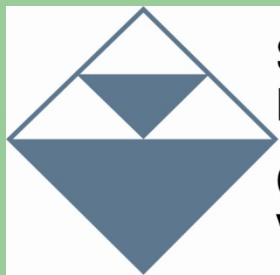


Title: More Value in Municipal Assets

Success with Value Engineering, Mississippi Mills sewage treatment plant design



SOCIÉTÉ CANADIENNE
D'ANALYSE DE LA VALEUR
CANADIAN SOCIETY OF
VALUE ANALYSIS

CSVA 2009 Conference
Ottawa, Ontario
Nov 23, 24, 2009

Name of Presenters:

- **Tim Kocialek, P.Eng, Director of Roads & Public Works, Town of Mississippi Mills**
- **Zbigniew Bukala, P.Eng, Engineering Technical Specialist, Ontario Clean Water Agency (OCWA)**

Topic Overview

- *The Town of Mississippi Mills is looking to design a new sewage treatment plant to meet current and future demands.*
- *The treatment technology and other criteria have not been finalized.*
- *Value Engineering was used during the preliminary design stage to evaluate the design alternatives to assist in finding a preferred alternative and other options to consider in the final design.*

Background

- The Town of Mississippi Mills was formed in 1998 by the amalgamation of the Town of Almonte and Townships of Ramsay and Pakenham.
- Mississippi Mills is located on the western edge of the City of Ottawa.



Background – Almonte Lagoons

- The Almonte Ward of Mississippi Mills (formerly the Town of Almonte) has a population of approximately 5,000 people and is serviced by municipal services.
- All sewage from the Town of Almonte is currently being treated in a four cell facultative lagoon



Background – Almonte Lagoons

- The operation of the lagoons have been contracted to the Ontario Clean Water Agency (formerly the Ministry of Environment) since they were built in the early 1960's.
- Since the 1990's, the lagoons have been operating close to the hydraulic design capacity.

Background – Almonte Lagoons

- The lagoons experienced a failure in one of the berm's in 2002 and additional work is being done as the lagoons are reaching the end of their design life.
- In 2004, the town undertook an Environmental Assessment (EA) on the sewage treatment facility to look at options for providing treatment for the existing and future flows.

Background – Environmental Assessment

- Through the EA, it was found that a lagoon based system could not reliably meet the effluent criteria that the Ministry of Environment (MOE) were requiring.
- The preferred solution was a mechanical treatment plant with tertiary treatment.
- The town wanted to include septage treatment as part of the design to treat septage from the rural areas (pop. 8,000) of the municipality.

Background – Environmental Assessment

- During the EA the cost to design and construct the new sewage treatment plant was more than the town could afford.

The EA carried forward three (3) different technologies for the sewage treatment plant were carried forward as the timing of the final design and construction were not known, including;

- Sequential Batch Reactors (SBR),
- Conventional Activated Sludge (CAS)
- Extended Aeration (EA)

Preliminary Design

- The town was unsuccessful in receiving COMRIF funding for the project and decided to tender out for the preliminary design for the new sewage treatment plant.
- In February 2009, the town was successful in receiving funding under the Build Canada fund for 2/3 of the cost for the design and construction of the facility.
- To assist with the management of the project the town retained the services of the Ontario Clean Water Agency (OCWA).
- The preliminary design for the facility was awarded to the Thompson Rosemont Group (TRG).

Value Engineering

- During the preliminary design, there were a number of questions about the design of the facility including treatment process that would be used, the location of some of the facilities...
- In April 2009, to help with the evaluation, Genivar (formerly National Capital Engineering) performed a two (2) day value engineering session.
- As part of the value engineering session, design consultants from two (2) independent consulting firms were invited to attend in addition to the design engineers, OCWA operators and town staff.

