TUALATIN VALLEY
WATER DISTRICT

SPEED

(Selecting PDB for Effective and Efficient Delivery)

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INTRODUCTIONS



Nicholas Augustus
Owner /
Tualatin Valley Water District
Project Manager



Keith Beckman
Slayden Constructors
Contractor / Project Manager



Tyler Whitehouse
Carollo Engineers
Design Lead

AGENDA

- Project Overview
- Why Alternative Delivery?
- Project Design
- Construction
- Project Outcome



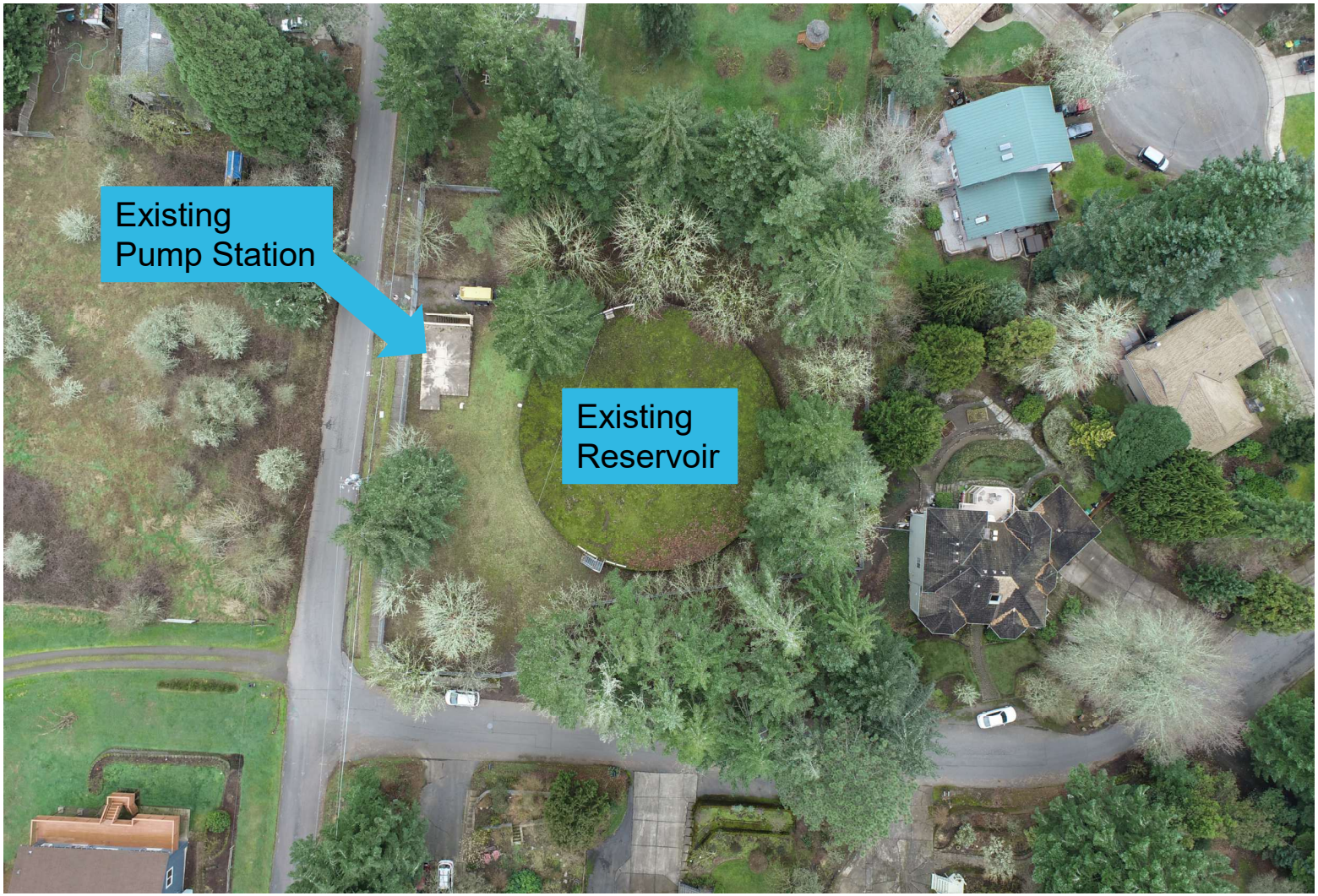
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PROJECT OVERVIEW

