

TSH
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Portfolio

t o t t e n s i m s h u b i c k i a s s o c i a t e s

TSH TAKES DATA MANAGEMENT SYSTEMS TO THE NEXT LEVEL



Screen capture of MIDS Workbench software, developed for the City of St. Thomas, ON by TSH and ASI.

TSH is using 42 years of experience in designing, constructing, and evaluating municipal infrastructure to develop the next generation of information management tools. Municipalities are faced with the challenge of assigning decreasing budget dollars to the most appropriate rehabilitation, or construction project. The average municipality is responsible for many services, including all underground services, roadways, sidewalks, lighting, trees, grass boulevards, parks, trails, buildings, parking lots, and transit systems. Managing these assets efficiently is extremely important.

The City of St. Thomas retained TSH

and ASI to develop an Internet-enabled software solution to the common problem of asset management. With the help of staff at the City of St. Thomas, TSH and ASI

More than ever, aging urban centres need careful, yet aggressive, renovation and expansion of their public assets.

created a user-friendly, web-enabled interface that provides access to asset information stored in a data warehouse. This system

can accommodate the needs of municipalities because it is based on the Municipal Infrastructure Data Standard (MIDS) and can be adapted to fit individual municipal requirements.

The data warehouse maintains the integrity of the base data, as it is imported into and manipulated by numerous management and mapping programs. For example, maintenance staff in the field can access and update infrastructure data through a wireless connection allowing office staff to instantaneously use the updated information.

The TSH solution represents a significant improvement over previous data management systems.

THE GARDEN CITY SKYWAY STRUCTURAL REHABILITATION

The Garden City Skyway, a 47-span, high-level structural steel girder bridge, located in St. Catharines, provides a key transportation link between the Niagara peninsula and the remainder of Southern Ontario. The structure carries the QEW over the Welland Canal, Port Colborne Harbour Railway, as well as intersecting city and regional roads. The assignment for the investigation and rehabilitation of the bridge substructure components was awarded to TSH, who will also provide structural liaison services during construction.

TSH compared new inspection data with previous findings in order to generate deterioration curves for each component. This allowed a more accurate assessment of rehabilitation alternatives. Detailed condition surveys were carried out in 2002 using mechanized inspection equipment. Remote access technology was also used for high-level piers (up to 30 m) near the Welland River.

The design incorporated new, as well as established, technology and construction techniques. The rehabilitation, with a total construction value of \$18-million, will be carried out in three separate construction contracts, commencing in 2003. The design incorporates minimal disruptions to traffic flow on the QEW, and includes

restoration of concrete piers, replacement of bearings, and limited coating of structural steel. The design included services by TSH's structural, electrical and highways/traffic departments.



COUNTIES OPT FOR ROUNDABOUT ALTERNATIVE

In 2002, the United Counties of Leeds and Grenville assigned two intersection improvements to TSH's Kingston office.



The first, a signalized intersection in the centre of Kemptville, at County Road 43 and County Road 44, and the second an intersection just west of Highway 416 at County Road 19 and County Road 43. Both intersections are busy, with County Road 43 also forming part of the Trans-Ontario barrier-free route for oversized loads.

At the intersection of County Roads 19 and 43, a deep (13m) layer of soft clay made the placement of traffic signal poles extremely expensive. TSH recommended that a roundabout be built instead.

The roundabout design is a simple, slow speed, traffic circle that requires all approaching traffic to yield to traffic in the roundabout. Regular passenger traffic can

comfortably negotiate the roundabout at 30 km/h. Greater speeds require an uncomfortable short cut across the rough surface of the centre island apron. In this way the roundabout also serves to slow traffic at the transition from a rural to urban environment. The roundabout, constructed within the available road right-of-way, accommodates oversized loads and has served the public safely and efficiently for over a year, saving the costs of power consumption, signal maintenance, and traffic delays common in signalized intersections.

GARDEN RIVER FIRST NATIONS HIGHWAY PROJECT UNDERWAY

In fall 2000, TSH was awarded the contract for administration and inspection of a new highway construction project through Garden River First Nations, east of Sault Ste. Marie. This \$60-million project includes the construction of a new four lane, 16 km highway and 11 new bridge structures, including eight waterway crossings, two highway overpasses, and one highway underpass.

TSH's team consists of five full-time site members, together with support and management staff. Due to the sensitive political and cultural aspects of this project, the contractor is Garden River Constructors, a joint venture of Peter Kewitt and Sons, and Garden River Development Corporation, with a large portion of construction workers being members of the local first nations community. Construction is expected to span seven years.

