Professional

Engineering

Services

Water Distribution System Model and Evaluation

RFQ # 17-033

Technical Proposal

Village of
Orland Park, IL

August 31, 2017

STRAND ASSOCIATES®

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August 31, 2017

Mr. John Mehalek, Village Clerk
Village of Orland Park
14700 S. Ravinia Avenue
Orland Park, IL 60462

Re: Request for Proposals (RFP) – Water Distribution System Model and Evaluation, RFQ # 17-033

Dear Ms. Mehalek:

On behalf of Strand Associates, Inc.®, thank you for the opportunity to submit to the Village of Orland Park our proposal to develop and evaluate a water system model. We are excited about the possibility of assisting the Village with this project.

Selecting of firm results in a Water System Evaluation that provides solutions the Village can implement with confidence. We know this because of the following key factors:

- **Our thorough project understanding and comprehensive approach results in an accurate water system model and solid conclusions to support recommendations to the Board.**
- **Our similar experience provides a sturdy foundation of proven solutions to challenging water system issues.**
- **Our project team brings unmatched expertise to evaluate the Village's water system issues.**
- **Our project schedule provides frequent Village interactions to provide valuable input and eliminate surprises.**
- **Our project fees reflect our efficient and effective approach to creating a calibrated water system model and performing a successful system evaluation.**

We have a history of successfully working with Orland Park and we anticipate that this relationship will continue for many years to come. After selection, we will meet with Village staff and establish the final scope of services for this project and discuss and negotiate acceptable terms and conditions of the Engineering Services Agreement.

We look forward to working with the Village on this project and to providing the exceptional knowledge, care, and detail needed to make this project a success.

Sincerely,

STRAND ASSOCIATES, INC.®

Chris J. Ulm, P.E.
Project Manager

P170.762/CJU:mah

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Executive Summary

Our Selection Results in Solutions the Village Can Implement with Confidence

We have created water models and performed similar studies for numerous municipalities in the area. We have a deep level of familiarity with systems very similar to Orland Park's, including water communities that purchase Lake Michigan water from Chicago, and are aware of common issues that systems like Orland Park's face in terms of hydraulic profile and water main. We are confident that upon review of our proposal, which supports the five key factors discussed below, the Village will find we are the right team for the project and our solutions to water system issues can be implemented with confidence.

We have a deep level of familiarity with systems, and their issues, similar in history, size, and operational profile to Orland Park's water system.

Thorough Project Understanding and Comprehensive Approach Results in an Accurate Water System Model and Solid Conclusions to Support Recommendations to the Board

As discussed above, we are familiar with water system issues in systems very similar to the Village's. We have met with Village Staff and discussed specific areas of concern and interest regarding evaluating system performance with the calibrated water model. We have recently assisted other communities with similar areas of concern, which has enabled us to create a project approach tailored to the Village's specific needs.

We are also familiar with the Village's GIS system and are confident that we understand the level of effort required to get the layer ready for modeling. As the selected firm for this project, the Village can rest assure that we will not be asking for extra fee because of unknown GIS status.

Finally, one of the key aspects of our approach is keeping the Village involved every step of the way. We will submit technical memorandum and meet monthly during the project to obtain input and direction. Keeping staff involved in the process will maximize the Village's confidence in the results. We will assist staff with any presentations to the Board, but it is our approach to have staff as an integral part of the team, so they understand the process and can make confident and well-supported recommendations to the Board.

More detail on our understanding and approach is provided in the *Project Understanding and Approach* section of this proposal.

Similar Experience Provides a Sturdy Foundation of Proven Solutions to Challenging Water System Issues

The *Project Experience* section provides a listing of the recent water system modeling projects and studies that members of the project team have recently been involved with over the past 5 years. It does not bring in the many other studies taking place throughout the firm, which also provides knowledge that can be easily accessed for this project. We are certain the Village will find that similar services for communities such as Romeoville, Niles, Streamwood, Crest Hill, Downers Grove, Glencoe, Wilmington, and others brings a full tool box of solutions to Orland Park's issues.

Project Team Brings Unmatched Expertise to Evaluate the Village's Water System Issues and Needs

We have prepared many water system studies that have included creation, calibration, and analysis of computerized water models. The *Project Team* section shows that the team assembled brings unmatched expertise. They have worked together on many of the projects listed in the *Project Experience* section and many other projects not discussed in this proposal.

Selecting our firm for the computer modeling and water system analysis project will result in a water system study that meets all of the Village's water system planning needs.

Project Schedule Provides Frequent Village Interactions to Provide Valuable Input and Eliminate Surprises

We developed a schedule for this project that takes into consideration several key factors. First, we will complete field testing before winter weather complicates that effort. Second, we will allow ample time for Village review of documents and workshop meetings to discuss and gather input. Finally, we will keep the project moving such that data and results are provided in time for budgeting and decision making.

Additional detail on our schedule and our team's availability to meet the schedule can be found in the *Project Schedule* section of this proposal.

Project Fees Reflect Our Efficient and Effective Approach to Creating a Calibrated Water System Model and Performing a Successful System Evaluation

Our strong understanding of the project has enabled us to develop an approach that we are confident will provide the results for which the Village is looking. As a result, we are able to develop fees that we are confident will most efficiently and effectively provide these results.

Again, we are confident that our proposal will demonstrate that selecting our firm for the Village's computer modeling and water system analysis project will result in a water system study that meets the Village's near-term water system planning needs.

Project Understanding and Approach

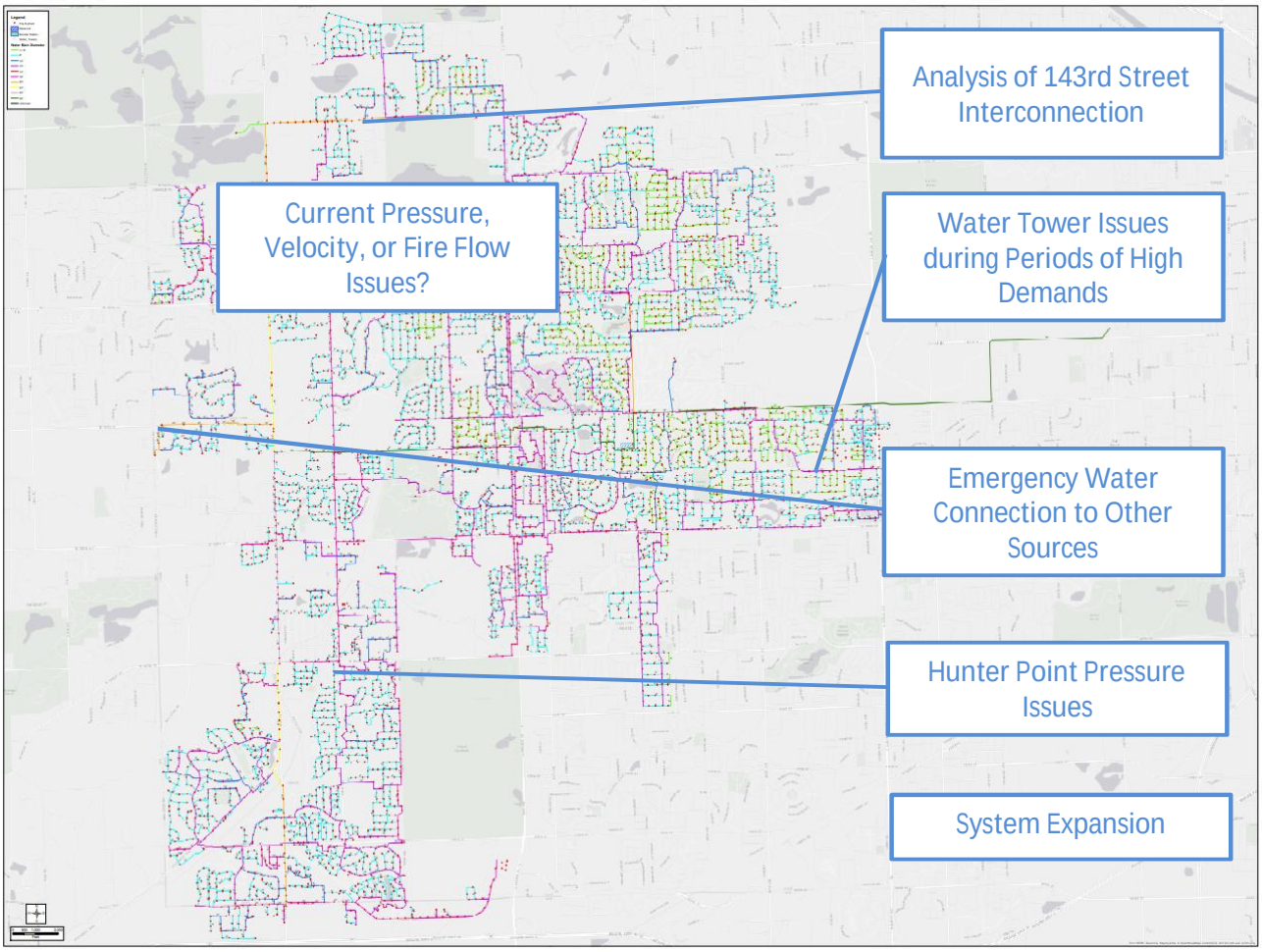
Thorough Project Understanding and Comprehensive Approach Results in an Accurate Water System Model and Solid Conclusions to Support Recommendations to the Board

The Village of Orland Park is seeking engineering expertise to prepare and calibrate a computerized water system model and then use the model to complete several system analyses. Based on discussions with Village staff, the following is our understanding of the project.

We are uniquely qualified for this project because of our proven project approach and experienced project team.

At this time, the project will include the creation and calibration of a water model using the Geographic Information System (GIS) water system layer and additional information provided by the Village. We are then to calibrate the model with field testing data provided by the Village and with demands allocated from the Village's water billing records. The top 10 to 20 water users will have specific demand allocate to their demand nodes, and the remaining demand will be distributed evenly. We are then to use the calibrated model to analyze the current performance of the system, including supply, storage, pumping, and distribution.

Our firm is then to make recommendations to improve any deficiencies discovered and develop associated opinions of probable cost. All of the findings will be summarized in a report provided to the Village.



We have reviewed the Village's GIS data for the water system layers and understand the level of effort required to make the model continuous. We are also familiar with the Village's SCADA capabilities and how that will be used to calibrate the model. We also understand that Orland Park purchases Lake Michigan water from the City of Chicago via Oak Lawn.

As for analyses that the Village would like to investigate with the calibrated water model, our meetings with Village staff indicated the following issues that they would like to analyze at some point in time, perhaps not part of this project:

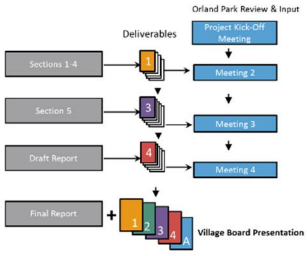
- Understanding of the impacts or ideal means of completing a system interconnect along 143rd where two pressure zones cross
- Solution to the issue of rapidly draining water towers (Tower 5) during high demand periods
- Correction of pressure issues at Hunter Point area
- Analysis of emergency connections for supply to the village
- Understanding of needs for the water system's expansion
- Other localized pressure issues

We are uniquely qualified to perform these services for the Village of Orland Park, as we have worked on many similar projects throughout Illinois and Wisconsin. Recently, we performed these services for Niles, Streamwood, Crest Hill, Lockport, Romeoville, Highland Park, Glencoe, Downers Grove, and Schaumburg, Illinois, which are similar in size and hydraulic configuration to the Village of Orland Park. These, and other similar projects, are detailed in our *Project Experience* section.

Frequent Village Involvement Eliminates Surprises and Maximizes Value

Each step in our proven process provides an opportunity to add value to the resulting model and report. This project will determine and support many future decisions. Thus, the proper steps must be taken now so that the resulting decisions are sound and economical. Using the wrong software, cutting corners on calibration, making overly conservative improvement choices, or not investigating the proper improvements will likely cost much more in the long run than spending the extra effort on a comprehensive water analysis that provides effective and economical recommendations.

We propose to involve the Village in the creation of the model, the analysis of current and future improvement scenarios, and the direction of the report. We will incorporate Village input by submitting technical memoranda of the report sections as they are prepared. We will then have a workshop to discuss the results of the previous steps and the direction of the next. This process is shown visually in the adjacent graphic. This process enables the Village to know the study direction at all times and not be surprised or disappointed at the end, but, rather, informed and confident in the results.



Approach provides many opportunities for Village staff input and direction.

At this time, it is anticipated that the report will be based on the following outline:

- Executive Summary
- Section 1 – Introduction
- Section 2 – Summary of Existing Water System and Water Demands
- Section 3 – Creation and Calibration of Water System Model
- Section 4 – Analysis of Current Water System Performance
- Section 5 – Analysis of Water System Improvements
- Section 6 – Recommendations and Cost Opinions

Summary of Project Approach

Based on our discussions with Village staff and our experience with similar projects, we have developed the following task list for our approach, with additional details of each step after the brief listing.

- Conduct a project kickoff meeting to collect and review existing data, discuss future and existing system deficiencies, and determine the expectations for accuracy, ease of use, and maintenance requirements of the model.
- Conduct field investigations to understand and document storage and pumping station information and collect hydrant flow data.
- Develop and calibrate the water model using WaterGEMS V8i water system modeling software.
  - Create distribution system model based on using GIS data
  - Incorporate facilities into water model
  - Allocate water demands based on Village provided data
  - Allocate top ten water users' demands, if necessary
  - Calibrate the water model using Village-provided flow data and flow data obtained from field testing
- Assess the current water system performance using the calibrated water model and identify facility and distribution system performance on average-day, max-day, and max-day plus fire demands.
- Prepare technical memorandum for the findings and attend a workshop meeting with Village staff to discuss the findings to-date and the direction of the next steps.
- Develop system improvement scenarios and analyze the ability to improve current system performance.
- Prepare technical memorandum for the findings and attend a workshop meeting with Village staff to discuss the findings to-date and the direction of the next steps.
- Develop opinions of probable cost for the improvements recommended.
- Develop a draft report detailing the study findings and recommendations.
- Meet with Village staff to discuss the draft report.
- Prepare a final report based on Village comments and submit to the Village.
- Provide the Village with a copy of the GIS-compatible model for inclusion into the Village's GIS maps.

Village-identified issues will be investigated and addressed, providing a long-term tool in which the VIllage can have confidence.

We have specifically discussed the tasks identified in the Village's RFQ. However, there are some additional tasks that the Village might find beneficial. These tasks would be provided on an optional, ala carte basis, and may be selected or rejected independent of the main task scope. If the Village wants to add any of these services, we can develop proposed fees and discuss each task further after our firm selection.

The following provides a detailed discussion of our proposed and optional scope of services tasks.

Conduct a Project Kickoff Meeting

This is a very important step in the project. The Village's input and thoughts on the system will lay the groundwork for the remainder of the study. The Village will be asked to provide the following to assist us in meeting the Village's objectives efficiently and effectively:

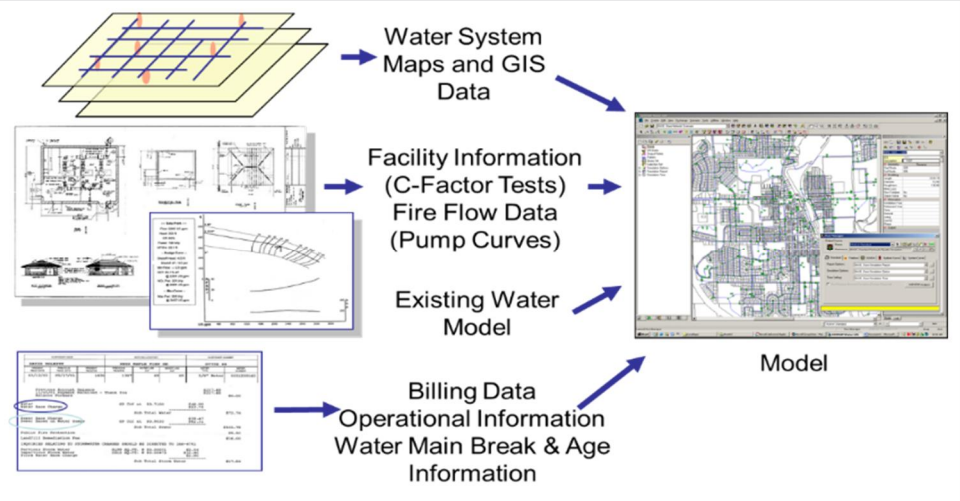
- Hard copy map(s) and AutoCAD or GIS file(s) of the system
- Pipe age and materials
- Operating schemes for the receiving/main pumping station, three system booster stations, and elevated water storage tanks
- Aerial photographs of the Village (GIS file)
- Contour map with 2-foot elevation contours (Cook County GIS file)

Gathering necessary information at the start of the project shows that we value staff time by maximizing efficiency while not sacrificing Village input.

