

PROPOSAL

Asset Management Planning and Implementation Phase 1 for the City of Burlington, Vermont

July 8, 2015





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July 8, 2015

Ms. Megan Moir
Water Resources Office
Burlington Water Treatment Plant
Burlington Department of Public Works
234 Penny Lane
Burlington, VT 05401

Re: Request for Proposals (RFP) – Asset Management Planning and Implementation Phase 1

Dear Ms. Moir:

The City of Burlington is taking an extraordinary step towards managing the City's infrastructure in a more sustainable manner. The implementation of this planned City-Wide Asset Management System moves the decision making process away from the subjective "why" towards the more objective "when" type of debate. Arming your key staff with accurate data will facilitate sound decision making that minimizes risk and maximizes the efficient use of the City's limited budgets. This, in-turn, will lead to higher public confidence and informed support for future projects.

Our project approach has proven to be highly effective. We will become full partners with you. The meaningful investment of time and understanding will result in a shift in culture that will be positive and lasting. The process outlined in this proposal meets your needs, engages your staff and delivers a product that will launch Burlington on a track towards implementing a City Wide Enterprise Asset Management Solution. For clarification purposes, we have included any assumptions used in the development of our detailed scope. We also understand that some changes may be necessary to the approach and schedules based on input from the City's key staff.

The Hoyle, Tanner team places great value on our long-standing professional relationship with the City of Burlington and we stand ready to again join with the City to assist with all your asset management needs. We have the resources and expertise to help your vision become a reality.

Sincerely,

HOYLE, TANNER & ASSOCIATES, INC.

A handwritten signature in black ink, appearing to read 'Carl Quiram'.

Carl L. Quiram, P.E., PWLF, Env-SP
Vice President

A handwritten signature in black ink, appearing to read 'Michael V. Schramm'.

Michael V. Schramm, P.E., LEED AP
Vice President

TABLE OF CONTENTS

Transmittal Letter	
	SECTION
PROJECT UNDERSTANDING & APPROACH	I
IDENTIFICATION OF TEAM & KEY STAFF	II
<ul style="list-style-type: none">● Project Team● Team Organizational Chart● Resumes	
RELEVANT EXPERIENCE	III
SCHEDULE	IV
COST PROPOSAL	V



CITY OF BURLINGTON
DEPARTMENT OF PUBLIC WORKS
DEPARTMENT OF PARKS AND RECREATION

645

PROJECT UNDERSTANDING & APPROACH

Project Understanding

The City of Burlington faces significant challenges to sustain the services it provides, as its infrastructure ages against a backdrop of budgetary constraints and increasing regulatory requirements. The situation this creates is complicated, and as such, the City seeks assistance from a qualified consultant to develop a roadmap for a city-wide AMP (AMP). The AMP will advance the City's goal of maintaining services at affordable operational and capital costs by strategically targeting funds for repairs, upgrades and inspections through sustainable and cost-effective processes. **Hoyle, Tanner's team not only has substantial local expertise with the development and implementation of municipal Asset Management plans, but our team is unique in that we also have familiarity with the City's existing assets.**

Development of an effective AMP requires experience not only in Asset Management, but also with the required workflows and processes to manage the variety of assets within all of the City departments. To assist the city in receiving the maximum benefit from the development process, Hoyle, Tanner has assembled a team that pairs our Asset Management specialists with various discipline specialists that will contribute to the plans success. To maximize value, our team includes professionals, with relevant experience in the workflows evaluations, who will assist in identifying any major gaps in information. Our team also includes engineers intimately familiar with Burlington's assets as well as the industry standards that should be considered as the City defines its desired Levels of Service and performance measurement metrics.

Key Considerations

The following are key considerations that Hoyle, Tanner understands are important to the City in the development of an AMP.

Limit the City Resources Required to Implement Asset Management

We recognize and appreciate that the City has limited resources, both financial and staffing, to develop a robust city-wide Asset Management Implementation Plan. As a solution, **Hoyle, Tanner is proposing a flexible approach** that can be utilized by the City to maximize value and generate the desired results with the level of resources the City can invest. This approach attempts to minimize the amount of staff time that Burlington needs to invest in planning while keeping our budget in line with the financial resources that the City currently has to invest. Our Scope of Services outlines this approach which has been successfully used on our previous Asset Management projects in Portsmouth, and Goffstown, NH, Springfield and Framingham, MA. While recognizing the immediate needs of the WRD (WRD) which are the catalyst to initiate the start of this process, the City realizes that their entire organization will derive future benefits from a well-orchestrated enterprise AMP. **Our team will assist the City in maximizing the benefits of the efficiencies to be gained by this approach without delaying the completion of Phase IB or Phase II efforts.**

"We sat down this afternoon and went over the draft report. Nice job. We like the format and product to date. Really appreciate the effort to get this completed on time to meet DES's deadline." - Brian F. Goetz, Deputy Director of Public Works, Portsmouth, NH

PROJECT UNDERSTANDING & APPROACH

Implement Asset Management as an Integral Part of Integrated Stormwater and Wastewater Planning

The City has acquired funding from the EPA to develop an integrated planning approach for managing stormwater and wastewater. A significant component of the integrated planning approach is to define ranking criteria for infrastructure investment. A 25% reduction of phosphorous loading is a short term key driver for how this ranking will be established. This is an excellent example of where Asset Management can be utilized to develop a long-term solution while the criteria used for integrated planning is reflected in the levels of service and risk model within the AMP. If needed, Hoyle, Tanner could become a valuable partner with the City's efforts with EPA and Tetra Tech to evaluate and prioritize the various options for phosphorus reduction within the MS4.

Project Manager **Michael V. Schramm, P.E., LEED AP** has been instrumental in the Potash Brook Flow Restoration project underway in the neighboring City of South Burlington. Principal in Charge **Carl L. Quiram, P.E., ENV-SP** is a certified sustainability professional through the Institute for Sustainable Infrastructure. The combination of this expertise can add real value to Burlington's efforts in integrating their utilities into one permit and developing a system to perform condition, risk and criticality rankings to the various system components. Furthermore, the AMP will include maintenance planning considerations to assure that MS4 related maintenance and cleaning operations are being conducted and reported properly. Carl has significant knowledge of MS4 requirements as they relate to this issue due to his experience managing an MS4 in NH. Carl's expertise in the area MS4 compliance combined with the complementary Asset Management expertise of our team will provide the City with a comprehensive inventory of permit related issues as well as the confidence to implement effective and practical solutions.



The Potash Brook Flow Restoration Project in South Burlington has been Vital in Showcasing Hoyle, Tanner's Expertise in Stormwater Related Design.

Address Aging Infrastructure Issues

In the past year alone, the City has experienced several events that emphasized the need for long-term planning, and monitoring of the infrastructure assets maintenance. The City, like other communities in the region, was subjected to a number of costly and disruptive water main breaks during the harsh winter season. The effective roll out of the AMP will serve to demonstrate the City's resolve to improve their responsiveness to the public's needs, while being mindful of efficiently utilizing tax dollars to facilitate maintenance and capital improvements. The AMP will include metrics such as expected useful life, age, and condition that will be key to the City's strategy to move from reactive to proactive maintenance and rehabilitation strategies. Effective planning is always a more cost-effective way to maintain assets rather than reacting to emergencies where the competitiveness of the construction bidding process is lost. As Hoyle, Tanner's core services include all aspects of utility and infrastructure inspection and design, we will be a valuable asset to WRD and Public Works Department by assisting with demonstrating the long-term cost savings of implementing the strategic data-based decision making process that the AMP will afford the City.

PROJECT UNDERSTANDING & APPROACH

Include Facilities and Buildings (Vertical Assets)

Hoyle, Tanner is currently assisting the City with completing repairs to three of the City's deteriorating parking structures. These structures are excellent candidates for the development of maintenance management plans due to the current nature of the structural evaluations and repairs. Our team has experience, in Newton, MA, with setting up municipal facility assessment and management programs utilizing Asset Management methods across a City's entire portfolio of buildings.

Burlington International Airport (BTV)

Hoyle, Tanner understands that the Airport would like to participate fully in Phase IA to better understand their needs and benefits of an AMP. At a minimum, representatives of the Airport would participate in the introductory meetings and training sessions to be completed in Phase IA.