Reviews of structural design changes will be completed by TSH's Structural Group, and the Quality Assurance function is being undertaken by TSH's Civil Group. The successful completion of this project will be the culmination of three decades of planning.



STANLEY AVENUE RECONSTRUCTION AND WIDENING WINS PUBLIC WORKS PROJECT OF THE YEAR

The Region of Niagara's Stanley Avenue Reconstruction and Widening Project has been awarded "Public Works Project of the



Year" (in the \$2- to 10-million Transportation category) by the Ontario Public Works Association Awards Committee.

The project was undertaken by TSH's St. Catharines office, as a Schedule "C" Class Environmental Assessment (EA) Transportation Study. Roadway improvements to the Stanley Avenue Corridor from Highway 420 to MacLeod Road in Niagara Falls were in response to the expected impacts of area developments including the Niagara Falls Casino. A grand entranceway to the City of Niagara Falls tourist area was created by upgrading a deficient two-lane roadway to a four-lane roadway with raised medians, pedestrian walkways, and streetscaping.

The construction for the widening and

beautification of Stanley Avenue, which started February 2003 and was completed December 2003, was a collaborative effort involving the Region of Niagara, the City of Niagara Falls, TSH, Norjohn Limited, Fallsview Business Improvement Association, Loretto Christian Life Centre, Mount Carmel Spiritual Centre, and local business owners and residents. Good planning and effective communication was critical to the successful construction management and administration of this project.

It was through the combined efforts of all involved that the objectives and construction schedule for this project were met, and now set the standard for future works within the tourist and commercial areas of the City of Niagara Falls.

MILITARY FAMILY RESOURCE CENTRE WINS 2003 CANADIAN WOOD COUNCIL AWARD

The Family Resource Centre and Child Care for National Defense Canada, begun in 2002 and designed for use by military personnel and their families, held their grand opening in June 2003. This project won the annual Canadian Wood Council "Green By Design" Award in 2003 in the Institutional category. The new 20,000 sq. ft. building replaced the existing childcare facility which no longer provided sufficient space. TSH provided structural and electrical consulting for the project under the Agreement for Structural Engineering Services with Public Works and Government Services Canada. The intent of the design was to develop a project that was user-friendly, interacted well with the environment, was sustainable and green, and provided a variety of spaces for different programs.

TSH's Structural Group took the lead role, along with Public Works and Government Services Canada in the selection and evaluation of building materials and value engineering. A variety of renewable and reusable materials were used, with wood being the predominant choice because it is best suited to the philosophical, sustainable, and aesthetic requirements of the user groups and programs. The roofs are exposed timber and are supported on large

wood pole columns and exterior walls. An Insulated Concrete Form wall system, selected for the construction of the exterior walls, and a highly efficient in-floor hydronic heat system provide superior thermal parameters and cost efficiency.



2003 "Green By Design" Award.

SIX NATIONS COMMUNITY CENTRE BECOMES FULLY-FUNCTIONAL FACILITY

The grand opening of the Six Nations Community Centre was held in December 2003. TSH won the competition for a recreation master plan in 1999, and since then, the project has evolved into a full-service design and administration project, managed from our Kitchener-Waterloo office. TSH worked closely with the Six Nations Steering Committee in developing the site plan, building program, architectural design, and building systems. The community hall features a multi-purpose gathering area with dining capacity for 300 people, a full kitchen, a stage, dressing rooms, and meeting rooms. The facility also incorporates new administration offices for the Parks and Recreation Department, a communal work area, reception, a kitchen/eating area, and a large conference room to be shared with community recreation groups.

TSH has recently been named the prime consultant for Phase 2, which includes a link to the existing arena, and arena renovations.



SASKATCHEWAN HIGHWAY 1 VALUE ANALYSIS STUDY



The Trans-Canada Highway (Highway 1) is not only an important east-west route in the Province of Saskatchewan, it is a critical link in the national highway system. In 1997, the provincial government of Saskatchewan committed to twinning the length of Highway 1 within Saskatchewan.

In spring 2003, Saskatchewan Highways retained the team of Lea Associates of Winnipeg, Clifton Associates of Regina, and TSH to carry out a Functional Design Study for the proposed twinning. In order to ensure the best value for taxpayers' dollars, Saskatchewan Highways requested that a Value

Analysis Study be undertaken once the Functional Design Study had been developed and evaluated. Lea and Clifton were responsible for the functional design, and TSH was the lead on the Value Analysis (VA) work, including providing the Value Engineering (VE) Team Leader. VA is not focused on cost reduction; rather it seeks the best combination of required function and appropriate cost. The VA study produces alternatives that will result in implemented savings, enhanced safety, and improved performance of a facility.

