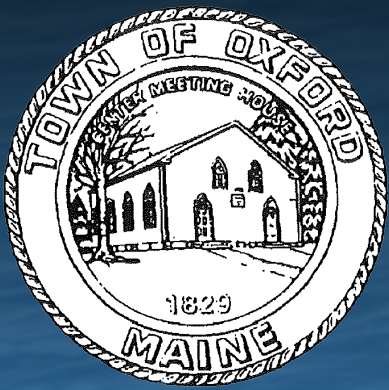


Town of Oxford, Maine

Membrane Treatment Equipment Pre-Procurement
2016 NEWEA Annual Winter Conference

Robert Polys, P.E.

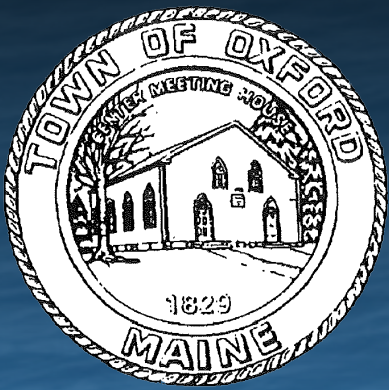




Presentation Overview

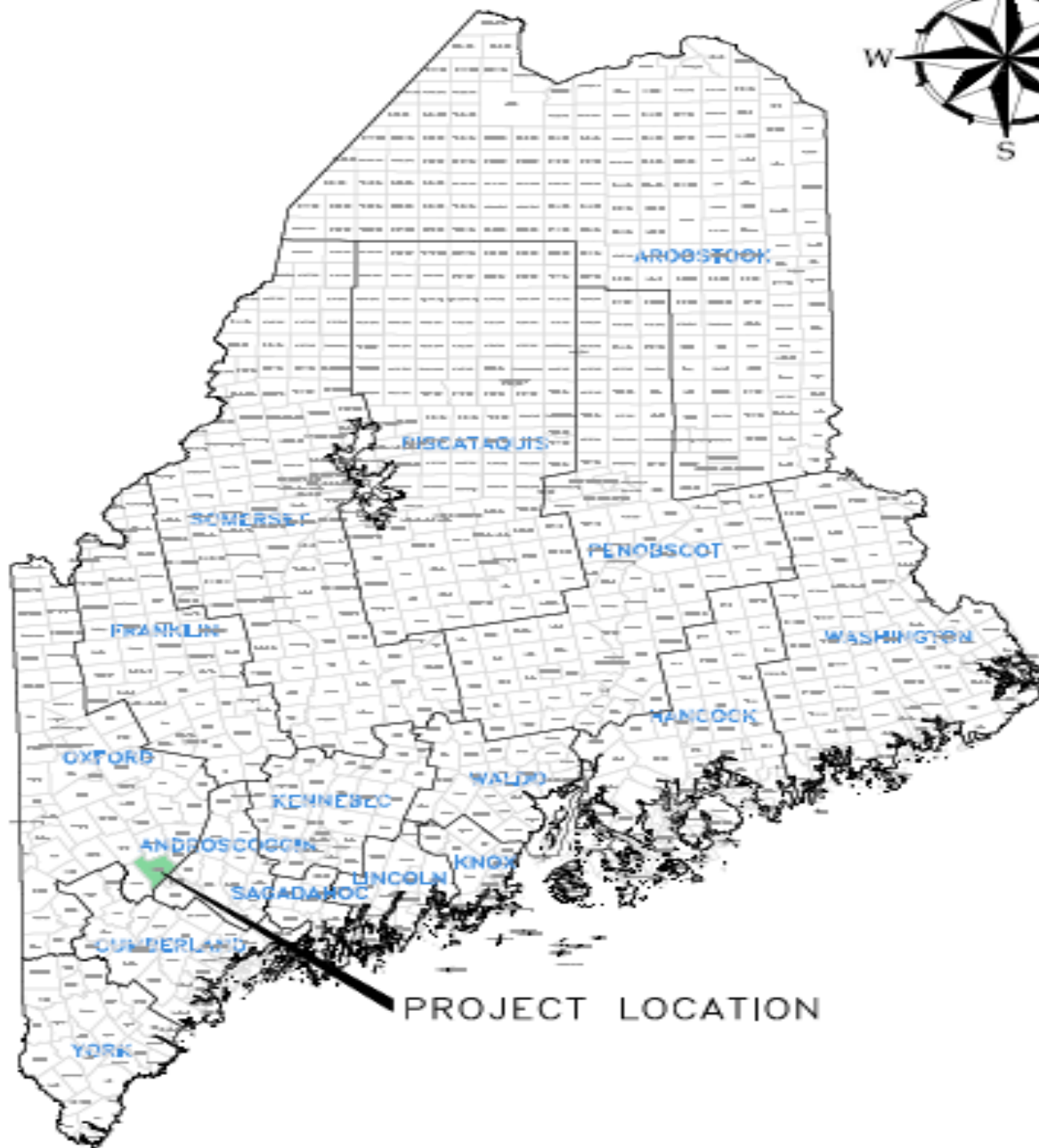
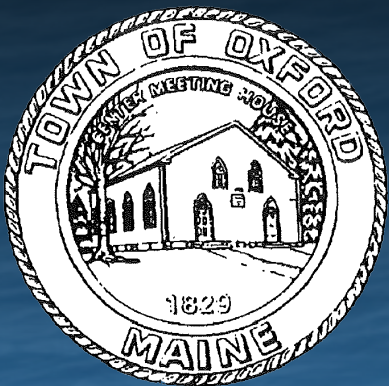
- General Overview - Town of Oxford
- General Overview - Overall Project
- General Overview – Key Background Information
- Walkthrough of Pre-Procurement Contract
- Why We Chose Pre-Procurement
- Lessons Learned
- Notable Successes
- Question & Answers

