City of Watsonville
Water Master Plan Study Session

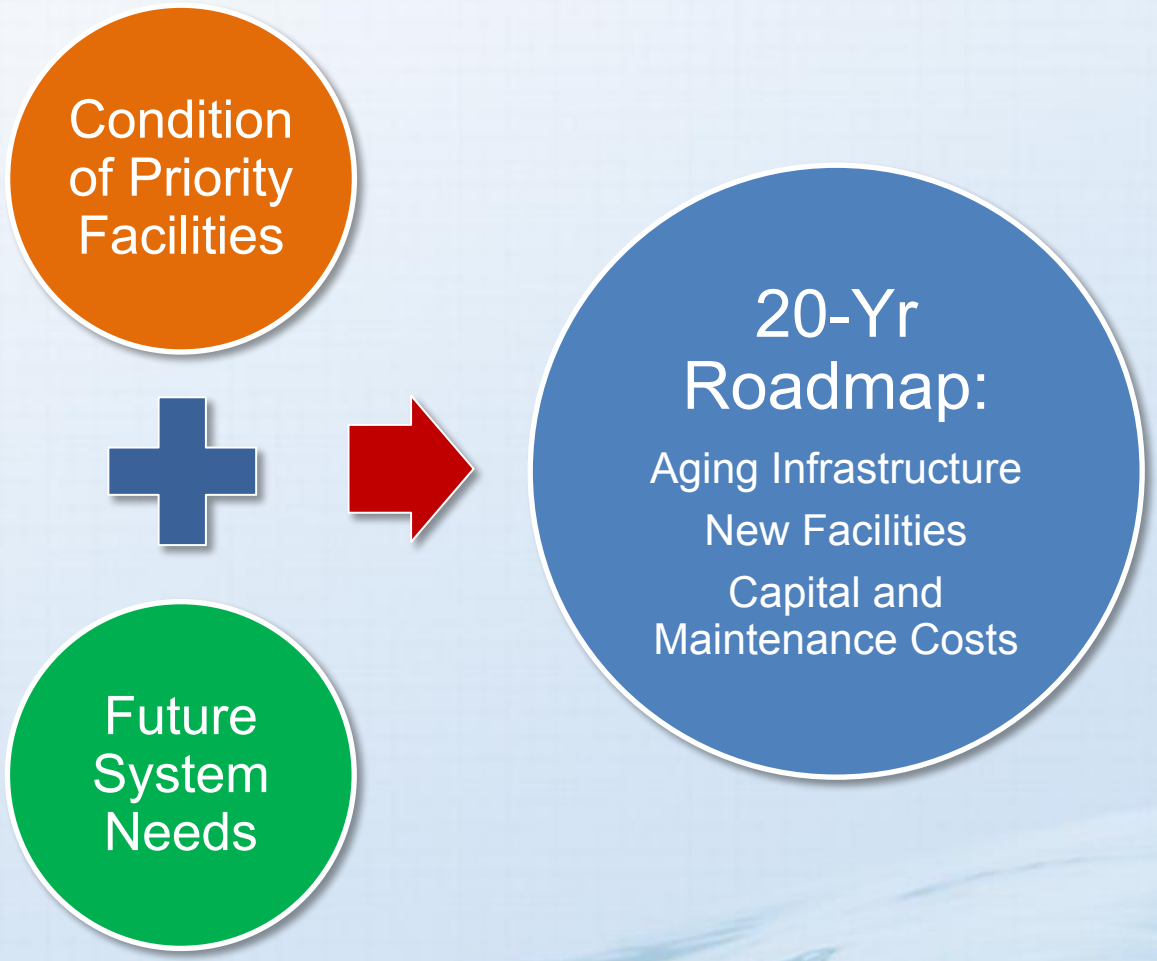
January 21, 2020

Engineers...Working Wonders With Water®

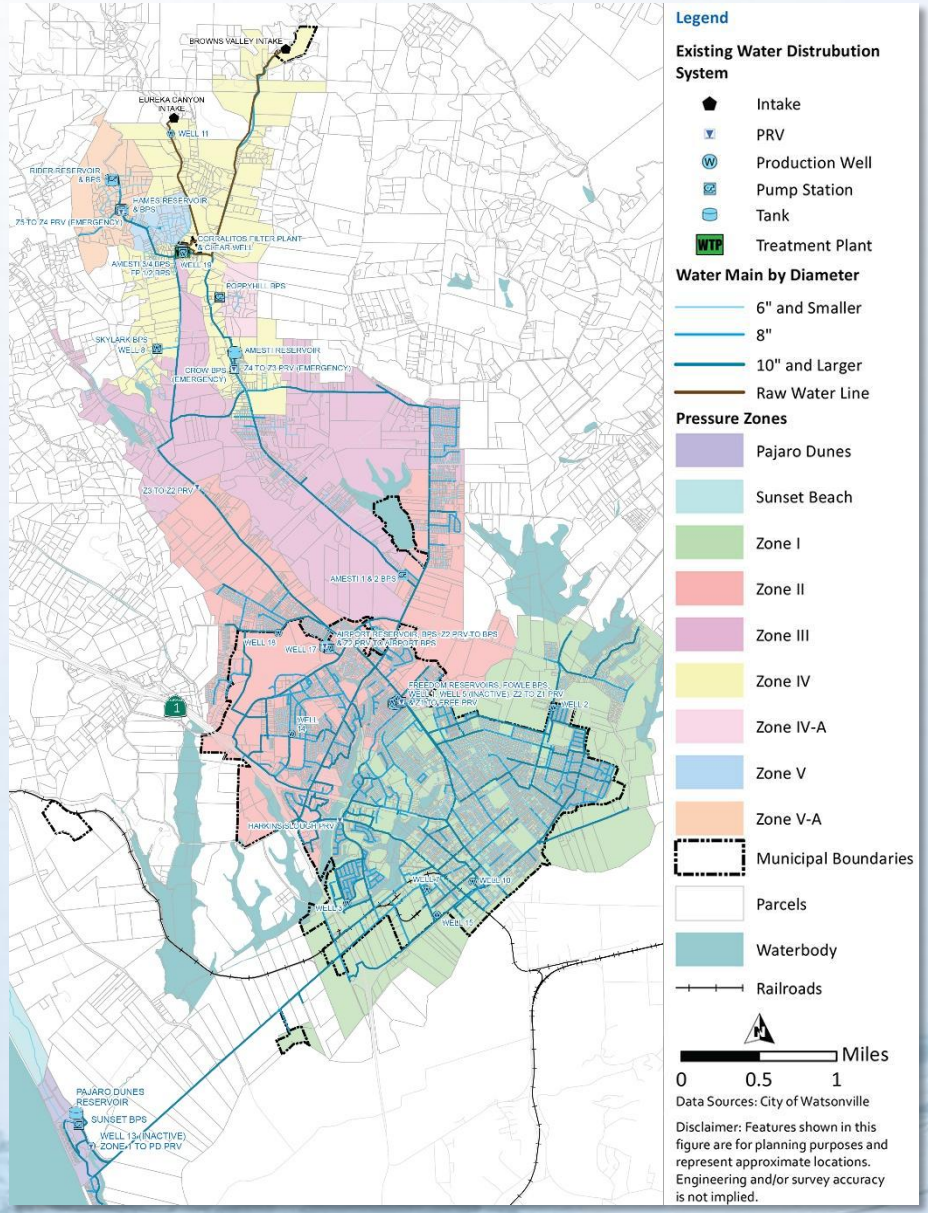
Project Timeline

- April 2019
  - Council identified as priority project and awarded contract to Carollo Engineers.
- May 2019
  - Staff and Carollo began working on Master Plan (first comprehensive plan).
- January 2020
  - Master Plan analysis and Draft CIP complete.
  - **Tonight's objective: Provide update on Water System Master Plan and receive input from City Council**

Purpose of Master Plan



Water System Overview



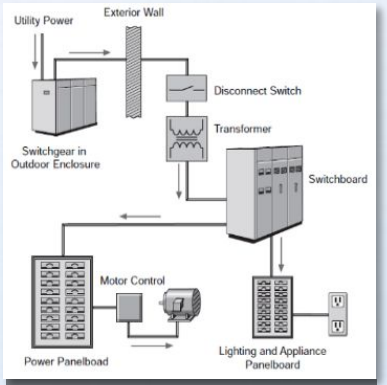
- City owned and operated
- 14,800 service connections (customer population 66,000)
- Service area: Watsonville, Corralitos, Freedom, Pajaro Dunes
- 9 pressure zones
- Groundwater and surface water
- 12 MG of storage reservoirs
- >182 miles of pipelines

Scope of Work

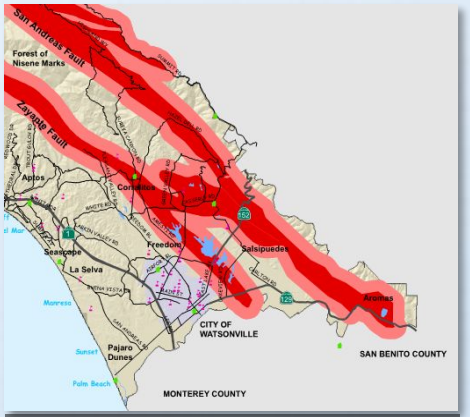
Task	Facilities	Benefit to City
Condition Assessment	• 4 Steel Tanks • 2 Earthen Reservoirs • 2 Pump Stations • 11 Wells	Anticipate remaining useful life of assets
Hazard Vulnerability Evaluation	• 4 Steel Tanks (Seismic) • 2 Pump Stations (Seismic) • Various Wells and Pump Stations (Flood)	Mitigate seismic and flood hazard vulnerability
