TOWN OF AMHERSTBURG | REQUEST FOR PROPOSAL (RFP)

# Professional Engineering Services - Construction of New Reservoir and Rehabilitation of Existing Reservoir, AWTP - 2022-046

Stantec Consulting Ltd.
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# Table of Contents



## List of Appendices

# 1 Introduction

Stantec Consulting Ltd. (Stantec) is pleased to respond to this Request for Proposal (RFP) for Professional Services to complete the Design and Construction of the New Reservoir and Rehabilitation of the Existing Reservoir at the Amherstburg Water Treatment Plant (RFP 2022-046) for the Town of Amherstburg (Town). We have assembled a team of professionals with a high level of commitment, enthusiasm, and experience to meet the specialized technical modeling and solutions requirements of this project.

Stantec has had a close partnership with Town for many years, having worked on a significant number of infrastructure projects, including the construction of the elevated water tower, the first Town's Water Master Plan in 2006 and its Update in 2021. We were also the consultant that completed the original Amherstburg Water Treatment Plant including existing reservoir. Accordingly, we have a deep understanding of the Town's water distribution system as well as strong understanding of the Amherstburg WTP including existing potable water reservoir.

# 2 Company Profile

## 2.1 About Stantec

The Stantec community unites approximately 22,000 employees working in over 400 locations across 6 continents. We always design with community in mind. We care about the communities we serve—because they're our communities too. We're designers, engineers, scientists, and project managers, innovating together at the intersection of community, creativity, and client relationships. Balancing these priorities results in projects that advance the quality of life in communities across the globe.

Since 1954, we have been providing solutions to our clients for the projects of any size and scope, including municipal infrastructure projects throughout North America. Stantec is a publicly traded company and trades on the NYSE and TSX under the symbol STN. We are required to be financially stable in order to maintain these listings and we are required to adhere to the Internal Control – Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission "(2013 framework)" (the COSO criteria). We are subject to ongoing independent audits that prove our financial stability and credit worthiness.

The Town of Amherstburg is a top tier client for Stantec, and we are committed to providing a strong project team to ensure successful delivery of the project.

## 2.2 Local Office

Our Windsor office is home to our team of 30 engineers, technologists, technicians, and administrative staff. Established in 1892, our office has since completed major transportation and environmental-related infrastructure projects in almost every sector of the Windsor–Essex County area since its inception.

With one trip through Windsor, Essex County and Chatham-Kent, you'll find our projects, past and present, distributed throughout the community. Whether it is roadways, community development, buildings, or water and wastewater-related work, including our award-winning Riverfront Retention Treatment Basin, that you pass en route, every project is a product of Stantec professionals living in the communities we serve.

As a full-service engineering office, we're working to bring communities together in the past, present, and future.

The majority of our key team members for this project are locally situated in Windsor office, with specialist support being serviced from other Stantec locations. All members of the team, including specialist advisors, have successful experience working on water and wastewater treatment projects together. The high level of local workforce content provides an added ownership to our team to ensure that this project receives top priority.

## 2.3 Corporate Certifications and Accreditations

- The following is a list of our corporate certifications and registrations within Ontario:
- Professional Engineers Ontario, Certificate of Authorization No. 11445923
- Professional Geoscientists Ontario, Certificate of Authorization No. 90060

- Association of Ontario Land Surveyors, Certification of Authorization No. 6966
- Association: Ontario Association of Architects Account/ID No. 21567
- Stantec is a corporate member in good standing of Consulting Engineers of Ontario, Transportation Association of Canada, and American/Canadian Public Works Association. Individual employees of Stantec are members collectively of virtually all learned engineering societies and professional organizations.

### 2.4 Health and Safety Program

Stantec's senior leadership is committed to continuous improvement in the areas of health, safety, security, and environment in all aspects of our business. Led by our Senior Vice President of Health, Safety, Security, and Environment, the health, safety, security, and environment team include three directors (Operations, Program & Practice, and Global Security), nine regional managers in North America, and seven international country managers. Support services include over 200 office coordinators, two dedicated workers compensation claims coordinators, as well as systems and administrative support staff around the globe.

The Health, Safety, Security, and Environment Program's objective is designed to eliminate injuries, property loss, and environmental damage by aligning work processes, systems, and behaviors so our employees have the necessary guidance and knowledge to complete every task safely, every time. To meet this objective, the health, safety, security, and environment team develops practices and tools that support safe work methods by meeting or exceeding government regulations and establishing best practices and continuous improvement through our Occupational Health and Safety Management System 18001 accredited Occupational Health and Safety Management System.

The foundation of our safety program is a Hazard Recognition and Control process that enables employees at all levels to establish a healthy and safe work environment. Projects begin with the development of a Risk Management Strategy or Health and Safety Plan that identifies potential risks associated with the project site. Based on the risks identified, additional controls are implemented, and then verified on a daily basis with a Field Level Risk Assessment process.

Hazard Recognition and Control empowers employees to proactively identify hazards, assess risks, eliminate, or control risks, and stop work if required in order to prevent injury and illness, environmental and property damage. Our Company Health, Safety, Security, and Environment Program is grounded in our Corporate Health, Safety, Security, and Environment Policy, the Health, Safety, Security, and Environment Program Manual, Safe Work Practices, and supporting programs.

The program is communicated to employees through a comprehensive communication strategy that includes regular features in our company magazine, ongoing use of the Company's intranet, e-bulletins from senior leadership, office signage, presentations, and workshops. In addition to tracking lagging indicators (workers' compensation costs and Total Recordable Injury Rate), we also track leading indicators such as site visits, file reviews, safety meetings, and worksite inspections to further gauge the effectiveness of the program.

One of the most significant components of Stantec's health, safety, security, and environment culture is the Safer Together internal employee training initiative, which began in 2016. A full version of our Health and Safety Program Manual can be provided upon request.

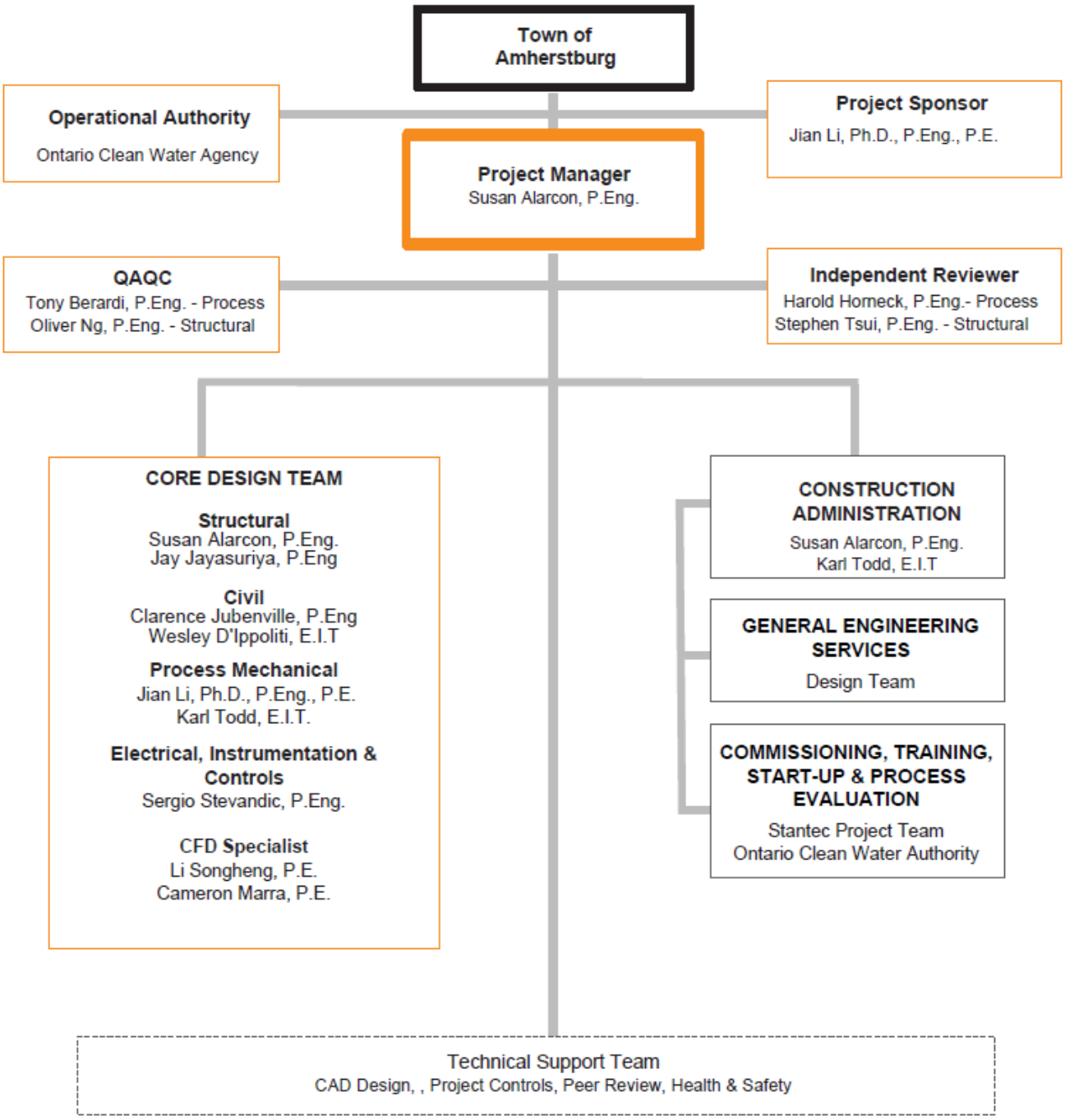
## 3 Project Team Members / Capacity and Qualification

### 3.1 Team Organization

Stantec values the Town of Amherstburg as one of their top tier clients and are fully committed to the continuation of this long lasting and successful relationship. With this in mind, our proposed project team has been selected based on their relevant experience, site familiarity and proven capabilities as well as each team member's time commitments and availability to work on this assignment. Stantec's proposed Project Team is located primarily out of our Windsor office, supported by staff in various offices. An Organization Chart is provided in below.

Our team will provide an integrated approach to complete this project, with our base of operations being in our Windsor office. Specialist support, as required, will be available from other Stantec offices within Canada and the United States. Curricula Vitae for all team members are also provided in **Appendix A.**

Our project team possesses the relevant technical skills for water treatment including potable water reservoirs and understands the challenges commonly encountered through the course of projects including working with governing bodies to facilitate all regulatory requirements and coordinate work to minimize service and site access interruptions.



## 3.2 Team Members

Brief descriptions of the key members for this project are provided below. Junior staff, support staff, and other specialized staff can also be engaged pending specific requirements and needs. The key team members for this project are provided herein with curricula vitae included in **Appendix A**.

**Susan Alarcon, P.Eng.,** (Windsor Office) **Project Manager:** Susan is a senior structural engineer with 22 years of experience providing structural design for major water and wastewater facilities throughout Ontario. She is an experienced project manager who maintains a keen sensitivity for budget, schedule, and project scope. She engages with her clients and team to develop solutions and deliver successful projects. She provided project management services for the Town of Amherstburg WTP parking lot and chlorine receiving station upgrades project in 2019. She has successfully managed projects at the Leamington PCC, Clarkson WWTP, City of Hamilton Water Reservoir HDR07, among others. Susan works effectively on multi-disciplined, complex projects to determine cost effective, sustainable, and constructible solutions. Technically she specializes in the design of reinforced concrete tanks and shafts including reservoirs, aeration tanks, clarifiers, settling tanks, and pumping stations. Including the below grade concrete backwash holding tanks for the Strange Street Water Treatment Facility for the Region of Waterloo and provided her design expertise on the concrete Windsor RTB facility for the City of Windsor just to name a couple. She has provided condition assessment and rehabilitation design services for numerous concrete structures.

**PRIMARY POINT OF ACCOUNTABILITY** – Susan will report directly to the Town's Project Manager on project management activities providing accountability for Stantec's activities, deliverables, and performance in meeting the project goals. She will coordinate and communicate with the Town on project updates, constraints, and answer any questions. As an experienced project manager, Susan's main goals in delivery to his clients involves:

- Managing scope and budget for the project through cost control and reporting systems.
- Communicating project status to clients on a regular basis to keep them informed on progress to date and projected timelines.
- Managing the client's available budget, through ongoing consultation as to the impacts on design changes or choices in an upfront manner so that informed decisions can be made.
- Clearly articulating and documenting design decisions and rationale so that collectively the design team, and any internal or external stakeholders, understand why particular choices were made.
- Identifying key issues that need resolution and following up on status so that the project continues to proceed or otherwise impacts are mitigated to the extent possible.
- Oversee the quality assurance and quality control process and maintain QA/QC records throughout the Project tenure and as per ISO requirements.
- Hold and chair the construction meetings as noted in the RFP in consultation with the Town.

**Jian Li, Ph.D., P.Eng., PE** (Windsor Office) **Project Sponsor & Process Mechanical Lead:** Jian has over 28 years of construction, technical and management experience in municipal and environmental engineering with particular emphasis on water & wastewater supply/collection, conveyance, pumping and treatment. Jian provides considerable experience in all aspects of project planning and delivery from feasibility studies, class environmental assessments, funding applications through to detailed design, specifications, approvals, contract administration and commissioning services from small simple projects to large complex multidiscipline projects. Jian's wealth of experience includes the carrying out of class environmental assessments, design of small and large complex water and wastewater treatment and pumping facilities, design of large diameter forcemains/watermains and metering facilities, development of innovative flow control systems for wet weather flows, development and preparation of complex contract documents and specifications and the creation of detailed operation manuals for water and sewage treatment facilities. Jian provides the practical insight that is required on a project obtained from many years of studies and detailed design experience on complex construction projects. Jian will be the Project Sponsor and Process Mechanical Lead for this project. He will be responsible for ensuring the project team has all the resources needed to meet the project budget and schedule and will allocate more resources as necessary. He will also oversee all of the process design elements of the project.

**Tony Berardi, P.Eng.,** (Windsor, Office) **QA/QC - Process:** Tony has over 35 years of construction, technical and management experience in municipal and environmental engineering with particular emphasis on water & wastewater supply/collection, conveyance, pumping and treatment. Tony provides considerable experience in all aspects of project planning and delivery from feasibility studies, class environmental assessments, funding applications through to detailed design, specifications, approvals, contract administration and commissioning services from small simple projects to large complex multidiscipline projects. Tony's wealth of experience includes the carrying out of Class Environmental Assessments, design of small and large complex water and wastewater treatment and pumping facilities, design of large diameter forcemains/watermains and metering facilities, development of innovative flow control systems for the hydroponic greenhouse industry, development and preparation of complex contract documents and specifications and the creation of detailed operation manuals for water and sewage treatment facilities. Tony provides the practical insight that is required on a project obtained from many years of detailed design and resident engineering experience on complex construction projects.

**Oliver Ng, P.Eng.**, (Windsor, Office) **QA/QC - Structural:** Oliver has over 34 years of experience designing reinforced concrete, prestressed concrete and structural steel, bridges, culverts, buildings, and specialized structures. His design experience also involves formwork and falsework design, excavation protection systems, and structural components using aluminum and fiberglass reinforced plastic (FRP). Throughout his career, Oliver has had considerable experience in construction inspection related to cast-in-place concrete work, precast structural component fabrication, structural steel erection, concrete repair and restoration, bridges, waterproofing, and cofferdams. Oliver also participates in structural condition survey and evaluation of bridges, tunnels, dams and buildings, failure investigation and insurance claims, and composite strengthening systems with CFRP laminates. Oliver has been responsible for condition survey and evaluation of existing buildings and structures, including material testing, structural analysis, report preparation, recommendations for rehabilitation or replacement, and design of repair and rehabilitation systems.

**Harold Horneck, M. Eng., P. Eng**., (Windsor Office) **Independent Reviewer - Process:** Harold has over 40 years of diverse experience in the municipal and environmental engineering fields with particular emphasis on water supply, wastewater collection, pumping and treatment, and biosolids management systems. He has a proven record in the successful delivery of a wide variety of projects including complex projects involving management of multi-disciplined teams of professionals. The success of these projects is based on the principle of maintaining effective communications with the client throughout the project and a demonstrated ability to blend innovative technology with practical experience to provide solutions tailored to the needs and resources of the client. Harold has experience in all aspects of project planning and delivery from feasibility studies, environmental study reports, funding applications and public consultation programs through to detailed design, approvals, contract administration and commissioning services. His variety of experience includes managing comprehensive stream studies and combined sewer overflow studies involving a broad range of technical disciplines such as microbiologists, aquatic biologist and sediment transport/river modeling specialists. He has participated on steering committees and as a study team member reporting on biosolids management technologies and pilot testing of innovative treatment systems.

**Stephen Tsui, M.Eng., C.Eng., P.Eng., F.E.C**., (Windsor Office) **Independent Reviewer – Structural:** Stephen has over 49 years of technical and management experience in the areas of structural engineering, buildings, bridges, and environmental engineering structures. His design experience has involved in many significant projects, specialized construction materials as well as deep foundations. He has developed expertise in conductibility review and value engineering. Stephen is an experienced Project Manager and has directed and managed many significant multi-discipline projects including industrial complex, commercial and institutional buildings, bridges and grade separation, tunnels, pumping stations, water and wastewater treatment plants. His approach to projects stresses design efficiency, cost effectiveness, and timely delivery. Stephen has also developed specialized experience in structural rehabilitation and restoration and published his work in journals and conferences. Stephen is an Adjunct Professor in the Faculty of Engineering at the University of Windsor, where he has shared his knowledge through technical presentations, teaching a course in Planning and Construction Management and supervising senior civil engineering students on their projects.

**Chithral (Jay) Jayasuriya, M.A.Sc, P.Eng.,** (Windor Office) **Structural Design:** Chithral (Jay) is a structural engineer with 27 years of experience in . Jay's responsibilities have included designing reinforced concrete, prestressed concrete, and structural steel structures. His design experience includes designing industrial buildings, underground storage tanks for water and wastewater facilities, transportation infrastructure including bridges, culverts and related infrastructure. Jay also has provided condition assessment and rehabilitation design services for environmental and transportation infrastructures, including underground tanks, bridges and culverts. Jay has also been responsible for construction inspection and contract administration of various underground tanks, bridges, and culvert projects.

**Clarence Jubenville, P.Eng.** (Windsor Office): **Civil Lead:** Clarence has 30 years of experience in civil engineering designing and constructing various municipal projects including extensive experience in designing and constructing various municipal projects including roads, sewers, watermains and drainage works. Clarence is an experienced Civil Engineer who recognizes the importance in understanding the client's needs when designing and dealing with technical and administrative issues. He has acted as Project Manager and Contract Administrator for dozens of projects and offers valuable insights for practical and cost-effective project designs. Clarence also conducts regular peer reviews for a number of municipalities. Clarence will serve as the Civil Infrastructure Lead on this project.

**Wesley D'Ippoliti, EIT,** (Windsor Office): **Civil Design:** Wesley is a Civil Engineering EIT with the Civil group in Windsor, ON. His responsibilities pertain to inspections and designs for various projects related to municipal engineering, structural rehabilitation and evaluation, and telecommunications supply. Wesley has worked in the Civil, Structural, and Energy-Telecom teams and coordinated with other disciplines such as Traffic, Electrical and landscape to further site design. He is skilled in AutoCAD and site surveying from previous job experience and familiar with using Regional, Municipal, and OPSS/OPSD design criteria. Wesley also has experience composing design specifications, opinions of probably costs, form of tender, meeting minutes, and generating change orders and payment certificates. Wesley's specific experience in the Civil discipline includes: Above ground removal and pavement plan drawings, roadway grading design, storm sewer design and installation, watermain installation, sanitary sewer installation. Wesley's specific experience in the Structural discipline includes: Inspection services on removal and rehabilitation of existing bridges/culverts, inspection services on Cast-In-Place and Pre-Cast structure installation, and Existing structural field evaluation for load posting and lifespan review.

**Karl Todd, EIT.**, (Windsor Office) **Process Mechanical:** Karl is an Environmental Designer in Stantec's water group. He has 5 years of engineering experience specializing in water/wastewater, coastal and civil engineering in Canada and the Caribbean. Karl has gained relevant experience in process mechanical engineering for water/wastewater pumping stations, biological process modelling for wastewater treatment systems in warm and cold weather using BioWin and GPS-X, planning for wastewater conveyance and treatment systems, multi-hazard assessments, shoreline protection and rehabilitation. Karl is also experienced in the management and support for the procurement and construction processes. He has worked with a wide range of clientele including, various government agencies and private sector organizations.

**Sergio Stevandic, P.Eng.**, (London Office) **Electrical, Instrumentation & Controls:** Sergio has over 26 years of experience, specializing in electrical power system, protection and control, and process automation and control. He has gained experience through numerous projects as a commissioning engineer, design engineer, and project manager for delivering and overseeing the full spectrum of technical solutions provided to water, wastewater, power, mining, and industrial sectors. His ability to work within a team environment and attention to detail and accuracy complements his technical expertise. He has carried out master studies, preliminary and detailed design, project management, contract administration and commissioning for the electrical power generation and distribution, electrical systems protection and control, motor control systems, process control and automation systems. Sergio has significant experience in PLC and SCADA integration using various platforms (GE/Emerson, Rockwell, Wonderware, etc.). He also specializes in electrical power systems investigation, analysis and studies facilitated using ETAP, including protective devices coordination, short-circuit and arc-flash; substation grounding; load-flow and motor starting; power quality and harmonic analysis. Sergio's experience extends to protective relay programming and integration (GE and SEL); substation and power system automation; power systems testing, start-up and commissioning

**Songheng Li, Ph.D., P. E, D.WRE.,** (Boston, MA) **CFD Specialist:** Songheng has over 28 years of experience in hydraulics and currently serves as a Principal Hydraulics Technical Lead at Stantec. His areas of his expertise include hydraulic structures, upstream and downstream fish passage, pump stations, water pump intakes, water and wastewater facilities, hydro-turbines, flow mixing, network transient, river flows, and sediment transportation. Songheng is an expert at computational fluid dynamics (CFD) and hydraulic and hydrological (H&H) modeling and brings relevant skills in ANSYS Fluent, Flow-3D, and InfoWork ICM. In short, Songheng uses this expertise to help clients solve their flow challenges.

**Cameron Marra, B.S., P.E,** (Indianapolis, IN) **CFD Specialist:** Cameron is an engineer who has worked in the consulting industry for three years. He has primarily focused on work involving aero and hydro modeling ranging from large system-wide models to smaller design-focused models. He has experience with solvers ranging from 1-D to 3-D and routinely utilizes Python for pre- and post-processing automation. He's also used his understanding of Python to create applications for use both internally by Stantec and externally by clients.

**Jeff Holmes, C.E.T.,** (Windsor Office): **CAD Lead:** Jeff has over 35 years of experience in design drafting of residential, industrial, and municipal servicing projects. He is a CAD Lead for the Windsor office and manages an experienced team of CAD designers from project inception to final acceptance. Jeff recognizes the importance of understanding clients' needs when designing and dealing with technical and administrative issues. His technical experience provides insight to practical and cost effective project designs. Jeff is responsible for the collection of topographic data through both field surveys and property record reviews and inclusion in electronic format within contract documents for all projects in the Windsor office. He is responsible for the preparation of drawings and graphics used in various processes including materials for EA presentations and public information sessions

## 3.3 Subconsultants

For this project, we are proud to have selected a cohesive team of expertise, led by our Windsor office, consisting of staff from within Stantec, to complete the majority of the requirements under the Request for Proposal. We have carried one sub-consultant WSP **Golder** to complete the geotechnical and excess soil management portions of the project. Golder is a long time, well-respected geotechnical firm well known to the Town.

# 4 Similar Project Experience

This section describes Stantec's qualifications and expertise relevant to this project as evidenced by several previous projects involving reservoir construction of which, Stantec has extensive experience.

Stantec offers multi-disciplinary design under one roof, with specialists drawn from our pool of technical experts across North America. Further to the benefits available through team member expertise, Stantec provides extensive familiarity with the Town's requirements, and, in particular, has a thorough knowledge of design, construction and operating details with respect to the construction of new reservoir and rehabilitation of existing reservoir. Past reservoir projects relevant to the RFP include the Wheatley WTP reservoir, Union WTP Reservoir, Stoney Point WTP Reservoir. The existing reservoir at Amherstburg WTP was also designed by our Windsor office.

Table 4.1 below is a checklist style representation of the projects profiled and their relevancy to this reservoir construction project. These reference projects include reservoir construction, specifically including potable water and disinfection procedures.

**Table 4.1 List of Relevant Projects**

| Project Name | Client | Construction $ Value | Specialty/Expertise | | |
|---|---|---|---|---|---|
| | | | Construction of Reservoir | Rehabilitation of Existing Reservoir | Potable water and disinfection procedures |
| Colchester Water Treatment Plant Reservoir Repair | Town of Essex | $250K | ✓ | ✓ | ✓ |
| Komoka-Mt. Brydges Water Supply Upgrades. | Lake Huron & Elgin Area Primary Water Supply Systems | $16.5M | ✓ | ✓ | ✓ |
| EPCOR White Rock Reservoir | EPCOR | $10M | ✓ | ✓ | ✓ |
| William Street and Strange Street Water Supply Systems | Region of Waterloo | $18.5M | ✓ | ✓ | ✓ |
| Burke Water Station Upgrades | City of Guelph | $5M | ✓ | ✓ | ✓ |
| Wheatley Water Treat Plant Reservoir | Municipality of Chatham Kent | 4.8M | ✓ | ✓ | ✓ |

| Description of Project | Client | Construction $ Value | Specialty/Expertise | | |
|---|---|---|---|---|---|
| | | | Construction of Reservoir | Rehabilitation of Existing Reservoir | Potable water and disinfection procedures |
| Union Water Treatment Plant Reservoir | Union Water Supply System | $1.5M | ✓ | ✓ | ✓ |
| Stoney Point Water Treatment Plant Reservoir | Municipality of Lakeshore | $1M | ✓ | ✓ | ✓ |
| Cottam Reservoir | Town of Essex | $2M | ✓ | ✓ | ✓ |

In addition to the foregoing projects listed above a detail reference chart has been added to Section 7. There are numerous other reservoir projects that have been completed by Stantec offices throughout Canada. Project profile sheets for several of these projects are included following this section.

# Lake Huron Primary Water Supply System
# Komoka-Mt. Brydges Water Supply Upgrades

Middlesex Centre and Strathroy-Caradoc, Ontario, Canada

In order to address water quality issues with existing groundwater based systems, Stantec undertook a series of complex projects involving five contracts to provide safe drinking water to two communities from the Lake Huron Primary Water Supply System.

The Lake Huron Primary Water Supply System constructed a new water supply system to provide a reliable and safe long-term water supply to the communities of Kilworth-Komoka in Middlesex Centre and Mt. Brydges in Strathroy-Caradoc. This project was required to address security concerns attributed to the existing groundwater supply systems in both communities.

The project included the design, tender and construction of the new Pump Station #4, located adjacent to the 110 megalitre Arva Reservoir near London. Construction of this new station involved new connections to 2 of the 4 cells of this 45 year old reservoir, while maintaining operations of the adjacent City of London Pumping Station which supplies up to 75% of the City's water supply. The new station has a pumping capacity of 15 MLD and includes three sets of duty and jockey pumps as well as a transient protection system. Two automated remote control stations control flow to the two municipalities.

The water transmission main project involved the design, tender and construction of 29 km of watermain of up to 450 mm diameter pipeline and involved approximately ten (10) trenchless crossings totaling over 1300 m.

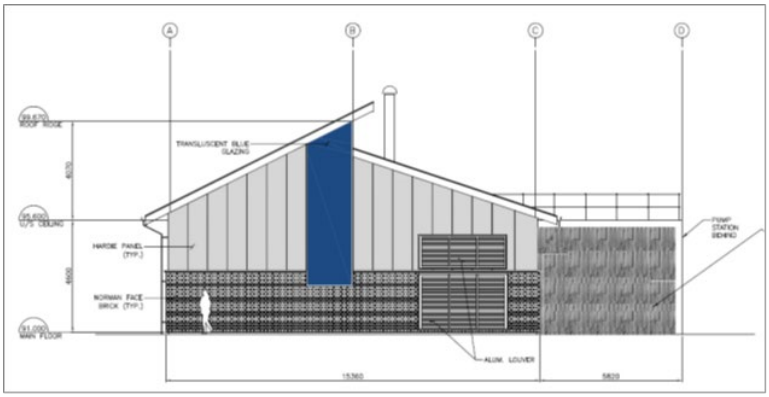
Stantec assisted the owners in overseeing the commissioning of this supply system involving five contracts and three operational jurisdictions.

Client: Lake Huron & Elgin Area Primary Water Supply Systems
Completed: 2010
Cost: CAD 16,500,000

# EPCOR White Rock Pumping Station and Reservoirs

White Rock, British Columbia, Canada

This design covers water system upgrades including the disinfection system, new reservoirs, instrumentation and controls and the associated water distribution system and pumping upgrades for EPCOR's White Rock water utility at the Oxford site, Merklin site and High Street well. The existing water distribution network consists of two pressure zones: a high zone 143 m and a low zone 103 m. The upper zone is serviced by a post-tensioned standpipe reservoir (on Merklin Street) which is seismically deficient and will be replaced by a new buried reservoir.



The addition of two water reservoirs: one at Oxford Street and one at Merklin Street will buffer the projected water demand in 2031 and will enable effective virus disinfection due to the required CT value. The reservoirs design incorporates baffle design that is optimized through CFD modeling.


New booster pumps are added at each site and new disinfection system consisting of sodium hypochlorite will be required. Pre-chlorination will achieve 4-log virus removal, while post-disinfection will allow to meet free chlorine residual required by Fraser Health Authority. Design layout was optimized to minimize tree removal (over 75% of trees saved). The reservoir elevation and wall thickness were optimized to achieve substantial cost savings. In addition, due to proximity of residential building the reservoir walls will incorporate form liner pattern that will increase the aesthetic appearance of the structure. Project is tendered in two phases to allow uninterrupted water system operation and to achieve full water disinfection by June 30, 2016.

Client: City of White Rock
Project Duration: 2012-2016
Cost: CAD $10 Million

# William Street and Strange Street Water Supply Systems

Kitchener & Waterloo, Ontario, Canada

The William Street and Strange Street Water Supply Systems (WSS) are part of the Region of Waterloo's (Region) Integrated Urban System (IUS). The facilities currently supply treated water to two separate pressure zones, the William Street WSS supplies Waterloo Zone 4 (WAT-4) and Strange Street supplies Kitchener Zone 4 (KIT-4).


The Region of Waterloo's Water Supply and Distribution Operations Master Plan (Stantec, 2012) recommended the combined treatment of raw water from both sites. A subsequent Schedule C Municipal Class Environmental Assessment determined that raw water from the William Street Well Field should be conveyed to a new water treatment facility for the combined treatment of iron and manganese removal. Stantec provided engineering services to the Region of Waterloo for the detailed design, site inspection and construction administration of the construction of a new greensand filtration plant. Substantial completion was granted in January 2022. The total constructed cost of the facility was $18.5 Million.

The new treatment plant is designed to treat between 65 and 250 L/s from 10 separate groundwater wells throughout the cities of Kitchener and Waterloo and target effluent concentrations below the government of Canada's aesthetic objectives for iron and manganese. The plant consists of a pre-oxidation influent tank, three parallel greensand filters, baffled effluent tank and directly feeds the Region of Waterloo's distribution system. The plant is fully automated and designed to operate with minimal supervision from the region's central SCADA desk.

An innovative well blending model that varies well source flowrates to target consistent influent water quality was developed for this project. Design staff also developed the backwash program and implemented in the native plant PLC rather than a filter supplied control system. A unique backwash decant system has been implemented to recycle settled backwash water, greatly reducing the overall facility operational costs.

Client: Region of Waterloo
Project Duration: 2017 – January 2022
Cost: CAD 18,500,000

# Burke Water Station Upgrades

Guelph, Ontario, Canada

Integrated solutions at the Burke Station will improve water quality and increase storage capacity while preserving the nearby natural wetland forest.

Stantec provided engineering services for a facility assessment, Class Environmental Assessment (EA), equipment pre-selection, detailed design, and contractor preselection for upgrades to the Burke Water Station in the City of Guelph. The project will add iron and manganese removal to the station through three pressure filters, as well as provide additional monitoring and control, additional below grade storage reservoir, and booster pumping capacity.

The Stantec team analysed existing site conditions, operational constraints, residuals handling, potential grants, energy efficiency, sustainability and integration into the community, and innovative opportunities in order to deliver quality results offering major capital cost savings to the client. We worked closely with various stakeholders to determine an optimal solution for all involved including protection of nearby residences, provisions for a future City trail, protection of nearby wetlands and groundwater supply, and environmental constraints.

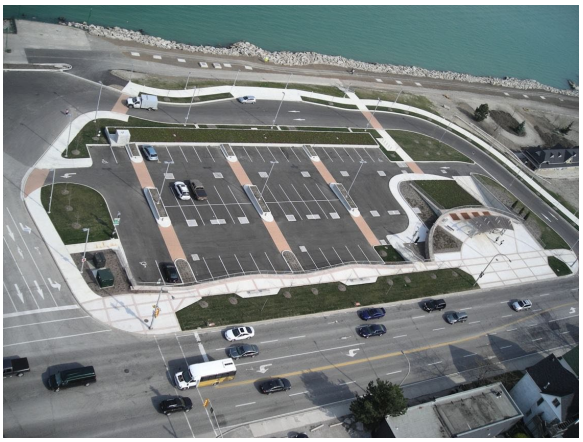
This equipment was pre-selected to allow for a detailed evaluation selection based on technical and cost factors, resolve long delivery timelines which would increase the cost of construction, and improve the final design. The project tendered in March 2017. The $5M construction contract successfully achieved substantial completion in April 2019.

Client: City of Guelph
Completed: 2012
Cost: CAD 5,000,000
Size: 678,000 $m^3$/day

# Windsor Retention Treatment Basin and Tunnel Sewer

Windsor, Ontario, Canada

The largest facility of its kind in the world, the Windsor RTB is helping to clean the Detroit River, an identified Area of Concern by the Canada and United States International Joint Commission on Great Lakes Water Quality.



Fish and wildlife population loss, beach closings, drinking water restrictions – all illustrate the Detroit River's significant environmental degradation. To help address this issue, the City of Windsor and Stantec developed and implemented a high-rate Retention Treatment Basin (RTB), believed to be the first of its kind in the world.

In Windsor's downtown riverfront area, space to accommodate a conventional combined sewer overflow storage and treatment facility was extremely limited, thus requiring a space saving solution. With the University of Windsor providing scientific input to support our engineering design, we developed criteria for designing and constructing high-rate RTB facilities that require only 15% of the footprint of a conventional facility.

It consists of a 1,650 mm to 2,250 mm diameter consolidation/conveyance tunnel that collects, stores, and conveys combined sewer overflows over a length of 2,400 meters at depths up to 9 meters to a chemically enhanced 680 MLD high-rate RTB facility with polymer flocculation. It also includes a 7,850 L/s influent pumping station with four identical screw pumps. The RTB is an underground concrete structure with a prestressed/precast concrete slab roof consisting of 12 (36.9 m x 4.75 m x 3.55 m) storage/treatment cells with a total storage capacity of 8,000 $m^3$. It sits below grade under a new parking lot. The smaller footprint addresses community concerns regarding visual impacts while the higher quality discharge satisfies the concerns of downstream stakeholders.

Client: City of Windsor
Completed: 2012
Cost: CAD 60,000,000
Size: 678,000 $m^3$/day

# Hidden Valley Reservoir

Kitchener, Ontario, Canada

Our team conducted a condition assessment for a 25 year old open-water reservoir and low lift pumping station.

Stantec completed a condition assessment of the Hidden Valley Reservoir and the Hidden Valley Low Lift Pumping Station. The facilities were constructed in 1990 and the assessment is required to identify existing deficiencies and to allow for capital budget planning for anticipated repairs and/or replacements in the coming years.

Multi-discipline site reviews were completed to assess the current condition of structural, architectural, process mechanical, HVAC mechanical, and electrical infrastructure and equipment.

The Low Lift Pumping Station consists of a raw water intake, travelling screens, channel gates, large submersible pumps, 600 mm diameter valving, associated electrical equipment, and a building structure. The raw water reservoir consists of a four cell reservoir constructed with an HDPE liner over earthen berm with concrete channels and valve chambers for directing flows.

