U.S. Army Corps of Engineers

St. Louis District

Festus/Crystal City Levee & Pump Station

Gateway to Excellence

Project Overview

- Project protects the adjacent cities of Festus and Crystal City, MO., including the sewage treatment plant and a major highway connecting the cities.

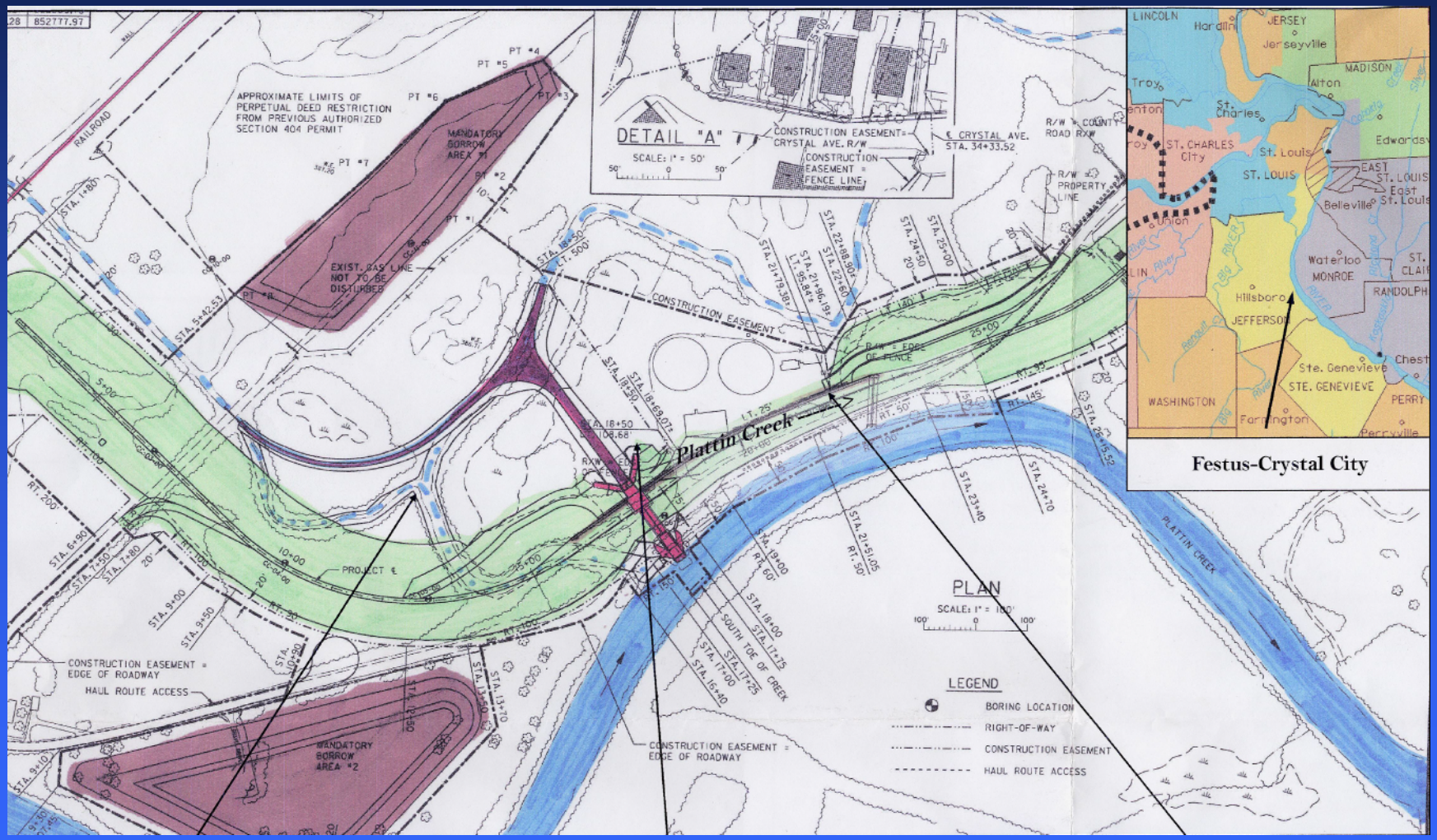
Project Overview

- The project will keep flood events, such as the Great Midwest Flood of 1993, from impacting life in these towns.

Project Overview

- Project provides Urban Design Level of Protection (500 year flood).
- Only highway between Festus and Crystal City subject to flooding.
- Only sewage treatment plant for a growing area with a present population of 40,000.
- Multiple project features were constructed.
- Total Project Cost $13,400,000.

