Innovative Evaluation and Design of Runway Pavement Rehabilitation

Swift 2017 - Halifax

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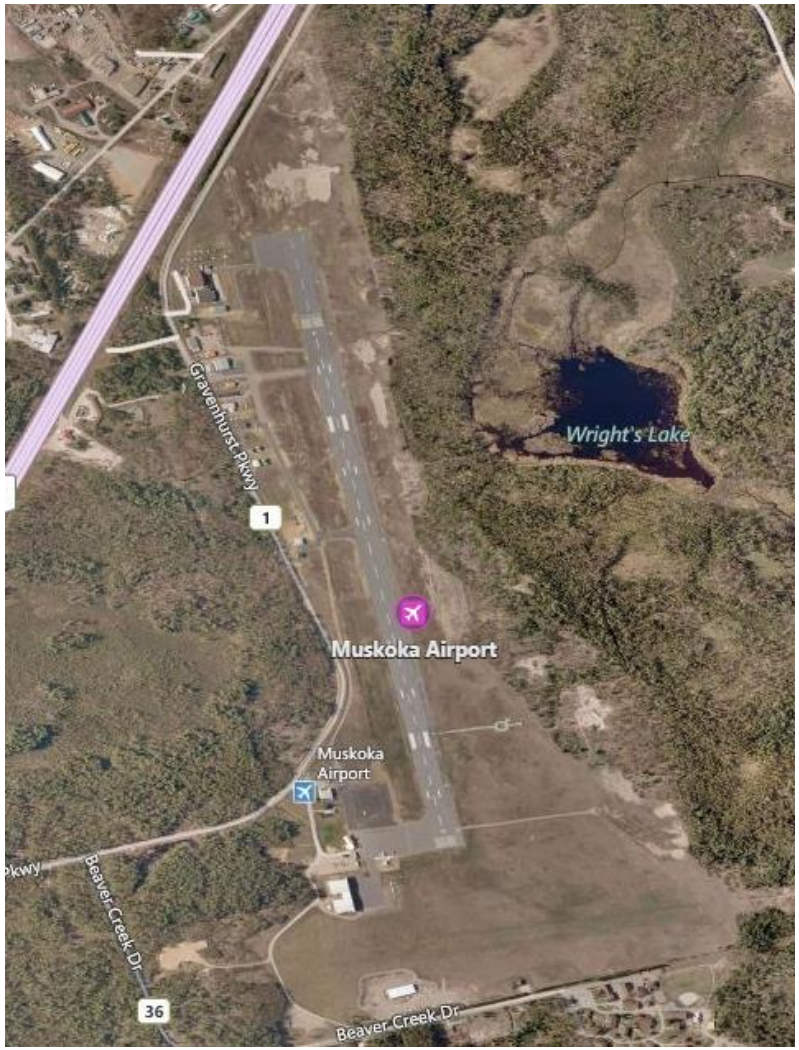
Soils Materials Environment

Presentation Outline

- Project Background
- Project Challenges
- Innovative Evaluation Approach
- Design and Construction
- Conclusions
- Q and A

Project Background



- CYQA - Owned and Operated by the District of Muskoka
- One Runway 18/36 - Flexible
- 1830 m in length and 61 m wide
- Rated for aircraft as large as Boeing 737
- About 15,000 aircraft movements annually

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Project Background

- Englobe teamed with CCTA to deliver this project
- Englobe completed design and QA
- CCTA developed tender and completed CA work

Project Background

- Original rehabilitation design in 2012
- Addition of 3 Sewer Crossings in 2015
- Update to 2012 rehabilitation recommendations requested

Project Background

- Initially constucted in the 30s and used in WWII
- Currently rated as a PLR 9 with a pavement classification number of 32/F/B/W/T
- Design aircraft Global Express and Gulfstream V

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Project Challenges

- Limited pavement construction or maintenance history information available
- Single runway airport
- Tenants have advanced, firm scheduling of landings
- Require 7 weeks to complete planned work
- Fast track construction required – no room for surprises

Project Challenges

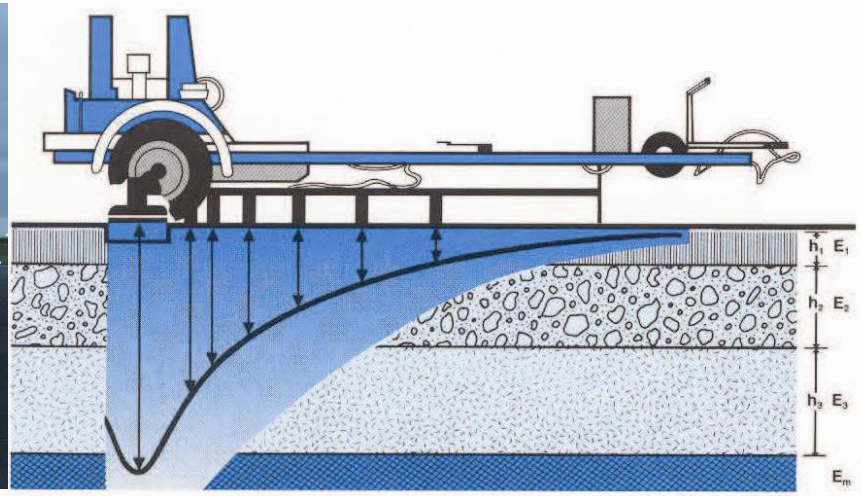
- No 7 week period available for closure
- Staged Construction / Staged Investigation
- Initial FWD testing program to determine overall structural condition of Runway
  - Calculation of existing PLR and determination of improvements needed
- Gap analysis and final field testing program to support detailed design

