REMOVING SECTION OF PIPE AND REPLACING WITH A NEW SECTION.
    B. REMOVE CORPORATION STOP, SADDLE AND PLACE A FULL CIRCLE 20" WIDE, STAINLESS STEEL REPAIR BAND.
13. ALL BACKFLOW PREVENTION DEVICES SHALL BE TESTED BY CERTIFIED APPROVED COUNTY TESTERS PRIOR TO FINAL ACCEPTANCE. COPIES OF SATISFACTORY TEST RESULTS SHALL BE FURNISHED TO THE DISTRICT PRIOR TO FINAL ACCEPTANCE OF SYSTEM AT NO COST TO THE DISTRICT. WATER SERVICE SHALL NOT BE PROVIDED UNTIL DISTRICT RECEIVES THE SATISFACTORY TEST RESULTS.
14. UPGRADE OF EXISTING FACILITIES SHALL INCLUDE BUT NOT LIMITED TO BRINGING FACILITY TO CURRENT STANDARDS AND/OR REPLACEMENT AS REQUIRED OR DIRECTED BY THE DISTRICT.
15. A SEPARATE SAMPLING STATION AND/OR STATIONS SHALL BE INSTALLED AS NECESSARY TO MEET STATE DEPARTMENT OF HEALTH SERVICES REQUIREMENTS FOR COLIFORM TESTING.

UTILITY	REPRESENTATIVE	PHONE
GAS	PACIFIC GAS AND ELECTRIC – DEB MIERKE	916-386-5167
DRAINAGE	SAC. CO DRAINAGE O&M – TODD PETERSON	916-875-7164
TELEPHONE	AT&T – ASTRID WILLARD	916-453-6163
ELECTRICITY	SMUD DISTRIBUTION SERVICES – MICHELLE ZUNIGA	916-732-5726
WATER	SACRAMENTO SUBURBAN WATER DISTRICT – WARREN JUNG	916-972-7171
SEWER	SACRAMENTO AREA SEWER DISTRICT – MARSHALL CASTON	916-876-6100
FIRE DIST	SACRAMENTO METROPOLITAN FIRE DISTRICT – PLAN REVIEW	916-942-3300
TELEVISION	COMCAST CONSTRUCTION COORDINATOR – STEVE ABELIA	916-830-6757
FIBER OPTIC	SUREWEST BROADBAND – CONSTRUCTION	888-946-3477
U.P. PIPELINE	UNION PACIFIC RAILROAD (CALL BEFORE YOU DIG)	800-336-9193
U.S.A.	CALL BEFORE YOU DIG	800-227-2600

SHEET INDEX

LEGENDS

DESCRIPTION	EXISTING	PROPOSED
CURB, GUTTER & SIDEWALK		
SANITARY SEWER	SS	
SANITARY SEWER MANHOLE	SS (S) SS	
STORM DRAIN MANHOLE	SD (D) SD	
STORM DRAIN	SD SD SD	
STORM DRAIN DROP INLET	SD SD	
WATER MAIN		
CHECK VALVE		
FLEXIBLE COUPLING		
UNION		
VALVE		
REDUCER		
BLOW OFF		
AIR RELEASE VALVE		
METERED FIRE SPRINKLER SERVICE		
WATER SERVICE		
WATER METER		
WATER METER W/ BACKFLOW DEVICE		
FIRE HYDRANT		
GAS	GAS GAS	
UNDERGROUND ELECTRIC	E E	
UNDERGROUND CABLE	UC UC	
UNDERGROUND PHONE	PH PH	
UNDERGROUND FIBER OPTIC	FO FO	

SACRAMENTO SUBURBAN WATER DISTRICT

APPROVED FOR CONSTRUCTION OF WATER SYSTEM:

BY _____ DATE _____

NOTE: THIS PLAN EXPIRES ONE YEAR FROM APPROVAL

NUMBER	DATE	DESCRIPTION	BY
8			
7			
6			
5			
4			
3			
2			
1			

REVISION BLK.

DRAWN BY: D.A.V. DESIGNED BY: D.A.V.
CHECKED BY: W.J.
SCALE: AS SHOWN
COMP. FILE NAME: DATE: 12/15/10
F.B. REF. PLOT DATE:

SACRAMENTO SUBURBAN WATER DISTRICT
3701 MARCONI AVENUE – SUITE 100
SACRAMENTO, CA 95821-5346
(916) 972-7171

PREPARED UNDER THE DIRECTION OF:

WARREN JUNG, P.E.

C33167 DATE _____
EXP.: 6/30/12

Sacramento Suburban Water District

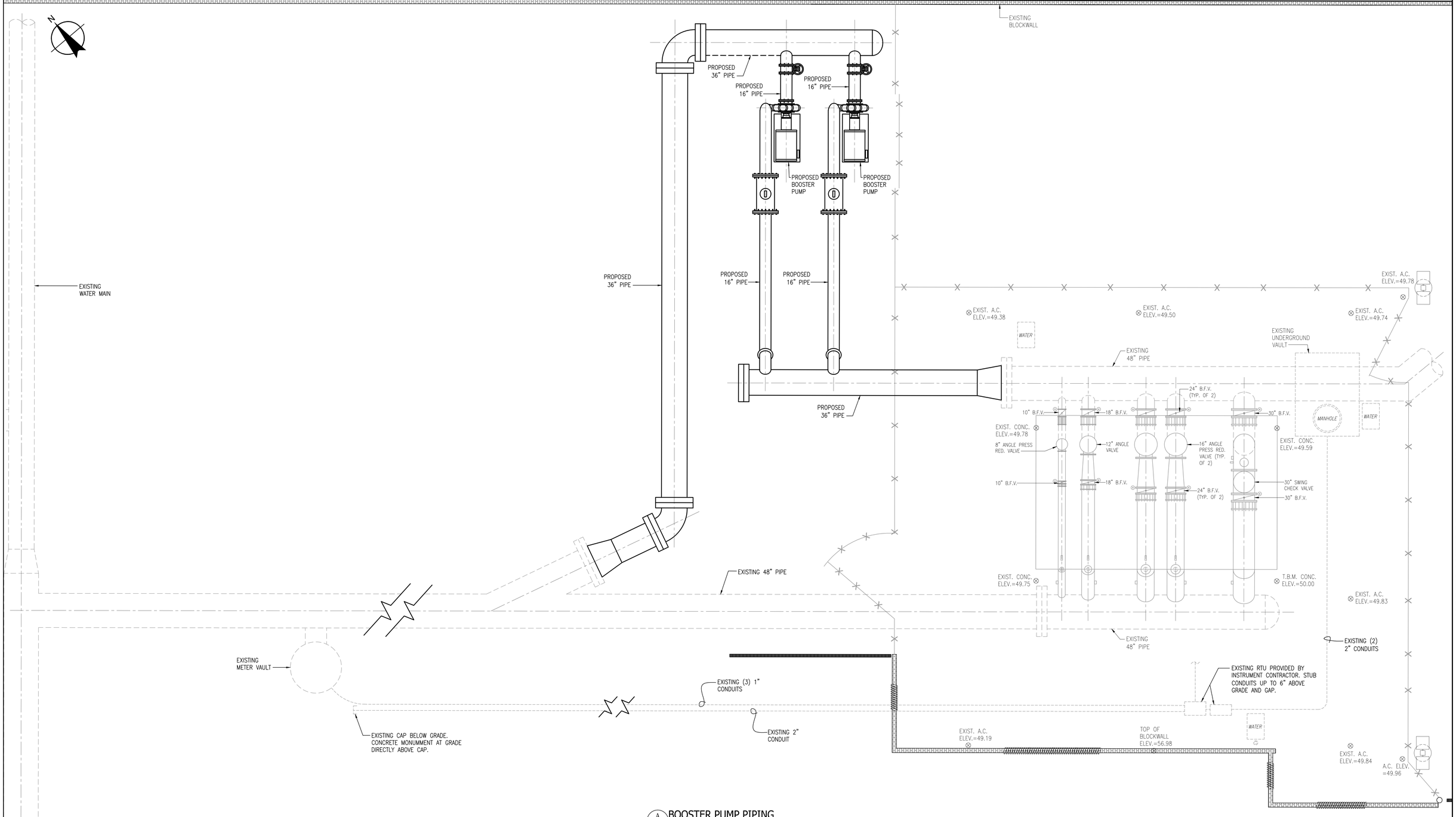
North Antelope Booster Pump Station

SHEET INDEX, VICINITY MAP & LEGEND

SHEET 1 OF 2

JOB NO.

NORTH ANTELOPE BOOSTER PUMP - 10% CONCEPTION PLAN



A/2 BOOSTER PUMP PIPING
1" = 60'

NORTH ANTELOPE BOOSTER PUMP - 10% CONCEPTION PLAN

NUMBER	DATE	DESCRIPTION	BY
8			
7			
6			
5			
4			
3			
2			
1			

REVISION BLK.

DRAWN BY: D.A.V. | DESIGNED BY: D.A.V.
CHECKED BY: W.J.
SCALE: AS SHOWN
COMP. FILE NAME: | DATE: 12/15/10
F.B. REF. | PLOT DATE:

SACRAMENTO SUBURBAN WATER DISTRICT
3701 MARCONI AVENUE – SUITE 100
SACRAMENTO, CA 95821-5346
(916) 972-7171

PREPARED UNDER THE DIRECTION OF:
WARREN JUNG, P.E.
C33167 DATE
EXP.: 6/30/12

Sacramento Suburban Water District
North Antelope Booster Pump Station
Booster Pump Piping

SHEET 2 / 2 OF
JOB NO.

Preliminary Pump Station Site Evaluation Technical Memorandum

BROWN AND CALDWELL

Technical Memorandum

10540 White Rock Road, Suite 180
Rancho Cordova, California, 95670
Tel: 916-444-0123 phone
Fax: 916-635-8805 fax

Prepared for: City of Folsom

Project Title: Folsom/Sacramento Suburban Water Transfer Project

Project No: 131097-006

Technical Memorandum No. 1

Subject: Preliminary Pump Station Site Evaluation

Date: June 19, 2009

To: Walt Sadler, City of Folsom

From: Jeff Lawrence, P.E., Brown and Caldwell

Prepared by: _____

Christina Brown, P.E., Project Engineer

_____

David Morrow, P.E., Project Engineer

Reviewed by: _____

Jeff Lawrence, P.E., Project Manager

1. INTRODUCTION

The City of Folsom (City) receives all of its drinking water from Folsom Lake. Water drawn from the lake is conveyed to the City's water treatment plant and then distributed to customers throughout the City. The City has the water rights to 34,000 acre-feet per year (afy) from Folsom Lake, as well as an additional 700 afy provided through the San Juan Water District [1]. The City is currently investigating water transfer alternatives with the Sacramento Suburban Water District (SSWD) to provide additional water supply during dry years.

1.1 Background Information

There are two dry year water supply alternatives being considered by the City. They both involve the transfer of water from the SSWD to another water purveyor. That water purveyor would then use less water from Folsom Lake thereby making more water available to the City. Figure 1 provides the two alternative site locations.

- Alternative 1 – New Booster Pump Station from SSWD North Service Area (NSA) to San Juan Water District (SJWD) Family of Agencies.
- Alternative 2 – New Booster Pump Station from SSWD NSA to the City of Roseville to serve the California American Water Company West Placer Service Area.

Alternative 1 – San Juan Water District

Brown and Caldwell (BC) previously presented two pump station location options to the City and SSWD for Alternative 1 [2]. The first option (Antelope Site) involved siting the pump station at the existing SSWD pressure reducing valve (PRV) station located along Antelope North Road. The second option (Verner Site) involved siting the pump station closer to the Citrus Heights Water District (CHWD) Verner Zone.

Water distribution system modeling was performed to determine the effects of the proposed pumping on the SSWD NSA for both the Antelope and Verner Sites. Modeling indicated that siting the booster pump station at the Verner Site created a 10 to 19 psi drop in pressure throughout the SSWD NSA south of Interstate-80 (I-80), and a 4 to 9 psi drop north of I-80. If the pump station is located at the Antelope Site, modeling indicates only a 6 to 9 psi pressure throughout the SSWD NSA. Because there is less pressure drop if the pump station is located at the Antelope Site, this was selected as the preferred location for Alternative 1.

Alternative 2 – City of Roseville

The pump station for Alternative 2 would be sited at the existing City of Roseville metering station. This site is located along Antelope North Road in Placer County. The southern boundary of the site is the Placer County/Sacramento County line.

1.2 Purpose

The purpose of this technical memorandum (TM) is to provide a preliminary evaluation of the two pump station site alternatives. A description of the general design assumptions, proposed facility locations, and preliminary design components are provided in the body of this TM.

2. PRELIMINARY DESIGN ASSUMPTIONS

The following provides the design assumptions used to prepare preliminary site layouts for each pump station site alternative for the purpose of preparing a preliminary cost estimate for each alternative. A preliminary pump station layout is provided in Figure 2.

- Design flow of 4,200 gpm (design head 25 psi)
- Abovegrade piping will be 12-inch
- Required pump station area is 10 feet by 20 feet (assuming two pumps will be installed)
- Abovegrade appurtenances include check valves, isolation valves, air release valves (ARV), and flange coupling adaptors (FCA)

3. PRELIMINARY SITE LAYOUTS

Based on the preliminary design assumptions presented in Section 2, potential site layouts were developed for each location alternative.

3.1 San Juan Water District - North Antelope PRV Station

The North Antelope PRV station is located immediately east of the SSWD Water Efficiency Landscape (WEL) Gardens. The PRV station is comprised of four PRVs and one bypass line. All of the PRV station piping and valves are located abovegrade. There are radio antennae and abovegrade electrical panels at the site as well. Record drawings for the PRV station are provided in Appendix A.

The PRV area (approximately 55 feet by 55 feet) is fenced (chain link with privacy slats) within a larger concrete block fenced area. This larger area around the PRV station is used for storage of portable generators, pipe, tanks, etc. The entire area has asphalt pavement.

Figure 3 provides a preliminary site layout for installation of a pump station at this site. There appears to be adequate space to accommodate the required pumps, piping, and appurtenances, as well as layout space for construction. The existing access gate for the PRV site is located along the northwesterly side of the fenced area. This may need to be relocated based on the final pump station layout and requirements for maintenance access to the existing PRV station equipment.

3.2 City of Roseville - Metering Station

The City of Roseville metering station is located adjacent to a Sacramento Area Sewer District (SASD) lift station, also along Antelope North Road. The site is on the west side of the road, immediately north of the Placer County/Sacramento County line. The site is located at the southeasterly corner of a large, undeveloped property, and measures approximately 36 feet by 51 feet. The perimeter fencing is chain link with privacy slats. Design drawings for the metering station are provided in Appendix B.

The existing metering station is comprised of both abovegrade and belowgrade equipment. Abovegrade equipment includes two radio antennae, electrical panels, a fire hydrant, and flow meter instrumentation. Belowgrade improvements include piping, valves, and a 20-inch flow meter inside a 72-inch manhole. The site is not paved.

Figure 4 provides a preliminary site layout for installation of a pump station at this site. There appears to be adequate space to accommodate the required pumps, piping, and appurtenances. However, there will be little area remaining for operation and maintenance access. If this site is selected, consideration should be given to expanding the existing fenced area. It is unknown if the adjacent land is owned by the City of Roseville, and whether or not it is currently zoned for this land use.

4. CONSTRUCTION COST ESTIMATE

The pump station layout for each site alternative is essentially the same. Therefore, the engineer's opinions of probable construction costs for each site are similar. The primary cost difference between the alternative estimates is due to the required piping necessary to connect the pump station to the existing local infrastructure. The engineer's opinion of probable construction costs for both selected alternatives are found in Table 1. The complete cost estimate is provided in Appendix C.

Table 4-1. Engineer's Opinion of Probable Costs

Alternative	Description	Cost Estimate
1	SJWD North Antelope PRV Station	$355,000
2	City of Roseville Metering Station	$365,000

Note: Estimated costs rounded up to the nearest $5,000.

If this project is pursued further and a site is selected, a more detailed cost estimate can be prepared as part of the design phase. The following summarizes the assumptions used to prepare the preliminary construction cost estimate.

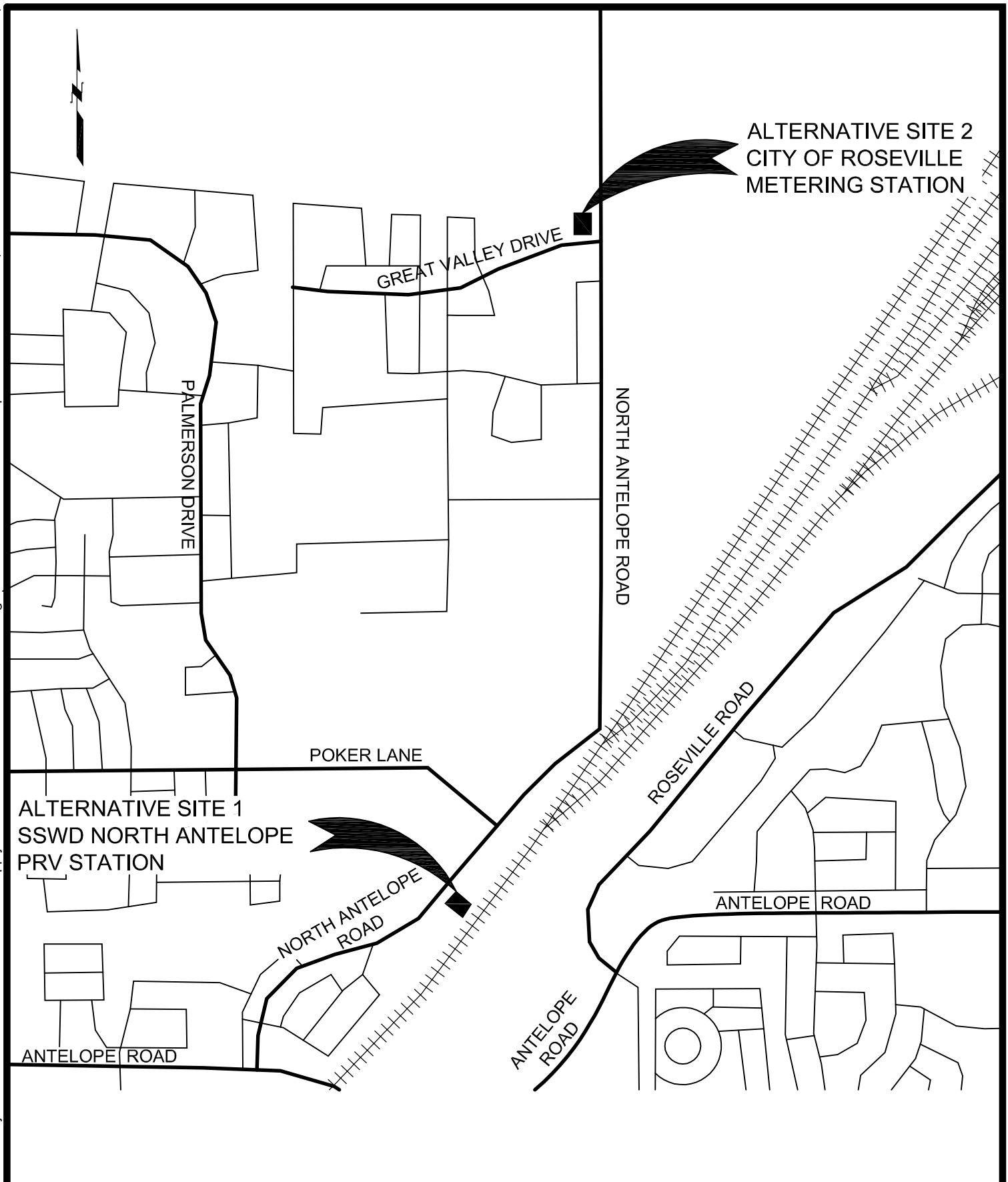
- Construction is anticipated in 2010.
- Each site appears to have adequate laydown and staging areas immediately adjacent to or nearby the site. Therefore, it is not anticipated that roads will need to be closed for construction at most sites. Minimal traffic control is included in the cost estimate to account for trucks entering and leaving the roadway to deliver equipment and materials as needed.
- These costs are preliminary estimates and should only be used at a planning level. A contingency of 20 percent is included in each estimate.

5. REFERENCES

[1] *Water Master Plan Update*, May 2008, prepared by West Yost Associates.

[2] Presentation to City of Folsom and SSWD, 2009, presented by Jeff Lawrence.

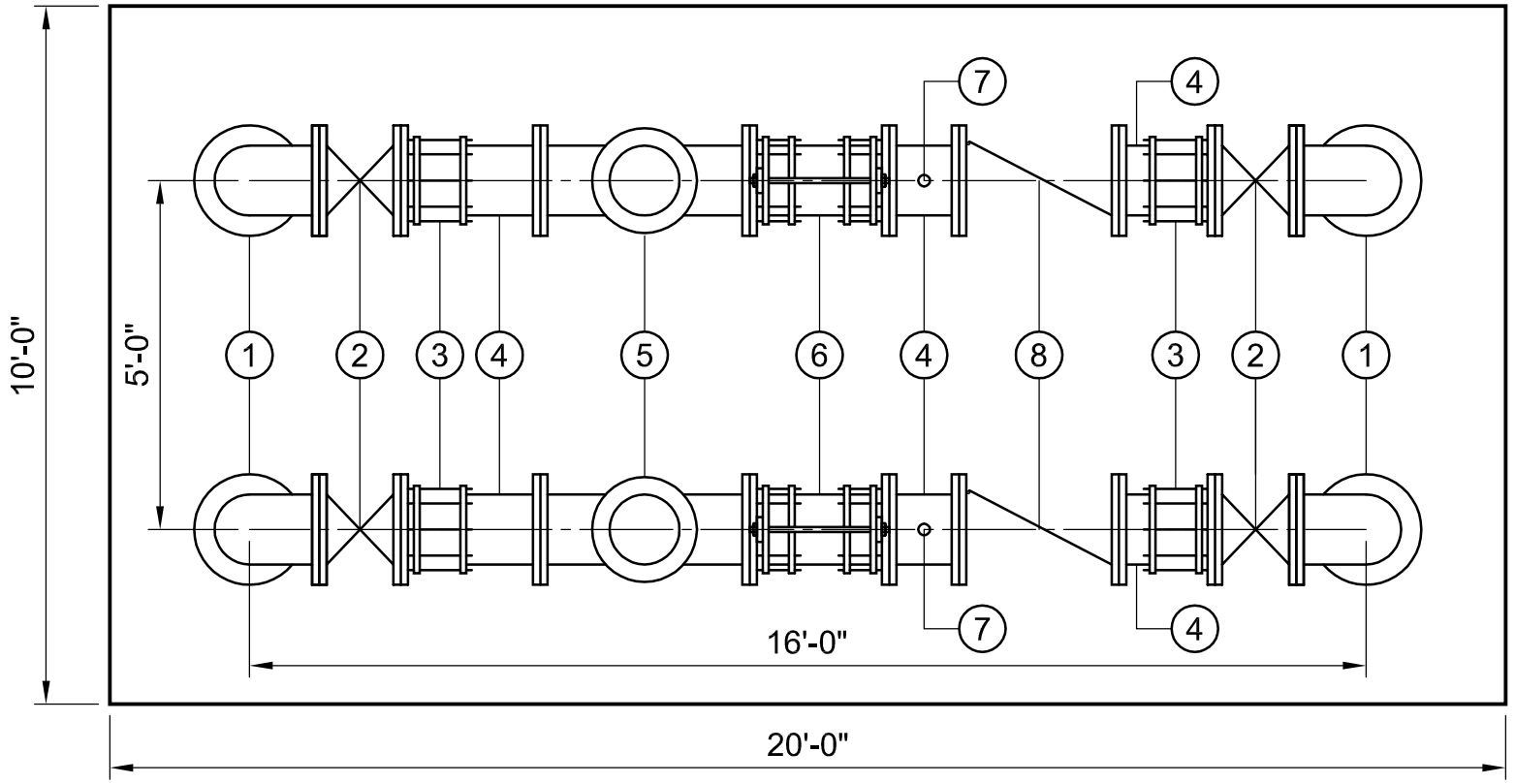
FIGURES



BROWN AND CALDWELL	SCALE: AS SHOWN JOB NUMBER: 131097 DATE: June 18, 2009	PUMP STATION ALTERNATIVE SITE LOCATIONS	FIGURE 1

LEGEND:

1. 12" 90° ELBOW
2. 12" ISOLATION GATE VALVE
3. 12" FLEXIBLE COUPLING ADAPTER
4. 12" SPOOL
5. 2,100 GPM PUMP MOTOR
6. 12" PUMP CONNECTOR
7. 2" AIR RELEASE VALVE
8. 12" CHECK VALVE



BROWN AND CALDWELL

SCALE: 3/8" = 1'-0"
JOB NUMBER: 131097
DATE: June 18, 2009

PRELIMINARY PUMP STATION LAYOUT

FIGURE
2

BROWN AND CALDWELL

SCALE: 1" = 30'
JOB NUMBER: 131097
DATE: June 19, 2009

ALTERNATIVE 1 SJWD NORTH ANTELOPE PRV STATION

FIGURE
3

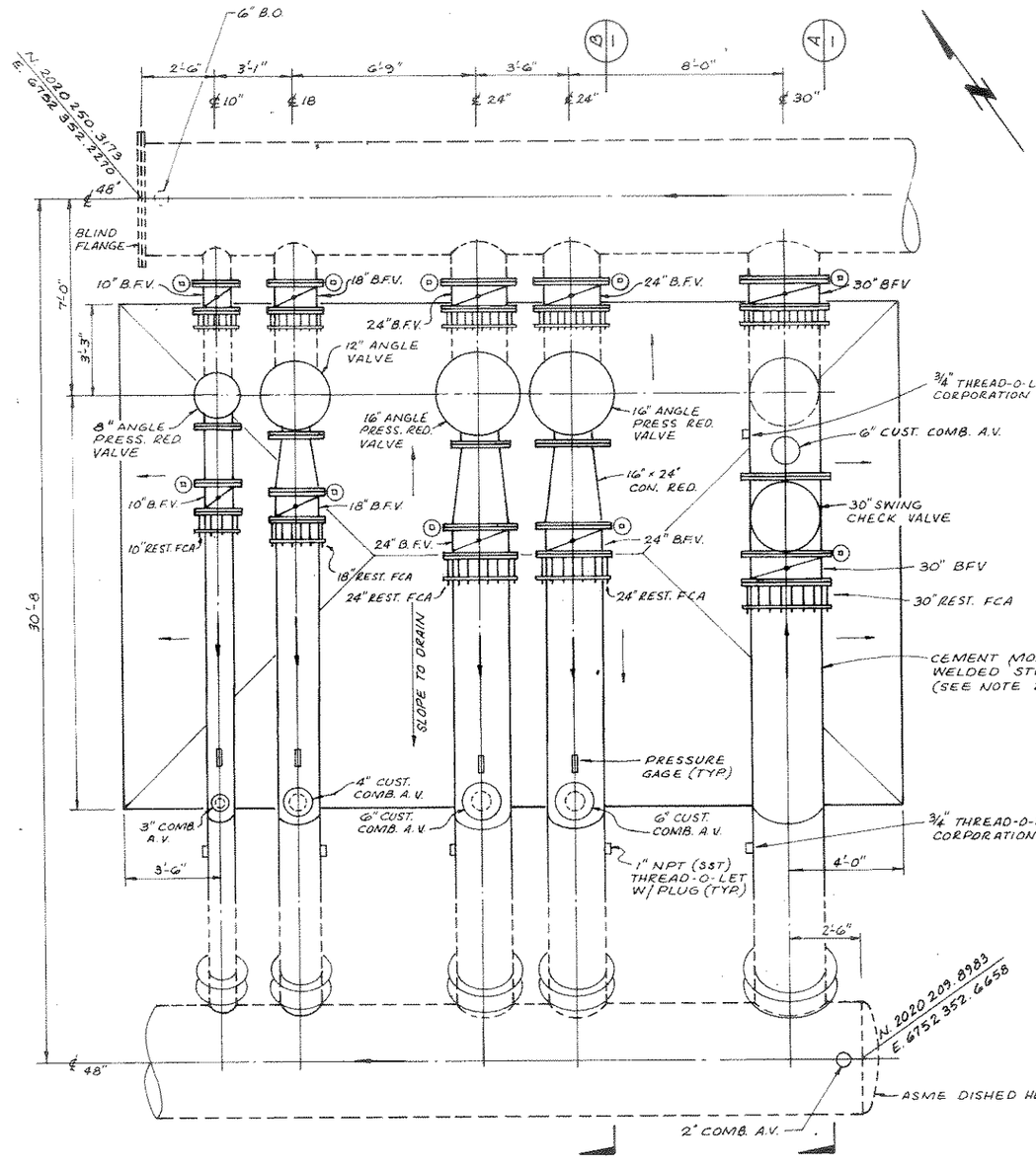
BROWN AND CALDWELL

SCALE: 1" = 30'
JOB NUMBER: 131097
DATE: June 19, 2009

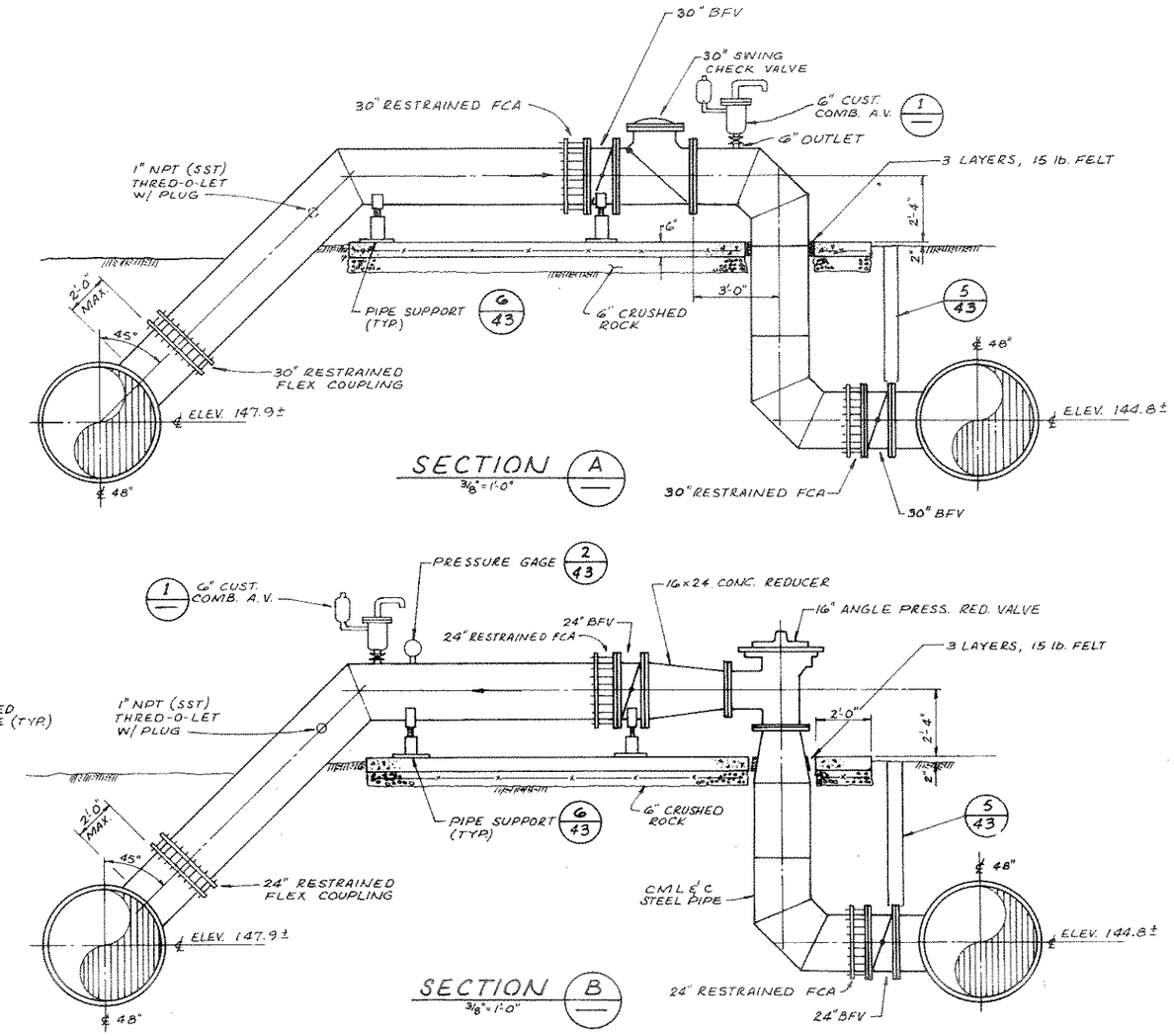
ALTERNATIVE 2 CITY OF ROSEVILLE METERING STATION

FIGURE
4

APPENDIX A: RECORD DRAWINGS FOR THE PRV STATION

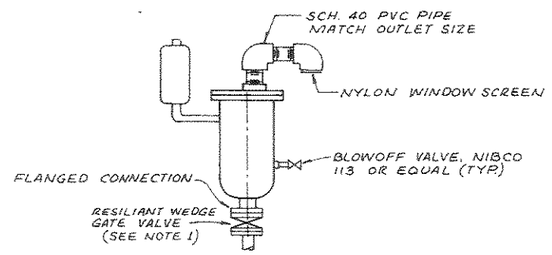


PLAN
3/8" = 1'-0"



SECTION A
3/8" = 1'-0"

SECTION B
3/8" = 1'-0"



CUSTOM COMBINATION AIR VALVE DETAIL 1
N.T.S.

NOTE:
1. G'RWGV MUST BE IN THE OPEN POSITION DURING & AFTER PRESSURE TESTING OF PIPE.
2. DESIGN PIPE THICKNESSES & COATINGS IN ACCORDANCE WITH CONTRACT SPECIFICATIONS.

RECORD DRAWING

THIS IS A RECORD DRAWING OF THE FACILITIES IDENTIFIED IN THE TITLE BLOCK ONLY AND HAS BEEN PREPARED IN PART ON THE BASIS OF INFORMATION COMPILED AND FURNISHED BY OTHERS. THE ENGINEER/ ARCHITECT AND OWNER(S) WILL NOT BE RESPONSIBLE FOR ANY ERROR(S) OR OMISSION(S) WHICH HAVE BEEN INCORPORATED INTO THIS DRAWING. ACTUAL CONDITIONS WILL VARY SOMEWHAT FROM THE CONDITIONS SHOWN HEREON AND AT SOME LOCATIONS THE VARIANCE MAY BE LARGE. IF THE PRECISE LOCATION OF ANY FACILITY IS REQUIRED, THE FACILITY SHOULD BE FIELD LOCATED IN THE PRESENCE OF AN EMPLOYEE OF THE RESPECTIVE OWNER(S) OF THE UTILITIES INVOLVED.

