

# BAY AREA WWTP CFRP REHABILITATION

**struc'tural**  
TECHNOLOGIES

Northern California Pipe  
Users Group 2024 Sharing  
Technologies Seminar





## Products, Investigation, Design Support & Installation

Pipeline Rehabilitation Solutions - Corrosion and Corrosion Control – Pipeline Renewal Management

**Atilana Bolton, PE**

Technical Project Manager

Pipelines Solutions



**Ian McFatridge**

Senior Manager

Municipal & Power

Infrastructure



We provide **solutions** that integrate products, engineering, and construction

## struc'tural

Contracting Licensee  
Non-union Construction

- Specialty repair and maintenance
- Investigate, design, build
- Technology solutions
- Safety/quality control
- Field execution

## PULLMAN

Contracting Licensee  
Union Construction

- Skilled craftsman from union halls
- Specialty repair and maintenance
- Investigate, design, build
- Safety / quality control
- Field execution

## struc'tural TECHNOLOGIES

### Investigation

- Inspection assistance
- Specialized evaluation and testing protocols
  - Post-tensioning corrosion

### Products

- New PT hardware & stay cables
- PT repair systems
- Strengthening systems
- Corrosion protection systems
- Armoring

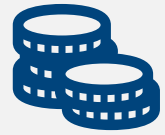
### Engineering Support

- Custom PT element design
- Solution development
- Design assist
- SIMCO durability design / service life modeling
- Acoustic monitoring

### Miscellaneous

- Installation support
- QA/QC
- Heavy lifting
- Hydrodemolition

# structural group



**ANNUAL  
REVENUE**  
\$800M+



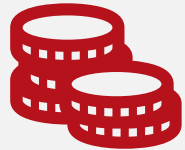
**OFFERINGS**  
Products  
Engineering Support  
Construction



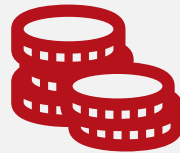
**TOTAL  
EMPLOYEES**  
3,000+

**struc'tural**  
TECHNOLOGIES

**struc'tural** | **PULLMAN**



**ANNUAL  
REVENUE**  
\$150M



**ANNUAL  
REVENUE**  
\$650M



**MARKETS  
SERVED**  
NORTH AMERICA  
& MIDDLE EAST



**REGIONAL TECHNOLOGY  
CENTERS**

- Baltimore, MD
- Dallas, TX
- Houston, TX
- Chicago, IL



**AVERAGE  
NUMBER OF  
PROJECTS**  
2,500

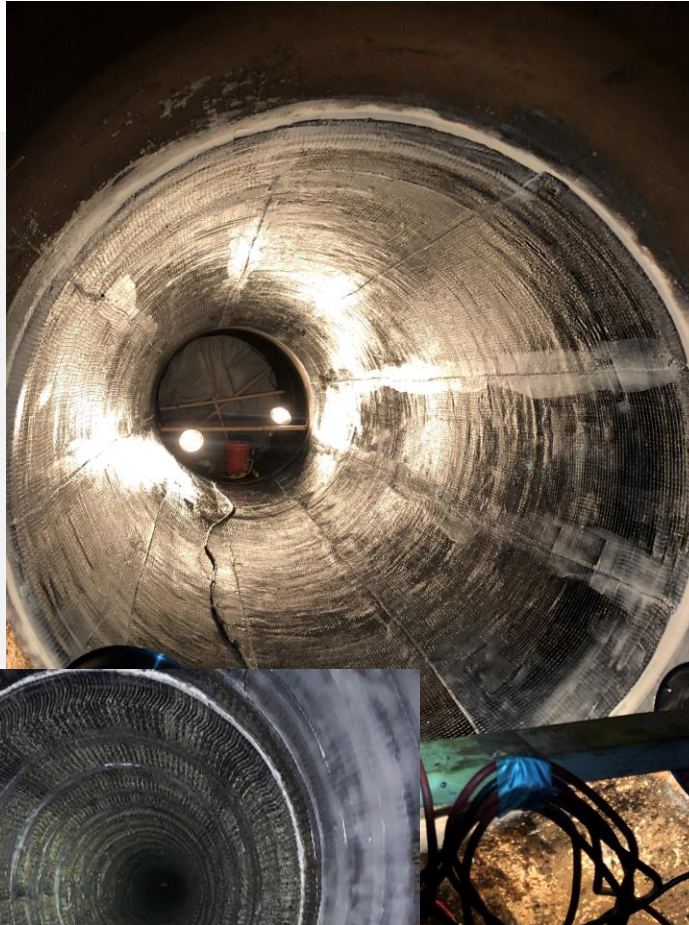


**#3**  
**CONCRETE  
CONTRACTOR**

# ***We Make Structures Stronger & Last Longer***

## **Products & Systems**

- **Pipe Repair & Upgrade**
- **Concrete Restoration**
- **Strengthening**
- **Corrosion Control**
- **Moisture Mitigation**
- **Force Protection**
- **Post Tensioning**
- **Seismic Resiliency**

