DESIGN CONCEPT REPORT
FOR
SERENO CANYON
ZONE 13 PUMP STATION AT SITE 145
SCOTTSDALE, ARIZONA

December 20, 2005
WP# 052484

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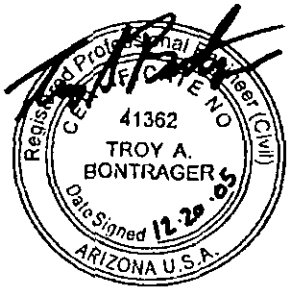
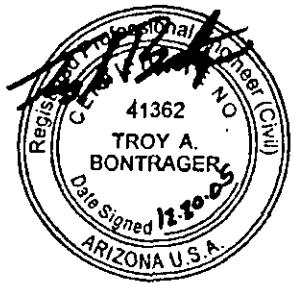


ENGINEER

PEER REVIEWER



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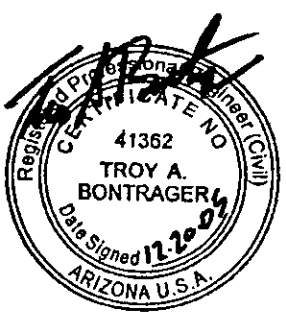

1.0 INTRODUCTION

1.1 General Background and Project History

The *Conceptual Master Water System Report for McDowell Mountain Back Bowl* by Wood, Patel and Associates, dated May 3, 2005 identified the conceptual locations and sizes of proposed water infrastructure needed to provide potable water service and fire protection to the proposed McDowell Mountain Back Bowl development (herein referred to as Sereno Canyon). The proposed water infrastructure system to serve Sereno Canyon includes a pump station (Site 145) to be located near the intersection of Alameda Road and 122nd Street in Scottsdale, Arizona. This pump station will need to be designed and constructed in accordance with City of Scottsdale (City) standards, and will be owned and operated by the City.

In addition to serving the Sereno Canyon development, this pump station will be designed to serve existing and future development located within the service area shown in Plate 1 – *Site No. 145 Booster Pump Station & Service Area*. This conceptual service area was defined by the City of Scottsdale. For planning purposes, the service area used for design includes approximately 1,490 acres and 483 dwelling units under future full-buildout conditions.

The City is requiring Crown Community Development to construct the pump station as part of the Sereno Canyon project. Since the development proposed by Crown Community Development involves only a portion of the pump station service area, an oversizing or similar agreement may be created based on benefiting properties. Please refer to Section 5.0 - *Payback-Eligible Water Infrastructure and Facilities* for more information.

1.2 Purpose and Scope of Design Concept Report

The purpose of the Design Concept Report is to present a conceptual design to the City of Scottsdale (City) for review and comment. This design concept report incorporates changes based on City review comments from the previously-submitted Preliminary Design Concept Report.

2.0 EXISTING CONDITIONS

2.1 Topography and Pressure Zones

Existing ground elevations within the proposed area to be served by the Site 145 Booster Pump Station (BPS) range from approximately 2,540 feet to 2,840 feet. The majority of the service area lies within Pressure Zones 12, and 13, with small portions within Zones 11 and 14. The pressure zone elevation ranges used for design are based on the *City of Scottsdale Integrated Water Master Plan*, dated September 2001, and include the following:

Service Zone	Lower Elev. (ft)	Upper Elev. (ft)	Range (ft)
11	2,440	2,570	130
12	2,570	2,700	130
13	2,700	2,830	130
14	2,830	2,960	130

2.2 Existing Water Infrastructure

The existing 3.0-million gallon Zone 12 reservoir and Zone 13 BPS located near 114th Street and Dixileta Drive (Site 143) will serve as one water source for the service area shown in Plate 1, as well as provide water supply to the proposed Site 145 BPS. A 16-inch Zone 13 water main extends from Site 143 southerly along 114th Street to Dynamite Road. Additional waterlines will need to be constructed to connect Site 143 to Site 145. These waterlines are discussed in Section 4.1 - *Zone 13 Water Transmission Main from Site 143.*

The second source of water supplying the proposed Site 145 BPS is the existing 12-inch Zone 12 water main that currently extends easterly along Alameda Road to a point of termination near the proposed Site 145 booster pump station. Please refer to Plate 2 – *Off-Site Water Infrastructure.*

3.0 WATER DEMAND DESIGN FLOWS AND HYDRAULIC MODEL

Water demand design flows are based on Wood/Patel's understanding of design criteria in the *City of Scottsdale Design Standards and Policy Manual – 2004 Update.* Specifically, these criteria include the following:

- Avg. Daily Water Use (indoor & outdoor), <2 DUs/Acre: 486 gpd/DU
- Max. Day Demand Multiplier: 2.0 x Avg. Day
- Peak Hour Demand Multiplier: 3.5 x Avg. Day
- Fire Flow Demand: 1,500 gpm

Based on the land-use breakdown presented in Plate 1 – *Site No. 145 Booster Pump Station & Service Area,* the water demand design flows utilized are shown below. See Table 1 – *Water Demand Calculations* for detailed calculations.

Site 145 Service Area - Modeled Water Demands

Avg-Day Demand:	163 gpm
Max-Day Demand:	326 gpm
Peak-Hour Demand:	571 gpm
Fire Flow Demand:	1,826 gpm (1,500 gpm + Max. Day Demand)

3.1 Hydraulic Model

WaterCAD Version 7.0, by Haestad Methods, Inc. was used to create a hydraulic model to size the proposed pumps and analyze system performance. Since the layout of future roads within the pump station service area is unknown at this time, a grid-type water distribution system was modeling using 8-inch and 12-inch water distribution mains. Please refer to Plate 3 – *Water Distribution Model.*

The following summarizes the modeling parameters used:

- Hazen-Williams 'C' Coefficient: 130
- Modeled Water Sources, Zone 12: Site 101; Site 143 Supply w/ Proposed PRV
- Modeled Water Sources, Zone 13: Site 143; Proposed Site 145 pump station
- Modeled Hydraulic Grade Line, Zone 12: 2,830 ft
- Modeled Hydraulic Grade Line, Zone 13: 2,965 ft

Project: *Sereno Canyon - Site 145 BPS*
Location: *City of Scottsdale, Arizona*
Date: *December 20, 2005*
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Project Engineer: TB

							AVE. DAY DEMAND		MAX. DAY DEMAND		PEAK HOUR DEMAND	HYD. MODEL JUNCTION NODE
LOCATION (SEE PLATE 1)	DESCRIPTION	AREA (AC)	ZONING	NO. DWELLING UNITS PER ACRE	MODELED NO. OF DWELLING UNITS	AVE. DAY DEMAND PER DU (GPD)	(GPD)	(GPM)	(GPD)	(GPM)	(GPM)	---
A	UNDEVELOPED	265	R1-130-ESL	0.31	81	486	39,366	27	78,732	55	96	J-510
B	SONORAN CREST	120	R1-70 ESL	0.55	66	486	32,076	22	64,152	45	78	J-290
C	UNDEVELOPED	40	R1-130-ESL	0.31	12	486	5,832	4	11,664	8	14	J-170
D	UNDEVELOPED	10	R1-130-ESL	0.31	3	486	1,458	1	2,916	2	4	J-280
E	SERENO CANYON	330	R1-130-ESL	0.31	101	486	49,086	34	98,172	68	119	J-50 / J-140
F	UNDEVELOPED	20	R1-130-ESL	0.31	6	486	2,916	2	5,832	4	7	J-200
G	UNDEVELOPED	102	R1-130-ESL	0.31	31	486	15,066	10	30,132	21	37	J-490
H	UNDEVELOPED	436	R1-130-ESL	0.31	133	486	64,638	45	129,276	90	157	J-580 / J-660
I	UNDEVELOPED	47	R1-130-ESL	0.31	14	486	6,804	5	13,608	9	17	J-210
J	UNDEVELOPED	40	R1-130-ESL	0.31	12	486	5,832	4	11,664	8	14	J-410
K	UNDEVELOPED	80	R1-130-ESL	0.31	24	486	11,664	8	23,328	16	28	J-400
TOTAL		**1,490**			**483**		**234,738**	**163**	**469,476**	**326**	**571**	

- Min. Zone Pressure, Peak Hour Demand: 50 psi
- Min. Zone Pressure, Fire Flow: 30 psi
- Max. Velocity, Peak Hour: 5 ft/s
- Max. Head Loss, Max. Day Demand: 8 ft/1000 ft
- Max Head Loss, Peak Hour Demand: 10 ft/1000 ft

3.1.1 Hydraulic Modeling Scenarios and Results

The scenarios listed below were modeled and analyzed to evaluate the performance of the proposed pumps and conceptual distribution system. Unless noted otherwise, the scenarios involved simultaneous water supply to the service area from both Site 143 and the proposed Zone 13 pump station at Site 145. Results are summarized in Table 2 – *Summary of Hydraulic Modeling Results*. For detailed modeling results, please refer to Appendix A – *Hydraulic Analysis and Modeling Results.*

- Average Day Demand
- Max Day Demand
- Max Day Demand + Fire Flow
- Max Day Demand + Fire Flow, Water Source from Site 145 Only
- Max Day Demand + Fire Flow, Water Source from Site 143 Only
- Peak Hour Demand
- Peak Hour Demand, Water Source from Site 145 Only

Project: *Sereno Canyon - Site 145 BPS*
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	ZONE 12 RESIDUAL PRESSURE (PSI)		ZONE 13 RESIDUAL PRESSURE (PSI)		ZONE 12 AVAILABLE FIRE FLOW (GPM)		ZONE 13 AVAILABLE FIRE FLOW (GPM)	
HYDRAULIC MODEL SCENARIO*	LOW	HIGH	LOW	HIGH	LOW	HIGH	LOW	HIGH
Average Day Demand	49**	128**	65	112**	---	---	---	---
Max Day Demand	49**	128**	65	115**	---	---	---	---
Max Day Demand + Fire Flow, Water Source from Site 145 Only	30	---	30	---	1,915	2,000+	1,650	2,000+
Max Day Demand + Fire Flow, Water Source from Site 143 Only	30	---	30	---	1,915	2,000+	1,380	2,000+
Peak Hour Demand	49**	127**	63	113**	---	---	---	---
Peak Hour Demand, Water Source from Site 145 Only	49**	128**	62	111**	---	---	---	---

*Unless noted otherwise, these scenarios reflect results obtained with the pump station service area being served by Site 143 and Site 145 simultaneously.
**Pressures at PRV or near zone boundary.

4.0 PROPOSED WATER INFRASTRUCTURE AND FACILITIES

4.1 Zone 13 Water Transmission Main from Site 143

As indicated in the *Conceptual Master Water System Report for McDowell Mountain Back Bowl,* a 16-inch Zone 13 waterline is proposed that connects to the existing 16-inch Zone 13 waterline at 114th Street north of Morning Vista Road. This waterline would extend easterly to 118th Street, southerly along 118th Street to the point of connection near the Troon Canyon Estates development, and would be extended an additional 660 feet (approximately) south to connect to the existing 12-inch Zone 12 waterline. Please refer to Plate 2 – *Off-Site Water Infrastructure* for the locations of these waterlines.

4.2 Zone 12/13 Pressure Reducing Valve

A pressure reducing valve (PRV) is proposed as part of the Sereno Canyon project to be located along the future 16-inch Zone 13 transmission main, near 118th Street south of Yearling Road. Please refer to Plate 2 – *Off-Site Water Infrastructure.*

4.3 Provisions to Prevent Low-Pressure Surges

In-line booster pump stations with direct connections between an existing water distribution main and the pump suction header create the potential for low suction pressures when pumps are started or ramped up. To address this issue, a 12,000-gallon receiving tank is proposed to act as a buffer between the supply main and the pump station. See Section 4.6 – *Summary of Proposed Water Facilities* for more information.

4.4 General Theory of Operation

Water from one or both of the sources discussed in Section 2.2 - *Existing Water Infrastructure*, will enter the site through a proposed 12-inch inlet line connected to the existing 12-inch water main in Alameda Road, adjacent to the pump station site. The incoming water will be conveyed to an on-site receiving tank. When the receiving tank is full, the altitude valve will stop flow from entering the tank. Water from the tank will flow into the suction header for the proposed pump station. As the water level in the tank drops, the proposed altitude valve will regulate the flow from the water supply main as required. Bypass piping and valves will be provided to allow the City to take the tank out of service while maintaining pump station operation. In addition, the Site 145 service area could rely on the Granite Ridge feed if the pump station is taken out of service.

The pump station will be configured to meet peak hour demand with the largest pump out of service. All pumps will have dedicated variable frequency drives (VFDs) that will vary pump speeds to maintain a target pressure on the discharge header. Pumps will turn on in series as required to meet demand. A fire pump will be installed, allowing the pump station to meet water demand design flows equal to Max. Day Demand plus 1,500 gallon-per-minute (gpm) fire flow.

The chlorine sampling line will draw water from the pump station discharge header. Chlorine will be injected upstream of the receiving tank and/or on the discharge line prior to leaving the site. Pressure surges will be controlled by a hydropneumatic surge tank with air compressor, plus a pressure relief valve between the suction and discharge headers.

4.5 Proposed Pump Station Site

The proposed BPS will be located near Alameda Road and 122nd Street. The proposed site will be located within Tract 'H', as shown in the *Final Plat for Sonoran Crest*, dated March 14, 2000 by Extreme Land Surveying, Inc. This tract has been designated to be used for a public water facility.

The conceptual site layout is provided in Appendix D – *30% Design Drawings*. An 8-foot public utility easement (PUE) will be located on the north side of the proposed site. Based on the proposed layout provided in the *Conceptual Master Water System Report for Sereno Canyon*, a PUE is not currently shown east of the pump station site.

4.6 Summary of Proposed Water Facilities

The proposed site features and water facilities are summarized as follows:

Site

Approximate Site Dimensions:	100 ft x 100 ft
Access:	16 ft wide Sliding Gate; Walk-Through Door

Booster Pumps

No. of Pumps:	4
No. of Pump Cans:	5
Pump Type:	Vertical Turbine, Fairbanks-Morse, 1750 RPM
Pump Motor Speed Control:	Variable Frequency Drives (each pump)
Pump Suction Design Pressure:	2 to 5 psi (from Receiving Tank)
Pump Station Elevation:	2,720 ft (approximate)
Pump Discharge Design Head:	245 ft; HGL = 2,965 ft
Pump Configuration:	See Table 3 – *Pump Configuration*
Suction-Side Surge Control Method:	Receiving Tank
Discharge-Side Surge Protection:	Hydropneumatic Surge Tank; Pressure Relief
Backup Power Supply:	Diesel Generator
Flow Meter:	Mag Meter

Receiving Tank

Receiving Tank Type:	Precast Concrete
Receiving Tank Size:	35 ft x 12 ft
Receiving Tank Level Control:	Altitude Valve or Motorized Control Valve

Building Information

Pump Room dimensions:	56 ft x 22 ft
Electrical Room Dimensions:	26 ft x 22 ft
Chlorine Room Dimensions:	16.5 ft x 12 ft
Chlorine Control Room Dimensions:	12 ft x 6 ft
On-Site Restroom:	None
Pump Room Access:	(2) Walk-through doors; (1) 10-ft Roll-Up Door
HVAC, Pump Room:	Evap. Cooler; Exhaust Fans
HVAC, Electrical Room:	A.C. Unit
HVAC, Chlorine Building:	Heat* plus A.C. Unit
Fire Suppression, Elec. Room:	FM200 System
Fire Suppression, Pump Room:	None
Fire Suppression, Chlorine Bldg:	None

*Recommended minimum storage temperature for chlorine cylinders is 60 deg. F.

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	PUMP#1	PUMP#2	PUMP#3	PUMP#4	PUMP#5 (FIRE PUMP)
PUMP TYPE	VERTICAL TURBINE				
DESIGN FLOW (GPM)	175	500	500	FUTURE	1,750
DESIGN TOTAL DYNAMIC HEAD (TDH, FT)	245	245	245	FUTURE	245
EFFICIENCY @ DESIGN POINT (%)	82%	82%	82%	FUTURE	83%
NUMBER OF STAGES	13	6	6	FUTURE	4
MOTOR SIZE (HP)	15	40	40	FUTURE	150

FIRM CAPACITY (GPM): 675

Chlorination System

Chlorination Type:	150-lb Gas Cylinders
Chlorinator:	Wallace & Tiernan
Chlorine Analyzer:	Micro 2000
Chlorine Cylinder Arrangement:	(1) Active, (1) Standby
Chlorine Containment System:	'Chlortainer' Vessels (2)

Site Safety & Security

Access Gate & Door:	Intrusion Alarm
Tank Hatch:	Intrusion Alarm
Building Access:	Intrusion Alarm
Lighting:	Interior Site Lighting
Vault Hatches:	Locks on Access Doors
Chorine Gas Detection:	Gas detectors / alarms
Fire Alarms:	Smoke detectors / fire alarms in all rooms

Electrical and Controls Systems

See Electrical and Controls sections of this report.

4.7 Site Grading and Drainage

The existing site conditions indicate a general drainage flow from southeast to northwest. The proposed grading and drainage design includes gravity drainage to a series of openings along the perimeter wall. Due to site conditions, a retaining wall is proposed for portions of the perimeter site wall to achieve necessary grades and slopes within the site. Drainage swales will be constructed to the rear of the pump building and chlorine building. A rip-rap ditch is proposed to convey runoff along the exterior side of the southern perimeter wall. A rip rap ditch and spillway structure are proposed near the southwest corner of the site to convey discharge from the receiving tank in the during a tank overflow event. Please refer to Appendix D – *30% Design Drawings* for more information.

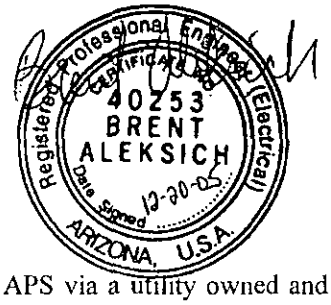
4.8 Site Aesthetics

The perimeter wall and site buildings visible to adjacent properties will be aesthetically-enhanced if required to blend in with the adjacent development and achieve Development Review Board (DRB) approval.

5.0 PAYBACK-ELIGIBLE WATER INFRASTRUCTURE AND FACILITIES

This report is technical in nature and does not address in detail arrangements to be made for payback-eligible water infrastructure and utilities. These will be addressed as part of separate discussions and documents at a later date. However, based on preliminary discussions with City staff, the following potential options have been identified:

- Credit agreement,
- Oversizing agreement,
- Payback agreement,
- Service Area agreement, and / or
- Community Facilities District.



6.0 ELECTRICAL SYSTEMS

6.1 Power Distribution

The proposed site will have electrical service provided by APS via a utility owned and maintained pad mounted transformer. The service shall be 800-Amp, 277/480-Volt, 3-Phase, 4-Wire. Refer to load calculation in Table 4 below.

Table 4
Service Entrance Load Calculations

CIRCUIT/DESCRIPTION	KVA	HP	FLA
MOTOR LOADS			
Booster Pump P1 (15 HP now and 50 HP in the future)		50.0	65.0
Booster Pump P2		40.0	52.0
Booster Pump P3		40.0	52.0
Booster Pump P4 (Future)		40.0	52.0
Booster Pump P5		150.0	180.0
Air Compressor (Surge Tank)		5.0	7.6
Pump Room Condensing Unit ACCU-1		7.5	11.0
Pump Room Fan Coil Unit FC-1		3.0	4.8
Electric Room Condensing Unit ACCU-2		7.5	11.0
Electric Room Fan Coil Unit FC-2		3.0	4.8
NON-MOTOR LOADS			
3 PHASE XFMR (LP)	75.0		90.2
SUBTOTAL			530.4
+ 25% OF LARGEST MOTOR			45.0
TOTAL AMPS @ 480V/3PHASE			575.4
SERVICE SIZE (AMPS)			800.0

The service will feed an 800-Amp Distribution Panel (DP) through an Automatic Transfer Switch (ATS). The Distribution Panel will supply both normal and standby 480-Volt power to the entire Booster Station including the VFDs, air compressor, HVAC equipment, and Lighting Panelboard (LP).

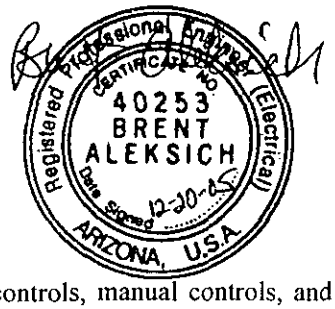
All 120/208-Volt circuits shall be supplied via a 225-Amp Lighting Panelboard (LP) via a 3-Phase, 75KVA Transformer. Standby power will be provided by an on-site diesel

generator. This generator will have a separate fuel tank and weatherproof and sound attenuating enclosure.

All circuits operating at 120-Volts, including the Remote Telemetry Unit (RTU), Chlorination system, site lighting, convenience receptacles, and miscellaneous devices will be fed from the Lighting Panel. The RTU will include an Uninterruptible Power Supply (UPS) that will protect against temporary loss of power for the Programmable Logic Controller (PLC), telemetry radio modem, and the site magnetic flow meter.

6.2 Lighting

Heavy-duty, metal halide wallpack fixtures that are listed for use in wet locations will be provided on the interior site walls. These fixtures will be controlled by a switch placed at the pedestrian door entrance to the site. The electrical room will be provided with heavy-duty industrial fluorescent fixtures. The pump room and chlorine building will be provided with enclosed and gasketed fluorescent fixtures that are listed for use in wet locations.



7.0 CONTROL SYSTEMS

7.1 Overview

The booster station control system comprises automatic controls, manual controls, and system monitoring. Manual and automatic controls will be provided for the booster pumps, chlorination system, and hydropneumatic system. Each booster pump VFD will be mounted in individual free standing enclosure with associated control hardware. Each motor controller will have a Hand/Off/Auto selector switch for the option of having either manual control or remote control through the RTU. The RTU will monitor system parameters including but not limited to: motor run status, motor failures, discharge header pressure, discharge header flow rate, smoke alarms, site intrusion detection, chlorine leak detection, and standby power system status.

7.2 Booster Pumps

The booster pumps can be controlled manually through control switches at each respective pump VFD enclosure or automatically through the RTU. The pumps will have hardware permissives for automatic shutdown upon having one of the following failure conditions: high motor temperature, emergency stop pushbutton activated, low suction pressure cutoff, high discharge pressure cutoff, or circuit overload. In auto mode, the RTU will utilize inputs from the system to determine control parameters that will drive the individual pumps upon demand.

7.3 Hydropneumatic System

The hydropneumatic system will be made up of a hydropneumatic tank and an air compressor with each having its own control panel. The water level in the tank will be maintained at a constant level with air supplied from the compressor. The water level in the tank is monitored with the use of Warrick level probes. These probes with the use of control relays, control air supply and release solenoids as well as initiate high and low level alarms. The high and low level alarms will be monitored by the RTU. The RTU will monitor the air compressor for run status, on/off status, low oil level alarm, and for a circuit overload.

7.4 Chlorination System

The Chlorination system will monitor and inject chlorine into the system to maintain predetermined residuals. There will be two points in the system for chlorine injection including the first at the input to the storage tank and the second at the pump discharge header. A chlorine residual analyzer will monitor residual chlorine levels in the system which will be used by the chlorine injectors for control and also monitored by the RTU. Two parallel chlortainers, with weight indication via independent scales, will supply the required system chlorine. The RTU will monitor the chlorine supply to notify the operator when the chlorine tank needs to be replaced. Chlorine leak detectors will notify the RTU of chlorine leaks in the chlorination building. Exhaust fans/louvers will vent the chlorine building, based on ambient room temperature, and shut down if a leak is detected. The emergency shower/eyewash station will incorporate a flow switch to inform the RTU of operation.

7.5 Remote Telemetry Unit (RTU)

The booster station RTU will utilize a Bristol Babcock, Control Wave process automation controller for system monitoring and control. The RTU and all of the associated analog/digital I/O, uninterrupted power supply, operator interface terminal (OIT), telemetry equipment, and connection terminals will be mounted in a common enclosure. The digital inputs will be 24 VDC non-isolated and the digital outputs will incorporate 24 VDC interposing relays for 120 VAC system controls. 20% spare I/O will be provided for future use.

Communication from the site to the City of Scottsdale Water Operations SCADA system will be via a radio modem using a licensed 928 MHz frequency. A radio survey will be provided by the City of Scottsdale to determine the required orientation and mounting height of the Yagi antenna.

7.6 Instrumentation

7.6.1 Main Flow Meter

The flow rate on the main 12-inch discharge line will be measured with a magnetic flow meter. The flow meter is comprised of a flow measurement element and a flow rate transmitter. The PLC will monitor the transmitter to obtain the 12-inch discharge line flow rate and flow totalizer signals.

7.6.2 Pressure Transmitter

The system discharge pressure will be measured on the 12" discharge line with a pressure transmitter. The pressure transmitter will be mounted directly on the discharge line in the pump room. The PLC will monitor the transmitter to set the pumping speed to maintain a constant system pressure.

7.6.3 Submersible Level Transmitter

The water level in the 12,000 gallon receiving tank will be measured with a submersible level transmitter. The PLC will monitor the transmitter to obtain the level reading of the tank. This parameter will be used to set flow to the receiving tank and also shut-down the pumps when the tank is below a set minimum water level.

7.6.4 Float Switch

Two float switches will be used in the 12,000 gallon receiving tank to back-up the submersible level transmitter. One float switch will be located at the tank "minimum water level" and the other at the tank "max fill level". The PLC will monitor these devices and use the information as a back-up in case of a failure of the submersible level transmitter. The "minimum water level" float switch will also be used as a hardware permissive in the control circuitry of each VFD. A high level float switch will also be located in the flow meter vault as well as any other site vaults. The PLC will monitor these devices to detect for vault flooding conditions.

7.6.5 High Pressure Switch

A high pressure switch will be provided on the discharge header of each pump. This switch will be used as a hardware permissive in the control circuitry of the respective pump VFD. Pump high pressure alarms will be monitored by the PLC.

7.6.6 Intrusion Switch

Intrusion switches will be monitored by the PLC to detect for intrusions into the site facilities. The following facilities will be monitored for intrusion: electrical room, pump room, pump station vehicle gate, pump station pedestrian door, chlortainer room, and chlorine room.

8.0 PRELIMINARY OPINION OF PROBABLE COSTS

The following opinion of probable costs is based on preliminary, conceptual information presented in this report. See Appendix B – *Detailed Opinion of Probable Costs* for a cost breakdown.

Surveying / Staking / As-Built Drawings:	$5,960
Site Work / Yard Piping / Wall:	$108,919
Storage Tank:	$46,500
Pump Station:	$263,350
Buildings:	$180,400
Chlorine Disinfection System:	$171,050
Electrical, Controls & Instrumentation:	$363,787
Contingencies	$113,997
Total	**$1,253,963**

9.0 CONCLUSIONS

Based on the preliminary analysis of the proposed water service area and conceptual design of the pump station components, the following conclusions can be made:

1. The water demand and system criteria are consistent Wood/Patel's understanding of the *City of Scottsdale's Design Standards and Policy Manual – 2004 Update.*

2. Zone 12 water will be supplied to the Site 145 Zone 13 BPS from two sources, including the existing Site 143, and Site 101, through the existing 12-inch Zone 12 water main currently extending easterly along Alameda Road to Site 145. Additional waterlines will need to be constructed to connect Site 143 to Site 145.

3. The proposed water facilities will be designed to provide domestic water service and fire protection to the proposed service area, including approximately 1,490 acres and 476 dwelling units under full-buildout conditions. Exceptions include homes that may be built in Pressure Zone 14, which may require individual booster pump systems.

4. The Zone 13 BPS serves as a secondary source of water for Sereno Canyon and the service area shown in Plate 1 – *Site No. 145 Booster Pump Station & Service Area,* and is an oversizing requirement to provide service to future properties. An oversizing or similar agreement would be obtained based on the number of lots serviced in each of the contributing properties for the BPS. Based on the service-area size and zoning information, proposed development by Crown Community Development accounts for approximately 21 to 26 percent of the area to be served by the pump station.

APPENDIX A

Hydraulic Analysis and Modeling Results

Scenario: Ave Day Demand
Steady State Analysis
Junction Report

Label	Zone	Elevation (ft)	Base Flow (gpm)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-10	Zone 13	2,732	0	0	2,964.99	101
J-20	Zone 13	2,705	0	0	2,964.99	112
J-30	Zone 13	2,707	0	0	2,964.99	112
J-50	Zone 13	2,745	17	17	2,965.00	95
J-80	Zone 13	2,747	0	0	2,965.01	94
J-110	Zone 13	2,719	0	0	2,973.09	110
J-120	Zone 13	2,748	0	0	2,965.00	94
J-140	Zone 13	2,725	17	17	2,964.99	104
J-150	Zone 13	2,780	0	0	2,965.01	80
J-160	Zone 13	2,773	0	0	2,965.03	83
J-170	Zone 13	2,815	4	4	2,965.03	65
J-200	Zone 13	2,800	2	2	2,965.00	71
J-210	Zone 13	2,760	5	5	2,964.98	89
J-220	Zone 13	2,783	0	0	2,964.99	79
J-240	Zone 13	2,730	0	0	2,964.99	102
J-250	Zone 12	2,702	0	0	2,815.04	49
J-270	Zone 13	2,782	0	0	2,965.03	79
J-280	Zone 13	2,730	1	1	2,964.99	102
J-290	Zone 13	2,700	22	22	2,964.98	115
J-300	Zone 13	2,748	0	0	2,965.00	94
J-310	Zone 13	2,740	0	0	2,965.00	97
J-320	Zone 13	2,765	0	0	2,965.01	87
J-330	Zone 13	2,755	0	0	2,965.03	91
J-340	Zone 12	2,695	0	0	2,815.04	52
J-350	Zone 12	2,698	0	0	2,815.04	51
J-360	Zone 13	2,740	0	0	2,965.05	97
J-370	Zone 13	2,765	0	0	2,965.02	87
J-390	Zone 13	2,733	0	0	2,964.97	100
J-400	Zone 12	2,693	8	8	2,815.04	53
J-410	Zone 12	2,630	4	4	2,815.04	80
J-420	Zone 12	2,630	0	0	2,815.04	80
J-470	Zone 12	2,606	0	0	2,815.04	90
J-480	Zone 12	2,605	0	0	2,815.04	91
J-490	Zone 12	2,600	10	10	2,815.04	93
J-500	Zone 13	2,730	0	0	2,964.97	102
J-510	Zone 12	2,700	27	27	2,964.97	115
J-560	Zone 12	2,653	0	0	2,815.08	70
J-570	Zone 12	2,561	0	0	2,815.08	110
J-580	Zone 12	2,665	23	23	2,815.03	65
J-600	Zone 12	2,670	0	0	2,815.08	63
J-610	Zone 12	2,700	0	0	2,964.99	115
J-630	Zone 13	2,765	0	0	2,965.01	87
J-640	Zone 12	2,630	0	0	2,815.03	80
J-650	Zone 12	2,564	22	22	2,815.03	109
J-660	Zone 12	2,548	0	0	2,815.04	116
J-680	Zone 12	2,610	0	0	2,815.04	89
J-690	Zone 13	2,730	0	0	2,964.98	102
J-710	Zone 12	2,542	0	0	2,815.04	118
J-720	Zone 12	2,690	0	0	2,815.04	54
J-730	Zone 12	2,556	0	0	2,815.04	112
J-740	Zone 12	2,670	0	0	2,964.99	128
PRV FROM SITE 10	Zone 13	2,582	0	0	2,965.00	166

Scenario: Ave Day Demand
Steady State Analysis
Junction Report

Label	Zone	Elevation (ft)	Base Flow (gpm)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
S145 FEED	PUMPS	2,708	0	0	2,815.08	46
SITE 101 DISCH	Zone 13	2,588	0	0	2,965.00	163

Scenario: Max Day Demand
Steady State Analysis
Junction Report

Label	Zone	Elevation (ft)	Base Flow (gpm)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-10	Zone 13	2,732	0	0	2,964.68	101
J-20	Zone 13	2,705	0	0	2,964.66	112
J-30	Zone 13	2,707	0	0	2,964.64	111
J-50	Zone 13	2,745	17	34	2,964.69	95
J-80	Zone 13	2,747	0	0	2,964.70	94
J-110	Zone 13	2,719	0	0	2,973.66	110
J-120	Zone 13	2,748	0	0	2,964.64	94
J-140	Zone 13	2,725	17	34	2,964.64	104
J-150	Zone 13	2,780	0	0	2,964.69	80
J-160	Zone 13	2,773	0	0	2,964.73	83
J-170	Zone 13	2,815	4	8	2,964.72	65
J-200	Zone 13	2,800	2	4	2,964.66	71
J-210	Zone 13	2,760	5	10	2,964.61	89
J-220	Zone 13	2,783	0	0	2,964.64	79
J-240	Zone 13	2,730	0	0	2,964.67	102
J-250	Zone 12	2,702	0	0	2,815.04	49
J-270	Zone 13	2,782	0	0	2,964.73	79
J-280	Zone 13	2,730	1	2	2,964.68	102
J-290	Zone 13	2,700	22	44	2,964.70	115
J-300	Zone 13	2,748	0	0	2,964.69	94
J-310	Zone 13	2,740	0	0	2,964.65	97
J-330	Zone 13	2,755	0	0	2,964.73	91
J-360	Zone 13	2,740	0	0	2,964.77	97
J-320	Zone 13	2,765	0	0	2,964.67	86
J-340	Zone 12	2,695	0	0	2,815.04	52
J-350	Zone 12	2,698	0	0	2,815.04	51
J-370	Zone 13	2,765	0	0	2,964.71	86
J-390	Zone 13	2,733	0	0	2,964.60	100
J-400	Zone 12	2,693	8	16	2,815.04	53
J-410	Zone 12	2,630	4	8	2,815.04	80
J-420	Zone 12	2,630	0	0	2,815.04	80
J-470	Zone 12	2,606	0	0	2,815.04	90
J-480	Zone 12	2,605	0	0	2,815.03	91
J-490	Zone 12	2,600	10	20	2,815.03	93
J-500	Zone 13	2,730	0	0	2,964.59	101
J-510	Zone 12	2,700	27	54	2,964.67	115
J-560	Zone 12	2,653	0	0	2,815.08	70
J-570	Zone 12	2,561	0	0	2,815.08	110
S145 FEED	PUMPS	2,708	0	0	2,815.08	46
J-600	Zone 12	2,670	0	0	2,815.08	63
J-610	Zone 12	2,700	0	0	2,964.91	115
SITE 101 DISCH	Zone 13	2,588	0	0	2,965.00	163
J-630	Zone 13	2,765	0	0	2,964.67	86
J-580	Zone 12	2,665	23	46	2,815.01	65
J-640	Zone 12	2,630	0	0	2,815.02	80
J-650	Zone 12	2,564	22	44	2,815.02	109
J-660	Zone 12	2,548	0	0	2,815.02	116
J-680	Zone 12	2,610	0	0	2,815.04	89
J-690	Zone 13	2,730	0	0	2,964.74	102
J-710	Zone 12	2,542	0	0	2,815.03	118
J-720	Zone 12	2,690	0	0	2,815.04	54
J-730	Zone 12	2,556	0	0	2,815.04	112

Scenario: Max Day Demand
Steady State Analysis
Junction Report

Label	Zone	Elevation (ft)	Base Flow (gpm)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-740	Zone 12	2,670	0	0	2,964.80	128
PRV FROM SITE 10	Zone 13	2,582	0	0	2,965.00	166

Scenario: Peak Hour Demand
Steady State Analysis
Junction Report

Label	Zone	Elevation (ft)	Base Flow (gpm)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-10	Zone 13	2,732	0	0	2,961.51	99
J-20	Zone 13	2,705	0	0	2,961.42	111
J-30	Zone 13	2,707	0	0	2,961.31	110
J-50	Zone 13	2,745	17	60	2,961.46	94
J-80	Zone 13	2,747	0	0	2,961.46	93
J-110	Zone 13	2,719	0	0	2,969.96	109
J-120	Zone 13	2,748	0	0	2,961.29	92
J-140	Zone 13	2,725	17	60	2,961.29	102
J-150	Zone 13	2,780	0	0	2,961.38	78
J-160	Zone 13	2,773	0	0	2,961.42	82
J-170	Zone 13	2,815	4	14	2,961.41	63
J-200	Zone 13	2,800	2	7	2,961.28	70
J-210	Zone 13	2,760	5	18	2,961.14	87
J-220	Zone 13	2,783	0	0	2,961.22	77
J-240	Zone 13	2,730	0	0	2,961.48	100
J-250	Zone 12	2,702	0	0	2,815.04	49
J-270	Zone 13	2,782	0	0	2,961.42	78
J-280	Zone 13	2,730	1	4	2,961.61	100
J-290	Zone 13	2,700	22	77	2,962.06	113
J-300	Zone 13	2,748	0	0	2,961.46	92
J-310	Zone 13	2,740	0	0	2,961.30	96
J-320	Zone 13	2,765	0	0	2,961.34	85
J-330	Zone 13	2,755	0	0	2,961.42	89
J-340	Zone 12	2,695	0	0	2,815.04	52
J-350	Zone 12	2,698	0	0	2,815.04	51
J-360	Zone 13	2,740	0	0	2,961.48	96
J-370	Zone 13	2,765	0	0	2,961.45	85
J-390	Zone 13	2,733	0	0	2,961.12	99
J-400	Zone 12	2,693	8	28	2,815.04	53
J-410	Zone 12	2,630	4	14	2,815.03	80
J-420	Zone 12	2,630	0	0	2,815.03	80
J-470	Zone 12	2,606	0	0	2,815.03	90
J-480	Zone 12	2,605	0	0	2,815.02	91
J-490	Zone 12	2,600	10	35	2,815.01	93
J-500	Zone 13	2,730	0	0	2,961.09	100
J-510	Zone 12	2,700	27	95	2,961.67	113
J-560	Zone 12	2,653	0	0	2,815.08	70
J-570	Zone 12	2,561	0	0	2,815.08	110
J-580	Zone 12	2,665	23	81	2,814.94	65
J-600	Zone 12	2,670	0	0	2,815.08	63
J-610	Zone 12	2,700	0	0	2,964.11	114
J-630	Zone 13	2,765	0	0	2,961.34	85
J-640	Zone 12	2,630	0	0	2,814.98	80
J-650	Zone 12	2,564	22	77	2,814.97	109
J-660	Zone 12	2,548	0	0	2,814.99	116
J-680	Zone 12	2,610	0	0	2,815.03	89
J-690	Zone 13	2,730	0	0	2,962.48	101
J-710	Zone 12	2,542	0	0	2,815.02	118
J-720	Zone 12	2,690	0	0	2,815.04	54
J-730	Zone 12	2,556	0	0	2,815.04	112
J-740	Zone 12	2,670	0	0	2,963.09	127
PRV FROM SITE 10	Zone 13	2,582	0	0	2,965.00	166

Scenario: Peak Hour Demand
Steady State Analysis
Junction Report

Label	Zone	Elevation (ft)	Base Flow (gpm)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
S145 FEED	PUMPS	2,708	0	0	2,815.08	46
SITE 101 DISCH	Zone 13	2,588	0	0	2,965.00	163

Scenario: Max Day + Fire Flow (Source: Site 145 Only)
Fire Flow Analysis
Fire Flow Report

Label	Elevation (ft)	Zone	Total Flow Needed (gpm)	Total Flow Available (gpm)	Calculated Residual Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction
J-10	2,732	Zone 13	1,500	2,000	73	45	J-170
J-20	2,705	Zone 13	1,500	2,000	77	45	J-170
J-30	2,707	Zone 13	1,500	2,000	71	45	J-170
J-50	2,745	Zone 13	1,534	2,034	70	45	J-170
J-80	2,747	Zone 13	1,500	2,000	71	45	J-170
J-110	2,719	Zone 13	1,500	2,000	105	59	J-170
J-120	2,748	Zone 13	1,500	2,000	45	45	J-170
J-140	2,725	Zone 13	1,534	2,034	64	45	J-170
J-150	2,780	Zone 13	1,500	2,000	58	45	J-170
J-160	2,773	Zone 13	1,500	2,000	58	39	J-170
J-170	2,815	Zone 13	1,508	1,648	30	65	J-270
J-200	2,800	Zone 13	1,504	2,004	44	45	J-170
J-210	2,760	Zone 13	1,510	2,010	54	44	J-200
J-220	2,783	Zone 13	1,500	2,000	48	44	J-200
J-240	2,730	Zone 13	1,500	2,000	71	45	J-170
J-250	2,702	Zone 12	1,500	2,000	47	49	J-350
J-270	2,782	Zone 13	1,500	2,000	47	33	J-170
J-280	2,730	Zone 13	1,502	2,002	69	45	J-170
J-290	2,700	Zone 13	1,544	2,044	72	45	J-170
J-300	2,748	Zone 13	1,500	2,000	43	45	J-170
J-310	2,740	Zone 13	1,500	2,000	62	45	J-170
J-320	2,765	Zone 13	1,500	2,000	56	45	J-170
J-330	2,755	Zone 13	1,500	2,000	37	33	J-170
J-340	2,695	Zone 12	1,500	2,000	48	48	J-250
J-350	2,698	Zone 12	1,500	1,913	30	47	J-250
J-360	2,740	Zone 13	1,500	2,000	79	47	J-170
J-370	2,765	Zone 13	1,500	2,000	66	45	J-170
J-390	2,733	Zone 13	1,500	2,000	45	44	J-200
J-400	2,693	Zone 12	1,516	2,016	53	49	J-250
J-410	2,630	Zone 12	1,508	2,008	77	49	J-250
J-420	2,630	Zone 12	1,500	2,000	72	49	J-250
J-470	2,606	Zone 12	1,500	2,000	89	49	J-250
J-480	2,605	Zone 12	1,500	2,000	89	49	J-250
J-490	2,600	Zone 12	1,520	2,020	80	49	J-250
J-500	2,730	Zone 13	1,500	2,000	61	44	J-200
J-510	2,700	Zone 12	1,554	2,054	68	49	J-250
J-560	2,653	Zone 12	1,500	2,000	69	49	J-250
J-570	2,561	Zone 12	1,500	2,000	109	49	J-250
J-580	2,665	Zone 12	1,546	2,046	52	49	J-250
J-600	2,670	Zone 12	1,500	2,000	63	49	J-250
J-610	2,700	Zone 12	1,500	2,000	107	49	J-250
J-630	2,765	Zone 13	1,500	2,000	42	45	J-170
J-640	2,630	Zone 12	1,500	2,000	72	49	J-250
J-650	2,564	Zone 12	1,544	2,044	101	49	J-250
J-660	2,548	Zone 12	1,500	2,000	103	49	J-250
J-680	2,610	Zone 12	1,500	2,000	87	49	J-250
J-690	2,730	Zone 13	1,500	2,000	57	45	J-170
J-710	2,542	Zone 12	1,500	2,000	116	49	J-250
J-720	2,690	Zone 12	1,500	2,000	53	49	J-250
J-730	2,556	Zone 12	1,500	2,000	106	49	J-250

Scenario: Max Day + Fire Flow (Source: Site 145 Only)
Fire Flow Analysis
Fire Flow Report

Label	Elevation (ft)	Zone	Total Flow Needed (gpm)	Total Flow Available (gpm)	Calculated Residual Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction
J-740	2,670	Zone 12	1,500	2,000	111	49	J-250
PRV FROM SI	2,582	Zone 13	1,500	2,000	132	91	J-170
S145 FEED	2,708	PUMPS	1,500	1,880	30	30	S145 FEED
SITE 101 DISC	2,588	Zone 13	1,500	2,000	163	91	J-170

Scenario: Max Day + Fire Flow (Source: Site 143 Only)
Fire Flow Analysis
Fire Flow Report

Label	Elevation (ft)	Zone	Total Flow Needed (gpm)	Total Flow Available (gpm)	Calculated Residual Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction
J-10	2,732	Zone 13	1,500	1,607	66	30	J-170
J-20	2,705	Zone 13	1,500	1,576	71	30	J-170
J-30	2,707	Zone 13	1,500	1,548	67	30	J-170
J-50	2,745	Zone 13	1,534	1,572	60	30	J-170
J-80	2,747	Zone 13	1,500	1,514	59	30	J-170
J-110	2,719	Zone 13	1,500	1,463	66	30	J-170
J-120	2,748	Zone 13	1,500	1,510	43	30	J-170
J-140	2,725	Zone 13	1,534	1,570	59	30	J-170
J-150	2,780	Zone 13	1,500	1,470	45	30	J-170
J-160	2,773	Zone 13	1,500	1,382	48	30	J-170
J-170	2,815	Zone 13	1,508	1,075	30	50	J-200
J-200	2,800	Zone 13	1,504	1,474	33	30	J-170
J-210	2,760	Zone 13	1,510	1,480	46	30	J-170
J-220	2,783	Zone 13	1,500	1,470	39	30	J-170
J-240	2,730	Zone 13	1,500	1,594	64	30	J-170
J-250	2,702	Zone 12	1,500	2,000	47	49	J-350
J-270	2,782	Zone 13	1,500	1,304	44	30	J-170
J-280	2,730	Zone 13	1,502	1,713	67	30	J-170
J-290	2,700	Zone 13	1,544	2,001	80	30	J-170
J-300	2,748	Zone 13	1,500	1,538	43	30	J-170
J-310	2,740	Zone 13	1,500	1,510	55	30	J-170
J-320	2,765	Zone 13	1,500	1,495	47	30	J-170
J-330	2,755	Zone 13	1,500	1,305	46	30	J-170
J-340	2,695	Zone 12	1,500	2,000	48	48	J-250
J-350	2,698	Zone 12	1,500	1,913	30	47	J-250
J-360	2,740	Zone 13	1,500	1,463	62	30	J-170
J-370	2,765	Zone 13	1,500	1,478	52	30	J-170
J-390	2,733	Zone 13	1,500	1,469	46	30	J-170
J-400	2,693	Zone 12	1,516	2,016	52	49	J-250
J-410	2,630	Zone 12	1,508	2,008	77	49	J-250
J-420	2,630	Zone 12	1,500	2,000	72	49	J-250
J-470	2,606	Zone 12	1,500	2,000	89	49	J-250
J-480	2,605	Zone 12	1,500	2,000	89	49	J-250
J-490	2,600	Zone 12	1,520	2,020	80	49	J-250
J-500	2,730	Zone 13	1,500	1,470	56	30	J-170
J-510	2,700	Zone 12	1,554	2,054	68	49	J-250
J-560	2,653	Zone 12	1,500	2,000	69	49	J-250
J-570	2,561	Zone 12	1,500	2,000	109	49	J-250
J-580	2,665	Zone 12	1,546	2,046	50	49	J-250
J-600	2,670	Zone 12	1,500	2,000	63	49	J-250
J-610	2,700	Zone 12	1,500	2,000	104	49	J-250
J-630	2,765	Zone 13	1,500	1,495	39	30	J-170
J-640	2,630	Zone 12	1,500	2,000	72	49	J-250
J-650	2,564	Zone 12	1,544	2,044	101	49	J-250
J-660	2,548	Zone 12	1,500	2,000	103	49	J-250
J-680	2,610	Zone 12	1,500	2,000	87	49	J-250
J-690	2,730	Zone 13	1,500	2,000	72	35	J-170
J-710	2,542	Zone 12	1,500	2,000	116	49	J-250
J-720	2,690	Zone 12	1,500	2,000	53	49	J-250
J-730	2,556	Zone 12	1,500	2,000	106	49	J-250

Scenario: Max Day + Fire Flow (Source: Site 143 Only)
Fire Flow Analysis
Fire Flow Report

Label	Elevation (ft)	Zone	Total Flow Needed (gpm)	Total Flow Available (gpm)	Calculated Residual Pressure (psi)	Calculated Minimum Zone Pressure (psi)	Minimum Zone Junction
J-740	2,670	Zone 12	1,500	2,000	105	49	J-250
PRV FROM S	2,582	Zone 13	1,500	2,000	132	64	J-170
S145 FEED	2,708	PUMPS	1,500	1,880	30	30	S145 FEED
SITE 101 DIS	2,588	Zone 13	1,500	2,000	163	64	J-170

Scenario: Max Day + Fire at J-200 (Source: Site 145 Only)
Steady State Analysis
Junction Report

Label	Zone	Elevation (ft)	Base Flow (gpm)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-10	Zone 13	2,732	0	0	2,941.61	91
J-20	Zone 13	2,705	0	0	2,941.21	102
J-30	Zone 13	2,707	0	0	2,940.68	101
J-50	Zone 13	2,745	17	34	2,941.85	85
J-80	Zone 13	2,747	0	0	2,941.99	84
J-110	Zone 13	2,719	0	0	2,976.24	111
J-120	Zone 13	2,748	0	0	2,940.21	83
J-140	Zone 13	2,725	17	34	2,940.46	93
J-150	Zone 13	2,780	0	0	2,939.97	69
J-160	Zone 13	2,773	0	0	2,942.69	73
J-170	Zone 13	2,815	4	8	2,942.68	55
J-200	Zone 13	2,800	752	1,504	2,932.75	57
J-210	Zone 13	2,760	5	10	2,932.67	75
J-220	Zone 13	2,783	0	0	2,932.72	65
J-240	Zone 13	2,730	0	0	2,941.50	92
J-250	Zone 12	2,702	0	0	2,815.04	49
J-270	Zone 13	2,782	0	0	2,942.69	70
J-280	Zone 13	2,730	1	2	2,941.55	92
J-290	Zone 13	2,700	22	44	2,941.50	104
J-300	Zone 13	2,748	0	0	2,941.85	84
J-310	Zone 13	2,740	0	0	2,940.21	87
J-320	Zone 13	2,765	0	0	2,940.10	76
J-330	Zone 13	2,755	0	0	2,942.69	81
J-340	Zone 12	2,695	0	0	2,815.04	52
J-350	Zone 12	2,698	0	0	2,815.04	51
J-360	Zone 13	2,740	0	0	2,945.50	89
J-370	Zone 13	2,765	0	0	2,942.23	77
J-390	Zone 13	2,733	0	0	2,932.65	86
J-400	Zone 12	2,693	8	16	2,815.04	53
J-410	Zone 12	2,630	4	8	2,815.04	80
J-420	Zone 12	2,630	0	0	2,815.04	80
J-470	Zone 12	2,606	0	0	2,815.04	90
J-480	Zone 12	2,605	0	0	2,815.03	91
J-490	Zone 12	2,600	10	20	2,815.03	93
J-500	Zone 13	2,730	0	0	2,932.66	88
J-510	Zone 12	2,700	27	54	2,941.48	104
J-560	Zone 12	2,653	0	0	2,815.08	70
J-570	Zone 12	2,561	0	0	2,815.08	110
J-580	Zone 12	2,665	23	46	2,815.01	65
J-600	Zone 12	2,670	0	0	2,815.08	63
J-610	Zone 12	2,700	0	0	2,965.00	115
J-630	Zone 13	2,765	0	0	2,940.10	76
J-640	Zone 12	2,630	0	0	2,815.02	80
J-650	Zone 12	2,564	22	44	2,815.02	109
J-660	Zone 12	2,548	0	0	2,815.02	116
J-680	Zone 12	2,610	0	0	2,815.04	89
J-690	Zone 13	2,730	0	0	2,941.49	92
J-710	Zone 12	2,542	0	0	2,815.03	118
J-720	Zone 12	2,690	0	0	2,815.04	54
J-730	Zone 12	2,556	0	0	2,815.04	112
J-740	Zone 12	2,670	0	0	2,965.00	128
PRV FROM SITE 10	Zone 13	2,582	0	0	2,965.00	166

Scenario: Max Day + Fire at J-200 (Source: Site 145 Only)
Steady State Analysis
Junction Report

Label	Zone	Elevation (ft)	Base Flow (gpm)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
S145 FEED	PUMPS	2,708	0	0	2,815.08	46
SITE 101 DISCH	Zone 13	2,588	0	0	2,965.00	163

Scenario: Max Day + Fire Flow at J-200 (Source: Site 143 Only)
Steady State Analysis
Junction Report

Label	Zone	Elevation (ft)	Base Flow (gpm)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-10	Zone 13	2,732	0	0	2,892.70	70
J-20	Zone 13	2,705	0	0	2,890.33	80
J-30	Zone 13	2,707	0	0	2,886.97	78
J-50	Zone 13	2,745	17	34	2,888.24	62
J-80	Zone 13	2,747	0	0	2,886.22	60
J-110	Zone 13	2,719	0	0	2,889.22	74
J-120	Zone 13	2,748	0	0	2,883.00	58
J-140	Zone 13	2,725	17	34	2,885.44	69
J-150	Zone 13	2,780	0	0	2,880.81	44
J-160	Zone 13	2,773	0	0	2,881.74	47
J-170	Zone 13	2,815	4	8	2,881.73	29
J-200	Zone 13	2,800	752	1,504	2,873.73	32
J-210	Zone 13	2,760	5	10	2,873.68	49
J-220	Zone 13	2,783	0	0	2,873.71	39
J-240	Zone 13	2,730	0	0	2,892.04	70
J-250	Zone 12	2,702	0	0	2,815.04	49
J-270	Zone 13	2,782	0	0	2,881.74	43
J-280	Zone 13	2,730	1	2	2,899.53	73
J-290	Zone 13	2,700	22	44	2,914.20	93
J-300	Zone 13	2,748	0	0	2,888.24	61
J-310	Zone 13	2,740	0	0	2,883.01	62
J-330	Zone 13	2,755	0	0	2,881.74	55
J-360	Zone 13	2,740	0	0	2,882.72	62
J-320	Zone 13	2,765	0	0	2,881.96	51
J-340	Zone 12	2,695	0	0	2,815.04	52
J-350	Zone 12	2,698	0	0	2,815.04	51
J-370	Zone 13	2,765	0	0	2,882.84	51
J-390	Zone 13	2,733	0	0	2,873.67	61
J-400	Zone 12	2,693	8	16	2,815.04	53
J-410	Zone 12	2,630	4	8	2,815.04	80
J-420	Zone 12	2,630	0	0	2,815.04	80
J-470	Zone 12	2,606	0	0	2,815.04	90
J-480	Zone 12	2,605	0	0	2,815.03	91
J-490	Zone 12	2,600	10	20	2,815.03	93
J-500	Zone 13	2,730	0	0	2,873.66	62
J-510	Zone 12	2,700	27	54	2,907.99	90
J-560	Zone 12	2,653	0	0	2,815.08	70
J-570	Zone 12	2,561	0	0	2,815.08	110
S145 FEED	PUMPS	2,708	0	0	2,815.08	46
J-600	Zone 12	2,670	0	0	2,815.08	63
J-610	Zone 12	2,700	0	0	2,949.65	108
SITE 101 DISCH	Zone 13	2,588	0	0	2,965.00	163
J-630	Zone 13	2,765	0	0	2,881.96	51
J-580	Zone 12	2,665	23	46	2,815.01	65
J-640	Zone 12	2,630	0	0	2,815.02	80
J-650	Zone 12	2,564	22	44	2,815.02	109
J-660	Zone 12	2,548	0	0	2,815.02	116
J-680	Zone 12	2,610	0	0	2,815.04	89
J-690	Zone 13	2,730	0	0	2,921.61	83
J-710	Zone 12	2,542	0	0	2,815.03	118
J-720	Zone 12	2,690	0	0	2,815.04	54
J-730	Zone 12	2,556	0	0	2,815.04	112

Scenario: Max Day + Fire Flow at J-200 (Source: Site 143 Only)
Steady State Analysis
Junction Report

Label	Zone	Elevation (ft)	Base Flow (gpm)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-740	Zone 12	2,670	0	0	2,932.10	113
PRV FROM SITE 10	Zone 13	2,582	0	0	2,965.00	166

Scenario: Peak Hour Demand (Source: Site 145 Only)
Steady State Analysis
Junction Report