- 189th Pump Station
  - Constructed in late 1980's
  - Site included 2 MG reservoir at 350 elev. and supply well
  - Pump failures and resilience concerns
- Goyak Pump Station
  - Constructed in 1973, expanded in 1992.
  - Issues with water intrusion, confined space, and seismic resilience
  - Site included 1 MG reservoir. Issues with drain and seismic resilience
- Construction Issues
  - Space constraints – small sites, adjacent development, compressed schedule
  - Single-source facilities



Old 189th Pump Station



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WHY ALTERNATIVE DELIVERY?

- Collaborative approach to delivery
- Best-value
- Lessons learned from experience
- **Qualified contractors***
- **Working around critical assets***
- **Contractor input on constructability and design up front***
- Schedule planning and input from contractor
- **Cost certainty earlier in process***
  - Focused design to progress long lead items and reduce overall schedule
- **Team review for placement of on-site assets***
- **Project unknowns***
- ORS 279C.355 requires a post-project evaluation

Items of major importance/key drivers



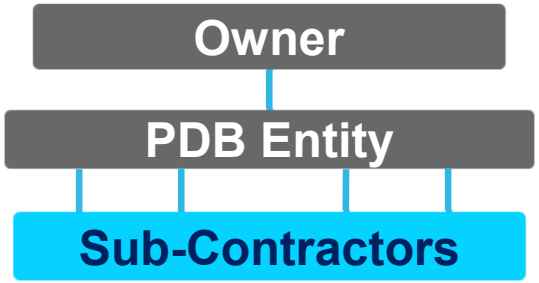
Old 189th Pump Station & Reservoir

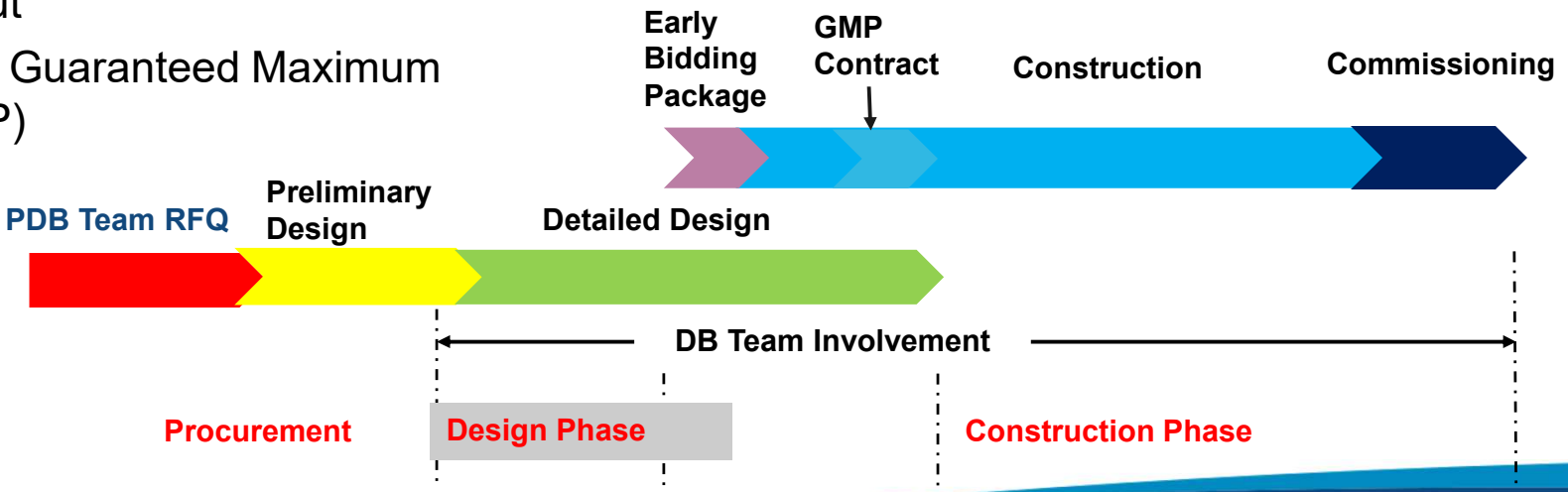
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ALTERNATIVE PROJECT DELIVERY