The VA study for Highway 1 was carried out in two separate workshops to allow for the progress of the functional design work. The first workshop covered the first 20-km section of the project, and identified opportunities to revise the proposed Canadian Pacific Railway bridge crossing, to minimize structure cost, and to improve safety by eliminating an at-grade intersection. Alternatives to save the "Percival Tree," a locally and politically important landmark, were also investigated.

The second workshop focused on the remaining 100-km section of the highway. The VA team identified opportunities to reduce capital costs by \$5.5-million without sacrificing safety, operations, or other required project functions. In this workshop, the VA team generated several competing alternatives, and used a quality-based weighted evaluation to identify the alternative that provided the best combination of cost, function, and environmental and social impacts.

DURHAM TRANSPORTATION MASTER PLAN

Durham Region is one of the fastest growing areas in Canada. The region's population increased by more than 40 per cent between 1986 and 1996 to nearly 460,000, and could reach nearly 850,000 by 2021. As a result, the region faces several challenges in its goal to provide an environmentally friendly, safe, efficient, and reliable transportation system.

To better identify the transportation challenges, risks, and opportunities in the Durham Region, TSH assisted the region with their Transportation Master Plan (TMP), developed through the Durham Mobility Study. The TMP provides a blueprint to guide the region's future transportation programs and investments. It also suggests strategies to encourage the use of non-automobile modes of travel, and explores how to make best use of existing transportation services. The movement of goods and services is also addressed through the study.



The Durham TMP was completed in accordance with the provisions of the Municipal Class Environmental Assessment (Class EA), satisfying the first two phases of the Class EA planning and design process. Project specific investigations are required to satisfy the final phases of the Class EA process. A framework approach for completing these phases is provided as part of the TMP. Durham Region Council formally approved the Durham Region TMP in December 2003.

TRANSIT STUDIES BYLINE

TSH strives to balance travel mobility and safety with community interests and public funding constraints. TSH recently completed a Rapid Transit Expansion Study for the City of Ottawa. Population and employment growth over the next 30 years is expected to put pressure on the existing system and drive the need for expansion and enhancements. TSH developed a rapid transit network plan to satisfy future transit needs, and enhance the quality of life for those who live and work in Canada's capital. Other projects undertaken by TSH's Transit Planning Services Division include:

- Whitby Transit Services Review
- Durham Region Transit Improvement Plan
- Durham College/UOIT Student Bus Route and Pass
- Monthly D-Pass Program in Durham Region
- Niagara Falls People Mover System

Our Growing Capabilities

TSH USES REALISTIC MICRO-SIMULATION MODELLING TECHNIQUES

Analysis of complex traffic systems requires realistic modelling techniques that evaluate specific factors such as vehicle characteristics, driver response, traffic composition, and network characteristics. Only micro-simulation approaches can adequately model complex traffic systems because they are detailed enough to consider behaviour of individual driver vehicle units, their interaction, as well as the network on which they travel.

TSH uses the user-friendly *Paramics* model, which was developed after extensive research in the European Union, and has since been tested, validated, and used in the United States, Canada, the United Kingdom, Germany, Australia, and New Zealand. The model has flexible features that make it possible to study complex networks under various traffic conditions in great detail, thereby bridging the gap between planning models and operational models. The output includes detailed information on approach delays, link travel speeds, volumes, routing choices and level of service for both intersection and highway sections. The outputs can be printed as compact reports or viewed graphically.

TSH has highly qualified staff with the requisite technical background and experience to conduct micro-simulation modelling tasks to suit the requirements of different clients. TSH is

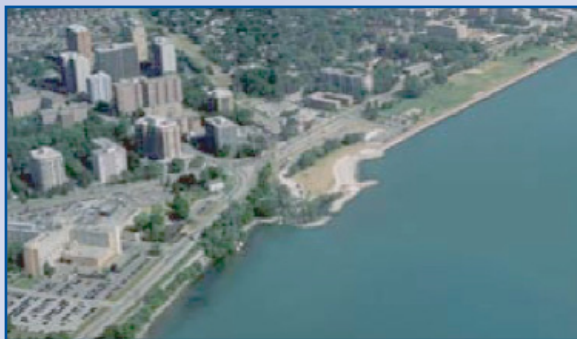
currently using the model in Ontario for traffic operations in a sub-area of the City of Niagara Falls. In addition, TSH provides micro-simulation modelling for research and operational analysis of a variety of transportation systems, including complex interchanges and intersections, roundabouts, weaving areas, congested networks, ITS system deployment, changeable message signs, designated truck routes, toll plazas, HOV and bus lanes, transit priority systems, and public transit operations.