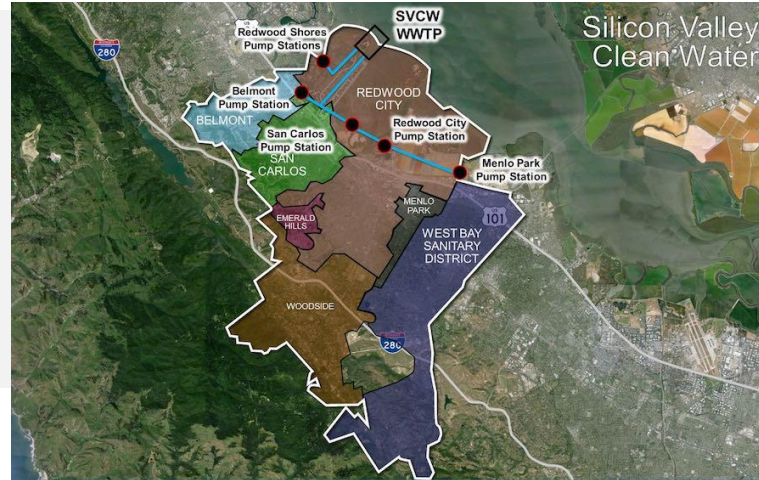


## **Engineering Support**

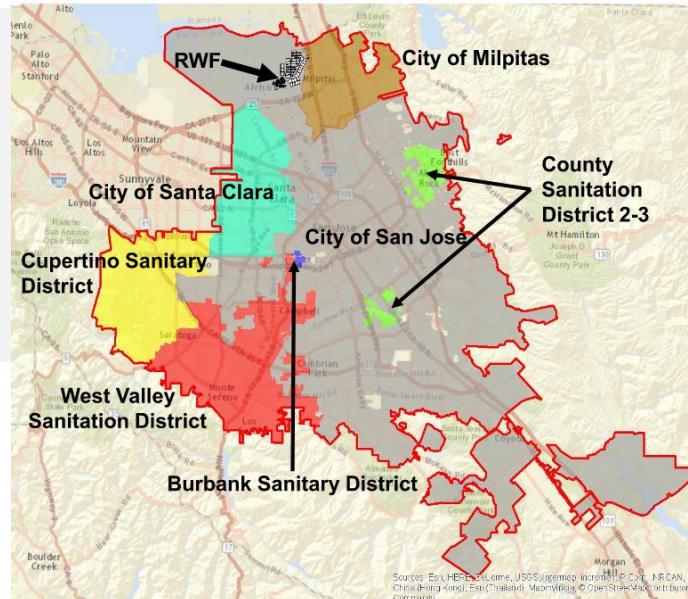
- **Product Selection**
- **Design Assistance**
- **Forensic Support**

# Up Next...Asset Management Matters

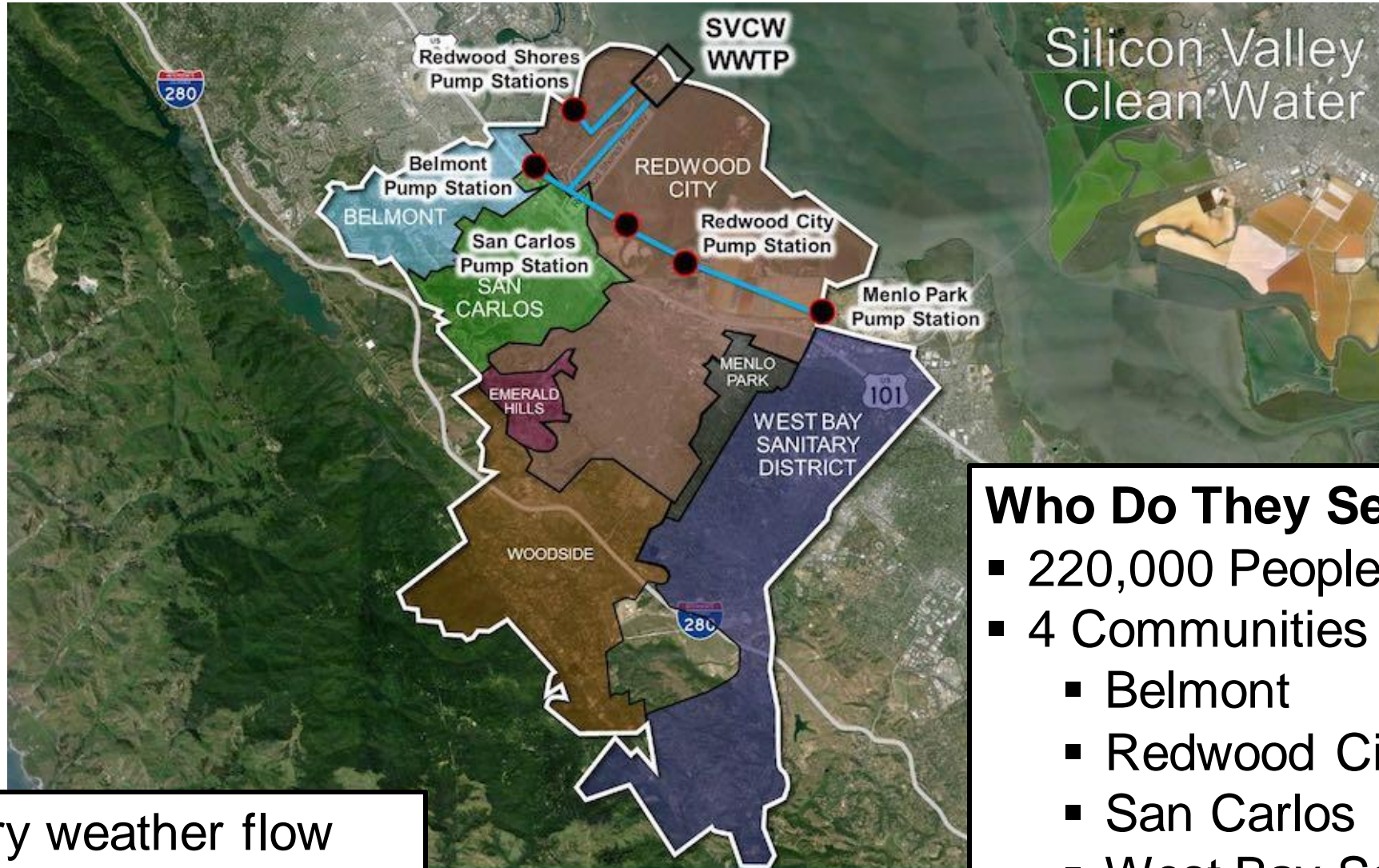
- Silicon Valley Clean Water
  - Investigation
  - Analysis
  - Design and repair



- City of San Jose – Santa Clara Regional Wastewater Facility
  - Condition Assessment Program
  - Future projects