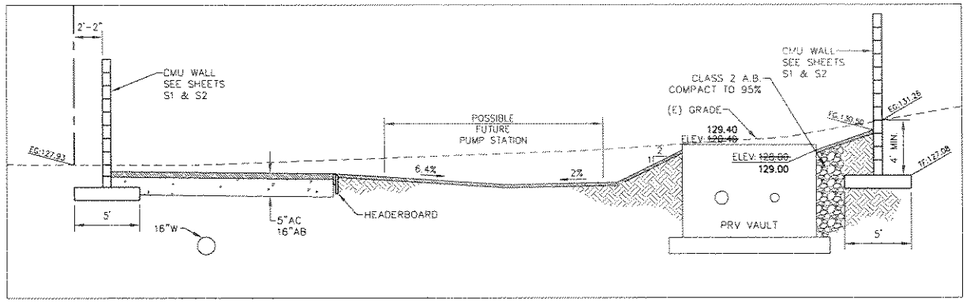
APPROVAL	DATE	DESIGN BY S.T.L.	REV	DATE	DESCRIPTION	APP
APPROVAL	DATE	DRAWN BY E.F.W.				
APPROVAL	DATE	DATE				

Boyle Engineering Corporation

NORTHRIDGE WATER DISTRICT
CONVEYANCE PIPELINE
ANTELOPE NORTH RD. PRESSURE REDUCING STATION

SHEET 46 OF 88 SHEETS
DRAWING NO. S-133

APPENDIX B: DESIGN DRAWINGS FOR THE METERING STATION



SECTION (B/19)
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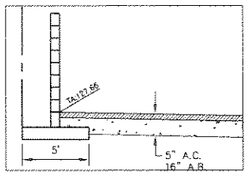

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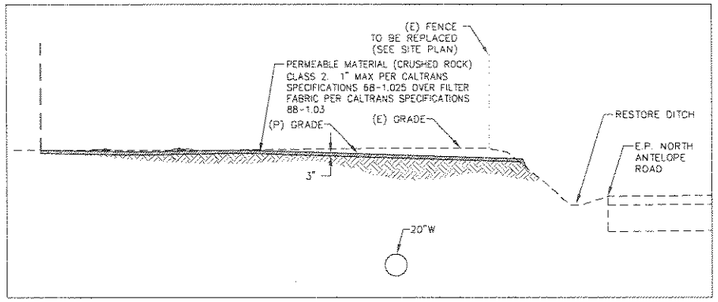

SECTION (C/19)
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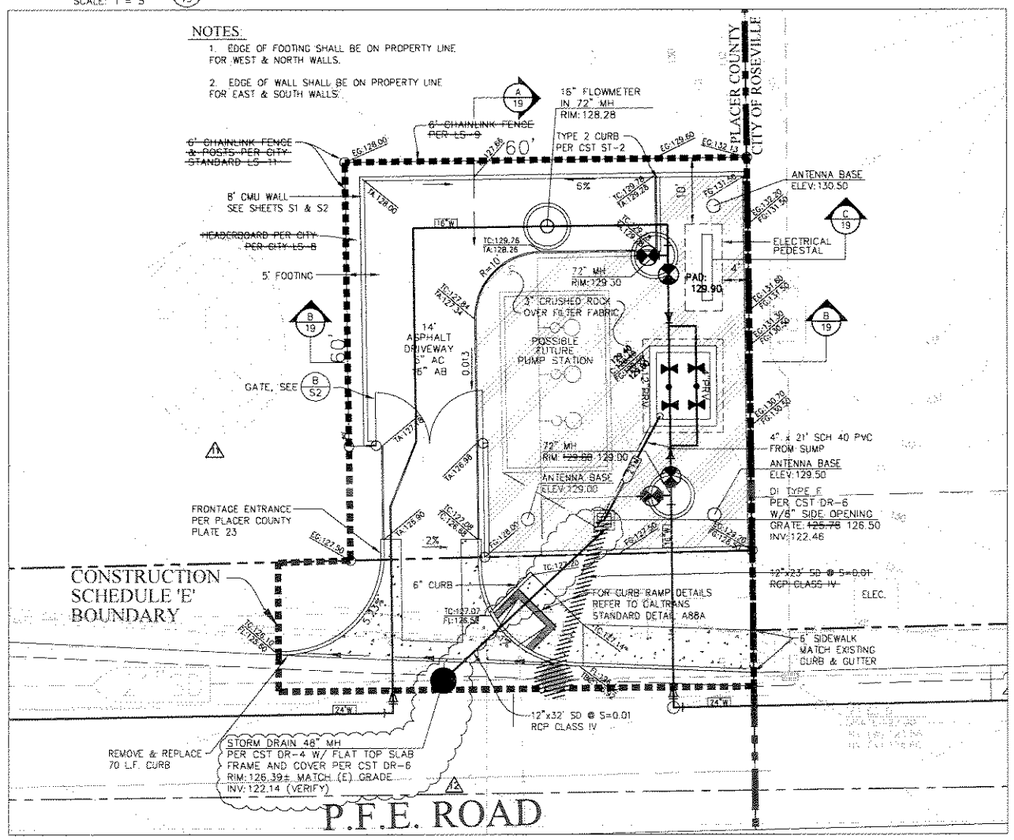
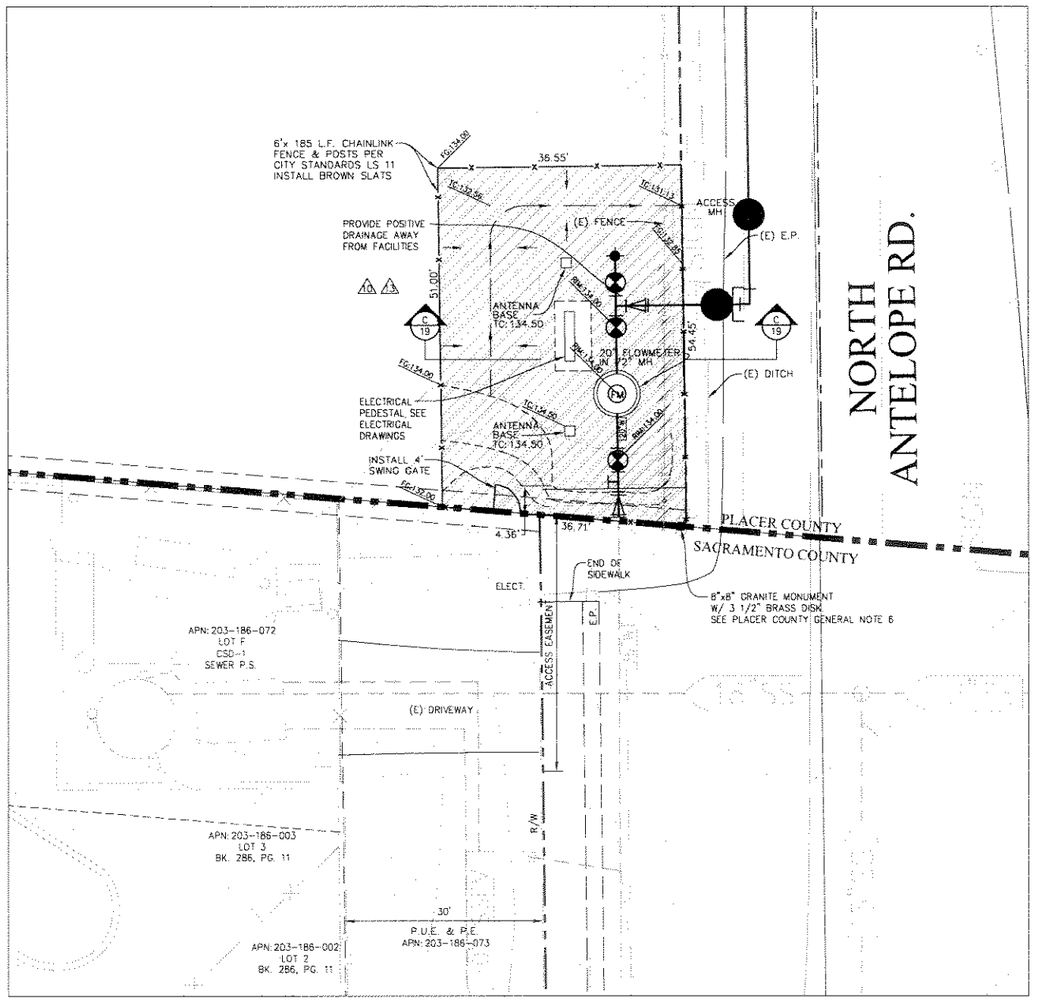


PFE RD. PRESSURE REDUCING STATION & FLOWMETER STATION
SCALE: 1"= 10'
SEE SHEET 20 FOR MECHANICAL LAYOUT



NORTH ANTELOPE RD. FLOWMETER STATION
SCALE: 1"= 10'
SEE SHEET 22 FOR MECHANICAL LAYOUT

RECORD DRAWING
ENG. INITIAL
DATE

REGISTERED PROFESSIONAL ENGINEER — ERWIN N. BENEDICTO — NO. Z5169 Exp. 12-31-05 — CIVIL — STATE OF CALIFORNIA

REV.	DATE	BY	APPR.	DESCRIPTION
1	1/11/07	C.R.		REVISE NORTH ANTELOPE ROAD FLOW METER STATION SITE LAYOUT.
2	12/1/06	C.R.		REVISE STORM DRAIN PIPE CONNECTION.
1	9/05/06	C.R.		REVISE NORTH ANTELOPE ROAD FLOW METER STATION SITE LAYOUT.

DESIGNED BY: C.R.M.
DRAWN BY: M.H.M.
CHECKED BY: O.N.B.
JOB NO.: 01436
FILE NAME: 01436L12

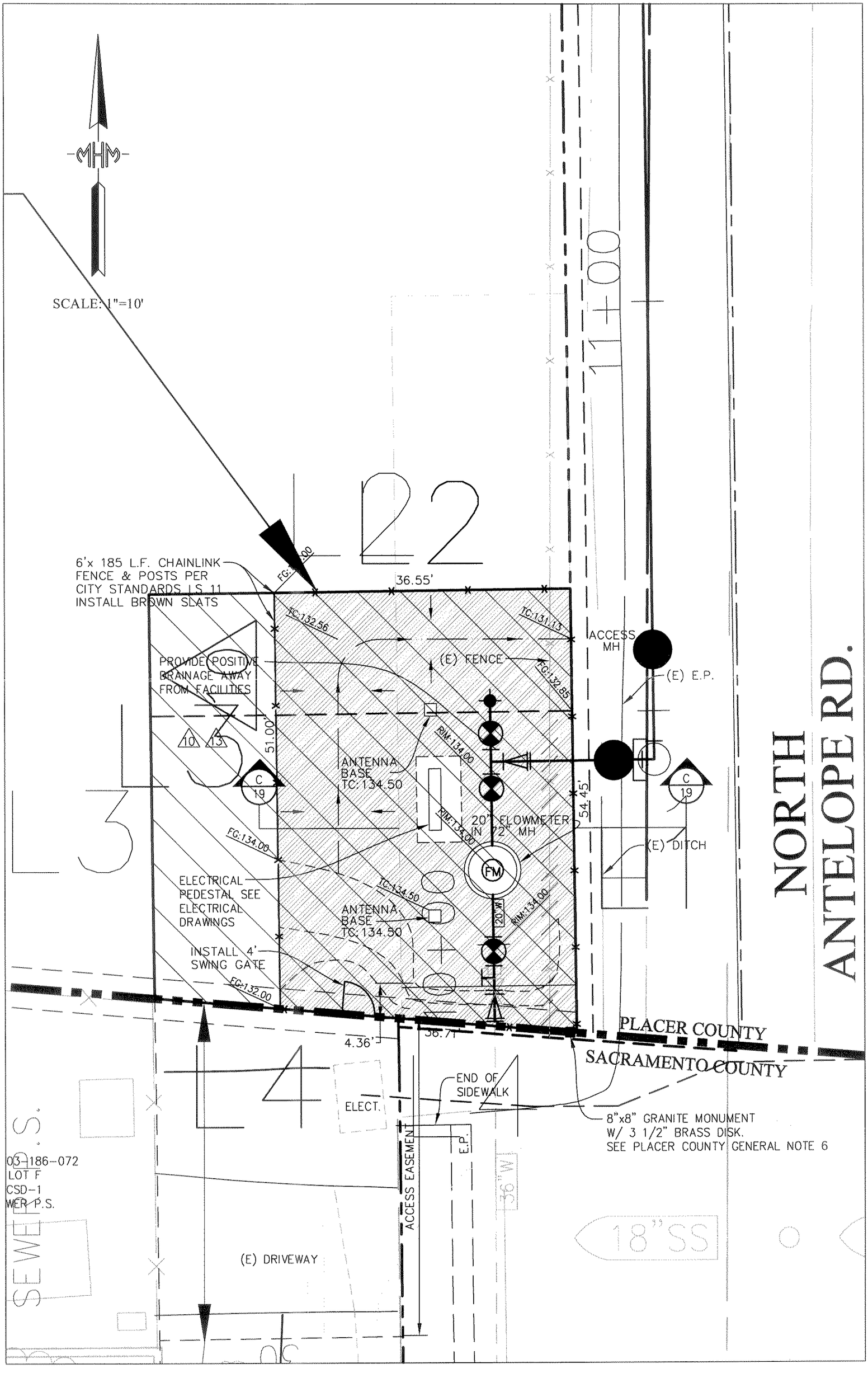
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING
0 1"
IF NOT ONE INCH ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

M·H·M
ENGINEERS & SURVEYORS SINCE 1892
ENGINEERING-SURVEYING
735 SUNRISE AVENUE, Ste. 220
ROSEVILLE, CALIFORNIA 95661
Ph:(916)783-4100 Fax(916)783-4110

ANTELOPE / PFE PIPELINE PROJECT
ROSEVILLE, CA

PFE RD. PRS & FLOWMETER STATION
NORTH ANTELOPE FLOWMETER STATION
SITE PLAN

PLAN SCALE: 1"=10'
PROFILE SCALE: N/A
DATE: 2/25/05
DWG. NO. L13
SHEET 19


SCALE: 1"=10'
6'x 185 L.F. CHAINLINK FENCE & POSTS PER CITY STANDARDS LS 11 INSTALL BROWN SLATS
PROVIDE POSITIVE DRAINAGE AWAY FROM FACILITIES
ELECTRICAL PEDESTAL SEE ELECTRICAL DRAWINGS
INSTALL 4' SWING GATE
ANTENNA BASE TC: 134.50
ANTENNA BASE TC: 134.50
20' FLOWMETER IN 72" MH
(E) FENCE
(E) E.P.
(E) DITCH
ACCESS MH
END OF SIDEWALK
ELECT.
ACCESS EASEMENT
E.P.
(E) DRIVEWAY
8"x8" GRANITE MONUMENT W/ 3 1/2" BRASS DISK. SEE PLACER COUNTY GENERAL NOTE 6
PLACER COUNTY
SACRAMENTO COUNTY
NORTH ANTELOPE RD.
03-186-072
LOT F
CSD-1
WER P.S.
SEWER
18"SS
36"W
L2
L3
L4
11+00
36.55'
51.00'
54.45'
4.36'
36.71'
TC:132.56
TC:131.13
FG:132.85
FG:134.00
FG:132.00
RIM:134.00
TC:134.50
20'W
FM
C 19
10
13

NORTH

ROPOSED
ASEMENT

L2

L3

L4

6'x 185 L.F. CHAINLINK FENCE & POSTS PER CITY STANDARDS LS 11 INSTALL BROWN SLATS

PROVIDE POSITIVE DRAINAGE AWAY FROM FACILITIES

(E) XENCE

ACCESS MH

(E) E.P.

ANTENNA BASE TC:134.50

20' FLOWMETER 12" MH

(E) DITCH

ELECTRICAL PEDESTAL, SEE ELECTRICAL DRAWINGS

INSTALL 4' SWING GATE

36.55'

36.71'

4.36'

51.00'

54.45'

NORTH ANTELOPE RD.

PLACER COUNTY

SACRAMENTO COUNTY

END OF SIDEWALK

ELECT.

8"x8" GRANITE MONUMENT W/ 3 1/2" BRASS DISK SEE PLACER COUNTY GENERAL NOTE 6

APN: 203-186-072
LOT F
CSD-1
SEWER P.S.

ACCESS EASEMENT

(E) DRIVEWAY

R/W

APN: 203-186-003
LOT 3
BK. 286, PG. 11

30'
P.U.E. & P.E.
APN: 203-186-073

APN: 203-186-002
LOT 2
BK. 286, PG. 11

NORTH ANTELOPE RD. FLOWMETER STATION

SCALE: 1" = 10'

SEE SHEET 22 FOR MECHANICAL LAYOUT

RECORD DRAWING
ENG. INITIAL
DATE

REGISTERED PROFESSIONAL ENGINEER
ERIN N. BERNEY
NO. 25158
Exp. 12-31-05
STATE OF CALIFORNIA
CIVIL

REV.	DATE	BY	APPR.	DESCRIPTION

DESIGNED BY: C.R.M.
DRAWN BY: M.H.M.
CHECKED BY: O.N.B.
JOB NO.: 01436
FILE NAME: 01436L12

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

M·H·M
ENGINEERS & SURVEYORS SINCE 1892
ENGINEERING-SURVEYING
735 SUNRISE AVENUE, Ste. 220
ROSEVILLE, CALIFORNIA 95661
Ph(916)783-4100 Fax(916)783-4110

ANTELOPE / PFE PIPELINE PROJECT
ROSEVILLE, CA

PFE RD. PRS & FLOWMETER STATION
NORTH ANTELOPE FLOWMETER STATION
SITE PLAN

PLAN SCALE: 1"=10'
PROFILE SCALE: N/A
DATE: 2/25/05
DWG. NO. L13
SHEET 19

APPENDIX C: COST ESTIMATE

MEMORANDUM

1017-131097-006

June 18, 2009

TO: JEFF LAWRENCE, SACRAMENTO
CHRISTINA BROWN, SACRAMENTO

FROM: DAN GOODBURN, PARKER

SUBJECT: FOLSOM/SACRAMENTO SUBURBAN WATER TRANSFER PROJECT
CONCEPTUAL DESIGN
BASIS OF ESTIMATE OF PROBABLE CONSTRUCTION COST

The Basis of Estimate Report for the subject project is attached. Please call me if you have questions or need additional information.

DLG:ua

Attachments
Summary Estimate
Detailed Estimate

cc: J. L. Matthews, Jacksonville
Dave Morrow, Sacramento

BASIS OF ESTIMATE REPORT

FOLSOM/SACRAMENTO SUBURBAN WATER TRANSFER PROJECT

Introduction

Brown and Caldwell (BC) is pleased to present this estimate of probable construction cost (estimate) prepared for the Folsom/Sacramento Suburban Water Transfer Project, Sacramento, California.

Summary

This Basis of Estimate contains the following information:

- Scope of work
- Background of this estimate
- Class of estimate
- Estimating methodology
- Direct cost development
- Indirect cost development
- Bidding assumptions
- Estimating assumptions
- Estimating exclusions
- Allowances for known but undefined work
- Contractor and other estimate markups

Scope of Work

This project is the construction of a water transfer pump station to transfer water from the Sacramento Suburban Water District North Service Area to either the San Juan Water District (alternative no. 1) or to the City of Roseville (alternative no. 2). Both alternatives require two 2100 gpm pumps and above grade piping that ties into an existing 24-inch distribution line. The City is evaluating both alternatives, however, at this conceptual design level, one cost estimate covers both alternatives.

Background of this Estimate

The attached estimate of probable construction cost is based on documents dated June, 2009, received by the Estimating and Scheduling Group. These documents are described as conceptual based on the current project progression, additional or updated scope and/or quantities, and ongoing discussions with the project team. Further information can be found in the detailed estimate reports.

Class of Estimate

In accordance with the Association for the Advancement of Cost Engineering International (AACE) criteria, this is a Class 4 estimate. A Class 4 estimate is defined as a Planning Level or Design Technical Feasibility Estimate. Typically, engineering is from 1 percent to 15 percent complete. Class 4 estimates are used to prepare planning level cost scopes or to evaluate alternatives in design conditions and form the base work for the Class 3 Project Budget or Funding Estimate.

Expected accuracy for Class 4 estimates typically range from -30 percent to +50 percent, depending on the technological complexity of the project, appropriate reference information, and the inclusion of an appropriate contingency determination. In unusual circumstances, ranges could exceed those shown.

Estimating Methodology

This estimate was prepared using quantity take-offs, vendor quotes, and equipment pricing furnished either by the project team or by the estimator. The estimate includes direct labor costs, including a shift differential if applicable, and anticipated productivity adjustments to labor, and equipment. Where possible, estimates for work anticipated to be performed by specialty subcontractors have been identified.

Construction labor crew and equipment hours were calculated from production rates contained in documents and electronic databases published by R.S. Means, Mechanical Contractors Association (MCA), National Electrical Contractors Association (NECA), and Rental Rate Blue Book for Construction Equipment (Blue Book).

This estimate was prepared using BC's estimating system, which consists of a Windows-based commercial estimating software engine using BC's material and labor database, historical project data, the latest vendor and material cost information, and other costs specific to the project locale.

Direct Cost Development

Costs associated with the General Provisions and the Special Provisions of the construction documents, which are collectively referred to as Contractor General Conditions (CGC), were based on the estimator's interpretation of the contract documents. The estimates for CGCs are divided into two groups: a time-related group (e.g., field personnel), and non-time-related group (e.g., bonds and insurance). Labor burdens such as health and welfare, vacation, union benefits, payroll taxes, and workers compensation insurance are included in the labor rates. No trade discounts were considered.

Indirect Cost Development

Local sales tax has been applied to material and equipment rentals. A percentage allowance for contractor's home office expense has been included in the overall rate markups. The rate is standard for this type of heavy construction and is based on typical percentages outlined in Means Heavy Construction Cost Data, 2009.

The contractor's cost for builders risk, general liability, and vehicle insurance has been included in this estimate. Based on historical data, this is typically two to four percent of the overall construction contract amount. These indirect costs have been included in this estimate as a percentage of the gross cost, and are added to the net totals after the net markups have been applied to the appropriate items.

Bidding Assumptions

The following bidding assumptions were considered in the development of this estimate.

1. Bidders must hold a valid, current Contractor's credentials, applicable to the type of project.
2. Bidders will develop estimates with a competitive approach to material pricing and labor productivity, and will not include allowances for changes, extra work, unforeseen conditions, or any other unplanned costs.
3. Estimated costs are based on a minimum of four bidders. Actual bid prices may increase for fewer bidders or decrease for a greater number of bidders.

4. Bidders will account for General Provisions and Special Provisions of the contract documents and will perform all work except that which will be performed by traditional specialty subcontractors as identified here:
   - Electrical
   - Painting

Estimating Assumptions

As the design progresses through different completion stages, it is customary for the estimator to make assumptions to account for details that may not be evident from the documents. The following assumptions were used in the development of this estimate.

1. Contractor performs the work during normal daylight hours, nominally 7 a.m. to 5 p.m., Monday through Friday, in an 8-hour shift. No allowance has been made for additional shift work or weekend work.
2. Contractor has complete access for lay-down areas and mobile equipment.
3. Equipment rental rates are based on verifiable pricing from the local project area rental yards, Blue Book rates, and/or rates contained in the estimating database.
4. Contractor markup is based on conventionally accepted values that have been adjusted for project-area economic factors.
5. Major equipment costs are based on both vendor supplied price quotes obtained by the project design team and/or estimators, and on historical pricing of like equipment. Vendor quotes were not received for the pumps.
6. Process equipment vendor training using vendors' standard Operations and Maintenance (O&M) material, is included in the purchase price of major equipment items where so stated in that quotation.
7. Bulk material quantities are based on manual quantity take-offs.
8. There is sufficient electrical power to feed the specified equipment. The local power company will supply power and transformers suitable for this facility.
9. Soils are of adequate nature to support the structures. No piles have been included in this estimate.
10. Depth of cover on existing distribution line is 5 feet.
11. Site restoration at alternative site no. 2 is 6-in. gravel. Asphalt paving is not included.

Estimating Exclusions

The following estimating exclusions were assumed in the development of this estimate.

1. Hazardous materials remediation and/or disposal.
2. O&M costs for the project with the exception of the vendor supplied O&M manuals.
3. Utility agency costs for incoming power modifications.
4. Permits beyond those normally needed for the type of project and project conditions.

Allowances for Known but Undefined Work

The following allowances were made in the development of this estimate.

1. Painting subcontractor allowance of $1,500.
2. Electrical and instrumentation subcontract allowance is based on 30 percent markup of net costs.

Contractor and Other Estimate Markups

Contractor markup is based on conventionally accepted values which have been adjusted for project-area economic factors. Estimate markups are shown in Table 1.

Table 1. Estimate Markups, June 2009

Item	Rate, percent
Prime Contractor	
Labor (employer payroll burden)	15
Materials and process equipment	10
Equipment (construction-related)	10
Subcontractor	5
Sales Tax (State and local for materials, process equipment and construction equipment rentals, etc.)	8.75
Startup, Training, O&M	2
Builder's Risk, Liability, and Vehicle Insurance	2
Material Shipping and Handling	2
Subcontractor Markups	Same as Prime
Contingency	20
Performance and Payment Bonds	1.5

Labor Markup. The labor rates used in the estimate were derived chiefly from the latest published State Prevailing Wage Rates. These rates include costs beyond raw labor for such items as Payroll Tax and Insurance (PT&I), FICA, and Workers Compensation Insurance. In addition to these markups, the General Contractor (GC) typically adds a percentage to each raw labor dollar to cover overhead and profit, payroll and accounting costs, additional insurance, retirement, 401k contributions, and sick leave/vacation cost.

Materials and Process Equipment Markup. This markup consists of the additional cost to the contractor beyond the raw dollar amount for material and process equipment. This includes shop drawing preparation, submittal and/or re-submittal cost, purchasing and scheduling materials and equipment, accounting charges including invoicing and payment, inspection of received goods, receiving, storage, overhead and profit.

Equipment (Construction) Markup. This markup consists of the costs associated with operating the construction equipment used in the project. Most GCs will rent rather than own the equipment and then charge each project for its equipment cost. The equipment rental cost does not include fuel, delivery and pick-up charges, additional insurance requirements on rental equipment, accounting costs related to home office receiving invoices and payment. However, the crew rates used in the estimate do account for the

equipment rental cost. Occasionally, larger contractors will have some or all of the equipment needed for the job, but in order to recoup their initial purchasing cost they will charge the project an internal rate for equipment use which is similar to the rental cost of equipment. The GC will apply an overhead and profit percentage to each individual piece of equipment whether rented or owned.

Subcontractor Markup. This markup consists of the GC's costs for subcontractors who perform work on the site. This includes costs associated with shop drawings, review of subcontractor's submittals, scheduling of subcontractor work, inspections, processing of payment requests, home office accounting, and overhead and profit on subcontracts.

Sales Tax (Materials, Process Equipment and Construction Equipment). This is the tax that the contractor must pay according to state and local tax laws. The percentage is applied to both the material and equipment the GC purchases as well as the cost for rental equipment. The percentage is based on the local rates in place at the time the estimate was prepared.

Contractor Startup, Training, and O&M Manuals. This cost markup is often confused with either vendor startup or owner startup. It is the cost the GC incurs on the project beyond the vendor startup and owner startup costs. The GC generally will have project personnel assigned to facilitate the installation, testing, startup, and O&M Manual preparation for equipment that is put into operation by either the vendor or owner. These project personnel often include an electrician, pipe fitter or millwright, and/or I&E technician. These personnel are not included in the basic crew makeup to install the equipment but are there to assist and trouble shoot the startup and proper running of the equipment. The GC also incurs a cost for startup for such things as consumables (oil, fuel, filters, etc.), startup drawings and schedules, startup meetings, and coordination with the plant personnel in other areas of the plant operation.

Builders Risk, Liability, and Vehicle Insurance. This percentage comprises all three items. There are many factors which make up this percentage, including the contractor's track record for claims in each of the categories. Another factor affecting insurance rates has been a dramatic price increase across the country over the past several years due to domestic and foreign influences. Consequently, in the construction industry we have observed a range of 0.5 to 1 percent for Builders Risk Insurance, 1 to 1.25 percent for General Liability Insurance, and 0.85 to 1 percent for Vehicle Insurance. Many factors affect each area of insurance, including project complexity, and contractor's requirements and history. Instead of using numbers from a select few contractors, we believe it is more prudent to use a combined 2 percent to better reflect the general costs across the country. Consequently, the actual cost could be higher or lower based on the bidder, region, insurance climate, and on the contractor's insurability at the time the project is bid.

Material Shipping and Handling. This can range from 2 percent to 6 percent, and is based on the type of project, material makeup of the project, and the region and location of the project. Material shipping and handling covers delivery costs from vendors, unloading costs (and in some instances loading and shipment back to vendors for rebuilt equipment), site paper work, and inspection of materials prior to unloading at the project site. BC typically adjusts this percentage by the amount of materials and whether vendors have included shipping costs in the quotes that were used to prepare the estimate. This cost also includes the GC's cost to obtain local supplies, e.g., oil, gaskets, and bolts that may be missing from the equipment or materials shipped.

Construction Contingency. The contingency factor covers unforeseen conditions, area economic factors, and general project complexity. This contingency is used to account for those factors that can not be addressed in each of the labor and/or material installation costs. Based on industry standards, completeness of the project documents, project complexity, the current design stage, and area factors, construction contingency can range from 10 percent to 50 percent.

Range of Accuracy. The amount of contingency in the estimate should not be confused with the accuracy of the estimate. The Expected Accuracy Range defines the window within which the bids are expected to fall based on the project complexity, information available during the estimate process, outside influences (wage rates, material, bidding climate), and includes a level of contingency appropriate to the project definition at the time the estimate was prepared. It is important to understand that AACEI notes on its ranges of accuracy that,

> "The state of process technology and availability of applicable reference cost data affect the range markedly. The +/- value [of the ranges] represents typical percentage variation of actual costs from the cost estimate after application of contingency (typically at a 50 percent level of confidence) for given scope."

While a 50-percent level of confidence in the contingency may seem broad, typically this results in a 90-percent confidence that the actual cost will fall within the bounds of the low and high ranges.

The caution here is that these estimates are not what are often referred to as "bid quality," i.e., estimates prepared by contractors who are receiving competitive bids from subcontractors, equipment vendors, and materials suppliers. In general, we receive reasonable budget values from those willing to provide quotations.

Performance and Payment Bonds. Based on historical and industry data, this can range from 0.75 percent to 3 percent of the project total. There are several contributing factors including such items as size of the project, regional costs, contractor's historical record on similar projects, complexity, and current bonding limits. BC uses 1.5 percent for bonds, which we have determined to be reasonable for most heavy construction projects.

BROWN AND CALDWELL

Environmental Engineers & Consultants

SUMMARY ESTIMATE REPORT WITH MARK-UPS ALLOCATED

Folsom/Sacramento Suburban Water Transfer Project Conceptual Design

Project Number:	131097-006
BC Project Manager:	Jeff Lawerence
BC Office:	Sacramento
Estimate Issue Number:	01
Estimate Original Issue Date:	6-17-09
Lead Estimator:	Dan Goodburn
Estimate QA/QC Reviewer:	Butch Matthews
Estimate QA/QC Date:	6-16-09

PROCESS LOCATION/AREA INDEX

Folsom/Sacramento Suburban Water Transfer Project
Conceptual Design

Description		Total w/ Markups Allocated
Alternate 1		**353,934**
1101 - Civil Sitework		
01500 - Temporary Facilities & Controls		4,347
01590 - Miscellaneous Equipment Rental without operators		797
02200 - Site Preparation		2,516
02300 - Earthwork		105
02700 - Bases, Ballasts, Pavements & Appurtenances		9,680
02800 - Site Improvements And Amenities		16,954
	1101 - Civil Sitework Total	34,399
1102 - Yard Piping		
02170 - Saw cutting		539
02300 - Earthwork		1,940
02500 - Utility Services		8,771
15031 - DIP Fittings		32,402
15032 - DIP Flanges, Bolts and Gaskets		13,747
15330 - Flexible connectors		4,882
	1102 - Yard Piping Total	62,282
1103 - Structural		
02300 - Earthwork		1,274
03100 - Concrete Forms & Accessories		1,672
03200 - Concrete Reinforcement		5,303
03300 - Cast-In-Place Concrete		3,084
05010 - Misc Metals		6,111
05050 - Basic Metal Materials & Methods		3,023
	1103 - Structural Total	20,467
1104 - Mechanical		
05050 - Basic Metal Materials & Methods		1,031
05100 - Structural Metal Framing		107
09000 - B & C Div 9 Coating Systems		2,767
11000 - Equipment		108,452
15031 - DIP Fittings		11,520
15032 - DIP Flanges, Bolts and Gaskets		18,362
15050 - Basic Materials & Methods		2,550
15100 - Building Services Piping		945
15255 - Valves, iron body		73,644
15300 - Automatic air vent		1,771
15330 - Flexible connectors		13,048
15950 - Testing/Adjusting/Balancing		2,588

Description		Total w/ Markups Allocated
	1104 - Mechanical Total	236,786
Alternate 2		364,830
1101 - Civil Sitework		
01500 - Temporary Facilities & Controls		4,347
01590 - Miscellaneous Equipment Rental without operators		797
02300 - Earthwork		7,961
02800 - Site Improvements And Amenities		15,765
	1101 - Civil Sitework Total	28,869
1102 - Yard Piping		
02170 - Saw cutting		539
02300 - Earthwork		5,941
02500 - Utility Services		21,197
15031 - DIP Fittings		32,402
15032 - DIP Flanges, Bolts and Gaskets		13,747
15330 - Flexible connectors		4,882
	1102 - Yard Piping Total	78,708
1103 - Structural		
02300 - Earthwork		1,274
03100 - Concrete Forms & Accessories		1,672
03200 - Concrete Reinforcement		5,303
03300 - Cast-In-Place Concrete		3,084
05050 - Basic Metal Materials & Methods		3,023
	1103 - Structural Total	14,356
1104 - Mechanical		
05010 - Misc Metals		6,111
05050 - Basic Metal Materials & Methods		1,031
05100 - Structural Metal Framing		107
09000 - B & C Div 9 Coating Systems		2,767
11000 - Equipment		108,452
15031 - DIP Fittings		11,520
15032 - DIP Flanges, Bolts and Gaskets		18,362
15050 - Basic Materials & Methods		2,550
15100 - Building Services Piping		945
15255 - Valves, iron body		73,644
15300 - Automatic air vent		1,771
15330 - Flexible connectors		13,048
15950 - Testing/Adjusting/Balancing		2,588

Description	Total w/ Markups Allocated
1104 - Mechanical Total	242,897

BROWN AND CALDWELL

Environmental Engineers & Consultants

DETAILED CONCEPTUAL ESTIMATE REPORT

Folsom/Sacramento Suburban Water Transfer Project Conceptual Design

Project Number:	131097-006
BC Project Manager:	Jeff Lawerence
BC Office:	Sacramento
Estimate Issue Number:	01
Estimate Original Issue Date:	6-17-09
Lead Estimator:	Dan Goodburn
Estimate QA/QC Reviewer:	Butch Matthews
Estimate QA/QC Date:	6-16-09

PROCESS LOCATION/AREA INDEX

City of Folsom

Folsom/Sacramento Suburban Water Transfer Project Conceptual Design

Item	Item Description	Qty	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Total Price Per Unit		Grand Total
	Alternate 1												
	1101 - Civil Sitework				**8,986**		**6,605**		**1,066**	**462**			**17,118**
	01500 - Temporary Facilities & Controls												
	01560100 - Barricades												
	Traffic control, flagger	5.0	days	435.60	2,178	3.00	15				438.6	days	2,193
	Temporary Facilities & Controls Total				**2,178**		**15**						**2,193**
	01590 - Miscellaneous Equipment Rental without operators												
	01590400 - General equipment rental without operators												
1600D	Equipment rental reflectorized barrels 1 to 100 barrels - Rent per month	8.0	mnth						332		41.5	mnth	332
1600E	Equipment rental reflectorized barrels 1 to 100 barrels - Crew daily cost	20.0	days						60		3.0	days	60
	Miscellaneous Equipment Rental without operators Total								**392**				**392**
	02200 - Site Preparation												
	02220250 - Demolish, Remove Pavement And Curb												
5010	Demolish, remove pavement & curb, remove bituminous pavement, 3" thick, excludes hauling and disposal fees	67.0	SY	3.56	238				104		5.1	SY	342
5010	Demolish, remove pavement & curb, remove bituminous pavement, 3" thick, excludes hauling and disposal fees	22.0	SY	3.56	78				34		5.1	SY	112
	02220330 - Selective Demolition, Dump Charges												
9999	Dump Charge, typical urban city, fees only, bldg constr mat'ls	14.0	ton							462	33.0	ton	462
	02220360 - Selective Demolition, Saw Cutting												
0015	Selective demolition, saw cutting, asphalt, up to 3" deep	100.0	LF	0.95	95	0.40	40		39		1.7	LF	174
0015	Selective demolition, saw cutting, asphalt, up to 3" deep	60.0	LF	0.95	57	0.40	24		23		1.7	LF	104
	02220420 - Selective Demolition, Chain Link Fences & Gates												
0300	Selective demolition, chain link fences & gates, gates, 14' width	1.0	EA	93.68	94				20		113.9	EA	114
	Site Preparation Total				**562**		**64**		**221**	**462**			**1,309**
	02300 - Earthwork												
	02315492 - Hauling												
0009	Loading Trucks, F.E. Loader, 3 C.Y.	6.5	cuyd	0.81	5				7		1.9	cuyd	12

Item	Item Description	Qty	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Total Price Per Unit		Grand Total
4498	Cycle hauling(wait, load,travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 25 min load/wait/unload, 20 CY truck, cycle 20 miles, 45 MPH, no loading equipment	6.5	L.C.Y.	2.68	17				23		6.2	L.C.Y.	40
	Earthwork Total				**23**				**29**				**52**
	02700 - Bases, Ballasts, Pavements & Appurtenances												
	02740310 - Asphaltic Concrete Pavement, Highways												
1050	Plant-mix asphalt paving, for highways and large paved areas, pavement replacement over trench, 3" thick, for paving projects 300 tons or less add for trucking	89.0	SY	39.81	3,543	12.50	1,113		180		54.3	SY	4,836
	Bases, Ballasts, Pavements & Appurtenances Total				**3,543**		**1,113**		**180**				**4,836**
	02800 - Site Improvements And Amenities												
	02820110 - Chain Link Fences And Gates												
4762	Chain link fences & gates, reset gate, chain link, galvanized steel, double gate, 3 strand barbed wire, 14' x 7' x 3', excludes excavation	1.0	EA	368.06	368				46		414.4	EA	414
	02820130 - Fence, Chain Link Industrial												
0500	Fence, chain link industrial, galvanized steel, 6 ga. wire, 2" posts @ 10' OC,, 6' high, includes excavation, & concrete	140.0	LF	5.58	782	24.00	3,360		121		30.4	LF	4,263
5060	Fence, chain link industrial, double swing gates, 6' high, 12' opening, includes excavation, posts & hardware in concrete	1.0	Opng	417.88	418	835.00	835		65		1,317.7	Opng	1,318
7001	Snow fence on steel posts, 10' O.C., 4' high, includes 2' in ground, no concrete	400.0	LF	2.70	1,081	2.70	1,080				5.4	LF	2,161
	02820150 - Fence, Chain Link, Gates & Posts												
6715	Fence,chain link, gates & posts, corner posts, chain link fence, galvanized steel, (1/3 post length in ground), 4" OD, 6', set in concrete, includes excavation	1.0	EA	30.41	30	138.00	138		11		179.1	EA	179
	Site Improvements And Amenities Total				**2,679**		**5,413**		**243**				**8,335**

Item	Item Description	Qty	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Total Price Per Unit		Grand Total
	1102 - Yard Piping				**7,474**		**21,592**		**1,470**				**30,536**
	02170 - Saw cutting												
	02170 - Saw cutting												
0060	Saw cutting, pipe, 24" DIP	4.0	each	23.51	94	26.53	106		66		66.5	each	266
	Saw cutting Total				**94**		**106**		**66**				**266**
	02300 - Earthwork												
	02315120 - Backfill, Structural												
4420	Backfill, structural, common earth, 200 H.P. dozer, 300' haul	26.0	L.C.Y.	1.07	28				39		2.6	L.C.Y.	67
	02315310 - Compaction, General												
7000	Compaction, around structures and trenches, 2 passes, 18" wide, 6" lifts, walk behind, vibrating plate	2.0	E.C.Y.	2.17	4				0		2.3	E.C.Y.	5
7000	Compaction, around structures and trenches, 2 passes, 18" wide, 6" lifts, walk behind, vibrating plate	8.0	E.C.Y.	2.17	17				1		2.3	E.C.Y.	19
7000	Compaction, around structures and trenches, 2 passes, 18" wide, 6" lifts, walk behind, vibrating plate	24.0	E.C.Y.	2.17	52				4		2.3	E.C.Y.	56
	02315492 - Hauling												
0009	Loading Trucks, F.E. Loader, 3 C.Y.	16.0	cuyd	0.81	13				17		1.9	cuyd	30
4498	Cycle hauling(wait, load,travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 25 min load/wait/unload, 20 CY truck, cycle 20 miles, 45 MPH, no loading equipment	16.0	L.C.Y.	2.68	43				56		6.2	L.C.Y.	98
	02315610 - Excavating, Trench												
0600	Excavating, trench or continuous footing, common earth, 1 C.Y. excavator, truck mounted, 6' to 10' deep, excludes sheeting or dewatering	34.0	B.C.Y.	2.64	90				99		5.6	B.C.Y.	189
	02315640 - Utility Bedding												
0100	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	9.0	L.C.Y.	9.37	84	43.50	392		18		54.9	L.C.Y.	494
	Earthwork Total				**332**		**392**		**234**				**958**
	02500 - Utility Services												
	02510730 - Water Supply, Ductile Iron Pipe												
2100	Water supply distribution piping, ductile iron pipe, cement lined, mechanical joint, no fittings, 18' lengths, 12" diameter, class 50, excludes excavation or backfill	20.0	LF	24.23	485	33.00	660		117		63.1	LF	1,262

