



KING COUNTY

1200 King County Courthouse
516 Third Avenue
Seattle, WA 98104

Signature Report

April 13, 2015

Motion 14338

Proposed No. 2015-0103.2

Sponsors Upthegrove

1 A MOTION approving a work plan for utilizing an expert
2 review panel to provide review and recommendations
3 regarding optimization, cost control measures, risk
4 management and risk mitigation for combined sewer
5 overflow control projects and the wastewater conveyance
6 and treatment system in accordance with the 2015/2016
7 Biennial Budget Ordinance, Ordinance 17941, Section 110,
8 Proviso P3; and authorizing the release of \$250,000.

9 WHEREAS, the 2015/2016 Biennial Budget Ordinance, Ordinance 17941,
10 Section 110, Proviso P3, states that \$250,000 of the appropriation for wastewater
11 treatment shall not be expended or encumbered until the King County executive transmits
12 by March 1, 2015, a detailed work plan for utilizing an expert review panel for combined
13 sewer overflow ("CSO") control projects and the wastewater conveyance and treatment
14 system and a motion approving the plan, and

15 WHEREAS, in accordance with the proviso, the wastewater treatment division of
16 the department of natural resources and parks has developed a work plan for utilizing an
17 expert review panel to provide review and recommendations for CSO control projects
18 and the wastewater conveyance and treatment systems;

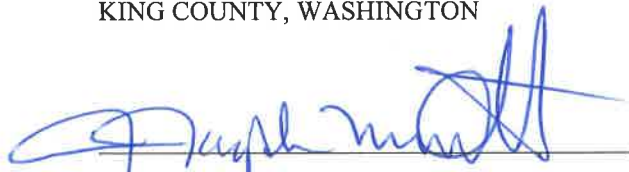
19 NOW, THEREFORE, BE IT MOVED by the Council of King County:

20 The work plan on utilizing an expert review panel, which is Attachment A to this
21 motion, is hereby approved, and the \$250,000 currently held in reserve through
22 Ordinance 17941, Section 110, Proviso P3, is hereby released.
23

Motion 14338 was introduced on 3/16/2015 and passed by the Metropolitan King
County Council on 4/13/2015, by the following vote:

Yes: 7 - Mr. von Reichbauer, Mr. Gossett, Ms. Hague, Ms. Lambert,
Mr. McDermott, Mr. Dembowski and Mr. Upthegrove
No: 0
Excused: 2 - Mr. Phillips and Mr. Dunn

KING COUNTY COUNCIL
KING COUNTY, WASHINGTON



Larry Phillips, Chair

ATTEST:



Anne Noris, Clerk of the Council

Attachments: A. Work Plan per Ordinance 17941, Section 110, Proviso P3

Work Plan per Ordinance 17941, Section 110, Proviso P3

Introduction

This Work Plan responds to 2015/2016 Biennial Budget Ordinance 17941, Section 110, Proviso P3, which states, in part:

Of this appropriation, \$250,000 shall not be expended or encumbered until the executive transmits a detailed work plan for utilizing an expert review panel to provide review and recommendations regarding optimizing, cost control measures, risk management and risk mitigation for combined sewer overflow ("CSO") control projects and the wastewater conveyance and treatment system and a motion approving the plan and the motion is passed by the council.

As directed by the Proviso, an Expert Review Panel of independent, technical experts in the field of CSO management, project design, construction, and implementation is being established to review and make technical recommendations to the King County Executive and Council on:

- Optimization of the design of the Georgetown Wet Weather Treatment Station (a CSO wet weather treatment facility to be constructed between the Brandon Street and South Michigan Street Regulator Stations), related conveyance pipeline, and a new outfall structure to release the treated water into the Lower Duwamish Waterway. Once constructed, the station will treat a peak flow of approximately 66-million gallons per day of combined sewage and stormwater that would otherwise have discharged, untreated, directly to the Duwamish River during storm events.
- The CSO Plan, which provides CSO control project recommendations, cost estimates, and schedule priorities for King County's eleven remaining uncontrolled CSOs, will be updated in 2015-2017. The Expert Review Panel will provide review and make technical recommendations as part of this update process, including identifying options for optimization, cost control, risk management, and risk mitigation. Approaches to optimization will consider redefinition or refinement of CSO basin boundaries to optimize sizing of control facilities, sewer separation, upstream improvements to divert stormwater, and optimization of CSO treatment and facility use. The comments and recommendations of the Expert Review Panel will be considered for incorporation into the design and construction of the Georgetown Wet Weather Station and into the 2018 CSO Plan Update. This update is required under the West Point National Pollutant Discharge Elimination System permit; and the plan update is also governed by a CSO consent decree that the County entered into with the U.S. Environmental Protection Agency and the Washington State Department of Ecology, which was approved and filed by the court on July 3, 2103.

Work Plan

This section outlines the work plan associated with utilizing an Expert Review Panel to provide recommendations regarding optimization, cost control measures, risk management, and risk mitigation for King County's CSO control projects and associated wastewater conveyance and treatment system. The Expert Review Panel will also conduct a technical review of the County's Georgetown Wet Weather Treatment Station and CSO Plan.

MWH Americas, Inc., and its team of subconsultants, has been selected as the Expert Review Panel. The Panel consists of seven experts in the field of CSO control management, project design, construction, and implementation. The names and expertise of individuals on the Expert Review Panel are listed in Table 1 below. The resumes of each panel member are attached to this Work Plan as Exhibit A.

Table 1. Expert Review Panel Members and Expertise

Expert Review Panel Member	Expertise
Mark Graham, PE, PMP	Project Manager
Art Hamid, PE	Wet-Weather Projects
Bill Pisano, Ph.D., PE	Wet-Weather Systems Control
Shannon Conway, PE	CSO Modeling
Jeffrey Schmidt, PE, PMP	Northwest CSO Expert
Adrienne Nemura, PE	GSI & Permitting
Andre Tolme, PE	Cost Estimating & Cost Control

Main elements of the work plan are:

- To provide review and technical recommendations to the County Executive and Council regarding the Georgetown Wet Weather Treatment Station project, including review of the October 10, 2014 Carollo Engineering report** – King County will provide the Expert Review Panel with technical reports pertaining to the facility siting and design, the Carollo Engineering report, and other applicable items related to the Georgetown project. The Expert Review Panel will review these items and provide recommendations on project optimization, cost control measures, risk management, and risk-mitigation measures regarding the project in the second quarter of 2015.
- To provide recommendations on the potential redefinition of CSO basin boundaries to ensure optimization and correct sizing of treatment plants and storage throughout the combined wastewater and stormwater collection system** – When considering combinations of CSO control options during the CSO Plan update process, and prior to detailed alternative analysis, King County will provide the Expert Review Panel with details of the existing CSO basin boundaries. The Expert Review Panel will make recommendations regarding the redefinition of boundaries and/or refinement of the CSO basins that could be combined for a CSO control project. These recommendations are anticipated in the third quarter of 2015 and will be considered for incorporation into the CSO Plan update.