Label	Zone	Elevation (ft)	Base Flow (gpm)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-10	Zone 13	2,732	0	0	2,956.81	97
J-20	Zone 13	2,705	0	0	2,956.80	109
J-30	Zone 13	2,707	0	0	2,956.80	108
J-50	Zone 13	2,745	17	60	2,956.98	92
J-80	Zone 13	2,747	0	0	2,957.11	91
J-110	Zone 13	2,719	0	0	2,970.94	109
J-120	Zone 13	2,748	0	0	2,956.95	90
J-140	Zone 13	2,725	17	60	2,956.81	100
J-150	Zone 13	2,780	0	0	2,957.25	77
J-160	Zone 13	2,773	0	0	2,957.46	80
J-170	Zone 13	2,815	4	14	2,957.45	62
J-200	Zone 13	2,800	2	7	2,957.15	68
J-210	Zone 13	2,760	5	18	2,957.01	85
J-220	Zone 13	2,783	0	0	2,957.09	75
J-240	Zone 13	2,730	0	0	2,956.81	98
J-250	Zone 12	2,702	0	0	2,815.04	49
J-270	Zone 13	2,782	0	0	2,957.46	76
J-280	Zone 13	2,730	1	4	2,956.66	98
J-290	Zone 13	2,700	22	77	2,956.49	111
J-300	Zone 13	2,748	0	0	2,956.98	90
J-310	Zone 13	2,740	0	0	2,956.96	94
J-330	Zone 13	2,755	0	0	2,957.46	88
J-360	Zone 13	2,740	0	0	2,957.72	94
J-320	Zone 13	2,765	0	0	2,957.10	83
J-340	Zone 12	2,695	0	0	2,815.04	52
J-350	Zone 12	2,698	0	0	2,815.04	51
J-370	Zone 13	2,765	0	0	2,957.32	83
J-390	Zone 13	2,733	0	0	2,956.99	97
J-400	Zone 12	2,693	8	28	2,815.04	53
J-410	Zone 12	2,630	4	14	2,815.03	80
J-420	Zone 12	2,630	0	0	2,815.03	80
J-470	Zone 12	2,606	0	0	2,815.03	90
J-480	Zone 12	2,605	0	0	2,815.02	91
J-490	Zone 12	2,600	10	35	2,815.01	93
J-500	Zone 13	2,730	0	0	2,956.96	98
J-510	Zone 12	2,700	27	95	2,956.45	111
J-560	Zone 12	2,653	0	0	2,815.08	70
J-570	Zone 12	2,561	0	0	2,815.08	110
S145 FEED	PUMPS	2,708	0	0	2,815.08	46
J-600	Zone 12	2,670	0	0	2,815.08	63
J-610	Zone 12	2,700	0	0	2,965.00	115
SITE 101 DISCH	Zone 13	2,588	0	0	2,965.00	163
J-630	Zone 13	2,765	0	0	2,957.10	83
J-580	Zone 12	2,665	23	81	2,814.94	65
J-640	Zone 12	2,630	0	0	2,814.98	80
J-650	Zone 12	2,564	22	77	2,814.97	109
J-660	Zone 12	2,548	0	0	2,814.99	116
J-680	Zone 12	2,610	0	0	2,815.03	89
J-690	Zone 13	2,730	0	0	2,956.48	98
J-710	Zone 12	2,542	0	0	2,815.02	118
J-720	Zone 12	2,690	0	0	2,815.04	54
J-730	Zone 12	2,556	0	0	2,815.04	112

Scenario: Peak Hour Demand (Source: Site 145 Only)
Steady State Analysis
Junction Report

Label	Zone	Elevation (ft)	Base Flow (gpm)	Demand (Calculated) (gpm)	Calculated Hydraulic Grade (ft)	Pressure (psi)
J-740	Zone 12	2,670	0	0	2,965.00	128
PRV FROM SITE 10	Zone 13	2,582	0	0	2,965.00	166

Scenario: Ave Day Demand
Steady State Analysis
Pipe Report

Label	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Hazen-Williams C	Closed?	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-10	12	39	0.11	130	false	0.01	0.01	2,964.99	2,964.99
P-30	8	4	0.03	130	false	0.00	0.00	2,964.99	2,964.99
P-60	12	43	0.12	130	false	0.01	0.01	2,964.99	2,965.00
P-90	12	60	0.17	130	false	0.01	0.01	2,965.00	2,965.01
P-170	8	1	0.01	130	false	0.00	0.00	2,964.99	2,964.99
P-200	8	25	0.16	130	false	0.01	0.02	2,965.01	2,965.03
P-210	8	4	0.03	130	false	0.00	0.00	2,965.03	2,965.03
P-250	12	54	0.15	130	false	0.01	0.01	2,965.01	2,965.00
P-270	12	52	0.15	130	false	0.01	0.01	2,965.00	2,964.99
P-280	12	52	0.15	130	false	0.01	0.01	2,964.99	2,964.98
P-300	8	4	0.03	130	false	0.00	0.00	2,964.99	2,964.99
P-320	8	0	0.00	130	false	0.00	0.00	2,964.99	2,964.99
P-330	8	4	0.03	130	false	0.00	0.00	2,964.99	2,964.99
P-340	8	0	0.00	130	false	0.00	0.00	2,815.04	2,815.04
P-360	8	4	0.03	130	false	0.00	0.00	2,965.03	2,965.03
P-380	12	10	0.03	130	false	0.00	0.00	2,964.98	2,964.99
P-390	8	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-400	8	18	0.12	130	false	0.01	0.01	2,965.00	2,964.99
P-410	8	18	0.12	130	false	0.01	0.01	2,965.01	2,965.01
P-440	8	0	0.00	130	false	0.00	0.00	2,965.03	2,965.03
P-480	8	0	0.00	130	false	0.00	0.00	2,815.04	2,815.04
P-490	8	29	0.18	130	false	0.02	0.03	2,965.03	2,965.05
P-500	8	0	0.00	130	false	0.00	0.00	2,815.04	2,815.04
P-510	12	60	0.17	130	false	0.01	0.01	2,965.01	2,965.02
P-520	12	48	0.14	130	false	0.01	0.01	2,965.02	2,965.01
P-530	12	108	0.31	130	false	0.03	0.04	2,965.05	2,965.02
P-560	12	0	0.00	130	false	0.00	0.00	2,973.09	2,973.09
P-590	8	17	0.11	130	false	0.01	0.01	2,964.97	2,964.98
P-620	8	4	0.03	130	false	0.00	0.00	2,815.04	2,815.04
P-690	8	5	0.03	130	false	0.00	0.00	2,815.04	2,815.04
P-710	8	4	0.03	130	false	0.00	0.00	2,815.04	2,815.04
P-730	8	6	0.04	130	false	0.00	0.00	2,815.04	2,815.04
P-760	12	8	0.02	130	false	0.00	0.00	2,815.04	2,815.04
P-780	12	30	0.09	130	false	0.00	0.00	2,964.97	2,964.98
P-820	8	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00

Label	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Hazen-Williams C	Closed?	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-830	8	0	0.00	130	false	0.00	0.00	2,815.04	2,815.04
P-850	8	16	0.10	130	false	0.00	0.01	2,964.97	2,964.97
P-910	12	14	0.04	130	false	0.00	0.00	2,815.04	2,815.04
P-920	12	14	0.04	130	false	0.00	0.00	2,964.97	2,964.97
P-930	8	17	0.05	130	false	0.00	0.00	2,815.04	2,815.04
P-940	8	17	0.11	130	false	0.01	0.01	2,964.96	2,964.97
P-980	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1000	*12*	*0*	*0.00*	*130*	*false*	*0.00*	*0.00*	*2,815.08*	*2,815.08*
P-1020	16	25	0.04	130	false	0.01	0.00	2,965.00	2,964.99
P-1030	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1070	20	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1090	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1100	8	0	0.00	130	false	0.00	0.00	2,965.01	2,965.01
P-1110	8	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1120	8	18	0.12	130	false	0.01	0.01	2,965.00	2,965.01
P-1140	16	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1150	8	16	0.10	130	false	0.01	0.01	2,815.04	2,815.03
P-1160	8	7	0.04	130	false	0.00	0.00	2,815.03	2,815.03
P-1170	8	4	0.02	130	false	0.00	0.00	2,815.03	2,815.03
P-1180	8	7	0.05	130	false	0.00	0.00	2,815.03	2,815.04
P-1210	8	11	0.07	130	false	0.01	0.00	2,815.03	2,815.04
P-1220	12	12	0.03	130	false	0.00	0.00	2,964.99	2,964.98
P-1230	8	2	0.01	130	false	0.00	0.00	2,815.04	2,815.04
P-1240	8	2	0.01	130	false	0.00	0.00	2,815.04	2,815.04
P-1270	12	12	0.03	130	false	0.00	0.00	2,964.98	2,964.98
P-1280	8	13	0.08	130	false	0.01	0.01	2,964.98	2,964.97
P-1300	8	10	0.07	130	false	0.01	0.00	2,815.04	2,815.03
P-1310	8	4	0.03	130	false	0.00	0.00	2,815.04	2,815.04
P-1320	12	2	0.00	130	false	0.00	0.00	2,815.04	2,815.04
P-1330	12	10	0.03	130	false	0.00	0.00	2,815.04	2,815.04
P-1340	8	7	0.05	130	false	0.00	0.00	2,815.04	2,815.04
P-1350	12	12	0.03	130	false	0.00	0.00	2,815.04	2,815.04
P-1360	12	10	0.03	130	false	0.00	0.00	2,815.04	2,815.04
P-1370	8	4	0.02	130	false	0.00	0.00	2,815.04	2,815.04
P-1390	8	1	0.01	130	false	0.00	0.00	2,815.04	2,815.04

Scenario: Ave Day Demand
Steady State Analysis
Pipe Report

Label	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Hazen-Williams C	Closed?	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-1400	8	0	0.00	130	false	0.00	0.00	2,815.04	2,815.04
P-1410	12	0	0.00	130	false	0.00	0.00	2,725.00	2,725.00
P-1420	12	0	0.00	130	false	0.00	0.00	2,725.00	2,725.00
P-1430	12	0	0.00	130	false	0.00	0.00	2,725.00	2,725.00
P-1440	12	137	0.39	130	false	0.02	0.06	2,724.98	2,725.00
P-1450	12	137	0.39	130	false	0.02	0.06	2,973.11	2,973.09
P-1460	12	0	0.00	130	false	0.00	0.00	2,973.09	2,973.09
P-1480	12	137	0.39	130	false	0.00	0.07	2,973.09	2,973.08
P-1490	12	137	0.39	130	false	0.03	0.06	2,965.08	2,965.05
P-1500	12	0	0.00	130	false	0.00	0.00	2,973.09	2,973.09
P-1520	8	3	0.02	130	false	0.00	0.00	2,815.04	2,815.04
P-1530	8	3	0.02	130	false	0.00	0.00	2,964.97	2,964.97
P-1540	16	25	0.04	130	false	0.01	0.00	2,964.99	2,964.99
P-1550	16	0	0.00	130	false	0.00	0.00	2,964.99	2,964.99
P-1560	12	25	0.07	130	false	0.00	0.00	2,964.99	2,964.98
P-1570	12	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1580	12	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1600	8	16	0.10	130	false	0.01	0.01	2,964.97	2,964.99
P-1610	8	6	0.04	130	false	0.00	0.00	2,964.99	2,964.99
P-1620	8	6	0.04	130	false	0.00	0.00	2,815.04	2,815.04

Scenario: Max Day Demand
Steady State Analysis
Pipe Report

Label	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Hazen-Williams C	Closed?	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-10	12	9	0.03	130	false	0.00	0.00	2,964.68	2,964.68
P-30	8	24	0.16	130	false	0.02	0.02	2,964.66	2,964.64
P-60	12	39	0.11	130	false	0.01	0.01	2,964.68	2,964.69
P-90	12	73	0.21	130	false	0.01	0.02	2,964.69	2,964.70
P-170	8	14	0.09	130	false	0.00	0.01	2,964.64	2,964.64
P-200	8	38	0.24	130	false	0.03	0.04	2,964.69	2,964.73
P-210	8	8	0.05	130	false	0.00	0.00	2,964.73	2,964.72
P-250	12	90	0.26	130	false	0.04	0.03	2,964.69	2,964.66
P-270	12	86	0.25	130	false	0.02	0.03	2,964.66	2,964.64
P-280	12	86	0.25	130	false	0.03	0.03	2,964.64	2,964.61
P-300	8	30	0.19	130	false	0.01	0.03	2,964.67	2,964.66
P-320	8	5	0.03	130	false	0.00	0.00	2,964.66	2,964.66
P-330	8	30	0.19	130	false	0.01	0.03	2,964.67	2,964.68
P-340	8	5	0.03	130	false	0.00	0.00	2,815.04	2,815.04
P-360	8	8	0.05	130	false	0.00	0.00	2,964.73	2,964.73
P-380	12	31	0.09	130	false	0.02	0.00	2,964.70	2,964.68
P-390	8	0	0.00	130	false	0.00	0.00	2,964.69	2,964.69
P-400	8	20	0.13	130	false	0.01	0.01	2,964.65	2,964.64
P-440	8	0	0.00	130	false	0.00	0.00	2,964.73	2,964.73
P-490	8	46	0.29	130	false	0.05	0.06	2,964.73	2,964.77
P-410	8	38	0.24	130	false	0.02	0.04	2,964.69	2,964.67
P-480	8	5	0.03	130	false	0.00	0.00	2,815.04	2,815.04
P-500	8	0	0.00	130	false	0.00	0.00	2,815.04	2,815.04
P-510	12	73	0.21	130	false	0.02	0.02	2,964.70	2,964.71
P-520	12	91	0.26	130	false	0.02	0.03	2,964.71	2,964.69
P-530	12	163	0.46	130	false	0.06	0.09	2,964.77	2,964.71
P-560	12	210	0.59	130	false	0.01	0.14	2,973.67	2,973.66
P-590	8	17	0.11	130	false	0.01	0.01	2,964.60	2,964.61
P-620	8	9	0.05	130	false	0.00	0.00	2,815.04	2,815.04
P-690	8	10	0.07	130	false	0.01	0.00	2,815.04	2,815.04
P-710	8	8	0.05	130	false	0.00	0.00	2,815.04	2,815.03
P-730	8	11	0.07	130	false	0.01	0.00	2,815.04	2,815.03
P-760	12	16	0.05	130	false	0.00	0.00	2,815.03	2,815.04
P-780	12	59	0.17	130	false	0.02	0.01	2,964.59	2,964.61
P-820	8	18	0.11	130	false	0.01	0.01	2,964.64	2,964.63

Label	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Hazen-Williams C	Closed?	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-830	8	18	0.05	130	false	0.00	0.00	2,815.04	2,815.04
P-850	8	33	0.21	130	false	0.01	0.03	2,964.58	2,964.59
P-910	12	27	0.08	130	false	0.01	0.00	2,815.04	2,815.04
P-920	12	27	0.08	130	false	0.00	0.00	2,964.59	2,964.59
P-930	8	17	0.05	130	false	0.00	0.00	2,815.04	2,815.04
P-940	8	17	0.11	130	false	0.01	0.01	2,964.59	2,964.60
P-980	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1000	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1030	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1020	16	114	0.18	130	false	0.09	0.01	2,965.00	2,964.91
P-1070	20	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1090	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1100	8	0	0.00	130	false	0.00	0.00	2,964.67	2,964.67
P-1110	8	18	0.11	130	false	0.01	0.01	2,964.64	2,964.65
P-1120	8	38	0.24	130	false	0.02	0.04	2,964.65	2,964.67
P-1140	16	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1150	8	33	0.21	130	false	0.04	0.03	2,815.04	2,815.01
P-1160	8	13	0.08	130	false	0.01	0.01	2,815.01	2,815.02
P-1170	8	7	0.05	130	false	0.00	0.00	2,815.02	2,815.02
P-1180	8	15	0.10	130	false	0.01	0.01	2,815.02	2,815.02
P-1210	8	22	0.14	130	false	0.02	0.02	2,815.02	2,815.03
P-1220	12	19	0.05	130	false	0.00	0.00	2,964.68	2,964.68
P-1230	8	3	0.02	130	false	0.00	0.00	2,815.04	2,815.04
P-1240	8	4	0.02	130	false	0.00	0.00	2,815.04	2,815.04
P-1270	12	75	0.21	130	false	0.04	0.02	2,964.74	2,964.70
P-1280	8	40	0.25	130	false	0.08	0.05	2,964.74	2,964.67
P-1300	8	21	0.13	130	false	0.02	0.01	2,815.04	2,815.02
P-1310	8	9	0.06	130	false	0.00	0.00	2,815.03	2,815.03
P-1320	12	3	0.01	130	false	0.00	0.00	2,815.03	2,815.03
P-1330	12	21	0.06	130	false	0.00	0.00	2,815.04	2,815.03
P-1340	8	15	0.10	130	false	0.01	0.01	2,815.03	2,815.02
P-1350	12	19	0.05	130	false	0.00	0.00	2,815.04	2,815.04
P-1360	12	21	0.06	130	false	0.00	0.00	2,815.04	2,815.04
P-1370	8	8	0.05	130	false	0.00	0.00	2,815.04	2,815.04
P-1390	8	3	0.02	130	false	0.00	0.00	2,815.04	2,815.04

Label	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Hazen-Williams C	Closed?	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-1400	8	5	0.03	130	false	0.00	0.00	2,815.04	2,815.04
P-1410	12	210	0.59	130	false	0.03	0.14	2,725.00	2,724.97
P-1420	12	0	0.00	130	false	0.00	0.00	2,725.00	2,725.00
P-1430	12	0	0.00	130	false	0.00	0.00	2,725.00	2,725.00
P-1440	12	0	0.00	130	false	0.00	0.00	2,725.00	2,725.00
P-1450	12	0	0.00	130	false	0.00	0.00	2,973.66	2,973.66
P-1460	12	0	0.00	130	false	0.00	0.00	2,973.66	2,973.66
P-1480	12	210	0.59	130	false	0.01	0.14	2,973.66	2,973.65
P-1490	12	210	0.59	130	false	0.07	0.14	2,964.84	2,964.77
P-1500	12	0	0.00	130	false	0.00	0.00	2,973.66	2,973.66
P-1520	8	5	0.03	130	false	0.00	0.00	2,815.04	2,815.04
P-1530	8	5	0.03	130	false	0.00	0.00	2,964.67	2,964.67
P-1540	16	114	0.18	130	false	0.10	0.01	2,964.91	2,964.80
P-1550	16	0	0.00	130	false	0.00	0.00	2,964.80	2,964.80
P-1560	12	114	0.32	130	false	0.06	0.05	2,964.80	2,964.74
P-1570	12	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1580	12	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1600	8	19	0.12	130	false	0.01	0.01	2,964.67	2,964.68
P-1610	8	11	0.07	130	false	0.00	0.00	2,964.64	2,964.64
P-1620	8	11	0.07	130	false	0.00	0.00	2,815.04	2,815.04

Scenario: Peak Hour Demand
Steady State Analysis
Pipe Report

Label	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Hazen-Williams C	Closed?	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-10	12	176	0.50	130	false	0.10	0.10	2,961.61	2,961.51
P-30	8	58	0.37	130	false	0.10	0.09	2,961.42	2,961.31
P-60	12	109	0.31	130	false	0.04	0.04	2,961.51	2,961.46
P-90	12	49	0.14	130	false	0.00	0.01	2,961.46	2,961.46
P-170	8	39	0.25	130	false	0.02	0.05	2,961.29	2,961.31
P-200	8	41	0.26	130	false	0.04	0.05	2,961.38	2,961.42
P-210	8	14	0.09	130	false	0.01	0.01	2,961.42	2,961.41
P-250	12	158	0.45	130	false	0.10	0.08	2,961.38	2,961.28
P-270	12	151	0.43	130	false	0.06	0.08	2,961.28	2,961.22
P-280	12	151	0.43	130	false	0.09	0.08	2,961.22	2,961.14
P-300	8	67	0.43	130	false	0.07	0.12	2,961.48	2,961.42
P-320	8	9	0.06	130	false	0.00	0.00	2,961.42	2,961.41
P-330	8	67	0.43	130	false	0.03	0.12	2,961.48	2,961.51
P-340	8	9	0.06	130	false	0.00	0.00	2,815.04	2,815.04
P-360	8	14	0.09	130	false	0.00	0.01	2,961.42	2,961.42
P-380	12	173	0.49	130	false	0.45	0.10	2,962.06	2,961.61
P-390	8	0	0.00	130	false	0.00	0.00	2,961.46	2,961.46
P-400	8	21	0.13	130	false	0.01	0.01	2,961.30	2,961.29
P-440	8	0	0.00	130	false	0.00	0.00	2,961.42	2,961.42
P-490	8	55	0.35	130	false	0.07	0.08	2,961.42	2,961.48
P-410	8	52	0.33	130	false	0.04	0.08	2,961.38	2,961.34
P-480	8	9	0.06	130	false	0.00	0.00	2,815.04	2,815.04
P-500	8	0	0.00	130	false	0.00	0.00	2,815.04	2,815.04
P-510	12	49	0.14	130	false	0.01	0.01	2,961.46	2,961.45
P-520	12	170	0.48	130	false	0.07	0.09	2,961.45	2,961.38
P-530	12	120	0.34	130	false	0.03	0.05	2,961.48	2,961.45
P-560	12	0	0.00	130	false	0.00	0.00	2,969.96	2,969.96
P-590	8	30	0.19	130	false	0.02	0.03	2,961.12	2,961.14
P-620	8	15	0.10	130	false	0.01	0.01	2,815.04	2,815.03
P-690	8	18	0.12	130	false	0.01	0.01	2,815.04	2,815.03
P-710	8	14	0.09	130	false	0.01	0.01	2,815.03	2,815.02
P-730	8	19	0.12	130	false	0.02	0.01	2,815.03	2,815.01
P-760	12	29	0.08	130	false	0.00	0.00	2,815.02	2,815.03
P-780	12	104	0.30	130	false	0.05	0.04	2,961.09	2,961.14
P-820	8	31	0.20	130	false	0.04	0.03	2,961.29	2,961.25

Label	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Hazen-Williams C	Closed?	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-830	8	31	0.09	130	false	0.00	0.00	2,815.04	2,815.04
P-850	8	57	0.37	130	false	0.02	0.09	2,961.07	2,961.09
P-910	12	47	0.13	130	false	0.01	0.01	2,815.03	2,815.04
P-920	12	47	0.13	130	false	0.00	0.01	2,961.08	2,961.09
P-930	8	30	0.08	130	false	0.00	0.00	2,815.04	2,815.04
P-940	8	30	0.19	130	false	0.03	0.03	2,961.09	2,961.12
P-980	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1000	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1030	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1020	16	392	0.63	130	false	0.89	0.11	2,965.00	2,964.11
P-1070	20	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1090	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1100	8	0	0.00	130	false	0.00	0.00	2,961.34	2,961.34
P-1110	8	31	0.20	130	false	0.01	0.03	2,961.29	2,961.30
P-1120	8	52	0.33	130	false	0.04	0.08	2,961.30	2,961.34
P-1140	16	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1150	8	57	0.37	130	false	0.10	0.09	2,815.04	2,814.94
P-1160	8	23	0.15	130	false	0.03	0.02	2,814.94	2,814.98
P-1170	8	13	0.08	130	false	0.01	0.01	2,814.98	2,814.97
P-1180	8	26	0.17	130	false	0.03	0.02	2,814.97	2,814.99
P-1210	8	38	0.24	130	false	0.05	0.04	2,814.97	2,815.02
P-1220	12	33	0.09	130	false	0.01	0.00	2,961.61	2,961.60
P-1230	8	6	0.04	130	false	0.00	0.00	2,815.03	2,815.03
P-1240	8	6	0.04	130	false	0.00	0.00	2,815.03	2,815.03
P-1270	12	250	0.71	130	false	0.42	0.19	2,962.48	2,962.06
P-1280	8	142	0.91	130	false	0.82	0.49	2,962.48	2,961.67
P-1300	8	36	0.23	130	false	0.05	0.04	2,815.03	2,814.98
P-1310	8	16	0.10	130	false	0.01	0.01	2,815.01	2,815.02
P-1320	12	5	0.01	130	false	0.00	0.00	2,815.02	2,815.02
P-1330	12	37	0.10	130	false	0.01	0.01	2,815.03	2,815.02
P-1340	8	26	0.17	130	false	0.03	0.02	2,815.02	2,814.99
P-1350	12	33	0.09	130	false	0.00	0.00	2,815.04	2,815.04
P-1360	12	37	0.11	130	false	0.01	0.01	2,815.04	2,815.03
P-1370	8	13	0.08	130	false	0.01	0.01	2,815.03	2,815.04
P-1390	8	5	0.03	130	false	0.00	0.00	2,815.04	2,815.04

Scenario: Peak Hour Demand
Steady State Analysis
Pipe Report

Label	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Hazen-Williams C	Closed?	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-1400	8	9	0.06	130	false	0.00	0.00	2,815.04	2,815.04
P-1410	12	0	0.00	130	false	0.00	0.00	2,725.00	2,725.00
P-1420	12	0	0.00	130	false	0.00	0.00	2,725.00	2,725.00
P-1430	12	0	0.00	130	false	0.00	0.00	2,725.00	2,725.00
P-1440	12	175	0.50	130	false	0.03	0.10	2,724.97	2,725.00
P-1450	12	175	0.50	130	false	0.03	0.10	2,969.99	2,969.96
P-1460	12	0	0.00	130	false	0.00	0.00	2,969.96	2,969.96
P-1480	12	175	0.50	130	false	0.01	0.10	2,969.96	2,969.96
P-1490	12	175	0.50	130	false	0.05	0.10	2,961.53	2,961.48
P-1500	12	0	0.00	130	false	0.00	0.00	2,969.96	2,969.96
P-1520	8	8	0.05	130	false	0.00	0.00	2,815.04	2,815.04
P-1530	8	8	0.05	130	false	0.00	0.00	2,961.67	2,961.67
P-1540	16	392	0.63	130	false	1.02	0.11	2,964.11	2,963.09
P-1550	16	0	0.00	130	false	0.00	0.00	2,963.09	2,963.09
P-1560	12	392	1.11	130	false	0.61	0.45	2,963.09	2,962.48
P-1570	12	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1580	12	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1600	8	39	0.25	130	false	0.06	0.05	2,961.67	2,961.61
P-1610	8	19	0.12	130	false	0.01	0.01	2,961.31	2,961.31
P-1620	8	19	0.12	130	false	0.01	0.01	2,815.04	2,815.03

Scenario: Peak Hour Demand (Source: Site 145 Only)
Steady State Analysis
Pipe Report

Label	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Hazen-Williams C	Closed?	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-10	12	216	0.61	130	false	0.15	0.15	2,956.66	2,956.81
P-30	8	2	0.01	130	false	0.00	0.00	2,956.80	2,956.80
P-60	12	227	0.65	130	false	0.17	0.16	2,956.81	2,956.98
P-90	12	287	0.81	130	false	0.13	0.25	2,956.98	2,957.11
P-170	8	17	0.11	130	false	0.00	0.01	2,956.81	2,956.80
P-200	8	101	0.64	130	false	0.20	0.26	2,957.25	2,957.46
P-210	8	14	0.09	130	false	0.01	0.01	2,957.46	2,957.45
P-250	12	158	0.45	130	false	0.10	0.08	2,957.25	2,957.15
P-270	12	151	0.43	130	false	0.06	0.08	2,957.15	2,957.09
P-280	12	151	0.43	130	false	0.09	0.08	2,957.09	2,957.01
P-300	8	11	0.07	130	false	0.00	0.00	2,956.81	2,956.80
P-320	8	9	0.06	130	false	0.00	0.00	2,956.80	2,956.80
P-330	8	11	0.07	130	false	0.00	0.00	2,956.81	2,956.81
P-340	8	9	0.06	130	false	0.00	0.00	2,815.04	2,815.04
P-360	8	14	0.09	130	false	0.00	0.01	2,957.46	2,957.46
P-380	12	101	0.29	130	false	0.17	0.04	2,956.49	2,956.66
P-390	8	0	0.00	130	false	0.00	0.00	2,956.98	2,956.98
P-400	8	76	0.49	130	false	0.15	0.16	2,956.96	2,956.81
P-440	8	0	0.00	130	false	0.00	0.00	2,957.46	2,957.46
P-490	8	115	0.73	130	false	0.26	0.33	2,957.46	2,957.72
P-410	8	108	0.69	130	false	0.15	0.29	2,957.25	2,957.10
P-480	8	9	0.06	130	false	0.00	0.00	2,815.04	2,815.04
P-500	8	0	0.00	130	false	0.00	0.00	2,815.04	2,815.04
P-510	12	287	0.81	130	false	0.21	0.25	2,957.11	2,957.32
P-520	12	165	0.47	130	false	0.07	0.09	2,957.32	2,957.25
P-530	12	452	1.28	130	false	0.40	0.58	2,957.72	2,957.32
P-560	12	420	1.19	130	false	0.05	0.51	2,970.99	2,970.94
P-590	8	30	0.19	130	false	0.02	0.03	2,956.99	2,957.01
P-620	8	15	0.10	130	false	0.01	0.01	2,815.04	2,815.03
P-690	8	18	0.12	130	false	0.01	0.01	2,815.04	2,815.03
P-710	8	14	0.09	130	false	0.01	0.01	2,815.03	2,815.02
P-730	8	19	0.12	130	false	0.02	0.01	2,815.03	2,815.01
P-760	12	29	0.08	130	false	0.00	0.00	2,815.02	2,815.03
P-780	12	104	0.30	130	false	0.05	0.04	2,956.96	2,957.01
P-820	8	31	0.20	130	false	0.04	0.03	2,956.95	2,956.91

Pipe Report

Label	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Hazen-Williams C	Closed?	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-830	8	31	0.09	130	false	0.00	0.00	2,815.04	2,815.04
P-850	8	57	0.37	130	false	0.02	0.09	2,956.94	2,956.96
P-910	12	47	0.13	130	false	0.01	0.01	2,815.03	2,815.04
P-920	12	47	0.13	130	false	0.00	0.01	2,956.96	2,956.96
P-930	8	30	0.08	130	false	0.00	0.00	2,815.04	2,815.04
P-940	8	30	0.19	130	false	0.03	0.03	2,956.96	2,956.99
P-980	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1000	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1030	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1020	16	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1070	20	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1090	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1100	8	0	0.00	130	false	0.00	0.00	2,957.10	2,957.10
P-1110	8	31	0.20	130	false	0.01	0.03	2,956.95	2,956.96
P-1120	8	108	0.69	130	false	0.14	0.29	2,956.96	2,957.10
P-1140	16	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1150	8	57	0.37	130	false	0.10	0.09	2,815.04	2,814.94
P-1160	8	23	0.15	130	false	0.03	0.02	2,814.94	2,814.98
P-1170	8	13	0.08	130	false	0.01	0.01	2,814.98	2,814.97
P-1180	8	26	0.17	130	false	0.03	0.02	2,814.97	2,814.99
P-1210	8	38	0.24	130	false	0.05	0.04	2,814.97	2,815.02
P-1220	12	33	0.09	130	false	0.01	0.00	2,956.66	2,956.65
P-1230	8	6	0.04	130	false	0.00	0.00	2,815.03	2,815.03
P-1240	8	6	0.04	130	false	0.00	0.00	2,815.03	2,815.03
P-1270	12	24	0.07	130	false	0.01	0.00	2,956.48	2,956.49
P-1280	8	24	0.15	130	false	0.03	0.02	2,956.48	2,956.45
P-1300	8	36	0.23	130	false	0.05	0.04	2,815.03	2,814.98
P-1310	8	16	0.10	130	false	0.01	0.01	2,815.01	2,815.02
P-1320	12	5	0.01	130	false	0.00	0.00	2,815.02	2,815.02
P-1330	12	37	0.10	130	false	0.01	0.01	2,815.03	2,815.02
P-1340	8	26	0.17	130	false	0.03	0.02	2,815.02	2,814.99
P-1350	12	33	0.09	130	false	0.00	0.00	2,815.04	2,815.04
P-1360	12	37	0.11	130	false	0.01	0.01	2,815.04	2,815.03
P-1370	8	13	0.08	130	false	0.01	0.01	2,815.03	2,815.04
P-1390	8	5	0.03	130	false	0.00	0.00	2,815.04	2,815.04

Scenario: Peak Hour Demand (Source: Site 145 Only)
Steady State Analysis
Pipe Report

Label	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Hazen-Williams C	Closed?	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-1400	8	9	0.06	130	false	0.00	0.00	2,815.04	2,815.04
P-1410	12	420	1.19	130	false	0.11	0.51	2,725.00	2,724.89
P-1420	12	0	0.00	130	false	0.00	0.00	2,725.00	2,725.00
P-1430	12	0	0.00	130	false	0.00	0.00	2,725.00	2,725.00
P-1440	12	147	0.42	130	false	0.02	0.07	2,724.98	2,725.00
P-1450	12	147	0.42	130	false	0.02	0.07	2,970.96	2,970.94
P-1460	12	0	0.00	130	false	0.00	0.00	2,970.94	2,970.94
P-1480	12	567	1.61	130	false	0.07	0.89	2,970.94	2,970.87
P-1490	12	567	1.61	130	false	0.41	0.89	2,958.13	2,957.72
P-1500	12	0	0.00	130	false	0.00	0.00	2,970.94	2,970.94
P-1520	8	8	0.05	130	false	0.00	0.00	2,815.04	2,815.04
P-1530	8	8	0.05	130	false	0.00	0.00	2,956.45	2,956.45
P-1540	16	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1550	16	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1560	12	0	0.00	130	true	0.00	0.00	2,965.00	2,956.48
P-1570	12	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1580	12	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1600	8	79	0.50	130	false	0.20	0.16	2,956.45	2,956.66
P-1610	8	19	0.12	130	false	0.01	0.01	2,956.80	2,956.79
P-1620	8	19	0.12	130	false	0.01	0.01	2,815.04	2,815.03

Scenario: Max Day + Fire at J-200 (Source: Site 145 Only)
Steady State Analysis
Pipe Report

Label	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Hazen-Williams C	Closed?	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-10	12	124	0.35	130	false	0.05	0.05	2,941.55	2,941.61
P-30	8	142	0.91	130	false	0.54	0.49	2,941.21	2,940.68
P-60	12	271	0.77	130	false	0.24	0.23	2,941.61	2,941.85
P-90	12	305	0.87	130	false	0.14	0.28	2,941.85	2,941.99
P-170	8	131	0.84	130	false	0.22	0.42	2,940.46	2,940.68
P-200	8	406	2.59	130	false	2.71	3.44	2,939.97	2,942.69
P-210	8	8	0.05	130	false	0.00	0.00	2,942.69	2,942.68
P-250	12	1,608	4.56	130	false	7.23	6.11	2,939.97	2,932.75
P-270	12	104	0.30	130	false	0.03	0.04	2,932.75	2,932.72
P-280	12	104	0.30	130	false	0.04	0.04	2,932.72	2,932.67
P-300	8	148	0.94	130	false	0.29	0.53	2,941.50	2,941.21
P-320	8	5	0.03	130	false	0.00	0.00	2,941.21	2,941.21
P-330	8	148	0.94	130	false	0.11	0.53	2,941.50	2,941.61
P-340	8	5	0.03	130	false	0.00	0.00	2,815.04	2,815.04
P-360	8	8	0.05	130	false	0.00	0.00	2,942.69	2,942.69
P-380	12	58	0.16	130	false	0.06	0.01	2,941.50	2,941.55
P-390	8	0	0.00	130	false	0.00	0.00	2,941.85	2,941.85
P-400	8	97	0.62	130	false	0.24	0.24	2,940.21	2,940.46
P-440	8	0	0.00	130	false	0.00	0.00	2,942.69	2,942.69
P-490	8	414	2.64	130	false	2.82	3.56	2,942.69	2,945.50
P-410	8	97	0.62	130	false	0.13	0.24	2,939.97	2,940.10
P-480	8	5	0.03	130	false	0.00	0.00	2,815.04	2,815.04
P-500	8	0	0.00	130	false	0.00	0.00	2,815.04	2,815.04
P-510	12	305	0.87	130	false	0.24	0.28	2,941.99	2,942.23
P-520	12	1,105	3.13	130	false	2.26	3.05	2,942.23	2,939.97
P-530	12	1,410	4.00	130	false	3.27	4.79	2,945.50	2,942.23
P-560	12	175	0.50	130	false	0.01	0.10	2,976.25	2,976.24
P-590	8	34	0.22	130	false	0.02	0.04	2,932.65	2,932.67
P-620	8	8	0.05	130	false	0.00	0.00	2,815.04	2,815.04
P-690	8	10	0.06	130	false	0.00	0.00	2,815.04	2,815.04
P-710	8	8	0.05	130	false	0.00	0.00	2,815.04	2,815.03
P-730	8	11	0.07	130	false	0.01	0.00	2,815.04	2,815.03
P-760	12	16	0.05	130	false	0.00	0.00	2,815.03	2,815.04
P-780	12	60	0.17	130	false	0.02	0.01	2,932.66	2,932.67
P-820	8	0	0.00	130	false	0.00	0.00	2,940.21	2,940.21

Label	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Hazen-Williams C	Closed?	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-830	8	0	0.00	130	false	0.00	0.00	2,815.04	2,815.04
P-850	8	33	0.21	130	false	0.01	0.03	2,932.65	2,932.66
P-910	12	27	0.08	130	false	0.01	0.00	2,815.04	2,815.04
P-920	12	27	0.08	130	false	0.00	0.00	2,932.66	2,932.66
P-930	8	34	0.10	130	false	0.00	0.00	2,815.04	2,815.04
P-940	8	34	0.22	130	false	0.04	0.04	2,932.61	2,932.65
P-980	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1000	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1030	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1020	16	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1070	20	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1090	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1100	8	0	0.00	130	false	0.00	0.00	2,940.10	2,940.10
P-1110	8	0	0.00	130	false	0.00	0.00	2,940.21	2,940.21
P-1120	8	97	0.62	130	false	0.11	0.24	2,940.21	2,940.10
P-1140	16	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1150	8	33	0.21	130	false	0.04	0.03	2,815.04	2,815.01
P-1160	8	13	0.08	130	false	0.01	0.01	2,815.01	2,815.02
P-1170	8	7	0.05	130	false	0.00	0.00	2,815.02	2,815.02
P-1180	8	15	0.10	130	false	0.01	0.01	2,815.02	2,815.02
P-1210	8	22	0.14	130	false	0.02	0.02	2,815.02	2,815.03
P-1220	12	19	0.05	130	false	0.00	0.00	2,941.55	2,941.55
P-1230	8	3	0.02	130	false	0.00	0.00	2,815.04	2,815.04
P-1240	8	4	0.02	130	false	0.00	0.00	2,815.04	2,815.04
P-1270	12	14	0.04	130	false	0.00	0.00	2,941.49	2,941.50
P-1280	8	14	0.09	130	false	0.01	0.01	2,941.49	2,941.48
P-1300	8	21	0.13	130	false	0.02	0.01	2,815.04	2,815.02
P-1310	8	9	0.06	130	false	0.00	0.00	2,815.03	2,815.03
P-1320	12	3	0.01	130	false	0.00	0.00	2,815.03	2,815.03
P-1330	12	21	0.06	130	false	0.00	0.00	2,815.04	2,815.03
P-1340	8	15	0.10	130	false	0.01	0.01	2,815.03	2,815.02
P-1350	12	19	0.05	130	false	0.00	0.00	2,815.04	2,815.04
P-1360	12	21	0.06	130	false	0.00	0.00	2,815.04	2,815.04
P-1370	8	8	0.05	130	false	0.00	0.00	2,815.04	2,815.04
P-1390	8	3	0.02	130	false	0.00	0.00	2,815.04	2,815.04

Label	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Hazen-Williams C	Closed?	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-1400	8	5	0.03	130	false	0.00	0.00	2,815.04	2,815.04
P-1410	12	175	0.50	130	false	0.02	0.10	2,725.00	2,724.98
P-1420	12	1,649	4.68	130	false	0.88	6.40	2,725.00	2,724.12
P-1430	12	0	0.00	130	false	0.00	0.00	2,725.00	2,725.00
P-1440	12	0	0.00	130	false	0.00	0.00	2,725.00	2,725.00
P-1450	12	0	0.00	130	false	0.00	0.00	2,976.24	2,976.24
P-1460	12	0	0.00	130	false	0.00	0.00	2,976.24	2,976.24
P-1480	12	1,824	5.17	130	false	0.58	7.71	2,976.24	2,975.66
P-1490	12	1,824	5.17	130	false	3.59	7.71	2,949.10	2,945.50
P-1500	12	1,649	4.68	130	false	1.91	6.40	2,978.15	2,976.24
P-1520	8	5	0.03	130	false	0.00	0.00	2,815.04	2,815.04
P-1530	8	5	0.03	130	false	0.00	0.00	2,941.48	2,941.48
P-1540	16	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1550	16	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1560	12	0	0.00	130	true	0.00	0.00	2,965.00	2,941.49
P-1570	12	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1580	12	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1600	8	45	0.29	130	false	0.07	0.06	2,941.48	2,941.55
P-1610	8	11	0.07	130	false	0.00	0.00	2,940.68	2,940.67
P-1620	8	11	0.07	130	false	0.00	0.00	2,815.04	2,815.04

Scenario: Max Day + Fire Flow at J-200 (Source: Site 143 Only)
Steady State Analysis
Pipe Report

Label	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Hazen-Williams C	Closed?	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-10	12	1,700	4.82	130	false	6.83	6.78	2,899.53	2,892.70
P-30	8	383	2.45	130	false	3.36	3.09	2,890.33	2,886.97
P-60	12	1,312	3.72	130	false	4.47	4.19	2,892.70	2,888.24
P-90	12	1,278	3.63	130	false	2.01	3.99	2,888.24	2,886.22
P-170	8	372	2.38	130	false	1.52	2.93	2,885.44	2,886.97
P-200	8	227	1.45	130	false	0.92	1.17	2,880.81	2,881.74
P-210	8	8	0.05	130	false	0.00	0.00	2,881.74	2,881.73
P-250	12	1,590	4.51	130	false	7.08	5.99	2,880.81	2,873.73
P-270	12	86	0.25	130	false	0.02	0.03	2,873.73	2,873.71
P-280	12	86	0.25	130	false	0.03	0.03	2,873.71	2,873.68
P-300	8	389	2.48	130	false	1.71	3.17	2,892.04	2,890.33
P-320	8	5	0.03	130	false	0.00	0.00	2,890.33	2,890.33
P-330	8	389	2.48	130	false	0.66	3.17	2,892.04	2,892.70
P-340	8	5	0.03	130	false	0.00	0.00	2,815.04	2,815.04
P-360	8	8	0.05	130	false	0.00	0.00	2,881.74	2,881.74
P-380	12	1,132	3.21	130	false	14.67	3.19	2,914.20	2,899.53
P-390	8	0	0.00	130	false	0.00	0.00	2,888.24	2,888.24
P-400	8	338	2.16	130	false	2.44	2.46	2,883.01	2,885.44
P-440	8	0	0.00	130	false	0.00	0.00	2,881.74	2,881.74
P-490	8	235	1.50	130	false	0.99	1.25	2,881.74	2,882.72
P-410	8	321	2.05	130	false	1.15	2.22	2,880.81	2,881.96
P-480	8	5	0.03	130	false	0.00	0.00	2,815.04	2,815.04
P-500	8	0	0.00	130	false	0.00	0.00	2,815.04	2,815.04
P-510	12	1,278	3.63	130	false	3.38	3.99	2,886.22	2,882.84
P-520	12	1,043	2.96	130	false	2.03	2.74	2,882.84	2,880.81
P-530	12	235	0.67	130	false	0.12	0.17	2,882.72	2,882.84
P-560	12	0	0.00	130	false	0.00	0.00	2,889.22	2,889.22
P-590	8	17	0.11	130	false	0.01	0.01	2,873.67	2,873.68
P-620	8	9	0.05	130	false	0.00	0.00	2,815.04	2,815.04
P-690	8	10	0.07	130	false	0.01	0.00	2,815.04	2,815.04
P-710	8	8	0.05	130	false	0.00	0.00	2,815.04	2,815.03
P-730	8	11	0.07	130	false	0.01	0.00	2,815.04	2,815.03
P-760	12	16	0.05	130	false	0.00	0.00	2,815.03	2,815.04
P-780	12	59	0.17	130	false	0.02	0.01	2,873.66	2,873.68
P-820	8	18	0.11	130	false	0.01	0.01	2,883.00	2,882.99

Label	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Hazen-Williams C	Closed?	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-830	8	18	0.05	130	false	0.00	0.00	2,815.04	2,815.04
P-850	8	33	0.21	130	false	0.01	0.03	2,873.66	2,873.66
P-910	12	27	0.08	130	false	0.01	0.00	2,815.04	2,815.04
P-920	12	27	0.08	130	false	0.00	0.00	2,873.66	2,873.66
P-930	8	17	0.05	130	false	0.00	0.00	2,815.04	2,815.04
P-940	8	17	0.11	130	false	0.01	0.01	2,873.66	2,873.67
P-980	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1000	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1030	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1020	16	1,824	2.91	130	false	15.35	1.90	2,965.00	2,949.65
P-1070	20	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1090	12	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1100	8	0	0.00	130	false	0.00	0.00	2,881.96	2,881.96
P-1110	8	18	0.11	130	false	0.01	0.01	2,883.00	2,883.01
P-1120	8	321	2.05	130	false	1.04	2.22	2,883.01	2,881.96
P-1140	16	0	0.00	130	false	0.00	0.00	2,815.08	2,815.08
P-1150	8	33	0.21	130	false	0.04	0.03	2,815.04	2,815.01
P-1160	8	13	0.08	130	false	0.01	0.01	2,815.01	2,815.02
P-1170	8	7	0.05	130	false	0.00	0.00	2,815.02	2,815.02
P-1180	8	15	0.10	130	false	0.01	0.01	2,815.02	2,815.02
P-1210	8	22	0.14	130	false	0.02	0.02	2,815.02	2,815.03
P-1220	12	19	0.05	130	false	0.00	0.00	2,899.53	2,899.53
P-1230	8	3	0.02	130	false	0.00	0.00	2,815.04	2,815.04
P-1240	8	4	0.02	130	false	0.00	0.00	2,815.04	2,815.04
P-1270	12	1,176	3.34	130	false	7.41	3.42	2,921.61	2,914.20
P-1280	8	648	4.14	130	false	13.62	8.18	2,921.61	2,907.99
P-1300	8	21	0.13	130	false	0.02	0.01	2,815.04	2,815.02
P-1310	8	9	0.06	130	false	0.00	0.00	2,815.03	2,815.03
P-1320	12	3	0.01	130	false	0.00	0.00	2,815.03	2,815.03
P-1330	12	21	0.06	130	false	0.00	0.00	2,815.04	2,815.03
P-1340	8	15	0.10	130	false	0.01	0.01	2,815.03	2,815.02
P-1350	12	19	0.05	130	false	0.00	0.00	2,815.04	2,815.04
P-1360	12	21	0.06	130	false	0.00	0.00	2,815.04	2,815.04
P-1370	8	8	0.05	130	false	0.00	0.00	2,815.04	2,815.04
P-1390	8	3	0.02	130	false	0.00	0.00	2,815.04	2,815.04

Label	Diameter (in)	Discharge (gpm)	Velocity (ft/s)	Hazen-Williams C	Closed?	Pressure Pipe Headloss (ft)	Headloss Gradient (ft/1000ft)	Upstream Structure Hydraulic Grade (ft)	Downstream Structure Hydraulic Grade (ft)
P-1400	8	5	0.03	130	false	0.00	0.00	2,815.04	2,815.04
P-1410	12	0	0.00	130	false	0.00	0.00	2,725.00	2,725.00
P-1420	12	0	0.00	130	false	0.00	0.00	2,725.00	2,725.00
P-1430	12	0	0.00	130	false	0.00	0.00	2,725.00	2,725.00
P-1440	12	0	0.00	130	false	0.00	0.00	2,725.00	2,725.00
P-1450	12	0	0.00	130	false	0.00	0.00	2,889.22	2,889.22
P-1460	12	0	0.00	130	false	0.00	0.00	2,889.22	2,889.22
P-1480	12	0	0.00	130	false	0.00	0.00	2,889.22	2,889.22
P-1490	12	0	0.00	130	false	0.00	0.00	2,882.72	2,882.72
P-1500	12	0	0.00	130	false	0.00	0.00	2,889.22	2,889.22
P-1520	8	5	0.03	130	false	0.00	0.00	2,815.04	2,815.04
P-1530	8	5	0.03	130	false	0.00	0.00	2,907.99	2,907.99
P-1540	16	1,824	2.91	130	false	17.55	1.90	2,949.65	2,932.10
P-1550	16	0	0.00	130	false	0.00	0.00	2,932.10	2,932.10
P-1560	12	1,824	5.17	130	false	10.49	7.71	2,932.10	2,921.61
P-1570	12	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1580	12	0	0.00	130	false	0.00	0.00	2,965.00	2,965.00
P-1600	8	589	3.76	130	false	8.46	6.86	2,907.99	2,899.53
P-1610	8	11	0.07	130	false	0.00	0.00	2,886.97	2,886.96
P-1620	8	11	0.07	130	false	0.00	0.00	2,815.04	2,815.04

Scenario: Ave Day Demand
Steady State Analysis
Pump Report

Label	Elevation (ft)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpm)	Relative Speed	Pump Head (ft)	Calculated Water Power (Hp)	Intake Pump Pressure (psi)	Discharge Pump Pressure (psi)
PMP-2	2,720	Off	2,725.00	2,973.09	0	1.00	0.00	0.00	2	109
PMP-1	2,720	On	2,724.98	2,973.11	137	0.95	248.13	8.58	2	110
PMP-3	2,720	Off	2,725.00	2,973.09	0	1.00	0.00	0.00	2	109
PMP-4	2,720	Off	2,725.00	2,973.09	0	1.00	0.00	0.00	2	109

Scenario: Max Day Demand
Steady State Analysis
Pump Report

Label	Elevation (ft)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpm)	Relative Speed	Pump Head (ft)	Calculated Water Power (Hp)	Intake Pump Pressure (psi)	Discharge Pump Pressure (psi)
PMP-2	2,720	On	2,724.97	2,973.67	210	0.90	248.70	13.16	2	110
PMP-1	2,720	Off	2,725.00	2,973.66	0	1.00	0.00	0.00	2	110
PMP-3	2,720	Off	2,725.00	2,973.66	0	1.00	0.00	0.00	2	110
PMP-4	2,720	Off	2,725.00	2,973.66	0	1.00	0.00	0.00	2	110

Scenario: Peak Hour Demand
Steady State Analysis
Pump Report

Label	Elevation (ft)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpm)	Relative Speed	Pump Head (ft)	Calculated Water Power (Hp)	Intake Pump Pressure (psi)	Discharge Pump Pressure (psi)
PMP-1	2,720	On	2,724.97	2,969.99	175	1.00	245.02	10.82	2	108
PMP-2	2,720	Off	2,725.00	2,969.96	0	1.00	0.00	0.00	2	108
PMP-3	2,720	Off	2,725.00	2,969.96	0	1.00	0.00	0.00	2	108
PMP-4	2,720	Off	2,725.00	2,969.96	0	1.00	0.00	0.00	2	108

Scenario: Max Day + Fire at J-200 (Source: Site 145 Only)
Steady State Analysis
Pump Report

Label	Elevation (ft)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpm)	Relative Speed	Pump Head (ft)	Calculated Water Power (Hp)	Intake Pump Pressure (psi)	Discharge Pump Pressure (psi)
PMP-1	2,720	Off	2,725.00	2,976.24	0	1.00	0.00	0.00	2	111
PMP-2	2,720	On	2,724.98	2,976.25	175	0.90	251.27	11.12	2	111
PMP-3	2,720	Off	2,725.00	2,976.24	0	1.00	0.00	0.00	2	111
PMP-4	2,720	On	2,724.12	2,978.15	1,649	1.00	254.03	105.74	2	112

Scenario: Max Day + Fire Flow at J-200 (Source: Site 143 Only)
Steady State Analysis
Pump Report

Label	Elevation (ft)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpm)	Relative Speed	Pump Head (ft)	Calculated Water Power (Hp)	Intake Pump Pressure (psi)	Discharge Pump Pressure (psi)
PMP-1	2,720	Off	2,725.00	2,889.22	0	1.00	0.00	0.00	2	73
PMP-2	2,720	Off	2,725.00	2,889.22	0	1.00	0.00	0.00	2	73
PMP-3	2,720	Off	2,725.00	2,889.22	0	1.00	0.00	0.00	2	73
PMP-4	2,720	Off	2,725.00	2,889.22	0	1.00	0.00	0.00	2	73

Scenario: Peak Hour Demand (Source: Site 145 Only)
Steady State Analysis
Pump Report

Label	Elevation (ft)	Control Status	Intake Pump Grade (ft)	Discharge Pump Grade (ft)	Discharge (gpm)	Relative Speed	Pump Head (ft)	Calculated Water Power (Hp)	Intake Pump Pressure (psi)	Discharge Pump Pressure (psi)
PMP-1	2,720	On	2,724.98	2,970.96	147	0.96	245.98	9.11	2	109
PMP-2	2,720	On	2,724.89	2,970.99	420	0.96	246.09	26.11	2	109
PMP-3	2,720	Off	2,725.00	2,970.94	0	1.00	0.00	0.00	2	109
PMP-4	2,720	Off	2,725.00	2,970.94	0	1.00	0.00	0.00	2	109

Scenario: Ave Day Demand
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Outflow (gpm)	Zone	Calculated Hydraulic Grade (ft)
SITE 143 Z13 BPS	2,965	25	Zone	2,965.00
SITE 101 Z13 BPS	2,965	-0	Zone	2,965.00
RECEIVING TANK	2,725	137	Zone	2,725.00

Scenario: Max Day Demand
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Outflow (gpm)	Zone	Calculated Hydraulic Grade (ft)
SITE 143 Z13 BPS	2,965	114	Zone	2,965.00
SITE 101 Z13 BPS	2,965	0	Zone	2,965.00
RECEIVING TANK	2,725	210	Zone	2,725.00

Scenario: Peak Hour Demand
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Outflow (gpm)	Zone	Calculated Hydraulic Grade (ft)
SITE 143 Z13 BPS	2,965	392	Zone	2,965.00
SITE 101 Z13 BPS	2,965	-0	Zone	2,965.00
RECEIVING TANK	2,725	175	Zone	2,725.00

Scenario: Max Day + Fire at J-200 (Source: Site 145 Only)
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Outflow (gpm)	Zone	Calculated Hydraulic Grade (ft)
SITE 143 Z13 BPS	2,965	0	Zone	2,965.00
SITE 101 Z13 BPS	2,965	0	Zone	2,965.00
RECEIVING TANK	2,725	1,824	Zone	2,725.00

Scenario: Max Day + Fire Flow at J-200 (Source: Site 143 Only)
Steady State Analysis
Reservoir Report

Label	Elevation (ft)	Outflow (gpm)	Zone	Calculated Hydraulic Grade (ft)
SITE 143 Z13 BPS	2,965	1,824	Zone	2,965.00
SITE 101 Z13 BPS	2,965	0	Zone	2,965.00
RECEIVING TANK	2,725	-0	Zone	2,725.00

Scenario: Ave Day Demand
Steady State Analysis
Valve Report

Label	Elevation (ft)	Diameter (in)	Calculated Pressure Setting (psi)	Control Status	Discharge (gpm)	From HGL (ft)	To HGL (ft)	Headloss (ft)	From Pressure (psi)	To Pressure (psi)
PRV-1	2,700	6	50	Closed	0	2,964.99	2,815.04	0.00	115	50
PRV-2	2,700	12	50	Closed	0	2,965.00	2,815.04	0.00	115	50
PRV-3	2,700	12	50	Throttling	16	2,964.97	2,815.04	149.93	115	50
PRV-5	2,700	12	50	Throttling	14	2,964.97	2,815.04	149.93	115	50
PRV-6	2,700	12	50	Throttling	17	2,964.96	2,815.04	149.92	115	50
PRV-7	2,582	12	101	Throttling	0	2,965.00	2,815.08	149.92	166	101
PRV-8	2,670	12	63	Closed	0	2,964.99	2,815.08	0.00	128	63
PRV-9	2,700	12	50	Throttling	12	2,964.98	2,815.04	149.94	115	50
GPV-1	2,719	12		Active	137	2,973.08	2,965.08	8.01	110	106
PRV-10	2,700	12	50	Throttling	3	2,964.97	2,815.04	149.93	115	50
PRV-11	2,700	12	50	Throttling	6	2,964.99	2,815.04	149.95	115	50