Hydraulic Model Analysis	• All Wells, Pump Stations and Storage • Distribution System	Plan for future infrastructure needs with development
Prepare Recommendations, Costs & 10-Yr CIP	Those recommended for facility improvements	Forecast projects and costs by priority (criticality and timing)

Condition Assessment and Hazard Vulnerability

Structural Assessment



Power Distribution System



Seismic Vulnerability

Mechanical Assessment

SCADA and PLC Network System

Flood Risk

Original Useful Life

Asset Category	Description (1)	Original Useful Life (Yrs)
Structural	Concrete Steel	50+ Depends on Rebar 25+ Depends on Coating
Mechanical	Pumps – Water Valves	20 20
Electrical	Motor Control Centers Variable Frequency Drives	30 15

Notes:
(1) Adapted from the International Infrastructure Management Manual(IIMM) Edition 2006, USEPA guides, and Carollo experience.

Age of Tanks:
- Airport (Steel): 35 Yrs
- Hames (Steel): 50 Yrs
- Rider (Steel): 47 Yrs
- Amesti (Steel): 48 Yrs
- Freedom (Earthen): 89 Yrs
- Pajaro Dunes (Earthen): 54 Yrs

Age of Pump Station Buildings:
- Airport PS: 35 Years
- Fowle PS: 49 Years

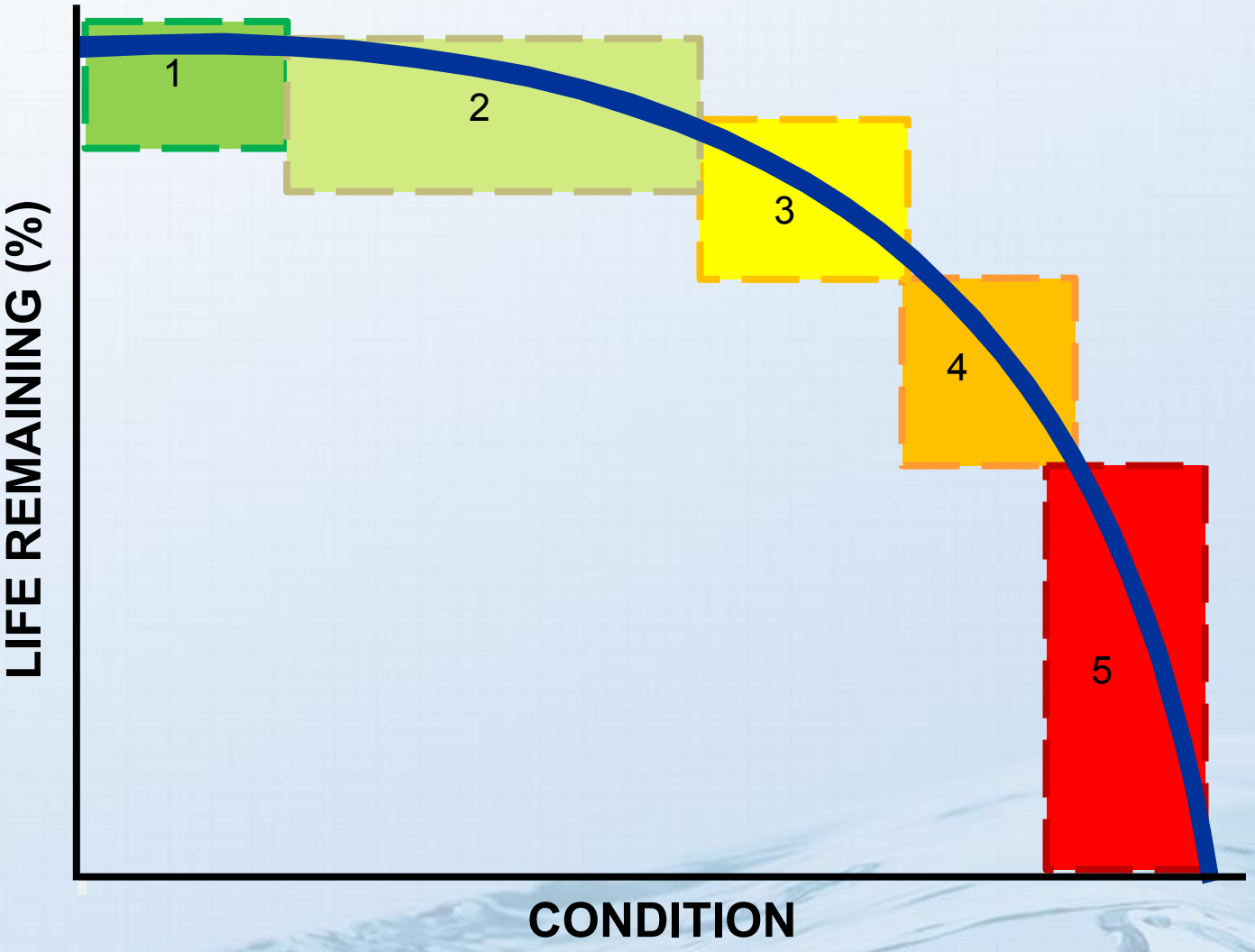
Age of Wells:
- Drilled 12 to 92 Years Ago (Avg 45)
- Pumps 6 to 30 Years Old (Avg 16)