# SILICON VALLEY CLEAN WATER

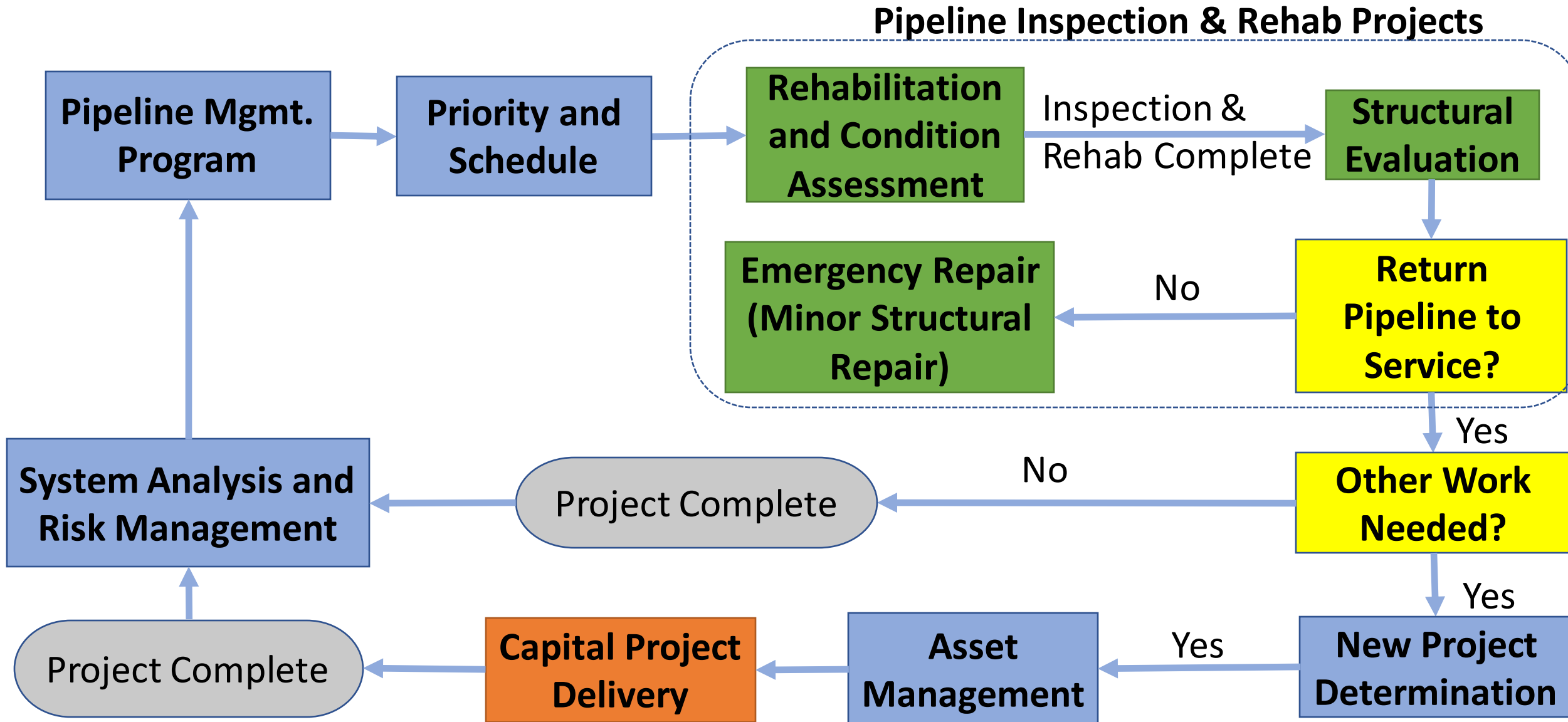


## Who Do They Serve:

- 220,000 People
- 4 Communities
  - Belmont
  - Redwood City
  - San Carlos
  - West Bay Sanitary District

Average dry weather flow permitted capacity: 29 MGD

# PIPELINE MANAGEMENT PROGRAM





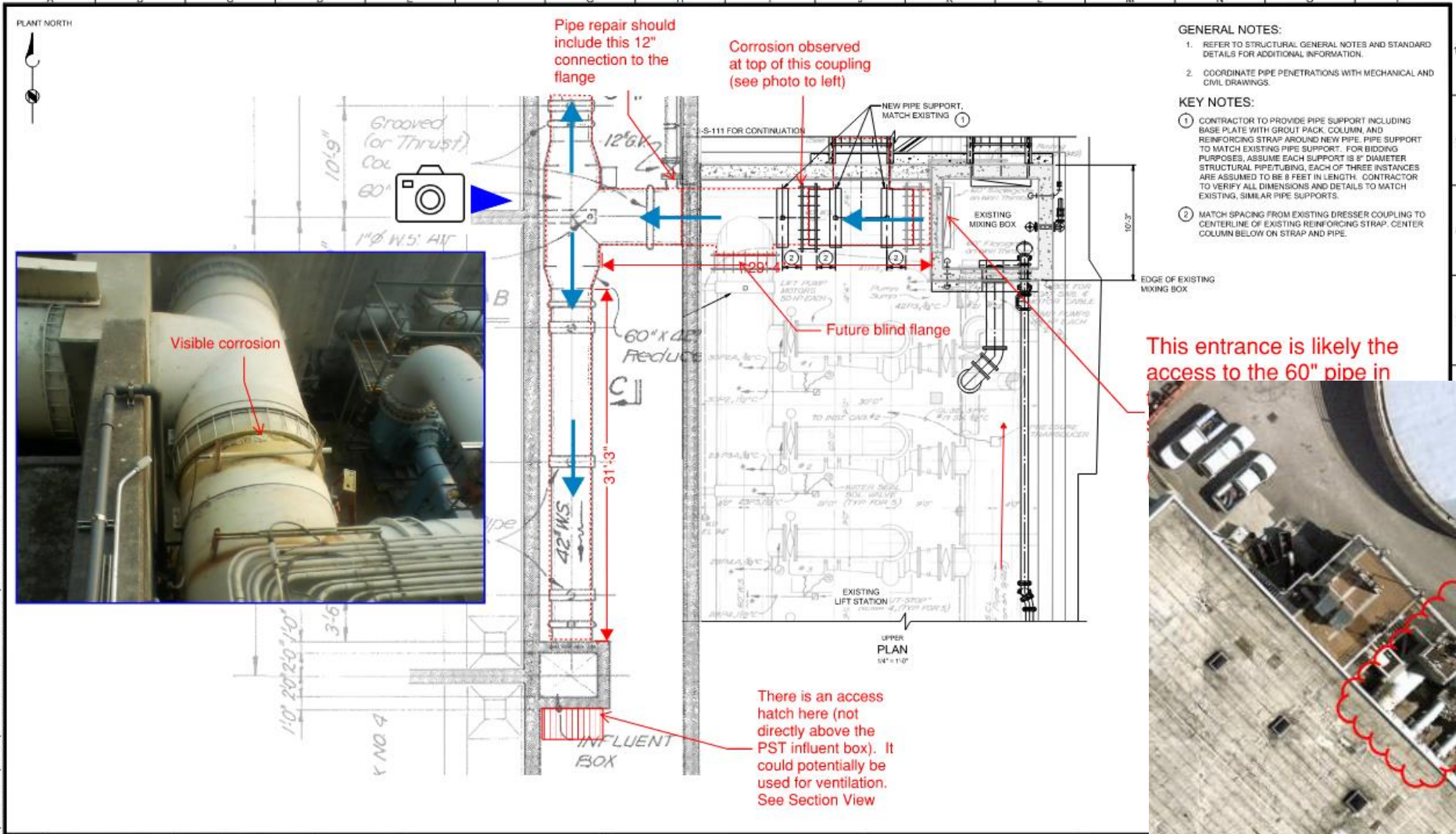
# Silicon Valley Clean Water WWTP Pipe Corrosion

