CITY OF ALBUQUERQUE, NEW MEXICO

PUMP STATION NO. 37 BELL AND COMMERCIAL OPERATIONS MANUAL

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The technical material and data contained in the Operations Manual were prepared under the supervision and direction of the undersigned, whose seal as a Professional Engineer, licensed to practice in the State of New Mexico, is affixed below.

DISCLAIMER

All information pertaining to the stormwater pump station equipment and mode of operation is based on information relevant at the time this manual was prepared. Information will be subject to change as equipment is up graded and replaced in the future. We recommend the Owner update the information contained in this manual as improvements occur so this manual can continue to serve as a useful tool to the operations staff.

(SEAL)

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All questions about the meaning or intent of these documents shall be submitted only to the Engineer of Record, stated above, in writing.

OPERATIONS MANUAL
FOR THE
CITY OF ALBUQUERQUE STORMWATER PUMP STATION NO. 37
BELL AND COMMERICAL

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LIST OF ACRONYMS AND ABBREVIATIONS

3P	Three Phase
A	Ampere
ABCWUA	Albuquerque Bernalillo County Water Utility Authority
AC	Alternating Current
AC/hr	Air Changes per hour
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
AWG	American Wire Gauge
BSCP	Bar Screen Control Panel
CAS	Control and Status (pump relay)
CFM	Cubic feet per minute
CP	Control Panel
CT	Control Transformer
CV	Check Valve
DB	dry bulb
DC	Direct Current
FVNR	Full Voltage Non-Reversing (Motor Starter)
FVR	Full Voltage Reversing (Motor Starter)
GF	Ground Fault
GND	Ground
gpm	gallons per minute
HMI	Human-machine interface (screen and keyboard)
H-O-A	hand-off- automatic
HP	horsepower
HVAC	Heating, Ventilation, and Air Conditioning
Hz	Hertz (cycles per second)
ICP	Integrated control panel
IM	isolation means
IMP	Impedance
JB	junction box
kcmil	thousand circular mils (area of conductor)
kV	Kilovolt
kVA	Kilo volt-ampere
kW	kilowatt
kWH	Kilowatt Hour (meter)
LE	Level Element
LIT	Level Indicator Transmitter
LOA	Local-Off-Auto
LOR	Local-Off-Remote
LOTO	lock-out-tag-out
LPCP	Lift Pump Control Panel
LSCP	Lift Station Control Panel
LS	Level Switch

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

mA	Milliampere
MCB	Main Circuit Breaker
MCC	Motor Control Center
mg/L	milligrams per liter
MGD	million gallons per day
MLO	Main Lug Only
MV	Medium Voltage
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NPSH	Net Positive Suction Head
O&M	Operation and Maintenance
OC	open-close
OCA	open-close-automatic
OIP	operator interface panel
OIS	operator interface station (screen and keyboard)
OL	Overload
OSE	Office of the State Engineer
P	Pump
P&ID	process and instrumentation diagram
PFCC	Power Factor Correction Capacitor
PLC	programmable logic controller
PMH-9	Model of Primary Voltage Switchgear Manufactured by S&C Electric
PNM	Public Service Company of New Mexico
PPE	personal protection equipment
PRV	pressure relief valve
psi	pounds per square inch
PT/CT	Potential (voltage) transformer/current transformer
PT	power transformer
RCP	reinforced concrete pipe
RMC	Rigid Metal Conduit
ROF	Reverse-Off-Forward
RPM	revolutions per minute
RTU	radio telemetry unit
RVPW	reduced voltage part winding
RVSS	reduced voltage solid state starter
SCADA	supervisory control and data acquisition
SLCP	Station Level Control Panel
SMP	Standard Maintenance Procedure
SOJP	Standard Operation Job Procedure
SPCP	Sump Pump Control Panel
sq.ft.	square feet
SS	stainless steel
SSCP	Stepped Speed Contactor Panel

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

SWRP	Southside Water Reclamation Plant
TDH	total dynamic head
UPS	Uninterruptible Power Supply
V	Volts
V	Valve
VDC	Volts Direct Current
VFD	variable frequency drive
WB	Wet Bulb
WC	Water column
WUA	Water Utility Authority
WUA-AMP	Water Utility Authority Asset Management Program
WWTP	Wastewater Treatment Plant
XFMR	Transformer

1.0 INTRODUCTION

This Operations Manual refers exclusively to the existing stormwater pump station facilities for Pump Station No. 37 Bell and Commercial. Refer to Section 1.3 for a description of existing facilities. The intent of this manual is to inform the operator of how each component operates and to serve as a reference for performing particular tasks. The intent of this manual is achieved by addressing three (3) areas of operation: Operations & Maintenance (O&M); Overview, Standard Operating Job Procedure (SOJPs); and Standard Maintenance Procedures (SMPs). This manual is written with the assumption that the operator reading it has more than just a basic understanding of storm drainage systems and stormwater pump stations in general and is not intended to be used as an education publication.

1.1 Guide to the Manual

1.1.1 Section Organization

The information presented in this manual for the three (3) areas of operation is organized into nine (9) major sections. Each section includes specific information that pertains to the section title. Although each section contains valuable information necessary for efficient, orderly, and safe operations of the facilities, certain sections cover the technical operations of the facility and contain detailed instructions on how the pump station should be operated.

There is some variation, but most of the sections listed above are broken down into subsections under the following headings:

- Overview
- Equipment Description
- Design Criteria
- Instrumentation and Alarms
- Normal Operation
- Safety: Information Unique to the System or Process

1.1.2 Section Headings

The text of this manual is prepared using a sequence numbering system for all of the headings and components (figure numbers, table numbers, and page numbers). The first number denotes the start of a section. The second number denotes the start of a subsection. The third number denotes the headings or the component of each subsection. Some sections that appear in this manual may have a fourth division. For example, 4.1.4 refers to the normal operations for the mechanical barscreen in Section 4 – Pump Station System.

This section would be located under Section 4 – Pump Station System, Subsection 4.1 – Mechanical Bar Screen, Heading 4.1.4 – Normal Operation.

Tables, page numbers, and figures are presented using a similar numbering system. The first number indicates the section where the figure, table, or page can be found. The second number is separated from the first number by a dash and indicates the order of the figures, table, or page in the appropriate section.

To minimize repetition, many systems are cross-referenced throughout the text to show the interrelationship between the various units. Where possible, discussions concerning identical or similar equipment installed at different locations are kept as similar as possible to provide the personnel with a routine, which can be used at all of the involved locations.

1.2 City-Wide Stormwater Pumping System Description

The City of Albuquerque stormwater pump stations are located mostly in low areas of the Valley, with three (3) stations, Nos. 31, 35, and 36, designed to discharge into the North Diversion Channel, and are used to collect and pump stormwater runoff and prevent or mitigate the impact of flooding; three (3) stations, Nos. 30, 44, and 47, are located outside of the City limits in unincorporated Bernalillo County. A map of all fourteen (14) pump stations is presented in Figure 1-1. Please note Station No. 42 Paseo Del Norte has been decommissioned, but is shown in Figure 1-1.

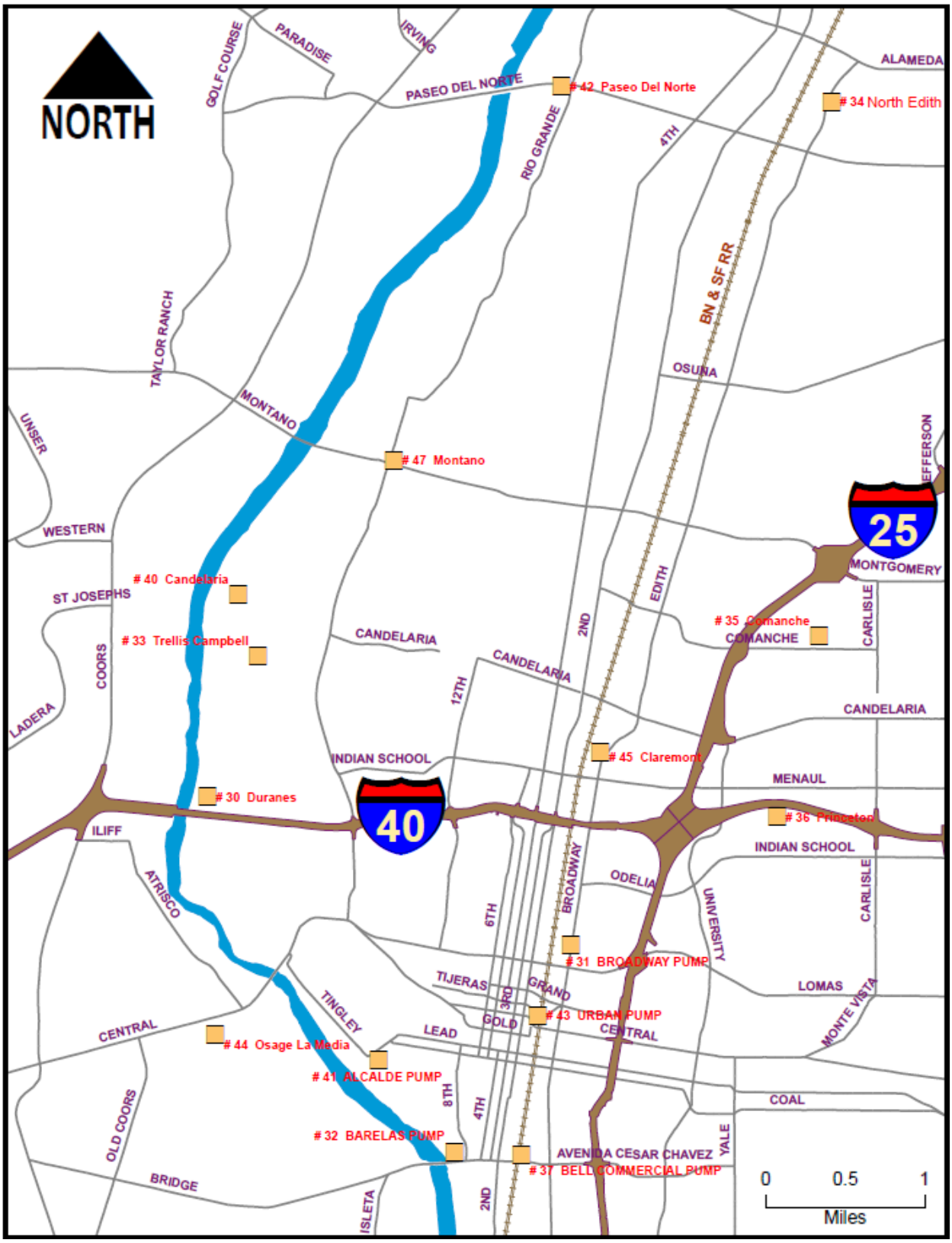

FIGURE 1-1
STORMWATER PUMP STATIONS MAP
Source: City of Albuquerque, DMD, SDD

The stormwater pump stations are owned by the City of Albuquerque (COA) and are administered by the Albuquerque Department of Municipal Development (DMD), Engineering Division, Storm Drain Design (SDD). Through an agreement between the City and the Albuquerque Bernalillo County Water Utility Authority (ABCWUA), the ABCWUA Field Operations Department, Line Maintenance/ Lift Station Section operate and maintain the stormwater pump stations, along with their other duties to operate and maintain the wastewater vacuum and lift stations.

1.3 General Description of Stormwater Pump Station No. 37 Bell and Commercial

Pump Station No. 37 Bell and Commercial is located on the northeast corner of the intersection of Bell Avenue SE and Commercial Street SE, shown in Figure 1-1. The address is 101 Bell Avenue SE, and it is located in zoning map grid L-14. It was constructed in 1977 and functions primarily as a lift station for the network of storm drains in the vicinity of the station. The station was upgraded in 2005. Two (2) of the three (3) dry pit lift pumps were replaced with surplus submersible pumps from the ABCWUA Southside Water Reclamation Plant and installed in a dry pit application. The station also received new control valves for each pump. It was again upgraded in 2009 as part of the Emergency Storm Water Pump Station Improvements Phase I, which included the replacement of the original mechanical bar screen assembly with the unit removed from Pump Station No. 32 Barelas.

The network of storm drains feeding the pump station's wet well have an approximate capacity of 117,500 gallons per minute (gpm). Assuming the area was to flood, such that Bell Avenue was submerged and the wet well full to the bottom of the inlet box, the combined capacity is approximately 206,400 gpm. The inlet capacities, as discussed in Section 3.1.1, are larger than the station's combined capacity of 30,500 gpm. The remaining stormwater collects locally, ponding in the surrounding neighborhood and a surge basin located to north at approximately Santa Fe Avenue and Broadway Boulevard until the over-burdened storm drain system can convey the water to the pump station. The station pumps stormwater uphill to a large main underlying Broadway Boulevard at Bell Avenue that discharges by gravity to the south in the San Jose Drain.

A site and base plan of the pump station are provided in Figures 1-2 and 1-3 respectively. Additionally, a reference section drawing from a previous construction project at the Bell and Commercial Station is provided in Figure 1-4. Reference drawings are for information only and may not be representative of existing conditions.

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COMMERCIAL STREET SE
CURB & GUTTER
4' SIDEWALK
PROPERTY LINE
PROPERTY LINE
8' CHAINLINK FENCE ALL AROUND
PROPERTY LINE
ALLEY
METER
PRIM. SWITCH
500KVA XFMR
FH
6"W
VALVE BOX
10"FM
8" THK. SLAB
WETWELL
SUMP PUMP-1
18"SUCT LINE
30"SUCT LINE
30"SUCT LINE
SCREENINGS CONVEYER
BAR SCREEN
℄ PUMP NO.1
℄ PUMP NO.2
℄ PUMP NO.3
SUMP PUMP-2
SUMP 2 DISCHARGES TO WET WELL VIA 2" PIPE
1"W
PUMP BUILDING SEE FIGURE 1-3
12' GATE
DRIVE PAD
8.70'
36"DISCH HEADER
KNIFEGATE VALVE
36" FM
60" RCP INLET
10" FORCEMAIN
6" WATER
N
(2) 10' GATES
R/W PROPERTY LINE
4' GATE
PROPERTY LINE
4' SIDEWALK
CURB & GUTTER
36" DISCHARGE LINE (08-001-77)
TO JUNCTION BOX AT BELL AVE. AND BROADWAY AVE.
BELL AVE. SE
10" FORCEMAIN
TO JUNCTION BOX AT BELL AVE. AND BROADWAY AVE.
6"W
6"W
6"W
48" RCP SD (08-001-77)
48" RCP SD (08-001-77)

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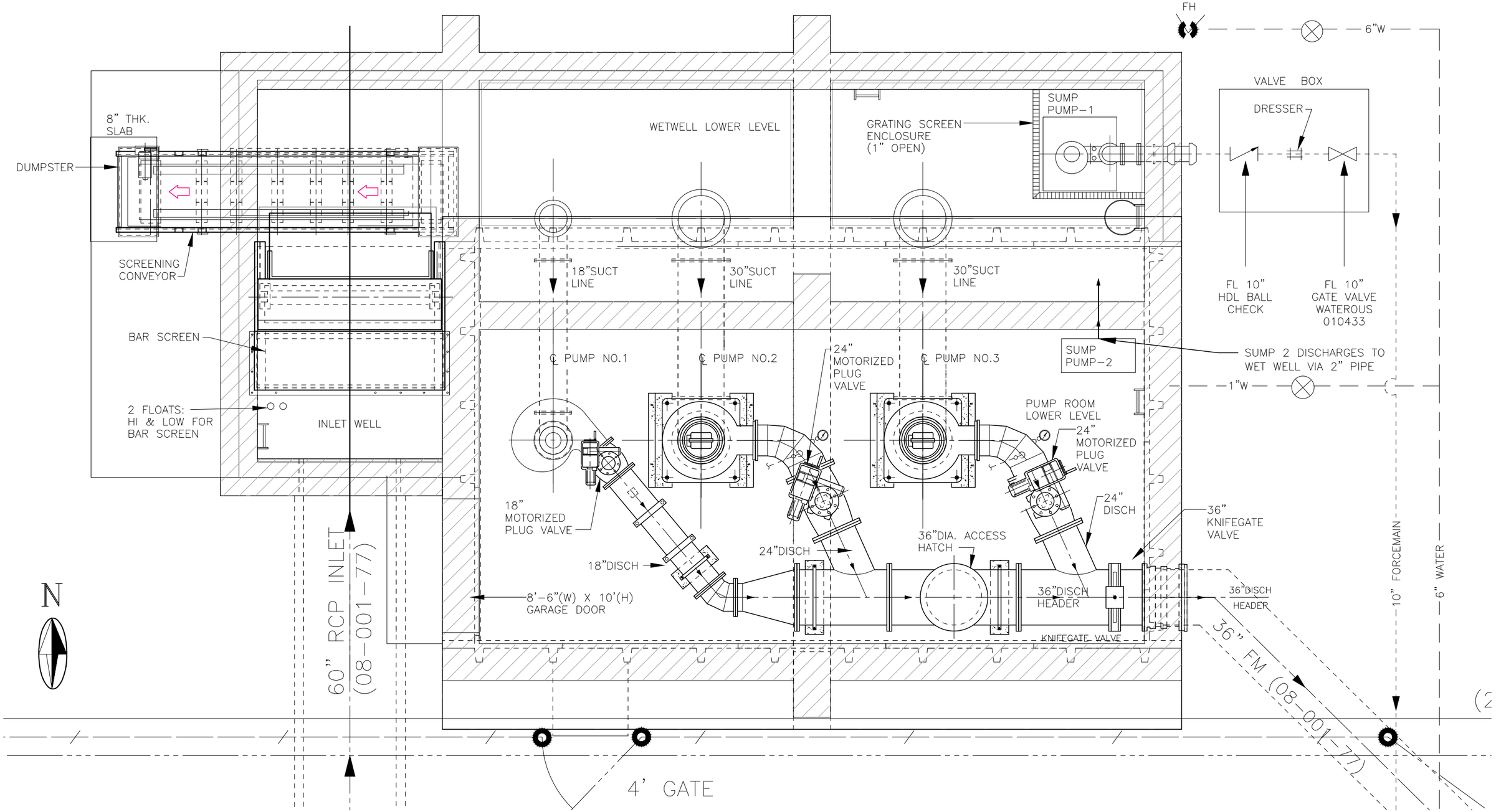
City Of Albuquerque Stormwater Pump Stations

Pump Station No. 37 Bell and Commercial Site Plan

Figure 1-2



City Of Albuquerque Stormwater Pump Stations

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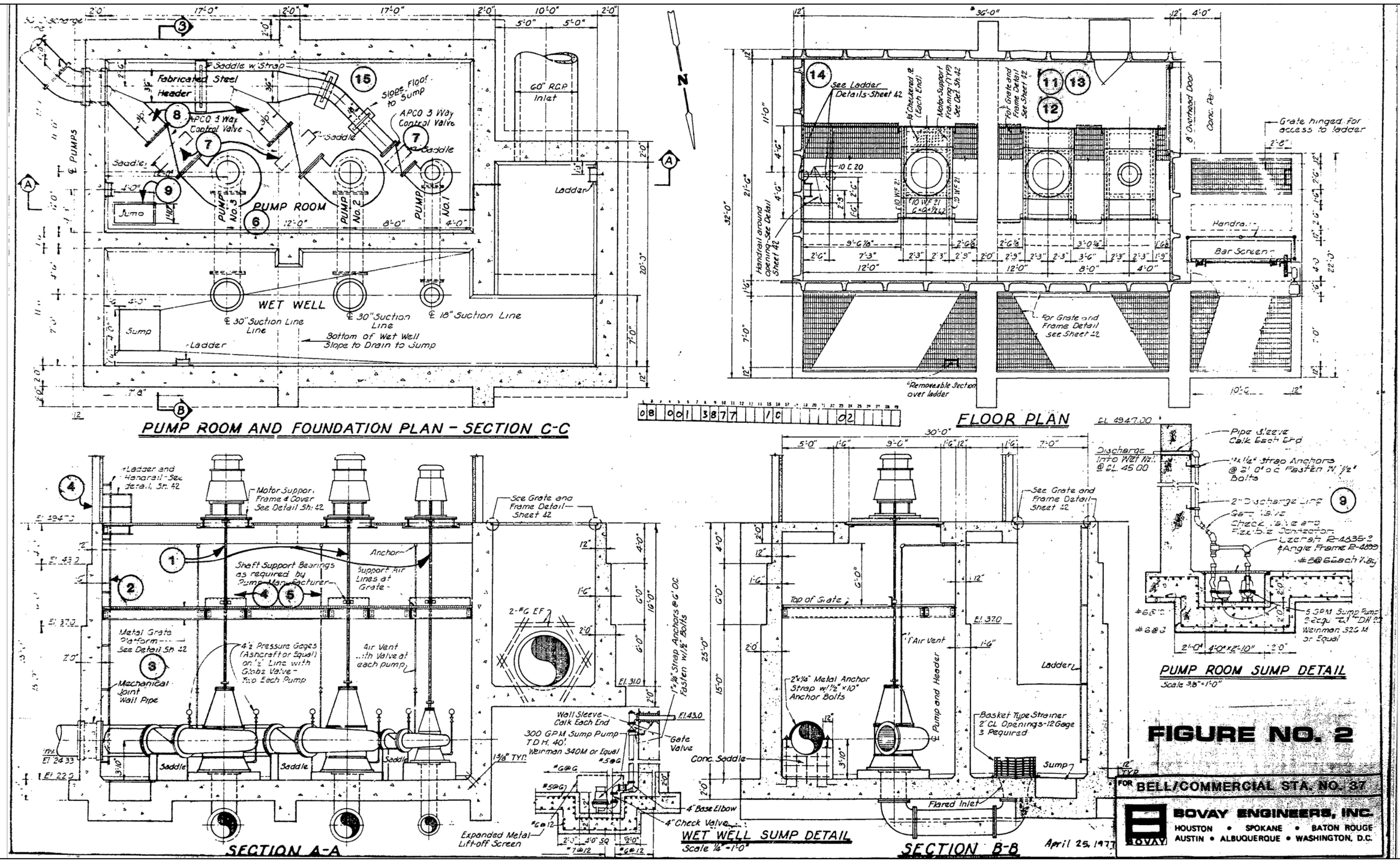
Pump Station No. 37 Bell and Commercial Base Plan

Figure 1-3



2.0 STANDARDS

This section provides a brief description of the standards applicable to this pump station and identifies the governing regulations which dictate the level of standards recommended for design and installation.

2.1 Water Resource Standards

The stormwater pumps are recommended to be designed and installed to meet the following standards by the American National Standard Institute/ Hydraulic Institute (ANSI-HI):

- ANSI/HI 1.3 Rotodynamic (Centrifugal) Pumps for Design and Application
- ANSI/HI 2.3 Rotodynamic (Vertical) Pumps for Design and Application
- ANSI/HI 9.6.4 Rotodynamic Pumps for Vibration Measurement and Allowable Values
- ANSI/HI 9.8 Intake Design for Rotodynamic Pumps**.**
- ANSI/HI 14.6 Rotodynamic Pumps for Hydraulic Performance Acceptance Tests

2.2 Electrical Standards

The Electrical systems are recommended to be designed and installed to meet the following standards: 2012 National Fire Protection Association (NFPA) – National Fire Code, NFPA 70 – National Electrical Code, NFPA 70B – Recommended Practices for Electrical Equipment Maintenance, NFPA 70E – Standard for Electrical Safety in the Workplace, NFPA 110 – Standard for Emergency and Standby Power Systems, and New Mexico Electrical Code (14.10.4.) Title 14 – Housing and Construction, Chapter 10.

Also, the Electrical design is to comply with the recommended practices of the following organizations:

- NEMA – National Electrical Manufacturer's Association
- UL – Underwriters Laboratories
- IEEE – Institute of Electrical and Electronics Engineers

2.3 HVAC Standards

The HVAC systems are recommended to be designed and installed to meet the following standards: 2009 International Building Code, 2009 Uniform Mechanical Code, 2009 International Energy Conservation Code, and the National Fire Code. Special attention is focused on 2012 National Fire Protection Association (NFPA) 820, Recommended Practice for Fire Protection in Wastewater Treatment Plants.

Also, the HVAC design and installation is to comply with the recommended practices of the following organizations:

- ASHRAE Standard 62.1-2010 Ventilation for Acceptable Indoor Air Quality
- American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)
- Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
- Air Moving and Conditioning Association (AMCA)
- Associated Air Balance Council (AABC)

2.3.1 HVAC Standard Description

2009 Uniform Mechanical Code – The Uniform Mechanical Code provides requirements for the installation and maintenance of heating, ventilating, cooling, and refrigeration systems.

2009 International Energy Conservation Code – The International Energy Conservation Code is a model code that regulates the minimum energy conservation requirements for all aspects of energy use in facilities heating and ventilating systems.

2012 National Fire Protection Association (NFPA) 820, Recommended Practice for Fire Protection in Wastewater Treatment Plants – This standard establishes the minimum requirements for protection against fire and explosion hazards in waste water treatment plants or collections systems such as storm sewers.

American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) – ASHRAE is the world's foremost technical society in the fields of heating, ventilation, air conditioning, and refrigeration.

Sheet Metal and Air Conditioning Contractors National Association (SMACNA) – SMACNA standards address all facets of the sheet metal industry, from duct construction and installation to air pollution control, and from energy recovery to roofing.

Air Moving and Conditioning Association (AMCA) – The Air Moving and Control Association is a non-profit association of air system equipment manufacturers – primarily fans, louvers, dampers, and air curtains used in commercial or industrial buildings.

Associated Air Balance Council (AABC) – The Associated Air Balance Council establishes industry standards for the field measurement and documentation of HVAC systems.

ASHRAE Standard 62.1-2010 Ventilation for Acceptable Indoor Air Quality – ASHRAE 62.1 standard specifies the minimum ventilation rates and measures intended to provide indoor air quality that is acceptable to human occupants.

3.0 DESIGN CRITERIA

This section provides a brief description of the criteria applicable to this pump station.

3.1 Water Resources Design Criteria

3.1.1 Inlet Pipe Capacity

The station wet well is fed by a 60-inch reinforced concrete pipe (RCP) collecting flow from two (2) 48-inch RCP storm drain systems in Bell Avenue; one (1) extending west to a collection system in Commercial Avenue and the other extending east to a collection storm drain system in William Street. The pipe to the west is at a slope of 0.0113 feet per foot, and the eastern 48-inch pipe is at a slope of 0.0059 feet per foot. The combined capacity of these pipes is approximately 117,500 gpm. In a surcharged condition assuming that Bell Avenue is flooded and the wet well is partially full to the bottom of the inlet box, the combined capacity is approximately 206,400 gpm.

3.1.2 Lift Pumps

There are three (3) lift pumps of two (2) different types. Pump No. 1 is a Fairbanks Morse (FM), Model 5710-18 vertical dry pit, line shaft centrifugal pump. The motor is a 75 HP, 460V, 3-phase, 705 rpm full speed Electric Machinery adjustable speed magnetic drive. The pump is fed by a buried 18-inch suction line from the wet well, and discharges via an 18-inch pipe to a 36-inch header located in the dry pit. Pump Nos. 2 and 3 are Flygt Model CT3500 with 595-mm diameter, 1430-type impellers. The CT3500's are submersible pumps in a dry pit configuration. The motors are Flygt 51-56-14AA with an 860 drive, and are rated to produce 134 HP at 505 rpm using 460V, 3-phase power. Each pump is fed by a 30-inch suction line from the wet well, and discharges via a 24-inch pipe to the 36-inch header. Upon exiting the station, water is pumped through approximately 1,000 feet of 36-inch force main to a junction box at the intersection of Bell Avenue and Broadway Boulevard. The two (2) Flygt pumps were installed as

part of a retrofit in 2002. Previously, they were in service as activated sludge pumps at the City of Albuquerque's Southside Water Reclamation Facility.

At maximum capacity, the pumps are capable of delivering between 13,900 and 32,000 gpm depending on the total dynamic head (TDH) required. The flow rate depends on the wet well's water level, which causes static lift to range from approximately 16 feet to 35 feet. A larger static lift corresponds to a smaller flow rate as the pumps must work harder to lift the water. The lift pumps may be operated in different configurations to suit variable pumping requirements. Pump No. 1 should not be operated by itself, but rather as an auxiliary to the two (2) Flygt pumps when more capacity is needed. This is because the required flow rate and TDH may be outside the manufacturer's recommended operating range under expected conditions. Refer to Appendix C for the manufacturer's pump curve and data. Also included in Appendix C are an additional set of curves showing approximate system hydraulics and possible pump operating combinations.

The manufacturer's pump curves for the FM 5710-18 and Flygt CT3500 indicate that the pumps require 18 feet and 16 feet of net positive suction head (NPSH) to prevent cavitation, respectively. When cavitation occurs, the pump runs noisily and sounds as if it were pumping marbles. Prolonged cavitation will result in pitting of the impeller and volute. Stormwater periods tend to be brief and some cavitation is tolerable over the life of the pump.

At the station's site elevation, the quantity of available suction head is greater than the required quantity. Therefore, the pumps are capable of pulling between 4.5 (FM 5710) and 8.5 (Flygt CT3500) feet of suction lift. That is, the pumps could pull water through suction piping from a wet well at a lower elevation with a water level approximately 4.5 to 8.5 feet below the elevation of the impeller. The station is designed such that the pumps pull less suction lift that this amount.

The Flygt pumps are installed in Flygt's "T" configuration, which indicates it is installed vertically in a dry-pit with permanent (flanged) suction and discharge piping.

3.1.3 Sump Pump

There are two (2) station sump pumps; one (1) in the dry pit and one (1) in the wet well.

The wet well sump is located in a 1-inch clear opening screened depression and is a 35 HP submersible Flygt, Model CP 3201, with a 636-type impeller. The pump runs at 1,170 full speed RPM on 460V, 3-phase power. The pump discharges through a 10-inch force main into a nearby gravity storm sewer junction box located at Bell Avenue and William Street. The discharge force main is equipped with a Flygt HDL-type ball check valve and Waterous gate valve. The pump's design capacity is 2,000 gpm at 48 feet of TDH.

The dry pit sump is located in a grated depression in the northeast corner of the dry pit and is 7.5 HP submersible Flygt, Model CP3185, with a 183-type impeller. The pump runs at 1,700 full speed RPM on 460V, 3-phase power. The pump discharges back into the wet well via a 2-inch pipe.

Both pumps are installed in Flygt's "P" configuration, which indicates that the pump has a vertical discharge riser, no piping attached to the intake bell, and is submerged under normal operation conditions. Refer to Appendix D for manufacturer's pump curve and data.

3.1.4 Mechanical Bar Screen

The inlet channel into the wet well is cleaned by a 9-foot wide climber-type mechanical bar screen. The unit is an Infilco Degremont Model IIIAS with a five (5) HP drive motor housed in a waterproof enclosure. The bar rack and frame are set at 90 degrees from horizontal in a 16-foot deep channel. The bar rack measures 9 feet wide by 10 feet, 9.5 inches high and the bars are spaced at 2-inch openings. The screenings are lifted to a belt conveyor approximately six (6) feet above the top of the channel. The belt conveyor is a 24-inch wide, 16-foot long Custom Conveyor Corporation unit with a 2 HP WEG motor. The bar screen rake is activated by a float switch in the inlet channel. Once activated, a timer runs the bar screen through a set number of racking cycles before it turns off in the "up" position. A second float switch initiates a high level

alarm. There is no bypass channel should the screen become blinded and flow blocked. Refer to Appendix B for manufacturer's maintenance schedule.

3.2 Electrical Design Criteria

3.2.1 Electrical Service

The pump station receives 480V, 3-phase power from a pad mounted transformer that is owned and maintained by PNM. The transformer secondary is routed through a pad mounted meter enclosure and is then connected to a 480V Motor Control Center (MCC).

3.2.2 Electrical Low Voltage

Low voltage is distributed from the MCC to the lift pumps, a sump pump, two (2) electric heaters, a supply fan, and a 120/240V panelboard via a 480 to 120/240V transformer.

3.2.3 Controls

The lift pumps are controlled by the Lift Station Control Panel (LSCP) and a programmable logic-type controller (PLC). The LSCP receives level inputs from level transmitters in the wet well. The LSCP has an operator interface panel for displaying station status and alarm messages. The LSCP also has selector switches and pilot lights for control and monitoring station operations.

3.3 HVAC Design Criteria

3.3.1 Outdoor Design

Outdoor Design conditions as follows:

Outside Summer: 96 °F DB / 60 °F WB

Outside Winter: 16 °F DB

3.3.2 Indoor Design

Indoor design conditions vary, depending on the occupancies of the areas served. Table 3-1 lists the indoor design conditions, as well as the code required ventilation rates. The ventilation rates for spaces are as required by NFPA 820 or ASHRAE 62.1. These rates are expressed in air changes per hour (AC/hr). This corresponds to the flow of fresh, outdoor air that is required to be supplied to the spaces.

TABLE 3-1
INDOOR HVAC DESIGN CRITERIA

Facility	Area	Min Indoor Design Temperature (°F)	Max Indoor Design Temperature (°F)	Ventilation Rate (Outdoor Air) (AC/hr)	Source/Reason for Ventilation Rate
Bell and Commercial – Pump Station No.37	Wet Well	Ambient	Ambient	Not Required	NFPA 820
	Control Room	55	90	Not Required	ASHRAE 62.1
	Dry Well	55	90	Continuously at 6 AC/hr	NFPA 820

4.0 PUMP STATION SYSTEM

This section provides a brief description of the different components of the stormwater pump station shown in Figure 1-2, including an overview of each process, equipment description, instrumentation and alarms, and safety information unique to the system or process. This section is supplemented with photos and diagrams of the processes at this pump station. The process and instrumentation diagram for the station is shown in Section 7.

4.1 Mechanical Bar Screen

4.1.1 Overview

Stormwater enters the pump station from a 60-inch reinforced concrete pipe storm drain into a 10-foot wide concrete channel. The stormwater is then conveyed through the mechanical bar screen (Figure 4-1), where debris is pulled out of the channel up the face of the screen, wiped into a belt conveyor, which conveys it into a dumpster.

4.1.2 Equipment Description

The debris from the incoming stormwater is removed by a 9-foot wide climber-type mechanical bar screen manufactured by Infilco Degremont. The vertical screen bar section has 2-inch clear openings and is rated at 262 million gallons per day (182,000 gpm). The screen channel does not have overflow provisions. The climber rake is driven by a 5 HP drive motor. A scraper mechanism wipes debris from the rakes onto a discharge chute, where it drops into a belt conveyor manufactured by Custom Conveyor Corporation (Figure 4-2). The 24-inch wide belt is sloped at a 14-degree angle and discharges into a large roll-off dumpster.

FIGURE 4-1
MECHANICAL BAR SCREEN

FIGURE 4-2
SCREENINGS CONVEYOR

The mechanical bar screen and conveyor at this station are not tagged with Water Utility Authority Asset Management Program Equipment Tags. The missing tag numbers were prescribed to aid in identification and are shown on Figure 37-1 in Section 7 to provide clarity. The prescribed convention for the mechanical bar screen and conveyor are listed below in Table 4-1.

