Village of La Grange

VILLAGE BOARD MEETING

MONDAY, FEBRUARY 27, 2012

7:30 p.m.

Village Hall Auditorium

53 South La Grange Road

La Grange, IL 60525

Elizabeth M. Asperger
Village President

Thomas Morsch
Village Clerk

53 South La Grange Road P.O. Box 668 La Grange, Illinois 60525 (708) 579-2300 Fax (708) 579-0980

VILLAGE OF LA GRANGE
BOARD OF TRUSTEES REGULAR MEETING

Village Hall Auditorium
53 South La Grange Road
La Grange, IL 60525

AGENDA

Monday, February 27, 2012 – 7:30 p.m.

1. CALL TO ORDER, ROLL CALL, PLEDGE OF ALLEGIANCE

   Trustee Holder
   Trustee Horvath
   Trustee Kuchler
   Trustee Langan
   Trustee Nowak
   Trustee Palermo
   President Asperger

2. PRESIDENT'S REPORT

   This is an opportunity for the Village President to report on matters of interest or concern to the Village.

3. PUBLIC COMMENTS REGARDING AGENDA ITEMS

   This is the opportunity for members of the audience to speak about matters that are included on this Agenda.

4. OMNIBUS AGENDA AND VOTE

   Matters on the Omnibus Agenda will be considered by a single motion and vote because they already have been considered fully by the Board at a previous meeting or have been determined to be of a routine nature. Any member of the Board of Trustees may request that an item be moved from the Omnibus Agenda to Current Business for separate consideration.

   A. Minutes of the Village of La Grange Board of Trustees Regular Meeting Monday, February 13, 2012

   B. Consolidated Voucher 120227

5. CURRENT BUSINESS

   This agenda item includes consideration of matters being presented to the Board of Trustees for action.

6. MANAGER'S REPORT

   This is an opportunity for the Village Manager to report on behalf of the Village Staff about matters of interest to the Village.

   A. Economic Development Workshop

B. Water System Workshop – Plan and Recommendations to Replace Water Meters and for Improvements to the Village's Water Pumping Station

7. PUBLIC COMMENTS REGARDING MATTERS NOT ON AGENDA

This is an opportunity for members of the audience to speak about Village related matters that are not listed on this Agenda.

8. EXECUTIVE SESSION

The Board of Trustees may decide, by a roll call vote, to convene in executive session if there are matters to discuss confidentially, in accordance with the Open Meetings Act.

9. TRUSTEE COMMENTS

The Board of Trustees may wish to comment on any matters.

10. ADJOURNMENT

The Village of La Grange is subject to the requirements of the Americans with Disabilities Act of 1990. Individuals with disabilities who plan to attend this meeting and who require certain accommodations so that they can observe and/or participate in this meeting, or who have questions, regarding the accessibility of the meeting or the Village's facilities, should contact the Village's ADA Coordinator at (708) 579-2315 promptly to allow the Village to make reasonable accommodations for those persons.

OMNIBUS VOTE

MINUTES

VILLAGE OF LA GRANGE
BOARD OF TRUSTEES REGULAR MEETING
Village Hall Auditorium
53 South La Grange Road
La Grange, IL 60525

Monday, February 13, 2012 - 7:30 p.m.

1. CALL TO ORDER, ROLL CALL, PLEDGE OF ALLEGIANCE

The Board of Trustees of the Village of La Grange regular meeting was called to order at 7:30 p.m. by President Asperger. On roll call, as read by Village Clerk Thomas Morsch, the following were present:

PRESENT: Trustees Holder, Horvath, Kuchler, Langan, Nowak and Palermo

ABSENT: None

OTHERS: Village Manager Robert Pilipiszyn
Assistant Village Manager Andrianna Peterson
Village Attorney Mark Burkland
Finance Director Lou Cipparrone
Community Development Director Patrick Benjamin
Assistant Community Development Director Angela Mesaros
Public Works Director Ryan Gillingham
Fire Chief William Bryzgalski
Police Chief Mike Holub

President Asperger requested the Board and audience stand for the Pledge of Allegiance to the Flag.

2. PRESIDENT'S REPORT

A. Resolution of Appreciation – Retirement of Auxiliary Police Sergeant Louis Berardi

President Asperger recognized Louis Berardi for his thirty three years of volunteer service as a member of the Auxiliary Police Unit. Reading the Resolution of Appreciation on the Retirement of Auxiliary Police Sergeant Louis Berardi, President Asperger requested Board approval. Trustee Langan moved to approve the resolution, seconded by Trustee Holder. Approved by voice vote. Mr. Berardi was presented with the resolution and received a standing ovation.

4-A

President Asperger reminded the audience that the La Grange Business Association is promoting restaurant week and encouraged residents to participate in "Passport to Dining" during the month of February.

President Asperger invited the public to attend the next regular Village Board meeting on Monday, February 27 which will be followed by two workshops related to economic development and the water meter replacement program. The public was also invited to attend the upcoming budget workshop to be held on Saturday, March 10 at 8:00 a.m. in the lower level conference room in the Village Hall. President Asperger encouraged residents to read the Village Manager's message in the preliminary draft budget document which will be available on line, at the Village Hall and the La Grange Public Library.

3. PUBLIC COMMENTS REGARDING AGENDA ITEMS

None

4. OMNIBUS AGENDA AND VOTE

A. Resolution (#R-12-01) – Investment Authorization for Village Treasurer and Officials

B. Ordinance (#O-12-04) Disposal of Surplus Property

C. Minutes of the Village of La Grange Board of Trustees Regular Meeting Monday, January 23, 2012

D. Consolidated Voucher 120213 – ($787,348.70)

It was moved by Trustee Langan to approve items A, B, C, and D of the Omnibus Agenda, seconded by Trustee Holder.

Approved by roll call vote.

Ayes:	Trustees Holder, Horvath, Kuchler, Langan, Nowak and Palermo
Nays:	None
Absent:	None

4-A.1

5. CURRENT BUSINESS

A. Ordinance (#O-12-05) – Amendments to the Zoning Map and the Zoning Code Related to Nonconforming Uses: Referred to Trustee Langan

Trustee Langan provided an overview of the Village's ongoing review of the Zoning Code in an attempt to bring the code into conformity with the Comprehensive Plan. Trustee Langan noted that the Plan Commission has conducted public hearings on the proposed amendments and these amendments are being presented to the Village Board for their consideration. Trustee Langan explained that recommendations made by staff and the Plan Commission consist of amendments to the residential district boundaries and to the nonconforming uses section of the zoning code.

Trustee Langan noted that evaluating the residential district boundaries is in part a follow-up to the review process completed earlier this year of single family residential regulations. Providing detailed information relative to the proposed amendments to the zoning map, Trustee Langan stated dates of the public hearings; affirming vote by the Plan Commissioners; and each of the recommended amendments. Trustee Langan added that the Plan Commission acknowledged consistency with the Comprehensive Plan, trends for development and the community need for each of the proposed amendments.

Trustee Langan described the amendments to the nonconforming uses section of the zoning code to allow restoration of nonconforming structures when there is damage or destruction to any extent beyond the control of the owner. Noting the Plan Commissions unanimous recommendation for these amendments, Trustee Langan moved to approve the ordinance amending the Zoning Map and Section 12-103 of the La Grange Zoning Code related to Nonconforming Uses in Structures Not Designed for Permitted Use, seconded by Trustee Horvath.

Village Attorney Burkland noted that 34 S. 7th Avenue was inadvertently omitted on the Board Report, however was included in the ordinance.

Trustee Langan thanked the members of the Plan Commission for their thoughtful and thorough consideration to rectify the code through these amendments.

Trustee Horvath concurred with Trustee Langan on a job well done by the Plan Commission.

Approved by roll call vote.

Ayes: Trustees Holder, Horvath, Kuchler, Langan, Nowak and Palermo
Nays: None
Absent: None

4-A.2

6. MANAGER'S REPORT

Village Manager Robert Pilipiszyn stated that the Village has been informed by the Burlington Northern Santa Fe Railroad that plans to perform track maintenance at the Kensington Avenue railroad crossing have been postponed until April. Information will be provided to the public at that time.
Mr. Pilipiszyn provided detailed information on voter registration deadlines and early voting for the upcoming Primary Election on March 20, 2012. Citizens were advised to visit the Cook County website at www.cookcountyclerk.com for additional information.

Lastly, Mr. Pilipiszyn noted that Village administrative offices would be closed on Monday, February 20 in observance of President's Day and will reopen on Tuesday, February 21.

7. PUBLIC COMMENTS REGARDING MATTERS NOT ON AGENDA

Dr. Bergschneider thanked the Board for beginning the meeting with the Pledge of Allegiance to the Flag.

Dr. Bergschneider expressed numerous concerns related to his recent petition of residents and parking issues on the 1100 block of Spring Avenue. He feels there were inconsistencies in the process of handling the petition and inquired if the Board had been informed of his communications with staff.

President Asperger assured Dr. Bergschneider that staff had processed and handled his requests properly and the Board was informed of all of his concerns and issues.

President Asperger noted Assistant Village Manager Andrianna Peterson's comprehensive review and study of the parking issues that Dr. Bergschneider brought forth and the conclusion provided to the Board.

8. EXECUTIVE SESSION

9 TRUSTEE COMMENTS

Trustee Langan reminded residents of the newly opened eatery's and encouraged everyone to patronize local businesses and restaurants.

Responding to Dr. Bergschneider, Trustee Kuchler clarified that the Board did receive information provided to them by staff regarding his referenced parking issues. Speaking for himself, he viewed the matter as operational, and did not believe it was his role to respond individually.

4-A.3

Referencing Dr. Bergschneider's concerns, Trustee Horvath voiced his desire for consistent policies and standards to be set so there is consistency throughout the Village.

Also in reference to Dr. Bergschneider's comments, Trustee Palermo believes that consistency is most important.

10. ADJOURNMENT

At 8:20 p.m. it was moved by Trustee Langan to adjourn, seconded by Trustee Palermo. Motion approved by voice vote.

_____
Elizabeth M. Asperger, Village President

ATTEST:

_____
Thomas Morsch, Village Clerk

Approved Date:

H:\eelder\ellie\Minutes\VB021312.doc

4-A.4

VILLAGE OF LA GRANGE

Disbursement Approval by Fund
February 27, 2012
Consolidated Voucher 120227

Fund No.	Fund Name	02/27/12 Voucher	02/17/12 Payroll	Total
01	General	100,586.99	274,337.91	374,924.90
21	Motor Fuel Tax			0.00
22	Foreign Fire Insurance Tax	102.34		102.34
24	ETSB			0.00
40	Capital Projects	2,000.00		2,000.00
50	Water	11,375.03	37,793.31	49,168.34
51	Parking	2,518.73	23,710.61	26,229.34
60	Equipment Replacement			0.00
70	Police Pension	500.00		500.00
75	Firefighters' Pension			0.00
80	Sewer	2,764.04	9,715.93	12,479.97
90	Debt Service			0.00
91	SSA 4A Debt Service			0.00
93	SAA 269			0.00
94	SAA 270			0.00
		119,847.13	345,557.76	465,404.89

We the undersigned Manager and Clerk of the Village of La Grange hereby certify that, to the best of our knowledge and belief, the foregoing items are true and proper charges against the Village and hereby approve their payment.

Village Manager

Village Clerk

President

Trustee

Trustee

Trustee

Trustee

Trustee

Trustee

4-B

MANAGER'S REPORT

VILLAGE OF LA GRANGE
Administrative Offices

BOARD REPORT

TO: Village President, Village Clerk,
Board of Trustees and Village Attorney

FROM: Robert J. Pilipiszyn, Village Manager and
Patrick D. Benjamin, Community Development Director

DATE: February 23, 2012

RE: **ECONOMIC DEVELOPMENT WORKSHOP**

In November 2011, the Village Board conducted a two-day strategic planning session to discuss goals and objectives for the next two years. During the course of the session, economic development was indentified as a strategic priority of continued importance for the Village. As part of the discussion and refinement process, comments were made and policy questions were asked by individual Trustees as they related to broadly guiding economic development over the long term, continuing with existing initiatives, and developing a revised economic development plan and approach.

The purpose of this workshop is to provide the Village Board with an opportunity to continue that discussion in hopes of providing staff with additional clarification as to this strategic goal. We have framed the workshop in response to the Village Board's preliminary discussion of this topic at the November 2011 planning session as follows:

1. Review of the purpose and the major policy elements of the Village's existing Comprehensive Plan dated May 2005. You may wish to bring your copy of the plan for reference and note taking, but it is not essential.

2. Explain how the market analysis reinforces the Comprehensive Plan, and the need to update the analysis to reflect changed economic conditions.

3. Review and reaffirm, as appropriate, policy decisions made by the Village Board over the past two years as they relate to the Village's role in economic development and corresponding strategies. (Copies and excerpts from meeting minutes where policy decisions were made and general direction was provided concerning economic development are attached for your reference).

6-A

4. Review the Village's current economic development plan, which largely consists of the detailed list of activities contained within the Community Development Department's economic development line item budget.

The impression that was left with staff from the planning session is that the Village Board was most interested in developing a single planning document which contained and organized this information. Feedback on the above will form the basis for creation of that document.

If our reading of the Village Board is off-target, then consensus direction on a combination of any one or all four of these main topical areas is requested.

F:\USERS\eelder\ellie\BrdRpt\economicdevelopmentworkshop.em.doc

6-A.1

MINUTES
VILLAGE OF LA GRANGE
SPECIAL MEETING OF THE
VILLAGE BOARD OF TRUSTEES

Village Hall Auditorium
53 South La Grange Road
La Grange, IL 60525

Monday, February 22, 2010
(immediately following the regular Village Board meeting)

1. CALL TO ORDER AND ROLL CALL

The Board of Trustees of the Village of La Grange special meeting was called to order at 8:36 p.m. by President Asperger. On roll call, as read by Administrative Secretary Ellie Elder, the following were:

PRESENT: Trustees Holder, Horvath, Kuchler, Langan, Livingston and Palermo with President Asperger presiding.

ABSENT: Clerk Milne

OTHERS: Village Manager Robert Pilipiszyn
Village Attorney Mark Burkland
Assistant Village Manager Andrianna Peterson
Finance Director Lou Cipparrone
Community Development Director Patrick Benjamin
Assistant Community Development Director Angela Mesaros

2. ECONOMIC DEVELOPMENT WORKSHOP

President Asperger noted the Village's past economic development successes and indicated that this workshop has been scheduled as economic development was identified as one of the Village Board's strategic priorities at their recent planning session. A background summary was presented by President Asperger with guidance to the Board for discussion in determining the Village's role related to economic development in a post-TIF environment. President Asperger noted the objective of this evening's workshop was to provide direction to Village staff on several key policy questions and decision points. She requested Village Manager Pilipiszyn to give a brief overview.

Mr. Pilipiszyn briefly described the Village's current operational plan for economic development which consists of infrastructure improvements; maintenance; considerable dedication of the Community Development Director's time on economic development and project development; and limited marketing and promotional activities, often in conjunction with the LGBA. Extensive discussion regarding economic development took place at the planning session. Mr. Pilipiszyn listed nearly ten goals from the session which related to economic development. Mr. Pilipiszyn noted that many of the policy questions identified in the staff report are pending matters from the business district discussion last year.

6-A.2

President Asperger opened the discussion to the Board utilizing the topics outlined by staff. Considerable debate and discussion ensued amongst the Village Board of Trustees including: measurable goals to help define the Village's economic development policy (e.g. – raise EAV, increase sales tax); ability for the Village to move nimbly in response to changing market conditions; boundaries; façade loans; the YMCA as a redevelopment site; and review of the Village's existing development / redevelopment policy.

At this point of the meeting, President Asperger invited Community Development Director Patrick Benjamin to speak on business recruitment and retention activities. Various understanding questions were asked of Mr. Benjamin's knowledge and experience in this area. Mr. Benjamin explained the importance of having the Village maintain safe, clean and attractive business areas; targeted and leveraged advertising among many businesses is effective; the Village should not get beyond what it does well and should not do more to fill vacancies than its current supportive role.

Before proceeding to a discussion of special events, Mr. Benjamin introduced Ryan Williamson, the new President of the LGBA. Mr. Benjamin described the current challenges facing the LGBA as an all-volunteer organization. He also noted the Village's financial and in-kind contributions to LGBA activities. Mr. Benjamin commented that the current structure and division of labor between the LGBA and the Village is very unique as compared to other communities.

Mr. Williamson provided the Village Board with a briefing on his perspective during his short term as the LGBA's new president. While the economy is still difficult, there are many opportunities for continued success for businesses in La Grange. The issue is how to continue with the positive momentum. Business owners need assistance with things that they cannot do individually, such as advertising, marketing and promotions. The two most pressing needs of the LGBA are organizational support for special events and advertising support.

Discussion ensued. There were many compliments from the Village Board as to the work of the LGBA, and for Mr. Williamson's personal efforts as LGBA president thus far. There was general agreement by the Village Board to maintain, if not enhance the Village's working relationship with the LGBA.

Due to the lateness of the hour, a discussion concerning financial resources did not commence. However, President Asperger noted that as the Village Board provided direction on economic development priorities, staff should assume that the Village Board would be inclined to fund those priorities to some degree.

The consensus of the Village Board on the policy questions / decision points for which staff sought direction was as follows:

1. Façade loans do not appear to be a Village Board priority for the time being.

2. The business district concept was discussed as an economic development tool (in the context of development / redevelopment opportunities).

6-A.3

3. The Village Board concurred with the existing development / redevelopment policy as written (dated November 7, 2005).

4. Staff to continue with current efforts (and tailor methods as determined to be most effective) concerning business recruitment and retention.

5. Maintain, if not enhance, the Village's support of the LGBA.

President Asperger instructed staff to work towards providing the Village Board with its thoughts and recommendations on how to support the LGBA.

3. ADJOURNMENT

The Village Board Economic Development Workshop was adjourned at 10:30 p.m.

Respectfully submitted,

Approved: 03/08/10

Robert J. Pilipiszyn
Village Manager

H:\eelder\ellie\Minutes\EconomicDevWkshp022210.doc

6-A.4

excerpt from:

Trustee Langan listed the conditions outlined in the sponsorship policy and noted that approval would include compliance to those conditions. Trustee Langan noted that La Grange Business Association President, Ryan Williamson and other members are in attendance to answer any questions on this year's event.

It was moved by Trustee Langan to support the Hometown Holiday's cost of advertising and marketing for 2010 in an amount not to exceed $12,000, with the conditions as outlined in the Village's sponsorship policy, seconded by Trustee Holder.

Mr. Williamson thanked the Board and staff for their consideration of support for this event.

Trustee Horvath inquired about electronic methods to advertise the event. Mr. Williamson added his openness for suggestions.

Approved by roll call vote.

Ayes: Trustees Holder, Horvath, Kuchler, Langan, Livingston, and Palermo
Nays: None
Absent: None

6. MANAGER'S REPORT

A. Continued Discussion – Village Board Strategic priority / Economic Development – Enhanced Support for the LGBA

Village Manager Robert Pilipiszyn gave an overview of a previous workshop whereby the Village Board noted their consensus for economic development in maintaining and possibly enhancing support for the La Grange Business Association. Mr. Pilipiszyn requested Community Development Director Patrick Benjamin to elaborate on the process and outcome of discussions with the La Grange Business Association and their request for additional support.

Mr. Benjamin indicated several meetings and discussions with the officers of the La Grange Business Association regarding management of the numerous events along with marketing the business community. Mr. Benjamin presented a proposed detail budget to enhance cost-effectiveness for the association's needs in coordinating special events and organization of operations.

The La Grange Business Association is seeking a technical assistance stipend from the Village which would assist them in obtaining a staff person for program management. Mr. Benjamin noted that staff is recommending utilizing the use of the TIF surplus for this stipend.

6-A,5

Trustee Kuchler expressed his strong objection to this matter.

Trustee Palermo wondered if an event planner may be more appropriate rather than hiring a part-time individual. Mr. Benjamin responded. Trustee Palermo shares his reluctance to consider the matter at this time, given budget challenges ahead. He feels that the proposal should be set aside for the time being and considered at a later date.

Trustee Horvath concurs that timing is an issue and would prefer not to move on the recommendation at this time.

Mr. Williamson explained how the organization operates, relying heavily on volunteers for event planning and execution. A staff person would provide considerable and necessary administrative relief.

President Asperger expressed the Board's appreciation for the La Grange Business Association and feels the Board is willing to support promotional events and marketing activities, however is reluctant to support an administrator for the organization.

Trustee Livingston noted that economic development is a priority for the Village and suggested that the Board keep this as a "live" discussion pending further development of the Village budget.

B. Status Report – Review of the Village's Operations Plan

Village Manager Robert Pilipiszyn provided the Village Board with a summary of activities and accomplishments pursuant to the Village's strategic plan, since the initial Operations Plan was presented back in April. Mr. Pilipiszyn stated that within the first ten months of 2010, the Village Board has conducted seven workshops, setting policy and providing direction to staff on the "higher order" priorities. He described the content and outcome of each of those workshops. Mr. Pilipiszyn highlighted approximately fifteen operational activities during the same period pursuant towards achieving the Village Board's strategic priorities.

Mr. Pilipiszyn indicated the entire Strategic Plan, as updated through the Operations Plan, is posted on the Village's website for those who wish to monitor the progress made by the Village Board and staff.

7. PUBLIC COMMENTS REGARDING MATTERS NOT ON AGENDA

Nancy Kenney, 400 S. Peck Avenue as a former resident and since returning to the Village, complimented the Village Board and La Grange Business Association on moving forward. Ms. Kenney noted her pride in the Village.

6-A.6

excerpt from:

Ayes: Trustees Holder, Horvath, Langan, Kuehler, Nowak, and Palermo
Nays: None
Absent: None

President Asperger thanked the YMCA and the Village Board for their support of staff's recommendation to improve the sidewalks on the Northeast corner of Ogden Avenue and La Grange Road. President Asperger also welcomed both new businesses who earlier received approval for liquor licenses.

5. CURRENT BUSINESS

6. MANAGER'S REPORT

A. Staff Update – Economic Development

Village Manager Robert Pilipiszyn noted that economic development is a high-order strategic priority for the Village Board. The Village has been working with retailers, restaurants, and building owners on retention and recruitment strategies. In addition, the Village has been working with the La Grange Business Association on promotional marketing activities. Mr. Pilipiszyn requested Community Development Director Patrick Benjamin to update the Board on economic development.

Mr. Benjamin announced new businesses soon to open in La Grange and elaborated on the reinvestment of certain local businesses that operate other locations within the Village. Several La Grange businesses also serve as a flagship for locations in outlining communities as well as La Grange attracting business attention from Chicago and neighboring communities. Mr. Benjamin detailed the businesses in both categories and noted that roughly 92% of retail spaces in the downtown area are either occupied or leased.

Mr. Benjamin noted that while two long term businesses are closing, La Grange is better positioned in many ways to continue to rebound. Explaining the concerns in finding new tenants, Mr. Benjamin advised that although La Grange Crossings was recently purchased by Edwards Realty, they chose to retain Mid-America Asset Management, Inc. Mr. Benjamin introduced Barb Kading from Mid-America who presented the Board with specifics on marketing efforts and elaborated on the possibilities for quality new tenants.

President Asperger thanked representatives from Edwards Realty and Mid-America Asset Management for their attendance and endeavors to fill the vacancies.

Mr. Benjamin reflected on surprisingly strong sales tax returns for the Village in relation to the state of the economy.

6-A.7

The YMCA has been responsive in maintaining the vacant ground and Mr. Benjamin expressed thanks to the Park District of La Grange for their efforts in the process.

Mr. Benjamin expressed his enthusiasm with the establishment of a Retail Community Committee and suggested Shop Local Program. In summary, Mr. Benjamin believes La Grange has the location; safe environment; and managed parking that will attract and retain retail businesses.

President Asperger thanked Mr. Benjamin for his refreshing update and optimism on the economic development for La Grange.

7. PUBLIC COMMENTS REGARDING MATTERS NOT ON AGENDA

None

8. EXECUTIVE SESSION

None

9. TRUSTEE COMMENTS

Trustee Kuchler congratulated staff on working with the YMCA to maintain the vacant property.

10. ADJOURNMENT

At 9:30 p.m. it was moved by Trustee Langan to adjourn, seconded by Trustee Holder. Motion approved by voice vote.

Elizabeth M. Asperger, Village President

ATTEST:

Thomas Morsch, Village Clerk

Approved Date: 09-26-11

H:\eelder\ellie\Minutes\VB091211.doc

6-A.8

VILLAGE OF LA GRANGE
Department of Public Works

BOARD REPORT

TO: Village President, Village Clerk,
Board of Trustees, and Village Attorney

FROM: Robert J. Pilipiszyn, Village Manager
Ryan Gillingham, Director of Public Works
Lou Cipparrone, Finance Director

DATE: February 27, 2012

RE: **WATER SYSTEM WORKSHOP - PLAN AND RECOMMENDATIONS TO REPLACE WATER METERS AND FOR IMPROVEMENTS TO THE VILLAGE'S WATER PUMPING STATION**

The FY2011-12 budget includes a $2.3 million bond issue to fund installation of replacement water meters and improvements to the East Avenue Pumping Station. The need for these projects has been discussed during various budget presentations and other planning meetings over the last several years. These projects were included in the current budget based on preliminary assessments and engineering reports.

Since the goals and scope for these projects were identified, staff has worked toward developing an implementation plan. The purposes of this report are to present and summarize the issues associated with each project, discuss the approach that has been taken to date, and to recommend an implementation plan.

This report is organized in four sections: Water Meter Replacement Program, East Avenue Pumping Station Improvements, Water Fund Financial Analysis, and Summary / Recommendations. We provide the background, current approach, and recommendations for next steps for each of the projects in the first two sections. We provide a separate third section analyzing the financial impact of the projects on the water fund, because we propose to finance the work with the bond issue rather than using a pay-as-you-go approach. We then provide our recommendations in the fourth section.