Innovative Evaluation Approach

- Existing Information Included:
  - JEGEL 1995 Investigation Report
  - 2012 Investigation Report
    - 16 boreholes
    - 2 CBR test
  - Some historic pavement structure thickness estimates

Innovative Evaluation Approach

- Simulates the force and duration of an aircraft moving at 60 km/h
- Load can be adjusted to simulate contact pressure of any type of aircraft (30 kN to 240 kN)



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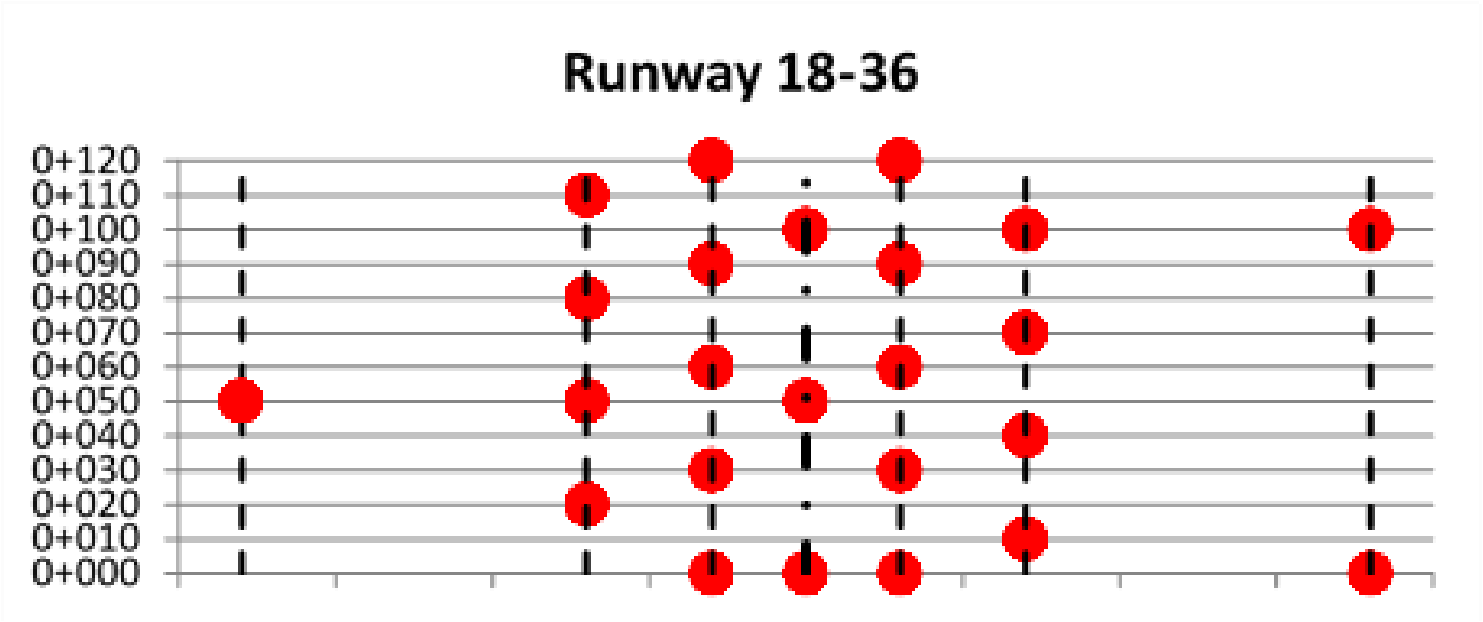
Innovative Evaluation Approach



