Design to Budget Approach – ENR Project at Indian Head, Maryland

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Presentation Outline

- Project Background
- DB Design-to-Budget Selection Process
- Constructed Improvements
- Operational Performance to Date
- Storm Water Requirements
- LEED Certification of Control/Laboratory Building
- Design – Build Process – Lessons Learned
- Conclusions
Project Background

• Location: NAVFAC Indian Head, MD

• Drivers / Challenges:
  • Existing facility built in 1960’s for 30:30 – required complete replacement
  • ADF = 0.5 mgd / Peak flow = 2.5 mgd
  • Industrial on-base customers
  • Chesapeake Bay Initiative – 4 mg/L TN and 0.3 mg/L TP
  • LEED Silver required for Lab/Control Bldg
  • MDE storm water requirements
  • Extremely tight site – 3 acre site in valley
  • Very Prescriptive RFP
Project Background (cont.)
Project Background (cont.)
Design to Budget Selection Process

• Phase 1 – Quals Based Selection (Oct. 2008)
  • Factor 1 – Relevant Experience - Design Team
  • Factor 2 – Relevant Experience - Construction Team
  • Factor 3 – Design & Construction Team Relationship
  • Factor 4 – Construction Safety
  • Factor 5 – Subcontracting History with SB/SDB/etc.
  • Past Performance Questionnaires from Factor 1 and 2 References

• Haskell / BC shortlisted with two other firms (Nov. 2008)
• Shortlisted Firms scheduled for Site Visit / Pre-Bid Meeting (12/8/2008) and given RFP
Design to Budget Selection Process (cont)

- Phase 2 – Quals/$$ Based Selection (Jan. 2009)
  - 8 weeks to respond
    - Factor 5b – Subcontracting Plan
      - Required over 76% of subcontracting efforts to be to SBEs
      - Minimum requirements for each type of SBE
      - More credit given if goals exceeded
    - Factor 6 – Design Concept
    - Factor 7 – Construction Schedule
  - Price – Design to Budget of $12,492,000
  - Total of Factors 1-7, Past Performance and Price were considered equal in importance
Prescriptive RFP / No Assignment of Risk = QUANDARY

- Do you respond exactly as described in RFP? Even if something is wrong?
- Do you deviate from RFP and be judged non-responsive?

Middle ground selected – deviate if:
- Cost savings help meet budget $ 
  - Construct on piles rather than bury tank 
- Deviation deemed value added 
  - Inexpensive nice to haves added
**Constructed Improvements**

- Diversion Box to existing EQ Tank
  - Controls high flows
  - Controls high load events
- Headworks
  - Screening
  - Grit removal
- Influent Pump Station
- Two Sequencing Batch Reactors
  - Continuous Inflow
  - Anoxic / Aerobic cycle for denitrification
  - Regular, Storm and Superstorm modes
 Constructed Improvements (cont.)

- Six Upflow Denitrification Filters
  - Continuous Backwash
  - Chemscan for chemical dosing
  - In-line rapid mixer for chemical mixing

- Closed Vessel UV Disinfection Units
  - Complete redundancy – 2.5 mgd/unit
  - LPHO
  - Self-cleaning

- Post Aeration Tank
  - Removable coarse bubble diffusers
  - Effluent flow measurement – V-notch weir
Chemical Feed Systems
- Micro-C for SBRs
- Sodium Acetate for filters
- Ferric Chloride
- Sodium Hydroxide

ABs Converted to Aerobic Digesters
- Replaced coarse bubble diffusers
- Provided air control
- Added decanting ability and reused gravity thickener

Control / Laboratory Building
Operational Performance – Start Up

- 50,000 Gallons of RAS was trucked in from local ENR WWTP
- Effluent from new WWTP pumped into old WWTP
- WWTP was meeting 30:30 limits immediately
  - BOD and TSS <5 mg/L
  - Ammonia < 0.5 mg/L
- One week after startup – existing WWTP turned off
Plant Effluent Total Nitrogen & Components
July 2011 - July 2012
Plant Effluent Total Phosphorus & Components
July 2011 - July 2012

mg/EFFLUENT

Tot P LIMIT  Ortho-P  Total P
Storm Water Requirements

• Storm Drain Channel through site
• MDE Redevelopment Criteria
  • No storm water detention ponds
  • Must have net reduction in impervious area / storm water runoff
  • Demolished unused facilities
  • Open tanks considered “treatment”
  • Porous pavers used for parking lot
  • Minimize site disturbance to less than 1 acre to avoid Storm Water NPDES
  • Contractor storage at remote gravel lot near site
**LEED Certification Process**

- Control/Lab Building was only structure eligible – occupancy requirements
- Identification of POSSIBLE credits during proposal
- Design upgrades to ensure maximum possible credits
- Manage construction process to ensure maximum possible credits
- Fill out LEED Certification sheets – confirm credits and certification
Points were received in following areas:

- Sustainable Sites = 8 points
- Water Efficiency = 4 points
- Energy and Atmosphere = 4 points
- Materials and Resources = 6 points
- Indoor Environ. Quality = 10 points
- Innovation & Design = 4 points
- Total = 36 points = SILVER LEED
LEED Certification Process (cont.)

- Landscaping that required no irrigation, porous pavement, and low flow fixtures (decrease use by 37%)
- 20% of building materials contained recycled content
- 85% of construction waste was diverted from landfills
- Project utilized low VOC paints, coatings, adhesives, and sealants.
- UV disinfection eliminated need for chlorine and sulfur dioxide gas disinfection.
- 45% of building materials extracted, harvested, recovered or manufactured within 500 miles of the project site.
- 99% of the regularly occupied spaces have access to views and day lighting.
• RFP was Design to $12.5 million budget (Positive)
  • Low bidding not encouraged
  • Best “Value” for $$ wins job
  • DB Team had to come up with “creative” spin on concept

• RFP was Very Prescriptive and did not assign risk (Negative)
  • Curtailed creativity to deviate far from 30% design
  • Resulted in 26 modifications and $700k in change orders
Design-Build Process - Design

• DB Team and Navy worked together (Positive)
  • Overcame challenges of 30% design by bridging consultant
  • Split project into 2 phases to facilitate construction while design progressed
  • Completed design / construction ahead of MDE required completion date
Design-Build Process - Construction

• DB Team and Navy worked together (Positive)
  • Modified solids treatment scheme during construction
  • Construction completed on schedule
  • No permit violations
Conclusions – Project a Success

• SBR / Upflow Denite Filters achieving ENR level effluent
• LEED - Silver Certification received for Control / Lab Building
• Storm water credit obtained through compact design
• Overall DB Process was a success

Post Aeration Tank

SBR – Decant Step
QUESTIONS ???