6-B

SECTION 1 - WATER METER REPLACEMENT PROGRAM

The first section of this report discusses the Water Meter Replacement Program and is organized as follows:

1. Background
2. Project Approach / Reasoning
3. Request For Bids
4. Analysis of Bids
5. Recommendations
6. Project Schedule

La Grange Water System

The Village supplies potable water to customers through a network of pipes, pump stations, and storage reservoirs. The Village purchases water from the Village of McCook. McCook receives Lake Michigan water directly from the City of Chicago. The Village's water is received at the La Grange reservoir located at East Avenue and Plainfield Road. From there, water is pumped through the Village's distribution system consisting of 59 miles of water main ranging in size from 4" to 16". The water received from McCook is measured with a water meter located on the incoming water main from McCook. Water usage throughout the Village is measured with water meters on the service lines located at customers' property. There are approximately 4,600 meters throughout the Village for residential, commercial, and industrial customers.

Past Water Meter Projects

It is not exactly known when individual customer's water meters were originally installed, but staff believes it was about 50 to 60 years ago.The first water meters required a meter reader to enter each house to read the meter. These readings were recorded in a book by hand, and then bills were manually generated from this data. Later, mechanical registers were installed on the outside of properties so that water meter readings could be recorded without going inside.

As water meters age, their accuracy decreases as the moving parts inside of the meters become worn. This decrease in accuracy has a direct, negative impact of the Village's water accountability because a worn meter will typically under-measure the water flowing through it, and thus the customer is under-billed for the water that customer is using. Therefore, water meters are routinely replaced at the end of their useful life, which is typically around 20 years for most meters in this area. Additional discussion regarding meter life is discussed in more detail later in this report.

The most recent water meter replacement project was started in 1984-85. Due to a technical issue with the meters, the majority of the meters were replaced several years later over a four-

6-B.1

year period starting in 1987 through 1990. That work was by done by Public Works staff. Individuals who worked on that program indicated that they could change out approximately 15-20 meters on a good day.

The meters installed in 1987 are mechanical meters called "Positive Displacement Meters." In this style of meter, water turns mechanical parts inside the meter, which then rotates a disk attached to the meter register.

Staff can determine the approximate age of each meter by cross-referencing the serial number on the meter with the date of manufacture. The following graph summarizes the meter ages by decade.

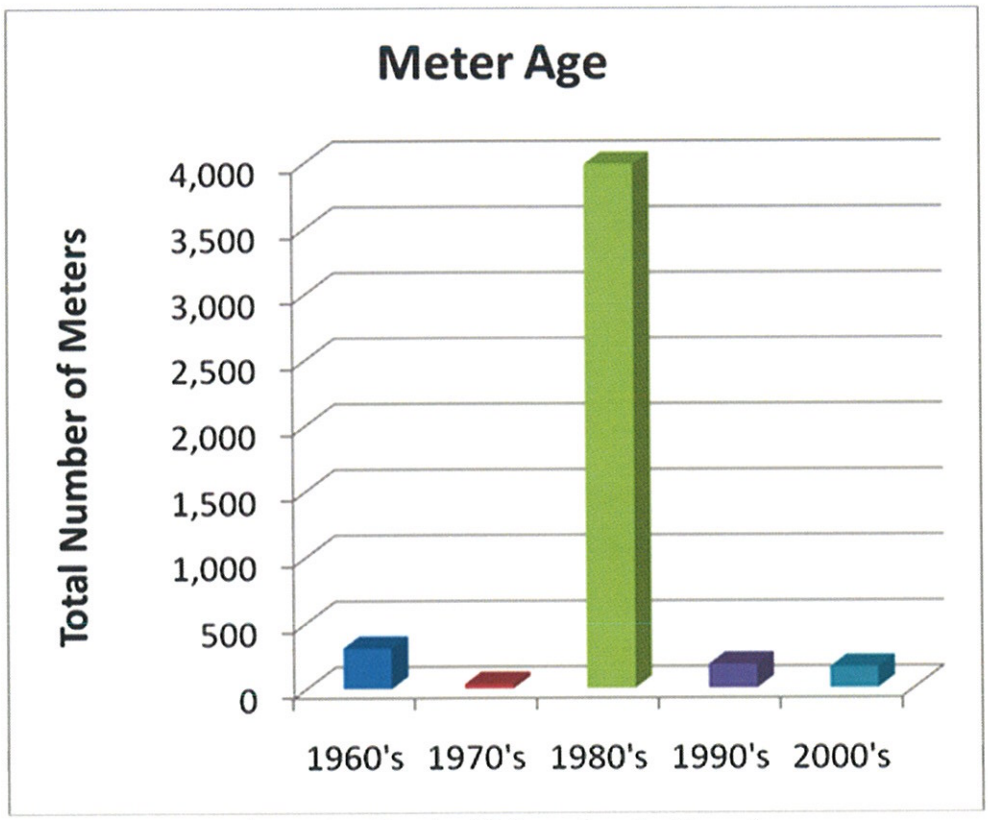


Figure 1 – Graph of Meter Age by Decade

As noted from the above graph, the date of manufacture is consistent with the date of the last meter replacement program. Please note that there are approximately 300 meters that are shown to be manufactured from the 1960's that are currently located within properties in the Village. We believe the majority of these meters were most likely rebuilt in the 1980's. Additionally, some of the meters from the 1987 meter replacement program have been rebuilt and reinstalled, which would not be reflected in above chart and graph. The rebuilding process removes the inside components and reusing the existing brass housing where the

6-B.2

serial number is stamped. The purpose of rebuilding the meter is to save costs by reusing the existing housing and replace the worn mechanical parts to improve the accuracy of the meter.

The 1987 meter replacement program implemented the most current technology of the time. Meters were replaced and touch pads were mounted to the outside of properties. A wire was run between the meter and the touch pad. An electronic collection system was implemented to collect meter readings by touching a handheld device to each touch pad device. Information was then brought back to the Finance Department to be downloaded into the billing software. The Village continues to operate on the technology that was implemented as part of the 1987 meter replacement program.

Water Accountability

As previously mentioned, water meters lose accuracy as the moving parts inside them become worn. Water "slips" by the worn mechanical devices within the meter and some passing water is not recorded. In some instances meters stop working altogether resulting in a "zero" read for usage. When a "zero" read is recorded, the current system flags this reading and a customer service call is initiated. This usually results in the meter being replaced. However, most meters lose accuracy for some time before they stop reading altogether.

For purposes of this report,"unaccounted for water" is defined as water purchased by the Village but not billed to customers because of leaks, inaccurate metering, and other kinds of losses. Unaccounted for water is calculated as the difference in gallons between the amount of water received at the East Avenue Pumping Station and the total amount of water delivered to customers as recorded by the individual water meters. "Unaccounted for water" can be expressed as a percentage of overall loss.

In 2011, the total unaccounted for water—that is, the loss of water between the East Avenue Pump Station and the customer water meters—was approximately 149 million gallons.

Unaccounted for water can occur from different sources. The following is a list of the major sources of unaccounted for water.

1. Water main breaks
2. Leaky joints in water mains
3. Inaccurate metering at the Pump Station
4. Inaccurate metering at customer meters
5. Annual hydrant flushing
6. Firefighting and training
7. Sewer cleaning

Unfortunately, the amount of unaccounted for water attributable to each of these sources is difficult to determine. For example, estimating the amount of water leaking from the joints of old water mains in the system is extremely complex because each main and the surrounding soil conditions are unique. Therefore, staff has taken a pragmatic approach in determining,

6-B.3

quantifying, and fixing the sources of unaccounted for water in order to improve the Village's water accountability.

Specifically, a yearly leak survey has been performed over the last several years to find otherwise undiscovered leaks in the system. The Village also has tested large meters within the Village for accuracy and has determined that these meters, including the incoming meter for the East Avenue Pumping, function properly. Finally, the Village records detailed estimates of water loss when a water main breaks and for other uses such as hydrant flushing and sewer cleaning. These surveys and other efforts have been successful in finding previously undiscovered leaks and defining losses, but these programs have only slowed the overall decrease of the Village's water accountability.

Since these efforts have not resulted in a significant improvement with unaccounted for water loss, staff turned to individual water meters as a potential source of water loss largely because these meters may have exceeded their expected life. Staff tested 25 randomly selected meters throughout the Village for testing.

Meter tests involve removing the meter, then measuring the accuracy of the meter at differing water flow rates, because the accuracy of a worn meter will change as the flow rate changes. Meter accuracy typically is worse at lower flow rates. For example, a new meter may record a slow leaking toilet, when an older meter may not. Additionally, meter accuracy at low flow rates decreases as the meter size increases. The following table details the results of the meter testing that has been performed to date:

			Meter Accuracy		
Location	**Meter Size**	**Manufacturer Year**	**1/4 GPM**	**2 GPM**	**15 GPM**
818 S. Ashland	5/8 x 1/2"	1987	0.0%	0.0%	0.0%
333 S. Gilbert	5/8 x 1/2"	1987	99.7%	99.8%	101.5%
211 S. Gilbert	5/8 x 1/2"	1988	0.0%	0.0%	79.0%
413 Hillgrove	5/8 x 1/2"	1987	98.0%	99.0%	101.2%
817 S. Ashland	5/8 x 1/2"	1987	20.0%	99.0%	101.0%
801 S. 7th Avenue	5/8 x 1/2"	1987	99.0%	99.5%	101.0%
339 S. Gilbert	5/8 x 1/2"	1987	0.0%	98.5%	100.5%
1021 S. La Grange	5/8 x 1/2"	1988	99.0%	101.5%	101.0%
741 S. Waiola	5/8 x 1/2"	1987	0.0%	99.0%	99.0%
25 S. Spring	5/8 x 1/2"	1988	85.0%	99.8%	100.2%
146 Bassford	5/8 x 1/2"	Unknown	29.0%	30.0%	55.0%
750 S. 12th	5/8 x 1/2"	1987	98.0%	100.0%	101.0%
27 N. Spring	5/8 x 1/2"	1987	90.0%	93.0%	100.4%
850 S. 10th	5/8 x 1/2"	1987	0.0%	0.0%	0.0%
130 Ashland	5/8 x 1/2"	1985	90.0%	99.6%	101.0%

6-B.4

803 S. 8th Avenue	5/8 x 1/2"	1988	97.5%	101.0%	100.3%
515 Blackstone	5/8 x 1/2"	1988	90.0%	100.1%	99.0%
641 S. Waiola	5/8 x 1/2"	1988	98.7%	99.8%	99.8%
37 N. Brainard	5/8 x 1/2"	1988	75.0%	101.0%	100.5%
505 Shawmut	5/8 x 1/2"	1987	96.0%	100.0%	100.2%
720 S. 7th Avenue	5/8 x 1/2"	1987	95.0%	99.2%	101.0%

			Meter Accuracy		
Location	**Meter Size**	**Manufacturer Year**	**1/2 GPM**	**3 GPM**	**25 GPM**
500 S. 6th Avenue	3/4"	1987	0.0%	98.5%	101.0%

			Meter Accuracy		
Location	**Meter Size**	**Manufacturer Year**	**3/4 GPM**	**4 GPM**	**40 GPM**
Villa Venice - 1003 Apt.	1"	1987	99.7%	99.8%	101.5%
1030 S. La Grange Road	1"	1987	98.0%	98.2%	99.0%

			Meter Accuracy			
Location	**Meter Size**	**Manufacturer Year**	**20 GPM**	**30 GPM**	**100 GPM**	**270 GPM**
51st & Edgewood	6"	Unknown	95.0%	100.0%	100.0%	100.0%

Figure 2 – Meter Accuracy – Total Volume Estimate

This sample size does not provide for statistically valid conclusions regarding the overall accuracy of the meters within the Village, but it does show that some meters are not operating properly. The inaccuracy is most evident in the low flow rates. Additionally, several of the meters were not functioning at all. (These meters would have been replaced in the next cycle of readings when a zero would have been read on the meter.)

Please note that the outside testing of a meter for accuracy is limited in its application in determining the amount of water loss in the system. Stated in a different way, in order to determine the amount of water that is lost passing through a meter one must know the particular volumes of water that are passing through the meter at the different flow rates. In order to help determine the amount of water loss, as well as to test the new water meter technology, staff devised a method of measuring the amount of water flowing through two different types of meters in order to compare the differences. The following picture is an

6-B.5

example of one of the test sites that was installed in order to try to quantify the amount of water that is not recorded through a meter.

Figure 3 – Test Meter Installation – Public Works

In this picture, the meter on the left is a new positive displacement meter and the meter on the right is a new magnetic meter. The water flows equally through both meters. The difference between the meter readings provides an indication as to the amount of that may be lost due to inaccurate meters. The magnetic meters have no moving parts and more accurately record water passing through them, especially at low flow rates when accuracy drops for displacement type meters.

Staff also ran this test between an old positive displacement meter and a new magnetic meter to determine the difference in the amount of water recorded that could be expected in the Village's system. For these tests it is assumed that the new meter is accurate to AWWA new meter accuracy standards. The following table presents the results of these tests:

6-B.6

Meter Accuracy – Total Volume Estimate				
Location	**Displacement Meter Usage (Cubic Feet)**	**Magnetic Meter Usage (Cubic Feet)**	**Difference In Usage (Cubic Feet)**	**Percentage Difference In Usage**
Comparison with Old Displacement Meters				
80 S. La Grange Road	1395.0	1425.6	30.6	2.19%
88 S. La Grange Road	158.0	166.4	08.4	5.34%
Gilbert Park	89.0	91.0	02.0	2.22%
145 Washington	479.0	485.7	06.7	1.39%
Comparison with New Displacement Meters				
Public Works	890.7	896.8	06.0	0.68%
LTHS	122.5	130.3	07.8	6.34%

Figure 4 – Meter Accuracy – Total Volume Estimate

Staff does not recommend additional sampling or testing of meters because the data collected to date is consistent with Village expectations, other industry studies show consistent results of decreasing accuracy with meter age, and the cost of testing the meters is high. Based on the above research and other industry information, staff estimates that the water "loss" due to inaccurate metering is at least 5% of the Village's total water loss.

The other major source of water loss is likely through leaking joints on aging water mains. The Village's current practice is to replace water mains based on water main break data and concurrently with road repairs. The Village always will have significant water loss attributable to leaking joints on aging water mains because replacing water mains is expensive and funding is always limited. These restraints elevate the importance of finding other ways to reduce water loss such as accurate metering.

External Requirements

In addition to internal processes performed by staff to identify and quantify the issue of water loss, external agencies including the Illinois Department of Natural Resources and the Village's auditors, Sikich, have also provided information to the Village on this issue.

Each year the Village submits its Annual Water Use Audit to the Illinois Department of Natural Resources. This audit documents the Village's unaccounted for water loss and compares it to the maximum allowed by law. Specifically,State regulations set the following standards related to unaccounted for water loss:

6-B.7

> Unaccounted-for flows for applicants in Categories IA and IIB shall not exceed 12% in 1981 decreasing to 8% in 1986 and for all years thereafter except as provided in Section 3730.307(b). The percentages stated in this Section shall be based on net annual pumpage.
>
> As a condition of receiving an allocation of Lake Michigan water, all permittees will agree to submit to the Department proposals designed to reduce or eliminate wasteful water use and to reduce unaccounted-for flows to 8% or less, based on net annual pumpage, and procedures used to determine efficiency of water metering or accounting in permittee's system.

As required by State law, the Village has calculated and submitted the required Annual Water Use Audit. The audit takes into consideration the age of the water mains and other water uses that result in losses such as hydrant flushing. An example of the annual form is attached to this report as Attachment A. The following chart summarizes the results of these reports for the last 7 years.

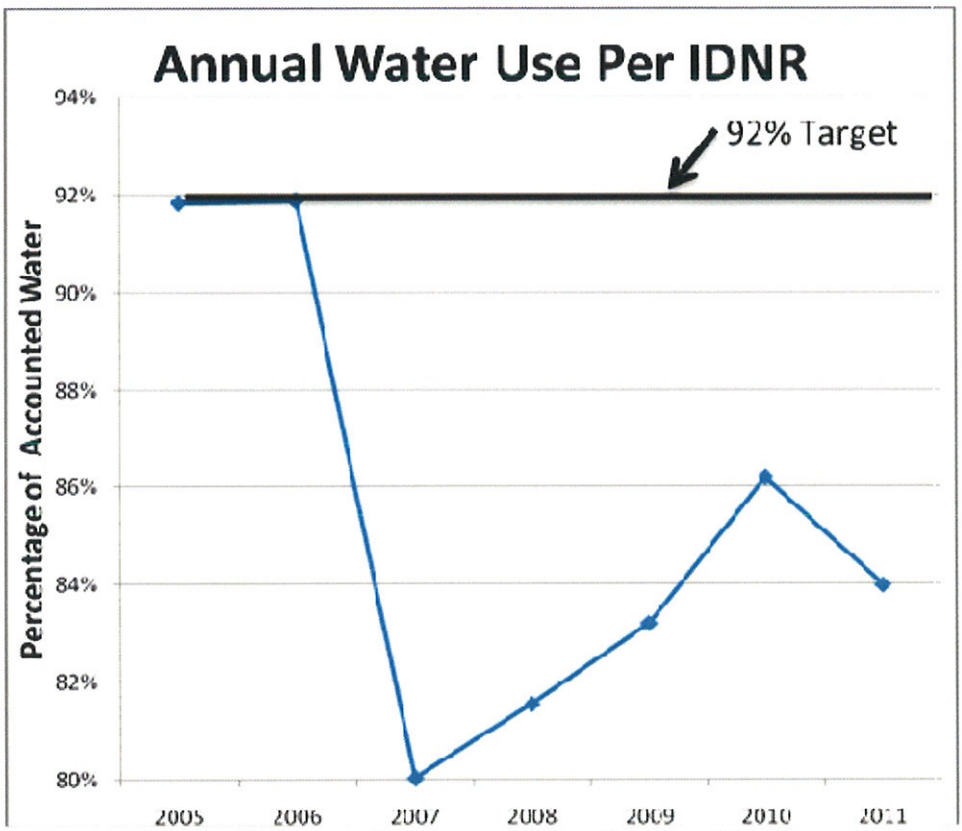


Figure 5 – Annual Water Use Per IDNR

Although the Village has exceededthe maximum threshold identified by the State, the initiatives and actions by the Village have resulted in no additional mandates to date. The IDNR has indicated that the Village should continue to make efforts to reduce the

6-B.8

unaccounted for water loss.

In addition, each Village annual audit is prepared by an outside accounting firm to verify the Village's accounting practices, including the Water Fund. The auditors have identified unaccounted for water as an issue to be addressed in the last 5 audits. In the most recent 2011 audit, the Village's auditor, Sikich, stated the following:

> During our review of the water billing of the Village we noted that the Village's ratio of water billed out versus water pumped was approximately 73.13%, versus 75.86% and 72.6% in 2010 and 2009, respectively. This is a slight decrease over prior years. The Village was aware of issues during the year and does monitor this on a regular basis and is currently planning a large water meter replacement project; however this is a low level that is costing the Village funds on a regular basis. The targeted ratio should be 80% or better. We recommend the Village continue to monitor this closely and implement programs to improve the ratio and utilization water purchased and sold.

As indicated in this excerpt, the auditors use a different standard than the IDNR for calculating unaccounted for water loss. The auditors refer to the total amount of unaccounted for water loss without taking into consideration leaking mains, hydrant flushing and other quantifiable loses. The standard used by the auditors is 80%. The following table details the unmodified unaccounted for water loss over the last 10 years.

6-B.9

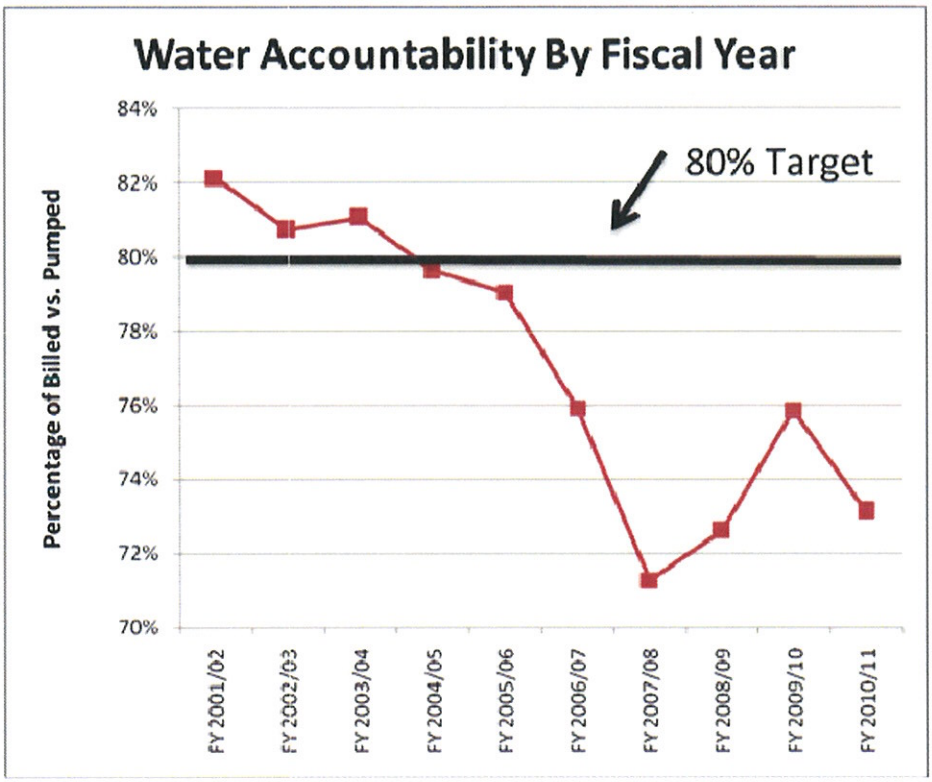


Figure 6 – Water Accountability By Fiscal Year

From a financial standpoint, the Water Fund was established as an enterprise fund to finance the cost of operating, maintaining, and replacing the Village's water distribution system. The water meters facilitate (a) the Village's proper determination of the rate to be charged for water and (b) the equitable distribution of water system costs among customers.

Stated simply, the Village's water rate is determined by estimating the amount of expenses associated with the water fund and dividing the estimated quantity of water to be billed to arrive at a water rate based on a unit of measure. Inaccurate meters result in higher rates than would otherwise be in place due to fewer quantities of water being recorded across the meter. Inaccurate meters also create the potential that customers with accurate meters will pay the proper amount for water while customers with inaccurate meters are being under-billed. Accurate meters across the Village's distribution system are thus an important component of the Village's water ratemaking. Additional information regarding the details of how this rate is calculated is provided in Section 3 of this report.

Recommendation to Replace Meters

Based on the preceding analysis, staff recommends that the individual customer water meters be replaced at this time for the following reasons:

6-B.10

1. The majority of the water meters range in age from 22 to 25 years old. The industry standard for the life expectancy of a water meter is roughly 20 years.

2. Many water meters have been repaired or replaced over the years because of inaccuracy or failure.

3. Numerous water meters have been tested for accuracy and the test results supports the conclusion that many meters are not operating within acceptable accuracy standards and that substantial benefits will result with replacement meters.

4. Based on IDNR's calculation, the Village's unaccounted for water exceeds current regulations.

5. The Village's auditors have stated that unaccounted for water loss is an issue that needs to be addressed based on a financial analysis of the Water Fund.

6. Inaccurate meters result in higher water rates and potentially an inequitable distribution of water fund costs between those customers with accurate meters and those with inaccurate meters.

Project Goals

Based on the above conclusions, staff has identified the following goals for a water meter replacement program:

1. Improve water accountability.

2. Reduce water meter reading expenses through the use of new technology.

3. Improve customer service.

4. Reduce environmental impacts associated with water loss and meter reading, as well as meet new federal maximum lead requirements for meters.

5. Provide a long-term solution to the inaccurate metering issues.

6. Implement program in a way that does not alter existing services.

Greatly Improved Technology

6-B.11

Meter technology has evolved significantly over the years, with improvements both to meter reading technology and the meter itself.

As for meter reading technology.meters can be read now not only from passing vehicles using radio reading technology, but also at a fixed-based meter reading center. The newest meter reading technology is commonly called Automatic Meter Reading (AMR) / Automated Metering Infrastructure (AMI.) With these new systems, communication between meters and a centralized data collection system occurs automatically and at regular intervals each day. These AMR / AMI systems use antennas spaced throughout the Village that communicate with the water meters and automatically send data to the data collection system, which then coordinates with billing software.

Many AMR / AMI systems also use two-way communication technology and software interfaces that provide for leak detection and other enhanced customer service features. For example, a Village employee could get a meter reading (on a customer's moving day, for example) simply by communicating with the meter from the data collection center.

As for the meters themselves, new meter technology now reads passing water with electronic devices, eliminating the moving parts inside the meter. These meters provide improved accuracy, especially at low flow rates, over the life of the meter.

Development of Specifications

New meter reading systems are unique to each manufacturer. Staff thus researched current available technologies and developed a specification based on the technological requirements that would best serve the Village's interests. The technical specifications are divided into two primary sections: (1) water meters, which include the water meters, the meter interface units (MIU), and the installation of water meters and (2) a fixed-base automatic water meter reading system. The following major objectives were identified for the specification consistent with goals identified above:

- Improved accuracy of measurement, thus reducing the unaccounted for water loss.
- Reliability of the system.
- Cost effective meter reading.
- Improved customer service through the effective use of customer usage data and off-cycle meter readings.
- Improved utility operations due to automatic meter readings.

6-B.12

- Ability to change to more-frequent water consumption readings, should they become useful, without additional infrastructure costs.

Staff has designed a "turnkey" project in which one firm would manage the acquisition and supply of materials, installation of the meters and fixed-based system, set-up of software, testing, training, and project closeout. The reasons for this approach are:

1. The value of centralized management and coordination of meter installations.

2. The value of having one party responsible for the successful set-up, coordination, and commissioning of the meter reading system.

3. The savings realized by bundling all the work for a single contractor.

4. The enhanced ability of staff to effectively manage the project while attending to all other current work.

5. The flexibility to perform meter installations during non-working hours at fixed installation rates.

In the past, Public Works employees have installed the water meters, even in 1987 during the comprehensive change-out. This time, however, staff recommends using the contractor to install the meters because of the advanced technologic, existing in-house staffing, and heavy workloads. This raises the question whether the Village is losing some savings that might be realized by phasing the meter replacement work over a number of years and hiring contract employees to do the installations. Staff has considered that question and determined to move forward on the assumption that the work would be completed in a single year for the following reasons:

1. Competitively bidding the project as a single component to be completed as a single project creates the savings noted above.

