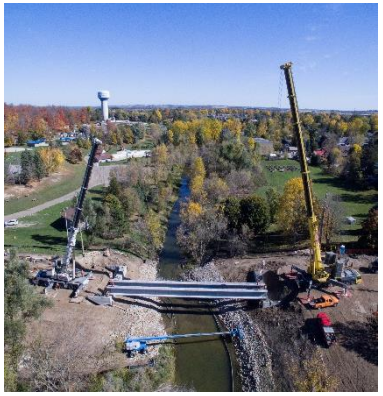
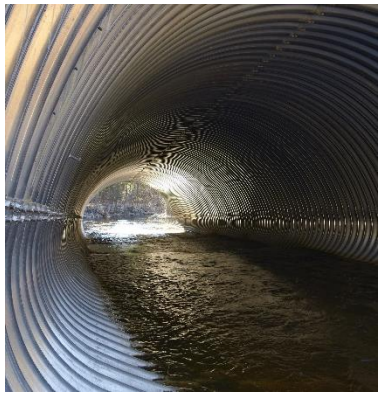



BRIDGE REHABILITATION

A Proactive Approach to Permitting, Staging, & Construction

November 27, 2019

A Presentation for the Municipal Engineer's Association Annual Workshop

Introduction

BRIAN WICKENHEISER, P.ENG., P.E.

BRIDGES AND STRUCTURES GROUP LEAD

Brian is a Professional Engineer with almost 25 years of diverse experience in detailed structural and civil design, with a focus on transportation structures.

As Ainley Group's Bridges and Structures Group Lead, he has undertaken the successful design and implementation of numerous bridge and large span culvert evaluation, rehabilitation, and replacement projects throughout Ontario, developing a reputation with municipal clients and respect from the construction community for high-quality, cost-effective designs and concise contract specifications.

Agenda for Presentation

Using examples from two recent projects in the Town of Wasaga Beach, we will:

- Discuss some of the permitting requirements and challenges encountered; and,
- Discuss staging and construction strategies, and the importance of understanding construction methodologies and options.

Town of Wasaga Beach

- One of 16 municipalities in Simcoe County.
- Located on shores of Georgian Bay with 14 km of white sand beach, it is a premier tourist destination.
- More than 21,000 permanent residents, 12,500 seasonal residents and a catchment area of more than 50,000 people combined with 2 million tourists every year.

Permitting & Approvals

SCHOONERTOWN BRIDGE REHABILITATION

CONSTRUCTION COMPLETED IN 2015

Schoonertown Bridge

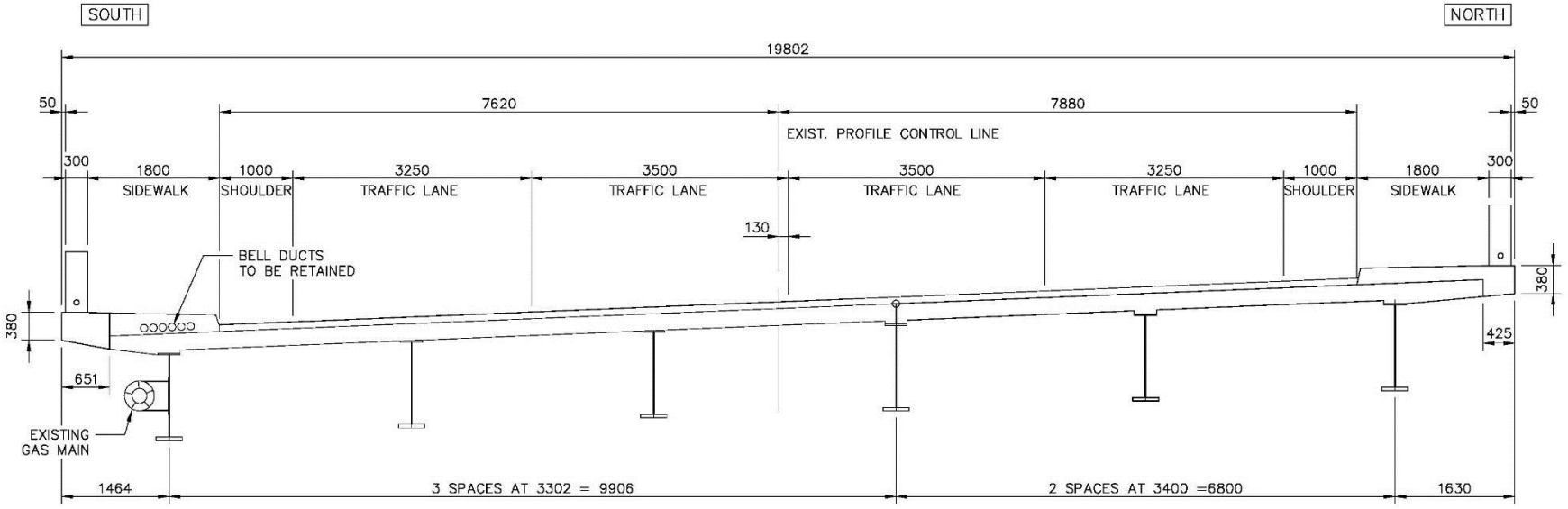
- Located over the Nottawasaga River on River Road West, which is one of the Town's busiest roadways, with an AADT of over 15,000, swelling by 15% to 20% more on long weekends.

