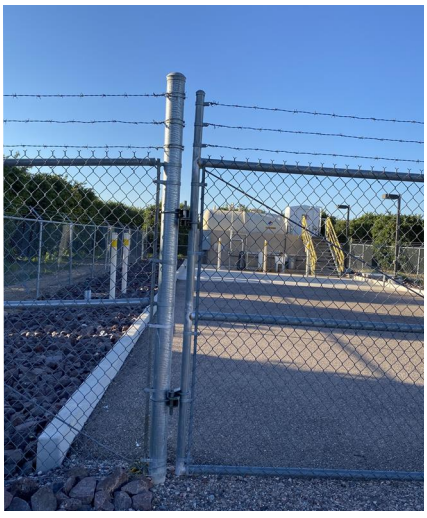
APPROVED
City of Mesa
Engineering

# Hermosa Vista Lift Station Rehabilitation

**Design Concept Report**
**April 12, 2024**

**City of Mesa**
**Project No. CP0958LS01**

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# 1. Introduction

The existing City of Mesa Hermosa Vista Lift Station (LS) was constructed in 1984. The LS was rehabilitated in 2005 and a sulfide control station (SCS) was added in 2010. The site is located at 4233 E Hermosa Vista Drive, within a citrus grove owned by the City along the Hermosa Vista Drive alignment near Greenfield Road. The lift station receives flow from a gravity sewer line located in Hermosa Vista Drive and discharges to sewer manhole in front of the site, approximately 65-ft away.

Existing LS components include:

- 34-ft deep, 8-ft diameter wet well
- Two submersible pumps, 350 gpm at 29-ft TDH each
- 3” diameter above ground discharge piping and valves
- Ferrous chloride storage tank and metering pumps
- Natural gas emergency generator
- 15” gravity sewer influent line
- 6” ductile iron force main

The purpose of this project is to rehabilitate the LS to replace aging components, and to replace components that no longer meet City requirements including replacing the 3” discharge piping with 6” piping and replacing the chain link fence with a CMU block wall. The City is also concerned about infiltration into the upstream inlet sewer system and believes the infiltration is due to rain events and not by the citrus grove flood irrigation. GHD is currently preparing a proposal to provide an infiltration study on the inlet sewer system for the City. The results of the infiltration study will be incorporated into a future amendment of this design concept report. Figures 1 and 2 below show the site and service area respectively.


**Figure 1 – Overall Site**

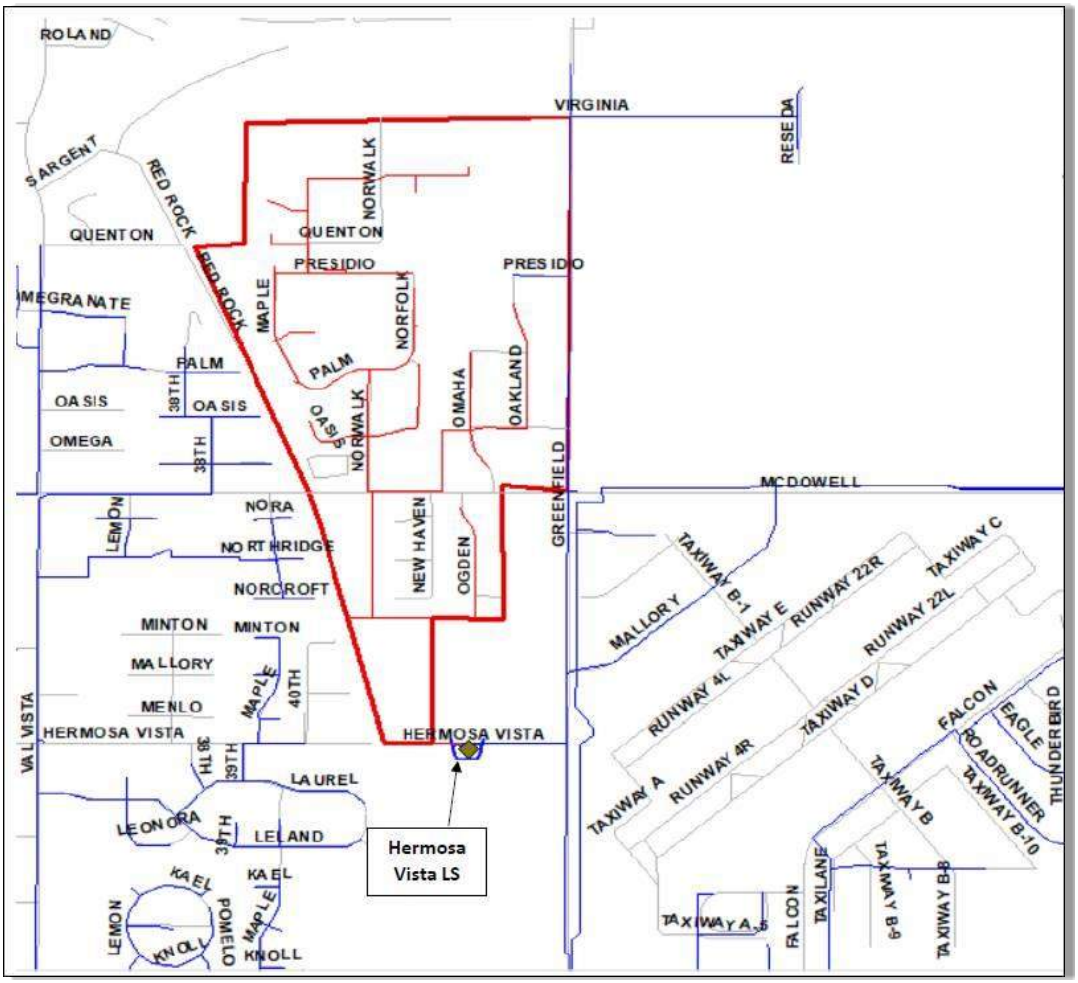



**Figure 2 – Service Area**

# 2. Project Scope

Rehabilitation improvements will include the following:

**Lift Station**

- Upsize all existing 3” discharge piping and valves to 6” epoxy coated ductile iron.
- Include a pressure gauge on discharge piping.
- Include a “gooseneck” on the above ground discharge piping to ensure the flowmeter remains full of liquid.
- Replace MAG meter with a new ultrasonic flow meter.
- Replace and relocate two ball check valves with swing check valves in the horizontal position.
- Replace and relocate two combination air valves upstream of the check valves.
- Replace existing submersible pumps.
- Replace existing pump rails, cables and brackets with heavy duty 316 stainless steel.
- Replace existing wet well cover and hatch. Include safety grate on new hatch.
- Inspect and recoat well wet.
- Include a wet well wizard wired to operate when lead pump runs with hand/off/auto switch.
- Rehabilitate 65-ft of existing 15” influent line with cured in place pipe (CIPP) liner.

- Install onsite gravity sewer manhole with epoxy coating at force main discharge assembly and replace approximately 65-ft of existing 6” ductile iron discharge pipe with 8” PVC gravity sewer. The existing 6” ductile iron pipe flows downhill and operates as a gravity line rather than a force main. Based on the recent Mesa Center Street LS design, the City prefers the force main to be converted to a gravity sewer when it flows downhill.
- Recoat inlet and outlet manholes and benches.

**Site**

- Shift gate to the east for vehicle accessibility.
- Replace chain link fence around the LS and SCS with an 8-ft tall CMU block wall and security pickets.
- Expand site walls to the south and west.
- Fill site approximately 2-ft and provide retaining wall at the base of the CMU wall.
- Provide new decomposed granite ground cover.

**Electrical**

- Replace and relocate service entrance section and transformer outside of the site walls.
- Replace pressure transducer, wet well floats, and all instruments.
- Replace existing automatic transfer switch.
- Replace control panels, pump controls, and electrical cabinets.
- Replace existing generator.
- The PLC has been recently upgraded and will be reused.
- Relocate electrical equipment and generator to new site expansion area for constructability and site vehicular access.
- The submersible pump termination junction box already includes an 18” air gap and will be reused.
- Redesign the wet well cover junction boxes and outlet to remove the tripping hazard in front of the hatch opening.
- Replace site lights with LED lights.
- Install new fiber optic communications and conduit to site from Greenfield Road.

