

10th STREET BRIDGE REPLACEMENT

Schedule 'C' EA: Phase 3

Presentation to Council
Recommended Design Alternatives
City of Owen Sound
August 27, 2018

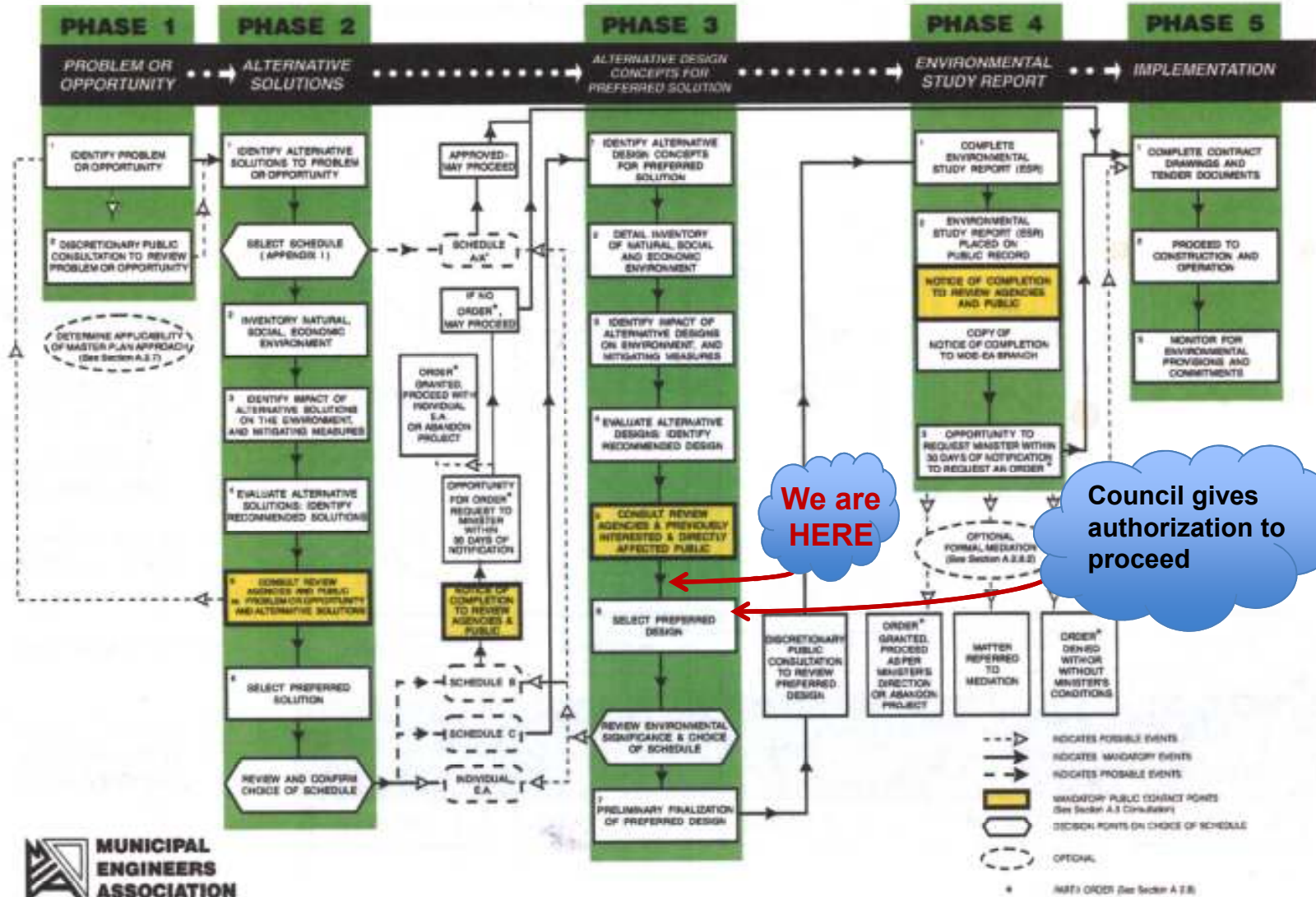


AGENDA

1. Overview of Municipal Class EA Process.
2. Recap of Phase 2.
3. Phase 3: Evaluation of Alternative Design Concepts.
4. Overview of Comments Received in regards to Phase 3 Consultation.
5. Recommended Design Concepts.
6. Next Steps (EA Process and Timeline).

EXHIBIT A.2 MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS

NOTE: This flow chart is to be read in conjunction with Part A of the Municipal Class EA



PHASE 2 (Recap): Alternatives Considered & Preferred Solution

Project Statement:

The 10th Street Bridge carries the highest traffic volume through the City and is deteriorating at an advanced rate. The proponent wishes to explore opportunities to address the needs of the community with minimal disruption.