- To provide recommendations on the feasibility of isolating or separating the sanitary sewer system from the existing combined system, where appropriate, and on upstream improvements to divert stormwater flows from the CSO system** – When considering stormwater separation and upstream diversion options during the CSO Plan update process, King County will provide the Expert Review Panel with existing and new technical analyses on isolation or separation of the sanitary sewer system from the combined system. These analyses include potential upstream improvements to divert stormwater flow to the stormwater system, as well as green stormwater infrastructure options. The Expert Review Panel will review these items and provide recommendations, which King County will consider for incorporation into the CSO Plan update, in the fourth quarter of 2016.
- To provide recommendations on the feasibility of optimizing CSO treatment and storage facility use** – When analyzing CSO treatment and storage facility use options during the CSO Plan update process, King County will provide the Expert Review Panel with existing and new documentation and technical analyses on County CSO control options. These items include treatment and storage facility details, information on applicable regulations, and other items related to the potential optimization of CSO facilities. The Expert Review Panel will review these items and provide recommendations on the feasibility of optimizing County CSO treatment and storage facilities, which King County will consider for incorporation into the CSO Plan update, in the first quarter of 2017.
- To provide review and recommendations during the CSO Plan update process to identify options for optimization, cost control, risk management, and risk mitigation, noting which projects would be the highest priority for alternatives analysis** – Throughout the CSO Plan update process, King County will engage with the Expert Review Panel, sharing existing and new technical analyses related to the County's CSO's and the Plan. The Expert Review Panel will review these items and provide recommendations on options for optimization, cost control, risk management, and risk mitigation, which King County will consider for incorporation into the CSO Plan update, in the first quarter of 2017.

In addition to the documentation provided by King County, the Expert Review Panel may consider additional information or documents from other sources outside of King County related to CSO planning, design, construction, and implementation. This information would be applied in the review of King County's Plan. The Expert Review Panel may also visit King County sites or other wastewater facilities to further facilitate their review and recommendations.

Schedule and Deliverables

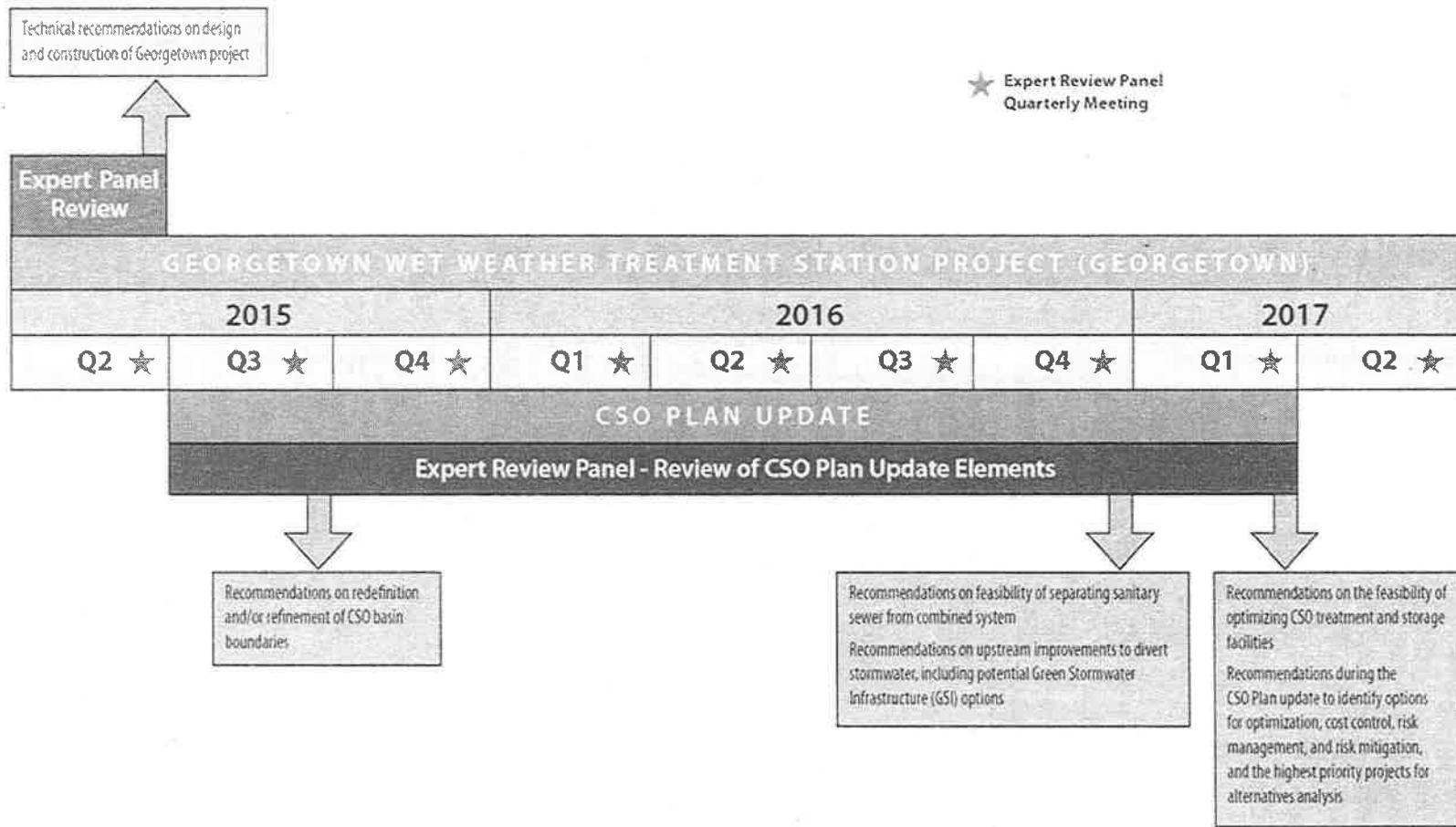
The staff of the King County Wastewater Treatment Division (WTD) of the Department of Natural Resources and Parks will implement this work plan. The Expert Review Panel will begin work in the spring of 2015 following approval of the work plan by Council. The majority of the work will take place during the remainder of 2015, throughout 2016, and conclude in the first quarter of 2017. Briefings and discussions with the County Executive, King County Council, Regional Water Quality Committee, and the Metropolitan Water Pollution Abatement Advisory Committee will occur throughout the expert review process at key deliverable milestones. An overview of the schedule and deliverables is provided in Table 2 and Figure 1 below.

**Table 2. Schedule and Deliverables for the
King County CSO Control Projects Expert Review Panel**

Task	Major Deliverables	Completion Date
Expert Review Panel quarterly meetings	Meeting handouts and notes	Quarterly, through Q2 2017
Expert Review Panel provides technical recommendations on design and construction of the Georgetown Wet Weather Treatment Station project	Written review comments and recommendations	Q2 2015
Expert Review Panel provides recommendations on the potential redefinition or refinement of CSO basin boundaries	Written review comments and recommendations	Q3 2015
Expert Review Panel provides recommendations on the feasibility of isolating or separating the sanitary sewer system from the existing combined system	Written review comments and recommendations	Q4 2016
Expert Review Panel provides recommendations on upstream improvements to divert stormwater	Written review comments and recommendations	Q4 2016
Expert Review Panel provides recommendations on the feasibility of optimizing CSO treatment and storage facilities	Written review comments and recommendations	Q1 2017
Expert Review Panel provides review and recommendations during the CSO Plan update process to identify options for optimization, cost control, risk management, and risk mitigation, noting which projects would be the highest priority for alternatives analysis	Written review comments and recommendations	Q1 2017

Resources and Costs

Section 129, ER2 Expenditure Restriction, of 2015/1016 Biennial Budget Ordinance 17941, directed WTD to expend up to \$1,250,000 to retain and support the work of the Expert Review Panel and conduct the research and analyses to produce the reports required by Section 110, Proviso P3. Some of the analyses performed by the Expert Review Panel include work that is also part of the scope of design for the Georgetown Wet Weather Treatment Station and the update of the CSO Plan. MWH Americas, Inc. has been retained to organize, manage, and coordinate the Expert Review Panel. WTD staff time will include overseeing the consultant and the Expert Review Panel process, as well as participating in meetings, preparing items for panel review, and documentation of review comments and recommendations.



