

008 – Dublin Pump Station

Summary

The Dublin Pump Station is a wet well pump station and was constructed in 1985. Located on the west side of Dublin Way and about 120 feet south from the centerline of Kofman Parkway (see Figure 008-1), the station includes two 5-hp pumps and serves approximately 45 acres of land including Dublin Parkway, Kofman Parkway, and Tralee Lane.



Figure 008-1: Dublin Pump Station Site

The Dublin Pump Station is currently undersized for the Peak Wet Weather Flows (PWWF) identified in the Sanitary Sewer Master Plan.

Table 008-1 summarizes the costs of the Immediate Recommended Improvements. The improvements are listed in Table 008-4 and should be addressed if the station is not rehabilitated in the near future.

Table 008-2 summarizes the pump station review. The pump station was given a HIGH rehabilitation priority due to its insufficient capacity, lack of a high-level bypass, and lack of backup generator.

The 25-year rehabilitation is estimated to cost \$240,000.

Table 008-1: Immediate Recommended Improvements

Priority	Improvement Category	Total Cost
1	Identified Safety Hazards	\$2,000
2	Identified Code Violations	\$44,000
3	Remaining Good Practice Improvements	\$6,000

Table 008-2: Summary Table

Rehabilitation Priority	HIGH
Rehabilitation Ranking (out of 34 stations assessed)	11th
# of Code Violations	8
Adequate Capacity?	No
25-Yr. Rehabilitation Estimate	\$240,000
Expected Annual Electricity Savings After Rehabilitation	\$670

Pump and Piping System Assessment

A summary of the pump station discharges, demands, and efficiencies are shown in Table 008-3. Currently, the two pumps operate at 135 gpm and 120 gpm with an overall efficiency of 4% and 8%. Using an estimated overall pumping efficiency after rehabilitation of 60%, the City would save an estimated \$670 each year on electricity.

Table 008-3: Dublin Pump Station

	Calculated Existing Pump Discharge (gpm)	Calculation Method	Calculated Existing Pumping Efficiency	System PWWF Demand (gpm)	Does Pump Station Have Sufficient Capacity?	Does Pump Station Have Redundancy?
Pump #1	135	Volumetric	4%	236	No	No
Pump #2	120	Volumetric	8%			

The Dublin pump station does not have a high-level bypass pipe and the pumps are currently operating at a level that is lower than the PWWF. The rehabilitation should be designed for redundancy; therefore, each of the two new pumps should have sufficient capacity for the peak wet weather flow (PWWF).

The station does not have a backup generator and there is sufficient room to add one. If this station were to overflow it would overflow to the lagoon; therefore, it is important to have a backup power supply.

The pump station has a 6-inch diameter, 950-foot long force main which discharges to a manhole on Kofman Parkway.

At the time of inspection there was standing water in the valve vault, the valve vault should either be replaced, or a drain should be added to the existing small valve vault.

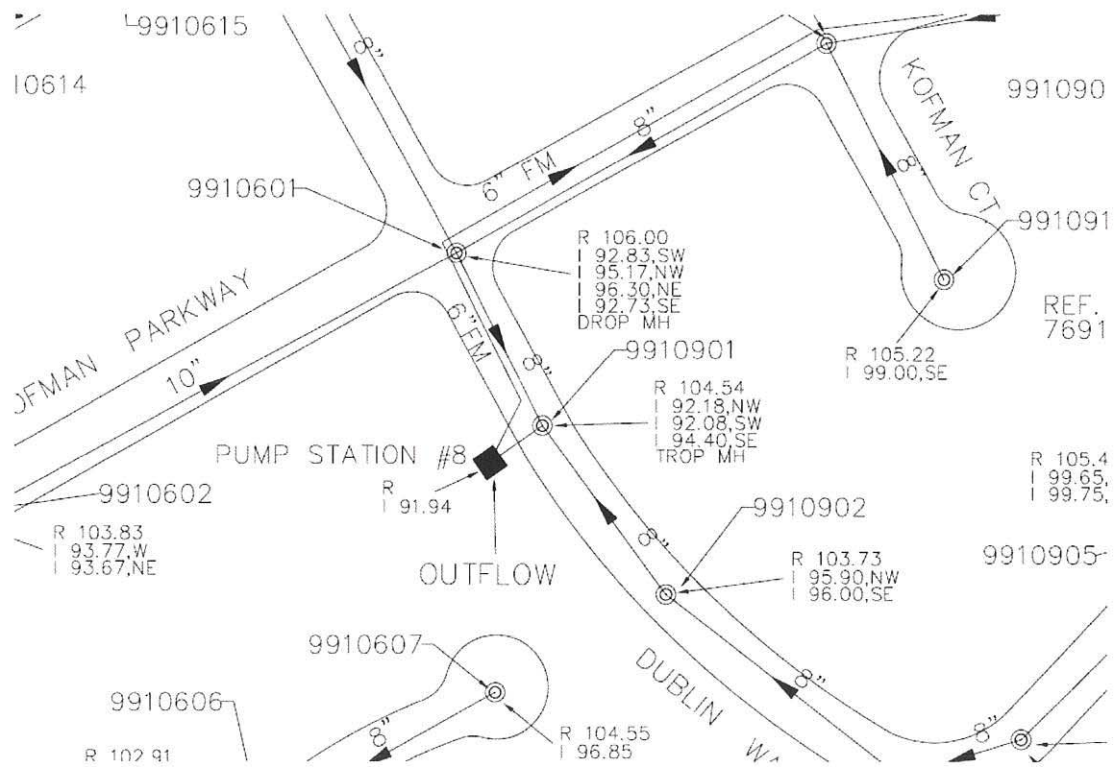


Figure 008-2: Dublin Pump Station Location and System Map

Electrical Assessment

A summary of the electrical assessment and noted code violations, safety hazards, and other recommendations are shown in Table 008-4.

Table 008-4: Dublin Pump Station Electrical Assessment

Type	Identified Electrical Deficiencies	Immediate Imp. Priority
Code Violations	• Explosion-proof conduit seal fittings for wet well appear to be missing	2
	• White PVC pipe, instead of electrical conduit, used between the wet well and pull box	2
	• Non-explosion-proof intrusion proximity switch for the hatch cover in the wet well	2
	• No explosion-proof junction box in the pull box	2
	• No electric shock and arc flash hazard warning signs on the panel doors	1
	• No nameplates for the main and individual pump breaker operating handle located on the pump starter panel	2
	• Wires not protected from the sharp edge of the conduit at the stub-up in the panel	2
	• Non-explosion-proof level switch in the wet well with no intrinsically safe relay	2
Safety	• Door mounted operating handles detached from the breakers when door is opened	1
NFPA 820 Violations	• Elect pull box not explosion-proof which is required due to close proximity (only 31-1/2") to wet well opening	1
Control or Instrumentation	• No individual control circuit for each pump	3
	• Bubbler tube not easily accessible	
Reliability	• No standby generator	
	• One common conduit for 2 pump motor power and seal/high temp switch wires	
Operations/Maintenance	• Single phase pump motors	
Others	• Panel interior dirty and dusty	3
	• Panel bottom area corroded	3

Structural / Seismic Assessment

The Dublin pump station is in good structural condition and there are no immediate improvements at this time. During inspection, the front of the right concrete pad supporting the electrical panel appeared to be undermined and there was noticeable corrosion on the electrical and on the metal components in the wet well. Approximately 73% of the surrounding area is predicted to liquefy during a severe earthquake.

Access and Site Assessment

The Dublin Pump Station is situated about 25 feet from the street curb adjacent to the sidewalk. The wet well is located a safe distance from the electrical panel, which is mounted on a concrete pad up against a wood fence. A small hill between the street and pump station makes it difficult to access the pump station with a work truck. Access could be improved by adding a driveway access to the station.

The site has sufficient room to add a backup generator, we recommend adding one during the next rehabilitation.

Cost Estimate

Rehabilitation costs for the Dublin Pump Station are found in Table 008-5. The 25-year rehabilitation is estimated to cost \$240,000. The 50-year rehabilitation cost is estimated to be \$380,000 and includes construction of a new wet well.

