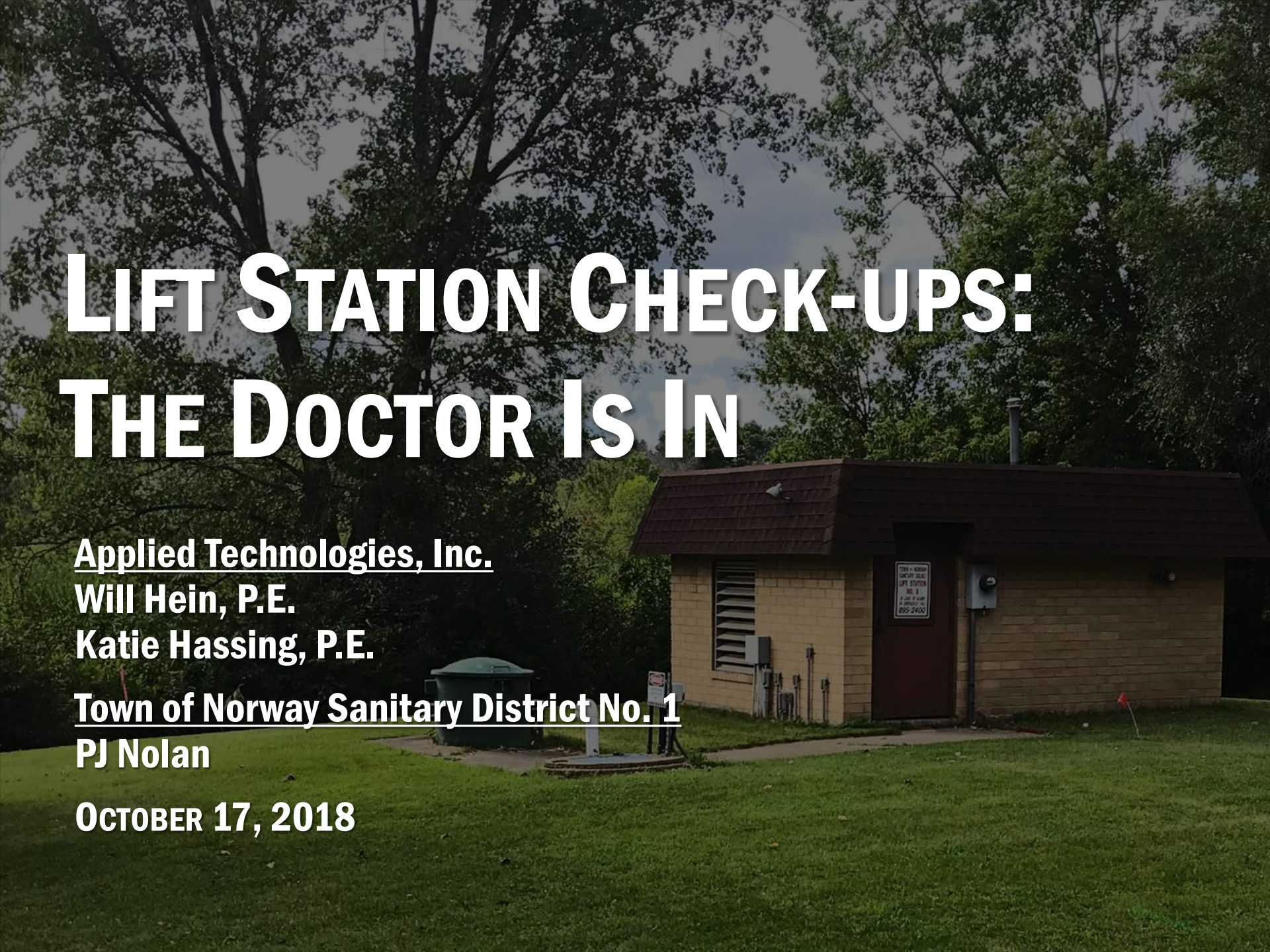


Lift Station Check-ups: The Doctor Is In

Applied Technologies, Inc.
Will Hein, P.E.
Katie Hassing, P.E.