Item	Item Description	Qty	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Total Price Per Unit		Grand Total
2180	Water supply distribution piping, ductile iron pipe, cement lined, mechanical joint, no fittings, 18' lengths, 24" diameter, class 50, excludes excavation or backfill	20.0	LF	53.85	1,077	86.00	1,720		263		153.0	LF	3,060
	Utility Services Total				**1,562**		**2,380**		**381**				**4,322**
	15031 - DIP Fittings												
	15031 - DIP Fittings												
0232B	Piping, fittings, wye or tee, 24" diameter	4.0	each	812.74	3,251	2,955.69	11,823		789		3,965.6	each	15,863
	DIP Fittings Total				**3,251**		**11,823**		**789**				**15,863**
	15032 - DIP Flanges, Bolts and Gaskets												
	15032 - DIP Flanges, Bolts and Gaskets												
	DIP, flg cplg adptr, 24"	4.0	ea	382.80	1,531	1,300.00	5,200				1,682.8	ea	6,731
	DIP Flanges, Bolts and Gaskets Total				**1,531**		**5,200**						**6,731**
	15330 - Flexible connectors												
	15330 - Flexible connectors												
0140	Connectors, flex, Dresser type, 12" dia.	4.0	each	176.25	705	422.91	1,692				599.2	each	2,397
	Flexible connectors Total				**705**		**1,692**						**2,397**

Item	Item Description	Qty	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Total Price Per Unit		Grand Total
	1103 - Structural				**4,993**		**4,884**		**252**				**10,128**
	02300 - Earthwork												
	02315120 - Backfill, Structural												
4420	Backfill, structural, common earth, 200 H.P. dozer, 300' haul	6.5	L.C.Y.	1.07	7				10		2.6	L.C.Y.	17
	02315310 - Compaction, General												
7500	Compaction, 2 passes, 24" wide, 6" lifts, walk behind, vibrating roller	5.8	E.C.Y.	1.89	11				2		2.3	E.C.Y.	13
7520	Compaction, 3 passes, 24" wide, 6" lifts, walk behind, vibrating roller	3.7	E.C.Y.	2.83	10				2		3.4	E.C.Y.	12
7540	Compaction, 4 passes, 24" wide, 6" lifts, walk behind, vibrating roller	4.9	E.C.Y.	3.78	19				4		4.5	E.C.Y.	22
	02315492 - Hauling												
0009	Loading Trucks, F.E. Loader, 3 C.Y.	14.0	cuyd	0.81	11				15		1.9	cuyd	26
4498	Cycle hauling(wait, load,travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 25 min load/wait/unload, 20 CY truck, cycle 20 miles, 45 MPH, no loading equipment	14.0	L.C.Y.	2.68	38				49		6.2	L.C.Y.	86
	02315610 - Excavating, Trench												
0060	Excavating, trench or continuous footing, common earth, 1/2 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering	17.9	B.C.Y.	5.06	91				32		6.8	B.C.Y.	122
0060	Excavating, trench or continuous footing, common earth, 1/2 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering	2.2	B.C.Y.	5.06	11				4		6.8	B.C.Y.	15
	02315640 - Utility Bedding												
0100	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	5.7	L.C.Y.	9.37	54	43.50	250		12		54.9	L.C.Y.	315
	Earthwork Total				**252**		**250**		**128**				**630**
	03100 - Concrete Forms & Accessories												
	03110425 - Forms In Place, Equipment Foundations												
0050	C.I.P. concrete forms, equipment foundations, 2 use, includes erecting, bracing, stripping and cleaning	8.0	sfca	17.59	141	1.98	16				19.6	sfca	157
	03110445 - Forms In Place, Slab On Grade												
3050	C.I.P. concrete forms, slab on grade, edge, wood, 7" to 12" high, 4 use, includes erecting, bracing, stripping and cleaning	120.0	sfca	4.95	594	0.74	89				5.7	sfca	683
	Concrete Forms & Accessories Total				**735**		**105**						**840**
	03200 - Concrete Reinforcement												

Item	Item Description	Qty	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Total Price Per Unit		Grand Total
	03210600 - Reinforcing In Place												
0602	Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	1,454.4	lb	0.54	793	0.43	625				1.0	lb	1,418
0602	Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	202.9	lb	0.54	111	0.43	87				1.0	lb	198
0602	Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	811.8	lb	0.54	442	0.43	349				1.0	lb	791
0602	Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	33.3	lb	0.54	18	0.43	14				1.0	lb	32
2000	Reinforcing steel, unload and sort, add to base	1.2	ton	41.39	51				10		49.5	ton	61
2000	Reinforcing steel, unload and sort, add to base	0.0	ton	41.39	1				0		49.5	ton	2
2210	Reinforcing steel, crane cost for handling, average, add	1.2	ton	44.77	55				11		53.6	ton	66
2210	Reinforcing steel, crane cost for handling, average, add	0.0	ton	44.77	1				0		53.6	ton	2
2420	Reinforcing steel, in place, dowels, deformed, 2' long, #5, A615, grade 60	14.0	EA	2.63	37	1.78	25				4.4	EA	62
	Concrete Reinforcement Total				**1,510**		**1,101**		**22**				**2,632**
	03300 - Cast-In-Place Concrete												
	03310220 - Concrete, Ready Mix Normal Weight												
0300	Structural concrete, ready mix, normal weight, 4000 PSI, includes local aggregate, sand, Portland cement and water, delivered, excludes all additives and treatments	7.4	CY			106.00	785				106.0	CY	785
0300	Structural concrete, ready mix, normal weight, 4000 PSI, includes local aggregate, sand, Portland cement and water, delivered, excludes all additives and treatments	2.2	CY			106.00	236				106.0	CY	236
0300	Structural concrete, ready mix, normal weight, 4000 PSI, includes local aggregate, sand, Portland cement and water, delivered, excludes all additives and treatments	0.1	CY			106.00	16				106.0	CY	16
	03310700 - Placing Concrete												
4650	Structural concrete, placing, slab on grade, pumped, over 6" thick, includes vibrating, excludes material	7.4	CY	20.01	148				33		24.4	CY	181
4650	Structural concrete, placing, slab on grade, pumped, over 6" thick, includes vibrating, excludes material	2.2	CY	20.01	44				10		24.4	CY	54
4650	Structural concrete, placing, slab on grade, pumped, over 6" thick, includes vibrating, excludes material	0.1	CY	20.01	3				1		24.4	CY	4
	03350300 - Finishing Floors												
0150	Concrete finishing, floors, manual screed, bull float, manual float, broom finish	220.0	SF	0.74	163						0.7	SF	163

Item	Item Description	Qty	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Total Price Per Unit		Grand Total
	03350350 - Finishing Walls												
0150	Concrete finishing, walls, carborundum rub, wet, includes breaking ties and patching voids	8.0	SF	2.64	21						2.6	SF	21
0750	Concrete finishing, walls, sandblast, heavy penetration	8.0	SF	4.90	39	1.41	11		4		6.8	SF	55
	Cast-In-Place Concrete Total				**419**		**1,048**		**47**				**1,513**
	05010 - Misc Metals												
	05010 - Misc Metals												
0010	Pump mounting base plate, complete w/ anchor bolts, 4 sf	2.0	each	714.60	1,429	795.79	1,592				1,510.4	each	3,021
	Misc Metals Total				**1,429**		**1,592**						**3,021**
	05050 - Basic Metal Materials & Methods												
	05090340 - Drilling												
0400	Concrete impact drilling, for anchors, up to 4" D, 5/8" dia, in concrete or brick walls and floors, incl bit & layout, excl anchor	14.0	EA	11.90	167	0.08	1				12.0	EA	168
	05090540 - Machinery Anchors												
0800	Machinery anchor, heavy duty, 1" dia stud & bolt, incl sleeve, floating base nut, lower stud & coupling nut, fiber plug, connecting stud, washer & nut	8.0	EA	60.26	482	98.50	788		55		165.7	EA	1,325
	Basic Metal Materials & Methods Total				**649**		**789**		**55**				**1,493**

Item	Item Description	Qty	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Total Price Per Unit		Grand Total
	1104 - Mechanical				**18,822**		**94,976**	**1,500**	**520**				**115,818**
	05050 - Basic Metal Materials & Methods												
	05090340 - Drilling												
0400	Concrete impact drilling, for anchors, up to 4" D, 5/8" dia, in concrete or brick walls and floors, incl bit & layout, excl anchor	24.0	EA	11.90	285	0.08	2				12.0	EA	287
	05090380 - Expansion Anchors												
8250	Wedge anchor, carbon steel, 1/2" dia x 2-3/4" L, in concrete, brick or stone, excl layout & drilling	24.0	EA	4.08	98	0.97	23				5.0	EA	121
	05090900 - Welding Structural												
2010	Welding structural steel in field, 4 passes, 0.7 Lb/LF, 1/2" thick, continuous fillet, type 6011	3.0	LF	28.77	86	1.66	5		19		36.7	LF	110
	Basic Metal Materials & Methods Total				**470**		**30**		**19**				**519**
	05100 - Structural Metal Framing												
	05120560 - Plates												
0300	Steel plate, structural, for connections & stiffeners, 3/8" T, shop fabricated, incl shop primer	2.3	SF			23.00	52				23.0	SF	52
	Structural Metal Framing Total						**52**						**52**
	09000 - B & C Div 9 Coating Systems												
	09000 - B & C Div 9 Coating Systems												
	Pipe painting	1.0	lsum					1,500			1,500.0	lsum	1,500
	B & C Div 9 Coating Systems Total							**1,500**					**1,500**
	11000 - Equipment												
	11090 - Pumps, general utility												
0350	Pump, cntfgl, horiz mtd, horiz splt, sgl stg,2100GPM,50HP,12"D	2.0	each	1,237.27	2,475	25,000.00	50,000		266		26,370.4	each	52,741
	Equipment Total				**2,475**		**50,000**		**266**				**52,741**
	15031 - DIP Fittings												
	15031 - DIP Fittings												
0060	Piping, water dist, DI, 90< bend or elbow, 12" dia	4.0	each	242.35	969	228.00	912		235		529.2	each	2,117
	DIP, cement lined, flg X pe spool, 12" length, 12" diam	6.0	ea	89.32	536	500.00	3,000				589.3	ea	3,536
	DIP Fittings Total				**1,505**		**3,912**		**235**				**5,653**
	15032 - DIP Flanges, Bolts and Gaskets												

Item	Item Description	Qty	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Total Price Per Unit		Grand Total
	15032 - DIP Flanges, Bolts and Gaskets												
0110	Stl ftg, gskt & bolt set, 150#, 12" pipe	22.0	each	268.57	5,909	32.00	704				300.6	each	6,613
	DIP, flg cplg adptr, 12"	4.0	ea	159.50	638	478.00	1,912				637.5	ea	2,550
	DIP Flanges, Bolts and Gaskets Total				**6,547**		**2,616**						**9,163**
	15050 - Basic Materials & Methods												
	15060300 - Pipe Hangers And Supports												
3400	Pipe hanger / support, saddle type pipe support, complete, adjustable, cast iron saddle, 12" pipe size, type number 36 per MSS-SP58, excludes vertical pipe riser (usually 3" Diam)	6.0	EA	11.79	71	195.00	1,170				206.8	EA	1,241
	Basic Materials & Methods Total				**71**		**1,170**						**1,241**
	15100 - Building Services Piping												
	15107620 - Pipe, Steel												
0630	Pipe, steel, black, threaded, 3" diameter, schedule 40, Spec. A-53, includes coupling and clevis hanger assembly sized for covering, 10' OC	12.0	LF	23.64	284	15.50	186				39.1	LF	470
	Building Services Piping Total				**284**		**186**						**470**
	15255 - Valves, iron body												
	15255 - Valves, iron body												
0810	Valves, iron body, gate, 125 lb, N.R.S., flanged, 12" size	4.0	each	928.94	3,716	4,366.80	17,467				5,295.7	each	21,183
1490	Valves, iron body, swing check, 125 lb, flanged, 12" size	2.0	each	928.94	1,858	6,459.30	12,919				7,388.2	each	14,776
	Valves, iron body Total				**5,574**		**30,386**						**35,959**
	15300 - Automatic air vent												
	15300 - Automatic air vent												
0060	Auto air vent, CI body, sst internals, float type, 1" NP inl, 250psi	2.0	each	72.56	145	360.00	720				432.6	each	865
	Automatic air vent Total				**145**		**720**						**865**
	15330 - Flexible connectors												
	15330 - Flexible connectors												
	Equipment connection fitting, 12"	2.0	ea	223.30	447	2,952.00	5,904				3,175.3	ea	6,351
	Flexible connectors Total				**447**		**5,904**						**6,351**
	15950 - Testing/Adjusting/Balancing												
	15955700 - Piping, Testing												

Item	Item Description	Qty	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Total Price Per Unit		Grand Total
0390	Nondestructive hydraulic pressure test, 12" - 24" pipe, 100 LF	1.0	each	1,306.16	1,306						1,306.2	each	1,306
	Testing/Adjusting/Balancing Total				**1,306**								**1,306**

Item	Item Description	Qty	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Total Price Per Unit		Grand Total
	Alternate 2												
	1101 - Civil Sitework				**5,321**		**8,142**		**763**				**14,226**
	01500 - Temporary Facilities & Controls												
	01560100 - Barricades												
	Traffic control, flagger	5.0	days	435.60	2,178	3.00	15				438.6	days	2,193
	Temporary Facilities & Controls Total				**2,178**		**15**						**2,193**
	01590 - Miscellaneous Equipment Rental without operators												
	01590400 - General equipment rental without operators												
1600D	Equipment rental reflectorized barrels 1 to 100 barrels - Rent per month	8.0	mnth						332		41.5	mnth	332
1600E	Equipment rental reflectorized barrels 1 to 100 barrels - Crew daily cost	20.0	days						60		3.0	days	60
	Miscellaneous Equipment Rental without operators Total								**392**				**392**
	02300 - Earthwork												
	02315640 - Utility Bedding												
0050	Fill by borrow and utility bedding, for site restoration, crushed or screened bank run gravel, excludes compaction	92.0	L.C.Y.	9.37	862	31.00	2,852		186		42.4	L.C.Y.	3,899
	Earthwork Total				**862**		**2,852**		**186**				**3,899**
	02800 - Site Improvements And Amenities												
	02820130 - Fence, Chain Link Industrial												
0500	Fence, chain link industrial, galvanized steel, 6 ga. wire, 2" posts @ 10' OC,, 6' high, includes excavation, & concrete	140.0	LF	5.58	782	24.00	3,360		121		30.4	LF	4,263
5060	Fence, chain link industrial, double swing gates, 6' high, 12' opening, includes excavation, posts & hardware in concrete	1.0	Opng	417.88	418	835.00	835		65		1,317.7	Opng	1,318
7001	Snow fence on steel posts, 10' O.C., 4' high, includes 2' in ground, no concrete	400.0	LF	2.70	1,081	2.70	1,080				5.4	LF	2,161
	Site Improvements And Amenities Total				**2,281**		**5,275**		**186**				**7,742**

Item	Item Description	Qty	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Total Price Per Unit	Grand Total
	1102 - Yard Piping				**10,299**		**25,858**		**2,473**			**38,631**
	02170 - Saw cutting											
	02170 - Saw cutting											
0060	Saw cutting, pipe, 24" DIP	4.0	each	23.51	94	26.53	106		66		66.5 each	266
	Saw cutting Total				**94**		**106**		**66**			**266**
	02300 - Earthwork											
	02315120 - Backfill, Structural											
4420	Backfill, structural, common earth, 200 H.P. dozer, 300' haul	79.0	L.C.Y.	1.07	85				119		2.6 L.C.Y.	204
	02315310 - Compaction, General											
7000	Compaction, around structures and trenches, 2 passes, 18" wide, 6" lifts, walk behind, vibrating plate	4.0	E.C.Y.	2.17	9				1		2.3 E.C.Y.	9
7000	Compaction, around structures and trenches, 2 passes, 18" wide, 6" lifts, walk behind, vibrating plate	24.0	E.C.Y.	2.17	52				4		2.3 E.C.Y.	56
7000	Compaction, around structures and trenches, 2 passes, 18" wide, 6" lifts, walk behind, vibrating plate	71.0	E.C.Y.	2.17	154				12		2.3 E.C.Y.	166
	02315492 - Hauling											
0009	Loading Trucks, F.E. Loader, 3 C.Y.	49.0	cuyd	0.81	40				51		1.9 cuyd	91
4498	Cycle hauling(wait, load,travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 25 min load/wait/unload, 20 CY truck, cycle 20 miles, 45 MPH, no loading equipment	49.0	L.C.Y.	2.68	131				170		6.2 L.C.Y.	302
	02315610 - Excavating, Trench											
0600	Excavating, trench or continuous footing, common earth, 1 C.Y. excavator, truck mounted, 6' to 10' deep, excludes sheeting or dewatering	102.0	B.C.Y.	2.64	269				297		5.6 B.C.Y.	566
	02315640 - Utility Bedding											
0100	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	28.0	L.C.Y.	9.37	262	43.50	1,218		56		54.9 L.C.Y.	1,537
	Earthwork Total				**1,002**		**1,218**		**711**			**2,931**
	02500 - Utility Services											
	02510730 - Water Supply, Ductile Iron Pipe											
2100	Water supply distribution piping, ductile iron pipe, cement lined, mechanical joint, no fittings, 18' lengths, 12" diameter, class 50, excludes excavation or backfill	20.0	LF	24.23	485	33.00	660		117		63.1 LF	1,262

Item	Item Description	Qty	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Total Price Per Unit		Grand Total
2180	Water supply distribution piping, ductile iron pipe, cement lined, mechanical joint, no fittings, 18' lengths, 24" diameter, class 50, excludes excavation or backfill	60.0	LF	53.85	3,231	86.00	5,160		790		153.0	LF	9,181
	Utility Services Total				**3,715**		**5,820**		**908**				**10,443**
	15031 - DIP Fittings												
	15031 - DIP Fittings												
0232B	Piping, fittings, wye or tee, 24" diameter	4.0	each	812.74	3,251	2,955.69	11,823		789		3,965.6	each	15,863
	DIP Fittings Total				**3,251**		**11,823**		**789**				**15,863**
	15032 - DIP Flanges, Bolts and Gaskets												
	15032 - DIP Flanges, Bolts and Gaskets												
	DIP, flg cplg adptr, 24"	4.0	ea	382.80	1,531	1,300.00	5,200				1,682.8	ea	6,731
	DIP Flanges, Bolts and Gaskets Total				**1,531**		**5,200**						**6,731**
	15330 - Flexible connectors												
	15330 - Flexible connectors												
0140	Connectors, flex, Dresser type, 12" dia.	4.0	each	176.25	705	422.91	1,692				599.2	each	2,397
	Flexible connectors Total				**705**		**1,692**						**2,397**

Item	Item Description	Qty	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Total Price Per Unit		Grand Total
	1103 - Structural				**3,564**		**3,292**		**252**				**7,108**
	02300 - Earthwork												
	02315120 - Backfill, Structural												
4420	Backfill, structural, common earth, 200 H.P. dozer, 300' haul	6.5	L.C.Y.	1.07	7				10		2.6	L.C.Y.	17
	02315310 - Compaction, General												
7500	Compaction, 2 passes, 24" wide, 6" lifts, walk behind, vibrating roller	5.8	E.C.Y.	1.89	11				2		2.3	E.C.Y.	13
7520	Compaction, 3 passes, 24" wide, 6" lifts, walk behind, vibrating roller	3.7	E.C.Y.	2.83	10				2		3.4	E.C.Y.	12
7540	Compaction, 4 passes, 24" wide, 6" lifts, walk behind, vibrating roller	4.9	E.C.Y.	3.78	19				4		4.5	E.C.Y.	22
	02315492 - Hauling												
0009	Loading Trucks, F.E. Loader, 3 C.Y.	14.0	cuyd	0.81	11				15		1.9	cuyd	26
4498	Cycle hauling(wait, load,travel, unload or dump & return) time per cycle, excavated or borrow, loose cubic yards, 25 min load/wait/unload, 20 CY truck, cycle 20 miles, 45 MPH, no loading equipment	14.0	L.C.Y.	2.68	38				49		6.2	L.C.Y.	86
	02315610 - Excavating, Trench												
0060	Excavating, trench or continuous footing, common earth, 1/2 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering	17.9	B.C.Y.	5.06	91				32		6.8	B.C.Y.	122
0060	Excavating, trench or continuous footing, common earth, 1/2 C.Y. excavator, 1' to 4' deep, excludes sheeting or dewatering	2.2	B.C.Y.	5.06	11				4		6.8	B.C.Y.	15
	02315640 - Utility Bedding												
0100	Fill by borrow and utility bedding, for pipe and conduit, crushed stone, 3/4" to 1/2", excludes compaction	5.7	L.C.Y.	9.37	54	43.50	250		12		54.9	L.C.Y.	315
	Earthwork Total				**252**		**250**		**128**				**630**
	03100 - Concrete Forms & Accessories												
	03110425 - Forms In Place, Equipment Foundations												
0050	C.I.P. concrete forms, equipment foundations, 2 use, includes erecting, bracing, stripping and cleaning	8.0	sfca	17.59	141	1.98	16				19.6	sfca	157
	03110445 - Forms In Place, Slab On Grade												
3050	C.I.P. concrete forms, slab on grade, edge, wood, 7" to 12" high, 4 use, includes erecting, bracing, stripping and cleaning	120.0	sfca	4.95	594	0.74	89				5.7	sfca	683
	Concrete Forms & Accessories Total				**735**		**105**						**840**
	03200 - Concrete Reinforcement												

Item	Item Description	Qty	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Total Price Per Unit		Grand Total
	03210600 - Reinforcing In Place												
0602	Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	1,454.4	lb	0.54	793	0.43	625				1.0	lb	1,418
0602	Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	202.9	lb	0.54	111	0.43	87				1.0	lb	198
0602	Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	811.8	lb	0.54	442	0.43	349				1.0	lb	791
0602	Reinforcing steel, in place, slab on grade, #3 to #7, A615, grade 60, incl labor for accessories, excl material for accessories	33.3	lb	0.54	18	0.43	14				1.0	lb	32
2000	Reinforcing steel, unload and sort, add to base	1.2	ton	41.39	51				10		49.5	ton	61
2000	Reinforcing steel, unload and sort, add to base	0.0	ton	41.39	1				0		49.5	ton	2
2210	Reinforcing steel, crane cost for handling, average, add	1.2	ton	44.77	55				11		53.6	ton	66
2210	Reinforcing steel, crane cost for handling, average, add	0.0	ton	44.77	1				0		53.6	ton	2
2420	Reinforcing steel, in place, dowels, deformed, 2' long, #5, A615, grade 60	14.0	EA	2.63	37	1.78	25				4.4	EA	62
	Concrete Reinforcement Total				**1,510**		**1,101**		**22**				**2,632**
	03300 - Cast-In-Place Concrete												
	03310220 - Concrete, Ready Mix Normal Weight												
0300	Structural concrete, ready mix, normal weight, 4000 PSI, includes local aggregate, sand, Portland cement and water, delivered, excludes all additives and treatments	7.4	CY			106.00	785				106.0	CY	785
0300	Structural concrete, ready mix, normal weight, 4000 PSI, includes local aggregate, sand, Portland cement and water, delivered, excludes all additives and treatments	2.2	CY			106.00	236				106.0	CY	236
0300	Structural concrete, ready mix, normal weight, 4000 PSI, includes local aggregate, sand, Portland cement and water, delivered, excludes all additives and treatments	0.1	CY			106.00	16				106.0	CY	16
	03310700 - Placing Concrete												
4650	Structural concrete, placing, slab on grade, pumped, over 6" thick, includes vibrating, excludes material	7.4	CY	20.01	148				33		24.4	CY	181
4650	Structural concrete, placing, slab on grade, pumped, over 6" thick, includes vibrating, excludes material	2.2	CY	20.01	44				10		24.4	CY	54
4650	Structural concrete, placing, slab on grade, pumped, over 6" thick, includes vibrating, excludes material	0.1	CY	20.01	3				1		24.4	CY	4
	03350300 - Finishing Floors												
0150	Concrete finishing, floors, manual screed, bull float, manual float, broom finish	220.0	SF	0.74	163						0.7	SF	163

Item	Item Description	Qty	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Total Price Per Unit		Grand Total
	03350350 - Finishing Walls												
0150	Concrete finishing, walls, carborundum rub, wet, includes breaking ties and patching voids	8.0	SF	2.64	21						2.6	SF	21
0750	Concrete finishing, walls, sandblast, heavy penetration	8.0	SF	4.90	39	1.41	11		4		6.8	SF	55
	Cast-In-Place Concrete Total				**419**		**1,048**		**47**				**1,513**
	05050 - Basic Metal Materials & Methods												
	05090340 - Drilling												
0400	Concrete impact drilling, for anchors, up to 4" D, 5/8" dia, in concrete or brick walls and floors, incl bit & layout, excl anchor	14.0	EA	11.90	167	0.08	1				12.0	EA	168
	05090540 - Machinery Anchors												
0800	Machinery anchor, heavy duty, 1" dia stud & bolt, incl sleeve, floating base nut, lower stud & coupling nut, fiber plug, connecting stud, washer & nut	8.0	EA	60.26	482	98.50	788		55		165.7	EA	1,325
	Basic Metal Materials & Methods Total				**649**		**789**		**55**				**1,493**

Item	Item Description	Qty	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Total Price Per Unit		Grand Total
	1104 - Mechanical				**20,251**		**96,567**	**1,500**	**520**				**118,839**
	05010 - Misc Metals												
	05010 - Misc Metals												
0010	Pump mounting base plate, complete w/ anchor bolts, 4 sf	2.0	each	714.60	1,429	795.79	1,592				1,510.4	each	3,021
	Misc Metals Total				**1,429**		**1,592**						**3,021**
	05050 - Basic Metal Materials & Methods												
	05090340 - Drilling												
0400	Concrete impact drilling, for anchors, up to 4" D, 5/8" dia, in concrete or brick walls and floors, incl bit & layout, excl anchor	24.0	EA	11.90	285	0.08	2				12.0	EA	287
	05090380 - Expansion Anchors												
8250	Wedge anchor, carbon steel, 1/2" dia x 2-3/4" L, in concrete, brick or stone, excl layout & drilling	24.0	EA	4.08	98	0.97	23				5.0	EA	121
	05090900 - Welding Structural												
2010	Welding structural steel in field, 4 passes, 0.7 Lb/LF, 1/2" thick, continuous fillet, type 6011	3.0	LF	28.77	86	1.66	5		19		36.7	LF	110
	Basic Metal Materials & Methods Total				**470**		**30**		**19**				**519**
	05100 - Structural Metal Framing												
	05120560 - Plates												
0300	Steel plate, structural, for connections & stiffeners, 3/8" T, shop fabricated, incl shop primer	2.3	SF			23.00	52				23.0	SF	52
	Structural Metal Framing Total						**52**						**52**
	09000 - B & C Div 9 Coating Systems												
	09000 - B & C Div 9 Coating Systems												
	Pipe painting	1.0	lsum					1,500			1,500.0	lsum	1,500
	B & C Div 9 Coating Systems Total							**1,500**					**1,500**
	11000 - Equipment												
	11090 - Pumps, general utility												
0350	Pump, cntfgl, horiz mtd, horiz splt, sgl stg,2100GPM,50HP,12"D	2.0	each	1,237.27	2,475	25,000.00	50,000		266		26,370.4	each	52,741
	Equipment Total				**2,475**		**50,000**		**266**				**52,741**
	15031 - DIP Fittings												
	15031 - DIP Fittings												

Item	Item Description	Qty	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Total Price Per Unit		Grand Total
0060	Piping, water dist, DI, 90< bend or elbow, 12" dia	4.0	each	242.35	969	228.00	912		235		529.2	each	2,117
	DIP, cement lined, flg X pe spool, 12" length, 12" diam	6.0	ea	89.32	536	500.00	3,000				589.3	ea	3,536
	DIP Fittings Total				**1,505**		**3,912**		**235**				**5,653**
	15032 - DIP Flanges, Bolts and Gaskets												
	15032 - DIP Flanges, Bolts and Gaskets												
0110	Stl ftg, gskt & bolt set, 150#, 12" pipe	22.0	each	268.57	5,909	32.00	704				300.6	each	6,613
	DIP, flg cplg adptr, 12"	4.0	ea	159.50	638	478.00	1,912				637.5	ea	2,550
	DIP Flanges, Bolts and Gaskets Total				**6,547**		**2,616**						**9,163**
	15050 - Basic Materials & Methods												
	15060300 - Pipe Hangers And Supports												
3400	Pipe hanger / support, saddle type pipe support, complete, adjustable, cast iron saddle, 12" pipe size, type number 36 per MSS-SP58, excludes vertical pipe riser (usually 3" Diam)	6.0	EA	11.79	71	195.00	1,170				206.8	EA	1,241
	Basic Materials & Methods Total				**71**		**1,170**						**1,241**
	15100 - Building Services Piping												
	15107620 - Pipe, Steel												
0630	Pipe, steel, black, threaded, 3" diameter, schedule 40, Spec. A-53, includes coupling and clevis hanger assembly sized for covering, 10' OC	12.0	LF	23.64	284	15.50	186				39.1	LF	470
	Building Services Piping Total				**284**		**186**						**470**
	15255 - Valves, iron body												
	15255 - Valves, iron body												
0810	Valves, iron body, gate, 125 lb, N.R.S., flanged, 12" size	4.0	each	928.94	3,716	4,366.80	17,467				5,295.7	each	21,183
1490	Valves, iron body, swing check, 125 lb, flanged, 12" size	2.0	each	928.94	1,858	6,459.30	12,919				7,388.2	each	14,776
	Valves, iron body Total				**5,574**		**30,386**						**35,959**
	15300 - Automatic air vent												
	15300 - Automatic air vent												
0060	Auto air vent, CI body, sst internals, float type, 1" NP inl, 250psi	2.0	each	72.56	145	360.00	720				432.6	each	865
	Automatic air vent Total				**145**		**720**						**865**
	15330 - Flexible connectors												
	15330 - Flexible connectors												

Item	Item Description	Qty	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Total Price Per Unit		Grand Total
	Equipment connection fitting, 12"	2.0	ea	223.30	447	2,952.00	5,904				3,175.3	ea	6,351
	Flexible connectors Total				**447**		**5,904**						**6,351**
	15950 - Testing/Adjusting/Balancing												
	15955700 - Piping, Testing												
0390	Nondestructive hydraulic pressure test, 12" - 24" pipe, 100 LF	1.0	each	1,306.16	1,306						1,306.2	each	1,306
	Testing/Adjusting/Balancing Total				**1,306**								**1,306**

Folsom/Sacramento Suburban Water Transfer Project Conceptual Design

Item	Item Description	Qty	Unit	Labor $/Unit	Labor Amount	Materials $/Unit	Material Amount	Subs Amount	Equip Amount	Other Amount	Total Price Per Unit	Grand Total
	Grand Total				**79,709**		**261,916**	**3,000**	**7,317**	**462**		**352,404**

Category	Percent	Amount	Hours
Alternate 1 Totals			
Labor	**11.43 %**	**40,275**	**623.4**
Material	**36.34 %**	**128,056**	
Subcontractor	**0.43 %**	**1,500**	
Equipment	**0.94 %**	**3,308**	**104.0**
Other	**0.13 %**	**462**	
User			
Net Costs		**173,601**	
Labor Mark-up	15.00 %	6,041	
Material Mark-up	10.00 %	12,806	
Subcontractor Mark-up	5.00 %	75	
Equipment Mark-up	10.00 %	331	
Sales tax	8.75 %	11,494	
Material Shipping & Handling	2.00 %	2,561	
Electrical and Instrumentation	30.00 %	52,080	
Subtotal		**258,989**	
Contractor General Conditions	10.00 %	25,899	
Subtotal		**284,888**	
Start-up, training, O & M	2.00 %		
Subtotal		**284,888**	
Construction Contingency	20.00 %	56,978	
Subtotal		**341,866**	
Bldg Risk, Liability Auto Ins.	2.00 %	6,837	
Subtotal		**348,703**	
Bonds	1.50 %	5,231	

Category	Percent	Amount	Hours
Subtotal		**353,934**	
Total Alternate 1		**353,934**	
Alternate 2 Totals			
Labor	**11.19 %**	**39,434**	**604.8**
Material	**37.98 %**	**133,860**	
Subcontractor	**0.43 %**	**1,500**	
Equipment	**1.14 %**	**4,009**	**103.5**
Other			
User			
Net Costs		**178,804**	
Labor Mark-up	15.00 %	5,915	
Material Mark-up	10.00 %	13,386	
Subcontractor Mark-up	5.00 %	75	
Equipment Mark-up	10.00 %	401	
Sales tax	8.75 %	12,064	
Material Shipping & Handling	2.00 %	2,677	
Electrical and Instrumentation	30.00 %	53,641	
Subtotal		**266,962**	
Contractor General Conditions	10.00 %	26,696	
Subtotal		**293,659**	
Start-up, training, O & M	2.00 %		
Subtotal		**293,659**	
Construction Contingency	20.00 %	58,732	
Subtotal		**352,390**	

Category	Percent	Amount	Hours
Bldg Risk, Liability Auto Ins.	2.00 %	7,048	
Subtotal		**359,438**	
Bonds	1.50 %	5,392	
Subtotal		**364,830**	
Total Alternate 2		**364,830**	

Sacramento Suburban Water District Standard Details

General Notes

1. Sacramento Suburban Water District is a member of U.S.A. one call program. Call for public water system information.

2. All materials used and work performed in water system construction and installation shall comply with approved plans, Special Conditions and the District Standards and Specs. Any and all deviations from these documents shall require prior written approval by the General Manager Or his duly appointed representative of the District.

3. Ten (10) days prior to pre-construction meeting, the Contractor shall furnish to the District, a list of materials proposed to be used in constructing the water system, including manufacturer, actual location of manufacturer and model number.

4. An on-site meeting with the District Inspector, Consulting Engineer, County Inspector and Contractor must be held at least two (2) days in advance of construction to inspect materials, schedule inspections, review the approved water system plans and schedule any tie-in connections. Pre-construction meetings will not be scheduled until all District costs and fees have been paid in full as well as submittals of all material lists, guarantee letters, encroachment/maintenance bonds, final signed plans, reproducible plans and electronic file of project.

5. No work shall begin until items in general notes "3" & "4" are completed.

6. All water system SHUTDOWNS shall be made ONLY by District personnel. Under no circumstances shall anyone other than the District open or close any valve in the District system. Shutdowns for the purpose of making connections to existing mains must be scheduled at least three (3) days in advance, and are ONLY permitted on Tuesday, Wednesday or Thursday. The hours of the shutdown shall be determined by the District. All connections will be supervised and controlled by the District.

7. The finish grade shall be established, staked and marked at each water service connection and hydrant location. Permanent property corner markers shall be placed by a licensed Civil Engineer or Surveyor.

8. A separate water service connection must be installed for each lot, parcel or premise, and shall be one inch in diameter unless otherwise specified on the approved water plan. No service shall be permitted within 20' of a blow off assembly.

9. The completed water system must be disinfected, hydro-tested and flushed.

10. No water service will be provided and no connections to water service will be permitted until the requirements for temporary water approval have been completed.

11. At the time of final acceptance by the District, the completed water system and main extensions with all appurtenances, apparatus, fittings and equipment shall become and forever remain the property of the District.

12. All existing water services not required for this project shall be abandoned according to the following. The exact method shall be determined by the District Inspector.

    A. Removing section of pipe and replacing with a new section.
    B. Remove corporation stop, saddle and place a full circle 20" wide, stainless steel repair band.

13. All backflow prevention devices shall be TESTED by certified approved County testers prior to FINAL ACCEPTANCE. Copies of satisfactory test results shall be furnished to the District prior to FINAL ACCEPTANCE of system at no cost to the District. Water service shall not be provided until District receives the satisfactory test results.

14. Upgrade of existing facilities shall include but not limited to bringing facility to current standards and/or replacement as required or directed by the District.

15. A separate sampling station and/or stations shall be installed as necessary to meet State Department of Public Health Services requirements for coliform testing.

SACRAMENTO SUBURBAN WATER DISTRICT
PHONE (916) 972-7171
3701 MARCONI AVENUE
SUITE 100
SACRAMENTO, CA
95821-5346

STANDARD DETAIL

GENERAL NOTES

DATE: DECEMBER 2008 | STD. DET. NO. A

WATER MAIN TO BE CONSTRUCTED (SIZE) . . . . . 12"W

VALVE . . . . . .

FIRE HYDRANT ASSEMBLY . . . . . .

SINGLE WATER SERVICE . . . . . W.S.

DOUBLE WATER SERVICE . . . . . .

AIR VALVE . . . . . A

TEE . . . . . .

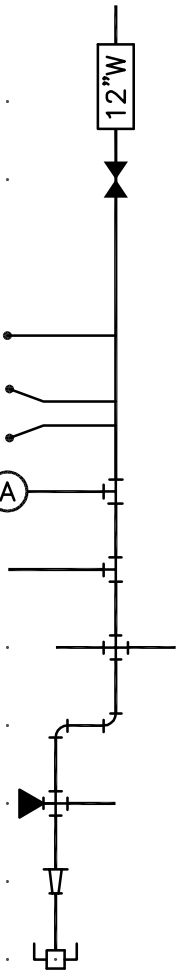
CROSS . . . . . .

ANGLE BEND . . . . . .

THRUST BLOCK (REQ'D AT ALL FITTINGS) . . . . . .

REDUCER . . . . . .

BLOW OFF . . . . . .



NOTE: EXISTING FACILITIES ARE TO BE SHOWN DASHED.

SACRAMENTO SUBURBAN WATER DISTRICT

APPROVED FOR CONSTRUCTION OF WATER SYSTEM:

_____ _____

BY DATE

NOTE: THIS PLAN EXPIRES ONE YEAR FROM APPROVAL

(NAME) FIRE DISTRICT

APPROVED AS TO FIRE SERVICE LOCATIONS ONLY. MAIN SIZE DETERMINED BY SACRAMENTO SUBURBAN WATER DISTRICT.

