APPROVED
City of Mesa
Engineering

Alma School Lift Station Rehabilitation

Design Concept Report
September 14, 2024

City of Mesa
Project No. CP0958LS01

Registered Professional Engineer (Civil)
CERTIFICATE NO.
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09/14/2024
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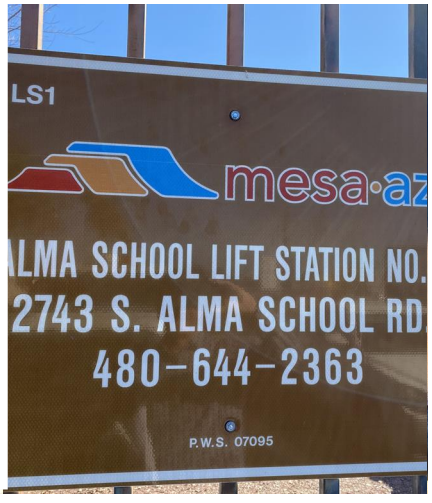
ARIZONA U.S.A.



mesa·az

GHD | 4747 North 22nd Street Suite 200, Phoenix, AZ 85016

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1. Introduction

The existing City of Mesa Alma School Lift Station (LS) was constructed in 1979 and rehabilitated in 2002. The site is located at 1166 W Guadalupe Road at the northeast corner of the intersection of Alma School Road and Guadalupe Road. The LS discharges to a gravity sewer approximately 50-ft west of the wet well. Figures 1 and 2 below show the site and service area respectively.

Existing LS components include:

- 30.5-ft deep, 8-ft diameter wet well
- Two submersible pumps, 1,400 gpm at 25-ft TDH each
- 8” above ground discharge piping and valves
- Natural gas emergency generator
- 18” vitrified clay pipe (VCP) gravity sewer influent line
- 10” cast iron (CI) force main
- 15” vitrified clay pipe (VCP) overflow drain pipe
- 3-ft slump block perimeter wall with steel security fence
- 16-ft wide double swing gate

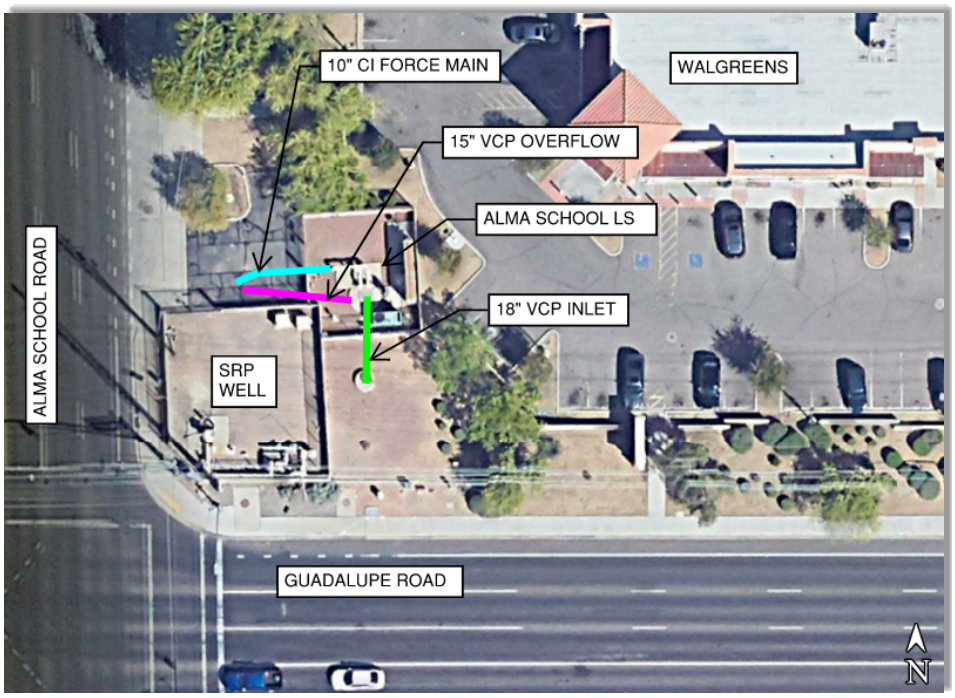


Figure 1 – Overall Site Location

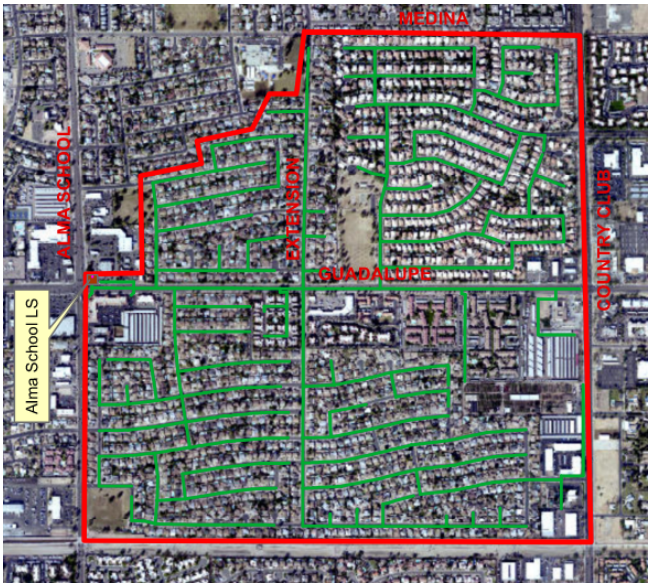


Figure 2 – Service Area

The purpose of this project is to rehabilitate the LS to replace aging components and to replace components that no longer meet City requirements. In addition, the current pump setting places the top of the pumps near the inlet sewer invert, causing wastewater to surcharge into the inlet sewer. The recent City measured wet well base elevation is approximately 4.5' higher than what is listed in the City Lift Station Inventory and what is shown on the original as-builts. Figure 3 below shows the relationship between the recent City measurements and the as-built information. In reviewing the original as-builts and the 2002 rehabilitation as-builts, it appears that the original wet well may have been filled with grout when abandoning the drywell pump configuration or when abandoning the non-standard pump configuration shown on the 2002 rehabilitation as-builts that is no longer in use. This could explain why the measured base elevation is approximately 4.5' higher than what is shown in the records and why surcharging is occurring. Pages from the original as-builts and 2002 rehabilitation as-builts are provided in Appendix B.

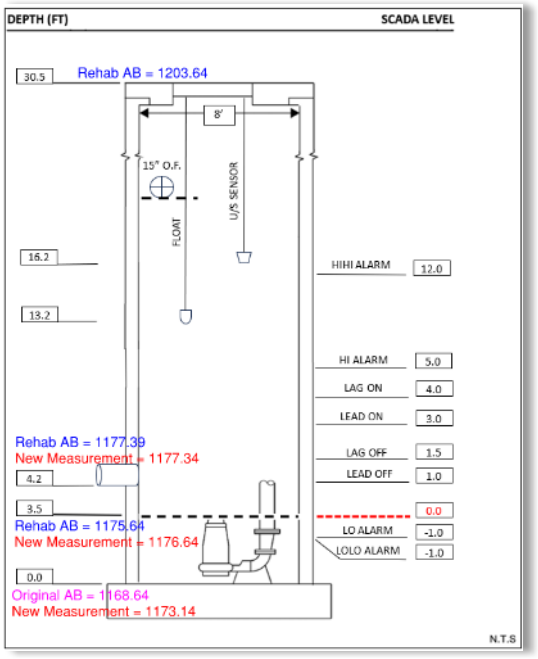


Figure 3 – Wet Well Measurements

The City is considering two options for providing the additional wet well capacity required to eliminate the inlet sewer surcharging. Both options will eliminate the surcharging. Proposed wet cross sections, pump settings, and elevations are shown for each option on Sheet M2 of the conceptual plans in Appendix A:

- **Option 1 – Remove Grout & Rehabilitate Existing Wet Well**
  - See Section 2 below.
- **Option 2 – New Wet Well**
  - See Section 2 below.

2. Project Scope

Rehabilitation improvements will include the following:

LIFT STATION

- **Option 1 – Remove Grout & Rehabilitate Existing Wet Well**
  - City to confirm grout fill depth. Confirmation of grout fill depth is not part of the DCR scope. GHD recommends the City obtain the services of a Job Order Contractor to set up bypass pumping, drain, clean and inspect the wet well. JOC to then Inspect bottom of wet well and perform exploratory chipping to confirm depth of grout fill and true depth of the wet well base.
  - If the JOC determines that the wet well base depth matches the original as-builts depth of 35-ft and that the grout fill can be removed, then JOC to update cost estimate for Option 1.
  - If Option 1 is deemed feasible and is still cost advantageous, GHD recommends proceeding with Option 1. In addition to the cost savings, Option 1 will have less down time and a simplified construction process compared to Option 2 due to the deep excavation required on the small site footprint for a new wet well.
  - Remove grout to wet well bottom for a pump base depth of 35-ft.
  - Inspect, repair, and recoat existing 8-ft diameter wet well.
- **Option 2 – New Wet Well**
  - If Option 1 is no longer feasible or cost effective after the JOC inspection discussed above, then GHD recommends proceeding with Option 2.
  - Demolish existing wet well.
  - install new 8-ft diameter, 35-ft deep wet well with modified slide rail shoring excavation system.
  - Remove and replace entire existing site wall to allow for excavation.
- Replace existing precast wet well cover and hatch with safety grate. Hatch shall open toward the discharge piping.
- Replace existing MAG meter with full bore ultrasonic flow meter.
- Include “gooseneck” on the above ground discharge piping to ensure flow meter remains full.
- Hard pipe ARV drains to wet well.
- New swing check valves placed in the horizontal position.
- Replace and relocate the two ARVs to upstream of the check valves.
- Provide emergency bypass cam-lock fitting for portable pump connection.
- Replace existing rails, pump cables, and holders with heave duty 316 stainless steel.
- Replace the two existing submersible pumps and provide a third pump for the shelf.
- Provide seal around gravity overflow pipe in wet well.
- New wet well wizard set to run with either Pump 1 or 2, with the lead pump, or continuous.

SITE

- New decomposed granite ground cover.
- Install faux wood slats on three sides of steel fencing. Repair mortar cap on slump block wall.
- Replace existing swing gate.
- Replace the existing 1” water service with a 2” water service connection and new 2” backflow preventer located against the wall.
- Adjust site grading to remove low point from the site.
- Coat existing brick discharge manhole and concrete base.
- Rehabilitate 18” VCP gravity influent pipe with Cured-In-Place-Pipe (CIPP) based on City CCTV report dated 3/23/21
- Rehabilitate 15” VCP overflow pipe with CIPP based on City CCTV report dated 3/23/21.
- Recoat existing inlet manhole and base.
- Replace existing cast iron force main with C900 PVC pipe force main.

ELECTRICAL

- Replace electrical enclosure.
- Replace automatic transfer switch, pump starters, 120VAC distribution panel, PLC and cabinets.
- Replace and relocate the SES to outside of the site walls with free standing support.
- Replace wet well float switches and level transducer.
- Replace the existing generator.
- Add LED site lighting.

3. Design

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

3.1 Submersible Pumps

The following existing site information is provided from the City Lift Station Inventory:

- Average flow = 155 gpm
- Peak flow = 310 gpm
- Pump 1 = Flygt CP3153X-415, 1400 gpm @ 25’ TDH
- Pump 2 = Flygt CP3153X-415, 1400 gpm @ 25’ TDH

The reported average flow matches City flow measurement data for the downstream MH3547 at approximately 153 gpm. However, the flow measurement data at MH3547 indicates that the pumps are operating at a lower flow rate of approximately 800 gpm. This is due to the pumps operating at a higher head than 25’ TDH as shown on the system curve below and head loss calculations below. The MH3547 flow data is provide in Appendix C. The proposed pumps for both Option 1 and 2 will match the approximate 800 gpm flow rate per the system curve and head loss calculations below. The proposed pump data is in Appendix D.

- Flygt NP3153 MT 3 436, 15 hp, 840 gpm @ 39’ TDH (Option 1 & 2)

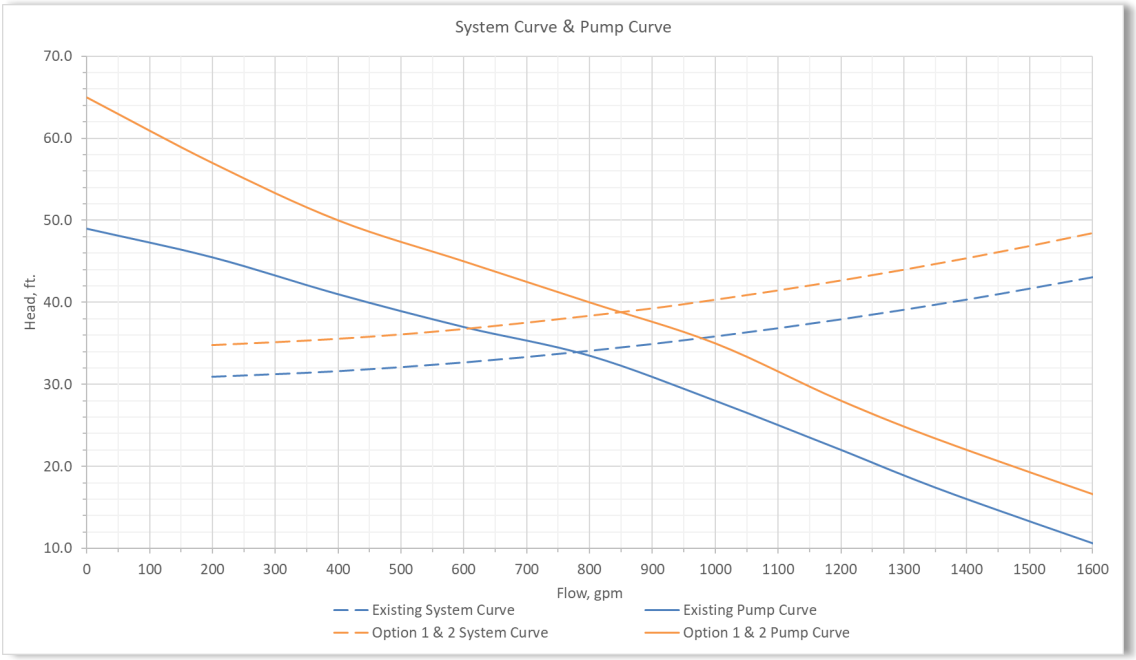


Figure 4 – System Curve

Flow =	800											
Headloss Calculations:	**Existing Condition**											
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**
8	37	800	DIP	1	37	37	5.11	0.40	130	1.18	0.44	0.4
10	53	800	DIP	1	53	53	3.27	0.17	130	0.40	0.21	0.6
8		800	90º Bend	7	20	140	5.11	0.40	130	1.18	1.66	2.3
8		800	Swing Check Valve	1	33	33	5.11	0.40	130	1.18	0.39	2.7
8		800	Plug Valve (Thru)	3	k = 0.25		5.11	0.40	-	-	0.10	2.8
8		800	Tee Branch	1	39.9	39.9	5.11	0.40	130	1.18	0.47	3.3
8		800	Flow Meter	1	13.3	13.3	5.11	0.40	130	1.18	0.16	3.4
										Total Headloss (Rounded), ft =		3.4
										Pump Off Elevation, ft =		1176.0
										Elevation of Highest Point in FM, ft=		1206.6
										Static Head, ft =		**30.6**
										TDH (Rounded), ft =		**34.1**