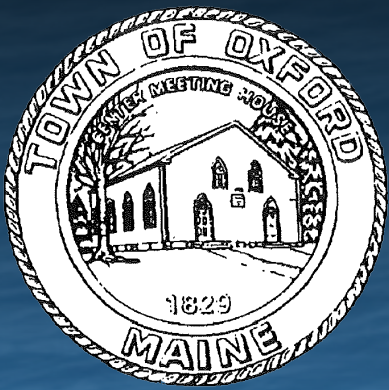




Overview: Town of Oxford, ME

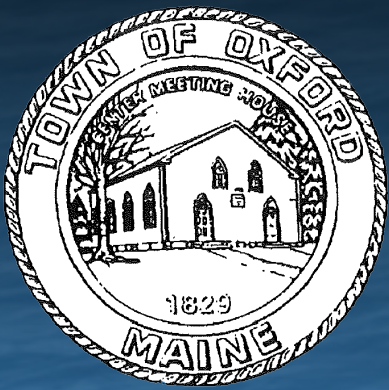
- Located Northwest of Portland, ME
 - Approximately 45 Minutes Drive
 - State Route 26
- Approximately 4,200 Residents
- Government
 - Appointed Town Manager
 - Five Selectman
- Land Area 42 Square Miles





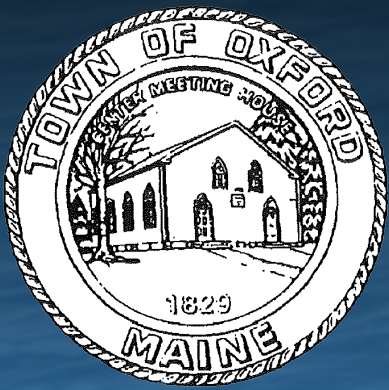
Overall Project Summary

- Pre-Procurement
- New WWTF
- New Sanitary Collection System
 - 9.2 Miles of Gravity Sewer
 - 4.8 Miles of Force Main
 - 7 Collection System Pump Stations
 - 3 Collection System Bridge Crossings
- Total Project Cost: **\$28,500,000**
- Funded By USDA Rural Development
 - 45% Grant & 55% Loan



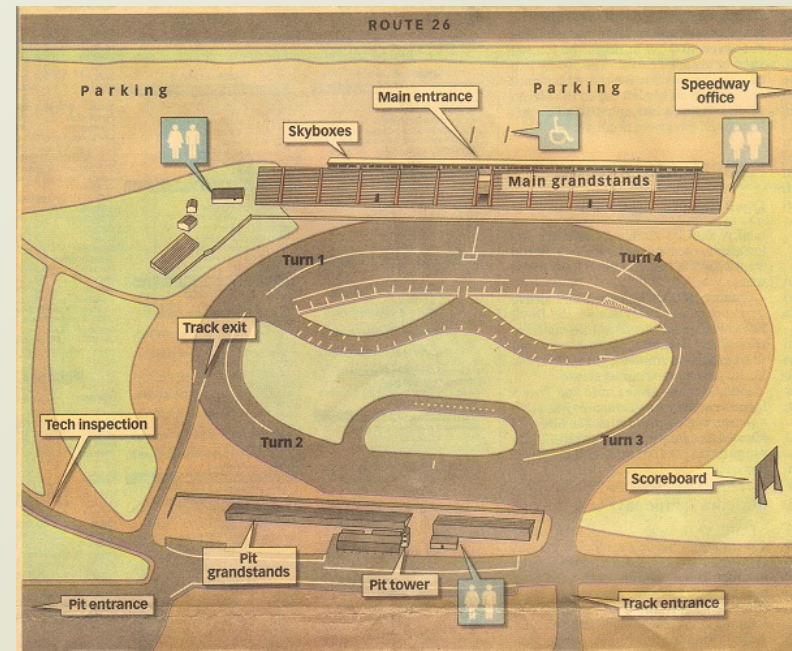
Background Information Summary

- Design ADF = 166,350 gpd
- Design MDF = 499,000 gpd
- Effluent BOD & TSS = 30/30 mg/L
- Effluent TP = 1.1 lbs/day (Future 0.48 mg/L)
- Seasonal Disinfection (May 15th to September 30th)
- Recommended (MBR) Treatment Process
 - First In Maine For Municipal Facility
 - WWTF Land Area of Only 0.67 Acres
- Design Fluxes
 - 10 gal/ft²-day @ ADF
 - 20 gal/ft²-day @ MDF – One Train Offline (Cleaning)
- MLSS Capped at 8,000 mg/L