TABLE 4-1
EQUIPMENT INFORMATION

Equipment No.	Asset Info	Classification Type	Classification
U53741	Station	Bar Screen	Unit
M53741	Station	Bar Screen Motor	Motor
U53760	Station	Conveyor	Unit
M53760	Station	Conveyor Motor	Motor
SS53760	Station	Conveyor Speed Switch	Speed Switch
ZS53760	Station	Conveyor Position Switch	Position Switch

4.1.3 Instrumentation and Alarms

Instrumentation includes:

- Level transmitter
- Alarm float level switch
- Conveyor belt speed switch
- Conveyor position switch

Alarms connected to telemetry include:

- High channel level
- Bar screen run
- Bar screen fail
- Conveyor run
- Conveyor fail

4.1.4 Normal Operation

The bar screen rake run cycle timer is initiated by a Flygt ENM-10 float level switch located inside the inlet channel. The rake runs on a prescribed interval and if there are no obstructions, it will continue to run until the duration timer expires. If debris caught in the screen causes the channel to rise, a high channel level relay contact closes and restarts the rake and run cycle timer. If the debris is large enough to overload the motor, the torque overload and reverse motion alternator switches are activated. The rake will run in reverse until it reaches the idle position. Large debris will need to be removed manually in this instance, or cleared by operating the rake in Hand mode. For more information on operating the rake in Hand mode, refer to SOJP No. 3700-SU-Bell and Commercial Pump Station in Section 7.

4.1.5 Safety: Information Unique to the System or Process

Refer to Section 9 for general safety guidelines.

4.2 Lift Pumps

4.2.1 Overview

The screened stormwater enters the wet well and is drawn through suction lines by three (3) dry pit lift pumps. Stormwater is pumped by any combination of the three (3) lift pumps. Each pump discharges into a 36-inch header located in the dry pit that feeds a 36-inch force main. The force main runs approximately 1,000 feet uphill along Bell Avenue to a junction box at Broadway Boulevard.

4.2.2 Equipment Description

The wet well level is monitored by an Ametek Drexelbrook Universal III level transmitter with fixed-probe type sensing element. There is an additional probe for redundancy. Stormwater is pumped by two (2) 134 HP Pumps No. 2 and 3 (Figure 4-3) and/or the auxiliary 75 HP Pump No. 1 (Figure 4-4) as needed. The two (2) larger pumps are Flygt Model CT3500 units with integral motors. They run at 1,170 full speed RPM using 460V, 3-phase power. The pumps are installed in Flygt's "T" configuration, which indicates it is installed vertically in a dry-pit with permanent (flanged) suction and discharge piping. The smaller pump is a Fairbanks Morse 5710-18 that is driven by vertical shaft motor and runs at 705 full speed RPM on 460V, 3-phase power. Each pump is controlled by a motorized plug valve that functions both as a check valve and an isolation valve. The entire station may be isolated from the 36-inch force main by a knife-gate valve installed at the end of the header.

Not all of the equipment at this station is tagged with Water Utility Authority Asset Management Program Equipment Tags. Missing tag numbers were prescribed to aid in identification and are shown on Figure 37-1 in Section 7 to provide clarity. The Equipment Tags that do exist at this station follow an older tagging convention than is currently used by the Water Utility Authority. The prescribed convention for the equipment, as well as the physical Equipment Tag numbers shown in parentheses, is listed in Table 4-2.

FIGURE 4-3
LIFT PUMPS NO. 2 & 3

FIGURE 4-4
LIFT PUMP NO. 1

TABLE 4-2
EQUIPMENT INFORMATION

Equipment No.	Asset Info	Classification Type	Classification
M53701 (537M01)	Station	Lift Pump No. 1 Motor (West)	Motor
P53701 (537P01)	Station	Lift Pump No. 1 (West)	Pump
P53702 (537P02)	Station	Lift Pump No. 2 (Center)	Pump
P53703 (537P03)	Station	Lift Pump No. 3 (East)	Pump
V53701 (537V01)	Station	Lift Pump Motorized Control Valve (West)	Check & Isolation Valve
V53702 (537V02)	Station	Lift Pump Motorized Control Valve (Center)	Check & Isolation Valve
V53703 (537V03)	Station	Lift Pump Motorized Control Valve (East)	Check & Isolation Valve

4.2.3 Instrumentation and Alarms

The wet well level signal is connected to the Lift Station Control Panel.

Alarms connected to telemetry include:

- Lift Pump 1 Run
- Lift Pump 2 Run
- Lift Pump 3 Run
- Lift Pump 1 Fail
- Lift Pump 2 Fail
- Lift Pump 3 Fail
- High Wet Well Level

4.2.4 Normal Operation

The lift pump start is initiated by a probe-type level sensor/transmitter. The pumps then convey water from the wet well and discharge into a 36-inch header and through a force main to a

junction box with the Broadway Boulevard storm sewer system. The pumps run until the water level drops below the specified level.

Valve positions during normal operation are as follows:

IN AUTOMATIC – Lift Pump No. 1 motorized discharge isolation plug valve **V53701**
IN AUTOMATIC – Lift Pump No. 2 motorized discharge isolation plug valve **V53702**
IN AUTOMATIC – Lift Pump No. 3 motorized discharge isolation plug valve **V53703**
OPEN – Station knife-gate discharge isolation valve

4.2.5 Safety: Information Unique to the System or Process

Refer to Section 9 for general safety guidelines. Additional safety information about performing work in confined spaces is detailed in Appendix F.

4.3 Sump Pumps

4.3.1 Overview

Excess stormwater and non-storm infiltration in the wet well is pumped by the single wet well sump pump to the storm sewer system on Bell Street. Dry pit pump equipment leakage and infiltration is pumped back into the wet well by the single dry pit sump pump.

The wet well sump pump is located inside a screened section of the wet well (Figure 4-5) and has a 10-inch discharge pipe controlled by a check valve and isolation valve (Figure 4-6). Both valves are located in a valve vault next to the wet well. The dry pit sump pump is located in a grated depression within the dry pit (Figure 4-7). It discharges into the wet well through a 2-inch pipe equipped with check and isolation valves.

FIGURE 4-5
WET WELL SUMP PUMP

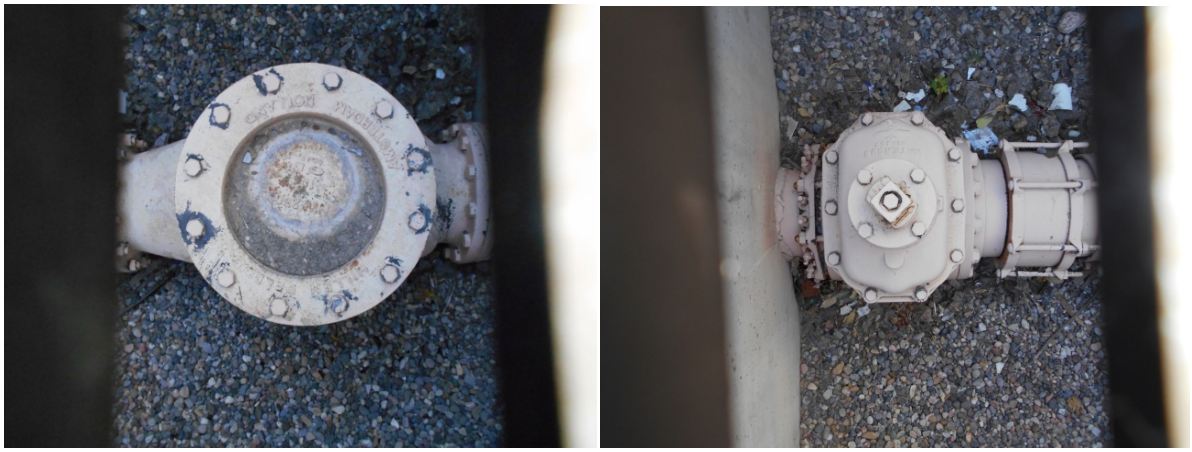


FIGURE 4-6
WET WELL SUMP PUMP
CHECK & ISOLATION VALVES

FIGURE 4-7
DRY PIT SUMP PUMP

4.3.2 Equipment Description

The wet well sump pump is a Flygt Model CP3201 with a 636-type impeller. The pump has a rated capacity of 2,000 gpm at 45 feet of TDH. The integral drive motor produces 35 HP at 1,170 full speed RPM using 460V, 3-phase power. The pump is installed in Flygt's "P" configuration, which indicates that the pump has a vertical discharge riser, no suction piping, and is submerged under normal operating conditions.

The dry-pit sump pump is a Flygt Model 3185 with a 181-type impeller. The integral drive motor produces 7.5 HP at 1,700 full speed RPM using 460V, 3-phase power. The pump's rated capacity is unknown. The pump is installed in Flygt's "P" configuration, which indicates that the pump has a vertical discharge riser, no suction piping, and is submerged under normal operating conditions.

None of the sump pump related equipment at this station is tagged with Water Utility Authority Asset Management Program Equipment Tags. Missing tag numbers were prescribed to aid in identification and are shown on Figure 37-1 in Section 7 to provide clarity. The prescribed convention used for the sump pump equipment is listed below in Table 4-3.

TABLE 4-3
EQUIPMENT INFORMATION

Equipment No.	Asset Info	Classification Type	Classification
CV53704	Station	Wet Well Sump Pump Check Valve	Check Valve
CV53705	Station	Dry Pit Sump Pump Check Valve	Check Valve
P53704	Station	Wet Well Sump Pump	Wet Well Pump
P53705	Station	Dry Pit Sump Pump	Dry Pit Pump
V53704	Station	Wet Well Sump Pump Valve	Isolation Valve
V53705	Station	Dry Pit Sump Pump Valve	Isolation Valve

4.3.3 Instrumentation and Alarms

The wet well level and float switch signals are connected to the Sump Pump Control Panel (SPCP). The dry pit float switch is also connected to the SPCP.

Alarms connected to telemetry include:

- Sump Pump No. 1 (Wet Well) Run
- Sump Pump No. 2 (Dry Pit) Run
- Sump Pump No. 1 (Wet Well) Fail
- Sump Pump No. 2 (Dry Pit) Fail

4.3.4 Normal Operation

The wet well sump pump is controlled by high and low level float switches located in the same portion of the wet well as the pumps. The dry pit has a single, binary (ON-OFF) float switch located in the same grated depression as the sump pump.

Valve positions during normal operation are as follows:

IN SERVICE - Sump Pump No. 1 (Wet Well) check valve C**V53704**

IN SERVICE - Sump Pump No. 2 (Dry Pit) check valve C**V53705**

OPEN – Sump Pump No. 1 (Wet Well) isolation valve **V53704**

OPEN – Sump Pump No. 2 (Dry Pit) isolation valve **V53705**

4.3.5 Safety: Information Unique to the System or Process

Refer to Section 9 for general safety guidelines. Additional safety information about working in confined spaces is detailed in Appendix F.

5.0 ELECTRICAL SYSTEM

This section provides a brief description of the electrical system at this pump station. Refer to Figure 5-1 for Electrical One-Line Diagram and Figures 5-2 and 5-3 for Electrical Site Plan.

5.1 Electrical Service

5.1.1 Overview

The pump station receives 12,470V, 3-phase power from an overhead feeder to a pad mounted metering PT/CT enclosure. Power from the metering enclosure is connected to a medium voltage (MV), S&C Electric Company Model PMH-5, pad mounted switch. The PMH-5 switch is the service disconnect. It is owned by the Water Utility Authority.

5.1.2 Equipment Description

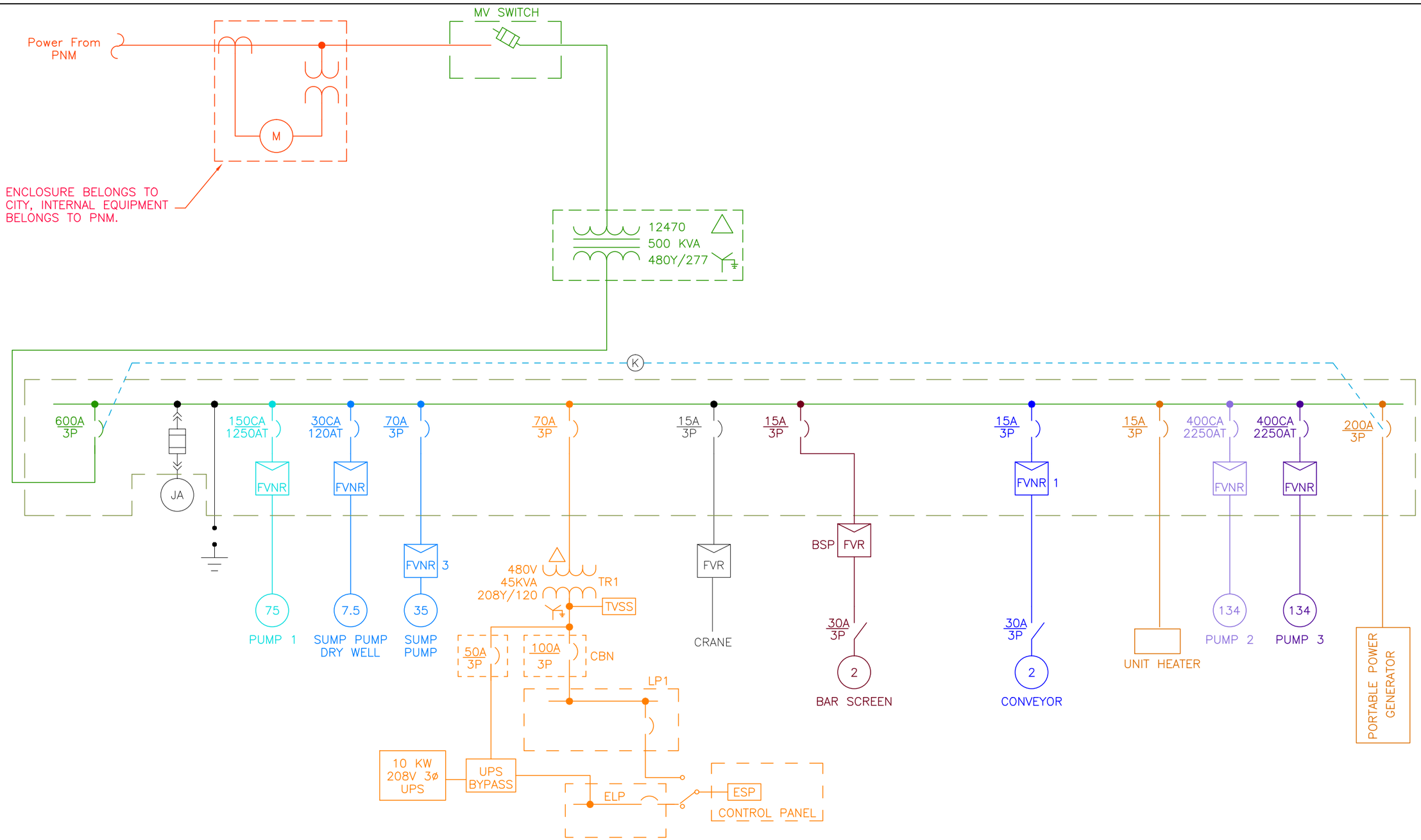
The PMH-5 switch is a MV pad mounted switch mounted on a concrete pad in the pump station yard. It is supplied by a 12,470V feeder from PNM's overhead distribution. The PMH-5 switch feeds a 500kVA 12,470V to 480V transformer.

5.1.3 Controls

Manual switch handle.

5.1.4 Normal Operation

The PMH-5 switch, which is normally closed, may be opened to service the 500 kVA transformer. The fuses will open to protect the 500 kVA transformer from shorts or ground faults.



PUMP STATION #37 ONE-LINE DIAGRAM

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City Of Albuquerque Stormwater Pump Stations

Pump Station No. 37 Bell and Commercial Electrical One-Line Diagram

Figure 5-1

8" THK. SLAB

CONVEYOR

BARSCREEN

2 FLOATS: HI & LOW FOR BAR SCREEN

LEVEL TRANSMITTERS

BAR SCREEN FLOAT

WETWELL LOWER LEVEL

WET WELL SUMP FLOATS

GRATING SCREEN ENCLOSURE (1" OPEN)

SUMP PUMP

LEVEL TRANSMITTERS

18"SUCT LINE

30"SUCT LINE

30"SUCT LINE

DRY SUMP PUMP

PUMP NO.1

PUMP NO.2

PUMP NO.3

PUMP ROOM LOWER LEVEL

CV

CV

CV

18" PLUG VALVE

24" PLUG VALVE

24" PLUG VALVE

30"DISCH

36" KNIFEGATE VALVE

36"DIA. ACCESS HATCH

30"DISCH

18"DISCH

8'-6"(W) X 10'(H) GARAGE DOOR

36"DISCH HEADER

VALVE BOX

DRESSER

6"W

FL 10" HDL BALL CHECK

FL 10" GATE VALVE WATEROUS 010433

1"W

60" RCP INLET

36" FM

10" FORCEMAIN

6" WATER

(2)

4' GATE

N

ELECTRICAL SITE PLAN – LOWER LEVEL

City Of Albuquerque Stormwater Pump Stations

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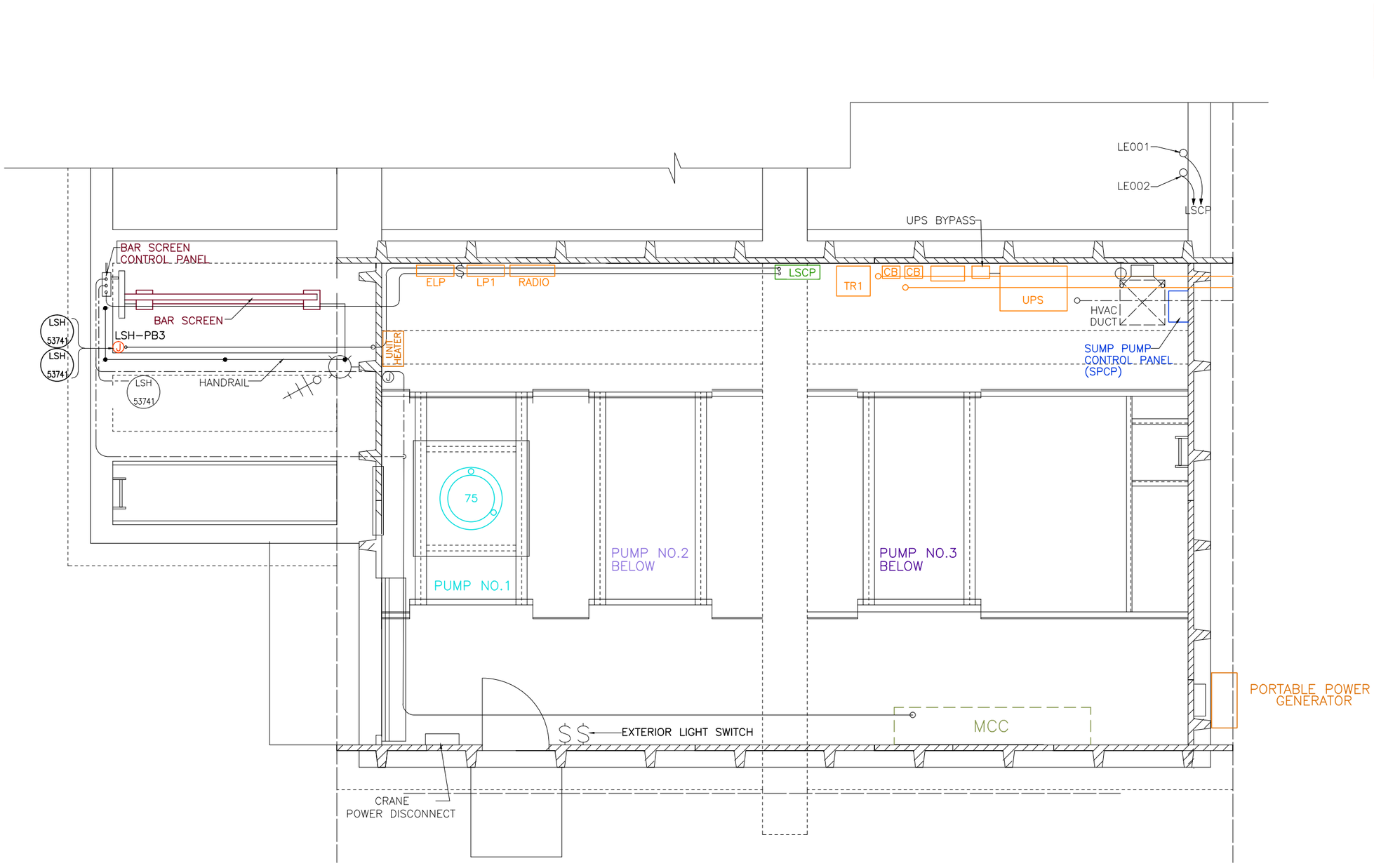
Pump Station No. 37 Bell & Commercial Electrical Site Plan-Lower Level

Figure 5-2



ELECTRICAL SITE PLAN – UPPER LEVEL

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City Of Albuquerque Stormwater Pump Stations

Pump Station No. 37 Bell & Commercial Electrical Site Plan-Upper Level

Figure 5-3

5.1.5 Safety: Information Unique to the System or Process

The electrical service is energized at 12,470V. The service equipment will be serviced and maintained by trained electricians equipped with protective gear. Contact PNM to disconnect the source, then lockout and tagout the source before servicing the PMH-5 switch.

5.2 500 KVA Transformer

5.2.1 Overview

This transformer steps the 12,470V pump station supply voltage down to 480V for various lift station loads.

5.2.2 Equipment Description

The transformer is a pad mounted transformer mounted on a concrete pad in the yard. It receives 12,470V from the PMH-5 switch and supplies the station 480V Motor Control Center (MCC).

5.2.3 Controls

The transformer is equipped with a temperature sensor that is connected to the Lift Station Control Panel (LSCP).

5.2.4 Normal Operation

The transformer steps 12,470V down to 480V for connection to station various loads.

5.2.5 Safety: Information Unique to the System or Process

Open the PMH-5 switch then lockout and tagout the source before servicing the transformer. The transformer is energized at 12,470V. As such, it shall be accessed only by electricians who are trained in the operation and are equipped with proper protective gear.

5.3 480V Motor Control Center (MCC)

5.3.1 Overview

The 600A main circuit breaker (MCB) in the 480V MCC serves as the station service disconnecting means. Additionally, the MCC contains a 200A sub-feed circuit that serves as a connection point for a portable generator. The sub-feed circuit breaker is interlocked with the MCB to avoid paralleling a generator with the utility. Additionally, the MCC contains starters and circuit breakers to connect station 480V loads to the electrical service.

5.3.2 Equipment Description

The 480V MCC contains the 600A MCB that serves as the station service disconnecting means. The MCC also houses full voltage non-reversing (FVNR) starters for the three (3) lift pumps, an FVNR starter for the conveyor, and an FVNR starter for the dry well sump pump. The MCC also contains circuit breakers for the wet well sump pump, electric unit heaters, the bridge crane, the bar screen and the station 480V to 240/120V transformer.

5.3.3 Controls

Controls on the lift pump starters include the disconnect switch and reset pushbuttons for the overload relay.

5.3.4 Normal Operation

The LSCP energizes a relay contact to call for a motor to run. A relay contact connected in the starter contactor circuit closes to energize the contactor. The starter contactor connects power to the associated motor.

5.3.5 Safety: Information Unique to the System or Process

The 480V MCC operates at 480V. Disconnect the source at the PMH-5 switch, then lockout and tagout the source before servicing. The disconnect switches shall be operated by trained personnel; the MCC shall be serviced and maintained by trained electricians.

5.4 Sump Pump Control Panel (SPCP)

5.4.1 Overview

The SPCP operates the sump pump to maintain the level in the wet well below the point where the lift pump starts.

5.4.2 Equipment Description

The SPCP is a relay logic type controller that receives a 4 to 20 mA signal that is representative of the wet well level. The SPCP starts the sump to pump the wet well down whenever the start level is reached.

5.4.3 Controls

Controls mounted on the front of the SPCP include:

- Hand – Off – Auto (HOA) Switch
- Pump run indicator
- Pump off indicator

- Over temperature indicator
- Elapsed time meter
- Overload indicator
- High level indicator

A cabinet thermostat is mounted inside of the SPCP.

5.4.4 Normal Operation

The LSCP receives the wet well level signal from the level transmitters. At a preprogrammed level, the LSCP closes a relay that signals the SPCP to start the sump pump. The SPCP closes a starter contactor to start the pump. As the wet well level falls, the LSCP drops the start relay and the SPCP stops the sump pump.

5.4.5 Safety: Information Unique to the System or Process

The SPCP operates at 480V. Disconnect and lockout and tagout the source at the MCC before servicing. The disconnect switches shall be operated by trained personnel; the MCC shall be serviced and maintained by trained electricians.

5.5 Sump Pump

5.5.1 Overview

The sump pump is a submersible pump installed in a sump area of the wet well. The sump pump operates to maintain the wet well level below the start level of the lift pumps. The pump is also used to empty the wet well for inspection and maintenance.

5.5.2 Equipment Description

The sump pump is a 35 HP submersible type pump that operates at 480V. The pump is controlled by the LSCP based on a 4 to 20 mA signal received from level transmitters installed in the wet well.

5.5.3 Controls

The pump has an internal temperature switch and a moisture detection switch. The internal switches are connected in the starter control circuit and a control relay connects a pump alarm signal to the LSCP.

5.5.4 Normal Operation

The LSCP receives the wet well level from the level transmitters installed in the wet well sump area. When the level rises to the start sump pump level, the LSCP signals the SPCP to start the sump pump. When pumping has lowered the wet well level to the stop level, the LSCP signals the SPCP to stop the sump pump. While the sump pump is running, if the level continues to increase, the LSCP stops the sump pump and starts the lead lift pump at the predetermined level.

5.5.5 Safety: Information Unique to the System or Process

The sump pumps are remotely controlled and they operate at 480V. Disconnect the source at the SPCP and lock out source before servicing.

5.6 Bar Screen Control Panel (BSCP)

5.6.1 Overview

The BSCP operates the bar screen to remove debris from the influent to minimize channel blockage and protect the lift pumps.

5.6.2 Equipment Description

The BSCP is a relay logic type controller that receives a level signal from the station influent channel, and signals from the bar screen mechanism. Relays and timers operate the reversing contactor to run the bar screen to clear the channel. The BSCP operates relays that initiate alarms to the station radio telemetry panel. For more information on operating the rake in Hand mode, refer to SOJP No. 3700-SU-Bell and Commercial Pump Station in Section 7.

5.6.3 Controls

Controls mounted on the front of the BSCP include:

- Main disconnect switch
- HOA switch
- Pilot indicators for
    - Control power on
    - Running
    - Alarm
- Reset pushbutton

Controls inside the BSCP:

- Programmable logic-type controller (PLC)
- VFD keypad
- Repeat cycle timer

Controls at the bar screen mechanism:

- Start level switch
- Alarm level switch
- Level sensor

5.6.4 Normal Operation

The BSCP receives the inflow channel level from the level transmitter. The BSCP starts the bar screen rake if the level reaches preprogrammed start level. The BSCP also runs the bar screen whenever any of the lift pumps are running. The bar screen rake runs continuously while a lift pump is running and when the level is at or above the start level. The repeat cycle timer initiates a run cycle on a weekly basis. In case of a jam, the BSCP reverses the bar screen rake operation in an attempt to clear the jam. If the bar screen rake is unable to clear the jam, the BSCP sends an alarm to the SWRP. For more information on operating the rake in Hand mode, refer to SOJP No. 3700-SU-Bell and Commercial Pump Station in Section 7.

5.6.5 Safety: Information Unique to the System or Process

The BSCP is energized at 480V. It shall be accessed only by electricians who are trained in the operation and are equipped with proper protective gear. All guards are to remain in place before starting and during operation of the equipment. Open then lockout and tagout disconnect switch at the 480V MCC before servicing the BSCP.

5.7 Conveyor Control Panel (CCP)

5.7.1 Overview

The CCP receives a signal from the LSCP whenever the bar screen runs. When the bar screen is running, the conveyor starts. The LSCP continues to run the conveyor for a preprogrammed time after the bar screen stops to clear any debris removed from the channel.

5.7.2 Equipment Description

The CCP is an FVNR starter.

5.7.3 Controls

The CCP contains the conveyor disconnect switch, the HOA switch, and the overload reset pushbutton. Conveyor mounted controls include a rope safety switch and conveyor zero speed switch.

5.7.4 Normal Operation

In automatic, the conveyor starter receives a run signal from the BSCP. When the run signal is received, the conveyor runs continuously while the bar screen is running. After the bar screen stops, the LSCP continues to run the conveyor to clear any debris from the conveyor belts.

5.7.5 Safety: Information Unique to the System or Process

The conveyor control panel operates at 480V. It shall be accessed only by electricians who are trained in the operation and are equipped with proper protective gear. Moving components of the conveyor are hazardous. All guards are to remain in place before starting and during operation of the equipment. The conveyor starts remotely; disconnect the power before servicing the conveyor.

5.8 Lift Pumps

5.8.1 Overview

Lift Pump No. 1 in storm water pump station is a 75 HP line shaft style pump that is equipped with a magnetic drive unit to provide variable speed. Storm water Lift Pumps No. 2 and No. 3 are constant speed submersible style pumps installed in the station dry well.

5.8.2 Equipment Description

Lift Pump No. 1 has a 480V, 75 HP motor manufactured by Electric Machinery (EM) Lift Pump No. 1 is fitted with a magnetic drive unit also manufactured by EM. The motor is controlled by an FVNR starter in the station 480V MCC. The pump speed is controlled by the amount of slippage allowed by the magnetic drive unit.

Lift Pumps No. 2 and No. 3 are 134 HP submersible style pumps manufactured by Flygt. Pumps No. 2 and No. 3 are installed in the station dry well. Lift Pumps No. 2 and No. 3 are controlled by FVNR starters in the station 480V MCC.

5.8.3 Controls

The lift pumps are controlled by the LSCP. The LSCP has HOA switches and start push buttons for each lift pump. The pump starters in the 480V MCC have a pilot light that indicates pump run status.

Each submersible pump has a winding temperature switch. The internal switches are connected in the starter control circuit and a control relay connects a pump alarm.

5.8.4 Normal Operation

The LSCP receives the wet well level from the level sensors installed in the wet well. When the level rises to the start lead pump level, the LSCP starts pump No. 1. The LSCP varies a 4 to 20mA signal to the magnetic drive on pump No. 1 motor to operate the pump at the speed required to match inflow. If the level continues to rise and reaches the start lag pump level, the LSCP starts additional pumps. The LSCP stops the last pump when pumping has lowered the wet well level sufficiently. The LSCP stops the lead pump then the wet well level falls into the sump pump range.

5.8.5 Safety: Information Unique to the System or Process

The pumps operate at 480V and may start automatically. Disconnect the source at the 480V MCC, then lockout and tagout the source before servicing.

5.9 Pump Discharge Valves

5.9.1 Overview

The storm water lift pumps are equipped with electric motor actuated discharge valves. The electric actuators are 1.5 HP, 3-phase, 208V actuators manufactured by EIM.

5.9.2 Equipment Description

The electric actuators are 1.5 HP, 3-phase, 208V actuators manufactured by EIM.

5.9.3 Controls

The EIM actuators have selector switches for local–off–remote. There are also push buttons for open, stop, and close. The actuator also has pilot lights for open and closed status.

5.9.4 Normal Operation

LSCP Control: The pump discharge valves are normally closed. When a lift pump is started, after a time delay as the pump gets up to speed, the LSCP sends a signal to open the associated pump discharge valve. When stopping a lift pump, the LSCP first closes the pump discharge valve; as the discharge valve closes, the LSCP stops the pump.

Control in Hand: When a lift pump is started in hand, the associated discharge valve must be opened to allow pump discharge. The valves may be opened electrically either locally at the

actuator or remotely from the selector switch on the LSCP. In case of electrical failure, the discharge valve may be hand cranked open at the actuator.

5.9.5 Safety: Information Unique to the System or Process

The valve actuator power is supplied from panelboard ELP. ELP power is backed up by an uninterruptable power supply (UPS). Verify all sources are disconnected before servicing the valve actuators. Operation of the lift pumps with the discharge valve closed may cause overheating of the pump motor that could result in pump failure. Failure to close the pump discharge valve when the pump is stopped could result in flooding of the station wet well.

5.10 Uninterruptable Power System (UPS)

5.10.1 Overview

The UPS is a battery backed power supply used to supply power to the pump discharge valves in case of power failure. The UPS also supplied power to the control panel, the LSCP and to the station level transmitters. The UPS has a manual bypass switch so power supply can be maintained to these critical loads while the UPS is being serviced.

5.10.2 Equipment Description

The UPS is a 208V, 3-phase, 10kVA model manufactured by APC.

5.10.3 Controls

The UPS has an operator interface panel (OIP) that is used access information and control the UPS. There is also a manual bypass switch that can be used to allow isolation of the UPS for maintenance and service.

5.10.4 Normal Operation

The UPS is connected in line with power to panelboard ELP. If power is interrupted, the UPS supplies power to ELP from onboard batteries until power is restored.

5.10.5 Safety: Information Unique to the System or Process

The UPS receives power from the AC service and produces AC power from on-board batteries. Disconnect all sources before servicing. The UPS supplies critical equipment. Verify critical equipment has an alternate power supply before disconnecting the UPS supply.

5.11 Lift Station Control Panel (LSCP)

5.11.1 Overview

The LSCP receives the wet well level signals. The LSCP energizes relays to start the lift pumps in accordance to the wet well level and the lead selections made by the operator. The LSCP also opens and closes the pump discharge valves as required. The LSCP relay contacts are connected to the radio transmitter to broadcast alarms to the SWRP.

5.11.2 Equipment Description

The LSCP is a PLC type controller. The LSCP has front panel mounted indicators to indicate pump discharge valve status. There is a door mounted OIP.

5.11.3 Controls

The LSCP contains lift pump HOA selector switches. The panel front has pilot lights for the pump discharge valves to indicate open or closed status. There is a door mounted PLC OIP.

5.11.4 Normal Operation

In automatic, operation level signals are applied to the LSCP. When the level signal reaches a preprogrammed level, relays are operated to start the sump pump. As the wet well level rises, the lead pump is started. If the level continues to rise, the second and third lift pumps will be started. As the wet well level falls the lift pumps are stopped in sequence. When the level falls into the sump pump range, the lead pump is stopped and the sump pump starts to empty the wet well.

5.11.5 Safety: Information Unique to the System or Process

The control panel has voltage from more than one source. Disconnect all sources before servicing.

6.0 HVAC SYSTEMS OPERATION

This section provides a brief description of the HVAC system at this pump station.

6.1 Electric Heater

6.1.1 Overview

The electric heater provides minimal heating in the control room.

6.1.2 Equipment Description

The existing electric heater is a Dayton Model 2YU70 rated at 10kW, using 480V, 60 Hz, 3-phase power. It includes an integral 0.22 amp fan motor.

6.1.3 Controls

The electric heater is activated by a line voltage thermostat.

6.1.4 Normal Operation

The line voltage thermostat in the control room should be set to a minimum temperature of 55°F. A line voltage thermostat mounted in the control room will activate an electric heater whenever temperatures in the control room are equal to or below 55°F. When temperatures in the control room are above 55°F, the electric heater will be off.

6.1.5 Safety: Information Unique to the System or Process

Heating is required to prevent freezing conditions.

