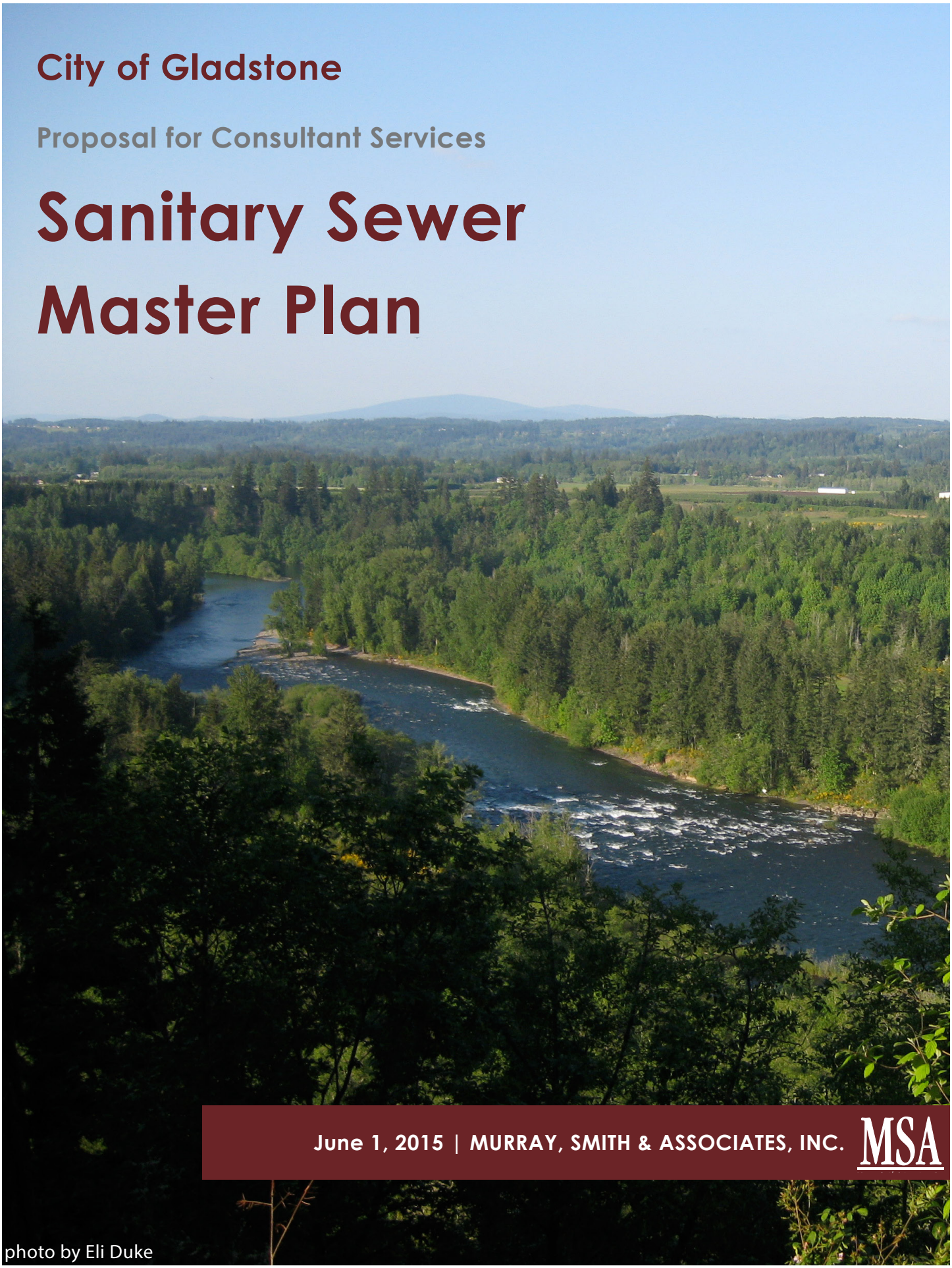
City of Gladstone

Proposal for Consultant Services

Sanitary Sewer Master Plan



June 1, 2015 | MURRAY, SMITH & ASSOCIATES, INC. MSA

photo by Eli Duke

Murray, Smith & Associates, Inc.
Engineers/Planners
121 SW Salmon, Suite 900 ■ Portland, OR 97204-2919 ■ PHONE 503.225.9010 ■ FAX 503.225.9022

June 1, 2015

Peter Boyce, City Administrator
City of Gladstone Public Works
525 Portland Avenue
Gladstone, OR 97027

Re: **Consulting Engineering Services for City of Gladstone Sanitary Sewer Master Plan**

Dear Pete:

The Sanitary Sewer Master Plan is an important project that will guide the City of Gladstone's infrastructure investments for years to come. Murray, Smith & Associates, Inc. (MSA) knows that efficient master planning requires an experienced team with a history of achieving success on similar assignments. Our team, who will work collaboratively with you, listen to your needs, and respond with the right solutions. We offer the following unique benefits for your Sanitary Sewer Master Plan:

Master Planning Experience the City Can Trust – MSA was founded over 30 years ago with a focus on public utility infrastructure and has prepared over 35 plans in the last five years throughout the Pacific Northwest. The City can rely on the MSA team to apply our strong experience to develop a Sanitary Sewer Master Plan that is both technically sound and easily understood by policy makers and the general public.

Local Expertise – MSA employs Portland staff who specialize in collection system hydraulic modeling, master planning, I&I analysis, and pipeline rehabilitation. We have performed recent collection system modeling and planning projects throughout Oregon in the past three years, including sanitary sewer master planning services for Wilsonville, Gresham, Clean Water Services, Wood Village, Bend, and Pendleton. Additionally, MSA has performed infiltration and inflow (I&I) rehabilitation design work throughout Oregon, including major programs for the City of Portland Bureau of Environmental Services, City of Springfield, and City of St. Helens. Our teaming partners, FCS GROUP, Sisul Engineering, and ADS Environmental also bring critical local expertise in financial analysis, system mapping, condition assessment, and flow monitoring.

Efficiency and Value – Our team understands the challenges facing the City of Gladstone and has the capacity, talent, and experience to efficiently guide you toward the right planning solutions. MSA has invested in planning tools to effectively develop a capital improvement program including hydraulic modeling software, I&I tool sets, and cost estimation databases. Additionally, we have key experience in presenting technical and planning information to facilitate public and stakeholder involvement.

MSA's commitment, relevant experience, and location of key staff will equate to providing the City with the greatest value for your master planning project. This will ensure an efficient use of City resources and delivery of high-quality, technically sound work products that adhere to project schedules and budgets.

Our proposal is intended not only to demonstrate our team's strong capabilities and expertise, but also to convey our genuine enthusiasm, passion, and commitment to serve you on this project. We will be very happy to discuss our proposal with you and other City staff in person. Thank you for considering MSA for this important assignment.

Mike Carr, PE will serve as our primary contact person. His contact information is: 121 SW Salmon Street, Suite 900, Portland, OR 97204; Ph: 503.225.9010; Email: Michael.carr@msa-ep.com.

Sincerely,
MURRAY, SMITH & ASSOCIATES, INC.

Mike L. Carr, PE
Principal-in-Charge, Portland Office Manager

Section 2

Project Team

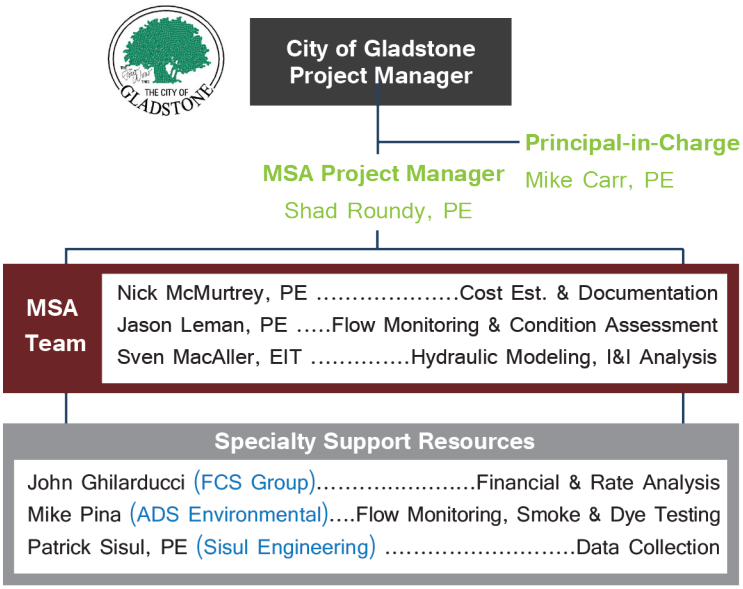
Team Introduction

MSA provides the City of Gladstone a team with extensive experience in sanitary sewer master planning for Oregon communities. Shad Roundy will serve as project manager. He leads a local team which has assisted developing cities throughout the region with hydraulic analysis and sewer system planning.

The MSA team includes Sisul Engineering which has critical knowledge of the Gladstone sewer system from previous mapping, assessment, and repair work. Sisul Engineering will provide assistance with condition assessment work and data collection.

ADS Environmental Services is available to perform flow monitoring, smoke testing, and dye testing to support condition assessment work and infiltration and inflow analysis. They are one of the longest serving flow services providers in North America.

FCS Group will provide utility rate and financial analysis similar to work that they performed in Gladstone for the water and stormwater master plans.



Years of Experience: 13
Length of Tenure: 4
Registration: Civil Engineer - OR & ID
Availability: 50%

Shad Roundy, PE | Project Manager

Shad, MSA's lead hydraulic modeler and planner, will serve as project manager. Shad leads a team of hydraulic modeling and planning experts in MSA's Portland office. His team is expert at efficient delivery of master plans, including infiltration and inflow analysis and capital improvement program development. His modeling and planning experience includes hydraulic model development, model calibration, infiltration and inflow studies, sanitary sewer alternatives analysis, operational analysis, and capital improvement planning.

Key Projects:

- Sewer Collection System Model, Deficiencies and Improvements Analysis, Clean Water Services, OR
- Sanitary Sewer Master Plan Update, City of Wilsonville, OR
- Sanitary Sewer Master Plan Update, City of Wood Village, OR
- Sewer Collection System Modeling, Master Planning, City of Bend, OR
- Sewer Collection System Model and CIP, City of Albany, OR
- I&I Study, MWMC, OR

Years of Experience: 21
Length of Tenure: 14
Registration: Civil Engineer - OR, WA, ID, & CA
Availability: 20%

Mike Carr, PE | Principal-in-Charge

Mike, a key MSA principal engineer, has many years of experience in a wide range of municipal wastewater, stormwater, and water projects. He has completed numerous wastewater system master planning and design projects throughout Oregon. Mike is familiar with the City of Gladstone, having assisted the City on projects dating back to 2002, when he led the Kirkwood Reservoir Replacement project.

Key Projects:

- Sanitary Sewer Master Plan Update, City of Wilsonville, OR
- Stormwater Master Plan, City of Pendleton, OR
- Stormwater Master Plan, City of Sherwood, OR
- Wastewater Facility Plan Amendment, City of Dundee, OR
- Kirkwood Reservoir Replacement, City of Gladstone, OR
- On-call Engineering Services, Oak Lodge Sanitary District, OR

