



City of Mercer Island

Utility Board Review

SCADA Equipment Replacement – Water Sites Design

November 10, 2020



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AGENDA

- 01 PROJECT BACKGROUND/
OVERVIEW
- 02 WATER SITES DESIGN REVIEW
- 03 UPDATE ON SCADA
REPLACEMENT AT SEWER SITES
- 04 QUESTIONS AND NEXT STEPS



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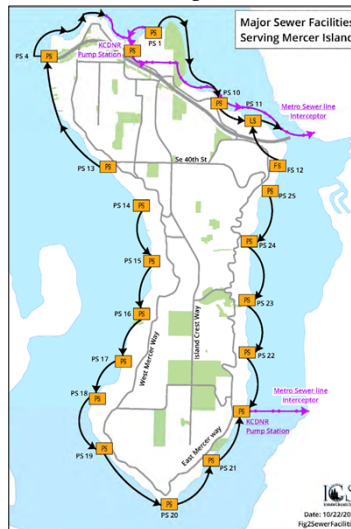
Project Overview / Background



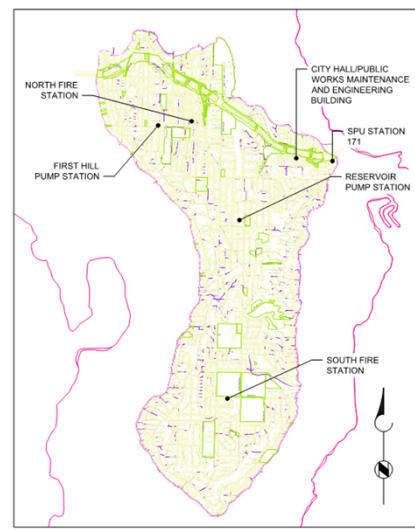
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City of Mercer Island SCADA System

- Sewer Collection System
 - 18 pump stations around the island
 - Pump to regional WWTP
- Water Distribution System
 - Receives water from Seattle Public Utilities
 - 5 sites currently monitored by SCADA



Sewer Collection System



Water Distribution System

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SCADA Criticality to Utility Operations

- Provides insight into the water and sewer processes
 - Collect data
 - Monitor and control process
 - Critical alarm notification
- Requirements
 - Uptime
 - Reliability
 - Accessibility
 - Usability
 - Security



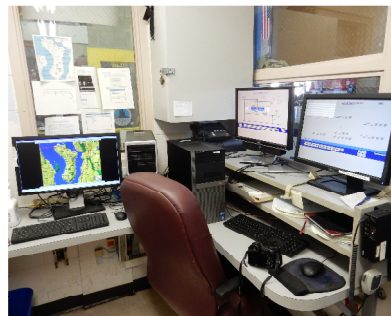
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Drivers for SCADA Project

- 2017 – City identified obsolete SCADA components
- Internal evaluation of SCADA system
 - Frequent alarms
 - Fragmented SCADA components
 - Reliability issues
 - Poor usability



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Project Objectives



- **Standardize on SCADA technology** for water and sewer systems to minimize maintenance, service, training, and spare parts
- **Reduce risk** by replacing aging components
- **Increase operator efficiency** through improved understanding of alarms, clarity of process conditions, and reduced training time
- **Enable Smart Utility capabilities** by developing a SCADA system platform that can integrate with other City enterprise applications (GIS, asset management, AMI, utility billing, etc.) in the future

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Timeline



- SCADA Master Plan completed in 2018
- Design and programming standards 2019-2020
- Water Site SCADA Construction
 - Anticipated Bid Award: January 2021
 - Anticipated Construction: May-September 2021
- Sewer Site SCADA Construction
 - Anticipated Bid Award: Mid-2022
 - Anticipated Construction: 2022-2023

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Engineer's Construction Cost Estimate



SCADA Equipment Replacement – Water Sites

Lower Range	Upper Range
\$329,000	\$465,000

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Water Sites Design Review

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AND
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Project Scope of Work