- Historic water demand data
- Water billing records for past 5 years
- Previous water system studies and reports
- Needed fire flow demands from ISO and the Village's Fire Department
- Available fire flow field test data and SCADA measurements
- Existing facility plans
- Anticipated growth areas and type of growth
- Locations and information on the 5 to 10 largest water system users
- Locations and information on critical water customers (from vulnerability assessment)
- Historic problem areas in water distribution system and facilities

Our goal for the kickoff meeting is to develop an understanding of the existing problems and discuss the future anticipated impacts to the water system. We value the Village staff's time and seek to make the entire process as streamlined and efficient as possible.

Furthermore, we will consult with Village staff to determine the Village's expectations of accuracy, ease of use, and maintenance requirements of the water model.



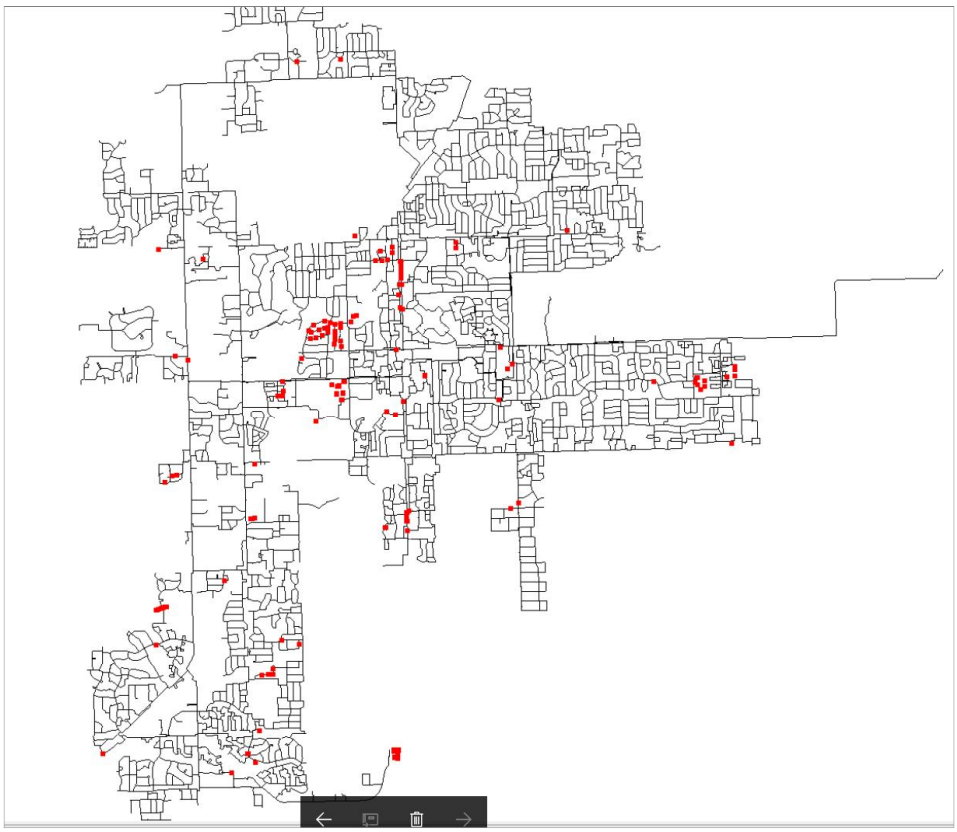
Model is built on extensive amounts of data to maximize its accuracy.

Develop and Calibrate the Water Model Using Watergems V8i Water System Modeling Software

We are recommending the use of WaterGEMS V8i software for Orland Park's water model. WaterGEMS V8i is produced by Bentley Software and has the capability to incorporate data from ESRI/Arcview GIS, AutoCAD, and MicroStation sources. The software is also capable of working in these platforms and as a stand-alone program. WaterGEMS V8i also meets all the performance and presentation requirements as described in the Village's request for qualifications (RFQ). Additionally, the software is continually updated and supported. WaterGEMS V8i is completely open architecture and used by many consultants, so the Village will maintain cost control and not be locked into any single firm.

Selection of software that produces the best fit for the Village's long-term use is vital.

The base of the model will be created using the Village's GIS water main database and shapefiles. WaterGEMS will work directly with the ESRI/Arcview data. We are very familiar with the Village's water system GIS data and have an unmatched understanding of what it will require to get that data ready to be a fully connected pipe network, ready for modeling. We will be able to move swiftly from model creation, into calibration and facility addition.



We have a thorough understanding of the level of effort required to resolve isolated elements in Orland Park's GIS information.

There are several ways to calibrate a water model. Hydrant flow testing at various key points in the system can provide the information necessary to calibrate the model for future analysis of the effects of system improvements or extensions. We understand that we will use fire flow data provided by the Village. For calibration, it is necessary to know the behavior of the system during hydrant flushing in order to correctly determine the system's response to the localized hydraulic stresses created by this test. We will observe conditions of water pumping levels, elevated water tank levels, and system demands during the performance of the test. We will request this information pertaining to the days and times of the fire flows, as provided in the Village's SCADA system; which we will use for verification of calibration accuracy, as necessary. If it is discovered that additional testing is required, we can provide assistance with field testing for an additional fee.

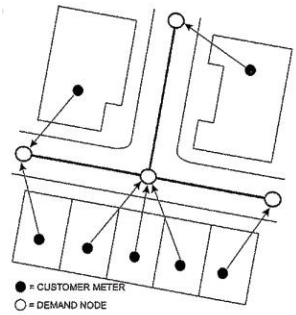
Water model calibration can help identify the existence of closed or pinched valves, and tuberculated water main.

Included in the effort to calibrate the model is the collection and input of the facility data and parameters. We will visit the supply and storage sites to assess how they operate and gather information necessary to recreate them in the model during the kickoff meeting. However, if pump curves are not available or inaccurate and the Village desires that the model include the most current pump curves, for an additional fee we can provide assistance with field testing to develop the curves. In that case, we will ask for Village staff's assistance in performing pump tests to operate the valves, hydrants, and pumps.

Staff involvement during calibration testing enables additional input regarding known system issues.

Water model calibration will include allocating the water demands throughout the system. In recent studies, we have been able to use WaterGEMS to allocate the demands based on the meter reading data from an average- and max-day. The billing and GIS data included coordinates for each meter and WaterGEMS was able to find the closest node for each demand and allocate it to that point. With this approach, the level of accuracy is very high and there is no need to complete any special processes for large users, as this is automatically incorporated.

Alternately, as we did in the Village of Downers Grove, we can allocate the demand based on zoning. By selecting a typical demand per-acre of zoning type using the Village's historical meter reading data, we will apply that data over those zoning types. This proved to have a high degree of accuracy in Downers Grove and several other locations.

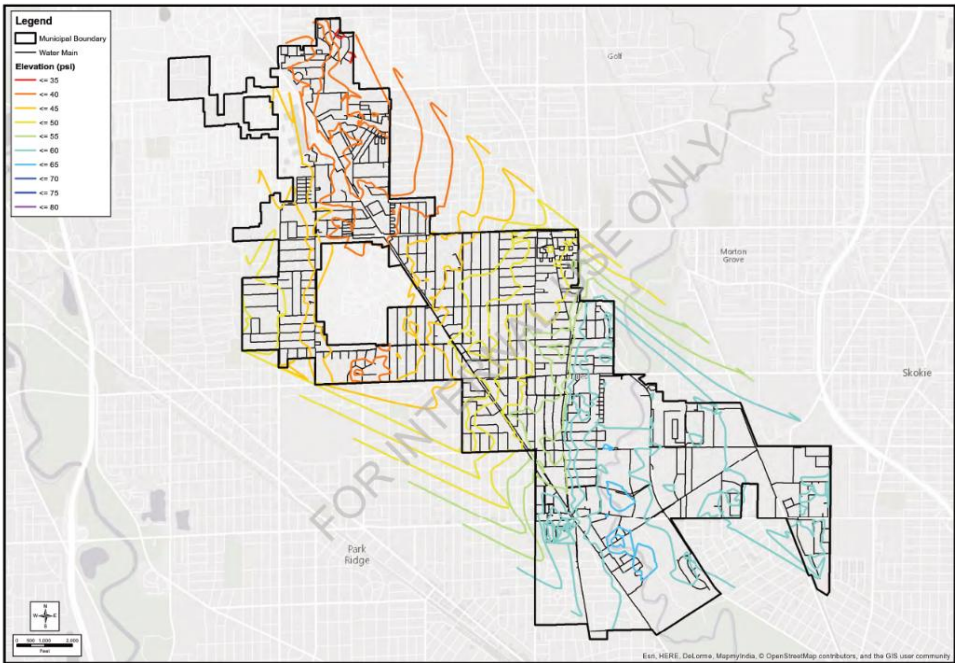


Potential for high water demand allocation accuracy in water model.

Centralia field testing and model calibration location.

Assess the Current Water System Performance Using the Calibrated Water Model

With the calibrated model, we will be able to review the overall operation of the existing system, as a whole, under both instantaneous and EPS. We will look for areas of exceptionally high or low pressure, major variation in pressure, and inadequate fire flow. Another item we will review is very high or very low velocities in distribution segments. This can result in shorter pipe life or excessive settlement within the pipe. Finally, we will look into other facility operations, such as tower turnover and water treatment plant production.



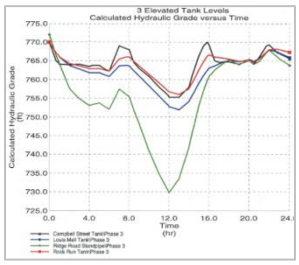
Niles average-day pressure contours.

In the future, GIS updates can be imported into the model to "check in" or troubleshoot after system changes.

These analyses will be observed under average-day demand conditions, maximum-day demand conditions, peak-hour demand conditions, and maximum-day plus fire conditions. We will look into other facility operations, such as tower and storage turnover, and water booster pumping station operation.

In addition, we will perform both desktop and model analysis of supply and storage capacities. The desktop analysis will give an overview using recommended standards for storage and supply capacities for the Village's demand patterns. The model will provide a dynamic perspective and assist in showing how the various facilities interact during high demand situations, such as major fires. Graphics, such as the one for pressure, can be easily created to show the results of the analysis.

The modeling process will be clearly documented to show assumptions and input data sources, and the model development, operation, and resulting recommended improvements will be based on the American Water Works Association (AWWA) suggested best practices. Modeled available fire flows will be compared with recommended fire flow ranges and durations for the specific zoning types (e.g., residential, commercial, industrial). Extended period simulations will be performed to assess the ability to meet the ISO recommended fire flows for the recommended duration.



Review of tank performance using an extended period simulation

Prepare and Submit a Technical Memorandum and Attend a Workshop with Village Staff

As discussed, we will provide technical memoranda at key stages during the study. These will eventually become the sections of the report. We will also schedule a workshop meeting with the Village to discuss the memoranda, obtain comments, and direction for our next steps. This will enable the Village to stay involved with the study, provide vital input, and be aware of possible end results.

Develop System Improvement Scenarios and Analyze Their Ability to Improve System Performance

This step includes finding recommended improvements to the system to help better meet today's conditions and issues, as well as future potential issues as the demands change during the next 10 and 20 years.

Once we have determined possible improvements to help the system meet current and future demands, we will run scenarios for these improvements and observe the results. If the results are favorable, we will include the improvements and opinions of their probable cost in the CIP and report.

Multiple methods of analysis provide necessary data for comprehensive system perspective.

The following figure shows a future maximum-day demand fire flow availability for a study recently completed.

Downers Grove's maximum-day fire flow contour map.

Prepare Opinions of Probable Cost for the Recommended Improvements

Once our technical memos have been reviewed and updated, we will prepare the final section of the draft Water System Evaluation, including the opinions of probable cost for each recommendation. We will factor in the specific situation of each recommended improvement and not resort to using generic unit price ranges.

Every step of the project is undertaken with the intention of exceeding the Village's engineering needs.

Submit Pre-Final Report

This will be the final progress report submittal. The technical memoranda that we have been providing to the Village will be formatted into a draft of the Water System Evaluation report that includes the reviews, evaluations, opinions of probable cost for each recommendation/suggestion, anticipated manpower needs, and schedule for implementation of the proposed improvements. We will also include a discussion of potential funding mechanisms to support financing of the project. The draft report will be based on the following outline:

- Executive Summary
- Section 1 – Introduction
- Section 2 – Summary of Existing Water System and Water Demands
- Section 3 – Creation and Calibration of Water System Model
- Section 4 – Analysis of Current Water System Performance
- Section 5 – Analysis of Water System Improvements
- Section 6 – Recommendations and Cost Opinions

As a compilation of all of the technical memoranda the Village has already reviewed, the final report will be familiar and receive full support.

After giving the Village time to review the information, we will meet with the Village to discuss the draft evaluation report and review in detail the proposed recommendations and alternatives.

Submit Final Report

After approval of the plan by the Village, we will incorporate comments into the Water System Evaluation and provide a final hard copy and PDF document for use by the Village.

As the Village will see, our approach is firm and well-developed to meet the needs of the Village. Our experience in system studies for many other communities has refined our approach to produce results Orland Park can rely on and implement with confidence. We want the Village to be completely satisfied, both after the study and after improvements are made.

Optional Tasks

During conversations with Village staff regarding this project, several other possible tasks were mentioned as being of interest. These tasks were not included in the RFQ, so we did not provide fee or include them in our schedule. However, if the Village wants to add these to the scope, fee, and schedule we would be happy to provide that information for discussion during or after the selection process. Those possible additional scope items are discussed below.

Supply and Storage Capacity Analysis

As part of a supply and storage capacity analysis, we would develop a diurnal water usage curve and compare the capacities of the pumping stations, water supply equipment, and storage tanks with the required capacity for both current-day and anticipated future demands. Typically, we will use the maximum-demand-day plus fire demand for the storage and pumping analysis.

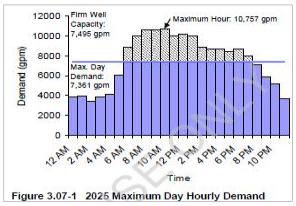


Figure 3.07-1 2025 Maximum Day Hourly Demand

System capacities can be analyzed.

Water Main Replacement Analysis

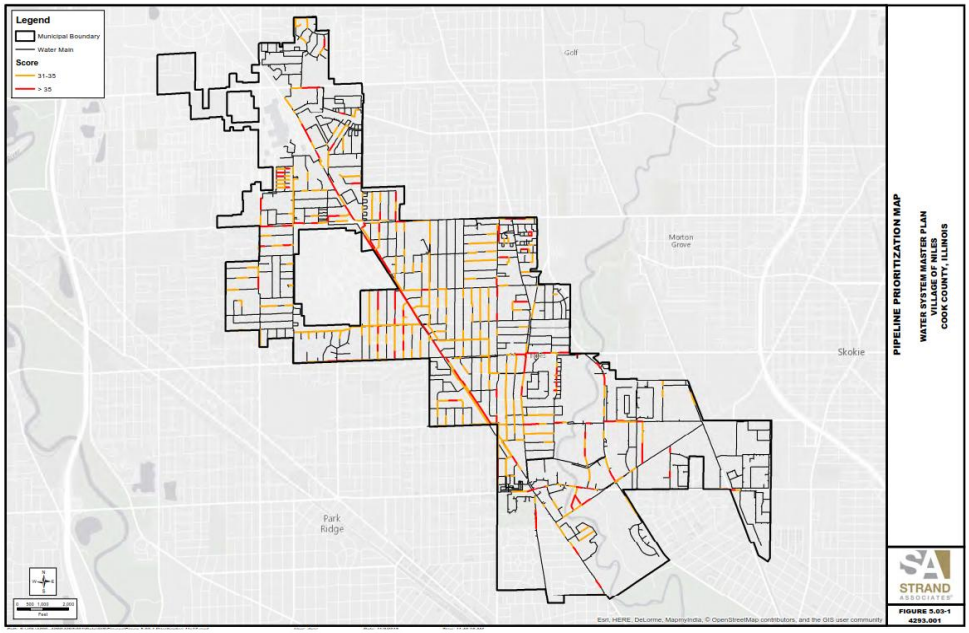
As an optional task, if the Village desires a water main replacement analysis to help prioritize and support water main replacement decisions, we will request the data necessary for the pipeline prioritization database, including pipe installation dates, historic water main break information, location of known water quality issues, locations of areas of interest where service continuity is more critical than other areas, location of deficient valves or hydrants, capital improvement plans adjacent to water mains, and other information. Information should be provided to us in an electronic format that includes tabular information with spatial coding, GIS shapefiles, AutoCAD files, or Microsoft Access files. Information received in a different format such as paper copies, PDF copies, or images can be included in the database, but doing so may incur an additional fee.

The prioritization plan map communicates concepts effectively to decision-makers and reveals how individual segments can be grouped into capital projects.