Key Team Members	Role	Key Experience
Nick McMurtrey, PE Cost Est. & Plan Documentation **Years of Experience**: 11 **Length of Tenure:** 2 **Registration:** Civil Engineer – OR & IL; LEED AP BD+C, Envision Accredited Professional **Time Commitment**: 30%	Nick is a civil engineer with 11 years of overseas and domestic experience working with the design and implementation of sustainable engineering projects. He is both a LEED® and Envision™ Accredited Professional, placing a strong emphasis on holistic planning strategies to extend the service life of infrastructure.	▪ Sanitary Sewer Collection System Master Plan, City of Wilsonville, OR ▪ Master Planning Services, City of Pendleton, OR ▪ Upper Mountain View Pressure Zone, City of Shelton, WA ▪ Innovative Stormwater Facilities On-Call, City of Portland, OR
Jason Leman, PE Flow Monitoring & Condition Assessment Coordination **Years of Experience:** 5 **Length of Tenure:** 5 **Registration:** Civil Engineer – OR **Time Commitment**: 30%	Jason is a key MSA engineer with experience in planning, design, and inspection for sewer and water system improvement projects. His extensive understanding of construction practices, specifications, and pipeline design throughout Oregon will make him a valuable team member.	▪ Sellwood – Moreland: Tasks 2 & 3 – Phase II Sewer Rehabilitation, BES ▪ Kenton: Tasks 2 & 3 – Phase II Sewer Rehabilitation, BES, OR ▪ Sanitary Sewer Rehabilitation Program, City of St. Helens, OR ▪ Veneta Water Pipeline Project, City of Veneta, OR
Sven MacAller, EIT Hydraulic Modeling Infiltration & Inflow Analysis **Years of Experience:** 2 **Length of Tenure:** 2 **Registration:** Engineer-in-Training – CO **Time Commitment**: 50%	Sven specializes in hydraulic modeling and GIS. His modeling experience includes wastewater collection, stormwater, and drinking water systems. Sven was involved in sanitary sewer planning work in Bend, Oregon, where he developed a hydraulic analysis tool for evaluating common force mains for multi-pump station operations. He has performed collection system modeling work for Clean Water Services in Hillsboro, Oregon, evaluating potential improvement sensitivity as a result of I&I reduction.	▪ Optimized Sewer Comprehensive Plan Update, City of Bend, OR ▪ Sanitary Sewer Improvement Analysis, Hillsboro Basin, Clean Water Services, OR ▪ Tualatin Valley Irrigation District Hydraulic Model, Clean Water Services, OR ▪ Master Plan Services, City of Pendleton, OR
John Ghilarducci **FCS Group** Financial & Rate Analysis **Years of Experience:** 27 **Length of Tenure:** 24 **Time Commitment**: 20%	John is a FCS Group principal and shareholder. He has formed stormwater and transportation utilities and has developed water, sewer, stormwater, transportation, and parks rates and charges for dozens of clients. John is a recognized technical rate and finance expert and provides litigation support/ expert witness testimony throughout the Northwest.	▪ Sewer Financial plan Model, City of Bend, OR ▪ Water Rate Study, City of Gladstone, OR ▪ Sewer Utility Financial Plan & Rate Review, Lake Oswego, OR ▪ Sewer Rate & SDC Study, Oregon City, OR
Mike Pina **ADS Environmental** Flow Monitoring, Smoke & Dye Testing **Years of Experience:** 15 **Length of Tenure:** 15 **Time Commitment**: 15%	Mike is a key project manager at his firm with many years of experience, which includes working on all local flow monitoring projects in the Northwest. These varied and complex projects maintain an impressive approximate 97 percent uptime rate while providing data that is critical to clients CSO reduction, modeling, billing and inflow and infiltration reduction efforts.	▪ Flow Monitoring, Seattle Public Utilities, WA ▪ Flow Monitoring Service for 16 Pacific Northwest clients
Patrick Sisul, PE **Sisul Engineering** Data Collection **Years of Experience:** 25 **Length of Tenure:** 25 **Registration:** Professional Engineer (Civil) – OR, WA **Time Commitment**: 20%	Pat is a senior project manager at Sisul Engineering, with a wide variety of water, stormwater, and sanitary sewer infrastructure project experience. Pat's experience includes municipal street and utility improvements, large commercial and industrial site development, single and multi-family development and parks improvements for multiple jurisdictions throughout the Portland metropolitan area.	▪ Downtown Sanitary Sewer Investigations, City of Gladstone, OR ▪ 2013 Sanitary Sewer Maintenance, Trenchless Repair Work, City of Gladstone, OR ▪ Field Data & Mapping (Sanitary, Storm Drain, and Waterline), City of Gladstone, OR

Section 3

Project Team Experience

The goal of our project team is to become your trusted advisors; we offer a diverse background proficient in planning, regulatory guidance, wastewater systems assessment, financial analysis, and fostering stakeholder partnerships.

Your Public Works Partner

In 1980, MSA was founded by Harold (Hal) Murray and Phil Smith with the key mission of providing high-value, high-quality municipal engineering services to public agencies. Staying true to this mission, 99 percent of our current business is for Pacific Northwest public sector clients. We are a full-service civil engineering firm headquartered in Portland, Oregon with a staff of 105. We offer planning, design, construction management, and other related services for all types of public infrastructure projects, including wastewater, stormwater, water, and transportation.

MSA offers the City of Gladstone one of the strongest public works planning teams in Oregon, having completed over 35 plans in the last five years for agencies throughout the Pacific Northwest. Recently, MSA team members have performed sanitary sewer hydraulic modeling, infiltration and inflow analysis, and master planning for small and large public utilities including the City of Wilsonville, the City of Sherwood, Clean Water Services, the City of Wood Village, the City of Gresham, the City of Bend, and the City of Pendleton. Additionally, MSA has performed infiltration and inflow rehabilitation design work throughout Oregon, including programs for the City of Portland Bureau of Environmental Services, the City of Springfield, and the City of St. Helens.

Teaming Partners

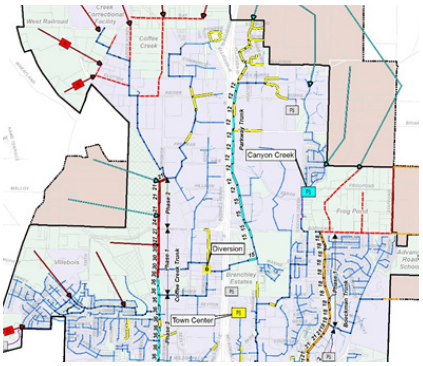
Our teaming partner, Sisul Engineering, is a civil engineering consulting and design firm headquartered in Gladstone, Oregon. Since 1990, Sisul Engineering has been located on Portland Avenue in downtown Gladstone, a block and a half south of City Hall. For more than 20 years, Sisul Engineering has provided engineering design services for projects throughout Gladstone, including the design and management of several infrastructure improvements projects. Local experience and proximity to the City will benefit the City in the preparation of the sanitary sewer system inventory and mapping and system condition assessment for the sanitary sewer master plan.

FCS Group, established in 1988, provides utility rate, financial, economic, and management consulting services to public sector clients inclusive of city and county governments, municipal corporations and ports, special purpose districts, and state agencies. As an independent and objective firm, FCS Group has delivered high-quality, cost-effective consulting services in over 3,000 engagements and served more than 550 clients. Their staff of 25 serves clients throughout the western United States and Canada from locations in Lake Oswego, Oregon, and Redmond, Washington. FCS Group recently performed rate studies for the City of Gladstone water and stormwater systems.

Founded in 1975, ADS Environmental is the largest and longest serving flow services provider in the Country, having assisted thousands of municipalities to provide critical flow and rainfall monitoring data. They maintain a local office in Tukwila, WA. ADS is recognized in the industry as a leader in sanitary sewer evaluation studies, including temporary and permanent sewer flow monitoring, rainfall monitoring, inflow and infiltration analysis, smoke and dye dilution testing, and flow isolation studies.

Project Examples

Listed below are references and project summaries demonstrating MSA's ability to conduct a study of this scope and magnitude. We encourage you to contact any or all of the noted individuals listed in this proposal to confirm our excellent reputation and suitability for the proposed City of Gladstone Sanitary Sewer Master Plan.



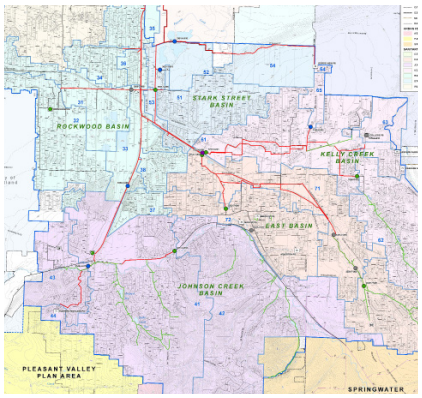
Wastewater Collection System Master Plan Update, City of Wilsonville, OR

Reference: Mike Ward, Civil Engineer | p: 503.570.1546 | ward@ci.wilsonville.or.us | 30000 SW Town Center Loop E, Wilsonville, OR 97070
Initial and final project fee: $142,000 : $173,000
Initial and actual completion date: May 2014 : March 2015

MSA updated the City of Wilsonville's wastewater collection system master plan. Project tasks included a flow monitoring data assessment, condition assessment, criteria development, sewer basin analysis, sewer system I&I analysis, hydraulic modeling to assess system deficiencies, alternatives analysis and concepts development for upgrade of three sewer trunk lines and the City's Memorial Park pump station. The master plan includes evaluation of added flows from Urban Reserve Areas for potential Urban Growth Boundary expansion. MSA worked with the City to prioritize system improvements and develop a Capital Improvement Program. MSA provided support to the City for public involvement and plan adoption.

Similar project elements:

- Master planning
- I&I analysis
- Alternatives analysis
- Public involvement
- Hydraulic modeling



Wastewater Collection System Master Plan, City of Gresham, OR

Reference: Jim Montgomery, PE, Senior Engineer | p: 503.618.2437 | montgomery@ci.gresham.or.us | 1333 NW Eastman Parkway, Gresham, OR
Initial and final project fee: $269,000 : $269,000
Initial and actual completion date: January 2012 : October 2012

MSA prepared a Wastewater Collection System Master Plan for the City of Gresham in 2013. The City serves a population of over 100,000 in east Multnomah County, Oregon. Hydraulic modeling of the existing system and the system at the 10-year, 20-year, and at full build-out conditions, including expanded UGB impacts, was completed using EPASWMM. Work includes the development of updated collection system mapping and development of an updated CIP. In the CIP, pipe sizing upgrades and cost estimates were based on pipe bursting, especially for environmentally sensitive areas. Work also included an I&I analysis. Flow monitoring data was used to identify subbasins with the greatest I&I so as to target reduction efforts. A unique element of the master plan was analysis of the potential to generate electrical power from the large sewage flows. Included in the master plan is an update of the current SDCs.

Similar project elements:

- Hydraulic model analysis
- Capital improvement program
- Growth impacts and development
- Infiltration and inflow reduction
- Master planning

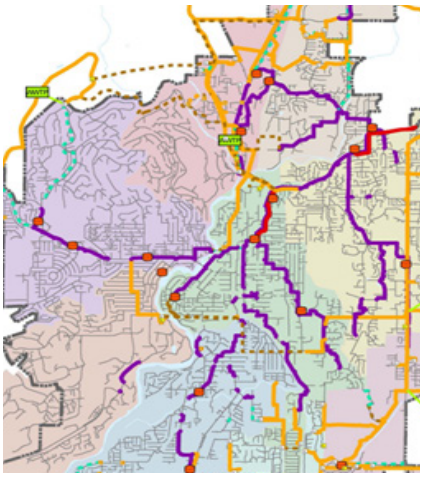
Stormwater and Sewer Collection System Master Plans, City of Pendleton, OR

Reference: Bob Patterson, Public Works Director | p: 541.969.3067 | bob.patterson@ci.pendleton.or.us | 500 SW Dorion Avenue, Pendleton, OR 9780
Initial and final project fee: $320,000 : $350,000
Initial and actual completion date: June 2014 : March 2015

MSA supported the City of Pendleton, with a population of approximately 18,000, in the development of concurrent stormwater, sewer, and water master plans. A GIS database was developed for both the stormwater and collection systems for use in hydraulic models (InfoSWMM was used to analyze both systems). The plan evaluates the ability of the City to convey existing and future loads in all portions of the system through build-out. The project also provides updated design and construction standards for internal and developer reference. Overall system asset management schedules are identified using a 100-year replacement schedule for piping and capital improvement plans to address any existing and future projects.

Similar project elements:

- Alternatives to eliminate system overflows
- Hydraulic modeling
- GIS integration
- Flow monitoring and anecdotal data used to calibrate hydraulic models



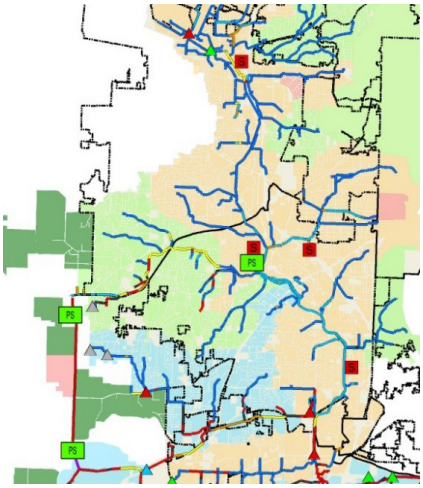
Optimized Sewer Collection System Master Plan Update and Alternatives Analysis, City of Bend, OR

Reference: Tom Hickmann, Engineering and Infrastructure Planning Director | p: 541.317.3029 | thickmann@ci.bend.or.us | PO Box 1458, Bend, OR 97709
Initial and final project fee: $2.6 million : $2.9 million
Initial and actual completion date: October 2014 : December 2014

MSA recently finalized an Optimized Sewer Collection System Master Plan Update for the City of Bend, Oregon. Traditional engineering analysis and modeling methods were used to identify alternatives for system improvement based on project feasibility and system hydraulics. The improvement options considered for the City include new trunk lines, system storage, satellite treatment, parallel pipelines, new pump stations, and existing pump station upsizing or decommissioning. Additionally, the analysis considered system sensitivity to infiltration and inflow and evaluated the long-term rainfall record in Bend. Once all alternatives were identified, the improvement selection and sizing were optimized based on capital and life-cycle costs. A range of hybrid improvement solutions were presented for review and consideration by City staff and community stakeholders. Once an improvement strategy was selected, project phasing was identified for 5-, 10-, and 20-year planning horizons for the $100 million plus CIP. MSA engaged a 17-member public committee throughout the process to ensure community support. The Optimized Sewer Collection System Master Plan Update is an element of a larger sewer-related engineering, planning, financing, and public relations project that will help guide development in Bend for decades.