Unique User Base

- Oxford Casino
- Oxford Plains Speedway
- *New* Hampton Inn
- *New* Dunkin Donuts



Oxford WWTF Site Location



WWTF Site

WWTF Outfall

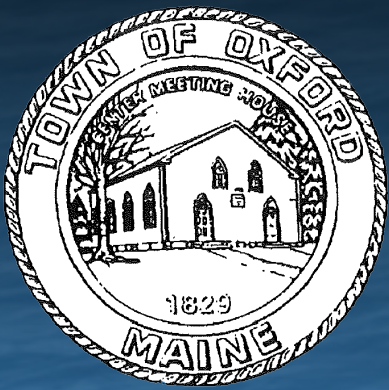
Welchville Dam

Little Androscoggin River

Little Androscoggin River Reservoir

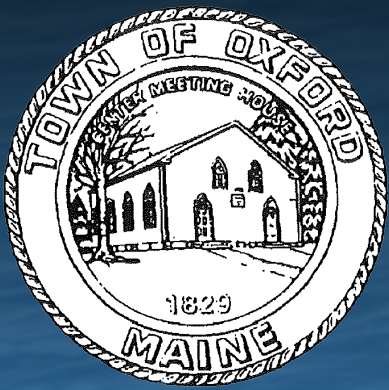
Google

Atlas Fine Jewelry



What Is Pre-Procurement?

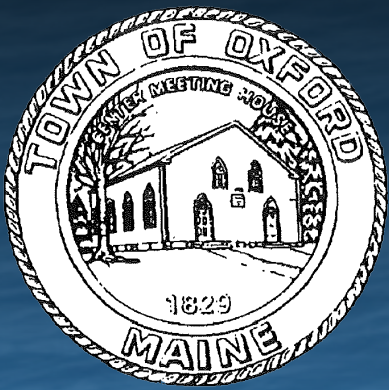
- Purchase Goods & Special Services In Advance
 - Items Normally Purchased By Contractor
- Step #1 = Pre-Procurement & Detailed Design
- Step #2 = Bid & Assignment Of Contract
 - Assignment Of Pre-Procured (Goods & Special Services) To General Contractor
- Step #3 = Build



Structure Pre-Procurement Contract

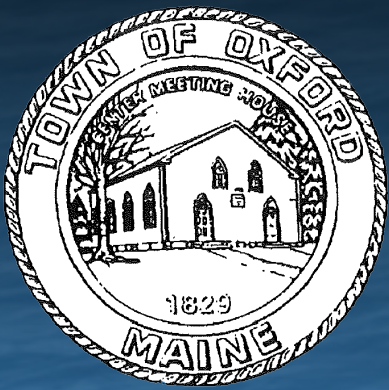
- Goal #1: Fair Evaluation For All Bidders
- Goal #2: Funding Agency Compliance & Acceptance
- Goal #3: Ensure Best Value For Town

Evaluation Criteria Number	Evaluation Criteria	Weight (Points)
1	Total System Cost	20
2	Net Present Value Life Cycle Cost	40
3	System Operability & Reliability	10
4	Warranty	10
5	Technical Support Capabilities	10
6	Experience & Qualifications	10
Total Points		100



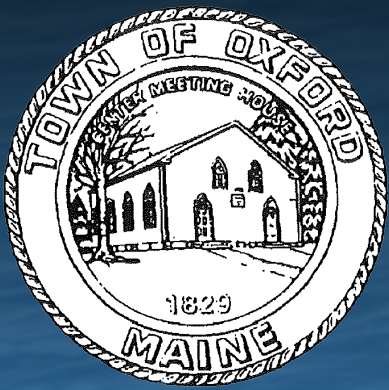
Pre-Procurement Bidding

- Three Bidders
 - Vendor A
 - Vendor B
 - Vendor C
- Many Others Expressed Interest During Bid Period
- Fully Open Public Bid Forum



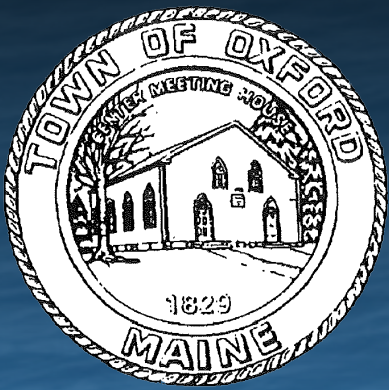
Criteria #1 – Capital Cost

- Cost of Initial Up-Front Equipment Purchase
- Defined Scope & Matching Bid Form
 - Item A: Fine Screening Equipment
 - Item B: Aeration Blowers
 - Item C: Fine Bubble Aeration Equipment
 - Item D: Anoxic Zone Mixers
 - Item E: Membrane Filtration Equipment
 - Item F: Air Scour Blowers
 - Item G: Permeate Pumps
 - Item H: Return Sludge Pumps
 - Item I: Membrane Chemical Cleaning Systems
 - Item J: EQ Aeration Blower
 - Item K: EQ Coarse Bubble Aeration
 - Item L: EQ Transfer Pumps
 - Item M: Instrumentation – MBR System
 - Item N: Integration & Controls – MBR System
 - Item O: Engineering & Drawings
 - Item P: Startup, Testing & Commissioning
 - Item Q: Membrane Equipment Warranty
 - Item R: Process Performance Warranty