Project Overview



Project Overview

EARTHEN LEVEE

Project Overview

RAILROAD CLOSURE STRUCTURE

Project Overview

PUMP STATION WITH MSE WALL

Project Overview

MECHANICALLY STABILIZED WALL AND EMBANKMENT

Pump Station Overview

- 120 cfs Total Pump Station Capacity
- 2 - Flygt Submersible Pumps
- 505 acre Ponding Area
- 2 – 8’ Wide x 8’ High Box Culverts with Cast Iron Sluice Gates
- Pump Station Switchgear and Controls Located Inside the Existing Sewage Treatment Plant
- Station Operates at 480 VAC
- Automatic Sluice Gate and Pump Operation Using Programmable Logic Controller
- Total Pump Station Construction Cost - $3,000,000

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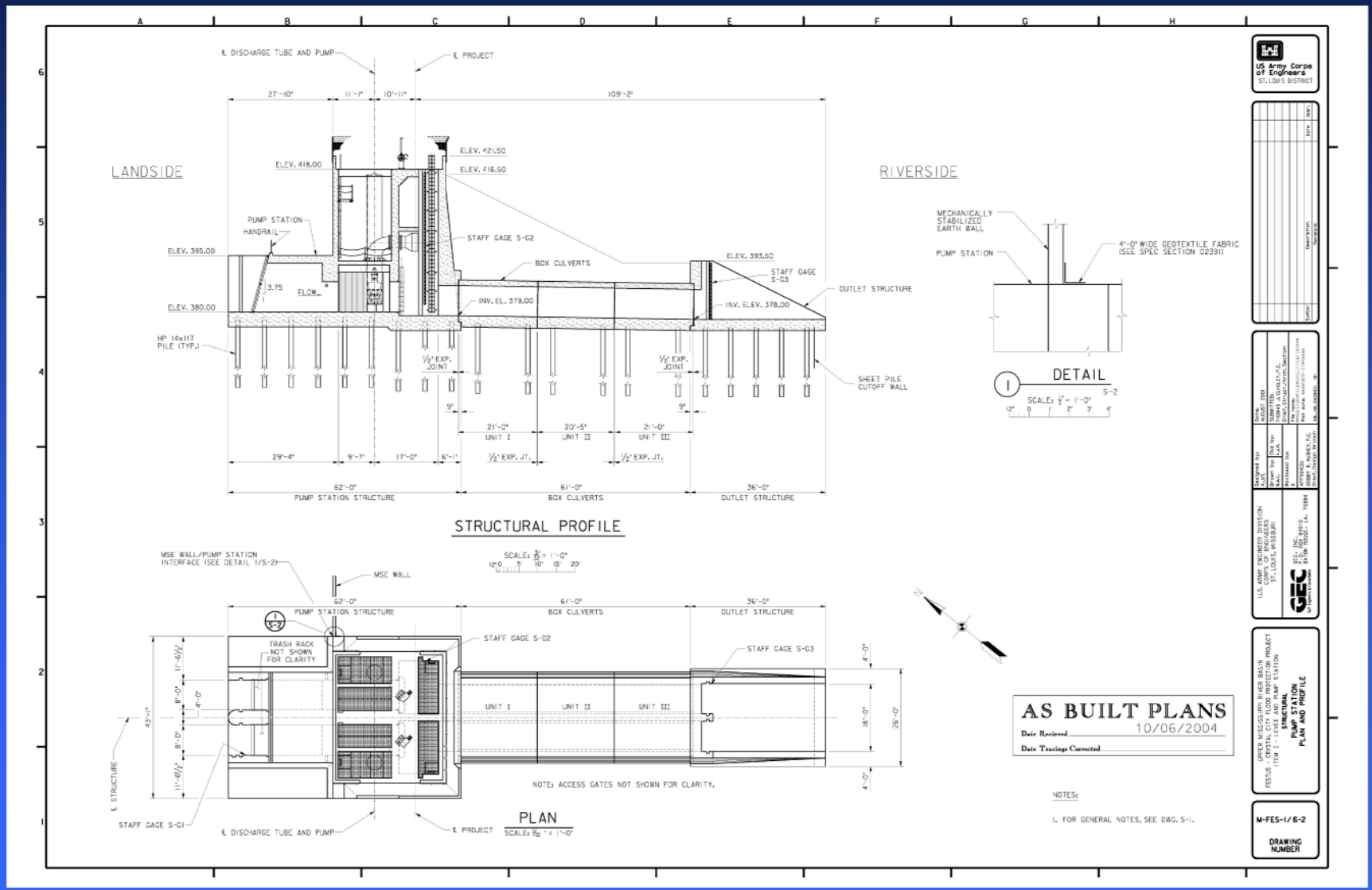
Pump Station Plan & Profile