14338

Figure 1. Overall Schedule and Major Deliverables for the King County CSO Control Projects Expert Review Panel



Mark Graham, PE, PMP



Position on Team: Project Manager

Mr. Graham has 22 years of broad water/wastewater industry experience, with specific technical expertise in delivery of large municipal water and wastewater capital projects. He has provided project management, planning, engineering, and construction and operations support for projects throughout Washington, Oregon, and California. He has managed on-call services contracts for King County and other clients, drawing from his technical background to effectively plan, guide and successfully complete projects.

Title

Project Manager

Employment History (2010-2015)

Project Manager, MWH, 19 years

Education

University of Cincinnati, M.S. Environmental Engineering, 1997

Stanford University, B.S. Civil Engineering, 1992

Registrations/ Licenses

Professional Engineer - WA (2005), CA (1998)

Project Management Professional (2012)



Specific Expertise

Managing and Maintaining the Overall Project. Mr. Graham's extensive experience in water and wastewater infrastructure gives him the perspective needed to provide overall leadership for a project, identify potential issues early, and work quickly to resolve challenges.

Managing Budgets and Schedules. Mr. Graham's close attention to detail allows him to keep close track of project budget and schedule status, even on projects with large teams and large numbers of subconsultants.

Timely and Effective Reporting. Mr. Graham works with his clients to develop "dashboard"-style reports that provide the information most important for a particular project in a clear, effective manner. Using MWH's robust internal project tracking and planning tools, these reports include not just project status, but projections based on monthly bottom-up estimates of the effort needed to complete a project.

Ensuring High Quality Timely Work Products. Mr. Graham has developed and implemented Quality Plans for all of his projects. He works closely with technical staff at the start of a project to assure that the most critical elements of a project are emphasized,

Managing Change. Mr. Graham has managed many large, complex projects and knows that the course of this type of project can never be fully predicted at the outset. He understands that effective change management is essential to project success, and knows that early communication of potential changes provides the best opportunity to mitigate or manage changes.

Developing Cooperative Working Relationships. By understanding the overall goals of a project, and appreciating his client's and other stakeholders viewpoints, Mr. Graham develops cooperative working relationships, working creatively to identify solutions to issues which can attract broad support from all parties.

Effective Communication. Mr. Graham has excellent communication skills, honed through presentation of technical and non-technical subjects to a wide variety of audiences. He has taught classes through a university extension, presented at public hearings, given papers at conferences, and led meetings and workshops in a variety of settings. He is particularly adept at presenting complex technical subjects to general audiences.



Relevant Project Experience

Design Review and Project Management Work Order, King County Department of Natural Resources and Parks, WA, 2011 - 2014

Mr. Graham was project manager for this contract which included \$500,000 of work in **thirteen Work Orders**. The contract included an **expert panel review** of King County's floodplain management practices. This review was conducted in close coordination with the DNRP Director's office to provide an **independent assessment** of the County's project scoping and implementation practices.

Madison Valley Long Term Solution, City of Seattle, WA, 2009 - 2013

Mr. Graham served as project manager for the design and engineering services during construction of this project, which resolved long-standing drainage issues in the Madison Valley Neighborhood. The project included **2,500 feet of 48-inch diameter stormwater conveyance pipelines**, a **1.3 million gallon stormwater storage tank** and **700,000 gallons of stormwater storage** in an open basin. The pipeline was installed using largely trenchless construction techniques, and the storage facilities were incorporated into an existing City park. The project required significant coordination with the community and other stakeholders to minimize impacts during construction and maximize enhancements to the park and community following construction.

Grants Pass Water Supply Improvement Project, City of Grants Pass, OR, 2008 - 2011

Mr. Graham **managed the MWH participation in this task order contract**. Task orders included evaluation and preliminary design of flash mixing, flocculation, sedimentation and solids handling improvements to the historic City of Grants Pass WTP. Alternatives evaluated included hydraulic and vertical shaft flocculation, pumped and mechanical flash mixing, and five different sedimentation basin sludge collection technologies. Mr. Graham helped **develop ways to cost-effectively implement improvements to the City's historic water treatment plant**.

Green River Filtration Facility, Tacoma Water, WA, 2009 - ongoing

Mr. Graham is currently project manager for MWH's construction-phase services, after serving as deputy project manager during the planning and design of this 180 mgd WTP. He helped **develop the WTP's innovative hybrid pre-treatment approach** with deep-bed granular media

filters rated at 12 gpm/sf. Mr. Graham actively **managed MWH's sub-consultants and managed schedule and budget for this \$200M fast-track project**. Mr. Graham is now working closely with the Owner and GC/CM to close out construction in early 2015. The project achieved substantial completion on-time, and the final construction cost will be **several million dollars under budget**.

South Fork Water Treatment Plant, City of Nanaimo, BC, 2008 - ongoing

Mr. Graham is project manager for MWH's participation in the planning, design and construction of the City of Nanaimo's 40 MGD South Fork Water Treatment Plant. As a subconsultant to Associated Engineering, Mr. Graham oversaw MWH's performance of pilot testing of DAF, plate settlers, and submerged membranes to assist in the selection of a treatment process. During design, MWH's role included I&C design, all design work associated with the membrane treatment process, and documentation for pre-procurement of the membrane treatment equipment. Mr. Graham has continued to **provide overall coordination and technical guidance** as this project moved into construction in March 2013.

Del Valle WTP 10-mgd DAF Project, Zone 7 Water Agency, CA, 2001 - 2005

Mr. Graham **managed the design** of a new 10-mgd dissolved air flotation (DAF) process to improve the capacity and reliability of an existing 40-mgd WTP. The project included new raw water piping, travelling screens, chemical feed systems, flocculation basins with vertical hydrofoil impellers, and provisions for future construction of ozone basins and conversion of existing Superpulsator clarifiers to DAF. Mr. Graham **developed innovative approaches to integrating the new clarification facilities into the existing WTP while minimizing disruptions to plant operation**. Mr. Graham was on-site during process startup, working closely with operations staff in trouble-shooting and optimizing the DAF treatment chain.

Tacoma-Cascade Pipeline Operations and Flow Allocation Plan, Cascade Water Alliance, WA, 2007 - 2008

Mr. Graham led **preparation of a comprehensive operations and flow allocation plan** for Cascade Water Alliance's Tacoma-Cascade Pipeline, a 10 mile-long, 42-inch diameter drinking water transmission pipeline



Art Hamid, PE



Position on Team: CSO Expert

Mr. Hamid is a Vice President and Principal Engineer with 40 years of experience. Mr. Hamid specializes in wet weather projects related to combined and separate sewer system overflow controls. He brings a proven record of success as Program Manager and Technical Advisor on many significant capital improvement programs for utilities nationwide and abroad. A nationally recognized expert in wet weather facilities planning and design, Mr. Hamid has conducted seminars on behalf of the USEPA in seven U.S. cites, and has authored over 20 publications.

Title

Vice President

Employment History (2010-2015)

Client Service Manager,
MWH, 26 Years

Education

Penn State University, Ph.D.
Coursework, 1971

Utah State University, M.S.
Civil Engineering, 1967

University of Engineering
and Technology, B.S. Civil
Engineering, 1965

Registrations/ Licenses

Professional Engineer – AZ
(1973), OR (1973), CA
(1973)



Specific Expertise

CSO Control Engineering Evaluations, Planning, and Design.