Condition Rankings

Score	Description
1	Very Good (0% renewal required)
2	Good (5% renewal required)
3	Fair (10-20% renewal required)
4	Poor (20-30% renewal required)
5	Very Poor (>50% renewal required)

Adapted from the International Infrastructure Management Manual (IIMM)

Condition and Asset Decay Curve



Structural Assessment Considerations

Replace Anchor Bolts at Pipe Supports

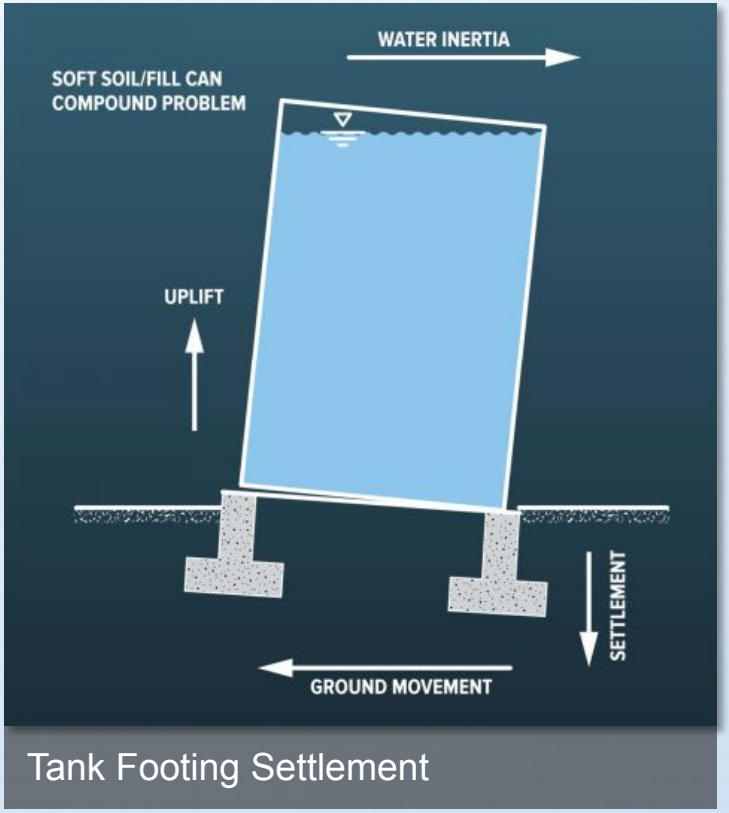
Repair Cracks or Spalling

Recoat Corroded Metal Surfaces

Seismic Evaluation Considerations

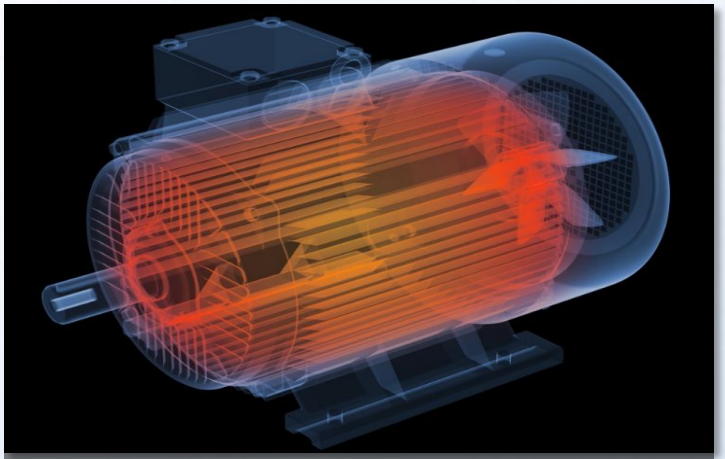
Anchorage of Roof Beams to Walls

Electrical Panel Seismic Anchors



Tank Footing Settlement

Mechanical Assessment Considerations



Vibration or Overheating

Maintenance History

Test Results

Test Date: 2/15/2018	Tester: Bob Fraker
Run Number ('E' = used for cost anal):	E-1
1. Pumping Water Level (ft):	173
2. Standing Water Level (ft):	135
3. Draw Down (ft):	38
4. Recovered Water Level (ft):	135
5. Discharge Pressure at Gauge (psi):	18
6. Total Lift (ft):	215
7. Flow Velocity (ft/sec):	5.5
8. Measured Flow Rate (gpm):	**1,334**
9. Customer Flow Rate (gpm):	1,350
10. Specific Capacity (gpm/ft draw):	35.1
11. Acre Feet per 24 Hr:	5.9
Million Gallons per 24 Hr:	1.921
12. Cubic Feet per Second (cfs):	3.0
13. Horsepower Input to Motor:	133
14. Percent of Rated Motor Load (%):	97
15. Kilowatt Input to Motor:	99
16. Kilowatt-hours per mill gal:	1,237
17. Cost to Pump a million gal:	$309.19
18. Energy Cost ($/hour)	$24.75
19. Base Cost per Kwh:	$0.250
20. Nameplate rpm:	1,785
21. rpm at Gearhead:	0
22. Overall Pumping Efficiency (%):	**54**

If a Flow Velocity (line 7) is less than 1 ft/second, the accuracy of the test is suspect.