Hoyle, Tanner is currently designing repairs for three of the City's parking structures, making them excellent candidates for Maintenance Management Plans

BTV is classified as a public primary small hub commercial service airport according to the Federal Aviation Administration (FAA) National Plan of Integrated Airport Systems (NPIAS). BTV is located in the City of South Burlington, however it is owned and operated by the City of Burlington and is the only commercial service airport in the State of Vermont. This makes BTV a major asset and economic driver for Chittenden County and the State of Vermont. In fiscal year (FY) 2014, BTV enplaned 609,507 passengers and the FAA Terminal Area Forecast (TAF) indicates that enplanement are expected to increase to 740,903 in FY 2030 and 830,228 in FY 2040. As a commercial service airport providing services to air carriers, BTV is also subject to requirements described in Title 14 CFR Part 139 Certification of Airports, which include, but is not limited to a self-inspection program and pavement management system for airside facilities.

The current Airport Master Plan was updated in 2011 and describes the 20-year development plan. According to the Airport's Capital Improvement Plan (CIP), the current Airport Master Plan will be updated in fiscal year 2018. Within the Airport Master Plan update, the current Airport Layout Plan (ALP) will also be updated to an electronic Airport Layout Plan (eALP). The eALP update process will be conducted via the FAA Airports Geographic Information System (AGIS) program. The data collected through the FAA AGIS would be compliant with the requirements of Advisory Circular (AC) 150/5300-18B Change 1, *General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System (GIS) Standards*. In addition, the development of the eALP would be eligible for funding through FAA Airport Improvement Program grant.

The FAA AGIS process would capture significant amounts of data required for a future Asset Management information system as the FAA AGIS eALP survey process focuses primarily on airside safety critical data collection. The eALP data collection and survey efforts could be expanded to include additional aeronautical and non-aeronautical components of the airport property that will be needed for a follow-on Asset Management system.

There are multiple organizations at the airport, such as the Transportation Security Administration (TSA) and U.S. Customs and Border Protection (CBP) which present additional challenges from an Asset Management perspective. Including these key stakeholders early in the Asset Management planning process is highly recommended. The FAA recognizes the significance of Asset Management and has published Asset Management guidance in Airport Cooperative Research Program (ACRP). Report 69: Asset and Infrastructure Management for Airport – Primer and Guidebook.

PROJECT UNDERSTANDING & APPROACH

It is clear that the requirements of an AMP for the Airport may greatly differ from other functional departments of the City. Participation of the Airport in Phase IA would provide a clear “roadmap” regarding Asset Management before the next master plan and ALP update. This would allow the airport to set clear goals and objectives, as well as set achievable levels of service and performance measures.

Participation in Phase IA, which is presented in our Approach, would also allow the Airport to evaluate existing, and establish new sustainable principles, practices, and metrics. In addition, Phase IA would allow the Airport to evaluate requirements regarding passenger convenience, ground access, and access to airport facilities for which the FAA has provided additional guidance in AC 150/5070-6B Change 2, *Airport Master Plans*.

Hoyle, Tanner has had a long-term relationship with BTV and has a great deal of experience in airport planning which will enhance the value of an early planning effort done in conjunction with the rest of the City departments. A well thought out AMP derived now will assist BTV staff while budgeting and scoping future capital plans and their next masterplan update.

Select and Implement a CMMS

While user friendly computerized maintenance management system (CMMS) software is a core component of an Asset Management system, the City understands that development of a clear roadmap to an AMP predicates the software selection process. With the roadmap in place, the City will be able to use it as a basis to define the functional requirements for a software that will best meet the needs of all of the asset groups. To this end, the City plans to integrate requirements for software to include citizen input, such as the current “See-Click-Fix”, as well as operations and maintenance work order generation and tracking within the content of the CMMS. Selection of an appropriate CMMS will be vitally important to the long-term success and continued use of Asset Management in the intended way. Our experience leads us to the conclusion that CMMS software is not a “one size fits all” solution. Once our team, in partnership with the City, answers the questions: “Where are we?”; “Where do we want to go?” and “How do we get there?”, a prudent decision can be made as to what CMMS is right for the City. As there are many options for a CMMS, we will utilize our experience to guide the City towards the development of specifications for the acquisition of a CMMS that not only facilitates effective initial implementation and meets the WRD’s AMP needs, but also allows for continued growth and future utilization by additional City departments.

Approach

This proposal focuses specifically on Phase 1 in order to define the scope of work required to develop the AMP and select a CMMS software package in Phases II & III.

Phase IA: Preliminary AMPing Assessment

Overview

Hoyle, Tanner’s approach is to meet the objectives of Phase IA by delivering a scope for an AMP that:

- Aligns investments in infrastructure with the City’s mission
- Focuses on long-term affordability and sustainability
- Provides a basis for all AMP for each asset class managed by the City
- Establishes communication protocols for justifying investment decisions
- Supports and enhances the Water Resources Integrated Planning program
- Sets the foundation for a cultural shift in how City departments manage infrastructure

PROJECT UNDERSTANDING & APPROACH

Process

The elements of the process that Hoyle, Tanner will follow are outlined in the RFP as Phase IA steps 1-10. Key to our strategy will be goal-oriented workshops and meetings described as follows:

1. Provide training/Introduction of Asset Management concept.

Approach: Hoyle, Tanner will lead a 12 hour long Asset Management Primer Workshop

Time: 6 hours per day over two consecutive days (if scheduling key staff for 2 consecutive days is a problem, modifications to the scope can be discussed.)

Attendees: Executive, manager, and supervisor level decision makers

Hoyle, Tanner recognizes that many City staff have already been exposed to Asset Management, but the level of understanding is not yet consistent between all staff members. Therefore, the purpose of the Asset Management Primer Workshop is to define a common understanding of what Asset Management is and how it will support the City's mission and various Department goals. The first couple hours will be geared towards a high level overview appropriate for executives like the DPW Director, City Mayor and Finance Director (interested City Council Members could be invited). The workshop will draw on information available from the EPA and the FAA interjected with our experience and insight on effective Asset Management. For attendees who are already educated in Asset Management, the course material will be familiar, while others will find the material new and informative. For all participants it will be an opportunity for consensus building as we engage City staff with questions and discussion points designed to help decision makers and allow them to leave after that section if they do not have time to stay for the entire workshop.

Topics included in the Asset Management Primer Workshop:

- Why we need Asset Management?
 - *Business drivers among City departments*
- What is Asset Management?
 - *Illustrative views to define Asset Management*
 - *Definitions-Life cycle business processes-Integration of people process and systems-A management framework-Five Core Questions-Elements of an AMP-Seven Principles of Asset Management-Enterprise Asset Management Framework*
- Fundamental decisions made from an Asset Management System
 - *What Maintenance Work is being Performed and Why?*
 - *What Capital Improvements need to be done and when?*
 - *Repair, Replace or Rehabilitate?*
- Components of Risk
 - *Consequences of Failure*
 - *Mitigation to Minimize Consequences*
 - *Likelihood of Failure*
 - *How do Assets Fail?*
 - *Physical Failure, Performance Failure, Economic Failure*
 - *Managing for Failure: Asset Decay*
 - *Tools to Manage the Potential for Failure*
 - *The Risk Matrix for Guiding Actions and Decisions*
 - *Triple Bottom Line and Asset Management*
- The Asset Management System

PROJECT UNDERSTANDING & APPROACH

- *Policies, Processes, People, Tools, Information Systems*
- *CMMS and Asset Management Software*
- Goal Setting Primer – Explain Homework Assignment
 - *Review Overall City Goals*
 - *Review Each Functional Groups Overall Mission*

Deliverable: Hoyle, Tanner will deliver a memo that highlights the consensus points, decisions, and challenges expressed. The document will also include further expectations for staff to prepare for targeted group meetings with each functional group for the next step.

2. Initial documentation of existing practices/workflow/asset inventory/asset data collection practices for each functional group of assets

Approach: Hoyle, Tanner will interview managers of each functional group separately including (1 to 2 hours each depending on complexity and interest):

- Water Resources Division – water distribution
- Water Resources Division- stormwater and wastewater collection (held together in consideration of integrated planning)
- Water Treatment
- Wastewater Treatment
- Traffic Signs and Signals
- Roads and Sidewalks
- City Buildings and Facilities (including Parks and Recreation Buildings)
- Parks and Recreation Assets including Facilities, Amenities and Trees
- Inspection/Engineering
- Recycling
- Fleet and Equipment

Assume that meant to include airport - but maybe didn't include because there are airport sub-asset classes?