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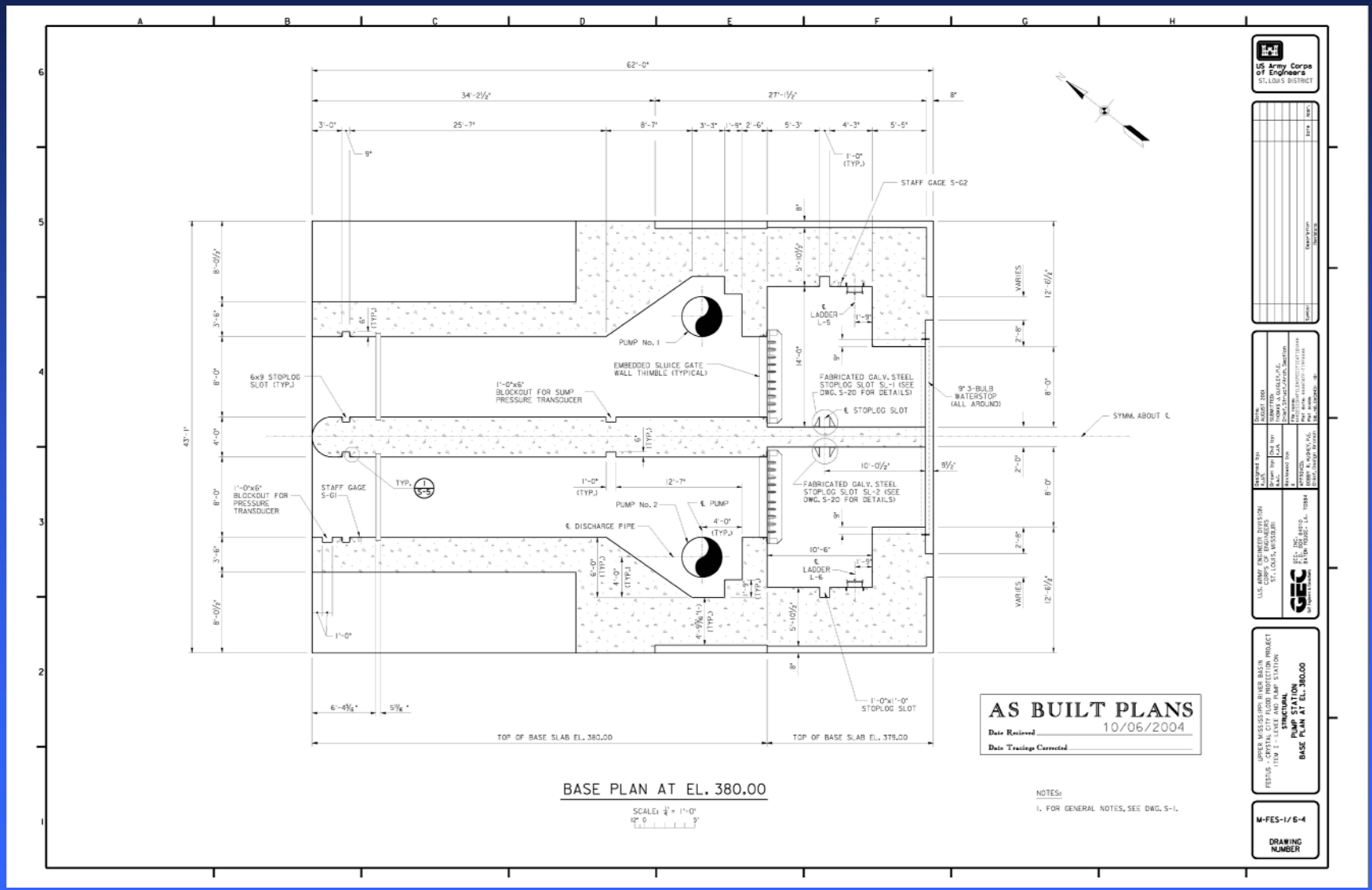
Pump Station Sump Plan