- Investigation of visible corrosion on multiple segments of pipe led the Owner to engage a consultant, Brown & Caldwell, for condition assessment and rehabilitation recommendations
- Brown & Caldwell contacted Structural Technologies for assistance with scoping the project
- Structural Technologies engaged in evaluation of products appropriate for rehabilitation



**Brown AND Caldwell**

# Silicon Valley Clean Water WWTP Pipe Corrosion



Plan: P:\134000\134002 - SVWC Stage 1 Influent Screening\13-S-100\13-S-100.dwg Plot Date: March 20, 2017 9:14 AM CAD User: Fred Bane  
 P:\134000\134002 - SVWC Stage 1 Influent Screening\13-S-100\13-S-100.dwg Plot Date: March 20, 2017 9:14 AM CAD User: Fred Bane

<b>Brown and Caldwell</b> WALNUT CREEK, CALIFORNIA		LINE IS 2 INCHES ALL FULL SIZE UNLESS OTHERWISE NOTED SCALE: AS SHOWN DESIGNED: K. SHANKS DRAWN: B. SHANKS CHECKED: F. GARCIA APPROVED: F. GARCIA	EXTERNAL REFERENCE FILES 13-S-100-01.dwg 13-S-100-02.dwg 13-S-100-03.dwg 13-S-100-04.dwg 13-S-100-05.dwg 13-S-100-06.dwg 13-S-100-07.dwg 13-S-100-08.dwg 13-S-100-09.dwg 13-S-100-10.dwg 13-S-100-11.dwg 13-S-100-12.dwg 13-S-100-13.dwg 13-S-100-14.dwg 13-S-100-15.dwg 13-S-100-16.dwg 13-S-100-17.dwg 13-S-100-18.dwg 13-S-100-19.dwg 13-S-100-20.dwg 13-S-100-21.dwg 13-S-100-22.dwg 13-S-100-23.dwg 13-S-100-24.dwg 13-S-100-25.dwg 13-S-100-26.dwg 13-S-100-27.dwg 13-S-100-28.dwg 13-S-100-29.dwg 13-S-100-30.dwg 13-S-100-31.dwg 13-S-100-32.dwg 13-S-100-33.dwg 13-S-100-34.dwg 13-S-100-35.dwg 13-S-100-36.dwg 13-S-100-37.dwg 13-S-100-38.dwg 13-S-100-39.dwg 13-S-100-40.dwg 13-S-100-41.dwg 13-S-100-42.dwg 13-S-100-43.dwg 13-S-100-44.dwg 13-S-100-45.dwg 13-S-100-46.dwg 13-S-100-47.dwg 13-S-100-48.dwg 13-S-100-49.dwg 13-S-100-50.dwg 13-S-100-51.dwg 13-S-100-52.dwg 13-S-100-53.dwg 13-S-100-54.dwg 13-S-100-55.dwg 13-S-100-56.dwg 13-S-100-57.dwg 13-S-100-58.dwg 13-S-100-59.dwg 13-S-100-60.dwg 13-S-100-61.dwg 13-S-100-62.dwg 13-S-100-63.dwg 13-S-100-64.dwg 13-S-100-65.dwg 13-S-100-66.dwg 13-S-100-67.dwg 13-S-100-68.dwg 13-S-100-69.dwg 13-S-100-70.dwg 13-S-100-71.dwg 13-S-100-72.dwg 13-S-100-73.dwg 13-S-100-74.dwg 13-S-100-75.dwg 13-S-100-76.dwg 13-S-100-77.dwg 13-S-100-78.dwg 13-S-100-79.dwg 13-S-100-80.dwg 13-S-100-81.dwg 13-S-100-82.dwg 13-S-100-83.dwg 13-S-100-84.dwg 13-S-100-85.dwg 13-S-100-86.dwg 13-S-100-87.dwg 13-S-100-88.dwg 13-S-100-89.dwg 13-S-100-90.dwg 13-S-100-91.dwg 13-S-100-92.dwg 13-S-100-93.dwg 13-S-100-94.dwg 13-S-100-95.dwg 13-S-100-96.dwg 13-S-100-97.dwg 13-S-100-98.dwg 13-S-100-99.dwg 13-S-100-100.dwg	THIS RECORD DRAWING WAS PREPARED USING INFORMATION REPORTED TO BROWN AND CALDWELL AND CONTAINS ONLY THE STANDARD AND CUSTOMARY LEVEL OF DETAIL. THE INFORMATION WAS NOT INDEPENDENTLY FIELD VERIFIED. THERE IS NO ONGOING PROGRAM TO UPDATE THE DRAWINGS TO REFLECT CHANGES SUBSEQUENT TO THE DATE INDICATED. THEREFORE, THIS DRAWING CANNOT BE RELIED UPON AS AN EXACT REPRESENTATION OF ACTUAL CONDITIONS.	REVISIONS <table border="1"> <thead> <tr> <th>NO.</th> <th>REV.</th> <th>DESCRIPTION</th> <th>BY</th> <th>DATE</th> <th>APP.</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	NO.	REV.	DESCRIPTION	BY	DATE	APP.							SILICON VALLEY CLEAN WATER SAN MATEO COUNTY, CALIFORNIA 	STAGE 1 INFLUENT SCREENING FOUNDATION AND INTERMEDIATE PLANS	March 20, 2017 DRAWN BY: K. SHANKS 13-S-100 SHEET NUMBER 28 OF 66
NO.	REV.	DESCRIPTION	BY	DATE	APP.															