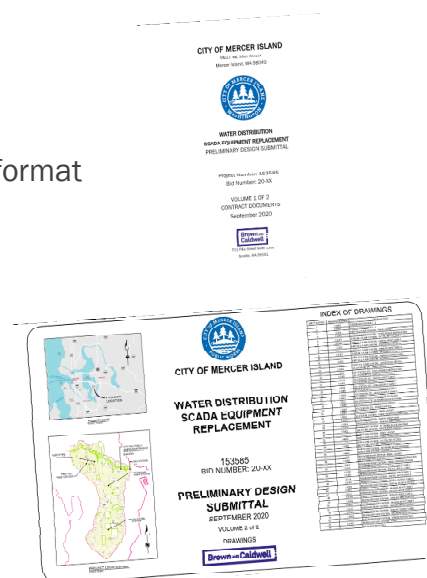
- Replace PLC control panels at 5 water distribution sites
 - First Hill Pump Station
 - SPU Station 171
 - South Fire Station
 - North Fire Station
 - Reservoir Pump Station
- Provide Siemens hardware (City standard)
- Perform field testing and commissioning services
- Perform associated electrical work
- Provide training on the PLC panel hardware
- *Note: Programming is being provided by Brown and Caldwell*



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Design Package Structure

- Specifications
 - City provided Div 00 upfront specs
 - BC standard specification sections following CSI format
 - Div 01 – General Requirements
 - Div 26 – Electrical
 - Div 40 – Process Integration
- Drawings
 - Control panel layouts
 - Control panel power distribution drawings
 - PLC input/output card drawings
 - Network block diagrams
 - Demolition details



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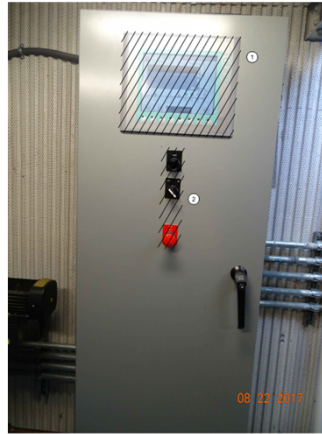
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First Hill Pump Station

Scope

- Reuse existing control panel enclosure
- Demo the existing back panel
- Install new back panel in existing enclosure