This list may be further refined for logistical purposes

The goals of these interviews will include:

- Formulate the basis for a gap analysis. Gap analysis will be expressed in terms of practices, workflows and inventory.
- Learn about resource availability and function. Learning how resources are currently used will be essential for determining resource needs in the future. The goal is to optimize existing resources before acquiring new resources.
- Learn about existing workflows. Existing workflows may sometimes be modified to collect information that is essential for an Asset Management system. For instance, a recorded assessment of the structural condition of a water main could be incorporated into any workflow requiring pipe excavation.
- Evaluate structure and availability of existing asset inventory & condition.
- Define Levels of Service for each functional group.
- Develop initial potential performance measures for each Functional Group.

Time: An allowance of up to 2 hours will be provided for each interview

Attendees: Functional group managers and their designees (up to three people per interview)

Deliverable: Documentation regarding the status of inventory, workflow and practices. The documentation will focus on establishing the basis for a gap analysis and roadmap to AMP.

PROJECT UNDERSTANDING & APPROACH

3. Develop a Strategic AMP (SAMP) which will include:

- Roadmap Document for each functional group to Include:
 - i. Initial documentation of existing practices/workflows/existing inventory assessment/existing data collection practices
 - ii. Outline of Levels of Service and Performance Measures now and goals for future
 - iii. Gap Analysis
 - iv. Readiness Assessment
 - v. Recommendations for Immediate Gap Closures
 - vi. Critical Next Steps
- Recommendations and compelling arguments regarding City wide organizational support for this effort in the short, mid and long term time periods
- Recommendation on resources needed and the formation of management teams to keep the project moving forward
- Prioritize functional groups for further development into Phase II

Phase 1B: Water Resources AMP Scoping

While Phase IA included other departments and functional groups, Phase 1B is primarily focused on the WRD. Phase 1B is best described as the approach to deliver a scope and budget requirements for Phase II.

1. Based on Phase IA – identify which areas of water resources and which asset classes should move forward in Phase II:

Approach: Hoyle Tanner will collaborate with the WRD to determine priorities

Hoyle, Tanner recommends that AMP's be developed for each asset class managed by the WRD. With respect to the Integrated Planning program for wastewater and stormwater (where combined systems exist) we should consider including these two systems in one plan. The specific Asset Classes and AMPs to be developed will be identified as part of this task in close collaboration with WRD managers.

Water Resources, by the Numbers

- 1 water plant
- 110 miles of water mains
- 3 Wastewater Treatment Plants
- 49 miles of sanitary sewer
- 45 miles of combined sanitary / storm sewer
- 37 miles of storm sewer
- 25 pump stations
- 102 storm water outfalls
- 2,000+ catch basins
- 900 fire hydrants
- 2 post-closure landfills
- 1 methane powered generating station



The main components of an AMP define the current state of the Asset Class (inventory, performance, condition, workflows and processes), the goals of the system (level of service goals, performance goals, decision making capabilities) the information required to measure and achieve these goals, and a set of steps to cost effectively achieve these goals. Other components include the benefits and costs of the implementation in order to prioritize the steps to achieve the goals of the AMP. All these areas of an AMP can be achieved regardless of the current state of the Asset system, however, Hoyle, Tanner will collaborate with WRD to determine which Asset Classes should move forward first as the first AMP can serve as a model for subsequent AMPs.

Deliverable: A memo that clearly defines each asset class/AMP to be developed along with the order that the AMPs will be created

PROJECT UNDERSTANDING & APPROACH

2. Immediate gap closure recommendations for Water Resources to be pursued in preparation for Phase II (AMP and CMMS Specifications Development) and Phase III (Implementation)

Approach: Refine and confirm the immediate gap recommendations identified in Phase IA.

Immediate gap recommendations will be first identified in Phase IA item 5. In this task Hoyle, Tanner will confirm and verify the immediate gap requirements specific to the WRD.

Deliverable: A document that identifies immediate gap closure requirements specifically for the WRD

3. Prepare Scope of Work for Phase II AMP development and probable cost estimate for Phase II work.

Approach: Hoyle, Tanner will develop the Scope of Work through close collaboration with WRD staff

The anticipated Scope of Work includes (but is not limited to):

- a. **More Detailed Training.** Hoyle, Tanner anticipates that there will be a need to provide training on the specific elements of an AMP. Other training needs may focus on an overview of CMMS and Asset Management software, and perhaps a review of the some of the different packages on the market today.
- b. **AMP Development:** Core elements of an AMP that will be considered for the scope will include (but are not limited to):
 - a. A definition of the Asset Class and its mission
 - b. An assessment of the current state of the Asset Class in terms of inventory (the asset register), condition, performance, and current management practices including workflows)
 - c. Level of Service goals; performance goals
 - d. Decision making goals using methods based in risk assessment
 - e. A roadmap of steps to achieve the goals
 - f. Costs and benefits of the components of the plan
 - g. Provisions for future plan improvements

Hoyle, Tanner will develop a draft Scope of Work that includes more detail on the elements of the plan to be developed based on the knowledge gained through the Phase 1 process. As mentioned in item 1, the actual number of AMP's to be developed under this scope will need to be determined. Hoyle, Tanner believes the best approach is to focus on one Asset Class at a time, then use lessons learned through the process to develop AMPs for subsequent Asset Classes.

- c. **Resources and Organization Structure Recommendations:** in order to fulfill the AMP and achieve a sustainable Asset Management System for the WRD, Hoyle, Tanner takes the approach to first optimize existing resources and workflows before recommending substantial changes. Often times the need for additional resources is within the implementation stages of an Asset Management System, then over time, the system should be manageable with existing resources. These matters will become evident as the team works through Phase IA and then reflected in this section of the scope.
- d. **Development of Scope and of Work/Bid Specifications for CMMS Purchase and Implementations:** Hoyle, Tanner takes an approach that focuses on the highest requirements for the software. Other matters that can be just as important include vendor support and upgrade policies, vendor response on feature requests, the vibrancy of the user community, as well as initial costs and support costs. Additionally, Hoyle, Tanner recommends the development of a software demonstration document so that the City can see how each software would be used to support actual workflows used within the City.

PROJECT UNDERSTANDING & APPROACH

- e. **Probable Cost of the CMMS Software and Implementation:** Hoyle, Tanner can draw on our experience with various software packages as well as our relationships with software vendors to arrive at a cost that is suitable for budgetary purposes.

Deliverable: Phase II Scope of Work with a fee estimate.

The City is taking a very thoughtful and sound approach to implementing an AMP that will serve the residents, decisions makers and employees long into the future. The road to Asset Management implementation of Asset Management Systems requires proper planning and patience, however, with our experience and engaged City employees the process will be rewarding and effective.



IDENTIFICATION OF TEAM &
KEY STAFF

IDENTIFICATION OF TEAM

Project Team

To illustrate how Hoyle, Tanner proposes to manage the WRTAP Asset Management Planning and Implementation Phase 1 Project, a Team Organizational Chart has been included in this section. The chart identifies Hoyle, Tanner's senior engineers in charge of the work as well as the in-house staff who will provide the technical support. Below is a brief description of the experience of the management members of the project team. Resumes of team members are provided in this section.

Carl L. Quiram, P.E., *Principal-In-Charge, Regional Manager-Environmental Engineering*

Mr. Quiram has extensive experience in innovative, cost effective municipal infrastructure planning, management, design, and construction. During his 28 year public works career he managed a comprehensive range of public infrastructure projects including: water distribution, water treatment, wastewater collection, wastewater treatment, stormwater management, solid waste/recycling facilities, hazardous waste, traffic and transportation, pavement rehabilitation and maintenance, fleet management, facilities and grounds, bike trails, cemeteries and asset management systems. Mr. Quiram's responsibilities include business development, client service, and project management, QA/QC and the planning, design and administration of municipal infrastructure projects. *As Principal-In-Charge, Mr. Quiram will be responsible for overall project control and for the prioritization of resources within Hoyle, Tanner to ensure that the technical, budgetary and scheduling needs of the City are met. Mr. Quiram will also utilize his extensive public work experience to assist Burlington's staff at identifying their goals with this Asset Management Planning Project.*

Michael V. Schramm, P.E., LEED® AP, *Project Manager*

Mr. Schramm has a proven ability to complete feasibility studies and engineering design of various water, wastewater and stormwater projects. He has managed many wastewater treatment plant solids handling, anaerobic digestion, energy development, and efficiency and process optimization projects. He has been instrumental in working under the requirements of aggressive completion schedules for funding and failing equipment replacement to deliver projects on-time and within-budget. Mr. Schramm's project management skills are supplemented by his experience on a variety of wastewater treatment plant evaluation, study, engineering and construction administration projects including advanced anaerobic digestion, digester mixing, CHP, solids thickening and dewatering, hauled waste and septage receiving, plant process optimization, energy efficiency and sustainable design projects. As a LEED Accredited Professional, Mr. Schramm views projects through the goals of sustainability and energy reduction. *Mr. Schramm will serve as the Project Manager and will be responsible for the day-to-day project management and the commitment of resources to ensure the budget and deadlines are met. He will also be the primary point-of-contact for the City.*