2. The Village's existing water meter reading equipment is not compatible with the new fixed-based reading system, and thus the old and new systems both would be required if the project is spread out over a longer period of time.

3. The project includes commissioning by the contractor, which includes recording and transferring customer data to the new system, scheduling appointments, management of personnel, and other overhead costs. These are components of the project that, if undertaken in-house, may tax staff resources beyond their limit.

6-B.13

4. It is not advisable to fundthe project with existing revenue sources because the Village has other water system priorities such water main replacement projects.

5. The Village will lose more revenue the longer the project is spread out over time.

In summary, the bid documents requested bids from firms able to provide the following:

- Replace existing water meters and upgrade/replace water meter interface units which are to be compatible with new automatic water meter reading infrastructure.

- Store and transmit pertinent meter reading, data logging information and tamper data from electronic meter registers to a fixed base water meter infrastructure network.

- Supply a fixed network data collection system to collect readings, usage, leak and tamper information from the transmitter modules, and provide the data to the Village's Finance Department.

- Supply software and customer support necessary to provide upload billing data files to Village owned financial software program.

- Include customer support services including assistance with software operation, troubleshooting and reconciling failed devices, network growth and the addition of new devices, training, recurrent software upgrades and other activities to sustain proper operation of the system.

- Install all necessary infrastructure equipment and appurtenances

Request For Bids

The project was advertised in the local newspaper on January 11, 2012, as required by the Village purchasing requirements. The bidding deadline was February 1, 2012. The bid documents and proposed contract incorporated the Village's standard contract language and was reviewed by the Village Attorney.

Because technologies vary between manufacturers, bidders were required to provide unit pricing for the following items so that the Village is able to effectively evaluate different proposals:

6-B.14

Schedule of Prices			
No.	Item Description	Units	Quantity
Water Meters			
1	Supply and install 5/8" Water Meter including Meter Interface Unit (This line item includes both 5/8" x 1/2" and 5/8" x3/4" water meters as determined by the owner. Unit price for either meter will be the same.)	Each	4000
2	Supply and install 3/4" Water Meter including Meter Interface Unit (This line item includes both 3/4" short and 3/4" long water meters as determined by the owner. Unit price for either meter will be the same.)	Each	29
3	Supply and install 1" Water Meter including Meter Interface Unit	Each	105
4	Replace/Retrofit existing touch pads with new Meter Interface Unit for existing meters that are not being replaced	Each	200
5	Replace existing radio read MXU with new Meter Interface Unit for existing meters that are not being replaced	Each	200
6	Additional Cost to install 5/8", 3/4" or 1" meter in pit location	Each	15
Fixed Network Automatic Water Meter Reading System			
7	Supply, install, configure and test collector, collector antenna, mounting hardware, computer equipment, software and all other items necessary for the complete installation of a fixed based network automatic water meter reading infrastructure system per the technical specifications.	Lump Sum	1
8	Hand held device to communicate with individual MIU	Each	1
Additional Unit Price Items			
9	Annual Maintenance Service Contract For Equipment and Software	Each Year	1
10	Installation of 1/2" ball valve	Each	1
11	Installation of 3/4" ball valve	Each	1
12	Installation of 1" ball valve	Each	1
13	Install owner supplied 1 1/2" Water Meter Sensus Omni Meter including Meter Interface Unit	Each	37
14	Install owner supplied 2" Water Meter Sensus Omni Meter including Meter Interface Unit	Each	15
15	Install owner supplied 3" Water Meter Sensus Omni Meter including Meter Interface Unit	Each	3

Figure 7 – Schedule of Prices – Bid Proposal

6-B.15

Analysis of Bids

Two firms submitted bids. Several other firms wrote letters stating that they did not submit bids because their current equipment did not meet the Village's required specifications.

One bid package is from Mueller Systems and is based on a system of meters and fixed-based equipment manufactured by the Mueller Company. The second bid package is from HD Supply Waterworks and is based on a system of meters and fixed-based equipment manufactured by Sensus, Inc.

Each of the bidder's technology is proprietary. Each bid package details the project approach, specifications for the individual pieces of equipment, and cost. The following table summarizes and compares the major components of the bids:

6-B.16

	HD Supply Waterworks		Mueller
Bid Bond	Complies		Complies
Bid Documents	Complies		Not compliant. Bid documents did not include responses to technical questions regarding project team and approach, but rather provided general information as to approach.
Fixed Based System Technology	HD Supply Waterworks bid includes the installation of the FlexNet system manufactured by Sensus, Inc. HD Supply Waterworks performed a propagation study based on the Sensus technology and determined that one antenna located at Village Hall would be required to read the entire Village.		Mueller's bid includes the installation of the Mi.Net system manufactured by Mueller Co. Mueller Systems performed a propagation study of the Village based on their technology and determined that 57 repeaters would be required attached to existing hydrants with 3 collector antennas located at centralized locations within the Village.
FCC Licensing	The Sensus FlexNet system is based on using a primary FCC licensed frequency specifically licensed to Sensus, Inc. for water meter reading purposes. Sensus purchased a license from a pager company in order to support their technology several years ago. The Sensus technology is able to broadcast at this specific frequency without conflicting with other transmitting devices. The Village would be authorized as a sub-licensee for transmitting on this primary frequency.		The Mueller Mi.Net system is based off using non-primary frequencies for communication. Since the system operates in this public frequency additional repeaters are necessary to transmit the data.
Water Meters	Complies. The proposed water meter is called an iPerl meter manufactured by Sensus, Inc. The iPerl meter is a magnetic meter that meets the low flow requirements in the specification.	Not compliant. The proposed water meter under this bid is a positive displacement meter manufactured by Sensus, Inc. that does not meet the low flow requirements contained within the specification.	Not compliant. The proposed water meter is called a positive displacement meter manufactured by Mueller. The meter does not meet the low flow requirements in the specification.

6-B.17

	HD Supply Waterworks		Mueller	
Estimated Yearly Software Maintenance Cost	HD Supply Waterworks provided the estimated yearly cost of software maintenance and technical support to be $5,150. Please note that the Village's existing yearly maintenance cost with Sensus is approximate $1,400 annually.		Mueller provided two options for yearly maintenance and support. The first option is for Mueller systems to host the software and data at a remote location on the east coast. The annual maintenance cost for this option is $20,550.	The second option is if the software and data were to reside on Village equipment. The annual maintenance cost for this option is $17,250.
Total Bid Price	$1,373,200.00	$1,208,072.00	$1,117,379.75 (Hosted)	$1,151,879.75 (Non-hosted)
Warranty	Sensus provides the following warranties for their meter equipment: Meter Accuracy - 20 Years, Battery life for meters and meter interface units - 20 years (prorated after 10 years)		Mueller provides the following warranties for their meter equipment: Meter Accuracy - First 5 Years guaranteed to be at new meter accuracy, Next 15 years guaranteed to be accurate to repaired meter accuracy, Meter Interface Units - 20 years (prorated after 10 years), Hydrant Repeaters - 10 Years (prorated after 5 years)	
Ability To Support Leak Detection	Yes		Yes	
Project Timeline	Complies		Complies	

6-B.18

HD Supply Waterworks proposal with the Sensus, Inc. iPerl meter is the only bid received that is considered responsive to the Village's request for bids. Specifically, the other meter in the HD Supply Waterworks bid and the meter in the Mueller bid do not meet the low flow accuracy requirements in the Village's specifications. Mueller's bid also was considered not responsive because it lacks information requested in the bidding documents related to the specific project team members and project approach.

Because the Village's existing meter infrastructure uses Sensus equipment, the proposed new system re-uses several of the existing components. This will, if the bid is accepted, reduce costs and disruption to customers. The new meter interface unit will clip onto the existing touchpad unit currently located on the outside of the property. The existing two-wire system will be reconnected to the iPerl meter and data will automatically be transmitted from the meter to the meter interface unit and then sent to the central collection system at Village Hall.

A significant advantage of the Sensus iPerl meter is its ability to read water passing through the meter in low flow conditions. The meter can accurately read flows down to 0.03 gallons per minute (the rate of a slowly leaking toilet, for example). A positive displacement meter is not considered accurate at this flow rate. Based on the number of meters in the Village, staff calculates that the iPerl meter would record additional revenue of more than $3 million compared to a traditional displacement meter over a 20-year period. The spreadsheet detailing this calculation and the assumptions used in making this calculation are included in Attachment B. (This calculation does not take into consideration any reduction in water rates that may occur to increased revenues.)

Payback Period

The amount of revenue lost due to inaccurate meters (assuming a 5% loss) is roughly $200,000 based on the current budget.This figure divided by the project cost of $1.5 million results in a payback period of roughly 8years. This is a rough estimate based on the anticipated increase in meter accuracy. And, (1) this figure is less than what can be expected over the anticipated 20-year life of the meter, (2) the existing meters if left in place would become less and less accurate over time, and (3) there are other cost savings to be had with this project through greater efficiency reduced manpower requirements.

Other Benefits of HD Supply Waterworks Bid

The Sensus iPerl meter offered by HD Supply Waterworks has several other features that will benefit the Village. First, the meter can send an alarm automatically to the Village of an empty pipe condition. The Village will respond to that alarm and thus will know if a customer tampers with or removes a meter. Second, the meter and meter interface unit will store several days of data in case of a power failure or if any particular component of the system fails. Third, since the meter is plastic it meets the existing and anticipated future federal standards for lead content.

6-B.19

The Sensus iPerl meter is a relatively new application of magnetic metering technology for residential meters. Sensus has offered a 20-year warranty on all components of the system related to battery life and accuracy. The warranty is "prorated" each year after 10 years. Sensus has indicated that more than 250,000 iPerl meters have been installed to date. Staff has been satisfied with the existing Sensus metering technology that has been in place within the Village for the last 25 years. Based on past performance and reference verification, staff believes that the new technology will perform as published and warranted.

Central to the proposed Sensus system is the data collection unit. Staff proposes to location the data collection unit, including its antenna and supporting computers, at Village Hall. The antennae will replace the existing antenna located on the south roof of the Village Hall and will look identical to the existing antenna in terms of color and size. The existing antenna will be relocated to the Public Works facility for continued use for two-way radio communications. Because the billing software is located in the Finance Department, no recurring monthly charges for transferring the data through cellular communication devices or land lines will be required. The proposed servers for the system would be located in one of the existing server rooms.

The proposed system will eliminate the need for water meter readings at individual properties. Currently meters are read monthly at each commercial property. Residential meters are read every other month. This activity takes approximately two weeks to complete every month. Notably, in conjunction with current vacancies in the Public Works Department, and in anticipation of the meter change out program, the meter reader position was eliminated from the budget and one of the two open full-time positions was filled. The time gained from not performing meter reading would be folded into existing operational needs.

The new HD Supply Waterworks system would need only one new data collection unit and antenna because the system uses a primary FCC frequency and the meter interface units are located on the outside of the individual properties. As part of the bid, HD Supply Waterworks undertook a propagation study to determine the number of antennas required in the Village. A propagation study analyzes the existing terrain, heights of structures, height of proposed antenna locations, power, and location of the meter interface units, and then determines the number of antennas and their location in the Village. The following map shows the propagation study that was completed for La Grange utilizing the Sensus FlexNet system:

6-B.20

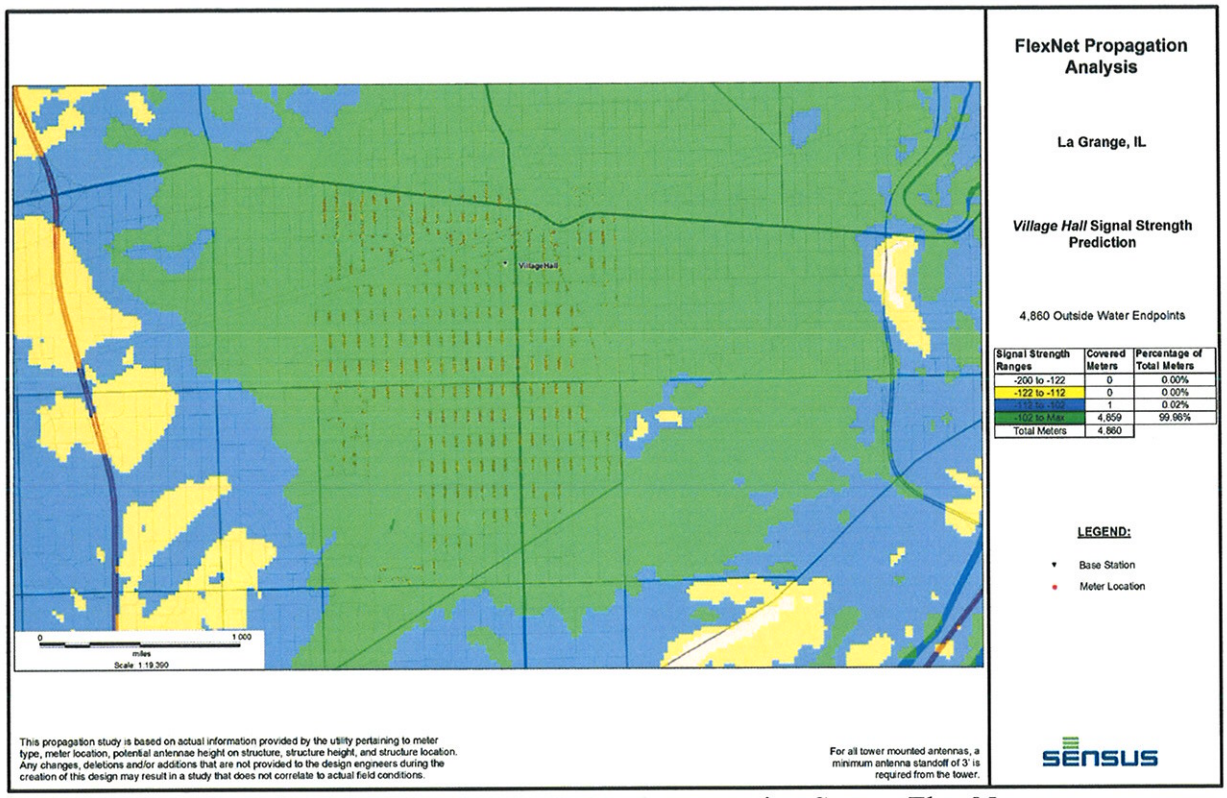


Figure 8 – Propagation Study For La Grange using Sensus Flex Net

In this map, the green color shows that a sufficient signal and connection can be made from each meter location to a single antenna at Village Hall. This is an advantage for the Village because the initial installation cost is lowered, future maintenance costs are reduced, data hauling costs for cellular phone service or land lines between antennae sites and Village Hall are eliminated, and data is physically located only in the secure Village Hall. (Sensus has indicated that more than 250 FlexNet fixed-base automatic reading systems have been installed successfully to date.)

In addition to the metering reading equipment and data collection units, HD Supply Waterworks would provide new software that will provide for enhanced data analysis. For example, Village staff receives many calls from residents about high water bills, with the resident usually claiming that the meter must have been inaccurate. With the new iPerl meters and FlexNet system, Village staff will be able to retrieve data and plot graphs showing usage over a defined period that could be a day, week, or month. The meters can be set to read water usage in increments as small as 15 minutes and, therefore, the system can generate detailed graphs showing water use. The following graph is an example from the proposed FlexNet system:

6-B.21

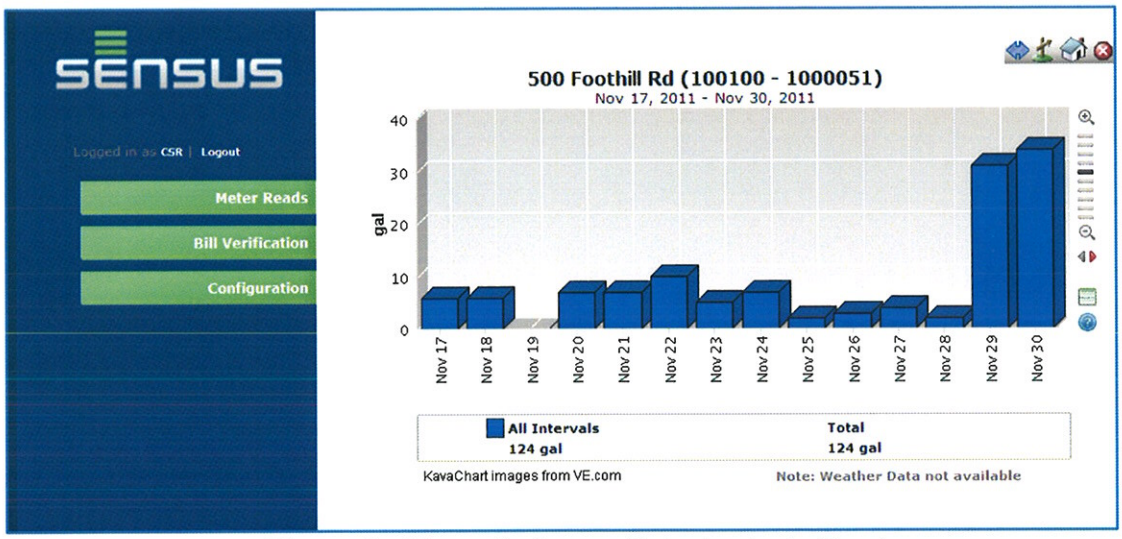


Figure 9 – Example Sensus Data Analysis Graph

Additionally, algorithms are built into the software to monitor meters for unusual water use patterns that may be indicative of leak in the system. For example, if a meter is reading continuous water over a long period of time (which can be specified) or if there is a spike in use, then an alarm would be sent to Village staff. The meters, meter interface units, and data collection unit also can be reprogrammed to change the frequency of reading, units of measure (gallons versus cubic feet), and other features as needed without the need to change the meters or meter interface units. The software can be updated to include new features that may be useful in the future. Similarly, the billing frequency for residential properties can be changed easily from bi-monthly to monthly.

The meter reading data that is transmitted via radio frequencies is encrypted for security purposes. The data would be secured on Village servers subject to the same security provisions that currently exist for the Village's computer network.

The Installation Process

Both bidders indicated that they plan to subcontract the installation work to firms that specialize in meter installation. The specifications state that the meter installation is to be performed by licensed plumbers who will be subject to background checks. All installations will be done with the property owner present and the property owner and installer will be required to sign off on the final reading of the old meter and the first reading for the new meter. As part of the specifications, installers are required to have non-regular work hours in the evenings and on weekends to accommodate customer schedules to avoid taking time off from work.

Meter installation time can vary greatly depending on the conditions of the existing plumbing and location of the meter within the property. For a normal meter installation

6-B.22

where access is not restricted and plumbing does not need to be modified, we estimate that the new meter installation process would take about a half hour. The normal meter installation process includes scheduling the appointment, removing the existing meter, installing the new meter, connecting the communication device to the meter, retrofitting the exterior touch pad, checking for leaks, and recording the serial numbers and initial water readings.

The bidding documents also requested separate unit pricing for several items that were not part of the base bid price. The first item was for yearly maintenance and technical support. Currently the Village pays Sensus approximately $1,400 for this service. This technical support would increase based on the new technology being installed. The new yearly maintenance costs are estimated to be $5,150. For comparison purposes, Mueller indicated that their yearly maintenance costs would be approximately $17,250. Future water fund budgets would reflect the maintenance and technical support costs.

The second item was for the installation of valves on private water lines. In rare cases new meters cannot be installed due either to the lack of a valve or to a broken valve. The costs and responsibility for addition or repair of a valve is the property owner's. Staff nevertheless requested pricing from the bidders for installation or repair of missing or broken valves (1) as a potential service to residents, (2) to avoid delays and inefficiencies in the overall installation program, and (3) to provide an economy of scale for that work. The Village would receive payments by the property owners for the valve installations and repairs at prices set in the contract. If this approach is approved, then the Village will need to include funds for this work up front, with customer reimbursements to follow. We estimate that approximately 150 installations will require valve installations or repairs at a cost of $115 each for an estimated total cost of $17,250.

The third item relates to the home electrical system. A home electrical system typically is grounded by a connection to a water pipe. If a home system needs to be adjusted because the grounding is incorrect or otherwise inadequate, then the meter installer will advise the resident to contact a licensed electrician to inspect the situation. Among other things, a grounding strap is needed across the meter to ensure connectivity on either side of the meter. Again as a service to residents, staff requested a separate unit price for installation of a grounding strap across the meter. The HD Supply Waterworks bid includes a cost to install the grounding strap of $9 each. The number of grounding straps that might be required is not known until a physical inspection of the site occurs. For contractual purposes we have estimated that 10% or 500 installations will require a grounding strap, which equates to $4,500. Again, if this approach is approved, additional funds will need to be allocated for this expense as part of the overall project.

The fourth item relates to meter size. Staff requested additional pricing for the installation of meters 1½" and larger. The majority of the meters in the Village (99%) are residential meters 1" and smaller. For larger meters the Village determined several years ago that the Sensus Omni meters would be used for because of its ability to read low

6-B.23

flows , and adjusted the meter installation rate schedules accordingly. Staff recommends continuing with using these Sensus Omni meters for the approximate 55 meters that are 1½" and larger, regardless of which bidder is selected for the project. Therefore costs were included for the installation of the Omni Meters separately since the selected bidder would not be known until after the bid opening. Therefore the additional cost of these meters will need to be added to the total expense for this project to reflect the material purchase of replacing these larger meters.

Large Meter Installation Cost

Size	Quantity	Omni Meter Material Costs	As Bid Installation Costs	Meter Cost Materials and Installation	Total
1 1/2" Water Meter Sensus Omni Meter including Meter Interface Unit	37	$466.00	$320.00	$786.00	$29,082.00
2" Water Meter Sensus Omni Meter including Meter Interface Unit	15	$654.00	$330.00	$984.00	$14,760.00
3" Water Meter Sensus Omni Meter including Meter Interface Unit	3	$1,062.00	$580.00	$1,642.00	$4,926.00
				Total	**$48,768.00**

Figure 10– Large Meter Installation Costs

Recommendation

HD Supply Waterworks has the technology specified by the Village. The company has vast experience and its references are positive. The company's equipment and technology are compatible to the fullest extent they can be to the Village existing system. The company's bid prices are consistent with the expectations of the Village based on staff research.

6-B.24

The low bidder Mueller Systems specifications are different from the requirements contained in the Village's specifications. Mueller is unable to adjust its equipment and bid to meet the Village's requirements. The Village is unable to make the adjustments necessary to match the low bidder's equipment without entirely changing the Village's program.

Staff therefore has determined that HD Supply Waterworks is the lowest, responsible bidder in the best interests of the Village for the project and staff thus recommends acceptance of the bid from HD Supply Waterworks in the amount of $1,373,200.00.

The HD Supply Waterworks bid, using the Sensus, Inc. system, meets the Village's goals of improving water accountability, reducing expenses through the use of technology, improving customer service, and reducing environmental impacts associated with water loss and meter reading.

The project would include the base bid items plus estimated expenses for repairing defective valves, installation of grounding straps, and installation of large meters (1½" and larger.) The following table details the total estimated project cost with HD Supply Waterworks:

Item	**Cost**
Base Bid – Includes all costs for supply and installation of meters (1" and smaller), meter interface units, and fixed base system components	$1,373,200
Electrical Grounding Straps	$4,500
Large Meter Installations	$48,768
Private Service Valve Repair / Installation (Reimbursable)	$17,750
Total	**$1,444,218**

Staff recommends that the Board approve a contract with HD Supply Waterworks in a total contract amount of $1,444,218. The form of the contract would use the Village's standard terms and conditions, and would be reviewed by the Village Attorney. (Because this is a unit price contract, the final contract cost will be determined when the final number of installed units is known.) The funding sources and budget for the project are detailed in Section 3 – Water Fund Financial Analysis section of this report.

Independent Review

In addition to the analyses performed by staff, the Village hired an outside consultant that specializes in water meter replacement programs to independently evaluate and review the process, findings, and recommendations contained within this report. The consultant,

6-B.25

Thomas Jakubowski of Water Accountability LLC, provided the review, and his analysis and opinion are attached as Attachment C. In summary, Mr. Jakubowski concurs with the findings of staff and with the recommendations as presented. Mr. Jakubowski will attend the Board's meeting and will be available to answer any questions the Board may have for him regarding the project or regarding national trends in water metering projects.

Project Schedule

The specifications for the project require that the fixed base reading equipment be installed and operating three months from the date of contract execution. Also, the specifications require that the contractor complete all meter installations one year from the date of the contract execution. HD Supply Waterworks has indicated that they will meet this schedule. Additionally, they have indicated that the water meter installations should proceed much quicker than the requirements of the specification and therefore could be completed with the project much sooner.

6-B.26

SECTION 2–EAST AVENUE PUMPING STATION IMPROVEMENTS

The second section of this report discusses the East Avenue Pumping Station Improvements and is organized as follows:

1. Background
2. Summary of Report Findings
3. Recommendations

Background

The Village on average pumps approximately two million gallons of potable water per day through a collection of pumps, pipes, and storage facilities. The main component of the Village's distribution system is the East Avenue Pumping Station located at the intersection of East Avenue and Plainfield Road. At the station water is received from the Village of McCook, re-chlorinated, and redistributed through a network of pipes to individual properties. The existing 1.75 million gallon reservoir and pump station facility at East Avenue was constructed in the early 1980's. In 1993 the pumping capacity of the original station was augmented with the construction of a prefabricated below grade pumping station.

Many of the current systems at the pumping station are nearing the end of their useful life and will require replacement such as the generator, control systems, pumps, motors, etc. Additionally, water pumping technology has evolved that could improve the energy efficiency and reliability of the pumping station. In order to assess the condition of this critical piece of infrastructure, Baxter & Woodman was hired to perform an evaluation of the station.