Scenario: Max Day Demand
Steady State Analysis
Valve Report

Label	Elevation (ft)	Diameter (in)	Calculated Pressure Setting (psi)	Control Status	Discharge (gpm)	From HGL (ft)	To HGL (ft)	Headloss (ft)	From Pressure (psi)	To Pressure (psi)
PRV-1	2,700	6	50	Throttling	5	2,964.66	2,815.04	149.62	115	50
PRV-2	2,700	12	50	Throttling	18	2,964.63	2,815.04	149.59	114	50
PRV-3	2,700	12	50	Throttling	33	2,964.58	2,815.04	149.54	114	50
PRV-5	2,700	12	50	Throttling	27	2,964.59	2,815.04	149.55	114	50
PRV-6	2,700	12	50	Throttling	17	2,964.59	2,815.04	149.55	114	50
PRV-7	2,582	12	101	Throttling	-0	2,965.00	2,815.08	149.92	166	101
PRV-8	2,670	12	63	Closed	0	2,964.80	2,815.08	0.00	128	63
PRV-9	2,700	12	50	Throttling	19	2,964.68	2,815.04	149.64	115	50
GPV-1	2,719	12		Active	210	2,973.65	2,964.84	8.81	110	106
PRV-10	2,700	12	50	Throttling	5	2,964.67	2,815.04	149.62	115	50
PRV-11	2,700	12	50	Throttling	11	2,964.64	2,815.04	149.59	114	50

Scenario: Peak Hour Demand
Steady State Analysis
Valve Report

Label	Elevation (ft)	Diameter (in)	Calculated Pressure Setting (psi)	Control Status	Discharge (gpm)	From HGL (ft)	To HGL (ft)	Headloss (ft)	From Pressure (psi)	To Pressure (psi)
GPV-1	2,719	12		Active	175	2,969.96	2,961.53	8.42	109	105
PRV-1	2,700	6	50	Throttling	9	2,961.41	2,815.04	146.37	113	50
PRV-2	2,700	12	50	Throttling	31	2,961.25	2,815.04	146.21	113	50
PRV-3	2,700	12	50	Throttling	57	2,961.07	2,815.04	146.02	113	50
PRV-5	2,700	12	50	Throttling	47	2,961.08	2,815.04	146.04	113	50
PRV-6	2,700	12	50	Throttling	30	2,961.09	2,815.04	146.04	113	50
PRV-7	2,582	12	101	Throttling	0	2,965.00	2,815.08	0.00	166	101
PRV-8	2,670	12	63	Closed	0	2,963.09	2,815.08	0.00	127	63
PRV-9	2,700	12	50	Throttling	33	2,961.60	2,815.04	146.56	113	50
PRV-10	2,700	12	50	Throttling	8	2,961.67	2,815.04	146.62	113	50
PRV-11	2,700	12	50	Throttling	19	2,961.31	2,815.04	146.26	113	50

Scenario: Peak Hour Demand (Source: Site 145 Only)
Steady State Analysis
Valve Report

Label	Elevation (ft)	Diameter (in)	Calculated Pressure Setting (psi)	Control Status	Discharge (gpm)	From HGL (ft)	To HGL (ft)	Headloss (ft)	From Pressure (psi)	To Pressure (psi)
GPV-1	2,719	12		Active	567	2,970.87	2,958.13	12.74	109	103
PRV-1	2,700	6	50	Throttling	9	2,956.80	2,815.04	141.76	111	50
PRV-2	2,700	12	50	Throttling	31	2,956.91	2,815.04	141.87	111	50
PRV-3	2,700	12	50	Throttling	57	2,956.94	2,815.04	141.90	111	50
PRV-5	2,700	12	50	Throttling	47	2,956.96	2,815.04	141.92	111	50
PRV-6	2,700	12	50	Throttling	30	2,956.96	2,815.04	141.92	111	50
PRV-7	2,582	12	101	Throttling	0	2,965.00	2,815.08	149.92	166	101
PRV-8	2,670	12	63	Closed	0	2,965.00	2,815.08	0.00	128	63
PRV-9	2,700	12	50	Throttling	33	2,956.65	2,815.04	141.61	111	50
PRV-10	2,700	12	50	Throttling	8	2,956.45	2,815.04	141.41	111	50
PRV-11	2,700	12	50	Throttling	19	2,956.79	2,815.04	141.75	111	50

Scenario: Max Day + Fire at J-200 (Source: Site 145 Only)
Steady State Analysis
Valve Report

Label	Elevation (ft)	Diameter (in)	Calculated Pressure Setting (psi)	Control Status	Discharge (gpm)	From HGL (ft)	To HGL (ft)	Headloss (ft)	From Pressure (psi)	To Pressure (psi)
GPV-1	2,719	12		Active	1,824	2,975.66	2,949.10	26.56	111	100
PRV-1	2,700	6	50	Throttling	5	2,941.21	2,815.04	126.17	104	50
PRV-2	2,700	12	50	Closed	0	2,940.21	2,815.04	0.00	104	50
PRV-3	2,700	12	50	Throttling	33	2,932.65	2,815.04	117.61	101	50
PRV-5	2,700	12	50	Throttling	27	2,932.66	2,815.04	117.61	101	50
PRV-6	2,700	12	50	Throttling	34	2,932.61	2,815.04	117.57	101	50
PRV-7	2,582	12	101	Throttling	0	2,965.00	2,815.08	149.92	166	101
PRV-8	2,670	12	63	Closed	0	2,965.00	2,815.08	0.00	128	63
PRV-9	2,700	12	50	Throttling	19	2,941.55	2,815.04	126.51	105	50
PRV-10	2,700	12	50	Throttling	5	2,941.48	2,815.04	126.44	104	50
PRV-11	2,700	12	50	Throttling	11	2,940.67	2,815.04	125.63	104	50

Scenario: Max Day + Fire Flow at J-200 (Source: Site 143 Only)
Steady State Analysis
Valve Report

Label	Elevation (ft)	Diameter (in)	Calculated Pressure Setting (psi)	Control Status	Discharge (gpm)	From HGL (ft)	To HGL (ft)	Headloss (ft)	From Pressure (psi)	To Pressure (psi)
GPV-1	2,719	12		Active	-0	2,889.22	2,882.72	6.50	74	71
PRV-1	2,700	6	50	Throttling	5	2,890.33	2,815.04	75.29	82	50
PRV-2	2,700	12	50	Throttling	18	2,882.99	2,815.04	67.95	79	50
PRV-3	2,700	12	50	Throttling	33	2,873.66	2,815.04	58.61	75	50
PRV-5	2,700	12	50	Throttling	27	2,873.66	2,815.04	58.62	75	50
PRV-6	2,700	12	50	Throttling	17	2,873.66	2,815.04	58.62	75	50
PRV-7	2,582	12	101	Throttling	0	2,965.00	2,815.08	149.92	166	101
PRV-8	2,670	12	63	Closed	0	2,932.10	2,815.08	0.00	113	63
PRV-9	2,700	12	50	Throttling	19	2,899.53	2,815.04	84.49	86	50
PRV-10	2,700	12	50	Throttling	5	2,907.99	2,815.04	92.95	90	50
PRV-11	2,700	12	50	Throttling	11	2,886.96	2,815.04	71.92	81	50

APPENDIX B

Detailed Opinion of Probable Costs
Without the Benefit of Approved Plans and Specifications

SITE 145 BOOSTER PUMP STATION

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS WITHOUT THE BENEFIT OF APPROVED PLANS AND SPECIFICATIONS

DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
SURVEYING / STAKING / AS-BUILTS				
MOB/DEMOBILIZATION, BONDS, INSURANCE, PERMITS AND CLEANUP			Not Included	
CONSTRUCTION SURVEYING AND STAKING				
Surveying and Staking	HR	8	$ 120	$ 960
SUBTOTAL				**$ 960**
CONSTRUCTION AS-BUILTS				
Drawings	JOB	1.0	$ 5,000	$ 5,000
SUBTOTAL				**$ 5,000**
TOTAL, SURVEYING / STAKING / AS-BUILTS				**$ 5,960**
SITE WORK				
SITE WORK, PAVING AND DRAINAGE				
Site Work				
Clearing and Grubbing	AC	0.2	$ 1,500	$ 344
Site Grading	SY	1,111	$ 2	$ 2,222
Decomposed Granite (2" thk)	SY	667	$ 3	$ 2,000
AC Driveway (2-1/2"AC, 6"ABC)	SY	44	$ 60	$ 2,667
Overflow Drains				
Splash Pad	EA	1	$ 100	$ 100
Riprap Protection (18" thk)	CY	44	$ 70	$ 3,111
Perimeter Wall				
Perimeter Wall/Stucco/Paint (8' high)	LF	400	$ 40	$ 16,000
Retaining Wall	SF	1,100	$ 20	$ 22,000
Sliding Gate	EA	1	$ 5,000	$ 5,000
Hinged Doors	EA	1	$ 750	$ 750
SUBTOTAL				**$ 54,194**

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS WITHOUT THE BENEFIT OF APPROVED PLANS AND SPECIFICATIONS

DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
YARD PIPING				
12" D.I.P. & Fittings	LF	65	$ 225	$ 14,625
Flow Meter and Vault	EA	1	$ 15,000	$ 15,000
Altitude Valve and Vault	EA	1	$ 9,500	$ 9,500
Miscellaneous Fittings, Valving and Appurtenances	JOB	1	$ 8,500	$ 8,500
Chlorine Analyzer Drain Pipe	LF	30	$ 70	$ 2,100
Process Piping	JOB	1	$ 2,500	$ 2,500
Testing and Disinfection	EA	1	$ 2,500	$ 2,500
SUBTOTAL				**$ 54,725**
TOTAL, SITE WORK				**$ 108,919**
STORAGE TANK				
Tanks & Appurtenances				
12,000 Precast Concrete Receiving Tank	EA	1	$ 45,000	$ 45,000
Testing and Disinfection	EA	1	$ 1,500	$ 1,500
SUBTOTAL				**$ 46,500**
TOTAL, STORAGE TANK				**$ 46,500**
PUMP STATION				
Booster Pump Station				
Vertical Turbine Pumps and Motors w/ VFD (175 gpm, 15 HP)	EA	1	$ 9,500	$ 9,500
Vertical Turbine Pumps and Motors w/ VFD (500 gpm, 40 HP)	EA	2	$ 60,000	$ 120,000
Vertical Turbine Pumps and Motors w/ VFD (1,750 gpm, 150 HP)	EA	1	$ 75,000	$ 75,000
Pump Cans	EA	5	$ 2,500	$ 12,500
Pressure Relief Valve and Appurtenances	EA	1	$ 3,000	$ 3,000
Hydro Tank	EA	1	$ 8,500	$ 8,500
Paint and Coatings	EA	1	$ 1,000	$ 1,000
Discharge Header and Appurtenances				
12-inch Steel Pipe	LF	60	$ 55	$ 3,300
12-inch Steel 90-Deg Bends	EA	4	$ 500	$ 2,000
12-inch Steel Tees	EA	7	$ 650	$ 4,550
12-inch Butterfly Valves	EA	8	$ 1,000	$ 8,000
Appurtenances	EA	1	$ 10,000	$ 10,000
Paint and Coatings	EA	1	$ 1,000	$ 1,000
Testing and Disinfection	EA	1	$ 5,000	$ 5,000
SUBTOTAL				**$ 263,350**
TOTAL, PUMP STATION				**$ 263,350**

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS WITHOUT THE BENEFIT OF APPROVED PLANS AND SPECIFICATIONS

DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
BUILDINGS				
Chlorine Bldg w/ HVAC	SF	240	$ 110	$ 26,400
Pump Room w/ HVAC	SF	1,000	$ 110	$ 110,000
Electrical Room w/ HVAC	SF	400	$ 110	$ 44,000
				$ 180,400
TOTAL, BUILDINGS				**$ 180,400**
CHLORINE DISINFECTION SYSTEM				
Chlorination Equipment				
Chlorine Equipment	EA	1	$ 45,000	$ 45,000
Chlorine Equipment Installation	EA	1	$ 12,000	$ 12,000
Piping, Valves and Appurtenances	EA	1	$ 2,500	$ 2,500
Containment Equipment				
ChlorTainer Dual 150-LB Containment System w/ Loader	EA	1	$ 81,000	$ 81,000
Electronic Scale Upgrade	EA	1	$ 1,600	$ 1,600
Spare Parts Kit	EA	1	$ 2,000	$ 2,000
On-Site Consultation (Start-up & Training)	EA	1	$ 3,750	$ 3,750
Optional On-Site Consultation (Installation)	EA	1	$ 2,500	$ 2,500
1-Year Warranty/Service Contract	EA	1	$ 2,500	$ 2,500
Freight	EA	1	$ 900	$ 900
Installation	EA	1	$ 17,000	$ 17,000
Piping and Appurtenaces				$ -
Catch Basin	EA	1	$ 300	$ 300
TOTAL, CHLORINE DISINFECTION SYSTEM				**$ 171,050**

PRELIMINARY OPINION OF PROBABLE CONSTRUCTION COSTS WITHOUT THE BENEFIT OF APPROVED PLANS AND SPECIFICATIONS

DESCRIPTION	UNIT	QTY	UNIT COST	TOTAL
ELECTRICAL, CONTROLS & INSTRUMENTATION				
Electrical				
Service Entrance Section, 800A, 480V, 3Phase, 4Wire	EA	1	$ 8,937	$ 8,937
Distribution Panel, 800A, 277/480V, with Circuit Breakers	EA	1	$ 16,360	$ 16,360
Power Quality Meter	EA	1	$ 2,530	$ 2,530
TVSS, Service rated, 480/277V, 3Phase, 4Wire	EA	1	$ 3,200	$ 3,200
Lighting Panel and Transformer	EA	1	$ 4,750	$ 4,750
Stand-By Generation System, 350KW, 277/480V, 3Phase, including ATS	EA	1	$ 45,000	$ 45,000
Variable Frequency Drive, 150HP, 480V, with Filter	EA	1	$ 28,500	$ 28,500
Variable Frequency Drive, 40HP, 480V, with Filter	EA	3	$ 16,000	$ 48,000
Control Panels	EA	6	$ 4,500	$ 27,000
Disconnect Switches , 30A, 600V, 3Phase	EA	4	$ 250	$ 1,000
Conduit	LF	12,500	$ 5	$ 62,500
Wire and Cable	LF	53,000	$ 0.75	$ 39,750
Grounding with Ground Rods and Connectors	EA	16	$ 275	$ 4,400
General Lighting	EA	30	$ 250	$ 7,500
Instrumentation				$ -
Level Transmitter	EA	1	$ 1,850	$ 1,850
Flowmeter, Magnetic	EA	1	$ 8,080	$ 8,080
Pressure Transmitter	EA	1	$ 1,180	$ 1,180
Chlorine Analyzer	EA	1	$ 4,000	$ 4,000
Level/Pressure/Temperature/Intrusion Switches	EA	25	$ 250	$ 6,250
Remote Telemetry Unit with Antenna, Radio	EA	1	$ 43,000	$ 43,000
TOTAL, ELECTRICAL, CONTROLS & INSTRUMENTATION				**$ 363,787**
TOTALS				
SUBTOTAL				**$ 1,139,966**
CONTINGENCIES		10%		**$ 113,997**
TOTAL				**$ 1,253,963**

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APPENDIX C

Selected Equipment

Vertical Turbine Pumps
Chlorinator
Chlorine Containment System
Hydropneumatic Surge Tank
Flow Meter

PUMP DATA SHEET FAIRBANKS MORSE, 60 Hz

Company: Wood/Patel
Name:
Date: 12/13/05

Site 145 BPS - Pump No. 1

Fairbanks Morse
Pentair Water

Pump:

Size: 7A.3+ (13 stages)
Type: VERT.TURBINE
Synch speed: 1800 rpm
Speed: 1750 rpm
Dia: 5.4375 in
Curve: 18-043
Impeller:
Specific Speeds:
Ns: ---
Nss: ---
Dimensions:
Suction: 6 in
Discharge: 6 in
Vertical Turbine:
Bowl size: 7.5 in
Max lateral: 0.25 in
Thrust K factor: 3.7 lb/ft

Pump Limits:

Temperature: 150 °F
Pressure: 400 psi g
Sphere size: 0.44 in
Power: 65 hp
Eye area: --- in²

Search Criteria:

Flow: 175 US gpm
Head: 245 ft

Fluid:

Water
SG: 1
Viscosity: 1.105 cP
Temperature: 60 °F
Vapor pressure: 0.2563 psi a
Atm pressure: 14.7 psi a
NPSHa: --- ft

Motor:

Standard: NEMA
Enclosure: TEFC
Size: 15 hp
Speed: 1800
Frame: 254T
Sizing criteria: Max Power on Design Curve

Data Point

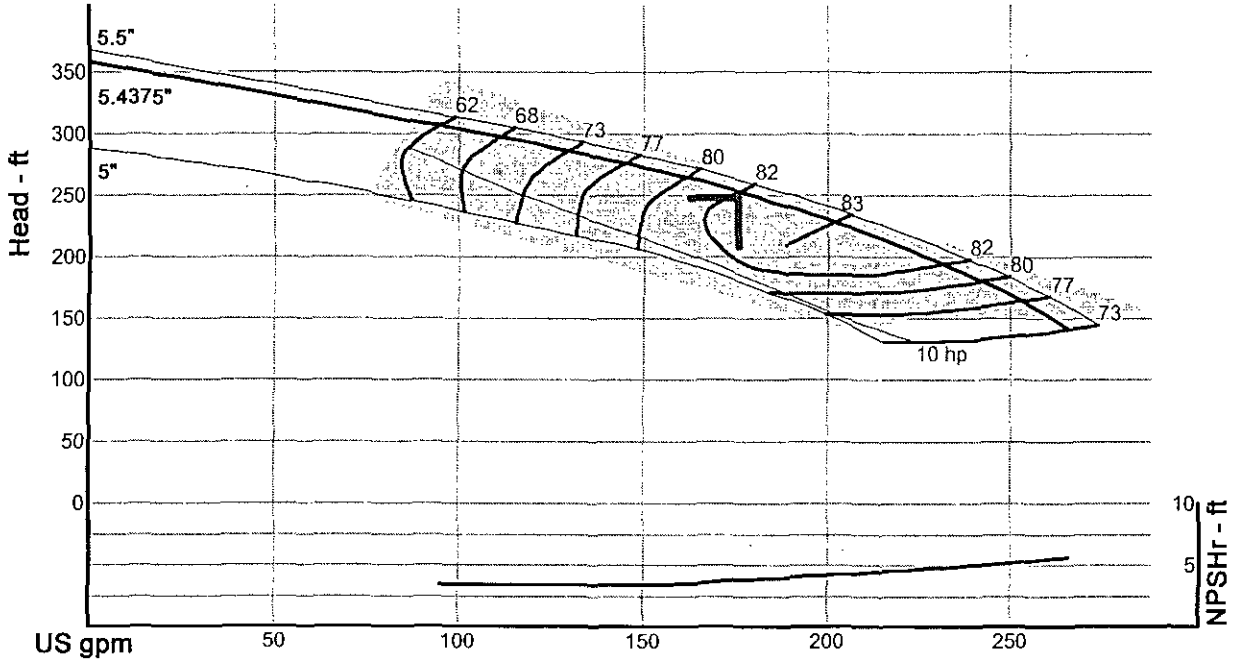
Flow: 175 US gpm
Head: 251 ft
Eff: 82%
Power: 13.5 hp
NPSHr: 3.81 ft

Design Curve

Shutoff Head: 356 ft
Shutoff dP: 154 psi
Min Flow: --- US gpm
BEP: 83% eff
@ 201 US gpm
NOL Pwr: 13.8 hp
@ 201 US gpm

Max Curve

Max Pwr: 14.5 hp
@ 206 US gpm



Performance Evaluation:

Flow *US gpm*	Speed *rpm*	Head *ft*	Pump *%eff*	Power *hp*	NPSHr *ft*
210	1750	216	82.7	13.8	4.43
175	1750	251	82	13.5	3.81
140	1750	277	75.8	12.9	3.39
105	*1750*	*298*	*65.8*	*12*	*3.39*
70	1750	---	---	---	---

PUMP DATA SHEET FAIRBANKS MORSE, 60 Hz

Company: Wood/Patel
Name:
Date: 12/13/05

Site 145 BPS - Pump Nos. 2 & 3

Fairbanks Morse
Pentair Water

Pump:

Size: 10B.4+ (6 stages)

Type: VERT.TURBINE
Synch speed: 1800 rpm

Speed: 1760 rpm
Dia: 7.5625 in

Curve: 18-071

Impeller:

Specific Speeds:

Ns: ---
Nss: ---

Dimensions:

Suction: 6 in
Discharge: 6 in

Vertical Turbine:

Bowl size: 9.63 in
Max lateral: 0.56 in
Thrust K factor: 4 lb/ft

Pump Limits:

Temperature: 150 °F
Pressure: 700 psi g
Sphere size: 0.625 in

Power: 283 hp
Eye area: --- in²

Search Criteria:

Flow: 500 US gpm
Head: 245 ft

Fluid:

Water
SG: 1
Viscosity: 1.105 cP

Temperature: 60 °F
Vapor pressure: 0.2563 psi a
Atm pressure: 14.7 psi a

NPSHa: --- ft

Motor:

Standard: NEMA
Enclosure: TEFC

Size: 40 hp
Speed: 1800
Frame: 324T

Sizing criteria: Max Power on Design Curve

Data Point

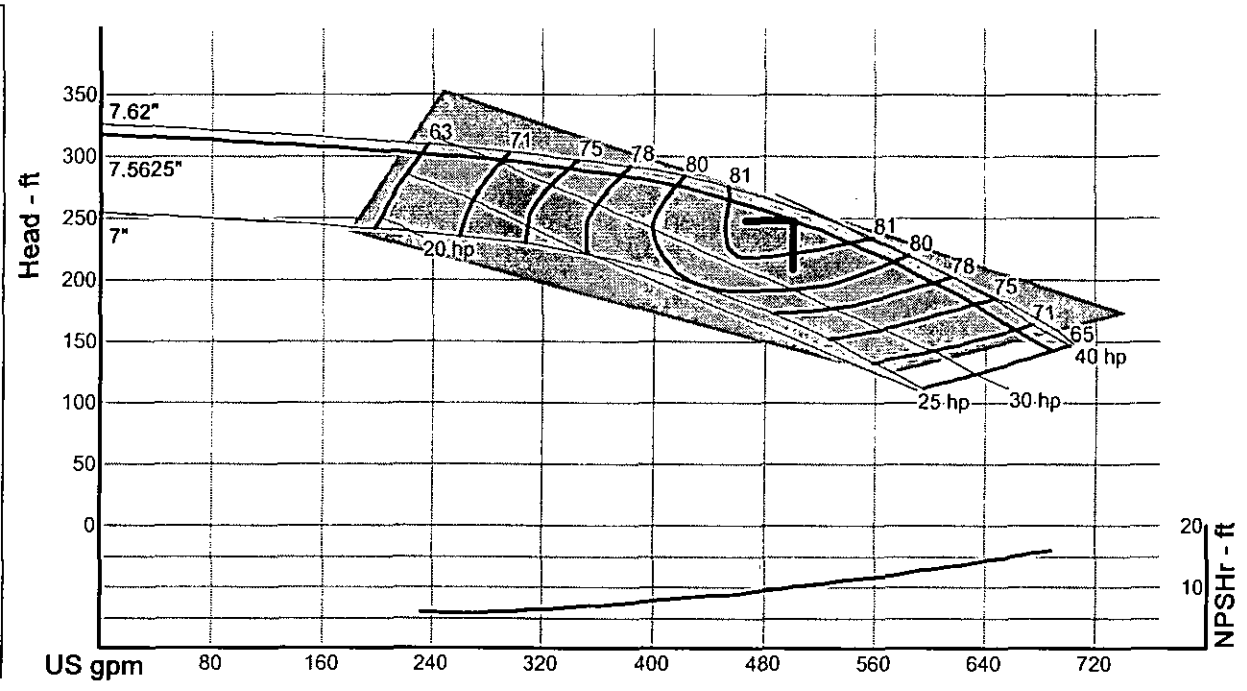
Flow: 500 US gpm
Head: 246 ft
Eff: 81.8%
Power: 37.9 hp
NPSHr: 10.1 ft

Design Curve

Shutoff Head: 315 ft
Shutoff dP: 136 psi
Min Flow: --- US gpm
BEP: 81.8% eff
@ 498 US gpm
NOL Pwr: 38.4 hp
@ 541 US gpm

Max Curve

Max Pwr: 40.2 hp
@ 558 US gpm



Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Pump %eff	Power hp	NPSHr ft
600	1760	197	78.1	38.1	13
500	1760	246	81.8	37.9	10.1
400	1760	277	79.2	35.3	7.87
300	1760	293	71.8	30.8	6.17
200	1760	301	58.6	26.4	6

PUMP DATA SHEET FAIRBANKS MORSE, 60 Hz

Company: Wood/Patel
Name:
Date: 12/13/05

Site 145 BPS - Pump No. 5 (Fire Pump)

Fairbanks Morse
Pentair Water

Pump:

Size: 13H.4+ (4 stages)

Type: VERT.TURBINE
Synch speed: 1800 rpm

Speed: 1770 rpm
Dia: 8 in

Curve:

Impeller:

Specific Speeds:

Ns: ---
Nss: ---

Dimensions:

Suction: 13 in
Discharge: 10 in

Vertical Turbine:

Bowl size: 12.9 in
Max lateral: 0.8 in
Thrust K factor: 12.02 lb/ft

Pump Limits:

Temperature: 150 °F
Pressure: 380 psi g
Sphere size: 1 in

Power: 344 hp
Eye area: --- in²

Search Criteria:

Flow: 1750 US gpm

Head: 245 ft

Fluid:

Water
SG: 1
Viscosity: 1.105 cP

Temperature: 60 °F
Vapor pressure: 0.2563 psi a
Atm pressure: 14.7 psi a

NPSHa: --- ft

Motor:

Standard: NEMA
Enclosure: TEFC

Size: 150 hp
Speed: 1800
Frame: 445T

Sizing criteria: Max Power on Design Curve

Data Point

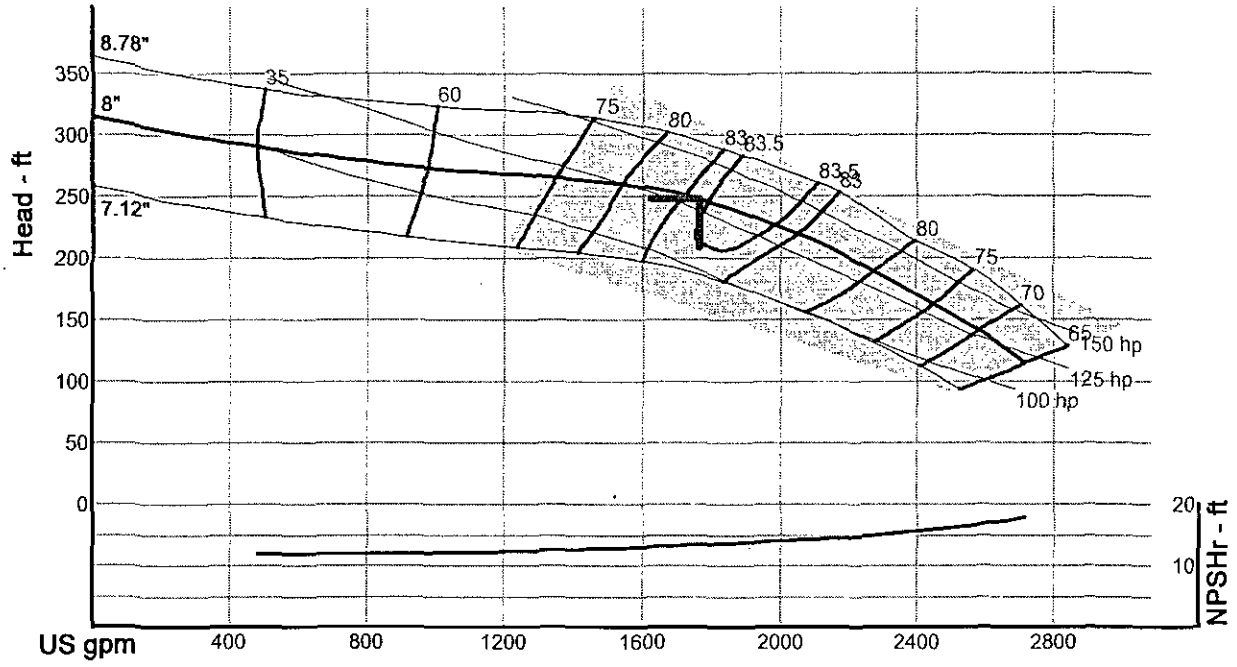
Flow: 1750 US gpm
Head: 245 ft
Eff: 83.3%
Power: 130 hp
NPSHr: 13.4 ft

Design Curve

Shutoff Head: 312 ft
Shutoff dP: 135 psi
Min Flow: --- US gpm
BEP: 83.8% eff
@ 1883 US gpm
NOL Pwr: 134 hp
@ 2038 US gpm

Max Curve

Max Pwr: 164 hp
@ 2158 US gpm



Performance Evaluation:

Flow US gpm	Speed rpm	Head ft	Pump %eff	Power hp	NPSHr ft
2100	1770	209	82.2	134	14.4
1750	1770	245	83.3	130	13.4
1400	1770	261	76.4	120	12.6
1050	1770	269	63	112	12.1
700	1770	280	46.1	104	12

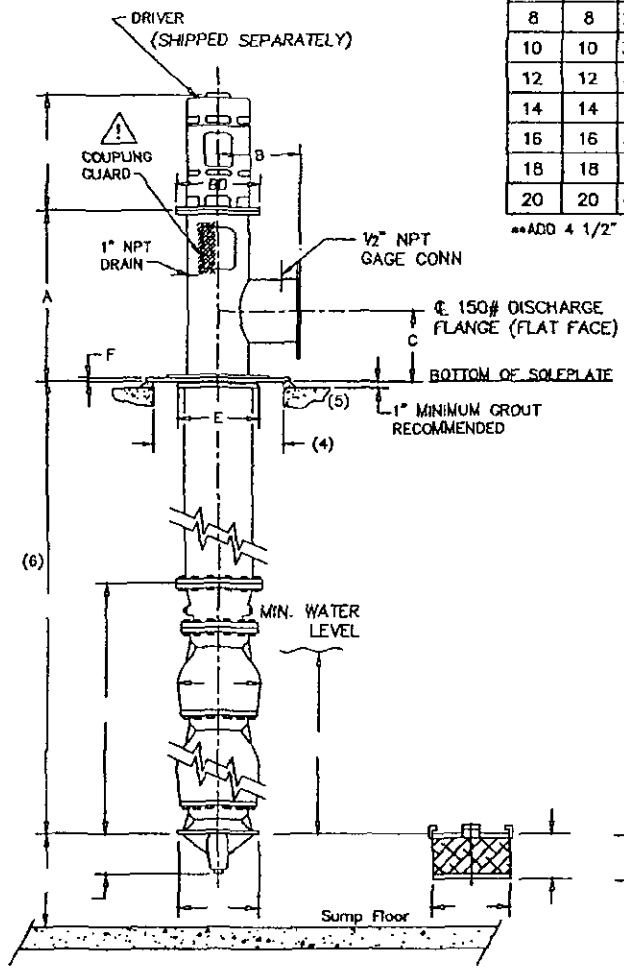
⚠ WARNING

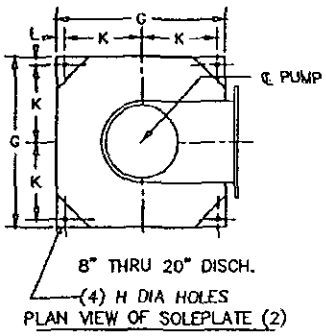
DO NOT OPERATE THIS MACHINE WITHOUT PROTECTIVE GUARD IN PLACE. ANY OPERATION OF THIS MACHINE WITHOUT PROTECTIVE GUARD CAN RESULT IN SEVERE BODILY INJURY.

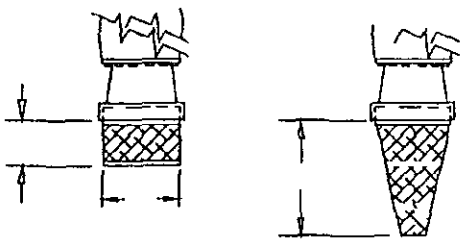
DISCHARGE HEAD DIMENSIONS

DISCH SIZE	COL SIZE	A** MTR BASE DIA (BD) 12	16½	20	24½	B	C	E	F	F1	G	H	K	L
4	4	24¼	—	—	—	14½	7½	6⅝	1	1	27	⅞	11½	2
6	6	26⅜	26⅜	—	—	14½	8½	9	1	1	27	⅞	11½	2
8	8	28⅝	28⅝	28⅝	—	16½	9¾	11½	1	1	31	⅞	13½	2
10	10	30⅞	30⅞	30⅞	—	16½	11	13¾	1	1	31	⅞	13½	2
12	12	33⅛	33⅛	33⅛	—	16½	12½	16¼	1	1	31	⅞	13½	2
14	14	36	36	36	38¾	18	14½	17½	1½	1½	34	1	15	2
16	16	38¼	38¼	38¼	41	19	15¾	19½	1½	1½	36	1	16	2
18	18	40	40	40	42¾	20	16½	22	1½	1½	38	1	17	2
20	20	42¼	42¼	42¼	45	23	17¾	23¾	1½	1½	44	1	20	2

**ADD 4 1/2" FOR VSS DRIVER AND SPACER COUPLING







1. THIS DRAWING NOT FOR CONSTRUCTION OR INSTALLATION UNLESS CERTIFIED. DIMENSIONS SHOWN ARE TYPICAL AND MAY VARY DUE TO VARIOUS TOLERANCES.
2. SOLEPLATE MUST BE SUPPORTED ON ALL 4 SIDES AND GROUTED IN PLACE.
3. MINIMUM SUBMERGENCE REQUIRED AT MAXIMUM FLOW.
4. MINIMUM DIAMETER REQUIRED TO REMOVE BOWL ASSEMBLY
5. DETAIL SHOWN FOR ILLUSTRATION ONLY AND IS NOT INTENDED TO REPRESENT THE ACTUAL INSTALLATION.
6. CUSTOMER TO VERIFY OR ADVISE OVERALL LENGTH PRIOR TO OR AT RELEASE.

CUSTOMER					P.O.	
JOB NAME				SERVICE		
PUMP SIZE & MODEL	STAGES	GPM	TDH	RPM	ROT CCW	
MOTOR	HP	FRAME	PHASE	HERTZ	VOLTS	ENCL
CERTIFIED FOR		CERTIFIED BY			DATE	

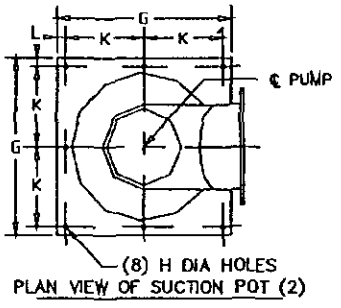
Fairbanks Morse
Pentair Water

SETTING PLAN
MODEL 7000/7100 PUMP
TYPE "LS" SURFACE HEAD
WITH SOLEPLATE

DWG. NO. 7000FS016 REV

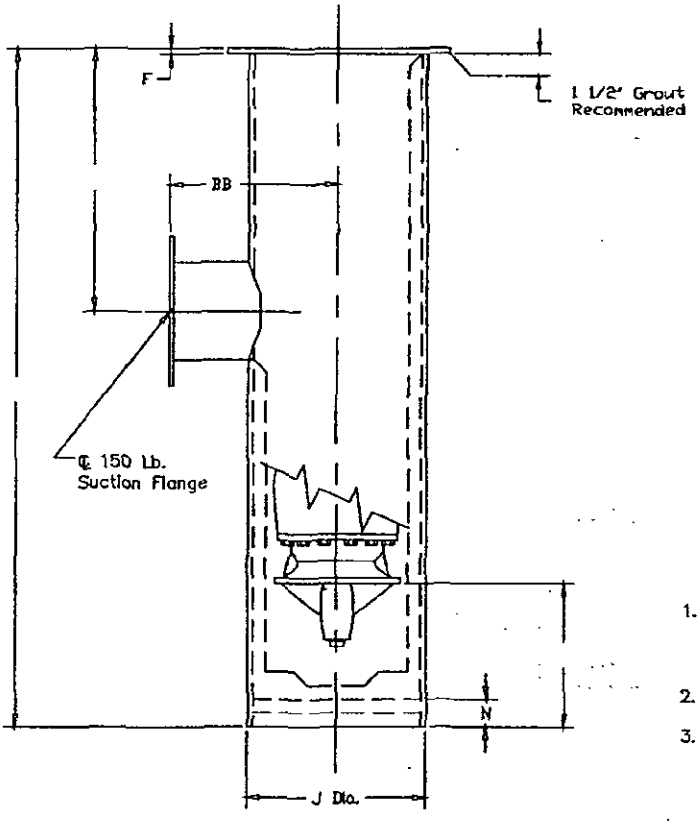
⚠ WARNING

DO NOT OPERATE THIS MACHINE WITHOUT PROTECTIVE GUARD IN PLACE. ANY OPERATION OF THIS MACHINE WITHOUT PROTECTIVE GUARD CAN RESULT IN SEVERE BODILY INJURY.



PLAN VIEW OF SUCTION POT (2)

Suction Pot Dimensions								
"J" Pot Size	Suct.	BB	F	G	H	K	L	N
36	20	24	1 3/4	49	1 1/8	21 1/2	3	2 3/8
36	24	24	1 3/4	49	1 1/8	21 1/2	3	2 3/8
36	30	24	1 3/4	49	1 1/8	21 1/2	3	2 3/8
42	30	28	1 3/4	56	1 1/8	25	3	2 3/8
42	36	28	1 3/4	56	1 1/8	25	3	2 3/8
48	36	32	2	63	1 1/4	28 1/2	3	2 5/8
48	42	32	2	63	1 1/4	28 1/2	3	2 5/8
54	42	35	2 1/2	70	1 1/4	32	3	2 5/8
54	48	35	2 1/2	70	1 1/4	32	3	2 5/8
60	48	40	2 1/2	77	1 1/4	36	2 1/2	2 7/8
60	54	40	2 1/2	77	1 1/4	36	2 1/2	2 7/8
72	54	46	2 1/2	91	1 1/2	42	3 1/2	2 7/8
72	60	46	2 1/2	91	1 1/2	42	3 1/2	2 7/8



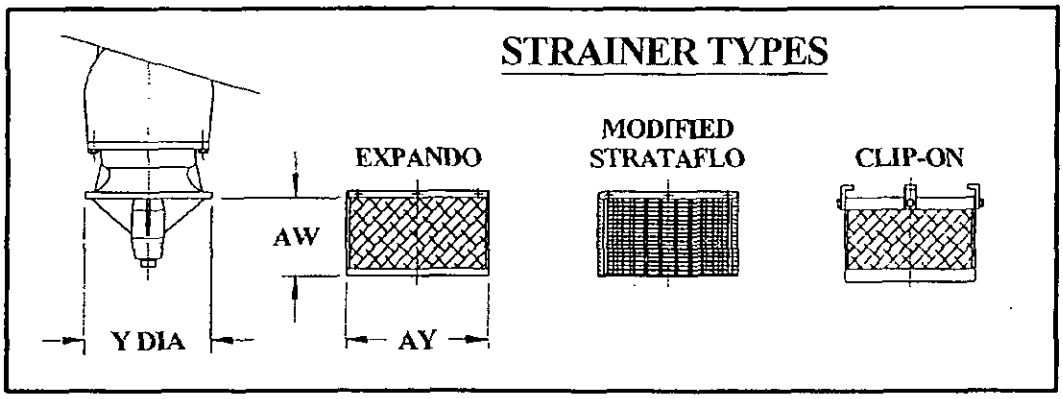
150# SUCTION FLG. DIM.					
NOM. SIZE	FLG. DIA.	FLG. THK.	NO. BOLTS	HOLE SIZE	B.C. DIA
20	27 1/2	1 3/4	20	1 1/4	25
24	32	1 7/8	20	1 3/8	29 1/2
30	38 3/4	2 1/8	28	1 3/8	36
36	46	2 3/8	32	1 5/8	42 3/4
42	53	2 5/8	36	1 5/8	49 1/2
48	59 1/2	2 3/4	44	1 5/8	56
54	66 1/4	3	44	1 7/8	62 3/4
60	73	3 1/8	52	1 7/8	69 1/4
72	86 1/2	3 1/2	60	1 7/8	82 1/2

1. THIS DRAWING NOT FOR CONSTRUCTION OR INSTALLATION UNLESS CERTIFIED. DIMENSIONS SHOWN ARE TYPICAL AND MAY VARY DUE TO VARIOUS TOLERANCES.
2. SUCTION POT MUST BE SUPPORTED ON ALL 4 SIDES AND GROUTED IN PLACE.
3. CUSTOMER TO VERIFY OR ADVISE OVERALL LENGTH PRIOR TO OR AT RELEASE.

Fairbanks Morse
Pentair Water

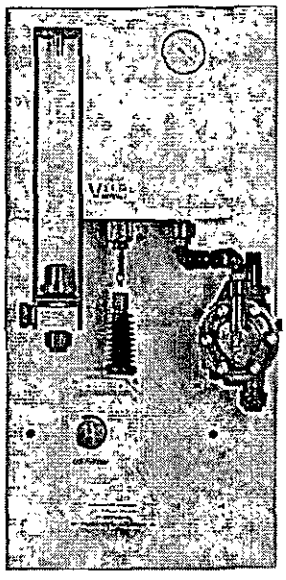
CUSTOMER	P.O.	SETTING PLAN TYPE "L" SUCTION CAN DIMENSIONS
JOB NAME	SERVICE	
CERTIFIED FOR	CERTIFIED BY / DATE	DWG. NO. 7000CS008 / REV

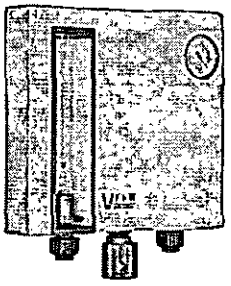
BASKET STRAINERS NON-THREADED



BOWL DIMS.		STRAINER TYPE			STRAINER DIMENSIONS		QTY. OF FASTENERS		
BOWL DESIGN	BELL DIA 'Y'	EXPANDO	MODIFIED STRATFLO	CLIP-ON	AY	AW	EXP.	MOD.	CLIP.
6A,B	5.50	X	X	–	6.50	4.00	4	4	–
6D,F	5.50	X	X	–	6.50	4.00	4	4	–
6G,J	5.50	X	X	–	6.50	4.00	4	4	–
7A,B,D	7.50	X	X	–	8.50	5.00	4	4	–
8B	7.50	X	X	–	8.50	5.00	4	4	–
8P,T,V	9.50	X	X	–	10.50	5.00	4	4	–
8M	8.00	–	–	X	8.00	7.00	–	–	4
8U,W	7.50	X	X	–	8.50	5.00	4	4	–
10A,B,D,E	9.50	X	X	–	10.50	5.00	4	4	–
10M	10.00	–	–	X	10.00	6.00	–	–	4
10G,J	9.50	X	X	–	10.50	5.00	4	4	–
10K,N	11.50	X	X	–	12.50	6.00	4	4	–
11M	11.38	–	–	X	11.50	8.00	–	–	4
11H	11.38	–	–	X	11.50	8.00	–	–	4
12A,B,D,F	11.50	X	X	–	12.50	6.00	4	4	–
12K,S	11.50	X	X	–	12.50	6.00	4	4	–
12M	13.00	–	–	X	13.00	7.00	–	–	4
12E,G,I	13.00	X	X	–	14.13	7.00	4	6	–
12N,U,W	13.00	X	X	–	14.13	7.00	4	6	–
12V	11.50	X	X	–	12.50	6.00	4	4	–
13E,F	11.50	X	X	–	12.50	6.00	4	4	–
13H	13.00	–	–	X	13.00	11.00	–	–	4
14C,D,F	17.00	X	X	–	18.25	9.00	4	6	–
14M	14.75	–	–	X	14.75	13.00	–	–	4
14I,J	17.00	X	X	–	18.25	9.00	4	6	–
15H	14.75	–	–	X	14.75	13.00	–	–	4
16E	17.25	X	X	–	18.25	9.00	4	6	–
17H	16.75	–	–	X	16.75	9.00	–	–	4
17M	18.00	–	–	X	18.00	9.00	–	–	4
18E,H	17.25	X	X	–	18.25	9.00	4	6	–
19A,B	17.25	X	X	–	18.25	9.00	4	6	–
19A-1,B-1	22.50	X	X	–	23.50	12.00	8	8	–
20HL	21.50	–	–	X	20.75	8.00	–	–	6
21H	20.75	–	–	X	20.75	8.00	–	–	6
22A,B	22.50	X	X	–	23.50	12.00	8	8	–
23HL,M,H	–	*REFER TO FACTORY*			–	–	–	–	–
24E	22.50	X	X	–	23.50	12.00	8	8	–
27M	28.11	–	–	X	28.00	9.00	–	–	6
30D,E	27.00	–	X	–	28.00	15.00	–	–	–
31M	31.30	–	–	X	31.00	11.00	–	–	10
33HH	–	*REFER TO FACTORY*			–	–	–	–	–
34H	32.00	–	–	X	31.00	11.00	–	–	10
36F,G	40.00	–	X	–	41.00	20.00	–	8	–
38A,B	34.25	–	X	–	35.25	18.00	–	8	–
42A	40.00	–	X	–	41.00	20.00	–	8	–
44A,B	43.00	*REFER TO FACTORY*			44.00	22.00	–	–	–
57H	54.00	–	–	X	54.00	9.00	–	–	10

V10k
GAS FEED SYSTEM





The V10k is a remote vacuum solution feeder for use with four of the most commonly used gases for the disinfection and treatment of municipal and industrial water and wastewater. This unit has been built to continue the long standing proven design and features of its predecessor and adds more. The versatility of wall mounting, front access of all components and maximum capacity of 500PPD (chlorine) have all been enhanced by this new design.

The V10k gas feed system consists of a vacuum regulator mounted at the gas supply, a wall-mounted gas control unit with a rotameter for indication of feed rate and a water-operated injector that provides the vacuum source to drive the entire system. Using automatic switchover regulators, the V10k provides an uninterrupted supply of gas to maintain continuous disinfection/ treatment.

USFilter

V10k
GAS FEED SYSTEM

 Municipal or Industrial Water Treatment	• Disinfection of potable water • Treatment of cooling water to inhibit biological growth and for algae control in irrigation systems
 Municipal or Industrial Waste Treatment	• Disinfection of municipal sewage effluent
 Chemical Processing	• Treatment of industrial wastes from: ▪ metal finishing ▪ pulp and paper operations ▪ chemical plants ▪ food processing plant discharges
 Industrial Process Water	• Taste and odor control in bottling plants and breweries • Tempering water treatment and bleaching in flour mills • High purity water in: ▪ electronics ▪ pharmaceuticals ▪ cosmetic industries
 Recreational Pools	• Swimming pool disinfection • CO_2 feed for pH control

FEATURES

- Versatility – a wall-mounted gas feeder available in a configuration to meet your water treatment requirements.
- Proven V-Notch Flow Control Technology – for accuracy and repeatability.
- Premium Construction – features a one-piece molded headblock for reliability and endurance.
- Large 5" and 10" Rotameters – available in 13 capacities up to 500PPD Cl2 for the highest degree of readability.
- Serviceability – components easily accessible for servicing without tools.
- Flexible Control Modes – manual to fully automatic control schemes.
- Differential-Type Regulation – allows for lower vacuum levels and efficient, economical injector operation.
- Handles All Water Treatment Gases – Chlorine, Ammonia, Sulfur Dioxide and Carbon Dioxide.

APPLICATIONS

- Municipal & Industrial Water & Wastewater treatment
- Treatment of industrial waste from chemical processing
- Industrial Process Water
- Recreational Pools

V10k
GAS FEED SYSTEM

CONTROL METHODS

Feed rate of any V10k Chlorinator is controlled by either one or both of these methods: interrupting the injector-water supply to shut off the chlorinator's operating vacuum; changing v-notch-orifice area (by positioning the v-grooved plug in its ring) while holding vacuum differential across the orifice constant.

Manual Control

Manual control by changing orifice area (v-notch-plug position) via an adjustment knob on the chlorinator.

Start-Stop or Program Control

This type of control is achieved with simple implementation. A V10k Chlorinator's operating vacuum is started and stopped by interrupting the injector water supply. A solenoid valve or motorized valve is wired into the control circuit of a pump, switch, controller, or timer. Similar to this, a special vacuum line solenoid valve can be used in the gas line to the injector.

Automatic Control

The V10k can be provided with automatic feed rate control ranging from simple to complex control schemes. The control system can consist of a simple direct mA control V-notch actuator or a more sophisticated control including and actuator and a controller (choice of either an SCU (Signal Conditioning Unit) or a PCU (Process Controller Unit). Either controller can be remote mounted or on the panel with the V10k.

Direct 4-20 mA input control (see TI 40.050UA)

- Direct 4-20mA input signal from an external control device.
- Compact itegral design
- Internal dosage capability

SCU (see TI 40.100UA)

- Operating Modes: flow proportional, manual
- Inputs: 4-20 MA DC (from flow transmitter)
- Outputs: Control out to actuator; also 4-20 mA output for retransmission of gas feed rate (actuator position)
- Control Capability: Dosage and flow scaling

PCU (see TI 40.200UA)

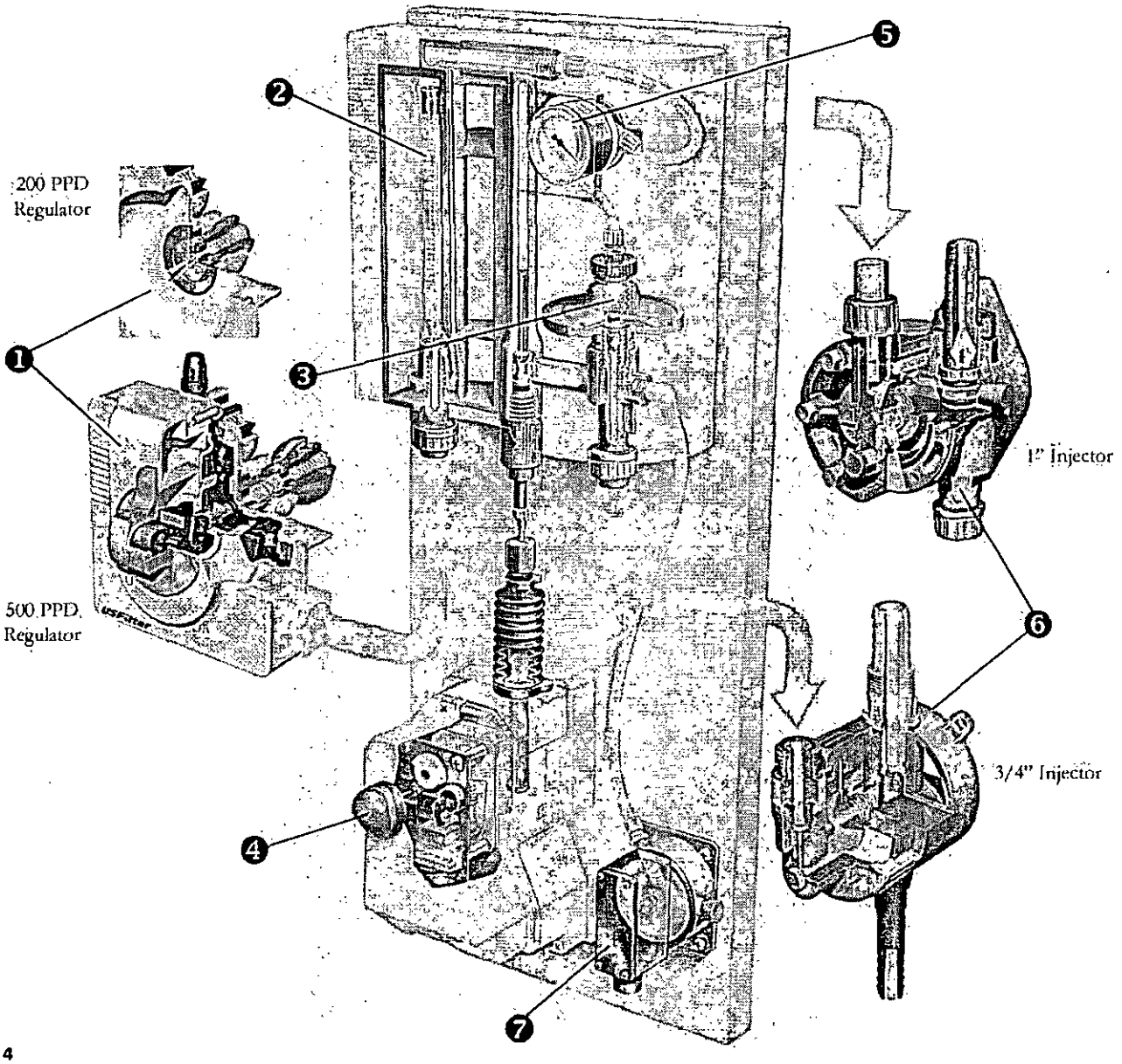
- Operating Modes: Direct residual feed back, compound loop, feed forward, flow proportional, manual
- Ranges: Setpoints up to 50 mg/L and center-zero capability for dechlorination
- Inputs: Up to 3 analog (flow, residual, spare); 2 digital
- Outputs: Control out to actuator; plus user-configurable 4-20 mA; RS-485 serial communications
- Control Logic: Proportional and integral with lag
- Alarms: Four user-configurable for 16 different conditions

V10k
GAS FEED SYSTEM

OPERATION

The V10k gas feed system operates under a vacuum that is produced at the injector and transmitted through the control unit to the vacuum regulating valve located at the gas supply. Gas enters the vacuum regulating valve and moves toward the flow control components under a vacuum.

Gas next passes through the rotameter, where its flow rate is measured and the V-Notch orifice, where feed rate is controlled manually or by an automatic positioner. At the injector, the metered gas is dissolved in the water stream. The resultant solution is discharged to the point of application.



V10k
GAS FEED SYSTEM

❶ Vacuum Regulators

Vacuum regulating valves, mounted on the gas supply containers, immediately reduce the pressurized gas to a vacuum. Two capacity regulators are available for both standard and switchover applications: 200PPD and 500PPD.

These regulators feature:

- Positive Indication of Operating Status – A unique lever mechanism and front panel knob provide the operator with a quick indication of 3 or 4 operation modes (operating, low gas supply, off, and standby for automatic switchover arrangements). An additional built-in red indicator becomes visible in the low/out-of-gas situation and an optional contact is available for remote indication.
- Secondary Pressure Check – The 500PPD regulator has a unique, built-in additional check valve, designed to confine gas under pressure should dirt build up on the primary valve seat.
- Local or Remote Vent Valve – The pressure relief vent is built into the regulator housing to keep all vent lines in the gas supply room.

❷ Rotameter

Large scale, 5" and 10" rotameter tubes provide clear and accurate indication of feed rate, with 13 capacities available in each size.

❸ Differential Regulating Valve

Maintains the proper vacuum differential across the V-Notch orifice for consistent feed rate, regardless of changes in operating vacuum.