Table 008-5: Dublin Pump Station Cost Estimate

Item	Size	Make / Material	Comments	Replacement Cost
Pumps and Motors				
Pump and Motor #1	5 HP	Flygt	Submersible	\$9,000
Pump and Motor #2	5 HP	Flygt	Submersible	\$9,000
			Subtotal	\$18,000
Electrical Equipment				
Electrical Panel				\$15,000
SCADA System				\$15,000
Level Sensor			Bubbler w/ Backup Float	\$5,000
Air Compressor				\$2,000
Backup Generator			Room available for generator	\$40,000
Miscellaneous			Wiring, conduit, etc.	\$2,000
			Subtotal	\$79,000
Piping				
Discharge Piping	4 inch	Ductile Iron	30 LF @ \$100 / LF	\$3,000
Fittings	4 inch	Ductile Iron	6 EA @ \$250 / EA	\$1,500
Check Valves	4 inch	Ductile Iron (body)	2 EA @ \$500 / EA	\$500
Gate Valves (isolation)	4 inch	Ductile Iron (body)	2 EA @ \$500 / EA	\$500
			Subtotal	\$5,500
Miscellaneous Equipment				
Valve Vault and Hatch				\$20,000
Hatch		Syracuse		\$2,000
Wet Well Rehabilitation			Epoxy Coating	\$6,500
Hose Bib			Includes piping to BFP	\$500
Backflow Preventer	3/4 inch	Wilkins		\$500
Ladder				\$1,000
Air Vent				\$1,000
Pump Rail			4 EA @ \$500 / EA	\$2,000
Bypass Pumping Connection				\$5,000
Site Improvements			Sidewalk, landscaping, etc.	\$3,000
Bypass Pumping			During Construction	\$7,000
Demolition & Disposal				\$5,000
			Subtotal	\$53,500
25- Year Replacement Cost				Total
				55% for Contingency, Admin., CM, Engr.
				Total w/ Contingency
				\$156,000
				\$86,000
				\$240,000
50 Year Replacement Items (Structural Components)				
New wetwell	6 feet ID	Precast Concrete	21 feet deep	\$70,000
Bypass Pumping			During Construction	\$7,000
Demolition & Disposal				\$10,000
			Subtotal	\$87,000
50- Year Replacement Cost				Total
				55% for Contingency, Admin., CM, Engr.
				Total w/ Contingency
				\$243,000
				\$134,000
				\$380,000

Notes:

1. Costs referenced to March 2009 San Francisco Construction Cost Index (9757.67)
2. Costs include materials, labor, demolition and hauling

This estimate of construction cost is a professional opinion, based upon the engineer's experience with the design and construction of similar projects. It is prepared only as a guide and is subject to change. Schaaf & Wheeler and its subconsultants make no warranty, whether expressed or implied, that the actual costs will not vary from these estimated costs, and assumes no liability for such variances.

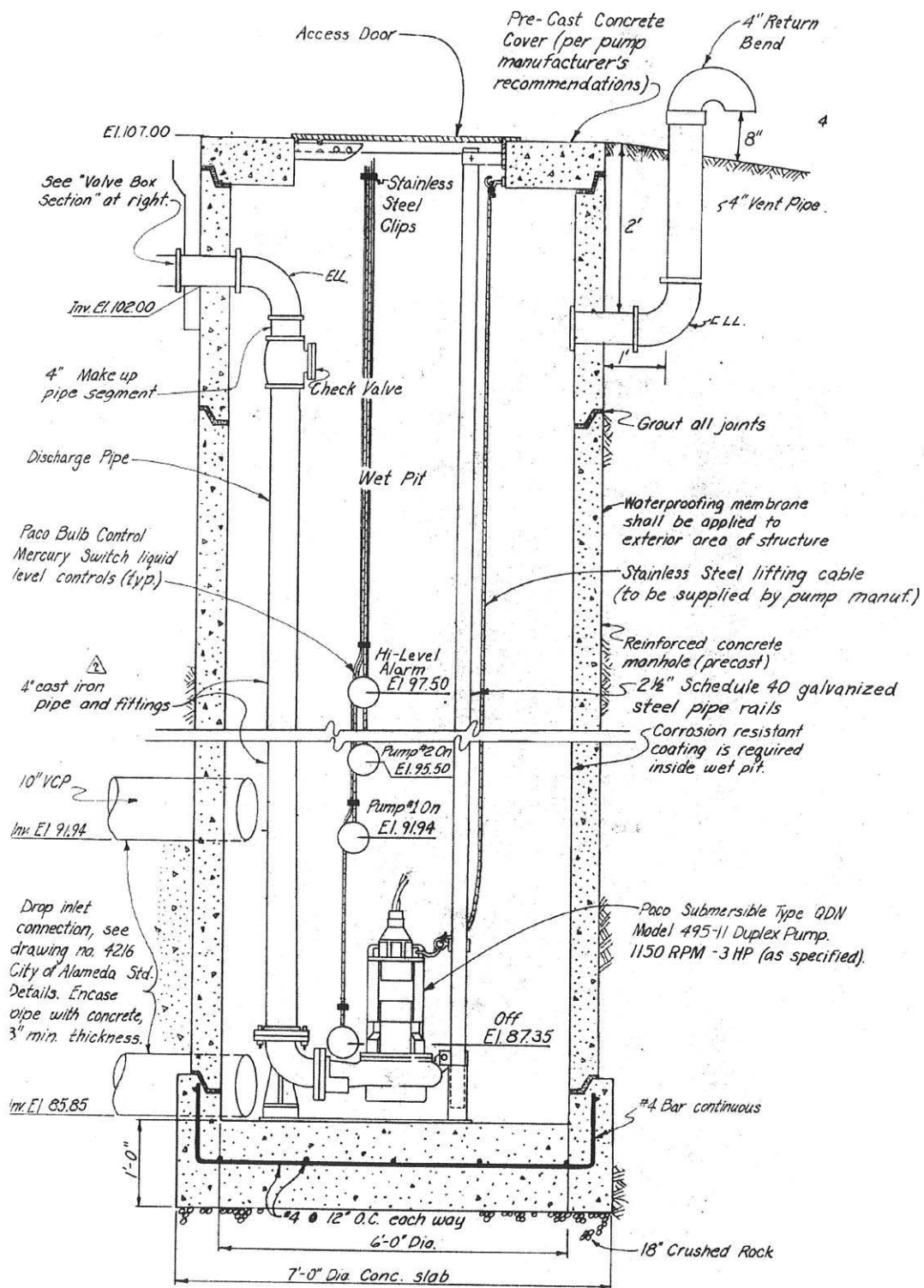


Figure 008-3: Pump Station Profile



Photo 008-1: Pump Station Site



Photo 008-2: Wet Well



Photo 008-3: Electrical Panel
(Exterior)

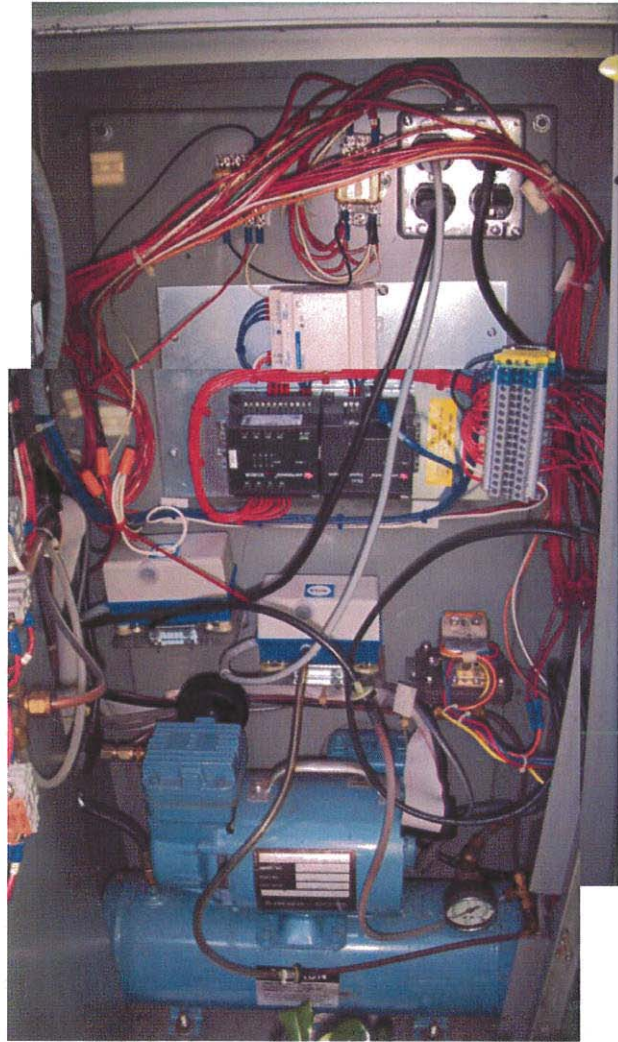


Photo 008-4: Electrical Panel (Interior)



Photo 008-5: Valve Box

017 – Willow Pump Station

Summary

The Willow Pump Station is a wet well pump station and was constructed in 1984. The wet well is located in a manhole in Willow Street, approximately half way between Shoreline Drive and Franciscan Way. The electrical panel and control box are located on the east side of Willow Street, adjacent to the wet well (see Figure 017-1). The station includes one 10-hp pumps and serves approximately 10 acres.



Figure 017-1: Willow Pump Station Site

The Willow Pump Station has adequate capacity for the peak wet weather flow (PWWF); however, it only has one pump and does not have backup power.

Table 017-1 summarizes the costs of the Immediate Recommended Improvements. The improvements are listed in Table 017-4 and should be addressed if the station is not rehabilitated in the near future.

Table 017-2 summarizes the pump station review. The pump station was given a MEDIUM rehabilitation priority due to its age and overall condition.

The 25-year rehabilitation is estimated to cost \$180,000.

