→ **Mark L. Pickering, P.E.**
Senior Project Manager

Owner's Advisor (OA)

Advantages and Case Study

Welcome

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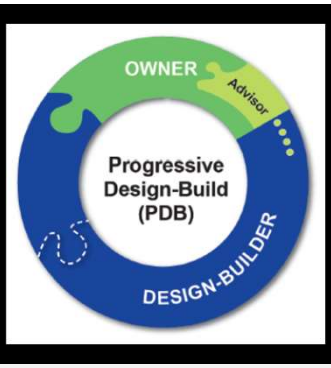
Agenda



- Collaborative Delivery
- OA Roles
- When to Consider OA
- Benefits
- Qualifications
- Case Study – PSU WRF

"The role of the OA for collaborative delivery projects holds a unique position relative to traditional engineering and program management scopes of services. An OA is focused on the strategy, tactics, and implementation of a successful collaborative delivery project." -WCDA

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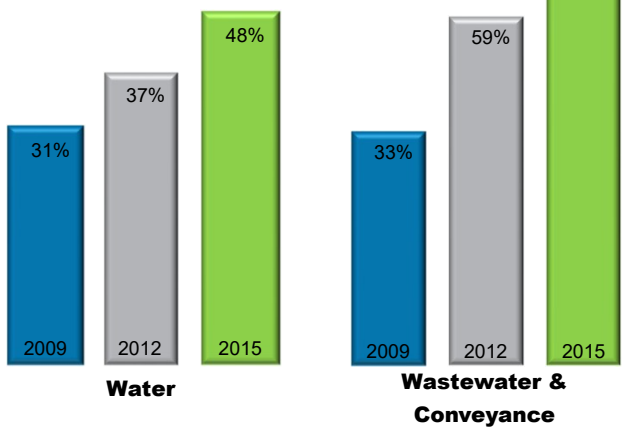
What is Collaborative Delivery

- Collaborative effort
- Design to be built – not bid
- Opportunity to realize and share savings



About 47% of Construction $$ 2022-2026

Alternate Project Delivery

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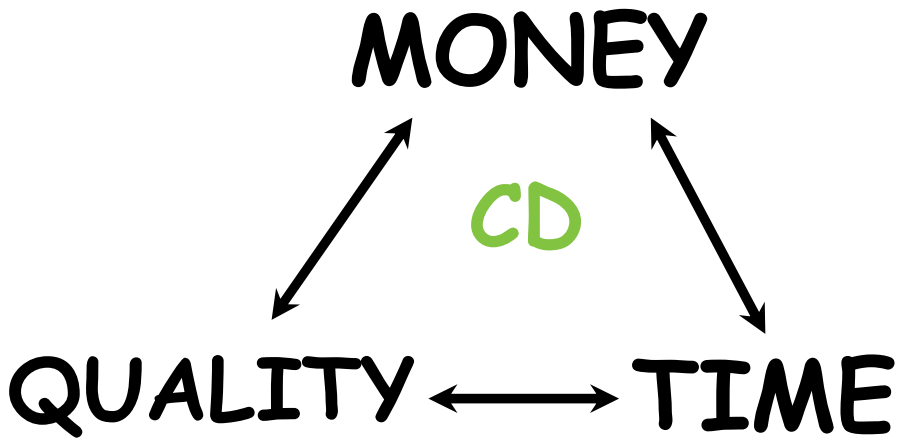
Why collaborative delivery?