John J. Jackman, P.E., *Associate – Senior Asset Management Specialist*

John has over 11 years of experience in the development of asset management programs and works closely with the EPA, NHDES, NEWEA and the GAO staying informed on programs and funding opportunities for communities. Mr. Jackman also has an extensive background in public works management and utility operations. *Mr. Jackman will serve as the Senior Asset Management Specialist where he will be responsible for development of the systematic program for conducting inspections, condition assessments and criticality analysis. Mr. Jackman will also be responsible for integrating the inspection data, condition assessments and criticality analysis with the AMP.*

IDENTIFICATION OF TEAM

Project Team

Roderick Lovely, P.E., *Technical Asset Management Expert*

Hoyle, Tanner has teamed with Kleinfelder on several Asset Management Projects and have a long working relationship with Mr. Lovely. Working out of Kleinfelder's Manchester office, Mr. Lovely will serve as **an expert technical advisor and resource**. Mr. Lovely serves as Kleinfelder's Asset Management Service Line Director and has experience in the implementation of Asset Management Systems across the country. His extensive experience includes many of the goals set to be completed on this project. ***Mr. Lovely will be a technical advisor for integrating the condition assessment and deliverables under this project.***

Evan R. McDougal, CM, Associate, *Senior Airport Planner*

Mr. McDougal is an airport planning professional with over 35 years of unique aviation industry experience including as a planner, designer, pilot and Airport Manager. He has served as the project manager and/or the lead technical planner on a variety of projects, including: airport master plans, noise compatibility studies, aircraft airport compatibility assessments, airspace obstruction analysis, aviation forecasting, and airport capacity studies. ***Mr. McDougal's keen understanding of the aviation industry and business systems makes him the perfect choice to develop the BTV roadmap under Phase 1A. Mr. McDougal will have full support from Hoyle, Tanner's Asset Management Specialists.***

Nicole E. Crawford, E.I.T., *Asset Management Specialist*

Ms. Crawford's engineering experience is focused on the transportation field including both roadway and aviation design. Prior to joining Hoyle, Tanner Ms. Crawford served as a Transportation Engineer with the Connecticut Department of Transportation where her responsibilities included designing roadway sign and marking plans as well as serving as the field inspector for roadway construction and paving projects. She also became proficient developing Stormwater Pollution Prevention Plans (SWPPP). After obtaining a Master's Degree in Civil Engineering, Ms. Crawford joined Hoyle, Tanner where she currently designs airport improvement projects using AutoCAD Civil 3D, prepares engineer's construction cost estimates and evaluates existing pavement conditions in order to analyze airport pavement condition index and pavement classification numbers for existing airfield pavement. Ms. Crawford's interest in asset management stems from her overall interest in system improvement. ***Ms. Crawford will assist as needed to provide both field and office asset management support for all tasks included as part of this project.***

Additional Technical Resources

As this project develops, Hoyle, Tanner has numerous technical discipline resources that can be brought into the project as needed to advise our Asset Management Specialists. **Jon A. Olin, P.E.** is the lead structural and transportation engineer in our Burlington office. Mr. Olin is currently working on the City of Burlington parking structure evaluation and has also worked on other projects in Burlington including; Pearl Street Streetscape Improvements, Church Street Lighting and Streetscape Improvements, Municipal Parking Garages Conditions Assessments and Repairs and more. On the aviation side of Hoyle, Tanner, **Karen J. Frink, P.E.** has been involved in many projects at BTV. Her Burlington project list includes; Pavement Rehabilitation Studies, Airport Sign Replacements, Runway Extensions, Runway and Taxiway Lighting Improvements, and Apron Rehabilitations. For environmental services we will have additional resources in **John D. Reilly, P.E.** from our Burlington office, who has experience with existing equipment inspections, alternatives evaluations, new equipment selection and preliminary design and specification development of recommended equipment improvements

Most resumes were in the original WRTAP submission. Some additional/supplemental resumes are provided herein.

IDENTIFICATION OF TEAM & KEY STAFF

Team Organizational Chart



PRINCIPAL-IN-CHARGE
Carl L. Quiram, P.E., ENV-SP
Vice President
Regional Manager-Environmental Engineering

PROJECT MANAGER
Michael V. Schramm, P.E., LEED[®] AP
Vice President

PROJECT TEAM
John J. Jackman, P.E.
Senior Asset Management Specialist
Roderick Lovely, P.E.
Technical Asset Management Expert
Evan R. McDougal, C.M.
Senior Airport Planner
Nicole E. Crawford, E.I.T.
Asset Management Specialist

CARL L. QUIRAM, P.E., ENV-SP

Vice President - Regional Manager of Environmental Engineering

Mr. Quiram has extensive experience in innovative, cost effective municipal infrastructure planning, management, design, and construction. During his 28 year public works career he managed a comprehensive range of public infrastructure projects including: water distribution, water treatment, wastewater collection, wastewater treatment, stormwater management, solid waste/recycling facilities, hazardous waste, traffic and transportation, pavement rehabilitation and maintenance, fleet management, facilities and grounds, bike trails, cemeteries and asset management systems.

Mr. Quiram's responsibilities include business development, client service, project management, QA/QC and the planning, design and administration of municipal infrastructure projects.

In 2010, Mr. Quiram was honored by his peers through recognition as an American Public Works Association Top 10 Leader of the Year. Mr. Quiram also served on the APWA Center For Sustainability and achieved the designation of Envision Sustainability Professional through the Institute For Sustainable Infrastructure.

Relevant Experience

Town of Goffstown Asset Management Project, Goffstown, NH: Public Works Director responsible for leading the effort of evaluating asset management products to determine the correct approach for the Town. Scope: Coordinating with DPW division heads and other town departments, he developed a transitional approach to implementation of asset management, matching needs, staffing and available resources.

NPDES Stormwater Management, Goffstown, NH: Public Works Director responsible for the development, implementation and funding for Goffstown's stormwater management plan. Scope: With the introduction of numerical water quality limits in the 2013 Draft MS4 NPDES General Permit, the need for a more in-depth understanding of the various water quality issues associated with the Town's MS4 became much more important. Mr. Quiram worked closely with other MS4 Communities, as well as the regulatory community, to engage in a meaningful review of the draft permit and its implications to local communities.

Roadway Infrastructure Management Plan, Goffstown, NH: Public Works Director developed a comprehensive pavement management plan for the community. Scope: Working with data gathered from Goffstown's roadways, Mr. Quiram was able to undertake a community education campaign that resulted in the Town passing an aggressive roadway funding plan at Town Meeting.

Water System Asset Management Plan, Rollinsford, NH: Principal-In-Charge & QA/QC Scope: Development of a water system asset management plan under a 50% matching grant from the New Hampshire Department of Environmental Services. Work included; data collection and review, water system inventory and mapping, condition assessment, financial analysis, setup and training for asset management software, development of public outreach material, and preparation of a summary report. Information compiled was incorporated into a web-based program (Web DPW) for asset management of water system assets.

Professional Registrations:

Professional Engineer: NH

Education:

- University of New Hampshire, BS, Civil Engineering, 1986

Professional Associations:

- American Public Works Association (APWA)
- American Society of Civil Engineers (ASCE)
- New Hampshire Public Works and Municipal Engineering Assoc. (NHPW&MEA)

Years in Industry: 28

JOHN J. JACKMAN, P.E.

Associate – Senior Asset Management Specialist

Mr. Jackman's experience is in municipal infrastructure planning, management, design, and construction. During this time he has been involved in collection sewer system evaluations and trenchless technology rehabilitation, biological nutrient removal, operation, maintenance and management of water and wastewater facilities for communities throughout New England, and development of asset management programs. He was Public Works Director for 11 years developing one of the first asset management projects in New England. He worked with NEIWPC to develop a model CMOM program to be used throughout New England and New York.

Relevant Experience

Water Asset Management, Portsmouth, NH: Project Manager responsible for the development of an Asset Management Plan for the water system. Scope: It was designed to assist the City with tools for more cost-effective decision making. The program includes several elements completed through a series of workshops and training sessions; Level of Service, Asset Inventory, Condition Assessment, Criticality Analysis\Risk Assessment, Life Cycle Costing\Long Term Funding, Workflow\Reporting and Communication Plan. The success of these programs was based on the inclusion of City at all operational levels. It allowed for the development of workflows that capture the information in the field that is critical in making the best decisions. This understanding throughout the organization is the root of the projects success. After each workshop, steps were taken to implement elements of the Asset Management program using the current data, staff knowledge and software tools.