❹ Automatic Positioner

For automatic control, this positioner moves the V-Notch plug up to 3" (compared to a fraction of an inch for competitive systems) in precise response to the application requirements. Features include:

- NEMA 4X enclosure
- Manual override is achieved by simply pulling the knob to disengage the drive motor.
- Three sets of customer contacts for system interface: Manual Override, MAX position and MIN position.
- Internal feedback potentiometer for precise operation with the SCU or PCU controllers.

❺ Vacuum Gauge

Provides indication of operating vacuum level. A direct acting diaphragm mechanism eliminates liquid-filled chambers.

❻ Injectors

Fixed throat, differential-type injectors create a powerful operating vacuum to drive the V10k system. Two capacity injectors are available: 3/4" for capacities up to 200PPD and 1" up to 500PPD.

These injectors feature:

- Built-in Double Check Valves for superior protection against backflooding. A spring-loaded diaphragm with a spherical seat for positive sealing and a spring-loaded poppet check work together to maintain system integrity.
- Flexible Mounting Orientation for convenient installation. The gas inlet connection can be rotated to provide pipe entry at selected angles. The injector can also be mounted in horizontal or vertical planes. It features an integral-mounting bracket and can be disassembled for service without removal from the wall or disconnecting the inlet/outlet piping.
- Optional Anti-siphon Arrangement for swimming pools and negative backpressure applications. These injectors require a minimum inlet water pressure of 20 psi for operation.

❼ Vacuum Switch

A local or remote mounted vacuum switch provides an alarm in the event of a high or low vacuum condition signifying a loss of gas feed.

V10k
GAS FEED SYSTEM

TECHNICAL DATA

Accuracy

Gas feed is ±4% of the indicated flow.

Operating Range

Manual 20:1 for any rotameter; Automatic 10:1.

Rotameters

Choice of 5" or 10" scale length.

Operating Vacuum

10 to 50" water.

Operating Temperature Range

10° to 130°F (-12° to 55°C)

Mounting

Wall or panel mounted. Panel mounted arrangement can be configured with a panel mounted injector or a panel mounted controller (for automatic control version). An optional vacuum switch can also be mounted on the panel.

Control Modes

Manual control, start-stop or program, flow proportional, direct residual and compound-loop control.

Distance, Supply to Control Panel

For flexibility, it is not necessary to install the vacuum regulating valve close to the control panel. They can be a few feet to several hundred feet apart, depending on maximum feed rate, the diameter of the connecting pipe or tubing and system performance requirement.

Injectors

For capacities up to 200 PPD, a 3/4" injector is used. For capacities up to 500 PPD, a 1" injector is used. Injectors can be panel mounted or remote.

Injector Operating Water

This must be reasonable clean. Injectors are fixed-throat differential type. Maximum inlet pressure is 300 psi to 100°F; 150 psi to a maximum of 130°F.

Pressure at Application Point

Maximum pressure with hose or polyethylene tubing is 75 psi, but high-pressure hose or rigid pipe will allow application against backpressure of 75 to 160 psi.

Electrical Requirements

Controller requires 120 volts +/- 10% (200 mA) or 230 volts +/- 10% (100 mA), 50/60 Hz, single phase.

Options

Gas Flow Transmitter

Non-inferential measurement of the rate of gas flow through any V10k gas feeder. Consists of a NEMA 4X sensor transmitter with a 4-20 mA output directly proportional to gas flow. See Technical Information publication TI 50.114.

Automatic Switchover

A pair of vacuum-regulating valves designed to switch to a fresh gas supply from an empty container.

Ton-Container Kit

Adapts the vacuum-regulating valve for mounting on a ton container for gas withdrawal.

Vacuum Switch

A low vacuum switch or a high, high/low vacuum switch is available to indicate loss of gas feed. Each switch contains two, s.p.s.t. contacts rated 5 amps at 250V.

V10k
GAS FEED SYSTEM

TECHNICAL DATA (CONT'D)

Related Options

Related options include: cylinder and ton container valves and connections; header valves with manifolding and connections; vent, injector-water and injector outlet lines and clamps; main connections; solenoid valves; water-line pressure gauge; gas mask; on-line residual analyzers; residual test kits; injector vacuum gauge; spare parts; booster pumps; chlorine detector; two cylinder scale.

Chlorine Gas Warning

All unattended chlorine gas containers and chlorination equipment should be monitored for leaks. Sensitive chlorine detectors, which respond quickly to chlorine in the atmosphere, should be installed at each site. Request Wallace & Tiernan Products publications TI 50.130UA.

Carbon Dioxide Warning

Because of the high pressure in carbon dioxide containers, the vacuum regulating valve cannot be mounted directly on the cylinder. A pressure-reducing valve must be installed between the cylinder and the vacuum-regulating valve.

Compliance

Gas feeder, controller and actuator are designed to conform to all applicable NEC and NEMA specifications and Chlorine Institute and Compressed Gas Association recommendations.

Overall Dimensions

Chlorinator:

Panel mounted:

manual: 34 5/8" X 17" X 7 5/16"

automatic: 34 5/8" X 17" X 10"

Wall mounted:

5": 12 3/8" X 13 7/16" X 6"

10": 19 7/8" X 13 7/16" X 6"

Controller:

SCU: 8 3/4" X 6 1/2" X 3 5/8"

PCU: 8 3/4" X 6 1/2" X 9 1/8"

Shipping Weight

Wall mounted units: 10 lbs

Panel mounted units:

manual: 20 lbs

automatic: 25 lbs

V10k
GAS FEED SYSTEM

TECHNICAL DATA (CONT'D)

Gases and Capacities*

Maximum capacity	Chlorine lb/24 hour	Carbon Dioxide lb/24 hour	Sulfur Dioxide lb/24 hour	Ammonia lb/24 hour
5" & 10" 200 PPD	3/10/20/30/50/75/100/150/200	2.4/8/15/24/35/58/75/116/150	3/10/20/30/50/75/100/150/200	1.4/4.5/9/14/24/35/45/70/95
5" & 10" 500 PPD	3/10/20/30/50/75/100/150/200/250/300/400/500	2.4/8/15/24/35/58/75/116/150/200/230/300/390	3/10/20/30/50/75/100/150/200/250/300/400/475	1.4/4.5/9/14/24/35/45/70/95/120/140/190/240

* A selection of tubes is also available in metric calibrations.

Connections

Pipe and plastic tubing sizes given.

Vacuum Regulating Valves		
Tubing to:	200 lb	500 lb
control panel	3/8 x 1/2"	1/2 x 5/8"
container valve	gas inlet is yoke connection to a cylinder or header valve or, with optional adaptor, to a ton container valve	

Injectors		
Connection	200 lb	500 lb
water inlet	3/4" male NPT or 3/4" flexible pipe	1" female NPT
water outlet	same as inlet	3/4" NPT with adapters for 3/4", 1", or 1-1/2" pipe or hose

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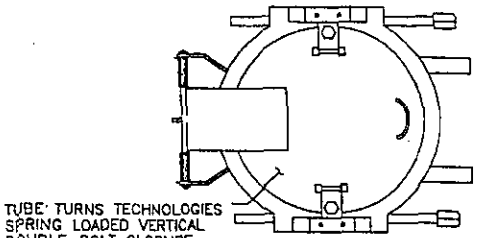
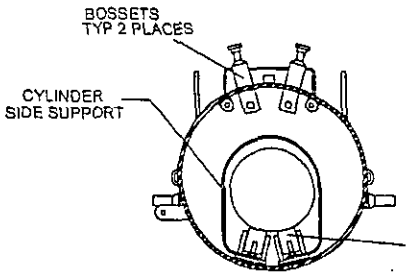
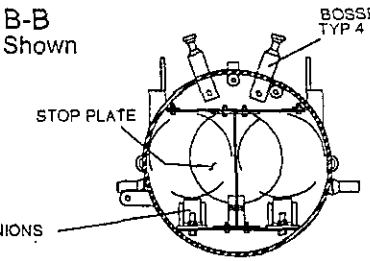


2 Bolt Door



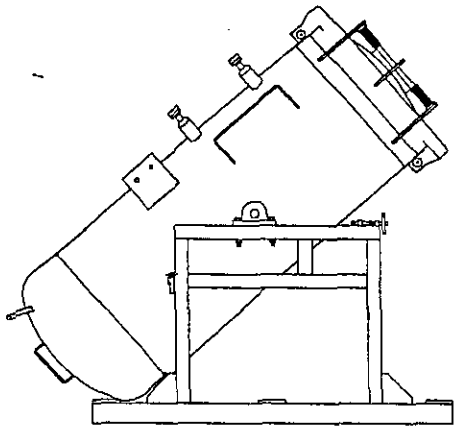
Single 150# cylinder

SECT B-B
Cylinders Shown

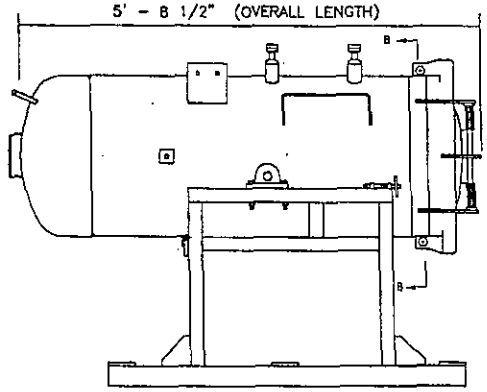


Dual (2) 150# cylinders

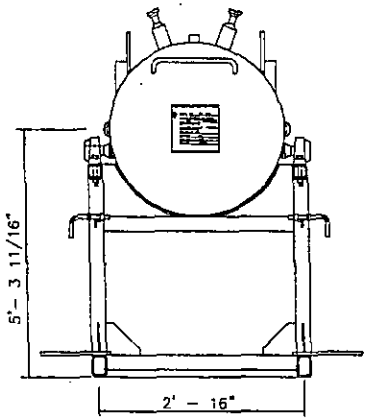
TGO TECHNOLOGIES, INC
TOTAL CONTAINMENT SYSTEM
CONTAINMENT VESSEL W/2 BOLT DOOR
SINGLE AND DUAL 150# CYLINDER
NOT DRAWN TO SCALE



Positioned for operation



Positioned for cylinder loading

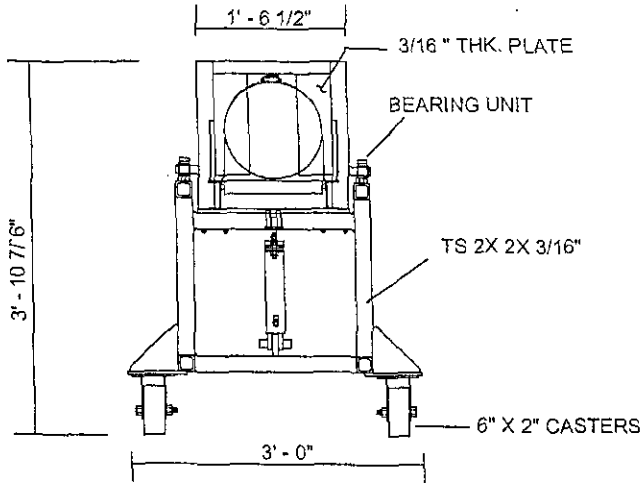


NOTES :

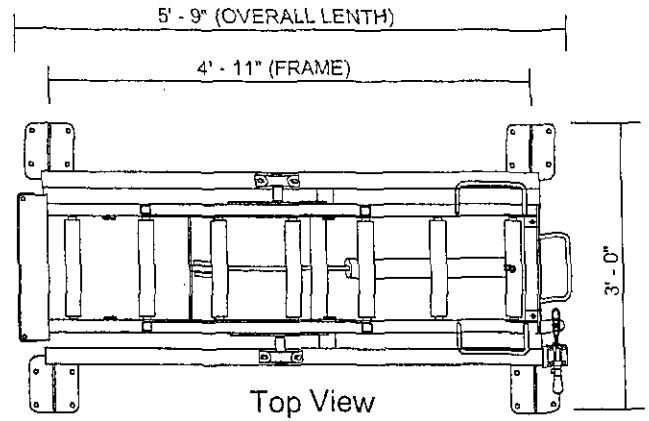
1. DESIGN :
   DESIGN PRESSURE = 285 PSIG @ 300°F
   MINIMUM DESIGN METAL TEMPERATURE = -20°F @ 285 PSIG
   CORROSION ALLOWANCE = 1/16"
   SERVICE : CHLORINE CONTAINMENT VESSEL
2. MATERIAL TEST REPORTS ARE REQUIRED FOR PIPE, CAP AND PLATES.
3. WELDING SHALL BE IN ACCORDANCE WITH ASME CODE SECTION IX USING THE FOLLOWING WELDING PROCEDURES :
   PS 7725-1 SMAW
   PS 91118-1 GTAW
   PS 92133-1 GMAW/FCAW
   PS 97160-1 GTAW(P42-P42)
   PS 97161-1 GTAW/SMAW(P42-P1)
4. ALL COMPLETED WELDS SHALL BE VISUALLY INSPECTED PER INSPECTION PROCEDURE PPC-VDE-1.
5. RADIOGRAPHY OF WELDS IS NOT REQUIRED.
6. HYDROTEST VESSEL TO 380 PSIG PER UG-99.
7. INTERIOR OF TANK TO BE BLAST CLEANED TO SSPC-SP-10, THEN PRIME COATED TO 2.5 TO 3.0 MILS DFT WITH AMERON DIMETCOTE 9VOC (INORGANIC ZINC).
8. EXTERIOR OF TANK TO BE BLAST CLEANED TO SSPC-SP-6, THEN PRIME COATED TO 4 TO 6 MILS DFT WITH AMERON 370 EPOXY (RED FINISH COAT WITH AMERON 450 HS POLYURETHANE TO 2 MILS DFT, COLOR: BL-6 (OSHA SAFETY BLUE).
9. COAT MACHINED SURFACES WITH RUST PREVENTIVE COMPOUND.
10. ASME CODE STAMP IS REQUIRED.
11. FABRICATION SHALL BE IN ACCORDANCE WITH ASME CODE SECTION VIII, DIV.1.

REFERENCE CODES:

ASME CODE SECTION VIII, DIV. 1 2001 EDITION
ASME CODE SECTION IX, 2001 EDITION
ASME CODE SECTION V, 2001 EDITION



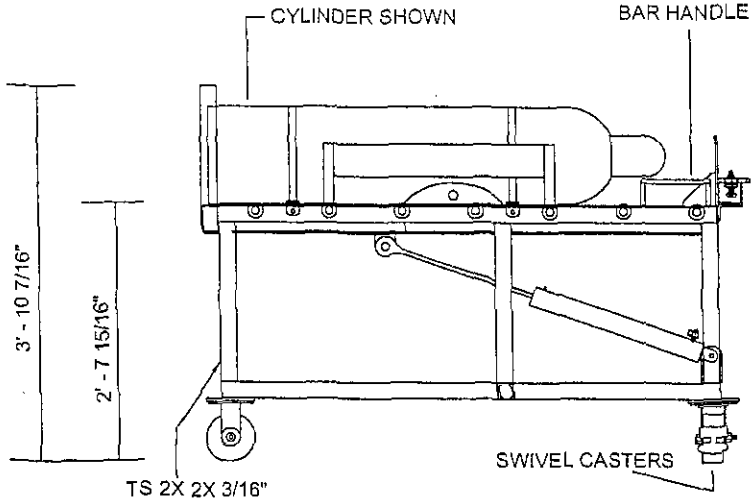
End View



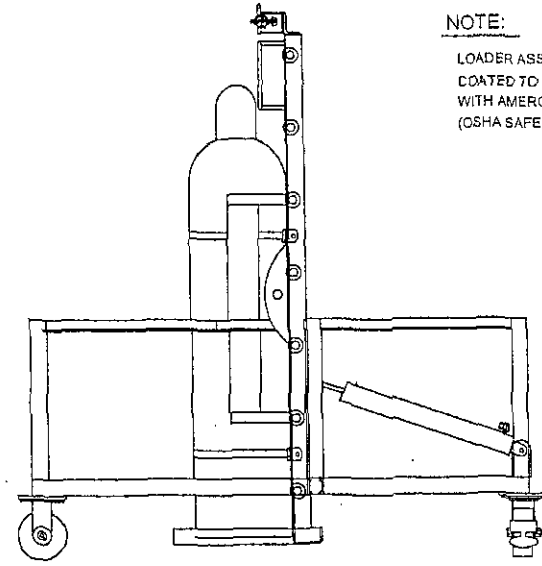
Top View

TGO TECHNOLOGIES, INC
TOTAL CONTAINMENT SYSTEM
150# CYLINDER
LOADER CART ASSEMBLY

NOT DRAWN TO SCALE



Positioned for loading cylinder into vessel



Positioned for securing cylinder onto loader

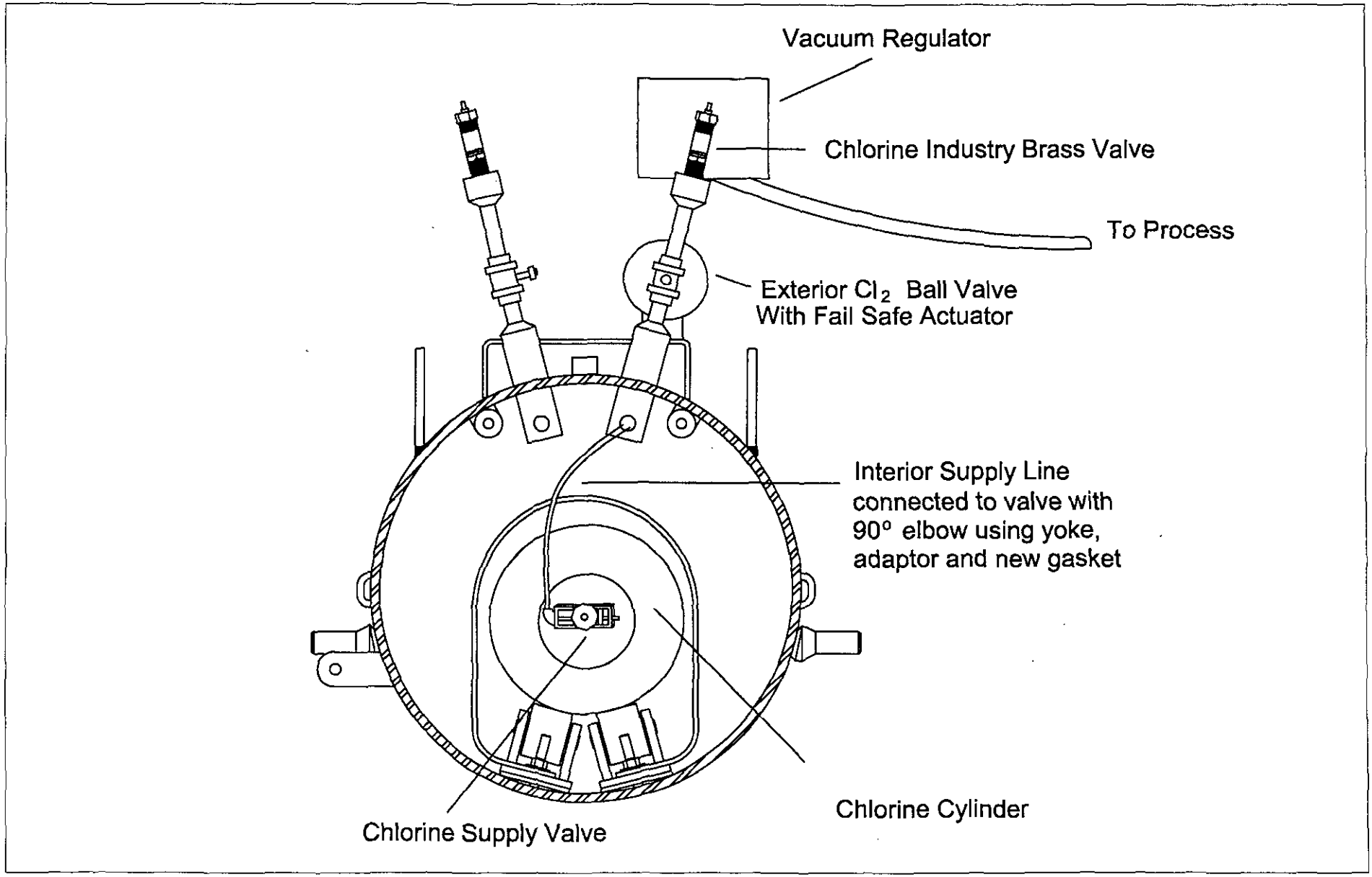
NOTE:

LOADER ASSEMBLY TO BE BLAST CLEANED PER SSPC-SP-6, THEN PRIME COATED TO 2.5-6 MILS DFT WITH AMERON 370 EPOXY (RED). FINISH COAT WITH AMERON 450 HS POLYURETHANE TO 2 MILS DFT, COLOR: BL-6 (OSHA SAFETY BLUE).

Gas Flow Diagram - Single 150 Vessel

ChlorTainer - Total Containment System

TGO Technologies, Inc
Santa Rosa, CA 707-576-7778



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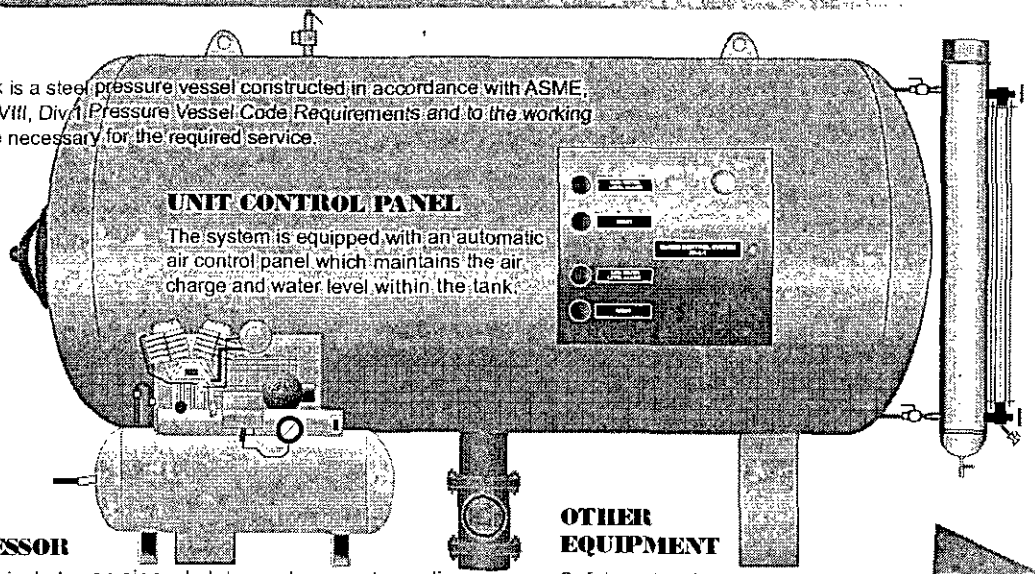
PULSCO

HYDROPNEUMATIC SURGE CONTROL SYSTEM

for control of damaging shock waves and pressure transients in fluid transport systems



TANK

The tank is a steel pressure vessel constructed in accordance with ASME, Section VIII, Div.1 Pressure Vessel Code Requirements and to the working pressure necessary for the required service.

UNIT CONTROL PANEL

The system is equipped with an automatic air control panel which maintains the air charge and water level within the tank.

SIGHT GLASS

For visual indication of tank water level, a tank mounted sight glass extends the full operating range of the system.

LEVEL TRANSMITTER

The level transmitter is used to provide the feedback information necessary for water level control in the tank. Several alternatives are available to transmit the water level information to the unit control panel including conductance probes, magnetic level switches, ultrasonic or capacitance probes.

AIR COMPRESSOR

The system includes an air cooled, two - stage, reciprocating type of air compressor with air receiver. The compressor works in conjunction with the unit control panel and provides the air for the add - air function of the control system.

OTHER EQUIPMENT

Safety, solenoid and ball valves are provided to complete the system package. The safety valve is sized in accordance with ASME code to prevent pressurization of the tank above design pressure.

OVERVIEW

PULSCO Hydropneumatic Surge Control Systems (surge arrestor or shock traps) are designed to eliminate pressure transients in fluid transporting systems. Pressure transients are a result of start up or shut down of a pump or rapid opening or closing of a valve. Fluid velocity, fluid density, pressure wave speed and piping elevation changes can all affect the magnitude of the pressure transients. These pressure transients, commonly known as water hammer, shock or surge, can result in catastrophic plant damage, loss of system control and associated capital equipment and maintenance costs. PULSCO's Hydropneumatic Surge Control Systems are recognized in the industry as the most dependable, predictable, safest and cost efficient form of surge protection available.

FEATURES

- PULSCO Hydropneumatic Surge Control Systems have a long history of proven performance (first installation in 1922).
- PULSCO systems eliminate water hammer by positive pressure control.
- The hydropneumatic surge system reacts immediately to pressure fluctuations.
- The hydropneumatic surge tank contains no moving parts.
- The system is configured to match the plant's requirements.
- PULSCO engineers provide detailed, integrated performance analysis of every system.

BENEFITS

- PULSCO's substantial record of successful system installations assures optimal performance and equipment longevity.
- The PULSCO Surge Control System will permit use of thinner wall pipe. The cost savings in pipe alone will more than pay for the surge control system.
- The system senses the pipeline pressure condition and disperses water into the pipeline before column separation can occur. Costly damage to valves and components is avoided and maintenance costs are reduced.
- Without moving parts, the system is virtually foolproof.
- Horizontal or vertical equipment configuration is possible.
- Detailed analysis allows system performance to be guaranteed.

SPECIFICATIONS

PULSCO's Hydropneumatic Surge Control Systems range from single to multiple tank configurations and vary in tank size from 400 gallon, three foot diameter by eight foot long tank(s) to 45,000 gallon, 13 foot diameter by 45 foot long tank(s).

KROHNE

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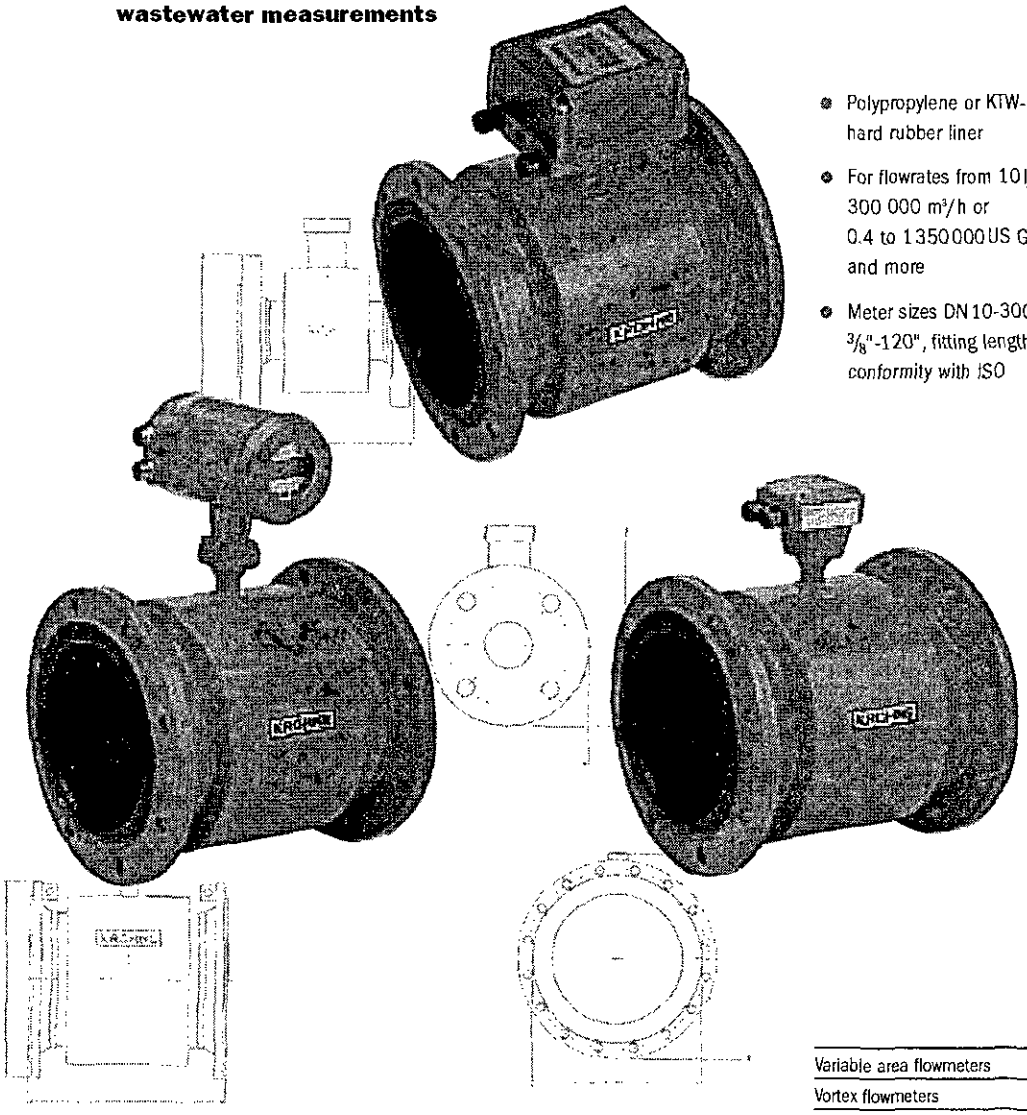
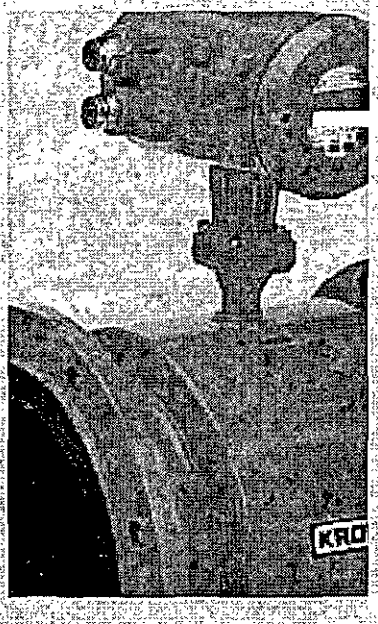
GR

AQUAFLUX
Electromagnetic Flowmeters

... the specialist for water and wastewater measurements



- Polypropylene or KTW-approved hard rubber liner
- For flowrates from 10 l/h to 300 000 m³/h or 0.4 to 1350000 US Gal/min and more
- Meter sizes DN 10-3000 and $^{3}/_{8}$"-120", fitting length also in conformity with ISO



AQUAFLUX
Electromagnetic Flowmeters

– the specialists for water and sewage

AQUAFLUX
flowmeters measure the volumetric flowrate of electrically conductive liquids.

Fields of application

- Water and wastewater
- Environmental engineering
- Abrasion resistance:
  more than adequate for the application fields
- Chemical resistance:
  alkaline solutions (e.g. NaOH)
  up to 50% at 20°C / 68°F
  acids (e.g. HNO_3)
  up to 5% at 20°C / 68°F

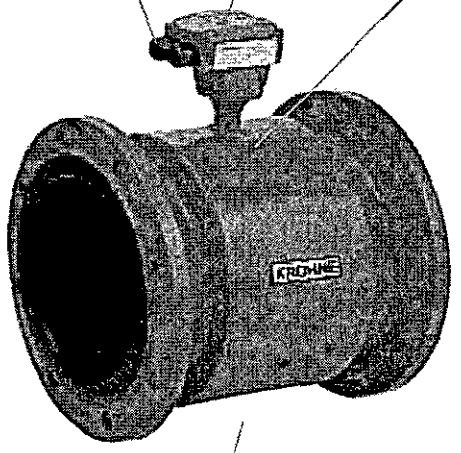
Calibrated on **EN 45 001**
certified calibration rigs,
accuracy of calibration better
than 99.97% of the measured value

Modular design:

- separate version
  with connection box (see photo),
  signal converter in field housing
  or as 19" plug-in version
- compact version,
  various signal converters
  for direct mounting
  on the primary head

IP 67 as standard,
equivalent to NEMA 6,
(IP 68 on request),
permanently submersible,
suitable for ground burial

Fully welded housing,
absolutely tight, rugged,
resistant to corrosion



For flowrates from 10l/h to 300 000 m³/h or
0.4 to 1350000US Gal/min and more

Meter sizes DN10-3000 and 3/8"-120",
fitting length also in conformity with ISO

The responsibility as to the suitability, intended use and corrosion-resistance of the materials used in their construction rests solely with the purchaser.

Technical data

Meter sizes	
Compact systems	DN10 - 1600 and $^3/_8$" - 64"
AQUAFLUX F (separate)	DN10 - 3000 and $^3/_8$" - 120"
Pipe flanges	
to DIN 2501 (= BS 4504)	DN10 - 50 and DN80 / PN40 DN65 and DN100 - 150 / PN16 DN200 - 1000 / PN10 DN1100 - 2000 / PN6 DN2200 - 3000 / PN2.5
to ANSI B 16.5	$^3/_8$" - 24" / Class 150lb / RF
to AWWA	14" - 120" / Class B or D / FF
Electrical conductivity	≥ 20µS/cm
Temperatures	Ambient temperature / Process temperature
Compact systems	- 25 to + **60**°C / - 5 to ≤ + 60°C - 13 to + **140**°F / + 23 to ≤ + 140°F - 25 to + **40**°C / - 5 to ≤ + 90°C - 13 to + **104**°F / + 23 to ≤ + 194°F
AQUAFLUX F (separate)	- 25 to + 60°C / - 5 to ≤ + 90°C - 13 to + 140°F / + 23 to ≤ + 194°F
Max. allowable operating data	Process temperature, operating pressure and vacuum load for the liner, refer to Page 6 "Limits"
Insulation class of field coils	E
Electrode design	
DN10 - 3000 / $^3/_8$" - 120"	flat elliptical electrodes, solidly fitted, surface-polished
Option DN350 - 3000 / 14" - 120"	field-replaceable electrodes WE
Protection category (EN 60 529 / IEC 529)	
Standard	IP67, equivalent to NEMA 6 (with field replaceable electrodes WE: IP65, equivalent to NEMA 4/4X)
Option	IP68, equivalent to NEMA 6
Grounding rings	available as an option
Materials	
Measuring tube	stainless steel 1.4301 (or higher materials number),equivalent to SS 304
Liner	
DN 10 - 0020 / $^3/_8$" - $^3/_4$"	Teflon®-PTFE
DN 25 - 0150 / 1" - 6"	Polypropylen
DN200 - 3000 / 8" - 120"	hard rubber
Electrodes	
Standard	Hastelloy C4
Option	stainless steel 1.4571 or SS 316 Ti, titanium
Field replaceable WE	stainless steel 1.4571 or SS 316 Ti
Connecting flanges*	
DIN: DN10 - 50, DN80 ($^3/_8$" - 2", 3")	steel 1.0402 (C 22) or AISI C 1020
DIN: DN65, ≥ DN100 (≥ 4")	steel 1.0501 (RST 37.2) or AISI C 1035
ANSI	steel ASTM A 105N
Housing*	
DN10 - 40 / $^3/_8$"-1$^1/_2$"	GTW-S 30 (malleable cast iron)
≥ DN50 / ≥ 2"	sheet steel
Terminal box*	
AQUAFLUX F (separate)	die-cast aluminium
Grounding rings (option)	stainless steel 1.4571 or SS 316 Ti

* with polyurethane coating

Teflon® is a registered trademark of DuPont

Dimensions and weights

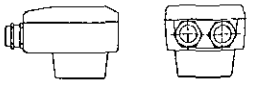
PLEASE NOTE !

The **total dimension for the height** is obtained from **dimension b** (see table) **plus the height** of the terminal box or the signal converter, see drawings.

The **total weight** is made up of the weight of the signal converter (see table) **plus** the weight of the terminal box or signal converter, see below.

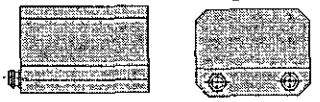
Dimension "a" without flange gaskets: not included with flowmeter, to be provided by customer.
Meter size 3/8": flange connection 1/2"

Terminal box



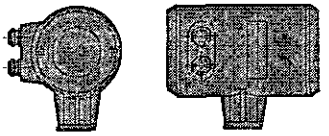
Weight approx. 0.5 kg (1.1 lb)

IFC 010 K and IFC 020 K signal converter



Weight approx. 1.6 kg (3.6 lb)

IFC 090 K signal converter



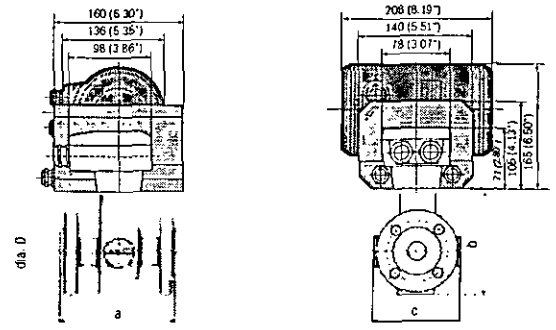
Weight approx. 2.3 kg (5.1 lb)

Flange connections to ...			**Dimensions** in mm (inches)
DIN 2501 (= BS 4504)	DN 10- 300	PN40, 16, 10	see table
	DN350-1000	PN10	see table
	DN350-1000	PN25	see table, dimension "$a_{standard}$" + 200 mm
	≥ DN1200	PN6, 2.5	information supplied on request
ANSI B 16.5	3/8"-24"	150lb / RF	see table
		≥ 300 lb / RF	dimensions supplied on request
AWWA	≥ 14"	Class B, D / FF	dimensions supplied on request

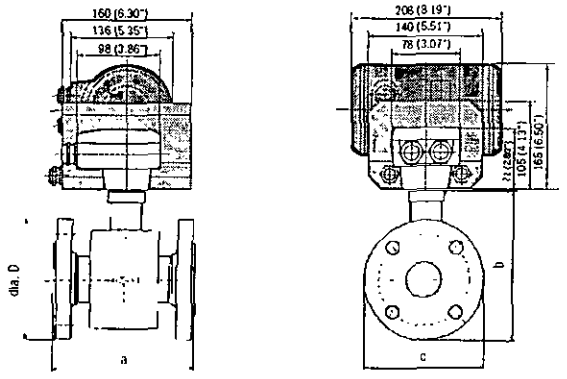
Nominal size			**Dimensions in mm (inches)**										**Approx. weight in kg (lb)**	
DIN		ANSI	a (fitting length)				b		c		dia. D		with DIN	with ANSI
DN	PN (psig)	inches	Standard	ISO 13 359	ANSI						DIN, ISO	ANSI	flanges	flanges
10	40 (580)	3/8	150 (5.91)	-	150 (5.91)		165 (6.50)		121 (4.76)		90 (3.54)	88.9 (3.50)	5 (11.0)	6 (13.2)
15	40 (580)	1/2	150 (5.91)	200 (7.87)	150 (5.91)		165 (6.50)		121 (4.76)		95 (3.74)	88.9 (3.50)	5 (11.0)	6 (13.2)
20	40 (580)	3/4	150 (5.91)	200 (7.87)	150 (5.91)		165 (6.50)		121 (4.76)		105 (4.13)	98.6 (3.88)	7 (15.4)	8 (17.6)
25	40 (580)	1	150 (5.91)	200 (7.87)	150 (5.91)		165 (6.50)		121 (4.76)		115 (4.53)	108 (4.25)	7 (15.4)	8 (17.6)
32	40 (580)	-	150 (5.91)	200 (7.87)	-		180 (7.09)		139 (5.47)		140 (5.51)	-	8 (17.6)	-
40	40 (580)	1 1/2	150 (5.91)	200 (7.87)	150 (5.91)		180 (7.09)		139 (5.47)		150 (5.91)	127 (5.00)	8 (17.6)	9 (19.8)
50	40 (580)	2	200 (7.87)	200 (7.87)	200 (7.87)		218 (8.58)		160 (6.30)		165 (6.50)	152 (6.00)	8 (17.6)	8 (17.6)
65	16 (232)	-	200 (7.87)	200 (7.87)	-		228 (8.98)		173 (6.81)		185 (7.28)	-	10 (22)	-
80	40 (580)	3	200 (7.87)	200 (7.87)	200 (7.87)		235 (9.25)		173 (6.81)		200 (7.87)	191 (7.50)	12 (27)	13 (29)
100	16 (232)	4	250 (9.84)	250 (9.84)	250 (9.84)		286 (11.26)		233 (9.17)		220 (8.66)	228 (8.98)	15 (33)	18 (40)*
125	16 (232)	-	250 (9.84)	250 (9.84)	-		297 (11.69)		233 (9.17)		250 (9.84)	-	19 (42)	-
150	16 (232)	6	300 (11.81)	300 (11.81)	300 (11.81)		327 (12.87)		257 (10.12)		285 (11.22)	279 (10.98)	22 (49)	26 (58) *
200	10 (145)	8	350 (13.78)	350 (13.78)	350 (13.78)		385 (15.16)		291 (11.46)		340 (13.39)	343 (13.50)	34 (75)	42 (95) *
250	10 (145)	10	400 (15.75)	450 (17.72)	400 (15.75)		437 (17.20)		331 (13.03)		395 (15.55)	406 (16.00)	48 (107)	64 (140) *
300	10 (145)	12	500 (19.69)	500 (19.69)	500 (19.69)		500 (19.69)		381 (15.00)		445 (17.52)	533 (21.00)	58 (128)	94 (210) *
350	10 (145)	14	500 (19.69)	550 (21.65)	700 (27.56)		548 (21.57)		428 (16.85)		505 (19.88)	597 (23.50)	78 (172)	129 (285) *
400	10 (145)	16	600 (23.62)	600 (23.62)	800 (31.50)		606 (23.86)		483 (19.02)		565 (22.24)	635 (25.00)	98 (217)	165 (365) *
500	10 (145)	20	600 (23.62)	-	800 (31.50)		651 (25.63)		533 (20.98)		670 (26.38)	699 (27.50)	128 (283)	223 (492) *
600	10 (145)	24	600 (23.62)	-	800 (31.50)		820 (32.28)		585 (23.03)		780 (30.71)	813 (32.00)	164 (362)	306 (675) *
700	10 (145)	28	700 (27.56)	-	flanges to AWWA: dimensions on request		937 (36.89)		694 (27.32)		895 (35.24)	flanges to AWWA: dimensions on request	245 (540)	flanges to AWWA: weight on request
800	10 (145)	32	800 (31.50)	-			1058 (41.65)		922 (36.30)		1015 (39.96)		328 (724)	
900	10 (145)	36	900 (35.43)	-			1164 (45.83)		1026 (40.39)		1115 (43.90)		425 (1000)	
1000	10 (145)	40	1000 (39.37)	-			1278 (50.31)		1132 (44.57)		1230 (48.43)		507 (1118)	

* max. Druckstufe wie mit DIN-Flanschen, s. Spalte "PN"

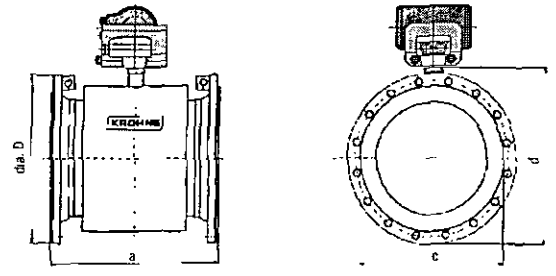
DN10 - 40 / 3/8" - 1 1/2"



DN50 - 300 / 2" - 12"



DN350 - 1000 / 14" - 24"



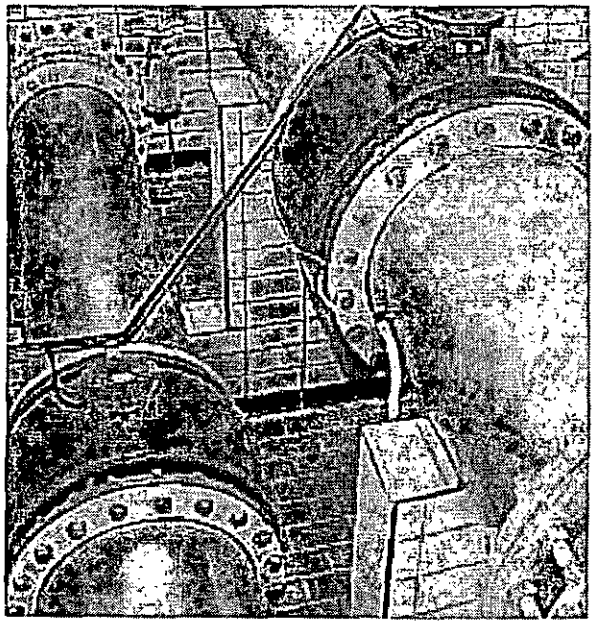
Tolerance details for fitting length dimensions "a"

Standard

DN ≤ 300 / ≤ 12" : ±0.5%,
min. ± 1mm / ± 0.04"
DN ≥ 350 / ≥ 14" : ±0.5%

to ISO DIS 13 359

DN ≤ 200 / ≤ 8" : +0/-3
DN ≥ 250 / ≥ 10" : +0/-5

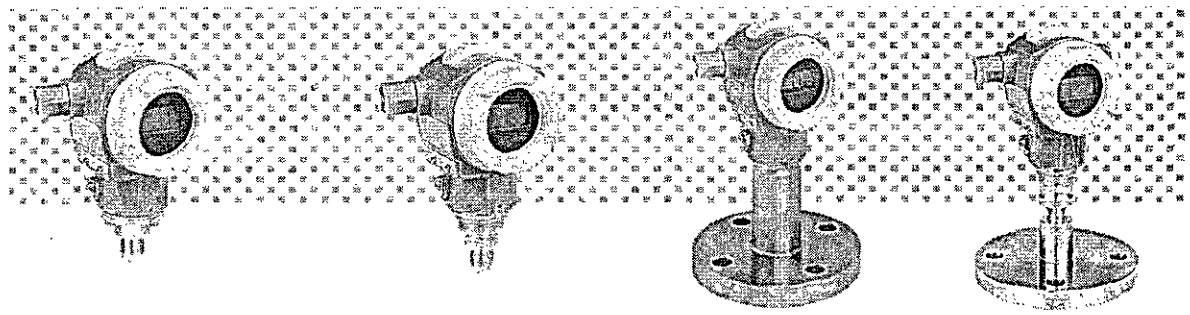


Level | Pressure | Flow | Temperature | Liquid Analysis | Registration | Systems Components | Services | Solutions

Technical Information

Cerabar S PMC 71, PMP 71/72/75

Gauge and absolute pressure with ceramic and polysilicon sensors
High accuracy with excellent long-term stability
HART®, Foundation Fieldbus or PROFIBUS-PA protocols



PMC 71 | PMP 71 | PMP 72 | PMP 75

Applications

The Cerabar S pressure transmitter are suitable for:
- Gauge and absolute pressure measurement in gases, liquids or steam in all areas of process engineering
- Level, volume or mass measurement in liquids
- Corrosive or abrasive applications using unique ceramic sensor technology (PMC 71). Ceramic sensors are cleanable with a wire brush.
- High temperatures up to 535°F (280°C) without diaphragm seals (PMP 72) – eliminates zero shift due to ambient/process temperature differences
- *High temperatures up to 662°F (350°C) with* integral or remote diaphragm seals (PMP 75)
- High pressure applications up to 10,150 psi (700 bar), PMP 71

Your benefits

Top of the line technical specifications:
- High long-term stability (0.05% of URL/year)
- High accuracy: up to ±0.075% span (≤ 15 : 1 turndown), with optional Platinum version ±0.05% span
- Turn down 100 : 1 standard, higher on request

Designed with safety in mind to keep your plant, *equipment and personnel safe:*
- SIL-2 certificate optional
- Electronic function-monitoring of the measuring cell provides alert upon sensor failure
- Secondary seals standard in every transmitter
- Built-in diagnostic software functionality (e.g., user-defined max/min operating window)
- Optional FM and CSA certificates, plus combination certificates

Modular design for easy repair:
- Replaceable display
- Universal electronics for pressure and differential pressure

Easy to setup with menu-driven interface, quick setup menu for standard application modes:
- Pressure
- Level
- Flow

HistoROM/M-DAT memory module enables:
- Quick duplication of measuring points
- Process monitoring via periodic recording of pressure and temperature values
- *Monitoring of events and configuration changes*
- Analysis and graphical evaluation of data by ToF tool software

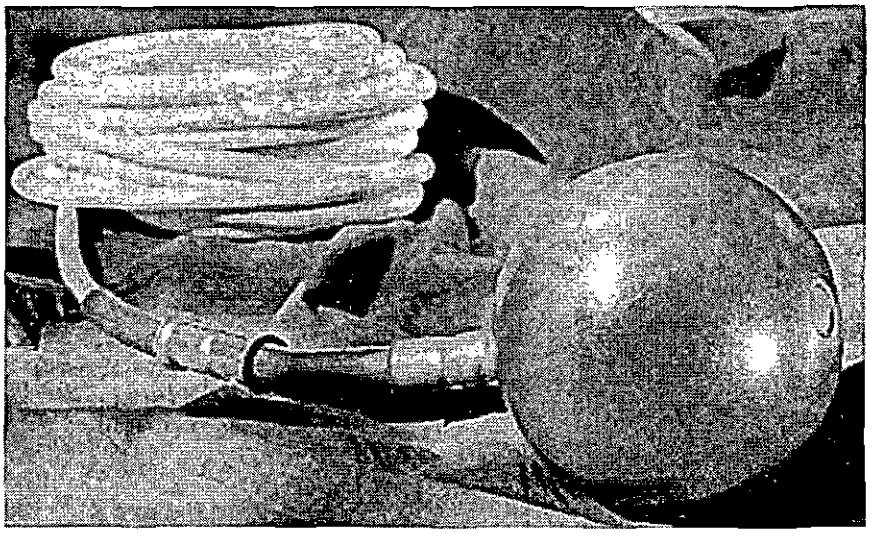
Flexible commissioning via multiple modes:
- On-board push buttons (external, or inside housing)
- HART® handheld operation
- ToF tool (PC software, free of charge with each transmitter) plus HART modem
- PROFIBUS-PA or Foundation Fieldbus configuration software

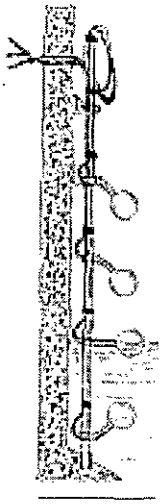
TI 383P/24/ae/04.04

Endress+Hauser

People for Process Automation

9G DIRECT ACTING FLOAT SWITCH (B100)





9G Features In Brief
Integral 20 amp @ 115 VAC (resistive) mercury switch. Nitrile PVC-jacketed, Type SO cable with 3 #14 fine-stranded conductors for heavy flexing and underwater service. Variety of cable lengths. Fixed 1" pipe or cable/weight suspension mounting provides for dependable operation. Three-year factory warranty. Optional pipe mounting kit or suspension kit includes stainless steel cable, clamps and coated 15# weight.

Arguably the best float switch available, this Teflon®-coated non-differential float of Type 316 stainless steel measures 5.5" in diameter. It is appropriate for a variety of applications, including sewage wet wells, storm water basins, water reservoirs, sludge tanks, irrigation canals and process sumps. The float operates reliably in even the most difficult environments. The 9G can be used singly to sense an alarm level, but typically two or more switches are used in conjunction with our controllers to provide a float-based control system. The 9G can be used as the redundant control sensor in larger automation installations.

TYPICAL SPECIFICATIONS

The level detecting device shall be a 5-1/2" diameter type 316 stainless steel float switch with a mercury switch inside and flexibly supported by a PVC jacketed, heavy-duty cable. The float shall be mounted on a vertical 1" pipe as shown on the plans or as otherwise directed by the Engineer. It shall be installed in accordance with the manufacturer's recommendations.

The float switch shall have a 20 amp rating at 115 VAC and 10 amps at 230 VAC. The float shall be type SO with three #14 AWG fine-stranded copper conductors. The float shall be mounted to the 1" pipe using type 316 stainless steel hardware.

The Model 9G Float Switch shall be furnished in quantities and with such accessories as are required to perform the specified control and alarm functions for this application. The float switch shall be Model 9G as manufactured by USFilter Control Systems, Saint Paul, MN. It shall have a 3-year factory warranty.

USFilter

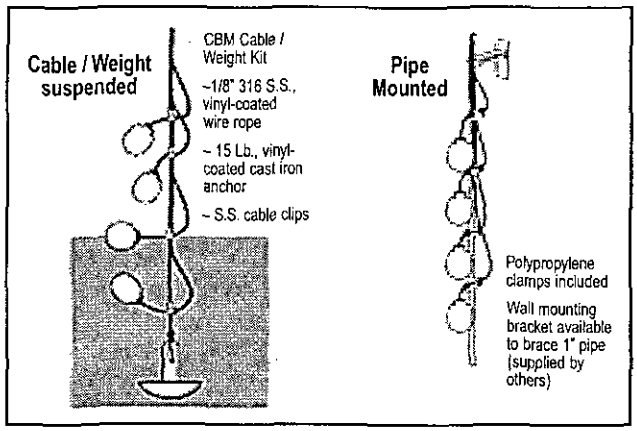
DATA SHEET

9G DIRECT ACTING FLOAT SWITCH (B100)

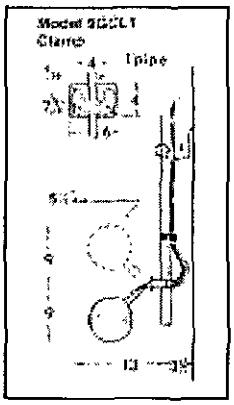
DESCRIPTION	PART NUMBER
9G NOTP Float Switch	
w/30' cable & clamp for pipe or cable mounting*	601340-30
w/60' cable & clamp for pipe or cable mounting*	601340-60
9G NCTP Float Switch	
w/30' cable & clamp for pipe or cable mounting*	601350-30
w/60' cable & clamp for pipe or cable mounting*	601350-60
** specify pipe or cable mounting at time of order*	
Mounting Hardware & Accessories	
Permanent stainless steel identification tag	Consult Factory
9G CL3 stainless steel pipe mount clamps (transducer or float mount)	601134-01
CBM 15# anchor mounting kit (does not include SS cable; see next item)	803360-ANC
CBM stainless steel cable; 20'	601440-20
CBM stainless steel cable; each additional 10' (XX=length)	601440-XX
9G CC cable mount clamp kit (included w/float; only req'd as replacement)	601212-01
9G pipe mount clamp kit (included w/flat; only req'd as replacement)	601184-01
TCB fiberglass junction box with terminal blocks for 4 switches and ground lug	601102-01
IS6 intrinsic safety barrier – requires 12-24 VDC @ 50 mA power source	601312-02

TYPICAL MOUNTING

(See Mounting Hardware and Accessories)



PIPE MOUNTING DIMENSIONS



COMPLETE CONTROL CAPABILITIES

USFilter Control Systems offers a single, high-quality source for everything from simple level sensors to telemetry systems to complex system control engineering and software. Based in St. Paul, Minnesota, USFilter Control Systems is part of United States Filter Corporation, the leading global provider of industrial, municipal and residential water and wastewater treatment systems, products and services. As a major manufacturer/integrator with an extensive selection of specialized product lines in the areas of SCADA and telemetry, power equipment integration, automation and measurement, USFilter Control Systems is uniquely positioned to provide cost-effective, comprehensive solutions for water, wastewater, and process control and telemetry applications.

