



SUPPLY CHAIN PROBLEMS – THEY’RE EVERYWHERE:
CASE STUDY IN ENGINEERING, PROCUREMENT AND CONSTRUCTION
MANAGEMENT AS AN ALTERNATIVE PROJECT DELIVERY METHOD

NEWEA ANNUAL CONFERENCE 2024

DOUG BRISEE, PE



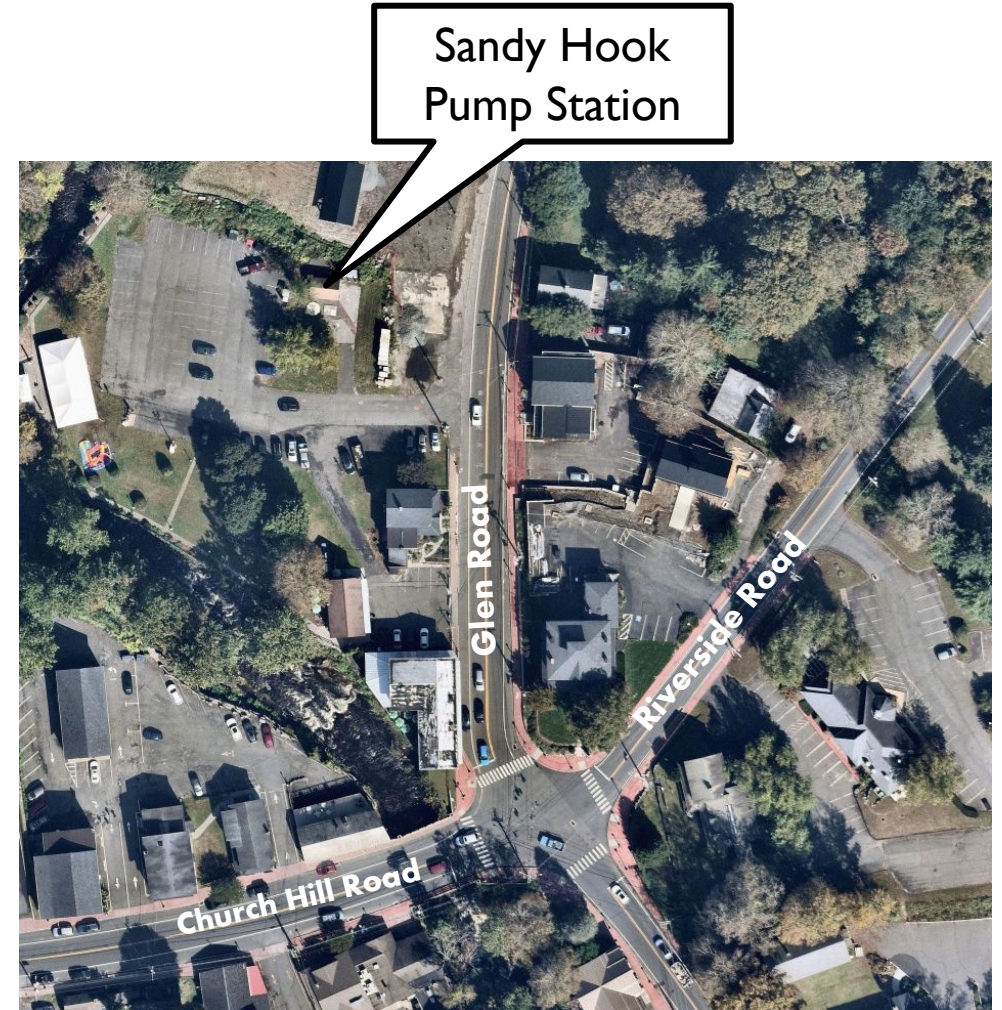
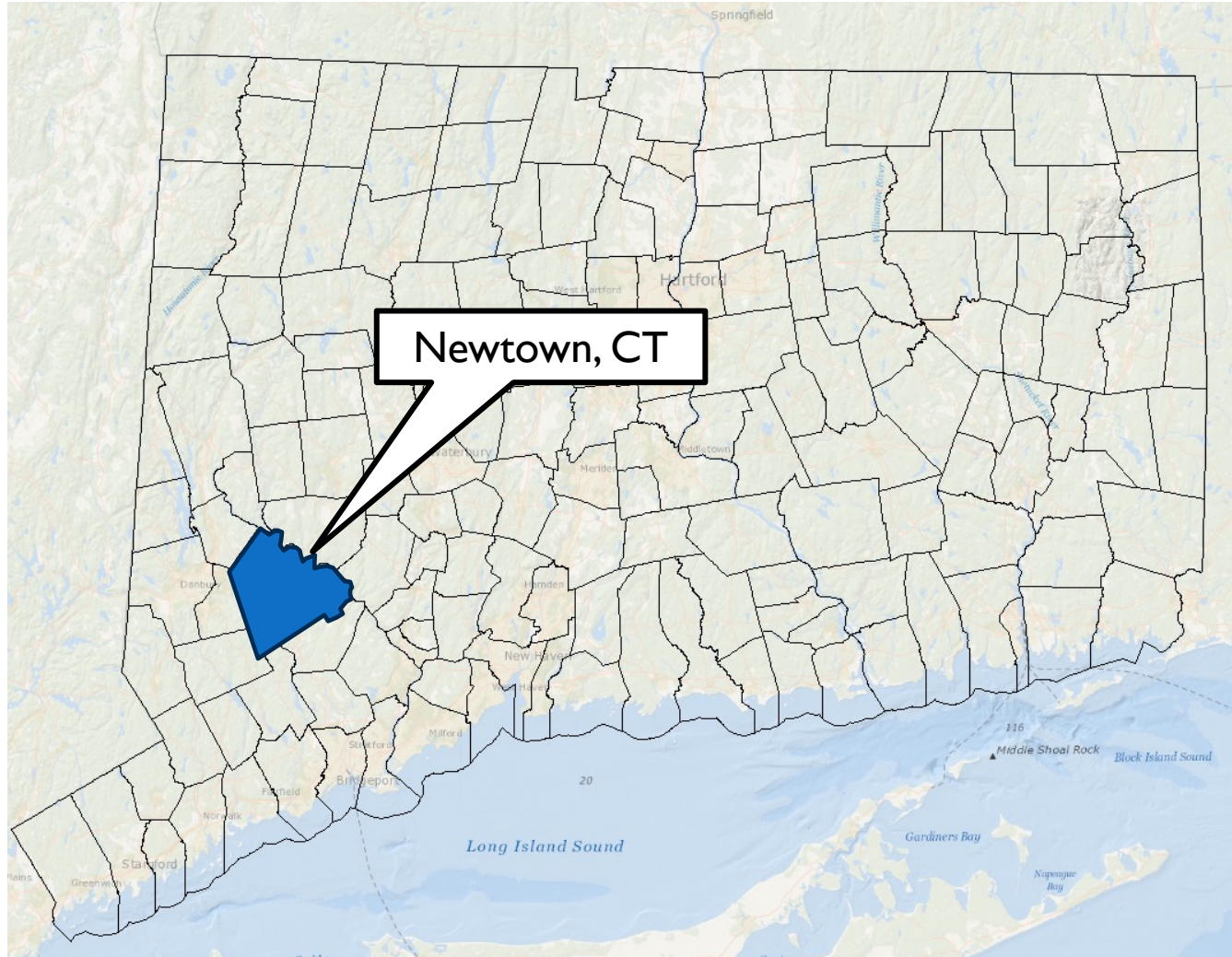
FUSS & O’NEILL