Airport Parkway Wastewater Treatment Facility Upgrade - Asset Management, So. Burlington, VT: Asset Management Specialist for the development of an equipment/asset prioritize standards system, inputting of all new equipment, O&M manuals, tasks and task priorities into a computerized maintenance system. The Asset Management program was for a \$24 Million Dollar upgrade. Scope: This project included developing a Request for Proposal (RFP) from asset management system vendors, facilitating proposal presentations with City staff to assist the City in selecting an asset management system type that best fits the City's staff and management needs.

Asset Management & Assistance, Goffstown, NH: Project Engineer responsible for updating the Asset Management software on the Town's intranet, updating all the GIS layer for all utilities, planning layer, linking up to the assessor's information to the GIS. Scope: Update the current asset management software and provide training in the use of the asset management software focusing on the stormwater utilities and using this feature class as a template for all the other utilities. Work also included development of different forms to allow the Town to collect data.

County-wide Asset Management Program Development, Citrus County, FL: Asset Management Specialist for the development of an asset management demonstration program that provided the City with a model to use throughout the County. Scope: Developing a demonstration project to evaluate the potential benefits of implementing a county-wide asset management program. At the conclusion of the project, an evaluation will be conducted to explore the potential increase in efficiency, cost savings, and effective data-driven decision making.

Professional Registrations:

Professional Engineer: VT, NH, ME

Education:

- University of Vermont, BS, Civil Engineering, 1975
- New England Regional Wastewater Institute, Graduate
- University of New Hampshire Environmental, Graduate Coursework

Professional Associations:

- New England Water Environment Association (NEWEA) - NEWEA Plant Operations Committee - Chairman; NEWEA Asset Management Committee – Chairman
- New Hampshire Water Pollution Control Association (NHWPCA)
- Water Environment Federation (WEF) - WEF Operators Challenge Maintenance Event Committee - Chairman

***Years in Industry:* 40**

Roderick Lovely, PE

Asset Management Practice Leader for Kleinfelder 2012-Present

Mr. Lovely has over 29 years of experience in the field of infrastructure Asset Management and supporting technologies. Formerly the vice president and Product Manager of an EAM software company, Mr. Lovely has led the procurement, development, implementation and management of Enterprise Asset Management solutions for dozens of organizations across the country. In this capacity he has demonstrated comprehensive capabilities for integrating the elements of technology, people, and business processes toward a common goal. His experience includes working with all stakeholders including management, staff, partners, programmers, and professional colleagues through all aspects of the project delivery cycle including design, development, project management, technical scopes, enterprise implementations and support services.

Asset Management Plan, Portsmouth NH

Serving as the Asset Management technical leader, Mr. Lovely worked closely with his counterpart at Hoyle, Tanner to deliver a curriculum of goal oriented workshops that not only taught City staff about Asset Management, but resulted in the development of service levels, failure mode criteria, risk parameters and more. Through this process city staff were able to identify their gaps in data and process as a basis for the Asset Management Plan. Mr. Lovely and his counterpart took this his information and delivered the Asset Management Plan within a short time window as required for the City to receive state grant funding.

Enterprise Asset Management System Implementation and Consulting, Springfield MA

Mr. Lovely is the project leader for a comprehensive risk based enterprise asset management system implementation for the Springfield Water and Sewer Commission. Spurred by successful implementation of a risk based asset management solution for the wastewater collection system, this project expands the scope of the program by migrating data from a range of disparate systems to a single Enterprise Asset Management software solution. The solution integrates with the Commission's GIS, financial, and inventory warehouse systems in order to provide the dynamic data requirements for the risk based decision model across the entire portfolio of assets managed by the Commission. Integrated with GIS, the system provides access to all horizontal and vertical asset types managed by the Commission including over 700 miles of wastewater collection pipe, 600 miles of water distribution mains, a 67 MGD wastewater treatment facility, 32 wastewater pumping facilities, two water treatment plants, 3 water supply facilities, monitoring vaults, booster stations, operation facilities, fleet, and more.

Education

BS, Civil Engineering, Syracuse University, NY

AS, Forestry Surveying, Paul Smith's College, NY

Registrations

Professional Engineer (PE)

- Civil; NH

Experience

29 years

Professional Affiliations

APWA, WEF

Chair of NEWEA Asset Management Committee 2010 to 2013

Certificates

BAMI-I Certificate of Training in Asset Management 2012

Virginia Tech Certification in Sustainable Water Infrastructure Asset Management 2012

Publications and Presentations

Using Triple Bottom Line to determine when to replace an Asset
WaterWorld Jan/Feb 2015

Optimizing Infrastructure Investments Using the Triple Bottom Line Approach
American City & County November 2014

Case Study: Using Nessie Curves for long term financial modeling
NJWEA Conference May 2011

Risky Business – Quantifying Risk is Fundamental to any Physical Asset Management Program
Published in Florida Water Resources Journal May 2010

Consequences and Probabilities – Asset Management 101
Presented at NEWEA annual conference January 2007

Enterprise Asset Management \ CMMS Software Selection, Springfield MA

Software technology must be aligned with strategies, processes and people in order to be effective within any organization. Concerned that existing software technology was not up to the task for asset management (EAM), maintenance management (CMMS), and other business processes, the Springfield Water and Sewer Commission asked Mr. Lovely for guidance. In response Mr. Lovely performed a business focus needs analysis that led the Commission to a succinct list of criteria that was required for their EAM/CMMS system. With this criteria Mr. Lovely led the Commission through a selection process that started with a list of 8 prospects, narrowed the field to 3, and led to the selection of software technology supported by a company that was the best match for the Commission's business needs. Evaluations included site visits to other organizations using candidate software.

Comprehensive Water - Wastewater Asset Management Solution, Framingham, MA

Mr. Lovely was the Software Implementation Team Leader for Framingham's Comprehensive Wastewater Management Program. In this capacity, Mr. Lovely implemented the VUEWorks Asset Management system that integrates with the Town's GIS, hydraulic modeling packages, and other systems. Working with team members, city decision makers, and other staff, Mr. Lovely established the specifications for how the system will function in Framingham's business environment and directed the development team to build-out the VUEWorks software to support processes including Facility Condition Assessment (FSA) and a risk based prioritization module. Furthermore, Mr. Lovely worked with Town DPW staff to incorporate the Town's water and storm water systems and work flow processes in the system.

Water Tank Risk Based CIP, Irving Texas

Faced with the challenge of addressing a range of capital project needs for fourteen water storage facilities the City of Irving expressed to Kleinfelder that they needed transparent and justifiable methods to prioritize the order that projects get accomplished. Mr. Lovely responded by implementing a data driven process focused on identifying assets that posed the greatest risk to the mission of the facilities through condition and performance assessments and functional analysis that led to risk based ranking of the projects. In this endeavor Mr. Lovely utilized VUEWorks as a tool to capture the condition assessment data and utilize it in the Risk model that formed the basis for project ranking. The City expressed great satisfaction with the process and is currently strategizing with Kleinfelder to expand the system across all City infrastructure.

Pavement Management System implementation for a global retail chain

With nearly 1800 stores and 8300 designated parking zones across the country this retail chain required a cost effective way to optimize its annual \$40M annual CAPEX spending to meet its goals. To arrive at the right solution Mr. Lovely consulted closely with the client's asset management team to define the parameters for a solution that is unique and effective within the commercial retail sector. The solution utilizes EAM software to manage a massive amount of data and documents including pavement, sidewalk, curbs, and loading docks in a logical structure that allows the client easy accessibility. Unusable in the form delivered, the task facing Mr. Lovely's team was to re-structure the data and present it in a logical manner that fit the client's vocabulary. The data is used to develop risk based priorities and decay curve based 'what-if' budget scenarios using client-centric criteria to optimize budgets using a combination of pavement management and Asset Management techniques.

EVAN R. MCDUGAL, C.M.