Similar project elements:

- Sewer collection system modeling and analysis
- Improvement alternatives identification and selection
- Public engagement process
- Analysis of project phasing alternatives
- Master planning
- Flow monitoring
- I&I analysis



*Sewer Collection System Deficiencies Analysis and Alternatives Analysis, Clean Water Services

Reference: Andy Braun, Project Manager | p. 503.681.3615 | brauna@cleanwaterservices.org | PO Box 16993, Hillsboro, OR 97123
Initial and final project fee: $275,000 : $300,000
Initial and actual completion date: March 2013 : September 2013

Shad Roundy performed collection system modeling and planning work for Clean Water Services, a sanitary sewer district serving multiple cities and more than 500,000 people in western Oregon. Shad was the hydraulic modeling lead for the two largest sanitary sewer basins (Rock Creek, Durham). Tasks included flow monitoring data review, model calibration, design storm evaluation, and hydraulic deficiencies analysis for multiple design storm scenarios. The model is setup to incorporate both dry weather flows and system response to infiltration and inflow. The modeling effort provides system deficiencies for existing, 2025, 2035, and build-out conditions. Specific modeling analysis was completed to size storage on the Fanno Creek Interceptor and Metzger Trunk line. Initial analysis was performed to upsize the Fanno Creek Interceptor to minimize deficiencies between growth horizons. Additional analysis was performed to size system improvements to the Summer Creek Trunk line from Cooper Mountain and other development in the urban area reserve. The project included a multi-consultant team for planning across four basins. The innovative design storm evaluation consisted of a modeling system response for 50 of the largest storms occurring over the past 50 years.

MSA team member performed work while with a previous employer

Similar project elements:

- Model development & calibration
- Infiltration and inflow analysis
- Alternatives analysis
- Urban reserve development
- Pump station and gravity interceptor analysis
- Flow monitoring

Section 4

Statement of Understanding

The City of Gladstone (City) provides sanitary sewer service to a population of approximately 12,200 including operation and maintenance of 125,000 feet of gravity piping. The City desires to develop a Sanitary Sewer Master Plan (SSMP) to document system conditions and evaluate system improvements. These improvements will focus on system condition, infiltration and inflow (I&I) reduction, and capacity upgrades for existing and future development within the urban planning area. Additionally, the SSMP will include a Capital Improvement Program (CIP) with cost estimates and improvement priorities. The SSMP project will develop funding strategies to implement capital improvements from utility rates and system development charges (SDCs).

Planning Goals and Objectives

The City of Gladstone has established the following project goals and objectives as outlined in the Request for Proposal (RFP):

Meet pertinent regulatory requirements - The City's SSMP must be completed and developed in compliance with Oregon Administrative Rules (OAR 660-011) including improvement planning to minimize risk of system overflows.

Create usable documents - The City is investing in a SSMP for the first time and this document will provide a clear road map for capital improvement investments and policy decision for many years. Additionally, the SSMP will establish a precedent for future planning documents.

Maintain project schedule and budgetary commitments - The City requires a product that maximizes document quality and usefulness for the available budget. Additionally, the project schedule is critical as some improvements may be time sensitive based on existing system condition and potential risk of overflow.

Capital improvement project development, prioritization, and cost estimates - The City requires an accurate listing of capital projects to improve system condition, performance, and to accommodate future flow projections. Based on discussions with City staff, the CIP will focus heavily on I&I reduction to eliminate localized capacity constraints and minimize downstream impacts. Accurate cost estimates and utility rate and SDC recommendations will provide the basis for funding the capital projects.

Engage internal and external stakeholders - The SSMP will be most effective if coordinated with Clackamas County and the Oak Lodge Sanitary District. By showing a proactive approach to I&I abatement, the City can offset potential user costs and fees associated with system conveyance and treatment. Additionally, public and City Council involvement in the planning process will be accomplished through informational workshops and formal hearings to facilitate plan understanding and adoption.

Value and Service

The MSA team understands the City's desire to have a current, prioritized CIP that can properly guide annual sanitary sewer system budgets and improvement implementation. We also understand the City's stewardship in protecting historic and future capital investments by efficiently and effectively improving system condition and performance, while providing a high level of service to sanitary sewer customers.

The MSA team will meet and exceed the City's goals and objectives by applying our industry-leading experience in master planning and I&I rehabilitation.

"I would like to congratulate you on a job well done. The final product is exactly what I had anticipated and is presented in a very user friendly format. It has been a pleasure working with you and I hope we have the opportunity to work with you in the future. Thanks for all your hard work." **- Michael Whiteley, PE, Senior Water Engineer, City of Gresham**

Industry-Leading Master Planning - We consistently apply the highest level of talent and technology to achieve planning documents that are understandable, readable, and dependable as day-to-day working tools, and valuable communication tools for policy makers and the public. We invest heavily in GIS applications, software, and staff training, and routinely apply integrated GIS tools to develop high-quality plan map products. We also employ the latest modeling software to perform hydraulic and I&I analyses in efficient and time-saving ways that are consistent with current regulations and industry standards. Additionally, we employ a specific local team of modeling and planning experts who perform hydraulic and hydrologic analysis on a full-time basis.

Condition Assessment and I&I Rehabilitation - The City will benefit from our experience in condition assessment and developing I&I rehabilitation programs throughout Oregon. We have provided planning, design, and construction management services on large- and small-scale pipeline rehabilitation programs for the City of Portland Bureau of Environmental Services, City of Springfield, City of St Helens, and City of West Linn. By applying the latest in trenchless technology to pipeline improvements, we can develop cost saving approaches to capital improvement planning. Additionally, we can assist the City to develop a clear and consistent pipe maintenance program to minimize long-term costs.

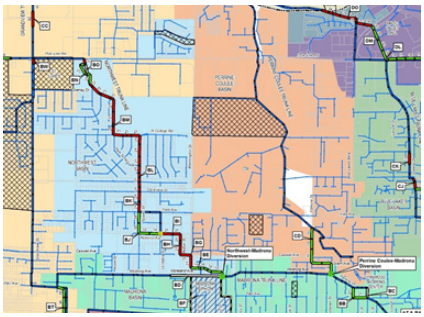
Cost Estimation - The City will benefit from our cost estimating database for capital improvement program development. MSA applies industry-standard cost estimating methodologies that have been used and refined through many of the firm's historical and recent master planning assignments, with testing and validation through construction bid results.

OAR Compliance - MSA has been providing municipal sewer, stormwater, water, and transportation services in Oregon since 1980 and has delivered hundreds of projects requiring compliance with OAR statutes. OAR 660 describes the requirements associated with developing Public Facility Plans (PFP). MSA ensures that all master planning documents that are developed can be used to meet the PFP requirements.

Financial Evaluation - MSA often provides cost-of-service, utility rate, and SDC analysis as an extension of our sewer, stormwater, and water system master planning work. Our team has helped numerous municipalities understand and negotiate a broad spectrum of planning and financial challenges. We will work closely with City staff and policy makers to develop utility rate recommendations that best achieve your capital goals and objectives. As noted, we have included FCS Group as part of our team. They have extensive experience performing this type of work for many northwest utilities including recent work for the City of Gladstone.

Stakeholder Engagement - The City will benefit from our experience in engaging with public stakeholders, including City policy makers. Recently, MSA facilitated public involvement and adoption for the City of Wilsonville sanitary sewer master plan through open houses, planning commission presentations, and City Council presentations. MSA also assisted with public involvement for the City of Bend sanitary sewer master plan, where we engaged a 17-member public committee of varied special interests. Ultimately, the committee made recommendations for plan adoption to the City Council.

MSA-led open house



Wastewater system planning is a major component of our business. We have completed numerous wastewater planning projects that have guided successful long-range Capital Improvements Programs. MSA provides unparalleled modeling experience and capabilities for wastewater system capital and operations planning. MSA has assisted many public clients in identifying cost-effective solutions for I&I rehabilitation.

- Wastewater Collection and Conveyance System Modeling
- Land Use Analysis
- Data Collection and QA/QC
- Flow Characterization and Loading Model
- Model Calibration
- I&I Analysis
- Capacity Analysis
- Future Improvement Identification
- Condition Assessment
- Capital Improvements Program (CIP) Development
- Geographical Information System (GIS) Development
- Rate and SDC Studies
- Improvement Implementation
- Improvement Design

Section 5

Project Approach and Scope of Work

The MSA team brings a unique approach to the City of Gladstone based on our experience throughout the region with both master planning and I&I rehabilitation work. We possess the background, regulatory awareness, and expertise to efficiently develop the SSMP.

Project Approach

MSA will provide top value to the City of Gladstone in accomplishing the City's goals and objectives. We will work cooperatively and collaboratively with City staff to develop planning and analysis criteria, evaluate improvements, and effectively communicate with stakeholders. Additionally, we are committed to delivering a quality product on time and on budget.

Our approach emphasizes:

1. Effective project management and communication
2. Strong technical expertise
3. A local project team for optimum responsiveness
4. Efficient and effective analysis tools to save the City time and money
5. Clear and practical documentation and mapping

The value of our approach as related to key project issues are highlighted below, followed by our scope of work.

Effective Project Management and Technical Expertise

Our project manager, Shad Roundy, PE, is an expert in hydraulic modeling, I&I analysis, and master planning. He has performed similar planning work for utilities throughout Oregon, including recent work for Wilsonville, Albany, Wood Village, Bend, and CWS. Shad manages a team of expert modelers and planners out of the MSA Portland office who are committed to efficient and timely project delivery. Shad's approach to project management includes the following:

- **Project Chartering -** Sets project mission, goals, responsibilities, and expectations, along with establishing a decision-making process.
- **Accessibility and Responsiveness -** Shad will conduct regular meetings with City staff and can be reached by email or cell phone anytime.
- **Detailed Scope of Work -** MSA understands that budget and schedule can be limiting factors, and we will work with the City to ensure that the priority scope items are included.
- **Cost and Schedule Control -** The project will be monitored on a regular basis from a budgetary, schedule, and technical perspective.
- **Workshops -** The MSA approach emphasizes using collaborative on-site workshops with City staff, both technical and managerial, throughout the project as noted in the schedule.
- **Communication -** Failure to effectively communicate is the single most common reason why projects fail to meet client expectations. MSA is committed to communication and implementing City feedback into the planning process and documentation.

Key Technologies

MSA will utilize industry standard tools and leading-edge technology to effectively develop the capital improvement program and master plan document. The applicable data and tools are listed below.

- **GIS -** The MSA team members are experts at GIS/CAD development and integration. They will utilize City and GIS/

Work Plan Summary

Task 1 – Project Management
- Kick-off Meeting
- Progress Meetings

Task 2 – Data Collection
- GIS/CAD Data Review
- Document Review
- Flow Monitoring Plan/Flow Monitoring
- Smoke/Dye Testing Plan/Field Work

Task 3 – Study Area Characterization
- Study Area Documentation
- Base Mapping
- Existing System Description
- Planning Criteria
- Regulatory Requirements

Task 4 – Population & Flow Projections
- Population Forecast
- Existing Flow Characterization
- Future Flow Characterization

Task 5 – I&I Analysis & Condition Assessment
- Existing Condition Documentation
- Estimate I&I Contributions
- I&I Rehabilitation & Maintenance Documentation

Task 6 – Sanitary Sewer Capacity Analysis
- Model Recommendations
- Develop Network Model
- Calibrate Model
- Deficiencies & Improvements Analysis

Task 7 – Capital Improvement Program
- Cost Estimation
- CIP Development
- CIP Documentation

Task 8 – Rate & SDC Study
- Funding Structure Review
- Rate & SDC Study & Documentation

Task 9 – Plan Documentation, Review, & Stakeholder Engagement
- Early Stakeholder Engagement
- Draft Documentation
- Documentation Review (City and Others)
- Public & City Council Hearings
- Finalize Documentation

CAD data as the primary tool for system mapping and modeling. Clear mapping products will be developed for capital improvement review and for the master plan document.

