

Regional Municipality of Niagara

Municipal Class Environmental Assessment for York Road and Four Mile Creek Road Intersection Improvements

Schedule 'C' Environmental Study Report

Thursday, June 30, 2022

B001271



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Municipal Class Environmental Assessment for York Road and Four Mile Creek Road Intersection Improvements

Project no B001271

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Executive Summary

The Regional Municipality of Niagara (Niagara Region) has completed a Municipal Class Environmental Assessment (Class EA) Study to explore improvements to the intersection of York Road and Four Mile Creek Road and the associated study area. The study was carried out as a Schedule C project in accordance with the Municipal Class EA process (October 2000, amended in 2007, 2011, and 2015), as approved under the *Ontario Environmental Assessment Act*.

Currently, the intersection of York Road and Four Mile Creek Road is controlled by an all-way stop. During peak periods, motorists sometimes experience delays, which are expected to increase over time as growth continues to take place in Niagara Region. There are also safety issues due to the skewed angle of the intersection and lack of active transportation facilities for pedestrians and cyclists. The study area is shown in **Figure ES-1**.

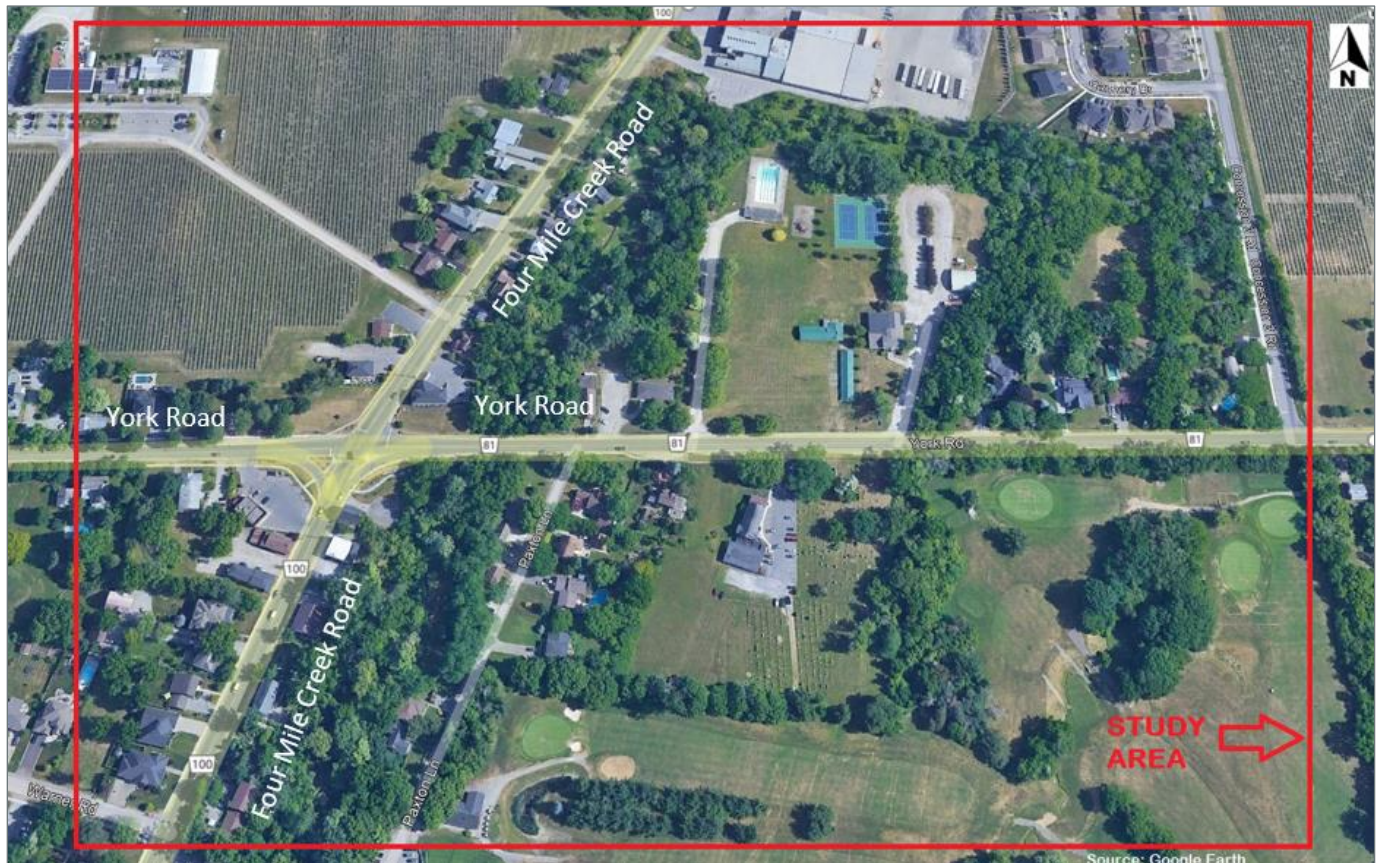


Figure ES-1 – Study Area

Existing Conditions

The existing conditions of the study area were collected and reviewed, through the following methods and further detailed in **Chapter 2 and Chapter 5**:

- Various relevant background studies and reports;
- Review of planning and policy context;
- Investigations undertaken as part of this Class EA study (e.g., Cultural Heritage Assessment, Stage 1 Archaeological Assessment, Natural Heritage Assessment, Transportation Study, Drainage and Stormwater Management Assessment, site visits, etc.);
- Consultation with the Region Project Team, relevant Region Staff, Town of Niagara-on-the-Lake, Agencies, Utility Companies, Indigenous Communities and Key Stakeholders; and
- Consultation with members of the public, (including two virtual Public Information Centres).

In general, the study area is located in the village of St. Davids with a mix of commercial uses and low-density residential houses. The Saint Davids-Queenston United Church and St. Davids Golf Course are located on York Road east of the York Road / Four Mile Creek Road intersection.

North of the York Road / Four Mile Creek Road intersection, just outside of the study area, there are a few industrial properties, and Four Mile Creek Road is used regularly by large trucks.

The area in proximity to the intersection is also experiencing growth and development including a subdivision north of the intersection approaching Line 9 Road and a proposed development (Vineyard Square) on the south side of York Road opposite the Old Barn.

Problem and Opportunity Statement

Currently during peak periods, motorists at the intersection of York Road and Four Mile Creek Road experience moderate delays, although it has been observed that occasional delays and queues on an approach can be significant. However, given expected traffic growth in the area road network, peak hour delays and queues are anticipated to significantly increase at the intersection should it remain under all-way stop control.

Further, the Region has the opportunity to address and improve conditions in the study area for all modes of transportation including cycling, walking and transit. This study

evaluated the need for additional transportation capacity, enhance transit and active transportation experience through improved sidewalk connections and better pedestrian and cyclist facilities, and conform to a complete streets approach while strengthening the area's relationship with its past.

Alternative Solutions

The following Alternative Solutions were considered to address the problems and opportunities:

- 1) Do Nothing: maintain existing conditions within the study area, i.e., intersection is controlled by an all-way stop.
- 2) Operational Improvements: address traffic operation issues through intersection modifications and access management including potential for signalization and roundabouts.
- 3) York Road / Four Mile Creek Road Corridor Improvements: address multi-modal transportation needs through the provision of active transportation facilities in the study area.

The Alternative Solutions were assessed in their ability to reasonably address the problems and opportunities. Operational Improvements and Corridor Improvements are recommended to be carried forward to address the future multi-modal transportation needs of the Four Mile Creek Road / York Road intersection and the adjacent corridors.

The Do-Nothing solution does not resolve the problem related to future capacity at the intersection and is not aligned with the goals of Niagara Region or the Town of Niagara-on-the-Lake to provide multi-modal transportation choices; however, this solution was carried forward through the process to serve as a baseline for comparison purposes. The screening of alternative solutions is further detailed in **Chapter 3**.

Evaluation of Alternative Design Concepts

Modifications to Four Mile Creek Road and York Road are required to address anticipated future transportation needs at the intersection, as well as proposed corridor improvements to support pedestrians and cyclists' movement and overall active transportation network connections within the Region.

Accordingly, two sets of alternative design concepts were developed: one for the intersection, and one for the development of active transportation facilities in the corridor.

The following Alternative Design Concepts were considered to address the problems and opportunities at the intersection:

- 1) **Do Nothing:** The intersection would continue to be controlled by an all-way stop.
- 2) **Signalized Intersection:** The intersection would be controlled by traffic signals.
- 3) **Roundabout** The intersection would be controlled by a single-lane roundabout.

The following Alternative Design Concepts were considered to address the problems and opportunities for active transportation within the corridor:

- 1) **Do Nothing:** No changes would be made to the corridors and therefore no new active transportation facilities would be added to the study area.
- 2) **Separate Bicycle Lanes and Sidewalks:** This option includes one 3.5 m travel lane, a 0.5 m buffer with physical separation, a 1.5 m bicycle lane (on-street), 0.5 m curb, a boulevard (width varies based on right-of-way), and a 1.8 m sidewalk on both sides of the road.
- 3) **Cycle Tracks and Sidewalks:** This design concept includes one 3.5 m travel lane with a 0.5 m curb, a 1.5 m one-way cycle track (in the boulevard), a boulevard (width varies based on right-of-way), and a 1.8 m sidewalk on both sides of the road.
- 4) **Multi-Use Paths:** This design concept includes one 3.5 m travel lane with a 0.5 m curb, a boulevard (width varies based on right-of-way), and a 3.0 to 4.0 m multi-use path (width varies based on right-of-way) on both sides of the road.

The Alternative Design Concepts were assessed in their ability to reasonably address the problems and opportunities. For the intersection design concepts, the “Do Nothing” was screened out as it will not address the peak hour delays and queues at the intersection, and it will not mitigate the existing geometric issues with large trucks. While the Signalized Intersection will address peak hour delays and queues and improve conditions for pedestrians and cyclists, it will have greater impact to the natural environment and built heritage properties within the study area. The Roundabout Intersection was determined to be the preferred design concept as it will address peak hour delays and queues, and improve conditions for pedestrians and cyclists, while minimizing impacts to built heritage resources and the environment.

For active transportation facilities design concepts, the “Do Nothing” alternative was screened out because it will not address the missing links in the pedestrian network, nor improve conditions for cyclists. While all three remaining options would improve conditions for pedestrian and cyclists, the recommended option is Cycle Tracks and Sidewalks because this option would allow separation between cyclists and pedestrians, and between cyclists and motor vehicles. The full evaluation of the design concepts can be found in **Chapter 4**.

Consultation

An extensive stakeholder consultation and engagement program was undertaken to assist and to inform members of the community and stakeholders about the planning and decision-making process. Throughout the study, the public, agencies, and Indigenous Communities were engaged to provide input. Key milestones of the consultation program included the following:

- Notice of Study Commencement was posted on the project webpage on the Region's website and advertised in "Niagara This Week" and the "Niagara-on-the-Lake Local" on January 14, 2021. The Notice was emailed to agencies, stakeholders, Indigenous Communities, and property owners within the Consultation Area shown in **Figure 5-1**;
- Virtual Public Information Centre #1 (Zoom) held on March 25, 2021;
- Virtual Public Information Centre #2 (Zoom) held on June 23, 2021;
- Study Newsletter was mailed via Canada Post to all property owners within the Consultation Area shown in **Figure 5-1** and was also placed into all mailboxes at the St. Davids post office.
- Other consultation efforts include individual meetings with utility companies, Town of Niagara-on-the-Lake, property owners, etc. The Indigenous Communities were also provided with the Stage 1 Archaeological Assessment for review.

A dedicated web page was established through the Region of Niagara website at the beginning of the project. Study notices and Public Information Centre materials (e.g., Notices, display material, Q&As) were made available on the website as the study progressed. Consultation activities undertaken as part of this study is further detailed in **Chapter 5**.

Study website: <https://www.niagararegion.ca/projects/regional-road-100/default.aspx>

Description of the Recommended Plan

The Recommended Plan is a roundabout at the intersection of York Road and Four Mile Creek Road with one-way cycle tracks and sidewalks on both sides of York Road and Four Mile Creek Road within the study area.

A single-lane roundabout with an average inscribed circle diameter of 40 m is proposed at York Road and Four Mile Creek Road. The diameter is slightly elliptical because of the skew angle of the intersection. The roundabout is designed to accommodate a WB-20 design vehicle (i.e., standard tractor-trailer). The semi-mountable curb will allow large trucks and farm equipment to navigate the roundabout but keep speeds low for

smaller vehicles. Raised splitter islands with curbs is proposed on all the approaches to further control entry speeds, provide refuge areas for pedestrians, and prevent wrong-way movements. Properties with existing accesses or future developments with accesses that overlap the splitter islands will be restricted to right-in/right-out movements only.

Pedestrian crossovers (PXOs) in accordance with Ontario Traffic Manual (OTM) Book 15 will provide approximately 1 to 2 passenger car lengths (6 to 12 m) from the roundabout entries and exits. PXOs require that motorists yield to pedestrians within the crosswalk.

The recommended active transportation facilities include 1.8 m wide sidewalks and a 1.5 m wide one-way cycle tracks on both sides of York Road and Four Mile Creek Road within limits of the study area. Pedestrians are expected to cross at the roundabout via PXOs as noted above. Cycle tracks at the roundabout are proposed in accordance with OTM Book 18. Cyclists riding on the cycle tracks will legally have to dismount and walk their bike to cross the roundabout entries and exits. Cyclists will also have the option of staying on the road and riding through the roundabout.

As part of the implementation of the Recommended Plan, which includes widened sidewalks and the addition of cycle tracks, the existing on-street parking on the south leg of Four Mile Creek Road will be removed due to limited right-of-way.

Further details of the Recommended Plan, including the preliminary plan, profile and cross-sections are included in **Chapter 6**.

Environmental Impacts and Proposed Mitigations

Through the Class EA process, the Recommended Plan has incorporated methods to avoid or minimize impacts to social, cultural, and natural environments. Where impacts cannot be entirely avoided, mitigation measures and commitments for further work during Detailed Design and construction have been identified. **Chapter 7** provides a summary of these impacts and mitigations under each discipline.

Notice of Completion

The Environmental Study Report (ESR) for this study is available for a 45-calendar day public review period during which comments/concerns can be submitted. The review period was announced with the publishing of the Notice of Study Completion. As detailed in the notice, interested persons may provide written comments to the project team by August 15, 2022. Further details on providing comments/concerns or requests for further study are included in **Section 1.2.2**.

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Appendix A: Consultation Record

Appendix B: Transportation Assessment (CIMA+, 2021)

Appendix C: Natural Environment Assessment Report (CIMA+, 2022)

Appendix D: Stormwater Management Report (CIMA+, 2022)

Appendix E: Archaeological Report (ASI, 2021)

Appendix F: Cultural Heritage Report (ASI, 2021)

Appendix G: Intersection Alternative Evaluation Memo (CIMA+, 2021)

Appendix H: Active Transportation Alternative Evaluation Memo (CIMA+, 2021)

Appendix I: Landscaping Opportunities Memo (CIMA+, 2022)

Appendix J: Preliminary Construction Cost Estimate (CIMA+, 2022)

***If technical reports are required in an alternative format for accessibility needs, please contact:**

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1 Introduction and Background

The intersection of Regional Road 81 (York Road) and Regional Road 100 (Four Mile Creek Road) is located in the heart of the village of St. Davids in the Town of Niagara-on-the-Lake, Ontario. York Road and Four Mile Creek Road are under jurisdiction of the Regional Municipality of Niagara (Niagara Region). The intersection is currently controlled by an all-way stop. During peak periods motorists sometimes experience delays, which are expected to increase over time as growth continues to take place in Niagara Region. The skewed angle of the intersection also creates safety issues. A map of the intersection is shown in **Figure 1-1**.

CIMA Canada Inc. (CIMA+) was retained by the Regional Municipality of Niagara to undertake a Municipal Class Environmental Assessment (Class EA) for the improvements to the intersection of York Road and Four Mile Creek Road and associated study area. The purpose of this study is to address and improve conditions for all modes of transportation (i.e., pedestrian, cycling, transit and auto). This study evaluates the need for additional transportation capacity, enhance transit and active transportation through improved sidewalk connections and better pedestrian and cyclist facilities and conform to a complete streets approach while strengthening the area's relationship with its past.

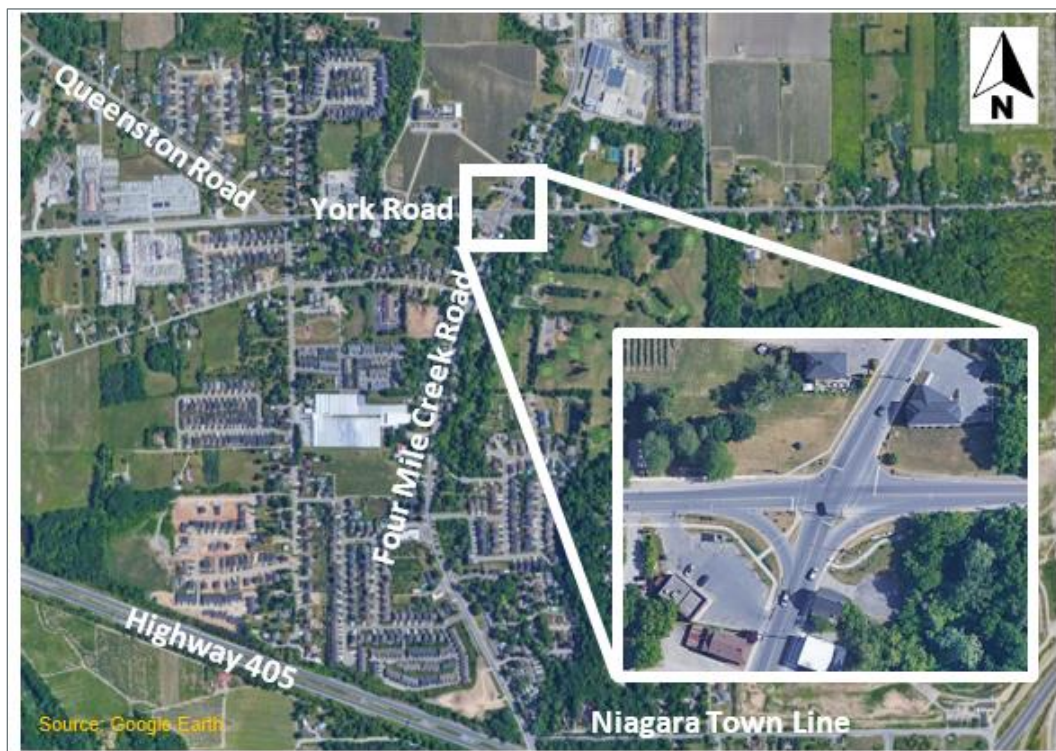


Figure 1-1: Map of the York Road and Four Mile Creek Road Intersection

1.1 Study Area

The study area for this EA Study is within the village of St. Davids as shown in **Figure 1-2**. It extends approximately 250 m north, west and south of the intersection of York Road and Four Mile Creek Road, and approximately 500 m to the east (i.e., to Concession 3 Road). Both York Road and Four Mile Creek Road are part of the Regional Road Network in Niagara Region, which is intended to carry a high volume of people and goods movement from community to community via a variety of transportation modes (i.e., walking, cycling, transit, cars, trucks, etc.).

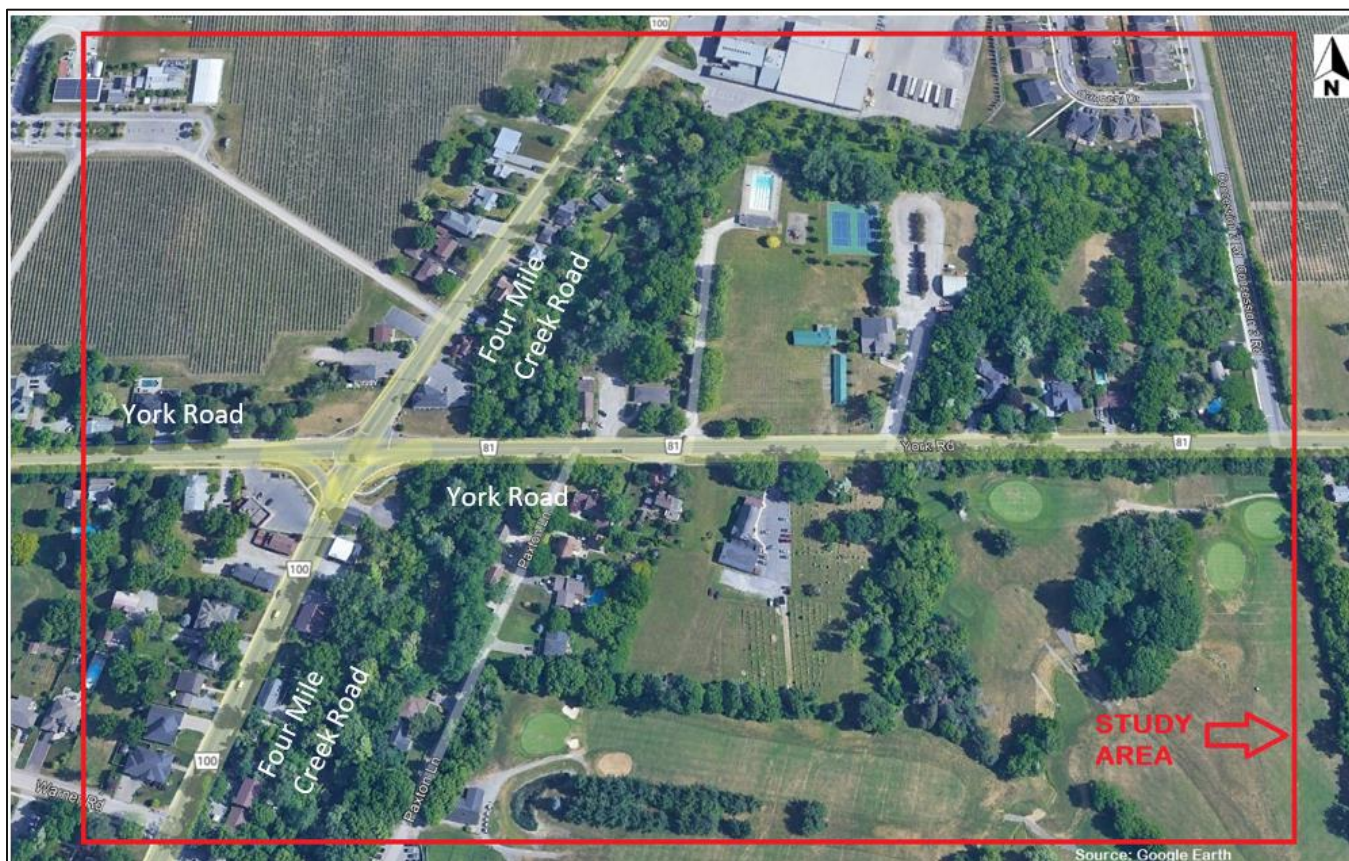


Figure 1-2: Study Area

1.2 Municipal Class Environmental Assessment Process

This study follows the Municipal Engineers Association (MEA) Municipal Class Environmental Assessment (EA) process for a Schedule C project (approved in October 2000, as amended in 2007, 2011, and 2015). Municipal Class EAs, once approved by the Ministry of Environment, Conservation and Parks (MECP), provide for specific classes of undertakings to follow an alternative planning and decision-making process. Providing that the approved process is followed, undertakings conducted under Class EAs have obtained approval under the *Environmental Assessment Act* and can proceed

with implementation, given that all other approvals have been obtained As illustrated in **Figure 1-3**, the planning and design process is comprised of five phases.

An Environmental Study Report (ESR) is required for Schedule 'C' projects and documents the EA process carried out.

The Municipal Class EA process includes five (5) phases. Schedule 'C' projects require that all five phases be conducted. Phases 1, 2, 3, and 4 are part of this study; the fifth phase will be initiated following completion of this study. The five phases are summarized as follows:

- Phase 1** Identify Problem or Opportunity;
- Phase 2** Identify and Evaluate Alternative Solutions to the Problem or Opportunity;
- Phase 3** Identify and Evaluate Alternative Design Concepts for the Preferred Solution;
- Phase 4** Complete and File Environmental Study Report (ESR) for public review; and
- Phase 5** Future implementation of the project (detailed design, Construction, Operation, and Environmental Monitoring).

Transportation improvements are classified into one of the following schedules:

- Schedule A** Projects are limited in scale, have minimal adverse environmental impacts, and may be implemented without following the full Class EA process.
- Schedule A+** Projects are limited in scale, have minimal adverse environmental impacts, and may be implemented without following the full Class EA process. However, the public is to be advised prior to implementing the project.
- Schedule B** Projects may have some adverse environmental impacts. The proponent must undertake a screening process, involving contact with directly affected public and technical/regulatory review agencies to ensure that they are aware of the project and that their concerns are addressed. A Project File is prepared for public review.
- Schedule C** Projects may have significant environmental impacts. The proponent must follow the full planning, design, and documentation process of the MEA Municipal Class EA document. An Environmental Study Report is prepared for public review.

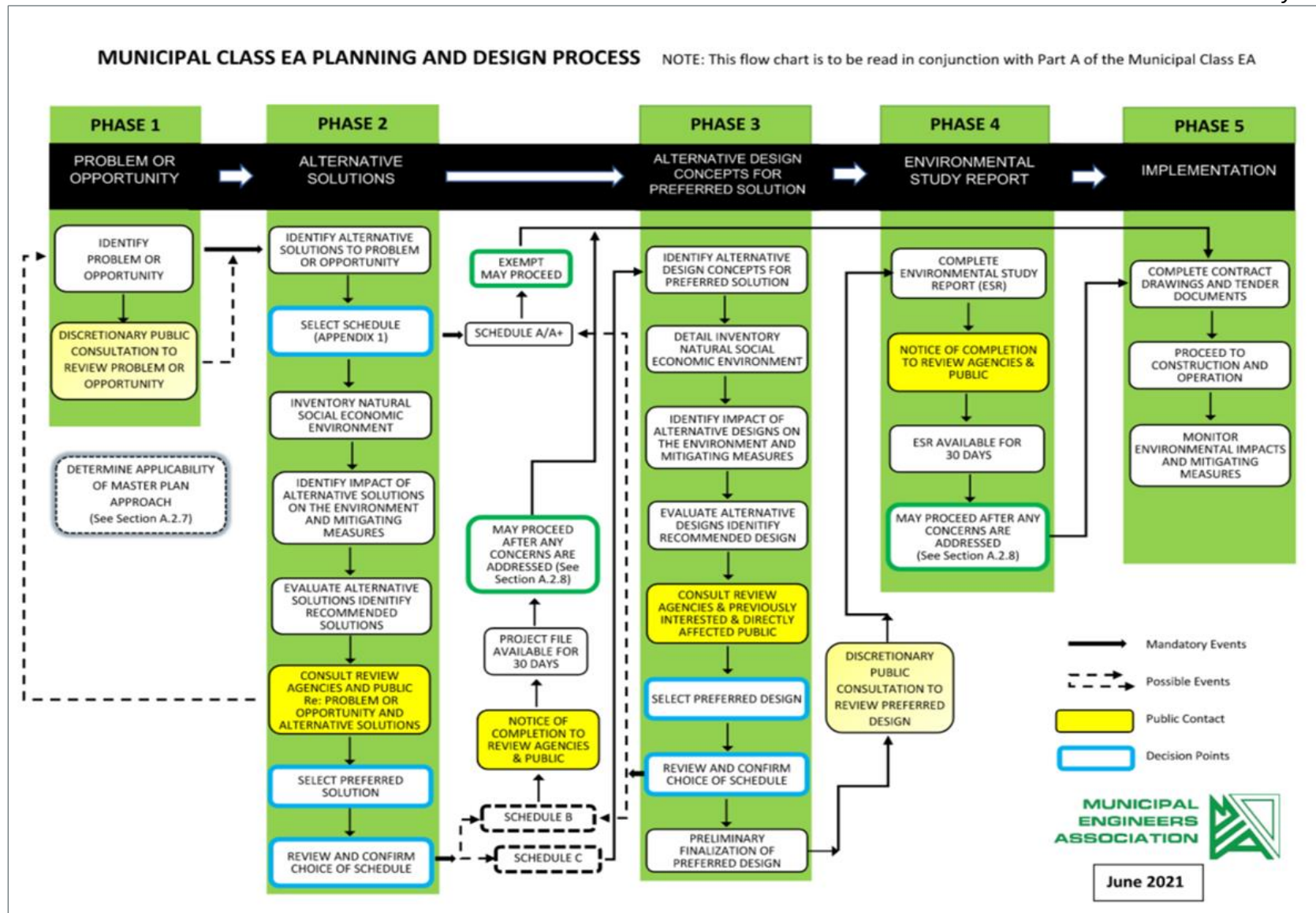


Figure 1-3: Municipal Class EA Planning and Design Process

1.2.1 Environmental Study Report

Phases 1, 2, 3 and 4 of the Schedule C process are documented in an Environmental Study Report (i.e., this report), which includes:

- Study background information;
- Description of the existing environment (socio-economic environment, cultural environment, and natural environment);
- Study area problems and opportunities;
- Alternative solutions to the undertaking;
- Evaluation of alternative solutions and identification of the preferred alternative solution;
- Alternative design concepts for the preferred solution;
- Evaluation of alternative design concepts and identification of the preferred alternative design concept;
- Anticipated impacts and proposed mitigation measures;
- Public and agency consultation; and
- Supporting technical documents.

The Environmental Study Report for this study is available for a 45-calendar day public review period commencing on June 30, 2022 ending on August 15, 2022. A Notice of Study Completion was published to announce the public review period (further detailed in **Section 1.2.2**).

This Environmental Study Report has been placed on the public record during the COVID-19 pandemic. At this time, exceptional measures are being employed by various levels of government to curb the pandemic. Due to these measures, the Environmental Study Report is not being provided in 'hard copy' for public viewing at centralized locations. Interested members of the public may view the document on the Region's website. Should a member of the public request a hard copy of the Environmental Study Report, the Region will assess how this might be prepared and delivered in a manner that is consistent with current public health agency and government direction regarding public protection.

1.2.2 Notice of Study Completion

The Environmental Study Report (ESR) for this study is available for a 45-calendar day public review during which comments/concerns can be submitted. The review period

was announced with the publication of the Notice of Study Completion. As detailed in the notice, interested persons may provide written comments to the project team by **August 15, 2022**. All comments and concerns should be sent directly to **Maged Elmadhoon** at the Region of Niagara.

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1.2.3 Appeal Provision

The Municipal Class EA process includes an appeal provision. The Minister of the Environment, Conservation and Parks has the authority and discretion to make an Order under Section 16 of the *Environmental Assessment Act*.

A Section 16 Order may require that the proponent of a project going through a Class Environmental Assessment (Class EA) process:

- Submit an application for approval of the project before they proceed. This is generally referred to as an Individual Environmental Assessment (individual EA).
- Meet further conditions in addition to the conditions in the Class EA. This could include conditions for: further study, monitoring and/or consultation

The minister can also refer a matter in relation to a section 16(6) Order request to mediation.

Before making an Order, the minister must consider the factors set out in section 16(5) of the *Environmental Assessment Act*. If a Section 16 Order request is made, the project proponent cannot proceed with the project until the minister makes a decision on the request. If the minister makes a Section 16 Order, the proponent may only proceed with the project if they follow the conditions in the Order.

Note, Section 16 Order requests were previously known as Part II Order requests.

Reasons for Requesting an Order

A concerned party may ask the minister to make a Section 16(6) Order if:

- they have outstanding concerns that a project going through a Class EA process may have a potential adverse impact on constitutionally protected Aboriginal and treaty rights;
- they believe that an Order may prevent, mitigate or remedy this impact.

A Section 16(6) Order request cannot be made to simply delay or stop the planning and implementation of a project that is going through a Class EA process. Prior to making a Section 16(6) Order request, the concerned party should first try to resolve any concerns directly with the project proponent, in this case, Niagara Region.

Timing for an Order Request

During the 45-calendar day public review period, anyone can review the documentation, submit any comments or concerns to the proponent, and request a Section 16(6) Order.

To request a Section 16 Order for a project, on the grounds that an Order may prevent, mitigate or remedy potential adverse impacts on constitutionally protected, Aboriginal and treaty rights, a concerned party must make the request before the public comment period is complete.

How to make a request

To submit a Section 16(6) Order request, the following information must be provided:

- name, address and email address;
- project name;
- proponent name;
- what kind of Order is being requested i.e., a request for additional conditions or a request for an individual environmental assessment;
- details about the concerns about potential adverse impacts on constitutionally protected Aboriginal or treaty rights and how the proposed Order may prevent, mitigate or remedy the identified adverse impacts;
- whether the concerned party belongs to, represents or has spoken with an Indigenous community whose constitutionally protected Aboriginal or treaty rights may be adversely impacted by the proposed project;
- whether the concerned party has raised their concerns with the proponent, the proponent's response (if any) and why the concerns could not be resolved with the proponent;
- any other information to support the request.

Section 16 Order requests are made to the Minister of Environment, Conservation and Parks and the Director of Environmental Assessment Branch. The request may be submitted by mail, email, fax or hand delivered to:

Minister

Ministry of the Environment, Conservation and Parks

777 Bay Street, 5th Floor

Toronto ON M7A 2J3

Minister.mecp@ontario.ca

Director

Environmental Assessment Branch

Ministry of the Environment, Conservation and Parks

135 St. Clair Avenue West, 1st Floor

Toronto ON M4V 1P5

EABDirector@ontario.ca

A copy of the written request should also be sent to the proponent of the project (in this case, Niagara Region).

There is no appeal of the minister's decision with respect to a Section 16 Order. If the request for a Section 16(6) Order is denied by the minister, the proponent can proceed with the project. If the minister makes an Order, the proponent may only proceed with the project if they follow the conditions in the Order.

The above discussion is intended as an overview of the process only. For more information and specific instruction, please visit:

<https://www.ontario.ca/page/class-environmental-assessments-section-16-order>

1.3 Project Team

The core project team is comprised of staff from the Niagara Region and CIMA Canada Inc. (CIMA+), and CIMA+'s subconsultant Archaeological Services Inc.

2 Study Area Needs and Existing Conditions

2.1 Study Area Needs

As described in **Chapter 1**, the intersection of York Road and Four Mile Creek Road is currently controlled by an all-way stop. During peak periods, motorists sometimes experience high delays, which are expected to increase over time as growth continues to take place in Niagara Region. There are also safety issues due to the skewed angle of the intersection, vehicles speeding and lack of active transportation facilities (i.e., for pedestrians and cyclists). The skewed intersection also creates difficulty with truck turning movements causing the trucks to drive up on the grassed boulevards. With development planned for the area and the vicinity of St. Davids School, it is important for the Region to address the current and future transportation needs, including the provision of active transportation facilities to the area to support all road users.

2.2 Policy and Planning Context

The provincial and municipal planning and policy context was also considered in assessing the needs of the study area. The provincial and municipal policy framework guides infrastructure, land use planning and strategic investment decisions to support Region growth and transportation objectives. The identification of study area problems and opportunities and the assessment of the study's need, and justification were carried out with due consideration of the planning framework to ensure that the Recommended Plan is consistent with the policies and objectives of the various levels of government.

2.2.1 *Places to Grow Act (2005) and Growth Plan (2020)*

The *Places to Grow Act*, 2005 provides the legal framework necessary to implement the Province's vision for managing growth within the Greater Golden Horseshoe (GGH). The *Act* enables the government to plan for population growth, economic expansion and the protection of the environment, agricultural lands and other resources in a coordinated and strategic manner.

The Growth Plan for the Greater Golden Horseshoe was prepared under the *Places to Grow Act*. Originally prepared in 2006, the Growth Plan was updated in 2020 to reflect growth planning to 2051, guiding decisions on transportation, infrastructure planning, land-use planning, urban form, housing, natural heritage, and resource protection.

Section 3.2 of the Growth Plan provides the infrastructure policies to support sustainable growth. While the Growth Plan should be considered in its entirety, the

policies that are particularly relevant to the York Road and Four Mile Creek Road Intersection Class EA are excerpted below:

Growth Plan Section 3.2.1 Integrated Planning

- Planning for new or expanded infrastructure will occur in an integrated manner and will be supported by infrastructure master plans, asset management plans, community energy plans, watershed planning, environmental assessments, and other relevant studies where appropriate.