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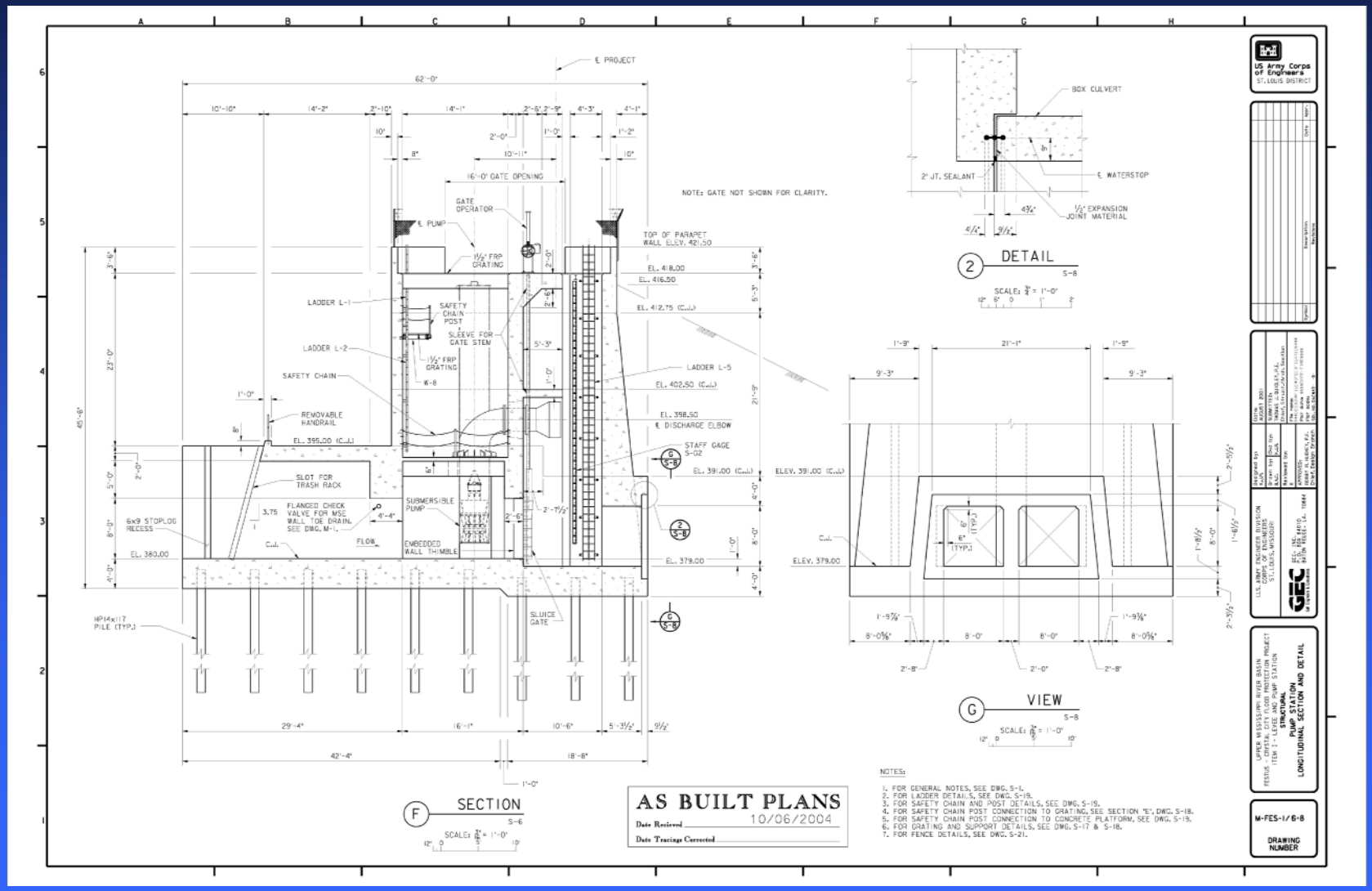
Pump Station Profile



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Pump Station/Gravity Drain

INLET STRUCTURE

Pump Station/Gravity Drain

OUTLET STRUCTURE

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Pump Station/Gravity Drain

BOX CULVERT CONSTRUCTION

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Pump Station Construction

PUMP STATION STRUCTURE AND WING WALLS

Gravity Drain Features

SLUICE GATE WALL THIMBLE & GATE SLIDE

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Gravity Drain Box Culvert

SLUICE GATE SLIDE & GATE HOIST

MSE Wall Installation

MSE WALL FOUNDATION & EMBANKMENT

MSE Wall Installation

MSE EMBANKMENT & BLOCK WALL

Submersible Pumps

- Flygt PL-7081
- Rated for 27,000 gpm @ 13.7 ft. TDH
- Pump Speed – 885 RPM
- Pump Tube Diameter – 40 in.
- Motor Size - 200 Hp
- Motor Voltage - 480 V
- Rated Current - 242 amp