The goals of the study were to evaluate the existing equipment to identify equipment that should be scheduled for replacement, assess new technologies that could increase the efficiency in order to decrease operating and maintenance costs, and review operations to identify areas for improvement. The scope of work of this study included the following:

Electrical / Instrumentation

1. Review electrical equipment including service entrance equipment, motor control equipment, conduit, conductors, and diesel engine generator to determine extent of deterioration and useful remaining life. Evaluate generator replacement alternatives, including opinions of probable cost. Review lighting system (indoor/outdoor).

6-B.27

2. Review instrumentation, including methods of recording and saving operating data. Review electrical billing over the past 10 years to determine cost per KWH and cost per MG pumped.

3. Review current pumping station supervisory system and evaluate life expectancy including availability of repair parts as well as available information and desired information. Evaluate an upgrade to a modern SCADA system.

4. Review possible energy generation utilizing the water entering the ground storage tank and a simple turbine system.

5. Make recommendations for equipment replacement, including cost estimates.

Operations

6. Review operational data including chemical feed costs vs. chlorine residual, daily pumping data including gallons entering tank vs. gallons pumped out, etc. Review pump run times and options to improve pumping efficiency while reducing pumping costs.

7. Review emergency response plan and vulnerability assessment for recommendations to be implemented. Evaluate means to maintain operations during emergency scenarios.

8. Identify alternatives to automate pumping station operation and reduce operational costs.

9. Make recommendations for operational and maintenance procedural changes.

Mechanical

10. Evaluate condition of physical facilities such as pipes, valves, flow meter, "can-style" pump intakes, pumps, chemical feed equipment, etc. to determine repair or replacement.

11. Make recommendation for frequency of evaluation of concrete storage facility given its proximity to the adjacent quarry.

12. Review pump curves and evaluate pump efficiency.

13. Evaluate possible replacement of pump control valve with VFD's or other "soft-start" options to reduce electrical costs.

14. Evaluate liquid chlorine versus gas chlorine.

6-B.28

15. Make recommendations including cost estimates of repairs or replacement.

The study was completed in January 2011 and is attached to this report as Attachment D.

Summary of Report Findings

The East Avenue Pumping Station was constructed in 1984, making many of the components in the station almost thirty years old. Many of the mechanical pieces of equipment have reached the end of their useful life and are in need of replacement. Additionally water pumping station technology has advanced significantly since 1984. Parts for many of the Village's existing station components are becoming more difficult to find. The engineering study on the station identified the following major improvements:

Upgrade electronic control system (SCADA) – The technology that operates the station is from based on the technology at the time of the improvements in 1984. While the existing system is still functioning, replacement parts are becoming more difficult to find. Additionally a newer SCADA system will provide more information, require less operator attention and potentially reduce overtime. A new SCADA system would have the ability to automatically generate reports and log operational information. The estimated cost to upgrade the SCADA system is $120,000.

Replace Automatic Transfer Switch and Motor Control Center – The existing electrical equipment used to power the building is obsolete, difficult to service and approaching the end of their service life. Baxter & Woodman recommends that these pieces of equipment be replaced in the next five years. The estimated cost to replace these pieces of equipment is $75,000.

Convert To A Liquid Chlorine System – The conversion from gas to liquid chlorine would improve safety at the station as liquid chlorine is easier and safer to transport. Additionally replacing the existing gas chlorination system with liquid chlorine is anticipated to increase the life of the pumps. The estimated cost for this conversion is $41,000.

Valve Replacement and Installation– Several valves are recommended for replacement or installation as part of the project. The first valve that is recommended to be installed is external to the station on East Avenue. Its purpose would be to isolate the existing water main on East Avenue to facilitate the continued operation of the pumping station in an emergency such as a main break on East Avenue. The second set of valves that are recommended to be replaced are the pump control valves. The replacement of these valves would improve the operation of the existing pumps by providing better control than the existing valves. Lastly, Baxter & Woodman recommends that a study be undertaken to assess the construction of a series of valves to bypass the East Avenue

6-B.29

Pumping Station should the East Avenue Pump Station become disabled. The proposed valves and piping would tie directly into the McCook feeder and would be used for emergency purposes. The total for these valve projects is estimated to be $58,000.

Other, smaller projects are also recommended in the report. The total estimated cost for all of the recommended projects including engineering services is approximately $500,000. A summary of all the project costs can be found within Appendix D of the attached report.

Recommendations

Staff recommends that the proposed improvements identified in the preliminary engineering report be completed as soon as possible. Due to the importance of the East Avenue Pump Station in supplying potable water to residents, staff recommends replacing the infrastructure at the station that has reached its expected useful life. Additionally staff recommends incorporating the current technology at the station to improve operations and reduce costs.

Staff recommends as the next step for this project to hire an engineering firm to complete the detailed plans and specifications for the project. Additionally, staff recommends that funding in the amount of $500,000 be budgeted for the completion of the engineering and construction of these projects. The following financial section describes in detail the alternatives for the funding of this project.

6-B.30

SECTION 3 – WATER FUND FINANCIAL ANALYSIS

Project Funding

The FY 2011-12 budget includes the issuance of a $2.3 million alternate revenue bond to fund the water meter replacement program and improvements at the East Avenue Water Pumping Station. Based on actual bids received, the required bond issue has been reduced to $2.0 million to fund these improvements.

The budget reflects borrowing funds to finance these two capital projects as sufficient reserves are not available in the Water Fund to complete the projects. The target reserve balance for the Water fund is 50% of annual operating expenditures. At last year's budget workshop, staff reported that the reserve balance in the Water Fund at the end of the five-year budget period (FY 2015-16) was approximately $1.3 million or 35% of annual operating expenditures, which included financing these two projects and 10% water rate increases in FY 2011-12 and FY 2012-13.

At that time, the rate increases were identified as being necessary for revenues to keep pace with projected operating and capital expenditures and to replenish reserves which had been depleted due to on-going water main replacement. It was also noted that if the Village were to complete the water meter replacement project on a pay-as-you go basis, utilizing Village employees to install the new meters, the project would take approximately 6+ years to complete and leave no available funding for the replacement of failing water mains during the duration of the project.

By issuing bonds, the Village is able to: 1) complete these projects within the next fiscal year while amortizing the expenditures over the useful life (20 plus years) of the improvements, 2) address the water accountability issue in a timely fashion, 3) utilize the new meter technology which eliminates reading meters manually, and 4) bill residents for actual water usage in an equitable manner. In addition, current financial conditions are such that the Village will benefit by financing these projects with municipal bonds while interest rates are at historical lows.

Last year, it was also reported that staff had researched alternate funding methods to traditional municipal bonds, for funding the water meter replacement program and pumping station improvements.

The State of Illinois has previously offered a low interest loan program to eligible recipients, primarily local government units, for the construction of water supply facilities that fulfill federal State Revolving Fund requirements. The loan program, which is administered by the Illinois Environmental Protection Agency (IEPA), iscapitalized annually with federal grants and state matching funds. Loans are awarded annually on a competitive basiswith a pre-application deadline of March 31st. We

6-B.31

contacted our financial consultant, Phil McKenna, who is familiar with the program and performed financial analysis on projects utilizing these loans.

Generally, the interest rate for the state program is lower than conventional municipal bonds; however, the program involves an extensive application process and a considerable amount of pre-engineering analysis. We also contacted Baxter and Woodman, the Village's consulting engineering firm, who advised that the loan program includes an approximate two year waiting period for notification of acceptance in the program with no certainty or guarantee of award. In addition, the availability of these loans remains uncertain in the short term due to the state and federal government's current financial condition.

Another alternative method of financing the projects is direct lending from local banking institutions. This form of financing utilized by municipalities who are seeking to borrow funds and have a good credit rating. Direct loans typically carry lower interest rates and lower legal and underwriting fees. However, direct loans are generally required to be paid back more quickly (5-10) years, resulting in higher annual loan payments, additional increases in water rates and/or further reduction of Water Fund reserves.

Staff met with representatives from a local bank to discuss direct loan options and to provide background information regarding the water meter replacement and pumping station projects. Although appreciative of the opportunity, the bank was not interested in issuing a direct loan due to the extended time frame of financing the project over the useful life of the meters/improvements (20 years), given the current historically low interest rate environment (rate risk).

Due to the uncertainties and timing of the IEPA loans and shorter duration of direct loans, it appears that the issuance of conventional municipal bonds may the best, viable funding option at this time. We have asked our financial consultant, Phil McKenna, to attend the workshop on Monday, February 27th, to address any questions or concerns regarding the funding methods available to the Village for this project

Water Rate Increase

The Water Fund was established as an enterprise fund to finance the cost of operating, maintaining and replacing the Village's water distribution system. As mentioned previously, our goal is to maintain Water Fund reserves at about 50% of operating expenses. The Water Fund reserve balance as of April 30, 2011 is approximately 22 percent of annual operating expenses.

Last year, the Village Board approved rate increases of 10 percent, effective May 1, 2011 and May 1, 2012, to keep pace with projected operating and capital expenditures and provide funding for the bond issue recommended for the replacement of water meters and rehabilitation of the pumping station.

It has been a longstanding Village policy to "pass on" water rate increases from the Village of McCook which supplies Lake Michigan water to the Village. McCook receives Lake Michigan water directly from the City of Chicago. The City of Chicago recently announced increases to water rates in the amounts of 25%, 15%, 15% and 15% over the next four years starting on January 1, 2012. Staff continues to work with the West Central Municipal Conference to advocate for lowering these planned increases from Chicago. Staff has assumed for budgeting purposes that these increases will be implemented as presented by the City of Chicago.

In order for the Water Fund to continue to 1) fund ongoing operations including the water rate increase from the City of Chicago, 2) fund the water meter replacement program/pumping station bonds 3) remain active with the replacement of water mains as part of the neighborhood street replacement program, 4) replace mains where known deficiencies exist within the system and 5) rebuild/maintain reserves; water rate increases in the amount of 15%, 7.5%, 7.5% and 7.5% are included in the proposed budget over the next four fiscal years starting May 1, 2012.

Please note the Village rate increases are significantly less than the City of Chicago rate increases as they are primarily applied to the cost of the water purchased in the Water Fund, which is just one component of the total expenses for providing water to residents.

It is estimated that the initial 15% increase will cost an average homeowner approximately $100 annually, with the three subsequent 7.5% increases costing homeowners approximately $65 annually. We will reevaluate the need for subsequent increases on an annual basis during budget preparation in future years.

Please note the water rate increases do not take into account any increase in revenues due to improved water accuracy which we expect to achieve as a result of the water meter replacement project. Should revenues increase due to improved meter accuracy, future water rate increases would be adjusted to reflect the additional revenues.

For comparative purposes, if the Village were solely to pass along the rate increases from Chicago/McCook and <u>not</u> fund bonds for the water meter replacement project, rate increases of 10%, 6%, 6% and 6% would be necessary to capture the increased cost of water purchases ($1 million) over the four year period. As a 10% rate increase was already approved for the bond issue, effective May 1, 2011, the remaining increases of 6% would be implemented beginning May 1, 2012 for three consecutive years. As the rate increases do not provide any additional funding for operations or to replenish reserves, this rate structure results in deficit spending of approximately $250,000 annually, <u>negative</u> reserves in year 4 and does not address the ongoing water accountably issue.

Currently, Water Fund reserves at the end of the proposed five year budget period,

6-B.33

including the Village rate increases as detailed above (15%, 7.5%, 7.5%, 7.5%) are at 30%, which is slightly less than the Water Fund's reserve position as presented during last year's budget discussions, which again also included the water rate increases for the water meter replacement bonds and to keep pace with projected operating and capital expenditures. Therefore, by implementing the proposed water rate increases, the Water Fund is simply maintaining its overall financial condition as discussed last fiscal year and is simply passing through the most recent rate increases from Chicago/McCook.

While we have developed this plan based on the proposed City of Chicago rate increases, we will evaluate future Village water rate increases, one year at a time, pending actual rate increases from McCook and Chicago and results of the water meter replacement program.

Sewer service fees are based on the cubic feet of water used by a property owner multiplied by a separate sewer rate. Therefore, an increase in the water rate does not affect sewer revenues.

Rate Structure

Definition of an Enterprise Fund - According to Generally Accepting Account Principles (GAAP); an enterprise fund is a governmental unit which for services rendered, to be paid for by the customers who use them, operates similar to a business. The services are typically provided to the general public on a user fee/charge, with the intent to generate sufficient revenues to be a self-supporting entity. Enterprise fund are utilized to track services that vary, based on consumption of the commodity and other operating costs. The primary purpose of enterprise funds is to recoup all expenses associated with operations including but not limited to personnel, indirect/overhead costs, operations, maintenance, equipment, capital, depreciation and debt financing.

By definition, the Village of La Grange's Water Fund is a model example of an enterprise fund. As such, the water rate is intended to recover all costs associated with operating as a separate business. For budgetary purposes, the Water Fund utilizes Working Capital (current assets – current liabilities) as a reserve balance and utilizes a cash basis for determining if sufficient revenues are available to meet annual operating expenses.

Presented below is a breakdown of the Village's current and proposed water rates per one hundred cubic feet listed by each separate cost component as a percentage of the overall budget expense.

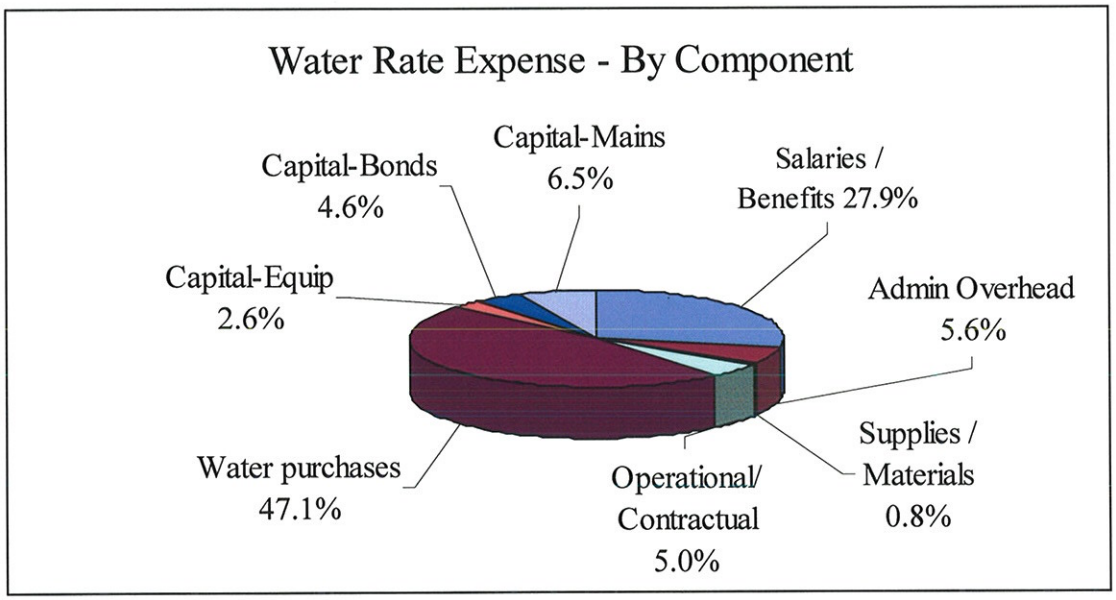


Figure 11 – Water Rate Expense – By Component

Water Rate By Cost Component, as Percentage of Budget

		Current Rate per 100 cu ft $5.82			Proposed Rate per 100 cu ft 15% increase $6.69	
Percentage		FY 2011-12			FY 2012-13	
of Total Exp	Cost Component / Expense	Annual Cost	Component Rate	Percentage of Total Exp	Annual Cost	Component Rate
27.9%	Direct salary / benefit costs	1,066,045	$1.62	26.1%	1,097,265	$1.75
5.6%	Indirect admin/overhead costs	214,139	$0.33	5.5%	229,668	$0.37
0.8%	Supplies/materials	31,465	$0.05	0.7%	31,500	$0.05
5.0%	Operational / contractual	190,196	$0.29	4.7%	195,546	$0.31
47.1%	Water purchases - McCook	1,800,000	$2.74	50.4%	2,120,000	$3.37
2.6%	Capital-Equip reserve/meters/hydrants/lab	97,650	$0.15	2.5%	104,771	$0.17
4.6%	Capital-Bond payment wtr meter repl	175,000	$0.27	4.2%	175,000	$0.28
6.5%	Capital-Est Annual Main Replacement	250,000	$0.38	5.9%	250,000	$0.40
100.0%		3,824,495	$5.82	100.0%	4,203,750	$6.69

Figure 12 – Water Rate By Cost Component, as Percentage of Budget

Indirect administrative overhead costs, which total 5.6% of annual operating expenditures in the Water Fund, include the allocation of a percentage of salaries for Administration, Finance and President & Board Department employees. Administrative overhead functions and responsibilities include: monitoring water usage during peak demand summer months, emergency water conservation efforts, budget development, long term capital planning and water main replacement analysis, investment, payroll, accounts payable, processing/receiving water billing payments, accounting & reporting and customer service.The total administrative overhead cost is within governmental and non-for-profit industry standards of 5-10% of annual operating expenses.

6-B.35

The budgeted water rate increases in the amounts of 15%, 7.5%, 7.5% and 7.5% over the next four fiscal years starting May 1, 2012, assume that the rate increases are as currently proposed by the City of Chicago/McCook. We have attempted to allocate the cost increases related to water purchased over the effected time period, while also taking into account the following:

- Funding to maintain ongoing operations,
- Funding required for the water meter replacement program bonds,
- Remaining active with the replacement of water mains as part of street projects and where know deficiencies exist within the systems, and
- Rebuild water reserves to within our established range of 50% of annual operating expenditures, pursuant to financial policies.

Water Rate survey – A recent survey of neighboring municipalities is detailed below. A combined water and sewer rate is included as municipalities have varying systems in place to bill for their water and sewer operations (flat sewer rate, combined water & sewer rate, sewer based on water usage, separate sanitary district…). It is anticipated the rates will increase for each of the respective communities as the rate increases from the City of Chicago are factored into future water fees.

6-B.36

WATER AND SEWER RATE SURVEY

	Water Rate	Sewer Rate	Total
1 RIVERSIDE	7.84	1.25	9.09
2 BELLWOOD	5.49	1.91	7.40
3 VILLA PARK	5.21	2.10	7.32
4 BLOOMINGDALE	4.02	3.30	7.32
5 HODGKINS	6.92	0.36	7.28
6 BENSENVILLE	4.02	3.18	7.20
7 WEST CHICAGO	2.90	4.20	7.10
8 LA GRANGE PARK	4.96	2.10	7.06
9 LYONS	6.70	0.29	6.99
10 **LA GRANGE**	**5.82**	**0.73**	**6.55**
11 ELMWOOD PARK	6.37	#	6.37
12 BROOKFIELD	4.78	1.30	6.08
13 WESTERN SPRINGS	6.06	#	6.06
14 WESTCHESTER	4.76	0.91	5.67
15 SCHILLER PARK	4.98	0.65	5.63
16 WESTMONT	5.06	#	5.06
17 RIVER FOREST	4.12	0.90	5.02
18 FRANKLIN PARK	3.19	1.71	4.90
19 FOREST PARK	4.73	#	4.73
20 COUNTRYSIDE	4.23	*	4.23
21 LISLE	3.29	*	3.29
22 WARRENVILLE	0.98	1.67	2.65

No separate municpal sewer rate, combined with water or part of a sanitary district.

* Municpalites charge a flat monthly fee for sewer, not based on consumption.

- All rates converted to100 cubic feet for comparison pursposes

- Municipalities served by McCook for City of Chicago water - La Grange, Countryside, Hodkins, Riverside and Lyons

Figure 13 – Rate Survey

McCook / La Grange Rate Increase History – Listed below is a 15 year history of water rate increases from the Village of McCook and subsequent rate increases or if the increase was absorbed by the Village of La Grange.

6-B.37

Water Rate History / Proposed

	Effective Jan 1st	Rate Increase		Effective May 1st	Rate Increase	
McCook	1996	2.35%	La Grange	1996	0.00%	Absorbed by Water Fund
	1997	1.72%		1997	0.00%	Absorbed by Water Fund
	1998	1.69%		1998	0.00%	Absorbed by Water Fund
	1999	0.00%		1999	0.00%	No increases
	2000	4.00%		2000	2.50%	City of Chicago Rate Increase
	2001	4.00%		2001	2.50%	City of Chicago Rate Increase
	2002	4.00%		2002	2.50%	City of Chicago Rate Increase
	2003	0.00%		2003	0.00%	No increases
	2004	2.00%		2004	0.00%	Absorbed by Water Fund
	2005	2.50%		2005	1.50%	City of Chicago Rate Increase
	2006	1.50%		2006	1.00%	City of Chicago Rate Increase
	2007	0.00%		2007	0.00%	No increases
	2008	12.50%		2008	10.00%	Chicago/Operations/Reserves
	2009	12.50%		2009	10.00%	Chicago/Operations/Reserves
	2010	12.50%		2010	10.00%	Chicago/Operations/Reserves
	2011	0.00%		2011	10.00%	Meter Repl Bonds
Actual	2012	20.00%	Proposed	2012	15.00%	Chicago/Metr Repl Bonds
Estimated	2013	12.00%		2013	7.50%	City of Chicago Rate Increase
	2014	12.00%		2014	7.50%	City of Chicago Rate Increase
	2015	12.00%		2015	7.50%	City of Chicago Rate Increase

Figure 14 - McCook / La Grange Rate History

6-B.38

SECTION 4–SUMMARY OF RECOMMENDATIONS

Water Meter Replacement Program

First, staff recommends that the individual customer water meters be replaced at this time based on the age of the meters, testing and analysis that has been performed to date, IDNR and Village auditor requirements, and best practices in managing the Water Fund. Based on this recommendation, staff completed a comprehensive, competitive process for obtaining bids for the replacement of water meters.

Staff determined that HD Supply Waterworks is the lowest, responsible bidder. The proposed equipment and technology are compatible to the fullest extent they can be to the Village existing system. The company's bid prices are consistent with the expectations of the Village based on staff research. The HD Supply Waterworks bid, using the Sensus, Inc. system, meets the Village's goals of improving water accountability, reducing expenses through the use of technology, improving customer service, and reducing environmental impacts associated with water loss and meter reading. Therefore staff recommends that the Board approve a contract with HD Supply Waterworks, Ltd. in a total contract amount of $1,444,218.

East Avenue Pump Station Improvements

Staff recommends that the proposed improvements identified in the preliminary engineering report be completed as soon as possible since many of the components within the station have reached there expected useful life. Therefore, staff recommends as the next step for this project to hire an engineering firm to complete the detailed plans and specifications for the project. The recommendation to the Board for the engineering firm would occur at a later date. The estimated cost for the completion of the engineering and construction for these projects is $500,000.

Financing

The FY2011-12 budget includes the issuance of a $2.3 million alternate revenue bond to fund the water meter replacement program and improvements at the East Avenue Pumping Station. Staff recommends issuing bonds for this project for the following reasons:

1. Ability to complete these projects within the next fiscal year while amortizing the expenditures over the useful life (20 years) of the improvements
2. Address the water accountability issue in a timely fashion
3. Utilize new meter technology which eliminates reading meters manually
4. Bill residents for actual water usage in an equitable manner.
5. Take advantage of low interest rates while they are at historical lows.

6-B.39

In addition to alternate revenue bonds, staff researched other forms of financing for these projects including IEPA loans and direct loans from banks. Based on this research, staff recommends alternate revenue bonds as the source of funding for the water meter replacement program and pumping station improvement project.

Also, staff recommends, as proposed in the FY2012-13 budget, water rate increases in the amounts of 15%, 7.5%, 7.5%, and 7.5% over the next four fiscal years starting on May 1, 2012 for the following reasons:

1. Fund ongoing operations including the water rate increase from the City of Chicago.
2. Fund the water meter replacement program / pumping station improvement bonds
3. Remain active with the replacement of water mains as part of the neighborhood street replacement program.
4. Replace mains where known deficiencies exist
5. Rebuild / maintain reserves

Tonight, we are asking for your concurrence with the proposed plan and recommendations described above.

If there is consensus support from the Village Board to direct staff to move forward with these plans, the next steps would be as follows:

1. Award contract at Board meeting on March 12 to HD Supply Waterworks, Ltd. in a total contract amount of $1,444,218.

2. Hire an engineering firm to complete the detailed plans and specifications for the East Avenue Pump Station Improvements. A recommendation to the Village Board for this award of contract would be anticipated to occur in the next two to three months.

3. Engage a financial consultant and bond counsel for the issuance of a $2.0 million alternate revenue bond to fund both the water meter replacement program and improvements to the East Avenue Pumping Station in March 2012.

4. Implement water rate increases in the amounts of 15%, 7.5%, 7.5%, and 7.5% over the next four fiscal years starting on May 1, 2012.

6-B.40

Figures:

1. Graph of Meter Age by Decade
2. Meter Accuracy – Total Volume Estimate(Outside Company)
3. Test Meter Installation – Public Works
4. Meter Accuracy – Total Volume Estimate
5. Annual Water Use Per IDNR
6. Water Accountability by Fiscal Year
7. Schedule of Prices – Bid Proposal
8. Propagation Study for La Grange using Sensus Flex Net
9. Example Sensus Data Analysis Graph
10. Later Meter Installation Cost
11. Water Rate Expense By Component
12. Water Rate By Cost Component, as Percentage of Budget
13. Rate Survey
14. McCook / La Grange Rate History

Attachments:

A. Illinois Department of Natural Resources – Annual Water Use Audit Form
B. iPERL Worksheet
C. Consultant Review
D. Pump Station Evaluation Report

6-B.41

Attachment A

Illinois Department of Natural Resources
Annual Water Use Audit Form

6-B.42

Village of La Grange

December 30, 2010

Mr. Daniel Injerd
Illinois Department of Natural Resources
Office of Water Resources
Michael A. Bilandic Building
160 North LaSalle Street
Suite # S-700
Chicago, IL 60601

Subject: Village of La Grange
Annual Water Use Audit Form

Dear Mr. Injerd:

Attached please find a copy of the "Water Systems Annual Audit Report" for 2010. The report reflects an unaccounted water loss of 13.80%, which is a decrease from the prior year. We have performed the following activities over the last year to reduce our unaccounted water loss:

1. Replaced 1,000' of 12" water main on Bluff Avenue from Cossitt Avenue to 47th Street.
2. Randomly tested residential water meters throughout the Village for accuracy.
3. Analyzed water billing information for inaccurate meters and replaced meters as necessary.
4. Planned for a leak detection survey throughout the Village to find leaks within the system.
5. Continued implementing new water meter technology (Omni Water Meters manufactured by Sensus) that better read low flow conditions.