# 3. Design

The following sections provide the design methodology utilized to develop the conceptual design plans provided in Appendix A.

## 3.1 Submersible Pump

The City provided an average incoming flowrate of 30 gpm and peak flowrate of 65 gpm at the lift station and does not expect any additional flows in the future. One pump meets system demand and the second pump is provided for backup. The pumps alternate between lead and lag, so each pump is routinely exercised.

There are currently two pumps installed in the wet well, which are undersized at 29-ft TDH and will not meet the City preference of 4 ft/s minimum velocity in the minimum required force main size of 6”:

- Flygt 3102.090, 5 hp, 350 gpm at 29-ft TDH
- Flygt 3102.095, 5 hp, 350 gpm at 29-ft TDH

The proposed pump listed below is based on the system curve and head loss calculations provided in Figures 3 & 4, while meeting the velocity and retention time requirements described in Sections 3.2 and 3.3 below. Two pumps will be installed with a third spare pump for the shelf. The pumps will alternate between lead and lag. Data sheets for the proposed pumps are provided in Appendix B.

- Flygt NP3127, 7.5hp, 420 gpm at 37-ft TDH, 65% efficiency

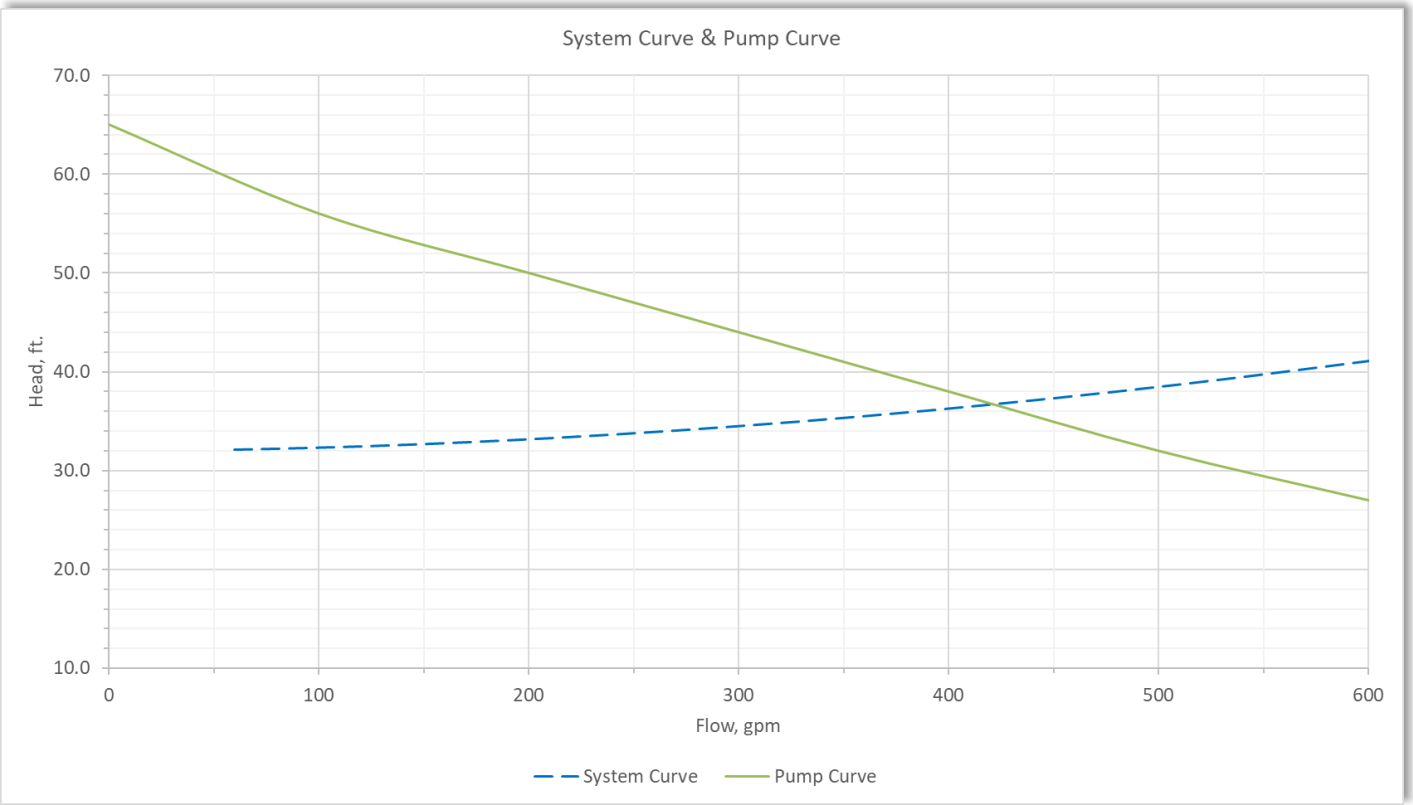



**Figure 3 – System Curve**

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **System Curve Flow, gpm =** | 420 | | **Pump Off Elevation, ft =** | 1,326.54 | | | | | | | | |
| **DIP C-Value =** | 130 | | **Elevation of Highest Point in FM, ft=** | 1,358.55 | | | | | | | | |
| | | | | | | | | | | | | |
| **Headloss Calculations:** | | | | | | | | | | | | |
| **Pipe Dia, in** | **Length, ft** | **Flow, gal/min** | **System Component** | **No. of Comp.** | **Equivalent Comp. Length, ft** | **Equivalent Length, ft** | **Velocity, ft/s** | **$V^2/2g$** | **C** | **$h_L$ per 100 ft** | **Actual $h_L$** | **Cumm. Head** |
| 4 | | 420 | 90º Bend | 1 | 10.1 | 10.1 | 10.72 | 1.79 | 130 | 10.46 | 1.06 | 1.1 |
| 6 | | 420 | 4''->6'' Reducer | 1 | k = 0.18 | | 4.77 | 0.35 | - | - | 0.06 | 1.1 |
| 6 | 56 | 420 | DIP | 1 | 56 | 56 | 4.77 | 0.35 | 130 | 1.46 | 0.81 | 1.9 |
| 6 | | 420 | 90º Bend | 6 | 15.2 | 91.2 | 4.77 | 0.35 | 130 | 1.46 | 1.33 | 3.3 |
| 6 | | 420 | Swing Check Valve | 1 | 50.5 | 50.5 | 4.77 | 0.35 | 130 | 1.46 | 0.73 | 4.0 |
| 6 | | 420 | Plug Valve (Thru) | 3 | k = 0.27 | | 4.77 | 0.35 | - | - | 0.10 | 4.1 |
| 6 | | 420 | Tee Branch | 1 | 30.3 | 30.3 | 4.77 | 0.35 | 130 | 1.46 | 0.44 | 4.5 |
| 6 | | 420 | Flow Meter | 1 | 10.1 | 10.1 | 4.77 | 0.35 | 130 | 1.46 | 0.15 | 4.7 |
| | | | | | | | | | | **Total Headloss (Rounded), ft =** | | 4.7 |
| | | | | | | | | | | | | |
| | | | | | | | | | | Pump Off Elevation, ft = | | 1326.54 |
| | | | | | | | | | | Elevation of Highest Point in FM, ft= | | 1358.55 |
| | | | | | | | | | | **Static Head, ft =** | | **32.0** |
| | | | | | | | | | | | | |
| | | | | | | | | | | **TDH (Rounded), ft =** | | **36.7** |

**Figure 4 – Head Loss Calculations at Operating Point**

## 3.2 Pipe Sizing

The pump discharge piping, valves, and fittings will be increased from 3" to 6" epoxy lined ductile iron to meet current City design standards and to reduce clogging in the discharge piping. At 420 gpm, the 6" discharge pipe velocity is 4.8 ft/s. This meets the City preferred requirement of 4 – 7 ft/s.

The existing buried 6" ductile iron discharge piping flows downhill and operates as a gravity line instead of a force main. Based on the recent Mesa Center Street Lift Station design, a gravity sewer manhole will be placed onsite and the buried 6" ductile iron pipe will be replaced with 8" PVC gravity sewer to the discharge manhole. At 420 gpm and a slope of 0.008 ft/ft, the velocity in the 8" PVC gravity line is 4.3 ft/s. This meets the City standard of 2.5 ft/s – 9.0 ft/s.