Four project delivery options evaluated

- Progressive Design-Build (PDB)
  - Single Selection
  - Schedule savings
  - Bid packages
  - Owner input
  - Negotiated Guaranteed Maximum Price (GMP)





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PROJECT DESIGN

Challenges

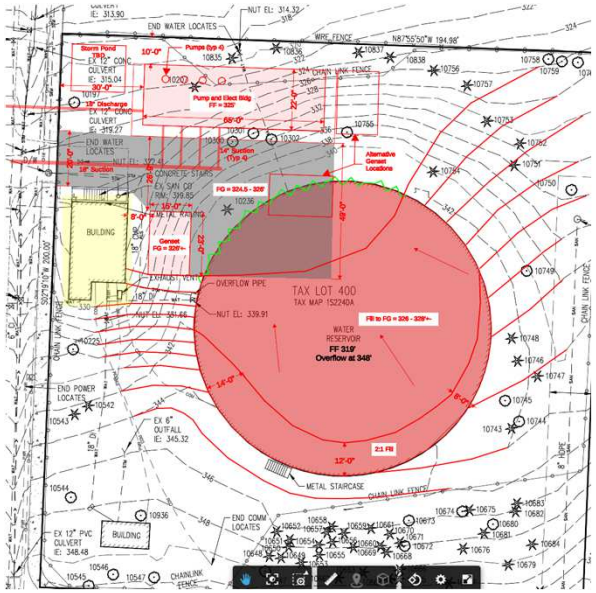
- **Pump Station Siting***
- Pipeline Routing
- **Reservoir Demolition***
- **Unique Hydraulics / High-pressure Pipelines***
- Designing around Existing Infrastructure
- **O&M Considerations / Visualization***

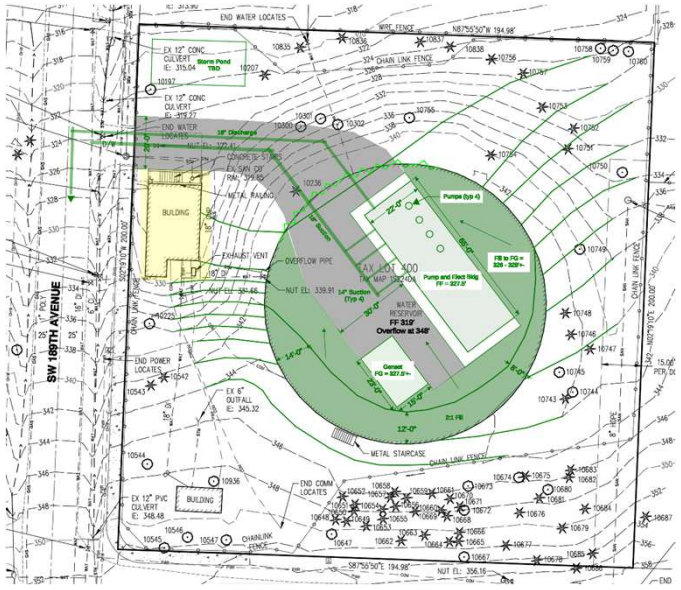


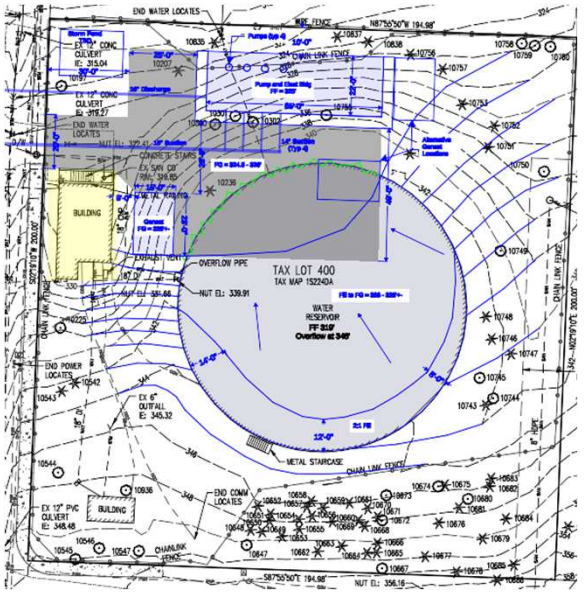
**Items of major importance/key drivers*