Mr. Hamid has served on six major wet weather programs as program manager or technical advisor over the last 25 years.

CSO Programs:

- NEORSD CSO Phase 1 Facility Plan in Cleveland (incl. Mill Creek Watershed) - \$1.2 billion
- City of Atlanta Clean Water Program - \$3.5 billion
- City of San Francisco PUC - \$6 billion

SSO Program:

- East Bay MUD - \$800 million
- City of Houston - \$1.2 billion
- City of Baltimore - \$1.3 billion

On all six wet weather programs, Mr. Hamid led the planning phase of the work, following the CSO guidance documents, and produced LTCPs that were accepted by the regulators. Appropriate innovative alternative evaluation and analysis methodologies were used in the programs to meet regulatory compliance at least cost to the clients.

A major part of the success was consensus building between the stakeholders. Mr. Hamid provided oversight for some major CSO conveyance/storage tunnel work, which provided predominant solution for CSOs.

His work also involved wet weather treatment technologies such as High rate Chemical Primary, Actoflow, Bio Actiflow, and Densadeg.

Regulatory Compliance and Negotiation. Mr. Hamid has provided technical assistance in the regulatory negotiations of Consent Decrees (CD) to the following cities:

- City of LA,
- City of Atlanta,
- City of Baltimore
- East Bay MUD

Most of the CD negotiations resulted in either reduction in cost/fines and/or extension of the capital improvements schedule.



Relevant Project Experience

Sewer System Improvement Program Central Bayside Improvement Project, San Francisco Public Utility Commission, CA, 2011-Present

Mr. Hamid is the project manager for this project which includes planning and design for the following major components:

- Watershed management including green and grey projects in two of the largest watersheds in San Francisco.
- **Modeling, planning and preliminary design for meeting the regulatory requirements for CSOs including a 30-foot diameter storage/conveyance tunnel, 120-mgd 100 feet deep dewatering pump station, and a high rate primary treatment facilities for CSO treatment.**
- **Development of a plan to manage flooding in the San Francisco bayside.**
- Incorporating issues, such as, sea level rise and climate change into real design parameters and standards.

Many of the key issues San Francisco is dealing with are similar to the King County CSO program, resulting in frequent consultations between these two agencies.

Atlanta Watershed Program, City of Atlanta, GA, 1999-2003

Mr. Hamid's main responsibilities as the leader of the team included **developing stakeholder consensus; assisting in public meetings; performing program management; assisting with and reviewing all technical submittals made to EPA and EPD; assisting in negotiating fines; and preparing and making presentations to the City management team and program manager.**

One of the most challenging aspects of this program was building a consensus between public and other stakeholders. Mr. Hamid participated in over 30 workshops to present ideas and gain input from stakeholders. He used several consensus-building tools such as Criterium Plus and Priority Path in these workshops. After this 2-year effort, the \$3 billion program was approved by the City, the public, and the regulatory agencies.

Mr. Hamid **prepared the long-term implementation plan and executive summary for the program**, describing the tasks and level of effort required for successful completion. He also collected and prepared a financial summary

document describing the capital projects required for the next 14 years.

Mill Creek Watershed Project, Northeast Ohio Regional Sewer District (NEORS), OH, 1996-1998

As leader of the MWH team, Mr. Hamid **integrated activities of 35 people from 4 major consulting firms, co-locating with the client for 3 years.** The project involved facilities planning and preliminary design for control of discharges into Mill Creek, with emphasis on water quality modeling, liaison with regulatory agencies, and a public information program.

Mr. Hamid led communication with the cities and the public through monthly meetings and a Web page. Communication with regulatory agencies included monthly meetings to present data, results, special reports, and summaries.

The primary deliverable of the initial efforts consisted of a Long-Term Control Plan that prioritized immediate and phased implementation of new and retrofitted infrastructure elements to meet strict pollution reduction metrics established by USEPA.

Infiltration/Inflow Program, East Bay Municipal Utility District, CA, 1980-1988; 1997-1999

Mr. Hamid worked for 8 years with a team of 9 consultants on this program, which became the industry standard for I/I control. He and the team **provided technical program management** while District staff performed all administrative and control functions. Work components included intensive flow monitoring, sewer system evaluation survey, hydraulic modeling, cost-effectiveness evaluation, and sewer rehabilitation and replacement.

Mr. Hamid's integrated program team negotiated with EPA on the design storm and level of treatment for wet-weather discharges based on the beneficial uses of receiving waters. Treatment levels varied between secondary, high-rate primary, and disinfection depending on receiving waters. These negotiations saved the District approximately \$300 million.



Bill Pisano, PhD, PE



Position on Team: CSO Expert

Dr. Pisano is a recognized expert in Combined Sewer Overflow (CSO) and wet weather sewerage systems technology and control. He has authored and presented over 130 technical papers in the area of urban runoff flooding and pollution control, including WEF Manual of Practice, Chapter 9, Emerging Technologies and BMPs, "CSO Pollution Abatement". Dr. Pisano was awarded the Thomas Camp Lecture prize in April, 2000, the Clemens Herschel prize in June, 2002 by the Boston Society of Civil Engineers, and the Stephen D. Bechtel Pipeline Engineering Award by ASCE in July, 2009.

Title

Senior Advisor

Employment History (2010-2015)

Senior Advisor, MWH,
26 Years

Education

Harvard University, Ph.D.
Environmental Engineering,
1979

Harvard University, M.S.
Environmental Engineering,
1974

University of Arizona, M.S.
Civil Engineering, 1964

Santa Clara University,
B.C.E. Civil Engineering,
1962

Registrations/ Licenses

Professional Engineer – MA
(1983), MI (1983), OH (1981)

\$450M
Cambridge Wet Weather
Program Capital
Improvements

47%
CSO/Flooding Cost
Reduction for Cambridge

Specific Expertise

CSO Control Engineering Evaluations, Planning, and Design.

For over 40 years, Dr. Pisano has specialized in wet weather infrastructure technology, focusing on wet weather sewerage system control, CSO storage and treatment facilities, CSO system storage and collection system improvements, planning and water quality control, design, modeling, research and development, post construction evaluation and quality control. Over the last 17 years he's worked on the City of Cambridge Wet Weather Program, working with the City, stakeholder, and regulators to reduce CSO's to the Alewife Brook, Mystic River, and Charles River. This work has included substantial efforts to develop hydraulic modeling for the entire combined sewer system in order to properly assess impacts of proposed design efforts and ensure cost effective solutions to reducing CSOs.

CSO Control Permitting / Regulatory Compliance.

Dr. Pisano has worked extensively with the EPA and local regulatory agencies to meet consent decrees and provide accurate permitting data associated with frequency and volume of CSOs throughout the Boston area.

As a result of these efforts, the Charles River water quality has improved from D+ in 1997 to a B+ in 2014.

Risk Management.

A large part of Dr. Pisano's work is helping clients understand how infrastructure improvements will reduce CSOs, reduce flooding, or improve water quality. Much of this focuses on risk awareness, understanding how best to spend limited budget to ensure the greatest overall benefit along with accepting of potential risks. This risk based approach with the City of Cambridge has resulted in local flooding control and minimized CSOs.

Cost Containment Measures.