- **Flow Monitoring and Condition Assessment -** MSA will work with ADS Environmental and City staff to collect flow monitoring data to identify I&I in localized basins. The key time period for flow monitoring is during the winter months to identify the maximum contributions of I&I to the system. ADS Environmental can also provide smoke testing and dye testing for localized condition assessment. Additional condition data based on historical investigations will be provided by Sisul Engineering and City staff interviews.

- **Design Storm -** MSA team members have performed design storm and sanitary sewer overflow risk analysis based on historical precipitation frequency as well as hydraulic capacity constraints for utilities throughout Oregon. We can provide recommendations on design storm selection to satisfy Oregon, Department of Environmental Quality standards to limit sewer system overflows. The selected design storm will be applied to the system to evaluate peak flow conditions and assess overflow risks for pre- and post-I&I abatement.

- **Infiltration and Inflow (I&I) Analysis -** MSA frequently utilizes EPASSOAP, developed by the EPA for I&I analysis. This program allows for the integration of condition assessment data, flow monitoring data, and wet weather flow extrapolation to evaluate effectiveness of system improvements for I&I abatement.

- **Hydraulic Model -** MSA will provide guidelines on model selection and development. We can assist the City in understanding the advantages of system modeling for I&I analysis and evaluating hydraulic capacity including system storage and surcharging. We will develop a trunk system model for use as a tool in evaluating risk of overflow. The hydraulic model is a key tool used to predict system flows during the design storm for pre- and post-I&I abatement. Additionally, the model can be used to size potential pipeline or pump station improvements.

City Involvement

It is anticipated that City staff will play a key role in the development of the sanitary sewer master plan work. Involvement will include the following:

1. Assisting with data collection

2. Participating in project meetings and interviews related to system facilities inventory and condition assessment
3. Providing input and feedback as improvements are developed, analyzed, screened, and selected
4. Reviewing and commenting on master planning documentation when submitted for review
5. Assisting in preparation and presentation strategies for stakeholder, public, and City Council presentations

Scope of Work

MSA's proposed scope of work is presented below:

Task 1 - Project Management

Effective project management will be provided to see that all of the City's project goals and expectations are met and exceeded with respect to budgets, schedule and final work products. This task includes a kick-off meeting, progress meetings at key intervals, monthly progress reports and billings, sub-consultant coordination, and quality assurance/quality control review.

Key staff: Shad Roundy, Mike Carr

Task 2 - Data Collection

Relevant data will be collected and compiled for the sanitary sewer system study area for use in subsequent tasks. MSA will work with City staff and subconsultants to compile data for the SSMP including the following:

A. Review system GIS/CAD data and collect additional field data for missing pipeline sizes or manhole rim/invert elevations.
B. Review planning documentation (Intergovernmental Agreements, Tri-City Facility Plan, etc.)
C. Review historic pump station and diversion flow and level data
D. Development of a flow monitoring plan and perform flow monitor data collection
E. Review historical condition assessment data and interview City staff
F. Develop a smoke/dye testing plan and perform condition data collection
G. Review sewer system maintenance reports, operation and maintenance reports, and inspection records

Key staff: Shad Roundy, Sven MacAller, Jason Leman, Patrick Sisul (Sisul), Mike Pena (ADS)
Key deliverables: Flow Monitoring Plan, Smoke/Dye Testing Plan

Task 3 – Study Area Characterization

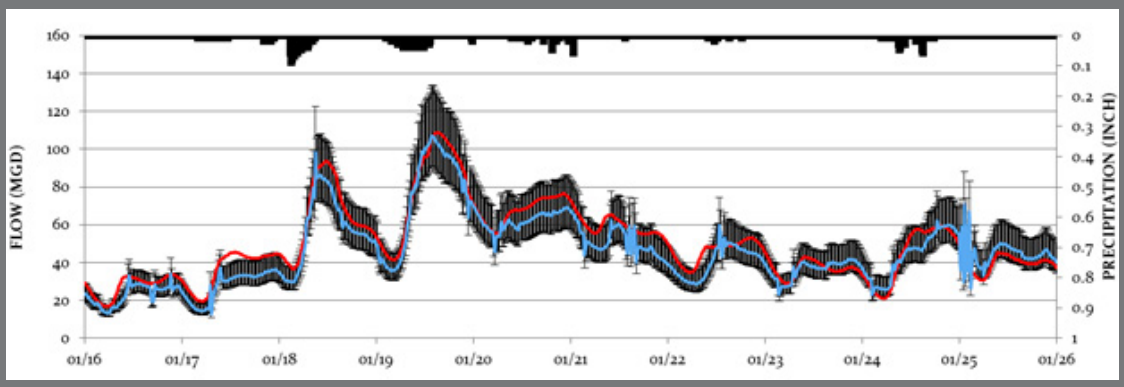
Work under this task includes completing a comprehensive system inventory and a discussion of the existing system. Sanitary sewer basins will be defined and characterized within the study area. Also under this task, general planning criteria and regulations will be evaluated and described. Key components of the task include:

A. Study area documentation, including characteristics related to community background, socioeconomic conditions, population, geography, and land use
B. Base mapping development including sewer infrastructure, topography, tax lots, land use, zoning and sewer basins
C. System inventory and existing sanitary sewer infrastructure description based on the available GIS data, field visits, and staff interviews
D. Planning criteria documentation including design storm, allowable depth of flow in the pipe during peak dry conditions, and allowable surcharging during peak wet weather conditions
E. Regulatory documentation based on federal, state, and local rules, regulations, and agreements related to the sanitary sewer system

Key staff: Shad Roundy, Sven MacAller, Nick McMurtrey, Mike Carr
Key deliverables: Draft plan sections related to study area, existing system description, planning criteria, and regulatory requirements

Task 4 – Population and Flow Projections

This task will focus on documentation of existing and future population and flow projections utilizing flow monitoring data and available land use information. Flow monitoring data will be evaluated using EPASSOAP.



Flow Monitoring and I&I Analysis

A. Population forecasts will be identified for a 20-year planning period
B. Existing dry and wet weather wastewater flows will be characterized based on flow monitoring data. Wet weather flows will be summarized for the largest storm event during the flow monitoring period and extrapolated to the design storm
C. Dry and wet weather wastewater flows will be forecast for the 20-year planning period using unit loading factors and unit hydrograph parameters developed from flow monitoring data and applied to undeveloped areas of the system by land use

Key staff: Shad Roundy, Sven MacAller, Nick McMurtrey, Mike Carr
Key deliverables: Draft plan section related to population and flow projections

Task 5 – Infiltration and Inflow Analysis and Condition Assessment

Work in this task will focus on summarizing condition data collected during task 2, inventorying system condition improvements, and estimating peak wet weather flow reductions associated with I&I abatement. The task will also highlight construction techniques for I&I reduction and maintenance recommendations.

A. Present a technical description and evaluation of the wastewater collection, pumping and conveyance systems based on existing conditions
B. Utilize available historic and recently collected field data to inventory and present system condition improvements in map format
C. Estimate existing and future I&I flow contributions pre- and post-I&I abatement during the design storm event
D. Summarize construction techniques for I&I rehabilitation
E. Summarize maintenance requirements to prevent or reduce I&I contributions

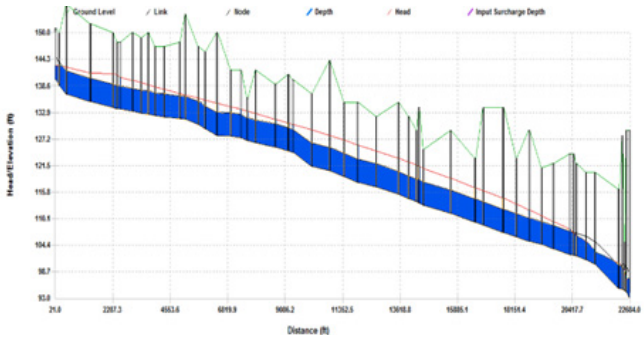
Key staff: Shad Roundy, Sven MacAller, Jason Leman, Mike Carr
Key deliverables: Draft plan section related to condition assessment and I&I analysis

Task 6 - Sanitary Sewer System Capacity Analysis

MSA will provide recommendations on a hydraulic model software platform to evaluate system capacity for existing and future flows. MSA will develop the hydraulic model for the trunk system and evaluate system capacity for existing and future flow projections.

A. Develop collection system model to include trunk piping from the City's GIS. Critical data required to evaluate pipe capacity include diameter, length, rim elevation and invert elevation.
B. Calibrate the model to validate existing flows during a dry weather period and during the largest storm event available for the flow monitoring period
C. Utilize the hydraulic model to identify capacity issues during existing and future peak dry and wet weather flows based on the planning criteria
D. Evaluate system improvements to accommodate existing and future flow projections including pre- and post-I&I abatement considerations

Key staff: Shad Roundy, Sven MacAller, Mike Carr
Key deliverables: Draft plan section related to sanitary capacity analysis, system deficiency, and improvement mapping



Hydraulic Modeling and Capacity Analysis

Task 7 – Capital Improvement Program

MSA will work with the City to select the most effective improvements and develop a prioritized Capital Improvement Program (CIP). Selection of improvements will focus on the condition assessment, I&I analysis, capacity analysis, environmental considerations, community impacts, cost effectiveness, alignment with other transportation or water projects, and other City goals.

A. Develop cost estimates for each capital improvement in accordance with the Association for the Advancement of Cost Engineering (AACE) level 5 classification for facility plans including appropriate allowances and contingency factors
B. Conduct an improvement workshop with City staff to review condition and capacity related deficiencies and capital improvements
C. Based on City review and input, prioritize improvements for CIP list
D. Document an implementation plan describing key project drivers, regulatory dates or other critical dates when specific improvements may be required

Key staff: Shad Roundy, Nick McMurtrey, Mike Carr
Key deliverables: Draft CIP documentation, list, and mapping

Table 7-1 Capital Improvement Program, Existing System Capacity Upgrades for Future Development

Project ID No.	Project Information: Name	Project Information: Type	Project Information: Description[4]	Project Information: Project Limits	Estimated Cost[1, 2]	Prioritization Category	Time Frame[3]	Driver	Percent Related to Growth[5]
CIP-01	Boberg Diversion Structure[6]	Diversion Structure - Replacement	Replace Diversion Structure	Boberg Rd	$70,000	UGB	0-5 Years	Condition and capacity (upstream development); overflow operation not fully functional	64%
CIP-02	Memorial Drive Flow Splitter Structure[6]	Flow Splitter Structure - Replacement	Replace Diversion Structure	I-5 Downstream of Memorial Park Pump Station	$100,000	UGB	0-5 Years	Condition and capacity (upstream development); maximize capacity of dual pipe system	83%
CIP-03	Coffee Creek Interceptor Railroad Undercrossing	Undercrossing	160 LF 21"Ø, Railroad Undercrossing	Under P&W Railroad	$190,000	UGB	0-5 Years	The existing undercrossing has capacity to serve Coffee Creek development and approximately 13% of Basalt Creek, West Railroad, and SW Tualatin development prior to improvement.	66%
CIP-04	Coffee Creek Interceptor Phase 1	Gravity - Pipe Upsizing	1030 LF 27"Ø; 610 LF 30"Ø; 1,020 LF 36"Ø	From Boeckman Road to Barbur Street	$2,600,000	UGB	0-5 Years	Kinsman Road Construction Project. The existing interceptor has capacity to serve Coffee Creek development. Improvements are required for development of Basalt Creek, West Railroad, and SW Tualatin.	61%
CIP-05	Seely Ditch Undercrossing[6]	Undercrossing	200 LF 15"Ø, modify slope and connection to downstream interceptor to minimize backwater	Ditch crossing near Industrial Way and Orepac Avenue	$140,000	UGB	0-5 Years	Backwater from downstream interceptor, stagnant conditions	60%
CIP-06	Memorial Park Pump Station[6]	Pump Station + Force Main - Upsizing & Relocation	1,220 LF 16"Ø FM; Pump station relocation/expansion to 3,800 gpm	Pump Station relocation within Memorial Park, Force main from pump station to Rogue Ln	$5,130,000	UGB	6-10 Years	Flood plain impacts, Frog Pond & Advance Rd School development. Existing pump station can serve Advanced Road School and approximately 40% of Frog Pond development prior to improvement. Existing force main has capacity to serve Advanced Road School, Frog Pond, and Advanced Road URA prior to improvement.	86%
CIP-07	Coffee Creek Interceptor Phase 2	Gravity - Pipe Upsizing	2,000 LF 21"Ø	From P&W Railroad to Boeckman Road	$1,700,000	UGB	6-10 Years	The existing interceptor has capacity to serve Coffee Creek development and approximately 25% of Basalt Creek, West Railroad, and SW Tualatin development prior to improvement.	66%

Capital Improvement Program with Cost Estimates

Task 8 – Rate and SDC Study

FCS Group will utilize the CIP developed in Task 7 to develop a rate and SDC study. Prospective work includes:

A. Funding structure review and summary of existing funding mechanisms encompassing operations and maintenance (O&M) and capital improvements

B. Work with City staff to identify, analyze, and agree on key policy issues such as SDC objectives and rate structure options

C. Perform the rate and SDC studies for the wastewater utility, including projection of utility revenue needs and development of rate alternatives

Key staff: FCS Group

Key deliverables: Draft rate and SDC study documentation

Task 9 – Plan Documentation, Review, and Stakeholder Engagement

Under this task, MSA will develop draft and final documentation for City review. Additionally, MSA will assist the City with stakeholder engagement, workshops, public hearings, and presentations to the City Council.