Town of Norway Sanitary District No. 1
PJ Nolan

October 17, 2018

The Patient:
Town of Norway Sanitary District No. 1

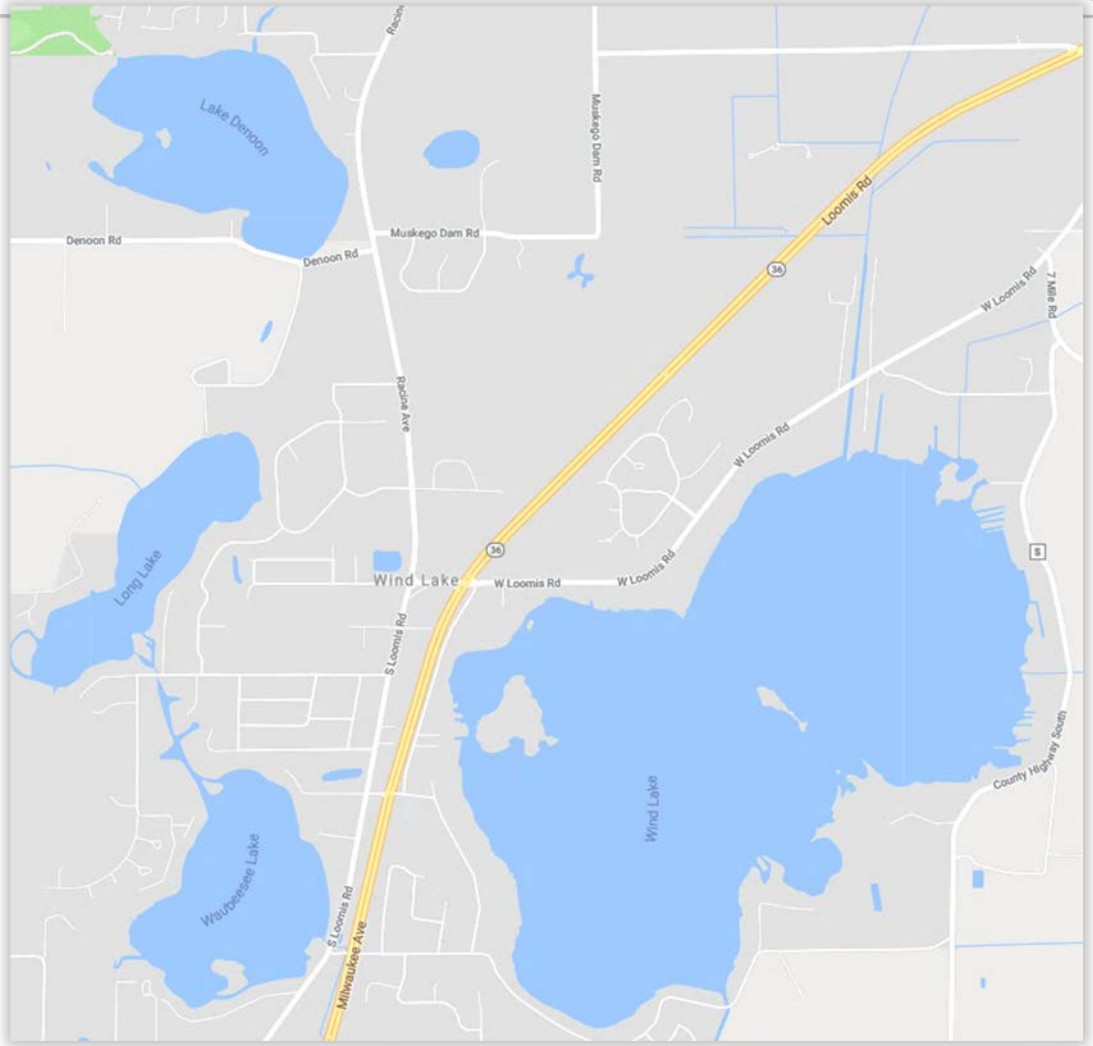
Established in the 1970s to protect Wind, Waubeesee, Long, and Denoon Lakes