USFilter

Control Systems
1239 Willow Lake Boulevard
Vadnais Heights, MN 55110
800.224.9474 *phone*
651.766.2700 *phone*
651.766.2701 *fax*

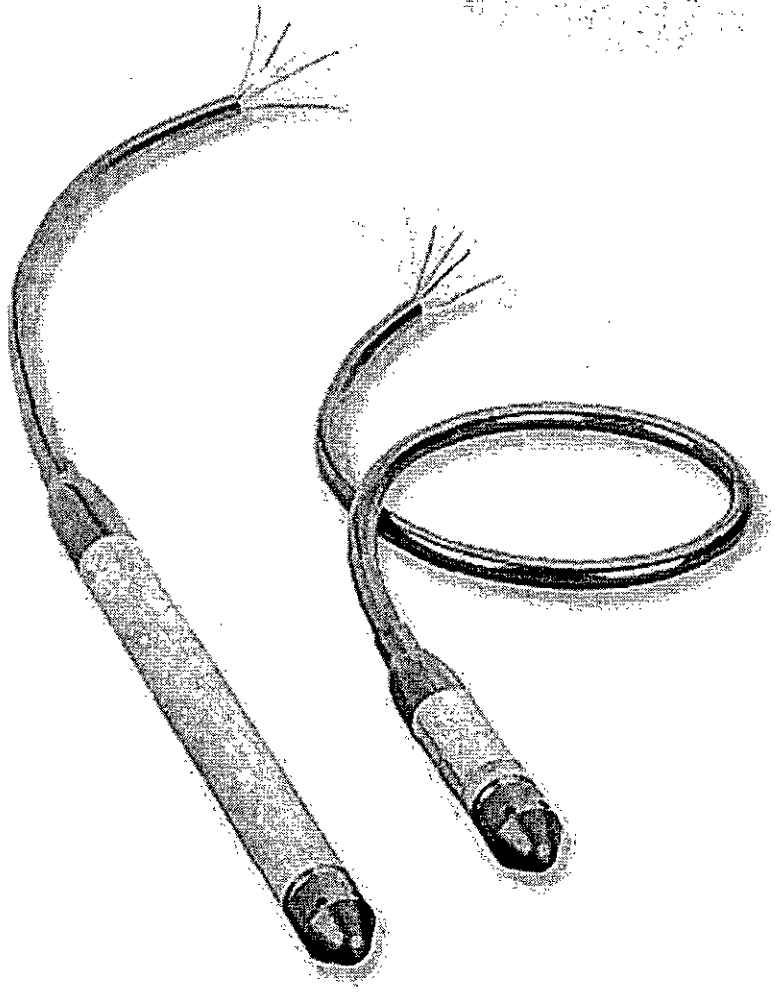
www.controlsystems.usfilter.com

PTX/PDCR 1830 Series

Druck

Depth and Level Pressure Sensors

- ±0.1% accuracy
- Excellent stability
- High integrity and reliability
- Full welded titanium construction
- Backed by 5 year corrosion warranty
- Outputs: 4-20mA, 0-100mV



PTX/PDCR 1830 Series

Depth and Level Pressure Sensors

INTRODUCTION

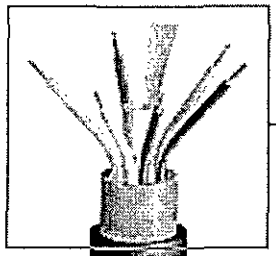
For over 20 years Druck have manufactured pressure sensors specifically for depth and level measurement.

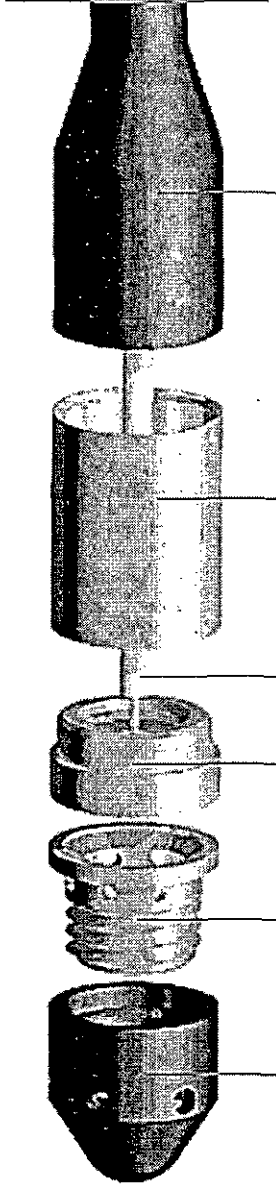
The 1830 Series is the latest generation of fully submersible sensors which incorporate the most recent technical advances in depth and level measurement.

At the heart of the 1830 Series is a high stability pressure sensing element manufactured from micro-machined silicon developed within Druck's own Class 100 processing facility. The silicon sensing element is fully isolated from the media by a titanium isolation diaphragm. The use of titanium enables the sensors to be used in the most hostile of fluids where materials such as stainless steel cannot be considered.

Surface mount electronics within the all-titanium body tube assembly enables minimum sensor size with improved reliability. The purpose-designed vented electrical cable results in a depth and level sensor with the highest integrity and the lowest cost of ownership.

With a choice of millivolt or current outputs, small physical size and wide range of pressures, the 1830 Series can be used in a variety of applications from the smallest diameter bore holes to canals, rivers and reservoirs. They are ideally suited for depth/level application in the oceanographic and remediation industries. The 1830 Series depth-sensing transmitters are backed by Druck's 5-year corrosion warranty.





Depth cable molded directly to the sensor body to give NEMA 6 rating for permanent immersion.

The encapsulated surface mount electronics are housed within the titanium body tube.

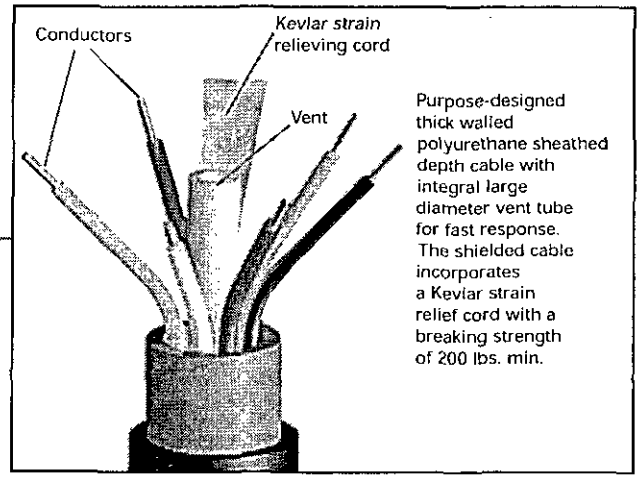
The body tube is welded to the pressure module offering maximum integrity and reliability.

Depth cable vent connected directly to the reference side of the silicon pressure element.

Pressure connection with radial inlet holes.

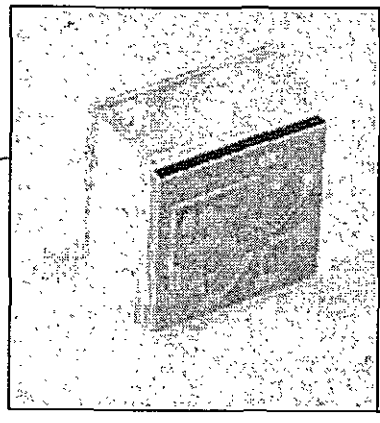
Screw-on acetal nose cone provides protection during installation and incorporates an anti shock feature.

Depth Cable



Purpose-designed thick walled polyurethane sheathed depth cable with integral large diameter vent tube for fast response. The shielded cable incorporates a Kevlar strain relief cord with a breaking strength of 200 lbs. min.

Pressure Module Assembly



A high stability micro-machined silicon sensing element is contained within the all-titanium pressure module assembly. The sensing element is both electrically and physically isolated from the pressure media.

PTX/PDCR 1830 Series

Specification

Druck

PTX 1830

Operating Pressure Range
1, 2.5 psig
5, 10, 15, 20, 30, 50, 75, 100, 150, 200, 300, 500, 900 psia or psig
Other pressure units can be specified.

Overpressure
8x for 1 and 2.5 psig ranges
6x for 5 psig range
4x for ranges of 10 psi and above up to a maximum 2000 psi.

Pressure Containment
10x for 1, 2.5 and 5 psig ranges
6x for ranges of 10 psig and above to a maximum of 2000 psig;
3000 psi for all absolute ranges.

Media Compatibility
Fluids compatible with titanium, acetal and polyurethane.

Excitation Voltage
9 to 30 V d.c.
The minimum required supply voltage must provide at least 9V excitation to the sensor, and may be calculated as follows.

$V_S = 9 + (0.02 \times R_L)$, where

V_S is the minimum required supply voltage in volts DC
R_L is total loop resistance in ohms.

Output Current
4 to 20mA, 2 wire.

Combined Non-linearity, Hysteresis and Repeatability
±0.1% F.S. BSL for all ranges.

Zero Offset & Span Setting
±0.25% F.S. maximum.

Long Term Stability
Typically ±0.1% F.S./annum.

Operating Temperature Range
-5° to +140°F (-20° to +60°C).

Compensated Temperature Range
+30° to +86°F (-2° to +30°C).

Temperature Effects
±0.3% F.S. Total Error Band for ranges of 5 psi and above.
±0.6% F.S. Total Error Band for 1 and 2.5 psi ranges.

Pressure Connection
Depth cone with radial inlet holes.

Electrical Connection
Vented polyurethane depth cable
3 feet supplied as standard
Longer lengths available on request.

Ingress Protection
NEMA 6 (IP68) to 2300 feet of water.

Insulation
Greater than 100 Megohms at 500 Vd.c.

Safety
EMC and Surge Protection

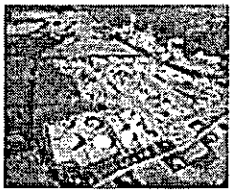
Electrostatic Discharge (per IEC 61000-4-2)	±4 kV in contact with unit ±8 kV in air
Radiated RF Immunity (per IEC 61000-4-3)	80 to 1000 MHz @10 V/m
Fast Transient (per IEC 61000-4-4)	±1 kV @5/50 µs Tr/Th
Surge Lines to Ground (per IEC 61000-4-5)	±1 kV (42 ohm Source) @ 1.2/50 µs Tr/Th
Conducted RF Immunity (per IEC 61000-4-6)	*0.15 to 80 MHz 10V/m*

FM and CSA Approved, Class I, Div. 1, Groups A, B, C, D
Intrinsically Safe: ATEX Intrinsically Safe Approval
Specify approval required.

Note: *Consult factory for FM or CSA Intrinsically Safe, Class I, Div 1, Groups A, B, C, D and ATEX Intrinsically Safe EEx ia IIC ($-40°C < T_{amb} < 80°C$)*

PDCR 1830

Operating Pressure Range
1, 2.5 psig
5, 10, 15, 20, 30, 50, 75, 100, 150, 200, 300, 500, 900 psia or psig
Other pressure units can be specified.



Overpressure
8x for 1 and 2.5 psig ranges
6x for 5 psig range
4x for ranges of 10psi and above up to a maximum of 2000 psi.

Pressure Containment
10x for 1, 2.5, and 5 psig ranges
6x for ranges of 10 psig and above to a maximum of 2000 psig;
3000 psi for all absolute ranges.

Media Compatibility
Fluids compatible with titanium, acetal and polyurethane.

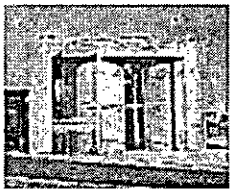
Excitation Voltage
10 Volts at 5mA maximum.

Output Voltage
25mV for 1 psig range
50mV for 2.5 and 5 psi ranges
100mV for ranges 10 psi and above
Output is ratiometric to supply.

Common Mode Voltage
Typically +3.5 to +9 V with respect to the negative supply at 10 V excitation.

Combined Non-linearity, Hysteresis and Repeatability
±0.1% F.S. BSL for all ranges.

Zero Setting
±3mV maximum.



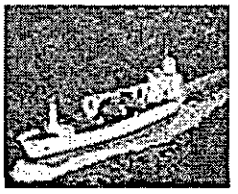
Span Setting
±10mV maximum.

Long Term Stability
Typically ±0.1mV/annum.

Operating Temperature Range
-5° to +140°F (-20° to +60°C).

Compensated Temperature Range
+30° to +86°F (-2° to +30°C).

Temperature Effects
±0.3% F.S. Total Error Band for ranges of 5 psi and above.
±0.6% F.S. Total Error Band for 1 and 2.5 psi ranges.



Pressure Connection
Depth cone with radial inlet holes.

Electrical Connection
Vented polyurethane depth cable
3 feet supplied as standard
Longer lengths available on request.

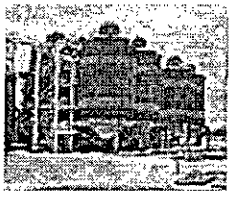
Ingress Protection
NEMA 6 (IP68) to 2300 feet of water.

Insulation
Greater than 100 Megohms at 500 Vd.c.

Safety

EMC emissions	EN50081-1
EMC immunity	EN50082-2
Certification	CE Marked

FM, CSA and UL Approved, Class I, Div. I Groups A, B, C, D
Intrinsically Safe.



PTX/PDCR 1830 Series

Depth and Level Pressure Sensors

Druck

ORDERING INFORMATION

Please state the following:-
(1) Type number
(2) Pressure range
(3) Gauge or absolute
(4) Vented electrical cable length
3 ft. supplied as standard.

For non-standard requirements please refer to Druck.

ASSOCIATED PRODUCTS

Special Depth/Level Transmitter PDCR/PTX 1880
- Suitable for aggressive environment
- Tefzel/Titanium construction
- Compact 0.69" diameter
- Accuracy: ±0.1%
- 4-20mA or mV output
- Seawater compatible

Cable Termination with Remote Electronics SCU-220
- 2-wire 4-20mA
- Desiccant Indicator
- Din-Rail for lightning suppressor
- NEMA 4X

Cable Termination STE 110
- Low maintenance
- Desiccant indicator
- Suitable for all sensors
- Rated NEMA 4X
- DIN-Rail for lightning suppressor or IS barriers

Pressure Level Handbook
- Full range of products
- Installation details
- Application information
- Lightning protection

Lightning Arresters

MDK-24	2-wire
MDK-LC	4-wire
MDK-LV	3-wire

- DIN rail mountable
- Fits in STE 110 & SCU 220

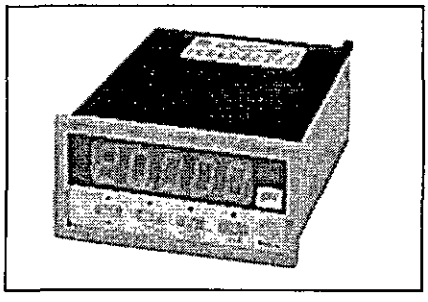
Signal Conditioners/Controllers DPI 280 Series
- Dual Scaling
- Suitable for all sensors
- Programmable features
- Level control/measurement
- RS 232 and RS 485 interface
- Up to 4 flexible alarms

Portable Barometric Standards DPI740
- Battery powered
- Pocket-sized
- Barometric range
- Accuracy: ±0.015% value
- Stability: 100 ppm/year

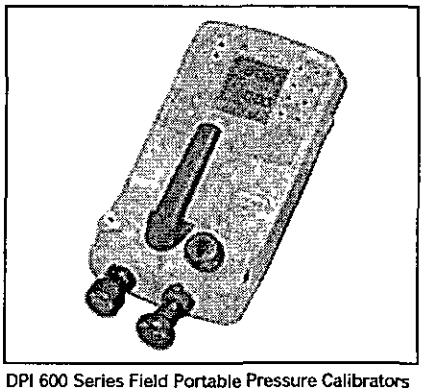
Field Pressure Calibrator DPI 600 Series
- Accuracy: ±0.05% F.S.
- Integral ranges to 500 psi
- Voltage/current power source
- Higher ranges to 10,000 psi available
- Intrinsically safe operation optional
- Integral pressure/vacuum generation

Continuing development sometimes necessitates specification changes without notice.

Druck is an ISO 9000 registered company.

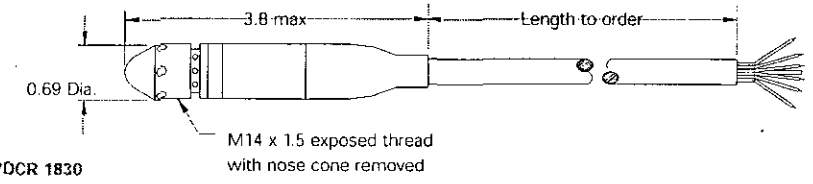


DPI 280 Series Digital Process Indicators



DPI 600 Series Field Portable Pressure Calibrators

INSTALLATION DRAWINGS: Dimensions in inches (NOT TO SCALE)

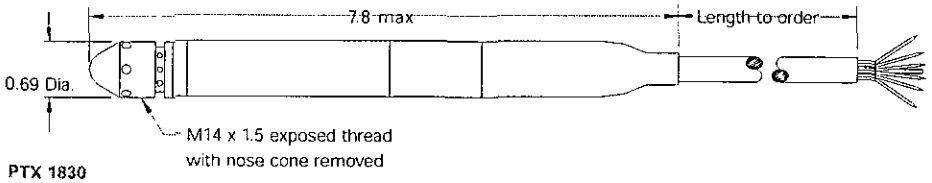


PDCR 1830

PDCR 1830
Electrical Connection
Vented polyurethane cable

Red	Positive supply
White	Negative supply
Yellow	Positive output
Blue	Negative output
Shield	connected to case

Any other conductors *not connected.*



PTX 1830

PTX 1830
Electrical Connection
Vented polyurethane cable

Red	Positive supply
Black	Negative supply
Shield	connected to case

Any other conductors not connected.

Druck

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New Fairfield , CT 06812
Tel: (203) 746-0400
Fax: (203) 746-2494
E-Mail: usa.sales@druck.com
www.druck.com
www.pressure.com

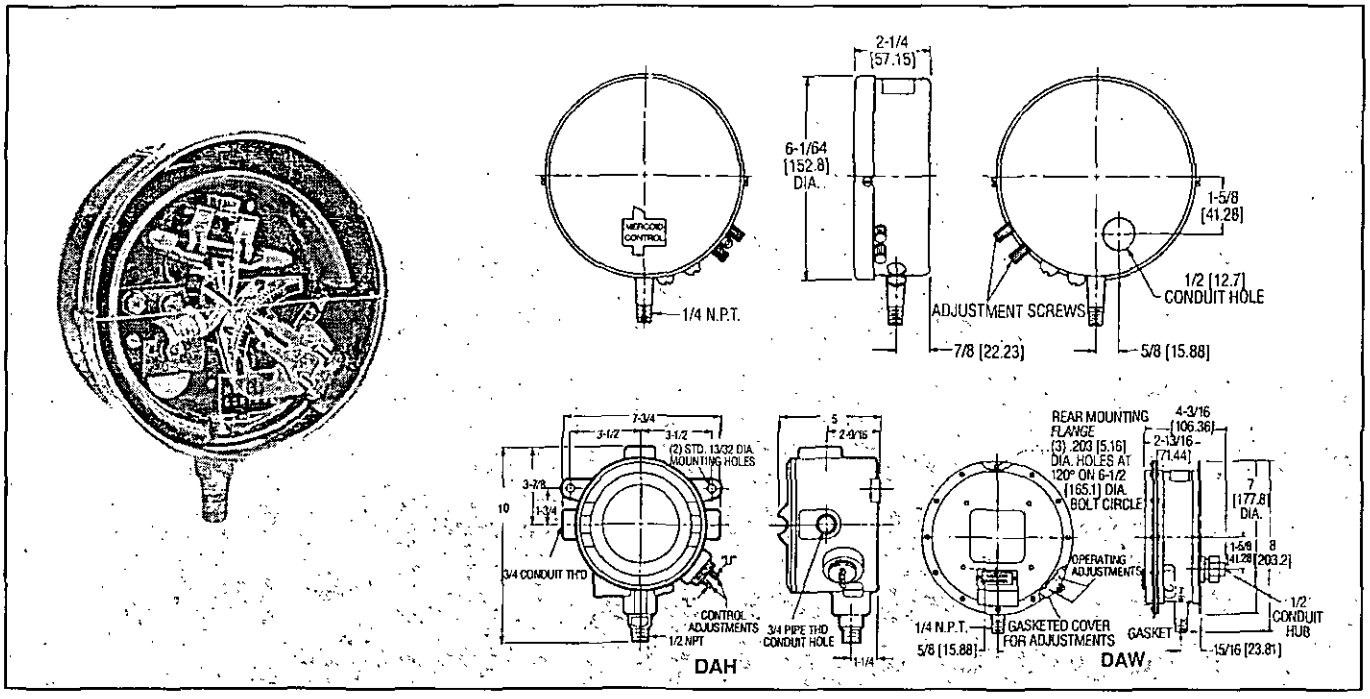
Representative

Mercoid®

Series DA/DS

Bourdon Tube Pressure Switches

Pressure Ranges to 8000 psi (551.6 bar)



Customers tell us that this is the best pressure switch made. The Mercoid D Series is one of the world's broadest lines of pressure switches. Whatever your application might be, it is most probable it can be fully satisfied with a D Series pressure switch.

The D Series has extremely high sensitivity and great repeatability. The DA Models are equipped with two external adjustments, one for setting high pressure operating point, the other for setting low pressure operating point. Deadband, the difference between high and low setpoints, is adjustable over the full scale. The DS Models are equipped with a single external adjustment for setting operating point only. The deadband is fixed at a factory setting and cannot be altered in the field. For switches choose between the snap action switch, hermetically sealed snap action switch and hermetically sealed mercury switch.

Options

Explosion-Proof Enclosure, Series DAH – Suitable for Class I, Groups C and D; NEMA 7; Class II, Groups E, F, G; Class III NEMA 9 and 9A, Division 1. Add "H" to model number after DA or DS.
Example: DAH-31-153-7

FM Approved: For general purpose and explosion-proof models listed above in agency approvals. Add "F" to model number after DA, DS, DAH or DSH.
Examples: DAF-31-153-7 or DAHF-31-153-7

Other Options (Consult Factory): DPDT switches or other switch types, fixed deadband mercury switch units for low deadband applications, manual reset operation, two-stage operation, Delrin® bushed movement for applications with high amounts of vibration and/or pulsation, fungus proofing, siphon, diaphragm seals, mounting flange and remote connection.

FEATURES

- Visible calibrated dial.
- On/off indication (except hermetically sealed snap switch models).
- Adjustable or fixed deadband.
- SPDT snap-action, hermetically sealed snap action or hermetically sealed mercury switch.
- External switch setpoint adjustments.
- Minimum deadband is obtainable at any point in the range.
- Pressure ranges of full vacuum to 8000 psig.
- UL listed, CSA approved. Many models FM approved.
- General purpose, weatherproof or explosion-proof enclosures.

SPECIFICATIONS

Wetted Materials: Brass, 403 SS, or 316 SS.
Temperature Limit: 180°F (82°C).
Pressure Limit: Maximum pressure of the operating range.
Enclosure Rating: General purpose, weatherproof or explosion-proof.
Repeatability: ±1% of full operating range, ±1.5% on DS-7300 models.
Switch Type: SPST mercury switch, SPDT mercury switch, SPDT snap switch, or SPDT hermetically sealed snap switch. Other circuit types available.
Electrical Rating: See model charts.
Electrical Connections: Screw terminal.
Conduit Connection: General purpose: 1/2" hole for conduit hub. Weatherproof: 1/2" conduit hub. Explosion-proof: 3/4" female NPT.
Process Connection: General purpose and weatherproof: 1/4" male NPT, 1/2" male NPT on ranges 15S and 16S. Explosion-proof: 1/2" male NPT and 1/4" female NPT.
Mounting Orientation: Vertical.
Set Point Adjustment: Thumbscrew.
Weight: General purpose: 4 lb (1.8 kg), weatherproof: 6 lb (2.7 kg), explosion-proof: 8 lb (3.5 kg).
Deadband: See model chart.
Agency Approvals: CE, UL, CSA, FM.

MODELS

D Series Pressure Switch with Mercury Switch and Weatherproof Enclosure

Bourdon Tube Material	Adjustable Operating Range (psig)	Adjustable Deadband: Minimum Deadband (psig)	SPDT 4A @ 120 V 2A @ 240 V AC/DC	SPST Open on Increase 10A @ 120 V 5A @ 240 V AC/DC	SPST Close on Increase 10A @ 120 V 5A @ 240 V AC/DC	Minimum Deadband (psig)	SPST Open on Increase 5A @ 120 VAC 2A @ 240 VAC 2.5A @ 120 VDC 1A @ 240 VDC	SPST Close on Increase 5A @ 120 VAC 2A @ 240 VAC 2.5A @ 120 VDC 1A @ 240 VDC
Brass	0-30" Hg Vac	2" Hg	DAW-33-153-2	DAW-33-2-2	DAW-33-3-2	1" Hg	DAW-533-2-2	DAW-533-3-2
	10" Hg Vac - 12	1	DAW-33-153-3	DAW-33-2-3	DAW-33-3-3	0.5	DAW-533-2-3	DAW-533-3-3
	25" Hg Vac - 50	3.5	DAW-33-153-27	DAW-33-2-27	DAW-33-3-27	2	DAW-533-2-27	DAW-533-3-27
	1/8 – 15	1	DAW-33-153-1	DAW-33-2-1	DAW-33-3-1	0.5	DAW-533-2-1	DAW-533-3-1
	1/8 – 20	1	DAW-33-153-3A	DAW-33-2-3A	DAW-33-3-3A	0.5	DAW-533-2-3A	DAW-533-3-3A
	1 – 35	1.75	DAW-33-153-4	DAW-33-2-4	DAW-33-3-4	0.75	DAW-533-2-4	DAW-533-3-4
	2 – 60	3	DAW-33-153-5	DAW-33-2-5	DAW-33-3-5	1	DAW-533-2-5	DAW-533-3-5
	5 – 100	3.75	DAW-33-153-6	DAW-33-2-6	DAW-33-3-6	2	DAW-533-2-6	DAW-533-3-6
	5 – 150	6	DAW-33-153-7	DAW-33-2-7	DAW-33-3-7	3	DAW-533-2-7	DAW-533-3-7
	10 – 200	8	DAW-33-153-8	DAW-33-2-8	DAW-33-3-8	3.5	DAW-533-2-8	DAW-533-3-8
	10 – 300	12	DAW-33-153-9	DAW-33-2-9	DAW-33-3-9	6	DAW-533-2-9	DAW-533-3-9
403 Stainless Steel	30" Hg Vac – 60	6	DAW-23-153-25S	DAW-23-2-25S	DAW-23-3-25S	3	DAW-523-2-25S	DAW-523-3-25S
	30" Hg Vac – 75	8	DAW-23-153-26S	DAW-23-2-26S	DAW-23-3-26S	4	DAW-523-2-26S	DAW-523-3-26S
	2 – 60	4	DAW-23-153-5S	DAW-23-2-5S	DAW-23-3-5S	2.5	DAW-523-2-5S	DAW-523-3-5S
	5 – 100	6	DAW-23-153-6S	DAW-23-2-6S	DAW-23-3-6S	3	DAW-523-2-6S	DAW-523-3-6S
	10 – 200	8	DAW-23-153-8S	DAW-23-2-8S	DAW-23-3-8S	4	DAW-523-2-8S	DAW-523-3-8S
	10 – 300	14	DAW-23-153-9S	DAW-23-2-9S	DAW-23-3-9S	7	DAW-523-2-9S	DAW-523-3-9S
	40 – 350	14	DAW-23-153-9AS	DAW-23-2-9AS	DAW-23-3-9AS	7	DAW-523-2-9AS	DAW-523-3-9AS
	25 – 600	25	DAW-23-153-10S	DAW-23-2-10S	DAW-23-3-10S	15	DAW-523-2-10S	DAW-523-3-10S
	50 – 1000	60	DAW-23-153-11S	DAW-23-2-11S	DAW-23-3-11S	40	DAW-523-2-11S	DAW-523-3-11S
	100 – 1500	90	DAW-23-153-12S	DAW-23-2-12S	DAW-23-3-12S	50	DAW-523-2-12S	DAW-523-3-12S
	300 – 2500	150	DAW-23-153-13S	DAW-23-2-13S	DAW-23-3-13S	100	DAW-523-2-13S	DAW-523-3-13S
	500 – 5000	450	DAW-23-153-15S	DAW-23-2-15S	DAW-23-3-15S	200	DAW-523-2-15S	DAW-523-3-15S
	800 – 8000	750	DAW-23-153-16S	DAW-23-2-16S	DAW-23-3-16S	400	DAW-523-2-16S	DAW-523-3-16S
316 Stainless Steel	30" Hg Vac – 75	7	DAW-43-153-26E	DAW-43-2-26E	DAW-43-3-26E	3.5	DAW-543-2-26E	DAW-543-3-26E
	5 – 75	3	DAW-43-153-23E	DAW-43-2-23E	DAW-43-3-23E	2	DAW-543-2-23E	DAW-543-3-23E
	10 –100	7	DAW-43-153-6E	DAW-43-2-6E	DAW-43-3-6E	3.5	DAW-543-2-6E	DAW-543-3-6E
	10 – 150	6	DAW-43-153-24E	DAW-43-2-24E	DAW-43-3-24E	3	DAW-543-2-24E	DAW-543-3-24E
	10 – 300	18	DAW-43-153-9E	DAW-43-2-9E	DAW-43-3-9E	5	DAW-543-2-9E	DAW-543-3-9E
	30 – 400	30	DAW-43-153-21E	DAW-43-2-21E	DAW-43-3-21E	15	DAW-543-2-21E	DAW-543-3-21E
	75 – 800	75	DAW-43-153-22E	DAW-43-2-22E	DAW-43-3-22E	35	DAW-543-2-22E	DAW-543-3-22E
	100 – 1000	100	DAW-43-153-11E	DAW-43-2-11E	DAW-43-3-11E	45	DAW-543-2-11E	DAW-543-3-11E
	200 - 2500	210	DAW-43-153-13E	DAW-43-2-13E	DAW-43-3-13E	110	DAW-543-2-13E	DAW-543-3-13E

D Series Pressure Switch with Snap Action Switch and Weatherproof Enclosure

Bourdon Tube Material	Adjustable Operating Range (psig)	Adjustable Deadband SPDT: 15A @ 120/240 VAC: Minimum Deadband (psig)	Model Number	Fixed Deadband SPDT: 15A @ 120/240 VAC: Fixed Deadband (psig)	Model Number	Hermetically Sealed, Fixed Deadband SPDT: 5A @ 120/240 VAC, 5A res.@30 VDC: Fixed Deadband (psig)	Model Number
Brass	0-30" Hg Vac	9" Hg	DAW-7033-153-2	3" Hg	DSW-7233-153-2	5" Hg	DSW-7333-153-2
	10" Hg Vac - 12	4	DAW-7033-153-3	1.5	DSW-7233-153-3	3	DSW-7333-153-3
	25" Hg Vac - 50	8	DAW-7033-153-27	2.5	DSW-7233-153-27	3.75	DSW-7333-153-27
	1/8 – 15	4	DAW-7033-153-1	1.5	DSW-7233-153-1	3	DSW-7333-153-1
	1/8 – 20	4	DAW-7033-153-3A	1.5	DSW-7233-153-3A	3	DSW-7333-153-3A
	1 – 35	5	DAW-7033-153-4	1.5	DSW-7233-153-4	3	DSW-7333-153-4
	2 – 60	6	DAW-7033-153-5	2	DSW-7233-153-5	3	DSW-7333-153-5
	5 – 100	9	DAW-7033-153-6	2.5	DSW-7233-153-6	3.75	DSW-7333-153-6
	5 – 150	16	DAW-7033-153-7	3	DSW-7233-153-7	5.25	DSW-7333-153-7
	10 – 200	16	DAW-7033-153-8	4	DSW-7233-153-8	6.75	DSW-7333-153-8
	10 – 300	25	DAW-7033-153-9	5	DSW-7233-153-9	9	DSW-7333-153-9
403 Stainless Steel	30" Hg Vac – 60	12	DAW-7023-153-25S	3.5	DSW-7223-153-25S	5.25	DSW-7323-153-25S
	30" Hg Vac – 75	15	DAW-7023-153-26S	3.5	DSW-7223-153-26S	5.25	DSW-7323-153-26S
	2 – 60	9	DAW-7023-153-5S	3	DSW-7223-153-5S	4.5	DSW-7323-153-5S
	5 – 100	13	DAW-7023-153-6S	3.5	DSW-7223-153-6S	5.25	DSW-7323-153-6S
	10 – 200	15	DAW-7023-153-8S	4	DSW-7223-153-8S	7.125	DSW-7323-153-8S
	10 – 300	19	DAW-7023-153-9S	6	DSW-7223-153-9S	10.5	DSW-7323-153-9S
	40 – 350	20	DAW-7023-153-9AS	6	DSW-7223-153-9AS	10.5	DSW-7323-153-9AS
	25 – 600	45	DAW-7023-153-10S	10	DSW-7223-153-10S	18	DSW-7323-153-10S
	50 – 1000	95	DAW-7023-153-11S	20	DSW-7223-153-11S	33	DSW-7323-153-11S
	100 – 1500	130	DAW-7023-153-12S	30	DSW-7223-153-12S	52.5	DSW-7323-153-12S
	300 – 2500	260	DAW-7023-153-13S	60	DSW-7223-153-13S	90	DSW-7323-153-13S
	500 – 5000	900	DAW-7023-153-15S	200	DSW-7223-153-15S	300	DSW-7323-153-15S
	800 – 8000	1500	DAW-7023-153-16S	500	DSW-7223-153-16S		
316 Stainless Steel	30" Hg Vac – 75	10	DAW-7043-153-26E	3.5	DSW-7243-153-26E	5.25	DSW-7343-153-26E
	5 – 75	8	DAW-7043-153-23E	4	DSW-7243-153-23E	6	DSW-7343-153-23E
	10 –100	10	DAW-7043-153-6E	3.5	DSW-7243-153-6E	5.25	DSW-7343-153-6E
	10 – 150	11	DAW-7043-153-24E	4	DSW-7243-153-24E	6.75	DSW-7343-153-24E
	10 – 300	28	DAW-7043-153-9E	8	DSW-7243-153-9E	12	DSW-7343-153-9E
	30 – 400	52	DAW-7043-153-21E	10	DSW-7243-153-21E	18	DSW-7343-153-21E
	75 – 800	120	DAW-7043-153-22E	25	DSW-7243-153-22E	37.5	DSW-7343-153-22E
	100 – 1000	190	DAW-7043-153-11E	35	DSW-7243-153-11E	52.5	DSW-7343-153-11E
	200 - 2500	400	DAW-7043-153-13E	75	DSW-7243-153-13E	112.5	DSW-7343-153-13E

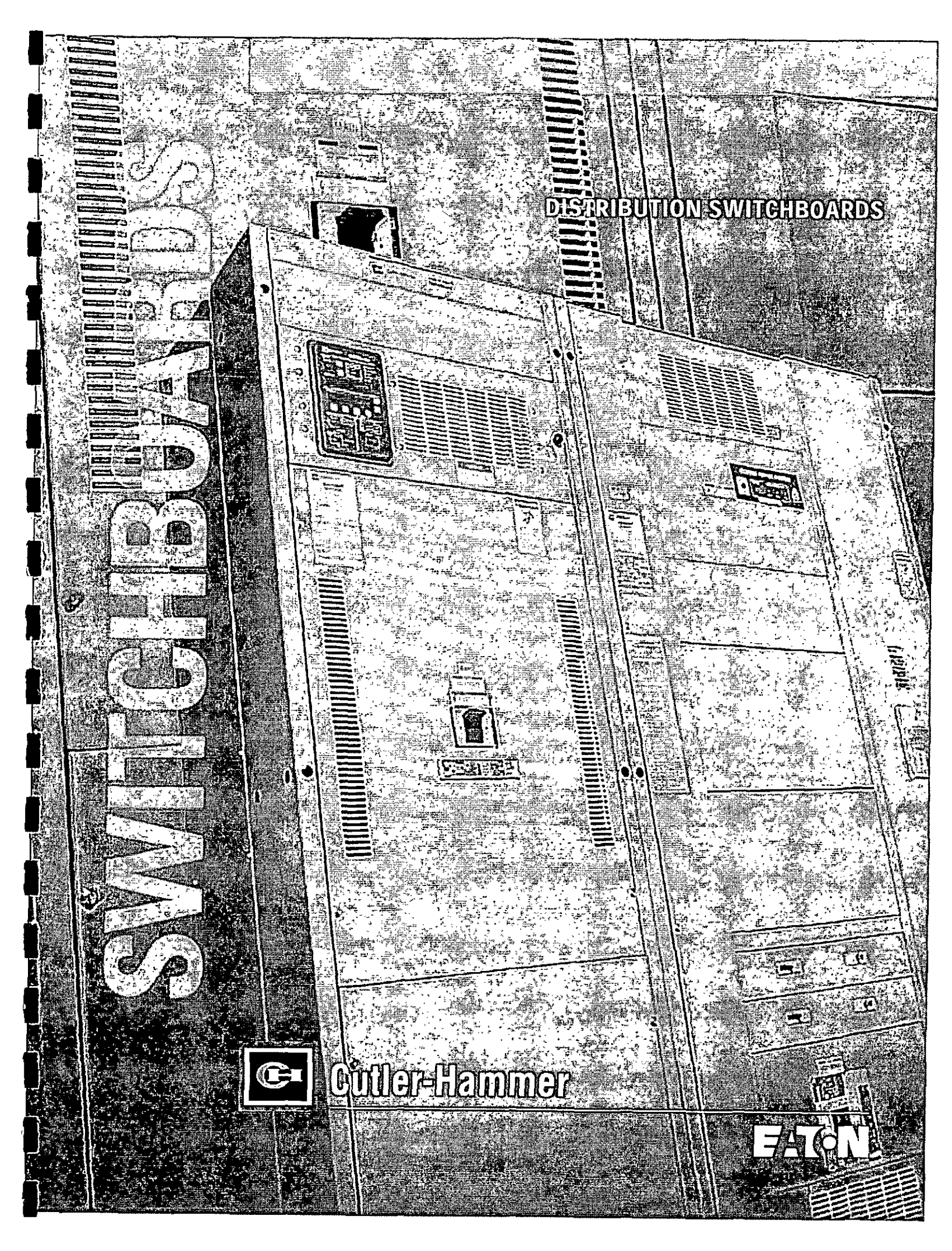
MODELS

D Series Pressure Switch with Mercury Switch and General Purpose Enclosure

Bourdon Tube Material	Adjustable Operating Range (psig)	Adjustable Deadband: Minimum Deadband (psig)	SPDT 4A @ 120 V 2A @ 240 V AC/DC	SPST Open on Increase 10A @ 120 V 5A @ 240 V AC/DC	SPST Close on Increase 10A @ 120 V 5A @ 240 V AC/DC	Minimum Deadband (psig)	SPST Open on Increase 5A @ 120 VAC 2A @ 240 VDC 2.5A @ 120 VDC 1A @ 240 VDC	SPST Close on Increase 5A @ 120 VAC 2A @ 240 VDC 2.5A @ 120 VDC 1A@ 240 VDC
Brass	0-30" Hg Vac	2" Hg	DA-31-153-2	DA-31-2-2	DA-31-3-2	1" Hg	DA-531-2-2	DA-531-3-2
	10" Hg Vac - 12	1	DA-31-153-3	DA-31-2-3	DA-31-3-3	0.5	DA-531-2-3	DA-531-3-3
	25" Hg Vac - 50	3.5	DA-31-153-27	DA-31-2-27	DA-31-3-27	2	DA-531-2-27	DA-531-3-27
	1/8 - 15	1	DA-31-153-1	DA-31-2-1	DA-31-3-1	0.5	DA-531-2-1	DA-531-3-1
	1/8 - 20	1	DA-31-153-3A	DA-31-2-3A	DA-31-3-3A	0.5	DA-531-2-3A	DA-531-3-3A
	1 - 35	1.75	DA-31-153-4	DA-31-2-4	DA-31-3-4	0.75	DA-531-2-4	DA-531-3-4
	2 - 60	3	DA-31-153-5	DA-31-2-5	DA-31-3-5	1	DA-531-2-5	DA-531-3-5
	5 - 100	3.75	DA-31-153-6	DA-31-2-6	DA-31-3-6	2	DA-531-2-6	DA-531-3-6
	5 - 150	6	DA-31-153-7	DA-31-2-7	DA-31-3-7	3	DA-531-2-7	DA-531-3-7
	10 - 200	8	DA-31-153-8	DA-31-2-8	DA-31-3-8	3.5	DA-531-2-8	DA-531-3-8
	10 - 300	12	DA-31-153-9	DA-31-2-9	DA-31-3-9	6	DA-531-2-9	DA-531-3-9
403 Stainless Steel	30" Hg Vac - 60	6	DA-21-153-25S	DA-21-2-25S	DA-21-3-25S	3	DA-521-2-25S	DA-521-3-25S
	30" Hg Vac - 75	8	DA-21-153-26S	DA-21-2-26S	DA-21-3-26S	4	DA-521-2-26S	DA-521-3-26S
	2 - 60	4	DA-21-153-5S	DA-21-2-5S	DA-21-3-5S	2.5	DA-521-2-5S	DA-521-3-5S
	5 - 100	6	DA-21-153-6S	DA-21-2-6S	DA-21-3-6S	3	DA-521-2-6S	DA-521-3-6S
	10 - 200	8	DA-21-153-8S	DA-21-2-8S	DA-21-3-8S	4	DA-521-2-8S	DA-521-3-8S
	10 - 300	14	DA-21-153-9S	DA-21-2-9S	DA-21-3-9S	7	DA-521-2-9S	DA-521-3-9S
	40 - 350	14	DA-21-153-9AS	DA-21-2-9AS	DA-21-3-9AS	7	DA-521-2-9AS	DA-521-3-9AS
	25 - 600	25	DA-21-153-10S	DA-21-2-10S	DA-21-3-10S	15	DA-521-2-10S	DA-521-3-10S
	50 - 1000	60	DA-21-153-11S	DA-21-2-11S	DA-21-3-11S	40	DA-521-2-11S	DA-521-3-11S
	100 - 1500	90	DA-21-153-12S	DA-21-2-12S	DA-21-3-12S	50	DA-521-2-12S	DA-521-3-12S
	300 - 2500	150	DA-21-153-13S	DA-21-2-13S	DA-21-3-13S	100	DA-521-2-13S	DA-521-3-13S
	500 - 5000	450	DA-21-153-15S	DA-21-2-15S	DA-21-3-15S	200	DA-521-2-15S	DA-521-3-15S
	800 - 8000	750	DA-21-153-16S	DA-21-2-16S	DA-21-3-16S	400	DA-521-2-16S	DA-521-3-16S
316 Stainless Steel	30" Hg Vac - 75	7	DA-41-153-26E	DA-41-2-26E	DA-41-3-26E	3.5	DA-541-2-26E	DA-541-3-26E
	5 - 75	3	DA-41-153-23E	DA-41-2-23E	DA-41-3-23E	2	DA-541-2-23E	DA-541-3-23E
	10 -100	7	DA-41-153-6E	DA-41-2-6E	DA-41-3-6E	3.5	DA-541-2-6E	DA-541-3-6E
	10 - 150	6	DA-41-153-24E	DA-41-2-24E	DA-41-3-24E	3	DA-541-2-24E	DA-541-3-24E
	10 - 300	18	DA-41-153-9E	DA-41-2-9E	DA-41-3-9E	5	DA-541-2-9E	DA-541-3-9E
	30 - 400	30	DA-41-153-21E	DA-41-2-21E	DA-41-3-21E	15	DA-541-2-21E	DA-541-3-21E
	75 - 800	75	DA-41-153-22E	DA-41-2-22E	DA-41-3-22E	35	DA-541-2-22E	DA-541-3-22E
	100 - 1000	100	DA-41-153-11E	DA-41-2-11E	DA-41-3-11E	45	DA-541-2-11E	DA-541-3-11E
	200 - 2500	210	DA-41-153-13E	DA-41-2-13E	DA-41-3-13E	110	DA-541-2-13E	DA-541-3-13E

D Series Pressure Switch with Snap Action Switch and General Purpose Enclosure

Bourdon Tube Material	Adjustable Operating Range (psig)	Adjustable Deadband SPDT: 15A @ 120/240 VAC: Minimum Deadband (psig)	Model Number	Fixed Deadband SPDT: 15A @ 120/240 AC: Fixed Deadband (psig)	Model Number	Hermetically Sealed, Fixed Deadband SPDT: 5A @ 120/240 VAC, 5A res. @ 30 VDC: Fixed Deadband (psig)	Model Number
Brass	0-30" Hg Vac	9" Hg	DA-7031-153-2	3" Hg	DS-7231-153-2	5" Hg	DS-7331-153-2
	10" Hg Vac - 12	4	DA-7031-153-3	1.5	DS-7231-153-3	3	DS-7331-153-3
	25" Hg Vac - 50	8	DA-7031-153-27	2.5	DS-7231-153-27	3.75	DS-7331-153-27
	1/8 - 15	4	DA-7031-153-1	1.5	DS-7231-153-1	3	DS-7331-153-1
	1/8 - 20	4	DA-7031-153-3A	1.5	DS-7231-153-3A	3	DS-7331-153-3A
	1 - 35	5	DA-7031-153-4	1.5	DS-7231-153-4	3	DS-7331-153-4
	2 - 60	6	DA-7031-153-5	2	DS-7231-153-5	3	DS-7331-153-5
	5 - 100	9	DA-7031-153-6	2.5	DS-7231-153-6	3.75	DS-7331-153-6
	5 - 150	16	DA-7031-153-7	3	DS-7231-153-7	5.25	DS-7331-153-7
	10 - 200	16	DA-7031-153-8	4	DS-7231-153-8	6.75	DS-7331-153-8
	10 - 300	25	DA-7031-153-9	5	DS-7231-153-9	9	DS-7331-153-9
403 Stainless Steel	30" Hg Vac - 60	12	DA-7021-153-25S	3.5	DS-7221-153-25S	5.25	DS-7321-153-25S
	30" Hg Vac - 75	15	DA-7021-153-26S	3.5	DS-7221-153-26S	5.25	DS-7321-153-26S
	2 - 60	9	DA-7021-153-5S	3	DS-7221-153-5S	4.5	DS-7321-153-5S
	5 - 100	13	DA-7021-153-6S	3.5	DS-7221-153-6S	5.25	DS-7321-153-6S
	10 - 200	15	DA-7021-153-8S	4	DS-7221-153-8S	7.125	DS-7321-153-8S
	10 - 300	19	DA-7021-153-9S	6	DS-7221-153-9S	10.5	DS-7321-153-9S
	40 - 350	20	DA-7021-153-9AS	6	DS-7221-153-9AS	10.5	DS-7321-153-9AS
	25 - 600	45	DA-7021-153-10S	10	DS-7221-153-10S	18	DS-7321-153-10S
	50 - 1000	95	DA-7021-153-11S	20	DS-7221-153-11S	33	DS-7321-153-11S
	100 - 1500	130	DA-7021-153-12S	30	DS-7221-153-12S	52.5	DS-7321-153-12S
	300 - 2500	260	DA-7021-153-13S	60	DS-7221-153-13S	90	DS-7321-153-13S
	500 - 5000	900	DA-7021-153-15S	200	DS-7221-153-15S	300	DS-7321-153-15S
	800 - 8000	1500	DA-7021-153-16S	500	DS-7221-153-16S		
316 Stainless Steel	30" Hg Vac - 75	10	DA-7041-153-26E	3.5	DS-7241-153-26E	5.25	DS-7341-153-26E
	5 - 75	8	DA-7041-153-23E	4	DS-7241-153-23E	6	DS-7341-153-23E
	10 -100	10	DA-7041-153-6E	3.5	DS-7241-153-6E	5.25	DS-7341-153-6E
	10 - 150	11	DA-7041-153-24E	4	DS-7241-153-24E	6.75	DS-7341-153-24E
	10 - 300	28	DA-7041-153-9E	8	DS-7241-153-9E	12	DS-7341-153-9E
	30 - 400	52	DA-7041-153-21E	10	DS-7241-153-21E	18	DS-7341-153-21E
	75 - 800	120	DA-7041-153-22E	25	DS-7241-153-22E	37.5	DS-7341-153-22E
	100 - 1000	190	DA-7041-153-11E	35	DS-7241-153-11E	52.5	DS-7341-153-11E
	200 - 2500	400	DA-7041-153-13E	75	DS-7241-153-13E	112.5	DS-7341-153-13E

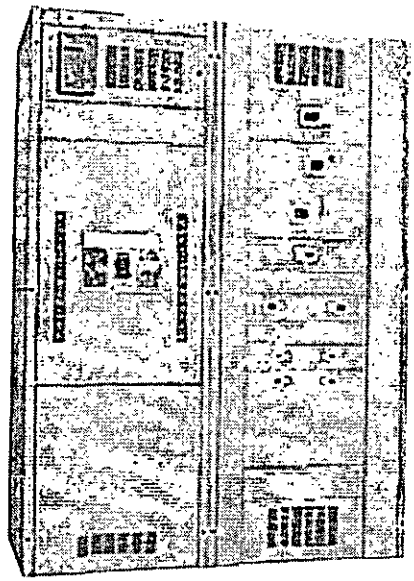

DISTRIBUTION SWITCHBOARDS
Cutler-Hammer
EATON

Pow-R-Line C

Group Mounted Distribution Switchboards

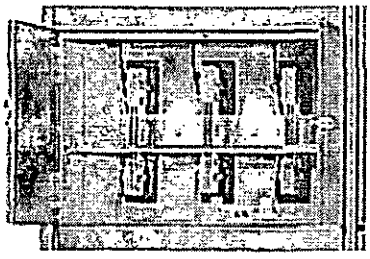
Pow-R-Line C Switchboards

Cutler-Hammer Distribution Switchboards combine a space-saving design with modular construction and increased systems ratings to provide economical and dependable electrical system distribution and protection.



Features

- 6000A maximum main bus rating.
- 600V AC and below.
- Front or rear accessible.
- Type 1 or Type 3R enclosures.
- ANSI-61 gray powder coat paint finish.
- The IQ family of microprocessor-based metering and monitoring devices.
- Utility metering provisions.
- Transient Voltage Surge Suppression (TVSS).
- Ground fault protection on mains and distribution devices.
- Busway and transformer connections.
- Complete protective device accessory capability.
- 65 kAIC standard bus bracing. Optional 100 or 200 kAIC.
- Standard tin-plated aluminum bus. Optional copper or silver-plated copper bus.
- Meet NEMA Standard PB-2 and UL 891.
- Seismically qualified.



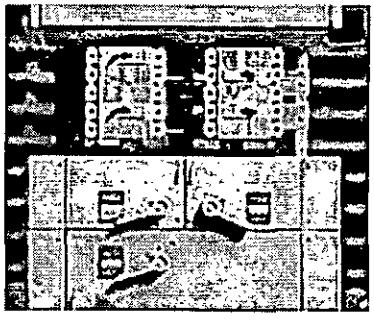
Utility metering compartments are available to meet standard or specific requirements. Units can be arranged for hot or cold sequence.

Main Devices

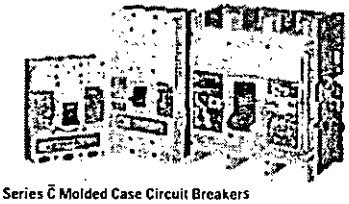
- DS/DSL Power Circuit Breakers, 800-4000A, fixed or drawout.
- SPB Insulated Case Circuit Breakers, 800-5000A fixed, 800-4000A drawout.
- Magnum DS Power Circuit Breakers, 800-5000A, fixed or drawout.
- Molded case circuit breakers, 400-2500A, fixed mounted.
- Bolted pressure switches, 800-5000A.
- FDPW Fusible Switches, 400-1200A.

Group Mounted Distribution Devices

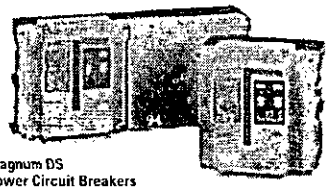
- Molded case circuit breakers, 15-1200A.
- FDPW Fusible Switches, 30-1200A.



The single chassis design provides device flexibility, accommodating both circuit breaker and fusible switches.



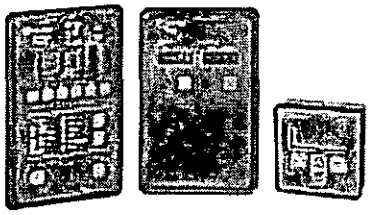
Series C Molded Case Circuit Breakers



Magnum DS Power Circuit Breakers

IQ Metering and Monitoring Devices

These microprocessor-based devices provide more usable information with greater accuracy than is usually obtainable with conventional meters and switches. IQ devices monitor and display electrical data from basic amperes and volts to complete system parameters including detailed power quality information.

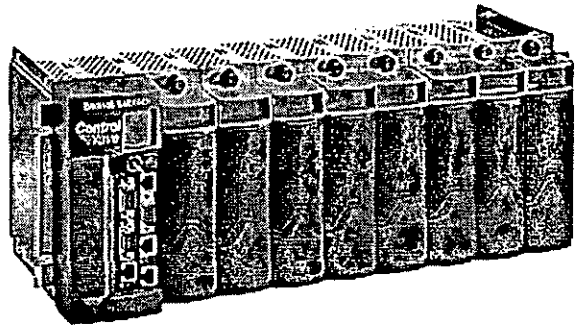


IQ Analyzer **IQ Data** **IQ 200**

Product Data Sheet
420DS-1h
01/19/05

ControlWave AUTOMATION

ControlWave®
Process Automation Controller



ControlWave is a highly adaptable, high performance Process Automation Controller with exceptional networking capability to provide a complete Process Automation Management Solution. Designed with a great emphasis on scalability and modularity, ControlWave can be configured to maximize the performance of a wide range of control systems, from small or mid-size applications to large ones. Additionally, due to its small form factor and rugged industrial design, **Control**Wave offers an outstanding ability to match the requirements of the most demanding process plant and remote SCADA system environments. Above all, Bristol Babcock has developed this innovative controller to provide cost-effective solutions by minimizing the time required for installation and configuration.

Through this new open architecture, **Control**Wave provides an ideal hybrid union of PLC, RTU and DCS without compromising the unique features and capabilities of each product. Consequently, the **Control**Wave Process Automation Controller not only introduces the great possibilities of an open architecture for emerging communication standards, but it also provides a simple solution for existing networks. From its conception, **Control**Wave was intended as a very flexible system capable of satisfying the requirements of local, expanded, remote and distributed I/O combinations. It is widely accepted as a scalable platform because it can be used for small applications using a single rack, but it can also be expanded to large applications spanning an entire plant.