Image Source: Google Earth

- The Town identified a need to widen the roadway to accommodate increased traffic requirements.

Schoonertown Bridge

- Existing three-span continuous steel girder bridge with concrete deck and expansion joints at both ends.
- Originally carrying 2 lanes of traffic, the bridge was increased to 4 lanes with sidewalks on both sides.



Schoonertown Bridge

- The existing abutments and piers were extended to support two additional girders to accommodate widening.
- The bridge was also converted to a semi-integral configuration with the existing expansion joints eliminated.

Schoonertown Bridge
Agencies, Permitting and Approvals

- Town of Wasaga Beach
- Nottawasaga Valley Conservation Authority (NVCA)
- Ministry of Natural Resources and Forestry – Lake Sturgeon (Endangered Species Act)
- Ministry of Natural Resources and Forestry – Work on Crown land (Public Lands Act)
- Department of Fisheries and Oceans – In water works timing restrictions, impacts to fish habitat
- Transport Canada – Navigation (Navigation Protection Act)
- Ministry of Environment, Conservation, and Parks – Environmental Compliance Approval for storm sewers
- Province of Ontario – Small Rural and Northern Municipal Infrastructure Funding

Schoonertown Bridge
Challenges

- Project schedule was planned for a two-year period commencing in Fall of 2013 in order to work specific stages of construction around agency timing windows.
- Funding was delayed, which pushed the project start into early 2014, impacting construction staging and timing.
- In-water works were only permitted between September 30 and March 31 (or ice out).
- Revised details and strategies had to be developed quickly in order to keep the project moving and meet funding timing requirements.

EXAMPLE

It was originally proposed that the pier cofferdams and piles would be installed using a barge, but that was not possible in winter months. A new methodology was developed, using causeways to build piers until the ice was out; this required re-approval through NVCA and MNRF.

Schoonertown Bridge
Key Considerations for Projects

- Risk Identification and Mitigation Planning
  - ✓ Undertake a process of identifying potential risks to the project (such as timing of funding, in-water works and tree clearing timing windows, property negotiations, utilities, etc.) and have a mitigation and contingency plan.
- Understanding of Agency involvement, Permitting Requirements, and Approvals
  - ✓ Pre-consult with all Agencies; understand their requirements and timings and include them in your risk identification, mitigation, and contingency planning.
- Understanding the Detailed Staging Requirements, Temporary Works, and Order of Operations during Construction
  - ✓ Identify options for working around various constraints, considering not only agency restrictions, but other key items such as traffic control and viable construction methods.

ALL PRIOR TO TENDERING. DO NOT LEAVE IT UP TO THE CONTRACTOR.

Traffic and Construction Staging

MAIN STREET BRIDGE REHABILITATION

CONSTRUCTION TO BE COMPLETE IN 2021

Main Street Bridge

- Final crossing of the Nottawasaga River before it reaches Georgian Bay.
- Located on Main Street, adjacent to Beach Area 1, with an AADT of over 4,000, which swells by more than 200% on long weekends.

*Image Source: Google Earth

- The most recent OSIM inspections identified significant deterioration of the girder ends at both abutments and other rehabilitation requirements.

Main Street Bridge

- Existing bridge is a four span, concrete slab on steel girder superstructure supported by concrete abutments and piers with a total deck length of 92 metres.
- The bridge carries 3 lanes of traffic and only required minor widening to increase the sidewalk widths.