8.2 square mile service area

Serves a population of 6,450 and a portion of the City of Muskego

Collection system

- 34 miles of 8- to 30-inch gravity sewers
- 16 lift stations
- 5.2 miles of 4- to 10-inch force main



The Symptoms

13 lift stations were placed into operation in 1977

Dry Wells

- Permit-required confined space made equipment maintenance dangerous

Past typical design lives

Running tests: Condition Assessment

Collection of data

- Performed capacity analyses, talked to Norway staff, and evaluated station buildings, equipment, and sites

Development and ranking of recommendations

Development of planning-level cost estimates for recommended improvements

Station Evaluation

Dry Wells

- Confined space
- Structure condition
- Equipment Condition

Wet Wells

- Confined space
- Structure condition
- Grease and odor

Generator Building

- Structure condition
- Equipment condition

Station Evaluation

Pumping Equipment

Flow Capacities
Maintenance Access
Condition

Piping and Valves

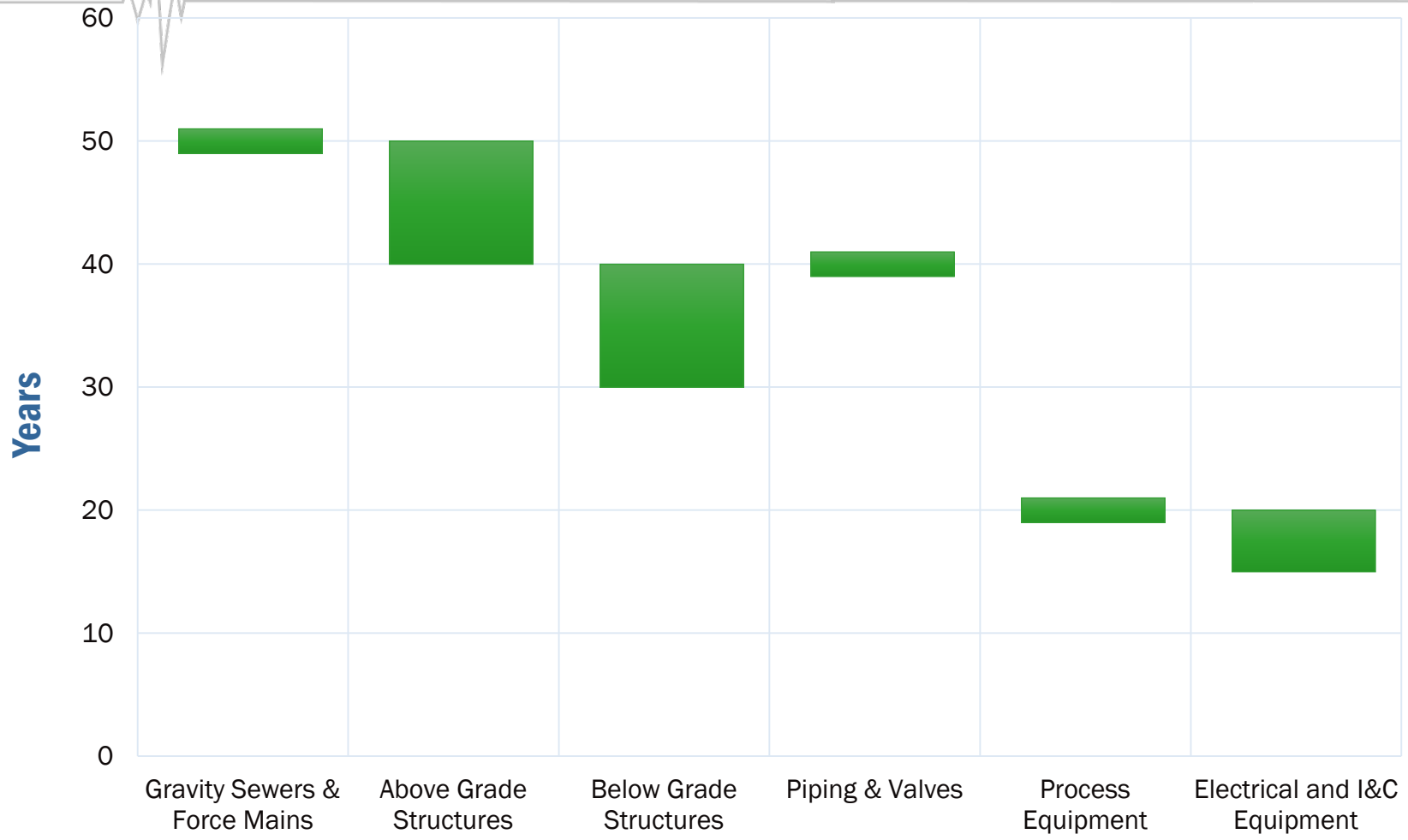
Condition

Electrical , Controls and Communications Equipment

Condition
Dated Technology

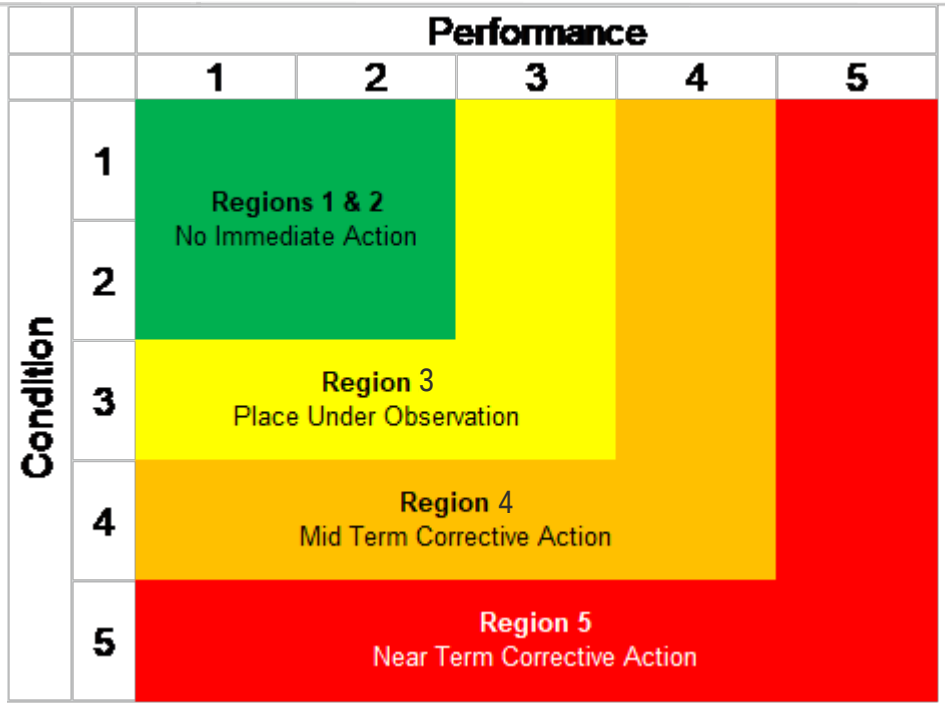
Site Access, Condition and Security

Design Life Assessments



Condition Ranking

Condition and Performance Rankings	
Condition	
1	Excellent
2	Slight visible degradation
3	Visible degradation
4	Integrity of component moderately compromised
5	Integrity of component severely compromised
Performance	
1	Component functioning as intended
2	In-service, but higher than expected O&M
3	In-service, but function is impaired
4	In-service, but function is highly impaired
5	Component is not functioning as intended
Performance Age Adjustment	
0-50% of design life →No adjustment	
50-75% of design life →Performance (+1)	
75-100% of design life →Performance (+2)	