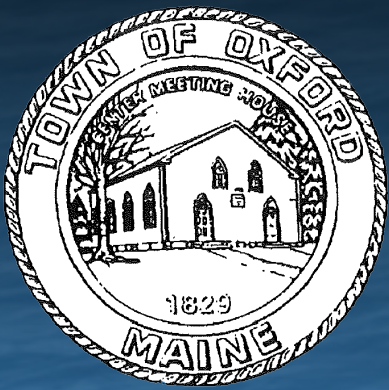
Criteria #1 – Capita Cost Scoring

- Capital Cost Scoring Breakdown
 - Most Cost Effective System: 20 Points
 - Second: 15 Points
 - Third: 10 Points



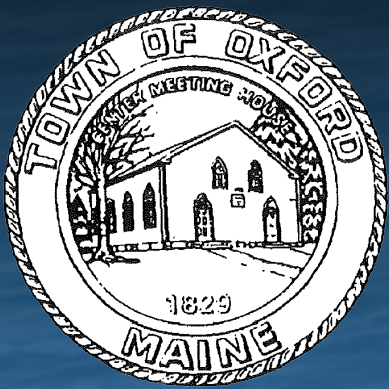
Criteria #1-Bid Results & Scoring

- Initial Capital Cost Bids
 - Vendor A = \$1,208,763
 - Vendor C = \$1,281,950
 - Vendor B = \$1,317,250
- Close Range of Capital Costs
- Final Capital Cost Scoring
 - Vendor A = 20 Points
 - Vendor C = 15 Points
 - Vendor B = 10 Points



Criteria #2 – Total NPV LCC

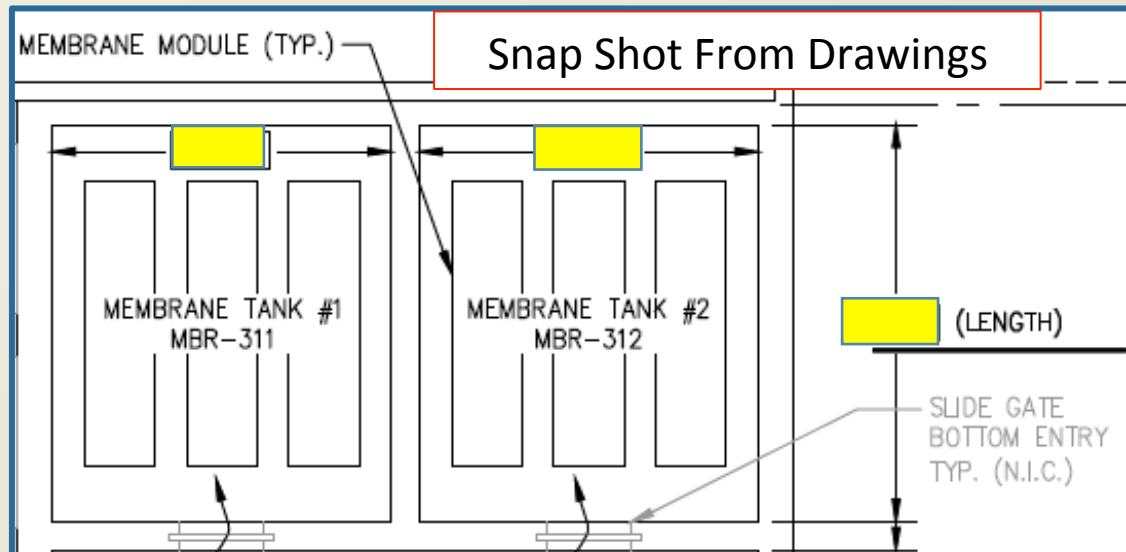
- Bid Evaluation Criteria Forms & Tables
- **The Heart Of The Process**
- Item #1: Preliminary WWTF Floor Plan Drawing
 - Filled In By Bidders & Submitted With Bid
- Item #2: Preliminary WWTF Hydraulic Profile
 - Filled In By Bidders & Submitted With Bid
- Item #3: Evaluation Tables (Used With Item #1 & #2)
 - Category #1: Tankage
 - Category #2: Building Space
 - Category #3: Operational Costs (Power & Chemicals)
 - Category #4: Short-Lived Assets (Membrane Replacement)