Main Street Bridge
Challenges & Key Considerations

- Town of Wasaga Beach required very specific traffic accommodations
  - ✓ Minimum of 2 lanes open during summer months (mid-June to Labour Day)
  - ✓ Minimum of 1 lane open from September to May (wide enough to accommodate snow removal equipment)
- NVCA, MNRF, and DFO in-water works requirements same as Schoonertown Bridge (i.e. no in-water work permitted during summer months).
- Need to maintain operation of watermain supported by bridge throughout construction.

IT WAS ESSENTIAL TO LOOK AT DESIGN OPTIONS & EVALUATE THE RISKS.

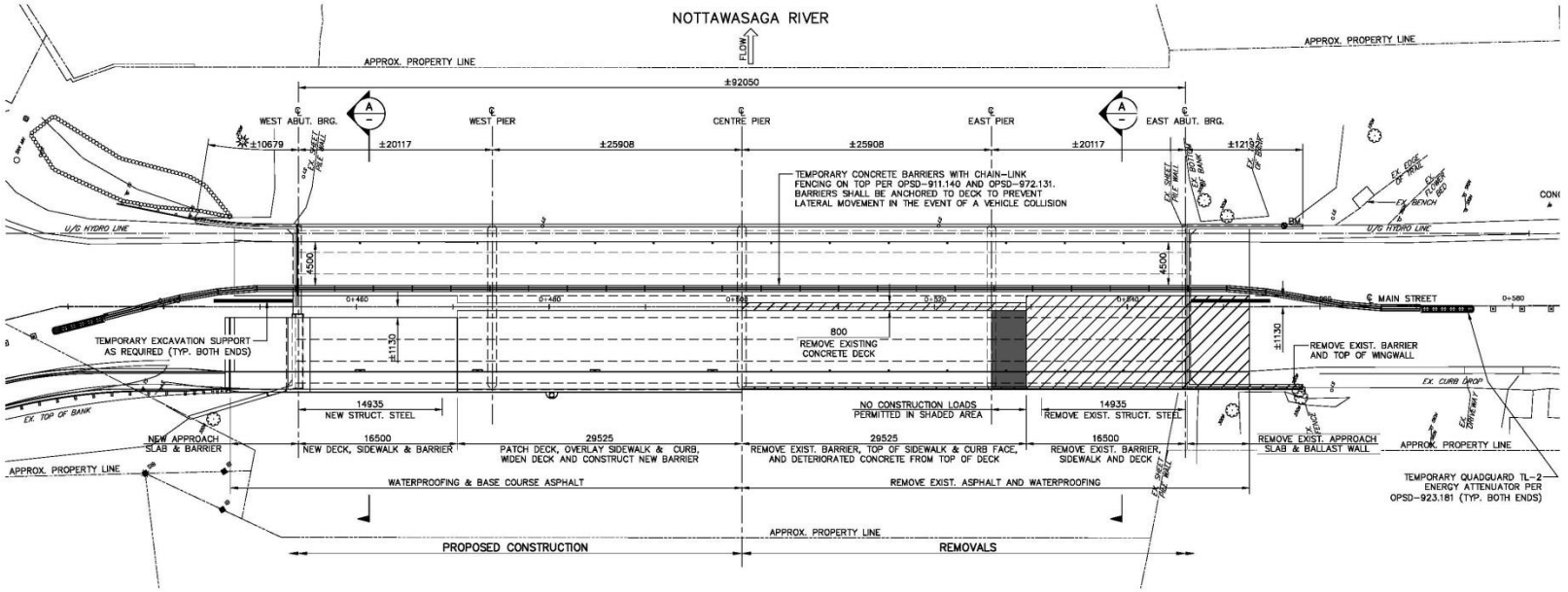
Main Street Bridge
Challenges & Key Considerations

EXAMPLE

Initially, the girder ends were to be reconstructed requiring temporary support structures to be installed within the river; however, full replacement of the deck and girders back to the first splice location eliminated risks with in-water work and expensive temporary support structures.

Detailed construction staging plans were developed to outline the order of work, associated timelines, and traffic staging requirements to set expectations for contractor and permit proper bidding and completion of the work.