Client: Region of Waterloo
Completed: 2014
Cost: CAD 35,000

# Seymour Capilano Filtration Plant

North Vancouver, British Columbia, Canada

Stantec provided design and construction services for the 1800 ML/d Seymour Capilano Filtration Plant. This project included the preparation of multiple technical memoranda covering a variety of technical topics relevant to the project implementation. Triple bottom line assessments and multiple workshops were held with Metro Vancouver engineering and operations staff. A number of technical options were evaluated using NPV techniques to arrive at the best value selection of technology for various process elements. The project included extensive integration of Metro Vancouver sustainability objectives into the overall design. It is anticipated the Operations and Maintenance Centre will achieve LEED® Gold and is only several points short of obtaining LEED® Platinum certification. As part of this project corrosion control facilities were designed using hydrated lime to increase the overall alkalinity and pH of the treated water. This is an important consideration in assessing the options for nitrification and ammonia control at the Seymour plant. Other resource recovery options incorporated into the design include use of ECOSMART concrete, reclamation of backwash water and geothermal heating and cooling. This project was delivered on budget in 3 major construction contracts and over 30 procurement contracts. A sustainable approach was used for the design and construction of the entire plant and site. This facility is a landmark project in terms of sustainable delivery of public infrastructure in North America.

SSBV Consortium

SSBV Consortium

This project is the largest treatment plant in North America where a sustainable design approach has been implemented. The project demonstrates recent experience working with Metro Vancouver staff to achieve consensus on complex technical issues. It also demonstrates our recent experience with Metro Vancouver engineering standards.  Seymour Clearwell Reservoir capacity is 200.0 ML. This is a 110 m x 140 m x 9m high concrete reservoir.

Client: Metro Vancouver
Project Duration: 2002-2010
Cost: $420 Million
Size: 200 Volume (MLiters)

# 5 Project Understanding, Approach and Methodology

## 5.1 Understanding of Requirements

The water distribution system within the Town of Amherstburg (Town) consists of a treatment plant, reservoir, and elevated storage tank. Raw water, which supplies the Town of Amherstburg, is drawn from the Detroit River and is treated at the Town of Amherstburg Water Treatment Plant (AWTP). The plant has a rated capacity of 18,184 $m^3$/d. Water storage in the Town's distribution system consists of a reservoir at the treatment plant that has a rated capacity of 14,900 $m^3$ and an elevated water tower located on Thomas Road with a capacity of 2,273 $m^3$.

In a single source system such as Amherstburg's, it is desirable to have sufficient storage capacity within the distribution system in the event of a failure at the water treatment plant. Currently, the existing elevated water tower can only provide between 1 to 9 hrs of servicing, depending on demand and water levels at the time of failure. Therefore, the upgrades of the water storage reservoir are needed to provide the Town with sufficient storage for future demands, creating operational flexibility and redundancy.Stantec Consulting Ltd. (Stantec) is pleased to respond to this Request for Proposal (RFP) for Professional Services to provide full Engineering Services mainly for the following work at the AWTP for the Town:

- The design and construction of a new 7,000$m^3$ potable water reservoir. The new reservoir will need to be constructed with a connection to the clearwell prior to rehabilitation works being completed on the existing reservoir.
- The rehabilitation of existing 14,900$m^3$ potable water reservoir. Works included in the rehabilitation will be to separate the reservoir into two (2) equal cells to allow for operational flexibility.

This proposal also includes the other works below:

- Revision of yard piping to suit new reservoir.
- Analysis of water movement and usage to ensure appropriate contact time (CT) is achieved in all operational scenarios and operational flexibility is achieved.
- Interconnections between reservoir cells and the clearwells.
- Additional piping or process changes inside the building to accommodate the new reservoir.

As requested, our proposal includes a $50,000 contingency for any out of scope engineering works that is required after the initial proposal is approved. We have assembled a team of professionals with a high level of commitment, enthusiasm, and experience to meet the specialized technical modeling and solutions requirements of this project.

This proposal outlines Stantec's team experience and approach for completion of this project. Stantec has completed a number of similar assignments and are familiar with the Town's water system. **Table 5.1** below outlines the benefits of the Stantec proposal.

**Table 5.1 Features and Benefits of the Stantec Proposal**

| Features | | | Benefit |
|---|---|---|---|
| ✓ | Site Familiarity | ⇒ | No learning curve and good working relationship with Town. Over 60 years of experience on the plant site. |
| ✓ | Experienced Team | ⇒ | Proposed Team has completed numerous similar projects within not only Windsor – Essex County, but also all over Canada. |
| ✓ | Community Sensitivity | ⇒ | Stantec has designed many infrastructure projects in the built up developed communities. |
| ✓ | Sustainability | ⇒ | Stantec are leaders in Sustainable Design. |
| ✓ | Thorough Technical Work Plan | ⇒ | Our work plan will address the technical challenges of this assignment. |
| ✓ | Resources | ⇒ | Stantec has the resources in house to complete your project. |

| Features | | Benefit | |
|---|---|---|---|
| ✓ | Schedule | ⇒ | We can meet your schedule. Our local office resources are unmatched by any other consultant. |

Through our involvement with many reservoir projects, Stantec has developed a clear understanding of the challenges involved with this project. Based on our review and our team's extensive experience, we have compiled a preliminary list of considerations and success factors to be evaluated for implementation with this project, as detailed below. Project Approach

Our approach is based on taking the time necessary to frame out the project during the five (5) phases including

- Preliminary design,
- Detailed design,
- Tender,
- Contract administration, and
- Post construction plant process evaluation.


Once the design criteria are agreed upon and the preliminary design is developed and discussed in detail with the Town, the design is "frozen" and contract documents are prepared, where all the members of the design team are working toward a well-defined common goal. Furthermore, planning of the construction staging is undertaken during the preliminary design design stage to ensure that the various facilities maintain an operational state while construction is ongoing. The proposed upgraded works will create a disruption to plant operations and our planning work will work to mitigate that disruption and ensure the plant continues to meet the needs of the residents of Amherstburg.

This approach requires Stantec to develop and implement staging and sequencing procedures to ensure construction work would connect and coincide with existing facilities at the proper time. Special construction sequencing with temporary measures will be required to redirect flows during construction. This sequencing requires complex tie-ins to redirect flows during extended periods without interfering with the continued operation of the existing treatment facilities.

To meet project schedule and budget, the project management team will develop a multi-task approach to carry out the preliminary and detailed design and administer the construction using a full complement of engineers, technologists, inspectors, contractors, and suppliers while meeting all regulatory conditions. Project team members will be conducting regular meetings to resolve issues and conflicts quickly in order to maintain project schedule.

## 5.2 Potential Risks

Stantec has developed a short form draft Risk Register for this project in **Table 5.2**. The risk register will track the critical project elements which could impact project scheduling, cost, and quality. Additional project risks will be added, and mitigation measures developed as the project design progresses.

**Table 5.2 Short-Form Draft Risk Register**

| Risk | Potential Mitigation Measure |
|---|---|
| Disruption of Plant Operation | Working with the Town/OCWA Operations to actively inform the operation staff on the schedule and potential impacts of Construction. |
| Construction Delays | Proper QA procedures during design, constructability reviews, advance scheduling |

## 5.3 Key Project Issues

For the scheduling of these operationally sensitive works, we plan to have extensive meetings with Town/OCWA staff to develop the preferred staging approach while minimizing the impacts on plant operations. Key issues for the successful delivery of this project are listed in **Table 5.3**.

**Table 5.3 Summary of Key Project Issues**

| Issue | Approach to Resolution | Benefit to Client |
|---|---|---|
| Provide project management to coordinate design team, Town, OCWA, and contractors | • Available and committed project management team.<br>• Reservoir experience on project management team. | • Low risk.<br>• Familiarity with Client procedures<br>• Established defined project management procedures. |
| Define design criteria | • Evaluate options for reservoir design based on implementation costs, performance, and flexibility in operations.<br>• Comply with regulatory requirements | • Confirm design approach with Town to seek consensus.<br>• Use knowledge from other relevant projects to benefit Town |
| Construction Staging and Reservoir Commissioning | • Develop sequencing plan.<br>• Review construction “lessons learned” from previous projects.<br>• Provide regular opportunities for communications and coordination.<br>• Have qualified staff on-site | • Minimize disruption to operations.<br>• Expedite implementation of construction works.<br>• Schedule critical tie-ins or installations.<br>• Minimize Town administrative effort.<br>• Meet or exceed Client’s expectations.<br>• Quality project delivered on time and on budget. |
| Manage capital cost | • Develop practical and constructible design, subject to constructability review.<br>• Eliminate unnecessary items and mitigate risk via Value Engineering Workshop.<br>• Provide cost opinions with tender package submittals. | • Lower capital costs.<br>• Interpret what the cost opinions mean in terms of what is – and is not – in the capital cost budget.<br>• Understand financial impacts of decisions. |
| Deliver Project | • Participation of key design team members at project meeting and value engineering workshops to communicate key concepts. | • Seamless project delivery.<br>• Cost savings linked to schedule savings. |

## 5.4 Permits and Approvals

Stantec will lead all permitting and approvals and will engage review agencies early in the design to confirm permitting and approval requirements. Anticipating agency information requirements, expectations and timelines, and monitoring the project schedule is critical to obtaining necessary permits, maintaining regulatory compliance and achieving the project schedule. Stantec provides a single point of responsibility for all permits and approvals, consolidating input from environmental specialists as well as technical input from detailed design teams. Key activities required to successfully complete the permitting and approvals program include review agency pre-consultation, following respective agency guidelines, regulations and manuals (e.g., MECP PTTW procedure manual, Site Plan guidelines, MECP Design Guidelines, CA Act in relation to ERCA approvals), building milestone reviews into project schedule, and delivery of complete /consistent application submissions and tracking. Regular contact with the respective agency will also be undertaken to confirm that there are no outstanding issues holding up their approvals process. To achieve this, specific work breakdown structure tasks will be defined and linked to each permitting approval stream schedule. A permit and approvals tracking table will be developed to document permitting, communication and status.

Upon project commencement, agency pre-consultation meetings will be held to present proposed construction methods, scope issues and confirm submission requirements and timelines. Ongoing meetings, discussions and coordination with approval agencies will form an integral component of the approval and permit process and will ensure that all required approvals are obtained prior to or on completion of Detailed Design and prior to tendering of all packages. For each agency approval, specific schedules will be established that take into account time to complete supporting work, agency meetings (including pre-consultation), agency processing timelines and tender and construction timelines. Our strategy for ensuring a rapid approvals process includes:

- Pre-consultation with applicable regulatory agencies;
- Quick start meetings and ongoing discussions and coordination with each of the applicable regulatory agencies and utilities;
- Immediate development of and strict adherence to a specific permit and approvals schedule;
- Advancing the detailed design at critical crossing locations;
- Detailed tracking of all required permits and approvals and associated applications; and
- Ongoing coordination with Town to obtain permission to enter privately owned lands.

Through ongoing consultation and communication, Stantec will confirm all approvals and permits required for the successful completion of this project. Following 60% design, application packages will be developed for review by Town, prior to submitting to the applicable agencies. Once the application packages have been reviewed and approved for submission by Town, we will ensure the full completeness of the process through formal submission, to obtaining final approvals/ permits from regulatory agencies. The team will record and track all required approvals and associated applications and a status report of all applications for approvals will be submitted to the client on a monthly basis. We have a proven track record in obtaining permits and approvals from all the identified agencies.

## 5.5 Reservoir Commissioning

A significant challenge with this project is the ability to commission the reservoir. All reservoirs should be disinfected in accordance with the MECP requirements and tested prior to being placed back into service following any maintenance or repairs. Piping associated with reservoirs will require to push swabs, undertake chlorination, and pressure testing. Common disinfection methods including

- Fill reservoir with potable water with a free chlorine residual of not less than 10 mg/L at the end of the prescribed retention period. Or
- A solution of 200 mg/L available chlorine shall be applied directly (brush or spray) to the surfaces of all parts of the reservoir that is in contact with water.

Chlorinated water is not allowed to be released directly to a surface water body. Chemicals (i.e. sodium bisulphite, sodium sulphite and sodium thiosulphate) are typically used to de-chlorinate. The choice of chemical is dictated by site-specific issues such as the strength of chlorine, volume of water release, and distance from receiving waters.

We recommend undertaking reservoir disinfection by applying 200 mg/L available chlorine directly by brush or spray to the surfaces of all parts of the reservoir that is in contact with water. Doing so eliminates the need for a significant amount of water. Chlorination can then be conducted using water at a much slower intake and discharge rate that can be supplied by local watermains and disposed of in the local sanitary sewer system. Intake and discharge will be documented in the commissioning plans as this plan will be reviewed and discussed with Town/OCWA at the early stages of the project as these plans will need to be carefully considered in conjunction with the construction phasing.

## 5.6 Approach to Project Management and Cost Control

Stantec's Project Manager, **Susan Alarcon**, will ensure that the project is carried out in accordance with RFP requirements, our schedule, and our detailed work plan/time task breakdown. Early development and implementation of tracking logs, schedule, and time task breakdown are critical to successful project delivery. Stantec provides the following steps to ensure that this project is delivered on budget and schedule, and to the Town's satisfaction:

- Coordinate activities of the Team through weekly review of schedule and budget to ensure adequate resources are allocated and to identify potential slippage in budget or schedule.
- Schedule meetings (as required) with key Team members to plan the month ahead and ensure we meet interim targets. Team members will be encouraged to stay ahead of schedule so any unplanned delays or additions to the program do not compromise the overall project delivery.
- Project status meetings with Town/OCWA, in accordance with the RFP. Meetings will involve comparison between baseline and actual schedules and budget to determine performance. Minutes will be provided within five calendar days of the meeting.
- Invoicing for this project will be completed on a monthly basis.
- Monthly progress updates will be provided with invoices. This will enable both Stantec and Town to stay informed of the project status and budget and eliminate the potential for unexpected budget exceedance.
- Stantec has allowed for a complete internal review within our Work Plan and Schedule ahead of all design package submissions. These reviews will be presented to the Town in QA reports (submitted with Monthly Progress Package) that will be documented and filed in case of future auditing of the QA/QC process.
- Stantec will work to maintain a cooperative and strong relationship with the Town/OCWA and the successful Contractor, to work together as project partners to achieve the project goals.

### 5.7 Approach to Health & Safety

With any project, Health & Safety is the first priority for Stantec. We are committed to providing and maintaining a healthy and safe workplace, and to responsibly manage all environmental aspects of our business and projects. At the outset of the project, we will develop a Risk Management Strategy (RMS) form identifying potential risks associated with the project site. Based on the risks identified, additional controls may be implemented. We acknowledge our awareness of the Accessibility for Ontarians with Disabilities Act and are in compliance with our obligations under the Act.

### 5.8 Quality Assurance/Quality Control (QA/QC) Program

In addition to our formal quality management system in use across the organization which is registered to the ISO9001:2015 Quality Management standard, our Project Team will specifically provide the following QA/QC tasks as part of the project led by our overall QA/QC Leads, **Oliver Ng (Structural)** and **Tony Berardi (Process)**:

- Development of QA/QC and issues tracking tool to be utilized throughout the project – this tool will be presented and discussed at the Project Kick-off Meeting and will be used to ensure that all QA/QC presented in this proposal and discussed at Project Meetings are completed. QA/QC tracking items will be developed and refined in Project Meetings. The tool will also track issues raised during the design process.
- Review of documents – Stantec has allowed for a complete independent review within our Work Plan, including the Preliminary Design and Final Tender Packages by **Stephen Tsui (Structural)** and **Harold Horneck (Process)**.
- After the Town's review of each submission, our Project Manager **Susan Alarcon** will review the quality of the submissions with Town staff to ensure a high level of quality.
- During tender preparation, Stantec will develop a complete Contractor Submittal List, which can be presented at the pre-construction meeting, and be used to ensure that the Contractor has all submittals in place prior to start.
- All QA/QC documentation will be submitted to the Town and filed with Stantec in case of future auditing.
- Our QA/QC team will review and sign-off on all deliverables before they are provided to the Town.

## 6 Work Plan

The purpose of this project is to prepare engineering design drawings and specifications for the construction of a new 7,000m$^3$ potable water reservoir prior to the rehabilitation of the existing 14,900m$^3$ reservoir. The following provides a general outline of our work plan to successfully undertake this project. For each major task, we have highlighted the key decision points at each phase.

Our proposed Time Task Matrix (TTM) in **Appendix B** provides a detailed work breakdown structure. Regular project meetings will be scheduled on a biweekly basis upon Town's request to review the status of the project and discuss any scope or scheduling changes should they arise.

## 6.1 Preliminary Design

The purpose of the preliminary design phase is to define and map out the project for the subsequent detailed design. This is the time for exploring options with the Town, with the intent of collectively defining the preferred approach to the construction of new reservoir and rehabilitation of existing reservoir.

To start the project, Stantec will undertake a background review to capture existing information that will be utilized throughout the project. This is a critical task that will allow the team to consolidate and analyze background information. Required documents, data and reports will be requested in formal Requests for Information (RFI) presented at the project initiation meeting along with an Excel-based tracking sheet to aid the Town in gathering and consolidating the data. The Project Initiation Meeting will review the objectives, work plan and schedule; establish lines of communication for the project; and to obtain additional background information.

The preliminary design phase is considered crucial toward improving the efficiency of the project delivery by involving the Town and OCWA at an early stage of the design phase and therefore reducing the potential for design changes late in the project. During preliminary design phase, Stantec project team will facilitate the decision making process, calling upon the advice of the specialists as needed to work through some of the technical issues. Stantec will also meet with the Town and OCWA as part of the regular meetings to present and evaluate any alternatives for the various project components.

A value engineering workshop will be planned as part of the requirements for the preliminary design stage. This workshop will be facilitated by Stantec and attended by members of all stakeholders identified.

Preliminary Design will include, but not be limited to:

**1) Structural Design**

- Detail design of the new reservoir will be completed to OBC 2012 and in accordance with ACI 350 "Code requirements for Environmental Engineering Concrete Structures" and all related CSA standards. The new reservoir will be designed and detailed as a watertight structure.
- Distribution of forces over the roof structures, walls and foundation will be determined by both static and dynamic analysis, using the latest computer programs such as SAP2000. Material type, size and capacity of new and existing structural members and connections will be evaluated, including existing reservoir walls for re-use as common walls. Structural members will be designed for finite element model shear stresses, flexural stresses, tension stresses, torsional stresses, and deflection results using engineered spreadsheets, finite element design software, and hand calculations. All concrete designs will incorporate the minimum reinforcement requirements of ACI 350 and CSA A23.3 to achieve watertight concrete.
- Items investigated during the design will include reservoir construction joints, waterstops, waterproofing, access, maintenance requirement, security, safety, and ventilation. Factors such as constructability, costs, durability, aesthetic, availability of materials, and adaptability to the site layout will also be considered and compared.
- An independent peer review of the reservoir structural calculations and drawings will be completed by a senior structural engineer. All peer review comments will be documented. The design engineers will provide responses to all comments, and calculations and drawings will be revised accordingly. The final structural drawings will include:

    i) General notes covering all design criteria, design assumptions, design loads, foundation and excavation notes, and material notes (concrete, steel, aluminum, etc.)

    ii) Waterstop / waterproofing details, reinforcement details at foundation slab / wall / roof intersections, reinforcement details at openings, hatches and exterior waterproofing details.

    iii) Recommended construction joint location drawings

    iv) Reservoir plan and section drawings

v) Reservoir reinforcement details, miscellaneous metal details, and exterior waterproofing details.

vi) Existing reservoir new interior wall plan, sections, and details.

vii) Relevant structural specifications will be prepared

**2) Civil Design**

- Carry out the civil / site design including the access road and prepare site grading and drainage plan, typical sections and details, fencing layout and details drawings
- Revision of yard piping to suit new reservoir
- Rerouting existing site drain to accommodate new reservoir

**3) Process Mechanical Design**

- Hydraulic analysis of water movement and usage to ensure appropriate CT is achieved in all operational scenarios and operational flexibility is achieved
- Mechanical design for the reservoir will include reservoir piping, valving, baffles, connections to, provision for the connection, to the existing water mains and valve chamber, connections to new valve chambers, hydraulics, and operation sequence.
- Interconnections between reservoir cells and the clearwells.
- Additional piping or process changes inside the building to accommodate the new reservoir
- Upgrade chlorination and associated mechanical, instrumentation and control equipment accordingly.

**4) Electrical and Instrumentation Design**

- The detailed design activities will result in design drawings and specifications detailing the reservoir site layout for EIC, the communications details for construction, and the security layout and location of cameras and method of wiring.
- Support drawings will include the electrical single lines, the cable schedules, lighting schedules and all control system panel detail drawings.

**5) Geotechnical Investigation and Excess Soil Management**

Stantec will be collaborating with geotechnical subconsultant WSP for the completion of the geotechnical requirement during the preliminary design phase. The subconsultant will also work alongside Stantec during the construction phase to collect and test soil samples to ensure project compliance with the Excess Soil Management O. Reg. 416/19.

**6) Archaeological Assessment**

It doesn’t appear archaeological information is available for the potential new reservoir site. Based on our project experience with infrastructure projects in the region, Stage 1 archaeological assessment is recommended for this project. Although archaeological Assessment is not specified in the RFP, our fee includes professional services for Stage 1 archaeological assessment. Our fee doesn’t include any Stage 2 archaeological assessment. Stage 2 assessment would be required if the site is identified as retaining archaeological potential.

**7) Risk Assessment**

A typical risk assessment process involves identifying risks related to a project, quantifying and prioritizing the risks, and developing mitigative strategies to deal with those risks. Risk analysis may be undertaken during many phases of a project, and at many different times within the individual project phases. For this project, we believe that the most beneficial time to conduct risk assessment is immediately following the preliminary design stage. The reason for this is that project capital costs, procurement planning, long delivery items, existing infrastructure tie-ins, construction sequencing, commissioning, etc. are important when considering overall project risks. These components will not be thoroughly defined until the end of preliminary design.

Stantec will organize a risk mitigation review, in conjunction with the value engineering workshop, to identify risk and brainstorm mitigative measures. Minutes of the workshop will be documented, and implementation of mitigative measures will occur over the remaining phases of the project.

**8) Contract Delivery**

- Development of preliminary project procurement strategy, including construction staging and construction scheduling.
- Develop construction methodology plan.

**Deliverables:**

Pre-design report summarizing the Preliminary Design as identified above, will be prepared. After submission of the pre-design report, Stantec will meet with the Town to present, discuss and evaluate its contents. Meeting notes will also be provided as a deliverable.

## 6.2 Detailed Design

Pending approval of the preliminary design, Stantec will generate 50%, 75%, 90% and 100% detailed design packages to include drawings and technical specifications. The primary objective of Detailed Design is to produce drawings and specifications to a professional standard that are sufficiently detailed for Contractors to tender the project without requiring excessive refinements or modifications during construction.

A value engineering workshop will be held at the 75% design stage. This workshop will be facilitated by Stantec and attended by members of all stakeholders identified. The intent of this workshop will be to review components of the 75% design where value added changes may be made.

Stantec will assist the Town with applicable approvals application pertaining to the works covered under this project. Application documents including drawings and technical documentation will be prepared for Consolidated MOE Certificate of Approval applications.

**Deliverables:**

- Prepare engineering design drawings (inclusive of all general arrangement drawings, P&IDS, hydraulic profile, loop drawings, data sheets, etc.) and supporting technical specifications conforming to Town standards.
- Assist the Town in preparing front-end commercial terms and supplementary general conditions for the contract package.
- Design drawings using AutoCAD. Specifications will be generated in Microsoft Word.
- 50%, 75% and 90% design submissions and respective review sessions with the Town.
- Tendering drawings and technical specifications.
- Opinion of probable cost.
- Update procurement strategy and schedules.
  - Identification of long delivery items to meet construction schedule and budgets, and issue pre-selection contracts as required.
- Arrangement of all applications and necessary approvals and permits from all involved regulatory bodies (Ministry of Environment, Conservation and Parks, Essex Region Conservation Authority etc.).

## 6.3 Tendering

During the Tendering Period, Stantec will provide the following services:

1) Support the Town in the Tendering process

2) Assist with issuance of tender documents

3) Attend pre-bid walkthrough and respond to technical questions

4) Answer bidder questions and prepare addenda as required

5) Assist the Town in evaluating all submitted tenders and provide recommendation of award

## 6.4 Construction Services

**1) Pre-Construction Meeting**

After award of the contract, a pre-construction meeting will be held with the Contractor, Town, and Consultant. This meeting is an important step in ensuring the work is properly organized. Some of the key items to be discussed and/or reviewed during this meeting include:

- Responsibilities under the contract.
- Requirements of the contract.
- Site safety requirements, designated safety officer, safety meeting frequency and reporting procedures. The Town/OCWA Safety Administrator is to attend this meeting.
- Contractor's proposed work schedule and procedures.
- Importance of timely completion and phasing of the work in consideration of plant constraints and other work ongoing on the plant site.
- Coordination with ongoing plant operations.
- Project communications and authority of individual personnel.
- Plant operation and regulatory requirements.
- Tie-in and shutdown procedures.
- Construction meeting schedule.
- Temporary site facilities, the location of equipment lay down areas, site access, site security and traffic limitations.
- Environmental protection and regulatory requirements.
- Change management and methods of handling progress payments.

**2) General Engineering Services**

Stantec's project team will oversee all general engineering services for the duration of the work. In addition to the list of services provided in the RFP, we will be providing the following services:

- Conducting bi-weekly construction site meetings until project completion.
- The provision of technical support to the Resident Engineering staff and to the Contractor.
- Assess and facilitate requests for changes of materials or methods.
- To review and validate Contractor progress payments and prepare progress payment certificates.
- Take actions as necessary to ensure construction proceeds on schedule and on budget.
- Review of the Contractor's detailed construction schedule to facilitate tracking of the work.
- Shop drawing reviews.
- Periodic site visits and inspections to ensure the work is in general compliance with the Contract Documents.

- Preparation of change orders and payment certificates and all other documentation to satisfy the contract requirements.

**3) Resident Engineering**

The Resident Engineering staff will be responsible for ensuring the Contractor is performing the work in accordance with the contract documents. In addition to the list of services provided in the RFP, we will be providing the following services:

- On-site monitoring of the work to ensure compliance with the contract documents.
- Act on behalf of the Town and protect the Town's interests.
- Arrange for and evaluate necessary field testing of installed materials and equipment.
- Preparation of field orders and change notices.
- Preparation of progress reports and maintenance of a job diary.
- Recommend actions to ensure construction proceeds on schedule and on budget.
- Participate in all site construction meetings.
- Ensure Stantec's compliance with site safety regulations, regulatory requirements and restrictions.
- Assist the Contractor in the development of a shutdown and tie-in schedule and coordinate the necessary approvals with OCWA staff.
- Maintain a set of construction photographs.
- Complete inspection of the final works and the preparation of deficiency list.
- Organize site files and records.

## 6.5 Post Construction Services

**1) As-built drawings**

As-built drawings in the following formats will be provided within 45 days of substantial completion of the contracted works:

One full-size set

a) Electronic in PDF file format in full-size

b) Electronic AutoCAD drawings in .dwg format. Drawings must be AutoCAD Lite compatible.

c) Electronic files must be submitted on a USB memory stick. File types (PDFs, AutoCAD files, etc. must be in separate file folders clearly indicating the contents.

**2) Operations and Maintenance Manuals**

Well in advance of commissioning, Operations and Maintenance (O&M) manuals will be prepared by the Contractor. O&M manuals, in the hard bound form, will be developed in accordance with WTP standards. The Contractor will lead this effort, with input into the operational components and reviews provided by Stantec. These manuals will be submitted to the Town/OCWA for review at least four weeks prior to start-up.

**Plant Operations Manual**

The operating descriptions prepared over the course of Detailed Design will be incorporated into an electronic copy of the existing plant operations manual. This integration will include those sections of the existing manual affected by the work of this project.

**3) Operator Training**

Consultant Team, Contractor and supplier representatives will work with the WTP operations staff during the start-up and commissioning period to train WTP personnel in the necessary O&M procedures.

**4) System Commissioning and Performance Testing**

This task assumes that commissioning will follow a similar format to past Town Projects and include:

- Preparation of a Commissioning Plan.
- Assist Contractor effort of control system programming through preparation of operating description and control system philosophy documentation.
- Operational and Performance Testing.
- Assist Town/OCWA during commissioning.

**5) Final Inspections**

Following construction and start-up, all work will be inspected with the Contractor and Town/OCWA staff and final deficiency lists completed. Upon completion of the rectification of deficiencies, the Consultant will recommend that the Town issue a Construction Completion Certificate.

**6) Record Documents and Contract Closeout**

Upon completion of the work, “as-built” drawings will be prepared using the Contractor’s “red-line” mark-ups and in accordance with Town Standards. The printed and PDF copies of “as-built” drawings will be submitted to the Town upon completion.

**7) Maintenance Period**

During the maintenance period, we will provide assistance as necessary to ensure that deficiencies in the work are resolved. During the maintenance period our Team will:

- Make one inspection during the maintenance period to monitor contract deficiencies in workmanship, materials or equipment and prepare correspondence informing Contractor of such deficiencies.
- In addition to the one maintenance inspection, our Team will participate in a final inspection and provide a letter identifying any deficiencies found together with recommended actions.
- Verify that all deficiencies arising during the maintenance period are properly corrected.
- Verify that noted deficiencies arising from the final inspections are properly resolved and prepare recommendations to the Town for the issuance of the Final Acceptance Certificate.

# 7 Project Schedule

## 7.1 Fees Schedule Time Task Matrix

A full detailed version of the Time Task Matrix can be found in **Appendix B** which provides a schedule of fees for all staff including individuals’ billable hourly rates and the expenses required for the project. We have reviewed your proposed RFP/contract terms and believe that should we be selected for this assignment, we will be able to conclude a mutually satisfactory contract with the Corporation of The Town of Amherstburg.

## 7.2 Project Schedule

The project schedule in **Table 7.1** has been developed to identify the timing of key deliverables and project milestones. Our team has developed the schedule to be realistic, while recognizing that time is of the essence in the delivery of this project. Our team understands that project schedule slippage can have many negative effects including issues with internal budgeting, increased tender costs depending on time of tendering, issues with sequencing of other proposed

works, etc. Stantec will notify the Town should major schedule changes expected. Our Proposed Project Schedule is provided below. A detailed Gantt Chart can be found in **Appendix C.**

**Table 7.1 Project Proposal Schedule**

| Task | Task Start | Task Complete |
|---|---|---|
| Project Initiation | January 2, 2023 | January 7, 2023 |
| Project Kick-off | January 7, 2023 | |
| Background Information Collection | January 2, 2023 | February 14, 2023 |
| Preliminary Design Report and Drawings | January 2, 2023 | March 3, 2023 |
| Design Period 50% Design Package | March 6, 2023 | April 14, 2023 |
| Design Period 75% Design Package | April 24, 2022 | May 26, 2023 |
| Design Period 90% Design Package | June 5, 2023 | July 7, 2023 |
| Tender Period | July 31, 2023 | September 1, 2023 |
| Construction | October 2, 2023 | June 28, 2024 |
| Maintenance Period | June 28, 2024 | June 27, 2025 |

# 8 References

**Table 8.1** lists a small sample of our vast experience on recently completed projects that are relevant in the Reservoir category. Specific project profiles for the projects listed, as well as some completed by the proposed project team have been added for information purposes following the table below

**Table 8.1 Project References**

| Client | Contact | Telephone | Email | Project Name / Brief Description | Duration of Contract/ Completion Date |
|---|---|---|---|---|---|
| Town of Essex | Kevin Gerard P.Eng., MBA, Director, Infrastructure Services | (519) 776-7336<br>ext. 1119 | kgirard@essex.ca | **Colchester Water Treatment Plant Reservoir Repair.** | Completed 2013 |
| Lake Huron & Elgin Area Primary Water Supply Systems | Billy Haklander, P.Eng., LL.M,<br>Capital Programs Manager, Regional Water Supply | 519-930-3505 ext.7006 | bhakland@huronelginwater.ca | **Komoka-Mt. Brydges Water Supply Upgrades**<br>The project included the design, tender and construction of the new Pump Station #4, located adjacent to the 110 ML Arva Reservoir near London. Construction of this new station involved new connections to 2 of the 4 cells of this 45 year old reservoir, while maintaining operations of the adjacent City of London Pumping Station which supplies up to 75% of the City's water supply. | 2017 - In January 2022 |
| EPCOR White Rock Water Inc. | Betty Icharia, Senior Manager, Regulatory Affairs | (780) 412-3414 | bicharia@epcor.com | **EPCOR White Rock Pumping Station and Reservoir**.<br>This design covers water system upgrades including the disinfection system, new reservoirs, instrumentation and controls and the associated water distribution system and pumping upgrades for EPCOR's White Rock water utility at the Oxford site, Merklin site and High Street well. | Completed 2014 |

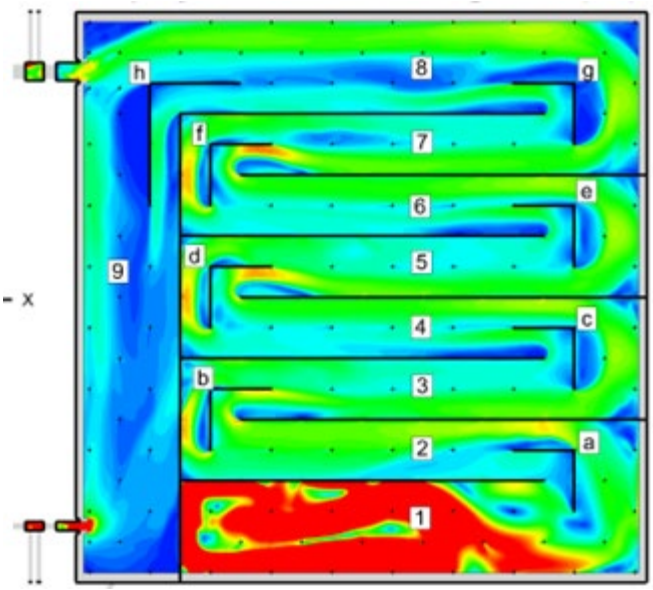
# 9 Added Value

## 9.1 Optimization of Potable Water Reservoir Water Circulation

Optimized configuration of potable water reservoirs is something Stantec has been actively involved with for many years. The addition of the proposed new reservoirs will increase the potable water storage capacity of the system. With that increase in storage capacity comes the additional challenge of ensuring that water does not become stagnant in the reservoirs as well as minimizing chemical addition required to maintain acceptable chlorine residuals within the reservoir.

**Challenges:**

Expand overall capacity of, and/or improve reservoir baffling for an operating potable water reservoir.




**Initiatives, Methods & Approach:**

- To assist in the optimization of existing and new potable water reservoirs, it is proposed to develop a CFD model for each reservoir. The main purpose of the CFD model will be to optimize baffle configuration and to minimize short-circuiting and dead space to offer better hydraulic mixing in the reservoirs. The CFD model will be developed by using ANSYS Fluent software.
- for each reservoir, the CFD model will run a baseline first with the existing or as-designed configuration, then two modifications. In total, three (3) scenarios will be completed for each reservoir.

Our fee includes CFD modeling to determine the baffle configurations in existing and new reservoirs.

## 9.2 Structural Condition Assessment of Existing Reservoir

The existing concrete reservoir was originally constructed in early 1970s. The structure is currently used as a finished water reservoir and has not been inspected and structurally repaired since 2012.

**Challenges:**

It's been advised by the OCWA that the existing reservoir is leaking. However, they can't quantify or determine the location and extent of the leak. Once the new reservoir is constructed, the existing reservoir can be taken out of service for assessment and repairs of the leaks.

**Initiatives, Methods & Approach:**

- Upon the completion of the new reservoir, the existing reservoir is to be drained, pumped dry, cleaned, and then inspected prior to separating the existing reservoir into two (2) equal cells.
- deteriorated concrete areas and cracks, which are likely a source of tank leakage, are to be repaired while the existing reservoir is being spitted into two (2) equal cells
- The reservoir repairs are to be included in contract specifications and drawings as provisional items. The contractor is to be paid based on unit price established in contract documents.

Our fee includes engineering services for concrete structural condition assessment and minor concrete repairs. Our fee doesn't cover engineering services for any major repairs of existing reservoir. Any major repairs of existing reservoir are not anticipated based on input received from the OCWA and our initial review of the record drawings.