Value Engineering

- The EA indicated that the sewage treatment technologies of Conventional Activated Sludge, Extended Aeration and Sequential Batch Reactors would all be capable of meeting the effluent limits.
- During the Value Engineering session a rating system was established which took into consideration variables such as the capital cost, simplicity, reliability, flexibility and owner/operator preferences, the Extended Aeration process was ranked the highest.

Value Engineering

- The value engineering session was a very organized systematic process that identified over 120 ideas for improving the project.
- Of the 120 ideas, 27 were identified as being valued for consideration
 - Of the 27, 11 were already taken into account in the preliminary design or included in the work plan for the final design.
 - The remaining 16 items will be evaluated as part of the final design including; building orientation, moving the plant closer to the outfall, raising the facility to reduce rock removal and retaining a lagoon cell for emergencies.

Value Engineering

- We choose to have Value Engineering as part of this project to help evaluate the alternatives that were available for the design of the facility.
- In the evaluation of the alternatives, you really had the feeling that “no stone was left unturned”, to quote one of the Councillors that attended the VE session.
 - This was one of the items that came out of the VE session, that I had not expected.
 - We have continued to use many of the principals used in the VE session

Other VE sessions - OCWA

- The Mississippi Mills project was just one of many times that OCWA has used this process to help evaluate options for projects including;

Township of South Dundas

Iroquois WWTP Expansion and Upgrade

- Location: North Shore of St. Lawrence River between Cardinal and Morrisburg
- Present WWTP: Primary with chemical P removal and sludge holding tank
- CE: TRG, completed Class EA and ESR

Value Engineering

- OCWA retained Joe Stephenson (Hydromantis Inc.) to facilitate 1 day VE workshop to review status, proposed design and cost of the project
- The steps of the VE were followed, but project could not be explored in the same depth as a full VE
- Project Capital Budget: fixed capital budget of \$18M will be available for this project (½ provincial, ½ federal funding, equals 100% funding)
- The estimated costs in ESR are higher than available budget:
 - “Regional” alternative (sewer line from Iroquois to Morrisburg WWTP = \$25M)
 - “Local” alternative (new WWTP at Iroquois = \$19.5M – \$20.8M)

Value Engineering

- Taking inflation and construction cost index: “Regional” cost escalates to \$30M and “Local” cost escalates to \$24M
- Goal of VE workshop is to reduce project cost by \$12M for “Regional” and \$6M for “Local” alternative
- Short listed alternatives:
 - Extended Aeration (EA)
 - Sequencing Batch Reactors (SBR)
- Creative Ideas Generated: 56
- Evaluation of Ideas: The VE team was divided into four (4) groups

Results from VE Workshop

- Potential Cost Savings for Key Ideas:
 - Estimated at \$5.74M for “Local” alternative
 - Estimated at \$6.6M for “Regional” alternative

City of Cornwall

Cornwall WWTP Class EA VE

- Location: North Shore of St. Lawrence River in the City of Cornwall
- Present WWTP: Primary with chemical P removal
- CE: J.L. Richards & Associates Ltd.
 - CH2MHill – Subconsultant
 - XCG Consultants - Subconsultant

VE Workshop

- 1 day workshop to evaluate Class EA and draft ESR
- No independent facilitator but J.L. Richards – Daniel Y. Lalande, P.Eng. assumed this role
- Project treatment process evaluated:
 - Biological Active Filters (BAF): 7 + 1 cell
 - Conventional Activated Sludge (CAS)
- Project capital cost estimated:
 - BAF - \$62.5M
 - CAS - \$61.25M
- Project budget approved: \$55.5M

Results of VE Workshop

- Project treatment process selected: BAF
 - Ease of operation
 - Lower operating cost
- City's goal during a preliminary design is to reduce capital construction cost to \$55.5

Questions ???

- **Tim Kocialek, P.Eng, Director of Roads & Public Works, Town of Mississippi Mills**
- **Zbigniew Bukala, P.Eng, Engineering Technical Specialist, Ontario Clean Water Agency (OCWA)**