



**2017
NEWEA Annual Conference**

**Case Study in Engineering, Procurement and Construction
Management as an Alternative Project Delivery Method**

Presented by:
Jeffrey McDonald, PE
Douglas Brisee, PE

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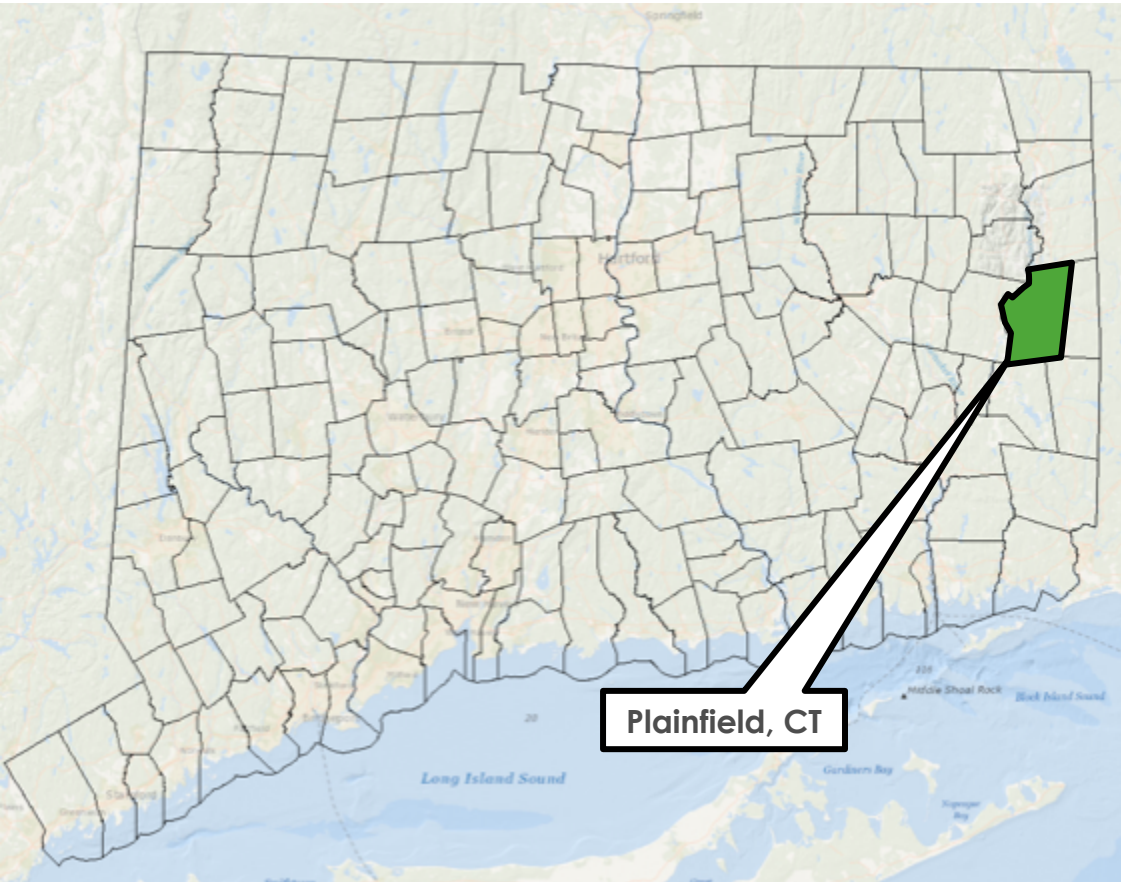
Presentation Outline

- **Project Background**
 - Village Wastewater Treatment Plant
 - North Wastewater Treatment Plant
- **Engineering, Procurement, and Construction Management (EPCM) Project Delivery Overview**
- **Equipment Procurement Process**
- **Equipment Procurement Savings**
- **Contractor Prequalification Process**
- **Lessons Learned**
- **Summary and Conclusions**
- **Questions**