There is no one-size fits all approach to CSO mitigation. Often times the best way to contain costs is to look at the entire basin as a whole and determine the best combination of appropriate improvements. This often includes combining sewer separation, GSI, and traditional 'gray' improvements to provide the greatest benefit at the least cost. Some examples of hybrid solutions include projects for both the City of Cambridge and in Chicopee, MA (see Relevant Project Experience section).



Relevant Project Experience

Design of Sewer Separation and Stormwater Management Program, City of Cambridge, MA, 1998-Present

Dr. Pisano is the technical director for the planning, design, and construction of sewer separation, stormwater management, BMP controls, pumping and storage facility improvements, and **CSO floatables controls** for the City of Cambridge, MA. This program consists of 68 projects with totals of about \$450M of new capital expenditures over the next 10 years. Dr. Pisano has **directed all technical aspects of the preparation of the program**, including the following phases of work: Phase 1: Infiltration/Inflow and Sewer System Evaluation Survey which included evaluation of the existing combined sewer system within the Bishop Allen Street and CAM017/South Mass Ave systems; the Phase 2 Analysis and Fast Track Design of Infiltration/Inflow Rehabilitation project evaluating the existing combined sewer system within the Cardinal Medeiros / Binney Street / CAM 017 systems; the Cambridgeport Area-wide Stormwater Master Plan project in the Cambridgeport system; the Harvard Square Flooding Reduction Facility Plan; the Agassiz Area 13 Facilities Plans, and the Cam 017 Facility Plan which included development and stormwater management improvements for the South Massachusetts Avenue storm drain and Bishop Allen Drive systems. Scope elements included physical survey and investigation of the existing combined sewer system, infiltration and inflow analysis, hydraulic analysis using the HydroWorks, and later the Info Works model, and design of sanitary system and stormwater conveyance and storage improvements.

Chicopee River CSO Project, Springfield Water & Sewer Commission, MA, 2007

Dr. Pisano is the Technical Director for the planning, design and construction of the Chicopee River CSO project in Springfield, MA. The project includes **field investigation, modeling using the InfoWorks system, and development of CSO controls** for the 6-month storm event in the Indian Orchard watershed. Development of a comprehensive plan and DEP/EPA approval to meet Administrative Order conditions was followed with final design and on-going construction of approximately 19,000 linear feet of sewer separation projects and a 60 mgd combined sewer pump station within an existing facility. The MWH plan will use several technologies to **reduce CSOs at \$8M less than originally anticipated** and minimize short-term construction impacts to the community.

Underground CSO Storage Facility, Narragansett Bay Commission, RI, 1995

As Technical Director, Dr. Pisano worked on **preliminary design of a 7.8-MG underground storage tank** with support facilities including mechanical influent screens, an 8-mgd dewatering pump station, a 200-mgd effluent pump station, HVAC facilities, odor control facilities, and five miles of open-cut shallow conveyance conduits.

Nut Island Headworks Facility, Massachusetts Water Resource Authority, MA, 1992

As Project Engineer, Dr. Pisano **supervised physical modeling component** (model 1:10 scale) involved directing 400-mgd within 90 degree turning junction chamber with side spill emergency overflow. Functional objectives included equalizing flow, deposits, and floatables within six screening channels immediately after the turning chamber. Modeling indicated that severe flow (and grit and floatables) imbalance corrected with turning vane.

Greater Cincinnati CSO Facility Plan, Metropolitan Sewer District of Greater Cincinnati, OH, 1994

Dr. Pisano was the Project Manager for this project that was a replacement of tunnel and near surface storage plan (\$2.2B) with combination of separation, 29 high rate screening and storage projects and three wet weather waste treatment plant expansions (\$600M). Four project designs already in design status involving high rate storage/disinfection coupled with new Swiss "combing" screens for floatables control.

Wet Weather Research and Development Projects, USEPA, NJ, 1985

Dr. Pisano was the project manager for USEPA wet weather research and development projects in various locations around the country. Projects included a full-scale, two-year evaluation of 40-mgd Swirl for **CSO control** in Lancaster, PA; design, construction, and evaluation of 12-mgd Swirl and Helical Bend to reduce stormwater settle-able solids and floatables in West Roxbury; monitoring pollutant removal of catch basins with insert enhancements (European) for better removal of floatables; and a three-year field program to determine pollutant removal effectiveness of flushing small-diameter combined sewers in Dorchester and Boston, MA.



Shannon Conway, PE



Position on Team: CSO Expert

As the Technical Discipline Lead for MWH's US Networks Modeling Group, and a member of MWH's Wet Weather Practice Group, Ms. Conway has been able to provide technical expertise for wet weather projects nationwide. Ms. Conway's expertise encompasses developing and reviewing hydraulic modeling strategies for planning studies throughout the US, primarily focusing on wet weather issues including CSOs.

Title

Technical Discipline Lead

Employment History (2010-2015)

Principal Project Technical Lead, MWH, 17 Years

Education

Case Western Reserve University, B.S. Civil Engineering, 1997

Registrations/ Licenses

Professional Engineer- OH (2001)

35

Hydraulic models developed for wet weather facility plans

25

Utility master plans developed

Specific Expertise

CSO Control Engineering Evaluations, Planning, and Design.

Ms. Conway has also developed and evaluated conceptual designs of alternative capital improvement solutions to address both combined and separate sanitary sewer overflows, capacity related sewer system deficiencies, and storm water flooding. Ms. Conway has led modeling efforts on several large CSO storage tunnel design and advanced facilities planning projects including the 24-ft diameter Dugway Storage Tunnel under construction in Cleveland, Ohio. Ms. Conway is currently working on three Integrated Planning projects where the goal is to develop a comprehensive plan to provide CSO and SSO mitigation strategies that provide equal or better environmental benefit than the current CIP plans at an affordable rate.

CSO Control Permitting / Regulatory Compliance.

Ms. Conway has extensive knowledge of current federal regulations for CSO compliance. Recently she has been working closely with several Midwestern cities in re-evaluating their CSO Consent Decrees under the USEPA's Integrated Planning Framework including the first Consent Decree built on this framework (Lima, Ohio). In addition, she brings experience with post construction

monitoring plans to evaluate system improvements in light of their ability to meet permitting requirements.

Risk Management.

At all stages within the project life cycle, risk management plays a critical role. As MWH's hydraulic modeling lead, Ms. Conway brings in depth knowledge of planning efforts and how decisions made early in a project can have consequences later in design and construction, often times resulting in increased costs. These early decisions are frequently made through development of risk registers to evaluate alternatives and limit risk wherever possible. In some cases, this may be as simple as recommending additional data collection within specific hydraulic basins to ensure that available data is available to properly inform the planning level decisions.

Implementation of Project Cost Containment Measure.

Ms. Conway is well versed in Financial Capability Assessments and the critical role that affordability can have on planning for future CSO control measures. This is a critical skill for utility master plan development where planning level costs are frequently relied upon for overall capital improvements planning and budgeting.



Relevant Project Experience

Akron Waterways Renewed Program, Akron, OH, March 2014 - Present

Ms. Conway leads the modeling task for the Akron CSO program, including detailed review of the existing InfoWorks collection system model. As the model formed the basis of the design for large planned capital improvements, the intent of the review was to assess the accuracy of the model and identify undue conservatism that could be driving up facility sizes and costs. To date, MWH has used hydraulic modeling to simulate the benefits of a Real Time Control system to more effectively dewater a planned large diameter CSO storage tunnel as well as improve utilization of existing facilities.