Table 017-1: Immediate Recommended Improvements

Priority	Improvement Category	Total Cost
1	Identified Safety Hazards	\$7,000
2	Identified Code Violations	\$0
3	Remaining Good Practice Improvements	\$13,000

Table 017-2: Summary Table

Rehabilitation Priority	MEDIUM
Rehabilitation Ranking (out of 34 stations assessed)	16th
# of Code Violations	2
Adequate Capacity?	Yes
25-Yr. Rehabilitation Estimate	\$180,000
Expected Annual Electricity Savings After Rehabilitation	\$50

Pump and Piping System Assessment

A summary of the pump station discharge and efficiency is shown in Table 017-3. Pump tests determined the pump currently operates at 533 gpm with an existing overall efficiency of 10%. The City has an identical backup pump for this station in their maintenance facility. Using an estimated overall pumping efficiency after rehabilitation of 60%, the City would save an estimated \$50 each year on electricity.

Table 017-3: Willow Pump Station

	Calculated Existing Pump Discharge (gpm)	Calculation Method	Calculated Existing Pumping Efficiency	System PWWF Demand (gpm)	Does Pump Station Have Sufficient Capacity?	Does Pump Station Have Redundancy?
Pump #1	533	Volumetric	10%	61	Yes	Yes

1. The station does not have pumping redundancy, but it does have a high-level bypass pipe providing redundancy

Figure 017-2 shows the existing sewer piping surrounding the Willow Pump Station. Figure 017-3 shows a profile of the wet well, which is approximately 11 feet deep and has a 5 foot inside diameter. The wet well is in descent condition.

City staff mentioned that the pump station often gets clogged with mop heads. The addition of a chopper pump may help reduce the frequency of clogs; however, they are not designed for large obstacles such as mop heads. The best method to reduce clogging may be to inform residents and businesses of the issues involved with flushing items into the sewer system.

The pump station has a 4 inch, 200 foot long force main that discharges to a manhole at the intersection of Willow and Franciscan. The sewage then flows by gravity another block north until it reaches the Willow Whitehall Pump Station (018).

The existing station does not have a backup generator, and it is not necessary to add one because the station has a high-level bypass pipe. The addition of a connection for a portable backup generator should be considered during the next rehabilitation.

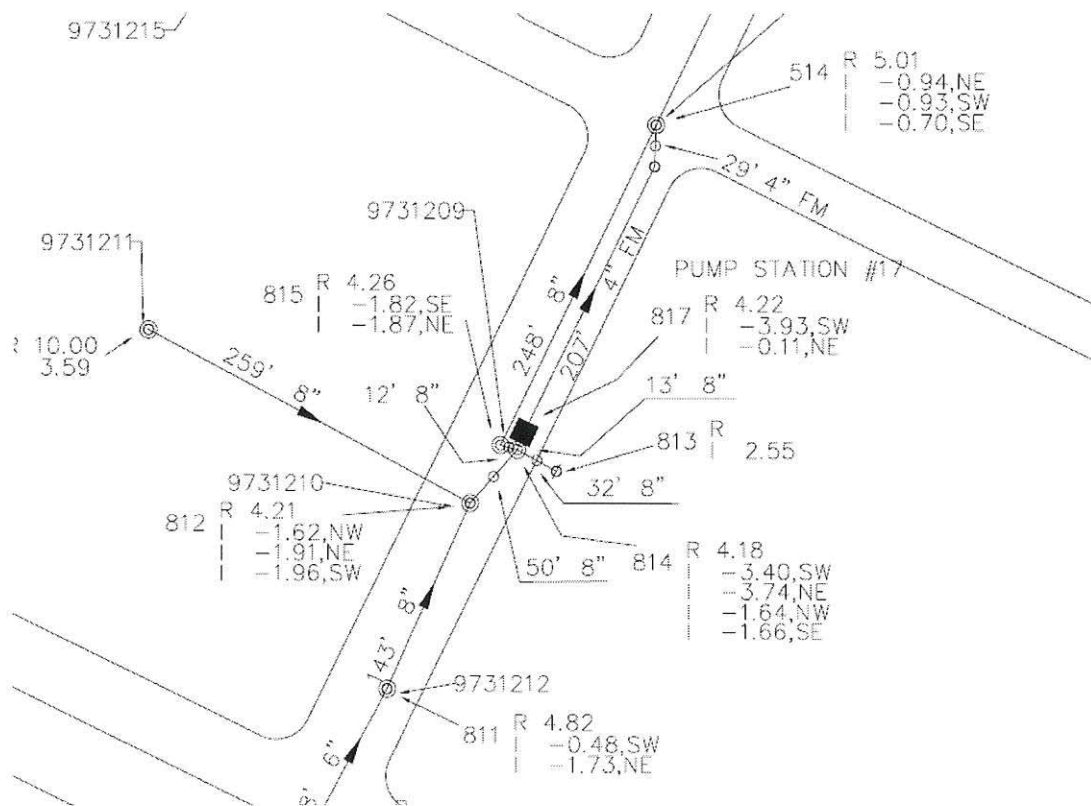


Figure 017-2: Willow Pump Station Location and System Map

Electrical Assessment

A summary of the electrical assessment and noted code violations, safety hazards, and other recommendations are shown in Table 017-4.

Table 017-4: Willow Pump Station Electrical Assessment

Type	Identified Electrical Deficiencies	Immediate Imp. Priority
Code Violations	• No electric shock and arc flash hazard warning signs on pump control panel and motor starter enclosure	1
	• A large rectangular unused opening in the pump control panel inner door which exposes energized parts	1
Safety	• Unused cutout hole for the operating handle in the pump starter panel door	1
	• Door mounted operating handle detached from the main breaker when door is opened	1
NFPA 820 Violations		
Control or Instrumentation	• Bubbler tube not easily accessible	3
	• No back-up level switch in the wet well	1
Reliability	• No standby generator	
	• Only 1 pump, no back-up	
Operations/ Maintenance	• No separate compartments for pump starter and level/pump controls	3
	• Pump motor cables routed through the conduit seal fitting make it difficult to pull them out for pump/motor repair	3
Others	• Panel interior dirty and dusty	3
	• Some panel areas corroded	3

Structural / Seismic Assessment

Structurally, the Willow pump station is in average condition. There is noticeable corrosion of discharge piping and other metal components in the wet well. Approximately 73% of the surrounding area is predicted to liquefy during a severe earthquake.

Access and Site Assessment

The Willow Pump Station is located in Willow Street in a manhole about half way between Shoreline Drive and Franciscan Way. Willow Street is a 60 foot wide street with lane of parking. The electrical panel and backflow preventer and on the east side of the street, near the wet well, and positioned between the curb face and sidewalk facing west (see Photo 017-3).

The site provides adequate access to the existing pump station equipment; however, there isn't sufficient room to add a backup generator.

Cost Estimate

Rehabilitation costs for the Willow Pump Station are found in Table 017-5. The 25-year rehabilitation is estimated to cost \$180,000. The 50-year rehabilitation is estimated to cost \$280,000 and includes construction of a new wet well.

Table 017-5: Willow Pump Station Cost Estimate

Item	Size	Make / Material	Comments	Replacement Cost
Pumps and Motors				
Pump and Motor #1	10 HP	Flygt	Submersible	\$14,000
Pump and Motor #2	10 HP	Flygt	Submersible	\$14,000
			Subtotal	\$28,000
Electrical Equipment				
Electrical Panel				\$15,000
SCADA System				\$15,000
Level Sensor			Bubbler w/ Backup Float	\$5,000
Air Compressor				\$2,000
Miscellaneous			Wiring, conduit, etc.	\$2,000
			Subtotal	\$39,000
Piping				
Discharge Piping	4 inch	Ductile Iron	50 LF @ \$100 / LF	\$5,000
Fittings	4 inch	Ductile Iron	6 EA @ \$250 / EA	\$1,500
Check Valves	4 inch	Ductile Iron (body)	2 EA @ \$500 / EA	\$1,000
Gate Valves (isolation)	4 inch	Ductile Iron (body)	2 EA @ \$500 / EA	\$1,000
			Subtotal	\$8,500
Miscellaneous Equipment				
Valve Vault and Hatch				\$20,000
Hatch		Syracuse		\$2,000
Wet Well Rehabilitation			Epoxy Coating	\$2,000
Pump Rail			4 EA @ \$500 / EA	\$2,000
Site Improvements			Sidewalk, landscaping, etc.	\$3,000
Bypass Pumping			During Construction	\$7,000
Demolition & Disposal				\$5,000
			Subtotal	\$41,000
25- Year Replacement Cost				Total \$116,500
				55% for Contingency, Admin., CM, Engr. \$64,000
				Total w/ Contingency \$180,000
50 Year Replacement Items				
<i>(Structural Components)</i>				
New wetwell		Precast Concrete	10 feet deep	\$45,000
Bypass Pumping			During Construction	\$7,000
Demolition & Disposal				\$10,000
			Subtotal	\$62,000
50- Year Replacement Cost				Total \$178,500
				55% for Contingency, Admin., CM, Engr. \$98,000
				Total w/ Contingency \$280,000

Notes:

1. Costs referenced to March 2009 San Francisco Construction Cost Index (9757.67)
2. Costs include materials, labor, demolition and hauling

This estimate of construction cost is a professional opinion, based upon the engineer's experience with the design and construction of similar projects. It is prepared only as a guide and is subject to change. Schaaf & Wheeler and its subconsultants make no warranty, whether expressed or implied, that the actual costs will not vary from these estimated costs, and assumes no liability for such variances.