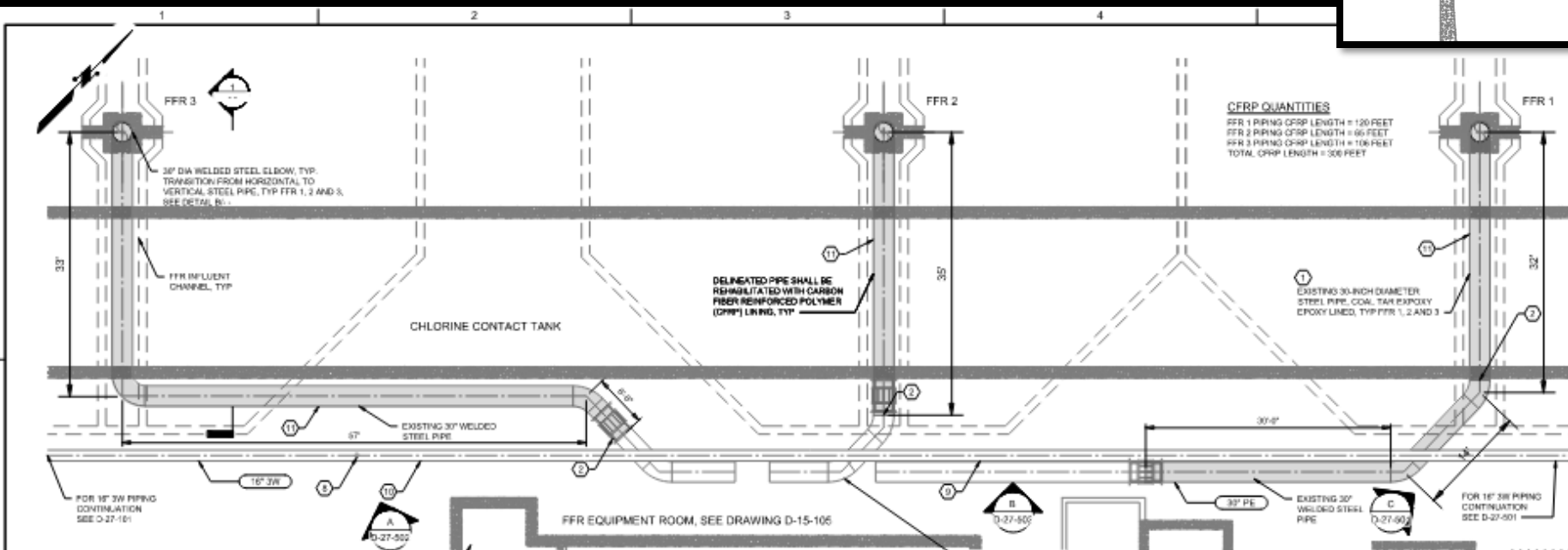
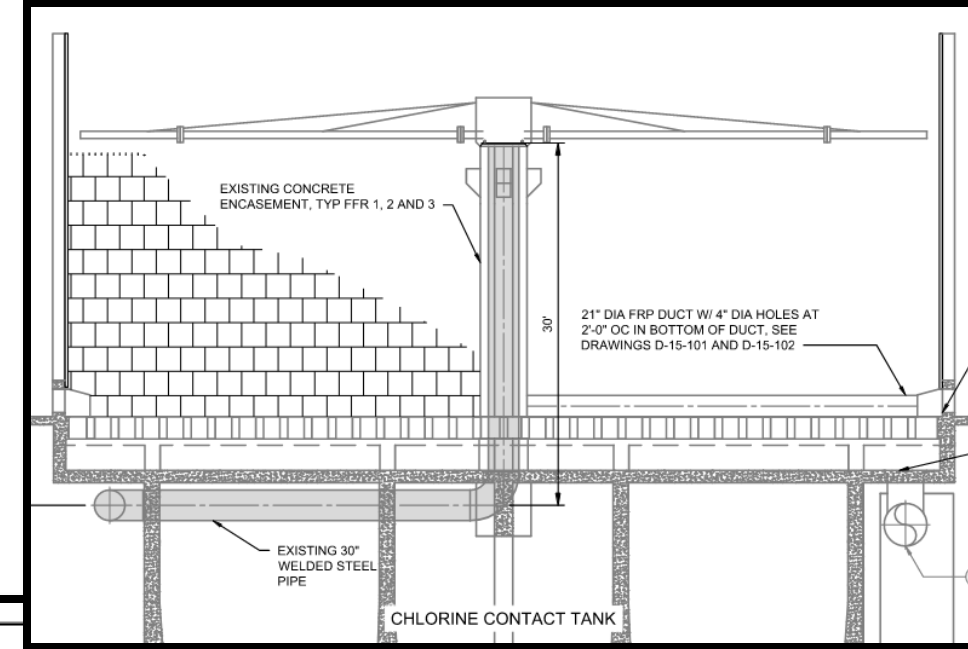
# Silicon Valley Clean Water WWTP Pipe Corrosion

- We were able to support Brown & Caldwell with specification development and operational planning
- Including the importance of qualifications for this type of specialty application work
- Project was completed in 21 days after initial mobilization



# Silicon Valley Clean Water WWTP Pipe Corrosion

- Since the completion, Structural has recently bid and procured the Fixed Film Reactor Project
- Three Phased Project (2024-2025) consisting of 290 LF of 30" welded steel pipe
- 30 LF descent through a 24in cage for manual entry

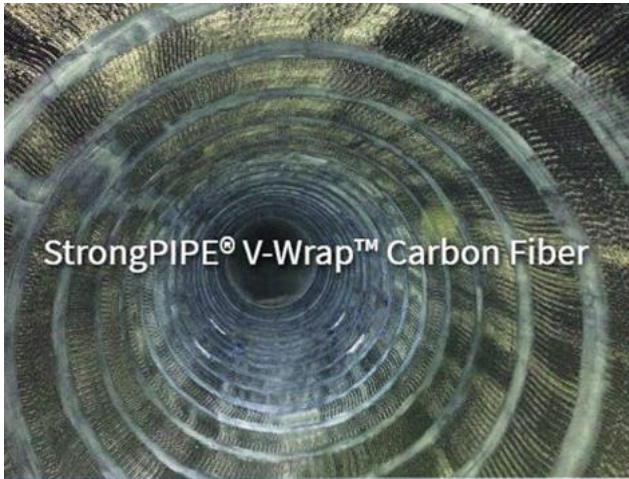


# Silicon Valley Clean Water WWTP Pipe Corrosion

- 3 additional projects (30" – 60" diameters) have been identified by the Owner for renewal using CFRP for interior and exterior wrapping