## 3.3 Wet Well Sizing

The existing 8-ft diameter wet well is sized adequately for the rehabilitation improvements. The proposed wet well level settings are provided on the wet well cross section provided in Appendix A. These settings match the existing settings and meet the City design requirements for a 30 minute maximum retention time per the calculations below.

The existing and proposed pumping volume provided (752 gal) does not meet the City design requirements for minimum pumping volume (1,575 gal) per the calculations below. This is common for lift stations with very low incoming flow. The minimum volume calculation is intended to produce a retention time of 30 minutes. However, the calculation only works when the pumps are sized to match incoming flow. This is the case for larger lift stations, but small lift stations require a pumping capacity much higher than the incoming flow so a 4 ft/s minimum velocity can be maintained in the City's minimum force main pipe diameter of 6". This site has an incoming flow of 30 gpm and a pumping rate of 420 gpm. The minimum pumping volume calculation only utilizes pumping capacity and does not consider the additional fill time required for such a low incoming flow. Using the minimum pumping volume calculation for pumping level settings at this site would result in a retention time greater than 30 minutes. GHD recommends matching the City's current pump level settings and pumping volume of 752 gal to maintain a retention time below 30 minutes.

- Minimum Pumping Volume Required: V = (t x q) / 4
  - V = Volume between 1st pump start level and pump stop level
  - t = minimum time between successive pump start (15 min)
  - q = single pump capacity at the design point
  - V = (15 min x 420 gpm) / 4 = 1,575 gal (210 $ft^3$)
- 8-ft diameter wet well cross-sectional area = 50.3 $ft^2$
- Setting Lead Pump On (above bottom) = 6.0 ft
- Setting Lead Pump Off (1-ft above motor) = 4.0 ft
- Pumping Volume Provided = 2.0 ft x 50.3 $ft^2$ = 100.6 $ft^3$ (752 gal)
- Average Day Retention Time Provided = 27.0 min (see Figure 5 below)

| Flow Scenario | Flow In (gpm) | Pumping Rate (gpm) | Pumping Volume (gal) | Fill time (min) | Pumping Duration Time (min) | Retention Time (min.) | Cycle Frequency per Hour | Starts per Hour per Pump |
|---|---|---|---|---|---|---|---|---|
| Average Day | 30 | 420 | 752 | 25.1 | 1.9 | 27.0 | 2.2 | 1.1 |

**Figure 5 – Retention Time Calculation**

### 3.4 Emergency Storage

The current high alarm is set at an elevation of 1331.20-ft. The overflow elevation of 1350.7-ft is located at a manhole rim elevation approximately 1,350-ft upstream of the lift station. The following emergency storage volume and time is provided for an emergency response with an average flow of 30 gpm:

- 8-ft diameter wet well = 50.3 $ft^3$ x 19.5-ft = 980.85 $ft^3$ (7,338 gal)
- 5-ft dia. Manholes, deep (5 total) = 19.6 $ft^3$ x 19.5-ft x 5 = 1,911 $ft^3$ (14,296 gal)
- 5-ft dia. Manholes, shallow (7 total) = 19.6 $ft^3$ x 16.7-ft x 7 = 2,291 $ft^3$ (17,141 gal)
- 12" sewer line = 0.79 $ft^3$ x 1,810-ft = 1,430 $ft^3$ (10,697 gal)
- Total emergency storage volume = 49,472 gal
- Emergency storage time = 49,472 gal / 30 gpm = 1,649 min (27.5 hours)

### 3.5 Onsite Overflow Pipe

GHD evaluated the feasibility of installing an overflow pipe from the wet well to the discharge manhole. It is not possible to install an overflow pipe at this site because the invert of the existing discharge manhole of 1351.42-ft is higher than the overflow elevation of 1350.7-ft discussed in Section 3.4 above. Wastewater would overflow at the upstream manhole prior to reaching the overflow pipe and discharge manhole.

# 4. Site Improvements

### 4.1 Site Walls and Gates

The existing LS and SCS sites are surrounded by a barbwire chain link fence. The chain link fence will be replaced with an 8-ft tall CMU block wall with security pickets. The LS and SCS chain link gates with be replaced with new steel swing gates with security pickets. The LS gate will be shifted to the east to allow for vehicular access into the site. The City will determine if the iron gates shall have faux wood slats or be left open for security purposes.

### 4.2 Site Expansion

The site will be expanded to the south and the west as shown in Appendix A. The site is located within the City owned citrus tree grove and is part of the larger City owned parcel APN 141-28-012A. The site expansion will require the removal of several citrus trees.

### 4.3 Grading and Drainage

The existing site currently drains to the southwest, into the citrus tree grove. The site expansion will require approximately 2-ft of fill and retaining wall at the bottom portion of the new CMU wall. The proposed site will also drain to the southwest. There are no drainage impacts associated with the site expansion since rainwater runoff will continue to water the citrus trees.

# 5. Maintenance of Plant Operation (MOPO)

Temporary power and bypass pumping will be required during construction from the influent manhole to the force main discharge manhole per figure 6 below. Once bypass pumping is in place, the site can be taken out of service for construction.


**Figure 6 – Bypass Route**

# 6. Electrical

The Hermosa Vista Lift Station is currently powered from an SRP pad mounted 480/277VAC utility transformer. This transformer provides power for both the lift station and the sulfide station. All existing electrical components at the lift station are to be demolished besides the existing PLC. All new electrical equipment will be installed in a new layout to fit the proposed layout for the lift station site. The existing sulfide station is to remain in place.

## 6.1 Power

All existing electrical equipment for the lift station is to be removed and demolished with the exception of the PLC. The existing electrical equipment for the sulfide station is to remain in place and be reused. The existing power to the sulfide station is being fed from the lift station MCC. This will be disconnected and reconnected to the new equipment.

A new 200 amp SRP utility transformer is required and will be located outside of the new site wall. The new service entrance section will be 200 amp, 480VAC three phase. The new service entrance section will be located on the outer wall on the outside of the site for easy access to the meter for SRP. The new automatic transfer switch will be located inside the site within the same lineup as the other electrical equipment. The new backup generator will be sized to power the entire site. This will include both lift station pumps running at the same time, all site lighting, communications, and the existing sulfide station. The new generator will be located within the new site walls. The new generator shall be natural gas powered at 480V 3-phase and be sized between 75KVA and 100KVA. Scot Sherwood with the City of Mesa has confirmed that the existing 1” gas service line is adequate to serve the new generator. The gas meter will be replaced and sized by the City of Mesa at the time of final design.

A new pump control panel, ATS, step down transformer, 240/120VAC distribution panel, and RTU panel will replace the existing MCC lineup. The new 240/120V distribution panel will be called panel LPA. The pump control panel will be designed to power and control two, 7.5 horsepower pumps for the lift station and a Wet Well Wizard Aeration system. The Wet Well Wizard will be three phase, 480V, and will be equipped with a Hand-Off-Auto selector switch that will allow the pump control panel to turn the aerator on when the lead pump is in operation. The pumps will be controlled using a level transducer with level floats for backup controls. The new electrical equipment line up will be covered by a shade structure to shield it from the sun.

This lift station is considered a class 1 division 1 hazardous area inside the wet well and class 1 division 2 outside of the wet well. Control conduit for level instruments penetrating the wet well area shall be fitted with conduit seal offs to eliminate the possibility of hazardous fumes entering any electrical equipment. The motor cables entering the wet well will make use of conduit air gaps. This will eliminate any vapors from entering the pump control panel and make it easier to pull the motors out of the wet well without destroying the cable or conduit.

The existing sulfide station will be powered out of panel LPA. Panel LPA will also power the RTU panel, low voltage instruments such as the new flow meter, and the site lighting. The new site lighting will be LED wall packs mounted to the site's new CMU wall.

There are several existing electrical boxes and devices on the top of the wet well that present a tripping hazard. These are being used for the level transducer and floats. The operation of the wet-well dictates that boxes be located in this area to avoid interference with the level instruments and the pumps. We will look at possible alternatives to this design.

