

## Impact-Echo Tests on Historic Monument

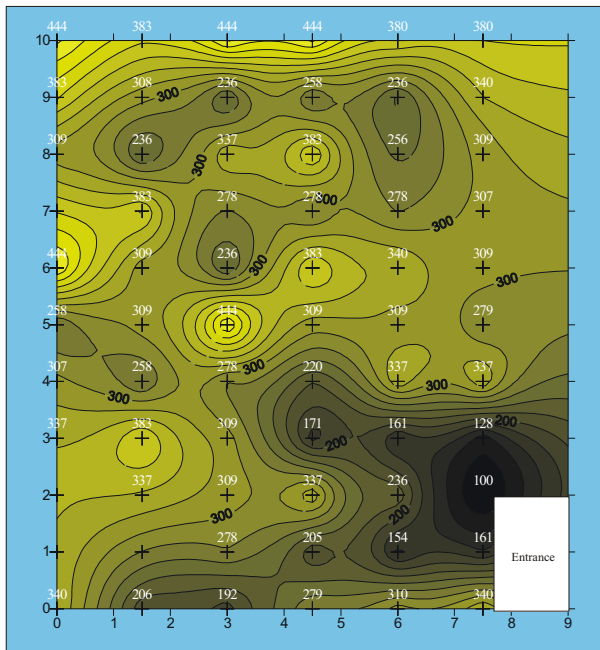
The monument was constructed in two layers, an outer shell of mortar and boulders and an inside concrete shell. The inside shell was showing signs of deterioration including moisture penetration and frost damage. It was considered probable that there was also deterioration at the interface between the two shells. In 1995, impact-echo tests were completed in a grid pattern of 1 m. The results confirmed that there were locations where the wall thickness was quite thin confirming that there was deterioration between the inside concrete shell and the outer shell of mortar and boulders. In 2000 a second set of impact-echo tests set of revealed that the deterioration was considerably greater. Contour maps of the both sets of test data were constructed enabling visual comparison of the ongoing deterioration.



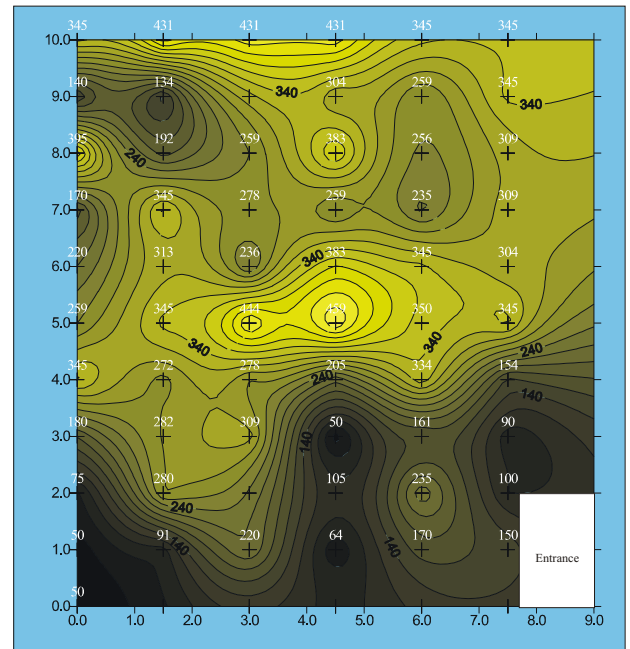
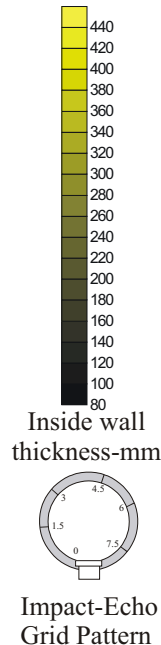
Pioneer Tower West  
Mennonite Historic Monument



Views of the inside concrete shell of the monument



Impact-Echo Survey - 1995



Impact-Echo Survey - 2000

Specialists in NDT and Computer Monitoring of Structures

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## Company Profile

Tekron Services is a Canadian company providing specialized inspection and testing of construction materials. Incorporated in 1987, the company offers a wide range of inspection and non-destructive testing services to evaluate structures and construction materials. Since the formation of the company our goal has been to incorporate emerging technology into tools and techniques for the construction industry.

## Data Sheets

To illustrate these technologies Tekron has produced a series of data information sheets and case studies. These data sheets are available on request and are posted on our web page from time to time.

## Evaluation Techniques

Since 1987, our company has been involved in several notable investigations including earthquake damage, historical masonry and extensive water leakage, often requiring unusual field techniques to be used to evaluate the problems. Our methods often make use of advanced computerized systems including impact-echo technology which uses sound waves to evaluate defects deep within concrete structures, ground penetrating radar which uses electrical conductivity to detect dissimilarities and computer monitoring techniques using miniature data loggers or cellular connections to evaluate the dynamics acting upon a structure. A list of some of the techniques used and types of investigations completed are given below.

### NDT Techniques

#### Impact-echo

- Thickness
- Delamination
- Honeycombing
- Voids

#### Ground Penetrating Radar

- Re-bar & post-tension cable detection
- Voids & honeycomb in concrete
- Voids below concrete
- Voids in masonry

#### Corrosion mapping

#### Boroscope

#### Moisture and humidity detection

#### Dynamic measurement of physical properties

- Linear displacement transducers
- Telltale
- Demeg gauge
- Vibrating wire strain gauge
- Vibrating wire water pressure transducers
- Vibrating wire tilt meters
- Miniature single and multiple channel data loggers including the following sensors:-
  - Temperature
  - Humidity
  - Light intensity
  - Voltage
  - Motor on/off vibration sensor
  - Motor on/offA/C sensor

### Investigations

#### Concrete Structures

- Bridge decks
- Parking garages
- Reservoirs
- Dams
- Concrete pipes
- Tunnels and shafts
- Water retaining structures
- Pavements
- Foundations
- Historical structures
- Concrete protection
- Analysis of structural materials
- Monitoring of physical properties

#### Building Envelopes

- Roof inspection
- Anchor Safety Testing
- Masonry cladding
- Residential inspection
- Precast concrete
- Stone cladding
- Historical masonry

#### **Tekron Services Inc.**

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