AGENDA

- Project Background
- Engineering, Procurement, and Construction Management (EPCM) Project Delivery Overview
- Equipment Procurement Process and Savings
- Schedule Benefits of EPCM Project Delivery
- Case No. 2
- Lessons Learned
- Summary and Conclusions
- Questions

PROJECT LOCATION

State of Connecticut



PROJECT LOCATION



PROJECT BACKGROUND

■ Existing Pump Station:

- Duplex Submersible Pump Station; Existing Pump Design Capacity 200 GPM; 25 HP
- Existing 6-inch force main; 3,120 feet long
- Precast Concrete Building for Controls
- 80 KW Generator

■ Project Need:

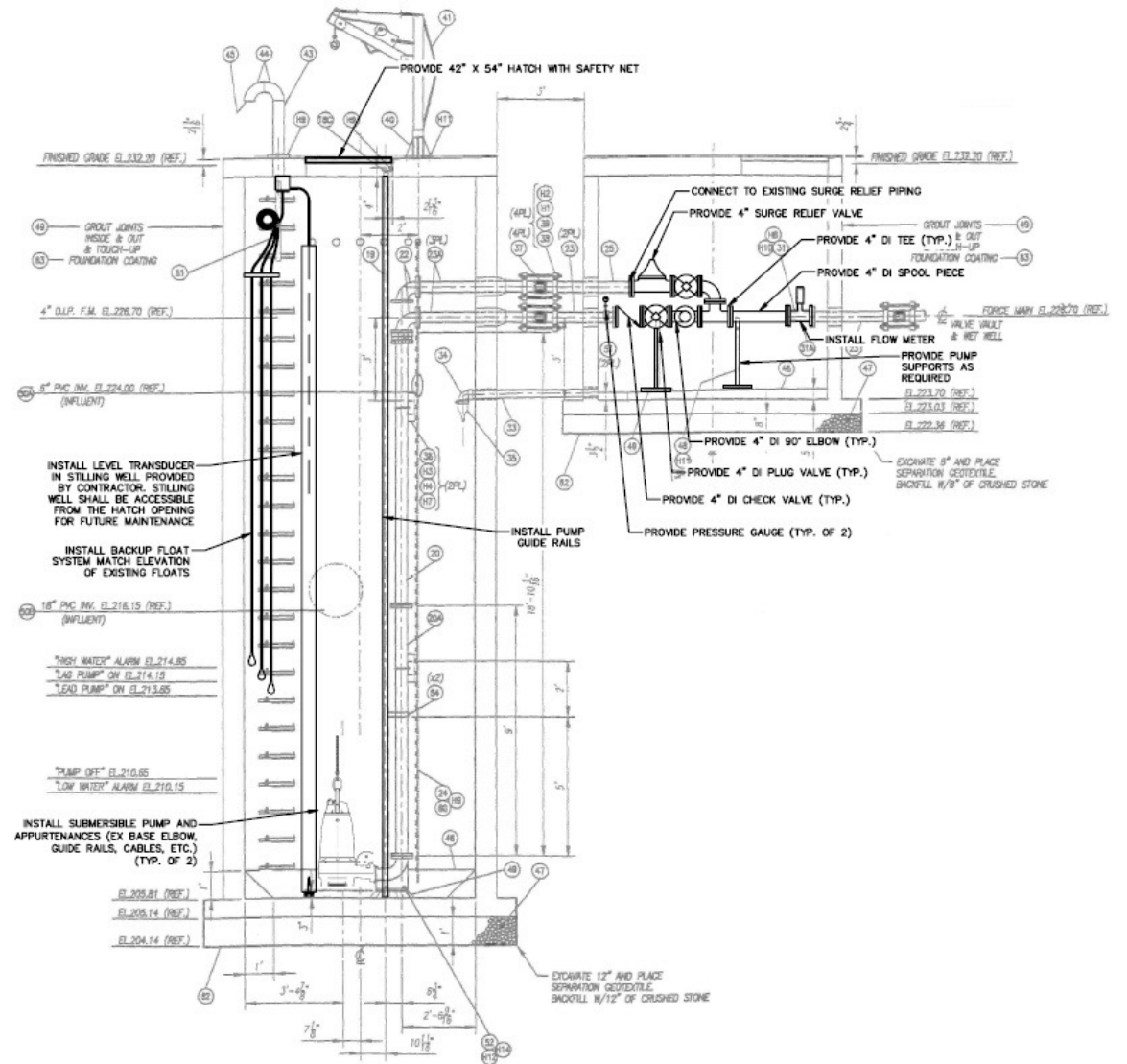
- Two instances where pump station wet well nearly surcharged:
 - *Newtown High School Pool Draining*
 - *Major grease blockage in collection system*
- Additional development planned surrounding pump station
- Increase Pump Station Pumping Capacity



Pump Station Valve Vault

PROPOSED PROJECT

- Proposed Improvements:
 - Provide new submersible pump (75 HP) and controls
 - Provide new wet well hatch and safety grate
 - Provide new exterior mounted generator in sound attenuating enclosure (350 KW)
 - Provide new piping, valves and flow meter in wet well and valve vault
 - Provide permanent bypass connection