Flow =	840											
Headloss Calculations:		**Option 1 & 2**										
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**
8	37	840	DIP	1	37	37	5.36	0.45	130	1.30	0.48	0.5
8	53	840	DIP	1	53	53	5.36	0.45	130	1.30	0.69	1.2
8		840	90º Bend	7	20	140	5.36	0.45	130	1.30	1.81	3.0
8		840	Swing Check Valve	1	33	33	5.36	0.45	130	1.30	0.43	3.4
8		840	Plug Valve (Thru)	3	k = 0.25		5.36	0.45	-	-	0.11	3.5
8		840	Tee Branch	1	39.9	39.9	5.36	0.45	130	1.30	0.52	4.0
8		840	Flow Meter	1	13.3	13.3	5.36	0.45	130	1.30	0.17	4.2
										Total Headloss (Rounded), ft =		4.2
										Pump Off Elevation, ft =		1172.1
										Elevation of Highest Point in FM, ft=		1206.6
										Static Head, ft =		**34.5**
										TDH (Rounded), ft =		**38.7**

Table 1 – Head Loss Calculations

3.2 Wet Well Sizing

The proposed pumping volume does not meet the City design requirements for minimum pumping volume (3,000 gal) per the calculations below. This is common for lift stations with 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 higher than the incoming flow to maintain a 4 ft/s minimum velocity. This site has an incoming flow of 155 gpm and a pumping rate of 840 gpm. The minimum pumping volume calculation only utilizes pumping capacity and does not consider the additional fill time required for 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 and excessive wet well depth. GHD recommends matching the pumping volumes proposed below and resulting retention times and pump cycles per hour:

- Minimum Pumping Volume Calculation: 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 800 gpm) / 4 = 3,000 gal (401 ft^3)
- 8-ft diameter wet well cross-sectional area = 50.3 ft^2
- Proposed Distance between pump on & off setting = 4.26 ft
- Proposed Pumping Volume = 4.26 ft x 50.3 ft^2 = 214.27 ft^3 (1,602 gal). The existing pump setting elevation on top of the apparent grout fill provides zero pumping volume in the wet well since the pump off setting is above the inlet invert. All existing pumping volume is coming from surcharging into the inlet sewer system. See Table 2 below for average retention time and starts per our per pump.

Data Set	Ave. 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
Option 1 & 2	155	840	1,602	10.3	2.3	12.7	4.7	2.4

Table 2 – Retention Time & Pump Cycling

3.3 Pipe Sizing

The proposed pumping rate of 840 gpm and discharge piping size of 8” will match the existing pump and pipe sizes. The short section of existing 10” force main is oversized and can be reduced to 8”. At 840 gpm, the velocity in the 8” discharge pipe and force main will be 5.4 ft/s, which meets the City’s preferred requirement of 4 – 7 ft/s.

4. Site Improvements

4.1 Site Walls and Gates

Option 1 – Remove Grout & Rehabilitate Existing Wet Well
The mortar cap will be replaced on the 3.0’ tall slump block wall. Faux wood slats will be installed on three out of four of the sides of the steel security fencing. The existing steel swing gate is out of alignment and will be replaced.

Option 2 – New Wet Well
The entire perimeter wall must be demolished to allow construction access required to install a modified slide rail system to excavate deep enough to remove the existing wet well, and to install the new wet well.

A new 8-ft tall CMU block wall with security pickets and 16-ft swing gate with faux wood slats will installed to replace the demolished wall.

Figure 5 – Existing Site Fence & Gate

4.2 Grading and Drainage

The lift station site was originally intended to drain to the adjacent retention basin located southeast of the site along with the surrounding area drainage. However, the City reported standing water within the site during rain events. GHD performed a topographic survey of the site and determined that the DG ground cover is approximately 6" lower in the center of the site than the surrounding area. Therefore, onsite drainage will pond up against the wet well and electrical pads during a rain event. The wet well cover and electrical pads are higher than the outfall of the site, so rainwater will leave the site prior to overtopping the electrical pad and wet well cover. However, the ground cover at the site should be regraded to fill in the 6" depression to eliminate the onsite ponding.

5. Maintenance of Plant Operation (MOPO)

Bypass pumping will be required during construction from the influent manhole, to the force main discharge manhole per figure 6 below. The bypass piping will be routed through the wall openings that were installed for bypass pumping during the previous site rehabilitation. A temporary electrical service will also be required to provide power for temporary bypass pumping since the electrical equipment will be replaced. Once bypass pumping is in place, the site can be taken out of service for construction.

Figure 6 – Bypass Route

6. Electrical

The Alma School Lift Station is currently fed from a 200 amp, 480/277VAC, three phase service from Salt River Project. This site requires a new service entrance section to be relocated to the exterior western wall of the site. This will be fed from an existing transformer located in the SRP well site next to the lift station. It is anticipated the upgraded pump motors match the existing motors. An increase in service capacity is not anticipated.

The existing automatic transfer switch, pump starters, 120VAC distribution panel, PLC and cabinets will be replaced. The existing service entrance portion is to be removed and a new service entrance will be located outside of the site wall.

The existing 50KW generator is past its useful life and needs to be replaced. It is anticipated the new generator will be a natural gas powered 50KFW generator to match existing. This will provide adequate backup power for the entire site. All existing conduit and conductors may be reused for the generator to the ATS. Since the ATS will remain, no new signals from the ATS to the PLC are required.

The existing pumps and motors are anticipated to be replaced in kind with 15HP 480V 3 phase motors. New conductors will be installed for the new pump motors and will use most of the same conduits as existing. New conduit and conductors from the new pump motor junction boxes and the new terminal junction boxes will be required.

The existing flow meter will be replaced with a new full bore ultrasonic flow meter. The wet well level transducer will be replaced with a new ultrasonic level transducer by pulsar. New conduit and conductors for these instruments will be required.

All existing site lighting is to be replaced with new LED lights.

7. Opinion of Probable Cost

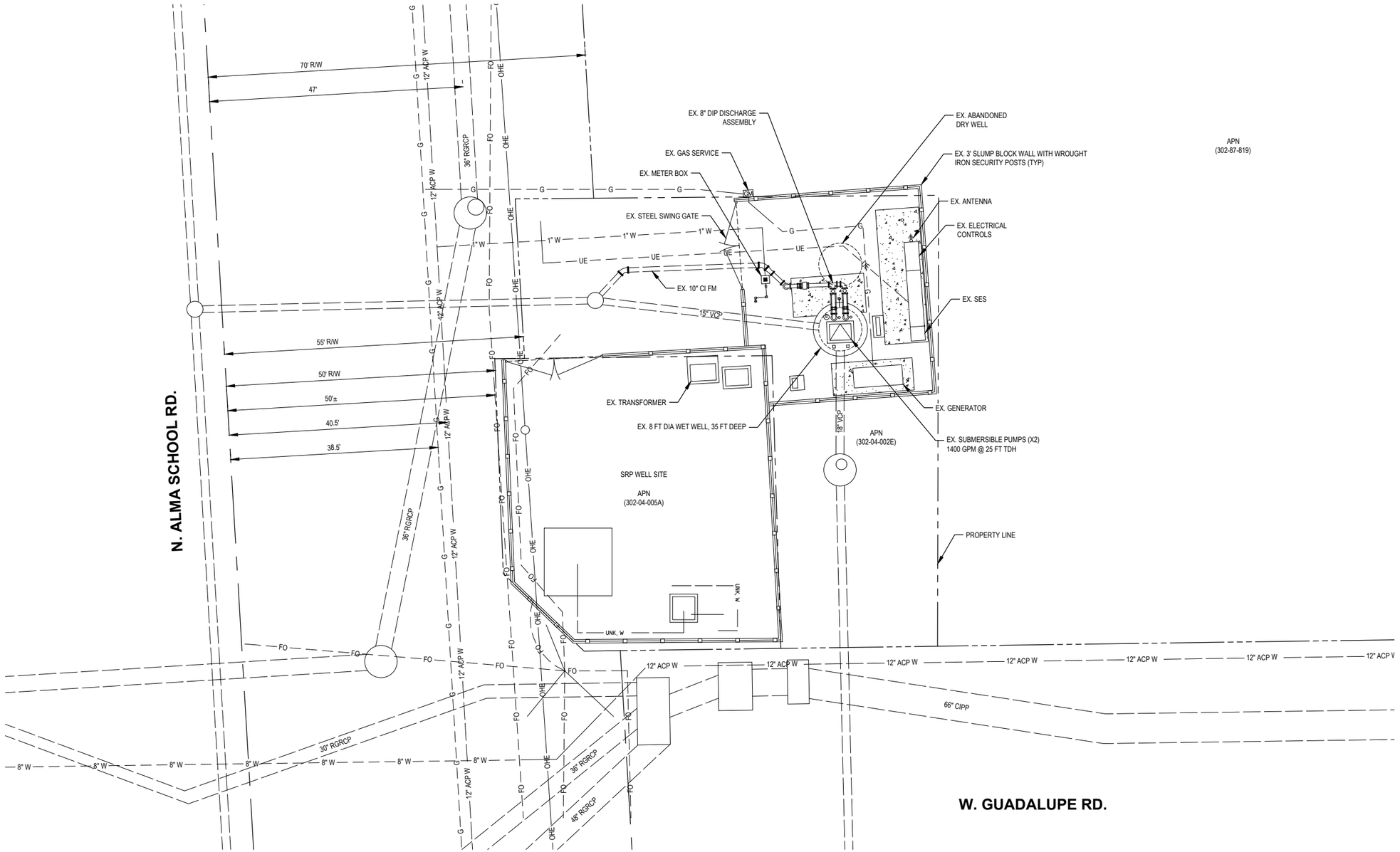
The preliminary Opinion of Probable Cost for both Options 1 and 2 are included in Appendix E and is summarized in Table 3 below. A 10% project contingency has been included along with a 15% market escalation factor to reflect recent market volatility and potential material and labor price increase at the time of construction.

Table 3 Preliminary Opinion of Cost Summary

Description	Option 1 – Remove Grout & Rehabilitate Existing Wet Well	Option 2 – New Wet Well
Materials & Labor	$1,120,812	$2,195,824
10% Project Contingency	$112,081	$219,582
15% Market Escalation Factor	$168,122	$329,374
15% Overhead & Profit	$210,152	$411,717
3% Bond & Insurance	$42,030	$82,343
TOTAL	**$1,653,197**	**$3,238,841**

Appendix A

Conceptual Plans



EXISTING SITE PLAN

SCALE: 1" = 10'

N

0 10' 20'

GHD

CITY OF MESA
LIFT STATION IMPROVEMENTS
ALMA SCHOOL LIFT STATION

EXISTING SITE PLAN

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Report No. **N/A**
Date **SEPT 2024**

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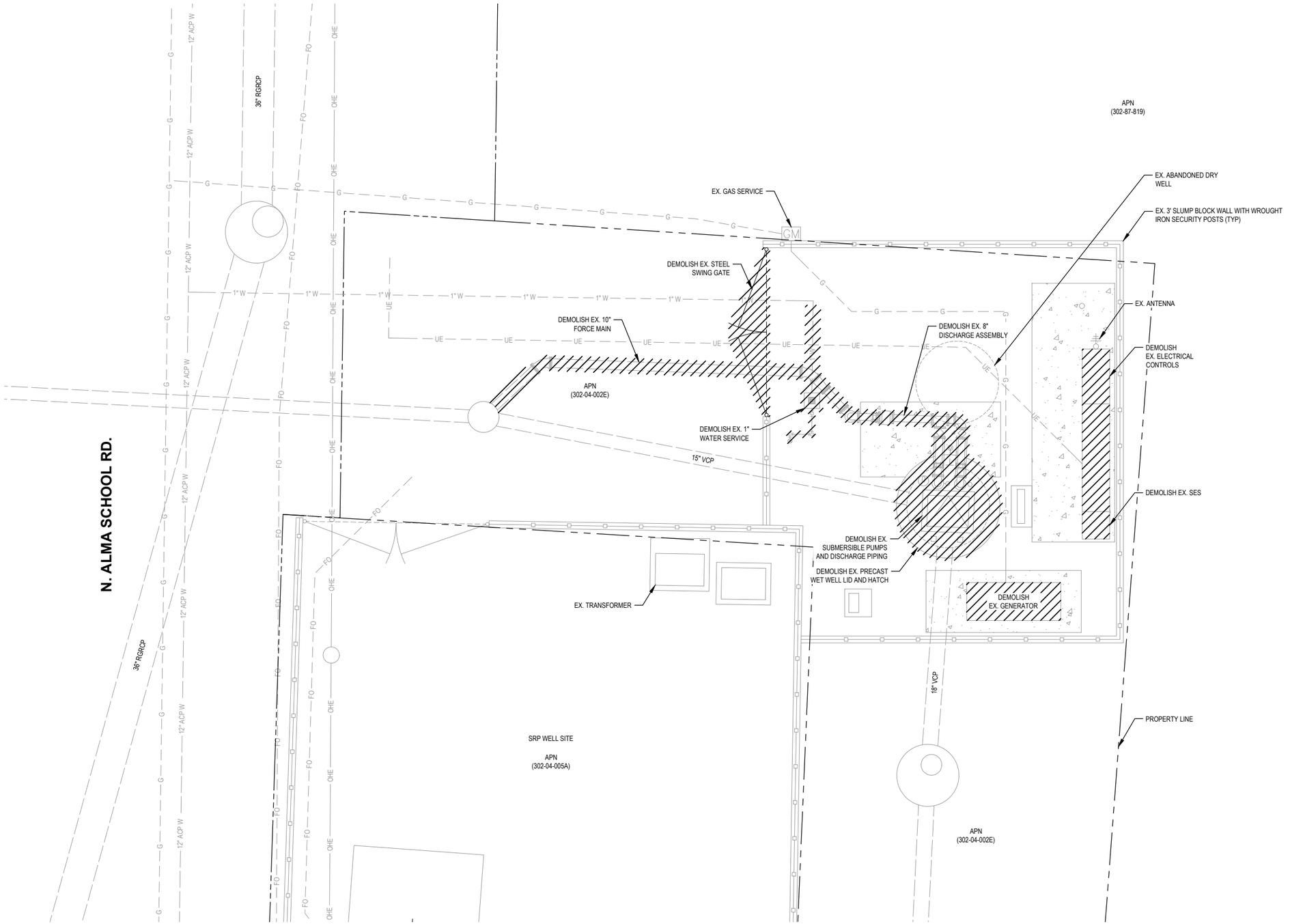

LEGEND

DEMOLITION AND REMOVALS

DEMOLITION NOTES

1. DEMOLITION PLAN SHOWN FOR OPTION 1 ONLY.
2. OPTION 2 DEMOLITION REQUIRES THE FOLLOWING ADDITIONAL DEMOLITION WORK.
   - REMOVE AND REPLACE ENTIRE SITE WALL.
   - REMOVE AND REINSTALL EXISTING ELECTRICAL EQUIPMENT.