PROJECT DESIGN

Pump Station Siting







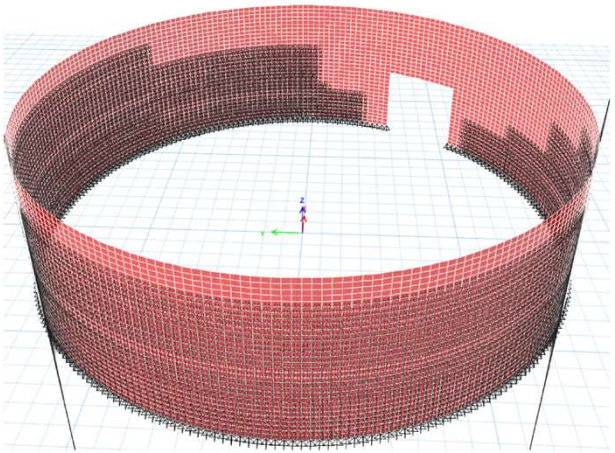
- Multiple iterations each with their own challenges
- Still left with how to safely demo Reservoir and maintain construction access

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PROJECT DESIGN

PDB effort to design around reservoir

- Carollo alternatives analysis with Cost input from Contractor helps make easy decisions for the Owner
  - Soil Nails
  - Retaining Wall
  - Full Demo
  - Grading modifications
- Subcontractor models for early demolition planning