As evidenced by the above initiatives, we are committed to continuing to reduce the unaccounted water loss within the Village. Over the next few years we are planning to continue with our water main replacement program, water meter replacement program, leak detection and analysis and water meter testing programs.

If you have any questions or require any additional information, please contact me at (708) 579-2328 ext. 2423.

Sincerely,

Ryan Gillingham, P.E.
Director of Public Works

Attachment: As noted

Department of Public Works 320 East Avenue La Grange, Illinois 60525 (708) 579-2328 Fax (708) 579-2330

6-B.43

Illinois Department of
Natural Resources
One Natural Resources Way Springfield, Illinois 62702-1271
http://dnr.state.il.us

Pat Quinn, Governor
Marc Miller, Director

Office of Water Resources, Michael A. Bilandic Building, 160 N. LaSalle Street, Suite #S-700,
Chicago, IL 60601 Phone: 312/793-3123 Fax: 312/793-5968

2010 Annual Water Use Audit Form (LMO-2)

This form must be completed by all Category IA and IIB Permittees for each annual water use accounting year running from October 1st through September 30th. This form must be submitted to the Department by January 3, 2011.

Section I - General Information

Name, address and phone number of Permittee:

Village of La Grange
53 South La Grange Road
La Grange, Illinois, 60525

County Cook

Name, address and phone number of the contact person for the Permittee:

Mike Bojovic
La Grange Department of Public Works
320 East Avenue
La Grange, Illinois 60525

e-mail address mbojovic@villageoflagrange.com

Authorized Official Mike Bojovic

Title Assistant Director of Public Works

Date December 30, 2010

Please provide the following leak survey information and population estimates for the last year.

Results and recommendations of leak surveys conducted on the water distribution system including progress made in leak repair. (attach to back of form)

6-B.44

Population 15,608 **Number of existing households** 5,624

The Illinois Department of Natural Resources is requesting disclosure of information that is necessary to accomplish the statutory purpose as outlined under Chapter 19, Section 120.2 of the Illinois Revised Statutes. Disclosure of this information is required. Failure to provide any information will result in this form not being processed. This form has been approved by the Forms Management Center, Central Management Services.

Section II - Water Use Audit

Enter the amount of water pumped and utilized for each item shown below. All amounts entered in this section must be in units of million gallons per day (MGD) rounded off to 3 decimal places to the right of the decimal. Conversion calculations are provided for your use in Section IV to convert other commonly used units to MGD.

A. Pumpage Data

Water bought or received from the following distribution systems:

Village of McCook, _____

1. Lake Michigan Pumpage	1.573	MGD
2. Shallow Aquifer Pumpage		MGD
3. Deep Aquifer Pumpage		MGD
4. Total Pumpage (Add lines 1, 2 & 3)		MGD
5. Water Treatment Use		MGD
6. Gross Annual Pumpage (subtract line 5 from line 4)	1.573	MGD

Water sold or provided to any other distribution systems (enter the name of each system and the amount sold or provided to that system on lines 7 through 12). If additional lines are required, attach an additional sheet listing each system and amount.

7.		MGD
8.		MGD
9.		MGD
10.		MGD
11.		MGD
12.		MGD
13. Total (add lines 7-12 and any additional amounts)		MGD
14. Net Annual Pumpage (subtract line 13 from line 6)	1.573	MGD

B. Uses.	Metered	Unmetered	Total	
15. Residential	.889		.889	MGD
16. Commercial and Manufacturing	0.308		0.308	MGD
17. Municipal				MGD
18. Construction				MGD
19. Total Uses (add Total lines 15 through 18)				MGD
20. Percentage of Total Use to Net Annual Pumpage (divide line 19 by line 14 and multiply by 100)			76.10	%

C. Hydrant Uses

21. Firefighting and Training	.0007	MGD
22. Water Main Flushing		MGD
23. Sewer Cleaning	.0004	MGD
24. Street Cleaning		MGD
25. Construction	0.0164	MGD
26. Other (attach explanation)		MGD
27. Total Hydrant Use (add lines 21 through 26)	.0175	MGD

6-B.45

Section II - Water Use Audit (continued)

28. Percentage of Hydrant Use to Net Annual Pumpage (divide line 27 by line 14 and multiply by 100).... ..... 1.1 %
29. Department Requirement for Hydrant Use .... 1.0 %
30. Excessive hydrant use (subtract line 29 from line 28). If the percentage is greater than 0.0, attach explanation. [see Rule 730.307(e)] ... 0.1 %

D. Unavoidable Leakage and Unaccounted for Flow

31. Maximum Unavoidable Leakage (Do worksheet in Section III; enter amount from line 10 of the worksheet) .... .139 MGD
32. Percentage of Maximum Unavoidable Leakage to Net Annual Pumpage (divide line 31 by line 14 and multiply by 100).... ..... 8.84 %
33. Total Accounted for Flow (add lines 19, 27 and 31)..... 1.356 MGD
34. Percentage of Total Accounted for Flow to Net Annual Pumpage (divide line 33 by line 14 and multiply by 100).... ..... 86.20 %
35. Total Unaccounted for Flow (subtract amount on line 33 from line 14) .0.217 MGD
36. Percentage of Total Unaccounted for Flow to Net Annual Pumpage (divide line 35 by line 14 and multiply by 100).... ..... 13.80 %

Please Check Your Calculations

The sum of lines 33 and 35 should equal line 14. If they do not equal, recheck your calculations.
The sum of lines 34 and 36 should equal approximately 100%. If not, check your calculations.

Section III - Maximum Unavoidable Leakage Worksheet

Complete the following calculations to determine your maximum unavoidable leakage. Enter the appropriate amounts in the spaces provided.

A. Cast Iron Pipes With Lead Joints

Age of Pipe	Miles of Pipe	Leakage Rate*	Maximum Unavoidable Leakage**
1. 60 yrs. or greater	33	x 3000 g/d/mi =	99,000 g/d
2. 40-60 yrs.	7	x 2500 g/d/mi =	17,500 g/d
3. 20-40 yrs.		x 2000 g/d/mi =	g/d
4. 20 yrs. or less		x 1500 g/d/mi =	g/d

B. All Other Types of Pipes and Joints

5. 60 yrs. or greater		x 2500 g/d/mi =	g/d
6. 40-60 yrs.		x 2000 g/d/mi =	g/d
7. 20-40 yrs.	7	x 1500 g/d/mi =	10,500 g/d
8. 20 yrs. or less	12	x 1000 g/d/mi =	12,000 g/d
9. Total Miles	59	Total Leakage	139,000 g/d

10. Total Maximum Unavoidable Leakage, in MGD (divide total leakage on line 9 by 1,000,000) .... .139 MGD
(Enter this amount on line 31 of "Section II - Water Use Audit")

* Leakage Rate expressed in gallons per day per mile (g/d/mi)
** Maximum Unavoidable Leakage expressed in gallons per day (g/d)

6-B.46

Attachment B

iPERL Worksheet

iPERL Worksheet

Change the cells in green to modify the spreadsheet

Quantity Residential Meters:	4,600
Average Usage (gal/yr):	95,000
20 yr Accuracy loss:	3%
Low Flow Accuracy Increase:	7%
Anticipated Low Flow Measurement of Total Water Usage:	15%

Water Rate:	7.78
Sewer Rate:	0.98
Increase per year:	5%

Additional items to consider:

* No maintenance costs
* Additional high flow measurement

1	cubic ft	=	7.48 gallons
	cubic meters	=	0 gallons

Year	B Usage	C Accuracy Loss	D Cost Water	E Cost Sewer	F Total Cost	G 100% Charge	H Actual Charge	I Difference	J Low Flow Accuracy	K Added Revenue	L Total Added Revenue	M Total Actual $	N Total Billable $	O Additional Revenue
1	95,000		$7.78	$0.98	$8.76	$832.20	$832.20	$0.00	998	$8.74	$8.74	$3,868,315	$3,828,120	$40,195
2	95,000	94,858	$8.17	$1.03	$9.20	$873.81	$872.50	$1.31	998	$9.18	$10.49	$4,061,731	$4,013,497	$48,234
3	95,000	94,715	$8.58	$1.08	$9.66	$917.50	$914.75	$2.75	998	$9.63	$12.38	$4,264,818	$4,207,850	$56,967
4	95,000	94,573	$9.01	$1.13	$10.14	$963.38	$959.05	$4.33	998	$10.12	$14.44	$4,478,058	$4,411,615	$66,443
5	95,000	94,431	$9.46	$1.19	$10.65	$1,011.54	$1,005.49	$6.06	998	$10.62	$16.68	$4,701,961	$4,625,248	$76,713
6	95,000	94,290	$9.93	$1.25	$11.18	$1,062.12	$1,054.18	$7.94	998	$11.15	$19.09	$4,937,059	$4,849,226	$87,834
7	95,000	94,148	$10.43	$1.31	$11.74	$1,115.23	$1,105.23	$10.00	998	$11.71	$21.71	$5,183,912	$5,084,049	$99,863
8	95,000	94,007	$10.95	$1.38	$12.33	$1,170.99	$1,158.75	$12.24	998	$12.30	$24.54	$5,443,108	$5,330,244	$112,864
9	95,000	93,866	$11.49	$1.45	$12.94	$1,229.54	$1,214.86	$14.68	998	$12.91	$27.59	$5,715,263	$5,588,361	$126,902
10	95,000	93,725	$12.07	$1.52	$13.59	$1,291.02	$1,273.69	$17.32	998	$13.56	$30.88	$6,001,027	$5,858,978	$142,049
11	95,000	93,585	$12.67	$1.60	$14.27	$1,355.57	$1,335.37	$20.20	998	$14.23	$34.43	$6,301,078	$6,142,699	$158,379
12	95,000	93,444	$13.31	$1.68	$14.98	$1,423.34	$1,400.03	$23.31	998	$14.95	$38.25	$6,616,132	$6,440,159	$175,973
13	95,000	93,304	$13.97	$1.76	$15.73	$1,494.51	$1,467.83	$26.68	998	$15.69	$42.37	$6,946,938	$6,752,024	$194,915
14	95,000	93,164	$14.67	$1.85	$16.52	$1,569.24	$1,538.91	$30.33	998	$16.48	$46.80	$7,294,285	$7,078,991	$215,295
15	95,000	93,024	$15.40	$1.94	$17.34	$1,647.70	$1,613.43	$34.27	998	$17.30	$51.57	$7,659,000	$7,421,791	$237,209
16	95,000	92,885	$16.17	$2.04	$18.21	$1,730.08	$1,691.56	$38.52	998	$18.17	$56.69	$8,041,950	$7,781,191	$260,759
17	95,000	92,745	$16.98	$2.14	$19.12	$1,816.59	$1,773.48	$43.11	998	$19.07	$62.19	$8,444,047	$8,157,995	$286,052
18	95,000	92,606	$17.83	$2.25	$20.08	$1,907.42	$1,859.36	$48.06	998	$20.03	$68.09	$8,866,249	$8,553,046	$313,204
19	95,000	92,467	$18.72	$2.36	$21.08	$2,002.79	$1,949.40	$53.39	998	$21.03	$74.42	$9,309,562	$8,967,227	$342,335
20	95,000	92,329	$19.66	$2.48	$22.14	$2,102.93	$2,043.80	$59.13	998	$22.08	$81.21	$9,775,040	$9,401,465	$373,575
								453.62		$288.93	$742.56	$127,909,535	$124,493,776	$3,415,759

6-B.48

Attachment C

Consultant Review

6-B.49

WATER ACCOUNTABILITY, LLC

WATER LOSS MANAGEMENT & AMR CONSULTING

MAKING EVERY DROP COUNT

February 20, 2012

Mr. Ryan Gillingham
Public Works Director
Public Works
320 East Avenue
La Grange, Il 60525

Re: AMR System Selection

This correspondence has been prepared in accordance with the recent recommendation of HD Waterworks Supply by the Village of La Grange AMR Selection Team. The selection team went through a Request for Bids and rigorous evaluation process; including proposal reviews, costs evaluations, interviews, and reference checks to determine their final recommendation.

As part of a third party evaluation, I reviewed the proposals and Water Meter Replacement Program Report, along with phone interviews, and concur with the recommendation of HD Waterworks Supply and feel that this selection will meet the goals and objectives of the Village.

Sincerely,

Thomas D. Jakubowski,

President

Water Accountability, LLC
N76 W22300 Cherry Hill Rd, Sussex, WI 53089
Phone: 262.251.9020 Cell: 262.853.8142
Email: tomjakubowski@wi.rr.com

6-B.50

Attachment D

Pump Station Evaluation Report

6-B.51

Village of LaGrange, Illinois

East Avenue Pumping Station Evaluation Report

January 2011

8678 Ridgefield Road
Crystal Lake, IL 60012
815.459.1260
Fax 815.455.0450
info@baxterwoodman.com

6-B.52

VILLAGE OF LA GRANGE, ILLINOIS
WATER SYSTEM STUDY
EAST AVENUE PUMPING STATION EVALUATION

TABLE OF CONTENTS

Section		Page No.
1.	INTRODUCTION	
1.1	Scope and Purpose of Evaluation	1-1
1.2	Pumping Station Overview	1-2
1.2.1	Main Station	1-2
1.2.2	Substation Pumping Station	1-5
1.2.3	Ground Storage Reservoir	1-6
1.2.4	Village Demand	1-6
1.2.5	Pumping Capacity	1-7
2.	MECHANICAL	
2.1	Condition of Major Mechanical Equipment	2-1
2.1.1	Main Station	2-1
2.1.2	McCook Influent Meter	2-1
2.1.3	Pumping Wells (cans)	2-2
2.1.4	Pump Well Air Release	2-2
2.1.5	Pump Discharge Air Release	2-3
2.1.6	Chemical Feed Equipment	2-3
2.1.7	Substation	2-4
2.2	Existing Pumping Equipment	2-5
2.2.1	General	2-5
2.2.2	Corrosion of Main Station Pumps	2-6
2.3	Pump Efficiency	2-7
2.4	Pump Surge Control	2-8
2.4.1	Soft-Start Programmable Starters	2-10
2.4.2	Variable Frequency Drives	2-10
2.4.3	Deep Well Pump Control Valves	2-11
2.4.4	In-line Pump Control Valves	2-11
2.5	Liquid Chlorine vs. Gas Chlorine	2-12
2.5.1	Gas Chlorine System Description	2-12
2.5.2	Disadvantages Associated with Chlorine Gas	2-13
2.5.3	Advantages Associated with Chlorine Gas	2-14
2.5.4	Liquid Chlorine	2-14
2.5.5	Proposed Improvements if Converting to Liquid Chlorine	2-15
2.5.6	Estimated Construction Costs	2-16
2.5.7	Annual Chemical Costs	2-16
2.5.8	Overall Station Efficiency	2-17

6-B.53

Section		Page No.
2.6	McCook Direct Feed (Station By-Pass)	2-18
2.7	Recommendations	2-19
3.	ELECTRICAL/INSTRUMENTATION	
3.1	Major Electrical Equipment	3-1
3.2	Engine Generator	3-2
3.3	Lighting Systems	3-3
3.4	Instrumentation	3-3
3.5	Electric Power Usage	3-4
3.6	Supervisory Control and Data Acquisition (SCADA) System	3-5
3.7	Recommendations	3-7
3.7.1	General Electrical Modifications	3-7
3.7.2	Supervisory Control System	3-8
3.7.3	Alarm Notification	3-9
3.7.4	SCADA System Security	3-9
3.7.5	ComEd Billing Option: Curtailment or Demand Response Program	3-10
4.	OPERATIONS	
4.1	Existing Operational Data	4-1
4.1.1	Daily Reporting	4-1
4.1.2	Additional Daily Informational Tracking	4-1
4.2	Pumping Operation	4-1
4.2.1	Pump Operation	4-1
4.3	Pumping Station Condition	4-2
4.3.1	Main Pump Station	4-2
4.3.2	Underground Substation	4-3
4.4	Existing ERP and VA	4-3
4.4.1	Emergency Response Plan	4-3
4.4.2	Vulnerability Assessment	4-3
4.5	Emergency Operation	4-3
4.5.1	Emergency Standby Generation	4-3
4.5.2	Substation	4-3
4.6	Recommendations	4-4
4.6.1	Operational Data	4-4
4.6.2	Pump Operation	4-5
4.6.3	Emergency Response Plan and Vulnerability Assessment	4-5
4.6.4	Emergency Operation	4-6
4.6.5	Main Station Isolation Valve	4-6

6-B.54

Section		Page No.
5.	ENERGY EFFICIENCY FUNDING	
5.1	Funding Opportunities	5-1
6.	REPORT SUMMARY	
6.1	Report Findings	6-1
6.1.1	Main Station Building	6-1
6.1.2	Main Station Equipment	6-1
6.1.3	Substation	6-2
6.2	Expected Life Expectancy	6-2

LIST OF TABLES

Table		Page No.
1	Summary of Village Demands – Jan. 2007 through Sept. 2010	1-7
2	Existing Pumping Equipment	2-5
3	Liquid Chlorine Storage Life	2-14
4	Estimated Sodium Hypochlorite Construction Costs	2-16
5	Projected Annual Chemical Costs	2-17
6	Summary of Mechanical Recommendation Construction Costs	2-21
7	Estimated SCADA Construction Costs	3-11
8	Summary of Electrical Recommendation Costs	3-12
9	Summary of Operational Recommendation Costs	4-6

LIST OF APPENDICES

Appendix	
A	Electrical/Controls Equipment Inventory
B	Summary of Electric Bills and Pumping
C	Mechanical Equipment Inventory

6-B.55

Appendix

D Summary of Recommendations and Costs

E Summary of Operational Recommendations

F Description of In-Line Pump Control Valves

6-B.56

1. INTRODUCTION

1.1 Scope and Purpose of Evaluation

The Village of LaGrange owns and operates a safe and reliable water supply which is critical to the well-being of the community. The Village wishes to continue efficient long-term operation, control and security of the system.

The East Avenue Pumping Station consists of three structures: the original pumping station (Main Station), a water storage reservoir and a pre-fabricated pumping station (Substation). The East Avenue pumping station Main Station was constructed in 1984 for the purposes of receiving Lake Michigan Water from the Village of McCook, storing water and distributing water to the Village of LaGrange. The Main Station and water storage reservoir are now 26 years old and many of the components within the station are nearing the end of their anticipated useful life. The purpose of this study is to determine the remaining life expectancy of each component, make recommendations for improvements and determine where efficiencies can be gained.

Since 1984, mining of gravel by Material Service Corporation has created a very deep and large quarry on the east side of the facility. The boundary of the quarry excavation extends to within a few feet of the north and east property lines of the station. The mining of gravel by explosives frequently vibrates the facility. The facility was designed to meet anticipated seismic conditions for the area. However, there is still concern that the frequent, low level vibrations resulting from the mining could create stresses on the facility, both structure and equipment. The structural integrity of the facility as well as the effect on equipment within the facility is beyond the scope of this report and it is recommended that they be investigated further.

6-13.57

In 1994, a below-grade, pre-fabricated steel pumping station Substation was placed into service. The purpose of the Substation was to supplement flow and provide a means of by-passing the Main Station and reservoir.

The Village wanted the following questions about the existing pumping stations addressed:

- What is the condition of the existing 1984 and 1994 equipment, including major mechanical and electrical control equipment, and how maintainable are they?
- What is the condition of the existing supervisory control and data acquisition (SCADA) equipment and how maintainable is it?
- How secure is the facility?
- What is the life expectancy of the existing pumping and equipment?
- Are there means of improving the efficiency of pumping operation and reduce operating costs?

The Baxter & Woodman evaluation team visited the facility on October 12, 2010. The evaluation team consisted of Professional Engineers, including a Senior Design Engineer, Certified Water Operator and a licensed Electrical and Control Systems Engineer.

The evaluation team inspected the facility and focused on the concerns expressed by the Village Staff. This report addresses those concerns and provides recommendations. The evaluation did not include an inspection of the interior of the reservoir or an evaluation of the structural integrity of the pumping station and concrete reservoir. The Village will address the structural integrity questions in a later report.

1.2 Pumping Station Overview

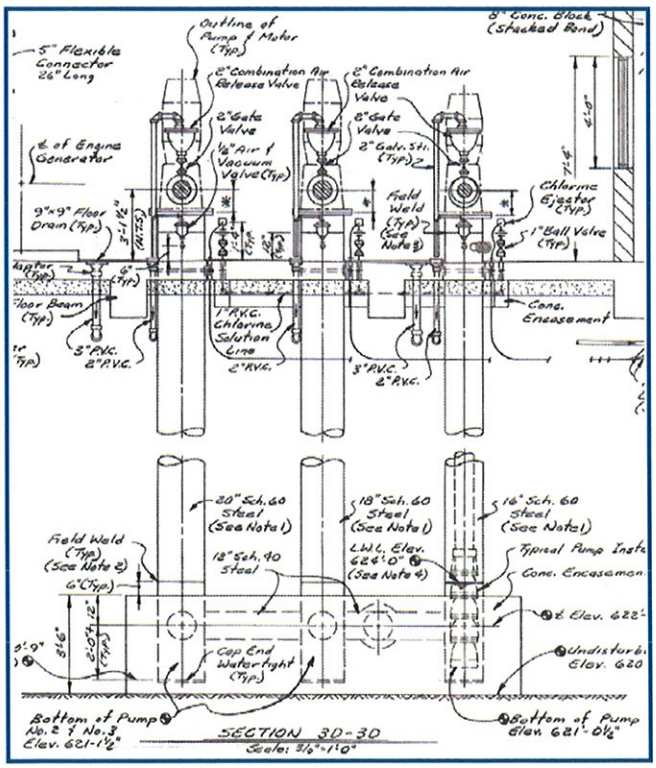
1.2.1 Main Station - The Main Station was constructed in 1984 for the purposes of receiving Lake Michigan water from the Village of McCook, storing water and distributing

6-B.58

water to the Village of LaGrange. The facility is located on the southeast border between the Village of McCook and the Village of LaGrange on East Avenue.

The Main Station consists of flow control, pressure control and metering to control and monitor the flow of water received from McCook. The flow of water from McCook enters the reservoir at a relatively constant rate and is delivered to the Village by three high service booster pumps at the rate necessary to meet demand.

The Main Station employs "can-style" vertical turbine pumps (see Figure 1). Each pump is inserted into a vertical steel pipe or "wet well". The bottom of each pipe is connected to the outlet of the adjacent reservoir.



Main Station Pumps - Figure 1

The vertical turbine pump style allowed the motors to be placed above grade, protecting them from potential flooding damage, with the pumps below grade in the vertical steel pipe. When the pumps are not in operation, the water level within the steel wet well is the same as the reservoir. This type of arrangement negates the need for a vacuum priming system which is necessary on pumps placed above the water level of the reservoir. When the pump is in operation, the water level in the steel wet well is lower than the level within the reservoir due to friction loss in the pipe between the tank and the pump wet well. This potentially creates issues with the pump if friction loss is too high, which can reduce pumping efficiency.

6-B.59

The advantages to this style of pump and station construction are its lower initial construction cost and similarity to potable well style pumps. This station replaced the Village's potable water wells so the Village Staff was very familiar with maintaining and operating this style of pump.

Disadvantages to this style of pump include the use of the steel pipe (wet well) which can corrode under certain conditions and begin leaking reservoir water into the ground. Further, experience has shown the flow of water into the can has the potential of creating flow patterns which can reduce pump efficiency. It is unclear if, or when, the pump casings were last inspected; and corrosion could be contributing to leaking and water loss. Another disadvantage is the lack of pipe which allows by-passing the reservoir in the event of an emergency or maintenance on the reservoir.

Relatively uniform flow patterns result from long, straight pipe. Flow patterns become disturbed and non-uniform immediately downstream of a ninety-degree bend or branch of a tee. Disturbed flow results when the water enters the steel wet well and must change direction to enter the suction of the pump. Two rapid changes in direction can create a pattern which the pump impeller must redirect into the pump volute. Research by various pump manufacturers has shown, by shaping the flow of water entering a pump impeller correctly, the pump may operate more efficiently.

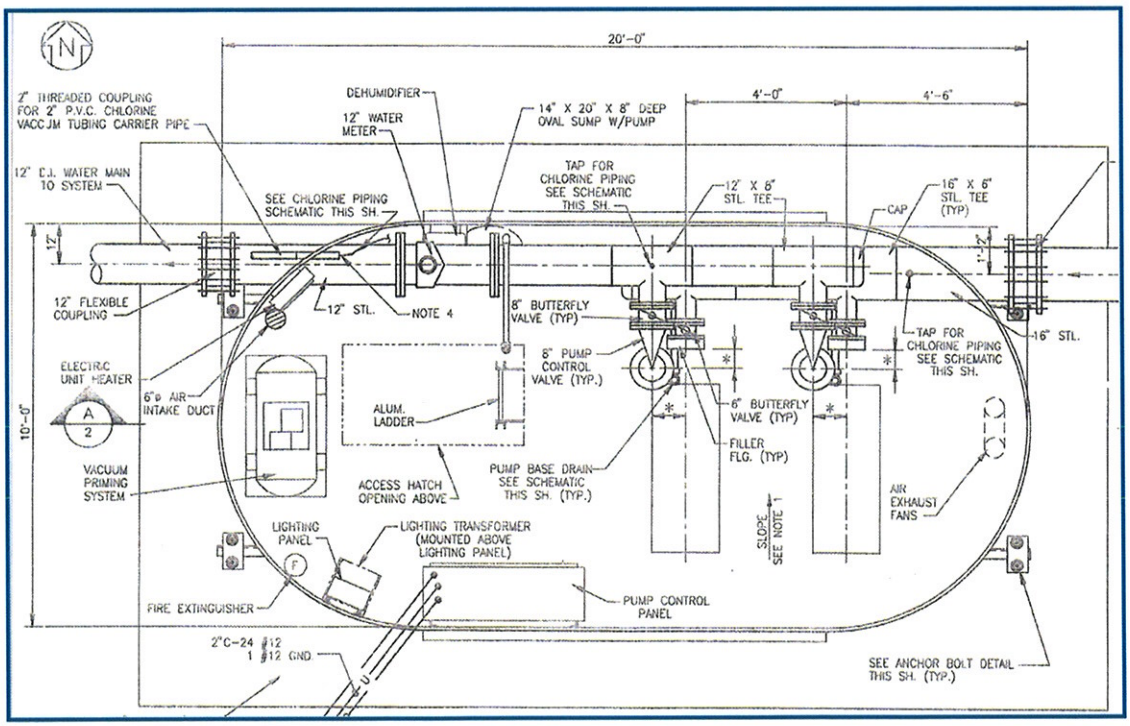
Since 1984, when the Main Station went into operation, the three pumps have been replaced every five to seven years, which is unusual for a pump. Several years ago, an investigation by Baxter & Woodman, Inc. (BWI) concluded that the premature pump failure was not caused by the flow into the pumps. The cause of the premature pump bowl and shaft failures appeared to be the result of corrosion.