6.2 Evaporative Cooler

6.2.1 Overview

The evaporative cooler provides minimal cooling ventilation in the control room.

6.2.2 Equipment Description

The existing evaporative cooler is a CHAMPION ADA50-12, Serial KC18050. It is estimated to be rated at 2,750 cubic feet per minute.

6.2.3 Controls

The evaporative cooler is operated by an automatic thermostat with pump on/off switch. The cooler can also operate as an intake fan with pump off.

6.2.4 Normal Operation

The line voltage thermostat in the control room should be set to a maximum temperature of 90°F. A thermostat in the control room should activate an evaporative cooler whenever temperatures in the control room are equal to or above 90°F. When temperatures in the control room are below 90°F, the evaporative cooler will be off.

6.2.5 Safety: Information Unique to the System or Process

Cooling is required to maintain safe working temperatures of the electrical equipment. Overheating of the electrical equipment would likely result in costly replacement or possible down time on the pumping station.

7.0 STANDARD JOB OPERATING PROCEDURES

This section includes Standard Operating Job Procedures (SOJP) for the system and equipment for Pump Station No. 37 Bell and Commercial. The SOJPs provide the detailed instructions for testing each component necessary to ensure that during the summer storm season of July 1st through September 30th, the facilities will be prepared to operate. SOJPs are utility by the Albuquerque Bernalillo County Water Utility Authority (WUA) and are used as the primary means for testing the equipment within their system. If a facility appears to have an issue, the SOJP testing shall bring the issue to light and a means to promptly correctly address the issue.

7.1 List of SOJPs

Below is a list of the SOJPs developed for Pump Station No. 37 Bell and Commercial and are included in this section.

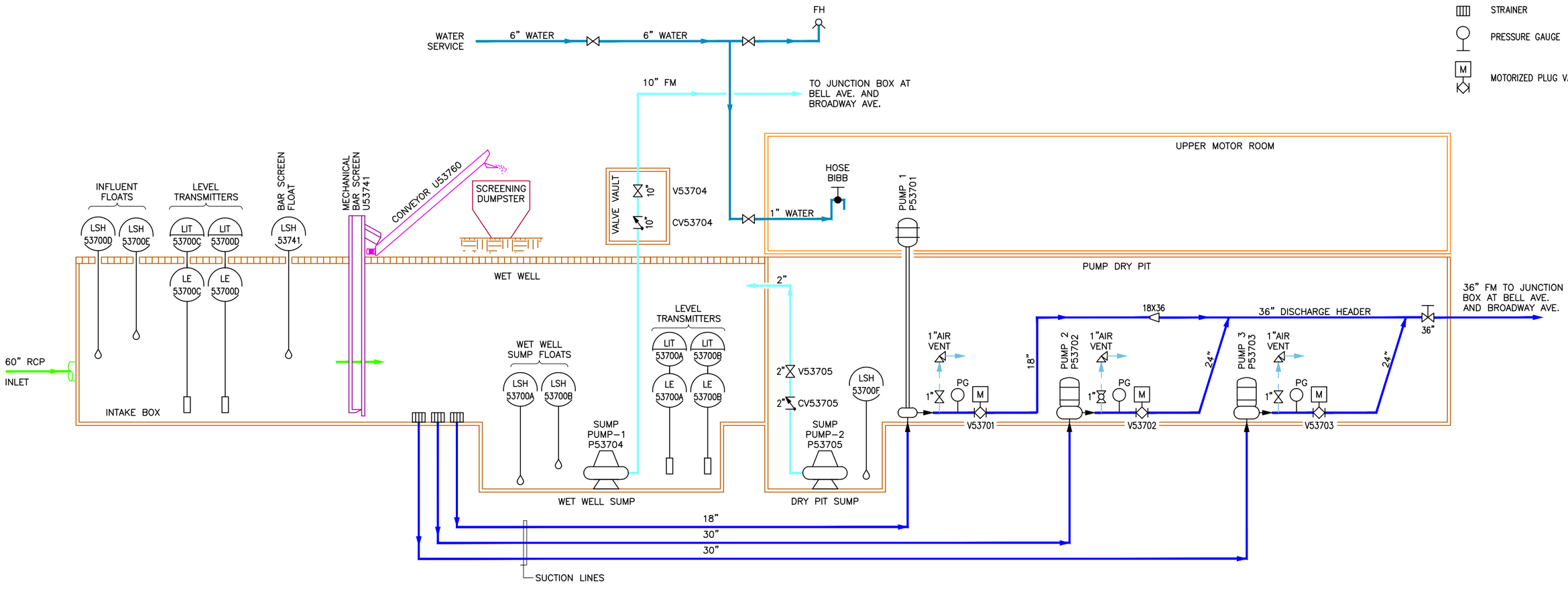
SOJP_3700_SU_Bell and Commercial Pump Station
SOJP_3700_N_ Bell and Commercial Pump Station
SOJP_3700_SD_ Bell and Commercial Pump Station

SOJP_3700_SU_ Bell and Commercial Evaporative Cooler
SOJP_3700_N_ Bell and Commercial Evaporative Cooler
SOJP_3700_SD_ Bell and Commercial Evaporative Cooler

SOJP_3700_SU_ Bell and Commercial Electric Heater
SOJP_3700_N_ Bell and Commercial Electric Heater
SOJP_3700_SD_ Bell and Commercial Electric Heater

LEGEND

- SUBMERSIBLE PUMP IN DRY PIT APPLICATION
- CENTRIFUGAL VERTICAL DRY PIT PUMP WITH EXTENDED SHAFT
- SUMP PUMP
- INSTRUMENT OPERATOR ACCESSIBLE
- FIELD MOUNTED INSTRUMENT
- FLOAT SWITCH
- LEVEL PROBE
- CHECK VALVE
- GATE VALVE
- PLUG VALVE
- AIR VENT
- REDUCER
- STRAINER
- PRESSURE GAUGE
- MOTORIZED PLUG VALVE



City Of Albuquerque Stormwater Pump Stations

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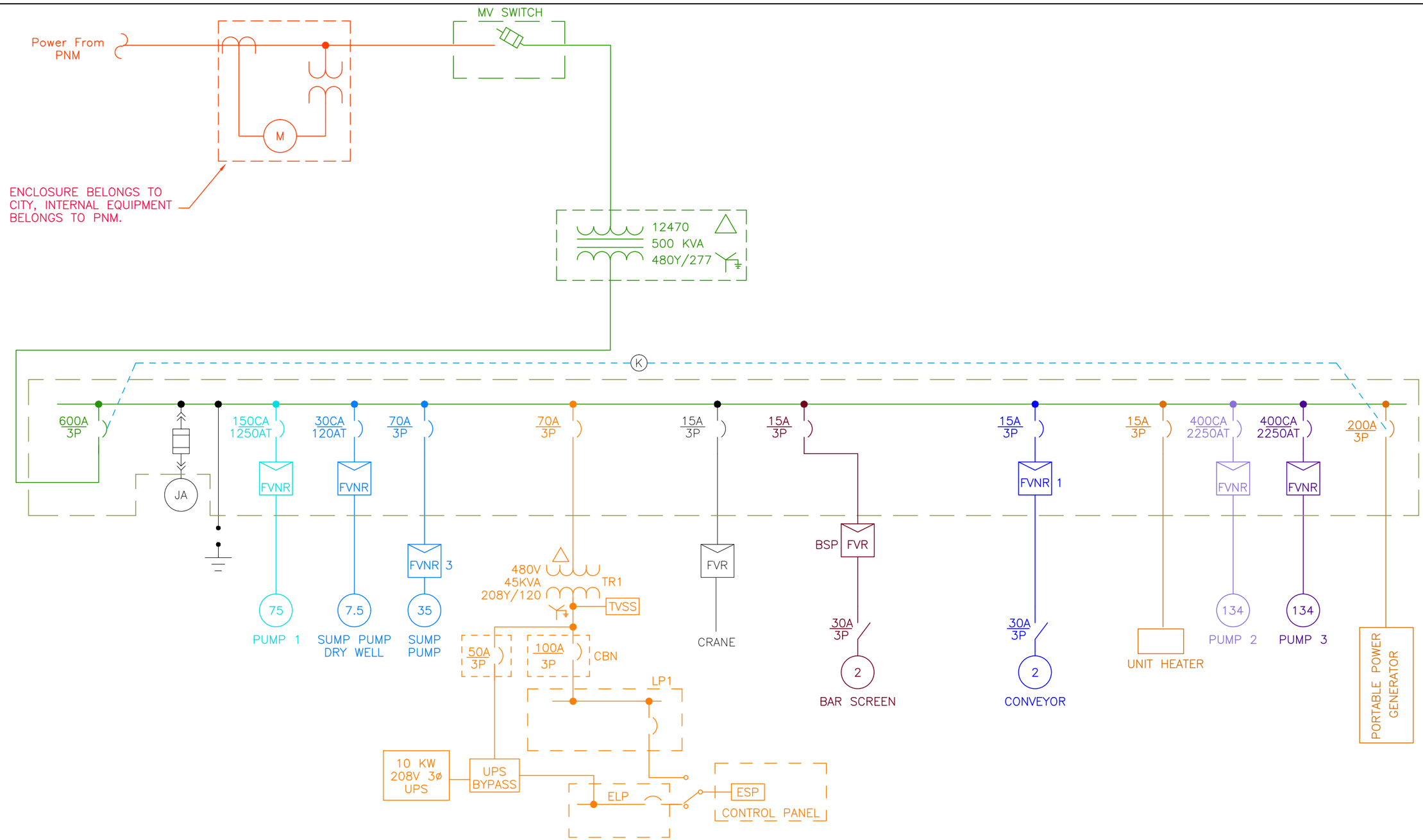
Pump Station No. 37 Bell and Commercial P&ID

Figure 37-1



PUMP STATION #37 ONE-LINE DIAGRAM

N.T.S.

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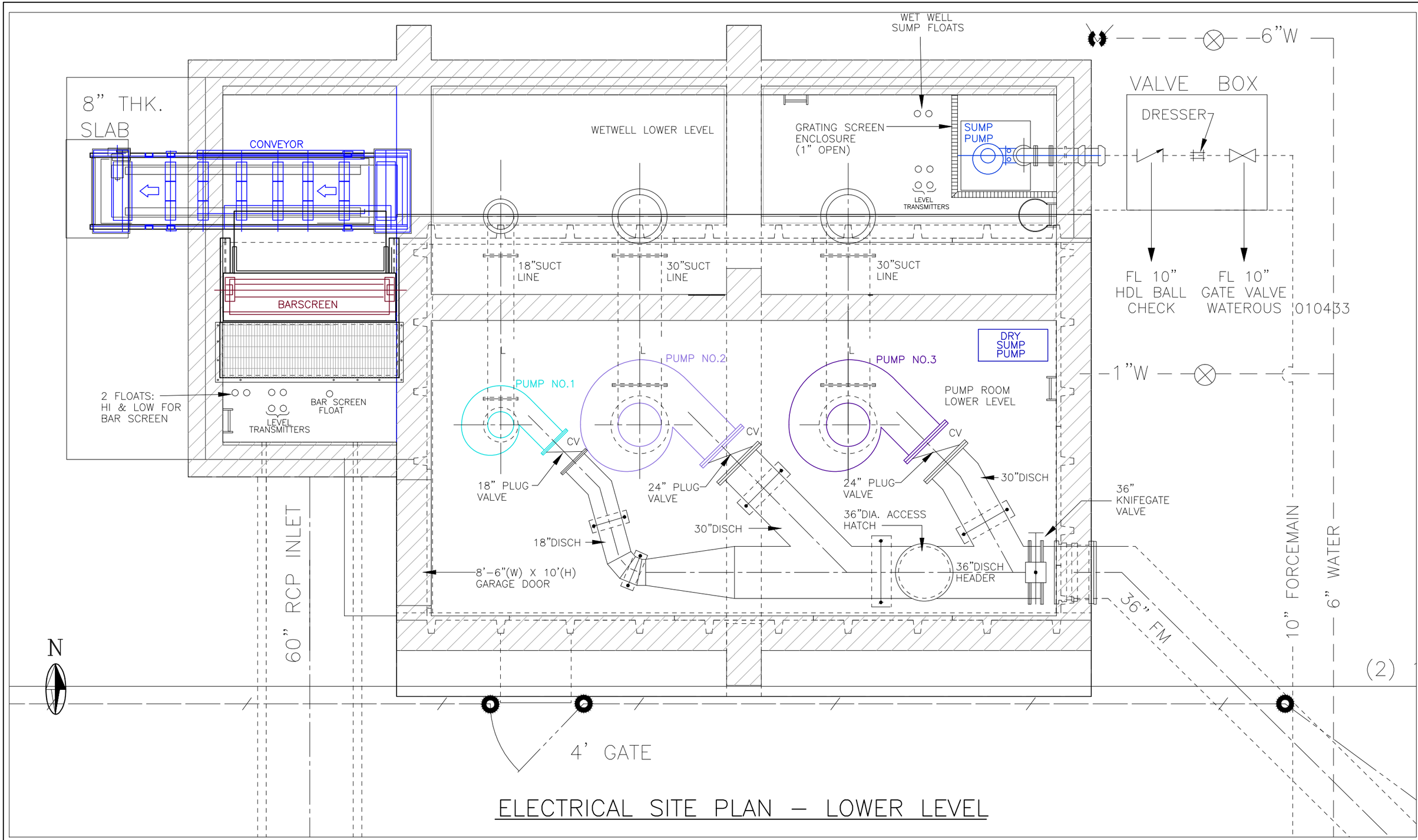
City Of Albuquerque Stormwater Pump Stations

Pump Station No. 37 Bell and Commercial Electrical One-Line Diagram

Figure 37-2



ELECTRICAL SITE PLAN – LOWER LEVEL

City Of Albuquerque Stormwater Pump Stations

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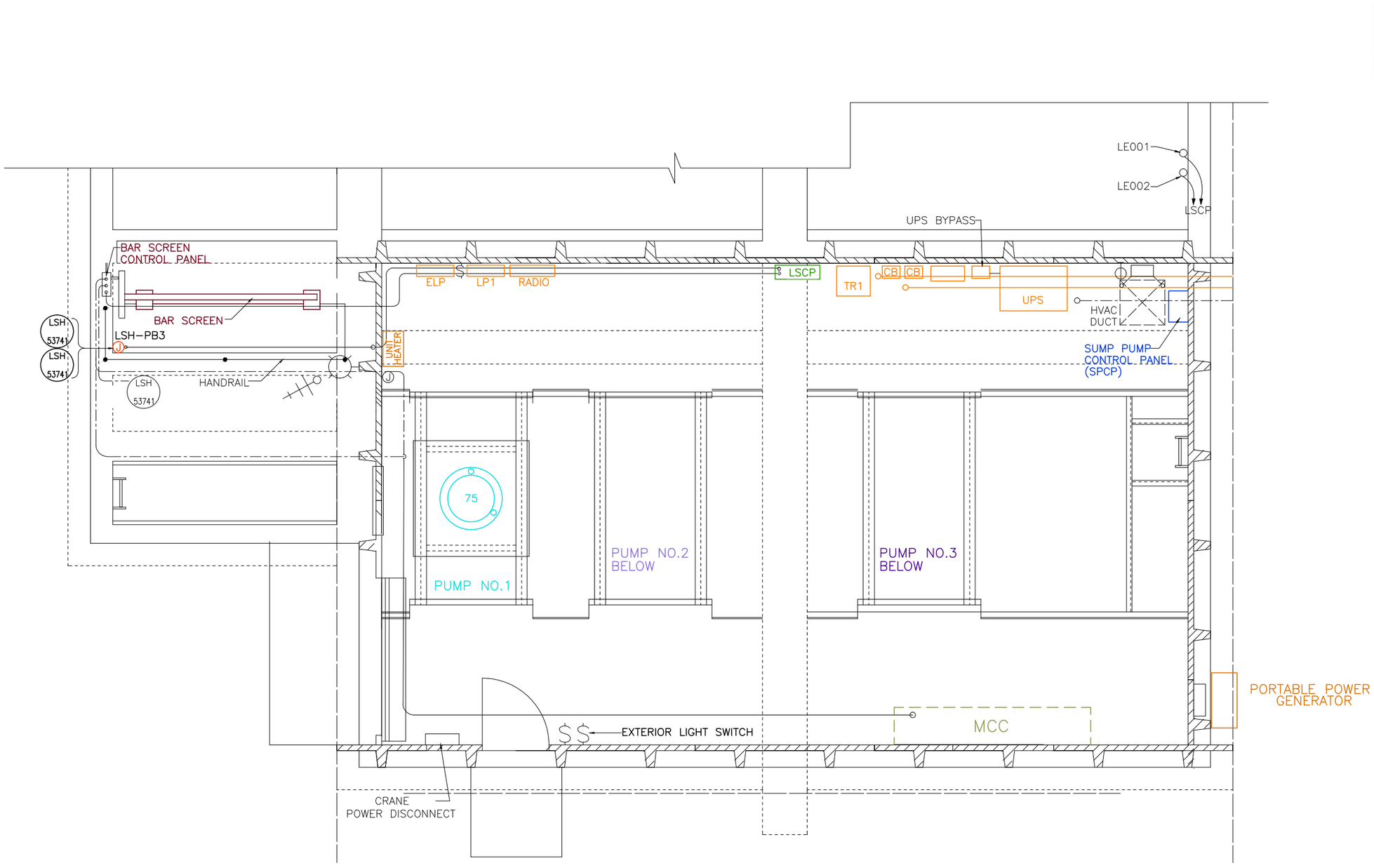
Pump Station No. 37 Bell & Commercial Electrical Site Plan-Lower Level

Figure 37-3



ELECTRICAL SITE PLAN – UPPER LEVEL

MOLZENCORBIN

City Of Albuquerque Stormwater Pump Stations

Pump Station No. 37 Bell & Commercial Electrical Site Plan-Upper Level

Figure 37-4

REF (Filename): SOJP_3700_SU_BELL AND COMMERCIAL PUMP STATION.doc
Revision Date: 6/24/2015
Revised By: Molzen Corbin
Approved by:

SOJP NO.: 3700-SU-BELL AND COMMERCIAL PUMP STATION

TITLE: BELL AND COMMERCIAL PUMP STATION – START-UP

Tools: Personal Protection Equipment: Hard hat, safety boots and safety glasses.

Hazards: Slip and fall and electrical shock.

Caution: See Section 9 Safety of the Stormwater Pump Station No. 37 Bell and Commercial Operations Manual

SYSTEM SCHEMATICS

Figure 37-1 Pump Station No. 37 Bell and Commercial P&ID
Figure 37-2 Pump Station No. 37 Bell and Commercial Electrical One-Line Diagram
Figure 37-3 Pump Station No. 37 Bell and Commercial Electrical Site Plan – Lower Level
Figure 37-4 Pump Station No. 37 Bell and Commercial Electrical Site Plan – Upper Level

BELL AND COMMERCIAL PUMP STATION

SYSTEM START-UP

PROCEDURE

Station Entry/Exit and Alarm Deactivation Procedure

Entry

1. Call Plant Control: Identify yourself with a Call Number: Example #202 and advise of your entry.
2. Entry: At the PLC Screen, push the "F1" key and enter the code 5241. This code will disable the intrusion alarm and the screen will light all the indicators lights to verify entry.

Exit

1. To exit the station: The operators will need to push the reset button to clear and acknowledge all alarms. Once the reset button has been pushed and cleared, the operator will exit the station after securing the doors. The alarm system will reset in 120 seconds.
2. Call Plant control to verify all the alarms have been cleared and advise of your departure.

Before Normal Operation, the following is required:

1. Position or verify that the pump station valves are as follows:
   IN AUTOMATIC – Lift Pump No. 1 motorized discharge isolation plug valve **V53701**
   IN AUTOMATIC – Lift Pump No. 2 motorized discharge isolation plug valve **V53702**
   IN AUTOMATIC – Lift Pump No. 3 motorized discharge isolation plug valve **V53703**

IN SERVICE – Sump Pump No. 1 (wet well) check valve **CV53704**
IN SERVICE – Sump Pump No. 2 (dry pit) check valve **CV53705**
OPEN – Station discharge knifegate isolation valve
OPEN – Sump Pump No. 1 (wet well) discharge isolation valve **V53704**
OPEN – Sump Pump No. 2 (dry pit) discharge isolation valve **V53705**

2. Test the pumps starting with water in the wet well at a level at least 5 feet above the wet well floor. Water may be diverted into the storm drains from a nearby fire hydrant.
3. Check that the station medium voltage disconnect switch is closed **(ON)**.

Test the Lift Pumps.

4. Check that the pump breaker switch(es) on the MCC are closed **(ON)**.
   Note: If a breaker or disconnect switch (other than a 120V) for the equipment to be started is not in the **ON** position, notify the shift supervisor, enter the event in the operator log, and generate a work order for a maintenance repair dispatch to have the switch(es) placed in the **ON** position.

Test the Lift Pumps in HAND.

5. Place the lift pump HAND-OFF-AUTO (HOA) switch(es) on the Lift Station Control Panel (LSCP) in **AUTO**.
6. Select a lead lift pump with the selector switch at the LSCP.
   Note: Verify there is sufficient wet well level before starting a lift pump.
7. Place the HOA selector in **HAND** position to start the lead pump. Record amperage and secondary voltage.

Test the Lift Pumps in AUTO.

8. Place the HOA switches on the LSCP in the **AUTO** position.
9. Check and record the level at which the lead lift pump starts.
10. Check and record the level at which the lead lift pump stops.
11. Verify the HOA switches are in the **AUTO** position after start-up is complete.

Test the Sump Pumps in HAND.

12. Verify the station 480V disconnect circuit breaker (on the 480V MCC is closed **[ON]**).
    Note: Verify there is sufficient wet well level before starting the sump pump.
13. Select the **HAND** position with the HOA switch on the door of Sump Pump Control Panel, and then press the start pushbutton.
14. Verify the Run indicator on the door of SPCP illuminates.
    Note: Observe the wet well level. Stop the pump when the wet well level goes below the top of the pump housing.

Test the Sump Pumps in AUTO.

15. Place the HOA switch on the SPCP in the **AUTO** position.
16. Check and record the level at which the sump pumps start.
17. Check and record the level at which the sump pumps stop.
18. Verify the HOA switch is in the **AUTO** position after start-up is complete.

Test the Bar Screen Rake in HAND (FORWARD).

19. Verify the station 480V disconnect circuit breaker (on the 480V MCC is closed, **[ON]**).

20. Verify that the disconnect on the door of the Bar Screen Control Panel (BSCP) is closed, (**ON)**.
21. Verify the control power on indicator is illuminated.
22. Select the **HAND** position with the HOA switch on the door of BSCP.
23. Using the Reverse-Off-Forward (ROF), selector switch on the control station, (at the bar screen), select the **FORWARD** position.
    Note: Use caution. The bar screen rake will start in the forward direction.
24. **Test the Bar Screen Rake in HAND (REVERSE).**
25. Start the bar screen rake in the forward direction.
26. While the bar screen rake is in motion, move the ROF switch to the **OFF** position. The bar screen rake stops.
27. While the bar screen rake is stopped, switch to the **REVERSE** position. The bar screen rake should run in reverse.
28. Verify that the ROF switch returns to the **OFF** position when it is released.
    Test the Bar Screen Rake in AUTO.
29. Select the **AUTO** position with the HOA on the door of SPCP.
30. After the start-up checks are complete, verify the bar screen HOA switch is in the **AUTO** position.

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SOJP NO.: 3700-N-BELL AND COMMERCIAL PUMP STATION

TITLE: BELL AND COMMERCIAL PUMP STATION - NORMAL OPERATION

Tools: Personal Protection Equipment: Hard hat, safety boots, and safety glasses.

Hazards: Slip and fall and electrical shock

Caution: See Section 9 Safety of the Stormwater Pump Station No. 37 Bell and Commercial Operations Manual

SYSTEM SCHEMATICS

Figure 37-1 Pump Station No. 37 Bell and Commercial P&ID
Figure 37-2 Pump Station No. 37 Bell and Commercial Electrical One-Line Diagram
Figure 37-3 Pump Station No. 37 Bell and Commercial Electrical Site Plan

BELL AND COMMERCIAL PUMP STATION

NORMAL OPERATION

GENERAL

Stormwater is conveyed into the stormwater pump station inlet channel through a 60-inch reinforced concrete pipe (RCP). The stormwater passes through a mechanical bar screen, whose raking mechanism is activated by a float level sensor. The screenings are raked onto a belt conveyor before being deposited into a dumpster. The inlet channel was not constructed with high-flow bypass provisions. As such, if the high channel alarm is tripped, the operator must visit the station to manually clear the screen in order to facilitate proper pump station operation. After passing through the bar screen, stormwater enters the pump station wet well. Three (3) dry pit lift pumps draw stormwater from the bottom of the wet well through individual buried and screened suction pipes. The pumps discharge into a common 36-inch discharge header located in the dry pit.

The pump station has a duty-standby configuration for the three (3) lift pumps and two (2) sump pumps. Pump No. 1 is a 75 HP dry pit, vertical line shaft centrifugal pump with a capacity of 10,000 gpm. Pump No. 2 and 3 are 134 HP submersible pumps in a dry pit configuration and have a capacity of 16,000 gpm each. Because the pumps discharge into a combined header, their capacity is not additive under combined operation. The combined capacity of all three (3) pumps is approximately 32,000 gpm. Pump No. 1 should not be operated by itself but rather as an auxiliary to Pump Nos. 2 and 3. This is because the pump would be beyond its runout limit if operated alone without the pressure from the other pumps. The combined capacity of Pump Nos. 2 and 3 is approximately 27,000 gpm. For more information about operational configurations, refer to Section 3.1.2 and Appendix C of Pump Station No. 37 Operations Manual.

Capacity of the wet well sump pump is small, relative to that of the lift pumps. The intent of the wet well sump pump is only to remove water in the wet well that remains once the water level has dropped below the inlet of the lift pumps, and to handle small, non-storm infiltration flows. Similarly, the dry pit sump pump also has a small capacity and is intended to remove flow from dry pit infiltration and equipment leakage.

NORMAL OPERATION CONDITIONS

During normal operation, the HAND-OFF-AUTO (HOA) switch for the mechanical bar screen will be in **AUTO** and will start and stop automatically based on the level floats.

During normal operation, the HOA switches for the sump pump and lift pumps will be in **AUTO** and will start and stop automatically based on the level transmitters.

LEAD, LAG, STANDBY assignments:

The lead lift pump is selected manually with the selector at the Lift Pump Control Panel.

The active level transmitter is selected automatically as the transmitter with the highest level indications or manually with a switch at the Station Level Control Panel.

Valve Positions at Pump Station No. 37 Bell and Commercial during normal operation is as follows:

IN AUTOMATIC – Lift Pump No. 1 motorized discharge isolation plug valve **V53701**
IN AUTOMATIC – Lift Pump No. 2 motorized discharge isolation plug valve **V53702**
IN AUTOMATIC – Lift Pump No. 3 motorized discharge isolation plug valve **V53703**
IN SERVICE – Sump Pump No. 1 (Wet Well) check valve **CV53704**
IN SERVICE – Sump Pump No. 2 (Dry Pit) check valve **CV53705**
OPEN – Station knifegate discharge isolation valve
OPEN – Sump Pump No. 1 (wet well) discharge isolation valve **V53704**
OPEN – Sump Pump No. 2 (dry pit) discharge isolation valve **V53705**

NORMAL OPERATING PROCEDURES

Station Entry/Exit and Alarm Deactivation Procedure

Entry

1. Call Plant Control: Identify yourself with a Call Number: Example #202 and advise of your entry.
2. Entry: At the PLC Screen, push the “F1” key and enter the code 5241. This code will disable the intrusion alarm and the screen will light all the indicators lights to verify entry.

Exit

1. To exit the station: The operators will need to push the reset button to clear and acknowledge all alarms. Once the reset button has been pushed and cleared, the operator will exit the station after securing the doors. The alarm system will reset in 120 seconds.
2. Call Plant control to verify all the alarms have been cleared and advise of your departure.

After initial Start-up, Normal Operation is as follows:

1. Check for abnormal conditions when entering facility – flooding, broken equipment, electrical fires, etc.
2. Check the building thermostat for proper HVAC settings.
3. Check the pump station and equipment status at the control panel.
4. Check and record the AC voltage at the MCC.
5. During lift pump operation check and record the amperage and secondary voltage.
6. Check the bar screen and belt conveyor control panel indicators for faults and indication that control power is available.
7. Check sump pump control panel indicators for faults.
8. Check and record wet well level at the level transmitters.
9. When bar screen rake motor is subjected to high torque, the motor will shut off. In hand mode, reverse the bar screen rack to expose obstruction. Clear the obstruction by running the bar screen rake forward in **HAND** or removing the obstruction by hand.
10. When the water level in the entrance channel is high, just above the channel wall, the bar screen will shut off. Manually operate the screen rake to park the motor in **UP** position (using either forward or reverse direction). This will prevent submerging the bar screen motor. Operate lift pump to bring water level below channel wall and resume bar screen operations.

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SOJP NO.: 3700-SD-BELL AND COMMERCIAL PUMP STATION

TITLE: BELL AND COMMERCIAL PUMP STATION-SHUTDOWN

Tools: Personal Protection Equipment: Hard hat, safety boots and safety glasses.

Hazards: Slip and fall and electrical shock.

Caution: See Section 9 Safety of the Stormwater Pump Station No. 37 Bell and Commercial Operations Manual

System Schematics:

Figure 37-1 Pump Station No. 37 Bell and Commercial P&ID
Figure 37-2 Pump Station No. 37 Bell and Commercial One-Line Diagram
Figure 37-3 Pump Station No. 37 Bell and Commercial Site Plan

BELL AND COMMERCIAL PUMP STATION

SYSTEM SHUTDOWN

PROCEDURE

Station Entry/Exit and Alarm Deactivation Procedure

Entry

1. Call Plant Control: Identify yourself with a Call Number: Example #202 and advise of your entry.
2. Entry: At the PLC Screen, push the “F1” key and enter the code 5241. This code will disable the intrusion alarm and the screen will light all the indicators lights to verify entry.

Exit

1. To exit the station: The operators will need to push the reset button to clear and acknowledge all alarms. Once the reset button has been pushed and cleared, the operator will exit the station after securing the doors. The alarm system will reset in 120 seconds.
2. Call Plant control to verify all the alarms have been cleared and advise of your departure.

Mechanical Bar Screen Shutdown

Shutdown is required for maintenance or for replacement. Shutdown of the mechanical bar screen and belt conveyor is as follows:

1. Disconnect, lock and tag power source before servicing. Failure to disconnect power source can result in fire, shock, or serious injury. Follow ABCWUA LOTO (lock out, tag out) procedures. Refer to Appendix E.

2. Select the Off Position with the Hand-Off-Auto (HOA) switch on the door of the Bar Screen Control Panel (BSCP).
3. The 480V disconnect switch in BSCP should be opened for complete shutdown.
   Note: If a breaker or disconnect switch (other than a 120V) for the equipment to be shutdown is not in the **OFF** position, notify the shift supervisor, enter the event in the operator log, and generate a work order for a maintenance repair dispatch to have the switch(es) placed in the **OFF** position.

Lift Pump Shutdown

Shutdown is required for maintenance or for replacement. Shutdown of the selected lift pump is as follows:

1. Disconnect, lock and tag power source before servicing. Failure to disconnect power source can result in fire, shock or serious injury. Follow ABCWUA LOTO (lock out, tag out). Refer to Appendix E.
2. Select the **OFF** position for the selected pump with the HOA switch on the door of the Lift Pump Control Panel.
3. Verify the HOA for the remaining lift pumps are in the **AUTO** position.
4. Verify the motorized isolation plug valve has closed by checking the indicator light on the appropriate valve in the dry pit.

Sump Pumps Shutdown

Shutdown is required for maintenance or for replacement. Shutdown the selected sump pump as follows:

1. Disconnect, lock, and tag power source of the sump pump before servicing. Failure to disconnect power source can result in fire, shock, or serious injury. Follow ABCWUA LOTO (lock out, tag out). Refer to Appendix E.
2. Select the **OFF** position for the sump pump with the HOA switch on the door of the Sump Pump Control Panel (SPCP).
3. Open the 480V circuit breaker inside SPCP.
4. Close the discharge isolation valve of the sump pump.

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SOJP NO.: 3700-SU-BELL AND COMMERCIAL EVAPORATIVE COOLER

TITLE: BELL AND COMMERCIAL EVAPORATIVE COOLER SYSTEM – START-UP

Tools: Personal Protection Equipment: Hard hat, safety boots and safety glasses, wrench set, and screw driver set.

Hazards: Improper installation can result in electric shock.

Caution: When servicing fan, motor may be hot enough to cause pain or injury.

SYSTEM SCHEMATICS

NA

BELL AND COMMERCIAL EVAPORATIVE COOLER SYSTEM

SYSTEM START-UP

GENERAL

The evaporative cooler system provides minimal cooling in the control room.

PROCEDURE

Before Normal Operation, the following is required:

1. Complete spring start-up standard maintenance procedures listed in the SMP section of this manual. Provide water connection and install drain overflow. Install and adjust float valve and fill pan with water. Check all fasteners for tightness.
2. Adjust drive pulley. Adjust the drive pulley to the least diameter and adjust belt tension. Start cooler.
3. Check amperage. With pads wet and unit started, check amperage draw with amperage meter. If amperage draw is less than motor rating, turn off electrical power. Adjust pulley to a large diameter and readjust belt tension, plug motor in and retest amperage draw. Repeat process until correct amperage draw is attained. Increasing motor pulley diameter increases amperage draw. Decreasing motor pulley diameter decreases amperage draw. Do not operate cooler with larger amperage draw than specified on motor plate.
4. Set thermostat to 90°F for system serving control room.

Albuquerque Bernalillo County
Water Utility Authority

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TITLE: BELL AND COMMERCIAL EVAPORATIVE COOLER – NORMAL OPERATION

Tools: Personal Protection Equipment: Hard hat, safety boots and safety glasses, wrench set, and screw driver set.

Hazards: Improper installation can result in electric shock.

Caution: When servicing fan, motor may be hot enough to cause pain or injury.

SYSTEM SCHEMATICS

NA

BELL AND COMMERCIAL EVAPORATIVE COOLER SYSTEM

NORMAL OPERATIONS

GENERAL

The evaporative cooler system provides minimal cooling in the control room.

NORMAL OPERATION PROCEDURE

After initial Start-up, Normal Operation is as follows:

1. The line voltage thermostat in the control room should be set to a maximum temperature of 90°F. A line voltage thermostat with automatic pump control mounted in the control room will activate an evaporative cooler whenever temperature in the control room is equal to or above 90°F. When temperature in the control room is below 90°F, the evaporative cooler will be off.

Albuquerque Bernalillo County
Water Utility Authority

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TITLE: BELL AND COMMERCIAL EVAPORATIVE COOLER-SHUTDOWN

Tools: Personal Protection Equipment: Hard hat, safety boots and safety glasses, wrench set, and screw driver set

Hazards: Improper installation can result in electric shock.

Caution: When servicing fan, motor may be hot enough to cause pain or injury.