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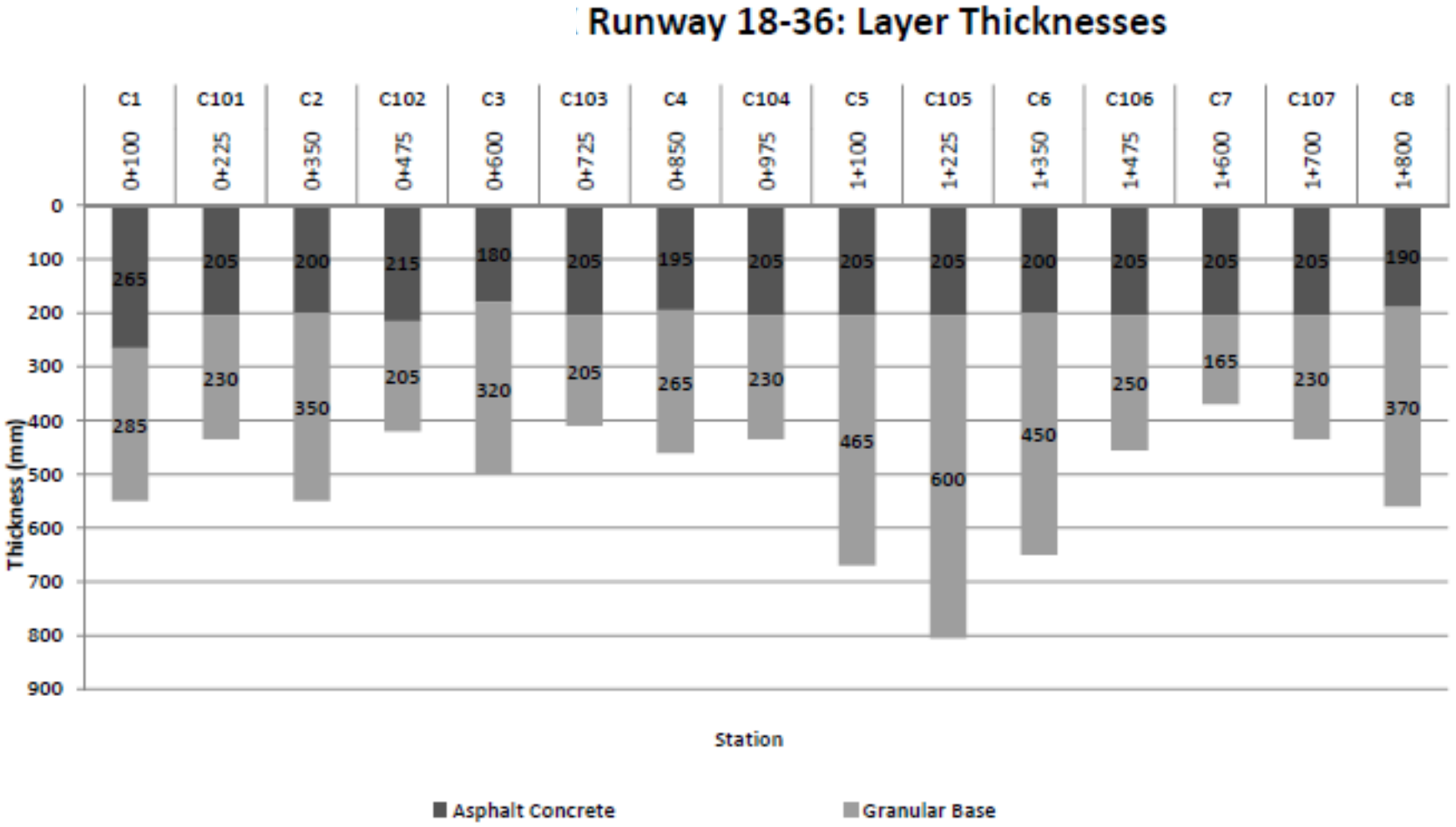
Design and Construction



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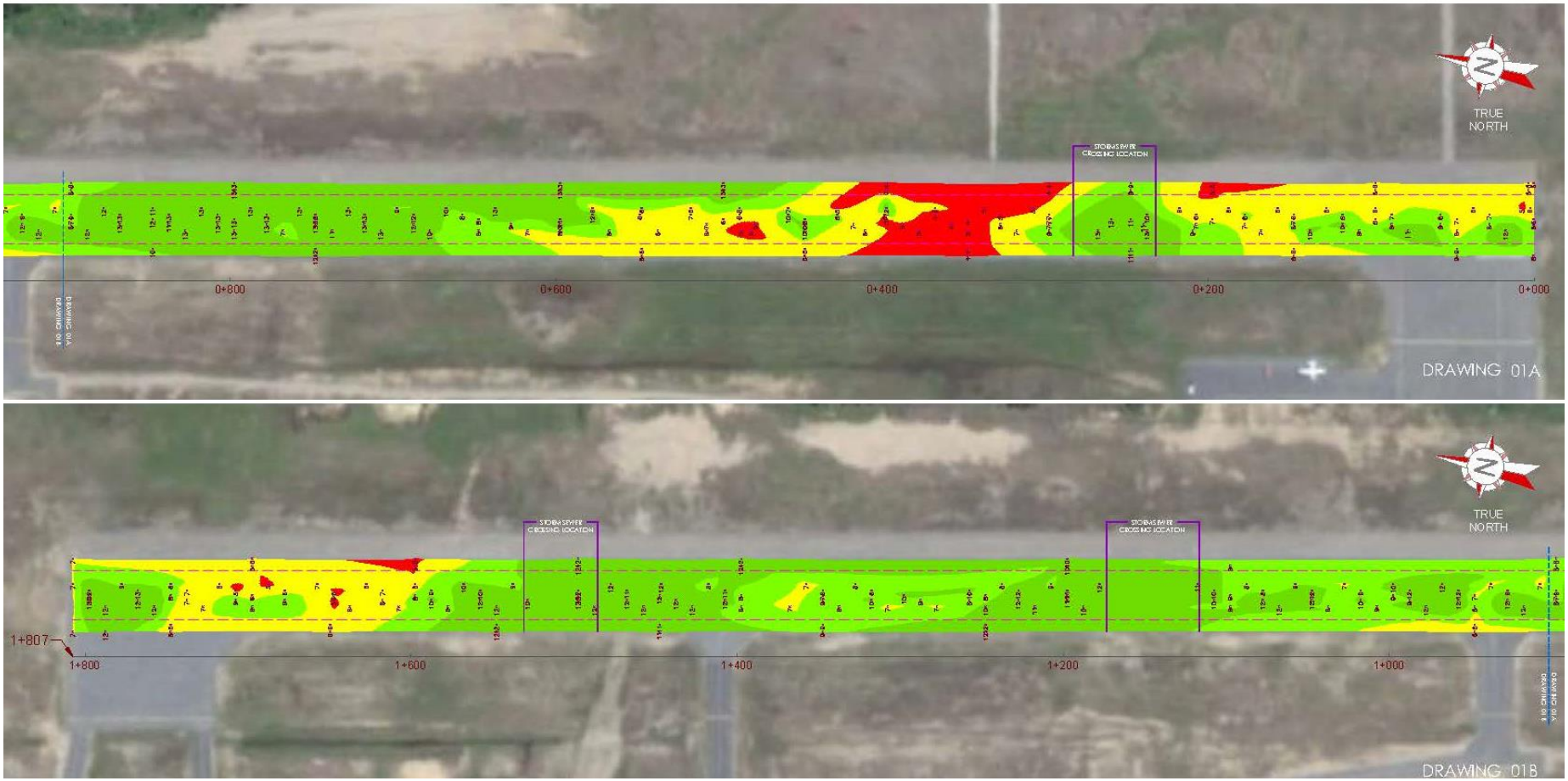
Design and Construction