Note any major difference between the "Measured" flow rate and the "Customer's" (lines 8,9).

Remarks

All results are based on conditions during the time of the test. If these conditions vary from the normal operation of your pump, the results shown may not describe the pump's normal performance.

Overall efficiency of this plant is considered to be fair assuming this run represents plant's normal operating condition.

Operational Performance

Electrical & Instrumentation Considerations

Age and Obsolescence

Power Issues

Corrosion

Key Condition Findings

Storage

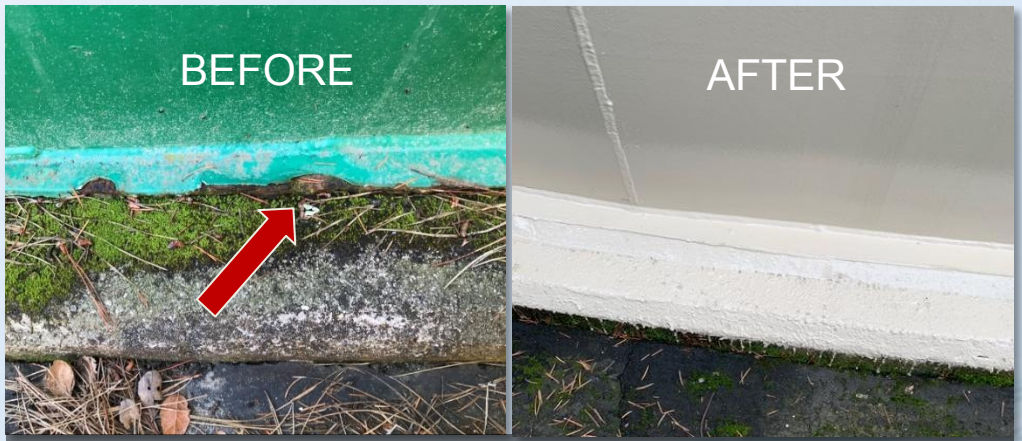
Evaluated 7 Reservoirs:

- Airport Tank 3.0 MG
- Amesti Tank 1.0 MG
- Hames Tank 0.5 MG
- Rider Tank 0.5 MG
- Freedom Reservoirs 5.3 and 0.7 MG
- Pajaro Dunes Reservoir 0.24 MG

Steel Tanks Condition Assessment

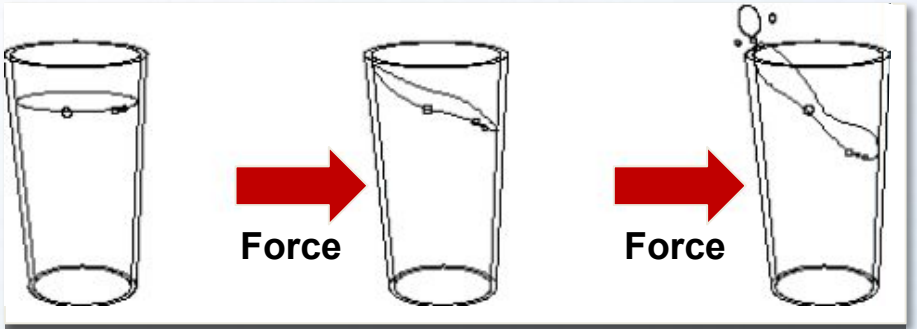
Tank Interior Corrosion
(Four Steel Tanks)

Tank Exterior Corrosion
(Airport Tank)



Rider Reservoir Exterior Corrosion Repaired

Steel Tanks Hazard Vulnerability



Seismic Vulnerability at Four Steel Tanks

Example of Potential Seismic Damage

Rafter Damage @ Airport, Rider, Amesti

Staff to evaluate mitigation opportunities by operational strategies and/or seismic retrofits.

Earthen Reservoirs

Freedom Reservoirs with Floating Covers (0.7 and 5.3 MG)

Pajaro Dunes Reservoir with Wood Cover (0.24 MG)

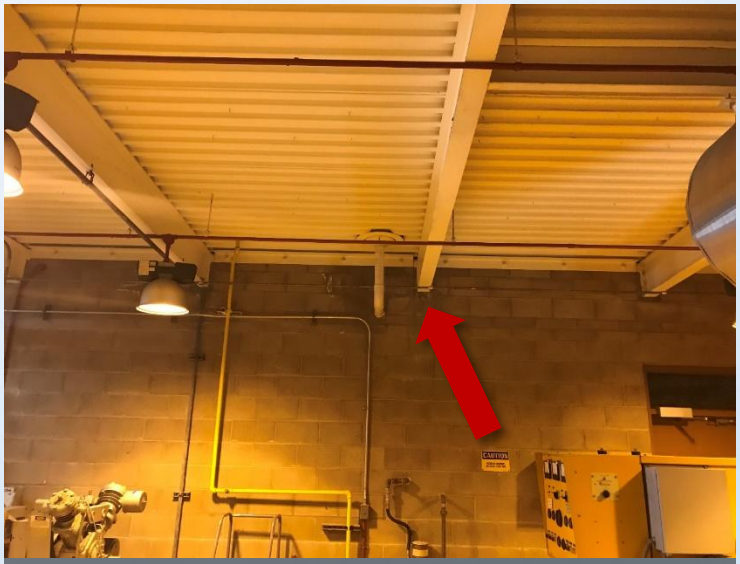
Approaching end of useful life, with structural and seismic deficiencies. Major upgrade or replacement recommended in 5 to 10 yrs.

Booster Pump Stations

Evaluated 2 high-priority pump stations.

Airport Booster Pump Station

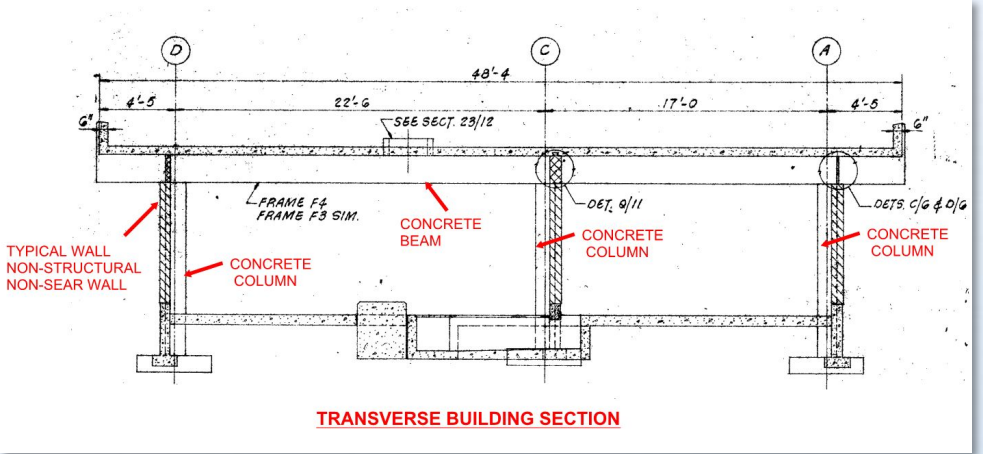
Good condition for 35-year age but seismic vulnerability exists. Retrofit project recommended.



