Case Study: The Sarcee – Trans-Canada Highway Overpass Rehabilitation

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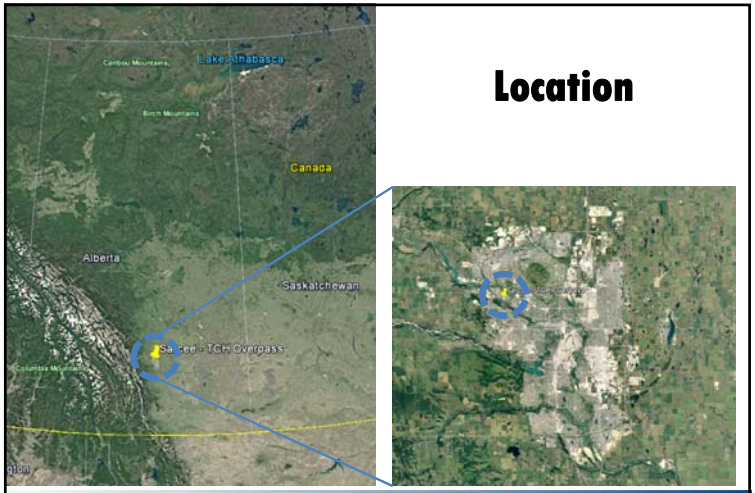
rjc Creative Thinking Practical Results

Overview

- Background History & Information
- Client Expectations
- Preliminary Investigation
- Evaluation
- Rehabilitation

Location

Location



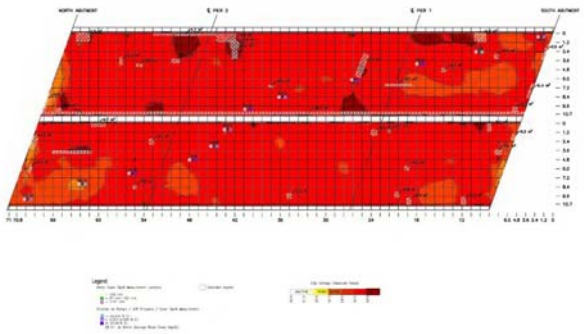
Bridge Description

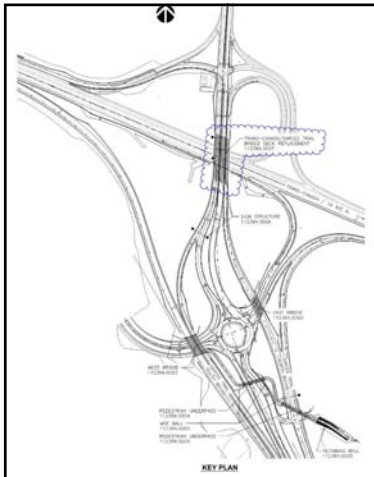
Bridge Description

Bridge Description

History

Previous Inspections



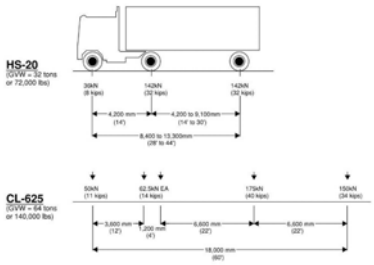


Client Expectations

- **Neighbouring Development:**
  - **Jumpstart Rehab**
  - **Increased traffic**
  - **Additional lane**

Client Expectations

- **City of Calgary:**
  - **Add 25 years of service life**
  - **CL-625 truck**
  - **Access**
  - **Deck replacement**



Preliminary Investigation

- **Visual inspections**
- **Hammer sounding**
- **Sampling (Chloride and Paint)**

Preliminary Investigation

Preliminary Investigation

- Inside face of an exterior girder; at the pier.

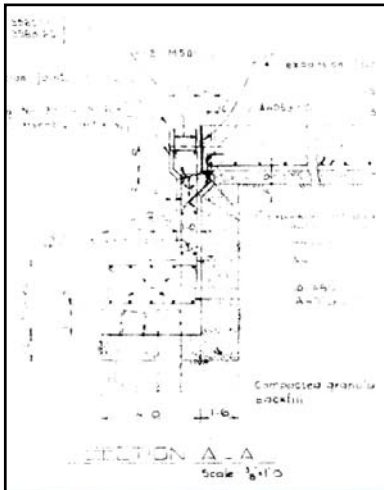
Preliminary Investigation

Preliminary Investigation

Preliminary Investigation

Evaluation

- CHBDC 2014 vs. AASHTO 1961
- Higher Loads:
  - +40mm Asphalt
  - +50mm Concrete
  - Concrete Barriers
  - CI-625
- 5 lanes vs. 6