Phase 2: Alternative Project Solutions Considered

- Do Nothing
- Rehabilitate
- Replace

Preferred Solution: Replace the 10th Street Bridge



Proceed to Phase 3:
Review of Alternative Design Concepts

PHASE 3: Alternative Design Concepts

Considerations/Concepts

1. Traffic Management During Construction;
2. Traffic Lane Configuration on the New Bridge;
3. Pedestrian & Bicycle Movements;
4. Bridge Style;
5. Bridge Construction Efficiencies;
6. Municipal Services and Utilities; and
7. Construction Implementation.

Design Concept 1

Traffic Management During Construction

Current traffic counts estimate that approximately 20,000 to 30,000 vehicles per day cross the 10th Street Bridge. Daily vehicle counts are subject to seasonal and daily (i.e. weekday versus weekend) fluctuations.

What will be done with traffic during construction?

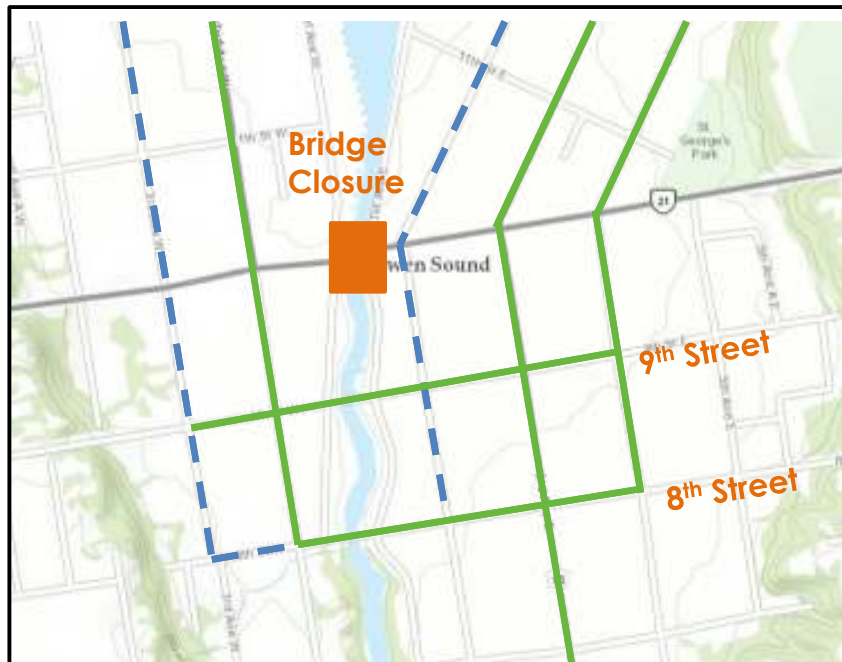
The feasibility of four options for Traffic Management have been reviewed, including:

- i. Do Nothing;
- ii. Maintaining lanes on 10th Street Bridge during construction;
- iii. Construction of an additional temporary bridge crossing; and
- iv. Optimize existing routes through the downtown core and encourage through traffic to use the By-Pass.

Traffic Management During Construction

Option 1

Do Nothing Option



Re-route traffic on existing road network, across the 8th and 9th Street Bridges.

- All study area intersections would experience significant congestion, queuing, and delays.
- Congestion would not likely be limited to the beginning and end of the alternate routes.
- The magnitude of increased traffic volume would significantly impact local businesses and residences.

- Not Supported -

Traffic Management During Construction Option 2

Is it feasible to maintain lanes on Bridge?

Additional Cost

- Would require significant additional remedial measures on remaining route.
- Construction process would be more costly.
- Would prolong construction period.

Safety Concerns

- Existing structure to remain would be structurally weakened.
- Significant public and worker safety concerns.