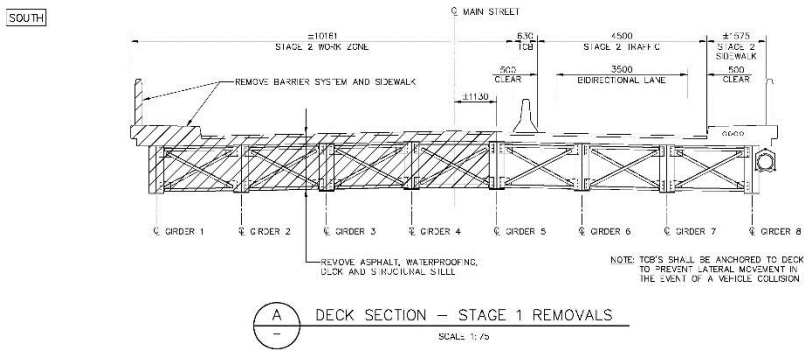
Main Street Bridge



PLAN – STAGE 1

SCALE 1:300

SEPTEMBER 3, 2019 TO JUNE 19, 2020



A – DECK SECTION – STAGE 1 REMOVALS

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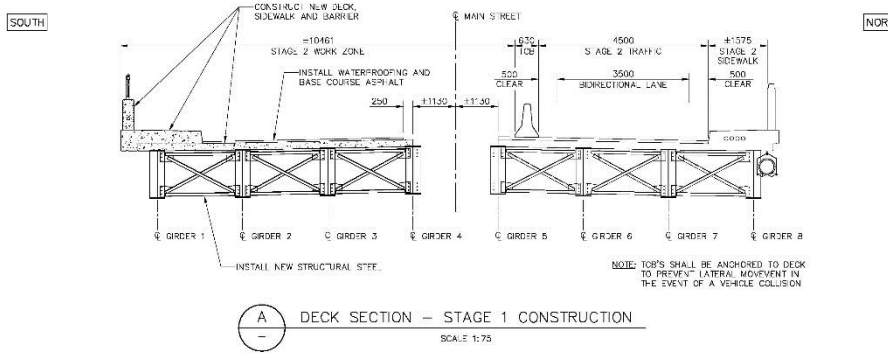

A – DECK SECTION – STAGE 1 CONSTRUCTION

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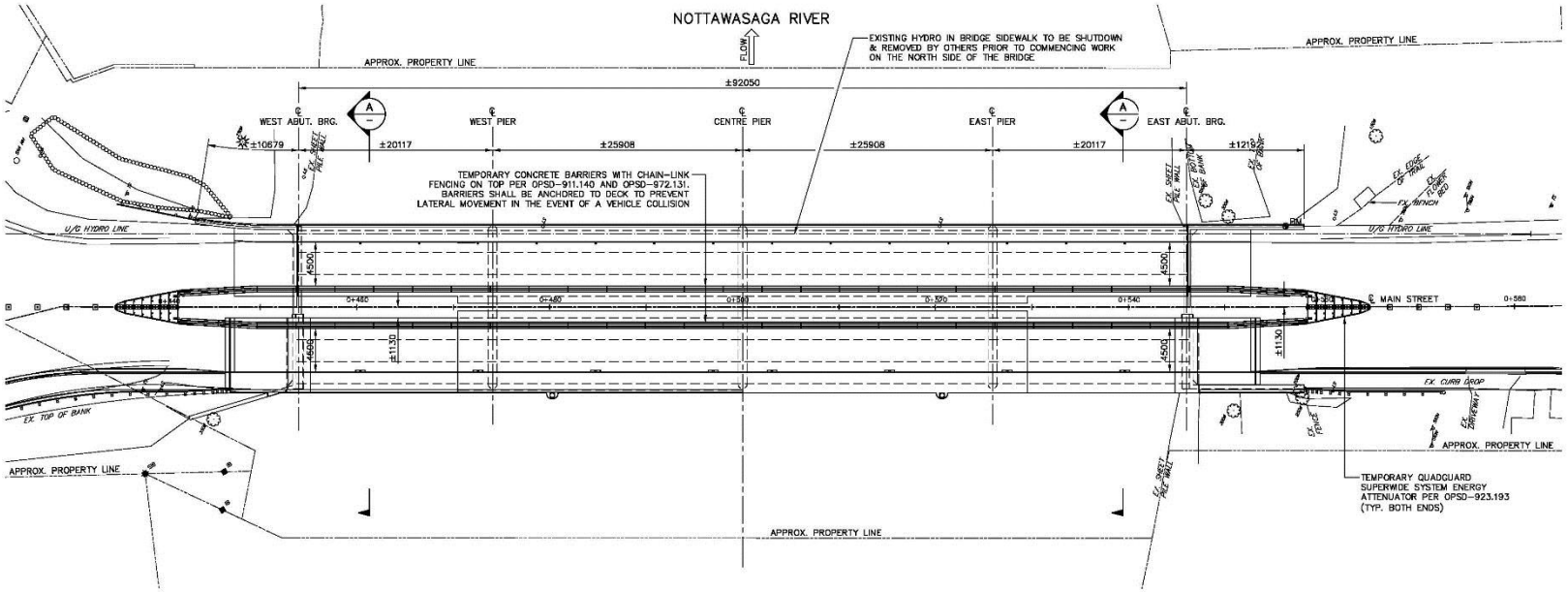
Main Street Bridge



