



Keystone Bridge Management Corp.

Keystone News

Keystone enters Third Year of Operation

Keystone Bridge Management 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 services.
- Bridge load testing.

Keystone Bridge Management Corp. enters its third year of operation this month. **Keystone** was incorporated to specialize in bridge asset management services. **Keystone's** mission is to apply engineering, economics, and risk management principles to achieve enduring benefit from bridge assets at lowest overall life-cycle cost. It has offered its services to both large and small municipalities, bridge authorities, Parks Canada, Manitoba, and as a sub-consultant.

In late 2006 and early 2007 **Keystone** provided expert advice to Bilfinger-Berger BOT, a major developer in Private-Public Partnerships. Bilfinger was joint venturing on a \$1B project to rehabili-

tate or replace 800 bridges in the State of Missouri. **Keystone** toured from the Ozarks to the cotton fields of the "Show me" State to report on a representative subset of the 800 bridges and offered important advice on a bridge management strategy that could potentially save the developer and the state millions of dollars.

In 2007 **Keystone** completed regular bridge inspections of 87 structures in the United Counties of Prescott & Russell. It completed 20 further inspection for the City of Brockville. **Keystone** utilized its proprietary Bridge Management system on both of the above assignments.

Keystone developed a Bridge



Prestressed girder bridge in Prescott-Russell Counties.

Asset Management training course for the University of Dalhousie. The two day course was very well received by its first audience in Halifax in May 2007. The course is being offered again in Toronto in March 2008.

Inside this issue:

Keystone enters Third Year of Operation	1
Keystone Bridge Management System	1
Cracks close Brockville Bridge.	2
Bridging the Gap	3
Laval Quebec Bridge Collapse Report	3
Bridges & PSAB 3150	4

Keystone Bridge Management System

There are numerous bridge management systems (BMS) available world-wide. The most common BMS in the US is PONTIS. The Province of Ontario developed its own system, OBMS in the late 1990's. Variations of OBMS have been distributed by the developer to other provinces.

Both PONTIS and OBMS rely on a highly subjective rating system when recording bridge inspection information.

Keystone Bridge Management has developed its own proprietary BMS. The **Keystone** BMS is based on a "Triple-D" approach of

modeling a bridge in terms of Depreciation, Defects and Damage. Depreciation is completely non-subjective as it is calculated based on the age and life expectancy of individual bridge components.

Continued on Page 3.....

“Shear cracks close Elm Street bridge”

“... shear cracks had not been reported by others since the posting took effect.”

The above story headline appeared in the ***Brockville Recorder & Times*** on Thursday November 22, 2007. During a routine biennial inspection of 20 Brockville bridges by **Keystone Bridge Management**, suspected active shear cracks were noted on the 9.9 metre long 100 year old Elm Street T-beam bridge. The posted bridge was already a concern to City officials and was being monitored closely.

The bridge had been load tested 15 years previously by the MTO and was signed with a triple posting of 14-22-35 tonnes. Previous in-

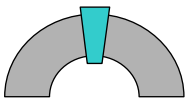
spections had concluded the bridge posting was adequate. Open shear cracks had not been reported by others since the posting took effect.

Although the bridge was on a low traffic route, it did serve school buses for a nearby elementary school, and was the only crossing of Butler Creek for several surrounding residential blocks.

To confirm the cracks were indeed shear cracks and active, the City of Brockville agreed to a simple load test. While carefully supervised by **Keystone Bridge Management**, a 20 tonne test load

was incrementally backed onto the bridge. At only 50% of the effective load posting it was confirmed the cracks were indeed opening under increasing load. Consequently, the City accepted **Keystone Bridge Management’s** recommendation to close the bridge immediately.

Shear cracking was confirmed as the failure mechanism for the Blvd. de la Concorde bridge in Laval Quebec, that resulted in the deaths of five motorists on September 30, 2006. That bridge collapsed essentially under its own weight after only 35 years of service.



Keystone is your bridge asset management specialist.



Picture above is of partly loaded tri-axle truck utilized for load testing Elm Street Bridge

Keystone Bridge Management System (Cont'd)

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Defects are undesirable but non-threatening component attributes not caused by normal Depreciation. A Defect may also be defined as any unintended characteristic associated with the component material that does not have immediate structural consequences. Defects shorten the intended life of a component and/or hasten its Depreciation. Unattended Defects may grow

and eventually result in Damage.

Damage is any transformation of a component to a structurally weaker condition. Damage is any alteration of a material or component that results in loss of structural section, change of geometry, or degradation of performance.

The forgoing definitions are designed to eliminate in so far as possible the subjectivity associated with rating a bridge. The

concept of Depreciation neatly dispenses with rating how much of a bridge is Excellent or Good. The fuzzy distinction between Fair and Poor is eliminated in favour of the more comprehensive and overarching definitions of Defects and Damage.