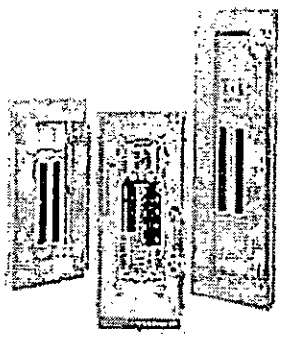
Hardware Features

- 586 based processor provides unparalleled performance
- Up to three 100/10 MB Ethernet ports
- Ethernet remote I/O
- Up to four serial communication ports
- 2, 4, and 8 I/O slot panel mount stainless steel chassis, panel or 19" rack mount on 8 slot chassis
- Single and double density I/O modules
- Hot Swap I/O replacement
- Security key-lock to prevent unauthorized access
- Internal loop power for I/O simplifies installation
- AOs maintain last/preset value on CPU Watchdog
- DOs maintain last or zero value on CPU Watchdog
- Wide temperature range (-40 to +70°C)
- Class I, Div. 2 hazardous location and CE approval
- Open, industry standards for programming, configuration and communication

PANELBOARD SELECTION

The Cutler-Hammer Pow-R-Line C Panelboard Family... From the Industry Leader in New Panelboard Products

Pow-R-Line 1a and 2a



Type PRL1a
Bolt-On or Plug-On Circuit Breakers
240V AC

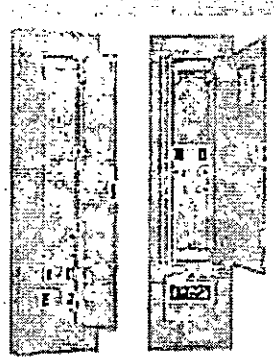
Type PRL2a
Bolt-On Circuit Breakers
240V or 480Y/277V AC
125V DC

Main Lugs Only
400A Maximum

Main Circuit Breaker
400A Maximum

Branch Circuit Breakers 1-, 2-, 3-Poles
100A Maximum

Pow-R-Line 3a



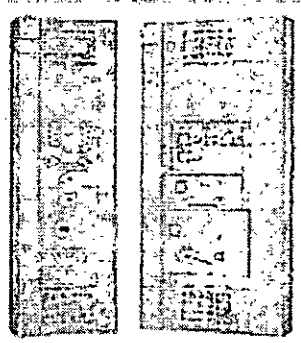
Type PRL3a
Bolt-On Circuit Breakers
240V, 480V or 600V AC, 250V DC

Main Lugs Only
800A Maximum

Main Circuit Breaker
800A Maximum

Branch Circuit Breakers 1-, 2-, 3-Poles
225A Maximum

Pow-R-Line 4



Type PRL4
Circuit Breakers or Fusible Switches
240V, 480V or 600V AC, 250V DC

Main Lugs Only
1200A Maximum

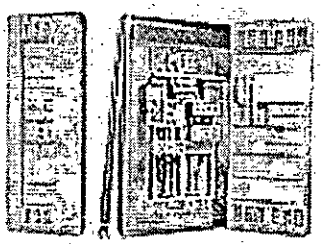
Main Circuit Breaker
1200A Maximum

Main Fusible Switch
1200A Maximum

Branch Circuit Breakers 1-, 2-, 3-Poles
1200A Maximum

Branch Fusible Switches 2-, 3-Poles
1200A Maximum

Pow-R-Line 5P



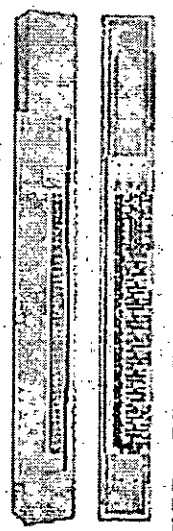
Type PRL5P
Plug-On Circuit Breakers
240V, 480Y or 600Y AC, 250V DC

Main Lugs Only
1200A Maximum

Main Circuit Breaker
1200A Maximum

Branch Circuit Breakers 1-, 2-, 3-Poles
1200A Maximum

Pow-R-Line Column Type



Solenoid Switching
30A Maximum

Conventional
225A Maximum

Type PRL1a-LX
Bolt-On
Circuit Breakers
240V AC

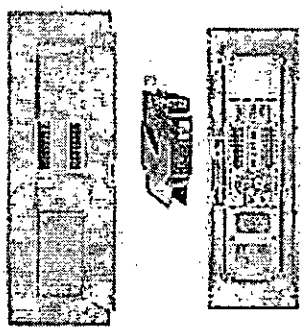
Type PRL2a-LX
Bolt-On
Circuit Breakers
240V or
480Y/277V AC
125V DC

Main Lugs Only
225A Maximum

Main Circuit
Breaker
225A Maximum

Branch Circuit
Breakers
1-, 2-, 3-Poles
100A Maximum

Pow-R-Command



Integral Microprocessor-Based
Lighting Control Systems

Type Pow-R-Command
Bolt-On Circuit Breakers
240V or 480Y/277V AC

Main Lugs Only
400A Maximum

Main Circuit Breaker
400A Maximum

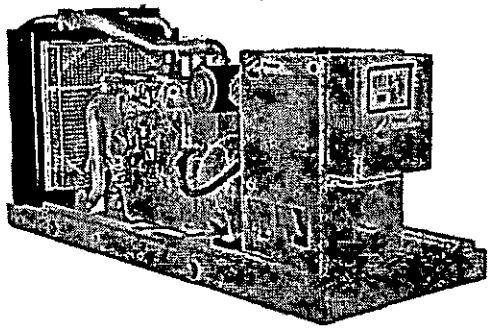
Branch Circuit Breakers 1-, 2-, 3-Poles
Solenoid Switching - 30A Maximum
Conventional - 225A Maximum

Power Generation

Diesel Generator Set

Model DFEG 60 Hz
EPA Emissions

350 kW, 438 kVA Standby
320 kW, 400 kVA Prime



Description

The Cummins Power Generation DF-series commercial generator set is a fully integrated power generation system providing optimum performance, reliability, and versatility for stationary standby or prime power applications.

A primary feature of the DF GenSet is strong motor-starting capability and fast recovery from transient load changes. The torque-matched system includes a heavy-duty Cummins 4-cycle diesel engine, an AC alternator with high motor-starting kVA capacity, and an electronic voltage regulator with three-phase sensing for precise regulation under steady-state or transient loads. The DF GenSet accepts 100% of the nameplate standby rating in one step, in compliance with NFPA 110 requirements.

The standard PowerCommand® digital electronic control is an integrated system that combines engine and alternator controls for high reliability and optimum GenSet performance.

Optional weather-protective enclosures and coolant heaters shield the generator set from extreme operating conditions. Environmental concerns are addressed by low exhaust emission engines, sound-attenuated enclosures, exhaust silencers, and dual-wall fuel tanks. A wide range of options, accessories, and services are available, allowing configuration to your specific power generation needs.

Every production unit is factory tested at rated load and power factor. This testing includes demonstration of rated power and single-step rated load pickup. Cummins Power Generation manufacturing facilities are registered to ISO9001 quality standards, emphasizing our commitment to high quality in the design, manufacture, and support of our products. The generator set is CSA certified and is available as UL2200 Listed. The PowerCommand control is UL508 Listed.

All Cummins Power Generation systems are backed by a comprehensive warranty program and supported by a worldwide network of 170 distributors and service branches to assist with warranty, service, parts, and planned maintenance support.

Features

UL Listed Generator Set - The complete generator set assembly is available Listed to UL 2200.

Low Exhaust Emissions - Engine certified to U.S. EPA Nonroad Source Emission Standards, 40 CFR 89, Tier 2.

Cummins Heavy-Duty Engine - Rugged 4-cycle industrial diesel delivers reliable power, low emissions, and fast response to load changes.

Alternator - Several alternator sizes offer selectable motor starting capability with low reactance 2/3 pitch windings; low waveform distortion with non-linear loads, fault clearing short-circuit capability, and class H insulation. The alternator electrical insulation system is UL1446 Recognized.

Permanent Magnet Generator (PMG) - Offers enhanced motor starting and fault clearing short circuit capability.

Control System - The PowerCommand electronic control is standard equipment and provides total genset system integration, including automatic remote starting/stopping, precise frequency and voltage regulation, alarm and status message display, AmpSentry™ protection, output metering, auto-shutdown at fault detection, and NFPA 110 compliance. PowerCommand control is Listed to UL508.

Cooling System - Provides reliable running at the rated power level, at up to 50°C ambient temperature.

Integral Vibration Isolation - Robust skid base supports the engine, alternator, and radiator on isolators, minimizing transmitted vibration.

E-Coat Finish - Dual electro-deposition paint system provides high resistance to scratches, corrosion, or fading.

Enclosures - Optional weather-protective and sound-attenuated enclosures are available.

Fuel Tanks - Dual wall sub-base fuel tanks are also offered.

Certifications - Generator sets are designed, manufactured, tested, and certified to relevant UL, NFPA, ISO, IEC, and CSA standards.

Warranty and Service - Backed by a comprehensive warranty and worldwide distributor network.

Generator Set

The general specifications provide representative configuration details. Consult the outline drawing for installation design.

Specifications – General

See outline drawing 500-3326 for installation design specifications.

Unit Width, in (mm)	60.0 (1524)
Unit Height, in (mm)	71.3 (1812)
Unit Length, in (mm)	152.1 (3864)
Unit Dry Weight, lb (kg)	8500 (3856)
Unit Wet Weight, lb (kg)	8800 (3992)
Rated Speed, rpm	1800
Voltage Regulation, No Load to Full Load	±0.5%
Random Voltage Variation	±0.25%
Frequency Regulation	Isochronous
Random Frequency Variation	±0.25%
Radio Frequency Interference	IEC 801.2, Level 4 Electrostatic Discharge IEC 801.3, Level 3 Radiated Susceptibility

Cooling	Standby	Prime
Standard Set-Mounted Radiator Cooling (Dwg. 500-3326)		
Set Coolant Capacity, US Gal (L)	15.3 (57.9)	15.3 (57.9)
Total Heat Rejected from Cooling System, BTU/min (MJ/min)	11300.0 (12.0)	10650.0 (11.3)
Heat Radiated to Room, BTU/min (MJ/min)	3485.0 (3.7)	3320.0 (3.5)

Air		
Combustion Air, scfm (m^3/min)	1145.0 (32.4)	1100.0 (31.1)
Alternator Cooling Air, scfm (m^3/min)	2190.0 (62.0)	2190.0 (62.0)
Radiator Cooling Air, scfm (m^3/min)	25000.0 (707.5)	25000.0 (707.5)
Max. Static Restriction, in H_2O (Pa)	0.5 (124.5)	0.5 (124.5)

Rating Definitions

Standby Rating based on: Applicable for supplying emergency power for the duration of normal power interruption. No sustained overload capability is available for this rating. (Equivalent to Fuel Stop Power in accordance with ISO3046, AS2789, DIN6271 and BS5514). Nominally rated.

Prime (Unlimited Running Time) Rating based on: Applicable for supplying power in lieu of commercially purchased power. Prime power is the maximum power available at a variable load for an unlimited number of hours. A 10% overload capability is available for limited time. (Equivalent to Prime Power in accordance with ISO8528 and Overload Power in accordance with ISO3046, AS2789, DIN6271, and BS5514). This rating is not applicable to all generator set models.

Site Derating Factors

Genset may be operated up to 3650 m (11900 ft) and 40°C (104°F) without power deration. For sustained operation above these conditions, derate by 1.8% per 305 m (1000 ft) and 10% per 10°C (5.6% per 10°F).

Engine

Cummins heavy duty diesel engines use advanced combustion technology for reliable and stable power, low emissions, and fast response to sudden load changes.

Electronic governing provides precise speed regulation, especially useful for applications requiring constant (isochronous) frequency regulation such as Uninterruptible Power Supply (UPS) systems, non-linear loads, or sensitive electronic loads. Optional coolant heaters are recommended for all emergency standby installations or for any application requiring fast load acceptance after start-up.

Note: Features included with the engine: battery charging alternator, fuel/water separator, shutdown low coolant and bypass oil filtration.

Specifications – Engine

Base Engine	Cummins Model QSX15-G9 Nonroad 2, Turbo-charged with air-to-air charge air cooling, diesel-fueled
Displacement in^3 (L)	912.0 (14.9)
Overspeed Limit, rpm	2150 ±50
Regenerative Power, kW	52.00
Cylinder Block Configuration	Cast iron with replaceable wet liners, In-Line 6 cylinder
Battery Capacity	900 amps minimum at ambient temperature of 32°F (0°C)
Battery Charging Alternator	35 amps
Starting Voltage	24-volt, negative ground
Lube Oil Filter Types	Single spin-on combination element with full flow and bypass filtration
Standard Cooling System	104° F (40° C) ambient radiator

Power Output	**Standby**	**Prime**
Gross Engine Power Output, bhp (kWm)	755.0 (563.0)	680.0 (507.3)
BMEP at Rated Load, psi (kPa)	249.0 (1716.8)	229.0 (1578.9)
Bore, in. (mm)	5.39 (136.9)	5.39 (136.9)
Stroke, in. (mm)	6.65 (168.9)	6.65 (168.9)
Piston Speed, ft/min (m/s)	1995.0 (10.1)	1995.0 (10.1)
Compression Ratio	17.0:1	17.0:1
Lube Oil Capacity, qt. (L)	88.0 (83.3)	88.0 (83.3)
Fuel Flow		
Fuel Flow at Rated Load, US Gal/hr (L/hr)	112.0 (423.9)	112.0 (423.9)
Maximum Inlet Restriction, in. Hg (mm Hg)	5.0 (127.0)	5.0 (127.0)
Maximum Return Restriction, in. Hg (mm Hg)	6.5 (165.1)	6.5 (165.1)
Air Cleaner		
Maximum Air Cleaner Restriction, in. H_2O (kPa)	25.0 (6.2)	25.0 (6.2)
Exhaust		
Exhaust Flow at Rated Load, cfm (m^3/min)	2600.0 (73.6)	2505.0 (70.9)
Exhaust Temperature, °F (°C)	810.0 (432.2)	805.0 (429.4)
Max Back Pressure, in. H_2O (kPa)	41.0 (10.2)	41.0 (10.2)

Fuel System	Full Authority Electronic (FAE) Cummins HPI-TP

Fuel Consumption		**Standby**				**Prime**			
60 Hz Ratings, kW (kVA)		**350 (438)**				**320 (400)**			
	Load	1/4	1/2	3/4	Full	1/4	1/2	3/4	Full
	US Gal/hr	9.0	14.3	19.4	24.1	8.5	13.4	18.1	22.1
	L/hr	34	54	73	91	32	51	69	84

Alternator

Single-bearing alternators couple directly to the engine flywheel with flexible discs for drivetrain reliability and durability. No gear reducers or speed changers are used. Two-thirds pitch windings eliminate third-order harmonic content of the AC voltage waveform and provide the standardization desired for paralleling of generator sets.

A Permanent Magnet Generator (PMG) excitation system limits voltage dip during transient load application, sustains 3-phase short circuit current at approximately three times rated for up to 10 seconds, and is resistant to harmful effects of harmonics generated by non-linear loads. The alternator delivers excellent performance in applications containing large motors or sensitive electronics.

Various alternator sizes are available to meet individual application needs. Alternator sizes are differentiated by maximum winding temperature rise at the generator set standby or prime rating when operated in a 40°C ambient environment. Available temperature rises range from 80°C to 150°C. Not all temperature rise selections are available on all models. Lower temperature rise is accomplished using larger alternators at lower current density. Lower temperature rise alternators have high motor starting kVA, lower voltage dip upon load application, and they are generally recommended to limit voltage distortion and heating due to harmonics induced by non-linear loads.

Alternator Application Notes

Alternator Space Heater - is recommended to inhibit condensation.

Available Output Voltages

Three Phase

[ ] 110/190
[ ] 110/220
[ ] 115/200
[ ] 115/230
[ ] 120/208
[ ] 127/220
[ ] 139/240
[ ] 220/380
[ ] 230/400
[ ] 240/416
[ ] 255/440
[ ] 277/480
[ ] 347/600

Specifications – Alternator

Design	Brushless, 4-pole, drip-proof revolving field
Stator	2/3 pitch
Rotor	Direct-coupled by flexible disc
Insulation System	*Class H per NEMA MG1-1.65 and BS2757*
Standard Temperature Rise	125(degree)C standby
Exciter Type	Permanent Magnet Generator (PMG)
Phase Rotation	A (U), B (V), C (W)
Alternator Cooling	Direct-drive centrifugal blower
AC Waveform Total Harmonic Distortion	<5% total no load to full linear load <3% for any single harmonic
Telephone Influence Factor (TIF)	<50 per NEMA MG1-22.43.
Telephone Harmonic Factor (THF)	<3

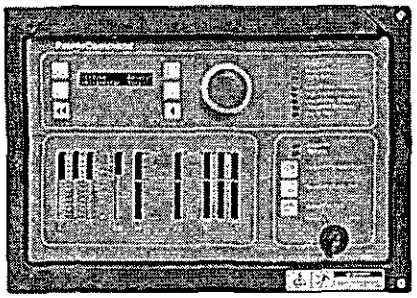
Three Phase Table[1]		**105° C**	**105° C**	**125° C**	**125° C**	**125° C**	**125° C**	**125° C**	**150° C**	**150° C**	**150° C**	**150° C**
Feature Code		B259	B301	B258	B252	B414	B246	B300	B426	B413	B424	B419
Alternator Data Sheet Number		306	305	305	305	306	305	305	305	305	305	305
Voltage Ranges		110/190 Thru 139/240 *220/380* Thru 277/480	347/600	110/190 Thru 139/240 *220/380* Thru 277/480	120/208 Thru 139/240 *240/416* Thru 277/480	120/208 Thru 139/240 *240/416* Thru 277/480	277/480	347/600	110/190 Thru 139/240 *220/380* Thru 277/480	120/208 Thru 139/240 *240/416* Thru 277/480	277/480	347/600
Surge kW		512	515	509	512	514	515	515	509	512	515	515
Motor Starting kVA (at 90% sustained voltage)	PMG	1896	1749	1749	1749	1896	1749	1749	1749	1749	1749	1749

Full Load Current - Amps at Standby Rating	110/190	120/208	110/220	115/230	139/240	220/380	230/400	240/416	255/440	277/480	347/600
	1329	1214	1148	1098	1052	665	631	607	574	526	421

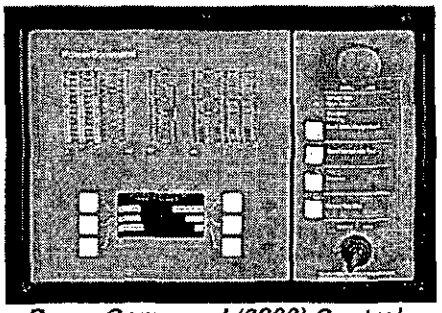
Notes:

1. ***Single Phase Capability:*** *Single phase power can be taken from a three phase generator set at up to 40% of the generator set* nameplate kW rating at unity power factor.

Control System



PowerCommand (2100) Control



PowerCommand (3200) Control

PowerCommand Control with AmpSentry™ Protection

- The PowerCommand Control is an integrated generator set control system providing governing, voltage regulation, engine protection, and operator interface functions.
- PowerCommand Controls include integral AmpSentry protection. AmpSentry provides a full range of alternator protection functions that are matched to the alternator provided.
- Controls provided include Battery monitoring and testing features, and Smart-Starting control system.
- InPower PC-based service tool available for detailed diagnostics
- Available with Echelon LonWorks network interface
- NEMA 3R enclosure (2100 only)
- *Suitable for operation in ambient temperatures from –40C to +70C, and altitudes to 13,000 feet (5000 meters)*
- Prototype tested; UL, CSA, and CE compliant

AmpSentry AC Protection

- Overcurrent and short circuit shutdown
- Overcurrent warning
- Single & 3-phase fault regulation
- Over and under voltage shutdown
- Over and under frequency shutdown
- Overload warning with alarm contact
- Reverse power and reverse Var
- Excitation fault (2100 only)

Engine Protection

- Overspeed shutdown
- Low oil pressure warning and shutdown
- High coolant temperature warning and shutdown
- High oil temperature warning
- Low coolant level warning or shutdown
- Low coolant temperature warning
- High and low battery voltage
- Weak battery
- Dead battery
- Fail to start (overcrank) shutdown
- Fail to crank shutdown
- Redundant start disconnect
- Cranking lockout
- Sensor failure indication

Operator Interface

- OFF/MANUAL/AUTO mode switch
- MANUAL RUN/STOP switch
- Panel lamp/reset switch
- Emergency Stop switch
- Alpha-numeric display with pushbutton access, for viewing engine and alternator data and providing setup, controls, and adjustments
- LED lamps indicating genset running, not *in auto, common warning, common* shutdown
- (5) configurable LED lamps (2100 only)
- LED Bargraph AC data display
- Panel Lighting with switch and timer

Alternator Data

- Line to Line and Line to Neutral AC volts
- 3-phase AC current
- Frequency
- Total and individual phase kW and kVA

Engine Data

- DC voltage
- Lube oil pressure
- Coolant temperature
- Lube oil temperature
- FAE engine data (varies with engine)

Other Data

- Genset model data
- Start attempts, Starts, running hours
- KW hours (total and since reset)
- Fault history
- Load Profile (Hours less than 30% and hours more than 90% load)
- System Data Display (optional with network and other PowerCommand gensets or transfer switches)

Governing

- Integrated digital electronic isochronous governor
- Temperature dynamic governing
- Smart idle speed mode
- Glow plug control (some models)

Voltage Regulation

- Integrated digital electronic voltage regulator
- 3-phase line to neutral sensing
- PMG Control Interface
- Single and three phase fault regulation
- Configurable Torque Matching

Control Functions

- Data logging on faults
- Fault simulation (requires InPower)
- Time delay start and cooldown
- Cycle cranking
- (4) Configurable inputs
- (4) Configurable outputs (2100 only)

Options

- ❑ Open Transition Power Transfer Control
- ❑ Fast Closed Transition Power Transfer Control (3200 Control)
- ❑ Ramping Closed Transition Power Transfer (3200 Control)
- ❑ Paralleling (3200 Control)
- ❑ Key-type mode switch
- ❑ Ground fault module
- ❑ Exhaust Temperature Monitor
- ❑ Echelon LonWorks interface
- ❑ Digital input and output module(s) (loose)
- ❑ Remote Annunciator (loose)
- ❑ (8) configurable network inputs and (16) outputs

Generator Set Options

Engine

[ ] 208/240/480 V thermostatically controlled coolant heater for ambient above 40°F (4.5°C)
[ ] 208/240/480 V thermostatically controlled coolant heater for ambient below 40°F (4.5°C)
[ ] 120 V 300 W lube oil heater
[ ] Heavy-duty air cleaner with safety element

Cooling System

[ ] 125°F (50°C) *ambient radiator*

Fuel System

[ ] 300 Gal (1136 L) Sub-base tank
[ ] 400 Gal (1514 L) Sub-base tank
[ ] 500 Gal (1893 L) Sub-base tank
[ ] 600 Gal (2271 L) Sub-base tank
[ ] 660 Gal (2498 L) Sub-base tank
[ ] 850 Gal (3218 L) Sub-base tank
[ ] 1700 Gal (6435 L) Sub-base tank

Alternator

[ ] 80°C rise alternator
[ ] 105°C rise alternator
[ ] 150°C rise alternator
[ ] 120/240 V, 300 W anti-condensation heater

Control Panel

[ ] 120/240 V, 150 W control anti-condensation space heater
[ ] Ground fault alarm
[ ] Paralleling configuration
[ ] Power transfer control
[ ] *Remote fault signal package*
[ ] Run relay package

Exhaust System

[ ] Critical grade exhaust silencer
[ ] Exhaust packages
[ ] Industrial grade exhaust silencer
[ ] Residential grade exhaust silencer

Generator Set

[ ] AC entrance box
[ ] Batteries
[ ] Battery charger
[ ] Export box packaging
[ ] UL2200 Listed
[ ] *Main line circuit breaker*
[ ] Paralleling accessories
[ ] Remote annunciator panel
[ ] Sound-attenuated enclosure (2 levels) with internal silencers
[ ] Spring isolators
[ ] Weather-protective enclosure with internal silencer
[ ] 2 year prime power warranty
[ ] 2 year standby warranty
[ ] 5 year basic power warranty
[ ] 10 year major components warranty

Available Products and Services

A wide range of products and services is available to match your power generation system requirements. Cummins Power Generation products and services include:

Diesel and Spark-Ignited Generator Sets

Transfer Switches

Bypass Switches

Parallel Load Transfer Equipment

Digital Paralleling Switchgear

PowerCommand Network and Software

Distributor Application Support

Planned Maintenance Agreements

Warranty

All components and subsystems are covered by an express limited one-year warranty. Other optional and extended factory *warranties and local distributor maintenance agreements are available.* Contact your distributor/dealer for more information.

Certifications

ISO9001 - This generator set was designed and manufactured in facilities certified to ISO9001.

CSA - This generator set is CSA certified to product class 4215-01.

PTS - The Prototype Test Support (PTS) program verifies the performance integrity of the generator set design. Products bearing the PTS symbol have been subjected to demanding tests in accordance to NFPA 110 to verify the design integrity and performance under both normal and abnormal operating conditions including short circuit, endurance, temperature rise, torsional vibration, and transient response, including full load pickup.

UL - The generator set is available Listed to UL 2200, Stationary Engine Generator Assemblies. The PowerCommand control is Listed to UL 508 - Category NITW7 for U.S. and Canadian usage.

See your distributor for more information

Power Generation

Cummins Power Generation
1400 73rd Avenue N.E.
Minneapolis, MN 55432
763.574.5000
Fax: 763.574.5298
www.cumminspower.com

Important: Backfeed to a utility system can cause electrocution and/or property damage. Do not connect generator sets to any building electrical system except through an approved device or after building main switch is open.

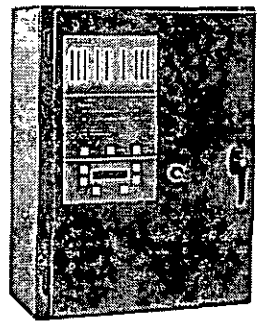
 Specifications subject to change without notice S-1375m (11/05)

Power Generation

Transfer Switches

OTPC PowerCommand®

40 - 3000 Amp
3 Pole and 4 Pole



Optional Features Shown

Description

Designed for continuous current operation and switching of electrical loads between primary power and standby generator sets, Cummins Power Generation Series OTPC PowerCommand automatic transfer switches monitor the primary power source, signal generator set startup, automatically transfer power, and return the load to the primary power source once the utility returns and is stabilized.

High-pressure silver alloy contacts can withstand thousands of switching cycles without burning, pitting, or welding. They require no routine contact maintenance and provide 100% continuous current ratings.

In **utility-to-genset applications,** the control system monitors utility and genset power. When utility power fails or is unsatisfactory, the switch starts the genset and transfers critical loads to the genset. The switch automatically transfers loads back to the utility when utility power returns.

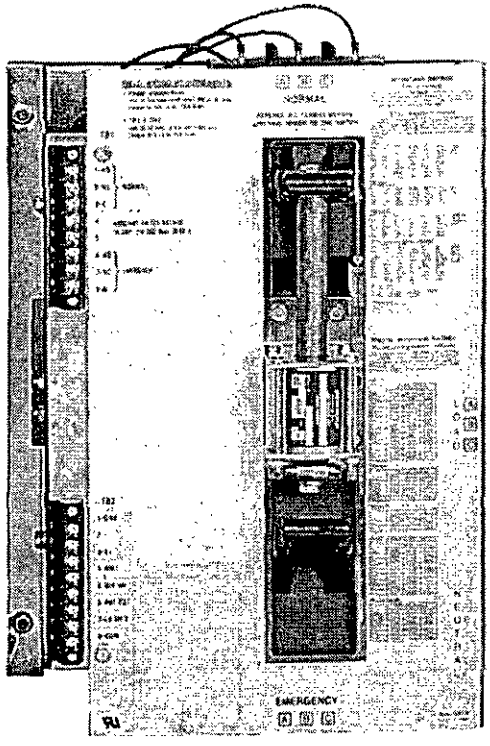
In **utility-to-utility applications,** the control system monitors the primary utility source and transfers the critical load to a secondary utility source when primary power fails or is unsatisfactory. The switch automatically transfers loads back to the primary source when power is restored.

In **genset-to-genset applications,** the transfer switch automatically controls multiple gensets, allowing one genset to power the load with another genset as standby. The running (lead) unit can be selected manually or may be changed automatically with a built-in changeover timer.

Features

- **Advanced Transfer Switch Mechanism** - Unique bi-directional linear actuator provides virtually friction-free, constant force, straight-line transfer switch action during automatic operation.
- **PowerCommand Microprocessor Control** - A standard, fully featured microprocessor control with a choice of options. All features, settings, and adjustments are software-enabled for ease of setup and accuracy. Optically isolated logic inputs and high isolation transformers for AC power inputs provide high-voltage surge protection.
- **Manual Operation** - Manual operating handles, shielded termination, and over-center type contact mechanisms allow effective, manual operation (40-1000A switches).
- **Positive Interlocking** - Mechanical and electrical interlocking prevent source-to-source connection through the power or control wiring.
- **Main Contacts** - Heavy-duty silver alloy contacts with separate arcing surfaces and multileaf arc chutes are rated for total system transfer including overload interruption.
- **Easy Service/Access** - Plug connections, door-mounted controls, ample access space, and compatible terminal markings. The control is field programmable.
- **Product lines, Accessories and Services** - Cummins Power Generation offers a wide range of accessories and services to suit your requirements.
- **Certifications** - Cummins Power Generation OTPC Transfer Switches are certified to a wide range of standards.
- **Warranty** - Cummins Power Generation offers single-source responsibility at both the factory and distributor levels for warranty, service, and parts support.

Transfer Switch Mechanism



- A bi-directional linear actuator powers OTPC Transfer Switches. This design provides virtually friction-free, constant force, straight-line transfer switch action. No complex gears or linkages.
- Independent break-before-make action is used for both 3-pole and 4-pole/switched neutral switches. On 3-pole/switched neutral switches, this action also prevents the objectionable ground currents and nuisance ground fault tripping that can result from overlapping designs.
- A mechanical interlock prevents simultaneous closing of normal and emergency contacts. The action positively prevents dangerous source-to-source connections.
- Electrical interlocks prevent simultaneous closing signals to normal and emergency contacts and interconnection of normal and emergency sources through the control wiring.
- Long-life, high pressure, silver alloy contacts resist burning and pitting. Separate arcing surfaces further protect the main contacts. Contacts are mechanically held in both normal and emergency positions for reliable, quiet operation.

Specifications-Transfer Switch Mechanism

Voltage Rating	Transfer switches rated from 40 A through 3000 A are rated up to 600 VAC, 50 or 60 Hz.
Arc Interruption	Multiple leaf arc chutes cool and quench the arcs. Covers prevent interphase flashover and are transparent for visual inspection.
Neutral Bar	A full current-rated neutral bar with lugs is standard on enclosed 3-pole transfer switches.
Auxillary Contacts	Two contacts (one for each source) are provided for customer use. Wired to terminal block for easy access. Rated at 10A continuous and 250 VAC maximum.
Operating Temperature	-40°F (-40°C) to 140°F (60°C)
Storage Temperature	-40°F (-40°C) to 140°F (60°C)
Humidity	Up to 95% relative, noncondensing
Altitude	*Up to 10,000 ft (3,000 m) without derating*
Surge Withstand Ratings	Surge-tested for location category B3, per IEEE C 62.41. Testing per guidelines in IEEE 62.45. Control tested to European Surge Test EN 61000-4-5
Total Transfer Time (source-to-source)	Will not exceed 6 cycles at 60 Hz with normal voltage applied to the actuator and without programmed transition installed.
Manual Operation Handles	Transfer switches rated through 1000 A are equipped with permanently attached operating handles and quick-break, quick-make contact mechanisms suitable for manual operation. Transfer switches over 1000 A are equipped with manual operators for service use only under de-energized conditions.

PowerCommand Microprocessor Control

Control Packages

A choice of two control packages allows flexibility for determining the most suitable level of control for a given application:

Level 1 Control	Level 2 Control
Utility-to-Genset Applications	**Utility-to-Genset Applications** **Utility-to-Utility Applications** **Genset-to-Genset Applications**
Software Adjustable Time Delays: Engine Start: 0 - 15 sec *Transfer Normal to Emergency: 0 - 120 sec* Retransfer Emergency to Normal: 0 - 30 min Engine Stop: 0 - 30 min Programmed Transition: 0 - 60 sec	**Software Adjustable Time Delays:** Engine Start: 0 - 120 sec *Transfer Normal to Emergency: 0 - 120 sec* Retransfer Emergency to Normal: 0 - 30 min Engine Stop: 0 - 30 min Programmed Transition: 0 - 60 sec
Undervoltage Sensing - 3-phase normal, 1-phase emergency Pickup: 85% to 98% of nominal voltage Dropout: 75% to 98% of pickup setting Dropout Time Delay: 0.1 to 1.0 sec **Overvoltage Sensing -** 3-phase normal, 1-phase emergency Dropout: 105% to 135% of nominal voltage Pickup: 95% to 99% of dropout setting Dropout Time Delay: 0.5 to 120 sec **Frequency Sensing** Pickup: ±5% to ±20% of nominal frequency Dropout: ±1% beyond pickup Dropout Time Delay: 0.1 to 15.0 sec	**Over/Undervoltage Sensing -** 3-phase normal and emergency Pickup: 85% to 98% of nominal voltage Dropout: 75% to 98% of pickup setting Dropout Time Delay: 0.1 to 1.0 sec **Overvoltage Sensing -** 3-phase normal and emergency Dropout: 105% to 135% of nominal voltage Pickup: 95% to 99% of dropout setting Dropout Time Delay: 0.5 to 120 sec **Frequency Sensing** Pickup: ±5% to ±20% of nominal frequency Dropout: ±1% beyond pickup Dropout Time Delay: 0.1 to 15.0 sec **Voltage Imbalance Sensing** Dropout: 2% to 10% Pickup: 90% of dropout Time Delay: 2.0 to 20.0 sec **Phase Rotation Sensing** Time Delay: 100 msec **Loss of Single Phase Detection** Time Delay: 100 msec
Standard Open Transition Transfer Mode **Programmed Transition Transfer Mode**	**Standard Open Transition Transfer Mode** **Programmed Transition Transfer Mode**
Programmable Genset Exerciser - One event/schedule with or *w/o load*	**Programmable Genset Exerciser -** Eight events/schedules with or *w/o load*
Basic Indicator Panel Source Available/Connected LED Indicators Test/Exercise/Bypass Buttons	**Basic Indicator Panel** Source Available/Connected LED Indicators Test/Exercise/Bypass Buttons Digital Display
Date/Time-Stamped Event Recording **Load Sequencing (optional with Network Communications Module)**	**Date/Time-Stamped Event Recording** **Load Sequencing (optional with Network Communications Module)**

Time-Delay Functions

Engine Start: Prevents nuisance genset starts in the event of momentary power system variation or loss. Not included in utility-to-utility systems.

Transfer Normal to Emergency: Allows genset to stabilize before application of load. Prevents power interruption if normal source variation or loss is momentary. Allows staggered transfer of loads in multiple transfer switch systems.

Retransfer Emergency to Normal: Allows the utility to stabilize before retransfer of load. Prevents needless power *interruption if return of normal source is momentary. Allows staggered transfer of loads in multiple transfer switch systems.*

Engine Stop: Maintains availability of the genset for immediate reconnection in the event that the normal source fails shortly after transfer. Allows gradual genset cool down by running unloaded. Not included in utility-to-utility systems.

Programmed Transition: Transfers load to neutral position, disconnected from sources, to allow inductive load voltages to decay.

Power Generation

Weatherprotective and Quiet Site® Sound Attenuated Steel Enclosures

For gensets from 6-500 kW

Description

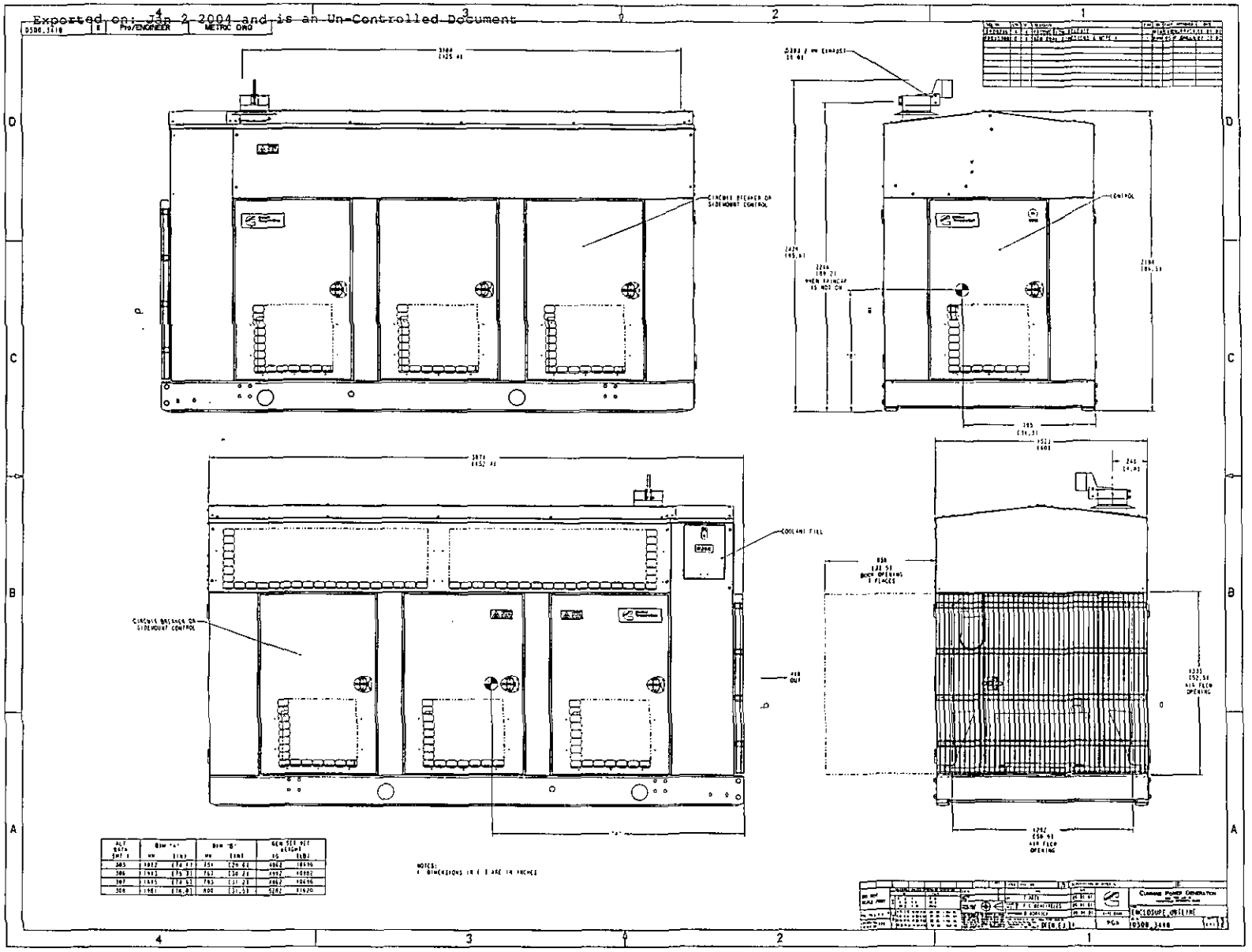
Field installable enclosure kits are designed to enclose the entire generator set and allow ample air flow for cooling. Multiple kit configurations available for each genset model to suit most weather protection and sound control requirements. Model specific kits are offered in three different configurations.

- **Standard Weather Protective**
  Provides weather protection and incidental noise reduction.
- **Level I Sound Attenuated**
  Provides weather protection and includes an internally mounted muffler and sound insulating panels which reduce the sound level of the set to a level below that achieved with a Weather Protective enclosure.
- **Level II Sound Attenuated**
  Provides weather protection and includes an internally mounted muffler and sound insulating panels which reduce the sound level of the set to a level below that achieved with a Level I enclosure.

Note: For specific sound data and dB(A) ratings, see Sound Data Sheet listed in the Power Suite Library under Genset Model.

Features

- Fourteen gauge steel construction (panels)
- Twelve gauge steel construction (posts)
- Removable enclosure panels or hinged doors provide easy generator set access
- Fixed louvers
- Double E-coat green paint
- Corrosion resistant hardware
- Cambered roof prevents water accumulation
- Lockable doors
- Fuel and electrical stub-up area within enclosure perimeter
- Compliant with UL 2200 Listed Generator Sets
- Designed to satisfy all requirements of National Electrical Code installations
- Easy access lifting points
- Optional upgrade kits provide sound attenuation



APPENDIX D

30% Design Drawings

SERENO CANYON
ZONE 13 PUMP STATION AT SITE 145
A PORTION OF SECTION 11, T.4N., R.5E., OF THE G.&S.R.M., MARICOPA COUNTY, ARIZONA

CITY OF SCOTTSDALE GENERAL NOTES:

GENERAL CONSTRUCTION NOTES FOR PUBLIC WORKS CONSTRUCTION

1. ALL CONSTRUCTION IN THE PUBLIC RIGHT-OF-WAY OR IN EASEMENTS GRANTED FOR PUBLIC USE MUST CONFORM TO THE LATEST MARICOPA ASSOCIATION OF GOVERNMENTS (MAG) UNIFORM STANDARD SPECIFICATIONS AND UNIFORM STANDARD DETAILS FOR PUBLIC WORKS CONSTRUCTION AS AMENDED BY THE LATEST VERSION OF THE CITY OF SCOTTSDALE (C.O.S.) SUPPLEMENTAL STANDARD SPECIFICATIONS AND SUPPLEMENTAL STANDARD DETAILS. IF THERE IS A CONFLICT, THE LATTER SHALL GOVERN.
2. THE ENGINEERING DESIGNS ON THESE PLANS ARE ONLY APPROVED BY THE CITY IN SCOPE AND NOT IN DETAIL. IF CONSTRUCTION QUANTITIES ARE SHOWN ON THESE PLANS, THEY ARE NOT VERIFIED BY THE CITY.
3. APPROVAL OF PLANS IS VALID FOR SIX (6) MONTHS. IF AN ENCROACHMENT PERMIT FOR THE CONSTRUCTION HAS NOT BEEN ISSUED WITHIN SIX MONTHS, THE PLANS SHALL BE RESUBMITTED TO THE CITY FOR RE-APPROVAL.
4. A PUBLIC WORKS INSPECTOR WILL INSPECT ALL WORKS WITHIN THE CITY OF SCOTTSDALE RIGHT-OF-WAY AND IN EASEMENTS. NOTIFY INSPECTION SERVICES 24 HOURS PRIOR TO STARTING OF CONSTRUCTION (TELEPHONE 480-312-5750).
5. WHENEVER EXCAVATION IS TO BE DONE, CALL THE "BLUE STAKE CENTER", (602) 263-1100, TWO WORKING DAYS BEFORE EXCAVATION IS TO BEGIN. THE CENTER WILL SEE THAT THE LOCATION OF THE UNDERGROUND UTILITY LINES IS IDENTIFIED FOR THE PROJECT. CALL "COLLECT" IF NECESSARY.
6. ENCROACHMENT PERMITS ARE REQUIRED FOR ALL WORK IN PUBLIC RIGHT-OF-WAY AND EASEMENT GRANTED FOR PUBLIC PURPOSES. AN ENCROACHMENT PERMIT WILL BE ISSUED BY THE CITY UPON RECEIPT OF PAYMENT OF A BASE FEE PLUS A FEE FOR INSPECTION SERVICES TO BE PROVIDED BY THE CITY. COPIES OF ALL PERMITS SHALL BE RETAINED ONSITE AND SHALL BE AVAILABLE FOR INSPECTION AT ALL TIMES. FAILURE TO PRODUCE THE REQUIRED PERMITS WILL RESULT IN IMMEDIATE WORK STOPPAGE UNTIL THE PROPER PERMIT DOCUMENTATION IS OBTAINED.
7. ALL EXCAVATION AND GRADING WHICH IS NOT IN THE PUBLIC RIGHT-OF-WAY OR NOT IN EASEMENTS GRANTED FOR PUBLIC USE MUST CONFORM TO CHAPTER 70, EXCAVATION AND GRADING, OF THE LATEST EDITION OF THE UNIFORM BUILDING CODE PREPARED BY THE INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS. A PERMIT FOR THIS GRADING MUST BE SECURED FROM THE CITY FOR A FEE ESTABLISHED BY THE UNIFORM BUILDING CODE.
8. SIGNS REQUIRE SEPARATE APPROVAL AND PERMITS.

ENGINEER'S CERTIFICATION:

ENGINEER'S CERTIFICATION: THE LOWEST FLOOR ELEVATION(S) AND/OR FLOODPROOFING ELEVATION(S) ON THIS PLAN ARE SUFFICIENTLY HIGH TO PROVIDE PROTECTION FROM FLOODING CAUSED BY ONE-HUNDRED YEAR FLOOD, AND ARE IN ACCORDANCE WITH CITY OF SCOTTSDALE REVISED CODE, CHAPTER 37-FLOODWAYS & FLOODPLAINS ORDINANCE.

SUMMARY OF QUANTITIES:

SEE DETAIL SHEET C5 FOR QUANTITIES

INDEMNITY:

CITY OF SCOTTSDALE WILL NOT BE RESPONSIBLE FOR REMOVAL, REPAIR, OR REPLACEMENT OF SIDEWALKS, LANDSCAPING OR ANY OTHER IMPROVEMENTS LOCATED WITHIN CITY EASEMENT(S) AS A RESULT OF ACCESS TO MAINTENANCE OF, OR REPAIRS TO THE WATERLINE SHOWN ON THESE PLANS.

FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

COMMUNITY NUMBER	PANEL NUMBER	SUFFIX	DATE OF FIRM	FIRM ZONE	BASE FLOOD ELEV. (USE DEPTH)
045012	1255	G	9/30/05	X	LESS THAN 1' DEPTH

NO CONFLICT SIGNATURE BLOCK

UTILITY	UTILITY COMPANY	NAME OF COMPANY REPRESENTATIVE	TELEPHONE NUMBER	DATE SIGNED
WATER	CITY OF SCOTTSDALE	CITY OF SCOTTSDALE	N/A	N/A
SANITARY SEWER	CITY OF SCOTTSDALE	CITY OF SCOTTSDALE	N/A	N/A
ELECTRIC	A.P.S.	XX	XX	XX
TELEPHONE	QWEST COMM.	XX	XX	XX
NATURAL GAS	SOUTHWEST GAS CORP.	XX	XX	XX
HIGH PRESS. GAS	SOUTHWEST GAS CORP.	XX	XX	XX
CABLE TV	COX CABLE	XX	XX	XX
OTHER	ADOT	XX	XX	XX
WATER/SEWER	CITY OF PHOENIX	XX	XX	XX
TRAFFIC	CITY OF SCOTTSDALE	XX	XX	XX

ENGINEER'S CERTIFICATION:

I, BRENT L. HENDERSON, BEING THE PERSON RESPONSIBLE FOR DESIGNING THE FACILITIES NECESSARY TO SERVE THIS DEVELOPMENT, HEREBY CERTIFY THAT ALL OF THE UTILITY COMPANIES LISTED ABOVE, HAVE REVIEWED THIS PROJECT PROPOSAL AND ALL CONFLICTS HAVE BEEN RESOLVED AT THIS POINT. "NO CONFLICTS" FORMS HAVE BEEN OBTAINED FROM EACH UTILITY COMPANY AND ARE INCLUDED IN THIS SUBMITTAL. I ALSO CERTIFY THAT ALL ONSITE TRANSFORMERS, CABLE BOXES AND ANY OTHER PUBLIC/PRIVATE UTILITY APPURTENANCES ARE PLACED SUCH THAT THEY DO NOT NEGATIVELY IMPACT THE USE OR INTENDED USE OF ANY DEDICATED EASEMENTS OR FACILITIES DEVELOPED WITH THIS PROJECT INCLUDING BUT NOT LIMITED TO STORMWATER STORAGE BASINS, SIGHT DISTANCE EASEMENTS AND NAOS OR OTHER OPEN SPACE EASEMENTS.

SIGNATURE _____ DATE _____

PARCEL DESCRIPTION

TRACT H, OF SENORON CREST AS SHOWN ON THE FINAL PLAT RECORDED IN BOOK 527 OF MAPS, PAGE 15, MARICOPA COUNTY RECORDS LYING WITHIN THE SOUTHWEST QUARTER OF SECTION 11, TOWNSHIP 4 NORTH, RANGE 5 EAST, OF THE GILA AND SALT RIVER MERIDIAN, MARICOPA COUNTY, ARIZONA.

LEGEND

- PROPOSED RIGHT OF WAY
- ROADWAY CENTERLINE
- SANITARY SEWER PIPE & MH
- POTABLE WATER PIPE & VALVE
- STORM DRAIN PIPE & MANHOLE
- (1) CONSTRUCTION NOTE
- (1) CONSTRUCTION NOTE

S.E.	SEWER EASEMENT
P.U.E.	PUBLIC UTILITY EASEMENT
W.L.E.	WATERLINE EASEMENT
D.E.	DRAINAGE EASEMENT
S.W.E.	SIDEWALK EASEMENT
L.E.	LANDSCAPE EASEMENT
V.T.E.	VISIBILITY TRIANGLE EASEMENT
E.S.V.A.E.	EMERGENCY AND SERVICE VEHICLE ACCESS EASEMENT
GB	GRADE BREAK
OHE	OVERHEAD ELECTRICAL
PT	POINT OF TANGENCY
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
PRC	POINT OF REVERSE CURVATURE
U.E.	UTILITY EASEMENT
A.E.	ACCESS EASEMENT

CITY OF SCOTTSDALE REVIEW & RECOMMENDED APPROVAL

FIRE DEPT.		GRADING & DRAINAGE	
PLANNING		WATER & SEWER	
TRAFFIC		PAVING	
STRUCTURAL			

APPROVED BY:

ENGINEERING COORDINATION MANAGER OR (DESIGNEE) _____ DATE _____

APPROVAL:

MARICOPA COUNTY ENVIRONMENTAL SERVICE DEPARTMENT

IN ACCORDANCE WITH AAC R-18-4-119, ALL MATERIALS ADDED AFTER JANUARY 1, 1993 WHICH MAY COME INTO CONTACT WITH DRINKING WATER SHALL CONFORM TO NATIONAL SANITATION FOUNDATION STANDARDS 60 AND 61.

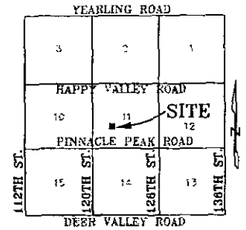
DATE _____

"THE ENGINEER OF RECORD ON THESE PLANS HAS RECEIVED A COPY OF THE APPROVED STIPULATIONS FOR THIS PROJECT AND HAS DESIGNED THESE PLANS IN CONFORMANCE WITH THE APPROVED STIPULATIONS."

ENGINEER: TROY A. BONTRAGER, P.E.

ENGINEERS NOTES

1. MARICOPA ASSOCIATION OF GOVERNMENTS (M.A.G.) UNIFORM STANDARD SPECIFICATIONS AND DETAILS FOR PUBLIC WORKS CONSTRUCTION (LATEST EDITION INCLUDING LATEST REVISION AND CURRENT SUPPLEMENTALS THEREOF PER THE LOCAL TOWN OR CITY) ARE INCORPORATED INTO THIS PLAN IN THEIR ENTIRETY.
2. ALL WORK REQUIRED TO COMPLETE THE CONSTRUCTION COVERED BY THIS PLAN SHALL BE IN ACCORDANCE WITH THE M.A.G. STANDARD SPECIFICATIONS AND DETAILS AND CURRENT SUPPLEMENTS THEREOF PER THE LOCAL CITY OR TOWN UNLESS SPECIFIED OTHERWISE IN THESE PLANS OR ELSEWHERE IN THE CONTRACT DOCUMENTS. CONTRACTORS SHALL FAMILIARIZE THEMSELVES WITH ALL REQUIRED STANDARD SPECIFICATIONS, DETAILS AND SUPPLEMENTS PRIOR TO BIDDING THE WORK FOR THE CONSTRUCTION COVERED BY THIS PLAN.
3. THE CONTRACTOR IS RESPONSIBLE FOR ALL METHODS, SEQUENCING, AND SAFETY CONCERNS ASSOCIATED WITH THIS PROJECT DURING CONSTRUCTION, UNLESS SPECIFICALLY ADDRESSED OTHERWISE IN THIS PLAN OR ELSEWHERE IN THE CONTRACT.
4. THE CONTRACTOR IS TO COMPLY WITH ALL LOCAL, STATE, AND FEDERAL LAWS AND REGULATIONS APPLICABLE TO THE CONSTRUCTION COVERED BY THIS PLAN.
5. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING AND COMPLYING WITH ALL PERMITS REQUIRED TO COMPLETE ALL WORK COVERED BY THIS PLAN.
6. THE QUANTITIES AND SITE CONDITIONS DEPICTED IN THESE PLANS ARE FOR INFORMATIONAL PURPOSES ONLY AND ARE SUBJECT TO ERROR AND OMISSION. CONTRACTORS SHALL SATISFY THEMSELVES AS TO ACTUAL QUANTITIES AND SITE CONDITIONS PRIOR TO BIDDING THE WORK FOR THE CONSTRUCTION COVERED BY THIS PLAN.
7. A REASONABLE EFFORT HAS BEEN MADE TO SHOW THE LOCATIONS OF EXISTING UNDERGROUND FACILITIES AND UTILITIES IN THE CONSTRUCTION AREA. THE CONTRACTOR IS RESPONSIBLE FOR ANY DAMAGE TO UTILITIES AND/OR FACILITIES CAUSED DURING THEIR CONSTRUCTION OPERATIONS. THE CONTRACTOR SHALL CALL 48 HOURS IN ADVANCE FOR BLUE STAKE (1-800-STAKE-IT) PRIOR TO ANY EXCAVATION.
8. THE CONTRACTOR IS RESPONSIBLE FOR ALL COORDINATION OF CONSTRUCTION AFFECTING UTILITIES AND THE COORDINATION OF ANY NECESSARY UTILITY RELOCATION WORK.
9. ALL PAVING, GRADING, EXCAVATION, TRENCHING, PIPE BEDDING, CUT FILL AND BACKFILL SHALL COMPLY WITH THE RECOMMENDATIONS SET FORTH IN THE SOILS (GEOTECHNICAL) REPORT FOR THIS PROJECT IN ADDITION TO THE REFERENCED REQUIRED SPECIFICATIONS AND DETAILS.
10. THE CONTRACTOR IS TO VERIFY THE LOCATION AND THE ELEVATIONS OF ALL EXISTING UTILITIES AT POINTS OF TIE-IN PRIOR TO COMMENCING ANY NEW CONSTRUCTION. SHOULD ANY LOCATION OR ELEVATION DIFFER FROM THAT SHOWN ON THESE PLANS, THE CONTRACTOR SHALL CONTACT THE OWNER'S AGENT.
11. CONTRACTOR TO VERIFY AND COORDINATE ALL DIMENSIONS AND SITE LAYOUT WITH ARCHITECTURE'S FINAL SITE PLAN AND FINAL BUILDING DIMENSIONS BEFORE STARTING WORK. REPORT DISCREPANCIES TO OWNER'S AGENT.
12. COORDINATION BETWEEN ALL PARTIES IS ESSENTIAL PART OF CONTRACT.
13. CONTRACTOR IS RESPONSIBLE FOR PROJECT AND SITE CONDITIONS, AND TO WORK WITH WEATHER CONDITIONS AS THE PROJECT SITE MAY BE LOCATED IN A FLOOD PRONE AREA AND SUBJECT TO FLOODING AND ITS HAZARDS.
14. THE CONTRACTOR IS TO VERIFY THE LOCATION, ELEVATION, CONDITION, AND PAVEMENT CROSS-SLOPE OF ALL EXISTING SURFACES AT POINTS OF TIE-IN AND MATCHING, PRIOR TO COMMENCEMENT OF GRADING, PAVING, CURB AND GUTTER, OR OTHER SURFACE CONSTRUCTION. SHOULD EXISTING LOCATIONS, ELEVATIONS, CONDITION, OR PAVEMENT CROSS-SLOPE DIFFER FROM THAT SHOWN ON THESE PLANS, RESULTING IN THE DESIGN INTENT REFLECTED ON THESE PLANS NOT ABLE TO BE CONSTRUCTED, THE CONTRACTOR SHALL NOTIFY THE OWNER'S AGENT IMMEDIATELY FOR DIRECTION ON HOW TO PROCEED PRIOR TO COMMENCEMENT OF CONSTRUCTION. THE CONTRACTOR ACCEPTS RESPONSIBILITY FOR ALL COSTS ASSOCIATED WITH CORRECTIVE ACTION IF THESE PROCEDURES ARE NOT FOLLOWED.
15. CONTRACTOR IS RESPONSIBLE TO COORDINATE UTILITY CROSSINGS AT CULVERT CROSSINGS BEFORE STARTING WORK ON CULVERT. COORDINATE WITH OWNER REPRESENTATIVE. VERIFY UTILITY LINES AND/OR CONDUITS ARE IN PLACE BEFORE STARTING CULVERT WORK.
16. CONSTRUCT RETENTION BASIN AS SHOWN. CONTRACTOR TO SCARIFY BOTTOM OF BASIN 2 FEET DEEP AND NOT ALLOW COMPACTION OVER 80%.
17. THIS PROJECT REQUIRES A REGULAR ONGOING MAINTENANCE PROGRAM FOR THE DESIGNED DRAINAGE SYSTEM(S) TO PRESERVE THE DESIGN INTEGRITY AND THE ABILITY TO PERFORM ITS OPERATIONAL INTENT. FAILURE TO PROVIDE MAINTENANCE WILL JEOPARDIZE THE DRAINAGE SYSTEM(S)' PERFORMANCE AND MAY LEAD TO IT'S INABILITY TO PERFORM PROPERLY AND/OR CAUSE DAMAGE ELSEWHERE IN THE PROJECT.
18. SEWER LINES DESIGNED IN PROFILE AND PUBLIC WATER LINES ARE REQUIRED TO BE ASBUILT AND THE INSTALLATION AND TESTING WITNESSED BY A PROFESSIONAL ENGINEER IN ACCORDANCE WITH ARIZONA ADMINISTRATIVE CODES R18-9-E301 "A.01 GENERAL PERMIT: SEWAGE COLLECTIONS SYSTEMS" AND R18-4-507 AND 508 "APPROVAL OF CONSTRUCTION" AND "RECORD DRAWINGS", RESPECTIVELY; IT IS THE CONTRACTOR'S RESPONSIBILITY TO NOTIFY OWNER 72 HOURS IN ADVANCE WHEN THOSE SYSTEMS ARE READY TO BE WITNESSED.
19. THE WORK PRODUCT PRESENTED IS BELIEVED TO BE COMPLIANT WITH THE INTENT OF THE CURRENT AMERICANS DISABILITIES ACT (ADA) REQUIREMENTS AS INTERPRETED BY THE REVIEWING AGENCY(S). IF CONSTRUCTION OF THE PROJECT IS DELAYED, THIS WORK PRODUCT SHOULD BE UPDATED TO ACCOUNT FOR ANY RELEVANT ADA UPDATES BEFORE CONSTRUCTION BEGINS.