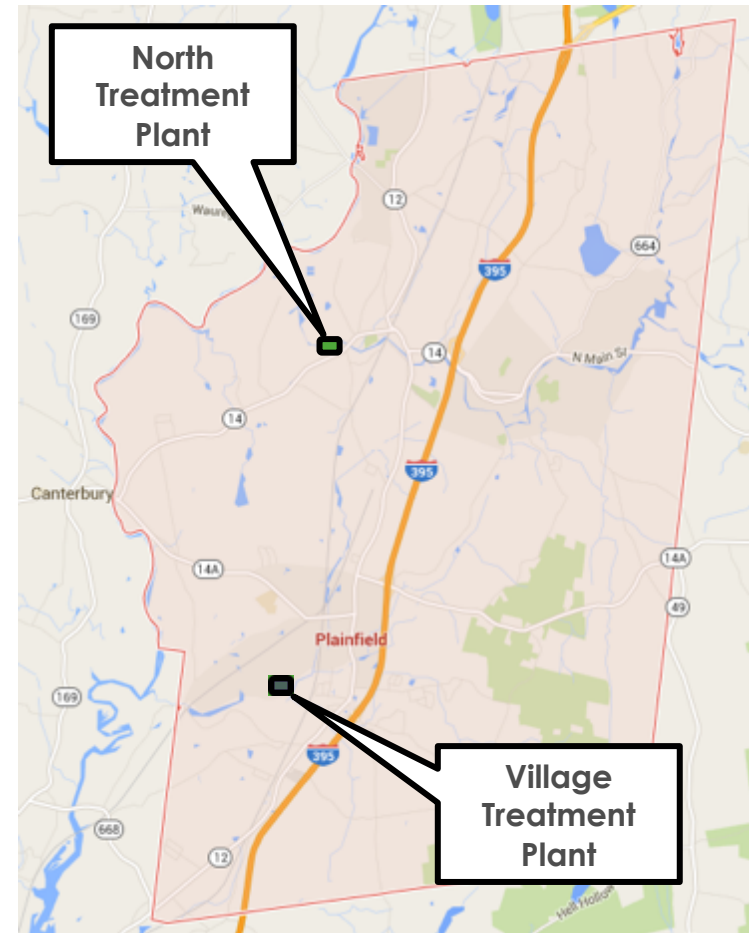
Project Background

Project Location

State of Connecticut



Town of Plainfield



Rehabilitation of Wastewater Treatment Facilities



Village Plant – Design Flow = 0.707 MGD



North Plant – Design Flow = 1.086 MGD

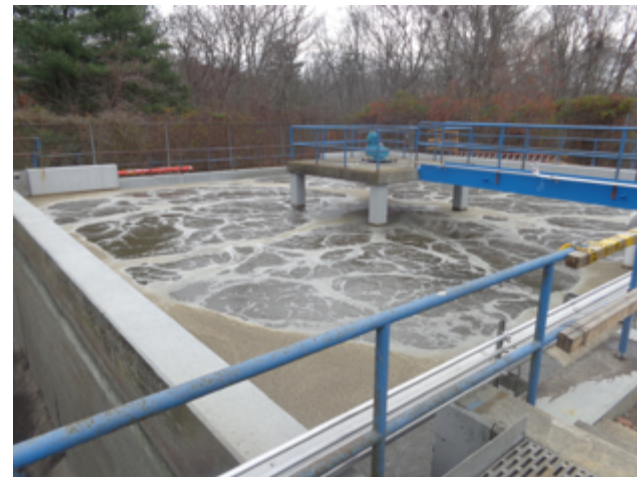
- **Two Plants**
 - Aging Equipment
 - New CTDEEP regulations regarding Nitrogen, Phosphorus & Metals
- **Costly To Replace**
 - \$5.5 Million vs. \$45 Million
- **Project Goals**
 - Compliance for Phosphorus Limits (0.43 mg/l)
 - Nitrogen goals (6 mg/l)
 - Modernize aging equipment
 - Maintain existing infrastructure

Village Plant Proposed Upgrades

- Upgrade existing extended aeration facility to include cyclical aeration process.
 - Install fine screen at main pump station/headworks
 - Create anaerobic zone in each aeration tank
 - Replace mechanical aeration equipment with hyperbolic mechanical aerators and diffused air
 - Upgrade chemical systems for phosphorus coagulant, pH adjustment, and polymer addition.



