



Keystone Bridge Management Corp.

Keystone News

Keystone Bridge Management Corp. offers:

- Specialized bridge asset management services
- Municipal bridge inspections
- Bridge management software solutions
- Training in bridge asset management and bridge inspection
- Bridge rehabilitation or replacement planning and design services
- Bridge load testing
- Quality Verification Engineering



Sustainable Bridges

“Sustainability” is an oft heard buzz word. The idea describes a lifestyle that ensures future generations will not be deprived by current avarice. It has strong “green” connotations.

There are numerous examples of unsustainability. A glaring one is suburban sprawl. The concept of large detached homesteads spreading virally over hill and dale is simply not sustainable. It is a luxury many of us smugly enjoy however!

Bridges, you would think, are inherently sustainable. They last for decades. They are made of robust materials. It is tempting to think of a “sustainable bridge” as a re-

dundant phrase. Regrettably, many Canadian and North American bridges were constructed in an unsustainable fashion.

A classic example is the Champlain Bridge in Montreal. The 3,400 m long six lane bridge over the St. Lawrence River was completed in 1962. It is already severely deteriorated and not economically repairable. It must be replaced within 15 years. Replacing a bridge such as this every 53 years is not sustainable!

Contrast this with the other end of the spectrum. There are multitudes of corrugated steel large diameter culverts (CSP’s) buried within deep fills. Many of these are corroded, perforated, and at the end of their service lives. They pose a significant risk to public

safety, and are very expensive to replace. The MTO recently replaced a two metre diameter CSP in an 11 metre deep fill on Hwy 416 for several million dollars. The “cheapest at any cost” decisions made in the 1960’s and 1970’s are coming back to bite us.

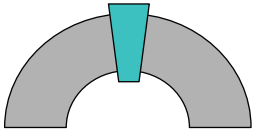
Asset management science provides the tools that enable sustainable practices for bridge construction, renewal, and rehabilitation. For example, life-cycle costing of competing bridge management scenarios invariably yields more sustainable bridge infrastructure solutions.

Keystone Bridge Management takes exceptional pride in recommending solutions that actualize

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**Keystone is your Bridge
Asset Management
Specialist!**

Sustainable Bridges, Cont'd

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the concept of sustainability. Sustainability really means looking out for the long-term. Will the decisions we make today be valued by those that succeed us? The Romans and Greeks almost had it right!



Champlain Bridge in Montreal is sad example of unsustainability

*Will the decisions we
make today be valued by
those that succeed us?*



Perforated 1980's vintage 64 m long CSP with 10 m cover will need \$1M replacement by 2025

Large Culvert Replacement Costs

A fundamental asset management parameter is the cost of asset replacement. The replacement value of bridges is typically of the order of \$3K to \$5K per square metre of deck area. Replacement cost of the assets in one category is essential to know for long term capital planning of those assets. Assessing the replacement costs of culverts presents a few challenges. Although the actual culvert structure is easy to estimate, that is only a relatively minor component of the replacement cost. Culvert replacement requires traffic management outlays, substantial excavation, de-

watering, bedding, backfilling, sub-base, base and pavement reinstatement, guiderail and vegetation restoration. Starting in 2012 Keystone Bridge Management will provide to its clients the estimated replacement costs of their large culvert inventory. A utility has been created in the Keystone Bridge Management System that will produce the estimates. The utility relies on basic parameters that include depth of cover, height and span of the conduit, number of barrels, stream depth, number of lanes on road, skew angle, and culvert type. The replacement cost will generate estimates for

replacing the existing culvert with both corrugated steel and concrete culverts. Not surprisingly, calibration runs of the utility reveal that a concrete culvert replacement is only marginally more expensive than CSP's on a first cost basis. The culvert replacement costs will be provided at no additional charge as part of Keystone's basic reporting for biennial bridge and large culvert assessment services. Keystone Bridge Management Corp.'s goal is to become the foremost provider of structural asset management services in Ontario.