Existing Enclosure



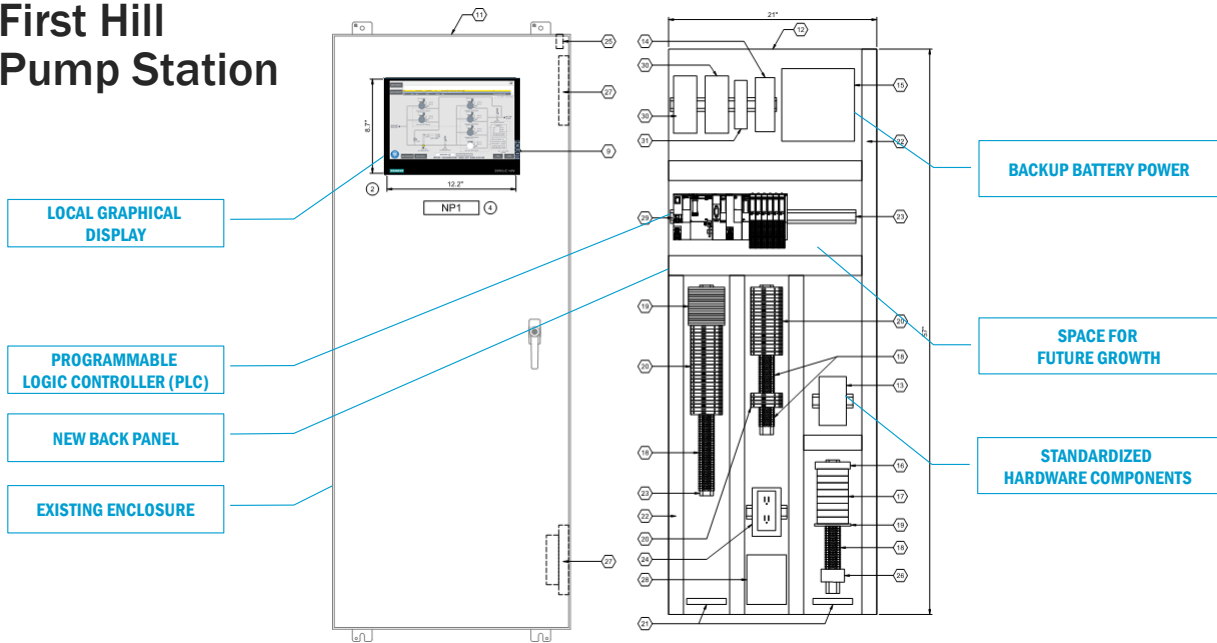
Existing Back Panel

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First Hill Pump Station



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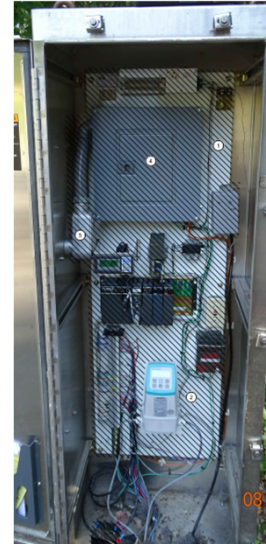
SPU Station 171

Scope

- Outdoor roadside cabinet
- Replace back panel in existing enclosure
- Replace power panelboard in existing enclosure