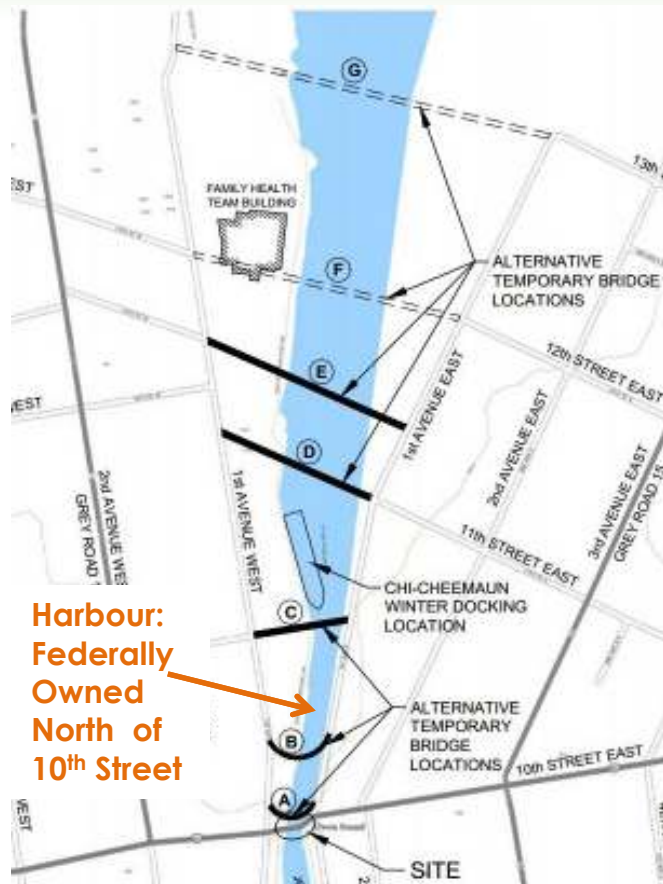
Overall Viability

- Area available to facilitate construction efforts would be insufficient.
- Would not address capacity issues on other routes.
- Traffic congestion on bridge adjacent to construction activities.

- Not Supported -

Traffic Management During Construction Option 3

Is it feasible to construct additional crossing capacity?



South of 10th Street:
Crossing opportunities are limited

Background Studies:

Transportation Master Plan and Corridor Optimization Study both conclude that a permanent additional crossing north of 10th Street is not warranted.

Governance and Financing Issues:

- City's financial capacity is limited.
- MTO has provided funding for the 10th Street Bridge.
- County could potentially provide financial support.
- Harbour north of 10th Street is federally-owned.

Funding Approval Timeline Limitations:

MTO grant valid to March 2021. This would provide insufficient time to plan, design and build an additional crossing.

- Not Supported -

Traffic Management During Construction

Option 4

Optimize existing routes



Through traffic: Use of By-Pass
(Springmount ↔ Rockford)

Traffic management alternatives are being assessed by Paradigm.

Considerations within alternatives include:

- Conversion to one-way traffic on select streets;
- Lane re-assignments and/or additions;
- Addition of turning lanes;
- Turning restrictions;
- Traffic signal timing changes;
- Traffic signal additions; and
- Removal of on-street parking.

Traffic Management During Construction

Optimize existing routes

Preliminary Assessment:

Of the alternatives considered, three provide a 'good' level of service and will be carried forward for a more detailed cost/benefit analysis.

Cost ↔ Benefit Analysis may include consideration for:

- Level of Traffic Congestion and Delays.
 - i. Intersections forecast to operate at or over capacity.
 - ii. Traffic queuing (i.e. spill back to one or multiple intersections).
- 'Capital' Costs.
 - i. Temporary signalizations to optimize traffic flow;
 - ii. Traffic signal additions; and
 - iii. Lane additions and/or re-assignments.
- Practicality of implementation.
- Removal of on-street parking.
- Social Impacts: Residential properties and businesses within the downtown core.

Cost ↔ Benefit analysis will be addressed during the Detailed Design Phase.

Design Concept 1

Traffic Management During Construction

What will be done with traffic during construction?