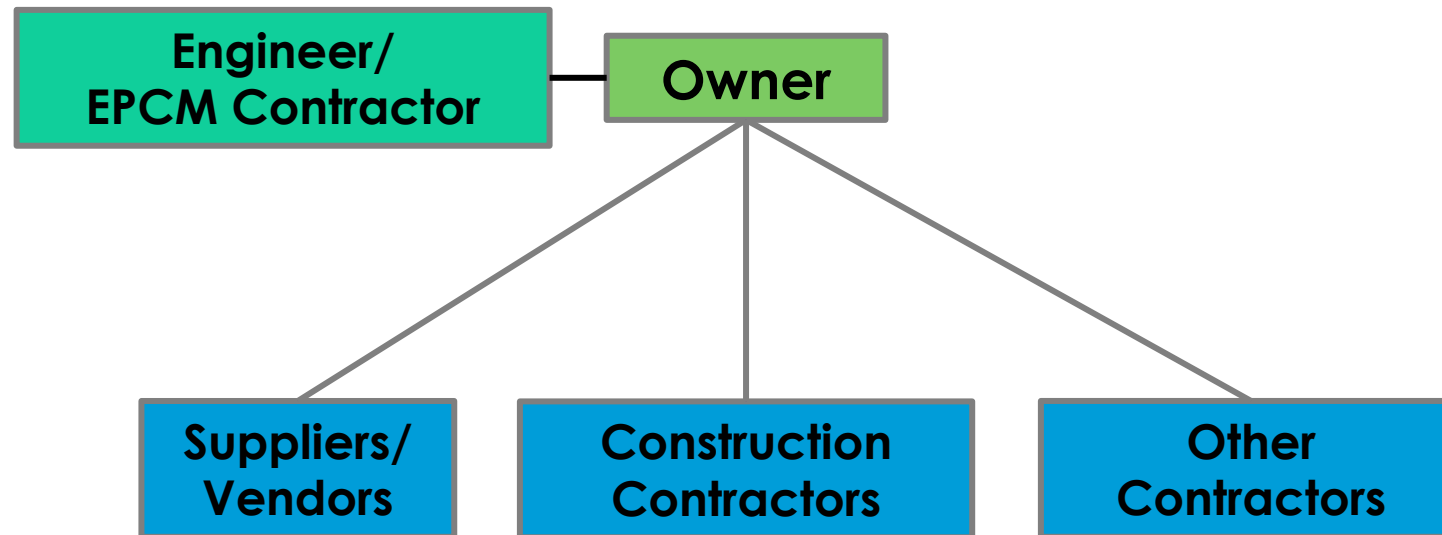


SUPPLY CHAIN ISSUES

- Project evaluation performed early 2020. Design commenced shortly thereafter
- Supply chain issues started during COVID-19 amid a “perfect storm” of causes including shifts in demand, labor shortages, and structural factors
- Upon conclusion of evaluation phase, project approach pivoted from Design-Bid-Build Project Delivery to Engineering, Procurement, Construction Management (EPCM) Project Delivery

PROJECT APPROACH

- Implement an Engineering, Procurement, Construction Management (EPCM) Project Delivery
- Engineer serves as liaison between Owner, Suppliers/Vendors, Construction Contractor and other Contractors



EPCM SERVICES

- Engineering / Design:
 - Engineer performs the 'basic' Front End Engineering and Design work
- Procurement:
 - Engineer advises the Owner of the optimum procurement strategy
 - Engineer assists Owner / acts as Owner's Agent in implementing the procurement strategy
- Construction Management:
 - The Engineer performs the coordination, supervision and management of the construction activities being performed by the various construction contractors...Clerk of the Works...

EPCM ADVANTAGES

- Owner is closely engaged with project
- Greater control over project budget
- Direct purchase of equipment avoids General Contractor markup
- Shorten the overall construction schedule



EPCM CHALLENGES

- Require heavy involvement from Owner
- Logistical challenges in terms of coordinating equipment delivery and startup/training
- May not be allowed with public funding agencies (SRF, USDA, etc.)



EQUIPMENT PROCUREMENT

- Develop separate performance-based specifications and equipment packages to procure equipment directly
- Work closely with suppliers/vendors
- Subsequent to bid opening, evaluate equipment submittals
- Furnish recommendation to Town
- Advantages:
 - Avoid General Contractor markup
 - Shorten overall construction schedule