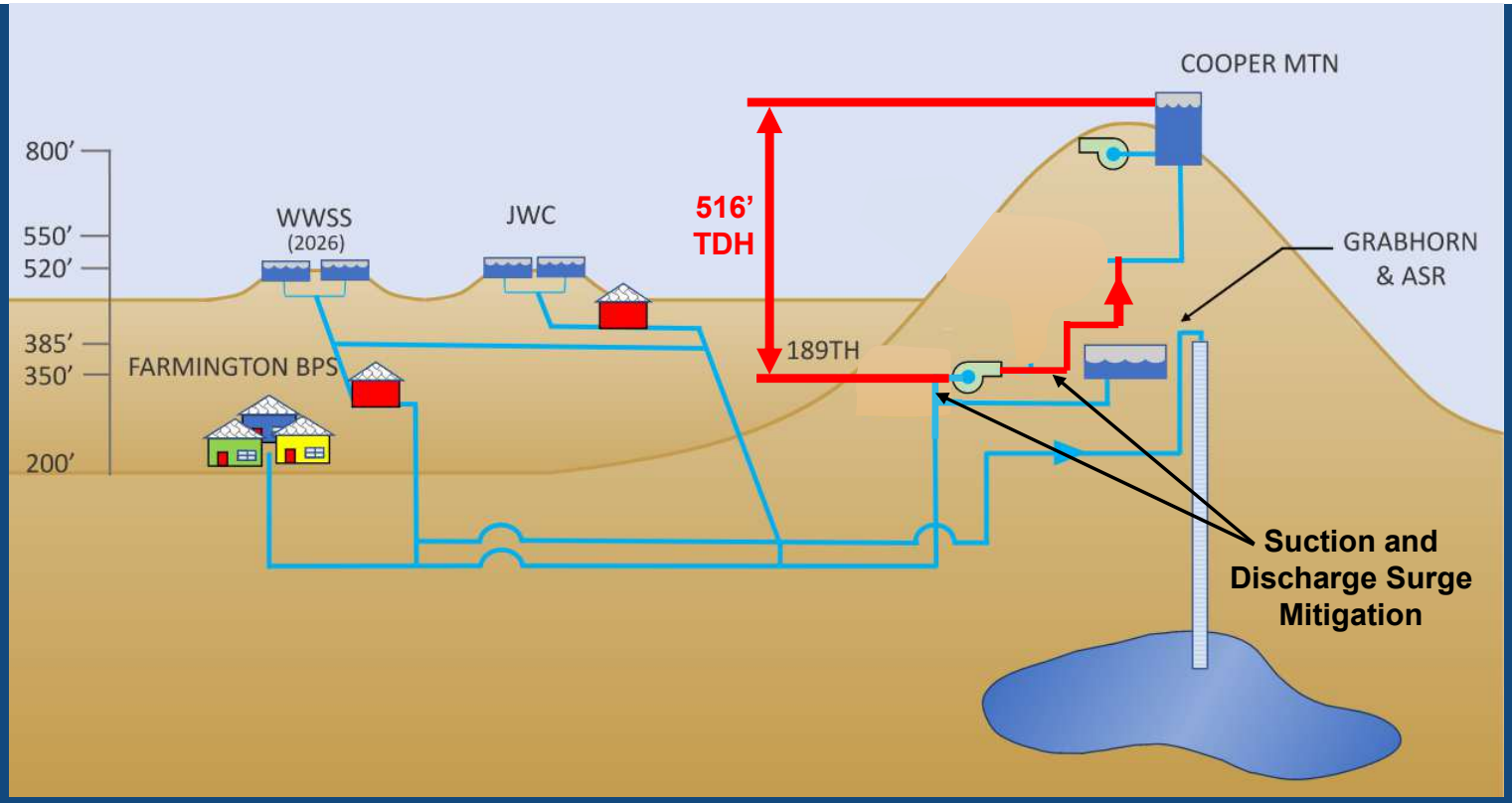




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PROJECT DESIGN

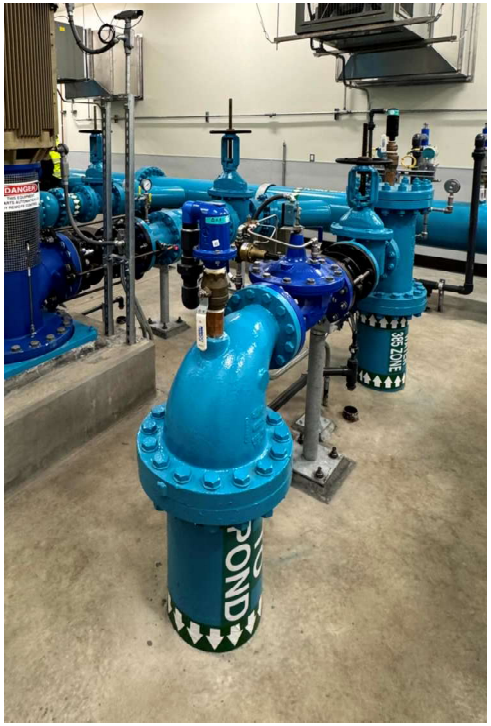
Unique Hydraulics / High-pressure Pipelines



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PROJECT DESIGN

Unique Hydraulics / High-pressure Pipelines







PROJECT DESIGN

O&M Considerations / Visualization





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CONSTRUCTION

Early Work Amendments

- Greatly reduced schedule critical path
- Mitigated supply chain issues
  - Material acquisition – Electrical, SCADA, Generator, Pumps & Motors, Automatic Transfer Switch, Valves, Ductile Iron Pipe
  - **Early bid packages – Tree removal, home inspections, demolition plans**
  - **Avoiding bird nesting season**



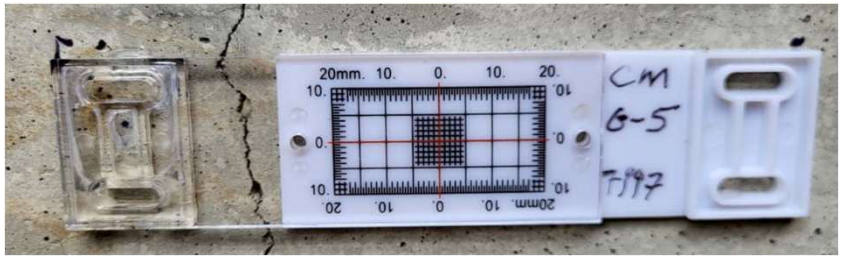
Tree Removal and other activities happening BEFORE day 1 of construction

Procurement and lead time drove the design and construction schedule

CONSTRUCTION

Construction Challenges

- Nearby Homes and ROW work
  - Performed pre-demolition optional home inspections
  - Setup vibration monitoring
  - Added Pipeline subcontractor to ROW permit but started before they were on board



Following Home Inspections, Crack monitors were placed at larger than typical foundation cracks