Seismic Vulnerability at Roof

Example of Roof Collapse

Fowle Booster Pump Station



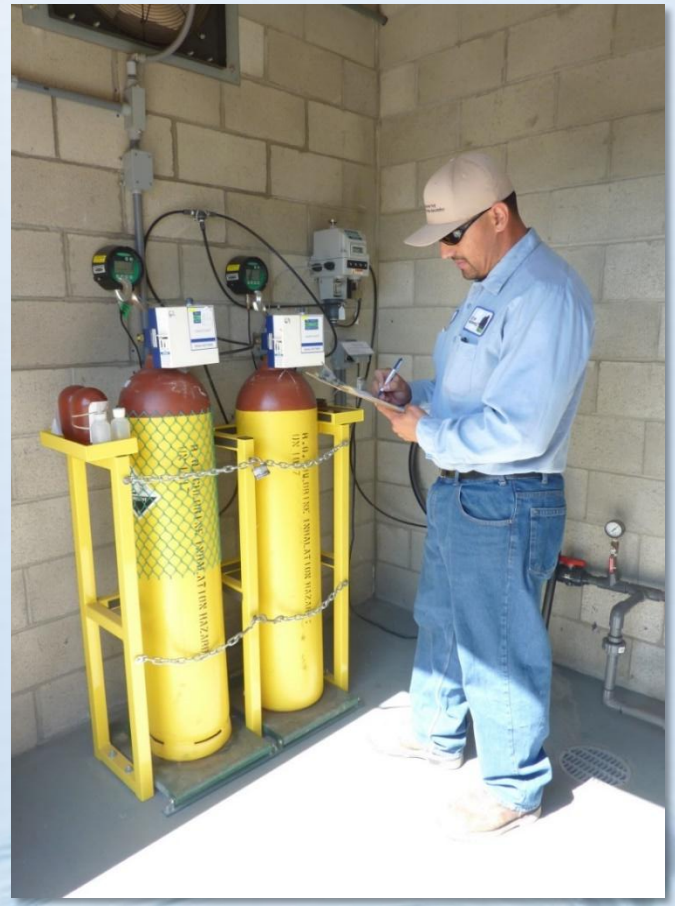
Seismic Vulnerability

Mechanical and Electrical Upgrades Needed

Fair condition for 50-year age but has seismic vulnerability and needs mechanical & electrical upgrades. Recommend further evaluation with Freedom Reservoirs improvements.

Groundwater Wells

Evaluated 11 wells throughout service area.



Groundwater Wells

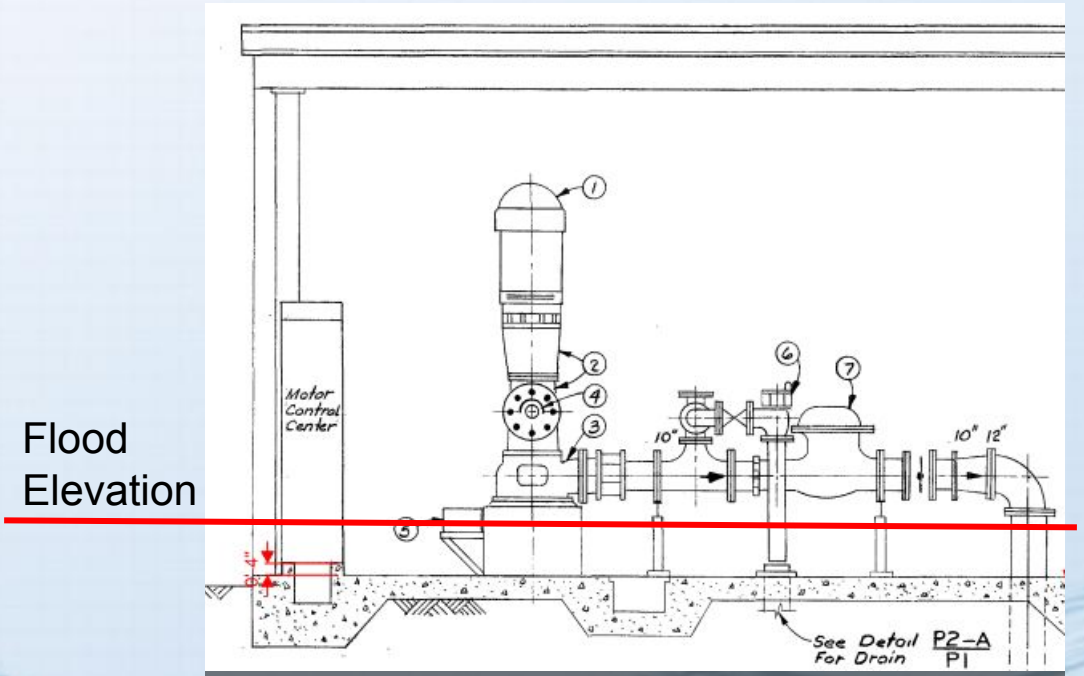
- Mechanical and Electrical upgrades needed at some sites due to age and obsolescence.