A. Identify and meet early in the master planning process with stakeholders/regulators, such as Clackamas County and the Oak Lodge Sanitary District

B. Develop draft Sanitary Sewer Master Plan from draft sections in previous tasks, including the following sections:

   a. Executive Summary
   b. Introduction
   c. Study Area Characteristics
   d. Existing System Description
   e. Criteria and Regulatory Requirements
   f. Population and Flow Projections
   g. Condition Assessment and I&I Analysis
   h. Capacity Analysis
   i. Capital Improvement Program
   j. Financial Analysis
   k. Appendices

C. Offer draft plan to Clackamas County and the Oak Lodge Sanitary District for comment

D. Incorporate City and other review comments

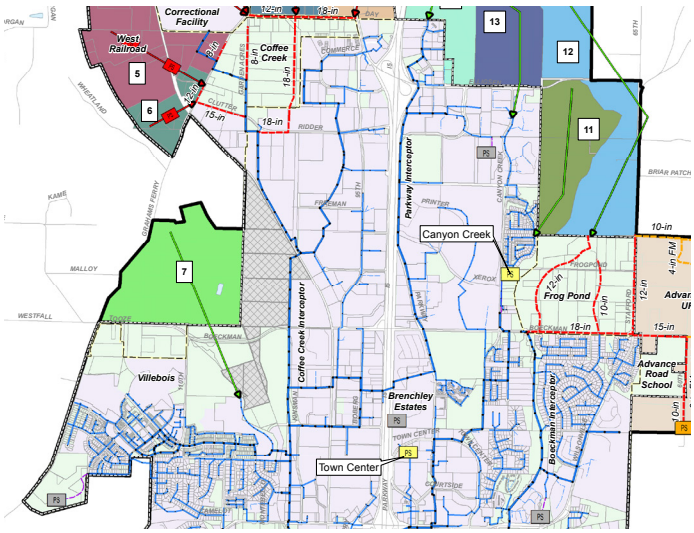
E. Participate in public hearing(s) as requested by City staff

F. Participate in City Council adoption meetings as requested by City staff

G. Finalize master plan documentation and provide electronic and hard copies

Key staff: Shad Roundy, Nick McMurtrey, Mike Carr

Key deliverables: Draft and final master plan



Master Plan Mapping

Section 6

Quality Assurance and Control Measures

MSA has adopted a robust quality assurance/quality control (QA/QC) program. As part of this process, we assign experienced project managers and senior staff to each project to see that the work is completed on time and that all deliverables meet our client's requirements. Shad Roundy, our project manager, and Mike Carr, principal-in-charge, are assigned as QA/QC reviewers. Shad will provide review throughout the project duration and integrate with staff during each project task. Mike will provide review for key deliverables and participate in key project milestones. MSA's QA/QC program strives to obtain input from City staff to utilize key knowledge and integrate City goals into the master planning process.

Principal Involvement – MSA achieves high quality through involvement of experienced principals in all of the firm's projects. As a principal and vested owner in the firm, Mike Carr will provide senior review for this assignment, to see that the City's project objectives are met.

Team Integration – MSA reviews all work submitted by specialty subconsultants prior to integration into project deliverables. We know that our reputation and the quality of our final work products are directly dependent on the caliber of services we receive from our partners and we work with them to receive top quality work.

Project Kick-off and QA/QC Plan – Every project starts out with an internal project kick-off meeting to ensure all team members, including subconsultants, understand the performance and quality requirements. An internal Project Work Plan (PWP) and QA/QC plan are developed just prior to this meeting and refinements from the meeting are incorporated into the working PWP. The QA/QC plan clearly lays out when reviews will occur, by whom, and includes time within the schedule to accomplish the reviews.

Day-to-day – Project performance and progress monitoring are conducted by MSA's project manager and assistant project managers. This is their key role. These individuals bring in technical advisors and other firm principals as needed for quality assurance advice and guidance as particular issues may warrant.

Weekly Internal Check-ins – Weekly internal check-ins between the project manager and project staff are conducted to see that projects are being executed to the highest quality level and are on track. These check-ins are particularly focused on innovative solutions, constructability, sustainability, and simplicity. These meetings also help to keep the project moving in the right direction and at the right pace.

Project Deliverables – Careful review is conducted on all project deliverables in conformance with the QA/QC plan by the project manager and principal-in-charge. At the project manager's discretion, other senior level engineers with extensive experience with the type of project may be brought into the deliverable review process.

Client Review Comments – A key working tool in MSA's QA/QC program is the use of a "Comment-Response Log." In this log we list all comments received, when they were received, assign a responsible staff person, and provide a response and completion date for when each comment was addressed. The log can be provided to the City at each major milestone or as requested to show how our team has managed the comments.

Plan Quality Approach – To maintain quality products, each project is developed with respect to the most recent similar projects that the firm has completed, as well as other known recent projects by the client or others in the region. This allows us to incorporate important industry advancements and other creative ideas on behalf of the City which are incorporated into the master plan.

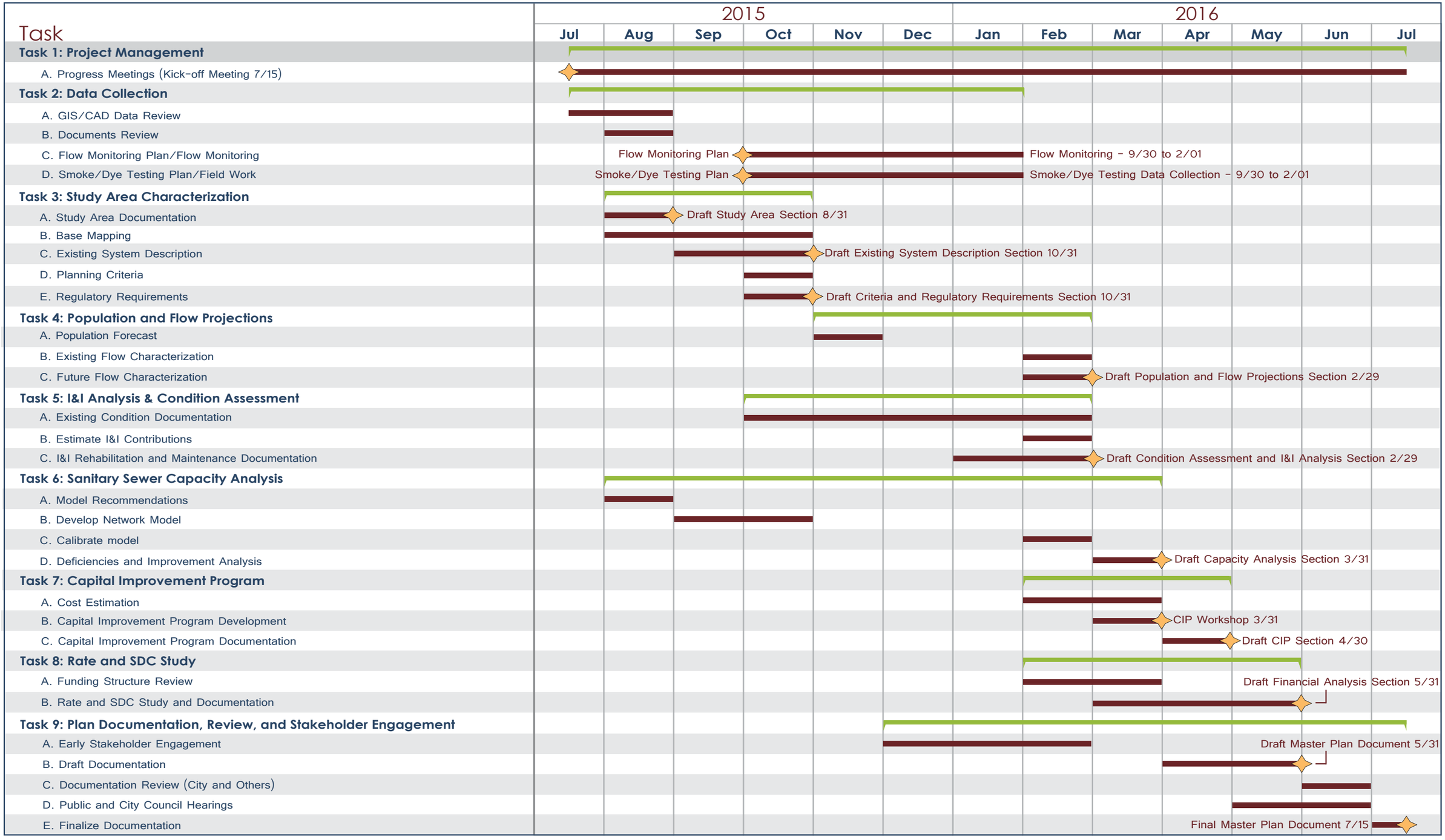
Checklists – MSA uses a variety of technical and standardized checklists to aid planners, modelers, and reviewers in the efficient production and review of documentation, technical memoranda, and other deliverables.

Project Schedule

We have assembled a local project team with staff availability to meet the needs of the City and will dedicate this staff for the duration of the project. A proposed project schedule illustrating key milestones and task durations is presented on the following page. The schedule is primarily controlled by flow monitoring data collection during the fall and winter months of 2015 and 2016.

Section 7

Schedule



Section 8

Resumes

Project Manager

Shad Roundy, PE

Shad specializes in hydraulic modeling, I&I analysis, master planning, and GIS. His modeling and planning experience includes wastewater collection, water quality, storm water, irrigation, water distribution, computational fluid dynamics, and transient analysis projects in Oregon, Washington, Idaho, and Montana, as well as international assignments.

Position/Title

Civil Engineer

Years of Experience

13

Education

MS, Civil and Environmental Engineering, Brigham Young University

BS, Civil and Environmental Engineering, Brigham Young University

Registration

Civil Engineer – State of Oregon (81510) & Idaho (12774)

Key Expertise

- Hydraulic & Operational Analysis of Wastewater Systems
- I&I Analysis
- Flow Monitoring
- Master Planning
- GIS applications
- Hydrologic and Hydraulic Modeling
- Transient Analysis

Key Project Experience:

Sewer Collection System Modeling, Clean Water Services, OR; *Hydraulic Engineering Task Lead.* Shad has performed collection system hydraulic modeling in the Rock Creek, Durham, and Hillsboro basins over the past three years. Tasks in the Rock Creek and Durham basins included flow monitoring data review, model calibration, design storm evaluation, future loading extrapolation, and hydraulic analysis of system deficiencies. The models are setup to incorporate both dry weather flows and system response to infiltration and inflow. The modeling effort provides system deficiencies for existing, 2025, 2035, and build-out conditions. Specific modeling analysis was completed to size storage on the Fanno Creek Interceptor and Metzger Trunk line. Initial analysis was performed to upsize the Fanno Creek Interceptor to minimize deficiencies between growth horizons. Additional analysis was performed to size system improvements to the Summer Creek Trunk line from Cooper Mountain and other development in the urban area reserve. He performed additional improvement and I&I analysis in the Hillsboro basin.

Sewer Collection System Modeling, Master Planning, and Optimization, City of Bend, OR; *Hydraulic Engineering Task Lead.* Shad has been involved in performing collection system modeling and master planning for the City of Bend over the past seven years. Project tasks included a storm frequency analysis, network review, flow monitoring recommendations, model calibration, hydraulic analysis of system deficiencies and improvements, capital improvement analysis and planning, system optimization, and technical support for City staff. Shad used the City's hydraulic model to size the Southeast Interceptor Trunk line during all design phases. The recent optimization effort includes integration with Optimatics software and staff to consider thousands of unique combinations of improvements and develop a system-wide least cost solution based on life-cycle costs including pipe condition data. The improvement options considered for the optimization include new trunk lines, system storage, satellite treatment, parallel pipelines, and pump station upsizing or decommissioning. The project also included sensitivity to infiltration and inflow from high to mid-range values and phasing of recommended improvements for 5-year, 10-year, and 20-year growth horizons.

