Appendix N.4 – Structural Design Report – 407ETR

Kennedy Road Environmental Assessment between Steeles Avenue and Major Mackenzie Drive

Kennedy Road Underpass of 407

Structural Design Report

Class EA Study for Improvements to Kennedy Road from Steeles Avenue to Major Mackenzie Drive

Regional Municipality of York

January 22, 2021

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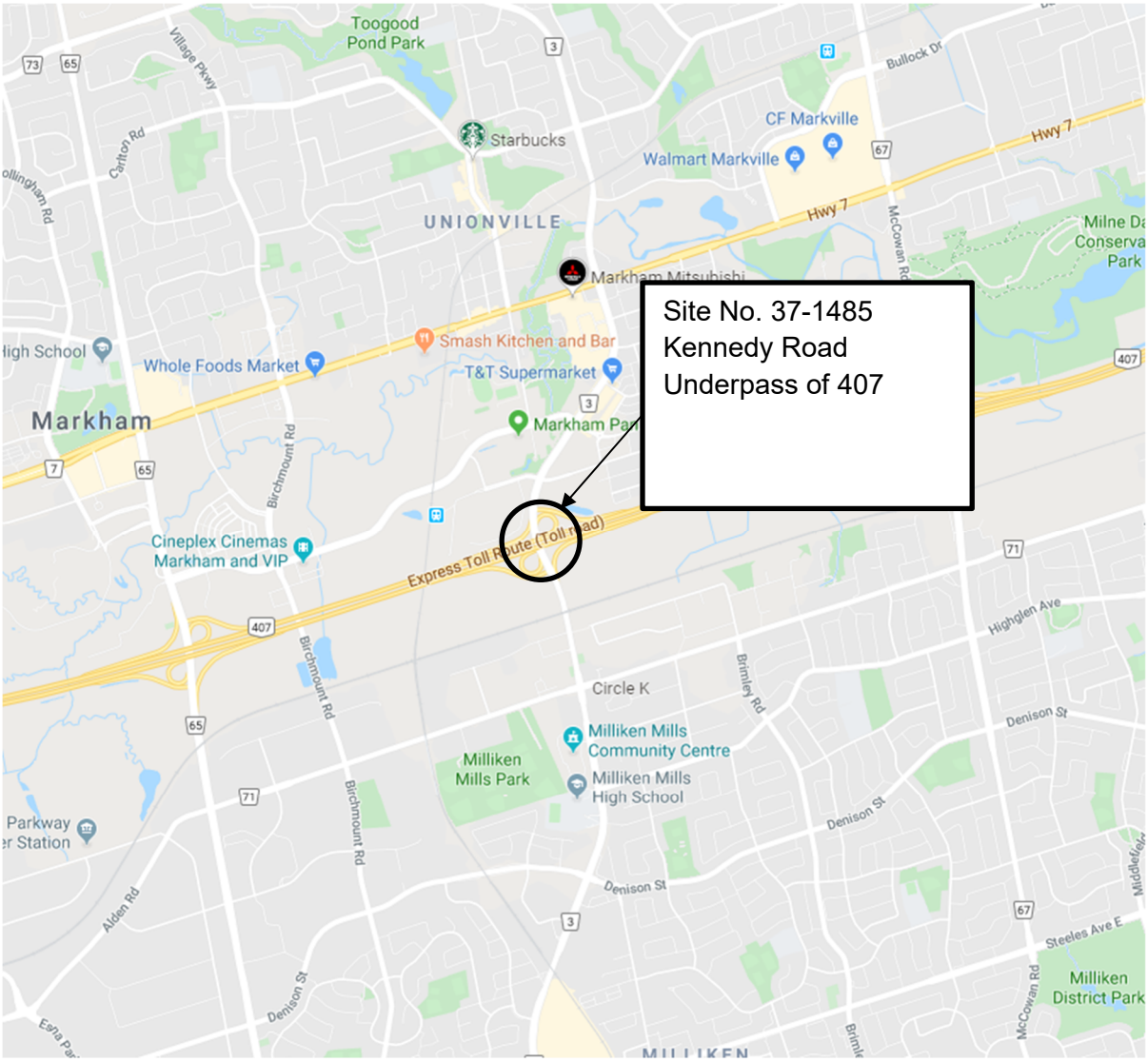
Contents

Key Plan


Site No. 37-1485
Kennedy Road
Underpass of 407
Toogood Pond Park
Starbucks
CF Markville
Walmart Markville
Hwy 7
UNIONVILLE
Markham Mitsubishi
Smash Kitchen and Bar
Whole Foods Market
T&T Supermarket
Markham
Cineplex Cinemas Markham and VIP
Express Toll Route (Toll Road)
Circle K
Milliken Mills Community Centre
Milliken Mills Park
Milliken Mills High School
Parkway
Milliken District Park
Denison St
Highglen Ave
Steeles Ave E
Birchmount Rd
Brimley Rd
McCowan Rd
Alden Rd
Carlton Rd
Village Pkwy

1. Introduction

HDR is undertaking the Municipal Class Environmental Assessment Study (Schedule 'C') and the Preliminary Design for improvement to Kennedy Road from Steeles Avenue to Major Mackenzie Drive for the Regional Municipality of York (York Region). The recently completed York Region Transportation Master Plan Update 2016 designates this section of Kennedy Road for future widening to 6 lanes as part of the Frequent Transit Network.

It is HDR's mandate to provide bridge engineering services and preliminary design for the proposed improvement of the bridge and culvert structures along the corridor to accommodate the road widening.

An existing interchange with Highway 407ETR is located in the corridor. HDR is mandated to analyze and develop all structural design options to better accommodate pedestrians and cyclists through the interchange. HDR is to also analyze the loop ramp alignments to accommodate the widening of Kennedy Road to six lanes.

This Design Structural Report provides a comparison of the options for the improvement of the Bridge Site No. 37-1485-1996. Based on the recommendation and MTO, 407ETR, and York Region decision, HDR performed a Preliminary Design of the preferred alternative.

2. Location

The 407ETR Underpass at Kennedy Road is located in the City of Markham. It currently carries three northbound and three southbound lanes of Kennedy Road over five eastbound and five westbound lanes of 407ETR as well as two speed change lanes.

3. Existing Conditions

3.1. General Conditions

The 407ETR Underpass is a continuous, two span, cast-in-place concrete slab deck on 26 PCG 1900 girders (13 girders per span), bridge that was constructed in 1997. The structure has spans of 41.0m and 41.0m, with total length of 82.4m and a width of 30.46m.

The bridge deck is 0.225m deep and carries four 3.5m (inner) traffic lanes, two 3.75m (outer) lanes, two 1.5m shoulders, two 1.5m sidewalks, two 0.48m barrier walls, and one 2.0m median, and has a vertical clearance of 5.05m.

The substructure consists of reinforced concrete abutments and piers supported on steel piles, and wingwalls.

3.2. Bridge Condition

The OSIM reports for this bridge are not available at this time to verify. The site visual inspection carried out on June 8, 2017, found that the bridge is in good condition, but with the following defects:

- Impact damage on all guiderails
- Asphalt cracks and deterioration on newly paved transverse strip at both approach slabs
- Cracking on all sidewalks
- Cracking and spalling on all barrier walls
- Long vertical cracks on North abutment
- Concrete segregation at top of both abutments
- Concrete curb spalling by Northeast catch basin
- Northeast guiderail missing
- Partially filled pothole on Southeast road surface
- Impact damage on Southeast guiderail/barrier wall connection
- Delamination and cracks on South abutment

4. Horizontal and Vertical Alignment

4.1. Horizontal Alignment

The alignments and profiles for the 407ETR and for Kennedy Road are not being adjusted and will match existing, with the recommended option. The horizontal alignment of the Kennedy Road remains unchanged after the construction.

4.2. Vertical Profile

The existing vertical profile of Kennedy Road as well as the vertical profile of the proposed alternative for Kennedy Road have crest vertical curves.

5. Cross-section

5.1. Existing Cross-Section

The existing Kennedy Road carries three (3) lanes of traffic in each direction and two speed change lanes. Sidewalks are located on both sides of Kennedy Road with a median separating northbound and southbound traffic.

5.2. Proposed Cross-Section

In the proposed cross section the current bridge remains untouched, and a separate AT bridge will be constructed on both sides of the bridge. These new bridges will only be designed to support pedestrian and small maintenance vehicle loads, and each will carry a 3m wide MUP over the 407ETR.

6. Proposed Structure

6.1. Bridge Options

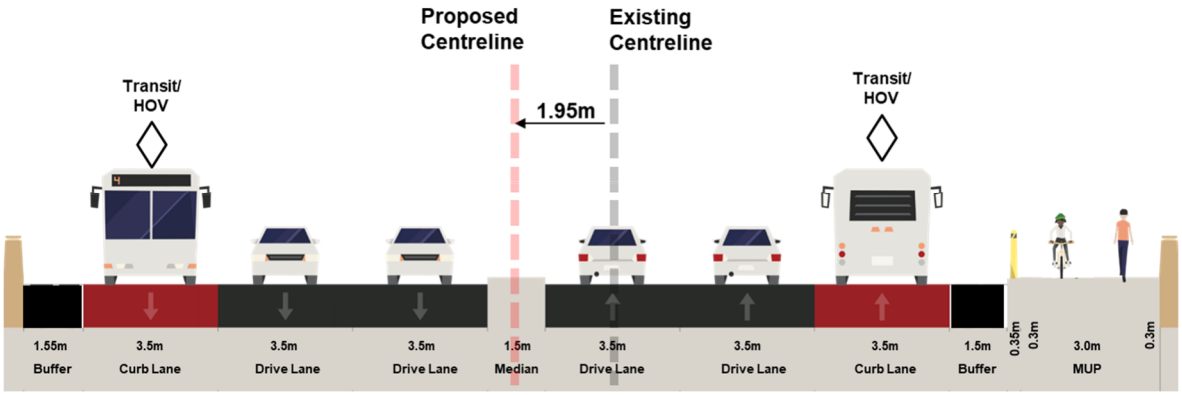
The following design alternatives address considerations for active transportation (AT) facilities through the 407 interchange. Bridge widening to accommodate AT facilities are identified based on the existing structure and its ability to meet vertical clearance requirements with widening.

6.1.1. Alternate 1 – No Widening, 1 MUP (Road Shift)

Alternate 1 consists of the current bridge width being maintained, with the west sidewalk removed and the MUP constructed on the east side. This will require the road centerline to be shifted 1.95m to the west, with median reconstruction and roadway realignment. AT will still have to yield to vehicular traffic when crossing the ramp lanes, and cross Kennedy Road to reach the east side. Barrier wall height shall be 1.37 m in accordance with CHBDC for combined pedestrian and bicycle traffic.

This option will result in the use of common construction materials and techniques, and consists of a short construction duration. Existing maintenance requirements will be maintained and a single lane closure on Kennedy Road would be sufficient for mobile access/inspection vehicle to view underside of bridge. It is noted that to practically inspect the underside of the Kennedy Road underpass of 407, the access would be via lane closures on HWY 407.

Preliminary cost estimate for Option 1 is $1,017,049.



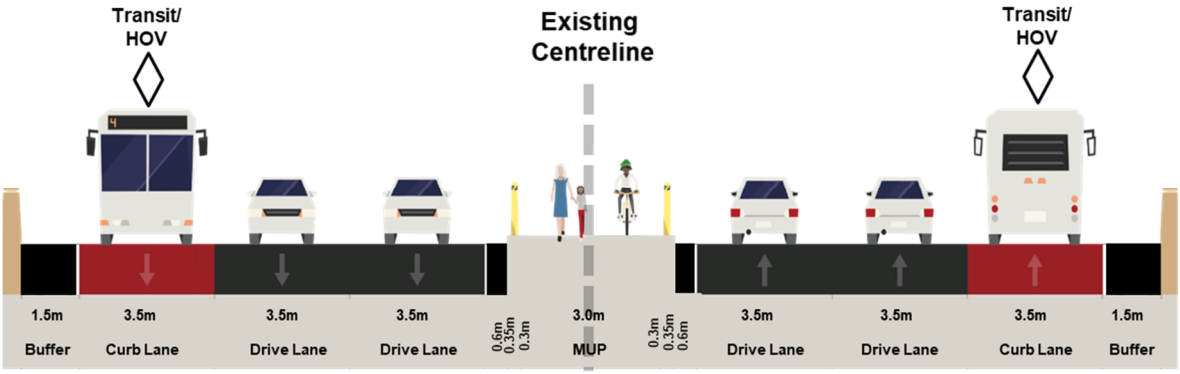
6.1.2. Option 2 – No Widening, 1 MUP at Median (No Road Shift)

Option 2 consists of the current bridge width being maintained, with both sidewalks removed and heightened the barrier wall on both sides, the MUP constructed on at the centre median, and the road centerline will be maintained. AT will still have to yield to vehicular traffic when crossing the ramp lanes, and cross Kennedy Road to reach its centreline. Barrier wall height shall be 1.37 m in accordance with CHBDC for combined pedestrian and bicycle traffic.

This option will result in the use of common construction materials and techniques, and consist of a short construction duration. Existing maintenance requirements will be maintained and a single lane closure on Kennedy Road would be sufficient for mobile access/inspection vehicle to

view underside of bridge. It is noted that to practically inspect the underside of the Kennedy Road underpass of 407, the access would be via lane closures on HWY 407.

Preliminary cost estimate for Option 2 is $809,244.

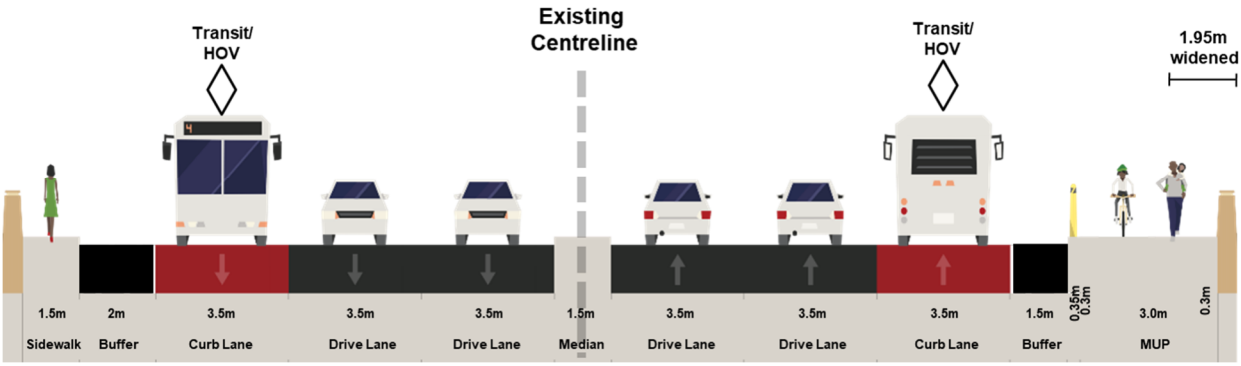


6.1.3. Alternate 3 – Widen by 1 Girder, 1 MUP + 1 SW (No Road Shift)

Alternate 3 consists of the bridge being widened 1.95m to the east, with the west sidewalk remaining, the MUP constructed on the east side, and the road centreline will be maintained. AT will still have to yield to vehicular traffic when crossing the ramp lanes. Barrier wall height shall be 1.37 m in accordance with CHBDC for combined pedestrian and bicycle traffic.

This option will result in the use of common construction materials and techniques, and consist of a moderate construction duration. Existing maintenance requirements will be marginally increased and a single lane closure on Kennedy Road would be sufficient for mobile access/inspection vehicle to view underside of bridge. It is noted that to practically inspect the underside of the Kennedy Road underpass of 407, the access would be via lane closures on HWY 407.

Preliminary cost estimate for Option 3 is $1,678,362.



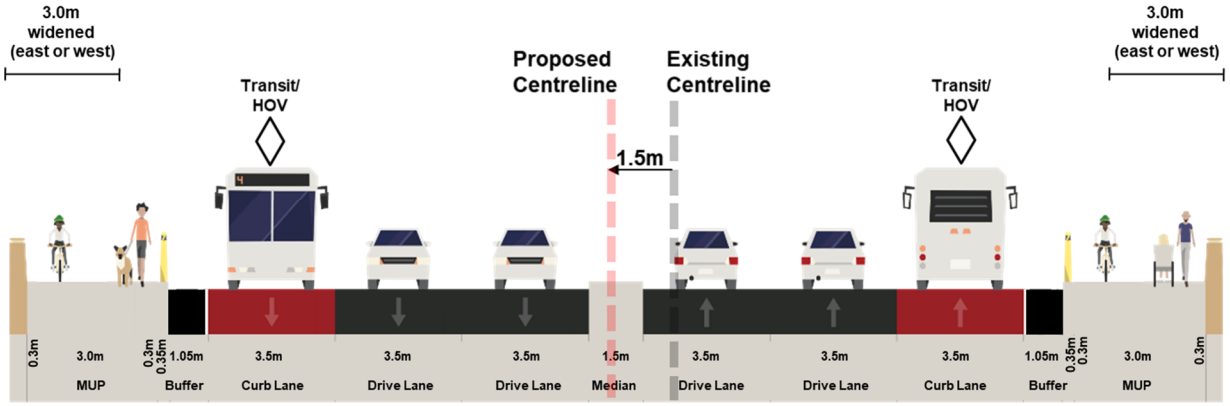
6.1.4. Alternate 4.1 – Widen by 1 Girder, 2 MUP's (Road Shift)

Alternate 4.1 consists of the bridge being widened 3.0m either to the east/west, with MUP's constructed on both sides and reduced shoulder widths. This will require the road centerline to be shifted 1.5m, with median reconstruction and roadway realignment. AT will still have to yield

to vehicular traffic when crossing the ramp lanes. Barrier wall height shall be 1.37 m in accordance with CHBDC for combined pedestrian and bicycle traffic.

This option will result in the use of common construction materials and techniques, and consist of a long construction duration. Existing maintenance requirements will be marginally increased and a single lane closure on Kennedy Road would be sufficient for mobile access/inspection vehicle to view underside of bridge. It is noted that to practically inspect the underside of the Kennedy Road underpass of 407, the access would be via lane closures on HWY 407.

Preliminary cost estimate for Option 4.1 is $3,268,519.

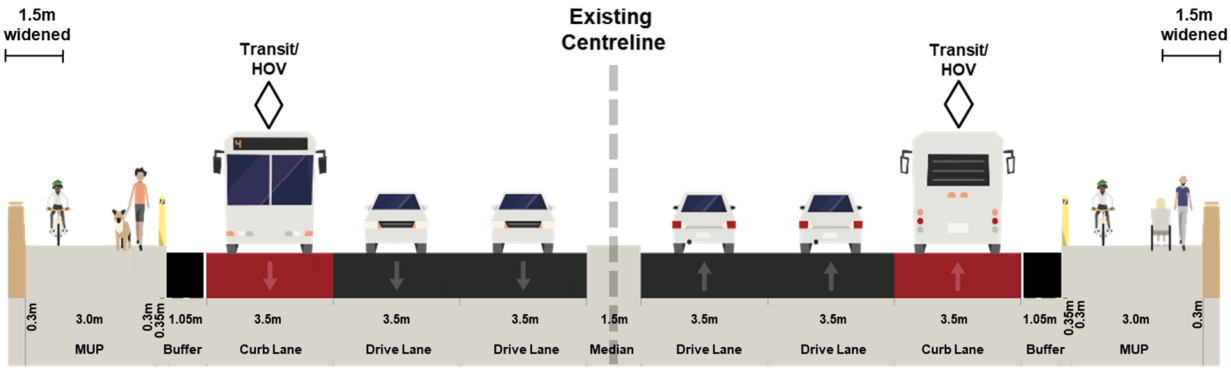


6.1.5. Alternate 4.2 – Widen by Propped Cantilevers, 2 MUP's (No Road Shift)

Alternate 4.2 consists of the bridge being widened 1.5m to both sides, with MUP's constructed on both sides and reduced shoulder widths. The road centerline will be maintained. AT will still have to yield to vehicular traffic when crossing the ramp lanes. Barrier wall height shall be 1.37 m in accordance with CHBDC for combined pedestrian and bicycle traffic.

This option will result in the use of common construction materials and techniques, and consist of a long construction duration. Existing maintenance requirements will be marginally increased and a single lane closure on Kennedy Road would be sufficient for mobile access/inspection vehicle to view underside of bridge. . It is noted that to practically inspect the underside of the Kennedy Road underpass of 407, the access would be via lane closures on HWY 407.

Preliminary cost estimate for Option 4.2 is $2,492,464.

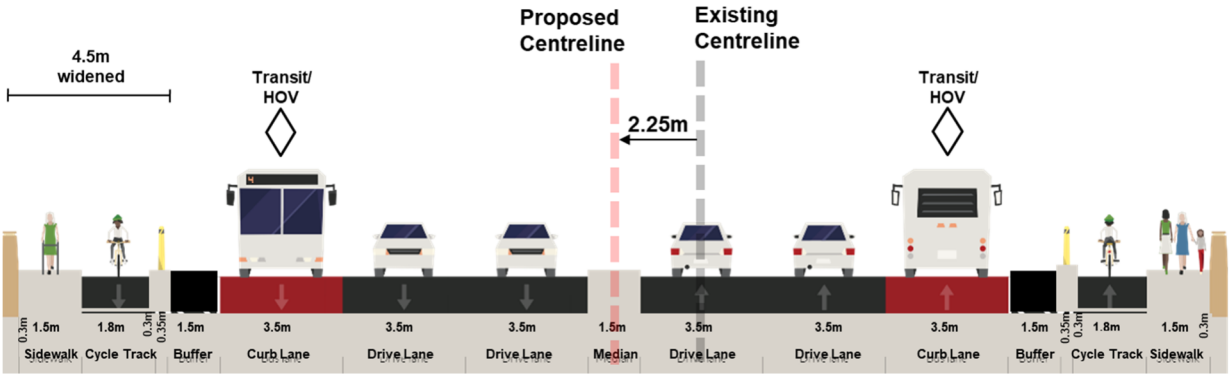


6.1.6. Alternate 5.1 – Widen by 2 Girders/1 Pier, 2 SW/Cycle Tracks (Road Shift)

Alternate 5.1 consists of the bridge being widened 4.5m to the west, with sidewalks and cycle tracks constructed on both sides. This will require the road centerline to be shifted 2.25m to the west, with median reconstruction and roadway realignment. AT will still have to yield to vehicular traffic when crossing the ramp lanes. Barrier wall height shall be 1.37 m in accordance with CHBDC for combined pedestrian and bicycle traffic.

This option will result in the use of common construction materials and techniques, and consist of the longest construction duration. Existing maintenance requirements will be moderately increased and a single lane closure on Kennedy Road would be sufficient for mobile access/inspection vehicle to view underside of bridge. . It is noted that to practically inspect the underside of the Kennedy Road underpass of 407, the access would be via lane closures on HWY 407.

Preliminary cost estimate for Option 5.1 is $4,096,001.

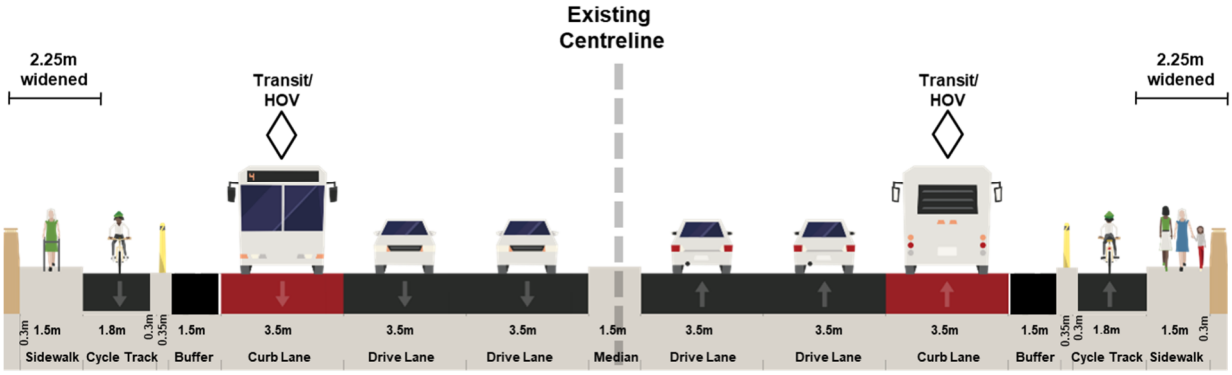


6.1.7. Alternate 5.2 – Widen by 2 Girders/2 Piers, 2 SW/Cycle Tracks (No Road Shift)

Alternate 5.2 consists of the bridge being widened 2.25m on both sides, with sidewalks and cycle tracks constructed on both sides. This will require the road centerline to be shifted 2.25m on both sides, with median reconstruction and roadway realignment. AT will still have to yield to vehicular traffic when crossing the ramp lanes. Barrier wall height shall be 1.37 m in accordance with CHBDC for combined pedestrian and bicycle traffic.

This option will result in the use of common construction materials and techniques, and consist of the longest construction duration. Existing maintenance requirements will be moderately increased and a single lane closure on Kennedy Road would be sufficient for mobile access/inspection vehicle to view underside of bridge. . It is noted that to practically inspect the underside of the Kennedy Road underpass of 407, the access would be via lane closures on HWY 407.

Preliminary cost estimate for Option 5.2 is $4,680,696.



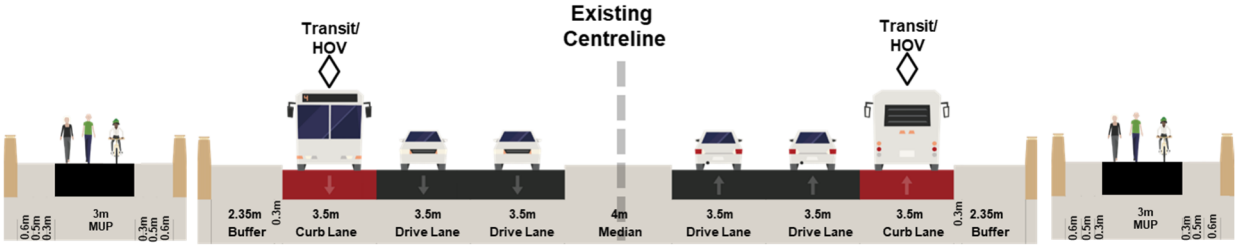
6.1.8. Alternate 6 – Separate AT Bridge

Alternate 6 consists of the current bridge remaining untouched, and separate AT bridges will be constructed on both sides of the bridge. These new bridges will only be designed to support pedestrian and small maintenance vehicle loads, and each will carry a 3m wide MUP over the 407ETR. AT will still have to yield to vehicular traffic when crossing the ramp lanes.

This option will result in the use of common construction materials and techniques, and consist of a long construction duration. Existing maintenance requirements will be significantly increased and lane closures on the 407ETR would be required to access the underside of the bridge, as the AT bridge would not be able to accommodate mobile access/inspection vehicles.

As per CHBDC the maintenance vehicle width is 2.200m and the provided width 3.0m should be sufficient. We can make use of 4 Tube railing on concrete curb or a traffic barrier with railing. The AT bridge will have to be widened by 0.6m on each side to accommodate this arrangement. In addition to the minimum width as per CHBDC, during Detailed Design York Region will be confirming the width with City of Markham and Operations to meet maintenance requirements.

Preliminary total cost estimate for Option 6 is $4,192,787.



6.1.9. Alternate 6A – Northwest/Southeast AT Bridge over Ramps

In addition to Option 6, the MUP from the AT bridge can be extended, via retaining walls if required, towards the ramp lanes northwest/southeast of the bridge. There, a second AT bridge may be constructed to span the 3m MUP over that northwest/southeast ramp lanes (Option A). Similar construction materials and techniques will be used as for Option 6, though utility concerns may arise during detailed design as there is a water main within the vicinity.

Preliminary cost estimate for Option A is $2,768,740 for each bridge. AT bridge on the southeast side will have additional overhead power line concerns.

6.1.10. Alternate 6B – Southwest/Northeast AT Bridge over Ramps

In addition to Option 6, the MUP from the AT bridge can be extended, via retaining walls if required, towards the ramp lanes southwest/northeast of the bridge. There, a second AT bridge may be constructed to span the 3m MUP over that southwest/northeast ramp lanes (Option B). Slightly more complicated construction procedure will be required due to the proximity of overhead power lines.

Preliminary cost estimate for Option B is $3,778,986 for each bridge. AT bridge on the southwest side will have additional overhead power line concerns.

6.2. Discussion

A comparison of the advantages and disadvantages of all alternatives are summarized in the tables below.

Further to the January 18th meeting with 407ETR and MTO, **Alternative 2 - AT with centre median** was **not carried forward** for further consideration due to operational concerns.

Alternative	Advantages	Disadvantages
1	• Moderate improvement to perceived safety for pedestrians due to wider path on one side shared with cyclists. • Reduction in conflict points to two on-ramps on one side.	• Increased crossing distance as pedestrians and cyclists must cross to one side at signalized ramp terminals. • Eliminates sidewalk on one side.

Alternative	Advantages	Disadvantages
	• Minor improvement to perceived safety for cyclists due to separation from automobiles on one side, shared with pedestrians • Shorter construction timing. • Minor Improvement to safety for all travel modes due to greater separation of pedestrians and cyclists from automobiles on one side and reduction in conflict points with ramp traffic.	
3	• Moderate improvement to perceived safety for pedestrians due to wider path on one side. shared with cyclists, and sidewalk on one side • Reduced conflict points for cyclists to two on-ramps on one-side. • Minor improvement to perceived safety for cyclists due to separation from automobiles on one side and shared facility with pedestrians. • Minor Improvement to safety for all travel modes due to maintenance of sidewalk on one side and separation of pedestrians and cyclists from automobiles on one side. • Medium construction timing. • No significant ramp modifications anticipated.	• Conflict points exist at all four on-ramps for pedestrians. • Increased crossing distance as cyclist must cross to one side at signalized ramp terminals.
4.1	• Moderate improvement to perceived safety for pedestrians due to wider path on both sides, but shared facilities with cyclists. • Moderate improvement to perceived safety for cyclists due to separation from automobiles on both sides and shared facilities with pedestrians. • Minor-Moderate Improvement to safety for all travel modes due to separation of pedestrians and cyclists from automobiles on both sides, but maintains conflict points with ramp traffic at all four locations.	• Conflict points exist at all four on-ramps for pedestrians and cyclists. • Longer construction timing. • Significant ramp modifications anticipated.
4.2	• Moderate improvement to perceived safety for pedestrians due to wider path on both sides, but shared facilities with cyclists. • Moderate improvement to perceived safety for cyclists due to separation from automobiles on both sides and shared facilities with pedestrians. • Minor-Moderate Improvement to safety for all travel modes due to separation of pedestrians and cyclists from automobiles on both sides, but maintains conflict points with ramp traffic at all four locations. • Medium construction timing. • No significant ramp modifications anticipated.	• Conflict points exist at all four on-ramps for pedestrians and cyclists.
5.1	• Moderate-Significant improvement to perceived safety for pedestrians due to cycling track and buffer between sidewalk and automobile traffic on both sides and separate facilities from cyclists. • Moderate-Significant improvement to perceived safety for cyclists due to dedicated and separated cycle track with barrier wall	• Conflict points exist at all four on-ramps for pedestrians and cyclists. • Longer construction timing.

Alternative	Advantages	Disadvantages
	between cyclist and automobile traffic on both sides, and separate facilities from pedestrians. • Moderate Improvement to safety for all travel modes due to separation of pedestrians and cyclists from automobiles on both sides, but maintains conflict points with ramp traffic at all four locations	
5.2	• Moderate-Significant improvement to perceived safety for pedestrians due to cycling track and buffer between sidewalk and automobile traffic on both sides and separate facilities from cyclists. • for cyclists due to dedicated and separated cycle track with barrier wall between cyclist and automobile traffic on both sides, and separate facilities from pedestrians. • Moderate Improvement to safety for all travel modes due to separation of pedestrians and cyclists from automobiles on both sides, but maintains conflict points with ramp traffic at all four locations. • No significant ramp modifications anticipated.	• Conflict points exist at all four on-ramps for pedestrians and cyclists. • Longest construction timing.
6	• Significant improvement to perceived safety for pedestrians and cyclists due to AT bridge over Hwy 407ETR separated from automobiles. • Moderate-significant Improvement to safety for all travel modes due to greatest separation of pedestrians and cyclists from automobiles on both sides, but maintains conflict points with ramp traffic at all four locations. • No impact to loop-ramps.	• Conflict points exist at all four on-ramps for pedestrians and cyclists. • Longer construction timing.

6.3. Recommended Option

Option 6 – Separate AT Bridge is the recommended option for the 407ETR Interchange, though with two separate AT bridges constructed, one on each side of the existing 407ETR Overpass. In addition, the existing bridge's barrier walls and median will remain untouched, but the existing sidewalks will be removed to eliminate the option for pedestrians to use them. The removal of these sidewalks will result in wider shoulders in their place, and the road centerline will be maintained.

This option was chosen for providing the greatest AT separation from automobiles, creating a pedestrian and cyclist friendly environment and significantly improving perceived safety.

Preliminary cost estimate for the recommended option is $4,069,988.

7. Construction Staging

Details of construction staging for pedestrian bridge without impacting HWY407 traffic will be prepared during the detailed design.

8. Geotechnical Investigation

Golder Associates Ltd. carried out a preliminary foundation investigation in November 2018. The following summarizes the findings of the investigation and foundation recommendations. The Preliminary Foundation Investigation Report was issued on March 27, 2019.

A 1.2m and 0.7m thick layer of granular road base fill was encountered underlying the asphalt in boreholes ETR-1 and ETR-2, respectively. The granular fill varies in composition from sand to gravelly sand to sand and gravel and extended to depths of 1.4m and 0.9m below ground surface, respectively. The SPT “N” values measured within the granular fill were 30 blows and 31 blows per 0.3m of penetration, indicating a dense level of compaction.

A 4.2m and 6.2m thick layer of silt and sand fill was encountered underlying the granular fill in boreholes ETR-1 and ETR-2, respectively at depths of 1.4m and 0.9m below ground surface and extended to depths of 5.6m and 7.1m below ground surface, respectively. The SPT “N” values measured within the silt and sand fill range from 10 blows to 37 blows per 0.3m of penetration, indicating a compact to very dense level of compaction.

A 9.0m and 7.5m thick till deposit was encountered underlying the silt and sand fill in boreholes ETR-1 and ETR-2, respectively. This till deposit varies in composition from clayey silt and sand to silty clay, trace sand, trace gravel. The till was encountered at depths between 5.6m and 7.1m below ground surface and extended to a depth of 14.6m below ground surface. The SPT “N” values measured within the till deposit range from 11 blows to 22 blows per 0.3m of penetration, with one SPT “N” value of 66 blows per 0.3m suggesting a stiff to hard consistency but generally a stiff to very stiff consistency.

A deposit of silty clay, trace sand and gravel was encountered underlying the till deposits in both boreholes at a depth of 14.6m below ground surface. The SPT “N” values measured within the silty clay deposit are 9 blows and 10 blows per 0.3m of penetration, indicating a stiff consistency.

In the report, shallow foundations are not considered suitable for support of widening the existing bridge foundations (Options 1-5) due to the presence of relatively weak (stiff) clayey silt and sand till deposit below the fill. Though shallow foundations may be considered suitable for support of the separate AT bridge (Option 6) due to the lower load requirements. Deep foundations are considered suitable for Options 1-5, but drilled shafts (caissons) are not recommended due to disturbance of the existing piles in terms of vibrations, soil loosening of the surrounding soils due to hydrostatic pressure, etc. Driven steel H-piles is recommended, especially since the existing bridge is already supported on deep foundations, founded on driven steel H-piles. Deep foundations are considered suitable for Option 6, though may not be necessary as shallow foundations may provide sufficient geotechnical resistances.

9. Environmental Constraints

There is no impact to designated natural areas as no Areas of Natural And Scientific Interest (ANSI), Provincially Significant Wetlands (PSWs), or Environmentally Sensitive Area (ESA) are located within the study area. There is no impact to vegetation due to construction of road widening, trees with 50dbh or higher and rare, threatened, or endangered species.

10. Miscellaneous

10.1. Design Code

The design of the pedestrian bridges and retaining walls will be undertaken in accordance with the CAN/CSA-S6—19 Canadian Highway Bridge Design Code (CHBDC), Ministry of Transportation of Ontario's "Structural Manual", and all other current directives and standards.

10.2. Access to the Site

The site is readily accessible from Kennedy Road and 407 ETR. Number of lanes will be maintained on Kennedy Road and 407 ETR throughout the construction. A traffic staging plan will be developed during the detailed design in consultation with the City of Markham and York Region.

10.3. Property

Property acquisition is not anticipated on either side of the Kennedy Road within the project limits.

10.4. Utilities

The 407ETR is bordered by the Hydro One corridor to the south, with 500 kV towers. They appear to be located away from the bridge and will likely not impact any construction/ modifications on the bridge.

The 407ETR Overpass currently carries a duct bank for Hydro cables on the west side of the bridge, suspended from the soffit and running through the abutments. These hydro cables should not interfere with the proposed option.

Both west and east barrier walls currently carry streetlight cables through embedded ducts.

10.5. Drainage

Existing drainage system for the 407ETR Overpass will be maintained.

10.6. Concrete

All cast-in-place concrete will be class C—1 concrete as per CSA A23.l.

10.7. Structural Steel

All main plate girder, web flanges, and bearing stiffeners shall be CSA G40.21 Grade 350 at category 5. Other non-fracture critical members including connecting angles, rolled section diaphragms and all secondary members shall be CAN3-G40.21 Grade 350A. The bearing plates shall be CAN3-G40.21 Grade 300W.

10.8. Reinforcing Steel

Stainless steel reinforcement will be used in areas of the components where their surfaces are within the splash zone, including the front face of the retaining wall, front face of the abutment wall, and the centre pier.

For all other components, black steel (Grade 400W) will be used as specified in Section 12 of the MTO Structural Manual and the MTO Bridge Office Memorandum dated November 22, 2010 “Reinforcing Steel”.

Prepared by

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Reviewed by

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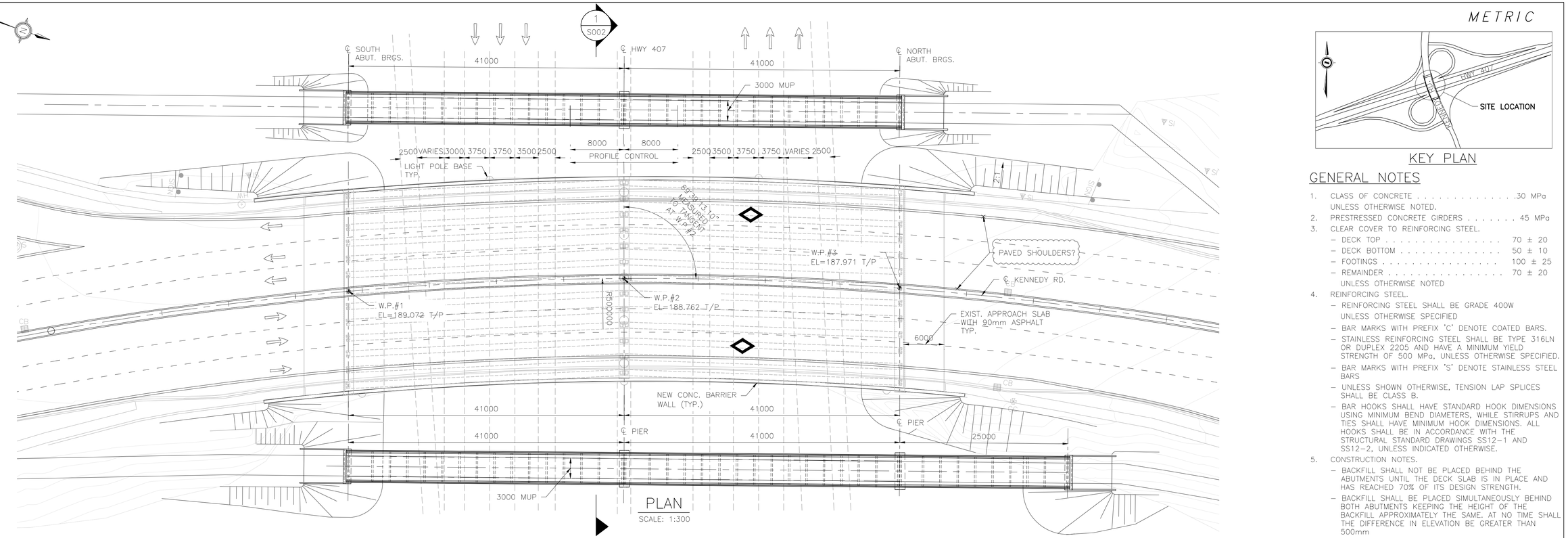
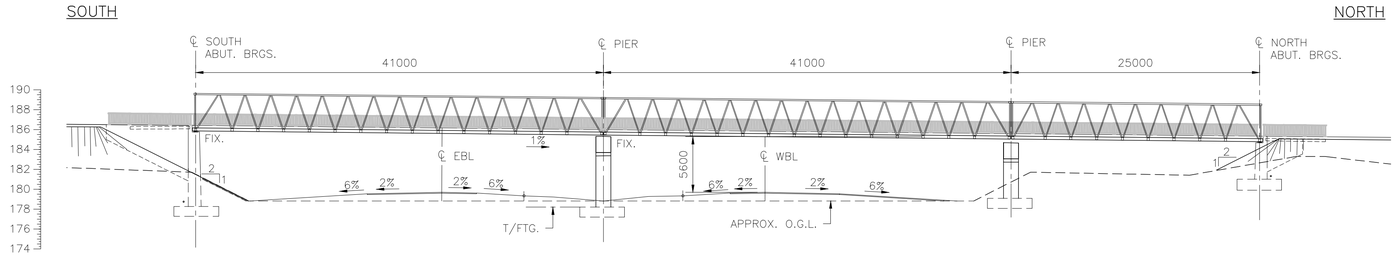
A

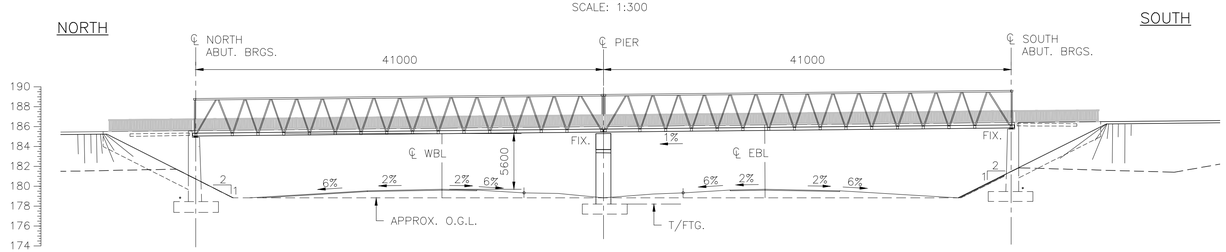
Appendix

Appendix A: Plan and Profile for Preferred Option

METRIC







KEY PLAN

GENERAL NOTES

1. CLASS OF CONCRETE . . . . . .30 MPa
   UNLESS OTHERWISE NOTED.
2. PRESTRESSED CONCRETE GIRDERS . . . . . 45 MPa
3. CLEAR COVER TO REINFORCING STEEL.
   - DECK TOP . . . . . 70 ± 20
   - DECK BOTTOM . . . . . 50 ± 10
   - FOOTINGS . . . . . 100 ± 25
   - REMAINDER . . . . . 70 ± 20

   UNLESS OTHERWISE NOTED
4. REINFORCING STEEL.
   - REINFORCING STEEL SHALL BE GRADE 400W UNLESS OTHERWISE SPECIFIED
   - BAR MARKS WITH PREFIX 'C' DENOTE COATED BARS.
   - STAINLESS REINFORCING STEEL SHALL BE TYPE 316LN OR DUPLEX 2205 AND HAVE A MINIMUM YIELD STRENGTH OF 500 MPa, UNLESS OTHERWISE SPECIFIED.
   - BAR MARKS WITH PREFIX 'S' DENOTE STAINLESS STEEL BARS
   - UNLESS SHOWN OTHERWISE, TENSION LAP SPLICES 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 STRUCTURAL STANDARD DRAWINGS SS12-1 AND SS12-2, UNLESS INDICATED OTHERWISE.
5. CONSTRUCTION NOTES.
   - BACKFILL SHALL NOT BE PLACED BEHIND THE ABUTMENTS UNTIL THE DECK SLAB IS IN PLACE AND HAS REACHED 70% OF ITS DESIGN STRENGTH.
   - BACKFILL SHALL BE PLACED SIMULTANEOUSLY BEHIND BOTH ABUTMENTS KEEPING THE HEIGHT OF THE BACKFILL APPROXIMATELY THE SAME. AT NO TIME SHALL THE DIFFERENCE IN ELEVATION BE GREATER THAN 500mm
   - CONSTRUCT ABUTMENTS AND WINGWALLS TO THE BEARING SEAT ELEVATIONS. THE CONTRACTOR SHALL SUPPLY TEMPORARY LATERAL BRACING FOR THE ABUTMENTS. FORMWORK AND LATERAL BRACING SHALL NOT BE REMOVED UNTIL CONCRETE HAS REACHED 70% OF ITS SPECIFIED 28-DAY STRENGTH.

NOTES:
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NOT FOR CONSTRUCTION

HDR
100 York Blvd., Suite 300,
Richmond Hill, ON, L4B 1J8
Phone (289) 695-4600
Fax (289) 695-4601

No.	DATE	REVISIONS	BY
1	JULY 27, 2020	NOT FOR CONSTRUCTION	S.M.B.

York Region Transportation Services

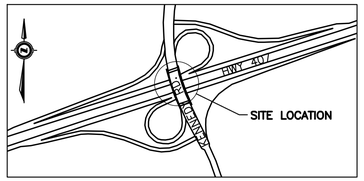
DESIGN	G.H.
DRAWN	V.R.
CHECKED	S.M.B.

KENNEDY ROAD
OVER HWY 407

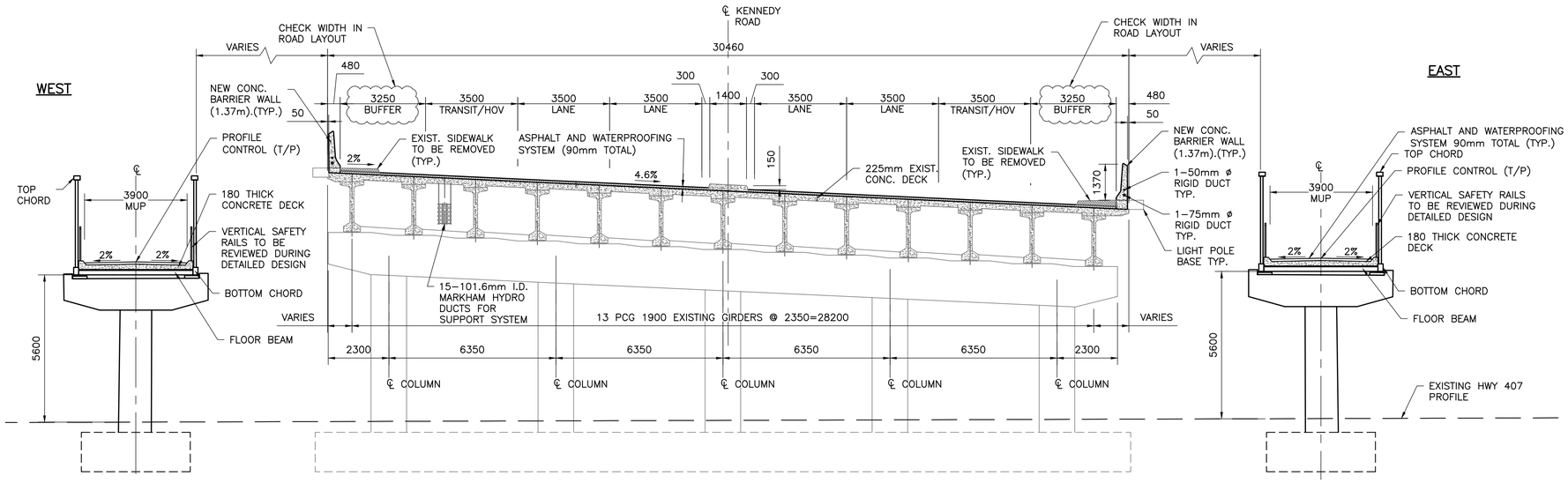
GENERAL ARRANGEMENT
(SHEET 1 OF 2)

DWG. NO.	S001
CONT. NO.	
SHEET NO.	

METRIC



KEY PLAN



SECTION 1 / S002
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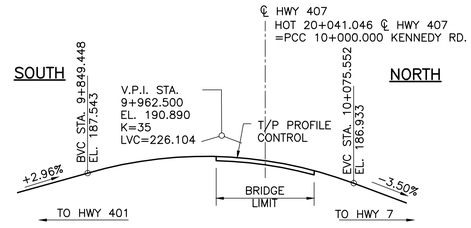
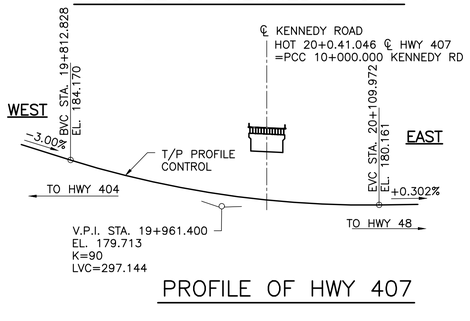


PROFILE OF KENNEDY ROAD



PROFILE OF HWY 407

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York Region Transportation Services

DESIGN G.H.
DRAWN V.R.
CHECKED S.M.B.

KENNEDY ROAD
OVER HWY 407

GENERAL ARRANGEMENT
(SHEET 2 OF 2)

DWG. NO. S002
CONT. NO.
SHEET NO.