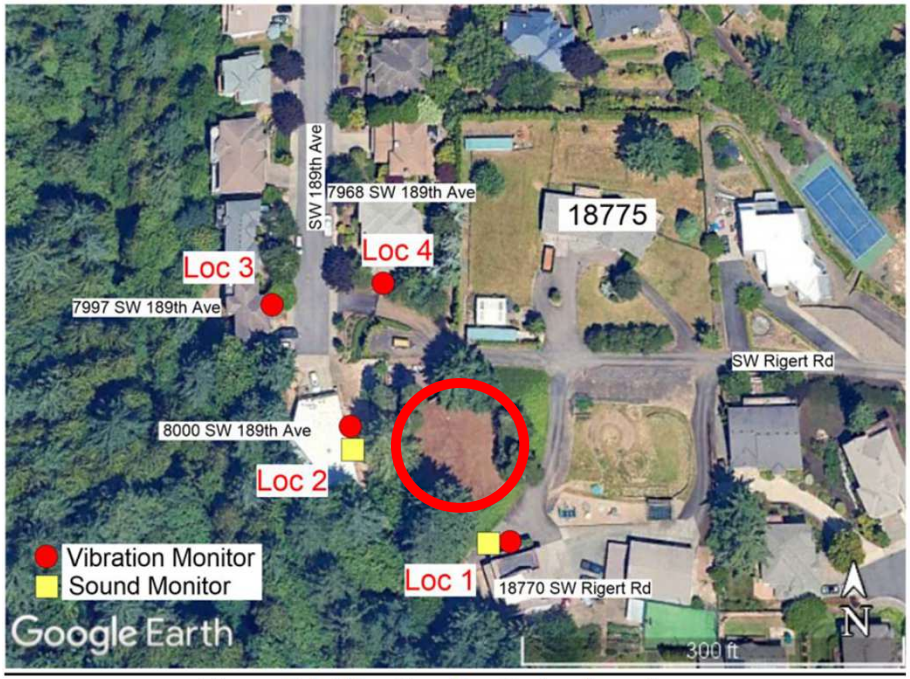


Figure 2-1. Vibration Monitoring Locations.

Vibration monitoring at homes prior to demolition - 24/7 monitoring of data

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CONSTRUCTION

True-Up During Construction

- Guaranteed Maximum Price (GMP) of 90%
  - Started work while finishing documents up to 100%
  - Early Changes Found and tracked separately between owner and contractor
- All changes from 90% addressed as separate from rest of construction
  - **Owner and PDB Contingency transfers done lock in budgets for 100% documents**

Lessons When Moving Fast:

- Use Overlays
- Approach EVERY vendor/Sub - Confirm in Writing



Typical project issues compared to True-Up. Above is the old buried 189th pump station found during construction.