A possible contributing factor to the premature corrosion is the point of chlorination. Water pumped from the reservoir is chlorinated via a vacuum gas system to maintain a

6-B.60

disinfected water supply and injected into the pipe immediately up stream of the pump suction header. The pump control valve slowly reduces flow from the pump to the distribution system when the pump is stopped. During the reduction of flow, chlorination continues to be injected into the water stream at the same rate as if the pump were operating at full capacity. The result is a very highly chlorinated water which remains in contact with the pump until the next time the pump is started.

1.2.2 Substation Pumping Station - The pumping capacity of the Main Station was augmented with the construction of a prefabricated, below-grade, pumping station, also designed by BWI in 1992. Construction of the new station was completed in August of 1993 (see Figure 2).



Sub Station Plan View - Figure 2

6-B.61

The design and construction of the Substation was considered prudent as removal of rock at the adjacent quarry by explosives was thought to cause cracks in the Main Station superstructure. Premature failure of the superstructure or reservoir was a growing concern.

The below-grade pumping station was constructed for the following purposes:

- To supplement the flow from the existing station during high demand by providing two 2.0 million gallons per day (MGD) pumps.
- Maintain flow from the reservoir should damage occur to the Main Station.
- Provide pumping capability directly from McCook (by-pass the reservoir) in the event damage occurred to the reservoir.

The Substation was designed with the capability to bypass the reservoir and pump water directly to the Village from the McCook supply using one or both of the horizontal split-case pumps. Based on information provided by the operators, this by-pass feature has never been used or tested. It is recommended that a test of the by-pass be performed so as to familiarize the operators with the operation.

1.2.3 Ground Storage Reservoir - BWI designed the existing 1.75 million gallon reservoir and pumping station in 1983 and construction was completed in August of 1984. The pre-stressed, pre-cast concrete reservoir has a capacity of 1.75 million gallons (MG). The tank was designed to receive and store potable drinking water.

The Village receives treated Lake Michigan water from McCook, no additional treatment other than maintaining acceptable chlorine residual is needed. The Village adds chlorine in the form of vacuum gas to the water pumped from the reservoir.

1.2.4 Village Demand - Table 1 is a summary of the Village's water demand for the period of January 2007 through September 2010.

6-B.62

TABLE 1

Summary of Village Demands – Jan. 2007 through Sept. 2010

	Average (gallons)	Maximum Day (gallons)	Minimum Day (gallons)
Average	1,675,678	2,022,302	1,376,651
Maximum	2,136,548	2,811,000	1,763,000
Minimum	1,429,666	1,295,000	928,000
Standard Deviation	173,661	275,573	163,804
Maximum Day to Average Day Ratio:		1.68	
Minimum Day to Average Day Ratio:		0.55	

The Village's average daily demand (ADD) for the review period was 1.676 MGD. The maximum daily demand (MDD) was 2.811 MGD, resulting in a MDD to ADD ratio of 1.68. The national statistical average MDD:ADD ratio is 1.75; placing the Village's MDD:ADD ratio very close to the national average. Statistically, the Village can anticipate at least one maximum day each summer ranging from 1.757 MGD to 2.298 MGD (MDD_{avg} [2.022 MGD] +/- Std Dev [0.276 MGD]).

These statistics are necessary information when evaluating the capacity of the pumping stations and available storage.

1.2.5 Pumping Capacity - Each of the large pumps (two in the Main Station and two in the Substation) can supply up to 2.0 MGD each day. Pump No. 1 in the Main Station can supply 1.0 MGD during the day.

The average demand for water by the Village (1.675 MGD) can typically be met utilizing only one of the two large pumps in the Main Station or either of the two pumps in the Substation. The MDD (2.811 MGD) can be met utilizing the 1.0 MGD pump and one 2.0 MGD pump.

6-B.63

Control of each pump is based upon the water level in the Tilden Park 1.5 MG elevated tank based on a "matrix" type of control. As the water level in the tank decreases, the pump control system starts more pumps to meet demand. The operator utilizes a set of switches in the matrix to determine the combination of pumps.

6-B.64

2. MECHANICAL

2.1 Condition of Major Mechanical Equipment

2.1.1 Main Station - In general, the mechanical equipment including pipe, valves and meters in both the Main Station and Substation appeared well maintained and operational at the time of the evaluation visit. Appendix C contains a list of major equipment and condition found during the evaluation visit.

The team observed corrosion around specific pieces of equipment which could be due to small leaks and/or condensation. Peeling paint was also observed on some fittings. Much of the observed corrosion and peeling paint potentially results from the lack of dehumidification in the Main Station building. Examples of the corrosion can be seen in Figures 3 and 4.

Figure 3

Figure 4

2.1.2 McCook Influent Meter - Standing water was observed on the top of the McCook Influent Meter (see Figure 5). This could result from condensation or indicative of a leaking housing which should be checked and repaired if necessary.

Figure 5

6-B.65

2.1.3 Pumping Wells (cans) - According to the operators, in March of 2010 when Pump No. 3 was replaced, corrosion (tubercles) could be seen on the inside of the steel pump wet well. This could be the result of chemical induced corrosion or electrolysis which will be described in greater detail later in this report. Each steel pump well is constructed of schedule 16 steel welded pipe. Only the lower 3'-6" of the steel pipe is encased in concrete. A corrosive soil could reduce the life expectancy of these pipes. It is recommended that, when allowed by the maintenance schedule, each wet well should be inspected using a video camera to determine the extent of the corrosion.

Of more immediate concern is the corrosion around the pipe at the floor (see Figure 6). This is likely the result of condensation which has collected at the floor sleeve. It is recommended that dehumidification be added to the building to prevent condensation and the accumulation of moisture around components.

Figure 6

2.1.4 Pump Well Air Release - Each steel pump well is equipped with a vacuum relief valve. The valve allows air to enter the well as water is pumped out. During pumping, the water level in the steel well will be lower than the water level in the reservoir due to friction in the pipe between the reservoir and well. When the pump shuts off, the valve allows air to evacuate as the level in the well stabilizes with the reservoir.

6-B.66

It is unclear how frequently this valve is maintained. It is recommended that these valves be checked for proper operation and serviced semi-annually to ensure proper operation.

2.1.5 Pump Discharge Air Release - The discharge of each pump is equipped with a combination air release and vacuum breaker valve. The valve allows air to enter the section of pipe between the pump and pump control valve when the pump stops which allows the water to drain from the pump. The air in the pump discharge pipe must be relieved when the pump starts so it is not discharged into the distribution system. It is critical that the combination air valve operate properly each time the pump is started and stopped. It is recommended that each pump combination air valve be checked for proper operation and serviced semi-annually.

2.1.6 Chemical Feed Equipment - The only chemical the Village adds to the water received and distributed is gas chlorine to maintain disinfection. The disinfection system consists of cylinders holding 150 pounds of compressed chlorine gas placed on a scale, regulators to discharge the gas, rate valves to regulate the flow of gas and ejectors to create the vacuum needed to open the tank regulators and mix the chlorine in the water passing through the ejectors.

It appears the original gas chlorine equipment has been periodically replaced. There are a minimum of two manufacturer's equipment currently in use. This suggests maintenance and replacement to maintain proper operation.

A scale specifically designed to be used in a chlorine room is used to monitor and record the pounds of chlorine added during the day. The Village's scale was apparently designed to withstand limited contact with chlorine gas. The scale is 26 years old and

6-B.67

showing signs of corrosion around the base. Despite the age and corrosion, the scale appears to be operating satisfactorily.

Figure 7

It is recommended that the calibration of the scale be checked to ensure proper measurement of chlorine gas being added to the water. It is also recommended that the Village consider replacing the scale with a modern load-cell based scale with electronic measurement (see Figure 7). This will allow the Village to monitor and record the amount of chlorine consumed automatically into a spread sheet for reporting to the IEPA.

2.1.7 Substation - The below-grade pumping station (Substation) is a pre-fabricated steel pumping station manufactured by USEMCO. The station houses two end-suction booster pumps with pump control valves (see Figure 8), a vacuum priming system (see Figure 9), and chlorine ejectors. Unlike the Main Station vertical turbine pumps which have a combination air valve on the pump discharge, each of the Substation pumps is equipped with an air release valve which is connected to a vacuum priming system. There is the potential of the pump loosing prime if air enters the pump because the centerline of the two Substation pumps is above the bottom of the adjacent reservoir. The vacuum priming system maintains a vacuum on the pump volute and suction pipe which forces air from the line and through the air release valve (see Figure 10).

Figure 8

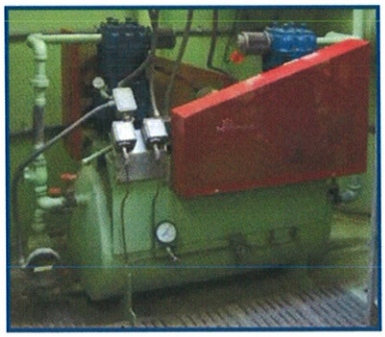


Figure 9

6-B.68

Operation of these air release valves is critical to maintaining the pipe empty of air. The operation of the valves should be checked semi-annually to ensure proper operation. Further, the operation of the vacuum priming system vacuum pumps should be checked to ensure there is sufficient vacuum to maintain the pump and suction line free of air.

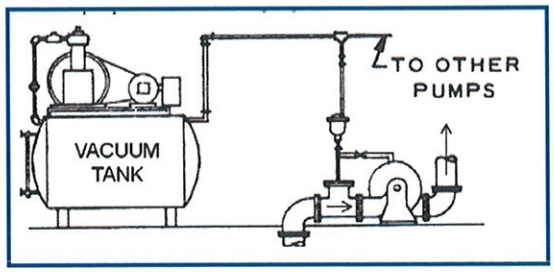


Figure 10

2.2 Existing Pumping Equipment

2.2.1 General - The two pumping stations have a total of five (5) booster pumps (see Table 2).

TABLE 2

Existing Pumping Equipment

Pump Number	Location	Style	GPM	TDH	Last Replaced
1	Main Station	Vertical Turbine	700	140	3/05
2	Main Station	Vertical Turbine	1,400	160	3/07
3	Main Station	Vertical Turbine	1,800	159	3/10
4	Substation	Horizontal Split-case	1,400	160	1993
5	Substation	Horizontal Split-case	1,400	160	1993

The three vertical turbine pumps appear to have a significantly reduced life expectancy. Since placed in operation, the pump cast-iron bowls and stainless-steel shafts are being replaced every five to seven years due to corrosion. Based on available records, Pump No. 1 was replaced in March of 2005, Pump No. 2 was replaced in March of 2007 and Pump No. 3 was replaced in March of 2010.

6-B.69

2.2.2 Corrosion of Main Station Pumps - The apparent corrosion of the Main Station Pumps could be the result of water chemistry. LaGrange receives Lake Michigan Water from the Village of McCook. The Village of LaGrange worked with Layne-Western Co. to test the water chemistry of the water received by the Village. Based upon conversations with an engineer from Layne-Western, there was nothing in the chemical analysis which would indicate a potential for corrosion.

Corrosion can also be the result of stray electrical currents creating a galvanic reaction between the steel pump can and the pump. The power supply to the pumping station is an ungrounded, 480 volt, three-phase service. The steel pipe the pumps are inserted into can function as a "ground" with the potential of allowing a high resistance voltage to pass from electrical equipment into the surrounding soil. Due to the high resistance, the ground would not be detected by the "ground-detection system" included in the service entrance equipment.

A possible cause for the corrosion is the means by which chlorine is added to the pump discharge. Chlorine is added to the water leaving the reservoir to ensure it remains disinfected throughout the distribution system. Vacuum gas chlorine is connected to an ejector piped between the pump discharge (before the pump control valve) and the common suction pipe from the reservoir (see Figure 11).

Figure 11

In order for a chlorine ejector to function and create the vacuum necessary to pull the gas in and mix with the water passing through the ejector, there must be a significant pressure difference between the supply source and the point of application. For the vertical

6-B.70

turbine pumps, the source is the pump discharge and the application point is in the common pump suction from the reservoir.

Each time the pump is shut down, the pump control valve begins closing until it is completely closed, then the pump motor stops. During the shut down period, chlorine continues to be fed to the pump but at the rate during normal pump operation. When the pump stops, the pump bowls can be surrounded by water containing a very high concentration of chlorine which could cause significant corrosion over time due to the lower pH and high chlorine.

2.3 Pump Efficiency

As previously discussed, each of the Main Station pumps has been replaced several times between 1984 and 2010; therefore, the original pump curves no longer apply. Based on information provided by the Village, pump curves for the latest pumps were not available for this evaluation. As a result, evaluating the potential electrical cost saving by improving either the motor or pump efficiency can not be determined.

The vertical turbine pumps installed at the Main Station are typical for that style of pump and very similar to well pumps. Multiple bowls (pumps) are connected in series. Each impeller of each bowl is trimmed to prove the required gallons per minute (gpm) discharge with a specific delivered total dynamic head (TDH) or pressure.

When pumps are placed in series, the gpm of each is the same but the TDH is accumulative. If each bowl delivers 53 feet of TDH, then three bowls mounted in series provides a total of 159 feet.

6-B.11

In order to achieve a specific TDH, one of the bowls may be trimmed more or less than the others. In this case, the overall efficiency of the pumping system is determined by the average efficiency of the three bowls.

A turbine bowl is tantamount to an end-suction type of pump. This style of pump has a typical efficiency of 75 percent to 80 percent. Trimming the impeller to match a specific TDH requirement dictates the efficiency. Little can be done to affect the pump efficiency other than change the gpm or TDH of the pump. Therefore, the efficiency of the existing pumps cannot be improved more than 2 percent to 3 percent. The cost associated with making such a change may exceed the electrical savings in as much as pump efficiency is only part of the overall wire-to-water efficiency.

In general, total "wire-to-water" efficiency is a combination of motor efficiency and pump efficiency. The typical motor produced in 1984 had an efficiency of approximately 94 percent. A premium efficiency motor produced in 2010 has an efficiency of 98 percent. Based on this and the ADD of 1.676 MGD, the Village could anticipate an electrical cost savings of approximately $1,440 per year. The cost of motor replacement would be approximately $6,000 each for a total of $18,000, resulting in an approximate 12.5-year payback.

2.4 Pump Surge Control

Each of the five pumps at the East Avenue Pumping Station is equipped with a Cla-Val pump control valve. This valve consists of a main valve and a pilot system which determines the function, in this case, a Pump Control Valve (PCV).

The purpose of the PCV is to control the flow of water from the pump during starting operation and shutdown. The flow is increased slowly during start-up and decreased slowly

6-B.72

during shutdown rather than surging the distribution system. When a pump is called to start, the PCV is initially closed. The pump begins operation and forces air out through the combination air valve (pumps 1, 2 and 3 only). The PCV begins opening slowly which gradually increases the flow from the pump to the distribution system. The process reverses when the pump stops operation. The PCV closes slowly and the pump does not stop until the valve is completely closed.

PCVs prevent surges to the system well and was the lowest cost option until approximately ten years ago. At that time, the cost of VFDs began to decrease, making other surge control options more economically attractive. The main disadvantage to the globe-style PCV is the lost pressure whenever the pump is running.

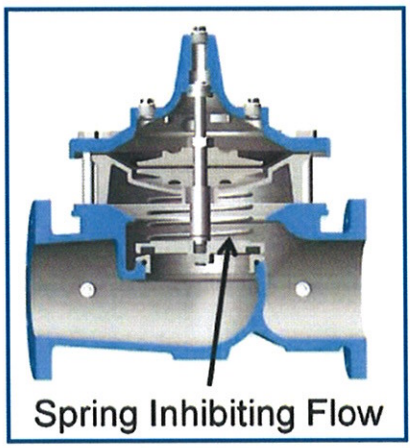


Figure 12

The main valve is a "globe-style", which the primary flow control operation is set vertically and perpendicular to the flow of water resulting in a water flow through the valve which changes direction several times. Each time the flow changes direction, pressure is lost. Further, the valve is constructed with a "lift-check" or internal check valve which means a spring is used to force a portion of the valve closed upon power failure (see Figure 12).

Approximately five-pounds per square inch (psi) of pressure delivered by the pump is lost holding the valve open. Reducing this five psi loss to as little as one-foot could save the Village up to $3,400 per year in electrical pumping costs at the average pumping rate.

6-B.73

There are several surge control methods which have been employed and could be retrofitted to the existing pumps.

- "Soft-Start" programmable starters
- Variable Frequency Drives (VFDs)
- Deep Well type pump control valves
- In-line PCVs

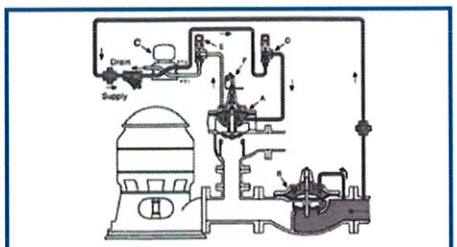
2.4.1 Soft-Start Programmable Starters - Soft-Start Programmable Starters have been available for several years. The starter can be programmed to start the motor in steps reducing the flow from the pump. They have been used at several facilities but it is unclear how well they work to reduce the surge created during start-up or shut-down of a centrifugal pump, like those at the East Avenue Pumping Station.

2.4.2 Variable Frequency Drives - VFDs can be used to reduce voltage and modulate the speed of a motor. Vertical turbine pumps are very similar to well pumps and are a type of centrifugal pump. VFDs were originally designed to modulate the speed of air-handling fans. While they do allow the speed of a pump motor to be modulated from 0 to 60 Hertz, a typical water pump motor can only be modulated from approximately 45 to 60 Hertz. It is difficult to precisely control the flow from a pump from 0 percent to 100 percent of design flow over only a 15 Hertz range.

Due to the cost of VFDs, while low enough to make them a viable surge control method, they are only used during start-up and shut-down of the pump. Installation of VFDs in the Main Station would be problematic. The available space within the station is limited and VFDs are relatively large, requiring more space than is available and still maintain National Electric Code required minimum clearances.

6-B.74

2.4.3 Deep Well Pump Control Valves - A "deep well pump" control valve is a type of control valve which is commonly used to start deep well pumps. When deep well pumps first begin operation, they produce very high head (pressure). The pump should never be started against a closed valve. A deep well pump control valve is similar to the pump control valves in the Main Station that are currently in use. The difference is the valve is not placed in the pump discharge line. It is placed in a by-pass line from the pump discharge to the reservoir inlet (see Figure 13).



Deep Well Pump Control Valve

Figure 13

Unlike the in-line pump control valve currently in use, which starts closed and slowly opens on pump start-up, the deep well pump control starts open and slow closes. When the pump starts, water from the discharge is diverted back to the reservoir. As the valve slowly closes, discharge pressure is slowly increased. As the discharge pressure equalizes with system pressure, the check valve opens and flow slowly increases to the distribution system. The current in-line pump control valve would be replaced with a standard silent check valve or a tilted-disk check valve. Either valve produces only about one-third the head loss as the pump control valve.

2.4.4 In-line Pump Control Valves - An in-line pump control valve operates in a similar manner as the globe-style PCV. The main difference is the in-line PCV can be any one of a number of style of valves. The following are a list of popular styles which have been successfully used as PCVs.

- Butterfly Valves
- Plug Valves

6-B.15

- Ball Valves
- For reference, a description of each of the types of in-line pump control valves is contained in Appendix F.

2.5 Liquid Chlorine vs. Gas Chlorine

2.5.1 Gas Chlorine System Description - The existing disinfection (chlorination) facilities utilized by both the Main Station and Substation at the East Avenue Pumping Station consist of two chlorine cylinders, a scale and wall-mounted vacuum regulators. The vacuum gas from the regulators is connected by a manifold to five 25 pounds per day (ppd) gas rate valves with rate indicators. Gas chlorination equipment for both the Main Station and the Substation is contained in the Chlorine Room of the Main Station.

Gas chlorine is distributed to the five pumps by creating a solution. The gas is drawn into solution water streams by vacuum created as water flows through the individual pump chlorine ejectors. Ejector inlet water is taken from the discharge side of the pumps and is combined with the chlorine gas in the ejectors to make a chlorine solution. The gas flow to each ejector is controlled manually by five rate valves. At the Main Station, the solution water is injected into the suction side of each pump. At the Substation, the solution water is injected into a common pump suction header.

The Main Station chlorine equipment was originally installed in 1984, and the Village has replaced parts as needed. The chlorine weigh scale is showing signs of corrosion, but otherwise, the equipment is well-maintained and in good condition.

The Village receives water from the Village of McCook distribution system, but does not regularly monitor the chlorine residual from McCook. By IEPA regulation, the water received from McCook should contain a minimum chlorine residual of 0.2 parts per million (ppm) free chlorine or 0.5 ppm total chlorine.

6-B.76

The IEPA requires that the Village's disinfection system be capable of supplying chlorine at a rate of 5 ppm. Utilizing the MDD to ADD ratio of 1.68 times the average usage rate of 10 pounds per day, the Village's chlorination system should be capable of supplying up to 16.7 pounds per day of chlorine.

2.5.2 Disadvantages Associated with Chlorine Gas - Chlorine gas is an extremely dangerous, toxic substance. The chlorine gas mixes with water in the lungs, skin or mucous membranes and creates hydrochloric acid. If inhaled, it can cause respiratory collapse or lung failure. It can also chemically burn skin, eyes and mucous membranes.

There is always the possibility of an involuntary release of chlorine gas due to an accident. Recently, there is increasing concern over an intentional release resulting from domestic or foreign terrorism. The East Avenue Pumping Station is located adjacent to a residential and industrial area on the south side of LaGrange (see Figure 16). A release of chlorine gas could affect a significant number of people.

Specialized training and equipment is required for the Village's operators due to the safety risks and necessary handling precautions. Techniques for handling chlorine cylinders and responding to leaks should be reviewed and updated annually. This should include training for new employees or refreshing existing employee knowledge.

Figure 16

The Village can avoid the issues all together by converting from chlorine gas to sodium hypochlorite (liquid chlorine). Many communities which utilize small quantities of gas chlorine have converted to liquid chlorine

6-B.77

to improve operator safety and protect the community from an accidental chlorine gas release from equipment failure or human error as well as deliberate sabotage.

2.5.3 Advantages Associated with Chlorine Gas - Chlorine gas has advantages over liquid chlorine. These include lower chemical purchase costs and indefinite storage life.

Gas chlorine is relatively pure chlorine which is added to water to create a chlorine solution which is injected into the water stream for the purpose of disinfection. Purchasing sodium hypochlorite includes the cost in the solution water. In general, one gallon of the typical 15 percent solution (12.5 percent nominal) contains approximately one pound of chlorine.

Liquid chlorine can disassociate into a relatively harmless gas leaving the solution water in the storage container. The storage life is dependent on the temperature of the area in which the storage container is stored (see Table 3).

TABLE 3

Liquid Chlorine Storage Life

Storage Temperature (F°)	212	140	77	50
Solution Half-Life (days)	0.079	3.5	220	800

While gas chlorine can be purchased and stored in bulk quantities, liquid chlorine must be purchased in quantities that can be used within the anticipated storage life. Keeping the liquid longer than anticipated creates the need to adjust the dosage to account for the decrease in concentration.

2.5.4 Liquid Chlorine - Liquid Chlorine (sodium hypochlorite) used for disinfection at a water pumping station or water treatment plant is an industrial strength of household bleach. While typical household bleach contains no more than six percent sodium hypochlorite, the liquid chlorine purchased for disinfection contains fifteen percent sodium hypochlorite.

6-B.78

The concentration of sodium hypochlorite in the solution purchased from suppliers can vary due to degradation during long-term storage. An average solution concentration of 12.5 percent is used for design purposes.

Pure chlorine (gas chlorine) is a gas at room temperature. As previously discussed, this gas is toxic. Liquid chlorine (12.5 percent sodium hypochlorite) produces an "off-gas" as the concentration degrades, which is significantly less harmful. The off-gas is a combination of chlorine and other chemicals which smells like chlorine but does not produce high concentration hydrochloric acid when mixed with water which is the main toxic issue with pure gas chlorine. As a result, storage of liquid chlorine does not require the high ventilation (one air change per minute) which is necessary with gas chlorine.

2.5.5 Proposed Improvements if Converting to Liquid Chlorine - The majority of public water systems use chlorine gas to disinfect drinking water, though the percentage of water systems using gas chlorine has consistently decreased since 1978[1]. Communities that have switched from chlorine gas most often switched to sodium hypochlorite. The conversion from chlorine gas to sodium hypochlorite will require the following improvements:

- Removal of chlorine gas storage and feed equipment.
- One new 250-gallon double-wall high density polyethylene (HDPE) sodium hypochlorite storage tank.
- Six (five plus one backup) new 0.6 gal/hr peristaltic pumps to feed sodium hypochlorite.
- Associated structural and electrical modifications.

The Engineer's Design Summary is provided as Appendix D.

[1] Committee Report: Disinfection Survey, Part 1 – Recent Changes, Current Practices, and Water Quality. AWWA Disinfection Systems Committee. Journal AWWA, October 2008.