SYSTEM SCHEMATICS

NA

BELL AND COMMERCIAL EXHAUST FAN SYSTEM

SHUTDOWN OPERATIONS

PROCEDURE

Shutdown is required for maintenance, replacement, or winter shutdown. Shutdown of the evaporative cooler is as follows:

1. Disconnect, lock, and tag power source before servicing. Failure to disconnect power source can result in fire, shock or serious injury.
2. Drain water. Always drain all of the water out of the cooler and water supply line. Keep the water line disconnected from both the unit and water supply so that it does not freeze.
3. Unplug motor and pump.
4. Cover unit. To protect the life of the finish, a cover is recommended in extended periods of non use.

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SOJP NO.: 3700-SU-BELL AND COMMERCIAL ELECTRIC HEATER

TITLE: BELL AND COMMERCIAL ELECTRIC HEATER SYSTEM – START-UP

Tools: Personal Protection Equipment: Hard hat, safety boots and safety glasses, and screw driver.

Hazards: Improper installation can result in electric shock.

Caution: Heater must be mounted at least 7 feet above floor to prevent accidental contact with fan blade. To prevent possible overheating, keep at least a 5-foot clearance in front of the heater, 6 inches from ceiling, 6 inches from side wall, and 13 inches from back wall.

SYSTEM SCHEMATICS

NA

BELL AND COMMERCIAL ELECTRIC HEATER SYSTEM

SYSTEM START-UP

GENERAL

The electric heater system provides minimal heating in the control room.

PROCEDURE

Before Normal Operation, the following is required:

1. Check all fasteners for tightness.
2. Ensure wiring installed per National Electric Code and heater must be grounded against possible electrical shock. Inspect the control panel wiring to make certain insulation is intact and all connections are tight.
3. Verify the power supply voltage coming to heater matches the ratings printed on the heater nameplate before energizing.
4. The heater is hot when in use.
5. Do not insert or allow foreign objects to enter any ventilation or exhaust opening, as this may cause electric shock, fire, or damage to the heater.
6. To prevent a possible fire, do not block air intakes or exhaust in any manner. Keep combustible materials away from heater.
7. A heater has hot and arcing or sparking parts inside. Do not use it in areas where gasoline, paint, or flammable liquids are used or stored.
8. Set line voltage thermostat to 55°F for system.

Albuquerque Bernalillo County
Water Utility Authority

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TITLE: BELL AND COMMERCIAL ELECTRIC HEATER – NORMAL OPERATION

Tools: Personal Protection Equipment: Hard hat, safety boots and safety glasses, and screw driver.

Hazards: Improper installation can result in electric shock.

Caution: Heater must be mounted at least 7 feet above floor to prevent accidental contact with fan blade. To prevent possible overheating, keep at least a 5-foot clearance in front of the heater, 6 inches from ceiling, 6 inches from side wall and 13 inches from back wall.

SYSTEM SCHEMATICS

NA

BELL AND COMMERCIAL ELECTRIC HEATER SYSTEM

NORMAL OPERATIONS

GENERAL

The electric heater system is intended to provide minimal heating in the control room.

NORMAL OPERATION PROCEDURE

After initial Start-up, Normal Operation is as follows:

1. The line voltage thermostat in the control room should be set to a minimum temperature of 55°F. A line voltage thermostat mounted in the control room will activate an electric heater whenever temperature in the control room is equal to or below 55°F. When temperature in the control valve room is above 55°F, the electric heater will be off.

Albuquerque Bernalillo County
Water Utility Authority

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TITLE: BELL AND COMMERCIAL ELECTRIC HEATER-SHUTDOWN

Tools: Personal Protection Equipment: Hard hat, safety boots and safety glasses, and screw driver.

Hazards: Improper installation can result in electric shock.

Caution: Heater must be mounted at least 7 feet above floor to prevent accidental contact with fan blade. To prevent possible overheating, keep at least a 5-foot clearance in front of the heater, 6 inches from ceiling, 6 inches from side wall and 13 inches from back wall.

SYSTEM SCHEMATICS

NA

BELL AND COMMERCIAL ELECTRIC HEATER SYSTEM

SHUTDOWN OPERATIONS

PROCEDURE

Shutdown is required for maintenance or for replacement. Shutdown of the electric heaters is as follows:

1. Disconnect, lock and tag power source before servicing. Failure to disconnect power source can result in fire, shock or serious injury.

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SOJP NO.: 3700-SU-BELL AND COMMERCIAL PUMP STATION

TITLE: BELL AND COMMERCIAL PUMP STATION – START UP

Tools: Personal Protection Equipment: hard hat, safety boots and safety glasses.

Hazards: Slip and fall and electrical shock.

Caution: See Section 9 Safety of the Stormwater Pump Station No. 37 Bell and Commercial Operations Manual

System Schematics:

Figure 37-1 Pump Station No. 37 Bell and Commercial P&ID
Figure 37-2 Pump Station No. 37 Bell and Commercial Electrical Site Plan
Figure 37-3 Pump Station No. 37 Bell and Commercial Electrical One-Line Diagram

BELL AND COMMERCIAL PUMP STATION

SYSTEM STARTUP

PROCEDURE

Before Normal Operation, the following is required:

1. Position or verify that the pump station valves are as follows:
   IN AUTOMATIC – Lift Pump No. 1 motorized discharge isolation plug valve **V53701**
   IN AUTOMATIC – Lift Pump No. 2 motorized discharge isolation plug valve **V53702**
   IN AUTOMATIC – Lift Pump No. 3 motorized discharge isolation plug valve **V53703**
   OPEN – Station discharge knifegate isolation valve
   OPEN – Sump Pump No. 1 (wet well) discharge isolation valve
   OPEN – Sump Pump No. 2 (dry pit) discharge isolation valve
2. Test the pumps starting with water in the wet well at a level at least 5 feet above the wet well floor. Water may be diverted into the storm drains from a nearby fire hydrant.
3. Check that the station medium voltage disconnect switch is closed, (ON.)
   Test the Lift Pumps
4. Check that the pump breaker switch(es) on the MCC are closed, (in the ON position.)

   Note: if a breaker or disconnect switch (other than a 120-volt) for the equipment to be started is not in the **ON** position, notify the shift supervisor, enter the event in the operator log, and generate a work order for a maintenance repair dispatch to have the switch(es) placed in the **ON** position.
   Test the Lift Pumps in Hand

5. Place the lift pump HAND-OFF-AUTO (H-O-A) switch(es) on the Lift Pump Control Panel, LPCP, in **AUTO**.
6. Select a lead lift pump with the selector switch at the LPCP,
   Note: Verify there is sufficient wet well level before starting a lift pump.
7. Place the HOA selector in **Hand** position to start the lead pump. Record amperage and secondary voltage.

   Test the Lift Pumps in Auto
8. Place the HOA switches on the LPCP in the **Auto** Position
9. Check and record the level at which the lead lift pump starts.
10. Check and record the level at which the lead lift pump stops.
11. Verify the HOA switches are in the **Auto** position after startup is complete.

    Test the sump pump in Hand
12. Verify the station 480V disconnect circuit breaker, (on the 480V MCC is closed, (ON.)
    Note: Verify there is sufficient wet well level before starting the sump pump.
13. Select the **Hand** position with the HOA switch on the door of SPCP, and then press the Start Pushbutton.
14. Verify the Run indicator on the door of SPCP illuminates.
    Note: Observe the wet well level. Stop the pump when the wet well level goes below the top of the pump housing.

    Test the sump pumps (dry pit and wet well) in Auto
15. Place the HOA switch on the SPCP in the **Auto** Position
16. Check and record the level at which the sump pumps starts.
17. Check and record the level at which the sump pumps stops.
18. Verify the HOA switch is in the **Auto** position after start-up is complete.

    Test the bar screen in Hand, (Forward)
19. Verify the station 480V disconnect circuit breaker, (on the 480V MCC is closed, (ON.)
20. Verify that the disconnect on the door of the Bar Screen Control Panel, BSCP, is closed, (ON.)
21. Verify the control power on indicator is illuminated.
22. Select the **Hand** position with the HOA switch on the door of BSCP.
23. Using the Reverse – Off – Forward, ROF, selector switch on the control station, (at the bar screen), select the forward position.
    Note: Use caution. The bar screen will start in the forward direction.
24. **Test the bar screen in Hand, (Reverse)**
25. Start the bar screen in the forward direction.
26. While the bar screen is in motion, move the ROF switch to the **Off** position. The bar screen stops.
27. While the bar screen is stopped, switch to the **Reverse** position. The bar screen should run in reverse.
28. Verify that the ROF switch returns to the **Off** position when it is released.

    Test the bar screen in Auto
29. Select the **Auto** position with the HOA on the door of SPCP.

30. After the start-up checks are complete, verify the bar screen HOA switch is in the **Auto** position.

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TITLE: BELL AND COMMERCIAL PUMP STATION - NORMAL OPERATION

Tools: Personal Protection Equipment: hard hat, safety boots, and safety glasses.

Hazards: Slip and fall and electrical shock

Caution: See Section 9 Safety of the Stormwater Pump Station No. 37 Bell and Commercial Operations Manual

System Schematics:

Figure 37-1 Pump Station No. 37 Bell and Commercial P&ID
Figure 37-2 Pump Station No. 37 Bell and Commercial Electrical Site Plan
Figure 37-3 Pump Station No. 37 Bell and Commercial Electrical One-Line Diagram

BELL AND COMMERCIAL PUMP STATION

NORMAL OPERATION

GENERAL

Stormwater is conveyed into the stormwater pump station inlet channel through a 60-inch reinforced concrete pipe (RCP). The stormwater passes through a mechanical bar screen, whose raking mechanism is activated by a float level sensor. The screenings are raked onto a belt conveyor before being deposited into a dumpster. The inlet channel was not constructed with high-flow bypass provisions. As such, if the high channel alarm is tripped, the operator must visit the station to manually clear the screen in order to facilitate proper pump station operation. After passing through the bar screen, stormwater enters the pump station wet well. Three (3) dry pit lift pumps draw stormwater from the bottom of the wet well through individual buried and screened suction pipes. The pumps discharge into a common 36-inch discharge header located in the dry pit.

The pump station has a duty-standby configuration for the three (3) lift pumps and two (2) sump pumps. Pump No. 1 is a 75 HP dry pit, vertical line shaft centrifugal pump with a capacity of 10,000 gpm. Pump No. 2 and 3 are 134 HP submersible pumps in a dry pit configuration and have a capacity of 16,000 gpm each. Because the pumps discharge into a combined header, their capacity is not additive under combined operation. The combined capacity of all three pumps is approximately 32,000 gpm. Pump No. 1 should not be operated by itself but rather as an auxiliary to Pump No. 2 and 3. This is because the pump would be beyond its runout limit if operated alone without the pressure from the other pumps. The combined capacity of Pump No. 2 and 3 is approximately 27,000 gpm. For more information about operational configurations refer to Section 3.1.2 and Appendix C of Pump Station No. 37 Operations Manual.

Capacity of the wet well sump pump is small, relative to that of the lift pumps. The intent of the wet well sump pump is only to remove water in the wet well that remains once the water level has dropped below the inlet of the lift pumps, and to handle small, non-storm infiltration flows. Similarly, the dry pit sump pump also has a small capacity and is intended to remove flow from dry pit infiltration and equipment leakage.

NORMAL OPERATION CONDITIONS

During normal operation, the HAND-OFF-AUTO (HOA) switch for the mechanical bar screen will be in **AUTO** and will start and stop automatically based on the level floats.

During normal operation, the HOA switches for the sump pump and lift pumps will be in **AUTO** and will start and stop automatically based on the level transmitters.

LEAD, LAG, STANDBY assignments:

The lead lift pump is selected manually with the selector at the Lift Pump Control Panel.

The active level transmitter is selected automatically as the transmitter with the highest level indications or manually with a switch at the Station Level Control Panel

Valve Positions at Pump Station No. 37 Bell and Commercial during normal operation is as follows:

IN AUTOMATIC – Lift Pump No. 1 motorized discharge isolation plug valve **V53701**
IN AUTOMATIC – Lift Pump No. 2 motorized discharge isolation plug valve **V53702**
IN AUTOMATIC – Lift Pump No. 3 motorized discharge isolation plug valve **V53703**
OPEN – Station knifegate discharge isolation valve
OPEN – Sump Pump No. 1 (wet well) discharge isolation valve
OPEN – Sump Pump No. 2 (dry pit) discharge isolation valve

NORMAL OPERATING PROCEDURES

After initial Start-Up, Normal Operation is as follows:

1. Check for abnormal conditions when entering facility – flooding, broken equipment, electrical fires, etc.
2. Check the building thermostat for proper HVAC settings.
3. Check the pump station and equipment status at the control panel.
4. Check and record the AC voltage at the MCC.
5. During lift pump operation check and record the amperage and secondary voltage.
6. Check the bar screen and belt conveyor control panel indicators for faults and indication that control power is available.
7. Check sump pump control panel indicators for faults.
8. Check and record wet well level at the level transmitters.
9. When bar screen is subjected to high torque, the motor will shut-off. In hand mode, reverse the bar screen rack to expose obstruction. Clear the obstruction by running the bar screen forward in hand mode or reversing obstruction by hand.
10. When the water level in the entrance channel is high, just above the channel wall, the bar screen will shut off. Manually operate the screen to park the motor in “up” position (using either forward or reverse direction). This will prevent submerging the bar screen motor.

Operate lift pump to bring water level below channel wall and resume bar screen operations.

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Approved by:

SOJP NO.: 3700-SD – BELL AND COMMERCIAL PUMP STATION

TITLE: BELL AND COMMERCIAL PUMP STATION- SHUT DOWN

Tools: Personal Protection Equipment: hard hat, safety boots and safety glasses.

Hazards: Slip and fall and electrical shock.

Caution: See Section 9 Safety of the Stormwater Pump Station No. 37 Bell and Commercial Operations Manual

System Schematics:

Figure 37-1 Pump Station No. 37 Bell and Commercial P&ID
Figure 37-2 Pump Station No. 37 Bell and Commercial Site Plan
Figure 37-3 Pump Station No. 37 Bell and Commercial One-Line Diagram

BELL AND COMMERCIAL PUMP STATION

SYSTEM SHUT DOWN

PROCEDURE

Mechanical Bar Screen Shut Down

Shut down is required for maintenance or for replacement. Shut down of the mechanical bar screen and belt conveyor is as follows:

1. Disconnect, lock and tag power source before servicing. Failure to disconnect power source can result in fire, shock or serious injury. Follow ABCWUA LOTO (lock out, tag out) procedures. Refer to Appendix E.
2. Select the Off Position with the Hand – Off – Auto, HOA, switch on the door of the Bar Screen Control Panel, BSCP.
3. The 480V disconnect switch in BSCP should be opened for complete shutdown.

   Note: if a breaker or disconnect switch (other than a 120-volt) for the equipment to be shut down is not in the **OFF** position, notify the shift supervisor, enter the event in the operator log, and generate a work order for a maintenance repair dispatch to have the switch(es) placed in the **OFF** position.

Lift Pump Shut Down

Shut down is required for maintenance or for replacement. Shut down of the selected lift pump is as follows:

1. Disconnect, lock and tag power source before servicing. Failure to disconnect power source can result in fire, shock or serious injury. Follow ABCWUA LOTO (lock out, tag out). Refer to Appendix E.
2. Select the **Off** Position for the selected pump with the HOA switch on the door of the Lift Pump Control Panel, LPCP.
3. Verify the HOA for the remaining lift pumps are in the **Auto** position.
4. Verify the motorized isolation plug valve has closed by checking the indicator light on the appropriate valve in the dry pit.

Sump Pumps Shut Down

Shut down is required for maintenance or for replacement. Shut down the selected sump pump as follows:

1. Disconnect, lock and tag power source of the sump pump before servicing. Failure to disconnect power source can result in fire, shock or serious injury. Follow ABCWUA LOTO (lock out, tag out). Refer to Appendix E.
2. Select the **Off** Position for the sump pump with the HOA switch on the door of the sump Pump Control Panel, SPCP.
3. Open the 480V circuit breaker inside SPCP.
4. Close the discharge isolation valve of the sump pump.

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SOJP NO.: 3700-SU-EVAPORATIVE COOLER

TITLE: BELL AND COMMERCIAL EVAPORATIVE COOLER SYSTEM – START UP

Tools: Personal Protection Equipment: hard hat, safety boots and safety glasses, wrench set, and screw driver set.

Hazards: Improper installation can result in electric shock.

Caution: When servicing fan, motor may be hot enough to cause pain or injury.

System Schematics:

NA

BELL AND COMMERCIAL EVAPORATIVE COOLER SYSTEM

SYSTEM STARTUP

GENERAL

The evaporative cooler system is intended to provide minimal ventilation cooling in the control room.

PROCEDURE

Before Normal Operation, the following is required:

1. Complete spring start up standard maintenance procedures listed in the SMP section of this manual. Provide water connection and install drain overflow. Install and adjust float valve and fill pan with water. Check all fasteners for tightness.
2. Adjust drive pulley. Adjust the drive pulley to the least diameter and adjust belt tension. Start cooler.
3. Check amperage. With pads wet and unit started, check amperage draw with amperage meter. If amperage draw is less than motor rating, turn off electrical power. Adjust pulley to a large diameter and readjust belt tension, plug motor in and retest amperage draw. Repeat process until correct amperage draw is attained. Increasing motor pulley diameter increases amperage draw. Decreasing motor pulley diameter decreases amperage draw. Do not operate cooler with larger amperage draw than specified on motor plate.
4. Set thermostat to 90°F for system serving control room.

Albuquerque Bernalillo County
Water Utility Authority

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SOJP NO.: 3700-N-EVAPORATIVE COOLER

TITLE: BELL AND COMMERCIAL EVAPORATIVE COOLER – NORMAL OPERATION

Tools: Personal Protection Equipment: hard hat, safety boots and safety glasses, wrench set, and screw driver set.

Hazards: Improper installation can result in electric shock.

Caution: When servicing fan, motor may be hot enough to cause pain or injury.

SYSTEM SCHEMATICS

NA

BELL AND COMMERCIAL EVAPORATIVE COOLER SYSTEM

NORMAL OPERATIONS

GENERAL

The evaporative cooler system is intended to provide minimal ventilation cooling in the control room.

NORMAL OPERATION PROCEDURE

After initial Start-Up, Normal Operation is as follows:

1. The control room is required not to exceed temperatures above 90°F. A line voltage thermostat with automatic pump control mounted in the control room will activate an evaporative cooler whenever temperature in the control room is equal to or above 90°F. When temperature in the control room is below 90°F, the evaporative cooler will be off.

Albuquerque Bernalillo County
Water Utility Authority

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SOJP NO.: 3700 – SD-EVAPORATIVE COOLER

TITLE: BELL AND COMMERCIAL EVAPORATIVE COOLER- SHUTDOWN

Tools: Personal Protection Equipment: hard hat, safety boots and safety glasses, wrench set, and screw driver set

Hazards: Improper installation can result in electric shock.

Caution: When servicing fan, motor may be hot enough to cause pain or injury.

SYSTEM SCHEMATICS

NA

BELL AND COMMERCIAL EXHAUST FAN SYSTEM

SHUTDOWN OPERATIONS

Procedure

Shut-Down is required for maintenance, replacement or winter shut-down. Shut-Down of the evaporative cooler is as follows:

1. Disconnect, lock and tag power source before servicing. Failure to disconnect power source can result in fire, shock or serious injury.
2. Drain water. Always drain all of the water out of the cooer and water supply line. Keep the water line disconnected from both the unit and water supply so that it does not freeze.
3. Unplug motor and pump.
4. Cover unit. To protect the life of the finish, a cover is recommended in extended periods of non use.

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SOJP NO.: 3700-SU-ELECTRIC HEATER

TITLE: BELL AND COMMERCIAL ELECTRIC HEATER SYSTEM – START UP

Tools: Personal Protection Equipment: hard hat, safety boots and safety glasses, and screw driver.

Hazards: Improper installation can result in electric shock.

Caution: Heater must be mounted at least 7 feet above floor to prevent accidental contact with fan blade. To prevent possible overheating, keep at least a 5 foot clearance in front of the heater, 6 inches from ceiling, 6 inches from side wall and 13 inches from back wall.

System Schematics:

NA

BELL AND COMMERCIAL ELECTRIC HEATER SYSTEM

SYSTEM STARTUP

GENERAL

The electric heater system is intended to provide minimal heating in the control room.

PROCEDURE

Before Normal Operation, the following is required:

1. Check all fasteners for tightness.
2. Ensure wiring installed per National Electric Code and heater must be grounded against possible electrical shock. Inspect the control panel wiring to make certain insulation is intact and all connections are tight.
3. Verify the power supply voltage coming to heater matches the ratings printed on the heater nameplate before energizing.
4. The heater is hot when in use.
5. Do not insert or allow foreign objects to enter any ventilation or exhaust opening, as this may cause electric shock, fire, or damage to the heater.
6. To prevent a possible fire, do not block air intakes or exhaust in any manner. Keep combustible materials away from heater.
7. A heater has hot and arcing or sparking parts inside. Do not use it in areas where gasoline, paint or flammable liquids are used or stored.
8. Set line voltage thermostat to 55°F for system.

Albuquerque Bernalillo County
Water Utility Authority

REF (Filename): SOJP_3700_N_ELECTRIC HEATER.doc
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SOJP NO.: 3700-N-ELECTRIC HEATER

TITLE: BELL AND COMMERCIAL ELECTRIC HEATER – NORMAL OPERATION

Tools: Personal Protection Equipment: hard hat, safety boots and safety glasses, and screw driver.

Hazards: Improper installation can result in electric shock.

Caution: Heater must be mounted at least 7 feet above floor to prevent accidental contact with fan blade. To prevent possible overheating, keep at least a 5 foot clearance in front of the heater, 6 inches from ceiling, 6 inches from side wall and 13 inches from back wall.

SYSTEM SCHEMATICS

NA

BELL AND COMMERCIAL ELECTRIC HEATER SYSTEM

NORMAL OPERATIONS

GENERAL

The electric heater system is intended to provide minimal heating in the control room.

NORMAL OPERATION PROCEDURE

After initial Start-Up, Normal Operation is as follows:

1. The control room is required not to fall below 55°F. A line voltage thermostat mounted in the control room will activate an electric heater whenever temperature in the control room is equal to or below 55°F. When temperature in the control valve room is above 55°F, the electric heater will be off.

Albuquerque Bernalillo County
Water Utility Authority

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SOJP NO.: 3700 – SD-ELECTRIC HEATER

TITLE: BELL AND COMMERCIAL ELECTRIC HEATER- SHUTDOWN

Tools: Personal Protection Equipment: hard hat, safety boots and safety glasses, and screw driver.

Hazards: Improper installation can result in electric shock.

Caution: Heater must be mounted at least 7 feet above floor to prevent accidental contact with fan blade. To prevent possible overheating, keep at least a 5 foot clearance in front of the heater, 6 inches from ceiling, 6 inches from side wall and 13 inches from back wall.

SYSTEM SCHEMATICS

NA

BELL AND COMMERCIAL ELECTRIC HEATER SYSTEM

SHUTDOWN OPERATIONS

Procedure

Shut-Down is required for maintenance or for replacement. Shut-Down of the electric heaters are as follows:

1. Disconnect, lock and tag power source before servicing. Failure to disconnect power source can result in fire, shock or serious injury.

8.0 STANDARD MAINTENANCE PROCEDURES

Standard Maintenance Procedures are developed to provide a list of tasks to be performed at a specified frequency to increase the overall life and performance of the lift station equipment. These procedures provide the recommended maintenance to be performed at the pump station with input from facilities staff and/or manufacturer's instructions.

8.1 Water Resource Equipment

8.1.1 Mechanical Bar Screen and Belt Conveyor

Maintenance is to be performed only by qualified personnel who are familiar with this type of equipment. The maintenance schedules includes item which should be completed based on run-time, weekly, monthly, quarterly, and semi-annual intervals. The schedules are contained in Appendix B. For further instruction, reference the manufacturer's O&M manual.

8.1.2 Lift Pumps

Maintenance is to be performed only by qualified personnel who are familiar with this type of equipment. The local sales and service representative for Fairbanks Morse and Flygt pumps is James, Cooke, and Hobson (JCH), located in Albuquerque, NM. If they are unable to assist with the Fairbanks Morse pump, contact Hennesy Mechanical Sales, located in Phoenix, AZ. The station operator may check oil levels in the reservoir and fill with the manufacturer's specified oil as needed. For further instruction, refer to the manufacturer's O&M manual. Appendix C may also be referenced for manufacturer's general information and pump maintenance specifications.

Removal of the motors and/or pumps requires lifting the individual units with the motor room's ceiling-mounted bridge crane and spotting them on the ground-level floor near the roll-up door. The crane is rated for five (5) tons, and the approximate weight of any equipment should be verified before use.

8.1.3 Sump Pumps

Maintenance is to be performed only by qualified personnel who are familiar with this type of equipment. The local sales and service representative for Flygt pumps is JCH, located in Albuquerque, NM. For further instruction, refer to the manufacturer's O&M manual. Appendix D may also be referenced for manufacturer's general information and pump maintenance specifications.

The dry pit sump pump is relatively small and may be removed by hand, but safe lifting procedures should be observed. Refer to Section 9 for general safety guidelines. It may also be possible to utilize the building's bridge crane and a spotter to lift the pump. The outdoor wet well sump will need to be lifted with either a portable crane or a winch. The wet well sump location is equipped with guide rails to prevent swinging during removal and aid in alignment during reinstallation.

8.1.4 Valves

Maintenance is to be performed only by qualified personnel who are familiar with this type of equipment. The local sales and service representative for DeZURIK motorized pump control plug valves is Hennesy Equipment Sales located in Phoenix, AZ. This is not the same Hennesy representative that is listed above in Section 8.1.2. The valves should be cycled at least annually using their actuators to ensure proper operation. All manual valves should be cycled annually to ensure proper operation. Refer to Appendix A for a listing of valves. Valves that appear to be faulty should be removed, inspected, and replaced if necessary.

8.2 Electrical Equipment

8.2.1 Transformer Disconnect Switch

The medium voltage (MV) transformer switch is the disconnecting means and contains fuse protection for the station transformers. The switch is MV switch is energized at 12,470V. As

such, the switch shall be operated only by electricians who are trained in the operations and are equipped with proper protective gear.

Maintenance: Always disconnect, lock and tag power source before servicing.

Ongoing:

- Keep the surrounding area clear of vegetation and other debris and protect the equipment against intrusion by wildlife.

Annual:

- Visual inspection
- Operate all switches
- Finish touch-up

5-Year :

- Cleaning
- Lubrication
- Adjustment Repair of non-functional or damaged equipment
- Infrared scan

8.2.2 Transformer

The transformer steps the 12,470V distribution down to match station requirements.

Maintenance: Always disconnect, lock and tag power source before servicing.

Ongoing:

- Keep the surrounding area clear of vegetation and other debris and protect the equipment against intrusion by wildlife.

Annual:

- Visual inspection
- Finish touch-up

5-Year :

- Cleaning
- Lubrication
- Infrared scan
- Oil analysis

8.2.3 480V Motor Control Center (MCC)

The 480V MCC contains the main circuit breaker for the station 480V service, and a key interlocked circuit breaker for generator connection. The MCC has full voltage non-reversing (FVNR) starters for the three (3) station storm water lift pumps, a dry well sump pump, and the conveyor at the bar screen. The MCC has feeder circuit breakers for the bridge crane, the station unit heaters, the 480V to 240/120V transformer, the sump pump and the bar screen control panels. A fused feeder for a power monitor is included as well as a tap connection for a surge protective device.

Maintenance: Always disconnect, lock and tag power source before servicing.

Ongoing:

- Visual inspection
- Keep the surrounding area clean

Annual:

- Visual inspection
- Vacuum interior of the MCC
- Operate each circuit breaker
- Plug or cover all unused openings

5-Year:

- Perform annual inspection
- Check/tighten all connections

8.2.4 Sump Pump Control Panel (SPCP)

The SPCP operates the sump pump to maintain the level in the wet well below the point where the lift pump starts.

Maintenance: Always disconnect, lock and tag power source before servicing.

Ongoing:

- Visual inspection
- Keep the surrounding area clean

Annual:

- Visual inspection
- Vacuum interior of the control panel
- Check/tighten all connections
- Operate all switches
- Test all pilot indicators
- Plug or cover all unused openings
- Connect variable 4 to 20 mA source and check control relative to rising signal

5-Year:

- Conduct annual maintenance
- Infrared scan

8.2.5 Bar Screen Control Panel (BSCP)

The BSCP operates the bar screen to remove debris from the influent to minimize channel blockage and protect the lift pumps.

Ongoing:

- Visual inspection
- Keep the surrounding area clean

Annual:

- Visual inspection
- Vacuum interior of the control panel
- Check/tighten all connections
- Operate all switches
- Test all pilot indicators
- Plug or cover all unused openings
- Manually operate floats and check control relative to rising signal

5-Year:

- Conduct annual maintenance
- Infrared scan

8.2.6 Lift Station Control Panel

The LSCP is a programmable logic-type controller that receives input regarding pump station status and produces outputs to affect pump station operation. The LSCP starts and stops the sump pumps, and upon stop, alternates the lead pump. The LSCP starts and stops the storm water lift pumps and alternates the start sequence based on station operator inputs. The LSCP receives alarms from the sump pump control panels and the bar screen control panel. The LSCP monitors intrusion switches for station security. The LSCP also communicates status and alarms to the control system at the Southside Water Reclamation Plant (SWRP).

Ongoing:

- Visual inspection
- Keep the surrounding area clean

Annual:

- Visual inspection
- Vacuum interior of the control panel
- Check/tighten all connections

- Operate input switches and observe LSCP reaction
    - Intrusion switches
    - Float switches for Bar Screen and sump pump
- Connect variable 4 to 20 mA signal and check LSCP reaction to wet well rising level.

5-Year:

- Conduct annual maintenance
- Test radio communication signal strength

8.3 HVAC Equipment

8.3.1 Evaporative Cooler

Maintenance is to be performed only by qualified personnel who are familiar with this type of equipment. Maintenance is generally limited to spring start up, winter shut-down, cleaning, replacing belts, and lubricating bearings. Cleaning is limited to cooler pads, pumps, interior and exterior surfaces and removing dust build up on motor housing. Refer to the specific manufacturer's guidelines for further details. The following general guidelines should be followed:

1. Always disconnect, lock and tag power source before servicing.
2. Clean pads as required, using a garden hose with nozzle. Back wash to clean out the openings, then clean off the inlet face any scale or other obstruction to the passages. Slight scrapping may be required to remove hardened scale. Change pads every five (5) years or as required.
3. Check belt tension. A 3lb force should deflect the belt ¾". Readjust belt if needed.
4. Oil bearings. The blower bearings and cooler motor in this unit should be oiled with 20/30 weight once every year. The motor does not need oil if it has no oil lines for oiling.
5. Clean pump once a year at start up. Unplug power to pump and remove bottom cover of pump cover to clean. Turn the impeller to ensure free operation. Remove the pump spout and check for any blockage. After cleaning, reinstall the cover onto the pump. Reattach the pump to the cooler mount. Check bleed off valve to be sure it is not clogged.

6. Winter drain down. Always drain all of the water out of the cooler and water supply line when not in use at the end of summer season. Keep the water line disconnected from both the unit and water supply so that it does not freeze. Unplug motor and pump. Cover unit.

8.3.2 Electric Heater

Maintenance is to be performed only by qualified personnel who are familiar with this type of equipment. Maintenance is generally limited to cleaning and lubrication. Refer to the specific manufacturer's guidelines for further details. Following general guidelines should be followed every 12 months:

1. Always disconnect, lock and tag power source before servicing.
2. Inspect the control panel wiring to make certain insulation is intact and all connections are tight. Inspect all heaters and relay contacts. If the contacts appear badly pitted or burned, replace the contactor/relay.
3. For proper heater protection, ensure the correct size fuse is used.
4. Clean the unit casing, fan and motor once a year. Any rusty spots on the casing should be cleaned and repainted.
5. All units up to 20 kW have fan motors that are permanently lubricated so that only occasional cleaning is required. Units above 20 kW have fan motors lubricated for five (5) years of continuous duty or ten (10) years of intermittent operation. When required, remove the oil access plug on back of heater at motor intake grill, open oil cap, fill with S.A.E. No. 10 electric motor oil, and replace plugs and access plug.

9.0 SAFETY

This section presents general information on safety procedure to help prevent accidents. Consequently, to reduce the danger, anyone engaged in the operation of a stormwater pump station must be familiar with safety practices that pertain specifically to the profession. Once recognized, the inherent hazards can be readily corrected or at least guarded against by proper warnings and safety procedures. The overall dangers of accidents are much the same whether in valve vaults, pumping stations, or other facilities. These hazards can usually be classified under one (1) of the following categories:

- Physical injuries
- Body infections
- Dangers from explosive or noxious gases or vapors and oxygen deficiency

Safety regulations such as New Mexico Occupation Health & Safety Bureau (OHSB) and Occupational Safety & Health Administration (OSHA) should be followed. More information can be found at:

- https://www.osha.gov/law-regs.html and
- https://www.osha.gov/dcsp/osp/stateprogs/new_mexico.html.

9.1 General Safety Guidelines

1. Observe all written and verbal safety rules and be aware of the particular hazards surrounding your job.
2. Do not start a task until you have received and fully understand the instructions.
3. Immediately correct or report to your supervisor any hazardous conditions, unsafe equipment, or unsafe working practice.
4. Report all injuries or accidents to your supervisor.
5. Do not run. Watch for and avoid slippery or congested areas.
6. Do not ride on or operate any moving equipment unless it is part of your job and you have been instructed in its use.

7. When operating moving equipment, observe all traffic signs, speed limits, and parking regulations.
8. Do not wear loose clothing or carry rags in your pockets. Cloth may become caught in equipment and cause personal injury.
9. Use protective equipment (PPE) such as goggles, hard hats, gloves, and respirators, whenever warranted or required by the tasks.
10. Do not operate any equipment unless all safety guards and safety devices designed for that equipment are in place, except as permitted in written maintenance or emergency operation procedures.
11. Lock out equipment before cleaning debris from moving parts. Follow ABCWUA LOTO Procedures before working on any equipment. Refer to Appendix E.
12. If it is necessary to remove safety devices, handrails, manhole covers, or related items, warn fellow employees.
13. Keep all tools in good repair and ensure that you use tools appropriate to the work being performed.
14. Do not pass under or work beneath fellow employees unless a task requires doing so. Never enter a wet well, tank, or basin until all precautions have been taken to ensure safety.
15. Practice good housekeeping. Immediately clean up any grease, oil, or hydraulic fluid that may have spilled or leaked from the equipment. Do not use gasoline to clean up oil and grease. Keep all passageways, aisles, stairs, and exits clear of tools, equipment, and other materials.
16. Do not consider a job finished until you have made conditions as safe as possible for the next person.
17. Work in pairs when feasible, especially if the work being done has high risk of injury or requires assistance.

9.2 Electrical Hazards

1. Do not ground yourself in water or on pipes or drains. Avoid them when working near any electricity.
2. Allow only authorized people to work on electrical equipment and repairs.