Evaluation

- As-built Drawings

Evaluation

- Looked at:
  - Girders, Bearings, Piers, Piles, Abutments, …
- Did not consider:
  - Bearings
  - Deck

Evaluation

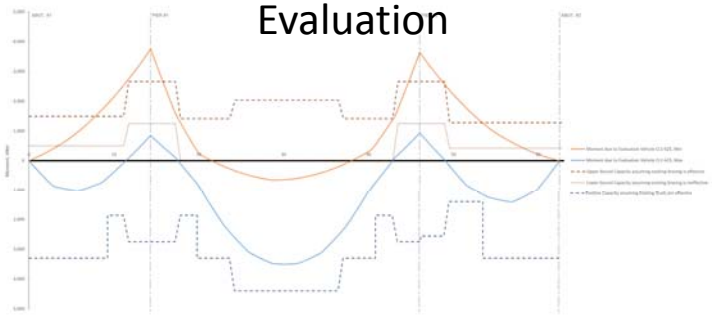
- The Live Load Capacity Factor

14.15.2.1 General

$$F = \frac{UR_r - \Sigma\alpha_D D - \Sigma\alpha_A A}{\alpha_L L(1+I)}$$

- If less than 1.0, necessitates an upgrade.

Evaluation

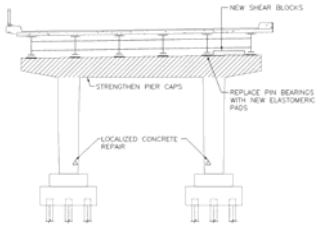


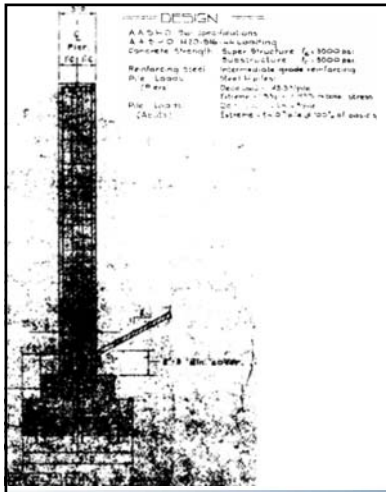
APPENDIX A: Moment Envelope for Evaluation Loads

- Girders:
  - F varies between 0.5 and 1.4 for flexure

Evaluation

- Pier Caps:
  - F as low as 0.6 in flexure and shear.