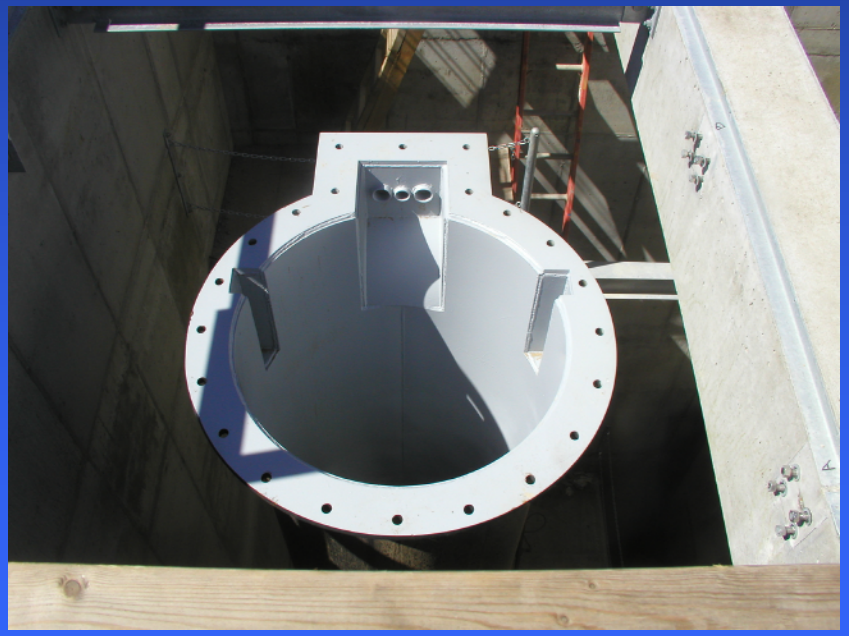
Submersible Pumps

FACTORY TESTING IN SWEDEN

Submersible Pumps

PUMP DISCHARGE TUBE

Submersible Pumps



PUMP DISCHARGE TUBE

Submersible Pumps

"DUCK-BILL" DISCHARGE INSTEAD OF FLAP GATE

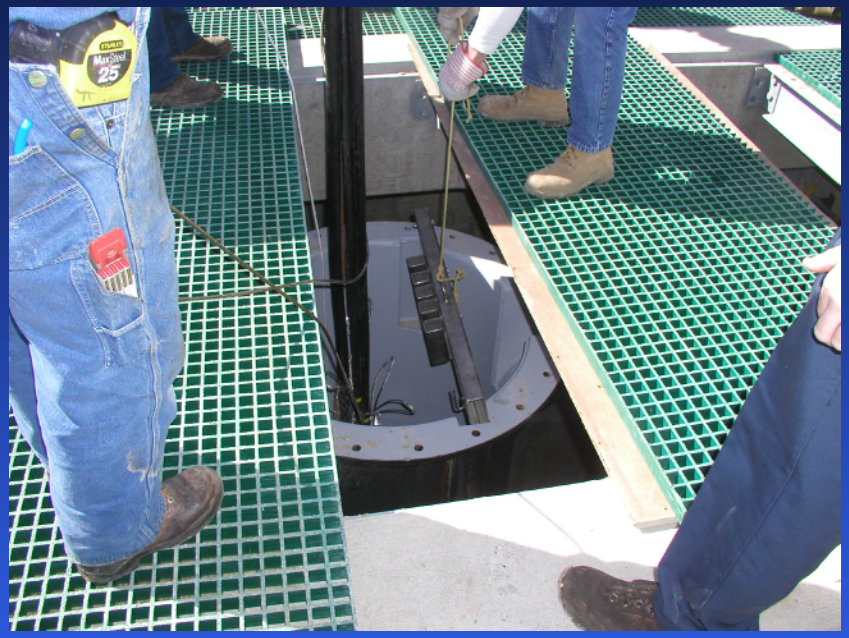
Submersible Pumps

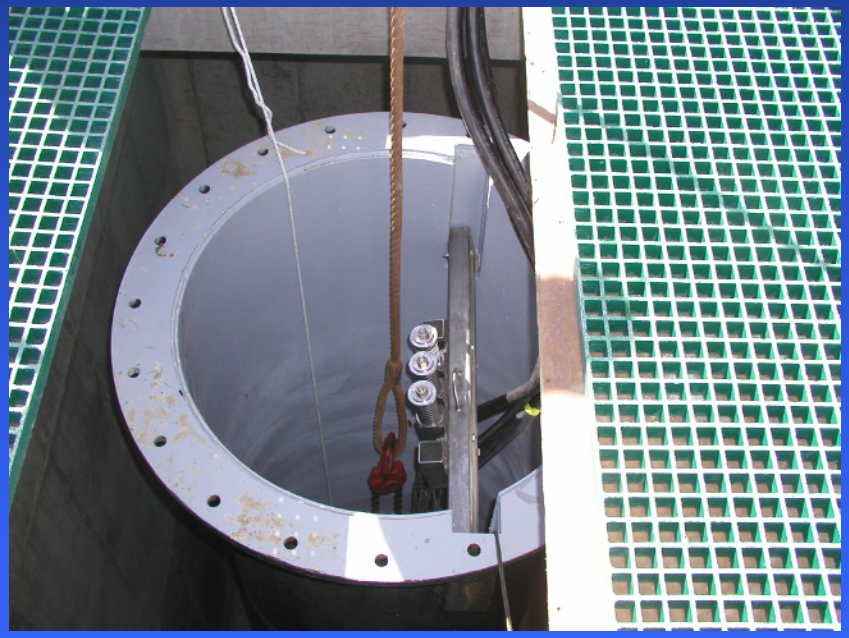
PUMP INSTALLATION

Submersible Pumps

SUBMERSIBLE PUMP
INSTALLATION

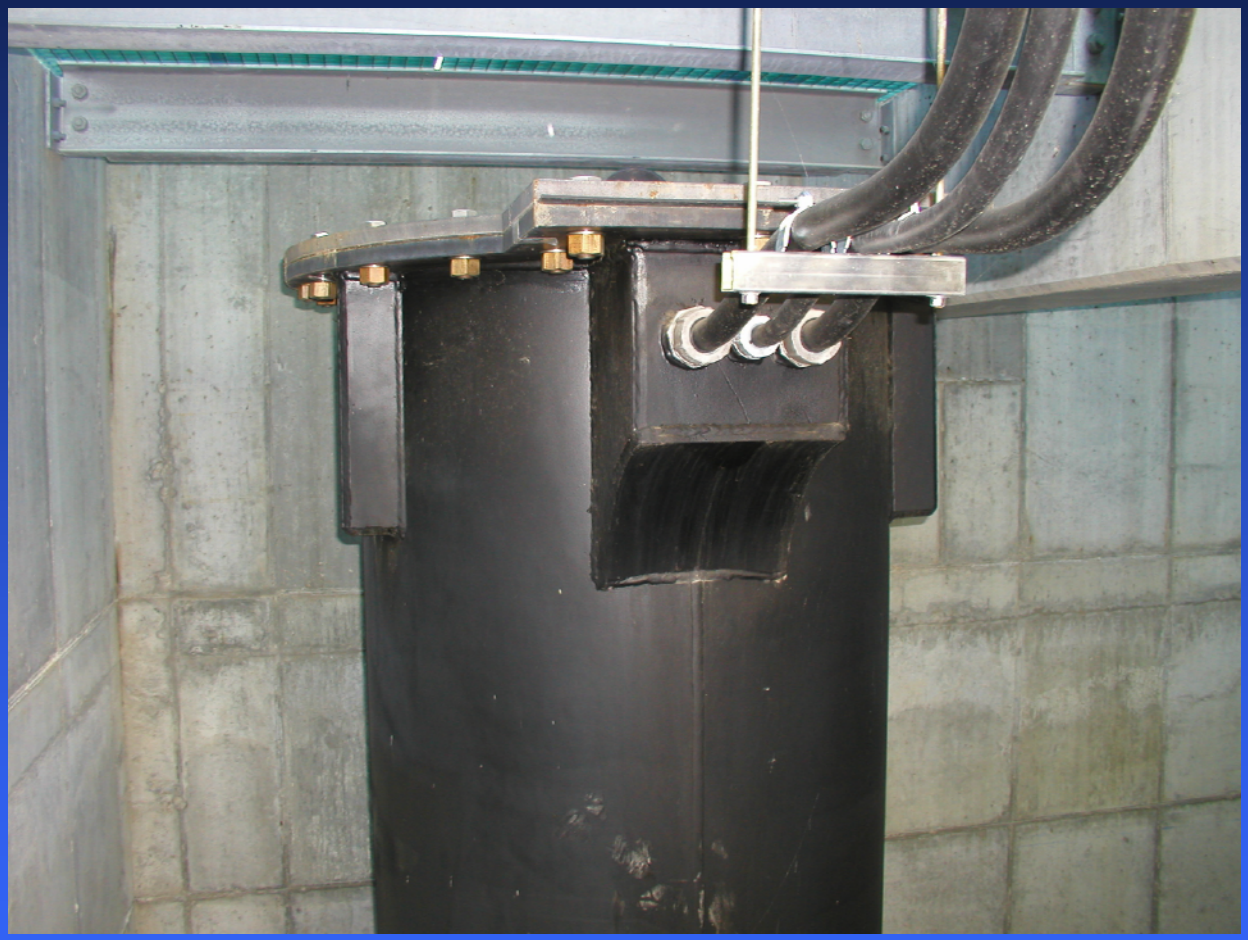
Submersible Pumps





"GRIP-EYE" SYSTEM TO SUPPORT POWER CABLES

Submersible Pumps



SIDE POWER CABLE ENTRANCE INSTEAD OF THRU THE TOP OF THE TUBE

Electrical Controls

ELECTRICAL
EQUIPMENT
INSTALLATION

Automatic Operation

- PLC automatically operates two gravity flow sluice gates at programmed water levels (using motor actuated gate hoists).
- Pressure transducers measure water level in four locations: Inlet, Outlet, Sump No. 1 and Sump No. 2.
- Two transducers are installed at each location to monitor for accuracy of measurements. PLC Logic detects open circuit or out of range.
- PLC starts and stops the pumps based on the water level at the Inlet Structure.
- PLC stores the run time of each pump in memory.
- Manual (Hand) Operation for sluice gates and pumps.
- Low Water Cut-off Float for Pumps and Float Operated High Water Sluice Gate Back-up Operation