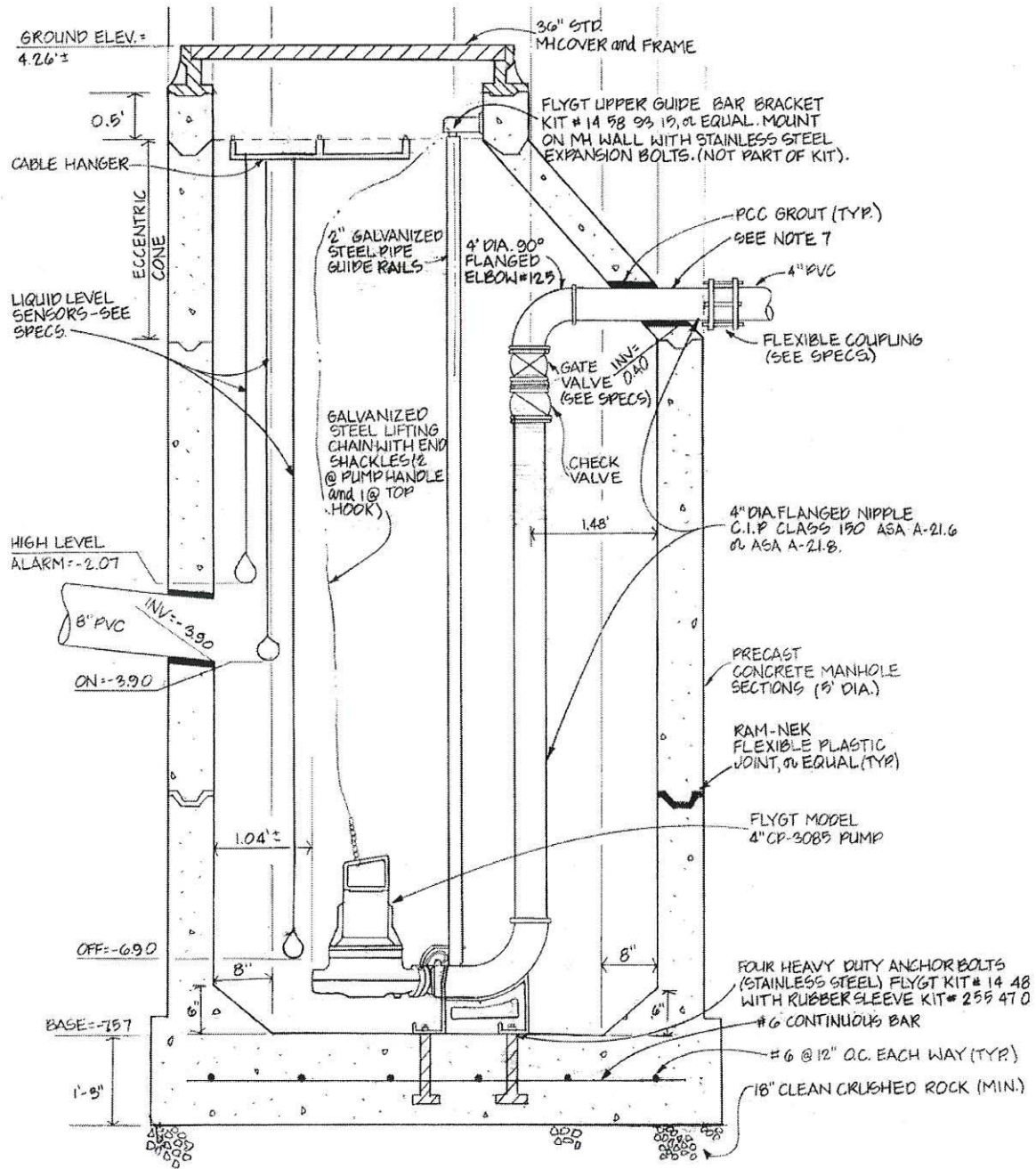


Figure 017-3: Pump Station Profile



Photo 017-3: Electrical Panel Location



Photo 017-4: Backflow Preventer



Photo 017-5: Electrical Panel (Exterior)



Photo 017-6: Electrical Panel (Interior)

025 – 8th Portola Pump Station

Summary

The 8th Portola Pump Station is a wet well / dry well pump station and was constructed in 1954. Located on the west side of 8th Street across from Portola Avenue (see Figure 025-1), the station includes two 12-hp pumps and serves approximately 100 acres of land including six courts off of Otis Drive, Westline Drive, Shore Point Court, and the discharge from the Paru Pump Station (#024) and Grand Pump Station (#043), north of the lagoon.



Figure 025-1: 8th-Portola Pump Station Site

The 8th Portola Pump Station is currently undersized for the Peak Wet Weather Flows (PWWF) identified in the Sanitary Sewer Master Plan.

Table 025-1 summarizes the costs of the immediate recommended Improvements. The improvements are listed in Table 025-4 and should be implemented as soon as feasible if the station is not rehabilitated in the near future.

The 8th Portola Pump Station has a HIGH rehabilitation Priority due to its insufficient capacity. A summary of the pump station assessment is shown in Table 025-2.

The 25-year rehabilitation is estimated to cost \$390,000.

Table 025-1: Immediate Recommended Improvements

Priority	Improvement Category	Total Cost
1	Identified Safety Hazards	\$47,000
2	Identified Code Violations	\$4,000
3	Remaining Good Practice Improvements	\$12,000

Table 025-2: Summary Table

Rehabilitation Priority	HIGH
Rehabilitation Ranking (out of 34 stations assessed)	3rd
# of Code Violations	4
Adequate Capacity?	No
25-Yr. Rehabilitation Estimate	\$390,000
Expected Annual Electricity Savings After Rehabilitation	\$760

Pump and Piping System Assessment

Recent pump testing found pump #2 operates at 462 gpm with an existing overall efficiency of 24%. Pump #1 was not operational at the time of testing; therefore, we do not have flow data for that pump. Using an estimated overall pumping efficiency after rehabilitation of 60%, the City would save an estimated \$760 each year on electricity. A summary of the pump station discharges, demands, and efficiencies are shown in Table 025-3.

Table 025-3: 8th Portola Pump Station

	Calculated Existing Pump Discharge (gpm)	Calculation Method	Calculated Existing Pumping Efficiency	System PWWF Demand (gpm)	Does Pump Station Have Sufficient Capacity?	Does Pump Station Have Redundancy?
Pump #1	-	-	-	1111	No	No
Pump #2	462	Ultrasonic	24%			

Sewage enters the station from a manhole southeast of the station in 8th Street, and discharges to a manhole northeast of the station (in 8th Street). A high-level bypass pipe connects the two manholes; however, if sewage backs up to the bypass elevation, the upstream manholes will overflow. Figure 025-2 shows the existing pipe layout surrounding the pump station. The station services the sewershed along Portola Avenue.

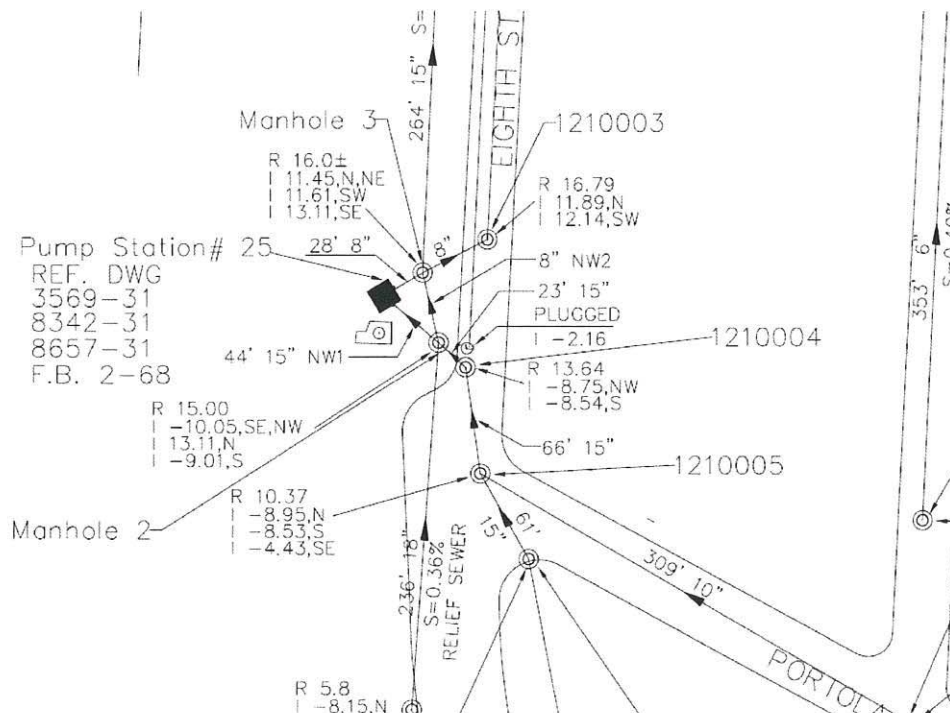


Figure 025-2: 8th-Portola Pump Station Location and System Map

Electrical Assessment

A summary of the electrical assessment and noted code violations, safety hazards, and other recommendations are shown in Table 025-4.