We will use this data to create a pipeline prioritization database in ArcGIS that incorporates information from the existing water model database, as well as additional layers of Village-provided information in an acceptable format, as previously described. The database will also include transportation features, areas of public interest, and others that are readily available through open-source databases. We will work with the Village to make assumptions where information is missing or unavailable and will document all assumptions in the report.

Using a matrix-scoring program that we have developed on past projects, we will adjust the scoring process based on Village-desired importance for the different areas of scoring. The spreadsheet-scoring program will give each pipe segment a score indicating its priority level for replacement.

After we run the pipe segments through the scoring matrix program, we will present the Village with a map of the pipeline prioritization database with various layers of information shown and the draft prioritization-scoring matrix for review and discussion at the next progress meeting.



Niles pipeline prioritization map.

Ultimately, we will provide a figure that shows the replacement priority for each pipe segment included in the study. This figure will display water main replacements prioritized in colorized rankings that are easily understandable by the elected officials and the general public. A sample from a recent assessment in Niles is shown below.

Criteria	Impact Score				
	0	1	2	3	Weight
Purpose of Existing Recommendation	Not Previously Recommended	Aged Infrastructure, Main Breaks, Water Quality, Reinforcement, System Performance	None	Compliance, Fire Flow	5
Number of Breaks	0	1 to 2	2 to 5	6 or more	3
Break Rate per 1,000 ft	None	Lowest 1/3	Middle 1/3	Highest 1/3	3
Diameter	N/A	6-in up to 10-in	4-in and smaller	12-in and larger	2
Material	Default	Asbestos Cement or CI			2
Accessibility	Default	County R-O-W	Federal/State ROW		1
Noteworthy Areas	Default	Schools, Police & Fire Stations	Hospitals, Prisons	Storage, Supply, Pumping, PRVs	1

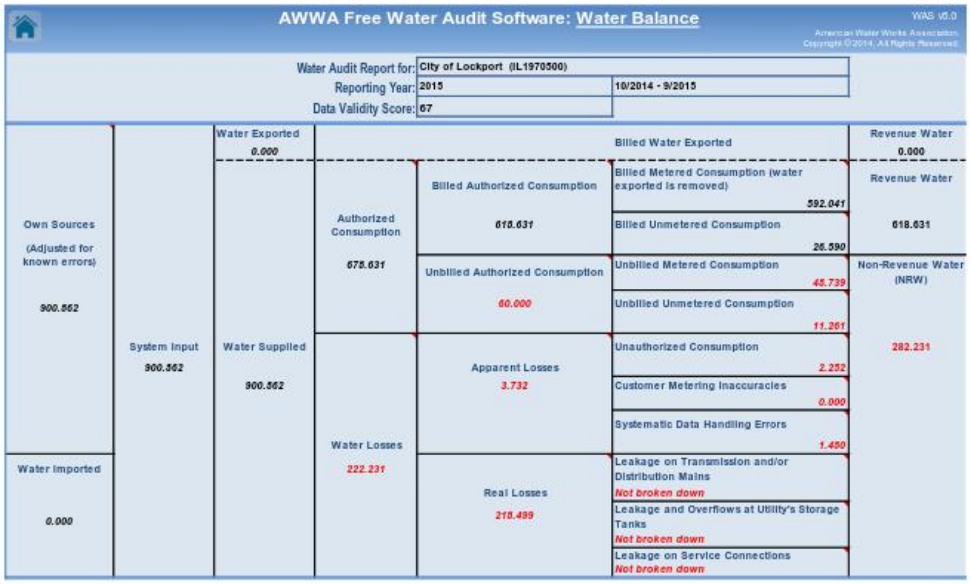
Example pipeline scoring plan.

Water Age Analysis

We can also run extended period simulations to look at the water age. In order to calibrate a water model to the level of detail that provides accurate water age, a vast and highly expansive amount of field testing and verification is needed to be performed. However, we have found that we can provide information on areas of concern with the level of calibration provided in our typical study scope. While we may not be able to say exactly how old the water is, we will be able to tell that the water in certain regions is much older than in others.

Nonrevenue Water Analysis

We can review the Village's overall water system information using AWWA M36 methodology and software, to identify and understand the Village's nonrevenue water, identify that portion that is water loss, and present recommendations as to the most efficient means to address the water loss, in an attempt to meet Illinois Department of Natural Resources requirements of no more than 10 percent by 2019.



Water balance table.

As noted in the figure above, in general, water use is comprised of three categories:

- Metered use
- Authorized unmetered use (system hydrant flushing, fire crews, system backwashing, landscape watering and street cleaning, water fountains, potential government agency use)
- Unauthorized unmetered use (main breaks, leaking service lines, storage overflows, theft of water, meter inaccuracies, and accounting discrepancies)

We will attempt to separate the apparent losses from the real losses, and aid the Village in rectifying both. We will first review the Village's produced and billed water to identify the amount of nonrevenue water. We will then review the Village's inventory of water meters for their potential accuracy issues. Village records will be reviewed for the meter testing and calibration history, the replacement history of the meters, the meter type and age throughout the system, cumulative volume by meter, and the status of the Village's Automatic Meter reading (AMR) system.

We will review the Village's water leak and main break data and the management information of the system to identify known leaks and their volume. We will identify the number of service connections on the Village's water system to identify potential unmetered loss on the service lines. We will use generally accepted AWWA methodologies to estimate losses on those service lines and potential unreported water main leakage losses.

We will then identify the Village's recoverable leakage – that is, the volume of water on which the Village can expect to claim revenue. This can amount to apparent losses caused by inaccurate meters, excessive unbilled authorized consumption, and high value real water losses from water main breaks and service leaks. We will estimate the value of the recoverable leakage, estimate the cost to recover the leakage, and evaluate and recommend to the Village options to recover the leakage and strategies to reduce water main losses.

We recently assisted the City of Lockport, Village of Indian Head Park, and Village of Romeoville with the AWWA M36 Water Audit process. For the City of Lockport, we have also continued to prepare nonrevenue water reduction plans at the request of Illinois Department of Natural Resources.

This process will focus the Village of Orland Park on the major contributors of water loss and nonrevenue water and provide the direction for improvements that will provide the biggest bang for the buck towards reducing the nonrevenue water percentage.

On-Call/As-Needed Services

We can provide on-call/as-needed hydraulic modeling to perform adequacy reviews on proposed developments within the village. Reviews will identify adequacy of water system to serve development or scope and probable cost of necessary modifications for proposed development.

We provide on-call modeling services for a number of clients for both developmental and emergency needs.

Project Experience

Similar Project Experience Produces a Sturdy Foundation of Proven Solutions to Water System Issues

The summary table shown below provides all of our similar projects completed in recent years. As indicated, we have unmatched local and similar experience when it comes to water system studies and modeling. This experience will certainly bring many proven solutions to the Village. Following the details of our Water System Studies and Evaluations experience provided below, we have provided our experience with the Village of Orland Park on all types of projects.

We have unmatched local and similar experience when it comes to water system studies and modeling.

Following the summary table are details on just a few of the similar projects that our firm has successfully completed in the past 5 years.

Water System and Model Analysis Experience	
Project	**Year**
Romeoville, IL – Water System Master Plan	2017
Niles, IL – Skokie Water System Repurposing	2017
Oak Creek, WI – Waukesha Demand Modeling	2017
Whitewater, WI – Water System Study	2017
Fond du Lac, WI – Water System Master Plan Update	2016
Wilmington, IL – Water System Model Updates	2016
Niles, IL – Water System Master Plan	2016
Glencoe, IL – Water Distribution System Plan	2016
Crest Hill, IL – Water System Model and Analysis	2015
Fitchburg, WI – Water System Master Plan Update	2015
Lockport, IL – Computer Hydraulic Model Update	2015
Stoughton, WI – Water System Study Update	2015
Glencoe, IL – Water System Master Plan	2015
Belvidere, IL – Southwest Area Water System Study	2014
Middleton, WI – Water System Planning	2014
Decatur, IL – Water System Master Plan Update	2014
Hoffman Estates, IL – North Pressure Zone Study	2014
Streamwood, IL – Water System Plan	2014
New Lisbon, WI – Comprehensive Water System Study	2014
Lake Mills, WI – Water Needs Assessment	2013
Monona, WI – Water System Study Update	2013
New Berlin, WI – Water System Study	2013
Romeoville, IL – Water Model Creation	2013
Downers Grove, IL – Hydraulic Computer Model Update	2012
Lindenhurst, IL – Lake Water Supply Hydraulic Modeling	2012
Waunakee, WI – Water System Evaluation	2012
Stoughton, WI – Water System Modeling	2012
Waukesha, WI – Oak Creek Connection Option	2012
Wilmette, IL – Specific Area Water Model Analysis	2012
Wilmette, IL – Wilmette–Kenilworth Interconnection Evaluation	2012
Downers Grove, IL – Water Model Update and GIS Transition	2011
Belvidere, IL – Water System Study Update	2008
Highland Park, IL – Water Distribution System Master Plan	2007

Select Recent Hydraulic Modeling Experience

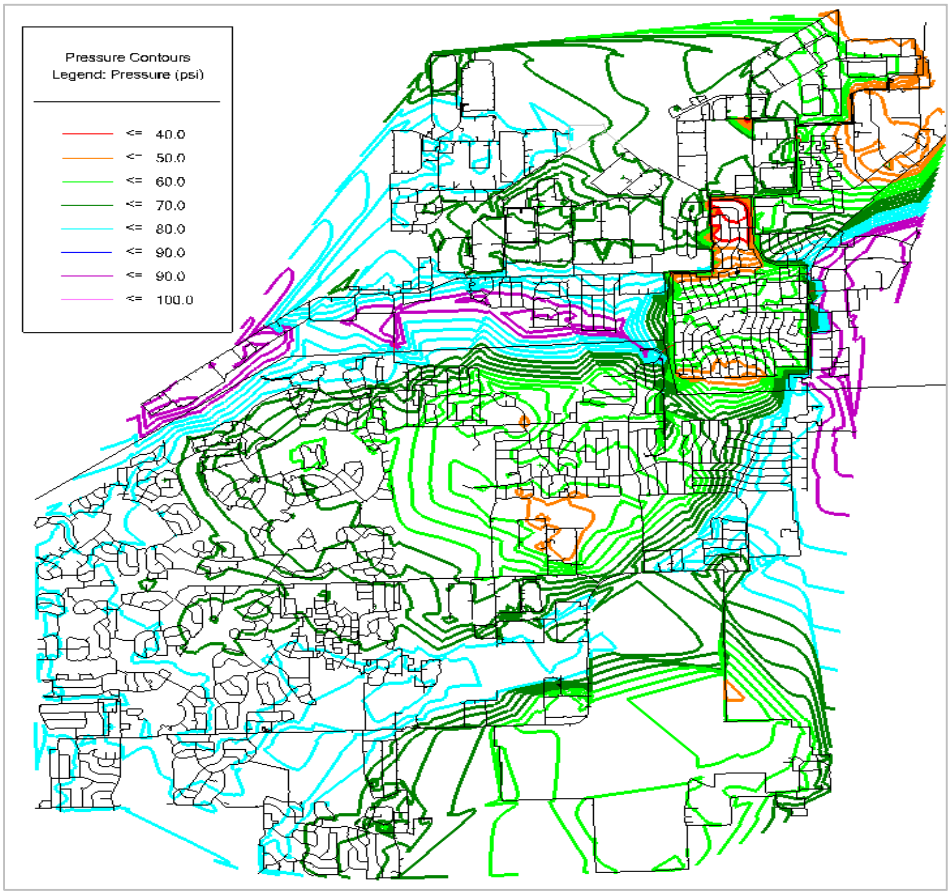
Water Modeling – Romeoville, IL

The Village of Romeoville hired us to develop a computerized water model of the Village's water distribution system to determine the effects of system improvements. The system consists of approximately 250 miles of water main ranging in size from 4 to 20 inches in diameter, 12 shallow and deep wells, five ion exchange water treatment plants, four booster stations, four elevated storage tanks, three ground-level reservoirs, one ground-level standpipe, and four pressure zones. The water model was created using WaterGEMS V8i software developed by Bentley Systems. The Village's water main, valve, and fire hydrant GIS mapping files were imported into the software, which resulted in quick and efficient modeling that has water system infrastructure in the correct geographic location. The water model was calibrated using the Village's hydrant flow test and SCADA data.

Reference:
Eric Bjork
Director of Public Works
815-886-1870

Project Team:
Chris Ulm, P.E.
Timothy Scholz, P.E.
Justin Bilskemper, P.E.

In-depth, extended period simulations (EPS) were completed to model changes in distribution pressures, booster flows, and elevated tank levels throughout the entire service area. The main purpose of the modeling was to show how supply, distribution, and storage improvements could improve water service to the Windham Pressure Zone customers.



Pressure contour map during fire event after system improvements.

Currently, the northern portion of this zone, where the largest booster station is located, is only connected to the rest of the zone by a single crossing. In addition, the zone's maximum-day demand was approximately equal to the firm well capacity. Several 72-hour EPS were completed using the maximum-day demand and included a 3-hour, 3,500 gpm fire in the zone. The existing condition simulation showed the system was not able to provide the necessary pressure to supply the demand and fire, resulting in negative pressures and elevated facilities draining.

System improvements, such as adding redundant crossings to the isolated portion of the Windham Pressure Zone, adding a new deep well and blending it with existing wells, and constructing a new, 1-million-gallon elevated tank, allowed the system to maintain adequate pressures and fill elevated storage facilities each day.

Water System Master Plan – Niles, IL

The Village of Niles hired us to provide a Water System Mater Plan to update its previous plan. Some of the unique challenges of the report were to determine what changes to the Village's system would be needed if a whole sale customer was lost and if the Village changed water suppliers. This included an evaluation of the existing water treatment plant and repurposing a pumping station used to supply water to the whole sale customer.

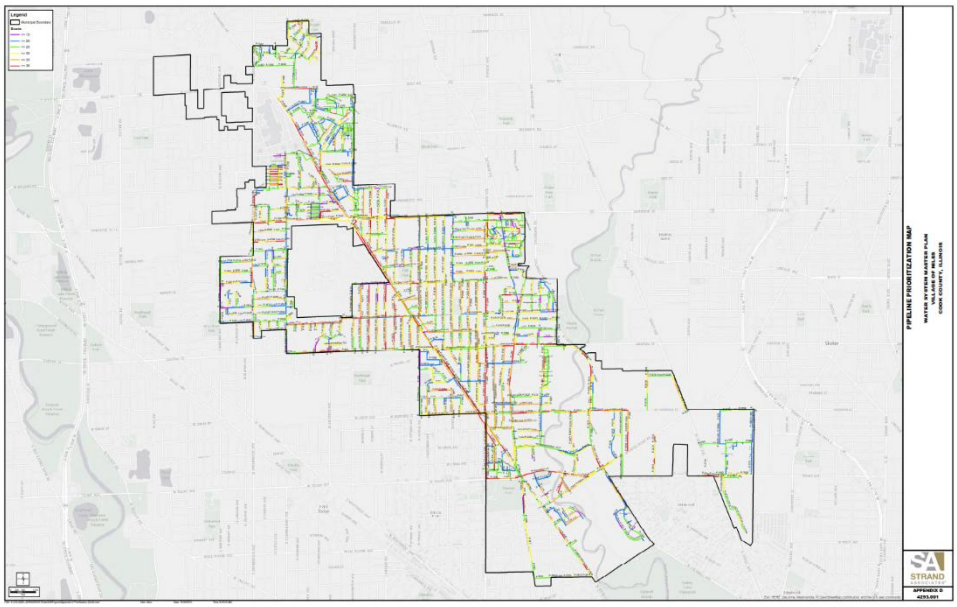
We used field data and water system mapping to create a computerized water model to perform system modeling for current-day average and maximum-day demands, as well as 2025 demands. Proposed improvement modeling scenarios included modeling fire flows in the industrial and commercial areas of the village to determine if a change was needed in the sequence of pumps at the water treatment plant.

Fire flows were analyzed using the computer model and several system improvements were recommended to improve performance. Water age, water loss, and water system electrical conservation and needs were also discussed, with recommendations for improved system performance. Water system improvements from the report were summarized and prioritized in a 5-year capital improvement plan. A pipeline prioritization plan was created as part of the report to help aid the Village in selecting water main replacement projects.

Reference:
Mary Anderson
Public Works Director
847-588-7900

Project Team:
Chris Ulm, P.E.
Justin Bilskemper
Dan Carpiaux

The Village of Niles Master Plan included a clearly presented water main replacement priority plan.



Niles – pipeline prioritization map.

Water Distribution System Analysis and On-call Support – Downers Grove, IL

The Village of Downers Grove selected us to evaluate its water distribution system and make recommendations for improvements necessary for the system to meet current and future demands. Coordination with Village planners and water department staff was necessary to determine current and future demands and development. Also, this work was coordinated with the village-wide, computer-based supervisory control telemetry system as well as the DuPage Water Commission's six pressure and rate adjusting control stations.