PLAN – STAGE 2

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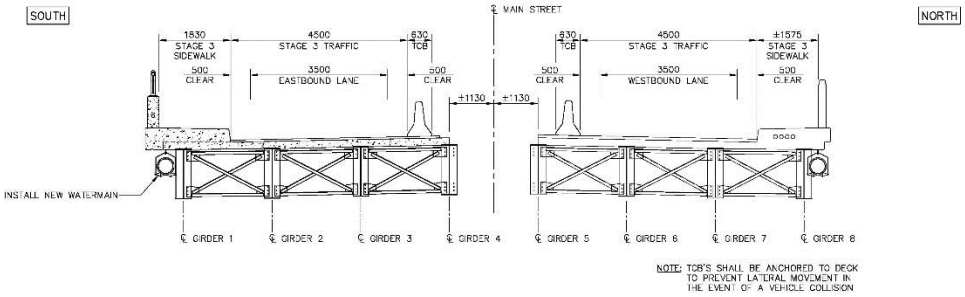
JUNE 20, 2020 TO SEPTEMBER 7, 2020



A – DECK SECTION – STAGE 2

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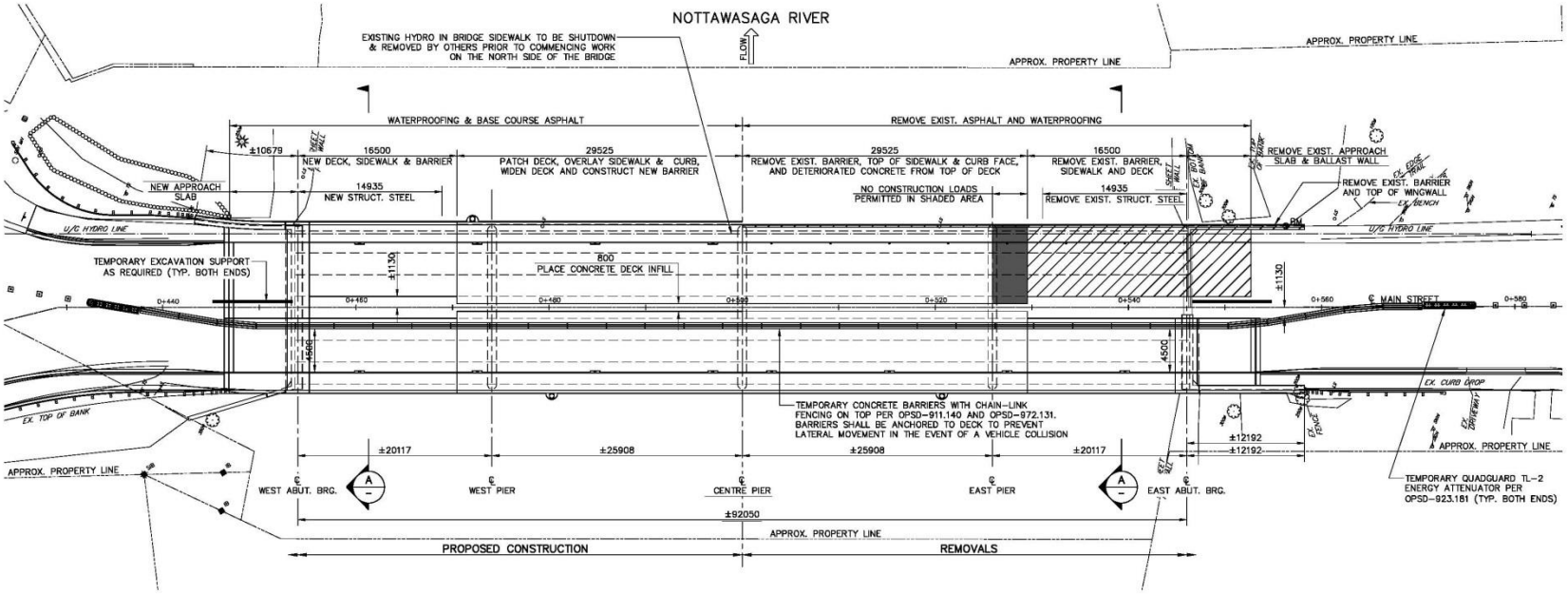
Main Street Bridge