As part of the optimization efforts, Green Infrastructure (GI) opportunities are being evaluated. The tiered approach to this analysis involves identification of areas in the sewershed that show promise for off-loading stormwater through retention, partial separation or infiltration measures, and then repeated filtering of alternatives based on CSO reduction potential, constructability consideration, and cost, resulting in recommended GI projects.

Integrated Plan (LTCP), City of Lima, OH, 2006-2014

Lodged in December 2014, the City of Lima's Consent Decree is the first decree to be built on EPA's 2012 integrated planning framework. The LTCP was negotiated with US Environmental Protection Agency (USEPA) Region 5 and is an example of an innovative approach following USEPA's Integrated Planning Framework, which includes CSO control, SSO Abatement, asset management and stormwater components. CSO control alternatives evaluated included sewer separation, storage tanks, increased treatment, tunnels and green infrastructure. The recommended plan is the result of a rigorous Financial Capability Assessment and will improve water quality and be affordable for rate-payers. As the Project Manager, Ms. Conway led the hydraulic modeling efforts, including modeling a sophisticated Real Time Control system, as well as actively participated in the CD negotiations.

Easterly CSO Doan Valley Tunnel Advanced Facilities Plan, Northeast Ohio Regional Sewer District (NEORS), OH, 2003-2005

Ms. Conway led the modeling evaluation of alternative tunnel alignments and flow diversion structures for the development of optimized CSO control recommendations. An existing model was modified to

include gaged inflow and outflow control systems for the proposed 17-foot diameter CSO storage tunnel using InfoWorks' Real Time Control module. Alternatives evaluation included an analysis of transient flows, pressure waves and the resulting potential for surge problems. Additional project tasks included development of detailed construction costs as well as geotechnical evaluation of construction feasibility. Project recommendations included over \$71M in capital improvement projects.

Dugway West Interceptor Relief Sewer (DWIRS), Northeast Ohio Regional Sewer District (NEORS), OH, 2012

Ms. Conway worked with the NEORS, program management staff, and the design team to assess the hydraulic feasibility of alternate configurations for dewatering the Doan Valley Tunnel (DVT) in the absence of the previously conceived southern end of DWIRS. As part of this effort, consideration was given to the difference in requirements for CSO control under the Consent Decree's mandated Control Measure 6 projects (2 CSOs/yr) and the control level required for the non-priority CSOs in the Doan Brook system (3 CSOs/yr). Ms. Conway performed hydraulic modeling and alternative evaluations to assess the impact of diverting captured CSO from regulator D-58 into Dugway Storage Tunnel Shaft 8 or conveying downstream to the DVT.

Doan Brook Watershed Study, Northeast Ohio Regional Sewer District (NEORS), OH, 1998-2002

Ms. Conway was involved in the sewer system evaluation survey (SSES); the collection system and stream hydraulic modeling; and facilities planning. She developed GIS-based collection system maps, performed field inspections, managed field crews, and collected and assimilated existing sewer system plans. In addition, she monitored and gauged tasks such as flow meter site selection, wet weather water quality sampling, flow balancing of collection system, and stream meters and the analysis of lake level and rainfall data. Ms. Conway developed a detailed collection system model of both the combined and separate sanitary sewer systems. In addition, she developed CSO control alternatives for 31 CSOs and modeled these alternatives. As part of the alternatives development and analysis process, she determined costs for various facilities and developed a public information program.



Jeffrey Schmidt, PE, PMP



Position on Team: CSO Expert

Mr. Schmidt is a Principal Engineer with over 17 years of experience in civil, environmental and water resources engineering. Project experience includes project management, planning studies, hydraulic and hydrologic analysis, detailed design, and construction administration for a wide variety of projects including combined sewer overflow (CSO) mitigation, conveyance system rehabilitation and design, pump station design, wastewater process design, stormwater quality improvements, stormwater flooding analysis, and Infiltration/Inflow studies.

Title

Principal Engineer

Employment History (2010-2015)

Principal Engineer, MWH, 16 Years

Education

University of Illinois, M.S.
Civil Engineering, 1997

Valparaiso University, B.S.
Civil Engineering, 1995

Registrations/Licenses

Professional Engineer – WA (2011), OR (2012), MA (2001)

Project Management Professional (2013)



Specific Expertise

CSO Control Engineering Evaluations, Planning, and Design.

Mr. Schmidt has worked on multiple CSO control projects both in the US and the UK, covering the entire project life cycle from planning and alternatives analysis through design and construction. Through these projects he has evaluated CSO control technologies, including CSO screening technologies, storage design elements, passive hydraulic control structures, and floatables control alternatives. He spent over a decade supporting the City of Cambridge Wet Weather Program, including work on sewer separation projects, flooding analysis, NPDES permit compliance, and floatables control design. While working on the AMP3 Program in the United Kingdom, he was lead project engineer for shaft and tunnel siting elements of the Preston CSO tunnel preliminary design, including deep shafts and conveyance pipelines. He is currently supporting King County with design of the Sunset & Heathfield Pump Station and Forcemain Upgrades Project, managing the alternatives analysis and design efforts for several phases of the project.

Construction Management.

Mr. Schmidt has performed engineering services during construction on multiple wastewater and pipeline projects, including work at the Hartford Wastewater Treatment Facility and oversight of sewer separation construction for CSO reduction for the City of Cambridge, MA.

Risk Management. Mr. Schmidt has produced multiple risk registers for various CSO and conveyance projects, including assessment of risk probability and estimated impact to determine overall project risk costs.

Cost Estimating. As project engineer, Mr. Schmidt prepared cost estimates on multiple projects under the Cambridge Wet Weather Program and works closely with MWH's cost estimating team on King County projects to provide planning level, alternatives analysis, and final design estimates.

Design Siting and Outfalls.

Mr. Schmidt was the lead project engineer for the City of Rockport Ocean Outfall evaluation and repair projects to assess remaining life on wastewater outfall and provide recommendations for short and long term repairs while in coordination with local regulatory agencies.



Relevant Project Experience

Sunset and Heathfield Pump Stations and Force Main Upgrades Project; King County WTD, WA, 2011 - Ongoing

Mr. Schmidt is currently managing the \$9M Final Design Phase for upgrades of two existing pump stations and force main replacement. Work included alternatives analysis of pump station upgrades, including evaluation of a large diameter 6-mile rock tunnel to eliminate several planned conveyance, storage, and pumping projects planned for the basin, representing an overall life cycle cost savings for the planning basin. Design work includes coordination of a multi-disciplinary team to evaluate criteria, perform alternatives analysis, triple-bottom line analysis, risk assessments, construction cost estimating, and development of comprehensive design drawings and specification.

NPDES CSO Permit, City of Cambridge, MA, 2010-2011

Mr. Schmidt served as Project Manager to assist the City of Cambridge with submission of their 2010 and 2011 NPDES CSO permit annual report. Primary work consisted of evaluating 11 existing CSO structures to determine overflow conditions, frequency, and volume. Based on standard weir and orifice equations, MWH developed a series of stage discharge curves for each CSO site to be incorporated into existing stage and velocity meters at these CSO structures to assist with annual estimations of CSO activation, peak flows, and total volume of CSO spill into local waterways. Additional analysis included coordination of Alewife Brook water levels for specific storm events and integration of these boundary conditions with MWH's InfoWorks model to ascertain potential positive and negative impacts of installing flap gates on CSO outfalls along the Alewife Brook.