EQUIPMENT PROCUREMENT SAVINGS

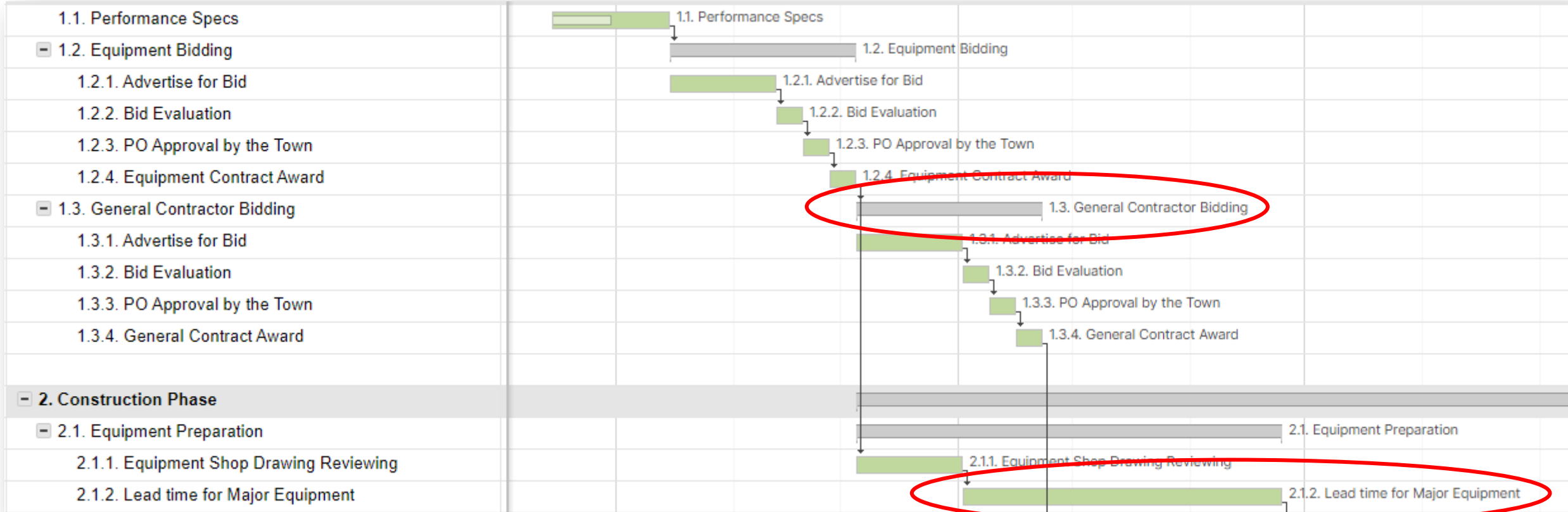
Sandy Hook Pump Station Upgrade

Equipment Type	Total Cost
Two (2) Submersible Pumps and Associated Controls	\$164,750
350 KW Generator and Automatic Transfer Switch	\$50,000
Flow Meter	\$6,000

- Total Cost = \$220,750
- Assume 15% savings by avoiding GC markup = \$33,112.50

SCHEDULE IMPLICATIONS

Shorten overall schedule – Multiple Tasks ongoing co-currently!



OTHER CASE STUDY

PLAINFIELD, CT



Village Plant – Design Flow = 0.71 MGD



North Plant – Design Flow = 1.09 MGD



■ Two Treatment Plants

- Aging Equipment
- New CT DEEP regulations regarding Nitrogen and Phosphorus

■ Background

- Consolidate treatment plants
- \$45 Million (2010 Dollars)
- Economically struggling community
- F&O worked with Town to develop \$5.5 Million program (Needs vs. Wants)

PLAINFIELD, CT – VILLAGE TREATMENT PLANT



1. Headworks
2. Aeration Tanks
3. Secondary Clarifiers
4. Disinfection Facility
5. Rapid Infiltration Sand Beds
6. Receiving Water (*Mill Brook*)
7. Gravity Thickeners

VILLAGE PLANT UPGRADES

- Install fine screen at main pump station/headworks
- Create anaerobic zone in each aeration tank
- Installed fine bubble diffusers



New Influent Fine Screening



New Biological System On Line

VILLAGE PLANT UPGRADES (CONTINUED)

- Replaced surface aerator with hyperbolic mixer
- Provided new blowers for aeration system
- Provided new control panel to operate mixers and blowers
- Upgrade chemical systems for phosphorus coagulant, pH adjustment, and polymer addition.



New Blowers for Aeration System



New Anoxic Mixers

NORTH PLANT UPGRADES

- Install fine screen at headworks
- Create anaerobic zone in each aeration tank
- New blowers for aeration system



New Anaerobic Zone



New Blowers and Aeration Piping

NORTH PLANT UPGRADES (CONTINUED)

- Replace existing mechanical aeration equipment with hyperbolic mechanical aerators and diffused air
- Upgrade chemical systems for phosphorus coagulant, pH adjustment, and polymer addition.
- Rehab chlorine contact tank