Alternate Project Delivery

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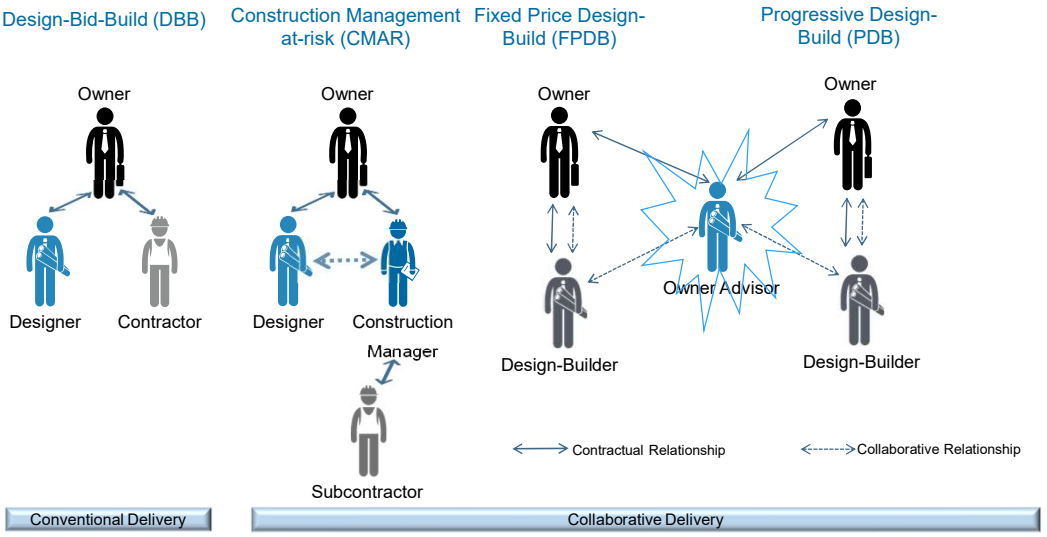
Where is the best OA fit?



Alternate Project Delivery

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Owners Advisor Roles

Feasibility and Planning
- Funding Approach and Project Budget
- Project Definition and Permitting Needs
- Selecting Collaborative Delivery Team

Technical Services
- Specialty Technical Expertise
- Conceptual/Preliminary Design
- Detailed Design Criteria
- Collaborative Design and Constructability Review
- Opinion of Cost

Procurement and Implementation
- Bid Documents
- Bid evaluation and procurement assistance
- Key submittals review and RPR services
- Commissioning

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When to Consider an Owner's Advisor

- limited collaborative delivery experience
- limited internal resources
- limited procurement and technical expertise
- significant size
- significant complexity
- complex funding/regulatory requirements
- budget constraints
- construction oversight
- startup and commissioning assistance

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Benefits of having OA

- Design and Treatment Performance
- Administrative/Permit Performance
- Delivery Performance (Construction)
- Operational Performance
- Life Cycle Performance

Checks and Balances

- Schedule Deadlines and Milestones
- Interpretation of Performance Guarantee
- LDs OR Incentives
- Progress Payments for Milestones
- Nonconforming Work

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OA Qualifications

- OA is not the engineer of record
- Experienced in Collaborative Delivery
- Technical Expertise
- Construction Experience
- Risk Management
- Startup and Operations
- State/Local Statutes and Agencies

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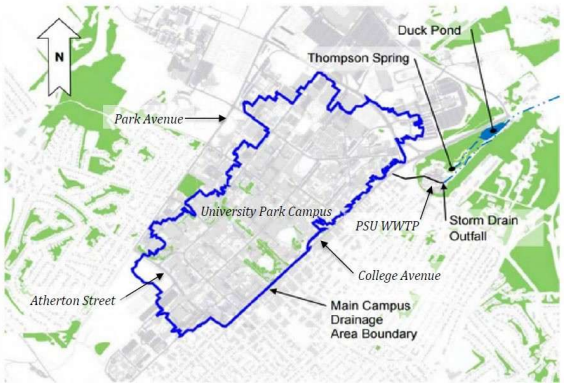
OA Case Study
PSU University Park WRF



Serves all University Park

- Site treatment beginning in 1913
- Majority of processes constructed in 1950's and 1960's
- Past Average treatment of 1.6 MGD
- Living Filter Recharge

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Improved infrastructure

Structural Deficiencies

50-year treatment horizon

All upgrades to improve safety to employees and students

Treatment Limitations

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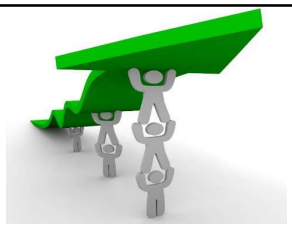
WRF Upgrade Program



- June 2010 Process Evaluation Report
- August 2015 Basis of Design Report
- Budget of $46 million
- Design Capacity 2.5 MGD
- Wholly funded by PSU (Private)
- Decision for Alternate Project Delivery (APD) – Design/Build

	MBR	BioMag®	IFAS
Estimated Capital Cost of Alternatives[1]	$21,100,000	$19,500,000	$19,300,000
Estimated Capital Costs of Common Elements[2]	$19,000,000	$19,000,000	$19,000,000
Engineering, Administration, and Legal Costs	$6,200,000	$6,200,000	$6,200,000
ESTIMATED TOTAL PROJECT COST	**$46,300,000**	**$44,700,000**	**$44,500,000**