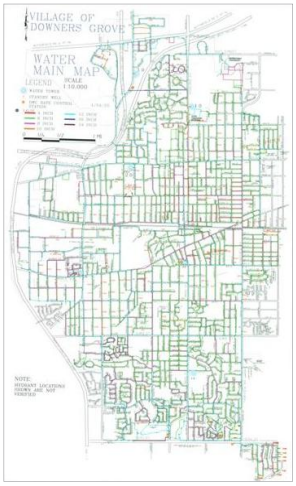
Reference:
Stan Balicki
Assistant DPW
630-464-5474

Project Team:
Timothy Scholz, P.E.
Dan Carpiaux

Demands were allocated across the system by locating and determining demands from representative areas from the varied zoning types and spreading the demands across the village on a demand-per-area basis. This approach resulted in a total village demand that was extremely close to the average-day demand of 6.68 million gallons.

Fieldwork was conducted with Village water department officials to obtain data for the computer model. This fieldwork, along with existing supply and storage data for the Village's seven elevated tanks, formed the basis for an accurate and calibrated computer model we developed for the Village.

In-depth, EPS were performed with WaterCad V7.0 by Haestad Methods. These were performed to model changes in distribution pressures and available fire flows throughout the entire service area during 24-hour periods under a multitude of scenarios, including 2005 and 2025 average-day and maximum-day demands, changes in main sizes, removal of elevated tanks, and adjustment of pressures for the pressure adjusting supply stations from DuPage Water Commission.



Downers Grove Water Main Map.

The model provided the Village with an accurate reflection of the strength of its system and its ability to face demands for the next 20 years. The Village has since recommended that the model be used to assess the impacts to the system of any proposed water utility work before such work is performed.

Water Main Modeling and On-Call Support – Lockport, IL

The City of Lockport faces tremendous growth potential resulting from the construction of I-355 that now traverses the entire north-south length of the city. In addition to the growth potential, the City had faced and addressed water quality issues within the city through multiple planning documents generated by multiple engineers. The City identified a strategy to meet future growth demands while addressing compliance issues, but needed to know how to implement that strategy.

Reference:
Ben Benson
City Manager
815-838-0549

Project Team:
Timothy Scholz, P.E.
Chris Ulm, P.E.

We were hired to review the previous engineering studies, conduct a review of the present-day distribution system, and develop short- and mid-term capital improvement plans to implement this strategy successfully.

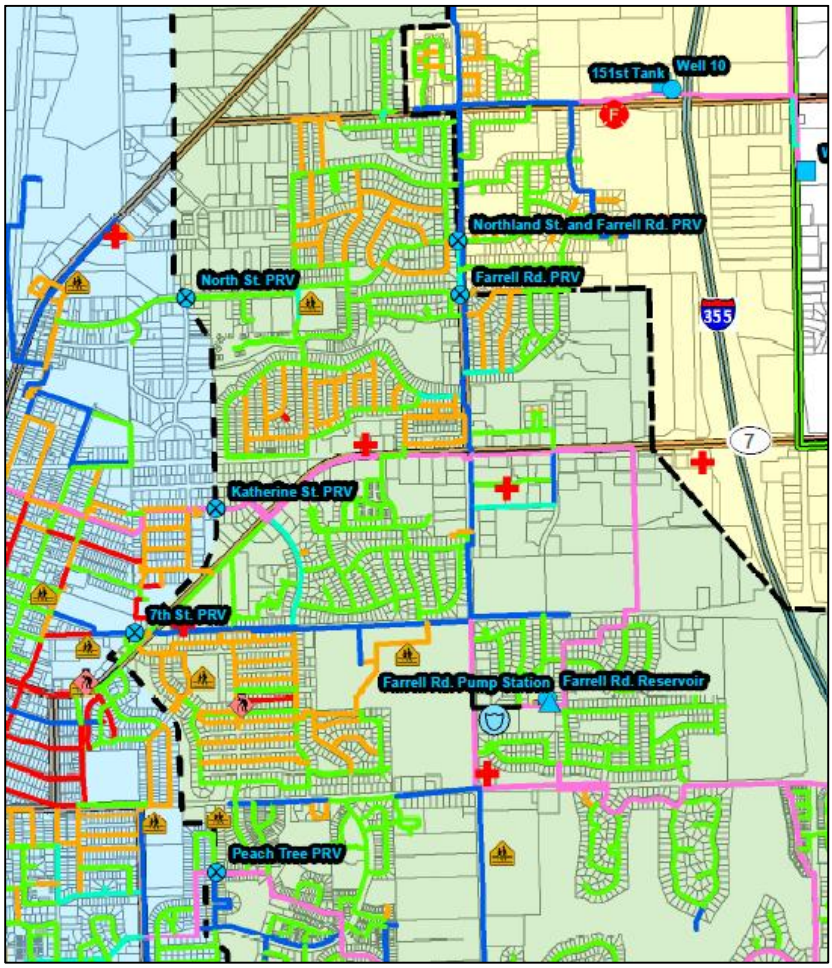
- **Water Model Update** – We obtained the previous water model files and performed a system update using WaterGEMS modeling software. Current GIS maps and operational information were applied to the model so that it reflected the present-day system. The model was recalibrated by simulating field fire flow tests to demonstrate that the field results could be duplicated in the model. This update was required to identify which recommendations from multiple previous engineering reports were still required to successfully implement the operational strategy to serve future growth.

- **On-Demand Water System Modeling** – Amidst our existing tasks to update the water model and generate a CIP, developers required feedback on proposed infrastructure, and staff needed additional support to make confident planning and capital decisions in the existing distribution system. We provided timely responses that considered the performance needs of both the present and ultimate distribution system.

  We updated growth areas with proposed development water mains and demands, which required us to project pressure zone boundaries beyond the consideration of previous studies. We then analyzed the performance of proposed developments while considering the needs of adjacent undeveloped parcels. These services have enabled the City to make decisions that are pro-growth while still maintaining the best interest of its existing customers and staff.

- **Capital Improvement Planning and Pipeline Replacement Prioritization –** Through years of planning, the City identified a strategy to address existing issues. The major remaining task was to identify how to implement these recommendations. We systematically reviewed the previous engineering studies to eliminate any recommendations that were not relevant to the City's strategy, as well as recommendations that the City had already implemented. The remaining list of recommended projects was analyzed in the updated computer model in order to validate the benefits of these projects to the distribution system. We also generated additional recommendations required for the system to perform as intended, including review of system pressures, fire flow availability, and water quality results from the model. Afterward, we created a pipeline prioritization model to aid the City in deciding when or if to implement these improvements.

  With City input, a prioritization scoring matrix was generated to apply scores for categories, such as water main breaks, pipe age, and adjacent critical areas. Water model results and multiple GIS layers were intersected so the scoring matrix of multiple user-defined parameters could be applied to each pipeline. The result was a prioritized list of every pipeline in the system. We also generated this list as a map to create a visual tool of the most highly prioritized areas in the city. Budgetary construction cost opinions were generated for pipelines with the highest priority score and divided into timelines that the City's budget could handle within 18-month, 2-year, and 5-year time frames. Ultimately, this created a clear path that staff and elected officials could follow as they worked to implement the distribution system improvement strategy.



Systematic review of existing studies and convergence with pipeline priority parameters enabled confident decision-making.

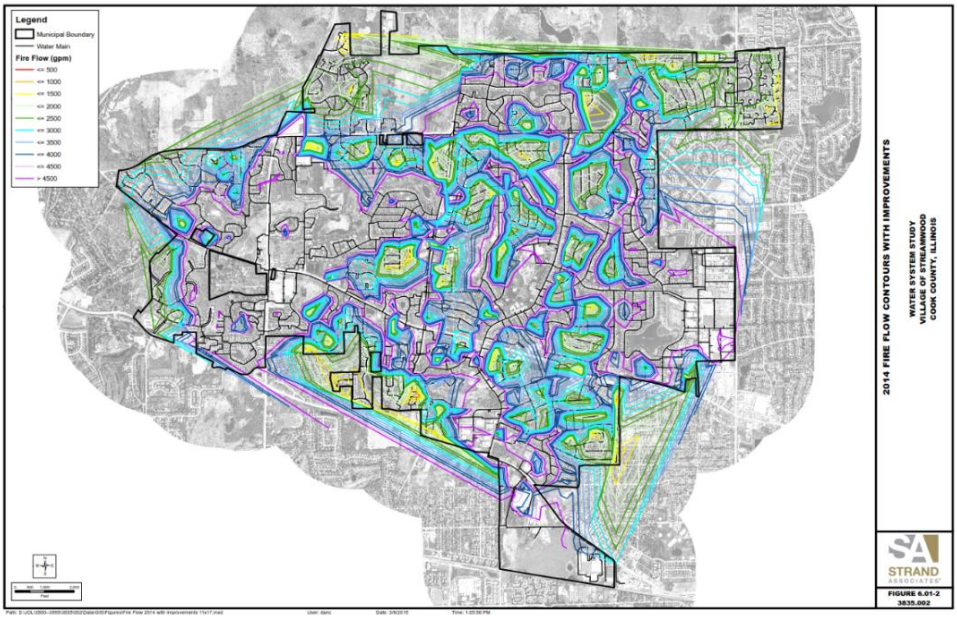
Water System Model and Study – Streamwood, IL

We completed a water system model and a study. The water system model was built using geographical information system (GIS) data, the model was calibrated, and demands were distributed using Village-supplied automated meter reading data. The study evaluated the Village's existing supply, storage, and nonrevenue water.

Water modeling was used to analyze the existing distribution system performance, evaluate system water age, and develop improvements based on Village-specified future water system scenarios. Modeled scenarios include the availability of fire flow when storage facilities are taken out of service, the ability to meet demands if supply from NSMJAWA is lost, evaluation of locations for Streamwood to connect to the Village of Bartlett supply, and the availability of fire flow if demand from its largest industrial user is increased.

Reference:
Matt Mann
Director of Engineering and Public Works
630-736-3850

Project Team:
Chris Ulm, P.E.
Justin Bilskemper, P.E.
Virginia Smith, P.E.



Fire flow contours with improvements – Village of Streamwood.

Hydraulic Computer Model Update – Downers Grove, IL

The Village of Downers Grove selected our firm to update the Village's existing AutoCAD-based computer hydraulic model to a new all-pipe inclusive, GIS-based computer hydraulic model. The new model takes advantage of the increased accuracy inherent in the GIS data and incorporates changes in the Village's distribution since the original water model was created in 2006. We also created the 2006 model.

The Village's GIS data was used to create the updated model, which enables the Village to run the model within their GIS framework and provides continuity in naming systems and data usage. The model is a complete representation of the Village's system, incorporating all main, valves, hydrants, service meters, and service lines in addition to the Village's larger facilities.

The model was created with WaterGEMS V8XM by Haestad Methods. Historical water sales data was obtained from the Village, adjusted by the Village's known sales to supply ratio, and applied to the service meters via cross-referencing account numbers. Therefore, the water demands of the village are as accurate as possible in terms of quantity and geospatial location.

Reference:
Stan Balicki
Assistant DPW
630-464-5474

Project Team:
Timothy Scholz, P.E.
Dan Carpiaux

In-depth extended period and fire flow simulations were performed to model changes in distribution pressures and available fire flows through the entire service area over 72-hour periods. We conducted these simulations using a range of scenarios, including average- and maximum-day demands, removal of facilities from service to simulate facility repair, and changes in main size.

The updated hydraulic model provides the Village with an accurate reflection of their system's strength and its ability to face demands for the next 20 years. The Village has since recommended that the model be used to help their budgeting process by assessing the impacts to the system of any proposed utility updates prior to any such work occurring.

Fire flow simulation map.

Water Distribution System Analysis – Schaumburg, IL

The Village of Schaumburg selected us to prepare a study of the Village's water distribution system. The system consists of 277 miles of water main ranging in size from 6 to 24 inches in diameter, four water feed stations from the Joint Action Water Agency (JAWA), one emergency interconnect with the DuPage Water Commission (DWC), six emergency standby wells, five reservoirs, two standpipes, and three elevated tanks.

The analysis observed the existing system and provided a review of the existing facilities. A hydraulic computer model of the system was created using WaterGEMS V8XM by Haestad Methods. The model incorporated the Village's GIS mapping of the water main, roadways, plats, and zoning to create a hydraulic model that contained every main, valve, hydrant, and storage and supply facility in the system in its correct geographic location.

Reference:
Timothy Molitor
Water Division
Foreman
847-923-6606

Project Team:
Timothy Scholz, P.E.
Chris Ulm, P.E.
Dan Carpiaux

The Village's average-day and maximum-day sales data was collected in spreadsheets, linked to the GIS land parcels, and allocated across the model such that every land parcel in the Village demanded its actual volume of water. This approach provided a village-demand that was not only very accurate in terms of total average- and maximum-day demand, but was also very accurate in placing the demands across the system.

Fieldwork was conducted with Village personnel to obtain calibration data from the model. This fieldwork, which included hydrant testing and Hazen-Williams C-Factor testing, was combined with Village supply and storage facilities data to form the basis for a calibrated model. Fire flow simulations and EPS were performed under a multitude of conditions to determine the ability of the distribution system to convey differing flow rates and to determine the behavior of the distribution system and its facilities throughout the course of daily domestic demands and multihour fire events.

Hydraulic analysis map for Village of Schaumberg.

The hydraulic model was used to provide recommendations to the Village to cycle the water in their elevated tanks more efficiently, and it identified whether the village was hydraulically well-served by the six emergency standby wells. In addition, the model pinpointed the location and likely age of the oldest water in the system and identified areas of the system that required reinforcement.

We developed cost opinions for the recommended work and scheduled a recommended 5-year capital plan based on each recommendation's potential benefit to the Village. The Village purchased the WaterGEMS V8XM software, and as part of our Scope of Services, we provided the model to the Village and trained Village staff to use the software so that any further modeling could be performed "in-house."

Water System Modeling – Hoffman Estates, IL

We completed water system modeling for the Village of Hoffman Estates. The existing water system model was updated using GIS data and fire flow testing was used to confirm the model was calibrated. Water modeling was completed to simulate the loss of one of its west transmission mains across the Tollway between the North and South pressure zones. An alternate connection that would move part of the village currently served by the South Zone into the elevated North Zone was proposed, and the model indicated it would raise pressures. Modeling also indicated that pressures in this part of the system could be lowered by lowering the tank levels in the North Zone, but still maintain adequate fire flow availability in the North Zone.

Reference:
Haileng Xiao
Superintendent of Water and Sewer
847-490-6800

Project Team:
Chris Ulm, P.E.
Timothy Scholz, P.E.

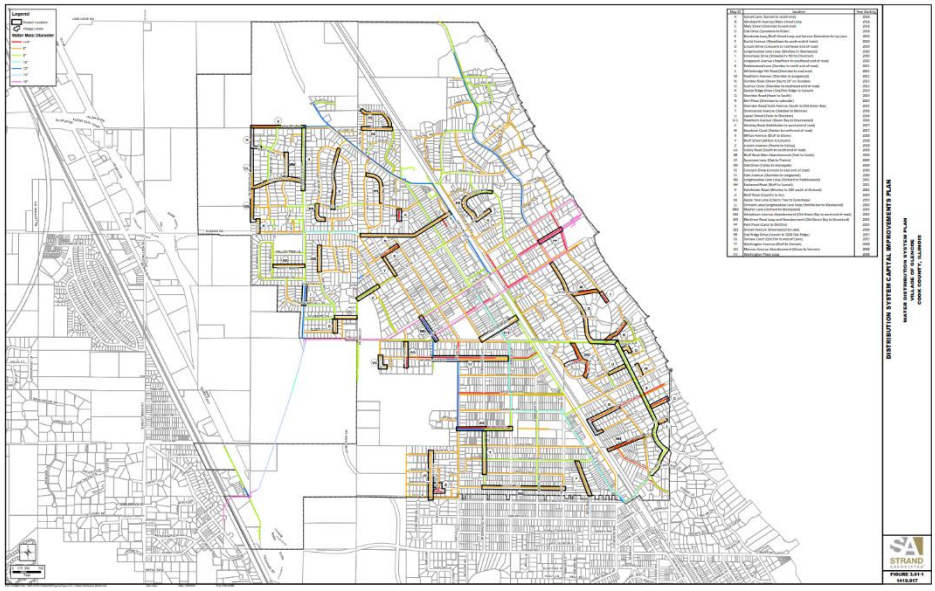
Water System Master Plan – Glencoe, IL

The Village of Glencoe began to supply residents with treated water from Lake Michigan beginning in 1928 and expanded its treated water production capacity to 7.3 mgd through a number of upgrades and improvement projects. Glencoe was approached by the Northwest Water Commission (NWC) in 2013 as a potential location for installation of a new 100 mgd raw water intake on Lake Michigan. Seeing the opportunity to partner and replace aging facilities, the Village selected us to assist in understanding and planning its future water supply options.

Reference:
David Mau, P.E.
Public Works Director
847-461-1116

Project Team:
Brian Hackman, P.E.
Chris Ulm, P.E.
Justin Bilskemper, P.E.