Table 025-4: 8th Portola Pump Station Electrical Assessment

Type	Identified Electrical Deficiencies	Immediate Imp. Priority
Code Violations	• No electric shock and arc flash hazard warning signs on service meter/main enclosure and pump control panel	1
	• Non-explosion-proof level switch in the wet well with no intrinsically safe relay	2
	• No sign indicating the type and location of the standby power source [Art. 702.8(A)]	2
	• Exposed wiring and splices at the receptacle/-plug assemblies in the dry well	2
Safety	• Elect panel near the wet well opening	1
	• Door mounted operating handles detached from the breakers when door is opened	1
	• No hazardous gas sensors and alarms in the dry well	1
	• No emergency light fixture in the dry well	1
	• Pump motor cables laying on the floor from the wall to the floor opening (formerly for the pump shaft)	1
	• Unused device holes on the electrical panelboard enclosure	1
NFPA 820 Violations	• Elect panel not explosion proof	2
Control or Instrumentation	• No individual control circuit for each pump	3
Reliability	• One common panel for the 2 pump starters	3
	• One common wireway for the 2 pump motor conductors and receptacle/plug units	3
Operations/ Maintenance	• No separate compartments for pump starters and level/pump controls	3
	• Pump motor cables routed through the conduit seal fittings makes it difficult to pull them out for pump/motor repair	3
	• Panelboard located below grade in the dry well	3
Others	• Panel interior dirty, dusty and covered with cobwebs	3
	• Panel bottom area and conduit stub-up corroded	3

Structural / Seismic Assessment

The 8th Portola Pump Station consists of a large wet well / dry well structure that has inside dimensions of 16 feet long by 10 feet wide by 16 feet deep, the walls are approximately 1 foot thick. The station is divided into a wet half and dry half, with an intermediate platform for both sides. Above ground, the station includes a 30kw backup generator, an electrical panel, a SCADA antenna, a couple control boxes, and an air vent.

Structurally, the 8th Portola Pump Station is in good condition. The structures' walls and access ladders are in good shape and the pumps are adequately anchored. The SCADA antenna is loose and there is some corrosion in and around the pumps as well as hydrogen sulfide exposure on the walls of the wet well. There is no fall protection and the ventilation was poor. Although the site is not supported by a deep foundation, the liquefaction hazard for this site is low.

We recommend checking the anchorage of the SCADA antenna pole and providing fall protection where necessary. We recommend removing areas of corrosion and repaint them with an appropriate Tnemec system. Any loose grout around the pumps should be removed and confirm the pumps are adequately bolted to their foundation.

Access and Site Assessment

The 8th Portola Pump Station is located on the west side of 8th Street across from Portola Avenue, and adjacent to Washington Park. The drywell is particularly deep and its current layout makes it difficult to remove the pumps.

City staff mentioned that they would like to consider moving the station further south on 8th Avenue. It appears that it would be possible to relocate the station; however, it would require construction of additional sewer mains (gravity and force mains).

The wet well / dry well hatch and electrical panel are not enclosed within a fence and could be susceptible to vandalism. The station exhibits a slight odor from the ventilation fan and the wetwell. The site has a backup generator, which is enclosed within a chain link fence.

Cost Estimate

Rehabilitation costs for the 8th Portola Pump Station are found in Table 025-5. The 25-year rehabilitation is estimated to cost \$390,000, and the 50-year rehabilitation is estimated to cost \$500,000 and includes the costs to convert the current wet well / dry well configuration to a single large wet well design.

Table 025-5: 8th-Portola Pump Station Cost Estimate

Item	Size	Make / Material	Comments	Replacement Cost
Pumps and Motors				
Pump and Motor #1		Flygt		\$16,000
Pump and Motor #2		Flygt		\$16,000
			Subtotal	\$32,000
Electrical Equipment				
Electrical Panel				\$15,000
SCADA System				\$15,000
Level Sensor			Bubbler w/ Backup Float	\$5,000
Air Compressor				\$2,000
Backup Generator			Room available for generator	\$40,000
Miscellaneous			Wiring, conduit, etc.	\$5,000
			Subtotal	\$82,000
Piping				
Piping	8 inch	Ductile Iron	20 LF @ \$140 / LF	\$2,800
Fittings	8 inch	Ductile Iron	4 EA @ \$650 / EA	\$1,950
Piping	5 inch	Ductile Iron	40 LF @ \$110 / LF	\$4,400
Fittings	5 inch	Ductile Iron	8 EA @ \$500 / EA	\$4,000
Check Valves	5 inch	Ductile Iron (body)	2 EA @ \$1000 / EA	\$2,000
Gate Valves (isolation)	5 inch	Ductile Iron (body)	2 EA @ \$1000 / EA	\$2,000
			Subtotal	\$17,150
Miscellaneous Equipment				
Valve Vault and Hatch				\$30,000
Hatch				\$10,000
Wet Well Rehabilitation	16L 10W 16D		1,150 SF @ \$16 / SF	\$18,500
Hose Bib			Includes piping to BFP	\$500
Backflow Preventer	3/4 inch			\$500
Fence			40 LF @ \$50 / LF	\$2,000
Ladder				\$5,000
Lighting				\$2,000
Air Vent				\$4,000
Fan			2 EA @ \$2,000 / EA	\$4,000
Dehumidifier				\$5,000
Pump Rail			4 EA @ \$500 / EA	\$2,000
Site Improvements			Sidewalk, landscaping, etc.	\$5,000
Bypass Pumping			During Construction	\$10,000
Demolition & Disposal				\$20,000
			Subtotal	\$118,500
25- Year Replacement Cost				Total \$249,650
				55% for Contingency, Admin., CM, Engr. \$137,000
				Total w/ Contingency \$390,000
50 Year Replacement Items				
<i>(Structural Components)</i>				
New Top and Manway of PS	16L 10W 1D	Precast Concrete	160 + 160 CF @ \$2,000 / CY	\$24,000
Rehab Conversion Work			Adding fillets, punching holes, etc.	\$10,000
Bypass Pumping			During Construction	\$10,000
Demolition & Disposal				\$30,000
			Subtotal	\$74,000
50- Year Replacement Cost				Total \$323,650
				55% for Contingency, Admin., CM, Engr. \$178,000
				Total w/ Contingency \$500,000

Notes:

1. Costs referenced to March 2009 San Francisco Construction Cost Index (9757.67)
2. Costs include materials, labor, demolition and hauling

This estimate of construction cost is a professional opinion, based upon the engineer's experience with the design and construction of similar projects. It is prepared only as a guide and is subject to change. Schaaf & Wheeler and its subconsultants make no warranty, whether expressed or implied, that the actual costs will not vary from these estimated costs, and assumes no liability for such variances.