# Appendix A - Curriculum Vitae

# Susan Alarcon P. Eng., P.E., ENV SP

Project Engineer
22 years of experience · Windsor, Ontario

Susan has 22 years of experience providing structural design for major water and wastewater facilities throughout Ontario. She specializes in the design of reinforced concrete tanks and shafts including aeration tanks, clarifiers, settling tanks, and pumping stations. Her technical expertise also includes structural design, condition assessment, and rehabilitation of buildings associated with treatment, including generator, blower, and administration buildings. She has provided condition assessment and rehabilitation design services for concrete structures, buildings, and architectural envelopes, and provided structural design and rehabilitation of bridges. Susan is also an experienced project manager who maintains a keen sensitivity for budget, schedule and project scope. She engages with her clients and team to develop solutions and deliver successful projects. Susan works effectively on multi-disciplined, complex projects to determine cost effective, sustainable, and constructible solutions. Her skill set additionally includes specification writing, contract administration services, and construction inspection.

## EDUCATION

B.As., Civil Engineering, University of Windsor, Windsor, Ontario, 1999

## REGISTRATIONS

Professional Engineer #100067223, Professional Engineers Ontario

Professional Engineer #6201056678, Michigan Society of Professional Engineers

## PROJECT EXPERIENCE

### WATER

Arnprior Water Filtration Plant Clearwell #1 Structural Review | Project Manager

Condition assessment of existing buried cast-in-place concrete water tank to determine the cause of leakage. Prepared report outlining potential causes and recommendations for tank repair.

F.M. Woods Pumping Station Upgrades | Guelph, Ontario | Structural Design Engineer

Design of structures including new addition to chlorine building with crane and aluminum platforms, new UV building with basement, crane and soil anchors and new valve chamber structure.
Existing reservoirs were inspected and assessed. Roof of reservoirs were modified to allow for additional access and roof was waterproofed after some concrete repair.
Coordinated design with process, mechanical, architectural and electrical design.

Tenth Line Pumpstation And Dual Forcemains | Ottawa, Ontario | Structural Design Engineer

Design of cast-in-place concrete 45 feet deep wet well/by-pass chamber. Design included steel cofferdam system.
Coordinated design with process engineers in Ottawa.

GCDC – Anthony Ragnone Treatment Plant | Genesee County Drain Commissioner | Genesee County, Michigan, United States | USD 11.6M | Structural Design Engineer

Provided structural and architectural condition assessment of treatment plant facilities including five major buildings and numerous concrete tank structures. Provided repair priority list to the County including estimated repair costs and proposed repair design and techniques. Extensive concrete repair, building façade repair, sidewalks, stairways and guardrail repair/replacement.

Paisley Road Reservoir Rehabilitation and Waterproofing Works | City of Guelph | Guelph, Ontario, Canada | CAD 855k | Structural Design Engineer

This unique project included the assessment, rehabilitation and strengthening of an existing potable water reservoir roof for use as a sports park. Included waterproofing and new concrete topping on existing roof and interior of the tank. Modifications to the structure included enlarging access hatch and new baffle wall.

## WASTEWATER

Ashbridges Bay Treatment Plant Aeration Upgrades Study | City of Toronto | Toronto, ON | 2018-2019 | Structural Lead Engineer

Susan completed a condition assessment and health and safety review for the aeration gallery structure. In addition, she also provided input related to structural ramification of potential upgrades to the existing aeration system and new blower and electrical buildings. The study included construction opinion of probable cost and construction sequencing.

Hespeler Wastewater Treatment Plant Secondary Headworks Upgrades | City of Cambridge | Cambridge, ON | Structural Lead Engineer

Susan completed the structural design of a new circular cast-in-place concrete clarifier tank, structural and architectural design of a new headworks/administration building, membrane thickener building and cast-in-place concrete MABR tank. (Involvement Timeline: 2012-2020)

Leamington Pollution Control Center Biosolids Upgrades | City of Leamington | Leamington, ON | 2016-2020 | Structural Design Engineer

Susan provided structural modifications to an existing biosolids building facility to repair existing walls and incorporate new process equipment. The project involved repair details for existing screw pumps.

Leamington Pollution Control Center Biosolids Upgrades | Leamington, Ontario | Structural Design Engineer

Structural modifications to existing biosolids building facility to repair existing walls and incorporate new process equipment. Repair details for existing screw pumps.

Port Stanley Wastewater Treatment Plant and Pumping Stations | Port Stanley, Ontario | Structural Design Engineer

Susan designed a circular tank bioreactor/ secondary clarifier with RAS/WAS pump station. She also assisted with the structural and architectural design of a one-story building to house a generator, public washrooms, and tourist information office.

Grand Bend Area Wastewater Treatment Facility | City of Grand Bend | Grand Bend, Ontario | 2013-2015 | Structural Design Engineer

Susan provided structural design oversight for the development of a new circular tank bioreactor and secondary clarifier with a RAS/WAS pump station at the Grand Bend Area Wastewater Treatment Facility.

New Kirkland Lake Wastewater Treatment Plant | City of Kirkland Lake | Kirkland Lake, Ontario | 2012-2014 | Structural Design Engineer

Susan provided design of a 1,394-square-meter circular tank bioreactor and secondary clarifier with a new RAS/WAS pump station in order to dramatically increase the daily capacity of the New Kirkland Lake Wastewater Treatment Plant.

Guelph Biosolids Upgrades | Guelph, Ontario | Structural Design Engineer

Susan designed a new 1,20-m2 transfer station building with a 7-m-deep pipe gallery. Structural design of two 25-m diameter by 5.4-m-deep below grade cast in place biosolids storage tanks. Both structures included rock anchor layout and design to prevent uplift.

Windsor Riverfront Retention Treatment Basin Facility | City of Windsor | Windsor, Ontario | 2009-2012 | Structural Design Engineer

Susan provided design of 2,230 square meters of underground cast-in-place and precast concrete tank, largest facility of its kind in the world. This project consisted of 12 storage treatment cells with stainless steel weirs and influent pumping station with four screw pumps, and a Micropile foundation system to resist high uplift pressure due to close proximity to Detroit River.

Oakville South West Wastewater Treatment Plant Phase 3 Upgrades | City of Oakville | Oakville, Ontario | 2007-2011 | Structural Design Engineer

Susan provided structural design of a influent flow splitting structure, a 4,274-square-meter concrete tank for primary settling, aeration, and final settling of wastewater.

Leamington Pollution Control Center | Leamington, Ontario | Structural Design Engineer

Design of dewatering facility addition including steel frame building, concrete structural platform, crane and foundations. Design of primary pumping gallery and 15 meter (50ft) dia. clarifier tanks, secondary pumping gallery and 20 meter (66ft) dia. clarifier tanks with rock anchor foundation system. Design of underground tunnel system and 25,000 square feet aeration tank. Project also included blower building, generator building and garage/workshop building.

Essex Sewage Works Upgrade and Expansion | Windsor, Ontario | 2004 | Structural Design Engineer

Susan designed structures to facilitate the process equipment, including a pumping station, sequencing batch reactor tanks, two-story grit building and a two-story administration building. She also coordinated design with process equipment, mechanical, and electrical.

## STRUCTURAL ENGINEERING

LaSalle Sanitary Pumping Station Condition Assessments | Town of LaSalle, | LaSalle, Ontario | Project Manager and Structural Lead

Susan provided field investigation and delivered a report discussing the condition of 16 existing sanitary pumping stations throughout the Town of LaSalle. The report provided options for repair of existing facilities, high level cost estimates, and recommendations for health and safety upgrades at each station.

LaSalle Various Sanitary Pumping Station Upgrades | Town of LaSalle, | LaSalle , Ontario | Project manager & Structural Lead

Susan led design of structural and architectural upgrades to 13 pumping station buildings. Upgrades included roofing replacement, concrete repairs, and a new roof over the existing screw pumping station.

Lou Romano Pollution Control Plant Grit Removal Facility Improvements | Windsor, Ontario | Structural Design Engineer

Design of new electrical rooms and vestibules in existing building. Complete structural roof reconstruction over portion of existing building. Concrete repair and restoration of existing tanks and channels.

Lou Romano Water Reclamation Plant Capacity Expansion and Upgrade, Process and Administration Building Improvements | City of Windsor | Windsor, Ontario | Structural Design Engineer

Susan provided design of a 604-square-meter addition to an existing administration building that houses washrooms, locker rooms, and a lunchroom. The addition included a new effluent water room with a concrete tank. The renovation of the existing building included removal of the existing roof structure and the design of a new open web steel joist roof system. (Involvement Timeline: 2008-2011)

West High Service Pump Station Boiler System Upgrade | Ann Arbor, Michigan | Structural Design Engineer

Third floor of existing structure was modified to house new boilers. Architectural and structural design including new structural floor system, walls, door, windows and access corridor. Building was assessed structurally for new loading conditions.

Kanata West Pump Station and Forcemains | City of Toronto | Toronto, ON, Canada | Structural Engineer

Susan was the structural engineering designer of an 18.5-m-diameter by 15-m-deep cast-in-place concrete pump station. The foundation included micropiles to prevent uplift of the structure. Design also included a screening chamber, valve chamber and inlet chamber, and a one-story building to house the electrical, mechanical, and control systems. Susan worked closely with geotechnical staff due to the unfavorable existing soil conditions for the station. She also coordinated with the mechanical, electrical, and process disciplines and prepared construction specifications.

Sandy Hill Flood Control Project | City of Ottawa | Ottawa, Ontario, Canada | CAD 15M | Structural Design Engineer

Susan designed a 9,753-m2 underground storm water storage tank. The design included cast-in-place structural base slab, walls, columns, top slabs, and rock anchors.

Western Beaches Tunnel Pumping Station Upgrades | City of Toronto | Toronto, Ontario | Structural Design Engineer

Susan provided structural condition assessment of three 30.5-m-diameter access shafts extending approximately 61 m below grade and approximately 2.5 km of 3-m-diameter concrete-lined tunnel extending between shafts. She prepared a technical memorandum outlining concrete structure deficiencies, accessibility, and health and safety issues, as well as recommendations for remediation of deficiencies.

Barrie WwTF – Advanced Nutrient Removal Upgrade | City of Barrie | Barrie, Ontario | 2015-2020 | Structural Engineer

Susan provided condition assessment of numerous existing cast-in-place concrete tankage. In addition, she assisted on the assessment of the existing pile system supporting the existing tanks. Susan provided recommendations for repairs and rehabilitation of the existing cast-in-place concrete tanks.

Leamington Pollution Control Center | Municipality of Leamington | Leamington, Ontario | Structural Design Engineer

Susan provided design of dewatering facility addition including steel frame building, concrete structural platform, crane and foundations. The project involved design of primary pumping gallery and 15-meter-diameter clarifier tanks, secondary pumping gallery and 20-meter-diameter clarifier tanks with rock anchor foundation system. It also included design of underground tunnel system and a 2,323-square-meter aeration tank, a blower building, a generator building, and garage/workshop building. (Involvement Timeline: 2007-2011)

Hamilton Real Time Control Project | Hamilton, Ontario | Structural Design Engineer

Structural and architectural design of 3 small buildings to house electrical equipment. Structural design of below grade concrete regulator chambers. Modifications to existing concrete chambers to suit new control equipment.

Veterans Memorial Pool and Ice Arena Renovations | Ann Arbor, Michigan | Structural Design Engineer

Providing field investigation, structural assessment and report on condition of existing pre-engineered building and building envelope. Completed detailed design drawings and specification for upgrades to the structure, including structural member strengthening and roof replacement.

EMS Building, Harrow Station | County of Essex, Ontario

Structural and architectural design of new 4,500 square foot facility including garage space for emergency medical services. Design included locker rooms, washrooms, lounge and kitchen spaces.

Barton and South Industrial Pump Stations Electrical Improvements | Ann Arbor, Michigan | Structural Design Engineer

Structural and architectural renovation of an existing pump station to suit new electrical equipment. New doors, windows and masonry repairs. Design of foundation and building layout for new 2,100 square foot pre-engineered storage building. Coordination with mechanical and electrical trades.

Lebreton Flats Diversion Chamber | City of Ottawa | Ottawa, Ontario | Structural Design Engineer

Susan provided structural design for three belowgrade concrete sewer access chambers between 11 and 16 m deep as well as modifications to one existing concrete chamber. The design included new aluminum platforms, steel weirs, and bulkhead plates.

Mannheim Water Treatment Plant | Kitchener, Ontario | Structural Design Engineer

Structural and architectural design of new switch gear room building addition on top of existing water reservoir. Design included structural concrete floor and steel building frame with precast concrete wall panel façade. Design included structural assessment of existing reservoir roof to support loads due to this new structure.

Humber Treatment Plant Odor Control and Headworks Upgrades | City of Toronto | Toronto, Ontario | Structural Engineer

Susan provided structural design for new electrical buildings and modifications to existing buildings including a new concrete equipment platform, aluminum equipment platforms, and new vestibules. Susan coordinated with electrical, mechanical, and process engineering and prepared specifications. (Involvement Timeline: 2015 – 2018)

Ottawa Combined Sewage Storage Tunnel | City of Ottawa | Ottawa, Ontario | CAD 150M | 2015 | Structural Engineer

Susan served as the structural engineering designer for seven below grade cast-in-place concrete chambers that extend down to rock-tunneled combined sewer in various locations in the downtown area of the City. Significant coordination was required between tunnel designers, geotechnical engineering, process engineering, and structural designers. Chamber sizes varied, with some measuring 10 m in diameter and located approximately 18 m deep in underlying bedrock. Because uplift was a consideration in the design due to high groundwater table, rock anchors were used to resist uplift in some chambers. Susan also prepared construction specifications and reviewed cost estimates.

William Street and Strange Street Water Supply Systems | Region of Waterloo | Kitchener & Waterloo, Ontario, Canada | Structural Engineer

Susan coordinated the preliminary design and detailed structural design of backwash waste holding tanks, including the floor slab for the filter support.

## BRIDGES

Reconstruction of Gesto Sideroad Culvert over Gesto Sideroad Drain and Mole Sideroad Culvert over John's Creek | Essex, Ontario

Design of two cast-in-place open footing culverts.

Reconstruction of Coutts Line Bridge over Government Drain No. 1 | Chatham-Kent, Ontario

Design of precast girder highway bridge with new cast-in-place abutments, wingwalls and footings.

Rehabilitation of Bridge Structure Over Dougall Parkway on Howard Avenue | Windsor, Ontario | Construction Inspector

Inspected the rehabilitation of roadway bridge which included removal of delaminated concrete from deck installing new reinforcement and corrosion prevention anodes in repair areas, new deck overlay, new concrete barrier walls, waterproofing and asphalting roadway.
Completed daily reports, dealt with construction, schedule and quality control issues.

Rehabilitation of Bridge Over Little River on Lauzon Road | Windsor, Ontario | Construction Inspector

Inspected the rehabilitation of roadway bridge which included demolition of existing deck. Repair of existing abutments and replacement of deck with high strength concrete casting-in-place deck. Completed daily reports, dealt with construction schedule and quality control issues.

New Concrete Culvert Bridge Over Cahill Drain | LaSalle, Ontario | Structural Design Engineer/Construction Inspector/Contract Administration

Design of roadway bridge consisting of concrete culvert and concrete retaining walls and footings. Project included new roadway, aluminum guardrails and sidewalks.
Construction Inspections included daily reports and providing solutions to construction issues.
Contract Administration included processing payments, RFI's and RFQ's for the project.

Bridge Replacement On County Rd 8 Over Ruscom River | Essex, Ontario | 2005 | Structural Design Engineer

Design of highway bridge consisting of composite concrete deck on steel girders complete with new concrete footings, abutments and wing walls.

# Jian Li Ph.D., P.Eng., PE

Senior Associate, Senior Environmental Engineer
29 years of experience, Windsor, Ontario

Jian Li has 28 years of diversified project experience in study and design of water and wastewater treatment facilities. Jian specializes in hydraulic and process design for water and wastewater treatment, combined sewer overflow control, odour control and pumping stations. He also has extensive experience in Municipal Class Environmental Assessments for municipal water and wastewater projects.

In recent years, Jian has focused on the development and implementation of measures of wet weather flow and pollution control, most notably in the areas of high-rate treatment for wet weather flow control. He has published more than 15 papers in technical journals and has made numerous presentations to various technical societies. He is also the reviewer of numerous Water Environment Federation documents including Manual of Practice 8: Design of Municipal Wastewater Treatment Plants.

## EDUCATION

Master, Tongji University/Municipal Engineering, Shanghai, China, 1988

Bachelor, Huazhong University of Science & Technology/Civil Engineering, Wuhan, China, 1985

Doctorate of Engineering, Meiji University/Environmental Engineering, Tokyo, Japan, 1995

## REGISTRATIONS

Professional Engineer #100053876, Professional Engineers Ontario

Professional Engineer #6201052330, State of Michigan

## MEMBERSHIPS

Member (Air Quality & Odor Control Committee), Water Environment Federation

Member, Water Environment Federation

Member, International Water Association

## PROJECT EXPERIENCE

### MUNICIPAL WASTEWATER TREATMENT

Lou Romano Water Reclamation Plant Grit Removal System Upgrades | Windsor, Ontario | Project Manager

Detailed Design of an upgrades to the 273 MLD (75 MGD) grit removal and processing system. The upgrades included addition of two new vortex grit separators, existing aerated grit tank improvements, concrete structure repairs, electrical and instrumentation upgrades, and explosion proof protection.

Leamington Pollution Control Centre Headworks Facility | Leamington, Ontario | Project Manager

Detailed design and contract administration of headworks upgrades to increase the capacity of influent pumping station, concrete structure repair and improve SCADA system.

Denis St. Pierre Water Pollution Control Plant (WPCP) Upgrades | Town of Lakeshore | Town of Lakeshore, Ontario, Canada | CAD 17.6M | Process and Hydraulic Design Lead

Process and hydraulic design for the upgrades of the 14 MLD (3.6 MGD) Denis St. Peirre WPCP, Town of Lakeshore. The upgrades include screening and grit removal, extended aeration, final clarifiers, chemical precipitation for phosphorus removal, aerobic digestion, sludge dewatering, excess wet weather flow capture and storage facility.

Windsor Retention Treatment Basin and Tunnel Sewer | City of Windsor | Windsor, Ontario, Canada | CAD 60M | Project Manager / Process and Hydraulic Design Lead

Detailed design and contract administration of the 678 MLD Windsor Riverfront Retention Treatment Basin (RTB) facility, City of Windsor. The RTB facility consists of chemically enhanced retention treatment basin, screw pump station, flushing system and chemical dosing and control system.

Lou Romano Water Reclamation Plant - Upgrade and Expansion | City of Windsor | Windsor, Ontario, Canada | CAD 110M | Process Engineer

Hydraulic and process design for expansion of Lou Romano Water Reclamation Plant to 218 MLD (60 MGD) capacity. The expansion includes bar screening, three new settling tanks, primary effluent pumping station, biological aerated filters (BAF) disinfection, sludge dewatering, odor control and effluent reuse system.

** denotes projects completed with other firms*

Oakville South West WWTP Phase 3 Upgrades | Regional Municipality of Halton | Oakville, Ontario, Canada | CAD 45M | Process Engineer

Detailed design of the 180 MLD (45 MGD) Oakville South Wastewater Treatment Plant upgrades. The upgrades included sewage pumping station, screening and grit removal, conventional activated sludge and odour control.

Suncrest Sewage Works Upgrades | Lakeshore, Ontario | Project Manager

Project manager for upgrade of sewage works to add intermittent sand filters, and improve raw sewage pumping station.

Lambton Generating Station Sewage Lagoon Study, Ontario Power Generation | Ontario | Project Manager

Project Manager for preparation of a study report focusing on the performance of the existing sewage lagoon system under reduced loadings.

Hespeler Wastewater Treatment Plant Assessment Study | Waterloo, Ontario | Process Engineer

Project engineer for preparation of assessment report outlining the current needs of the plant, and identification of upgrades that should be considered.

Leamington Pollution Control Centre Upgrades | Municipality of Leamington | Municipality of Leamington, Ontario, Canada | Environmental Engineer

Conducted emission modeling and prepared application documents for Noise & Air Certificates of Approval for the pollution control centre to comply with related regulations and guidelines in Ontario.

Assessments, Permitting and Compliances | Environmental Engineer

Conducted emission modeling and noise assessment, and prepared application documents for Noise & Air Certificates of Approval for numerous emission sources to comply with related regulations and guidelines in Ontario.

Essex Pollution Control Plant | Town of Essex | Essex, Ontario | CAD 2.1M | 2008 | Process Engineer

Process design for biosolids dewatering facility. Carried out analysis and design of process equipment including centrifuges, polymer feed and odour control system utilizing wet chemical scrubber technology.

McGregor Sewage Treatment Facility | Town of Amherstburg | Amherstburg, Ontario, Canada | Process Engineer

Reviewed literature related to the performance of facultative lagoons and intermittent sand filters for E. Coli removal; examined historical documents for evaluating the performance of the facility in E. Coli removal and determined whether any additional disinfection equipment is require to comply with effluent discharge criteria.

Cottam Sewage Works | Kingsville, Ontario | Process and Hydraulic Design Lead

Process and hydraulic design lead for the upgrades and expansion to the 3 MLD (0.8 MGD) Cottam Sewage Works, Town of Kingsville. The upgrades included lagoons, effluent pumping station, chemical feed system and intermediate sand filters.

Landfill Leachate Treatment Facility* | Chiba, Japan | Process Engineer

Identified preferred treatment technology and performed conceptual design of a leachate treatment plant with a treatment capacity of 300 cubic meters per day (55 GPM).

Windsor CSO Treatment Pilot Plant | City of Windsor | Windsor, Ontario | 2003 | Research Engineer

Performed laboratory jar testing and pilot-scale treatability studies on wet weather wastewater to develop parameters for the design of full-scale chemically enhanced primary treatment (CEPT) facilities.

Western Beaches Tunnel Pumping System Improvements | City of Toronto | Toronto, Ontario, Canada | CAD 50M | Hydraulic Design Lead

Hydraulic analysis and detailed design of CSO storage tunnel upgrades including CSO interception, tunnel flushing and pumping system improvements. The storage tunnel facility consists of a four kilometres long CSO storage tunnel, three storage shafts and six drop shafts preventing combined sewer overflows from going directly in Lake Ontario.

Post-Construction Optimization Study of CSO Retention Treatment Basin | City of Windsor | Windsor, Ontario, Canada | CAD 114.8k | Process & Hydraulic Lead

Post-construction optimization study of the Riverfront Retention Treatment Basin (RTB) for the storage and treatment of CSO generated from the eastern riverfront area of the City of Windsor. Review and analysis of historical operational records including settled solids flushing, polymer dosing system control, CSO flows and the analytical results of the influent and final effluent samples recorded during the period between November 2011 and December 2013.

Ashbridges Bay Eastern Bypass and Wet Weather Flow Study | City of Toronto | Toronto, Ontario, Canada | CAD 700k | Biosolids Management Expert

A study that examines the potential to receive wet weather flow (WWF) solids at ABTP and the potential synergies between improving conveyance of WWFs through the plant by making modifications to the Eastern Bypass and co-treatment of WWF through chemically enhanced primary treatment.

** denotes projects completed with other firms*

## ENVIRONMENTAL ASSESSMENTS

Lakeshore Eastern Communities Sewage Works Class Environmental Assessment | Town of Lakeshore | Town of Lakeshore, Ontario, Canada | Project Manager

Prepared a Schedule C Class EA report for new wastewater collection and treatment facilities to service Lakeshore Eastern Communities. The preferred alternative included construction of municipal sewer systems for unserved areas, and new centralized treatment plant for the communities.

Pollution Control Asset Condition Assessment | Lou Romano Water Reclamation Plant, Ojibway Parkway, Windsor, ON, Canada | CAD 420k | Project Manager

Implemented pollution control assets condition assessment for two wastewater treatment plants, one biosolids management facility and 34 pumping stations. Carried out visual inspection and comprehensive desktop analysis to ensure all pollution control assets were included within the maintenance and capital plans. Prepared a report for each facility, which includes opinion of probable cost and the results to all condition assessments, the capital and maintenance plans that provided a high-level summary of capital replacement costs forecasted to maintain current pollution control assets projected over the next 20 years

Windsor Riverfront CSO Control Facility Class Environmental Assessment and Pre-design | City of Windsor | Windsor, Ontario, Canada | Process Engineer

Class Environmental Assessment and functional design for the provision of a Retention Treatment Basin (RTB) facility to control combined sewer overflows to the Detroit River from the Windsor Riverfront Area. The CSO control facility consists of five interceptor chambers; collection sewer; chemically enhanced high-rate RTB Facility under the existing riverfront parking lot with a storage capacity of 14 ML (3.7 MG) and a primary treatment capacity of 678 MLD (180 MGD).

Integrated Site Energy Master Plan | Windsor, ON, Canada | CAD 0 | 2019-2020 | Project Manager

Completed the integrated site energy master plan for the two municipal wastewater treatment plants in the City of Windsor. Reviewed current energy use and future needs. Evaluated alternative options for energy conservation, improved energy efficiency, and on-site renewable energy generation including anaerobic co-digestion, biogas utilization, and GHG reductions. Implemented a Triple Bottom Line framework for evaluation of alternative solutions. Identified a list of actions that would move the two wastewater treatment plants towards a “net-zero” energy future and significantly reduced GHG emissions.

Environmental Study for Improvements to the Erie Street South Strom Sewer Outfall | Leamington, Ontario | Project Manager

Prepared a Schedule B Class EA report to review various options to improve operations and water quality of the outfall discharge. The preferred alternative included relocating the outfall discharge and sewer separation.

Windsor Riverfront West CSO Control Class EA | The Corporation of The City of Windsor | Windsor, Ontario, Canada | CAD 0 | Project Manager

Schedule "C" Class Environmental Assessment for combine sewer overflow control along the western district of the Windsor Riverfront. Identified the preferred means and preferred design to control CSOs in the West Windsor area. Revisited wet weather flow conditions to determine if any CSO control alternatives may also help to alleviate wet weather flows at the Lou Romano Water Reclamation Plant (LRWRP). The recommended CSO control facility consists of chemically enhanced retention treatment facility adjacent to the LRWRP with a primary treatment capacity of 786 MLD.

Sanitary Sewer Servicing Study | Windsor, Ontario | Project Engineer

Prepared a Schedule B Class EA amendment to review and document changes to the Sanitary Sewer Servicing Study for lands annexed from adjacent township areas.

City of Windsor CSO - RTB Optimization Study | Windsor Ontario | CAD 114.8k | Project Manager

Post-construction optimization study of the Riverfront Retention Treatment Basin (RTB) for the storage and treatment of CSO generated from the eastern riverfront area of the City of Windsor. Review and analysis of historical operational records including settled solids flushing, polymer dosing system control, CSO flows and the analytical results of the influent and final effluent samples recorded during the period between November 2011 and December 2013.

Water and Wastewater Master Plan | Lakeshore, Ontario | Project Engineer

Prepared a master plan report to review water and wastewater servicing and treatment for the Town. Work involved assessment of the existing water and wastewater treatment plants, as well as other treatment plant options.

Environmental Impact Assessment for a Steel Mill Project Proposed for the Japan Bank for International Cooperation Financing* | Wuhan, China | Technical Adviser

Reviewed the EIA report for the steel mill project to determine that the executor of the project took into account appropriate environmental considerations.

Environmental Sustainability Study for the City of Dalian* | China | Water Quality Specialist

The study provided the city with information for decision-making on pollution prevention compatible with sustainable economic development. The study focused on the city's overall environmental problems and aimed to restore a good environment by coordinating with the city economic development plan.

Municipal Class Environmental Assessment for Windsor West CSO Control | City of Windsor | Windsor, Ontario, Canada | 2017-present | Project Manager

Class Environmental Assessment for the selection of the preferred means and preferred design to control Combined Sewer Overflows (CSOs) in the West Windsor area, and revisit wet weather flow conditions at Lou Romano Water Reclamation Plant (LRWRP) to determine if any CSO control alternatives may also help to alleviate wet weather flows at the LRWRP. The recommended CSO control facility consists of chemically enhanced retention treatment facility adjacent to the LRWRP with a primary treatment capacity of 786 MLD (210 MGD).

Municipal Class Environmental Assessment for Denis St. Pierre Water Pollution Control Plant Expansion | Town of Lakeshore | Lakeshore, Ontario | Project Manager

Prepared a Schedule C Class EA report for expanding the capacity of the Denis St. Pierre Water Pollution Control Plant from 14,500 m3/d to 30,000 m3/d. The preferred alternative included construction of new extended aeration, final settling tanks, UV disinfection, and biosolids dewatering facility.

## INDUSTRIAL WASTEWATER TREATMENT

Ras Al Khair Seawater Conveyance System | Kingdom of Saudi Arabia | Ras Al Khair, Eastern Province, Saudi Arabia | USD 110M | Process Engineer

Process Engineer responsible for the analysis of treatment alternatives for industrial wastewater generated in Jubail Industrial City. Duties included alternative analysis, process selection, and detailed design of a two-stage chemical precipitation process.

Industrial Wastewater Treatment* | Japan | Process Engineer

Conducted numerous feasibility and treatability studies for treating industrial wastewaters generated from steel mills, a municipal solid waste incinerator, a landfill for disposal of solid waste, paper and pulp, chemical , food, and dyeing industries as well as restaurants. Evaluated the treatment process, which included biological treatment (conventional activated sludge, IFAS, UASB & USB), advanced oxidation using ozone and hydrogen peroxide, carbon adsorption, chemical coagulation, precipitation and floatation.

## LINEAR INFRASTRUCTURE

Regulator Upgrades and Real Time Control Implementation | Ottawa, Ontario | Process Engineer

Performed feasibility study and preliminary design of upgrading and retrofitting six major hydraulic flow control structures along the Central Interceptor-Outfall system.

Huron Lodge Stormwater Pumping Station | Windsor, Ontario | Hydraulic Engineer

Hydraulic analysis and design for Huron Lodge Stormwater Pumping Station with a firm capacity of 30 l/s.

Forest Hill Stormwater Pumping Stations | Lakeshore, Ontario | Hydraulic Engineer

Hydraulic analysis and design for a stormwater pumping station with a firm capacity of 1000 l/s.

Odor Study for the Seven-Mile Sewer and LaSalle Forcemain | City of Windsor | Windsor, Ontario, Canada | Process Engineer

Reviewed odour problems generated from the collection system. Evaluated alternatives and identified preferred solutions for odour control.

Windsor Essex Parkway Stormwater Pumping Stations | Windsor, Ontario | Hydraulic and Process Engineer

Hydraulic analysis and preliminary design for seven stormwater pumping station with firm capacities ranging from 650 l/s to 2050 l/s. Evaluated alternatives and identified the preferred option for spill containment/sediment removal.

LaSalle Forcemain Outfall Improvements | LaSalle, Ontario, Canada | CAD 750k | Project Engineer

Hydraulic design and construction administration for improvements to the Sewage Pumping Station. Improvements included construction of one-way surge tank and outfall chamber to prolong the remaining useful life of the forcemain and to protect it from damage due to pressure surge conditions.

Hamlet of Ruthven Sewage Works | Town of Kingsville | Kingsville, Ontario | CAD 6.5M | Process and Hydraulic Design Lead

Process and hydraulic design for the pumping system with an ultimate capacity of 70 l/s. Developed options for practical solutions to eliminate surge and cavitation problems associated with the pumping system. Evaluated various odour control alternatives and undertook detailed design of chemical feed system for odour control at the pumping station.

Belle River/Maidstone Water Pollution Control Plant Capacity Assessment | Town of Lakeshore | Town of Lakeshore, Ontario, Canada | Project Engineer

Hydraulic design and contract administration for upgrades to eight sewage lift stations with firm capacities ranging from 27 l/s to 390 l/s.

** denotes projects completed with other firms*

## MUNICIPAL WATER TREATMENT

Infrastructure Assessment for Harrow/Colchester South Water Treatment Plant | Town of Essex | Town of Essex, Ontario, Canada | Process Engineer

Evaluated the condition of the facilities, identified systems that require maintenance and/or upgrade, established priorities for undertaking the necessary work, and provided the related cost estimates. Powdered activated carbon adsorption to achieve taste and odor removal was necessary due to the condition of the raw water quality.

Windsor Water Treatment Plant | Windsor Utilities' Commission | Windsor, Ontario | Process Engineer

Process and Hydraulic analysis for Windsor Utilities' 260 MLD (70 MGD) Water Treatment Plant utilizing ozone for disinfection, taste and odor removal, and pre-treatment purposes. Tasks included hydraulic modeling of the existing system to compute hydraulic grade line under different flow conditions, evaluating system capacity, and developing options for practical solutions to operational problems.

Union Water Treatment Plant | Union Water System | Essex County, Ontario, Canada | CAD 18.6M | Process Engineer

Hydraulic analysis for expansion of the Union Water Process and Treatment Plant from 110 MLD (30 MGD) to 145 MLD (40 MGD). Tasks included report and analysis of test results to address the under-performance of filter capacity.

## PUBLICATIONS

Performance Monitoring of a Retention Treatment Basin in City of Windsor for Combined Sewer Overflow Control. *Forty-Fourth of Technical Symposium Water Environmental Association of Ontario*, 2015.

Windsor Riverfront High-rate Retention Treatment Facility: From Planning To Implementation. *Forty-First of Technical Symposium Water Environmental Association of Ontario*, 2012.

"Sustainable Solution to Plant Hydraulic and Treatment Capacity Issues - A Case Study of Denis St. Pierre Water Pollution Control Plant, Lakeshore, Ontario". *Fortieth of Technical Symposium Water Environmental Association of Ontario*, 2011.

"Lessons Learned on Startup and Operation of a Biological Aerated Filter for Simultaneous BOD Removal and Nitrification at the Lou Romano Water Reclamation Plant, Windsor, Ontario, Canada". *Fortieth of Technical Symposium Water Environmental Association of Ontario*, 2011.

"Development of Retention Treatment Basin with Polymer Flocculation for CSO Treatment". *WEFTEC*, 2009.

"Treatment of Combined Sewer Overflow (CSO) Using Retention Treatment Basin (RTB) assisted with Polymer Chemical Coagulation". *Water Environment Research*, 2007.

"Identifying Preferred Alternatives for CSO Control along the Windsor Riverfront East of Caron Avenue in the City of Windsor". *Thirty-sixth of Technical Symposium Water Environmental Association of Ontario*, 2007.

"Modeling a Retention Treatment Basin for CSO". *Journal of Environmental Engineering*, 2007.

"Hydraulic Transient Analysis of LaSalle-Windsor Forcemain". *Thirty-fourth of Technical Symposium Water Environmental Association of Ontario*, 2005.

"High-Rate Retention Treatment Basins for CSO Control in Windsor, Ontario". *Water Quality Research Journal of Canada*, 2004.

"Biodegradation of Red B Dye by Bacillus SP.OY1-2". *Journal of Environmental Technology*, 2004.

“Windsor Combined Sewer Overflow Treatability Study with Chemical Coagulation”. *Water Quality Research Journal of Canada*, 2003.

"Characterization and Treatability Study on Windsor CSO". *Thirty-seventh Central Canadian Symposium on Water Pollution Research*, 2002.

"The Decolorization of Dyeing Wastewater by Bacillus sp. OY 1-2". *Proceeding of 32nd Japan Society on Water Environment's Annual Conference (Tokyo, Japan)*, 1998.

"The Advanced Treatment of COD and Colour by a new Biological System". *Journal of Japan Energy and Technology Intelligence*, 1996.

"Treatment of Bordeaux S Dye Wastewater by Biological Activated Carbon". *Journal of Japan Society on Water Environment*, 1995.

"Dyeing Wastewater Treatment using Hydrogen Peroxide". *Journal of Chemical Engineering*, 1995.

"Study on the Removal of Bordeaux S Dye in Wastewater by Biological Activated Carbon". *Proceeding of 28th Japan Society on Water Environment's Annual Conference (Tokyo, Japan)*, 1994.

"Biological Activated Carbon Treatment of Wastewater From a Plant of Dye Industry". *Proceeding of Second International Symposium on Environmental Engineering and Chemical Engineering (Dailian, China)*, 1994.

"Removal of Biorefractory, Soluble Organic Substances by Biological Activated Carbon". *Proceeding of 26th Japan Society on Water Environment's Annual Conference (Tokyo, Japan)*, 1992.

** denotes projects completed with other firms*

# Tony Berardi P. Eng.

Principal & Senior Consultant, Water
38 years of experience · Windsor, Ontario

Tony has over 37 years of design, construction, technical and project management experience in the municipal and environmental engineering sectors with particular emphasis on water & wastewater supply/collection, conveyance, pumping and treatment and site facilities. Tony works out of the Windsor office and provides considerable experience in all aspects of project planning and delivery from feasibility studies, class environmental assessments, funding applications through to preliminary and detailed design, specifications, approvals, contract administration and commissioning services on small and simple projects to large complex multidisciplinary projects.