Through a planning level effort, we helped the Village consider a variety of components. As a first step, our project team conducted a system summary and demand analysis to set the framework for future improvement needs. Our initial evaluation reviewed the Village's data and water system infrastructure, along with future growth projections, to establish current and 40-year projected water supply needs. The results of our study recommended upgrading to a 6 mgd water treatment facility and possibly expanding to an 8 mgd facility.



Glencoe – Distribution System Capital Improvement Plan.

Glencoe's Water System Master Plan included development of a CIP and clear figures showing improvement recommendations.

Our next step evaluated the existing water treatment system through site visits, operator interviews, and discussions with equipment vendors to understand the condition of the existing WTP facilities. This initial effort evaluated both rehabilitating the existing WTP and developing a new WTP incorporating NWC's proposed 100 mgd lake water intake design. The project team soon recognized that the Village had a need to purchase water from a neighboring water system to assist with the transition to a future WTP.

To aid with understanding its neighboring water supply options, the Village had a computerized water system model that required updates and calibration. Using the existing model and GIS mapping, we developed a fully calibrated model with accurate geospatial references in Bentley WaterGEM® software to evaluate operating scenarios with future improvements to the water system. The water system model was used to develop the water supply characteristics, including pressure and flow, required to support the water system with neighboring communities. The model results assisted with developing options for interconnections between the Village of Winnetka, Village of Northbrook, and City of Highland Park.

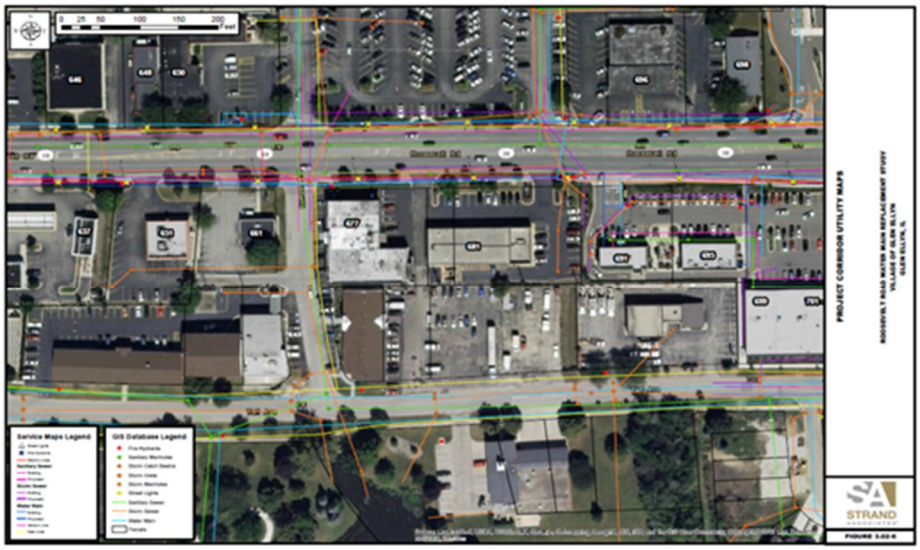
Through the comprehensive planning effort, the Village ultimately considered six water supply improvement options, including four Lake Front WTP rehabilitation or replacement options, one inland WTP option, and the option to purchase water from a neighboring water supply. Each option included a detailed discussion regarding technical requirements, the Village's perceived advantages and project challenges, future tasks, and a detailed breakdown of probable costs. We then presented the results of our study to the Village Board in March 2015, and discussions about the future water supply and a possible association with NWC are ongoing.

Roosevelt Road Water Main Replacement Study – Glen Ellyn, IL

The Village of Glen Ellyn hired us to investigate potentially replacing approximately 7,500 feet of existing 12-inch water main within the Illinois Route 38 (Roosevelt Road) right of way. The existing cast-iron main was experiencing more and more breaks, which disrupted water supply to the numerous commercial interests along Roosevelt Road and created traffic flow issues. Rehabilitation or replacement of the main would be a significant undertaking, as it would involve coordination and/or permitting with multiple Utilities (ComED, Nicor, ATT and Verizon, among others) given the congested right of way. The rehabilitation is currently underway, construction will be completed in 2018.

Reference:
Robert Minix
Village Engineer
630-469-6756

Project Team:
Timothy Scholz, P.E.
Chris Ulm, P.E.
Mike Waldron, P.E.



A project utility map identifying the corridor segments.

We split the study corridor into 10 segments and conducted a routing analysis and trenchless technology replacement analysis. The routing analysis included feasibility and cost opinions and was coordinated with IDOT; thus, it received early feedback and buy-in from IDOT with regard to the construction schedule and methods. In the trenchless technology replacement analysis, we compared trenchless methods to open cut methods and conducted independent investigations for each corridor segment. The trenchless methods that we investigated included slip lining, Cured-In-Place Pipe (CIPP), pipe splitting, and hydraulic directional drilling.

The construction methodology analysis also examined whether each segment was actually necessary for service, how to maintain service during construction, the level of water services on each segment, the level of disruption to the public, and the likely construction cost.

In addition, the study identified three areas that could be abandoned, preferred replacement routes for the remaining seven segments, and the construction method and schedule for those segments. The report also developed a proposed capital improvement plan for the corridor that took advantage of construction efficiencies and accounted for the Village's financial plans.

Water System Master Plan – Highland Park, IL

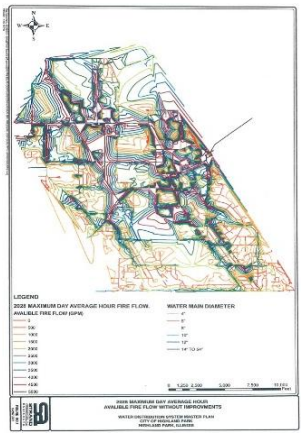
The City hired us to provide a Water Distribution System Master Plan. The main goal of the project was to perform a review of most aspects of the water distribution system and make recommendations on any improvements necessary over the next 10 years. We used an existing computerized water model to perform system modeling for current-day average- and maximum-day demands, as well as 2028 demands. Fire Flows were also analyzed using the computer model. Based on these findings, several system improvements were recommended to improve system performance.

We were also asked to look at several aspects of the City's metering practices, which included recommending better methods for collecting meter readings. We also investigated and discussed current meter maintenance and replacement practices. We analyzed the impacts of inaccurate meters on unaccounted-for flows and suggested ways the City could reduce the unaccounted-for flows that it was experiencing. We briefly discussed an approach to start a cross-connection control and backflow prevention program and a lead service replacement program. We also discussed the distribution system impacts resulting from initiating a residential fire sprinkler system requirement.

For ongoing maintenance of the distribution system, we reviewed and made recommendations regarding water main replacements because of pipe age and condition. We also investigated current hydrant and valve maintenance procedures and made recommendations to improve hydrant and valve life. Finally, we developed a unidirectional flushing plan using their GIS system to guide City staff through more than 400 steps to flush the entire City water system. All findings and recommendations were compiled into a Master Plan document that included tabulation of costs over a 10-year period for all recommended improvements.

Reference:
Ramesh Kanapareddy, P.E.
Director of Public Works
847-432-0807

Project Team:
Timothy Scholz, P.E.
Chris, Ulm, P.E.



Highland Park's 2028 maximum-day average-hour available fire flow without improvements.

2014 Water System Model Update and Capital Improvement Plan – Decatur, IL

The City of Decatur is a storied community with what was once a heavy industrial base of water users. Over the years, industry has shrunk as the existing users have become more efficient. The surface water treatment plant (WTP) is rated for 54 mgd of capacity, but only sees a typical-day demand of 28 mgd. The distribution system has a single entry point at the high service pumping station (HSPS). The hydraulics of the system were designed based on moving large volumes of water from the source to the largest users.

Today, the system demands are predominantly residential and commercial with the need to move water much more efficiently throughout the system. Problems that the City needed to address included pumps too large to service lower demands, inadequate fire protection on the fringes of the system, high water age resulting from large storage with reduced demand, and aging infrastructure that was installed to service large users. To complicate the issue, the investment needs of this very large system outweighed revenues from reduced water sales.

Reference:
Jerry Stevens, Engineering Services Coordinator
217-424-2833

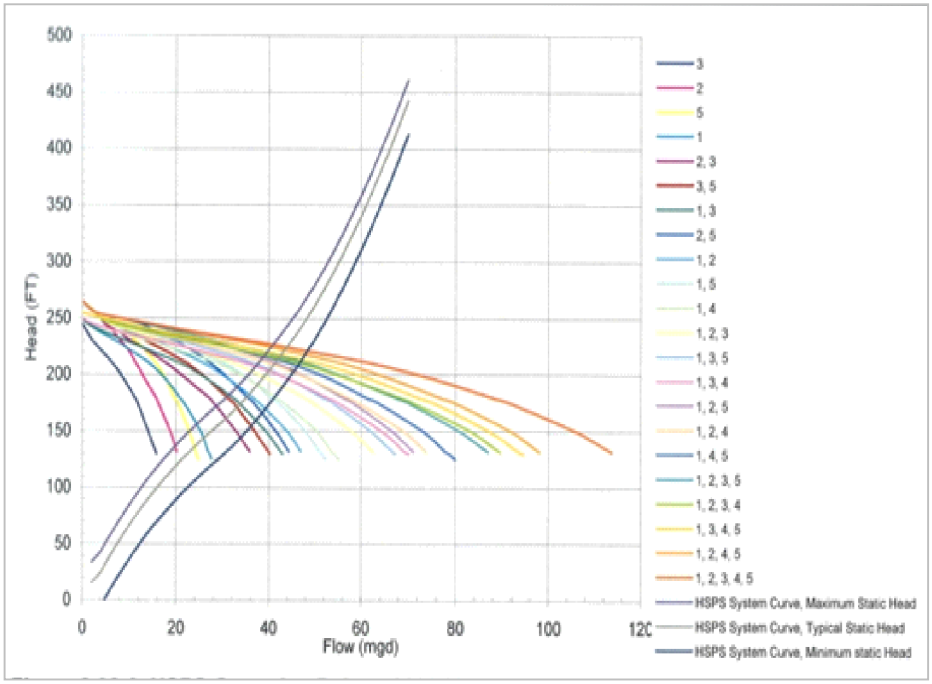
Project Team:
Brian Hackman, P.E.
Timothy Scholz, P.E.

We conducted a 2014 water system master model update and 5-year capital improvement plan to reevaluate the recent progress of the City's planned improvements as well as to prepare the City to address the remaining immediate needs in a systematic fashion. This included recreating the water distribution system hydraulic model using Bentley's WaterGEMS software populated from the City's GIS database. We were hired in the year 2000 to help analyze the vulnerability of a single entry point water system to a power failure. We were able to immediately identify that undersized water mains were creating excessive friction loss, limiting the ability of storage facilities to provide adequate pressure when the supply point was out of service. Additionally, we recognized that the urban sprawl on the outskirts of the system required the creation of a new pressure zone to serve residential customers adequately.

We recognized that the urban sprawl on the outskirts of the system required the creation of a new pressure zone to serve residential customers adequately.

These improvements were completed in 2012 and the City wanted to reassess the remaining needs. We confirmed that the pumps were still oversized for the low demands on the system. We also recommended changes to the pump operating scheme that would allow greater frequency of storage turnover and reduce water age and disinfection by-product issues during the summer months. The water model analyses that we completed included static evaluations of present and future average-day, maximum-day, and maximum-hour of the maximum-day demands. Dynamic model elevations included EPS of tank and pump performance over a 72-hour period of each maximum- and minimum-day for a present and future plan year. Last, we also conducted fire flow analyses to evaluate deficiencies in system performance.

The City also assessed the needs of the water main network. The existing rate of water main replacement was not keeping pace with the rate at which the infrastructure was aging. We prioritized recommended water main projects so those that had the greatest impact for the most users would be completed first. As a result, the water main improvements focused first on fire flow deficiencies and then on hydraulic capacity to isolated areas of the system. At the end of the 5-year plan, the City will then address aging infrastructure that can be replaced with new pipes. We have also completed several other water system studies and planning projects for the City of Decatur.

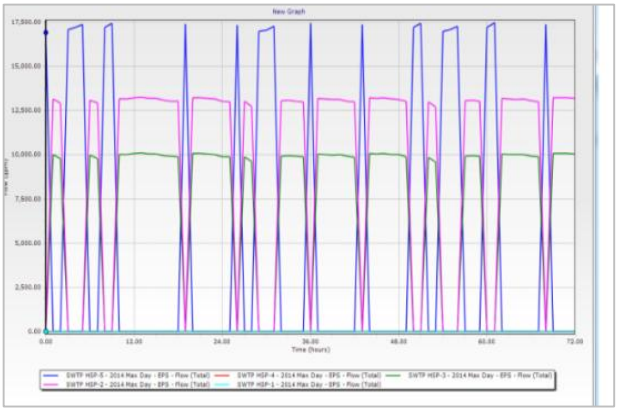


In-depth evaluation of all operating conditions revealed potential for pump runout.

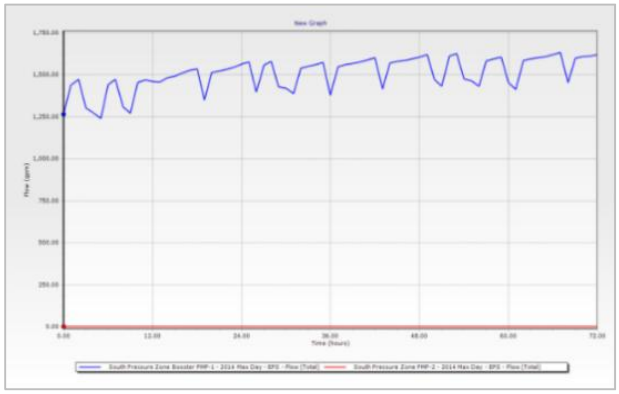
- **High Service Pump Station and Water Treatment Plant Storage Study** – We conducted an in-depth review of the storage capacity at the treatment plant to evaluate the potential for unforeseen conditions to restrict supply to the high service station. We were ultimately able to utilize the hydraulic model to identify a particular operational condition that would cause runout on the pump curves, leading to erratic pump behavior. This situation occurred when the City would refill a reservoir in the distribution system while using its single preferred pump that could match the lower system demands better than the other pumps. City staff were able to recreate this scenario in the actual distribution system and confirm this was indeed the main issue causing erratic pump behavior. Our immediate recommendation consisted of a new operating scheme that would eliminate the problem while maintaining the chlorine contact performance of the WTP finished water reservoir. Long-term recommendations included pumping station upgrades and improved SCADA controls to enable the station to better match system demands.

Long-term recommendations included pump station upgrades and improved SCADA controls that would enable the station to better match system demands.

- **Planning Study for New Large User** – A private company and existing water service customer contacted the City of Decatur in 2009 and expressed that it was interested in increasing its water consumption by 5.9 mgd under average conditions and 6.5 mgd for maximum-day conditions. This posed a significant shift in the demands as the customer was located beyond the current water treatment plant and storage facilities. The City hired our firm to evaluate the increased demand and to generate a report discussing the potential effects on the distribution system; we would then develop recommendations for the most effective means to accommodate the new demand. We systematically evaluated all possible alternatives, including those generated in a previous master plan. These included improving connectivity in the northern portion of the zone, installing larger-diameter water main to an existing booster station to increase its capacity, installing large diameter water main to increase connectivity to existing elevated storage, and adjusting the operating scheme of the High Service Pumping Station. We were able to arrive at an optimal solution that maintained the minimum service requirements and goals of the City while providing the customer with adequate supply.



EPS data for WTP pumps.



EPS data for North Zone Tank.