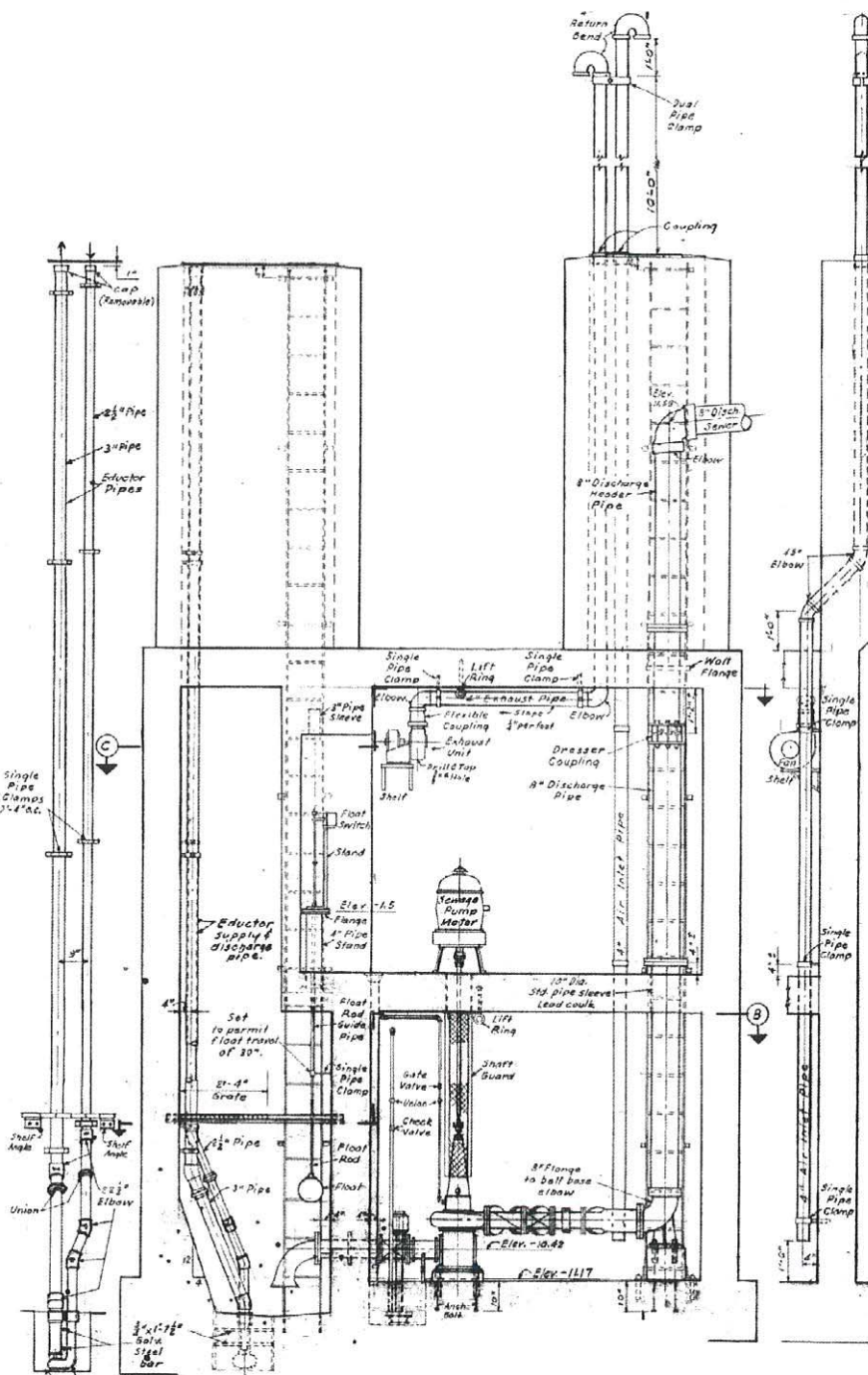


Figure 025-3: Pump Station Profile
(pumps have since been replaced)



Photo 025-1: Pump Station Site



Photo 025-2: Outside Electrical Panel



Photo 025-3: Generator



Photo 025-4: Shaft

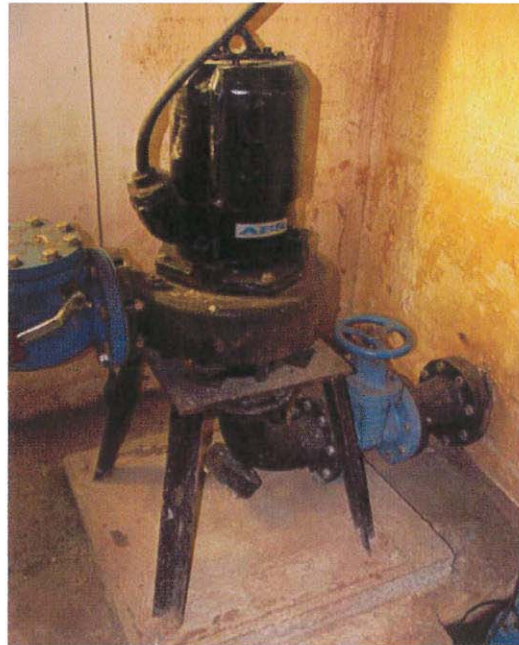


Photo 025-5: Pump



Photo 025-6: Inside Electrical Panel



Photo 025-7: Vent Fan

026 – 8th-Taylor Pump Station

Summary

The 8th Taylor Pump Station is a wet well pump station and was constructed in 1954. Located on the north side of Taylor Avenue about 80 feet west of 8th Street (see Figure 026-1), the station includes two 7.5-hp pumps and serves approximately 25 acres of land west of the station south of the station, including a couple blocks of Central Avenue, 8th Avenue and Page Street.



Figure 026-1: 8th-Taylor Pump Station Site

The 8th Taylor Pump Station has adequate capacity for the peak wet weather flow (PWWF); however, it does not have backup power.

Table 026-1 summarizes the costs of the Immediate Recommended Improvements. The improvements are listed in Table 026-4 and should be addressed if the station is not rehabilitated in the near future.

Table 026-2 summarizes the pump station review. The pump station was given a MEDIUM rehabilitation priority since it has sufficient capacity but no backup power.

The 25-year rehabilitation is estimated to cost \$280,000.

Table 026-1: Immediate Recommended Improvements

Priority	Improvement Category	Total Cost
1	Identified Safety Hazards	\$11,000
2	Identified Code Violations	\$2,000
3	Remaining Good Practice Improvements	\$22,000

Table 026-2: Summary Table

Rehabilitation Priority	MEDIUM
Rehabilitation Ranking (out of 34 stations assessed)	21st
# of Code Violations	5
Adequate Capacity?	Yes
25-Yr. Rehabilitation Estimate	\$280,000
Expected Annual Electricity Savings After Rehabilitation	\$40

Pump and Piping System Assessment

Pump tests determined Pumps 1 and 2 operated at 387 gpm and 386 gpm, at overall efficiencies of 29% and 25%, respectively. Using an estimated overall pumping efficiency after rehabilitation of 60%, the City would save an estimated \$40 each year on electricity. A summary of the pump station discharges, demands, and efficiencies are shown in Table 026-3.

Table 026-3: 8th Taylor Pump Station

	Calculated Existing Pump Discharge (gpm)	Calculation Method	Calculated Existing Pumping Efficiency	System PWWF Demand (gpm)	Does Pump Station Have Sufficient Capacity?	Does Pump Station Have Redundancy?
Pump #1	387	Volumetric	29%	250	Yes	Yes
Pump #2	386	Volumetric	25%			

The station has an 8 inch high-level bypass pipe to a manhole in the intersection of 8th Street and Taylor Avenue. The station has a relatively short (70-feet) 4-inch force main. Figure 026-2 shows the existing piping adjacent to the pump station.

The pump station does not have a backup generator.

The site does not have sufficient room to add a backup generator and has a short time to overflow; therefore, additional storage should be added to the system. 2,300 cubic feet of storage is required to increase the time to overflow to 2-hours. A connection for a portable backup generator should also be added during the next rehabilitation.

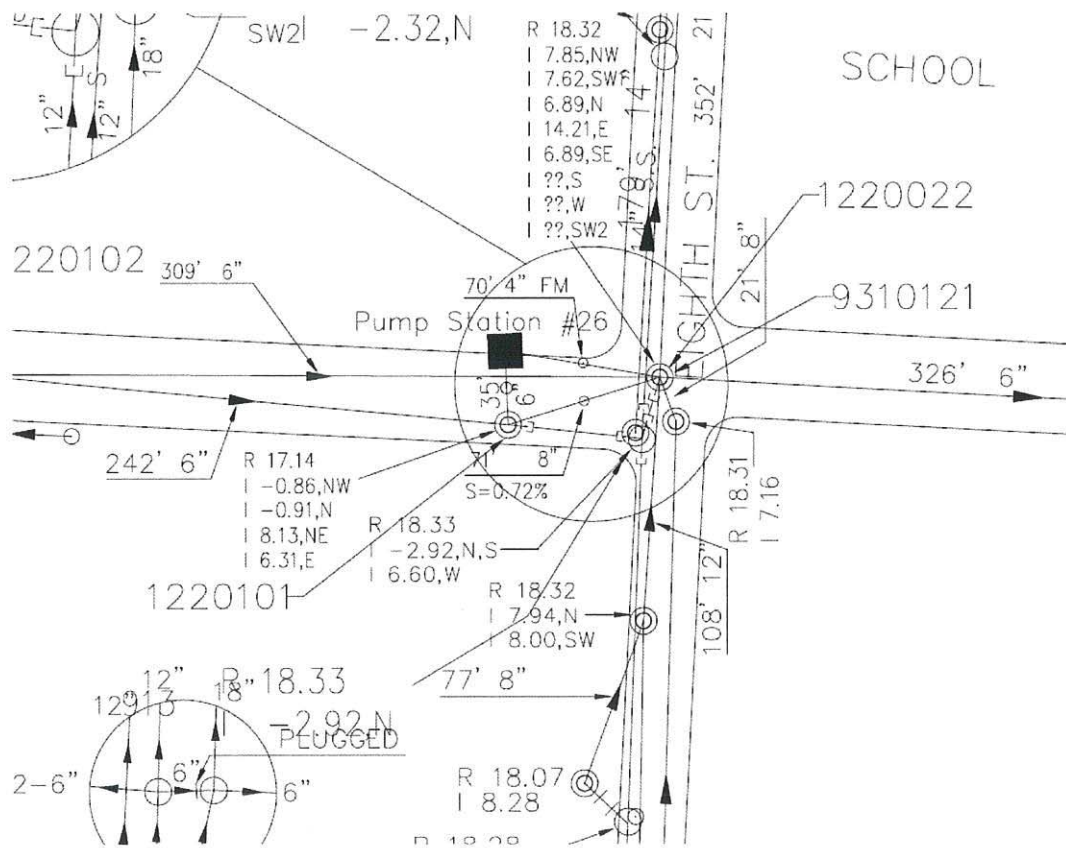


Figure 026-2: 8th-Taylor Pump Station Location and System Map

Electrical Assessment

A summary of the electrical assessment and noted code violations, safety hazards, and other recommendations are shown in Table 026-4.