ACTIVE COORDINATION

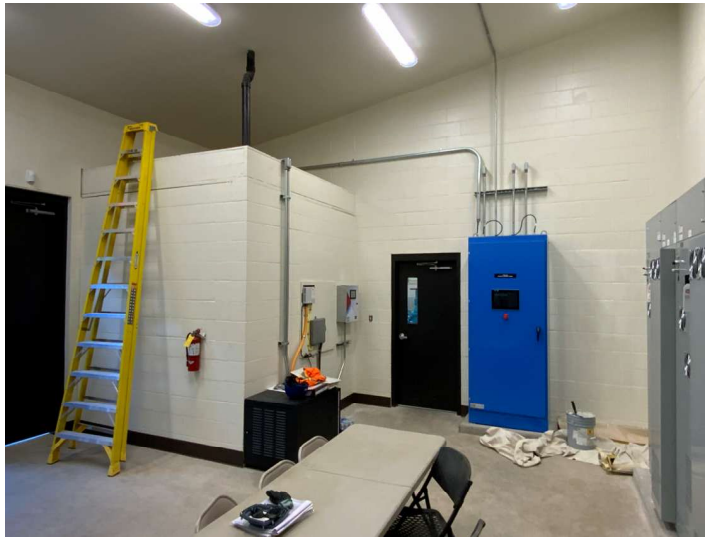


Early-decision to add working space – Placed generator on PS



Late demo activities had new infrastructure nearby

ACTIVE COORDINATION



Coatings on internal wall

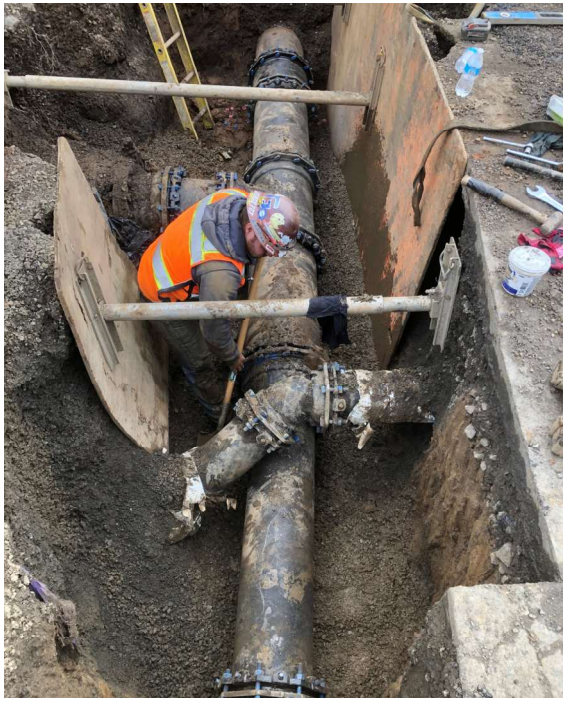


Pipeline Coatings- Pull test and pipe supports



Existing generator leaving the site

ACTIVE COORDINATION



Tee 550 Zone Connection – 8" conflict was re-routed prior to this connection



16" Connection at Goyak – Flow meter vault, conduit, and lots of other issues



16" Connection at Goyak

ACTIVE COORDINATION





Existing Goyak Pump Station

ACTIVE COORDINATION



Demo Goyak Reservoir –
Reservoir plug issues and drainage



Demo Goyak Pump Station - Drainage

ACTIVE COORDINATION



Aerial View of 189th Pump Station – Looking South

Challenges

- Drainage beneath existing reservoirs
- Buried structures
- Pipeline connections
- Rock inside new pipe***
- Construction Schedule