BY _____ DATE _____

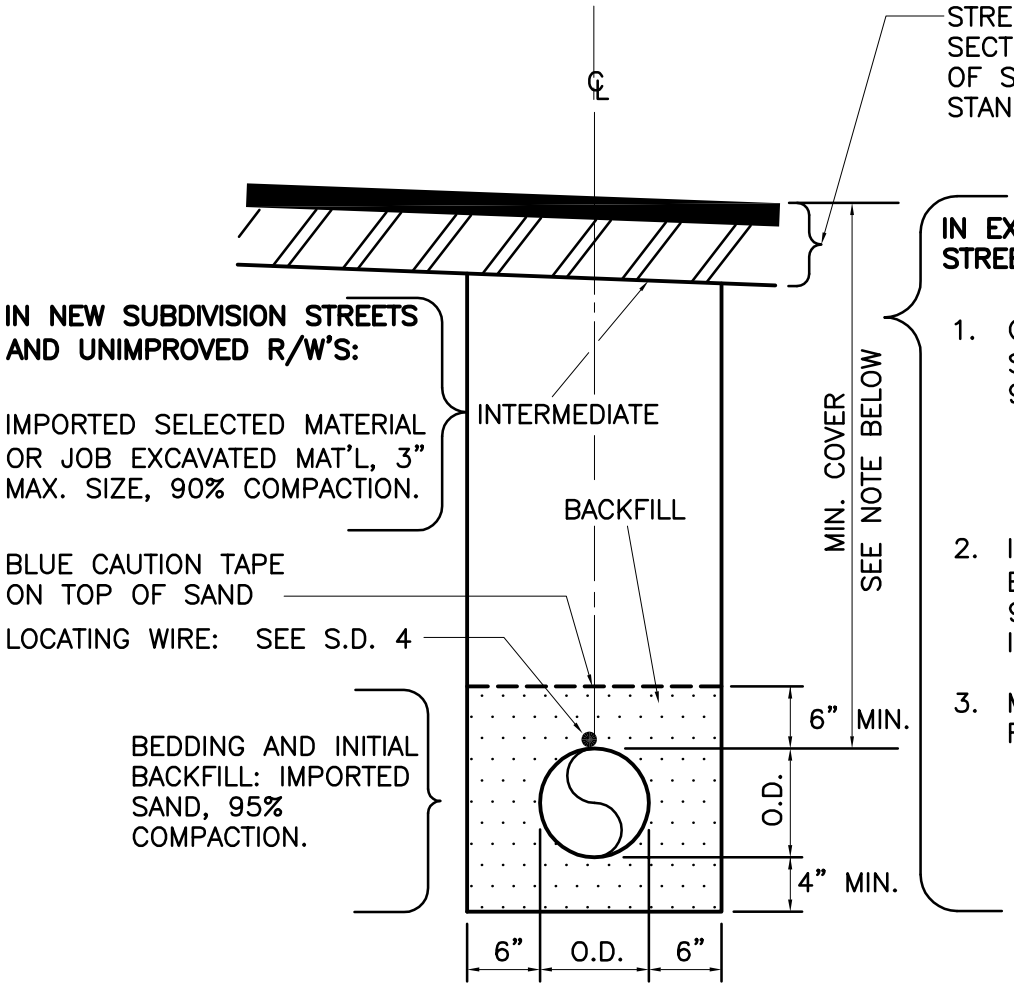
SACRAMENTO SUBURBAN WATER DISTRICT

PHONE (916) 972-7171
3701 MARCONI AVENUE
SUITE 100
SACRAMENTO, CA
95821-5303

STANDARD DETAIL

DRAFTING SYMBOLS AND APPROVAL BLOCKS

DATE: NOVEMBER 2007 | STD. DET. NO. 1



NOTE: MIN. COVER FROM TOP OF PIPE TO FINISHED GRADE SHALL BE:

12" DIAMETER AND UNDER.....36"
OVER 12" DIAMETER.....42"

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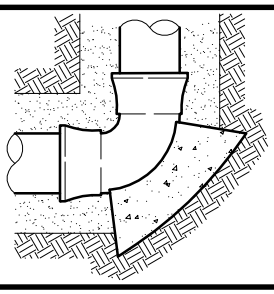
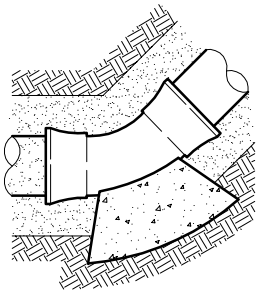
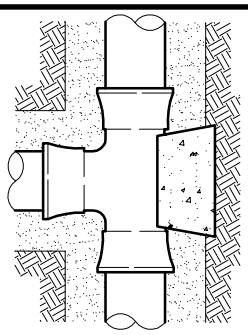
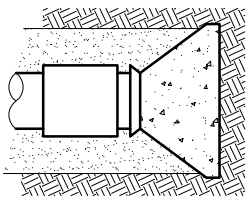
STANDARD DETAIL

TRENCH BACKFILL

DATE: NOVEMBER 2007 | STD. DET. NO. 2

REQUIRED BEARING AREAS IN SQ. FT.

INSTALLATION	TYPE FITTING	PIPE SIZES 4"	6"	8"	10"	12"
	90° ELL	2	4	7	12	16
	45° BEND	1	2	4	6	10
	22 1/2° BEND 11 1/4° BEND	1	1	2	3	5
	TEE	2	3	5	8	12
	DEAD END	2	3	5	8	12

NOTES

1. THRUST BLOCKS ARE TO BE CONSTRUCTED OF CLASS 'B' CONCRETE.
2. AREAS GIVEN AR FOR CLASS 150 PIPE AT TEST PRESSURE OF 150 P.S.I. IN SOIL WITH 2,000 P.S.F. BEARING CAPACITY. INSTALLATIONS USING DIFFERENT DATA SHALL ADJUST AREAS SUBJECT TO DISTRICT APPROVAL.
3. BLOCKING TO BE POURED AGAINST UNDISTURBED SOIL.
4. THRUST BLOCKS ARE TO BE FREE, SEPARATE AND INDEPENDENT OF ADJACENT OR NEARBY THRUST BLOCKS.
5. THRUST BLOCKS FOR PIPE SIZES LARGER THAN 12" SHALL BE CALCULATED AND SUBMITTED FOR DISTRICT DESIGN APPROVAL.

SACRAMENTO SUBURBAN WATER DISTRICT
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3701 MARCONI AVENUE
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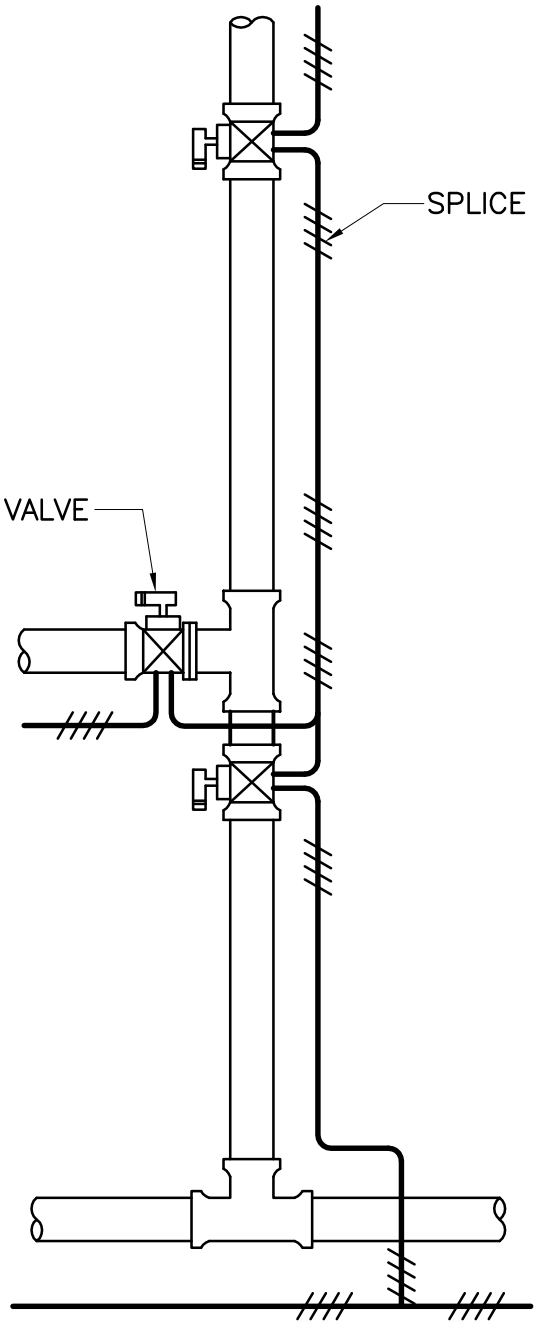
SACRAMENTO, CA
95821-5303

STANDARD DETAIL

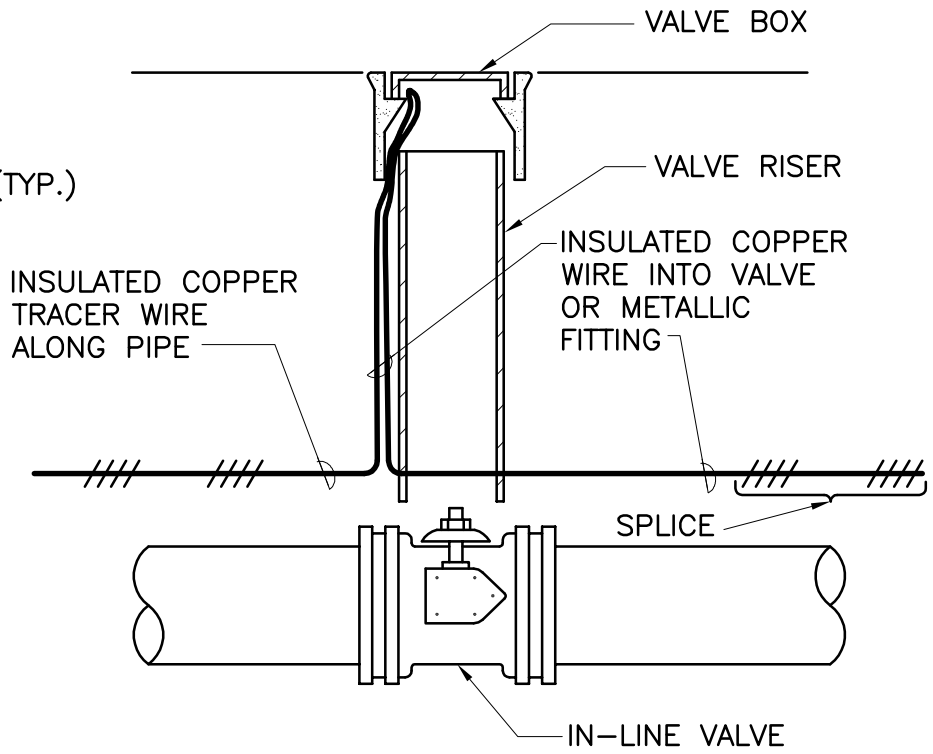
THRUST BEARING BLOCK AREA

DATE: FEBRUARY 2002 | STD. DET. NO. 3

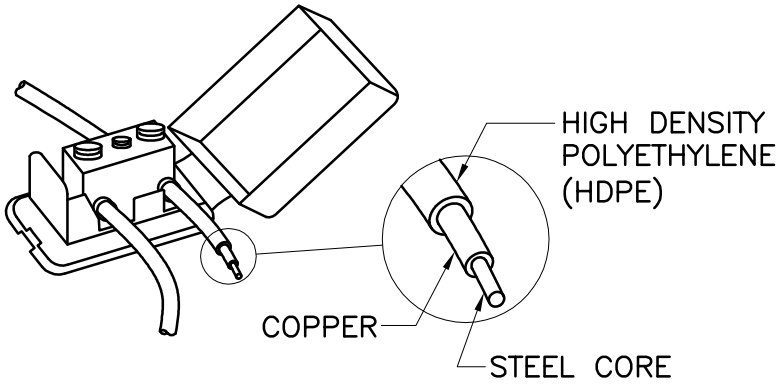


ALL RUNS TO BE SPLICED TOGETHER CLEAR OF FITTINGS.

TYPICAL LAYOUT



VALVE DETAIL



SPLICE DETAIL

1. STRIP MAIN AND TAP CONDUCTOR
2. PLACE STRIPPED CONDUCTOR INTO SLOTTED LUG
3. TORGUE TO 35LB-IN
4. REPEAT ON LATERAL RUN
5. REMOVE SEALANT COVER AND DISCARD
6. CLOSE HOUSING, ALIGNING CONDUCTORS UNTIL HOUSING LID IS FULLY LATCHED

NOTES

1. TRACING WIRE TO BE NO. 10 AWG., SOLID COPPER CLAD HARD DRAWN HIGH CARBON STEEL EXTRA HIGH STRENGTH HORIZONTAL DIRECTIONAL DRILL TRACER WIRE, 45 MIL BLUE INSULATION JACKET COMPLYING WITH ASTM-D-1248, 30 VOLT RATING.
2. WIRE TO BE CONTINUOUS BETWEEN VALVE BOXES.
3. INSULATED WIRE SHALL NOT TOUCH VALVES OR FITTINGS.
4. LOCATING WIRE TO BE TAPE ON TOP OF POLYWRAP, ABOVE CENTER OF PIPE.

SACRAMENTO SUBURBAN WATER DISTRICT
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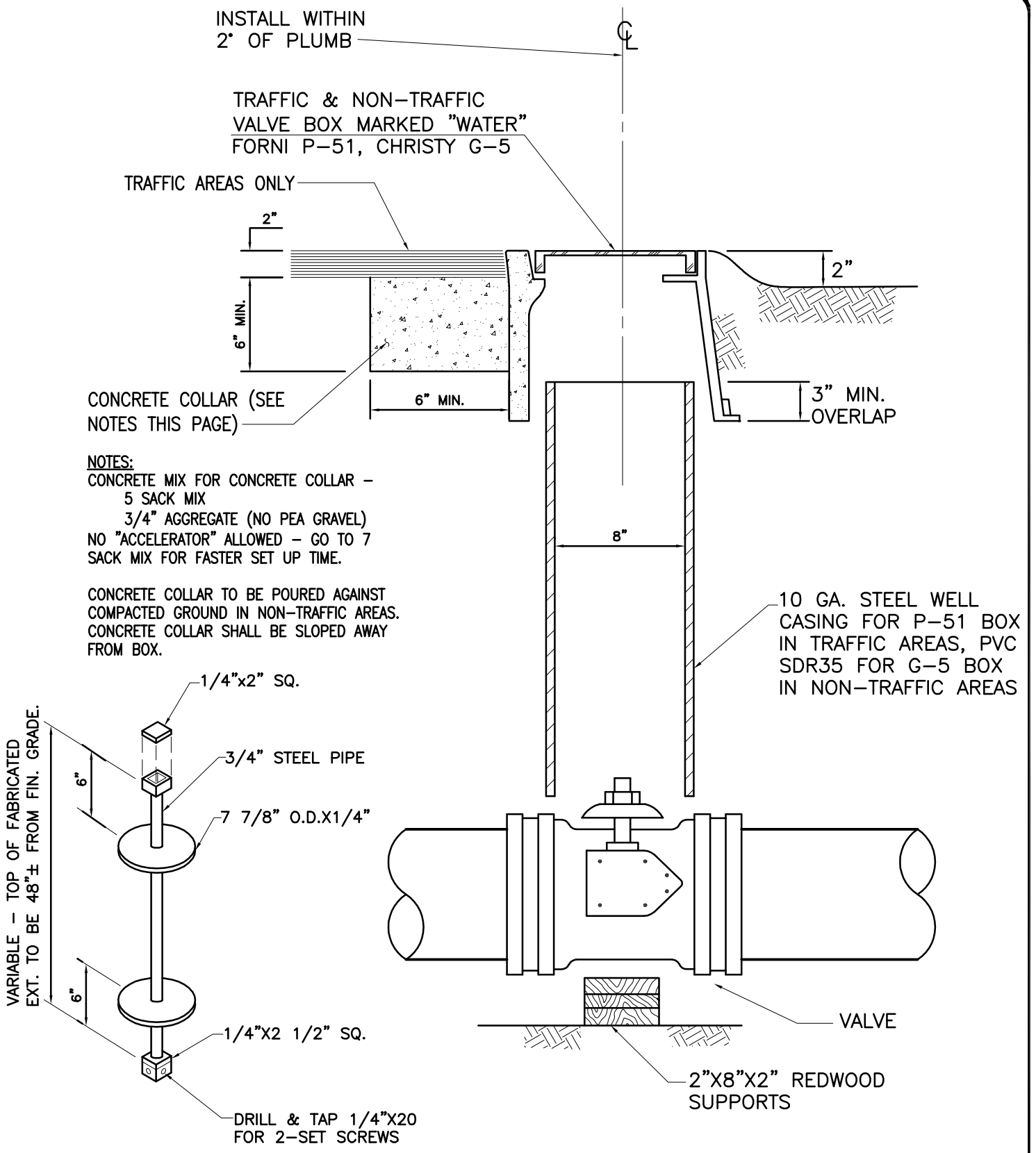
95821-5303

STANDARD DETAIL

TRACING WIRE FOR WATER MAINS

DATE: DECEMBER 2008 | STD. DET. NO. 4



NOTES:
CONCRETE MIX FOR CONCRETE COLLAR -
5 SACK MIX
3/4" AGGREGATE (NO PEA GRAVEL)
NO "ACCELERATOR" ALLOWED - GO TO 7 SACK MIX FOR FASTER SET UP TIME.

CONCRETE COLLAR TO BE POURED AGAINST COMPACTED GROUND IN NON-TRAFFIC AREAS. CONCRETE COLLAR SHALL BE SLOPED AWAY FROM BOX.

VALVE OPERATING EXTENSION

REQ'D WHERE VALVE NUT IS IN EXCESS OF 48" DEEP.

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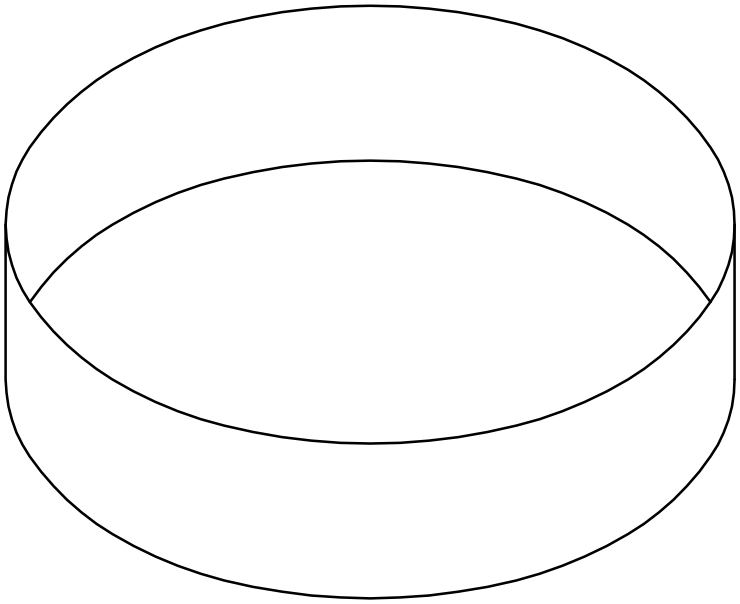
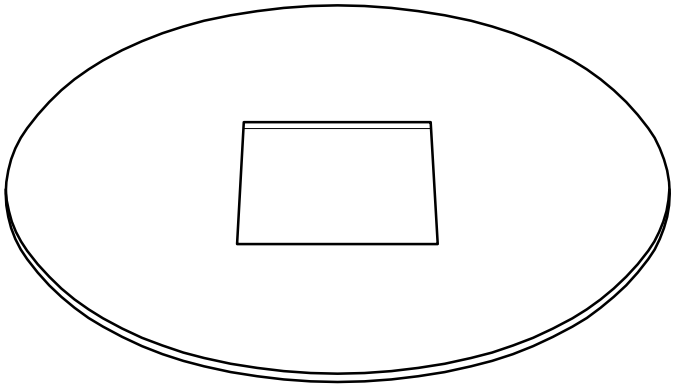
STANDARD DETAIL

VALVE RISER & BOX INSTALLATION

DATE: DECEMBER 2009 | STD. DET. NO. 5

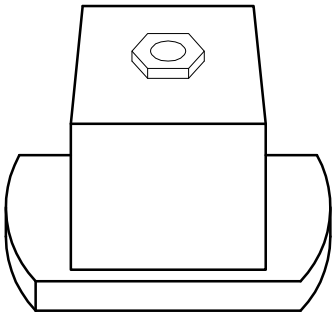


RISER PIPE
8' DIA.



RISER ALINER SIZE
AS NECESSARY TO
FIT RISER PIPE

METAL CLIP TO BE USED
ONLY ON BUTTERFLY
VALVES



2" OPERATING NUT

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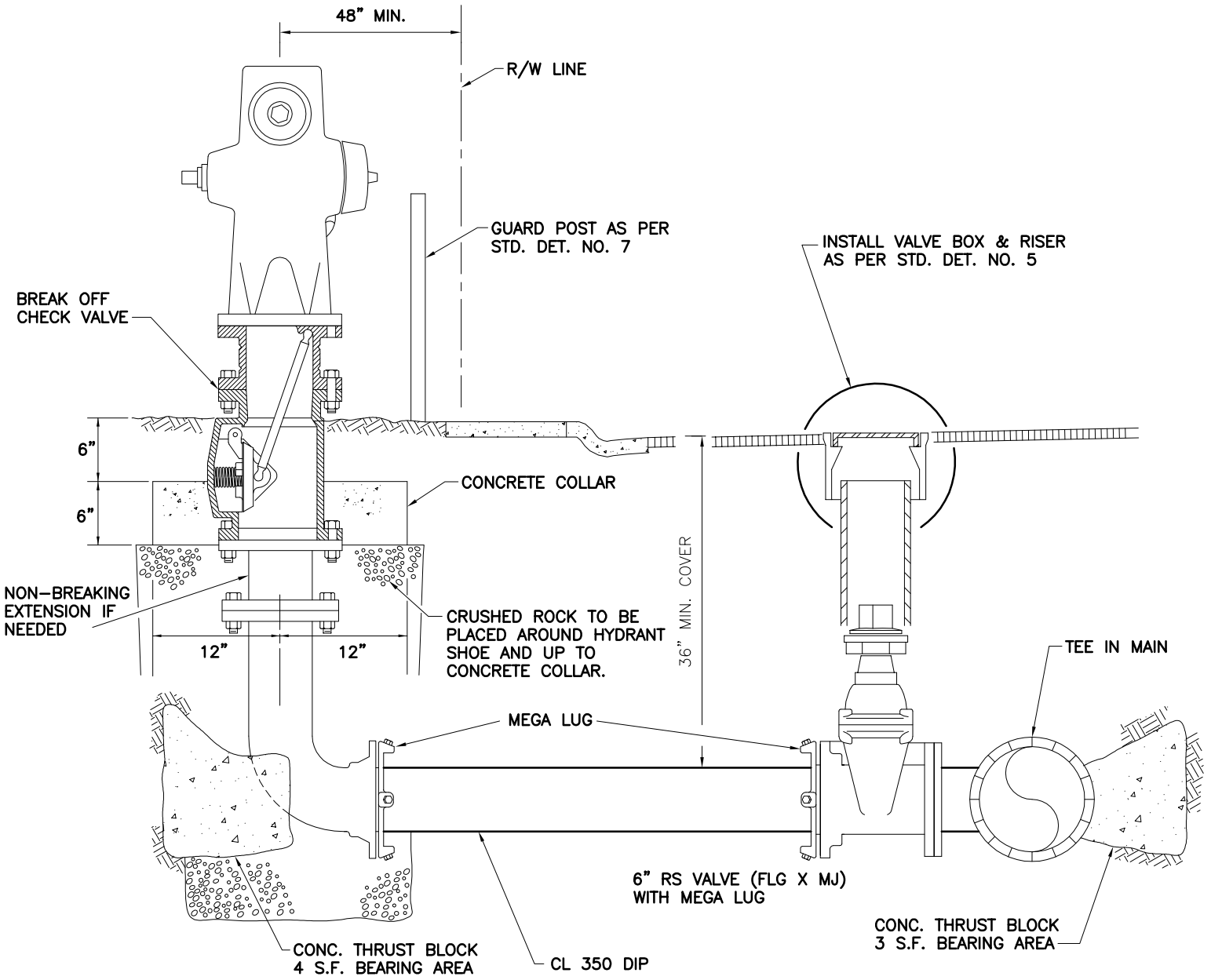
STANDARD DETAIL

RISER ALINER

DATE: FEBRUARY 2002 | STD. DET. NO. 5A



NOTES:

1. HYDRANT LATERAL VALVE SHALL BE FLANGE CONNECTED TO MAIN TEE.
2. ALL HYDRANT LATERALS SHALL BE RESTRAINT TYPE CONNECTIONS INCLUDING HYDRANT.
3. CONCRETE COLLAR TO BE PLACED AGAINST COMPACTED LOAD BEARING SOIL.
4. HYDRANT SHALL BE WET BARREL, STEAMER TYPE, (REFER TO SPEC.)
5. MINIMUM OF 4 GUARD POSTS SHALL BE INSTALLED AT ALL HYDRANTS LOCATED
   a) COMMERCIAL AND INDUSTRIAL COMPLEXES
   b) MULTI-DENSITY DEVELOPMENTS
   c) AT LOCATION OF SEVERE VEHICULAR TRAFFIC AS PER STD. DET. NO. 7
6. PAINT HYDRANTS AND GUARD POSTS W/"RUST-O-CRYLIC" NO. 5747 YELLOW.

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STANDARD DETAIL

STEAMER TYPE HYDRANT ASSEMBLY INSTALLATION

DATE: DECEMBER 2009 | STD. DET. NO. 6

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FOR
FUTURE
CONSIDERATION

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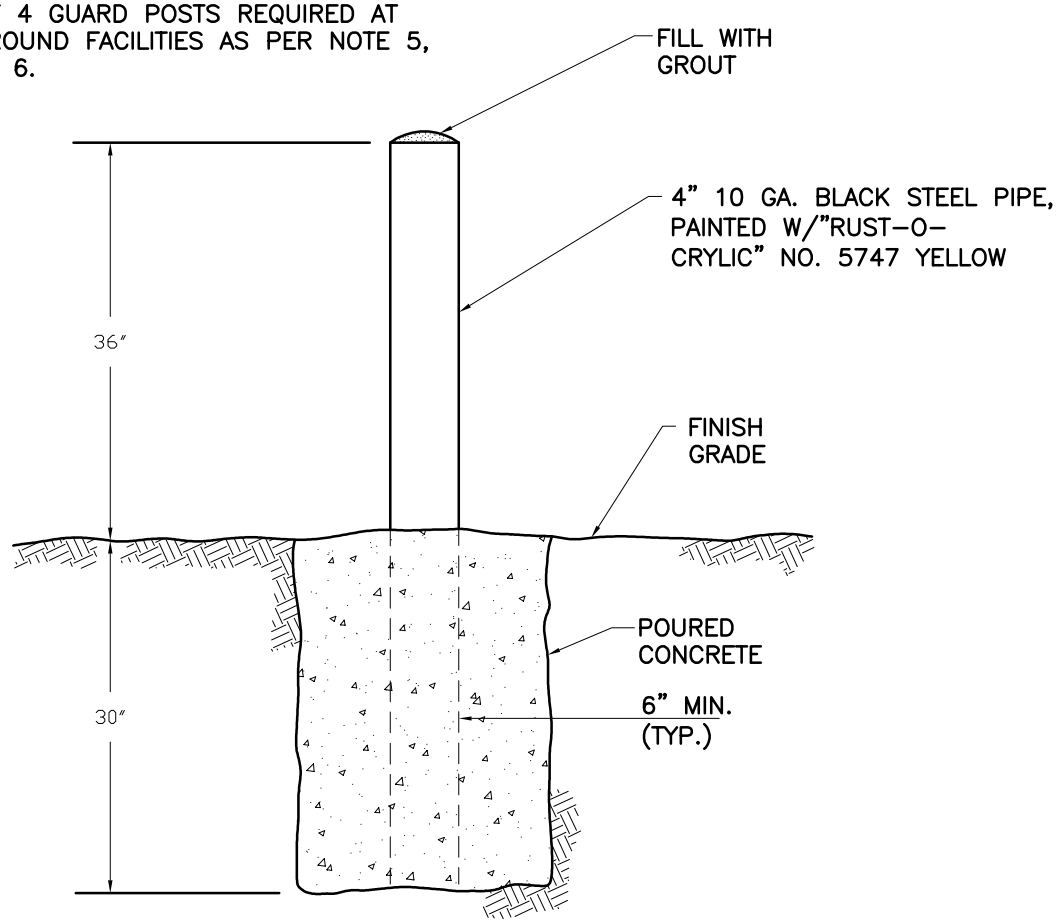
STANDARD DETAIL

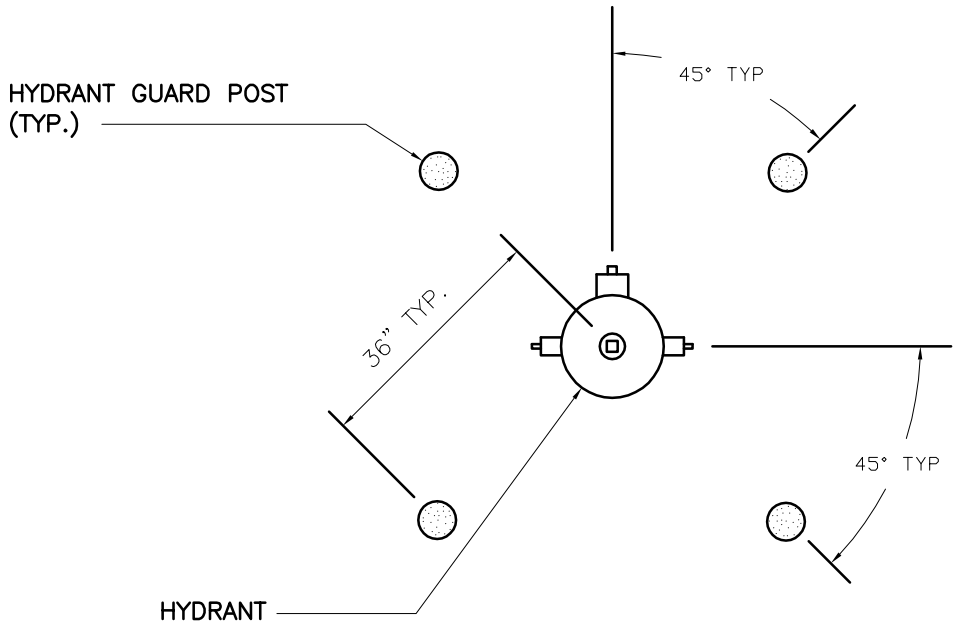
DATE:

STD. DET. NO. 6A

Note: A MINIMUM OF 4 GUARD POSTS REQUIRED AT ALL ABOVE GROUND FACILITIES AS PER NOTE 5, STD. DET. NO. 6.



TYPICAL INSTALLATION



TYPICAL LOCATION

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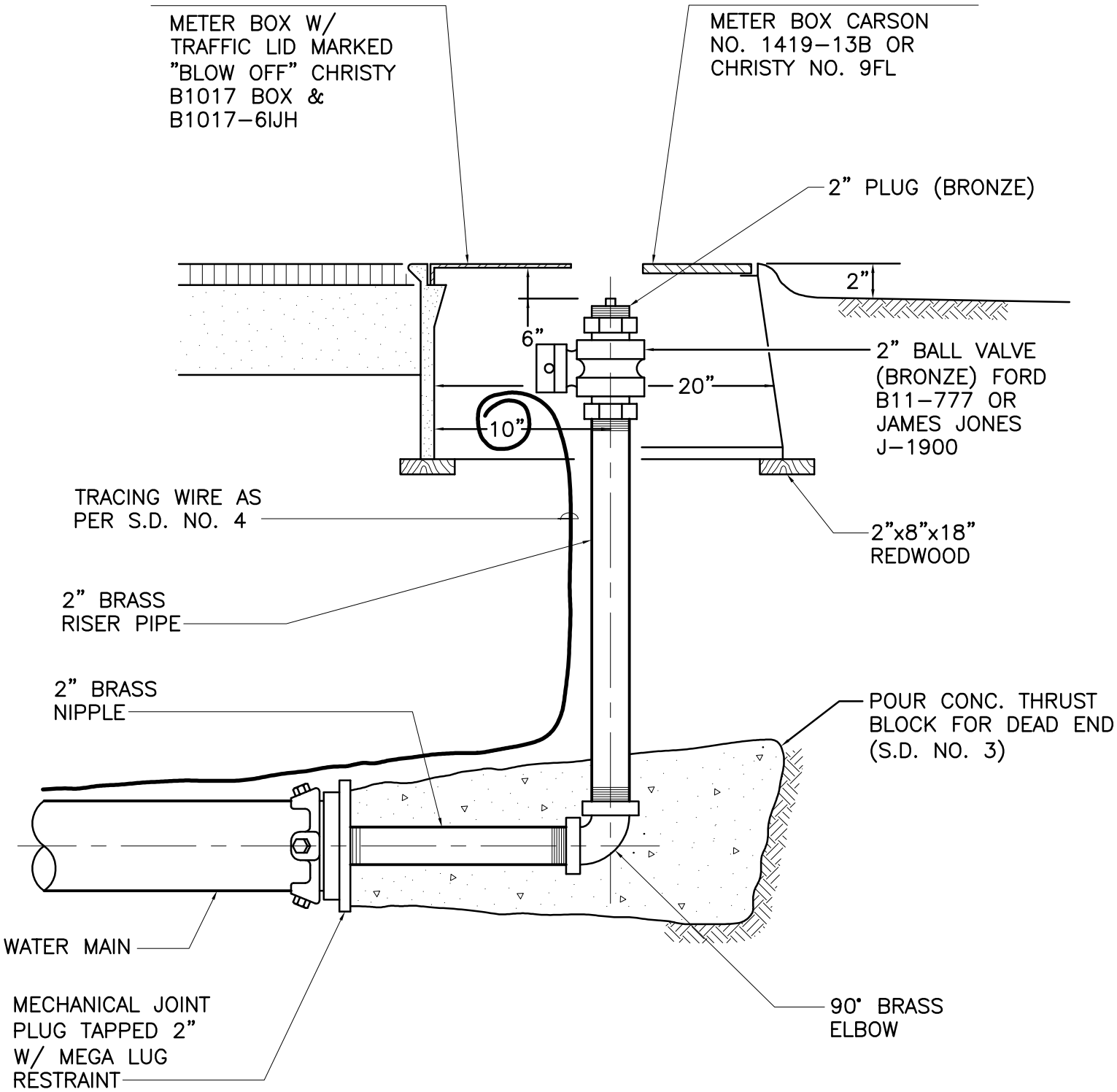
STANDARD DETAIL

HYDRANT GUARD POSTS

DATE: FEBRUARY 2002 | STD. DET. NO. 7



NOTES:

1. USE TEFLON PLUMBER'S TAPE ON ALL PIPE THREADS.
2. ALL UNDERGROUND PIPE AND FITTING TO BE WRAPPED WITH VINYL TAPE.

*METER BOX SHALL NOT BE PLACED UNTIL BACKFILL IS FULLY COMPACTED.

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STANDARD DETAIL

TEMPORARY
2" BLOW OFF INSTALLATION

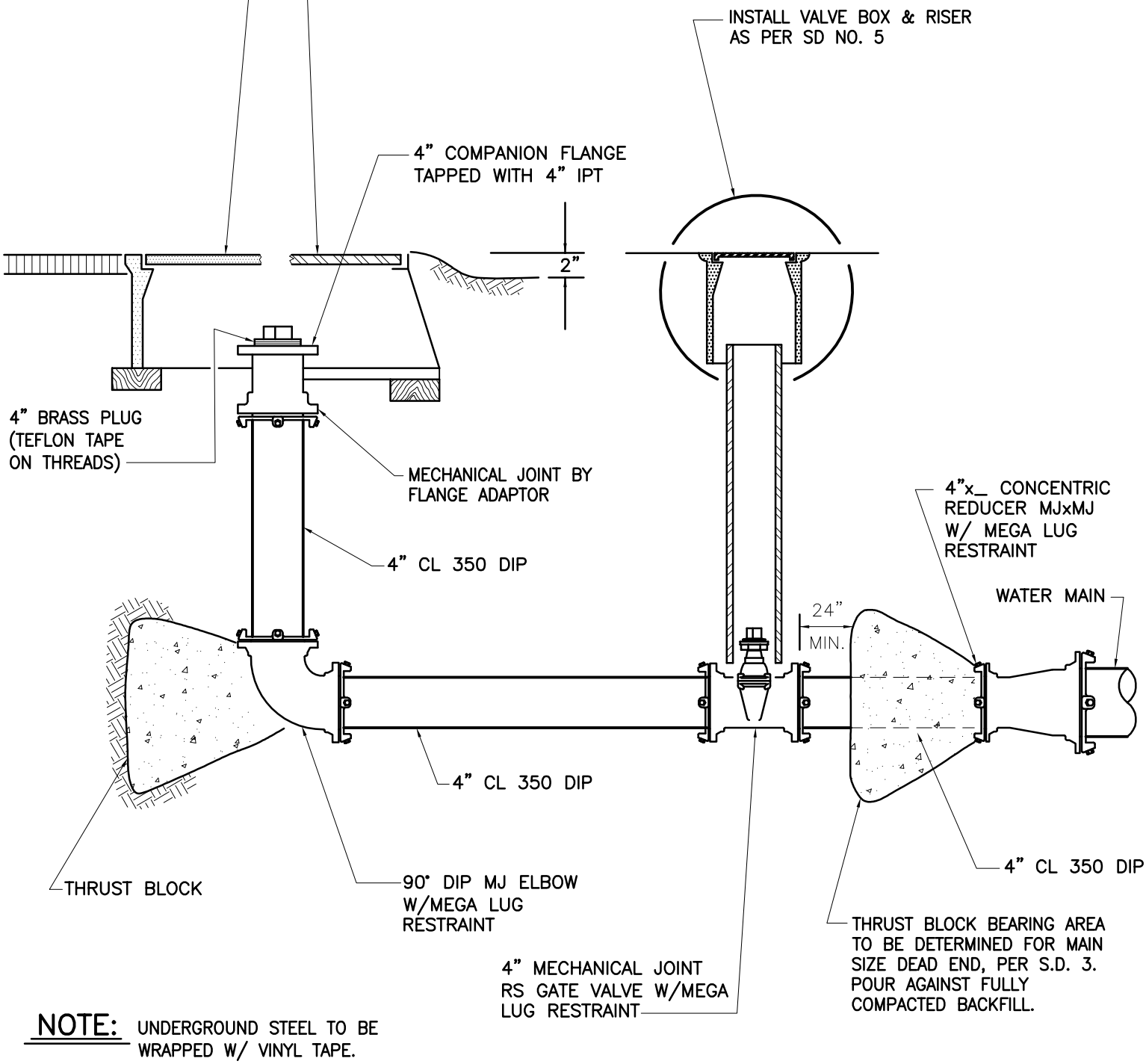
DATE: FEBRUARY 2002 | STD. DET. NO. 8

*PAVED AREAS:

METER BOX W/TRAFFIC LID MARKED "BLOW OFF": CHRISTY B1730 BOX & B1730-5IJH

*NON-PAVED AREAS:

METER BOX: CARSON NO. 1419-13B OR CHRISTY NO. 9FL



NOTE: UNDERGROUND STEEL TO BE WRAPPED W/ VINYL TAPE.