Growth Plan Section 3.2.2 Transportation - General

- Transportation system planning, land use planning, and transportation investment will be coordinated to implement this Plan.
- The transportation system within the GGH will be planned and managed to:
 - provide connectivity among transportation modes for moving people and for moving goods;
 - offer a balance of transportation choices that reduces reliance upon the automobile and promotes transit and active transportation;
 - be sustainable and reduce greenhouse gas emissions by encouraging the most financially and environmentally appropriate mode for trip-making and supporting the use of zero- and low-emission vehicles; and
 - offer multimodal access to jobs, housing, schools, cultural and recreational opportunities, and goods and services.
 - In the design, refurbishment or reconstruction of the existing and planned street network, a complete streets approach will be adopted that ensures the needs and safety of all road users are considered and appropriately accommodated.

Growth Plan Section 4.2.10 Climate Change

- Upper- and single-tier municipalities will develop policies in their official plans to identify actions that will reduce greenhouse gas emissions and address climate change adaptation goals, aligned with the Ontario Climate Change Strategy, 2015 and the Climate Change Action Plan, 2016 that will include:
 - supporting the achievement of complete communities as well as the minimum intensification and density targets in this Plan;
 - reducing dependence on the automobile and supporting existing and planned transit and active transportation;

- assessing infrastructure risks and vulnerabilities and identifying actions and investments to address these challenges; and
- undertaking stormwater management planning in a manner that assesses the impacts of extreme weather events and incorporates appropriate green infrastructure and low impact development.

2.2.2 Provincial Policy Statement (2020)

The Provincial Policy Statement (PPS) is issued under the *Planning Act* and supports the Growth Plan in providing policy direction for the use and management of land and infrastructure while protecting the environment and resources. Sections of the PPS that are applicable to the planning of transportation infrastructure include:

- Part IV Vision for Ontario's Land Use Planning System – land development should be optimized to promote efficient use of land, resources and public investment in infrastructure and public service facilities. The supporting transportation infrastructure is to provide choices and promote increased use of active transportation as well as transit before other modes of travel.
- Part V Policies – transportation systems should be safe, energy efficient, facilitate the movement of people and goods, and are appropriate to address projected needs. A multimodal transportation system is to provide connectivity within and amongst the transportation systems.

2.2.3 Greenbelt Plan (2017)

The Greenbelt is the cornerstone of the of the Ontario Greater Golden Horseshoe Growth Plan (Growth Plan) which is an overall strategy to provide information and guidance about urban structure, where and how future growth should be accommodated, and what should be protected for future generations. In 2017, the Greenbelt plan was created and together with the Oak Ridges Moraine Conservation Plan (ORMCP) and the Niagara Escarpment Plan (NEP), it identifies where urbanization should not occur due to the potential ecological, agricultural and hydrological features within the area.

Schedule 1 of The Greenbelt Plan designates the entire Study Area as Protected Countryside and Niagara Escarpment Plan Area which falls under the Natural Heritage System; these designations afford protections against urbanization.

2.2.4 Niagara Escarpment Plan (2017)

As stated in **Section 2.2.4**, The Niagara Escarpment Plan (NEP), The Growth Plan, The Greenbelt Plan, The ORMCP and the PPS work together to establish a land use planning framework for Ontario's Greater Golden Horseshoe. The NEP is a framework of objectives and policies used to guide the development of the area while protecting the important landform feature and the resources it supports.

The intersection of Four Mile Creek Road and York Road is located in the Niagara Escarpment Plan Area and designated as Escarpment Rural Area and Minor Urban Centre. Infrastructure is a Permitted Use in the NEP subject to satisfying the policies and development criteria, in particular Part 2.12 (Infrastructure). The development and growth objectives for Minor Urban Centres support development that protects natural heritage features and functions and the conservation of Cultural Heritage Resources and considerations for reductions in greenhouse gas emissions.

The property is not subject to Niagara Escarpment Commission (NEC) Development Control. As such, a Development Permit for the proposed improvements would not be required after the EA is complete.

2.2.5 #CycleON: Ontario's Cycling Strategy (2013)

#CycleON is a 20-year strategy from the Ontario Government to promote cycling as a method of transportation for Ontarians. The overall goal is to ensure Ontario is more cycling-friendly and provides an alternate mode of transportation that is convenient, affordable and better for the environment. The strategy provides directions on how to accomplish this goal and includes a province-wide cycling network that includes Niagara Region.

2.2.6 Niagara Region Official Plan (2014)

Schedule A of the Official Plan (OP) of Niagara Region identifies the study area as a Greenbelt Plan Area, and Niagara Escarpment Plan (NEP) Area. Schedule E2 of the OP identifies York Road and Four Mile Creek Road as a Strategic Cycling Network and Urban Area.

The OP also provides several objectives in terms of transportation infrastructure planning within the Region including:

- The promotion and support for a multimodal transportation system to enable the movement of goods and people;

- The reduction of single-occupant vehicle trips by enhancing the opportunity for residents and visitors to walk, cycle, take public transit and carpool;
- The creation and further development of an interconnected active transportation system;
- The implementation of complete streets at both the regional and local levels; and
- The encouragement of environmentally friendly modes of sustainable transportation to reduce greenhouse gas emissions.
- The OP has also set objectives to reduce air pollutants and greenhouse gas emissions through various measures including:
 - The promotion of energy efficiency in Regional Facilities;
 - The emphasis on mixed use development to reduce the need for travel;
 - Supporting transit and active transportation;
 - The encouragement of waste reduction and water conservation; and
 - The promotion of green space, tree planting and natural heritage conservation.

2.2.7 Niagara Region Transportation Master Plan (2017)

As part of the Region's growth and development plan, the Transportation Master Plan (TMP) provides a long-term strategy to guide the planning, development and renewal of a sustainable multi-modal transportation system within the Region for the next 25 years. The main goal of the plan is to improve the Region's transportation network within each of its municipalities to enhance the movement of people and goods across all modes of transportation.

Roads

Within the Region's roadway network, there are four jurisdictions:

1. Provincial;
2. Regional;
3. Local; and
4. Niagara Parks Commission.

The TMP states that most of the road network has adequate capacity for current conditions and future growth, however there are some operational and capacity improvements that are needed to address specific hotspots, barriers and bottlenecks.

Active Transportation

The TMP describes the current active transportation network in the Region to have 352 km of bicycle lanes and 409 km of trails, however there are many gaps within the network and the Region would like to connect, enhance and expand the network.

2.2.7.1 Niagara Region Transportation Master Plan – Niagara Region’s Complete Streets: Vision and Direction for a Changing Region (2017)

Building off the TMP, the Region developed a Complete Streets Vision to guide the investments in road/street corridors and to provide a decision-making framework to ensure its successful implementation. This Complete Streets Vision provides direction on:

- How the Regional Roads are planned and designed;
- How the Regional rights-of-way accommodate various users;
- What physical elements form the cross-sections of a Regional Road;
- How road/street corridors can be designed according to their planned function and context;
- How transportation level of service can be measures and what is the design decision making process; and
- Direction on jurisdictional responsibility for each corridor infrastructure component.

This Complete Streets Vision also must take into account Niagara’s unique influences such as:

- The two-tier government context;
- Urban, Village and Rural Context;
- Geographically dispersed and diverse communities;
- Traffic demands;
- Climate;
- Demographics;
- Tourist-orientation;
- Cross-border influences; and
- Niagara as a destination.

This Complete Streets approach can help enable Niagara to realize a fuller potential for the Region's roads by increasing usability and relevance to land uses. The investment in Complete Streets can lead to increased growth and prosperity and can help the Region attract residents and businesses that contribute to its economic growth.

2.2.7.2 Niagara Region Transportation Master Plan - Niagara Region Complete Streets Design Guidelines (2017)

As part of the Region's Complete Streets Vision, the integration of land use planning, transportation planning and urban design is critical to develop "Complete Corridors" to support this overall Complete Streets Vision. Complete Corridors are roads and adjacent lands planned with the future context in mind and serve as both a placemaking and transportation function to support healthy communities. The roads and adjacent lands are designed to support all mobility modes, based on context and assist people of all ages and abilities in travelling throughout the area.

The Region has developed Complete Streets design guidelines to support the developer of these complete corridors. For this study, the Project Team reviewed the 2017 Complete Street guidelines and received input from an update of these guidelines that is currently underway by the Region and their Consultant.

Under the 2017 Complete Street design guidelines, there are six (6) typologies:

1. Main Street
2. Urban General (Narrow)
3. Urban General (Wide)
4. Transitioning
5. Hamlet
6. Rural

The Study Area for the EA was compared to the six (6) typologies, and it was determined that the area falls under the Hamlet Typology. Hamlets are described as small communities found throughout rural areas of the Region. Portions of these streets pass through villages serving local residents and through-traffic, and they are often centred around an intersection and may include residential frontages and commercial business. Narrow rights-of-way (ROWs) are typically found in this typology, but in contrast to the Rural Road typology, Hamlet roads should slow traffic and should be designed to support the local community and calm traffic as they transition into a village. Key elements of the Hamlet Typology are:

- Sidewalks and pedestrian amenities (benches, lighting, etc.);

- May include on-street parking;
- Limited goods movement;
- Pedestrian crossings; and
- Landscaping and streetscaping

2.2.8 Complete Street Guideline Update (Ongoing)

The ongoing Complete Streets Design Manual (CSDM) is a design directive for Complete Streets on the Regional Roadway Network. It provides Regional staff and practitioners guidance on how to design, implement, and maintain Complete Streets. Design practice included in the CSDM is based off best practices and updated standards included in the Transportation Association of Canada Geometric Design Guidelines for Canadian Roads and Ontario Traffic Manual.

Regional Road Typologies provide a Complete Streets classification system for roads in the Region with context sensitive planning and design direction. Typologies act as an additional layer to the functional roadway classification system. The typologies reflect aspirational visions for Regional Roads and planned rights-of-way. Each typology reflects common operational characteristics, land use, built form and urban design attributes. The typologies included in the CSDM build off the foundational typologies included in the Niagara TMP – Complete Streets Guidelines.

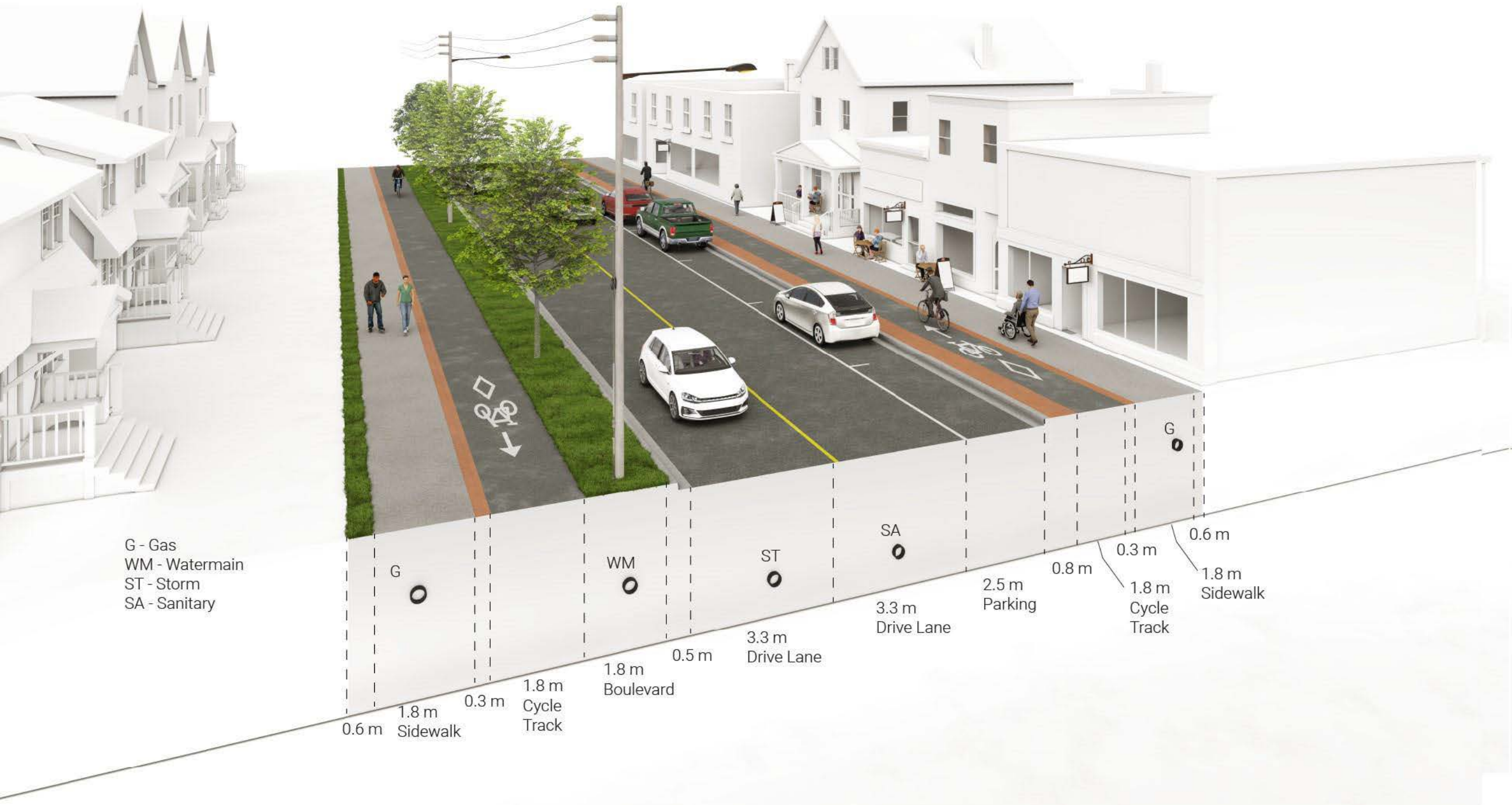
Six regional road typologies were developed as part of the TMP (2017) to provide a Complete Streets characterization system for roads in the Region with context sensitive planning and design direction. The six original road typologies were reviewed and refined through the development of the CSDM to five broad typologies and four sub-typologies. Typologies were refined based on principles and values of complete streets, vision zero and other emerging planning and design principles. Regional roads are classified into Main Street, Urban General, Thoroughfare, Rural Scenic and Hamlet typologies. Urban General roads are further classified under Narrow and Wide sub-typologies based on right-of-way width. Roads classified as Thoroughfares are further classified into Urban or Rural based on land use designations.

As noted in **Section 2.2.7.2**, it was determined that the study area falls under the Hamlet Typology (**Figures 2-1 & 2-2**). Hamlets are streets within Hamlet areas that reflect both mobility and place-making priorities. These streets pass through villages serving local residents as well as through-traffic. Streets in Hamlet areas typically include residential frontages and small commercial or other users that serve the community. These streets form the “heart” of Hamlets, where opportunities for streetscaping can be pursued.

Figure 2-1 - Hamlet Typology Cross-section - Option 1



Figure 2-2 - Hamlet Typology Cross-Section - Option 2



2.2.9 Town of Niagara-on-the-Lake Official Plan (2017)

The Town of Niagara-on-the-Lake's OP identifies the village of St. Davids as a Special Policy Area (Schedule D1) due to the historical significance of the area. This designation is further described in **Section 2.3.1 – Social Environment / Economic Environment**. The Village of St. Davids is recognized as one of the founding settlements in the area and has many historic buildings and streetscapes that help characterize the village.

The future role of St. Davids is described in the OP as being predominantly residential with some commercial areas. A minor commercial area is identified at the intersection of York Road and Four Mile Creek Road. This function of this commercial area and all commercial areas within the Village is to primarily serve the needs of the local residents within the Village.

The OP lays out several developmental policies that should govern any development within the Village. The Town has adopted design guidelines to ensure the historic character of the Village is preserved and extended. These urban design guidelines should be followed in any development or redevelopment occurring within the Village.

Also identified on Schedule H of the OP, is the potential for the study area to have archaeological findings.

The OP encourages the identification/development of a system of pedestrian and bicycle routes and pathways linking the Village, and states that the Town may designate and develop pedestrian and bicycle routes and pathways on Town streets, laneways and public spaces to allow the safe travel of pedestrians and bicyclists. Specifically, the development of a pedestrian connection to the St. Davids Lion's Club Park was noted in the OP and should be developed in accordance with the Town's requirements and with all the necessary permits and approvals.

2.2.10 Village of St. Davids Urban Design Guidelines (2005)

Similar to the Region's Complete Streets Urban Design Guidelines, the Village of St. Davids Urban Design Guidelines (Niagara on the Lake, 2005), provides recommended design concepts aimed at enhancing and preserving St. Davids unique qualities. A key objective of these guidelines is to provide a strong connection between St. Davids' natural landscape and the existing Village neighbourhoods and emerging communities as growth continues in this area. The guidelines looked at various community concerns and issues including:

- Traffic volume, noise and speed;

- Safety and pleasantness of walking on York Road and Four Mile Creek Road;
- Loss of business (i.e., attractiveness of the Village Centre);
- Lack of clear identification of the Village limits; and
- Protection of agricultural and urban area interface.
- The following principles were identified:
 1. Affirm St. Davids' Cultural Legacy
 2. Define a sustainable development framework
 3. Re-establish the Village Centre as the commercial focus of the community
 4. Create an open space network
 5. Foster high-quality built form and community design

Based on these guidelines, the study area for this EA is within the Village Centre, also known as the Four Corners, which provides significant potential for new businesses and services as the Village grows. The 'Vision for the Four Corners' provides the opportunity to strengthen this area within the Village, but it requires the creation of a pedestrian-friendly environment while still balancing the needs of the residents and tourists. General guidelines and streetscaping guidelines were provided for this area and they were applied to the proposed alternative solutions their evaluation for this study.

2.3 Existing Conditions

As part of the EA Study, background information was collected from prior planning studies, and additional studies were undertaken to update information where needed to understand the existing conditions including the social (i.e., land use and economic), cultural (i.e., archaeology and built heritage), and natural environment, as well as drainage and utilities.

2.3.1 Social Environment / Economic Environment

2.3.1.1 Land Use

The Town of Niagara-on-the-Lake Official Plan, 2017 recognizes the village of St. Davids as a Special Policy Area. Permitted land use within the St. Davids Special Policy Area per the Official Plan are shown in **Figure 2-3**.

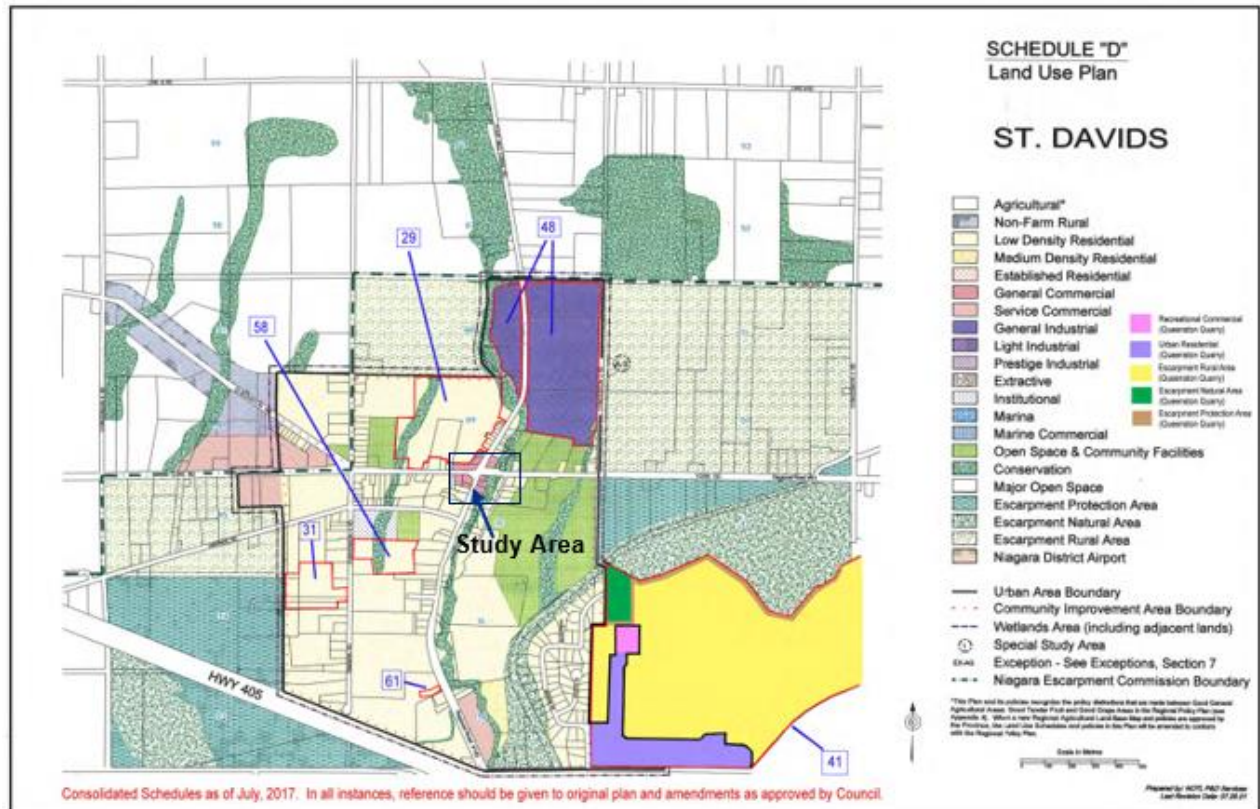


Figure 2-3: Permitted Land Use (Town of Niagara-on-the-Lake Official Plan, 2017)

The land surrounding the Four Mile Creek Road and York Road intersection is predominately designated as general commercial and low-density residential. Some land east of the intersection is designated conservation and open space & community facilities. There is a large general industrial area just north of the study area.

There are a number of buildings close to the right-of-way in the vicinity of the intersection with some having heritage designation like the Old Barn on the northwest corner, as well as a residential property on the southeast corner. These properties are further described in the Cultural Heritage Report summarized in **Section 2.3.2** and included in **Appendix F** of the ESR.

Existing commercial developments at the intersection include a dentists' office, a convenience store, and single-family homes.

About 80 m east of the intersection is the densely-treed Four Mile Creek and valley. Further east of the intersection is a Bed and Breakfast, Saint Davids-Queenston United Church and St. Davids Golf Course on York Road.

North of the intersection, there is a Canada Post Office, local restaurant and a few industrial properties, and Four Mile Creek Road is used regularly by large trucks.

The area in proximity to the intersection is also experiencing growth and development including developments including a subdivision north of the intersection approaching Line 9 Road and a proposed development (Vineyard Square) on the south side of York Road opposite the Old Barn.

2.3.2 Cultural Environment

2.3.2.1 Historical Background

The intersection of Four Mile Creek Road and York Road is one of the cornerstones of the St. Davids village and has a strong historical significance. Four Mile Creek follows an old First Nations Trail between Lake Ontario and the top of the Escarpment, and St. Davids was at the crossroads with another trail from Queenston to Burlington Bay. St. Davids was subsequently the site of numerous battles in the War of 1812. The burning down of St. Davids (and Queenston) by the Americans led to the British retaliating by burning down Washington, DC in 1814. The current intersection of Four Mile Creek Road and York Road contains references to its past, most notably, a plaque describing the burning incident (see **Figure 2-4**).

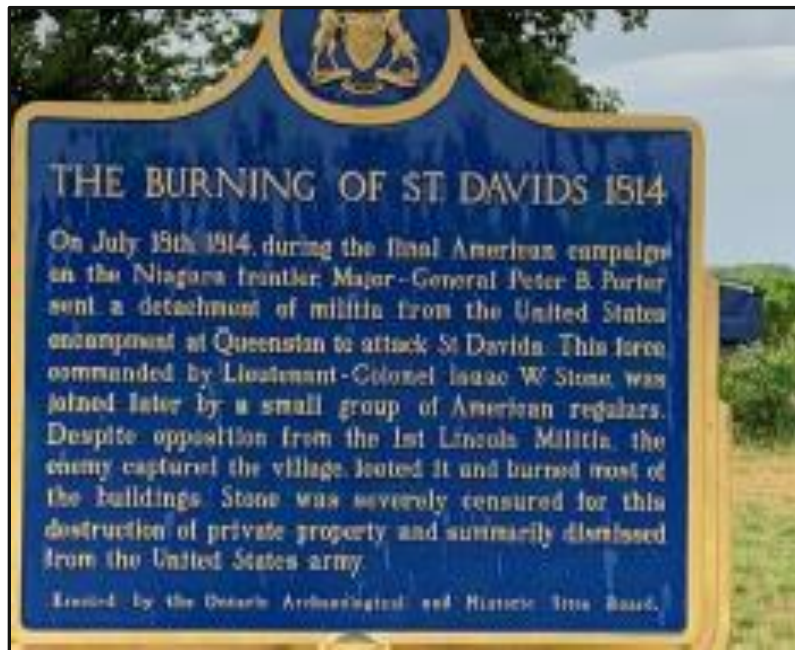


Figure 2-4: Historic Plaque

The intersection also includes a parkette with more contemporary references to the past; specifically, example millstones from a nearby quarry/cement plant from the late 19th Century (**Figure 2-5**). The parkette also includes benches and a naturalized garden with plants designed to attract butterflies (**Figure 2-6**).



Figure 2-5: Millstone



Figure 2-6: Parkette in Southeast Corner

2.3.2.2 Archaeological Resources

Archaeological Services Inc. (ASI), completed a Stage 1 Archaeological Assessment in early 2021 as part of this EA. A summary of their findings is provided in this section and the complete report can be found in **Appendix E** of this ESR.

- The study area is adjacent to the St. Davids Queenston United Cemetery. The York Road right-of-way has the potential for unmarked or shifted burials, and therefore it is recommended that any impacts adjacent to this area are subject to a Stage 3 cemetery investigation during detailed design.
- Areas to the east of the intersection have archaeological potential and a Stage 2 Assessment is recommended during detailed design. This will require a test pit survey at 5 m intervals prior to any impacts to the property.

The report was reviewed and received clearance from the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) on January 5, 2022. A copy of this letter can be found in **Appendix A** of this ESR.

2.3.2.3 Cultural Heritage

Archaeological Services Inc. (ASI), completed a Cultural Heritage Report as part of this EA. A summary of their findings is provided in this section and the complete report can be found in **Appendix F** of the ESR.

After a review of federal, provincial and municipal registers, inventories and databases, it was determined there is one potential cultural heritage landscape (CHL) which contains several individual properties within the study area. This CHL is the core of the historical settlement of St. Davids and contains:

- Three (3) properties designated Part IV of the *Ontario Heritage Act*;
- Thirteen (13) properties listed on the Town of Niagara-on-the-Lake Heritage Register;
- Eight (8) properties with potential cultural heritage value; and
- Two (2) commemorative features.

The report was reviewed the MHSTCI and as per their email on December 1, 2021, they had no concerns or comments. A copy of the letter can be found in **Appendix A** of this ESR.

2.3.3 Natural Environment/Natural Heritage Features

A Natural Environment Assessment (NEA) Report was completed in support of this EA Study. The NEA documents the existing conditions and evaluates the potential impacts to the natural environment associated with the alternative solutions that were developed as part of the EA. A summary of the findings is provided below, and the complete report can be found in **Appendix C** of this ESR.

The study area and adjacent properties are located within Ecoregion 7E (Lake Erie-Lake Ontario). There are no Provincially Significant Wetlands (PSWs), significant valley lands or Areas of Natural and Scientific Interest (ANSIs) located within the study area. The study area is located in the Niagara River Watershed and hosts a narrow stream called Four Mile Creek, which traverses the study area from south to north. An unnamed drainage channel is also present within the eastern end of the study area approximately 20 m west of Concession 3 Road. Areas within the main study area are within a Highly Vulnerable Aquifer (HVA) and as such these areas are susceptible to contamination such as road salt.

Based on field investigations carried out, no rare vegetation species or species at risk (SAR) were observed; however, based on results of the SAR screening assessment through background data review coupled with on-site investigations, there is potential for seven (7) SAR and their habitat present within the study area to be impacted by construction activities; Northern Map Turtle, Snapping Turtle, Barn Swallow, Eastern Wood-Pewee, Wood Thrush, Little Brown Myotis, and Tri-colored Bat. Avoidance and

mitigative strategies to address potential impacts to SAR are identified in **Section 7.3** of this ESR.

2.3.4 Drainage and Stormwater Management

A Drainage and Stormwater Management Report has been prepared as part of the EA Study to document the analysis of the existing drainage conditions, including drainage patterns and catchment areas, and the hydrologic and hydraulic assessments undertaken in more detail. The complete report can be found in **Appendix D** of this ESR.

The study area falls within two separate watersheds and is under the jurisdiction of the Niagara Peninsula Conservation Authority (NPCA). Most of the study area is within the Four Mile Creek watershed while the easterly portion of the study area along York Road is within the Two-Mile Creek watershed. Surface water features in the study area include Four Mile Creek, regulated under NPCA Regulation 155/06, and unregulated tributaries of Two Mile Creek. All watercourses drain from south to north, towards Lake Ontario.

A field investigation of the existing drainage features and culvert conditions in the study area was conducted on September 14, 2021. Near the intersection of Four Mile Creek Road and York Road, the roadways have an urban road cross-section with a curb and gutter. Most minor storm runoff is captured by catch basins and conveyed via storm sewer to discharge into Four Mile Creek. Runoff in one catchment area drains overland through roadside ditches and discharges into a tributary of Two Mile Creek. Under existing conditions, there is no runoff quality or quantity control measures except for roadside ditches on York Road, east of the intersection.

Within the study area, three culverts drain Four Mile Creek and the tributaries of Two Mile Creek. The location, size, and condition of the existing culverts are summarized in **Table 2-1**. A map showing the location of the culverts, storm sewer, and photos taken during the field investigations can be found in Figure 4 in Appendix A and Photo 1 through 20 in Appendix B in the Drainage and Stormwater Management Report in **Appendix D** of this ESR.

Table 2-1: Summary of Culverts on York Road

Culvert Number	Location	Drainage	Type of Culvert	Diameter (mm)	Length (mm)	Comments
Culvert C1	York Road, ~ 70m east of Four Mile Creek Road	Four Mile Creek	Corrugated Steel Pipe (CSP), circular	2500	46.3 m	Fair to poor condition
Culvert C2	York Road, ~ 310 m east of Four Mile Creek Road	Tributary of Two-Mile Creek	CSP, circular	800	25.0 m	Poor condition
Culvert C3	York Road, ~445 m east of Four Mile Creek Road	Tributary of Two-Mile Creek	CSP, circular	600	20.4 m	Poor condition

There are three storm sewer outlets in that study area that drain into Four Mile Creek. During the field investigation, one storm sewer outlet was observed on the west bank of Four Mile Creek downstream (north) and west of Culvert C1. The outlet is a corrugated steel pipe (CSP) storm sewer; it is heavily corroded, and the bottom of the outlet pipe is damaged by rust. Minor storm water runoff is conveyed to this outlet via storm sewer along York Road, west of and through the York Road / Four Mile Creek Road intersection.

The condition of the other two outlets was not observed during the field investigation. One outlet is located on private property on Four Mile Creek Road, downstream of Culvert C1. Minor storm water runoff is conveyed to this outlet via storm sewer along

Four Mile Creek Road, north of the intersection. The other outlet is on the north side of York Road, east of Culvert C1. Minor storm water runoff is conveyed to this outlet via storm sewer on York Road, east of the intersection.

2.3.5 Utilities / Services

Utility companies were contacted through a utility circulation and a meeting was held on May 17, 2021, to gather further information from companies with infrastructure in the area. Bell Canada has major infrastructure located on/under the northeast corner of the intersection. There is a copper distribution cable interface box and a fibre distribution interface box. There is also a Bell maintenance hole present in the area which the boxes are tied into. Workers are required to have access to that area for maintenance of these boxes.

Niagara Region also has a transmission watermain along York Road from Concession 7 to approximately 50 m west of the Four Mile Creek Road intersection where it will connect to an existing local watermain. There are plans to replace this transmission watermain in 2023; the project is currently in the early stages of design.

Niagara Region also has a sanitary forcemain running north-south along Four Mile Creek Road.

There are existing Niagara-on-the-Lake Hydro poles on the south side of York Road and east side of Four Mile Creek Road. The other utilities in the study area are Enbridge Gas and Niagara Region Broadband Network (NRBN).

2.4 Transportation

2.4.1 Existing Transportation Facilities

Existing and future traffic conditions in the study area were analyzed in detail through a Transportation Assessment dated April 6, 2021 and provided as **Appendix B** of this ESR.

The intersection is controlled by an all-way stop and has single-lane approaches in all directions with no auxiliary lanes. There are channelized right-turn lanes eastbound-to-southbound, and northbound-to-eastbound. York Road has a 20 m right-of-way (ROW) and 50 km/h speed limit. Four Mile Creek Road has a narrow 16 m ROW and 50 km/h speed limit.

There is no crosswalk on the north leg of Four Mile Creek Road, and the sidewalks transition to asphalt shoulders 65 m north of the intersection. On the east leg of York Road, there are no sidewalks on the north side and the sidewalk on the south side ends

at St. Davids United Church. On the south leg of Four Mile Creek Road, the sidewalks are very narrow and close to the roadway. On the west leg of York Road, there are sidewalks on each side of the roadway.

2.4.2 Existing Traffic Analysis

The existing 2021 intersection volumes at York Road and Four Mile Creek Road were estimated using March 2016 turning movement counts (TMC) provided by the Region and a 2% linear annual growth rate. The existing turning movement volumes are shown in **Figure 2-7**. Truck percentages at the intersection are relatively high, with some individual movements exceeding 10%. The overall volume does not exceed 18 trucks per hour at any of the intersection approaches. The intersection lane configuration is shown in **Figure 2-8**.

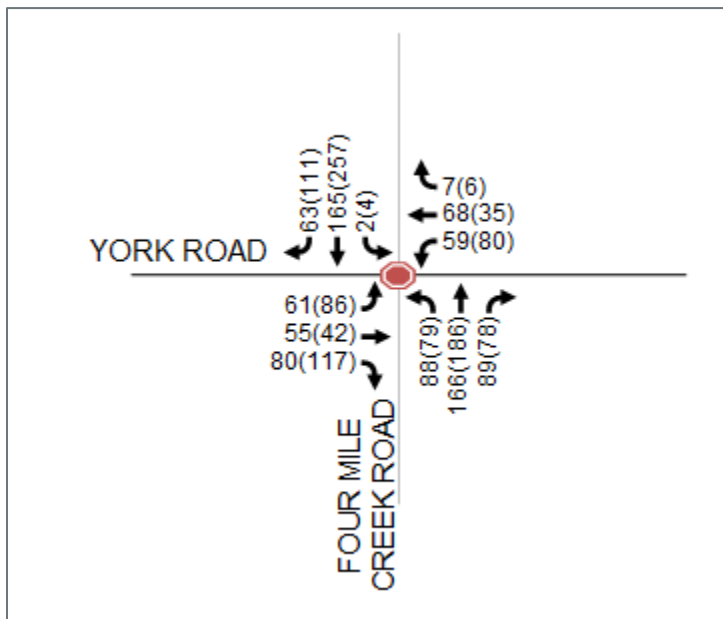


Figure 2-7: Existing Intersection Volumes (2021)

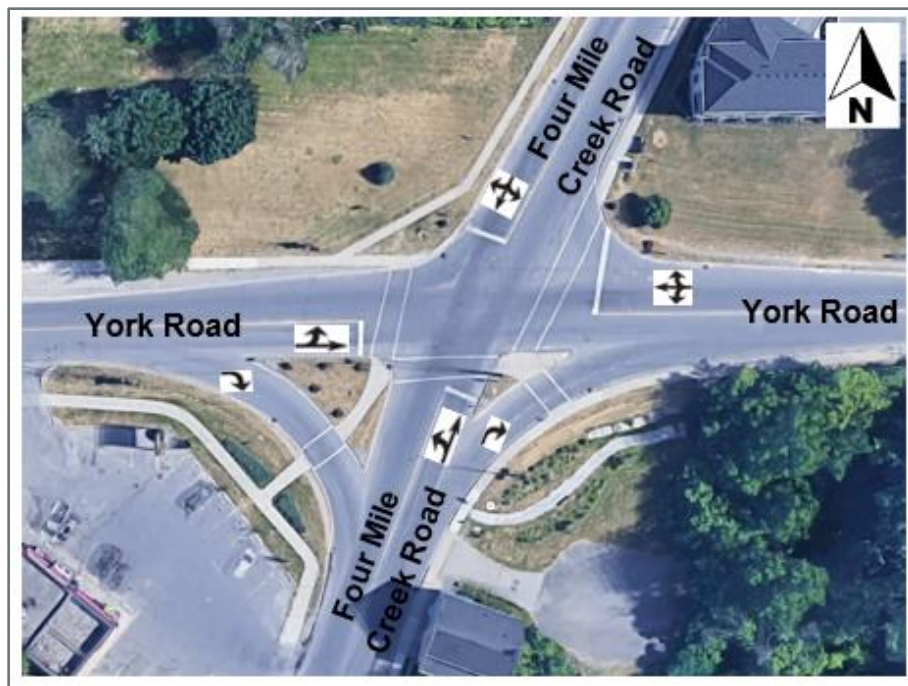


Figure 2-8: Existing Lane Configuration

A capacity analysis was undertaken using Synchro/SimTraffic 10 software to assess existing conditions. The results indicate that the overall intersection, and all individual movements, are operating below capacity, with delays of less than 25 seconds per vehicle. 95th percentile queue lengths are between 17 m (approximately 3 passenger car lengths) and 37 m (approximately 6 passenger car lengths).

It should be noted that the analysis did not replicate an observed 200 m queue on the west leg of York Road. A possible reason for this was that the 2016 count was conducted in March, whereas the observed queue was in August, presumably during tourist season (even though it was mid-afternoon on a Monday, during a pandemic in 2020).

2.4.3 Future Traffic Analysis

Future traffic operations at the intersection were reviewed for a 10-year horizon (2031), a 20-year horizon (2041) and a 30-year horizon (2051) to evaluate long-term effects of traffic growth through the study area. The same 2% linear annual growth rate was used in growing traffic the 2016 traffic counts to 2021. The resulting turning movement counts are shown in **Figure 2-9**, **Figure 2-10** and **Figure 2-11**. Future truck percentages were assumed to be consistent with existing.

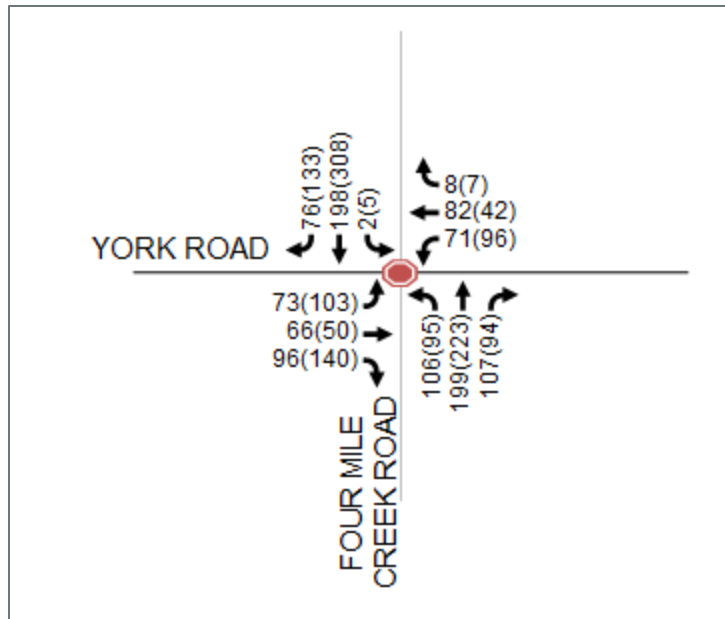


Figure 2-9: 2031 Intersection Volumes

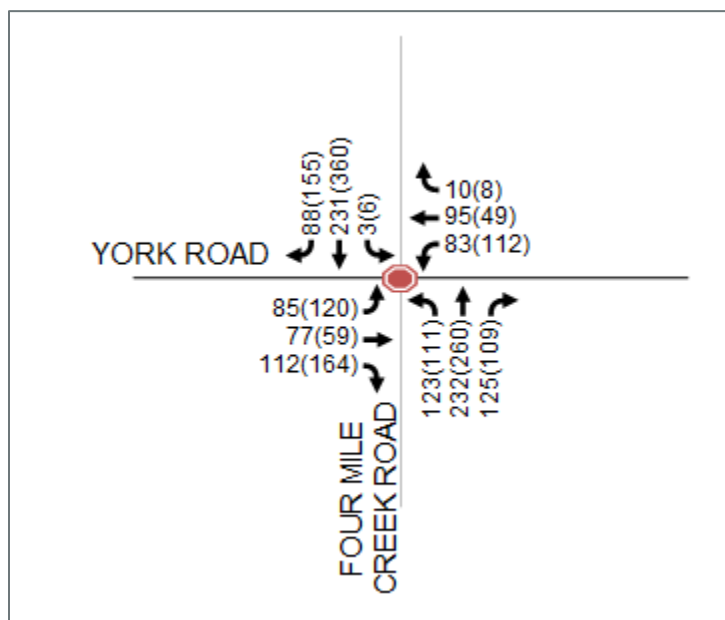


Figure 2-10: 2041 Intersection Volumes

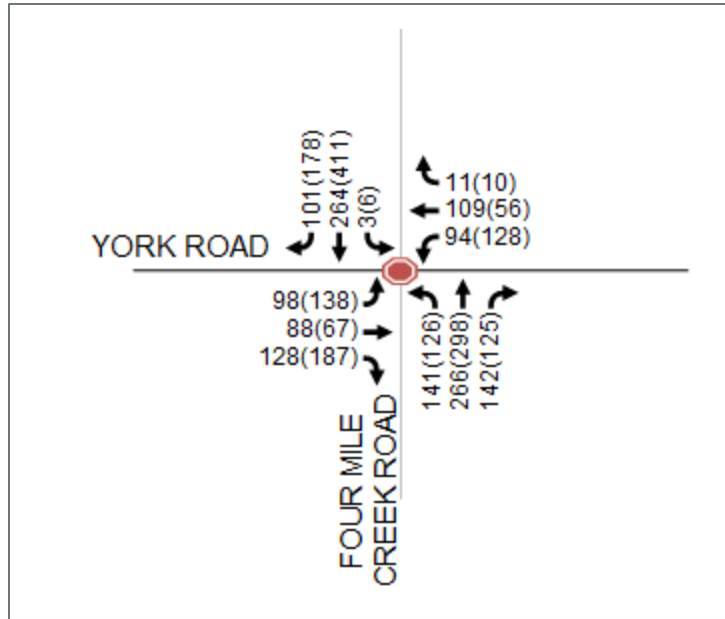


Figure 2-11: 2051 Intersection Volumes

The analysis was completed for three different scenarios:

- Alternative 1 - do nothing (all-way stop control).
- Alternative 2 - traffic signal control.
- Alternative 3 - roundabout.

Alternative 1 – All-Way Stop Control

The first alternative involves leaving the intersection as an all-way stop control and not changing the existing lane configuration. **Table 2-2, Table 2-3 and Table 2-4** summarize the results of the operational analysis for the 2031, 2041 and 2051 horizon years, respectively. Full analysis reports are provided in the Transportation Assessment in **Appendix B**. It should be noted that v/c Ratio refers to volume-to-capacity ratio, which is a measure of how close an approach is (i.e., northbound, or NB) to approaching capacity.

Table 2-2: All-Way Stop Control – 2031 Capacity Analysis Results

Approach	Delay (s)	v/c Ratio	95 th Percentile Queue (m)
EB	16 (26)	0.53 (0.71)	27 (56)
WB	14 (17)	0.41 (0.41)	23 (20)
NB	25 (45)	0.78 (0.92)	41 (49)
SB	17 (54)	0.58 (1.00)	32 (64)
Overall	19 (41)	0.59 (0.78)	-

Legend: AM (PM)

Table 2-3: All-Way Stop Control – 2041 Capacity Analysis Results

Approach	Delay (s)	v/c Ratio	95 th Percentile Queue (m)
EB	23 (41)	0.67 (0.85)	35 (145)
WB	18 (21)	0.51 (0.50)	25 (27)
NB	68 (110)	1.00 (1.12)	57 (94)
SB	27 (138)	0.74 (1.19)	42 (115)
Overall	40 (94)	0.74 (0.94)	-

Legend: AM (PM)

Table 2-4: All-Way Stop Control – 2051 Capacity Analysis Results

Approach	Delay (s)	v/c Ratio	95 th Percentile Queue (m)
EB	35 (69)	0.81 (1.00)	52 (212)
WB	23 (25)	0.62 (0.58)	28 (30)
NB	169 (215)	1.27 (1.36)	123 (186)
SB	46 (255)	0.91 (1.45)	58 (130)
Overall	87 (174)	0.92 (1.12)	-

Legend: AM (PM)

The results indicate that the northbound and southbound approaches are expected to approach and exceed capacity respectively for the PM peak hour by 2031. Both movements are also expected to operate with high peak hour delays. The 95th percentile queues range from 20 m, which is 3 passenger car lengths, and 64 m, which is 11 passenger car lengths.

By 2041, all approaches except for westbound are expected to present high PM peak hour delays, as well as the overall intersection. The delays for all approaches and movements are expected to range between 18 seconds, for westbound in the AM peak hour, and 138 seconds, for northbound in the PM peak hour. The northbound, southbound, and eastbound shared left/through/right-turn lanes, in both the AM and PM peak hours, are expected to approach or exceed capacity by 2041. The 95th percentile queues range from 25 m, which is 4 passenger car lengths, and 145 m, which is 24 passenger car lengths.

The 2051 horizon year results are similar to 2041, but with longer delays and higher v/c ratios. In particular, the southbound approach is expected to reach a v/c ratio of 1.45, with the overall intersection reaching 1.12. The 95th percentile queues range from 28 m (approximately 5 passenger car lengths) and 212 m (approximately 36 passenger car lengths).

Alternative 2 – Traffic Signal Control

Alternative 2 involves changing the intersection to a fully actuated signal and adding left-turn lanes with 30 m of storage and eliminating the channelized right-turn lanes.

Table 2-5 summarizes the results of the operational analysis for the 2051 horizon year

using Synchro/SimTraffic 10 software. Full analysis reports are provided in the Transportation Assessment in **Appendix B**.

Table 2-5: Traffic Signal Control – 2051 Capacity Analysis Results

Approach	Movement	Delay (s)	v/c Ratio	95 th Percentile Queue (m)
EB	L	18 (25)	0.50 (0.59)	31 (38)
EB	T/R	17 (20)	0.43 (0.33)	39 (50)
WB	L	20 (44)	0.55 (0.80)	23 (33)
WB	T/R	17 (19)	0.36 (0.16)	25 (31)
NB	L	6 (10)	0.29 (0.40)	33 (41)
NB	T/R	7 (8)	0.42 (0.43)	51 (101)
SB	L	4 (5)	0.01 (0.01)	4 (6)
SB	T/R	6 (10)	0.40 (0.61)	40 (80)
Overall		11 (16)	0.45 (0.66)	-

Legend: AM (PM)

The results indicate that, by 2051, all movements are expected to operate at low to moderate peak hour delays. 95th percentile queues for the left turn lanes are predicted to exceed the available storage length of 30 m, with the exception of the southbound approach. All approaches are expected to remain under capacity, with v/c ratios of 0.80 or lower.

Alternative 3 – Roundabout

Alternative 3 consists of converting the intersection to a single-lane roundabout. **Table 2-6** summarizes the results of the operational analysis for the 2051 horizon year using ARCADY software. Full analysis reports are provided in the Transportation Assessment in **Appendix B** of this ESR.

Table 2-6: Roundabout Control – 2051 Capacity Analysis Results

Approach	Delay (s)	v/c Ratio	95 th Percentile Queue (m)
EB	5 (6)	0.25 (0.33)	8 (15)
WB	5 (4)	0.18 (0.16)	6 (4)
NB	5 (6)	0.39 (0.40)	13 (13)
SB	5 (6)	0.29 (0.44)	13 (10)
Overall	5 (6)	-	-

Legend: AM (PM)

The results indicate that, by 2051, all movements and the overall intersection are expected to operate with low peak hour delays. 95th percentile queues are predicted to be under 22 m (approximately 3 passenger car lengths). All approaches are expected to operate well under capacity, with v/c ratios of 0.61 or lower.

2.4.4 Transit

The ongoing Niagara Region Transit OnDemand (NRTOD) pilot currently provides transit coverage to the study area. Trips within the municipality of Niagara-on-the-Lake are provided directly, with inter-municipal trips requiring connection at a ‘hub’ such as the Niagara College Glendale Campus and the Outlet Collection at Niagara. The pilot project is currently anticipated to continue through December 31, 2023. Future transit service to the Study area following the conclusion of the pilot project will be determined by the soon-to-be-formed transit Commission.

No special or specific design considerations would need to be taken into account to reflect this future possibility as the NRTOD service operates using modified passenger vehicles (most commonly minivans). Further, unlike conventional services, the NRTOD pilot operates on a ‘closest pickup corner’ or where necessary or possible a ‘door to door’ model, so there is not a consistent pickup location or stop that would require roadside infrastructure.

2.4.5 Pedestrian/Cyclist Safety - Active Transportation

There are limited pedestrian facilities and no cycling facilities located within the study area. The skewed angle of the intersection also presents some sight challenges for not only drivers but pedestrians and cyclists as well.

Many pedestrians use this intersection to travel to and from St. Davids Public School (which is located west of the study area, within a Community Safety Zone), local businesses, public pool and the Ravine Vineyard Winery.

For cycling, York Road is a connectivity route to the Niagara Parkway and also a continuous route from west to east for the entire Region. The Welland Canal limits crossings for cyclists and thus Glendale to York Road is a common route. The area is also popular for bicycle tours of the area's wineries.

2.4.6 On-Street Parking

There is currently on-street parking along Four Mile Creek Road south of York Road, on the west side any time and on the east side for one hour and not overnight between 2:00 am and 6:00 am. There is no other on-street parking within the study area, although some informal on-street parking occasionally occurs along York Road on the north side just west of Four Mile Creek Road.

2.5 Problem / Opportunity Statement

Based on the review of relevant policies, a review of existing conditions, as well as findings of the transportation assessment for existing and future transportation needs, the following problems and opportunities have been identified:

Problems

- The intersection currently experiences some peak hour capacity issues, which will increase as traffic volumes grow.
- Limited pedestrian and cyclist facilities.

Opportunities

- To provide additional transportation capacity and improved street lighting and illumination at the intersection.
- To provide enhanced active transportation facilities and better pedestrian and cyclist connection, as well as to conform to complete streets approach throughout the corridor.

Therefore, Niagara Region is undertaking a Schedule 'C' Municipal Class EA to identify an implementation strategy for the transportation infrastructure requirements for Four Mile Creek Road and York Road, including the intersection.

3 Alternative Solutions

Phase 1 of the Municipal Class EA process involves the identification of transportation problems and opportunities to be addressed by the study and is detailed in **Chapter 2**. The following section details Phase 2 of the Municipal Class EA process, which involves the identification and screening of a range of functionally different solutions to address the identified problems and opportunities. Alternative Solutions are high-level, planning options and include a "Do Nothing" scenario.

3.1 Description of Alternative Solutions

The following Alternative Solutions were considered to address the problems and opportunities:

Table 3-1: Alternative Solutions

Alternative Solution	Description
Do Nothing	Maintain existing conditions within the study area, i.e., intersection is controlled by an all-way stop.
Operational Improvements	Address traffic operation issues through intersection modifications and access management including potential for signalization and roundabouts.
York Road / Four Mile Creek Road Corridor Improvements	Address multi-modal transportation needs through the provision of active transportation facilities in the study area. Active transportation facilities in the study area may include extended and widened sidewalks, and cycling facilities, e.g., separated bike lanes, cycle tracks, or multi-use paths. Separated bike lanes would be provided as on-road facilities; whereas cycle tracks and multi use paths will be provided in the boulevard. The active transportation facilities will be provided on both York Road and Four Mile Creek Road to ensure a continuation and connectivity to the broader active transportation network in Niagara Region.

3.2 Screening of Alternative Solutions

To determine the most appropriate solution(s) a high-level screening was completed to assess the potential impacts of each alternative and their ability to address the problems and opportunities.

Table 3-2: Screening of Alternative Solutions

Alternative Solution	Preliminary Review	Recommendation
Do Nothing	- Does not address future capacity needs at the Four Mile Creek Road / York Road intersection. - Does not align with Niagara Region or Town of Niagara-on-the-Lakes planning policies.	Carry forward as a baseline comparison. Not recommended to address the problems and opportunities.
Operational Improvements	- Improves efficiency and safety of transportation network at key intersection. - Implements Niagara Region 2017 Transportation Master Plan (TMP) intersection improvement program recommendations. - May require additional right-of-way to accommodate modifications, this may result in footprint impacts near the intersection.	Carry forward
York Road / Four Mile Creek Road Corridor Improvements	- Accommodates new cycling facilities to address multi-modal transportation needs. - Consistent with Niagara Region 2017 TMP and Complete Street Design Manual goals to improve options for equitable transportation choices, sustainable modes, and to enhance multi-modal connectivity. - Follows OTM Book 18	Carry forward

Alternative Solution	Preliminary Review	Recommendation
	Aligned with Town of Niagara-on-the-Lake 2017 Official Plan growth strategy objective (3.2 I) to develop compact, complete communities with access to local stores and services via active transportation.	

3.3 Preferred Alternative Solution(s)

Based on the high-level screening in **Table 3-2**, Operational Improvements and Corridor Improvements are recommended to be carried forward to address the future multi-modal transportation needs of the Four Mile Creek Road / York Road intersection and the adjacent corridors. These solutions address the future transportation needs at the intersection (i.e., to avoid high delays and long queues due to the all-way stop) and are consistent with the objectives of the Region's 2017 Transportation Master Plan and Town of Niagara-on-the-Lake's 2017 Official Plan.

The Do-Nothing solution does not resolve the key problem related to future capacity at the intersection and is not aligned with the multi-modal transportation goals of Niagara Region or the Town of Niagara-on-the-Lake; however, this solution was carried forward through the process to serve as a baseline for comparison purposes.

4 Alternative Design Concepts

Phase 3 of the Municipal Class EA process involves examining alternative design methods to implement the preferred solution(s) from Phase 2 of the Municipal Class EA as identified in **Chapter 3**. The alternative design concepts are evaluated against the environmental factors relevant to the study, such as the natural environment, socio-economic environment, cultural environment, transportation and measures of mitigating or minimizing negative effects and maximizing positive effects. This Chapter documents the alternative design concepts developed and the associated analysis and evaluation.

4.1 Development of Alternative Design Concepts

4.1.1 Ontario Traffic Manuals

The Ontario Traffic Manual (OTM) was referenced as part of the development process for the intersection design concepts. The OTM has the objective of ensuring safe driving behaviour for all road users and it achieves this objective through providing information and guidance for transportation planners to promote uniformity in the design, application and operation of traffic control devices and systems across Ontario. The OTM is made up of a series of 22 Books which are being generated over a period of time and are consistently updated to become more comprehensive.

When considering the pedestrian crossings and active transportation infrastructure for this EA Study, the project team consulted with the specific OTM Books described in the following sections.

OTM Book 15 – Pedestrian Crossing Treatments

OTM Book 15 (June 2016), provides guidance and application information for pedestrian roadway crossing treatments. A pedestrian crossover (PXO) is a marked crosswalk identified by signs and pavement markings. PXOs require that motorists yield to pedestrians within the crosswalk.

OTM Book 18 – Cycling Facilities

OTM Book 18 (June 2021), provides guidance on the planning, design and operation of on- and off-road cycling facilities in Ontario. The cycling facility selection outline in Book 18 follows a three-step process:

1. Step 1 – Facility pre-selection: Pre-select an appropriate type of facility based on the vehicular volume and speed using the OTM Book 18 Nomograph. (See **Figure 4-1**)

2. Step 2 – Consideration of the specific Corridor Characteristics: Consider the design characteristics such as visibility of cyclists, number of driveways and whether on-street parking is provided.
3. Step 3 – Justify decision and identify design enhancements: Document the rationale of the chosen facility.

The above methodology outline in Book 18 was applied to determine the suitable cycling facility for this EA Study.

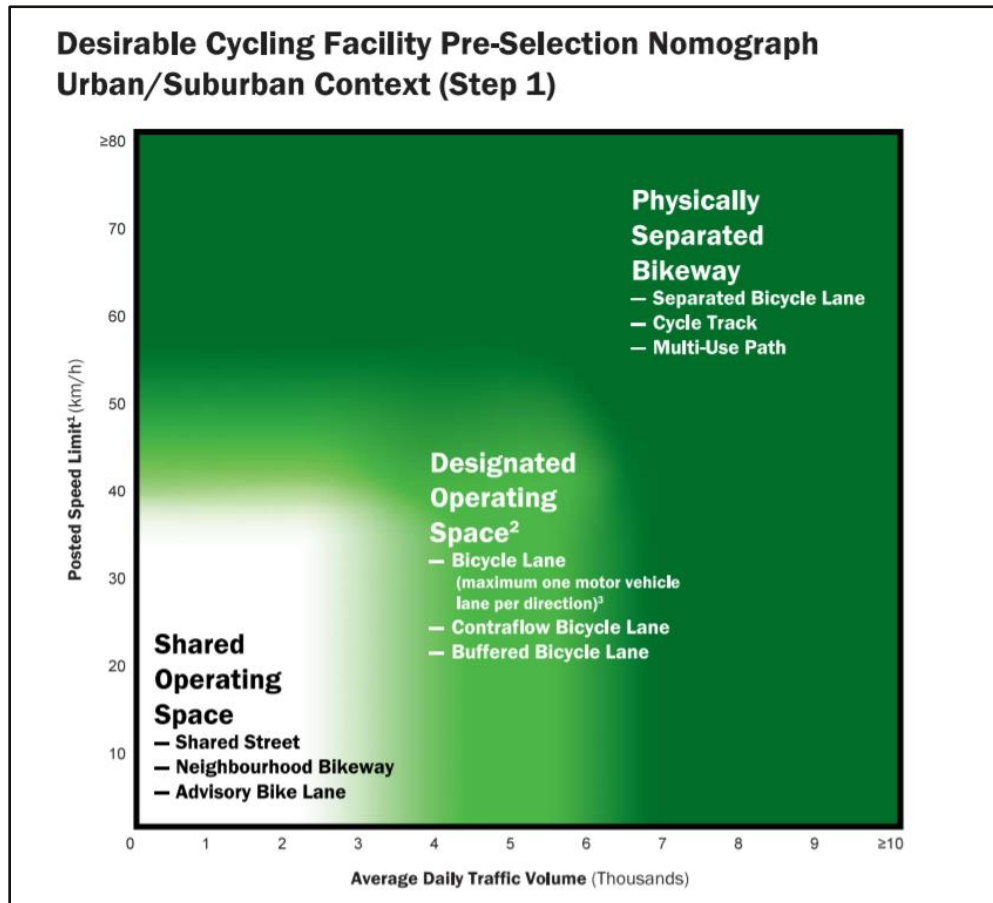


Figure 4-1: Book 18 Nomograph

4.1.2 Alternative Design Concepts

Modifications to Four Mile Creek Road and York Road are required to address anticipated future transportation needs at the intersection (i.e., to avoid high delays and long queues due to the existing all-way stop). Corridor improvements are proposed to support pedestrians and cyclists and overall active transportation network connections within the Region.

Accordingly, two (2) sets of alternative design concepts were developed: one (1) for the intersection itself, and one (1) for the development of active transportation facilities in the corridor. **Figure 4-2** illustrates the focused study areas for the development of the alternative design concepts.

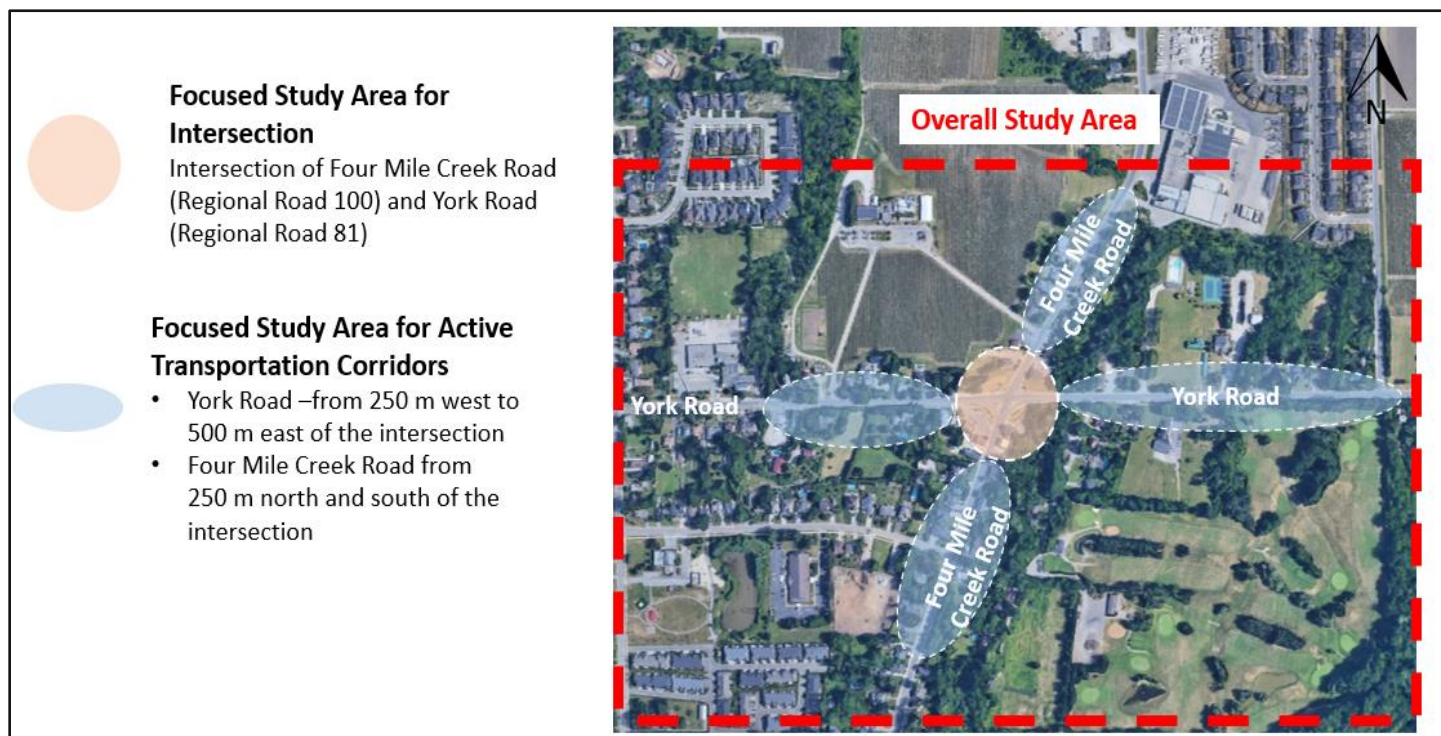


Figure 4-2: Focused Study Areas for Alternative Design Concepts

4.1.2.1 Intersection Design Concepts

The preferred solution, Alternative 1: Operational Improvements, requires modifications to the intersection of York Road and Four Mile Creek Road. Three intersection concepts have been developed: 'Do Nothing', signalized intersection and roundabout.

Intersection Alternative 0 – Do Nothing

The intersection would continue under all-way stop control.

Intersection Alternative 1 – Signalized Intersection

In this design concept, the intersection would be controlled by traffic signals. The two channelized right turns would be eliminated, and left-turn lanes, medians, and pedestrian crosswalks introduced on all legs. See **Figure 4-3**.



Figure 4-3: Alternative 1 – Signalized Intersection Design Concept

Intersection Alternative 2 – Roundabout

In this design concept, the intersection would be controlled by a single-lane roundabout. Pedestrian crosswalks would be included on all legs. See **Figure 4-4**.



Figure 4-4: Alternative 2 – Roundabout Design Concept

4.1.2.2 Active Transportation Design Concepts

Through the traffic analysis completed as part of the EA Study, it has been confirmed that 2-lanes (1 lane in each direction) are required on York Road and Four Mile Creek

Road. Other cross-sectional elements include curbs, active transportation facilities (i.e., bike lanes, cycle tracks, multi-use paths, sidewalks, etc.) and boulevard space for planting. These elements will be provided within the 20 m right-of-of York Road and 16 m right-of-way of Four Mile Creek Road.

Cycling facility type options were pre-selected based on the facility selection framework in Ontario Traffic Manual (OTM) Book 18: Cycling Facilities. Considering the average daily traffic volumes based on future conditions and posted speed limits on York Road and Four Mile Creek Road, physically separated bikeways are identified as the preferred level of separation for cyclists. Physically separated bikeways include separated bicycle lanes, cycle tracks and multi-use paths.

In addition to the level of separation for cyclists, the following aspects were considered in developing typical cross-sections for the corridors:

- Niagara Region's Complete Streets Design Manual (2017) – preliminary recommendation of Hamlet Street Typology
- Niagara Region's Transportation Master Plan (2017), and the Region's vision for active transportation and the strategic cycling network
- The existing road right-of-way width (16.0 m to 20.0 m)

Three typical cross-sections were developed, as described below and illustrated on following pages.

Alternative 0 – Do Nothing

In this alternative, no changes would be made to the corridors and therefore, no new active transportation facilities would be added to the study area. The existing sidewalks on Four Mile Creek Road and York Road would be maintained.

Alternative 1 – Separate Bicycle Lanes and Sidewalks

This design concept includes one 3.5 m travel lane, a 0.5 m buffer with physical separation, a 1.5 m bicycle lane, 0.5 m curb and gutter, a boulevard (width varies based on right-of-way), and a 1.8 m sidewalk on both sides of the road (**Figure 4-5**).

Alternative 2 – Cycle Tracks and Sidewalks

This design concept includes one 3.5 m travel lane with a 0.5 m curb and gutter, a 1.5 m one-way cycle track, a boulevard (width varies based on right-of-way) and a 1.8 m sidewalk on both sides of the road (**Figure 4-6**).

Alternative 3 – Multi-Use Paths

This design concept includes one 3.5 m travel lane with a 0.5 m curb and gutter, a boulevard (width varies based on right-of-way), and a 3.0 to 4.0 m multi-use path (width varies based on right-of-way) on both sides of the road (**Figure 4-7**).

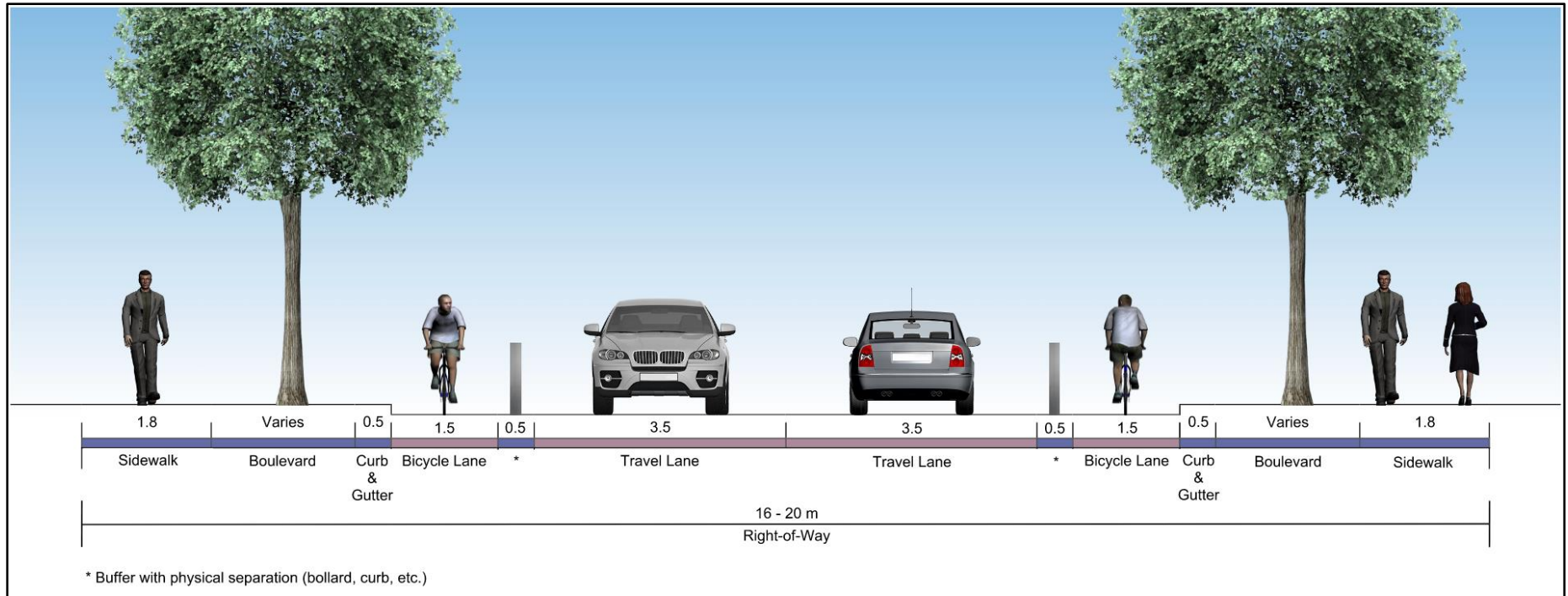


Figure 4-5: Alternative 1 - Physically Separated Bicycle Lanes and Sidewalks Design Concept

Note all dimensions are shown in metres.

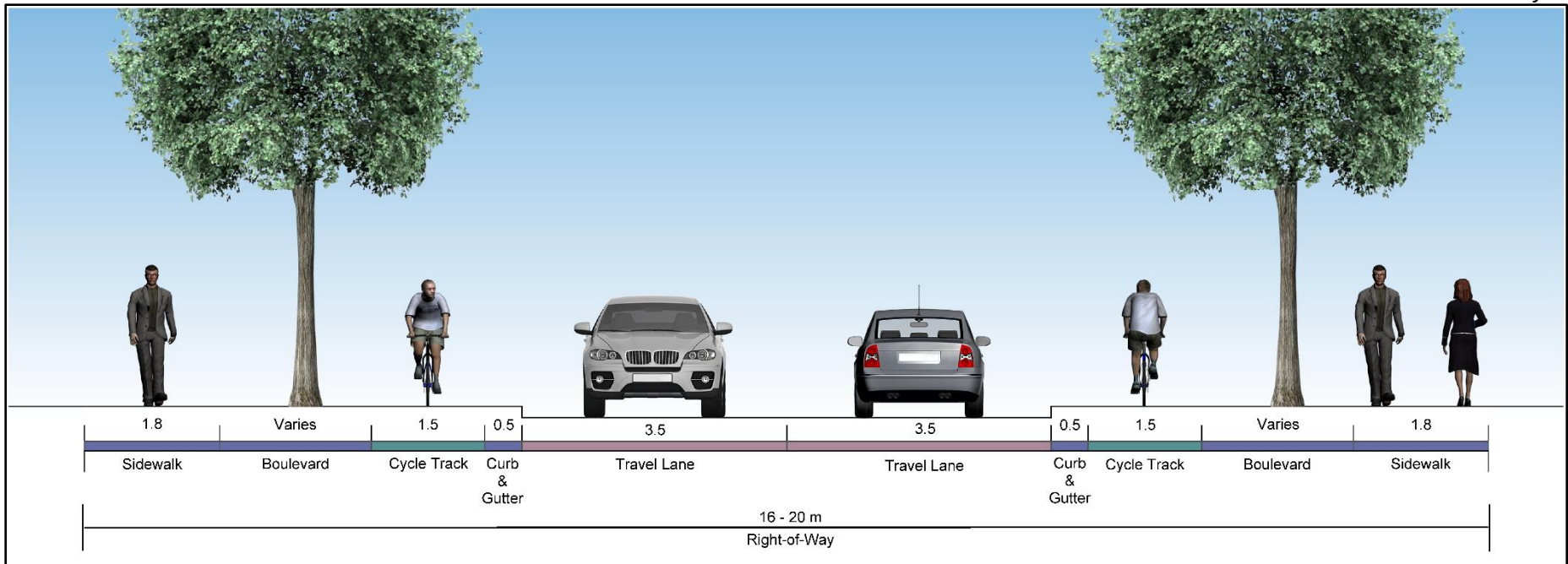


Figure 4-6: Alternative 2 - Cycle Tracks and Sidewalks Design Concept

Note all dimensions are shown in metres.

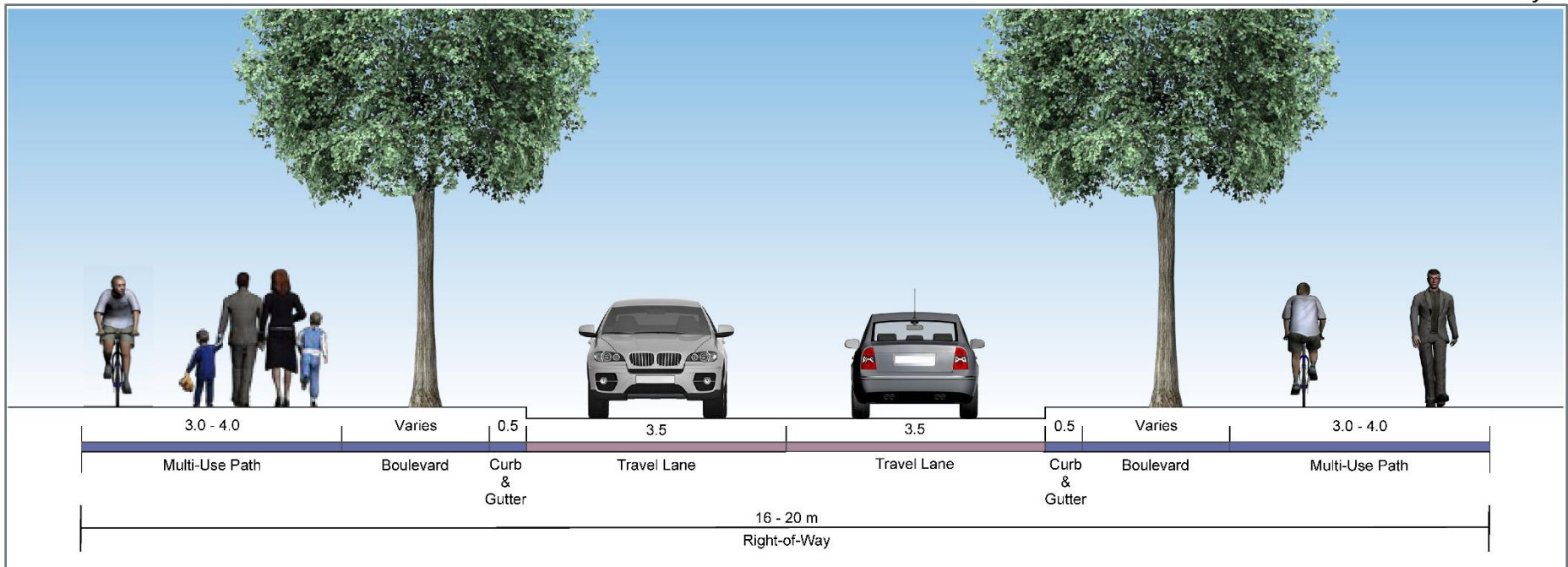


Figure 4-7: Multi-Use Paths Design Concept

Note all dimensions are shown in metres.

4.2 Evaluation of Alternative Design Concepts

4.2.1 Intersection Design Concepts

The effects of the intersection design concepts were assessed based on the criteria and factors listed in **Table 4-1**. A reasoned argument approach was used to assess the potential impacts of each concept and compare the relative significance of the impacts to select the preferred design concept. The evaluation is summarized in **Table 4-2**.

Table 4-1: Evaluation Criteria and Factors for Intersection Design Concepts

Criteria	Factors
Transportation: To evaluate the efficiency, movement, and safety of all modes of transportation with the different intersection design concepts.	• Future Peak Hour Traffic Operations • Off-Peak Hour Traffic Operations • Traffic Safety • Pedestrian Accommodation • Cyclists Accommodation
Natural Environment: To assess the impacts to the sensitive natural features.	• Creek Crossing Impacts • Species at Risk (SAR) Impacts • Tree/Vegetation Impacts • Emissions/Air Quality
Socio-Economic Environment: To assess potential impacts on residents and properties adjacent to the road.	• Property Impacts • Access Impacts • Speed Control • Vehicle Noise • Streetscaping Potential
Cultural / Archaeological Environment: To assess impacts the design concepts will have on cultural environment.	• Cultural Heritage Impacts • Archaeological Impacts
Engineering / Constructability: To assess the anticipated magnitude of disruptions that construction would cause and the cost of construction.	• Geometry • Effects on Utilities/Services • Construction Staging • Operating and Maintenance Costs • Capital Cost (Utility Relocation and Construction)

The detailed evaluation **Table 4-2** uses the following five category-ranking to represent the extent of the impact of the alternative when evaluated against the evaluation criteria. These symbols are used to visually represent the qualitative analysis and is not meant as a quantitative assessment tool.

Legend:

				
Very Low Impact (Most Desirable)	Fairly Low Impact	Medium / Ambivalent Impact	Fairly High Impact	Very High Impact (Least Desirable)

Table 4-2: Evaluation of Intersection Design Concepts

Evaluation Criteria	Alternative 0 – Do Nothing (All-Way Stop Control)	Alternative 1 – Signalized Intersection	Alternative 2 - Roundabout
Transportation			
Peak Hour Traffic Operations	Delays will steadily increase, becoming high in the PM peak hour northbound and southbound by 2031 and more widespread in both peak hours by 2041. 	Low delays. 	Low delays. 
Off-Peak Traffic Operations	Low to moderate delays as drivers come to a full stop. 	Low to moderate delays for side street traffic, even if no traffic in other direction. 	Low delays for all traffic. 
Traffic Safety	Potential for high-speed angle and turning-movement collisions. 	Potential for high-speed angle and turning-movement collisions. 	Statistically the safest type of at-grade intersection for all road users. 
Pedestrian Accommodation	Short crossing distances, but no pedestrian crosswalk on north leg and no tactile walking surface indicators (TWSI's). 	Longer crossing distances but have TWSI's and audible signals. 	Shortest crossing distances, TWSI's, pedestrians only have to look in one direction at a time. 
Cyclist Accommodation	Cyclists have no dedicated facilities. 	Cyclists would have dedicated facilities. Crossing at intersection would be accommodated by cross ride. but higher traffic speeds for turning movements. 	Cyclists have dedicated facilities, but crossings are via crosswalks as pedestrians and cyclists will have to dismount. 

Transportation Summary:

- Retaining the all-way stop will not address peak hour delays and queues at the intersection and will not improve conditions for pedestrians and cyclists.
- The signalized intersection alternative will address peak hour delays and queues and improve conditions for pedestrians but will not address potential severe injuries resulting from road collisions.
- The roundabout alternative will address peak hour delays and queues and improve conditions for pedestrians and cyclists and will improve road safety and reduce potential severe injuries resulting from collisions.

Evaluation Criteria	Alternative 0 – Do Nothing (All-Way Stop Control)	Alternative 1 – Signalized Intersection	Alternative 2 - Roundabout
Natural Environment			
Creek Crossing Impacts	None. 	Taper for westbound left-turn lane will lead to a wider cross section and therefore would impact the Four Mile Creek structure located immediately east of the intersection. The implementation of active transportation facilities will require additional right-of-way. 	The roundabout itself is not expected to have direct impact to the Four Mile Creek structure. However, the implementation of active transportation facilities will require additional right-of-way. 
Species at Risk (SAR) Impacts	None. 	Do not anticipate impacts to SAR. 	Do not anticipate impacts to SAR. 
Trees / Vegetation Impacts	None. 	Some potential impact to Four Mile Creek crossing and associated property impacts. 	Some potential impact to Four Mile Creek crossing and associated property impacts. 
Emissions / Air Quality	Vehicle idling due to stop/start cycles during peak and off-peak times. 	Vehicle idling due to stop/start cycles during peak and off-peak times. 	Generally, more continuous and uniform traffic flow should reduce stop/start cycles of vehicles and therefore lead to lower emissions. 

Natural Environment Summary:

- Overall, the signalized intersection alternative does not compare quite as favourably as the all-way stop and roundabout in terms of the natural environment.

Evaluation Criteria	Alternative 0 – Do Nothing (All-Way Stop Control)	Alternative 1 – Signalized Intersection	Alternative 2 - Roundabout
Cultural / Archaeological Environment			
Cultural Heritage Impacts	None. 	Signalized intersection itself will be in close proximity to old barn in northwest corner and will directly impact building at #253 Four Mile Creek Road. 	Roundabout itself will be in close proximity to old barn in northwest corner and building at #253 Four Mile Creek Road; however, no direct impact to buildings. 

Evaluation Criteria	Alternative 0 – Do Nothing (All-Way Stop Control)	Alternative 1 – Signalized Intersection	Alternative 2 - Roundabout
Archaeological Impacts	None. 	Parts of the study area exhibit archaeological potential and require Stage 2 Assessment prior to any construction activities. 	Parts of the study area exhibit archaeological potential and require Stage 2 Assessment prior to any construction activities. 

Cultural / Archaeological Environment Summary:

- Although the retaining the all-way stop (i.e., the do nothing alternative) will result in the least impact, between the other two the roundabout alternative is preferred because it will not directly impact the building on the southwest corner of the intersection.

Evaluation Criteria	Alternative 0 – Do Nothing (All-Way Stop Control)	Alternative 1 – Signalized Intersection	Alternative 2 - Roundabout
Socio-Economic Environment			
Property Impacts	Does not impact any property in study area. 	Impacts approximately 875 m ² of privately-owned property in study area. 	Approximately 805 m ² of privately-owned property in study area. 
Access Impacts	None. 	Median on south leg restricts access to closest driveway on east side to right turns only. 	Splitter island on south leg restricts access to closest driveway on east side to right turns only. 
Speed Control	Drivers are expected to stop at the stop signs per traffic regulations. 	Drivers are expected to come to a complete stop on a red signal. However, speeding may occur at yellow indication. Overall, traffic speeds will be higher than with the other alternatives. 	Generally continuous flow and low speeds due to roundabout geometry. 
Vehicle Noise	Moderate due to vehicle stop/start cycles. 	Moderate due to vehicle stop/start cycles. 	Lower due to more continuous and uniform traffic flow. 
Streetscaping Potential	None. 	Some with reconstruction of intersection. 	More with reconstruction of intersection and roundabout central island. 

Socio-Economic Environment Summary:

- The signalized intersection alternative will have greater impact to adjacent properties compared to the all-way stop and roundabout.
- From an operation and road user perspective, the roundabout alternative is the most preferred as it is expected to encourage lower speeds through the intersection and result in less vehicle noise.

Evaluation Criteria	Alternative 0 – Do Nothing (All-Way Stop Control)	Alternative 1 – Signalized Intersection	Alternative 2 - Roundabout
Engineering / Constructability			
Geometry	Current geometry does not accommodate large trucks for all movements; some truck turning movements strikes the curbs. 	Geometry under signalized intersection will accommodate truck turning movements. 	Geometry under roundabout will accommodate truck turning movements. 
Construction Staging	None. 	Minor lane closures during construction. 	Lane closures but can be mitigated through detours on adjacent roads during construction. 
Operation and Maintenance Costs	Status quo. 	Will require ongoing maintenance of the signal traffic signals, monitoring of signal timing, as well as other typical roadway maintenance costs, etc. 	Will require landscaping maintenance, as well as other typical roadway maintenance costs. 
Capital Cost (Utility Relocation and Construction)	None. 	Estimated at \$3.7 million. This includes relocation of major Bell boxes northeast corner and major utility pole on southeast corner. 	Estimated at \$3.5 million. This includes relocation of major utility pole on southeast corner. 

Engineering / Constructability Summary

- Retaining the all-way stop is the lowest-cost alternative, but it will not mitigate existing geometric issues with large trucks.
- The signalized intersection and roundabout alternatives will both address existing geometric issues but will be expensive to construct.

Evaluation Criteria	Alternative 0 – Do Nothing (All-Way Stop Control)	Alternative 1 – Signalized Intersection	Alternative 2 - Roundabout
Summary	Although retaining the all-way stop is the lowest-cost alternative, it will not address peak hour delays and queues at the intersection. It will also not improve conditions for pedestrians and cyclists, nor mitigate existing geometric issues with large trucks.	The signalized intersection alternative will address peak hour delays and queues and improve conditions for pedestrians and cyclists, but it will have greater impacts to the natural environment and built heritage properties.	The roundabout alternative will address peak hour delays and queues and improve conditions for pedestrians and cyclists. It will also have socio-economic benefits compared to a signalized intersection. Overall, this is the best balance in addressing transportation needs while minimizing potential impacts where feasible.
Recommendation	Not Recommended 	Not Recommended 	Recommended 

4.2.2 Active Transportation Design Concepts

The typical cross sections for the active transportation design concepts were assessed based on the criteria and factors shown in **Table 4-3**. The assessment is summarized in **Table 4-4**.

Table 4-3: Evaluation Criteria and Factors for Active Transportation Design Concepts

Criteria	Factors
Transportation: To evaluate the efficiency, movement, and safety of all modes of transportation with the different intersection design concepts.	• Pedestrian Accommodation • Cyclist Accommodation • Transit and Goods Movement Accommodation • Connection to Existing and Planned Active Transportation Facilities
Natural Environment: To assess the impacts to the sensitive natural features.	• Potential Impact to Four Mile Creek Crossing
Socio-Economic Environment: To assess potential impacts on residents and properties adjacent to the road.	• On-Street Parking Impacts (Four Mile Creek Road south of York Road) • Access Management • Speed Control • Streetscaping Potential • Integration with Adjacent Land Uses (Existing and Future)
Cultural / Archaeological Environment: To assess impacts the design concepts will have on cultural environment.	• Cultural Heritage Impacts • Archaeological Impacts
Conformance to Planning Documents: To assess the concepts based on the current planning policies.	• Conformance to Niagara Region Transportation Master Plan • Conformance to Complete Streets Approach • Conformance with Vision Zero Objectives • Conformance with Town of Niagara-on-the-Lake Official Plan Objectives

Criteria	Factors
Engineering / Constructability: To assess the anticipated magnitude of disruptions that construction would cause and the cost of construction	• Potential Impact and Offset Requirement for Utilities / Services • Operating and Maintenance

The detailed evaluation **Table 4-4** uses the following five category-ranking to represent the extent of the impact of the alternative when evaluated against the evaluation criteria. These symbols are used to visually represent the qualitative analysis and is not meant as a quantitative assessment tool.

Legend:

				
Very Low Impact (Most Desirable)	Fairly Low Impact	Medium / Ambivalent Impact	Fairly High Impact	Very High Impact (Least Desirable)

Table 4-4: Evaluation of Active Transportation Design Concepts

Evaluation Criteria	Alternative 0 – Do Nothing	Alternative 1 – Separated Bicycle Lanes	Alternative 2 – Cycle Tracks and Sidewalk	Alternative 3 – Multi-use Paths
Transportation				
Pedestrian Accommodation	Some existing sidewalks in various sections of Four Mile Creek Road and York Road. Most are narrow and discontinuous. 	1.8 m sidewalk provided on both sides of the road, adjacent to the boulevard and separate from the on-road bicycle lane. 	1.8 m sidewalk provided on both sides of the road, adjacent to the boulevard which provide separation from the cycle track. 	3.0 to 4.0 m multi-use path on both sides of the road to accommodate pedestrians and cyclists. Potential conflict between pedestrians and cyclists due to shared facilities. 
Cyclist Accommodation	No dedicated accommodation for cyclists. 	Dedicated buffered bike lanes for cyclists; separated from travel lanes by flexible bollards and separated from sidewalk in the boulevard. 	Off-road cycle tracks in the boulevard; separated from travel lanes by mountable curb and separated from sidewalk on the other side of the boulevard. 	3.0 to 4.0 m multi-use path on both sides of the road to accommodate pedestrians and cyclists. Potential conflict between pedestrians and cyclists. 
Transit and Goods Movement - NOTL Transit services were suspended indefinitely as of April 9, 2020. NRT OnDemand Transit services the Town. - OnDemand Transit is a rideshare program with no fixed schedules or routes. A fleet of dedicated transit vehicles provides trips within the service boundaries.	Status quo. May have to reconstruct existing sidewalk should transit amenities be provided at the intersection. 	In the future, pedestrians may have to cross bicycle lane to access transit vehicles. 	May be more difficult with narrower road and cycle track between road and sidewalk. In the future, pedestrians may have to cross cycle track to access transit vehicles. 	In the future, pedestrians may have to cross cyclists' path to access transit vehicles. Cyclists may be travelling at lower speeds compared to those in a bike lane or cycle track. 
Connection to Existing and Planned Active Transportation Facilities - Within the study area Four Mile Creek Road is part of the existing cycling network - Within the study area, York Road has been identified as an "infill link". From Queenston Road to Four Mile Creek Road, a multi-use trail is preferred on the north side of York Road to accommodate travel to St. Davids Public School. From Four Mile Creek Road to Concession Road 2, volumes support a shared facility. The facility	Does not provide connection to existing or planned active transportation facilities on Four Mile Creek Road or York Road. 	Provides connection to existing active transportation facility on Four Mile Creek Road and future facilities on York Road. 	Provides connection to existing active transportation facility on Four Mile Creek Road and future facilities on York Road. 	Provides connection to existing active transportation facility on Four Mile Creek Road and future facilities on York Road. 

Evaluation Criteria	Alternative 0 – Do Nothing	Alternative 1 – Separated Bicycle Lanes	Alternative 2 – Cycle Tracks and Sidewalk	Alternative 3 – Multi-use Paths
type identified does not necessarily reflect the preferred ultimate facility type; however, it does reflect an appropriate facility for the street context. In the Town of NOTL OP, York Road is identified as a future on-road cycling facility. Active transportation facilities are not identified on Four Mile Creek Road.				
Natural Environment				
Potential Impact to Four Mile Creek Crossing	None. 	New cross section will require nominal widening at Four Mile Creek crossing and extension of culverts on York Road to accommodate active transportation facilities; similar for all alternatives. 	New cross section will require nominal widening at Four Mile Creek crossing and extension of culverts on York Road to accommodate active transportation facilities; similar for all alternatives. 	New cross section will require nominal widening at Four Mile Creek crossing and extension of culverts on York Road to accommodate active transportation facilities; similar for all alternatives. 
Socio-Economic Environment				
On Street Parking Impacts (Four Mile Creek Road south of York Road)	None. Existing on-street parking maintained on both sides of the road. 	Removes existing on-street parking on both sides of the road (i.e., convert space of existing parking into on street bike lanes). 	Removes existing on-street parking on both sides of the road (i.e., convert space of existing parking into off road cycle track with mountable curb). 	Removes existing on-street parking on both sides of the road (i.e., convert space of existing parking into multi-use path). 
Access Management Potential conflict between cyclists and vehicles as a result of vehicles entering and exiting the road.	Currently no designated cycling facility, potential for conflict if driver is not expecting cyclists on road or sidewalk. 	Suitable facility type considering site characteristics. 	Suitable facility type considering site characteristics. 	Suitable facility type considering site characteristics, assuming one-way paths on both sides of the road. However, a two-way path on one side would introduce additional conflicts. Motorists exiting driveways would not expect cyclists approaching from opposite the direction of traffic. 

Evaluation Criteria	Alternative 0 – Do Nothing	Alternative 1 – Separated Bicycle Lanes	Alternative 2 – Cycle Tracks and Sidewalk	Alternative 3 – Multi-use Paths
Speed Control	Status quo. 	On-road bike lanes will increase overall pavement width and may increase vehicle speeds (mainly applies to York Road). However, bollards may offer some traffic calming. 	On average, lanes widths will be similar to existing. 	On average, lanes widths will be similar to existing. 
Streetscaping Potential	Status quo. 	Similar boulevard space between alternatives (mainly applies to York Road). 	Similar boulevard space between alternatives (mainly applies to York Road). 	Similar boulevard space between alternatives (mainly applies to York Road). 
Integration with Adjacent Land Uses (Existing and Future) - Permitted land use within the study area is primarily residential with some commercial and conservation uses surrounding the intersection. There are several community facilities on York Road near the intersection, including St Davids Public School and Queenston United Church (Land Use Plan – St Davids – Schedule B4, NOTL Official Plan, August 2019). - St. Davids is experiencing significant development in the form of new residential subdivisions and condominium townhouse development (1.1.8, NOTL Official Plan, August 2019). - Study area is designated as built-up urban area (Appendix 4.4 Schedule B – Regional Structure Draft, Niagara Official Plan Consolidated Policy Report, May 2021).	Less appropriate treatment considering surrounding residential land use and facilities (e.g., public school, St. Davids Lions Park, etc.) nearby. Does not provide dedicated or separate cycling facilities to support multi-modal approach. 	Appropriate treatment considering surrounding land use, nearby facilities, and future residential development in St. Davids. 	Dedicated facilities for pedestrians and cyclists which may be more attractive for users such as students and tourists. Appropriate treatment considering surrounding land use, nearby facilities, and future residential development in St. Davids and tourist destinations in the area. 	Appropriate treatment considering surrounding land use, nearby facilities, and future residential development in St. Davids. 
Cultural / Archaeological Environment				
Cultural Heritage Impacts	None. 	Some chance of impact to building at #253 Four Mile Creek Road. To be confirmed at detailed design. 	More chance of impact to building at #253 Four Mile Creek Road. To be confirmed at detailed design. 	Potential encroachment on building at #253 Four Mile Creek Road. To be confirmed at detailed design. 

Evaluation Criteria	Alternative 0 – Do Nothing	Alternative 1 – Separated Bicycle Lanes	Alternative 2 – Cycle Tracks and Sidewalk	Alternative 3 – Multi-use Paths
Archaeological Impacts	None. 	Stage 2 Archaeological assessment required along cemetery at Queenston United Church prior to construction (east leg only). 	Stage 2 Archaeological assessment required along cemetery at Queenston United Church prior to construction (east leg only). 	Stage 2 Archaeological assessment required along cemetery at Queenston United Church prior to construction (east leg only). 
Conformance to Planning Documents				
Niagara Region Transportation Master Plan (TMP) - Four Mile Creek Road and York Road are part of the strategic cycling network. - Within the study area Four Mile Creek Road (Regional Road 100) is part of the existing cycling network (Appendix C: Strategic Cycling Network, Strategic Cycling Network Development Technical Paper, June 2017). - Within the study area, York Road has been identified as an “infill link”. From Queenston Road to Four Mile Creek Road, a multi-use trail is preferred on the north side of York Road to accommodate travel to St. Davids Public School. From Four Mile Creek Road to Concession Road 2, volumes support a shared facility. The facility type identified does not necessarily reflect the preferred ultimate facility type; however, it does reflect an appropriate facility for the street context. (Infill Corridor Feasibility Review / Appendix D: Summary of Infill Corridors, Strategic Cycling Network Development Technical Paper, June 2017).	Inconsistent with strategic cycling network identified in the Niagara Region Official Plan and Transportation Master Plan (TMP). 	Consistent with strategic cycling network identified in the Niagara Region Official Plan and TMP. 	Consistent with strategic cycling network identified in the Niagara Region Official Plan and TMP. 	Most consistent with strategic cycling network identified in the Niagara Region Official Plan and TMP. 
Complete Streets Approach A complete street accommodates multiple modes of transportation, people of all ages and abilities and supports adjacent land uses (Complete Streets in Niagara, web page).	Status quo. 	Prioritizes pedestrians and, to some extent, cyclists. 	Prioritizes pedestrians and cyclists. 	Appropriate for both experienced and inexperienced cyclists, pedestrians, and other users such as in-line skaters, skateboarders, wheelchair users, etc. 

Evaluation Criteria	Alternative 0 – Do Nothing	Alternative 1 – Separated Bicycle Lanes	Alternative 2 – Cycle Tracks and Sidewalk	Alternative 3 – Multi-use Paths
Vision Zero Objectives Vision Zero is a multi-national road traffic safety project that aims to achieve a road network with no fatalities or serious injuries involving road traffic. The Vision Zero Road Safety Program strives to eliminate traffic fatalities and serious injuries on Niagara regional roads, while increasing safe, healthy, equitable mobility for all road users.	Status quo. 	Provision of separated facilities for pedestrians and cyclists conforms with Vision Zero objectives. Less protected facility for cyclists compared with other alternatives. 	Narrowest overall road widths, most protected facilities for pedestrians and cyclists. 	Provision of multi-use path for pedestrians and cyclists conforms with Vision Zero objectives. Less protected facility for pedestrians compared with other alternatives, potential conflict between pedestrians and cyclists. 
Town of Niagara-on-the-Lake Official Plan Objectives - Objective to provide for alternative modes of transportation to the private automobile such as walking and bicycling (9.1.2.1 f, NOTL Official Plan, August 2019). - The Town supports Regional initiatives to develop and expand cycling and other forms of active transportation options throughout the Town (9.1.4.4, NOTL Official Plan, August 2019). - Main function of regional roads is to move large volumes of vehicles over long distances within the region and provide for active transportation options inside these rights-of-way (9.1.7.1 a, NOTL Official Plan, August 2019). - York Road is identified as a future on-road cycling facility. Active transportation facilities are not identified on Four Mile Creek Road (Recreational Trails and Major Open Spaces – Schedule F, NOTL Official Plan, August 2019).	Does not provide for alternative modes of transportation or support Regional initiative to expand active transportation throughout the Town. 	Aligned with objectives to provide for alternative modes of transportation and support Region initiatives to expand active transportation throughout the Town. Satisfies on-road facility classification. 	Aligned with objectives to provide for alternative modes of transportation and support Region initiatives to expand active transportation throughout the Town. Does not satisfy on-road facility classification. 	Aligned with objectives to provide for alternative modes of transportation and support Region initiatives to expand active transportation throughout the Town. Does not satisfy on-road facility classification. 
Engineering / Constructability				
Utilities/Services (Potential Impact and Offset Requirement)	No effect. 	Minor impacts on overhead utilities outside of intersection. 	Minor impacts on overhead utilities outside of intersection. 	Minor impacts on overhead utilities outside of intersection. 

Evaluation Criteria	Alternative 0 – Do Nothing	Alternative 1 – Separated Bicycle Lanes	Alternative 2 – Cycle Tracks and Sidewalk	Alternative 3 – Multi-use Paths
Operation and Maintenance Assume width requirement for street sweeper vehicle is 1.8 m and maintenance cost implications should narrow facilities require specialized or manual clearing methods (OTM Book 18).	Status quo. 	Unobstructed width of bicycle lane is 1.5 m. May require specialized equipment for cleaning and winter maintenance. Would require pass on sidewalk and bicycle lane on both sides of the road. Physical barriers (i.e., bollards, planters, etc.) may need to be removed to accommodate maintenance equipment and snow storage. 	Unobstructed width of cycle track is 2.0 m, including mountable curb. Would require pass on sidewalk and cycle track on both sides of the road for cleaning and winter maintenance. 	Unobstructed width of multi-use path is greater than 2.0 m. Would require two passes, on both sides of the road, for cleaning and winter maintenance. 
Summary				
Summary	Doing nothing will not address missing links in the pedestrian network, nor improve conditions for cyclists.	The addition of on-road bike lanes, either shared or separate, along with wider sidewalks and the retention of on-street parking on the south leg, is a good alternative, but not as good as Alternative 2.	The addition of off-road cycle tracks, along with wider sidewalks, is considered the preliminary preferred alternative because it maximizes separation between cyclists and pedestrians, and between cyclists and motor vehicles.	Best balanced but very close to ranking for cycle tracks. The final decision may come down to operating and maintenance decisions between the Region and Town.
Recommendation	Not Recommended 	Not Recommended 	Recommended 	Not Recommended 

4.3 Preferred Alternative Design Concepts

Based on the results of the evaluation, Intersection Alternative 2, Roundabout, and Active Transportation Alternative 2, Cycle Tracks and Sidewalks are the preferred design concepts. The Roundabout is preferred compared with the all-way stop and signalized intersection design concepts because it addresses peak hour delays and queues while minimizing impacts to the natural environment and built heritage resources, where feasible. Cycle Tracks and Sidewalks are preferred because cycle tracks provide greater separation between cyclists and motor vehicles, and cyclists and pedestrians, compared with physically separated bicycle lanes and multi-use paths. These preferred design concepts will form the basis for “Recommend Plan”, described in **Chapter 6** of this report.

4.4 Refined Designed Concepts

During discussions with area property owners after PIC #2 a refinement was made to the geometric design of the roundabout. This consisted of altering the alignment of the north leg such that it encroached less outside the right-of-way of Four Mile Creek Road, in the vicinity of the Old Fire Hall restaurant.

During discussions with the Town of Niagara-on-the-Lake it was revealed that having cycle tracks and sidewalks together, instead of separated by a boulevard, will make it easier to maintain the two facilities in the winter. It will also act to locate the cycle track farther from the road where there is space for a boulevard between them. A tactile strip will be provided between the sidewalk and cycle track to assist people with vision loss in discerning between the two facilities.

5 Public Consultation

Consultation with stakeholders, members of the public, agencies and Indigenous Communities is a key part of the MCEA process and also a part of this EA Study. Since the entirety of the project took place during the COVID-19 pandemic (January 2021 to March 2022) and emergency orders prohibiting public gatherings were in place, the Region made significant efforts to notify all interested parties in a variety of ways (newspaper ads, emails, mail-outs, bulletin board notices, study web page, etc.) and provided a number of consultation opportunities (virtual public information centres, virtual meetings, phone calls, on-site outdoor one-on-one meetings, etc.). This chapter summarizes the consultation effort during the EA Study.

5.1 Consultation Area

To better encompass the residents and property owners who live close to the intersection of York Road and Four Mile Creek Road, a Consultation Area was identified, and a mailing list was created by the Region based on this area. As shown in **Figure 5-1** this area extends beyond the study area of the EA Study and includes to the newer subdivisions to the north close to Line 9 Road. Property owners within the Consultation Area received Notice of Study Commencement, Notices of Public Information Centre #1 and #2, the study newsletter, as well as the Notice of Study Completion.

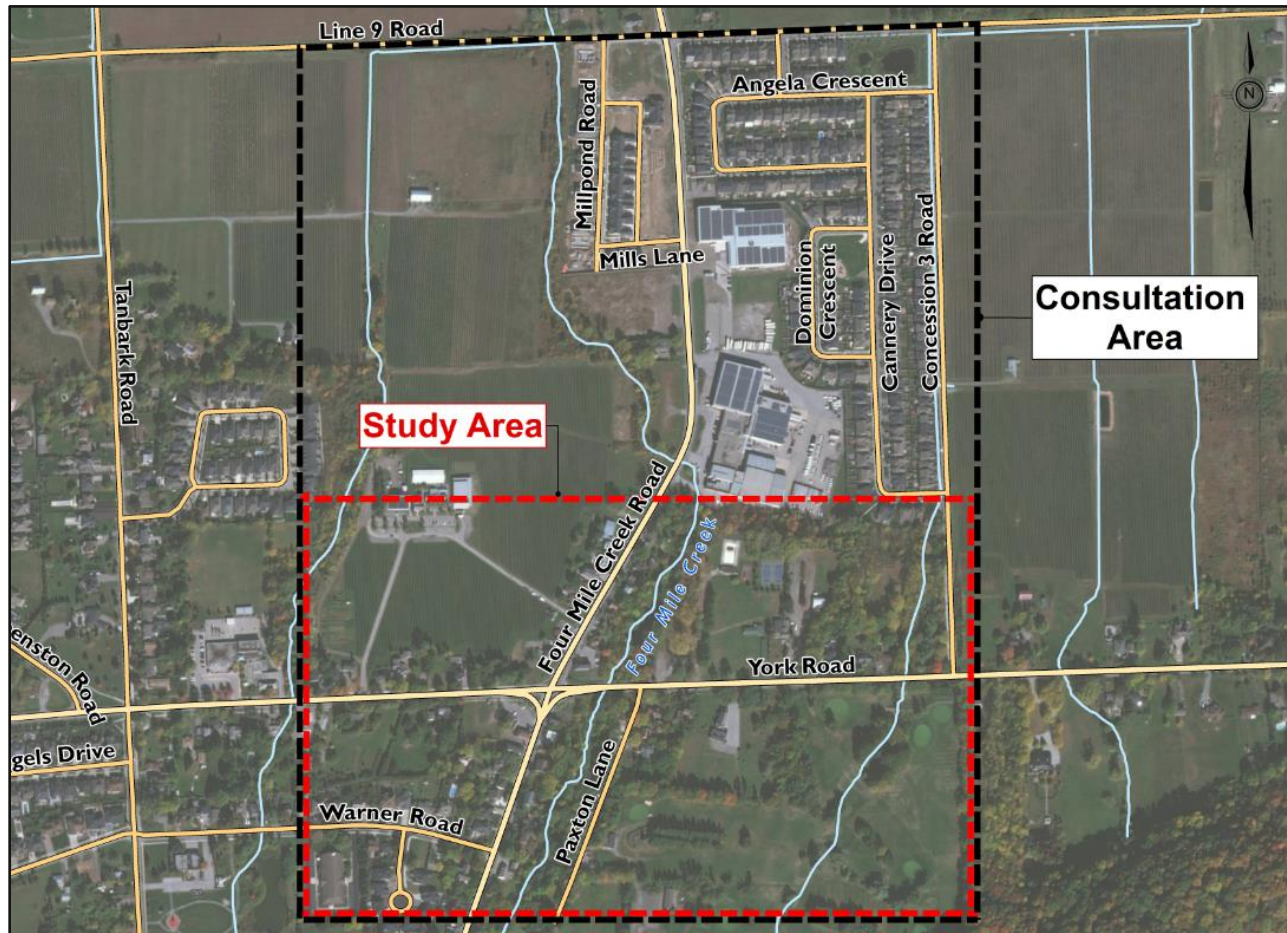


Figure 5-1: Consultation Area

5.2 Key Points of Contact

External agencies, utilities, emergency service providers, Indigenous communities, as well as residents, business owners and property owners within the Consultation Area were contacted directly at key milestones during the Municipal Class EA Study to provide input to the study and feedback on the decision-making process. The key points of contact are listed in **Table 5-1**. The list of relevant agencies and stakeholders contacted during the EA Study can be found in **Section 5.3**.

At the outset of the study, a direct mailing list of residents and businesses within the consultation area shown in **Figure 5-1** was developed. The mailing list was updated based on feedback received throughout the study.

Members of the public were made aware of the study through a notification in the local newspapers (Niagara-on-the-Lake Local The Lake Report and Niagara This Week) and were invited to contact the project team to join the project mailing list. Members of the

general public requesting to be on the mailing list received direct notification of subsequent study milestones.

A dedicated project webpage was established through the Region of Niagara's website at the outset of the study. Project updates were uploaded to the website as the study progressed.

Project website: <https://www.niagararegion.ca/projects/regional-road-100/default.aspx>

Table 5-1: Key Points of Contact

Notice	Notification & Date	Purpose
Notice of Study Commencement	- Streamlined EA Project Information Form and Notice emailed to MECP on January 6, 2021. - Noticed emailed to Indigenous Communities on January 11, 2021. - Notice mailed via Canada Post to agencies, stakeholders, residents and business owners without email the week of January 11, 2021. - Notice emailed to agencies, stakeholders, residents and business owners on January 12, 2021. - Notice advertised in Niagara-on-the-Lake Local and Niagara This Week on January 14, 2021.	To introduce and invite participation in the study and to request preliminary comments.
Public Information Centre #1	- Noticed emailed to Indigenous Communities on March 5, 2021. - Notice emailed to agencies, stakeholders, residents and business owners on March 10, 2021. - Notice mailed via Canada Post to agencies, stakeholders, residents and business owners without email the week of March 15, 2021.	To notify and invite interested parties to view and participate in the first virtual Public Information Centre held on March 25, 2021.

Notice	Notification & Date	Purpose
	• Notice advertised in Niagara-on-the-Lake Local on March 10, 2021 and March 17, 2021. • Notice advertised in Niagara This Week on March 11, 2021 and March 18, 2021.	
Public Information Centre #2	• Notice emailed to agencies, stakeholders, residents and business owners on June 9, 2021. • Notice emailed to Indigenous Communities on June 10, 2021. • Notice mailed via Canada Post to agencies, stakeholders, residents and business owners without email the week of June 7, 2021. • Notice advertised in Niagara-on-the-Lake Local on June 9, 2021 and June 16, 2021. • Notice advertised in Niagara This Week and The Lake Report on June 10, 2021 and June 17, 2021.	To notify and invite interested parties to view and participate in the second virtual Public Information Centre held on June 23, 2021.
Project Newsletter	• Notice mailed via Canada Post to all residents and property owners the week of October 25, 2021. • Notice was placed in all mailboxes at the Canada Post Office for all residents and business owners the week of October 25, 2021.	To provide an overview of the study to date, evaluation process and its outcome, website link to the project webpage, contact information and next steps in the process.
Notice of Study Completion	• Notice emailed to Indigenous Communities on the week of June 27, 2022. • Notice mailed via Canada Post to agencies, stakeholders, residents and business owners without email the week of June 27, 2022.	To announce completion of the Class EA Study and notify interested parties of the 45-calendar day review period for the Environmental Study Report.

Notice	Notification & Date	Purpose
	• Notice emailed to agencies, stakeholders, residents and business owners on the week of July 4, 2022. • Notice advertised in Niagara-on-the-Lake Local, The Lake Report and Niagara This Week on June 30, 2022 and July 7, 2022.	

5.3 External Agency and Stakeholder Consultation

As stated previously, a list of relevant technical agencies was assembled at the beginning of the study. External ‘agencies’ (including regulator/review agencies, utilities and emergency service providers) were first notified of the study via email informing them of the commencement of the study and soliciting their comments. A copy of the stakeholder list is provided in **Appendix A**. The following list provides the agencies, utilities, and other stakeholders that were consulted throughout the study:

- Provincial Agencies
 - Ministry of the Environment, Conservation and Parks
 - Ministry of Northern Development, Mines, Natural Resources and Forestry
 - Ministry of Heritage, Sport, Tourism and Culture Industries
 - Niagara Peninsula Conservation Authority
 - Ministry of Transportation
 - Infrastructure Ontario, Development Planning, Realty Portfolio Planning
- Municipal Agencies
 - Town of Niagara-on-the-Lake
 - Niagara-on-the-Lake Agricultural Committee
 - NRT on Demand
- Emergency Services
 - Niagara Regional Police Services
 - Niagara Emergency Medical Services
- Utility Services

- Enbridge Gas Distribution
- Niagara-on-the-Lake Hydro Inc.
- Enbridge Pipelines Inc.
- Niagara Regional Broadband Network
- Hydro One Networks Inc.
- Rogers Cable
- Cogeco Data Services
- Trans-Northern Pipeline
- Group Telecom
- Interested Stakeholders
 - Niagara Escarpments Commission
 - Niagara-on-the-Lake Chamber of Commerce
 - St. Davids Ratepayers Association
 - Friends of St. Davids
 - Potentially Impacted Property Owners / Businesses

5.4 Indigenous Communities Consultation

Niagara Region followed the Aboriginal consultation recommendations provided by the Ministry of Environment, Conservation and Parks (MECP) in their response letter to the Notice of Commencement dated January 7, 2021, that was sent via email to the project team.

Notification of the project was mailed to every identified Indigenous Community for the project area (refer to project stakeholder list in **Appendix A**). This included the Notice of Study Commencement, Notice of Public Information Centre #1, Notice of Public Information Centre #2 and the Notice of Study Completion. The summary of the engagement with Indigenous Communities is provided in **Table 5-2**.

Table 5-2: Summary of Indigenous Communities Engagement

Indigenous Community	Key Correspondence	Course of Action
Mississaugas of the Credit First Nation	● MCFN sent a formal letter via email on February 5, 2021,	● Notice of Commencement and introductory letter sent

Indigenous Community	Key Correspondence	Course of Action
	acknowledging the Stage 1 works commencing and requesting further information Also included was their Standards and Guidelines for Archaeology. • MCFN confirmed via email on October 18, 2021, that they did not have any concerns regarding the Stage 1 report or its recommendations for the scope of the Stage 2 Assessment. MCFN also confirmed that they will require the same level of engagement on the Stage 3 cemetery investigation.	to MCFN on January 11, 2021, by the Region. • Email sent by ASI on February 4, 2021, notifying MCFN that the Stage 1 Archaeological work was commencing and that a draft report would be sent for review. • The Notice of PIC #1 and a cover letter was sent by the Region via email on March 5, 2021. • The Region provided a formal response letter via email on March 9, 2021. • The Notice of PIC #2 and a cover letter was sent by the Region via email on June 10, 2021. • The Stage 1 Archaeological report was sent by ASI via email on September 8, 2021, for review.
Six Nations of the Grand River (Both Six Nations Elected Council and Haudenosaunee Confederacy Chiefs Council)	• In an email date January 11, 2021, the Six Nations of the Grand River confirmed receipt of the notice and their interest in reviewing the archaeological reports. • In an email dated June 24, 2021, a new contact email was provided for the First Nation contact. • In an email dated October 12, 2021, the Community confirmed they did not have any additional	• Notice of Commencement and introductory letter sent to Six Nations of the Grand River on January 11, 2021, by the Region. • The Notice of PIC #1 and a cover letter was sent by the Region via email on March 5, 2021. • The Notice of PIC #2 and a cover letter was sent by the Region via email on June 10, 2021.

Indigenous Community	Key Correspondence	Course of Action
	recommendations but would like to participate in the construction monitoring phase of the project.	• The Stage 1 Archaeological report was sent by ASI via email on September 8, 2021, for review. • ASI requested an update on the review of the archaeological report via email on October 12, 2021.
Haudenosaunee Confederacy Chiefs Council / Haudenosaunee Institute of Development (HDI)	• HDI confirmed interest in the Stage 1 Archaeological Assessment via email on February 4, 2021.	• Notice of Commencement and introductory letter sent to the Haudenosaunee Confederacy Chiefs Council / HDI on January 11, 2021, by the Region. • The Notice of PIC #1 and a cover letter was sent by the Region via email on March 5, 2021. • The Notice of PIC #2 and a cover letter was sent by the Region via email on June 10, 2021. • The Stage 1 Archaeological report was sent by ASI via email on September 8, 2021, for review • ASI requested an update on the review of the archaeological report via email on October 12, 2021.

The Region commits to continuing outreach and engagement with all Indigenous Communities that may have interest in the study area during Detailed design. The Region acknowledges the Six Nations of the Grand River's request to participate in

construction monitoring and will work with the Communities to facilitate this at that time. All future correspondence will be documented and submitted with any subsequent applications to the MECP.

5.5 Public Information Centres

5.5.1 Public Information Centre #1 Summary

The first Public Information Centre (PIC) was held virtually on Zoom on Thursday, March 25, 2021, from 6:00 pm to 8:00 pm. The purpose of the PIC was to introduce the study and present the study scope, existing conditions, problems and opportunities, alternative solutions, and early design concepts.

The online event format consisted of a live presentation of the PIC display boards delivered by the project team, followed by a question-and-answer session. The presentation materials were posted on the project webpage on the Region's website on the day of the PIC and were available online for the remainder of the study.

Eighteen (18) people signed into the Zoom presentation. In addition to the questions and comments received during the online event, comments were also received during the comment period, ending April 8, 2021. Most questions and comments were related to traffic operations, road safety, pedestrian safety, active transportation, the consultation area, study area history, construction impacts, and project cost. The PIC #1 Summary Report is provided in **Appendix A** and summarizes the comments received and project team responses. Sensitive information such as names and contact information have been removed.

5.5.2 Public Information Centre #2 Summary

The second Public Information Centre (PIC) was held virtually on Zoom on Wednesday, June 23, 2021, from 6:00 pm to 8:00 pm. The purpose of the PIC was to provide an overview of the work completed to date and gather public input on the evaluation and selection of the preferred design concept and active transportation facility applications.

The online event format was the same as PIC #1 and consisted of a presentation of the PIC display boards delivered by the project team, followed by a live question-and-answer session. The presentation materials were posted on the project webpage on the Region's website on the day of the PIC and were available online for the remainder of the study.

Twenty-seven (27) people signed into the Zoom presentation. In addition to the questions and comments received during the online event, comments were also

received during the comment period, ending July 7, 2021. Most questions and comments were related to traffic operations, road safety, active transportation, study area history, parking impacts, construction impacts, natural environment, specific property impacts, and project timing. The PIC #2 Summary Report is provided in **Appendix A** and summarizes the comments received and project team responses. Sensitive information such as names and contact information have been removed.

5.5.3 Key Issues / Concerns

Correspondence with all stakeholders was tracked throughout the project. A summary of the key comments/ issues raised during the study, along with the project team response is provided in **Table 5-3**.

Table 5-3: Key Comments Summary

Comment	Project Team Response
Impact on the pollinator garden on the southeast corner of the intersection.	The proposed roundabout has been designed to limit the impact to the pollinator garden as much as possible.
Want improved pedestrian facilities in the area.	Active transportation was a key part of the scope of this project and the design includes both cycle tracks and sidewalks throughout the study area.
Uncertainty of how to correctly use a roundabout – both pedestrians and drivers.	The Region has committed to an educational campaign in the area for how to properly use a roundabout. This also includes an education program for St. Davids Public School.
Movement of trucks through the roundabout.	The proposed roundabout has been designed to accommodate vehicles of all sizes including tractor-trailers.
Access management during construction.	The Region will ensure all businesses and residential units have access during construction. A traffic staging and access plan will be completed as part of the detailed design phase.

Comment	Project Team Response
Clarification on how traffic counts were generated.	Traffic volumes were collected by automatic traffic recorders (the black rubber hoses left across the road for a few days), and through a turning movement count (where someone is physically at the intersection during the peak hours).
Interest in diverting traffic to Line 9 away from the downtown core of St. Davids.	The project team has noted this preference; however, Line 9 is not under Regional jurisdiction and is outside of the scope of this intersection improvement project.
Potential for widening York Road and/or Four Mile Creek Road.	At this time the Region has no intent on widening York Road or Four Mile Creek Road.
Speed concerns in the area.	The project team has been made aware of this, and the proposed roundabout will lower speeds through the study area.
Concern over the limited size of the study area.	The study area was determined by the functional area of the intersection (250 m in all directions, except for extending to Concession 3 Road to the east).
Impacts to private properties.	The intersection improvements will require property acquisition by the Region, and the project team will be meeting with the impacted property owners after PIC#2.
Impacts to on-street parking.	The project team has noted the concerns around the removal of on-street parking and will take those concerns into account when finalizing the preferred design.

5.6 Consultation with Technical Agencies and Stakeholders

Table 5-4 summaries key meetings with Technical Agencies and other Stakeholders that were held throughout the EA study. Meeting Minutes for all meetings can be found in **Appendix A**.

Table 5-4: Consultation with Technical Agencies and Stakeholders

Meeting	Objective of Meeting
Stakeholder Meetings	
Stakeholder Meeting #1. January 19, 2021	Meeting was held to introduce everyone to the study, discuss opportunities, constraints and gather input from the various departments from the Region and Town.
Stakeholder Meeting #2. May 27, 2021	This meeting discussed the findings of the background studies, consultation activities undertaken to date, alternative solutions being proposed and the evaluation of the alternatives. Opportunity was given for all to provide input and feedback on the proposed alternatives and result of the evaluation.
Stakeholder Meeting #3. September 20, 2021	This meeting provided an overview of the proposed design concept including access management, active transportation, impacted properties and on-street parking. Opportunity was given for all to provide input and feedback on the proposed alternatives and result of the evaluation.
Niagara-on-the-Lake	
Cultural Heritage Meeting. Attended by Niagara Region, CIMA+ and Niagara-on-the-Lake Heritage Department. March 9, 2021	This meeting was held to introduce the project to the Town of Niagara-on-the-Lake's Heritage Department and to gather some cultural heritage background information on the study area. Two (2) main areas of constraints were identified: 1. The old barn on the west side of the intersection (north of road) 2. The proposed development on the southwest corner of the intersection (behind Avondale Food Store)

Meeting	Objective of Meeting
Active Transportation Operation and Maintenance October 21, 2021	The objective of this meeting was to discuss the Town's reasoning as to why the multi-use path was their preferred alternative. The Region also wanted to discuss the operation and maintenance of the cycle tracks and their parking strategies for the area.
Utility Companies	
Utilities Meeting May 17, 2021	The project team held a meeting with utility providers in the area (Bell Canada, Niagara-on-the-Lake Hydro and Niagara Region Broadband) to gather current utility information and help to determine the potential utility impacts from the proposed alternatives. It was determined that Bell Canada has significant infrastructure in the area and impacting these areas could result in very high utility relocation costs. The Project Team noted this and confirmed that the design concepts would be adjusted to avoid conflicts with Bell as much as possible.
Niagara Region	
Niagara Region Heritage Department July 16, 2021	The project team met with the Region's Cultural Heritage representatives to review Niagara Region Planning and Development staff comments on the intersection design concept evaluation table and how the proposed design concept could impact cultural heritage features in the study area

5.6.1 Impacted Property Owners

The project team held separate on-site and virtual meetings in the summer of 2021 with the property owners whose properties will be impacted by the improvements to the intersection. The property owners provided comments to the project team and

discussed issues specific to their properties. Meeting minutes are on file with Niagara Region.

5.6.2 Other Technical Agencies

The project team also reached out to key review agencies throughout the study to gather information and seek input. These Agencies include NPCA, MECP, MNDMNR, Niagara Escarpment Commission and MTHSCI. Copies of the email correspondence is provided in **Appendix A**.

5.7 Consultation – Next Steps

As EA studies are only high-level in nature, many of the specifics regarding the amount of property required to be expropriated are uncertain at this time as more detailed analyses are required.

As this project proceeds into the detailed design phase and more specific details on the design are determined, the Region commits to continue consultation efforts with local residents and businesses to ensure all concerns regarding this project are addressed.

6 Recommended Plan

The Recommended Plan is a roundabout at the intersection of York Road and Four Mile Creek Road with one-way cycle tracks and sidewalks on both sides of the road. The following sections outline the features of the proposed roundabout and approaches on York Road and Four Mile Creek Road. The preliminary plan and profile are shown in **Figures 6-1 to 6-18**. The preliminary plan and profile may be refined in detailed design.

6.1 Roundabout Design

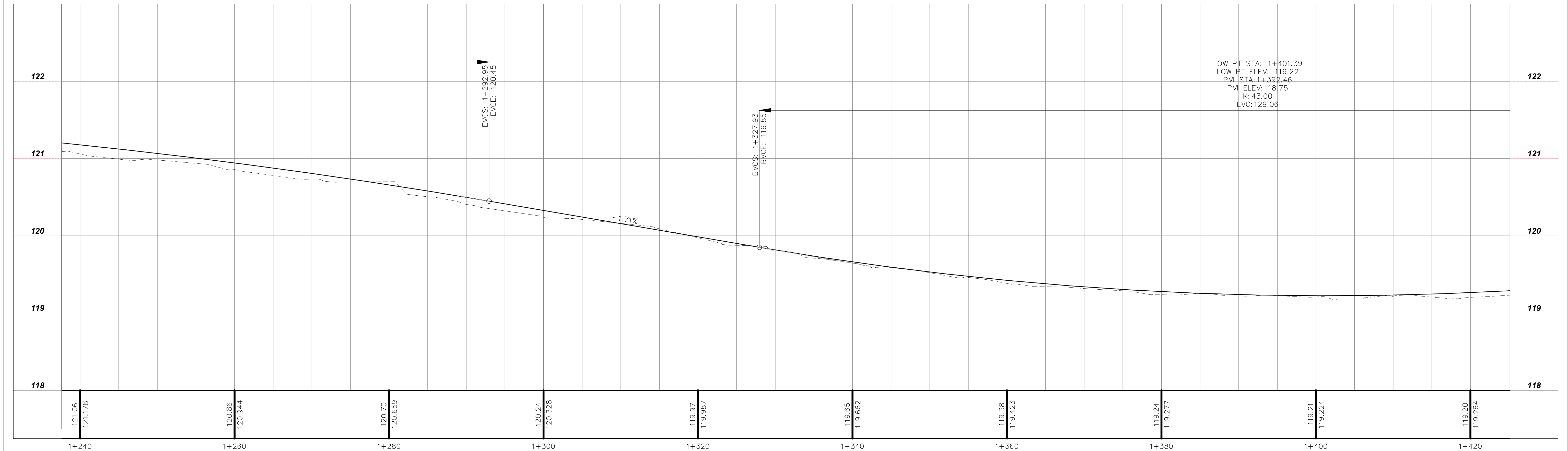
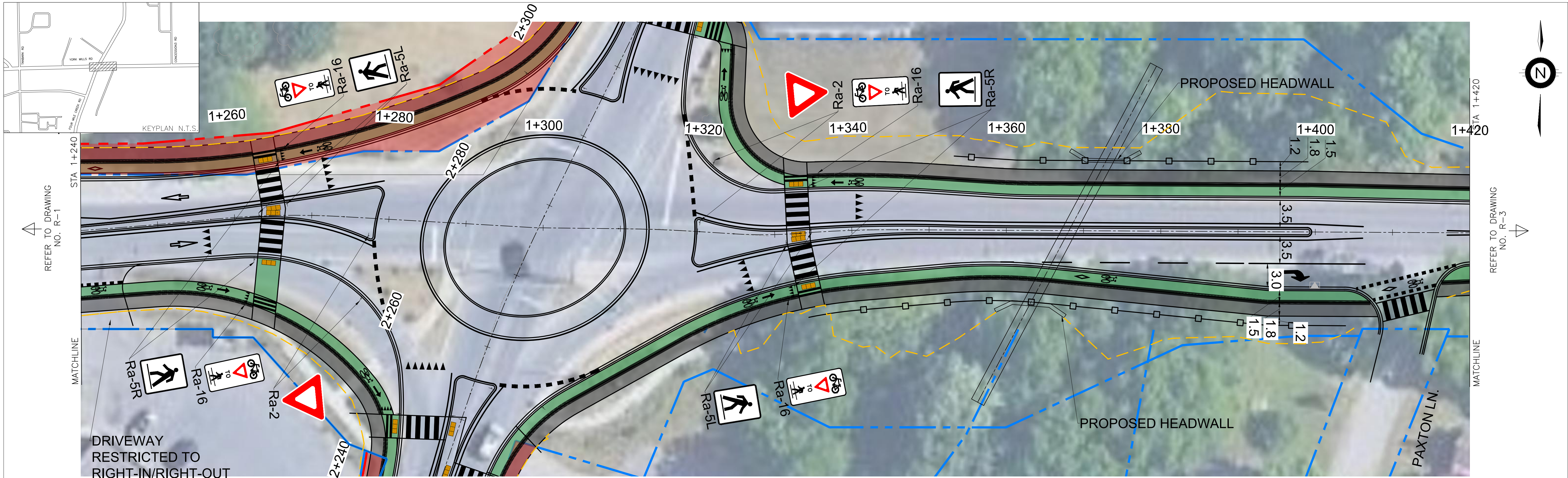
A single-lane roundabout with an average inscribed circle diameter of 40 m is proposed at York Road and Four Mile Creek Road. The diameter is slightly elliptical because of the skew angle of the intersection.

The roundabout is designed to accommodate a WB-20 design vehicle (i.e., standard tractor-trailer). The circulatory road is 6 m wide, and the central island will have a 3 m wide truck apron with semi-mountable curb around the outside to provide additional width for the off-tracking of trailer wheels. The semi-mountable curb will allow large trucks and farm equipment to navigate the roundabout but keep speeds low for smaller vehicles.

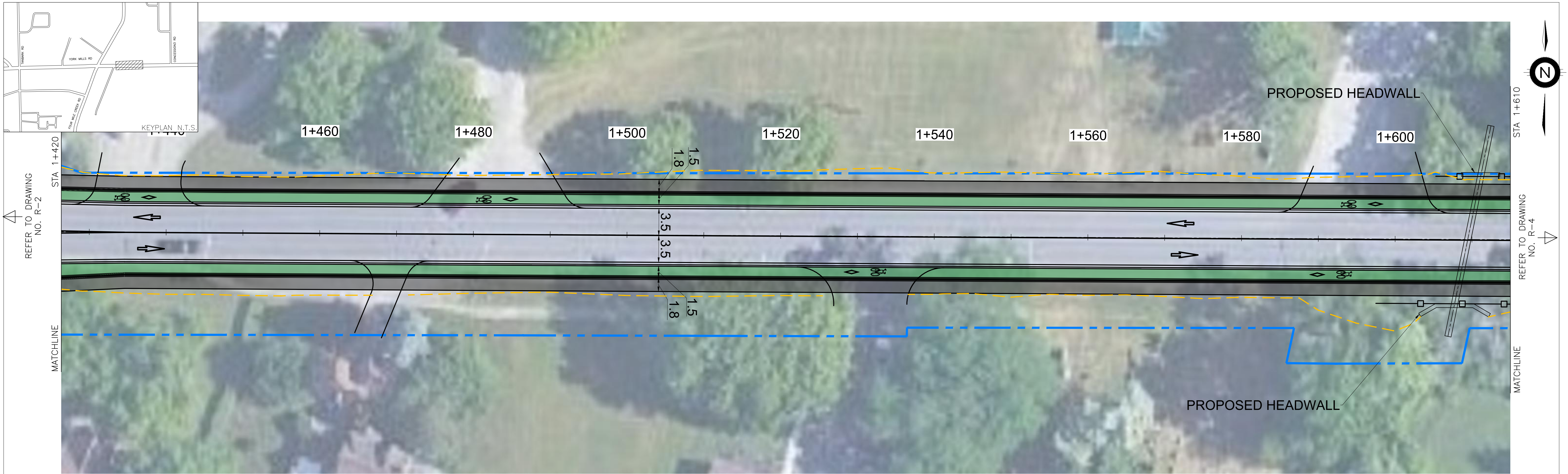
Raised splitter islands with curbs will be provided on all the approaches to further control entry speeds, provide refuge areas for pedestrians, and prevent wrong-way movements. Properties with existing accesses or future developments with accesses that overlap the splitter islands will be restricted to right-in/right-out movements only. The same access restrictions would have been the case had traffic signals been implemented at the intersection, as long medians would have been installed in place of the splitter islands.

Pedestrian crossovers (PXOs) in accordance with Ontario Traffic Manual (OTM) Book 15 will be provided approximately 1 to 2 passenger car lengths (6 to 12 m) from the roundabout entries and exits. PXOs require that motorists yield to pedestrians within the crosswalk.

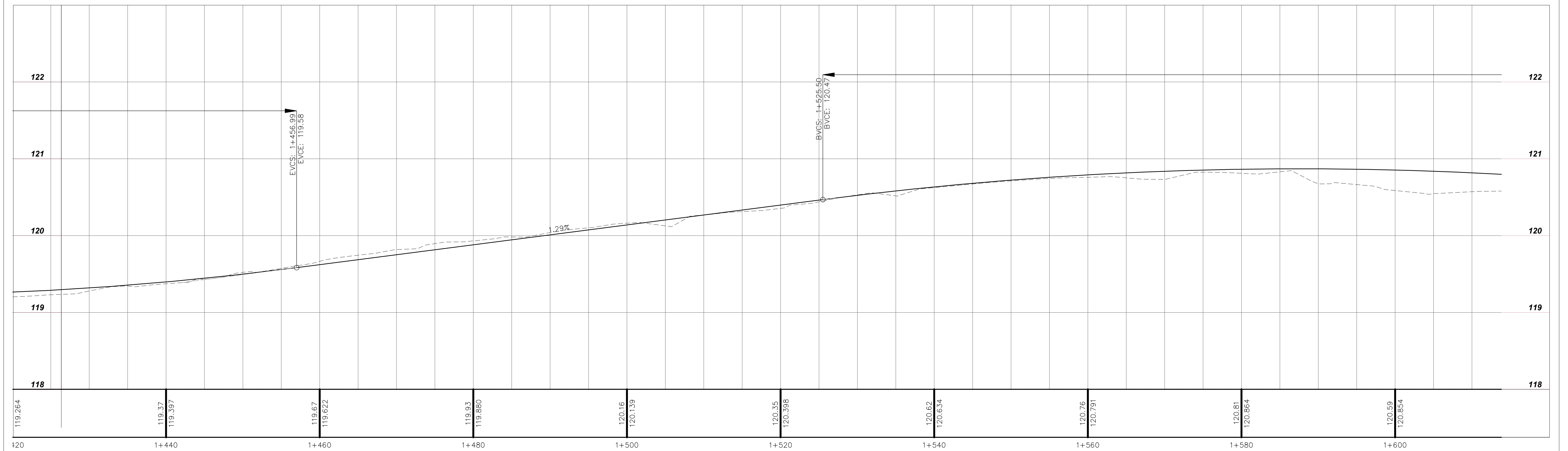
The geometric design guidelines used to design the roundabout are summarized in **Table 6-1**. The design criteria for the roadways approaching the roundabout are listed in **Table 6-2**. The Region will finalize these design criteria during detailed design.



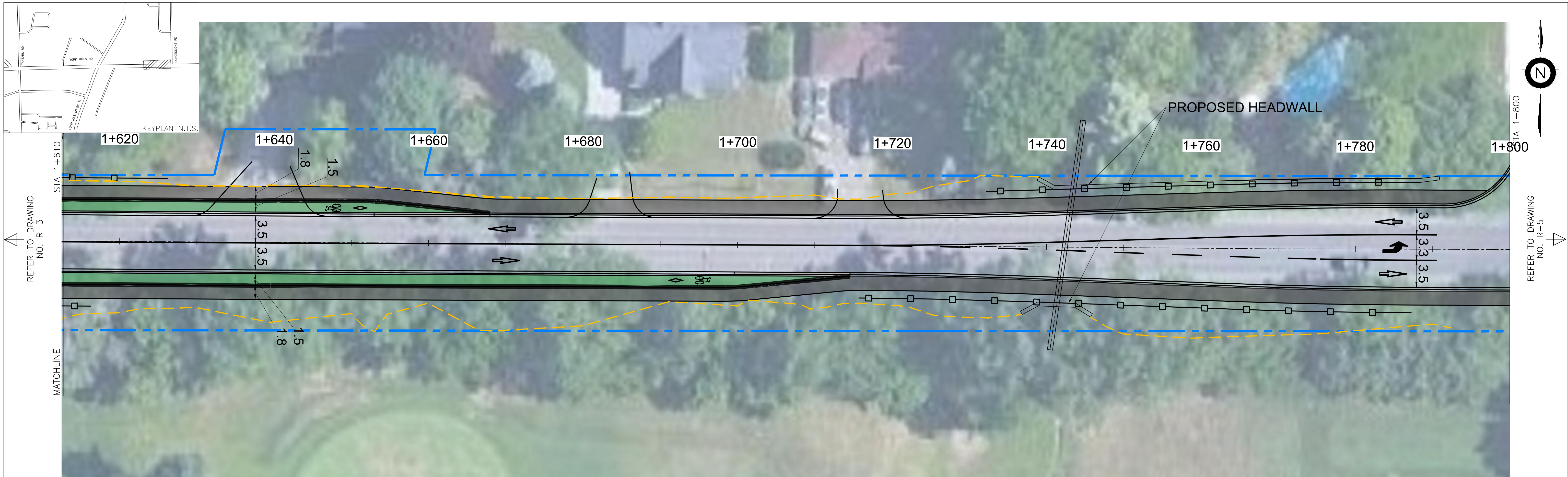
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			2 PROPERTY LINES WERE PLOTTED USING REGISTERED PLANS AND BARS LOCATED IN THE FIELD. TO VERIFY THE ACCURACY OF THESE PROPERTY LINES, A LEGAL SURVEY SHOULD BE PERFORMED PRIOR TO CONSTRUCTION.		XXX		 PROPOSED PROPERTY LINE		SCALE		Hor : 1:250 m Ver : 1:10 m	
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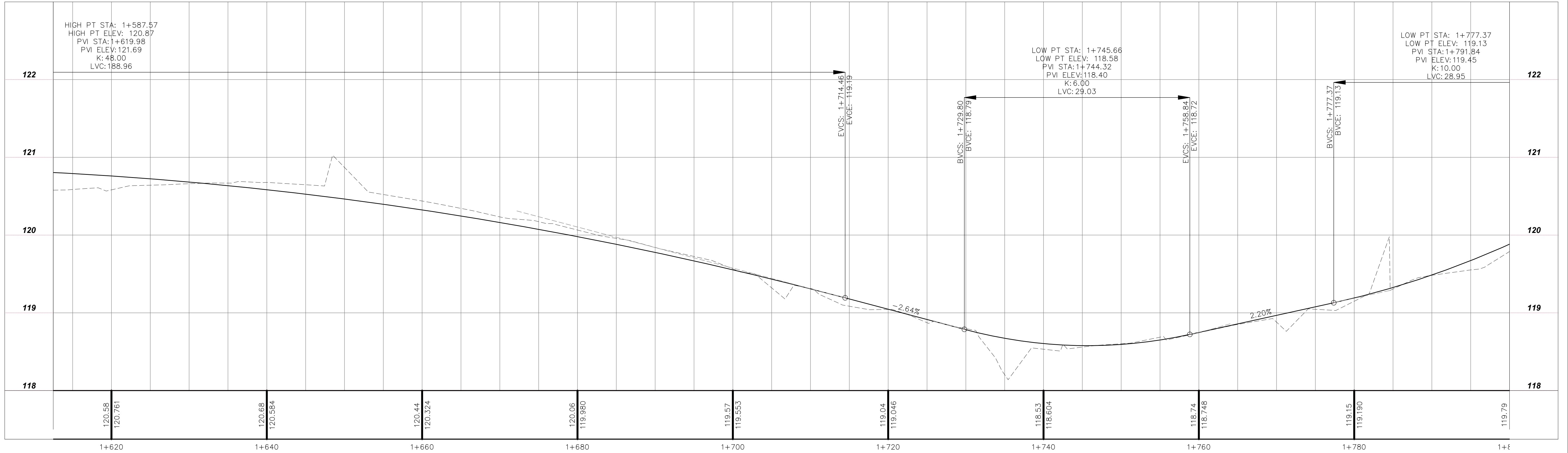
YORK ROAD



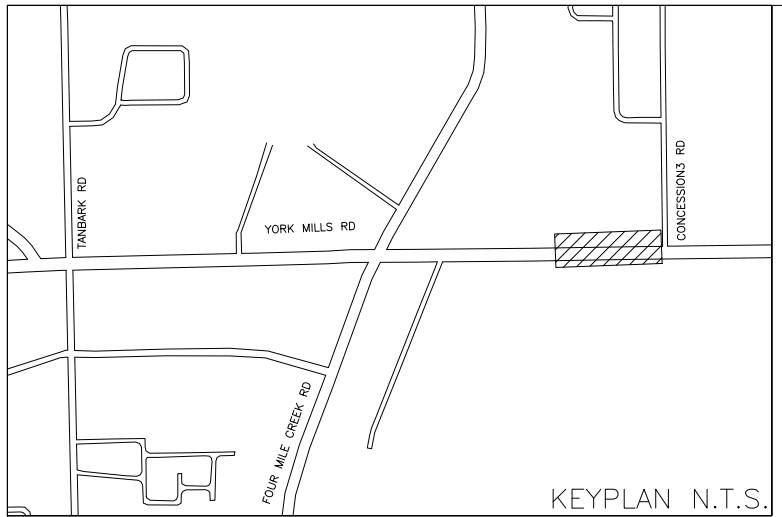
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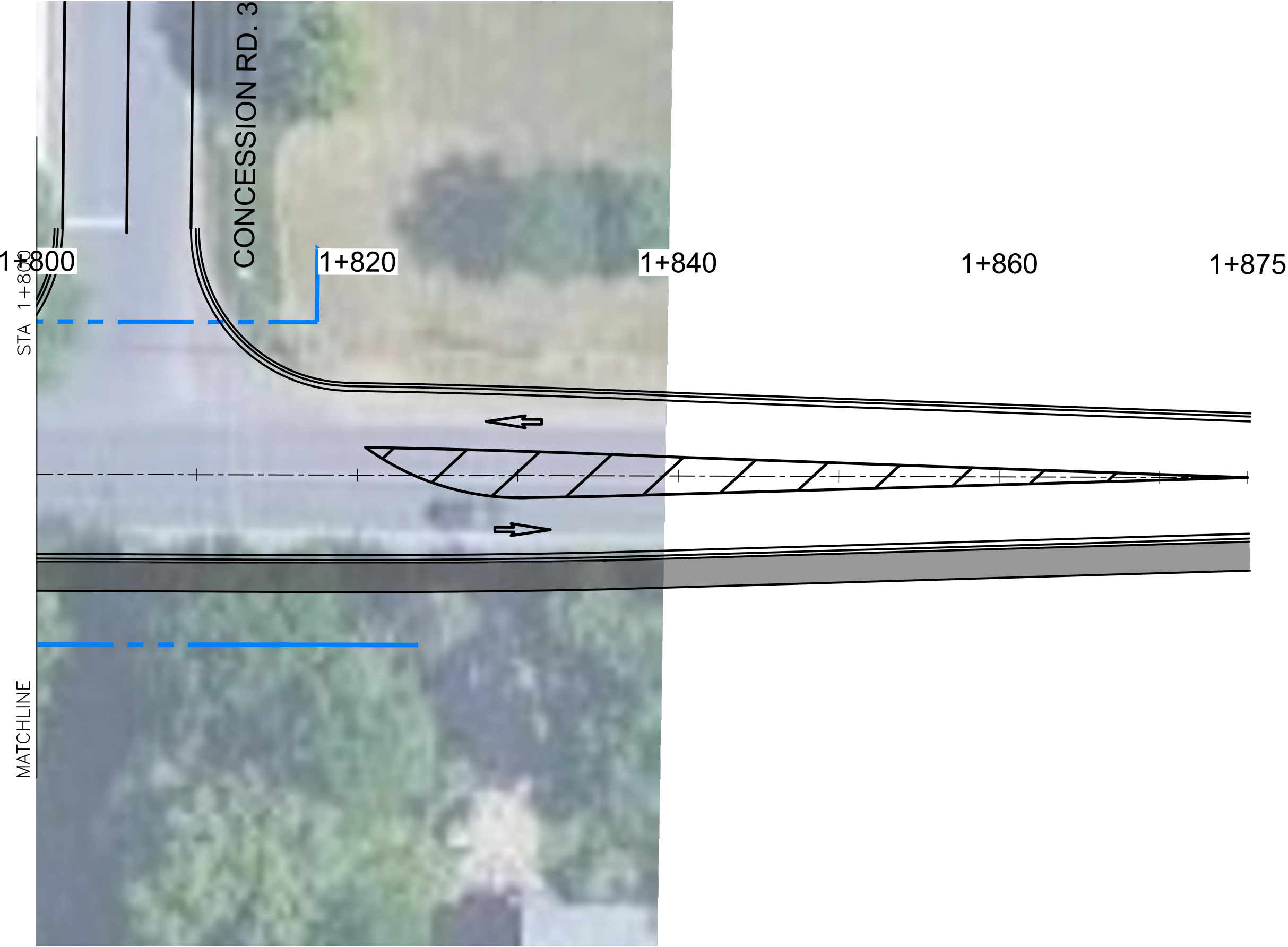


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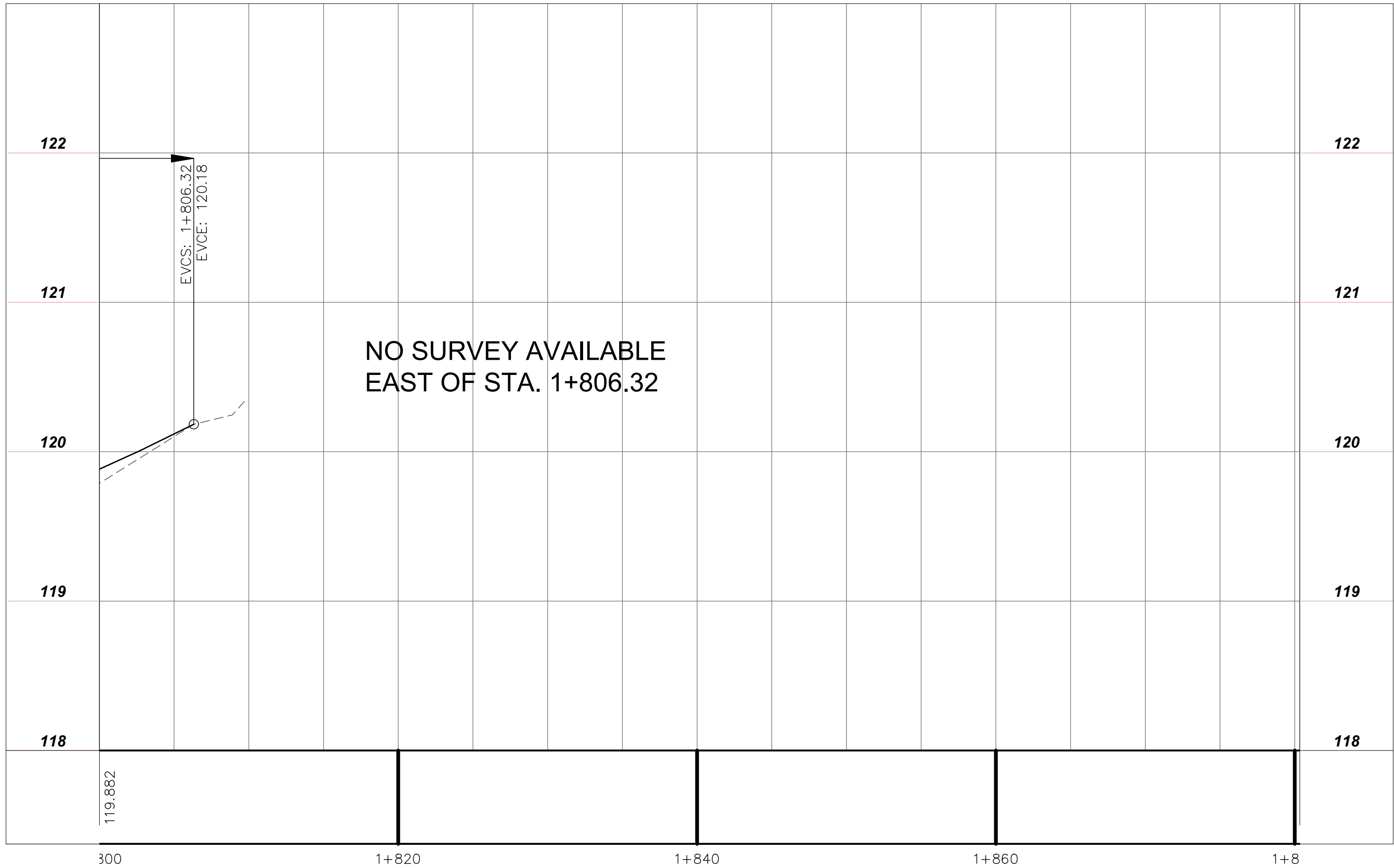


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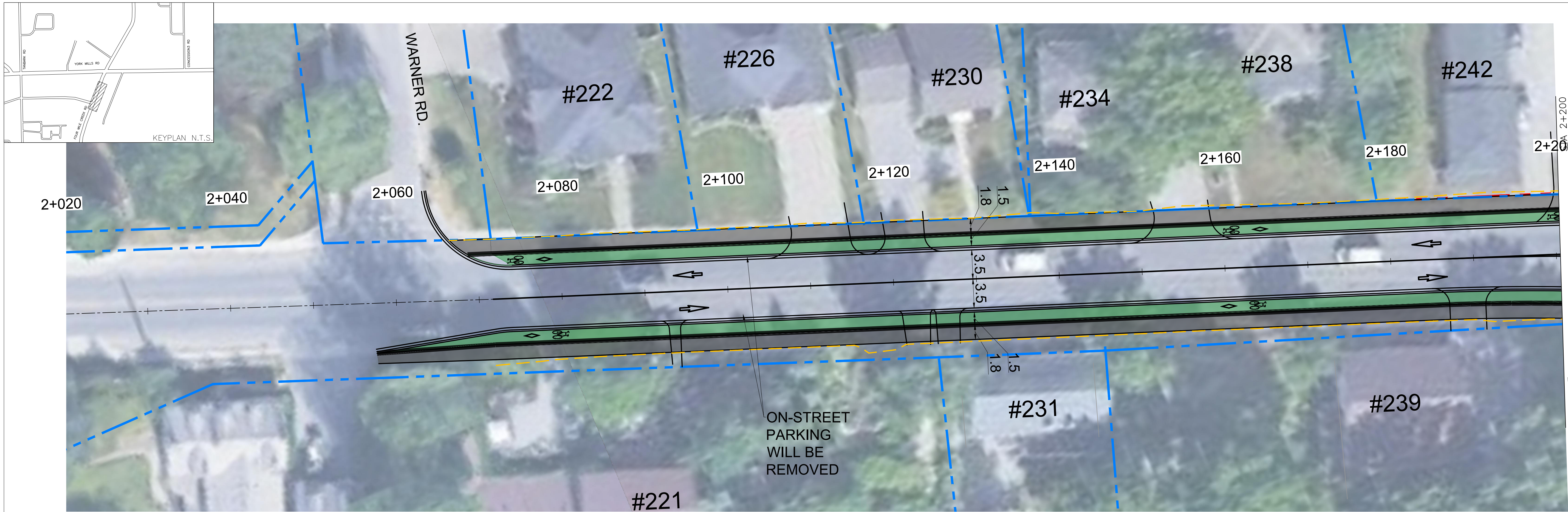
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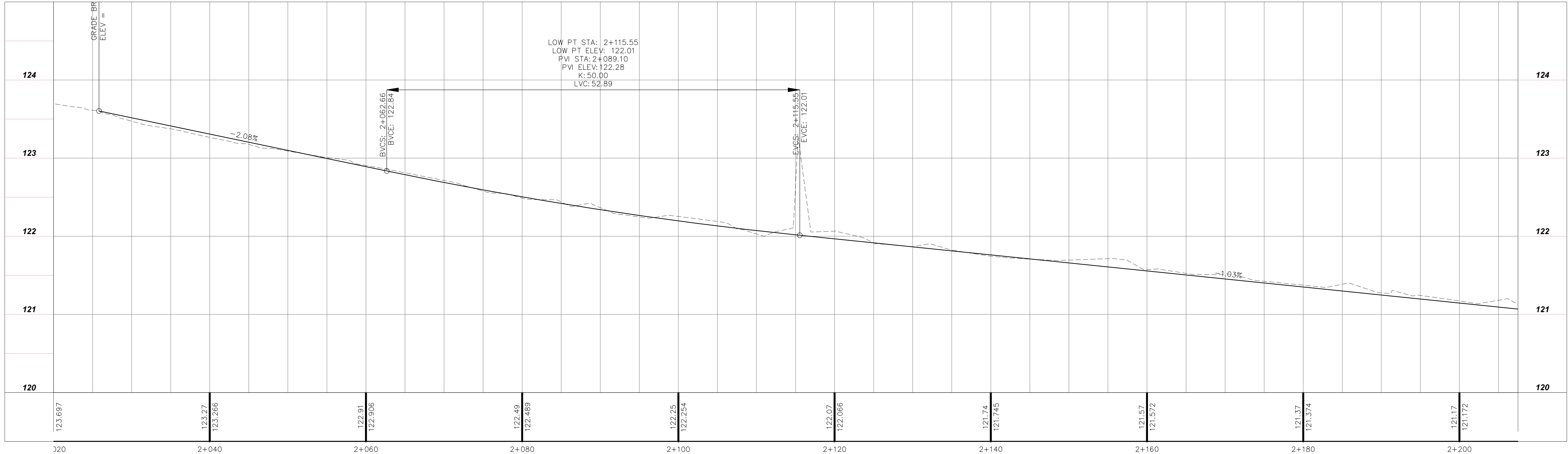
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TANBARK RD TO CONCESSION 3 RD
NIAGARA ON THE LAKE
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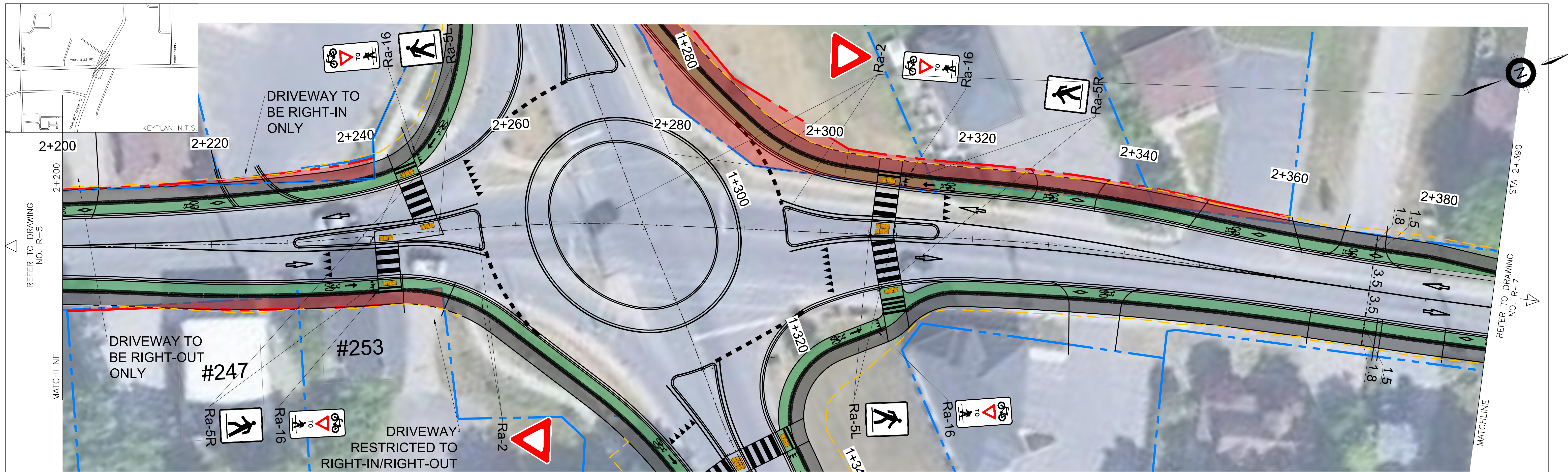
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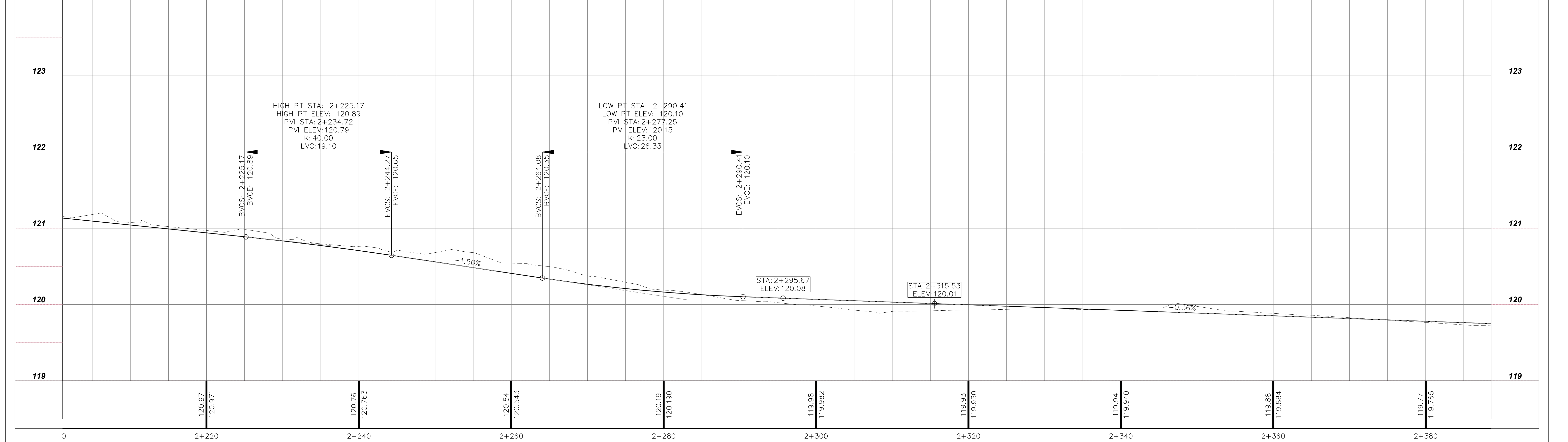
FOUR MILE CREEK ROAD



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FOUR MILE CREEK ROAD



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PLAN AND PROFILE

FOUR MILE CREEK ROAD

WARNER RD TO 200m NORTH OF YORK RD

NIAGARA ON THE LAKE

DRAWING TYPE

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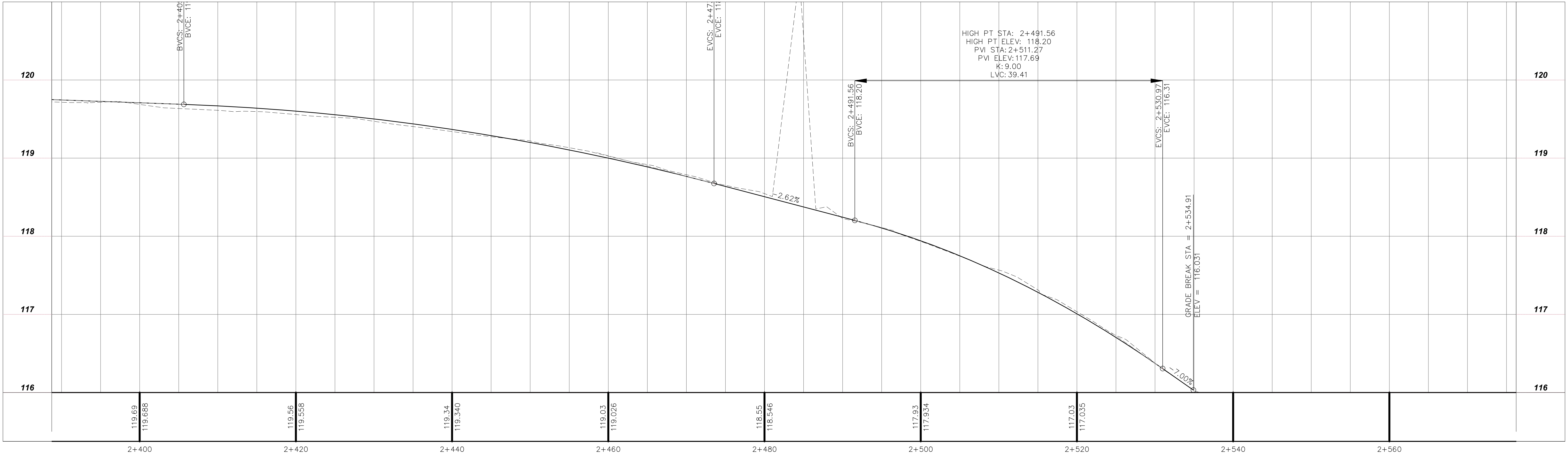
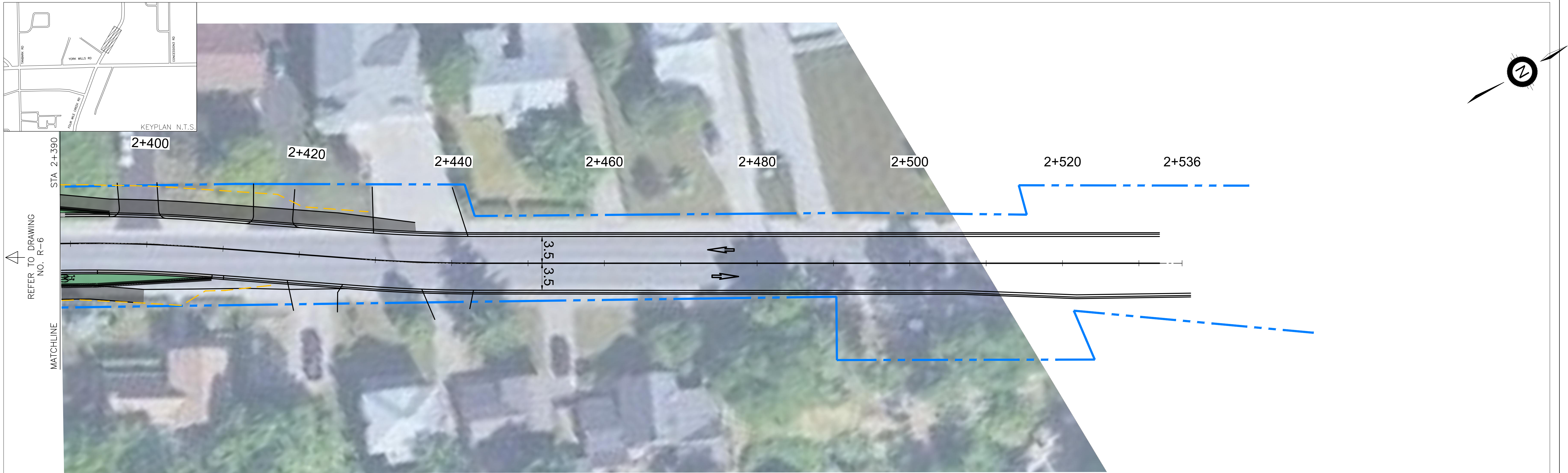
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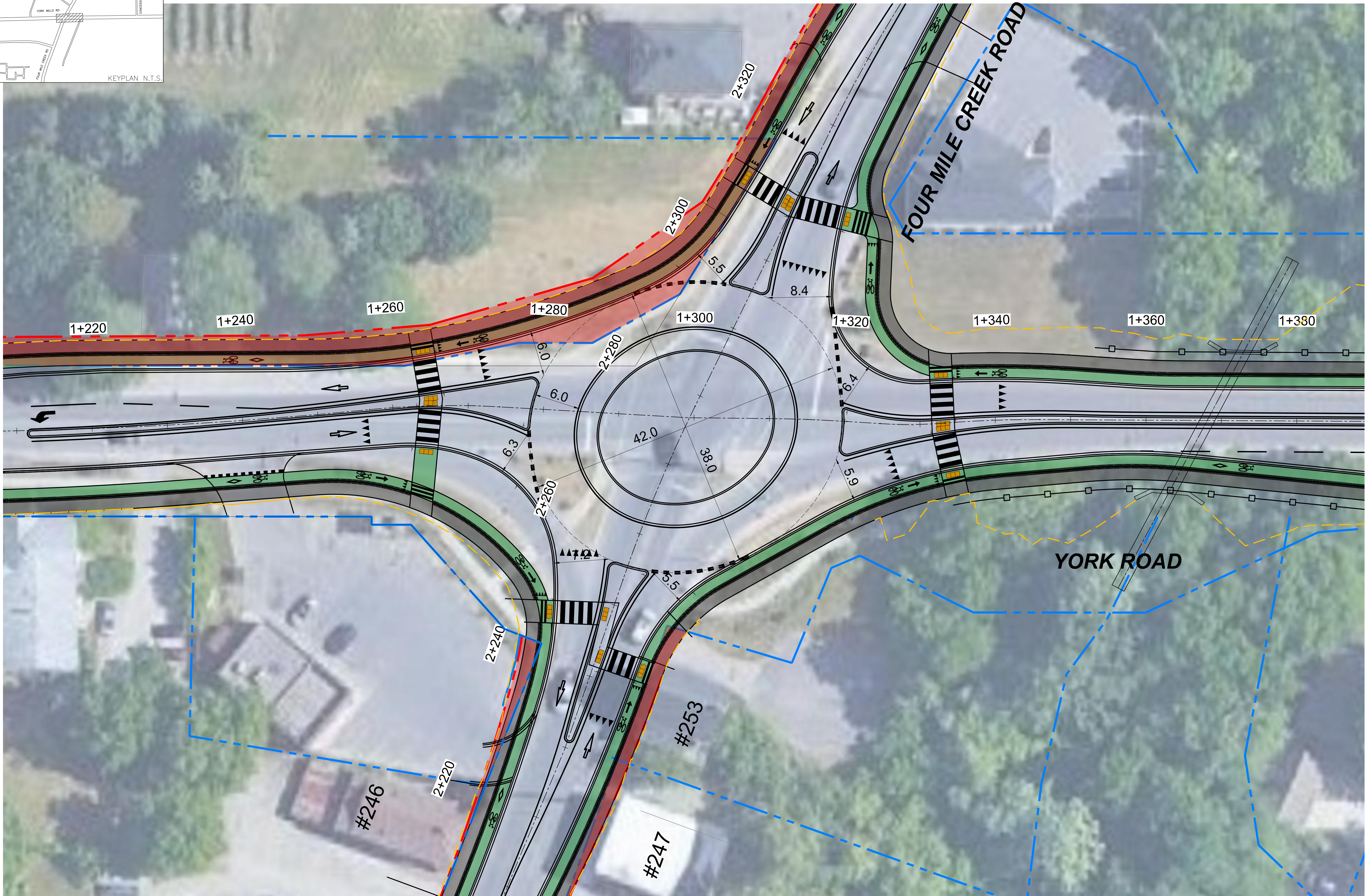
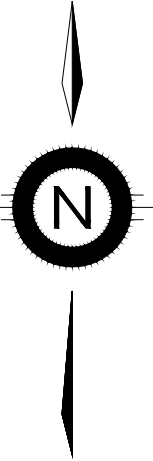
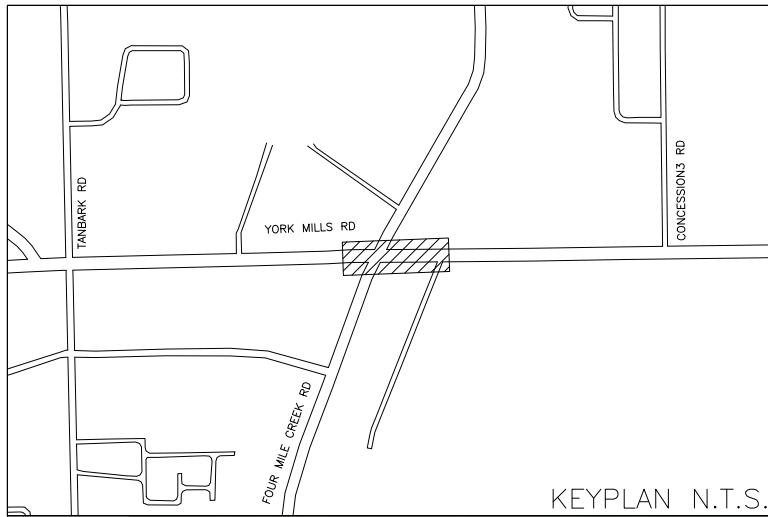
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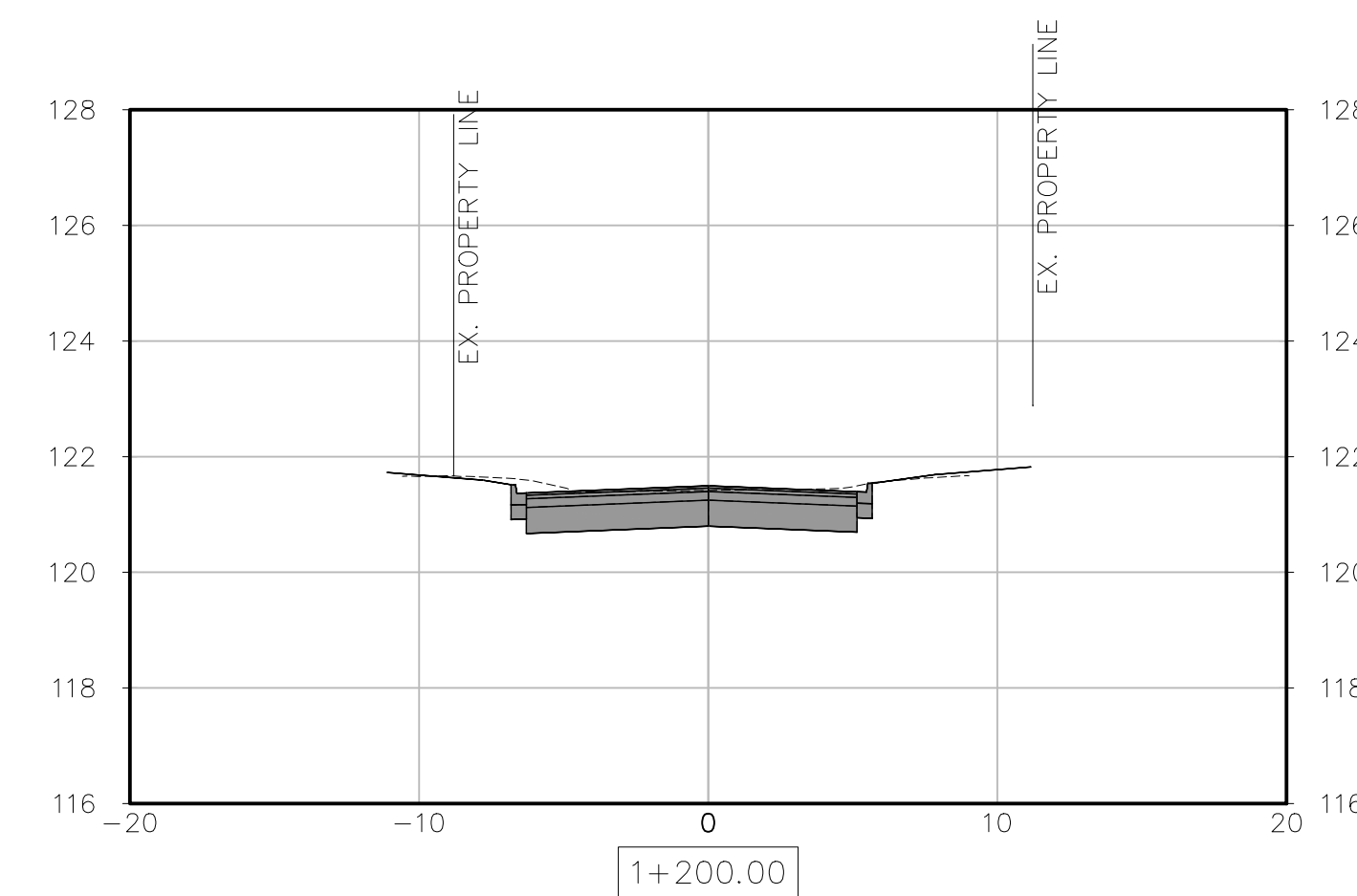
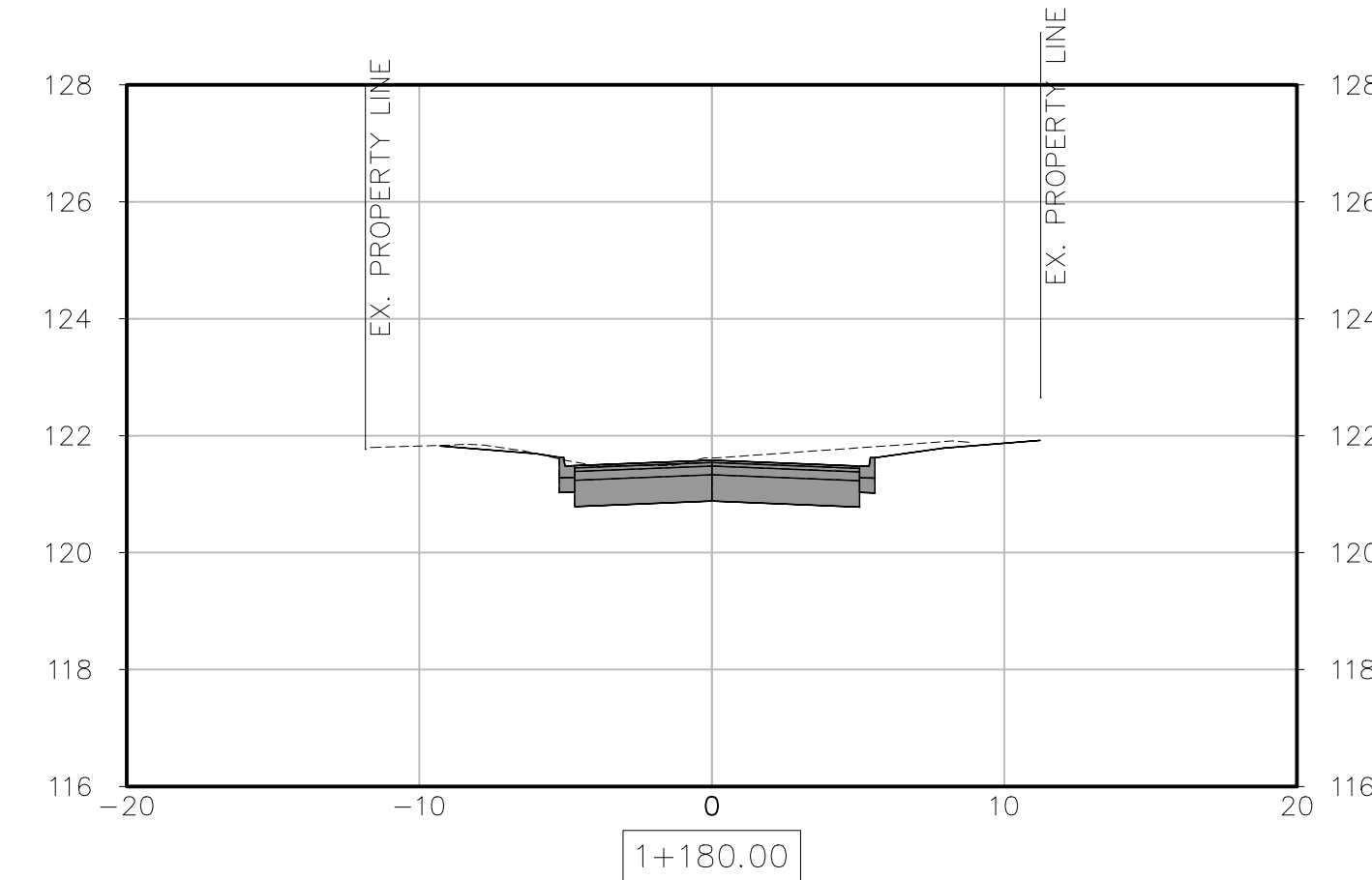
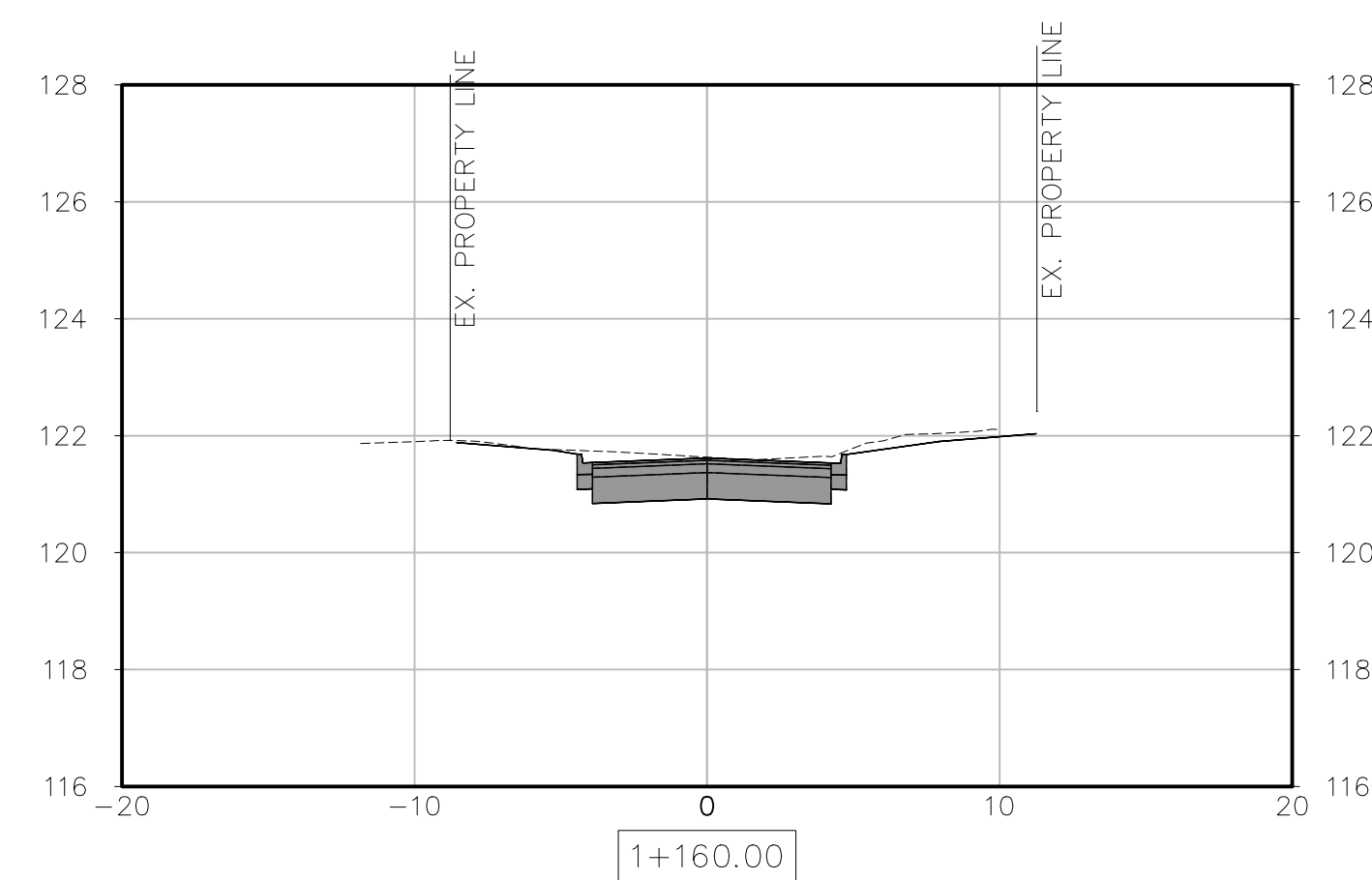
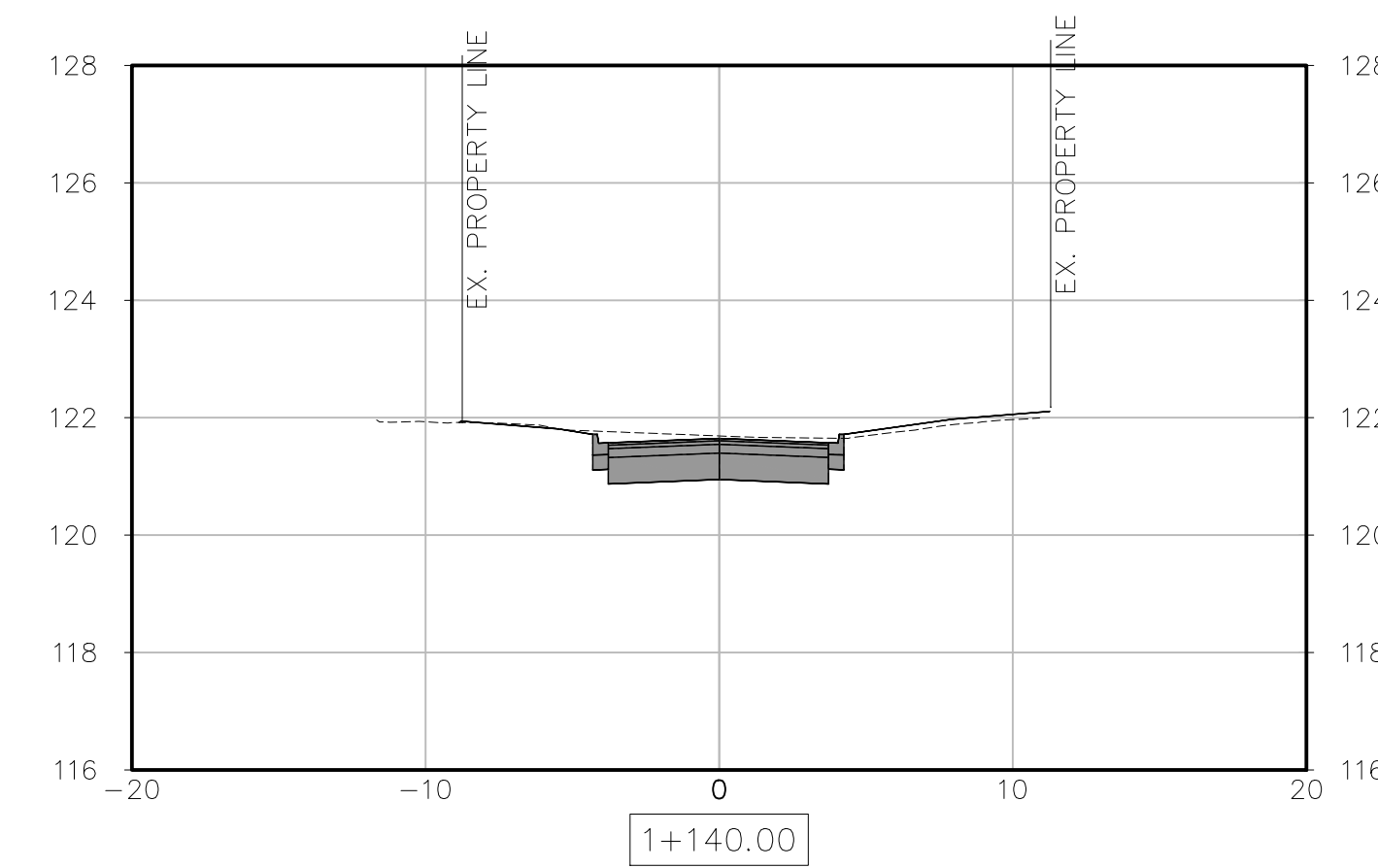
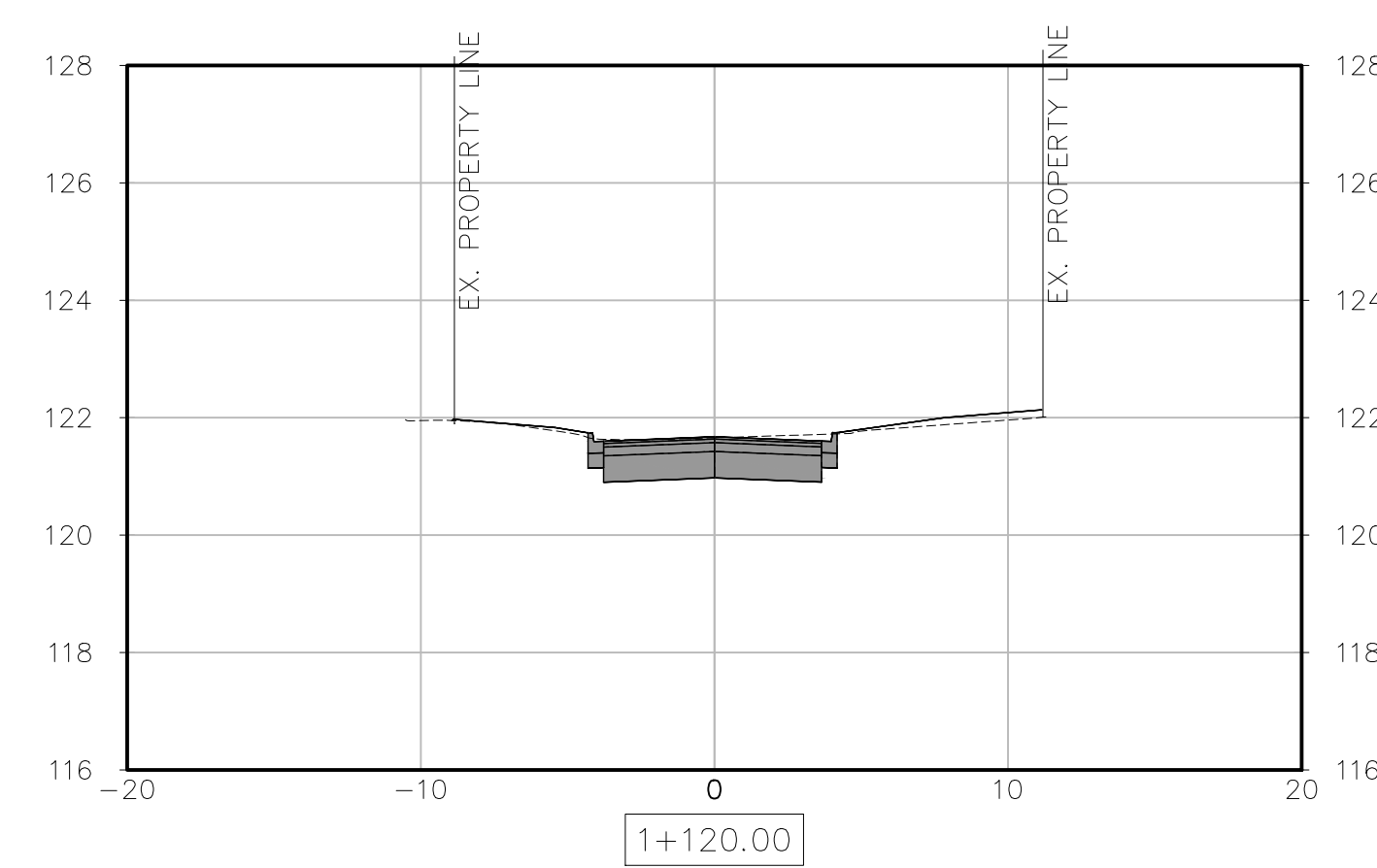
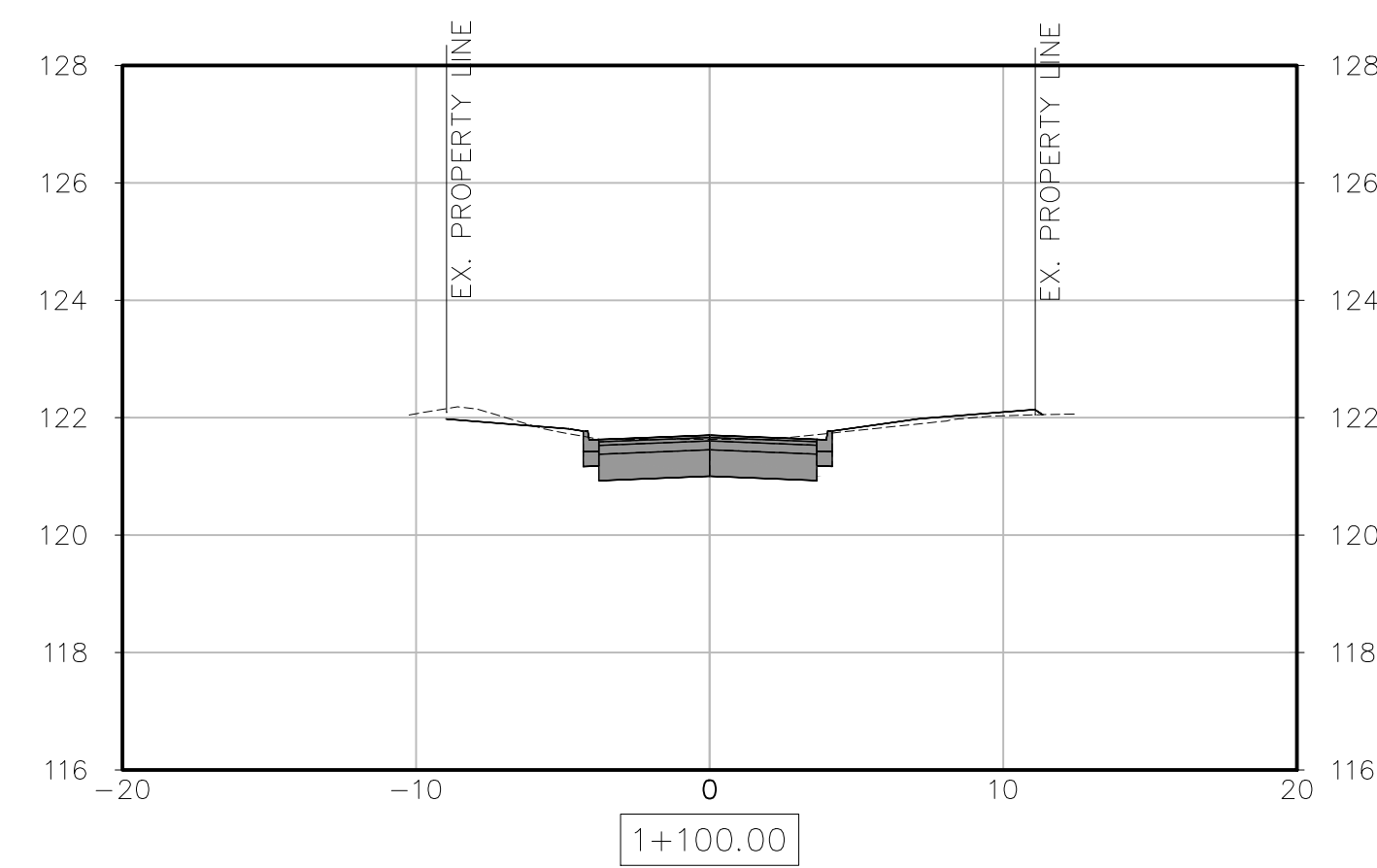