# StrongPIPE® Technologies



StrongPIPE® V-Wrap™ Carbon Fiber

## V-Wrap™ CFRP System

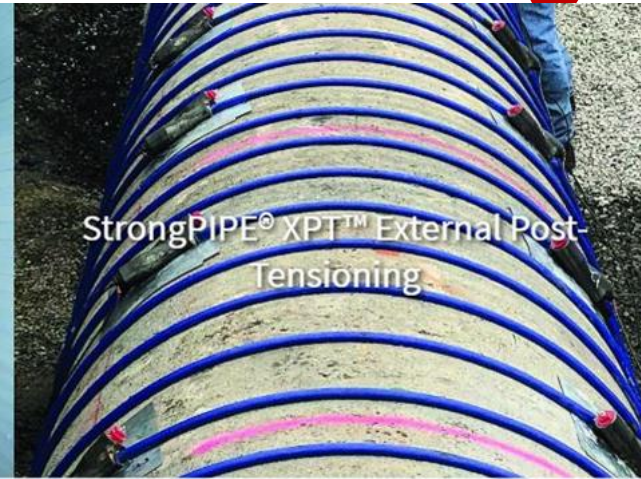
- Standalone design
- Internal / external
- Gravity / pressurized
- No hydraulic impact
- Odd geometries & bends



StrongPIPE® PALTEM®

## PALTEM Flow Ring System

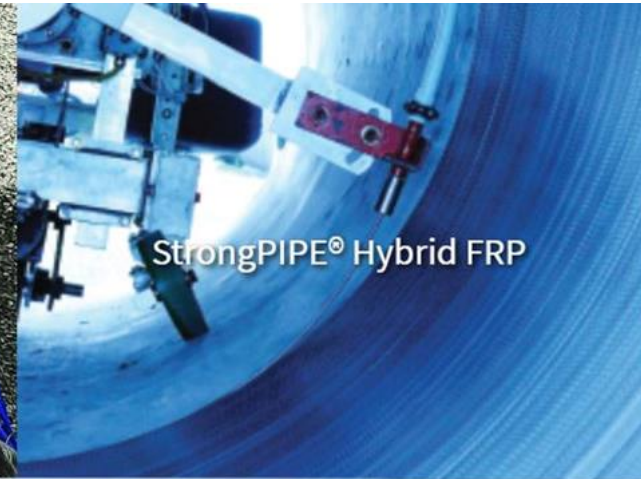
- Standalone design for gravity pipelines
- Internal
- Odd geometries & bends



StrongPIPE® XPT™ External Post-Tensioning

## XPT External Post-Tensioning

- Structural capacity upgrade for pressurized PCCP
- External
- Localized repairs



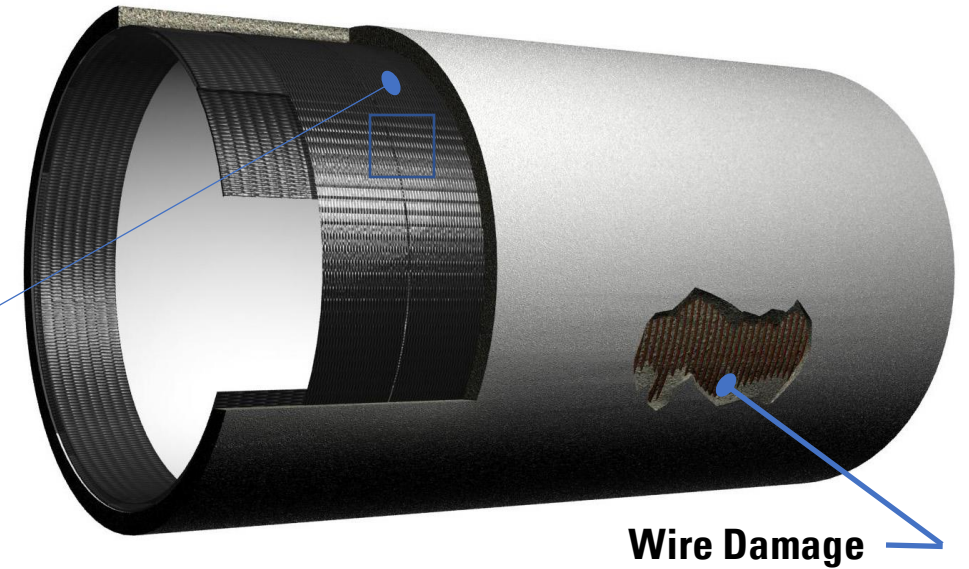
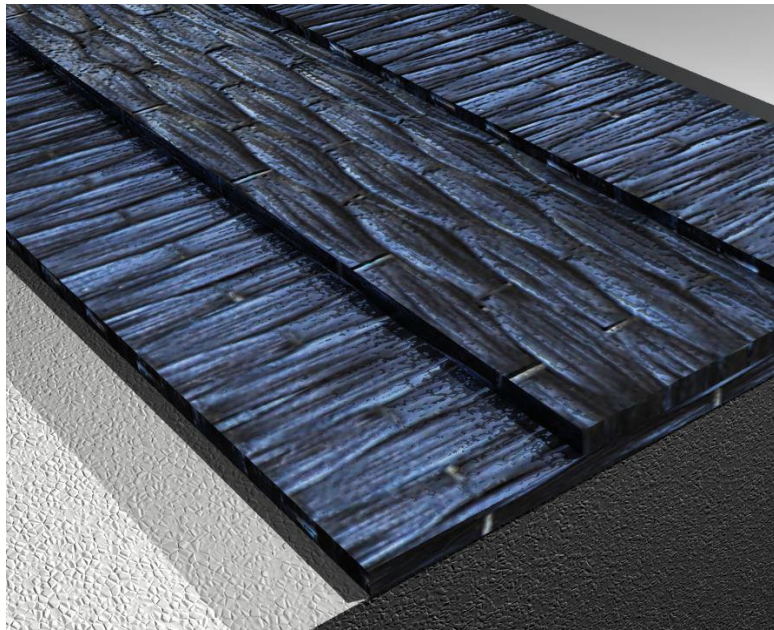
StrongPIPE® Hybrid FRP

## SCL Hybrid FRP

- Standalone design
- Mechanically Installed Internally
- Helically wound wire embedded in polymer
- Long runs of Straight Pipe

# StrongPIPE® V-Wrap™ Carbon Fiber Reinforced Polymer (CFRP)

- Structural Technologies supported CFRP per AWWA C305 a full standalone Class 4 rehabilitation