Patient X: Lift Station No. 8

Constructed in 1977

Prefabricated steel dry well

10-inch force main

Electrical service: 240V/3ph/60Hz

2 pumps installed in 2002

70 kW generator

Physical Exam: Wet Well

Assessment

- Entrance concrete: Good
- Interior: Unable to view
- Grating: Covered with grease and debris
- Cover underside: Significant corrosion
- Grease and odor: None

Recommendations

- Enter the wet well to assess concrete and grating
- Cover corrosion: No immediate concerns

Physical Exam: Dry Well

Assessment

- Entrance: Significant corrosion
- Floor: Significant corrosion
- Pumping equipment: Insufficient capacity, corrosion, poor access
- Piping and valves: Operational issues

Recommendations

- Install higher capacity pumps
- Replace with new submersible lift station and valve vault

Physical Exam: Electrical

Electrical

- Generator:
  Good condition, but exceeded design life
- Replace with new station

Building

- Minor structure damage
- HVAC in good condition

Site & Security

- Drainage and access issues

Physical Exam: Controls and Communication

Assessment

- Control panel: End of design life
- Control devices: Control levels drift
- Flow monitoring: None installed

Recommendations

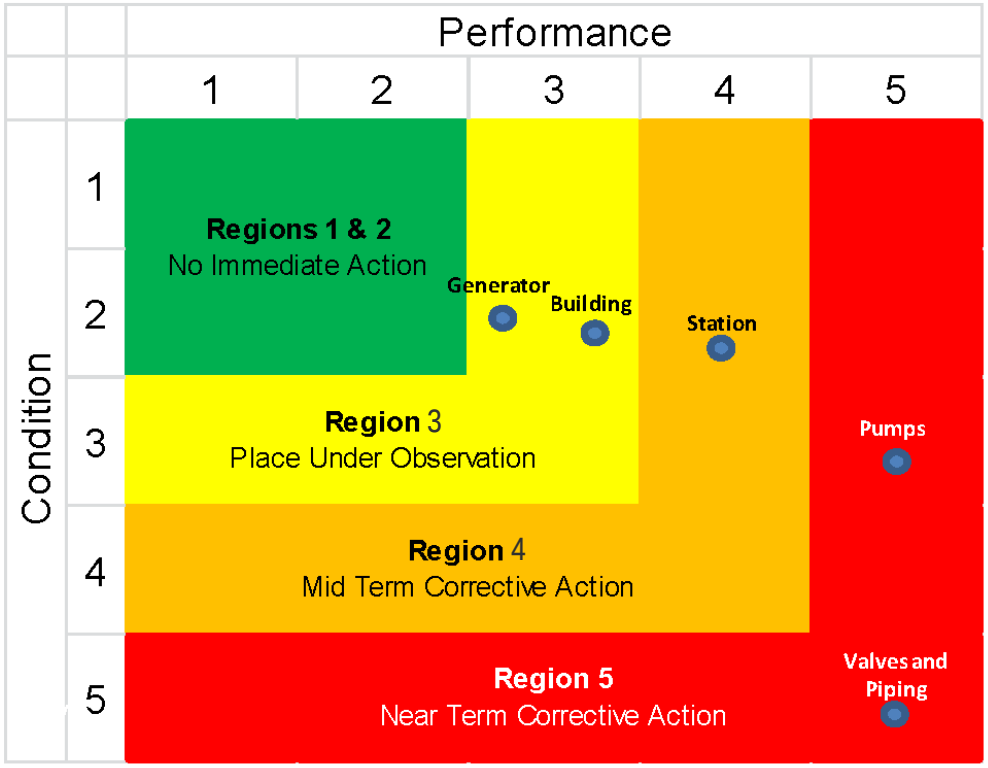
- Replace controls and panel with new station
- Install flow monitoring

Lift Station No. 8: Rankings

Table 4-8 Lift Station No. 8 Condition and Performance Rankings										
Assessment Type	Building		Station		Pumping		Valves & Piping		Generator	
	Condition	Performance	Condition	Performance	Condition	Performance	Condition	Performance	Condition	Performance
Initial	2	1	2	2	3	4	5	5	2	1
Age Adjusted	2	3	2	4	3	5	5	5	2	3