Table 026-4: 8th Taylor Pump Station Electrical Assessment

Type	Identified Electrical Deficiencies	Immediate Imp. Priority
Code Violations	• Insufficient work space in front of the pump control panel due to the wet/dry well hatch opening	1
	• No electric shock and arc flash hazard warning signs on pump control panel	1
	• No identification for each pump starter breaker operating handle [Art. 110.22]	2
	• Non-explosion-proof level switches in the wet/dry well with no intrinsically safe relays	2
Safety	• Door mounted operating handles detached from the breakers when the door is opened	1
	• No hazardous gas sensors and alarms in the dry well	1
NFPA 820 Violations		
Control or Instrumentation	• No individual control circuit for each pump	3
Reliability	• No standby generator	
	• One common panel for the 2 pump starters	3
	• One common junction box for the 2 pump motor conductors and receptacle/plug units	3
Operations/Maintenance	• No separate compartments for pump starter, level/pump controls, and bubbler compressors	3
Others	• Panel interior slightly dirty and corroded	3
	• Junction box on top of the wet/dry well structure metal deck badly corroded with missing screws	3

Structural / Seismic Assessment

The 8th Taylor Pump Station contains the largest wet well of all “wet well” pump stations evaluated in this report – it measures approximately 22 feet deep and 9 feet in diameter. The large depth of the wet well is necessary for flows accumulate by gravity flow and the large diameter is necessary to fit the two 7.5-hp pumps side by side. Figure 026-3 shows the station profile and how the pump motors sit on a mid-level platform. Beside the wet well, the station includes an electrical panel, control box and elevated air vents. The electrical panel is bolted to a 4 inch diameter steel pipe positioned between the street curb and sidewalk.

The 8th-Taylor Pump Station is in good structural condition. One structural concern noted during inspection is the crack in the sidewalk at the edge of the wet well.

Access and Site Assessment

The 8th-Taylor Pump Station is located on the north side of Taylor Street, just west 8th Street. The wet well is located in the sidewalk and the electrical panel is located just above the wet well structure. The station is located on the south side of a large apartment building in a dense residential neighborhood.

The existing panel was marked with spray paint during our inspection. The addition of barriers or fencing is not possible at this station since it is located within the sidewalk. Durable panels and hatches should be used during rehabilitation to protect against vandalism.

The existing hatch is not directly over the pump rails, making it difficult to remove the pumps. Relocation of the wet well hatch should be considered during rehabilitation.

Cost Estimate

Rehabilitation costs for the 8th-Taylor Pump Station are found in Table 026-5. The 25-year rehabilitation is estimated to cost \$280,000. The 50-year rehabilitation cost is estimated to be \$420,000 and includes converting the station to a wet well pump station with submersible pumps.

Table 026-5: 8th-Taylor Pump Station Cost Estimate

Item	Size	Make / Material	Comments	Replacement Cost
Pumps and Motors				
Pump and Motor #1		Flygt	Submersible	\$12,000
Pump and Motor #2		Flygt	Submersible	\$12,000
			Subtotal	\$24,000
Electrical Equipment				
Electrical Panel				\$15,000
SCADA System				\$15,000
Level Sensor			Bubbler w/ Backup Float	\$5,000
Air Compressor			Similar to existing compressor	\$2,000
Miscellaneous			Wiring, conduit, etc.	\$2,000
			Subtotal	\$39,000
Piping				
Discharge Piping	4 inch	Ductile Iron	40 LF @ \$100 / LF	\$4,000
Fittings	4 inch	Ductile Iron	6 EA @ \$250 / EA	\$1,500
Check Valves	4 inch	Ductile Iron (body)	2 EA @ \$500 / EA	\$1,000
Gate Valves (isolation)	4 inch	Ductile Iron (body)	2 EA @ \$500 / EA	\$1,000
			Subtotal	\$7,500
Miscellaneous Equipment				
Valve Vault and Hatch				\$20,000
Hatch				\$4,000
Wet Well Rehabilitation			Epoxy Coating	\$7,000
Hose Bib			Includes piping to BFP	\$500
Backflow Preventer	3/4 inch			\$500
Ladder				\$2,000
Air Vent				\$2,000
Fan				\$2,000
Pump Rail			4 EA @ \$500 / EA	\$2,000
Add System Storage Volume				\$80,000
Site Improvements			Sidewalk, landscaping, etc.	\$3,000
Bypass Pumping			During Construction	\$7,000
Demolition & Disposal				\$5,000
			Subtotal	\$135,000
25- Year Replacement Cost				Total \$183,000
				55% for Contingency, Admin., CM, Engr. \$101,000
				Total w/ Contingency \$280,000
50 Year Replacement Items				
<i>(Structural Components)</i>				
New wet well		Precast Concrete	22 feet deep	\$70,000
Bypass Pumping			During Construction	\$7,000
Demolition & Disposal				\$10,000
			Subtotal	\$87,000
50- Year Replacement Cost				Total \$270,000
				55% for Contingency, Admin., CM, Engr. \$149,000
				Total w/ Contingency \$420,000

Notes:

1. Costs referenced to March 2009 San Francisco Construction Cost Index (9757.67)
2. Costs include materials, labor, demolition and hauling

This estimate of construction cost is a professional opinion, based upon the engineer's experience with the design and construction of similar projects. It is prepared only as a guide and is subject to change. Schaaf & Wheeler and its subconsultants make no warranty, whether expressed or implied, that the actual costs will not vary from these estimated costs, and assumes no liability for such variances.



Photo 026-1: Pump Station Site



Photo 026-2: Electrical Panel



Photo 026-3: Wet Well



Photo 026-4: Electrical Panel (Interior)

027 – Tideway Pump Station

Summary

The Tideway Pump Station is a wet well / dry well pump station and was constructed in 1965. Located in the median of Ballena Boulevard about 100 feet north of Tideway Drive (see Figure 027-1), the station includes two 10-hp pumps and serves approximately 20 acres of land including parts of Ballena Boulevard, and Tideway Drive.



Figure 027-1: Tideway Pump Station Site

The Tideway Pump Station is currently undersized for the Peak Wet Weather Flows (PWWF) identified in the Sanitary Sewer Master Plan.

Table 027-1 summarizes the costs of the Immediate Recommended Improvements. The improvements are listed in Table 027-4 and should be addressed if the station is not rehabilitated in the near future.

Table 027-4 is a summary of the pump station evaluation. The pump station was given a HIGH rehabilitation priority due to its insufficient capacity.

The 25-year rehabilitation is estimated to cost \$410,000.

Table 027-1: Immediate Recommended Improvements

Priority	Improvement Category	Total Cost
1	Identified Safety Hazards	\$49,000
2	Identified Code Violations	\$4,000
3	Remaining Good Practice Improvements	\$12,000

Table 027-2: Summary Table

Rehabilitation Priority	HIGH
Rehabilitation Ranking (out of 34 stations assessed)	7th
# of Code Violations	4
Adequate Capacity?	No
25-Yr. Rehabilitation Estimate	\$410,000
Expected Annual Electricity Savings After Rehabilitation	\$1,140

Pump and Piping System Assessment

Pump test results show that Pump #1 operates at 158 gpm with an overall efficiency of 3%. Data for Pump #2 is not available. Using an estimated overall pumping efficiency after rehabilitation of 60%, the City would save an estimated \$1,140 each year on electricity.

Table 027-3: Tideway Pump Station

	Calculated Existing Pump Discharge (gpm)	Calculation Method	Calculated Existing Pumping Efficiency	System PWWF Demand (gpm)	Does Pump Station Have Sufficient Capacity?	Does Pump Station Have Redundancy?
Pump #1	158	Ultrasonic	-	243	No	No
Pump #2	-	-	-			

The Tideway Pump Station receives sewage from a manhole on the west side of Ballena Boulevard. The 8-inch force main joins with the Cola Ballena pump station(#028) force main and runs approximately 800-ft north on Ballena Boulevard and east on Central Avenue. Figure 027-2 shows the existing layout and piping near the pump station.

The existing ventilation system is not operational or adequate for current standards and should be replaced as soon as feasible if the station is not rehabilitated in the near future.

The station does not have a high-level bypass, nor does it have a backup generator. There is sufficient room in the roadway median for a backup generator; we recommend adding one during the next pump station rehabilitation. The station does not have a bypass pumping hookup, due to the force main length we recommend adding one with the next rehabilitation. The pump station rehabilitation should be designed for redundancy; therefore, each pump should be able to handle the full PWWF.

We recommend relocating the pump control panels and electrical enclosures above ground during the next rehabilitation. Converting the pump station to a wet well pump station with submersible pumps should be considered during the next rehabilitation.