## 6.2 Instrumentation and Communications

The existing PLC is located in the MCC lineup. The PLC has recently been upgraded to a Modicon M340. The existing PLC and most new components, including the back panel, will be reused, and relocated to a new stand-alone RTU panel. A new communications cabinet equipped with fiber optic connections will be installed next to the new RTU location. The PLC will communicate to SCADA through the communications panel using a fiber optic connection. The communications cabinet will run fiber to a fiber pull box located at the edge of the site. From the fiber pull box, the fiber connection will run ~ 1000ft. east to Greenfield Rd. and then ~150ft. north to an existing fiber vault located in Greenfield Rd. Appendix D includes the preliminary alignment for the new FOC. The City of Mesa Project (CP0696CAP) Fiber Network Expansion Phase 2 – Package #2 will install a new 144-strand FOC in an open existing 2" conduit (of the 12 – 2" conduits) in Greenfield Road to support fiber optic communications for this project.

The existing flow meter will be removed, and a new ultrasonic flow meter will be installed.

Below is a list of anticipated signals to be sent to SCADA for monitoring:

- Wet Well Level
- Wet Well High Level
- Lift Pump Remote Mode (2)
- Lift Pump Running (2)
- Lift Pump Fault (2)
- Lift Station Pump Discharge Pressure
- Lift Station Pump Discharge Flow
- Pump Panel Intrusion Alarm
- RTU Intrusion Alarm
- Generator Running
- Generator Alarm
- Utility Power On
- Standby Power On

These signals will be typical for two lift station pumps, discharge pressure and discharge flow. The existing discharge flow meter is a magnetic flow meter. This will be replaced with an ultrasonic flow meter. The existing sulfide station control and monitoring signals will be reconnected to the PLC.

# 7. Opinion of Probable Cost

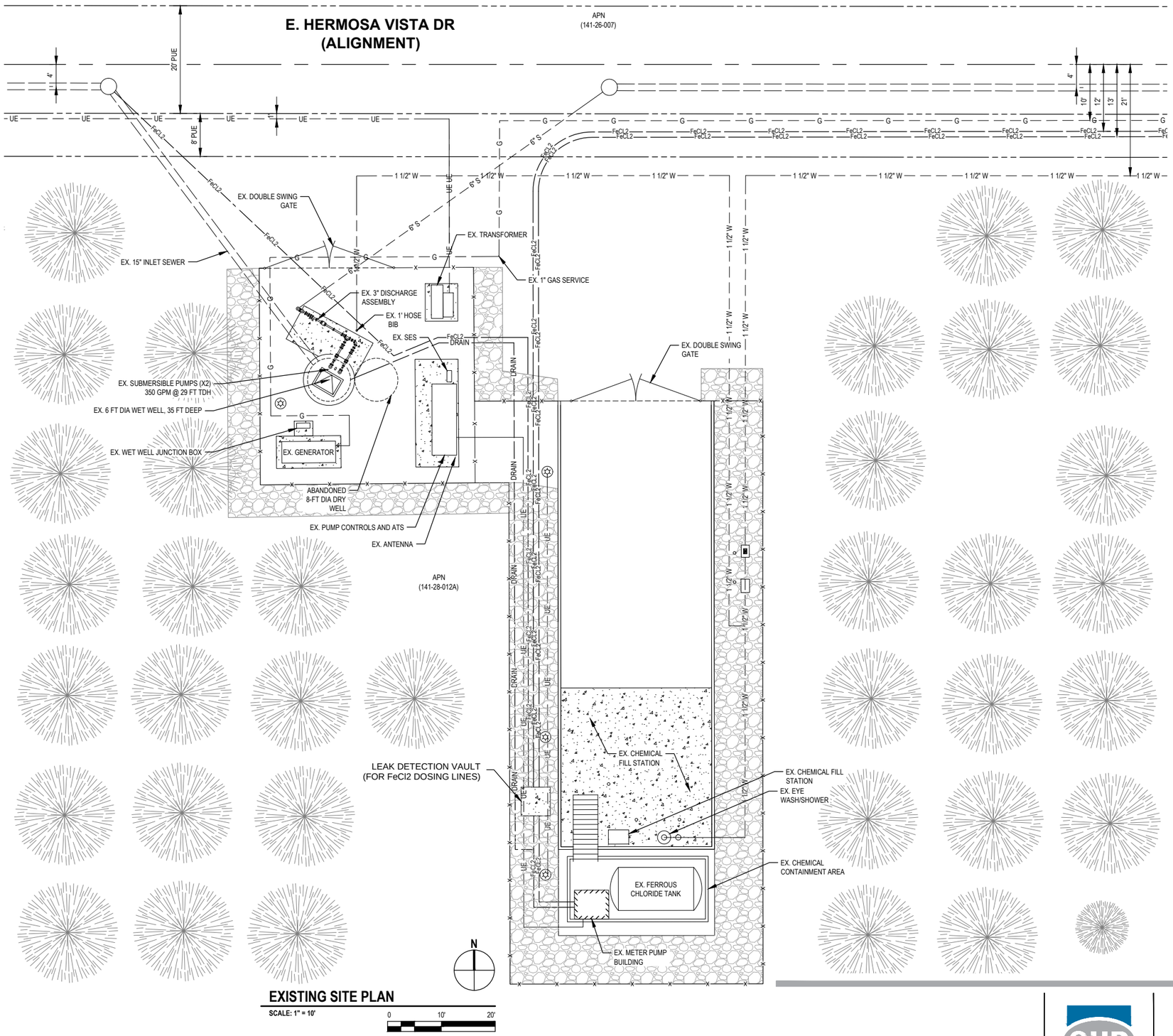
The preliminary Opinion of Probable Cost is included in Appendix C and is summarized in Table 7.1 below. A 10% project contingency has been included along with a 15% market escalation factor to reflect recent market volatility and potential material and labor price increase at the time of construction.

**Table 7.1 Preliminary Opinion of Cost Summary**

| Description | Cost |
|---|---|
| Materials & Labor | $1,149,368 |
| 10% Project Contingency | $114,937 |
| 15% Market Escalation Factor | $172,405 |
| 15% Overhead & Profit | $215,507 |
| 3% Bond & Insurance | $43,101 |
| **TOTAL** | **$1,695,318** |

# Appendix A

# Conceptual Plans




## EXISTING SITE PLAN

SCALE: 1" = 10'