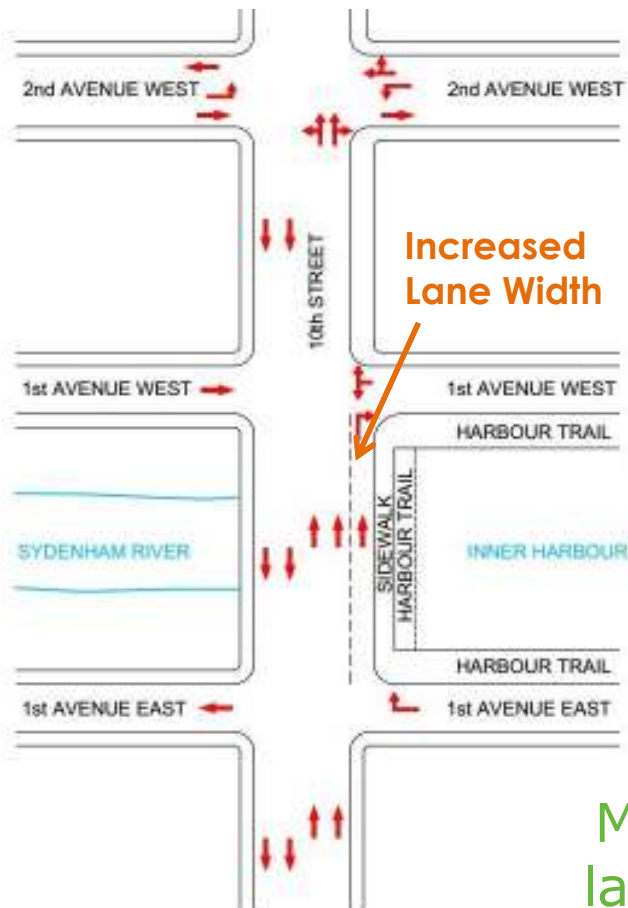
SUMMARY OF OPTIONS

	TRAFFIC MANAGEMENT OPTION	CONCLUSION
1.	Diversion of traffic to By-Pass and other existing crossings: Insufficient capacity available on existing alternate routes.	Not Supported
2.	Maintain lanes on 10 th Street Bridge during construction: <u>Not feasible</u> due to technical and safety issues.	Not Supported
3.	Construction of an additional temporary bridge crossing: <u>Not feasible</u> due to harbour ownership, timeline and lack of County & Provincial funding.	Not Supported
4.	Optimize existing routes through the downtown core and encourage <u>through</u> traffic to use the By-Pass. (Feasible)	Supported

Design Concept 2

Traffic Lane Configuration

What is the appropriate lane configuration long-term?



1. Corridor Optimization Study recommended a 5-Lane Bridge, similar to existing with:
 - Two Lanes Eastbound;
 - Two lanes Westbound; and
 - One westbound turn lane to 1st Avenue West (northbound).

2. Modest widening of northerly westbound lane to standard design width is recommended.

Preferred Configuration:

Maintain Status Quo with respect to traffic lane configuration, with a wider north lane.

Design Concept 3

Pedestrian and Bicycle Movements

How will non-vehicular movements be accommodated?

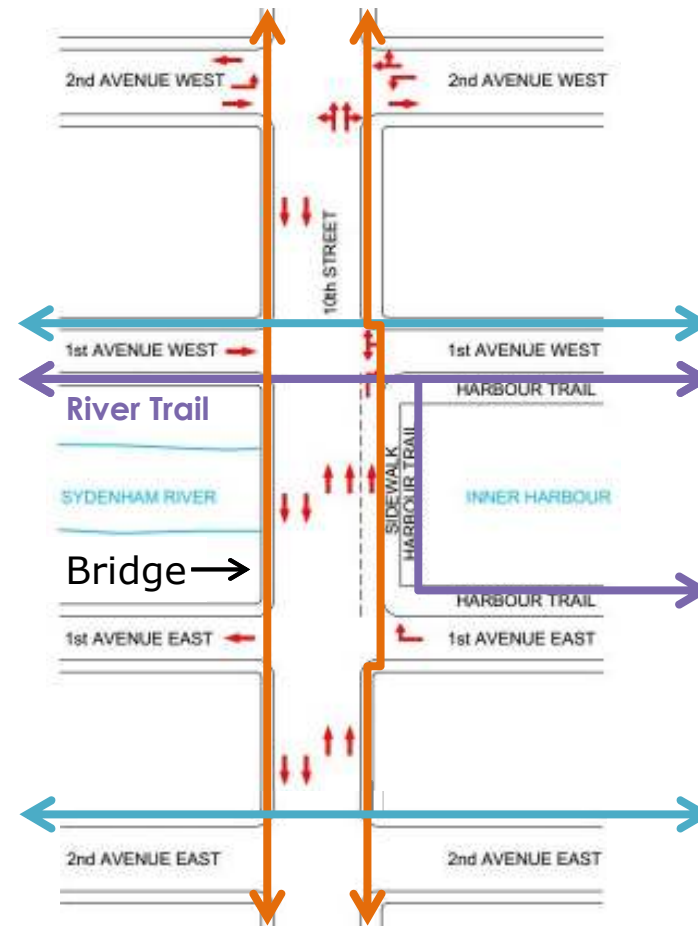
a) East ↔ West

- South Side
- North Side

b) North ↔ South

- East Side
- West Side

c) Multi-Use Trail System



Design Concept 3

Pedestrian and Bicycle Movements

East ↔ West Movements

South Side:

- Maintenance of the existing alignment of the 10th Street (eastbound) through lane: 3 meters is available.
- May include:
 - A standard 1.5 m wide sidewalk;
 - A 1.0 m boulevard for snow storage and splash protection; and
 - A railing.

North Side:

Paths of travel include:

- a) Urban pedestrian movements connecting the commercial districts.
- b) Inner Harbour multi-purpose trail system.