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Design and Construction

- Initial 2012 Design
  - Removal of existing HMA
  - 150 mm HMA
  - 150 mm of new Granular Base
- Updated Design
  - 135 mm HMA
  - 150 mm of new Granular Base
  - Mill to 150 mm and Pulverize to 125 mm
  - Full Depth Repair to Key Areas

Design and Construction

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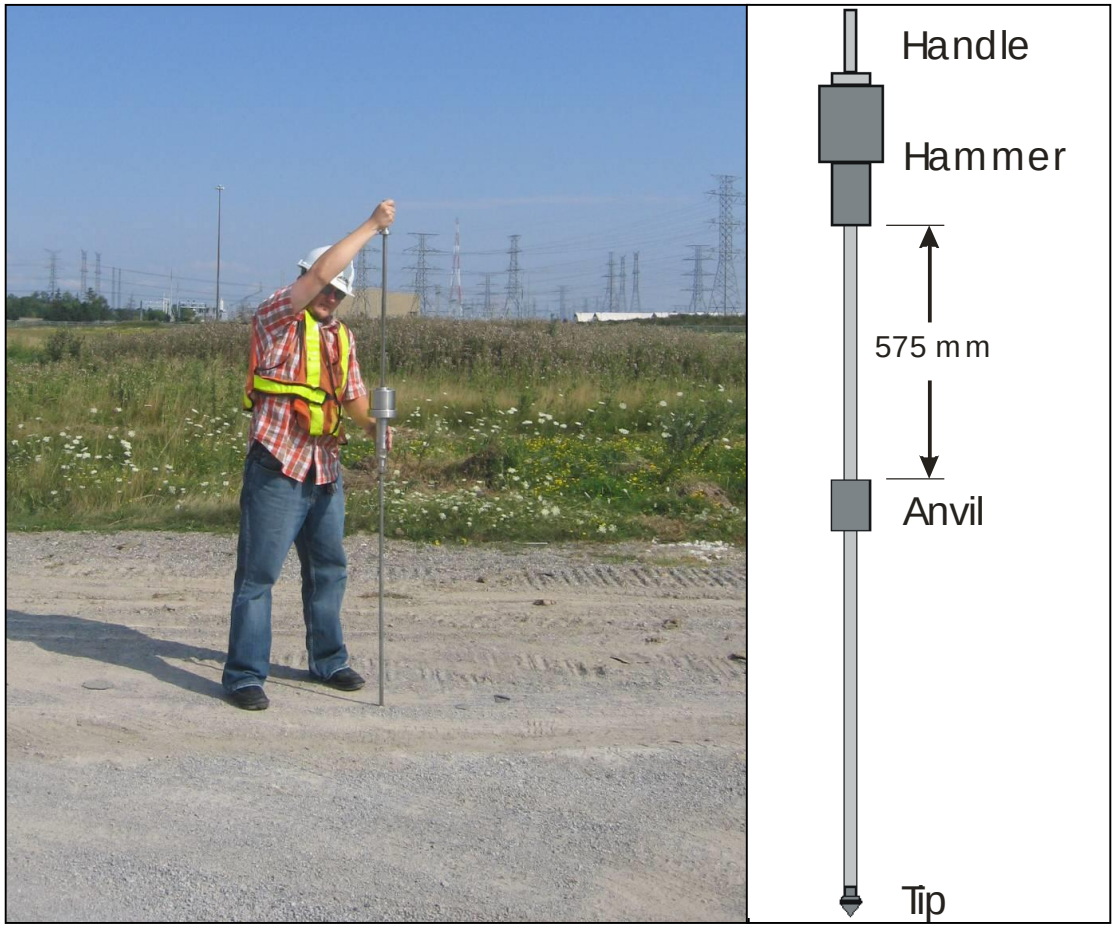
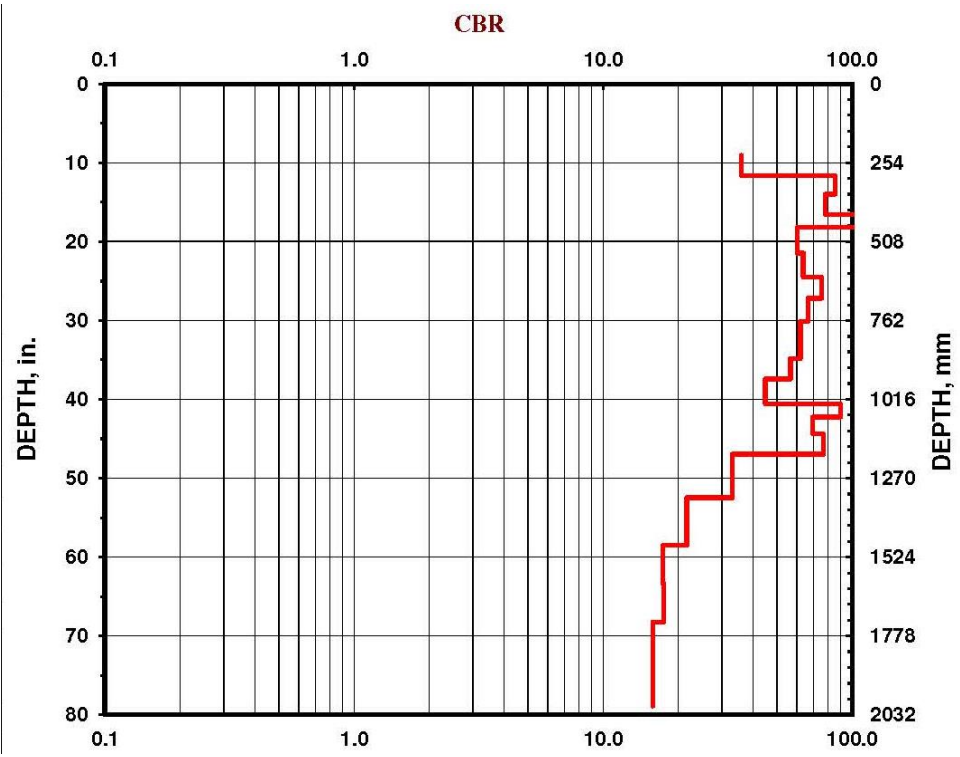
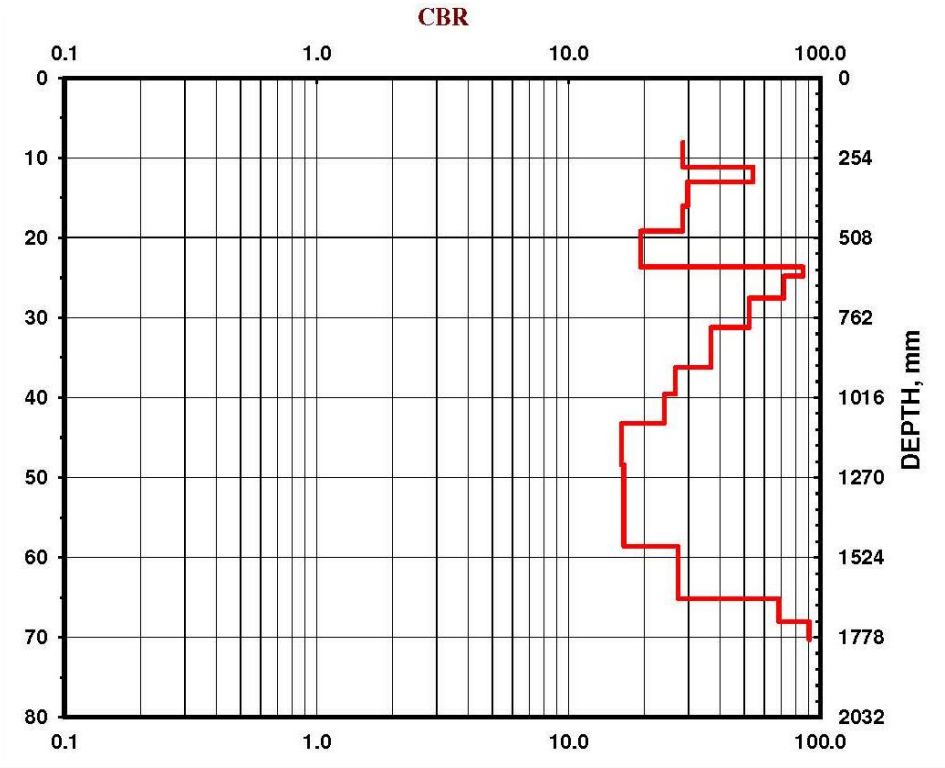