Tony's wealth of experience includes the carrying out of class environmental assessments, design of small and large complex water and wastewater treatment and pumping facilities, design of large diameter forcemains/watermains and metering facilities, development of innovative flow control systems for the hydroponic greenhouse industry, development and preparation of complex contract documents and specifications along with the creation of detailed operation manuals for water and sewage treatment facilities.

Tony provides the practical insight that is required on a project obtained from many years of detailed design and resident engineering experience on complex construction projects. As a principal, practice leader and project manager in the Windsor office, Tony is directly involved in the procurement, management and delivery of all projects from the Windsor office.

## EDUCATION

B.A.Sc., Geological Engineering, University of Windsor, Windsor, Ontario, 1984

## REGISTRATIONS

Professional Engineer #3434503, Professional Engineers Ontario

## MEMBERSHIPS

Former Member, Water Environment Association of Ontario

Former Member, American Water Works Association, 2003

Member, Professional Engineers Ontario, 1988

## PROJECT EXPERIENCE

### WATER

Union Water Supply System – WTP Capital Upgrade Assessment | Project Manager

Responsible for assessing new Hi-lift Pump & Reservoir Upgrades. In Progress – Capital Cost $0.05 Million.

Stoney Point Water Treatment Plant Clarifier Rehabilitation Works | Project Manager

Responsible for planning, design, tendering and contract administration. Completed Oct 2020 – Capital Cost $1.0 Million

LaSalle Drinking Water System Initiative – Source Water Selection Study | Project Manager

Responsible for management, advisement, coordination and QA-QC. Completed 2020 – Capital Cost $0.15 Million

Kingsville Water Distribution System Upgrades – CR 18 from CR 34 Easterly Watermain Extension | Project Manager

Responsible for planning, design, & contract administration. Completed 2018 – Capital Cost $0.7 Million.

Lakeshore Water/Wastewater Master Plan Update (in Partnership with Jacobs)

Responsible for water master plan portion. Completed 2018 – Capital Cost $0.3 Million

Kingsville SW Service Area Water Supply Study | Project Manager

Responsible for carrying out all evaluations and preparation of report. Completed 2017 – Capital Cost $0.015 Million.

Union Water Supply System – CR 29 Watermain Diversion Works | Project Manager

Responsible for planning, design, and contract administration. Completed 2016 – Capital Cost $0.2 Million.

** denotes projects completed with other firms*

Belle River Elevated Water Tower Replacement | Project Manager

Responsible for planning, design, tendering and contract administration of a 1.5-million-gallon elevated water tower. Completed 2015 – Capital Cost $6.0 million.

Amherstburg Elevated Water Tower Replacement | Project Manager

Responsible for planning, design, tendering and contract administration for new 0.5-million-gallon elevated water tower; and demolition of old post-tensioned concrete elevated water tower. Completed 2013 – Capital Cost $3.2 Million

Union Water Supply System Master Plan | Project Engineer/Advisor

Engineer & Advisor in development of Master Plan Completed 2009 – Capital Cost $0.5 Million

Windsor Utilities Commission Water Distribution System - Hydraulic Model Study | Project Manager

Responsible for planning and carrying out distribution system hydraulic model study.
Completed 2008 – Capital Cost $0.2 Million

Windsor Utilities Commission Water Distribution System Upgrades - Banwell Reservoir Class Environmental Assessment | Project Manager

Responsible for planning and carrying out of Class EA for an 85 million gallon in ground reservoir. Completed 2008 – Capital Cost $0.15 Million

Windsor Utilities Commission Water Distribution System Upgrades - Water Tower Flow Control Facilities | Project Manager

Responsible for planning, design, tendering and contract administration. Completed 2007 – Capital Cost $0.7 Million.

Belle River Water Distribution System Upgrades - Water Tower Flow Control Facilities | Project Manager

Responsible for planning, design, tendering and contract administration. Completed 2007 – Capital Cost $0.4 Million.

Kingsville Water Distribution System Upgrades - Graham Sideroad Watermain | Project Manager

Responsible for planning, design, and contract administration. Completed 2007 – Capital Cost $0.4 Million.

Windsor Utilities Commission Water Treatment Plant Expansion - Reservoir Influent | Project Manager

Responsible for planning, design, tendering and contract administration including innovative development of world's largest live top into in-service concrete potable water reservoir. Completed 2006 – Capital Cost $2.0 Million.

Harrow - Colchester Water Treatment Plant - C of A Upgrades | Project Manager

Responsible for planning, design, tendering and contract administration. Completed 2006 – Capital Cost $0.3 Million.

Union Water System Expansion - Clarifier 4 | Project Manager

Responsible for planning, design, tendering and contract administration. Completed 2006 – Capital Cost $3.5 Million.

Kingsville Water Distribution System Upgrades - Union Court Watermain | Project Manager

Responsible for planning, design and contract administration.
Completed 2006 – Capital Cost $0.15 Million.

Stoney Point Water Treatment Plant Clarifier Upgrades | Project Manager

Responsible for planning, design, tendering and contract administration. Completed 2005 – Capital Cost $0.1 Million.

Comber Water Pumping Station - C of A Upgrades | Project Manager

Responsible for planning, design, tendering and contract administration. Completed 2005 – Capital Cost $0.25 Million.

Stoney Point Water Treatment Plant – C of A Upgrades | Project Manager

Responsible for planning, design, tendering and contract administration. Completed 2005 – Capital Cost $0.25 Million.

Belle River Water Treatment Plant - C of A Upgrades | Project Manager

Responsible for planning, design, tendering and contract administration. Completed 2005 – Capital Cost $0.25 Million.

Windsor Utilities Commission Water Treatment Plant Expansion - Hydraulic Evaluation | Project Manager

Responsible for planning and carrying out plant hydraulic study. Completed 2005 – Capital Cost $0.15 Million.

Union Water Supply System Expansion 2nd Concession Trunk Watermain & Metering | Project Manager

Responsible for planning (Class EA), design, tendering and construction administration. Construction consisted of approximately 3550 m of 1050 mm diameter watermain and 520 m of 900 mm diameter watermain including connections to the existing 900 mm diameter, 750 mm diameter, smaller diameter watermains, and a 900 mm diameter meter chamber. Completed 2005 – Capital Cost $6.0 Million.

** denotes projects completed with other firms*

Kingsville North-East Trunk Watermain | Project Manager

Responsible for planning, design, and contract administration for approximately 4200 m of 600 mm diameter, and 1200 m of 300 mm diameter watermain installed to service the expanding greenhouse demands and address area residents' low water pressure problems that occur regularly during the summer months. The watermain route required utility easements and crossed a major highway. The work was undertaken following the completion of a Class Environmental Assessment. Completed 2004 – Capital Cost $2.0 Million.

Wheatley Water Treatment Plant Expansion | Project Engineer

Responsible for development of Operations Manuals Completed 2004 – Capital Cost $8.9 Million.

Hydroponic Greenhouses Leamington/Kingsville/Essex/Amherstburg | Project Manager

Advisory, development & design of water flow control systems for hydroponic greenhouses. On Going 1995 to Present 2020

Union Water Supply System Expansion Class Environmental Assessment | Project Engineer

Co-Author in development of the Class EA - Environmental Study Report. Completed 2003 – Capital Cost $0.4 Million.

Wheatley Water Treatment Plant Expansion | Resident Engineer

Responsible for overall construction inspection and quality control. Completed 1994 – Capital Cost $9.5 Million.

Stoney Point Water Treatment Plant Expansion | Resident Engineer

Responsible for overall construction inspection and quality control. Completed 1990 – Capital Cost $2.5 Million.

Yaoundé Water Supply, Cameroon, Africa* | Project Engineer

Responsible for operation of civil engineering laboratory, surveying and resolving technical issues. Completed 1988 – Capital Cost $100 Million.

## WASTEWATER

Hamlet of Ruthven Sewage Works | Project Director

Responsible for overall planning, design, tendering and contract administration.

Essex Sewage WPCP Works | Project Advisor

Responsible for QA/QC during planning, design, tendering and contract administration phases.

McGregor Sewage Treatment Facility Class EA | Project Advisor

Responsible for QA/QC of Class Environmental Assessment (ESR).

Belle River - Maidstone WPCP Upgrades | Project Manager

Responsible for overall planning, design, tendering, and contract administration.

Cottam Sewage Lagoon Upgrades | Project Director

Responsible for overall planning, design, tendering and contract administration.

Windsor Riverfront Retention Basin | Project Director

Responsible for overall planning, design, tendering and contract administration.

Windsor Little River PCP Settling Tank Upgrades | Project Manager

Responsible for overall planning, detailed design, tendering and contract administration.

Lakeshore West Pollution Control Plant | Kingsville, Ontario | 2000 | Project Manager

Responsible for construction management of Biosolids Handling Facility.

Lakeshore West Pollution Control Plant | Kingsville, Ontario | 1998 | Resident Engineer

Responsible for overall construction inspection and quality control.

Windsor Little River PCP Expansion | 1989 | Resident Engineer

Responsible for overall construction inspection and quality control.

## TRANSPORTATION

Windsor Detroit Bridge Authority - Gordie Howe Bridge - Early Works | Project Director

Responsible for PM financial & advisory services. Completed 2020 - Capital Cost $110 Million.

Huron Church Road Expansion, Windsor | 1988 | Resident Engineer

Responsible for overall construction inspection and quality control.

## JUSTICE

Maryvale Adolescent Centre HVAC Renovations | 1996 | Resident Engineer

Responsible for overall construction inspection and quality control.

** denotes projects completed with other firms*

# Oliver Ng M.A.Sc., P.Eng., ENV SP

Structural Engineer
34 years of experience · Windsor, Ontario

Oliver has over 34 years of experience designing reinforced concrete, prestressed concrete and structural steel, bridges, culverts, buildings, and specialized structures. His design experience also involves formwork and falsework design, excavation protection systems, and structural components using aluminum and fiberglass reinforced plastic (FRP).

Throughout his career, Oliver has had considerable experience in construction inspection related to cast-in-place concrete work, precast structural component fabrication, structural steel erection, concrete repair and restoration, bridges, waterproofing, and cofferdams. Oliver also participates in structural condition survey and evaluation of bridges, tunnels, dams and buildings, failure investigation and insurance claims, and composite strengthening systems with CFRP laminates. Oliver has been responsible for condition survey and evaluation of existing buildings and structures, including material testing, structural analysis, report preparation, recommendations for rehabilitation or replacement, and design of repair and rehabilitation systems.

Oliver has also been responsible for structural design, structural rehabilitation, inspection of construction, and contract administration for various highway bridges and drainage culvert projects.

## EDUCATION

Master of Applied Science, Structural Engineering, University of Windsor, Windsor, Ontario, 1985

Bachelor of Applied Science, Civil Engineering, University of Windsor, Windsor, Ontario, 1980

## REGISTRATIONS

Licensed Member #90216870, Professional Engineers Ontario

## PROJECT EXPERIENCE

### WATER

Old Plant Ozone for Windsor Utilities Commission | City of Windsor, Ontario

Structural design and inspection during construction for the modification and repair of existing reservoir.

New Water Treatment Plant | District Municipality of Muskoka, Ontario

Design of structural components including underground concrete reservoirs, pumping stations and office building.

Expansion and Upgrade of the Union Water System in the County of Essex | Ontario

Structural design and inspection during construction of major structural components including underground concrete reservoirs, pumping stations, filters, clarifiers, chambers, cofferdams, equipment, and office buildings.

Stoney Point Water Treatment Plant Expansion | Town of Lakeshore, Ontario

Structural design and inspection during construction of major structural components including underground concrete reservoirs, pumping stations, filters, clarifiers, chambers, cofferdams, equipment, and office buildings.

Wheatley Water Treatment Plant and Subsequent Expansion | Municipality of Chatham-Kent

Structural design and inspection during construction of major structural components including underground concrete reservoirs, pumping stations, filters, clarifiers, chambers, cofferdams, equipment, and office buildings.

Mannheim Water Treatment Plant | Kitchener, Ontario

Engaged in the structural QA/QC of filter underdrain upgrade of the plant.

New Water Treatment Plant | Township of North Dorchester, Ontario

Design of structural components including underground concrete reservoirs, pumping stations and office building.

Harrow/Colchester South Water Treatment Plant | Harrow, Ontario

Structural design and inspection during construction to restore reservoir floor slab settlement due to leaking joints by polyurethane foam injection below floor and installation of new joint.

## WASTEWATER

New Wastewater Treatment Plant and Pumping Stations for each of the Town of Amherstburg, Town of Essex, and Township of North Dorchester, Ontario and a New Wastewater Treatment Plant in the Town of Windsor, Nova Scotia

Major structures include pumping stations, clarifiers, aeration tanks, SBR tanks, sludge holding tanks, elevated flow channels, service tunnel, excavation protection systems, equipment, and administration buildings.

New Wastewater Treatment Plant in Palmyra Township | Michigan

Design of major structural components of the facility.

New Industrial Wastewater Treatment Plant, Jubeil Industrial City | Saudi Arabia

Structural design of major structural components including underground concrete tanks, pumping station, clarifiers, chambers, and office buildings.

Lakeshore West Pollution Control Plant | Kingsville, Ontario

Structural design and inspection during construction of major structural components including underground concrete tanks, aeration tanks, pumping stations, outlet structure, equipment, and office buildings.

Capacity Expansion of the Caron Avenue Pumping Station | Windsor, Ontario

Engaged in the structural design and upgrade of the pumping station including new by-pass chamber.

Expansion to the Lou Romano Water Reclamation Plant | Windsor, Ontario

Structural design and inspection during construction of major structural components including generator building, underground concrete tanks, screw pump pumping station, clarifiers, chambers, cofferdams, equipment, service tunnels, and office buildings of a $110 Million project.

New Kirkland Lake Wastewater Treatment Plant | Kirkland Lake, Ontario

Engaged in the architectural design and structural design QA/QC of the treatment plant.

Wonderland Pumping Station | London, Ontario

Structural and architectural design of complete pumping station including underground concrete tanks and building.

Expansion to Oxford Wastewater Treatment Plant | London, Ontario

Structural design and inspection during construction of major structural components including underground concrete tanks, pumping stations, new building, and modification of existing tanks.

Windsor Retention Treatment Basin and Tunnel Sewer | City of Windsor | Windsor, Ontario, Canada | CAD 60M

Structural design and inspection during construction of the $60 Million project. Major components include underground concrete storage tank, screw pump pumping station, outlets, chambers, cofferdams, equipment, and building.

Grand Bend Area Wastewater Treatment Facility | Municipality of Lambton Shores and Municipality of South Huron | Grand Bend, Ontario, Canada | CAD 14.5M

Engaged in the structural and architectural design of treatment building and administration building of an Envision certified new treatment facility.

Phase II Expansion and Upgrade of the Little River Pollution Control Plant | Windsor, Ontario

Structural design and inspection during construction of major structural components including underground concrete tanks, pumping stations, clarifiers, chambers, cofferdams, equipment, and office buildings.

Bright's Cove Lagoon Plant Upgrade | Sarnia, Ontario

Engaged in the structural and architectural design of tertiary building.

Expansion and Upgrade of Leamington Pollution Control Plant | Leamington, Ontario

Expansion and Upgrade of the Leamington Pollution Control Plant, Leamington, Ontario. Structural design and inspection during construction of major structural components including generator building, screw pump pumping stations and clarifiers.

## BRIDGES

Reconstruction of Bridge on Kent Road 1 | Municipality of Chatham-Kent, Ontario

Reconstruction of bridge on Kent Road 1 over Mersea Township Drain using open footing rigid frame culvert to replace existing concrete deck on steel girder structure.

Rehabilitation of Pike Creek Bridge | County of Essex, Ontario

Ridge frame bridge on County Road 42 was rehabilitated by repairing deteriorated concrete, install new concrete overlay and waterproofing.

Rehabilitation of Little River Bridge

Rigid frame bridge on Lauzon Road was rehabilitated by complete removal of deck and replaced with a flat slab deck. Existing abutments were utilized by strengthening and repair.

Reconstruction of Culvert on CR 34 over Malden Road Drain | City of Windsor, Ontario

Rigid frame structure was removed and replaced with new cast-in-place concrete structure.

Bridge Rehabilitation of Various Structures | Municipality of Chatham-Kent, Ontario

Rehabilitated or replaced 15 bridge structures in the Municipality between 2008 and 2016. These bridge structures included single span or multi-spans precast prestressed girder with concrete deck, steel girders with concrete deck and rigid frame concrete structures.

Rehabilitation of Howard Bridge over Dougall Avenue | City of Windsor, Ontario

Rigid frame bridge was rehabilitated by removal and repair deteriorated concrete on deck and abutments. Existing steel barrier wall was replaced with new concrete barrier.

Rehabilitation, Repair, and Replacement of Five Bow String Arch Bridges | County of Essex, Ontario

Bridges over Big Creek and Ruscom River on County Road 46 - complete replacement with concrete deck on prestressed concrete girder superstructure. Bridges over Ruscom River on County Road 46 and over Belle River on County Road 46 - project used existing abutments and footings, new concrete pier, and new concrete deck on structural steel girder superstructure. Bridge over Canard River on County Road 8 - preserved existing bow string arch bridge by repairing and upgrading structural components.

Reconstruction of Two Bridges on County Road 8 | County of Essex, Ontario

Bridge over Big Creek on County Road 8 - complete replacement with new abutments and concrete deck on steel girder superstructure. Bridge over Puce River on County Road 8 - complete replacement with new abutments and concrete deck on steel girder superstructure.

Construction of Little River Bridge, Twin Oak Industrial Park | Windsor, Ontario

This project involved the first high performance concrete deck in the region, on prestressed concrete girders.

Rehabilitation of Bridge Structures on EC Row Expressway | City of Windsor, Ontario

Rigid frame structure over CPR Tracks was rehabilitated by removal and replacing deteriorated joints and barrier wall and removal and repair deteriorated concrete on deck and abutments. Bridge over Jefferson Blvd. / Bridge over Matchette Road. / Bridge on Lauzon Parkway over EC Row Expressway Deteriorated expansion joints were replaced with new semi-integral abutment design and deteriorated concrete on deck, prestressed concrete girder and abutment are removed and repaired.

Rehabilitation of Puce River Bridge | County of Essex, Ontario

Bridge on County Road 46 was rehabilitated using the hydro-demolition method of bridge deck repair. Existing bridge abutment footing was underpinned.

Reconstruction of Duck Creek Bridge | County of Essex, Ontario

Reconstruction of bridge on County Road 42 using cast-in-place footings and CON/SPAN precast concrete arch culvert construction.

## STRUCTURAL ENGINEERING

Building Design Services | Windsor, Ontario

Engaged in design of industrial structures including buildings, equipment supports and pits, service tunnels, crane runways and monorails, conveyor supports, and structural reinforcement systems. Design of structural strengthening systems using CFRP laminates. Provided services to Municipalities for building plan review and Building Code conformance check. Conducted building failure/damage investigation for insurance companies and municipalities. Provided services to automotive plants and equipment manufacturers to conduct structural review of new and existing installations. Provide annual structural inspection of the Detroit-Windsor vehicle tunnel. Engaged in structural and architectural design and structural QA/QC of Multi-Modal Cargo Development project in Windsor International Airport.

## TUNNELS

Detroit-Windsor Vehicular Tunnel

Participated in and managed annual inspection, assessment and preparation of report from 2004 to 2009.

## DAMS & LEVEES

Little River Dyke Rehabilitation | City of Windsor, Ontario

Performed structural assessment, devised method of rehabilitation, performed structural design and contract administration during construction to repair/replace corroded steel retaining walls along the river.

Flat Rock Dams 2008 Repairs

Participated in the condition survey, inspection, assessment, design and rehabilitation of deteriorated concrete gravity dam in Flat Rock, Michigan.

# Harold Horneck M. Eng., P. Eng.

Senior Environmental Consultant
0 years of experience · Windsor, Ontario

Harold has over 40 years of diverse experience in the municipal and environmental engineering fields with particular emphasis on water supply, wastewater collection, pumping and treatment, and biosolids management systems. He has a proven record in the successful delivery of a wide variety of projects including complex projects involving management of multi-disciplined teams of professionals. The success of these projects is based on the principle of maintaining effective communications with the client throughout the project and a demonstrated ability to blend innovative technology with practical experience to provide solutions tailored to the needs and resources of the client.

Harold has experience in all aspects of project planning and delivery from feasibility studies, environmental study reports, funding applications and public consultation programs through to detailed design, approvals, contract administration and commissioning services. His variety of experience includes managing comprehensive stream studies and combined sewer overflow studies involving a broad range of technical disciplines such as microbiologists, aquatic biologist and sediment transport/river modeling specialists. He has participated on steering committees and as a study team member reporting on biosolids management technologies and pilot testing of innovative treatment systems.

## EDUCATION

Bachelor of Science, Civil Engineering, University of Windsor, Canada / Science, Windsor, Ontario, 1968

Masters of Engineering, Chemical Engineering, McMaster University / Engineering, Hamilton, Ontario, 1970

## MEMBERSHIPS

Member, Professional Engineers Ontario

## PROJECT EXPERIENCE

### WATER

Water Supply and Distribution System | Township of Tilbury West

Pre-design, final design and services during construction for a water supply and distribution system in the Township of Tilbury West including two reservoirs and high lift pumping stations and approximately 60 km of trunk watermains and local distribution mains.

Development of Master Water Supply, Distribution and Storage Plans

Development of master water supply, distribution and storage plans for several municipalities to provide water supply to unserviced areas and to accommodate development in serviced areas. Master Plans have been prepared for the Townships of Gosfield South, Mersea, Tilbury West and Gosfield North.

Union Water Supply System - Cottam Reservoir & Booster Pumping Station | Ontario Clean Water Agency | Cottam, Ontario

Pre-design, final design and services during construction for a reservoir, high lift pumping station and trunk water mains to serve five municipalities in the North West area of the Union Water Supply System. This project included a 9,000 m³ storage reservoir, 265 l/s firm high lift pumping capacity and over 25 km of trunk watermains ranging in size from 500 mm diameter to 300 mm diameter.

Trunk and Local Distribution Watermains

Pre-design, final design and service during construction for trunk and local distribution watermains to serve the northern portion of the Township of Mersea. This project included approximately 15 km of trunk watermains ranging in size from 400 mm diameter to 300 mm diameter.

### WASTEWATER TREATMENT

Class Environmental Assessment | Former Township of Maidstone

Class Environmental Assessment for sewage collection and treatment facilities to serve the Elmstead-Pike Creek area in the former Township of Maidstone.

Little River Pollution Control Plant | City of Windsor | Windsor, Ontario

Member of a Technical Steering Committee overseeing preparation of a plant capacity audit of the Little River Pollution Control Plant.

Little River Pollution Control Plant | City of Windsor | Windsor, Ontario

Pre-design including a public consultation program, final design and services during construction for upgrading the Little River Pollution Control Plant in the City of Windsor to a capacity of 73,000 m3/d. Expansion and upgrading work included all unit processes from pretreatment and raw sewage pumping through to biosolids dewatering and handling. The work was undertaken in six (6) separate controls at an overall cost of approximately $25 million. Interesting features of this project include an hydraulic model study of the raw sewage wet well and retrofitting of baffles in the well to enhance pump suction conditions, use of a "modified" activated sludge process providing approximately one half of the normally recommended aeration tank hydraulic retention time, an anoxic "selector" zone in the aeration tankage to control filamentous organisms, ultra violet light disinfection facilities, dissolved oxygen monitoring and automatic blower control to minimize energy consumption, conversion of plant operating and control systems to a modern PLC based distributed control system, and state of the art sludge handling, dewatering, cake pumping and odor control facilities.

Class Environmental Assessment | Township of Lakeshore

Class Environmental Assessment for upgrading and expansion of the sewage collection, pumping and treatment facilities serving the Township of Lakeshore. This project included an assessment of biosolids management alternatives and the cost and implications of co-treating landfill leachate at the expanded plant.

West Windsor Pollution Control Plant (WWPCP)

Consultant to and member of a Steering Committee to evaluate innovative treatment technologies for possible upgrading of the West Windsor Pollution Control Plant (WWPCP). This project involved a comprehensive pilot testing program of treatment technologies including modified activated sludge, trickling filter/solids contact, rotating biological contactor,and biological aerated filters including both co-current and countercurrent flow configurations.

West Windsor Pollution Control Plant

Preparation of a Master Plan for the West Windsor Pollution Control Plant identifying long term load requirements to accommodate future treatment facilities. The study included consideration of buffer zone requirements and appropriate load use and zoning policies for the area surrounding the plant.

Hydraulic Model Studies

Hydraulic model studies including design and retrofitting of baffles in final clarifiers to eliminate short circuiting and in pumping station wet wells to control vortex and air entrainment conditions.

Biosolids Management System | Windsor, Ontario

Consultant to and member of a Steering Committee with the responsibility of selecting a long term biosolids management system for the City of Windsor. This project involved a comprehensive review of current biosolids management processes, public meetings, preparation of proposal call documents including terms of reference and technical specifications, a detailed evaluation of proposals and presentation of a report to Council. A design-build-operate-transfer project delivery method was selected to provide long term, cost effective recycling of biosolids from the two wastewater treatment plants in the City of Windsor.

West Windsor Pollution Control Plant

Pre-design, final design and services during construction for expansion and upgrading of the West Windsor Pollution Control Plant including coarse bar screens, raw sewage pumping with standby power, fine bar screens, aerated grit removal, enhanced sedimentation with chemical precipitation, centrifuge sludge dewatering and automated sludge cake handling facilities at a overall cost in excess of $30 million (1998 dollars).

Upgrading and Enlargement of Sewage Pumping and Treatment Facilities | Town of Kingsville

Pre-design, final design and services during construction for upgrading and enlargement of sewage pumping and treatment facilities for the Town of Kingsville including two raw sewage pumping stations and an aerated lagoon treatment system.

## WATER RESOURCES

Windsor Riverfront Pollution Control Planning Study | City of Windsor | Windsor, Ontario, Canada

Prime consultant and project manager for the Windsor Riverfront Pollution Control Planning Study. All Windsor inputs to the Detroit River were assessed with emphasis on combined sewer overflows (CSO's). The work included a detailed inspection of CSO chambers, sewer system modeling, sediment and water sampling and analysis, river transport modeling and biomonitoring to evaluate the impact of CSO discharges on the river. A staged implementation plan was developed to control CSOs in accordance with Provincial Guidelines and the objectives of the Detroit River Remedial Action Plan.

Little River Drainage Area | Windsor

Prime consultant and project manger for a Comprehensive Stream Study for the Little River Drainage Area in the City of Windsor. The work included an extensive program of collection and analysis of water, sediment and benthic samples, development of a detailed inventory of pollution loadings and computer modeling of sewer collection systems.

## WASTEWATER

City of Windsor Biosolids Master Plan | City of Windsor | Windsor, Ontario | CAD 14M | 1998 | Senior Consultant

Consultant to and member of a Steering Committee with the responsibility of selecting a long term biosolids management system for the City of Windsor. This project involved a comprehensive review of current biosolids management processes, public meetings, preparation of proposal call documents including terms of reference and technical specifications, a detailed evaluation of proposals and presentations to City Council. A design-build-operate-transfer project delivery method was selected to provide long term, cost effective drying and recycling of biosolids from the two wastewater treatment plants in the City of Windsor.
The preparation of the Master Plan for the West Windsor Pollution Control Plant (now the LRWRP) also included identifying long term land requirements to accommodate future treatment facilities. The study investigated buffer zone requirements and appropriate land use and zoning policies for the area surrounding the plant.

Evaluation of Innovative Treatment Technologies | Windsor, Ontario | Consultant & Steering Committee Member

This project involved a comprehensive pilot testing program of several dispersed growth and fixed film biological treatment technologies. Two treatment technologies were identified that could be implemented at very significant cost savings as compared to conventional activated sludge treatment. Pre-design including a public consultation program, final design and services during construction for upgrading the Little River Pollution Control Plant in the City of Windsor to a capacity of 73,000 m3/d. Expansion and upgrading work included all unit processes from pretreatment and raw sewage pumping through to biosolids dewatering and handling. The work was undertaken in six (6) separate contracts at an overall cost of approximately $40 million (2003 dollars).

Lou Romano Water Reclamation Plant - Upgrade and Expansion | City of Windsor | Windsor, Ontario, Canada | CAD 110M | Project Management

Senior consultant providing services to upgrade and expand the existing 159 MLD enhanced primary treatment process at the Lou Romano WRP to secondary treatment utilizing biological aerated filtration. Upgrades include additional primary and secondary treatment capacity to service growth; additional primary treatment capacity as part of the City's program to reduce combined sewer flows to the Detroit River; and other upgrades required to accommodate the increased capacity. The upgraded and expanded plant will have a rated capacity of 218 MLD with an additional 55 MLD of primary capacity for CSO treatment.

Plant Capacity Audit | Windsor, Ontario | Member of Technical Steering Committee

Hydraulic model studies including design and retrofitting of baffles in final clarifiers to eliminate short circuiting and in pumping station wet wells to control vortex and air entrainment conditions.

## LAND DEVELOPMENT

Ontario Municipal Board Hearings.

Presentation of information at public meetings and evidence at Ontario Municipal Board Hearings.

100 Hectare Business Park | Windsor

Pre-design, final design and services during construction for a 100 hectare business park in the City of Windsor.

1000 Lot "Active Adult" Residential Community

Pre-design and final design for all road, water supply, stormwater management, sewage collection and treatment and electrical services for a 1000 lot "active adult" residential community integrated with an 18 hole golf course layout.

# Stephen Tsui M.Eng., C.Eng., P.Eng.,

F.E.C.

Senior Consultant, Structural
51 years of experience · Windsor, Ontario

Stephen has over 49 years of technical and management experience in the areas of structural engineering, buildings, bridges, and environmental engineering structures. His design experience has involved in many significant projects, specialized construction materials as well as deep foundations. He has developed expertise in conductibility review and value engineering.

Stephen is an experienced Project Manager and has directed and managed many significant multi-discipline projects including industrial complex, commercial and institutional buildings, bridges and grade separation, tunnels, pumping stations, water and wastewater treatment plants. His approach to projects stresses design efficiency, cost effectiveness, and timely delivery. Stephen has also developed specialized experience in structural rehabilitation and restoration and published his work in journals and conferences.

Stephen is an Adjunct Professor in the Faculty of Engineering at the University of Windsor, where he has shared his knowledge through technical presentations, teaching a course in Planning and Construction Management and supervising senior civil engineering students on their projects.

## EDUCATION

B.Sc. (Eng.), Civil Engineering, Chu Hai University, NT, Hong Kong, 1966

Qualifying Year for Graduate Studies, McGill University, Montreal, Quebec, 1968

M.Eng., Structural Engineering, Carleton University, Ottawa, Ontario, 1971

## REGISTRATIONS

Licensed Member #47136015, Professional Engineers Ontario

## MEMBERSHIPS

Chartered Structural Engineer, Engineering Council UK

Fellow, Engineers Canada

Member, The Institution of Structural Engineers

Member, Structural Engineers Association of Michigan

## PROJECT EXPERIENCE

### STRUCTURAL ENGINEERING

Rehabilitation and Upgrade to Island Water Treatment Plant | Toronto, Ontario

Served as structural team lead and QA/QC Engineer for the following projects:

$60 Million Odour Control Upgrade to Humber Wastewater Treatment Plant | Toronto, Ontario (2010-2014)

Building Facilities for Emergency Medical Services | Windsor & County of Essex, Ontario (2008-2011) | 2008-2010

$50 Million Upgrade to Oakville Southwest Wastewater Plant | Region of Halton, Ontario (2009-2011) | 2009-2011

$65 Million CSO Sewer and Retention Treatment Facility | Windsor, Ontario | 2009-2011

Expansion of Belle River Water Treatment Plant | Lakeshore, Ontario

Wheatley Water Treatment Plant | Chatham-Kent, Ontario

Grand River Pumping Station | Waterloo, Ontario

New Sewage and Water Treatment Plants | Muskoka, Ontario

Expansion and Upgrade to the F.W. Woods Water Treatment Plant | Guelph, Ontario

Screw Pumping Station for Town of LaSalle, Tecumseh, and Ford Motor of Canada

Expansion of Stoney Point Water Treatment Plant

Sewage Treatment Plant and Pumping Stations | Lakeshore, Ontario

Sewage Treatment Plant and Pumping Stations | Kingsville, Ontario

Ottawa Combined Sewage Storage Tunnel (2013 to Present)

Kanata West Pumping Station and Forcemains in the City of Ottawa (2013 to Present)

Seven Pumping Stations for the Town of LaSalle Sewage Works | LaSalle, Ontario

Highlift Pumping Station and Underground Reservoirs | Cottam, Ontario

$45 Million Expansion and Upgrade of the Union Water Treatment Plant | Kingsville, Ontario

$45 Million Expansion and Upgrade of the Leamington Pollution Control Plant | Leamington, Ontario (2005-2011) | 2005-2011

Structural Rehabilitation and Upgrade to the Windsor Water Treatment Plant | Windsor, Ontario

Maplewood Sewage Pumping Station | Windsor, Ontario

Expansion and Upgrade to the Little River Pollution Control Plant | Windsor, Ontario

$110 Million Expansion to the Lou Romano Water Reclamation Plant | Windsor, Ontario (2003-2008) | 2003-2008

High and Low Pressure Transmission Main | Ottawa, Ontario

Sandy Hill Flood Control Facility | Ottawa, Ontario (2007-2009) | 2007-2009

Tenth Line Pumping Station | Ottawa, Ontario

Responsible for Structural Design of the following Projects:

Truck Service Terminal for International Carriers Ltd. | Woodstock, Ontario

Services Building for Ford Engine Plant | Windsor, Ontario

Mazda Automotive Dealership Building | Windsor Mazda | Windsor, Ontario

## PROJECT MANAGEMENT

Project Technical Representative on Behalf of the Canadian International Development Agency (CIDA)

Provided advisory services on design and construction and to conduct feasibility studies for projects in Zambia and Egypt

Conducted Project Design, Management, Planning, and Feasibility Studies for numerous Municipalities and Government Agencies

Clients include City of Windsor; Seven Municipalities in the County of Essex, Chatham-Kent, London, Guelph, Toronto, Halton; Ontario Clean Water Agency; Ontario Ministry of Transportation, Ministry of Transport-Marine; Public Works and Government Services Canada; and Agriculture and Argi-Food Canada.

Participated as a Consultant for the Constructability Review of the $270 Million Pine Creek Wastewater Treatment Plant | Calgary, Alberta

Participated as a Value Engineering Team Member for the Following Projects:

• $118 Million Mid-Halton Wastewater Treatment Plant Phase IV & V Expansion, Region of Halton, Ontario • $103 Million Skyway Wastewater Treatment Plant Phase II Expansion, Region of Halton, Ontario • $50 Million Port Darlington Wastewater Treatment plant Phase 2 Expansion, Region of Durham, Ontario • $25 Million Pembroke Wastewater Treatment Plant, Pembroke, Ontario

## BRIDGES

Project Manager Responsible for Condition Survey & Rehabilitation Program of 92 Bridges | Municipality of Leamington, Ontario (2004-2011) | 2004-2009

Project Manager & Design Team Lead for Rehabilitation & Reconstruction of 35 Bridges | Municipality of Chatham-Kent, Ontario (2008-2011) | 2008-2011

Gateway Feature Pedestrian Bridge | Windsor, Ontario

Condition Surveys and Rehabilitation of 5 Highway Bridges in the City of Windsor | Windsor, Ontario (2007-2011) | 2007-2011

New Concrete and Steel Bridges for River and Creek Crossings in Chatham-Kent, Essex, and Oxford Counties

Precast Concrete Railway Level Crossing | Windsor, Ontario

A Three-Span Bridge for CN Rail Grade Separation | Woodstock, Ontario.

## FORENSIC INVESTIGATIONS

Condition Survey and Concrete Restoration of Digester and Sludge Holding Tanks | Winnipeg, Manitoba

Structural Evaluation of Four Underground Concrete Reservoirs | Guelph, Ontario

Published and Presented Topics in Repair and Restoration of Concrete and Masonry Structures | U.S.A.