Collection System Master Plan Update, City of Wilsonville, OR; *Task Lead.* Shad led the hydraulic analysis and capital improvement program development for the master plan update. Additionally, he provided direction and review for the full master plan and presented the capital improvement program at City and public meetings. Project tasks included model development, model calibration, flow projections, alternatives analysis, cost estimation, and basin planning.

Sewer Collection System Model and Capital Improvement Program, City of Albany, OR; *Hydraulic Engineering Task Lead.* Shad lead the modeling and capital improvement program development. He converted and updated the collection system hydraulic model. Other tasks included flow monitoring recommendations, model calibration, hydraulic analysis of system deficiencies and improvements, and capital improvement analysis. The modeling and planning effort provides system improvements and costs for both conveyance and pumping capacity.

Wastewater Master Plan Update, City of Wood Village, OR; *Project Manager.* Performed project management activities to coordinate with client. Managed tasks and provided technical review. MSA is in the process of updating the City's wastewater master plan and capital improvement program. The project includes development of GIS and hydraulic modeling tools to evaluate system capacity. The master plan also includes analysis of shared infrastructure between Wood Village and Fairview.

Sewer Collection System Evaluation; City of Calgary, Alberta; *Hydraulic Engineering Task Lead.* Shad developed modeling design criteria for the City of Calgary sanitary sewer system. Tasks included gravity pipeline design criteria analysis and recommendations, design storm analysis, infiltration and inflow analysis, modeling coordination, and benefit-cost analysis. Design storm evaluations considered varied frequency events for the Huff and Chicago distributions. A specific GIS and spreadsheet model were developed to analyze many alternatives and define parameter sensitivity and cost/risk associated with level of service.

Infiltration and Inflow Study; Metropolitan Wastewater Management Commission, OR; *Hydraulic Engineering Task Lead.* Evaluated flow monitoring data to determine relative contribution of infiltration and inflow from Eugene and Springfield, Oregon. Utilized EPA SSOAP software to evaluate unit hydrographs for multiple storm events. Applied five-year design storms to sub-basins. Developed spreadsheet model for infiltration and inflow reduction scenarios.

Sewer Collection System Hydraulic Model and Capital Improvement Program, Hydraulic and Planning Analysis, City of Twin Falls, ID; *Project Engineer.* Project tasks included development of sewer GIS network and model construction, coordination of flow monitoring program, model calibration for dry weather flows and system response to infiltration and inflow, analysis of existing and 20-year hydraulic deficiencies, analysis of flow diversion scenarios and 20-year build-out improvements, capital improvement cost development, project management, and development review. Also provided alternatives analysis for major collection system conveyance upgrades and pump station evaluations.

Sewer Collection System Model and Master Plan, Al Udeid Air Base; Doha, Qatar; *Project Engineer.* As project lead for the AUAB wastewater master plan, performed field work, developed network model, coordinated flow monitoring, performed hydraulic analysis of system deficiencies and improvements, and developed capital improvement program. Analysis included both conveyance and pumping analysis.

Southeast Interceptor, Hydraulic Analysis and Design; City of Bend, OR; *Project Engineer.* As project engineer for the Southeast Interceptor design, evaluated pipeline slope and depth alternatives, phasing alternatives, and pipeline hydraulics utilizing City hydraulic model.

Murphy Road Pump Station, Hydraulic Analysis and Design; City of Bend, OR; *Project Engineer.* As project engineer for the Murphy Road Interim Pump Station design, evaluated pump station alternatives using the City's hydraulic model, evaluated pump curves and system curves, selected appropriate pump model, and assisted with design of the pump station.

Sewer Collection System Hydraulic Model Conversion, Hydraulic Model; City of Meridian, ID; *Project Engineer.* Converted the model from HYDRA to EPASWMM 5.0. Also analyzed historic precipitation data and provided recommendations for a wet weather flow monitoring plan. Reviewed flow monitoring data for accuracy. After the model conversion, trained City staff to use the EPASWMM 5.0 model and interface.

Principal-in-Charge

Mike Carr, PE

Mike, a key MSA principal engineer, has over 21 years of experience in a wide range of municipal wastewater, stormwater, water, and transportation projects. He has completed numerous wastewater system master planning projects throughout Oregon. As one of MSA's wastewater pumping experts, Mike has also led numerous pump station rehabilitation and design projects. Mike's experience and history with the City of Gladstone will allow him to provide valuable review of the sanitary sewer master plan.

Position/Title

Principal Engineer

Years of Experience

21

Education

BS, Civil Engineering, San Jose State University

Registration

Civil Engineer – States of Washington (49064), Oregon (58379), Idaho (15213), & California (81656)

Professional Activities

- American Public Works Association
- Pacific Northwest Clean Water Association
- Water Environmental Federation

Key Expertise

- Stormwater Master Planning and Analysis
- Sanitary Sewer Planning and Analysis
- Wastewater System Design
- Water Quality Facilities Design
- LID Applications
- Permits & Land Use Approvals
- Grants & Loans Programs

Key Project Experience

Sanitary Sewer Collection System Master Plan Update, City of Wilsonville, OR; *Project Manager.* Mike serves as project manager for the City of Wilsonville wastewater collection system master plan update. Additionally, Mike performed a key role in assessing three of the City's existing sewage pump stations and providing recommendations for rehabilitation or replacement of those facilities. The work included condition assessments, basin analysis, design flow development, capacity analysis, and siting alternatives analysis.

Wastewater Facility Plan and Plan Amendment, City of Dundee, OR; *Project Engineer.* Mike served as project engineer for the City of Dundee's Wastewater Facility Plan and Plan Amendment. Large vacant tracts of land within Dundee's Urban Growth Boundary are being planned for residential development that will more than double the City's population. The goal of this facility planning was to develop strategies for accommodating growth without adversely impacting the current City residents. The comprehensive plan included an evaluation of the existing wastewater collection system and its pumping, treatment and disposal components. An I&I study was conducted, and an I&I correction program was included in the Capital Improvement Plan (CIP). The project also included the development of computerized hydraulic modeling of the collection system. In addition, wastewater treatment and disposal alternatives and environmental impacts were analyzed. Rate and SDC impacts and funding strategies were developed and assessed. MSA prepared a recommended CIP and implementation program and also played a key role in providing a public education and participation program. Sequential Batch Reactor (SBR) treatment technology was recommended with summer time effluent disposal via water reuse irrigation and winter time discharge to the Willamette River.

Sanitary Sewer Comprehensive Plan, City of Sherwood, OR; *Project Engineer.* Mike was project engineer for the Sanitary System Master Plan in 2007 for the City of Sherwood to evaluate the City's sanitary sewer system relative to current and future development growth. A comprehensive facilities plan map of the City's wastewater collection system was developed, showing both existing and proposed wastewater facilities, including the City's recent UGB expansion areas. A hydraulic model of the collection system was created using HYDRA flow analysis software to analyze current and future capacities and identify potential restrictions. Recommended wastewater collection system facilities improvements were developed to correct existing deficiencies and provide required system capacity at ultimate build-out. A proposed CIP for the recommended improvements was developed.

Wastewater Facilities Plan and Wastewater Treatment Plant Improvements Predesign, Parkdale Sanitary District, OR; *Project Manager/Project Engineer.* MSA has served the Parkdale Sanitary District as their District Engineer for over 10 years. In 2003, the District and DEQ entered into a Mutual Agreement and Order (MAO) to address compliance of a 40-year old treatment facility with new total maximum daily loads (TMDL) for temperature and chlorine toxicity for the Western Hood River Subbasin. MSA completed a Facility Plan to address compliance issues associated with the MAO and evaluate the needs of the District's collection and treatment systems. Alternatives to comply with the TMDL for temperature included an alternate outfall location, treatment options and reuse opportunities. Through a collaborative process with the District and DEQ, MSA developed a Facility Plan that will satisfy the conditions of the MAO and upgrade the District's facilities to accommodate the next 20 years of service. MSA also assisted the District in the negotiation and renewal of their NPDES permit and applications for grant/load funding through DEQ's Clean Water State Revolving Fund and United States Department of Agriculture's Rural Utilities Services Programs. Preliminary Design considered ultraviolet disinfection as an option for disinfection. Mechanical chilling is being considered to reduce effluent temperature. Credit for planting trees along Trout Creek is being negotiated with DEQ as an alternative.

Stormwater Master Plan, City of Sherwood, OR; *Assistant Project Manager.* Mike served as MSA's assistant project manager for the preparation of a comprehensive stormwater master plan update for the City of Sherwood. The master plan was completed in coordination with CWS and the governing, watershed-based NPDES permit held by CWS. Planning work included assessment of stormwater quantity and quality issues, review and application of City and CWS design/construction standards, and review of current funding capabilities. The work utilized recent City and CWS GIS mapping to develop a model of the existing and proposed stormwater conveyance system using PCSWMM hydrologic/hydraulic analysis software. A detailed study of stormwater rates and system development charges was also conducted as part of this project. As a follow-up to the stormwater master plan, an areas of interest study was also conducted to determine possible stormwater impacts from areas contemplated for future expansion of the City's urban growth boundary.

Sherwood Sewage Pump Station Expansion, Clean Water Services, OR; *Project Engineer.* Mike served as project engineer on the most recent phase of a long-term expansion of the Sherwood Sewage Pump Station. The first phase featured installation of two 215-hp dry pit submersible pumps to replace existing frame-mounted non-clog pumps. The project included upsizing of piping, isolation and check valves, flow meter, surge relief valve, and jib crane. The existing motor control center was refurbished with new soft starter panels. The existing wet well was retrofitted with concrete fillets and channeling to minimize solids deposition and improve transport of grit to the pump suction inlets. Energy efficiency upgrades were also included on the existing lighting and HVAC systems. Additional long-term upgrades to meet the forecasted buildout flow of 11.2 mgd were recommended, which include a second force main, an upsized receiving interceptor sewer, larger pump impellers, and an expanded motor control center.

Wastewater & Stormwater Facilities Analysis, Planning and Design, OR; *Project Engineer.* Mike has also previously assisted in wastewater facilities analysis, planning and design for several communities and special districts throughout Oregon, including Willamina, Monmouth, Amity, Depoe Bay, Joseph, Biggs Service District, Sweet Home, and Sutherlin.

Various Sanitary Sewer Lift Station Projects, City of Oregon City, OR; *Project Manager.* Mike served as project manager for planning, design and construction engineering services for the City of Oregon City for improvements at six of the City's existing sewage lift station sites. The projects include a new duplex submersible pump station at the Amanda Court site in an existing residential neighborhood, including architect-designed control building and landscaping; a new 1,000 gpm triplex pump station with electrical building to replace the existing facility on Pease Road; an evaluation of the Settler's Point Lift Station to determine upgrades required to increase capacity for a proposed 20-acre development; the replacement of an existing buried package pump station at the Hilltop Lift Station site and the installation of a standby generator at the Newell Crest Lift Station site. MSA also assisted the City with obtaining land use, design review and building permits, and conducted neighborhood informational meetings for the Amanda Court and Pease Road projects. Mike is currently leading the design work for upgrades to the Barclay Hills Pump Station.

Cost Estimation and Documentation

Nick McMurtrey, PE

Nick is a civil engineer with 11 years of overseas and domestic experience working with the design and implementation of sustainable engineering projects. He is both a LEED® and EnvisionTM Accredited Professional, placing a strong emphasis on holistic planning strategies to extend the service life of infrastructure. He joined MSA in 2014. Nick's experience is multifaceted and originates from a myriad of projects ranging from master planning to site development. His background provides exposure to wastewater collection systems, stormwater conveyances, water supply systems, highways, multi-modal trails, parks and nature centers, municipal, medical, justice, residential, and commercial construction. By "wearing many hats" Nick is capable of relating on various levels to members of the community, other engineers, system operations and maintenance personnel, and administrators.

Position/Title

Civil Engineer

Years of Experience

11

Education

BS, Civil Engineering, Oregon State University

Registration

Civil Engineer - States of Oregon (72710) & Illinois (062.064041)

Certifications

- U.S. Green Building Council, LEED AP BD+C
- Institute for Sustainable Infrastructure, Envision Sustainability Professional

Professional Activities

- ASCE
- Water for People
- Returned Peace Corps Volunteer (RPCV)

Key Expertise

- Collection System Master Planning
- Low Impact Development
- Erosion Control

Key Project Experience:

Sanitary Sewer Collection System Model and Master Plan, City of Wilsonville, OR; *Project Engineer.* Nick provided the technical writing for the master plan update and assisted with analysis of collection system improvements. This comprehensive modeling and master planning effort started with a complete inventory and assessment of the collection system to understand existing problems and capacity constraints. The City's model was then updated to reflect extensive flow monitoring data and imitate the anticipated wet weather response. Evaluation of applicable design criteria was provided, allowing the City to conservatively plan for future land use scenarios under their jurisdiction. A series of flow loading alternatives was analyzed to assess the sensitivity of the collection system towards future development. This approach allowed the City to understand their risk for exceeding system capacity based on various potential future development scenarios. Several special "areas of interest" were undergoing concept plan development concurrent with preparation of the master plan, which required coordination and involvement with other consultants. The final master plan was then prepared with collaboration from City staff. Several topics were included by City request, such as development of City-specific unit costs, a RDII Reduction Program, and the ratio of growth attributed to each improvement for determination of SDCs. To complete the master planning process, the City was supported throughout the public involvement and City Council adoption process.