* METER BOX SHALL NOT BE PLACED UNTIL BACKFILL IS FULLY COMPACTED

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STANDARD DETAIL

TEMPORARY
4" BLOW OFF INSTALLATION

DATE: OCTOBER 2006 | STD. DET. NO. 9

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CONSIDERATION

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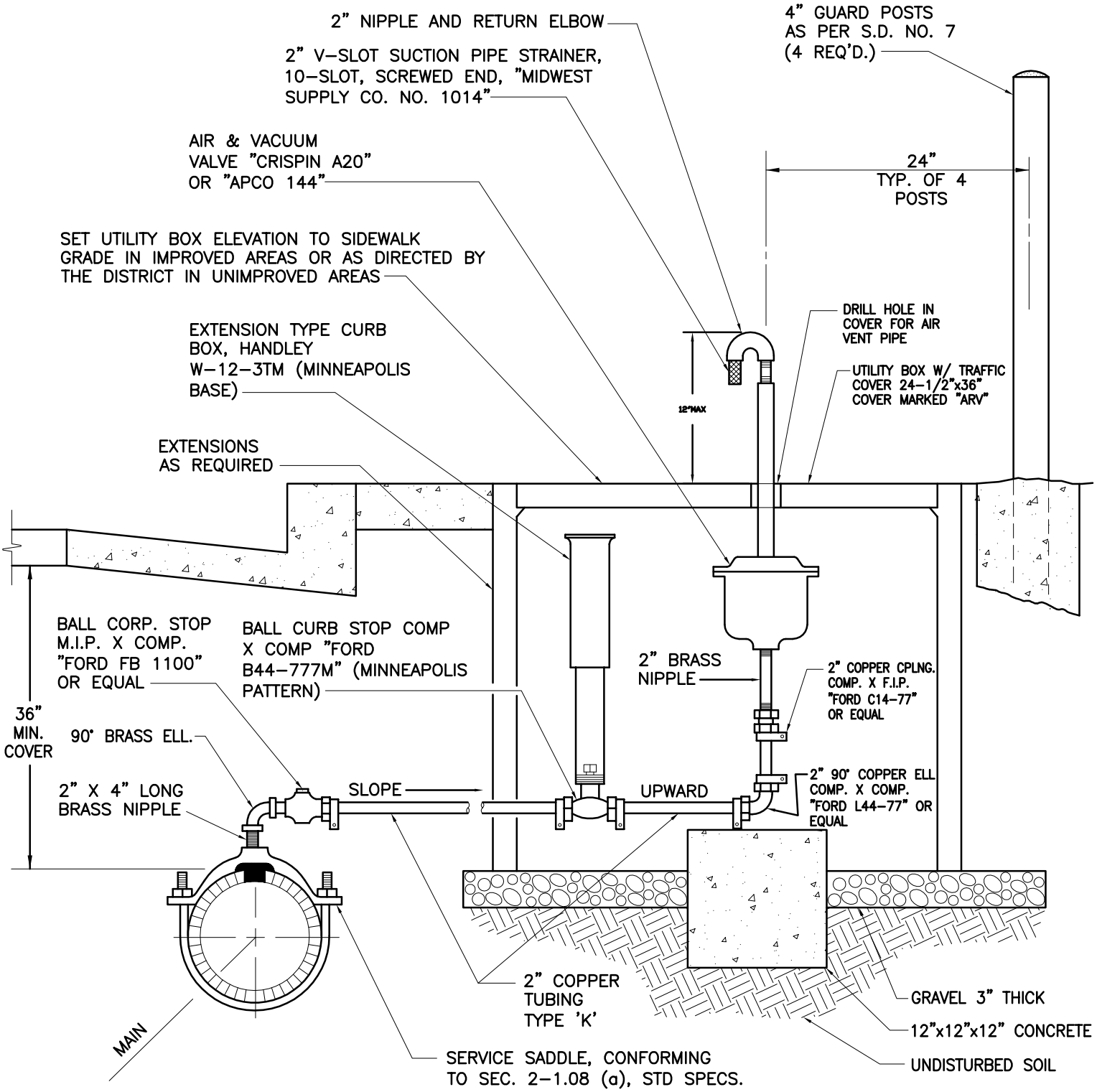
STANDARD DETAIL

DATE:

STD. DET. NO. 10



NOTES:

1. USE TEFLON PLUMBER'S TAPE ON ALL THREADS.
2. POLYETHYLENE ENCASEMENT WILL BE REQUIRED FOR ALL COPPER PIPE INSTALLATION. ENCASEMENT MATERIAL AND INSTALLATION METHODS SHALL CONFORM TO AWWA STANDARD C-105.

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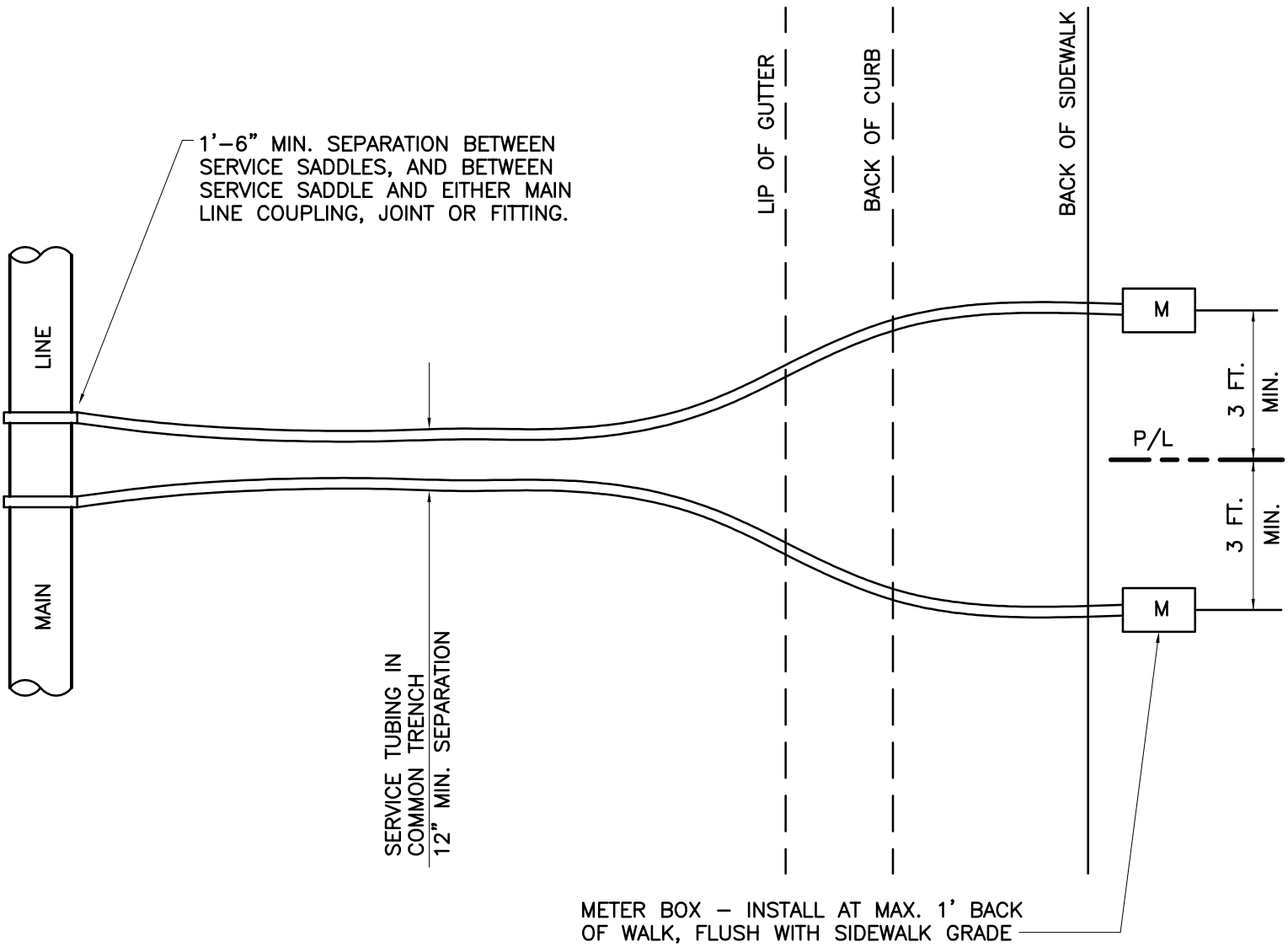
STANDARD DETAIL

2" AIR RELEASE ASSEMBLY

DATE: NOVEMBER 2007 | STD. DET. NO. 11



NOTES:

1. SERVICES SHALL BE BEDDED AND BACKFILLED AS PER STD. DET. NO. 2
2. DOUBLE SERVICES TO BE USED ONLY WITH PRIOR WRITTEN APPROVAL OF DISTRICT.

SACRAMENTO SUBURBAN WATER DISTRICT
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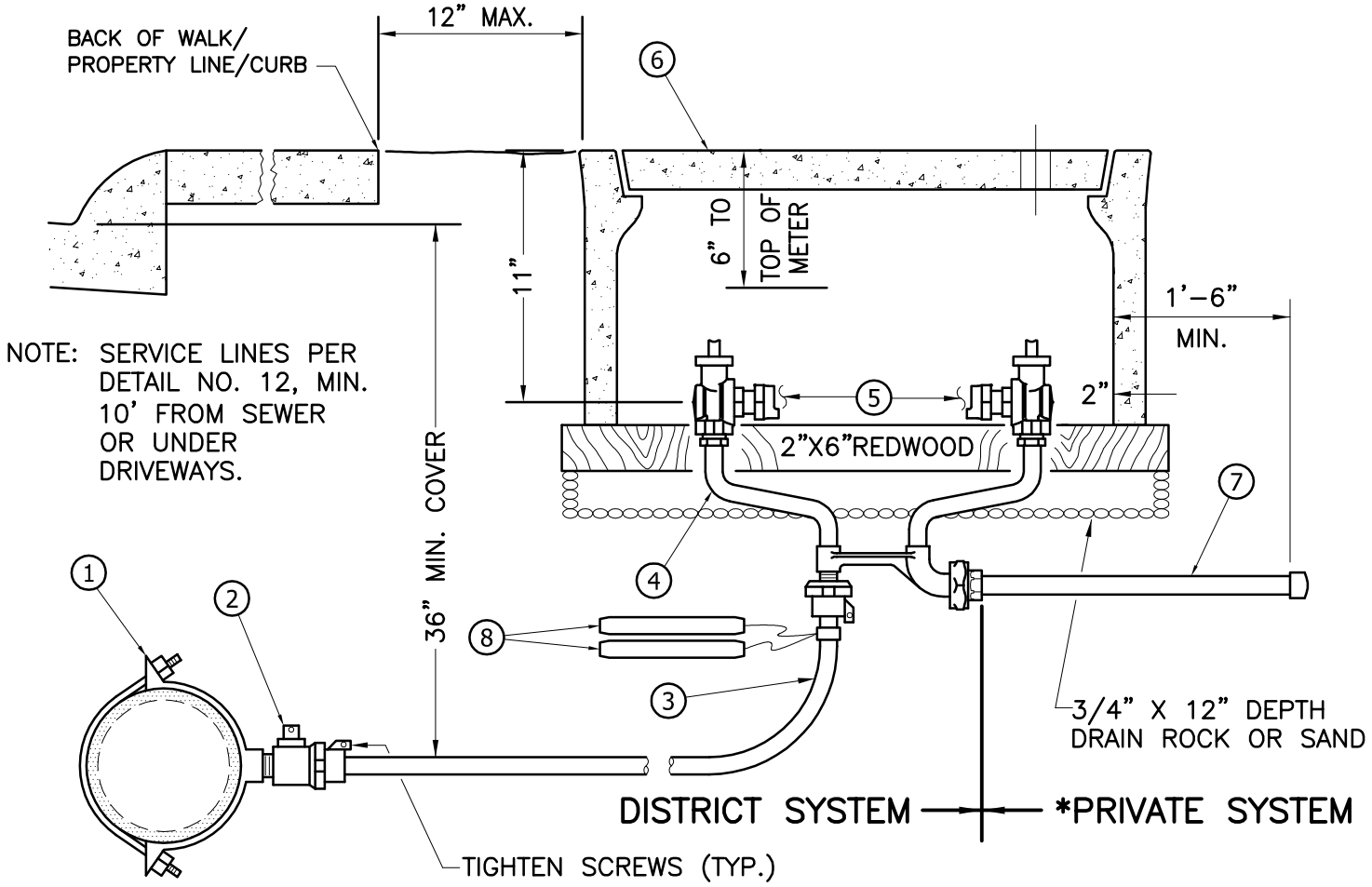
STANDARD DETAIL

DOUBLE WATER SERVICE INSTALLATION

DATE: FEBRUARY 2002 | STD. DET. NO. 12



1. 1" SERVICE SADDLE, FIP AS PER SEC. 2–1.08 (a), STD. SPECS.
2. 1" CORP. COCK, MIP X COMP., AS PER SECTION 2–1.08 (b), STD. SPECS.
3. 1" TYPE K POLYETHYLENE–COATED COPPER TUBING, AS PER SEC. 2–1.08 (c) STD. SPECS.
4. 1" COPPER SETTER: W/CT PACK JOINT INLET AND FIP OUTLET AS PER SECTION 2–1.08 (d), STD. SPECS.
5. WATER METER TO BE INSTALLED BY CONTRACTOR, PAID FOR BY DEVELOPER AT FURNISH ONLY FEE.
6. 1" CONCRETE METER BOX (MARKED "WATER"): AS PER SECTION 2–1.08 (d).
7. BRASS NIPPLE – 18" LONG, FIP CAP (1" MINIMUM).
8. 2 – 4# HIGH PURITY COPPER SERVICE LINE ANODES WITH INSULATED SOLID CORE COPPER WIRE 10 FEET LONG AND BRASS CABLE TO PIPE CLAMP. ANODES TO BE USED ONLY ON EXISTING COPPER SERVICE LINES, AS PER SECTION 2–2.11 STD. SPECS.

NOTES:

POLYETHYLENE ENCASEMENT WILL BE REQUIRED FOR ALL COPPER PIPE INSTALLATION. ENCASEMENT MATERIAL AND INSTALLATION METHODS SHALL CONFORM TO AWWA STANDARD C–105.

*PRIVATE SYSTEM TO CONFORM WITH SACRAMENTO CO. STANDARDS
DISTRICT SYSTEM SHALL INCLUDE METER BOX

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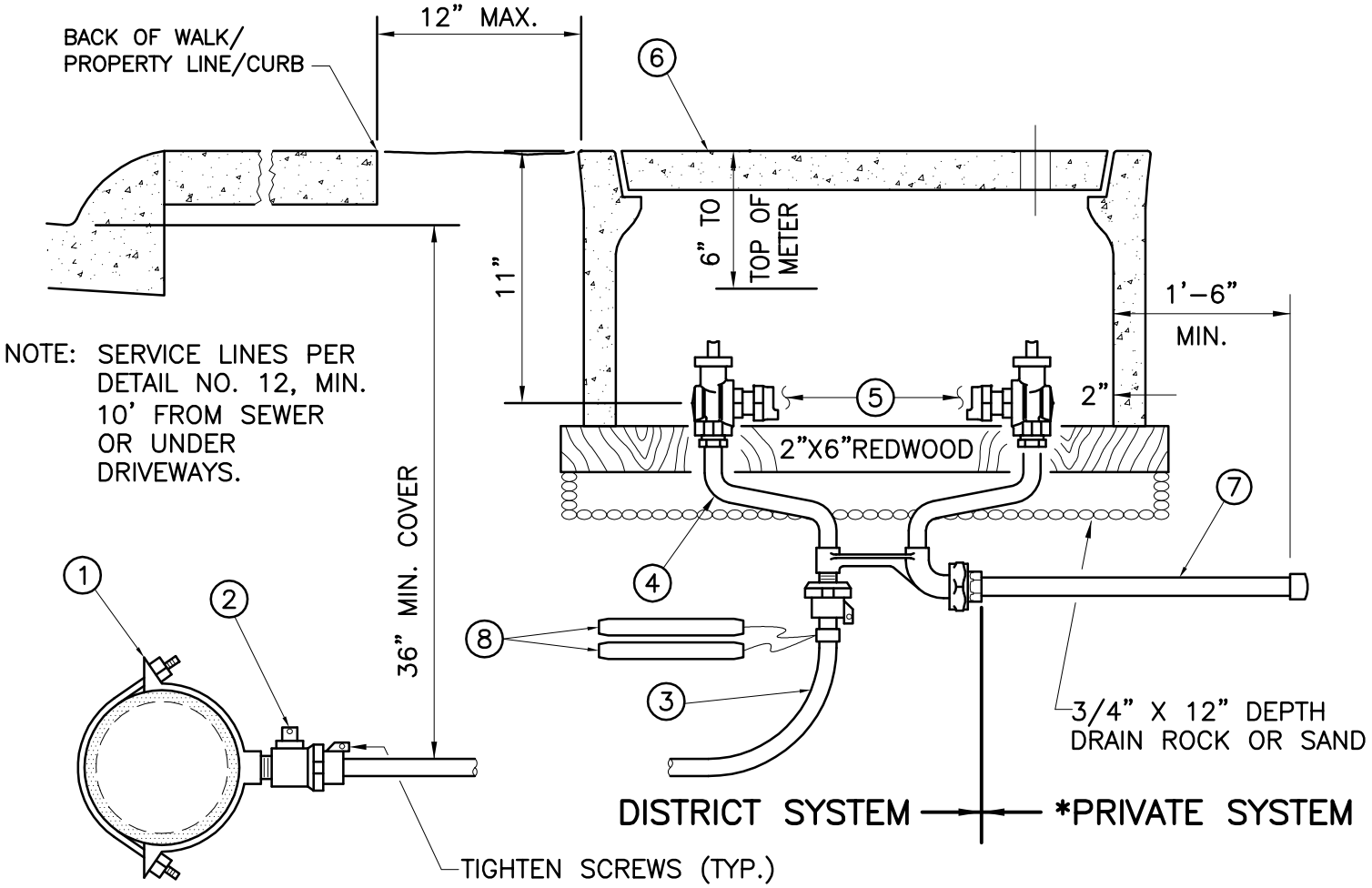
STANDARD DETAIL

TYPICAL 3/4" & 1" METERED RESIDENTIAL WATER SERVICE

DATE: DECEMBER 2008 | STD. DET. NO. 13



1. 1" SERVICE SADDLE, FIP AS PER SEC. 2–1.08 (a), STD. SPECS.
2. 1" CORP. COCK, MIP X COMP., AS PER SECTION 2–1.08 (b), STD. SPECS.
3. 1" TYPE K POLYETHYLENE–COATED COPPER TUBING, AS PER SEC. 2–1.08 (c) STD. SPECS.
4. 1" COPPER SETTER: W/CT PACK JOINT INLET AND FIP OUTLET AS PER SECTION 2–1.08 (d), STD. SPECS.
5. WATER METER INSTALLED BY CONTRACTOR, PAID FOR BY DEVELOPER AT FURNISH ONLY FEE.
6. 1" CONCRETE METER BOX (MARKED "WATER"): AS PER SECTION 2–1.08 (d).
7. BRASS NIPPLE – 18" LONG, FIP CAP (1" MINIMUM)
8. 2 – 4# HIGH PURITY COPPER SERVICE LINE ANODES WITH INSULATED SOLID CORE COPPER WIRE 10 FEET LONG AND BRASS CABLE TO PIPE CLAMP. ANODES TO BE USED ONLY ON EXISTING COPPER SERVICE LINES, AS PER SECTION 2–2.11 STD. SPECS.

NOTES:

POLYETHYLENE ENCASEMENT WILL BE REQUIRED FOR ALL COPPER PIPE INSTALLATION. ENCASEMENT MATERIAL AND INSTALLATION METHODS SHALL CONFORM TO AWWA STANDARD C–105.

*PRIVATE SYSTEM TO CONFORM WITH SACRAMENTO CO. STANDARDS
DISTRICT SYSTEM SHALL INCLUDE METER BOX

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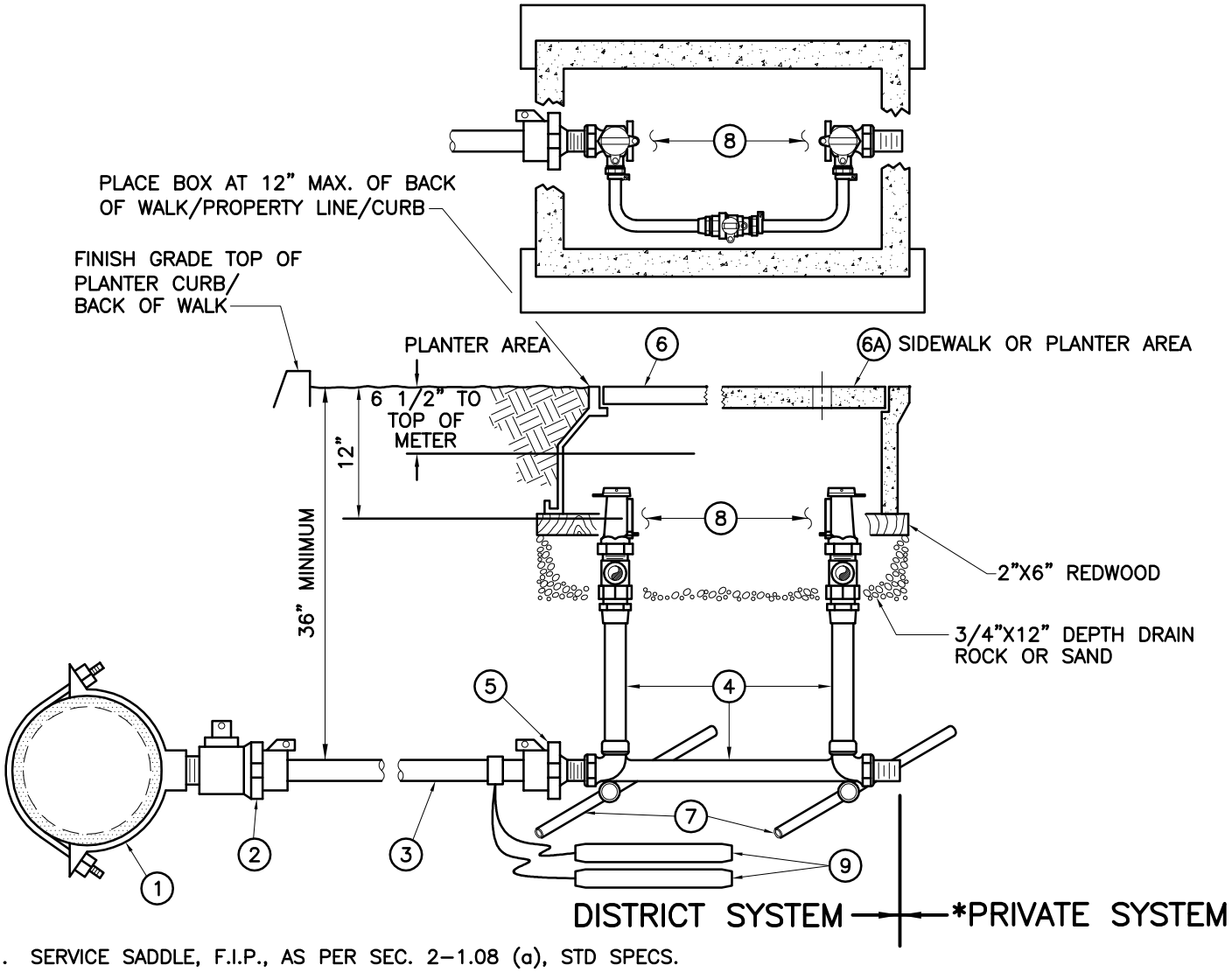
STANDARD DETAIL

TYPICAL 3/4" & 1" NON–RESIDENTIAL METERED WATER SERVICE

DATE: DECEMBER 2009 | STD. DET. NO. 14



1. SERVICE SADDLE, F.I.P., AS PER SEC. 2–1.08 (a), STD SPECS.
2. BALL CORP. COCK, M.I.P. X COMP., AS PER SEC. 2–1.08 (b), STD. SPECS.
3. TYPE K POLYETHYLENE–COATED COPPER TUBING, AS PER SEC. 2–1.08 (c) STD. SPECS.
4. CUSTOM STTER WITH BY PASS OR EQUAL AS PER SEC. 2–1.08 (d).
5. BRONZE STRAIGHT COUPLING, MIP X COMP, FORD C–84.
6. 2" METER BOX (MARKED "WATER"): AS PER SECTION 2–1.08 (d).
6A. 2" METER BOX (MARKED "WATER"): AS PER SECTION 2–1.08 (d).
7. 1" PVC OR I.P. THROUGH BRACE PIPE.
8. WATER METER INSTALLED BY CONTRACTOR, PAID FOR BY DEVELOPER AT A FURNISH ONLY FEE.
9. 2 – 4# HIGH PURITY COPPER SERVICE LINE ANODES WITH INSULATED SOLID CORE COPPER WIRE 10 FEET LONG AND BRASS CABLE TO PIPE CLAMP. ANODES TO BE USED ONLY ON EXISTING COPPER SERVICE LINES, AS PER SECTION 2–2.11 STD. SPECS.

NOTES: POLYETHYLENE ENCASEMENT WILL BE REQUIRED FOR ALL COPPER PIPE INSTALLATION. ENCASEMENT MATERIAL AND INSTALLATION METHODS SHALL CONFORM TO AWWA STANDARD C–105.

*PRIVATE SYSTEM TO CONFORM WITH SACRAMENTO CO. STANDARDS
DISTRICT SYSTEM SHALL INCLUDE METER BOX

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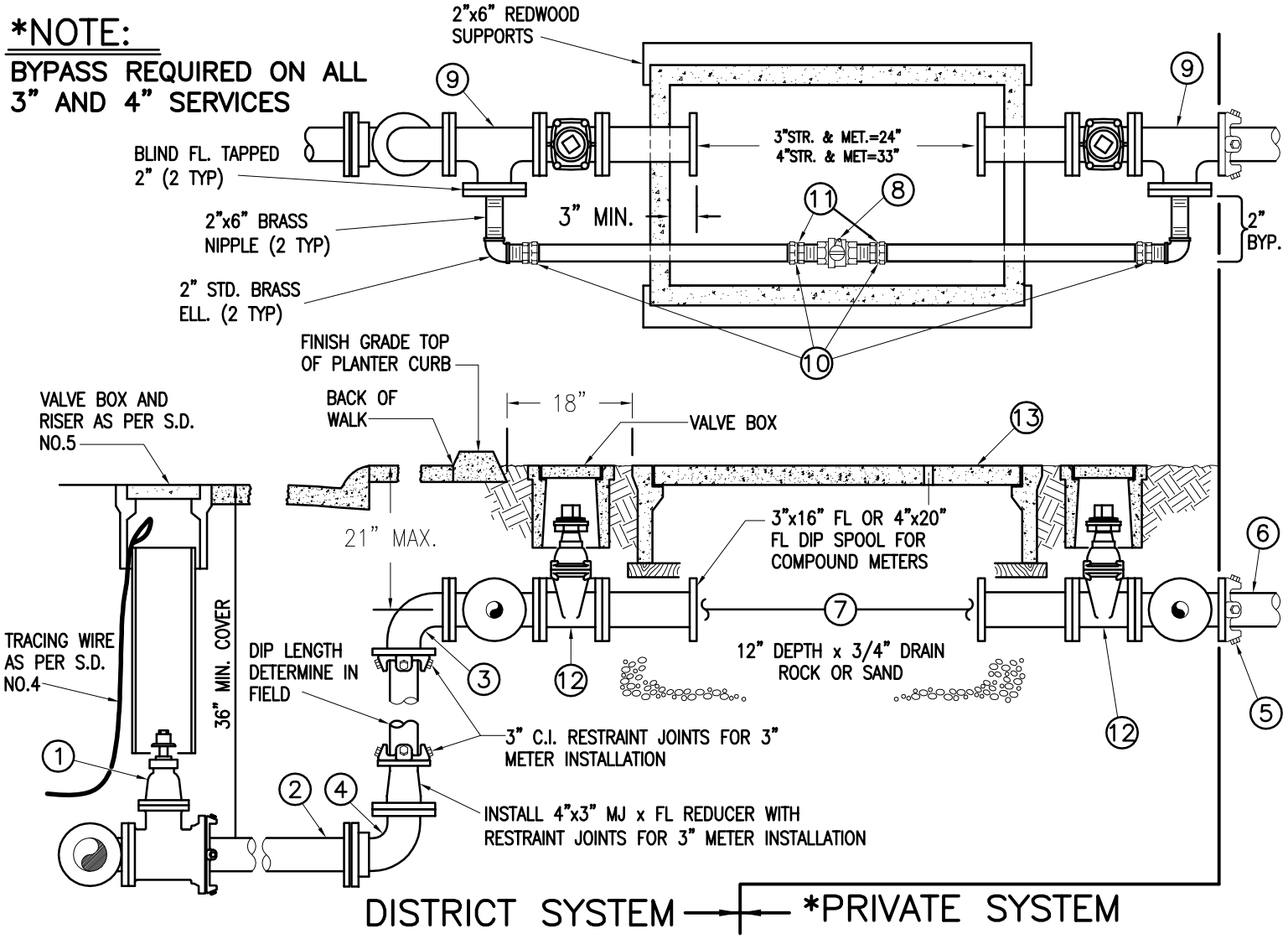
STANDARD DETAIL

TYPICAL 1 1/2" & 2" METERED WATER SERVICE

DATE: NOVEMBER 2007 | STD. DET. NO. 15

*NOTE:

BYPASS REQUIRED ON ALL 3" AND 4" SERVICES



1. 4" RS GATE VALVE – FL X MJ, INSTALL AS PER S.D. 5., TYPE PER SEC. 2–1.06 (a).
2. DIP, 12" MINIMUM LENGTH CL350 OR EQUAL (FLGxPE SPOOL)
3. C.I. 90° ELL, MJ X FL.
4. C.I. 90° ELL, FL X FL.
5. 4" C.I. RESTRAINT JOINT.
6. DIP, 36" MINIMUM LENGTH CL350 OR EQUAL.
7. WATER METER AND PLATE STRAINER INSTALLED BY CONTRACTOR, PAID FOR BY DEVELOPER AT A FURNISH ONLY FEE, BOLTS AND NUTS SHALL BE BRASS.
8. 2" BALL VALVE – F.I.P. X F.I.P. – FORD B–11–777W OR EQUAL.
9. 4x4x4" DIP TEE – FL.
10. MIP X COPPER COMP. ADAPTER – JONES J–2605SG OR EQUAL.
11. TYPE K COPPER.
12. 4" RS GATE VALVE – FL x FL.
13. METER BOX (MARKED "WATER"): AS PER SECTION 2–1.08 (d).

NOTES:

1. USE TEFLON PLUMBER'S TAPE ON ALL PIPE THREADS.
2. IF VALVE NUT IS OVER 4 FT. DEEP, INSTALL OPERATING EXTENSION AS PER S.D. 5
3. BYPASS NOT SHOWN IN PLAN VIEW FOR CLARITY

*PRIVATE SYSTEM TO CONFORM WITH SACRAMENTO CO. STANDARDS

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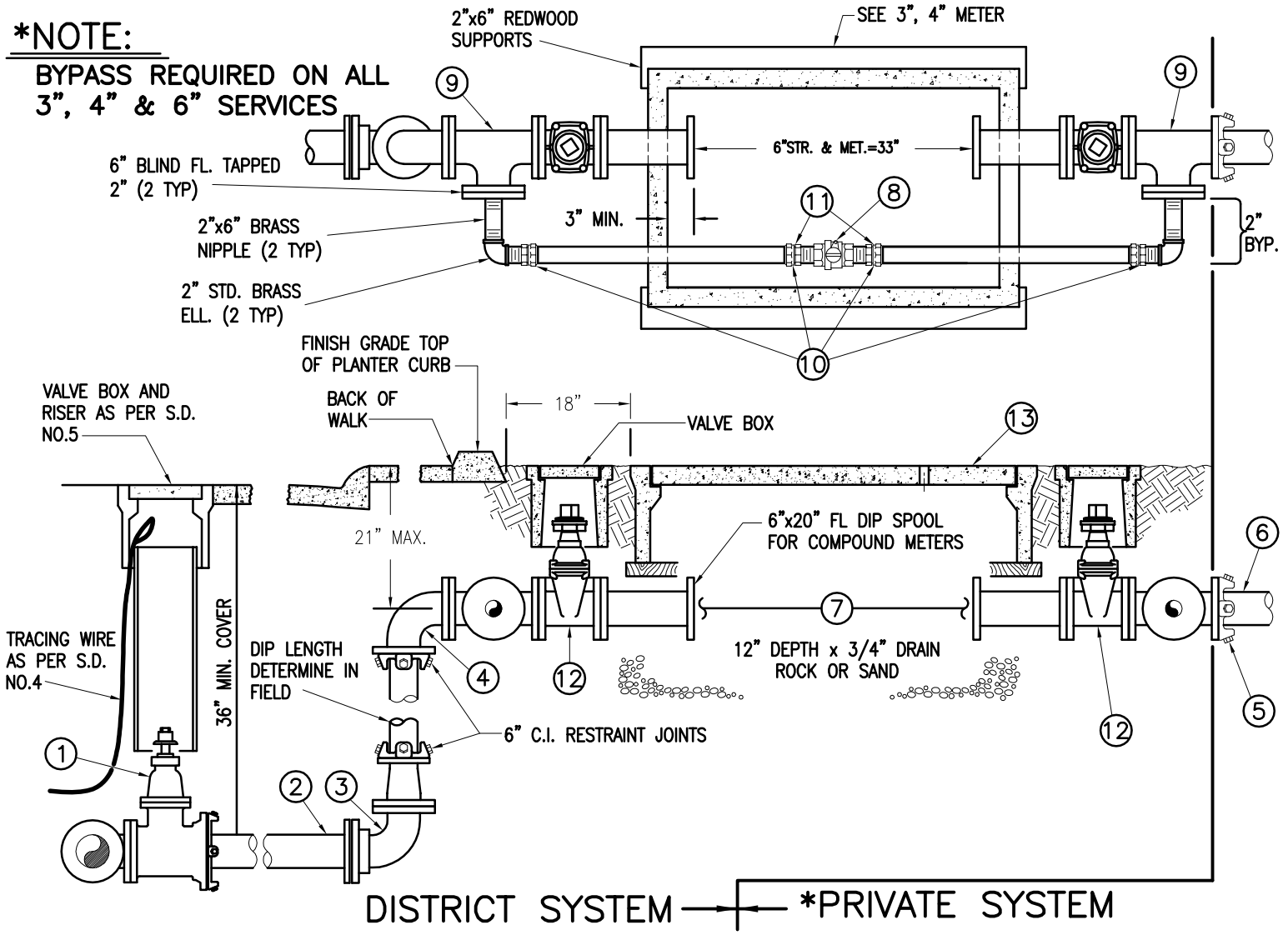
STANDARD DETAIL

TYPICAL 3" & 4" METER INSTALLATION

DATE: DECEMBER 2009 | STD. DET. NO. 16

*NOTE:

BYPASS REQUIRED ON ALL 3", 4" & 6" SERVICES



1. 6" RS GATE VALVE – FL X MJ, INSTALL AS PER S.D. 5., TYPE PER SEC. 2–1.06 (a).
2. DIP, 12" MINIMUM LENGTH CL350 OR EQUAL (FLGxPE SPOOL)
3. C.I. 90° ELL, MJ X FL.
4. C.I. 90° ELL, FL X FL.
5. 6" C.I. RESTRAINT JOINT.
6. DIP, 36" MINIMUM LENGTH CL350 OR EQUAL.
7. WATER METER AND PLATE STRAINER INSTALLED BY CONTRACTOR, PAID FOR BY DEVELOPER AT A FURNISH ONLY FEE, BOLTS AND NUTS SHALL BE BRASS.
8. 2" BALL VALVE – F.I.P. X F.I.P. – FORD B–11–777W OR EQUAL.
9. 6x6x6" DIP TEE – FL.
10. MIP X COPPER COMP. ADAPTER – JONES J–2605SG OR EQUAL.
11. TYPE K COPPER.
12. 6" RS GATE VALVE – FL x FL.
13. METER BOX (MARKED "WATER"): AS PER SECTION 2–1.08 (d).