3. Keep all electrical controls accessible and well marked.
4. Keep rubber mats on the floor in front of electrical panels; keep edges trimmed so they do not become a tripping hazard.
5. Keep wires from becoming a tripping hazard.
6. Work in pairs around electrical equipment.
7. Place "MAN ON LINE" signs on electrical disconnects, and lock the disconnects when working on electrical equipment which another person can turn on.
8. Never use metal ladders around electrical equipment.
9. Handle breaker wires as though they were "live" wires.
10. When there is a question about any electrical hazard, ask before you expose yourself to it.
11. Do not use any part of your body to test a circuit.
12. Ground all electrical tools.
13. When working around electrical equipment, as with any other hazardous work, always remain aware of the potential hazard.

9.3 Mechanical Equipment Hazards

The exposed moving parts of some pieces of equipment pose a safety hazard to personnel working around the equipment. Installing stationary guards where necessary can prevent accidental injury related to these parts. These guards, which would shield the moving part without interfering with its operation, should be considered for belts, wheels, chains, shafts, and any couplings between a piece of equipment and its drive motor or two (2) moving parts of a piece of equipment. Protective guards are sometimes furnished in the form of screens, plates, hollow shells, or tubes by the manufacturer and installed when the equipment is put into service. The designated personnel should inspect V-belts, drive chains, horizontal or vertical drive shafts, and all exposed moving parts.

Guards should be kept in good condition and replaced if necessary. Bent or improperly fitting guards could rub and interfere with the movement of a belt, shaft, wheel, etc. Before a guard is replaced, the related piece of equipment should be shut off and the power disconnected.

In addition, certain pieces of equipment may pose noise problems. High noise levels could cause serious injury to personnel coming into close contact with the equipment. Some form of ear protection, such as headsets, should be provided for personnel working near the unit. However, before any corrective measure is taken, the personnel should make certain the high noise level is not the result of a malfunction in the unit. At no time should unauthorized personnel be allowed to come near a piece of machinery that poses a safety threat. Whether guards are installed or not, this protective measure should always be observed.

9.4 Explosion and Fire Hazards

1. Install fire extinguishers where a fire hazard exists, and mark the location of the extinguishers with properly placed signs.
2. Post "NO SMOKING" signs where a potential fire hazard exists.
3. Instruct plant employees in fire prevention and what action to take in case of a fire.
4. Label all portable containers of flammable materials to indicate their contents.
5. Mark storage locations for flammable materials with signs reading "FLAMMABLE MATERIAL".
6. Store flammable combustible liquids in tanks or closed containers.
7. Clean up leaks or spills of flammable materials immediately and dispose of them promptly.
8. Inspect fire extinguishers monthly, keep them charged, and test them at least once every five (5) years.

9.5 Biological Hazards

1. All cuts, skin abrasions, scratches, and similar injuries should be treated promptly. It is recommended that all cuts and scratches, no matter how small, be treated immediately with a povidone-iodine solution and watched closely for any signs of redness, tenderness, swelling, or infection. If any of these signs appear, the individual should see a physician.
2. A doctor should be called for all but minor injuries.
3. Treatment facility personnel should be familiar with first aid treatment.
4. Avoid putting fingers in nose, mouth, or eyes while working.

5. Thoroughly clean hands when convenient and always before eating, smoking, or leaving work. Fingernails should be kept short to aid cleanliness.
6. Wear proper shoes and clothing on site, especially when working in the pump station wet well, to protect from injury (ex., needles, razors, broken glass, etc.).
7. Wear leather gloves to protect hands from nicks, scratches, etc.
8. Wear rubber gloves when direct contact with wastewater is a possibility.

9.6 Oxygen Deficiency and Noxious Gas Hazards

1. Test atmosphere before entering any confined space, in conformance with ABCWUA confined space entry procedures. Refer to Appendix F.
2. In closed spaces, allow no smoking or open flames, and guard against sparks.
3. Use only safety explosion-proof lighting equipment or mirrors.
4. Always ventilate all manholes, tanks, etc. (enclosed areas), before entering.
5. Test the atmosphere for explosive and toxic gases and oxygen deficiency, as required by the New Mexico Occupational and Health Safety Bureau. If the atmosphere is normal, a worker may enter with a safety harness attached and two (2) men available at the top. The atmosphere must be continually monitored.
6. If gas or oxygen deficiency is found, the atmosphere should be ventilated with pure air by natural or artificial means. Use of a portable blower is the most practical method of artificial ventilation. Gas tests should then be repeated and atmosphere cleared as normal before workers enter. Adequate ventilation must be maintained during work, and tests frequently repeated.
7. If gas or oxygen deficiency is present and it is not practical or possible to ventilate adequately before workers enter (such as in the saving of life), a hose mask or self-contained breathing apparatus should be worn and extreme care taken to avoid all sources of ignition if flammable gas is present. Use explosion-proof safety lights (not ordinary flashlights), wear rubber boots or non-sparking shoes, use non-sparking tools, etc.

Note: Work in a flammable gas atmosphere is extremely hazardous and should never be attempted except by those thoroughly familiar with the dangers and fully equipped with the proper protection safety equipment, and then only if it is impossible to provide a safe atmosphere within the time limitation of the emergency.

9.7 Safety Equipment

Safety helmets provide head protection from falling or flying objects and from limited electric shock.

Hearing protection (e.g. earplugs or earmuff) is required in areas of high noise levels.

Goggles prevent eye injury where there is a reasonable probability of injury.

Protective creams protect the skin from sunburn, oils, greases, paints, and dust.

Gloves of the appropriate material prevent injuries while handling pipe, tools, chemicals, solvents, and similar materials.

Safety boots protect toes from falling objects and when moving heavy items.

Oxygen, toxic gas, and explosive condition detectors are used to assure that the air in confined spaces or other work areas is not hazardous.

Portable air blowers are used for ventilating manholes and other confined spaces before entering.

Self-contained breathing apparatus or hose masks are used when atmospheres immediately hazardous to life or health must be entered.

Safety harness is required where individuals are exposed to hazardous atmospheres; the only type that should be used is that consisting of a body belt with a buckle and a shoulder harness.

1. Warning Signs or Tags: Required to be placed in strategic areas around dangerous or potentially dangerous areas; temporary tags should be attached to broken-down units to prevent start-up resulting in an injury.
2. Tools: Required by OSHA standards that the management makes sure that proper tools in good repair are available at all times (even those tools owned by employees); non-sparking tools should be available and used in required areas.
3. Fire Extinguishers: Required to place fire extinguishers approved by the Underwriter's Laboratories in areas of possible fire hazards.
4. Medical Aid: Required by OSHA standards that the employer must insure the availability of medical personnel; if there are no medical facilities in the nearby area, some employee trained in first aid should be available, as should a first aid kit.
5. Gas Detection Meter: Prevents injury by the detection of explosive and toxic gases before removal of manhole covers.

APPENDIX A

Pump Station List of Equipment

Pump Station No. 37 Bell and Commercial Equipment List

Equipment Number	Description	Manufacturer	Model Number	Serial Number	Size, Capacity	Local Source for Parts and Service
CP53700	Station Control Panel	YUKON & ASSOCIATES	ASSEMBLY	AY-185681	120V, 1 PHASE, 20A F.L.A,	Yukon & Associates; Albuquerque, NM
CP53704	Sump Pump Control Panel	EG PUMP CONTROLS	ASSEMBLY	246609	35HP, 47A, 480V, 3 PHASE, 60HZ	
CP53741	Barscreen Control Panel	INFILCO DEGREMONT	ASSEMBLY		120V	MISCOWater; Albuquerque, NM
D53701	Lift Pump 1 (West) Outlet Valve Actuator	EIM	MGL5-1 1334025	9C2303FC-G	18 IN, 1.5 HP, 3" DIAMETER, 60 HZ, 1725RPM, 208VAC	
D53702	Lift Pump 2 (Center) Outlet Valve Actuator	EIM	MGL5-1 1334320	073579A201	24 IN	
D53703	Lift Pump 3 (East) Outlet Valve Actuator	EIM	MGL5-1 1334025	073579A202	24 IN	
D53760	Barscreen Conveyor Gearbox	BALDOR MANF	TAZ115H25 902001			
E53700	Motor Control Panel	SIEMENS	TIASTAR	STYLE# 89BFU9X39001		
E53700C	Wet Well Level Transmitter Power Supply	DREXELBROOK				
E53700D	Wet Well Level Transmitter Power Supply	DREXELBROOK	320-1-13			
E53701	Lift Pump #1 Power Supply	SIEMENS	TIASTAR	999354	134HP	
E53702	Lift Pump #2 Power Supply	SIEMENS	TIASTAR	999352		
E53703	Lift Pump #3 Power Supply	SIEMENS	TIASTAR	999351		
E53710	Lighting System	ALLEN BRADLEY				
E53711	UPS Bypass Switch/Panel	APC	SBP10KFC1M1		10KVA, 208V	
E53712	Electronic Sag Protector	SQUARE D/ SCHNEIDER ELECTRIC	ESP0015G3E REACTIVAR	SQD000101	120VAC IN/OUT 12.5AAC	
E53713	Phase Monitor Module	SIEMENS				
E53714	Surge Protector	PROTECTOR	PSP PRODUCTS INC.	VORTEX V-02B200DC	WC#PP03B	
E53760	Barscreen Conveyor Motor Control Center	SIEMENS	TIASTAR			

Pump Station No. 37 Bell and Commercial Equipment List

Equipment Number	Description	Manufacturer	Model Number	Serial Number	Size, Capacity	Local Source for Parts and Service
H53730	Electric Heater	MARLEY ENGINEERED PRODUCTS	Q MARK MUH104		10KW	
LE53700A	Wet Well sump pump level element	AMETEK DREXELBROOK	700-0005-054-BAO-9144	7081		
LE53700B	Wet Well sump pump level element	AMETEK DREXELBROOK	700-0005-054-BAO-9144	7082		
LE53700C	Wet well level element	AMETEK DREXELBROOK	700-0005-018-BAO-6949.44	ADU-00658		
LE53700D	Wet well level element	AMETEK DREXELBROOK	700-0005-018-BAO-6949.44	ADU-00659		
LSH53700D	Wet well influent level switch	FLYGT	ENM-10 FLOAT	P/N 582-88-30		James, Cooke, and Hobson; Albuquerque, NM
LSH53700E	Wet well influent level switch	FLYGT	ENM-10 FLOAT	P/N 582-88-30		James, Cooke, and Hobson; Albuquerque, NM
LSH53700A	Wet well sump float level switch	FLYGT	ENM-10 FLOAT	P/N 582-88-30		James, Cooke, and Hobson; Albuquerque, NM
LSH53700B	Wet well sump float level switch	FLYGT	ENM-10 FLOAT	P/N 582-88-30		James, Cooke, and Hobson; Albuquerque, NM
LSH53700F	Dry pit sump float level switch	FLYGT	ENM-10 FLOAT	P/N 582-88-30		James, Cooke, and Hobson; Albuquerque, NM
LT53700A	Wet well Sump Transmitter level	DREXELBROOK	409-1000-011-00	35636(M)		
LT53700B	Wet well Sump Transmitter level	DREXELBROOK	409-1000-011-0	3578(M)		
LT53700C	Wet well Transmitter level	DREXELBROOK	409-1030-004-00-M0037	21852/3916(M)		
LT53700D	Wet well Transmitter level	DREXELBROOK	409-1030-004-00-M0037	21844/3923(M)		
M53701	Lift Pump 1 (West) Motor	ELECTRIC MACHINERY CO	72CA6344/MODEL TBDP	172184891	75HP, 3 PHASE, 230V	Electric Machinery Co.; Minneapolis, MN
M53702	Lift Pump 2 (Center) Motor	FLYGT	51-56-14AA/38	860.000-5009	134HP, 460V, 10kW, 225A, 505 RPM	James, Cooke, and Hobson; Albuquerque, NM
M53703	Lift Pump 3 (East) Motor	FLYGT	860.000-5009	59120663	134HP, 460V, 10kW, 225A, 505 RPM	James, Cooke, and Hobson; Albuquerque, NM
M53704	Wet Well Sump Pump Motor	FLYGT				James, Cooke, and Hobson; Albuquerque, NM

Pump Station No. 37 Bell and Commercial Equipment List

Equipment Number	Description	Manufacturer	Model Number	Serial Number	Size, Capacity	Local Source for Parts and Service
M53741	Barscreen Motor	INFILCO DEGREMONT	BW932077	F0703273594	5 HP	MISCOWater; Albuquerque, NM
M53760	Barscreen Conveyor Motor	WEG	00218XP3E145T		2(1.5) HP, 1750 RPM/ 1425RPM, 460/380V, 2,77/3.50 AMPS, 60HZ	MISCOWater; Albuquerque, NM
P53701	Lift Pump 1 (West)	FAIRBANKS MORSE	537POI	RU49094	75HP, 18" Discharge	Hennesy Mechanical Sales; Phoenix, AZ
P53702	Lift Pump 2 (Center)	FLYGT	3500.860-5002		134 HP	James, Cooke, and Hobson; Albuquerque, NM
P53703	Lift Pump 3 (East)	FLYGT	3500.860-5002	SN 9120663	134 HP	James, Cooke, and Hobson; Albuquerque, NM
P53704	Wet well Sump Pump	FLYGT			10" Discharge	James, Cooke, and Hobson; Albuquerque, NM
P53705	Dry Pit Sump Pump	FLYGT			7.5 HP, 460/230V, 4.5 AMP, 60HZ, 1700RPM	James, Cooke, and Hobson; Albuquerque, NM
SS53760	Barscreen Conveyor Speed Switch	ELECTRO SENSORS INC	SCP1000	WO #J028945-04		
T53700	Telemetery System	MOTOROLA	MOSCAD F7563A	0858NG042X		
U53741						
U53760	Conveyor Unit	CUSTOM CONVEYOR CORP		312008		MISCOWater; Albuquerque, NM
UPS53700	Uninterruptable Power Supply	APC	SL10KB1	WE0306110022		
V53701	Lift Pump 1 (West) Outlet Valve	DEZURIK	9449213R001	603928-3	18 IN	Hennesy Equipment Sales; Phoenix, AZ
V53702	Lift Pump 2 (Center) Outlet Valve	DEZURIK	9449213R001	603928-2	24 IN	Hennesy Equipment Sales; Phoenix, AZ
V53703	Lift Pump 3 (East) Outlet Valve	DEZURIK	9449213R001	603928-1	24 IN	Hennesy Equipment Sales; Phoenix, AZ
XA53700	Intrusion Alarm	SENTROL	2207AU			
Y53700	Roll up Door					
Z53700	Storm Station Crane	STEWART ENGINEERING & EQUIPMENT CO.		B-1009	5 TON	

Pump Station No. 37 Bell and Commercial Equipment List

Equipment Number	Description	Manufacturer	Model Number	Serial Number	Size, Capacity	Local Source for Parts and Service
ZS53760	Barscreen Conveyor Safety Switch	CONVEYOR COMPONENTS CO.	RS-2X		SPDT-20AMP, 1HP, 125VAC	

APPENDIX B

Manufacturer's Mechanical Bar Screen and Conveyor Maintenance Schedule

Infilco Degremont Inc

IDI 95-341

MAINTENANCE SCHEDULE

Item	Hours	Weekly	Monthly	Semi-Annually
Pin Racks - Grease (May be extended after field experience)		X		
Drive shaft - Permalube cartridge				
Check, replace as req'd	Quarterly; replace after 9 months.			
Follower shaft - Permalube cartridge				
Check, replace as req'd			X	
Cam Tracks - Grease		X	X	
Gear Box				
Leak Check		X		
Level Check	5,000			
Oil Change	20,000			
Cam Follower rollers				
Exchange	20,000			
Fasteners - Check Torque				
Pin Rack Bolts		XInitially	X	
Latch Bolts		XInitially	X	
Rake-to-Rake Arm Bolts		XInitially	X	
Wiper Bolts		XInitially	X	
Pillow block to Rack Arm		XInitially		X
Spring Nuts and Threaded Rod				X
Wear - Check				
Rollers and Bushings				X
Sprockets				X
Cam Followers				X
Latch				X
Wiper Blade				X

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PREVENTIVE MAINTENANCE INFORMATION
AND
EQUIPMENT DATA SHEET

1. Equipment Name: BELT CONVEYOR

2. Equipment Number: 312008

3. Equipment Manufacturer: CUSTOM CONVEYOR INC.

   Address: 19096 INDUSTRIAL BLVD

   Phone: (763) 441-1644

4. Equipment Supplier: MISCO NEW MEXICO

   Address: 4500 ATHERTON WAY, ALBUQUERQUE, NM 87120

   Phone: (505) 898-8728

5. Nameplate Data:
   Drive Unit: 2 hp, 1725 rpm, 460 volts, 3 Θ
   Motor class: Explosion Proof TEFC
   Manufacturer WEG
   Model No. 00218XP3E145T Serial No.
   Frame: 145T

   Driven Unit: TORQUE-ARM II
   Manufacturer: Dodge
   Equipment Type: Speed Reducer
   Model No. TA2115H
   Ratio: 25:1

6. Method of Power Transmission: V-Belt, Goodyear B-70

Maintenance Requirements:

Maintenance Operation	Frequency	Lubricant	Comments
A. Clean surrounding area & Check belt tracking.	Daily	-NA-	None
B. Observe wipers and adjust Accordingly.	Weekly	-NA-	None
C. Lubricate bearings and idlers	Monthly	NLGI #2	None
D. Check reducer oil level	Monthly	SAE-80/90	Flush and fill gear reducer every six months.
E. Lubricate Motor	Annually	NLGI #2	None

Lubricant List (provide Mobile number in addition to any other recommended manufacturers):

Reference Symbol	Mobil	Standard Oil	Gulf	Arco	Or Equal
List symbols used in Item 7, above.	*List equivalent lubricants, as distributed by each manufacturer for the specific use recommended*				
C.	-NA-	-NA-	-NA-	-NA-	NLGI #2
D.	SAE-80/90	SAE-80/90	SAE-80/90	SAE-80/90	SAE-80/90
E.	-NA-	-NA-	-NA-	-NA-	NLGI #2

This data sheet prepared by: Project Manager

Firm: Industrial Electric-Automation, Inc.

Date: 5/27/09

EQUIPMENT MAINTENANCE SCHEDULE

Equipment Item: 24" Wide x 15'-11" Long Screenings Belt Conveyor

Manufacturer: Custom Conveyor Corporation

Daily:

1. Clean-up around conveyor.
2. Check belt tracking.

Weekly:

1. Observe wipers and adjust accordingly.
2.

Monthly:

1. Lubricate bearings and idlers.
2. Check reducer oil level.

Quarterly:

1. Check drive belt tension.
2.

Semi-annually:

1. Flush and fill gear reducer.
2.

Annually:

1. Lubricate motor.
2.

LUBRICATION SCHEDULE

Component	Quantity	Frequency	Type
Reducer Dodhe TA2115	Quarts 1.1	Every 2500 Hours Or 6 Months	SAE-80/90
Bearings	As Required to Purge Seal	1 Month	NLGI #2
Idlers	As Required to Purge Seal	1 Month	NLGI #2

SPARE PARTS LIST

Qty	Manufacturer	Description

CUSTOM CONVEYOR CORPORATION

19096 INDUSTRIAL BOULEVARD
ELK RIVER, MINNESOTA 55330
763/441-1644
FAX 763/441-1662

WARRANTY

Custom Conveyor Corporation (Seller) warrants that all products manufactured by Seller will be of good merchantable quality, free from defects in material and workmanship and will possess the characteristics represented in writing by Seller. In addition, Seller certifies that the products will comply with OSHA Standards and other applicable codes and regulations in effect at the time of order acceptance that relate solely to the physical characteristics and not to the circumstances of use of the products. *THE FOREGOING IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION OF THE PRODUCTS.* Claim for breach of the above warranty must be made within 18 months from date of delivery for Equipment Only Contracts, or within 12 months from date of start-up for Equipment and Field Service Work Contracts.

REMEDY: Upon satisfactory proof of claim and/or return of defective parts by Buyer, Seller will, within a reasonable time, make any repairs, additions or corrections or at the option of Seller, provide replacement parts free of charge. If Seller declares a defect or deficiency to be a "Major Failure," (as defined herein), Seller shall provide, or at Seller's option, pay for, Warranty labor at no charge to Buyer. In all other instances, Seller shall not be liable for Warranty labor expenses. Generally, major failures shall be defined as (a) unusual repetitive failures of component parts, and/or (b) failure of a system, installed by Seller to meet the operating rates specified in Seller's Proposal, provided that the correction will require eight hours or more of repair time. Buyer labor costs or charges for correcting defects or making additions will not be allowed, nor will Seller accept products returned for credit unless the correction or return is authorized by Seller in writing prior to the correction. With regard to any item not manufactured by Seller, the Warranty shall be limited to that extended to Seller by the supplier.

LIABILITY LIMITATIONS: The foregoing is the Buyer's exclusive remedy for breach of any Warranty or deficiency in connection with the sale or use of Seller's products.

Seller shall not, under any circumstances, be liable for incidental or consequential damages of any nature (whether based on tort or contract), including, but not limited to: Loss of profits, production, sales opportunity, or business reputation; direct or indirect labor cost and overhead expense; and damage to equipment or property. The liability of Seller shall not, under any circumstances, exceed the purchase price of the products furnished by Seller.

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EQUIPMENT SUPPLIERS

Although there are local distributors for most hardware items, this is custom manufactured equipment, therefore, we would like all correspondence of replacement parts directed to:

Custom Conveyor Corporation
19096 Industrial Boulevard
Elk River, MN 55330

Phone: (763) 441-1644
Fax: (763) 441-1662

E-mail: ccc@customconveyorcorp.com Website: www.customconveyorcorp.com

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BELT CONVEYOR

SAFETY INFORMATION

1. At a time close to completion of installation, all personnel and supervisors should be given a complete indoctrination in the use of the system and all of its equipment. Field inspection and classroom techniques are two valuable types of training.

2. A formal safety training program for operations, maintenance, and supervisory personnel will go along way toward establishing and maintaining the highest standards of safety in the work place.

3. Concurrent with completion of the installation and the trial runs of all belt conveyors and associated equipment, a "Safety Check-Up" is recommended. The check-up should include all mechanical and electrical operating equipment, plus the structures, walkways, ladders, stairs, headroom, and access ways. It is at this time that a detailed physical inspection of the facility and the installed conveyor equipment will often reveal the need for additional guarding, safety devices, and warning signs.

4. At no time should the conveyors be used to handle material other than that originally specified. Capacity and belt speed design ratings should not be exceeded.

5. Only trained personnel should be allowed to operate the conveyor system. They should have complete knowledge of conveyor operation, electrical controls, safety and warning devices, and the capacity and limitation performance of the system.

6. The location and operation of all emergency control and safety devices should be made known to all personnel. Surrounding areas should be kept free of obstructions or materials that could impede ready access and a clear view of such safety equipment at all times.

7. A program should be established to provide frequent inspections of all equipment. Gaurds, safety devices, and warning signs should be maintained in their proper positions and in good working order. Only competent, properly trained, and authorized persons should adjust or work on safety devices.

8. A "walking inspection" of a belt conveyor system is a good means by which well-trained maintenance personnel can often detect potential problems from any unusual sound made by such components as idlers, pulleys, shafts, bearings, drives, belts, and belt splices.

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9. Hands and feet should never come in contact with any conveyor component, and no one should be allowed to ride on a moving or operable conveyor. Poking at or prodding material or the belt or any component of a moving conveyor should be prohibited. Contact with, or work on a conveyor must occur only while the equipment is stopped, with the electrical control locked off.

10. No person should be allowed to ride on, step on, or cross over a moving conveyor, nor to walk or climb on conveyor structures, without using the walkways, stairs, ladders, and crossovers provided.

11. Good housekeeping is a prerequisite for safe conditions. All areas around a conveyor, and particularly surrounding drives, walkways, safety devices, and control stations should be kept free from debris and obstacles, including inactive or unused equipment, components, wiring, and obsolete or non-applicable warning signs or posted instructions.

12. Any conveyor found to be in an unsafe condition for operation, or one that does not have all guards and safety devices in excellent condition, should not be used unless adequate supplementary safety devices are installed.

13. All persons should be barred by appropriate means from entering an area where falling material may present a hazard. Warning signs and barricades can be used.

14. First-call maintenance is a prerequisite for the safest operation of conveyors. Maintenance, including lubrications, should be performed with the conveyor stopped and locked out. Special lubricating equipment, lube extensions, pipes, and the like can be installed so as to permit lubrication of an operating conveyor without any foreseeable hazards.

15. Good lighting contributes to a safe working environment.

16. During the life of the belt conveyor system, its operational conditions and environment may require changes. There should be a continuing effort to detect and treat promptly any new possible safety hazards associated with these changes. If such a hazard cannot be readily eliminated, warning signs, barricades, or posted instructions should be installed

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FIELD STORAGE OF MACHINERY AND EQUIPMENT

A. INSPECTION UPON ARRIVAL AT JOB SITE

As soon as the equipment arrives at it's destination, it should be carefully inspected to determine any shortage or damage, checking each item with the shipping manifest. Should any shortage or damage be found, it should be immediately called to the attention of the local freight agent of the carrier over which the shipment arrived and proper notation be made by him on the freight bill. This will prevent controversy when claim is made to the carrier and will facilitate prompt and satisfactory adjustment.

The Custom Conveyor machinery was painted, and exposed machined surfaces covered with suitable protective coating before shipment was made. Look for signs of damage to these coatings and for scuffing or abrading of the protected surfaces. Parts that were supported on machined surfaces for shipment should be removed from blocking or cradles. Inspect the areas that had been in contact and apply additional protective coatings, if necessary.

B. PROTECTION

Apply additional protective coatings wherever necessary. Machined surfaces can be coated with a semi-hard film rust preventative coating. Acceptable coatings are as follows:

Tectyl 506	- Valvoline Oil Company
Nox Rust 369	- Daubert Chemical Company
Rust Veto 342	- E.F. Houghton Company

Where the part is to be stored inside and for relatively short periods of time, a lighted oil film rust preventative can be used as follows:

Tectyl 511M	- Valvoline Oil Company
Nox Rust X21	- Daubert Chemical Company
Rust Veto 4214	- E.F. Houghton Company

Painted surfaces are to be touched up with original paint or similar paint which will be compatible with the final finish to be used. Unpainted castings should be covered to protect them from direct contact with the elements.

C. STORAGE

1.) The storage site selected should be on high ground with good drainage, free from standing water and mud. Parts to be stored should be positioned or covered to avoid collection of water which may damage the equipment due to corrosion or freezing.

2.) The actual arrangement of the storage area should be discussed with Custom Conveyor and then arranged so that all parts are readily accessible.

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3.) Provide adequate supervision when unloading parts and when reloading for movement or installation.

4.) Place machinery parts on cradles, timbers or rails off ground in a place separated from the active construction area to avoid on site damage.

5.) Equipment having machined parts should be covered with tarpaulins or polyethylene sheeting and placed on a suitable vapor barrier.

6.) The parts in storage should be inspected periodically for corrosion, especially at contact points of support, cleaned and reprotected, as necessary. The frequency of inspection will be dependent upon the climatic conditions.

7.) Assembled machined components, electrical motors, electrical equipment and items shipped in bulk or cartons such as small castings, bolts, nuts, spare parts, etc., should be stored inside. The inside storage area should be dry and preferably heated.

8.) Remove caps on pillow block bearings, check condition and lubrication, and pack with grease if necessary.

9.) Gear reducers and components having assembled anti-friction bearings should be rotated periodically while in storage and before plant start-up.

10.) Oil lubricated enclosed bearings and gear reducers should be protected with a vapor emitting rust preventative oil such as Nox-Rust Motorstor P10 (formerly known as Nucle Oil) made by the Daubert Chemical Company. If the bearing or gear reducer is filled with oil, 2% Motorstor by volume should be blended with or added to the oil. If used alone, 1 oz. of Motorstor is sufficient to protect 3 cu. ft. of volume in the bearing housing or gear case. All openings should be sealed off tightly to keep the rust preventing vapor from escaping.

CAUTION: Vapor emitting rust preventative oils may be incompatible with certain non-ferrous metals, such as copper, brass, bronze, cadmium, lead, etc., when used undiluted. Follow manufacturer's instructions.

D. STORAGE OF ERECTED EQUIPMENT

1.) Drives, motors and bearings are to be lubricated to prevent corrosion.

2.) Protect oil lubricated bearings or gear reducers with a vapor emitting preventative oil as described in Paragraph C, Item 10.

3.) Bearings should be rotated periodically to lubricate all bearing parts.

4.) If the machinery is erected before the building is enclosed, cover with tarpaulins or polyethylene sheeting to prevent the entry of water.

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For additional storage instructions or equipment not covered herein, contact:

Custom Conveyor Corporation
19096 Industrial Boulevard
Elk River, MN 55330

Phone: (763) 441-1644
Fax: (763) 441-1662

APPENDIX C

Manufacturer's Lift Pump Curve and General Information

Pump 1

FINAL REPORT - VOLUME TWO

FOR

ALBUQUERQUE STORM WATER PUMPING STATIONS

REHABILITATION STUDY - PHASE I

STATIONS : ~~26, 27, 32, 34, 35, 36,~~ 37, ~~AND ALCALDE (PROPOSED)~~

A/E SERVICES AGREEMENT 81-26

FOR

MUNICIPAL DEVELOPMENT DEPARTMENT
CITY OF ALBUQUERQUE

BEI NO. 6001-021

BOVAY ENGINEERS, INC.

Pump 1

Bell/Commercial Station No. 37

EQUIPMENT DATA SHEET

1. LOCATION: Inside Building

2. EQUIPMENT: Pump/Motor Unit No. 1

3. DATA: Include as much as possible - nameplate, manufacturer, supplier, dates, tags, etc.:

1. Motor Nameplate Data: EM Ampli. Speed
Adjustable Speed Magnetic Drive
SN 172184831
Input Speed 705
Full Load 69 HP at 96% speed
Instr. Book 158 Frame MDS18
Electric Machinery Mfg. Co.
Minneapolis, Minn. 55413

Anti-friction Bearings:

Input End: Internal Rotor Bearing:
Size 6215
Quantity 0.7
Greasing Internal Operating Hours 8800

Output End: External Bearing:
Size 7314
Quantity 1
Greasing Internal 8800 hrs.

Internal Bearing:
Size 6215
Quantity 0.7
Greasing Internal 8800 hrs.

Pump 1

2. Other Nameplate on Motor: 75 HP 3pH 60 Cy
KVAC Ser. 7209
Ins. Cl F Frame 445 HPH
40°C rise Model TBDP
Volts 230/440
Amps 200/100
EM SN 172184891
Motor Style 72C43644

Drive or Lower Bearing 70BC035PP3
Opp. Drive or Upper Brg. 65BC035PP3
Good for 5500 ft. alt.

EM Squirrel Cage Induction Motor
Westinghouse Electric Corporation

3. Pump No. 1 Nameplate: Size 18" 5710
GPM 10,000
RPM 695
Head 22'
SN 796118

Pump 1

18"

5711
VERTICAL FOR FLEXIBLE SHAFTING

5721
HORIZONTAL

5731M&W
SUBMERSIBLE

5741
VERTICAL CLOSE COUPLED

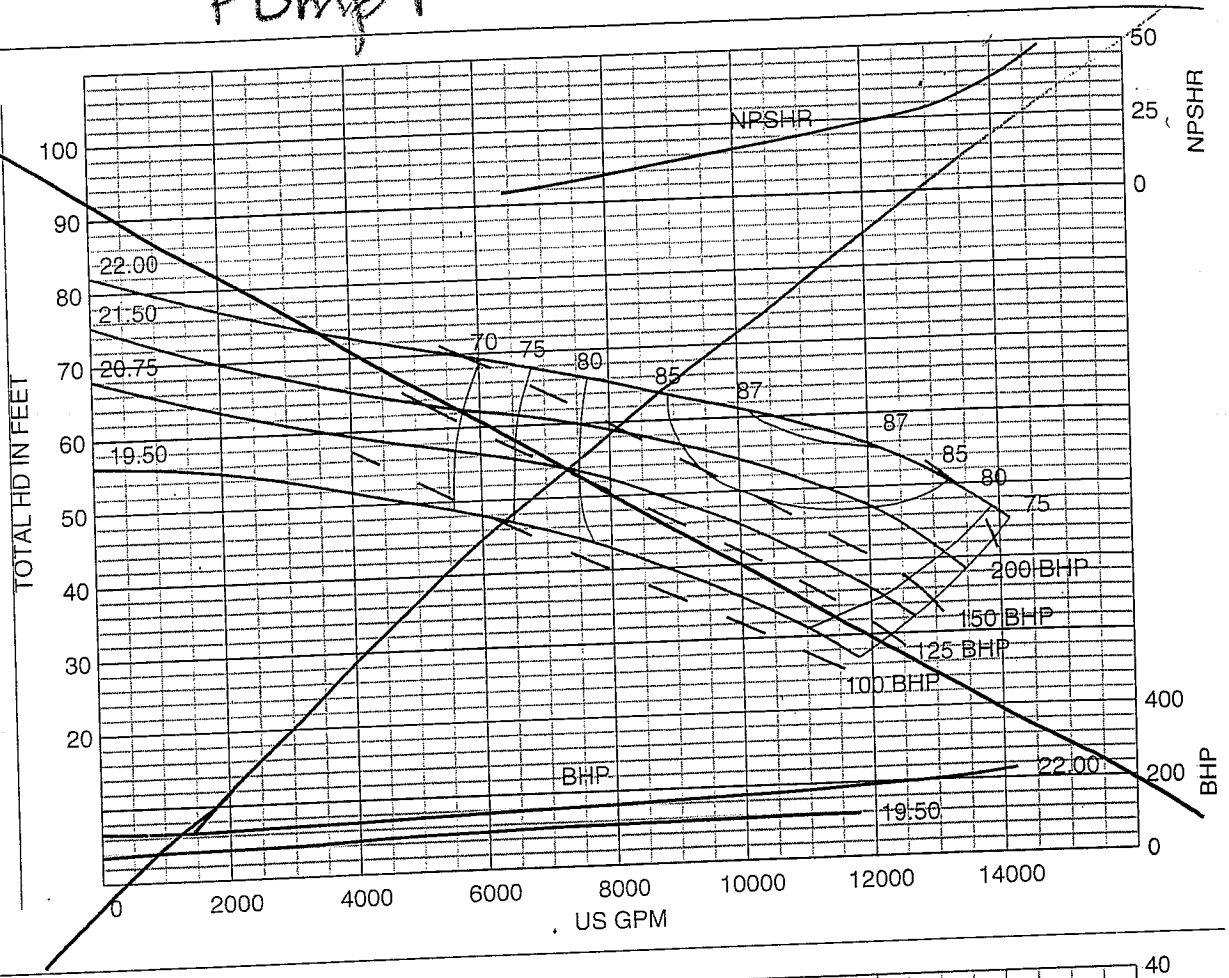
705 RPM
NO.OF VANES 3

SUCTION SIZE 18"

IMPELLER L18A1H

INLET AREA 190.3 SQ.IN.