**CITY OF MESA**
**LIFT STATION IMPROVEMENTS**
**HERMOSA VISTA**

**EXISTING SITE PLAN**

Project No. **12577360**
Report No. **N/A**
Date **APRIL 2024**

**C1**

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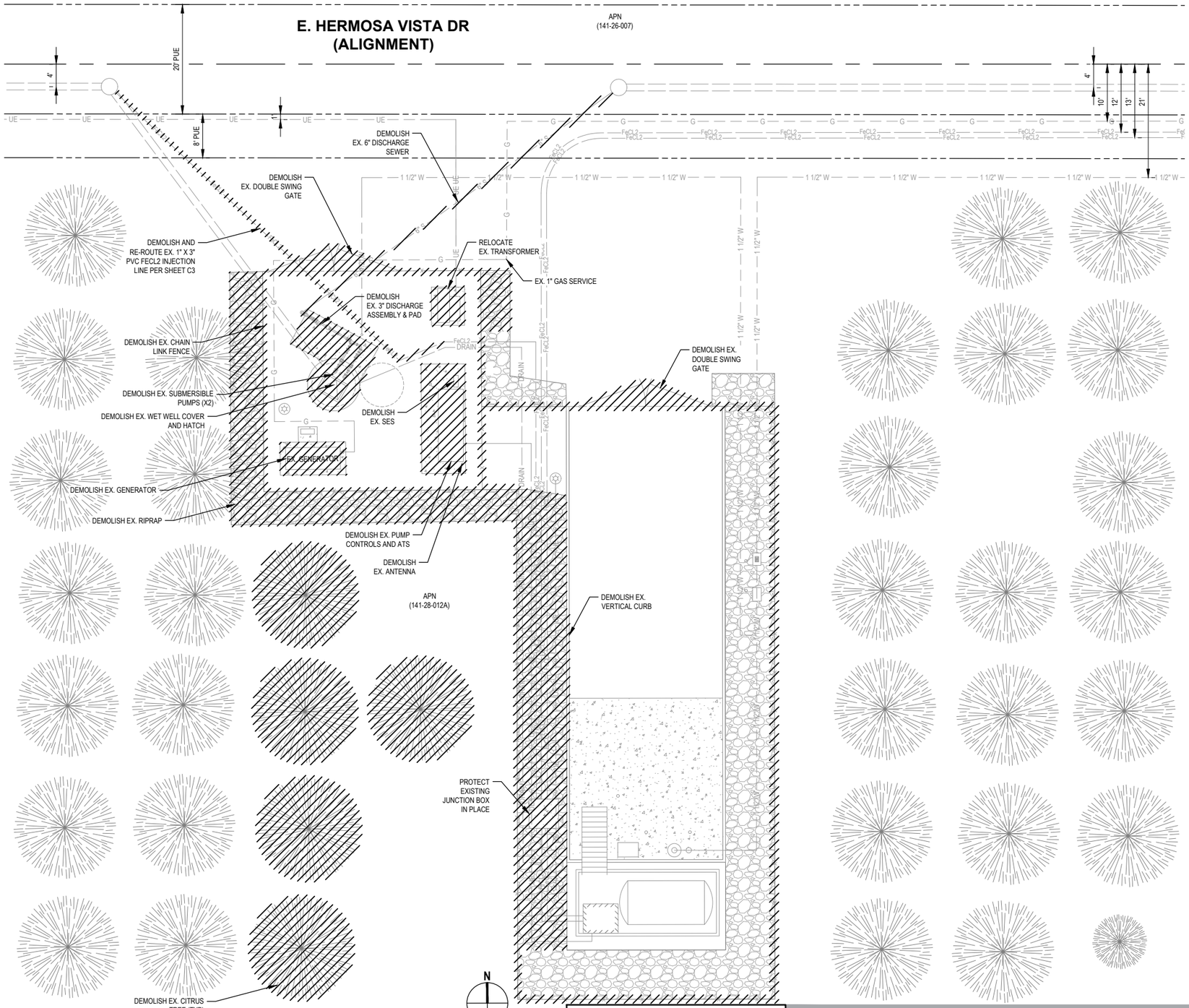


## DEMOLITION PLAN

SCALE: 1" = 10'

## LEGEND

DEMOLITION AND REMOVALS

GHD

CITY OF MESA
LIFT STATION IMPROVEMENTS
HERMOSA VISTA

DEMOLITION PLAN

Project No. 12577360
Report No. N/A
Date APRIL 2024

C2

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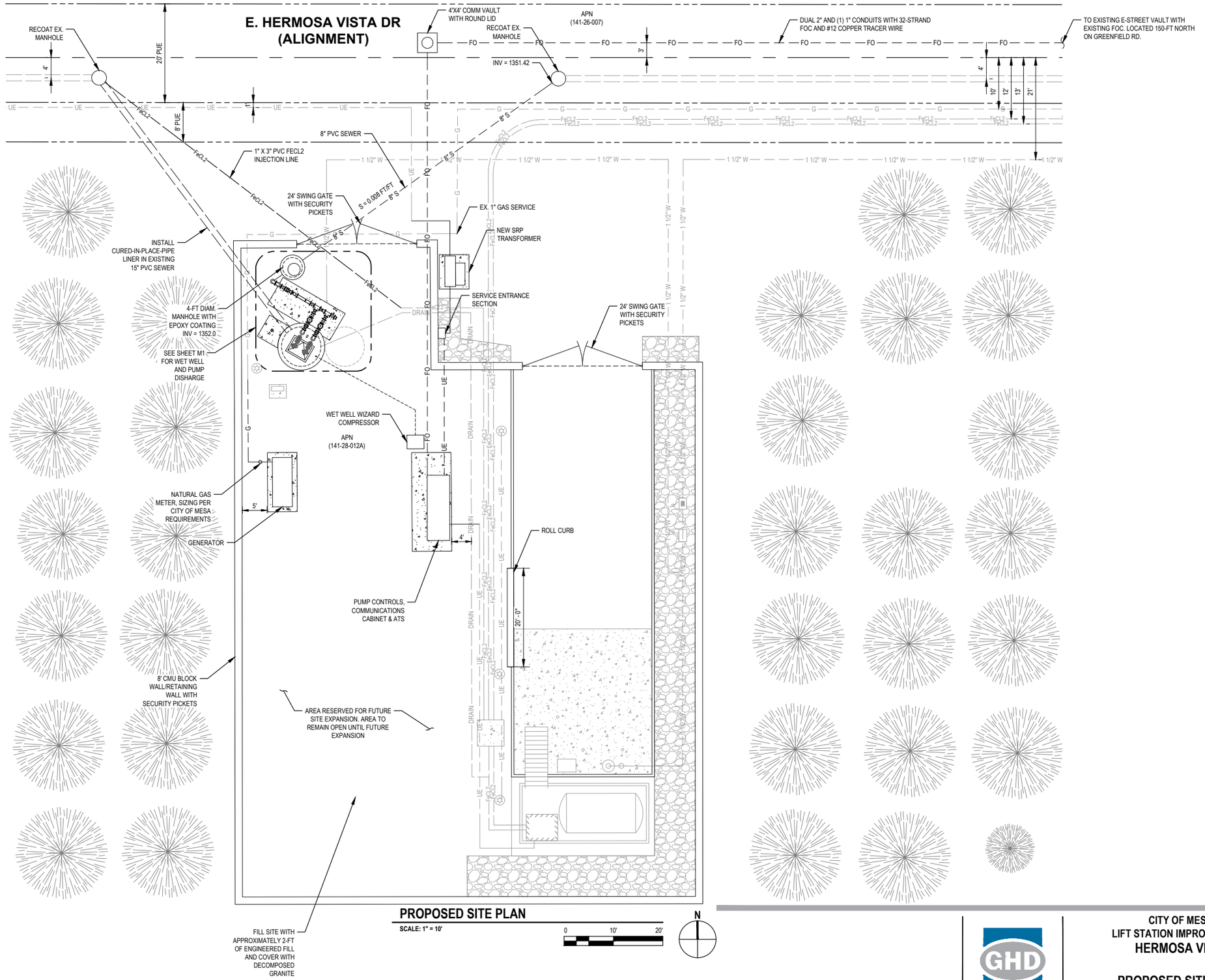