Contract 4 & 5 Alewife Brook / Charles River CSO Floatables Control, City of Cambridge, MA, 2010

Mr. Schmidt served as project manager during preliminary design, design, and construction of floatables control structures at existing CSO regulators along the Alewife Brook and Charles River. Work includes field efforts to assess current CSO condition and pipe interconnectivity, preliminary assessment of floatables control alternatives including installation of CDS control units versus static control baffles, modeling analysis of baffles impacts on system hydraulics, and design of baffles and additional flow controls to minimize CSO spill frequency and

volume through additional system storage and flow diversion to underutilized systems.

Screening and Disinfection Facility for Combined Sewer Overflows, City of Nashua, NH, 2008

Mr. Schmidt served as Project Engineer for the "Screening and Disinfection Facility for the East Hollis Street and Nashua River Combined Sewer Overflows (CSO #005 and CSO #006) Draft Preliminary Design Report." Mr. Schmidt evaluated available technologies and provided recommendations for application at the proposed CSO disinfection and storage facility. This included assessment of flow throttling devices, diversion structure overflow controls, solids and floatables removal methodologies, CSO disinfection and storage tank configurations, and tank cleaning and dewatering alternatives.

CSO Tunnel and Rising Mains, Preston Bathing Waters, England UK, 2003

Mr. Schmidt worked on the Preston Bathing Waters CSO - Tunnel and Rising Mains Project for the AMP3 United Utilities Program in the United Kingdom. Tasks included hydraulic/civil designs, as well as design coordination between technical departments (mechanical / electrical / geotechnical / construction / CAD) during the Alternatives Analysis and Implementation phases of the project. Key design components included 6 vortex drop shafts to convey storm overflows from high level sewers into a 20-meter deep storage/conveyance tunnel, design coordination of a 25-meter diameter, 31-meter deep terminal pump station with screening and storm pump overflow chambers, and various components of the design associated with 3.3-km of 2.85-meter diameter tunnel and 5.5-km twin 1-meter diameter rising mains.

Year-5 CSO Design, Croston, England UK, 2003

Mr. Schmidt performed hydraulic analysis and preliminary designs for several CSO's in the Croston Watershed drainage area as part of the AMP3 United Utilities Program in the United Kingdom. Solutions primarily focused on design of Combined Sewer Overflow screens for individual sites to minimize impacts from CSO's and discussions with third parties to minimize community and environmental impacts.



Adrienne Nemura, PE

Geosyntec[®]
consultants

Position on Team: CSO Expert

Ms. Nemura is a water resources engineer and an Associate of Geosyntec Consultants. She has 30 years of experience helping clients identify cost-effective and sustainable solutions to meet their water quality goals, particularly with respect to wet weather discharges. She has worked for more than 40 cities and wastewater utilities and also state and federal regulatory agencies, industrial facilities, airports, attorneys, consulting firms, non-profit organizations, and trade associations. She supports the US Conference of Mayors (USCM) Water Council, National Association of Clean Water Agencies (NACWA), and Association of Clean Water Administrators (ACWA) on Clean Water Act issues.

Title

Practice Professional

Employment History (2010-2015)

Associate, Geosyntec Consultants, 2 Years

Vice President, LinnoTech, 16 Years

Education

Virginia Tech University, M.S. Civil Engineering - Hydrosystems, 1986

Virginia Tech University, B.S. Civil Engineering - Hydrosystems, 1984

Registrations/Licenses

Professional Engineer - MI (1999)

23
CSO communities
With LTCPs or I/Ps

5.5
Years
Support to USGM

Specific Expertise

CSO Control Engineering Evaluations, Planning, and Design.

Ms. Nemura has led several high profile studies to incorporate green infrastructure into long-term control plans (LTCPs) for combined sewer overflows (CSOs). This includes directing watershed characterization, evaluating green infrastructure and stormwater BMPs, and stormwater master planning. Ms. Nemura has also used adaptive watershed management to evaluate the impact of pollutant discharges from multiple sources, including wastewater treatment plants, CSOs, sanitary sewer overflows (SSOs), industrial facilities, and municipal separate storm sewer systems (MS4s).

CSO Control Permitting and Regulatory Compliance.

Ms. Nemura has 30 years of experience assisting municipalities and industrial clients develop and negotiate cost-effective wastewater and stormwater management strategies to meet state and federal Clean Water Act requirements in a sustainable and affordable manner. She also helped clients navigate issues such as water quality standards (beneficial uses, criteria, and anti-degradation); 303(d) listings; total maximum

daily loads (TMDLs) and implementation plans; Use Attainability Analyses (JAAs); and National Pollutant Discharge Elimination System (NPDES) permits.

Implementation of Project Cost Containment Measures.

Ms. Nemura has assisted many clients with negotiations with USEPA to eliminate unnecessary and expensive projects that result in little or no public health benefits. For example, while working with SD1 of Kentucky, Ms. Nemura helped the clients present to USEPA that a \$20M project required by USEPA (to remove a single sewer overflow of 1-MG per year) has little benefit to the water quality of the receiving stream, and managed to defer this project.

Design and Siting Outfalls.

Ms. Nemura has assisted engineers in evaluating the instream water quality impacts of continuous and intermittent discharges for many CSO projects. She provided information to help clients weigh relative benefits of alternative outfall siting within the context of holistic solutions for the watershed.



Relevant Project Experience

Integrated Planning, City of Akron, OH, March 2014-Present

Ms. Nemura is project manager for green infrastructure and water quality support for Akron's CSO LTCP update and integrated plan (IP) development under the Akron Waterways Renewed Program. The goal of the IP is to move from a Consent Decree (signed in January 2014) negotiated over multiple decades that requires zero, untreated CSOs and a 10-year level of service for SSOs to a plan that achieves equal or greater benefit at a dramatically reduced cost. Her work involves evaluating effectiveness of green infrastructure opportunities (project specific and programmatic) and modeling the impacts on bacteria levels in the receiving streams. She is also tasked with helping the program team communicate need for and benefits of integrated planning to EPA Region 5 and Ohio EPA.

LTCP Update for Muncie Sanitary District (MSD), IN, 2013-Present

Ms. Nemura is adjunct staff helping MSD redo their CSO LTCP in the context of integrated planning for wastewater and stormwater. She serves as project manager for technical work of multiple consultants and providing support to legal counsel. Her work consists of moving from a LTCP focused on zero CSOs to an integrated approach that addresses asset management, enhanced wet weather wastewater treatment plant (WWTP) capacity, CSO storage and treatment wetlands, CSO storage, stormwater discharges, and flood protection with an updated financial capability analysis (FCA).

Regulatory Support Services for Metropolitan St. Louis Sewer District, MO, 2004-Present

Ms. Nemura led the water quality assessment of CSO, SSO and stormwater impacts for MSD's LTCP, and federal Consent Decree negotiations. She helped craft overall CSO strategy which focused on a high level of control on CSO discharging to tributaries, and long-term green infrastructure implementation for CSOs discharging to the Mississippi River. She assists MSD in reviewing and commenting on numerous bacteria TMDLs and changes to water quality standards, general stormwater permit, and use attainability analyses protocols. She assists MSD review barriers to conducting integrated planning.

Regulatory Support Services, City of Lima, OH, 2012-Present

Ms. Nemura assisted the City and its engineering and legal consultants finalize a CSO, SSO, and WWTP improvement plan and a federal Consent Decree that incorporates integrated planning. Her responsibilities also include assisting the city with general CWA support. She reviewed draft TMDLs, and helped define a supplemental environmental project (SEP). Ms. Nemura is currently overseeing implementation of the riparian reforestation SEP. She is representing Lima and other small Ohio publicly owned treatment works on Ohio's Nutrient Technical Advisory Group to help the state develop a water quality standards rulemaking for nutrients in streams and rivers.