DEMOLITION PLAN

SCALE: 1" = 5'

N

0 5' 10'

GHD

CITY OF MESA
LIFT STATION IMPROVEMENTS
ALMA SCHOOL LIFT STATION

DEMOLITION PLAN

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

C2

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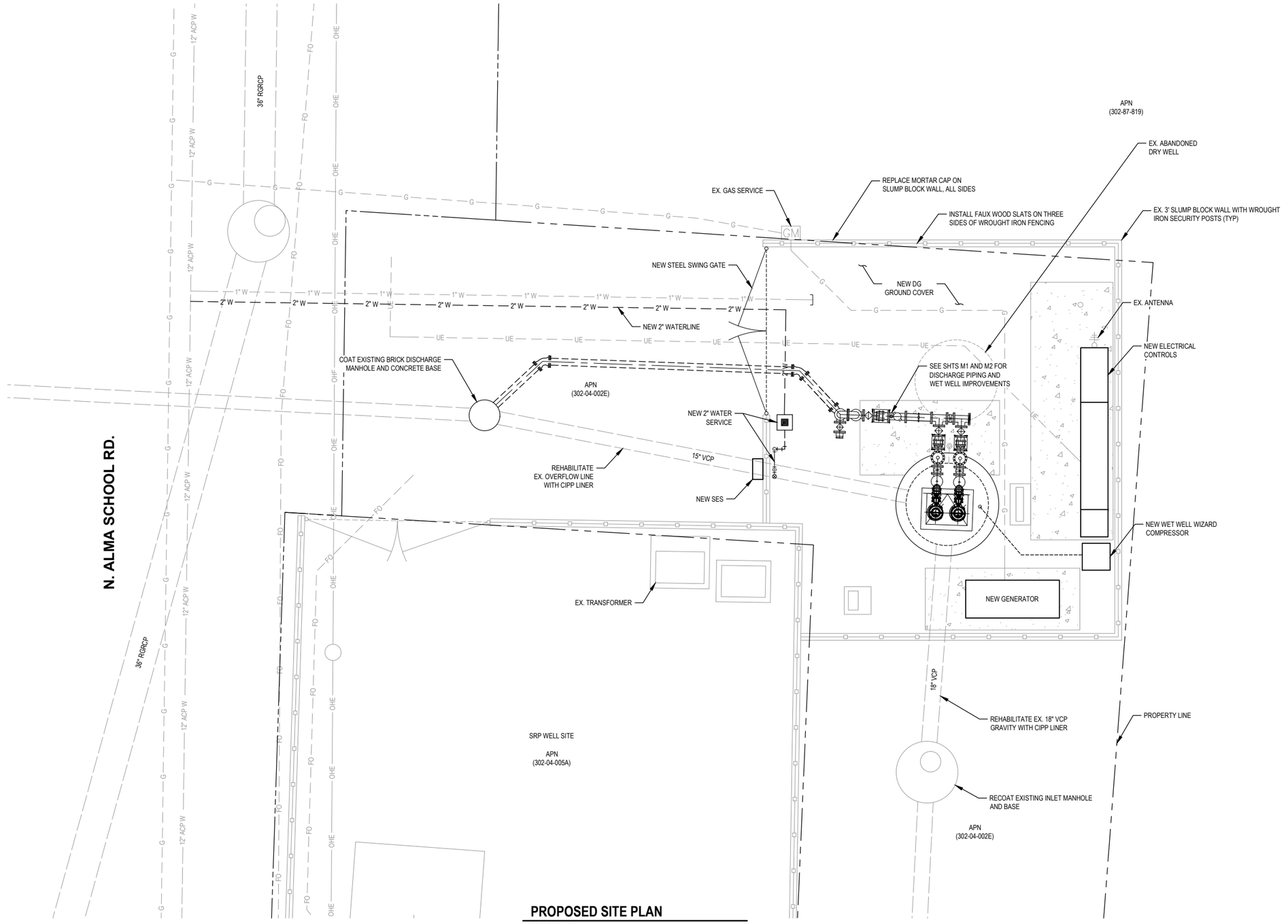

PROPOSED SITE PLAN

SCALE: 1" = 5'

N

0 5' 10'

GHD

CITY OF MESA
LIFT STATION IMPROVEMENTS
ALMA SCHOOL LIFT STATION

PROPOSED SITE PLAN

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

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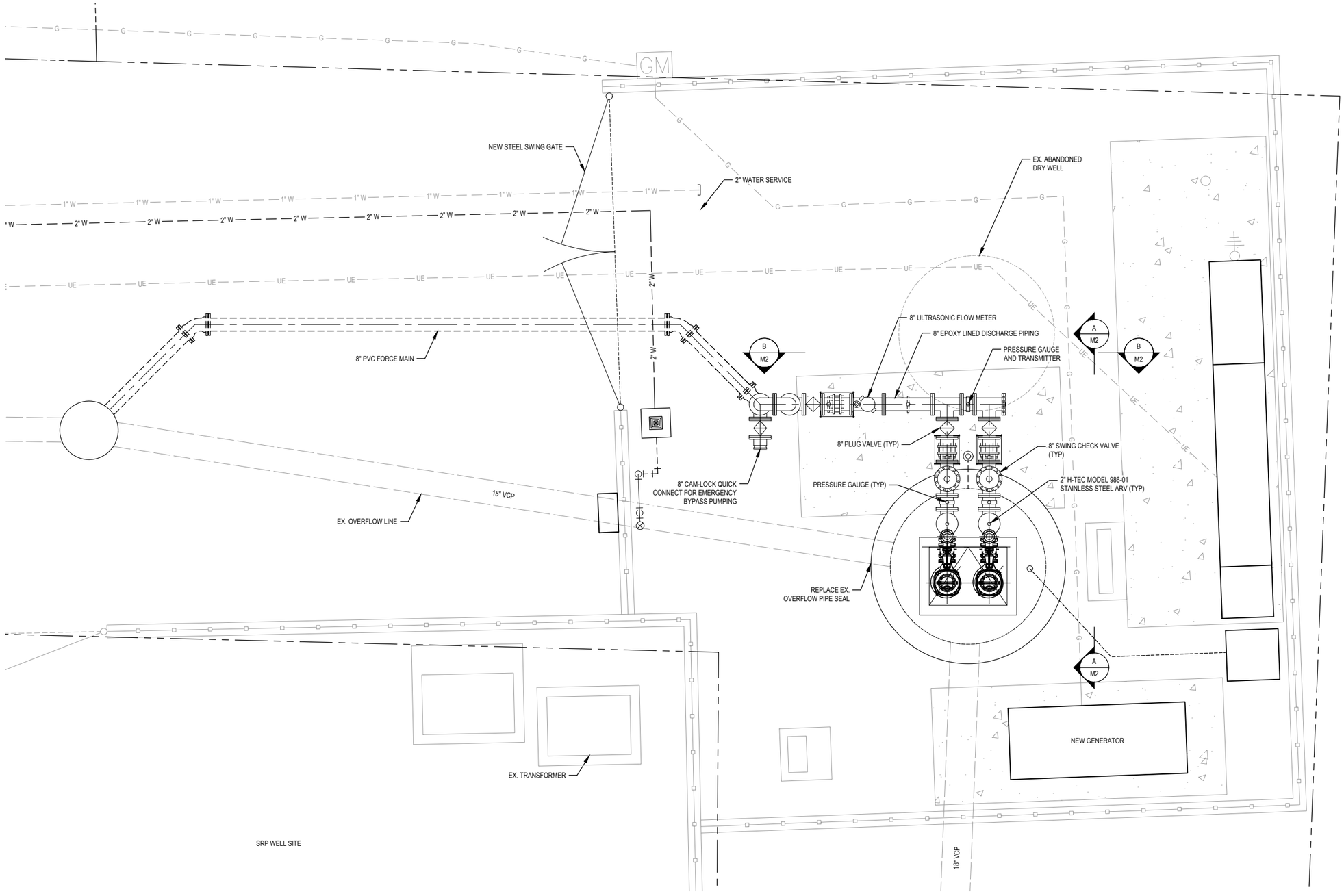

PROPOSED LIFT STATION PLAN

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

N

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

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

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CITY OF MESA
LIFT STATION IMPROVEMENTS
ALMA SCHOOL LIFT STATION

PROPOSED LIFT STATION PLAN

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

M1

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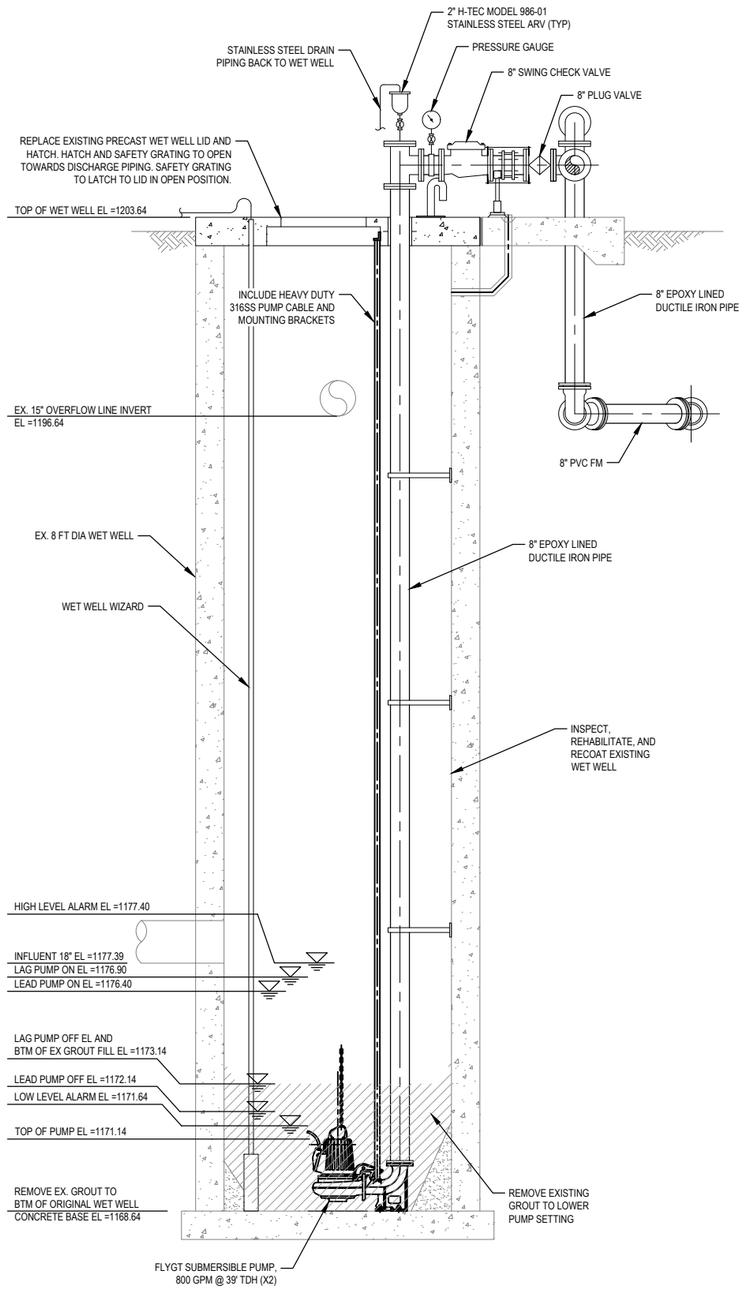
LEGEND

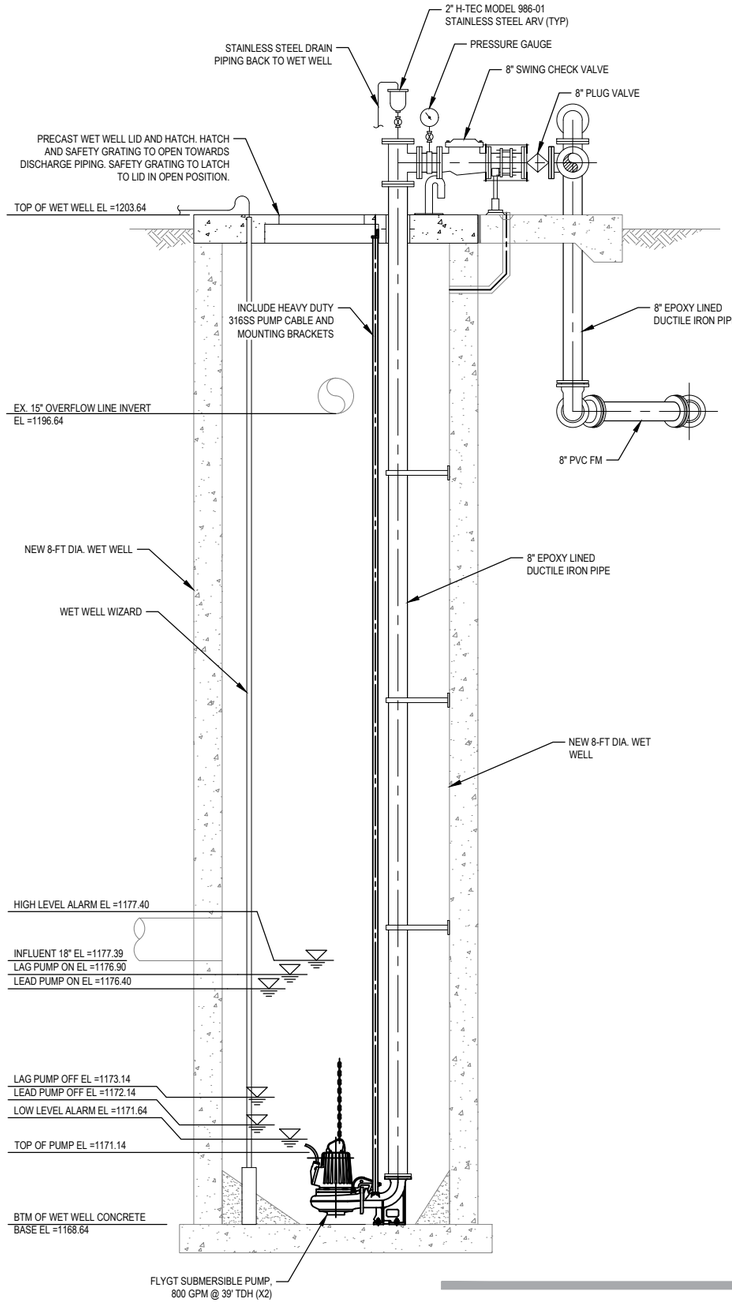
DEMOLITION AND REMOVALS



A / M1 **SECTION**

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

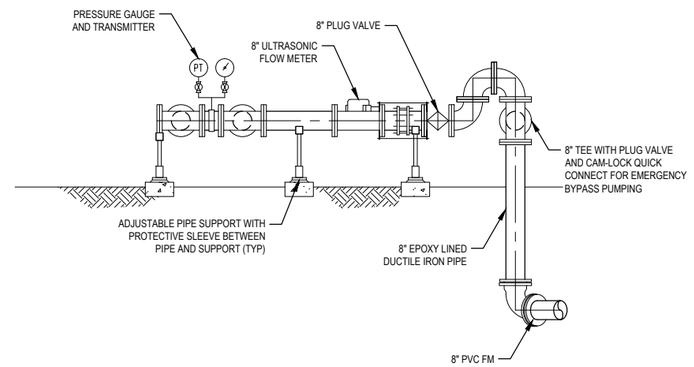
OPTION 1 - REHABILITATE EXISTING 8-FT DIA. WETWELL AND LOWER PUMP SETTING BY REMOVING EXISTING GROUT AT WET WELL BASE.