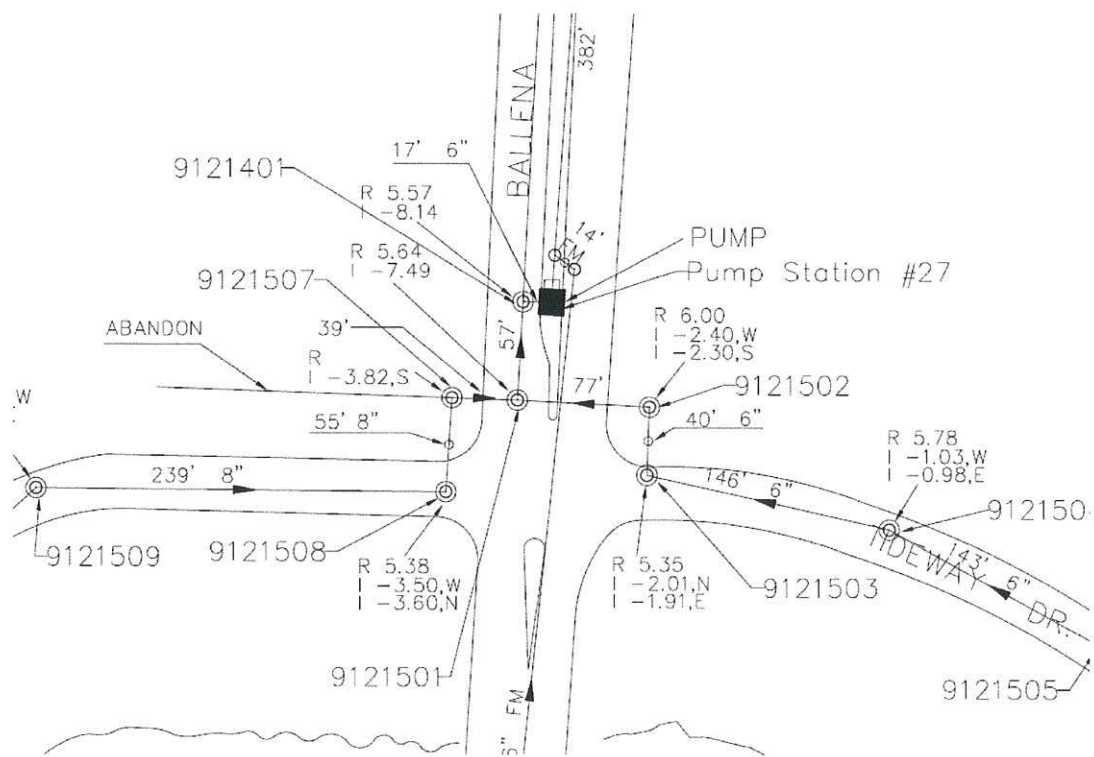


Figure 027-2: Tideway Pump Station Location and System Map

Electrical Assessment

A summary of the electrical assessment and noted code violations, safety hazards, and other recommendations are shown in Table 027-4.

Table 027-4: Tideway Pump Station Electrical Assessment

Type	Identified Electrical Deficiencies	Immediate Imp. Priority
Code Violations	• No electric shock and arc flash hazard warning signs on the pump control panel	1
	• Insufficient work space in front of the pump control panel, only 24", to the panel located in front and to the side	1
	• No identification for each pump starter breaker operating handle	2
	• Improper use of the post ground connector with large and small conductors	2
Safety	• Door mounted operating handles detached from the breakers when door is opened	1
	• No hazardous gas sensors and alarms in the dry well	1
	• No emergency light fixture in the dry well	1
NFPA 820 Violations	• No explosion-proof elect equipment in the dry well (due to no forced push/pull ventilation fans)	2
Control or Instrumentation	• No individual control circuit for each pump	3
Reliability	• No standby generator	
	• One common panel for the 2 pump starters	3
Operations/ Maintenance	• No separate compartments for pump starters, level/pump controls, and bubbler compressors	3
	• Pump motor cables routed through the conduit seal fittings make it difficult to pull them out for pump/motor repair	3
	• Pump control panel and electrical enclosures located below grade subject to flooding, dripping and seeping water	3
	• No directions provided on the pump control panel door to instruct personnel to reset the manual switch contactor after opening and closing the main circuit breaker	3
Others	• Insufficient work space in front of the service meter enclosure due to the shrubs located below (this may be Alameda Municipal Power issue)	3
	• Panel interior dusty, dirty and corroded, especially the abandoned mounting holes for the compressor	3
	• Light fixtures and conduits severely corroded and filthy in the wet well	2

Structural / Seismic Assessment

The Tideway Pump Station consists of a large wet well / dry well structure measuring 18 feet long, 11 feet wide and 20 feet deep. The station includes two pumps, piping electrical panels, control boxes and other hydraulic and electrical appurtenances. The upper level includes the electrical panel and control cabinets; the lower level includes the pumps and inoperable ventilation fan and associated piping.

The station is in good structural condition. There are no signs of settlement or cracking and the stairs and platform appear solid. The concrete walls are spalling around the suction pipe and the pump base plates show some corrosion. There is no lateral bracing on the discharge piping and the liquefaction hazard is approximately 73% in this area.

We recommend removing the corrosion and ground near the pump base plates and repaint these areas with an appropriate Tnemec system. Also, the pumps and piping should be properly braced.

Access and Site Assessment

The station is located in the median of Ballena Boulevard just north of Tideway Drive. At this location, Ballena Drive is approximately 30 feet wide in both directions and includes two travel lanes and one parking lane. The station's electrical panels are located within the dry well.

The site access is adequate; however, the layout of the station makes it difficult to remove equipment from the dry well.

Cost Estimate

Rehabilitation costs for the Tideway Pump Station are found in Table 027-5. The 25-year rehabilitation is estimated to cost \$410,000. The 50-year rehabilitation cost is \$520,000 and includes the costs to convert the current wet well / dry well configuration to a single large wet well design. This conversion should also be considered during the 25-year rehabilitation.

Table 027-5: Tideway Pump Station Cost Estimate

Item	Size	Make / Material	Comments	Replacement Cost
Pumps and Motors				
Pump and Motor #1		Flygt		\$14,000
Pump and Motor #2		Flygt		\$14,000
			Subtotal	\$28,000
Electrical Equipment				
Electrical Panel				\$15,000
SCADA System				\$15,000
Level Sensor			Bubbler w/ Backup Float	\$5,000
Backup Generator				\$40,000
Air Compressor				\$2,000
Miscellaneous			Wiring, conduit, etc.	\$5,000
			Subtotal	\$82,000
Piping				
Piping	6 inch	Ductile Iron	40 LF @ \$120 / LF	\$4,800
Fittings	6 inch	Ductile Iron	10 EA @ \$500 / EA	\$5,000
Check Valves	6 inch	Ductile Iron (body)	2 EA @ \$1000 / EA	\$2,000
Gate Valves (isolation)	6 inch	Ductile Iron (body)	2 EA @ \$1000 / EA	\$2,000
			Subtotal	\$13,800
Miscellaneous Equipment				
Valve Vault and Hatch				\$30,000
Hatch				\$10,000
Wet Well Rehabilitation	18L 11W 20D		2,400 SF @ \$16 / SF	\$38,000
Hose Bib			Includes piping to BFP	\$500
Backflow Preventer	3/4 inch			\$500
Ladder				\$2,000
Lighting				\$2,000
Air Vent				\$4,000
Fan			2 EA @ \$2,000 / EA	\$4,000
Dehumidifier				\$5,000
Pump Rail			4 EA @ \$500 / EA	\$2,000
Bypass Pumping Connection				\$5,000
Site Improvements			Sidewalk, landscaping, etc.	\$5,000
Bypass Pumping			During Construction	\$10,000
Demolition & Disposal				\$20,000
			Subtotal	\$138,000
25- Year Replacement Cost				Total \$261,800
				55% for Contingency, Admin., CM, Engr. \$144,000
				Total w/ Contingency \$410,000
50 Year Replacement Items				
<i>(Structural Components)</i>				
New Top of Pump Station				\$20,000
Rehab Conversion Work			Adding fillets, punching holes, etc.	\$15,000
Bypass Pumping			During Construction	\$10,000
Demolition & Disposal				\$30,000
			Subtotal	\$75,000
50- Year Replacement Cost				Total \$336,800
				55% for Contingency, Admin., CM, Engr. \$185,000
				Total w/ Contingency \$520,000

Notes:

1. Costs referenced to March 2009 San Francisco Construction Cost Index (9757.67)
2. Costs include materials, labor, demolition and hauling

This estimate of construction cost is a professional opinion, based upon the engineer's experience with the design and construction of similar projects. It is prepared only as a guide and is subject to change. Schaaf & Wheeler and its subconsultants make no warranty, whether expressed or implied, that the actual costs will not vary from these estimated costs, and assumes no liability for such variances.

for air intake.

5'-4"

Inv El. +1.5'

Control Panel

6x6 Wye

6" C.I.

14" x Sump Pump Discharge

2'-4"

1'-6 3/4"

1'-5 1/4"

1'-7"

1'-6 3/4"

2'-2 1/4"

6" DeZurik, Fig. 118 plug valve. (typ.)

6" Rich #152 swing check valve with lever, weight & spring. (typ.)

Press. Gages u.s. or appr., = 4 1/2" dial, w.t.p., #5021, 0-70' H₂O, with gage cock & snubber.

6" C.I.

Vibralytic sply.

6" C.I.

6" B Bend

Base Fill Grout Conc. Part

1/2" ± Grout

6x4 Ell

6x4 Ell

6 1/4" ± Discharge El. - 11.43



Photo 027-1: Pump Station Site



Photo 027-2: Transformer



Photo 027-3:
Backflow Preventer



Photo 027-4: Pump



Photo 027-5: Electrical Panel



Photo 027-6: Sump Pump