Stormwater Master Plan, City of Pendleton, OR; *Project Engineer.* MSA is developing Pendleton's first Stormwater Master Plan concurrently with updates to their water and sewer master plans. By integrating the development process across the three plans, a holistic approach towards capital improvements is realized. This approach allows for greater economy by prioritizing capital improvements for construction of multiple utilities under the scope of one project. Nick provided the technical analysis and writing for the stormwater master plan. Specific tasks included guiding the City through the regulatory requirements associated with their stormwater system. This included the FEMA certification for Provisionally Accredited Levees, and evaluation of the potential MS4 program expansion from the Oregon DEQ. Being the City's first stormwater master

plan, a GIS model was created relying upon a comprehensive review of the City's record drawing data and supplemented by interviews with City staff. A new staff member was hired to manage the GIS system, with training provided by the design team to navigate the newly created model. The project will also provide updated design and construction standards for internal City use, as well as for developer reference.

***SW 211th Avenue and Brackenwood Lane Outfall Enhancements, Clean Water Services, OR;** *Project Engineer.* This project required civil engineering, design and construction survey services for outfall enhancements to a 119-acre urbanized drainage basin in unincorporated Washington County. This project was commissioned by Clean Water Services to analyze, survey, design, permit and provide easement descriptions for water quality treatment facilities to retrofit four existing pipe outfalls discharging into a tributary of Beaverton Creek. These outfalls were identified as part of a local Healthy Streams Program, which aims to enhance water quality treatment on existing infrastructure throughout Washington County. Through an extensive alternatives analysis, an open tract of land was excavated, exposing a large existing storm main. The main was removed and replaced with a meandering water quality swale and wetpool. In a rare opportunity for public involvement, the project site was next to an elementary school which now offers an outdoor classroom at the facility to educate students about environmental processes.

***SE Division Street Reconstruction Project, City of Portland Bureau of Environmental Services, OR;** *Project Engineer.* This 30-block modification of SE Division Street was undertaken by the City's Bureaus of Transportation and Environmental Services. The existing street was modified to reduce combined sewer overflows through the construction of numerous green street elements, including urban rain gardens and ADA-compliant curb returns within the right-of-way. The City's collection system model was updated to reflect altered loading conditions as a result of the stormwater disposal from the rain gardens, resulting in a marked decrease in combined sewer overflows. Improvements required street, stormwater, and sewer design, traffic engineering, environmental documentation, right-of-way and easement acquisition, public involvement, utility coordination, and surveying.

***Junction City Prison Floodplain Mitigation, Oregon Department of Corrections (ODOC);** *Project Engineer.* This property was purchased by the ODOC for an 1,150-inmate prison facility and was situated in the flood-prone lowlands of the Willamette Valley, continually subjected to inundation during the winter wet season. Numerous site constraints outside of the project limits contributed to painting a very complex picture for how drainage functioned in a convoluted interwoven system of FEMA delineated floodplain, undersized culverts, drainage ditches and flow impounding embankments. A unique challenge for this project revolved around designing the developed runoff characteristics to mimic the pre-developed condition. Almost a third of the development would incorporate wetland mitigation areas, which would expose groundwater through most of the year. Rainfall runoff from the newly created wetlands would greatly exceed levels from the existing site. These conditions in conjunction with an inline drainage system for 1,000 upstream acres created a unique opportunity to merge environmental mitigation with regional conveyance improvements.

**Indicates projects conducted outside of Murray, Smith and Associates, Inc.*

Flow Monitoring and Condition Assessment Coordination

Jason Leman, PE

Jason is a key MSA engineer with experience in planning, design, and inspection for sewer and water system improvement projects. His extensive understanding of pipeline rehabilitation practices, specifications, and pipeline design throughout Oregon will make him a valuable team member for condition assessment coordination work.

Before joining MSA, Jason worked for the City of Portland Bureau of Environmental Services (BES) as a Construction Technician. His responsibilities included the following:

- Review sewer and stormwater design plans for constructability and feasibility
- Coordinate communication, scheduling, submittals, and construction meetings for sewer replacement projects
- Finalize payments and perform cost analysis during construction in order to track progress and work schedule
- Reference the City of Portland standard construction specifications, detail drawings, and contract documents on a daily basis
- Process bid results for awarding projects

Position/Title

Civil Engineer

Years of Experience

5

Education

BS, Civil Engineering, Gonzaga University

Registration

Civil Engineer - State of Oregon (88712)

Professional Activities

- ASCE
- MSA Training Committee
- MSA Green Team Committee

Key Expertise

- Gravity Sewer Design
- Infiltration & Inflow
- Improvements and System Rehabilitation
- Trenchless Technologies

Key Project Experience:

Sellwood - Moreland: Tasks 2 & 3 – Phase II Sewer Rehabilitation, BES, OR; *Project Engineer.* Project includes the design of approximately 25,000 feet of sanitary sewer piping from 8 to 39 inches in diameter including laterals, new catch basins and inlet leads to combined sanitary and storm piping, approximately 4,600-feet of cured-in-place pipe (CIPP), approximately 1,400 feet of sewer pipe bursting, subsurface utility coordination, and nonconforming sewer research. Jason worked closely with Steven Burger and Claudia Sterling throughout the design of the project.

Kenton: Tasks 2 & 3 – Phase II Sewer Rehabilitation, BES, OR; *Project Engineer.* Project includes design of approximately 7,000 feet of sanitary sewer piping from 8 to 36 inches in diameter including laterals, approximately 1,900 feet of CIPP, approximately 750 feet of sewer pipe bursting, approximately 100 feet of man entry work, subsurface utility coordination, and nonconforming sewer research. Jason worked closely with Ayda Forouzan throughout the design of the project.

Nob Hill Sewer Replacement 2011, BES, OR; *Construction Technician.* This project involved replacement of approximately 10,000 feet of 8- to 21-inch diameter sanitary sewer mainline and 6-inch laterals throughout Northwest and Southwest Portland. A 265-foot section used the trenchless method of pilot tube microtunneling to install 12-inch diameter high density polyethylene beneath streetcar tracks and underground utilities.

SE 18th & SE McLoughlin Blvd. Sewer Replacement, BES, OR; *Construction Technician.* This project included approximately 300 feet of sanitary sewer replacement and upsizing from 8 to 12 inches in diameter by both open trench and pipe-bursting methods. The portion of pipe to be pipe-burst was composed of 200 feet of Vitrified Clay Pipe, Concrete Pipe,

and several linings of CIPP underneath SE McLoughlin Blvd. The pipe burst used a pneumatic hammer, cutting head, and winch for a successful pipe replacement without having to close SE McLoughlin Blvd.

Lents Sanitary Sewer Extension, BES, OR; *Construction Technician.* This project involved installation of approximately 15,000 feet of 6- to 12-inch diameter Polyvinyl Chloride (PVC) pipe for new sewer system extension to connect to 180 properties in a Southeast Portland neighborhood.

Division Street Reconstruction Project, City of Portland Bureau of Transportation and BES, OR; *Staff Engineer.* Project includes design of over a mile of sanitary sewer piping from 8 to 66 inches in diameter including laterals, new catch basins, and inlet leads to combined sanitary and storm piping, approximately 1,000 feet of sewer pipe bursting, subsurface utility coordination, and design coordination with other team members on pavement improvements and new stormwater bioswales.

Foster & Holgate Sewer Replacement, BES, OR; *Construction Technician.* This project involved replacement of approximately 350 feet of existing 36-inch diameter brick sewer with 36-inch diameter reinforced concrete pipe. The location provided challenges as numerous underground utilities both paralleled and crossed over the sewer line, including a 60-inch diameter water main. In order to avoid undermining utilities by excavating in poor soil conditions, jacking and hand-tunneling of a 60-inch diameter casing was used to replace the existing sewer both underneath and parallel to the 60-inch diameter water main.

Sanitary Sewer Rehabilitation Program, City of St. Helens, OR; *Staff Engineer.* This $10M sewer system rehabilitation infiltration and inflow reduction program involves improvements to both sanitary sewer and storm drainage systems. The overall work program includes approximately 75,000 feet of sewer rehabilitation and reconstruction. This work involves CIPP and pipe bursting rehabilitation, as well as open cut construction.

58th Street Sanitary Sewer Bypass, City of Springfield, OR; *Project Engineer.* During recent wet weather events, the City of Springfield experienced severe system surcharges and risks of overflows in the City's Thurston Trunk sewer, a gravity interceptor that serves a significant portion of east Springfield. A solution was found in available capacity in the City's Main Street trunk sewer, which lies parallel to the Thurston Trunk, approximately 5,000 feet to the south. Through preliminary design, MSA established that an 18-inch diameter bypass sewer could provide sufficient relief to remedy the surcharging. Because the amount of available vertical drop between the trunk sewers only allow for minimum slope even through the manholes, potential conflicts with existing utilities needed to be carefully addressed prior to construction.

Jasper Trunk Sewer, City of Springfield, OR; *Project Engineer.* This project consists of approximately 20,000 feet of new gravity trunk sewer ranging from 12 to 27 inches in diameter. The project will provide service to currently unserved areas in the southeast portion of the City and will include additional connecting mains to allow for the abandonment of three existing sewage pump stations. Routing challenges along the proposed trunk sewer corridor include an existing roadway and parallel railroad, underground and overhead utilities, wetlands, areas of shallow solid rock, easements and county right-of-way. The project involves hydraulic modeling, highway and railroad permitting, and environmental permitting. MSA is also providing property acquisition services for easements as well as support to the City for a public information program.

Veneta Water Pipeline Project, City of Veneta, OR; *Project Engineer.* MSA was retained to provide design engineering and construction management services for this $10M project. The pipeline will supply the City's existing main ground-level storage reservoir. The pipeline route selected was primarily on ODOT and Lane County roads and was located in environmentally sensitive areas, particularly through the Fern Ridge Wildlife Refuge. Four horizontal directional drilling crossings using fusible PVC pipe were included in the project to cross beneath creeks. The project included extensive permitting and approvals, as well as interior recoating of the City's 2.0 MG ground-level reservoir.

Hydraulic Modeling and I&I Analysis

Sven MacAller, EIT

Sven specializes in hydraulic modeling and GIS. His modeling experience includes wastewater collection, stormwater and drinking water systems. Recently, Sven was involved in sanitary sewer planning work in Bend, Oregon, where he developed a hydraulic analysis tool for evaluating common force mains for multi-pump station operations. Additionally, Sven performed complex modeling of optimized improvement projects. He has performed collection system modeling work for Clean Water Services in Hillsboro, Oregon, evaluating potential improvement sensitivity as a result of I&I reduction. Prior to working for MSA, Sven gained valuable experience while working as a staff engineer for the utility company that serves the city of Copenhagen, Denmark.

Position/Title

Staff Engineer

Years of Experience

2

Education

BS, Environmental Engineering, Colorado State University
MS, Environmental Engineering, Technical University of Denmark

Registration

Engineer-in-Training- State of Colorado

Key Expertise

- Hydraulic Modeling
- Master Planning
- GIS

Key Project Experience:

Optimized Sewer Comprehensive Sewer Plan Update, City of Bend, OR; *Staff Engineer.* MSA recently updated the City's sewer master plan utilizing optimization technology. The optimization effort includes integration with Optimatics software and staff to consider thousands of unique combinations of improvements and develop a system-wide least-cost solution based on life-cycle costs. As a member of the master planning team, Sven provided modeling support, including incorporation of optimization alternatives into existing collection system models, development of scenarios to illustrate future collection system conditions, and evaluation of pipeline alternatives.

Sanitary Sewer Model Refinement, Clean Water Services, OR; *Staff Engineer.* Sven has been involved in collection system modeling for Clean Water Service's Hillsboro Basin. Tasks included updating the model to reflect changes in the collection system, flow monitoring data review, design storm evaluation, and hydraulic deficiencies analysis for multiple design storm scenarios. The model is setup to incorporate both dry weather flows and system response to infiltration and inflow. The modeling effort provides system deficiencies for existing, 2025, 2035, and build-out conditions. Further analysis was completed to size conveyance improvements for several areas of concern.