PLAN – STAGE 3

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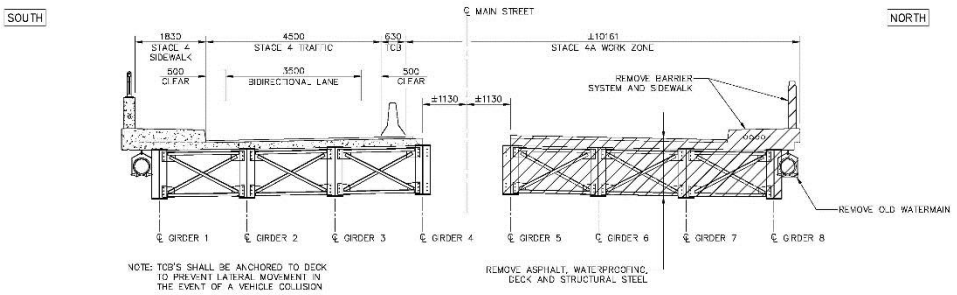
SEPTEMBER 8, 2020 TO JUNE 18, 2021



A DECK SECTION – STAGE 3A REMOVALS

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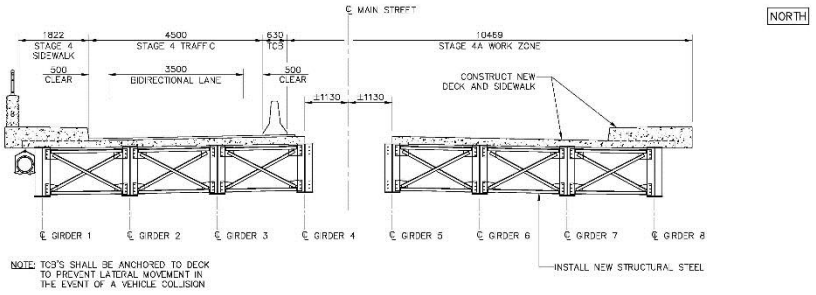