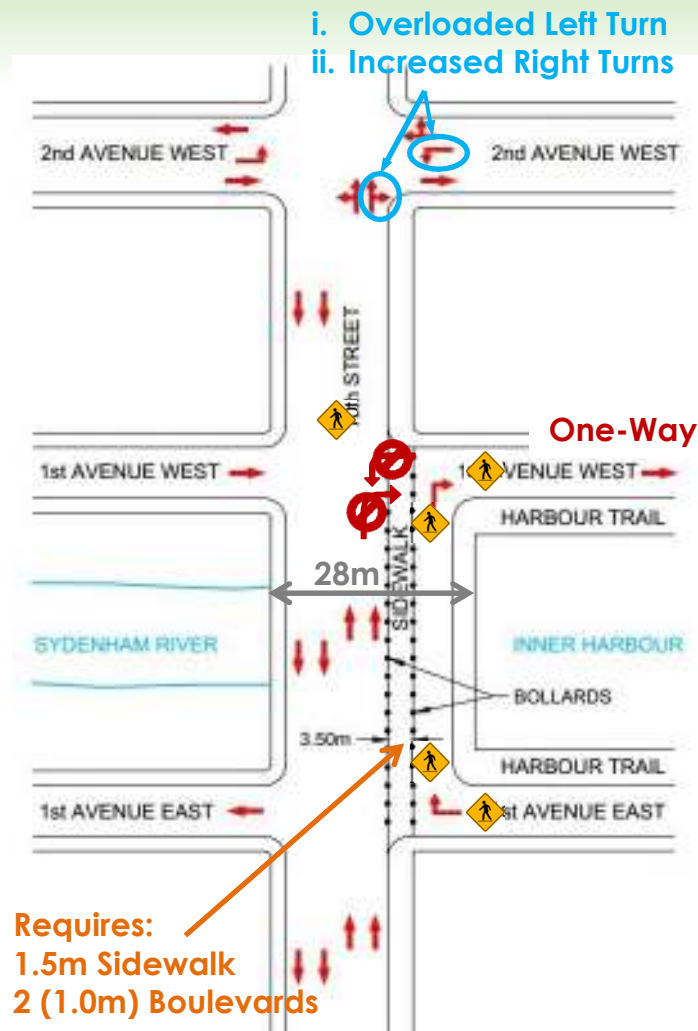
Options (at Grade) include:

1. Separate Uses; or
2. Combine Uses

Design Concept 3

Pedestrian and Bicycle Movements

North Side of Bridge



Option 1: Separate Urban and Trail Uses

1. Increased bridge width and cost.
2. Introduces two additional pedestrian crossings.
3. Requires inclusion of additional signals.
4. Pedestrian visibility may be restricted.
5. Eliminates 10th Street westbound merge to right turn lane.
6. 1000 Block of 1st Avenue West would be converted to one-way (northbound).
7. Diversion of southbound left turns from 1st Avenue West to 2nd Avenue West (not supported by traffic studies).

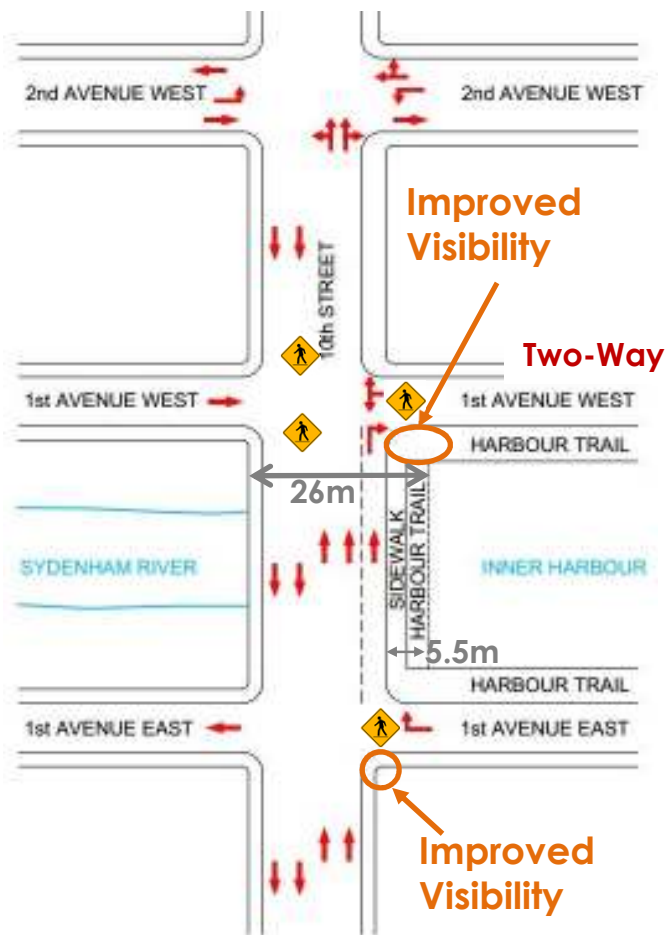
- Not Supported -

Design Concept 3

Pedestrian and Bicycle Movements

North Side of Bridge

Option 2: Combined Urban and Trail Uses



1. Reduced bridge width and cost.
2. Minimizes pedestrian conflicts.
3. Signals at 1st Avenue West would support both pedestrian and vehicular traffic.
4. Pedestrian visibility improvements may include:
 - Elimination of existing north bridge railing.
 - Raised sidewalk elevation relative to road.
5. Maintains westbound right turn merge.
6. Maintains southbound left turn move at 1st Avenue West.
7. Maintains two-way traffic on 1st Avenue West (1000 Block).