** Attend Nick's Presentation on Friday

PROJECT OUTCOME

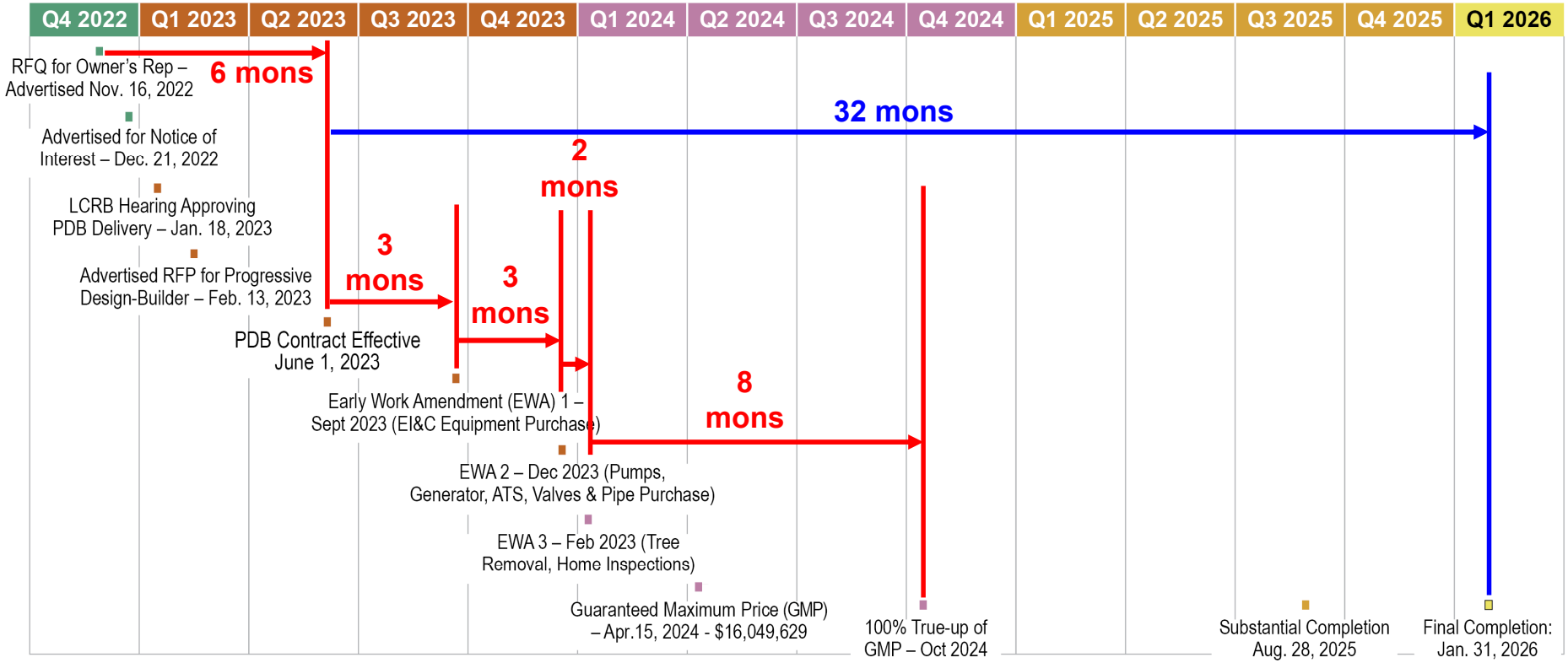


Completed 189th Pump Station – Looking Northwest

- Piping Design – corridor selection
- Mitigation of long-lead items
- Working next to other contractors
- Handling challenging site conditions
- Tree removal
- Coordination with roadway project
- Handling material delays

PROJECT OUTCOME

Project Schedule



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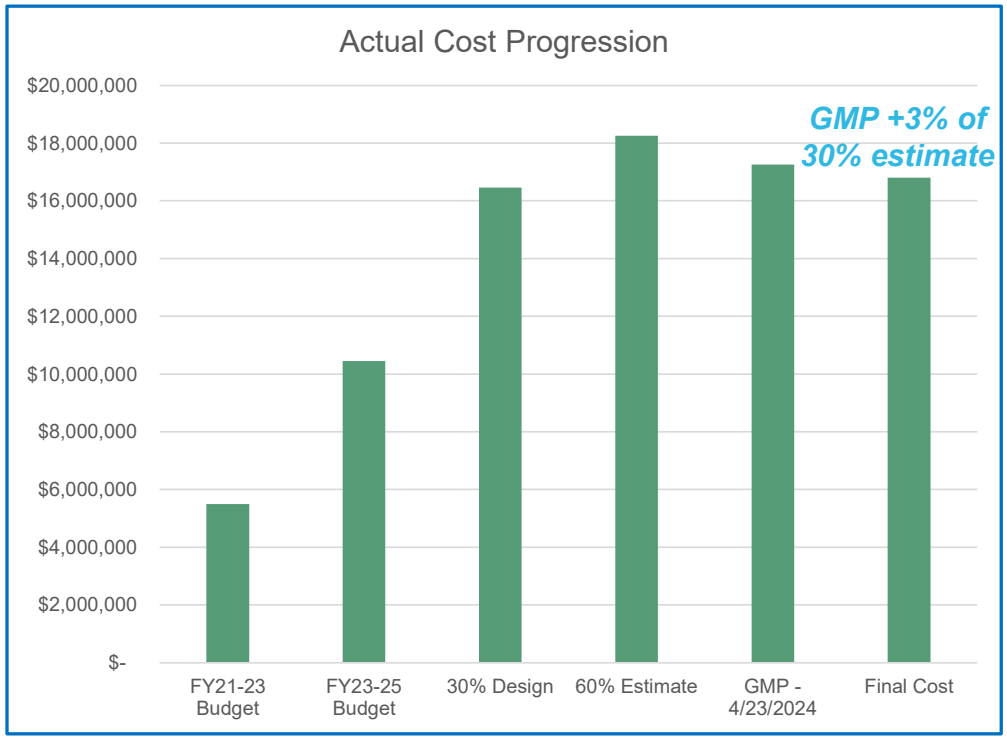
PROJECT OUTCOME

Total Project Costs:

- Original Budget: $10,454,515
- 30% Project Estimate: $16,500,000
- Final Actual: $16,800,000
  - Increase due to market conditions

PDB Costs:

- Design: $1,500,000
- Construction: $14,500,000
- Guaranteed Maximum Price: $16,049,629
  - Negotiations during GMP, costs appeared reasonable
- Savings split:
  - 50/50 - $300,000 paid to PDB
- Change order total: $0



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QUESTIONS?

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