Existing Enclosure



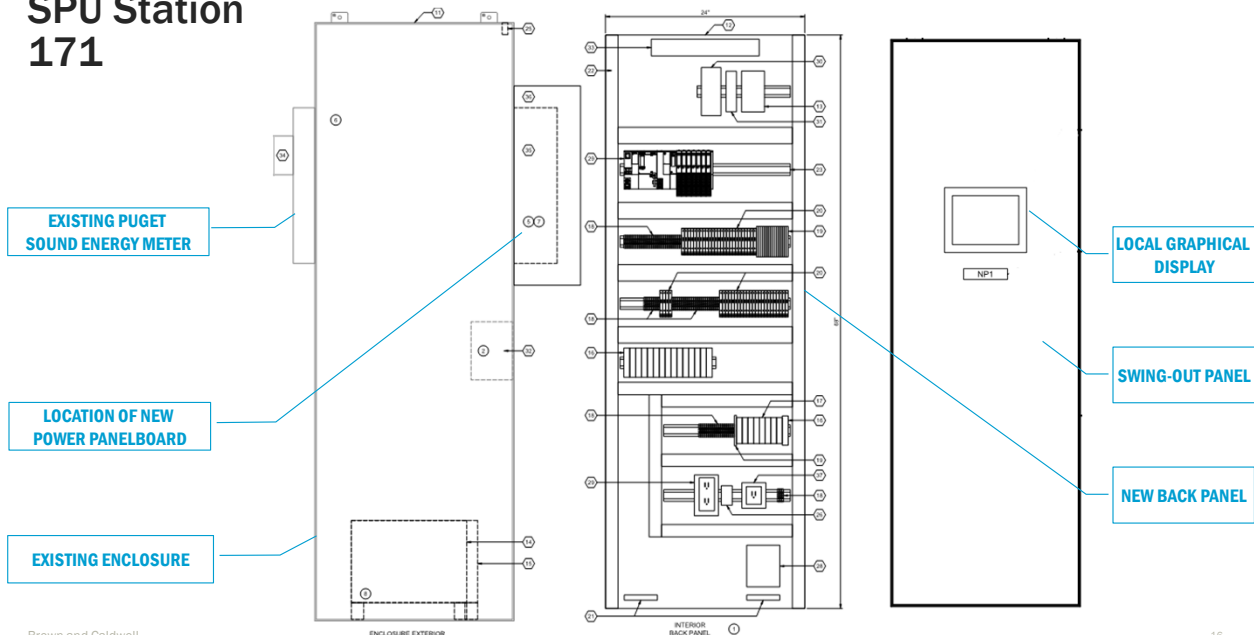
Existing Back Panel

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SPU Station 171



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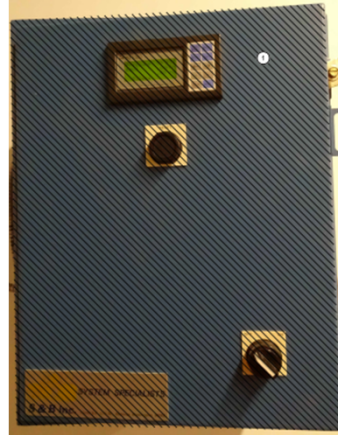
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South Fire Station (Pressure Monitoring)

Scope

- Demo the existing control panel
- Install new control panel enclosure in existing location



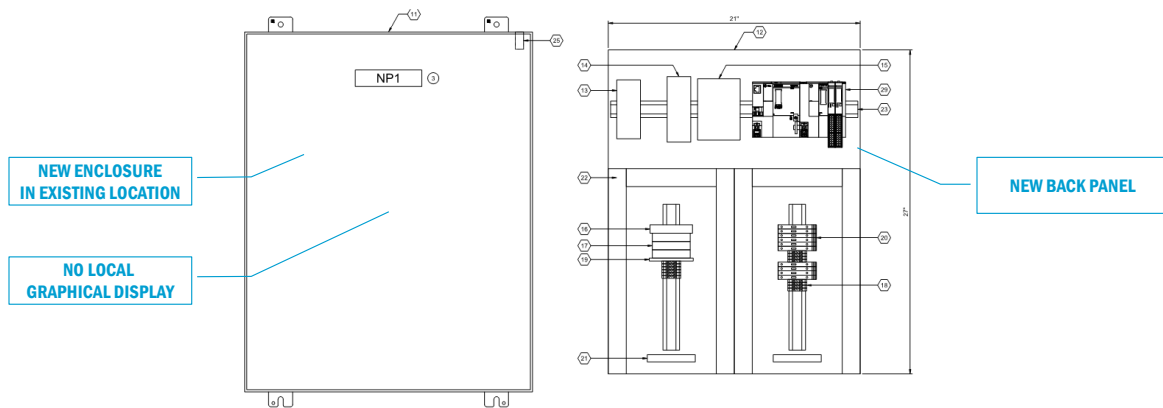
Existing Enclosure

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South Fire Station (Pressure Monitoring)



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North Fire Station (Pressure Monitoring)

Scope

- Install new control panel enclosure (new location to meet code requirements)
- Repurpose existing control panel as a terminal junction box for existing wiring
- Install new conduit/wiring between existing enclosure and new panel location