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Culvert Replacement Cost

Bridge ID	Name	Cost of Excavation	Cost of Structure Removal	Installation Cost for Similar Size Concrete	Installation Cost for Similar Size Steel	Total Cost of Concrete Replacement	Total Cost of Steel Replacement
01-022	Doran Creek	\$29,992.50	\$6,900.00	\$34,500.00	\$17,250.00	\$361,383.00	\$340,683.00
01-068	Vandersank MD	\$44,334.00	\$5,400.00	\$27,000.00	\$13,500.00	\$379,773.60	\$363,573.60
01-147	Sandy Creek Bridge	\$25,770.20	\$11,750.00	\$94,000.00	\$47,000.00	\$488,772.24	\$429,552.24
01-158	Ferguson MD	\$35,087.05	\$8,100.00	\$40,500.00	\$20,250.00	\$409,083.66	\$384,783.66
01-188	Thorpe-Ellis MD	\$88,110.00	\$6,600.00	\$33,000.00	\$16,500.00	\$491,863.20	\$472,063.20
01-281	Milton Hoy MD	\$46,531.00	\$9,500.00	\$28,500.00	\$14,250.00	\$384,637.20	\$367,537.20

Above: Prototype of Culvert Replacement Cost Report

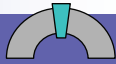
Large Culvert Maintenance Tip

Stagnant water residing in a steel culvert can greatly accelerate the rate of corrosion. Water can stay ponded inside a culvert when there is very little gradient. With multiple barrels often one barrel carries low flow and water is trapped in the other barrels by silt build up.

Where possible, excavate channels so that ponding water can escape an otherwise dry barrel. Ensure debris and vegetation is cleared from the barrel, inlet and outlet at the same time!

Right: Severely perforated culvert invert resulting from standing water



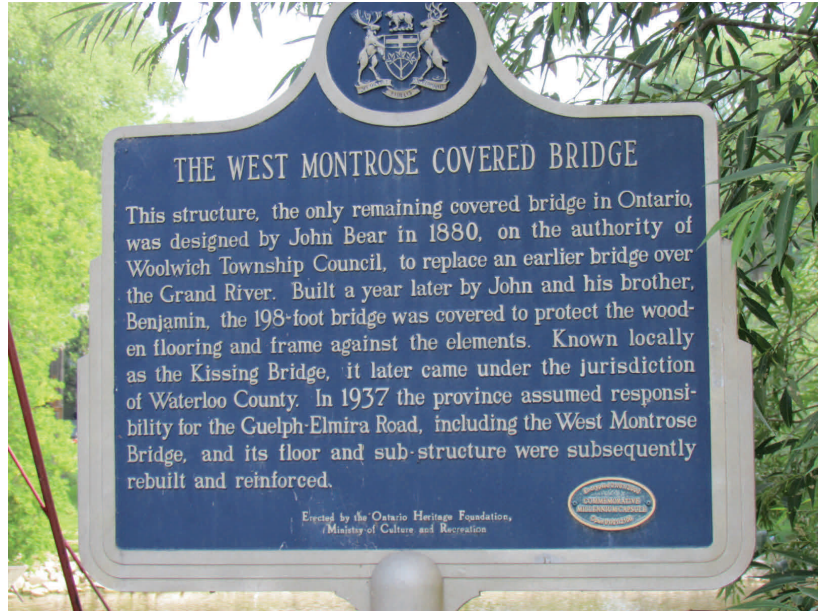


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Check out the web site at:
www.keystonebridge.ca
(soon to be updated)



Above plaque describes bridge on front page. Child on front page image is author's grandson, Jacob.

Milestone for Keystone

September 2011 marked the fifth anniversary of Keystone Bridge Management Corp. By any measure the business has succeeded. The client base includes large and small municipalities from northern, southwestern, central, and principally eastern Ontario. Every client has elected Keystone's "Triple-D" approach to modelling bridge and large culverts over the more traditional OSIM methodology. Business from 2010 to 2011 increased by more than 50%. Fortunately, so did our staff.

Two new major clients chose Keystone Bridge Management in 2011 for biennial inspections; the United Counties of Stormont, Dundas & Glengarry, and the City of Barrie. We look forward to competing successfully to gain some major local clients in 2012. In the same breath, we look forward equally to servicing all of our existing clients.

The growth will force the relocation of our office to a bigger location in the spring of 2012. We are currently recruiting for an experienced structural design engineer to bolster our ability to furnish replacement bridge designs.

Keystone is deeply grateful to all of its clients, staff, and service providers for its continued growth and success!