Associate - Senior Airport Planner

As an experienced pilot and aviation planner, Mr. McDougal is the Manager of Hoyle Tanner's Airport planning staff. He has expertise in airport design and layout, FAA compliance issues, land acquisition and release procedures, environmental and historical reviews, airport business planning, and instrument approach procedures analysis. He has worked on numerous airport master plans and airport layout plan updates throughout New England and is equally experienced when discussing airport management activities. Mr. McDougal is a retired Senior Army Aviator and USCG Officer with extensive military and civilian flying experience (+4,000 hours). As the former Airport Manager of the Sanford Maine Seacoast Regional Airport he has "hands on" airport planning and management experience and has been directly involved and responsible for Airport Master Planning, the crafting and enforcing of Airport Minimum Standards, rules and regulations, negotiating FBO leases and operating rights agreements as well as agreements for hangar land leases, and through the fence and Specialized Aviation Service Operators agreements.

Relevant Experience

RSG-BurlingtonVTChamberlin Neighborhood Planning Project, Burlington, VT:

Senior Airport Planner responsible for historical research and alternative development evaluation. Scope: Incorporating a multi-discipline team to engage regional stakeholders and propose short, mid and long term development strategies for a residential neighborhood adjacent to the airport.

Development Plan & ALP Update, Augusta, ME: Senior Airport Planner for the development of airport master plans, development of airport layout plan, property acquisition services, assistance with airport minimum standard documents, airport business planning, management of the National Environmental Protection Act (NEPA) documents, assistance to airports with review of tenant lease agreements, and overall advice to airport management staff. Scope: This project updated the existing Airport Layout Plan (ALP) following recently completed runway safety area improvements. This ALP update also analyzed the potential for additional hangar construction availability.

Airport Master Plan, ALP Update, Sanford, ME: Project Manager / Senior Airport Planner for the research and development, presentation and public coordination of the Airport Master Plan and Layout Plan Update. Scope: The emphasis of this planning effort will be on creating the first General Aviation ALP in Maine that involves GIS compliant inventory data collection, facility needs and alternatives analysis, and capital improvement program planning.

Pease Facility Analysis, Portsmouth, NH: Project Manager, Project Manager / Senior Airport Planner for all technical aspects of the project, scheduling, public presentations, attendance at client committee meetings, and client coordination. Scope: This planning study determined what runway length and associated infrastructure modifications are necessary to support the civil usage of Portsmouth International Airport at Pease and to quantify that cost over the pavement life of the runway.

FBO Feasibility Study, Hyannis, MA: Project Manager / Senior Airport Planner for all technical aspects of the project, scheduling, budget and cost control, public presentations, attendance at client committee meetings, permitting, and client coordination. Scope: Developed options that might allow the Sponsor to provide additional value added FBO facilities amenities commonly found at other destination oriented airports. The study is intended to assist the airport in determining financial advantages of FBO facility location as well as operating labor costs required to provide additional services.

Education:

- University of Maine - Orono, BS, Agricultural Resources & Economics, 1977
- Commissioned 2LT US ARMY, Graduated Top 10% ROTC Class, 1977
- US Army Rotary Wing, 1978
- US Army Fixed Wing, 1980
- US Coast Guard, Direct Commission Aviator Course, 1985

Certifications & Specialized Training:

- Airline Transport Pilot Multi-engine Airplane
- Airline Transport Pilot Rotorcraft-Helicopter
- Flight Instructor Rotorcraft-Helicopter
- Flight Instructor Single Engine Land Airplane
- Instrument Flt Instructor Rotorcraft-Helicopter

Professional Associations:

- Aircraft Owners & Pilots Association
- American Association of Airport Executives (AAAE) - Certified Member (C.M.), Northeast and National Chapter Member
- Massachusetts Airport Management Association (MAMA)
- Town of Sanford, ME Planning Board - Past Member
- York County Soil & Water Conservation District - Past Chair and Supervisor

Years in Industry: 37

NICOLE E. CRAWFORD, E.I.T.

Asset Management Specialist

Ms. Crawford's engineering experience is focused on the transportation field including both roadway and aviation design. Prior to joining Hoyle, Tanner Ms. Crawford served as a Transportation Engineer with the Connecticut Department of Transportation where her responsibilities included designing roadway sign and marking plans as well as serving as the field inspector for roadway construction and paving projects. She also became proficient developing Stormwater Pollution Prevention Plans (SWPPP). After obtaining a Master's Degree in Civil Engineering, Ms. Crawford joined Hoyle, Tanner's Aviation Services Group where she currently designs airport improvement project using AutoCAD Civil 3D, prepares engineer's construction cost estimates and evaluates existing pavement conditions in order to analyze airport pavement condition index (PCI) and pavement classification numbers (PCNs) for existing airfield pavement. Ms. Crawford's interest in asset management stems from her overall interest in system improvement.

Relevant Experience

Pease Facility Analysis, Portsmouth, NH: Airport Engineer responsible for construction bid quantity estimates. Scope: This planning study determined what runway length and associated infrastructure modifications are necessary to support the civil usage of Portsmouth International Airport at Pease and to quantify that cost over the pavement life of the runway.

Statewide Airport Pavement Condition Index, Windsor Locks, CT: Airport Engineer responsible for computation of Pavement Condition Index and preparation of technical report. Scope: In accordance with FAA and ASM guidelines this project will evaluate existing pavement conditions and develop airport pavement condition index (PCI) and pavement classification numbers (PCNs) for the existing airfield pavement at the five Connecticut General Aviation airports.

Statewide Airport Pavement Condition Index, Windsor Locks, CT: Airport Engineer for computation of Pavement Condition Index and preparation of technical report. Scope: In accordance with FAA and ASM guidelines this project will evaluate existing pavement conditions and develop airport pavement condition index (PCI) and pavement classification numbers (PCNs) for the existing airfield pavement at Bradley International Airport.

Storm Drainage Repairs, Lebanon, NH: Airport Engineer responsible for assisting with construction administration services. Scope: City of Lebanon Municipal Airport proposed restoration and stabilizing a Runway 25 drainage swale, installation of outlet control and drainage structures, drainage pipe, improvements to a detention pond; Restoration of Areas 2A and 2B including a stabilizing slope failures, drainage structure and pipe, and a level spreader; and Restoration of Runway 36 Service Road including regrading a gravel road, installing water bars and repaving a small parking lot, and all associated earth work, stone fill, and other incidental work at the Lebanon Municipal Airport. The project includes coordination with the City, Airport, FAA, FEMA, and NHDES. The design and bidding was accelerated and completed in less than 4 weeks to meet FEMA funding 2014 requirements.

Airfield Improvements, Brunswick, ME: Airport Engineer responsible for assisting with construction administration including shop drawing reviews and reviewing change orders. Scope: This project includes multiple airfield improvements necessary following the announcement that the Naval Air Station Brunswick (NASB) would be closed as part of the Base Realignment and Closure (BRAC) process including electrical upgrades, obstruction removal, building demolition, fence installation and equipment purchase.

Pavement Maintenance - Phase 2, Brunswick Executive Airport, Brunswick, ME: Airport Engineer for drafting plans and quantity estimates for airport pavement markings. Scope: This maintenance project included crack sealing a portion of the usable bituminous pavement surfaces in order to prolong the life of the existing pavement.

Professional Registrations:

Engineer in Training

Education:

- Kansas State University, MS, Civil Engineering, 2014
- University of Rhode Island, BA, French Language and Literature, 2008
- University of Rhode Island, BS, Civil Engineering, 2008

Certifications & Specialized Training:

- NH LPA Certification for Labor Compliance
- NH LPA Certification Training

Professional Associations:

- Society of Women Engineers

Years In Industry: 3



RELEVANT EXPERIENCE

RELEVANT EXPERIENCE

Asset Management



Water Asset Management Plan

Portsmouth, New Hampshire

Client:

City of Portsmouth
Brian F. Goetz
Deputy Director
Department of Public Works
680 Peverly Hill Road
Portsmouth, NH 03801
(603) 766-1420

Services Provided:

- Training
- Asset Management Assistance
- Utility Coordination

Total Project Cost:

\$30,000

The City of Portsmouth Public Works Water Division takes a pro-active posture to continuously maintain and improve; not only the assets that comprise the water system, but also the processes that are used to manage it. Within the past 15 years the Water Division has made significant investments in the tools it uses to manage the system including investments in the City's Geographic Information System (GIS), a three phase water system master plan, an updated hydraulic model, and in computerized maintenance management/asset management (CMMS/AM) software.

The Hoyle, Tanner/Kleinfelder team was hired by the City of Portsmouth to develop an Asset Management Plan for the water system. It was designed to assist the City with tools for more cost-effective decision making. The program includes several elements completed through a series of workshops and training sessions; Level of Service, Asset Inventory, Condition Assessment, Criticality Analysis/Risk Assessment, Life Cycle Costing/Long Term Funding, Workflow/Reporting and Communication Plan. The success of these programs was based on the inclusion of City at all operational levels. It allowed for the development of workflows that capture the information in the field that is critical in making the best decisions. This understanding throughout the organization is the root of the projects success. After each workshop, steps were taken to implement elements of the Asset Management program using the current data, staff knowledge and software tools.