Orland Park Project Experience

As requested in the RFQ, following is our experience working with the Village. We have worked with the Village of Orland Park since 1997. During that time, we have had the opportunity to provide quality engineering services on many projects, including:

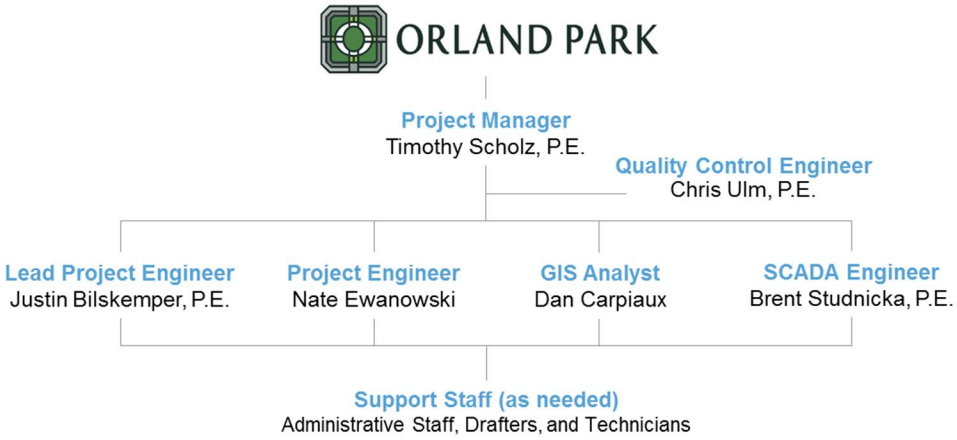
- Ravina Avenue Roundabout Planning
- Ravina Avenue Roundabout Design
- Ravina Avenue Boulevard Design
- Ravina Avenue at 151st Street Geometric Improvements
- LaGrange Road Signal Timing Improvements at 149th Street
- LaGrange Road Signal Timing Improvements at 151th Street
- LaGrange Road Signal and Geometric Improvements at 153rd Street
- LaGrange Road Signal and Geometric Improvements at 163rd Street
- 159th Street Geometric Improvements at 104th Avenue
- 159th Street Geometric Improvements at Orlan Brook Drive
- CMAQ Application for Metra Parking Lot
- ADA Accessibility Plan and Guidance

Project Team

Project Team Brings Unmatched Expertise to Study the Village's Water System Issues and Needs

The staff selected for this project have the technical expertise and recent relevant experience in evaluating and treating water supplies with similar concerns. The team has worked together on various types of projects, including creation, calibration, and analysis of computerized water system models. The approach detailed in the *Project Understanding and Approach* section was developed by this team using our past relevant experience and successes as guidance. The Village will benefit from our team's familiarity and expertise.

We are certain the Village will be confident in our motivated and experienced project team, providing the highest level of service and quality.



The following chart depicts the overall organization of our proposed project team and identifies the specific responsibilities of each team member. Team members' experience summaries follow and detailed resumes can be found at the end of this section.

Project Manager

Timothy J. Scholz, P.E., will serve as the Project Manager and will be responsible for communication and administration of the project from start to finish. Tim will make sure that the project team has the resources it needs to complete the work and that the Village's needs are met. Tim has been with our company for more than 12 years and has gained considerable experience in performing studies and designing water system components for various projects in Joliet, Schaumburg, Highland Park, Downers Grove, Northbrook, Huntley, Channahon, Romeoville, Rockford Illinois, Central Lake County Joint Action Water Agency and Utilities Incorporated, as well as Fond du Lac, Wisconsin.

Tim will be responsible for communication and administration of the project from start to finish.

Tim has worked on and managed water system studies and evaluations in many municipalities such as Downers Grove, Schaumburg, Streamwood, Morton Grove, Highland Park, Joliet, Romeoville, Channahon, Lockport, Crest Hill, Monee and Braidwood, Illinois; and for private entities, such as Clarendon Water Company and Great Northern Utilities, Illinois, and Indiana Water Services, Indiana.

Tim has prepared basic and advanced water model training materials and has trained personnel in water model use for Schaumburg and Joliet, Illinois. He has given award winning presentations to Illinois Section AWWA on the subject of water models and their applicability to maintaining water quality in a municipality's distribution system.

Quality Control Engineer

Chris J. Ulm, P.E., Senior Associate, will provide quality control review for the project. Chris has been with our firm for more than 20 years, has considerable experience in designing water system components for various projects, and has either managed or reviewed every water system study prepared by our Joliet office staff. His experience is highlighted by water system modeling, planning, and design efforts in Niles, Glencoe, Streamwood, Joliet, Highland Park, Schaumburg, Downers Grove, Channahon, Monee, Braidwood, Wilmington, Decatur, and Romeoville, Illinois. He has also managed or been the Lead Contact for projects in Highland Park, Niles, Northbrook, Schaumburg, Lisle, Joliet, Romeoville, Monee, Channahon, and Illinois American Water. Chris serves as the Assistant Director of Operations for our Joliet office and has led the office's water and wastewater department for more than 13 years.

Chris has more than two decades of experience in water supply engineering.

Lead Project Engineer

Justin R. Bilskemper, P.E., will serve as the Lead Project Engineer. Justin received his bachelor's degree in civil engineering from the University of Wisconsin-Platteville and has gained considerable experience in water system master planning, groundwater treatment and pumping design, and computerized water system modeling in his 11 years with our firm. Justin has worked on many of our water distribution modeling and system evaluation projects, including more than 30 full-scale studies and evaluations and dozens of smaller modeling projects. Justin has created numerous water system models from scratch using AutoCAD and GIS files and has updated existing models created for clients by other consultants. His extensive experience includes steady state, EPS, available fire flow, and water age modeling to evaluate distribution system hydraulics and improvements and creation of system head curves to quantify the magnitude of pressure fluctuations under various demand conditions.

Justin has completed more than 30 water system master plans and studies.

Project Engineer

Nathan M. Ewanowski, E.I.T., will serve as the Project Engineer. Nate has been with our firm since 2016 after graduating from the University of Wisconsin-Madison and has experience in water system master planning and computerized water system modeling. He has worked on several water system modeling projects for clients in Waunakee, Fitchburg, Whitewater, Fond du Lac, and Middleton, Wisconsin, and Romeoville, Illinois.

Nate has assisted in creating water system models by importing and analyzing information from AutoCAD and GIS files, performing in-field fire flow tests, and calibrating the water model using fire flow tests results. Using calibrated models, Nate has performed simulations using varied demand conditions, extended periods, and added improvements and growth areas to analyze pressure and available fire flow results, and evaluate distribution system hydraulics to ultimately recommend future improvements. He has also used clients' existing water models to incorporate recent distribution improvements and run hydrant flow tests to create and submit detailed reports and figures to satisfy regulatory requirements.

Nate will assist in the creation and calibration of the water model

Geographic Information System (GIS) Analyst

Daniel A. Carpiaux will serve as the GIS Analyst in charge of the development of the necessary mapping tools and report products. Dan has 16 years of experience in various GIS applications in both the public and private sectors. He is our Lead GIS Analyst and has developed and updated utility databases using ArcGIS for many municipalities. Dan was involved in GIS system creation and mapping for the Wisconsin Department of Transportation's (WisDOT) Stormwater Mapping and Illicit Discharge Detection project. He has extensive experience in geodatabase design and creation and is highly knowledgeable in map data creation and conversion, coordinate systems, GPS technology implementation, 3-D modeling, and database design. His experience includes

Dan is our lead GIS Analyst and has developed and updated utility databases using ArcGIS for many municipalities.

collecting/obtaining existing mapping/data sources and molding them into a usable GIS format with supporting databases. Dan is also well-versed in ArcGIS, AutoCAD, and Microstation. Dan has extensive experience in using GIS systems to aid creation of water models and to allocate water system demands accurately across the water model.

Dan's public experience as a County Planner and GIS Specialist brings familiarity with public databases, data sharing, and implementation of GIS systems. His private experience as a consultant and GIS analyst brings an engineering familiarity and practical application of GIS capabilities, including geodatabase design and creation, training and support, and Azteca Cityworks implementation.

SCADA Engineer

Brent M. Studnicka, P.E., has 27 years of experience, 16 with our firm, and currently serves as the Electrical Discipline Coordinator in our Joliet office. Brent is an excellent SCADA and plant-automation design engineer, with significant design experience with water pumping and treatment facility systems, as well as geographically separated SCADA systems. The majority of projects with which Brent has been involved have been rehabilitation projects where his attention to detail and experience with water treatment systems not only provided improved efficiency in process system controls, but also in the system's energy efficiency. Brent was the lead engineer on the City of Joliet City-Wide Water SCADA System Replacement project. This project included the replacement of a leased line-telephone telemetry system with a licensed frequency radio system. The existing analog electronics at the remote stations were replaced with PLC-based equipment and the existing 1980s-vintage computer-based master station was replaced with a modern PC-based operator interface using Wonderware Intouch operator interface software.

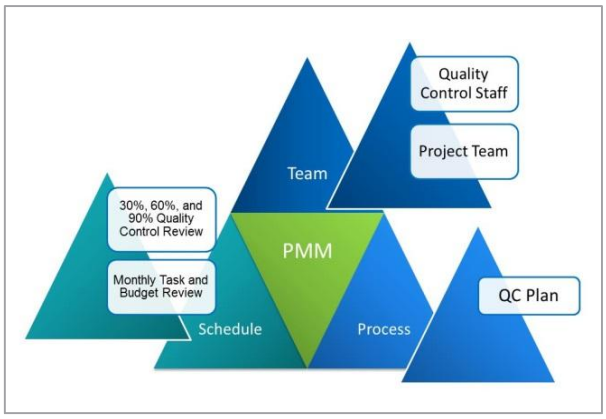
Brent has 16 years of engineering experience and is an instructor for numerous SCADA classes for the Illinois Section American Water Works Association

Quality Control Measures Provide Minimal Construction Issues and Change Orders

To promote quality on our projects, we have developed a Quality Control (QC) program that focuses on applying quality peer review at certain stages of the project. We understand that quality is not defined by end-of-the-line checking. During project scoping, a Project Management Memorandum (PMM) is issued that describes the individual QC plan for the project. This plan identifies the Key QC Engineer who is responsible for critiquing the plans, calculations, and design reports, at critical stages throughout project, for technical adequacy, constructability, and conformance to project objectives. The Key QC engineer is experienced with projects of similar scope and has knowledge of the project elements, but is not typically part of the project team. This enables the Key QC Engineer to provide an objective perspective when reviewing the work. By assembling the QC plan early in project scoping, all team members are aware of the stages at which quality reviews will take place and can plan accordingly. At design completion, the Key QC Engineer signs the QC plan, indicating that all reviews have been completed.

Internal QC review will occur at critical stages of the project.

By adhering to the above practices, we have been able to provide quality engineering work and projects that are within budget, meet client goals, and on schedule.



Quality review program defines commitment to excellence.

Resumes

Project Manager

Timothy J. Scholz, P.E.

Quality Control Engineer

Chris J. Ulm, P.E., Senior Associate

Project Engineers

Justin R. Bilskemper, P.E.
Nathan M. Ewanowski, E.I.T.

GIS Analyst

Daniel A. Carpiaux

SCADA Engineer

Brent M. Studnicka, P.E.

Timothy J. Scholz, P.E.

AREAS OF EXPERTISE

- Water and Wastewater Treatment Facilities Design
- Construction Engineering
- Storage Design
- Pumping Station Design
- Hydraulics and System Analysis

PROFESSIONAL EXPERIENCE

Water Supply Engineering experience includes water tank and tower inspection procedures; water tower design; well design, testing, and production investigation; emergency interconnect siting and design; treatment plant analysis and design including hydrous manganese oxide (HMO), conventional surface water treatment plant and groundwater pressure filtration analysis and design; distribution system modeling, testing, and analysis; comprehensive system studies; water quality reports; funding (SRF loan and grant) acquisition and construction observation.

Water System Studies and Master Plans for communities include distribution system computer analysis, demand analysis, storage capacity analysis, supply capacity analysis, and facility improvement evaluations. Systems have included surface water and groundwater supplies. Energy efficiency analysis for communities includes review of pumping and related equipment and computer analysis.

Computer analysis of water distribution systems has included data collection, creation and calibration of water system models, fire flow and C-factor tests, water main sizing, water age and chemical dispersion analysis, surge analysis, well, interconnect and elevated tank siting using WaterCAD, and LIQT computer modeling programs. Experience includes steady state and extended period modeling of distribution systems.

Construction Engineering experience includes surveying staking, observation, and project administration for water treatment plants, well and well house projects, water main, sanitary sewer, storm sewer, deep rock wells, force main;. Water storage experience has included climbing and inspecting elevated tanks, reservoirs and hydropneumatic storage tanks prior to during and post construction, repaint/repair, cellular antenna installation and construction projects.

Wastewater Treatment experience includes aiding with facilities plans for wastewater treatment plants and development, research and design of algae prevention treatments for Nestle Industrial wastewater facility at Morton, Illinois, during 2004 internship.

Wastewater Conveyance experience includes transfer facilities, force main design, pumping station design and large diameter trunk line routing studies and preliminary design.

Flow Metering and Data Analysis experience includes installation, maintenance, removal, and data analysis of area velocity flow meters in sanitary sewer and combined sewer applications. Data analysis includes quality control and characterization of dry weather flows and wet weather flows.

PRESENTATIONS

- WaterGEMS and GIS – How to Streamline Your Model, Chicago Metro Chapter APWA Annual Meeting, Schaumburg, Illinois, June 2010
- Monitoring the Health of your well and Pumps, ISAWWA Annual Convention, Springfield, March 2015

YEARS OF EXPERIENCE

12

YEARS WITH FIRM

12

EDUCATION

B.S. Civil Engineering and Environmental Engineering – Bradley University, Illinois, 2005

REGISTRATION

Professional Engineer in Illinois

STRAND ASSOCIATES®

Timothy J. Scholz, P.E.

PROFESSIONAL AFFILIATIONS AND RECOGNITION

- American Society of Civil Engineers
- American Water Works Association
- Mid-Central Water Works Association
  - 2015, Secretary
  - 2016, Treasurer
  - 2017, Vice President
- 2013 Illinois Section American Water Works Award E.D.U.C.A.T.E. Award

SPECIAL TRAINING AND CERTIFICATES

- Fall Protection Training, May 2006
- Confined Space Awareness Training, May 2006

STRAND ASSOCIATES®

Chris J. Ulm, P.E.

Senior Associate

AREAS OF EXPERTISE

- Water Supply Studies
- Design and Construction Services for Wells and Surface Water
- Pumping Stations
- Storage Facilities
- Water Treatment
- Supervisory Control and Water Distribution Systems

PROFESSIONAL EXPERIENCE

Ground and Surface Water Supply and Treatment including feasibility studies, design studies, pilot studies, design and construction administration for iron and manganese removal, zeolite softening, aeration, VOC removal, radon removal, radium removal, corrosion control, taste and odor control, chemical room renovations, chemical and UV disinfection, and intake structures.

Groundwater wellhead protection plans, aquifer analysis, design, construction, administration, testing, and evaluations for sand and gravel, limestone, and sandstone wells. Lake Michigan and river supply surface water plant intakes, renovation and expansion studies, chemical room rehabilitation, metering and pumping studies, surge protection studies, and piping modification.

Water System Studies including computer analysis, demand and trend analysis, supply and storage evaluations, facility evaluation, efficiency analysis, alternative development cost impact evaluation, and critical improvement program development. Systems include surface water and groundwater supplies with and without elevated storage facilities. Certified Vulnerability Assessor using AWWA Sandia Labs RAM-W methodology.

Pump Facility Design including design studies for new and existing facilities, equipment layout, and evaluation, preparation of drawings and specifications.

Storage Facility Design including design studies, material selection, layout, and preparation of drawings and specifications for new facilities and rehabilitation of existing facilities. Facilities include elevated and ground storage, constructed of steel, concrete, and precast materials.

Supervisory Control Systems for groundwater and surface water supply systems, and water treatment plants. Services include feasibility and cost studies, specification development and project administration.

Metering Analysis including studies on meter accuracy, impacts on unaccounted-for flows, and improvement analyses for automated meter reading implementation.

Rate and Financing Studies including project-specific impacts to rate structure, comprehensive rate studies and recommendations, and analyses of possible funding mechanisms.

PRESENTATIONS

- The Art of the Start – Considerations to Avoid Start-up Issues
- Arsenic: Problems and Solutions in Illinois Waters
- Radium in Drinking Water and Wastewater
- Computerized Maintenance Management Systems
- Secondary Effects of Radium Treatment Systems
- Why Pay the Markup? Contract Equipment Procurement Prior to Construction Contracting
- Water System Studies – Matching Your Budget to Your Needs

YEARS OF EXPERIENCE

20

YEARS WITH FIRM

20

EDUCATION

B.S. Civil Engineering – Bradley University, Illinois, 1996

REGISTRATION

Professional Engineer in Illinois

STRAND ASSOCIATES®

Chris J. Ulm, P.E.

Senior Associate

- Energy Efficiency in Your Water System
- Ultraviolet Disinfection for Groundwater Supplies

PROFESSIONAL AFFILIATIONS

- American Water Works Association
  - Recipient of Illinois Section American Water Works Association 2008 Volunteer Appreciation Award
  - Education Committee Chair 2006 – 2011
  - ACE 2010 Facility Tours Committee Chair 2007 – 2010
- Illinois Potable Water Supply Operators Association

STRAND ASSOCIATES®

Justin R. Bilskemper, P.E.

AREAS OF EXPERTISE

- Water System Master Planning
- Well Drilling and Treatment Facility Design
- Water System Computer Modeling
- Wellhead Protection Planning

PROFESSIONAL EXPERIENCE

Water System Studies and Master Plans for communities include distribution system computer analysis, demand analysis, storage capacity analysis, supply capacity analysis, and facility improvement evaluations. Systems have included surface water and groundwater supplies. Energy efficiency analysis for communities includes review of pumping and related equipment and computer analysis.

Well Design for deep rock wells, including aquifer analysis, capacity evaluation, design and construction observation, pump design, test well drilling, alignment testing, pump testing, and well rehabilitation.