In-Situ Testing of Site Subgrade with DCP

Design and Construction





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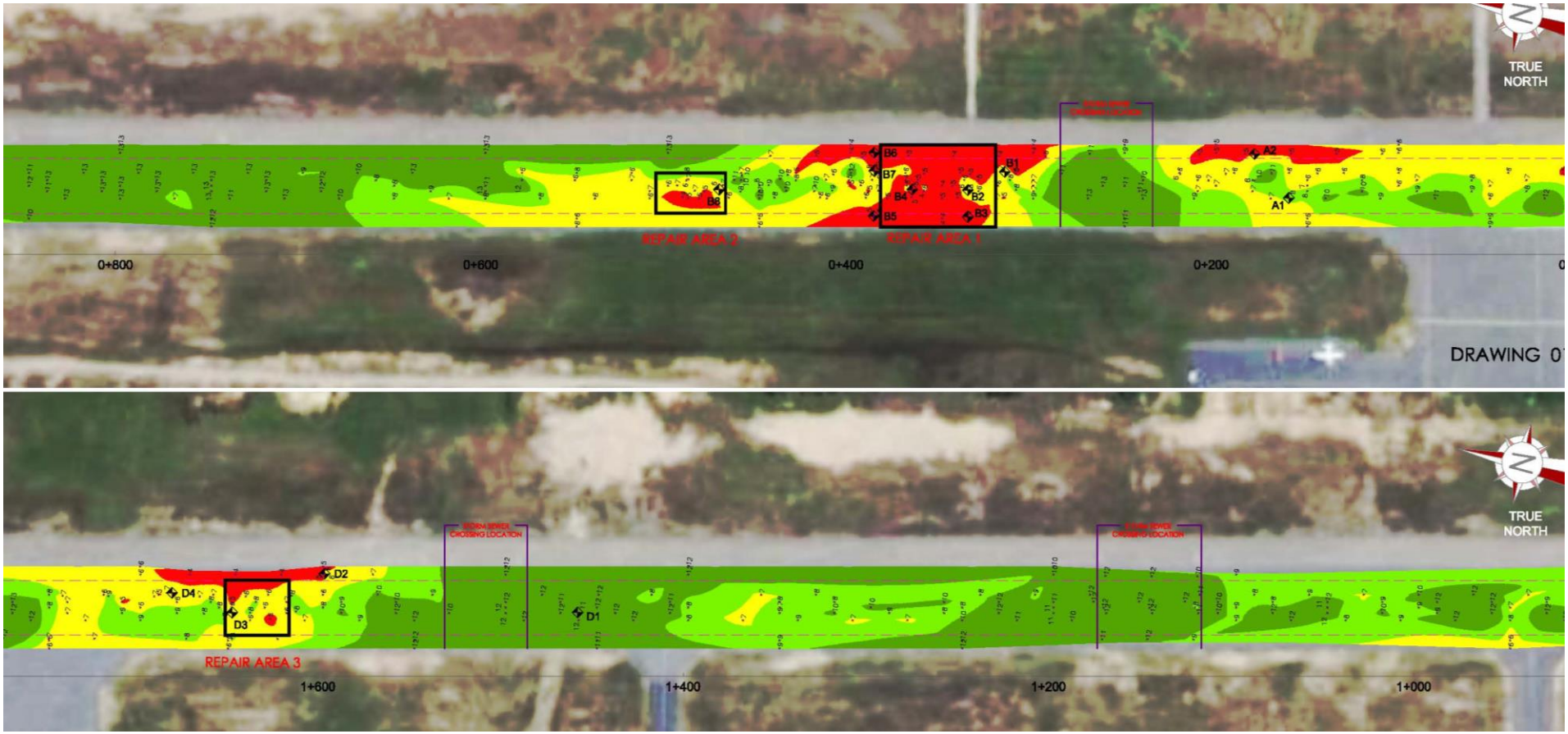