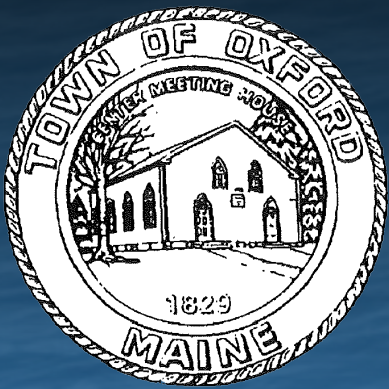


Criteria #2 – Total NPV LCC

- Category #1 - Example Tankage Cost Table
 - Table 3-A: Membrane Tankage Cost Excerpt

Item	Parameter	Value	Units	Notes
1-A	Basin #1 Volume		gallons	Total Volume (Provide Layout & Dimensions)
2-A	Basin #1 Unit Cost	\$3.00	\$/gallon	Cost Per Gallon of Volume
3-A	Basin #1 Cost		\$	(1A) Volume (gal)*(2A)
4-A	Basin #1 Area		ft ²	Plan Area
5-A	Basin #1 Cover Unit Cost	\$60.00	\$/ft ²	Cover Unit Cost
6-A	Basin #1 Cover Cost		\$	(4A) Area (ft ²)*(5A)

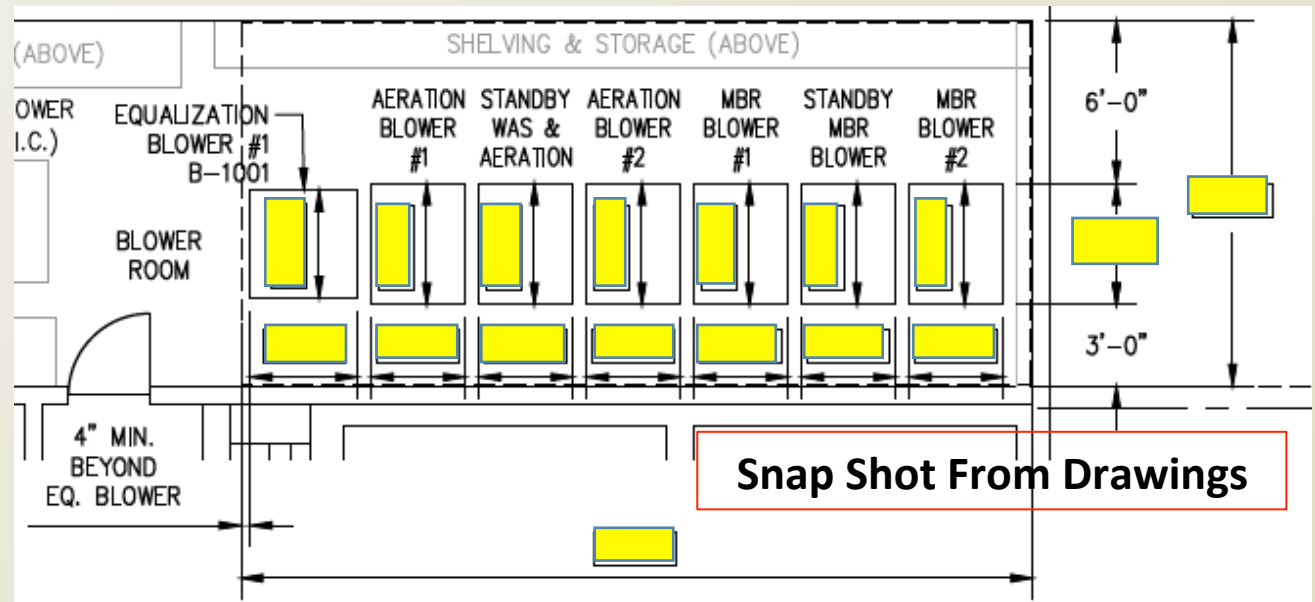


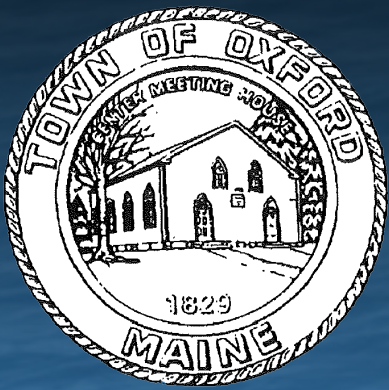


Criteria #2 – Total NPV LCC

- Category #2 - Example Building Space Table
 - Table 3-G: Blower Building Area Costs
 - Specified Clearances For Bidders On Drawings

Item	Parameter	Value	Units	Notes
1-G	Blower Room Area		ft ²	Total Area (All Blowers) (Provide Plan Layout & Dimensions)
2-G	Blower Room Unit Cost	\$250	\$/ft ²	Cost Per Square Foot
3-G	Blower Room Cost		\$	Area (ft ²)*(Unit Cost) (1G)*(2G)



