

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: File *DW*
FROM: David Worthington/Jaclyn Merchant *JM*
DATE: August 11, 2011
SUBJECT: Drinking Water Revolving Fund (DWRF) Project No. 7338-01
City of Cadillac Project Plan
Green Project Reserve (GPR) Qualifying Costs

In the Part III Application for the above-referenced project, bid information was obtained to determine the final qualifying GPR amounts for inclusion in the Order of Approval package.

The following items are GPR eligible from the bid proposal of the successful low bidder (Erhardt Construction Company) on the Well Houses and Service Building Improvements:

Bid Item 1 – Water Well Pump, Motor and Appurtenances, Furnished and Installed (Well No. 8)	\$ 53,000
Bid Item 2 – Water Well Pump, Motor and Appurtenances, Furnished and Installed (Well No. 9)	\$ 53,000
Bid Item 3 – Water Well Pump, Motor and Appurtenances, Furnished and Installed (Well No. 10)	\$ 53,000
Bid Item 4 – Variable Frequency Drives, Furnish and Install	<u>\$ 56,000</u>
Total	\$215,000

Bid items 1 through 4 above will improve the efficiency of the pumping system as the life expectancy of this equipment is twenty years or more. Therefore, the electricity savings over the life of the equipment will be significant.

Attached is a copy of the bid proposal. Total eligible construction costs for this project = \$2,238,358. Therefore, the percentage of green construction is $\$215,000 \div \$2,238,358 = .096$. Since the DWRF loan amount is \$2,925,000, the total green costs (construction and non-construction) are $\$2,925,000 \times .096 = \$280,800$.

Because 40 percent of the GPR eligible costs qualify for "principal forgiveness," the maximum amount usable for this purpose is $\$280,800 \times .40 = \$112,320$.

Please note that eligibility of the four GPR items was documented on April 29, 2010 in the attached business case that was submitted by Mr. James Brode, Jr. of Fishbeck, Thompson, Carr & Huber, Inc. on the City of Cadillac's behalf. Mr.

Brad Slater of the Cadillac District Office, in his memorandum to Mr. David Worthington dated June 9, 2010, notes that he supports the determination that the well pumps and motors meet the criteria for the GPR.

Attachments

INTEROFFICE COMMUNICATION

TO: David Worthington, Project Manager, Revolving Loan Section, DNRE
FROM: Brad Slater, District Engineer, Drinking Water Program, Cadillac District Office
DATE: June 9, 2010
SUBJECT: DWRF Green Project Reserve

Per your request, my findings in review of the City of Cadillac Drinking Water Revolving Fund Green Project Reserve (GPR) Business Cases are as follows:

1. I agree with your May 4, 2010 email that the "Business Case – New Well Pumps and Motors" meets the GPR criteria.
2. I agree with your May 4, 2010 email that the "Business Case – Improved Raw Water Quality" does not meet the GPR criteria.
3. I agree with your May 4, 2010 email that the "Business Case – New High-Service Transmission Mains" does not meet the GPR criteria.

ARTICLE 5 – BASIS OF BID

5.01 Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the amounts determined pursuant to Paragraphs 5.01.A, 5.02, below:

Division A – Pumps and Appurtenances

Item #	Item Description	Est Qty	Item Unit	Unit Price	Total Price
A1	Water Well Pump, Motor & Appurtenances, Furnished & Installed – Well No. 8	1	LSUM	\$53,000	\$53,000
A2	Water Well Pump, Motor & Appurtenances, Furnished & Installed – Well No. 9	1	LSUM	\$53,000	\$53,000
A3	Water Well Pump, Motor & Appurtenances, Furnished & Installed – Well No. 10	1	LSUM	\$53,000	\$53,000
A4	Variable Frequency Drives – Furnish and Install	1	LSUM	\$56,000	\$56,000

Division A Total \$ 215,000
(A1 through A4)

Division B – Building Construction and Site Work

Item #	Item Description	Est Qty	Item Unit	Unit Price	Total Price
B1	Well House No. 8 Complete	1	LSUM	\$102,000	\$102,000
B2	Well House No. 9 Complete	1	LSUM	\$102,000	\$102,000
B3	Well House No. 10 Complete	1	LSUM	\$102,000	\$102,000
B4	Well House Site Work	1	LSUM	\$71,000	\$71,000
B5	Service Building Complete	1	LSUM	\$459,800	\$459,800
B6	Service Building Site Work	1	LSUM	\$38,000	\$38,000
B7	Well Site Roads	1	LSUM	\$69,000	\$69,000
B8	Well House Electrical Service Feeds	1	LSUM	\$34,000	\$34,000
B9	Allowance for Site Electrical Service	1	LSUM	\$50,000.00	\$50,000.00
B10	Standby Generator & Appurtenances	1	LSUM	\$98,000	\$98,000
B11	Telemetry & Controls	1	LSUM	\$140,000	\$140,000
B12	Restoration & Cleanup	1	LSUM	\$5,000	\$5,000

Division B Total \$ 1,270,800
(B1 through B12)

Total Bid Amount Division A \$ 215,000

Total Bid Amount Division B \$ 1,270,800

TOTAL BID AMOUNT. \$ 1,485,800

(Add Divisions A through B)