Electrical and Instrumentation upgrades needed due to end of useful life

New emergency generators at Wells 14 & 18

Well Flooding Potential

- Submersible or elevated pumps = safe
- Electrical or instrumentation panels = at risk; elevate asset or floodproof building

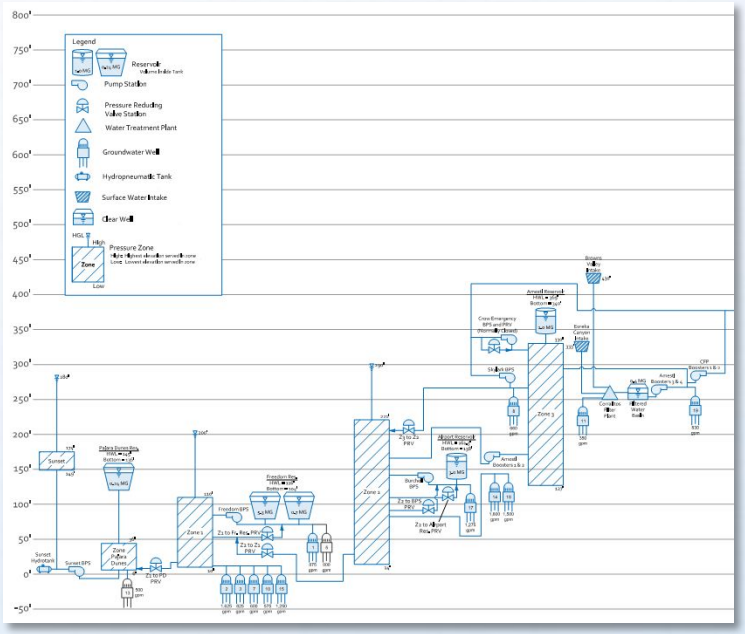


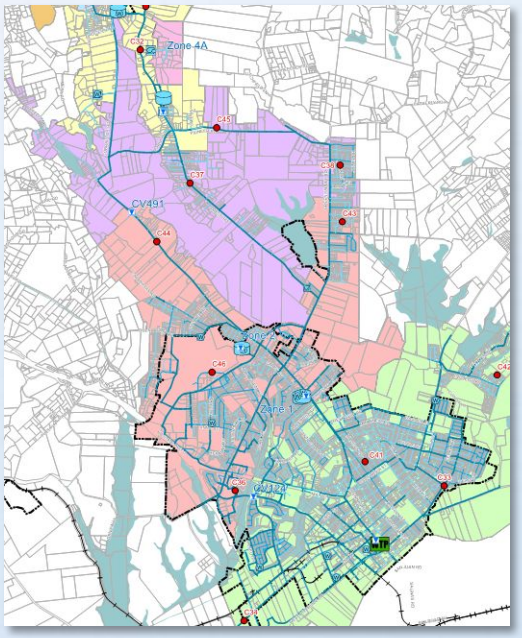
Electrical Equipment Flooding Vulnerability

Example of Floodproofing

Hydraulic Model Analysis

Impact of Future Demand Projections



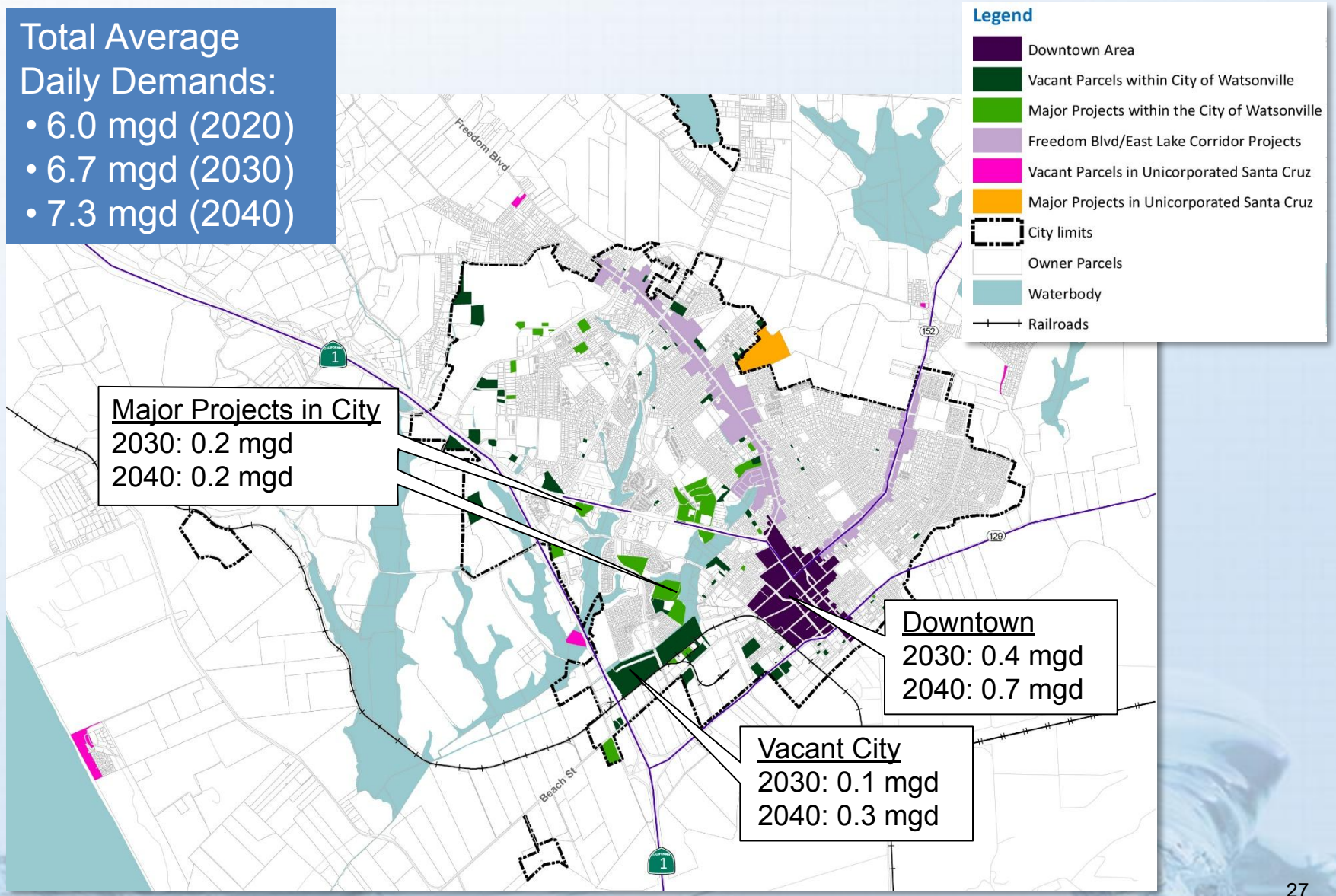


Used Hydraulic Model from 2018-19 Project to Evaluate Future Demands' Impact on Existing System:

- Capacity
- Pipe Age and Material
- Emergency Supply and Storage
- Infrastructure Reliability Gaps