6-B.79

2.5.6 Estimated Construction Costs - Based on our preliminary estimate, we recommend the Village budget $40,700 for the disinfection improvements listed above. The $40,700 budget does not include engineering or construction services. This cost estimate is based on the pricing from equipment available through USA Bluebook.

TABLE 4

Estimated Sodium Hypochlorite Construction Costs

Description	Cost
General Conditions	$10,000
Demolition	1,000
Concrete Equipment Pads	300
Pipe, Valves & Fittings	9,000
Bulk Storage Tank	1,000
Feed Pumps	4,500
Ultrasonic Level Transmitter	2,300
Solenoid Valves	900
Subtotal	29,000
Contingency (20%)	6,000
OH&P (15%)	5,300
Bonds & Insurance (1%)	400
TOTAL*	$40,700

* Does not include Engineering Design or Construction Services

2.5.7 Annual Chemical Costs - Sodium hypochlorite is more expensive than chlorine gas per pound of chlorine fed[2]. Assuming that the Village purchases 3,650 lbs per year at $0.44 per pound, it is projected the Village will spend about $1,600 for chlorine gas. The equivalent amount of sodium hypochlorite would cost about $3,900. The Village will pay about $1,850 more per year if it switches to sodium hypochlorite (see table below). The cost savings the Village will realize from reduced operator training, improved operator safety and eliminating the ERP updating procedure cannot be easily determined.

[2] One gallon of 12.5% sodium hypochlorite provides approximately 0.80 pounds of chlorine.

6-B,80

TABLE 5

Projected Annual Chemical Costs

	Annual Quantity	Annual Cost
Chlorine Gas ($0.44/lb)	3,650 lbs	$1,600
Sodium Hypochlorite ($1.15/gal)	3,000 gals	$3,450
Annual Cost increase		$1,850

2.5.8 Overall Station Efficiency - The Village of LaGrange, East Avenue Pumping Station design was designed to operate efficiently. High service pumping is the single largest consumer of electrical energy at water pumping stations. Electrical efficiency, as it relates to pumping water, is a relationship between the kWh required to deliver a specific volume of water to the community; typically, MG of water pumped. The quantity of electricity required to deliver water is not limited to pumping and includes lighting, chemical feed, heating, air conditioning, ventilation, as well as general building consumption. The accumulated kWhs versus MG pumped (kWh/MG) is used to measure the efficiency of the overall pumping system and to "trend" changes which can indicate a potential loss of efficiency or mechanical problem.

Based on the data provided by the Village, the average consumption of electrical power per MG pumped between January 2007 and August 2010 was 848 kWh/MG. This compares favorably with other communities. A recent study for another consumer of Lake Michigan water consumed 750 kWh/MG.

In general, a water pump converts electrical energy into mechanical energy. The mechanical energy is used to lift the water from the water elevation within the ground storage pump to the water elevation within the Village's elevated storage tank. A portion of the original electrical energy is lost due to the motor's efficiency of converting the electrical

6-B.81

energy to the horsepower needed to make the pump impeller rotate. Additional energy is lost due to the specific pump's efficiency to convert the impeller's rotation to move the water and increase the water's energy. A portion of the energy imparted to the water is lost overcoming friction within the pipe due to rough pipe walls (in older pipes), fittings (elbows, wyes, tees, etc.) and valves (pressure regulating valves, gate valves and check valves).

Without pump curves for the new vertical turbine pumps, an exact efficiency determination was not possible. As previously discussed, the variation in efficiency between pumps is minimal. The arrangement of pipe and the number of fittings is minimal and efficient. The pumps appear to be closely matched to the Village's demand for water. Significant population growth is not expected. As a result, the pumping operation of the station appears to be operating efficiently.

The Main Station building includes a two-wythe wall with a 2-inch air gap filled with insulation. This reduces heating costs. Most building heat loss is through the ground and roof. The roof consists of several inches of poured-in-place insulation. Perimeter insulation was used to further reduce heat loss.

Heat loss can be reduced by securing the air intake vent and exhaust fan. Building heat and moisture from the outside can permeate these structures increasing building heating in the winter and dehumidification in the summer.

2.6 McCook Direct Feed (Station By-Pass)

As previously discussed, the Village of LaGrange receives water from the Village of McCook. Currently, the supply pressure is lower than the minimum required by LaGrange to maintain water in the Village's elevated storage tanks. Therefore, all the water received by LaGrange is delivered into the ground storage tank and pumped to the Village.

6-B.82

The Substation Pumping Station was designed with provisions to function as an "in-line" pumping station which would increase the McCook water pressure for use by LaGrange in the event the ground storage tank must be by-passed. Based on information provided by Village Staff, McCook has the capability to increase the delivery pressure to LaGrange. If the increase in supply pressure is equal to or greater than the minimum supply pressure required by LaGrange, both pumping stations could be by-passed.

By-passing the two pumping stations would provide several advantages for the Village. An investigation is recommended in order to assess if McCook could supply sufficient pressure or to fully assess the ramifications of by-passing the station on either a temporary or permanent basis.

2.7 Recommendations

The following is a list of recommendations and associated construction costs. These costs do not include engineering (design or construction). These projects have different levels of intensity required for design and construction services. Design and Construction Service fees can best be determined when the combination of projects have been selected by the Village.

Dehumidification - It is recommended that dehumidification be added to the Main Station. Dehumidification was added to the Substation during design. Maintaining the moisture concentration (relative humidity) below the dew point of the pipe can reduce maintenance costs.

The Main Station is used to receive and distribute Lake Michigan water. The temperature of Lake Michigan water can vary from 33 degrees Fahrenheit (33° F) in January to 78° F in late August. Refrigerant type dehumidification will not work to reduce the dew

6-B.83

point when the water temperature decreases below 45° F. Desiccant type dehumidification will function to very low water temperatures and is the type most suitable for the Main Station.

In order for the system to function properly, ventilation should be kept to a minimum. It is common to employ ventilation when sweating pipes are observed. However, additional ventilation only provides more moisture which increases sweating. By reducing ventilation to only when the generator is in operation, sweating can be better controlled.

Pump Surge Control **-** New surge control system begins by replacing the existing Cla-Val PCV and air release spool with a silent check valve (SCV) and plug valve with hydraulic operator. This would save approximately $3,400 per year in electrical pumping costs due to reduced friction loss between the silent check and plug valve over the existing globe-style PCV. The laying length of the silent check and plug valve will require a short spool as together they are shorter than the globe-style valve.

Electrically, the new PCV assembly is a direct replacement for the existing PCV, which minimizes the construction cost.

Sodium Hypochlorite **-** The Village should convert from gas chlorine to liquid chlorine. Liquid chlorine is easier to handle and safer to transport and store. While it is difficult to confirm, the addition of gas chlorine solution to the suction side of the Main Station pumps could be causing the premature corrosion of the cast iron pump bowls and stainless steel shafts. Further, it could be one of the causes of the tubercles observed inside the steel pump wells.

It is recommended that the disinfection injection (sodium hypochlorite) be relocated to the discharge of the pump downstream of the existing pump control valve using chemical

6-B.84

feed pumps. Control of the pumps would be accomplished in the same manner as the gas chlorination. When the pump is started, an electric circuit would be energized and the chemical feed pump would be started.

The change to liquid chlorine will require a construction permit from the IEPA.

TABLE 6

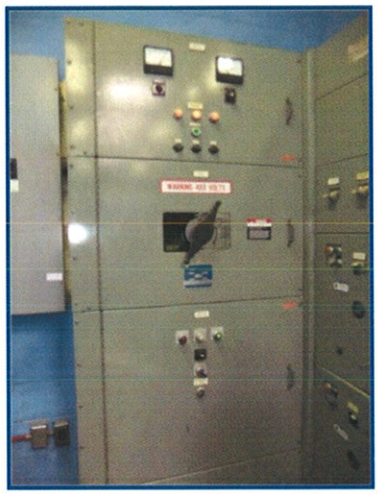
Summary of Mechanical Recommendation Construction Costs

Recommendation	Estimated Cost
Dehumidification (Main Station Only)	$15,000
Plug Valve/Hydraulic Operator PCV Conversion	$35,000
Deep Well PCV Conversion	$40,000
Convert to Liquid Chlorine System	$40,700
Chlorine Scale Replacement (load cell with 4-20 mAdc output)	$ 4,000

Note: Fees for Design Engineering including permits and bidding assistance as well as Construction Services will be determined once the scope of work is determined by the Village.

6-B.85

3. ELECTRICAL/INSTRUMENTATION



3.1 Major Electrical Equipment

The major electrical equipment evaluated consisted of the Motor Control Center (MCC) and automatic transfer switch (ATS) (see photo above). The MCC was manufactured by Siemens-Allis in 1984. Siemens stopped manufacturing this series of MCC around 1990; and finding parts for repair or retrofit is becoming increasingly difficult. The ATS was manufactured by Creigier Electric Manufacturing Company, who is no longer in business.

The lead operator commented that the Village has had issues with retrofitting existing equipment in the MCC in the past. Although a number of factors will dictate the expected life of this type of equipment, it is typically expected to last about 30 years.

One major concern has been the physical connections between the electrical conductors and both the starters and at the motors. Current flowing through these conductors can create heat which can cause the wire size to slightly increase. The conductors cool when

6-B.86

the pump is stopped. Over time, the heating and cooling cycles can loosen these connections. Further, vibration caused by the mining can also cause these connections to loosen.

Once the connections become loose, resistance and heating is increased which can eventually affect the motors potentially causing failure. It is recommended that these connections be checked at least once each year by a licensed electrician to ensure proper connection.

3.2 Engine Generator

The diesel engine generator was manufactured by Onan (now Cummins Onan) and installed with the original pump station in 1984 (see Figure 17). The manufacturer states that this type of generator should last between 25-50 years depending on maintenance, runtime and loading. The generator is routinely exercised and appears to still be in good working order. The generator physically looks to be in good condition.

Figure 17

The generator appears to be sized to operate one 40 hp (1.0 MGD) pump and one 75 hp (2.0 MGD) pump at the same time. Operation of two 75 hp pumps may be possible.

When the Main Station was originally constructed, the design included a 1,000-gallon underground diesel storage tank. Changes to regulations governing the design and operation of underground diesel storage tanks, in addition to concerns over the vibrations created by the adjacent mining operations, prompted the Village to remove the tank and rely completely upon the small day-tank located within the station.

6-B.87

The capacity of the day-tank provides limited operating time for the generator. It is recommended that a new 1,000-gallon on-grade fuel storage tank be purchased and installed adjacent to the existing building. Several diesel fuel suppliers can be contacted which will provide costs for both the purchase and the installation of the storage tank.

3.3 Lighting Systems

The lighting inside the main pump station consists of dual-lamp lighting fixtures using 4-foot long T12 fluorescent lamps and magnetic ballasts. Installation of T12 style lamps was common practice at the time the pump station was built. However, the installation of more energy efficient fluorescent lamp types (such as T8 and T5 type) is now common practice for new construction. The U.S. Department of Energy had mandated that the magnetic ballasts for T12 lamps no longer be manufactured after July 1, 2010. Also, many T12 lamps will be phased out of production starting July 2012.

The lighting inside the Substation utilizes the same T12 fluorescent lamps and magnetic ballasts. There are only three fixtures which remain off for the majority of the time. Should the ballast fail, they should be replaced with the more efficient models. Until the fixtures fail, they are not used enough to warrant replacement for the purpose of energy savings.

3.4 Instrumentation

The existing instrumentation consists of various flow meters, level transmitters, pressure transmitters, a chlorine gas leak detector and chart recorders that measure, display and record the following process parameters:

- Incoming Flow
- Incoming Pressure
- Discharge Flow
- Discharge Pressure

6-B.88

- Reservoir Level
- Chlorine Gas Leak
- Underground Pump Station Discharge Flow

All of the measuring instruments (flow meters, pressure transmitters, level transmitters and chlorine leak detector) are in working order and serviceable.

The chart recorders, manufactured by Bristol Babcock, are currently operational but are obsolete (see Figure 18). They are an older style of analog recorder that is no longer in production. If a recorder were to stop working, service and repair may be difficult to obtain.

Figure 18

The only method for recording and saving historical data is through saving paper charts from the chart recorders, and through manually recording flow and runtime data.

3.5 Electric Power Usage

A review of the current billing for the site was made. From the copy of the bills, it was calculated that the Village is billed an average of $0.10 per kilowatt hour (kWh). Based upon the monthly electrical bills divided by the monthly flow totals, the Village spends an average of $81.75 per MG (848 kWh/MG).

This is a reasonable value for a community receiving Lake Michigan Water. Before receiving Lake Michigan Water, the Village of LaGrange owned and operated both shallow and deep wells. Many communities which do not receive Lake Michigan water continue to utilize deep wells as their water supply. These communities consume an average 4,300 kWh/MG pumped to the community.

6-B,89

The amount that is spent on the electrical bills could be financially reduced by going into a curtailment agreement with ComEd. This program is discussed further in the recommendations section later in this report.

3.6 Supervisory Control and Data Acquisition (SCADA) System

The existing control system provides basic pump control, display of system status and alarm notification. The pump controller is an AGM model TA-5300-2 Integrated Control Station (see Figure 19). The controller provides system status and alarm indication through use of lamps on the front panel, and allows for pump on/off control based on level setpoints that are operator adjustable. Although the lead operator can navigate through the menu system for adjusting setpoints fairly easily, it is not very intuitive and other operators are not as comfortable with using the system. The system provides limited control capabilities and does not provide for the ability to graphically display system status or control functions. The control panel enclosure also contains numerous digital indicators to display process values such as flow, level and pressure, with indication lamps for alarms as shown in Figure 20.

Figure 19

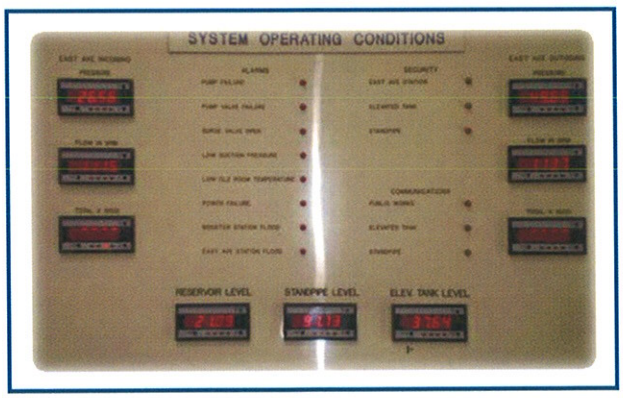


Figure 20

Graphical interface systems allow for a more intuitive method for viewing system status and adjusting setpoints. A typical screen from a graphical user interface system is shown below. This type of system provides

6-B.90

a better "at-a-glance" view of the system status and more intuitive navigation for moving to other screens for changing setpoints and viewing more detailed data. It is also more easily modified in the future to incorporate changes in the system (additional instruments, pumps or other equipment). The graphical symbols of equipment shown in schematic form with process values allows one to more easily identify process values with the equipment and location in a piping system. This type of system also allows for a quicker learning curve for new employees.

The main panel at the pump station communicates to three remote sites – the elevated tank, the standpipe and Public Works. Leased phone lines are used to transmit elevated tank and standpipe level data to the pump station. A 900 MHz spread spectrum radio system is used to transmit data from the pump station to a computer at Public Works. The computer did, at one time, allow staff to view pump station status at Public Works, but is currently not operational.

Typical screen from graphical interface

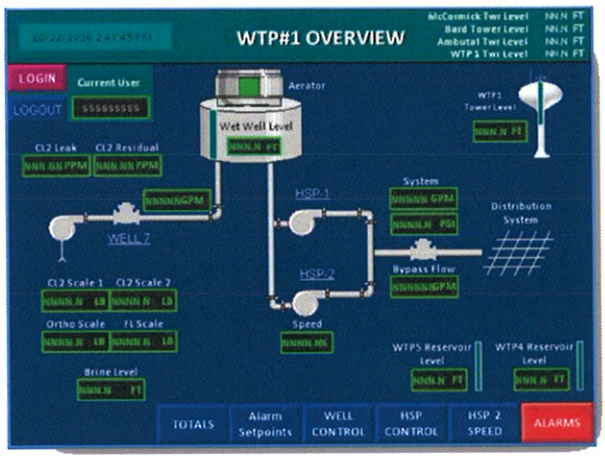


Figure 21

System alarm notification is achieved through use of an Antx Dialog Elite alarm dialer. The dialer currently has three 8-channel input modules installed, allowing up to 24 alarms to be monitored. This model of autodialer is still manufactured so there are no issues with obtaining spare parts.

6-B.91

Although the system is functional, a new SCADA system will provide many benefits the existing system does not have, such as historical data collection, automated reporting, ability to remotely access system information, more flexible alarming options and a more intuitive graphical user interface. A SCADA system can reduce or eliminate the amount of time staff needs to visit the station on weekends as data will be collected automatically; and may also reduce overtime during off hours by having the ability for staff to remotely access system controls and make setpoint changes without visiting the station. A new SCADA system would include the following scope of work, some of which could be phased in over time:

- PLC-based control panel at the main station with graphic operator interface terminal (touch screen).
- PLC-based control panels at the remote stations (water tower and standpipe).
- Point-to-multipoint radio system for communication from the pump station to the elevated tank and standpipe.
- SCADA Server with software to allow for a graphical user interface.
- Historical data collection and reporting system.
- Software-based alarm dialing system.
- Internet connection with firewall security appliance at the pump station and laptop to allow for remote access to the SCADA server.

3.7 Recommendations

3.7.1 General Electrical Modifications - The ATS and MCC are obsolete, difficult to service and approaching the end of their service life; and should be planned for replacement in the next 5 years. The lighting transformer and lighting panel section of the MCC could remain in service as this type of equipment generally has a longer service life

6-B.92

than the other MCC sections and circuit breakers for the lighting panel are still readily available.

A qualified service technician should perform a complete maintenance check on the engine generator to check the cooling system, fuel system, batteries and filters; and perform a load bank test to confirm the generator capacity. A regular generator maintenance schedule should be followed to continue to keep the generator operational.

The Main Station T12 lighting fixtures should be retrofitted with T8 style fixtures with electronic ballasts. This should be performed within eighteen months before replacement bulbs become obsolete.

3.7.2 Supervisory Control System - The instrumentation is all in working order, so no immediate replacements are recommended. It is recommended that the chart recorders be replaced with newer digital style recorders as they fail if chart recorders are still desired. The installation of a SCADA system (discussed below) would make the chart recorders unnecessary.

The existing control system is still functioning but is antiquated. It requires more operator attention than is typical for more modern SCADA systems. It is recommended the existing control system be replaced within a timeframe that budget will allow.

There are several options available to the Village including a relatively simple modernization of the existing equipment to full replacing the existing system with a "State-of-the-Art", fully automated and programmable, SCADA system which would include alarms and remote monitoring and control.

No one system fulfills the unique needs of individual communities. Every community has unique features, preferences and operational goals. Which one of the many

6-B.93

levels of automation and control would best fit the Village of LaGrange would be determined after more extensive collaboration with the Village Staff. The collaboration process would include more detailed discussions on system security, reliability, potential operation cost savings versus capital investment and long term goals of operational cost savings.

3.7.3 Alarm Notification **-** It is recommended the Village install an automatic dialer alarm system at both the existing standpipe and elevated storage tank. While alarm dialing, remote alarm viewing and acknowledgement can be incorporated into a SCADA system, many communities rely on both for additional security. Therefore, an automatic dialer similar to the one currently in use at the Main Station could be installed at the standpipe and elevated tank and remain in operation once the type of SCADA system has been determined.

While the automatic dialers utilize conventional voice telephone lines, the Village currently uses leased communications lines between the two tanks and the Main Station to acquire data. Reviewing the monthly invoicing for these leased lines was not part of this investigation. The cost of replacing the current leased line communication system with a radio based system would be approximately $20,000 with a yearly replacement cost of approximately $500. Because monthly lease line cost varies due to length and grade, the yearly savings to the Village can only be estimated at between $750 and $2,000 per year per leased line.

3.7.4 SCADA System Security **-** SCADA System Security, specifically the potential that unauthorized personnel could "hack" into the Village's system, is a major concern for any community. This potential issue is one being addressed on multiple levels including software and firmware manufacturers, system integrators, as well as system operators.

6-B.94

Any SCADA system has potential cyber security risks. Even if a system is not connected to any network, viruses can be spread on USB flash drives or other electronic media. Cyber security risks to SCADA systems can be minimized by following industry best practices and standards, such as: periodically update operating system and software patches, keeping antivirus software up to date, installing a firewall when connecting to a network and requiring multiple levels of password authentication (computer access, application software access, etc). By following these best practices, cyber security risks to SCADA systems can be greatly minimized.

Since 9/11, SCADA system manufacturers recognize the need to "harden" security of water distribution control systems. Most systems resist all but the most determined unauthorized access. In addition, it is unlikely that such determined hackers would be interested in accessing most municipal systems.

3.7.5 ComEd Billing Option: Curtailment or Demand Response Program - This option is available from ComEd and is commonly referred to as Rider CLR. From the billing records, this does not appear to be an option the Village is currently pursuing with ComEd. In brief, the Village would receive a single annual payment equal to the total credits earned. Credits are earned by allowing for a maximum of 15 interruptions to the electrical service over a period of one year. These interruptions can last between two to eight hours with a 30-90 minute lead time. The amount of the payment will be based on the market-based compensation for energy not used when requested. The agreement with ComEd can be performed by the Village with/without the assistance of BWI. The annual credit per year from ComEd could be $2,500.00 to $5,000.00 depending on the contract.

6-B.95

While the Village could save substantial funds each year, the draw-backs should be considered before committing to this program. The generator has been shown to be very reliable. The current limited fuel storage makes operation limited. In addition, the continuous operation of this station is pivotal to the safety of the community. We cannot recommend this option until the capacity of the fuel system has been increased and overall affect of this option on pumping station operation has been thoroughly investigated.

TABLE 7

Estimated SCADA Construction Costs

Description	Cost
Project Administration and Training	6,000
Documentation	2,000
Control Panels (design, fabrication and equipment)	26,000
SCADA Computer Hardware	4,000
SCADA Graphic Software License	3,500
SCADA Alarm Software License	2,000
SCADA Graphical Software Development	10,000
Software Alarm Configuration	2,500
Historical Data Collection and Automated Reporting	5,000
Remote Access (Firewall, laptop, configuration)	3,000
PLC and touch screen programming	10,000
Antenna System Installation	12,500
Equipment Installation	6,000
System Start-up and testing	6,500
Subtotal	99,000
Contingency (15%)	19,800
TOTAL*	**$118,800**

* Note: We typically recommend that SCADA projects are implemented through a qualification selection process, whereby a systems integrator is selected to implement the SCADA project based on firm qualifications, and not by using a typical design/bid/build procurement process. Therefore, engineering costs are not included in the cost estimate.

6-B.96

TABLE 8

Summary of Electrical Recommendation Costs

Recommendation	Estimated Cost
Main Station Lighting Fixture Replacement	$ 4,000
Automatic Transfer Switch and Motor Control Center Replacement	$ 75,000
Recorder Replacement (each recorder)	$ 2,500
SCADA System Replacement	$118,800
Hydro-Electric Turbine Generator Installation Study	$ 5,000

Note: Fees for Design Engineering including permits and bidding assistance as well as Construction Services will be determined once the scope of work is determined by the Village.

6-B.97

4. OPERATIONS

4.1 Existing Operational Data

4.1.1 Daily Reporting - Daily readings are taken by the operator and hand documented on forms located at the Main Pumping Station. Readings include:

- Water meter readings from McCook, coming into the Pump Station,
- Meter readings on water leaving the Main Pump Station and the Substation,
- Chlorine usage and a calculated dosage.

This information is required to be submitted to the Illinois Environmental Protection Agency (IEPA) in a monthly operating report. It is also used to complete annual reports for Lake Michigan Allocation and Illinois Water Survey.

4.1.2 Additional Daily Informational Tracking - Additional daily readings are taken by the operator and hand documented on forms located at the Main Pumping Station to be used by the operator in assessing equipment operation, determining process and operational control decisions. These records also provide data that can be used to troubleshoot when problems arise. Additional tracked information includes:

- Time of day that facility is checked and the operator's initials,
- Inlet and discharge Gallons per Minute flow rates and pressures,
- Reservoir and standpipe water levels,
- Pumps running,
- System pressure and chlorine residual.

4.2 Pumping Operation

4.2.1 Pump Operation - The operator manually determines which pumps to operate. In general, long term operation of the facility has produced routines based on daily operation. Which pump is used on any given day is based primarily on operator experience. This

6-B.98

includes seasonal changes and observing weather patterns in an attempt to predict what the demand for water will be on a given day.

The standard operating procedure is to rotate the lead and lag positions of the pumps using a matrix of control switches. Data provided by the Village does not show the number of hours that a pump runs on any given day, nor does it provide the number of times that a pump starts and/or stops.

The Main Station pumps have been replaced several times since the station when into operation due to failures, and there are no pump curves available. Soft starts have been installed on the pump motor circuits to gradually ramp up or down the starting and stopping of the pumps in order to minimize water hammer within the pump station and water distribution system. Pumps are also started and stopped against a closed head created by pump control valves to prevent system surges.

Because of the limited number of pumps and the capacity of each pump, there is limited options for altering the operation to improve efficiently. In general, the station is operating as efficiently as the pumps and system demand allow.

4.3 Pumping Station Condition

4.3.1 Main Pump Station - In general, both the Main Station and Substation appeared well maintained and operational at the time of the evaluation visit.

The team observed corrosion around specific pieces of equipment which could be due to small leaks and/or condensation. Peeling paint was also observed on some fittings. Much of the observed corrosion and peeling paint could be the result of the lack of dehumidification in the Main Station building.

6-B.99

4.3.2 Underground Substation - The Substation appeared well maintained and operational at the time of the evaluation visit.

4.4 Existing ERP and VA

4.4.1 Emergency Response Plan - The Village could not locate the Emergency Response Plan (ERP) for our review and inclusion in this report. A copy of this report should be readily available for review by new personnel and periodically updated.