CITY OF MESA
LIFT STATION IMPROVEMENTS
HERMOSA VISTA

PROPOSED SITE PLAN

Project No. 12577360
Report No. N/A
Date APRIL 2024

C3

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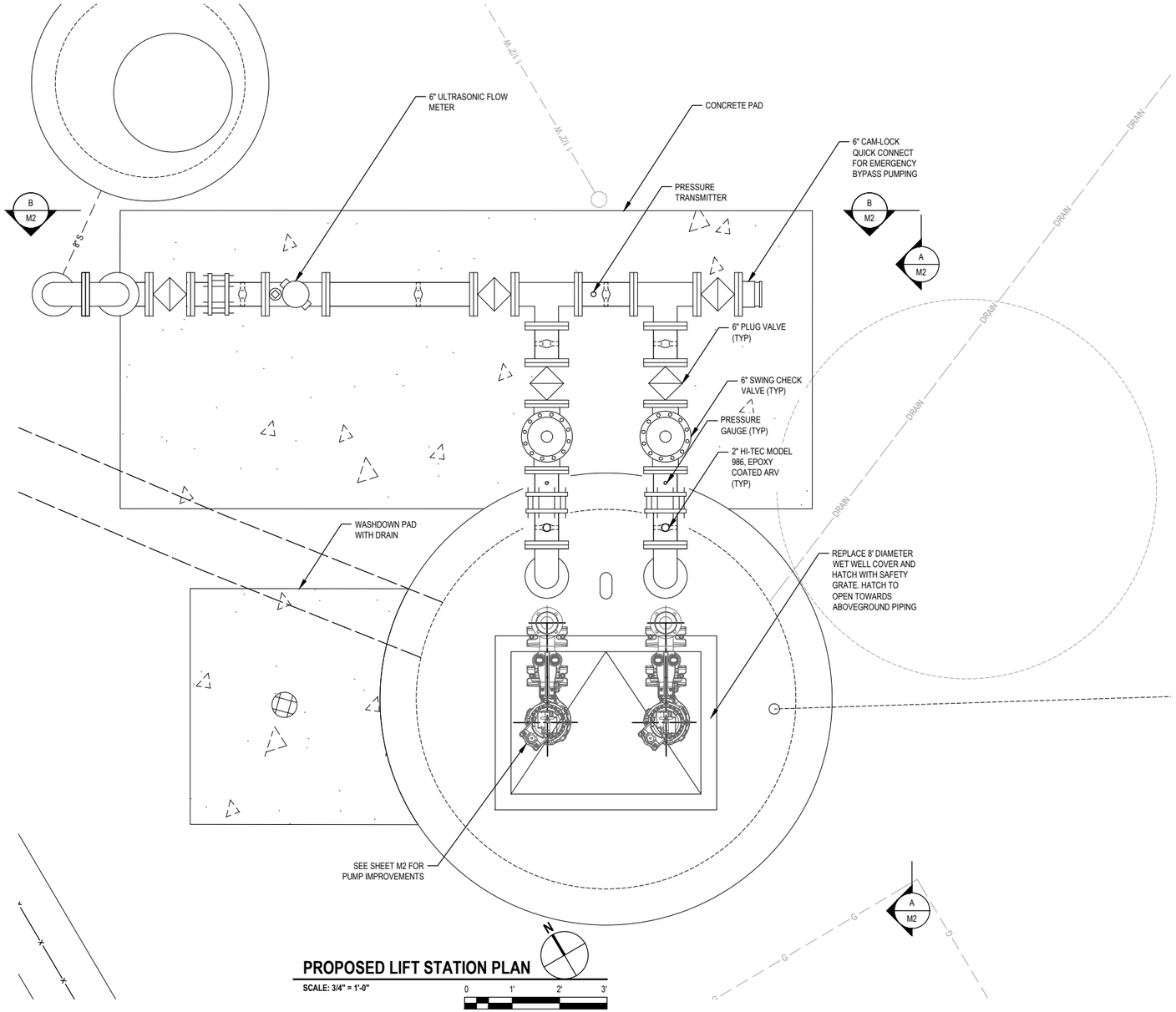


CITY OF MESA
LIFT STATION IMPROVEMENTS
HERMOSA VISTA

PROPOSED LIFT STATION PLAN

Project No. 12577360
Report No. N/A
Date APRIL 2024

M1

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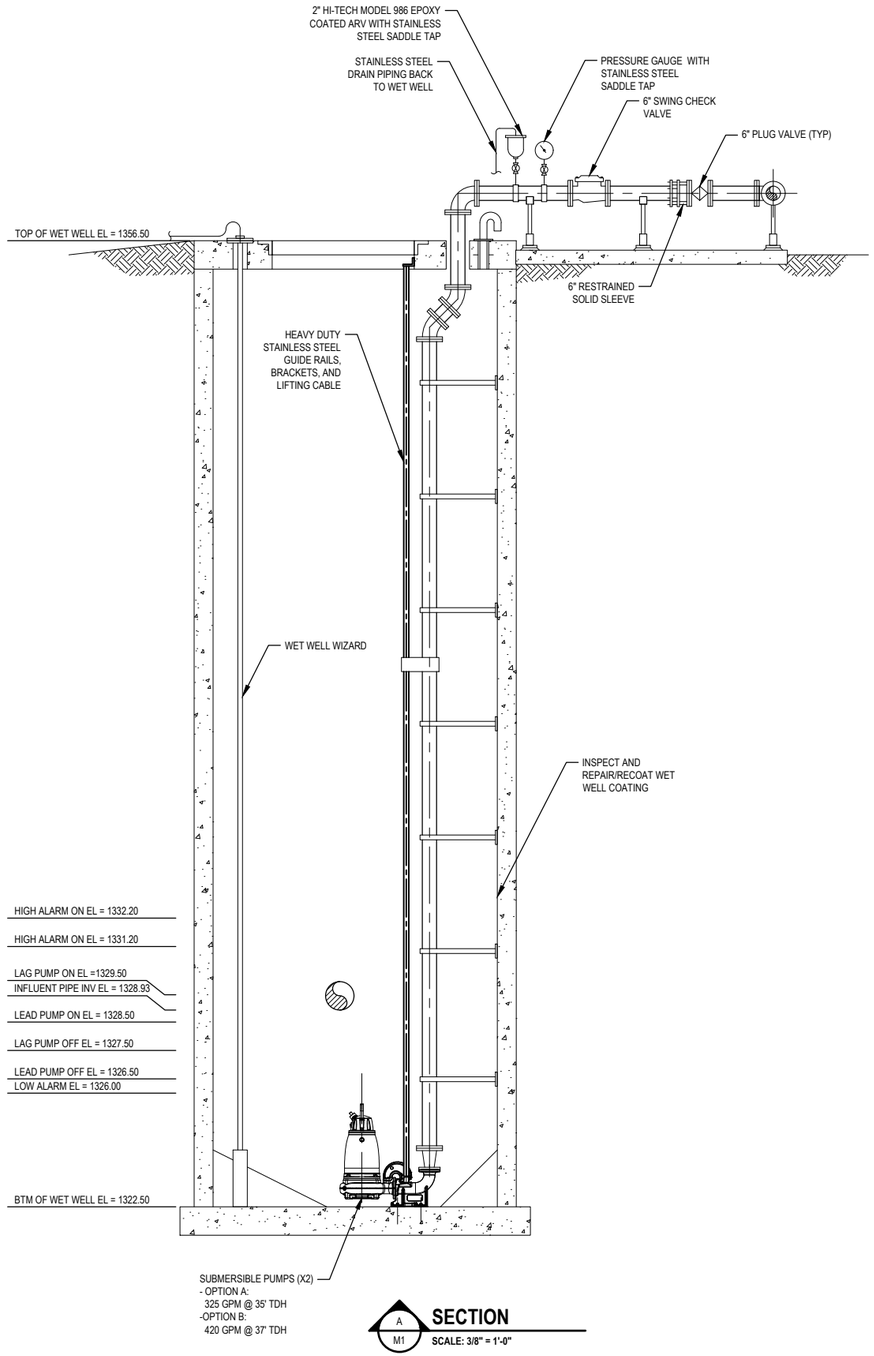
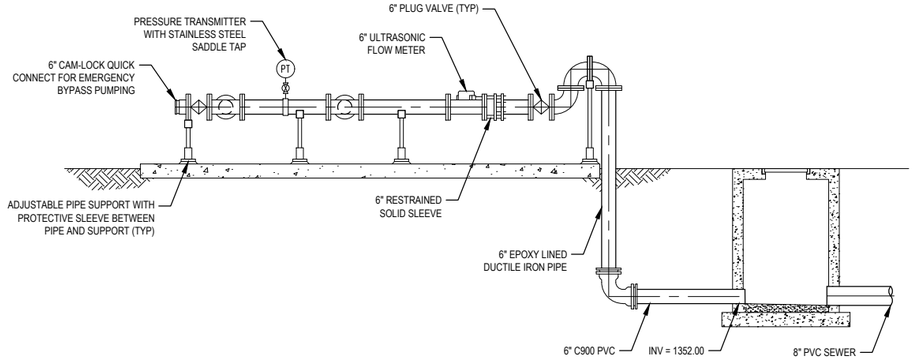



A M1 **SECTION**

**SCALE: 3/8" = 1'-0"**




B M1 **SECTION**

**SCALE: 3/8" = 1'-0"**

0 2'-0" 4'-0" 6'-0"