Structural Consultant for Evaluation of Structural Deficiencies at the New Tecumseh Wastewater Treatment Plant | Alliston, Ontario

Structural Consultant for High and Low Pressure Transmission Main Replacement Program

Structural Strengthening of Concrete Structures Using CFRP Laminates | Windsor, Ontario

Repair and Strengthening of Large Water Retaining Vessels Using Epoxy Injection and External Reinforcing | Windsor, Ontario

Protective Coating Systems for Steel and Concrete Restoration Projects | Windsor, Ontario

Crack Repairs, Concrete Restoration of Settling Tanks and Aeration Tanks | Windsor, Ontario

Restoration and Strengthening of a Concrete Clarifier | Lakeshore, Ontario

Investigating and Reporting for Insurance Companies, Lawyers, and Municipalities on Cases Related to Building Failures, Structural Distress, and Fire Damages.

## PUBLICATIONS

"Bridge Inspection & Rehabilitation". *A presentation to the Department of Public Works, City of Sarnia*, 2009.

"Consulting Engineering". *A presentation to graduating engineering students at the University of Windsor, 2006 &*, 2007.

Application of Ozone at the Old Water Treatment Plant in Windsor Provides Compliance with Regulation 170/03. *International Ozone Association*, 2004.

Restoration of a Concrete Clarifier Structure. *Rehabilitation, Renovations & Preservations of Concrete & Masonry Structures; American Concrete Institution*, 1986.

Comparative Creep Study of Plain Concrete Under Dynamic, Static & Static - Dynamic Loads. *Masters Thesis, Carleton University, Ottawa Canada*, 1971.

Behavior & Ultimate Strength of Plain & Reinforced Concrete Model Beams Under Combined Bending & Torsion. *McGill University Structural Concrete Series*, 1969.

Model Micro-Concrete Mixes. *Structural Concrete Series No. 23; McGill University*, 1969.

# Chithral (Jay) Jayasuriya

M.A.Sc, P.Eng.

Structural Engineer
27 years of experience · Windsor, Ontario

Chithral (Jay) is a structural engineer with 27 years of experience. Jay's responsibilities have included designing reinforced concrete, prestressed concrete and structural steel structures. His design experience includes designing industrial buildings, underground storage tanks for water and wastewater facilities, transportation infrastructure including bridges, culverts and related infrastructure. Jay has also provided condition assessment and rehabilitation/repair design services for environmental and transportation infrastructures, including underground tanks, bridges and culverts.

As a Project Manager and Senior Structural Engineer, Jay has also been responsible for construction inspection and contract administration of various underground tanks, bridges, and culvert projects. Jay brings a particular strength to project teams through his knowledge and experience in design with reinforced concrete, pre-cast pre-stressed concrete, steel, timber, and masonry.

## EDUCATION

M.A.Sc., Civil Engineering, University of Windsor, Windsor, Ontario, Canada, 2007

B.Sc., Civil Engineering, University of Peradeniya, Peradeniya, Sri Lanka, 1990

## REGISTRATIONS

Professional Engineer #100078326, Professional Engineers Ontario

## AWARDS

2006 Ontario Graduate Scholarship in Science and Technology (OGSST)

## PROJECT EXPERIENCE

### WATER

William Street and Strange Street Water Supply Systems | Region of Waterloo | Kitchener & Waterloo, Ontario, Canada | Structural Engineer

Provided structural engineering services to the Region of Waterloo for the detailed design of a new 7500 sq.ft, long span steel frame building addition to house Greensand pressure filters. The total constructed cost of the facility was $18.5 Million.

Burke Water Station Upgrades | Guelph, ON | Structural Engineer

Burke water station improvements was to provide improved water quality, increased booster pumping and to provide additional storage. Performed structural design of water storage reservoirs and the modifications to existing reservoir structures.

### WASTEWATER TREATMENT PLANTS

Denis St. Pierre Water Pollution Control Plant Expansion and Upgrades | Town of Lakeshore | Lakeshore, Ontario, Canada | Structural Engineer

Performed structural design of blower building.

Bombardier Global Manufacturing Center | Mississauga, ON | Structural Engineer

Performed structural designs of four underground storage tanks for Bombardier global manufacturing center in the Pearson Aerostructures Facility in Mississauga, Ontario. Two tanks were located below aircraft movement area and were designed to withstand aircraft loading. In order to provide additional headroom, roof slabs were designed as flat slabs.

Combined Sewage Storage Tunnel | Ottawa, Ontario | Structural Engineer

Completed structural designs of underground chambers, shafts including rock anchor foundations for structures.

Kanata West Pumping Station and Forcemains | Ottawa, ON | Structural Design Engineer

Carried out structural design of underground chambers, micropile foundations for structures.

Windsor Riverfront Retention Treatment Basin Facility | City of Windsor | Windsor, ON | Structural Engineer

Executed structural designs of 2000 m2 precast concrete and cast in place roof parking structure.

** denotes projects completed with other firms*

Oakville South-West Waste Water Treatment Plant - Phase 3 Upgrades | Region of Halton | Structural Design Engineer

Carried out structural designs of 9000 square feet underground concrete equalization tanks, underground pumping station and screen building.

Greenway Pollution Control Plant | City of London | London, ON | Structural Design Engineer

Carried out structural design of elevated support structure and foundation for piping for new tech centre.

Industrial Wastewater Treatment Plant | Jubail Industrial City, Saudi Arabia | Structural Design

Carried out preliminary design of sludge holding tank and dewatering structure.

## ROADWAY CULVERTS / SMALL BRIDGES

West Townline Drain Culvert Replacement | County of Essex | Essex, ON | Project Manager

Project Manager for the replacement of the existing West Townline Drain culvert structure No. C-50-060. Conducted a condition survey and roadside safety evaluation. Existing CSP culvert was replaced with new precast concrete culvert.

Culvert on County Road 11 at King's Creek Replacement | County of Essex | Essex, ON | Project Manager

Project manager in the replacement of the existing King's Creek culvert bridge structure. Completed a condition survey, roadside safety evaluation, and detailed design.

Tom Wright Drain Culvert Replacement | County of Essex | Essex, ON | Project Manager

Condition survey, evaluation and replacement structure design for Tom Wright Drain culvert structure.

Culvert C-42-113 over 4th Concession Drain Bridge Replacement | County of Essex | Lakeshore, ON | Project Manager

Project Manager for the replacement of the existing 4th Concession Drain culvert/bridge structure. Conducted a detailed site audit, measurement, and evaluation of the existing structure. Existing culvert structure was replaced with a precast rigid frame culvert with open footing.

## BRIDGES

Replacement of Bridge 3012– 5th Concession N over River Canard | Town of Amherstburg | Amherstburg, ON | Project Manager

The existing bridge is a 3-span cast-in-place concrete rigid frame structures with two support piers in the river built in 1960. Completed detailed site investigation and structural assessment. Performed replacement design with a 34m long two span bridge with prestressed box beam superstructure and concrete substructure.

Replacement of Dashwheel Road Bridge over Forbes Internal Drain | City of Windsor | Windsor, ON | Project Manager

Project management for carrying out the design, tender, contract administration and inspection engineering services for the replacement of Dashwheel Road Bridge over Forbes Internal Drain.

Rehabilitation of Lauzon Parkway Bridge #160 over CP Rail | City of Windsor | Windsor, ON | Project Manager

The existing bridge constructed in 1980 is a three-span, concrete deck on prestressed concrete girders bridge. The bridge spans over the Canadian Pacific Railway (CPR) tracks with a clear span of 62.0m. Rehabilitation design included concrete repairs to barrier walls and replacement of the asphalt surface and deck waterproofing.

Engineering Services for Glenwood Pedestrian Bridge | City of Windsor | Windsor, ON | Project Manager

Rehabilitation design included replacement of existing deck with new prestressed box girders and new bicycle railings including conversion to semi-integral diaphragms and new approach slabs.

Rehabilitation of County Road 8 Bridge Over River Canard | County of Essex, ON | Structural Engineer

Carried out Structural evaluation and Rehabilitation design of Concrete Bow-String Arch Bridge. Existing reinforced concrete hangers were strengthened to increase load carrying capacity.

Bridge Rehabilitation Program | Municipality of Chatham-Kent | Municipality of Chatham-Kent, Ontario | Structural Engineer

Carried out condition survey/detailed visual inspection of bridges in Municipality of Chatham-Kent. Designed four bridge structures for rehabilitation/reconstruction and evaluated existing bridges for load carrying capacity.

Rehabilitation of Wigle Creek Bridge | Town of Kingsville | Kingsville, ON | Design Engineer

Design Engineer for the bridge over Wigle Creek on County Road 50. Completed the replacement of the existing superstructure with a new concrete deck on steel girders.

Rehabilitation of Lauzon Parkway and Matchette Road Bridges | City of Windsor | Windsor, ON | Design Engineer/Inspector

Three span PSC girder bridges in the City of Windsor were rehabilitated by converting into semi-integral abutment bridges, repairing deteriorated concrete, install new asphalt overlay with deck water-proofing.

Rehabilitation of Jefferson Bridge | City of Windsor | Windsor, Ontario | Design Engineer/Inspector

Single span box girder bridge on EC ROW expressway was rehabilitated by converting into a semi-integral abutment bridge, repairing deteriorated concrete, install new asphalt overlay with deck water-proofing.

** denotes projects completed with other firms*

Rehabilitation of Brookmill Road Bridge over Joshua's Creek* | Oakville, Ontario | Project Engineer

Rehabilitation of a 3-span precast box girder bridge including detailed structural evaluation.

Highway 401- Mega 4 Contract 7 Bridge Rehabilitation* | Ministry of Transportation | Ontario | Project Engineer

Carried out rehabilitation design of Ten bridges on Hwy. 401 including detailed structural evaluation.

Highway 401/427 Interchange Rehabilitation* | Ministry of Transportation | Ontario | Project Engineer

Performed structural evaluation of nine bridges with post-tensioned concrete decks.

Rehabilitation Highway 400 NBL and SBL, Severn River Boat Channel Bridge* | Ministry of Transportation | Ontario | Project Engineer

Designed a new replacement structure 118m long, 3-span deck on steel girder bridge with integral abutments.

Engineering Services Division* | Ministry of Transportation and Highways | Colombo, Western Province, Sri Lanka | 1999-2003 | Design Engineer

Developed standard designs for pre-stressed concrete bridge beams, executed detailed designs of bridge projects, analyzed structures using computer applications, carried out bridge inspection, assessment and rehabilitation work, and served in technical evaluation committees for bridge projects.

PB Merz and McLellan Ltd* | Ministry of Environment | Singapore, Singapore | 1997-1998 | Civil Engineer

Designed bridge and retaining structures for Jurong town development project. Carried out geometric and drainage designs for MRT Projects. Evaluated potential ground displacement effects on adjacent structures induced by Deep-Tunnel excavations for Deep Tunnel Sewer System (DTSS) project.

## CONSTRUCTION ADMINISTRATION

Rehabilitation of County Road-8 Bridge over River Canard | County of Essex | Essex, ON | Project Manager

Project involved strengthening of vertical concrete hangers of 36m span Bow-String Arch Bridge, removal and reinstallation of waterproofing and asphalt paving on deck, concrete repairs and installation of protective coating.

Rehabilitation of Dawn Mills Bridge over Sydenham River | Chatham-Kent, ON | Project Administrator

Project involved complete removal of 100m long concrete deck, strengthening and painting steel bridge girders, concrete repairs and construction of new deck.

City of Windsor Riverfront Treatment Basin (RTB) Project Contract 1 and 2 (Total $ 38M) | Windsor | 2009-2011 | Resident Engineer

RTB project involved installation of excavation protection system, micropile foundation system, trenchless piping, underground concrete CSO tanks, pump station, roof parking structure, land and marine pipe installation. Responsible for maintaining records, liaison, coordination and supervision of overall construction activities.

Samanalawewa Hydro-Electric Project (Central Engineering Consultancy Bureau)* | Ceylon Electricity Board | Balangoda, Sabaragamuwa Province, Sri Lanka | 1990-1992 | Shift Engineer

Construction supervision of 120MW surface power station and residential buildings, spillway and appurtenant structures, and 2km long grouting tunnels.

## HYDRAULIC MODELING

Non-point Source Pollution Modelling for Muddy Creek Watershed | Essex Region Conservation Authority | Windsor, ON | Research Assistant

Hydrologic modeling of Canard and Muddy Creek watersheds in Essex County, Ontario using AnnAGNPS pollution loading model. Prioritized sub-watersheds in Canard and Muddy Creek watersheds for treatment and management based on susceptibility to soil erosion. Assessed agricultural nutrient loadings that cause water quality degradation in Wheatley Harbour.

## ROADWAYS

Maintenance Management and Construction Division (Road Development Authority of Sri Lanka)* | Ministry of Transportation and Highways | Kandy, Central Province, Sri Lanka | 1992-1996 | Design Engineer / Project Engineer

Managed construction of bridge projects and road construction projects and carried out preliminary investigation and feasibility analysis.

Pulau Semakau Off-Shore Landfill Project (TOA Corporation of Japan)* | Ministry of Environment | Singapore, Singapore | 1996-1997 | Civil Engineer

Carried out geometric designs of roads, out settlement forecast calculations of off shore sand bunds, and prepared construction drawings for building works. and related services.

** denotes projects completed with other firms*

# Clarence Jubenville P. Eng.

Municipal Engineer
30 years of experience · Windsor, Ontario

Clarence has over 30 years of experience in the civil engineering discipline designing and constructing various municipal projects including roads, sewers, watermains, subdivisions and drainage works.

Clarence is an experienced Project Engineer who recognizes the importance in understanding the client's needs when designing and dealing with technical and administrative issues. His technical and construction experience provide insight for practical and cost effective project designs.

## EDUCATION

B.A.Sc., University of Windsor/Civil Engineering, Windsor, Ontario, 1992

## REGISTRATIONS

Licensed Member #90419292, Professional Engineers Ontario

## PROJECT EXPERIENCE

### WASTEWATER

Windsor Retention Treatment Basin Contract 2 Interceptor Sewer | Windsor | Civil Design Lead and Project Management

Responsible for design and managing the construction of a 2 km long 1650 / 2250 mm dia. interceptor sewer constructed by tunneling and open cut.

Lou Romano Water Reclamation Plant - Upgrade and Expansion | City of Windsor | Windsor, Ontario, Canada | CAD 110M | Site Work Design

To protect the natural ecosystem of the Great Lakes, and in particular, the Detroit River, the Lou Romano Water Reclamation Plant was going to require major upgrades. Our team of environmental and design engineers completed this complex, $110 million project to increase primary treatment capacity and add secondary treatment, making this plant the largest biological aerated filter (BAF) wastewater treatment facility in North America. The upgrade and expansion included construction of three (3) additional primary clarifiers that increased the average rated capacity of primary treatment from 159 ML/d to 272.7 ML/d. Bench top, pilot-scale, and full-scale testing of chemically enhanced primary treatment (CEPT) was performed and indicated that CEPT can provide effluent that meets the Ministry of the Environment and Climate Change treatment requirements for the wet weather bypass flows. One (1) primary clarifier with diameter of 51.8 m was constructed to provide the primary treatment capacity of 55 ML/d for treating excess wet weather flow using the CEPT process. Clarence was responsible for site work design.

Windsor Retention Treatment Basin Contract 3 Interceptor Chambers | Windsor | Civil Design Lead and Project Management

Responsible for design and managing the construction.

### SEWER SYSTEM DESIGN

Essex SW Storm Sewer System Improvements - Phase 1 | Town of Essex | Essex, ON | 2021-2023 | Project Manager

The purpose of the work is to implement storm sewer system improvements to Essex Ward 1, Southwest Storm Sewer System - Phase 1. Responsible for design and project management during construction.

Tecumseh Road Street & Storm Sewer Reconstruction | Town of Tecumseh | Tecumseh, ON | 2021-2022 | Project Manager

A new storm sewer is to be constructed to the limits of the project in accordance with the recommendations of the Town's Storm Water Master Plan. In addition, the road shall be fully reconstructed. Responsible for design and project management during construction.

Design Lead

Responsible for sewer and infrastructure design for phases 2, 3, 4, 5, and 9.

Oldcastle Hamlet 8th Concession Sanitary Servicing Plan | Tecumseh, ON | 2021 | Project Manager

Review the Oldcastle Hamlet 8th Concession Sanitary Servicing Plan with respect to existing and proposed development within the service area. The intent of this study is to carry out a preliminary sanitary sewer design.

Prince Road Sewage System | Windsor, ON | Civil

Ruthven Sewage Works | Ruthven, ON | 2006-2008 | Design and Project Management

Responsible for design and project management of the sewer system.

## ROADWAYS

Front Road Development | Nor-Built Construction | Amherstburg, ON | 2021-2022 | Project Manager

Infrastructure servicing of Amherstburg's Front Road Subdivision consisting of residential duplexes and apartment buildings.

Kingsbridge Subdivision | Amherstburg, ON | Project Management and Design

Lanoue Street Extension - Lakeshore | Town of Lakeshore | Lakeshore, ON | 2019-2022 | Project Manager

Lanoue Street Extension, from Manning Road to Amy Croft Drive to satisfy the transportation and roadway needs of the corridor.

Tecumseh Road East, Road Reconstruction - Stages 1,2,3,4 & 5 | Windsor | Design

Responsible for road and infrastructure design. Stage 4 included approximately 340 m of 900 mm, 600 mm and 400 mm dia. feedermains.

Division Road | Kingsville | Design and Project Management

Responsible for road and infrastructure design as well as project management during construction.

Howard Avenue and Cabana Road Intersection Reconstruction | City of Windsor | Windsor, ON | Design and Project Manager

Responsible for design and project management of the road and infrastructure improvements.

Main Street | Kingsville | Design and Project Management

Responsible for road and infrastructure design as well as project management during construction.

Taylor Avenue Road Reconstruction | Chatham, ON | Design

Responsible for road and infrastructure design.

Responsible for design of Phases 4, 5, & 6 and contract administration for Phase 4.

Robson Road Reconstruction | Leamington, ON | Design

Responsible for road and infrastructure design.

I.C. Roy Road Construction | Lakeshore, ON | Design

Responsible for road and infrastructure design.

Twin Oaks Industrial Park | Windsor, ON | Design

Responsible for road and infrastructure design.

Queen Street Reconstruction | Harrow | Design

Responsible for road and infrastructure design.

Notre Dame Street Improvements Phase 4 -11th Street to Duck Creek | Municipality of Lakeshore | Lakeshore, ON | 2018-2022 | Project Manager

Reconstruction of Notre Dame Street from 11th Street to Duck Creek to satisfy the transportation and roadway needs of the corridor while improving public safety and providing opportunities for urban revitalization as envisioned in the Class EA for the Notre Dame Street Revitalization Project.

Patillo Road Upgrade and Improvements | Municipality of Lakeshore | Lakeshore, ON | 2017-2019 | Project Manager

Design and preparation of contract documents for the reconstruction of Patillo Road from Advance Boulevard southerly to the Canadian Pacific Railway (CPR) crossing including the enclosure of Leffler Drain with a box culvert and watermain replacement.

## SITE DEVELOPMENT

Windsor Retention Treatment Basin Contract 1 - Site Work | Windsor | Civil Design Lead

The City of Windsor Riverfront Pollution Control Plan (PCP) was completed by Stantec in 1999 with the specific objective of reducing combined sewer overflows and total pollutant loadings to the Detroit River in keeping with the requirements of the MOE’s Procedure F-5-5. Since that time, Stantec has led the implementation of the major components of the plan, which have included major upgrades and expansions to the Lou Romano Water Reclamation Plant, upgrades to the Caron Avenue Pumping Station, construction of relief sewers, and the implementation of a conveyance tunnel and chemically enhanced high-rate retention treatment basin (RTB) providing satellite treatment. The Riverfront Retention Treatment Facility for the storage, treatment and disposal of CSOs included the construction of a 1.65- to 2.25-m-diameter interceptor tunnel over a length of 2,400 m to collect, store, and convey CSO to the chemically enhanced RTB with a rated capacity of 7.85 m3/s. The interceptor tunnel includes five new CSO interceptor chambers located downstream of existing chambers to divert flows and capture CSOs that currently bypass these chambers during wet weather events. The new CSO interceptor chambers include fixed overflow weirs, underflow baffles to control floatables, as well as gates to regulate CSOs from interceptor chambers to the RTB facility via the CSO collection sewer, and level sensors to measure the flow over the fixer weirs. Physical model testing was carried out to develop empirical equations for quantifying the overflow to the Detroit River and the flow to the RTB facility. Responsible for site work design.

Meadowview Subdivision Phases 1 & 2 | Amherstburg, ON | 2017-2021 | Project Management and Design

Lakeshore Emergency Medical Services | Lakeshore | Site Work Design

Royal Oak at the Creek Subdivision Phases 3 & 4 | Kingsville | Design

King Subdivision | Lakeshore | Design

Natures Reserve Subdivision | LaSalle | Design

City of Windsor - Annexed Lands Phase 1A & 3 | Windsor | Design

Chelsea Park Subdivision Phase 1,2,3 & 4 | Lakeshore | Design

Harrow Emergency Medical Services | Harrow | Site Work Design

Leamington Emergency Medical Services | Leamington | Site Work Design

Oak Park Subdivision | LaSalle | Design

Cottam Sewage Works | Cottam | Design and Project Management

Belle River Pollution Control Plant | Belle River | Site Work Design

Leamington Pollution Control Plant | Leamington | Site Work Design

## WATER DISTRIBUTION AND TRANSMISSION PIPELINES

Lakeshore Railway Ave., Dupuis St, 6ht & 7th St. WM Replacement | Town of Lakeshore | Lakeshore, ON | 2020-2022 | Project Manager

Replacement of the existing 50mm and 350mm diameter municipal watermains across Via Rail, along Railway Avenue, Dupuis Street, Sixth Street and Seventh Street with new 150mm and 400mm diameter municipal watermains as identified in the Town of Lakeshore's Water Infrastructure Renewal & Improvement Strategy. Responsible for design and project management during construction.

Tilbury Water Supply Project | Tilbury, ON | Project Manager and Design Lead

Responsible for design and managing the construction of the 24 km long, 600 mm dia. transmission watermain under four separate contracts.

Gracey Side Road Watermain Replacement | Municipality of Lakeshore | Lakeshore, ON | 2018-2022 | Project Manager

Replacement of an existing 50mm diameter municipal watermain with a new 200mm diameter watermain along Gracey Sideroad (County Road 37) from south of the Canadian National Railway to Lakeshore Road No. 302 and along Tecumseh Road (County Road 2) from Gracey Sideroad to east of Little Creek as identified in the Town's Updated Water Master Plan. Responsible for design and project management during construction.

County Road 18 from CR34 E Watermain Ext | Town of Kingsville | Kingsville, ON | 2017 | Project Manager

The intent of this project was to construct a new 250 or 300 mm diameter municipal watermain along County Road 18 East from County Road 34 easterly for approximately 745 meters and fronting the M&M Farms lands at Municipal No. 1755 in accordance with the recommendations of the Engineer's Report for the M&M Farms Ltd. Responsible for design and project management during construction.

LaSalle Southwest Quadrant Watermain Replacement | LaSalle, ON | Watermain and Sewer Design

Responsible for design and Project Management of the watermain and sewer system.

Union 2nd Concession Trunk Watermain | Kingsville, ON | Design

Responsible for design of 4.5 km long, 1050 mm and 900 mm dia. transmission watermain in the Union Water Supply System under two separate contracts.

Walker Road and Highway No.3 Watermain Replacement | Town of Tecumseh | Tecumseh, ON | 2018-2022 | Project Manager

Design, tendering, and contract administration services for replacement of existing 150mm and 200mm diameter watermains along Walker Road and Highway No.3 with new 300mm diameter watermains.

## URBAN PLANNING & DESIGN

Downtown Essex Center Streetscaping | Town of Essex | Essex, ON | 2020-2022 | Project Manager

Clarence and his team carried out the detailed design for the construction of the proposed streetscaping improvements along 'Main Street' (Talbot Street) from Maidstone Ave. to Gosfield Road., including short sections of abutting streets within the core area (Centre St., Gordon Ave., Wilson Ave. and Fox St.) The redesign of the downtown streetscape is intended to reinvigorate the community and carry forward the vision and design principals outlined in the Town of Essex Downtown Essex Center Streetscape & Silo District Plan (August 2013) while providing a cohesive visual identity and sense of place that is reflective of the Essex community.

Harrow Centre Streetscaping | Town of Essex | Essex, ON | 2020-2021 | Project Management

Streetscaping improvements in the Town of Harrow Centre downtown corridor. Responsible for road and infrastructure design as well as project management during construction.

## VALUE ENGINEERING, PEER REVIEWS AND MEDIATION

Peer Review | Lakeshore, ON

Reviewed over 80 individual site plans and subdivision developments on behalf of the Town of Lakeshore to ensure conformance with Town standards.

Peer Review | Essex, ON

Reviewed over 30 individual site plans and subdivision developments on behalf of the Town of Lakeshore to ensure conformance with Town standards.

## ENVIRONMENTAL ASSESSMENTS

Windsor Riverfront West CSO Control Class EA | The Corporation of The City of Windsor | Windsor, Ontario, Canada | CAD 0 | 2017-2019 | Civil Team Lead

Stantec completed the execution of the Schedule “C” Class Environmental Assessment (Class EA) for Combine Sewer Overflow control along the western district of the Windsor Riverfront. The assessment also included revisiting the wet weather flow (WWF) control that is located at the Lou Romano Water Reclamation Plant (LRWRP.) Clarence provided civil support, as well as contributions to alternative design solutions for finalizing the Class EA report to the City of Windsor. These tasks generally consisted of problem identification via collection, review, and analysis of pertinent data; evaluation of alternative solutions to the problem; establishing the recommended alternative solution; coordinating and obtaining public participation, confirm and select the preferred alternative solution; and preparation of an Environmental Study Report to document the process.

City of Windsor, Pollution Control Asset Condition Assessment Consultant | Lou Romano Water Reclamation Plant, Ojibway Parkway, Windsor, ON, Canada | CAD 0 | 2018-2020 | Civil Design Lead

Stantec completed the City of Windsor Pollution Control Asset Condition Assessment for two wastewater treatment plants, one biosolids management facility and 34 pumping stations. The assessment aligned with the provincial 2002 Sustainable Water and Sewage Systems Act (Bill 175) and assisted the City in developing future capital projects. This was obtained by providing an up-to-date assessment of average life expectancy of assets, and the cost associated with replacing these assets. Clarence led his civil team to obtain background information required to estimate the remaining service life, repair, and replacement costs for the 34 pumping stations. Visual site inspections were completed for all assets that were located on site. However, there were numerous assets with no information available. For those assets inaccessible or not found, a comprehensive desktop analysis was completed, ensuring all pollution control assets were included within the maintenance and capital plans.

Prince Road Storm Sewer Outlet Municipal Class Environmental Assessment/ Design | City of Windsor | Windsor, ON | CAD 100k | 2021-2022 | Project Manager

As project manager Clarence will lead his team to complete a Schedule C Class EA to establish the preferred location of the outlet and associated pumping station within the McKee Creek study area. His work plan is defined to the west by the Detroit River, to the east by the west limit of the existing storm sewer along Chappell Avenue constructed under Phase 9A just east of the ETR railway spur line extending from Russell Street, and to the north and south on either side of McKee Creek by lands owned by Coco Paving Ltd. Design work completed to date indicates that the outlet pipe would need to be routed across the ETR railway spur line, privately owned lands (by Coco Paving), and a Hydro One easement prior to discharging into a sensitive watercourse that also has species at risk.

## AUTOMOTIVE

Chrysler Canada - Windsor RS Flex Body Expansion | Windsor | Design

Responsible for design of site work.

DaimlerChrysler Canada - Pillette Road Truck Assembly Plant | Windsor | Design

Responsible for design of site work.

# Wesley D'Ippoliti BE, Civil

Civil Engineer in Training
6 years of experience · Windsor, Ontario

Wesley is a Civil Engineering EIT with the Civil group in Windsor, ON. His responsibilities pertain to inspections and designs for various projects related to municipal engineering, structural rehabilitation and evaluation, and telecommunications supply. Wesley has worked in the Civil, Structural, and Energy-Telecom teams and coordinated with other disciplines such as Traffic, Electrical and landscape to further site design. He is skilled in AutoCAD and site surveying from previous job experience and familiar with using Regional, Municipal, and OPSS/OPSD design criteria. Wesley also has experience composing design specifications, opinions of probably costs, form of tender, meeting minutes, and generating change orders and payment certificates.

Wesley's specific experience in the Civil discipline includes: Above ground removal and pavement plan drawings, roadway grading design, storm sewer design and installation, watermain installation, sanitary sewer installation.

Wesley's specific experience in the Structural discipline includes: Inspection services on removal and rehabilitation of existing bridges/culverts, inspection services on Cast-In-Place and Pre-Cast structure installation, and Existing structural field evaluation for load posting and lifespan review.

## EDUCATION

B.Eng., Civil Engineering, Lakehead University, Thunder Bay, Ontario, Canada, 2019

B.Eng., Civil Engineering Technology, St. Clair College, Windsor, Ontario, Canada, 2017

## CERTIFICATIONS & TRAINING

169CS-363869, Confined Space Entry & Monitor, Windsor, Ontario, Canada, 2021

Reliability Status (valid until 2031-01-20), Security Screening Certificate, Government of Canada / Ottawa, ontario, Canada, 2021

TU679800, Working at Heights Training, Windsor, Ontario, Canada, 2020

## REGISTRATIONS

Engineer-In-Training #100548390, Professional Engineers Ontario, 2020-PRESENT

## PROJECT EXPERIENCE

### SITE DEVELOPMENT

Lanoue Extension - Manning Road to Amy Croft Drive | Municipality of Lakeshore | Lakeshore, Ontario | 2020-present | Inspector

Provided inspection services for the installation of storm sewer, sanitary sewer, watermain, pond excavation, streetlight and traffic signalization, and road construction. Wesley also provided updates to payment certificates and change order's over the course of the project.

### CONSTRUCTION OBSERVATION, INSPECTIONS AND REPORTING

Watermain Replacement on Rourke Line | Municipality of Lakeshore | Lakeshore, Ontario | 2019 | Inspector

Provided inspection services, installation of a new watermain by open cut methods. This project also included jack-and-bore elements to install a watermain below an active railway.

### INSPECTION - BRIDGES / CULVERTS / RETAINING WALLS

Replacement of Culvert on CR42 (C-42-113) | Municipality of Essex County | Lakeshore, Ontario | 2021 | Inspector

Provided inspection for the removal of the existing structure, and erection of the new culvert. The project included both Cast-in-Place elements for the footing, approach slab, and curbs, and also included precast open-bottom box culvert, and block retaining walls. After the new structure was erected, the road and surrounding drains were remediated.

Replacement of Culvert on CR50 over West Townline Drain (C-50-060) | Municipality of Essex County | Amherstburg, Ontario | 2021 | Inspection of structural elements

Provided inspection services for excavation of the existing structure, installation of a new precast box culvert, and backfill.

Replacement of Gleeson Line Bridge over McDougall Drain & Rehabilitation of Gleeson Line Bridge over Government Drain No. 1 | Municipality of Chatham-Kent | Chatham-Kent, Ontario | 2020 | Inspector

Provided inspection for both bridge's under this contract. The first structure involved cast-in-place elements to a full tear down and rebuilt. The second structure involved retrofitting a new deck structure on existing abutment walls.

## FIBER OPTIC

1780 North Talbot Rd. ON1014 Fibre Optic Cable Installation | Telus Canada | Windsor, Ontario | 2020 | Inspector

Provided inspection services for underground drilling and overhead lashing of Telus Fibre Optic cable.

5255 County Rd. 42 ON1434 Fibre Optic Cable Installation | Telus | Windsor, Ontario | 2020 | Inspector

Provided inspection services for underground drilling and overhead lashing of Telus Fibre Optic cable.

## ROADWAYS

Notre Dame Street Improvements - Phase 4 | Municipality of Lakeshore | Lakeshore, Ontario | 2019-2020 | Inspector

Provided construction inspection for this project. The project included storm sewer upgrades, PDC connection upgrades, installation of a new watermain, and a full depth road reconstruction. Wesley also provided input on contract change orders throughout the course of construction.

# Karl Todd E.I.T

Environmental Designer in Training
5 years of experience · Windsor, Ontario

Karl is an Environmental Designer in Stantec's water group. Karl has 5 years of engineering experience specializing in water/wastewater, coastal and civil engineering in Canada and the Caribbean. Karl has gained relevant experience in process mechanical engineering for water/wastewater pumping stations, biological process modelling for wastewater treatment systems in warm and cold weather using BioWin and GPS-X, planning for wastewater conveyance and treatment systems, multi-hazard assessments, shoreline protection and rehabilitation. Karl is also experienced in the management and support for the procurement and construction processes. Karl has worked with a wide range of clientele including, various government agencies and private sector organizations.

## EDUCATION

Master of Science, Civil Engineering, University of Manitoba, Manitoba, Winnipeg, Canada, 2021

Bachelor of Science, Civil Engineering, University of the West Indies, St. Augustine, Trinidad, Trinidad and Tobago, 2016

## CERTIFICATIONS & TRAINING

Project Management Certificate, University of West Indies, Mona School of Business, Mona, Saint Andrew Parish, Jamaica, 2017

## PROJECT EXPERIENCE

### PUMP STATION

Denis St. Pierre Water Pollution Control Plant Expansion and Upgrades | Town of Lakeshore | Lakeshore, Ontario, Canada | Site Inspector

Carried out daily site inspections, reviewed shop drawings, and was responsible for project administration and construction administration.

St. Paul Storm Water Pumping Station Upgrades | Windsor, Ontario

Assisted with the process design for the expansion of the pump station. Contributed to the preparation of the design report. The upgrades will increase the total pumping capacity of the station from 12.5 m3/s to 21.7 m3/s.

LaSalle Sewage Pumping Station Upgrades | LaSalle, Ontario

Contributed to the process design and the preparation of the preliminary engineering report. The upgrades will increase the firm pumping capacity of the station from 870 L/s to 1174 L/s.

### WASTEWATER TREATMENT

Cayman Islands Airport Master Plan | Cayman Islands Airport Authority | Cayman Islands | Sewage and Stormwater Management

The role involved review of local and international environmental regulations, Put forward short and long term planning solutions to manage wastewater and stormwater at various stages of the airport development on both Grand Cayman and Cayman Brac.

Norman Manley International Airport Wastewater Treatment Plant* | Airports Authority of Jamaica | Kingston, Jamaica | Environmental Engineer

Responsible for the biological process modelling to upgrade wastewater treatment plant to meet future loads of the growing national airport.

Caribbean Estates Wastewater Treatment Plant Condition and Capacity Assessment* | Dynamic Environmental Management Ltd | Portmore, Jamaica | Environmental Engineer

Environmental Engineer tasked with performing a condition and capacity assessment of the existing waste stabilization pond system to determine the available capacity in the system to accommodate planned future flows. Specific tasks included field data collection to obtain aerial and topographic surveys as well conducting a waste characterization study. Also carried out process modelling for the existing and proposed upgrades to waste stabilization lagoon system and produced a conceptual design for the upgrade.

Meat Packing Wastewater Treatability Study* | Winnipeg, Manitoba

Designed operated and reported on bench-scale study to determine the treatability of site-specific wastewater from a meat smokehouse facility using MBBR technology.

** denotes projects completed with other firms*

Cold Temperature Nitrification Study* | Winnipeg, Manitoba

Designed, operated and reported on bench-scale study to treat post lagoon effluent at very cold temperatures using MBBR technology.

Appleton Estate Dunder and Domestic Wastewater Treatment Plant Modification* | Campari | St. Elizabeth Parish, Jamaica | Environmental Engineer

Environmental Engineer tasked with performing the biological treatment process modelling and design and to upgrade the existing treatment plant include of a low flow activated sludge system side-stream to treat domestic sewage during the sugarcane washing offseason.

## WATER COASTAL PROTECTION & RESTORATION

Norman Manley International Airport End of Runway Shoreline Protection* | Airports Authority of Jamaica | Kingston, Jamaica | Junior Civil/Coastal Engineer

The project was aimed at stopping and rolling back the coastal erosion that threatened to undermine the end of the runway at Jamaica's main international airport. Major project elements included Karl's responsibilities on this project included field data surveys including Aerial/topographic survey, collection and analysis of shoreline sediments, dune species sampling, anecdotal evidence of surge associated with specific events. Karl performed cross shore sediment transport modelling to determine beach profile changes during extreme storm and assisted with the design of the dune rehabilitation measures to limit further degradation and enhance the dune resilience to withstand the 100-year return period conditions. Physical scale model testing of proposed revetment and dune rehabilitation.