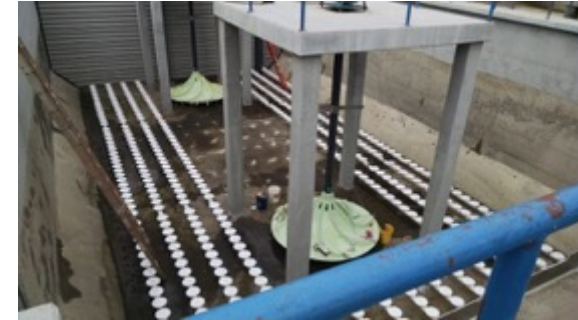
New Diffused Aeration



New Biological System On Line

North Plant Proposed Upgrades

- **Upgrade existing conventional activated sludge facility to include cyclical aeration and chemical phosphorus removal**
 - Install fine screen at headworks
 - Create anaerobic zone in each aeration tank
 - 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

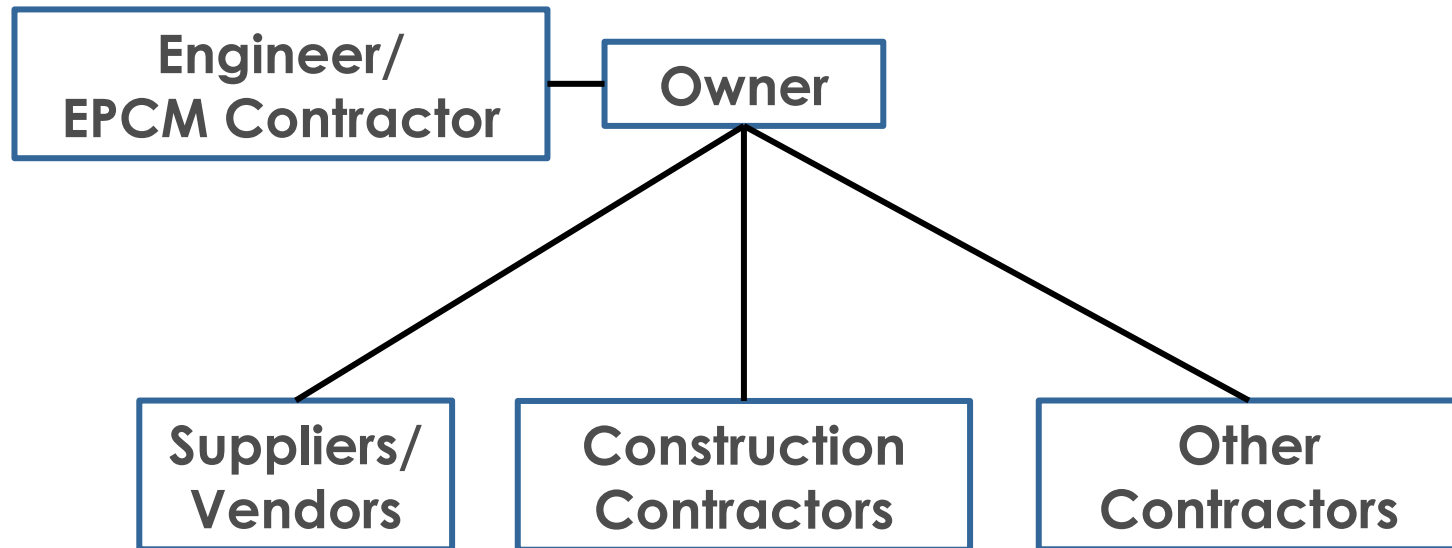


**Chlorine Contact Tank
Rehabilitation**

Project Approach

Project Approach

- Implement Engineering, Procurement, Construction Management (EPCM) Project Delivery
- Engineer serves as liaison between Owner and 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...