Integrated Asset Management Program

Canton, Massachusetts

Driven by the constant challenge of maintaining aging infrastructure with ever shrinking budgets and the need to maintain desired levels of service, Canton's Department of Public Works embarked with Kleinfelder on a 5-year plan to implement an innovative and comprehensive Asset Management Program that will integrate their pavement management with their water, wastewater and stormwater utilities. The Town of Canton was seeking to establish a culture of Asset Management in the Town's DPW, abandoning the traditional, reactive way of conducting operations for a centralized, data driven, automated, accessible, easy to use, expandable, efficient and sustainable system. The main goals of the implementation included improving efficiency, optimizing budgets, leveraging technology (GIS and asset management software), standardizing processes for managing assets and tracking outcomes in terms of return on investment and improvement of levels of service.

Contact

**Michael Trotta | DPW
Superintendent**
Town of Canton
801 Washington St
Canton, Massachusetts
(781) 821-5023
mtrotta@town.canton.ma.us

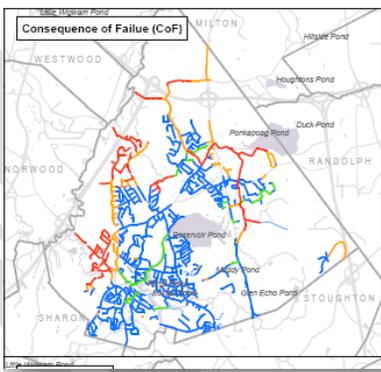
Special Features and Benefits

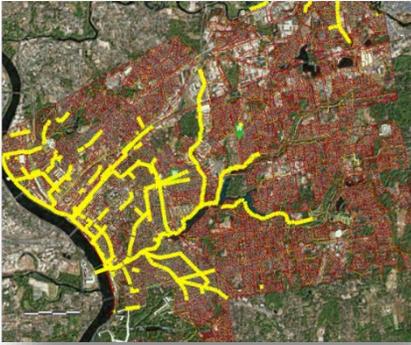
- Integrated water resource management with Asset Management
- Strategic use of GIS and asset management software technologies
- Comprehensive Asset management plan
- Incorporates cost effect and sustainable life cycle planning

In the first year of implementation Kleinfelder developed a five-year plan for the Town, that will provide Canton a fully developed bottom-up asset management and work management system for the three utilities(including horizontal and vertical assets) and their pavement assets by the end of 2018. Once the plan was developed, Kleinfelder and the Canton team worked together to develop the backbone of the asset management program consisting of:

- The establishment of the levels of service goals and performance metrics for the three systems,
- A data model for the GIS that fit with the Town's GIS requirements and future asset management tasks and processes,
- A system-wide inventory of water, stormwater, and wastewater system main assets from a variety of digital data sources available into the Town's GIS,
- Identification of data gaps for the three systems in a manner that prioritizes data gaps for future data collection efforts based on a criticality analysis,
- A risk model framework for water, wastewater and stormwater mains and a preliminary risk assessment where sufficient data is available,
- Development of a risk-based capital planning tool to be used at the project level to compare projects across the three different utilities while 'bottom-up' asset management implementation is still in process,
- A storm water assets operations manual,
- Leading Town public works and IT staff through a series of Asset Management planning workshops.

The first year of the effort constituted a milestone for building a legacy of continuous improvements to the community. It resulted in recommendations for extensive improvements to the Town's information management processes, and provided the synergy for a strong beginning for year 2 which will focus on effective maintenance management strategies.





Wastewater Collection System Asset Management Program

Springfield Water and Sewer Commission

Challenges

The Springfield Water and Sewer Commission (SWSC) was under an EPA Administrative Order to develop a Long Term Control Plan for the control of Combined Sewer Overflows (CSOs). At the time of the order the SWSC was struggling to meet not only its CSO obligations but also its other Clean Water Act obligations as it related to Sanitary Sewer Overflows (SSOs), NPDES Permitting, Inflow and infiltration removal, nutrient removal at the treatment plant, and storm water MS4 permitting in addition to normal O&M and capital improvements to its aging infrastructure. The burden would have been too much for the rate payers to bear.

Kleinfelder's Solution

The SWSC originally engaged Kleinfelder to develop the Combined Sewer Overflow (CSO) Long Term Control Plan. As the Kleinfelder team became aware of the burdens that SWSC faced we collaborated with the SWSC to implement a risk-based Asset Management approach to effectively prioritize limited funding across the spectrum of needs. This approach allowed the SWSC to negotiate a new agreement with EPA and thereby not sacrifice impending SSO and other issues within the collection system in order to meet the original CSO requirements.

Client

Springfield Water and Sewer Commission

Contact

Mr. Joshua Schimmel
Chief Engineer
413.787.6256

Completion Date

ongoing

To initiate the Asset Management program Kleinfelder held a series of goal oriented workshops to develop levels of service, consequence scoring methods and failure modes to be measured. The approach was not only educational but provided the basis for the asset management plan going forward.

The program that followed called on Kleinfelder to manage a range of services across the entire collection system. The team gathered condition information in the field using multiple methods such as confined space entry visual inspections, CCTV, ultrasonic thickness testing, laser profiling, etc. The assessment information was then used to define failure modes for each asset type. The team also created a hydraulic model of the combined wastewater and storm water system and used information gathered from the model to determine failures due to capacity and efficiency.

Risk values were calculated throughout the system utilizing GIS based asset management software. The team calibrated the risk model by comparing asset risk values to real-world assessments and engineering judgment. When everyone agreed with the model's validity, the team began defining and prioritizing projects based on the risk model. Project selection is further enhanced using benefit costs across the life-cycle of contending projects. The program has been in effect for over five years to satisfaction of all stakeholders.



Client Benefits

The SWSC saved substantial sums and avoided devastating rate increases by employing an asset management approach that balances EPA CSO requirements with ongoing collection system needs. With Kleinfelder's assistance the SWSC is now in the process of implementing an Asset Management approach across its water system.



SCHEDULE

TASK	DATE/DUTRATION	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16
Project Kickoff	End of July	*									
Phase 1A											
Schedule AM Primer Workshop		*									
12 HR AM Primer	mid-September			*							
Letter Report with Results	3 weeks from AM Primer										
Face to Face Meetings	ASAP scheduled after Primer					*					
Phase 1A - Road Map Report											
Phase 1B											
Memo refining WRD Asset Classes and Gap Closures											
Meeting to review Draft Documents	Around first of the year						*				
Finalize WRD Road Map and Gap Closure											
Prepare Scope of Work and Probable Cost Estimate Phase II											
BTV Alternate Add On											
Organizational Survey for BTV AM Groups	Sent out after Primer										
Workshops/Meetings with BTV Groups	One week - TBD after survey										
Develop Draft Needs Assessment/LOS/Performance Measure											
Preliminary Findings								*			
Gap Analysis and Preliminary AMP Roadmap for BTV											



SCOPE OF SERVICES

PHASE 1A – Preliminary Asset Management Assessment

Task 1 - City Wide Road Map Development and Training

Hoyle, Tanner will develop an Asset Management Primer Workshop to educate all City management staff on the benefits and capabilities of a robust asset management system.

Hoyle, Tanner staff will conduct a 12 hour Asset Management Primer Workshop. The workshop will be broken into two sessions over two consecutive days. The first few hours of the first session will be geared towards higher level executive positions who may want to get the flavor of the program but not dig into the details.

The following delineates how the tasks identified as 3 to 9 and described in Phase 1A of the RFP will be completed for the various City entities identified in the RFP.

Task 2 – Inventory and Document Existing Conditions

The primary objective of this task is to “ask the right people the right questions”. The process will begin with an information gathering survey.

2A. Organizational Survey – Describe the Organizational Structure and Stakeholders of the City participants (Airport as separate task)

This is a high level survey for management and operations staff in which the overall organizational structure of each functional group is defined and examined. It would be coordinated by Hoyle, Tanner after the introductory meetings and trainings (Phase 1A items 1 & 2 from the WRTAP Asset Management Planning Scoping Study RFP). It is expected that at least one manager from each functional group would participate in this survey. The objective of this survey is to identify and describe the functional groups and key stakeholders that could or perhaps should participate in a future asset management system.