Saint Kitts Multi-Hazard Assessment and Coastal Designs* | Government of Saint Christopher (Kitts) and Nevis | Saint Kitts, Saint Kitts and Nevis | Junior Civil/Coastal Engineer

Junior Civil/Coastal Engineer on this project aimed at identifying the hazards affecting the main coastal road for the island of St Kitts and Nevis. Duties on this project included bathymetric surveys, aerial and topographic surveys, anecdotal surveys for evidence of surge associated with specific storm events. Performed climate variability and statistical analysis to determine the both the extreme rainfall and extreme wave conditions associated with the 2-year to 100-year return period. Responsible for wave modelling, sediment transport modelling and storm surge inundation mapping.

Port Royal Street Shoreline Stabilization* | Jamaica Social Investment Fund | Kingston, Jamaica | Project Engineer

Project Engineer on this project where he carried out bathymetric surveys, drogue tracking, collection and analysis of shoreline sediments and anecdotal surveys for evidence of storm surge. Responsible for performing wave modelling, overtopping analysis, sediment transport modelling, storm surge inundation mapping, revetment design, physical scale modelling and reporting. Also liaised between sub-consultants, stakeholders, and regulators.

Point Estate Hanover Storm Surge and Erosion Assessment* | Scenic Development Ltd. | Hanover, Jamaica | Civil/Coastal Engineer

Served as the civil/coastal engineer on this project where he carried out bathymetric surveys, analysis of shoreline sediments, collection of anecdotal evidence of surge associated with specific events, climate change and variability analysis. Performed storm surge inundation mapping and cross shore sediment transport modelling to support the subdivision planning effort by determining the minimum road elevations, minimum floor levels and horizontal set back from the shoreline.

Norman Manley International Airport Green Climate Fund Application* | Airports Authority of Jamaica | Kingston, Jamaica | Civil/Environmental Engineer

Civil/Environmental engineer contributing to the preparation of the concept Note for Green Climate Fund (GCF) Shoreline Protection application. Specific tasks included defining the pre and post-climate change damage conditions, Cross shore sediment transport modelling, Storm Surge Inundation mapping and wave modelling for the 2 - 500 year return period storm event along the entire Palisadoes Peninsula. Karl also contributed to the conceptual planning of protective measures such as raised road levels, dune modifications and revetments.

# Srdjan (Sergio) Stevandic

M.E.Sc., P.Eng.

Senior Electrical Engineer, Water, Electrical

Discipline Lead, Eastern Canada
27 years of experience · London, Ontario

Sergio is a Senior Electrical Engineer with over 25 years of experience, specializing in electrical power system, protection and control, and process automation and control. He has gained experience through numerous projects as a commissioning engineer, design engineer, and project manager for delivering and overseeing the full spectrum of technical solutions provided to water, wastewater, power, mining and industrial sectors. His ability to work within a team environment and attention to detail and accuracy complements his technical expertise. He has carried out master studies, preliminary and detailed design, project management, contract administration and commissioning for the electrical power generation and distribution, electrical systems protection and control, motor control systems, process control and automation systems.

Sergio has significant experience in the PLC and SCADA integration using various platforms (GE/Emerson, Rockwell, Wonderware, etc.). He also specializes in electrical power systems investigation, analysis and studies facilitated using ETAP, including protective devices coordination, short-circuit and arc-flash; substation grounding; load-flow and motor starting; power quality and harmonic analysis. Sergio's experience extends to protective relay programming and integration (GE and SEL); substation and power system automation; power systems testing, start-up and commissioning.

## EDUCATION

Master of Engineering Science Program, University of Western Ontario, London, Ontario, Canada, 2004

B.Sc. in Electrical Engineering, University of Belgrade, Belgrade, Yugoslavia, 1995

## REGISTRATIONS

Professional Engineer, Professional Engineers Ontario

## PROJECT EXPERIENCE

### WASTEWATER TREATMENT PLANTS

Ashbridges Bay Treatment Plant, Aeration Upgrades Pre-design | Toronto Water | Toronto, Ontario | 2018-2019 | Design Engineer, Electrical

Pre-design for Aeration System, Secondary Treatment and Blower Upgrades, prepare technical memo for 15kV/5kV substation replacement and addition, 15kV/5kV/600V distribution system and 5kV/600V motor controls.

Barrie WWTF, Expansion Pre-design | City of Barrie | Barrie, ON, Canada | 2016-2020 | Design Engineer, EI&C

Pre-design for plant expansion and upgrade to MBR, including retrofit to Aeration System, Secondary Treatment and Blower Upgrades, prepare pre-design and technical memo for 46kV transformer substation replacement, 600V distribution with 5000A distribution and synchronizing switchgear, 600V standby generation, 600V motor controls, PLC and SCADA control.

Greenway Pollution Control Center, Arc Flash Hazard Assessment | City of London | London, Ontario | 2018-2019 | Design Engineer, Project Manager

Arc flash hazard assessment report and labeling, including short-circuit analysis, protective device coordination and arc flash study utilizing ETAP. Study included 4.16kV/600V/208V distribution switchgear and MCCs. Project included update of master single-line diagrams for the plant.

Vauxhall Pollution Control Plant, Standby Generator | City of London | London, Ontario | 2017-2019 | Design Engineer, Project Manager

Retrofit of used 700kW, 600V diesel generator with outdoor enclosure, removal of second utility transformer, and retrofit of existing 600V switchgear with automatic transfer scheme.

Woodstock Wastewater Treatment Plant, Substation Replacement | Oxford County | Woodstock, Ontario | 2016-2019 | Design Engineer

Replacement of 27.6kV substation and 600V outdoor switchgear /w pad-mount transformer, 600V outdoor switchgear /w ATS and standby generator.

Pottersburg Pollution Control Plant, Inlet Screen Replacement | City of London | London, Ontario | 2017-2018 | Design Engineer

600V motor control panels, automatic transfer switch, process control (Modbus TCP) and instrumentation, PLC programming and SCADA integration.

** denotes projects completed with other firms*

Greenway Pollution Control Centre, Turbo Blower Upgrades | City of London | London, Ontario | 2017-2018 | Design Engineer, Project Manager

Electrical distribution for turbo blowers retrofit project.

Port Stanley Wastewater Treatment Plant and Pumping Stations | Municipality of Central Elgin | Port Stanley, Ontario | 2016-2017 | Design Engineer

New treatment plant, new pumping station, and upgrade to existing pumping station; 600V switchboard and MCCs (Ethernet/IP) with VFDs, building services, standby power, process control and instrumentation.

Vauxhall Pollution Control Plant, Turbo Blower Electrical Installation | City of London | London, Ontario | 2015-2016 | Design Engineer, Project Manager

Electrical distribution for turbo blowers retrofit project, air control power actuators, DO/TSS instrumentation.

Grand Bend Wastewater Treatment Plant | Municipality of Lambton Shores and South Huron | Grand Bend, Ontario | 2014-2015 | Design Engineer

New treatment plant; 600V switchboard and MCCs (Ethernet/IP) with VFDs, building services, standby power, process control and instrumentation.

Guelph Wastewater Treatment Plant, Secondary Effluent Pumping Station Standby Generator | City of Guelph | Guelph, Ontario | 2014-2015 | Electrical Engineer

Design for upgrades to Secondary Effluent Pumping Station standby outdoor diesel generator (400kW, 600V).

Ashbridges Bay Treatment Plant, Aeration Tank 2 Upgrades | Toronto Water | Toronto, Ontario | 2013-2016 | Design Engineer

600V MCCs, process control and instrumentation for controls of blower vanes actuators; modification to existing PLC Control Panels; Process and Control Narrative updates.

Southwestern Ontario Water Consortium | City of London | London, Ontario | 2013-2015 | Design Engineer

New R&D facility at Greenway PCC: electrical distribution and motor control for sewage pumping and conveyance (600V DeviceNet MCCs, Profibus actuated valves); building services; process control and instrumentation (Profibus); PLC programming and SCADA integration.

PLC Programming Best Practice Manual | City of London | London, Ontario | 2013-2014

GE PAC system platform programming and customization standard for implementation in Water and Wastewater plants and pumping stations.

Thorndale Wastewater Treatment Plant | Municipality of Thames Centre | Thorndale, Ontario | 2011-2012 | Design Engineer

New SBR treatment plant; 600V MCCs (DeviceNet) with VFDs, building services, standby power, process control and instrumentation.

Kirkland Lake Wastewater Treatment Plant | Kirkland Lake | Town of Kirkland Lake | 2012-2014 | Design Engineer

4.16kV pad-mount transformer and electrical distribution, 600V switchboards with ATS, 600V MCCs with VFDs (DeviceNet), building services, 700kW standby generator, process control and instrumentation.

Vauxhall Pollution Control Plant, Inlet Works & CEP | City of London | London, Ontario | 2010-2012 | Design Engineer

Inlet Works, Chemically Enhanced Pre-treatment Expansion & RAS/WAS Upgrades; 600V MCCs (DeviceNet), building services, process control and instrumentation (Profibus), PLC programming and SCADA integration.

Komoka Wastewater Treatment Plant Expansion | Municipality of Middlesex Centre | Komoka, Ontario | 2010-2011 | Design Engineer

Treatment plant expansion; 600V switchboard and DeviceNet MCCs, building services, standby generator, process control and instrumentation.

Vauxhall Pollution Control Plant, Section 1 Electrical Upgrades | City of London | London, Ontario | 2008-2009 | Electrical Engineer, Project Manager

Design for replacement of 600V switchgear, Section 1 MCCs (DeviceNet) /w VFDs, and electrical distribution.

Tavistock Wastewater Treatment Plant, Lagoon Aeration Upgrades | Oxford County | Tavistock, Ontario | 2007-2008 | Design Engineer

Electrical distribution and process control.

Oxford Pollution Control Plant MBR Expansion | City of London | London, Ontario | 2007-2008 | Design Engineer

Plant expansion with MBR; 600V switchboard and MCCs with VFDs (DeviceNet), 1MW standby generator, building services, process control and instrumentation (Profibus), PLC programming and SCADA integration.

Vauxhall Pollution Control Plant, Section 2 Electrical Upgrades* | City of London | London, Ontario | 2005-2006 | Design Engineer, Project Manager

Replacement of 600V DeviceNet MCCs.

Adelaide Pollution Control Plant, Sludge Thickening Upgrades* | City of London | London, Ontario | 2004-2005 | Design Engineer

600V MCCs (DeviceNet), VFDs, building services, process control and instrumentation.

** denotes projects completed with other firms*

Greenway Pollution Control Centre, Grit Removal Upgrades* | City of London | London, Ontario | 2005 | Design Engineer

600V MCC (DeviceNet) and process control system.

Greenway Pollution Control Centre, Electrical Upgrades* | City of London | London, Ontario | 2002-2005 | Design Engineer, Project Manager

Planning, pre-design, design and construction of complete multi-phase, multi-year electrical infrastructure replacement; (2) 4MVA 27.6/4.16kV transformer substation, 4.16kV electrical distribution including closed loop with (3) 4.16kV switchgear and (4) 1.5/2MVA indoor unit transformer substation and (2) double-ended 2000A 600V switchgear, (14) 600V MCCs c/w FVNR/FVR/RVSS/VFD motor controllers, protective relay protection and programming, process control and field communication (DeviceNet), PLC programming and SCADA integration.

Greenway Pollution Control Centre, Sludge Thickening Upgrades* | City of London | London, Ontario | 2003 | Design Engineer

600V MCC and process control.

Greenway Pollution Control Center, ORC Generator SCADA Integration | City of London | London, ON | 2020-Present | Design Engineer, Project Manager

Project included PLC programming and SCADA integration of new ORC Generator Energy Recovery System, and incinerator upgrades.

Little River Pollution Control Plant, Grit Upgrades | City of Windsor | Windsor, ON | 2020-Present | Design Engineer

Process control (Profinet). and instrumentation, including upgrade of Genius I/O control panel /w Rx3i PAC.

Lou Romano Water Reclamation Plant, Main Pump House Raw Sewage Pump VFD Replacement | City of Windsor | Windsor, ON | 2019-Present | Design Engineer, Project Manager

Replacement of four (4) 360-540HP VFDs /w RVSS bypass, addition of two (2) automatic harmonic filters, and process control (Profinet).

Standby Generator Replacement | Chatham-Kent PUC | Municipality of Chatham-Kent | 2019-Present | Design Engineer, Project Manager

Replacement of standby generators, distribution and ATS at Chatham WPCP, Tilbury WPCP, and Wheatley WPCP, including Chatham SPS 2, and Napier Street SPS (Wallaceburg), including 600V MCC and process automation replacement, and HVAC modifications to meet area classification at Wheatley WPCP.

Little River Pollution Control Plant, Sludge Pumping station 1 Upgrades | City of Windsor | Windsor, Ontario, Canada | 2019-Present | Design Engineer

Building services, process control (Profinet). and instrumentation, including upgrade of Genius I/O control panel /w Rx3i PAC.

Stoney Point Water Pollution Control Plant and Pumping Station | Town of Lakeshore | Town of Lakeshore | 2018-2019 | Design Engineer

Design of new treatment plant, and upgrade to existing pumping station; 600V switchboard and MCCs (Ethernet/IP) with VFDs, building services, standby power, process control and instrumentation.

## WASTEWATER PUMP STATIONS

Colonel Talbot Sewage Pump Station | City of London | London, Ontario | 2018-2020 | Design Engineer

600V switchboard with ATS, 600V MCC (Modbus TCP), four (4) 85-250HP VFDs (Modbus TCP), standby generator, building services, process control and instrumentation (Profibus), PLC programming and SCADA integration.

Western Beaches Tunnel Upgrades | Toronto Water | Toronto, Ontario | 2016-2018 | Design Engineer, Electrical

Replacement of the pumping system and other existing equipment, including 600V switchgear, 600V MCC, 600V/280-460HP VFDs /w bypass RVSS, process control and building services, building services standby generator.

Kilworth Sewage Pump Station | Municipality of Middlesex | Kilworth, Ontario | 2016-2019 | Design Engineer

600V switchboard with ATS, 600V MCC (Ethenet/IP) /w VFDs, standby generator (NG), building services, process control and instrumentation.

Adelaide Sewage Pump Station, Inlet Screen Replacement | City of London | London, Ontario | 2018 | Design Engineer, Project Manager

PLC programming and SCADA integration for new inlet screening equipment.

Sewage Pump Stations, VFD Replacement | City of London | London, Ontario | 2017-2018 | Design Engineer, Project Manager

Replacement of 600V VFDs (600V, 25-350HP, Modbus TCP), and PLC programming and SCADA Integration at Adelaide SPS, Berkshire SPS, Hunt Club PS, Medway SPS and Summercrest SPS.

Southland Sewage Pump Station | City of London | London, Ontario | 2015-2018 | Design Engineer

Demolition of sewage treatment plant and retrofit of existing pumping station; 600V MCC (Modbus TCP) with ATS, standby generator, process control and instrumentation, PLC programming and SCADA integration.

Dingman Creek Sewage Pump Station, Electrical Upgrades | City of London | London, Ontario | 2012-2015 | Design Engineer, Project Manager

1MVA 27.6/0.6kV padmount transformer, electrical distribution (600V 1600A switchgear with ATS, and DeviceNet MCC); 1MW standby generator; process control and instrumentation (Profibus); PLC programming and SCADA integration.

Chelsea Heights Sewage Pump Station, VFD Upgrades | City of London | London, Ontario | 2013-2014 | Design Engineer, Project Manager

Design for replacement of four (4) 600V sewage pump VFDs (DeviceNet); PLC programming and integration.

Stanley Street Sewage Pump Station | City of London | London, Ontario | 2012-2104 | Design Engineer

600V integrated motor control panel, building services, standby power (natural gas), process control and instrumentation.

Pitcarne Street Sewage Pump Station, Electrical Upgrades | City of London | London, Ontario | 2012-2013 | Electrical Engineer, Project Manager

Design of 120/240V integrated motor controls, standby power.

Sandford Street Sewage Pump Station Electrical Upgrades | City of London | London, Ontario | 2011-2013 | Electrical Engineer, Project Manager

Design of 600V integrated motor control; building services.

Halton Hills Sewage Pump Station 3 | Region of Halton | Halton Hills, Ontario | 2011-2013 | Design Engineer

600V MCC (DeviceNet), building services, standby power, process control and instrumentation.

W12A Leachate Pump Station | City of London | London, Ontario | 2011-2012 | Design Engineer

600V VFDs, ATS, standby generator, process control (DeviceNet) and instrumentation (Profibus), PLC panel, PLC programming and integration.

John Pound Sewage Pumping Station Upgrades | Oxford County | Tillsonburg, Ontario | 2010-2011 | Design Engineer

600V VFDs, and process control.

Woodworth Sewage Pump Station, Upgrades | City of St. Thomas | City of St. Thomas, Ontario | 2009-2010 | Design Engineer

600V MCC, and process control.

Westfield Village Sewage Pump Station | York Development | London, Ontario | 2009-2010 | Design Engineer

600V MCC (DeviceNet) with VFDs, building services, standby power, process control and instrumentation (Profibus), PLC programming and SCADA integration.

Dingman Creek Sewage Storage Facility Transfer Pump Station | City of London | London, Ontario | 2008-2010 | EI&C Engineer

Design of 600V integrated motor control, standby power, process control and instrumentation, PLC programming and integration.

Wonderland Sewage Pump Station | City of London | London, Ontario | 2008-2010 | Design Engineer

600V switchboard with ATS, 600V MCC (DeviceNet), four (4) 250HP VFDs (DeviceNet), standby generator, building services, process control and instrumentation (Profibus), PLC programming and SCADA integration.

Bostwick Sewage Pump Station | York Development | London, Ontario | 2008-2009 | Design Engineer

600V MCC (DeviceNet) with VFDs, building services, standby power, process control and instrumentation (Profibus), PLC programming and SCADA integration.

Byron Sewage Pump Station, Upgrades | City of London | London, Ontario | 2007-2008 | Design Engineer

600V VFDs (DeviceNet), standby power, process control and instrumentation (Profibus), PLC programming and SCADA integration.

Dingman Creek Sewage Storage Facility* | City of London | London, Ontario | 2006 | Design Engineer

Electrical distribution, underground duct bank, area lighting, building services, process control and instrumentation, PLC programming and SCADA integration.

Northridge Pumping Station* | City of London | London, Ontario | 2005 | Design Engineer

240V VFDs (DeviceNet), building services, process control and instrumentation (Profibus), PLC programming and SCADA integration.

Dingman Creek Sewage Pump Station, VFD Replacement* | City of London | London, Ontario | 2000 | Design Engineer

Replacement of 600V 300HP pump VFD, process control design and PLC integration, including emergency replacement of 300HP VFD.

Cedarwood Sewage Pump Station Upgrades | Ontario Clean Water Agency | Tecumseh, ON | 2018-2019 | Design Engineer

600V MCC /w ATS, standby generation, process control and instrumentation, building services.

William Street Sewage Pump Station | Municipality of South Huron | Exeter, ON | 2018-2020 | Design Engineer

600V switchboard with ATS, VFDs (Modbus TCP), standby generator, building services, process control and instrumentation.

Swastika WPCP Decommissioning & Sewer System Connection to Kirkland Lake WWTP | Ontario Clean Water Agency | Town of Kirkland, Ontario | 2020-Present | Design Engineer

Swastika WPCP decommissioning and upgrades of three (3) sewage pumping station (Swastika SPS, Culver Park SPS, Chaput Hughes SPSP); 600V switchboard and ATS, VFDs (Ethernet/IP), standby power, process control and instrumentation.

** denotes projects completed with other firms*

Dingman Creek Sewage Pump Station | City of London | London, ON | 2020-Present | Design Engineer

New sewage pumping station, including screening and grit removal facilities, 600V switchboard with ATS, 600V MCC (Modbus TCP), 100-250HP VFDs (Modbus TCP), standby generator, building services, process control and instrumentation (Profibus), PLC programming and SCADA integration.

## WATER TREATMENT PLANTS

Burke Water Station Upgrades | City of Guelph | Guelph, Ontario | 2016-2019 | Design Engineer

600V MCC /w VFDs, ATS, standby generator (NG), building services, process control and instrumentation, PLC control panels.

South Chatham-Kent Water Treatment Plant, Electrical Upgrades | Chatham-Kent PUC | Erie Beach, Ontario | 2018-2019 | Design Engineer, Project Manager

Replacement of 27.6kV substation including transformers and over-head -line, 4.16kV switchgear c/w automatic transfer scheme, and 4.16kV MCC.

Elgin Area Water Treatment Plant, High Lift MCC Replacement | City of London, Regional Water Supply | Port Stanley, ON | 2017-2018 | Design Engineer, Project Manager

4.16kV MCC and associated relay protection and motor control (Ethernet/IP), including two (2) 4.16kV VFDs with synchronizing control of multiple motors.

Grand Bend Water Treatment Plant, Substation and Electrical Upgrades | City of London, Regional Water Supply | Grand Bend, Ontario | 2015-2018 | Design Engineer, Project Manager

Replacement of (2) 6/8MVA 115/4.16kV transformers, including substation grounding, 115kV circuit switchers and equipment, 4.16kV distribution, and associated relay protection and control. Electrical upgrades and replacement of 4.16kV MCC including two (2) 4.16kV VFDs at Low Lift Pumping Station, and all 600V MCCs throughout the plant, including 4.16/0.6kV distribution, and associated relay protection and motor control (Ethernet/IP).

Elgin Area Water Treatment Plant, Low Lift MCC Replacement | City of London, Regional Water Supply | Center Elgin, Ontario | 2015-2016 | Design Engineer, Project Manager

4.16kV MCC and associated relay protection and motor control (Ethernet/IP).

Elgin Area Water Treatment Plant, Electrical Upgrades | City of London, Regional Water Supply | Port Stanley, Ontario | 2009-2011 | Design Engineer, Project Manager

Electrical upgrades; replace all 600V MCCs (DeviceNet), and 4.16kV motor protection relays and programming.

Grand Bend Water Treatment Plant, Backwash MCC Replacement | City of London, Regional Water Supply | Grand Bend, Ontario | 2009-2010 | Design Engineer, Project Manager

4.16kV Backwash Pumps MCC Replacement

West Elgin Water Treatment Plant | Municipality of West Elgin | West Elgin, Ontario | 2007-2008 | Design Engineer

New water treatment plant and Low Lift PS Upgrades; 600V switchboard with ATS, 600V DeviceNet MCCs with VFDs, standby power, building services, process control and instrumentation.

Elgin Area and Grand Bend Water Treatment Plant* | City of London, Regional Water Supply | Grand Bend, Pt. Stanley, Ontario | 2006-2007 | Design Engineer, Project Manager

Pre-design of standby power (4.16kV, 2.0MW at EAWTP and 2x4.2MW at GBWTP), procurement, electrical distribution (27.6 kV/4.16 kV switchgear), protection and stand-by/parallel generation automatic transfer system.

Grand Bend Water Treatment Plant, High Lift MCC Replacement* | City of London, Regional Water Supply | Grand Bend, Ontario | 2002-2004 | Design Engineer, Project Manager

4.16kV MCC replacement for (5) 3000HP synchronous high lift pumps, including synchronous brushless motor retrofits.

## WATER PUMP & LIFT STATIONS

Delaware/Komoka Water Pump Station | Municipality of Middlesex Centre | Komoka, Ontario | 2018-2019 | Lead Electrical Engineer

Design of 600V distribution and VFDs (Ethernet/IP), building services, process control and instrumentation, PLC control panel.

Elgin-Middlesex Water Reservoir and Pump Station, Arc Flash Hazard Assessment | Ontario Clean Water Agency | St. Thomas, Ontario | 2018 | Design Engineer, Project Manager

Arc flash hazard assessment report and labeling, including short-circuit analysis, protective device coordination and arc flash study utilizing ETAP. Study included 4.16kV switchgear and MCC, and 600V MCCs.

McGillivray Water Reservoir and Pump Station, Arc Flash Hazard Assessment | Ontario Clean Water Agency | McGillivray, Ontario | 2018 | Design Engineer, Project Manager

Arc flash hazard assessment report and labeling, including short-circuit analysis, protective device coordination and arc flash study utilizing ETAP. Study included 4.16kV switchgear and MCC, and 600V MCCs.

** denotes projects completed with other firms*

Pond Mills Water Pump Station, Electrical Upgrades | City of London | London, Ontario | 2016-2017 | Design Engineer, Project Manager

600V MCC with ATS, VFDs (DeviceNet), process control and instrumentation, and PLC/SCADA programming and integration.

Wickerson Water Pump Station, Upgrades | City of London | London, Ontario | 2014-2017 | Design Engineer

Pump upgrades, 600V VFD (DevicNet) replacement, process control and instrumentation, and PLC/SCADA programming and integration.

Elgin-Middlesex Water Reservoir and Pump Station, London Pump Upgrades | City of London | St. Thomas, Ontario | 2013-2016 | Design Engineer

4.16kV/600V RVSS upgrades, electrical and process control, and power metering.

Elgin-Middlesex Water Reservoir and Pump Station, Aylmer Pumps VFD Upgrade | Township of Malahide | St. Thomas, Ontario | 2012-2013 | Design Engineer

600V VFD upgrades, electrical and process control.

Southeast Water Reservoir and Pump Station | Stantec Consulting | London, Ontario | 2010-2012 | Design Engineer

Design of SCADA and Pump Control Panels.

Westmount Water Pump Station, Electrical Upgrades | City of London | London, Ontario | 2010-2011 | Design Engineer, Project Manager

600V MCC (DeviceNet) with VFDs and ATS, process control and instrumentation, and PLC/SCADA programming and integration.

Denfield Water Storage and Pump Station | Municipality of Middlesex Centre | Denfield, Ontario | 2010-2011 | Design Engineer

600V integrated VFD control panel (DeviceNet), standby power, building services; process control and instrumentation.

Kilworth-Komoka Water Storage and Pump Station | Municipality of Middlesex Centre | Komoka, Ontario | 2009-2010 | Design Engineer

600V MCC (DeviceNet) with VFDs, standby power, building services; process control and instrumentation.

Komoka-Mt.Brydges Water Pump Station | City of London, Regional Water Supply | London, Ontario | 2009-2010 | Design Engineer

600V MCC (DeviceNet), standby power, building services; and process control and instrumentation.

Clair Tower Water Pump Station | City of Guelph | Guelph, Ontario | 2008-2009 | Design Engineer

600V MCC with VFDs, standby power, building services, process control, and instrumentation.

Arva Water Reservoir and Pump Station, Electrical Upgrades* | City of London | London, Ontario | 2006 | Design Engineer, Project Manager

27.6 kV over-head line replacement, 600V MCCs (DeviceNet) replacement, and pre-design of 27.6/4.kV substation and 4.16 kV switchgear/MCC.

McGillivray Water Reservoir and Pump Station, Protection Relay Upgrades* | Stantec Consulting | London, Ontario | 2002 | Design Engineer, Project Manager

Design of 115/4.16 kV distribution and motor control system protection relay upgrade for four (4) 4.16kV, 3000HP booster pumps, including relay programming.

## POWER

Amherst Island Wind Power Project | Pennecon | Kingston, Amherst Island, Ontario | 2017-2018 | Design Engineer P&C

Design-built team with Pennecon for Algonquin Power for 75MW Wind Power Project; 115/34.5kV 50/67/83MVA transformer and switching substation relay protection, control and automation/SCADA; IEC 61850 implementation.

Recurrent Solar Projects | PCL | Strathroy, Ingersoll, Orillia, Midhurst, Smith Falls, Ontario | 2013-2014 | Design Engineer

Design-build team with PCL for Recurrent for (14) 3.5-10MW solar farms, including 44/27.6kV transformers, 44kV and 27.6kV substations, E-house, relay protection & control; AC/DC underground system design; grounding design; power system studies including cable ampacity, load-flow, short-circuit, protective device coordination, arc-flash, harmonic, and insulation coordination analysis.

Port Dover-Nanticoke Wind Project | Graham Infrastructure | Haldimand/Norfolk County, Ontario | 2012-2013 | Design Engineer

Design-built team with Graham Infrastructure for 230/34.5kV 100/133/166MVA transformer and substation relay protection & control; power analysis including short-circuit, load-flow & reactive power, protective devices coordination, insulation coordination, harmonic/transient analysis, and 34.5kV underground collector system design; commissioning support for 230/34.5kV substation and P&C.

Canadian Solar Projects | PCL | Ontario | 2012 | Design and Support Engineering

Design-build team with PCL for Canadian Solar for (5) 7-10MW solar farms, including 44kV substations, 44/27.6kV transformers, E-house, relay protection & control; AC/DC underground system design; power system studies including cable ampacity and insulation coordination analysis.

Ontario Power Generation Grounding Studies* | Ontario Power Generation | Ontario

Grounding studies for Indian Chute and Matabitchuan GS.

** denotes projects completed with other firms*

London Hydro 13.8kV Downtown Protection Relay Study* | London Hydro | London, Ontario | Design Engineer

Review, analysis and recommendations for protection system for downtown 13.8 kV closed-loop distribution system including over-current, distance and pilot relaying.

## POWER STUDIES

City of Toronto Arc Flash Hazard Assessment | Toronto Water | Toronto, Ontario | 2010, 2012 | Design Engineer

Arc flash studies for (40) Wastewater and (10) Water Pumping Stations through the City of Toronto.

City of London Arc Flash Hazard Assessment | City of London | London, Ontario | 2011-2103 | Design Engineer and Project Manager

Arc flash studies for (40+) water and wastewater pumping stations and (6) wastewater treatment plants / pollution control plants.

Protective Devices Coordination Studies and Harmonic Analysis, Municipal* | Various Clients

City of London: Lake Huron WTP, Ausable WPS, Elgin Area WTP, Greenway PCC, Dingman Creek PS and Medway PS; City of Toronto: Clark WTP.

Protective Devices Coordination Studies and Arc-flash Studies, Industrial and Institutional - Various Clients*

GM Components Plant, St.Catherines, GM Diesel, General Dynamics, EMD London, Magna Presstran Industries, Magna Promatek, Gerdau Courtice Steel, GKN Sintermental, Lear Seating, Labatt Breweries, Blue Circle Cement, University of Western Ontario, Sir Wilfrid Laurier University, University of Waterloo, London Board of Education, etc.

## MINING

Apollo Gold | Timmins, Ontario | Design Engineer

Gold processing facility upgrades (design-build team with Industrial Systems); 27.6kV outdoor substation, grounding, electrical distribution (4.16kV switchgear, 4.16kV RVSS, 600V MCCs, 600V VFDs), protection and control system; protective replaying design, PLC programming and SCADA integration.

Lake Shore Gold, Timmins, Ontario | Design Engineer

New Timmins West Mine surface facilities (design-build team with Industrial Systems); 115 kV overhead line, 115/4.16kV 10/13MVA transformer substation, 4.16kV SVC and power factor correction facilities, 4.16/0.6 kV switchgear and distribution, protection and control system, protective relaying, stand-by generation, building services, and coordination with Hydro One and IESO.

DeBeers, Victor Mine, Ontario*

Grounding analysis and design for Pioneer Camp, Construction Camp and Service Core substation.

Vale Inco Sudbury Relay Coordination Study | Vale Inco | Sudbury, Ontario | 2008

Protective relay coordination for new Creightion # 9 bus-ring substation, including over-current and distance relaying.

Xtrata - Kidd Creek, Timmins, Ontario*

Power systems analysis to address voltage regulation problems. Designed and prepared specifications of 14 MVAr, 13.8 kV Static VAR compensator (SVC).

## CEMENT / AGGREGATES

St. Marys Cement, St. Marys, Ontario

Design of electrical power distribution including two (2) 750kVA, 13.8-0.6kV pad-mount transformers and underground distribution to new CBM line power control panel.

Lafarge North America, Woodstock Cement Plant, Ontario* | Design Engineer and Project Manager

Various projects: Design of 13.8/4.16 kV underground cable distribution system; Design of protection system upgrades for the 115/13.8/4.16 kV distribution systems, including protective relay coordination and arc-flash studies; and Predesign for 4.16kV and 600V distribution system upgrades including 10 unit substations (total of 12MVA transformation) and replacement of 10 PCB transformers; Review and implementation of crane safety control and automation; Design for implementation of four (4) 200/250HP 600V VFD's for kiln cooling application, including harmonics mitigation solution.

St. Marys Cement, St. Marys, Ontario*

Design of electrical power and controls for cooling tower project (600/208V distribution and controls).

## INDUSTRIAL FACILITIES

Promatek/MTTC Facility Expansion* | Magna | Brampton, Ontario | Design Engineer

44,000/600/208 V, 4 MVA distribution system addition.

CSB Line* | CSB Line | Earlton, Ontario | Design Engineer

Electrical distribution and 44kV substation and grounding.

GM Diesel London Protection Relay Upgrades* | GM Diesel | London, Ontario | Design Engineer

Design-build project for implementation of protection, metering and control system replacement for the 27.6/13.8kV distribution system.

Labatt Breweries Protection Relay Study* | Labatt Breweries | London, Ontario | Design Engineer

Review, analysis and recommendations for parallel generator (5MW, 4.16 kV) protection system to satisfy requirements of generator protection system and coordination with Utility relaying.

** denotes projects completed with other firms*

# Songheng Li Ph.D., P.E., D.WRE

Principal Hydraulics Technical Lead
ıce · Boston, Massachusetts

Songheng has over 28 years experience in hydraulics and currently serves as a Principal Hydraulics Technical Lead at Stantec. His areas of his expertise include hydraulic structures, upstream and downstream fish passage, pump stations, water pump intakes, water and wastewater facilities, hydro-turbines, flow mixing, network transient, river flows, and sediment transportation. Songheng is an expert at computational fluid dynamics (CFD) and hydraulic and hydrological (H&H) modeling and brings relevant skills in ANSYS Fluent, Flow-3D, and InfoWork ICM. In short, Songheng uses this expertise to help clients solve their flow challenges.

## EDUCATION

Ph. D., Instituto Superior Tecnico, Lisbon, Lisbon, Portugal, 2001

Master's Degree of Engineering, Tsinghua University, Beijing, Beijing, China, 1990

Bachelor's Degree of Engineering, Wuhan University, Wuhan, Hubei, China, 1988

## REGISTRATIONS

Professional Engineer #48195, Commonwealth of Massachusetts

## MEMBERSHIPS

Member, American Society of Civil Engineers

Member, Water Environment Federation

D.WRE., American Academy of Water Resources Engineers

## AWARDS

1999 Science and Technology Progressing Award, “Application of Numerical Model of Sediment Erosion and Deposition in the Yellow River”, Ministry of Water Resources, China.

## PROJECT EXPERIENCE

### HYDRODYNAMIC AND WATER QUALITY MODELING

City of Woonsocket, “Water Treatment Plant Design-Build, Chlorine Contact Tank and Clearwell”* | City of Woonsocket | Woonsocket, Rhode Island | Technical Lead

Led CFD of residence time distribution and contact time assessment. CFD model was developed and used to evaluate the flow patterns in the chlorine contact tank, calculate the baffling factor and head loss through the chlorine contact tank.

District of Columbia Water and Sewer Authority, “CSO Outfall Hydrodynamic and Erosion Analysis” * | District of Columbia Water and Sewer Authority (DC Water) | Washington, DC | Technical Lead

As part of the remedial investigation for the former Washington Gas Company Manufactured Gas Plant, a hydrodynamic analysis was conducted to evaluate riverbed erosion caused by combined sewer outfalls (CSOs) owned by the District of Columbia Water and Sewer Authority located near the site. Specifically, the objective of this study was to develop an understanding of the impact of the CSO outfalls on the potential erosion subject to 100 and 500-year discharge and river flood conditions in the receiving Anacostia River. It was conducted in response to a request from the National Parks Service (NPS) that potential erosion from these CSO Outfalls be investigated for the 100- and 500- year storm events, based on the potential for resuspension of contaminated riverbank sediment. A CFD model was developed to analyze the hydrodynamics of the Anacostia River. A hybrid model domain was constructed, consisting of a far-field depth-averaged 2D shallow water model and a near field 3D model to capture the hydrodynamic impacts of CSO 16. The General Moving Objects (GMO) model was used to simulate the cast-iron tide gate that rotates around a fixed axis with the rotation determined by the hydrodynamic force of the flow surrounding the structure and gate gravity under coupled motion. The CSO discharge rates were estimated using a separate hydrologic model developed in HEC-HMS and used in the CFD model as an input. Field sediment data was used to calculate bed critical shear stress. The modeled bed shear stress values were compared to the critical shear stress to assess the extent of erosion.