EXISTING ENCLOSURE



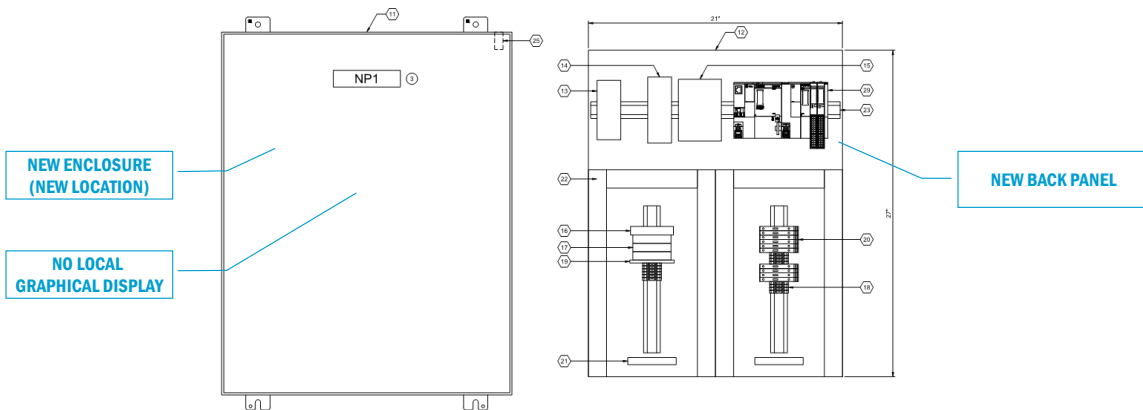
NEW PLC PANEL LOCATION

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North Fire Station (Pressure Monitoring)



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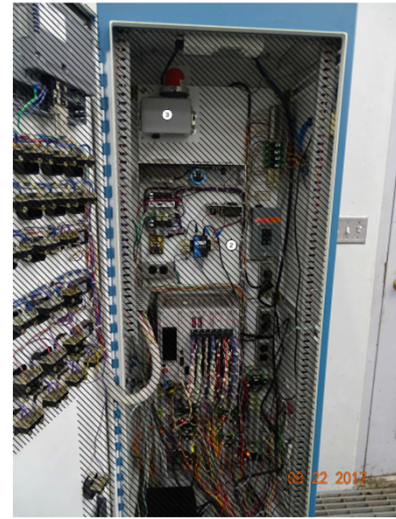
Reservoir Pump Station

Scope

- Install new control panel enclosure (new location)
- Repurpose existing control panel as a terminal junction box for existing wiring
- Install new conduit/wiring between existing enclosure and new panel location



Existing Enclosure



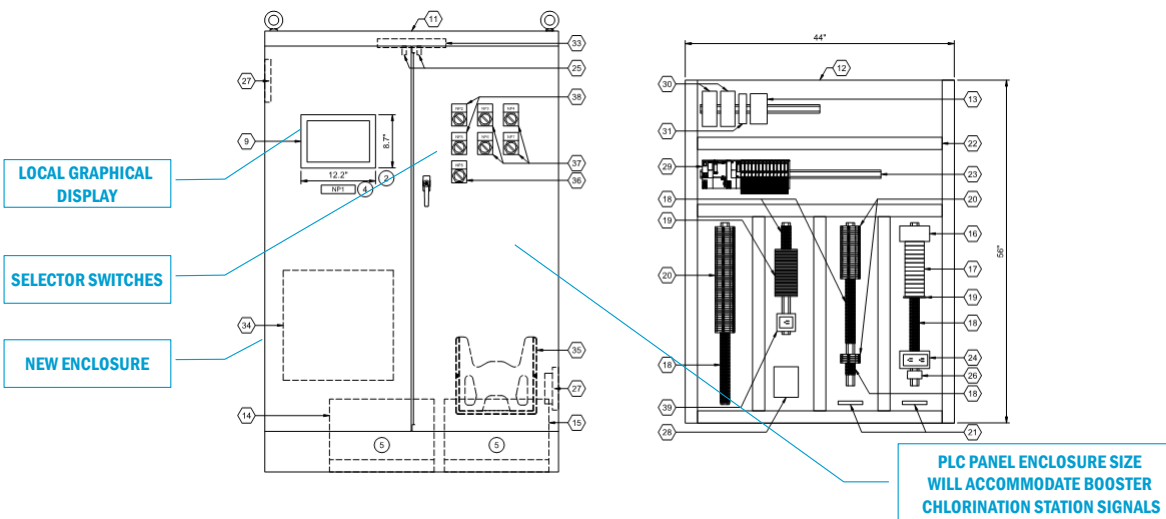
Existing Back Panel

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Reservoir Pump Station



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Reservoir Variable Frequency Drives (VFDs)