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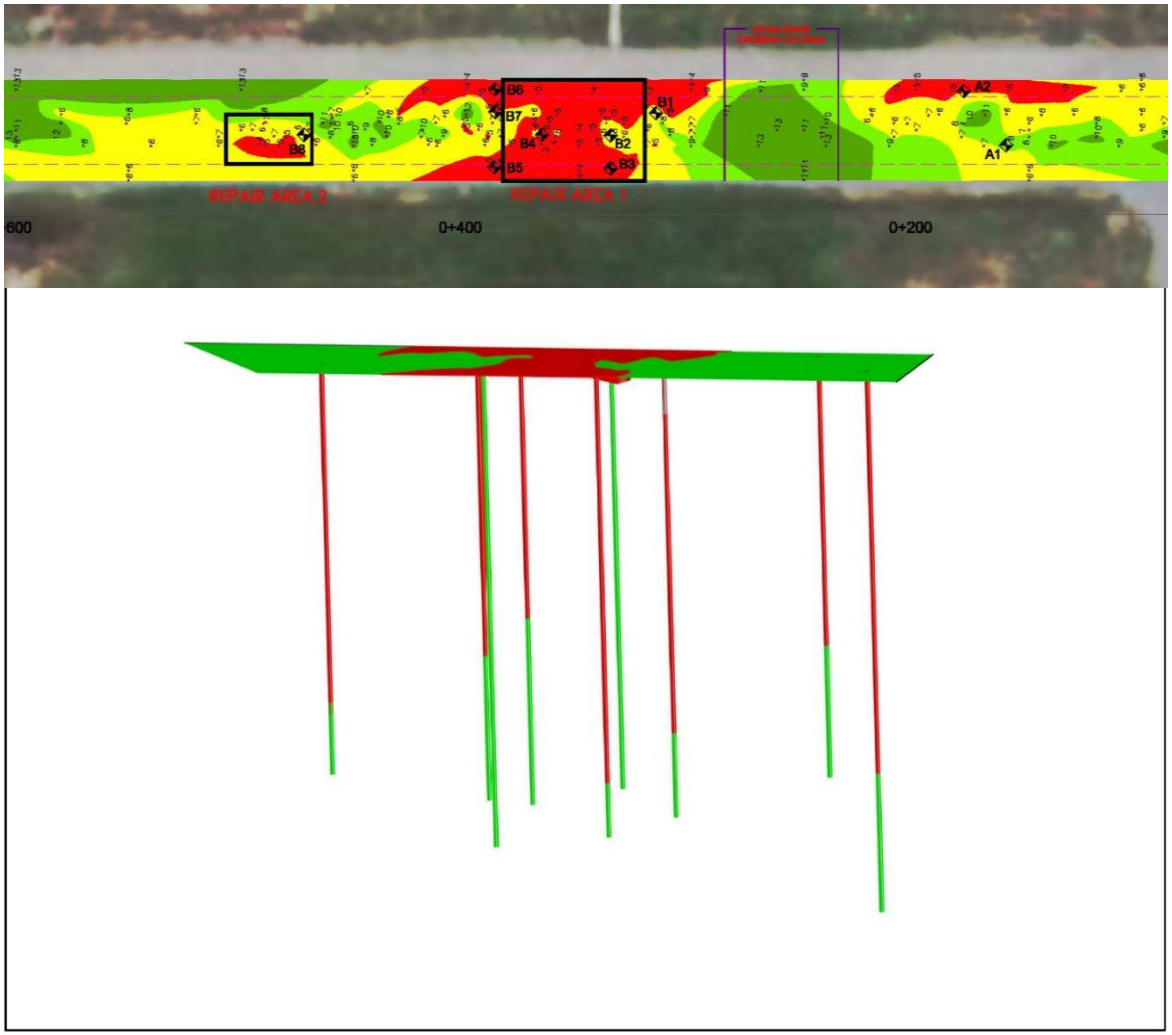

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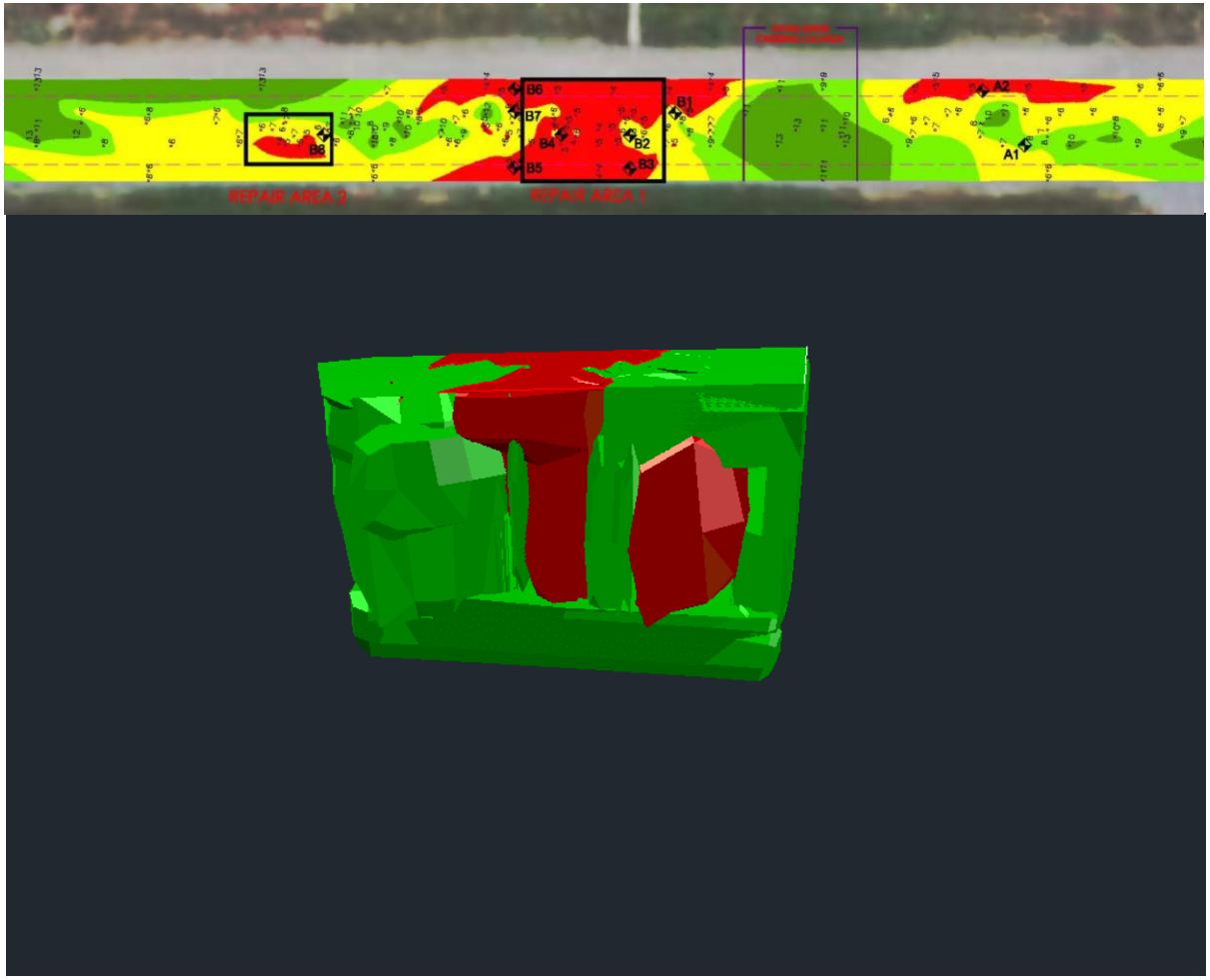