** denotes projects completed with other firms*

City of Richmond, “Computational Fluid Dynamics (CFD) Modeling of Byrd Park Reservoir”* | City of Richmond | Richmond, Virginia | Technical Lead

The Byrd Park Reservoir provides water storage for the Cities drinking water system. It functions as an extension of the Richmond Water Treatment Plant. An inspection discovered that the cover is in poor condition with increasing deterioration. The city is implementing a project to replace the reservoir roof system. As part of the project, the city would like to improve the mixing and or plug flow within the reservoir. Design of such improvement requires performing Computational Fluid Dynamics (CFD) modeling. The primary objectives of the CFD study included: To evaluate the plug flow pattern in the reservoir; and To improve efficiency of the baffle system to reach close to plug flow pattern through the entire reservoir. The general approach included the following two phases: Phase 1: Hydraulic Evaluation. A hydraulic evaluation of the initial design by G&H was conducted and possible modifications of the design were recommended; Phase 2: CFD Evaluation. The CFD evaluation included: Baseline, Modification 1 (Mod 1), and Modification 2 (Mod 2). Each simulation in Phase 2 included two steps: Step 1: Steady-state hydrodynamic simulation was conducted. Step 2: Transient species transport simulation was conducted. In this step, the converged hydrodynamic results of Step 1 was used, tracer (fluoride solution) was added into the model and only the species transport equation was solved by freezing the velocity, pressure, and turbulent quantities. A constant initial concentration of c0=2 mg/L (converted to mass fraction of 2.0036E-06) was continuously supplied at the inlet pipe.

Great Lakes Water Authority, “CFD Modeling of Springwells Plant Reservoirs”* | Great Lakes Water Authority | Detroit, Michigan | Technical Lead

CFD models were developed using ANSYS Fluent (2019 R3). Three (3) Res. #1 models were developed at high, mid, and low reservoir operational levels with different flows. One 3-Res. High Flow model was developed with all three reservoirs in operation. For the Res. #1 models each simulation was first run with steady-state condition until converged. Transient simulation of species transportation (tracer) was then continued. Tracer study was not conducted for this 3-Res. model. Tracer was injected using Pulse Method at the inlet. For each run the residence time distribution (RTD) curves (normalized E- and F-curves) were evaluated. For the 3-Res. High Flow Model with the modeled configuration, short circuiting is more obvious. The 3-Res. High Flow Model can be used to evaluate different flow paths by opening or closing different gate valves or baffle wall layouts.

Huizhou Municipal Water Authority, “Shangping Water Plant - Multiple Chamber Inline Ozone and Chlorine Dioxide Contactor Computational Fluid Dynamics Modeling” | Huizhou Municipal Water Authority | Shenzhen, Guangdong Province, China | Project Manager

Led CFD of the plant performance evaluation of residence time distribution and contact time. The major water quality risks at the Shangping Water Plant come from the raining and flooding season when the turbidity, iron and manganese concentrations are significantly increased in the influent water and with seasonal high algae and odor. Upgrades need to be done at the existing plant to address these water quality issues. The major treatment technology improvements to be used include the combination of using ozone and chlorine dioxide as disinfectants, and activated carbon. The existing energy dissipation basin is to be retrofitted to become an entirely closed structure with multiple inline ozone and chlorine dioxide contactor chambers. A CFD model of the multiple chamber inline ozone and chlorine dioxide contactor was developed to evaluate the system performance effectiveness on reducing manganese concentration. The objective of the CFD models was to evaluate the hydraulic performance of the multiple chamber inline ozone and chlorine dioxide contactor and to evaluate performance effectiveness on reducing manganese concentration of different ozone and chlorine dioxide injection concentrations.

## COMPUTATIONAL FLUID DYNAMICS

FWRC Secondary Treatment Aeration Basin and Clarifiers (150 MGD Expansion) | Clark County Water Reclamation District | Nevada, United States | CFD Lead

Lead CFD modeling of the aeration basin. CFD model was developed to check the hydraulics in a train of aeration basin. Air aeration from thousands air diffusers and mixing effect of the upward impeller mixers were modeled. Mixing of the primary effluent (PE), return activated sludge (RAS) and mixed liquor return (MLR) were simulated. Hydraulic profile, surface and bottom backflows, short circuiting, and velocity at top of the diffusers were checked. Different operation modes were simulated.

New York City Department of Environmental Protection, “Alley Creek Combined Sewer Overflow Retention Facility Disinfection Computational Fluid Dynamics Modeling”* | New York City Department of Environmental Protection | New York, New York | Project Manager

Led CFD of the evaluation of facility chlorination and dechlorination effect. Primary objectives included to predict the chlorination effect with 2-log kill target and chlorination residual concentration after dechlorination before being discharged to the creek.

Reservoir CFD Modelling and Recommendations | City of Hamilton | Hamilton, ON, Canada | CFD Lead

Lead CFD modeling to baseline mixing and alternative modes of mixing in four (4) drinking water storage facilities. The primary objective of the CFD study is to provide the city with its goal of reducing water age/water quality issues for the four (4) identified reservoirs. The CFD Modelling task will commence with a background review of available drawings and reports including the City's water Design Manual, SCADA data, and trends, as well as additional information for the purpose of evaluating the future reservoir upgrade(s). This information will be documented in the drafts for each of the respective TMs. An overview of water circulation improvement technologies will be provided and include curtain baffles, concrete baffles, mechanical mixers, perforated pipe with nozzels/jets, or other technologies. The preferred technologies will be used for the identified reservoirs where appropriate. This information will be summarized in the minutes from Review Meeting 1 (e.g. MS PowerPoint slides in PDF format). The CFD modelling effort will be conducted in stages where the priority #1 reservoir (HDR11) will be assessed and reviewed with the City initially to confirm the approach and outcomes meet the City's needs, followed by the evaluation for the subsequent three (3) reservoirs.

Anaerobic Reactor Optimization Study | J. R. Simplot Company | Grand Forks, North Dakota, United States | CFD Lead

Lead CFD modeling. Stantec will develop a CFD model for one anaerobic reactor using ANSYS FLUENT, a state-of-the-art CFD software program for modelling complex flows. This model will incorporate inlet piping, outlet piping, mixing systems, sludge draw-off piping, and other details of the reactor. Modelling of both Cells 1 and 2 will be completed. It is anticipated that mixing will primarily occur in Cell 1, and Cell 2 will continue to be used for settling and sludge removal. The CFD model of the existing reactor configuration will provide detailed three-dimensional (3D) flow patterns in the reactor and identify opportunities for mixing and sludge removal improvements. The results will include flow streamline movies, velocity contour plots at key sections, and active and inactive volumes. The results of the existing reactor modelling will be used to develop design modifications to improve hydraulics in the reactors. CFD models will be also developed for design modifications to assess anticipated mixing improvements. At the end of this study, a recommended design will be developed to provide satisfactory performance of the reactors. CFD results will be communicated to the client as they become available via conference calls.

Ashbridges Bay Treatment Plant Grit Study | City of Toronto, ON, Canada | City of Toronto, ON, Canada | 2021-present | CFD lead

The City of Toronto (City) has recently completed upgrades in P and D Buildings and is undertaking a comprehensive grit study to evaluate and optimize the performance of the grit removal systems for the Ashbridges Bay Treatment Plant (ABTP) with the ultimate objective of reducing grit disposition downstream, particularly in the anaerobic digesters. Computational fluid dynamics modeling of multiphase flows is being developed to establish the theoretical performance of the aerated grit tanks, to compare the measured results and to investigate where and why they differ, to identify and quantify options to improve the aerated grit tank performance. I determined the CFD approach in the proposal, developed the models, run the scenarios, reviewed CFD work of teammate, wrote technical memorandums.

SWSC Grit Removal Upgrade | Springfield Water and Sewer Commission | Springfield, Massachusetts, United States | CFD Lead

Led CFD. Primary Sedimentation Basin No. 2 was selected to develop the CFD model, which includes the entire influent channel (from downstream of the gate chamber), the influent distribution channel, the 16 ports from the influent distribution channel to the basin, the orifice plates in front of the ports, the baffle wall downstream of the ports inside the basin, the entire basin, the scum baffle, effluent weirs, effluent channel, and a portion of the 90" diameter effluent pipe. The primary objective of the CFD modeling is to predict the possible lowering of the water level at the upstream of the influent channel by comparing the existing configuration to alternative configurations. The CFD modeling was also used to evaluate the 180-degree bend in the influent channel and flow distribution through the distribution channel. Reduced water head, flow distribution among orifice plates/ports, flow regime transition, effluent channel weir submergence status, and flow patterns inside the basin were analyzed based on the model results.

North Toronto Treatment Plant Combined Sewer Overflow Tank Technical Assessment | City of Toronto, ON, Canada | City of Toronto, ON, Canada | 2021-Present | CFD lead

The City of Toronto (City) has identified concerns and limitations with the operability and performance of the North Toronto Treatment Plant (NTTP) Combined Sewer Overflow (CSO) Tank. Specifically, the concerns are related to hydraulic restrictions in the CSO tank, as well as solids and debris creating challenges with the pumping and cleaning system. In the first phase the CFD model of the existing conditions was developed to replicate the nature of flow at the CSO and storm tanks and to assess the hydraulic capacity of the existing CSO tank. I determined the CFD approach in the proposal, developed the model, run the scenarios, review CFD work of teammate, wrote technical memorandums.

Turners Falls Gatehouse Upstream Fish Passage* | Firstlight Power Resources | Burlington, MA | Project Manager

Songheng led CFD of the investigation of fish passage issues and hydraulic design improvement. Observation of the 2010 fish passage revealed that only about 50% of Shad in the power canal passed the Turners Falls gatehouse fishway. To better understand the effects on the hydraulics of the modifications made to date, to improve flow and velocity conditions in the fishway at the old entrance, and to develop concepts for possible further enhancements at the old entrance, a CFD model was developed to model the gatehouse ladder and its canal entrances from the upstream pool to the downstream junction with the spillway ladder. The model was validated using field data and used to investigate modifications that would enhance fish passage.

New Castle County, “Governor Printz Interceptor Construction Monitoring and Implementation”* | New Castle County | Wilmington, Delaware | Technical Lead

Led CFD of hydraulic structure performance evaluation and improvement.

Locust Transfer and Optimization Preliminary Design | Springfield Water and Sewer Commission, Springfield, MA | Springfield, MA, USA | 2021-present | CFD lead

CFD models were developed at three major locations in the SWSC system: The Locust MIS Structure and 48” Relief Sewer Diversion Structure, The proposed MIS Diversion, MIS Transfer Pipe, and MH#6, and The Mill Street Siphon, the CSO-019 regulator, and the proposed Stilling Chamber. The CFD models were used to assist in optimization of various key structures by analyzing the hydraulic and/or sedimentation performance of the existing system and evaluating the proposed design elements of the project under highly varied historical storms and design flow conditions. Head-Discharge rating curves of the structures were developed from the CFD model results and incorporated into the Infoworks ICM model which serves the hydrological and hydraulic (H&H) modeling of the entire SWSC system. I determined the CFD approach in the proposal, developed the models, run the scenarios, reviewed the CFD work of teammate, wrapped up results, wrote technical memorandum.

Exelon Generation, “River Temperature Predictions Downstream of Quad Cities Nuclear Generating Station”* | Exelon Generation, Warrenville, IL | Washington, DC | Technical Lead

Attorney-Client work product – Privileged and Confidential. Led CFD.

San Francisco Public Utilities Commission (SFPUC), “Beach Street Anti-Backflow Valve Hydrodynamic and Structural Modeling* | San Francisco, California | Technical Lead

Led the hydrodynamic modeling. Anti-backflow valves are being installed at the San Francisco combined sewer discharge (CSD) outfalls to prevent seawater intrusion into the collection system, in part in response to sea level rise associated with global climate change. An ant-backflow flap valve was installed at the Beach Street outfall but found ineffective in preventing intrusion of seawater upstream of the valve. Thicker flaps are proposed to resolve the problems. However, before embarking on other modifications based on engineering judgement, SFPUC asked to conduct modeling to help elucidate the cause of the malfunction and suggest modifications to address the problem. Hydrodynamic and structural modeling were conducted. The hydrodynamic modeling assessed the flow of water around the valves due to waves and the associated loadings on the flaps, concluded the cause of the backflow, estimated the head loss imparted by the flap valves on the CSD outflow for the existing and proposed thicker flaps. The structural modeling was aimed at characterizing the deformation of the flaps due to the wave loadings relative to seawater intrusion.

Capital Regional District, “McLoughlin Point Wastewater Treatment Plant Design-Build”* | Capital Regional District (CRD) | Victoria, BC, Canada | Technical Lead

Led CFD modeling. Computational Fluid Dynamics (CFD) models were used to evaluate the hydraulic performance of the McLoughlin Point Wastewater Treatment Plant. The primary objectives of the CFD study included to predict the hydraulic profiles, to evaluate the general flow patterns, to predict the flow splits among the control influent overflow weirs to different units, to optimize the settings of weir heights to achieve uniform flow distributions, and to achieve a detention time of at least 5 minutes upstream of the disk filters to allow for floc formation. A multiple model approach was used. The study developed three models: Model 1 - Influent Force Main to Primary Influent, Model 2 - Primary Effluent to Biological Aerated Filters, and Model 3 - Biological Aerated Filters Effluent to Disk Filters. Model 2 was used to specially assess flow distribution to odd side and even side banks of MBBRs and BAFs, impact of screen operation on flow distribution to MBBRs, elevation of secondary bypass weir to limit flows to the secondary processes to stated limits, size of opening on MBBR bypass gates to limit flow to MBBRs to stated limits, and flow distribution to BAF units. Model 3 was developed to specially assess flow distribution to disk filters, detention time upstream of disk filters, and hydraulic profile between disk filters and BAF Units.

Drainage Services Department, Hong Kong. “Harbour Area Treatment Scheme Stage 2A - Sewage Treatment Works”* | Drainage Services Department | Hong Kong | Technical Lead

Led CFD modeling. Two separated models were developed: one for Kwun Tong Preliminary Treatment Works (PTW) and one for Aberdeen PTW. The Kwun Tong PTW model covered from the influent channels, the common wet well and channels to the four detritors, the four detritors and its effluent channels to the common flume channel, the flume channel, vortex shaft, vortex chamber and downpipe. The model was validated with field measurement data and used to confirm the overflow condition of the emergency overflow weir setting. The Aberdeen PTW model covered from the effluent channel of the new grit traps, chamber FC-01, chamber FC-02, inflow from Ap Lei Chau, the flume conduit, vortex shaft, air chamber, downpipes to deep tunnel. The model was use to check the hydraulic performance and evaluate the possible impact to the plant operation.

SSIP Program Management-Southeast Plant Project Support * | San Francisco Public Utilities Commission (SFPUC) | San Francisco, California | 2011-2016 | Technical Lead

Songheng led CFD modeling to investigate velocity distribution of the flow approaching the Southeast Plant’s screens (which should have been uniform to ensure proper performance and longevity); eddies and recirculation, potential solids deposition; and pump approach flow conditions relative to Hydraulic Institute Standards at the Plant. Flow-3D CFD software was used. The model incorporated the suggested modifications from the previous physical and numerical models and was updated to cover a portion of the approach channel extending beyond the dog leg and the entire pumping station including the three pumps and all the design details that could affect the flow. A series of flow and operation scenarios were then modeled. From the model results the hydraulics of the pumping station design were found to be devoid of any major issue. Recommendations to operation and modifications were also put forward.

Computational Fluid Dynamics Modeling of the Bay Delta River Intake Surge Effects/Flow Distribution* | Metropolitan Water District of Southern California | Los Angeles, California | Project Manager

Songheng led a CFD modeling study for the Bay Delta River Intake 2, which is one of three intake facilities designed by the MWDSC to withdraw water from the Sacramento River. The objective of the study was to develop a CFD model of Intake 2 and verify that the mesh quality and mesh resolution is sufficient for the model to produce reasonable results, to determine the flow distribution among the intake conduits, to predict the approaching velocity distribution at the fish screen surface, and to deliver the operational CFD model to MWDSC. The study was conducted for two scenarios of river flows. Mesh independence was conducted using three meshes with different resolutions.

The Metropolitan District (MDC), “The South Hartford Conveyance and Storage Tunnel”* | The Metropolitan District (MDC) | Hartford, Connecticut | Principal Engineer

Led CFD. Computational flow model study of the South Hartford CSO Conveyance and Storage Tunnel for odor control was conducted to determine air flow exhaust rates from the tunnel for sizing of the odor control units (OC). CFD model of the tunnel system was used to determine the air flow exhaust rates caused by tunnel filling during an extreme storm event. The model allowed air to freely move in or out of the tunnel through the upstream retrieval and downstream launch shafts only. The model predicted the air flow rates with no odor control piping installed. In addition to the measured air flow rates, model results were used to characterize the water flow through the tunnel, including the filling patterns at each adit and the water surface as the end of the tunnel as it filled.

Arthur Kill Generating Station, “CFD Modeling of Arthur Kill Plant Dual Screens”* | Arthur Kill Generating Station | Staten Island, New York | Principal Engineer

Led CFD model development to evaluate the performance of dual screens installed at the entrance of intakes of Arthur Kill Plant. Flow patterns inside the intake bay was assessed. Approaching and sweeping velocity close to the dual screens and through-screen velocity was evaluated. The effectiveness of dual screens on preventing fish from being impinged was evaluated. In addition, flow approaching the pumps was also evaluated.

Ocean County Utilities Authority, “Central Water Pollution Control Facility Computational Fluid Dynamics Modeling”* | Ocean County Utilities Authority | Ocean County, New Jersey | Project Manager

Led CFD of the plant hydraulic performance evaluation and design improvement. Preliminary design, value engineering, final design, and engineering services during construction for the proposed modifications and expansions at their Water Pollution Control Facility of Ocean County Utilities Authority was being conducted. The proposed modifications include an additional grit chamber as well as an additional primary clarifier. Also, several possible modifications to the primary distribution channel and primary distribution box have been discussed. Computational Fluid Dynamics (CFD) modeling was used to evaluate these changes and how they will affect flow distribution, grit distribution, and flow patterns. Separate models were developed for flow from the grit screening facility through the aerated grit chambers, and from the aerated grit chambers through the primary clarifiers. For the downstream model, three design options for the primary distribution channel and distribution box were evaluated, all including the new and additional primary clarifier.

Dominion Energy, Millstone Power Station, Waterford, New London County, Connecticut. “CFD Modeling of Proposed Dual Flow Cooling Water Intake Screens at Millstone Power Station”* | Dominion Energy, Millstone Power Station | Waterford, New London, Connecticut | Project Manager

Led CFD of intake screen hydraulic performance evaluation. The use of dual flow screens to reduce approach and through-screen velocity at the circulating water pump intakes at Unit 2 and 3 were investigated by Millstone Power Station. Intake structure hydraulics with the proposed screens were evaluated in order to understand the impact of such a change on the hydraulic performance of the wet wells. This was accomplished using Computational Fluid Dynamics (CFD) models. Flow control devices, including turning vanes upstream of the screens and two separate designs of a column flow distributor downstream were also evaluated. The flow direction changes created with the dual flow screens cause shear flows and large regions of flow separation in the wet wells approaching the pump inlets. Nonetheless, the axial velocity profiles at the pump throats are close to acceptable limits. Still, a decision to move forward with this design on the part of MPS was accompanied by a physical model to confirm hydraulic performance. A column flow distributor was suggested to dissipate the central jet produced by the contraction downstream of the dual flow screens. Of the two flow distributor designs evaluated in the study, the one with a larger spacing in the center and narrower spacing on the ends is preferred because it reduces side wall jet effects. The CFD results showed promise in the hydraulic performance of the wet wells. A physical model was recommended if a decision was made to move forward with final design.

Electric Power Research Institute, “Fish Friendly Hydropower Turbine Development & Deployment: Alden Turbine Preliminary Engineering and Model Testing. Primary investigator and led CFD evaluation of turbine impact on fish passage* | Electric Power Research Institute | Palo Alto, California | Primary Investigator

Led CFD. The Alden turbine was developed and patented specially for high fish survival. A 3D CFD model was developed to include the entire turbine from the penstock to the draft tube outlet and tail water. The water filled spaces between the outer runner shroud and the casing, as well as between the head cover and the runner top, were also included. Actual field dimensions of the entire turbine were used to avoid scale up issues. Plotting the resulting efficiencies from both the physical model and the CFD simulations using non-dimensional head and flow coefficients aided a direct comparison between the BEP operating conditions and maximum efficiency. The general shapes of the efficiency lines on the "hill chart" were also compared. Flow conditions were comprehensively examined to meet the biological criteria for fish survival.

Metabolic Studio, “Hydraulic Design of a Water Wheel”* | Metabolic Studio | Los Angeles, California | Principal Engineer

Led CFD of water wheel system. The project will harness power available in the Los Angeles (LA) River to operate a waterwheel which will lift water for treatment and use. Water will be conveyed from the LA River to the waterwheel for both powering and lifting purposes. Both stationary and moving blade was modeled using CFD to evaluate the geometry and performance of the proposed blade concept for the planned LA River water wheel. The stationary blade CFD model was utilized to optimize the blade geometry while the moving blade CFD model determined the relationship between wheel speed and efficiency. Based on this geometry for the blades and the inflow, overall moving waterwheel simulations were completed to observe flow patterns and determine an optimal wheel rotational speed. The efficiency of energy transfer between an inflow jet and the blades as well as the best wheel efficiency were estimated based on the CFD results. Flow patterns in the tailrace were modeled to aid in refining that geometry and understanding operational conditions. All the information gained during the CFD modeling is critical to project planning and understanding project effectiveness, including a variety of future design efforts such as the water lifting system. Further CFD modeling was carried out to select the final lifting bucket design, to determine the arc length over which the buckets would empty at the top of the wheel, to estimate the bucket discharge versus position and to provide a conceptual design of a water collection system for the discharge from the buckets.

Nassau County Department of Public Works, “Computation Fluid Dynamics Model Study of the Bay Park Sewage Treatment Plant Grit Removal Facility Improvements”* | Nassau County Department of Public Works | East Rockway, New York | Project Manager

Led CFD. Available grit removal technologies that could replace the existing three Detritus-style tanks for the Grit Removal Facility at the Bay Park Sewage Treatment Plant in East Rockaway, New York, was being evaluated. Vortex-style grit removal chambers for replacement of the existing detritus tanks was recommended. CFD model was developed to provide numerical analysis on the hydraulic conditions in the vortex-style grit removal system and associated conduits and channels. The objectives of the study were to determine the flow distribution through the three grit removal units, predict the water surface elevations, and check the flow patterns of the proposed system. Simulated system components included the facility inlet pipes and conduits, influent distribution channel, grit removal tanks, and the common effluent channel. To meet the study objectives two series of simulations were conducted modeling the facility highest instantaneous and average flows. Each series modeled three potential flow balances between the two facility inlet pipes in order to assess the impact of any imbalance on the downstream grit removal tanks.

Brentwood Industries, “Computational Fluid Dynamics Model Study of the Brentwood Storm Tank Shield”* | Reading, Pennsylvania | Project Manager

Led CFD. Brentwood Industries (BI) was designing storm tank shields. To better understand the functions of the product, BI’s primary interests included to develop a removal efficiency curve (flow rate versus removal efficiency) to illustrate removal of solid particles by settling in the tank for each design and configuration and to evaluate the effectiveness of the shield in collecting the floatables transported into the tank. To meet the above primary goals a CFD model study was conducted to assist in evaluating the hydraulic performance and removal of selected solid particles and floatables for the following designs: Shield STKS-18 installed in a 4 ft x 2 ft tank, and Shield STKS-18 installed in a 4 ft x 4 ft tank. Sand particles of 1/16” diameter and 200 mg/L concentration were modeled. Floatables were modeled as thirteen beverage bottles and cans (three 2-liter and four 16-ounce bottles and six 12-ounce cans) with density of 61.18 lbs/ft3.

Northport Generating Station, “CFD Model of the Cooling Water Intake at Northport Generating Station”* | Northport Generating Station | Hicksville, New York | Principal Engineer

CFD models were developed to assist in evaluating the effects of a proposed barrier net structure on reducing fish egg entrainment at the Northport Generating Station located in Hicksville, NY. Two CFD models, one FLUENT model and one FLOW3D model, were developed and used for the study. The former model was used to simulate mean water level, time-averaged, steady-state simulations and the latter was used to simulate varying water level and inflow time-dependent simulations. Fish eggs of two key species of interest, Tautog and Cunner, were modeled as buoyant round particles with the same density of water, and their movement in flow was modeled using a Discrete Particle Model (DPM). The effect of the proposed barrier net structure on reducing fish egg entrainment was then quantitatively evaluated based on the simulated particle trajectories. The performance of the proposed modification to the intake structure with a barrier net was consistently confirmed by both CFD models to be able to reduce entrainment of fish eggs into the plant. Noting that the water levels varied significantly during a full tidal cycle, it is suggested that the results of time-dependent simulations with varying water levels and inflows are more reliable than the results of steady-state simulations with fixed mean water level. Tautog and Cunner eggs are buoyant particles that can be easily disturbed by the surrounding water and follow the flow. The outcome showed the more efficient way to reduce ER should be focusing on preventing fish eggs from entering the bay zone covered in this study.

The City of Richmond, “Three-Dimensional Computational Fluid Dynamics Modeling of Richmond Crossover Chamber Structural Underpass”* | The City of Richmond | Richmond, Virginia | Project Manager

Project manager. Led CFD. The City of Richmond, Virginia launched a series of fast track drainage improvement projects to improve drainage capacity and overall system reliability of handling interior flooding. Being a major component of the City’s interior flood control and Shockoe combined sewage retention facilities, the existing Crossover Chamber (COC) is being modified to two separate flow paths. The new COC will consist of an overpass for combined sewage flow from west to east into the Shockoe Retention Basin (SRB) and an underpass for the interior floodwater from north to south into the James River. CFD model was constructed to model flows for the underpass. The developed models were used to predict the water levels and hydraulic grade lines at different flow rates and upstream or downstream water level restrictions.

Donald C. Cook Nuclear Plant, “Sediment Transport Modeling at Donald C. Cook Generating Station”* | Brigman, Michigan | Principal Engineer

Led CFD for a study requiring two separate CFD models: a model of the intake structure in the lake and the surrounding area, including the two discharge structures and a model of the forebay. A sieve analysis of two sets of forebay sand samples provided by the D. C. Cook Nuclear Plant was conducted. The particle size distribution is used for further analysis of the settling velocity, sediment inceptive motion shear stress, and sediment Rouse number. This information was then used to help characterize the sediment transport mode. The lake model included the three intake structures, two discharge structures, and surrounding lake areas. The objective of this model was to evaluate the flow patterns and lake bed shear stress that could impact the sediment transport into the intake with effects of different lake current speeds and direction. In addition, the model was used to evaluate benefits of a proposed riprap berm designed to reduce bed load transport to the intakes. A riprap berm was proposed to reduce the amount of sediment entering the forebay. A model of the forebay included the three intake pipes, the seven Circulating Water (CW) pumps, the four Essential Service Water (ESW) pumps, the deflection walls, and other important structures involved in the forebay. The objective of the forebay model was to evaluate the flow patterns under different operational conditions of the plant to better understand the sediment transport characteristics and to qualitatively evaluate the change in sediment deposition around the ESW pumps.

## HYDRAULIC MODELING

Hydraulic Analysis of Operations of Little Bear, Serenbe, and Bouckaert Town Center Pump Stations* | Department of Public Works | Atlanta, GA | Principal Hydraulics Technical Lead

Led hydraulic analysis of the operations between the Little Bear (LB), Serenbe, and a future Bouckaert Town Center (BTC) pump stations with the objective of evaluating the possible operational changes after the future BTC pump station linked to the existing system.

Tennessee Valley Authority, Allen Fossil Plant. “East Ash Pond Closure 30-inch Force Main Hydraulic Analysis* | Memphis, Tennessee | Principal Hydraulics Technical Lead

Led hydraulic analysis. InfoWorks ICM was used to develop a one-dimensional (1D) network model to conduct the hydraulic analysis for the 30” permanent force main at the East Ash Pond Complex Closure. The developed model simulated four (4) flows corresponding to four pump operations. Due to the Cross bridge and deep slope pipe, the force main was pressurized at the Cross rising leg then transitioned to gravity flow with pipe fully or partially filled. Supercritical flow occurred followed by hydraulic jump downstream. Head loss along the force main was calculated. Pressure at the Cross was predicted. Air demand due to hydraulic jump entrainment or open channel flow at normal operational conditions and potential gravity flow rate under extreme conditions was evaluated. Air valve size at the Cross was recommended and top open air vent was suggested at the top of the deep slope.

Tennessee Valley Authority, Allen Fossil Plant “East Ash Pond Interim Response Action 36-inch Bypass Hydraulic Analysis” * | Memphis, Tennessee | Principal Hydraulics Technical Lead

Led hydraulic analysis. Bypass hydraulic analysis was conducted by developing an InfoWorks ICM one-dimensional (1D) network model. Four flow scenarios were modeled which correspond four pump operational conditions. Bypass was pressurized at the Cross rising leg then transitioned to gravity flow with pipe fully or partially filled. Supercritical flow occurred at a few locations along the bypass. Head loss from the Cross top to the bypass exit was calculated. Pressure at the Cross was predicted. Air demand due to hydraulic jump entrainment and open channel flow under normal operational conditions and potential gravity flow rate under extreme conditions was evaluated. Due to the elevation variation of intermediate summits along the bypass pipeline, separated water pools were formed after draining out. The size of the air valve at the Cross was suggested. Open top air vents were recommended along the bypass.

Valdez Marine Terminal (VMT) 12” Corrugated Metal Pipe (CMP) Flow Capacity* | Department of Environmental Conversation | Juneau, AK, USA | Principal Hydraulics Technical Lead

Oily water from the overflowing sump migrated underground, entered the nearby drainage system, and flowed 1,000 feet downhill to an outfall pipe into Port Valdez west of the VMT small boat harbor. Oil contaminated water continued to flow through the CMP to the outfall location where it is captured by temporary tankage and pumped to the Ballast Water Treatment system (BWT). It is recommended that Alyeska Pipeline Service Company (APSC) begin design and installation of a permanent collection facility at the outfall location with the purpose of capturing all flow through the CMP and pumping it to existing BWT infrastructure. The objective of this analysis was to estimate the flow capacity of the 12” CMP pipe under open channel flow and before flooding the ground.

New York City Department of Environmental Protection, “Lower Manhattan Coastal Resiliency (LMCR), South Battery Park Resiliency, North Battery Park Resiliency”* | New York, New York | Technical Lead

Led integrated 1D, 2D (InfoWorks ICM) and 3D (CFD) hydraulic modeling. Upon review of additional drawings and survey information collected, updated the InfoWorks ICM model previously developed with various parallel conveyance structures within Two Bridges to support the evaluation of interior drainage risks and alternatives to mitigate these risks for the Lower Manhattan Costal Resiliency Two Bridges (LMCR-Two Bridges) and East Side Coastal Resiliency (ESCR), South Battery Park, and North Battery Park project areas.

# Cameron Marra B.S. Chemical

Engineering, PE

Urban Water Resources Engineer
5 years of experience · Indianapolis, Indiana

Cameron is an engineer who has worked in the consulting industry for three years. He has primarily focused on work involving aero and hydro modeling ranging from large system-wide models to smaller design-focused models. He has experience with solvers ranging from 1-D to 3-D and routinely utilizes Python for pre- and post-processing automation. He's also used his understanding of Python to create applications for use both internally by Stantec and externally by clients.

## EDUCATION

B.S. Chemical Engineering, University of Florida, Gainesville, FL, 2017

## CERTIFICATIONS & TRAINING

EIT, Indiana Professional Licensing Agency, Indianapolis, IN, 2017

PE, Indiana Professional Licensing Agency, Indianapolis, Indiana, United States, 2021

## PROJECT EXPERIENCE

### WATER NETWORK MODELLING

City of Las Vegas 2019 Master Plan Update | Las Vegas, Nevada, United States | 2019-2020

Cameron created a model for the City of Las Vegas' sanitary sewer system in InfoSWMM from their GIS data. He refined the model geometry with drawing and survey information, calibrated the model with 20+ metered areas, and used the model to evaluate past capital improvement projects (CIPs) and suggest new CIPs to the client.

City of Venice Wastewater System Hydraulic Model Update | Venice, Florida, United States | 2019-2020 | Project Engineer

Converted City of Venice InfoSWMM model to a PCSWMM model. Model was then entirely recalibrated using SCADA data from the over 80 lift stations that exist within the system. Model was used to evaluate previously suggested Capital Improvement Projects (CIPs) and suggest new CIPs for the City.

Sanders Capacity Assessment | Sanders, Kentucky | Project Engineer

Handled modeling tasks for sanitary sewer capacity assessment. Performed meter data assessment. Helped build PC SWMM model for the area. Extracted dry weather flow patterns from meter data. Calibrated wet-weather flow using RTKs and EPA SSOAP Toolbox. Ran design storm simulations to identify locations in need of capacity improvements.

South and Central Reno Sanitary Sewer Capacity Analysis | City of Reno | Reno, Nevada, US | Project Engineer

Cameron was responsible for sanitary sewer PCSWMM modeling of present and future build-out conditions. He ported the previous model to PCSWMM, extracted dry weather flow patterns from metered data and calibrated hydraulics in PCSWMM, calibrated wet-weather flow with RTKs using U.S. EPA's Sanitary Sewer Overflow Analysis and Planning (USEPA SSOAP) Toolbox, ran design storm and build-out condition, and post-processed the results in ArcGIS to identify areas in need of infiltration and inflow (I/I) reduction and capacity improvements under design storm and future population conditions.

Hartford MDC Long Term Control Plan Update and CSO Tunnel Design Support* | Hartford, Connecticut | Project Engineer

Cameron helped update the hydraulic and hydrologic (H&H) model to reflect preliminary tunnel design and perform long-term, continuous model simulations to verify that approximately $900 million of planned system enhancements will meet Consent Decree requirements. This process included dynamic modeling of all sanitary, storm, and combined sewers within the City of Hartford as well as receiving streams and tidal influences on the collection system. Cameron was primarily involved in model calibration effort to bring model into line with 132 metered site locations.

JMEUC Sanitary Interceptor I/I Study* | New Jersey | Project Engineer

Helped create an infoWorks ICM interceptor model for the JMEUC. Calibrated sanitary sewer flows using the RTK method in USEPA SSOAP Toolbox. Further modified values based on model results to match metered values.

Systemwide Sanitary Sewer I/I Master Plan* | New Britain, Connecticut | Project Engineer

Cameron performed RTK analysis using USEPA SSOAP to understand inflow and infiltration (I/I) problems in the area. He created Python script to automate appendix generation for calibration plots.

** denotes projects completed with other firms*

South Bend Combined Sewer Overflow Long-Term Control Plan Re-Evaluation | South Bend, Indiana | Project Engineer

Currently serving as project engineer responsible for updates, calibration, and facilities planning using the system-wide hydrologic and hydraulic model built using EPA SWMM 5. The collection system includes 30+ CSO locations with in-system real-time control mechanisms used to mitigate CSO and SSO occurrences, volume, and duration. Analyses included design storms as well as continuous simulations for existing and potential improvement solutions.

Great Lakes Water Authority Sewer System Master Plan * | Detroit, Michigan | Project Engineer

Assisted master plan development for the Great Lakes Water Authority (GLWA) in the Detroit Area. Developed and ran a matrix of design storm simulations for critical capacity analysis. Post-process results to identify storms types resulting in worst conditions and identify system weaknesses.

## HYDRAULIC MODELING

Spring Hill Sewer Separation | Somerville, Massachusetts | 2020 | Project Engineer

A 2-D model is being used by the City of Somerville to identify and address overland flooding issues. An area of combined sewer in the model was separated into sanitary and storm sewer. This area was then evaluated with various design storms to size the new pipes and quantify flood reduction in the area.

Toronto Basement Flooding Capacity Assessments | Toronto, Ontario, Canada | 2019-2020 | Project Engineer

Created 2-D models within InfoWorks ICM of Toronto sub-areas to assess overland flooding issues in the Toronto area. The 2-D mesh was linked with sub-surface drainage to create a high resolution model that will be used to assess basement flooding risk.

Lower James River Watershed FEMA Flood Risk Assessment | Virginia | Project Engineer

Helped create detailed models for all streams located within the Lower James River watershed. Pre-processing model inputs was carried out in HEC-GeoRAS incorporating surveyed cross-section. HEC-GeoRAS values were imported into a new HEC-RAS model for each stream along with Hydrology data. Surveyed structure data was incorporated into the HEC-RAS model. Floodways were generated by HEC-RAS via the RAS-mapper tool for recurrence intervals range from 1- to 500-year flood discharges.