Total Bid Amount in words

One Million Four Hundred Eighty Dollars and Zero cents
Five Thousand Eight Hundred Dollars

5.02 Pump Setting Allowance:

Unit Price Adjustment for Final Pump Settings: For pump setting greater than or less than specified in these Contract Documents, the Contract Price shall be adjusted as follows:

Add/deduct for Pump Setting greater than or less than indicated in the Contract Documents

\$ 120 /LFT

ARTICLE 6 – TIME OF COMPLETION

- 6.01 Bidder agrees that the Work will be substantially complete on or before July 27, 2012, and will be completed and ready for final payment in accordance with Paragraph 14.07 of the General Conditions on or before August 17, 2012.
- 6.02 Bidder accepts the provisions of the Agreement as to liquidated damages.

ARTICLE 7 – ATTACHMENTS TO THIS BID

- 7.01 The following documents are submitted with and made a condition of this Bid:
- A. Required Bid security in the form of 5%;
 - B. Attachment 1 - EPA Form 6100-2 DBE Program Subcontractor Participation Form.
 - C. Attachment 2 - EPA Form 6100-3 - DBE Program Subcontractor Performance Form
 - D. Attachment 3 - EPA 6100-4 DBE Program Subcontractor Utilization Form
 - E. Attachment 4 - Certification Regarding Debarment, Suspension, and Other Responsibility Matters
 - F. Attachment 6 – Project Reference/Bidder Information
 - G. The apparent successful Bidder, and any other Bidder so requested, will be required to submit Attachment 7 – Subcontractor Information and Attachment 8 – Schedule of Manufacturers of Major Equipment Items within twenty-four hours after Bid opening time and date.

ARTICLE 8 – DEFINED TERMS

- 8.01 The terms used in this Bid with initial capital letters have the meanings stated in the Instructions to Bidders, the General Conditions, and the Supplementary Conditions.

DRINKING WATER STATE REVOLVING FUND – GREEN PROJECT RESERVE BUSINESS CASE

New Well Pumps and Motors

SUMMARY

- New well pumps are required at the Blakely (Crosby Road) Well Field to pump drinking water from new wells to the distribution system to replace existing aging equipment.
- Estimated Loan amount = \$3,850,000 for complete project.
- Energy saving (green) portion of the loan = \$457,000 for the well pumps, motors, and variable frequency drives (VFDs).
- Annual energy savings = 344,165 kilowatt hours (kwh) per year.

BACKGROUND

- The existing wells are aging. Four of the five well pumps and motors were installed in 1960. The existing equipment is less efficient than equipment currently available. The efficiency of the existing pumps is also less than it was when originally installed, due to wear.
- In conjunction with well replacement, pumps will be upgraded to modern, high-efficiency equipment.

RESULTS

- Approximately 2,650 gallons per minute (gpm) of pumping capacity will be removed and replaced with approximately 3,000 gpm of new pumping capacity.
- Pump selection will be made to optimize energy efficiency. NEMA Premium Efficiency motors will be used.
- The hydraulic efficiency of the proposed pumps is 85.5%.
- The electrical efficiency of the proposed motors is 95.0%.

CALCULATE ENERGY EFFICIENCY IMPROVEMENTS

- The hydraulic efficiency of the existing pumps to be replaced is 74.5%. The electrical efficiency of the existing motors to be replaced is 89.0%.
- Total efficiency (wire to water) of the pumps and motors is the product of pump efficiency and motor efficiency.
- Therefore, the efficiency of the existing pumps and motors is:

$$74.5\% * 89.0\% = 66.3\%$$

- The hydraulic efficiency of the proposed pumps is 85.5%.
- The electrical efficiency of the proposed motors is 95.0%.
- Therefore, the efficiency of the proposed pumps and motors is:

$$85.5\% * 95.0\% = 81.2\%$$

- To compare the efficiency of the proposed pumps and motors with the existing pumps and motors, divide the total efficiency of the proposed equipment by the efficiency of the existing equipment:

$$81.2\% / 66.3\% = 1.23\%$$

- The wire to water efficiency is improved by 23%. This level of efficiency exceeds the minimum 20% required for pumps and motors to be included in the Green Project Reserve.
- For an equivalent pumping rate, the existing well pumps consume 1,492,719 kwh per year; the new pumps will consume an estimated 1,218,525 kwh per year.
- Improved energy efficiency with new pumps and motors is: $1,492,719 - 1,218,525 = 274,193$ kwh per year.

CITY OF CADILLAC DWRF PROJECT PLAN NO. 7338-01

- Additionally, VFDs will be added to improve efficiency at reduced flows. The VFDs will result in an additional energy savings of approximately 5% or 69,971 kwh per year.
- Total Energy savings for pumps, motors, and VFDs is: $274,193 + 69,971 = 344,165$ kwh per year.
- At \$0.09 per kwh, this equals \$30,975 per year of reduced electrical cost.
- Over the 20-year anticipated life of the pumps and motors, this will equate to over \$619,000.

CONCLUSION

The proposed pump, motor, and VFD improvements will improve the efficiency of the pumping system. The life expectancy of this equipment is 20 years or more. The electricity savings over the life of the equipment will be significant.