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PSU "third party" scope*

Extension of owner representation for:

1. Value Engineering
   a. Site facility report
   b. Technology selection
   c. Act 537 Plan
2. Design Document Reviews and Review Meetings
3. Cost estimate review at 30%, 60%, 90%
4. Achieve program goals of reliability, consistency, level of detail, scope inclusion, and market comparison
5. Review GMP with specific feedback on contract details and outstanding items

*Selection of GHD was through competitive process

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PSU WRF at 30% Design

30% Design and Value Engineering

- Build size and peak factors
- Equipment redundancy and risk
- Need for PTF Building
- Type of MBR
- Disinfection and UW
- Accessibility and safety

– Third party pricing comparison

– Direct and indirect costs Estimates qualified to vary 10-15% on average

– Estimated construction period 36-40 months

– Cost review within margin of error

30% Design Level Budget	
Revised 30% Design Estimate	$64,466,293
Engineer's Opinion of Probable Cost	$53,920,000
Low End Estimate (-10%)	$48,528,000
High End Estimate (+20%)	$64,704,000

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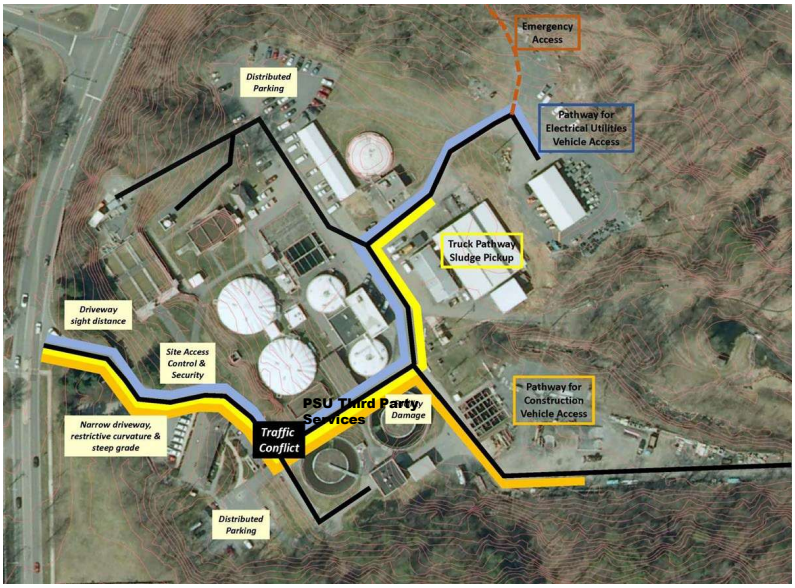
Site accessibility was key consideration

Ingress/Egress for:

Construction

Operations

Staff and Students



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VE Review

	Accepted 30% Value Engineering
($2,100,000)	Eliminate UV Disinfection Facility
($1,300,000)	Reduction of Construction Schedule by 6 Months - related to removal of UV Facility scope
($500,000)	Reduction of On Site Staffing
($150,000)	Exterior stair at PTF building
($250,000)	Split Face Block in Lieu of Brick Veneer - PTF
($190,000)	Split Face Block in Lieu of Brick Veneer - MBR
($250,000)	Reduce size of pipe gallery - MBR
($150,000)	Blowers on exterior pad
($80,000)	Shelf spare permeate and drain pumps
($770,000)	Eliminate Separate Thickner Facility
($560,000)	Allow 480V Pumps at Effluent Pump Station
($6,300,000)	

Ref.	Description
300 – Biological Reactor Basins (BRB) and Membrane Bioreactor (MBR) Structure	
300.1	Eliminate swing zone
300.2	Eliminate pipe gallery (no step feed)
300.3	Remove the enclosed stairs
300.4	Blowers moved to outside pad
300.5	Remove superstructure over MBR tanks
300.6	Removal of backpulse tank
300.7	Eliminate spare permeate pump for shelf spare
300.8	Use butterfly valves for permeate lines
300.9	Eliminate spare MBR drain pump for shelf spare

Ref.	Description
400 – UV Disinfection	
400.1	Eliminate UV Disinfection facility
400.2	Move UV facility to BRB/MBR facility and have only one channel
400.3	Provide NPW supply from effluent PS force main
400.4	Enlarge footprint and reduce excavation