New Diffused Aeration

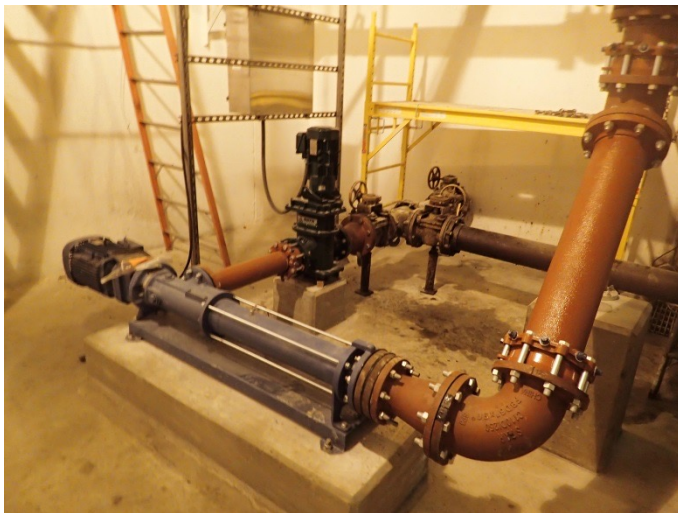


Rehab Chlorine Contact Tank

NORTH PLANT UPGRADES (CONTINUED)



New Centrifuge



New Sludge Feed Pump and Grinder

- Centrifuge Dewatering Project
 - *New inline grinder*
 - *New sludge feed pump*
 - *New centrifuge*
 - *New shaft less conveyor*
 - *New Polymer System*

EQUIPMENT PROCUREMENT SAVINGS

Plainfield Village Plant Upgrade

Equipment Type	Number of Units	Unit Cost	Total Cost
Mechanical Screen	1	\$88,480	\$88,480
Anaerobic Mixer	2	\$24,850	\$49,700
Anoxic Mixer	2	\$38,000	\$76,000
Blower Package with VFD	3	\$43,840	\$131,520
Fine Bubble Diffuser	1	\$21,200	\$21,200

- Total Cost = \$366,900
- Assume 15% savings by avoiding GC markup = \$55,035

EQUIPMENT PROCUREMENT SAVINGS

Plainfield North Plant Upgrade

Equipment Type	Number of Units	Unit Cost	Total Cost
Anaerobic Mixer	2	\$20,900	\$41,800
Anoxic Mixer	4	\$24,200	\$96,800
Blower Package with VFD	3	\$41,100	\$123,300
Fine Bubble Diffuser	1	\$34,500	\$34,500

- Total Cost = \$296,400
- Assume 15% savings by avoiding GC markup = \$44,460

EQUIPMENT PROCUREMENT SAVINGS

Plainfield North Plant Centrifuge Dewatering Project

Equipment Type	Number of Units
Centrifuge	1
Inline Grinder	1
Sludge Feed Pump	1
Polymer Feed System	1
Shaft less Screw Conveyor	1

- Lump Sum Bid: Total Cost = \$318,200
- Assume 15% savings by avoiding GC markup = \$47,730
- Total savings between three projects approximately \$150,000

CONTRACTOR PREQUALIFICATION PROCESS

FUSS & O'NEILL, INC.
20110383.V14

PLAINFIELD WPCF VILLAGE PLANT UPGRADE
PLAINFIELD, CT

SECTION 00 45 13 - BIDDER PRE-QUALIFICATIONS - GENERAL CONTRACTING

General Contractor

SUMMARY OF WORK

The Work is to have a general contractor furnish civil/site work; demolition/disposal of existing equipment and structure; concrete repair and construction; FRP baffle wall and weir installation; guard rail installation; aeration air piping/valves, and equipment (mixers, blowers with VFDs, fine bubble diffuser system) installation at the Plainfield Village wastewater treatment plant. In addition, the General Contractor shall provide storage and handlings of the equipment purchased by the Town of Plainfield, and provide coordination and assistance in electrical installation and system integration (control system installation). The General Contractor will be responsible for coordination of all trades and vendors .

BIDDER INFORMATION

Bidder's Name: _____

Contact Information: _____

Year Business was Established: _____

How Many Years of Experiences in Similar Project/Areas: _____

Trade Experience

Please note if work was self-performed or subcontracted. Answer "Yes" or "No", and indicate years of experiences

- Excavation and Sitework: _____
- Concrete Demolition and Disposal: _____
- Cast-In-Place Concrete: _____
- Aeration Blower Installation: _____
- Submersible Mixer and Deck-Mounted Mixer Installation: _____
- Fine Bubble Diffuser System Installation: _____
- Aeration Air Piping Installation: _____
- Water/Wastewater Piping Installation: _____
- FRP Baffle Wall Installation: _____
- Mechanical Work: _____