- Supported -

Design Concept 3

Pedestrian and Bicycle Movements

North ↔ South Movements

East Side

- Proximity of traffic signals at 2nd Avenue East to 1st Avenue East is considered sufficient.
- Additional crossing location at 1st Avenue East would impede traffic flow along 10th Street.
- Reflects current conditions.

- Status quo supported -

West Side

- Multi-purpose trail connection.
- Crosses 4 through lanes and one right turn lane.
- Traffic studies recommend traffic signals remain at 1st Avenue West in order to maintain southbound left turns and westbound right turns.

Option 1 – Pedestrian Underpass

Option 2 – At Grade Crossing (similar to existing)

Option 3 – Pedestrian Overpass

Design Concept 3

Pedestrian and Bicycle Movements

West Side of Bridge

		Option 1 (Underpass)	Option 2 (at Grade)	Option 3 (Overpass)
1.	Separation of vehicular from pedestrian traffic.	↑	↓	↑
2.	Removal of traffic signals at 1 st Avenue West.	Traffic studies do not support the removal of traffic signals at 1 st Avenue West.		
3.	Maintenance of multipurpose trail connection.	↑	↑	↑
4.	Security (i.e. Safety): Isolation from public view.	↓	↑	--
5.	Accessibility: Area Requirements (i.e. AODA: approaches/ramps)	↓	↑	↓
6.	Technical Issues (i.e. vertical clearances)	↓(1)	↑(2)	--(3)
7.	Cost	High	Low	High
OVERALL			PREFERRED	

- (1) Insufficient vertical clearance between high water level and bridge. Raising bridge elevation would lead to other complications.
- (2) Existing poor sight lines could be addressed.
- (3) Minimum height clearance is 5 meters. This would provide opportunities for visual enhancements.
- (4) Traffic signals must remain regardless at 1st Avenue West to support vehicular traffic.

Design Concept 4

Bridge Style

Bridge style choices generally relate to:

i. Materials:

- Concrete
- Steel

ii. Construction Method:

- Pre-Cast/Pre-Fabricated
- Cast-in-Place

iii. Geometry (i.e. supporting system for deck structure)

- Above-Grade Support systems are usually used for spans longer than the 10th Street Bridge (i.e. Truss or Suspension Bridges).
- For spans less than 30 meters, below-grade support systems are preferred (i.e. Girder and Arch Bridges).



Arch Bridge



Steel Girder Bridge



Concrete Girder Bridge

Design Concept 4

Bridge Style

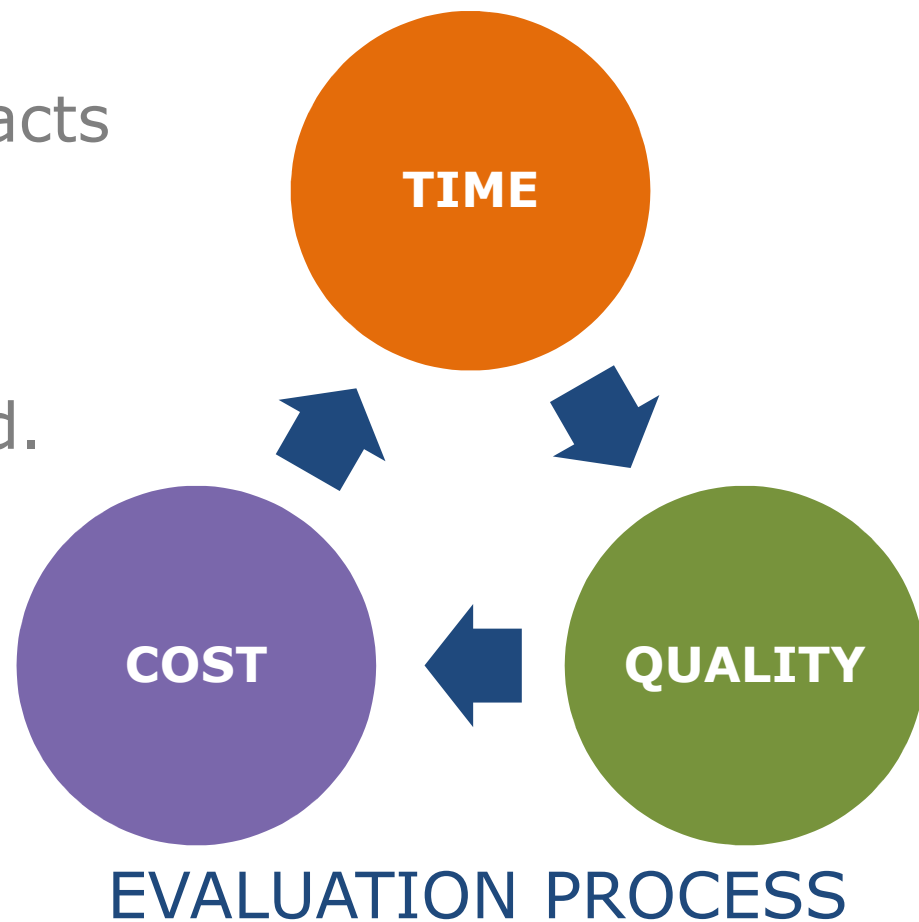
GEOMETRY	GIRDER STYLE		ARCH STYLE	
Construction Material	Pre-Cast Concrete	Pre-Fabricated Steel	Pre-Cast Concrete	Cast-in-Place Concrete
1. Relative Cost	Low	Moderate	High	Low
2. Quality	Plant manufacturing generally provides greater quality control over construction material.			Exposure to elements may impact strength and durability of concrete.
3. Construction Efficiency	Girder bridges typically require less time to construct than arch bridges.		An arch bridge typically takes longer to construct.	Longest construction period.
4. Appearance	Modest	Industrial	Similar to existing arch profile.	
5. Natural Environment	A girder bridge provides greater potential to improve flow hydraulics.		An arch bridge may have more impact on flow hydraulics.	
OVERALL	- Preferred -	2	3	4