The judicious application of this methodology permits the **Keystone** BMS to accurately assess a bridge in structural and economic terms.



Severe spalling Damage to a parapet wall on a bridge on Hwy 17. The tarnishing of the railings can be characterized as a slight Defect.

Bridging the Gap

In November 2007 the Infrastructure Investment Coalition released the report "Ontario's Bridges Bridging the Gap." The report received widespread media attention. The report identified significant weaknesses in the management of municipal bridges. Among them:

- No central comprehensive database of municipal bridges.
- There is no central agency to

report on the status of Ontario's municipal bridges.

- Bridge inspections may be compromised by lack of thoroughness and lack of accreditation of bridge inspectors due to competitive process to award the work, and weak legislation.

- "There is no way of knowing if all of Ontario bridges are safe."

- Smaller rural municipalities that are geographically disadvan-

taged with a large and older bridge population are the most challenged to adequately fund their bridge infrastructure.

- Not presently possible to assess total bridge needs for the Province of Ontario.

For more information visit:
www.rcao.com or
www.infracolition.ca

"There is no way of knowing if all of Ontario bridges are safe."

Laval Quebec Bridge Collapse Report

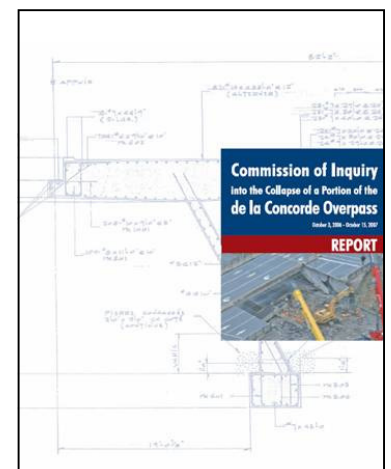
A must read for anyone involved with managing bridge infrastructure is the 222 page Johnson "Commission of Inquiry into the Collapse of a Portion of the de la Concorde Overpass". The report can be obtained through the Commission web site at www.cevc.gouv.qc.ca. The report cover is shown to the right

of this article.

The inquiry concluded the Province of Quebec needs to spend at least \$5B over the next ten years on its bridges. It noted unclear accountability within the MTQ "...and the apparent difficulty of engineers to impose their professional judgment."

The Commission took the somewhat unusual step of naming and reproaching one engineer for management of repair work to the bridge, and deplores the incomplete inspection by another named engineer.

The bar for bridge inspection standards has clearly been raised in Canada as a result.





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“Bridges give flight to the ground.”

Bridges & PSAB 3150

The Public Sector Accounting Board has developed new standards for reporting the worth of tangible capital assets. Any such public asset in Canada that has been constructed or rehabilitated in the last 20 years is required to be accounted for in conformance with the PSAB 3150 standard. The expectation is that all levels of public governance inventory and appraise their infrastructure by January 1, 2009.

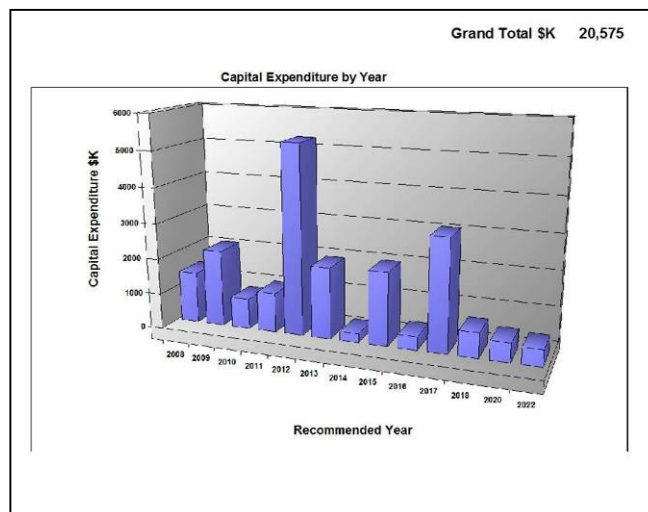
Accountants by virtue of this initiative have done the engineering profession a tremendous service. Only a proper and comprehensive public accounting of the investment in Canadian public infrastructure will convincingly pressure governments to invest in sustaining our aging fleet of roads, bridges, sewers and mains.

Presently there is no authoritative number of how many bridges are in Canada or Ontario.

Nor is there any idea of their worth or the amount of capital required to sustain their worth.

It behooves everyone in the bridge community to fully support the PSAB 3150 initiative.

It is noteworthy that the “Triple-D” approach implicit to the **Keystone Bridge Management System** permits a highly accurate appraisal of the current worth of any bridge, and facilitates forecasting immediate and future bridge capital needs.



To the left is a capital needs forecast for 109 municipal structures in eastern Ontario produced by Keystone BMS.