Regulatory Support Services, Sanitation District No. 1 of Northern Kentucky (SD1), KY, 2002-Present

Ms. Nemura served on a four-person team providing strategic advice on issues and approaches for implementing the country's first wet weather consent decree based on adaptive watershed management. She assisted in responding to regulatory agency questions and revising watershed plans to address comments. Ms. Nemura directed development of draft comments on EPA's Construction & Development Rule, EPA's Water Quality Standards Rule an amici brief on the Los Angeles County and Flood Control case regarding MS4s, comments on ORSANCO's triennial review planning, EPA's selenium criterion, and the EPA/Corps of Engineers' Waters of the US Rulemaking. She provided expert opinion in lawsuit against SD1 about how failed private stormwater culverts underneath a shopping center were not combined sewers and therefore not SD1's assets.

Integrated Planning Research for the Squamscott-Exeter, New Hampshire Water Shed, NH, 2013-Present

Ms. Nemura is senior advisor on a research grant through the University of New Hampshire to develop a foundation for a Water Integration Plan for three coastal New Hampshire towns. The plan will help communities meet new, more stringent wastewater and stormwater permit requirements and improve water quality in the Squamscott-Exeter River and Great Bay Watershed across municipal boundaries. This plan should serve as a model for multi-jurisdictional integrated planning.

**Title**

Area Construction Manager

Employment History (2010-2015)

Area Construction Manager, MWH, 13 Years

Education

University of New Hampshire, B.S. Civil Engineering, 1995

Registrations/ Licenses

Professional Engineer – CA (2000)

Andre Tolme, PE

Position on Team: CSO Expert

Mr. Tolme has more than twenty years' experience in Construction Management and Project Management. His project experience includes work on combined sewer overflow (CSO) projects, wastewater treatment facilities, water and sewer pipelines, green stormwater infrastructure (GSI), and other public and private infrastructure projects. Mr. Tolme has expertise in project planning, project management, constructability reviews, construction management, and claims support. Mr. Tolme is currently on the Board of Directors for the Oregon chapter of the Construction Management Association of America.



Specific Expertise

Construction Management. As the Pacific Northwest Area Manager for MWH's Construction Management (CM) services group, Mr. Tolme has a strong background in constructability reviews, CM procedures, quality assurance, and health & safety. He is currently the Project Manager for CM services on two of the County's CSO projects. In addition, he manages MWH's Work Order CM contract with King County, giving him a thorough knowledge of the County's CM procedures in all of its satellite offices. His focus as a construction manager is to staff projects with the right people in the right positions and to get involved early in a project to see that project specifications are written in a way that best allows the contractor and the owner to achieve success and avoid disputes.

Risk Management. Proper risk management starts with the evaluation of construction technologies, schedule and milestone constraints, and a detailed risk register developed and updated through the design phase. Mr. Tolme's experience with construction sequencing along with his qualifications as a professional engineer have allowed him to provide valuable input to risk registers and design reviews on past projects. For example, on King County's North Creek

Interceptor Project, Mr. Tolme is helping to transition the risk management strategy from the design team to the CM team.

Implementation of Project Cost Containment Measures. Cost containment is highly influenced by proper cost estimating and by management of risk. Mr. Tolme's experience with constructability reviews has focused on obtaining bid certainty so that contractors do not include large or unnecessary contingencies in their bids. As a construction manager on numerous public works projects, he has developed expertise in potential change order identification, tracking, and resolution.

Cost Estimating. Mr. Tolme has performed independent cost estimating for verification and negotiation of contractor change orders and has extensively reviewed contractor cost estimates throughout his CM career. His experience includes work as an estimator for a large national general contractor and as an estimator for MWH Constructors on a large federally funded project.



Relevant Project Experience

North Creek Interceptor Project, King County WTD, Bothell, WA, 2014-Present

Mr. Tolme is currently the Principal-in-Charge for this \$30M sewer pipeline project. The project includes 10,000 LF of 36" to 48" pipe including four trenchless crossings using pipe ramming and open face shield tunneling. Mr. Tolme is responsible for overall delivery of MWH's construction management services and subconsultant coordination.

Murray CSO Control Project, King County WTD, Seattle, WA, 2013-Present

Mr. Tolme is currently the Project Manager for this \$26M CSO control project in a residential neighborhood in Seattle. The project includes a one million gallon storage tank, onsite emergency generator and fuel storage, tie-ins to an existing pump station and outfall, tipping buckets, odor control, and extensive landscaping. Mr. Tolme is responsible for management of MWH's construction management team including four subconsultants providing inspection, document controls, and environmental compliance oversight.

Barton CSO Control Project, King County WTD, Seattle, WA, 2013-Present

Mr. Tolme is currently the Project Manager for this \$5M CSO project consisting of green stormwater infrastructure (GSI) and underground injection control (UIC) wells. The project includes bioretention swales, UIC wells, and final landscaping on fifteen city streets in a densely populated neighborhood. Mr. Tolme is responsible for management of MWH's construction management team including four subconsultants providing inspection, document controls, and environmental compliance oversight.

Work Order Construction Management Services, King County, WA, 2013-Present

Mr. Tolme is currently the Project Manager for MWH's on-call work order CM contract with King County. He manages all work order proposals and delivery of CM services including subconsultants and financial reporting.

L.L. Anderson Dam Spillway Project, Placer County Water Agency, CA, 2010-2012

Mr. Tolme was the Construction Manager on this \$15M project at a remote mountain site that won the CMAA National Project Excellence Award. The project involved blasting and excavation of a spillway channel, mass concrete

placements, installation of two new radial gates, rock bolting, grouting, and a nominal dam raise. Mr. Tolme was responsible for supervision of the construction management team and overall responsibility for execution of CM services.

Anaerobic Digester and Dewatering Facility Project, City of San Mateo, CA, 2005-2009

Mr. Tolme was the Construction Manager for this \$30M wastewater treatment plant expansion. The work included the construction of a new anaerobic egg-shaped steel digester, a new sludge storage silo, a gas conditioning system, new sludge dewatering equipment, new screenings and grit removal systems, and structural modifications to an existing Solids Handling Facility. Mr. Tolme had primary responsibility for the administration and management of the construction contract and oversight of the resident engineer and inspection staff.

Marine Terminal Deconstruction Project, El Paso Corporation, Hercules, CA, 2009-2010

Mr. Tolme was the Construction Manager for this unique \$5M deconstruction project at an offshore decommissioned marine terminal. Mr. Tolme was the primary contact for the Owner and was responsible for oversight of the contractor payments, change order negotiation, and monitoring the work for compliance with safety, quality and contract requirements.

South Pipeline Project, South County Regional Wastewater Authority, CA, 2010-2011

The project included installation of more than 12,000 lineal feet of 20" diameter Fusible PVC pipe conveying treated wastewater effluent to a river discharge location. As the Construction Manager, Mr. Tolme reviewed change orders, CPM schedule updates, and contractor progress payment applications.

UNWI 9 and NEA Projects, Sacramento Regional County Sanitation District, CA, 2011

The projects included approximately six miles of 24" to 36" interceptor pipe along major roadways with a total construction value of more than \$50M. Work included installation of more than 25,000 lineal feet of microtunneled PCP and VCP pipe. Mr. Tolme supported the analysis and negotiation of contractor claims and change order requests, and analyzed the construction schedule for critical path impacts resulting from unexpected delays.