Once the surveys have been completed, Hoyle, Tanner will provide up to two consultants for up to three (3) consecutive working days. During this time, the consultants will perform face-to-face meetings up to two hours in duration with key functional group staff to determine the following:

2B. Identify and Describe Functional Workflows

The objective of these discussions is to identify and briefly describe the existing work flows at the various functional units. In essence, the objective is for the operations and engineering directors and supervisors from stakeholder organizational units identified in the organizational survey to answer the “what?” and “who?” questions. The specific objectives include the following:

- Identify the tasks at the operational levels
- Identify and describe the existing functional groups of assets
- Identify and describe existing functional workflows
- Identify and describe existing asset data collection practices
- Establish Asset Management Goals that tie into overall City Goals

The consultants will document the findings of the workshops utilizing electronic forms and documents in commonly used files formats such as Microsoft Word/Excel and Adobe Acrobat.

2C. Identify the Functional Group's Needs

A need in its simplest form can be defined as an unsatisfied goal or objective. Identifying the needs is not always an easy task. In some cases organizations have identified a solution, however, the actual underlying needs for the solution have not been identified. An asset management system is a solution that can help an organization to satisfy specific needs. The objective of this discussion is for managers and supervisors to identify the actual underlying needs of the functional group. As an example, removing snow and ice from the roadway is a need. The solution is the combination of people, equipment, and procedures that are needed to store, maintain, and operate the system developed for snow removal.

2D. Identify Preliminary Levels of Service and Performance Measures

Based on the information collected in the previous workshops and discussions, Hoyle, Tanner will work with managers and supervisors to identify preliminary metrics of levels of service and performance measures.

2E. Preliminary Presentation of Findings

A report will be prepared to present the preliminary findings obtained from the previous workshops and discussions and submitted to management staff of each functional group for review and comment.

Task 3 – Perform Preliminary Gap Analysis

Based on information obtained from the workshops and discussions, Hoyle, Tanner will perform a gap analysis on the existing work flows. The gap analysis will examine the difference between the existing conditions and the future desired conditions based on the preliminary levels of service and performance measures discussions.

Task 4 – Prepare Preliminary Strategic Asset Management Planning Document

Hoyle, Tanner will prepare a Strategic Asset Management Planning Document (SAMP). The objective of the SAMP is to summarize the findings of the study and provide initial recommendations. The SAMP will provide overall recommendations for the City to advance a City wide asset management system. The document will identify recommendations for gap closures and prioritize functional groups for future implementation. The SAMP is intended to provide each functional group with a decision-making tool prior to the implementation of an asset management system. The SAMP is also intended to provide an initial roadmap for each functional group to continue planning for the implementation of an asset management system. The SAMP will have the following elements:

- Summary of Findings
- Summary of Opportunities and Recommendations
- A Business Case
- Supporting documentation

PHASE 1B – Water Resources Division

Asset Management Plan Scoping

Task 1 – More Detailed SAMP for WRD

Hoyle, Tanner will develop a draft SAMP that clearly defines each asset class to be further developed with a suggested prioritization based on the Phase 1A conversations. The document will also highlight recommended Gap Closures that WRD could work on while developing scope for Phase II and III.

Hoyle, Tanner assumes we will have to have a meeting to discuss comments to the draft document.

Hoyle, Tanner will finalize recommended SAMP document to further develop AMP for WRD.

Task 2 – Preparation for Phase II

Hoyle, Tanner will prepare a Scope of Work and Probable Cost Estimate for Phase II work. The scope will develop the following

- More detailed training for WRD staff
- Asset Management Plan Development
 - Detailed work flow development
 - Detailed level of service review and/or creation
 - Detailed performance measures review/creation
- Recommendations regarding organizational support necessary for a sustainable WRD asset management system
- Scope of Work and Bid Specifications for a suitable CMMS for Phase III purchase and implementation
- Probable Cost of CMMS software and implementation

PHASE 1A – BTV Alternate Add On

Evaluation and Road Map Development for AMP at BTV

Phase IA – Scope of Work – Burlington International Airport Asset Management

The following delineates how the tasks identified as 3 to 9 and described in Phase IA of the RFP will be completed if the Airport decides to participate beyond the initial development/refinement of City goals and asset management introductory training proposed for all stakeholders.

Task 1 – Inventory and Document Existing Conditions

The primary objective of this task is to “ask the right people the right questions”. Hoyle, Tanner will provide up to two consultants for up to three (3) consecutive working days. During this time, the consultants will perform up to 10 face-to-face meetings with key airport staff to determine the following:

1A. Organizational Survey – Describe the Organizational Structure and Stakeholders of the Airport

This is a high level survey for operations and engineering directors in which the overall organizational structure of the airport is defined and examined. It would be coordinated by the consultant after the airport stakeholders have participated in the introductory meetings and trainings (Phase IA items 1 & 2 from the WRTAP Asset Management Planning Scoping Study RFP). It is expected that at least one manager from each organization unit would participate in this survey. The objective of this survey is to identify and describe the airport organizational units and key stakeholders that could or perhaps should participate in a future airport asset management system. These

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key stakeholders could include TSA, CBP, ARFF, ATC, ANG, FBO or other tenants that the airport director and staff determine should be involved. This information is critical to understand the Airport as a system and to establish the boundaries of any future asset management system.

1B. Identify and Describe Functional Workflows

The objective of these discussions is to identify and briefly describe the existing work flows at the Airport. In essence, the objective is for the operations and engineering directors and supervisors from stakeholder organizational units identified in the organizational survey to answer the “what?” and “who?” questions. The specific objectives include the following:

- Identify the tasks at the operational levels
- Identify and describe the existing functional groups of assets
- Identify and describe existing functional workflows
- Identify and describe existing asset data collection practices

The consultants will document the findings of the workshops utilizing electronic forms and documents in commonly used files formats such as Microsoft Word/Excel and Adobe Acrobat.

1C. Identify the Airport’s Needs

A need in its simplest form can be defined as an unsatisfied goal or objective. Identifying the needs is not always an easy task. In some cases organizations have identified a solution, however, the actual underlying needs for the solution have not been identified. An asset management system is a solution that can help an organization to satisfy specific needs. The objective of this workshop is for operations and engineering managers and their designated supervisors to identify the actual underlying needs of the Airport. As an example, removing snow and ice from the runway so that a plane can land and stop safely is a need. The solution is the combination of people, equipment, and procedures that are needed to store, maintain, and operate the system developed for snow removal.

1D. Identify Preliminary Levels of Service and Performance Measures

Based on the information collected in the previous workshops and discussions, Hoyle, Tanner will work with operations and engineering directors and their designated supervisors to identify preliminary metrics of levels of service and performance measures. Using the snow removal need example there are specific clearing criteria goals established for CFR Part 139 Airports that can be considered the desired levels of service. These metrics and performance standards can be examined to determine if the system of personnel, equipment, and procedures needs to be adjusted to provide a better snow removal solution.

1E. Preliminary Presentation of Findings

A report will be prepared to present the preliminary findings obtained from the previous workshops and discussions and submitted to operations and engineering directors and their designated supervisors.

Task 2 – Perform Preliminary Gap Analysis

Based on information obtained from the workshops and discussions, Hoyle, Tanner will perform a gap analysis on the existing business process. The gap analysis will examine the difference between the existing conditions and the future desired conditions based on the preliminary levels of service and performance measures.

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Task 3 – Prepare Preliminary Strategic Asset Management Planning Document

Hoyle, Tanner will prepare a Strategic Asset Management Planning Document (SAMP). The objective of the SAMP is to summarize the findings of the study and provide initial recommendations. The SAMP is intended to provide the Airport with a decision-making tool prior to the implementation of an airport asset management system. The SAMP is also intended to provide an initial roadmap for the Airport to continue planning for the implementation of an asset management system. The SAMP will have the following elements:

- Summary of Findings
- Summary of Opportunities and Recommendations
- A Business Case
- Supporting documentation

Based on the above assumptions Hoyle, Tanner has developed the following Lump Sum costs for the various Phases outlined in this proposal. Hoyle, Tanner stands willing and able to fulfill this project as proposed or, if the City wishes to offer suggestions on changes to make it more acceptable to them, we are willing to negotiate new scope and fee amendments as needed. Our Lump Sum fee as proposed is:

PHASE 1A (1-2)– Preliminary Asset Management Assessment.....	\$12,800
PHASE 1A (3-10)– Preliminary Asset Management Assessment.....	\$12,200
PHASE 1B – Water Resources Division	\$11,500
PHASE 1A – BTV Alternate Add On	<u>\$18,200</u>
Total As Proposed	\$54,700



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