(Ref: Loots and Henchie)

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**



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

Plainfield Village Plant

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

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**
- **Total savings between two plants approximately \$100,000**

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

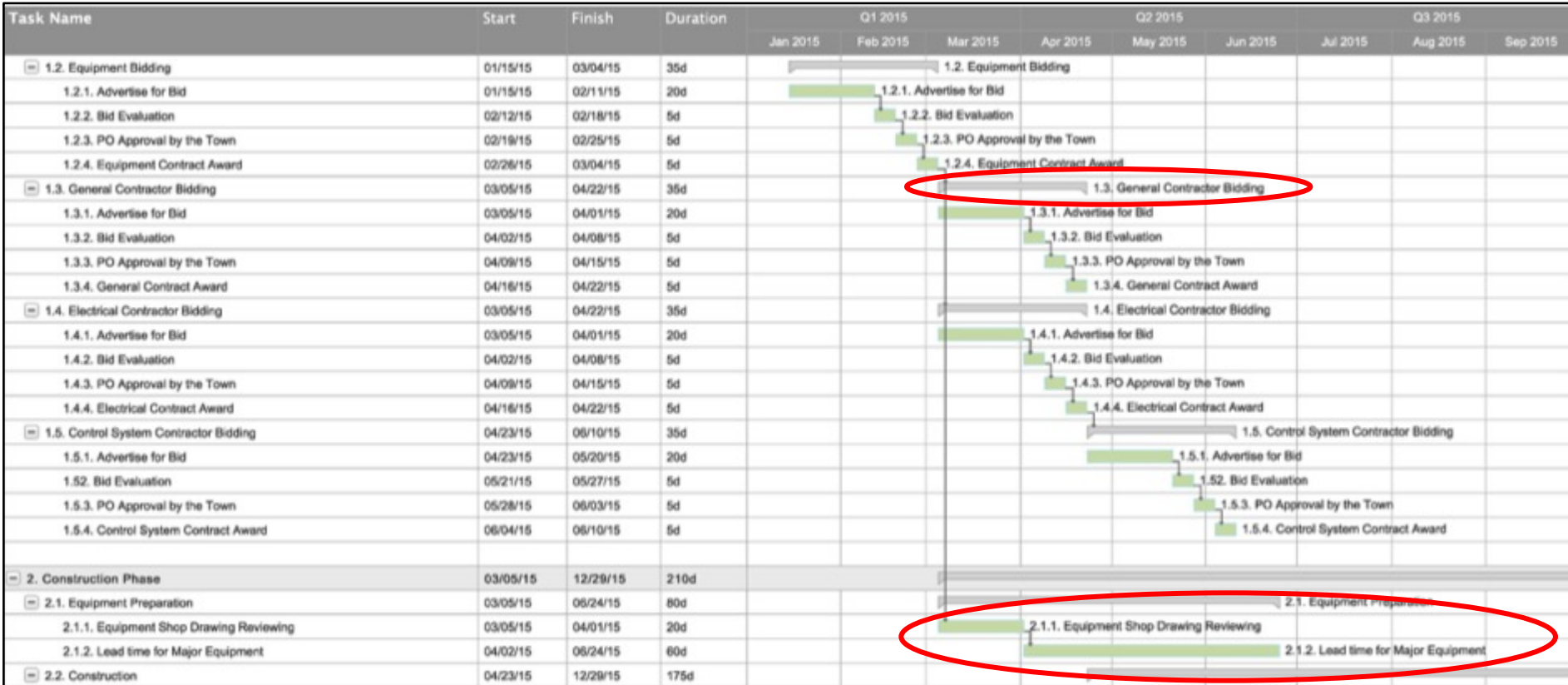
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- **Develop Contractor Prequalification packages and circulate to prospective bidders**
- **Prequalification packages developed for each discipline:**
 - **General Contractor**
 - **Electrical Contractor**
 - **System Integrator**
- **Contractors prequalified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

Contractor Prequalification Process

- Multiple tasks ongoing concurrently:

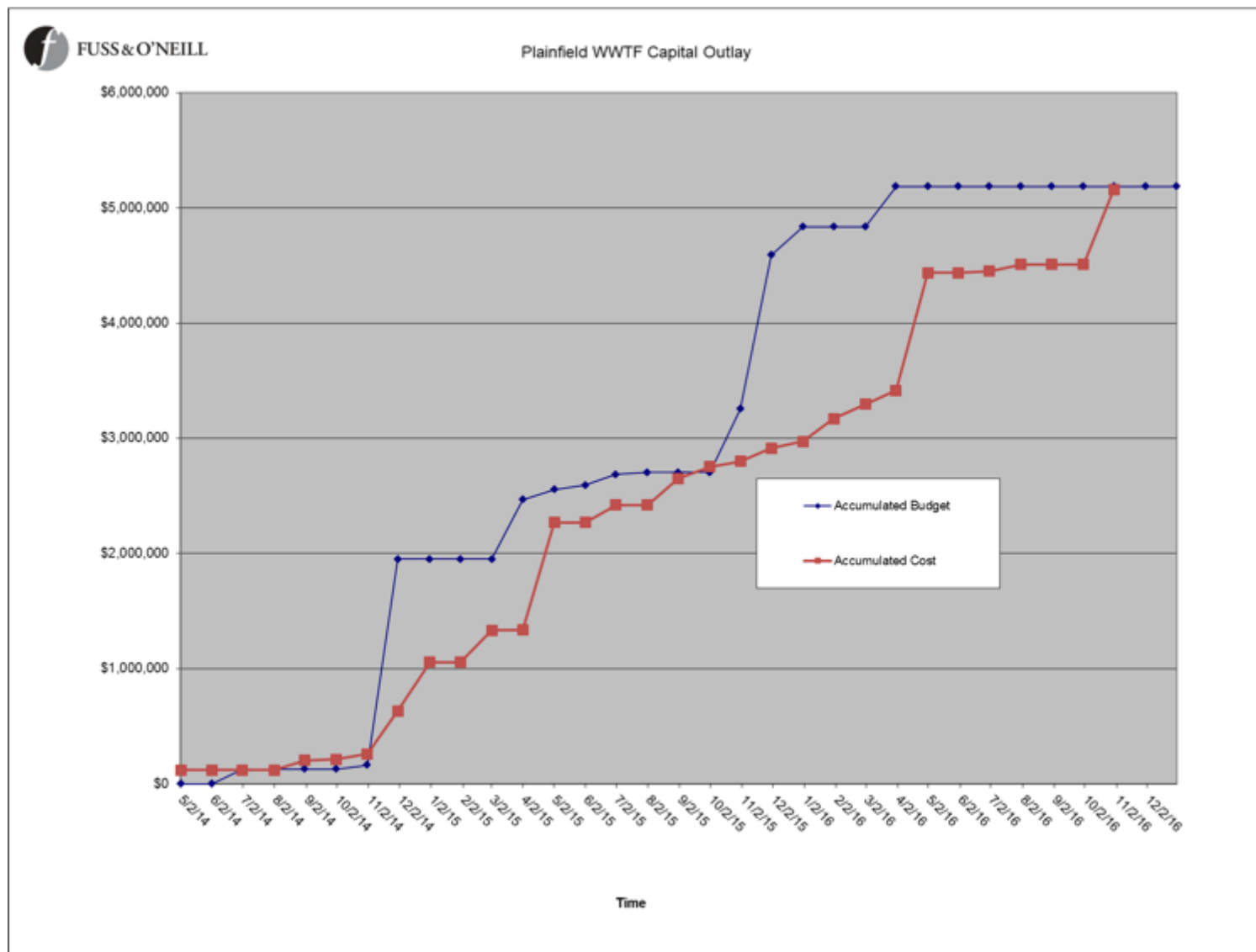


Project Budget Management

- Able to monitor project budget closely
- Able to prioritize upgrades/needs
- Advance project as needed within budgetary constraints

		Design Phase				Construction Phase			
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:**
 - **Degree of risk aversion of the client**
 - **Level of skill and resources the client is able to commit to the project**
 - **Level of control the Client wants over the project**

Questions



Contact Information

Jeffrey McDonald, P.E.

JMcDonald@fando.com

Douglas Brisee, P.E.

dbrisee@fando.com

Fuss & O'Neill, Inc.

146 Hartford Road

Manchester, CT 06040

(800) 286-2469 x5273

www.fando.com