Lift Station No. 8: Recommended Actions

Figure 4-8
Lift Station No. 8
Recommended Action Chart

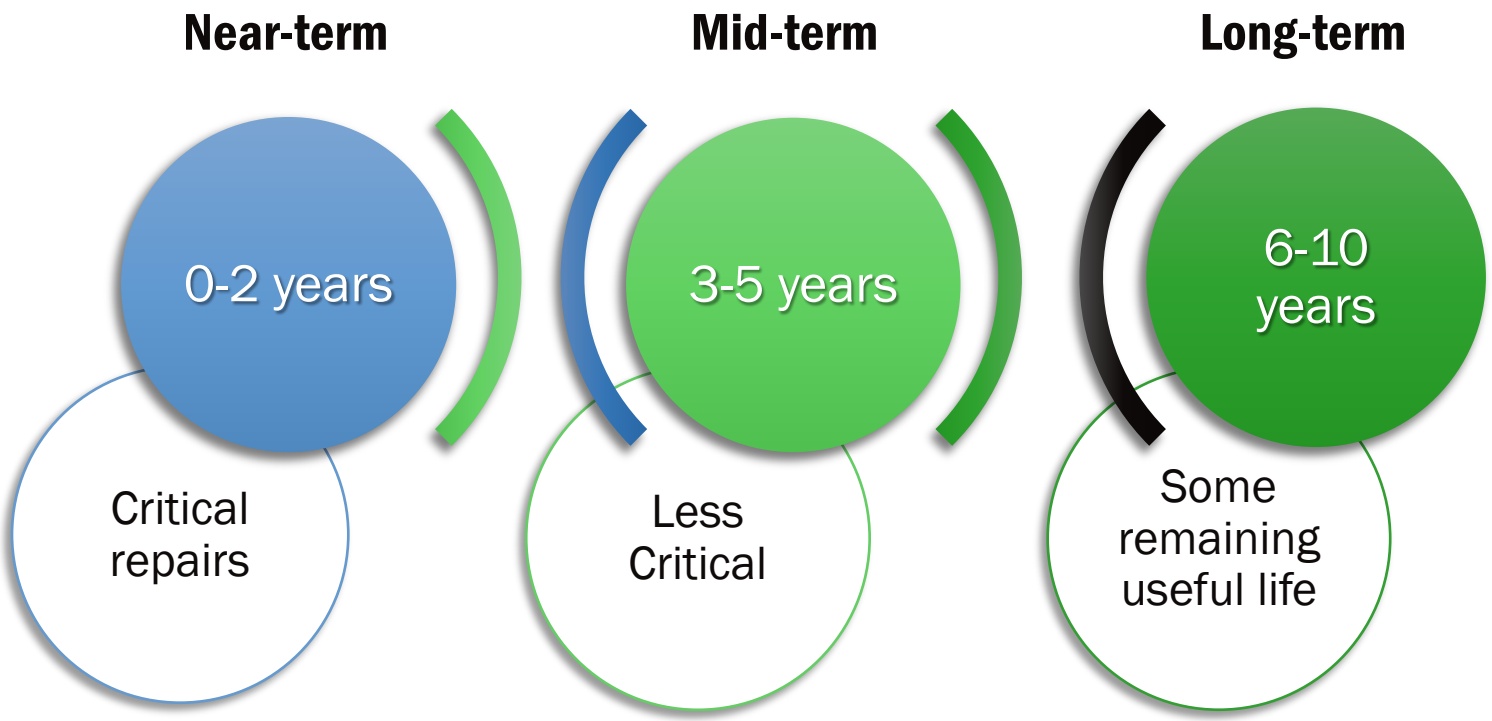


PRESCRIPTION: CREATING A ROADMAP

Table 1-2
Lift Station Asset Condition and Performance, Adjusted

No.	Location	Building Condition	Building Performance	Station Condition	Station Performance	Pump Condition	Pump Performance	Valve and Piping Condition	Valve and Piping Performance	Generator Condition	Generator Performance
1	S. Wind Lake Rd	2	3	3	4	2	2	2	2	1	1
2	E. Wind Lake Rd	2	3	2	4	2	2	2	2	1	1
3	Kurtz Lane	2	3	2	4	3	5	3	4	2	3
4	Sadler Drive	2	3	2	4	3	4	3	4	2	3
5	W. Wind Lake Rd	3	3	3	4	3	4	2	4	2	3
6	W. Loomis Rd	3	3	2	4	3	5	2	4	2	3
7	W. Loomis Rd	2	3	3	4	3	4	2	3	2	3
8	Hart Drive	2	3	2	4	3	5	5	5	2	3
9	Scenic View Dr	-	-	2	1	2	2	2	3	-	-
10	Iverson Road	-	-	3	4	1	1	4	5	-	-
11	North Lake Road	-	-	3	4	3	4	4	5	-	-
12	Martha Circle	2	3	2	4	3	4	2	4	2	3
14	West View Drive	2	3	4	4	3	4	3	4	2	3
15	West Loomis Rd	-	-	3	4	3	4	4	5	-	-
16	Hummingbird Dr.	-	-	2	2	2	2	3	3	-	-
17	Nordic Ridge Dr.	-	-	2	2	2	2	3	3	-	-

Prescription: Implementation Phases