NOTES:

1. USE TEFLON PLUMBER'S TAPE ON ALL PIPE THREADS.
2. IF VALVE NUT IS OVER 4 FT. DEEP, INSTALL OPERATING EXTENSION AS PER S.D. 5
3. BYPASS NOT SHOWN IN PLAN VIEW FOR CLARITY

*PRIVATE SYSTEM TO CONFORM WITH SACRAMENTO CO. STANDARDS

SACRAMENTO SUBURBAN WATER DISTRICT

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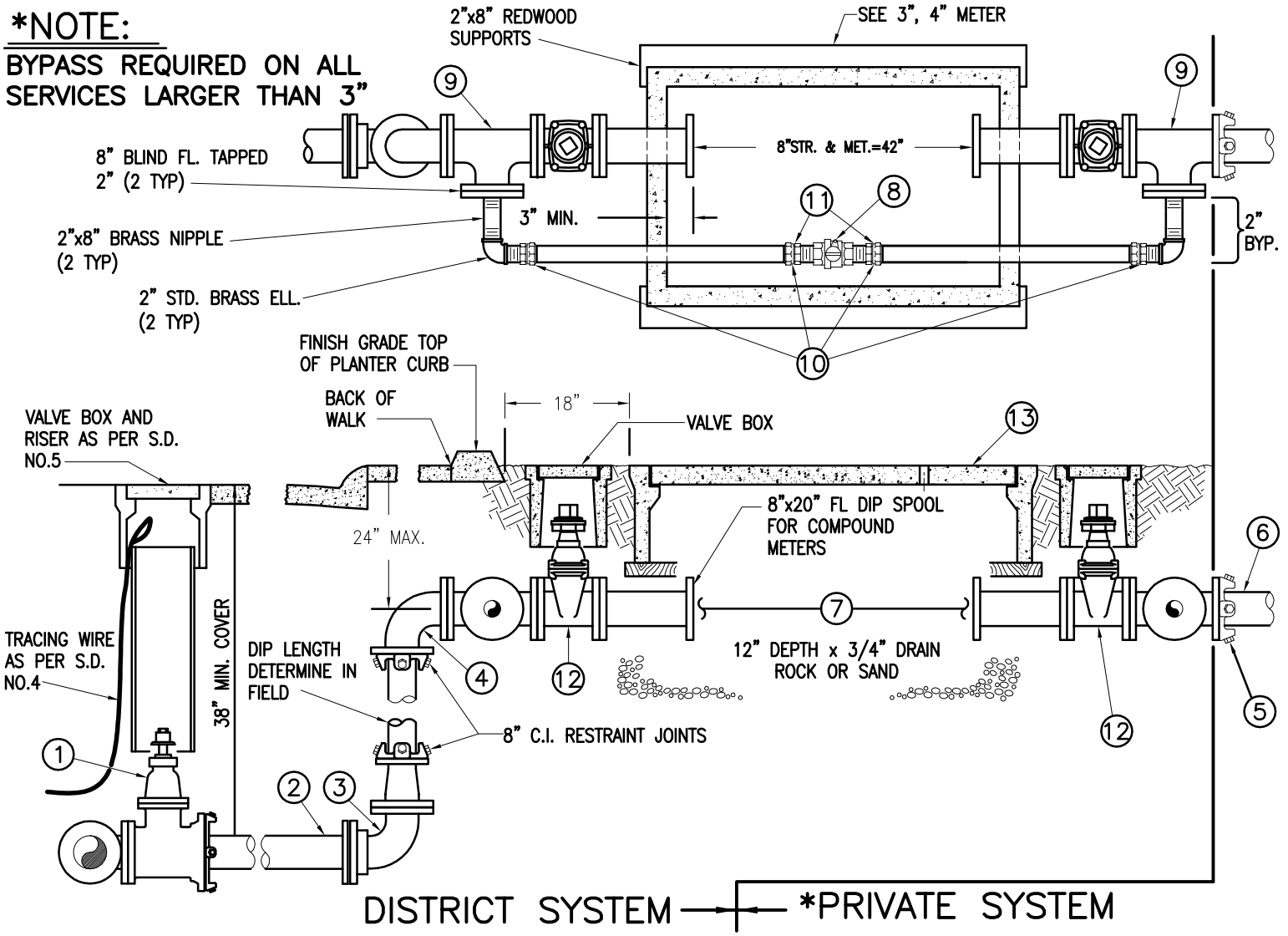
STANDARD DETAIL

TYPICAL 6" METER INSTALLATION

DATE: DECEMBER 2009 | STD. DET. NO. 16A

*NOTE:
BYPASS REQUIRED ON ALL SERVICES LARGER THAN 3"



1. 8" RS GATE VALVE – FL X MJ, INSTALL AS PER S.D. 5., TYPE PER SEC. 2–1.06 (a).
2. DIP, 12" MINIMUM LENGTH CL350 OR EQUAL (FLGxPE SPOOL)
3. C.I. 90° ELL, MJ X FL.
4. C.I. 90° ELL, FL X FL.
5. 8" C.I. RESTRAINT JOINT.
6. DIP, 36" MINIMUM LENGTH CL350 OR EQUAL.
7. WATER METER AND PLATE STRAINER INSTALLED BY CONTRACTOR, PAID FOR BY DEVELOPER AT A FURNISH ONLY FEE, BOLTS AND NUTS SHALL BE BRASS.
8. 2" BALL VALVE – F.I.P. X F.I.P. – FORD B–11–777W OR EQUAL.
9. 8x8x8" DIP TEE – FL.
10. MIP X COPPER COMP. ADAPTER – JONES J–2605SG OR EQUAL.
11. TYPE K COPPER.
12. 8" RS GATE VALVE – FL x FL.
13. METER BOX (MARKED "WATER"): AS PER SECTION 2–1.08 (d).

NOTES:

1. USE TEFLON PLUMBER'S TAPE ON ALL PIPE THREADS.
2. IF VALVE NUT IS OVER 4 FT. DEEP, INSTALL OPERATING EXTENSION AS PER S.D. 5
3. BYPASS NOT SHOWN IN PLAN VIEW FOR CLARITY

*PRIVATE SYSTEM TO CONFORM WITH SACRAMENTO CO. STANDARDS

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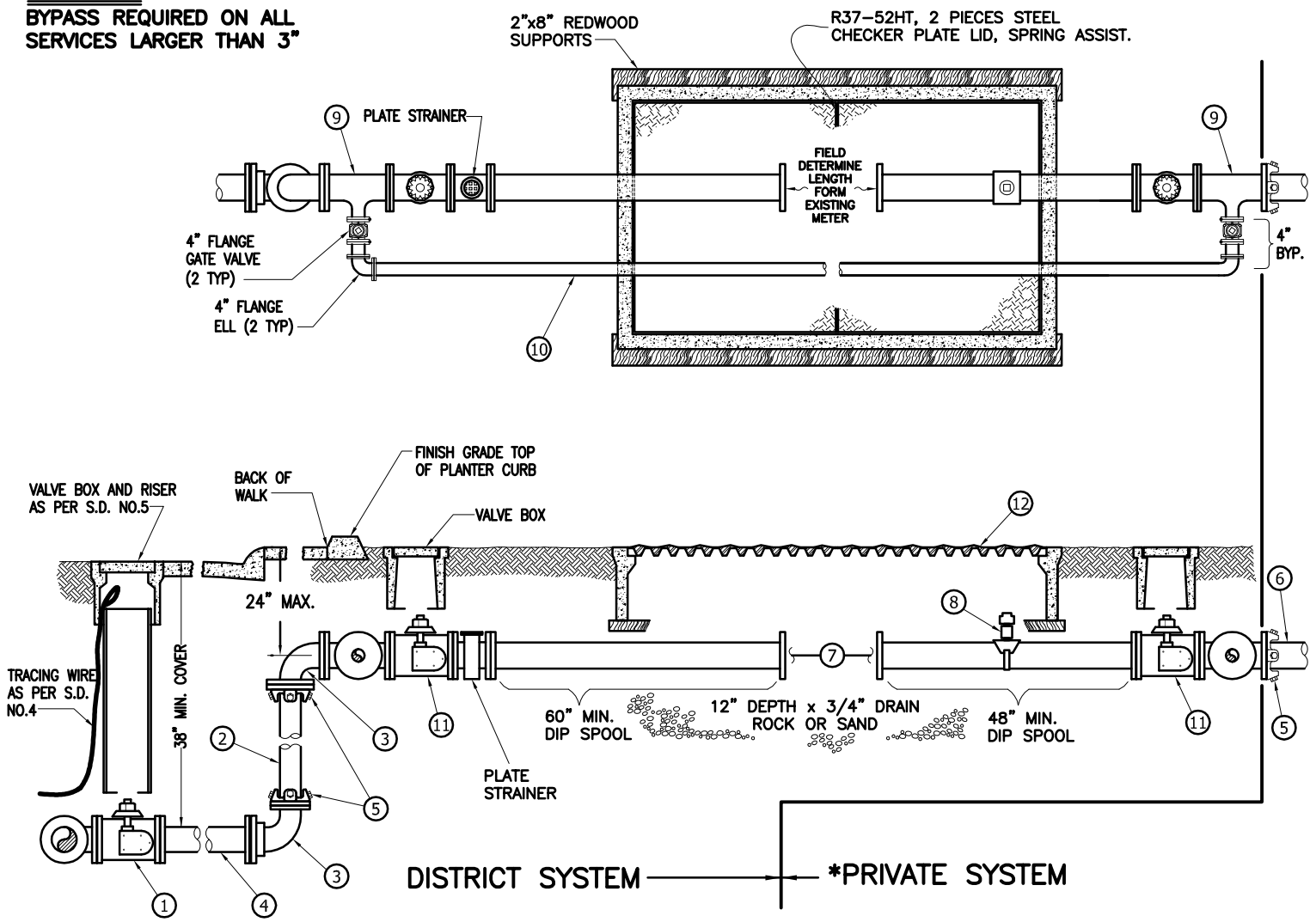
STANDARD DETAIL

TYPICAL 8" METER INSTALLATION

DATE: DECEMBER 2009 | STD. DET. NO. 16B

*NOTE:
BYPASS REQUIRED ON ALL SERVICES LARGER THAN 3"



1. 12" BUTTERFLY VALVE – FL x FL, INSTALL AS PER S.D. 5., TYPE PER SEC. 2-1.06 (a).
2. 12" DIP SPOOL CL350 OR EQUAL (FIELD DETERMINE LENGTH).
3. C.I. 90° ELL, MJ x FL.
4. 12" FLANGE DIP SPOOL CL350 OR EQUAL (FIELD DETERMINE LENGTH).
5. 12" C.I. RESTRAINT JOINT (MEGALUG RESTRAINTS).
6. DIP, 36" MINIMUM LENGTH CL350 OR EQUAL.
7. WATER METER INSTALLED BY CONTRACTOR, USE EXISTING METER, BOLTS AND NUTS SHALL BE BRASS.
8. PLACE 2" SADDLE WITH CORP-STOP FOR TESTING AT 24" FROM METER.
9. 12x12x4" DIP TEE – FL.
10. 4" DIP SPOOL (FIELD DETERMINE LENGTH).
11. 12" FLANGED BUTTERFLY VALVE.
12. METER BOX (MARKED "WATER"): CHRISTY R37 PIT WITH R37-52HT COVER.

NOTES:
1. USE TEFLON PLUMBER'S TAPE ON ALL PIPE THREADS.
2. IF VALVE NUT IS OVER 4 FT. DEEP, INSTALL OPERATING EXTENSION AS PER S.D. 5
3. BYPASS NOT SHOWN IN PLAN VIEW FOR CLARITY

*PRIVATE SYSTEM TO CONFORM WITH SACRAMENTO CO. STANDARDS

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STANDARD DETAIL

TYPICAL 12" METER INSTALLATION

DATE: OCTOBER 2009 | STD. DET. NO. 16D

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CONSIDERATION

SACRAMENTO SUBURBAN WATER DISTRICT

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95821-5303

STANDARD DETAIL

DATE:

STD. DET. NO. 17

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FOR
FUTURE
CONSIDERATION

SACRAMENTO SUBURBAN WATER DISTRICT

PHONE (916) 972-7171
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STANDARD DETAIL

DATE:

STD. DET. NO. 18

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FOR
FUTURE
CONSIDERATION

SACRAMENTO SUBURBAN WATER DISTRICT

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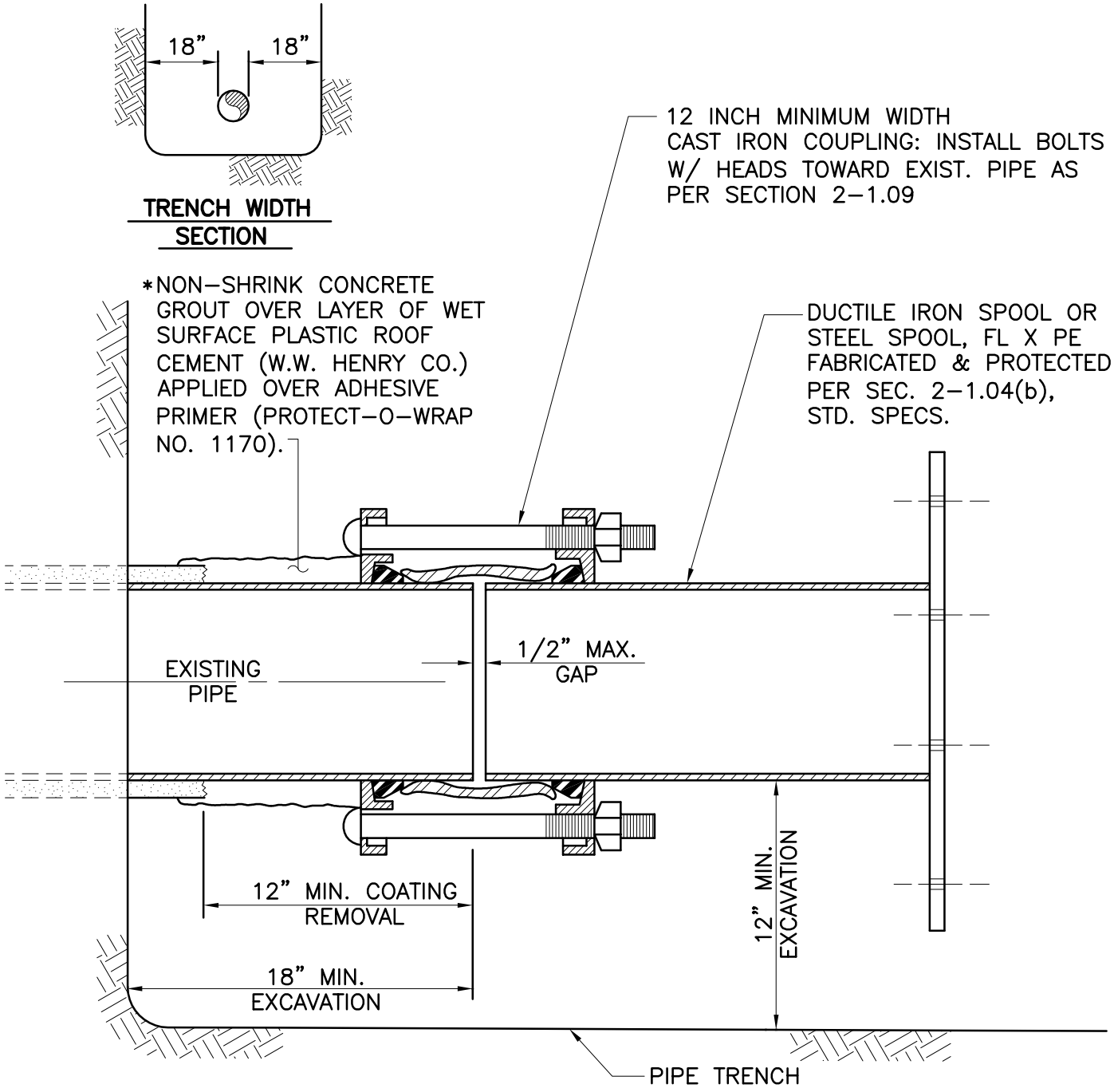
3701 MARCONI AVENUE
SUITE 100
SACRAMENTO, CA
95821-5303

STANDARD DETAIL

DATE:

STD. DET. NO. 19



TRENCH WIDTH SECTION

ELEVATION

NOTES:

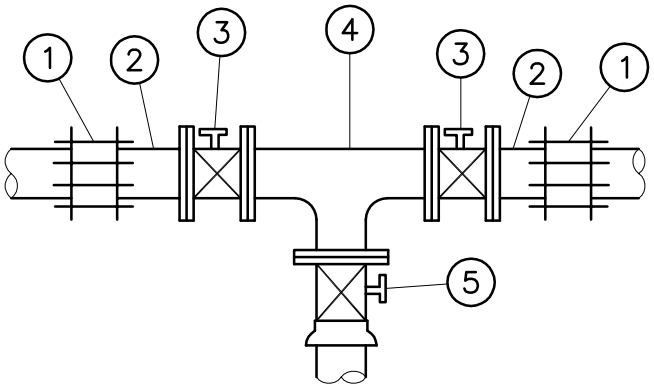
1. PIPE TO BE CUT IN CONFORMANCE WITH DIVISION OF INDUSTRIAL SAFETY REQUIREMENTS.
2. COMPRESSION CUTS ARE NOT PERMITTED ON EXISTING, IN–SYSTEM ASBESTOS CEMENT PIPE.
3. *PRIMER, MASTIC & GROUT REQUIRED ONLY FOR CONNECTIONS TO EXISTING STEEL PIPE. DISTRICT INSPECTOR WILL PROVIDE DETAIL ON THE APPLICATIONS.
4. THIS DETAIL IS FOR CONNECTION TO **EXISTING PIPELINES ONLY.**

SACRAMENTO SUBURBAN WATER DISTRICT
PHONE (916) 972–7171
3701 MARCONI AVENUE
SUITE 100
SACRAMENTO, CA
95821–5303

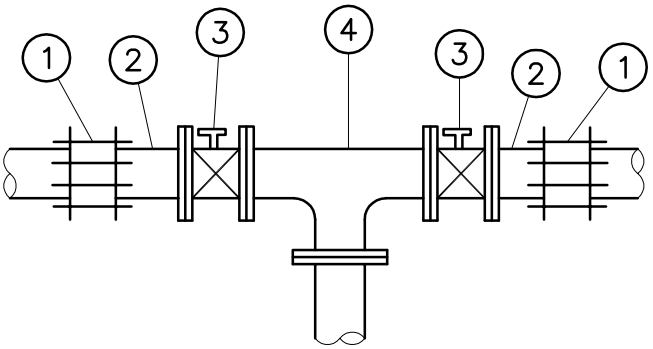
STANDARD DETAIL

TIE–IN CONNECTION

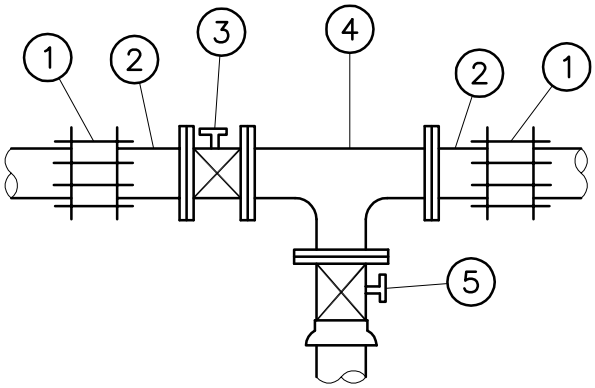
DATE: DECEMBER 2008 | STD. DET. NO. 20



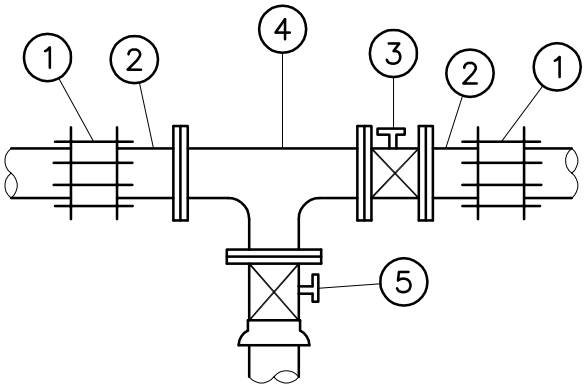
CASE 1



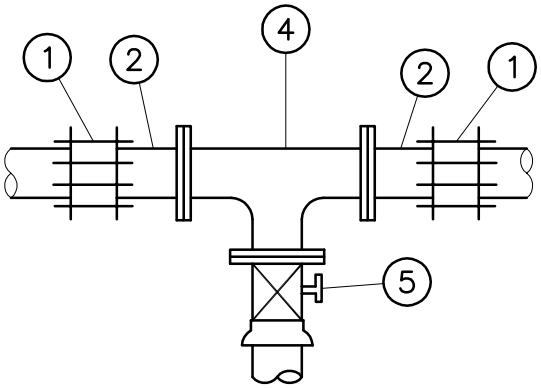
CASE 2



CASE 3



CASE 4



CASE 5

LEGEND

1. CAST IRON COUPLING PER SD. NO. 20
2. DUCTILE IRON SPOOL, FL X PE
3. BUTTERFLY VALVE, FL X FL
4. CAST IRON TEE, FL
5. BUTTERFLY VALVE, FL X MJ

NOTES:

1. SEE S.D. NO. 20 FOR DETAILS OF CONNECTION TO EXISTING PIPE.
2. INSTALL VALVE, RISER AND BOX AS PER S.D. NO. 5.
3. INSTALLATION SHALL BE BACKFILLED & COMPACTED AS PER S.D. NO. 2.

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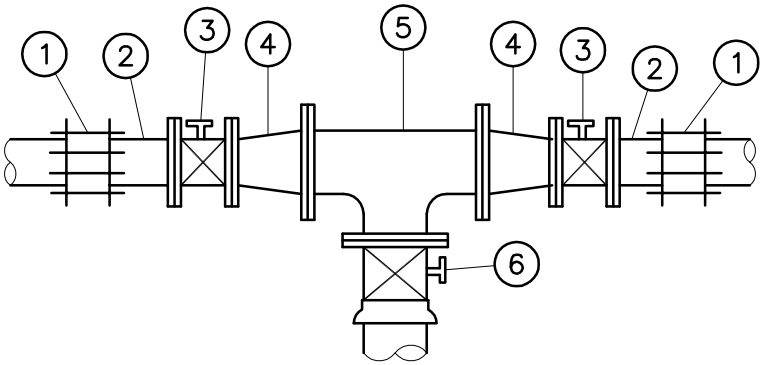
SUITE 100
SACRAMENTO, CA
95821-5303

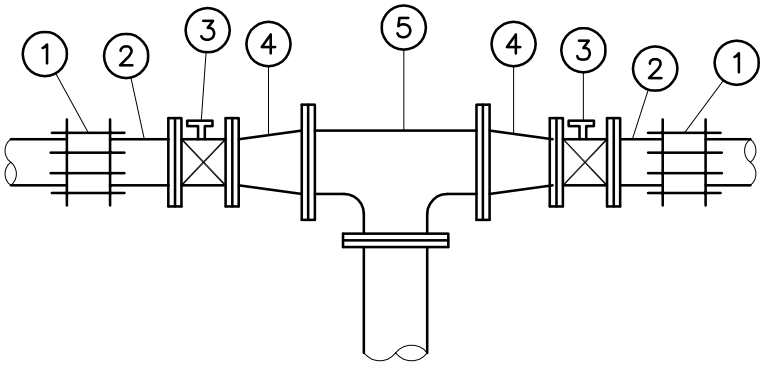
STANDARD DETAIL

TIE-IN DETAILS WITH TEE

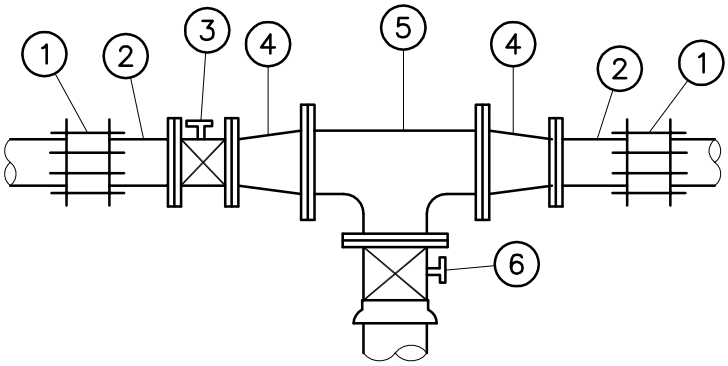
DATE: NOVEMBER 2007 | STD. DET. NO. 21



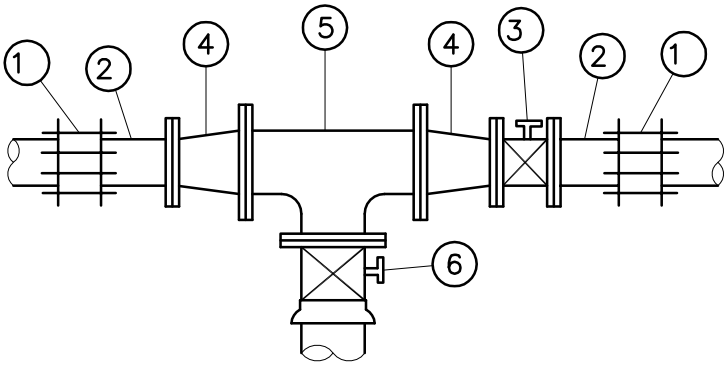
CASE 1



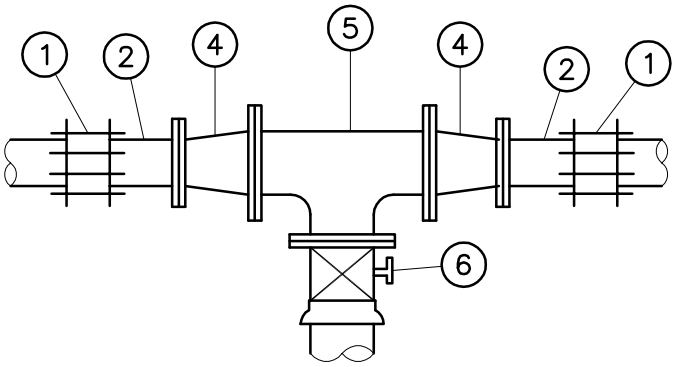
CASE 2



CASE 3



CASE 4



CASE 5

LEGEND

1. CAST IRON COUPLING PER SD. NO. 20
2. DUCTILE IRON SPOOL, FL X PE
3. BUTTERFLY VALVE, FL X FL
4. CAST IRON REDUCER, FL X FL
5. CAST IRON TEE, FL
6. BUTTERFLY VALVE, FL X MJ

NOTES:

1. SEE S.D. NO. 20 FOR DETAILS OF CONNECTION TO EXISTING PIPE.
2. INSTALL VALVE, RISER AND BOX AS PER S.D. NO. 5.
3. INSTALLATION SHALL BE BACKFILLED & COMPACTED AS PER S.D. NO. 2.

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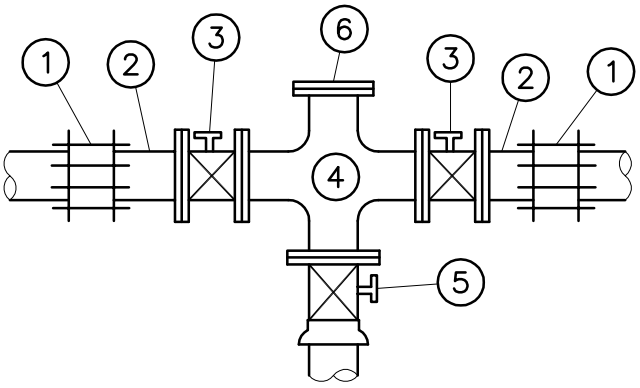
3701 MARCONI AVENUE
SUITE 100
SACRAMENTO, CA
95821-5303

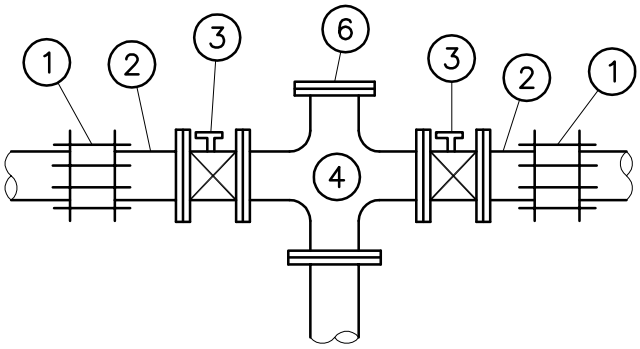
STANDARD DETAIL

TIE-IN DETAILS
INCREASING MAIN SIZE

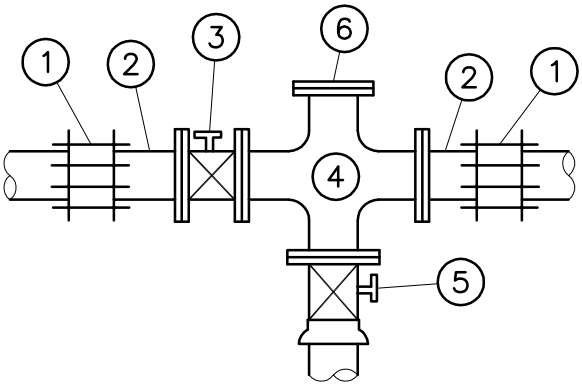
DATE: NOVEMBER 2007 | STD. DET. NO. 22



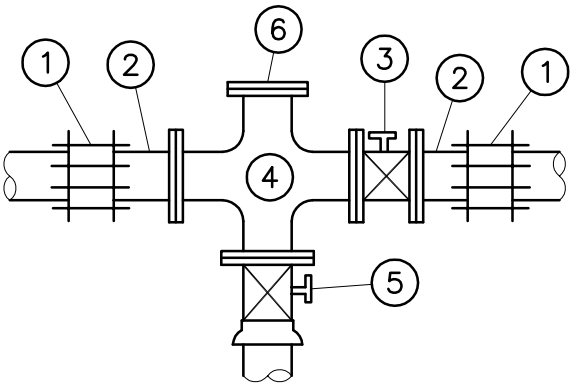
CASE 1



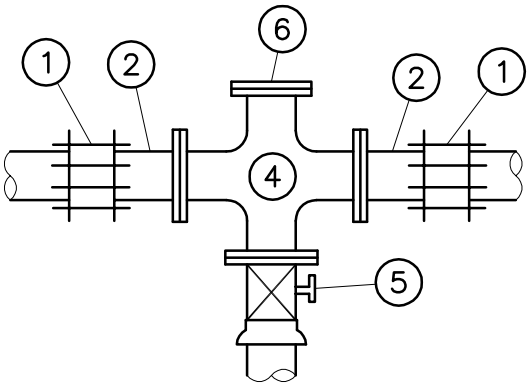
CASE 2



CASE 3



CASE 4



CASE 5

LEGEND

1. CAST IRON COUPLING PER SD. NO. 20
2. DUCTILE IRON SPOOL, FL X PE
3. BUTTERFLY VALVE, FL X FL
4. CAST IRON CROSS, FL
5. BUTTERFLY VALVE, FL X MJ
6. BLIND FLANGE

NOTES:

1. SEE S.D. NO. 20 FOR DETAILS OF CONNECTION TO EXISTING PIPE.
2. INSTALL VALVE, RISER AND BOX AS PER S.D. NO. 5.
3. INSTALLATION SHALL BE BACKFILLED & COMPACTED AS PER S.D. NO. 2.

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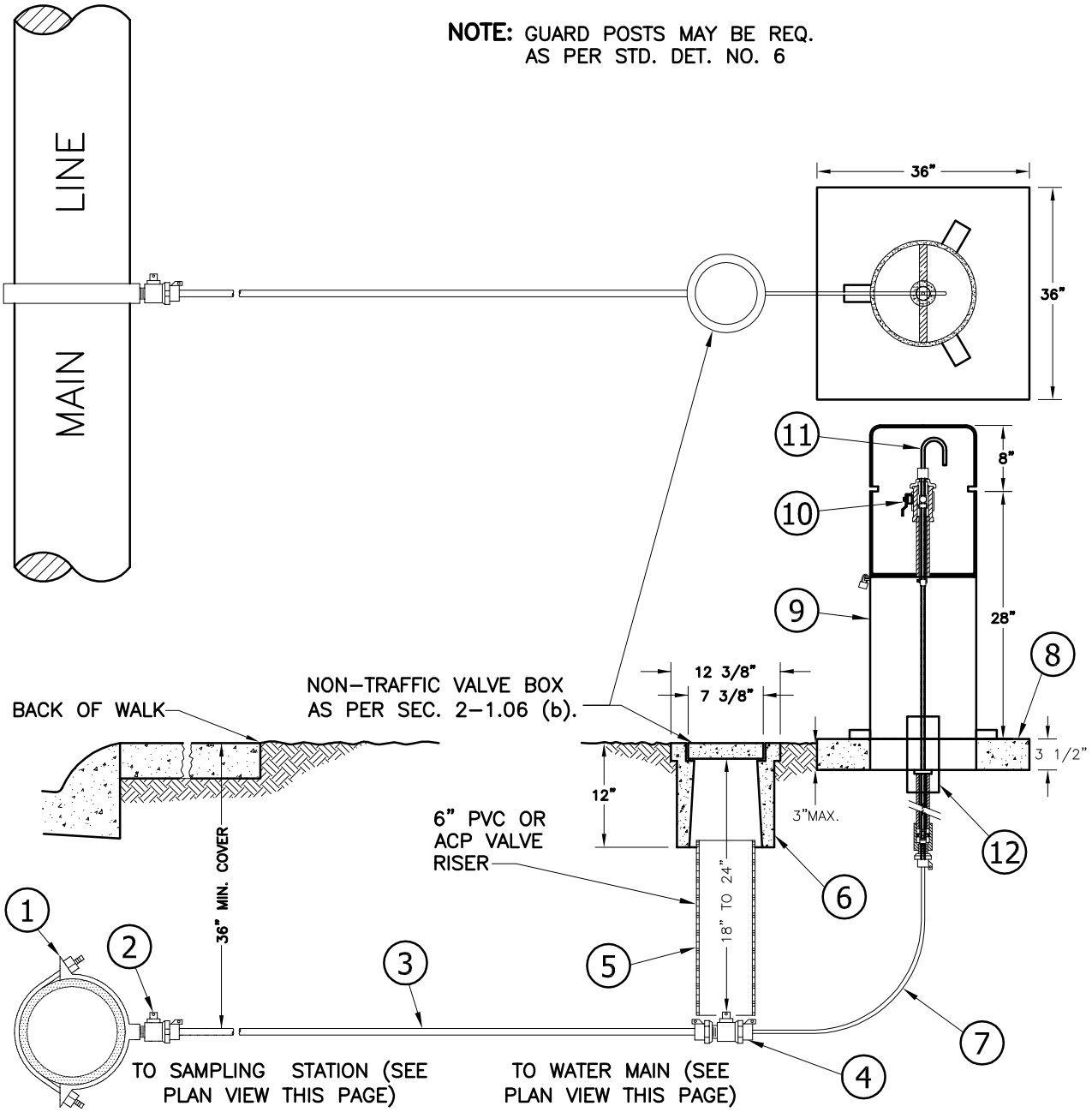
STANDARD DETAIL

TIE-IN DETAILS WITH CROSS

DATE: NOVEMBER 2007 | STD. DET. NO. 23

NOTE: GUARD POSTS MAY BE REQ.
AS PER STD. DET. NO. 6



ELEVATION

NOT TO SCALE

1. SERVICE SADDLE, FIP AS PER SEC.2–1.08(A), STD SPECS.
2. CORP, COCK, MIP X COMP., AS PER SEC. 2–1.08(B) STD SPECS.
3. ¾" K COPPER TUBING.
4. CURB STOP FIP X COMP. FORD B41–333, JAMES JONES 1921 OR APPROVED EQUAL.
5. 6" PVC OR ACP VALVE RISER.
6. NON–TRAFFIC BOX PER SEC.2–1.06(B)
7. ⅜" K COPPER TUBING.
8. 3' X 3' X 3 ½" CONCRETE PAD ⅚ SACK CONCRETE MIX.
9. ARMORCAST SAMPLE STATION PART#P6002010 TO BE ANCHORED ON THE OUTSIDE OF SAMPLE STATION.
10. ¼" BALL VALVE ANCHORED TO ARMORCAST SAMPLE STATION.
11. ⅜" COPPER TUBING WITH 90° BEND.
12. 2" SCH. 80 PVC, 12" LONG EXTEND 4" ABOVE SLAB.

NOTES: POLYETHYLENE ENCASEMENT WILL BE REQUIRED FOR ALL COPPER PIPE INSTALLATION. ENCASEMENT MATERIAL AND INSTALLATION METHODS SHALL CONFORM TO AWWA STANDARD C–105.

SACRAMENTO SUBURBAN WATER DISTRICT

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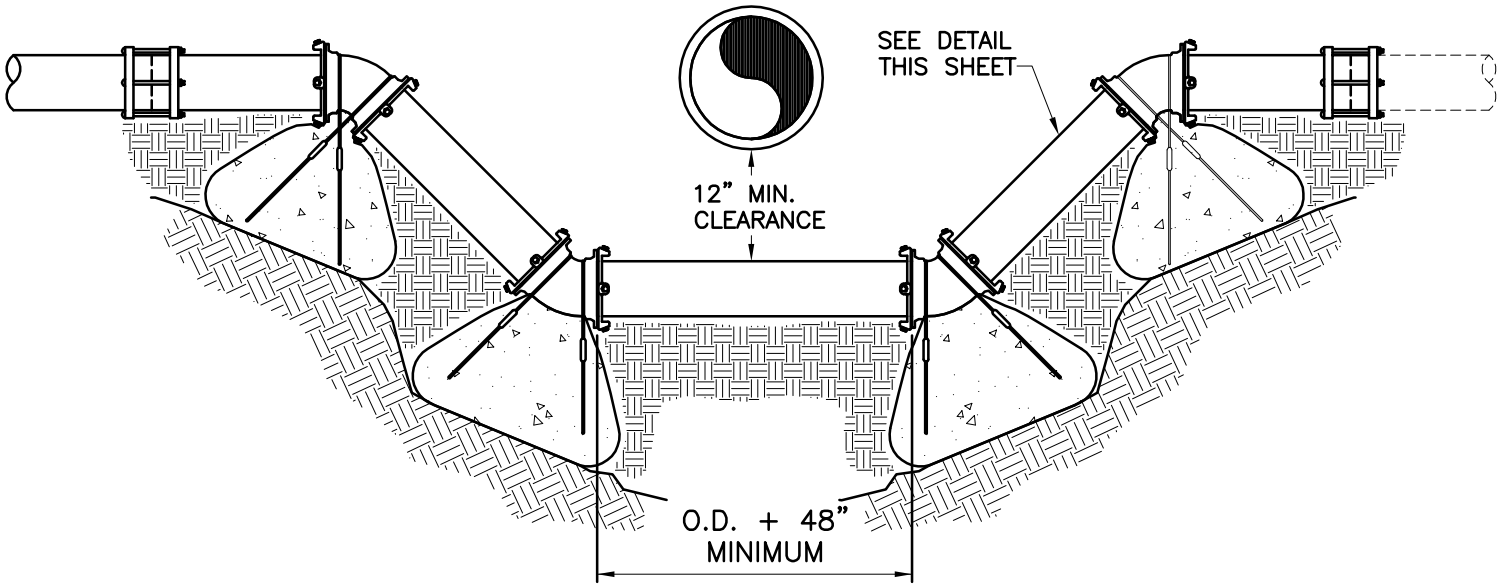
95821–5303

STANDARD DETAIL

DETAIL OF SAMPLING STATION

DATE: DECEMBER 2009 | STD. DET. NO. 24

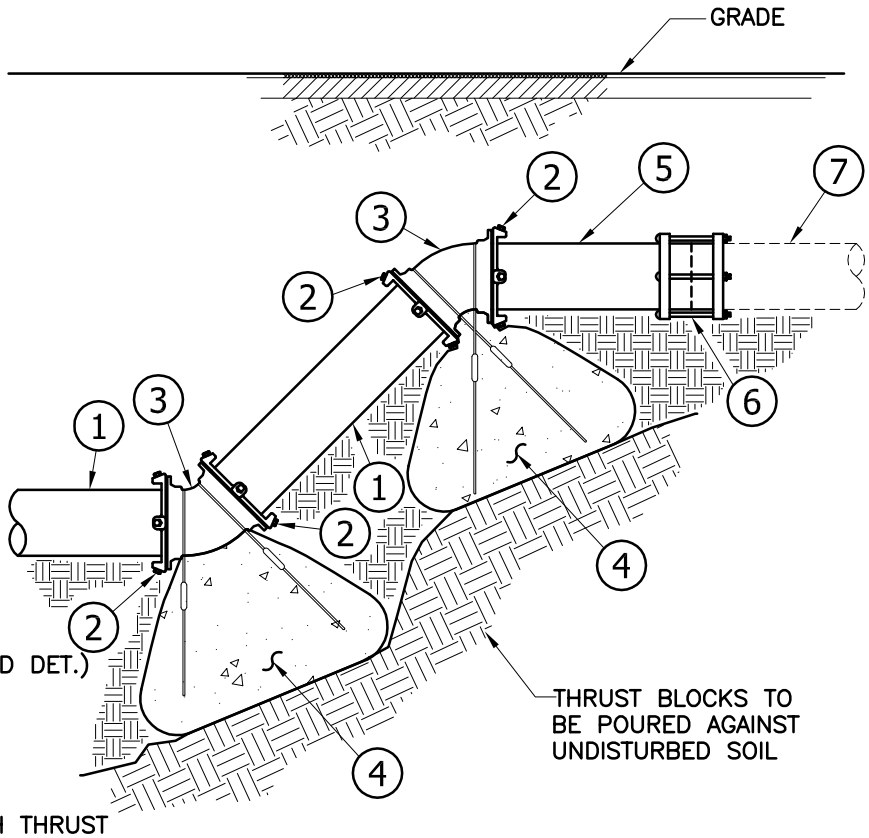


Water Pipe Crossing

NO SCALE

Note:

1. WRAP ALL FITTINGS AND PIPE PER SSWD STANDARDS.
2. THIS DETAIL IS FOR CONNECTION TO EXISTING PIPELINES ONLY. **METHOD NOT APPLICABLE FOR NEW INSTALLATIONS.**



Water Pipe Detail

NO SCALE

Legend:

1. DIP WATER MAIN PER SSWD STDS. (LENGTH FIELD DET.)
2. MEGA LUG RESTRAINT
3. 45° MJ ELBOW
4. THRUST BLOCK WITH 2–#5 REBAR STRAPS EACH THRUST BLOCK (AT CONTRACTOR'S DISCRETION)
5. DIP WATER MAIN (MIN. LENGTH 36")
6. FLEX COUPLING (MIN. LENGTH 12")
7. EXISTING WATER MAIN

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95821–5303

STANDARD DETAIL

WATER PIPE CROSSING EXISTING FACILITIES

DATE: DECEMBER 2008 | STD. DET. NO. 25

Sacramento Suburban Water District Improvement Standards and Technical Specifications

SACRAMENTO SUBURBAN WATER DISTRICT

CLEARLY REFRESHING SERVICE!