Design Concept 5

Bridge Construction Efficiencies

GOAL:

In order to minimize impacts to traffic flow and local businesses, construction methods that streamline construction are preferred.



Design Concept 5

Bridge Construction Efficiencies

Pre-Cast Components

Advantages:

- Reduces construction time.
- Better quality control.

Disadvantages:

- Requires transportation to site.
- Higher cost.
- Cold joints between pre-cast units.

CONSTRUCTION PROCESSES	APPLICATION
1. Construct Foundations (Piles driven to bedrock and pile caps)	Not Supported
2. Construct Abutments	Not Supported
3. Install Girders	Supported
4. Construct Bridge Deck	Supported*
5. Railings	Supported*
* Subject to Detailed Design *	

Design Concept 5

Bridge Construction Efficiencies

Rapid Replacement Technologies

Process:

- Construction of the structure in close proximity to the Site.
- Commonly used for secondary roads over expressways.

Advantages:

Duration of road closure(s) can be greatly reduced.

Disadvantages:

- Requires a large area: Existing constraints include buildings, steep slopes and high voltage hydro lines.
- Locally poor soil conditions would require temporary foundations during pre-fabrication.
- Challenges in moving new bridge into position.
- Insignificant reduction in construction time at a significantly greater cost.

- Not Supported -

Design Concept 5

Bridge Construction Efficiencies

Contractor Incentives

1. Set Completion Date.
2. Penalty clause for late completion: Liquidated Damages.
3. Incentive clause for early completion: Contractor Bonus.

- Supported -

Design Concept 6

Municipal Services and Utilities

A. Watermains:

Proposed new 600mmØ HP watermain across new bridge.

B. Sanitary Sewers

Opportunities to divert sewage flows from the existing aging gravity flow siphon that crosses the Sydenham River south of 10th Street may be addressed as a separate project following bridge construction.

C. Storm Sewers

- Upgrades to storm sewer outlet on the west side are recommended.
- Water quality provisions to be resolved with detailed design.

D. Utilities:

Will continue to be consulted during the Detailed Design Phase.

Design Concept 7

Construction Implementation and Timing

Timing Considerations:

- i. APRIL: 'Half Load Season'
 - Restricts the use of heavy trucks due to frost conditions.
 - Light preparatory work may be completed during this time.
- ii. *JULY 1 to SEPTEMBER 15*:
 - Timing window for in-water work.
 - * Consultation with the MNRF has provided for alternative in-water timing windows.
- iii. NOVEMBER THROUGH MARCH: Winter work season.
- iv. MTO Grant is valid until March 31, 2021. Substantial completion by December 31, 2020.