- Upgrade from hardwired to networked (Profinet) communication between the existing VFDs and new control panel
- Will allow for pump control and transfer of additional monitoring data over a single cable

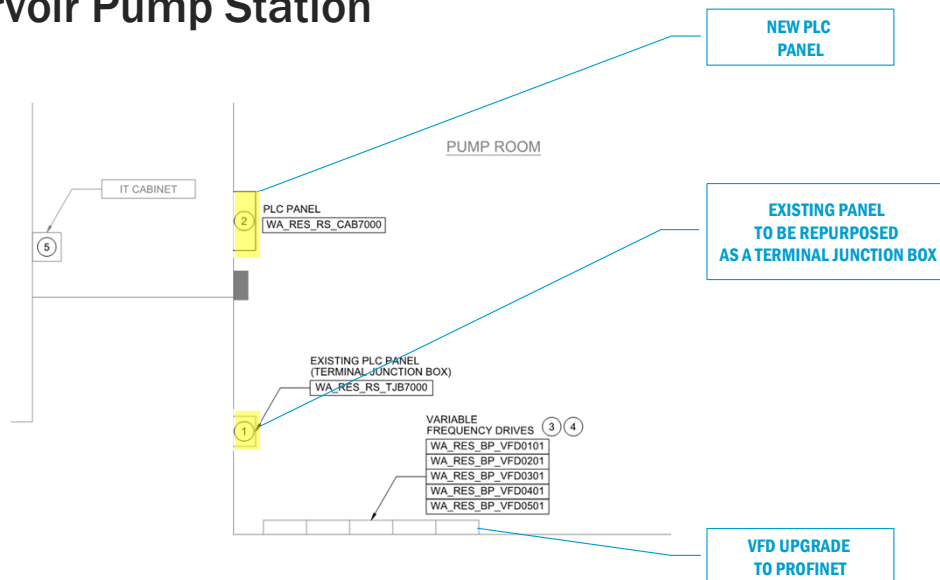


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Reservoir Pump Station



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Construction Sequencing and Constraints



- Work Sequence

Work Package Sequence	Site	Work Period Performed	Estimate I/O Point Quantity per Site	Allowed Cutover Time (Control System Downtime)	Construction Constaints	Flexibility to Move Construction of Package within Sequence
1	SOUTH FIRE STATION	Anytime	10	4 Hours	None.	Flexibility within Work Period
1	NORTH FIRE STATION	Anytime	10	4 Hours	None.	Flexibility within Work Period
2	SPU STATION 171	Anytime	25	6 Hours	None.	N/A
3	FIRST HILL PUMP STATION	Anytime	35	8 Hours	Site must remain in operation during panel cutover.	N/A
4	RESERVOIR PUMP STATION	Construction at site must be complete by August 31, 2021.	100	16 Hours	Site must remain in operation during panel cutover. Coordinate with other Construction at site per Section 01 12 16.	N/A

ANY WORK PERIOD RESTRICTIONS

SITES THAT MUST REMAIN OPERATIONAL

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Update on SCADA Replacement at Sewer Sites



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Update on SCADA Replacement at Sewer Sites

- Ventilation Study
 - Impact to SCADA: ensuring the sewer control panels are adequately rated for the environment
- Sewer Site SCADA Construction
 - Anticipated Bid: Mid-2022
 - Anticipated Construction: 2022-2023

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Next Steps

The logo for Brown and Caldwell, featuring the company name in a white box with a green background and a white border. The text "Brown" is above "AND" which is above "Caldwell".

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Next Steps

- Finalize water bid documents
- City Council meeting – Dec 1st for authorization to bid
- Bid Award – January 2021
- Construction – May to September 2021
- Sewer site SCADA design – Mid-2021



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Thank you.
Questions?

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