IMPROVEMENT STANDARDS

AND

TECHNICAL SPECIFICATIONS

Sacramento Suburban Water District
3701 Marconi Avenue, Suite 100, Sacramento, California 95821
Telephone (916) 972-7171

IMPROVEMENT STANDARDS & TECHNICAL SPECIFICATIONS

Approved by the Board of Directors – August 2004
Effective: August 2004

Last Revisions: Improvement Standards – December 2009
Technical Specifications – December 2009
Standard Details – December 2009

TABLE OF CONTENTS

Sacramento Suburban Water District

Improvement Standards

Section A. Purpose and Definitions

A- 1 Purpose

It is the purpose of these Improvement Standards to provide standards to be adhered to in the design and construction of water system improvements, which are to be conveyed to and accepted by the District for operation and maintenance.

All improvements, modifications, and repairs to the District's water system will be planned, designed, and constructed in conformance with these Improvement Standards, the Standard Technical Specifications, Standard Detail, District Regulations, plus any applicable Special Conditions that have been approved by the District.

A- 2 Definitions

Whenever the following terms or titles are used in these standards, the intent and meaning will be as herein defined:

(a) **District** – Will mean Sacramento Suburban Water District.

(b) **General Manager/Engineer/Inspector** – Will mean the General Manager of the District or his duly appointed representative.

(c) **Consulting Engineer** – Will mean any person or persons, firm, partnerships, or corporation duly licensed to practice engineering in the State of California who prepares or submits improvement plans and specifications to the District for approval.

(d) **Applicant** – Will mean any person or persons, firm, partnership, corporation, or combination thereof financially responsible for the water system improvements.

(e) **Development** – Will mean the act or process of any construction on properties as well as subdivision improvement.

(f) **Contractor** – Will mean the person or persons, firm, partnership, corporation, or any combination thereof who has entered into a contract with the District or the Applicant, and who is duly licensed under the laws of the State of California to do or perform such tasks as the said contract may define.

(g) **Standard Technical Specifications** – Will mean the latest Standard Technical Specifications adopted by the District governing the construction of Water System Improvements.

(h) **Standard Details** – Will mean those drawings included herein, adopted by the District and as may be subsequently modified, revised, or added, illustrating and governing the design and construction of Water System Improvements.

Section B. General Requirements

B- 1 Approved Plans Required

No work will commence on any water system, which is intended to become attached to the District's system unless complete plans and specifications covering all phases of the proposed construction have been submitted to, and approved by, the District in accordance with the provisions of Section B-7 hereof. Furthermore, no work will commence after the date said approval expires, as specified in the approval block contained on the said plans.

An exception to this requirement would be the installation of a single item such as a water service, fire hydrant or fire service.

B- 2 Plans by an Appropriate Engineer

All plans and specifications for improvements to the District's water system will be prepared by a duly licensed Consulting Engineer of the appropriate branch of engineering covering the work.

B- 3 Existing Utilities

All existing utilities are to be shown on the plans. In addition, the Consulting Engineer will submit prints of the preliminary and approved plans to the utility companies involved. Copies of the transmittal letters to the utility companies will be provided to the District with the initial plan submittal.

B- 4 Partial Plans

Where the improvement plans submitted cover only a portion of ultimate development, the plans submitted will be accompanied by an overall plan of the entire project showing proposed streets, lots, water, sewer, and drain systems, plus topographic features of the ultimate development at an adequate scale to clearly show the proposed improvements.

B- 5 Improvement Plan Submittal

Consulting Engineers contemplating the preparation of improvement plans for a project are encouraged to discuss the design and details with the District's staff prior to final design and drafting.

The initial submittal of improvement plans to the District will consist of the following:

(a) Two sets of plans complete and in accordance with these Improvement Standards and the Standard Technical Specifications, along with any required specifications, computations, or other material requested by the General Manager or his authorized representative. Plans will be clearly marked or stamped to indicate that they are Preliminary—Not for Construction.

(b) Two copies of the proposed Draft Final Map if applicable.

(c) The name, address, and telephone number of the Applicant.

(d) Payment of the District's current Plan Review Charge.

(e) Copies of utility transmittal letters.

Should there be required alterations or revisions to the plans submitted the District will return one copy with the corrections marked or indicated thereon and stamped and dated "NOT APPROVED FOR CONSTRUCTION SACRAMENTO SUBURBAN WATER DISTRICT". If the plans submitted are not prepared in accordance with these Improvement Standards and the Standard Technical Specifications, or do not meet minimum accepted engineering standards, the plans may be returned unmarked and unacceptable.

B- 6 Improvement Plan Resubmittal

Plans being resubmitted will consist of two complete sets of plans and Final Map, if applicable. The District may require additional sets.

Plans being resubmitted that contain revisions or alterations other than those required by the District on previously corrected plans will require the Consulting Engineer to bring those revisions and alterations to the attention of the District by use of words or colors placed on the plan which clearly describe such revisions and/or alterations.

B- 7 Plan Approval

The approval of plans will be signified by the signature thereon of the General Manager, or his authorized representative, in the District's signature block on the plans. The plans will be signed when:

(a) All such changes, corrections, or additions as previously described by the District have been made to the original plans.

(b) All applicable charges and fees have been paid to the District.

(c) All applications, agreements, and required easement documents have been prepared, signed, and presented to the District for acceptance.

B- 8 Submittal of Plans for Approval

For plan approval the Applicant/Engineer will provide the following items:

(a) Original Mylar plans for signatures. Plans must be signed by the fire department prior to water district signatures.

(b) A check for the calculated fees for water service.

(c) Completed application for water main extension and/or water service application.

(d) Signed and notarized grant of easement and right of way forms with legal description and plat map.

(e) Electronic version of plans on CD in Auto Cad (Latest Version). Digital data shall be in NAD83, California State Plane, Zone II Coordinate System.

B- 9 Re-approval of Plans after Expiration

Re-approval of plans after expiration will require the Consulting Engineer to resubmit plans for review and possible revisions and/or alterations. New fees and/or additional fees will be assessed and paid, along with all applicable required documents as stated in B-7, prior to re-approval. Previous paid fees will be credited to the new assessed fees.

B- 10 Final Plans Required

Following approval, one set of prints of approved drawings with County approval will be furnished to the District; one copy of the water plan only will be a reproducible Mylar transparency or vellum and one copy of final complete plans on CD-Rom in the latest Auto Cad software. **NO CONSTRUCTION WILL BEGIN UNTIL THE DISTRICT RECEIVES THE ABOVE APPROVED PLANS AND SUBMITTALS.**

B- 11 Other Agency Notification

The Applicant is responsible for obtaining the approval and necessary permits of all other governmental or municipal agencies when their facilities and/or regulatory authority are involved.

B- 12 Improvement Plan Revisions During Construction

Should changes become necessary during construction, the Consulting Engineer will first obtain the consent of the General Manager, or his authorized representative, and will then resubmit the title sheet and the plan sheets affected for approval. The changes on the plans will be made in the following manner:

(a) The original proposal will not be eradicated from the plans but will be lined out.

(b) In the event that eradicating the original design is necessary to maintain clarity of the plans, approval must first be obtained from the District.

(c) The changes will be clearly shown on the plans with the changes and approval noted in the revision block.

(d) The revision number in a triangle delineated on the plans adjacent to the change and in the revision block will identify the changes.

Minor changes which do not affect the basic design or contract may be made upon the authorization of the District, but said changes must be shown on "As Built" plans when the contract is completed.

The District may order changes in the plans in order to complete the necessary facilities. Changes in the plans ordered by the District will conform to all of the above.

In all cases where changes are made to the plans during construction, prints of the revised drawings will be furnished to the District in accordance with B-9.

B- 13 As Built Plans

The Contractor will keep an accurate record of all approved deviations from the plans and will provide a copy of these records to the Consulting Engineer upon completion of the work. These are to be utilized by the Consulting Engineer along with the Inspector's accurate records for preparing a complete and accurate set of "As Built" plans for the permanent records of the District. One set of completed "As Built" plans will be promptly submitted to the District, one copy of the water plan only will be a reproducible vellum and/or one copy on CD-Rom in the latest Auto Cad software.

B- 14 Conflicts, Errors, and Omissions

Excepted from approval are any features of the plans that are contrary to, in conflict with, or do not conform to any State law or regulation, Sacramento County Code, or District ordinance, resolution, regulation, or generally accepted good engineering practice in keeping with the standards of the profession, even though such errors, omissions, or conflicts may have been overlooked in the District's review of the plans. The District will have no liability for errors of either commission or omission.

B- 15 Change in Consulting Engineer

If the Applicant elects to have a registered civil engineer or licensed land surveyor other than the engineer who prepared the plans provides construction staking, the Applicant will provide the District in writing the name of the individual or firm one week prior to the staking of the project. The Applicant continues to be responsible for providing all professional engineering services

which may be required during construction, the preparation of revised plans for construction changes, and the preparation of "As Built" plans upon completion of the construction.

B- 16 Work in Sacramento County Rights-of-Way, Easements, and Waterways

Any Contractor performing construction within Sacramento County rights-of-way, easements, and waterways will be in possession of County-approved plans or a County Encroachment Permit, and will comply with all conditions imposed therein, all at no expense to the District.

B- 17 Compliance with Statutes

The Contractor will conduct the work in compliance with all existing State and federal safety code laws and County and Municipal ordinances and regulations limiting or controlling the work in any manner.

B- 18 Construction Safety

All construction of water systems intended to be connected with the District's system must be constructed in strict compliance with the statutory safety requirements of the State of California as set forth in the California Administrative Code, Title 8, and all amendments thereto.

B- 19 Boring/Jacking Requirements

Any boring or jacking operation of 100 feet or greater length and involving an opening greater than 30 inches in diameter is subject to the State of California Division of Industrial Safety's tunnel safety requirements. The Consulting Engineer will submit to the Division of Industrial Safety plans and specifications applicable to the tunnel operation with a letter requesting tunnel classification. This procedure also is recommended to avoid project delay if there is the possibility of any personnel entering the tunnel, regardless of diameter and length. The letter should identify the District as the agency responsible for the project and the District's mailing address. The plans will identify underground utilities and tanks or areas for storing fuel and toxic gasses in the vicinity of the tunnel site. The request for classification should be submitted allowing ample time for the Division of Industrial Safety to review in order that any special requirements can be included in the project plans and specifications. The Consulting Engineer will also attend the required pre-job safety conference.

B- 20 Pre-Construction Meeting

An on-site meeting with the District Inspector, Consulting Engineer, County Inspector, and Contractor must be held at least two days in advance of beginning construction of the approved project to inspect materials, schedule inspections, and review the approved water system construction plans. Pre-construction meetings will not be scheduled until all District costs and fees have been paid in full and the material list, guarantee letter, and guarantee/maintenance bond submitted. In addition all items in B-10 above must be received prior to scheduling a pre-construction meeting.

B- 21 Construction Requirements

Any improvement constructed in accordance with the approved plans, the Special Conditions, and the General and Standard Technical Specifications, for which it is intended that the District will assume maintenance responsibility, will be inspected during construction by an authorized representative of the District. Any improvements constructed without inspection as provided above or constructed contrary to the order or instructions of the District will not be accepted by the District for maintenance purposes and permission to connect with the existing system will be denied.

Within ten days after receiving the request for final inspection, the District will inspect the work. The Contractor, Consulting Engineer, and Applicant will be notified in writing as to any particular defects or deficiencies to be remedied. The Contractor will proceed to correct any such defects or deficiencies at the earliest possible date. At such time as the work has been completed, the District will make a second inspection to determine if previously mentioned defects have been repaired, altered, and completed in accordance with the plans.

On assessment districts and projects where the District participates in the costs thereof, quantities will be measured in the presence of the District, Consulting Engineer, and Contractor, and witnessed accordingly.

B- 22 Statement of Final Costs

A statement of final costs of the water system, on a unit cost basis or lump sum, will be stated in the guarantee letter in its appropriate space.

No work shall begin if the final cost is not stated on the guarantee letter.

B- 23 Construction Approval – Temporary and Final System Acceptance

Approval of a constructed water system will be as follows:

(a) Temporary Approval: When a water system, the plans and specifications concerning which have been theretofore approved in accordance with the provisions of paragraph B-7 above, are in place and have received inspection approval as required in accordance with the provisions in paragraph B-20 above, the General Manager may grant temporary approval with interim hook-up to the District's system. This temporary approval does not mean acceptance by the District of the in-place system and is intended only as a means of permitting completion of construction of Applicant's improvements.

(b) Final Approval: When the Applicant produces proof to the General Manager's, or his authorized representative's, satisfaction that all utilities required for the subject property have been approved and accepted by the County of Sacramento, and provided the in-place system has been constructed in strict compliance with the approved plans and specifications, the District will issue a written Final Approval.

B- 24 Guarantee and Maintenance Bond

Prior to commencement of the work accomplished under District-approved plans, and as a condition of final acceptance herein, the Contractor will execute and deliver to the District a guarantee of the materials, workmanship, and/or equipment that he or she will have constructed or installed in the course of said work. This guarantee will be in the form attached hereto and will remain in full force and effect for a period of one year from the date upon which the work is accepted by the District. Should any failure of the work occur within the guarantee period, which can be attributed to faulty materials, poor workmanship, or defective equipment, the Contractor will promptly make the needed repairs at his expense. A completed guarantee form will be required before each job performed by a Contractor in the Sacramento Suburban Water District. **The District will not accept the guarantee letter unless it is placed on the Contractor's letterhead, signed by the Contractor, filled out completely and includes the statement of final cost of the water system**.

Prior to commencement of any work performed in Sacramento Suburban Water District, each Contractor will be required to furnish an overall maintenance bond or corporate surety bond, payable to the District, issued by an acceptable surety company authorized to do business in the State of California, to protect the District against the results of faulty materials, poor workmanship, or defective equipment, and to guarantee the Contractor's responsibility for each completed work or project, as outlined above, for a period of one year from the date the District accepts the work or project. The bond also will cover all subsequent jobs performed by the Contractor in the Sacramento Suburban Water District, if such works or projects are being constructed simultaneously or serially. The time limit of such bond will begin from the date the District first accepts the bond and will end on the anniversary date of the acceptance letter. The Contractor will obtain the bond on forms furnished by the District in the sum of not less than $7,000.00. It will be the Contractor's responsibility to renew the bond on the anniversary date so as to cover all jobs that are started after initial bond submittal and so that it remains in effect for at least one year after the District accepts the last work on the project and issues an acceptance letter. Should the Contractor be unable to obtain a bond for the project, and then the Developer will furnish a bond. Said bond will only cover the project and will be no less than 50% of the contract amount for water facilities and be in effect for a period of one year from the date of the District's acceptance of the work or project.

GUARANTEE

(**To be submitted on Contractor's letterhead**)

Sacramento Suburban Water District ("District")
3701 Marconi Avenue, Suite 100
Sacramento, CA 95821

Dear Sir or Madam:

We hereby unconditionally guarantee that the construction performed under approved plans and/or contract dated _____, 20___, for the project entitled _____will be done in accordance with the approved drawings and specifications and that work as installed will fulfill requirements of the guarantee included in the specifications. We agree to repair and/or replace at our sole cost and expense, and to the satisfaction of the District and its engineers, any or all of our work, together with any other adjacent work which may be displaced by doing so, that may prove to be defective in workmanship or materials within a period of one year from date of acceptance of above-named project by District, without any expense to said District, ordinary wear and tear excepted. We further guarantee that we will leave the site of any repair or replacement work in satisfactory working order and condition.

In the event of our failure to comply with the above-mentioned conditions, within ten days after being notified in writing by the District, we, collectively or separately, do hereby authorize the District to have said defects repaired and made good at our expense, and we will honor and pay the costs and charges therefore upon demand. In the event of such failure on our part, we further promise to pay such reasonable litigation costs, including attorney's fees and expert witness fees and costs, as a court with jurisdiction in the matter shall decide, should the enforcement or interpretation of this guarantee or any part thereof require legal action.

_____
Company Name (Print)

_____
Address

_____
Phone Number

_____ _____
Contractor's License Number Contractor's Signature

_____
Print Name

The contract amount for water construction only: _____

Section C. Plan Sheet Requirements

C- 1 Paper Details

All improvement plans will be prepared on sheets 24" x 36" in size. Scales: horizontal 1" = 20', 40', or 50', vertical 1" = 2', 4', or 5', but only the scale, horizontal and vertical, for which the sheet was intended will be used.

C- 2 Drafting Standards

All plans approved by the District may be microfilmed. Therefore, certain drafting standards are necessary to produce legible film and subsequent prints. All line work must be clear, sharp, and heavy. Letters and numerals must be 1/8-inch minimum height, well formed, and sharp. Numerals showing profile elevations will not be bisected by station grid lines. Dimension lines will be terminated by sharp solid arrowheads.

C- 3 Title Block

Each sheet within the set of drawings will have an approved title block showing the sheet title, number, date, scale, the Consulting Engineer's name, signature, and license number; the street address or Assessor's Parcel number, and the name of the subdivision project or assessment district.

C- 4 General Information Requirements

(a) The following information will be shown on the cover or title sheet of plans, or on the first sheet if there is no title sheet:

(1) Location map
(2) Index of sheets
(3) Legend of symbols

(b) In addition, the following information will be shown on the water plan and/or the title sheet:

(1) The entire subdivision or parcel and project
(2) District boundary
(3) Assessment District limits
(4) Street names and widths
(5) Adjacent subdivisions, including lot lines and lot numbers
(6) Signature blocks in the lower right hand corner of the sheet for approval by the District and the responsible fire district.

C- 5 Required Notes

District "WATER SYSTEM CONSTRUCTION NOTES" (Standard Detail A) will be required and placed on a sheet in the plans.

C- 6 Plan Details

In addition to the other requirements of these Improvement Standards, the following details will be shown on water plans submitted for approval. This does not in anyway exempt the Consulting Engineer from the responsibility of preparing neat, accurate, and comprehensive plans in keeping with the standards of the profession.

(a) **Right-of-Way** – Right-of-way lines, the boundaries of lots, easements, section lines and corners, land grant lines and temporary construction easements, both existing and proposed, will be shown on the plans. All right-of-way and easement lines will be properly dimensioned.

(b) **Topography** – All pertinent topographic features will be shown, such as street lines, medians, driveways, curbs, sidewalks, high water and frequent inundation levels, water lines, gas lines, telephone conduits, other underground utilities, existing structures, houses, trees (6" and larger) and other foliage, traffic signals, street lights and pull boxes, underground electrical conduits, drainage ditches, utility poles, fire hydrants, retaining walls, masonry structures, and all other features of the area which may affect the design requirements. When a potential utility conflict exists, "As Built" elevations of the utilities will be verified by the Consulting Engineer.

(c) **Profiles** – Plans will include profiles of proposed water mains whenever the pipeline diameter will be 16 inches or greater, or whenever the cover over the pipeline will be less than 30 inches or more than 6 feet. Profiles may also be required by the District if it determines that conditions require them or as required by the County.

When profiles are required, the proposed pipeline will be shown, together with all crossing and closely paralleling sewers, drains, and utilities. The ground line over the pipeline will be shown, except where pipeline is to be located within an improved street, in which case either the street centerline or the gutter flow line may be shown.

(d) **Stationing and Orientation** – The stationing on plan and profile will read from left to right. Sacramento County stationing will be used whenever possible. Stationing will increase from south to north or from west to east. Plans will be so arranged that North arrow points toward the top or upper 180 degrees, insofar as practical.

(e) **Bench Marks** – The benchmarks and datum will be clearly delineated on the plans both as to location, description, and elevation. The data will be 1929 North American datum (U.S.G.S. or U.S.C. & G.S.). Consulting Engineers will contact Sacramento County for location and elevation of the nearest official bench mark.

(f) **Special Notes and Details** – Will be employed wherever necessary in order to clearly convey the design intent. The District's standard details may be reproduced and included, but are not required, within the plans.

Section D. Design Standards

D- 1 Design Criteria

The wells, pumps, and distribution system will be designed to supply and maintain an adequate positive pressure in all parts of the system at all times with an economical loss of head, keeping in mind that the systems must be designed to provide emergency as well as normal flow.

(a) Water Quality

(1) California Health and Safety Code, Division 5, Part 1; Chapter 7
(2) California Administrative Code, Title 17, Chapter 5, Subchapter 1, Group 4
(3) California Administrative Code, Title 22, Chapters 15 and 16
(4) Standards of Minimum Requirements for Safe Practice in the Production and Delivery of Water for Domestic Use (California Section of the AWWA).
(5) Sacramento County Ordinance No. 508.

(b) Water Quality and Supply

The system or facilities will be designed to deliver water at a rate adequate to supply the total requirements of all consumers served by the system or facilities under the more extreme of the following two conditions:

(1) Peak Hour Demand; or
(2) Maximum Day Demand plus Fire Flow

Care must be used in estimating fire flows, which are discussed in (c) below.

Special consideration will be given to the design of systems to supply multiple family dwelling projects, commercial, and/or industrial developments. Computations for the design of such systems will be submitted with the plans and specifications. Each system, subdivision, or development will have a sufficient number of independent well systems or production facilities to maintain maximum consumption and fire flow at the required pressures with one well out of service. Detailed plans and specifications of wells and pumping plants will be prepared by the District. Sites for wells or production facilities will be located and sized by the District, and conveyed to the District by the Applicant at no cost to the District.

(c) Required Fire Flows

The design of the system will provide for the delivery of fire flows in accordance with the following:

(1) Single Family Detached Residential: Required fire flows – to be determined by the responsible Fire District.

(2) Multiple Family Residential, Commercial, and Industrial: Required fire flows to be determined by the responsible Fire District.

(d) Pressure Requirements

Under max day plus applicable fire flow requirements, the static pressure will not be less than 35 P.S.I in water mains and not be less than 30 P.S.I at service connections. Service connection will be the outlet side of meter setter, curb stop, or meter. Static pressure will not exceed a maximum of 75 P.S.I.

(e) Velocity Requirements

The velocity of flows in transmission and distribution pipelines will not exceed 5 feet per second under any design condition.

D- 2 Minimum Water Main Size

The minimum size for water distribution mains necessary to adequately deliver domestic water and public fire protection to all new developments and construction of whatever kind or size will be determined with reference to the Real Property Use Zones established by the County of Sacramento, including any variance granted thereto, and specifically in compliance with the following provisions:

Sacramento County Zoning	**Minimum Water Pipeline Size**
Commercial (BP, SC, LC, GC, AC, TC)	12-Inch
Mobile Home Park (RM-1)	12-Inch
High Density Residential (RD-20, RD-30, RD-40, and greater)	12-Inch
Public (Schools, Parks, etc.)	12-Inch
Quasi-Public (Hospitals, Churches, Meeting Halls, etc.)	12-Inch
All Other Zoning*	8-Inch

Industrial (All types) MP, M-1, M-2	16-Inch
*Exception: Cul-de-sacs – Single Family (Non Fire-Hydrant Req. or as determined by District)	6-Inch

Larger sized mains may be required to adequately handle design flows.

D- 3 Location of Water Mains

All water mains and pipelines will be constructed and installed within improved streets, between curbs. Alternate locations will be permitted only with specific approval of the General Manager or his duly authorized representative.

All runs of non-metallic and metallic pipes will have a No. 10 gauge solid, blue insulated, Copperhead Reinforced Tracer Wire affixed along the top of the pipe taped with 20 mil black tape. Bare wire connections are to be made with DryConn Direct Bury Lug connectors. Blue caution tape shall be laid along the top of the initial backfill to facilitate notification of facilities. See Standard Detail No. 4.

D- 4 Separation of Water and Sewer Lines/Storm Drains

(a) Separation between water and sewer (sanitary and storm) facilities will comply with the requirements of the State Department of Public Health Services.

(b) Water lines will be laid in separate trenches with a minimum horizontal separation of ten (10) feet from nearby sanitary sewers.

(c) Water lines will be installed at a higher elevation than nearby sanitary sewers. Stepping of facilities will not be allowed.

(d) When pipelines cross, the bottom of the water line will be at least twelve (12) inches clear above the top of the sewer pipe and eighteen (18) inches clear above or below the storm pipe. No joints will be over a sewer pipe. A full length of water pipeline shall be centered over the crossed pipe.

(e) When the sewer crosses over the top of the water main, the sewer will be replaced with a full length of C900 PVC or DIP Class 350 pipeline centered over the crossed pipe with 12-inch clearance or as per County Improvement Standards.

D- 5 Distribution System

(a) Layout of Mains

The distribution system will be in a grid or looped form so that pressures throughout the system tend to equalize under varying rates and locations of fire flow drafts. The

distribution system will be gridded with 12-inch or larger cross-connecting mains at intervals of approximately 1,300 feet, with an intermediate 8-inch or larger main as required.

Dual Mains (one pipeline on each side of the street) will be installed in streets for which the right-of-way width is 80 feet or greater. The minimum size of pipelines will be as required in Section D-2 herein. Larger sized mains may be required to serve multiple-family residential, commercial, or industrial projects or areas, as determined by an analytical evaluation of the anticipated requirements.

Dual Mains will be interconnected ("cross-tied") with pipe of the same diameter at intervals of not more than 800 feet and at each cross street.

Dead-end water mains will be avoided whenever possible. When unavoidable, dead-end mains will be provided with a standard blow-off connection or other means of flushing acceptable to the District. See Standard Detail Nos. 8 and 9.

(b) Valves

The distribution system will be designed with a sufficient number of valves so located that no single shutdown will result in shutting down a transmission main or necessitate the shutdown of a distribution main for a distance of more than 500 feet. No more than 20 customers will be without service from any single shutdown. In no case will more than two fire hydrants be out of service from any single shutdown.

The valves will be so located that any section of main can be shut down without going to more than three locations to close valves.

Valves will be installed in conformance with Standard Detail No. 5.

Valves at junction will be flange-connected to tees or crosses, or as specified on plans.

(c) Fire Hydrants

Fire hydrants will be "WET BARREL" type, constructed in accordance with Standard Detail No. 6 and installed at locations specified by the responsible Fire Agency or as specified herein.

Fire hydrants will be located to minimize the hazard of damage by traffic. They will have a maximum normal spacing of 500 feet in residential areas and 300 feet in commercial or industrial areas, measured along the street frontage, or as determined by the Fire Agency. "Wet Barrel" hydrants will be set with the lowest outlet a minimum of 18 inches above ground level, with the Steamer Outlet facing the street or point of engine access, as determined by the responsible Fire Agency. Wet Barrel outlets will be within 10 feet of the engine access point.

Fire hydrants will be located and spaced to provide the required fire flows as set forth under Section D-1 (c) herein.

All fire hydrants will be staked for location and finished grade by a licensed surveyor or civil engineer.

Fire hydrants will be placed at 4 feet from property lines and/or back of sidewalk and/or curbs.

(d) Service Lines

A separate water service connection must be installed for each lot, parcel, or premises and will be a minimum of one-inch diameter unless otherwise specified on the approved water plan. Each water service meter box will be staked for location and finished grade by a licensed surveyor or civil engineer or District representative.

Service lines from the water main to the property line will be installed at the time the main is constructed to avoid frequent cutting of the street. No service connection will be permitted within 20 feet of a blow-off assembly.

Service lines in sizes up to and including 2 inches in diameter will be polyethylene coated copper tubing, Type K soft tempered, meeting ASTM 688 and will be equipped with a service saddle and corporation stop at the main, and a meter setter, meter and meter box at the property line. At the District's direction, a water meter will be placed on all services, residential or commercial. Residential service lines will be installed in the middle one-third of the lot frontage, but not less than 10 horizontal feet from any sewer. Installation of service lines will conform to Standard Detail Nos. 12, 13, 14 and 15. Service lines larger than 2 inch shall be per Standard Detail 16 or as approved by the District Engineer.

No new connections to service lines will be permitted, and the water system cannot be approved or accepted until permanent property corner markers are in place and the location and installation of service connections in accordance with District Standard Specifications have been verified by the District, as well as the payment of all fees and the satisfaction of all requirements.

(e) Thrust Blocks

Thrust blocks of Class "B" concrete will be cast in place at all horizontal or vertical bends of four (4) degrees or more, behind each plug, tee, or cross which is valved or plugged in such a manner that it can act as a tee or elbow, and at the back of each fire hydrant. The thrust block will extend from the fitting to undisturbed soil, will be kept clear of the joints, and will be of such bearing area as to assure adequate resistance to the force to be encountered. All bolts, valves, and flanges will be covered with plastic wrap, 4 mil thick minimum prior to pouring concrete thrust blocks. Size of blocking will be in accordance with Standard Detail No. 3.

(f) Meters

When required by the District, meters will be installed in conformance with Standard Detail Nos. 13, 14, 15, 16, 16A and 16B.

(g) Backflow Prevention Devices

A reduced pressure backflow prevention assembly will be required with each meter which services a non-residential parcel including irrigation services, except that a backflow prevention device may be required for residential parcels used for business purposes as determined by the District or served with an alternative source.

Backflow devices will comply with guidelines set forth in the State of California Health and Safety Code, Section 116875, subdivision (a) and AB1953, which prohibits the use of any pipe or plumbing fitting or fixture, solder or flux that is not "lead free", as define in the statute, in the installation or repair of any public water system or any plumbing in a facility providing water for human consumption. Backflow devices shall be Wilkins Model 975XL2, Ames Model C400 or Watts Model 957 or approved equal.

Backflow prevention devices will be installed at the point of delivery within 5 feet downstream of the meter to the Applicant or customer. Backflow devices will be installed per Sacramento County Standard Drawings. The devices will be owned, maintained tested by the Customer.

Existing backflow devices shall be upgraded as required on all improvement projects. Upgrade may include replacement per current State Department of Public Health standards.

Final acceptance and permanent water service will be granted after the Applicant or Contractor has delivered to the District a certified test report stating the satisfactory operation of the device after installation.

(h) Private Fire Service

Double detector check valve assembly will be required with each private fire service. No single check assemblies will be allowed. All devices will be installed above ground per Sacramento County or Fire Department Standard Drawings.

D- 6 Final Acceptance Criteria

Prior to final acceptance, the Applicant or Contractor will show to satisfaction of District the following:

(a) Water facilities have been installed completely as per approved improvement plans and District's latest set of improvement standards and details.

(b) All outstanding fees or costs have been satisfactorily paid to the District and other responsible agencies.

(c) The Applicant has remedied any deficiencies on the water facilities to the satisfaction of the District and other responsible agencies.

(d) A passing hydro-test has been completed on the main.

(e) A satisfactory bacteriological test has been taken with results meeting State limits.

(f) A certified backflow test report stating satisfactory operation of all devices after installation delivered to District.

(g) As-built drawings have been submitted by the Consulting Engineer and approved by District.

Technical Specifications

Division 1 General Requirements

1-1.01 Approved Plans Required

No work will be commenced on any water facilities which are intended to be attached to the District's system unless the Contractor is in possession of complete, fully-approved plans and specifications bearing the signature of the General Manager or his duly authorized representative, and covering all phases of the proposed construction.

An exception to this requirement would be the installation of a single item such as a water service, fire hydrant or fire service.

1-1.02 Contractor's License

All contractors performing work for the District or performing work on projects, which are to be accepted by the District, must be duly licensed under the laws of California to do or perform such work.

1-1.03 Reference to Standards

Whenever standards (such as AWWA, ASTM, etc.) are referred to in these specifications, said reference will be to the latest officially adopted revision thereof.

From time to time these improvement standards, technical specifications and standard details will be revised. It will be the engineer/contractor's responsibility to obtain the latest revision thereof prior to design and installation.

1-1.04 Permits, Licenses, and Fees

The Contractor will, at no expense to the District, obtain all necessary permits and licenses for construction of the project, give all necessary notices, and pay all fees required by law. Contractor will promptly furnish the District copies of all finally approved permits secured by the Contractor in the performance of his contract.

1-1.05 Compliance with Laws

The Contractor will conduct the work in compliance with all existing State and Federal safety laws and County and Municipal ordinances and regulations limiting or controlling the work in any manner.

1-1.06 Construction Safety

All construction of water systems intended to be connected to the District's system must be constructed in strict compliance with the statutory safety requirements of the State of California as set forth in California Administrative Code, Title 8 and all amendments thereto.

1-1.07 Work in Sacramento County Rights-of-Way, Easements, and Waterways

Any Contractor performing construction within Sacramento County rights-of-way, easements, and waterways will be in possession of County-approved plans or a County Encroachment Permit and will comply with all conditions imposed therein, all at no expense to the District.

1-1.08 Existing Facilities and Utilities

The Contractor will be responsible to determine and verify the location of existing facilities and/or utilities. Damage to any existing pipeline, service or other utility, fence building or other structure or to landscaping or other improvements will be the responsibility of the Contractor and will be repaired or replaced by the Contractor at his expense and to the satisfaction of the District.

The District recommends the Contractor take photographs of the existing as-is conditions prior to beginning work.

1-1.09 Pre-Construction Meeting

An on-site meeting with the District Inspector, Consulting Engineer, County Inspector, and Contractor must be held at least two days in advance of construction to inspect materials, schedule inspections, review the approved water system construction plans, and schedule any tie-in connections. Pre-construction meetings will not be scheduled until all items in B-10 have been received including submittal of the material list, guarantee letter, and encroachment/maintenance bond submitted.

1-1.10 Materials Approval

At least ten days prior to the pre-construction meeting, the Contractor will furnish to the District for approval a list of all materials proposed to be used in constructing the water system, including manufacturer, actual location of manufacture, and model number of each item.

1-1.11 Required Notice

The Contractor will notify the District three days prior to commencement of construction and will furnish the District at least two days notice when inspections are required, when pipe is in the ground prior to backfilling, when service and main valves are installed, when initial backfill has been placed, when ready for the hydrostatic test, and will keep the District informed generally as to progress of construction.

1-1.12 Inspection Requirements

Any improvement constructed in accordance with the approved plans, the Special Conditions, and the General and Standard Technical Specifications, for which it is intended or required that the District will assume maintenance responsibility, will be inspected during construction by an authorized representative of the District. Any improvements constructed without the inspection as provided above or constructed contrary to the order or instructions of the District will not be accepted by the District for maintenance purposes and permission to connect with the existing system will be denied.

Within ten days after receiving the request for final inspection, the District will inspect the work. The Contractor, Consulting Engineer, and Developer will be notified in writing as to any particular defects or deficiencies to be remedied. The Contractor will proceed to correct any such defects or deficiencies at the earliest possible date. At such time as the work has been completed, a second inspection will be made by the District to determine if previously mentioned defects have been repaired, altered, and completed in accordance with the plans. The District will not accept any work or project until all defects have been remedied to its satisfaction.

1-1.13 Water System Information

Sacramento Suburban Water District is a member of the U.S.A. One-Call Program, Call U.S.A. 48 hours in advance for public water system information.

1-1.14 Water System Shutdown

All water system shutdowns will be made only by District personnel. **Under no circumstances will anyone other than a representative of the District open or close any valve in a District system.**

Shutdowns for the purpose of making connections to existing mains must be scheduled at least three working days in advance and are only permitted on Tuesday, Wednesday, or Thursday. The District will advise the Contractor of the hours during which shutdowns may be made. All connections must be supervised and controlled by District personnel. No shutdowns will be permitted until the District Inspector verifies that Contractor is physically present and prepared to assist making the connection with personnel, materials, and appurtenances as specified on approved plans.

Night work as required shall be scheduled through the District pending available personnel, time and coordination of customers affected by the proposed shutdown. Night work will require payment of additional inspection fees in advance of the proposed work as determine by the District.

Tie-ins will not be allowed to District facilities on the Tuesday following a District holiday or on the Thursday prior to a District holiday.