Design Concept 7

Implementation and Estimated Timing

TASK		OPTION 1		OPTION 2		OPTION 3	
1.	Bridge Removal	2019	July/Aug	Bridge Closure = 14 months	April	2019	October
2.	Sheet Piling Installation (in-water*)		Aug/Sept		May		November
3.	Removal of Existing Foundations		October		June		December
4.	Installation of Foundation Piles (driven to Bedrock) and Pile Caps		Nov/Dec		July/Aug		Jan/Feb
5.	Installation of Abutments	2020	Jan - March	2020	Aug/Sept	2020	March/April
6.	Girder Placement		April		October		May
7.	Construction of Bridge Deck		May		Oct/Nov		June
8.	Completion of Services and Utilities		June/July		November		July/August
9.	Concrete Work and Paving		August		Nov/Dec		September
10.	Landscaping		September		May		October
11.	Clean-Up		October		2021		June
Estimated Construction Period		16 Months		15 Months		14 Months	

i. MNRF and DFO consultation confirmed an alternative in-water timing window may be considered.

ii. Winter work season (November through March).

PIC No.2 COMMENTS

GENERAL SUMMARY

1. Additional provisions for pedestrians and bicycles:
 - i. Add provisions to improve pedestrian visibility and safety (detailed design).
 - ii. Request to further pursue the opportunity to provide to a separate pedestrian and bicycle crossing at 1st Avenue West (i.e. below-grade crossing).
 - iii. Further support active communities by ensuring consideration for the Complete Streets Concepts.
2. Bridge Design: Opportunity to showcase the Harbour.
3. Traffic management during construction: Potential impact to downtown businesses due to the use of the By-Pass as an alternative route.
4. Construction Timing: Consideration for an alternate in-water timing window.

PIC No.2 COMMENTS

(1) Complete Streets Concepts

Complete streets concepts ensure all road users, including cyclists and pedestrians, are given equal consideration during the planning process.

Comment:

Provide for segregated bicycle route(s) along 10th Street.

Assessment:

Accommodations to provide for bike lanes could include:

1. Widen the existing Right-of-Way:

Opportunities to widen the 20 m ROW are limited due to existing development.

2. Narrower traffic lanes:

- The City and likely the MTO would not support narrower lanes on this Connecting Link.
- Bicycle safety would be an issue considering the significant volume of trucks.

3. Geometric changes to the 10th Street Cross-Section:

- Reduction to three lanes for vehicular traffic, with the additional lane being dedicated to bike lanes.
- Corridor Optimization Study (BTE) found that this would further limit capacity on an already congested 10th Street.

Other, more appropriate, pedestrian and bicycle routes are being implemented through other initiatives.

PIC No.2 COMMENTS

(2) Bridge Design

Bridge replacement provides the *'opportunity to showcase the Harbour and the Sydenham River for tourists and local residents alike'*.

1. Detailed Design Phase:

Will consider provisions to beautify the structure, including landscaping, retaining walls, lighting and bridge enhancements (i.e. railing, viewing platform).

2. Additional opportunities will ultimately be subject to funding constraints.

3. Future bridge enhancements could be considered.



PIC No.2 COMMENTS

(3) Traffic Diversion to By-Pass: Impact on Downtown Businesses

- 10th Street accommodates a significant volume of the City's traffic.
- Travel management during construction will need to balance the following:
 - i. The use of the By-Pass by through traffic (i.e. traffic not intending Owen Sound as a destination). This will lower traffic volumes within the City.
 - ii. Traffic flow through the City's downtown core with minimal congestion and delays.
 - iii. The needs of the downtown businesses.

The degree of traffic congestion and delays will be inversely related to the volume of traffic diverted on the By-Pass, particularly during peak traffic periods.

- Several strategies to support Owen Sound businesses could include:
 - Signage advertising that Downtown Owen Sound is open for business;
 - Waiving of parking fees for the duration of the construction period; and
 - Advertising in print, radio, and online to promote the Downtown businesses.

Summary of Recommended Design (Presented at PIC No.2)

Considerations/Concepts		Solutions
1.	Traffic Management During Construction	Optimize existing routes through the downtown core, while continuing to inform travelers not intent on stopping in Owen Sound of the By-Pass as an alternative. A signage plan will be developed to promote the downtown.
2.	Traffic Lane Configuration	Maintain 5-lane traffic configuration with widened right-turn lane onto 1 st Avenue West.
3.	Pedestrian Movements	Pedestrian crossing similar to existing with: <ul style="list-style-type: none"> • Provisions for improved visibility; and • Minimum 3.0 m wide multi-purpose trail connection (along north side).
4.	Bridge Style	Pre-cast concrete girder (similar to 9 th Street).
5.	Bridge Construction Efficiencies	i. Consideration for pre-cast components; and ii. Contractor incentives.
6.	Municipal Services and Utilities	Provide for water, sanitary sewer, storm sewer and utilities, as appropriate.
7.	Construction Implementation	Plan to initiate, with shortest construction timeline, as practical.

Next Steps

- Council Endorsement of Preferred Design Alternative.
- Finalize ESR (Phase 4).
- Advertise Notice of Completion.
- 30-day Public Review Period to Satisfy Part II Order Request Period.
- Proceed to detailed design, tender, and construction (Phase 5).