SITE MAP

N.T.S.

SITE AREA

AREA = 0.2296 ACRES

ASSESSORS PARCEL#

217-04-099

DEVELOPER:

CROWN COMMINITY DEVELOMENT
3600 THAYER COURT, SUITE 100
AURORA, ILLINOIS 60504
CONTACT: MS. TERI FRANKIEWICZ
PHONE (630) 851-5490

ENGINEER:

WOOD, PATEL & ASSOCIATES INC.
1855 NORTH STAPLEY DRIVE
MESA, AZ 85203
PHONE (480) 834-3300
CONTACT: GORDON WARK, P.E.

BENCHMARK

G.L.O. BRASS CAP (UP 1.0') NEAR FENCE CORNER AT THE INTERSECTION OF PINNACLE PEAK ROAD (ALIGNMENT) AND 120TH STREET (ALIGNMENT).
NAVD '88 ELEVATION = 1351.26
(CITY OF SCOTTSDALE DATUM)

SHEET INDEX

WOOD/PATEL
CROWN COMMUNITY DEVELOPMENT
Civil Engineers
Water Resources
Land Surveyors
Construction Managers
(602) 335-8500

SERENO CANYON
SCOTTSDALE
ZONE 13 PUMP STATION AT SITE 145
COVER SHEET

30% DESIGN PRELIMINARY NOT FOR CONSTRUCTION

41342 TROY A. BONTRAGER ARIZONA, U.S.A.

CALL TWO WORKING DAYS BEFORE YOU DIG 602-263-1100 1-800-STAKE-IT (OUTSIDE MARICOPA COUNTY)

DESIGNED	M. MAYES
DRAWN	M. MAYES
CHECKED	T. BONTRAGER
DATE	12/16/05
SCALE	N.T.S.
JOB NO.	052484
SHEET	C1 OF 8

WR# 6217-05

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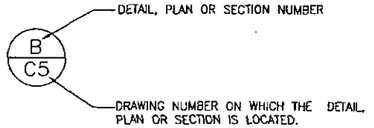
ABBREVIATIONS

A	ARC LENGTH
AC	ASPHALTIC CONCRETE
ALPL	ALUMINUM PLATE
APPRVD	APPROVED
APS	ARIZONA PUBLIC SERVICE
ARCH	ARCHITECTURAL
ASTM	AMERICAN SOCIETY FOR TESTING AND MATERIALS
AWWA	AMERICAN WATER WORKS ASSOCIATION
BC	BRASS CAP
BF	BLIND FLANGE
BFV	BUTTERFLY VALVE
BLDG	BUILDING
BOW	BOTTOM OF WALL
CA	CONCRETE ANCHOR
CATV	CABLE TV
CCP	CONCRETE CYLINDER PIPE
CF	CUBIC FEET
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET PER SECOND
CJ	CONSTRUCTION JOINT
CL	CENTER LINE
CL2	CHLORINE
CLR	CLEAR
CML&C	CEMENT MORTAR LINE AND COATED
CML	CEMENT MORTAR LINE
CMU OR C.M.U.	CONCRETE MASONRY UNIT
CO	CLEAN OUT
CONT.	CONTINUED OR CONTINUATION
CORP	CORPORATION
COS	CITY OF SCOTTSDALE
CPLG	COUPLING
CU	CUBIC
D	DRAIN
DG	DECOMPOSED GRANITE
DI	DUCTILE IRON
DIA	DIAMETER
DIP	DUCTILE IRON PIPE
DTL OR DET	DETAIL
DWG	DRAWING
EA	EACH
EL OR ELEV	ELEVATION
ELEC	ELECTRICAL
ELL	ELBOW
EW	EACH WAY
EXIST OR EX	EXISTING
FF	FINISHED FLOOR
FFE	FINISHED FLOOR ELEVATION
FG	FINISHED GRADE
FL	FLOW LINE
FLG OR FLGD	FLANGE OR FLANGED
FPT	FEMALE PIPE THREAD
FRP	FIBERGLASS REINFORCED POLYPROPYLENE
FT	FOOT OR FEET
GA	GAUGE
GALV	GALVANIZED
GB	GRADE BREAK
GLO	GOVERNMENT LAND OFFICE
GSP	GALVANIZED STEEL PIPE
HH	HANDHOLE
HORIZ	HORIZONTAL
HP	HIGH POINT OR HORSEPOWER
HVY	HEAVY
HWL	HIGH WATER LINE
ICBO	INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS
ID	INSIDE DIAMETER
IE OR I.E.	INVERT ELEVATION
INV	INVERT
IP	IRON PIPE SIZE
LB.	POUND
LFE	LOWET FLOOR ELEVATION (CITY OF SCOTTSDALE 1988 DATUM)
MAG	MARICOPA ASSOCIATION OF GOVERNMENTS
MAX	MAXIMUM
MCC	MOTOR CONTROL CENTER
MFG	MANUFACTURER
MG	MILLION GALLONS
MH	MANHOLE
MIL	MILLIMETER
MIN	MINIMUM
NAOS	NATURAL AREA OPEN SPACE
NAVD	NORTH AMERICAN VERTICAL DATUM
NPT	NATIONAL PIPE THREAD
NTR	NON-TANGENT RADIUS
NTS	NOT TO SCALE
OC	ON CENTER
OCEW	ON CENTER EACH WAY
OD	OUTSIDE DIAMETER
OF	OVERFLOW
P	PUMP NUMBER
P S	PUMP STATION
PE	PLAIN END
POLY	POLYPROPYLENE
PSI	POUNDS PER SQUARE INCH
PVC	POLYVINYL CHLORIDE
Q100	100 YEAR FLOOD EVENT
R/W OR R-O-W	RIGHT OF WAY

ABBREVIATIONS CONT

REQ D	REQUIRED
RPPD	REDUCED PRESSURE BACKFLOW PREVENTER
RTU	REMOTE TELEMETRY UNIT
S	SLOPE
SCBA	SELF CONTAINED BREATHING APPARATUS
SCE OR S.C.E	SCENIC CORRIDOR EASEMENT
SCFM OR S.C.F.M	STD CFM
SCH	SCHEDULE
SDR	STANDARD DIMENSION RATION
SES	SERVICE ENTRANCE SECTION
SIM.	SIMILAR
SOG	SLAB ON GRADE
SP	STATIC PRESSURE
SPECS	SPECIFICATIONS
SS OR SST	STAINLESS STEEL
STD	STANDARD
SYS	SYSTEM
T OR THK	THICKNESS
TELE	TELEPHONE LINE
TOC	TOP OF CONCRETE
TOR	TOP OF RESERVOIR
TOW OR TW	TOP OF WALL
TRANS	TRANSMISSION
TYP	TYPICAL
UBC	UNIFORM BUILDING CODE
U S	UNDERSIDE
VNE OR V.N.E.	VEHICULAR NON-ACCESS EASEMENT
W	WITH
WS	WATER STOP
WTR	WATERLINE
WWM	WELDED WIRE MESH
Z12	ZONE 12
Z13	ZONE 13

DETAIL AND SECTION REFERENCING SYSTEM



LEGEND

ø	DIAMETER
	WATER
	GAS
	ELECTRIC
	STORM DRAIN
	TELEPHONE
CATV CATV	CATV
S	MANHOLE COVER
1776.5	SURFACE ELEV.
1760	CONTOUR ELEV.
	TREES, BUSHES
	CACTUS
	STREET LIGHT
	CITY OF SCOTTSDALE BRASS CAP
	DEFLECTION POINT
	LIMITS OF NAOS SETBACK
	RIGHT-OF-WAY LINE AND MONUMENT LINE
	LOT LINE
N89°55'43"E 344.709'	BEARING DISTANCE
	CHECK VALVE
	VALVE (GENERAL)
	STRAINER
	BALL VALVE
	NEEDLE VALVE
	REDUCER
	GATE VALVE
	GATE VALVE
.005	SLOPE WITH VALUE IN FT/FT OR PERCENTAGE
	DRAINAGE FLOW LINE / DIRECTION OF FLOW
	NEW DECOMPOSED GRANITE
	CONCRETE
	RIPRAP

CALL TWO WORKING DAYS BEFORE YOU DIG
602-263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

WOOD/PATEL
Civil Engineers
Hydrologists
Land Surveyors
Construction Managers
(602) 336-8500

CROWN COMMUNITY DEVELOPMENT
A Trammell Crow Company

SERENO CANYON
SCOTTSDALE

ZONE 13 PUMP STATION AT SITE 145
ABBREVIATIONS, LEGEND, AND NOTES

30% DESIGN
PRELIMINARY
NOT
FOR
CONSTRUCTION

Registered Professional Engineer
CERTIFICATE NO.
41383
TROY A. BONTRAGER
ARIZONA, U.S.A.

DESIGNED	M. MAYES
DRAWN	M. MAYES
CHECKED	T. BONTRAGER
DATE	12/16/05
SCALE	
JOB NO.	052484
SHEET	62 OF 8

WR# 6217-05

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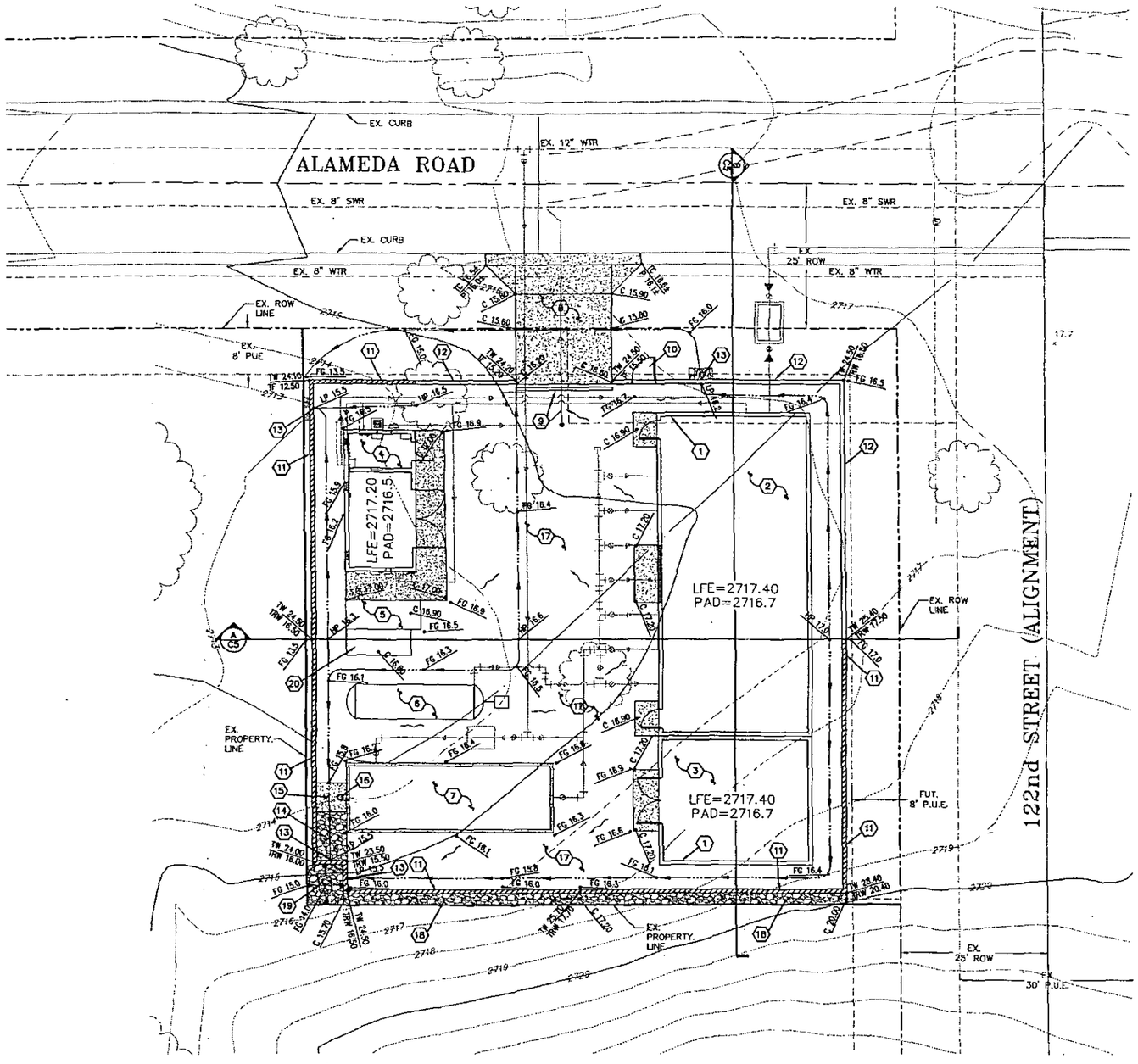
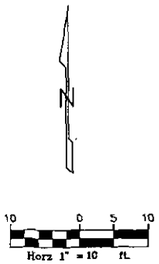
Plot Date: Jan 4, 2006





CONSTRUCTION NOTES

1. PUMP AND ELECTRICAL BUILDING.
2. PUMP ROOM.
3. ELECTRICAL ROOM.
4. CHLORINE BUILDING.
5. GENERATOR.
6. HYDROPNEUMATIC SURGE TANK.
7. 12,000 GAL PRECAST CONCRETE RECEIVING TANK.
8. CONCRETE ACCESS DRIVE.
9. 16-FT SLIDING GATE.
10. 4-FT WALK THROUGH GATE.
11. COMBINATION MASONRY SCREEN WALL AND RETAINING WALL.
12. 8-FT HIGH MASONRY SCREEN WALL.
13. WALL OPENING PER DETAIL ON SHEET C7.
14. PROVIDE GROUTED ROCK RIP RAP (D50=6", 8" THICK) SPILLWAY PER DETAIL ON SHEET C7.
15. INSTALL CONCRETE SPLASH PAD FOR RECEIVING TANK OVERFLOW.
16. RECEIVING TANK OVERFLOW WITH CHECK VALVE AND AIR GAP.
17. INSTALL 4" DECOMPOSED GRANITE ON 8" A.B.C. SEE SOILS REPORT FOR FURTHER INFORMATION.
18. CONSTRUCT 2' WIDE GROUTED RIP RAP DITCH, PER DETAIL ON SHEET C7.
19. CONSTRUCT RIP RAP SPILLWAY STRUCTURE PER DETAIL ON SHEET C7.
20. FUEL TANK.

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SERENO CANYON
SCOTTSDALE

ZONE 13 PUMP STATION AT SITE 145
SITE GRADING AND DRAINAGE PLAN

30% DESIGN
PRELIMINARY
NOT
FOR
CONSTRUCTION

Registered Professional Engineer
CERTIFICATE NO. 41343
TROY A. BONTRAGER
ARIZONA, U.S.A.

DESIGNER	M. MAYES
DRAWN	M. MAYES
CHECKED	T. BONTRAGER
DATE	12/16/05
SCALE	1" = 10'
JOB NO.	052484
SHEET	C3 OF 8

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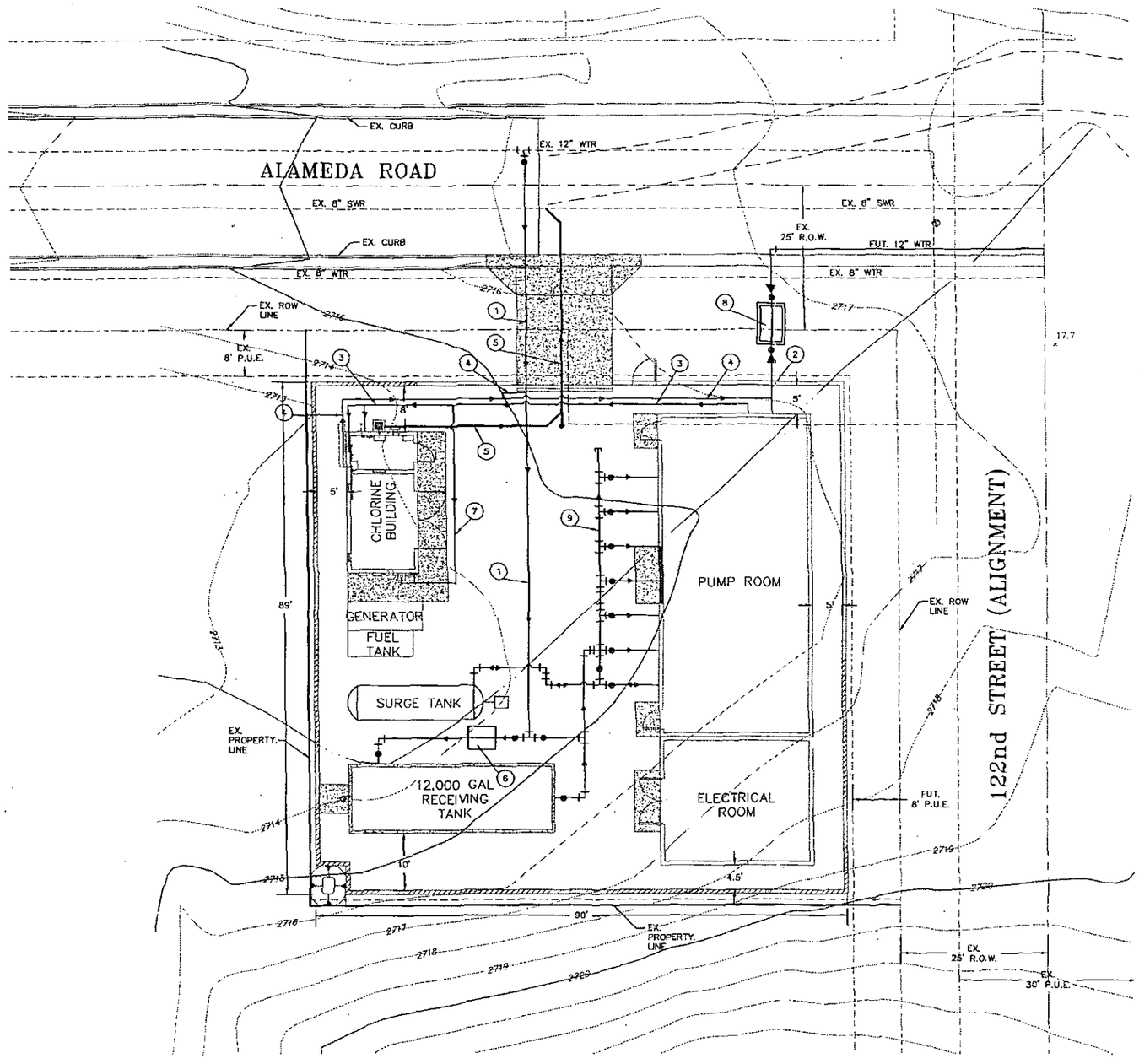
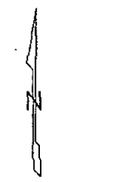
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)

WR# 6217-05





10 0 5 10
Horz 1" = 10 ft.

CONSTRUCTION NOTES

1. 12" SUCTION LINE.
2. 12" DISCHARGE LINE.
3. CHLORINE SAMPLING LINE.
4. CHLORINE INJECTION LINE.
5. CHLORINE ANALYZER DRAIN LINE.
6. ALTITUDE VALVE VAULT.
7. 1" WATER SUPPLY LINE.
8. FLOW METER AND VAULT.
9. SUCTION HEADER.

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ZONE 13 PUMP STATION AT SITE 145
SITE PLAN AND PIPING LAYOUT

30% DESIGN
PRELIMINARY
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FOR
CONSTRUCTION

Professional Engineer Certificate No. 41382 TROY A. BONTRAGER Arizona, U.S.A.

DESIGNED	M. MAYES
DRAWN	M. MAYES
CHECKED	T. BONTRAGER
DATE	12/16/05
SCALE	1" = 10'
JOB NO.	052484
SHEET	C4 OF 8

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(OUTSIDE MARICOPA COUNTY)

N:\2005\052484\dwg\civil\ 2484civil.dwg
Feb 06, 2006 (PM) by Mayes

WR# 6217-05

A / C3 SECTION A

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=10'

B / C3 SECTION B

HORIZONTAL SCALE: 1"=10'
VERTICAL SCALE: 1"=10'

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ZONE 13 PUMP STATION AT SITE 145
SITE CROSS SECTIONS

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CONSTRUCTION

CERTIFICATE NO. 41593
TROY A. BONTRAGER
Registered Professional Engineer
ARIZONA, U.S.A.

DESIGNED	H. HAYES
DRAWN	H. HAYES
CHECKED	T. BONTRAGER
DATE	12/16/05
SCALE	1" = 10'
JOB NO.	052484
SHEET	C5 OF 8

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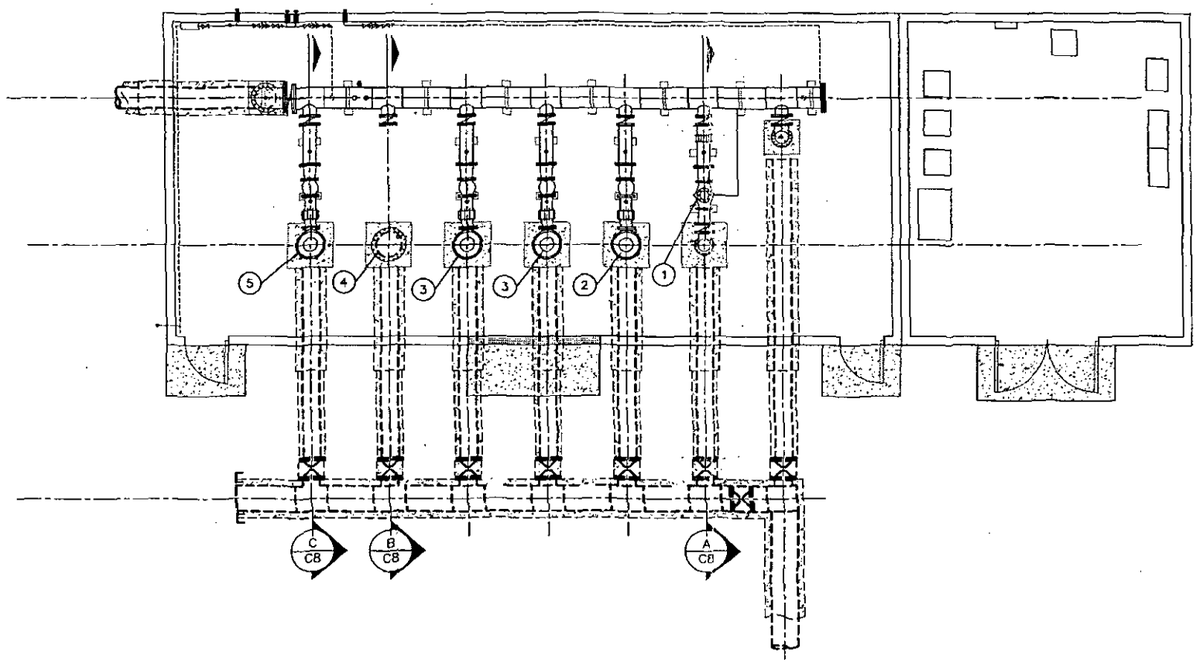
Plot Date: Jan. 2006

WR# 6217-05



FLOOR PLAN
SCALE: 3/16" = 1'-0"

CONSTRUCTION NOTES

1. PRESSURE RELIEF VALVE.
2. 15-HP VERTICAL TURBINE PUMP.
3. 40-HP VERTICAL TURBINE PUMP.
4. SPARE PUMP CAN.
5. 150-HP FIRE PUMP.

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SERENO CANYON
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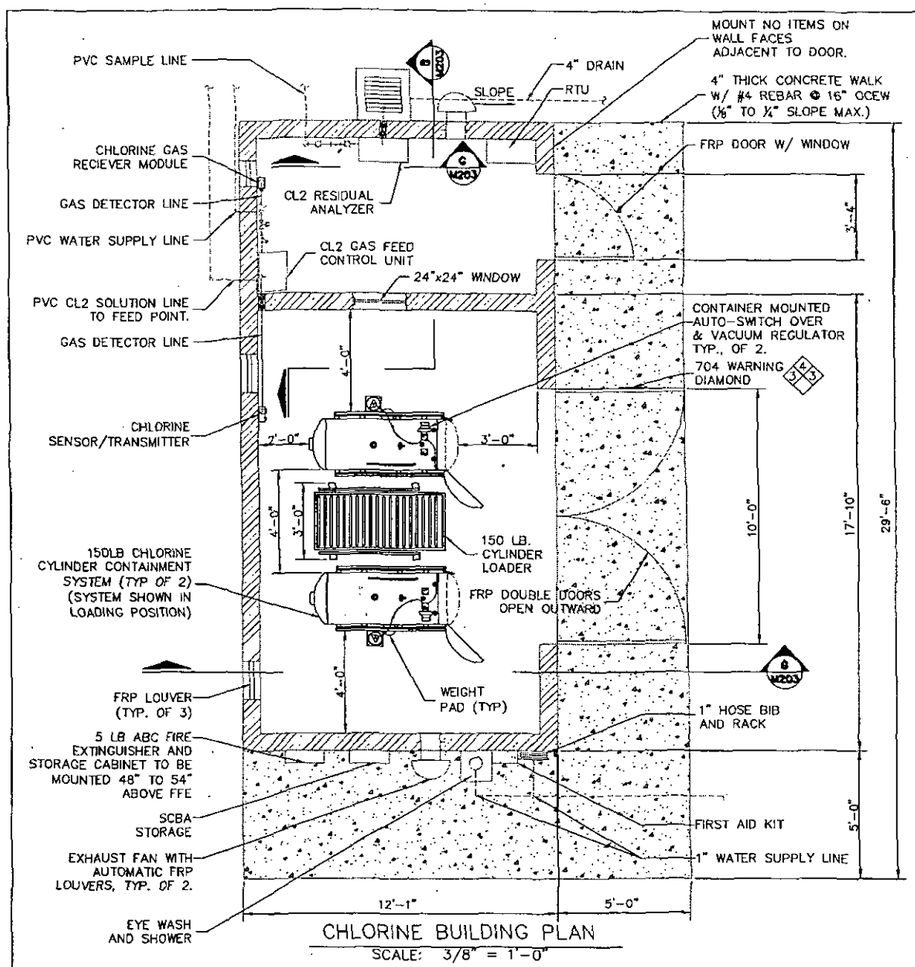
ZONE 13 PUMP STATION AT SITE 145
PUMP AND ELECTRICAL BUILDING PLAN

30% DESIGN
PRELIMINARY
NOT
FOR
CONSTRUCTION

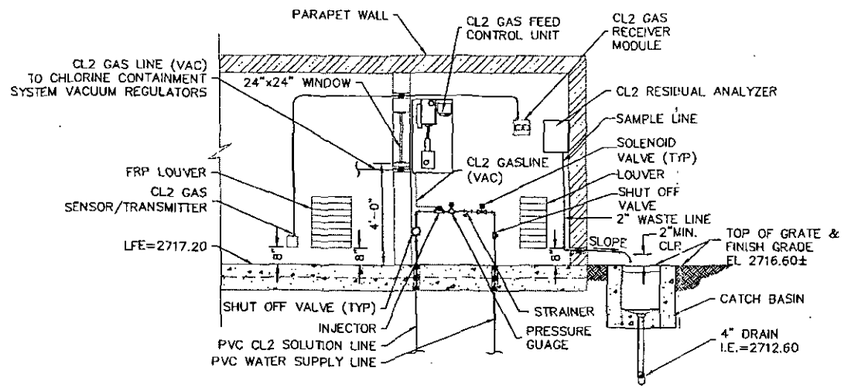
Registered Professional Engineer (Civil)
41362
TROY A. BONTRAGER
ARIZONA, U.S.A.

DESIGNER	M. MAYES
DRAWN	M. MAYES
CHECKED	T. BONTRAGER
DATE	12/16/05
SCALE	N.T.S.
JOB NO.	052484
SHEET	C6 OF 8

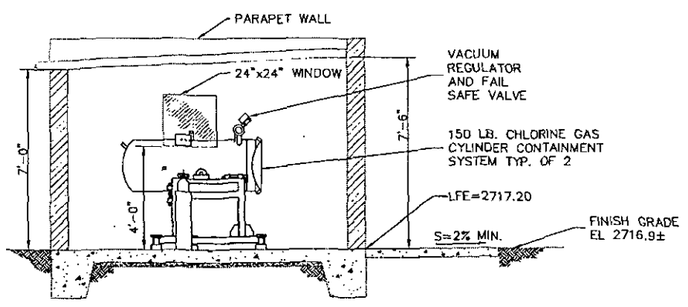
WR# 6217-05



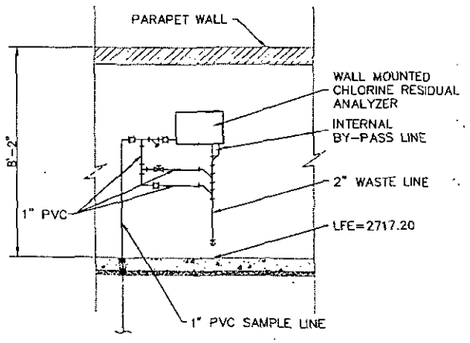
CHLORINE BUILDING PLAN
SCALE: 3/8" = 1'-0"



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



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



SECTION C
SCALE: 3/8" = 1'-0"

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SCOTTSDALE

ZONE 13 PUMP STATION AT SITE 145
CHLORINE BUILDING PLAN

30% DESIGN PREVIEW
NOT FOR CONSTRUCTION

DESIGNED	M. MAYES
DRAWN	M. MAYES
CHECKED	T. BONTRAGER
DATE	12/16/05
SCALE	N.T.S.
JOB NO.	052484
SHEET	C1 OF 8

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1-800-STAKE-IT
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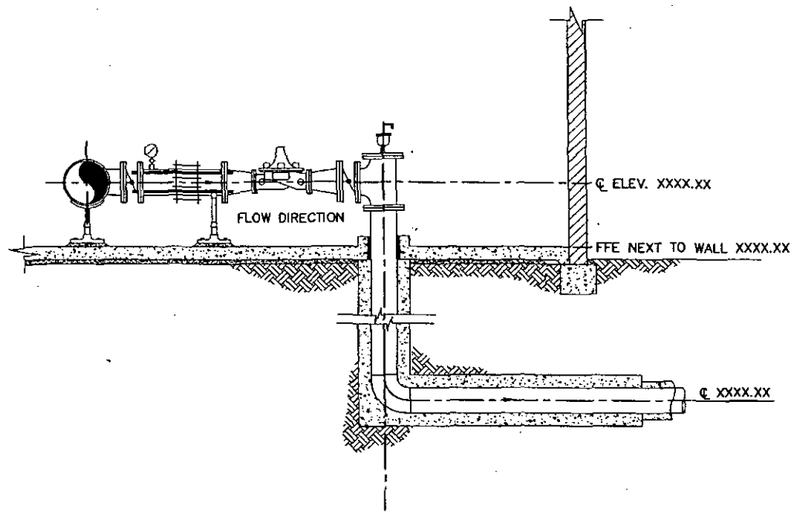
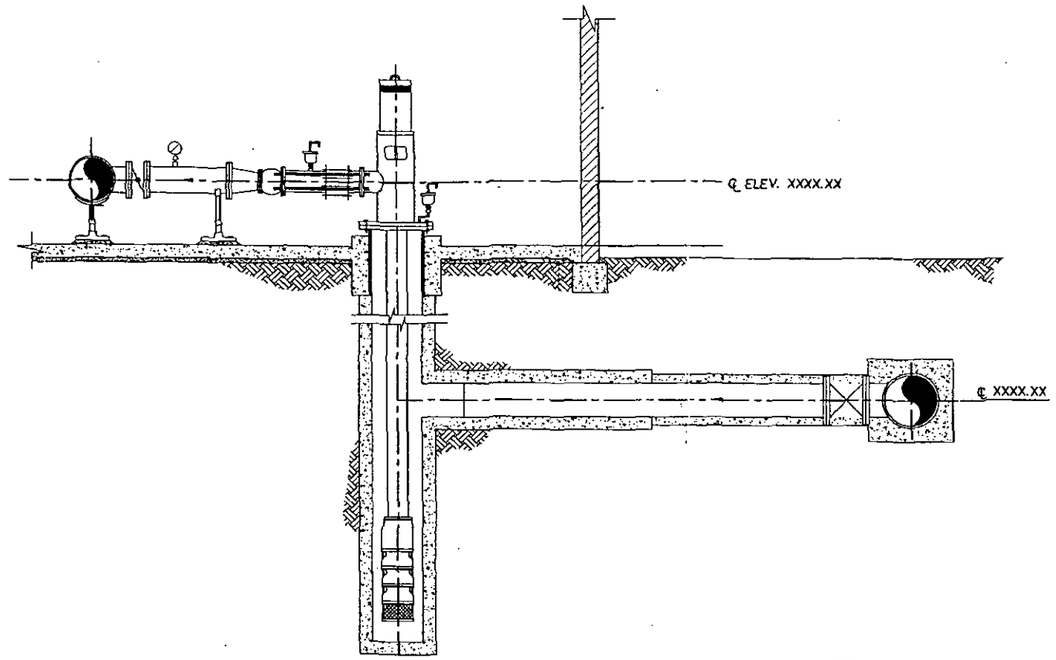
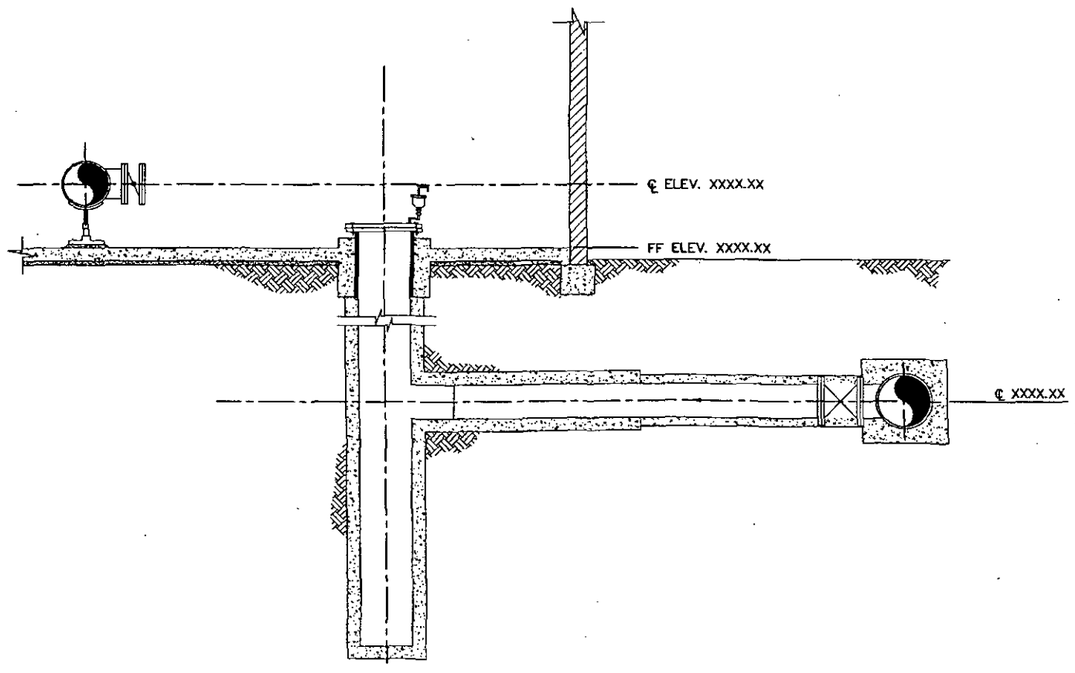
WR# 8217-05



PRESSURE RELIEF VALVE SECTION (A)
N.T.S.



TYPICAL PUMP SECTION (C)
SCALE: 3/8" = 1'-0"



TYPICAL SECTION – SPARE PUMP CAN (B)
SCALE: 3/8" = 1'-0"

CONSTRUCTION NOTES

– TO BE INCLUDED WITH 60% DESIGN

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SERENO CANYON
SCOTTSDALE
ZONE 13 PUMP STATION AT SITE 145
TYPICAL PUMP SECTIONS

30% DESIGN
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CONSTRUCTION

Professional Engineer Certificate No. 41362 TROY A. BONTRAGER Arizona, U.S.A.

DESIGNER	M. MAYES
DRAWN	M. MAYES
CHECKED	T. BONTRAGER
DATE	12/16/05
SCALE	N.T.S.
JOB NO.	052484
SHEET	C6 OF 8

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WR# 6217-05

SCHEMATIC DIAGRAM SYMBOLS

- (CR) CONTROL RELAY
- (TD) TIME DELAY RELAY
- (AR) ALARM RELAY
- (ETM) ELAPSED TIME METER
- (M) MOTOR STARTER OR CONTACTOR COIL
- (PC) PHOTO CELL
- (R) BEACON ALARM LIGHT — LETTER INDICATES COLOR R=RED, A=AMBER, B=BLUE, G=GREEN
- (R) PILOT LIGHT — LETTER INDICATES COLOR R=RED, A=AMBER, B=BLUE, G=GREEN
- OUTPUT DV/DT FILTER
- HEATING ELEMENT
- TRANSFORMER
- CT CURRENT TRANSFORMER
- GROUND CONNECTION
- GENERATOR
- HORN
- FULL VOLTAGE NON-REVERSING (FVNR) MOTOR STARTER OR CONTACTOR NUMBER DESIGNATES NEMA SIZE
- NORMALLY OPEN CONTACT
- NORMALLY CLOSED CONTACT
- RTU OR PLC CONTACT (DI, DO)
- HAND AUTO XO — 2 POSITION SELECTOR SWITCH POSITION LEGEND: X=CLOSED O=OPEN
- OFF HAND AUTO XOO — 3 POSITION SELECTOR SWITCH HAND – OFF – AUTO POSITION LEGEND: X=CLOSED O=OPEN
- NORMALLY CLOSED PUSH BUTTON
- NORMALLY OPEN PUSH BUTTON
- LOCKOUT STOP PUSH BUTTON
- EMERGENCY STOP PUSH BUTTON (MAINTAINED)
- AMPS — DISCONNECT SWITCH SHOWN WITH RATING AND NUMBER OF POLES
- LIMIT OR POSITION SWITCH
- PSH — PRESSURE SWITCH HIGH
- PSL — PRESSURE SWITCH LOW
- FLOW SWITCH
- LEVEL FLOAT SWITCH
- T ICTO — TIMER RELAY CONTACT INSTANTANEOUS CLOSE TIME DELAY OPEN
- T NOTC — TIMER RELAY CONTACT NORMALLY OPEN TIME DELAY CLOSE
- TEMPERATURE SWITCH
- FUSE
- AMPS — FUSEHOLDER OR FUSEBLOCK
- THERMAL OVERLOAD RELAY
- TERMINAL BLOCK
- DEVICE LOCATED AT REMOTE LOCATION
- CONDUIT SEALOFF

POWER SINGLE LINE DIAGRAM SYMBOLS

- JUNCTION BOX WITH POWER DISTRIBUTION BLOCK OR LUGS
- CONDUIT SEALOFF
- LTC CONNECTION
- MC CONNECTION
- BOND TO METALLIC WATER PIPE
- (UM) UTILITY METER
- (HP) MOTOR, NUMBER DESIGNATES NEMA HORSEPOWER SIZE
- FUSE
- AMPS — FUSEHOLDER OR FUSEBLOCK
- AMPS / POLES — CIRCUIT BREAKER, SHOWN WITH TRIP RATING AND NUMBER OF POLES
- AMPS MCP / POLES — MOTOR CIRCUIT PROTECTOR WITH TRIP RATING AND NUMBER OF POLES
- AMPS / POLES — DISCONNECT SWITCH SHOWN WITH RATING AND NUMBER OF POLES
- MMR — MOTOR MANAGEMENT RELAY
- SSS — SOLID STATE STARTER
- VFD — VARIABLE FREQUENCY DRIVE
- HF — HARMONIC FILTER
- EOL — ELECTRONIC OVERLOAD RELAY
- GROUND CONNECTION

SITE PLAN SYMBOLS

- TELEPHONE OUTLET
- SINGLE POLE SWITCH
- 3 WAY SWITCH
- 4-WAY SWITCH
- MANUAL MOTOR STARTER
- SPECIAL PURPOSE OR WELDING OUTLET
- SMOKE DETECTOR
- THERMOSTAT
- FIELD DEVICE
- GROUND ROD
- DUPLEX RECEPTACLE
- ANTENNA MAST
- CONDUIT SEALOFF
- DISCONNECT SWITCH
- (M) MOTOR

CIRCUIT SCHEDULE LEGEND

AAA–BC
- AAA — DEVICE SERVED
- B — TYPE C=CONTROL P=POWER
- C — SEQUENCE NUMBER

ELECTRICAL ABBREVIATIONS

A	AMPERE
AFD	ADJUSTABLE FREQUENCY DRIVE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AI	ANALOG INPUT
AIC	AMPS INTERRUPTING CAPACITY
AO	ANALOG OUTPUT
AS	AIR SUPPLY
ATS	AUTOMATIC TRANSFER SWITCH
BC	BYPASS CONTACTOR
C	CONDUIT
CB	CIRCUIT BREAKER
CCW	COUNTER CLOCKWISE
CL2	CHLORINE
CON	CONTACTOR
CPB	CONTROL PULLBOX
CU	COPPER, BARE
CV	CONTROL VALVE
CW	CLOCKWISE
DCS	DISTRIBUTED CONTROL SYSTEM
DI	DISCRETE INPUT
DO	DISCRETE OUTPUT
DP	DISTRIBUTION PANEL
DV/DT	DIFFERENTIAL VOLTAGE/TIME
DWG	DRAWING
ETM	ELAPSED TIME METER
EOL	ELECTRONIC OVERLOAD
EXIST	EXISTING
FA	FOUL AIR
FC	FAIL CLOSED
FE	FLOW ELEMENT
FLA	FULL LOAD AMPS
FS	FLOW SWITCH
FVNR	FULL VOLTAGE NON-REVERSING
FW	FINISHED WATER
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
GFP	GROUND FAULT PROTECTION
GND	GROUND
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GRS	GALVANIZED RIGID STEEL
H, HI	HIGH
H2S	HYDROGEN SULFIDE
HMI	HUMAN MACHINE INTERFACE
HOA	HAND-OFF-AUTO
HOR	HAND-OFF-REMOTE
I	CURRENT
IC	INSTRUMENTATION CABLE
ICR	INTERMITTENT CYCLE REACTOR
IO	INPUT/OUTPUT
ISC	SHORT CIRCUIT CURRENT
JB	JUNCTION BOX
L, LO	LOW
LAN	LOCAL AREA NETWORK
LC	LOOP CONTROLLER
LCL	LEVEL CONTROL, LOW
LCP	LOCAL CONTROL PANEL
LOS	LOCK-OUT-STOP
LOR	LOCAL/OFF/REMOTE
LS	LEVEL (i.e., FLOAT) SWITCH
LTC	LIQUIDTIGHT FLEXIBLE METAL CONDUIT
M	MOTOR
MA	MANUAL/AUTO
MA	MILLIAMP
MAX	MAXIMUM
MC	MANUFACTURER'S CABLE
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MCP	MOTOR CIRCUIT PROTECTOR
MFR(S)	MANUFACTURER(S)
MGD	MILLION GALLONS PER DAY
MGL	MILLIGRAMS PER LITER
MH	MANHOLE
MIN	MINIMUM
MOV	MOTOR OPERATED VALVE
MMR	MOTOR MANAGEMENT RELAY
MTU	MASTER TELEMETRY UNIT
NEC	NATIONAL ELECTRICAL CODE
NECA	NATIONAL ELECTRICAL CONTRACTOR ASSOCIATION
N.C.	NORMALLY CLOSED
N.O.	NORMALLY OPEN
NOTC	NORMALLY OPEN TIMED CLOSED
NPW	NON-POTABLE WATER
NS	NITROGEN SUPPLY
NTS	NOT TO SCALE
NTU	TURBIDITY
OF	OVERFLOW
OIT	OPERATOR INTERFACE TERMINAL
OL	OVERLOAD
OLR	OVERLOAD RELAY
OO	ON/OFF (MAINTAINED)
OR	OFF-REMOTE
OSC	OPEN/STOP/CLOSE
P	PHASE
PB	PULL BOX
PCP	PROCESS CONTROL PANEL
PCV	PRESSURE CONTROL VALVE
PFR	PHASE/POWER FAILURE RELAY
PI	PULSE INPUT
PLC	PROGRAMMABLE LOGIC CONTROLLER
PLI	PLANT INFLUENT
PMP	PUMP
PNL	PANEL
PO	PULSE OUTPUT
PPB	POWER PULLBOX
PPG	POUNDS PER GALLON
PPH	POUNDS PER HOUR
PPM	PARTS PER MILLION
PR	PAIR
PRES	PRESSURE
PS	PRESSURE SWITCH
PSH	PRESSURE SWITCH, HIGH
PSI	POUNDS PER SQUARE INCH
PV	PROCESS VARIABLE
RAS	RETURN ACTIVATED SLUDGE
RW	RAW WATER
RF	RADIO FREQUENCY
RIO	REMOTE INPUT OUTPUT
RS	RAW SEWAGE
RSP	RAW SEWAGE PUMP
RST	RESET
RTD	RESISTANCE TEMPERATURE DETECTOR
RTU	REMOTE TELEMETRY UNIT
RWT	REFLECTED WAVE TRAP
SCA	SHORT CIRCUIT AMPS
SED	SERVICE ENTRANCE EQUIPMENT
SES	SERVICE ENTRANCE SECTION
SLC	SINGLE LOOP CONTROLLER
SLOS	START-LOCK-OUT-STOP
SMC	SUBMERSIBLE MANUFACTURER CABLE
SO2	SULFUR DIOXIDE
SP	SET POINT
SPC	SPARE CONDUIT
SPR	SPARE
SS	START/STOP
SSS	SOLID STATE STARTER (SOFT START)
ST	SHUNT TRIP
TC	TELEPHONE CABLE
TS	TEMPERATURE SWITCH
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
TYP	TYPICAL
UG	UNDERGROUND
UL	UNDERWRITERS LABORATORIES
UNO	UNLESS NOTED OTHERWISE
V	VOLT
VFD	VARIABLE FREQUENCY DRIVE
W	WATT, WIRE
WAS	WASTE ACTIVATED SLUDGE
WP	WEATHERPROOF
XFMR	TRANSFORMER
XMR	TRANSFORMER
XMTR	TRANSMITTER
ZS	POSITION (i.e., LIMIT) SWITCH

ELECTRICAL LINETYPES

- EXPOSED CONDUIT
- EXISTING EXPOSED CONDUIT
- UNDERGROUND CONDUIT
- EXISTING UNDERGROUND CONDUIT
- BARE COPPER GROUND CONDUCTOR
- EXISTING OR FUTURE
- NEW ELECTRICAL EQUIPMENT
- DEMOLITION
- DETAIL VIEW OR MATCHING
- CAPPED CONDUIT STUB OUT
- PXXX / CXXX — GROUPED CONDUIT AND CIRCUIT IDENTIFICATION TAGS. REFER TO THE POWER SINGLE-LINE, SCHEMATIC CONNECTION DIAGRAMS AND CIRCUIT SCHEDULE FOR CONDUIT SIZES AND CONTENTS. P=POWER C=CONTROL

GENERAL NOTES

1. THE COMPLETED INSTALLATION SHALL COMPLY WITH LATEST REVISION OF APPLICABLE FEDERAL, STATE, AND LOCAL CODES, ORDINANCES, AND REGULATIONS. THE CONTRACTOR SHALL OBTAIN NECESSARY PERMITS AND INSPECTIONS REQUIRED BY THE AUTHORITIES HAVING JURISDICTION. ALL WORK SHALL BE COMPLETED IN A NEAT, WORKMANLIKE MANNER IN ACCORDANCE WITH THE LATEST NECA STANDARDS OF INSTALLATION UNDER COMPETENT SUPERVISION. INSTALL GROUNDING PER NEC.
2. VISIT THE SITE PRIOR TO BIDDING TO BECOME FAMILIAR WITH EXISTING CONDITIONS AND OTHER FACTORS, WHICH MAY EFFECT THE EXECUTION OF THE WORK. INCLUDE ALL RELATED COSTS IN THE INITIAL BID PROPOSAL.
3. THE CONTRACTOR SHALL COORDINATE WORK WITH THE UTILITIES PROVIDING SERVICES ON THIS PROJECT, AND SHALL COMPLY WITH ALL THEIR INSTALLATION REQUIREMENTS.
4. ALL MATERIALS SHALL BE NEW AND OF THE BEST QUALITY, MANUFACTURED IN ACCORDANCE WITH THE LATEST REVISION OF NEMA, ANSI, UL, OR OTHER APPLICABLE STANDARDS. THE USE OF MANUFACTURERS' NAMES, MODELS, AND NUMBERS IS INTENDED TO ESTABLISH STYLE, QUALITY, APPEARANCE, USEFULNESS, AND BID PRICE.
5. PROTECT ALL ELECTRICAL MATERIAL AND EQUIPMENT INSTALLED AGAINST DAMAGE BY OTHER TRADES, WEATHER CONDITIONS, OR ANY OTHER PREVENTABLE CAUSES. EQUIPMENT DAMAGED DURING SHIPPING OR CONSTRUCTION, PRIOR TO ACCEPTANCE BY THE ENGINEER OR THE OWNER, WILL BE REJECTED AS DEFECTIVE.
6. LEAVE THE SITE CLEAN. REMOVE ALL DEBRIS, EMPTY CARTONS, TOOLS, CONDUIT, WIRE SCRAPS AND ALL MISCELLANEOUS SPARE EQUIPMENT AND MATERIALS USED IN THE WORK DURING CONSTRUCTION. ALL COMPONENTS SHALL BE FREE OF DUST, GRIT AND FOREIGN MATERIALS, LEFT AS NEW BEFORE FINAL ACCEPTANCE OF WORK. DAMAGED PAINT AND FINISHES SHALL BE TOUCHED UP OR REPAINTED WITH MATCHING COLOR PAINT AND FINISH.
7. CIRCUIT CONDUCTORS #6 AWG OR SMALLER SHALL BE THWN STRANDED COPPER. #4 AWG THROUGH #2 AWG SHALL BE XHHW STRANDED COPPER. #1 AWG OR LARGER SHALL BE XHHW-2 STRANDED COPPER. MINIMUM POWER CONDUCTOR SIZE SHALL BE #12 AWG WITH #12 AWG GROUND.
8. UNDERGROUND CONDUITS SHALL BE SCHEDULE 40 PVC. MINIMUM CONDUIT DEPTH SHALL BE 24 INCHES. MINIMUM UNDERGROUND CONDUIT SIZE SHALL BE 1 INCH.
9. CONDUITS SHALL BE MARKED AT EACH END WITH MATCHING NUMBERED BRASS TAGS. SPARE CONDUITS SHALL HAVE A PULL STRING INSTALLED, SECURED, AND CAPPED.
10. EXPOSED CONDUITS SHALL BE GALVANIZED RIGID STEEL (GRS). MINIMUM SIZE 3/4 INCH, UNLESS OTHERWISE NOTED ON THE PLANS.
11. SAFETY SWITCHES, ELECTRICAL DISTRIBUTION EQUIPMENT, CONTROL PANELS, AND OTHER ELECTRICAL DEVICES SHALL BE UL LISTED, AND RATED FOR HEAVY DUTY SERVICE.
12. WIRING DEVICES SHALL BE SPECIFICATION GRADE.
13. THE CONTRACTOR IS RESPONSIBLE FOR MANAGING, SCHEDULING, DOCUMENTING, AND PERFORMING THE WORK SO THAT A COMPLETE ELECTRICAL, INSTRUMENTATION AND CONTROL SYSTEM FOR THE FACILITY IS PROVIDED. ACCURATE SHOP AND RECORD DRAWINGS, AND O&M MANUALS SHALL BE SUBMITTED PRIOR TO FINAL ACCEPTANCE OF THE WORK.
14. TYPICAL DETAILS SHALL APPLY IN ALL CASES, WHETHER SPECIFICALLY REFERRED TO OR NOT.