SCALE 3/8"=1'-0" AT ORIGINAL SIZE

**CITY OF MESA**
**LIFT STATION IMPROVEMENTS**
**HERMOSA VISTA**

**SECTIONS**

Project No. **12577360**
Report No. **N/A**
Date **APRIL 2024**

**M2**

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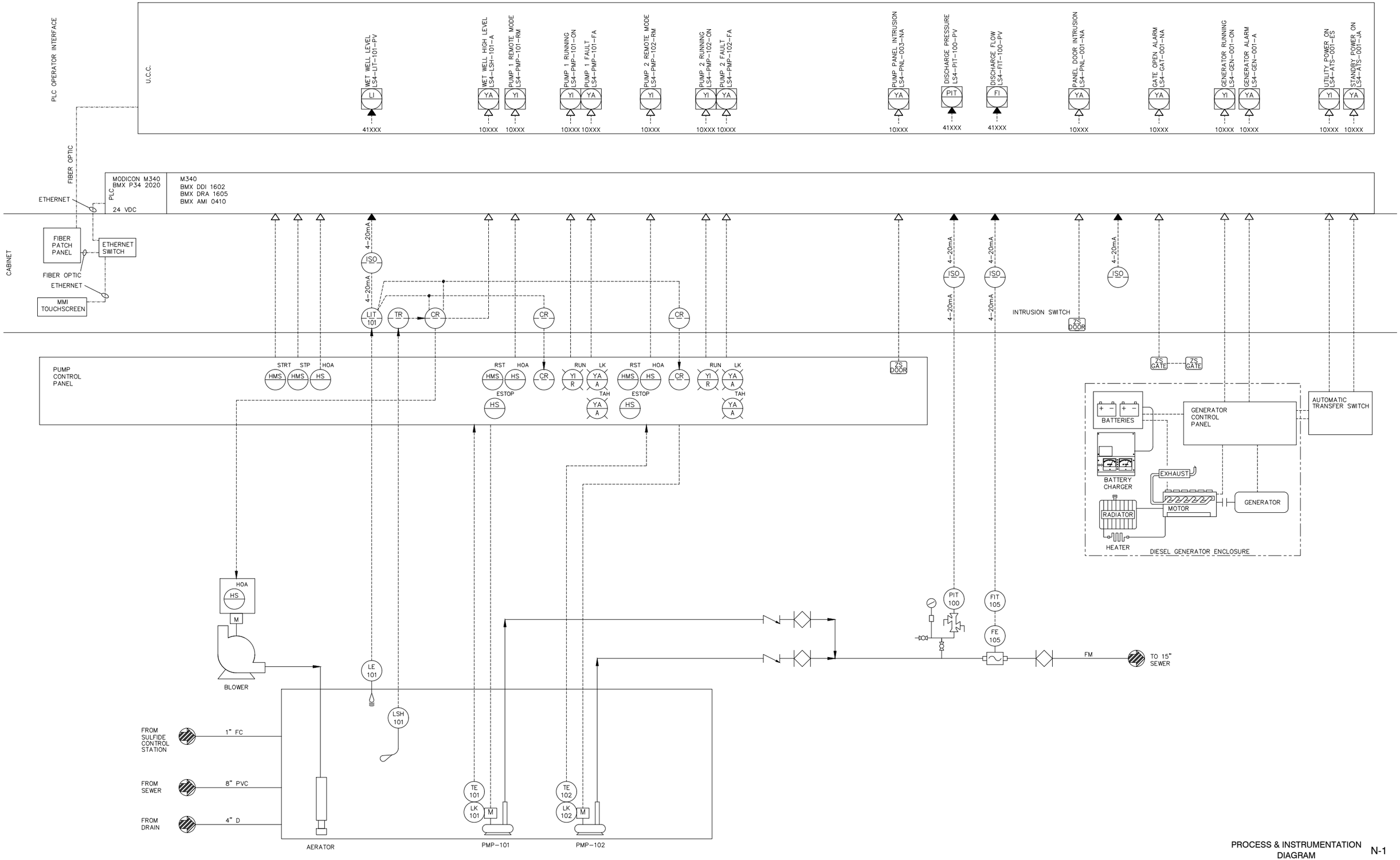



PROCESS & INSTRUMENTATION DIAGRAM

# Appendix B

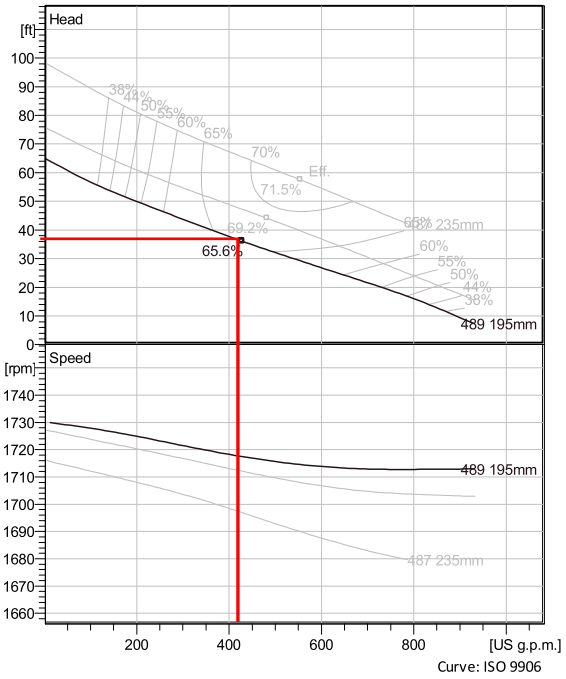
# Pump Data Sheets

# NP 3127 HT 3~ Adaptive 489

Patented self cleaning semi-open channel impeller, ideal for pumping in waste water applications. Modular based design with high adaptation grade.

## Technical specification

Curves according to: Water, pure Water, pure [100%], 39.2 °F, 62.42 lb/ft³, 1.6891E-5 ft²/s




Curve: ISO 9906

Nominal (mean) data shown. Under- and over-performance from this data should be expected due to standard manufacturing tolerances.
Please consult your local Flygt representative for performance guarantees.

## Configuration

**Motor number**
N3127.060 21-10-4AL-W 7.5hp

**Installation type**
P - Semi permanent, Wet

**Impeller diameter**
195 mm

**Discharge diameter**
4 inch

## Pump information

**Impeller diameter**
195 mm

**Discharge diameter**
4 inch

**Inlet diameter**
100 mm

**Maximum operating speed**
1750 rpm

**Number of blades**
2

**Max. fluid temperature**
40 °C

## Material

**Impeller**
Hard-Iron ™

**Stator housing material**
Grey cast iron

| | | | | | |
|---|---|---|---|---|---|
| **Project** | GHD ENG HERMOSA VISTA LS | **Created by** | ED Martin | | |
| **Block** | 0 | **Created on** | 9/28/2023 | **Last update** | 9/28/2023 |

# NP 3127 HT 3~ Adaptive 489

Technical specification

## Motor - General

| | | | |
|---|---|---|---|
| **Motor number**<br>N3127.060 21-10-4AL-W 7.5hp | **Phases**<br>3~ | **Rated speed**<br>1750 rpm | **Rated power**<br>7.5 hp |
| **ATEX approved**<br>No | **Number of poles**<br>4 | **Rated current**<br>9.6 A | **Stator variant**<br>12 |
| **Frequency**<br>60 Hz | **Rated voltage**<br>460 V | **Insulation class**<br>H | **Type of Duty**<br>S1 |
| **Version code**<br>060 | | | |

## Motor - Technical

| | | | |
|---|---|---|---|
| **Power factor - 1/1 Load**<br>0.85 | **Motor efficiency - 1/1 Load**<br>86.3 % | **Total moment of inertia**<br>0.963 lb ft² | **Starts per hour max.**<br>30 |
| **Power factor - 3/4 Load**<br>0.81 | **Motor efficiency - 3/4 Load**<br>87.6 % | **Starting current, direct starting**<br>58 A | |
| **Power factor - 1/2 Load**<br>0.72 | **Motor efficiency - 1/2 Load**<br>87.4 % | **Starting current, star-delta**<br>19.3 A | |

| | | | | | |
|---|---|---|---|---|---|
| **Project** | GHD ENG HERMOSA VISTA LS | **Created by** | ED Martin | | |
| **Block** | 0 | **Created on** | 9/28/2023 | **Last update** | 9/28/2023 |