MAX.SPHERE 4 1/4"



18"

5711
VERTICAL FOR FLEXIBLE SHAFTING

5721
HORIZONTAL

5731M&W
SUBMERSIBLE

5741
VERTICAL CLOSE COUPLED

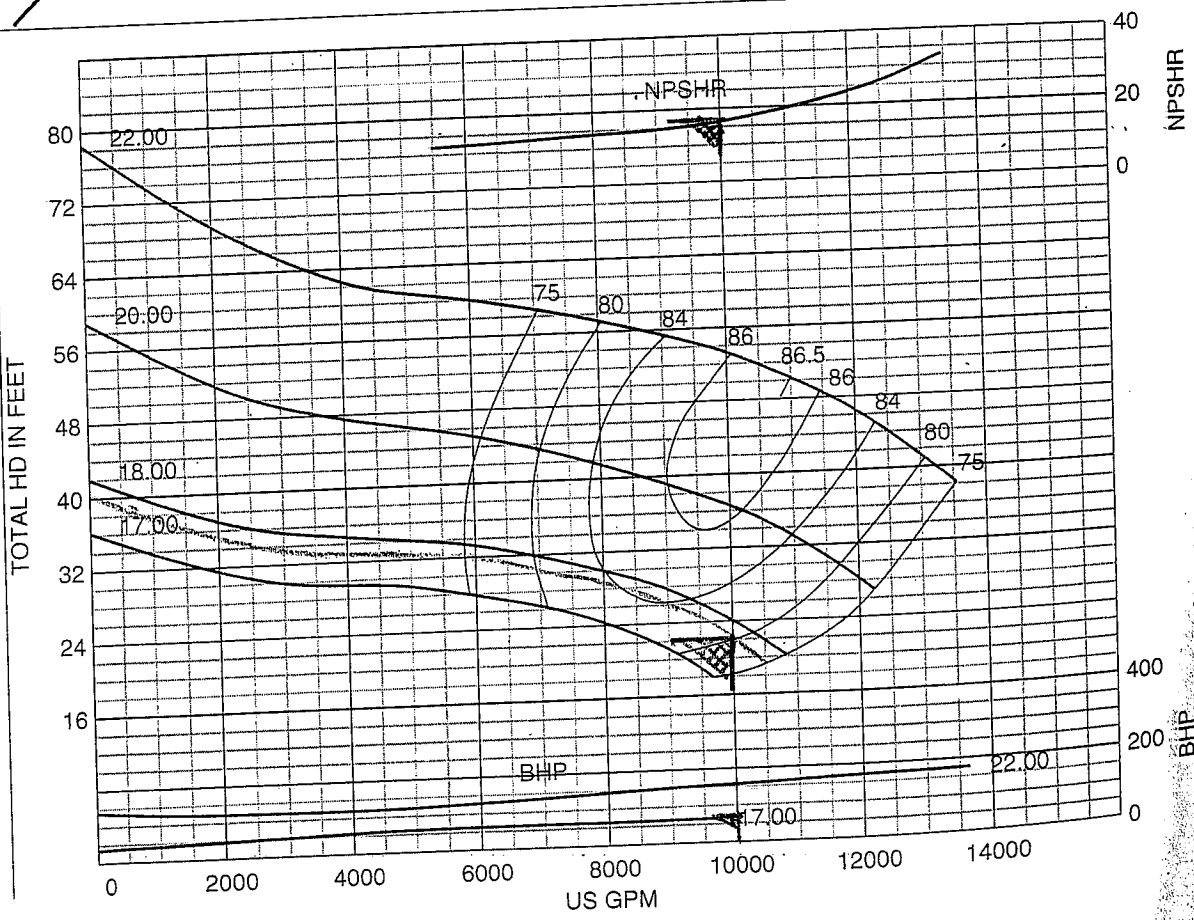
705 RPM
NO.OF VANES 2

SUCTION SIZE 18"

IMPELLER L18A1M

INLET AREA 190.3 SQ.IN.

MAX.SPHERE 6 3/4"

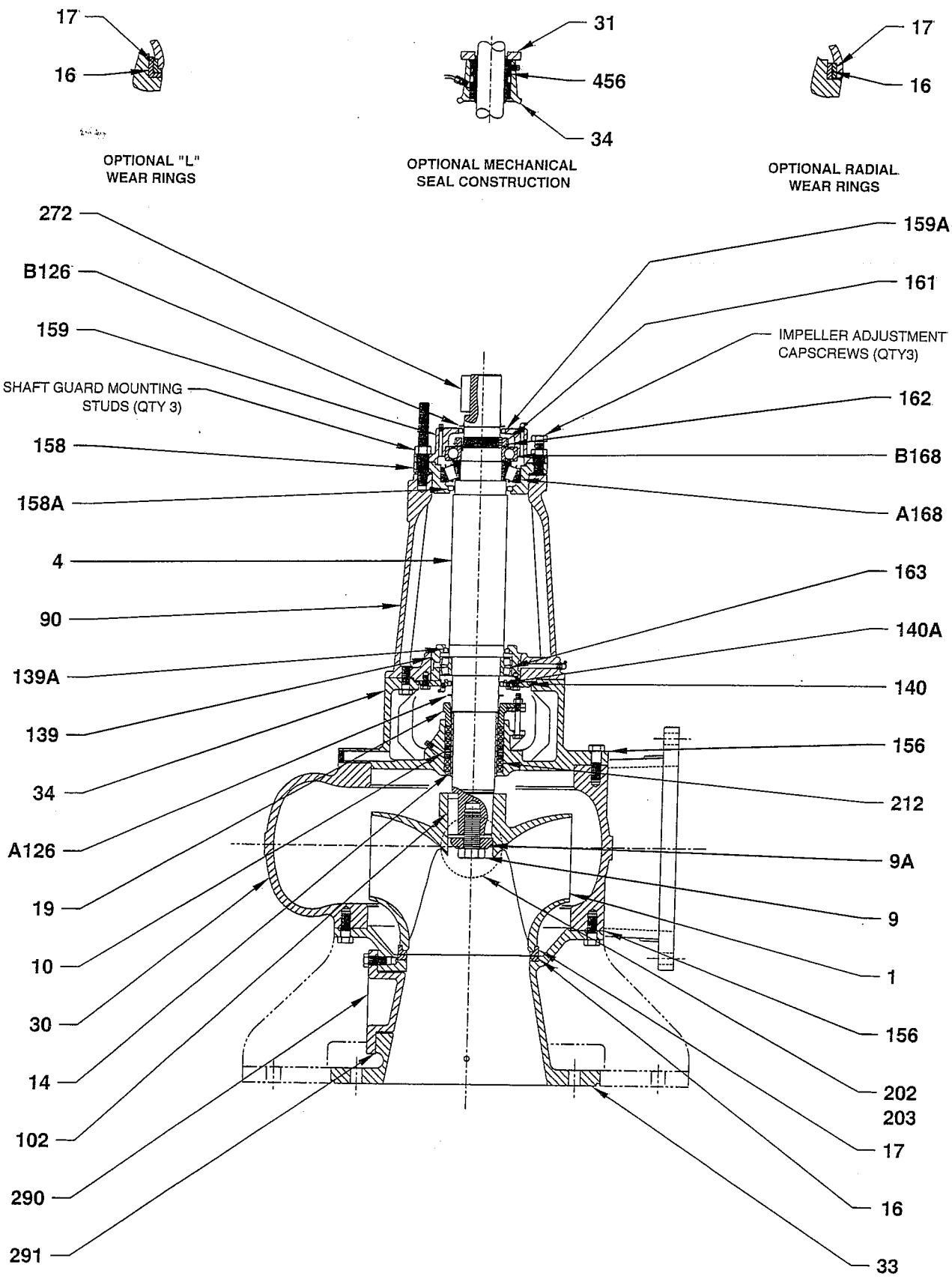


Pump 1

Pump Model	5711	B5711				E5711			C5711	
Frame Size	—	T40	T40	T60	T60	T80	T80	T80	—	—
Pump Size (Discharge Size)	8	10	12	14	16	14	16	18	20	24
Suction Size	8	10	12	14	16	14	16	18	20	24
Nominal Wear Ring Clearance:	.033	.035	.037	.039	.041	.039	.041	.042	.045	.060
Impeller Fastener:										
Size	1-14	7/8 - 9	7/8 - 9	1 1/4 - 7	1 1/4 - 7	1 1/2 - 6	1 1/2 - 6	1 1/2 - 6	2 1/2 - 12	2 1/2 - 12
Tightening Torque (lb-ft)	150	150	150	350	350	525	525	525	950	950
Impeller:										
Weight (lbs.)	30.0	76.00	104.50	(4)	(5)	(4)	(5)	(6)	(7)	(8)
Inlet Area (sq. inches)	41.75	63.63	88.15	(4)	(5)	(4)	(5)	(6)	(7)	(8)
WR^2 (lb-ft^2)	2.5	9.0	15.0	(11)	(12)	(11)	(12)	(13)	(14)	(15)
Sphere Size, Maximum	3	3 3/4	4 1/2	(4)	(5)	(4)	(5)	(6)	(7)	(8)
Shaft Diameter:										
at Impeller	1 1/2	2 3/8	2 3/8	3 1/4	3 1/4	3 13/16	3 13/16	3 13/16	4	3 5/8
at Sleeve	1 7/8	2 5/8	2 5/8	3 1/4	3 1/4	4 1/8	4 1/8	4 1/8	4 1/4	5 1/2
at Thrust Bearing	1.97	2.953	2.953	2.953	2.953	5	5	5	4.000	5.000
at Radial Bearing	1.97	3.740	3.740	3.740	3.740	4.726	4.726	4.726	4.620	5.510
between Bearings	2 3/8	4	4	4	4	5 5/16	5 5/16	5 5/16	5 1/2	5 7/8
at Coupling	1 7/8	2 3/8	2 3/8	2 3/8	2 3/8	3 1/2	3 1/2	3 1/2	3 3/4	4 1/2
Torsional Shaft Stiffness (in-lbs/radian)	$3.54x10^5$	$2.26x10^6$	$2.26x10^6$	$2.90x10^6$	$2.90x10^6$	$8.08x10^6$	$8.08x10^6$	$8.08x10^6$	$4.78x10^6$	$5.99x10^6$
Center to Center of Bearings	10 7/16	14 1/8	14 1/8	13 5/8	13 5/8	18 9/10	18 9/10	18 9/10	16 5/8	25 13/16
Thrust Bearing No.	7210BG	5315	5315	7315	7315	98400	98400	98400	TSS-TS	TSS-TS
Radial Bearing No.	6210	6219	6219	5219	5219	23024	23024	23024	22224	23128
Sealing Box:										
Packing:										
Size	1/2	1/2	1/2	1/2	1/2	5/8	5/8	5/8	3/4	3/4
No. Rings per Box	5	5	5	5	5	5	5	5	6	7
Seal Cage Width	3/4	1	1	1	1	1 1/4	1 1/4	1 1/4	1	1 1/4
Mechanical Seal:										
Type (standard)	Double	Double	Double	Double	Double	Double	Double	Double	Double	Double
Recommended Flush Water:										
Pressure (psi)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)	(3)
Flow (GPM)	1/2 - 1	1/2 - 1	1/2 - 1	1/2 - 1	1/2 - 1	1/2 - 1	1/2 - 1	1/2 - 1	1/2 - 1	1/2 - 1
Sleeve OD	2 3/16	3	3	3 5/8	3 5/8	4 1/2	4 1/2	4 1/2	5	6 1/4
Box ID	3 3/16	4	4	4 5/8	4 5/8	5 3/4	5 3/4	5 3/4	6 1/2	7 3/4
Box Depth	3 3/8	3 3/4	3 3/4	3 3/4	3 3/4	5	5	5	6 1/8	6 3/4
Box Inlet Tap Size (NPT)	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	3/8	3/8
Box Outlet Tap Size (NPT) (Mechanical Seal Only)	1/4	1/4	1/4	1/4	1/4	1/4	1/4	1/4	3/8	3/8
Backhead Drain Tap Size (NPT)	3/8	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4	3/4
Volute Cleanout Diameter	4 3/4	4 3/4	4 3/4	6	6	6	6	6	6	8
Fronthead Cleanout Diameter	4	4	4 1/2	4 1/2	6	6	6	6	6	8
Vent/Priming Tap Size (NPT)	3/4	1	1	1	1	1	1	1	1 1/4	1 1/2
Volute Drain Tap Size (NPT)	3/4	1	1	1	1	1	1	1	1 1/4	1 1/2
Gauge Tap Size:										
Suction & Discharge (NPT)	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2	1/2
Hydrostatic Test, PSI (18)	75	75	75	75	75	75	75	75	75	75
Casing Working, PSI (18)	50	50	50	50	50	50	50	50	50	50
Nominal Casing Thickness	3/8	9/16	5/8	3/4	3/4	3/4	3/4	13/16	7/8	1
Operating Temperature, °F (18)	150	150	150	150	150	150	150	150	150	150
Anchor Bolt Size, recommended	7/8	7/8	1	1	1 1/8	1	1 1/8	1 1/8	1 1/4	1 1/4
Minimum Diameter Round Opening to Install Pump	27 1/2	36 1/2	39 1/2	47 1/2	52	47 1/2	52	57	66	78
Shipping Weight, Basic Pump only (lbs)	450	960	1240	1530	2600	1900	3000	3400	4100	6600

See notes on page 472.

Pump 1



ASSEMBLY

~~14", 16" &~~ 18" E5711 T80 FRAME

Fairbanks Morse Pump Corporation

DWG NO 5710A011 REV NO 0

~~10" thru 16" B5711 T40 & T60 Frame and 14", 16" &~~ 18" E5711 T80 Frame
Standard Fitted (SF) Pumps

Ref. No.	Description	Material	Specification (1)
1	Impeller	Cast iron	A48-CL30
4	Shaft	Steel	A 108-C1141 or A332-C4140 (Mfg. Option)
9	Bolt, impeller	Steel	SAE Bolt Steel-GR-8
9A	Washer, impeller	Steel	A108 GR12L14
10	Ring half, seal water	Teflon	Teflon
14	Sleeve, shaft	Stainless steel	A743-CA15 or A276-410 (Mfg. Option) (300-350 BHN)
16	Wear ring, fronthead	Stainless Steel	A743 CA15 (300-350 BHN)
17	Wear ring, impeller	Stainless steel	A743 CA15 (190-241 BHN)
19	Gland half, interlocking	Cast iron	A48-CL30
30	Volute	Cast iron	A48-CL30
33	Fronthead	Cast iron	A48-CL30
34	Backhead, frame	Cast iron	A48-CL30
90	Frame	Cast iron	A48-CL30
102	Key, impeller	Steel	A108 GR1018
A126	Deflector, radial bearing	Rubber	Neoprene
B126	Deflector, thrust bearing	Rubber	Neoprene
139	Housing, bearing	Cast Iron	A48-CL30
139A	Lip seal	Steel & Rubber	Commercial
140	Cover, bearing housing	Cast Iron	A48-CL30
140A	Lip seal	Steel & Rubber	Commercial
156	Gasket, volute	Tagboard	D1170-G3111
158	Housing, thrust bearing	Cast iron	A48-CL30
158A	Lip seal	Steel & Rubber	Commercial
159	Cover, thrust bearing housing	Cast Iron	A48-CL30
159A	Lip seal	Steel & Rubber	Commercial
161	Locknut, bearing	Steel	SAE Bolt Steel
162	Lockwasher, bearing	Steel	AISI-1215
163	Bearing, radial	Steel	Commercial
168	Bearing, thrust	Steel	Commercial
A168	Bearing, thrust	Steel	Commercial
B168	Bearing, thrust	Steel	Commercial
202	Cover, volute handhole	Cast iron or steel	A48-CL30 or A283
203	Gasket, volute handhole cover	Rubber	—
A206	Retainer, radial grease (2)	Steel	Commercial
B206	Retainer, thrust grease (2)	Steel	Commercial
212	Packing	Synthetic packing graphite impregnated	—
272	Key, coupling	Steel	A 108 GR1018
290	Cover, handhole	Cast iron	A48-CL30
291	Gasket, handhole	Rubber	—
464	Comb base/elbow (3)	Cast Iron	A48-CL30

countinued on next page

Pump 2 & 3

JCH James, Cooke & Hobson, Inc.

sales@jchinc.com

3810 ACADEMY PARKWAY SOUTH NE
ALBUQUERQUE, NEW MEXICO 87109-4453
(505) 344-7100
FAX (505) 345-1487

4709 RIPLEY DRIVE
EL PASO, TEXAS 79922-1028
(915) 581-5458
FAX (915) 581-9242

4632 SOUTH 36TH STREET
PHOENIX, ARIZONA 85040-2904
(602) 243-0585
FAX (602) 276-5402

FAX TRANSMITTAL

Date: 10/17/02

To: _____ Company: _____

Fax: _____

From: _____

Re: _____

# of Pages: _____

Message:

Old plant RAS pumps installed (2002 under Molzen Corbin) project / RMCI installing contractors (cable PO#

Morton S1-56-144A/38
S/N 59120661

860.000 - 5009 W/ FLS
134 hp

PUMP 3500. 860 - 5002
505 Rpm
3105 lbs

1430 Rad
595 impellers

Pump #2 S/N 59120663

Pump 2 & 3

PROJECT SUBMITTAL

FLYGT CORPORATION

Engineer: CAMP DRESSER & MCKEE
Customer: THE CITY OF ALBUQUERQUE, N.M.
Project: Southside Water Reclaimation Plant
Project: Activated Sludge Plant Improvements

Specification Section: 11316
Page No: 9
Section: B.1.

Requirement: Pump Performance Curves:
Specified Performance/Submitted Pump Performance

Submittal: R.A.S. Pumps

Flygt Model: CP-3500-1430, 134 HP, 595mm Ø Impeller

Duty Point #1:

	Q	H	O.A.Eff.	NPSH	Shutoff Head
Specification:	21 MGD	23'	71%	<25'	46'-75'
Submittal:	21 MGD	23'	71%	13.4' (Req)	46'

Duty Point #2:

Specification:	18 MGD	28'	73%	<25'
Submittal:	18 MGD	28'	73%	10.2' (Req)

Duty Point #3:

Specification:	23 MGD	18'	64%	<25'
Submittal:	23.5 MGD	18'	64%	16.7' (Req)

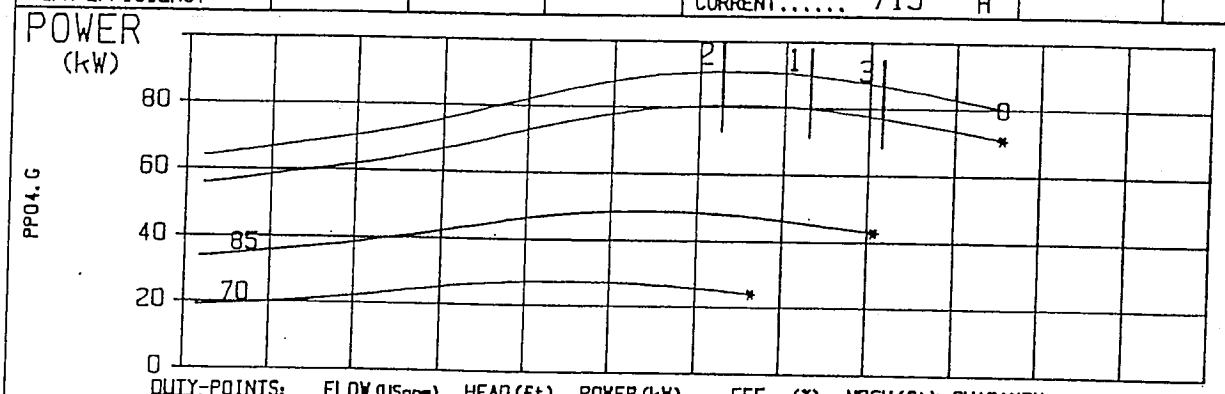
FLYGT

PERFORMANCE CURVE Pump 2 & 3

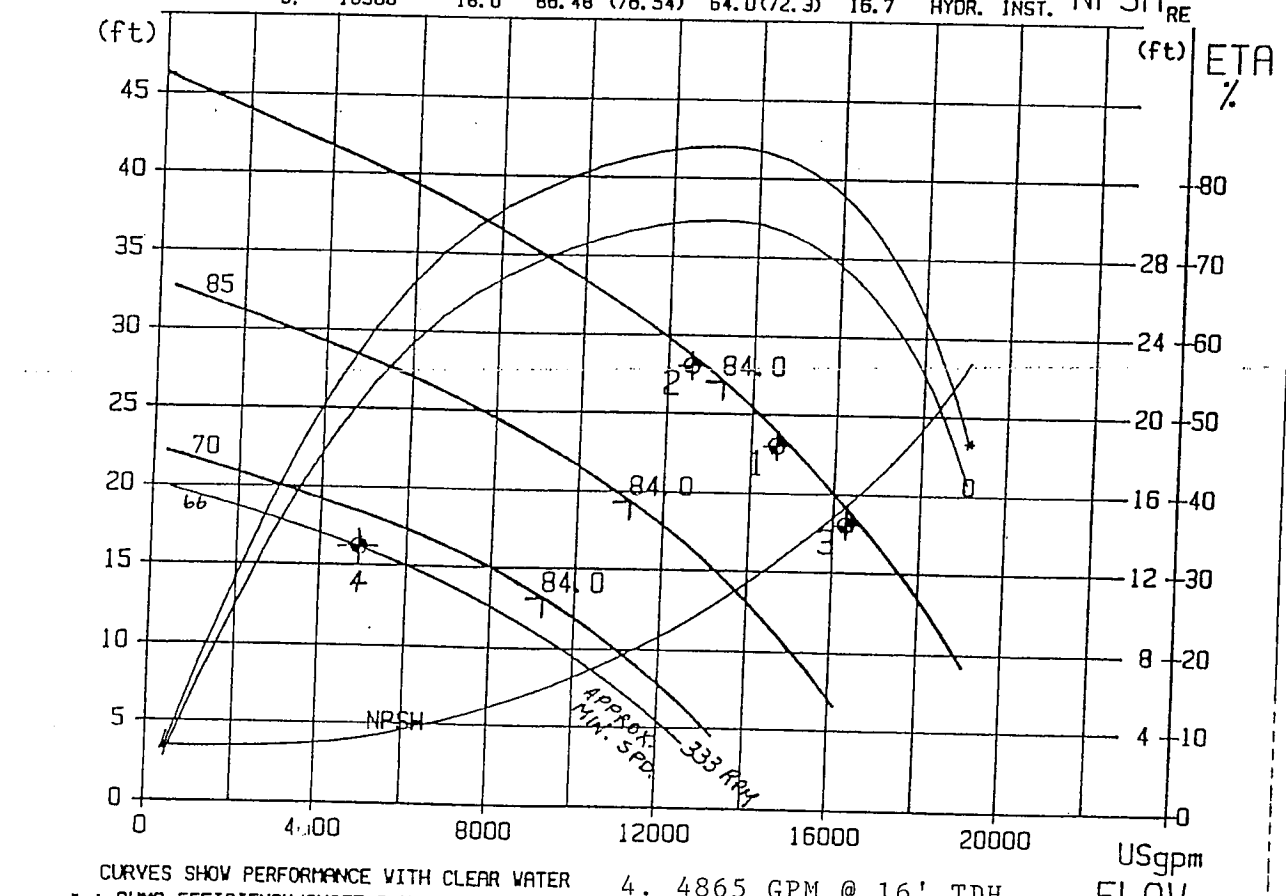
DATE	PROJECT	ISSUE	PROD
1990-11-08	C.D.M. ALBQ. WWTP - R.A.S. PUMPS	5	3500

NO. OF BLADES..... 3	TOT.MOM.OF INERTIA..... 12.99 KGM²	POLES 14	FREQ 60 HZ	CURVE NO	63-1430
IMPELLER THROUGHLET... 110*250 RECTA.	RATED SPEED..... 505 RPM	VOLTAGE.....	460 V	IMPELLER DIAMETER	595 MM
		MOTOR SHAFT POWER.....	100 KW	MOTORTYPE	51-56-14AA/3
		STARTING TORQUE.....	1715 NM	GEARTYPE	RATIO
		MAX TORQUE.....	3560 NM		
		RATED CURRENT.....	225 A		
		STARTING CURRENT.....	715 A		

	1/1-LOAD	3/4-LOAD	1/2-LOAD
MOTOR COS FI	0.63	0.56	0.45
MOTOR EFFICIENCY	88.5%	88.5%	86.5%
GEAR EFFICIENCY			



DUTY-POINTS:	FLOW (USgpm)	HEAD (ft)	POWER (kW)	EFF. (%)	NPSH (ft)	GUARANTY
1.	14600	23.0	89.64 (79.48)	70.7 (79.7)	13.4	HYDR. INST.
2.	12540	28.0	91.08 (80.79)	72.7 (82.0)	10.2	HYDR. INST.
3.	16300	18.0	86.48 (76.54)	64.0 (72.3)	16.7	HYDR. INST.



CURVES SHOW PERFORMANCE WITH CLEAR WATER
* : PUMP EFFICIENCY/SHAFT POWER
O : OVERALL EFFICIENCY/INPUT POWER

4. 4865 GPM @ 16' TDH
MIN.SUBMERGENCE 36" ABOVE PUMP BASE.
MAX.SUBMERGENCE 65' ABOVE PUMP BASE.

.0370.1

PERFORMANCE CURVE

Pump 2 & 3

SIMILAR UNIT TEST DATA

FLYGT

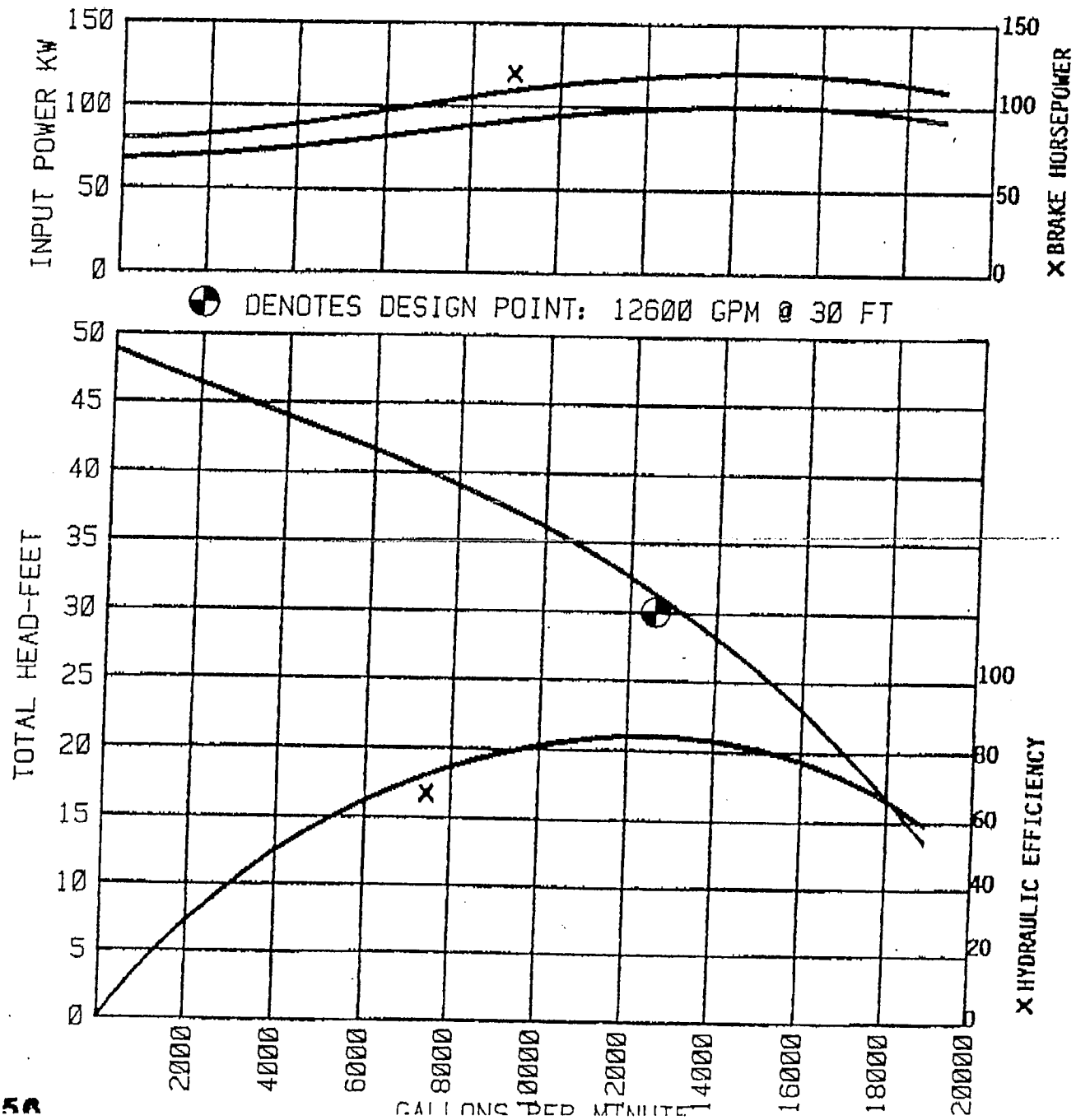
CUSTOMER REF. NO.	James Cooke
	Squaw Peak Pkwy
	Phoenix, AZ
REP.	James Cooke

CERTIFIED TEST CURVE NO. 5950

SER. NO. 880-8850643	KW 112	FLYGT REF. NO. C - 21868A	
HP 134	PH 3	VOLT. 480	
RTD. RPM 505	IMPLR. 1430	PUMP MODEL CP-3500X	SIZE 20"

CERTIFICATION THIS TEST WAS CONDUCTED AT A FLYGT CORPORATION TEST FACILITY USING CLEAN WATER AT AMBIENT TEMP. (60-80 F.). FLOW, HEAD AND POWER READINGS WERE TAKEN FROM ELECTRONIC METERING EQUIPMENT. ACCURACY OF THE TEST EQUIPMENT CONFIRMED BY PERIODIC CALIBRATIONS.

	TEST	PREP.	WITNESSED
	BY Lindas	BY A. Hannis	BY
T.A.# 6662	DATE 6/29/88	DATE 7/29/88	DATE



Pump 2 & 3

C-3500

SECTION	PAGE
3500	7A
SUPERSEDES	ISSUED
4/86	5/87

ELECTRICAL DATA

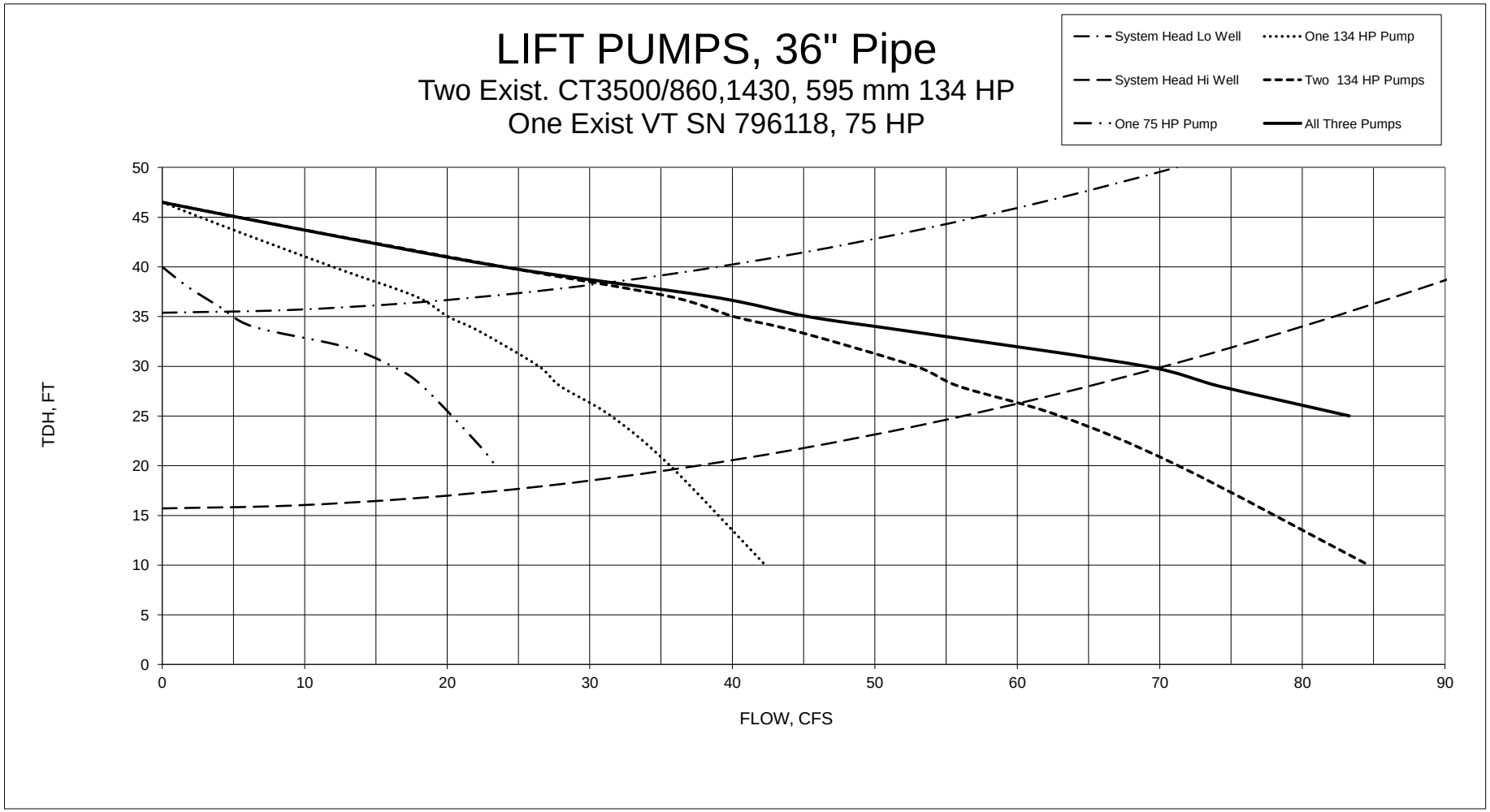
MOTOR DATA

	Rated Output Power HP(Kw)	Ø	Vnom	Full Load Amps	Starting Amps Surge/LR	Locked Rotor KVA	NEC Code Letter	Rated Input Power (Kw)	Poles/RPM
	100 (75)	3	230 460 575	332 166 133	990/810 495/405 396/324	322	B	84	14/500
	121 (90)	3	230 460 575	348 174 139	1290/1020 645/510 516/408	406	B	98	12/590
RAS	134 (100)	3	460 575	225 180	715/615 616/492	489	C	112	14/505
2ry	154 (115)	3	460 575	225 180	835/705 716/564	561	C	125	12/590
	169 (126)	3	460 575	222 178	960/730 768/584	581	B	139	10/705

	Pump Motor HP	EFFICIENCY			POWER FACTOR		
		100% Load	75% Load	50% Load	100% Load	75% Load	50% Load
	100	89.0	89.0	88.0	0.64	0.59	0.48
	121	92.0	92.0	90.5	0.71	0.66	0.55
RAS	134	88.5	88.5	86.5	0.63	0.56	0.45
2ry	154	91.0	91.0	89.5	0.70	0.65	0.53
	169	91.0	92.5	92.0	0.78	0.74	0.65