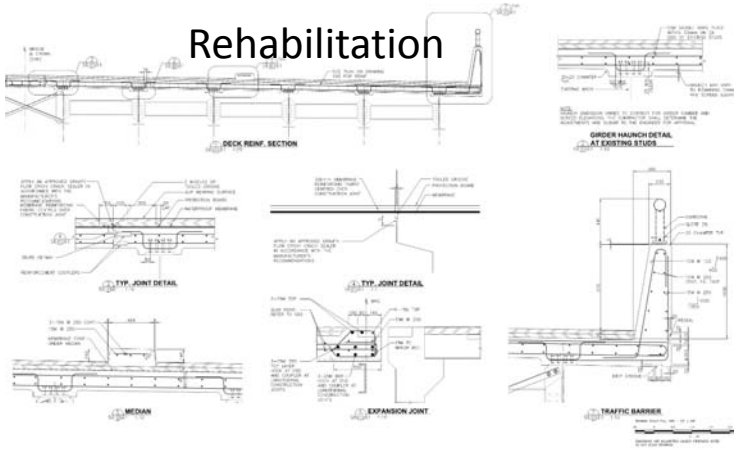


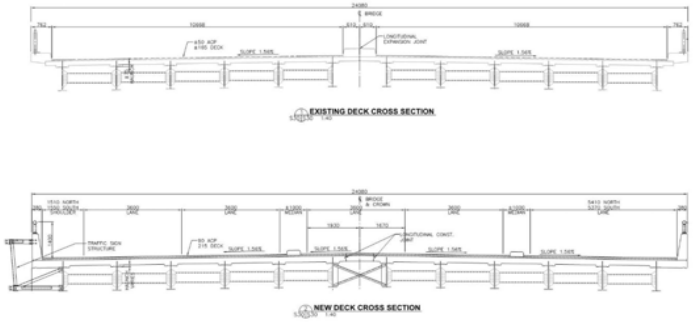


Evaluation

- **Piers:**
  - **F >> 1.0**
- **Piles:**
  - **F > 1.0**

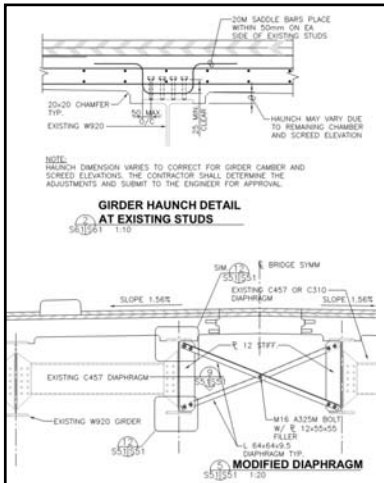
Rehabilitation





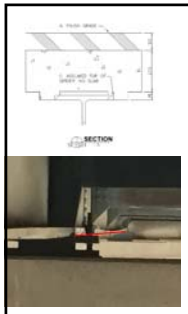
Rehabilitation

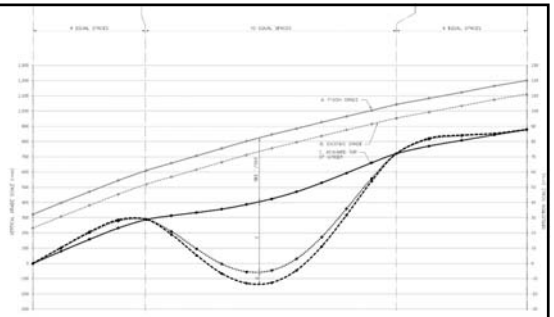
- **Deck Replacement:**
  - **Thickness**
  - **Design Life**
  - **Joints**



Rehabilitation

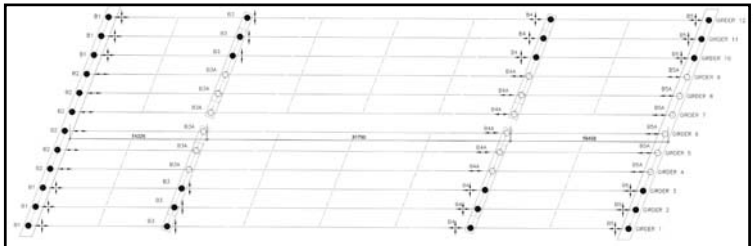
- **Girder Strengthening**





Rehabilitation

- **Haunch the Deck**

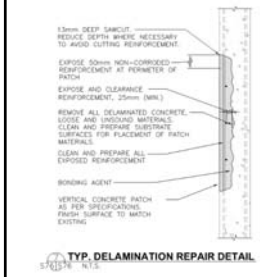


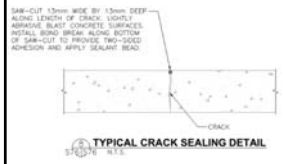
Rehabilitation

- **Bearings:**
  - **Replacement of neoprene (12)**
  - **Make-good of 40% of bearings (18)**
  - **Replacement for additional translation (18)**

Rehabilitation

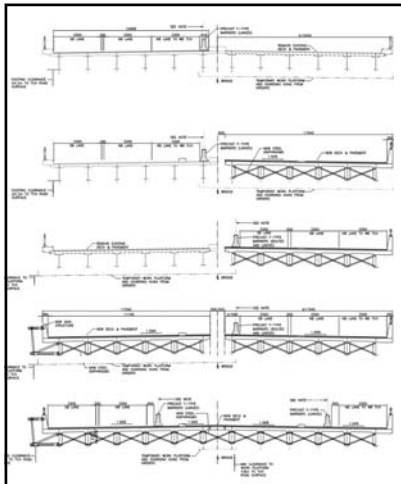
- **Piers**
  - **CFRP wrap and strips**





Rehabilitation

- **Typical concrete repairs:**
  - **Delaminations**
  - **Cracks**
  - **Spalling**

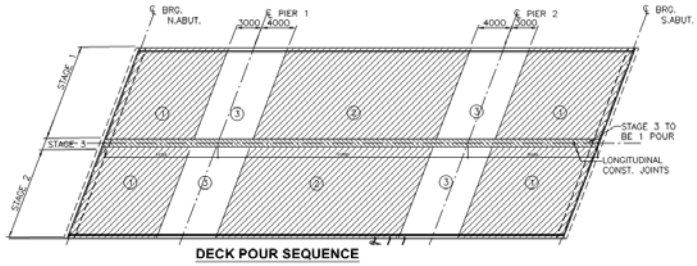


Rehabilitation

- Construction Staging

Rehabilitation

- 3 Pours per construction stage



Thank You

QUESTIONS?

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