A DECK SECTION – STAGE 3A CONSTRUCTION

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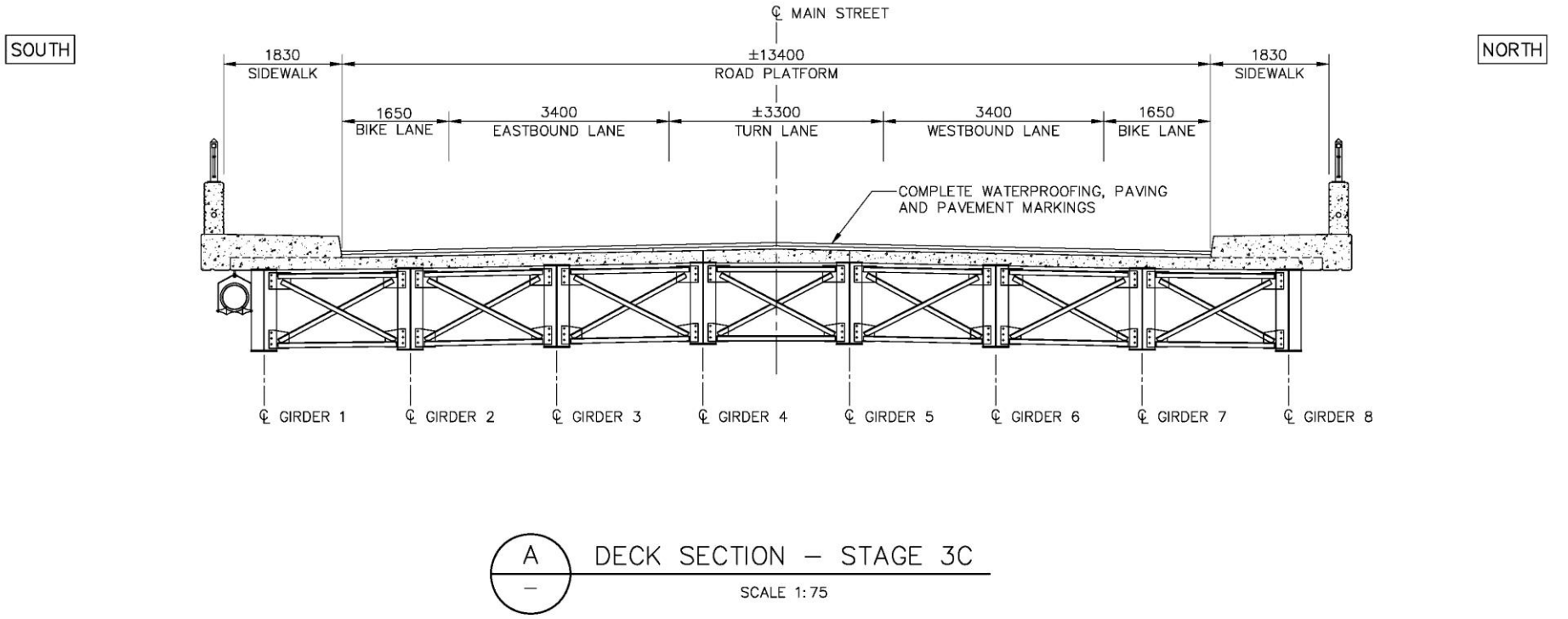
Main Street Bridge



A — DECK SECTION – STAGE 3C

SCALE 1:75

Main Street Bridge
Key Considerations for Projects

- Initially, it was anticipated that construction could be completed in a single year of construction; however, through proper detailing of the staging and considering all constraints, it became apparent that two years would be required.
- Understanding the constructability and methodology components, how long tasks will take, and not setting unrealistic expectations reduces risk of scheduling issues, unanticipated delays, risk of rushed poor-quality workmanship, and can be more cost effective.
- Contractors appreciate the advanced planning and detail; therefore, they are more likely to chase after the project, and they can bid the work more accurately and aggressively.

EXPECT YOUR CONSULTANTS TO BE KNOWLEDGEABLE AND ACCOUNTABLE FOR THE DESIGN AND RESULTING CONSTRUCTION.

Summary of Proactive Actions

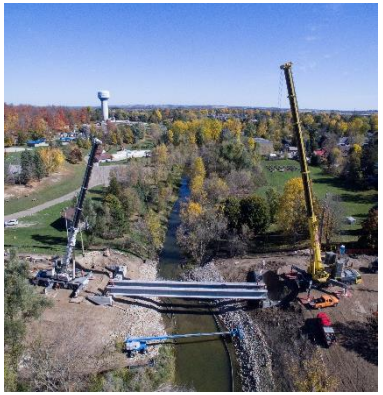
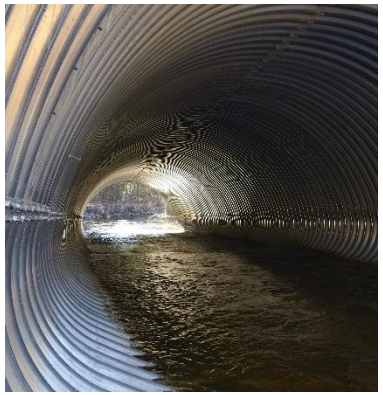
Permitting and Approvals

- Determine the permits/approvals required well in advance
- Pre-consult with approval authorities to confirm their requirements and timing windows/restrictions (even before a consultant is retained)
- Review and select design options to minimize environmental impacts and permitting requirements, where possible
- Identify and include sufficient details on drawings for any required temporary works for which permits or approvals may be required
- Set construction schedule to work with timing restrictions and minimize duration of construction and impacts on public

Traffic and Construction Staging

- Review constructability of design and identify viable construction methodologies/approaches including any required temporary works
- Determine most appropriate/likely sequence of construction
- Determine impacts of traffic staging on construction and vice versa
- Provide a detailed construction staging sequence within tender drawings and contracts, including dates to confirm feasibility of schedule and allow contractors to properly scope and bid the work or ask questions




Thank you for attending!

I would be happy to answer any questions.