Future Demand Projections Map

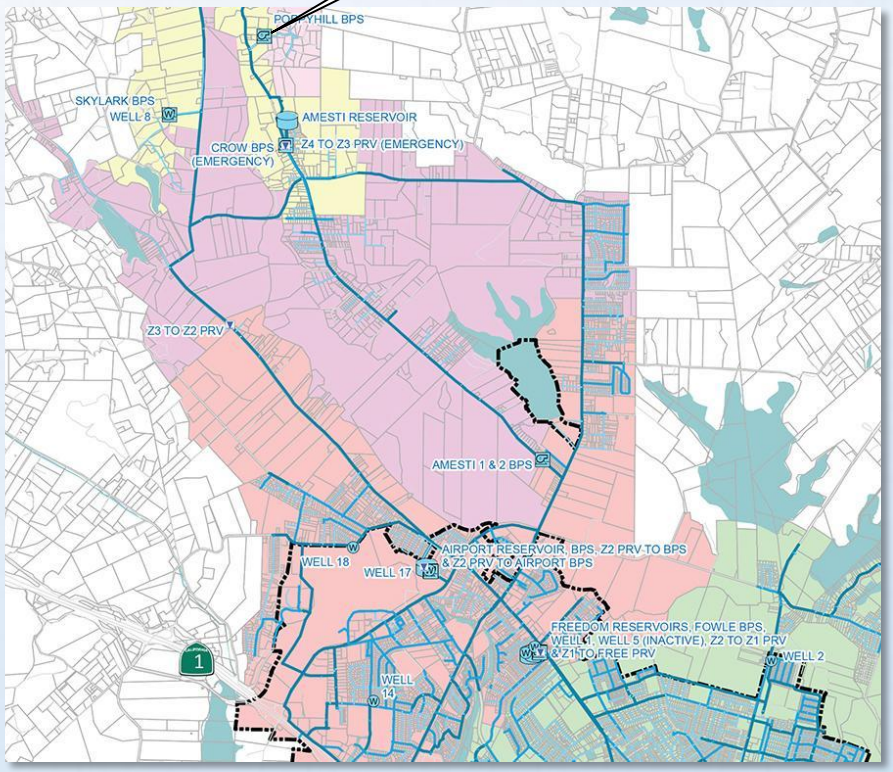
Total Average Daily Demands:
- 6.0 mgd (2020)
- 6.7 mgd (2030)
- 7.3 mgd (2040)



Recommended Zones 1 & 2 Projects

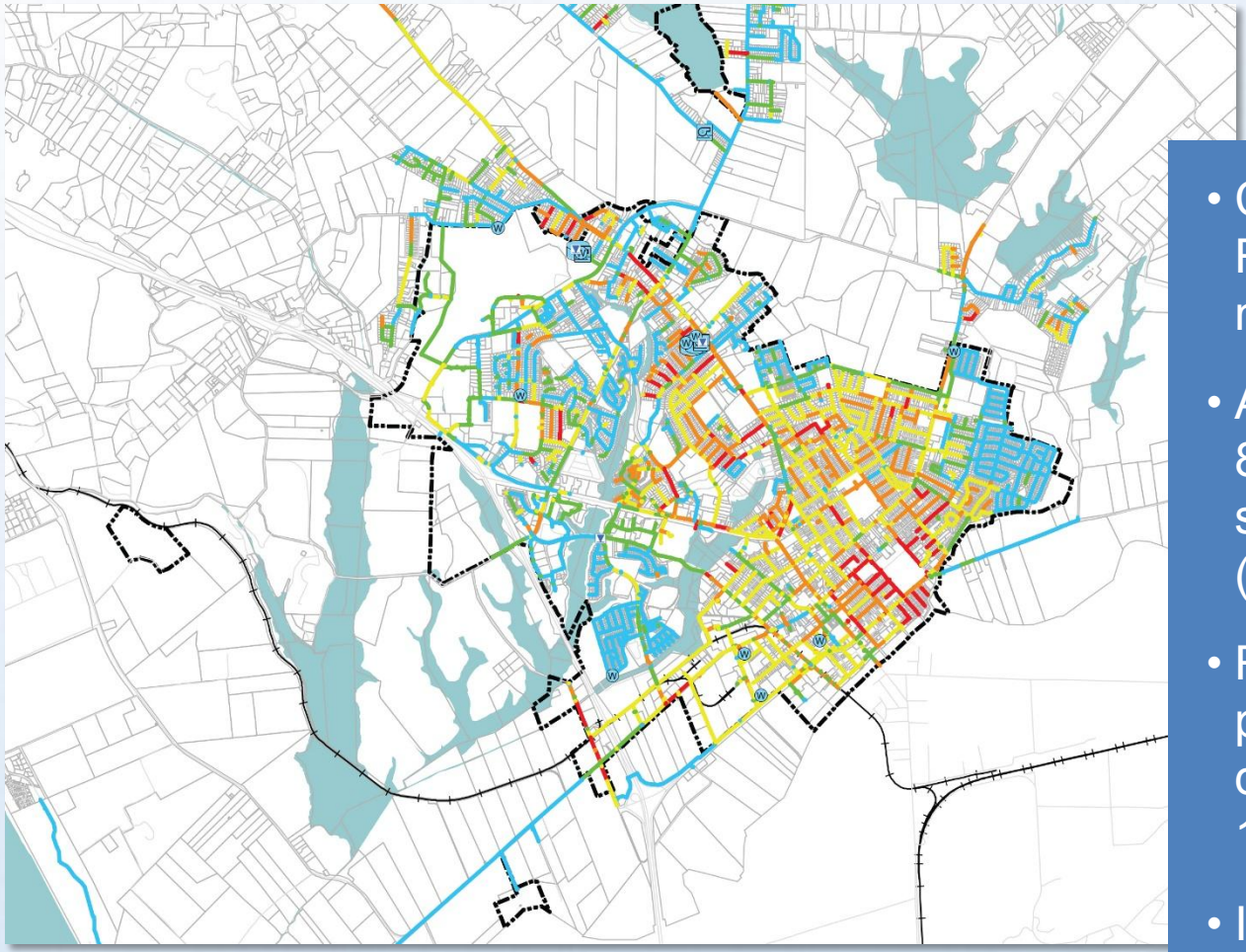
Recommended Projects in Other Zones

Poppy Hill Pump Station: Add 1000 gpm capacity (Yr 1-5)



Replace Pajaro Dunes Reservoir (Yr 6-10)

Recommended Pipeline Projects



- City In-House Annual Replacement at 1.75 miles/yr (Current)
- Add 1.2 miles of new 8- to 12-inch pipe for system reliability (Start Yr 1-5)
- Replace 7.9 miles of pipe with larger diameters: 8- to 12-inch (Start Yr 1-5)
- Increase Annual Replacement by 0.5 miles/yr (Start Yr 1-5)

CIP and Maintenance Cost Development

Capital and Maintenance Improvements

10-Yr CIP and Maintenance Projects

Basis of Planning Costs

10-Yr CIP & Maintenance Planning Costs

Improvement type	FY 2020-25	FY 2025-30	Total Costs
CIP Rehab & Replacement (Exist. Facilities)	$ 35.4M	$ 53.5M	$ 88.9M
CIP Capacity (New Facilities)	$ 3.6M	$ 13.6M	$ 17.2M
CIP Studies	$ 0.2M	$0	$ 0.2M
Total 10-Yr CIP Costs [1]	**$ 39.2M**	**$ 67.1M**	**$ 106.3M**
Maintenance Rehab & Replacement	$ 5.9M	$ 4.9M	$ 10.8M
Total 10-Yr Maintenance Costs [2]	**$ 5.9M**	**$ 4.9M**	**$ 10.8M**

Notes:

1. Approximately $54.1M of add'l CIP projects proposed for beyond FY 2030.
2. Approximately $9.4M of add'l Maintenance projects proposed for beyond FY 2030.