DLengineering & controls
3550 N. Central Ave., Ste. 1900 Phx., AZ 85012

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CROWN COMMUNITY DEVELOPMENT
A Trammell Crow Company

SERENO CANYON
SCOTTSDALE
ZONE 13 PUMP STATION AT SITE 145
ELECTRICAL ABBREVIATIONS, LEGEND, AND NOTES

30% DESIGN PRELIMINARY NOT FOR CONSTRUCTION

DESIGNER	BL
DRAWN	CW
CHECKED	BA
DATE	12/20/05
SCALE	N.T.S.
JOB NO.	052484
SHEET	9 OF 16

WRE 6217-05

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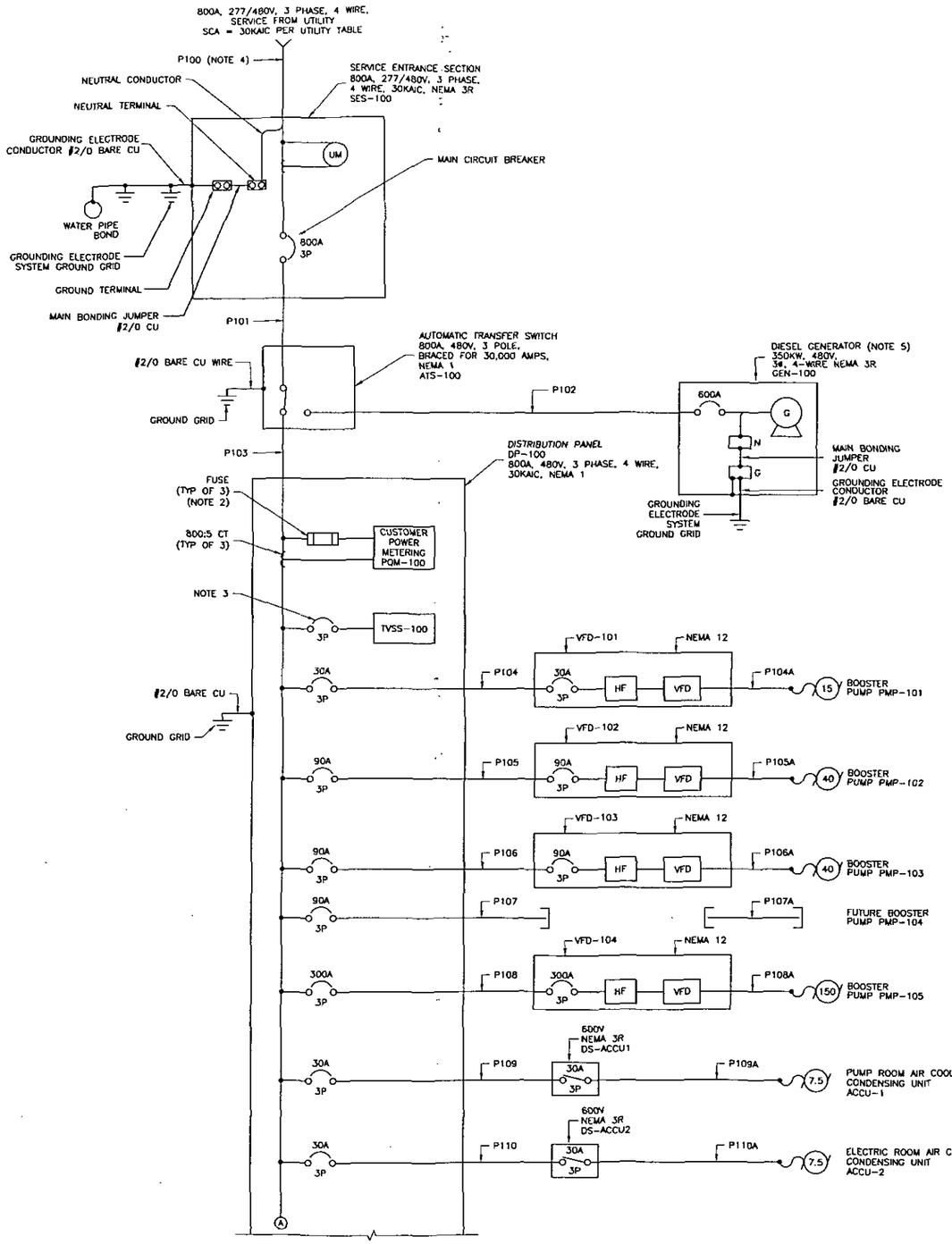
Plot Date: (Tue, 20 Dec 2005)
X:\Projects-Engineering\6000's\6100's\6100 Sereno Canyon Booster Pump Station\6130\100\100DLEC CAD Files\ DI3LEC01.dwg



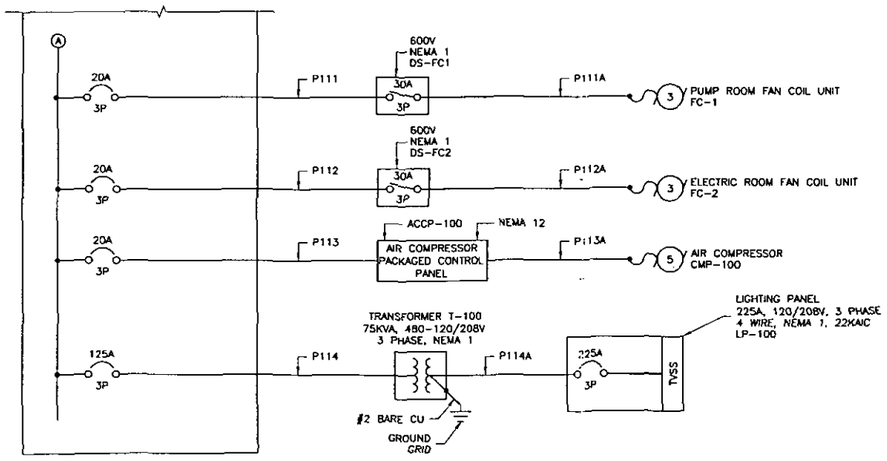
A SINGLE LINE DIAGRAM
N.T.S.

CALLOUT NO.	NO. SETS	CONDUIT SIZE	CIRCUIT CONDUCTORS	CIRCUIT NO.'s
P100	PER UTILITY	PER UTILITY	PER UTILITY	SES100-P1
P101	3	3"	3 - 350KCMIL, #1/0 GND	ATS100-P1
P102	2	3"	3 - 350KCMIL, #1/0 GND	G100-P1
P103	3	3"	3 - 350KCMIL, #1/0 GND	DP100-P1
P104	1	1"	3 - #10, #10 GND	VFD101-P1
P104A	1	1"	3 - #10, #10 GND	PMP101-P1
P105	1	1.5"	3 - #4, #8 GND	VFD102-P1
P105A	1	1.5"	3 - #4, #8 GND	PMP102-P1
P106	1	1.5"	3 - #4, #8 GND	VFD103-P1
P106A	1	1.5"	3 - #4, #8 GND	PMP103-P1
P107	1	1.5"	FUTURE	FUTURE
P107A	1	1.5"	FUTURE	FUTURE
P108	1	2.5"	3 - #4/0, #4 GND	VFD105-P1
P108A	1	2.5"	3 - #4/0, #4 GND	PMP105-P1
P109	1	1"	3 - #12, #12 GND	DSACCU1-P1
P109A	1	1"	3 - #12, #12 GND	ACCU1-P1
P110	1	1"	3 - #12, #12 GND	DSACCU2-P1
P110A	1	1"	3 - #12, #12 GND	ACCU2-P1
P111	1	1"	3 - #12, #12 GND	DSFC1-P1
P111A	1	1"	3 - #12, #12 GND	FC1-P1
P112	1	1"	3 - #12, #12 GND	DSFC2-P1
P112A	1	1"	3 - #12, #12 GND	FC2-P1
P113	1	1"	3 - #12, #12 GND	DSACCP100-P1
P113A	1	1"	3 - #12, #12 GND	CMP100-P1
P114	1	1.5"	3 - #1, #6 GND	T100-P1
P114A	1	2.5"	3 - #4/0, #4 GND	LP100-P1

B CIRCUIT SCHEDULE
N.T.S.

CIRCUIT/DESCRIPTION	KW	KVA	HP	FLA
NEW MOTOR LOADS				
BOOSTER PUMP PMP-101 (FUTURE)			50.0	65.0
BOOSTER PUMP PMP-102			40.0	52.0
BOOSTER PUMP PMP-103			40.0	52.0
BOOSTER PUMP P-104 (FUTURE)			40.0	52.0
BOOSTER PUMP PMP-105			150.0	180.0
CONDENSING UNIT ACCU-1			7.5	11.0
CONDENSING UNIT ACCU-2			7.5	11.0
FAN COIL UNIT FC-1			3.0	4.8
FAN COIL UNIT FC-2			3.0	4.8
AIR COMPRESSOR CMP-100			5.0	7.6
NEW NON-MOTOR LOADS				
TRANSFORMER T-100		75.0		90.2
SUBTOTAL				530.4
+ 25% OF LARGEST MOTOR				45.0
TOTAL AMPS @ 480V/3PHASE				575.4
EXISTING SERVICE SIZE (AMPS)				800.0

C LOAD CALCULATIONS
N.T.S.



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A Shea Homes Company
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NOTES:

1. ALL SHORT CIRCUIT INTERRUPTING AND PROTECTING DEVICES SHALL HAVE A SHORT CIRCUIT INTERRUPTING RATING EQUAL TO OR GREATER THAN THE AVAILABLE SHORT CIRCUIT ON THE BUS.
2. FUSES SHALL BE SIZED PER THE EQUIPMENT MANUFACTURER'S RECOMMENDATIONS.
3. CIRCUIT BREAKER SHALL BE SIZED PER THE TVSS MANUFACTURER'S *RECOMMENDATIONS*.
4. PROVIDE CONDUIT TRENCHING AND BACKFILL PER UTILITY REQUIREMENTS.
5. PROVIDE GENERATOR WITH A WEATHERPROOF AND SOUND ATTENUATING ENCLOSURE.

SERENO CANYON
SCOTTSDALE

ZONE 13 PUMP STATION AT SITE 145
ELECTRICAL SINGLE LINE DIAGRAM

30% DESIGN
PRELIMINARY
NOT
FOR
CONSTRUCTION

DESIGNER	BL
DRAWN	CW
CHECKED	BA
DATE	12/20/05
SCALE	N.T.S.
JOB NO.	052484
SHEET	10 OF 16

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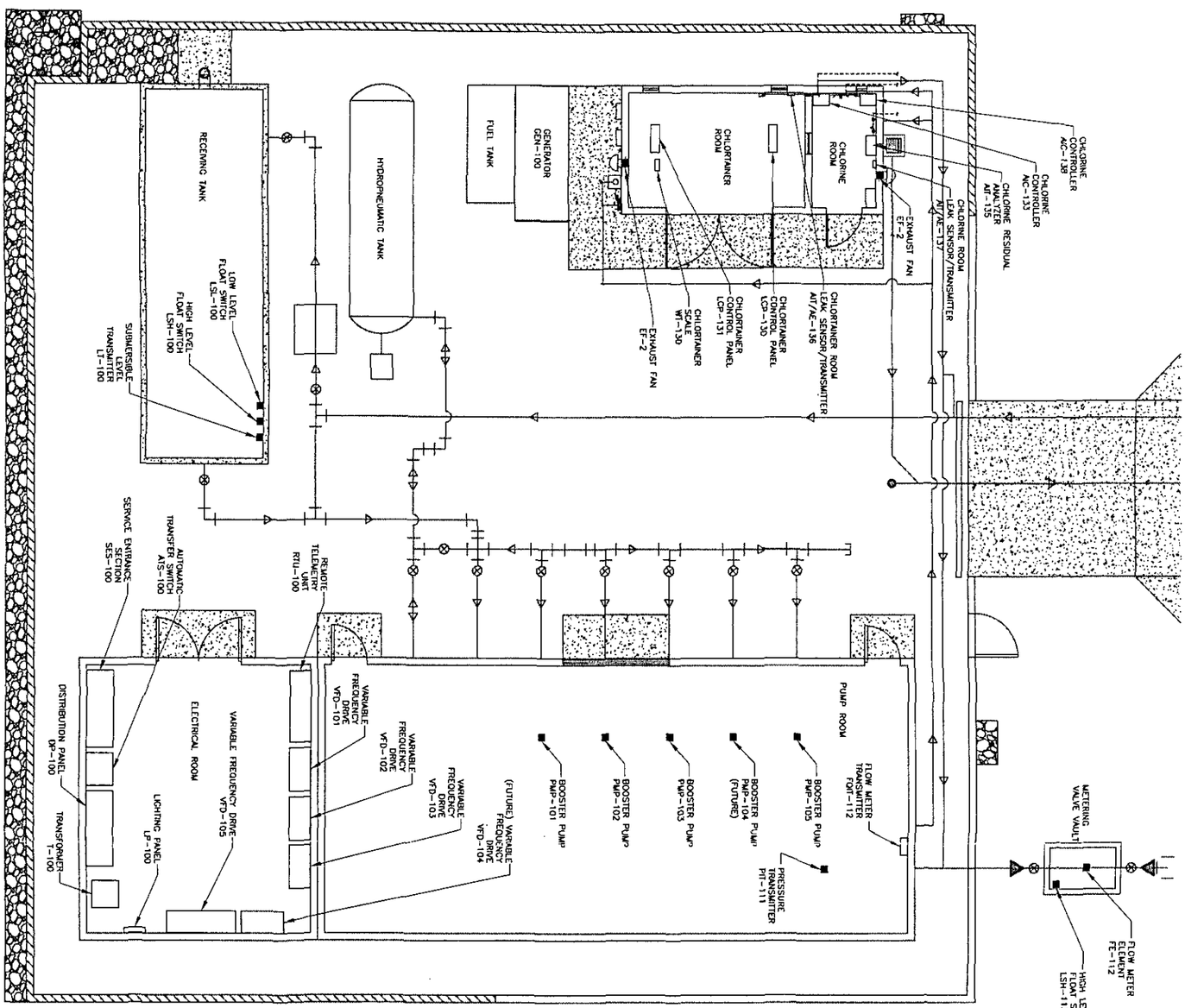
X:\Projects-Engineering\WOOD\WB\00 Sereno Canyon Booster Pump Station\WB\20\00\DGN\E-CAD Files\ DWB_E07.dwg
Plot Date: 12 Dec 2005

WRE 6217-05



X:\Projects-Engineering\1100's\1151.00 Sereno Canyon Booster Pump Station\1151.00\100\DLEG CAD Files\ D1151_E09.dwg

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ZONE 13 PUMP STATION AT SITE 145
PUMP AND ELECTRICAL BUILDING ELECTRICAL PLAN

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CROWN COMMUNITY DEVELOPMENT
A Del Webb Corporation Company

DESIGNER	BL
DRAWN	CH
CHECKED	BA
DATE	12/20/05
SCALE	3/16"=1'-0"
JOB NO.	052484
SHEET	11 OF 16

Plot Date: Tue, 20 Dec 2005

WRE 6217-05

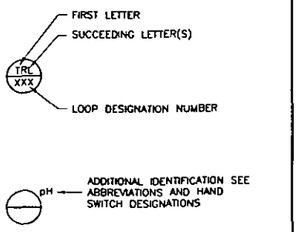
ISA INSTRUMENT IDENTIFICATION TABLE

FIRST LETTERS			SUCCEEDING LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYZER		ALARM		AUTO
B	BURNER, COMBUSTION				
C	CONDUCTIVITY			CONTROL	CLOSED
D	DENSITY	DIFFERENTIAL			
E	VOLTAGE		ELEMENT		
F	FLOW	RATIO			
G	GAUGE		GLASS, VIEWING DEVICE		
H	HAND				HIGH
I	CURRENT		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHED.	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	MOTION				MIDDLE
N	INTRUSION				NORMAL
O	TORQUE		ORIFICE, RESTRICTION		OPEN
P	PRESSURE		POINT CONNECTION		STOP
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD, OR PRINT		RUN OR REMOTE
S	SPEED, FREQUENCY	SAFETY		SWITCH	START
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION			VALVE, LOUVER	
W	WEIGHT		WELL		
X	MOTOR	X-AXIS	UNCLASSIFIED	UNCLASSIFED	UNCLASSIFED
Y	EVENT, STATE, OR PRESENCE	Y-AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION	Z-AXIS		DRIVER, ACTUATOR, FINAL CONTROL ELEMENT	

P&ID ABBREVIATIONS

A	AMPERE
AFD	ADJUSTABLE FREQUENCY DRIVE
AI	ANALOG INPUT
AIC	AMPS INTERRUPTING CAPACITY
ARV	AIR RELIEF VALVE
AO	ANALOG OUTPUT
AS	AIR SUPPLY
ATS	AUTOMATIC TRANSFER SWITCH
AUTO	AUTOMATIC
CB	CIRCUIT BREAKER
CL2	CHLORINE
CON	CONTACTOR
CU	COPPER
CV	CONTROL VALVE
DCS	DISTRIBUTED CONTROL SYSTEM
DI	DISCRETE INPUT
DO	DISSOLVED OXYGEN, DISCRETE OUTPUT
DP	DIFFERENTIAL PRESSURE
DWG	DRAWING
EGO	EMERGENCY GAS OFF
ETM	ELAPSED TIME METER
ETMf	ELAPSED TIME METER (FAST SPEED)
ETMs	ELAPSED TIME METER (SLOW SPEED)
EOL	ELECTRONIC OVERLOAD
EXIST	EXISTING
FA	FOUL AIR
FC	FAIL CLOSED
FE	FINAL EFFLUENT
FR	FORWARD-REVERSE
FS	FLOAT SWITCH
FVNR	FULL VOLTAGE NON-REVERSING
FW	FINISHED WATER
GND	GROUND
GAL	GALLONS
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
H, HI	HIGH
H2S	HYDROGEN SULFIDE
HMI	HUMAN MACHINE INTERFACE
HOA	HAND-OFF-AUTO
I	CURRENT
IO	INPUT/OUTPUT
IOE	INTERNAL-OFF-EXTERNAL
JB	JUNCTION BOX
L, LO	LOW
LAN	LOCAL AREA NETWORK
LC	LOOP CONTROLLER
LCP	LOCAL CONTROL PANEL
LOS	LOCK-OFF-STOP
LR	LOCAL/REMOTE
LS	LEVEL (i.e.. FLOAT) SWITCH
M	MOTOR
MA	MANUAL/AUTO
mA	MILLIAMP
MC	MANUFACTURE CABLE
MCC	MOTOR CONTROL CENTER
MCP	MOTOR CIRCUIT PROTECTOR
MFR(S)	MANUFACTURER(S)
MGD	MILLION GALLONS PER DAY
MGL	MILLIGRAMS PER LITER
MH	MANHOLE
MLR	MIXED LIQUOR RETURN
MO	MOISTURE
MOD	MODULATED
MTU	MASTER TELEMETRY UNIT
NPW	NON-POTABLE WATER
NS	NITROGEN SUPPLY
NTU	TURBIDITY
O/C	OPEN / CLOSE
OCA	OPEN-CLOSE-AUTO
OCR	OPEN-CLOSE-REMOTE
OIT	OPERATOR INTERFACE TERMINAL
OL	OVERLOAD
OO	ON/OFF (MAINTAINED)
OOA	ON-OFF-AUTO
OOR	ON-OFF-REMOTE
OSC	OPEN-STOP-CLOSE
PAH	PRESSURE ALARM HIGH
PER	PERMISSIVE
PLC	PROGRAMMABLE LOGIC CONTROLLER
PNL	PANEL
PO	PULSE OUTPUT
POS	POSITION
POT	POTENTIOMETER
PPG	POUNDS PER GALLON
PPH	POUNDS PER HOUR
PPM	PARTS PER MILLION
PR	PAIR
PRES	PRESSURE
PS	PRESSURE SWITCH
PSI	POUNDS PER SQUARE INCH
PV	PROCESS VARIABLE
RAS	RETURN ACTIVATED SLUDGE
RAW	RAW WATER
REM	REMOTE
RF	RADIO FREQUENCY
RIO	REMOTE INPUT OUTPUT
RS	RAW SEWAGE
RSP	RAW SEWAGE PUMP
RST	RESET
RTD	RESISTANCE TEMPERATURE DETECTOR
RTU	REMOTE TELEMETRY UNIT
RUNf	RUN (FAST SPEED)
RUNs	RUN (SLOW SPEED)
SB	SLUDGE BLANKET
SEQ	SERVICE ENTRANCE EQUIPMENT
SES	SERVICE ENTRANCE SECTION
SLC	SINGLE LOOP CONTROLLER
SLDS	START-LOCK-OFF-STOP
SO2	SULFUR DIOXIDE
SOV	SOLENOID OPERATED VALVE
SP	SET POINT
SPD	SPEED
SPR	SPARE
SS	START/STOP (MAINTAINED)
SSS	SOLID STATE STARTER (SOFT START)
STR	MOTOR STARTER
TAH	TEMPERATURE ALARM HIGH
T/M	TEMPERATURE AND/OR MOISTURE
TEMP	TEMPERATURE
TS	TEMPERATURE SWITCH
TSS	TOTAL SUSPENDED SOLIDS
UG	UNDERGROUND
USD	UP/STOP/DOWN
V	VOLT
VFD	VARIABLE FREQUENCY DRIVE
W	WATER
WAS	WASTE ACTIVATED SLUDGE
WW	WASTEWATER
XMTR	TRANSMITTER
ZS	POSITION (i.e. LIMIT) SWITCH

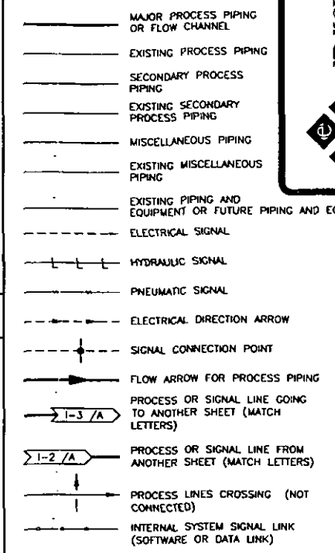
TAG NUMBERS AND DESIGNATIONS



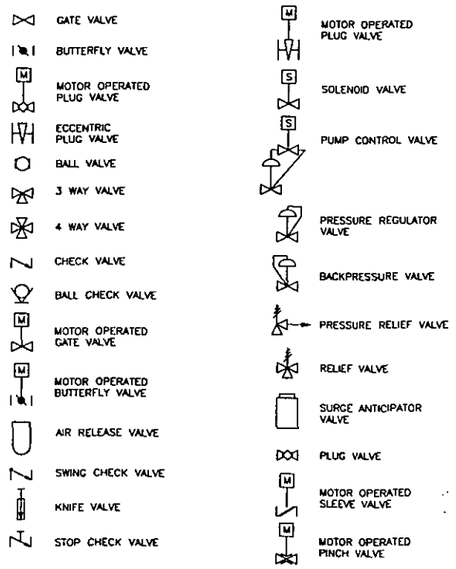
HAND SWITCH DESIGNATIONS

ES	EMERGENCY STOP
HOA	HAND-OFF-AUTO
HOR	HAND-OFF-REMOTE
HORA	HAND-OFF-REMOTE-AUTO
JOA	JOG-OFF-AUTO
LOR	LOCAL-OFF-REMOTE
LR	LOCAL-REMOTE
OC	OPEN-CLOSE
OO	ON-OFF

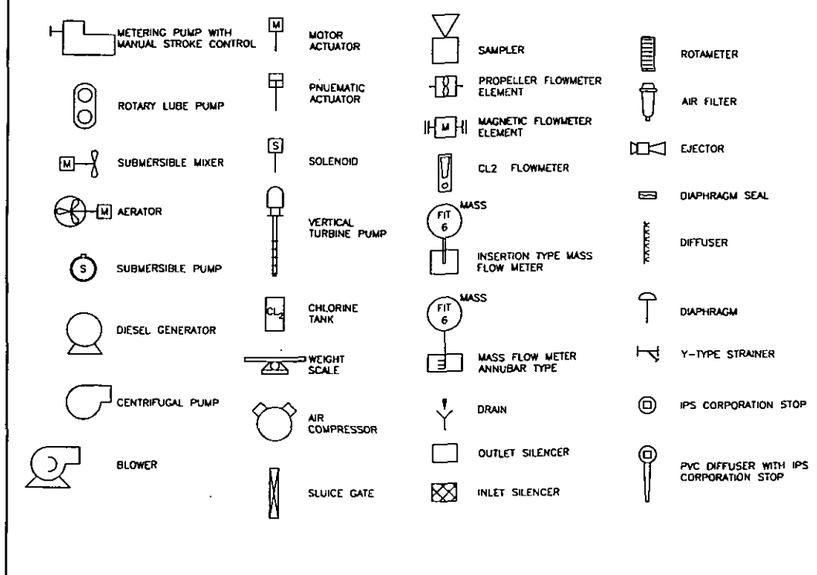
LINE SYMBOLS



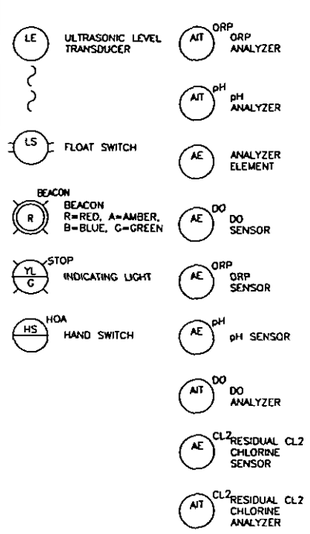
P&ID VALVE SYMBOLS



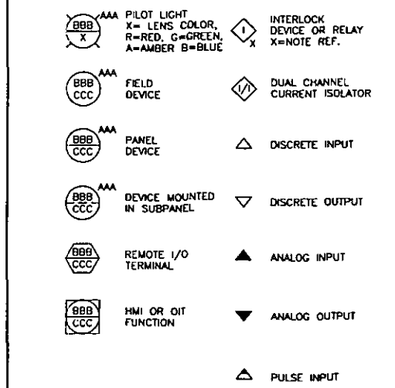
P&ID EQUIPMENT AND PROCESS SYMBOLS



SENSING, INDICATION, AND CONTROL SYMBOLS



P&ID INTERFACE SYMBOLS



NOTE:

REFER TO ISA INSTRUMENT IDENTIFICATION TABLE FOR DEFINITION OF LETTERS BBB INSIDE THE BUBBLES. CCC REPRESENTS LOOP ID (IF USED). SEE ABBREVIATIONS LIST FOR SUPERSCRIPT AAA.

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A Liberty Property Company

SERENO CANYON
SCOTTSDALE

ZONE 13 PUMP STATION AT SITE 145
INSTRUMENTATION ABBREVIATIONS, LEGEND, AND NOTES

30% DESIGN
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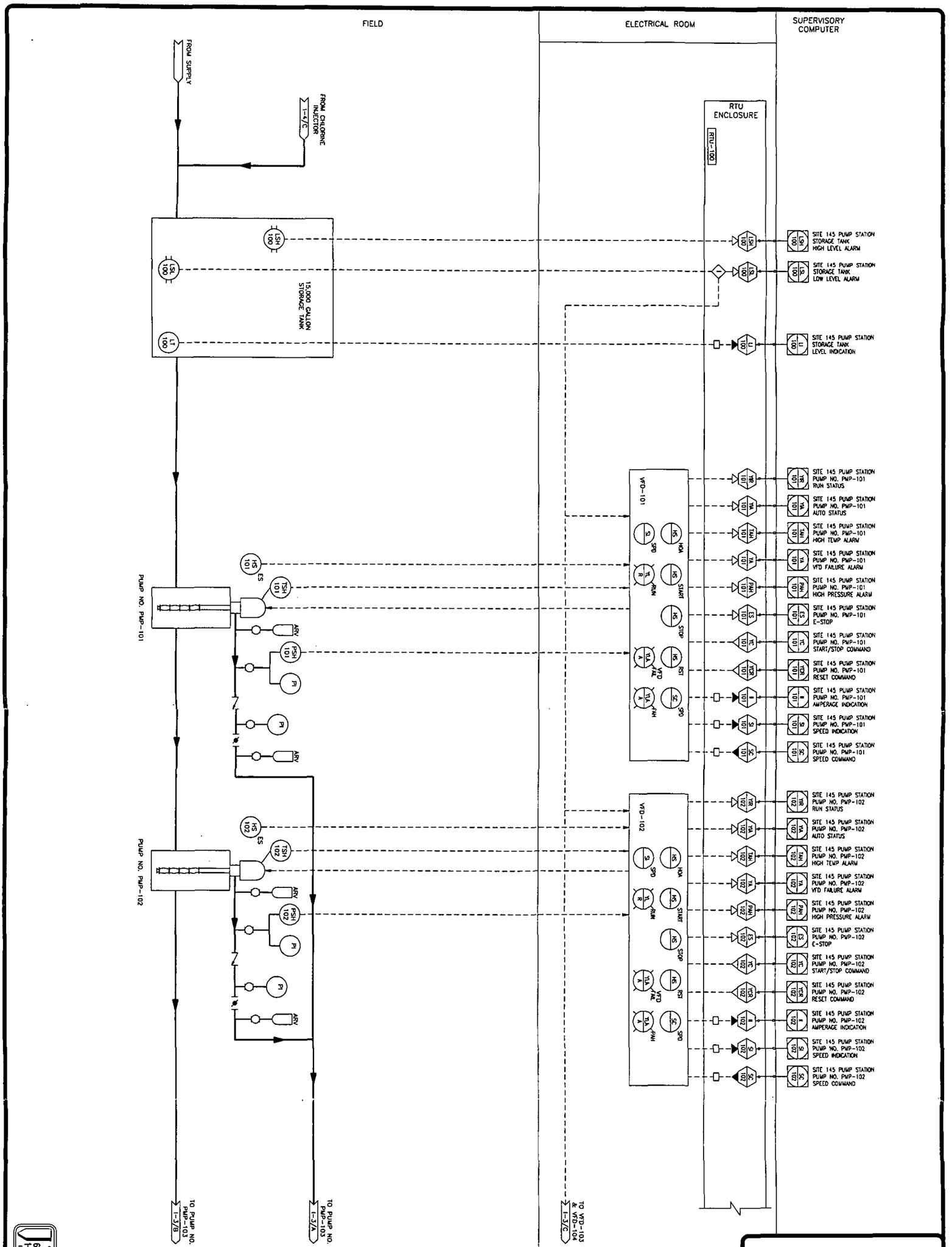
NOT
FOR
CONSTRUCTION

DESIGNED	BL
DRAWN	CH
CHECKED	BA
DATE	12/20/05
SCALE	N.T.S.
JOB NO.	052484
SHEET	12 OF 16

WRE 6217-05



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DATE	12/20/05
SCALE	N.T.S.
JOB NO.	052484
SHEET	13 OF 16

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ZONE 13 PUMP STATION AT SITE 145
INSTRUMENTATION P-I-D - SHEET 1

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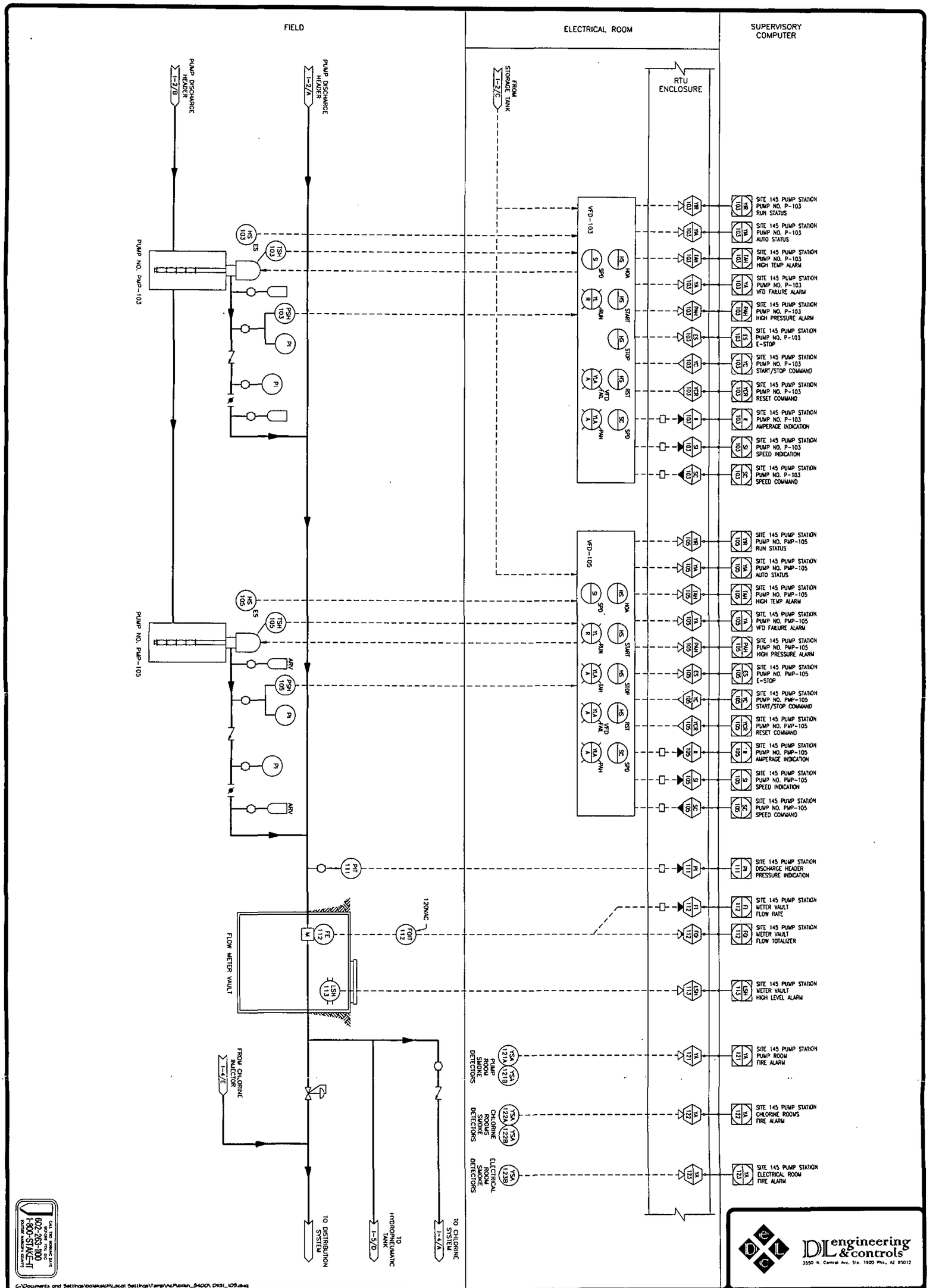
CROWN COMMUNITY DEVELOPMENT
A Chang Crown Company

Plot Date (Tue, 20 Dec 2005)

WR& 6217-05



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CHECKED BA
DATE 12/20/05
SCALE N.T.S.
JOB NO. 052484
SHEET 14 OF 16

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FOR
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ZONE 13 PUMP STATION AT SITE 145
INSTRUMENTATION P+ID - SHEET 2

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Plot Date: Tue, 20 Dec 2005
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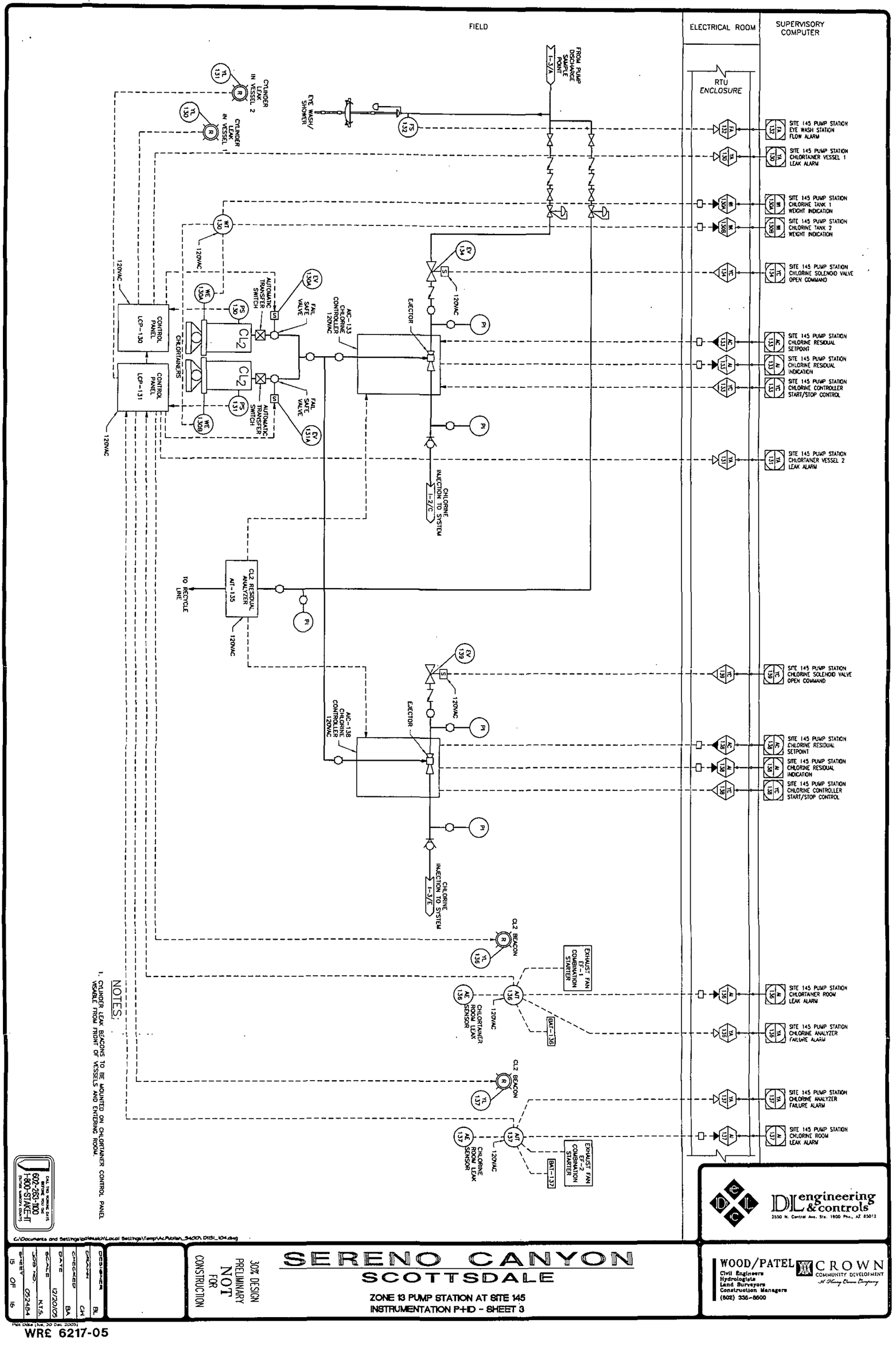

NOTES:

1. CYLINDER LEAK BEACONS TO BE MOUNTED ON CHLORTAINER CONTROL PANEL VISABLE FROM FRONT OF VESSELS AND ENTERING ROOM.

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INSTRUMENTATION P+ID - SHEET 3

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DESIGNER BL
DRAWN
CHECKED CH
DATE BA
SCALE 12/20/05
JOB NO. N.T.S.
SHEET 052484
15 OF 16

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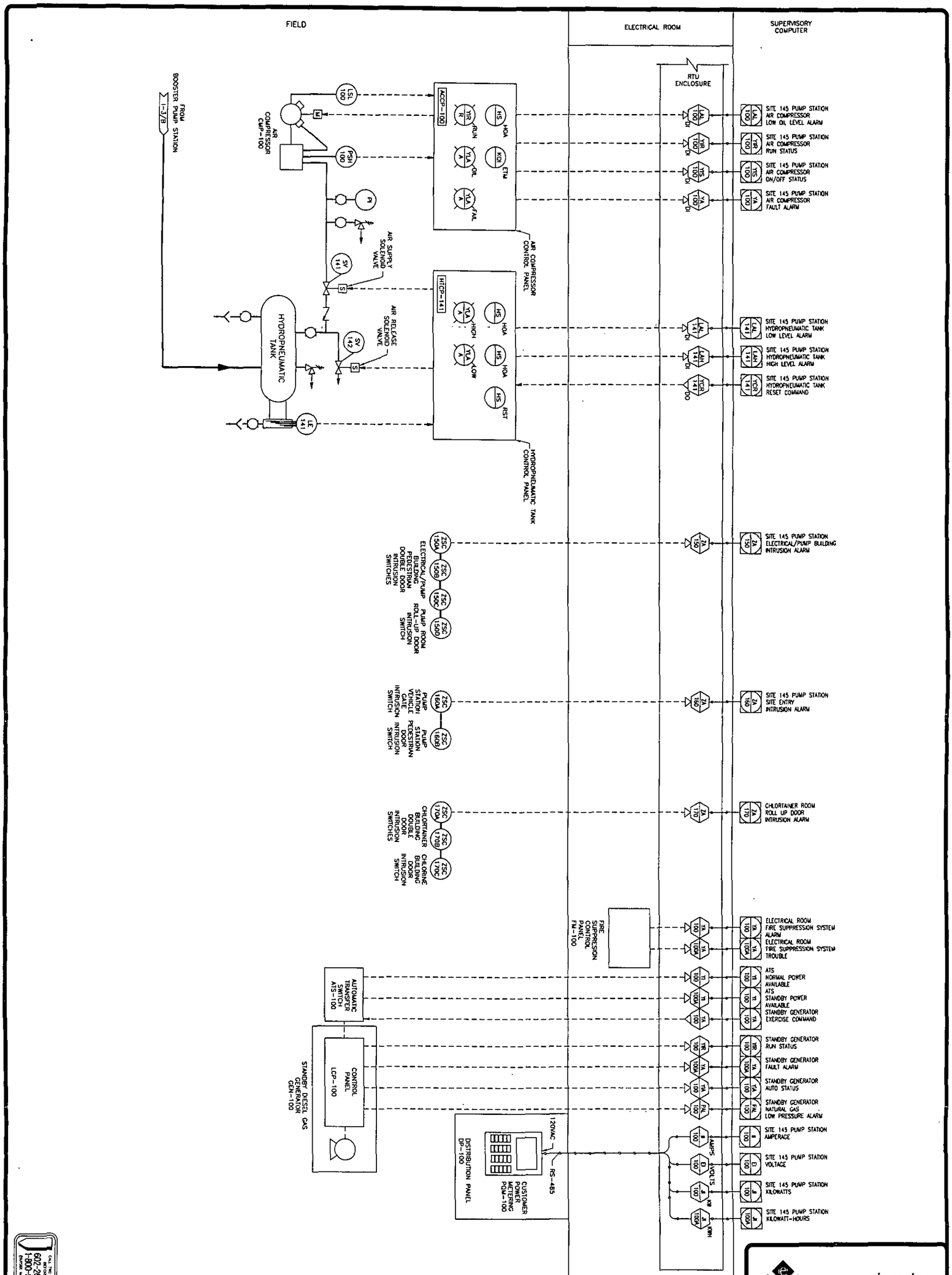

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ZONE 13 PUMP STATION AT SITE 145
INSTRUMENTATION P+ID - SHEET 4

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DATE	12/20/05
SCALE	N.T.S.
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SHEET	16 OF 16

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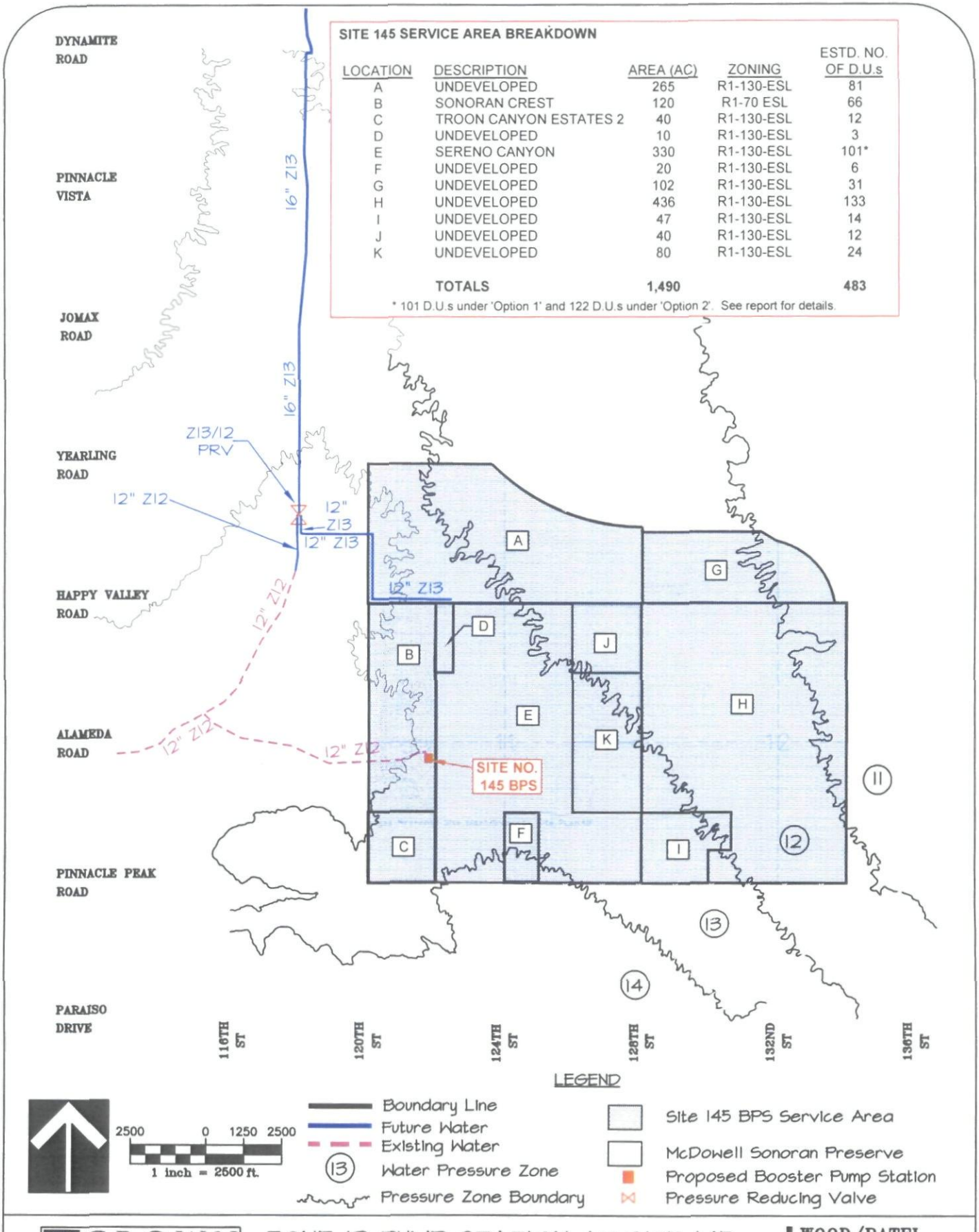
X:\Projects-Engineering\V100\V0100 Sereno Canyon Booster Pump Station\V0100\00\DLEC CAD Files\ DI13_105.dwg

Plot Date: Tue, 20 Dec 2005

WRE 6217-05

PLATE 1

Site No. 145 Booster Pump Station & Service Area



SITE 145 SERVICE AREA BREAKDOWN

LOCATION	DESCRIPTION	AREA (AC)	ZONING	ESTD. NO. OF D.U.s
A	UNDEVELOPED	265	R1-130-ESL	81
B	SONORAN CREST	120	R1-70 ESL	66
C	TROON CANYON ESTATES 2	40	R1-130-ESL	12
D	UNDEVELOPED	10	R1-130-ESL	3
E	SERENO CANYON	330	R1-130-ESL	101*
F	UNDEVELOPED	20	R1-130-ESL	6
G	UNDEVELOPED	102	R1-130-ESL	31
H	UNDEVELOPED	436	R1-130-ESL	133
I	UNDEVELOPED	47	R1-130-ESL	14
J	UNDEVELOPED	40	R1-130-ESL	12
K	UNDEVELOPED	80	R1-130-ESL	24
	TOTALS	**1,490**		**483**

* 101 D.U.s under 'Option 1' and 122 D.U.s under 'Option 2'. See report for details.

CROWN COMMUNITY DEVELOPMENT
A Henry Crown Company

ZONE 13 PUMP STATION AT SITE 145

PLATE 1

Site No. 145 Booster Pump Station & Service Area

WOOD/PATEL ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors
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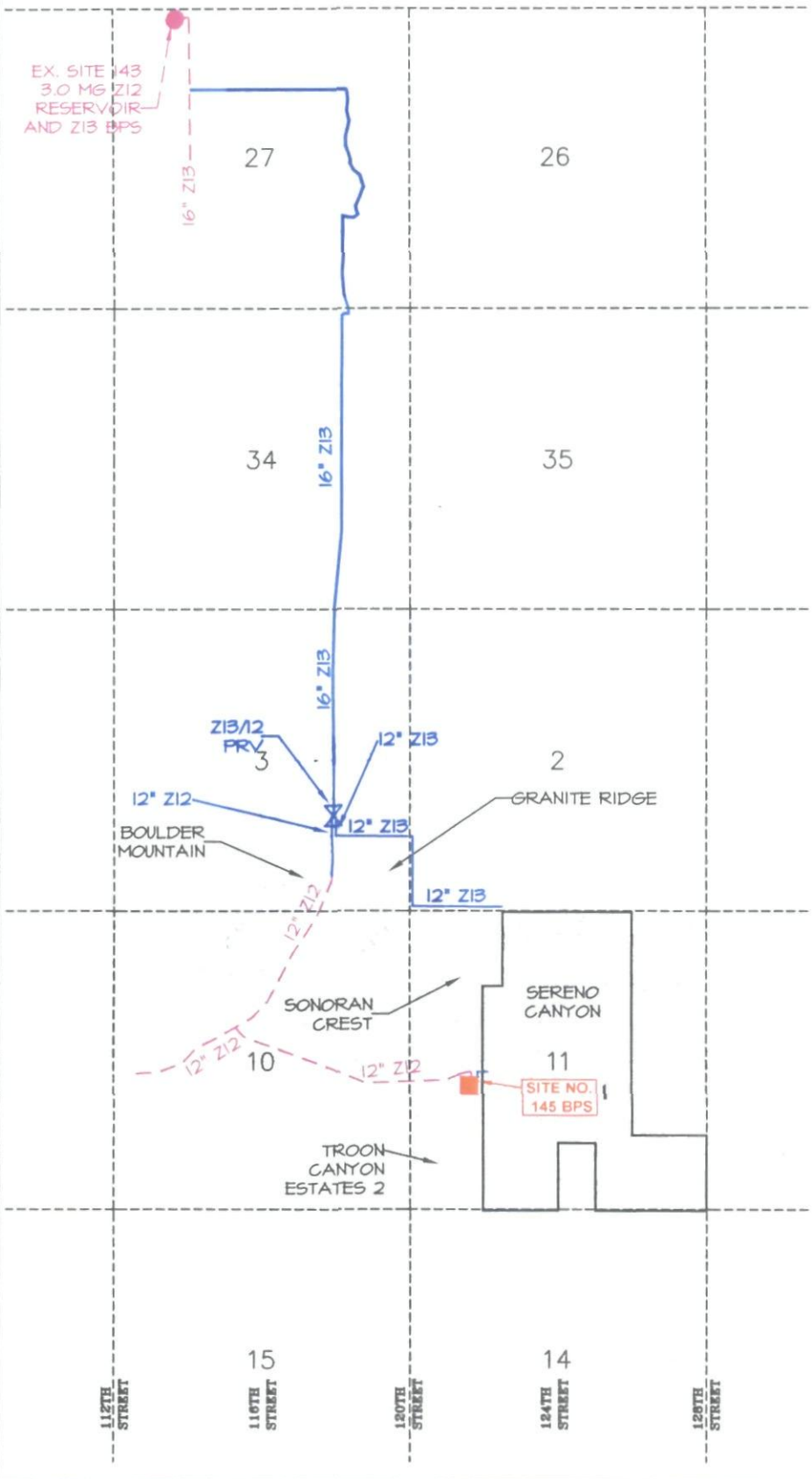
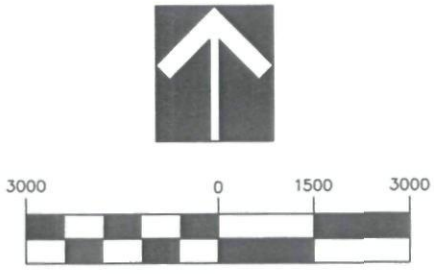
N:\2005\052484\dwg\Exhibits\Pump Station\Plate 1 Site 145 Service Area.dwg

12/16/05

PLATE 2

Off-Site Water Infrastructure





1 inch = 3000ft.

LEGEND:

- Project Boundry
- Existing Water
- Future Water
- Water Pressure Zone Line
- Water Pressure Zone
- Booster Pump Station
- Pressure Reducing Valve

The locations and sizes of the waterlines are shown for illustrative purposes only and should not be used for construction.

CROWN COMMUNITY DEVELOPMENT
A Henry Crown Company

SITE 145 - ZONE 13 PUMP STATION

Plate 2

"Off-Site Water Infrastructure"

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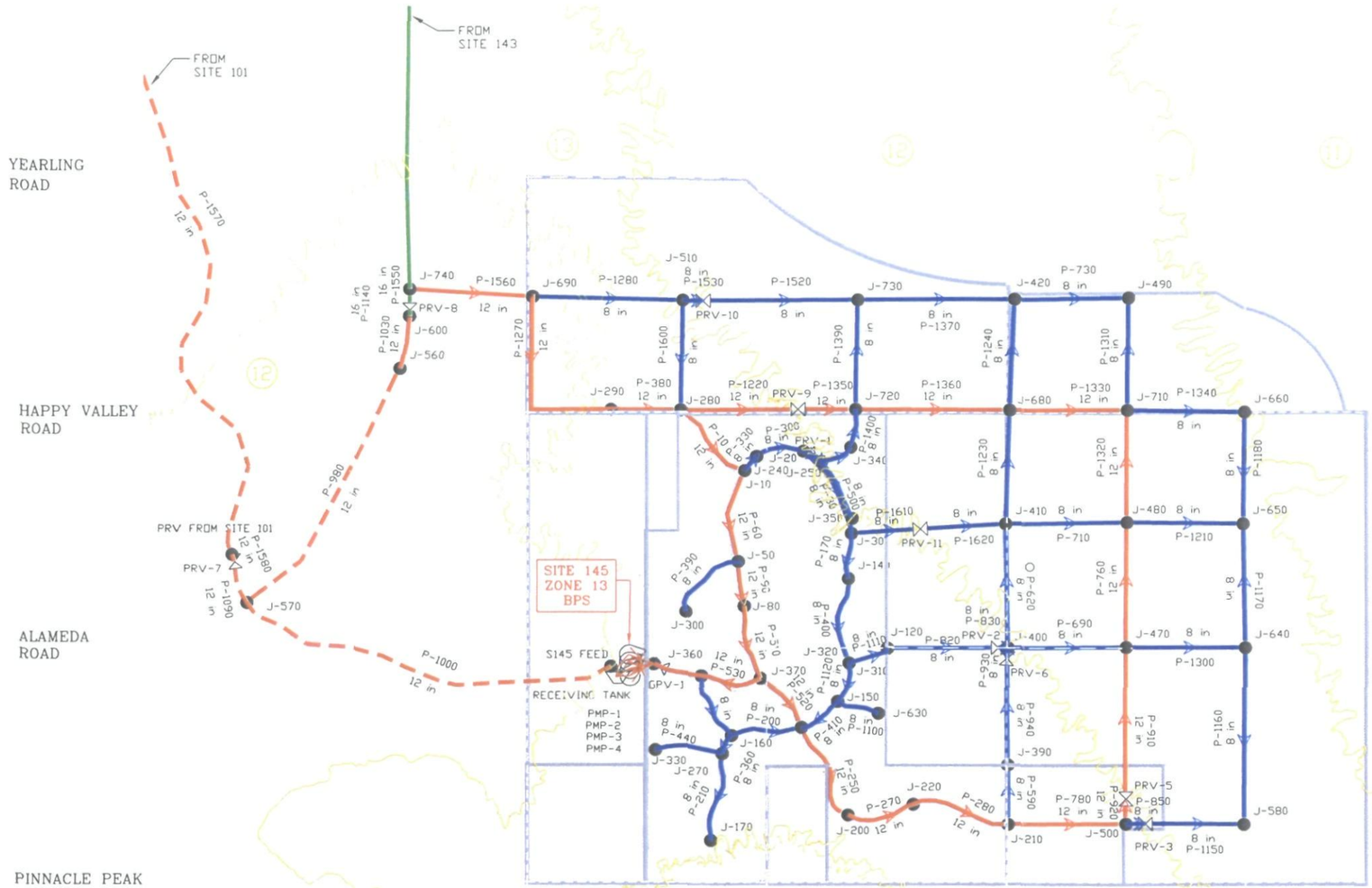
N:\2005\052484\dwg\Exhibits\Pump Station\Plate 2 Off-Site Water Infrastructure.dwg

12/19/05

PLATE 3

Water Distribution Model



1500 0 750 1500

1 inch = 1500 ft.

LEGEND

DIAMETER (IN)	EXISTING PIPE	FUTURE PIPE
8		
12		
16		

PARCEL BOUNDARY

HYD. MODEL JUNCTION NODE

PRESSURE REDUCING VALVE

PRESSURE ZONE

PRESSURE ZONE BOUNDARY

NOTE: FUTURE WATER MAIN ALIGNMENTS AND SIZES SHOWN ARE CONCEPTUAL AND ARE SUBJECT TO CHANGE.

CROWN COMMUNITY DEVELOPMENT
A Henry Crown Company

SITE 145 - ZONE 13 PUMP STATION

PLATE 3 - "WATER DISTRIBUTION MODEL"

PRELIMINARY
NOT FOR CONSTRUCTION

WOOD/PATEL & ASSOCIATES
Civil Engineers
Hydrologists
Land Surveyors
(602) 335-8500

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12/16/05