

City of Mississauga

Heritage Impact Assessment: Middle Road Bridge

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1. Introduction

1.1 Study Purpose

AECOM was retained by the City of Mississauga to conduct a Heritage Impact Assessment on the Middle Road Park-01 Bridge (hereafter referred to as the 'Middle Road Bridge' or the 'subject bridge') as part of the engineering services for the rehabilitation of the bridge. The bridge is located at 1700 Sherway Drive and carries a pedestrian trail and City maintenance vehicles across the Etobicoke Creek, which also is the border between Mississauga and Toronto (**Figure 1** and **Figure 2**). The bridge is a reinforced concrete tied arch bridge built in 1909 on pre-existing stone masonry abutments.

The bridge is designated under Part IV of the *Ontario Heritage Act* by the City of Mississauga (By-law 1101-86) and by the City of Toronto (By-law 1986-281). There is also a heritage easement agreement for the bridge under Part II, Section 22 of the *Ontario Heritage Act* held by the Ontario Heritage Trust. Based on the cultural heritage significance of the structure and deficiencies observed in the Ontario Structure Inspection Manual (OSIM) 2016 Biennial Inspection Report, the bridge needs rehabilitation on several key components of the structure. In 2020, AECOM was contracted to develop the rehabilitation plan and design of the Middle Road Bridge in order to extend the remaining service life of the structure. Therefore, this Heritage Impact Assessment is required for the proposed rehabilitation work, as per the Ontario Heritage Trust approval for the alteration process.

1.2 Physical Description and Study Area Context

Middle Road Bridge is located at the eastern terminus of Sherway Drive, in Middle Road Park, and spans Etobicoke Creek. The bridge acts as a boundary between the City of Mississauga and the City of Toronto, and historically between the counties of York and Peel. Originally designed for vehicle traffic, Middle Road Bridge is currently used as a pedestrian bridge.

Middle Road Bridge has an east-west orientation and is considered a one-span concrete bowstring truss bridge which has a crossing length of 26.125 metres (m) and a deck travel width of 4.52 m. The overall width is 5.4 m (**Photograph 1**). There is no posted load limit.

Middle Road Bridge is located in the Etobicoke Creek Valley, a naturally landscaped park along the shores of Etobicoke Creek. It is isolated from main urban roads and is part of a natural and scenic environment and a reminiscent historic setting in a formerly rural area. In its setting, the structure is a landmark. The bridge is situated on the edge of a residential suburb on its Mississauga side and connects to a hospital property and Sherway Gardens mall on its Etobicoke side. The bridge provides the local community with a nature trail across an open field and access to a commercial area in Etobicoke.

Photograph 1. South Elevation of Middle Road Bridge (AECOM, September 11, 2020)



1.3 Present Owner

Middle Road Bridge is currently co-owned by the City of Mississauga and the City of Toronto. The structure is maintained by the City of Mississauga.

1.4 Current Cultural Heritage Recognition

The Mississauga portion of the 4.3 m wide and 26.1 m long concrete arch bridge is acknowledged for its heritage value, recognized for its architectural and historical significance and for its contextual value as an important community landmark. The following lists the bridge's heritage recognition:

- Designated Part IV of the *Ontario Heritage Act* by the City of Mississauga By-law 1101-86 (**Appendix A**).
- Designated Part IV of the *Ontario Heritage Act* by the City of Toronto (formally City of Etobicoke) By-law 1986-281 (**Appendix B**).

- Heritage Easement Agreement under Part II, Section 22 of the *Ontario Heritage Act* held by the Ontario Heritage Trust. The Ontario Heritage Trust prepared a Statement of Significance for the bridge (**Appendix C**).
- Listed as an Ontario Heritage Bridge by the Ontario Ministries of Transportation and Heritage, Sport, Tourism and Culture Industries.
- Identified as a potential cultural heritage landscape in the City of Mississauga (under study, email communication with Paula Wubbenhorst, Heritage Planner, March 17, 2021).
- Recognized as a Canadian Society for Civil Engineering (CSCE) Civil Engineering Historic Site¹.
- Listed on the Canadian Register of Historic Places.
- Identified as a historic bridge on historicbridges.org.

1.5 Summary of Proposed Undertaking

Based on the OSIM 2016 Biennial Inspection Report, Middle Road Bridge required rehabilitation on several key components of the structure. The City of Mississauga in partnership with the City of Toronto retained AECOM to deliver a full rehabilitation plan to return the bridge to a service life acceptable under OSIM. In 2020, AECOM was awarded the contract.

In January 2021, AECOM completed Phase 1, the Structural Detailed Condition Assessment which collected data on the existing conditions of the bridge. A draft of the Condition Assessment report was provided by AECOM which summarizes the existing conditions, identifies functional concerns, and provides recommendations to address issues through rehabilitation of the structure. In February 2021, AECOM completed the 30% Detailed Design of the rehabilitation plan and following that, the 60% Detailed Design in March 2021.

As part of the rehabilitation plan, AECOM is responsible for preparing the Alterations Request Form for Ontario Heritage Trust approval, which includes the completion of a Heritage Impact Assessment. This Heritage Impact Assessment report will evaluate the impacts proposed in AECOM's 60% Detailed Design regarding the proposed rehabilitation of the bridge.

1.6 Study Method

The objective of this Heritage Impact Assessment is to identify the potential impacts of the proposed undertaking to the heritage attributes identified for the structure. This document will provide:

- A historical overview of the design and construction of the bridge within the broader context of the surrounding geographic township and bridge construction generally;
- A location plan showing the contextual location of the site, including a description of the surrounding context;

¹ CSCE is currently drafting a plaque for Middle Road Bridge (personnel communication Michael Bartlett, Chair of the CSCE, March 22, 2021)

- A photographic record, maps, drawings, or other documentary material found during the historical research for this report;
- A review and assessment of the heritage attributes described in the Ontario Heritage Trust Statement of Significance and the two city by-laws for the bridge;
- Provisions of specifications for heritage sensitive removals/additions (i.e. abutment rehabilitation);
- A written description of the undertaking of the identified impacts;
- A summary of community engagement for the proposed undertaking; and
- A list of mitigation measures and recommendations to ensure that any impacts to the bridge are minimized.

Relevant background information on Middle Road Bridge was gathered from existing statements of cultural heritage value, and other archived sources collected for this Heritage Impact Assessment. A field review was completed by Tara Jenkins, AECOM Cultural Heritage Specialist on February 17, 2021 to document the current condition of the bridge.

Potential impacts to the subject property were evaluated according to the Ministry of Heritage, Sport, Tourism and Culture Industries' (MHSTCI) *Ontario Heritage Toolkit, Heritage Resources in the Land Use Planning Process, InfoSheet #5 Heritage Impact Assessments and Conservation Plans* (MHSTCI 2006:3) and the Park's Canada *Standards and Guidelines for the Conservation of Historic Places in Canada* (2010). The MHSTCI document defines "impact" as a change, either positive or negative, in an identified cultural heritage resource resulting from a particular activity. This Heritage Impact Assessment identifies *direct (physical) impacts, indirect impacts, and/or positive impacts* as the impact types that a construction component and/or activity may have on cultural heritage resources.

Impacts to heritage resources may be direct or indirect. Direct adverse impacts include (MHSTCI 2006):

- Destruction, removal or relocation of any, or part of any, significant heritage attributes or features
- Alteration that is not sympathetic, or is incompatible, with the historic fabric or appearance

Indirect adverse impacts to cultural heritage resources may result in the direct destruction or alteration of a feature or its heritage attributes, thereby affecting the cultural heritage value of a property. Indirect impacts include (MHSTCI 2006):

- Shadows created that alter the appearance of a heritage attribute or change the exposure or visibility of a natural feature or plantings, such as a garden
- Isolation of a heritage attribute from its surrounding environment, context, or a significant relationship
- Direct or indirect obstruction of significant views or vistas from, within, or to a built or natural heritage feature

- A change in land use such as rezoning a battlefield from open space to residential use, allowing new development or site alteration to fill in the formerly open spaces
- Land disturbances such as a change in grade that alters soils, and drainage patterns that adversely affect an archaeological resource

A direct (physical) negative impact has a permanent and irreversible negative affect on the cultural heritage value or interest of a structure, or results in the loss of a heritage attribute. An indirect negative impact is the result of an activity on or near the property that may adversely affect its cultural heritage value or interest and/or heritage attributes. A positive impact will conserve or enhance the cultural heritage value or interest and/or heritage attributes of the property.

Where negative impacts of the rehabilitation on Middle Road Bridge and/or its heritage attributes are identified, mitigative or avoidance measures or alternative development or site alteration approaches will be proposed. In addition, conservation options as outlined in the *Ontario Heritage Bridge Program* (MCC 1991) which is regarded as current best practice for conserving heritage bridges in Ontario and ensures that heritage concerns, and appropriate mitigation options are considered.

As this bridge is designated under Part IV of the *Ontario Heritage Act*, an Ontario Heritage Bridge, and within an Ontario Heritage Trust heritage easement, a resource-specific HIA is required for the proposed rehabilitation of this structure. The present report satisfies this requirement.

1.7 Summary of Potential Impacts

Impacts were identified based on the 60% Detailed Design drawings for the rehabilitation of this bridge. Affected heritage attributes as prepared in the Ontario Heritage Trust Statement of Significance (**Appendix C**) include:

Historical Value:

- Located on stone abutments of an earlier bridge over Etobicoke Creek- rehabilitate/repair

Engineering Value:

- Six vertical concrete hangers- patch repairs
- Seven-panelled parabolic bowstring truss featured massive arched compression chords, 22 inches by 24 inches- patch repairs and west end bearing replacement
- Slim vertical tension members and a system of counter braces- patch repairs
- Steel reinforcing in the main structure- west end floor beam over abutment to be reconstructed so it allows the west end of the bridge to move as originally intended based on the description of the bridge design as described by Barber & Young in 1909
- Concrete baluster and railing- patch repairs, a GFRP bar will be added to the baluster pickets in the system where required as a result of existing reinforcing section loss

The removal or demolition of the Middle Road Bridge is not being considered. The detailed interventions of the proposed undertaking are discussed further in **Section 4**.

1.8 Middle Road Bridge Historical Overview

Middle Road Bridge opened on Tuesday, October 26, 1909 and was designed as a reinforced concrete truss or tied arch bridge (Globe and Mail 1909). Middle Road Bridge spans the Etobicoke Creek, and is historically a boundary bridge between the County of Peel, Township of Toronto South, and the County of York, Township of Etobicoke. Currently the subject bridge is a boundary bridge between the cities of Mississauga and Toronto.

1.8.1 Previous Bridge Crossings

The subject bridge is not the first bridge crossing over Etobicoke Creek on Middle Road (now Sherway Drive). There has been at least one previous crossing.

The 1859/1860 Tremaine maps indicate that the early concession road, later named Middle Road, from the County of York did not connect over Etobicoke Creek, westward, with the County of Peel concession road (**Figure 2**). Although no bridge is illustrated connection the two concession roads, the lots on either side of Etobicoke Creek where the subject bridge is now located were owned in 1859/1860. Aron Silverthorn is identified as the landowner in the Township of Etobicoke, for Lot 13, Concession II SFL. Abram Markle is identified as the landowner in the Township of Toronto South, for Lot 4, Concession I SDS. The Ontario Heritage Trust Statement of Significance for the Middle Road Bridge states that Middle Road opened in Toronto Township South in 1806 (Appendix C).

Similarly, the 1877/1878 Illustrated Historical Atlas maps do not show the concession roads connecting and continuing over Etobicoke Creek (**Figure 3**). In 1877, Lot 4, Concession I SDS, the Township of Toronto South, was owned by James Alderson and in 1878, Lot 13, Concession II SFL, Township of Etobicoke, was owned by M. Culham. The County of Peel Committee minutes indicate there was construction on Middle Road in the late 1880s which is likely related to the construction of the road connecting the two counties, thus forming the alignment of historic Middle Road over Etobicoke Creek (email communication, September 4, 2021, Kyle Neill, Senior Archivist, PAMA).

It should be noted, however, that not all features of interest were mapped systematically in the Ontario series of historical atlases, given that they were financed by subscription, and subscribers were given preference with regard to the level of detail provided on the maps. Moreover, not every feature of interest would have been within the scope of the atlases.

By 1909, the topographic map shows Middle Road continuing over Etobicoke Creek and connecting the two counties. The map indicates a wooden bridge is extant at the location of the current subject bridge (**Figure 4**). By that time, Middle Road had become an established historic highway with frame and brick houses along its route. No houses were directly adjacent to the bridge crossing in 1909. In the early 1900s,

Middle Road was used by horses, carts and cattle to cross the Etobicoke Creek (OHT Statement of Significance; Appendix C).

By 1962, the Queen Elizabeth Way (QEW) had been constructed (c. 1930s) and the subject bridge was just north of urban land use (Figure 5). In 1962, a house is shown as directly adjacent to the bridge on the west side of Etobicoke Creek in the Township of Toronto South and hospital grounds are on the east side of the bridge in the Township of Etobicoke. The context surrounding the bridge in 1962 consists of the wooded valley of Etobicoke Creek and farm orchards.

In summary, since the subject bridge was constructed in place in 1909, it is evident there has been at least one previous bridge, a wooden bridge, across Etobicoke Creek at this location.

Figure 3. Subject Bridge overlaid on the 1859/1860 Tremaine Map: Counties of Peel and York

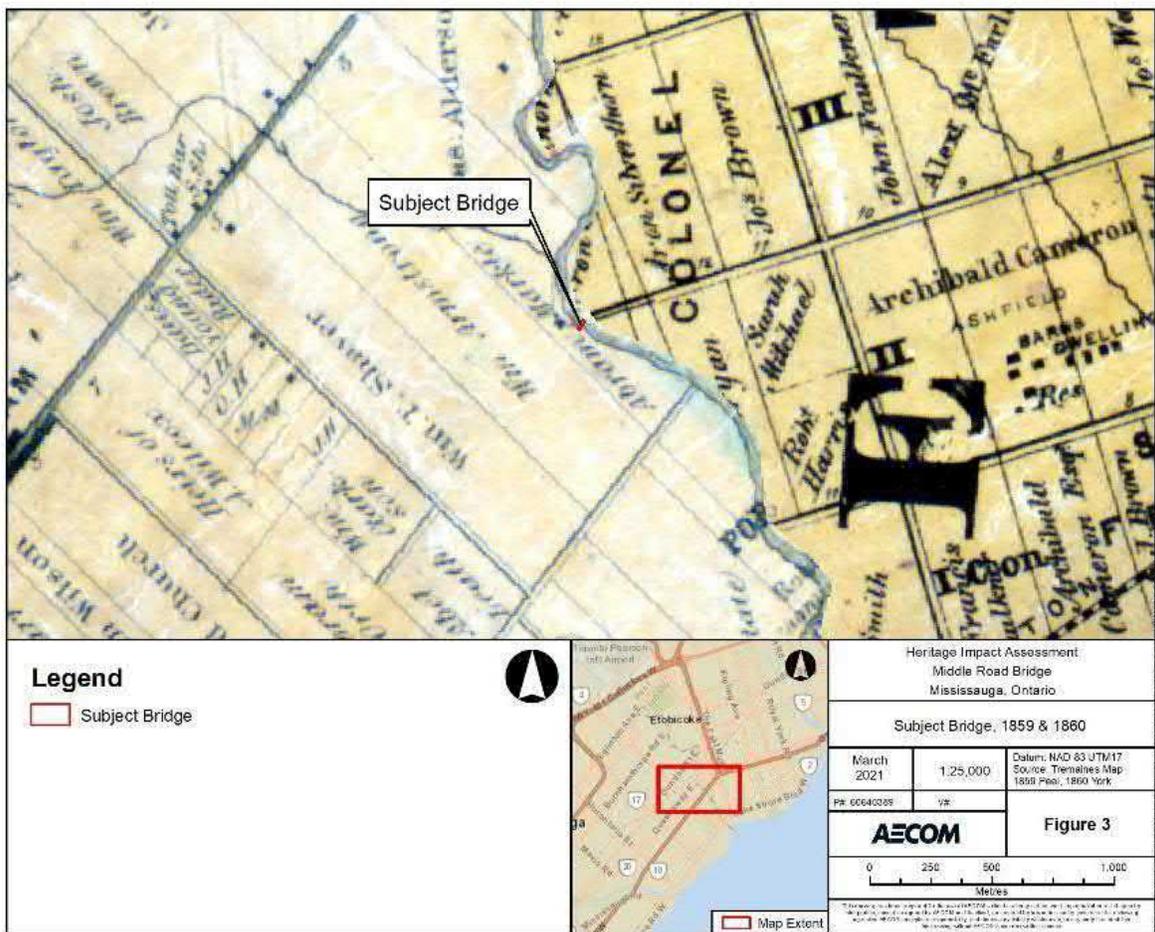


Figure 4. Subject Bridge overlaid on the 1877/1878 Illustrated Historical Atlas Map: Counties of Peel and York

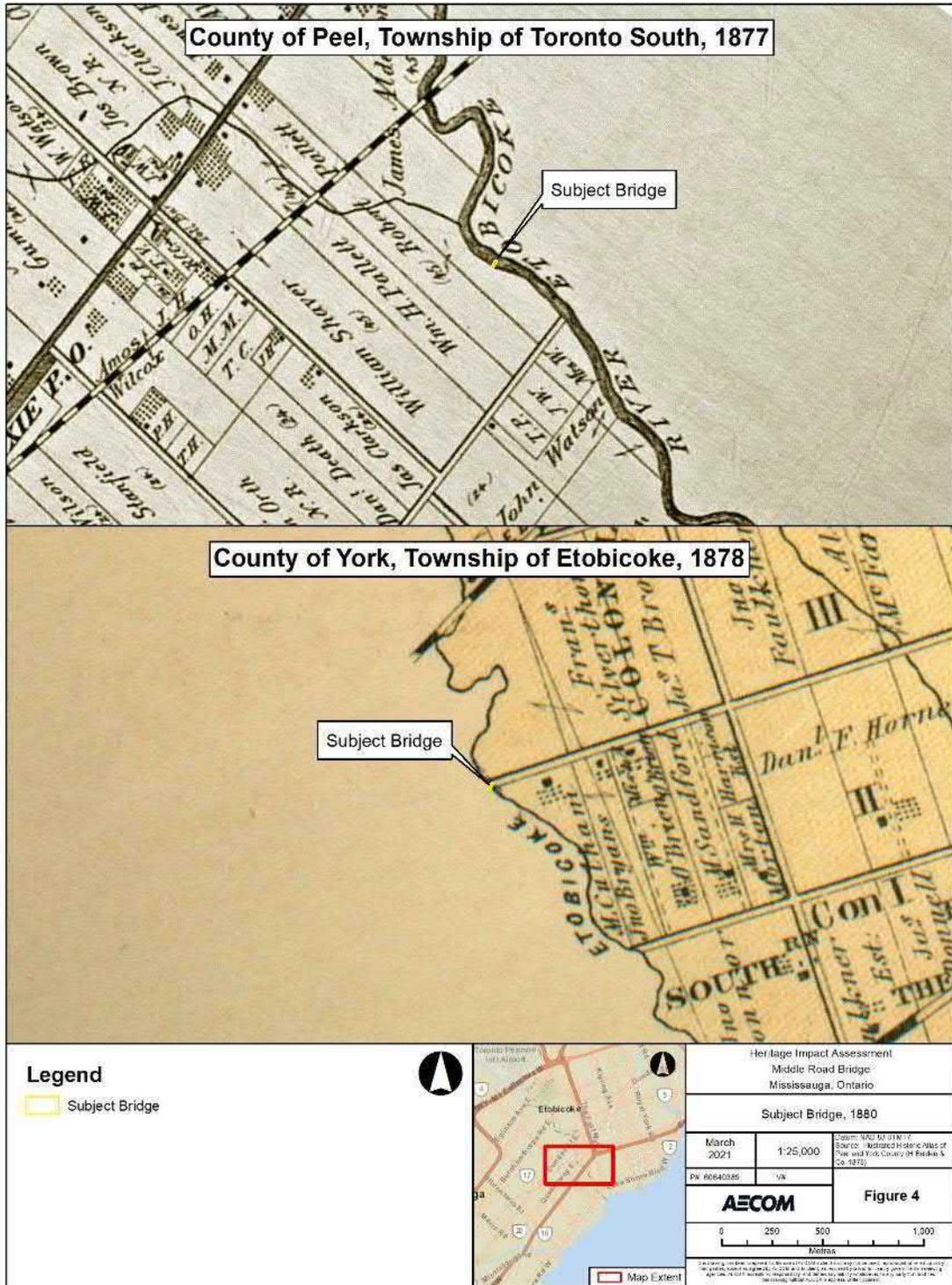


Figure 5. Subject Bridge overlaid on the 1909 Topographic Map

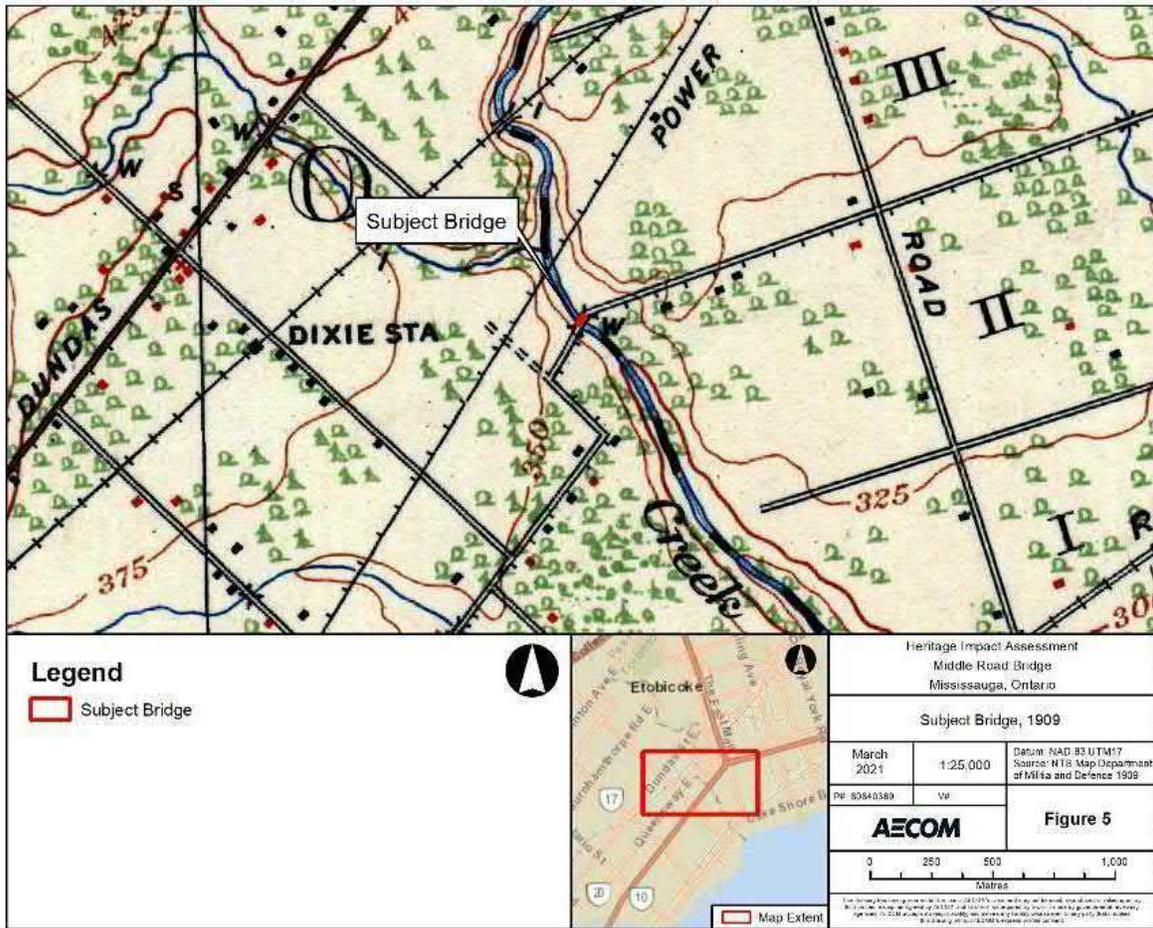
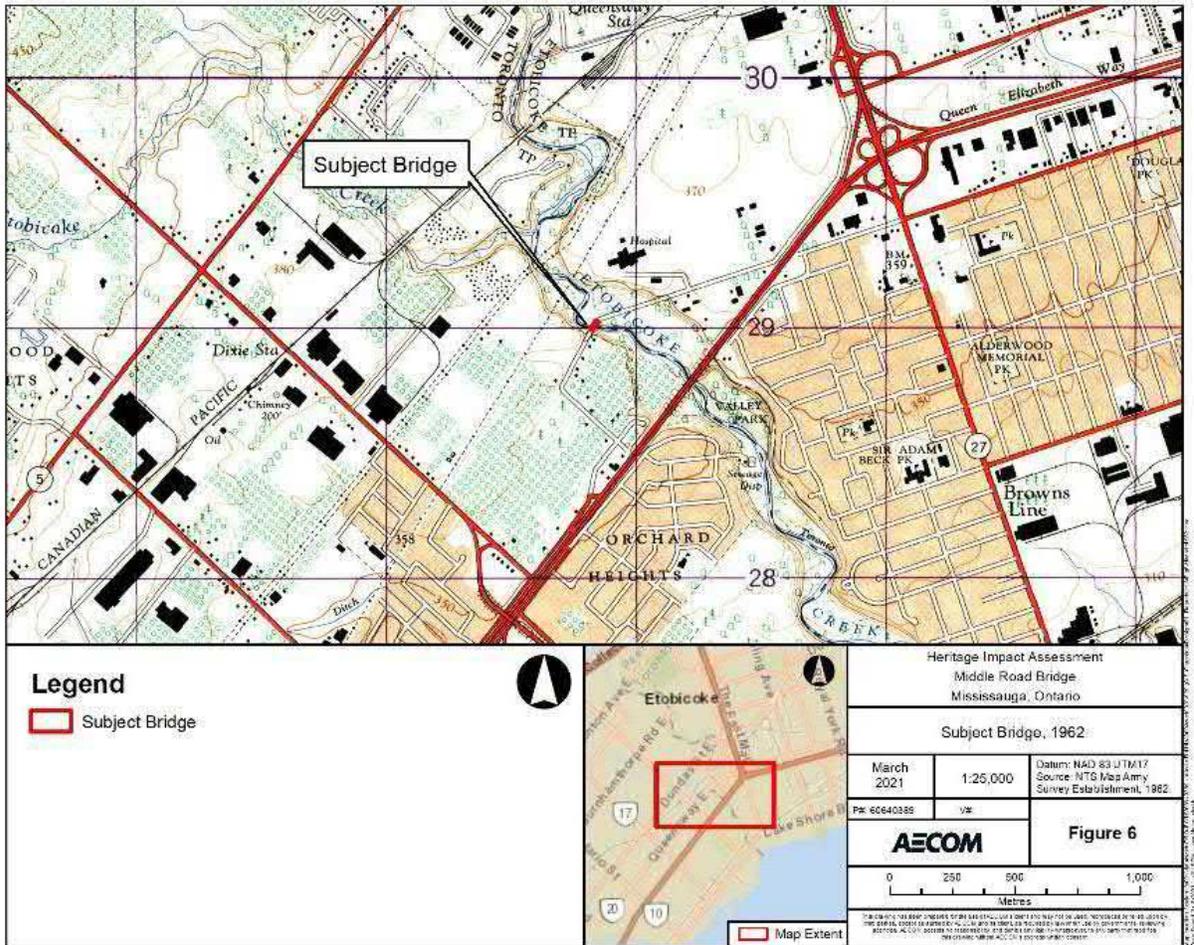


Figure 6. Subject Bridge overlaid on the 1962 Topographic Map



1.8.2 Construction of Bowstring Truss or Tied Arch Bridge in Ontario

Middle Road Bridge is the first example of a reinforced concrete truss or tied arch bridge in Canada and the second example in North America (Barber & Young 1909). It is considered one of the oldest and most unique of the historic concrete bridges in Canada (historicbridges.org).

The first concrete arch bridge in Ontario was built in 1906 by W.A. McLean, assistant engineer to the Ontario Department of Public Works under “Good Roads” Campbell (Cumming 1951:46). This arch was 92 feet long over the Aux Sauble River at Massey. Erected shortly afterwards, Hurdman’s Bridge in Ottawa had seven arches and stretched 626 feet. Several other concrete arches appeared, but shortly after, a new type of concrete arch bridge emerged: the reinforced concrete truss or tied arch (bowstring) bridge (Cumming 1951:46).

In the early 20th century there was excitement in bridge building as the use of concrete and steel, either together or independently, was developing and engineers were experimenting to develop new designs in bridge construction. The bowstring or tied arch takes the principle of the suspended roadway one step

further– the ends of an arch exert tremendous thrusts on abutments (Cumming 1951:15). Instead of attempting to contain the thrust, the problem was overcome by “tying” the arch ends together with the bottom chord and the roadway (Cumming 1951:15). Tied arches were particularly useful where large abutments were unsuitable or long distances required spanning (Cumming 1951:15). For a tied arch bridge, “the toes of the arch chord are perfectly tied together at all times, and the upper and lower chords expand and contract together with temperature changes, provision for which is made by sliding bearing plates at one end of the truss” (Cumming 1951:47). This design was also beneficial instead of a heavy solid concrete arch. The reinforced concrete tied arch bridge could be adapted for use at almost all locations, either in single or multiple spans (Cumming 1951:47).

1.8.3 Construction of Middle Road Bridge

In 1909, Middle Road Bridge was designed by and erected under the supervision of James Frank Barber and Clarence Richard Young of the firm Barber & Young, a prominent bridge and structural engineering firm in Toronto. Barber was an engineer for the County of York and Young a lecturer on engineering at the University of Toronto. The James Franklin Barber fonds, housed at the Archives of Ontario, indicate that more than 500 bridges were built under his direction in Canada, including 16 of the first 20 concrete truss bridges constructed in Canada, the first of which was built on Middle Road in 1909. Barber & Young also engineered the first open spandrel concrete arch at Weston in 1910 (Cumming 1951:47).

Due to Covid-19, the records for Middle Road Bridge in this collection were not accessible at the time of this report. This includes:

- F2077-2-1-20 Middle Road [191?], B-754
- F2077-5-1-5 Canadian Concrete Trusses [191?], A1200, A1201
- F2077-5-1-10 Concrete Trusses [191?], A-1204
- F2077-5-1-11 Concrete Trusses- Construction Photos [191?], A-1204

The 1908-1909 County of York council minutes noted to the Commissioner the dangerous condition of Middle Road Bridge and instructions were given to the temporary closure of traffic. The 1908-1909 inspection of the bridge by the County of York indicated that the masonry abutments under the bridge with some minor repairs were suitable for a steel superstructure. On December 22, 1908, the County of Peel approved a steel superstructure at the location of the subject bridge. The County of York recommended an 80 foot bridge with a concrete or brick deck with an estimated cost of \$3000. However, Barber contested a steel bridge and suggested that this was the perfect location to experiment employing his firm’s concrete truss type. In April 1909, the County of Peel met with the County of York and agreed on Barber’s new type bridge and asked for tenders (County of Peel 1908).

When Barber & Young partnered in 1909 they advocated building bridges of reinforced concrete with the entire weight to be carried by the trusses built of reinforced concrete. They claimed that the concrete truss as a replacement bridge on Middle Road would cost no greater than an all-steel truss bridge and would be able to carry a greater load and would still be ornamental, like a steel truss, and outlast the ordinary life of

the steel truss. They argued a concrete tied arch truss designed bridge could utilize the old stone abutments while a traditional arch design could not.

Six tenders were received, and O.L. Hicks of Humber Bay (Etobicoke) was hired for the erection of a reinforced concrete bridge at the cost of \$3,090.00 at a length of 87 feet and 10 ½ inches (County of Peel 1909). O.L. Hicks accepted the price at the lowest cost tender and the work began in May of 1909. Hicks settled in Humber Bay in 1873 and purchased the Royal Oak Inn on Lakeshore Road west of Humber River. He built fine yachts and patented a sliding seat for racing hulls. He invented methods in bridge building and was commissioned to build “firsts” in bridge designs.

(<http://www.etobicokehistorical.com/humber-bayrsquos-octavius-laing-hicks-was-a-master-bridge-builder.html>).

As the building of Middle Road Bridge began, a freshet came down the river and swept away much of the staging and forms. Three months later 19 tons of ¾ inch steel rods and steel trusses were put into place and surround by wooden “forms” in preparation for the concrete to be cast.

No original drawings of the bridge have been located at the time of this report, however, Barber & Young described their Middle Road Bridge in the *Canadian Cement and Concrete Review* (November 1909). Their description provides insight into the construction of the bridge. Barber & Young describe the bridge as a seven-panelled parabolic bowstring truss since the maximum stress of the lower chord was the same for all its members, and consequently the same number of steel rods were used from one end of the chord to the other, thus becoming an advantage in construction. The vertical members of the web truss system are tension members, and the diagonals are counterbraces, “carrying no stress for live load covering the entire floor or from the dead load, and acting alternately in compression and in tension for a moving load” (Barber & Young 1909:3). The compression (top) chord, 22 inches by 24 inches at the middle segment is only slightly reinforced with 12 rods, ¾ inch round, bonded with smaller rods spaced six inches apart, except at the panel points, where somewhat elaborate detailing is resorted to in order to make the bond “perfectly” secure between the hangers and the chord. It is designed with a load of 10 tonnes on two axles, 80 feet in the clear, a roadway 16 feet wide, with 14 feet height above water at one end (Barber & Young 1909). The bridge contains upward of 13 tons of steel and weighs nearly 200 tons (Barber & Young 1909). Provision was made for expansion at one end using brass plates sliding between steel. The bridge deck was reinforced with No. 10 standard expanded metal as manufactured by the Expanded Metal and Fireproofing Co., Toronto.

To prevent newly placed concrete from setting at joint locations bags of cracked ice were laid on the last concrete placed at night, and “this was found to be the perfectly plastic the next morning, as if it had just been poured” (Barber & Young 1909:5). This was an invention of O. L. Hicks, the contractor for the bridge. Barber & Young (1909:6) describe the concrete used as “a mixture used was one of cement to three of aggregate- sand and crushed stone, so proportioned to leave a minimum void”. Likely by August, on a Monday, the work had begun as the concrete was mixed and the forms filled (Globe and Mail 1909). The

concrete took a total of six days to cast-in-place. The workers slept by the bridge at night during this time. On Saturday, just after midnight, the last shovel of concrete was thrown.

The bridge opened for traffic September 1, 1909, however October 26, 1909 was the official opening and test day (Globe and Mail 1909). On Thursday October 28, 1909, the Globe and Mail reported that a new era in bridge building in Canada had begun. Engineers across Canada were waiting to see if the theories of the young engineers, Barber & Young, would stand the test of even a one-day trial. A throng of officials gathered, including Barber, Young, and Hicks, and other county and township officials. A drove of Alderman John Dunn's cattle, 167 in total², were driven over the bridge to get a drink from the river. The vibration of the cattle on the bridge was barely perceptible (Globe and Mail 1909).

Barber & Young compare Middle Road Bridge to the reinforced concrete trusses designed by Armand Considère, a French engineer, who was the originator of the concrete trusses and who built several bridges of this type in Europe. In 1904, Considère built the first reinforced concrete truss bridge in France. Barber & Young note the differences between Considère's bridge and the Middle Road Bridge are in the curved upper chords and the handrailing and other details. Considère's chords were much lighter than those of Middle Road Bridge (Barber & Young 1909).

As mentioned above, when Middle Road Bridge opened in 1909 there was only one other reinforced concrete truss bridge in North America; the Sparkman Street Bridge in Nashville, Tennessee (Walton 1995). Sparkman Street Bridge is different however, than Middle Road Bridge as it has two tied arches, but the arches are (below) deck and the spans do not have diagonals (Bartlett 2021). Therefore, the load and tension are distributed differently than Middle Road Bridge.

The November 25, 1909, County of Peel Reports of Committees for Roads and Bridges documents the cost of Middle Road Bridge and the amount owned to the County of Peel from the County of York as follows:

- Superstructure contract price: \$3,090.00
- Extra reinforcement, as per vouchers and labor account: \$134.99
- Abutments- Concrete 56 cubic yards at 7.00: \$392.00
- Abutments- Painting, 138 square yards at 25c: \$34.50
- Abutments- Steel, 970 lbs, at 31/2c: \$33.95
- Abutments- Excavating, 50 cubic yards at 40c: \$20.00
- Filling approaches, building dry walls, wooden fence guard, repairs to foundations, etc. as per bill: \$291.17
- Total, O.L. Hicks account: \$4,096.61
- Two cement tests at \$3.50: \$7.00
- Copying letters and reports: \$1.20

² Note, Barber & Young 1909 document that the bridge was tested at the official opening with a concentrated load of 10 tons moving across the bridge by a herd of 70 cattle, all that could crowd on the bridge, weighing likely 35 tons (pp.4)

- Five per cent for engineering: \$205.24
- Inspection: \$38.65
- Mr. Kennedy's bill for closing traffic: \$1.00
- Total: \$4349.70
- Less price for Old Bridge: \$40.00
- Half by Peel: \$2,154.85



Image 1: Middle Road Bridge with forms in position (Source: Barber & Young 1909:5)

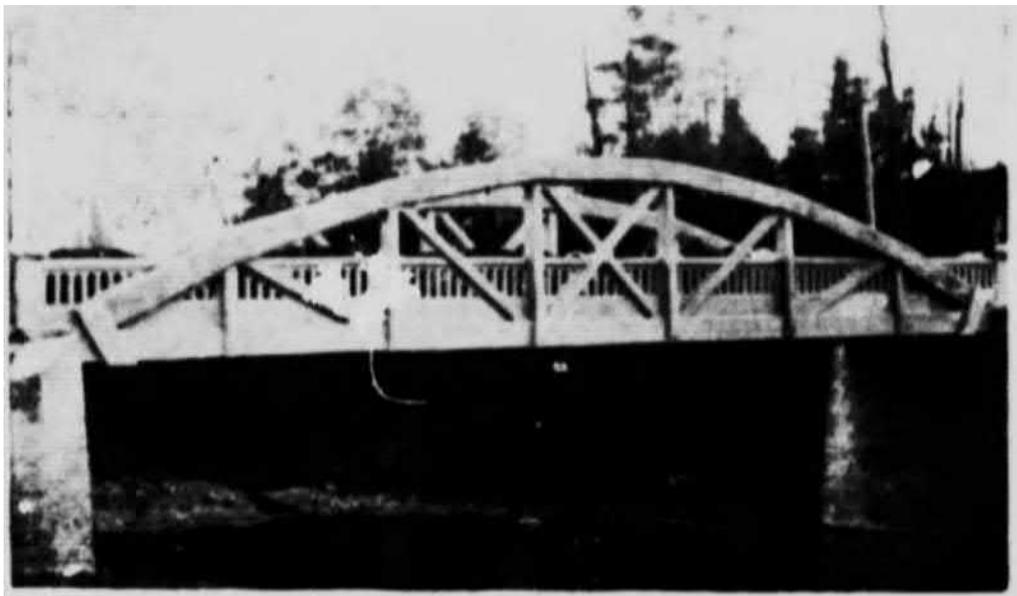


Image 2: View of bridge during the test with 70 cattle crowding on the structure, weight of at least 35 tons (Source: Barber & Young 1909:4)



Image 3: Opening Day October 26, 1909 (Source: Courtesy of the Etobicoke Historical Society)



Image 4: Opening Day - Ceremony attendees, from the left of photo (Vintage Toronto):
 W.E. Smith, Toronto World, Wm. Jackson, Reeve of Brampton, Wm Cowler, Toronto Globe, Frank Barber, C.E. Canada Inspection Company, John Richardson, Clerk, York County, W.D. Annis, Commissioner, York County, Mr. Gillaspby, President, Concrete Association, Mr. Ritchie, North Toronto Record, John Harris, Commissioner, York County, Mr. Jackson, Warden, Peel County, George S. Henry, Warden, York County, Mr. Kennedy, Commissioner, Peel County, Mr. O'Brien, O.L. Hicks, Contractor



Image 5: North Elevation of Bridge (Source: Courtesy of the Etobicoke Historical Society)



Image 6: Middle Road Bridge, ca. 1930, looking east (Photograph taken by Mary Laughton)

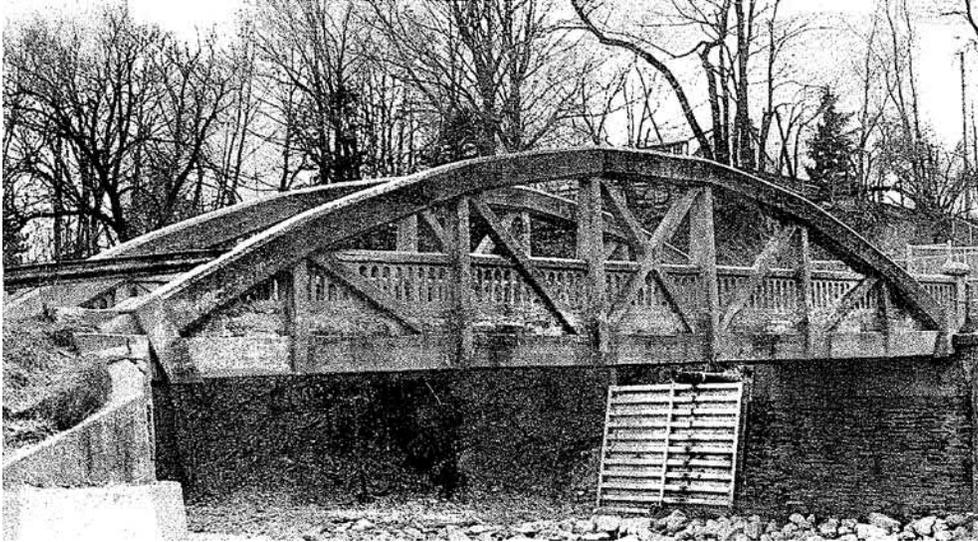


Image 7: North Elevation of Middle Road Bridge, ca. 1980s (Source: Cumming 1983:242)

1.8.4 Further Discussion on Middle Road Bridge Type

Nathan Holth of historicbridges.org notes that Middle Road Bridge defies classification and acknowledges the bridge has been described as a concrete truss and also a concrete arch type bridge. In favour of the concrete arch description is the fact that there is no defined end post as in a truss, rather the top chord/arch rib maintains a constant arc from abutment to abutment. [Historicbridges.org](http://historicbridges.org) refers to Middle Road Bridge as a rainbow arch bridge, ignoring its diagonal members. The rainbow arch is often called a bowstring bridge in Canada. However, historicbridges.org also considers the truss description by the fact that there are diagonal members and the top chord/arch rib is not perfectly curved, but instead has a polygonal appearance to it, where a curve is generated by a series of straight beams at different angles. [Historicbridges.org](http://historicbridges.org) notes, that like bowstring truss bridges of the 1870s, Middle Road Bridge incorporates a combination of arch and truss thinking into its design.

Holth comments that another rainbow arch bridge was built the same year, in 1909 - the Benson Street Bridge (also referred to as Millcreek Bridge) in Ohio designed by E.A. Gast. The thrust was taken up by steel rods in the plane of the floor between the ends of the arches and tied to the steel in the ribs, thus leaving only the vertical load to be carried on the abutment (Gast 1911). Michael Bartlett, Chair of the Canadian Society for Civil Engineering National History Committee, notes that Gast's Benson Street Bridge is a classic reinforced rainbow arch bridge. Compared to Middle Road Bridge, the classic arch of the Benson Street Bridge has the thrust line moving within the arch to counter unsymmetrical applied loadings, whereas Middle Road Bridge is an arch-truss as the designers did not intend the thrust lines to move. Thus, Middle Road Bridge is referred to as a reinforced concrete arch-truss bridge.



Image 8: Benson Street Bridge, ca. 1909 (Source: Gast 1911:32)

2. Statement of Cultural Heritage Value

The By-Laws of the City of Mississauga are provided in full in **Appendix A** (1101-86) and the City of Etobicoke in **Appendix B** (1986-281). The Ontario Heritage Trust *Statement of Significance* is provided in **Appendix C**, with the list of character-defining elements is included in this section. In addition, the full Statement of Significance from the Canadian Register of Historic Places is provided in **Appendix D**. The list of character-defining elements is provided below.

2.1 Short Statement of Reasons for the Proposed Designation (By-law 1101-86)

The Middle Road Bridge across the Etobicoke Creek is listed on the City of Mississauga Heritage Inventory and recommended for designation for its historical and architectural significance. Designed and built in 1909 by Frank Barber and C.W. Young, the Middle Road Bridge is a reinforced concrete tied arch or truss bridge. It is the first structure of its type built in Canada.

2.2 Reasons for Designation City of Etobicoke (By-law 1986-281)

Officially opened in October 1909, the concrete truss bridge which spans the Etobicoke Creek in the cities of Etobicoke and Mississauga was the first structure of its kind to be erected in Canada and one of the first to be constructed in North America. The bridge was designed and erected under the supervision of Barber & Young, Bridge and Structural Engineers, of Toronto. The contractor was Mr. O.L. Hicks, of Humber Bay.

During construction and after construction, the bridge aroused a great deal of interest among engineers and municipal officials by its novel character. Concrete was felt to be suitable for a bridge on a grade. At this location, teams could not be prevented from trotting over the bridge. On opening day, it was tested with a concentrated load of ten tons moving across the bridge, and by a herd of seventy cattle, all that could be crowded upon the bridge, weighing approximately thirty-five tons. The resulting vibration was likely to loosen joints and crystallize steel, but was almost non-existent in concrete.

2.3 Ontario Heritage Trust Statement of Significance

The Statement of Significance for Middle Road Bridge is provided in full in **Appendix C**.

2.3.1 Character-Defining Elements – Ontario Heritage Trust

Elements that contribute to the historical value of the Middle Road Bridge include:

- First example in Canada and the second example in North America of a reinforced concrete bowstring truss or tied arch bridge

- Positioned on the stone abutments of an earlier bridge over the Etobicoke Creek
- Associated with O.L. Hicks of Humber Bay, who developed an inventive method of pouring concrete
- Designed by Frank Barber of Barber and Young, Toronto

Elements that contributes to the engineering value of the Middle Road Bridge include:

- Six vertical concrete hangers
- Seven-panelled parabolic bowstring trusses featuring massive arched compression chords, 22 inches by 24 inches
- Slim vertical tension members and a system of counter braces
- Truss joints specially designed so that members will fail in the body rather than at the joint
- 12 steel rods, $\frac{3}{4}$ inches round, bounded with smaller rods spaced 6 inches apart
- Steel reinforcing the main structure
- No. 10 standard metal reinforcing rods in the deck
- Concrete caps and posts
- Concrete baluster and railing

Characteristics that contribute to the contextual value of the Middle Road Bridge include:

- Continued cultural use as a pedestrian transportation link between the former Counties of Peel and York (Mississauga and Toronto)
- Located at the eastern terminus of Sherway Drive in view of the Queen Elizabeth Way
- Continued relationship to the adjacent natural lands of the Etobicoke Creek Valley which retains its connection to its historic rural setting within the now developed city
- Scenic location

2.4 Character-Defining Elements – Canadian Register of Historic Places

- Massive arched compression chords, slim vertical tension members and system of counter braces
- Truss joints specially designed so that members will fail in the body rather than the joint
- Continued cultural and economic use as a transportation link between the former Counties of Peel and York
- Positioned on the stone abutments of a former crossing of the Etobicoke Creek
- Prominent setting at the eastern terminus of Sherway Drive in view of the Queen Elizabeth Way
- Continued relationship to the adjacent natural lands of the Etobicoke Creek Valley

3. Assessment of Existing Conditions

3.1 Context

The assessment of existing conditions was completed by Tara Jenkins, AECOM Cultural Heritage Specialist, on February 17, 2021. At the time of the field review, there were no significant changes in the current physical or material condition of the bridge from that described in the *Middle Road Bridge Condition Assessment* drafted by AECOM in January 2021.

The assessment of existing conditions was completed by foot, from the public rights-of-way, and as such, there were limitations to the on-site investigation.

For ease of description the bridge is considered to have an east-west orientation. Select photographic documentation of the structure is provided in **Section 8** and the photographic locations are shown on **Figure 7**.

3.2 Middle Road Bridge

Middle Road Bridge, built in 1909, is a single span reinforced concrete truss or tied arch bridge resting on masonry abutments that carries the former Middle Road over Etobicoke Creek. The bridge has a total length of 24.38 m and a roadway width of 4.88 m. The height above water is 4.27 m at one end and 5.49 m at the other. The bridge contains 13 tons of steel and weighs nearly 200 tons. The bridge is currently used as a pedestrian and maintenance vehicle bridge. It was designed by Barber & Young and built by the construction firm of O.L. Hicks.

The substructure features the masonry abutments of an earlier bridge. Reinforced concrete caps were added to the existing masonry abutments. In addition, cast-in-place concrete wingwalls were added adjacent the masonry abutment to support backfill. The east end includes a concrete protection wall in front of the stone masonry. At the west end only there are bearing plates between the bottom chord and abutment caps. The bearing plates allow the bottom chords to expand and contract longitudinally with temperature changes.

The bridge superstructure is a cast-in-place concrete truss or tied arch which has been integrated with the abutments. The superstructure features a reinforced cast-in-place concrete deck circa 1985 with an exposed concrete wearing surface and curb. No drains were visible on the bridge deck. The deck is supported by cast-in-place floor beams and stringers. The main components include the cast-in-place concrete top (compression) chord, the bottom chord, the vertical (tension) hangers, the diagonals, and the railing system consisting of end posts, top and bottom rails and pickets. The railing system is cast against

the diagonal and vertical members in the arch. Two commemorative plaques have been affixed to two ends posts. The bridge includes concrete slabs on the approaches and a timber approach railing barrier.

The structure review indicates that the majority of the key members are original to the bridge, however components of the bridge underwent reconstruction in 1985.

Based on 1985 design drawings, the City of Mississauga Engineering and Works Department included a plan to (**Appendix F**):

- reconstruct the deck including the floor stringers (remove asphalt, concrete deck slab, curb and longitudinal stringers of three deck panels, pour concrete, then later repeat for the other four panels),
- repair the existing steel and bearing plates at the west end,
- add a slope protection on the east abutment,
- repair concrete deterioration and repoint the east and west abutments
- repair the west abutment concrete cap
- patch repair the railing system
- repair the concrete end posts and caps and baluster. **Image 7**, above, indicates in 1983 the northeast end post was missing and in 1985, the plans included the rebuild to appear similar to the northwest end post.
- repair the east abutment cracks and fill the concrete wall with epoxy injection.
- Cover the steel bin wall on the southwest side of the bridge with concrete (see **Image 7**, above, of the steel bin wall).
- Repair cracks in northwest wingwall
- Improve the west approach, including concrete pavement and for an expansion joint in the sidewalk
- Add a stepped gabion slope projection for the east abutment

The 1985 design drawings indicate that the west abutment had been previously repaired possibly in a previous restoration effort when the northwest wingwall was added. Further details on the west abutment repairs in 1985 are not included in the design drawing set in **Appendix F**.

In 2020, AECOM completed a condition inspection of Middle Road Bridge. The inspection noted that the west deck and stringers were anchored to the abutment since its original construction. The bottom chord has remained free to move on the original bearings. This has resulted in unplanned stress between the arch and the deck and in the floor beams, abutment and stringers. The Condition Assessment Report by AECOM (2021) concluded that to extend the service life of the bridge, repairs to the structural system in the west end of the deck are required to maintain the original design intent. Concrete repairs are required on most structural elements and masonry repairs to the abutment are required to ensure ongoing structural stability. The following are deficiencies documented by AECOM.

Condition Inspection Deficiencies (AECOM 2021):

Superstructure:

1. Top Chord- fair to good condition with cracks
2. Bottom Chord- fair to good condition- narrow to wide cracks
3. Diagonal Chords- fair to good condition- random medium to light cracking, sever spalls in two diagonals
4. Vertical Hangers- fair to good condition- random narrow cracks, light delamination, a medium spall
5. Interior Floor Beams- fair to poor condition- severe to very severe delamination and narrow to wide cracks, west end of deck is “fixed” and unable to move
6. Stringers- removed and replaced 1985, “fixed” to west abutment and unable to move
7. Concrete Deck- installed in 1985- fair to good condition with delamination and medium cracks, medium spalls, and severe delamination across deck. Fine to Medium diagonal cracks in all corner of the deck.
8. Railing System- cast-in-place concrete railing – end posts, top and bottom rails and pickets- fair to poor condition with crack, patched spalls, delamination on all faces, some exposed and corroded steel
9. Concrete slabs at approaches- settled, sunken

Substructure:

1. Abutment Caps- reinforced concrete cap installed 1909 on original stone abutments, fair to poor condition
2. Masonry abutments- stone and concrete rubble- fair to poor condition- stone face scale and recedes, softer stones crumbled and cracked, mortar lost etc.
3. Bearing Plates- poor condition severe corrosion- over 100 years old

Middle Road bridge is now located at the edge of a quiet residential suburb on the Mississauga side and connects the residents to a hospital and Sherway Gardens mall on the Etobicoke side. Although only used for pedestrians now, the bridge is part of a picturesque landscape view within the Etobicoke Creek Valley and provides the local community with a walking trail to connect the residential and commercial areas. The bridge is situated over the river crossing and is surrounded by a vegetated floodplain.

4. Description and Purpose of Proposed Activity

4.1 Context

Typically, a “do-nothing” approach in which no changes to the existing environment or resources(s) is evaluated as part of the alternatives for a particular undertaking. A “do-nothing” approach for Middle Road Bridge was screened out at an early stage due to the age of the structure and deficiencies documented in a 2016 OSIM report. Middle Road Bridge is in need of rehabilitation on several key components of the structure. Consequently, the “do-nothing” approach would eventually require the permanent closure of the bridge as the structure continues to crack and further deteriorate due to the fixed west end deck and stringers. Therefore, AECOM was retained to deliver the rehabilitation design of Middle Road Bridge and to extend the service life of the bridge, within the heritage requirements. The project has a phased approach as follows:

Phase 1- Structural Detailed Condition Survey

Phase 2- Preliminary & Detailed Design

Phase 3- Preparation of Tender Documents

Phase 4- Contract Administration for Construction

During Phases 1 and 2, AECOM is to complete the application for Ontario Heritage Trust and meet all requirements of the Ontario Heritage Trust approval process. This Heritage Impact Assessment is a required document as part of this process.

At the outset of the design process, AECOM provided input to the bridge design team on how to best rehabilitate the bridge with heritage considerations that could potentially conserve some elements of the existing bridge. This Heritage Impact Assessment is based on the 60% Detailed Design which carry forward the heritage attributes of this provincially significant heritage bridge (**Appendix E**).

4.1.1 Middle Road Bridge

Based on the 60% Detailed Design, the recommended plan for Middle Road Bridge is to rehabilitate the bridge reconstructing the floor beam and deck end at the west end so the floor beam is connected to the deck and bottom chord allowing the west end superstructure freedom to expand and contract. This will reduce stress between the arch and the deck support system and be more consistent with the designer’s original description of the bridge. The plan is to continue use of this bridge *in-situ* for non-vehicular use. The proposed rehabilitation plan fits with the conservation option in the *Ontario Heritage Bridge Program* to retain the bridge with sympathetic modifications with the intent to retain all the original components

without any significant intrusions on the heritage structure (MHSTCI 1991). There will be little to no loss of original material of the bridge. The rehabilitation of the bridge will involve:

Table 1: Rehabilitation Plan based on the Condition Assessment Report (AECOM 2021)		
Element Name	Deficiency	Recommended Repair/Rehabilitation
Superstructure		
Top Chord	cracks	Repair concrete elements where required; patch, crack sealant
Bottom Chord	Narrow to wide cracks	Repair concrete elements where required; patch, crack sealant
Diagonal Chords	Random medium to light cracking, severe spalls in two diagonals	Repair concrete elements where required; patch, crack sealant
Vertical Hangers	Random narrow cracks, light delamination, a medium spall	Repair concrete elements where required; patch, crack sealant
Floor Beams	Severe to very severe delamination and narrow to wide cracks, deck is “fixed” and unable to move	At the west end, reconstruct so the last floor beam is connected to the deck and bottom chord freeing the deck to expand and contract with the truss relative to the abutment.
Stringers	Fixed to abutment and unable to move	Reconstruct deck and end floor beam to release from restraint
Concrete Deck	delamination and medium cracks, medium spalls, and severe delamination across deck	Remove deteriorated concrete and repair concrete- install a proprietary thin waterproofing and wearing surface which will seal cracks and protect the concrete and reinforcing from moisture and salt ingress which will extend the service life of the deck, stringers and floor beams.
Railing System	crack, patched spalls, delamination on all faces, some exposed and corroded steel	Remove deteriorated concrete and repair concrete elements where required, including around pickets; patch, crack sealant
Substructure		
Concrete slab approaches	Sunken, settled	Remove and replace with an approach slab to be supported by the bridge on corbels and install a subdrain to keep the water away from masonry, includes removal of trees
Abutment Caps	cracks, spalling and light scaling	Repair
Masonry Abutments	West abutment - stone face scale and recedes, softer stones crumbled and cracked, mortar lost	<p>West abutment:</p> <ul style="list-style-type: none"> re-pointing and back-pointing to be completed to fill large voids using sacrificial type N Mortar remove damaged mortar Where possible, stones will be returned to their current locations (systematic documentation of during the repair process) replace the stone entirely if cracking is substantial – broken stones will be reused as rubble fill and nearby field stone will be used for replacement as needed <p>Proposed low concrete protection along the west abutment – designed to tie into the existing abutment but will be removable in future</p>

Table 1: Rehabilitation Plan based on the Condition Assessment Report (AECOM 2021)		
Element Name	Deficiency	Recommended Repair/Rehabilitation
		East abutment: <ul style="list-style-type: none"> • Re-point, back-point and stones replaced using nearby field stone
Bearing Plates (Seats)	Cracked under seat	Consider replacing
Wingwalls (wingwalls of masonry abutment and protection wall in front and a concrete caps on east and west end) Adjacent concrete retaining walls at west end	Poor condition of concrete cap on southwest wingwall, scaled concrete cap on east wingwall	Reconstruct concrete cap on southwest wingwall and reface concrete cap on east wingwall
Other		
Entire structure	N/A	Consideration of an anti-graffiti coating which will include cleaning the bridge to ensure bond of coating (low to high pressure washing)
Approach fencing	Good condition	Timber fence in first two panels at east end to be removed to accommodate installation of subdrains and reconstructed prior to bridge reopening

5. Impact Assessment and Mitigation Measures

5.1 Assessment of Impacts

As discussed in **Section 1.6** of this report, the impacts of the undertaking, identified cultural heritage resources are considered against a range of possible impacts based on the *Ontario Heritage Tool Kit, Heritage Resources in the Land Use Planning Process, InfoSheet #5 Heritage Impact Assessments and Conservation Plans* (MHSTCI 2006:3).

5.2 Impacts on Heritage Attributes on Middle Road Bridge

The impacts of the 60% Detailed Detail drawings on the heritage attributes of the existing bridge are identified in **Table 2**. In general, the proposed bridge rehabilitation has a sympathetic design framework developed to conserve the existing superstructure and substructure and thus, all interventions will conserve and protect the cultural heritage value and heritage attributes of Middle Road Bridge.

A number of the heritage attributes, namely the abutments and a floor beam, will be impacted by the rehabilitation activities. At present, the replacement components are proposed for the substructure and consist of new west end bearing plates and locally sourced replacement abutment stones, where necessary. The new elements will be integrated sensitively into the structure. Note, the abutment wall will be supported during repair and stones will be documented so that they can be reintegrated in the same place they were removed from during the repair process. Likewise, any modifications that will be done to repair any of the concrete components of the superstructure, including the railing system, will be done in a sympathetic manner, such as using a concrete aggregate that is visually similar to the existing bridge.

Table 2: Impacts of the 60% Detailed Design on Middle Road Bridge

Heritage Attribute	Potential Impact	Mitigation Measures
Elements that contribute to the historical value of the Middle Road Bridge include:		
<p>First example in Canada and the second example in North America of a reinforced concrete truss or tied arch bridge</p>	<p>No impact.</p> <p>Based on the 60% Detailed Design, the rehabilitation plan is to restore deteriorated elements of the substructure and superstructure and the bridge will be retained in place.</p>	<p>No mitigation measures required.</p>
<p>Located on the stone abutments of an earlier bridge over the Etobicoke Creek</p>	<p>Alteration (repair/rehabilitation) to a heritage attribute that is sympathetic to the historic fabric.</p> <p>Based on the 60% Detailed Design, the east and the west masonry walls require rehabilitation to fix deteriorated stone and mortar in the abutments. Stones will be preferably repaired then replaced. If new stone is required, the 60% Detailed Design indicates that stone found nearby the bridge will be used for replacement. Cement pointing mortar to be removed to prevent further scaling deterioration of stone masonry</p> <p>A new low concrete protection wall is included in the 60% Detailed Design plans as provisional. The plan is to tie into the existing west end abutment but install the wall so it can be removed if necessary. The wall is to offer protection from water to the original abutment.</p> <p>Based on the 60% Detailed Design, it is not anticipated that the rehabilitation plan for the abutments will be negative and will be rehabilitated in a sympathetic manner.</p>	<ul style="list-style-type: none"> • As proposed in the 60% Detailed Design, reuse cracked stone and if necessary, replace stone with nearby local field stone from the Etobicoke Creek Valley. Match the new stone to the form and material to the existing stone in the abutment. • Use a suitable mortar mixture compatible with the original mortar and sacrificial to the stone masonry • Use DHL (Dispersed Hydraulic Lime) on the masonry injection repairs, where required.
<p>Associated with O.L. Hicks of Humber Bay, who developed an inventive way of pouring concrete</p>	<p>N/A</p>	<p>N/A</p>

Table 2: Impacts of the 60% Detailed Design on Middle Road Bridge

Heritage Attribute	Potential Impact	Mitigation Measures
Designed by engineer Frank Barber of Barber and Young, Toronto	N/A	N/A
Features that contribute to the engineering value of the Middle Road Bridge include:		
Six vertical concrete hangers	<p>Alteration (patch repair) to a heritage attribute that is sympathetic to the historic fabric.</p> <p>Based on the 60% Detailed Design, the vertical concrete hangers will require patch repairs. These are the vertical members of the truss web system and are tension members. The diagonals are counterbraces.</p>	<ul style="list-style-type: none"> • Use an aggregate mixture similar to the existing bridge • Discouragement of using a tinted sealer
Seven-panelled parabolic bowstring trusses featuring massive arched compression chord, 22 inches by 24 inches (at the middle segment)	<p>Alteration (patch repair) to a heritage attribute that is sympathetic to the historic fabric.</p> <p>The truss includes the compression chord (top chord) and the bottom chord. The compression chord is reinforced with 12 rods, ¾ inches round and bonded with small rods spaced 6 inches apart except at the panel points. The hangers are bonded to the chord.</p> <p>Based on the 60% Detailed Design, there will be removal of deteriorated concrete and patch repairs of concrete to the chords. Based on the 60% Detailed Design, it is not anticipated that the rehabilitation plan for the concrete in the superstructure will be negative and will be rehabilitated in a sympathetic manner.</p>	<ul style="list-style-type: none"> • Use an aggregate mixture similar to the existing bridge • Discouragement of using a tinted sealer
Slim vertical tension members and a system of counter braces	See above (six vertical concrete hangers)	N/A
Truss joints specially designed so that members will fail in the body rather than at the joint	Alteration (repair/reconstruction) to a heritage attribute that is sympathetic to the historic fabric.	No mitigation measures required.

Table 2: Impacts of the 60% Detailed Design on Middle Road Bridge

Heritage Attribute	Potential Impact	Mitigation Measures
	<p>Originally, the east end of the truss was fixed to the abutment and the end bottom chord was free to move. Since the original construction of the bridge, the west deck was anchored to the abutment which resulted in restricted movement at the west end. The west end bottom chord sits on bearing plates so the concrete can expand and contract. The bottom chord has remained free to move on the original bearings.</p> <p>Based on the 60% Detailed Design, a floor beam and stringers will be reconstructed at the west abutment, so the floor beam is connected to the deck and the bottom chord is free to expand and contract with the truss relative to the abutment (S-5). The original brass bearings at the west end will be replaced during the repair of the bottom chord. The remaining floors beams, once the west abutment is repaired, will be patch repaired where required (S-7). The bearing cap is cracked and will be repaired.</p> <p>Based on the 60% Detailed Design, the rehabilitation plan for the truss joints is not an adverse impact and will allow the bridge to return to its original functional arrangement.</p>	
<p>12 steel rods, ¾ inches round, bounded with smaller rods spaced 6 inches apart</p>	<p>No impact.</p> <p>Based on the 60% Detailed Design, the steel reinforcement in the chords will not be impacted during the rehabilitation of the bridge.</p>	<p>No mitigation measures required.</p>
<p>No. 10 Standard metal reinforcing rods in the deck</p>	<p>No impact.</p> <p>The original floor was highly reinforced with the No. 10 standard expanded metal. Based on the 60% Detailed Design, the deck and curb will require patch repairs,</p>	<p>No mitigation measures required.</p>

Table 2: Impacts of the 60% Detailed Design on Middle Road Bridge		
Heritage Attribute	Potential Impact	Mitigation Measures
	including the removal of deteriorated concrete at particular locations (S-1)	
Concrete caps and posts (columns)	<p>Potential alteration (patch repair) to a heritage attribute that is sympathetic to the historic fabric.</p> <p>Based on the 60% Detailed Design, the caps and posts will be patch repaired, if necessary.</p>	<ul style="list-style-type: none"> • Ensure the posts and caps are protected during construction <ul style="list-style-type: none"> ○ Mark on detailed design drawings the location of the plaques affixed to the southwest and the northeast posts and install protection prior to construction. During construction, monitor the projection of the plaques. ○ Monitor vibration impacts to the caps from the jackhammer, if necessary. • Avoid connecting reconstructed timber fence at the east and west ends into the posts
Concrete baluster and railing	<p>Alteration (patch repair) to a heritage attribute that is sympathetic to the historic fabric.</p> <p>Based on the 60% Detailed Design, the railing system will be retained, and patch repaired. Some deteriorated concrete will require removal and will be repaired with concrete. The pickets and railing caps will be retained. The existing steel reinforcement will be protected. If steel reinforcing has deteriorated, in the railing system, then a glass fiber-reinforced polymer (GFRP) rebar will be added to the system. Patch repairs have been planned to be physically and visually compatible with the bridge. Therefore, the repair of this heritage attribute will not have a negative impact on the cultural heritage value of the bridge.</p>	<ul style="list-style-type: none"> • Use an aggregate mixture similar to the existing bridge • Discouragement of using a tinted sealer

Table 2: Impacts of the 60% Detailed Design on Middle Road Bridge

Heritage Attribute	Potential Impact	Mitigation Measures
Characteristics that contribute to the contextual value of the Middle Road Bridge include:		
Continued cultural use as a pedestrian transportation link between the former Counties of Peel and York (Mississauga and Toronto)	No impact. The rehabilitation plan ensures the continued safe use of the bridge as a pedestrian bridge between the cities of Mississauga and Toronto.	No mitigation measures required.
Located at the eastern terminus of Sherway Drive in view of the Queen Elizabeth Way	No impact. Based on the 60% Detailed Design, the rehabilitation plan is to restore deteriorated elements of the substructure and superstructure and the bridge will be retained in place.	No mitigation measures required.
Continued relationship to the adjacent natural lands of the Etobicoke Creek Valley which retain their connection to their historic rural setting within the now developed city	Potential Indirect Impact. Based on the 60% Detailed Design, tree removal will be required to repair masonry abutments. Other trees will be protected with fencing during construction. Based on the 60% Detailed Design, the construction staging areas have been suitably planned and avoid adverse impact to the natural lands surrounding the bridge. Staging area 1 is within the low flat land adjacent to the east abutment and the staging area 2 is within the pedestrian walkway west of the bridge approach.	<ul style="list-style-type: none"> • Construction and rehabilitation plan shall have minimal intervention in the Etobicoke Creek Valley <ul style="list-style-type: none"> ○ Avoid and retain to the greatest extent possible the trees adjacent to the bridge ○ As proposed in the 60% Detailed Design protect the trees prior to construction by hoarding with fence.
Scenic location	No impact. Based on the 60% Detailed Design, and the tree removal plan, the bridge will remain <i>in-situ</i> within the scenic location at the bottom of the Etobicoke Creek Valley crossing the creek.	No mitigation measures required.

6. Summary of Community Engagement

6.1 Context

Community engagement was undertaken as a part of this Heritage Impact Assessment. The subsections below include a summary of the consultation activities as well as relevant consultation and feedback undertaken as a part of the impact assessment.

6.2 Consultation

The following stakeholders were contacted with inquiries regarding background information on the Middle Road Bridge.

Contact	Organization	Date(s) of Communication	Description of Information Received
Kiki Aravopoulos	Ontario Heritage Trust	August 27, 2020	Initial engagement between the Cultural Heritage Specialist at AECOM and Kiki Aravopoulos. The process for OHT approval was explained. She confirmed OHT does not appear to have the original drawings on file for the bridge.
Sean Morris	Ministry of Transportation	August 29, 2020	Confirmed that MTO does not have original drawings of the bridge on file.
Paula Wubbenhorst	City of Mississauga Heritage Planner	August 31, 2021	Provided a photograph of the bridge taken by Mary Laughton in 1930, the 1985 General Arrangement of the bridge, and the 1984 "Sherway Heritage Bridge" heritage information as part of the designation file 17 111 84131
Kyle Neill	Peel Art Gallery Museum and Archives (PAMA)	September 4, 2020	Provided a list of bridge plans that are found in the County of Peel fonds- Middle Road Bridge is not on the list. A 1970 Planning Department overview was also provided for the bridges in Peel - Middle Road bridge was also not included, perhaps because the bridge was no longer an active traffic bridge. Provided scans of assorted County of Peel Committee minutes in a PDF that included Middle Road Bridge. The County newspaper index did not include the bridge name.
Evangeline Lee	Region of York Archives	September 8, 2020	Provided digital archives for Middle Road Bridge. The County of York Council minutes regarding the bridge in 1909 were provided. Due to Covid-19, she is working from home. Additional archives on the bridge may be housed on-site but were not accessible at the time of this report. Provided AECOM a link to the Archives of Ontario archives on the Barber fonds.

Table 3: Results of Consultation

Contact	Organization	Date(s) of Communication	Description of Information Received
Neil Park	Etobicoke Historical Society	September 8, 2020	The Etobicoke Historical Society does not have original drawings for the bridge. The society provided some newspaper articles on opening day October 26, 1909. Three photos of the bridge were provided from opening day. In addition to a link on O.L. Hicks: https://urldefense.proofpoint.com/v2/url?u=http-3A-www.etobicokehistorical.com_humber-2Dbayrsquos-2Doctavius-2Dlaing-2Dhicks-2Dwas-2Da-2Dmaster-2Dbridge-2Dbuilder.html&d=DwMFaQ&c=TQzoP61-bYDBLzNd0XmHrw&r=DtJXTPcpNdcf9MmrSCqlvhsrHjTJOeRKTykXs4CH_0&m=q8_7sGL9vWMWgR4iJVGFvCd2gwclAKgrjt1n4Trh8Y4&s=3C6tfU1Dv5Ou_2-eyl8i0vcJb3ycEHdcNstRcc2Zr80&e=
Serge Paquet, Reference Archivist	Archives of Ontario	September 10, 2020	Email had been sent to inquire about original drawings for the bridge. Stated they do not have original drawings for the bridge and directed AECOM to PAMA. Serge Paquet provided a PDF copy of a finding aid to the Frank Barber fonds (F2077). At the time of this report, due to COVID-19, the staff of AO were working remotely, and the fonds could not be accessed (confirmed again March 2 and April 27, 2021).
Nathan Holth	Historicbridge.org	September 30, 2020	Provided the Barber & Young article reprinted from Canadian Cement and Concrete Review, November 1909 issue. Provided May 1911 article on the reinforced concrete arch bridge named Benson Bridge in Ohio. Holth notes they were constructed the same year but has not discovered a connection between Barber and Gast (the bridge designers).
Kiki Aravopoulos	Ontario Heritage Trust	February 2, 2021	Provided the technical data sheet for the anti-graffiti system used on the City of Hamilton bridge on the York Boulevard Bridge.
Kiki Aravopoulos	Ontario Heritage Trust	March 3, 2021	Kiki Aravopoulos reviewed AECOM's Condition Assessment report and was supportive of the overall approach. Commented on: Epoxy Injection and proposes DHL. Raised concerns over using a tinted sealer. Prefers using a concrete mix close to existing bridge for patch repairs. AECOM revised the rehabilitation plans to use DHL, as opposed to epoxy, for injection repairs on the masonry were required.
Michael Bartlett	Chair, Canadian Society for Civil Engineering National History Committee Professor Emeritus of Civil and Environmental Engineering University of Western Ontario	March 18, 2021	CSCE decided to recognize the Middle Road Bridge as a CSCE Civil Engineering Historic Site roughly 10 years ago. Michael Bartlett provided AECOM with a short paper he authored for this summer's Canadian Society for Civil Engineering Annual Conference. Noted that Phyllis Rose wrote a Master's thesis at the University of Toronto "Frank Barber and his bridges" in 1985. AECOM was unable to request from the university at this time due to Covid-19. Provided AECOM with an article by Steven A. Walton on Canadian Aesthetic of Early Reinforced-Concrete Bridges.

6.3 Stakeholder/Agency Review of the Heritage Impact Assessment

This draft Heritage Impact Assessment has been distributed to the Ontario Heritage Trust for review. The Heritage Impact Assessment is a requirement as a part of the Ontario Heritage Trust approval process. In addition, the Alteration Request Form was submitted to the Ontario Heritage Trust on March 23, 2021. Once the report is reviewed by the Ontario Heritage Trust and this report will be updated with any input/feedback. In addition, the draft Heritage Impact Assessment will be provided to the following agencies and stakeholders to provide input:

- City of Toronto Heritage Planning
- City of Mississauga Heritage Planning Staff
- City of Mississauga Heritage Advisory Committee

Any input/feedback received will be incorporated into this report.

7. Recommendations

Standard 11 of the *Standards and Guidelines for the Conservation of Historic Places in Canada* (Parks Canada 2010) states that new construction may be needed to assure the continued use of the historic place. Standard 10 states that replacing elements that can be repaired are discouraged in a rehabilitation project. Standard 10 also states that if deterioration is not properly addressed, it can result in a loss of heritage value. In the case of Middle Road Bridge, the deteriorated parts of the constructed elements will be repaired in such a manner that is physically and visually compatible with the bridge. More specifically, the repairs to the west end of the bridge will return the bridge to its original functional arrangement and allow the bridge to move in the way it was intended, ultimately extending the service life of the bridge.

This HIA report did not find the proposed design to have direct negative impacts on the cultural heritage value of the structure. The 60% Detailed Design drawings provide opportunities for the greatest degree of conservation of cultural heritage value or interest while accommodating for improvements in infrastructure. As proposed, in the 60% Detailed Design of Middle Road Bridge, the rehabilitation will be done in a manner which conserves the heritage attributes and will be undertaken using recognized conservation methods to protect the bridge during the rehabilitation process.

The mitigation measures noted in **Table 2** support the rehabilitation plan proposed, while highlighting that the integration of new material in the repairs requires an appropriate substitute material to match as closely as possible in form, material, detailing, and be adequate strength.

Following the evaluation of potential impacts on the heritage attributes, the following recommendations should be considered and implemented for Middle Road Bridge:

1. Consider developing a conservation plan for Middle Road Bridge to ensure the bridge is conserved short and long term. A plan will guide any future repairs and alterations, as necessary.
2. Consult **Table 2** for recommended mitigation measures on repair design details. Ensure materials, assemblies and construction methods are well suited with the existing materials regarding the reinforced concrete superstructure and the masonry abutments.
 - Complete sample test finishes, including anti-graffiti coating
3. Any physical impact to the bridge requires municipal approval through a Heritage Alteration Permit (City of Mississauga) and Ontario Heritage Trust approval prior to construction.
4. Ensure there is minimal intervention in the Etobicoke Creek Valley and avoid tree removal to the greatest extent possible.

8. Photographs



Photograph 1:
View of bridge
from Sherway
Drive (AECOM,
2021)



Photograph 2:
Timber approach
barrier, looking
north (AECOM,
2021)



Photograph 3:
Portal view,
looking east
(AECOM, 2021)



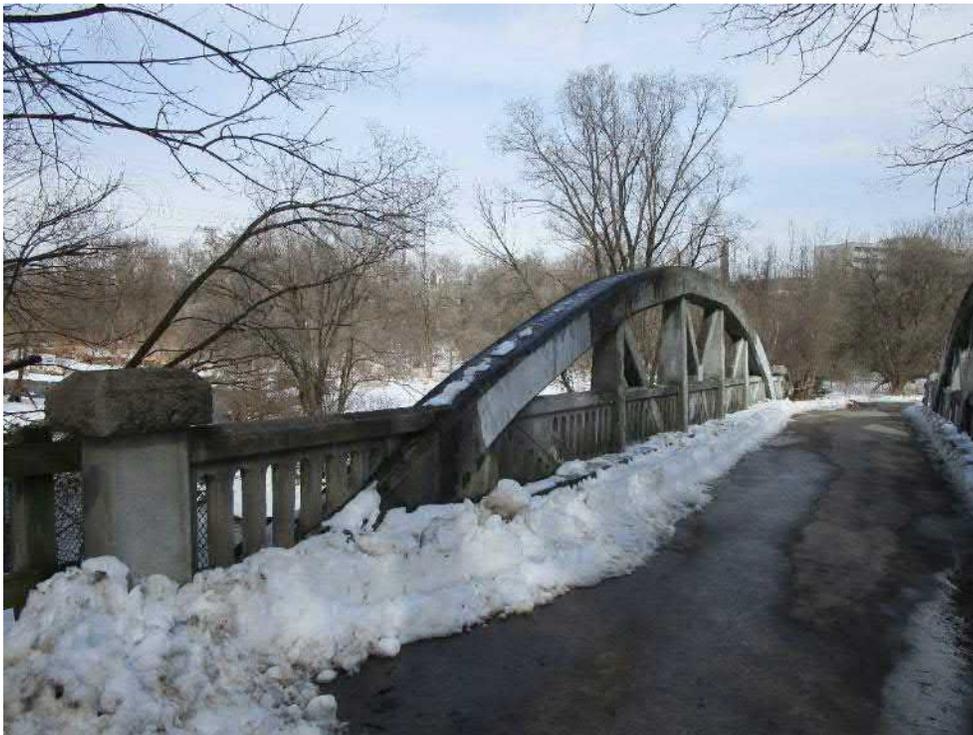
Photograph 4:
Commemorative
City of
Mississauga
plaque on
southwest end
post (BM Ross,
2018)



Photograph 5:
View of
southwest
wingwall and
abutment from
bridge (AECOM
2021)



Photograph 6:
Overview of
south seven-
panelled arch
(AECOM 2021)



Photograph 7:
Overview of north
seven-panelled
arch (AECOM,
2021)



Photograph 8:
West end
approach slab
(AECOM, 2021)



Photograph 9:
View of an arch
panel, north
elevation
(AECOM 2021)



Photograph 10:
View of an arch
panel, south
elevation
(AECOM, 2021)



Photograph 11:
Northeast end
post,
reconstructed in
1985, with
commemorative
City of Etobicoke
(Toronto) plaque
(AECOM 2021)



Photograph 12:
View of bridge,
looking west
(AECOM, 2021)



Photograph 13:
Portal view,
looking west
(AECOM, 2021)



Photograph 14:
East end
approach slab
(AECOM, 2021)



Photograph 15:
Upstream
Etobicoke Creek,
looking south
(AECOM 2021)



Photograph 16:
Downstream
Etobicoke Creek,
looking north
(AECOM, 2021)



Photograph 17:
Close-up of
pickets in railing
system (AECOM,
2021)



Photograph 18:
South elevation
of bridge, view
from the
proposed staging
area (AECOM,
2021)



Photograph 19:
View of the east
end abutment
(AECOM, 2021)



Photograph 20:
View of the southeast end wingwall from bridge (AECOM, 2021)



Photograph 21:
View of south bottom chord (AECOM, 2021)



Photograph 22:
View of
northwest
abutment and
wingwall
(AECOM, 2021)



Photograph 23:
View of west end
abutment and
wingwalls
(AECOM, 2021)

9. Map of Photographic Locations on an Aerial Image

10. References

AECOM

2021 Middle Road Bridge Condition Assessment. On file at AECOM.

Barber, F. and C.R. Young

1909 Canada's First Concrete Truss Bridge. Reprinted for the Canadian Cement and Concrete Review November 1909.

Bartlett, F. M.

2021 A brief history of the Middle Road Bridge. Prepared for the CSCE 2021 Annual Conference. Courtesy of Michael Bartlett, Department of Civil and Environmental Engineering, University of Western Ontario.

City of Mississauga

2016 OSIM Biennial Inspection Report- Middle Road Park- 01 Bridge. On file with the City.

County of Peel

1905-1913 Committee Minutes. The reports were found in a single volume that can be referenced as County of Peel council minutes, reports, and bylaws (published), 1905-1913, file 25, series 5, County of Peel fonds (RG12), Region of Peel Archives.

Gast, E.A.

1911 Reinforced Concrete Through Arch Bridge in Ohio. Ohio Engineering Society. Thirty-Second Annual Meeting.

Globe and Mail

1909 "New Idea in Bridges". Handsome Trussed Concrete Bridge on the Etobicoke. Thursday, October 28, 1909.

Ministry of Heritage, Sport, Tourism, and Culture Industries (MHSTCI)

1980 *Guidelines on the Man-Made Heritage Component of Environmental Assessments*. Prepared by Weiler. Toronto: Historical Planning and Research Branch, Ontario Ministry of Culture and Recreation.

1991 *Ontario Heritage Bridge Program*. Toronto: Queen's Printer.

2006 *Ontario Heritage Tool Kit*. Accessed online at:
http://www.mtc.gov.on.ca/en/heritage/heritage_toolkit.shtml

2010 *Standards & Guidelines for the Conservation of Provincial Heritage Properties*. Accessed online at:
http://www.mtc.gov.on.ca/en/heritage/MTCS_Heritage_IE_Process.pdf

Ministry of Transportation, Ontario

2008 *Ontario Heritage Bridge Guidelines for Provincially Owned Bridges*. Toronto: MTO, Planning and Environment Office.

Toronto Star

1909 Of Concrete Alone is This New Bridge. Tuesday, October 26, 1909.

Walton, S.A.

1995 Canadian Aesthetics of Early Reinforced-Concrete Bridges. *The Journal of the Society of Industrial Archaeology*. Vol. 21, No. 1, pp 5-14.

Appendix A: City of Mississauga By-law 1101-86 and Heritage Information



An agency of the Government of Ontario



Un organisme du gouvernement de l'Ontario

This document was retrieved from the Ontario Heritage Act Register, which is accessible through the website of the Ontario Heritage Trust at **www.heritagetrust.on.ca**.

Ce document est tiré du registre aux fins de la *Loi sur le patrimoine de l'Ontario*, accessible à partir du site Web de la Fiducie du patrimoine ontarien sur **www.heritagetrust.on.ca**.



Terence L. Julian, A.M.C.T., C.M.C.
City Clerk

Leonard M. McGillivray
Deputy City Clerk

OFFICE OF THE CLERK

November 17, 1986.

Mr. R. F. Cloutier,
Clerk,
City of Etobicoke,
Civic Centre,
Etobicoke, Ontario.
M9C 2Y2

Dear Sir:

Re: Middle Road Bridge -
Sherway Drive across Etobicoke Creek
Notice of Passing of By-law
Our File: I.10.84004

I enclose for your retention, a copy of By-law #1101-86, being a By-law to designate the "Middle Road Bridge" located on Sherway Drive across the Etobicoke Creek in the City of Mississauga and in the City of Etobicoke as being of architectural value and of historical interest.

Yours very truly,

Dorene Vinter

Dorene Vinter, (Mrs.)
Committee Coordinator.

/le
Encl.

cc: Ontario Heritage Foundation
M. L. Evans, City Curator
B. Mann, Planning Department



BY-LAW NUMBER 1101-86

To designate the "Middle Road Bridge" located on Sherway Drive across the Etobicoke Creek, in the City of Mississauga, and in the City of Etobicoke, as being of architectural value and of historical interest.

WHEREAS The Ontario Heritage Act, R.S.O. 1980, Chapter 337, authorizes the Council of a municipality to enact by-laws to designate real property including all the buildings and structures thereon, to be of historic or architectural value or interest; and

WHEREAS Notice of Intention to so designate the "Middle Road Bridge", located on Sherway Drive across the Etobicoke Creek, in the City of Mississauga, and in the City of Etobicoke, having been duly published and served and no notice of objection to such designation having been received by the Council of the Corporation of the City of Mississauga.

WHEREAS the reasons for the said designation are set out as Schedule 'A' hereto;

THEREFORE the Council of The Corporation of the City of Mississauga enacts as follows:

1. That the real property, more particularly described in Schedules 'B' and 'C' hereto, known as the "Middle Road Bridge", located on Sherway Drive across the Etobicoke Creek, in the City of Mississauga and in the City of Etobicoke, be designated as being of architectural value and historical interest.
2. That the City Clerk is hereby authorized to cause a copy of this by-law to be served upon the owner of the aforesaid property and upon the Ontario Heritage Foundation and to cause notice of this by-law to be published in a newspaper having general circulation in the City of Mississauga.
3. That the City Solicitor is hereby directed to register a copy of this by-law against the subject property.

ENACTED AND PASSED, this 27th day of October, 1986.

[Signature]
L. McGILLIVRAY
DEPUTY CITY CLERK
CITY OF MISSISSAUGA

[Signature]
MAYOR
[Signature]
CLERK

APPROVED AS TO FORM
OF EXECUTIVE
City Solicitor
MISSISSAUGA
<i>[Signature]</i>
Date <u>24/10/86</u>

SCHEDULE 'A' TO BY-LAW NO. *1101-86*

SHORT STATEMENT OF THE REASONS FOR

THE PROPOSED DESIGNATION

The Middle Road Bridge across the Etobicoke Creek is listed on the City of Mississauga Heritage Inventory and recommended for designation for its historical and architectural significance. Designed and built in 1909 by Frank Barber and C. W. Young, the Middle Road Bridge is a reinforced concrete tied arch or truss bridge. It is the first structure of this type built in Canada.

SCHEDULE 'B' to BY-LAW ~~1101~~-86

Description: Part of Lot 3, Concession 1 South of Dundas Street and part of the Un-Named Road, Plan TOR-15, City of Mississauga

ALL AND SINGULAR those certain parcels or tracts of land and premises situate, lying and being in the City of Mississauga, Regional Municipality of Peel (formerly the Township of Toronto, County of Peel), Province of Ontario and being composed of:

FIRSTLY: That portion of Lot 3, Concession 1 South of Dundas Street designated as Part 1 on a Plan of Survey deposited in the Land Registry Office for the Registry Division of Peel as 43R-13767; said portion being established as part of Sherway Drive by Township of Toronto By-law 3301 (registered in said Land Registry Office as By-law 764).

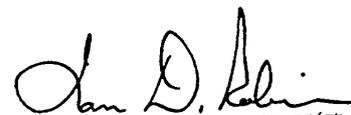
SECONDLY: That portion of the Un-Named Road according to a Plan of Road through part of Lots 3 and 4, Concession 1 South of Dundas Street, prepared by Edgar Bray, Provincial Land Surveyor, registered May 31, 1887 and referred to as TOR-15, designated as Part 2 on a Plan of Survey deposited in said Land Registry Office as 43R-13767. Said Part 2 being established as part of Sherway Drive by the aforementioned Toronto Township By-law number 3301.

... 2

THIRDLY:

That portion of Lot 3, Concession 1 South of Dundas Street designated as Part 3 on a Plan of Survey deposited in the said Land Registry Office as 43R-13767; said Part 3 being established as part of Sherway Drive by Township of Toronto By-law number 5045 (registered in said Land Registry Office as By-law number 938).

October 15, 1986



Ian D. Robinson,
Ontario Land Surveyor.

SCHEDULE 'C' to BY-LAW *1101-86*

Description: Part of Lot 13, Concession 2, Colonel Smith's Tract and part of the Road Allowance between Concessions 2 and 3, Colonel Smith's Tract

ALL AND SINGULAR those certain parcels or tracts of land and premises situate, lying and being in the City of Etobicoke, Municipality of Metropolitan Toronto (formerly the Township of Etobicoke, County of York), Province of Ontario and being composed of:

FIRSTLY: Those portions of the Road Allowance between Concessions 2 and 3, Colonel Smith's Tract designated as Parts 4 and 6 on a Plan of Survey deposited in the Land Registry Office for the Registry Division of Toronto Boroughs as 64R-11165; said Parts 4 and 6 now being part of Sherway Drive by Township of Etobicoke By-law number 10832 (registered in said Land Registry Office as Instrument number 2855).

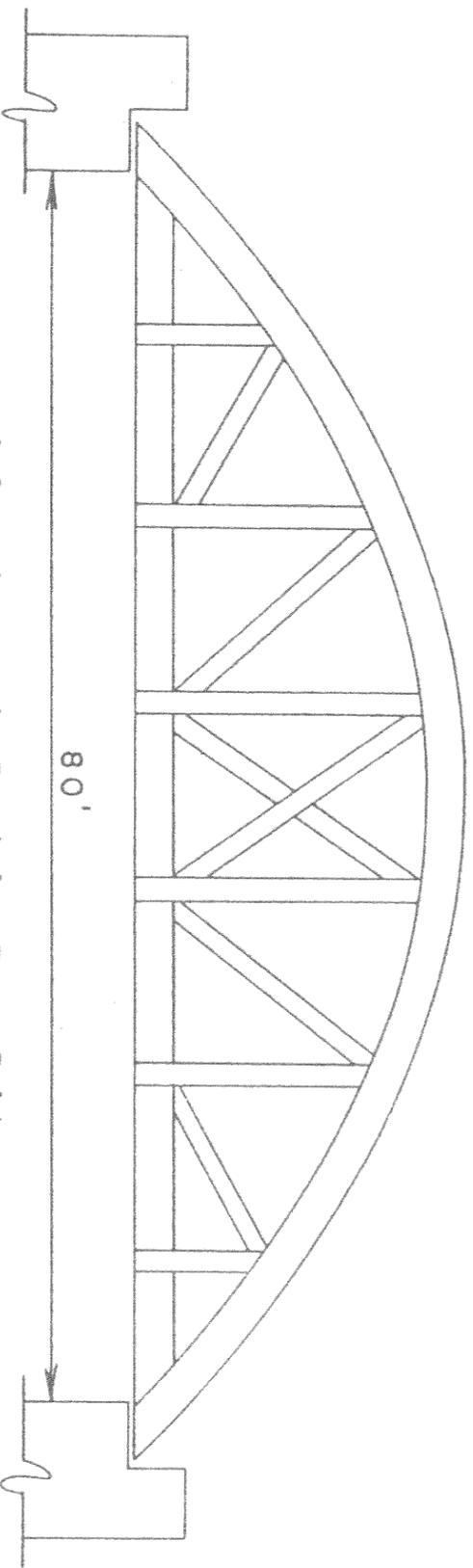
SECONDLY: That portion of Lot 13, Concession 2, Colonel Smith's Tract designated as Part 5 on a Plan of Survey deposited in said Land Registry Office as 64R-11165; said Part 5 being established as public highway by City of Etobicoke By-law number 1986-105 and City of Mississauga By-law number 621-86 (registered in said Land Registry Office as Instrument numbers TB335255 and TB335179 respectively).



Ian D. Robinson,
Ontario Land Surveyor.

October 15, 1986

SHERWAY HERITAGE BRIDGE



Reinforced Concrete Bowstring Truss Bridge
on the Middle Road (Sherway Drive)
between the Counties of York and Peel,
(now Cities of Etobicoke and Mississauga).
Handrailing not shown - Sketch not to scale.

DESIGNER: Frank Barber of Barber and Young, Bridge and Structural Engineers,
Toronto, Ontario.

CONTRACTOR: O.L. Hicks of Humber Bay.

BUILT IN: 1909 - The first of its kind to be built in Canada. Originator of
the concrete truss was Consideré, an eminent French Engineer.

DESIGNATED: In 1983 as a historic site by the Etobicoke Historical Board and
listed in the Heritage Bridge List prepared by the M.T.C. and
M.C.C. See attached evaluation criteria.

LOADING: Dead Load - 200 tons
Live Load a) 10 tons on two axles including 50% of the
L.L. for impact.
b) Plus a distributed load of 100 p.s.f.

Tested at the official opening with a concentrated load of ten
tons moving across the bridge, and by a herd of seventy cattle
weighing probably 35 tons.

ROADWAY WIDTH: 16 feet

EXPANSION: Provided at one end by brass plates sliding between steel plates.

.../....

...2...

REINFORCING: Consisted of plain round rods except for the floors which were reinforced with No. 10 standard expanded metal. Approximately 13 tons of reinforcing were placed in the bridge.

To avoid the development of hair cracks in the concrete in the lower chord the reinforcing was pretensioned before the concrete was poured by an ingenious device of the Contractor.

CONCRETE: The concrete mix was one of cement to three of aggregate consisting of sand and crushed stone. The bridge was concreted in one week. Extraordinary care was taken to avoid poor bonding of successive days' work. For this purpose cracked ice was laid in bags upon the last concrete placed at night, and this was found to be perfectly plastic the next morning as if it had just been poured. This method of keeping the concrete from settling resulting in a perfect bond between concrete placed on successive days, was the invention of O.L. Hicks, the Contractor for the bridge.

Moist curing was achieved by keeping the forms and floor wet for a whole week. The concrete matured without showing any checks or hair cracks.

TRUSS JOINTS: Specially designed truss joints so that any member would fail in the body rather than at the joint. Technical details of joint design not available.

TRUSS vs ARCH: The reason that a truss was adopted at the Middle Road rather than an Arch was that the truss bridge utilized the old stone abutments and the arch design could not as the abutments were not originally designed to take the thrust forces from an arch bridge.

March 16, 1984
File: 17 111 84131

Appendix B: City of Etobicoke By-law 1986-281



CITY OF ETOBICOKE
BY-LAW NUMBER

1986-281

BOX NUMBER

274008

Produced according to archival standards for the creation
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SUPPLEMENTARY FILE

1986-281-01.tif
[naming convention for oversized scans]



The Corporation of the City of Etobicoke

BY-LAW Number 1986-281

A BY-LAW TO DESIGNATE MIDDLE ROAD BRIDGE
CITY OF ETOBICOKE

WHEREAS the Ontario Heritage Act authorizes the Council of a municipality to enact by-laws to designate real property, including the buildings and structures thereon, to be of historic or architectural value or interest;

AND WHEREAS the bridge over the Etobicoke Creek connecting Sherway Drive in the City of Mississauga, with Sherway Drive in the City of Etobicoke, known as the Middle Road Bridge, is a boundary line bridge under the joint jurisdiction of the Corporation of the City of Etobicoke and the Corporation of the City of Mississauga, pursuant to the provisions of Section 90 of the Municipality of Metropolitan Toronto Act, R.S.O 1980, c. 314, as amended and Section 43 of the Regional Municipality of Peel Act, R.S.O. 1980, c. 440, as amended;

AND WHEREAS the aforesaid lands and premises are more particularly described in Schedules "A" and "B" attached hereto;

AND WHEREAS the Council of the Corporation of the City of Etobicoke has caused to be served upon the Ontario Heritage Foundation notice of intention to so designate the aforesaid real property and has caused such notice of intention to be published in a newspaper having general circulation in the Municipality once for each of three consecutive weeks;

AND WHEREAS the reasons for designation are set out in Schedule "C" attached hereto;

AND WHEREAS no notice of objection to the said proposed designation has been served upon the Clerk of the Municipality;

AND WHEREAS it is understood that the Corporation of the City of Mississauga has passed a By-law similar to this By-law to designate the aforesaid real property pursuant to the Ontario Heritage Act;

NOW THEREFORE THE MUNICIPAL COUNCIL OF THE CORPORATION OF THE CITY OF ETOBICOKE ENACTS AS FOLLOWS:

BY-LAW Number 1986-281

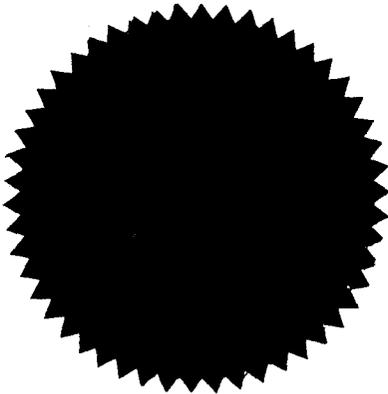
1. THAT the real property known as the Middle Road Bridge, more particularly described in Schedules "A" and "B" attached hereto, is designated as being of historical and architectural interest pursuant to the terms of the Ontario Heritage Act.

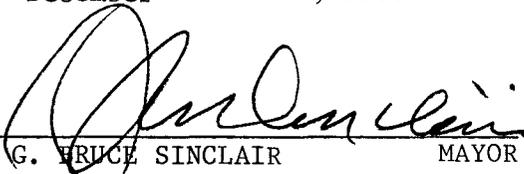
2. THAT the City solicitor be authorized to cause a copy of this By-law to be registered against the real property described in Schedules "A" and "B" attached hereto in the proper Land Registry Office.

3. THAT the City Clerk be authorized to cause a copy of this By-law to be served upon the Ontario Heritage Foundation and to cause notice of this By-law to be published in a newspaper having general circulation in the City of Etobicoke.

4. THAT this By-law shall take effect upon the registration thereof in the appropriate Registry Office.

ENACTED AND PASSED this 15th day of December, 1986.




G. BRUCE SINCLAIR MAYOR


ROGER F. CLOUTIER CLERK

BY-LAW Number 1986-281

SCHEDULE "A"

Description: Part of Lot 3, Concession 1 South of Dundas Street
and part of the Un-Named Road, Plan TOR-15, City
of Mississauga (part of Sherway Drive to be closed)

ALL AND SINGULAR those certain parcels or tracts of land and premises
situate, lying and being in the City of Mississauga, Regional Municipality
of Peel (formerly the Township of Toronto, County of Peel), Province of
Ontario and being composed of:

FIRSTLY: That portion of Lot 3, Concession 1 South of Dundas Street
designated as Part 1 on a Plan of Survey deposited in the Land
Registry Office for the Registry Division of Peel as 43R-13767;
said portion being established as part of Sherway Drive by
Township of Toronto By-law 3301 (registered in said Land
Registry Office as By-law 764).

SECONDLY: That portion of the Un-Named Road according to a Plan of Road
through part of Lots 3 and 4, Concession 1 South of Dundas
Street, prepared by Edgar Bray, Provincial Land Surveyor,
registered May 31, 1887 and referred to as TOR-15, designated as
Part 2 on a Plan of Survey deposited in said Land Registry
Office as 43R-13767. Said Part 2 being established as part of
Sherway Drive by the aforementioned Toronto Township By-law No.
3301.

BY-LAW Number 1986-281

SCHEDULE "B"

Description: Part of Lot 13, Concession 2, Colonel Smith's Tract and part of the Road Allowance between Concessions 2 and 3, Colonel Smith's Tract (part of Sherway Drive to be closed)

ALL AND SINGULAR those certain parcels or tracts of land and premises situate, lying and being in the City of Etobicoke, in the Municipality of Metropolitan Toronto (formerly the Township of Etobicoke, County of York), Province of Ontario and being composed of:

FIRSTLY: Those portions of the Road Allowance between Concessions 2 and 3, Colonel Smith's Tract designated as Parts 4 and 6 on a Plan of Survey deposited in the Land Registry Office for the Registry Division of Toronto Boroughs as 64R-11165; said Parts 4 and 6 now being part of Sherway Drive by Township of Etobicoke By-law No. 10832 (registered in said Land Registry Office as Instrument No. 2855).

SECONDLY: That portion of Lot 13, Concession 2, Colonel Smith's Tract designated as Part 5 on a Plan of Survey deposited in said Land Registry Office as 64R-11165; said Part 5 being established as public highway by City of Etobicoke By-law No. 1986-105 and City of Mississauga By-law No. 621-86 (registered in said Land Registry Office as Instrument No's TB 335255 and TB 335179 respectively).

THIRDLY: That portion of Lot 3, Concession 1 South of Dundas Street designated as Part 3 on a Plan of Survey deposited in the said Land Registry Office as 43R-13767; said Part 3 being established as part of Sherway Drive by Township of Toronto By-law No. 5045 (registered in said Land Registry Office as By-law No. 938).

BY-LAW Number 1986-281

SCHEDULE "C"

MIDDLE ROAD BRIDGE

REASONS FOR DESIGNATION

Officially opened in October, 1909, the concrete truss bridge which spans the Etobicoke Creek in the cities of Etobicoke and Mississauga was the first structure of its kind to be erected in Canada and one of the first to be constructed in North America. The bridge was designed and erected under the supervision of Barber & Young, Bridge and Structural Engineers, of Toronto. The contractor was Mr. O. L. Hicks, of Humber Bay.

During construction and after completion, the bridge aroused a great deal of interest among engineers and municipal officials by its novel character. Concrete was felt to be suitable for a bridge on a grade. At this location, teams could not be prevented from trotting over the bridge. On opening day, it was tested with a concentrated load of ten tons moving across the bridge, and by a herd of seventy cattle, all that could be crowded upon the bridge, weighing approximately thirty-five tons. The resulting vibration was likely to loosen joints and crystallize steel, but was almost non-existent in concrete.

RENDERED FOR
DUPLICATE

FOR OFFICE USE ONLY

NUMBER

TB 39 54 77

CERTIFICATE OF
REGISTRATION 11:07 A.M.

MAR 10 1987

TORONTO BOROUGHS
No. 64, TORONTO

Dandy
LAND REGISTRAR

New Property Identifiers

Additional:
See Schedule

Executions

Additional:
See Schedule

(1) Registry <input checked="" type="checkbox"/> Land Titles <input type="checkbox"/>		(2) Page 1 of 6 pages	
(3) Property Identifier(s)		Block	Property
(4) Nature of Document BY-LAW 1987- 281			
(5) Consideration Dollars \$			
(6) Description FIRSTLY: Part of the Road Allowance between Concessions 2 and 3, Colonel Smith's Tract, in the City of Etobicoke, in the Municipality of Metropolitan Toronto being designated as Parts 4 and 6 on Plan 64R-11165; SECONDLY: Part of Lot 13, Concession 2, Colonel Smith's Tract, in the City of Etobicoke, in the Municipality of Metropolitan Toronto being designated as Part 5 on Plan 64R-11165.			
(7) This Document Contains:		(a) Redescription New Easement Plan/Sketch <input type="checkbox"/>	(b) Schedule for: Description <input type="checkbox"/> Additional Parties <input type="checkbox"/> Other <input checked="" type="checkbox"/>

(8) This Document provides as follows:

A certified copy of By-law 1987- 281 being a By-law passed by The Corporation of the City of Etobicoke on the 15th day of December, 1986 to designate certain lands as being of historical and architectural interest pursuant to the Ontario Heritage Act.

Continued on Schedule

(9) This Document relates to instrument number(s)

(10) Party(ies) (Set out Status or Interest)

Name(s)

Signature(s)

Date of Signature

THE CORPORATION OF THE CITY OF
ETOBICOKE by its solicitors,
REBLE, RITCHIE & HEROLD

Bruce Ketcheson
Per: Bruce Ketcheson

Y	M	D
1987	03	09

(11) Address for Service

Etobicoke City Hall, 399 The West Mall, Etobicoke, Ontario M9C 2Y2

(12) Party(ies) (Set out Status or Interest)

Name(s)

Signature(s)

Date of Signature

(13) Address for Service

(14) Municipal Address of Property
Not Assigned

(15) Document Prepared by:

REBLE, RITCHIE & HEROLD
1 Eva Road, Suite 100
Etobicoke, Ontario
M9C 4Z5

Fees and Tax	
Registration Fee	
Total	

Reble, Ritchie & Herold
BARRISTERS, SOLICITORS, NOTARIES
CLERK'S DEPT.

John H. Reble, B.A., LL.B.
John C.L. Ritchie, B.Sc.Eng., P.Eng., LL.B.
Casimir N. Herold, Q.C.
Bruce C. Ketcheson, B.A., LL.B.
Patricia E. Wright, B.Mus.A., LL.B.
Mary Ellen Bench, B.A., LL.B.

1987 MAR 13 PM 3:43
Eva Road, Suite 100
Etobicoke, Ontario M9C 4Z5

Telephone: (416) 622-6601

Counsel: Clifford E. Shand, Q.C.

March 12, 1987

City of Etobicoke
Clerk's Department
399 The West Mall
Etobicoke, Ontario
M9C 2Y2

Attention Mr. R.S. Gillespie
Deputy City Clerk

Dear Sir:

Re: City of Etobicoke By-law 1987-281 - To designate certain
lands as being of historical and architectural interest pursuant
to the Ontario Heritage Act

Enclosed herewith please find the duplicate registered copy of
By-law 1987-281 which was registered at the Land Registry Office at
Toronto on March 10, 1987 as Instrument No.T.B.395477.

Yours truly,

REBLE, RITCHIE & HEROLD

Per: *P. Kennedy*

Patti Kennedy

:pk
Enclosure



City of Etobicoke

8.7 /

Departmental

Memorandum

RECEIVED
CLERK'S DEPT.

1987 FEB 16 AM 9:28
Ray

To: City Clerk
Attn: Mrs. D. Harris

From: Mr. G.A. Thompson,
Director of Industrial Development

Date: February 16, 1987

Subject: By-law 1986-281

Attached for the consideration of Council is a draft by-law which is required to correct description errors. One paragraph was put on the wrong page when the original was prepared at Mississauga.

G.A. Thompson,
Director of Industrial Development

GAT/hb
Attach.

Reble, Ritchie
BARRISTERS, SOLICITORS, NOTARIES

John H. Reble
John C.L. Ritchie
Wolfgang J. Pazulla
Bruce C. Ketcheson
Mary Ellen Bench

1 Eva Road, Suite 100
Etobicoke, Ontario M9C 4Z5

Telephone: (416) 622-6601

February 17, 1987

Mr. Ron Gillespie
Clerk's Department
Etobicoke City Hall
Etobicoke, Ontario

Dear Sir:

Re: Etobicoke re By-law No. 1986-281

By-law 1986-281 was proposed by Council for the purpose of designating the Middle Road Bridge pursuant to the Ontario Heritage Act. Said By-law contained descriptions set out in Schedules "A" and "B" thereto of the lands and premises affected by the designation. It has been determined that the said Schedules contain an error in description. We have prepared and attach with this letter a by-law correcting the said Schedules and would ask that you place it on the agenda for consideration by Council at its meeting to be held on February 23, 1987.

Yours truly,

REBLE, RITCHIE

Per: 

Bruce C. Ketcheson

BCK/lb

cc: Glenn Thompson

RECEIVED
CLERKS DEPT.
1987 FEB 18 PM 3:27



The Corporation of the City of Etobicoke

BY-LAW Number 1986-281

A BY-LAW TO DESIGNATE MIDDLE ROAD BRIDGE CITY OF ETOBICOKE

WHEREAS the Ontario Heritage Act authorizes the Council of a municipality to enact by-laws to designate real property, including the buildings and structures thereon, to be of historic or architectural value or interest;

AND WHEREAS the bridge over the Etobicoke Creek connecting Sherway Drive in the City of Mississauga, with Sherway Drive in the City of Etobicoke, known as the Middle Road Bridge, is a boundary line bridge under the joint jurisdiction of the Corporation of the City of Etobicoke and the Corporation of the City of Mississauga, pursuant to the provisions of Section 90 of the Municipality of Metropolitan Toronto Act, R.S.O. 1980, c. 314, as amended and Section 43 of the Regional Municipality of Peel Act, R.S.O. 1980, c. 440, as amended;

AND WHEREAS the aforesaid lands and premises are more particularly described in Schedules "A" and "B" attached hereto;

AND WHEREAS the Council of the Corporation of the City of Etobicoke has caused to be served upon the Ontario Heritage Foundation notice of intention to so designate the aforesaid real property and has caused such notice of intention to be published in a newspaper having general circulation in the Municipality once for each of three consecutive weeks;

AND WHEREAS the reasons for designation are set out in Schedule "C" attached hereto;

AND WHEREAS no notice of objection to the said proposed designation has been served upon the Clerk of the Municipality;

AND WHEREAS it is understood that the Corporation of the City of Mississauga has passed a By-law similar to this By-law to designate the aforesaid real property pursuant to the Ontario Heritage Act;

NOW THEREFORE THE MUNICIPAL COUNCIL OF THE CORPORATION OF THE CITY OF ETOBICOKE ENACTS AS FOLLOWS:

BY-LAW Number 1986-281

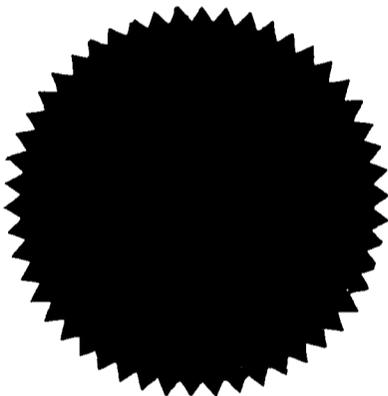
1. THAT the real property known as the Middle Road Bridge, more particularly described in Schedules "A" and "B" attached hereto, is designated as being of historical and architectural interest pursuant to the terms of the Ontario Heritage Act.

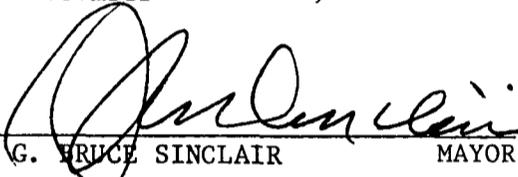
2. THAT the City solicitor be authorized to cause a copy of this By-law to be registered against the real property described in Schedules "A" and "B" attached hereto in the proper Land Registry Office.

3. THAT the City Clerk be authorized to cause a copy of this By-law to be served upon the Ontario Heritage Foundation and to cause notice of this By-law to be published in a newspaper having general circulation in the City of Etobicoke.

4. THAT this By-law shall take effect upon the registration thereof in the appropriate Registry Office.

ENACTED AND PASSED this 15th day of December, 1986.




G. BRUCE SINCLAIR MAYOR


ROGER F. CLOUTIER CLERK

CERTIFIED A TRUE COPY
AS AMENDED.

DEPUTY CLERK, CITY OF ETOBICOKE

BY-LAW Number 1986-281

SCHEDULE "A"

Description: Part of Lot 3, Concession 1 South of Dundas Street and part of the Un-Named Road, Plan TOR-15, City of Mississauga (part of Sherway Drive to be closed)

ALL AND SINGULAR those certain parcels or tracts of land and premises situate, lying and being in the City of Mississauga, Regional Municipality of Peel (formerly the Township of Toronto, County of Peel), Province of Ontario and being composed of:

FIRSTLY: That portion of Lot 3, Concession 1 South of Dundas Street designated as Part 1 on a Plan of Survey deposited in the Land Registry Office for the Registry Division of Peel as 43R-13767; said portion being established as part of Sherway Drive by Township of Toronto By-law 3301 (registered in said Land Registry Office as By-law 764).

SECONDLY: That portion of the Un-Named Road according to a Plan of Road through part of Lots 3 and 4, Concession 1 South of Dundas Street, prepared by Edgar Bray, Provincial Land Surveyor, registered May 31, 1887 and referred to as TOR-15, designated as Part 2 on a Plan of Survey deposited in said Land Registry Office as 43R-13767. Said Part 2 being established as part of Sherway Drive by the aforementioned Toronto Township By-law No. 3301.

THIRDLY: That portion of Lot 3, Concession 1 South of Dundas Street designated as Part 3 on a Plan of Survey deposited in the said Land Registry Office as 43R-13767; said Part 3 being established as part of Sherway Drive by Township of Toronto By-law No. 5045 (registered in said Land Registry Office as By-law No. 938).

BY-LAW Number 1986-281

SCHEDULE "B"

Description Part of Lot 13, Concession 2, Colonel Smith's Tract and part of the Road Allowance between Concessions 2 and 3, Colonel Smith's Tract (part of Sherway Drive to be closed)

ALL AND SINGULAR those certain parcels or tracts of land and premises situate, lying and being in the City of Etobicoke, Municipality of Metropolitan Toronto (formerly the Township of Etobicoke, County of York), Province of Ontario and being composed of:

FIRSTLY: Those portions of the Road Allowance between Concessions 2 and 3, Colonel Smith's Tract designated as Parts 4 and 6 on a Plan of Survey deposited in the Land Registry Office for the Registry Division of Toronto Boroughs as 64R-11165; said Parts 4 and 6 now being part of Sherway Drive by Township of Etobicoke By-law No. 10832 (registered in said Land Registry Office as Instrument No. 2855).

SECONDLY: That portion of Lot 13, Concession 2, Colonel Smith's Tract designated as Part 5 on a Plan of Survey deposited in said Land Registry Office as 64R-11165; said Part 5 being established as public highway by City of Etobicoke By-law No. 1986-105 and City of Mississauga By-law No. 621-86 (registered in said Land Registry Office as Instrument No.'s TB335255 and TB335179 respectively).

BY-LAW Number 1986-281

SCHEDULE "C"

MIDDLE ROAD BRIDGE

REASONS FOR DESIGNATION

Officially opened in October, 1909, the concrete truss bridge which spans the Etobicoke Creek in the cities of Etobicoke and Mississauga was the first structure of its kind to be erected in Canada and one of the first to be constructed in North America. The bridge was designed and erected under the supervision of Barber & Young, Bridge and Structural Engineers, of Toronto. The contractor was Mr. O. L. Hicks, of Humber Bay.

During construction and after completion, the bridge aroused a great deal of interest among engineers and municipal officials by its novel character. Concrete was felt to be suitable for a bridge on a grade. At this location, teams could not be prevented from trotting over the bridge. On opening day, it was tested with a concentrated load of ten tons moving across the bridge, and by a herd of seventy cattle, all that could be crowded upon the bridge, weighing approximately thirty-five tons. The resulting vibration was likely to loosen joints and crystallize steel, but was almost non-existent in concrete.

15.

Reble, Ritchie
BARRISTERS, SOLICITORS, NOTARIES

John H. Reble
John C.L. Ritchie
Wolfgang J. Pazulla
Bruce C. Ketcheson
Mary Ellen Bench

1 Eva Road, Suite 100
Etobicoke, Ontario M9C 4Z5

Telephone: (416) 622-6601

December 12, 1986

Mayor Bruce Sinclair and
Members of Council
Etobicoke City Hall
Etobicoke, Ontario

Mayor Sinclair and Members of Council:

Re: Designation of the Middle Road Bridge Under
the Ontario Heritage Act

Pursuant to Council's instructions, we have prepared and forwarded with this report a by-law designating the Middle Road Bridge as a historic structure pursuant to the Ontario Heritage Act. This designation is being carried out jointly with the City of Mississauga, which has enacted a similar by-law. The reasons for designation for the bridge are set forth under Schedule "C" to the by-law.

Upon passage of the by-law, a copy of it will be registered on title and served upon the Ontario Heritage Foundation. It will also be necessary to publish notice of the passage of the by-law in a newspaper having general circulation within the municipality.

While the passage of this by-law will establish the historic designation on the structure, a number of subsidiary matters remain to be completed. These include the execution of an agreement between the City of Etobicoke and the City of Mississauga with respect to the maintenance of the structure, and the execution of an encroachment agreement between both municipalities and the Ontario Heritage Foundation with respect to the use of the structure. It will also be necessary to pass a by-law closing that portion of Sherway Drive forming part of the approaches to the bridge and covered under the historic designation. We understand that notice of the intention to pass this by-law has been circulated.

We will keep you advised as to further developments with respect to this matter as they occur.

Yours truly,

REBLE, RITCHIE

Per: 

Bruce C. Ketcheson

BCK/lb



The Corporation of the City of Etobicoke

BY-LAW Number 1987-36

A BY-LAW TO AMEND BY-LAW NO. 1986-281

WHEREAS By-law No. 1986-281 designated the Middle Road Bridge pursuant to the Ontario Heritage Act;

AND WHEREAS Schedules "A" and "B" attached to the said By-law contain descriptions of the lands and premises affected by the aforesaid designation;

AND WHEREAS it has been determined that the said Schedules do not properly describe the aforesaid lands and premises;

NOW THEREFORE the Municipal Council of the Corporation of the City of Etobicoke enacts as follows:

1. That By-law No. 1986-281 be and the same is hereby amended by deleting Schedules "A" and "B" attached thereto and by affixing thereto Schedules "A" and "B" attached hereto.

ENACTED AND PASSED this 23rd day of February , 1987.

MAYOR

G. BRUCE SINCLAIR

DEPUTY

CLERK

RONALD S. GILLESPIE

BY-LAW Number _____

SCHEDULE "A"

Description: Part of Lot 3, Concession 1 South of Dundas Street and part of the Un-Named Road, Plan TOR-15, City of Mississauga (part of Sherway Drive to be closed)

ALL AND SINGULAR those certain parcels or tracts of land and premises situate, lying and being in the City of Mississauga, Regional Municipality of Peel (formerly the Township of Toronto, County of Peel), Province of Ontario and being composed of:

FIRSTLY: That portion of Lot 3, Concession 1 South of Dundas Street designated as Part 1 on a Plan of Survey deposited in the Land Registry Office for the Registry Division of Peel as 43R-13767; said portion being established as part of Sherway Drive by Township of Toronto By-law 3301 (registered in said Land Registry Office as By-law 764).

SECONDLY: That portion of the Un-Named Road according to a Plan of Road through part of Lots 3 and 4, Concession 1 South of Dundas Street, prepared by Edgar Bray, Provincial Land Surveyor, registered May 31, 1887 and referred to as TOR-15, designated as Part 2 on a Plan of Survey deposited in said Land Registry Office as 43R-13767. Said Part 2 being established as part of Sherway Drive by the aforementioned Toronto Township By-law No. 3301.

THIRDLY: That portion of Lot 3, Concession 1 South of Dundas Street designated as Part 3 on a Plan of Survey deposited in the said Land Registry Office as 43R-13767; said Part 3 being established as part of Sherway Drive by Township of Toronto By-law No. 5045 (registered in said Land Registry Office as By-law No. 938).

BY-LAW Number _____

SCHEDULE "B"

Description Part of Lot 13, Concession 2, Colonel Smith's Tract and part of the Road Allowance between Concessions 2 and 3, Colonel Smith's Tract (part of Sherway Drive to be closed)

ALL AND SINGULAR those certain parcels or tracts of land and premises situate, lying and being in the City of Etobicoke, Municipality of Metropolitan Toronto (formerly the Township of Etobicoke, County of York), Province of Ontario and being composed of:

FIRSTLY: Those portions of the Road Allowance between Concessions 2 and 3, Colonel Smith's Tract designated as Parts 4 and 6 on a Plan of Survey deposited in the Land Registry Office for the Registry Division of Toronto Boroughs as 64R-11165; said Parts 4 and 6 now being part of Sherway Drive by Township of Etobicoke By-law No. 10832 (registered in said Land Registry Office as Instrument No. 2855).

SECONDLY: That portion of Lot 13, Concession 2, Colonel Smith's Tract designated as Part 5 on a Plan of Survey deposited in said Land Registry Office as 64R-11165; said Part 5 being established as public highway by City of Etobicoke By-law No. 1986-105 and City of Mississauga By-law No. 621-86 (registered in said Land Registry Office as Instrument No.'s TB335255 and TB335179 respectively).

CITY OF ETOBICOKE

BY-LAW NUMBER 1986- 281

A BY-LAW TO DESIGNATE MIDDLE ROAD BRIDGE

CITY OF ETOBICOKE

*Amended By By-law 1987-36.
Registered Land Registry Office
Toronto March 10, 1987.
Instrument No. T.B. 395477.*

Passed: December 15, 1986

ROGER F. CLOUTIER
CITY CLERK

1986-281

Appendix C: Ontario Heritage Trust Statement of Significance



An agency of the Government of Ontario

Statement of Significance Middle Road Bridge

Description of Historic Place

The Middle Road Bridge is located at 1700 Sherway Drive and spans the Etobicoke Creek which acts as a boundary between the City of Mississauga and the City of Toronto. The bridge was designed by Frank Barber and constructed by O.L. Hicks in 1909. It is situated in Etobicoke Valley Park near the intersection of Evans Avenue and The West Mall. This concrete bowstring truss bridge is 4.3 meters wide and 26.1 meters long. It was designated under Section 29 of the *Ontario Heritage Act* in 1986 by both the City of Mississauga (Bylaw 1101-86) and by the City of Toronto, formerly the City of Etobicoke, (Bylaw 1986-281).



Heritage Value

Historic Value:

The Middle Road Bridge is historically significant as the first example of a reinforced concrete truss or tied arch bridge in Canada and the second example in North America. French engineer, Armand Considère, was the originator of the concrete truss and built several in Europe such as the Bridge at Menier (1906). The principle differences between Considère's concrete trusses and the Middle Road Bridge are in the curved upper chords and in the handrailing and other details that make up a bowstring. A truss design was built at the Middle Road Bridge rather than an arch so that stone abutments from an earlier bridge could be incorporated. The arch type could not be adapted in this way.

The bridge was designed by Frank Barber of Barber and Young, a prominent bridge and structural engineering firm in Toronto. Middle Road Bridge was constructed in 1909 by O.L. Hicks of Humber Bay, who is recognized for his unique construction method which involved the placement of ice on concrete to slow down the setting process in order to ensure a good bond between successive pours.

The bridge was commissioned by both the Counties of York and Peel. The Commissioners for whom the bridge was built were Warden Henry and Commissioners Annis and Harris of York, and Warden Jackson and Commissioner Kennedy of Peel. When tenders were opened, the bid for the concrete truss was found to be the second lowest. "Warden Henry of York, well supported by Warden Jackson of Peel, spoke strongly in favour of the concrete bridge as being the most suitable bridge, and the cheapest in the end."

The bridge is the only remaining feature of this portion of the well-travelled historic highway the Middle Road, which was opened in Toronto Township (Mississauga) in 1806. The Middle Road Bridge is an enduring remnant of the historic Middle Road, which was a major transportation corridor connecting the former counties of York and Peel until it was surpassed by the Queen Elizabeth Way in the late 1930s. The roads met at the bridge at an angle because the road grid in Etobicoke was at a different orientation than the Mississauga street grid. The bridge continues to provide an important social, cultural, and recreational use for surrounding communities. In the early 1900s, it was used by horses, carts and cattle to cross the Etobicoke Creek. Later, automobiles used the bridge, although it only allowed for one lane of traffic. The bridge is now located on the edge of a quiet residential suburb on the Mississauga side and connects the residents to a hospital and Sherway Gardens mall on the Etobicoke side. Although used only for pedestrian traffic now, it provides the local community with a trail across an open field and access to a commercial area on the Etobicoke side of the valley.

The Middle Road Bridge is a part of what bridge and road historian David J. Cuming has classified as the second phase of road, bridge building in Ontario - 1880 to 1914. The second phase is distinctive as an age of experimentation, relative prosperity and change. The Middle Road Bridge exemplifies the use of new materials such as steel and concrete. In addition, the Middle Road Bridge was part of a government infrastructure initiative associated with the passing of *The Highway Improvement Act* in 1901, that reimbursed counties one third the cost of constructing a county highway system.

Engineering Value:

The Middle Road Bridge is significant for engineering history because it was the first concrete bowstring truss bridge to be built in Canada. The seven-panelled parabolic bowstring truss, demonstrates that engineering and aesthetics can go hand-in-hand. The bridge is a technological achievement because the maximum stress in the lower chord is the same for all its members; consequently, the same number of steel rods is used from one end of the chord to the other. The vertical members of the web system are tension members, and the diagonals function as counterbraces, carrying no stress for a live load (a temporarily added weight) covering the entire floor or from the dead load (a constant weight, including the weight of the structure itself), and acting alternately in compression and in tension for a moving load. The compression chord, 22 inches (55.88 centimeters) by 24 inches (60.96 centimeters) at the middle segment, is only slightly reinforced with twelve steel rods, $\frac{3}{4}$ inches (1.91 centimeters) round, and bonded with smaller rods spaced 6 inches (15.24 centimeters) apart, except at the panel points, where somewhat elaborate detailing is restored in order to make the bond perfectly secure between the hangers and the chord. Historic engineering analysis calculated that the "maximum compressive stress for this cord is 430 pounds (195.05 kilograms) per square inch for the concrete and 6,450 pounds (2,925.67 kilograms) for the steel, or about 500 pounds (226.8 kilograms) per square inch for concrete and steel acting together." This calculation is evidence that in the early 20th century engineering calculations become increasingly more accurate. The reinforcing consists of plain round steel rods, except for the deck, which is reinforced with No. 10 standard expanded metal manufactured by Toronto based Expanded Metal and Fireproofing Company.

The contractor, O.L. Hicks of Humber Bay, developed an ingenious way of pouring concrete to avoid hairline cracks and internal stress in the concrete for steel rods that were not straight at the time the concrete was poured. Extraordinary care was taken to avoid poor bonding for the successive days' work. For this purpose, bags of cracked ice were laid upon the last concrete poured at night, and the concrete remained 'plastic' until the next morning, as if it had just been poured.

The concrete mix was one part Portland cement to three parts aggregate consisting of sand and crushed stones, proportioned to leave a minimum of air pockets. The bridge was concreted in one week, and the forms and floor were kept wet for another week to ensure optimal slow curing. The

concrete matured without showing any hairline cracks. Two inches was chiseled off the newel posts caps after the concrete had set as they were thought to be too large. The caps were left rough.

The length of the bridge is 80 feet (24.38 meters) in the clear and the roadway is 16 feet (4.88 meters) wide. The height above water is 14 feet (4.27 meters) at one end and 18 feet (5.49 meters) at the other. It contains approximately 13 tons of steel and weighs nearly 200 tons. On-site testing was carried out at the official opening with a concentrated moving load of ten tons and by a herd of cattle numbering about seventy head and weighing about 35 tons. Barber reported that “vibration under these loads was very slight”.

Contextual Value:

The Middle Road Bridge is located in Etobicoke Valley Park, in a naturally landscaped park along the shores of Etobicoke Creek. The bridge is isolated from the main roads, but is a part of a natural, scenic, environment that is reminiscent of its historic setting in a formerly rural part of Toronto. The structure is physically prominent in its setting.

Character Defining Elements

Elements that contribute to the historical value of the Middle Road Bridge include:

- First example in Canada and the second example in North America of a reinforced concrete bowstring truss or tied arch bridge
- Located on the stone abutments of an earlier bridge over the Etobicoke Creek
- Associated with O.L. Hicks of Humber Bay, who developed an inventive way of pouring concrete
- Designed by engineer Frank Barber of Barber and Young, Toronto

Features that contribute to the engineering value of the Middle Road Bridge include:

- Six vertical concrete hangers
- Seven-panelled parabolic bowstring truss featured massive arched compression chords, 22 inches by 24 inches
- Slim vertical tension members and a system of counter braces
- Truss joints specially designed so that members will fail in the body rather than at the joint
- 12 steel rods, $\frac{3}{4}$ inches round, bounded with smaller rods spaced 6 inches apart
- Steel reinforcing in the main structure
- No. 10 standard metal reinforcing rods in the deck
- Concrete caps and posts
- Concrete baluster and railing

Characteristics that contribute to the contextual value of the Middle Road Bridge include:

- Continued cultural use as a pedestrian transportation link between the former Counties of Peel and York (Mississauga and Toronto)
- Located at the eastern terminus of Sherway Drive in view of the Queen Elizabeth Way
- Continued relationship to the adjacent natural lands of the Etobicoke Creek Valley which retains its connection to its historic rural setting within the now developed city
- Scenic location

Sources:

Barber & Young Bridge and Structural Engineers, "Canada's First Concrete Truss Bridge." FILM F CIHM no. 79072

Cuming, David. *Discovering Heritage Bridges on Ontario's Roads*. Erin, Ontario: Boston Mills Press, 1983.

Revised July, 2012



Appendix D: Canadian Register of Historic Places Statement of Significance

1. Other Name(s)

ES 1. Sherway Heritage Bridge
Middle Road Bridge

2. Construction Date(s)

ES 2. 1909/01/01 to 1910/01/01

3. Listed on the Canadian Register: 2005/05/30

4. Statement of Significance

5. Description of Historic Place

ES 3. The Middle Road Bridge is located at the eastern terminus of Sherway Drive and spans the Etobicoke Creek which acts as a boundary between the City of Mississauga and the City of Toronto.

Currently used as a pedestrian bridge, the Mississauga portion of the 4.3 meter wide and 26.1 meter long concrete truss bridge is recognized for its heritage value by City of Mississauga Bylaw 1101-86.

The City of Toronto (formerly City of Etobicoke) portion of the bridge is recognized for its heritage value by (former) City of Etobicoke Bylaw 1986-281.

6. Heritage Value

ES 4. The heritage value of the Middle Road Bridge lies in its architectural and historical significance, and in its contextual value as an important community landmark.

Built in 1909-1910 to accommodate growing use of the Middle Road, it is the first example in Canada and second example of a reinforced concrete truss or tied arch bridge in North America. The bridge was designed by Frank Barber of Barber and Young, a prominent bridge and structural engineer from Toronto and constructed by O.L. Hicks of Humber Bay, who is recognized for his unique construction method which involved the placement of ice on concrete to slow down the setting process in order to ensure a good bond between successive pours.

Constructed on the stone abutments of a former bridge, the Middle Road Bridge is an enduring remnant of the historic Middle Road, which was a major transportation corridor connecting the former counties of York and Peel until it was surpassed by the Queen Elizabeth Way in the late 1930s. The bridge provided an important economic and social link for surrounding communities. In the early 1900s, it was used by horses, carts and cattle to cross the waterway. Later, automobiles used the bridge, although it only allowed for one lane of traffic. The bridge is now located on the edge of a quiet residential suburb. Although used only for pedestrian traffic, it continues to provide the local community with access to a commercial area on the Etobicoke side of the valley.

Middle Road Bridge is an important landmark within the community. The structure is physically prominent in its setting, and continues to be appreciated by the public. The bridge is the only remaining feature of this portion of the popular, well-travelled highway, the Middle Road.

Sources: City of Mississauga Bylaw 1101-86; Middle Road Bridge Heritage Structure Report, City of Mississauga, 1984; City of Mississauga File CS.08.SHE 1&2

7. Character-Defining Elements

ES 5. Key character-defining elements that embody the heritage value of the bridge as an early example of reinforced concrete truss or tied arch bridge construction include its:

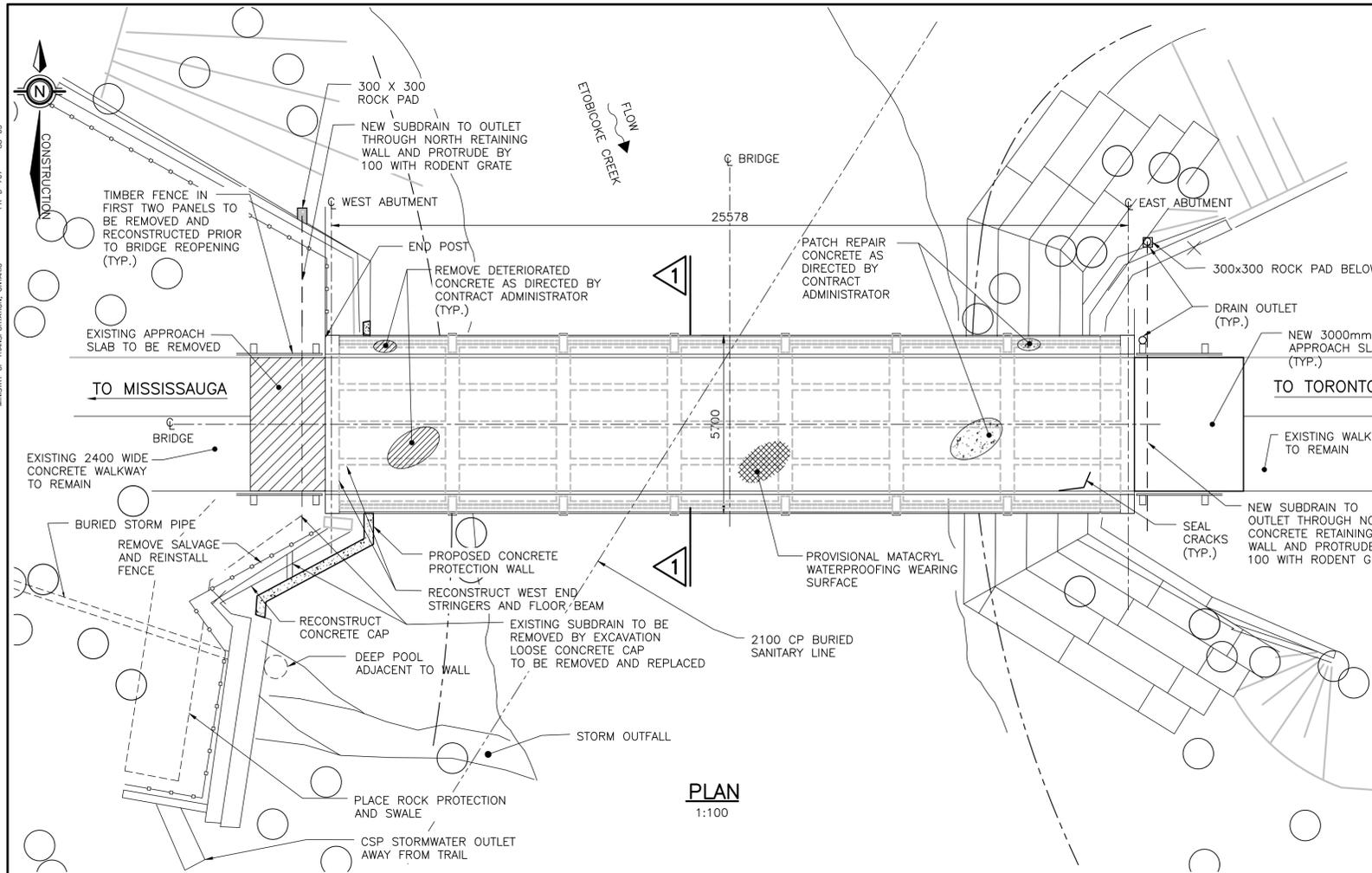
- massive arched compression chords, slim vertical tension members and system of counter braces
- truss joints specially designed so that members will fail in the body rather than at the joint

Key character-defining elements that embody the contextual heritage value of the bridge as an enduring remnant of the historic Middle Road and community landmark include the bridge's:

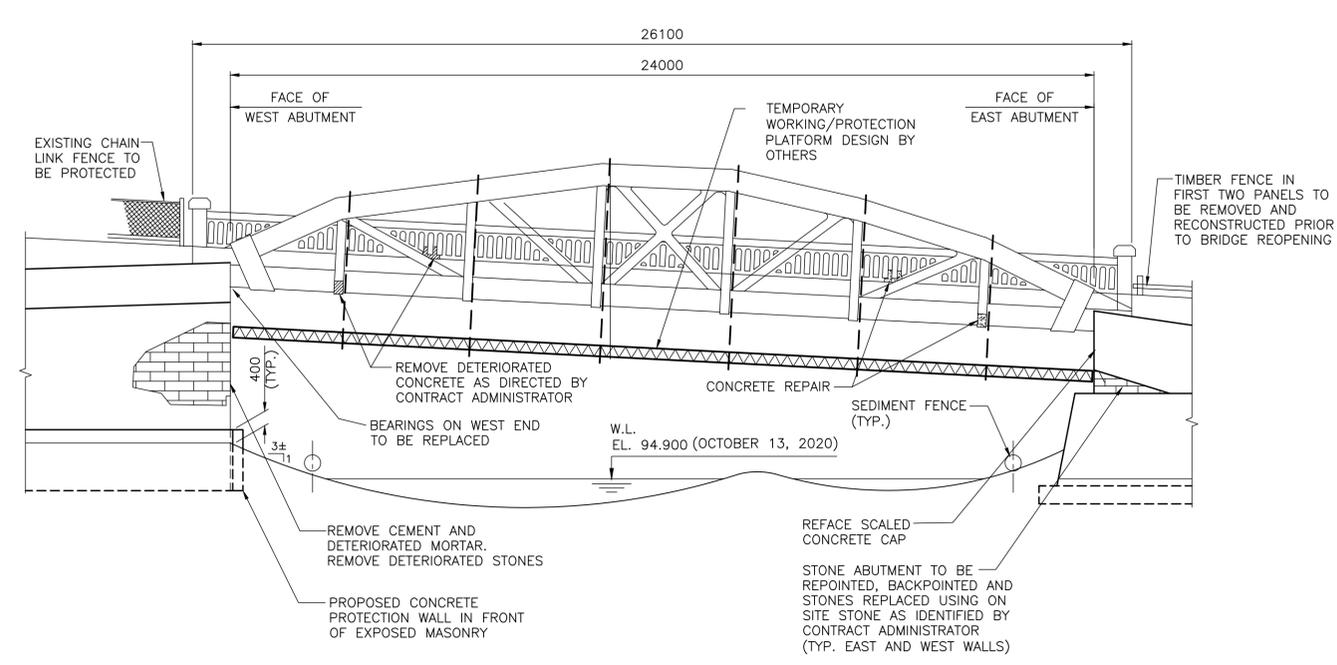
- continued cultural and economic use as a transportation link between the former Counties of Peel and York
- location on the stone abutments of a former crossing of the Etobicoke Creek
- prominent setting at the eastern terminus of Sherway Drive in view of the Queen Elizabeth Way
- continued relationship to the adjacent natural lands of the Etobicoke Creek Valley

Appendix E: GA Drawings- 60% Detailed Design

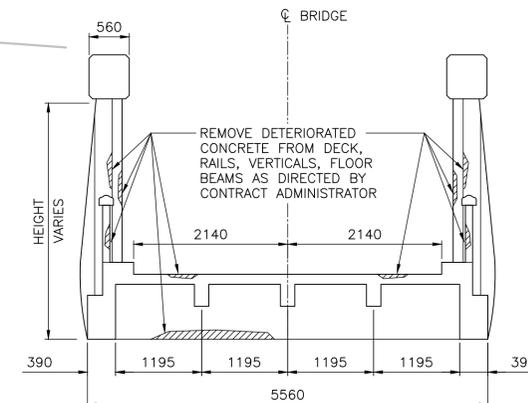
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SAVED BY: Kramarcik
SAVED DATE: 3/10/2021 7:44 AM
PLOT DATE: 3/16/2021 2:58 PM
MINISTRY OF TRANSPORTATION, ONTARIO
PRE-D-707
BB-05



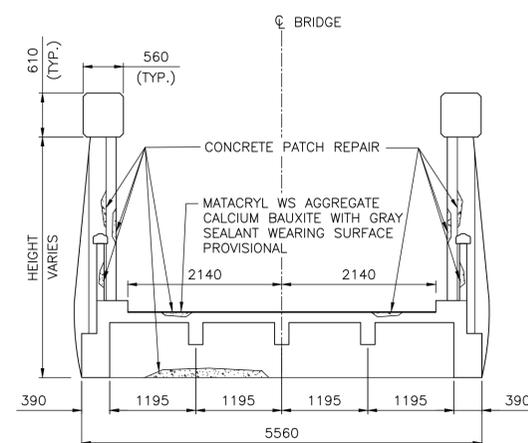
PLAN
1:100



ELEVATION
1:100



EXISTING
SCALE 1:50



PROPOSED
SCALE 1:50

- LEGEND:**
- CONCRETE REMOVALS
 - PATCH REPAIRS
 - SEDIMENT FENCE
 - TREE PROTECTION FENCE
 - MATACRYL WATERPROOFING WEARING SURFACES
 - PROTECTED TREE

- LIST OF DRAWINGS:**
- S1 GENERAL ARRANGEMENT
 - S2 CONSTRUCTION STAGING
 - S3 REMOVAL DETAILS
 - S4 MASONRY DETAILS AND PROTECTION WALL
 - S5 WEST ABUTMENT RECONSTRUCTION
 - S6 JACKING AND BEARING DETAILS
 - S7 REPAIR DETAILS
 - S8 APPROACH SLAB DETAILS
 - ES-01 EROSION SEDIMENT CONTROL 1
 - ES-02 EROSION SEDIMENT CONTROL 2

ENVIRONMENTAL NOTES:

1. SEDIMENT AND EROSION CONTROL MEASURES SHALL BE IMPLEMENTED PRIOR TO AND MAINTAINED DURING THE CONSTRUCTION PHASES TO PREVENT ENTRY OF SEDIMENT INTO THE WATER
2. TO PROTECT LOCAL FISH POPULATIONS DURING THE SPAWNING AND NURSERY PERIODS IN-WATER WORK SHALL OCCUR DURING THE FOLLOWING PERIOD: FROM JULY 01 TO MARCH 31 ANY GIVEN CALENDAR YEAR.
3. NO MACHINERY SHALL BE ALLOWED TO ENTER THE WATERCOURSE. MOVEMENT OF CONSTRUCTION EQUIPMENT IN THE VICINITY OF ANY CREEK SHALL BE LIMITED TO THE MINIMUM REQUIRED FOR CONSTRUCTION. THE CONTRACTOR SHALL NOT CARRY OUT EQUIPMENT MAINTENANCE OR REFUELING OR STORE OF FUEL CONTAINERS WITHIN 100 METERS OF ANY WATERCOURSE. THE CONTRACTOR SHALL NOT STOCKPILE CONSTRUCTION DEBRIS OR EMPTY FUEL/PESTICIDE CONTAINERS WITHIN THE CONTRACT LIMITS.
4. THE CONTRACTOR WILL BE REQUIRED TO MAINTAIN THE EXISTING STREAM FLOWS AND SHALL CONTROL ALL CONSTRUCTION WORK SO AS NOT TO ALLOW SEDIMENT OR OTHER DELETERIOUS MATERIAL TO ENTER STREAMS. NO WASTE OR SURPLUS ORGANIC MATERIALS, INCLUDING TOPSOIL IS TO BE STORED OR DISPOSED OF WITHIN 30 METERS OF ANY WATERCOURSE. RUN-OFF FROM EXCAVATIONS WILL NOT BE PERMITTED TO DRAIN DIRECTLY INTO WATERCOURSES BUT SHALL BE DIFFUSED ONTO VEGETATIVE AREAS A MINIMUM OF 30 METERS FROM THE WATERCOURSE. WHERE THIS MEASURE IS NOT SUFFICIENT OR FEASIBLE TO CONTROL SEDIMENT ENTERING THE WATERCOURSE, SEDIMENT TRAPS OR GEOTEXTILE COVERAGE WILL BE REQUIRED.
5. CONSTRUCTION SHOULD BE AVOIDED DURING UNUSUALLY WET, RAINY OR WINTER THAW CONDITIONS.
6. MACHINERY SHALL BE OPERATED IN A MANNER THAT MINIMIZES DISTURBANCE TO THE WATERCOURSE BANKS.
7. MACHINERY IS TO ARRIVE ON SITE IN A CLEAN CONDITION (INCLUDING FREE OF MUD/SOIL/DIRT FROM OTHER LOCATIONS: INCLUDING CLEAN WHEELS/TIRES/TRACKS) AND IS TO BE MAINTAINED FREE OF FLUID LEAKS.
8. TO REDUCE THE SPREAD OF INVASIVE SPECIES, EQUIPMENT SHOULD BE THOROUGHLY CLEANED BEFORE BEING BROUGHT ON SITE. FOR GUIDANCE IN THIS REGARD, PLEASE REFER TO THE CLEAN EQUIPMENT PROTOCOL FOR INDUSTRY AVAILABLE ONLINE: www.ontarioinvasiveplants.ca/file/cleanequipmentprotocol_Mar152013_D3.pdf
9. MACHINERY IS TO LEAVE SITE IN CLEAN CONDITION. A CLEANING STATION REQUIRED IN CONJUNCTION WITH ANY MUD MATS TO BE USED.
10. KEEP AN EMERGENCY SPILL KIT ON SITE IN CASE OF FLUID LEAKS OR SPILLS FROM MACHINERY.

METRIC
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

REVISIONS		
DATE	DETAILS	INIT.
2021/03/16	ISSUED FOR HERITAGE REVIEW	C.B.L.

GENERAL NOTES:

1. DESIGN AND WORKMANSHIP:
 - CANADIAN HIGHWAY BRIDGE DESIGN CODE CAN/CSA S6-19
 - CAN/CSA S6-19 - LIVE LOAD PEDESTRIANS
 - ONTARIO PROVINCIAL STANDARD DRAWINGS AND SPECIFICATIONS
 - CITY MAINTENANCE VEHICLE
2. CLASS OF CONCRETE: 35 MPa, C1
MAXIMUM AGGREGATE SIZE 13.2 mm REPAIRS
ALL CONCRETE REPAIR MATERIALS WAS APPLIED IN ACCORDANCE WITH THE MANUFACTURER'S SPECIFICATIONS.
3. CLEAR COVER TO REINFORCING STEEL: 70±20 mm UNLESS OTHERWISE NOTED
4. REINFORCING: REINFORCING STEEL SHALL BE GRADE 400W.
REINFORCING BAR MARKED WITH PREFIX "F" DENOTES GLASS FIBER REINFORCING POLYMER BARS (GFRP), GRADE III
UNLESS SHOWN OTHERWISE, TENSION LAP SPLICES FOR REINFORCING STEEL BARS SHALL BE CLASS B.
BAR HOOKS SHALL HAVE STANDARD HOOK DIMENSIONS USING MINIMUM BEND DIAMETERS, WHILE STIRRUPS AND TIES SHALL HAVE MINIMUM HOOK DIMENSIONS. ALL HOOKS SHALL BE IN ACCORDANCE WITH THE MTO STRUCTURAL STANDARD DRAWING SS12-1, UNLESS INDICATED OTHERWISE.

CONSTRUCTION NOTES:

1. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS, DETAILS AND ELEVATIONS OF THE EXISTING STRUCTURE THAT ARE RELEVANT TO THE WORK SHOWN ON THE DRAWINGS PRIOR TO COMMENCEMENT OF THE WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE CONTRACT ADMINISTRATOR AND THE PROPOSED ADJUSTMENT OF THE WORK REQUIRED TO MATCH THE EXISTING STRUCTURE SHALL BE SUBMITTED FOR APPROVAL.
2. THE CONTRACTOR IS FULLY RESPONSIBLE FOR ADEQUATE PROTECTION OF UTILITIES, SERVICES, STRUCTURES, ROADWAYS, WATERCOURSES, ETC. DURING CONSTRUCTION OPERATIONS.
3. ANY DAMAGE DONE TO EXISTING STRUCTURE DURING REMOVALS OR RECONSTRUCTION SHALL BE REPAIRED BY THE CONTRACTOR TO THE SATISFACTION OF THE ENGINEER AND AT NO COST TO THE OWNER.
4. SAWCUTS IN CONCRETE UNLESS OTHERWISE SHOWN SHALL BE 25 mm DEEP OR TO THE FIRST LAYER OF REINFORCING STEEL WHICHEVER IS LESS.
5. ALL EXPOSED CONCRETE TO HAVE 20 mm CHAMFER UNLESS OTHERWISE NOTED.
6. THE EXTENT OF CONCRETE REPAIRS ON STRUCTURE AND ABUTMENT WALLS SHALL BE DETERMINED ON SITE BY THE CONTRACT ADMINISTRATOR.
7. CONTRACTOR'S METHOD OF PROTECTION TO BE SUBMITTED TO CONTRACT ADMINISTRATOR FOR INFORMATION BEFORE PROCEEDING WITH THE WORK.

LIST OF ABBREVIATIONS:

- TYP. TYPICAL
- W.S. WORKING POINT
- W.L. WATER LEVEL

PRODUCED FOR - T&W, ENGINEERING AND WORKS

DESIGN BY: _____ APPROVED BY: _____

DEPARTMENTAL APPROVAL: _____ C.E.T.

SILVO CESARIO P.ENG.

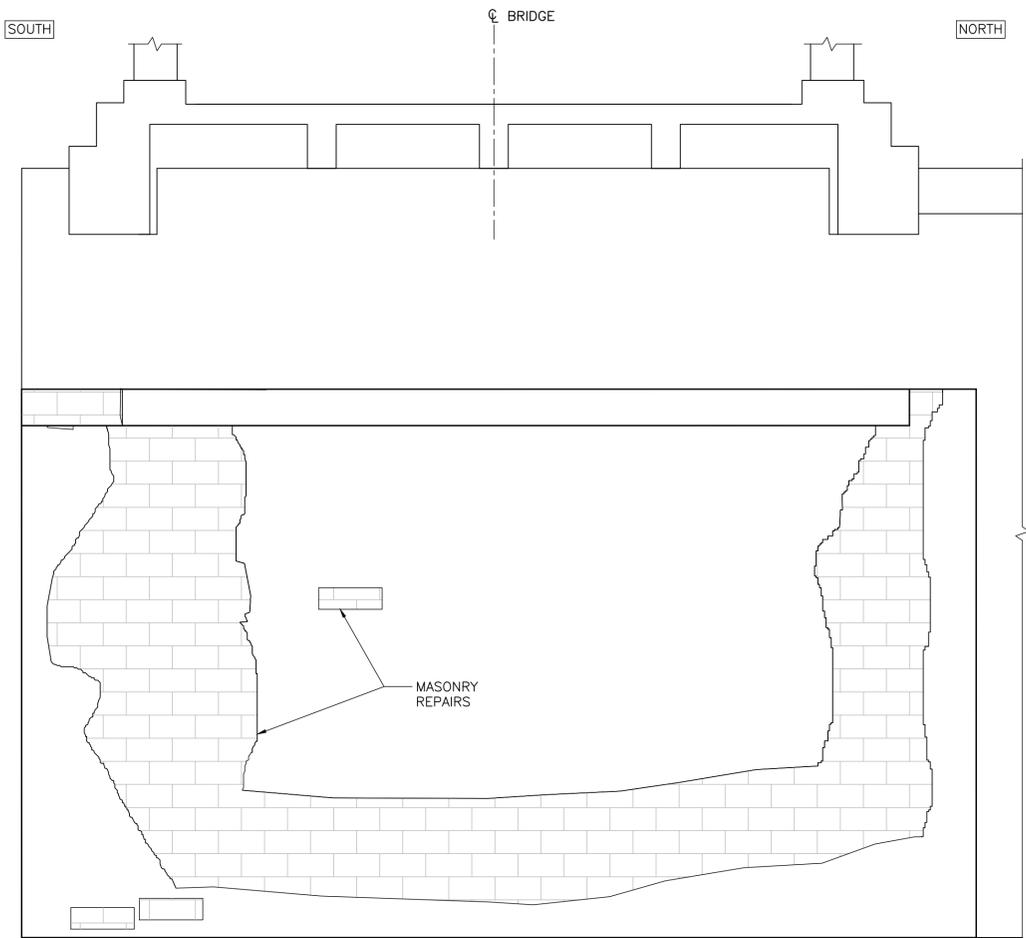
 Engineering & Construction Services

MIDDLE ROAD HERITAGE BRIDGE
BRIDGE REHABILITATION
GENERAL ARRANGEMENT

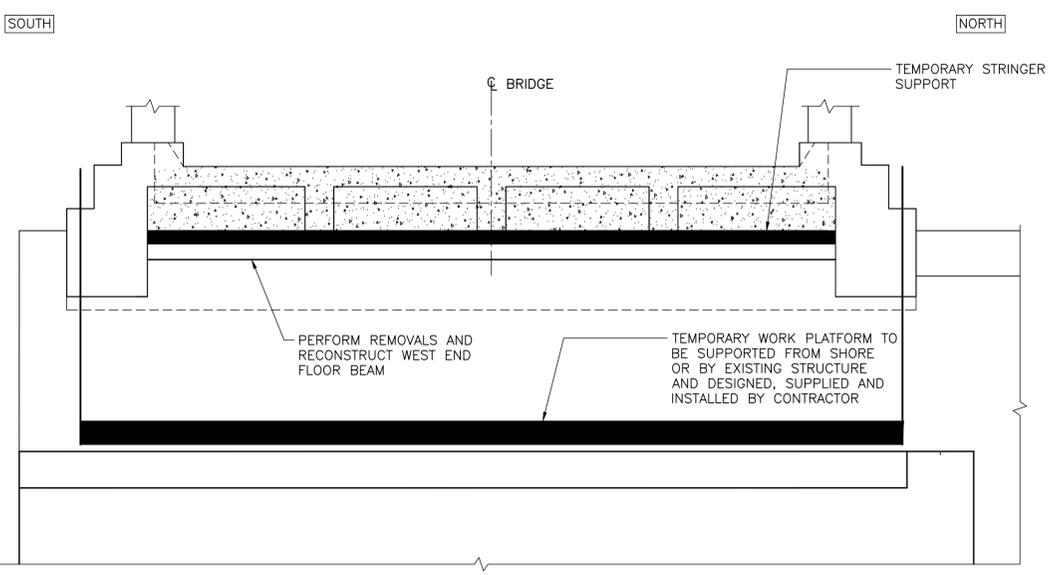
SCALE AS SHOWN	AREA	PROJECT No. 60640389
C.A.D.D. BY V.K.	CHECKED BY C.B.L.	DRAWING No. S-1
DATE NOV. 2020	SHEET XX	

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 PROJECT No: 60640389
 DRAWING No: S-2

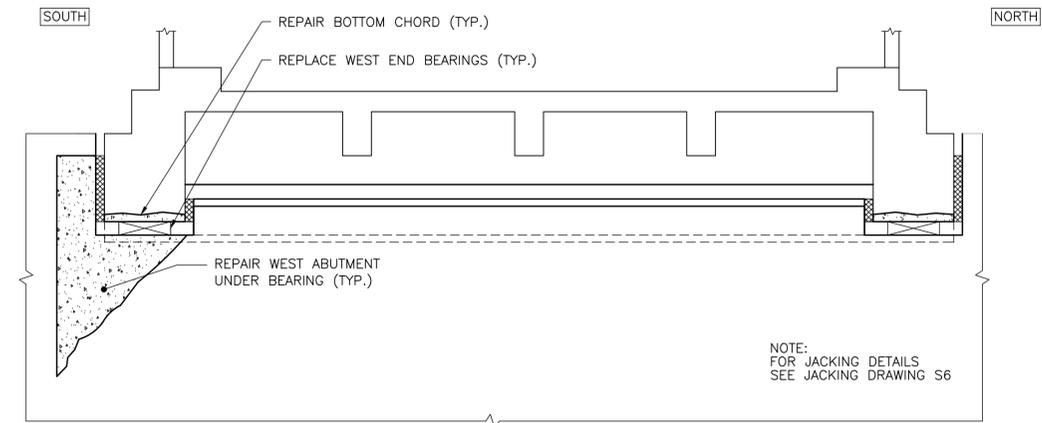
PE-D-707
 BB-05
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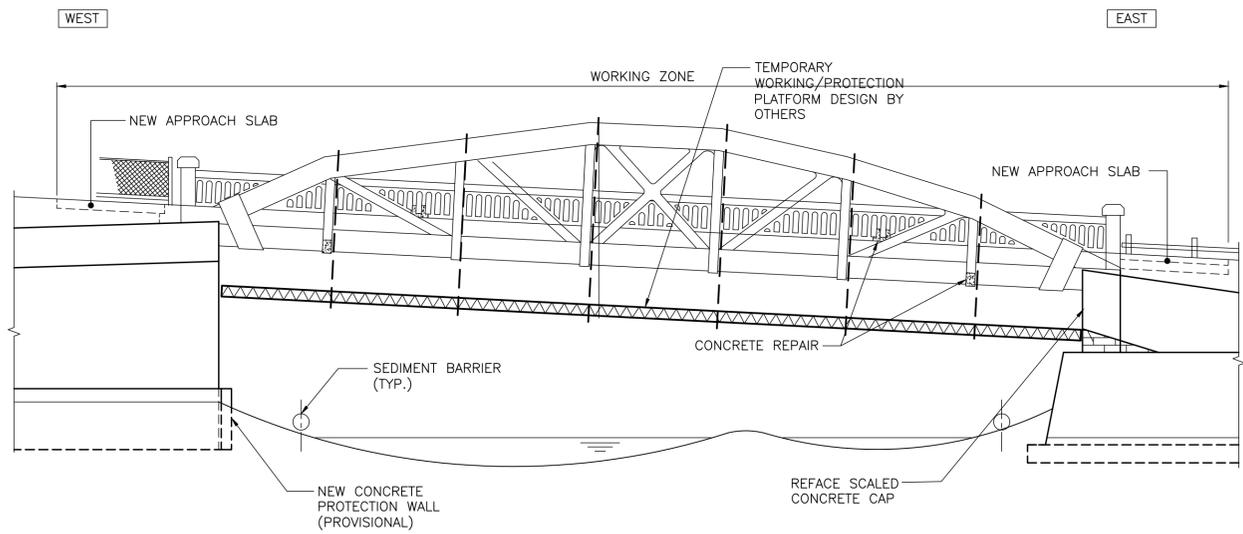
WEST END ABUTMENT
STAGE #1
1:25



WEST END FLOOR BEAM RECONSTRUCTION
STAGE #2
1:25



WEST END ABUTMENT REPAIRS AND BEARING REPLACEMENT
STAGE #3
1:25



STAGE #4
1:25

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REVISIONS		
DATE	DETAILS	INIT.
2021/03/16	ISSUED FOR HERITAGE REVIEW	C.B.L.

STAGING NOTES:

- STAGE #1**
1. INSTALL EROSION CONTROL, TREE PROTECTION BARRIERS.
 2. PERFORM MASONRY REPAIRS INCLUDING RAKING, STONE REPLACEMENT, BACKPOINTING, REPOINTING AS DIRECTED BY CONTRACT ADMINISTRATOR
 3. APPLY ANTI-GRAFFITI COATING TO MASONRY (PROVISIONAL)
- STAGE #2**
1. CLOSE BRIDGE TO PEDESTRIAN TRAFFIC
 2. INSTALL TEMPORARY WORKING PLATFORM, TEMPORARY WEST END STRINGER SUPPORT
 3. EXCAVATE AND EXPOSE WEST END DECK END
 4. PERFORM REMOVALS TO WEST END ABUTMENT CAP, FLOOR BEAM BETWEEN BOTTOM CHORDS
 5. RECONSTRUCT WEST END ABUTMENT CAP, FLOOR BEAM AND OVERHANG INCLUDING WEST END SUBDRAIN
- STAGE #3**
1. JACK BRIDGE AT WEST END AND SHIM
 2. REPAIR BOTTOM CHORD, WEST ABUTMENT CAP UNDER BEARING SEATS, REPLACE BEARINGS
 3. LOWER JACKS, REMOVE JACKS
- STAGE #4**
1. PERFORM ALL OUTSTANDING PATCH REPAIRS, CRACK SEALING, INSTALL CORBEL AT EAST END
 2. INSTALL WEST ABUTMENT PROTECTION WALL (PROVISIONAL)
 3. INSTALL SUBDRAIN AT EAST END
 4. INSTALL APPROACH SLABS
 5. REMOVE WORK PLATFORM
 6. CLEAN UP SITE, SEED AND REPAIR
 7. OPEN BRIDGE TO PEDESTRIAN TRAFFIC

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DESIGN BY	APPROVED BY
C.E.T.	C.E.T.
DEPARTMENTAL APPROVAL	
SILVIO CESARIO P.ENG.	

Engineering & Construction Services

MIDDLE ROAD HERITAGE BRIDGE
BRIDGE REHABILITATION
CONSTRUCTION STAGING

SCALE AS SHOWN	AREA	PROJECT No. 60640389
C.A.D.D. BY B.J.S.	CHECKED BY C.B.L.	DRAWING No. S-2
DATE NOV. 2020	SHEET XX	

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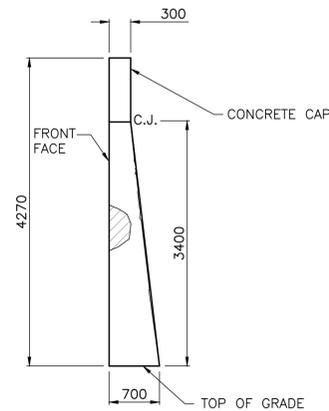
REVISIONS		
DATE	DETAILS	INIT.
2021/03/16	ISSUED FOR HERITAGE REVIEW	C.B.L.

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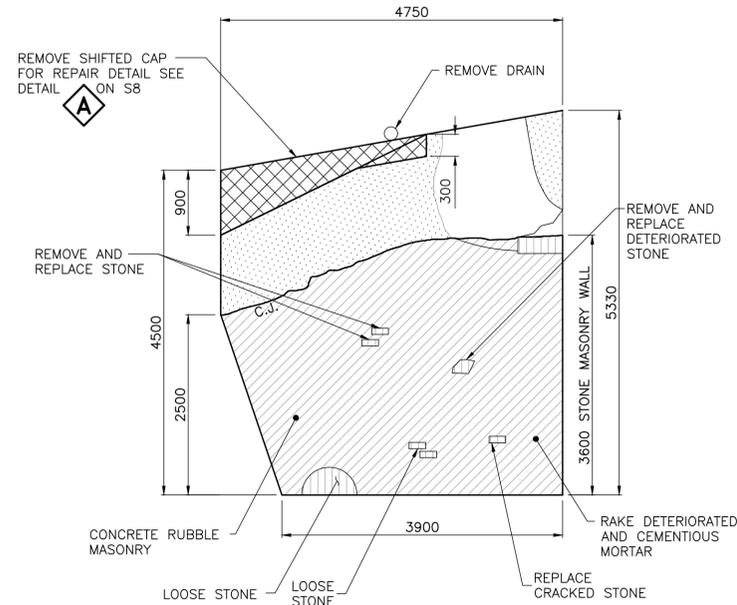
1. CONCRETE AND MASONRY REMOVALS SHALL BE PERFORMED IN ACCORDANCE WITH THE CONSTRUCTION STAGING IN DWG. S2.
2. STRUCTURE TO BE MONITORED DURING REMOVALS ANY DAMAGE CAUSED AS A RESULT OF REMOVALS IS THE RESPONSIBILITY OF THE CONTRACTOR.
3. THE JACKHAMMER SIZE IS TO BE MINIMIZED TO REDUCE THE CONCRETE REMOVED.

LEGEND

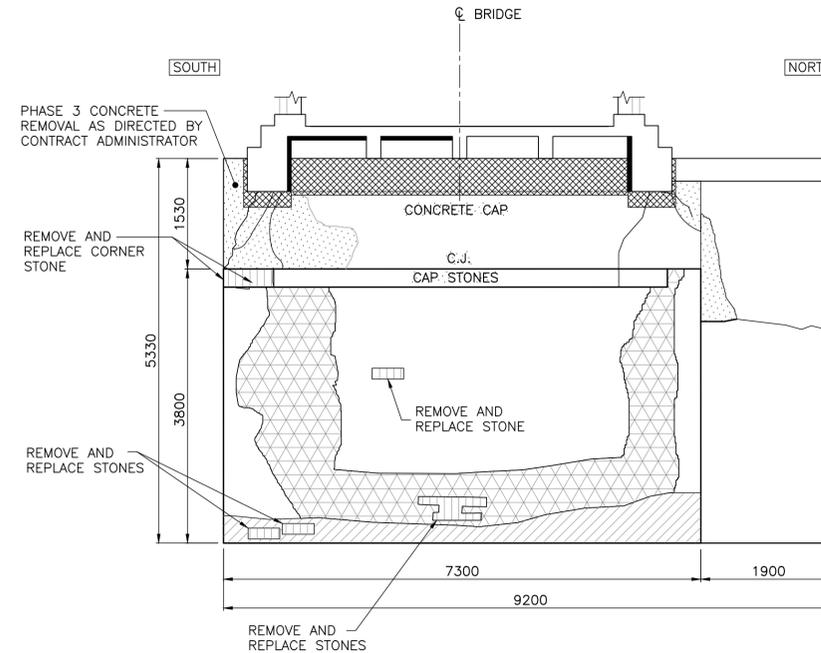
-  REMOVE CEMENT POINTING
-  REMOVE AND REPLACE STONE
-  REMOVE DETERIORATED POINTING
-  PARTIAL DEPTH CONCRETE REMOVAL
-  CONCRETE REMOVAL



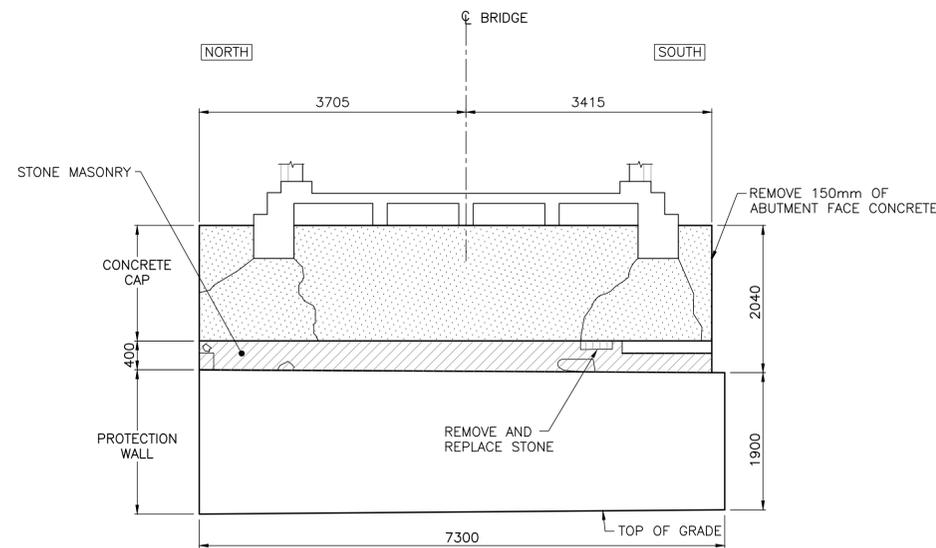
SOUTH WEST MASONRY WALL 2
1:50



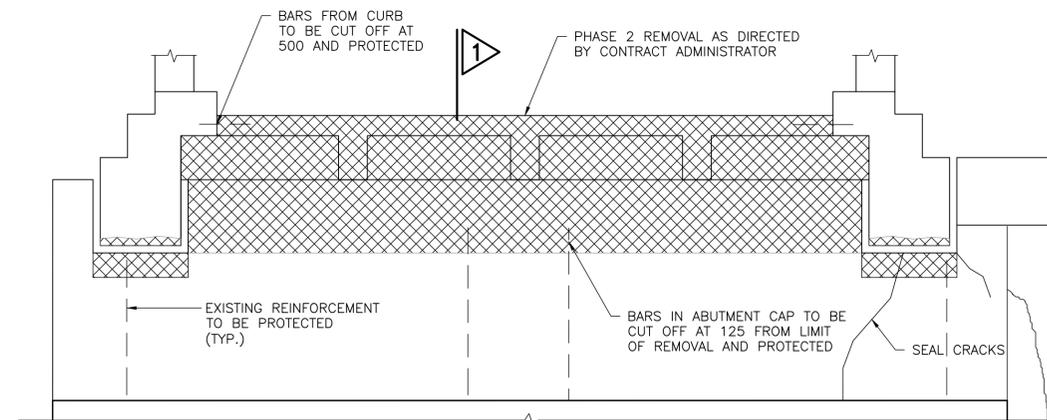
SOUTH WEST MASONRY WALL 1 REMOVALS
1:50



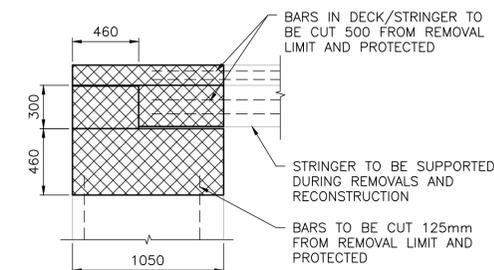
WEST ABUTMENT FACE
1:50



EAST ABUTMENT FACE
1:50



WEST ABUTMENT REMOVALS
1:25



1
SCALE: 1:25




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DESIGN BY	APPROVED BY
C.E.T.	
DEPARTMENTAL APPROVAL	
SILVO CESARIO P.ENG.	


Engineering & Construction Services

**MIDDLE ROAD HERITAGE BRIDGE
BRIDGE REHABILITATION
REMOVAL DETAILS**

SCALE AS SHOWN	AREA	PROJECT No. 60640389
C.A.D.D. BY B.J.S.	CHECKED BY C.B.L.	DRAWING No. S-3
DATE NOV. 2020	SHEET XX	

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UNLESS OTHERWISE SHOWN

REVISIONS		
DATE	DETAILS	INIT.
2021/03/16	ISSUED FOR HERITAGE REVIEW	C.B.L.

NOTES:

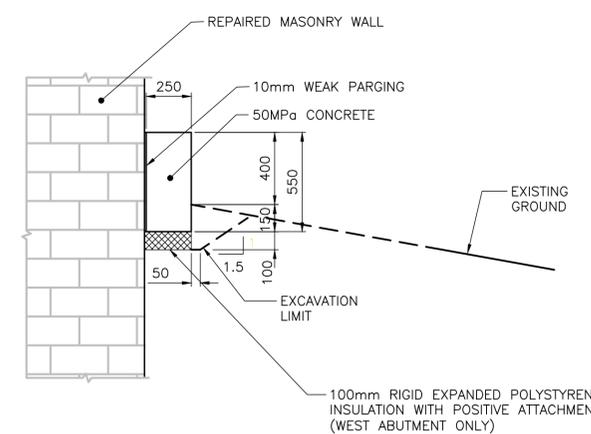
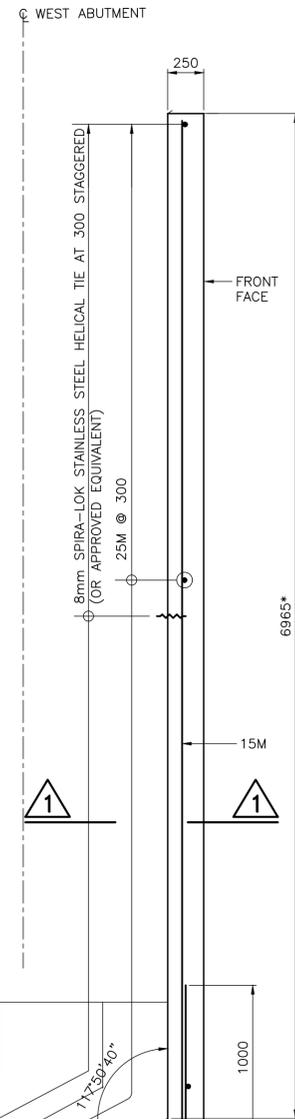
1. POINTING AND BACKPOINTING MORTAR USED TO MATCH COLOUR OF ORIGINAL POINTING MORTAR.
2. ONLY BETOMIX PLUS TYPE N MORTAR OR EQUIVALENT PRE-COLOURED MORTAR PRODUCT WEAKER THAN THE ADJACENT STONE MAY BE USED FOR POINTING.

LEGEND:

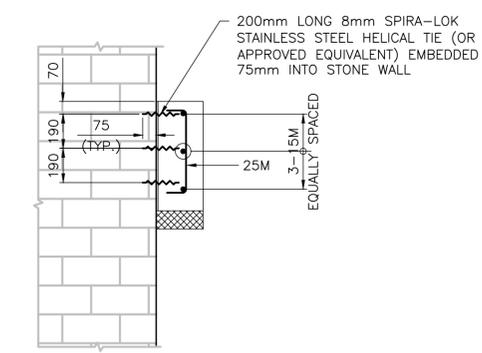
-  RE-POINTING
-  BACKPOINTING
-  CUT LOCAL FIELD STONE TO FIT AND REPLACE STONE



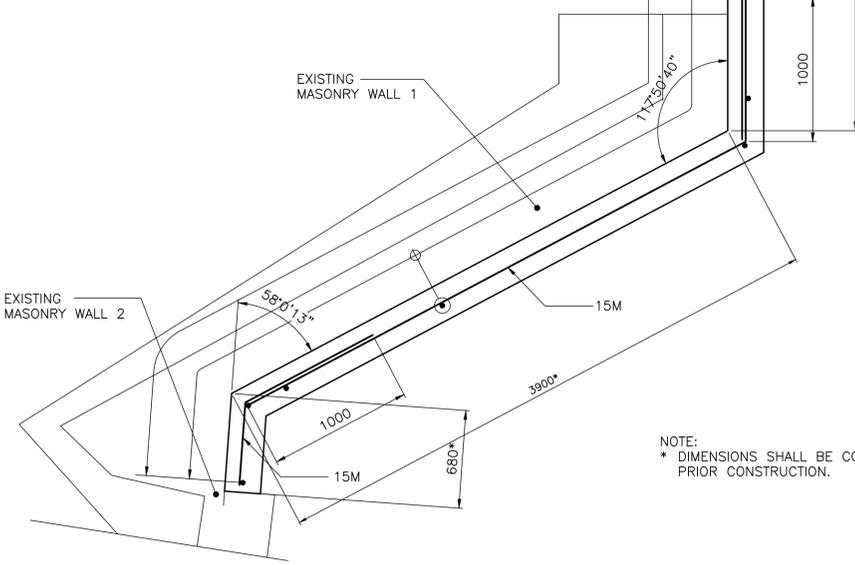
MINISTRY OF TRANSPORTATION, ONTARIO
PR-D-707 BR-05



1 SECTION - DIMENSIONS
SCALE: 1:20

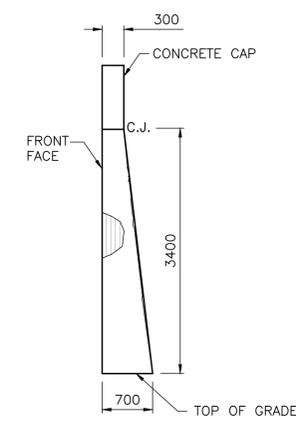


1 SECTION - REINFORCING
SCALE: 1:20

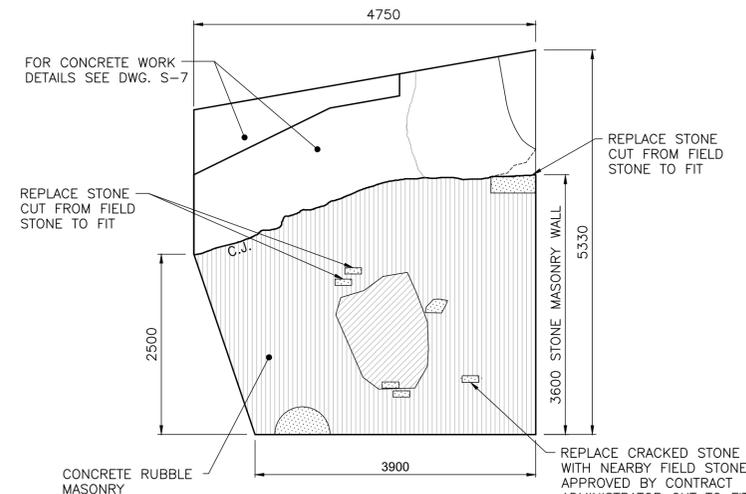


PLAN
SCALE: 1:25

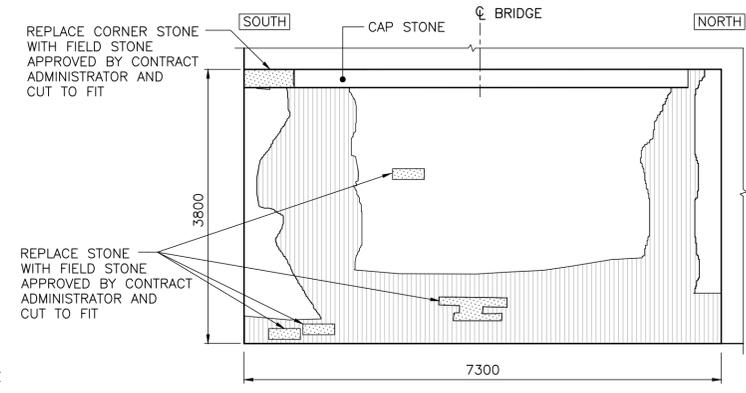
NOTE:
* DIMENSIONS SHALL BE CONFIRMED ON SITE PRIOR CONSTRUCTION.



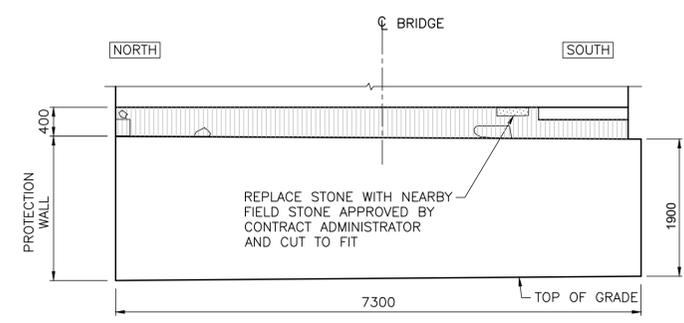
SOUTH WEST MASONRY WALL 2
1:50



SOUTH WEST MASONRY WALL 1
1:50



WEST ABUTMENT MASONRY
1:50



EAST ABUTMENT MASONRY
1:50

AECOM		
		
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DESIGN BY	APPROVED BY	
C.E.T.		
DEPARTMENTAL APPROVAL		
SILVO CESARIO P.ENG.		
 Engineering & Construction Services		
MIDDLE ROAD HERITAGE BRIDGE BRIDGE REHABILITATION MASONRY DETAILS AND PROTECTION WALL DETAILS		
SCALE AS SHOWN	AREA	PROJECT No. 60640389
C.A.D.D. BY B.J.S.	CHECKED BY C.B.L.	DRAWING No. S-4
DATE NOV. 2020	SHEET XX	

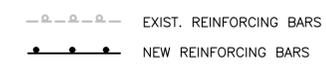
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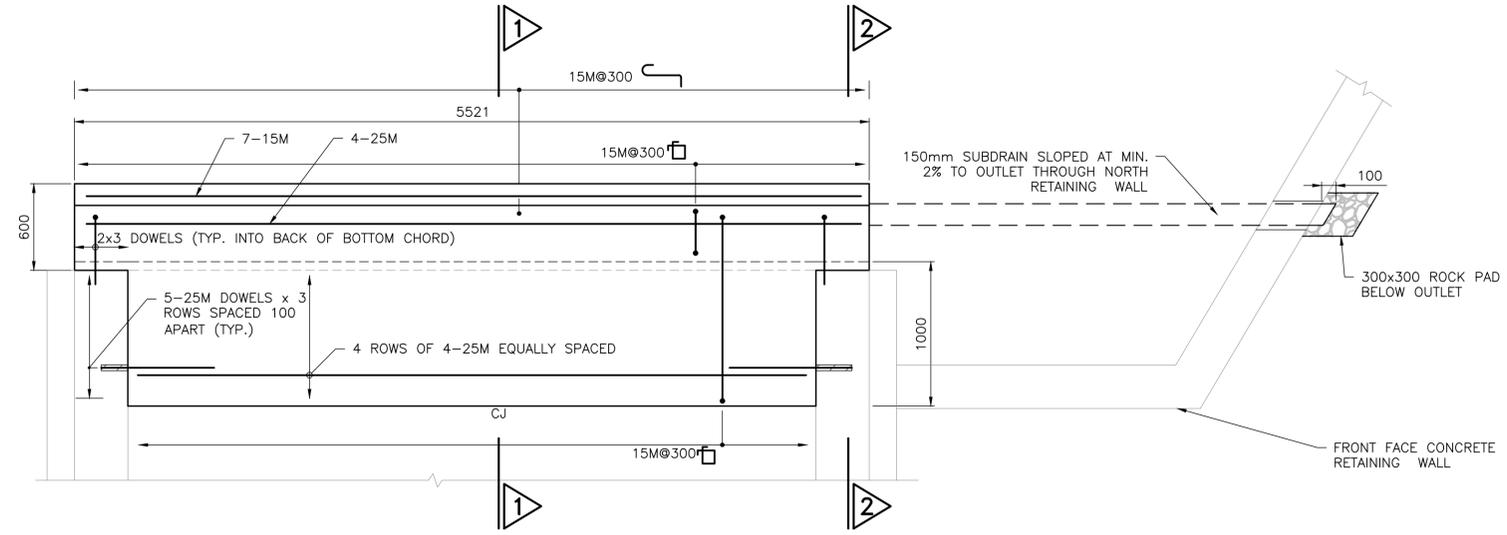
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MINISTRY OF TRANSPORTATION, ONTARIO
PRE-D-707
BR-05

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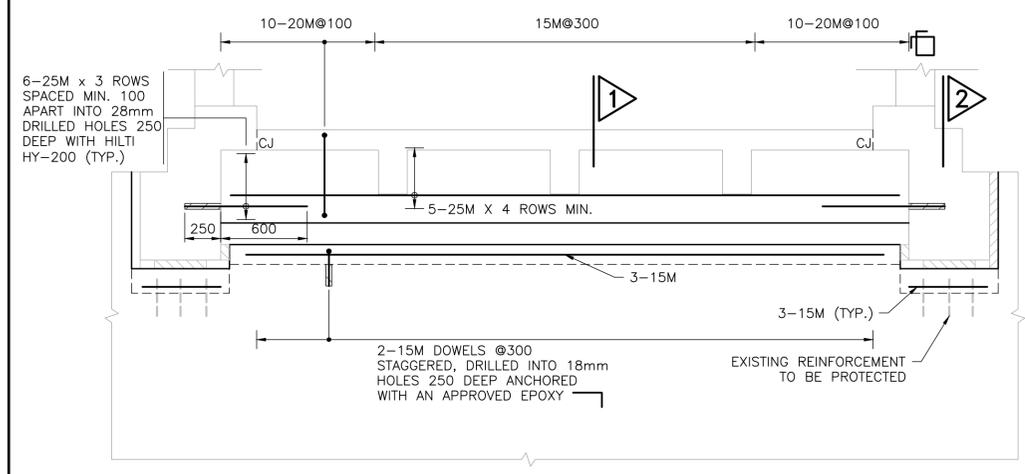
REVISIONS		
DATE	DETAILS	INIT.
2021/03/16	ISSUED FOR HERITAGE REVIEW	C.B.L.

NOTES:
1. ORDER OF CONSTRUCTION SHALL PROCEED IN ACCORDANCE WITH PROPOSED STAGING.

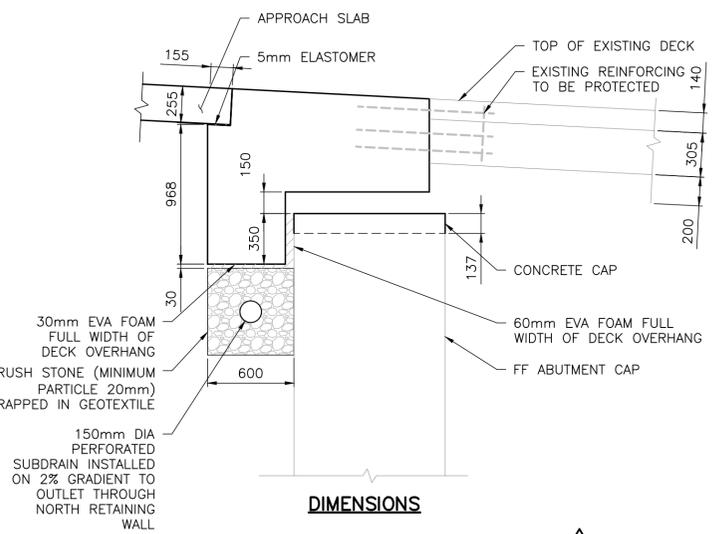
LEGEND

 --- EXIST. REINFORCING BARS
 --- NEW REINFORCING BARS



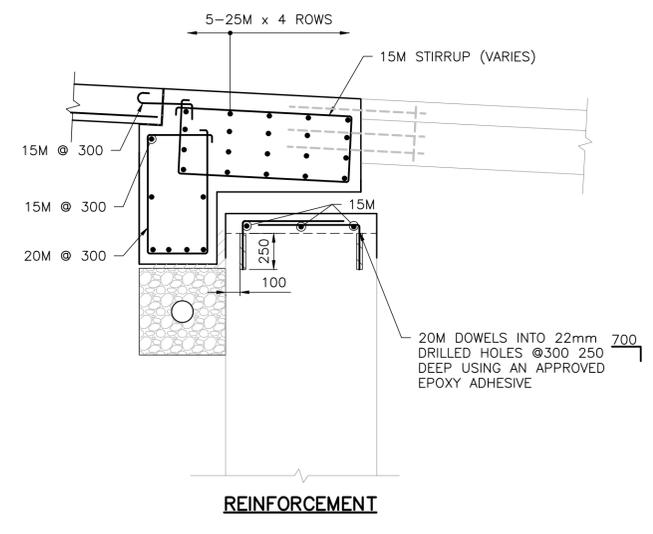
WEST ABUTMENT PLAN REINFORCEMENT
1:25



WEST ABUTMENT ELEVATION REINFORCEMENT
1:25

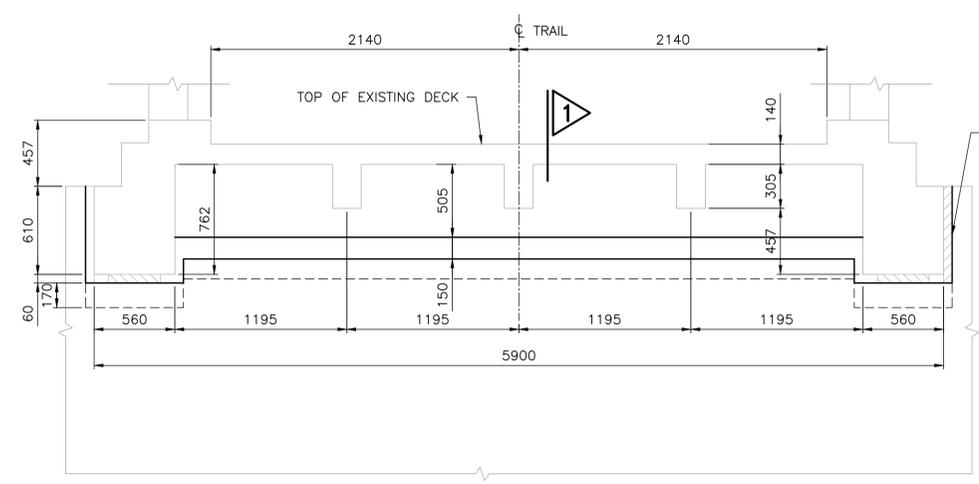


DIMENSIONS

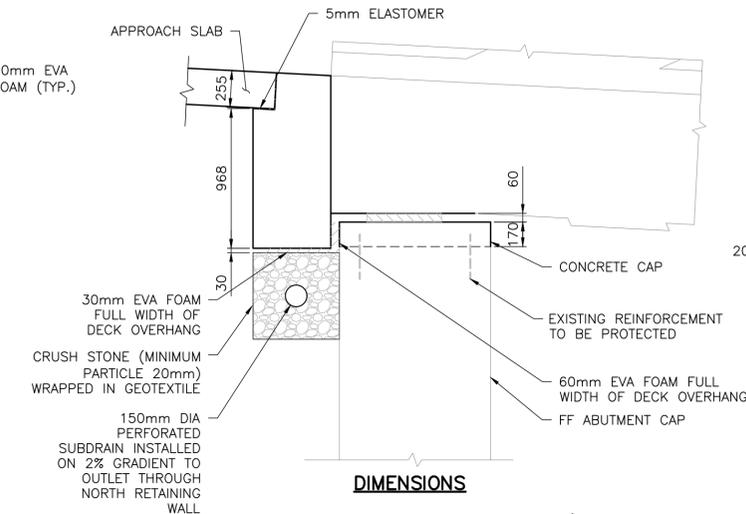


REINFORCEMENT

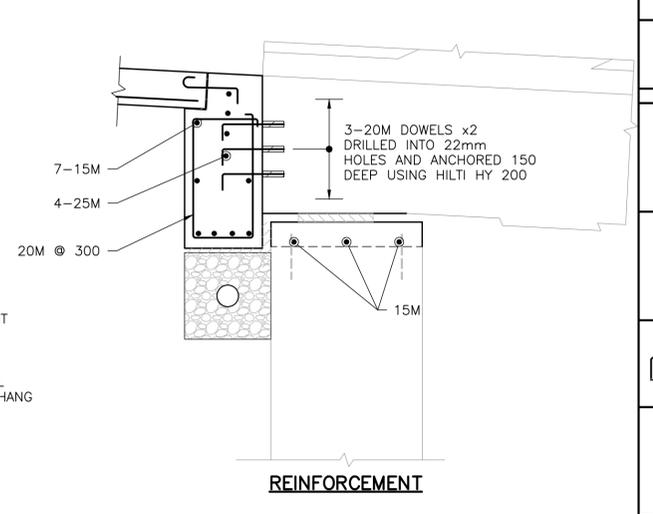
1 END BEAM
SCALE: 1:25



WEST ABUTMENT ELEVATION DIMENSIONS
1:25



DIMENSIONS



REINFORCEMENT

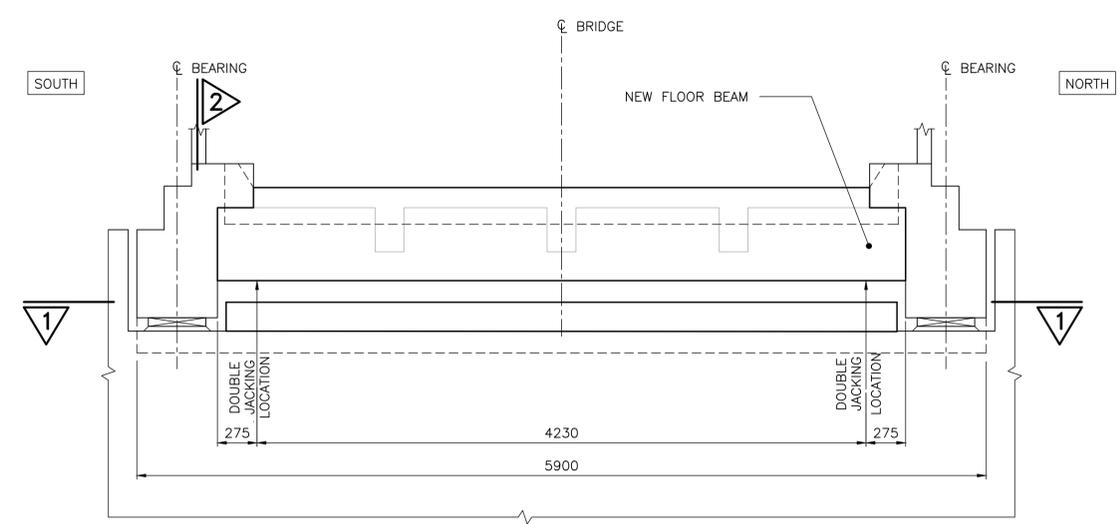
2 OVERHANG AT BOTTOM CHORD
SCALE: 1:25

AECOM
MISSISSAUGA
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 DESIGN BY: _____ APPROVED BY: _____
 C.E.T.
 DEPARTMENTAL APPROVAL: _____
 SILVIO CESARIO P.ENG.
TORONTO Engineering & Construction Services
 MIDDLE ROAD HERITAGE BRIDGE
 BRIDGE REHABILITATION
 WEST ABUTMENT RECONSTRUCTION
 SCALE AS SHOWN AREA PROJECT No. 60640389
 C.A.D.D. BY B.J.S. CHECKED BY C.B.L. DRAWING No. S-5
 DATE NOV. 2020 SHEET XX

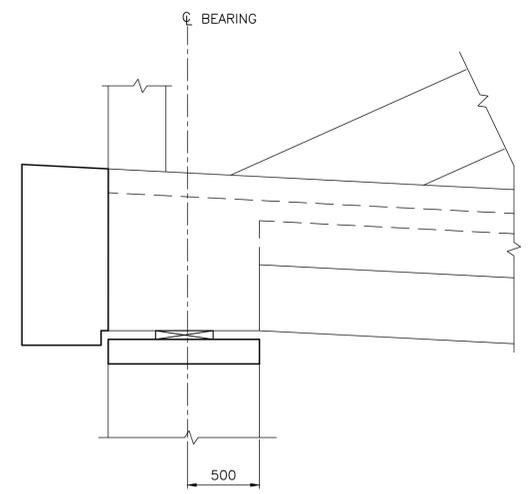
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 DRAWING No. S-6
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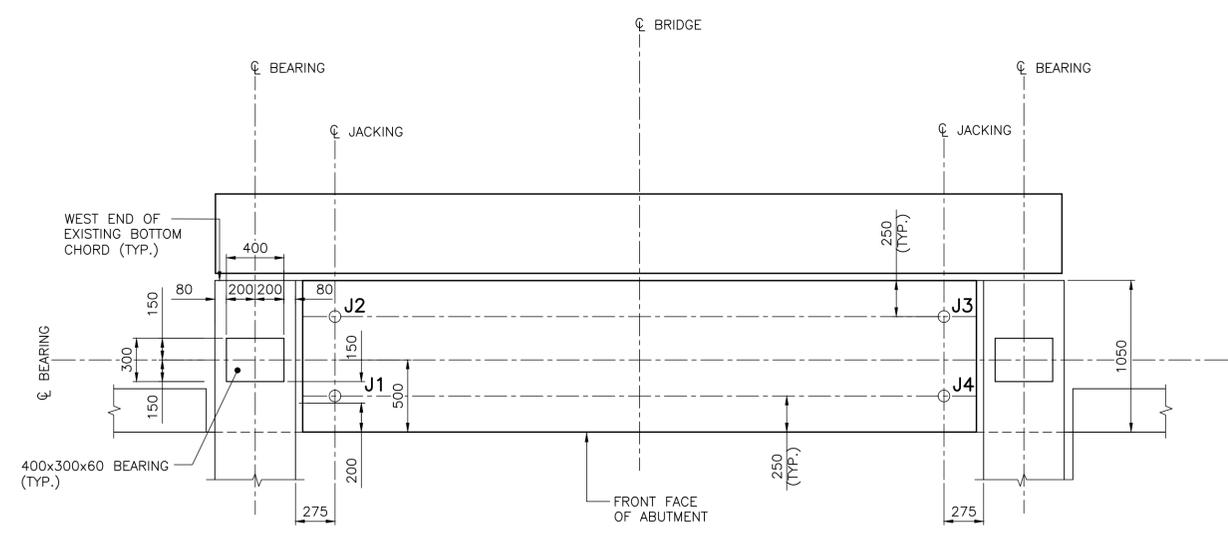
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DATE	DETAILS	INIT.
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JACKING DETAIL WEST END
 1:25



2
 SCALE: 1:25



1
 SCALE: 1:25

NOTES

- CLEAR EXPANSION JOINTS PRIOR TO JACKING, REMOVE SEAL.
- THE STRUCTURE SHALL BE RAISED BY PLACING JACKS AT THE REQUIRED LOCATIONS (4 No.) USING A SYNCHRONIZED JACKING SYSTEM WITH APPROPRIATE METERING DEVICES. AT NO TIME SHALL THE DIFFERENCE IN LIFTS BETWEEN ADJACENT JACKS BE GREATER THAN 1mm. MAX LIFT = 10mm
 MAXIMUM LOADS (ULS)
 EXTERIOR: DEAD LOAD 100kN
 DEAD LOAD: JACK 500kN
- THE BRIDGE SHALL BE JACKED WITH NO TRAFFIC ON THE BRIDGE. THE STRUCTURE TO BE MONITORED DURING JACKING. IF CRACKS APPEAR ANYWHERE ON THE BRIDGE JACKING OPERATIONS ARE TO CEASE IMMEDIATELY.
- BOTTOM CHORD TO BE SHIMMED IN PLACE DURING BEARING REPLACEMENT WORKS AND DURING CONCRETE REPAIR WORKS TO THE END OF THE BOTTOM CHORD AND ABUTMENT.
- OLD BEARINGS TO BE REMOVED AND REPLACED WITH NEW BEARINGS.
- BOTTOM CHORD SHIMS TO BE REMOVED AND THE BRIDGE TO BE LOWERED ON NEW BEARINGS.
- TEMPORARY SIGN SHOULD INCLUDE:
 MAXIMUM VEHICLE LOAD - 9 TONNES
 MAXIMUM PERSONS LOAD - 100 PERSONS

LOCATION	ABUTMENTS
TYPE	LAMINATED NATURAL RUBBER
SIZE (mm)	400x300x60
NUMBER REQUIRED	2
DEAD LOAD (kN)	540
TOTAL LOAD (kN)	660
MOVEMENT (mm)	±19mm
ROTATION	0.0134
MAXIMUM SHEAR RATE (kN/mm)	3
DEAD LOAD (kN)	640
TOTAL LOAD (kN)	850

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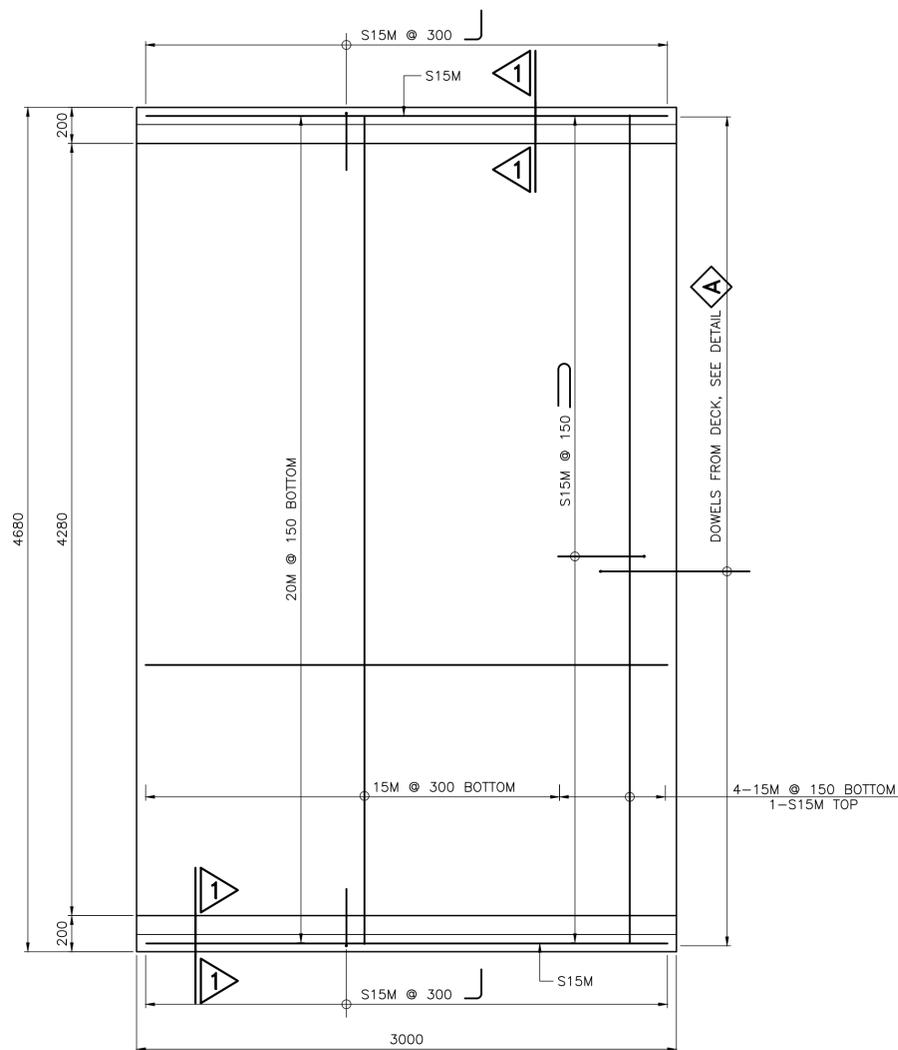
DESIGN BY: _____ C.E.T.
 APPROVED BY: _____

DEPARTMENTAL APPROVAL: SILVIO CESARIO P.ENG.

MIDDLE ROAD HERITAGE BRIDGE
 BRIDGE REHABILITATION
 JACKING AND BEARING DETAILS

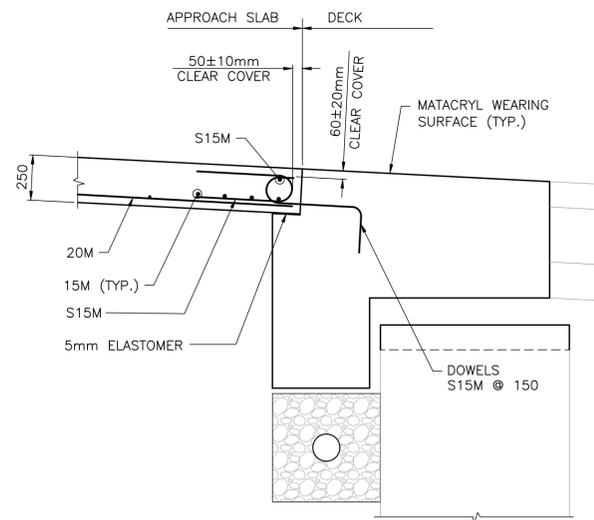
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C.A.D.D. BY B.J.S.	CHECKED BY C.B.L.	DRAWING No. S-6
DATE NOV. 2020	SHEET XX	

MINISTRY OF TRANSPORTATION, ONTARIO
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BR-05

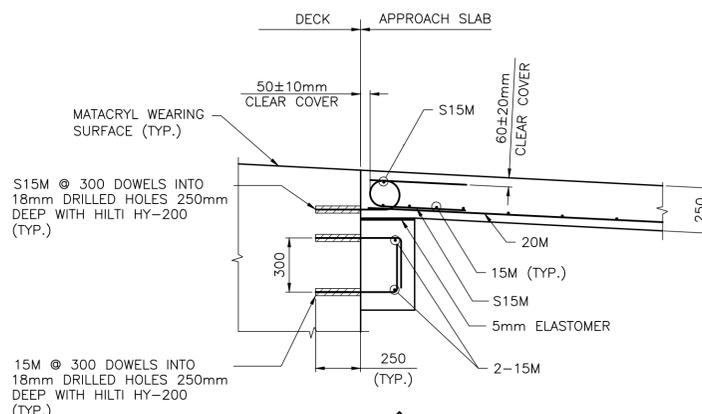


PLAN
1:20

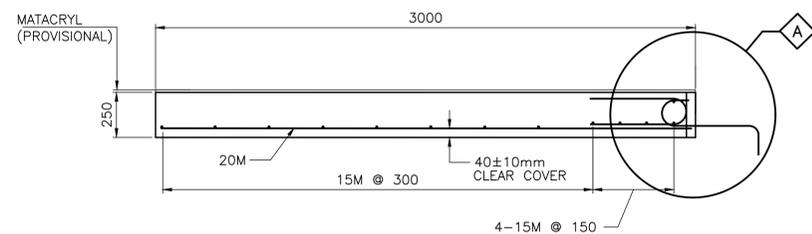
WEST APPROACH SLAB SHOWN, EAST SIMILAR



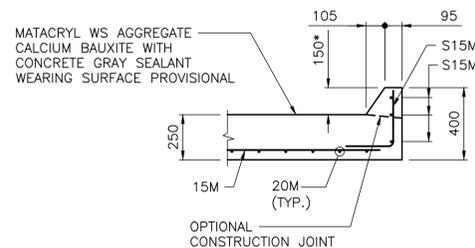
WEST END
SCALE 1:20



EAST END
SCALE 1:20



LONGITUDINAL SECTION
1:20



NOTE:
* DENOTES DIMENSION SHOULD MATCH TOP OF EXISTING CURB



APPROACH SLAB CURB

METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

REVISIONS		
DATE	DETAILS	INIT.
2021/03/16	ISSUED FOR HERITAGE REVIEW	C.B.L.

NOTES:

- CLEAR COVER TO REINFORCING STEEL 70 ± 20 mm EXCEPT AS NOTED.
- STAINLESS STEEL BARS SHALL BE TYPE 316 LN OR DUPLEX 2205 WITH A MINIMUM YIELD STRENGTH OF 500MPa. REINFORCING STEEL SHALL BE GRADE 400W.
- BARS MARKED WITH PREFIX S DENOTE STAINLESS STEEL BARS.

DRAWING NAME: 60640389 - S8.dwg
SAVED BY: brian.sanders1
SAVED DATE: 3/10/2021 7:53 AM
PLOT DATE: 3/16/2021 2:59 PM

STANDARD DRAWING MARCH 2016	MODIFIED SS116-1
6000 mm APPROACH SLAB	

PRODUCED FOR - T&W, ENGINEERING AND WORKS

DESIGN BY	APPROVED BY
DEPARTMENTAL APPROVAL	
SILVO CESARIO P.ENG.	

Toronto Engineering & Construction Services

**MIDDLE ROAD HERITAGE BRIDGE
BRIDGE REHABILITATION
APPROACH SLAB DETAILS**

SCALE AS SHOWN	AREA	PROJECT No. 60640389
C.A.D.D. BY B.J.S.	CHECKED BY C.B.L.	DRAWING No. S-8
DATE NOV. 2020	SHEET XX	

GENERAL NOTES:

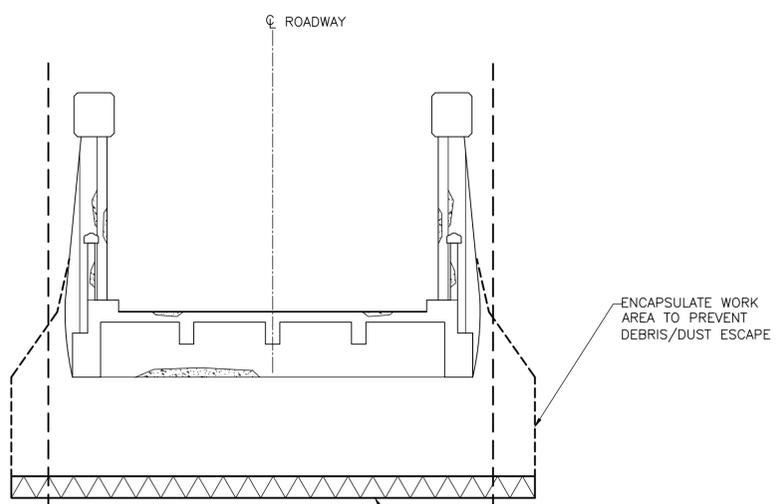
- EROSION AND SEDIMENT CONTROL (ESC) MEASURES WILL BE IMPLEMENTED PRIOR TO, AND MAINTAINED DURING THE CONSTRUCTION PHASES, TO PREVENT ENTRY OF SEDIMENT INTO THE WATER. ALL DAMAGED EROSION AND SEDIMENT CONTROL MEASURES SHOULD BE REPAIRED AND/OR REPLACED WITHIN 48 HOURS OF THE INSPECTION. ALL CONSTRUCTION AND TREE PROTECTION FENCING SHALL BE INSTALLED PRIOR TO START OF CONSTRUCTION, AFTER LAYOUT AND SHALL BE INSPECTED BY THE CONTRACT ADMINISTRATOR.
- DISTURBED AREAS WILL BE MINIMIZED TO THE EXTENT POSSIBLE AND TEMPORARILY OR PERMANENTLY STABILIZED OR RESTORED AS THE WORK PROGRESSES.
- ALL NEAR WATER WORKS WILL BE CONDUCTED IN THE DRY WITH APPROPRIATE AND SEDIMENT CONTROLS.
- THE EROSION AND SEDIMENT CONTROL STRATEGIES OUTLINED ON THE PLANS ARE NOT STATIC AND MAY NEED TO BE UPGRADED/AMENDED AS SITE CONDITIONS CHANGE TO MINIMIZE SEDIMENT LADEN RUNOFF FROM LEAVING THE WORK AREAS. IF THE PRESCRIBED MEASURES ON THE PLANS ARE NOT EFFECTIVE IN PREVENTING THE RELEASE OF DELETERIOUS SUBSTANCE, INCLUDING SEDIMENT, THEN ALTERNATIVE MEASURES MUST BE IMPLEMENTED IMMEDIATELY TO MINIMIZE POTENTIAL ECOLOGICAL IMPACTS. TRCA ENFORCEMENT OFFICER SHOULD BE IMMEDIATELY CONTACTED. ADDITIONAL ESC MEASURES TO BE KEPT ON SITE AND USED AS NECESSARY.
- AN ENVIRONMENTAL MONITOR WILL ATTEND THE SITE TO INSPECT ALL NEW CONTROLS, AS WELL AS ON A REGULAR BASIS, OR FOLLOWING RAIN/SNOWMELT EVENT, TO MONITOR ALL WORKS, AND IN PARTICULAR WORKS RELATED TO EROSION AND SEDIMENT CONTROLS, DEWATERING OR UNWATERING, RESTORATION AND IN- OR NEAR- WATER WORKS. SHOULD CONCERNS ARISE ON SITE THE ENVIRONMENTAL MONITOR WILL CONTACT THE TRCA ENFORCEMENT OFFICER AS WELL AS THE PROPONENT.
- CONSTRUCTION ACTIVITIES, INCLUDING MAINTENANCE PROCEDURES WILL BE CONTROLLED TO PREVENT THE ENTRY OF PETROLEUM PRODUCTS, DEBRIS, RUBBLE, CONCRETE OR OTHER DELETERIOUS SUBSTANCES INTO THE WATER. VEHICULAR REFUELING AND MAINTENANCE WILL BE CONDUCTED, MINIMUM 30 METRES FROM THE CREEK EDGE.
- ALL GRADES WITHIN THE REGULATORY FLOOD PLAIN WILL BE MAINTAINED OR MATCHED.
- THE CONTRACTOR SHALL MONITOR THE FIVE DAY WEATHER FORECAST ON A DAILY BASIS TO ANTICIPATE WEATHER CONDITIONS AND SHALL BE PREPARED TO LEAVE THE SITE IN A STABLE AND SECURE CONDITION SHOULD WATER LEVELS RISE.
- ANY SEDIMENT LADEN DEWATERING DISCHARGE SHALL BE PUMPED USING SCREENED PUMP TO A SEDIMENT TRAP/FILTERING SYSTEM AT LEAST 30m FROM THE TRIBUTARY AND ALLOWED TO SETTLE AND/OR FILTER THROUGH RIPARIAN VEGETATION BEFORE REENTERING THE TRIBUTARY DOWNSTREAM OF THE CONSTRUCTION AREA. ALL DEWATERING SHALL BE LOCATED AT LEAST 15m FROM CREEK TO A SEDIMENT TRAP. NO DEWATERING SHALL BE SENT DIRECTLY TO WATERCOURSE. THESE CONTROL MEASURES SHALL BE MONITORED FOR EFFECTIVENESS.
- CONSTRUCTION VEHICLES ARE NOT PERMITTED TO CROSS THE CREEK. ALTERNATE ACCESS TO OPPOSITE BANK MUST BE ARRANGED USING MUNICIPAL ROADS UNLESS APPROVED BY TRCA.
- TREE REMOVAL TO BE APPROVED BY ENGINEER. NO TREES ARE TO BE REMOVED.
- TO PROTECT LOCAL FISH POPULATIONS DURING THEIR SPAWNING, NURSERY AND MIGRATORY PERIODS, IN-WATER/NEAR-WATER ACTIVITIES, MAY ONLY OCCUR DURING THE FOLLOWING TIME PERIOD JULY 1 TO MARCH 31.
- FISH AND WILDLIFE STRANDED WITHIN THE WORK AREA SHALL BE CAPTURED AND RELEASED LIVE IN SUITABLE HABITAT UPSTREAM OF THE WORK AREA UNDER THE SUPERVISION OF A QUALIFIED AQUATIC BIOLOGIST. A PERMIT FROM THE MINISTRY OF NATURAL RESOURCES IS REQUIRED.

- CONTRACTOR IS REQUIRED TO NOTIFY TRCA ENFORCEMENT OFFICER (XXX AT 416.XXXX CELL) AND TRCA PROJECT MANAGER (XXX AT 416.661.6600 C.CC) 48 HOURS PRIOR TO COMMENCING CONSTRUCTION.
- AN ENVIRONMENTAL MONITOR WILL BE ON SITE, AND PROVIDE ADVICE DURING SETUP AND REMOVAL OF PROTECTION FENCING, SEDIMENT CONTROLS, PLATFORMS, TO ENSURE THAT ACTIVITIES THAT COULD HAVE A NEGATIVE IMPACT TO THE NATURAL ENVIRONMENT ARE EFFECTIVELY MITIGATED AS CONSTRUCTION PROCEEDS. THE ENVIRONMENTAL MONITOR SHALL NOTIFY THE TRCA ENFORCEMENT OFFICER AND PROJECT MANAGER IF AN ISSUE ARISES.
- ALL UNSUITABLE AND/OR EXCESS MATERIAL TO BE DISPOSED OF OFF SITE.
- ALL STOCKPILE AREAS TO BE ENCLOSED WITH A SEDIMENT CONTROL FENCE.
- DISTURBED AREAS TO BE RESTORED TO ORIGINAL CONDITION AT COMPLETION OF CONTRACT.
- SEDIMENT CONTROL FENCE CONTENTS TO BE COLLECTED AND REMOVED OFFSITE AND INSPECTED BY THE ENGINEER.
- AN AFTER HOURS TECHNICIAN TO BE ASSIGNED FOR CONTINUOUS PUMPING.
- PLEASE BE AWARE OF UPDATES AND REQUIREMENTS OF THE MIGRATORY BIRDS CONVENTION ACT WHICH GOVERNS THE PROTECTION AND CONSERVATION OF MIGRATORY BIRDS WITHIN CANADA. ANY POTENTIALLY DESTRUCTIVE OR DISRUPTIVE ACTIVITY SUCH AS VEGETATION CLEARING SHOULD BE AVOIDED BETWEEN AUGUST 1 AND APRIL 1. IT IS THE PROPONENT'S RESPONSIBILITY TO ADHERE TO ALL PERTINENT LAWS, REGULATIONS AND PERMIT REQUIREMENTS INCLUDING BUT NOT RESTRICTED TO THE MIGRATORY BIRDS CONVENTION ACT AND THE MIGRATORY BIRDS REGULATIONS. ANY MITIGATION USED TO AVOID DESTRUCTION OF NESTS SHOULD BE CONFIRMED THROUGH CONSULTATION WITH THE CANADIAN WILDLIFE SERVICE. FURTHER INFORMATION ON THE GENERAL NESTING PERIODS OF MIGRATORY BIRDS IN CANADA CAN BE FOUND AT:
[HTTP://WWW.EC.GC.CA/PAON-ITMB/DEFAULT.ASP?LANG=EN&N=4F39A78F-1](http://www.ec.gc.ca/PAON-ITMB/DEFAULT.ASP?LANG=EN&N=4F39A78F-1)
- NO MOTORIZED EQUIPMENT ACCESS IS PROVIDED TO UNDERSIDE OF BRIDGE. WORK PLATFORM AND CONCRETE EQUIPMENT IS TO BE LOWERED OR CRANED FROM DECK AND APPROACH OR MANUALLY CARRIED AND ASSEMBLED UNDER THE BRIDGE.

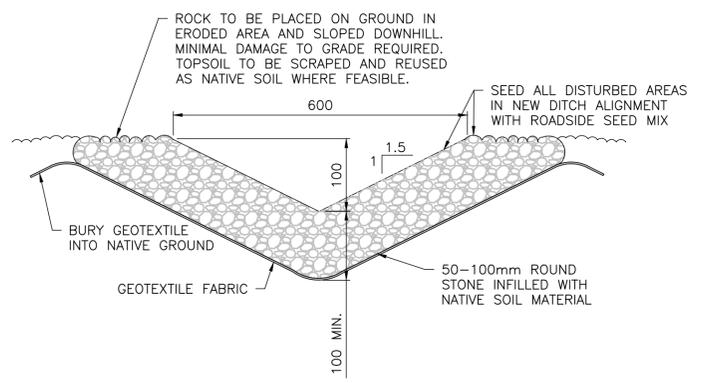
REVISIONS		
DATE	DETAILS	INIT.
2021/03/16	ISSUED FOR HERITAGE REVIEW	C.B.L.

METRIC
DIMENSIONS ARE IN METRES
AND/OR MILLIMETRES
UNLESS OTHERWISE SHOWN

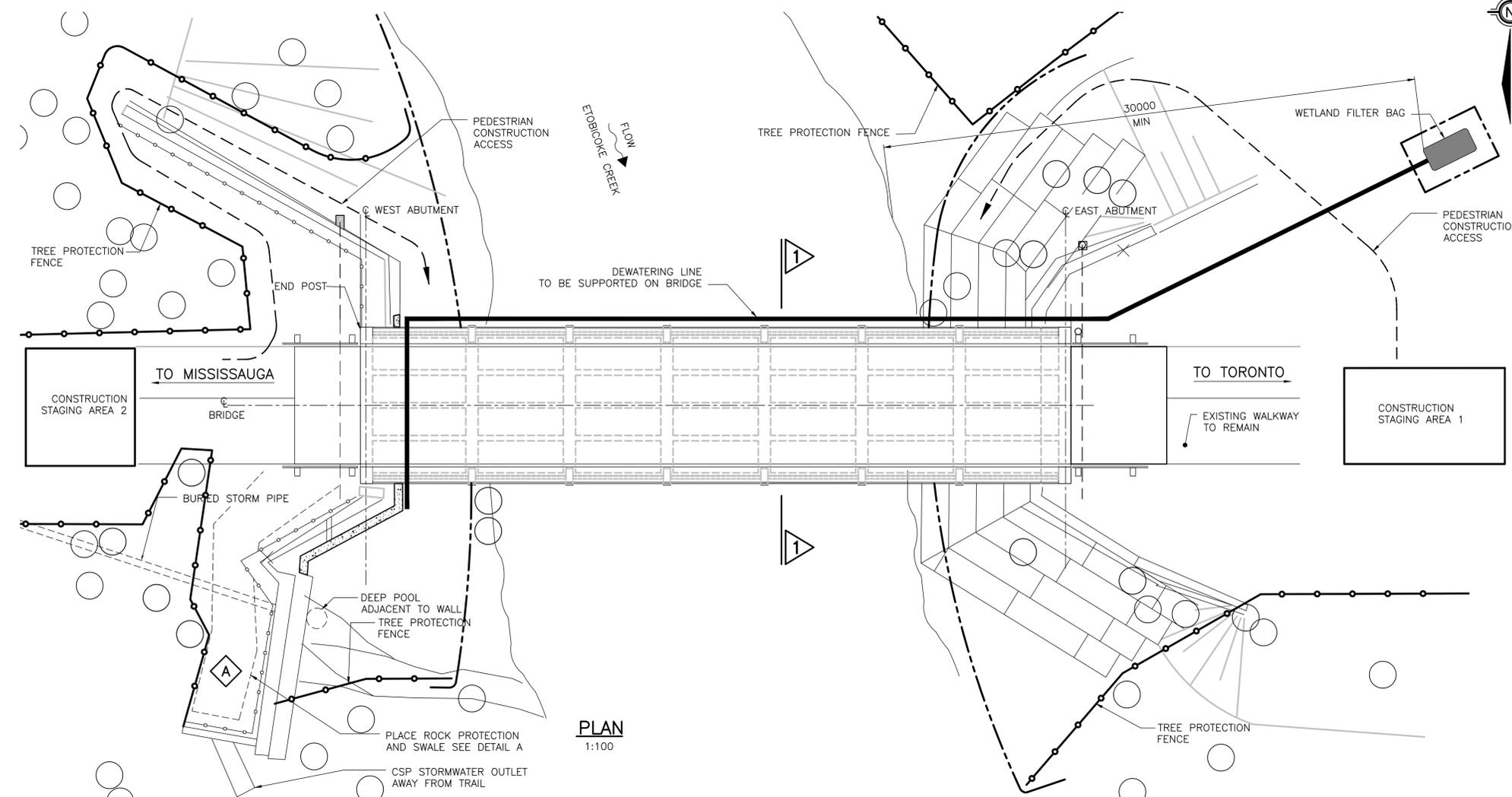
- LEGEND:**
- SEDIMENT FENCE
 - TREE PROTECTION FENCE
 - PROTECTED TREE



SECTION 1
SCALE: 1:50



DETAIL A
N.T.S.



PLAN
1:100

PRODUCED FOR - T&W, ENGINEERING AND WORKS

DESIGN BY	APPROVED BY
C.E.T.	
DEPARTMENTAL APPROVAL	
SILVO CESARIO P.ENG.	

**MIDDLE ROAD HERITAGE BRIDGE
BRIDGE REHABILITATION
EROSION SEDIMENT CONTROL 1**

SCALE AS SHOWN	AREA	PROJECT No. 60640389
C.A.D.D. BY B.J.S.	CHECKED BY C.B.L.	DRAWING No. ES-01
DATE NOV. 2020	SHEET XX	

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 PLOT DATE: 3/16/2021 2:59 PM
 SAVD DATE: 3/10/2021 8:11 AM
 PRE-D-707
 BB-05
 MINISTRY OF TRANSPORTATION, ONTARIO

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 SAVED DATE: 3/10/2021 9:42 AM
 PLOT DATE: 3/16/2021 2:59 PM
 PRE-D-707
 BB-05
 MINISTRY OF TRANSPORTATION, ONTARIO

METRIC
 DIMENSIONS ARE IN METRES
 AND/OR MILLIMETRES
 UNLESS OTHERWISE SHOWN

REVISIONS		
DATE	DETAILS	INIT.
2021/03/16	ISSUED FOR HERITAGE REVIEW	C.B.L.

LEGEND:

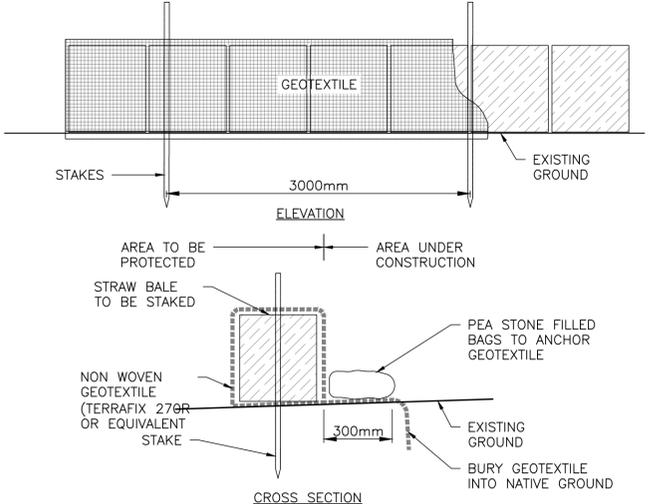
- TREE CANOPY DRIP-LINE
- SEDIMENT CONTROL FENCE
- TREE PROTECTION FENCE
- WORKZONE

TREE PROTECTION NOTES:

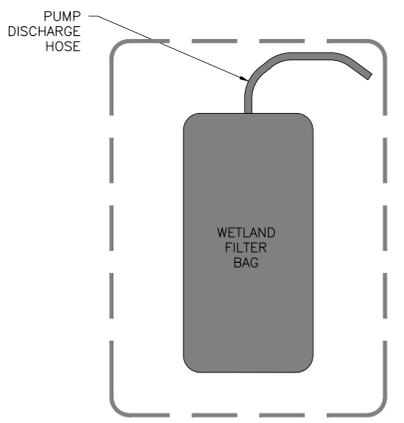
- TREE PROTECTION FENCING LOCATIONS MAY CHANGE WITH SITE INSPECTION BY LANDSCAPE ARCHITECT ARBORIST OR PROJECT MANAGER. ALL TREE PROTECTION FENCING SHALL BE INSTALLED PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION ACTIVITIES AND SHALL BE INSPECTED AND APPROVED BY THE LANDSCAPE ARCHITECT OR PROJECT MANAGER.
- FREE PROTECTION STANDARDS WILL BE ENFORCED THROUGHOUT THE DURATION OF CONSTRUCTION.
- DO NOT STORE MATERIALS, PLACE EQUIPMENT, OR MOVE EQUIPMENT OVER ROOT SYSTEM OR THROUGH SET BACK PROTECTION AREA.
- DO NOT BURN WASTE NEAR TREES OR FLUSH CONCRETE TRUCKS OR CEMENT MIXING MACHINES OVER ROOTS SYSTEMS.
- AREAS WHERE ROOT SYSTEMS ARE DIRECTLY EXPOSED SHALL HAVE ROOTS PRUNED AND THEN BACK FILLED WITH GOOD NATIVE SOIL.
- DAMAGED TREES MUST BE IMMEDIATELY REPAIRED AT CONTRACTORS EXPENSE.
- NO TREES TO BE REMOVED TO FACILITATE CULVERT REPLACEMENT WORKS.

SITE RESTORATION NOTES:

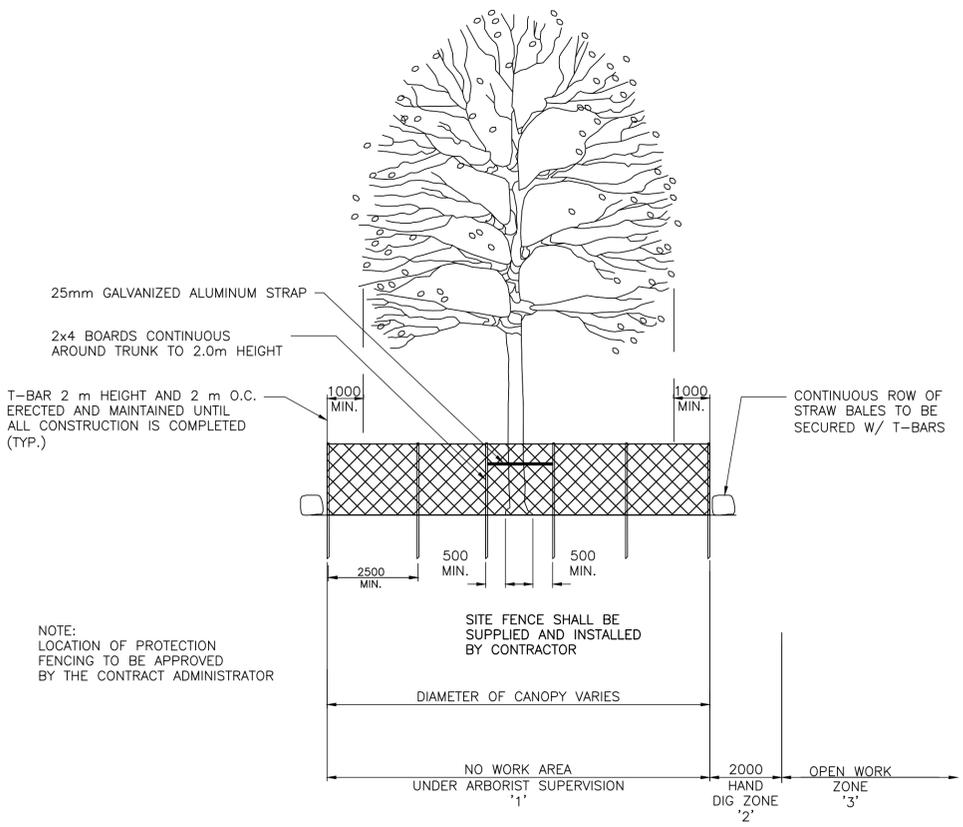
- ALL DISTURBED AREAS TO RECEIVE 150mm SCREENED TOPSOIL AND NURSE CROP AND SEED APPLICATION.
- SEE APPLICATION TYPE WITHIN 3m OF THE CREEK TO BE STREAMBANK SEED MIX, OTHERWISE "ROADSIDE SEED MIX TO BE USED"



A
SEDIMENT FENCE DETAIL
 SCALE 1:25



C
DETAIL
 SCALE 1:25



NOTE:
 LOCATION OF PROTECTION FENCING TO BE APPROVED BY THE CONTRACT ADMINISTRATOR

- NOTES:**
- THE "NO WORK AREA" IS NOT TO BE ENCLOSED UPON IN ANY WAY.
 - ALL TREE ROOTS WITHIN THE "HAND DIG ZONE" WILL BE CAREFULLY LOCATED AND CLEANLY PRUNED WITH A HAND PRUNING SAW TO THE DEPTH REQUIRED FOR CONSTRUCTION.
 - WORK IN THE "OPEN WORK ZONE" IS SUBJECT TO NORMAL CONSTRUCTION PRACTICE.

B
TREE PROTECTION DETAIL
 SCALE 1:100

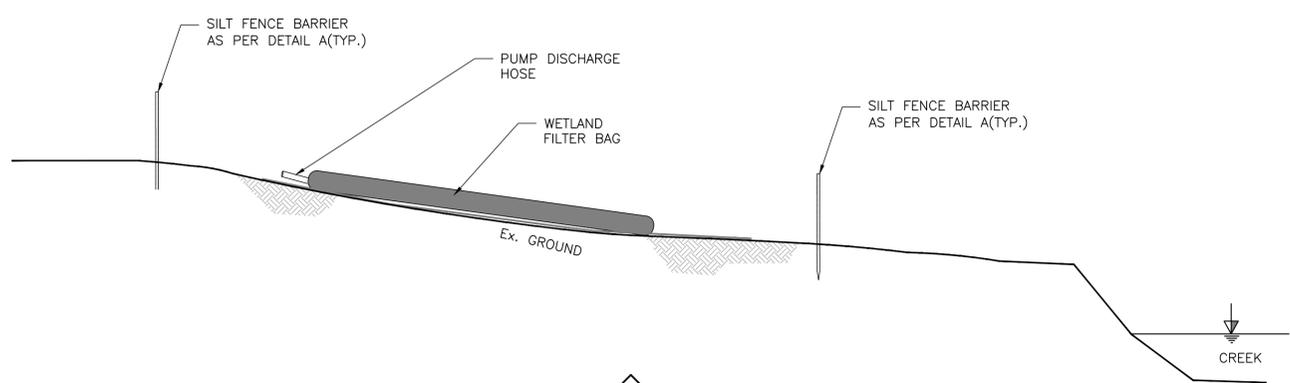
SEED MIXES

ALL SEED TO BE APPLIED AT A RATE OF 25kg/Ha

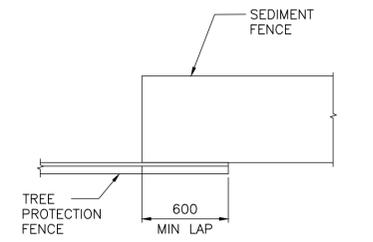
MIX: ROADSIDE SEED MIXTURE		
COMMON NAME	SCIENTIFIC NAME	% OF MIX
TALL MANA GRASS	GLYCERIA GRANDIS	25.00
LITTLE BLUE STEM	SCHIZACHYRIUM SCOPARIUM	25.00
BIG BLUE STEM	ANDROPOGON GERARDII	25.00
CANADA BROME	BROMUS PUBESCENS	25.00
TOTAL SPECIES: 4		100.00

MIX: STREAMBANK SEED MIXTURE		
COMMON NAME	SCIENTIFIC NAME	% OF MIX
BLACK EYED SUSAN	BLACK EYED SUSAN	5.00
NEW ENGLAND ASTER	SYMPHYOTRICHUM NOVAE-ANGLICAE	5.00
FOWL MANNA GRASS	GLYCERIA STRIATA	10.00
YELLOW NUT SEDGE	CYPERUS ESCULENTUS	10.00
PENNSYLVANIA SEDGE	CAREX PENNSYLVANICA	15.00
BIG BLUE STEM	ANDROPOGON GERARDII	15.00
BOTTLEBRUSH GRASS	ELYMUS HYSTRIX	20.00
FOWL BLUEGRASS	POA PALUSTRIS	20.00
TOTAL SPECIES: 8		100.00

MIX: NURSE CROP MIXTURE		
COMMON NAME	SCIENTIFIC NAME	% OF MIX
CANADA WILD-RYE	ELYMUS CANADENSIS	100.00
TOTAL SPECIES: 1		100.00



D
DETAIL
 SCALE 1:25



E
TREE/SEDIMENT FENCE CONNECTION
PLAN
 SCALE N.T.S.

PRODUCED FOR - T&W, ENGINEERING AND WORKS

DESIGN BY	APPROVED BY
C.E.T.	
DEPARTMENTAL APPROVAL	
SILVO CESARIO P.ENG.	

Engineering & Construction Services

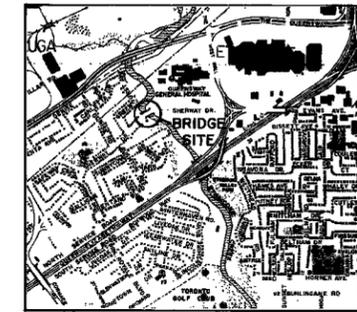
MIDDLE ROAD HERITAGE BRIDGE
BRIDGE REHABILITATION
EROSION SEDIMENT CONTROL 2

SCALE AS SHOWN	AREA	PROJECT No. 60640389
C.A.D.D. BY B.J.S.	CHECKED BY C.B.L.	DRAWING No. ES-02
DATE NOV. 2020	SHEET XX	

Appendix F: 1985 Restoration Design Drawings

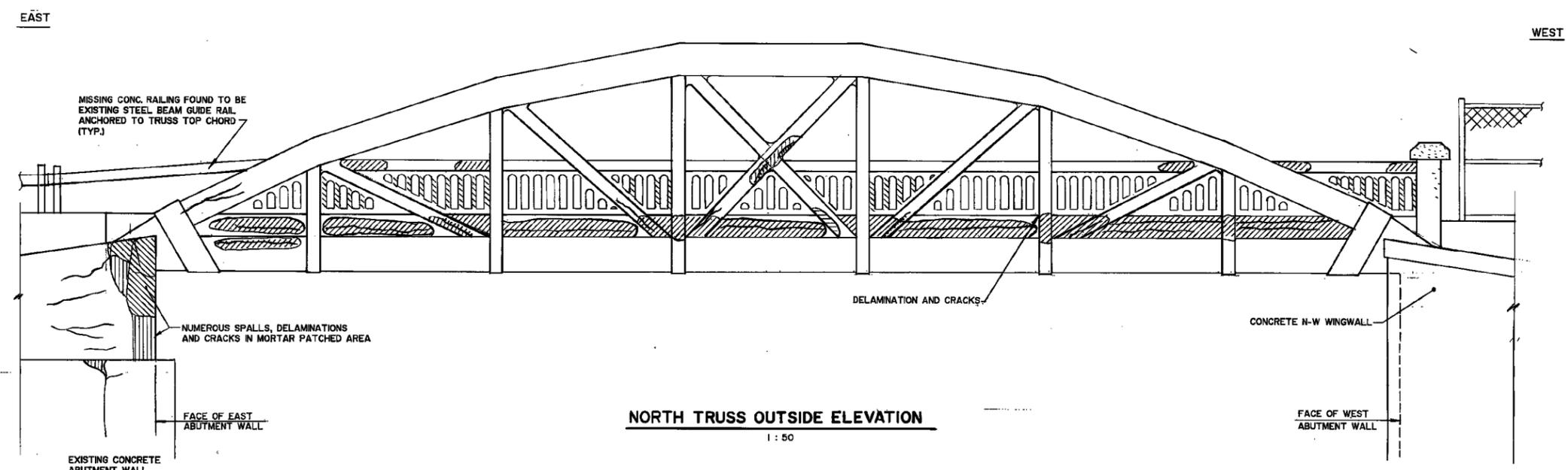
SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS		
STORM SEWERS			BELL. U/G CABLE		
WATER MAINS			HYDRO. U/G CABLE		

REVISIONS		
DATE	DETAILS	INIT. R.P.
MAR 7/1986	AS BUILT	

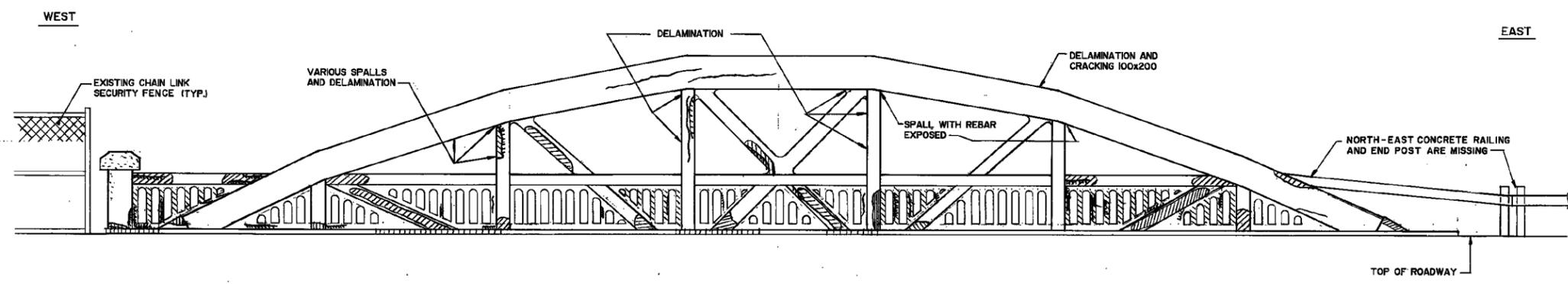


LEGEND

- CRACKS
- SPALLING WITH REBAR EXPOSED
- DELAMINATION
- SPALLS
- HEAVY SCALING



NORTH TRUSS OUTSIDE ELEVATION
1:50



NORTH TRUSS INSIDE ELEVATION
1:50

- GENERAL NOTES**
- ALL DRIVEWAYS ASPHALT UNLESS OTHERWISE NOTED.
 - ALL SERVICE LOCATIONS ARE APPROXIMATE AND MUST BE LOCATED ACCURATELY IN FIELD.
 - DENOTES BUILDING - NOT LOCATED.
 - DENOTES BUILDING - LOCATED.
 - T.T.B.M. No. ELEV.
 - TEMP BENCH MARK ELEV. DESCRIPTION.

Morrison Herzfeld Limited
Consulting Engineers **MH**

DESIGNED BY
—CHRD

APPROVED BY

**MIDDLE ROAD
BRIDGE RESTORATION**

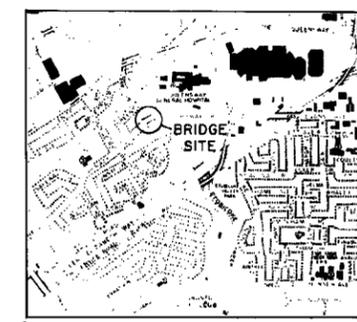
ELEVATIONS OF NORTH
BOWSTRING TRUSS DETERIORATION

CITY OF MISSISSAUGA
ENGINEERING AND WORKS DEPARTMENT

SCALE AS NOTED	AREA Z12	PROJECT No PNB4131
DRAWN BY S. L.	CHECKED BY A.T.C.	PLAN No.
DATE JULY 26 / 1985	SHEET 2 OF 13	C-21244

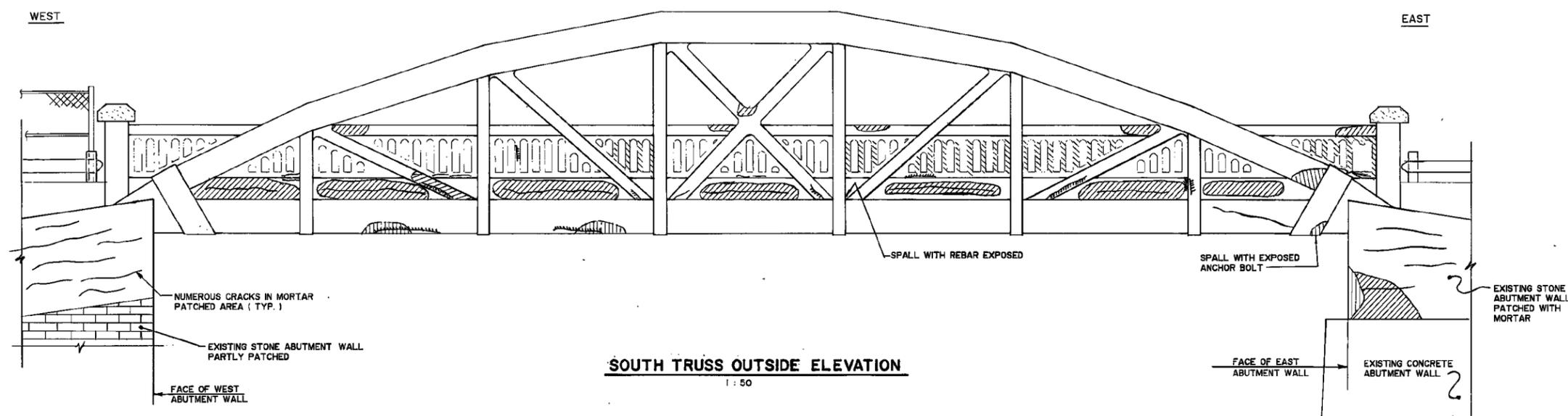
SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/S CABLE		
WATERMANS			HYDRO U/S CABLE		

REVISIONS		
DATE	DETAILS	INIT.
MAR 7/1986	AS BUILT	RP



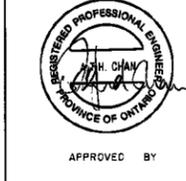
LEGEND

- CRACKS
- SPALLING WITH REBAR EXPOSED
- DELAMINATION
- SPALLS
- HEAVY SCALING



- GENERAL NOTES**
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 - DENOTES BUILDING - LOCATED
 - T.T.B.M. No. ELEV.
 - TEMP BENCH MARK ELEV. DESCRIPTION.

Morrison Hershfield Limited
Consulting Engineers



DESIGNED BY

APPROVED BY

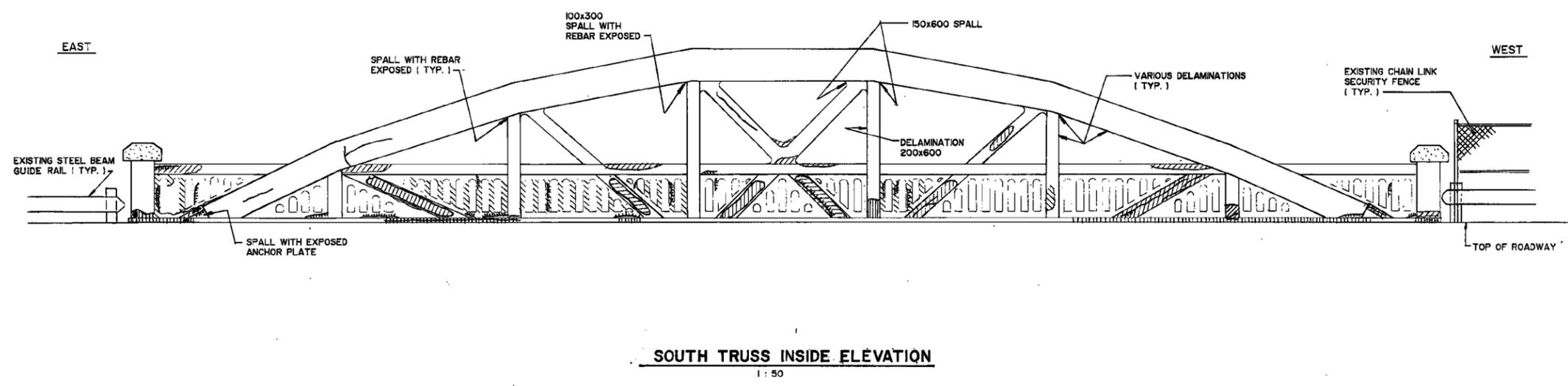
**MIDDLE ROAD
BRIDGE RESTORATION**

ELEVATIONS OF SOUTH
BOWSTRING TRUSS DETERIORATION

CITY OF MISSISSAUGA
ENGINEERING AND WORKS DEPARTMENT

STN. TO STN.

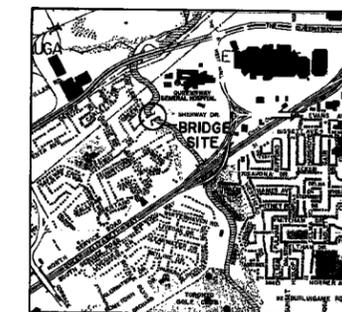
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DATE JULY 26 / 1985	SHEET 3 OF 13	C-21245



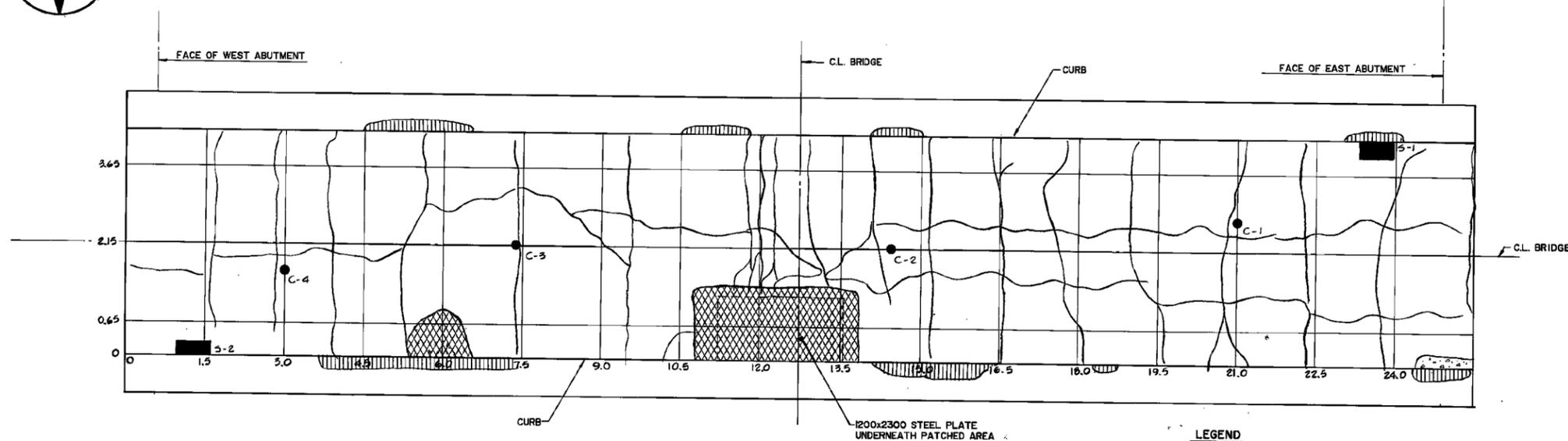


SERVICE DATA					
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SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/S CABLE		
WATERMANS			HYDRO U/S CABLE		

REVISIONS		
DATE	DETAILS	INIT. R.P.
MAR 7/1986	AS BUILT	



KEY PLAN

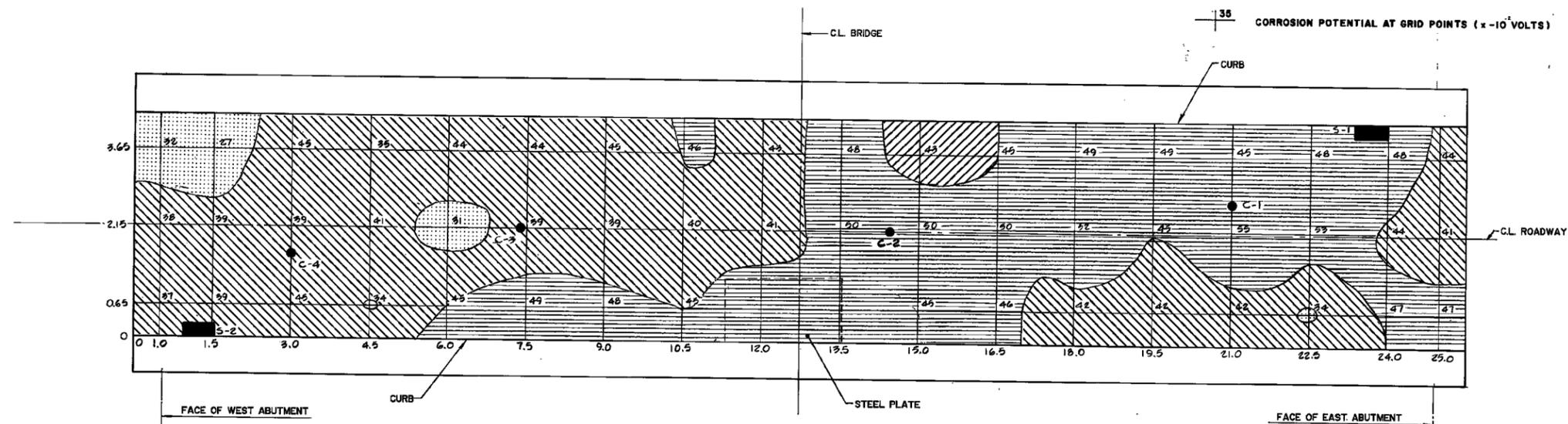


DECK SURFACE DETERIORATION

1 : 50

LEGEND

- CORE HOLE LOCATION C-1 TO C-4
- SAWN ASPHALT SAMPLE S-1, S-2
- CRACKS
- ▨ CONCRETE REPAIR
- ▩ PATCHED SPALLS
- ▧ SPALLS
- 0 TO -0.20V
- ▤ -0.21V TO -0.35V
- ▥ -0.36V TO -0.45V
- ▦ -0.46V TO -0.55V
- 35 CORROSION POTENTIAL AT GRID POINTS ($\times 10^{-3}$ VOLTS)



CORROSION POTENTIAL

1 : 50

GENERAL NOTES

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- □ DENOTES BUILDING - LOCATED.
- T.T.B.M. No. ELEV.
- TEMP BENCH MARK ELEV. DESCRIPTION.

Morrison Hershfield Limited
Consulting Engineers



DESIGNED BY
CHKD



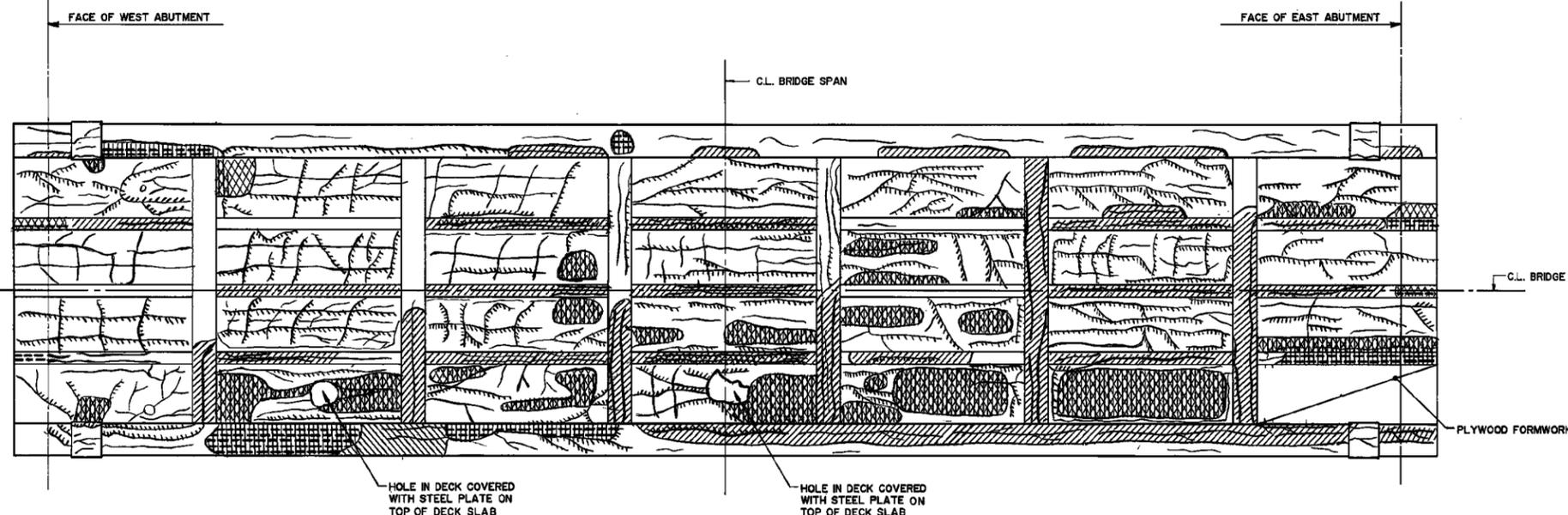
APPROVED BY

**MIDDLE ROAD
BRIDGE RESTORATION**

**DECK SURFACE DETERIORATION
AND CORROSION POTENTIAL**

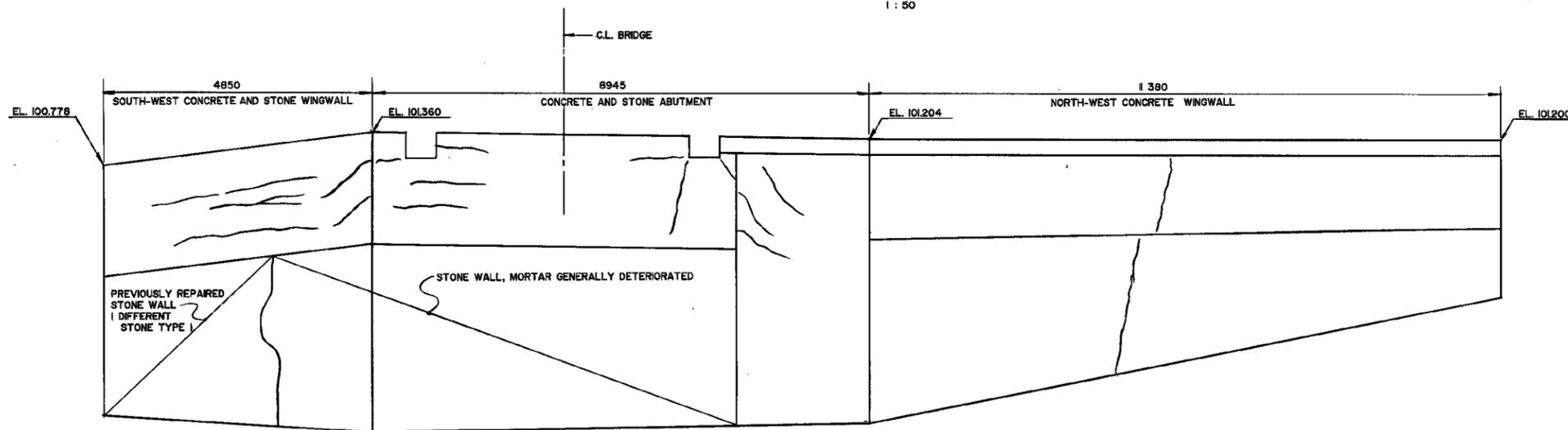
CITY OF MISSISSAUGA
ENGINEERING AND WORKS DEPARTMENT

SCALE AS NOTED	AREA Z12	PROJECT No. PN-84131
DRAWN BY S.L.	CHECKED BY A.T.C.	PLAN No.
DATE JULY 26/1985	SHEET 4 OF 13	C-21246



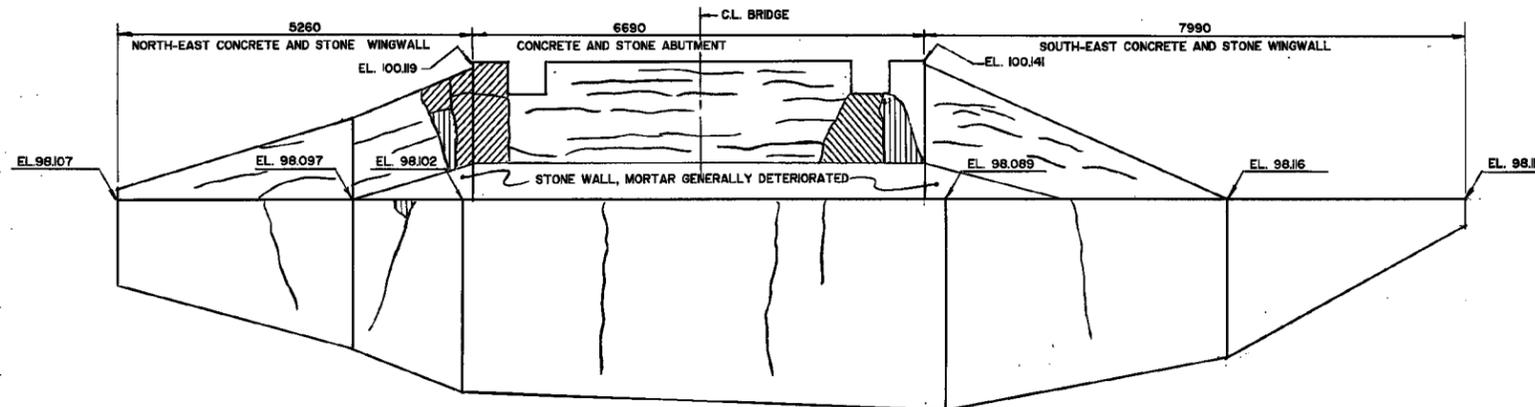
UNDERSIDE DECK DETERIORATION

1:50



DETERIORATION OF WEST ABUTMENT

1:50

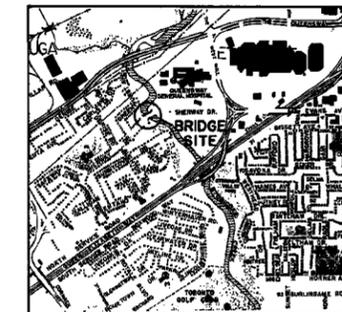


DETERIORATION OF EAST ABUTMENT

1:50

SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMANS			HYDRO U/G CABLE		

REVISIONS		
DATE	DETAILS	INIT.
MAR 7/1986	AS BUILT	RP



KEY PLAN

LEGEND

- DELAMINATION
- SPALLS
- SPALLS WITH EXPOSED REBAR
- SPALLS WITH EXPOSED W/W
- CRACKS
- CRACKS WITH EFFLORESCENCE

GENERAL NOTES

- ALL DRIVEWAYS ASPHALT UNLESS OTHERWISE NOTED.
- ALL SERVICE LOCATIONS ARE APPROXIMATE AND MUST BE LOCATED ACCURATELY IN FIELD.
- DENOTES BUILDING - NOT LOCATED.
- DENOTES BUILDING - LOCATED.
- T.T.B.M. No. ELEV.
- TEMP. BENCH MARK ELEV. DESCRIPTION.

Morrison Hershfield Limited
Consulting Engineers **MH**



DESIGNED BY



APPROVED BY

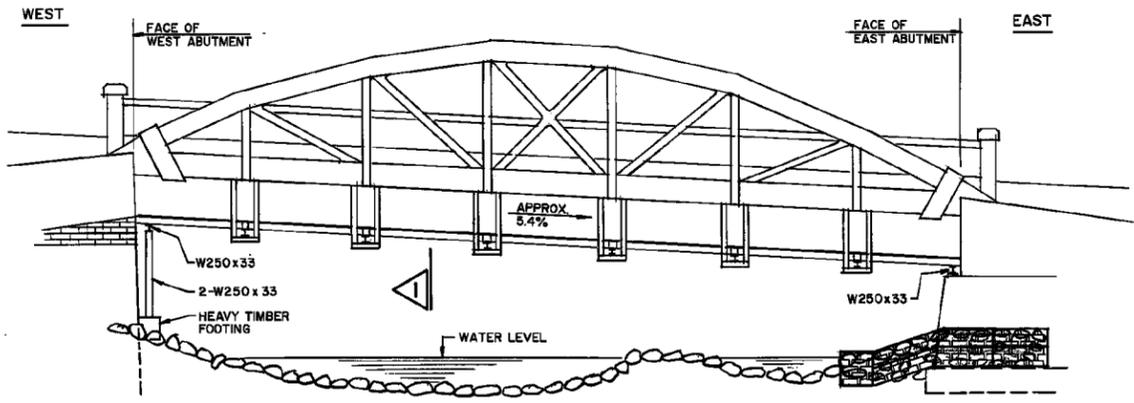
CHKD.

**MIDDLE ROAD
BRIDGE RESTORATION**

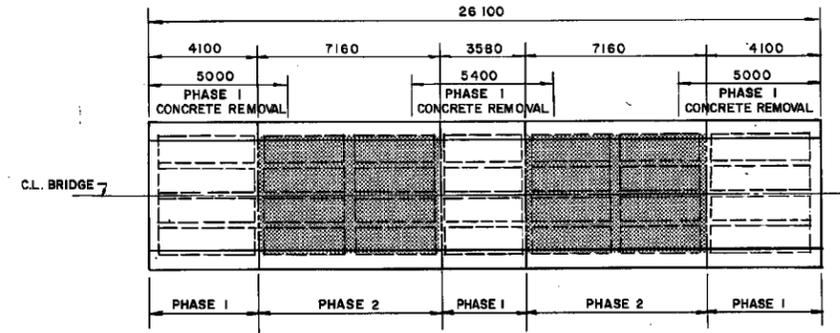
UNDERSIDE DECK DETERIORATION
ABUTMENTS AND WINGWALLS DETERIORATION

CITY OF MISSISSAUGA
ENGINEERING AND WORKS DEPARTMENT

SCALE	AREA	PROJECT No.
AS NOTED	Z12	PN-94131
DRAWN BY S.L.	CHECKED BY A.T.C.	PLAN No.
DATE JULY 26/1985	SHEET 5 OF 13	C-21247

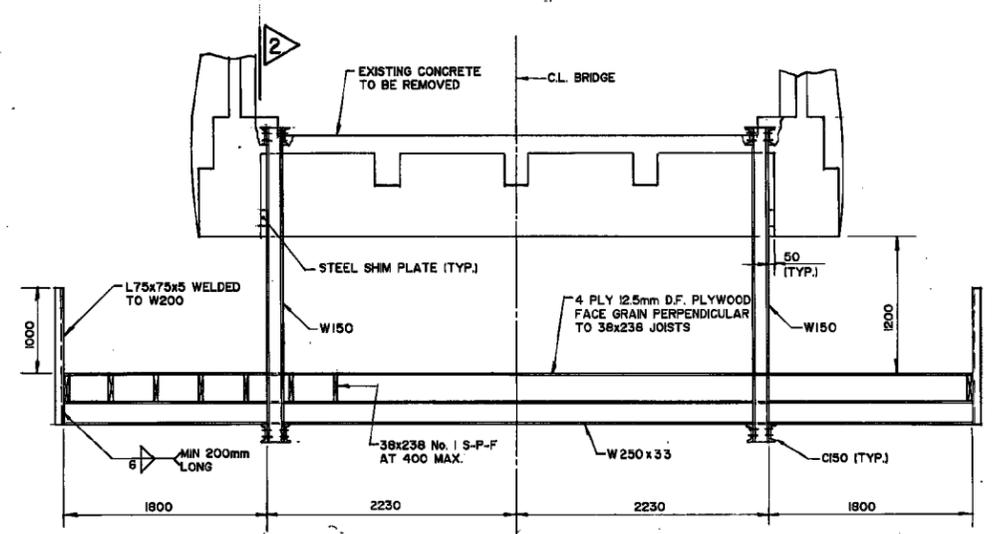


ELEVATION
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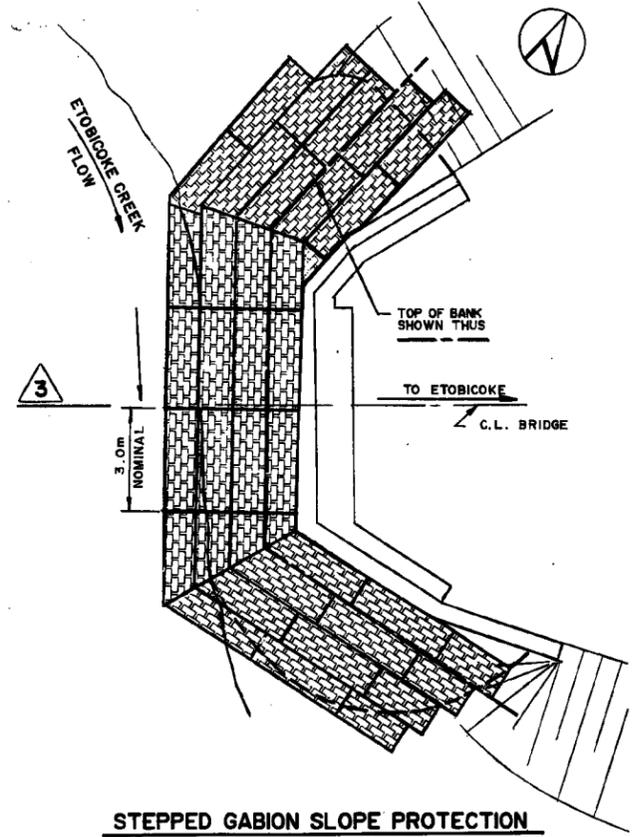


BRIDGE DECK CONSTRUCTION SEQUENCE

N.T.S.
(SEE SHEET 7 FOR DECK CONSTRUCTION DETAILS)

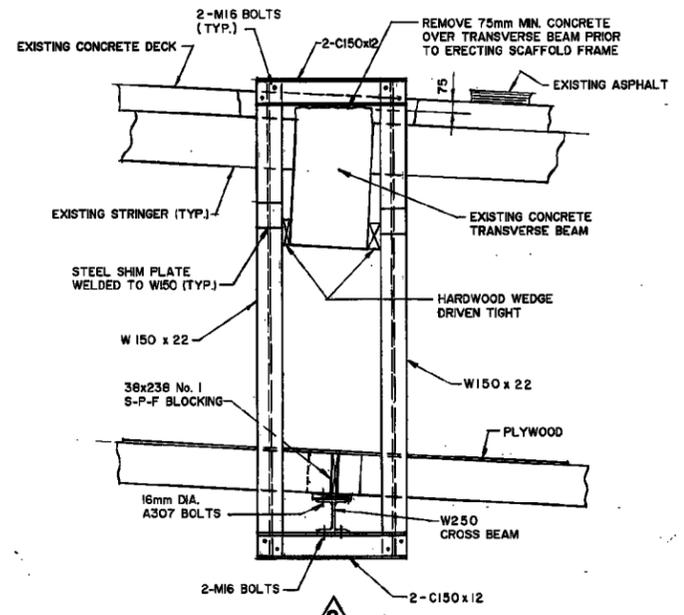


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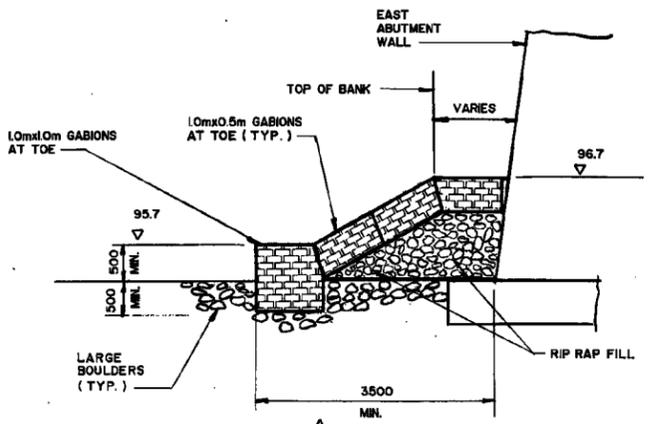


STEPPED GABION SLOPE PROTECTION FOR EAST ABUTMENT

1:100



1:20



1:50



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMANS			HYDRO U/G CABLE		

REVISIONS		
DATE	DETAILS	INIT.
13 SEPT. 85	SLOPE PROTECTION CHANGE TO GABIONS	RBD
MAR 7/1986	AS BUILT	RP.

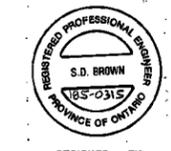
FALSEWORK NOTES

- FIELD CHECK ALL DIMENSIONS BEFORE PROCEEDING WITH THE WORK.
- PROTECT ALL EXISTING STRUCTURES AND EQUIPMENT DURING CONSTRUCTION.
- ALL LUMBER SHALL CONFORM TO THE STANDARD GRADING RULES OF THE NATIONAL LUMBER GRADES AUTHORITY (NLGA) AND TO CSA 286-M80, "CODE FOR THE ENGINEERING DESIGN OF WOOD".
- JOISTS SHALL BE RESTRAINED AGAINST TWISTING BY SOLID BLOCKING AT THE ENDS AND BY SOLID BLOCKING OR CROSS-BRIDGING AT INTERVALS BETWEEN SUPPORTS NOT EXCEEDING 2 METRES.
- ALL PLYWOOD SHALL CONFORM TO THE REQUIREMENTS OF CSA O121-1973, "DOUGLAS FIR PLYWOOD" FOR SELECT SHEATHING GRADE.
- TIMBER - NO. 1 GRADE S4S SPRUCE (SPF).
- WEDGES & SHIMS - KILN DRIED OAK EXCEPT AS NOTED.
- STRUCTURAL STEEL - CSA G40.21W GRADE 300 MPa.
- BOLTS - ASTM A325 WITH FINISHED HEX NUTS, UNLESS NOTED.
- NAILS AND SPLICES SHALL CONFORM TO THE REQUIREMENTS OF CSA B111-1974, "WIRE NAILS, SPIKES, AND STAPLES" FOR COMMON ROUND WIRE NAILS FOR COMMON SPIRAL NAILS.
- UNLESS OTHERWISE NOTED NAILING SHALL CONFORM TO THE REQUIREMENTS OF TABLE 9.23.2-A AND TABLE 9.23.3-B OF THE ONTARIO BUILDING CODE.
- DIMENSIONS FOR SAWN TIMBER ARE TO NET SURFACED SIZE.
- DESIGN LIVE LOAD = 4.8 kN/m².

GENERAL NOTES

- ALL DRIVEWAYS ASPHALT UNLESS OTHERWISE NOTED.
- ALL SERVICE LOCATIONS ARE APPROXIMATE AND MUST BE LOCATED ACCURATELY IN FIELD.
- DENOTES BUILDING - NOT LOCATED.
- ◻ DENOTES BUILDING - LOCATED.
- T.T.B.M. No. ELEV.
- TEMP BENCH MARK ELEV. DESCRIPTION.

Morrison Herthfield Limited
Consulting Engineers



DESIGNED BY

APPROVED BY

MIDDLE ROAD BRIDGE RESTORATION

CREEK PROTECTION FALSEWORK AND DETAILS

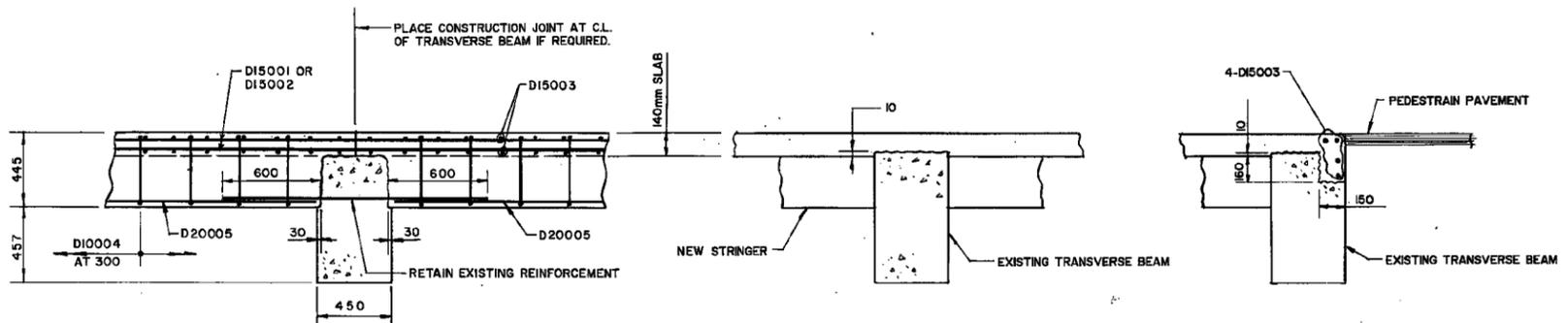
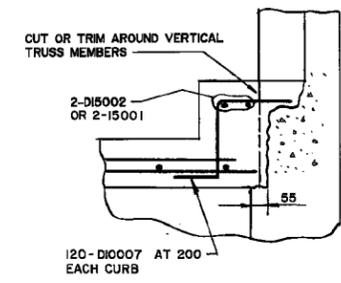
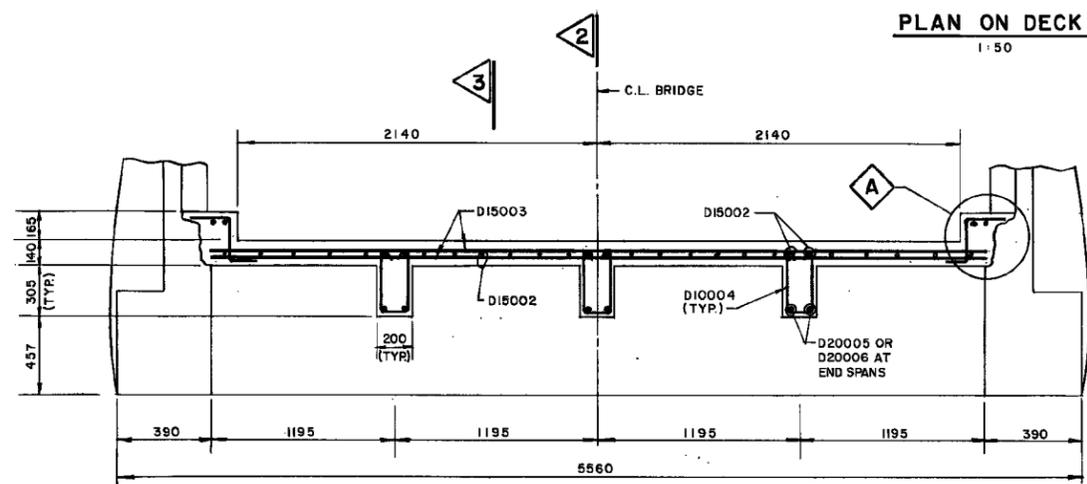
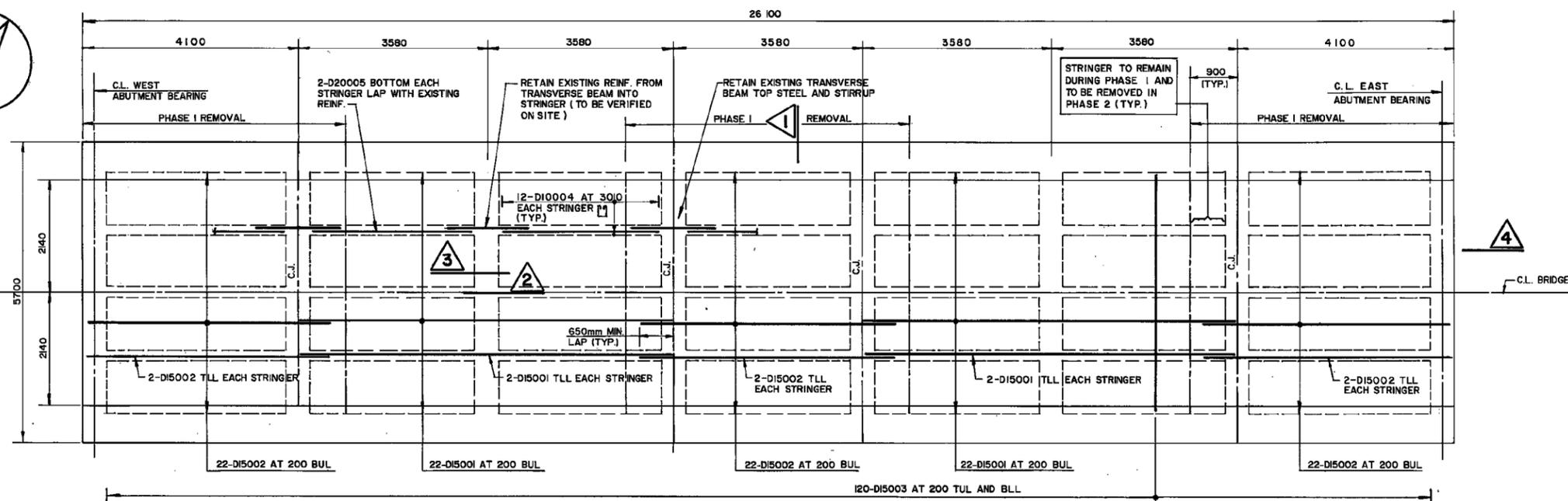
CITY OF MISSISSAUGA
ENGINEERING AND WORKS DEPARTMENT

SCALE AS NOTED	AREA Z 12	PROJECT No. PN84131
DRAWN BY H.T.	CHECKED BY A.T.C.	PLAN No.
DATE JULY 26/1985	SHEET 6 OF 13	C-21248



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/S CABLE		
WATERMANS			HYDRO U/S CABLE		

REVISIONS		
DATE	DETAILS	INIT. RP.
MAR 7/1988	AS BUILT	



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 - ◻ DENOTES BUILDING - LOCATED.
 - T.T.B.M. No. ELEV.
 - TEMP. BENCH MARK ELEV. DESCRIPTION.

Morrison Hershfield Limited
Consulting Engineers **MH**

DESIGNED BY

CHKD.

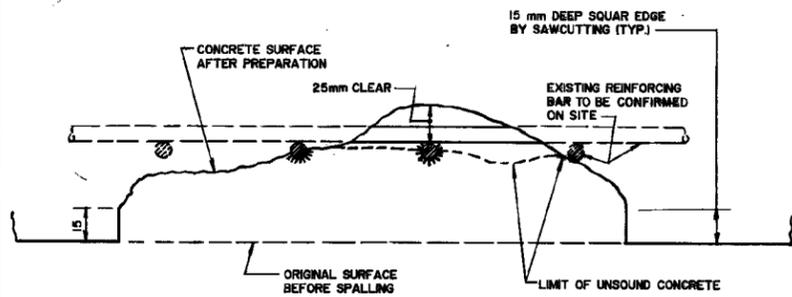
APPROVED BY

**MIDDLE ROAD
BRIDGE RESTORATION**

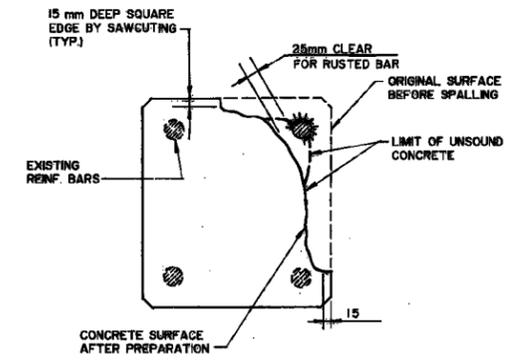
DECK REINFORCEMENT PLAN AND DETAILS

CITY OF MISSISSAUGA
ENGINEERING AND WORKS DEPARTMENT

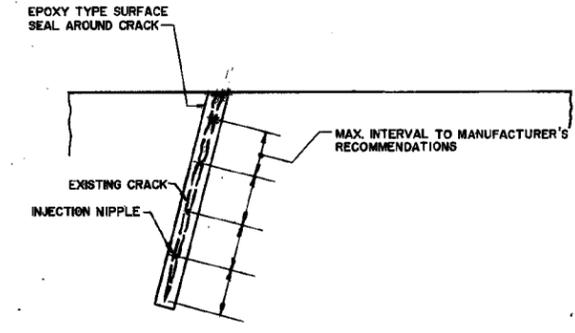
SCALE AS NOTED	AREA Z12	PROJECT No. PNB4131
DRAWN BY H.T.	CHECKED BY A.T.C.	PLAN No.
DATE JULY 26/1988	SHEET 7 OF 13	C-21249



TYPICAL WALL SURFACE PREPARATION DETAIL
N. T. S.



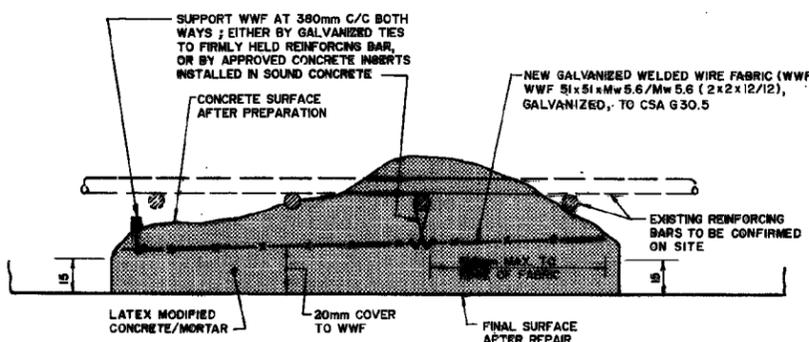
TYPICAL RECTANGULAR SECTION PREPARATION DETAIL
N. T. S.



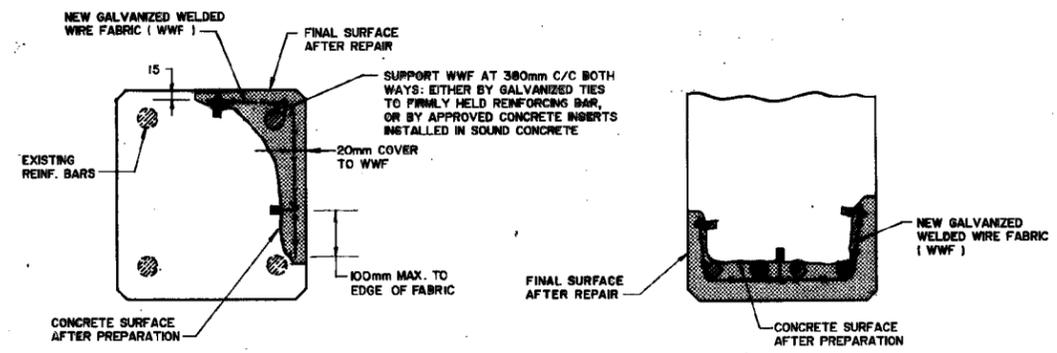
TYPICAL CRACK REPAIR DETAIL BY EPOXY INJECTION
N. T. S.

- SURFACE PREPARATION NOTES:**
1. REMOVE ALL UNSOUND AND LOOSE CONCRETE
 2. WHERE REINFORCING BAR IS RUSTED OVER LESS THAN HALF OF ITS CIRCUMFERENCE AND SURROUNDING CONCRETE IS SOUND, REMOVE CONCRETE TO EXPOSE ALL RUSTED PARTS OF THE BAR.
 3. WHERE REINFORCING BAR IS RUSTED OVER MORE THAN HALF OF ITS CIRCUMFERENCE, REMOVE 25mm OF CONCRETE ALL AROUND THE BAR.
 4. SANDBLAST ALL SURFACES OF CONCRETE AND REINFORCING STEEL ON COMPLETION OF PREPARATION, THE CONCRETE SURFACES SHALL BE ROUGH AND CLEAN WITHOUT ANY LOOSE FRAGMENTS, AND REINFORCING STEEL SHALL BE CLEAN OF RUST.

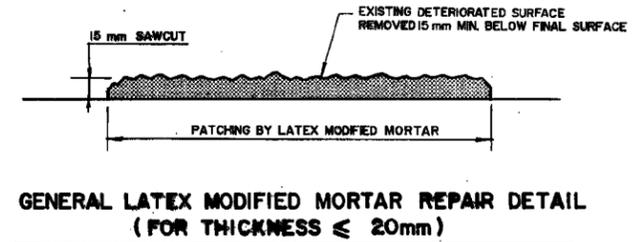
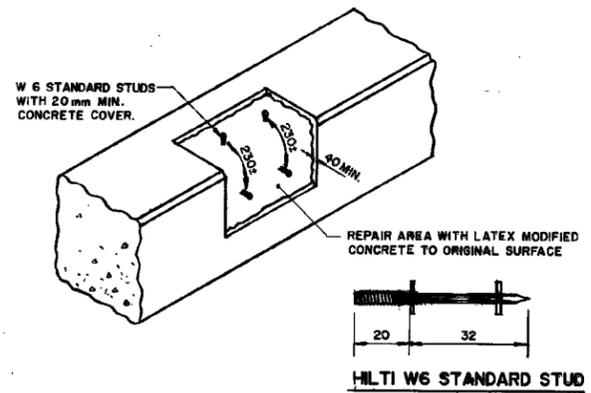
- EPOXY INJECTION NOTES:**
1. EPOXY ADHESIVE SHALL BE SIKADUR HI-MOD LV SUPPLIED BY SIKA CANADA INC. OR APPROVED EQUAL.
 2. ALL APPLICATIONS SHALL BE TO THE MANUFACTURER'S RECOMMENDATIONS.
 3. CRACKS SHALL ONLY BE REPAIRED WHICH DIRECTED BY THE ENGINEER.
 4. CLEAR OUT THE CRACK WITH COMPRESSED AIR.
 5. INSERT VALVES IN CLEAR HOLES DRILLED IN CRACK AND COMPLETELY SEAL THE SURFACE OF THE CRACK TO BE GROUTED WITH SIKADUR HI-MOD GEL.
 6. INJECT SIKADUR HI-MOD LV UNDER PRESSURE INTO THE LOWEST NIPPLE UNTIL THE EPOXY REACHES THE LEVEL OF THE NEXT HIGHER NIPPLE.
 7. MOVE UP AND REPEAT THE PROCEDURE.



TYPICAL WALL SURFACE LATEX MODIFIED CONCRETE/MORTAR REPAIR DETAIL (FOR AREA > 380mm x 380mm)
N. T. S.



TYPICAL RECTANGULAR SECTION LATEX MODIFIED CONCRETE/MORTAR REPAIR DETAIL (FOR AREA > 380mm x 380mm)
N. T. S.



GENERAL LATEX MODIFIED MORTAR REPAIR DETAIL (FOR THICKNESS <= 20mm)
N. T. S.

APPLY HILTI POWER DRIVEN W6 ZINC PLATED STUDS AT EVEN SPACINGS AND NO WIRE MESH IS REQUIRED.

NO. OF STUDS REQUIRED	AREA
4	140 000 mm ²
3	100 000 mm ²
2 MIN.	≤ 70 000 mm ²

GENERAL LATEX MODIFIED CONCRETE/MORTAR REPAIR DETAIL (FOR AREA <= 380mm x 380mm, WIDTH <= 380mm & THICKNESS >= 40mm)
N. T. S.

SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS		
STORM SEWERS			BELL U/S CABLE		
WATERMANS			HYDRO U/S CABLE		

REVISIONS			
DATE	DETAILS	INIT.	RF.
MAR 7/1986	AS BUILT		

- GENERAL NOTES**
- ALL DRIVEWAYS ASPHALT UNLESS OTHERWISE NOTED.
 - ALL SERVICE LOCATIONS ARE APPROXIMATE AND MUST BE LOCATED ACCURATELY IN FIELD.
 - ○ DENOTES BUILDING - NOT LOCATED.
 - □ DENOTES BUILDING - LOCATED.
 - T.T.B.M. No. ELEV.
 - TEMP BENCH MARK ELEV. DESCRIPTION.

Morrison Hershfield Limited
Consulting Engineers

DESIGNED BY: CHKD

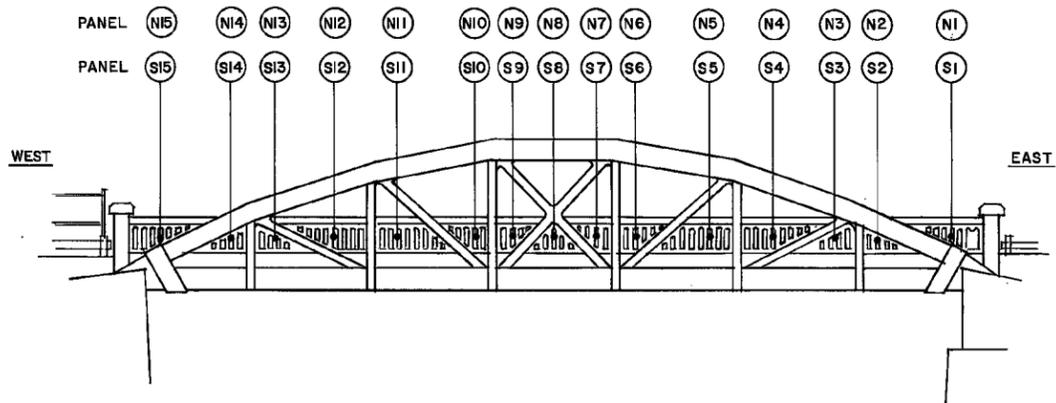
APPROVED BY:

MIDDLE ROAD BRIDGE RESTORATION

GENERAL CONCRETE REPAIR DETAILS

CITY OF MISSISSAUGA
ENGINEERING AND WORKS DEPARTMENT

SCALE	N.T.S.	AREA	Z12	PROJECT No.	PN84131
DRAWN BY	H. T.	CHECKED BY	A.T.C.	PLAN No.	
DATE	JULY 26/1985	SHEET	8 OF 13		C-21250

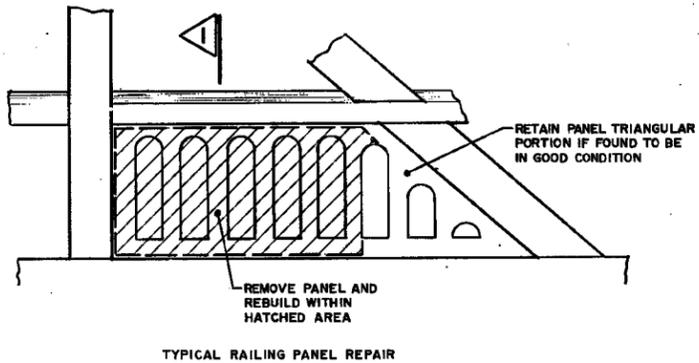


GENERAL RAILING REPAIR ELEVATION

RAILING PANEL REPAIR SCHEDULE

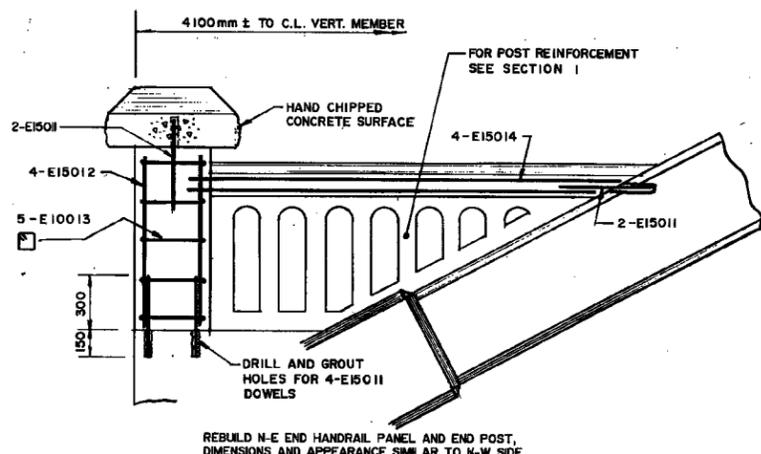
NORTH PANELS		SOUTH PANELS	
N 1*	WR	S 1	WR
N 2	R	S 2	R
N 3	WR	S 3	R
N 4	WR	S 4	WR
N 5	R	S 5	WR
N 6	WR	S 6	WR
N 7	R	S 7	R
N 8	R	S 8	R
N 9	R	S 9	R
N 10	WR	S 10	WR
N 11	R	S 11	R
N 12	R	S 12	R
N 13	R	S 13	R
N 14	R	S 14	R
N 15	WR	S 15	R

N1* NOT EXISTED, REBUILD WHOLE PANEL, TOP RAILING CAP AND CONCRETE END POST ARE REQUIRED.
 PANEL NUMBER STARTING AT EAST END
 WR — DENOTES WHOLE PANEL TO BE REPLACED AS SHOWN ON DETAIL A
 R — DENOTES PARTIAL REPAIR REQUIRED AS SHOWN ON DETAIL B



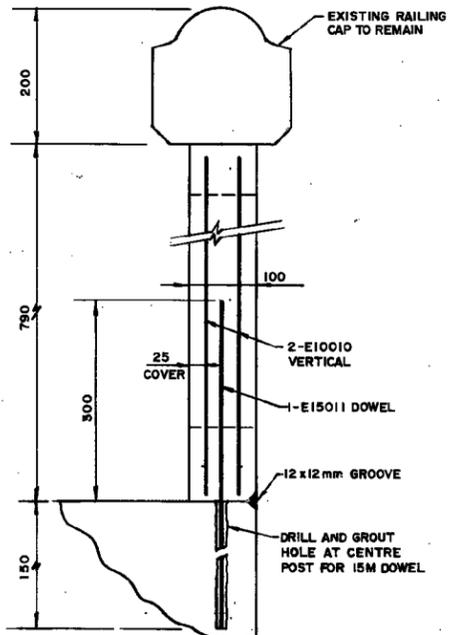
A

1:20



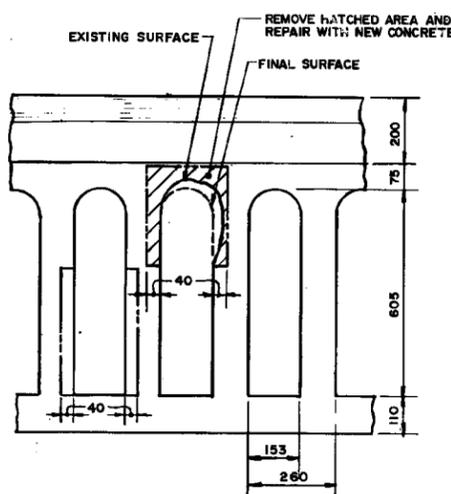
PANEL N1

1:20



I

1:5



B

1:10

SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		

REVISIONS		
DATE	DETAILS	INI
MAR 7/1986	AS BUILT	R.P.

- GENERAL NOTES**
- ALL DRIVEWAYS ASPHALT UNLESS OTHERWISE NOTED.
 - ALL SERVICE LOCATIONS ARE APPROXIMATE AND MUST BE LOCATED ACCURATELY IN FIELD.
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 - T.T.M. No. ELEV.
 - TEMP BENCH MARK ELEV. DESCRIPTION.

Morrison Hershfield Limited
Consulting Engineers

DESIGNED BY

APPROVED BY

MIDDLE ROAD
BRIDGE RESTORATION

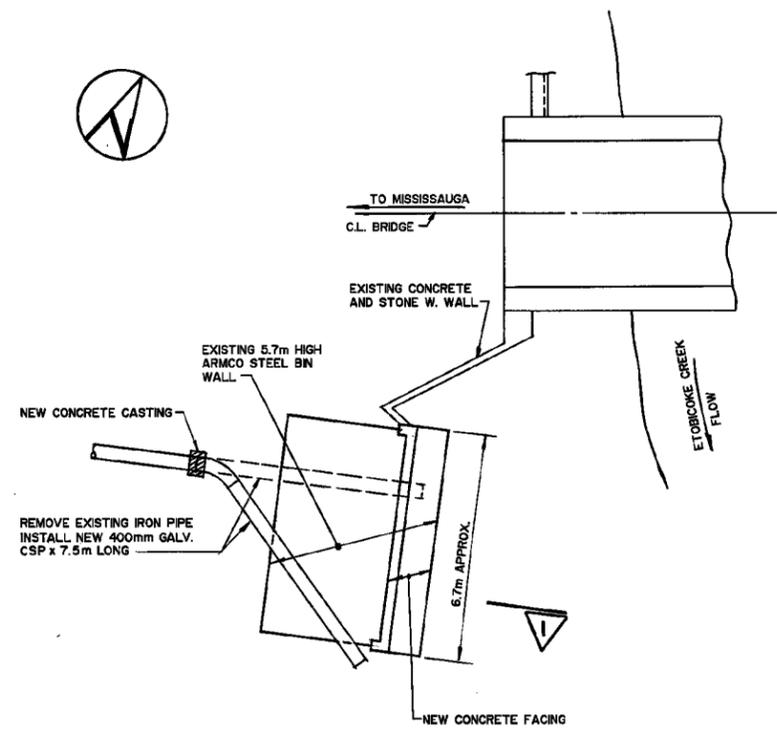
CONCRETE RAILING REPAIR DETAILS

CITY OF MISSISSAUGA
ENGINEERING AND WORKS DEPARTMENT

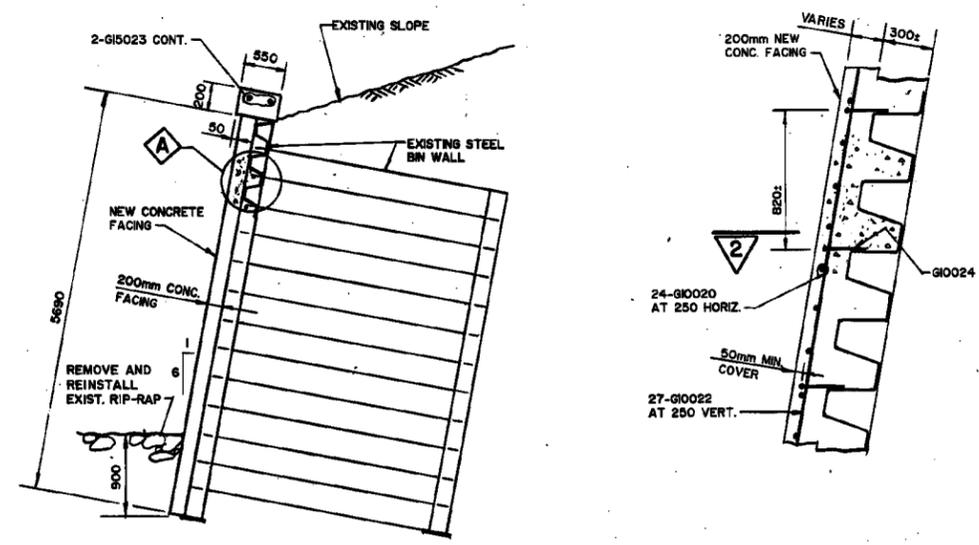
SCALE AS NOTED	AREA Z12	PROJECT No. PN84131
DRAWN BY H.T.	CHECKED BY A.T.C.	PLAN No.
DATE JULY 26 / 1985	SHEET 9 OF 13	C-21251

SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMAINS			HYDRO U/G CABLE		

REVISIONS		
DATE	DETAILS	INIT.
OCT. 8, 1985	ADDITIONAL FENCE DETAIL	A.C.
MAR 7/1985	AS BUILT	R.P.



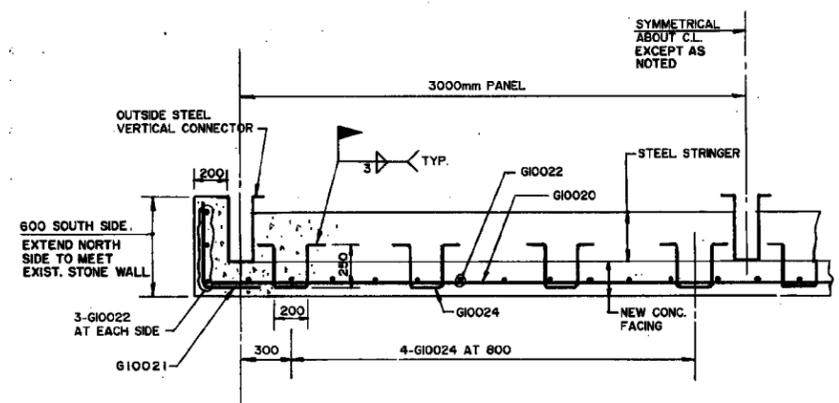
PLAN



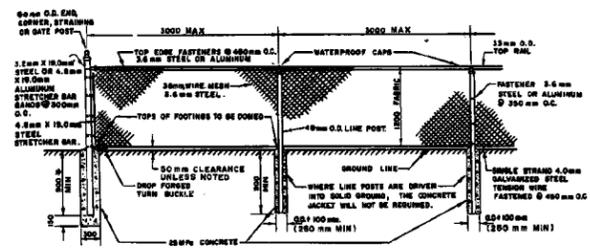
FOR REINFORCING DETAIL SEE DETAIL A AND SECTION 1

1
N. T. S.

A
1:20



2
1:20



NOTES

- ALL FABRIC SHALL BE 3.6mm KNUCKLED AT TOP AND BOTTOM AND ONE OF THE FOLLOWING MATERIALS:
(A) STEEL WIRE, HOT DIP GALVANIZED AFTER WEAVING
(B) STEEL WIRE, ELECTRO GALVANIZED BEFORE WEAVING
- ALL POSTS & RAILS SHALL BE GALVANIZED STEEL PIPE "STANDARD WEIGHT", CONFORMING TO CURRENT SPECIFICATIONS FOR BLACK AND HOT DIPPED ZINC COATED (GALVANIZED) WELDED AND SEAMLESS PIPE FOR ORDINARY USES, ASTM DESIGNATION A120.
- ALL REQUIRED FITTINGS AND HARDWARE SHALL BE OF A SUITABLE ALUMINUM ALLOY OR OF A STEEL DUCTILE IRON, ASTM SPECIFICATIONS (A152).
- MINIMUM REQUIREMENTS FOR ZINC COATING
FABRIC AND WIRE 0.5 kg/m²
POSTS AND RAILS 0.5 kg/m²
FRAMES AND BRACES 0.5 kg/m²
CAST FITTINGS 0.6 kg/m²
OTHER FITTINGS 0.6 kg/m²

DETAILS FOR NEW CHAIN LINK FENCE

SEE DWG. NO. C-21243 FOR LAYOUT

GENERAL NOTES

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- DENOTES BUILDING - NOT LOCATED.
- DENOTES BUILDING - LOCATED.
- T.T.B.M. No. ELEV.
- TEMP BENCH MARK ELEV. DESCRIPTION.

Morrison Hershfield Limited
Consulting Engineers **MH**

DESIGNED BY

APPROVED BY

**MIDDLE ROAD
BRIDGE RESTORATION**

STEEL BIN WALL CONCRETE FACING

CITY OF MISSISSAUGA
ENGINEERING AND WORKS DEPARTMENT

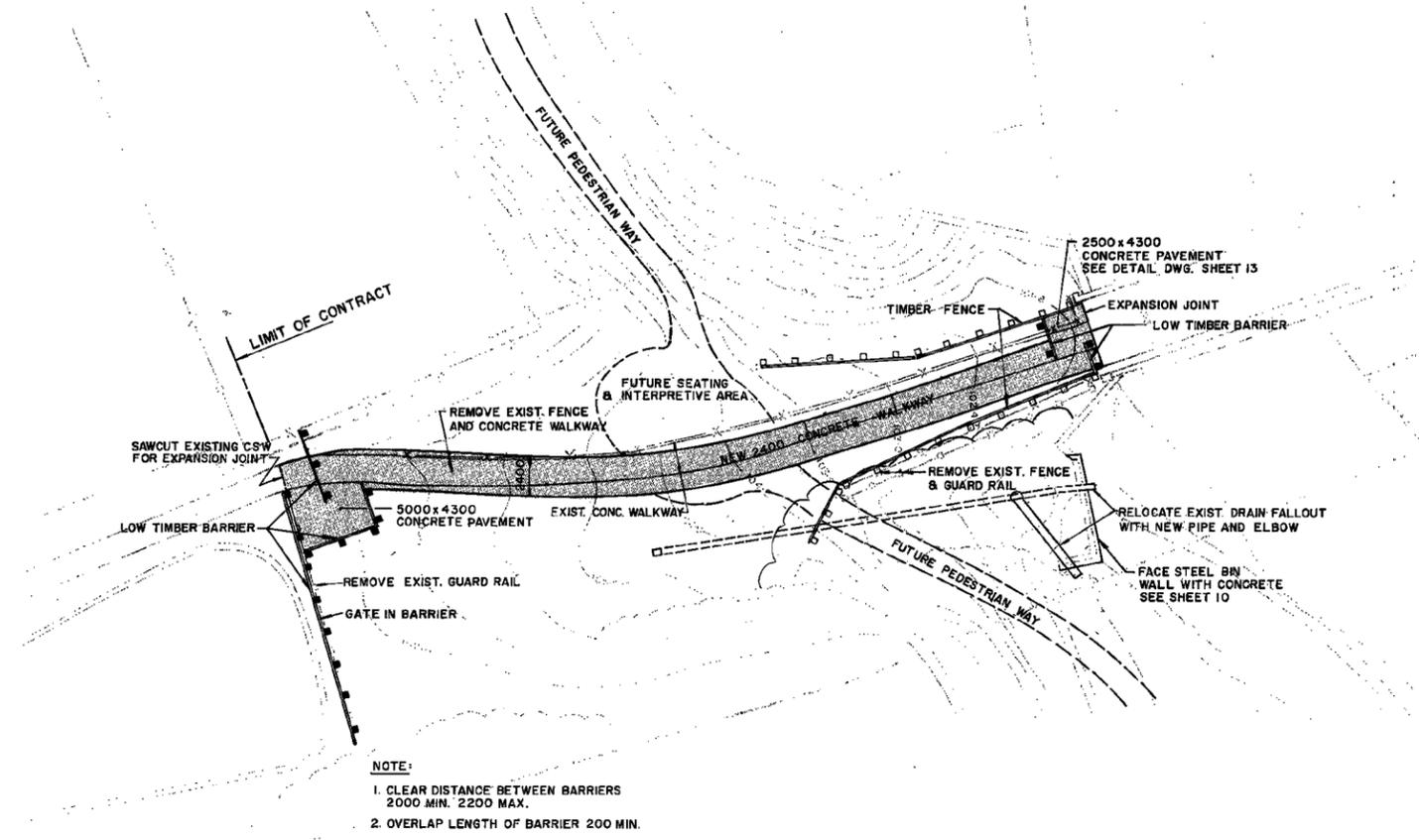
STN. TO STN.

SCALE AS NOTED	AREA Z12	PROJECT No. P184131
DRAWN BY H.T.	CHECKED BY A.T.C.	PLAN No.
DATE JULY 26/1985	SHEET 10 OF 13	C-21252

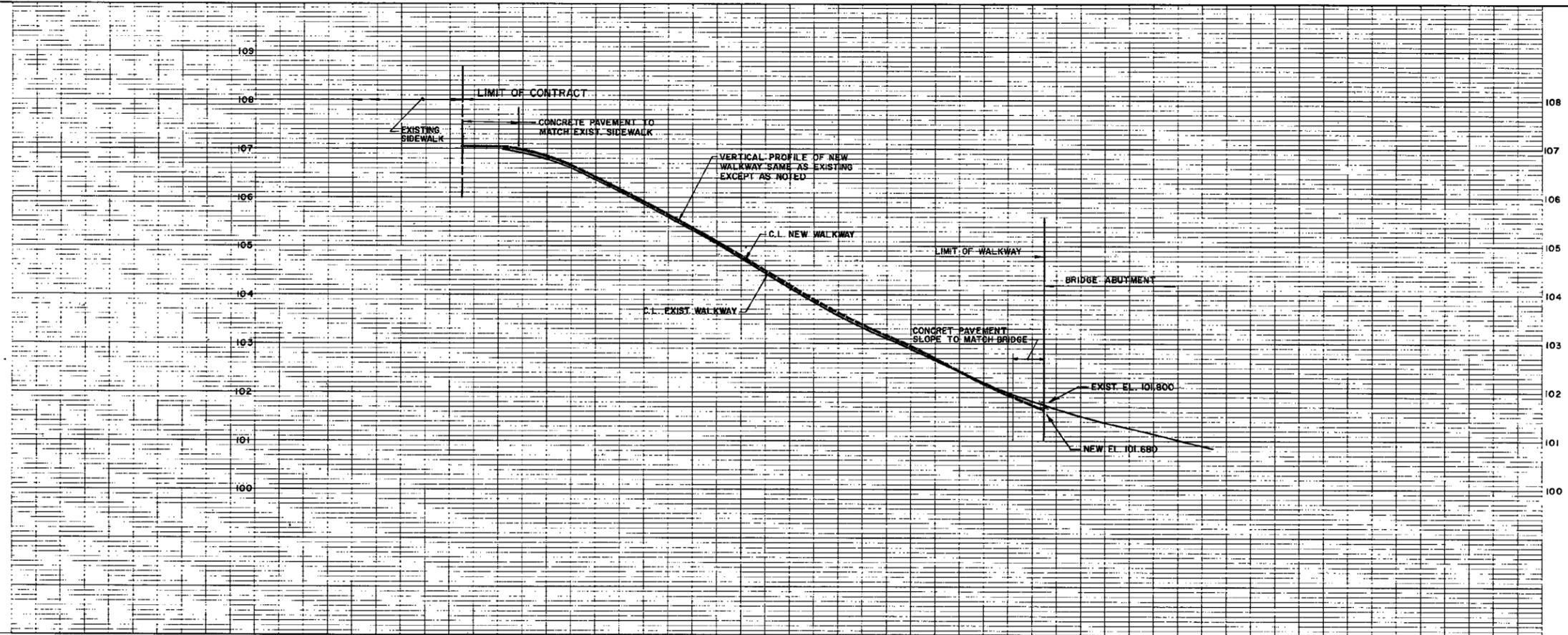


SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMANS			HYDRO U/G CABLE		

REVISIONS		
DATE	DETAILS	INIT.
MAR 7/1986	AS BUILT	R.P.



NOTE:
 1. CLEAR DISTANCE BETWEEN BARRIERS 2000 MIN. 2200 MAX.
 2. OVERLAP LENGTH OF BARRIER 200 MIN.



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Mortenson Hershfield Limited
 Consulting Engineers

DESIGNED BY
 CHKD

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**MIDDLE ROAD
 BRIDGE RESTORATION**

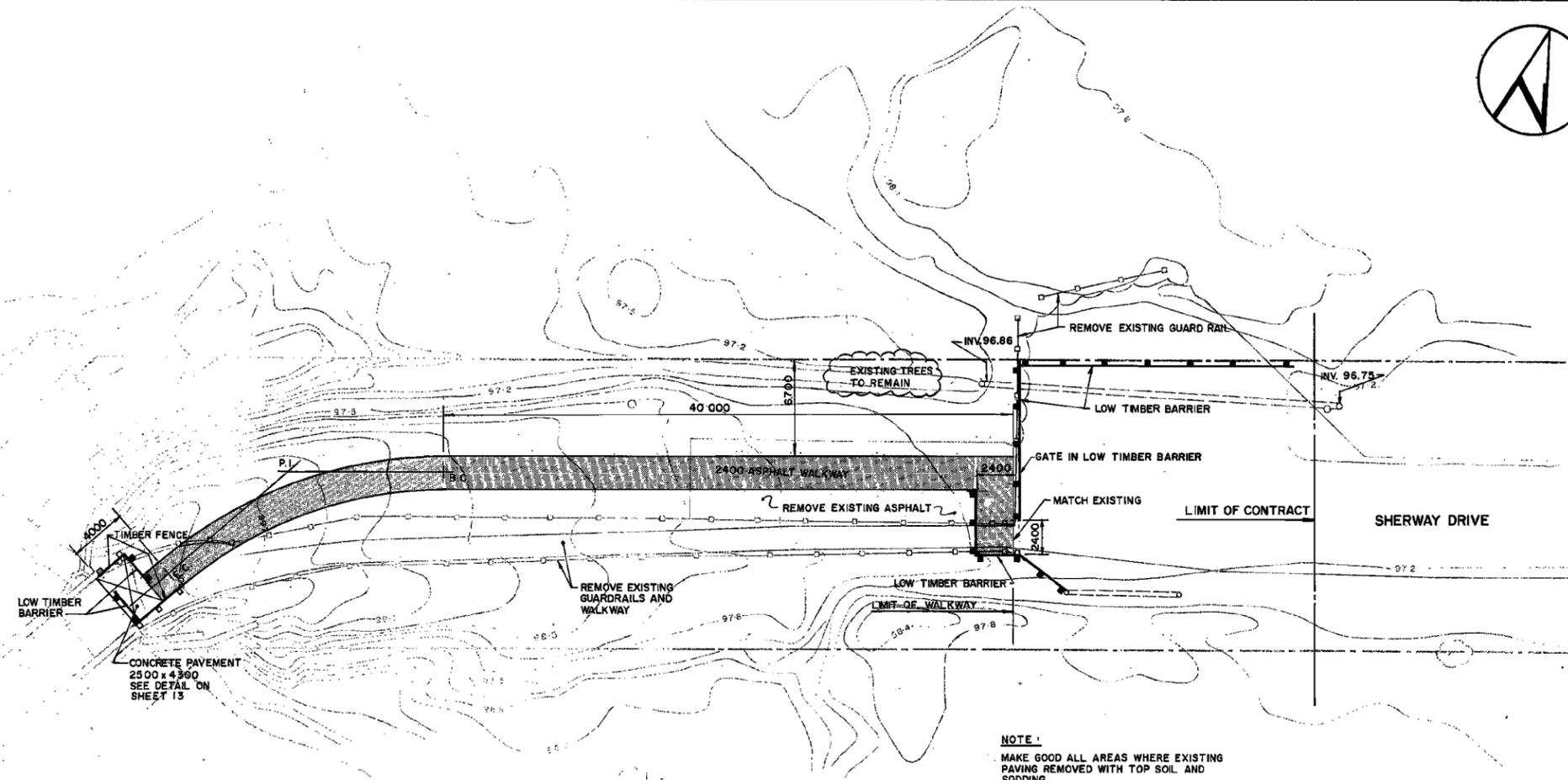
WEST APPROACH IMPROVEMENT
CITY OF MISSISSAUGA
 ENGINEERING AND WORKS DEPARTMENT

SCALE	HOR. 1:100 VERT. 1:20	AREA Z12	PROJECT No. PN 84131
DRAWN BY	S.L.	CHECKED BY	R.D.
DATE	JULY 26/1985	SHEET	11 OF 13
		PLAN No.	C-21253



SERVICE DATA					
SERVICE	DATE	INIT.	SERVICE	DATE	INIT.
SAN. SEWERS			GAS MAINS		
STORM SEWERS			BELL U/G CABLE		
WATERMANS			HYDRO U/G CABLE		

REVISIONS		
DATE	DETAILS	INIT.
AUG 22/1985	GENERAL REVISION	S.L.
MAR 7/1986	AS BUILT	RF



NOTE:
MAKE GOOD ALL AREAS WHERE EXISTING PAVING REMOVED WITH TOP SOIL AND SODDING



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 - TEMP. BENCH MARK ELEV. DESCRIPTION.

Morrison Hershfield Limited
Consulting Engineers

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CHKD

**MIDDLE ROAD
BRIDGE RESTORATION**

EAST APPROACH IMPROVEMENT

CITY OF MISSISSAUGA
ENGINEERING AND WORKS DEPARTMENT

SCALE	HOR. 1"=200' VERT. 1"=80'	AREA	Z12	PROJECT No.	PN 84131
DRAWN BY	S.L.	CHECKED BY	A.T.C.	PLAN No.	
DATE	JULY 26/1985	SHEET	12 OF 13		C-21254

Contact

Christine Beard Laaber
Manager Structural Engineering, Transportation
T 226-750-45413
E christine.laaber@aecom.com