CABLE DATA

	HP x Volts	Max. Length ft.	Gauge	Nominal Dia.	Conductors (in one cable)
	100 x 230	240	(2) #00/3-0-2-GC	44.5mm (1.75")	(3) #00 AWG (PWR)
	100 x 460	485	(1) #00/3-0-2-GC	44.5mm (1.75")	(2) #4 AWG (GND)
	100 x 575	760	(1) #00/3-0-2-GC	44.5mm (1.75")	(1) #4 AWG (G.C.)
	121 x 230	280	(2) #0000/3-0-2-GC	52.0mm (2.04")	
	121 x 460	560	(1) #0000/3-0-2-GC	52.0mm (2.04")	
	121 x 575	880	(1) #0000/3-0-2-GC	52.0mm (2.04")	
RAS	134 x 460	520	(1) #0000/3-0-2-GC	52.0mm (2.04")	
	134 x 575	810	(1) #0000/3-0-2-GC	52.0mm (2.04")	
2ry	154 x 460	520	(1) #0000/3-0-2-GC	52.0mm (2.04")	(3) #0000 AWG (PWR)
	154 x 575	810	(1) #0000/3-0-2-GC	52.0mm (2.04")	(2) #2 AWG (GND)
	169 x 460	525	(1) #0000/3-0-2-GC	52.0mm (2.04")	(1) #2 AWG (G.C.)
	169 x 575	820	(1) #0000/3-0-2-GC	52.0mm (2.04")	
	100,121,134 154,169	PILOT CABLE	(1) #14/7	17.8mm (0.70")	(7) #14 AWG


LIFT PUMPS, 36" Pipe
Two Exist. CT3500/860,1430, 595 mm 134 HP
One Exist VT SN 796118, 75 HP
System Head Lo Well
One 134 HP Pump
System Head Hi Well
Two 134 HP Pumps
One 75 HP Pump
All Three Pumps
TDH, FT
FLOW, CFS
0
5
10
15
20
25
30
35
40
45
50
0
10
20
30
40
50
60
70
80
90

APPENDIX D

Manufacturer's Sump Pump Curve and General Information

APPENDIX E

Albuquerque Bernalillo County Water Utility Authority

Lockout/Tagout (LOTO)

Albuquerque Bernalillo County
Water Utility Authority

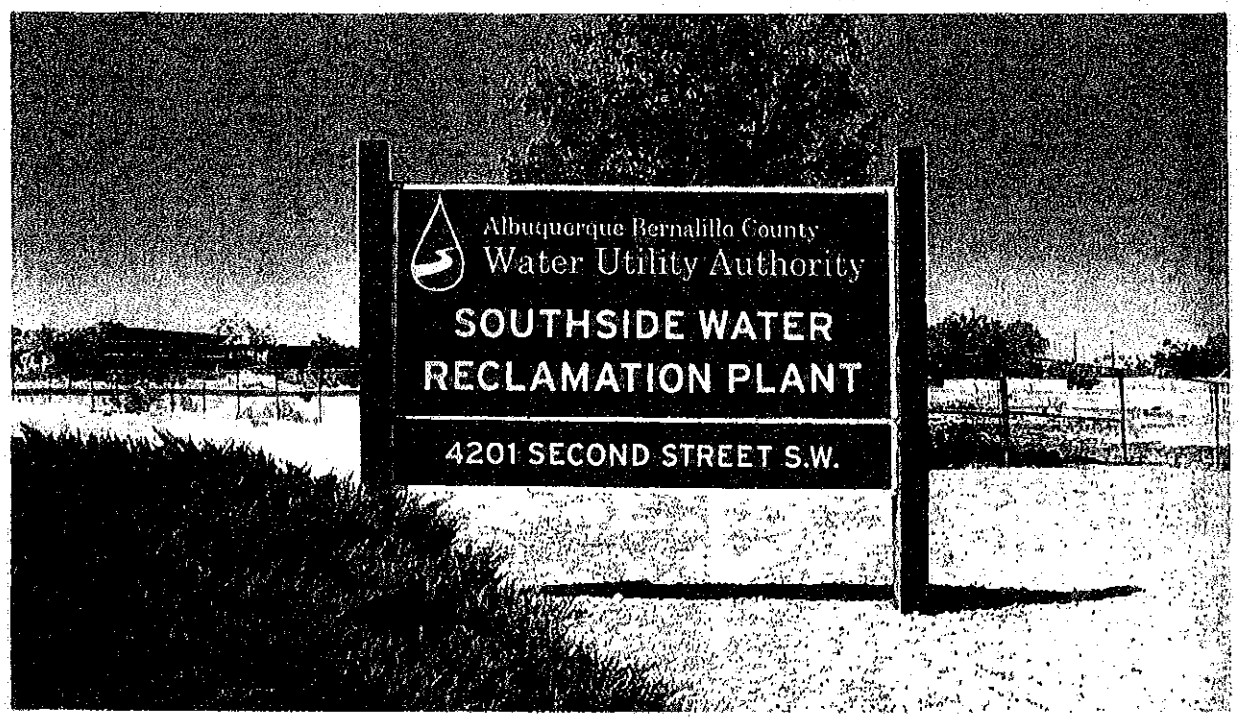
Southside Water Reclamation Plant

Program for the

Control of Hazardous Energy (Lockout/Tagout)

Based on

OSHA 29 CFR PART 1910.147



The Control of Hazardous Energy (Lockout/Tagout) Program

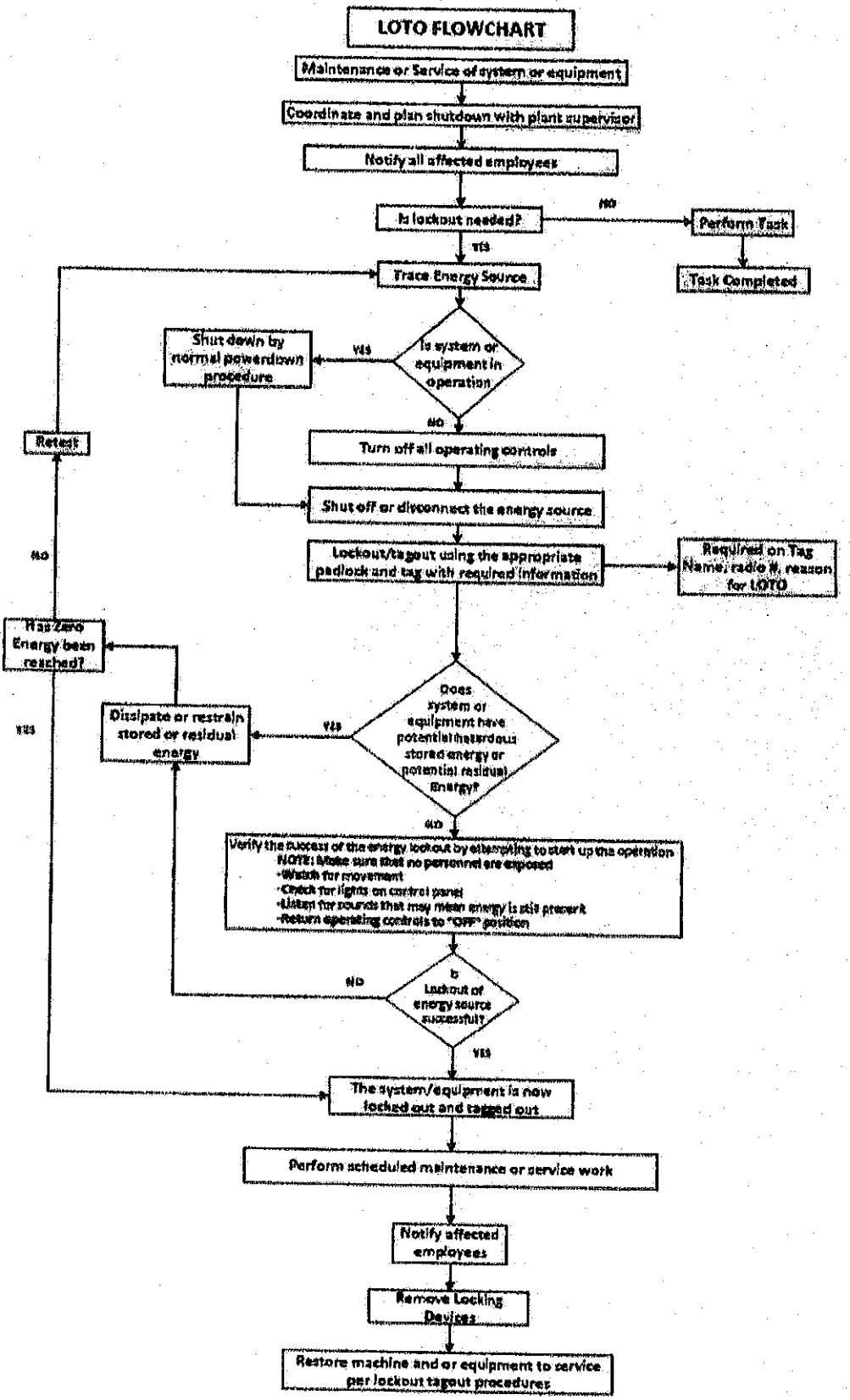
Table of Contents

Lockout/Tagout

Last Revised: March 2013

REVIEWED/APPROVED

Title/Name	Signature	DATE
Chief Engineer Jeff Romanowski		3-28-13
Operations Superintendent Joey Nogales		3-29-13
Maintenance Superintendent Jeff Romero		4-1-13
SAF J. Frank Bailey		4-1-13
Safety Manager Mike Cummings		4/4/13


LOTO FLOWCHART
Maintenance or Service of system or equipment
Coordinate and plan shutdown with plant supervisor
Notify all affected employees
Is lockout needed?
NO
Perform Task
Task Completed
YES
Trace Energy Source
Is system or equipment in operation
YES
Shut down by normal powerdown procedure
NO
Turn off all operating controls
Shut off or disconnect the energy source
Lockout/tagout using the appropriate padlock and tag with required information
Required on Tag Name, radio #, reason for LOTO
Does system or equipment have potential hazardous stored energy or potential residual energy?
YES
Dissipate or restrain stored or residual energy
Has Zero Energy been reached?
NO
YES
Retest
NO
Verify the success of the energy lockout by attempting to start up the operation
NOTE: Make sure that no personnel are exposed
-Watch for movement
-Check for lights on control panel
-Listen for sounds that may mean energy is still present
-Return operating controls to "OFF" position
Is Lockout of energy source successful?
NO
YES
The system/equipment is now locked out and tagged out
Perform scheduled maintenance or service work
Notify affected employees
Remove Locking Devices
Restore machine and or equipment to service per lockout tagout procedures

I. Introduction

The following "Lockout/Tagout" (LOTO) are the specific practices and procedures of the Albuquerque Bernalillo County Water Utility Authority (ABCWUA, hereafter referred to as Water Authority) Southside Water Reclamation Plant (SWRP) requirements to safeguard employees from the unexpected energization or startup of machinery and equipment, or the release of any stored hazardous energy during service or maintenance activities. This stored energy could be electrical, hydraulic, mechanical or any other source that may cause unexpected movement. This requires that a designated individual turns off, disconnects, disengages or blocks the machinery or equipment from its energy source(s) before performing service or maintenance.

All employees are required to follow the procedures outlined in this program.

II. Purpose

It is the policy of the SWRP for all employees working at this facility to follow all these established and effective lockout/tagout practices and procedures to ensure the safety of Water Authority employees.

III. Program Management Responsibilites

(A) Management (Chief Engineer):

(1) Responsible for providing the tools and resources necessary to implement this program and for ensuring that the provisions in this program are being followed by the Program Administrator.

(2) Developing specific lockout procedures for each individual piece of machinery/equipment at the facility. The Administrator will involve the maintenance staff, electricians, and employees operating the machinery/equipment in the development of the procedures to ensure all energy sources are identified.

(3) Identifying employee classifications – "Authorized" and Affected".

(B) Program Administrator (Safety Manager):

(1) Review program at least annually, or more frequently if changes are needed or new equipment is aquired.

(2) Identifying the proper personal protective equipment (PPE) needed, if any, during the LOTO procedures.

(3) Providing appropriate level of safety training to employees based on their classification.

(4) Providing outside contractors working at the SWRP with training and information on the SWRP Lockout/Tagout Program and procedures.

(C) Superintendents and Supervisors:

(1) Ensuring that only Authorized Employees who are qualified and trained apply and remove locks and tags.

(2) Ensuring that employees who are found to have insufficient skills or understanding of LOTO requirements do not perform LOTO and receive retraining before conducting any lockout/tagout procedures.

(3) Ensuring employees comply with all elements described in this program.

(4) Providing any information necessary for the continued functioning or updating of this program.
(5) Implement disciplinary procedures for employees deviating from the LOTO procedure.

(D) Employee Classification:

(1) "Authorized" Employees: Employees who are trained on the dangers of exposure to hazardous energy and are authorized (and trained) to perform de-energization of this hazardous energy. Employess are also trained to perform proper lock and tag out on a machine or piece of equipment in order to conduct servicing or maintenance on that machine, tool or piece of equipment under this program.

Duties of an "Authorized" employee include:

(a) Completing all training required to be authorized to perform lockout/tagout procedures on specific equipment, tool(s) or machinery under this program.
(b) Performing lockout/tagout activities which are in conformance with this program.
(c) Retaining control of the equipment, system or machinery while a lockout/tagout is in progress and works only under their own lock and tag.
(d) Maintaining lockout/tagout hardware and tags in good condition.
(e) Notifications of staff.

(2) "Affected" Employees. All employees whose job requires them to operate or use a machine or piece of equipment on which servicing or maintenance activities are being performed under LOTO, or whose job requires them to be in an area in which LOTO is being used, are considered "Affected" employees. They are not authorized to implement lockout/tagout procedures.

IV. Training and Communication

(A) Authorized Employees and their Supervisors

(1) The SWRP has developed and will provide LOTO training on the recognition of applicable hazardous energy sources, the type and magnitude of the energy available in the workplace, the methods and means available for energy isolation and control, and removal of energy-control devices. Equipment-specific training will be accomplished by presenting applicable written procedures to Authorized Employees, verifying that they understand the requirements of the procedure and observing correct performance of the lockout/tagout procedure(s). Reference SOJP's, SMJP's, and O&M manuals. Employees shall be trained on all individual lockout devices.

(B) Affected Employees

(1) Affected Employees working in areas where lockout/tagout may be used will be trained in the purpose of the lockout/tagout program, identification of locks and tags and restrictions these impose on equipment operation.
(2) Affected Employees must be retrained if a significant OSHA regulation or SWRP lockout/tagout guideline change has been made (i.e., new requirement, change in locks or tags).
(3) Affected Employee retraining can be delivered through awareness campaigns. Other Employees will be trained on the procedure and instructed never to attempt to restart or reenergize a machine that has been locked out or tagged out.

(C) Retraining of Authorized and Affected Employees

Retraining is required if:

(1) There is a change in task assignment that involves use of different LOTO procedures for which the Authorized Employee has not been previously trained.

(2) There is a change in the machine, equipment or processes that presents new hazards.

(3) There is a change in the energy-control procedures.

(4) The Supervisor has reason to believe, or determines through a periodic inspection or observation, that an Authorized or Affected Employee is performing the energy-control procedures inadequately or has deviated from or lacks sufficient knowledge of established procedures.

(D) Record retention

(1) All training records, including employee names and training dates, will be maintained in the employee's personnel files, or in plant administrative safety files.

(2) Training records will be maintained indefinitely.

(3) Training will be certified using Attachment A (Authorized Personnel) or Attachment B (Affected and Other personnel). The certifications will be retained in the employee personnel files.

V. Lockout/Tagout Control

LOTO devices are provided by the Water Authority. LOTO devices must be standardized as to color, size and shape. Each authorized person will have access to his/her individual lockout devices. Locks must be individually keyed. It shall be the responsibility of the employees performing the maintenance or repair to implement the lockout/tag out procedure before work begins. Supervisors are responsible for maintaining LOTO stations.

Note: LOTO procedures are the required method of isolating equipment. Tag out alone shall only be used when it is not possible to lock out the energy-isolating device and **shall not** be considered as an alternative method until all other options have been proven "Infeasible". When alternative methods are proven infeasible and only a tagout is used a safety watch, visual barriers, and danger or caution tape are required to be in place.

(A) Short-term locks are working-locks that are individually keyed in *red*, working locks are to be attached to energy isolation devices by each person in a work crew. Working locks are to be removed when maintenance is no longer being performed. Whenever a working lock is used, a "Danger - Do Not Operate" lock out tag shall be attached to the working lock. The lock out tag must also include the date that the lock is attached, a legible name and radio number of the person attaching the lock (see Appendix A).

(B) Long-term locks are color coded for operations and each maintenance group as shown in the table below:

DEPARTMENT	COLOR
Electrical	White
Instrumentation	Yellow
Mechanical	Blue
Operations	Green
Operations (* construction coordination)	Black

* Black padlocks are used by the Operations Superintendent or Assistant Operations Superintendent for new construction, contractor coordination and assistance requests.

VI. TAG OUT REQUIREMENTS

Tags used in the LOTO program (Appendix A) will be constructed of a laminated material (so that the following information can be recorded/written with a "grease pencil"); this information will contain but not be limited to:

(1) Full name
(2) Date, radio number, and phone number if applicable
(3) Reason for the LOTO / description

These Tags will be standardized as described below:
When a long-term lock is used, an identification tag shall be attached to a lock. The identification tag must also include the date that the lock was attached, a legible name and radio number of the person attaching the lock, and a brief description of work. Long-term locks are common keyed per work group and controlled by work group supervisors.

A tag may be used when it is infeasible to, or may create an unsafe condition to use a lockout/tagout device, and such no other means of isolation is possible. This tag will need approval from the Superintendent.

Tags shall be attached in such a manner as will clearly indicate that the operation or movement of energy isolating devices from the "neutral" or "off" position is prohibited. Tags shall be attached using all environment-tolerant nylon tie-wraps. Where a tag cannot be affixed directly to the energy isolating device, the tag shall be located as close as safely possible to the device, in a position that will be immediately obvious to anyone attempting to operate the device.

Note: Other (caution or work order) tags are not part of the LOTO program, but is used for informational purposes. They are not intended for employee protection. This process is referred to as an "administrative control" and is not a part of the LOTO procedure.

VII. ENERGY CONTROL PROCEDURE

(1) Coordinate and plan the shutdown of process equipment with the plant or field operations supervisor, as appropriate. Operations is primarily responsible for shut down, isolation, and lockout of plant process equipment. All personnel shall place their work group specific lock on the isolation device relevant to the equipment that they will be working on, along with a lock out tag.
Note: Planning and coordination must be done between the affected groups and all isolation points must be identified and addressed prior to the commencement of any work.
(2) Notify impacted employees that a lock out procedure is going to be utilized, and advise them of the machine or equipment that is involved.
(3) Isolate the equipment from all applicable energy sources using the isolation switches, breakers, valves or other energy isolating devices as appropriate.
Example: To change the drive belts on a HVAC system, isolate the voltage source. To perform maintenance on the heating cores, on a HVAC System, isolate the voltage source and the hot water supply and return lines. Bleed any stored thermal and hydraulic energy.

(4) Relieve stored energy associated with the equipment. Stored energy (such as that in springs, elevated machine members, hydraulic systems and air, gas, steam or water pressure, etc.) must be dissipated or restrained by methods such as repositioning, blocking, bleeding down pressure, etc. *Example:* To remove a hotsy after isolating all energy sources (voltage, gas and water supplies), allow the unit to cool, bleed off the water pressure, and after ensuring proper ventilation, vent off the gas pressure before proceeding to remove the equipment.
(5) LOTO the energy isolating device with an assigned padlock and attach a tag (Appendix A) to the lock.
(6) Verify that the equipment will not operate using normal operating controls.

VIII. REMOVING THE LOTO FOR START-UP

(1) After the servicing and/or maintenance are complete, and equipment is ready for normal operation, check the area around the machine or equipment that is locked out. Ensure that no one is exposed to danger if the machine or equipment is energized.
(2) Check the machine or equipment to ensure that all tools have been removed from the machine or equipment and that any guards that were removed have been reinstalled.

CAUTION: Insure controls are in "neutral" or "off" position prior to start-up and testing of equipment. Follow applicable SOJP's when starting or testing equipment.

(3) Notify operations supervisor that the equipment is ready for testing or start-up. Plant Operations is responsible for the start-up of plant equipment by removing operations locks from energy isolating devices. Operate the energy isolating devices to restore energy to the machine or equipment. Test the operation of the machine or equipment that was locked out for proper operation.
(4) Notify shift supervisor and the control room operator that the machine or equipment is no longer locked out and available for service or appropriate equipment status.

IX. DISCIPLINARY ACTION REQUIRED FOR VIOLATING LOTO PROCEDURES

The only person authorized to remove the LOTO devices is that person who installed the devices; therefore, unauthorized removal or by-passing the LOTO device procedure compromises the worker's safety. Any person who violates a LOTO procedure and energizes, starts or otherwise activates a machine or who removes a LOTO device without authorization shall be disciplined according to Water Authority policies and procedures. Disciplinary action shall be taken whether or not injury or damage occurs.

X. PROCEDURES INVOLVING MORE THAN ONE PERSON

If more than one person is involved in the service or repair of a machine or equipment, each individual will place his/her personal LOTO device on all energy isolating devices. When an energy isolating device cannot accept multiple locks or tags, a multiple lockout device (a hasp) may be used.

If LOTO is used, a single lock may be used to lockout the machine or equipment, but the key to that lock must be placed in a lockout box or cabinet which allows the use of multiple locks to secure it. Each employee will then use his/her own lock to secure the box or cabinet. As each person no longer needs to maintain his/her LOTO protection, that person will remove his/her own lock from the lockout device or from the lockout box.

XI. PROCEDURES INVOLVING MORE THAN ONE WORK GROUP

When a work group finishes its daily work, the work crew shall ensure that all tools are removed. Only that crews red lock out device and identification tag shall be removed from the energy isolating device associated with the machine or equipment. The technician/operator shall not remove his/her lock until all coworkers and affected personnel are notified and clear. If the equipment is ready for service, the last work crew to complete its work will assist operations in the complete procedure for removing the lock out devices and ensuring proper operation.

There may be occasions when a LOTO device must remain in place for more than one work shift or after other personnel changes. The procedure depends on whether or not employees on the incoming shift will be working on the locked out or tagged out equipment.

(A) Service or repair work will be continued by the new shift:
Employees leaving the work place will remove their locks and incoming employees will connect their locks under the direct observation of their supervisors. The supervisors for both shifts will be present for the transfer of the LOTO.

(B) Employees on other shifts will not be working on the machines:
The LOTO devices will remain in place and the incoming personnel will be notified that a LOTO is in affect. The supervisors of both shifts will be responsible for ensuring that the information is made available to the incoming personnel.

XII. NON-ROUTINE REMOVAL OF A LOTO DEVICE

When the employee who applied the LOTO device is not available to remove it, the LOTO may be removed under the direction of the supervisor of the employee who applied the lock out device, or under the direction of the responsible superintendent. The rules for LOTO removal still apply. Moreover, the supervisor must:

(1) Verify that any Authorized Employee who applied lock(s) and associated tag(s) is not on duty and that their work is no longer in progress. All reasonable efforts will be made to contact the Authorized Employee(s) to discuss the planned removal of their lock(s) and determine if the Authorized Employee(s) have any safety concerns with removal of their lock(s).
(2) An Authorized Employee/Supervisor returns the equipment to service and notifies the Affected Employees that service or maintenance is completed and the equipment is ready for use.
(3) When the Authorized Employee(s) whose lock(s) were removed return to work, their Supervisor(s) will again notify them that their lock(s) and tag(s) were removed.

XIII. HOT TAP OPERATIONS

Hot Tap Operations requires preapproval of the Chief Engineer. Work involving transmission and distribution systems for substances such as gas, steam, water or petroleum can be performed on pressurized pipeline systems if:
(A) The employer can demonstrate that the continuity of service is essential.
(B) Shutdown of the system is infeasible, and could lead to employees being exposed to other

hazards. In this case employees will need to follow established safe work procedures, developed for these operations.

(C) Special equipment is used that will provide effective protection for employees.

XIV. AUDIT/INSPECTION OF THE LOTO PROCEDURE

All LOTO procedures will be reviewed at least **annually**. The procedure will be reviewed for adequacy and completeness by an Authorized Employee who does not regularly use the machine/equipment-specific lockout procedure or by the Safety Manager or his/her designee. If any deviations or inadequacies are identified, the Program Administrator will take all necessary steps to update the procedure. The annual inspection will include a review, between the Reviewer and each Authorized Employee of that machine/equipment, to determine if they understand their responsibilities under that procedure. Annual inspections are documented with the information shown in **Attachment D**. This inspection record will be retained indefinitely.

XV. PROCEDURES FOR OUTSIDE PERSONNEL/ CONTRACTORS

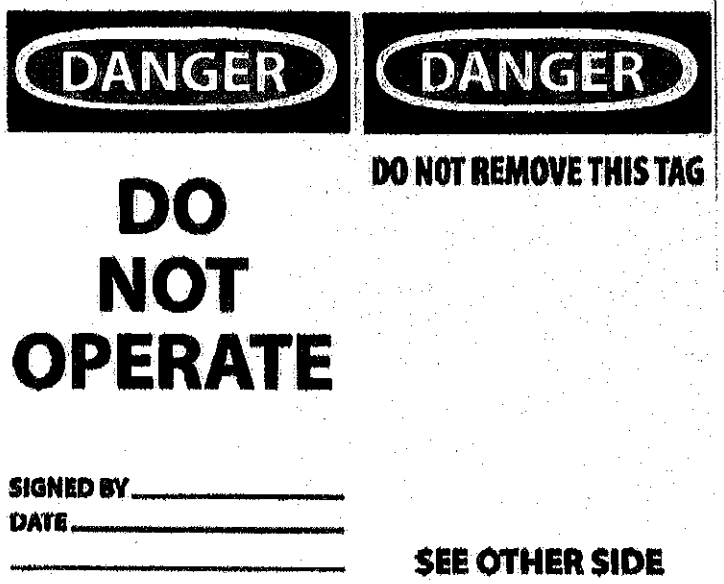
(A) Outside personnel/contractors shall be advised that the SWRP has and enforces the use of LOTO procedures. They will be informed of the use of locks and tags and notified about the prohibition of attempts to restart or re-energize machines or equipment that are locked out or tagged out.

(B) The company will obtain information from the outside personnel/contractor about their LOTO procedures and advise affected employees of this information.

(C) The outside personnel/contractor will be required to sign a certification form (see Attachment E). If outside personnel/contractor has previously signed a certification that is on file, additional signed certification is not necessary.

APPENDIX A

Lock Out Tag



ATTACHMENT A

Certification of Training
(Authorized Personnel)

I certify that I received training as an "Authorized Employee" under SWRP Lockout/Tagout program. I further certify that I understand the procedures and will abide by those procedures.

AUTHORIZED EMPLOYEE SIGNATURE

DATE

ATTACHMENT B

Certification of Training
(Affected Personnel)

I certify that I received training as an Affected Employee under SWRP Lockout/Tagout Program. I further certify and understand that I am prohibited from attempting to restart or re-energize machines or equipment that are locked out or tagged out.

AUTHORIZED EMPLOYEE SIGNATURE _____ DATE _____

ATTACHMENT C

Lockout/Tagout Equipment Inspection Certification

I certify that _____was inspected on this date utilizing lockout/tagout procedures. The inspection was performed while working on

_____.

_____ _____

AUTHORIZED EMPLOYEE SIGNATURE DATE

_____ _____

INSPECTOR SIGNATURE DATE

ATTACHMENT D

Annual Evaluation Report

Date(s) of Evaluation _____

Evaluation was made by _____.
(PRINT)

General policy has been reviewed: YES____NO____

Comments on general policy:

The following specific procedures have been reviewed (list below):

Does the procedure comply with the SWRP program?

If a specific lockout/tagout were inspected in the field placed by the employee evaluated:

Location: _____

Equipment No.: _____

Equipment Name: _____ Serial No.: _____

Department who apply the Lockout/Tagout in the machine/equipment: _____

Does the machine/equipment have properly the LOTO? Yes____ No____

If not explain what need to be addressed and fix it:_____

ATTACHMENT E

Outside Personnel/Contractor Certification

I certify that _____and _____ (outside personnel/contractor) have informed each other of our respective Lockout/Tagout procedures.

_____ _____

AUTHORIZED EMPLOYEE SIGNATURE DATE

_____ _____

INSPECTOR SIGNATURE DATE

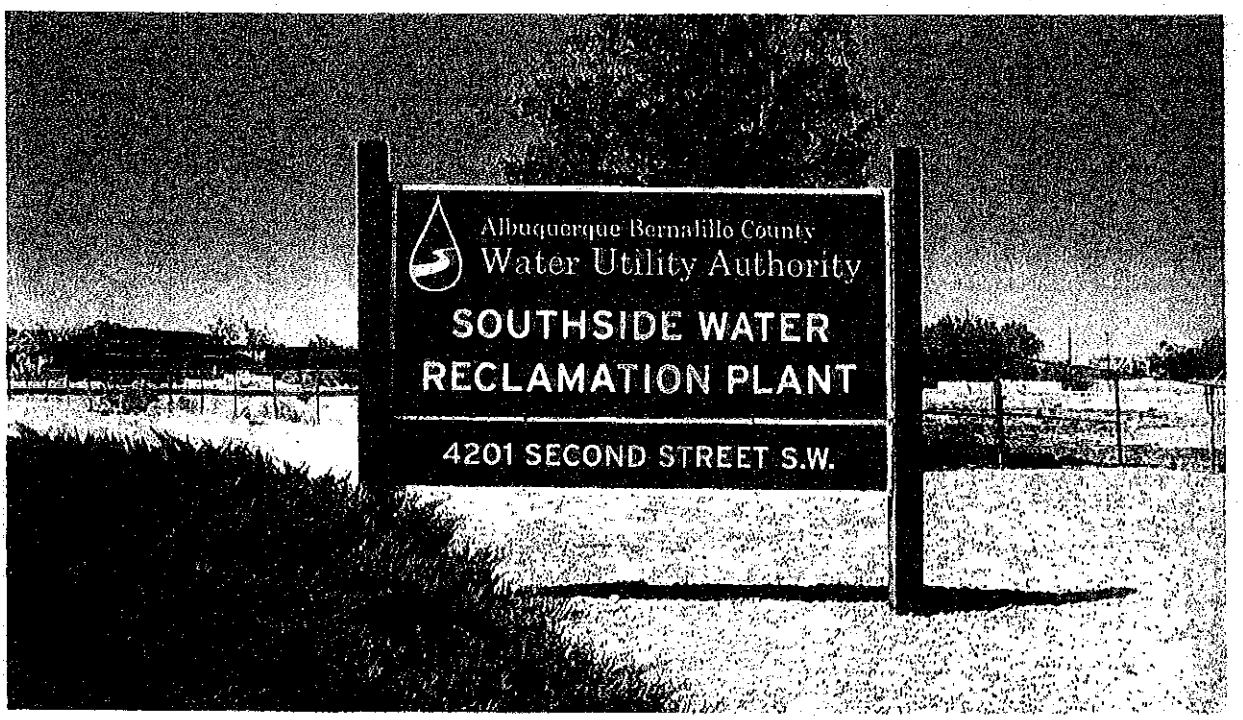
APPENDIX F

Albuquerque Bernalillo County Water Utility Authority

Confined Space Program

Albuquerque Bernalillo County
Water Utility Authority

Confined Space Program
For
Southside Water Reclamation Plant



Albuquerque Bernalillo County
Water Utility Authority

Southside Water Reclamation Plant

Confined Space Program

Last Revised: April 3, 2014

REVIEWED/APPROVED

SAFETY SUPERVISOR: _____

SWRP CHIEF ENGINEER: _____

SWRP OPERATIONS SUPERINTENDENT: _____

SWRP MAINTENANCE SUPERINTENDENT: _____

TABLE OF CONTENTS

CONFINED SPACE ENTRY PROCEDURES

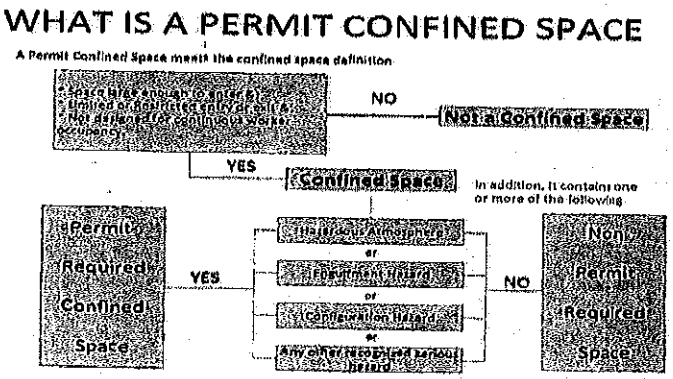
ALBUQUERQUE BERNALILLO COUNTY WATER UTILITY AUTHORITY
CONFINED SPACE ENTRY PROGRAM

I. Description of our Water Authority Program

The purpose of this program is to set forth the requirements for practices and procedures to protect Water Authority employees and contractors from exposure and injury from the hazards of entering and performing work in confined spaces. The policies and procedures in this document are elements that make up the Water Authority's Permit Space Program. This program is intended to meet and exceed the requirements of the U.S. Department of Labor, Occupational Safety and Health Administration's Confined Space Standard 29 CFR 1910.146.

II. Scope

This program applies to all confined spaces owned by the Water Authority. This program also applies to all confined spaces that may be entered by Water Authority employees. Included in this program are the Southside Water Reclamation Plant, Surface Water Treatment Plant, Sanitary Lift Stations, Storm Water Lift Stations, Well Stations, Water Pump Stations, and Chemical Feed Stations.



III. Requirements of the Water Authority

(1) In administering this Confined Space Entry Program the Chief Engineers and Safety Manager will:

(a) Monitor the effectiveness of the program;

(b) Provide training to affected employees and supervisors that is sufficient to impart necessary understanding, knowledge and skills;

(c) Certify that training has been accomplished. Certification must include employee's name, signature of trainer, dates of training;

(d) Provide atmospheric testing equipment as needed;

(e) Provide personal protective equipment as needed;

(f) Provide technical assistance as needed;

(g) Review and update the program on an annual basis or more often as needed.

(2) The Chief Engineers and Operation/Maintenance Superintendents are responsible for managing the Confined Space Entry Program in the Water Authority facilities and they will:

(a) Verify that all confined spaces at their facilities are properly labeled and maintained;
(b) Review all confined space entry permits for successful operation and perform "lessons learned" for any entry that experienced any problems or presented any condition that caused the permit to be canceled and the confined space to be evacuated;
(c) Maintain hard copies and electronic storage of all canceled/completed confined space entry permits. These canceled/completed permits will be kept for a minimum of 3 years;
(d) Require all employees who enter confined spaces to receive training which will make them both competent and qualified to perform confined space entry operations and establish employee proficiency in required duties;
(e) Verify that employees are provided all necessary confined space entry/rescue equipment, maintain that equipment properly, and ensure employees use that equipment properly;
(f) Perform monthly inspections of all related confined space entry equipment and verify all such equipment meets manufacturers' standards.

IV. Safety Policies and Regulations

It is the safety policy of the Water Authority that a confined space:
(1) Is large enough and so configured that an employee can bodily enter to perform assigned work; and
(2) Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry); and
(3) Is not intended for continuous employee occupancy.