10-Yr CIP Costs - Master Plan/Existing City

CIP Term	Master Plan Projects	Previously Identified City Projects	Total Costs
FY 2020-2025	$ 6.4M	$ 32.8M	$ 39.2M
FY 2025-2030	$ 61.1M	$ 6.0M	$ 67.1M
Total 10-Yr CIP Costs	**$ 67.5M**	**$ 38.8M**	**$ 106.3M**

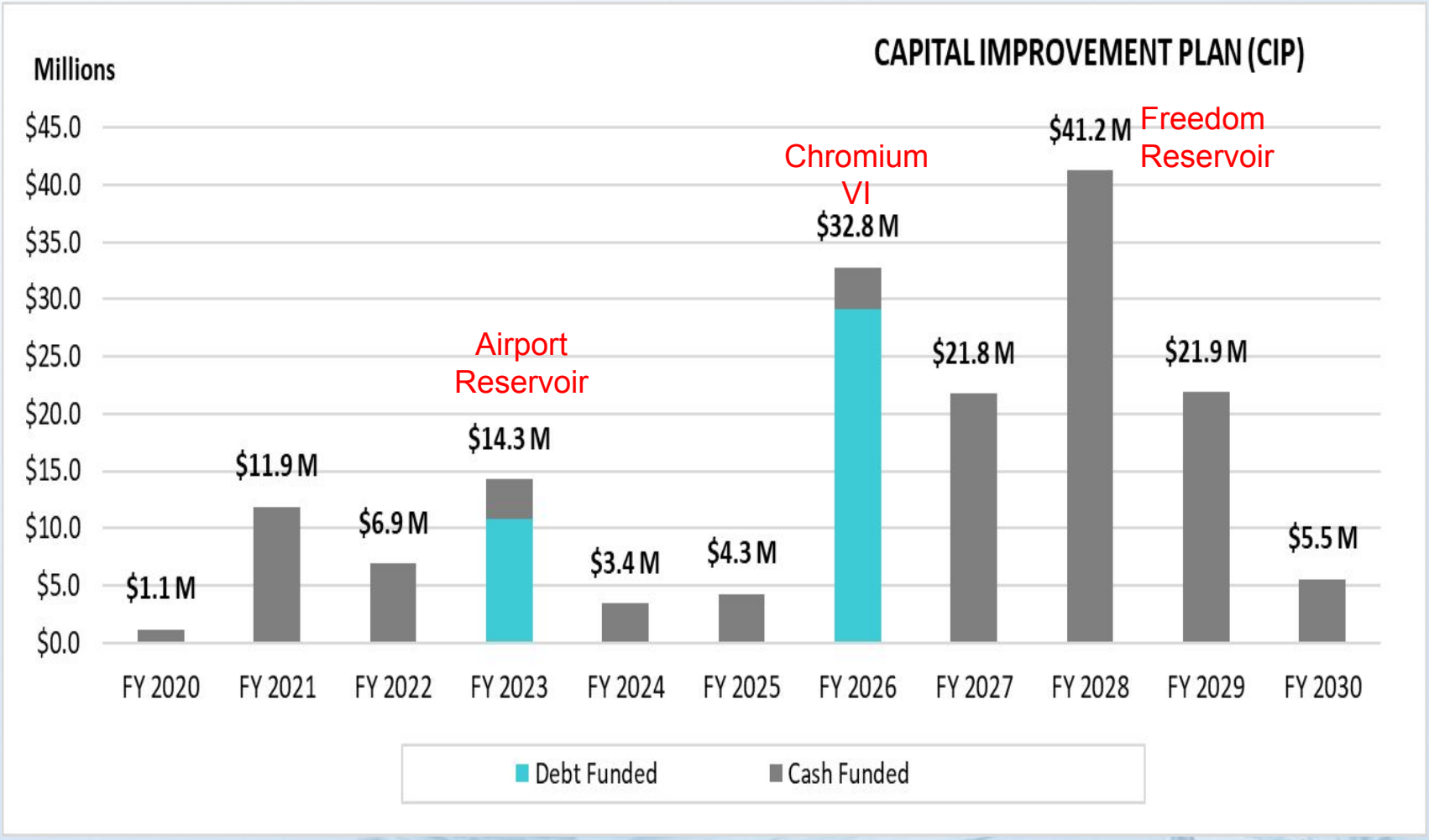
FY 2020-25 Key CIP Projects

Item	Cost
Chromium 6 Treatment Plants	$22.5M
New Zone 1 or Zone 2 Well	$3.0M
Additional 0.5 Mile/Yr Pipeline Replacement Beyond Current 1.75 Mile/Yr Replacement Rate	$2.1M
Airport, Hames and Amesti Reservoir Coating	$1.5M
Electrical/Instrumentation Upgrades at Various Sites	$0.8M
Poppy Hill Booster Pump Station Capacity	$0.5M

FY 2026-30 Key CIP Projects

Item	Cost
Freedom Reservoirs Replacement	$21.7M
New 2.0 MG Zone 2 Reservoir	$10.9M
Additional 0.5 Mile/Yr Pipeline Replacement Beyond Current 1.75 Mile/Yr Replacement Rate	$5.2M
Well 1 Replacement	$5.0M
Fowle Booster Pump Station Replacement	$4.3M
Pajaro Dunes Reservoir Replacement	$3.3M

Water Enterprise:
10-Year CIP



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In Summary

- Completed Master Plan allows Water Division to strategically plan for facility improvements over next 20 years to serve growing community and regulatory needs.
- Next steps:
  - Incorporate projects into 5-year rate study.
  - Update future water demand projections with development and land use changes every 5 to 10 years. Project priorities and design criteria may need updating.
  - Consider funding opportunities such as grants.

Questions and Discussion