1-1.15 Traffic Control

When working in streets, the Contractor will take adequate precautions for the protection of the traveling public. Barricades, warning lights and signs, and flagmen, where necessary, will be maintained in accordance with the latest revision of the Caltrans "Manual of Traffic Controls" or County of Sacramento "Improvement Standards" until the excavation is refilled, the obstruction removed, and the roadway made safe for the traveling public. At its discretion, the District may require the Contractor to submit and obtain Sacramento County's approval of a traffic control plan before the District will approve plans and/or authorize a shutdown.

1-1.16 As-Built Drawings

The Contractor will maintain one set of construction drawings to be used for keeping a record of all changes made during construction. The Contractor will be responsible for keeping these drawings and neatly noting all changes with colored pencil or ink. These drawings will be checked by the District, and partial payments will not be made to the Contractor until the check made by the District verifies that the records are being properly kept. These construction drawings are to be kept in neat order and will be delivered to the Consulting Engineer at the completion of the project. Upon completion of revised as-built drawings, said drawings will be delivered as per B-12.

1-1.17 Disposal of Trench Soil

Surplus material excavated from pipeline trenches will become the property of the Contractor and will be disposed of legally in conformance with applicable County ordinances. The Contractor will promptly furnish to the District copies of all grading permits and written permissions from landowners secured by the Contractor to dispose of trench soil.

1-1.18 Guarantee and Maintenance Bond

Prior to commencement of the work accomplished under District-approved plans, and as a condition of final acceptance herein, the Contractor will execute and deliver to the District a guarantee of the materials, workmanship, and/or equipment that he or she will have constructed or installed in the course of said work. This guarantee will be in the form attached hereto and will remain in full force and effect for a period of one year from the date upon which the work is accepted by the District. Should any failure of the work occur within the guarantee period, which can be attributed to faulty materials, poor workmanship, or defective equipment, the Contractor will promptly make the needed repairs at his expense. A completed guarantee form will be required before each job performed by a Contractor in the Sacramento Suburban Water District. **The District will not accept the guarantee letter unless it is placed on the Contractor's letterhead, signed by the Contractor, filled out completely and includes the statement of final cost of the water system.**

Prior to commencement of any work performed in Sacramento Suburban Water District, each Contractor will be required to furnish an overall guarantee/maintenance bond or corporate surety bond, payable to the District, issued by an acceptable surety company authorized to do business in the State of California, to protect the District against the results of faulty materials, poor workmanship, or defective equipment, and to guarantee the Contractor's responsibility for each completed work or project, as outlined above, for a period of one year from the date the District

accepts the work or project. The bond also will cover all subsequent jobs performed by the Contractor in the Sacramento Suburban Water District, if such works or projects are being constructed simultaneously or serially. The time limit of such bond will begin from the date the District first accepts the bond and will end on the anniversary date of the acceptance letter. The Contractor will obtain the bond on forms furnished by the District in the sum of not less than $7,000.00. It will be the Contractor's responsibility to renew the bond on the anniversary date so as to cover all jobs that are started after initial bond submittal and so that it remains in effect for at least one year after the District accepts the last work on the project and issues an acceptance letter. Should the Contractor be unable to obtain a bond for the project, then the Developer will furnish a bond. Said bond will only cover the project and will be no less than 50% of the contract amount for water facilities and be in effect for a period of one year from the date of the District's acceptance of the work or project.

GUARANTEE

(**To be submitted on Contractor's letterhead**)

Sacramento Suburban Water District ("District")
3701 Marconi Avenue, Suite 100
Sacramento, CA 95821

Dear Sir or Madam:

We hereby unconditionally guarantee that the construction performed under approved plans and/or contract dated _____, 20____, for the project entitled _____ will be done in accordance with the approved drawings and specifications and that work as installed will fulfill requirements of the guarantee included in the specifications. We agree to repair and/or replace at our sole cost and expense, and to the satisfaction of the District and its engineers, any or all of our work, together with any other adjacent work which may be displaced by doing so, that may prove to be defective in workmanship or materials within a period of one year from date of acceptance of above-named project by District, without any expense to said District, ordinary wear and tear excepted. We further guarantee that we will leave the site of any repair or replacement work in satisfactory working order and condition.

In the event of our failure to comply with the above-mentioned conditions, within ten days after being notified in writing by the District, we, collectively or separately, do hereby authorize the District to have said defects repaired and made good at our expense, and we will honor and pay the costs and charges therefore upon demand. In the event of such failure on our part, we further promise to pay such reasonable litigation costs, including attorney's fees and expert witness fees and costs, as a court with jurisdiction in the matter shall decide, should the enforcement or interpretation of this guarantee or any part thereof require legal action.

_____
Company Name (Print)

_____
Address

_____
Phone Number

_____ _____
Contractor's License Number Contractor's Signature

_____
Print Name

The contract amount for water construction only: _____

Technical Specifications

Division 2 Pipelines & Appurtenances

Section 1: Materials

2-1.01 Materials and Brand Names

All materials and equipment furnished under these specifications will be new and of a quality equal to that specified in this Section. Materials or equipment specified herein by brand or trade name or catalog designation are so specified or designated because they are known to be suitable for the operating service required of them. It is, however, not the purpose of these specifications to eliminate other material or equipment of equally demonstrated design and functional quality and efficiency. However, all material proposed to be used will carry the AWWA stamp of approval with test results to verify the material satisfies AWWA Standards and will be subject to approval by the District as specified in Subsection 1-1.10.

2-1.02 Material Testing

All testing requirements of the specifications will be conducted by the pipe manufacturer or his representative within the State of California and the resulting tests will be certified by an established, reputable firm acceptable to the District operating in the materials testing field.

2-1.03 Water Pipe

Pipe used in the construction of water distribution systems may be any of the types specified below, unless a particular type is specified or shown on the approved plans. It will be the regular product of a firm who has successfully manufacturer comparable pipe for at least three years.

Ductile Iron Pipe

Ductile Iron pipe (D.I.P.) will be thickness Class 50 or Pressure Class 350 unless specified otherwise and will conform to AWWA Standard C-151. All ductile pipes will be cement mortar lined and seal coated in conformance with AWWA Standard C-104. Joints will be of a bell and spigot type conforming to AWWA Standard C-111, such as “Tyton Joint:” manufactured by U.S. Pipe and Foundry Co. Standard laying length will be 18 feet. Installation will conform to these specifications and AWWA Standard C-600.

Ductile iron pipe used for trench-less methods or laid under culverts will be minimum thickness Class 53 or Pressure Class 350.

Ductile Iron Pipe will be used under all culverts and will extend a minimum 5 feet beyond outside edge of the culvert as per Standard Detail No. 25. No joints will be located under the culvert.

Polyethylene Encasement will be required for all Ductile Iron Pipe installation, including fittings, valves, etc. Encasement material and installation methods will conform to AWWA Standard C-105.

All runs of water pipe will have a No. 10 gauge solid, insulated, soft drawn copper wire affixed along the top of the pipe taped with 20 mil black tape. Blue caution tape shall be laid along the top of the initial backfill to facilitate notification of facilities. Installation will conform to Standard Detail No. 4.

2-1.04 Water Pipe Fittings

All junctions will be flange connected, unless otherwise noted. All bends, elbows, tees, crosses, and special fittings will be flanged unless otherwise noted and will conform to the following requirements. Tie-ins to **existing facilities** will be performed per Standard Details 21, 22, and 23 or in accordance with the following if conditions warrant.

(1) Flanged tee, should a valve be required on the existing main or should the main be mortar lined steel pipe as per Standard Details 21, 22, and 23.

(2) Stainless steel tapping saddle for runs on existing mains with no additional valves on existing main. Stainless steel tapping saddles will not be used on mortar lined steel pipe 14 inches or smaller unless directed by District. However, the tapping saddle will only be used when the run is as per the following chart:

Existing Main Size	**Maximum Allowable Tap Size**
4-Inch	None
6-Inch	None
8-Inch	6-Inch Max.
10-Inch	8-Inch Max.
12-Inch	8-Inch Max.
14-Inch	None
16-Inch	12-Inch Max.
20-Inch	16-Inch Max.
24-Inch	16-Inch Max.

(a) Fittings for Water Pipeline

Fittings will conform to AWWA Standards C-110 and C-153, Class 250, but need not be mortar lined. Gaskets will conform to AWWA Standard C-111. Joints will be flanged or mechanical joint with mega lug type restraints, unless otherwise specified or shown on plans. Rubber-ring push-on joints for A.C. Pipe conforming to AWWA Standards C-110 and C-153 may be employed for 6-inch diameter or smaller pipe only. Field restrain type gaskets will be used as necessary in conjunction with restraint type fittings.

(b) Fabricated Steel Items

Fabricated adapter fittings and specials will be made up of steel pipe, conforming to ASTM Designation A53, 35,000 P.S.I. Minimum Yield Strength, 1/4-inch wall, except 20-inch diameter through 24-inch diameter, which will be 3/8-inch wall, greater than 24-inch through 36-inch will be 1/2-inch wall thickness. Welding fitting will be seamless steel conforming to ASTM Designation A-234. Flanges will be Class "D," slip-on welding flanges welding front and back and faced, and all in accordance with AWWA Standard C-207. Pipe, fittings, and flanges will be lined and coated, 12 to 15-mil thickness with a Fusion Bonded Epoxy Coating conforming to AWWA Standard C-213. The lining and coating material will be 100% solids, thermosetting, fusion bonded, dry powder epoxy resin such as "Scotchkote No. 302" (3M Co.) or approved equivalent applied by the fluidized bed method only.

2-1.05 Conductor Pipe

Pipe used as a conductor under a highway, railroad, or other location will be welded steel pipe manufactured of ASTM Designation A-245, commercial grade steel. All joints will be butt-welded. Welded steel conductor will have a minimum wall thickness of 1/4-inch for sizes up to and including 24-inch in diameter, 5/16-inch for sizes 27-inch to 36-inch diameter, and 3/8 inch for sizes greater than 36-inch to 42-inch diameter. Sizes greater than 42-inch will be designed and approved by the District prior to use.

Conductor casing will be used for all trench-less methods unless otherwise directed by District.

2-1.06 Valves and Valve Boxes

Installation of valves, valve boxes, and appurtenances will conform to Standard Detail No. 5 and as specified herein.

(a) Valves

All valves will be Class 150 and will meet or exceed the requirements of AWWA Standard C-504 for Butterfly type and AWWA Standard C-509 or C-515 for Resilient Seat type gate valves.

Valves will be suitable for buried service, will be equipped with a 2-inch square operating nut, and will open CCW. Unless shown or otherwise noted on the plans, valves will be furnished with flanged, mechanical joint or push-on ends, conforming to the requirements set forth herein for water pipe fittings.

The type of valves will be of the following:

American Darling, Dresser 450, Pratt, Kennedy, Mueller, Clow, or approved equivalent.

Butterfly valves will be used on 10-inch diameter or larger pipe, and Resilient Seat gate valves will be used on 8-inch or smaller pipe or unless otherwise noted.

(b) Valve Boxes

Valve boxes located in non-traffic or traffic areas will be P-51 FORNI or Christy G-5, having a cast iron face and cast iron traffic lid. Covers will be marked "WATER" and will have a tight fit in the box.

Valve box risers will be fabricated from 8-inch diameter PVC or ACP pipe for boxes in non-traffic areas and 8-inch – No. 10GA steel well casing or equivalent for traffic areas.

(c) Valve Operating Extension

A valve operating extension will be required whenever the valve is installed such that the operating nut is more than 48 inches below finishing grade. The valve operating extension will be fabricated from steel elements to the dimensions shown on Standard Detail No. 5.

(d) Valve Aliners

Valve aliners will be required on all valves placed in Sacramento Suburban Water District. Aliners will be installed as shown on Standard Detail No. 5A and be sized to fit within the riser pipe as designated by these specifications.

2-1.07 Fire Hydrants

Fire hydrants and appurtenances will be furnished and installed in conformance with Standard Detail No. 6, as designated on the plans, and as specified herein.

The hydrant main valve will be minimum 5 1/4 inch diameter; will open CCW, with bronze-to-bronze seating. The foot piece will have mechanical joint inlet with mega lug type restraints, for

connection to the 6-inch diameter ductile iron pipe hydrant lateral. Hydrants are to be furnished with drain openings plugged to the base.

Hose nozzles will be threaded-in, with one (1) 4 1/2-inch diameter Pumper Outlet and two 2 1/2-inch Hose Outlets, having "National Standard Fire Hose Coupling Screw Threads," conforming to ASA Standard B26 or unless otherwise specified. The hydrant nozzle caps will be securely chained to the body. Pumper Outlet will face the street or traffic lane unless specified otherwise. In the event that the hydrant must be disassembled to rotate the pumper outlet so that it faces the street, new gaskets will be applied to the hydrant when it is reassembled.

Even though not indicated on the plans, every fire hydrant installation must have a 6-inch resilient seat gate valve installed on the 6-inch lateral at the tee from the main and all piping will be restrained from hydrant tee to hydrant foot piece.

Fire hydrants 50 feet or longer from the connecting water main shall have an 8-inch lateral and valve.

All fire hydrants will be staked for location and finished grade prior to construction by a licensed surveyor or civil engineer.

"Steamer" fire hydrants will be wet-barrel type, will meet or exceed the requirements of AWWA Standard C-503 and will be CLOW Model No. 960, JONES Model J4060, or approved equal. Hydrants must be a traffic-type equipped with an approved break-off protection device, such as LBI Model No. 400 BOCVA or AVK Series 2488 or James Jones Model J5000 series. The portion of the completed hydrant above the "breakable" flange will be finish-painted with "RUST-O-CRYLIC" No. 5747 Yellow. Installation will conform to Standard Detail No. 6. All fire hydrants will be traffic protected by guard posts as per Standard Detail #7 unless otherwise noted.

2-1.08 Service Lines and Fittings

Service lines and fittings will be furnished and installed in conformance with Standard Detail Nos. 12, 13, 14, 15, and 16, and as specified herein.

(a) Service Saddles

Service saddles will conform to the following, depending on the type and size of water main on to which they are to be mounted.

Ductile Iron Pipe: 6-inch through 12-inch diameter; brass body, double strap brass saddle casing, drilled and tapped for corporation stop, and be of all brass and will be of the following: JAMES JONES 979, ROMAC 202B, FORD 202B, ROCKWELL 323, MUELLER HI600 or approved equal.

Ductile Iron Pipe: 16-inch through 24-inch diameter; brass body, stainless steel band of brass, drilled and tapped for corporation stop, and will be of the following: JAMES JONES 979, FORD 202BS, ROCKWELL 323, or approved equal.

Cast Iron saddles will not be used in Sacramento Suburban Water District unless approved by the District.

(b) Corporation Stop

Corporation stops will be ball valves and be manufactured from 85-5-5-5 brass (ASTM Designation B62) with a standard male iron pipe thread inlet and compression ("Pack Joint") outlet for copper tubing. Corporation stops will be of the following models, or approved equal, conforming to the following table of sizes:

Service Size	FORD Model No.	JAMES JONES Model No.	McDONALD Model No.	MUELLER Model No.	FORD Model No.
1"	FB1100	J-1435SG	4704-BT22	B-25028	3826
1 1/2"	FB1100	J-1935SG	4704-BT22	B-25028	3826
2"	FB1100	J-1935SG	4704-BT22	B-25028	3826

(c) Service Line

Service lines in sizes up to and including 2 inches in diameter will be polyethylene-coated "Type K" copper tubing soft tempered, meeting ASTM Designation B88. Service lines larger than 2 inches in diameter up to and including 4 inches will be Ductile Iron Pipe Class 50, 53, or Pressure Class 350 with Bell and Spigot joints. Service lines larger than 4 inches in diameter will conform to Section 1.03 and 1.04 herein.

(d) Meter Setters and Fittings

Meter setters will be copper with angle ball valve on the inlet side and meter thread connection on the outlet side. Connection to inlet piping will be compression type pack joint inlet and FIP outlet with a double purpose coupling on 1-inch setters. Setters for 1 1/2 inches and 2 inches will be copper with flange ball valve on inlet, and flange ell on outlet with the bypass tee not drilled. Connection to inlet piping will be compression type pack joint inlet and a FIP outlet.

Service Size	FORD Model No.	MUELLER Model No.	McDONALD Model No.
1"	VBB74-84W-41-44-Q	390B2478----04	39410JJ2D44
1 1/2"	VBB66-18HB-11-66	B2423-99000	39B612WW2F665
2"	VBB77-18HB-11-77	B2423-99000	39B712WW2F775

Boxes will be of the type as listed below:

Service Size	Box	Lids	
		Non - Traffic	Traffic
¾" & 1"	Armorcast, RPM P6001868x12 (Rotocast 13"x 24") B-30	Armorcast A6001969-H10	Steel Lid
	Armorcast, RPM A6001946PCx12 (Polymer 13"x 24") B-30	Armorcast A6001969-H10	Steel Lid
	Carson – 13242005 (Polymer 1324-12PPC Body Gray H10/20) B-30	Carson MSCBC1324SPC01-H10	Steel Lid
	Carson MSBCF1324-12X – B-30	Carson MSCBC1324SPC01-H10	Steel Lid
1 1/2 & 2"	Armorcast, RPM P600153 4x18 (Rotocast 17"x 30") B-36	Armorcast A6001947-T-H10	Steel Lid
	Armorcast, RPM A6001640PCx18 (Polymer 17"x 30") B-36	Armorcast A6001947-T-H10	Steel Lid
	Carson – 17302009 (Polymer 1730-18PPC Body Gray H10/20) B-36	Carson MSCBC1730SPC01-H10	Steel Lid
	Carson MSBCF1730-18 – B-36	Carson MSCBC1730SPC01-H10	Steel Lid
3" & 4"	Armorcast RPM A6001430PCx18 – B-48	Armorcast A6001470TA-H10	Steel Lid
	Brooks 68 – B-68	68-THR	Steel Lid
	Carson – 380481003 B-68	30484003	Steel Lid

All steel lids for traffic situations are to match size of box and constructed from diamond plate material with 1 7/8-inch diameter hole drilled in a 5/8–inch diameter recessed 3-inch diameter depression at 3 ½ -inches equal distance from any corner of lid for radio read antenna.

2-1.09 Flexible and Transition Couplings

Flexible couplings and transition couplings will be bolted, with ductile iron sleeve and end rings, ROMAC MODEL 501, DRESSER No. 153, or SMITH BLAIR No. 413, or approved equal. Flexible and transition couplings must be 12-inch minimum in length unless otherwise directed by District.

2-1.10 Sampling Stations

Sampling stations for coliform testing will be a P6002010 Armorcast Water Sampling Station, manufactured by the Armorcast Company. Sampling Stations will be installed per Standard Detail No. 24.

Technical Specifications

Division 2 Pipeline and Appurtenances

Section 2: Installation and Construction

2-2.01 Trench Excavation

Trench excavation will include removal of all materials or obstructions of any nature, the installation and removal of all sheeting and bracing, and the control of water, necessary to construct mains, services, or other works. Unless otherwise indicated on the drawings or permitted by the District, excavation will be open cut.

(a) Trench Depth and Width

Trenches will be dug to an even laying grade to a depth sufficient to provide 36 inches of minimum cover over the pipe measured from the finished grade. For pipe diameters larger than 12 inches, minimum cover will be 42 inches measured from the finished grade.

The minimum clear width of trench at the top of pipe will be 18 inches or 12 inches greater than the outside diameter of the barrel of the pipe, whichever is greater.

The maximum clear width of trench at the top of the pipe will be the outside diameter of the pipe plus 24 inches. The Contractor will conduct his operations to limit top widths to the above-specified maximum at the top of the pipe unless the District allows a greater allowable width.

If trench widths at the top of the pipe as specified above are exceeded by any amount, for any reason, the Contractor will provide at his own expense stronger pipe, improved bedding conditions, or concrete protection, as approved by the District, to meet the load requirements of the condition.

(b) Cutting of Pavement

When the trench is in an existing paved area, the pavement will be sawed or scored on neat lines parallel with and equidistant from, the trench centerline. Pavement between lines will be broken and removed immediately ahead of the trenching operations. The width of the pavement removed will be sufficient that the trenching operation does not damage the edges of the pavement left in place. When existing pavement is concrete, it will be sawed to a neat line 6 inches wider on each side than the actual trench width or as specified by Sacramento County Improvement Standards.

(c) Bracing and Shoring

All construction of water systems intended to be connected with the District's system must be constructed in strict compliance with the statutory safety requirements of the State of California as set forth in California Administrative Code, Title 8, and all amendments thereto, and all applicable County and District ordinances, rules, orders and regulations. Any violation by the Contractor of any safety law, ordinance, order, rule or regulation will be sufficient cause for the District to immediately suspend the work. No compensation for losses incurred by the Contractor for such a suspension will be allowed.

Insofar as possible, sheeting will not extend below the bottom of the pipe barrel. All sheeting, timbering, lagging, and bracing will, unless otherwise required by the District, be removed during backfilling, and in such a manner as to prevent any movement of the ground or damage to the piping or to other structures. When the District requires that sheet piling, lagging, and bracing be left in place, such materials will be cut off where designated and the upper part withdrawn, with compacting of backfill to proceed as it is removed.

(d) Maximum Length of Trench Open

There will be no more than a maximum of 100 feet of open trench, unless otherwise authorized by the District for each operation. The remainder of the trench will be backfilled and compacted, and when in streets, opened to traffic as soon as possible.

(e) Control of Water

When water is encountered, the Contractor will furnish, install, maintain and operate all necessary machinery, appliances, and equipment to keep the excavation reasonably free from water until the placing of the bedding material, laying and jointing of pipe and fittings, pouring of concrete, and placing of the initial backfill has been completed, inspected, and approved, and all danger of flotation and other damage is removed. Ground water pumped from the trench will be disposed of in such a manner as will not cause injury to public or private property or constitute a nuisance or menace to the public, and the disposal method will be subject to the approval of the State Regional Water Quality Control Board.

(f) Special Foundation Treatment

Whenever the bottom of the trench is soft or rocky or, in the opinion of the District, otherwise unsuitable as a foundation for the pipe, the unsuitable material will be removed to a depth such that when replaced with imported crushed rock or gravel, it will provide a stable and satisfactory foundation. The imported crushed rock or gravel will be graduated so that 100% will pass the 3/4-inch sieve and not more than 10% will pass the No. 8 sieve.

When the trench bottom is cobbled or of any other material, which, in the opinion of the District, might allow loss of sand bedding, the bedding material will be crushed rock or gravel graduated so that 100% will pass the 3/4-inch sieve and not more than 15% will pass the 1/2-inch sieve.

2-2.02 Trench Bottom Preparation and Pipe Bedding

Unless otherwise specified, the trench will be excavated so as to provide a minimum of 4 inches between pipe barrel and undisturbed earth. This undercutting will be refilled with either clean, imported sand, thoroughly compacted into place, or with native material 3 inches in diameter or smaller as per Section 2.2.06 herein.

When approved by the District, pipe may be supported on earth mounds where the trench bottom is solid and firm mounds can be built that will hold the pipe from settling during and after assembly until initial backfill has been placed in accordance with Section 2-2.06 herein. The location and number of earth mound supports will be in accordance with the pipe manufacturer's recommendations.

Supporting pipe on blocks will not be permitted.

2-2.03 Pipe and Fitting Installation

All pipe, valves, fittings, and appurtenances will be installed in accordance with the manufacturer's recommendations and according to accepted water works practice. Each section of pipe and each fitting will be thoroughly cleaned out before it is installed. All pipe, fittings, valves, etc. will be carefully lowered into the trench by suitable tools or equipment in such a manner as to prevent any damage, particularly to the lining and coating. When required by the District, approved slings will be used to lower the pipe. Under no circumstances will pipe or accessories be dropped into the trench. All pipe, valves, fittings, and appurtenances, before lowering into the trench, will be examined for defects. Any defective, damaged, or unsound materials will be rejected. All material must be new and in good condition.

The pipe will be laid true to line with no visible change in alignment at any joint unless curved alignment is shown on the plan, in which case the maximum deflection at any joint will not exceed the manufacturer's recommendations for the type of pipe joint being used.

Under no circumstances shall small sections of pipe be installed unnecessarily unless approved by the District.

No bells or fittings shall be installed within 4 feet under any structure unless approved by the District.

Thrust blocks of Class "B" concrete will be cast in place at all horizontal or vertical bends of four (4) degrees or more, behind each plug, tee, or cross which is valved or plugged in such a manner that it can act as a tee or elbow, and at the back of each fire hydrant. The thrust block will extend from the fitting to undisturbed soil, will be kept clear of the joints, and will be of such bearing area as to assure adequate resistance to the force to be encountered. All bolts,

valves, and flanges will be covered with plastic wrap, 4 mil thick minimum prior to pouring concrete thrust blocks. Size of blocking will be in accordance with Standard Detail No. 3.

Whenever pipe laying is discontinued for an hour or more, the open end of all mains and fittings will be closed with watertight plugs or bulkheads. The plug or bulkhead will not be removed unless, or until, the trench is dry. Pipe will not be laid when the condition of the trench or the weather is unsuitable.

All pipe jointing, including the maximum deflection of joints in curved alignments, will be in accordance with accepted best practices and as detailed in the manufacturer's installation manual. Both joint surfaces will be clean before joints are made. Materials used in jointing the pipe will only be that furnished with the pipe or recommended by the manufacturer.

When necessary to cut pipe, it will be neatly and squarely cut to length using methods recommended by the manufacturer.

2-2.04 Placing Locating Wire and Caution Tape

All runs of non-metallic and metallic water pipe will have a No. 10 gauge solid, insulated, soft drawn copper wire affixed along the top of the pipe taped on the poly wrap with 20 mil black tape. Blue caution tape shall be placed on top of the sand backfill over the center of the pipe prior to initial backfill. The wire will be stubbed up inside each valve box and placed as shown on Standard Detail No. 4. Locating wire will have a 3/64-inch type TW insulation.

Prior to placement of final paving, contractor shall perform a continuity test to confirm, locate and repair any breaks in the locator wire identified in the test. The cost of the test, repairs or replace will be borne by the contractor. The contractor is advised to use care in the installation and backfilling operations to prevent damage to the wire.

2-2.05 Setting Valves, Fire Hydrants, and Blow-Off Assemblies and Air Release Assemblies

Installation of valves, valve boxes, and appurtenances will conform to Standard Detail No. 5 and these specifications. Whenever valves are to be installed at a pipeline junction, the valves will be flange-connected to the tee or cross fittings.

Installation of fire hydrants will conform to Standard Detail No. 6 and these specifications. Guard posts will conform to Standard Detail No. 7.

Fire Hydrants will stand plumb with the pumper outlet facing the street. The pumper outlet of "steamer" hydrants will be set at least 18 inches above the sidewalk or finished ground surface, whichever is higher. A minimum 6-inch lateral will serve the hydrant from the main, containing a valve to enable repairs to be made to the hydrant without shutting down the main. Hydrant laterals greater than 40 feet in length will be 8-inch minimum diameter or as necessary to provide required fire flows. The Sacramento Suburban Water District will determine size. In no case will a fire hydrant be installed within 3 feet of a building or any other structure that would limit access. Hydrants will be located 4 feet back of walk or curbs and in planters whereby sufficient

space is available for guard posts as shown in Standard Detail No. 7. Hydrants may be required to be relocated to attain the sufficient space.

Blow-off assemblies will be constructed as shown on Standard Detail Nos. 8 and 9. The location will be such that there will be no possibility of back siphonage into the distribution system.

Air release assemblies will be constructed as shown on Standard Detail No. 11. The location will be such that the assembly functions as designed.

2-2.06 Initial Backfill

The trench will be backfilled using either sand or native material as per Standard Detail No. 2 provided that all native materials are free of debris, organic matter, or pieces larger than 3 inches in diameter. Existing job excavated material larger than 3 inches in diameter can be used; however, it must be crushed to 3-inch diameter or smaller prior to placement. The initial backfill will be carefully placed so as not to disturb or damage the pipe and will be brought up evenly on both sides. If the existing native material, in the Inspector's opinion, is unsuitable or the particular area requires additional pipe support, then that section or sections of trench will be backfilled initially with sand to a point 6 inches above the pipe thoroughly and evenly on both sides of the pipe to avoid disturbing or damaging the pipe.

Compaction by flooding will be permitted subject to District approval and when made by water jetting or other approved methods adequate to completely saturate the bedding and initial backfill. Flooding will be regulated to prevent flotation or uplift of pipes and Contractor will replace or re-lay as necessary any damaged pipe. When the intermediate backfill is to be compacted mechanically, the bedding and initial backfill will first be fully compacted by flooding.

2-2.07 Intermediate and/or Top Backfill

Backfill will be furnished and placed in conformance with Standard Detail No. 2 and these specifications. All backfill will be placed and compacted to a minimum relative compaction of 90 percent as determined by the test method currently being employed by the County of Sacramento unless specified otherwise in the Special Provisions or County Encroachment Permit.

(a) Backfill within Existing Improved Streets and Under Paving

Mechanical compaction methods will be employed for all installations in this category, except as hereinafter provided. Intermediate backfill material will be Class 2 Aggregate Base, 1 1/2-inch maximum particle size, conforming to Sacramento County Standard Specification SS-17, for all streets as specified by County standards.

(b) Backfill in New Subdivision Streets and Unimproved Rights-of-Way

Backfill will be "Imported Select Material," conforming to Sacramento County Standard Specification SS-10 and compacted by mechanical methods. Subject to specific prior approval from the District, job excavated material; free of debris, organic

matter, or pieces less than 3 inches may be used for intermediate backfill, compacted by jetting as specified hereinafter.

Jetting will be performed with suitable pipe jets approved by the District, but in no case will the jet pipe be less than 1 1/2 inches in diameter, nor will the flow be less than 20 GPM. The jetting pipe will be long enough to reach the bottom of the backfill layer and water will be discharged continuously as the pipe is slowly withdrawn in order to thorough saturate the material and cause it to slump to its maximum compaction. Proceeding upgrade, jet points will be staggered from side to side of the ditch at intervals not to exceed 6 feet or closer if necessary to insure that the backfill takes all possible subsidence. All "bridges" in the backfill material will be completely broken down during the jetting process. No jetting operations will be allowed that will, in the opinion of the District, jeopardize in any manner the stability of the pipeline in the trench. Jetting operations done any time except during regular working hours will have prior approval of the District.

2-2.08 Other Backfill Requirements

In addition to the requirements outlined above, the following conditions will govern when applicable.

(a) Bracing and Shoring

Where bracing and shoring is used in the trench, the backfill will be carried to a height sufficient to prevent the surrounding ground from cracking and caving into the trench before the bracing and shoring is removed. Backfill of the pit excavated for boring operations will be made in the same manner as above specified for trenches. Bracing or shoring permits and details may be required prior to any pipe inlaying.

(b) Backfill of Service Lines

If water service lines are installed by open cut methods, the service line trench will be backfilled in the same manner as the water main trench.

2-2.09 Installation of Water Services

Water service will be furnished and installed in conformance with Standard Detail Nos. 12, 13, 14, 15, and 16.

Applicable codes prohibiting the laying of water pipe in the same trench as the sewer service will be rigidly enforced.

(a) Connections to Existing Mains

The District will make Service connections to existing mains. The District may authorize a contractor, who is licensed to perform and is active in underground pipe-line construction and installation, to make the connections to existing mains. Service

connections to existing mains must be made by using materials and equipment to make taps under pressure without removing the main from service.

(b) Installing Meter Setters and Meter Boxes

All meter setters will be installed with a water meter of proper size by Contractor. After backfilling of a service line is completed, the meter setter will be physically protected by a "can-like" cover until the meter box is set. Should there be any damage to the meter setter, meter, and meter box prior to system acceptance; the Contractor will replace the damaged unit with a new one, at no cost to the District.

All meter boxes will be set with the top cover flush with the abutting sidewalk or finished grade and will be solidly founded and backfilled so there is no settlement. The District will install the meter transponder head once the meter box has been placed at its proper grade.

2-2.10 Threaded Joints

Threaded joints for service connections, air release assemblies, etc. will be made with Teflon Plumber's Tape. **NO JOINT COMPOUND WILL BE USED**.

2-2.11 Water Facilities Corrosion Protection

All underground water facilities shall be protected for potential corrosion activities. Ductile iron pipe shall be protected with polyethylene encasement per manufacturer's specifications. Tees, ells, valves and special fitting shall be wrapped in plastic 4 mil thick minimum prior to any pouring of concrete or backfill. New copper water services shall be protected with a polyethylene coated encasement. Existing copper service lines meeting District standards shall be modified and reused per District details. Two – 4-pound high purity copper service line anodes shall be buried below the new installed meter setter. Anodes shall be connected to the existing copper service line with a brass cable-to-pipe clamp.

2-2.12 Boring and Jacking

Where specified or permitted by the District, the water main will be placed in a conductor pipe under a roadway, railroad, or other obstruction by boring and jacking. The equipment and method of operation will be approved by the District before proceeding with the work.

Excavation for the boring operation will be the minimum necessary to satisfactorily complete the work. Bracing and shoring will be adequate to protect workmen and any adjacent structure or roadbed.

(a) Installation of Conductor

The Conductor will be jacked simultaneously with the boring operation. The bored hole will not be more than 0.1 feet larger in diameter than the outside diameter of the

conductor. Adjoining sections of the conductor will be fully welded together. The conductor will extend 5.0 feet minimum on each side of the bore, or as specified.

(b) Placing Pipe in Conductor

Pipe sections will be jointed outside the conductor and then slid into place. The pipe will be strapped with casing insulators, Calpico Model PC or M, or approved equivalent, centered at points approximately 1/5 the pipe length from each end.

The space between the pipe and the conductor will be left as is or filled with sand as specified by the District. The ends of the conductor will be end sealed with a Calpico, Model W, or as specified by the District.

(c) Backpacking of Voids

Whenever, in the opinion of the District, the nature of the soil indicates the likelihood of ground loss which would result in a greater space between the outer surface of the conductor than herein allowed, the Contractor will take immediate steps to prevent such occurrences by installing a jacking head extending at least 18 inches from the leading edge of the conductor. The jacking head will cover the upper 2/3 of the conductor and project not more than 1/2 inch beyond the conductor's outer surface. Excavation will not be made in advance of this jacking head.

Voids greater than allowable will be filled with sand, soil, cement, or grout as directed by the District. Where voids are suspected, the District may direct the Contractor to drill the conductor, pressure inject grout to refusal, and then to repair the drilled hole. Grouting pressure will not exceed 50 P.S.I. at the nozzle.

2-2.13 Clean Up

During the progress of the work, the Contractor will keep the entire job in a clean and orderly condition. Spillage resulting from hauling operations along or across existing streets or roads will be removed immediately by the Contractor. He will govern his operations and methods at all times to minimize dust problems within the area of the work or along adjacent properties. Water or dust palliative will be applied as required to provide adequate dust control to complete satisfaction of the District.

2-2.14 Hydrostatic Tests

After completion of the installation, the Contractor will test all piping to the pressure specified below. The Contractor will furnish all material, equipment, and labor for such testing. The water services will be considered as part of the main for test purposes.

In no case will there be placement of permanent pavement prior to successful completion of the test. Thrust blocks will have been in place for at least 36 hours if high-early strength cement was used or at least 4 days if standard cement was utilized.

Each section of the system to be tested will be slowly filled with water, and all air will be expelled from the pipe. The release of the air can be accomplished by opening hydrants and service line cocks at the high points of the system and the blow-offs at all dead ends. The valve controlling the admission of water into the section of pipe to be tested should be opened wide before shutting the hydrants or blow-offs. After the system has been filled with water and all air expelled, all the valves controlling the section to be tested will be closed, and the line will remain in this condition for a period of not less than 24 hours.

The pipe will then be refilled, if necessary, and subjected to a pressure of not less than 150 P.S.I., or the service pressure plus 50 pounds, whichever is greater, for a period of 2 hours.

The allowable leakage in the test section will be in accordance with AAWA C-600 and will not exceed 0.0919 gallons per hour per inch diameter per 1,000 feet of main being tested.

All leaks will be corrected immediately and the system again subjected to the same test for a period of 2 hours. Even if the leakage is less than allowable, all observed leaks should be repaired.

The Contractor will take all necessary precautions to prevent any joints from drawing while the pipelines and their appurtenances are being tested and will, at his own expense, repair any damage to the pipes and their appurtenances or any other structures resulting from or caused by these tests.

2-2.15 Disinfection and Flushing of Water Lines

After all other work has been completed, and prior to placing in service, all water lines will be completely disinfected in accordance with AAWA Standard C-651 and Section 12B of Sacramento County Ordinance No. 508.

The main will be flushed as thoroughly as possible with the water pressure outlets available, prior to chlorination. However, if calcium hypochlorite tablets are attached to the pipe at the time of installation for the purpose of sterilization, it will not be possible to flush the main prior to disinfection. It will therefore be necessary that extreme care be exercised in keeping the pipe clean during installation. It will be the Contractor's responsibility to obtain from the State Regional Water Quality Control Board a **WASTE WATER DISCHARGE PERMIT** to expel the chlorinated water into the storm drain system. As a requirement of the permit, the contractor shall monitor the sediment and chlorine residual during flushing. The District shall provide forms for the monitoring. The forms must be completed and returned to the District as a condition of water service. The number of calcium hypochlorite tablets used will be in accordance with the following table, which is based on 6-8 tablets per ounce. Proportionately more tablets will be required if they are of a smaller size.

Tablets Required Per Pipe Length					
Length of Pipe Section	Pipe Diameter				
	6”	8”	10”`	12”	16”

12’ to 13’	2	3	4	6	8
16’ to 18’	2	4	6	8	10

Pipes greater than 16” will require tablets proportionately as to the sizes as listed in this table.

Prior to acceptance of the system by the District, all mains will be thoroughly flushed and successfully tested for bacteriology quality.

2-2.16 Regulations Relating to Sanitary Hazards

All construction will conform to applicable regulations relative to safeguarding the public health, particularly the regulations relating to cross-connections as established by the California Administrative Code, Title 17, Chapter V, and Sections 7583-7622.

2-2.17 Water Used in Construction

Water used for testing and flushing or any other construction operation that is taken from a District system will be paid for at the District’s current construction water rate. The Contractor is to furnish the District with true and accurate records of the amount of water used. Before drawing water from a District system, the Contractor will make application for a hydrant permit for such service with the District. At a minimum a hydrant meter with backflow assembly or a backflow assembly will be required prior to connection from the water truck to the fire hydrant. The Contractor can obtain one from the District. A $2,300.00 deposit will be required. The deposit will be returned once the hydrant meter with backflow assembly or backflow assembly is returned. The Contractor may provide its own, provided it shows proof that the hydrant meter with backflow assembly has been tested and satisfies all safe operation criteria and is performing within the operating limits of the American Water Works Association Standards.