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PSU WRF at 60%

60% Design

- VE recap/additional VE
- Cost estimate and scope
- Risk register review
- Procurement Method(bid GC packages)

30% Design Level Budget	
Revised 30% Design Estimate	$64,466,293
Net VE Deducts	$- 6,300,000
Total With VE Deducts	$58,166,293
Planning Budget	$46,300,000

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PSU Risk Register

Contingency Items

- Subcontracts
- Liability
- Liquidated Damages
- Design Items
- Permitting
- Construction

Updated through GMP

HASKELL — Date: 05/11/18 — Job #: 6703660 — Name: University Park WWTP

No.	Risk Issue	Potential Cause	Exposure	Mitigation	Mitigation $ Allocation	Cost of Mitigation	Remaining Exposure (less Mitigation)	Contingency %	Contingency $
B. Design									
B.1	Construction Management Administration through GMP	Personnel costs not included in Pre-Con Change Orders	$350,000	Tracking Costs that could be lost if the project is cancelled	None included in direct costs.	$0	$350,000	100%	$350,000
B.2	Lacking information from Geotech Report	Not enough borings to properly locate rock strata	$0	Clarification in GMP summary		$0	$0	0%	$0
B.3	Missing scope sitework	Design is only 60%	$2,800,000	Assign contingency accordingly for design completion percentage	$0	$0	$2,800,000	15%	$420,000
B.4	Missing scope Electrical	Design is only 60%	$1,740,000	Assign contingency accordingly for design completion percentage	$0	$0	$1,740,000	20%	$348,000
B.5	Missing scope HVAC	E-finity Distributed Generation This product should be considered at the WWTP project. It can use natural gas or biogas to generate electricity, and the waste heat can be used to supplement the WWTP processes as well as run a absorber to cool the admin building.	$320,000	Assign contingency accordingly for design completion percentage	$0	$0	$320,000	25%	$80,000
B.6	Missing scope Plumbing	Currently no design, only fixtures have been shown	$64,000	Assign contingency accordingly for design completion percentage	$0	$0	$64,000	75%	$48,000
	Missing Fire Protection	Currently no design, only fixtures have been shown, fire pump?	$100,000	Assign contingency accordingly for design completion percentage	$0	$0	$100,000	100%	$100,000

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PSU Early procurement

MBRs

- Competitive procurement
- Selected Hollow Fiber MBR

Thickener

- In Primary Digester Control Bldg.

Employee Trailers

- Temporary Relocation

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OA 90% Design quality check

All Disciplines

Recorded Responses

Backcheck of High Risk Items

GHD Design Review Document Comment Tracker

Document Under Review:	*PSU 90% Design Uploaded 9/12/18*				As of:	*9/24/2018*
Design Comment #	Discipline	Page or Process Area	Made By	GHD COMMENT	DISPOSITION	Made By
MP-018	Mech/ Process	PTF	J.Kostelac	Yard piping associated with odor control (drains, NPW, etc.) should be shown on the piping plan.	Corrected	J Hartwig
MP-019	Mech/ Elect/ I&C	PTF	J.Kostelac	There appears to be some disagreement in the number of BRB and MBR blowers provided between the M drawings, I drawings, E drawings and Evoqua package.	This is not the PTF. Coordination has been completed for the BRB and MBR blowers with Evoqua	J Hartwig
MP-020	Mech/Process	M150 & M151	J.Kostelac	Why not combine all three modified EQ tanks to one EQ tank? Per 30% review, the total converted EQ tank capacity is only 0.45 mgd. It may not be necessary to keep them as separate tanks with multiple inlets and outlets as well as multiple level control systems.	Separate tanks are provided for flexibility and reduce effort for cleaning	J Hartwig
MP-021	Mech/Process	M152	J.Kostelac	The three 12" slide gates and piping are new and they should be shown with heavy lines.	Corrected	J Hartwig
MP-022	Mech/Process	M152	J.Kostelac	Are these slide gates necessary?	Yes to provide tank isolation	J Hartwig
MP-023	Mech/Process	M152	J.Kostelac	How to keep solids in suspension?	Not necessary based on an approved previous decision	J Hartwig
MP-024	Mech/Process	M152	J.Kostelac	How are the EQ Return Pumps controlled?	Magnetic flow meter and control valve	J Hartwig
MP-025	Mech/Process	M153	J.Kostelac	Why only fill half of all the existing sludge hoppers with concrete fill? They all should be filled.	Corrected. Both are being filled	J Hartwig
MP-026	Mech/Process	M300	J.Kostelac	Update M300 to match other mechanical drawings (e.g., pumping equipment in the MBR building shown on DWG M300 is not consistent with those shown on DWGs M310 and M319)	Drawings are updated to finalize the design	D. Baar
MP-027	Mech/Process	M300	J.Kostelac	Remove air ducts and roofing shown above Electrical Room on DWGs M300 and M302 for better view.	Drawings are updated to finalize the design	D. Baar