Carbon County FEMA Flood Risk Assessment* | Wyoming | Project Engineer

Performed riverine flood modeling using rapid modeling tools and HEC-RAS to investigate existence and severity of flood hazards in a 9,000 square mile watershed.

## COMPUTATIONAL FLUID DYNAMICS

Ground Vehicle Aerodynamics Assessment*

Performed high resolution 3D CFD in HELYX (built with OpenFOAM) to analyze ground vehicle aerodynamics in the motorsport and trucking industry alongside in-house scale wind tunnel testing. Regularly utilized HPC cluster to run all high resolution CFD in parallel. Used ParaView and Blender to create post-processing images and movies to communicate results. Performed alternitives analysis in designated improvement areas to meet customer's design criteria.

Vacuum Design CFD Support*

Worked with a well-known vacuum company in support of their iterative design process to provide daily updates on product aerodynamic performance and suggest new geometry to meet targeted performance metrics using CFD. Automated Design of Experiments CFD analysis to perform multidimensional fitting and predict vacuum filter performance across multiple variables for use by client in product design. Drew 3D geometry in 3-Matic and Blender to assist alternatives analysis in CFD. Used ParaView and Blender to create post-processing images and movies to communicate results.

## PUBLICATIONS

Starchenko, V., C. Marra, A. Ladd. Journal of Geophysical Research: Solid Earth. *Three-dimensional simulations of fracture dissolution*, 2016, pp. 24.

** denotes projects completed with other firms*

# Jeff Holmes C.E.T., Civil CAD

Civil Technologist
38 years of experience · Windsor, Ontario

Jeff has over 37 years of experience in design drafting of residential, industrial and municipal servicing projects. He is a CAD Leader for BC1656 and manages an experienced team of CAD designers from project inception to final acceptance. Jeff recognizes the importance of understanding clients' needs when designing and dealing with technical and administrative issues. His technical experience provides insight to practical and cost effective project designs. Jeff is responsible for the collection of topographic data through both field surveys and property record reviews and inclusion in electronic format within contract documents for all projects in the Windsor office. He is responsible for the preparation of drawings and graphics used in various processes including materials for EA presentations and public information sessions.

Jeff has been involved in a number of projects in Lasalle including the Southwest Quadrant Watermain replacement, Front Road Rehabilitation, Reaume Road and Sacred Heart Watermain Replacements along with numerous subdivisions. Jeff has been involved with numerous City of Windsor projects, including Huron Church Road Reconstruction Phase 2-6, Tecumseh Road East Reconstruction Phases 1-5, Prince Road Sewer Separation and Road Reconstruction Phases 1-8. Jeff has also worked on road reconstruction projects for all Municipalities in Essex County and Chatham-Kent.

## EDUCATION

C.E.T., Fanshawe College of Applied Arts & Technology, London, Ontario, 1984

## MEMBERSHIPS

Member, Ontario Association of Certified Engineering Technicians & Technologists

## PROJECT EXPERIENCE

### URBAN LAND ENGINEERING

Wheatley Water Treatment Plant Expansion and Transmission Main to Tilbury

It included water treatment plant expansion and 17 km of 600mm trunk watermain.

2nd Concession Trunk Watermain

Designed for Ontario Clean Water Agency (OCWA). It was a 1050 mm Dia. trunk watermain to service the green house industry.

Land Development | Design & CAD

Jeff has worked on a number of residential developments ranging in size from 8 lots to more than 400 lots. Jeff has also worked on the design of industrial sites.

Magna Industrial Subdivision

Encompasses 36 hectares of land in the former Township of Maidstone (now Town of Lakeshore) for Magna Corporation.

Forest Hill Estates

Designed in the Town of Belle River for Ricenburg Developments. It included 109 lots in the first phase of a 500 lot residential development. This project was unique in that it involved integration of a small existing wetland area into the stormwater management scheme.

Devonshire Heights Subdivision

Designed in the City of Windsor for Ontario Realty Corporation. It included 423 lots constructed in 2 stages between 1994 and 1998. It included integration of a dry stormwater pond into an existing City park setting.

Golfview Park Subdivision

Designed for Amicone Design Build in the Town of Amherstburg included a first stage of approximately 150 lots in what will ultimately be 268 lots. This development included a retention pond with a permanent water area of 1.2 hectares.

Twin Oaks Industrial Park

Developed for the City of Windsor. It encompasses approximately 100 hectares and involved extensive alterations to the Little River channel through the park in accordance with the requirements of the Essex Region Conservation Authority. The project included bank stabilization, widening of the river channel to accommodate increased flows from the development, construction of meandering low flow channels and construction of sediment basins in addition to the on-site servicing.

Crownridge Subdivision

It included 245 lots constructed between 1989 and 1997.

Knobb Hills Subdivision

This development was actually the first phase of what will ultimately be a 1200 lot development.

## GRAPHIC DESIGN / PRESENTATIONS

Drawings & Graphics | Supervisor

Jeff is responsible for the preparation of drawings and graphics used in various processes including materials for EA presentations and public information sessions.

## SURVEYS / GEOMATICS

Topographic Data Collection | Supervisor

Jeff is responsible for the collection of topographic data through both field surveys and property record reviews and inclusion in electronic format within contract documents for all projects in the Windsor office.

## TRANSPORTATION

Roadway Design and Construction | Windsor, Ontario | Design & CAD

Jeff has designed or supervised the design of a number of road projects (not related to subdivision or water and sewer projects) including the following:
· Huron Church Road, Phase 2-6, City of Windsor
· Tecumseh Road East, Phase 1, Lauzon Road Intersection
· Pre-design and Final Design for Chrysler's Windsor RS Flex Body Expansion in the City of Windsor.
· Provincial/Cabana Intersection, City of Windsor

# Quang Kha C.A.T.

Engineering Technologist
29 years of experience · Windsor, Ontario

Quang is a CAD Technician and Mechanical Designer with the Water team in Stantec's Windsor office. Quang has over 28 years of experience in Autocad Design, Mechanical Heating and Plumbing Design, as well as Process Design. He provides a wide range of CAD drawing services. Since joining Stantec, Quang has provided CAD design for Process, Architectural, Structural, Mechanical and Electrical aspects of treatment plant projects.

## EDUCATION

Architectural Technologist, St. Clair College of Applied Arts and Technology, Windsor, Ontario, Canada, 1989

## PROJECT EXPERIENCE

### WASTEWATER

Stoney Point Water Pollution Control Plant | Stoney Point, Ontario | CAD Design & Lead

Provided CAD design service on process, mechanical, architectural and structural for the new sewage treatment plant.

Western Beaches Tunnel Pumping System Improvements | City of Toronto | Toronto, Ontario, Canada | CAD 50M | CAD Design & Lead

Provided CAD detail work for 3 major shafts (Battery Park, Cowan & Glendale) and 6 interception chambers.

Pumping Station No. 1 | Town of LaSalle, Ontario | CAD Design

Provided CAD detail work for process and electrical service to replace coarse bar screen and upgraded electrical to code.

Port Stanley Wastewater Treatment Plant & Pumping Station | Port Stanley, Ontario | CAD Design

Provided detail design service for mechanical system for the new treatment facility.

Leamington Pollution Control Centre, Biosolids Management Facility Upgrades | Municpality of Leamington, Ontario | CAD Design

Provided detail design service for mechanical system for the existing facility.

Lou Romano Water Reclamation - Grit Removal Facility Improvement | Windsor, Ontario | CAD Design & Lead

Provided detail design service for process and mechanical system for the existing facility.

Foxboro Wastewater Treatment Plant Upgrades | Waterloo, Ontario | CAD Design & Lead

Provided detail design service for mechanical, process and CAD work for the existing RBC's and electrical building.

Grand Bend Area Wastewater Treatment Facility & Upgrades | Grand Bend, Ontario | CAD Design

Provided detail design service for mechanical system for the new treatment facility.

Improvements to Ward 1, Inlet Pumping Station & Bypass Chamber | Town of Essex, Ontario | CAD Design & Lead

Provided CAD detail design for the project.

Windsor-Detroit Bridge Authority Early Works | Windsor, Ontario | CAD Design

Provided detail design service for the pumping station and generator building.

Automated Interceptor Chamber Upgrades | Windsor, Ontario | CAD Design & Lead

Provided detail design service for mechanical system for the existing facility.

Windsor Riverfront Retention Treatment Basin Facility | City of Windsor | Windsor, Ontario | 2009 | CAD Design

Provided detail design service for process and mechanical systems and all other disciplines for this new storm-water retention treatment basin facility for the City of Windsor.

Humber Treatment Plant, Odour Control and Process Upgrades | Toronto, Ontario | CAD Design

Provided detail design service for mechanical, architectural, and structural systems and all other disciplines for plant upgrades for the City of Toronto.

EPC of Industrial Wastewater Treatment Plant | Kingdom of Saudi Arabia | CAD Design

Provided detail design service for process and mechanical system and all other disciplines for this new industrial wastewater treatment plant for the Kingdom of Saudi Arabia.

New Kirkland Lake Wastewater Treatment Plant | Kirkland Lake, Ontario | CAD Design

Provided detail design service for mechanical system for the new treatment facility for the Town of Kirkland Lake.

Leamington Pollution Control Centre - Phase 3-5 Upgrades | Leamington | Municipality of Leamington, Ontario | 2008 | CAD Design

Provided detail design service for mechanical system for this expansion of wastewater treatment plant.

Oakville South West Wastewater Treatment Plant – Phase 3 Upgrades | Halton | Halton Region, Ontario | 2009 | CAD Design

Provided detail design service for mechanical system for this expansion of wastewater treatment plant.

Belle River Maidstone Water Pollution Control Plant Upgrade | Town of Lakeshore | Town of Lakeshore, Ontario | 2008 | CAD Design

Provided detail design service for Process and mechanical system during the detailed design stage and all other discipline for this expansion of wastewater treatment plant.

Lou Romano Water Reclamation Plant – Upgrade and Expansion | City of Windsor | Windsor, Ontario | 2003 | Cad Design

Provided detail design for Process and mechanical system and assisted coordinating the design for this upgraded expansion of the wastewater treatment plant.

## WATER

Strange Street Water Supply System Upgrades | Kitchener, Ontario | CAD Design

Provided detail design service for mechanical system for the existing and new treatment facility.

Burke Water Station Upgrades | City of Guelph | Guelph, Ontario, Canada | CAD 5M | CAD Design

Provided detail design service for mechanical system for the existing and new treatment facility.

New West Elgin Water Treatment Plant | West Elgin, Ontario | CAD Design

Provided detail design service for Structural and mechanical system for this new treatment plant for the Municipality of West Elgin.

Davidson Wells Pumphouse Upgrade and Fourth Line Wells Pumphouse Upgrade | Halton Hills, Ontario | CAD Design

Provided detail design service for Architectural, Structural and mechanical system for the expansion of the pumphouse for the Town of Halton Hills.

West High Service Pump Station | Ann Arbor, Michigan | CAD Design

Provided detail design service for Process and mechanical system for the addition of the pump station for the city of Ann Arbor.

Belle River Elevated Water Tower Replacement | Lakeshore, Ontario | CAD Design

Provided detail design service for Process and mechanical system and all other discipline for this new Water Tower for the Town of Lakeshore.

Aurora South Reservoir, Re-Chlorination Upgrade | York Region, Ontario | CAD Design

Provided detail design service for architectural, structural, process and mechanical system for the new re-chlorination building for the Region of York.

## MECHANICAL ENGINEERING

Sandwich Public Library | Windsor, Ontario | CAD Design

Provided detail design service for mechanical and electrical system for the upgraded facility.

Institute for Border Logistics & Security (IBLS) Building - Multi-Modal Cargo Development | Windsor, Ontario | CAD Design

Provided detail design service for mechanical system for the new facility.

Fred's Farm Fresh International Market | Windsor, Ontario | CAD Design

Provided detail design service for mechanical and electrical system for the new facility.

Assumption College Catholic High School Heating Upgrade | Windsor, Ontario | CAD Design

Provided detail design service for mechanical system for Windsor-Essex catholic district school board for the city of Windsor.

## HEALTHCARE

EMS Building - Mercer Station | Windsor, Ontario | CAD Design

Provided detail design service for HVAC replacement on the existing facility.

EMS Building - Dougall Avenue Station | Windsor, Ontario | CAD Design

Provided detail design service for mechanical system for the new facility.

# Sheri Little

Structural & Architectural CAD
22 years of experience · Windsor, Ontario

Sheri has been working in the structural/architectural CAD design field for over 20 years. She has worked on projects ranging from road bridges and equipment platforms to large buildings complete with office space and work/plant areas. Sheri has worked with all disciplines from civil, mechanical, electrical and also process. On many of these projects, she has coordinated between disciplines and also produced the drawings for some projects such as a Dynamometer facility at Ford Essex Engine.

## EDUCATION

Architectural Technologist, St. Clair College, Windsor, ON, Canada, 2000

## PROJECT EXPERIENCE

### ROAD BRIDGES

Reconstruction of Mersea Road 12 Culvert (Bridge 11) over Big Creek Drain No. 1 | Leamington, Ontario | Civil, Structural CAD

Reconstruction of Finn Line Bridge over Government Drain No. 1 | Chatham-Kent, Ontario | Structural CAD

Rehabilitation of Walker Road Pedestrian Bridge over Sucker Creek | Amhurstburg, Ontario | Civil, Structural CAD

Rehabilitation of Walker Road Bridge over Sucker Creek | Amhurstburg, Ontario | Civil, Structural CAD

Herman Line Bridge over government Drain No 2 | Chatham-Kent, Ontario | Structural CAD

Rehabilitation of County Road 21 Bridge over Pike Creek | County of Essex, Ontario | Civil, Structural CAD

### WASTEWATER

Foxboro Waste Water Treatment plant Upgrades | Waterloo, Ontario | Structural/Architectural CAD

Structural CAD for existing building upgrades. Structural/Architectural CAD for two new precast electrical/mechanical buildings, as well as revitalization of three RBCs including concrete repairs, platform and stair replacements.

Lou Romano Water Reclamation Plant, Grit Removal Facility Upgrade | Windsor, Ontario | Structural/Architectural CAD

Provided detailed design for Structural/Architectural CAD. Project included structural roof replacement on portion of existing building, 2 new electrical rooms within existing building, new vestibules throughout existing building, stair replacements and existing concrete repairs.

Western Beaches Tunnel | Toronto, Ontario | Structural CAD

Provided detailed design for Structural CAD. Project included expansion/modification of various interceptor chambers, access stairs for three 37m to 47m deep shafts, a new raised roof over the UV treatment area and implementation of various health and safety equipment.

Port Stanley WWTP & Pumping Stations | Port Stanley, Ontario | Architectural/Structural CAD

Provided detailed design for Architectural/Structural CAD. Project included Pre-engineered Administration and Headworks building, clarifiers, and pumping station. A tourist information office and public washroom building was also included within the scope of this project.

Hespeler Wastewater Treatment Plant Secondary Clarifier Upgrades | Region of Waterloo | Cambridge, Ontario, Canada | Structural CAD

Provided detailed design for Structural CAD. New secondary clarifier and pumping station.

Phase II Hespeler WWTP | Cambridge, Ontario | Structural CAD

Provided detailed design for Architectural & Structural CAD. New administration and treatment facility building. Renovation to various building structures.

Stoney Point Water Pollution Control Plant | Lakeshore, Ontario | Structural CAD

Provided detailed design for Structural CAD. Project consists of new Screen & Grit Removal Building, Administration Building, Blower Building, Aeration & Digester Tanks, Settling Tanks, Service Building, UV Building and Effluent Discharge Chamber.

### WATER

City of Grosse Pointe Park - Water System Improvements | City of Grosse Pointe Park | Grosse Pointe Park, Michigan, US | Process CAD

Process flow diagrams, pipe layout plans and sections.

** denotes projects completed with other firms*

Burke Water Station Upgrades | Guelph, Ontario | Architectural/Structural CAD

Addition to existing water station, with a 2 cell reservoir and pump well. Provided architectural design for building exterior elevations.

Kanata West Pump Station and Forcemains | Ottawa, Ontario | Architectural/Structural CAD

One story building with mezzanine, concrete pump station, screening chamber, valve chamber and inlet chamber.

Strange Street Water Treatment Plant Upgrades | Region of Waterloo, Ontario | Structural CAD

Addition and renovation to existing heritage water station building. The new addition consists of a steel framed building with masonry infill. Much of the floor is structural slab over various concrete treatment tanks. Provided detailed design for structural CAD, coordination between disciplines and structural shop drawing review.

## HEALTHCARE

EMS Building – Dougall Avenue Station | Windsor, Ontario | Architectural / Structural CAD, Project Field Inspector

Provided detailed design of Structural/Architectural CAD and field inspector for complete project. New one story building with six truck vehicle bay area and office space including washrooms, locker area, lounge/kitchen area and work rooms.

## STRUCTURAL ENGINEERING

Marsh Area Renewal Project – Point Pelee National Park | Leamington, Ontario | Structural CAD

Provided detailed design for Structural CAD. Project included replacement and redesign of approx. 500m of fixed boardwalk, boat ramp, comfort station and picnic shelters.

Day Use Area - Point Pelee National Park | Leamington, Ontario | Structural CAD

Provided detailed design for Structural CAD. 3 new Comfort Stations and 2 Picnic Shelters.

Open Web Steel Joist and Metal Deck Detail Design – various projects within Canada and the United States * | Structural Detailing CAD

Over 3 years' experience designing and detailing open web steel joist connections and metal deck layout. Producing and checking drawings and Bill of Materials. Coordinating project information with the clients.

Addition to St. Francis of Assisi Mausoleum – Heavenly Rest Cemetery* | LaSalle, Ontario | Architectural/Structural CAD

Provided detailed design for Architectural and Structural CAD. Two story addition constructed with precast concrete crypts and niches.

## AUTOMOTIVE

Dynamometer facility – Ford Essex Engine* | Windsor, Ontario | Architectural, Structural, Mechanical and Electrical CAD

3 dynamometer cell addition to an exiting dynamometer facility which is part of an existing engine plant. Produced all Architectural, Structural, mechanical and electrical CAD drawings for project. Primary consultant during design and construction meetings with client and contractors.

** denotes projects completed with other firms*

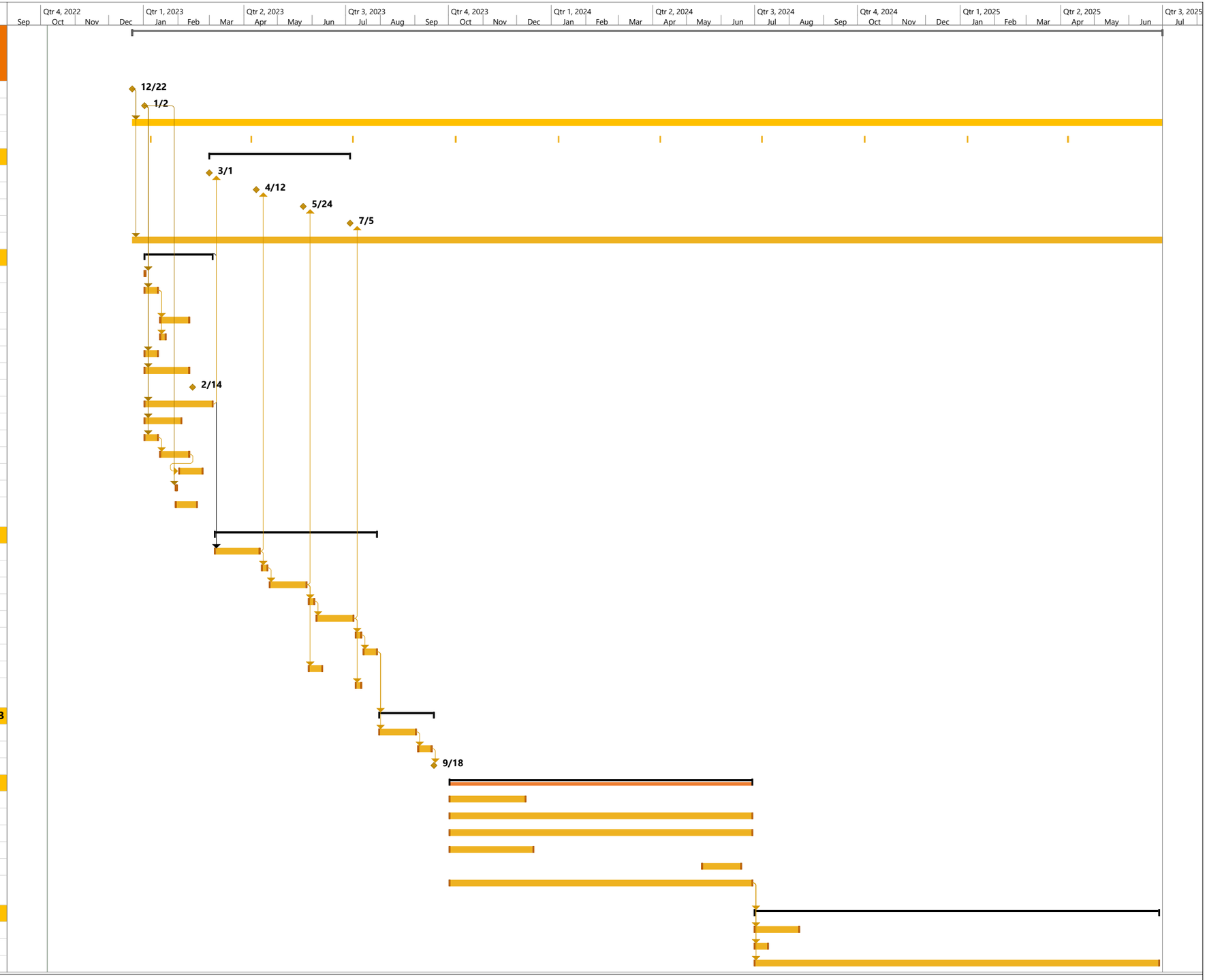
# Appendix B - Time Task Matrix

# Time Task Matrix - Amherstburg Water Treatment Plant Resevoir

| Name | Total Hours | Project Manager | Structural Engineer | QA/QC - Structural | Independant Reviewer - Structural | Civil Lead | Civil | Process Lead | Process Engineer | QA/QC - Process | Electrical Lead | Electrical CAD | Independant Reviewer - Process | CFD | CFD Modeller | Archaeological Lead | Archaeological Support | Structural CAD | Process CAD | Civil CAD | Project Controls | Geotechnical + Excess Soil Testing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total Units (T&M)** | 4,523.00 | 380.00 | 380.00 | 64.00 | 16.00 | 96.00 | 143.00 | 127.00 | 1,565.00 | 34.00 | 55.00 | 60.00 | 18.00 | 120.00 | 160.00 | 60.00 | 80.00 | 394.00 | 230.00 | 79.00 | 462.00 | 1.00 |
| **WBS Code** | **Task Code** | **Task Name** | **Units** | | | | | | | | | | | | | | | | | | | |
| **1** | **200** | **Preliminary Engineering Services** | | | | | | | | | | | | | | | | | | | | |
| 1.1 | 200.100 | Project Management | | | | | | | | | | | | | | | | | | | | |
| 1.1.1 | | Project meetings and teleconferences | 30.00 | 10.00 | 10.00 | | | | | 10.00 | | | | | | | | | | | | |
| 1.1.2 | | Quality Assurance & Control | 26.00 | 6.00 | | | 8.00 | | | | | | | 8.00 | | | | | | | 4.00 | |
| 1.1.3 | | Monthly progress reports and invoices | 64.00 | 40.00 | | | | | | | | | | | | | | | | | 24.00 | |
| 1.2 | 200.200 | Review background information | | | | | | | | | | | | | | | | | | | | |
| 1.2.1 | | Preliminary construction cost estimate (-15% to +25%) | 216.00 | | 10.00 | 4.00 | | 10.00 | 5.00 | 10.00 | 15.00 | 2.00 | | | 80.00 | 80.00 | | | | | | |
| 1.2.2 | | Scheduling and workshops | 14.00 | 6.00 | | | | 4.00 | | 4.00 | | | | | | | | | | | | |
| 1.2.3 | | Project Management Plan | 22.00 | 8.00 | | | | | | | | | | | | | | 10.00 | | 4.00 | | |
| 1.2.4 | | Project Scoping | 10.00 | 4.00 | | | | 2.00 | | 2.00 | | | | 2.00 | | | | | | | | |
| 1.2.5 | | Process Narrative & P&ID | 35.00 | | | | | | | 5.00 | 10.00 | | 5.00 | 5.00 | | | | | 10.00 | | | |
| 1.2.6 | | Site visits | 25.00 | 4.00 | 4.00 | | | 4.00 | | 4.00 | 4.00 | | 5.00 | | | | | | | | | |
| 1.3 | 200.300 | Preliminary design report and drawings | | | | | | | | | | | | | | | | | | | | |
| 1.3.1 | | Regulatory Approvals | 214.00 | 8.00 | 8.00 | | | | | 8.00 | 30.00 | | | | | | 60.00 | 80.00 | | 20.00 | | |
| 1.3.2 | | Traffic Management Plan | 28.00 | 4.00 | | | | 4.00 | 10.00 | | | | | | | | | | | 10.00 | | |
| 1.3.3 | | Constructability plan | 83.00 | 8.00 | 4.00 | | | 4.00 | | 4.00 | 4.00 | 4.00 | | | | | | | 30.00 | 10.00 | 10.00 | |
| 1.3.4 | | Operational Plan | 16.00 | 4.00 | | | | 2.00 | | 10.00 | | | | | | | | | | | | |
| 1.4 | 200.400 | Geotechnical | | | | | | | | | | | | | | | | | | | | |
| 1.4.1 | | Management of Geotechnical and hydrogeological assessment and services | 16.00 | 4.00 | 8.00 | | | | | 2.00 | | | | | | | | | | | 2.00 | 1.00 |
| **2** | | **Design Period Services** | | | | | | | | | | | | | | | | | | | | |
| 2.1 | 300.100 | Project Management | | | | | | | | | | | | | | | | | | | | |
| 2.1.1 | | Project meetings and teleconferences | 118.00 | 30.00 | 10.00 | | | 5.00 | 10.00 | 5.00 | 10.00 | | 8.00 | | | | | | 10.00 | 10.00 | 10.00 | 10.00 | |
| 2.2 | 300.200 | Design | | | | | | | | | | | | | | | | | | | | |
| 2.2.1 | | 50% Design package | 465.00 | 16.00 | 40.00 | 10.00 | | 15.00 | 30.00 | 15.00 | 30.00 | 4.00 | 5.00 | 20.00 | | 40.00 | 80.00 | | 100.00 | 50.00 | 10.00 | | |
| 2.2.2 | | 75% design package | 275.00 | 16.00 | 40.00 | 10.00 | | 10.00 | 20.00 | 10.00 | 20.00 | 4.00 | | 15.00 | | | | | 80.00 | 40.00 | 10.00 | | |
| 2.2.3 | | 95% design package | 288.00 | 16.00 | 40.00 | 10.00 | 8.00 | 10.00 | 20.00 | 10.00 | 20.00 | 6.00 | | 10.00 | 8.00 | | | | 80.00 | 40.00 | 10.00 | | |
| 2.2.4 | | Tender design package | 96.00 | 16.00 | 16.00 | 10.00 | | | 5.00 | | | 4.00 | 5.00 | 5.00 | | | | | 20.00 | 10.00 | 5.00 | | |
| 2.2.5 | | Operations manual | 56.00 | 4.00 | 2.00 | | | 2.00 | | 4.00 | 40.00 | | 4.00 | | | | | | | | | | |
| 2.3 | 300.300 | Pre Tender Construction cost estimate (+/-5%) | 44.00 | 2.00 | 12.00 | | | 2.00 | | 4.00 | 20.00 | | 4.00 | | | | | | | | | | |
| **3** | **301** | **Tender Period Services** | | | | | | | | | | | | | | | | | | | | |
| 3.1 | | Project meetings and teleconferences | 4.00 | 2.00 | | | | | | | 2.00 | | | | | | | | | | | | |
| 3.2 | | Price schedule and cost estimate | 20.00 | 2.00 | 2.00 | | | 2.00 | | 2.00 | 10.00 | | 2.00 | | | | | | | | | | |
| 3.3 | | Tender period assistance | 42.00 | 16.00 | 8.00 | | | | | | 10.00 | | 4.00 | | | | | | 4.00 | | | | |
| **4** | **400** | **Construction Period Services** | | | | | | | | | | | | | | | | | | | | |
| 4.1 | 400.100 | Project management | | | | | | | | | | | | | | | | | | | | |
| 4.1.1 | | Project meetings and teleconferences | 162.00 | 40.00 | 16.00 | 4.00 | | 10.00 | | 10.00 | 60.00 | 2.00 | | | | | | | | | | 20.00 | |
| 4.1.2 | | Design team support | 86.00 | | 40.00 | 8.00 | | 4.00 | 8.00 | 4.00 | 8.00 | 4.00 | | | | | | | | | | 10.00 | |
| 4.2 | 400.200 | Contract administration | | | | | | | | | | | | | | | | | | | | | |
| 4.2.1 | | Contract administration support | 590.00 | 40.00 | 20.00 | | | 4.00 | 10.00 | 4.00 | 150.00 | 2.00 | | | | | | | | | | 360.00 | |
| 4.2.2 | | Shop drawing review, RFI's | 211.00 | 20.00 | 60.00 | 4.00 | | | | 10.00 | 20.00 | 2.00 | 5.00 | | | | | | 40.00 | 20.00 | | 30.00 | |
| 4.2.3 | | Testing and Commissioning | 40.00 | 10.00 | | | | | | 6.00 | 20.00 | | 4.00 | | | | | | | | | | |
| 4.3 | 400.300 | Site inspection | 1,074.00 | 30.00 | 20.00 | | | 4.00 | 20.00 | | 1,000.00 | | | | | | | | | | | | |
| **5** | **500** | **Post Construction Period Services** | | | | | | | | | | | | | | | | | | | | | |
| 5.1 | 500.100 | Maint. Services | | | | | | | | | | | | | | | | | | | | | |
| 5.1.1 | | As Constructed Drawings | 101.00 | 10.00 | 10.00 | 4.00 | | | 5.00 | | 20.00 | | | | | | | | 20.00 | 20.00 | 10.00 | 2.00 | |
| 5.1.2 | | Maintenance manual | 52.00 | 4.00 | | | | | | 4.00 | 40.00 | | 4.00 | | | | | | | | | | |

# Appendix C - Project Schedule Gantt Chart

| ID | Task Name | Duration | Start | Finish |
|---|---|---|---|---|
| 0 | **Town of Amherstburg - Construction of New Reservoir and Rehabilitation of Existing Reservoir** | **131.6 wks** | **Thu 12/22/22** | **Mon 6/30/25** |
| 1 | Contract Award | 0 wks | Thu 12/22/22 | Thu 12/22/22 |
| 2 | Commencement of the Assignment | 0 wks | Mon 1/2/23 | Mon 1/2/23 |
| 3 | Project Management | 131.6 wks | Thu 12/22/22 | Mon 6/30/25 |
| 4 | Project Meetings and Teleconferences | 117.2 wks | Sat 1/7/23 | Mon 4/7/25 |
| 15 | **Quality Assurance & Control** | **18 wks** | **Wed 3/1/23** | **Wed 7/5/23** |
| 16 | Quality Assurance & Control No. 1 | 0 wks | Wed 3/1/23 | Wed 3/1/23 |
| 17 | Quality Assurance & Control No. 2 | 0 wks | Wed 4/12/23 | Wed 4/12/23 |
| 18 | Quality Assurance & Control No. 3 | 0 wks | Wed 5/24/23 | Wed 5/24/23 |
| 19 | Quality Assurance & Control No. 4 | 0 wks | Wed 7/5/23 | Wed 7/5/23 |
| 20 | Monthly progress reports and invoices | 131.6 wks | Thu 12/22/22 | Mon 6/30/25 |
| 21 | **Preliminary Engineering Services** | **9 wks** | **Mon 1/2/23** | **Fri 3/3/23** |
| 22 | Review background information | 0.2 wks | Mon 1/2/23 | Mon 1/2/23 |
| 23 | Preliminary construction cost estimate (-15% to +25%) | 2 wks | Mon 1/2/23 | Fri 1/13/23 |
| 24 | Scheduling | 4 wks | Mon 1/16/23 | Fri 2/10/23 |
| 25 | Project Management Plan | 1 wk | Mon 1/16/23 | Fri 1/20/23 |
| 26 | Project Scoping | 2 wks | Mon 1/2/23 | Fri 1/13/23 |
| 27 | Process Narrative & P&ID | 6 wks | Mon 1/2/23 | Fri 2/10/23 |
| 28 | Site Visit | 0 wks | Tue 2/14/23 | Tue 2/14/23 |
| 29 | Preliminary design report and drawings | 9 wks | Mon 1/2/23 | Fri 3/3/23 |
| 30 | Regulatory Approvals | 5 wks | Mon 1/2/23 | Fri 2/3/23 |
| 31 | Traffic Management Plan | 2 wks | Mon 1/2/23 | Fri 1/13/23 |
| 32 | Constructability plan | 4 wks | Mon 1/16/23 | Fri 2/10/23 |
| 33 | Operational Plan | 3 wks | Thu 2/2/23 | Wed 2/22/23 |
| 34 | Geotechnical | 0.2 wks | Mon 1/30/23 | Mon 1/30/23 |
| 35 | Management of Geotechnical and hydrogeological assessment and services | 3 wks | Mon 1/30/23 | Fri 2/17/23 |
| 36 | **Design Period Services** | **21 wks** | **Mon 3/6/23** | **Fri 7/28/23** |
| 37 | 50% Design package | 6 wks | Mon 3/6/23 | Fri 4/14/23 |
| 38 | Owners Review | 1 wk | Mon 4/17/23 | Fri 4/21/23 |
| 39 | 75% design package | 5 wks | Mon 4/24/23 | Fri 5/26/23 |
| 40 | Owners Review | 1 wk | Mon 5/29/23 | Fri 6/2/23 |
| 41 | 95% design package | 5 wks | Mon 6/5/23 | Fri 7/7/23 |
| 42 | Owners Review | 1 wk | Mon 7/10/23 | Fri 7/14/23 |
| 43 | Tender design package | 2 wks | Mon 7/17/23 | Fri 7/28/23 |
| 44 | Operations manual | 2 wks | Mon 5/29/23 | Fri 6/9/23 |
| 45 | Pre Tender Construction cost estimate (+/-5%) | 1 wk | Mon 7/10/23 | Fri 7/14/23 |
| 46 | **Tender Period Services** | **7 wks** | **Mon 7/31/23** | **Mon 9/18/23** |
| 47 | Tender period assistance | 5 wks | Mon 7/31/23 | Fri 9/1/23 |
| 48 | Tender Review | 2 wks | Mon 9/4/23 | Fri 9/15/23 |
| 49 | Tender Award | 0 wks | Mon 9/18/23 | Mon 9/18/23 |
| 50 | **Construction Period Services** | **39 wks** | **Mon 10/2/23** | **Fri 6/28/24** |
| 51 | Design team support | 10 wks | Mon 10/2/23 | Fri 12/8/23 |
| 52 | Contract administration | 39 wks | Mon 10/2/23 | Fri 6/28/24 |
| 53 | Contract administration support | 39 wks | Mon 10/2/23 | Fri 6/28/24 |
| 54 | Shop drawing review, RFI's | 11 wks | Mon 10/2/23 | Fri 12/15/23 |
| 55 | Testing and Commissioning | 5 wks | Wed 5/15/24 | Tue 6/18/24 |
| 56 | Site inspection (assumed 1000 hours as per RFP) | 39 wks | Mon 10/2/23 | Fri 6/28/24 |
| 57 | **Post Construction Period Services** | **52 wks** | **Mon 7/1/24** | **Fri 6/27/25** |
| 58 | As Constructed Drawings | 6 wks | Mon 7/1/24 | Fri 8/9/24 |
| 59 | Maintenance manual | 2 wks | Mon 7/1/24 | Fri 7/12/24 |
| 60 | Maintenance Period (one year ) | 52 wks | Mon 7/1/24 | Fri 6/27/25 |




Project: Town of Amherstburg
Date: Fri 10/7/22

Task | Split | Milestone | Summary | Project Summary | Inactive Milestone | Inactive Summary | Manual Task | Duration-only | Manual Summary Rollup | Manual Summary | Start-only | Finish-only | External Tasks | External Milestone | Deadline | Progress | Manual Progress