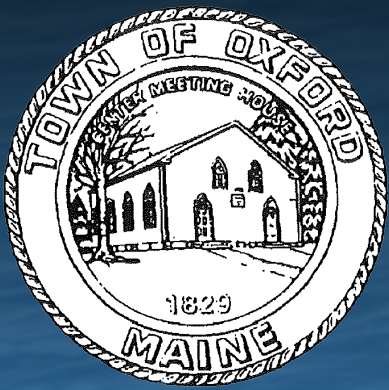


Criteria #2 – Total NPV LCC

- Category #3 - Example O&M Table
 - Table 3-J: Chemical Use Cost Estimate

Item	Process Use	Chemical	Strength	Specific Gravity	Annual Volume (gallons)	Chemical Unit Cost (\$/Unit)	Annual Cost (\$)
1-J	Membrane Cleaning (Organic Fouling)	Sodium Hypochlorite	12.5%	1.3		\$2.60/gal	
2-J	Membrane Cleaning (Inorganic Fouling)	Citric Acid (Liquid)	50%	1.24		\$0.95/lb	
TOTAL ANNUAL CHEMICAL COST (1J)+(2J)							

- Electrical Power O&M Tables Also Included
 - Pumps & Blowers – Estimated Discharge Pressures

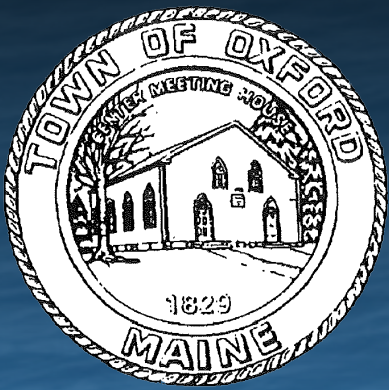


Criteria #2 – Total NPV LCC

- Category #4 - Example Short-Lived Asset Table
 - Table 3-K: Membrane Replacement Costs

Item	Parameter	Value	Units	Notes
1-K	Total SMU		Units (SMU)	Total SMU Quantity
2-K	SMU Cost		\$/SMU	Cost Per SMU
3-K	Replacement Interval		Years	Average @ ADF & Loads
4-K	Replacement Cost		\$/year	(1K)*(2K)/(3K)

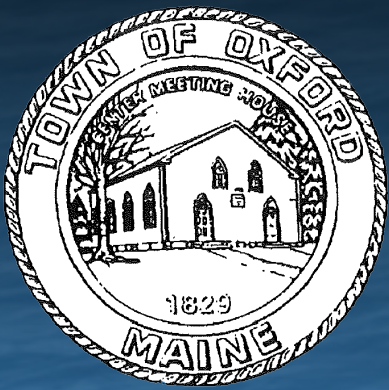
- Required Minimum of Ten Facility Examples
 - Substantiate Claims of Membrane Life
 - Verified By Project Team Prior To Award



Criteria #2 – NPV LCC Scoring

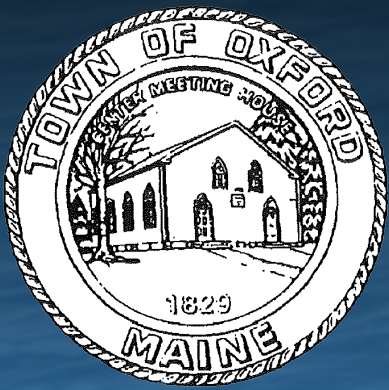
- NPV LCC Scoring
 - Most Cost Effective: 40 Points
 - Second: 30 Points
 - Third: 20 Points





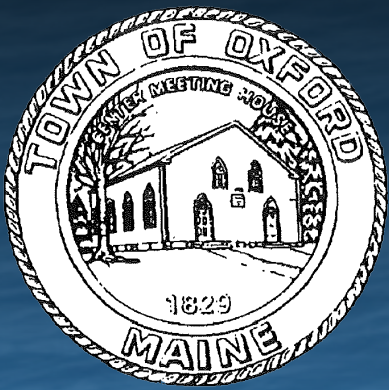
Criteria #2-Bid Results & Scoring

- NPV LCC Bid Results
 - Vendor B = \$2,840,000
 - Vendor A = \$2,880,000
 - Vendor C = \$3,542,786
- NPV LCC Scoring
 - Vendor B = 40 Points
 - Vendor A = 40 Points
 - Vendor C = 30 Points
- Vendor B & Vendor A
 - Equivalent & Within Margins of Error Of Planning Level Comparison



Criteria #3 – Operability & Reliability

- Lowest System Complexity = 5 Points
 - Less Automated Valves
 - Less I/O, Etc.
- Lowest Chemical Cleaning = 5 Points
 - Less Number of Required Cleanings
 - Confirmed by Design Team Investigations



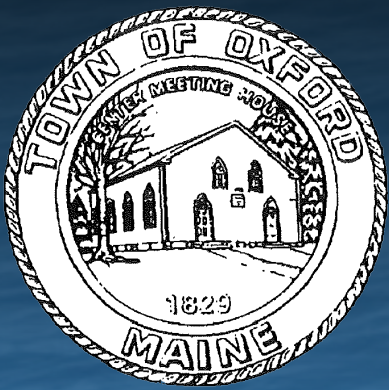
Criteria #3 – Operability & Reliability Bid Tables