4.4.2 Vulnerability Assessment - The Village could not locate the Vulnerability Assessment (VA) for our review and inclusion in this report. A copy of this report should be readily available for review by new personnel and periodically updated.

The IEPA requires public water supplies to maintain an ERP. Federal EPA requires all water supplies serving more than 3,300 customers to complete a VA of their water system. Once the VA was completed, water supplies were required to revise their ERP to take into consideration the responses to vulnerabilities addressed in the VA.

4.5 Emergency Operation

4.5.1 Emergency Standby Generation - An emergency standby generator is located within the Main Pumping Station. The generator can supply electrical power to operate the Main Pumping Station and/or the Substation in the case of an electrical power outage.

4.5.2 Substation - In 1994, a below-grade, pre-fabricated steel pumping station (Substation) was placed into service. The purpose of the station was to supplement flow and provide a means of by-passing the Main Station. The below-grade pumping station was constructed for the following purposes:

- To supplement the flow from the existing station during high demand by providing two 2.0 MGD pumps.

6-B.100

- Maintain flow from the reservoir should damage occur to the existing station.
- Provide pumping capability directly from McCook (by-pass the reservoir) in the event damage occurred to the reservoir.

Unlike the Main Station, the Substation has the capability to bypass the reservoir and pump water directly to the Village from the McCook supply using one or both of the horizontal split-case pumps. A second pumping station connection to the distribution system was installed across East Avenue when the Substation was constructed.

One of the concerns of the Operator is the lack of an isolation valve on the Main Station discharge prior to crossing East Avenue. The main pumping station would have to be shut down in the event of a break in the main crossing East Avenue. Both pumping stations could remain in operation if a valve were located on the pumping station property, immediately west of the Substation connection.

4.6 Recommendations

The following is a list of recommendations associated with the operation of the Main Pumping Station and the Substation.

4.6.1 Operational Data - Considerable time is needed each month to manually collect and enter data used for regulatory compliance reporting and for historical tracking purposes. Automatic collection of almost all of this data is possible electronically.

Many advances in automatic operational collection have been made since the pumping station became operational. A SCADA System will provide updated pump station controls, but the routine data can be collected and reports generated electronically. This will reduce operation time and improve station security. Some communities have installed

6-B.101

"internet cameras" which allow operation staff to remotely view the station interior and listen to operations to reduce visitations.

The addition of remote setpoint access via a laptop computer allows operators to investigate alarms prior to actually visiting the station. Alarms which do not affect operation or safety can be acknowledged and left until morning rather than calling out an operator in the middle of the night. Other benefits of a SCADA System are covered in the Electrical & Instrumentation portion of this report.

4.6.2 Pump Operation - Currently, pumps are started and stopped against a closed valve (dead head). Installing Variable Frequency Drives (VFD) on the motor controls is not considered to be an option given the limited space in the building and the availability of lower cost options as discussed in the Mechanical Evaluation Section.

4.6.3 Emergency Response Plan and Vulnerability Assessment - The pump station property is encircled by an 8-foot high chain link fence as a first line of risk reduction. The main room of the pump station is monitored by an intrusion alarm system with a motion detector. The chlorine room does not have a motion detection system. Exterior doors into the main pump station and the chlorine room have large panels of clear glass that could easily be broken.

It is recommended that the Village remove the existing exterior door glazing and install steel panels. The risk benefit of switching from gaseous chlorine to liquid chlorine is addressed in the Mechanical portion of this report.

The Village's water system ERP and VA should cover not only incidents caused by vandals or intentional acts, but also accidental or natural occurrences that could either contaminate or disrupt water service to customers.

6-B.102

4.6.4 Emergency Operation - The close proximity of the quarry to the pump station and reservoir is a major concern that is recognized by the Village. Should something happen that removes the reservoir and/or Main Pump Station from service, the emergency bypass connection through the Substation would be critical in restoring or maintaining water service to the Village.

A written procedure should be composed and incorporated into an operations manual in the event of an emergency.

It is recommended the Village water personnel should practice implementing the emergency bypass to (1) ensure that it will operate if and when needed, and (2) to make sure that water personnel are familiar with valve and pumping changes necessary to complete the process in a timely manner. A written Standard Operating Procedure (SOP) should be in place and used during operator training.

4.6.5 Main Station Isolation Valve - It is recommended that a new isolation valve be placed on the Main Station discharge prior to crossing East Avenue. This would allow isolation of the line crossing East Avenue and facilitate continuing operation of both pumping stations in the event of a main break under East Avenue.

TABLE 9

Summary of Operational Recommendation Costs

Recommendation	Estimated Cost
Replace exterior door glazing with steel panels	$4,000
East Avenue Isolation Valve	$7,500

6-B.103

5. ENERGY EFFICIENCY FUNDING

5.1 Funding Opportunities

The best opportunity for partial funding for the improvements described would be through the Illinois Department of Commerce and Economic Opportunity Public Sector Electric Efficiency (PSEE) program. This program has a set rate for light replacement and high efficiency motor replacement. They will also allow for custom grants for such things as valve replacement. The grants are based on the amount of energy that can be saved.

There are some programs that can be applied to the addition of the hydro-electric turbine including the PSEE program and the Illinois Finance Authority Renewable Energy and Energy Efficiency Program (IFA). This program provides working capital for improvements which is then paid back to the IFA from the energy savings that are realized. The project payback must be 7 years or less.

The Illinois Clean Energy Community Foundation Grant is also a potential source of funds for these projects. The Illinois Clean Energy Community Foundation invests in clean energy development and land preservation efforts, working with communities and citizens to improve environmental quality in Illinois. The Foundation supports programs and projects that will improve energy efficiency, develop renewable energy resources and preserve and enhance natural areas and wildlife habitats throughout the state. Over the last seven years, the Foundation has awarded 3,000 grants, totaling $160 million to Illinois nonprofit organizations, schools, municipalities and other local government agencies.

6-B.104

6. REPORT SUMMARY

6.1 Report Findings

6.1.1 Main Station Building - Both the Main Station and Substation are in relatively good operating condition. It appears the Main Station has suffered some minor structural damage; probably due to the mining in the quarry adjacent to the site.

6.1.2 Main Station Equipment - There is no dehumidification in the Main Station, which contributes to maintenance problems such as peeling paint and corroding fittings. The addition of dehumidification will significantly affect the cost of maintenance by extending the life of equipment.

The pumping equipment is relatively new but, due to failures, has been replaced on a five to seven year schedule. Replacing the existing gas chlorination system with liquid chlorine could potentially increase the life of the pumps significantly. Further, the use of liquid chlorine is easier and safer to transport through populated areas. The safety of operation staff and the population around the station will be improved. The use of liquid chlorine will reduce the need for an ERP and improve the results of the next VA.

Due to changes in the National Electric Code, there are portions of the existing electrical equipment at the Main Station which do not meet the current code. The Operators experienced problems disconnecting the station from ComEd during a recent electrical problem in the station. All of these issues can be resolved by replacing the antiquated ATS and MCC. The ATS and MCC are still functioning. Due to the age of the equipment, it will become increasingly difficult to find replacement parts.

The SCADA System is still functioning but is outdated and replacement parts will become difficult to find. A newer system will provide more information, require less

operator attention and potentially reduce overtime. The newer system will automatically log operational information and generate reports. Further, it allows access to operations from a remote location by laptop computer, potentially reducing nuisance night-time call-outs.

The electrical efficiency of the Main Station can be improved by replacing the existing globe style pump control valves with a SCV and automatic plug valve. The current valves waste energy due to headloss through the valve. The silent check valve/plug valve combination will provide surge control and significantly reduce the energy loss.

6.1.3 Substation - The Substation appears to be in good shape. The prefabricated steel station includes sacrificial anode packs attached to the station. These packs have a limited life expectancy and should be located and checked to determine if they require replacement.

6.2 Expected Life Expectancy

With proper maintenance and implementing the recommendations of this report, the Main Station should be expected to remain operational for at least twenty years. The Substation is a steel, below-grade structure. With proper maintenance of the anode packs, the station should be operational for the same period of time as the Main Station. It is anticipated that the Substation will have a life expectancy less than the above grade station.

VILLAGE OF LA GRANGE, ILLINOIS
WATER SYSTEM INVESTIGATION
ELECTRICAL / CONTROLS EQUIPMENT INVENTORY
October 6, 2010
APPENDIX A

Equipment Item	Model No.	Serial No.	Date Installed	Condition	Comments
Transfer Switch	Cregier Electric MFG Co./ Anixter, Chicago, IL (312)772-0870	DWG No. 3G1782 SN: 47770	c. 1984	Manufacturer cannot be reached - possibly no longer in business. It is probable that parts and service are not available.	Rated: 480V, 600A, 3Ø, 3W - Could not contact Cregier Electric.
MCC	Siemens-Allis	47770	c. 1984	Siemens products frequently change and rarely do these changes retrofit. Rep recommends to replace rather than repair a MCC >10 years old.	Rated: 480V, 600A, 3Ø
Lighting Xfmr in MCC	Sylvania CAT# 158-317-34N	29-114603-0183	c. 1984	Sylvania does not produce or service lighting transformers or panels.	15kVA, 240x480V/120-240V, 1Ø
HSP No. 1 SSRVS	Cutler Hammer S80IN66P3B	1012232		Will last @10 million operations. Product is currently produced by manufacturer. Parts and service are still available on this product.	
HSP No. 2 SSRVS	Eaton Cutler-Hammer S811R13P3S	5A9C00B6			
HSP No. 3 SSRVS	Eaton Cutler-Hammer S801R13P3B	R1009490			
P1 Motor	U.S. Electric Motors	ID# 9304425-758		Motors are still in working order.	40 hp, 89.5% eff, 460V, 49.5A Design/Code/Ins = B/G/F
P2 Motor	U.S. Electric Motors	ID# 9304428-758			75 hp, 91% eff, 460V, 88A Design/Code/Ins = B/H/F
P3 Motor	U.S. Electric Motors	ID# 9304428-758			75 hp, 91% eff, 460V, 88A Design/Code/Ins = B/H/F
Generator	ONAN 200.ODFP.17R/26021L	GB30671090		Cummins/Onan representative claims typical life span is 25-50 years. These can last longer with good maintenance record and no overloading.	Service: Standby 200kW/250kVA 300A @ 460V, pf 0.8
Day Tank	Tramont			Tank should be replaced when generator replaced, unless it is stand alone and damaged.	
Fire Alarm System	Fire-Lite MS-4424B			This model is no longer produced by Fire-Lite. Parts and service are no longer available.	(2) Smoke Detectors Pump Room (1) Smoke Detector Cl2 Room
Chart Recorders (x4)	Bristol Babcock			Recorders are obsolete, but still working.	Tank Level/Standpipe Level/ Res Level/ Discharge Flow
Flow Meters (x3)	Sensus W-5500 Turbo			Flow meters are still funcitonal.	Incoming in P.S.
Flow Transmitter	Act-Pak	1000D-ACIP-39669C		Functioning	12" 101 - Underground Pump Discharge
Flow Transmitter	Act-Pak	1100D-CIX-52023D		Functioning	12" 102 - Discharge Flow Between Meters
Flow Transmitter	Act-Pak	1107D-2BP-528790		Functioning	2- 12" 102 - Function I.C.S.
Pump Controller	AGM TA-5300-2	AGM TA-5300-2	401-880	Functioning	
Cl2 Leak Detector	ATI			Functioning	
Dialer	ANTX Diaglog Elite			Functioning	24 - Ch In / 4 - Ch Out
BP Station Motor Control Panel				Functioning	Relay Logic Pump Control Panel
BP4 Motor	Marathon YE 365TTAS7036JP-R26W			This motor is no longer produced by Marathon. Parts and service are no longer available	75 hp, DESB, Code F, INS FI, 91.7% Eff, 82.0 pf
BP 5 Motor	Marathon YE 365TTAS7036JP-R26W				75 hp, DESB, Code F, INS FI, 91.7% Eff, 82.0 pf

6-B.107

VILLAGE OF LA GRANGE, ILLINOIS
EAST AVENUE PUMPING STATION
SUMMARY OF MONTHLY ELECTRIC BILLS AND WATER PUMPING
APPENDIX B

ELECTRIC BILLS				WATER PUMPING	
Service Date	Days	Total Electrical Cost	kWh	Gallons/month	kWh/MGD
01/02/07 - 01/30/07	28	$3,260.11	34,650	48,647,000	712
01/30/07 - 02/28/07	29	$3,925.72	43,895	50,025,000	877
02/28/07 - 03/29/07	NO RECORD			51,704,000	
03/29/07 - 04/27/07	29	$3,596.66	38,019	50,016,000	760
04/27/07 - 05/29/07	32	$4,126.20	45,960	57,446,000	800
05/29/07 - 06/27/07	29	$4,518.16	50,253	63,739,000	788
06/27/07 - 07/27/07	30	$4,479.18	50,187	66,233,000	758
07/27/07 08/27/07	31	$4,692.06	48,866	NO RECORD	
08/27/07 - 09/26/07	30	$4,569.11	47,302	63,273,000	748
09/26/07 - 10/25/07	29	$3,874.27	41,053	NO RECORD	
10/25/07 - 11/27/07	33	$3,787.02	43,263	47,684,000	907
11/27/07 - 12/28/07	31	$4,064.99	45,449	51,437,000	884
12/28/07 - 01/30/08	33	$4,293.06	49,465	51,785,000	955
01/30/08 - 02/28/08	29	$3,919.00	43,688	48,359,000	903
02/28/08 - 03/28/08	29	$3,668.00	40,569	47,810,000	849
03/28/08 - 04/28/08	31	$3,799.78	40,710	46,855,000	869
04/28/08 - 05/28/08	30	$3,847.72	41,914	52,104,000	804
05/28/08 - 06/26/08	29	$4,022.47	40,196	51,737,000	777
06/26/08 - 07/29/08	33	$5,165.12	50,838	60,263,000	844
07/29/08 - 08/27/08	29	$4,503.07	45,005	59,984,000	750
08/27/08 - 09/26/08	30	$4,413.43	44,547	51,828,000	860
09/26/08 - 10/27/08	31	$4,025.30	41,502	48,363,000	858
10/27/08 - 11/25/08	29	$3,851.54	38,387	46,160,000	832
11/25/08 - 12/30/08	35	$5,037.99	51,081	50,049,000	1,021
12/30/08 - 01/30/09	31	$4,479.02	45,955	51,010,000	901
01/30/09 - 03/02/09	31	$4,732.98	46,523	45,419,000	1,024
03/02/09 - 03/31/09	29	$3,830.73	38,905	46,697,000	833
03/31/09 - 04/29/09	29	$3,796.34	38,667	47,684,000	811
04/29/09 - 05/29/09	30	$4,140.62	41,766	50,481,000	827
05/29/09 - 06/29/09	31	$4,058.32	44,267	49,653,000	892
06/29/09 - 07/29/09	30	$3,899.98	43,027	54,932,000	783
07/29/09 - 08/27/09	29	$3,947.63	43,660	56,072,000	779
08/27/09 - 09/29/09	33	$4,171.00	45,727	51,602,000	886
09/29/09 - 10/27/09	28	$3,301.54	36,243	46,068,000	787
10/27/09 - 11/30/09	34	$3,994.77	44,344	42,860,000	1,035
11/30/09 - 12/31/09	31	$3,767.80	43,527	45,538,000	956
12/31/09 - 02/01/10	32	$3,997.79	45,653	46,754,000	976
02/01/10 - 03/02/10	29	$3,770.46	41,448	42,840,000	968
03/02/10 - 03/31/10	29	$3,549.40	38,885	45,355,000	857
03/31/10 - 04/28/10	28	$3,456.76	37,653	46,110,000	817
04/28/10 - 5/28/10	30	$3,473.60	38,876	48,679,000	799
5/28/10 - 6/29/10	32	$4,309.80	41,792	46,578,000	897
6/29/10 - 7/29/10	30	$4,725.58	43,609	56,741,000	769
07/29/10 to 08/27/10	29	$4,214.34	39,757	54,838,000	725
TOTALS		$175,058.42	1,816,030	2,141,412,000	

Summary	
$0.0964	per kWh
$81.75	per MGD
848	kwh/MGD

6-B.108

VILLAGE OF LA GRANGE, ILLINOIS
WATER SYSTEM INVESTIGATION
MECHANICAL EQUIPMENT SUMMARY
October 12, 2010
APPENDIX C

Equipment Item	Model No.	Serial No.	Condition	Comments
PUMP NO. 1 MOTOR	US Electric 324 T 1770 RPM 40 HP	J1810317 / R2112700	GOOD CONDITION	9304428-758
PUMP NO. 1 PUMP	LAYNE-WESTERN VERTICAL TURBINE	NAME PLATE MISSING	UNKNOWN	700 gpm
PUMP NO. 1 PUMP CONTROL VALVE	CLA-VAL 6" 60-73AB	60-7325D	GOOD CONDITION	
PUMP NO. 2 MOTOR	US Electric 365 TP 1770 RPM 75 HP	J1810294 / R2112699	GOOD CONDITION	9304428-758
PUMP NO. 2 PUMP	LAYNE-WESTERN VERTICAL TURBINE	NAME PLATE MISSING	UNKNOWN	1,400 gpm
PUMP NO. 2 PUMP CONTROL VALVE	CLA-VAL 8" 60-73AB	60-7325D	GOOD CONDITION	
PUMP NO. 3 MOTOR	US Electric 365 TP 1770 RPM 75 HP	J1810294 / R2112698	GOOD CONDITION	9304428-758
PUMP NO. 3 PUMP	LAYNE-WESTERN VERTICAL TURBINE	NAME PLATE MISSING	UNKNOWN	1,800 gpm
PUMP NO. 3 PUMP CONTROL VALVE	CLA-VAL 8" 60-73AB	60-7325D	GOOD CONDITION	
SURGE CONTROL VALVE	CLA-VAL 6" 52-03B	52-03123B	GOOD CONDITION	
EFFLUENT METER	SENSUS PROP-ROF1 (12")	044441	HEAD LEAKING	60 PULSES/INCREMENT
INFLUENT METER	ROCKWELLS W-5500 TURBO (10")	N/A	SIGNES OF LEAKING AROUND HEAD	119.5 PULSES/1000 GALLONS
RESERVOIR FILL VALVE	CLA-VAL 10" 92BG-07ABC	92-07 420	REBUILT TO DIFFERENT FUNCTION	2G388801G / 131-22ABCS XN
FLOW CONTROL VALVE	PRATT CYLINDER OPERATED	N/A	REBUILT TO DIFFERENT FUNCTION	MANUAL VALVE
CHLORINE SCALE	W&T U23338	AR-39697	SIGNES OF CORRSION	
CHLORINE RATE VALVES	SUPERIOR 25 PPD ALL 5 VALVES	N/A	GOOD CONDITION	P2 OPERATING AT 10 PPD
UNDERGROUND PUMP STATION	USEMCO	N/A	FAIR-GOOD	
PUMP NO. 4 (2A) MOTOR	MARATHON 75 HP	YL 365TTDS 7036JP-R26W	GOOD CONDITION	
PUMP NO. 4 (2A) PUMP	PACO YG 92R2123301A	11-501574 158261	GOOD CONDITION	1,400 GPM / 160FT TDH
PUMP NO. 4 (2A) VALVE	CLA-VAL 8" 60-73AB	60-73-48F	GOOD CONDITION	
PUMP NO. 5 (3A) MOTOR	MARATHON 75 HP	YL 365TTDS 7036JP-R26W	GOOD CONDITION	
PUMP NO. 5 (3A) PUMP	PACO YG 92R2123301B	11-50157 158237	GOOD CONDITION	1,400 GPM / 160FT TDH
PUMP NO. 5 (3A) VALVE	CLA-VAL 8" 60-73AB	60-73-48F	GOOD CONDITION	
EFFLUENT METER	SENSUS PROP-ROF1 (12")	N/A	GOOD CONDITION	98.02 PULSES/REVOLUTION

6-B.109

VILLAGE OF LA GRANGE, ILLINOIS
EAST AVENUE PUMPING STATION
SUMMARY OF RECOMMENDATIONS AND PRIORITY
APPENDIX D

	Operational Recommendations	Estimated Construction Cost	Design Engineering	GCA/RPR Engineering
1	Replace Exterior Door Glazing with Steel Panels	$4,000[1]	N/C	
2	East Avenue Isolation Valve in vault	$12,000	$2,500	N/A
3	Update the Emergency Response Plan and Vulnerability Study		$10,000	N/A
	Electrical Recommendations			
1	Main Station Lighting Fixture Replacement	$2,000[1]	N/C	
2	Recorder Replacement	$5,000[1]	N/C	
	OR - SCADA System Replacement	$120,000[2]	$20,000	
3	Alarm Dialer at Standpipe and at Elevated Storage Tank	$5,000[1]	N/C	
4	Generator Load-Bank Test	$2,000[1]	N/C	
5	Automatic Transfer Switch and Motor Control Center Replacement	$75,000[2]	$20,000	
6	Generator Above-Ground Storage Tank (1,000 gallon)	$12,000	N/C	
	Mechanical Recommendation			
1	Pull Main Station Pumps and inspect for damage ($7,000/pump)	$21,000[1]	N/C	
2	Dehumidification (Main Station Only)	$15,000[1]	N/C	
3	Chlorine Scale Replacement (load cell with 4-20 mAdc output)	$4,000[1]	N/C	
	OR - Convert to Liquid Chlorine System	$41,000[2]	$15,000	N/A
4	Plug Valve/Hydraulic Operator PCV Conversion	$35,000[2]	$6,000	$3,000
	OR - Deep Well PCV Conversion	$40,000[2]		
5	Reservoir Stuctural Inspection		$2,000	N/C
6	Investigate McCook By-pass	N/C	$6,000	N/C
	Total Cost and Engineering fees	$393,000	$61,500	$23,000

[1] Can be contracted directly with vendor by Village Staff

[2] Drawings and specifications required for IEPA review and construction permit

N/C: No Cost, project contracted directly with Vendors

N/A: Not Applicable, project contracted directly with Vendors

6-13.110

VILLAGE OF LA GRANGE, ILLINOIS
EAST AVENUE PUMPING STATION
SUMMARY OF OPERATIONAL RECOMMENDATIONS
APPENDIX E

Description	Urgency	Frequency
Inspect and repair corroded exterior of pump cans	Immediate	Yearly
Inspect and tighten pump electrical connections	Immediate	Yearly
Dismantle and inspect (repair if necessary) air release valves.	Immediate	Yearly
Test Substation By-Pass Function	Immediate	Yearly
Calibrate flow meters	Immediate	Yearly
Monitor building cracks and repair	Immediate	Yearly
Inspect Ground Storage tank for cracks	Immediate	Yearly
Inspect Substation vacuum priming system and valves	Immediate	Monthly
Visually inspect (video camera) interior of pump cans	Immediate	5-years
Identify leaks at flow meters and repair	Immediate	As needed
Inspect operation of pump control valves		Monthly
Maintain new dehumidifiers		6-months
Calibrate scales, flow meters, pressure transmitters, and gauges		Yearly
Inspect all paint and repair as needed		As needed

6-B.111

APPENDIX F

DESCRIPTION OF IN-LINE PUMP CONTROL VALVES

Butterfly Valves - Butterfly valves are a popular choice for a PCV requiring minimum control due to their low cost compared to either the plug valve or ball valve. The two main drawbacks include when open, the valve disk remains in the flow stream creating a minimal of head loss. The speed of the disk moving from fully closed to fully open can be controlled throughout the ninety degrees, but because of the shape of the disk, flow control only occurs in the first thirty degrees. Once the valve has reached the thirty percent open position, flow is almost at 100 percent.

Plug Valves - Plug valves have been used as PCVs for many decades (See Figure F1). The valve typically has a square port opening which allows improved flow control over the butterfly valve. When open, there is nothing in the flow stream to create headloss. The drawback is most plug valves are not a "full port" valve, which means typically the cross-sectional area of a fully open plug valve is only eighty percent of the pipe area. This creates headloss and reduces the efficiency of the system.

Figure F1

Ball Valves - Ball valves have the advantage of being a full port valve (See Figure F2). When the valve is fully open, headloss is the same as the equivalent length of pipe. The two drawbacks are the cost and size of the valve, both in length and width. Due to the circular port opening of the valve disk, the flow control is a cross between the butterfly valve and the plug valve.

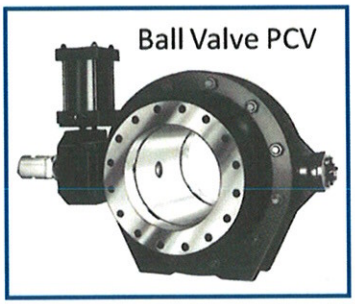


Figure F2

The in-line PCV is equipped with either a motorized operator or a cylinder operator utilizing either air or water as the operating medium.

Motorized In-line PCVs - Motorized operators provide a smooth open and closing operation but require electricity to operate. Therefore, they will not close during a power failure allowing reverse flow through the pump unless a standard check valve is also used. Another downside is, once purchased, the speed of opening and closing is determined by the valve gearing and can not be easily changed.

Pneumatic Cylinder Operators - Pneumatic cylinder operators are a popular choice since most facilities have a high pressure air source available. The opening and closing speed of the pneumatic operators can easily be adjusted in the field. One of drawbacks to the pneumatic operator is if leaks in the packing develop. If leaks develop, high pressure air can be lost and the only indication is the frequency of the compressor cycling.

Another drawback is the potential rapid opening of the valve. It requires several times more pressure to move the valve out of the seat than to move the valve to the open position. Once the valve is seated, the operator must generate a high differential pressure to force the valve out of the seat. Once out of the seat, much less pressure differential is required and the valve typically makes a quick opening which can, in some cases, defeat the purpose of the PCV.

Hydraulic Cylinder Operators - The in-line PCV equipped with a water based cylinder is less popular than the pneumatic cylinder for one reason; if the packing begins leaking, water can accumulate on the floor. While some view this as a disadvantage, some operators view this as an advantage as the leak can be identified and repaired quickly.

One of the main advantages of the hydraulic operator is the smooth operation. Water is an incompressible liquid. Pressure can be applied to force the valve out of the seat but will not "uncompress" like air when the high pressure is no longer required to move the valve.