Colour coded representation of link flows on a 3D network

Recently Started

NEW PIER AND MARINA REVITALIZES TOURISM IN BURLINGTON



Extending out into Lake Ontario, the Burlington Pier and Marina represent an exciting challenge for TSH. Planned as a catalyst for tourism and a world-class public amenity, the proposed public pier will extend southward from the foot of Brant Street in Burlington, Ontario. A transient marina and wave protection are also proposed for visiting boaters. TSH has compiled an excellent team of leading experts to undertake this multi-faceted assignment. The project's scope includes the Environmental Assessment, preliminary through to detailed design, and contract administration during construction. Construction is scheduled to begin in 2005 with completion the following year. This project is one of several that the City of Burlington has commissioned in the renovation of their waterfront.

PORT WHITBY MARINA CLUBHOUSE BUILDING NEW FOCAL POINT AT WATERFRONT



The Town of Whitby's new Port Whitby Marina clubhouse building is under construction and scheduled to be complete in time for the start of the 2004 boating season. The \$1.6-million building accommodates facilities for administration and staff, washrooms and laundry facilities for boaters, as well as a community meeting hall featuring large expanses of glass overlooking the marina and Lake Ontario. The hall will be available for use by local community groups.

Designed by TSH's Whitby Building Group, the building will be a focal point of marina activities for local boaters, tourists, and the community.

Recently Completed

IMPROVING TORONTO'S WATERFRONT

The Wet Weather Flow Management Master Plan was initiated to improve the environmental quality of streams, rivers and Lake Ontario waterfront within the City of Toronto. Wet weather flows are storm sewer and combined sewer overflow discharges and infiltration/inflow into the sanitary sewer. The study established environmental objectives, reviewed over 100 potential Best Management Practices (BMPs), and developed and evaluated control options. Short and long-term strategies, and an implementation plan were also developed. From the study, a new philosophy in wet weather flow management was adopted, recognizing rainwater as a resource. Also, wet weather flows were to be managed on a watershed basis, and a hierarchical approach was to be used, starting with at source, conveyance, and finally end-of-pipe control measures.



CROSS ISRAEL HIGHWAY: COMPLETE AND OPEN



A grand opening was held January 2004 to applaud the outstanding success of what is considered the most advanced toll highway in the world. The Cross Israel Highway extends 87 km and cost \$1.3-billion (U.S.). TSH and its subsidiary CIDC in Israel were responsible for the design and project management for 44 km of highway, five interchanges, 46 bridges, and two tunnels.

COBOURG WATERFRONT. ACCESSIBLE, DYNAMIC, AND INTERACTIVE.



Every July first weekend, 50,000 visitors converge on the Town of Cobourg's Waterfront Festival. Acting as engineers and landscape architects, TSH helped renovate Cobourg's waterfront and downtown park lands. Visitors and locals now enjoy safe, accessible, and beautiful landscapes packed with dynamic and interactive features. TSH's work on the Victoria Park projects has rekindled the tourism demand at Cobourg's waterfront while providing much needed trails, traffic control, parking, seating, plantings, low maintenance landscaping, and exciting play features.

INCREASED CAPACITY AT HIGHLAND CREEK TREATMENT PLANT

In July 2003, a full-scale Moving Bed Biofilm Reactor (MBBR) process began operation at the Highland Creek Treatment Plant in Toronto. The MBBR process adds fixed film media to an aeration tank, allowing for higher biomass concentrations. The aeration tank can then be rated at a higher capacity with a more compact footprint.

TSH staff evaluated the MBBR and provided detailed design and construction administration for the upgrades of aeration tanks No. 7 and No. 8. Aeration tank No. 7 was installed with a fine bubble aeration system to replace the mechanical aerators. Aeration tank No. 8 was installed with an MBBR in the first two sections and a fine bubble aeration system in the last three sections. A one-year pilot study to evaluate the benefits of the MBBR process will be performed under two options: a single stage MBBR system; and a hybrid MBBR/activated sludge system. Under each of these options, two flow operations will be tested: normal flow to both aeration tanks; and double flow to aeration tank No. 8 with aeration tank No. 7 out of service.

The MBBR process will benefit the existing plant by increasing capacity of the existing tank, and enabling growth in areas with limited site expansion capabilities.



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