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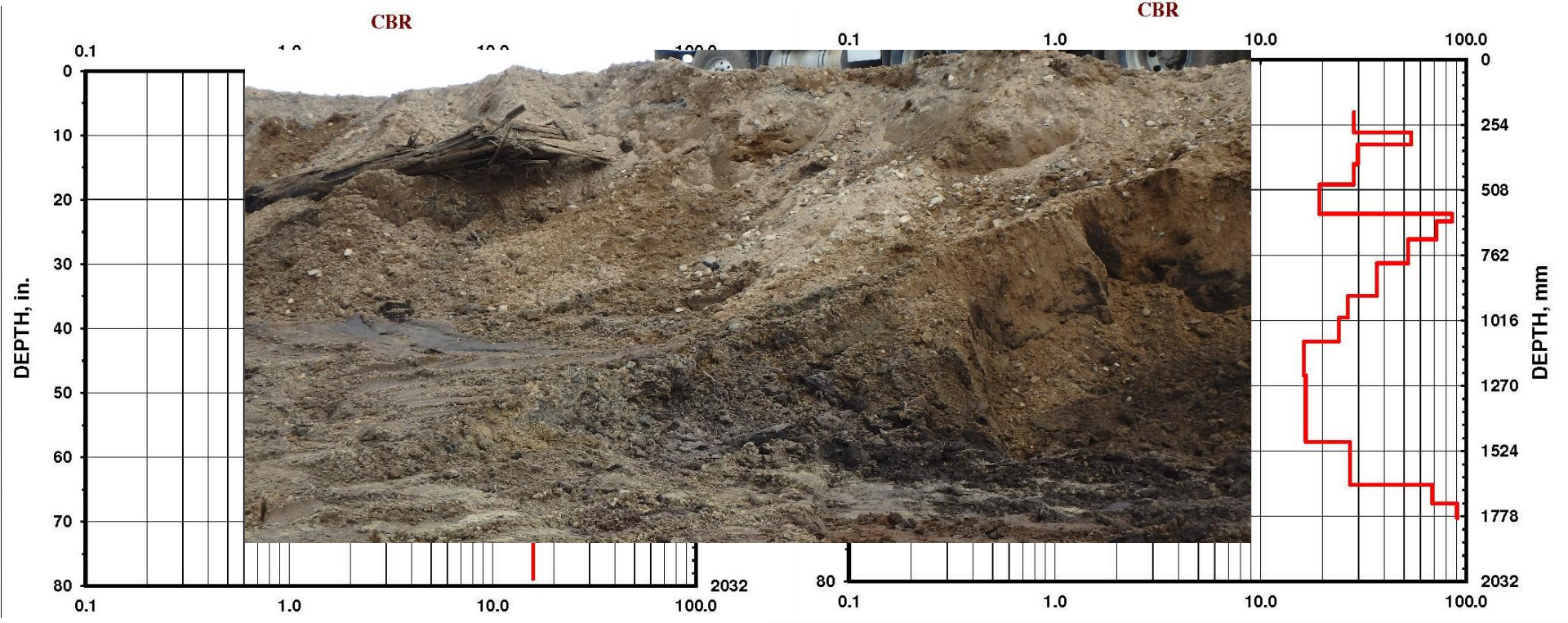

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Conclusions

- Original designs considered two CBR tests and estimates from 16 BH while Englobe's designs considered 320 back-calculated equivalent values
- Staged investigation program allowed for a detailed investigation of poor areas which eliminated costs and delays during construction due to "surprises"
- DCP a quick, inexpensive method for determining weak material at depth

Conclusions

- By focusing on problem areas, were able to reduce the total design HMA thickness on the project which saved $$$
- Project completed on time and under budget

Acknowledgements

- Special Thanks:
  - Fred Jan – Commissioner of Public Works, The District Municipality of Muskoka
  - Ryan Mannings, C.E.T., Project Manager – C.C. Tatham and Associates Ltd.

Questions and Answers

http://aksdaem.com/

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