## Benefits:

- No excavation – Use existing point of access
- Industry accepted

## Considerations:

- Control of temperature and humidity
- Joint crossings
- Noise abatement

# StrongPIPE® V-Wrap™ Carbon Fiber Reinforced Polymer (CFRP) - Installation Steps



**Dewatering**



**Surface Preparation**



**Adhesion Testing**



# StrongPIPE® V-Wrap™ Carbon Fiber Reinforced Polymer (CFRP) - Installation Steps



**Fabric Saturation**



**Weight Ratio  
Test - Verification**



**Fabric Installation**

# StrongPIPE® V-Wrap™ Carbon Fiber Reinforced Polymer (CFRP) - Installation Steps



**Testing for Voids**

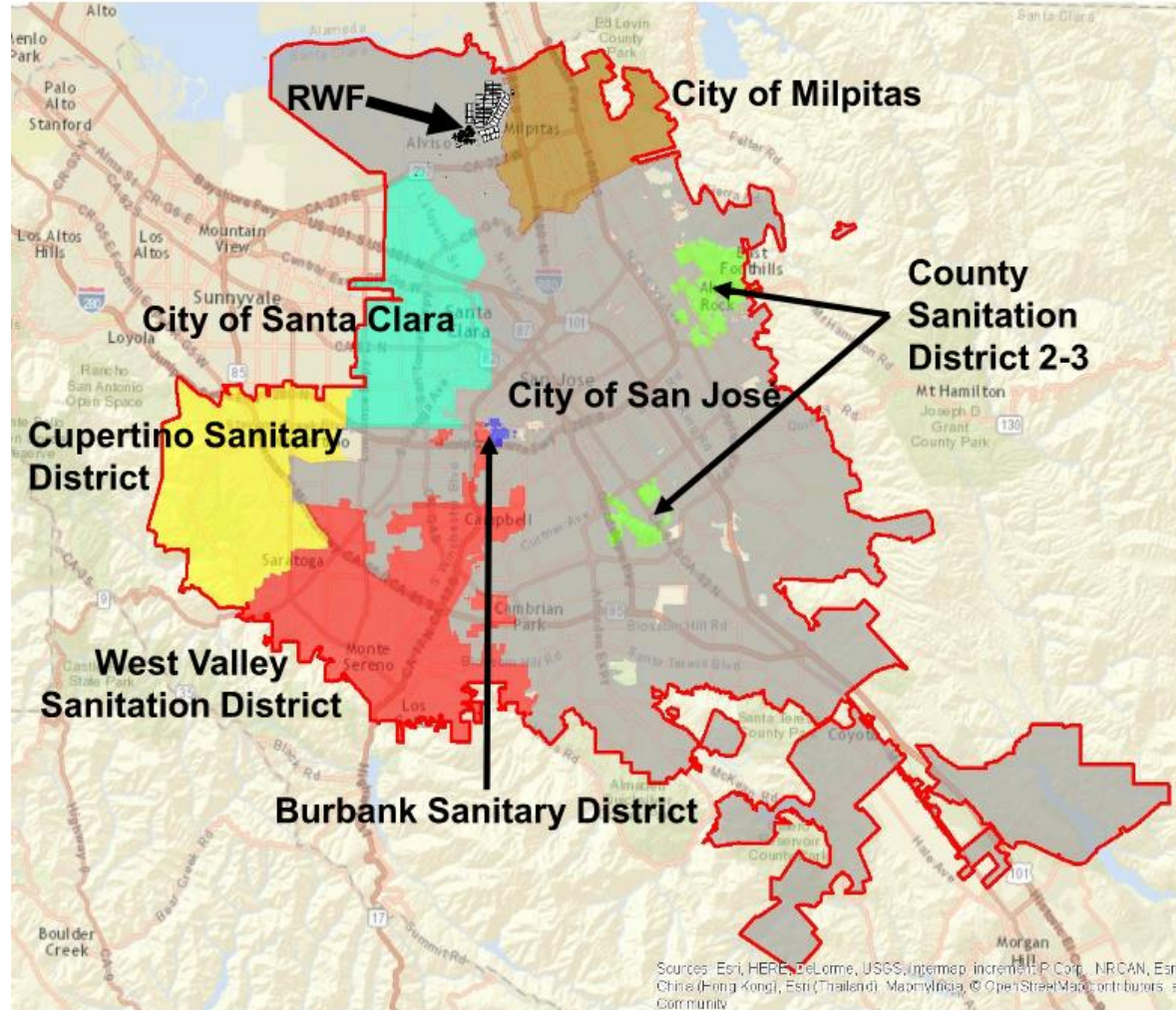


**Compression Ring  
Installation at  
Terminations**



**Final Walk Through –  
QA/QC**

# CITY OF SAN JOSE – SANTA CLARA REGIONAL WASTEWATER FACILITY



- Largest advanced wastewater facility on the West Coast
  - 167 MGD capacity
  - 2,600 acre site
- Serves
  - 1.4 million people
  - 17,000 businesses
  - 8 cities & County areas
- Continually operating 24/7 since 1956

Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri, China (Hong Kong), Esri (Thailand), Swire, © OpenStreetMap contributors, and the community