- Table 4-A1: Membrane System Complexity

Parameter	Quantity
Control Panels	
Equipment HOA Switches	
Electrically Operated Valve HOA Switches	
Electrically Operated Cycling Valves	
Quantity of Analog Inputs	
Quantity of Analog Outputs	
Quantity of Discrete Inputs	
Quantity of Discrete Outputs	

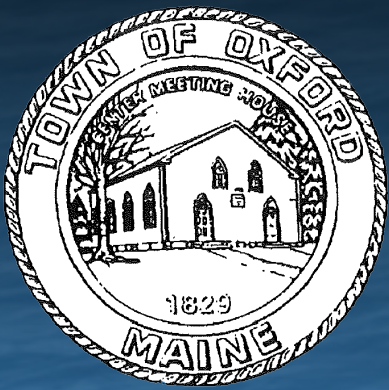
- Table 4-A2: Membrane Cleaning Procedures

Parameter	Units	Quantity
Frequency of Maintenance Cleans	#/year	
Duration of Standard Maintenance Cleans	hours/MBR basin	
Frequency of Recovery Cleans	#/year	
Duration of Recovery Cleans	hours/MBR basin	



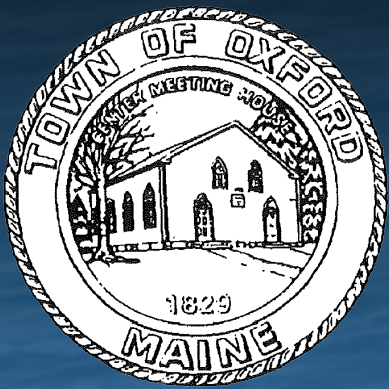
Criteria #3 – Operability & Reliability Scoring

- Membrane System Complexity Bid Results
 - Vendor A = 3 Points
 - Vendor B = 2 Points – **Most Complex**
 - Vendor C = 5 Points – **Least Complex**
- Membrane Cleaning Bid Results
 - Vendor A = 5 Points – **Lowest Cleaning**
 - Vendor B = 3 Points
 - Vendor C = 2 Points – **Highest Cleaning (Daily)**
- Total Points
 - Vendor A = 8 Points
 - Vendor B = 5 Points
 - Vendor C = 7 Points



Criteria #4 – Membrane Warranty

- Lowest Cost Warranty
- Pro-Rated or Not?
- Most Inclusive
- Criteria #4 Scoring Breakdown
 - Most Inclusive & Cost Effective: 10 Points
 - Second: 6 Points
 - Third: 4 Points

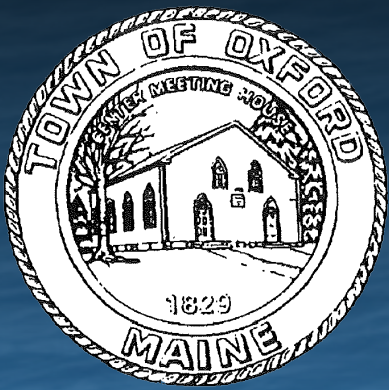


Criteria #4-Warranty Scoring

■ Criteria #4 Warranty Summary Table

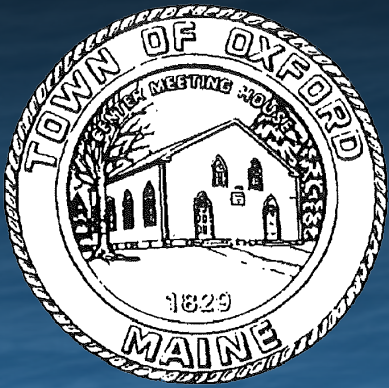
Number	Description	Vendor A	Vendor B	Vendor C
1	Warranty of Ancillary Supporting Equipment	1 Year	1 Year	1 Year
2	Standard Warranty for Membranes & Cassettes	5 Year (Non-Prorated)	5 Year Prorated (2 Year Full)	5 Year Prorated (2 Year Cliff)
3	One Year Process & Performance Guarantee	\$ -	\$ 11,825	\$ 5,000
4	Cost of Full 5 Year Membrane Warranty	\$ -	\$ 83,214	\$ 5,000
5	Cost of Full 10 Year Membrane Warranty (\$/Year)	\$ -	Not Available 10 Year Pro-Rated (5 Year Full)	\$ 25,000
POINTS SCORING		10	4	6

- **Vendor A** – Most Cost Effective & Inclusive Warranty



Criteria #5 – Technical Support

- Lowest Cost
- Most Inclusive
- Extended Support Costs
- Criteria #5 Scoring Results
 - Most Inclusive & Cost Effective: **Vendor B** = 10 Points
 - Second: **Vendor A** = 6 Points
 - Third: **Vendor C** = 4 Points



Criteria #6 – Experience & Qualifications

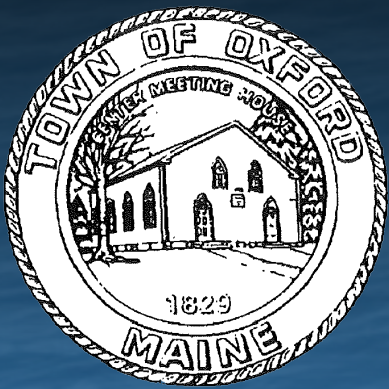
- U.S. Based Installations of Similar Size