Wellhouse and Treatment Design for groundwater systems includes site layout, grading, process piping arrangement, pump design and analysis, and iron and manganese removal through pressure filtration.

Computer Modeling of water distribution systems, including collection of field data such as fire flow testing, C-factor testing, and field capacity testing of pumping equipment, model creation and calibration, sizing new sources of supply and storage, analysis of water main extensions, and evaluation of water systems for fire flow and service area pressure using KYPIPE, WaterCAD, and WaterGEMS computer modeling programs. Experience includes steady state and extended period modeling to determine hydraulics of distribution systems, water age problem areas, and optimal pumping facilities energy efficiency. Completed projects include more than 30 full-scale studies and evaluations for communities.

Wellhead Protection Planning experience includes water system background information, regional aquifer characteristics, potential sources of contamination, and management plans and strategies to protect and sustain drinking water quality.

PROFESSIONAL AFFILIATIONS

- American Society of Civil Engineers – Southwest Branch Board
  - 2006 – 2014, Scholarship Committee Chair
  - 2008 – 2011, Secretary
  - 2007, 2009, 2010, 2012, 2013, 2015, 2017 Conference Planning Committee
  - 2011 – 2014, Younger Member Executive Committee
  - 2012 – Present, Director
- American Society of Civil Engineers – Wisconsin Section Board
  - 2011 – 2014, Director-at-Large
  - 2015 – 2016, Vice President
  - 2016 – 2017, President-Elect
- American Water Works Association-Wisconsin

YEARS OF EXPERIENCE

11

YEARS WITH FIRM

11

EDUCATION

B.S. Civil Engineering – University of Wisconsin-Platteville, 2006

REGISTRATION

Professional Engineer in Wisconsin

STRAND ASSOCIATES®

Nathaniel M. Ewanowski, E.I.T.

AREAS OF EXPERTISE

- Water System Master Planning
- Water System Computer Modeling
- Construction Observation
- Drinking Water Corrosion Control
- Pressure Filtration Design

PROFESSIONAL EXPERIENCE

Water System Studies and Master Plans for communities, including distribution system computer analysis, demand analysis, storage capacity analysis, supply capacity analysis, and facility improvement evaluations. Systems have included surface water and groundwater supplies.

Water System Computer Modeling of water distribution systems, including collection of field data such as fire flow testing, C-factor testing, and field capacity testing of pumping equipment, model creation and calibration, sizing new sources of supply and storage, analysis of water main extensions, and evaluation of water systems for fire flow and service area pressure using WaterGEMS computer modeling program. Experience includes steady state and extended period modeling to determine hydraulics of distribution systems and water-age problem areas.

Construction Observation of water- and wastewater-related improvement projects. Work items included common excavation, directional drilling, concrete testing, water and sewer utility installation and testing, reservoir construction, booster pumping station construction, lift station construction, and ultrafiltration membrane facility improvements.

Drinking Water Corrosion Control, including analyzing the compatibility of two different drinking water sources and designing and submitting plans and specifications for a new corrosion control system within an existing drinking water system.

Pressure Filtration Design includes designing building additions to accommodate existing groundwater wells to filter radium using hydrogenous manganese oxide (HMO) injection and horizontal pressure filters. Design also includes discharge and construction permitting for regulatory agencies.

PROFESSIONAL AFFILIATIONS

- American Water Works Association – Wisconsin (2016 – Present, Young Professional)

YEARS OF EXPERIENCE

1

YEARS WITH FIRM

1

EDUCATION

B.S. Civil Engineering – University of Wisconsin-Madison, 2016

REGISTRATION

Engineer-in-Training in Wisconsin

STRAND ASSOCIATES®

Daniel A. Carpiaux

GIS Analyst

AREAS OF EXPERTISE

- Geographical Information Systems (GIS)
- Project Management
- Surveying

PROFESSIONAL EXPERIENCE

GIS experience includes use of ArcGIS, AutoCAD, and GPS technologies for data analysis and facilities management as follows:

Developed long-range plans, goals, objectives and priorities to improve GIS operational efficiency and effectiveness for numerous clients throughout the Midwest.

Implemented Azteca's Cityworks asset management utility software application on SQ Server 2007 for the City of Seymour, Indiana, and Waupun Utilities.

Edited and reconciled digital data to match client specifications: utilized custom menus, applications, and GIS software. Actively participated in prototype development and implementation of the company's quality control/data reconciliation application design and process for Henrico County, Virginia.

Analyze/consult GIS needs and business requirement for clients to determine proper technical solutions.

Supervised GIS projects and personnel internally at Strand and externally for clients.

Designed, created, and maintained datasets in enterprise, personal, and file geodatabases for numerous clients.

Responsible for coordination of mobile mapping applications (GPS and ArcPad/TerraSync) and field inspections (Outfalls, Poles, Manholes, Trees)

Designed and developed GIS Desktop Applications using VB.NET, VBA, and ArcObjects

Various types of mapping/analysis in the ESRI® ArcGIS environment, including crime, transportation/addressing, planning, utility, and demographic.

Computer software experience includes ArcGIS, AutoCAD, MicroStation, SQL Server, VB programming, TerraSync, ArcPad, 3D modeling and rendering, and Access Database creation and manipulation.

A list of Dan's GIS projects include:

- GIS Implementation and Website – Prairie du Sac, WI
- GIS Implementation and Website – Viroqua, WI
- GIS Creation and Web Hosting Services – East Troy, WI
- GIS Design and Implementation – Waupun, WI
- GIS Services – Lake Mills, WI
- Development of New GIS for Sanitary Sewer and Water System – Parkersburg Utility Board, WV
- Facilities Planning and Maintenance of Sanitary Sewer Collection System Using GIS-Based Asset Management and Flow Modeling Software – Seymour, IN
- Water Supply and Distribution System Study-Galena Territories – Utilities, Inc. – Galena, IL
- GIS Storm Sewer System Mapping– Sterling, IL

PROFESSIONAL AFFILIATIONS

- Wisconsin Land Information Association
- ESRI Wisconsin User Group

YEARS OF EXPERIENCE

16

YEARS WITH FIRM

12

EDUCATION

B.S. Urban and Regional Planning – University of Wisconsin-Green Bay, 1997

STRAND ASSOCIATES®

Brent M. Studnicka, P.E.

AREAS OF EXPERTISE

- Electrical Power Distribution (15 kV and below)
- Microprocessor-based Control Systems
- Emergency and Standby Power Systems
- Process Controls Instrumentation

PROFESSIONAL EXPERIENCE

Municipal Electrical System experience includes design of electrical distribution and control systems for water distribution systems, water production facilities, and wastewater treatment plants. Experience also includes process control, emergency power communication systems, instrumentation, and supervisory systems utilizing telemetry.

Industrial Electrical System experience includes design of electrical distribution, lighting and control systems for industrial and food processing plants. Experience includes electric service to plant, analysis and modification of existing systems, plant communication network analysis and expansion, building automation system evaluation and expansion, P&ID preparation, and construction observation. Familiar with requirements for food processing areas including sanitation and wash down and effect on electrical system design.

SCADA System experience includes design of widely separated control systems that utilize radio and telephone based communications to link the systems together. Experience includes both water and wastewater systems.

Control System Graphic User Interface experience includes development and maintenance of computer-based graphics as the operator interface for water and wastewater plants. User interface development includes development of automatically generated State and operational reports.

Select Projects include International Food Processor Plant one-line updates and distribution system documentation, International Food Processor boiler expansion, International Food Processor production line installation, City of Joliet Radium Removal Water Plants, Specialty Food Processor freezer addition, International Food Processor building demolition projects, City of Loves Park Radium Removal Water Plants, International Food Processor Water Supply modifications, Logan Todd Regional Water Commission Raw Water Pumping Station, Kenilworth Water Treatment Plant upgrades, Lindenhurst Water and Wastewater Treatment Plant SCADA System and SCADA graphics, Dixon Wastewater Treatment Plant SCADA System graphics, and Loves Park Water SCADA System and SCADA graphics.

PROFESSIONAL AFFILIATIONS

- The International Society of Automation, American Water Works Association

YEARS OF EXPERIENCE

27

YEARS WITH FIRM

16

EDUCATION

B.S. Electrical Engineering – University of Wisconsin-Platteville, 1989

REGISTRATION

Professional Engineer in Illinois and Indiana

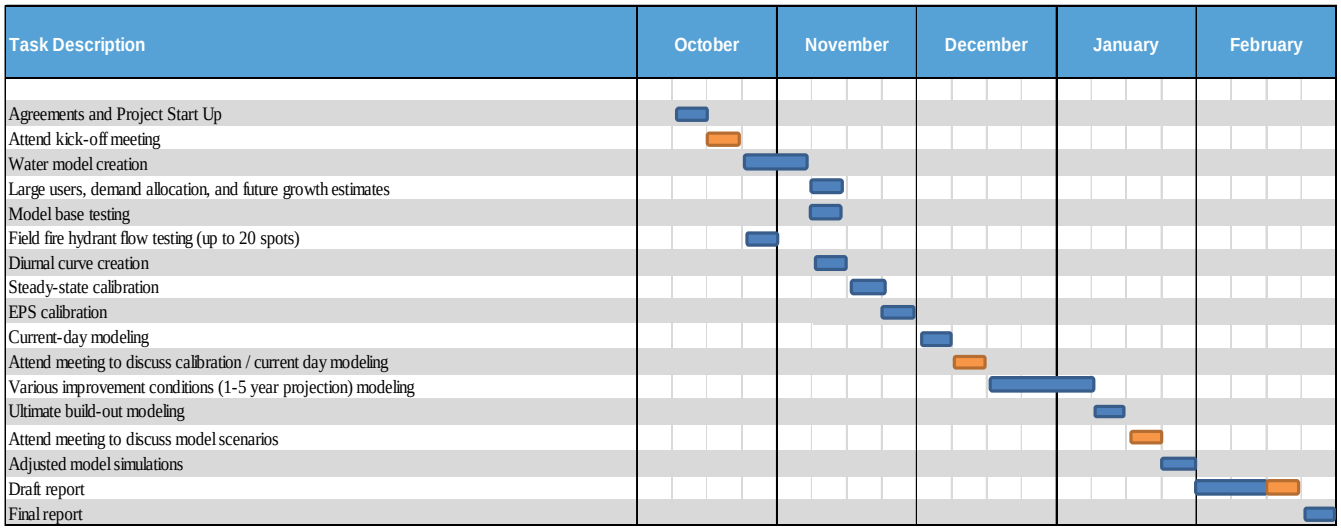
STRAND ASSOCIATES®

Project Schedule

Project Schedule Provides Frequent Village Interactions to Provide Valuable Input and Eliminate Surprises

Our proposed schedule for each major task of the project is shown below. This schedule was developed with several considerations in mind. First, we need to get field testing completed before winter weather complicates efforts. Second, we want to allow time for Village review of documents and workshop meetings to discuss with the Village and gather input. Finally, we want to keep the project moving such that data and results are provided in time for budgeting and decision making.

One very important factor in keeping this schedule will be to meet with Village staff and collect the necessary Village-provided information.



Internal, Corporate-Wide Scheduling System Proves Availability of Key Project Team Members

Our record of meeting agreed upon project schedules is excellent, as our references can attest. We have also provided the extra effort necessary to meet tight and unanticipated timeframes and funding deadlines. Based on our computerized, corporate-wide scheduling system, we can make commitments to project schedules because we know the current workload of every employee each month for several years out, and we closely monitor the progress of each project.

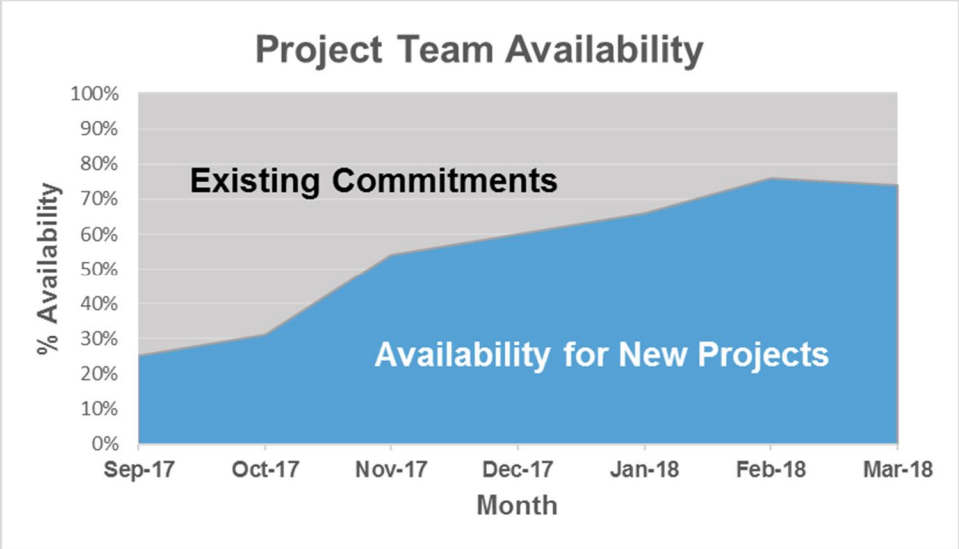
Current Workload and Availability

Our engineering team is available to begin immediately and can easily accommodate the Village's project schedule. In addition, the team's degree of availability exceeds our anticipated level of effort needed for the project and, therefore, we have ample capacity for unforeseen changes in scope.

Our team is immediately available to work on this project.

Our firmwide scheduling system indicates that the team members will be available to work on the project throughout its duration. Our scheduling system is reviewed bi-weekly and updated monthly by our Project Managers so we are confident that this team will remain available to work on this project. These multiple reviews provide our Project Managers with the information necessary to meet changing project conditions on a staff-member by staff-member basis. Our system also give us confidence when scheduling multidiscipline team members. The scheduling system provides demonstrable proof that for the duration of a project, we have ample capacity with the selected team members.

In reviewing our team's current commitments, we are confident in our team's availability to meet the Village's project schedule, as substantiated by the graph below.



Team's percentage of availability leads to responsive service.

Proven Task Schedule and Budget Management Methodology Will Result in a Cost-Conscious, Expeditiously Completed Project

A successful project not only yields completed facilities that serve their intended function, but also is a project that is completed effectively, on time, and within budget. Most projects have time constraints of a fiscal nature or are established by permit regulation or order. Regardless, these time constraints must be met. Our projects are managed using an integrated system of task and budget management employing the following steps:

Assigning qualified, experienced, and motivated staff to important project tasks is the first step in budget/task management.

- **Proper Assignment of Personnel** – Assigning qualified, experienced, and motivated staff to important project tasks is the first step in budget/task management. We pay close attention when assembling our project teams to assign qualified, available personnel for each given task.

- **Detailed Work Plan Development** – Prior to the start of a project, the Project Manager prepares a Work Plan that includes the major project tasks, their manpower and other resource requirements, their duration, and their interdependence with other project work. Budget allocations are then made for each task based on the overall budget and task requirements.

- **Obtain Village Input** – As our client, we will obtain the Village's input relative to the tasks and level of effort prior to proceeding. A computerized budget/task management system is created to aid the Project Manager in adhering to task budgets and schedules as the project proceeds.

- **Effective Staff Management** – As the project proceeds, the Project Manager works with the assigned staff to make sure they have the information required for the task and are proceeding in a satisfactory manner. This enables the Project Manager to provide the needed support or make other adjustments, as needed, for a quality project.

- **Tracking of Performance Indicators** – The Project Manager, on a monthly basis, compares the time budgeted for the assigned staff with the actual number of hours spent, as well as compares schedule requirements with the budget spent. This review enables the Project Manager to identify problems early and make needed adjustments to keep the project on track and within budget.

- **Effective Client Communications** – We fully recognize the client as part of our team. Throughout the project, the Project Manager maintains contact with the client to obtain input on task requirements and performance of the project team. Only with an understanding of Village objectives and integration of Village ideas can we achieve a successful project.

- **Adherence to Standardized Quality Control Program** – We have a standardized, in-house quality control program to make sure that all projects are reviewed for quality. The quality control program begins with a memorandum that defines who the quality control person is and establishes milestones for an independent review of the work products.

We fully recognize the client as part of our team.

Project Fee / Level of Effort

Project Fees Reflect Our Efficient and Effective Approach to Creating a Calibrated Water System Model and Performing a Successful System Evaluation

We have met with the Village several times regarding this project and carefully reviewed the suggested scope and the associated level of effort to implement the project outlined in the RFQ efficiently. This section provides typical hourly rate ranges and a man-hour task breakdown for the Scope of Services discussed in the *Project Understanding and Approach* section. There is also a fee breakdown per task associated with the Scope of Services. These fees are based on the proposed man-hours per task and the rates for the specific project team members presented in the *Project Team* section. The rates shown are the current rates for those individuals and are subject to adjustment in July 2018. The project fee summary is based on project completion by March 2018, so salary adjustments considerations were not required.

We have carefully reviewed the Village's suggested scope and the associated level of effort to implement the project outlined in the RFQ efficiently.