# Appendix C

# Opinion of Cost

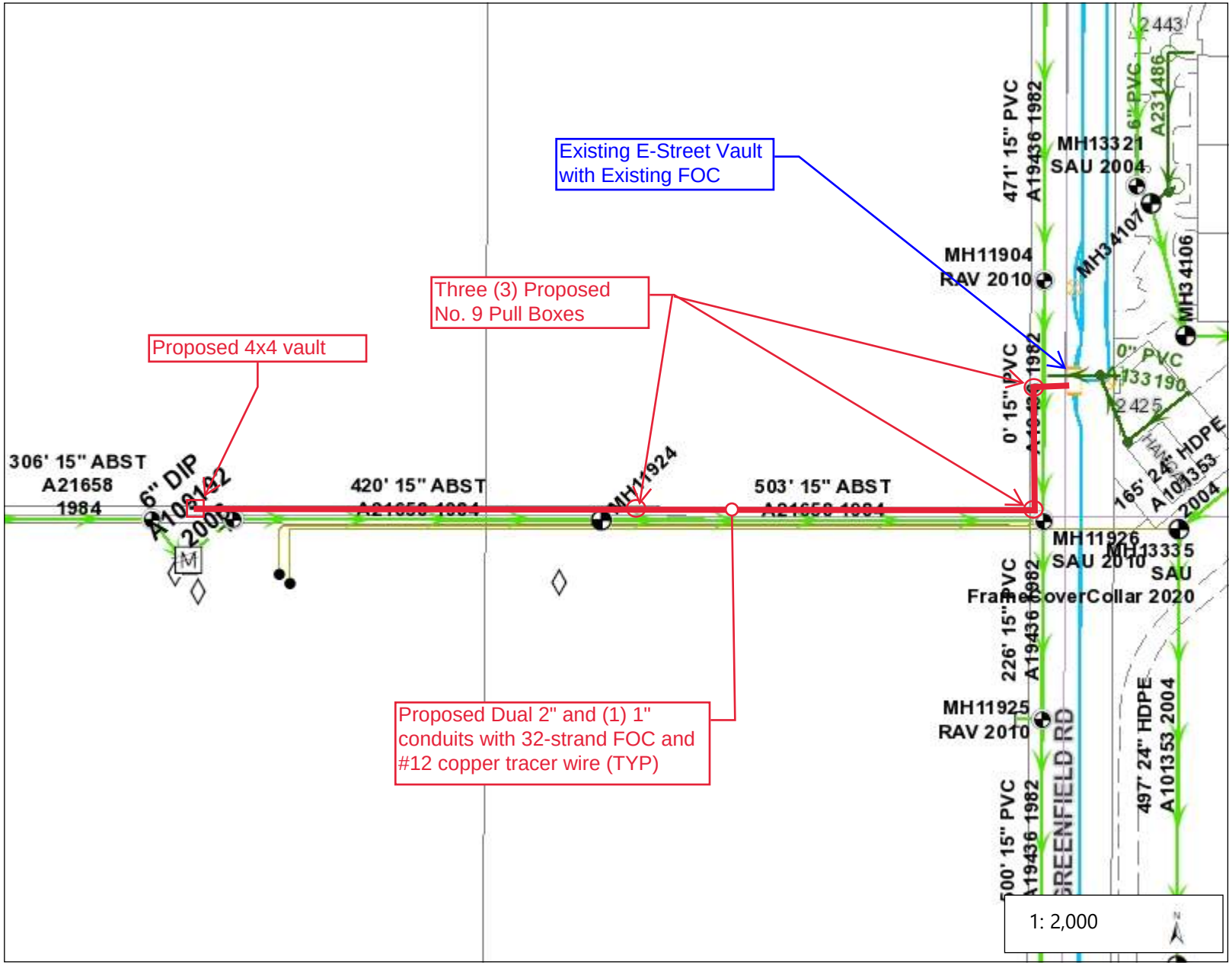
| Description | Unit | Quantity | Unit Price | Total |
|---|---|---|---|---|
| | | | | |
| Construction Staking and As-Builts | LS | 1 | $11,400 | $11,400 |
| Traffic Control | LS | 1 | $2,000 | $2,000 |
| Mobilization/De-Mobilization | LS | 1 | $49,800 | $49,800 |
| Utility Locating | LS | 1 | $9,200 | $9,200 |
| Demolition and Removal of Existing Piping | LS | 1 | $15,000 | $15,000 |
| Demolition and Removal of Existing Pumps | LS | 1 | $6,000 | $6,000 |
| Connect to Existing Manhole | EA | 2 | $6,480 | $12,960 |
| 6" Roll Curb | LF | 20 | $125 | $2,500 |
| Site Grading | LS | 1 | $20,000 | $20,000 |
| CMU Wall | LF | 400 | $400 | $160,000 |
| 1-1/2" - 1/4" DG | SY | 600 | $50 | $30,000 |
| 3'-6" x 3'-6" Washdown Pad | CY | 1 | $1,800 | $1,800 |
| Discharge Assembly Pad | CY | 2 | $1,800 | $3,600 |
| Remove Ex. Tree | EA | 3 | $2,500 | $7,500 |
| 24' Swing Gate | EA | 2 | $20,000 | $40,000 |
| Wet Well Coating | SF | 913 | $30 | $27,398 |
| Wet Well Wizard | LS | 1 | $17,000 | $17,000 |
| Recoat Ex. Inlet Manhole | SF | 490 | $30 | $14,688 |
| Recoat Ex. Discharge Manhole | SF | 144 | $30 | $4,326 |
| Submersible Pump Assembly W/ Stainless Steel Rails and Lifting Chains | EA | 2 | $28,458 | $56,915 |
| 6" DIP Force Main | LF | 56 | $400 | $22,400 |
| Misc. DIP Fittings | LS | 1 | $5,000 | $5,000 |
| 6" Plug Valve | EA | 4 | $2,094 | $8,375 |
| 6" Swing Check Valve | EA | 2 | $3,834 | $7,668 |
| 6" Ultrasonic Flow Meter | EA | 1 | $14,334 | $14,334 |
| 2" H-Tec Air Release Valve, Epoxy Coated | EA | 2 | $2,625 | $5,250 |
| Pipe and Equipment Coating | LS | 1 | $30,000 | $30,000 |
| Pipe Support | EA | 8 | $2,600 | $20,800 |
| 8" PVC Gravity Sewer | LF | 65 | $500 | $32,500 |
| CIPP line ex. 15" Gravity Sewer | LS | 1 | $25,000 | $25,000 |
| 4-ft Diameter Manhole with epoxy coating | EA | 1 | $10,000 | $10,000 |
| Temporary Sewer Bypass Pumping | LS | 1 | $165,600 | $165,600 |
| 8-ft Diameter Wetwell Cover & Hatch | EA | 1 | $10,000 | $10,000 |
| 36-Strand Single-Mode Fiber Optic Cable | LF | 1,960 | $1.25 | $2,450 |
| (2) 2", (1) 1" HDPE Conduit and #12 Copper Tracer Wire | LF | 1,200 | $55 | $66,000 |
| No. 9 Pull Box (30"x42"x48" Deep) | EA | 3 | $1,800 | $5,400 |
| 48" x 48" Vault with Round Frame and Cover | EA | 1 | $8,000 | $8,000 |
| Splice Enclosure | EA | 1 | $2,500 | $2,500 |
| Electrical & Instrumentation Improvements | LS | 1 | $216,004 | $216,004 |
| | | | | |
| Subtotal | | | | $1,149,368 |
| Project Contingency | 10% | | | $114,937 |
| Market Escalation Factor | 15% | | | $172,405 |
| Overhead & Profit | 15% | | | $215,507 |
| Bond & Insurance | 3% | | | $43,101 |
| **Total** | | | | **$1,695,318** |

# Appendix D

# Preliminary Fiber Optic Alignment

mesa·az Land & Utilities Viewer

Conceptual Layout for Fiber Lateral to Hermosa Vista LS (Site 6)
Date: 12/14/2023




Legend

Notes

0.1 0 0.03 0.1 Miles

NAD_1983_HARN_StatePlane_Arizona_Central_FIPS_0202_Feet_Intl


# about GHD

GHD is one of the world's leading professional services companies operating in the global markets of water, energy and resources, environment, property and buildings, and transportation. We provide engineering, environmental, and construction services to private and public sector clients.

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