BIDDER PRE-QUALIFICATIONS

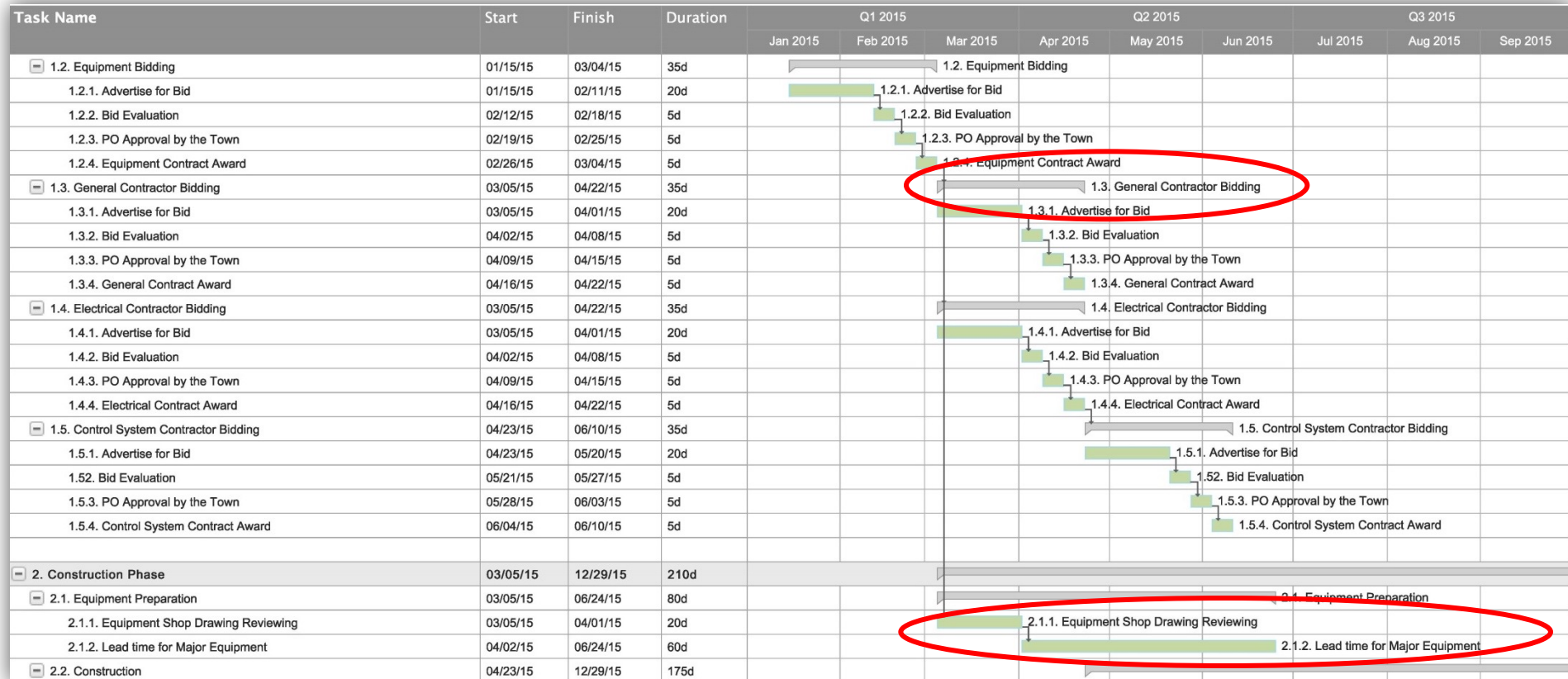
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- Develop Contractor Prequalification packages and circulate to prospective bidders
- Prequalification packages developed for each discipline:
 - General Contractor
 - Electrical Contractor
 - System Integrator
- Contractors prequalified based on experience with design/build projects

CONTRACTOR PREQUALIFICATION PROCESS

Multiple tasks ongoing concurrently:



PROJECT BUDGET MANAGEMENT

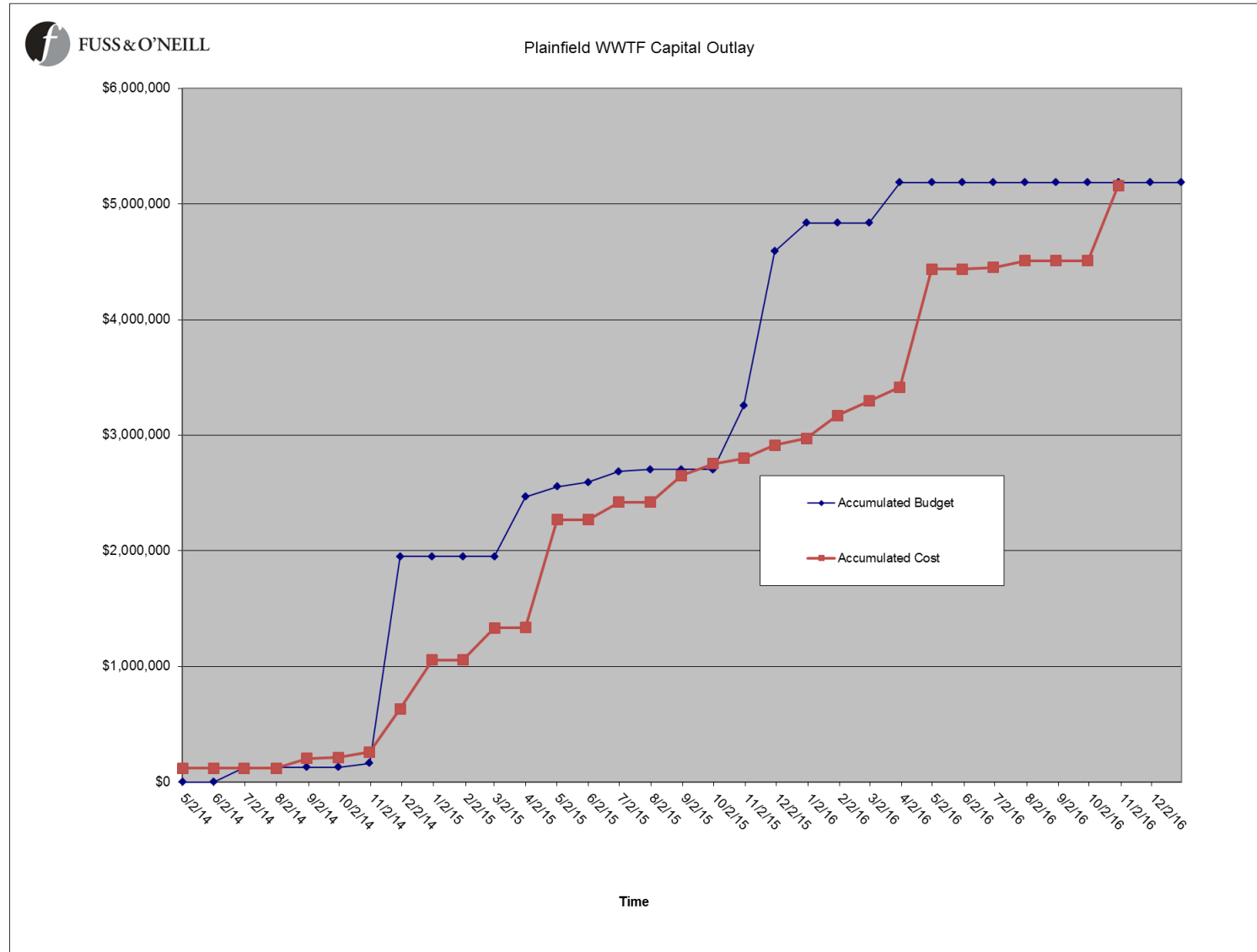
- Able to monitor against total appropriation
- Able to prioritize upgrades/needs
- Advance project as needed within funding limits.

Design Phase	Construction Phase
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High Priority Projects

		May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14
Village Plant	Mechanical Screen								\$88,480
	Screen Building (Headworks Construction)					\$83,000			
	Phosphorus Removal Upgrade (GC)						\$9,600	\$28,609	
	Nitrogen Removal Upgrade (Electrical)			\$120,100					
	Replace Secondary Clarifier (CANCELLED)								
	Disinfection System Upgrade							\$27,500	\$155,200
	Dosing Tank Demo (Incl. w/ Disinfection Upgrade)								
	Sand Filter Upgrade (CANCELLED)								
	Misc. (Integrator)								
North Plant	Mechanical Screen							\$208,700	
	Phosphorus Removal Upgrade (GC)								
	Nitrogen Removal Upgrade (Electrical)								
	Upgrade (Integrator)								
	Secondary Clarifier (CANCELLED)								
	Disinfection System Upgrade								
	RAS Pump Upgrade								
	Centrifuge Dewatering Upgrade								
	Misc. and Direct Purchases and Repairs								
Year of 2014:									\$721,189

CAPITAL OUTLAY



LESSONS LEARNED

- Use tight language in developing Equipment and Contractor Performance Specification
- Be specific when detailing responsibilities for equipment startup and training
- Clearly detail logistics for equipment delivery and storage



SUMMARY AND CONCLUSIONS

- EPCM is an effective project delivery approach
- Not intended for all projects
- Need to take into account the following:
 - By taking on more responsibility, Owner takes on more risk.
 - Level of skill and resources the client is able to commit to the project
 - Level of control the Client wants over the project

QUESTIONS



THANK YOU!



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