Man-Hour Breakdown

The following table shows our anticipated man-hour breakdown per task for the Scope of Services presented in the *Project Understanding and Approach* section.

Task Description	Principal	Project Manager	QC Engineer	Project Engineers	GIS / SCADA Specialists	Secretary	Total Man-Hours
Administration/Project Management	2	14	2			2	20
Attend kickoff meeting		6	6	2			14
Water model creation		4		20	4		28
Large users, demand allocation, and future growth estimates			2	24	2		28
Model base testing				4			4
Field fire hydrant flow testing (up to 20 spots)				20	2		22
Diurnal curve creation				6	2		8
Steady-state calibration		2		32			34
EPS calibration		2		16			18
Current-day modeling		4		8			12
Attend meeting to discuss calibration / current day modeling		4		2			6
Various improvement conditions (1 to 5 year projection) modeling		4	4	20			28
Ultimate build-out modeling			2	16			18
Attend meeting to discuss model scenarios		4		2			6
Adjusted model simulations and prepare cost opinions				24			24
Draft report		4		48	4	6	62
Final report		2	4	16	2	6	30
Total Proposed Man-Hours	**2**	**50**	**20**	**260**	**16**	**14**	**362**

Typical Hourly Rates

Listed below are typical hourly rates for each staff classification. These rates are updated annually on July 1. There may be some time required by staff members other than those shown in the *Project Team* section.

Direct expenses are also added to the man-hour fees in our fee breakdown.

Classification	Billing Rate Range
Principal	$270 to $501
Senior Project Manager	$163 to $234
Project Managers	$105 to $163
Project Engineers/Scientists	$89 to $111
Engineering Technicians	$45 to $134
Office Production	$85 Average

Project Fee Summary

Based on the man-hour estimates shown above and the rates of our project team members, the following is our fee for the Village's Water Distribution System Model and Evaluation. As discussed, we would be glad to negotiate the scope and make adjustments to remove items the Village would rather not have performed in lieu of other items discussed in the *Project Understanding and Approach* section.

Task Description	Proposed Fee
Administration/Project Management	$3,310
Attend kickoff meeting	$2,260
Water model creation	$3,350
Large users, demand allocation, and future growth estimates	$3,390
Model base testing	$510
Field fire hydrant flow testing (up to 20 spots)	$2,630
Diurnal curve creation	$1,130
Steady-state calibration	$4,000
EPS calibration	$2,100
Current-day modeling	$1,430
Attend meeting to discuss calibration / current day modeling results	$820
Various improvement conditions (1-5 year projection) modeling	$3,600
Ultimate build-out modeling	$2,280
Attend meeting to discuss model scenarios	$820
Adjusted model simulations	$2,800
Draft report	$7,340
Final report	$4,150
Total Proposed Fee	**$45,920**

ORLAND PARK

ADDENDUM NO. 1

RFQ #17-033
Water Distribution System Model & Evaluation

Date: Monday, August 21, 2017

To: All Potential Proposers

From: Village of Orland Park

RE: Responses to Questions Received

This Addendum No. 1 is being issued to provide responses to questions submitted for the above mentioned Project. All other provisions and requirements of the RFQ shall remain in effect. **All addenda must be acknowledged by signing the Addendum and including it with your submittal.** Failure to include a signed formal Addendum with your submittal may deem the submittal non-responsive; provided, however, that the Village may waive this requirement if in its best interest.

The following are the Village's responses to questions submitted for this RFQ:

1. Can a screenshot of a part of water system GIS be provided?

   Village Response: An overall atlas, a screenshot of a part of your Water System GIS, and a screenshot of the geodatabase table are downloadable as part of this addendum.

2. Does the GIS have accurate pipe material, pipe age and pipe diameter for the entire system?

   Village Response: Approximately 98% of the pipe material and diameters are accurate. However, pipe age is missing on most pipes.

3. How many "improvements" have been made to the Village's water main GIS geodatabase that will need to be added?

   Village Response: The ESRI geodatabase for the water distribution piping system is current as of this date. Water mains and appurtenances may be added as they are constructed, none are expected within the next few months.

4. How many discontinuities within the distribution system's GIS database are to be corrected as part of the modeling effort?

   Village Response: The amount is unknown but is expected to be minimal.

5. How many model simulations are to be performed and what is the desired deliverable? How many future year scenarios?

Village Response: The village is expecting a minimum of three model simulation reports, current condition, various improvement conditions (5-10 year projection) and ultimate build (2050 projection). The model simulations that are needed for determining deficiencies and improvements to the current distribution system are unknown.

6. Is there a limit or budgetary cost range or cap to stay under when developing the draft report summarizing the modeling and estimating improvements?

   Village Response: The village has allotted $200,000 for system improvements over the next five years. Part of this SOQ is to provide guidance in establishing short term improvements at minimal costs and budgeting for long term improvements for the village's capital improvement program.

7. Can we get a water distribution base map? If not, can you tell how many pressure zones? How many billing records or customer accounts? How many booster stations? How many water storage tanks or towers? How many PRV vaults or master meters?

   Village Response: A water atlas is downloadable as part of the addendum. There are four (4) pressure zones which include the main pumping station of the village and three booster station areas. Approximately 24,000 billing records. There are three (3) booster stations. There are seven (7) elevated tanks, two (2) PRV's and two (2) master meters.

8. What is the maximum numbers of fire flow calibration points?

   Village Response: It is expected that the consultant will determine the maximum needed to calibrate the model.

9. What is the maximum numbers of EPS calibration locations using SCADA data?

   Village Response: This is unknown but we believe that the seven towers, three booster stations and the main pumping station are available from our SCADA data.

10. We expect to use either WaterGems or InfoWater software. Is that doable?

    Village Response: The village cannot comment or respond regarding the software. We have not tested and are unfamiliar with the aspects of any of the software on the market.

11. We have completed modeling projects as a sub-contractor. For the reference contact information, what kind of contact information would you like to have, consultant engineer or owner?

    Village Response: The Statement of Qualifications should include the project name, year of project, contact company name, contact person, contact person title and contact person's email or telephone number.

12. We are currently in the process of transferring our business from Colorado to IL including office search and state business registration etc. At this point, can we check Yes on Page 16, "The Consultant is authorized to do business in Illinois:"?

    Village Response: It is expected that any firm submitting a Statement of Qualifications (SOQ) will meet the requirements at the time of submittal. However, all submittals will be reviewed and any exceptions will be considered.

13. Our Firm has $2,000,000 Commercial General Liability with a $4,000,000 General Aggregate Limit. However, we only have $1,000,000 umbrella liability for each occurrence. Is that sufficient to meet the requirements of the RFP? The aggregate is more than requested, although the umbrella is not exactly to the specifications?

    Village Response: It is expected that any firm submitting a Statement of Qualifications (SOQ) will meet or exceed the required amounts. However, all submittals will be reviewed and any exceptions will be considered.

14. Please confirm the maximum number of meetings. They are listed in the RFQ as three. They are:
    - Kick-off meeting
    - Review calibration results with Village.
    - Following the modeling effort, attend a meeting where result will be reviewed with the Village Staff including initially proposed improvements. Note that the Village will review and make adjustments.

    Village Response: The number of meetings expected will depend on the consultant and village. The SOQ should include a list of the expected meetings to provide sufficient results. A minimum of three are required as listed in the RFQ.

15. Do you have an existing water model that can be review or will be incorporated as part of this project?

    Village Response: No, a previous model was developed in the early 1980's and is not available.

The question and answer period for this RFQ is closed. **The RFQ submission deadline remains Thursday, August 31, 2017 not later than 11:00 A.M.**

Proposers are required to acknowledge receipt of any formal Addendum by signing the Addendum and including it with the RFQ submission.

Addendum No. 1, dated Monday, August 21, 2017

RFQ #17-033

I read and hereby acknowledge this addendum as of the date shown below.

Business Name: Strand Associates, Inc.

Name of Authorized Signee: Matthew S. Richards

Signature of Authorized Signee: matthew richards

Title: Corporate Secretary Date: 8/28/17

AFFIDAVIT OF COMPLIANCE

The undersigned Matthew S. Richards, as Corporate Secretary
(Enter Name of Person Making Affidavit) *(Enter Title of Person Making Affidavit)*

and on behalf of Strand Associates, Inc., certifies that:
(Enter Name of Business Organization)

1) BUSINESS ORGANIZATION:

The Consultant is authorized to do business in Illinois: Yes [✓] No [ ]

Federal Employer I.D. #: 39-1020418
(or Social Security # if a sole proprietor or individual)

The form of business organization of the Consultant is (*check one*):

__ Sole Proprietor
__ Independent Contractor *(Individual)*
__ Partnership
__ LLC
✓ Corporation Wisconsin *(State of Incorporation)* 1946 *(Date of Incorporation)*

2) ELIGIBILITY TO ENTER INTO PUBLIC CONTRACTS: Yes [✓] No [ ]

The Consultant is eligible to enter into public contracts, and is not barred from contracting with any unit of state or local government as a result of a violation of either Section 33E-3, or 33E-4 of the Illinois Criminal Code, or of any similar offense of "Bid-rigging" or "Bid-rotating" of any state or of the United States.

3) SEXUAL HARRASSMENT POLICY: Yes [✓] No [ ]

Please be advised that Public Act 87-1257, effective July 1, 1993, 775 ILCS 5/2-105 (A) has been amended to provide that every party to a public contract must have a written sexual harassment policy in place in full compliance with 775 ILCS 5/2-105 (A) (4) and includes, at a minimum, the following information: (I) the illegality of sexual harassment; (II) the definition of sexual harassment under State law; (III) a description of sexual harassment, utilizing examples; (IV) the vendor's internal complaint process including penalties; (V) the legal recourse, investigative and complaint process available through the Department of Human Rights (the "Department") and the Human Rights Commission (the "Commission"); (VI) directions on how to contact the Department and Commission; and (VII) protection against retaliation as provided by Section 6-101 of the Act. (Illinois Human Rights Act). (emphasis added). Pursuant to 775 ILCS 5/1-103 (M) (2002), a "public Contract" includes "...every contract to which the State, any of its political subdivisions or any municipal corporation is a

party."

4) EQUAL EMPLOYMENT OPPORTUNITY COMPLIANCE: Yes [✓] No [ ]

During the performance of this Project, Consultant agrees to comply with the "Illinois Human Rights Act", 775 ILCS Title 5 and the Rules and Regulations of the Illinois Department of Human Rights published at 44 Illinois Administrative Code Section 750, et seq. The

Consultant shall: (I) not discriminate against any employee or applicant for employment because of race, color, religion, sex, marital status, national origin or ancestry, age, or physical or mental handicap unrelated to ability, or an unfavorable discharge from military service; (II) examine all job classifications to determine if minority persons or women are underutilized and will take appropriate affirmative action to rectify any such underutilization; (III) ensure all solicitations or advertisements for employees placed by it or on its behalf, it will state that all applicants will be afforded equal opportunity without discrimination because of race, color, religion, sex, marital status, national origin or ancestry, age, or physical or mental handicap unrelated to ability, or an unfavorable discharge from military service; (IV) send to each labor organization or representative of workers with which it has or is bound by a collective bargaining or other agreement or understanding, a notice advising such labor organization or representative of the Vendor's obligations under the Illinois Human Rights Act and Department's Rules and Regulations for Public Contract; (V) submit reports as required by the Department's Rules and Regulations for Public Contracts, furnish all relevant information as may from time to time be requested by the Department or the contracting agency, and in all respects comply with the Illinois Human Rights Act and Department's Rules and Regulations for Public Contracts; (VI) permit access to all relevant books, records, accounts and work sites by personnel of the contracting agency and Department for purposes of investigation to ascertain compliance with the Illinois Human Rights Act and Department's Rules and Regulations for Public Contracts; and (VII) include verbatim or by reference the provisions of this Equal Employment Opportunity Clause in every subcontract it awards under which any portion of this Agreement obligations are undertaken or assumed, so that such provisions will be binding upon such subcontractor. In the same manner as the other provisions of this Agreement, the Consultant will be liable for compliance with applicable provisions of this clause by such subcontractors; and further it will promptly notify the contracting agency and the Department in the event any subcontractor fails or refuses to comply therewith. In addition, the Consultant will not utilize any subcontractor declared by the Illinois Human Rights Department to be ineligible for contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations. Subcontract" means any agreement, arrangement or understanding, written or otherwise, between the Consultant and any person under which any portion of the Consultant's obligations under one or more public contracts is performed, undertaken or assumed; the term "subcontract", however, shall not include any agreement, arrangement or understanding in which the parties stand in the relationship of an employer and an employee, or between a Consultant or other organization and its customers. In the event of the Consultant's noncompliance with any provision of this Equal Employment Opportunity Clause, the Illinois Human Right Act, or the Rules and Regulations for Public Contracts of the Department of Human Rights the Consultant may be declared non-

responsible and therefore ineligible for future contracts or subcontracts with the State of Illinois or any of its political subdivisions or municipal corporations, and this agreement may be canceled or avoided in whole or in part, and such other sanctions or penalties may be imposed or remedies involved as provided by statute or regulation.

5) TAX CERTIFICATION: Yes [✓] No [ ]

Contractor is current in the payment of any tax administered by the Illinois Department of Revenue, or if it is not: (a) it is contesting its liability for the tax or the amount of tax in accordance with procedures established by the appropriate Revenue Act; or (b) it has entered into an agreement with the Department of Revenue for payment of all taxes due and is currently in compliance with that agreement.

6) AUTHORIZATION & SIGNATURE:

I certify that I am authorized to execute this Affidavit of Compliance on behalf of the Contractor set forth on the Proposal, that I have personal knowledge of all the information set forth herein and that all statements, representations, that the Proposal is genuine and not collusive, and information provided in or with this Affidavit are true and accurate. The undersigned, having become familiar with the Project specified, proposes to provide and furnish all of the labor, materials, necessary tools, expendable equipment and all utility and transportation services necessary to perform and complete in a workmanlike manner all of the work required for the Project.

ACKNOWLEDGED AND AGREED TO:

Matthew Richards
Signature of Authorized Officer

Matthew S. Richards
Name of Authorized Officer

Corporate Secretary
Title

8/28/17
Date

Subscribed and Sworn To
Before Me This 28th Day
of August, 2017.

Rachel A. Frieders
Notary Public Signature

My commission expires
March 21, 2021

RACHEL A. FRIEDERS NOTARY PUBLIC STATE OF WISCONSIN

(NOTARY SEAL)

INSURANCE REQUIREMENTS

Please submit a policy Specimen Certificate of Insurance showing bidder's current coverage's

WORKERS COMPENSATION & EMPLOYER LIABILITY
$1,000,000 – Each Accident $1,000,000 – Policy Limit
$1,000,000 – Each Employee
Waiver of Subrogation in favor of the Village of Orland Park

AUTOMOBILE LIABILITY
$1,000,000 – Combined Single Limit
Additional Insured Endorsement in favor of the Village of Orland Park

GENERAL LIABILITY (Occurrence basis)
$1,000,000 – Each Occurrence $2,000,000 – General Aggregate Limit
$1,000,000 – Personal & Advertising Injury
$2,000,000 – Products/Completed Operations Aggregate
Additional Insured Endorsement & Waiver of Subrogation in favor of the Village of Orland Park

EXCESS LIABILITY (Umbrella-Follow Form Policy)
$2,000,000 – Each Occurrence $2,000,000 – Aggregate
EXCESS MUST COVER: General Liability, Automobile Liability, Workers Compensation

Any insurance policies providing the coverages required of the Contractor shall be specifically endorsed to identify "The Village of Orland Park, and their respective officers, trustees, directors, employees and agents as Additional Insureds on a primary/non-contributory basis with respect to all claims arising out of operations by or on behalf of the named insured." If the named insureds have other applicable insurance coverage, that coverage shall be deemed to be on an excess or contingent basis. The policies shall also contain a Waiver of Subrogation in favor of the Additional Insureds in regards to General Liability and Workers Compensation coverage's. The certificate of insurance shall also state this information on its face. Any insurance company providing coverage must hold an A VII rating according to Best's Key Rating Guide. Permitting the contractor, or any subcontractor, to proceed with any work prior to our receipt of the foregoing certificate and endorsement however, shall not be a waiver of the contractor's obligation to provide all of the above insurance.

The Consultant agrees that if they are the selected contractor, within ten days after the date of notice of the award of the contract and prior to the commencement of any work, you will furnish evidence of Insurance coverage providing for at minimum the coverages and limits described above directly to the Village of Orland Park, Denise Domalewski, Contract Administrator, 14700 S. Ravinia Avenue, Orland Park, IL 60462. Failure to provide this evidence in the time frame specified and prior to beginning of work may result in the termination of the Village's relationship with the selected Consultant.

ACCEPTED & AGREED THIS 28th DAY OF August, 2017

Signature
Matthew S. Richards, Corporate Secretary
Printed Name & Title

Authorized to execute agreements for:
Strand Associates, Inc.
Name of Company