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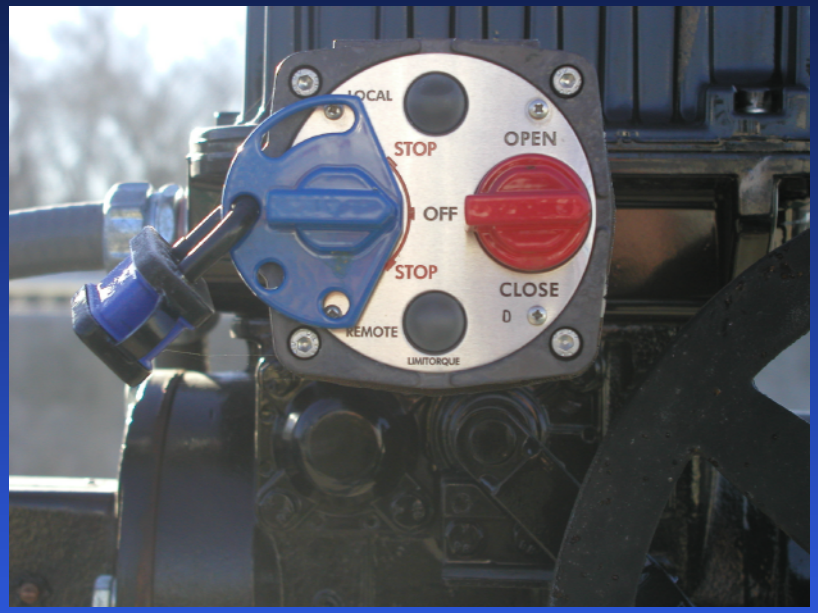
Monitoring & Control Systems



Sluice Gate Controller

Pump Control Panel

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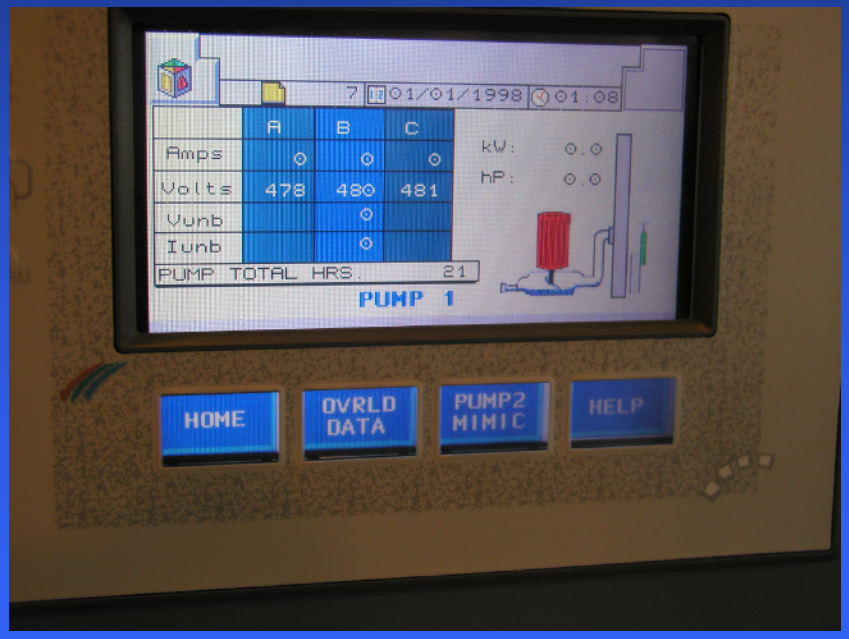
Monitoring & Control Systems



Pump & Sluice Gate Status Screen
(MAGELIS Screen)

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Monitoring & Control Systems