It is the safety policy of the Water Authority that a Permit-Required Confined Space means a confined space that has one or more of the following characteristics:
(1) Contains or has a potential to contain a hazardous atmosphere;
(2) Contains a material that has the potential for engulfing an entrant;
(3) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
(4) Contains any other recognized serious safety or health hazard.
Unauthorized entry into a permit-required confined space by Water Authority employees and contractors is forbidden and cause for disciplinary action.

Manpower and equipment shall be available during permit-required confined space entry to immediately and safely remove any disabled worker from the confined space. Assisted Self-Rescue is the approved procedure Water Authority employees will use to remove a disabled worker from a confined space.

Water Authority employees will perform Assisted Self-Rescue (ASR) vertical direct retrieval operations only. Horizontal confined space rescue is not allowed and will be contracted out to Rocco or some other confined space rescue service.

No Hot Work shall be conducted inside a confined space prior to completion of the appropriate Hot Work Permit.

Facial hair at the facepiece-to-face interface that may interfere with the operation of the full-face piece of the supplied air respirator shall not be permitted. This facial hair may include beards, sideburns, mustaches, long hair and or bangs.

Water Authority employees are required to consider all confined spaces as Permit-Required Confined

Spaces unless they can be reclassified as a Non-Permit Confined Space.

Multiple confined space entries are not to be monitored by a single attendant.

When the Water Authority arranges to have a contractor perform work that involves permit space entry, the Authority shall:
(1) Inform the contractor that the workplace contains permit-required confined spaces and that permit space entry is allowed only through compliance with the Water Authority permit space program;
(2) Apprise the contractor of the hazards identified and the Water Authority's experience to include but not limited to the presence of hydrogen sulfide (H_2S), carbon monoxide (CO), carbon dioxide (CO2), hydrogen chloride (HCL), and methane (CH4) gas in the space, that make the space in question a permit space;
(3) Apprise the contractor of any precautions or procedures that the Water Authority has implemented for the protection of employees in or near permit spaces where contractor personnel will be working;
(4) Coordinate entry operations with the contractor, when both Water Authority personnel and contractor personnel will be working in or near permit spaces;
(5) Meet and debrief the contractor at the conclusion of the entry operations regarding the Water Authority's permit space program regarding any hazards confronted or created in permit spaces during entry operations.

CONFINED SPACE IDENTIFICATION

V. Confined Space Identification

The Water Authority has implemented this written permit space program and it is available for inspection by employees and their authorized representatives. The Water Authority has evaluated the workplace and has determined that the workplace contains permit-required confined spaces. The permit spaces are posted with one or more of the following danger signs:

DANGER
PERMIT-REQUIRED CONFINED SPACE
AUTHORIZED ENTRY ONLY

DANGER
PERMIT-REQUIRED CONFINED SPACE
DO NOT ENTER

The Permit-Required Confined Spaces are also labeled with a number that identifies the confined space for identification and inventory purposes. The inventory label is PRCS followed by the confined space number, for example PRCS 365. This evaluation/inventory system will be used for annual review and to provide employees additional information about the confined space they will be working in. The Water Authority has evaluated the hazards of our permit spaces and the following procedures, practices, and acceptable entry conditions necessary for safe permit space entry operations are specified below.

VI. Permit-Required Confined Space Entry Permit

The Water Authority's confined space entry permit documents compliance with the Water Authority's Permit Space Program and authorizes entry to a permit space. The confined space entry permit is the most essential tool for assuring employee safety during entry operations in permit-required confined spaces with known hazards, or with unknown or potentially hazardous atmospheres. The entry permit process guides the entry supervisor, attendant, and entrants through a systematic evaluation of the permit space to be entered. The entry permit will be used to establish acceptable conditions before each entry and verify that conditions in the confined space are acceptable throughout the duration of an authorized entry.

VII. Permit-Required Confined Space Entry Procedures

(1) When entry into a permit-required confined space is necessary the Operations/Maintenance Superintendent from the appropriate section will select an entry supervisor, attendant, and entrant(s) to initiate the confined space entry procedures. An Operations/Maintenance Supervisor may also select the entry team.

(2) Prior to entry of the permit-required confined space, the entry supervisor, attendant, and entrant shall be responsible for the following:

(a) Completion of the confined space entry permit;
(b) Verify acceptable entry conditions in the confined space;
(c) Isolation of the permit space; establishing communication with the Control Room;
(d) Verifying the availability of the Assisted Self-Rescue service;
(e) Signature of the entry supervisor on the entry permit after its completion.

(3) Remove the entrance cover, hatch, or grating to the confined space to be entered. Any conditions making it unsafe to remove an entrance cover to the confined space shall be eliminated before the cover is removed. When entrance covers are removed, the opening shall be promptly guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and that will protect each employee working in the space from foreign objects entering the space.

(4) Before an employee enters the confined space, the internal atmosphere shall be tested, with a calibrated direct-reading gas detector, for oxygen content, for flammable gases and vapors, and for potential toxic air contaminants, in that order. Any entrant who enters the confined space shall be provided an opportunity to observe the pre-entry testing. The approved gas detectors for atmospheric testing are the RKI GX-2012, GX-2009 and GX-2001.

(5) Isolate the confined space from any potential hazards that may be encountered. This includes electrical hazards, mechanical hazards, Engulfment hazards, Entrapment hazards, and physical hazards. Make sure the proper isolation procedures are followed such as lock out/tag out, double block and bleed, blanked, blocked, chocked and disengaged. Document this isolation on the confined space entry permit. Employees are required to observe and assist with this isolating of the permit space.

(6) Ventilate the permit-required confined space with continuous forced air ventilation. The entry supervisor, attendant, and entrant shall be responsible for setting up the mechanical ventilation and it shall be used, as follows:

(a) An employee may not enter the space until the forced air ventilation has eliminated any hazardous atmosphere;
(b) The forced air ventilation shall be so directed as to ventilate the immediate areas where an employee is or will be present within the space and shall continue until all employees have left the space;
(c) The air supply for the forced air ventilation shall be from a clean source and may not increase the hazards in the space.

(7) Test the confined space for a hazardous atmosphere. The entry supervisor, attendant, and entrant shall continuously monitor the atmosphere within the confined space. The pre-entry atmospheric check shall be documented on the entry permit. The entrant must have a calibrated gas detector on

his/her body at all times during entry operations. The entry supervisor, attendant, or designee shall monitor the atmosphere within the permit space from outside the confined space using a calibrated gas detector with a sample draw pump and tubing. This atmospheric testing will ensure that the continuous forced air ventilation is preventing the accumulation of a hazardous atmosphere. There may be no hazardous atmosphere within the space whenever any employee is inside the space.

(8) If a hazardous atmosphere is detected during entry;

(a) Each employee shall leave the space immediately;

(b) The space shall be evaluated to determine how the hazardous atmosphere developed;

(c) Measures shall be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place.

(9) The entry supervisor, attendant, and entrant shall establish the communication procedures to be used by the authorized entrants and attendants to maintain contact during entry operations. The preferred communication procedures are visual and voice contact at all times; every effort should be made to maintain this type of contact between the attendant and entrant. Visual contact at all times and the Authority radio system are also acceptable communication procedures. Any other communication procedures necessary must be preapproved by the entry supervisor.

(10) The attendant shall establish contact with the Control Room and inform the control room operator that a permit-required confined space entry is taking place. Give the control room operator the location of the confined space, authorized attendant, authorized entrant, and the purpose of the entry in case an emergency arises and emergency medical services needs to be contacted. A copy of the entry permit may also be posted in the Control Room if it is going to be a prolonged entry. The confined space entry permit must be located at the confined space during all entry operations.

(11) The entry supervisor shall select an Authority Assisted Self-Rescue Team required for the permit-required confined space entry. The entry supervisor will select an Assisted Self-Rescue team leader and team members. This Assisted Self-Rescue team will be responsible for rescue procedures associated with the confined space entry. Log this information down on the entry permit.

(12) The entry team (entry supervisor, attendant and entrant) shall procure all required personal protective equipment required for the permit entry. Don all equipment properly and set up the DBI-SALA confined space entry/retrieval system required for Assisted Self-Rescue.

(13) The entry supervisor shall certify that the confined space is safe for entry and that the pre-entry measures required by the confined space entry permit have been taken. The entry supervisor will then sign the permit-required confined space entry permit and allow work to commence.

(14) The entry supervisor shall assign a person to take periodic atmospheric tests of the atmosphere inside the confined space during entry operations. If an attendant is assigned this task it cannot interfere with his attendant duties. The interval between atmospheric readings shall be every 15 minutes unless specified otherwise by the entry supervisor. The names or initials of the person conducting these tests and an indication of when the tests were performed must be noted on the entry permit.

(15) When the confined space entry is completed the entry supervisor will make sure the permit is cancelled and closed out; all equipment is returned to its proper location and the entrance cover is replaced to the confined space.

Water Utility Authority

CONFINED SPACE ENTRY PERMIT

PERMIT VALID FOR 8 HOURS MAXIMUM ONLY. ALL COPIES OF PERMIT WILL REMAIN AT JOB SITE UNTIL JOB IS COMPLETED.
DATE: _____ PERMIT SPACE TO BE ENTERED: _____
PURPOSE OF ENTRY: _____
AUTHORIZED DURATION OF THE ENTRY PERMIT (Hours): _____
AUTHORIZED ENTRANTS (Full Name): _____, _____,
_____, _____,
AUTHORIZED ATTENDANTS (Full Name): _____, _____,
ENTRY SUPERVISOR (Full Name): _____

HAZARDS OF THE PERMIT SPACE TO BE ENTERED EMPLOYEES COULD BE EXPOSED TO THE FOLLOWING:	YES	NO	N/A	LIST
Engulfment/Entrapment	( )	( )	( )	_____
Presence of toxic gases	( )	( )	( )	_____
Presence of explosive/flammable gases	( )	( )	( )	_____
Oxygen deficiency	( )	( )	( )	_____
Bio-hazards	( )	( )	( )	_____
Wet conditions, slip, trip, and fall hazards	( )	( )	( )	_____

Mitigation: _____

ISOLATION OF THE PERMIT SPACE (Lock out/tag out devices specific to entry)	YES	NO	N/A	LIST & INITIAL ISOLATION
Electrical systems locked out and tagged out	( )	( )	( )	_____
Mechanical systems (blocked, chocked, disengaged)	( )	( )	( )	_____
Gas systems (blanked) locked out and tagged out	( )	( )	( )	_____
Liquid systems (double block, bleed) locked out	( )	( )	( )	_____
Secure area (Post, Flag, Barricade)	( )	( )	( )	_____

Mitigation _____

VENTILATION MODIFICATION	YES	NO	N/A	MODEL & FLOW RATE
Mechanical	( )	( )	( )	_____
Mechanical explosion proof	( )	( )	( )	_____
Natural ventilation only	( )	( )	( )	

ATMOSPHERIC CHECK AFTER ISOLATION AND VENTILATION
DATE: _____ TIME: _____ TESTER: _____ CALIBRATION DATE: _____ (Must be within 2 month period)
Percent Oxygen _____ % (Must be between 19.5% to 23.5%)
Explosive Gases _____ %LEL (Must be less than 10% LEL)
Toxic Gas (H2S) _____ PPM (Must be less than 5 PPM)
Toxic Gas (CO) _____ PPM (Must be less than 35 PPM)
Other (Specify) _____ PPM (Must be less than PEL)

COMMUNICATION PROCEDURES	YES	NO	N/A	LIST
Authority Radio System or Cellular Phone	( )	( )	( )	_____
Contact established with Control Room/Dispatch	( )	( )	( )	_____

RECLASSIFICATION (NON-PERMIT CONFINED SPACE)
If all hazards have been eliminated or mitigated, then this permit-required confined space can be reclassified as a non-permit confined space.

All hazards mitigated:	YES	NO
	( )	( )

Certification by: _____ Date: _____ Time: _____
(If "NO" continue with permit-required confined space procedures. If "YES" refer to WUA non-permit confined space procedures or OSHA 1910.146(C)(7) for further clarification on reclassifying a PRCS to non-permit confined space)

ASSISTED SELF-RESCUE & EMERGENCY SERVICES	YES	NO	N/A
Authority Assisted Self-Rescue on Site	( )	( )	( )
911 Emergency Medical Service Available	( )	( )	( )

Authority Assisted Self-Rescue Team (Full Name): _____, _____
Assisted Self-Rescue Team Leader: _____
All confined space, CPR, and first aid certifications current? YES ( ) If not do not proceed

PROTECTIVE CLOTHING AND EQUIPMENT IN ADDITION TO REGULAR HARD HAT, SAFETY SHOES AND SAFETY GLASSES

	YES	NO	N/A	LIST
Review MSDS, Post at Confined Space	( )	( )	( )	
Respiratory protection (Check one): ☐ SCBA ☐ Airline ☐ Cartridge type	( )	( )	( )	_____
Eye protection (Check one): ☐ Chemical goggles ☐ Face shield ☐ Dust goggles	( )	( )	( )	_____
Gloves (Check Type): ☐ Chemical ☐ Leather ☐ Other _____	( )	( )	( )	_____
Protective clothing (Check Type): ☐ Chemical suit ☐ Rubber apron ☐ Rubber boots	( )	( )	( )	_____
Electrical shock protection ☐ Flash suit ☐ Rescue hook ☐ Hot stick	( )	( )	( )	_____
Full body harness with lifeline, **(Mandatory)**	( )	( )	( )	_____
Rescue davit & retrieval winch **(Mandatory)**	( )	( )	( )	
Hearing protection _____	( )	( )	( )	
Fall protection _____	( )	( )	( )	
Lighting (Explosive Proof) _____	( )	( )	( )	
Hot work permit	( )	( )	( )	
Fire extinguishers _____	( )	( )	( )	
First Aid kit	( )	( )	( )	

I have reviewed the work authorized by this permit and the information contained here-in.
Permit Approved By:
ENTRY SUPERVISOR: _____
(Printed Name) (Signature)
Reviewed By: (Unit Superintendent) _____
(Printed Name) (Signature)
Reviewed By (Safety Manager) _____
(If Available #239-4122) (Printed Name) (Signature)

ATMOSPHERE TEST RESULTS, RECORD CONTINUOUS MONITORING RESULTS EVERY 15 MINUTES OR AS NECESSARY TO ENSURE PERMIT COMPLIANCE.
(Permissible safe limits for personnel are 19.5 - 23.5% Oxygen, less than TWA for toxics and less than 10% LEL.)
Instrument Model _____ Serial # _____ Date Calibration Performed? _____ Calibration Performed by Whom? _____

Tester_____ Time_____ Oxygen_____%, LEL._____%, H2S_____PPM, CO_____
Tester_____ Time_____ Oxygen_____%, LEL._____%, H2S_____PPM, CO_____
Tester_____ Time_____ Oxygen_____%, LEL._____%, H2S_____PPM, CO_____
Tester_____ Time_____ Oxygen_____%, LEL._____%, H2S_____PPM, CO_____
Tester_____ Time_____ Oxygen_____%, LEL._____%, H2S_____PPM, CO_____
Tester_____ Time_____ Oxygen_____%, LEL._____%, H2S_____PPM, CO_____
Tester_____ Time_____ Oxygen_____%, LEL._____%, H2S_____PPM, CO_____
Tester_____ Time_____ Oxygen_____%, LEL._____%, H2S_____PPM, CO_____
Tester_____ Time_____ Oxygen_____%, LEL._____%, H2S_____PPM, CO_____
Tester_____ Time_____ Oxygen_____%, LEL._____%, H2S_____PPM, CO_____

VIII. Duties of Authorized Entrants

(1) Complete all required confined space training prior to entry operations.

(2) Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure. Review the appropriate Material Safety Data Sheet (MSDS) for each chemical hazard that may be encountered;

(3) Properly use equipment as required by the Water Authority's permit-required confined space program. This equipment must be properly maintained and includes:

(a) Testing and monitoring equipment (RKI GX-2012, GX-2009 or GX-2001);
(b) Ventilating equipment needed to obtain acceptable entry conditions;
(c) Communications equipment;
(d) Personal protective equipment;
(e) Lighting equipment needed to work safely and to exit the space quickly in an emergency;
(f) Barriers and shields;
(g) Equipment, such as ladders, needed for safe ingress and egress by authorized entrants;
(h) Rescue and emergency equipment;
(i) Any other equipment necessary for safe entry into and rescue from permit spaces.

(4) Communicate with the attendant as necessary to enable the attendant to monitor entrant status and to enable the attendant to alert entrants of the need to evacuate the space as required by the permit-required confined space program.

(5) Alert the attendant whenever the entrant recognizes any warning sign or symptom of exposure to a dangerous situation or the entrant detects a prohibited condition.

(6) Exit from the permit space as quickly as possible whenever:

(a) An order to evacuate is given by the attendant or the entry supervisor;
(b) The entrant recognizes any warning sign or symptom of exposure to a dangerous situation;
(c) The entrant detects a prohibited condition; or
(d) An evacuation alarm is activated.

IX. Duties of Attendants

(1) Complete all required confined space training prior to entry operations.

(2) Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure. Review the appropriate MSDS for each chemical hazard that may be encountered;

(3) Is aware of possible behavioral effects of hazard exposure in authorized entrants;

(4) Continuously maintain an accurate count of authorized entrants in the permit space and ensures that the means used to identify authorized entrants accurately identifies who is in the permit space;

(5) Remain outside the permit space during entry operations until relieved by another attendant;

(6) Communicate with authorized entrants as necessary to monitor entrant status and to alert entrants of the need to evacuate the confined space;

(7) Monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space and orders the authorized entrants to evacuate the permit space immediately under any of the following conditions:

(a) If the attendant detects a prohibited condition;
(b) If the attendant detects the behavioral effects of hazard exposure in an authorized entrant;
(c) If the attendant detects a situation outside the space that could endanger the authorized entrants; or
(d) If the attendant cannot effectively and safely perform all the duties required;

(8) Activate assisted Self-Rescue Procedures or summon emergency services as soon as the attendant determines that authorized entrants may need assistance to escape from permit space hazards;

(9) Take the following actions when unauthorized persons approach or enter a permit space while entry is underway:

(a) Warn the unauthorized persons that they must stay away from the permit space;
(b) Advise the unauthorized persons that they must exit immediately if they have entered the permit space; and
(c) Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space;

(10) Perform non-entry rescue as specified by the Water Authority Assisted Self-Rescue procedures; and

(11) Perform no duties that might interfere with the attendant's primary duty to monitor and protect the authorized entrants.

X. Duties of Entry Supervisors

(1) Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure. Review the appropriate MSDS for each chemical hazard that may be encountered;

(2) Check that the appropriate entries have been made on the permit, all tests specified by the permit have been conducted and all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin;

(3) Terminate the entry and cancel the permit when;

(a) The entry operations covered by the entry permit have been completed; or
(b) A condition that is not allowed under the entry permit arises in or near the permit space;

(4) Verify Authority Assisted Self-Rescue services are available and that the means for summoning them are operable;

(5) Remove unauthorized individuals who enter or who attempt to enter the permit space during entry operations; and

(6) Reevaluate the permit space in the presence of any authorized entrant who has reason to believe

that the evaluation of that permit space may not have been adequate;

(7) Determine, whenever responsibility for a permit space entry operation is transferred and at intervals dictated by the hazards and operations performed within the space, that entry operations remain consistent with terms of the entry permit and that acceptable entry conditions are maintained.

(8) The Entry Supervisor shall provide at least one authorized attendant outside the permit space into which entry is authorized for the duration of entry operations. Multiple spaces are not to be monitored by a single attendant according to the Water Authority's Permit Space Program.

NON-PERMIT CONFINED SPACE

XI. Non-Permit Confined Space

(1) A non-permit confined space means a confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm. The only hazard posed by the confined space is an actual or potential hazardous atmosphere.

(2) A space classified by the Authority as a permit-required confined space may be reclassified as a non-permit confined space under the following procedures:

(a) If the permit space poses no actual or potential atmospheric hazards and if all hazards within the space are eliminated without entry into the space, the permit space may be reclassified as a non-permit confined space for as long as the non-atmospheric hazards remain eliminated.

(b) If it is necessary to enter the permit space to eliminate hazards, such entry shall be performed as a permit-required confined space entry. If testing and inspection during that entry demonstrate that the hazards within the permit space have been eliminated, the permit space may be reclassified as a non-permit confined space for as long as the hazards remain eliminated.

(c) The Authority shall document the basis for determining that all hazards in a permit space have been eliminated through a certification that contains the date, the location of the space, and the signature of the person making the determination. The certification shall be made available to each employee entering the space. This non-permit confined space certification shall be documented through the Confined Space Entry Permit.

(d) If hazards arise within a permit space that has been declassified to a non-permit required confined space, each employee in the space shall exit the space. The entry supervisor shall then reevaluate the space and determine whether it must be reclassified as a permit space.

(3) The Water Authority has determined that many of the permit-required confined spaces around its facilities may be declassified or reclassified to a non-permit required confined space if the proper reclassification procedures have been followed and documented. This reclassification procedure requires an entry supervisor, authorized attendant, or authorized entrant to perform an analysis of the hazards within the confined space and demonstrate and certify that these hazards have been eliminated.

(4) The certification that these confined space hazards have been eliminated will be accomplished through the first page of the Water Authority's Confined Space Entry Permit. The first page of the confined space entry permit will require an employee to document his or her basis for making a non-permit confined space reclassification and document the procedures followed. If the confined space cannot be reclassified as a non-permit confined space then it shall be treated as a permit-required confined space and the appropriate procedures shall be followed.

(5) All confined spaces shall be considered permit-required confined spaces until the pre-entry procedures completed on the Confined Space Entry Permit demonstrate that the space can be maintained in a safe condition for entry by natural ventilation or mechanical ventilation alone.

(6) When there are changes in the use or configuration of a non-permit confined space that might increase the hazards to entrants, the Authority shall reevaluate that space and, if necessary, reclassify it as a permit-required confined space.

XII. Non-Permit Confined Space Entry Procedures

(1) Prior to initiating the entry, the entry supervisor, attendant, and entrant shall:

(a) Obtain the Confined Space Entry Permit/Reclassification Form for the confined space to be entered. The Confined Space Entry Permits are on file in the SWRP Control Room or appropriate Maintenance/Operations shop.

(b) Assess whether or not recent changes due to construction, equipment failures, or other causes may have generated actual or potential hazards not anticipated in the Reclassification Permit.

(c) Designate authorized entrant(s).

(d) Designate authorized attendant(s).

(e) Designate Assisted Self-Rescue team members, minimum of two including the team leader.

(f) Establish contact with the Assisted Self-Rescue Team Leader and the Control Room. Advise them of all relevant details of the proposed entry, providing at least, the following information:

(1) Exact location of the confined space to be entered.

(2) Number of people who will be performing the entry.

(3) Estimated length of time the work will take.

(4) Radio call number of the authorized attendant.

(g) Verify that all required personal protective equipment, rescue equipment, and hazardous gas monitors are available for the entry to take place.

(h) The authorized attendant and authorized entrant shall check the calibration on the hazardous gas monitor and verify the operability of the gas detection equipment.

(2) Any conditions making it unsafe to remove an entrance cover to the confined space shall be eliminated before the cover is removed.

(3) When the entrance cover(s) are removed, the opening shall be promptly guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening.

(4) Test atmospheric conditions in the confined space to determine if acceptable entry conditions exist before entry is authorized to begin and are being maintained during the course of entry operations;

(a) When testing for atmospheric hazards, test for oxygen first, test for combustible gases and vapors second, and then for toxic gases and vapors.

(5) Acceptable atmospheric conditions inside the confined space shall be 19.5% to 23.5% oxygen, less than 10% LEL, less than 5 ppm H_2S, and less than 35 ppm CO.

(6) The authorized attendant and authorized entrant shall continuously and independently monitor the atmosphere inside the non-permit confined space during entry operations. The entrant must have a calibrated gas detector on his/her body at all times during entry operations. The attendant shall monitor the atmosphere within the space from outside the confined space using a calibrated gas detector with a sample draw pump and tubing.

(7) The authorized attendant shall maintain contact with the Control room and the Assisted Self-Rescue team leader during entry operations.

(8) The authorized attendant shall notify the Control Room and the Assisted Self-Rescue team leader upon completion of the work inside the confined space.

(9) The confined space entrance shall be properly secured by entrant(s) before leaving the site.

(10) All equipment used during the entry operation shall be returned to proper storage.

ASSISTED SELF-RESCUE AND EMERGENCY SERVICES

XIII. Assisted Self-Rescue and Emergency Services

(1) The Water Authority will provide Assisted-Self Rescue Services to all employees required to enter permit-required confined spaces. Assisted Self-Rescue means trained, equipped rescuers standing by outside the confined space, prepared to perform vertical direct retrieval operations. Water Authority employees will not perform horizontal confined space rescue, an outside contractor like ROCCO will be contracted out to perform horizontal confined space rescue. Water Authority employees who have been designated to provide vertical permit space Assisted Self-Rescue shall be considered Assisted Self-Rescue Team members and shall take the following measures:

(a) Assisted Self-Rescue Team members shall be trained as permit space entrants and attendants at a minimum, including training in the potential hazards of all permit spaces from which rescue may be needed. Assisted Self-Rescue Team members shall demonstrate proficiency to perform assigned rescue duties;

(b) Assisted Self-Rescue Team members will be provided with and properly trained in the use and need for PPE, such as SCBA or fall arrest equipment, which may be required to perform permit space rescues. Every team member shall be properly trained to perform his or her functions and make rescues, and to use any rescue equipment, such as ropes and harnesses, that may be needed in a rescue attempt. Assisted Self-Rescue Team members shall demonstrate proficiency in the use of that PPE;

(c) Assisted Self-Rescue Team members shall be trained in the first aid and medical skills needed to treat victims overcome or injured by the types of hazards that may be encountered in the permit spaces until Emergency Medical Services arrive. At least one member of the rescue team must have current certifications in CPR, Basic First Aid, and Hazwoper 40; and

(4) Assisted Self-Rescue Team members shall practice making permit space rescues at least once every 12 months, by means of simulated rescue operations in which they remove dummies, manikins, or actual persons from the actual permit spaces or from representative permit spaces.

(2) Assisted Self-Rescue Team members shall focus on their own safety before considering the safety of the victim. Members shall be able to test the atmosphere to determine if it is IDLH. Members shall be able to identify information pertinent to the rescue from entry permits, hot work permits, and MSDSs.

(3) To facilitate non-entry rescue, employees will use the DBI-SALA confined space entry/retrieval systems whenever an authorized entrant enters a permit space, unless the retrieval equipment would increase the overall risk of injury or would not contribute to the rescue of the entrant. The DBI SALA retrieval systems meet the following requirements:

(a) Each authorized entrant (includes rescue entrants) must use a full body or chest harness, with a

retrieval line attached at the center of the entrant's back near shoulder level, above the entrant's head.

(b) The other end of the retrieval line shall be attached to the DBI-SALA rescue davit retrieval system outside the permit space in such a manner that rescue can begin as soon as the rescuer becomes aware that rescue is necessary. The rescue davit retrieval system shall be available to retrieve personnel from vertical type permit spaces more than 5 feet deep.

(4) If an injured entrant is exposed to a substance for which a MSDS or other similar written information is required to be kept at the worksite, that MSDS or written information shall be made available to the medical facility treating the exposed entrant.

(5) Assisted Self-Rescue Team members shall properly package and retrieve victims from a permit space that has a limited size opening (less than 24 inches in diameter), limited internal space, or internal obstacles or hazards. Airline respirators shall be used when required.

(6) The Chief Engineer, Safety Manager, Superintendents, and Assisted Self-Rescue Team members shall develop a plan for each of the kinds of permit space rescue operations at the facility that may be required. This rescue plan shall be developed in writing and shall be updated annually or as needed. Rescue operation plans of representative permit spaces with: Internal configuration, Elevation, Portal size and Space access.

XIV. Assisted Self-Rescue Procedures

Once an employee is assigned to an Assisted Self-Rescue Team or is selected to be an Assisted Self-Rescue team leader the following procedures shall be followed:

(1) Obtain all required personal protective equipment (PPE) as well as monitoring, communication, and rescue equipment to make a rescue feasible. SCBAs and mechanical ventilation are an example of PPE required to be on site at all times. Most of the required PPE will be housed in the Safety Equipment Building adjacent to the Operations and Maintenance Facility;

(2) Set up the required DBI-SALA rescue/retrieval equipment at the confined space to be entered before entry operations begin. This will ensure immediate Assisted Self-Rescue services are available at all times;

(3) Assisted Self-Rescue Team members will evaluate the confined space and scheduled work to be completed and assist with the isolation of the confined space and mitigation of all confined space hazards;

(4) Assisted Self-Rescue Team members will come up with a rescue plan that details how to rescue authorized entrants should an emergency situation arise. This rescue plan can be verbal among the rescue team members or it can be a written plan as long as all rescue team members understand how rescue procedures will be conducted and their roles;

(5) The Assisted Self-Rescue Team shall outfit every authorized entrant with a chest or full body harness equipped with fall protection, a retrieval line attached at the center of the entrant's back near shoulder level, above the entrant's head, and a retrieval hoist system. The confined space entry/rescue equipment authorized by the Water Authority is the DBI-SALA hoist systems;

(6) Continuously monitor the atmospheric conditions and potential hazards during entry operations. Two gas detectors are required during entry/rescue procedures, one detector on the entrant and the

other outside the confined space monitoring the internal atmosphere. Perform required duties until entry operations are completed. Assisted Self-Rescue Team members have the authority to stop permit space entry operations should a prohibited condition be detected;

(7) Once entry operations have been completed and the confined space entry permit has been cancelled, return all rescue equipment and personal protective equipment to its proper location. Please make sure the entrance cover to the confined space is properly secured.

DEFINITIONS

XV. Definitions

Acceptable entry conditions means the conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.

Assisted Self-Rescue means Water Authority employees trained to provide vertical confined space rescue procedures.

Attendant means an individual stationed outside a permit space who monitors the authorized entrants and who performs all attendant's duties assigned in the Water Authority Permit Space Program.

Authorized entrant means an employee who is authorized by the Water Authority to enter a permit space.

Bio-Hazard or Biological Hazard refers to biological substances that pose a threat to the health of living organisms, primarily that of humans. This can include medical waste or samples of a microorganism, virus or toxin that can affect human health. It can also include substances harmful to animals.

Blanking or blinding means the absolute closure of a pipe, line, or duct by the fastening of a solid plate (spectacle blind or skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

Confined space means a space that:

(1) Is large enough and so configured that an employee can bodily enter and perform assigned work; and

(2) Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and

(3) Is not designed for continuous employee occupancy.

Double block and bleed means the closure of a line, duct, or pipe by closing and locking or tagging two in-line valves and by opening and locking or tagging a drain or vent valve in the line between the two closed valves.

Emergency means any occurrence (including any failure of hazard control or monitoring equipment) or event internal or external to the permit space that could endanger entrants.

Engulfment means the surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.

Entrapment/engulfment means converging walls; to swallow up or overwhelm by or as if by overflowing and enclosing.

Entry means the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

Entry permit means the written or printed document that is provided by the Water Authority to allow and control entry into a permit space and that contains the information required in **1910.146(f) Entry permit.**

Entry supervisor means the person (such as the operations/maintenance supervisor or superintendent) responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by the Water Authority Permit Space Program.

Hazardous atmosphere means an atmosphere that may expose employees to the risk of death, incapacitation, and impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

(1) Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL);

(2) Airborne combustible dust at a concentration that meets or exceeds its LFL;

(3) Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;

(4) Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart G, Occupational Health and Environmental Control, or in Subpart Z, Toxic and Hazardous Substances, of this part and which could result in employee exposure in excess of its dose or permissible exposure limit;

(5) Any other atmospheric condition that is immediately dangerous to life or health.

Hot work permit means the Water Authority written authorization to perform operations (for example, riveting, welding, cutting, burning, and heating) capable of providing a source of ignition.

Immediately dangerous to life or health (IDLH) means any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space.

Inerting means the displacement of the atmosphere in a permit space by a noncombustible gas (such as nitrogen) to such an extent that the resulting atmosphere is noncombustible.

Isolation means the process by which a permit space is removed from service and completely protected against the release of energy and material into the space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages.

Line breaking means the intentional opening of a pipe, line, or duct that is or has been carrying

flammable, corrosive, or toxic material, an inert gas, or any fluid at a volume, pressure, or temperature capable of causing injury.

Mitigate or Mitigation means to become less harsh or to eliminate the hazard.

Non-permit confined space means a confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

Oxygen deficient atmosphere means an atmosphere containing less that 19.5 percent oxygen by volume.

Oxygen enriched atmosphere means an atmosphere containing more than 23.5 percent oxygen by volume.

Permit-required confined space means a confined space that has one or more of the following characteristics:

(1) Contains or has a potential to contain a hazardous atmosphere;
(2) Contains a material that has the potential for engulfing an entrant;
(3) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
(4) Contains any other recognized serious safety or health hazard.

Permit-required confined space program means the Water Authority's overall program for controlling, and, where appropriate, for protecting employees from, permit space hazards and for regulating employee entry into permit spaces.

Permit system means the Water Authority's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.

Prohibited condition means any condition in a permit space that is not allowed by the permit during the period when entry is authorized.

Rescue service means the personnel designated to rescue employees from permit spaces. This rescue service could be provided by a contractor such as ROCCO.

Retrieval system means the equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

SWRP means the Southside Water Reclamation Plant.

TRAINING

XVI. Training

Training shall be provided by the Water Authority so that all employees whose work is regulated by the permit space program acquire the understanding, knowledge, and skills necessary for the safe performance of the duties assigned.

(A) Training shall be provided to each affected employee:

(1) Before the employee is first assigned duties under the permit space program;

(2) Before there is a change in assigned duties;

(3) Whenever there is a change in permit space operations that presents a hazard about which an employee has not previously been trained;

(4) Whenever the Water Authority has reason to believe either that there are deviations from the permit space entry procedures or that there are inadequacies in the employee's knowledge or use of these procedures.

(B) The training shall establish employee proficiency in the duties required by the permit space program and shall introduce new or revised procedures, as necessary, for compliance.

(C) The Water Authority shall certify that the training required of this program has been accomplished. The certification shall contain each employee's name, the signatures or initials of the trainers, and the dates of training. The certification shall be available for inspection by employees.

XVII. Respirator Fit Testing

Before a Water Authority employee may be required to use any respirator with a negative or positive pressure tight-fitting face-piece, the employee must be fit tested with the same make, model, style, and size of respirator that will be used. Water Authority employees will use the SCOTT AV-3000 full facepiece respirator or the SCOTT XCEL half facepiece respirator.

(A) The Water Authority shall ensure that employees using a tight-fitting facepiece respirator pass an appropriate qualitative fit test (QLFT) or quantitative fit test (QNFT).

(B) Employees using a tight-fitting facepiece respirator are to be fit tested prior to initial use of the respirator and whenever a different respirator facepiece (size, style, model, or make) is used. Employees must pass a qualitative fit test at least annually thereafter.

(C) The Water Authority shall conduct an additional fit test whenever the employee reports, or the employer, PLHCP, supervisor, or program administrator makes visual observations of, changes in the employee's physical condition that could affect respirator fit. Such conditions include, but are not limited to, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight.