

7 PROJECT DESCRIPTION

The major features for the proposed roadway and active transportation improvements on Trafalgar Road between north of 10 Side Road and Highway 7 are described in **Section 7.1**. Potential environmental effects, mitigation measures, and commitments to future work along this section of the Trafalgar Road corridor are described in **Section 7.2**. The preliminary plan is provided in **Plates 1 to 38**.

This information should be reviewed in conjunction with **Section 5** of the ESR which describes the alternative designs. While refinements may occur during detailed design, any changes should not alter the intent of the recommended undertaking or its components. During detailed design, there will be further consultation with technical agencies, including, but not limited to: Conservation Halton, Credit Valley Conservation, Niagara Escarpment Commission, Ministry of Natural Resources and Forestry, Ministry of the Environment and Climate Change, Ministry of Transportation, CN Rail, Metrolinx, Town of Halton Hills, utilities, and affected property owners.

The recommended undertaking for Trafalgar Road between north of 10 Side Road and Highway 7 includes the following:

- Widening of Trafalgar Road from 2 to 4 lanes from north of 10 Side Road to Highway 7. For improvements south of 10 Side Road refer to ***Trafalgar Road Environmental Study Report (Section 1) from Steeles Avenue to North of 10 Side Road***
- The corridor will transform from a rural (i.e. ditches) to urban (i.e. curbs) corridor through selected sections:
 - East side of Trafalgar Road between 10 Side Road and 15 Side Road
 - East and west sides of Trafalgar Road between 15 Side Road and Trafalgar Sports Complex entrance (i.e. north of 17 Side Road)
 - East side of Trafalgar Road between Trafalgar Sports Complex and Highway 7
- The corridor will remain as a rural (i.e. ditches) corridor through the following sections:
 - West side of Trafalgar Road between 10 Side Road and 15 Side Road
 - West side of Trafalgar Road between Trafalgar Sports Complex and Highway 7
- Active transportation facilities, include:
 - From north of 10 Side Road to 15 Side Road: 3.0 m bi-directional multi-use path on the east side, 1.8 m exclusive bike lane on the east side, 1.5 m paved shoulder on the west side available for use by cyclists
 - From 15 Side Road to Trafalgar Sports Park Entrance: 3.0 m bi-directional multi-use path on the east side, 2.0 m sidewalk on the west side, 1.8 m exclusive bike lane in each direction
 - From Trafalgar Sports Park Entrance to Highway 7: 3.0 m bi-directional multi-use path on the east side, 1.8 m exclusive bike lane on east side, 1.5 m paved shoulder on west side available for use by cyclists
- Introduce full illumination and enhanced streetscape features
- Widen and replace Black Creek crossing structure
- Construct grade-separated underpass structures at CN and Metrolinx crossings (i.e. road under rail)

7.1 Major Features

7.1.1 Design Criteria

Currently, Trafalgar Road is generally posted at 60 km/h between 10 Side Road and Highway 7, except between 10 Side Road and 15 Side Road, and between 300 m north of Princess Anne Drive and Highway 7 where Trafalgar Road is posted at 80 km/h and 70 km/h, respectively. Once the improvements have been implemented, the posted speed limit on Trafalgar Road is expected to be reduced to 60 km/h and 70 km/h between 10 Side Road and Highway 7; this is consistent with Trafalgar Road’s major arterial road classification and its transformation to a multi-modal major arterial road in a semi-urban setting. The geometric details are listed in **Table 7-1** for all new sections of road.

Table 7-1: Trafalgar Road Design Criteria

	Existing Conditions	Design Standard	Proposed Standard
Design Speed	80 km/h	80 km/h	80 km/h
Posted Speed	60 km/h to 80 km/h	60 km/h to 70 km/h	60 km/h to 70 km/h
No. of Lanes and Width	2 lanes @ 3.75 m	4 @ 3.50 m	4 @ 3.50 m
Shoulder treatment	3.0 m shoulder in each direction (combination of 0.8 – 1.2 m paved plus 1.2 – 1.8 m granular)	Rural section only : 1.5 m paved shoulder in each direction	Rural section only: 1.5 m paved shoulder* plus 1.0 m granular
Provision for Pedestrians and Cyclists: North of 10 Side Road to 15 Side Road	<ul style="list-style-type: none"> No sidewalks / multi-use path 	<ul style="list-style-type: none"> 3.0 m multi-use path east side 1.5 m paved shoulder in each direction 	<ul style="list-style-type: none"> 3.0 m multi-use path east side 1.8 m bike lane east side (urban) 1.5 m paved shoulder west side (rural)
Provision for Pedestrians and Cyclists: 15 Side Road to Trafalgar Sports Park Entrance	<ul style="list-style-type: none"> No multi-use path Sidewalk on the east side up to Stewarttown Road South 1.5 m paved shoulder in each direction up to Stewarttown Road North 1.5 m sidewalk over Black Creek on west side 	<ul style="list-style-type: none"> 3.0 m multi-use path east side 1.8 m bike lane in each direction 2.0 m sidewalk west side 	<ul style="list-style-type: none"> 3.0 m multi-use path east side 1.8 m bike lane in each direction (urban) 2.0 m sidewalk west side
Provision for Pedestrians and Cyclists: Trafalgar Sports Park Entrance to Highway 7	<ul style="list-style-type: none"> No sidewalks / multi-use path 1.5 m paved shoulder in each direction 	<ul style="list-style-type: none"> 3.0 m multi-use path east side 1.5 m paved shoulder in each direction 	<ul style="list-style-type: none"> 3.0 m multi-use path east side 1.8 m bike lane east side (urban) 1.5 m paved shoulder west side (rural)
Minimum Grade	0.35 %	0.3%	0.35 %
Maximum Grade	7.90 %	6-8%	5.50 %
Minimum Curve Radius	N/A	250 m	350 m
Minimum Stopping	113 – 140 m	113 – 140 m	135 m

	Existing Conditions	Design Standard	Proposed Standard
Sight Distance			
Raised Median: North of 10 Side Road to 15 Side Road	N/A	5.0 m (Varies)	5.0 m (Varies)
Raised Median: 15 Side Road to North of CN Crossing	N/A	Varies	Varies
Raised Median: North of CN Crossing to Highway 7	N/A	Varies	Varies
Minimum Crest Curve	$K_{crest} = 24$	$K_{crest} = 24 - 36$	$K_{crest} = 24$
Minimum Sag Curve	$K_{sag} = 25$	$K_{sag} = 25 - 32$ $K_{sag\ comfort} = 12 - 16$	$K_{sag} = 15$
Basic Right-of-Way	Varies	42 m	42 m

*1.5 m paved shoulder available for use by cyclists

As part of the improvements of Trafalgar Road, a portion of the east-west connection roads will also have to be reconstructed, including 15 Side Road, 20 Side Road and Lindsay Court. **Tables 7-2 and 7-3** are design criteria for these roadways. It should be noted that some of the proposed standard criteria may be less than the design standard; however, it is considered to be acceptable since the reconstruction is at the intersection and vehicles are expected to reduce speed when approaching the intersection.

Table 7-2: 20 Side Road Design Criteria (at Trafalgar Road)

	Existing Conditions	Design Standard	Proposed Standard
Design Speed	60 km/h	60 km/h	60 km/h
Posted Speed	40 km/h	60 km/h	60 km/h
No. of Lanes and Width	2 lanes at 3.5 m each	2 lanes at 3.5 m each	2 lanes at 3.5 m each
Provision for Pedestrians and Cyclists	None	None	None
Minimum Grade	TBD upon completion of survey during detail design	0.5 %	0.5 %
Maximum Grade	TBD upon completion of survey during detail design	6-12 %	4 %
Minimum Curve Radius	70 m (40 m at T-intersection)	130 m	130 m (55 m at T-intersection)
Minimum Stopping Sight Distance	75 – 85 m	75 – 85 m	75 – 85 m
Minimum Crest Curve	TBD upon completion of survey during detail design	$K_{crest} = 10$	$K_{crest} = 18$
Minimum Sag Curve	TBD upon completion of survey during detail design	$K_{sag} = 15$	$K_{sag} = 4$
Basic Right-of-Way	20 m	20 m	20 m

Table 7-3: Lindsay Court Design Criteria (at Trafalgar Road)

	Existing Conditions	Design Standard	Proposed Standard
Design Speed	50 km/h	50 km/h	50 km/h
Posted Speed	50 km/h	50 km/h	50 km/h
No. of Lanes and Width	2 lanes at 3.5 m each	2 lanes at 3.5 m each	2 lanes at 3.5 m each
Provision for Pedestrians and Cyclists	None	None	None
Minimum Grade	3.2 %	0.5 %	2.8 %
Maximum Grade	3.2 %	6-12 %	3.3 %
Minimum Curve Radius	N/A	90 m	90 m
Minimum Stopping Sight Distance	60 – 65 m	60 – 65 m	60 – 65 m
Minimum Crest Curve	N/A	$K_{\text{crest}} = 6$	$K_{\text{crest}} = 8$
Minimum Sag Curve	N/A	$K_{\text{sag}} = 11$	$K_{\text{sag}} = 4$
Basic Right-of-Way	19 m	19 m	19 m

7.1.2 Horizontal Alignment

Trafalgar Road will be widened mainly along the existing centerline (i.e. to both the west and east sides) from north of 10 Side Road to 15 Side Road. In localized areas where there are existing constraints, the typical cross section will be modified to minimize impact to adjacent properties / features. It is recognized that lands on the east side of Trafalgar Road will be subject to future development as part of Vision Georgetown. The Town of Halton Hills has been consulted throughout the Municipal Class EA Study.

Between 15 Side Road and Stewarttown Road North, Trafalgar Road will be widened to the east in order to avoid impacts to St. John’s Anglican Church, which is located in the southwest quadrant of Trafalgar Road / 15 Side Road. From a constructability perspective, it is considered to be more technically desirable to widen to the east side compared to the west side due to staging complexity.

From Stewarttown Road North (approximately 300 m south of 17 Side Road), the alignment of Trafalgar Road will shift to the east and cross under CN rail via an underpass and the alignment will reconnect with existing Trafalgar Road at the access to the Trafalgar Sports Park (i.e. immediately north of Devereaux House). Due to the shift in road alignment, the future 17 Side Road / Maple Avenue intersection will be located approximately 65 m to the east compared to its current location. The CN crossing is discussed in further detail in **Section 7.1.6.1**.

From the Trafalgar Sports Park access to Berton Boulevard, Trafalgar Road will be widened to the west to minimize impacts to existing development on the east side.

North of Berton Boulevard, Trafalgar Road will shift to the west and cross under the Metrolinx rail north of 20 Side Road via an underpass and will tie into Highway 7 at the current intersection location.

20 Side Road will be realigned as it approaches the new alignment of Trafalgar Road. Due to the shift in road alignment, the future 20 Side Road intersection will be located approximately 30 m to the west of its current location. Approximately 150 m of 20 Side Road will require reconstruction as it approaches the new alignment of Trafalgar Road. The Metrolinx crossing is discussed in further detail in **Section 7.1.6.2**.

Lindsay Court will be extended by approximately 40 m to the west to connect to the new alignment of Trafalgar Road.

Trafalgar Road will tie into the existing T-intersection at Highway 7.

7.1.3 Typical Cross Sections

Exhibits 7-1 to 7-3 illustrate the typical proposed cross-sections for the Trafalgar Road corridor improvements between 10 Side Road and Highway 7. The following summarizes the basic features of the cross-sections within the Study Area:

- Nominal 42 m right-of-way (varies locally near intersections and at some residences)
- 4 through lanes (2 lanes in each direction)
- Raised median of varying width. Median narrows in areas where property is constrained in order to mitigate impacts and near intersections to accommodate left turn lanes
- In proximity to residential and business properties, a flush median will be considered to allow for left turn access; subject to review during detailed design
- Active transportation facilities are provided as follows:
 - From north of 10 Side Road to 15 Side Road: 3.0 m bi-directional multi-use path on the east side, 1.8 m exclusive bike lane on the east side, 1.5 m paved shoulder on the west side available for use by cyclists
 - From 15 Side Road to Trafalgar Sports Park Entrance: 3.0 m bi-directional multi-use path on the east side, 2.0 m sidewalk on the west side, 1.8 m exclusive bike lane in each direction
 - From Trafalgar Sports Park Entrance to Highway 7: 3.0 m bi-directional multi-use path on the east side, 1.8 m exclusive bike lane on east side, 1.5 m paved shoulder on west side available for use by cyclists

In areas where there are constraints, for example, Mount Pleasant Cemetery, properties with buildings in close proximity to the road, etc., the cross section has been modified to minimize or avoid impact to these features. This will be subject to further review and modification during detailed design.

7.1.4 Profile

Except at the Black Creek valley, CN, and Metrolinx crossings, the proposed vertical profile of Trafalgar Road between 10 Side Road and Highway 7 is generally consistent with that of the existing Trafalgar Road profile in order to minimize property requirements.

At the Black Creek crossing (north of 15 Side Road), the profile of Trafalgar Road will be raised approximately 2.5 m to eliminate potential flooding conditions at Black Creek during Regional storm events (see **Section 7.1.10** Drainage). North of the Black Creek

crossing, the existing steep grade (~8%) will be improved by reducing the grade to 5.50%.

At the CN crossing (north 17 Side Road / Maple Avenue), the profile of Trafalgar Road will be lowered by up to 7 m to accommodate a grade separated underpass. The grade of Trafalgar Road approaching the underpass from the south and from the north will be at 2.8% and 5%, respectively. The CN crossing structure is discussed in further detail in **Section 7.1.6.1**.

At the Metrolinx crossing (north of 20 Side Road), the profile of Trafalgar Road will be lowered by up to 7 m to accommodate a grade separated underpass. The grade of Trafalgar Road approaching the underpass from the south and from the north will be at 0.93% and 3.5%, respectively. The Metrolinx crossing structure is discussed in further detail in **Section 7.1.6.2**.

7.1.5 Geotechnical

A preliminary geotechnical investigation was carried out by Thurber Engineering regarding pavement design and recommendations. A copy of the report is provided in **Appendix M**.

Pavement Design

The recommended pavement design based on borehole data, anticipated traffic volumes, and assuming adequate subgrade drainage, the following preliminary pavement design is recommended for the widening of Trafalgar Road north of 10 Side Road:

- HL 1: 50 mm
- HDBC (2 lifts): 110 mm
- Granular A Base (19 mm crusher run limestone): 150 mm
- Granular B Type II Subbase (50 mm crusher run limestone): 550 mm

All Hot Mix Asphalt (HMA) material should meet the requirements of OPSS 310, as modified by the Region of Halton Specifications for Hot Mix Asphalt Paving, Materials, Sampling, and Testing. An asphalt cement binder grade of PG 64-28 is recommended for all asphalt mixes. All granular base material shall consist of OPSS Granular A or 19 mm crusher run limestone, while the granular subbase material shall consist of OPSS Granular B, Type II or 50 mm crusher run limestone.

Exhibit 7-1: Trafalgar Road Proposed Typical Cross Section – North of 10 Side Road to 15 Side Road



Exhibit 7-2: Trafalgar Road Proposed Typical Cross Section – 15 Side Road to 17 Side Road

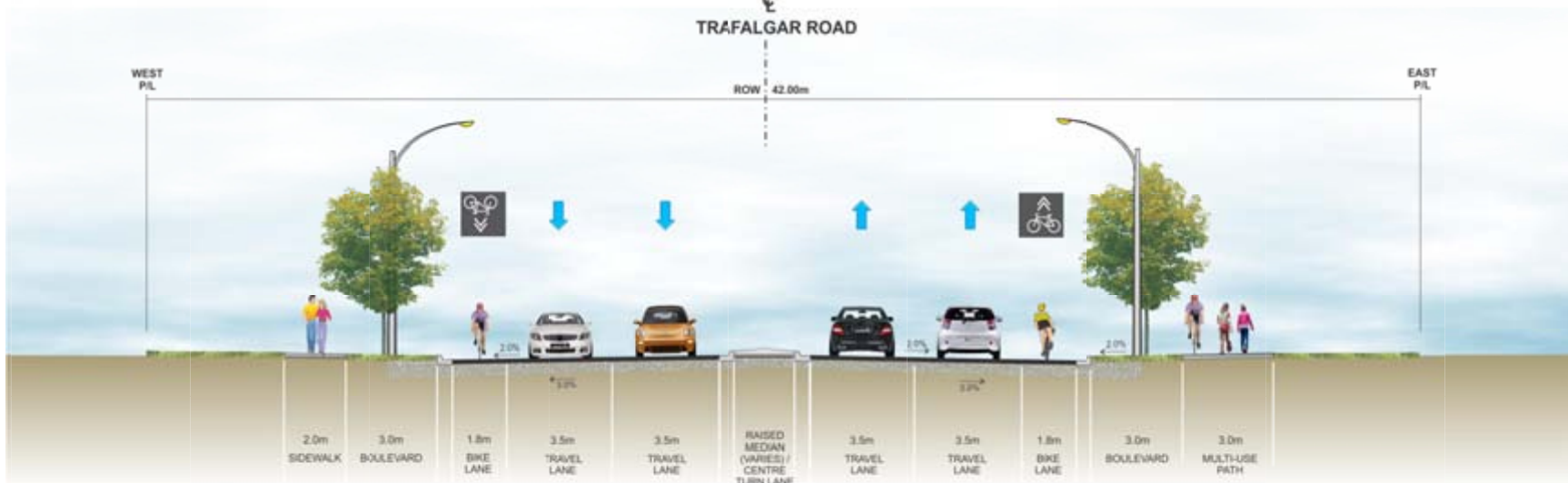
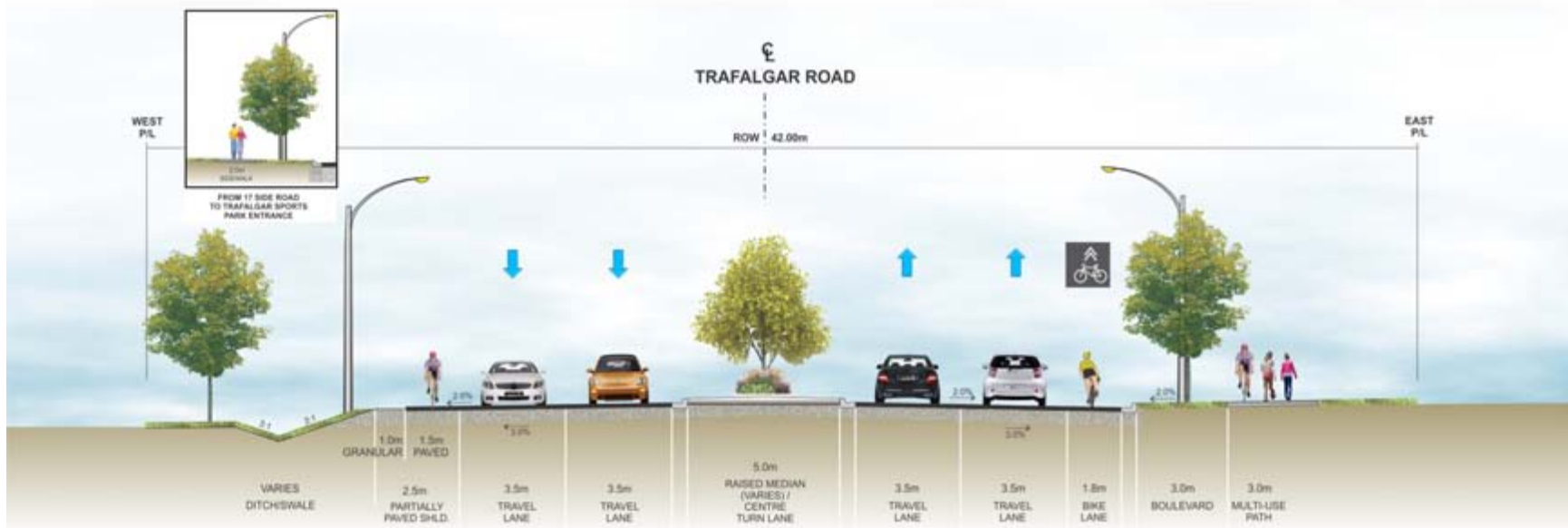


Exhibit 7-3: Trafalgar Road Proposed Typical Cross Section – 17 Side Road to Highway 7



Foundation

Boreholes were drilled at the Black Creek crossing, the retaining wall south of Black Creek, as well as the future CN and Metrolinx grade separations for foundation investigations.

Black Creek Crossing

Based on the borehole data, supporting the replacement bridge on spread footings extended down to the very dense sand and silt encountered at 4.6 m depth, below the level of all fill and organic material, could be considered. It is noted; however, that excavation for footing construction will extend approximately 2 m below the measured groundwater level, and installation of a cofferdam and dewatering system will be required to enable construction of footings in the dry and prevent base instability in the cohesionless foundation subgrade. Installation of driven sheet pile cofferdam may not be practical due to the very dense condition of the underlying sand and silt, and therefore, spread footings are not the preferred foundation option based on the preliminary borehole information. The use of steel H-piles driven to refusal in the very dense sand and silt or shale bedrock may also be considered.

Retaining Wall South of Black Creek

The existing retaining wall on the east side of Trafalgar Road south of Black Creek, opposite to Stewarttown Road South, will be replaced and relocated to the east of the existing alignment due to the proposed widening of Trafalgar Road.

Based on the available information, replacement of the existing retaining wall with a concrete cantilever wall, a soldier pile wall or a reinforced soil structure (RSS) is considered feasible from a geotechnical perspective. An RSS wall or spread footings for a cantilever wall should be founded on the compact to very dense native sand/silt below the level of all fill, alluvial/organic materials or loose/soft soils. Soldier piles if employed should be socketed into the very dense native sand and silt and/or the underlying shale bedrock.

CN Grade Separation

Based on the borehole data, the road cut is expected to extend through the silty clay till and into the underlying sand and silt till. In general, the base and sidewalls of the road cut excavated in the till deposits are expected to be stable with permanent cut slopes designed at inclinations not exceeding 2H:1V. Considering the relatively low permeability of the till, dewatering from within the excavation should be feasible and permanent drainage via the storm sewer system should be adequate.

The recommended foundation type for support of the grade separation structure comprises spread footings founded on the very dense sand and silt till encountered at 4.6 m depth. A factored geotechnical resistance at ULS of 600 kPa and a geotechnical reaction at SLS of 400 kPa are recommended for preliminary design of spread footings founded on the very dense till. The use of steel H-piles driven to refusal in the very dense sand and silt till or shale bedrock may also be considered.

Considering the high geotechnical resistance available in the very dense till at the anticipated founding level for spread footings, the use of augered caissons is not expected to be a cost effective foundation alternative.

Metrolinx Grade Separation

Based on the borehole data, the road cut is expected to extend through the silty sand embankment fill, silty sand layer and into the underlying silty clay till. In general, the base and sidewalls of the road cut excavated in these deposits are expected to be stable with permanent cut slopes designated at inclinations not exceeding 2H:1V. The groundwater level was measured to be below the proposed base of cut, and therefore is not expected to be an issue.

Consideration may be given to supporting the proposed grade separation structure on spread footings founded on the dense to compact sand encountered at 7.6 m depth. A factored geotechnical resistance at ULS of 400 kPa and a geotechnical reaction at SLS of 250 kPa are recommended for preliminary design of spread footings founded on the dense sand.

Considering of thick deposit of cohesionless sand below the water table, the use of augered caissons is not recommended to support the proposed grade separation structure at this site due to the potential for sidewall and base instability, dewatering issues and the inability to examine the competency of the caisson base.

7.1.6 Structures

As part of the Trafalgar Road widening from 2 to 4 lanes between north of 10 Side Road and Highway 7, the Black Creek crossing structure will be replaced and underpass structures will be built at the CN and Metrolinx crossings. Details related to each of the structures can be found in this section of the ESR.

7.1.6.1 Black Creek Crossing Structure

The existing crossing of Black Creek is located approximately 400 m north of 15 Side Road on Trafalgar Road. It is a reinforced concrete rigid frame structure consisting of a single 9.1 m span rigid frame bridge with a sidewalk on the west and concrete parapet walls on either side. The bridge is approximately 12.5 m wide with a vertical clearance ranging from 2.7 m to 3.1 m. The bridge was rehabilitated in 2012 including patch repairs to the soffit, replacement of the sidewalk, curb and parapet walls, a concrete overlay and new waterproofing and pavement.

The existing bridge is generally in good condition with local wet staining, efflorescence and patches as identified during the field investigation. Overhead utility wires were noted to the west of the bridge as well as a single utility duct was along the west fascia of the bridge. Additional information regarding the existing structure can be found in the inspection memo in **Appendix I**.

The existing bridge does not provide adequate hydraulic capacity. The existing waterway restrictions result in flooding of the roadway during a Regional Storm event (see **Section 7.1.10**). Therefore, it is proposed that the road profile be raised by approximately 2.5 m. The existing structure will be removed and replaced by a new bridge to accommodate

the road widening and also to address potential flooding under the Regional storm event under the existing profile.

The Preliminary General Arrangement Drawing (GA) can be found in **Exhibit 7-4**.

The proposed new bridge consists of a 33.0 m long single span bridge on a 17 degree skew to the creek. The bridge has a 225 mm thick reinforced concrete deck overlaid with 90 mm of asphalt and waterproofing system wearing surface, supported by 11 precast CPCI 1600 concrete girders. It carries two 3.5 m wide lanes and 2.1 m wide shoulders in each direction with a 3.0 m wide multi-use trail to the east and a 2.0 m wide sidewalk to the west. The 2.1 m shoulder connects to the on street bike lane to the south and to the north of the structure.

The slab-on-precast girder type bridge is considered as the first choice, for the proposed new structure on the basis of economy. This type of bridge is one of the traditional structure types commonly used in Ontario and many other jurisdictions.

The proposed design utilizes conventional 35 Mpa concrete for all components except the precast girders where 50 Mpa concrete has been proposed. The deck will have a combined 90 mm asphalt and waterproofing wearing surface. The ends of the structures will employ 6 m approach slabs to provide a transition between the structures and roadway. Standard Performance Level 3 concrete barrier walls are proposed for both sides of the structure.

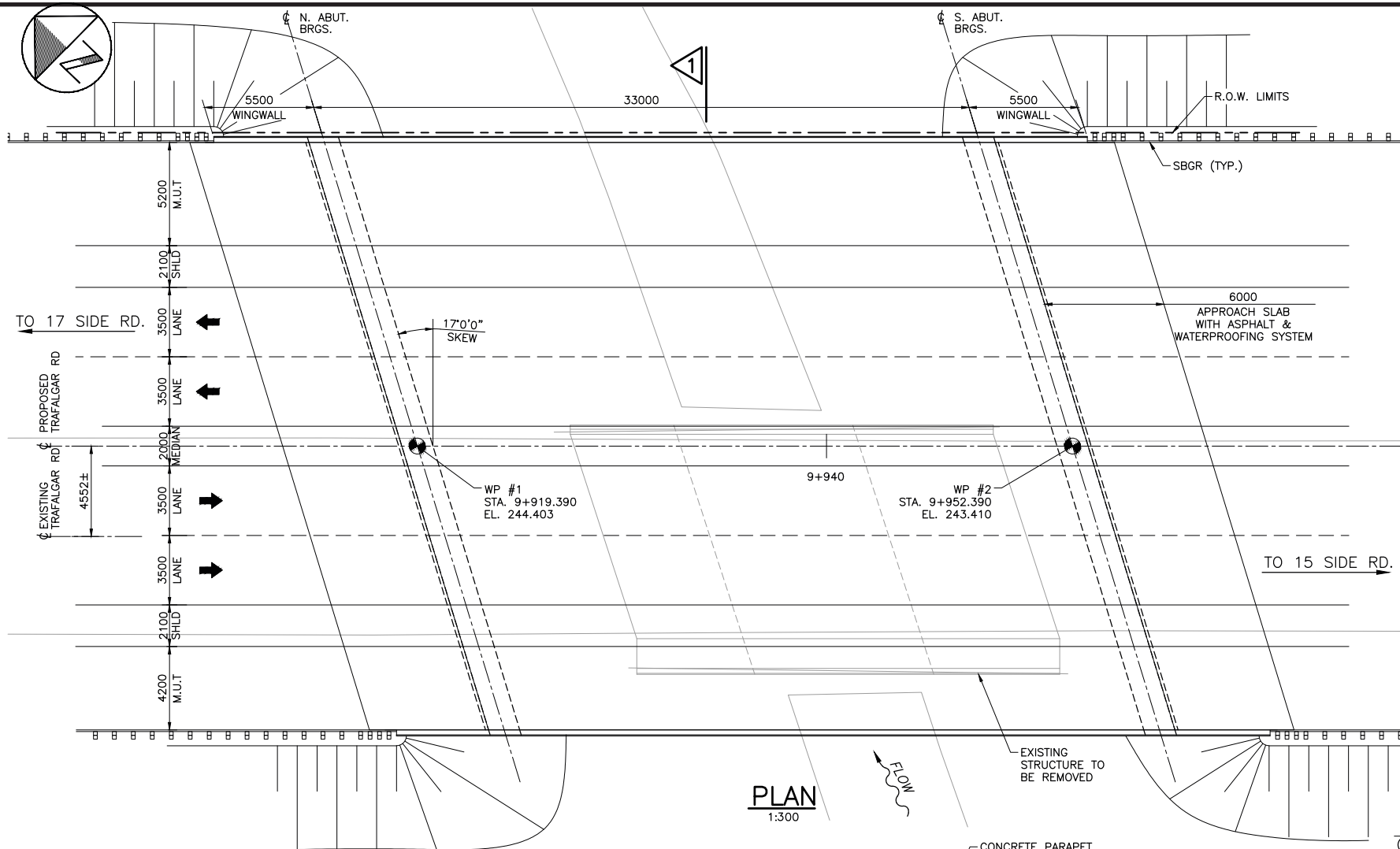
The structural cross section including lane, shoulder and side clearance widths were established in accordance with the Ministry's Geometric Design Standards (GDSOH) and Road Classifications.

The proposed structure cross section comprises the following from west to east:

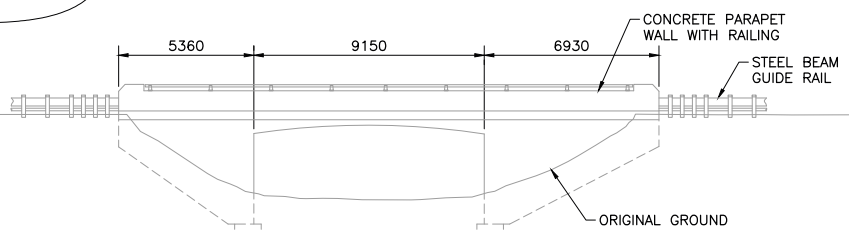
- 0.3 m parapet wall
- 2.0 m side walk
- 2.1 m shoulder
- 2 x 3.50 m lanes
- 2.0 m raised concrete median
- 2 x 3.50 m lanes
- 2.1 m shoulder
- 3.0 m multi-use path
- 0.3 m parapet wall

A meeting was held with Credit Valley Conservation (CVC) in November 2015 and the agency generally supported the proposed structure. CVC will continue to be consulted during the detailed design process.

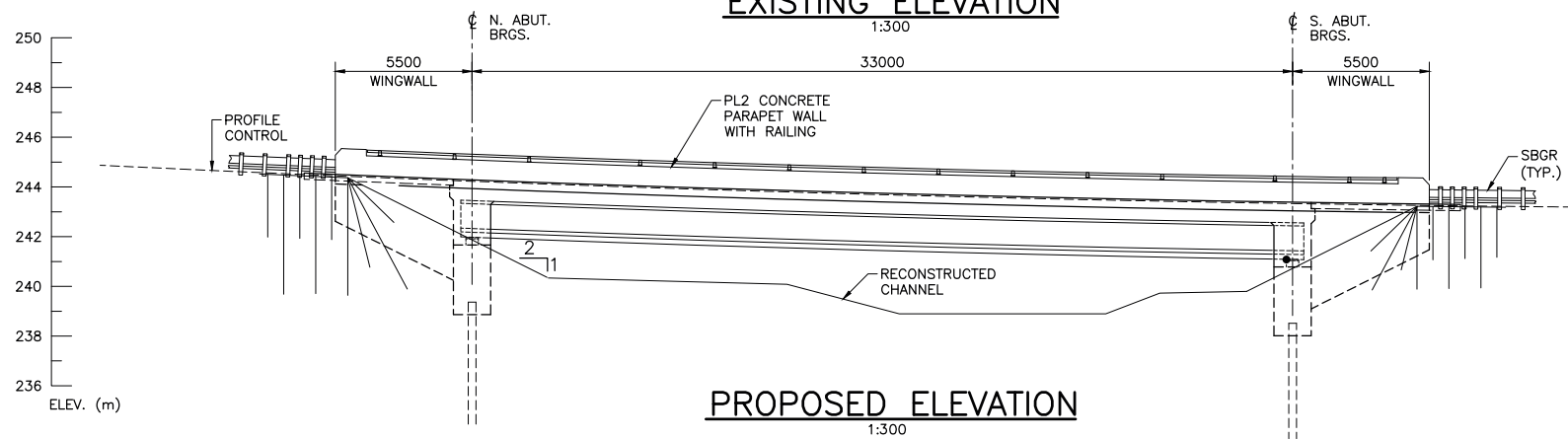
All existing traffic lanes (one through lane in each direction) will be maintained at all times during construction. Conceptual construction staging plans can be found in **Section 7.1.7**.



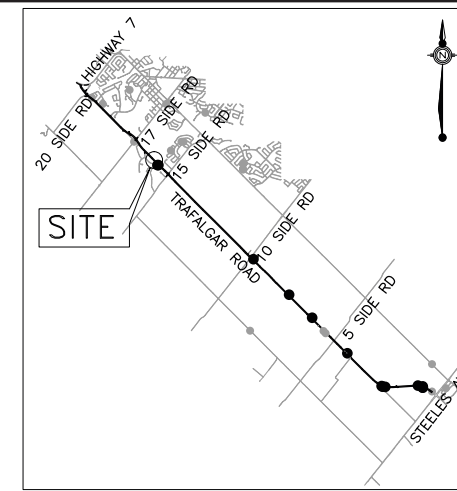
PLAN
1:300



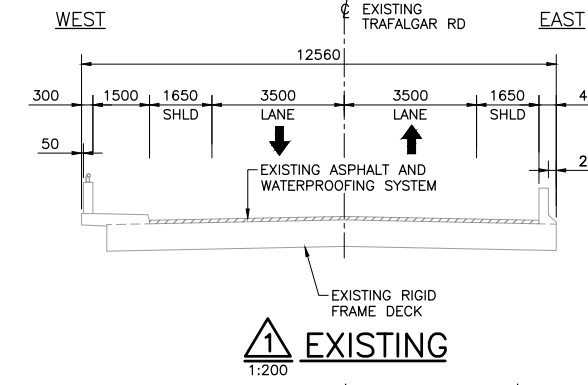
EXISTING ELEVATION
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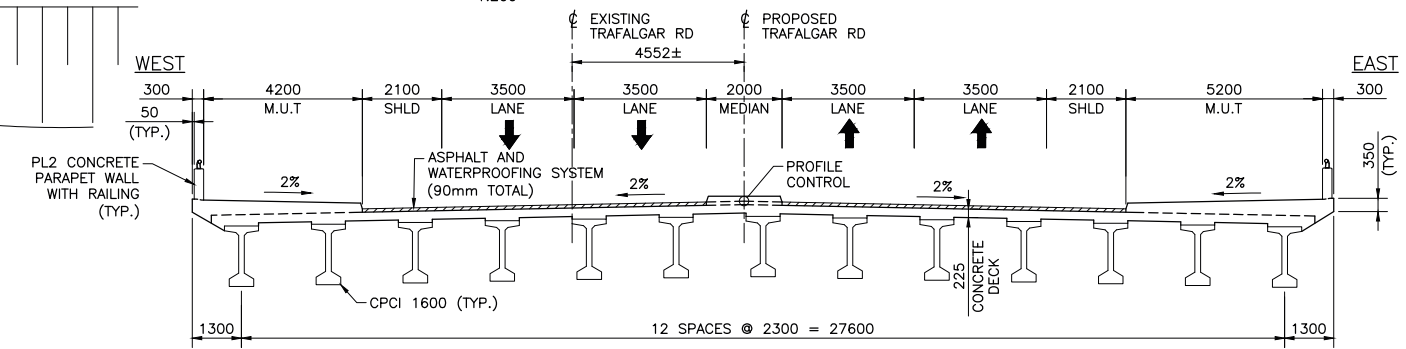
PROPOSED ELEVATION
1:300



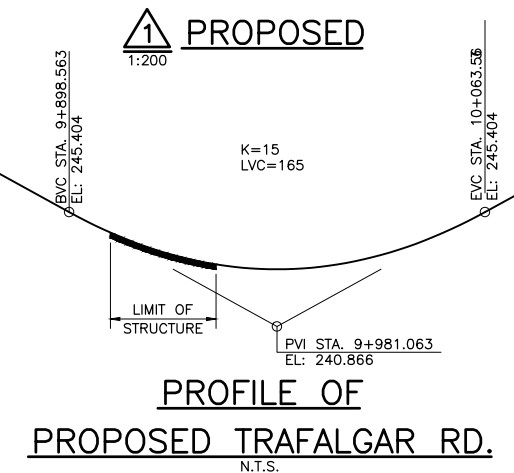
KEY PLAN
N.T.S.



1 EXISTING
1:200



1 PROPOSED
1:200



PROFILE OF PROPOSED TRAFALGAR RD.
N.T.S.

CLASS OF CONCRETE:

PRECAST GIRDERS 50 MPa
REMAINDER 35 MPa

CLEAR COVER TO REINFORCING STEEL:

BOTTOM OF TOP SLAB 50±10mm
BOTTOM OF BOTTOM SLAB 100±25mm
REMAINDER 70±20mm

REINFORCING STEEL:

REINFORCING STEEL SHALL BE GRADE 400 UNLESS OTHERWISE SPECIFIED.

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.

CONSTRUCTION NOTES:

THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS OF THE EXISTING WORK AND ALL DETAILS ON SITE AND REPORT ANY DISCREPANCIES TO THE CONTRACT ADMINISTRATOR BEFORE PROCEEDING WITH THE WORK.

BACKFILL SHALL BE GRANULAR 'B' AND SHALL BE PLACED SIMULTANEOUSLY BEHIND BOTH SIDES OF THE CULVERT KEEPING THE HEIGHT OF THE BACKFILL APPROXIMATELY THE SAME. AT NO TIME SHALL THE DIFFERENCE IN ELEVATION BE GREATER THAN 300mm.

NO CONCRETE SHALL BE PLACED UNTIL THE DEPTH OF THE EXCAVATION AND THE CHARACTER OF THE FOUNDATION HAVE BEEN APPROVED BY THE CONTRACT ADMINISTRATOR.

LIST OF ABBREVIATIONS:

U/S - DENOTES UP STREAM
D/S - DENOTES DOWN STREAM
T/C - DENOTES TOP OF CULVERT
T/F - DENOTES TOP OF FOOTING

LIST OF DRAWINGS:

1. PRELIMINARY GENERAL ARRANGEMENT

7.1.6.2 CN Rail Underpass Crossing

Trafalgar Road (2 lanes) currently crosses the CN rail crossing approximately 150 m north of 17 Side Road / Maple Avenue. It consists of two at grade rail lines with signals and swing arms. In addition, there are several railway electrical / maintenance units in close proximity to the existing crossing; these may have to be relocated during the proposed realignment.

The warrant to consider a 4-lane grade separated crossing structure at this location was documented in **Section 2.2.4**. The selection of an underpass versus an overpass design was documented in **Section 5.3**, and the alignment alternatives considered for Trafalgar Road were documented in **Section 5.5**.

Two new railway structures are required for the grade separation and the widening of Trafalgar Road. The proposed grade separation crossings include realignment of Trafalgar Road to the east by up to approximately 60 m and lowering of the existing profile by approximately 6 m in order to maintain existing CN track elevation. Some track realignment will be required to accommodate the offset of the two structures beyond the structure for the north track. The exact location of the realigned tracks will be confirmed during detailed design subject to consultation with CN. It is assumed that the south track will remain on its existing alignment.

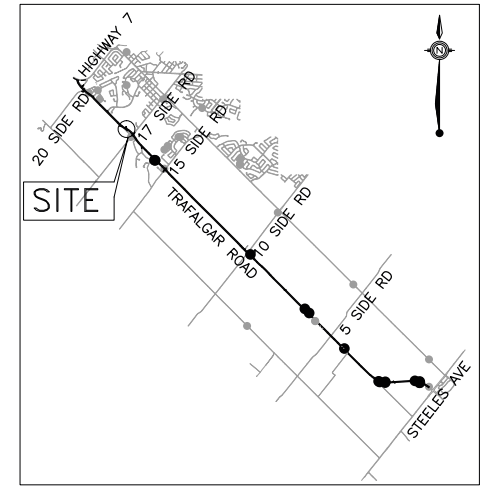
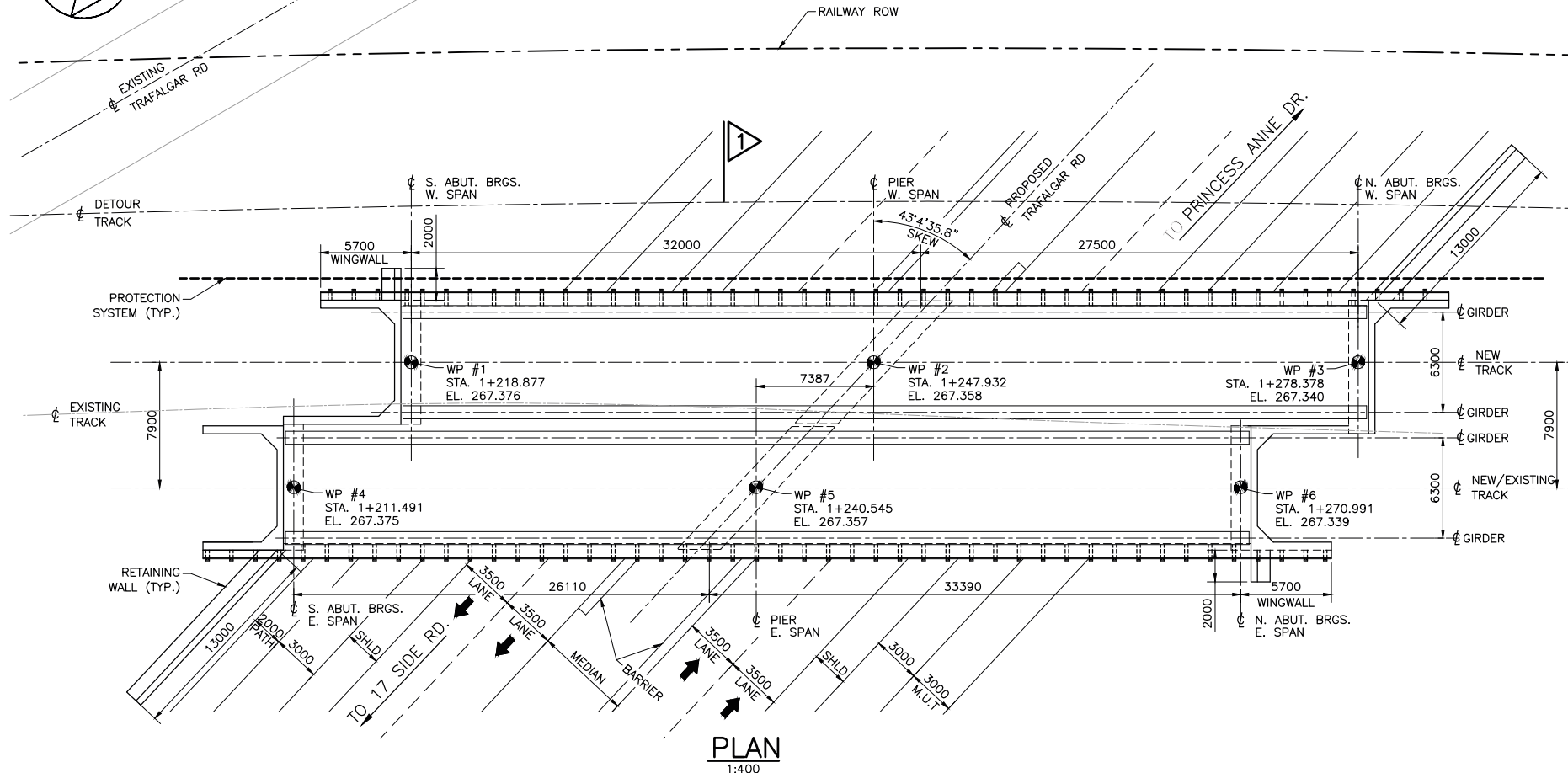
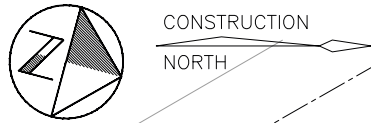
It is anticipated that a single or dual diversion rail line will be required to the north while the rail bridge is constructed and service to Trafalgar Road is maintained. For preliminary design purposes, it has been assumed that track protection will be required. The decision regarding number of tracks to be diverted will be assessed during detail design and through discussion with CN Rail. This option is possible due to the tracks transitioning to a single track immediately to the south across Black Creek therefore minimizing potential service concerns.

The General Arrangement Drawing (GA) can be found in **Exhibit 7-5**.

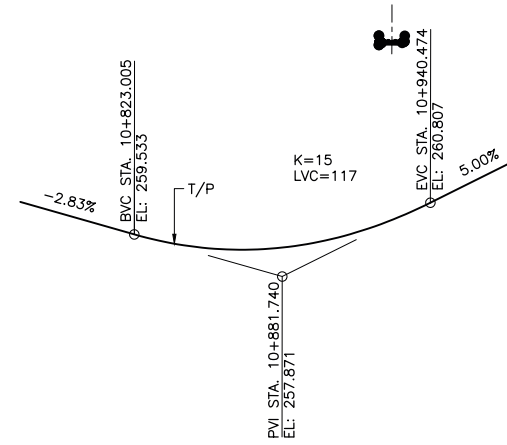
The proposed structure consists of two two-span thru-plate steel-girder bridge for the east and west track with square supports on a 45 degree skew to the proposed Trafalgar Road.

CN is in general agreement with the proposed underpass grade separation as noted in a letter dated May 12, 2016. CN will continue to be consulted during the detailed design process.

All existing traffic lanes (one through lane in each direction) will be maintained at all times during construction. Conceptual construction staging plans can be found in **Section 7.1.7**.



KEY PLAN
N.T.S.



PROFILE OF TRAFALGAR RD.
N.T.S.

GENERAL NOTES:

BRIDGE DESCRIPTION:

TWO (2) NEW BRIDGES CONSISTING OF A 2-SPAN BALLASTED DECK THROUGH PLATE GIRDER (T.P.G.) SUPPORTED ON A CONCRETE PIER AND ABUTMENTS ARE TO BE CONSTRUCTED TO CARRY TWO (2) EXISTING CANADIAN PACIFIC RAILWAY TRACKS OVER TREMAINE ROAD AT MILEAGE 34.24 GALT SUBDIVISION.

MATERIAL SPECIFICATIONS:

DESIGN AND WORKMANSHIP:
 - A.R.E.M.A. MANUAL 2014 FOR RAILWAY ENGINEERING - CHAPTER 8 & 15.
 - CPR REQUIREMENTS FOR THE DESIGN OF STEEL AND CONCRETE BRIDGES TO CARRY RAILWAY TRAFFIC IN CANADA (2006).
 REINFORCING STEEL: C.S.A./CAN-630.18-LATEST EDITION
 CONCRETE: C.S.A./CAN-A23.1 & A23.2-LATEST EDITION
 STRUCTURAL STEEL: C.S.A./CAN-640.21-LATEST EDITION
 WELDING: C.S.A./CAN W59-LATEST EDITION

DESIGN LOADS

LIVE LOAD - COOPER E90 OR ALTERNATE LIVE LOAD, WITH DIESEL IMPACT FOR SUPER STRUCTURE
 DESIGN BALLAST DEPTH - 600mm (MAX.)

CLASS OF CONCRETE

PIER, ABUTMENTS AND RETAINING WALLS 35MPa
 MASS CONCRETE 20MPa
 FOOTINGS 35MPa
 REMAINDER..... 35MPa

CLEAR COVER TO REINFORCING STEEL

FOOTING 100 ± 25 mm
 ABUTMENTS, WINGWALLS & RETAINING WALLS
 FRONT FACE 85 + 10 - 20mm
 BACK FACE 70 ± 20mm
 PIERS 100 + 10 - 20mm
 REMAINDER 75 ± 20mm
 (UNLESS NOTED OTHERWISE)

REINFORCING STEEL

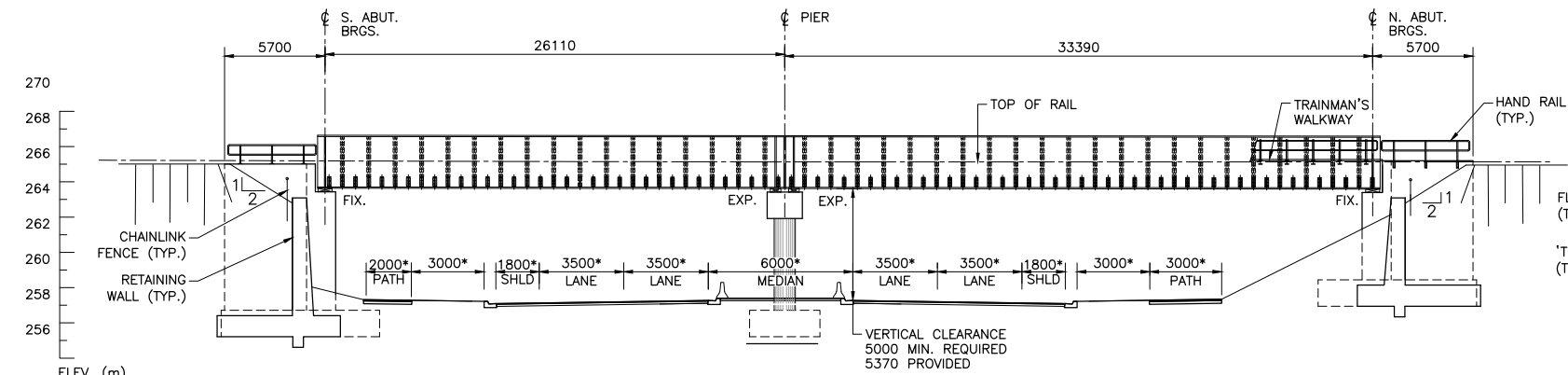
REINFORCING STEEL SHALL BE GRADE 400 BILLET STEEL DEFORMED BARS. BAR MARKS WITH THE PREFIX 'C' DENOTE COATED BARS.

BAR HOOKS SHALL HAVE STANDARD HOOK DIMENSIONS USING MINIMUM BEND DIAMETERS. STIRRUPS AND TIES SHALL HAVE MINIMUM HOOK DIMENSIONS.

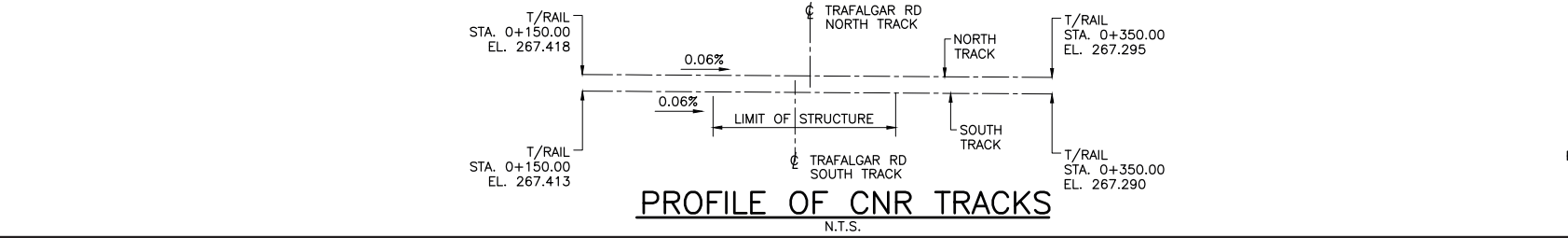
CONSTRUCTION NOTES

THE CONTRACTOR SHALL ESTABLISH THE BEARING SEAT ELEVATIONS BY DEDUCTING THE ACTUAL BEARING THICKNESSES FROM THE TOP OF BEARING ELEVATIONS. IF THE ACTUAL BEARING THICKNESSES ARE DIFFERENT FROM THOSE GIVEN WITH THE BEARING DESIGN DATA, THE CONTRACTOR SHALL ADJUST THE REINFORCING STEEL TO SUIT.

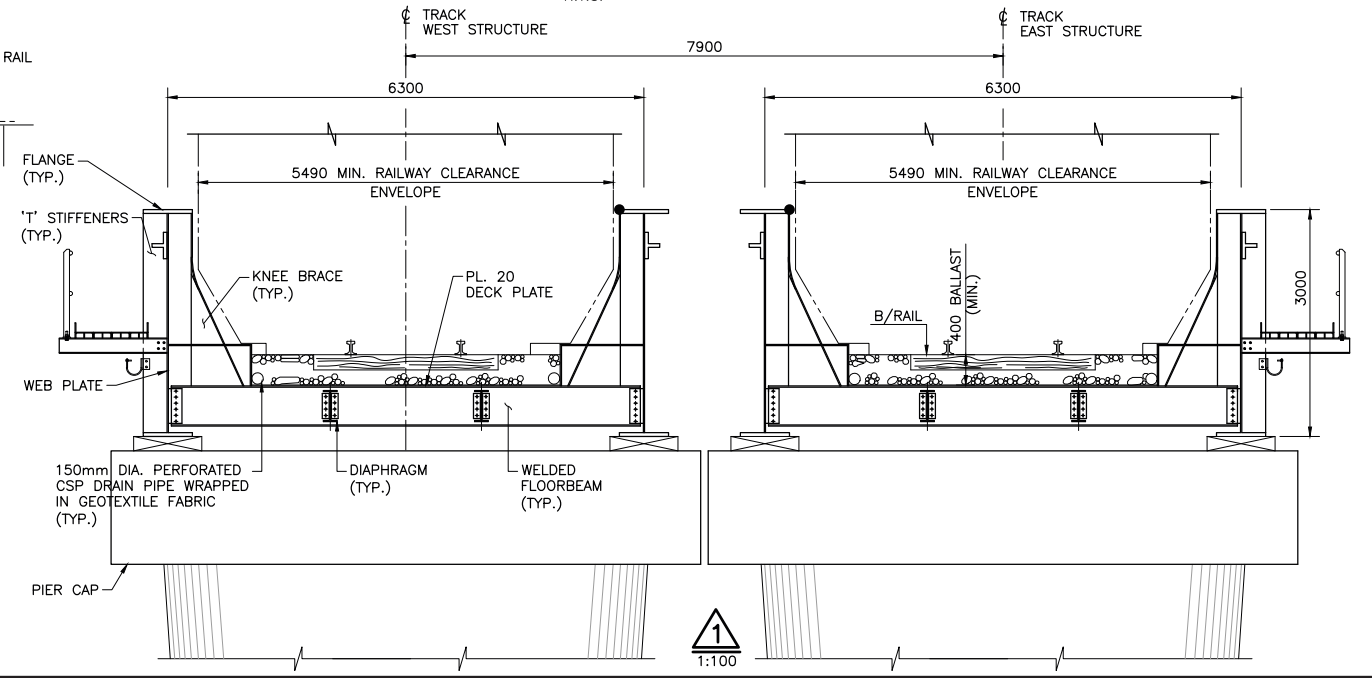
ALL ELEVATIONS ARE TO GEODETIC DATUM.



ELEVATION * DIMENSIONS ARE MEASURED PERPENDICULAR TO TRAFFIC LANES
1:400



PROFILE OF CNR TRACKS
N.T.S.



1:100

7.1.6.3 Metrolinx Underpass Crossing

Trafalgar Road (2 lanes) currently crosses the Metrolinx rail crossing approximately 60 m north of 20 Side Road. It consists of a single at grade rail line with signals and swing arms. In addition, there are several railway electrical / maintenance units in close proximity to the existing crossing; these may have to be relocated during the proposed realignment.

The warrant to consider a 4-lane grade separated crossing structure at this location was documented in **Section 2.2.4**. The selection of an underpass versus an overpass design was documented in **Section 5.3**, and the alignment alternatives considered for Trafalgar Road was documented in **Section 5.5**.

The Preliminary General Arrangement Drawing (GA) can be found in **Exhibit 7-6**.

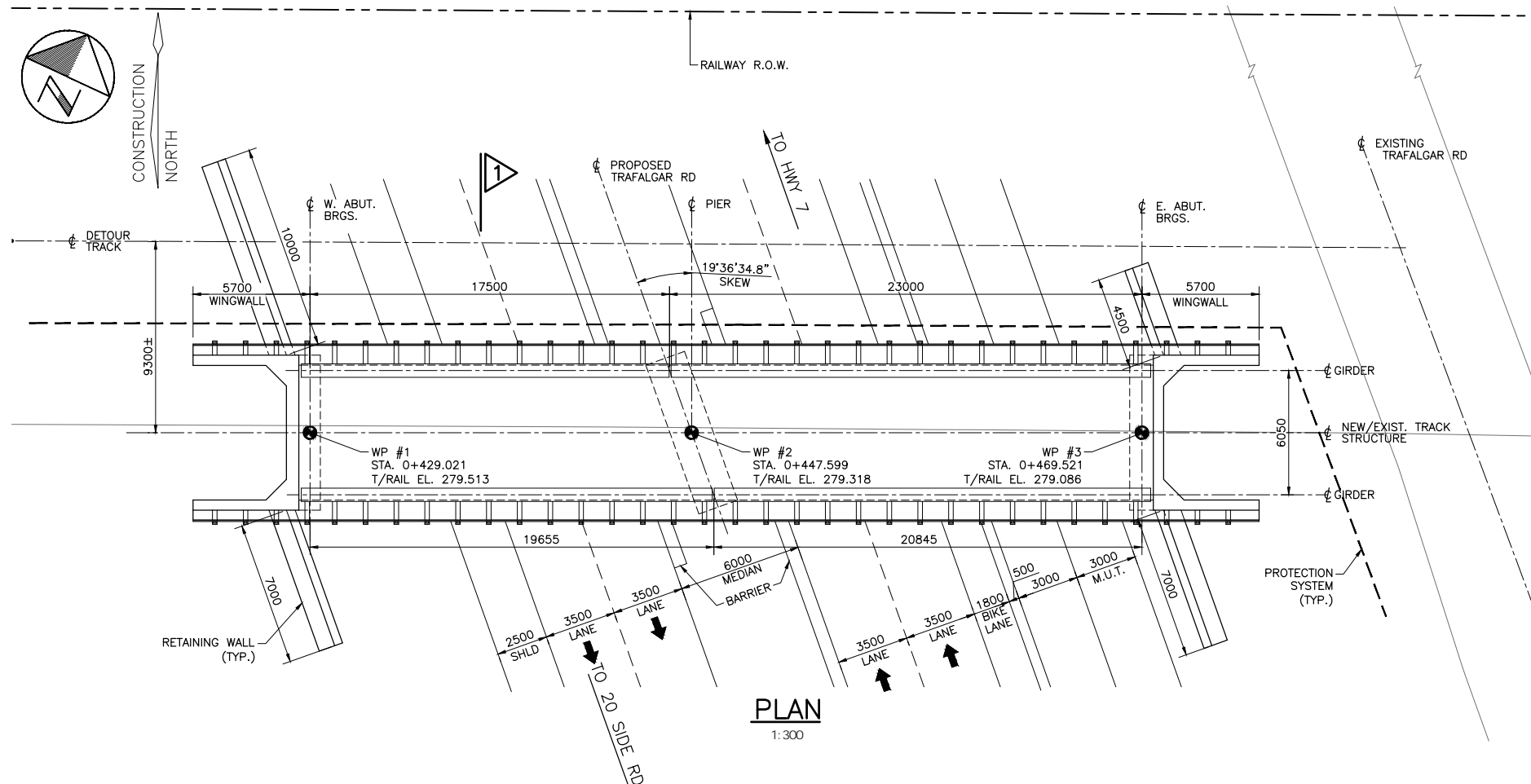
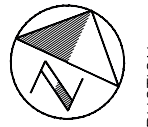
One new railway structure is required for the grade separation and widening of Trafalgar Road. The preliminary proposed at grade crossing includes realignment of Trafalgar Road to the west by up to approximately 35 m and lowering the existing profile by approximately 6 m in order to maintain existing Metrolinx track elevation and alignment.

It is anticipated that a diversion rail line will be required to the north while the rail bridge is constructed and service to Trafalgar Road is maintained. For preliminary design purposes, it has been assumed that track protection will be required.

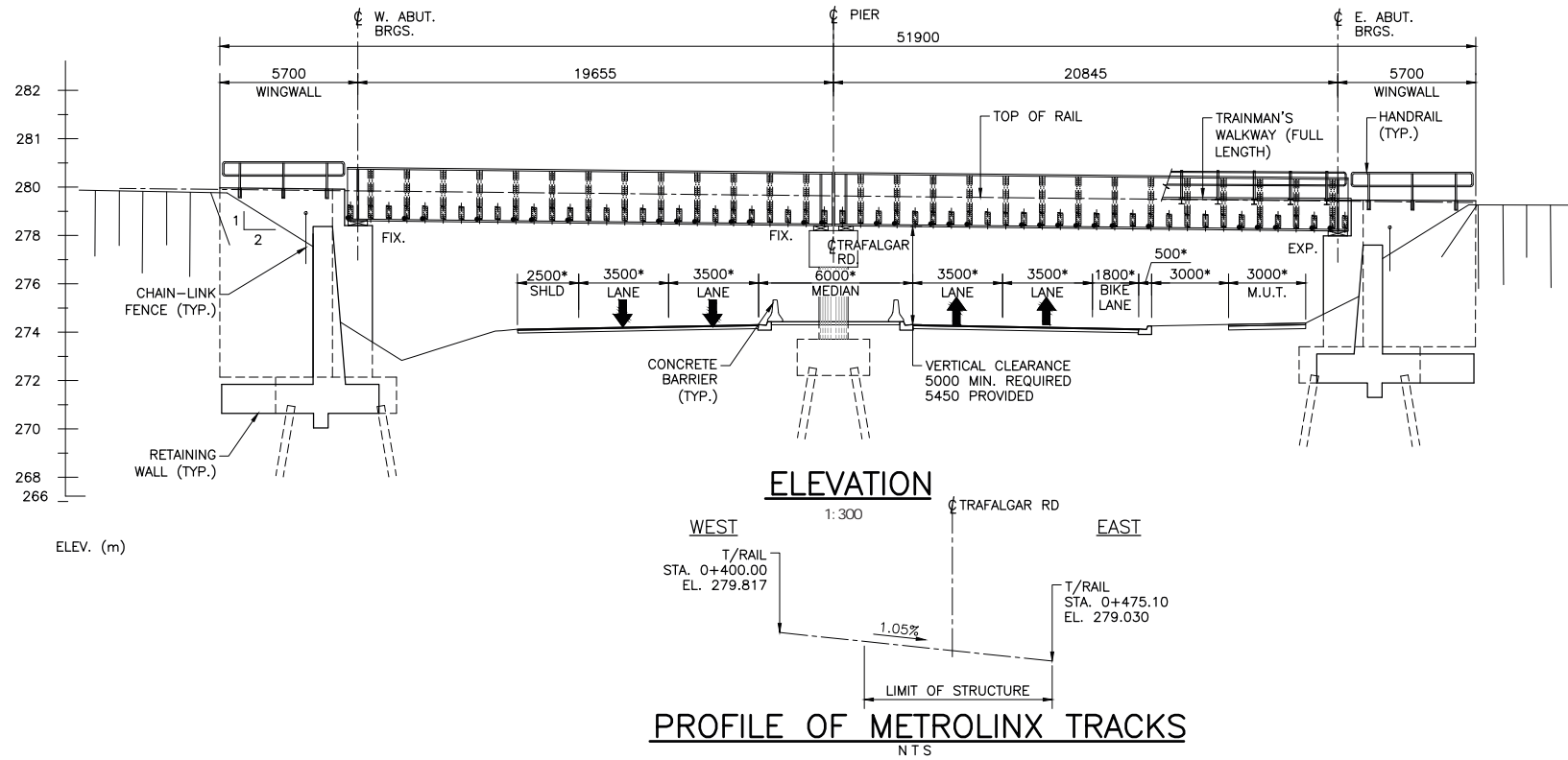
The proposed structure consists of a two-span thru-plate steel-girder bridge with square supports on a 20 degree skew to the proposed Trafalgar Road.

Metrolinx is in general agreement with the proposed underpass grade separation as noted in a letter dated January 18, 2016. Metrolinx will continue to be consulted during the detailed design process.

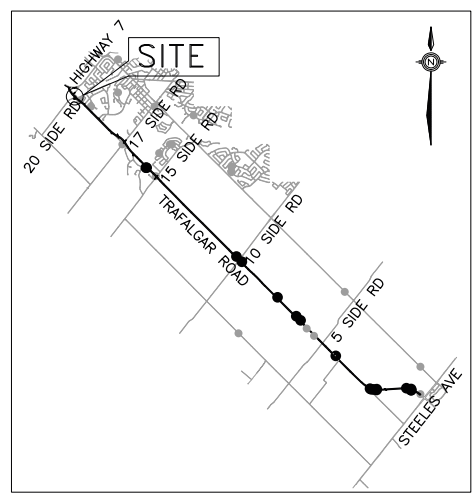
All existing traffic lanes (one through lane in each direction) will be maintained at all times during construction. Conceptual construction staging plans can be found in **Section 7.1.7**.



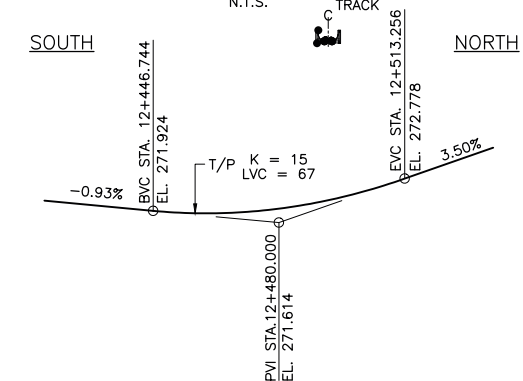
PLAN
1:300



ELEVATION
1:300
PROFILE OF METROLINX TRACKS
N.T.S.



KEY PLAN
N.T.S.



PROFILE OF PROPOSED TRAFALGAR RD.
N.T.S.

GENERAL NOTES:
MATERIAL SPECIFICATIONS:
DESIGN AND WORKMANSHIP:
- A.R.E.M.A. MANUAL 2016 FOR RAILWAY ENGINEERING - CHAPTER 8 & 15.
- CPR REQUIREMENTS FOR THE DESIGN OF STEEL AND CONCRETE BRIDGES TO CARRY RAILWAY TRAFFIC IN CANADA (2006).
REINFORCING STEEL: C.S.A./CAN-G30.18-LATEST EDITION
CONCRETE: C.S.A./CAN-A23.1 & A23.2-LATEST EDITION
STRUCTURAL STEEL: C.S.A./CAN-G40.21-LATEST EDITION
WELDING: C.S.A./CAN W59-LATEST EDITION

DESIGN LOADS:
LIVE LOAD - COOPER E90 OR ALTERNATE LIVE LOAD, WITH DIESEL IMPACT FOR SUPERSTRUCTURE
DESIGN BALLAST DEPTH - 600mm (MAX.)

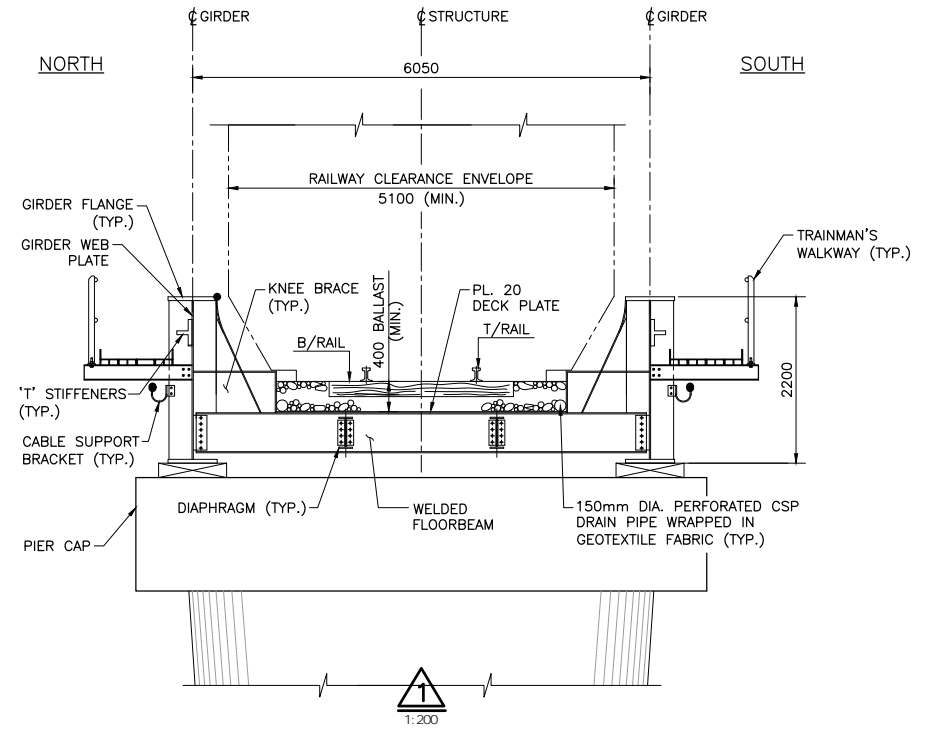
CLASS OF CONCRETE:
PIER, ABUTMENTS AND RETAINING WALLS 35MPa
MASS CONCRETE 20MPa
FOOTINGS 35MPa
REMAINDER..... 35MPa

CLEAR COVER TO REINFORCING STEEL:
FOOTING 100 ± 25 mm
ABUTMENTS, WINGWALLS & RETAINING WALLS
FRONT FACE 85 + 10 - 20mm
BACK FACE 70 ± 20mm
PIERS 100 + 10 - 20mm
REMAINDER 75 ± 20mm
(UNLESS NOTED OTHERWISE)

REINFORCING STEEL:
REINFORCING STEEL SHALL BE GRADE 400 BILLET STEEL DEFORMED BARS. BAR MARKS WITH THE PREFIX 'C' DENOTE COATED BARS.
BAR HOOKS SHALL HAVE STANDARD HOOK DIMENSIONS USING MINIMUM BEND DIAMETERS. STIRRUPS AND TIES SHALL HAVE MINIMUM HOOK DIMENSIONS.

CONSTRUCTION NOTES:
THE CONTRACTOR SHALL ESTABLISH THE BEARING SEAT ELEVATIONS BY DEDUCTING THE ACTUAL BEARING THICKNESSES FROM THE TOP OF BEARING ELEVATIONS. IF THE ACTUAL BEARING THICKNESSES ARE DIFFERENT FROM THOSE GIVEN WITH THE BEARING DESIGN DATA, THE CONTRACTOR SHALL ADJUST THE REINFORCING STEEL TO SUIT.

LIST OF ABBREVIATIONS:
WP - DENOTES WORKING POINT
R.O.W. - DENOTES RIGHT OF WAY
T/P - DENOTES TOP OF PAVEMENT
T/RAIL - DENOTES TOP OF RAIL
B/RAIL - DENOTES BOTTOM OF RAIL
M.U.T. - DENOTES MULTI-USE TRAIL



1:200

7.1.7 Construction Staging

As part of the widening of Trafalgar Road, it is expected that at least one lane of traffic in each direction will be maintained during construction. There may be further restriction or temporary road closures in localized areas to facilitate construction activities which will be confirmed during detailed design.

The following sections describe the construction staging at Black Creek crossing, CN underpass and Metrolinx underpass.

7.1.7.1 Black Creek Crossing Construction Staging

A new railway structure is required for the grade separation and to accommodate the Black Creek Crossing Construction Staging

See **Exhibits 7-7a to 7-7c** for the Black Creek crossing conceptual construction staging plans.

Stage 1:

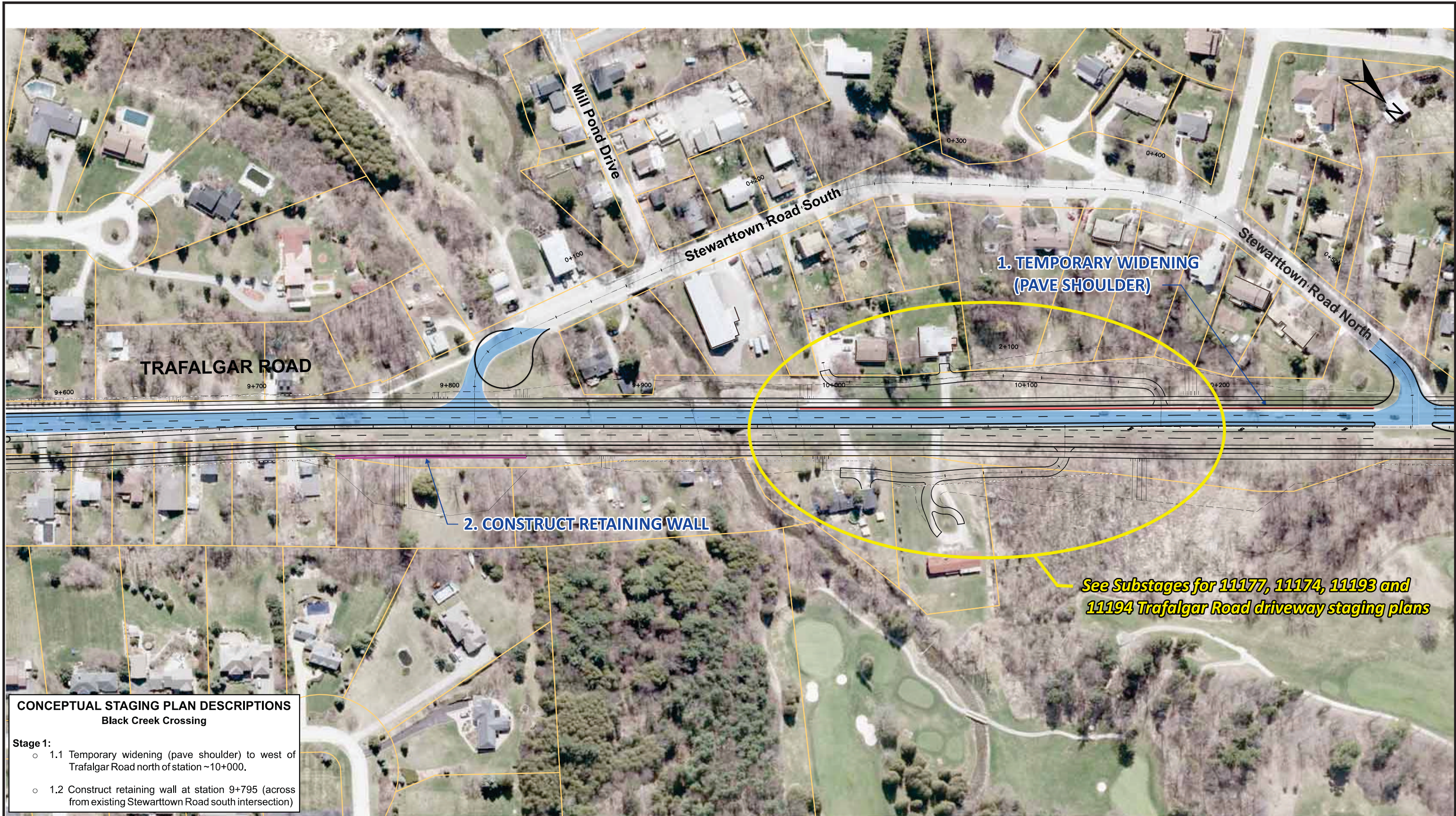
- 1.1. Temporarily widen (pave shoulder) to the west of existing Trafalgar Road north of the Black Creek crossing structure at approximately Station 10+000
- 1.2. Construct new retaining wall on the east side of Trafalgar Road (i.e. across from the existing Stewarttown Road south intersection) at approximately Station 9+795

Stage 2:

- 2.1. Shift traffic to the west through the Black Creek crossing area
- 2.2. Install shoring along the centreline of the existing crossing structure
- 2.3. Construct the east side of the new crossing structure over Black Creek
- 2.4. Construct the two northbound lanes through the Black Creek crossing area

Stage 3:

- 3.1. Remove the existing crossing structure to the east and construct the new structure over Black Creek; close off access to Stewarttown Road south and convert to cul-de-sac.
- 3.2. Complete construction of Trafalgar Road (southbound lanes) through the Black Creek crossing area



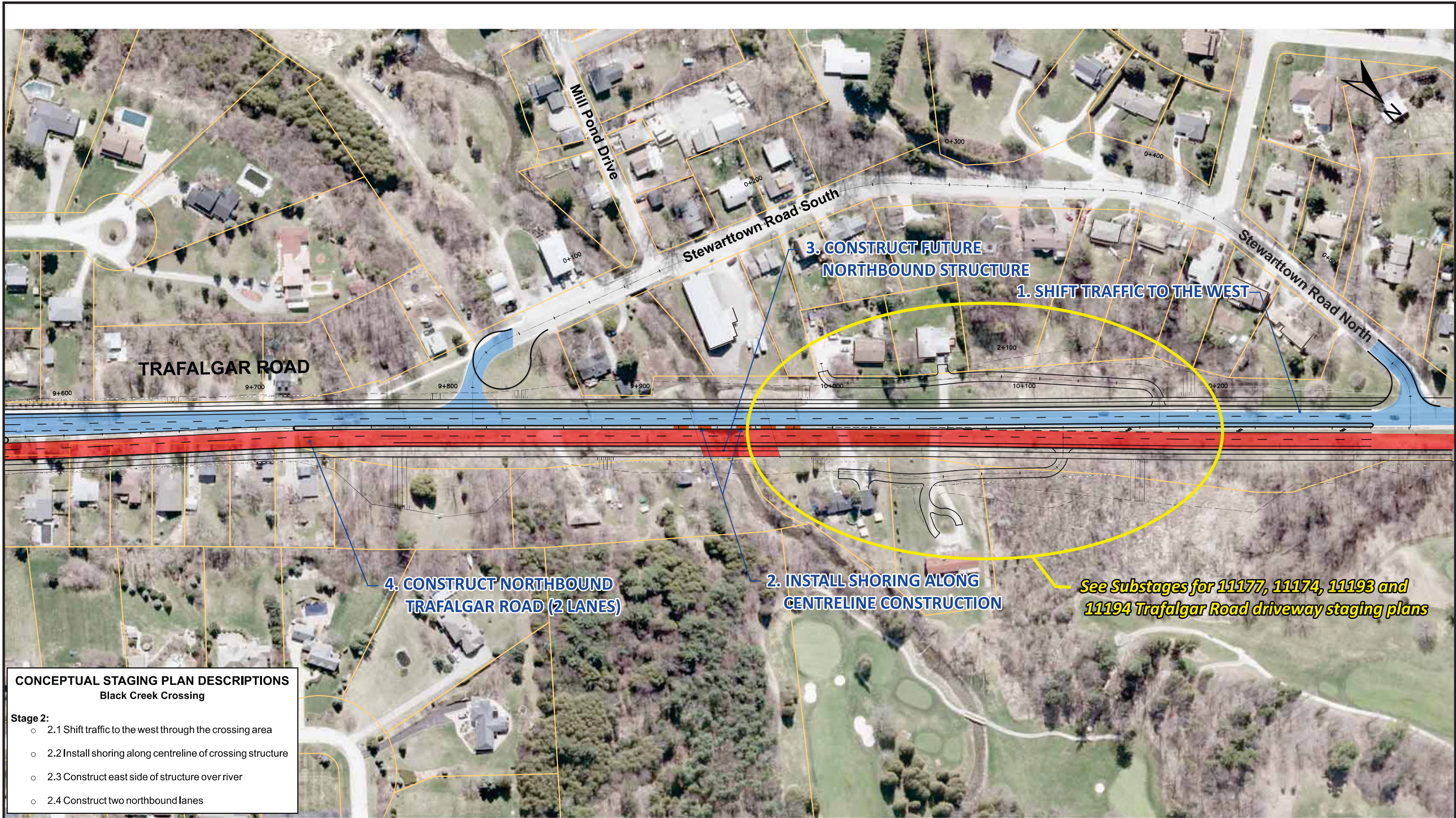
See Substages for 11177, 11174, 11193 and 11194 Trafalgar Road driveway staging plans

CONCEPTUAL STAGING PLAN DESCRIPTIONS
Black Creek Crossing

- Stage 1:**
- 1.1 Temporary widening (pave shoulder) to west of Trafalgar Road north of station ~10+000.
 - 1.2 Construct retaining wall at station 9+795 (across from existing Stewarttown Road south intersection)

LEGEND

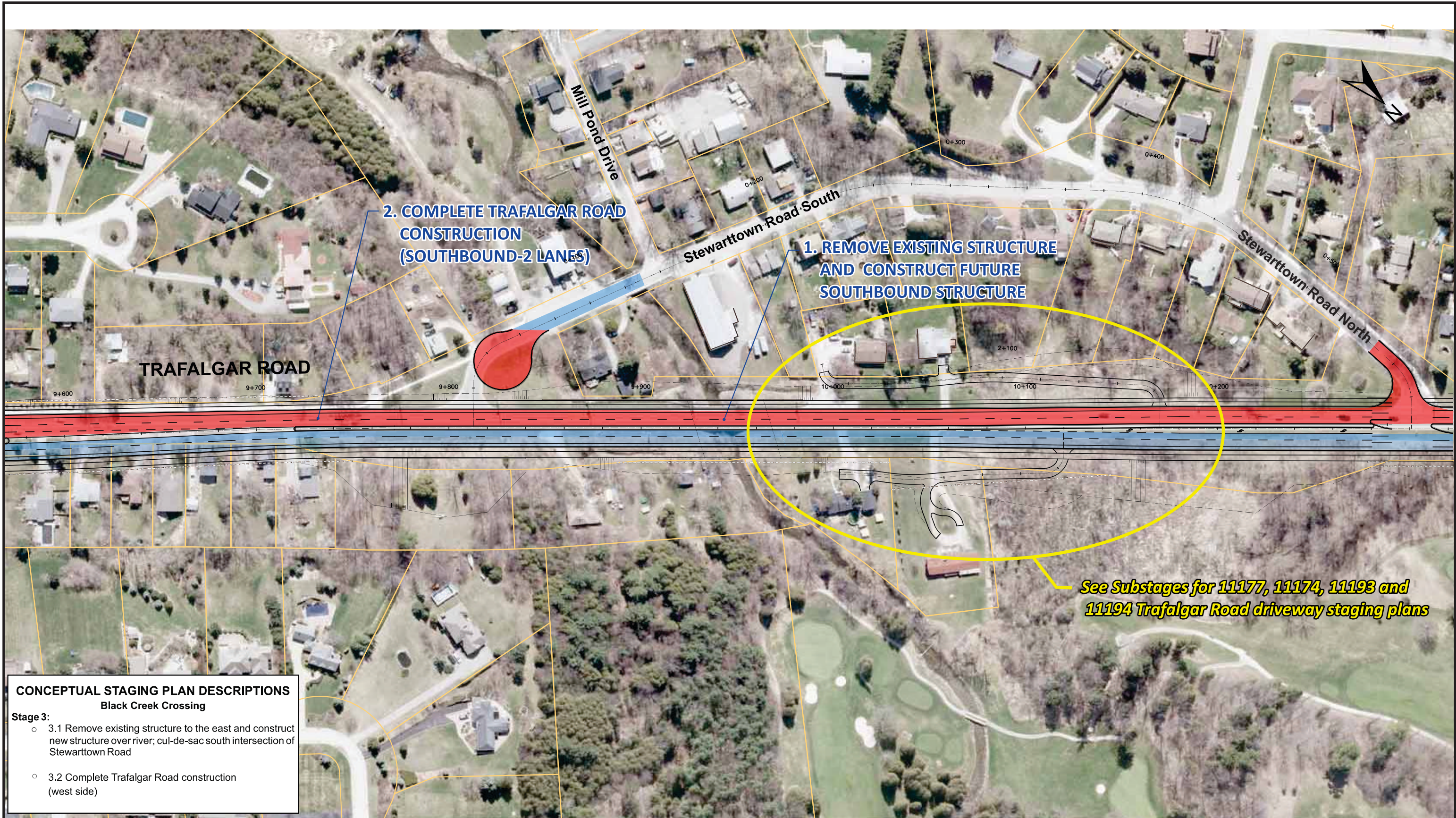
	Existing Traffic
	Under Construction



- CONCEPTUAL STAGING PLAN DESCRIPTIONS**
Black Creek Crossing
- Stage 2:**
- 2.1 Shift traffic to the west through the crossing area
 - 2.2 Install shoring along centreline of crossing structure
 - 2.3 Construct east side of structure over river
 - 2.4 Construct two northbound lanes

LEGEND

- Existing Traffic
- Under Construction



2. COMPLETE TRAFALGAR ROAD CONSTRUCTION (SOUTHBOUND-2 LANES)

1. REMOVE EXISTING STRUCTURE AND CONSTRUCT FUTURE SOUTHBOUND STRUCTURE

See Substages for 11177, 11174, 11193 and 11194 Trafalgar Road driveway staging plans

CONCEPTUAL STAGING PLAN DESCRIPTIONS

Black Creek Crossing

Stage 3:

- 3.1 Remove existing structure to the east and construct new structure over river; cul-de-sac south intersection of Stewarttown Road
- 3.2 Complete Trafalgar Road construction (west side)

LEGEND

- Existing Traffic
- Under Construction



TRAFALGAR ROAD CLASS EA STUDY (Section 2)
North of 10 Side Road to Highway 7

Conceptual Staging Plan
Black Creek Crossing
Stage 3

Exhibit
7-7c

7.1.7.2 CN Rail Underpass Construction Staging

See **Exhibits 7-8a to 7-8c** for CN Rail underpass conceptual construction staging plans.

Stage 1:

- 1.1. Install CN track diversion through the crossing area
- 1.2. Close 17 Side Road for reinstatement of at-grade crossing surface (approximately 2 days); detour via 15 Side Road
- 1.3. Install temporary shoring at rail crossing
- 1.4. Construct subway structure (road under railway)

Stage 2:

- 2.1. Remove CN track diversion through the crossing area and relocate tracks at the new location per grade separation structures
- 2.2. Close 17 Side Road for reinstatement of at-grade crossing surface (approximately 2 days); detour via 15 Side Road
- 2.3. Construct the east side of Trafalgar Road (northbound lanes)

Stage 3:

- 3.1. Complete Trafalgar Road construction (west side, southbound lanes); as well as complete the cul-de-sac north of 17 Side Road (former Trafalgar Road)

A survey of the existing railway tracks is recommended along with detailed geotechnical investigations of the founding soils north of the existing structure during detailed design. Detailed information such as characteristics of the soils, groundwater, geology, and slope stability is required for design and construction.

Construction will require access to the railway lands, and co-operation and flagging services from CN Rail. Construction of the new structure will require working within CN's right-of-way and may impact their operations.

In addition, there are several railway electrical/maintenance units in close proximity to the existing crossing that may have to be relocated during the proposed realignment.