Digital Water Level Display

Sump Transducers

Inlet Transducers

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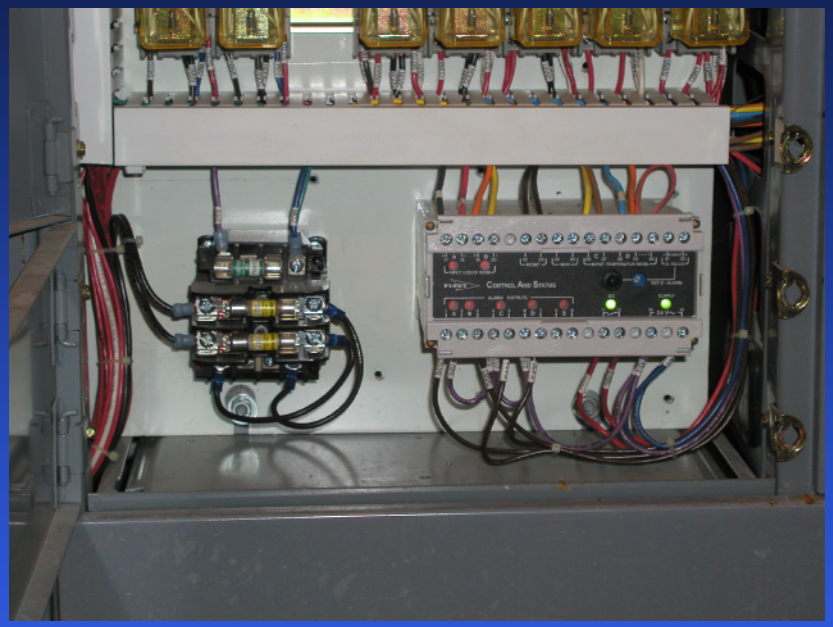
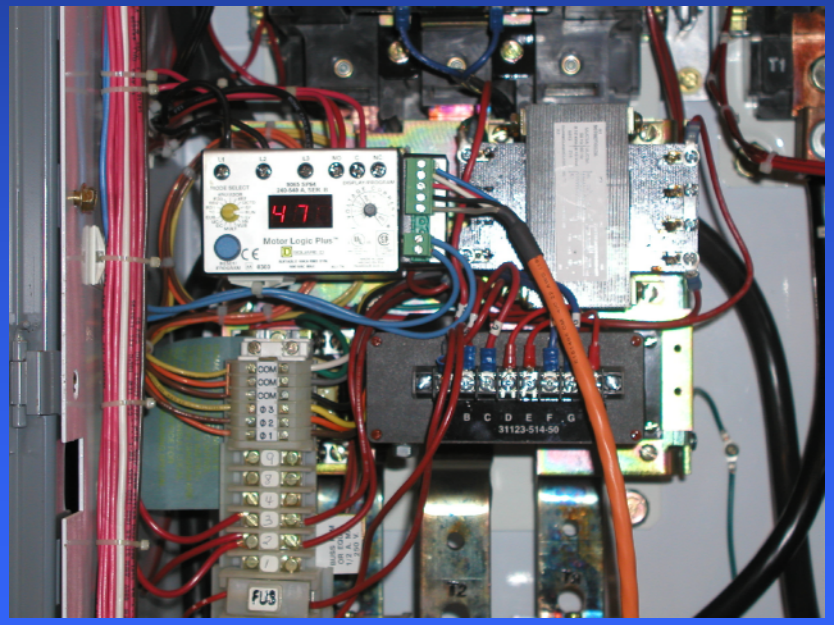
Pump & Motor Protection



Pump/Motor Monitoring Device
(Flygt CAS Unit)



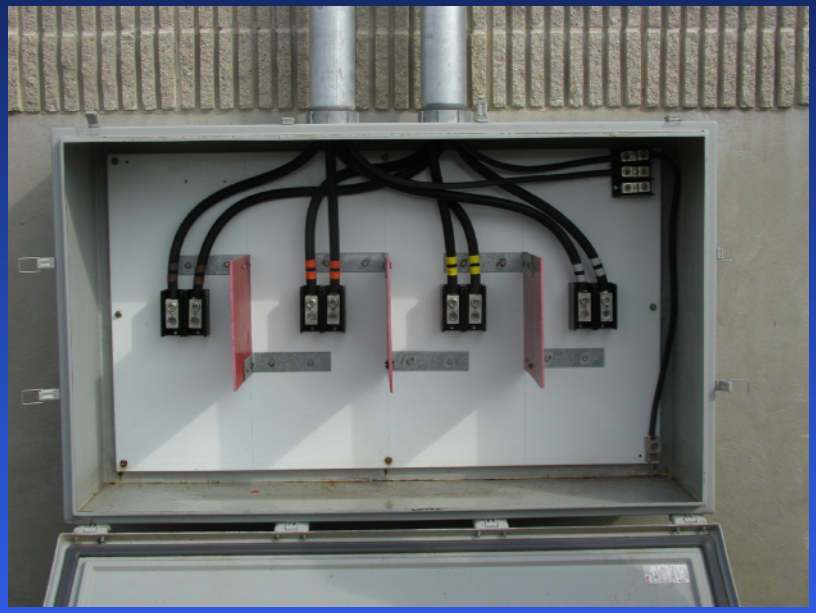
Solid State Overload Relay

Auto Dialer


SENSAPHONE®
EXPRESS II
MONITORING SYSTEM
IN# 9= OPEN
IN#10= OPEN
IN#11= OPEN
IN#12= OPEN
INPUT SLOT 1
INPUT SLOT 2
INPUT SLOT 3
PROGRAM
INQUIRE
STATUS
ALARMS
ENTER
CODE
HALT
DISPLAY
ALARM CANCEL
Phonetics, Inc.


EXPRESS II
Phonetics, Inc.
937-7444

Provisions for Back-Up Generator



Generator Connection Access Panel

Dedicated Circuit Breaker for Generator

Failures and Alarms

- PLC monitors the CAS Unit and Solid State Overload Relay located in the motor starter. The CAS Unit instruments the following:
  - Stator Temperature
  - Bearing Temperature
  - Stator Leakage
  - Motor Junction Box Leakage
- The PLC tries to start a pump for 30 seconds. If the pump does not start, a “Failure to Start” alarm is generated.
- Failures trigger the audible alarm located on the PLC Enclosure to alert an onsite operator.
- PLC also tries to start the second pump.
- If personnel do not acknowledge the alarm within 10 minutes, the PLC activates the autodialer.

Presenter

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