A / M1 **SECTION**

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

OPTION 2 - DEMOLISH EXISTING WET WELL AND INSTALL NEW 8-FT DIA. WET WELL.



B / M1 **SECTION**

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

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

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

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CITY OF MESA
LIFT STATION IMPROVEMENTS
ALMA SCHOOL LIFT STATION

SECTIONS

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

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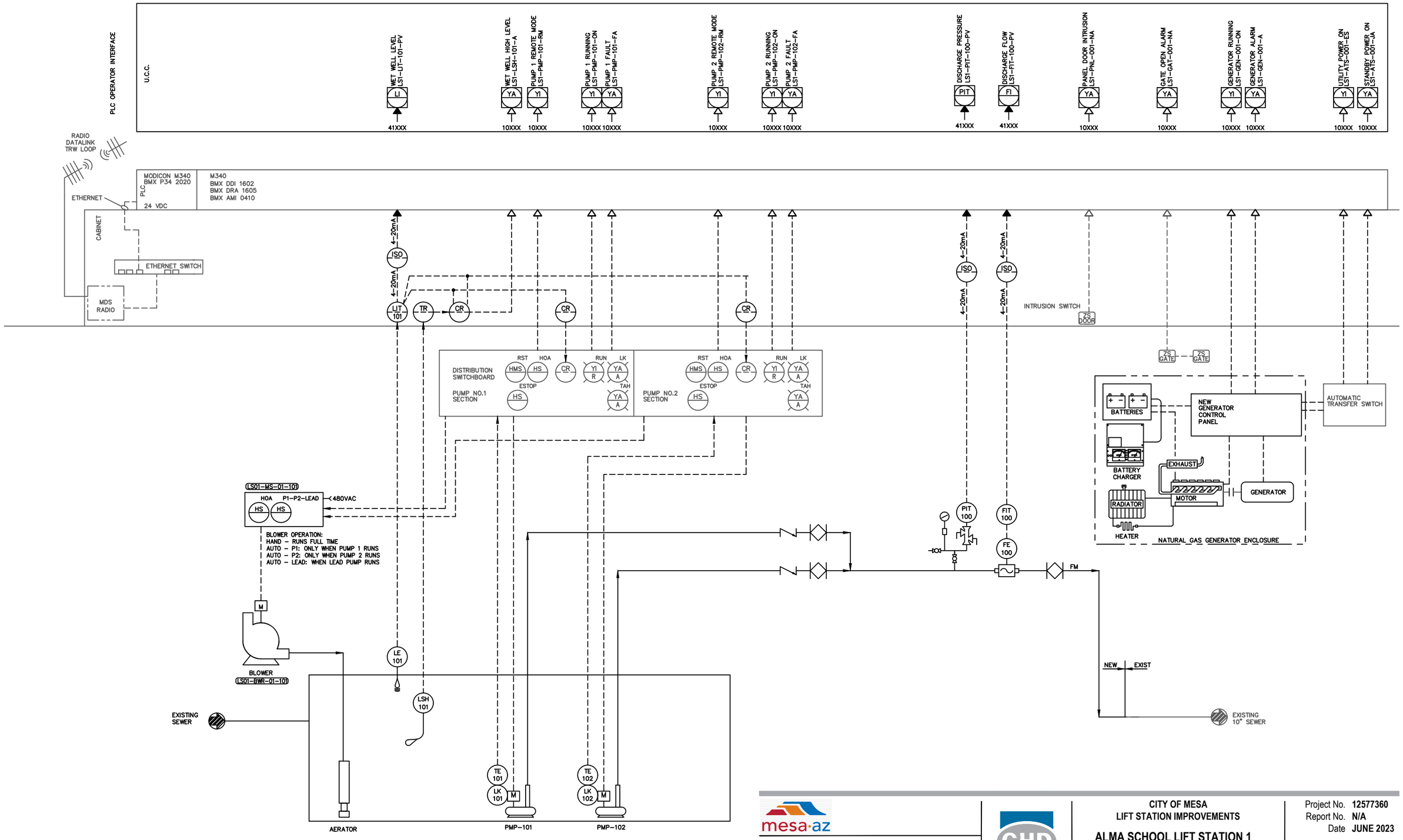

mesa-az

Jensen Engineering, LLC
Cave Creek, Arizona
(480) 595-9342
Est. 1988

GHD

CITY OF MESA
LIFT STATION IMPROVEMENTS

ALMA SCHOOL LIFT STATION 1
PROCESS & INSTRUMENTATION DIAGRAM

Project No. **12577360**
Report No. **N/A**
Date **JUNE 2023**

FIG E2

Filename: S:\E02017 GHD Mesa Lift Stations\Alma School\DCR Alma School PID Lift Station.dwg
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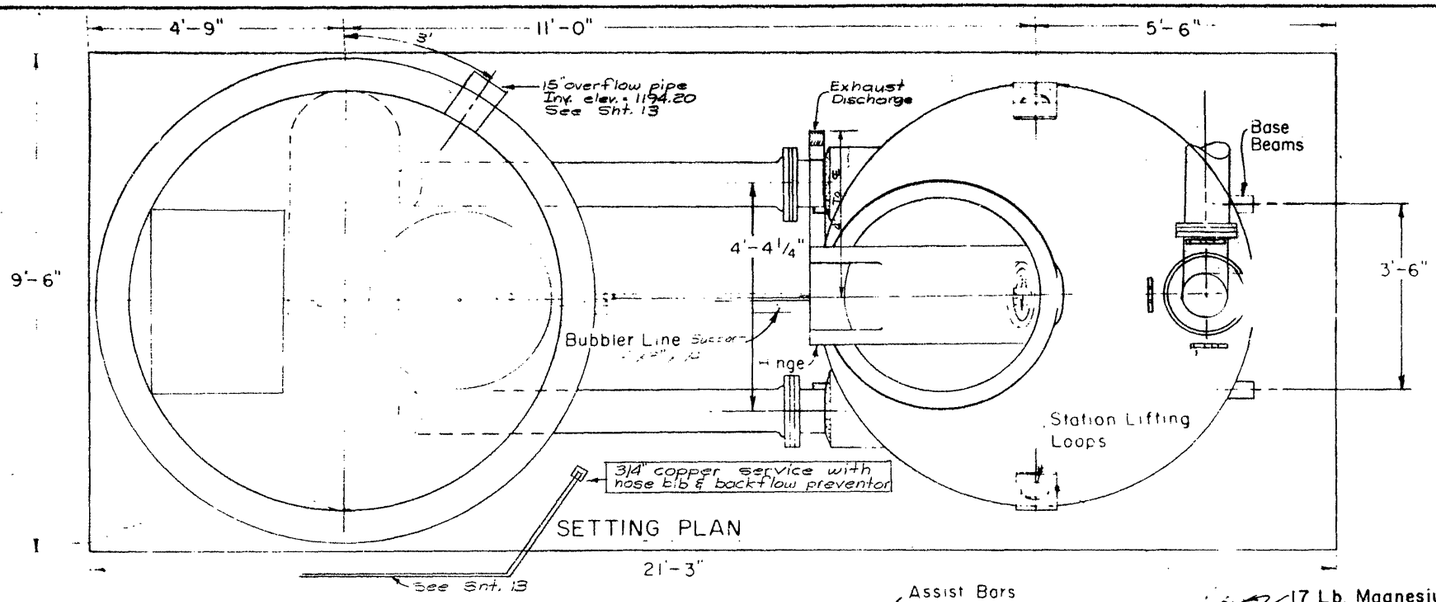
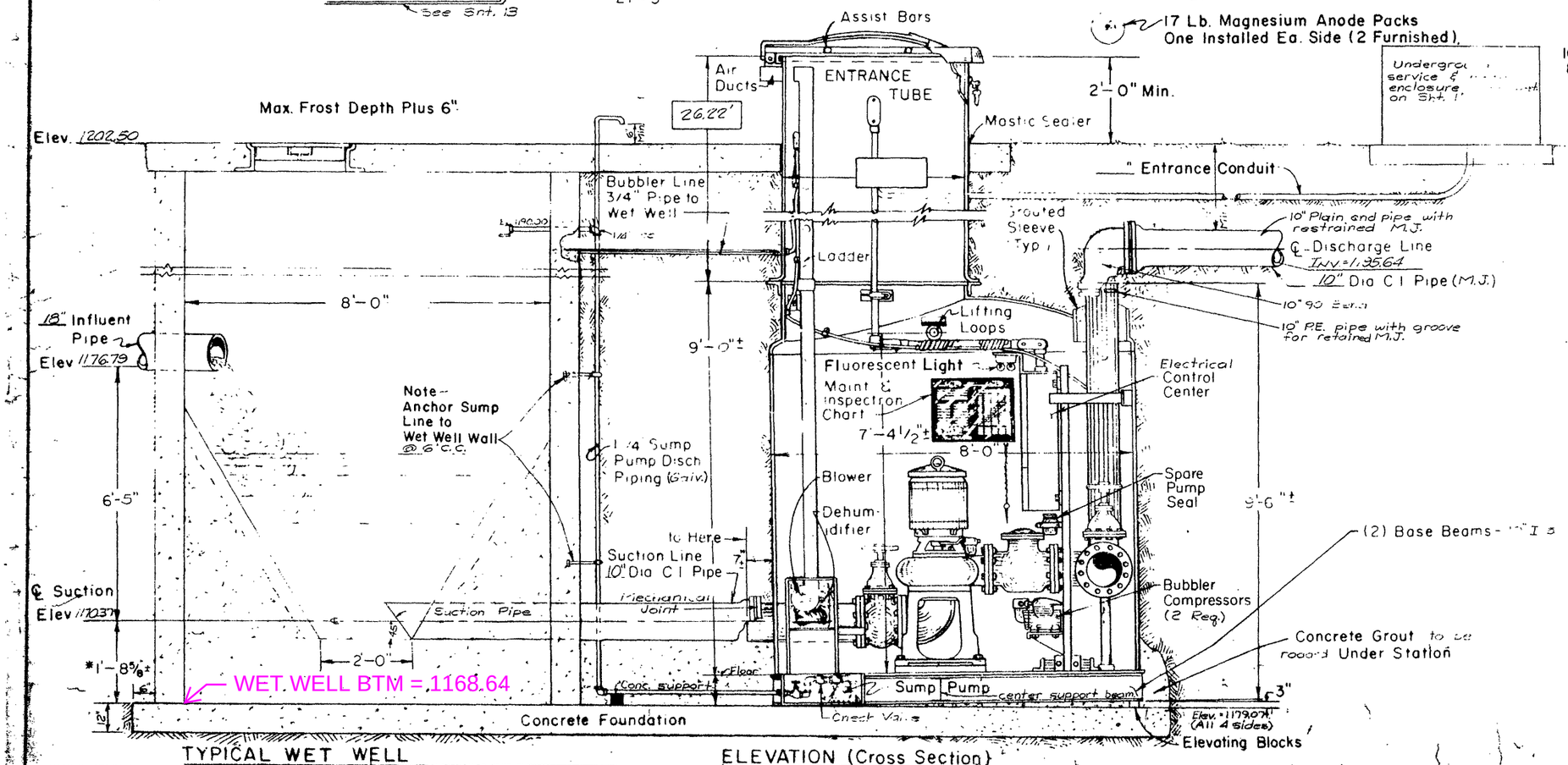
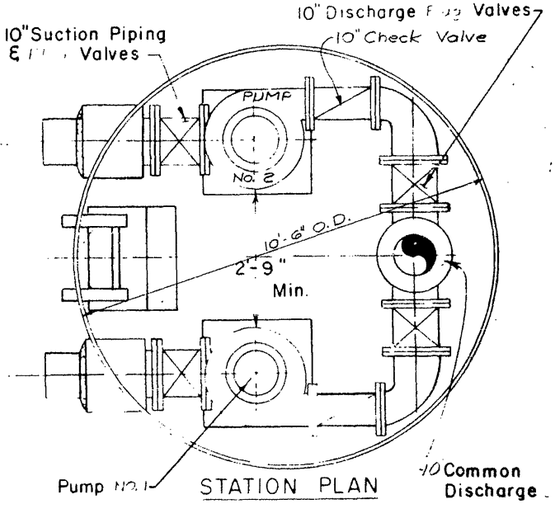
Appendix B

Project As-Builts

ORIGINAL AS-BUILT
A-011933







AS-BUILT
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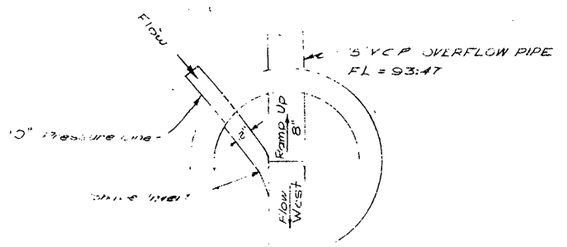
AMERICAN ENGINEERING CO.

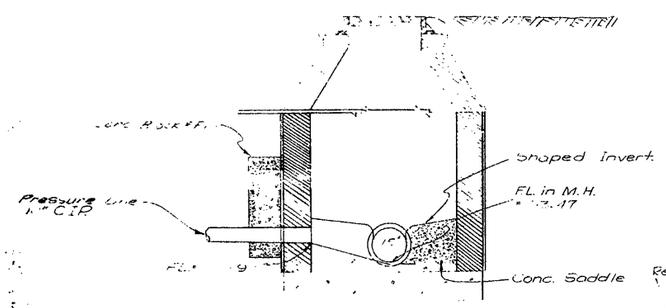
UNDERGROUND DUPLEX SEWAGE PUMPING STATION
8'-0" DIA.-36" DIAM. ENT. TUBE

SHEET NO. Sht. 16 of 17

A-N948

ORIGINAL AS-BUILT
A-011933

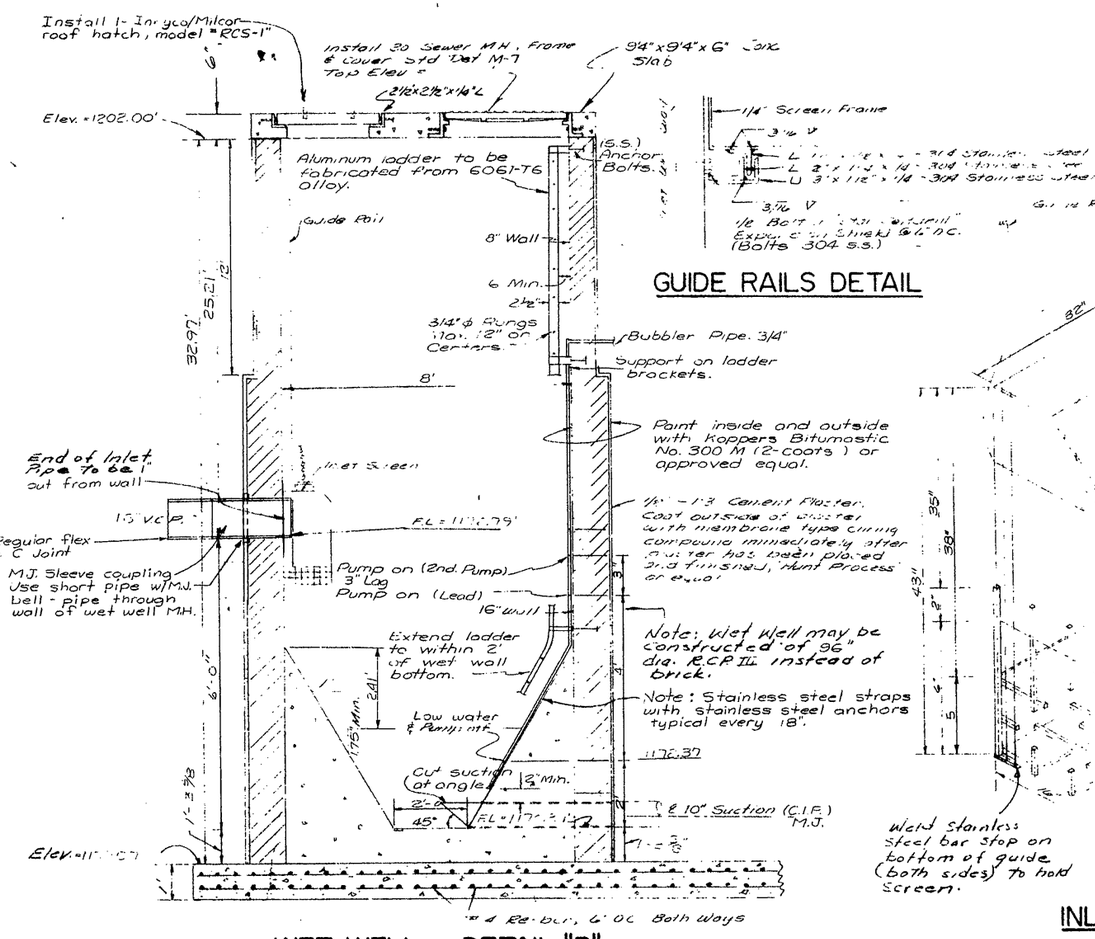




DETAIL "A"

Pressure line connection to M.H.

NOTE: Install locking device on lids to prevent removal.



GUIDE RAILS DETAIL

DESIGN CRITERIA FOR ANALYSIS OF PUMPING RATE

D. GPM capacity of pump
V = Storage in wet well low to high water level in G.P.M.
T = total time between cycles
Q = in flow to wet well in G.P.M.

therefor:
Min. flow expected upon start up of pump sta. = 250,000 gpd. = 174 G.P.M.

Avg. daily design flow = 1,414,000 gpd = 987 gpm

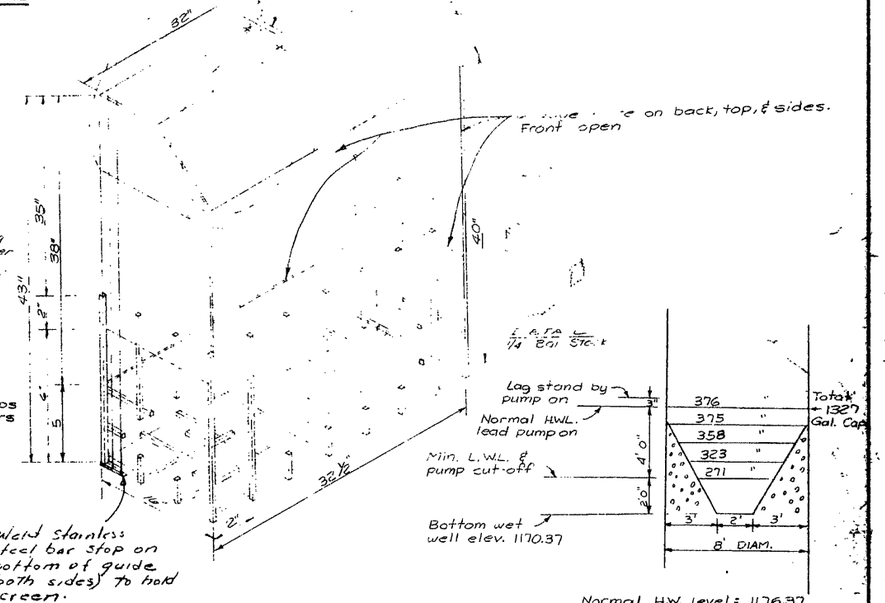
Wet well cap = 1327 gal.

Pumping time between cycles:

$\frac{Q}{D}$ min. = $\frac{174}{1400}$ = .125 = 6.1 min cycle time

$\frac{Q}{D}$ max = $\frac{987}{1400}$ = .705 = 4.8 min. cycle time

Wet well capacity OK

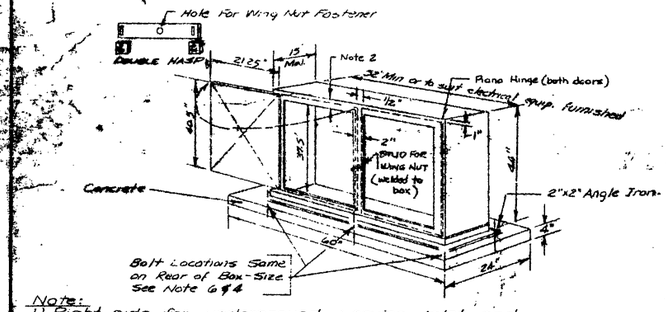


INLET SCREEN DETAIL

NOTE: 1/4" Bar stock to be spot welded to 4 Ga. Steel plate at 2" O.C. for 3 sides and bottom. Paint all surfaces with coal tar enamel.

STATION DESIGN CRITERIA

Static Head	= 20.0'
Friction loss in 51' 60" of 10' C.I.P. @ 1400 g.p.m.	= 0.1'
Less thru plant	= 3.12
Friction loss in Bends & Tee	= 0.35
T.D.H.	= 27.5'
Velocity in 10 C.I.P.	= 5.67 f.p.s.
Velocity head = .5'	

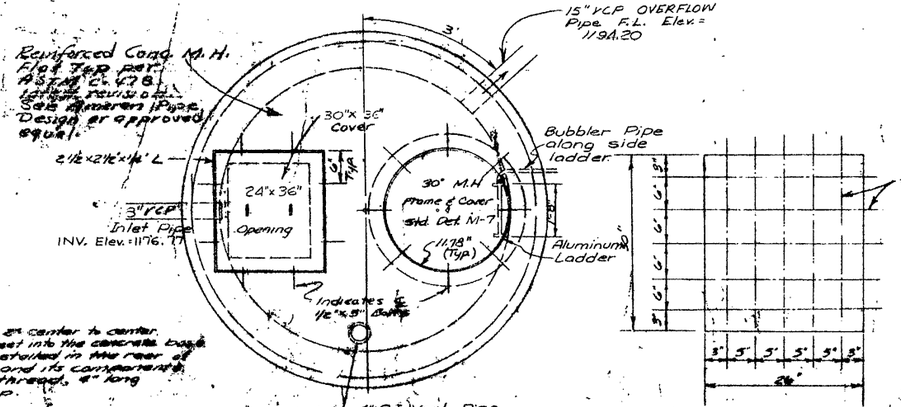


Note:
1.) Right side for underground service inlet and meter enclosure.
2.) Left side shall have a main line fusible disconnect switch 200 amp capacity, and also shall have a 3 pole transfer switch to transfer from power company operation to a portable generator source of supply with 3 prong and grounded plug in connection for portable generator to supply power in case of electric outage.

1. Box shall be 11 ga. Steel.
2. 3" fold over ground door openings.
3. Welding shall be spot welded ½" long 2" center to center.
4. Box shall be bolted down with bolts set into the concrete base.
5. A ¾" exterior plywood will will be installed in the rear of box for installation of meter base and its components.
6. Bolts to be ½" galvanized std. threaded, 4" long being set into the base 6" deep.
7. Weatherstrip doors.
8. Double brace all doors with 1¼" x 1¼" x ⅛" L iron stiffners.

UNDERGROUND SERVICE & METER ENCLOSURE

WET WELL DETAIL "B"



Detail "C"

AS-BUILT
Date 12-26-79 By J. Babcock

AMERICAN ENGINEERING CO.
PHOENIX ARIZONA

GUADALUPE ROAD
SEWER LIFT STATION DETAIL

JOB NO.	SCALE	DATE
77153	NONE	July, 1977

GENERAL NOTE

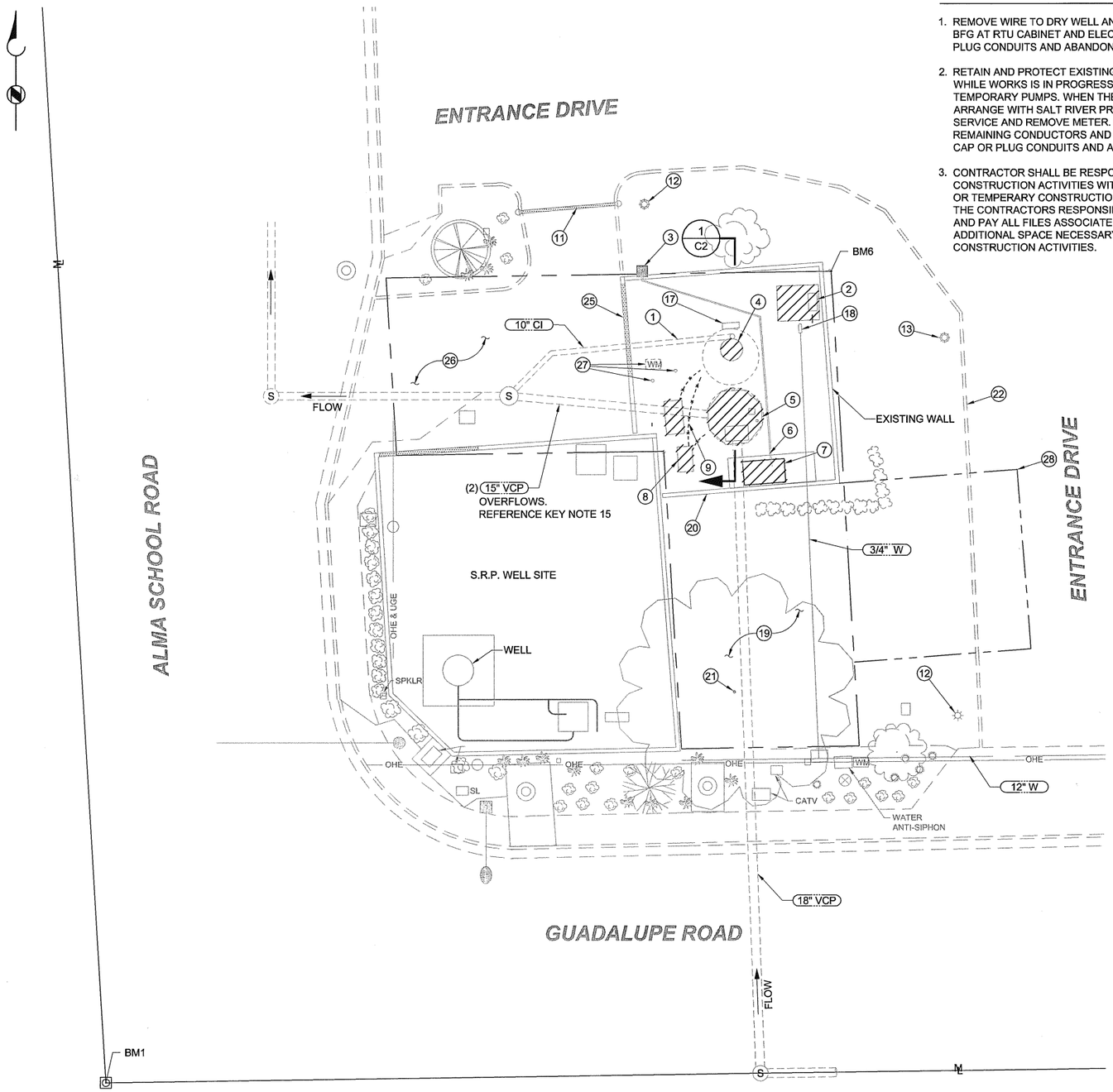
1. REMOVE WIRE TO DRY WELL AND TO WET WELL TO 36 INCHES BFG AT RTU CABINET AND ELECTRIC SERV ICE PANEL. CAP OR PLUG CONDUITS AND ABANDON IN PLACE.
2. RETAIN AND PROTECT EXISTING ELECTRIC SERVICE PANEL WHILE WORKS IS IN PROGRESS TO PROVIDE SERVICE TO TEMPORARY PUMPS. WHEN THE NEW PUMPS ARE IN SERVICE, ARRANGE WITH SALT RIVER PROJECT TO DISCONTINUE SERVICE AND REMOVE METER. REMOVE PANEL. REMOVE REMAINING CONDUCTORS AND CONDUITS TO 36 INCHES BFG. CAP OR PLUG CONDUITS AND ABANDON IN PLACE.
3. CONTRACTOR SHALL BE RESPONSIBLE TO MAINTAIN CONSTRUCTION ACTIVITIES WITHIN CITY OF MESA PROPERTY OR TEMPERARY CONSTRUCTION EASEMENTS. IT SHALL BE THE CONTRACTORS RESPONSIBILITY TO COORDINATE, OBTAIN AND PAY ALL FILES ASSOCIATED WITH OBTAINING ANY ADDITIONAL SPACE NECESSARY TO COMPLETE CONSTRUCTION ACTIVITIES.

2002
REHABILITATION
AS-BUILTS
A-097638

NORTH

BENCHMARK: SEE TABLE
BM6
N 10136.66 E10122.08
ELEVATION=1203.72 (CITY OF MESA DATUM)

SCALE: AS SHOWN



BENCHMARK	ELEVATION *	NORTHING	EASTING
BM1	1203.43	10000.00	10000.00
BM6	1203.72	10136.66	10122.08

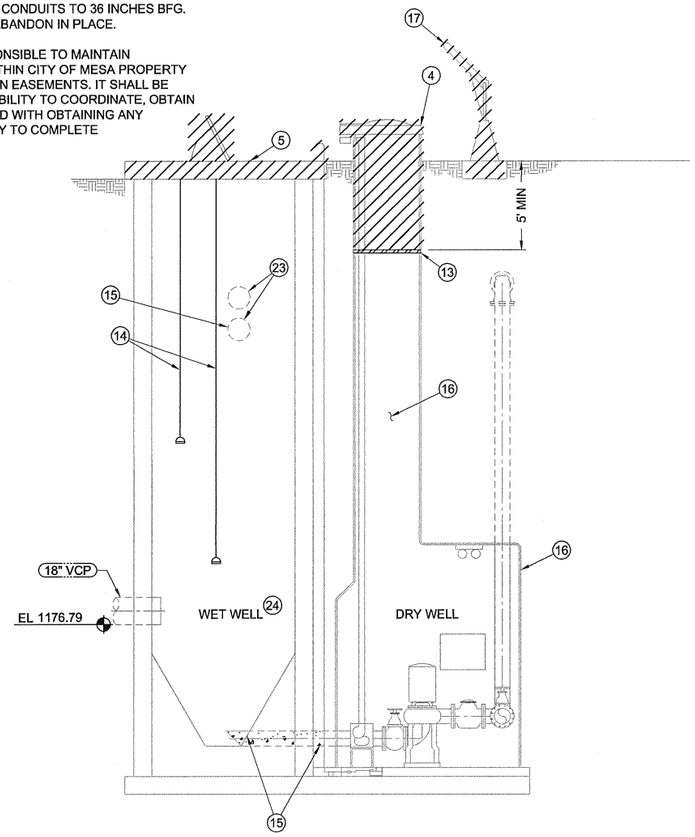
* CITY OF MESA SURVEY - ALMALIFT. FBK - 8.21.01

SITE DEMOLITION

PLAN

SCALE: 1" = 10'-0"

REMOVE AND DISPOSE OF OFF-SITE



EXISTING WET/DRY WELL DEMOLITION

SECTION 1/C2

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

KEYNOTE

1. CUT AND PLUG 10" CI FORCE MAIN TO ALLOW CONNECTION OF NEW FORCEMAIN
2. REMOVE AND DISPOSE OF CABINET AND CONCRETE PAD
3. PROTECT EXISTING GAS METER
4. REMOVE AND DISPOSE TOP PORTION OF STEEL VAULT SHELL
5. REMOVE CONCRETE WET WELL TOP SLAB. INCLUDE HATCHES AND VENT PIPING
6. GAS LINE, FIELD VERIFY LOCATION
7. REMOVE ENGINE/GENERATOR SET AND DISPOSE OF PROPERLY OFFSITE. RETAIN AND PROTECT THE CONCRETE PAD. PROTECT NATURAL GAS LINE
8. REMOVE AND RELOCATE EXISTING RTU CABINET, MAST AND ANTENNA. COORDINATE WITH COM PROCESS CONTROLS STAFF: (480) 644-2139
9. REMOVE WIRING AND PLUG CONDUIT. SEE GENERAL NOTE #1
10. NOT USED
11. PROTECT EXISTING DRIVEWAY BARRIER
12. RETAIN AND PROTECT EXISTING YARD LIGHT
13. WELD AND SEAL 1/4" PLATE TO TOP FOR ABANDONMENT
14. REMOVE AND DISPOSE OFF SITE WET WELL LEVEL SWITCHES AND SENSORS
15. PLUG LOWER 15" OCP OVERFLOW PER MAG STD DETAIL 427
16. ABANDON LOWER PORTION OF VAULT SHELL AND EXISTING EQUIPMENT IN PLACE. FILL WITH SAND
17. CITY OF MESA TO REMOVE AND DISPOSE HOIST. CON TRACTOR TO REMOVE AND PROPERLY DISPOSE CONCRETE PAD OFF-SITE
18. RETAIN AND PROTECT WATER SPIGOT
19. REPLACE DISTURBED LANDSCAPE GRAVEL IN KIND AND DEPTH
20. RETAIN AND PROTECT EXISTING WALL
21. RETAIN AND PROTECT TREE
22. RETAIN AND PROTECT EXISTING CURB
23. EMERGENCY OVERFLOW PIPES (TYPICAL OF 2)
24. RETAIN WET WELL
25. RETAIN AND PROTECT GATE
26. RETAIN AND PROTECT ASPHALT ENTRANCE
27. RETAIN AND PROTECT EXISTING WATER METER AND ANTI-SIPHON
28. TEMPORARY CONSTRUCTION EASEMENT. SEE GENERAL NOTE 3

0 2 4 8
SCALE: 1/4" = 1'-0"

0 5 10 20
SCALE: 1" = 10'-0"

AS-BUILT

CALL TWO WORKING DAYS BEFORE YOU DIG
ALERT STAKE CENTER
602-263-1100
INSIDE MARICOPA COUNTY

BROWN AND CALDWELL

CERTIFICATE NO. 27807 RONALD L ABLIN — Registered Professional Engineer — State of Arizona, U.S.A.

DRAWN BY: JWJ
ENGINEER: RLA
APPROVED BY: RLA

340 W.O. #3269
PROJ. NO. 02-049

CITY OF MESA
ENGINEERING DIVISION

ALMA SCHOOL/GUADALUPE
SEWAGE LIFT STATION REHABILITATION

SITE DEMOLITION
PLAN AND DETAIL

DRAWING C2

SHEET 4 OF 20

CATALOG NUMBER: A-97641

XREFS: 22156-X-01, MLRP-2021-G-000, ablin
IMAGES:

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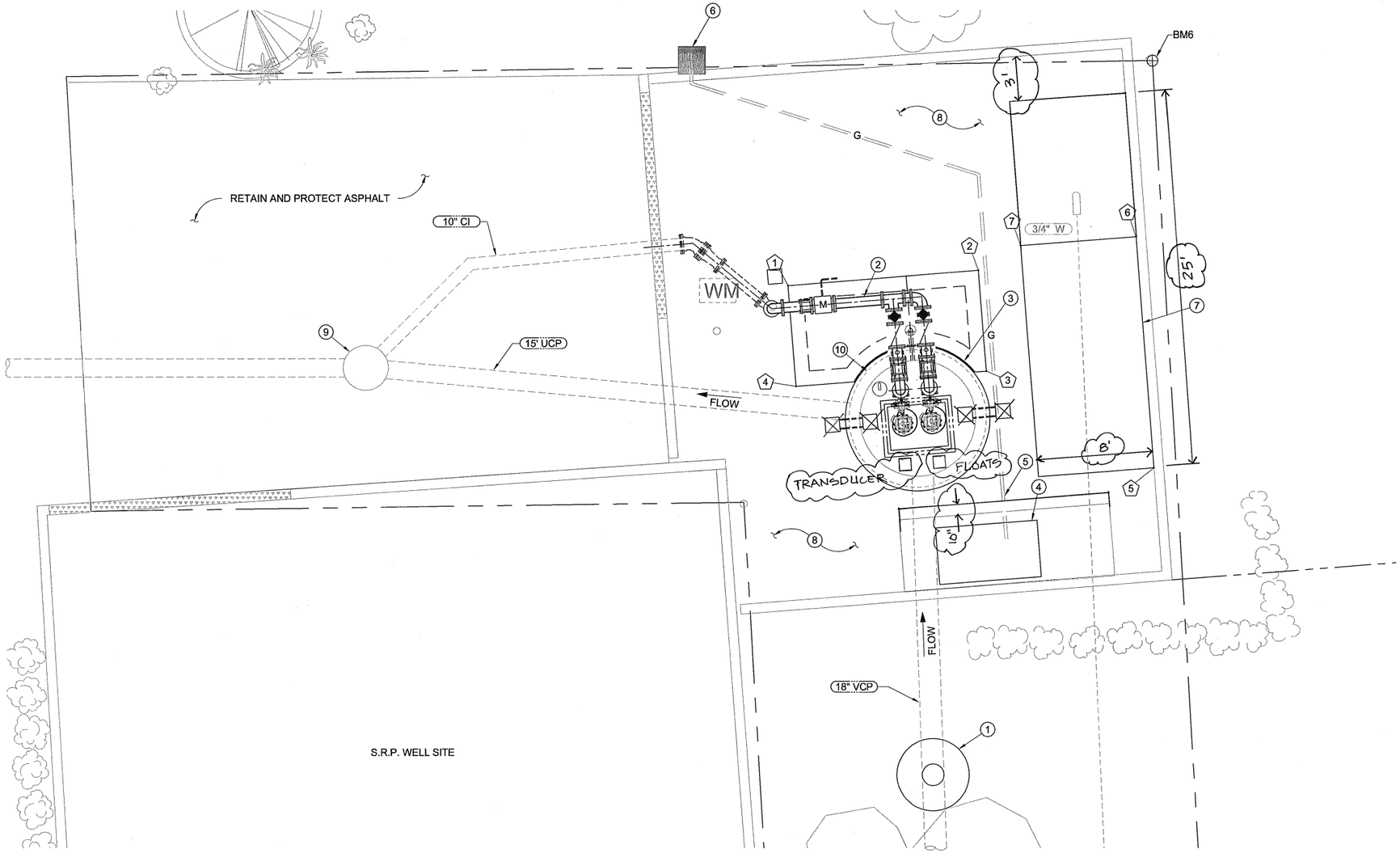
2002
REHABILITATION
AS-BUILTS
A-097638

NORTH

BENCHMARK:
BM6
N 10136.66 E10122.08
ELEVATION=1203.72 (CITY OF MESA DATUM)

SCALE: 1" = 4'-0"



S.R.P. WELL SITE

SITE DEMOLITION

PLAN

SCALE: 1" = 4'-0"

KEYNOTE

1. NEW (BY-PASS) MANHOLE. SEE SECTION 1/C1.
2. SITE PIPING. SEE DRAWING M1
3. CONCRETE SLAB FOR WET WELL SHALL BE LEVEL WITH VALVES AND FLOW METER PLATFORM. SEE DETAIL C/E3
4. EMERGENCY POWER BACKUP GENERATOR - SEE ELECTRICAL DRAWING E4
5. RECONNECT EXISTING GAS SERVICE LINE TO NEW GENERATOR
6. RETAIN AND PROTECT NATURAL GAS METER
7. NEW CONCRETE MCC PANEL PAD. SEE DETAIL C/E4
8. MAINTAIN EXISTING SITE DRAINAGE. GRADE AWAY FROM WET WELL. 3/4" MINUS DECOMPOSED GRANITE RED MOUNTAIN RED - 4 INCHES THICK OVER ENTIRE SITE WITHIN ENCLOSURE WALL. APPLY PRE-EMERGENT TO ALL GRAVEL AREAS
9. RETAIN AND PROTECT EXISTING DISCHARGE MANHOLE. RE-SEAL LID WITH MASTIC TAPE FOLLOWING CONSTRUCTION
10. INSTALL EXPANSION JOINT BETWEEN VALVE SLAB AND WET WELL SLAB. SEE DETAIL F/M2

CONCRETE COORDINATE TABLE		
	NORTHING	EASTING
1	10121.25	10096.91
2	10122.30	10110.07
3	10115.33	10110.63
4	10097.47	10114.27
5	10108.67	10122.20
6	10124.62	10120.97
7	10124.01	10112.99

0 2 4 8
SCALE: 1" = 4'-0"

AS-BUILT

CALL TWO WORKING DAYS BEFORE YOU DIG BLUE STAKE CENTER 602-263-1100 INSIDE MARICOPA COUNTY

BROWN AND CALDWELL

Registered Professional Engineer (Civil) CERTIFICATE NO. 27807 RONALD L. ABLIN 9/13/02 Date Signed ARIZONA, U.S.A.

DRAWN BY: JWJ
ENGINEER:
APPROVED BY:

340 W.O. #3269
PROJ. NO. 02-049

CITY OF MESA
ENGINEERING DIVISION

ALMA SCHOOL/GUADALUPE
SEWAGE LIFT STATION REHABILITATION

PROPOSED
SITE IMPROVEMENTS
PLAN

DRAWING
C3

SHEET 5 OF 20

CATALOG NUMBER:
A-97642

IMAGES:

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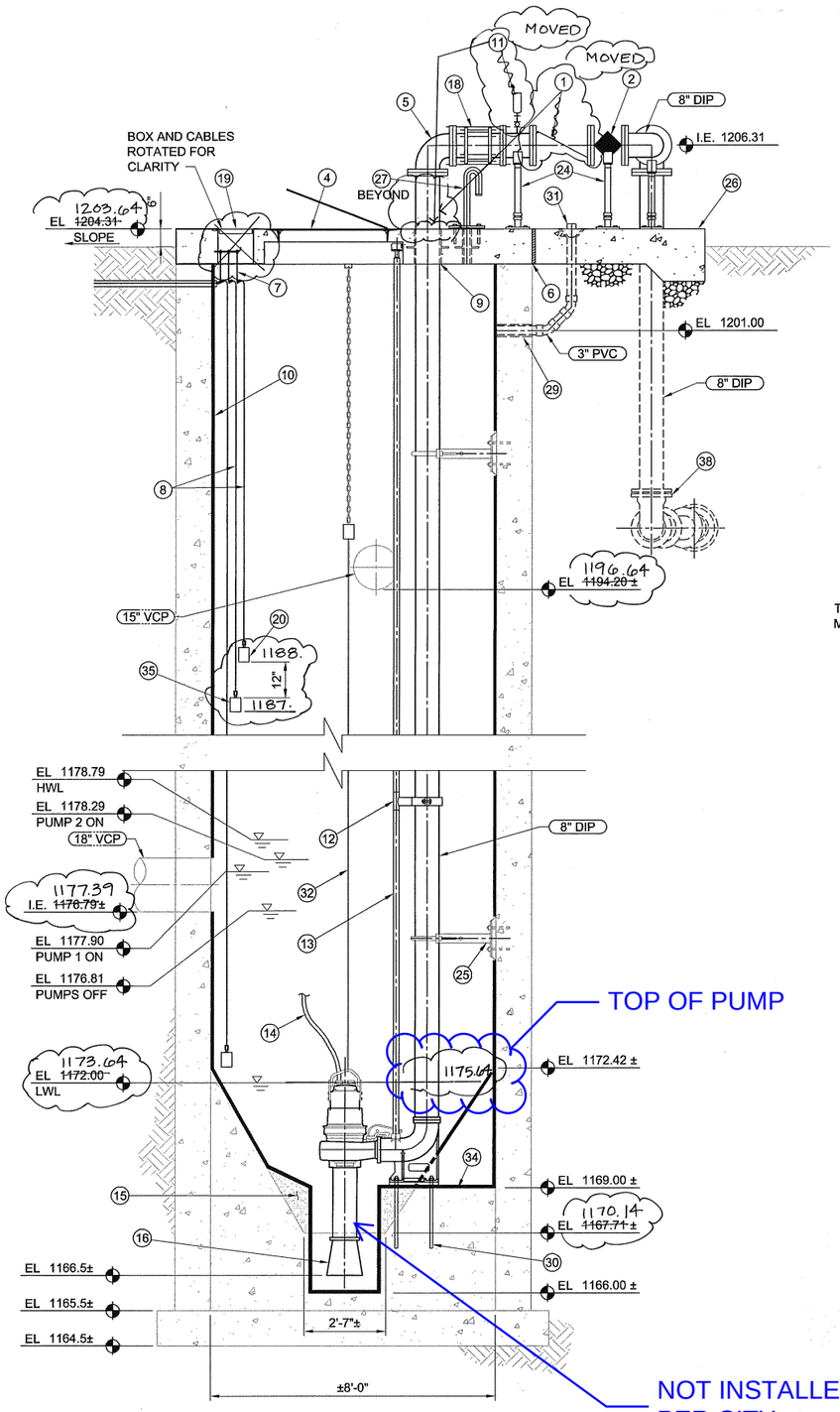


SECTION (1 / M1)

SCALE: 1/2" = 1'-0"

NOTE:
SOME ITEMS ORIENTATION HAVE BEEN ADJUSTED FOR CLARITY

GENERAL NOTES

1. LOCATE ANCHOR BOLTS USING CLEAR INSIDE EDGE OF ACCESS FRAME AND CENTERLINE OF PUMP AS REQUIRED. BOLT LOCATIONS MUST BE HELD TO MAINTAIN EXACT POSITION OF PUMP RELATIVE TO ACCESS FRAME.
2. CONTRACTOR SHALL FIELD VERIFY PIPE DIMENSION AND TYPE PRIOR TO ORDERING CONNECTION FITTING.
3. JOINT RESTRAINT AT MECHANICAL JOINT SHALL BE AS SHOWN IN MAG STANDARD DETAIL 302. SEE DETAIL B/M2.
4. ALL BOLTS, NUTS, AND WASHERS IN THE INTERIOR OF THE WET WELL SHALL BE S.S.

KEYNOTES (CONTINUED)

(31) 3" CLEAN OUT WITH THREADED CAP

(32) LIFTING CABLE WITH PLASTIC PROTECTOR TYPE 316 SS - EYE TO EYE. (BOTTOM 15 FEET) REMAINDER SHALL BE STAINLESS STEEL CHAIN USING A SPELTER SOCKET. (FLYGT GRIP EYE SYSTEM)

(33) 8" DIP SPOOL, LENGTH AS RECOMMENDED BY PUMP MANUFACTURER FOR PUMP SEPARATION

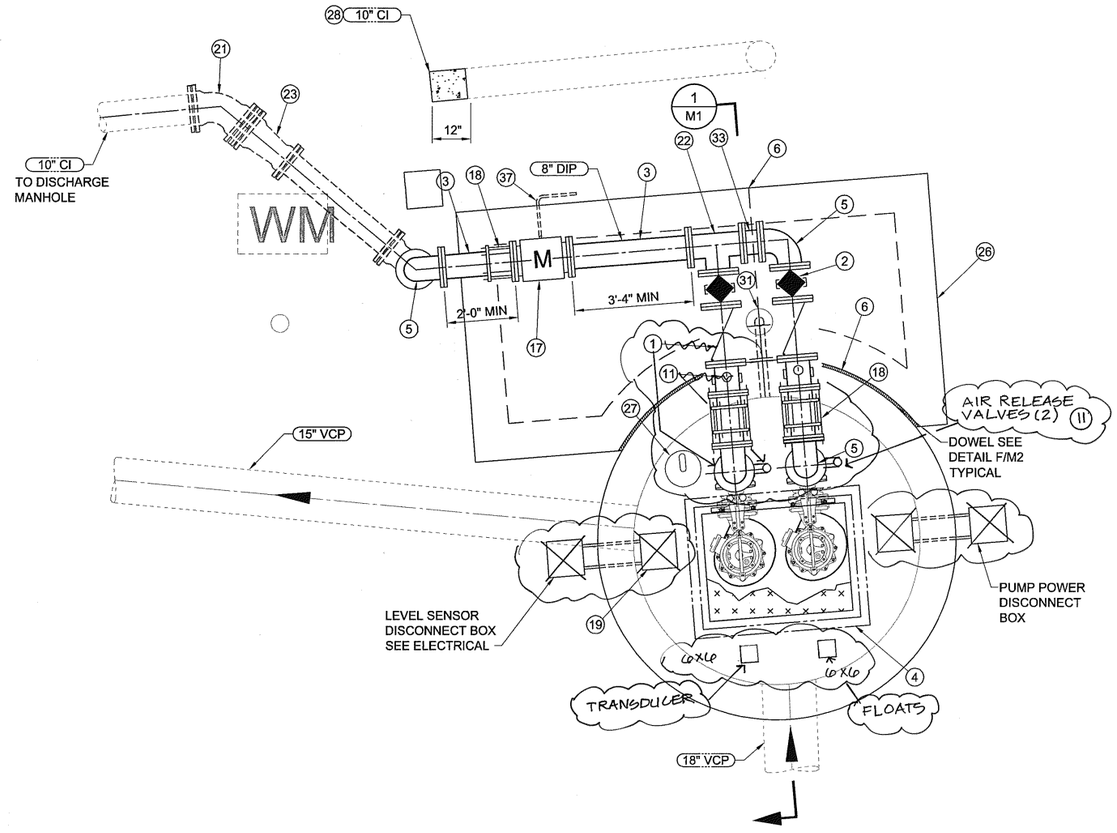
(34) NOTCH EXISTING CONCRETE AS REQUIRED TO INSTALL PUMP MOUNTING BRACKET

(35) "BLUE BALL" HIGH LEVEL SENSOR. SEE ELECTRICAL DRAWINGS.

(36) SEE DETAIL D/M2 FOR WET WELL FLOOR MODIFICATIONS

(37) FLOW METER CABLE CONDUIT. SEE ELECTRICAL DRAWING E5

(38) 8" 90° BEND, MJxMJ (RESTRAINED)



PROPOSED WET WELL

PLAN

SCALE: 1/2" = 1'-0"

0 1 2 4

SCALE: 1/2" = 1'-0"

2002 REHABILITATION AS-BUILTS A-097638

BENCHMARK:
BM6
N 10136.66 E10122.08
ELEVATION=1203.72 (CITY OF MESA DATUM)

NORTH

SCALE: 1/2" = 1'-0"

KEYNOTES

(1) 8" BALL CHECK VALVE (TYP OF 2), SEE SPECIFICATION SECTION 15120 INSTALLED HORIZONTAL INSTEAD OF VERTICAL
(2) 8" ECCENTRIC PLUG VALVE (TYP OF 2), SEE SPECIFICATION SECTION 15110
(3) 8" DIP SPOOL, LENGTH PER METER MANUFACTURER'S REQUIREMENTS
(4) ACCESS HATCH. LOCATION AND DIMENSION SHALL BE AS RECOMMENDED BY PUMP MANUFACTURER. ACCESS HATCH SHALL BE CAST INTO LIFT STATION TOP WITH METAL FALL THROUGH PROTECTION GRATING UNDER THE ACCESS HATCH, SEE DETAIL H/M2
(5) 8" 90° FLANGED BEND
(6) CONCRETE EXPANSION JOINT. SEE DETAIL F/M2
(7) PROVIDE STAINLESS STEEL "KELLUM" STRAIN RELIEF SUPPORTS (TYP OF 4)
(8) LEVEL SENSOR CABLE. SEE ELECTRICAL DRAWINGS
(9) LINK SEAL (TYPICAL OF 2)
(10) COAT ALL INTERIOR WALLS WITH PROTECTIVE COATING PER SPECIFICATION SECTION 9900
(11) 1" SEWAGE COMBINATION AIR RELEASE VACUUM VALVE (TYP OF 2) PER DETAIL E/M2
(12) INTERMEDIATE GUIDE BAR BRACKET PER MANUFACTURERS RECOMMENDATIONS
(13) 2" 316 STAINLESS STEEL GUIDE BARS AS RECOMMENDED BY PUMP MANUFACTURER
(14) POWER CABLE. CONNECT TO JUNCTION PULLBOX
(15) CONCRETE GROUT (CLASS C). SEE SPECIFICATION SECTION 03300
(16) 8" x 12" REDUCER WITH S.S. BOLTS
(17) 8" MAG-X FLOW METER AS MANUFACTURED BY ABB, SERIES NO. 10DX3111E/G
(18) 8" FLANGE COUPLING ADAPTER (TYP OF 2)
(19) FLOAT AND POWER CABLE ACCESS J-BOX CAST IN WET WELL LID. SEE ELECTRICAL DETAIL E/E3
(20) ULTRASONIC LEVEL SENSOR. SEE ELECTRICAL DRAWINGS
(21) 10" 45° BEND MJ x MJ (RESTRAINED) CONNECT TO EXISTING PIPE
(22) 8" x 8" x 8" TEE FL x FL
(23) 10" x 8" REDUCER MJ x MJ (RESTRAINED)
(24) PIPE SUPPORT, SEE DETAIL C/M2 (TYP)
(25) TYPE 10 PIPE SUPPORT, SEE DETAIL A/M2 (TYP OF 4)
(26) CONCRETE SLAB SEE DETAIL C/E3
(27) 3" VENT WITH STAINLESS STEEL NO. 16 MESH
(28) PLUG EXISTING 10" CI FORCE MAIN WITH 4000 psi CONCRETE AND ABANDON
(29) CORE DRILL. LINK SEAL AROUND PIPE. SEE DETAIL GM/2.
(30) 1" x 18" LONG STAINLESS STEEL ANCHOR BOLTS WITH FULL THREADED STUDS AND WASHERS. EXTEND ANCHOR INTO EXISTING CONCRETE. EPOXY ANCHOR INTO POSITION

AS-BUILT

CALL TWO WORKING DAYS BEFORE YOU DIG BLUE STAKE CENTER 602-263-1100 INSIDE MARICOPA COUNTY

BROWN AND CALDWELL

CERTIFICATE NO. 27807 RONALD L. ABLIN 1-1-04 REGISTERED PROFESSIONAL ENGINEER ARIZONA, U.S.A.

DRAWN BY: JWJ
ENGINEER:
APPROVED BY:

340 W.O. #3269
PROJ. NO. 02-049

CITY OF MESA
ENGINEERING DIVISION

ALMA SCHOOL/GUADALUPE
SEWAGE LIFT STATION REHABILITATION

PROPOSED
WET WELL
PLAN AND SECTION

DRAWING
M1

SHEET 6 OF 20

CATALOG NUMBER:
A-97643

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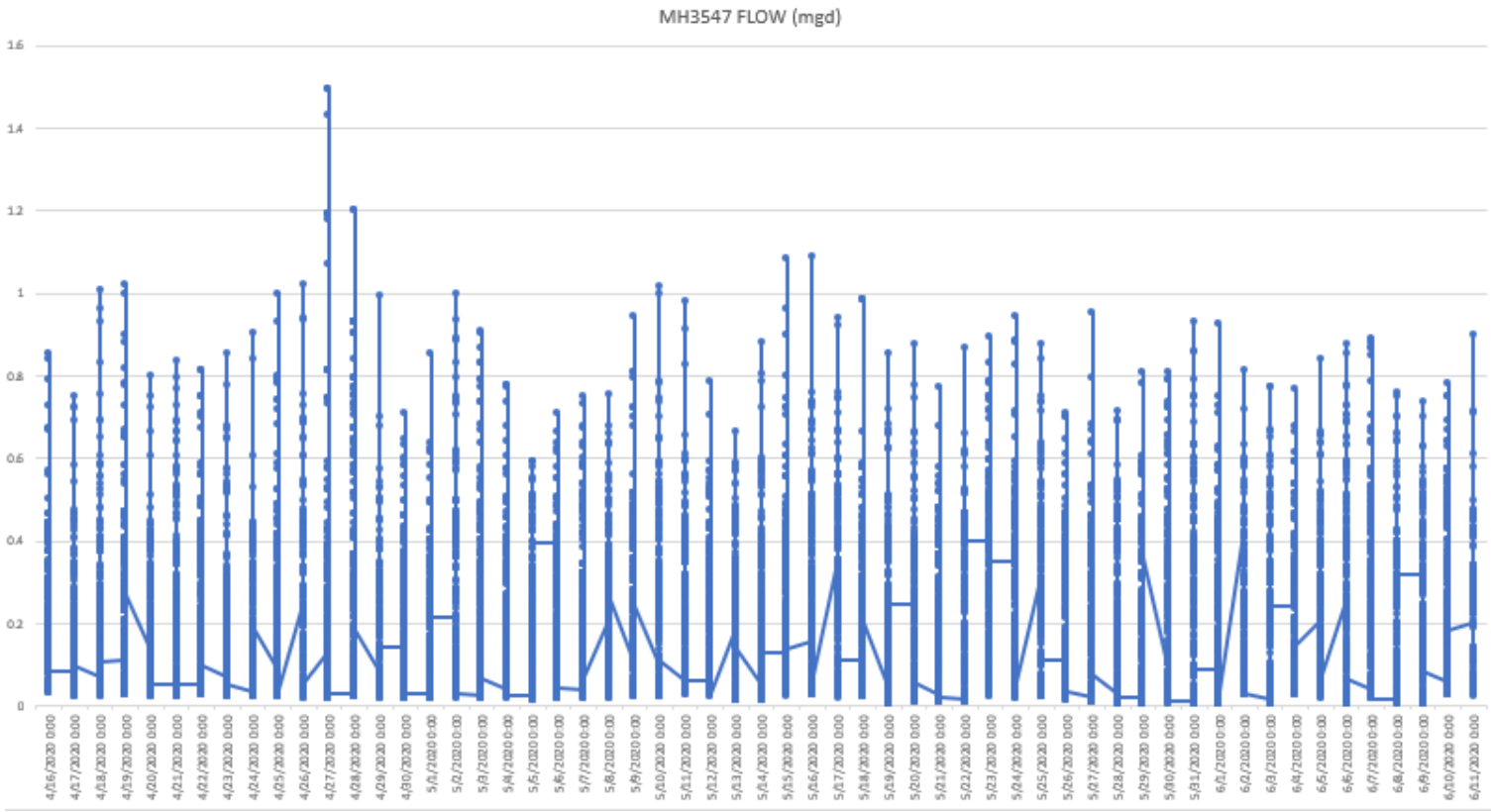
IMAGES

Appendix C

MH3547 Flow Data


MH3547 FLOW (mgd)
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
4/16/2020 0:00
4/17/2020 0:00
4/18/2020 0:00
4/19/2020 0:00
4/20/2020 0:00
4/21/2020 0:00
4/22/2020 0:00
4/23/2020 0:00
4/24/2020 0:00
4/25/2020 0:00
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6/5/2020 0:00
6/6/2020 0:00
6/7/2020 0:00
6/8/2020 0:00
6/9/2020 0:00
6/10/2020 0:00
6/11/2020 0:00

Appendix D

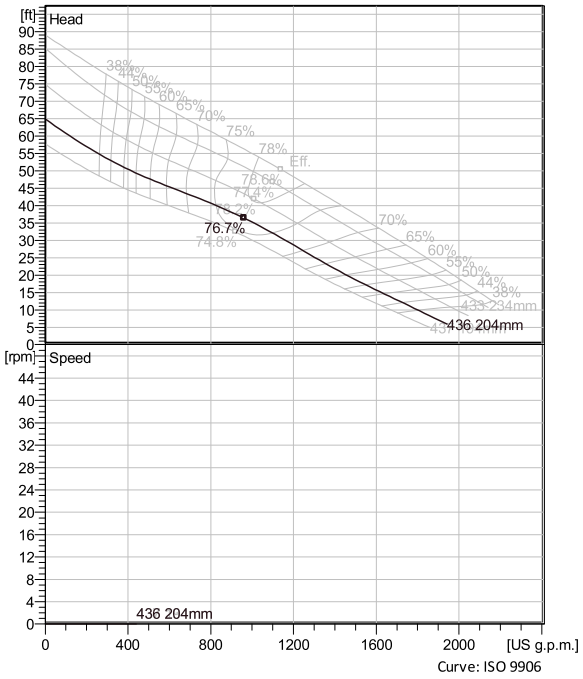
Pump Data Sheets

NP 3153 MT 3~ 436

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



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
N3153.185 21-15-4AA-W 15hp

Installation type
P - Semi permanent, Wet

Impeller diameter
204 mm

Discharge diameter
6 inch

Pump information

Impeller diameter
204 mm

Discharge diameter
6 inch

Inlet diameter
150 mm

Maximum operating speed
1755 rpm

Number of blades
2

Max. fluid temperature
40 °C

Material

Impeller
Hard-Iron ™

Project	GHD ENG MESA ALMA SCHOOL LS	**Created by**	ED Martin		
Block	0	**Created on**	5/21/2024	**Last update**	5/21/2024

NP 3153 MT 3~ 436

Technical specification

Motor - General

Motor number N3153.185 21-15-4AA-W 15hp	**Phases** 3~	**Rated speed** 1755 rpm	**Rated power** 15 hp
ATEX approved No	**Number of poles** 4	**Rated current** 19 A	**Stator variant** 5
Frequency 60 Hz	**Rated voltage** 460 V	**Insulation class** H	**Type of Duty** S1
Version code 185			

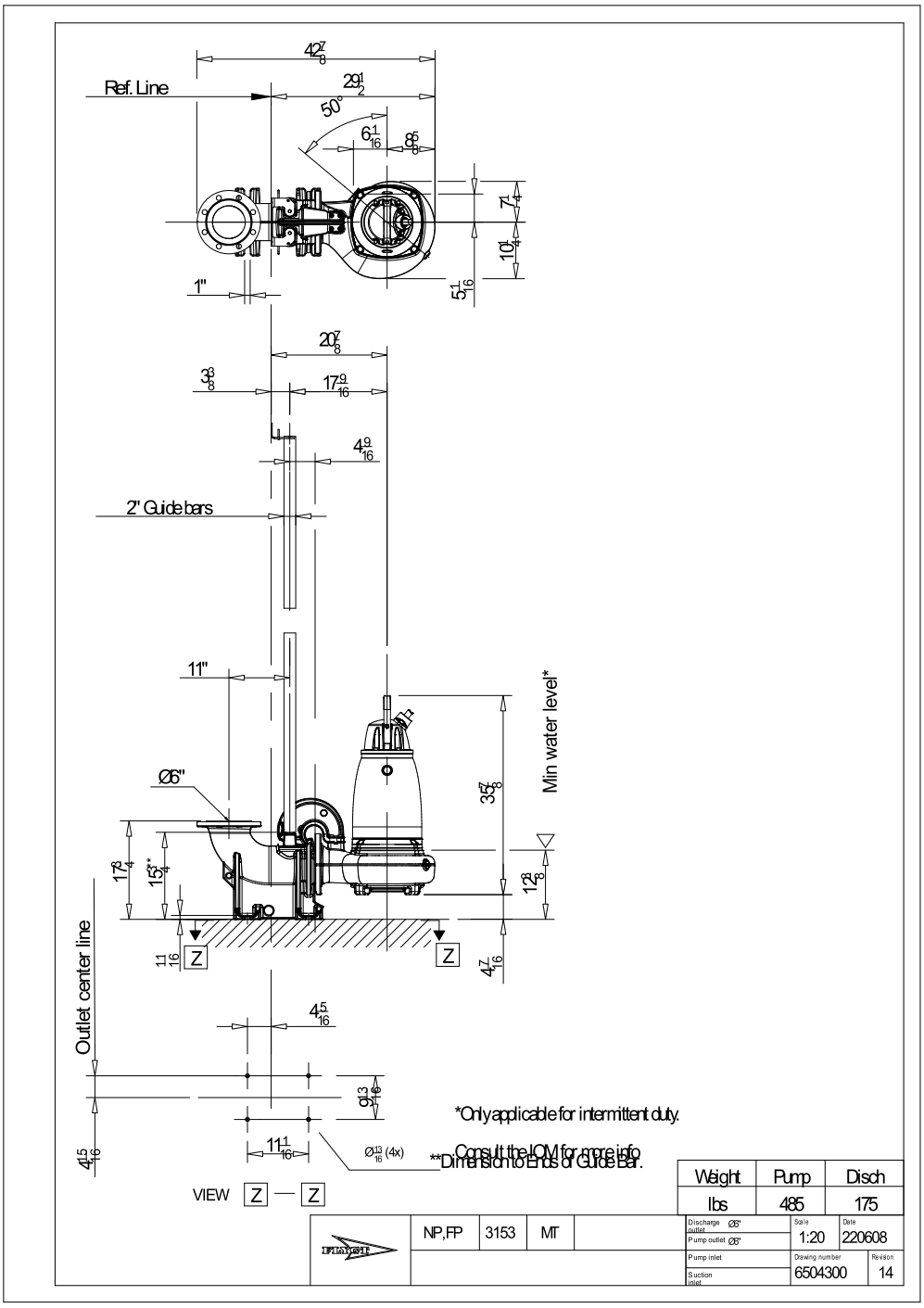
Motor - Technical

Power factor - 1/1 Load 0.82	**Motor efficiency - 1/1 Load** 87.5 %	**Total moment of inertia** 1.61 lb ft²	**Starts per hour max.** 30
Power factor - 3/4 Load 0.77	**Motor efficiency - 3/4 Load** 88.5 %	**Starting current, direct starting** 114 A	
Power factor - 1/2 Load 0.65	**Motor efficiency - 1/2 Load** 88.0 %	**Starting current, star-delta** 38 A	

Project	GHD ENG MESA ALMA SCHOOL LS	**Created by**	ED Martin		
Block	0	**Created on**	5/21/2024	**Last update**	5/21/2024

NP 3153 MT 3~ 436

Dimensional drawing



Project	GHD ENG MESA ALMA SCHOOL LS	**Created by**	ED Martin		
Block	0	**Created on**	5/21/2024	**Last update**	5/21/2024

Appendix E

Opinion of Cost

Option 1 – Remove Grout & Rehabilitate Existing Wet Well
Alma School Sewer Lift Station Rehabilitation
Preliminary Opinion of Cost

Description	Unit	Quantity	Unit Price	Total
Construction Staking and As-Builts	LS	1	$11,400	$11,400
Mobilization/De-Mobilization	LS	1	$49,800	$49,800
Utility Locating	LS	1	$21,000	$21,000
Demolition and Removal of Existing Piping, and Wet Well Lid/Hatch	LS	1	$20,000	$20,000
Demolition and Removal of Existing Pumps	LS	1	$6,000	$6,000
Demolition and Removal of Existing Steel Swing Gate	LS	1	$3,000	$3,000
Demolition and Removal of SES and Generator	LS	1	$4,500	$4,500
Connect to Existing Manhole	EA	1	$6,480	$6,480
Faux Wood Slats	LF	102	$100	$10,200
Site Grading	LS	1	$5,000	$5,000
1-1/2" - 1/4" DG	SY	83	$50	$4,150
16' Steel Swing Gate	EA	1	$18,750	$18,750
Replace Existing Wet Well Cover and Hatch	EA	1	$10,000	$10,000
Wet Well Wizard	LS	1	$17,000	$17,000
Coat Existing Brick Discharge MH	SF	144	$30	$4,320
Recoat Existing Inlet MH	SF	515	$30	$15,450
Coat Existing 8' Diameter Wet Well	SF	1010	$30	$30,287
Inspect and Repair Existing Wet Well	LS	1	$50,000	$50,000
Remove Grout from Existing Wet Well	LS	1	$20,000	$20,000
Submersible Pump Assembly W/ Stainless Steel Rails and Lifting Chains	EA	2	$40,000	$80,000
Submersible Pump for Backup Storage	EA	1	$30,000	$30,000
8" DIP Force Main	LF	102	$310	$31,555
8" DIP 90 Bend	EA	3	$2,000	$6,000
8" DIP Tee	EA	4	$1,200	$4,800
8" Cam-Lock	EA	1	$2,000	$2,000
4" x 8" DIP 90 Bend Reducer	EA	2	$1,500	$3,000
8" Plug Valve	EA	3	$2,738	$8,213
8" Swing Check Valve	EA	2	$4,994	$9,988
8" Ultrasonic Flow Meter	EA	1	$14,675	$14,675
8" PVC Force Main Piping + Fittings	LF	38	$400	$15,200
New 2" Water Service	LS	1	$5,000	$5,000
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	3	$2,600	$7,800
Temporary Sewer Bypass Pumping	LS	1	$110,000	$110,000
CIPP ex. 18" VCP Inlet Sewer	LF	20	$1,200	$24,000
CIPP ex. 15" VCP Overflow Pipe	LF	40	$1,200	$48,000
Electrical Improvements & Generator	LS	1	$377,995	$377,995
Subtotal				$1,120,812
Project Contingency	10%			$112,081
Market Escalation Factor	15%			$168,122
Overhead & Profit	15%			$210,152
Bond & Insurance	3%			$42,030
Total				**$1,653,197**

Option 2 – New Wet Well
Alma School Sewer Lift Station Rehabilitation
Preliminary Opinion of Cost

Description	Unit	Quantity	Unit Price	Total
Construction Staking and As-Builts	LS	1	$11,400	$11,400
Mobilization/De-Mobilization	LS	1	$75,000	$75,000
Utility Locating	LS	1	$21,000	$21,000
Demolition and Removal of Existing Piping	LS	1	$20,000	$20,000
Demolition and Removal of Existing Pumps	LS	1	$6,000	$6,000
Demolition and Removal of Existing Steel Swing Gate	LS	1	$3,000	$3,000
Demolition and Removal of SES and Generator	LS	1	$4,500	$4,500
Demolition and Removal of Wet Well	LS	1	$20,000	$20,000
Excavation & Modified Slide Rail System	LS	1	$885,700	$885,700
Connect to Existing Manhole	EA	1	$6,480	$6,480
8' Tall CMU Wall	LF	115	$400	$46,000
Site Grading	LS	1	$5,000	$5,000
1-1/2" - 1/4" DG	SY	83	$50	$4,150
16' Steel Swing Gate with Faux Wood Slats	EA	1	$18,750	$18,750
New Wet Well Cover and Hatch	EA	1	$10,000	$10,000
Wet Well Wizard	LS	1	$17,000	$17,000
Coat Existing Brick Discharge MH	SF	144	$30	$4,320
Recoat Existing Inlet MH	SF	515	$30	$15,450
New 8' Diameter, 35.5 ft Deep Wet Well	EA	1	$117,600	$117,600
Coat New 8' Diameter Wet Well	SF	1200	$30	$36,000
Submersible Pump Assembly W/ Stainless Steel Rails and Lifting Chains	EA	2	$40,000	$80,000
Submersible Pump for Backup Storage	EA	1	$30,000	$30,000
8" DIP Force Main	LF	102	$310	$31,555
8" DIP 90 Bend	EA	3	$2,000	$6,000
8" DIP Tee	EA	4	$1,200	$4,800
8" Cam-Lock	EA	1	$2,000	$2,000
4" x 8" DIP 90 Bend Reducer	EA	2	$1,500	$3,000
8" Plug Valve	EA	3	$2,738	$8,213
8" Swing Check Valve	EA	2	$4,994	$9,988
8" Ultrasonic Flow Meter	EA	1	$14,675	$14,675
8" PVC Force Main Piping + Fittings	LF	38	$400	$15,200
New 2" Water Service	LS	1	$5,000	$5,000
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	3	$2,600	$7,800
Temporary Sewer Bypass Pumping	LS	1	$165,000	$165,000
CIPP ex. 18" VCP Inlet Sewer	LF	20	$1,200	$24,000
CIPP ex. 15" VCP Overflow Pipe	LF	40	$1,200	$48,000
Electrical Improvements & Generator	LS	1	$377,995	$377,995
Subtotal				$2,195,824
Project Contingency	10%			$219,582
Market Escalation Factor	15%			$329,374
Overhead & Profit	15%			$411,717
Bond & Insurance	3%			$82,343
Total				**$3,238,841**

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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