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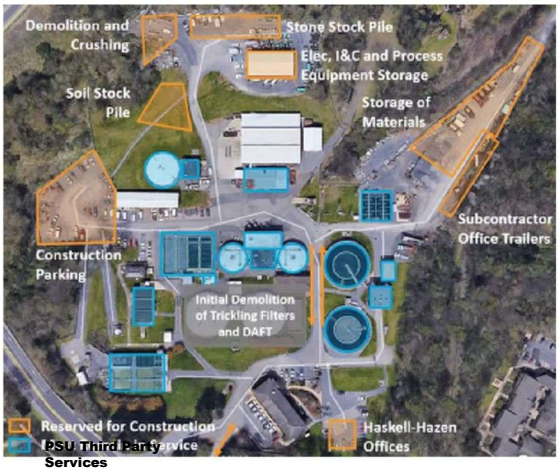
PSU GMP 1 Review

- Started November 2018
- 2 Contracts for Demolition, Temporary/Bypass, New Connections
  - Site Utilities – Process
  - Electrical Utilities
- D/B Nonconstruction Costs
- Market Procurement of Contracts
- Critical Bypassing during PSU Winter Break
- Ongoing demolition phase



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PSU Bid packages

25 Separate Packages
Advertised on PSU OPP Site
Managed by D/B Team
Bidders Descope
Comparison to 90% Estimate
Recommendation to PSU

Some packages received no bids

Third Party Team asked to assist Packages 5 and 15

Stages 3, 4 & 5 WRF Upgrades

Haskell General Conditions
Bid Package 02.3 - Landscaping & Grassing
Bid Package 02.4 -Fencing
Bid Package 02.5 - Site Utilities
Bid Package 02.6 - Earthwork
Bid Package 02.7 - Paving
Bid Package 03.0 - Concrete
Bid Package 03.4 - Post Tension Concrete Tank
Bid Package 04.0 - Masonry
Bid Package 05.0 - Metals ***Haskel Bidding***
Bid Package 07.0 - Metal Roofing and Wall Panels
Bid Package 08.0 - Doors and Windows
Bid Package 08.1 - Overhead Coiling Doors
Bid Package 08.2 - Admin Bldg COMPLETE
Bid Package 09.0 - Painting & Coatings
Bid Package 09.1 - Building Finishes (PTF & MBR)
Bid Package 10.0 - Specialties
Bid Package 11.0 - Process Equipment
Bid Package 12.0 - Laboratory
Bid Package 14.0 - Cranes & Hoists
Bid Package 15.0 - Process Piping***Haskell Bidding***
Bid Package 15.1 - Plumbing
Bid Package 15.2 - HVAC
Bid Package 15.3 - Fire Protection
Bid Package 16.0 - Electrical
Bid Package 17.0 - I&C

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OA Bid Package Review

GMP and Procurement

- Phases 1 and 2 GMP
- Construction value market pricing
- Bid Package Evaluation

Bidder	Form of Proposal	Bid Guarantee	Receipt of Addenda	General Acknowledgments	Staffing Plan	DBE Utilization Form	Public Works Employment Verification	Prequalified by Haskell
The Haskell Company	Yes	No	Yes	Yes	No	No	No	Yes
GM McCrossin	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes

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PSU WRF

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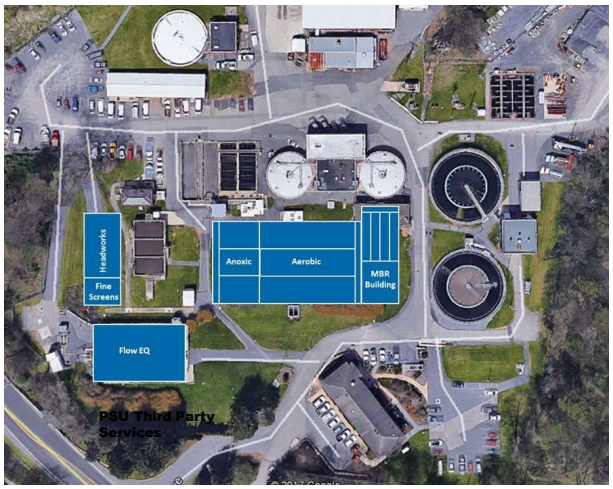
PSU's use of an Owner Advisor

- Helped Manage and Mitigate Risks to PSU and Project team; identified solutions & strategy to mitigate
- Provided technical knowledge, contracts review, construction scope and pricing to meet PSU's project performance objectives
- Team was mindful of schedule, budget & quality objectives



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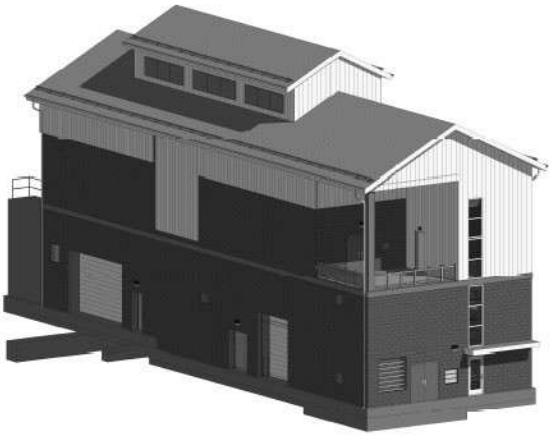
PSU's use of an Owner Advisor

- Quick, creative and decisive decision- making process to PSU
- Co-locating key team members with the Owner at meetings
- Deep bench of contracts, technical, construction, and commissioning staff
- Excellent Communication / Transparency with D/B and PSU



NORTH-WEST AXONOMETRIC

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Benefits of having OA

- Experienced in Collaborative Delivery
- Technical Expertise
- Construction Experience
- Risk Management
- Startup and Operations
- State and Local Statutes

- Design and Treatment Performance
- Administrative/Permit Performance
- Delivery Performance (Construction)
- Operational Performance
- Life Cycle Performance

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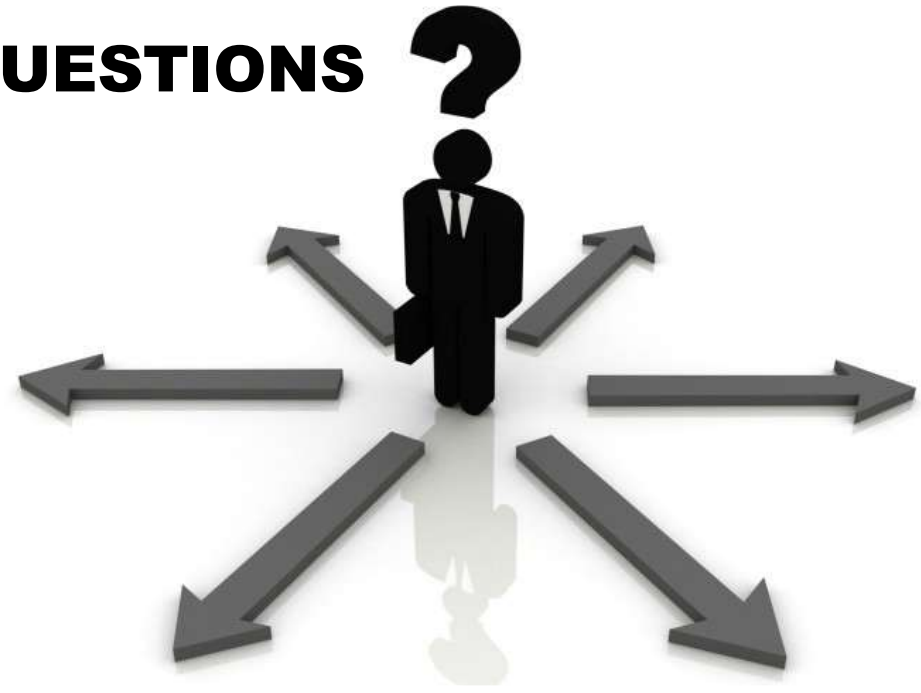
QUESTIONS



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