PRESCRIPTION: TIMELINE WITH COST ESTIMATES

Table 1-1
Recommended Improvements with Cost Estimates

Lift Station No.	Type		Timeframe			Cost Estimate
	Rehab	Replace	Near-Term (0-2 years)	Mid-Term (3- 5 years)	Long-Term (6-10 years)	
1 (Sewer)	★		★			$210,000
1 (Station)		★			★	$565,000
2		★			★	$635,000
3		★	★			$549,000
4		★		★		$465,000
5		★		★		$971,000
6 (Sewer)	★		★			$310,000
6 (Station)		★		★		$642,000
7		★		★		$526,000
8		★	★			$885,000
9	★				★	$100,000
10		★			★	$365,000
11		★			★	$365,000
12				★		$589,000
14				★		$455,000
15		★			★	$365,000
16	★				★	$164,000
17	★				★	$164,000
Total Improvements Cost[1]			$1,954,000	$3,648,000	$2,723,000	**$8,325,000**

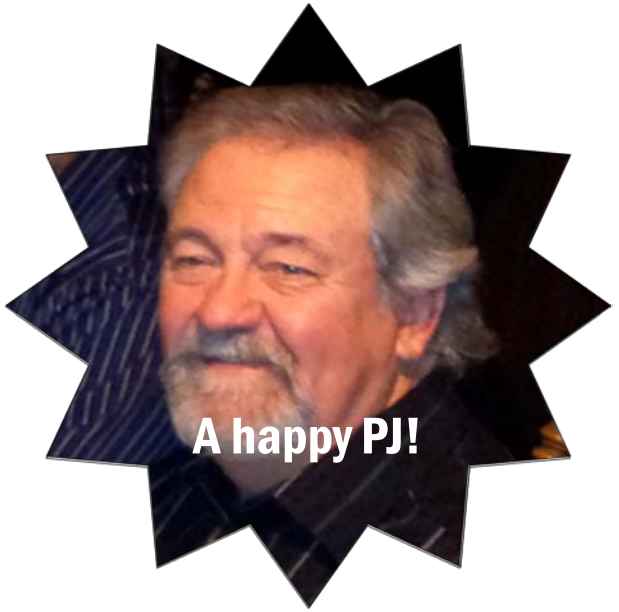
1. All costs are in 2017 dollars.

Lift Station No. 8: On the road to recovery!

- District proceeded with replacement and a new submersible lift station is currently under design
- Construction anticipated for 2019

Prognosis

Less surprises + Budgeted improvements =



Questions?

Thank you!

Applied Technologies
Engineers - Architects