Tualatin Valley Irrigation District Hydraulic Model, Clean Water Services, OR; *Staff Engineer.* Sven has been part of the MSA team developing a hydraulic model for the Tualatin Valley Irrigation District (TVID) conveyance system. The model will be used to evaluate system capacity and to develop hypothetical water use scenarios. Sven helped develop a GIS database that includes information about the conveyance system including pipe characteristics and turnout locations. This database was also used to develop the hydraulic model that will be used to evaluate various water supply scenarios. Additional tasks include installation of flow monitoring equipment, analysis of flow monitoring data and TVID consumption records, and model calibration.

Stormwater Master Plan, City of Pendleton, OR; *Staff Engineer.* MSA developed water, sewer, and stormwater master plans for the City of Pendleton, Oregon, with a population of approximately 18,000. Sven has worked on the Stormwater component and completed the development of the stormwater GIS database and created a hydraulic model to identify system deficiencies and to evaluate potential improvements. In addition to modeling, Sven completed

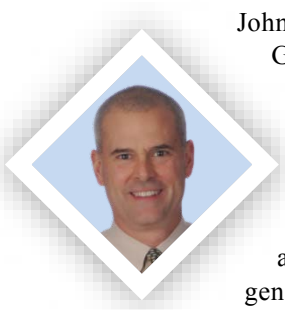
a frequency analysis of 80 years of rainfall data for the City of Pendleton to develop an appropriate design storm to be used in identifying deficiencies and developing system improvements.

***Copenhagen Flood Prevention Plan, Greater Copenhagen Area Utility Company and the City of Copenhagen, Denmark;** *Staff Engineer.* Following severe flooding in Copenhagen in 2011, a flood prevention plan is being developed for the city. The flood prevention plan is also part of the city's comprehensive Climate Change Adaptation Plan and climate change considerations play a large role in the development of flood protection measures. The project is a collaboration between the city of Copenhagen and several surrounding municipalities as well as the Greater Copenhagen Area Utility Company (HOFOR). As a member of the utility company's team, Sven worked on a variety of tasks including field work, preliminary design of conduit and culverts, evaluation of utility conflicts, stormwater modeling, GIS analysis, and helping to facilitate collaboration and communication between the numerous project stakeholders.

**Indicates projects completed for previous employer*

FCS GROUP
Solutions-Oriented Consulting

JOHN GHILARDUCCI
Principal



John Ghilarducci is an FCS GROUP principal and shareholder with 27 years of professional experience including 24 with the firm. His practice focuses on all aspects of utility and general services system development charges (SDCs) and financial rate studies, from technical modeling and public involvement to ordinance drafting and implementation. He has formed stormwater and transportation utilities and has developed water, sewer, stormwater, transportation and parks rates and charges for dozens of clients. John is a recognized technical rate and finance expert and provides litigation support/expert witness testimony throughout the Northwest.

John's innovative rate making approaches have resulted in "level of service" stormwater rates, area-specific SDCs, sewer strength sub-classes, inverted block water rate structures, and defensible stormwater rate credit methodologies. He offers a broad knowledge of public policy and finance, and a thorough understanding of the institutional issues and options underlying the formation of utilities and the design of supporting rate and charge structures.

EXAMPLE PROJECT EXPERIENCE

Oregon

BEND
- Water and Sewer SDC Study
- Sewer Financial Plan Model
- Extra Strength Surcharge Analysis

CENTRAL POINT
- Special Wholesale Water SDC Methodology Review
- Water Rate Study and Revenue Requirement Update
- Water, Stormwater, Transportation and Parks SDC Study and Stormwater Utility Formation

CORNELIUS
- Water, Wastewater and Stormwater Rate and SDC Study and Update

EDUCATION
- M.P.A., Organization and Management, University of Washington
- B.S., Economics, University of Oregon

REGISTRATION
- SEC-registered Municipal Advisor

CAREER SUMMARY
- 27 years (since 1988) professional experience
- Joined FCS GROUP in 1991

EXPERTISE
- System Development Charges (SDCs), General Facilities Charges (GFCs), Capital Facility Charges (CFCs) and Connection Charges
- Water, Sewer, Stormwater, & Transportation Utility Rates
- Stormwater and Transportation Utility Formations
- Transportation Funding
- Comprehensive Plans Financial Elements
- Litigation Support/Expert Witness
- Financial/Feasibility Studies
- Special Cost of Service
- Options Analysis

PROFESSIONAL AFFILIATIONS
- American Water Works Association
- American Public Works Association
- Oregon Municipal Finance Officers Association

COTTAGE GROVE
- Water, Wastewater and Stormwater Rate Study Update
- Utility Rate and SDC Study

CRESWELL
- Water Rate Study Update

EAGLE POINT
- Water, Transportation and Stormwater Rate and SDC Study

FOREST GROVE
- Water Rate and SDC Study and Update

GLADSTONE
- Water Rate Study and Stormwater Utility Formation

GLENEDEN SANITARY DISTRICT
- Sewer SDC Study

GOVERNMENT CAMP SANITARY DISTRICT
- Issues Review

HILLSBORO
- Large Water User SDC Payment Alternatives
- Water Rate and SDC Study

KEIZER
- Stormwater Utility Formation
- Water Rate Study and Update Assistance

LAKE OSWEGO
- Sewer Utility Financial Plan and Rate Review
- Water Cost-of-Service Analysis, SDC Study, Rate Study and Update

LAPINE
- Water and Wastewater Rate and SDC Study

MCMINNVILLE WATER AND LIGHT
- Water SDC Study

MEDFORD
- Sewer, Stormwater and Transportation Rate Design Study

MILWAUKIE
- Wastewater Rate and Water, Wastewater and Stormwater SDC Studies and Update

MOSIER
- Water Rate Study Update and SDC Study

MT. ANGEL
- Sewer Rate and SDC Study
- Stormwater SDC Study

OREGON CITY
- Sewer Rate and SDC Study
- Water Rate Study

RAINIER
- Wastewater Rate Study Update

SCAPPOOSE
- Wastewater Rate Study

SEASIDE
- Water Rate, Wastewater and Parks SDC Studies

SHADY COVE
- Wastewater, Stormwater, Transportation, Parks SDC Studies and Review

SHERWOOD
- Stormwater and Wastewater Rate and SDC Studies
- Water Rate and SDC Study and Financial Chapter

SILVERTON
- Water, Wastewater and Transportation SDC Study and Update

ST HELENS
- Water, Sanitary Sewer, Storm Sewer, Transportation and Parks SDC Studies and Updates

THE DALLES
- Wastewater Rate and SDC Study
- Wastewater Financial Plan

TIGARD
- River Terrace Community Plan
- Infrastructure Financing Services

TUALATIN
- Water Rate and SDC Study with Water Master Plan and Financial Element

VENETA
- Wastewater Rates and SDC Study
- Water Rate and SDC Study and Update

VERNONIA
- Wastewater Rate Study

WARRENTON
- Fort Stevens State Park Wastewater Cost Analysis
- Street, Water, Wastewater, Parks, Storm Drainage SDC Methodology Review and Public Process

Idaho

NAMPA
- Wastewater Rate Study and Funding Options Study

Mike Pina, Project Manager. Mike has over 15 years as a Project Manager for the Pacific Northwest United States, British Columbia and Alberta Canada for ADS Environmental Services. He has overall financial, staffing and project management responsibilities for this area. Mr. Pina is currently Project Manager for multiple Seattle Public Utilities wastewater projects and is Project Manager for 16 additional regional clients' wastewater projects. Mr. Pina also serves as Project Manager for all local flow monitoring projects in the Pacific Northwest. As of July 2014 the temporary flow monitoring locations in the Pacific Northwest and British Columbia region totals 343 monitoring points. These varied and complex projects maintain an impressive > 97% uptime rate while providing data that is critical to clients CSO reduction, modeling, billing and inflow and infiltration reduction efforts.

Patrick A. Sisul, P.E.
Vice President / Project Manager
Sisul Engineering

REGISTRATIONS/CERTIFICATIONS

Registered Professional Engineer, Oregon #16551
Registered Professional Engineer, Washington #29717

EDUCATION

B.S. Civil Engineering, Oregon State University, 1988

AFFILIATIONS

American Society of Civil Engineers, Member Grade

PROFESSIONAL SUMMARY

Pat is a senior project manager at Sisul Engineering with over 25 years of experience on a wide variety of water, stormwater, and sanitary sewer infrastructure projects. Pat's experience includes municipal street and utility improvements, large commercial and industrial site development, single and multi-family development and parks improvements for multiple jurisdictions throughout the Portland metropolitan area. Since 2011, Pat has managed several infrastructure improvement projects for the City of Gladstone, including the Downtown Gladstone Sanitary Sewer Investigations, East Jersey Street Improvements, Barclay and Howell Street Improvements, the 2013 Sanitary Sewer Maintenance, Trenchless Repair Work, Urban Renewal Area, and the 2013 Open Cut Sewer Repair Work. Pat was also heavily involved with gathering field data and mapping of the City of Gladstone Sanitary Sewer Map, the City of Gladstone Storm Drain Map and the City of Gladstone Waterline Map. These projets have included survey and seystem mapping, capacity evaluations, alternatives alalysis, system condition assessment, documentation, and presentation to the Gladstone City Council. Pat also performs stormwater plan reviews on behalf of the City of Gladstone on new site development projects to confirm conformance with the City of Gladstone Stormwater Treatment and Detention Standards.

Recent City of Gladstone Sanitary Sewer Related Projects:

2014 — Review of Sanitary Sewer Upgrades report for proposed Webster Rd. Apartment project
Client: City of Gladstone
The City of Gladstone asked Sisul Engineering to review a sanitary sewer study prepared by an engineering consultant working for a developer of a proposed apartment site on Webster Road. Sisul Engineering reviewed the report, made recommendations and provided a letter to the City of Gladstone Public Works Supervisor summarizing our findings.

2013 - 2014 — Mapping of City of Gladstone Sanitary Sewer System
Client: City of Gladstone
Sisul Engineering re-mapped the City of Gladstone Sanitary Sewer System, inventoried by Sisul Engineering in 2012 – 2013. The map included dividing the City into seprate sewer basins,

labeling pipe material, pipe diameter, manhole depth and node numbers. The map also identified known locations where public catch basins are piped into the sanitary sewer system.

2013 — 2013 Open Cut Sewer Repair Work
Client: City of Gladstone
Sisul Engineering prepared a Request for Quote for maintenance and repairs on the existing sanitary sewer system that were dicovered with the 2012 Video Inpection of the Downtown Sanitary Sewer System. The project included the repair of broken or leaky manholes, replacement of channels in manholes, repair of broken main line pipes, broken laterals, and offset laterals, removal of mortar in main lines and repair of protruding service taps. During construction, Sisul Engineering provided construction administration services.

2013 — 2013 Sanitary Sewer Maintenance, Trenchless Repair Work, Urban Renewal Area
Client: City of Gladstone
Sisul Engineering prepared a Request for Quote for CIPP work on the on the existing sanitary sewer system in downtown Gladstone to repair problems uncovered with the 2012 Video Inpection of the Downtown Sanitary Sewer System. The project included grouting leaking lateral connections to public mains, grouting cracks in the mains, installation of 35 CIPP patch repairs, and installation of a 455 LF CIPP liner in E. Gloucester Street. During construction, Sisul Engineering provided construction administration services.

2013 — System Assessment and Downtown Sanitary Sewer Maintenance Plan
Client: City of Gladstone
Sisul Engineering reviewed video reports, photographs and written logs prepared with copletion of the 2012 Video Inspection of the Downtown Gladstone Sanitary Sewer System in order to prepare a system assessment and a list of needed maintenance repairs. Following preparation of this information, Sisul Engineering reported the findings to the Gladstone City Council. This information was used as the basis for over $150,000 of sanitary sewer system repairs nad improvements in Gladstone in 2013 and 2014.

2012 - 2013 — Surveying and condition assessment of City of Gladstone Sanitary Sewer Manholes
Client: Brown and Caldwell
Beginning in late 2013, and continuing for approximately 18 months, Sisul Engineering undertook a project to locate and tie utility infrastructure throughout Gladstone as a part of the work for the City of Gladstone Water and Stormwater Master Plans. This work included locating, measuring the depth of, and assessing the condition of most sanitary sewer manholes in Gladstone that are not within the Oak Lodge Sanitary District service area. Collection of the information led to the updated Gladstone Sanitary Sewer System Map completed in 2014.

2012 — Video Inspection of Downtown Gladstone Sanitary Sewer System
Client: City of Gladstone
Sisul Engineering worked with the City of Gladstone to prepare a Request for Quote for cleaning and video inspection of approximately 30,000 LF of sanitary sewer mains in Downtown Gladstone between Portland Avenue and Oatfield Road. Sisul Engineering assisted the City with selection of a contractor and assisted City Public Works Staff with administration of the project.

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