Parameter	Experience Category	Maximum Points Available
Location	Number of U.S. Facilities > 100	2
	Number Facilities Worldwide > 500	1
Capacity Facilities (Average Annual Design)	> 25 Facilities of 0.2 MGD or Greater	1
	> 50 Facilities of 0.05 MGD or Greater	1
Years of Service	Average of 10 Reference Plants > 5 years	2
	Average of 10 Reference Plants > 3 years	2
	Average of 10 Reference Plants > 1 year	1
Total		10

- Scoring Breakdown

- Vendor A = 10 Points
- Vendor B = 10 Points
- Vendor C = 8 Points



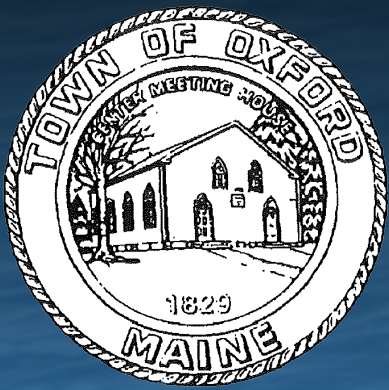


Final Pre-Procurement Scoring

- Summary Table Of Final Scoring

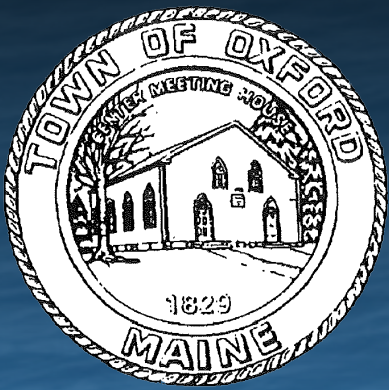
Criteria Number	Evaluation Criteria	Weight (Points)	Vendor A	Vendor B	Vendor C
1	Total System Capital Cost	20	20	10	15
2	Net Present Value Life Cycle Cost	40	40	40	30
3	System Operability & Reliability	10	8	5	7
4	Warranty	10	10	4	6
5	Technical Support Capabilities	10	6	10	4
6	Experience & Qualifications	10	10	10	8
TOTAL SCORING			94	79	70

- Vendor A & B - Close Scoring
- Each Held 1 Hour Presentation To Town
- Vendor A** - Awarded Pre-Procurement Contract
 - Town Concurrence On Award



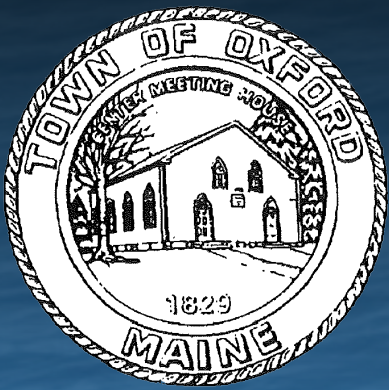
Why Pre-Procurement?

- Unique Systems For Each MBR Vendor
 - Difficult To Design
- Ensure Quality System Is Used
 - Remove Selection From GC - Based Only On Price
- Fast-Track Design Requirements
 - Submittal Review Concurrent With Final Design + Bidding
- Full Control Over Vendor Equipment
 - Dictate Supporting Equipment
- Easier Collaboration & Detail From Vendor
 - Greatly Assists With Detailed Design
 - Streamlined Information Sharing



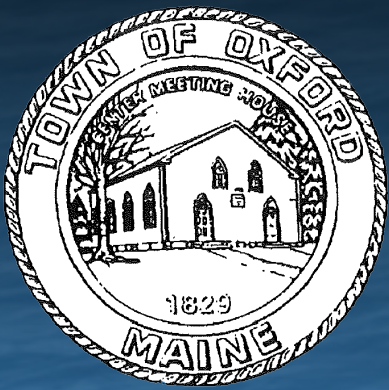
Lessons Learned

- Equipment Delivery Language
 - *Allow Engineer More Control Over Delivery*
- Bid Period
 - Lengthen Bid Period - 21 Days Too Short
 - Adjusted In Addenda
- Include UV Disinfection In Package
- Improved Equipment Submittals Language
 - Engineer Control of Timing Vs. *"Within XX Days of Contract Award"*
- Use Locked & Embedded Excel Files For Bid Evaluation Tables For Bidders



Notable Successes

- Submittal Reviews Expedited
 - Completed Prior To Award of Construction Contract
- Assignment Of Equipment Contract
 - Very Smooth Vendor A to Construction Contractor
- Bidder Feedback
 - “The Most Fair Evaluation We Have Been Through”
- Project Time Savings – At Least 6-8 Months
- Full Control Over Key Equipment (Screens)
- Far Easier Detailed Design
 - Real Equipment Drawings & CAD Blocks
 - Allowed Adjustments Due to Equipment During Design



Closing

- Questions?
- Example Of Full Package Available Following Other Presentations