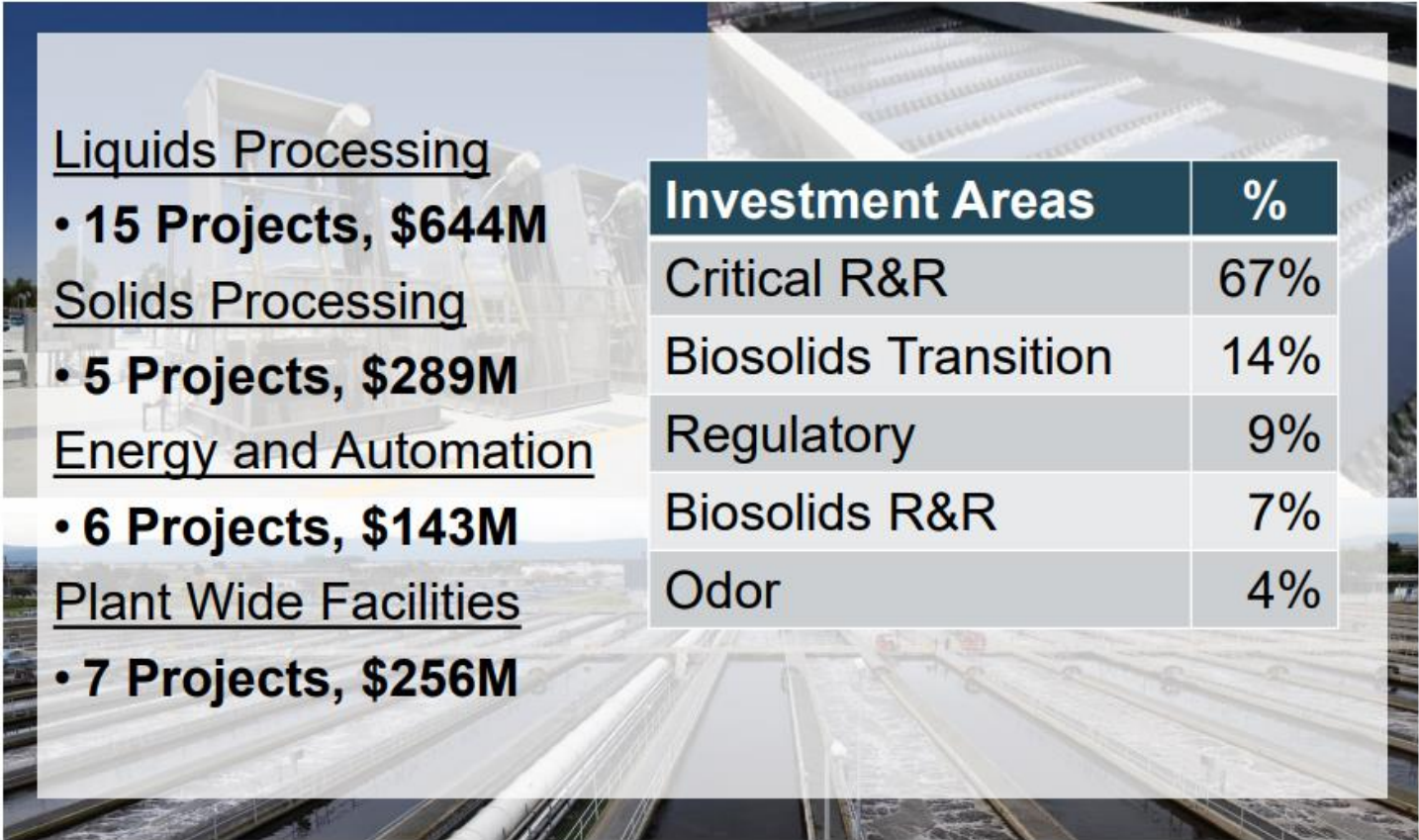
# CITY OF SAN JOSE – SANTA CLARA REGIONAL WASTEWATER FACILITY

- 30-year Capital Improvement Program (2010-2040)
- Issues:
  - Aging infrastructure, lots of concrete!
  - Seismic upgrades.
  - High groundwater - salty water.
  - Large diameter pipes in bad condition.



# CITY OF SAN JOSE – SANTA CLARA REGIONAL WASTEWATER FACILITY

## CIP Organized into 4 Work Packages



Liquids Processing  
• **15 Projects, \$644M**

Solids Processing  
• **5 Projects, \$289M**

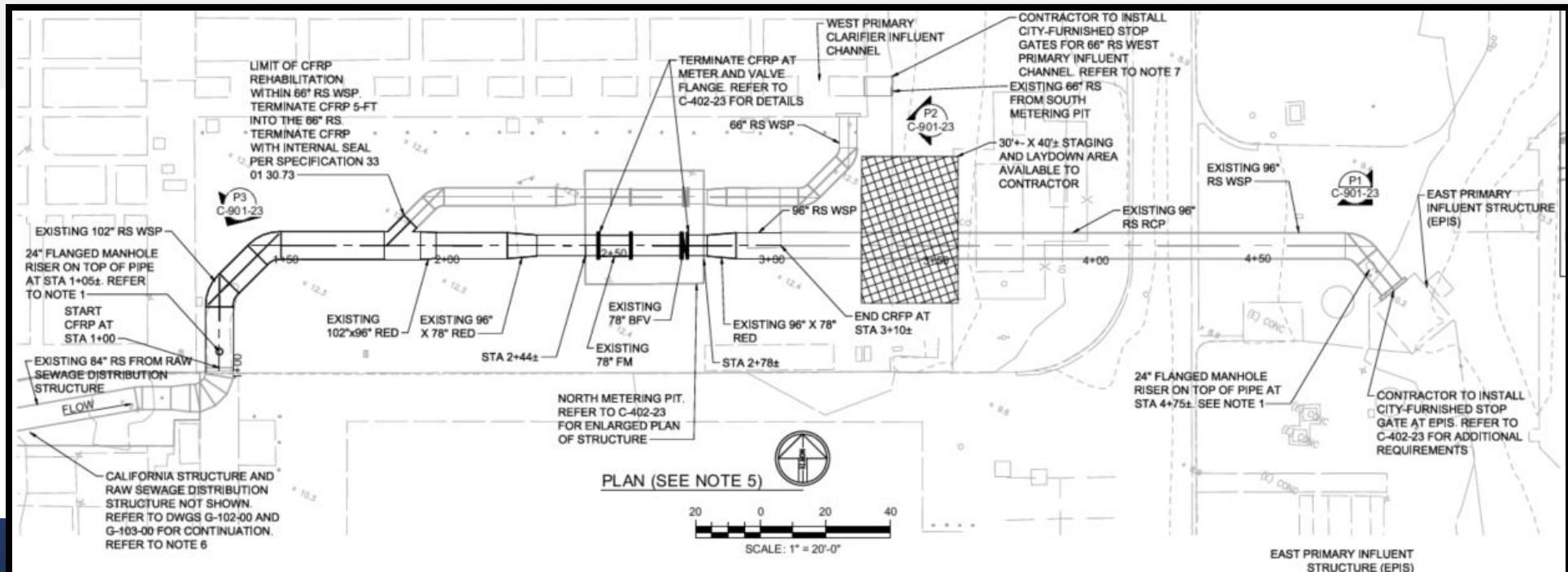
Energy and Automation  
• **6 Projects, \$143M**

Plant Wide Facilities  
• **7 Projects, \$256M**

Investment Areas	%
Critical R&R	67%
Biosolids Transition	14%
Regulatory	9%
Biosolids R&R	7%
Odor	4%

# CITY OF SAN JOSE – SANTA CLARA REGIONAL WASTEWATER FACILITY

- City of San Jose – Santa Clara Regional Wastewater Facility to move forward with a similar rehabilitation approach for their deteriorated pipeline infrastructure.
- Project 9850 – Yard Piping Improvements, Phase 2 consists of approximately 200 LF of 102", 96" and 78" corroded steel pipe.
- The project is scheduled for July 2024 and CFRP is planned for 5 weeks of construction.



**Thank You!**

**Questions?**

**struc'tural**  
**TECHNOLOGIES**