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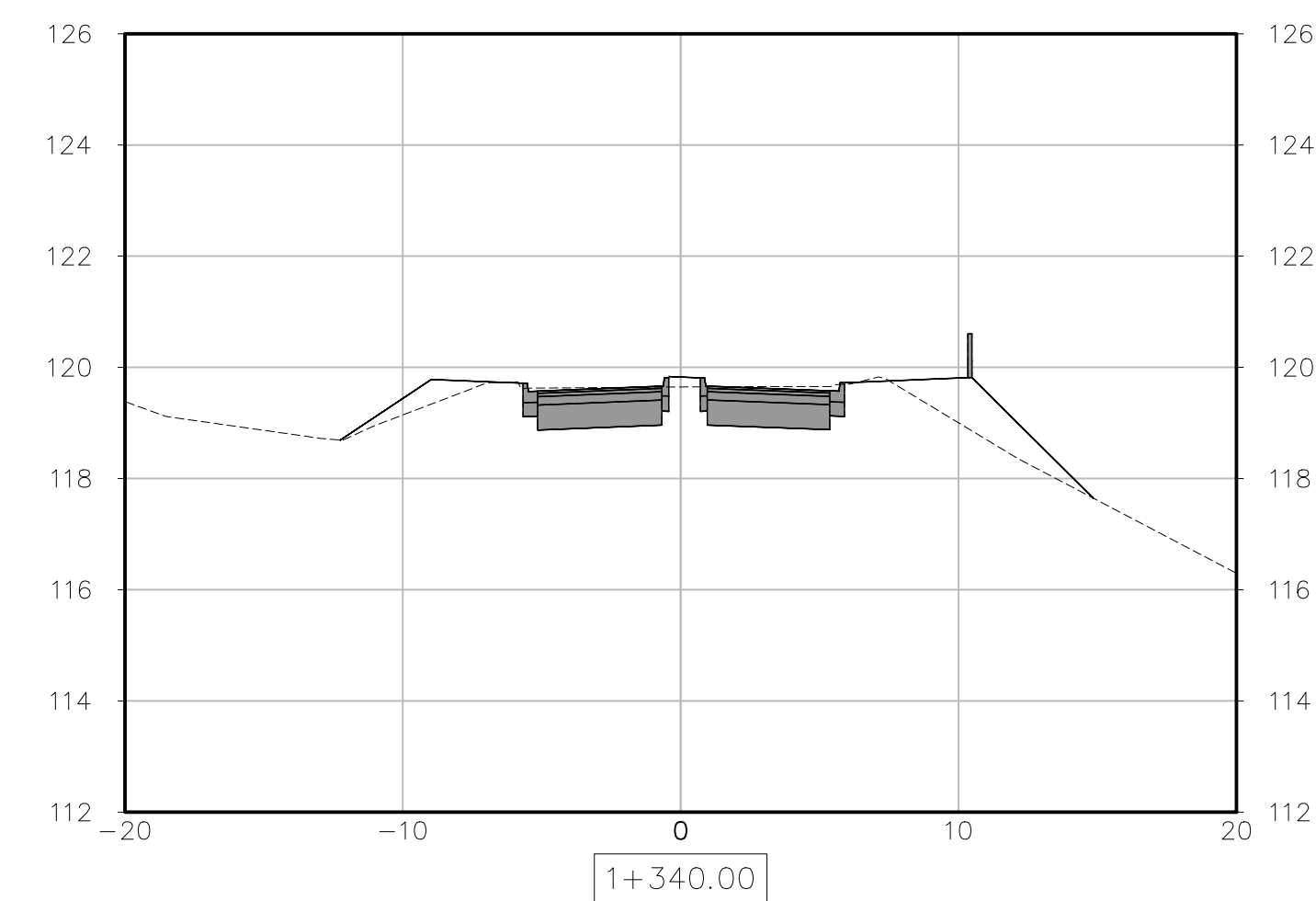
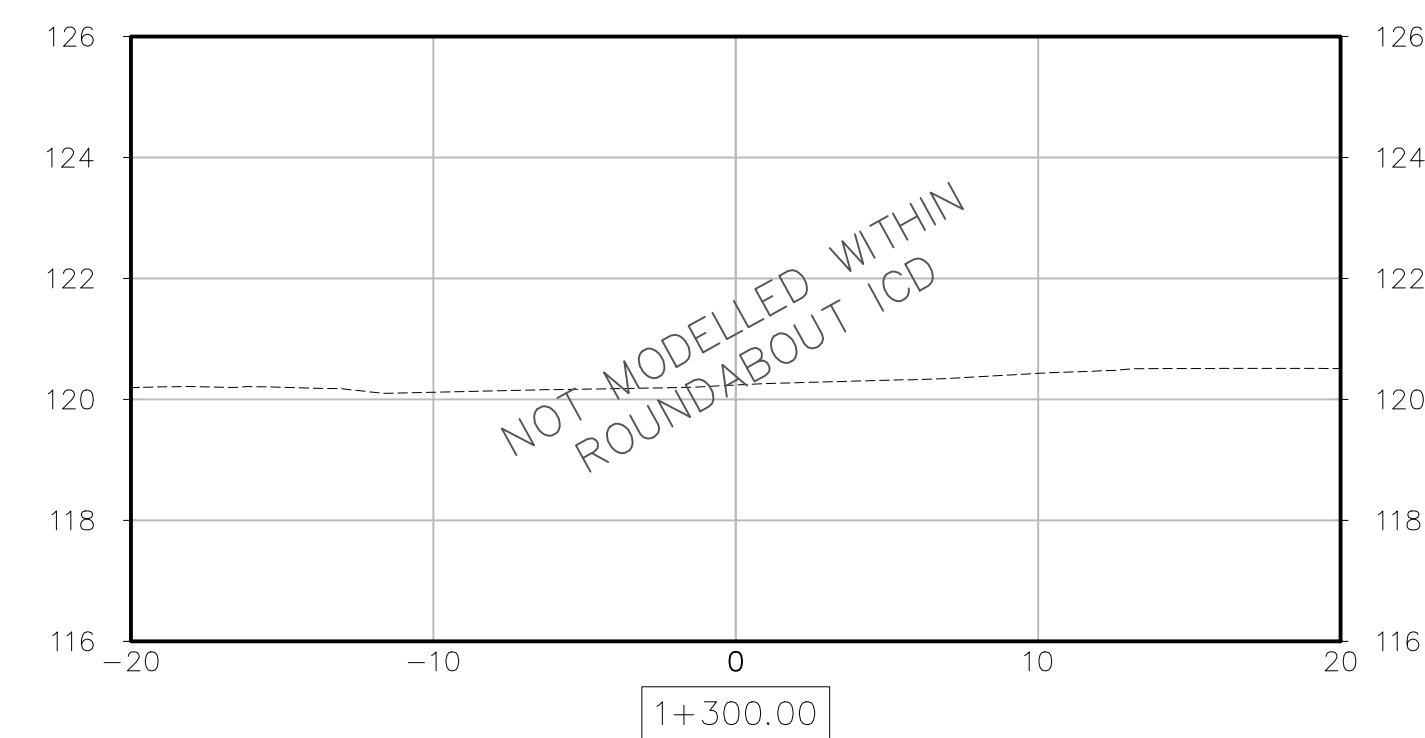
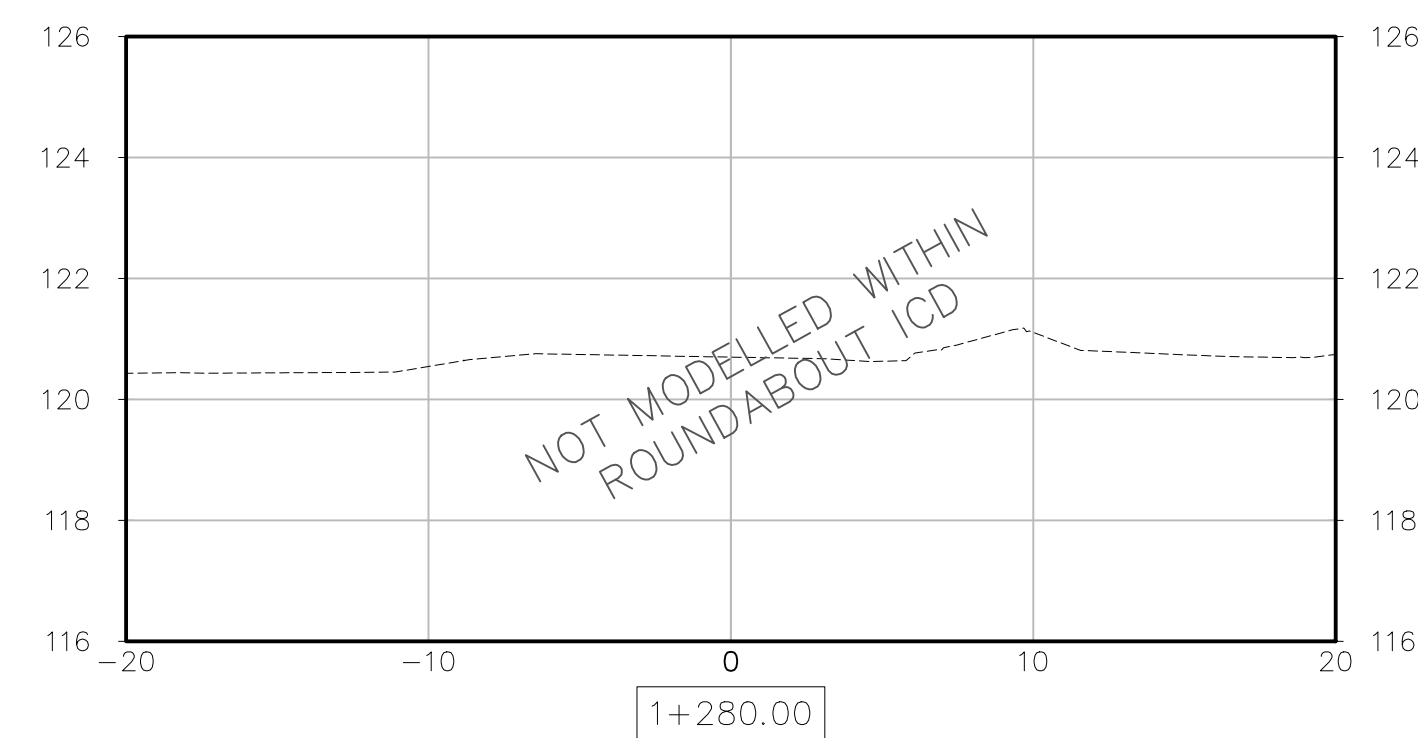
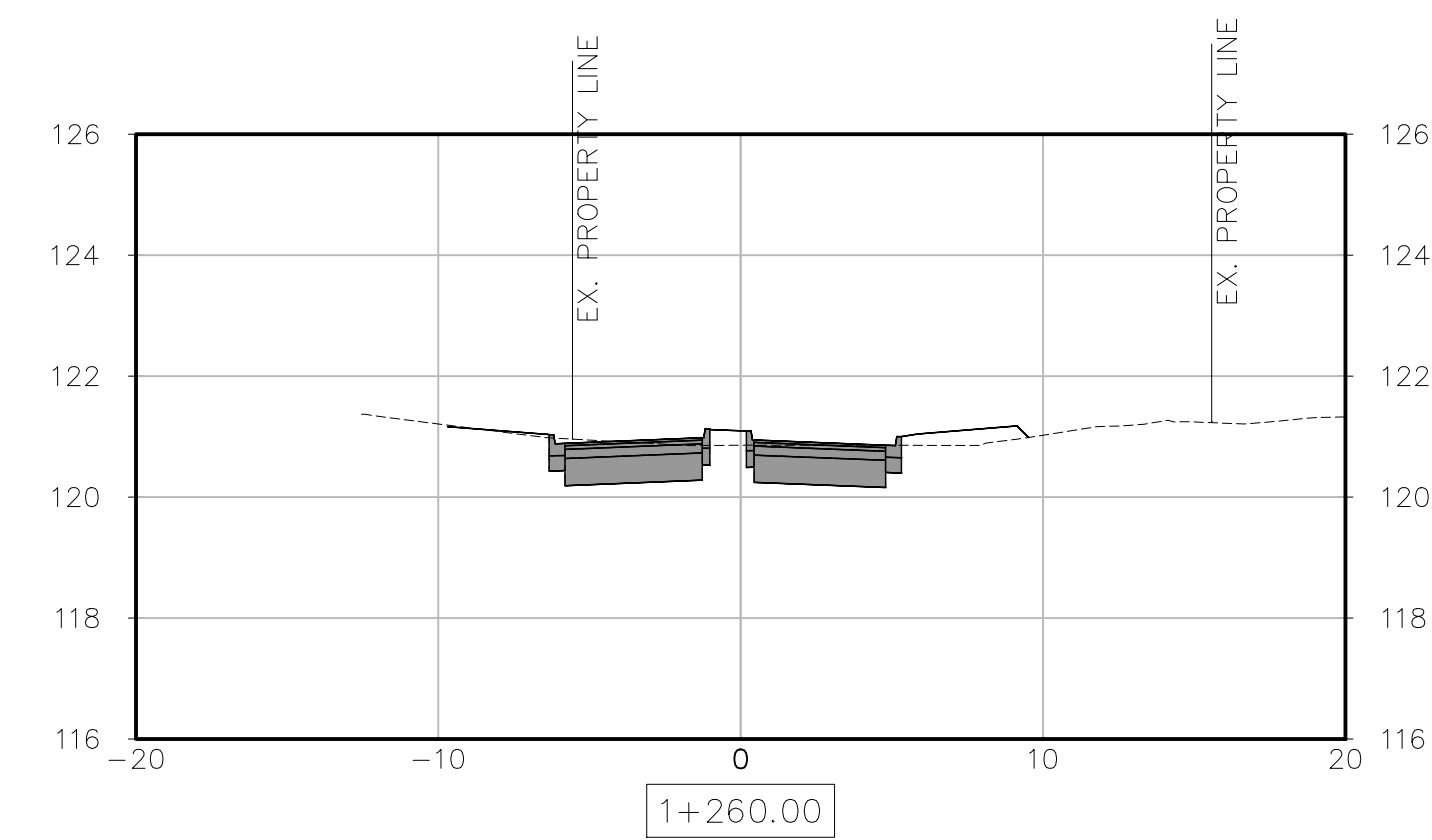
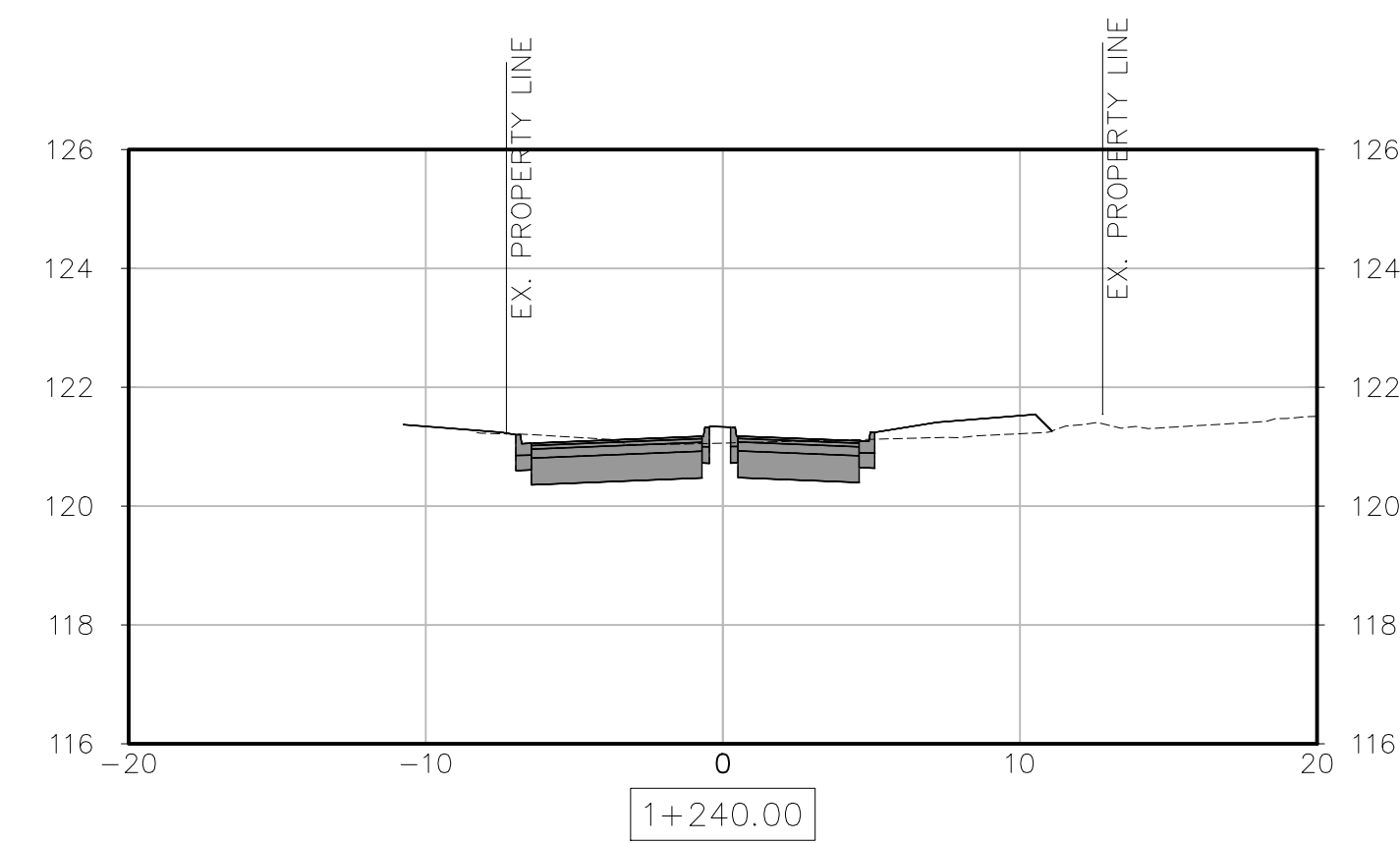
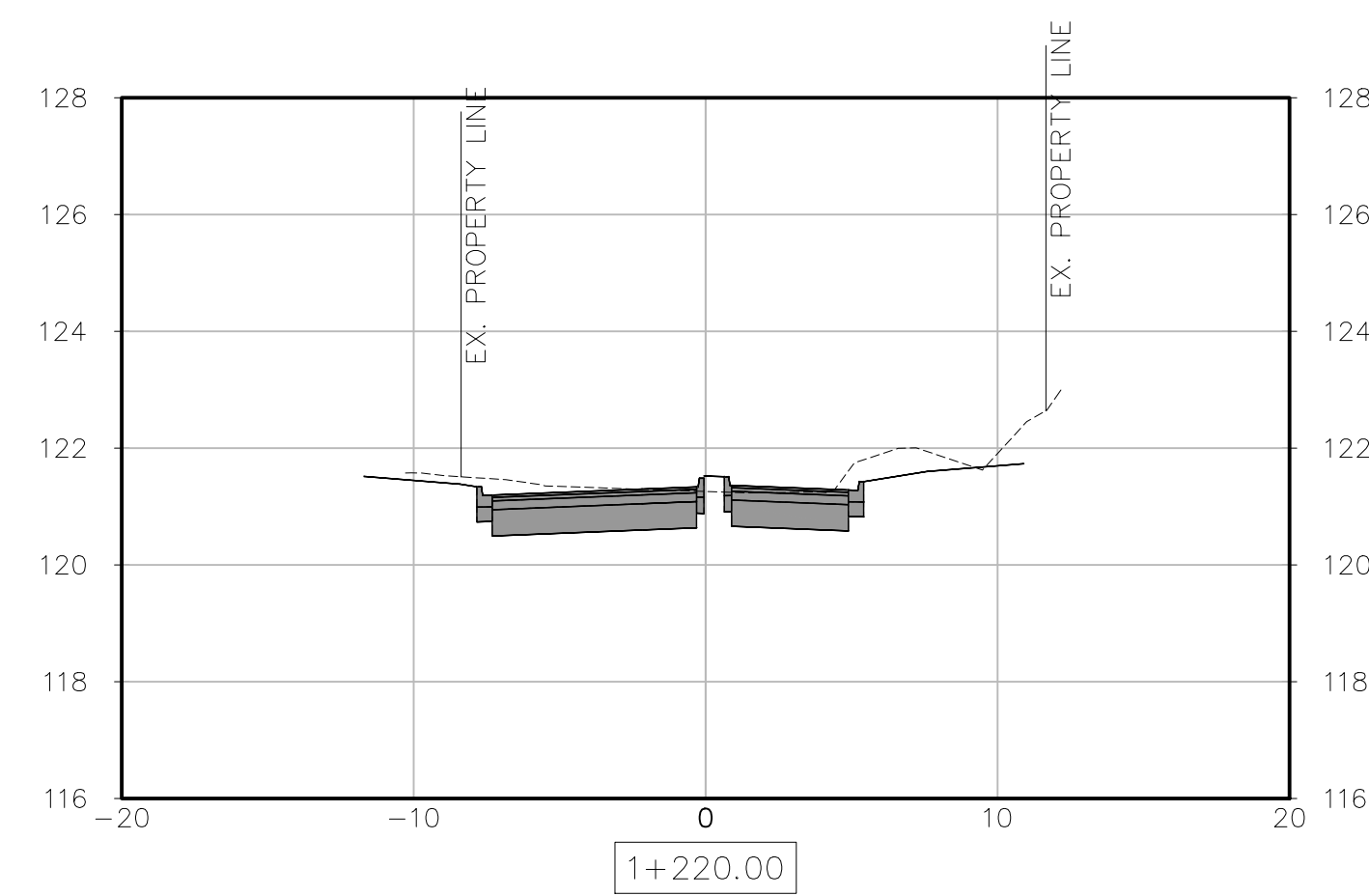
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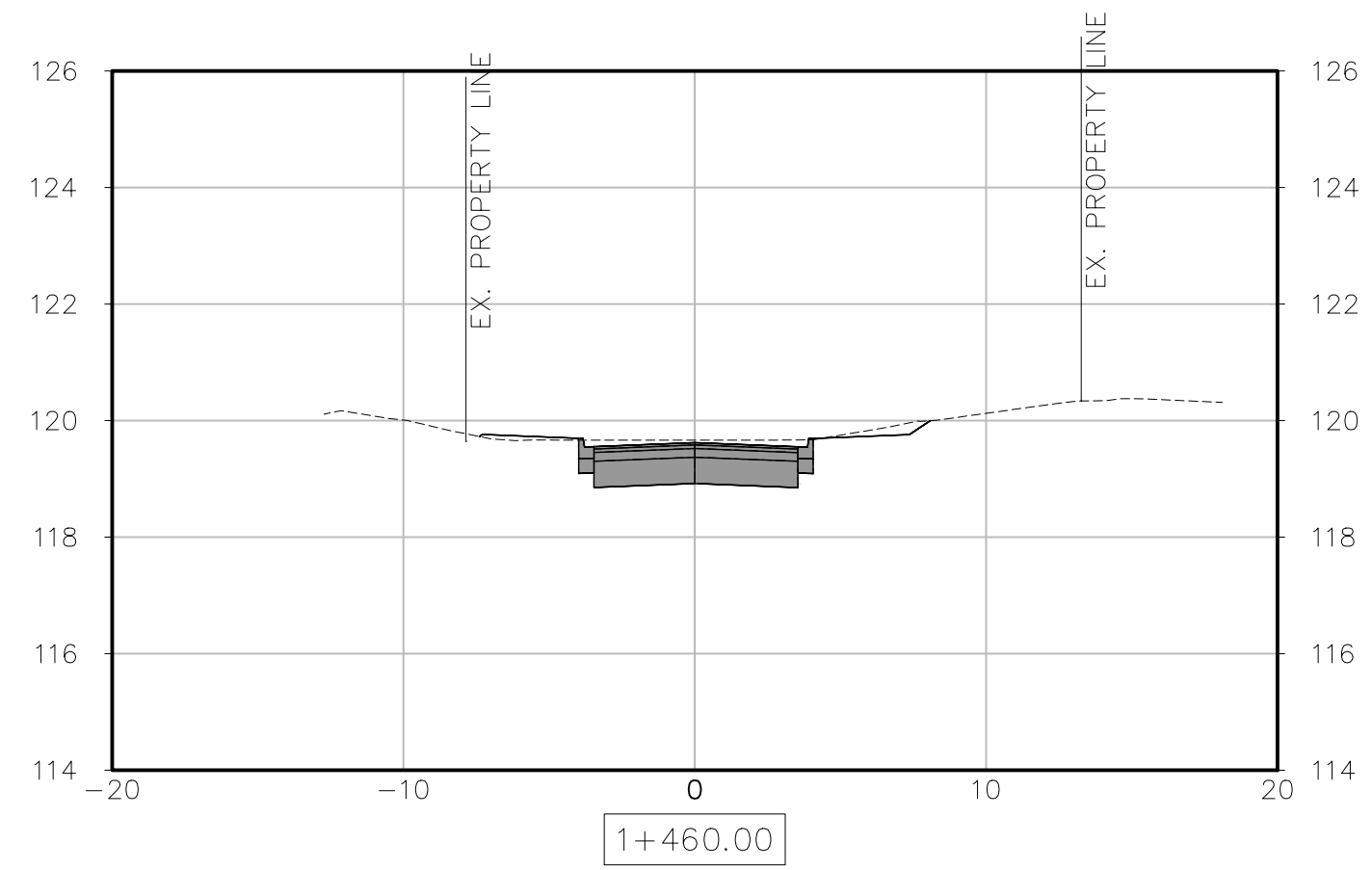
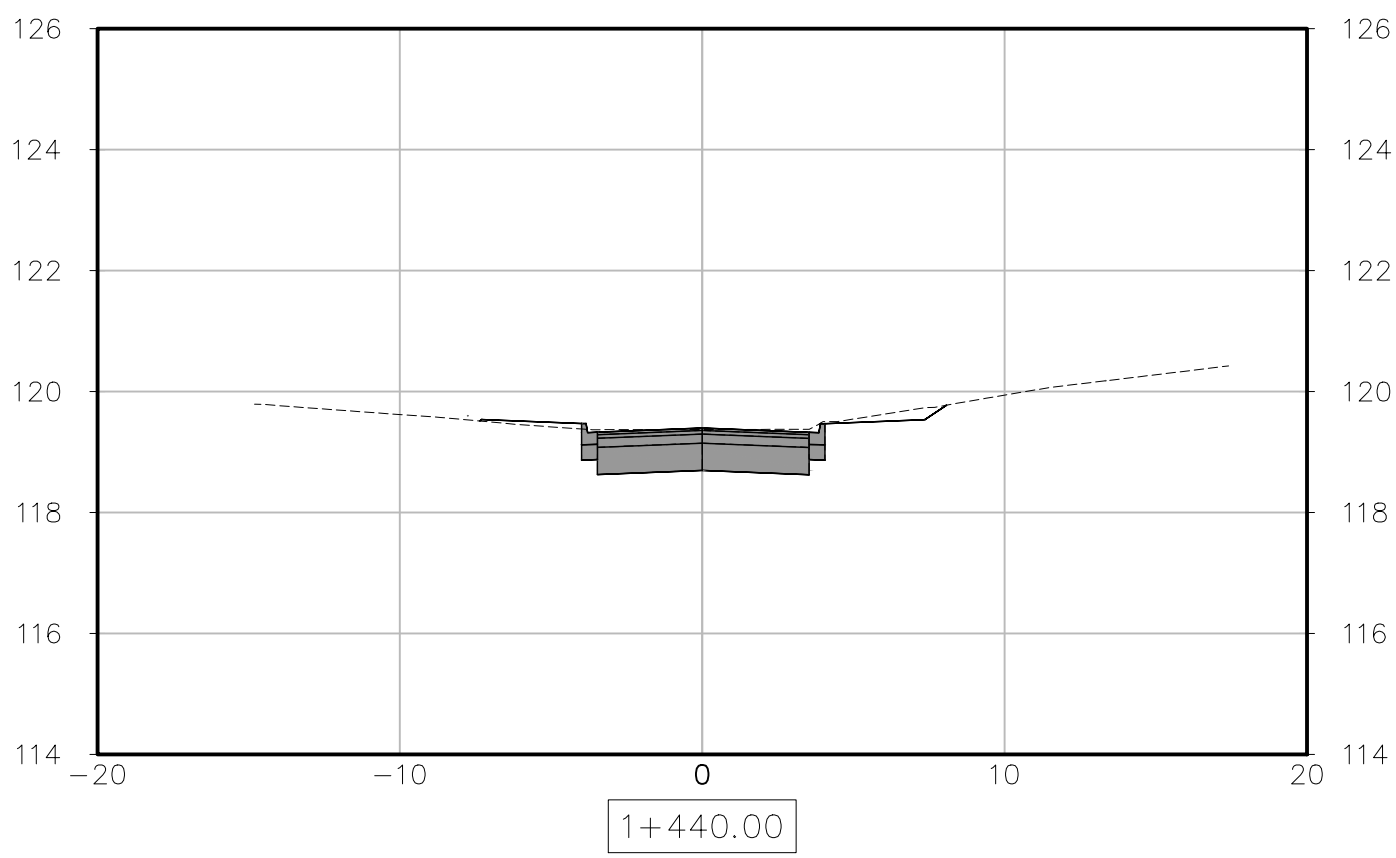
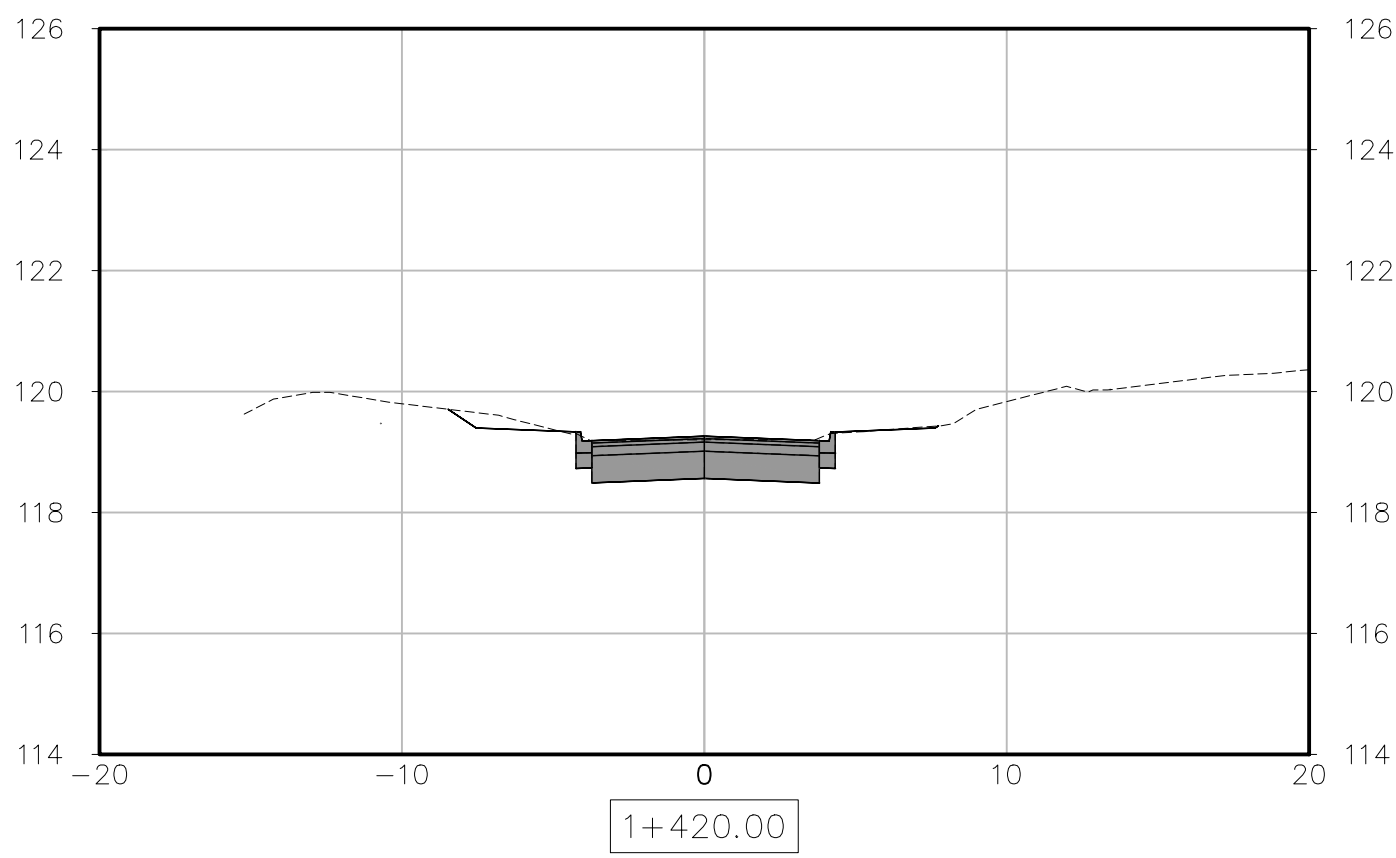
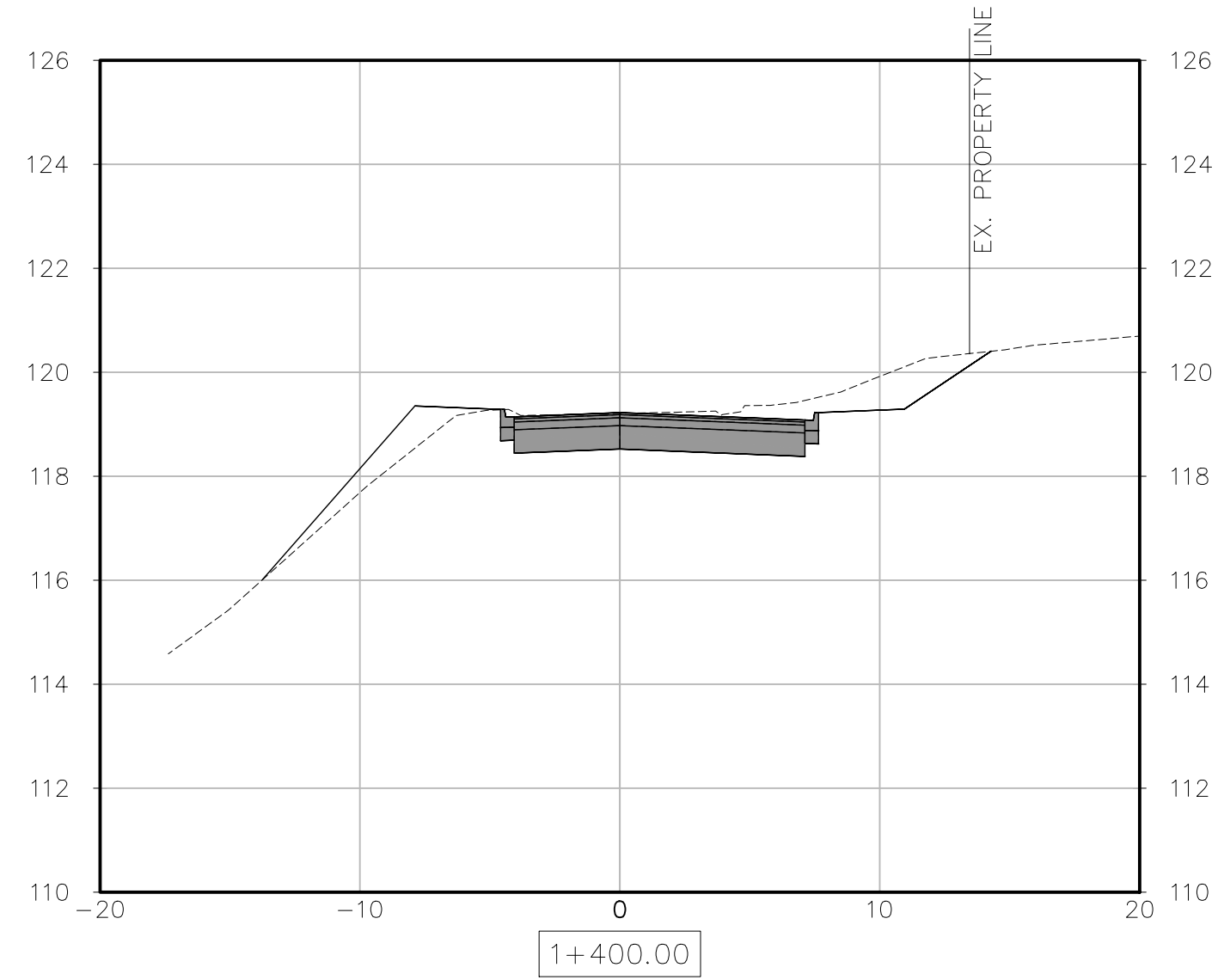
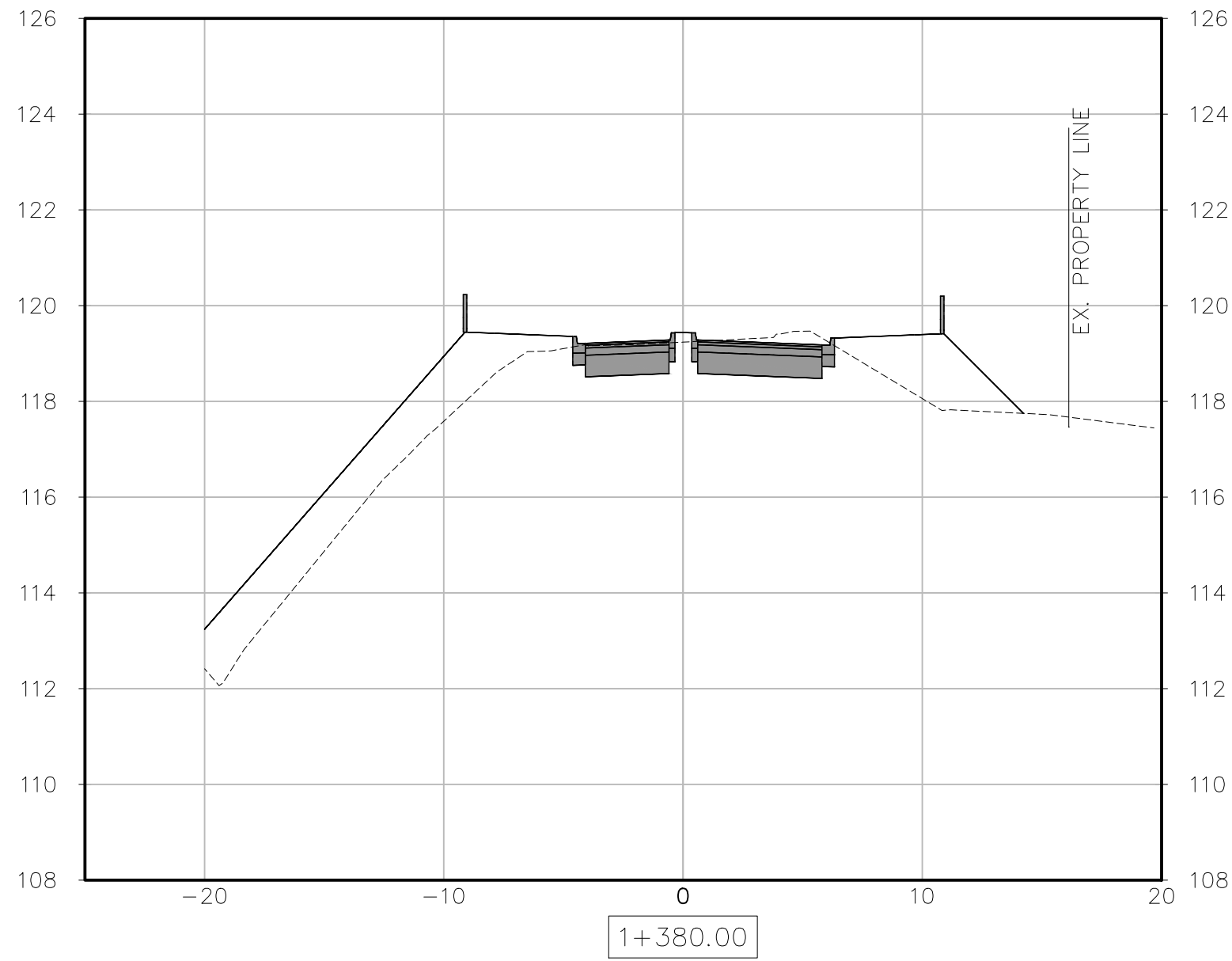
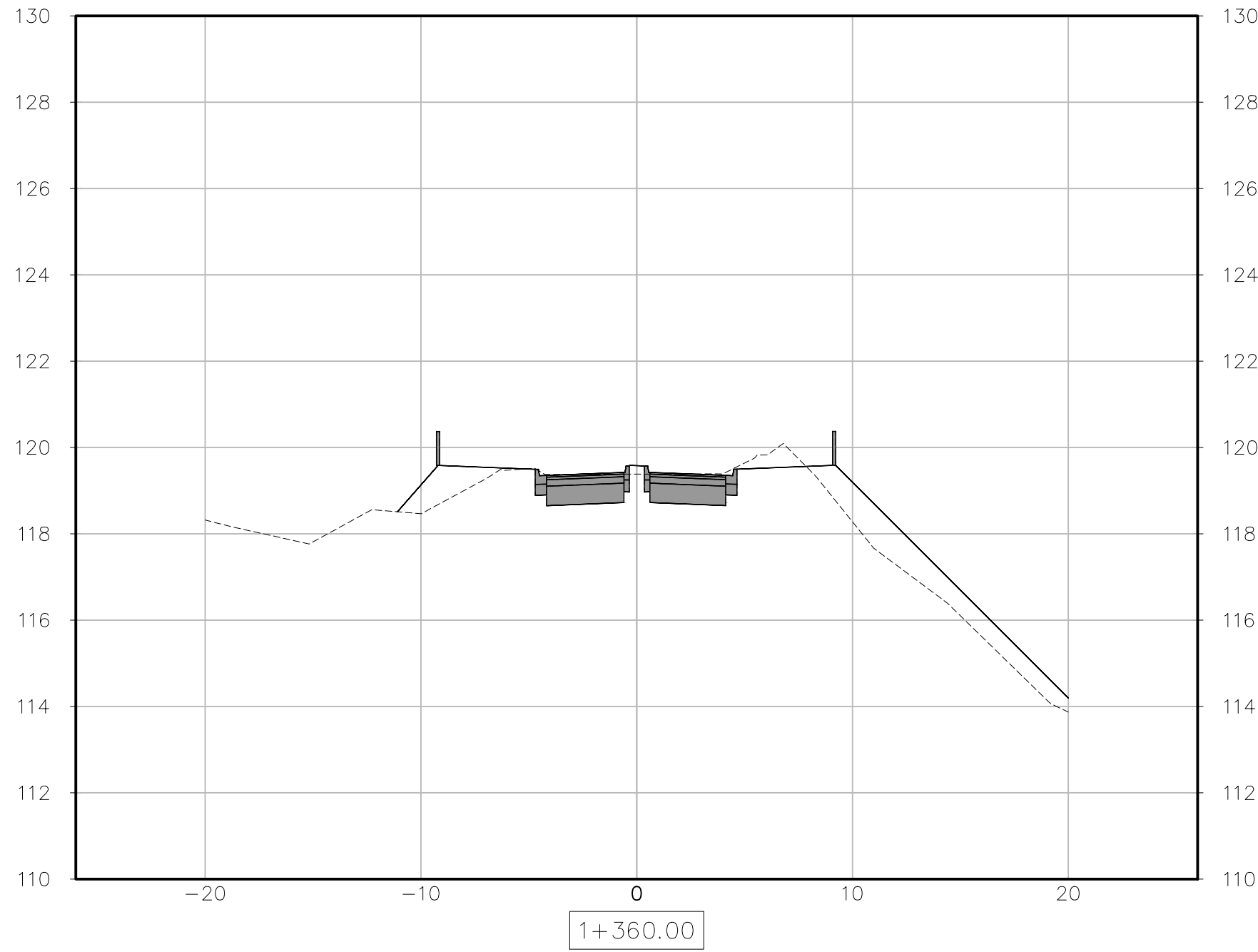
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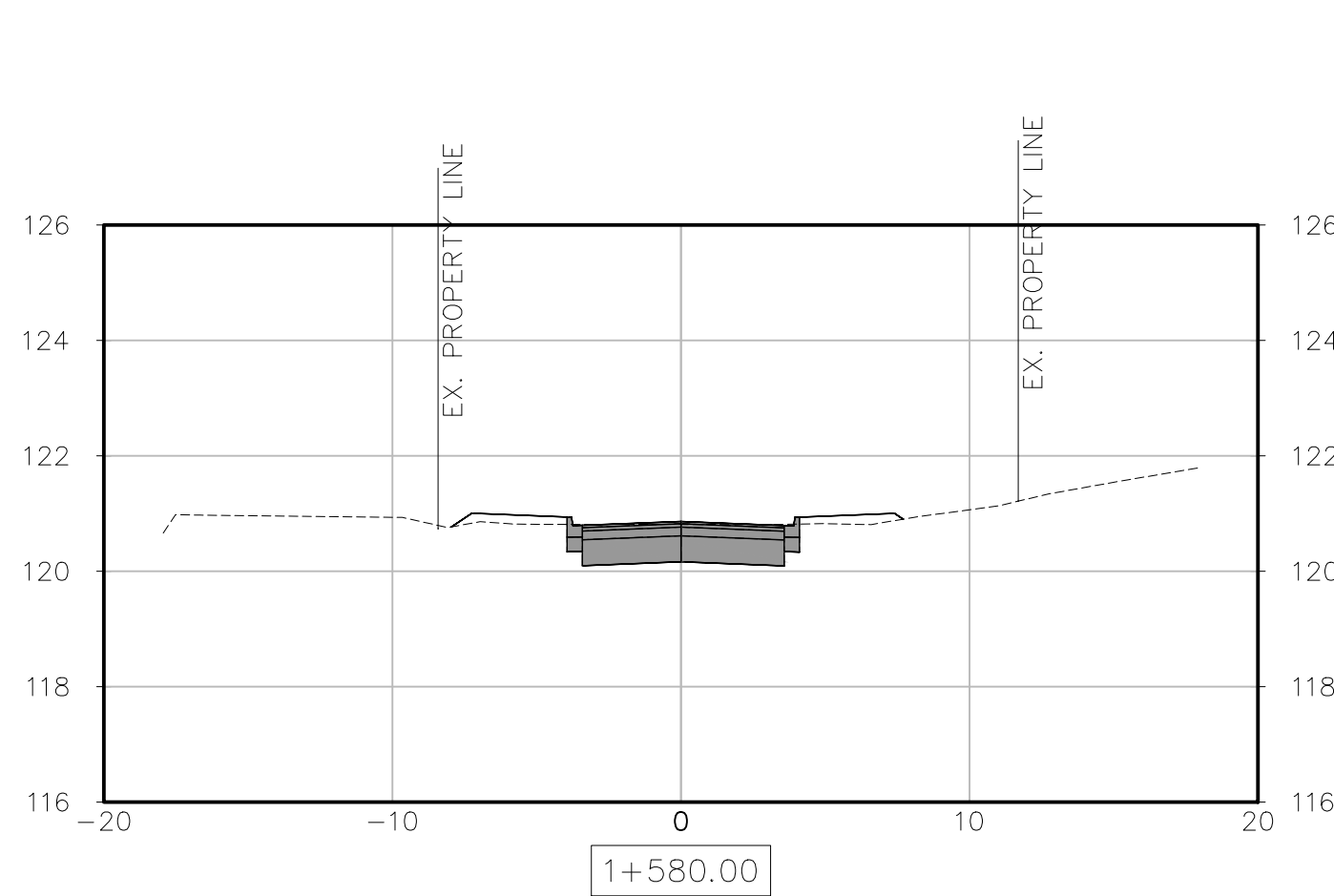
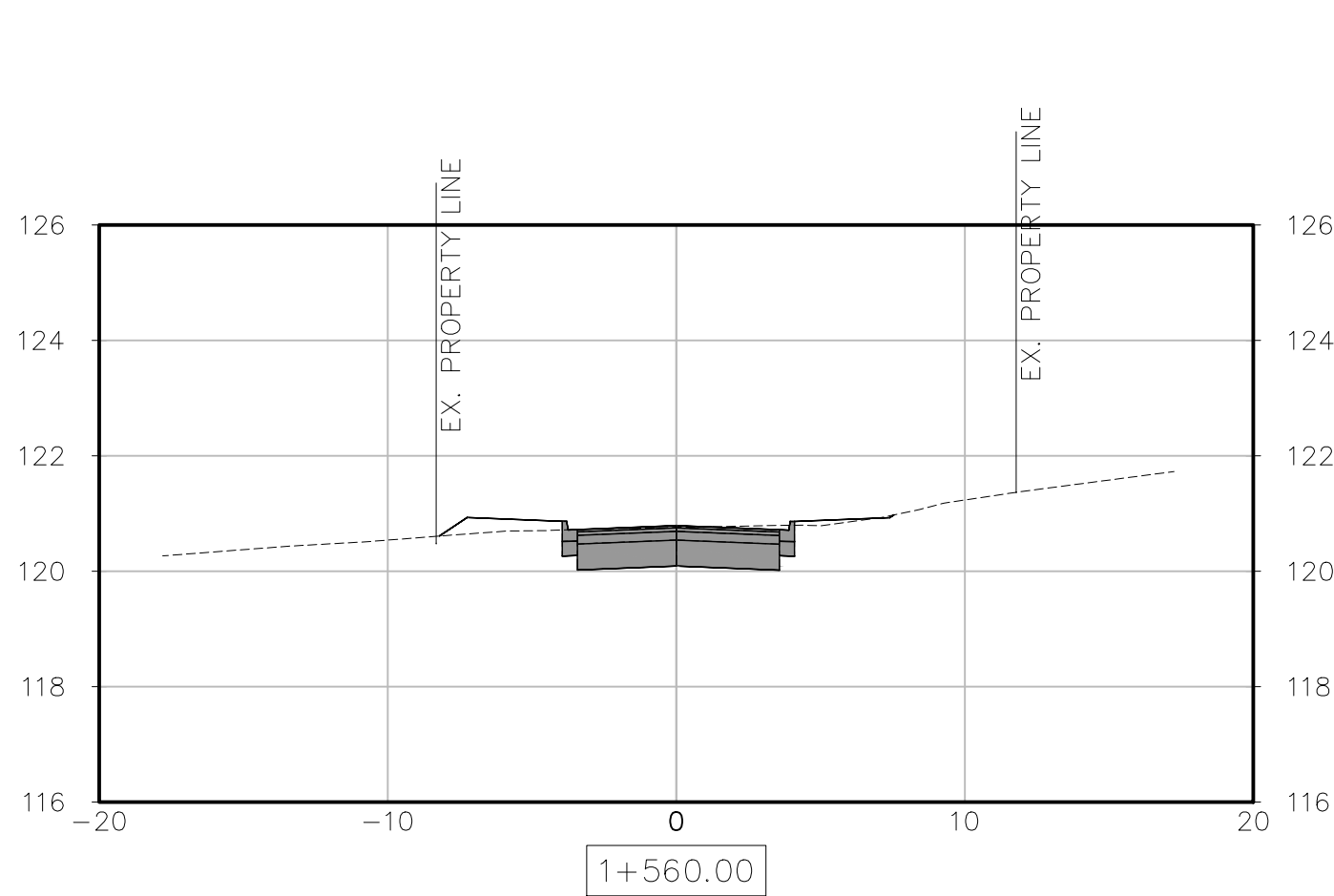
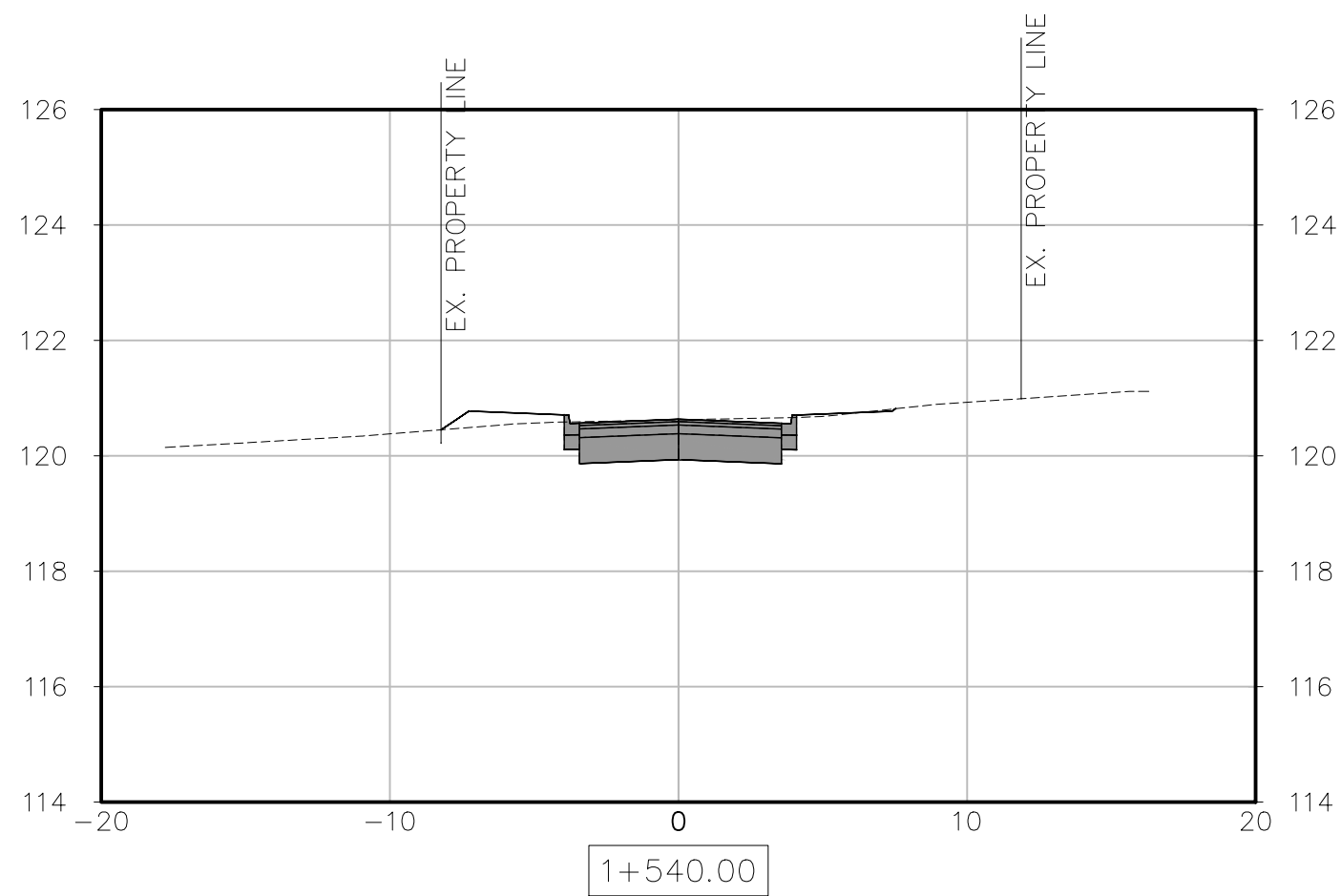
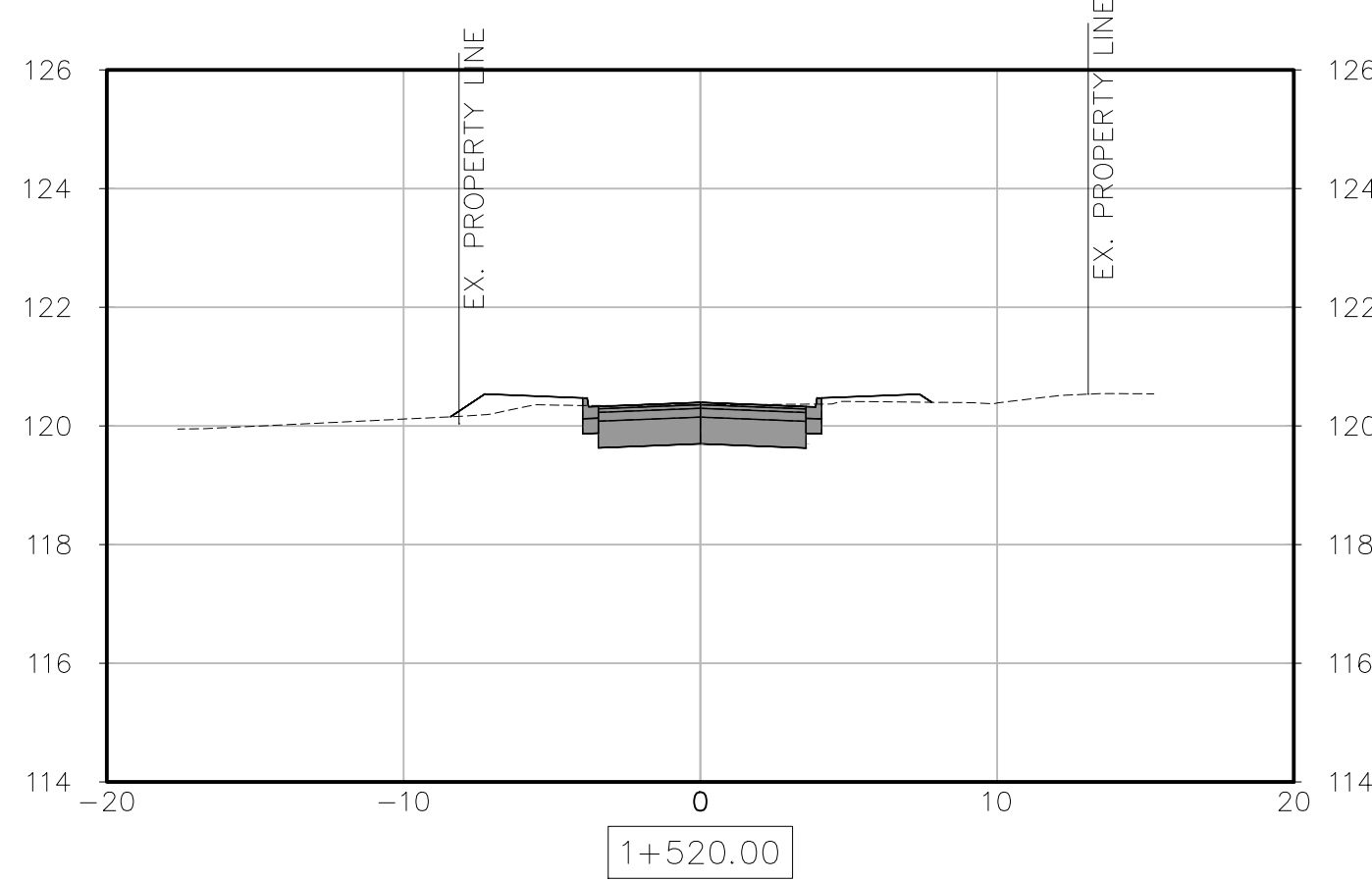
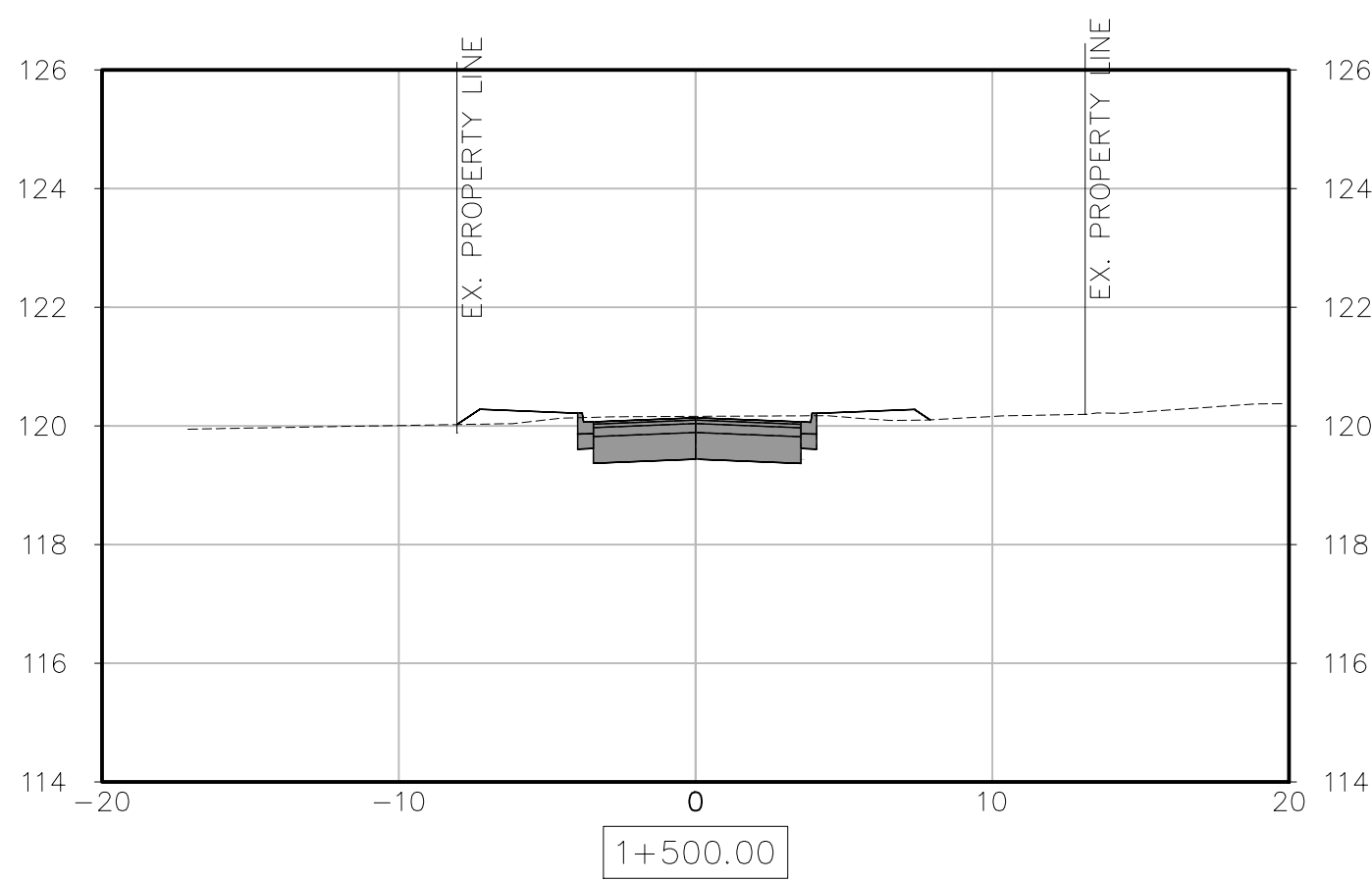
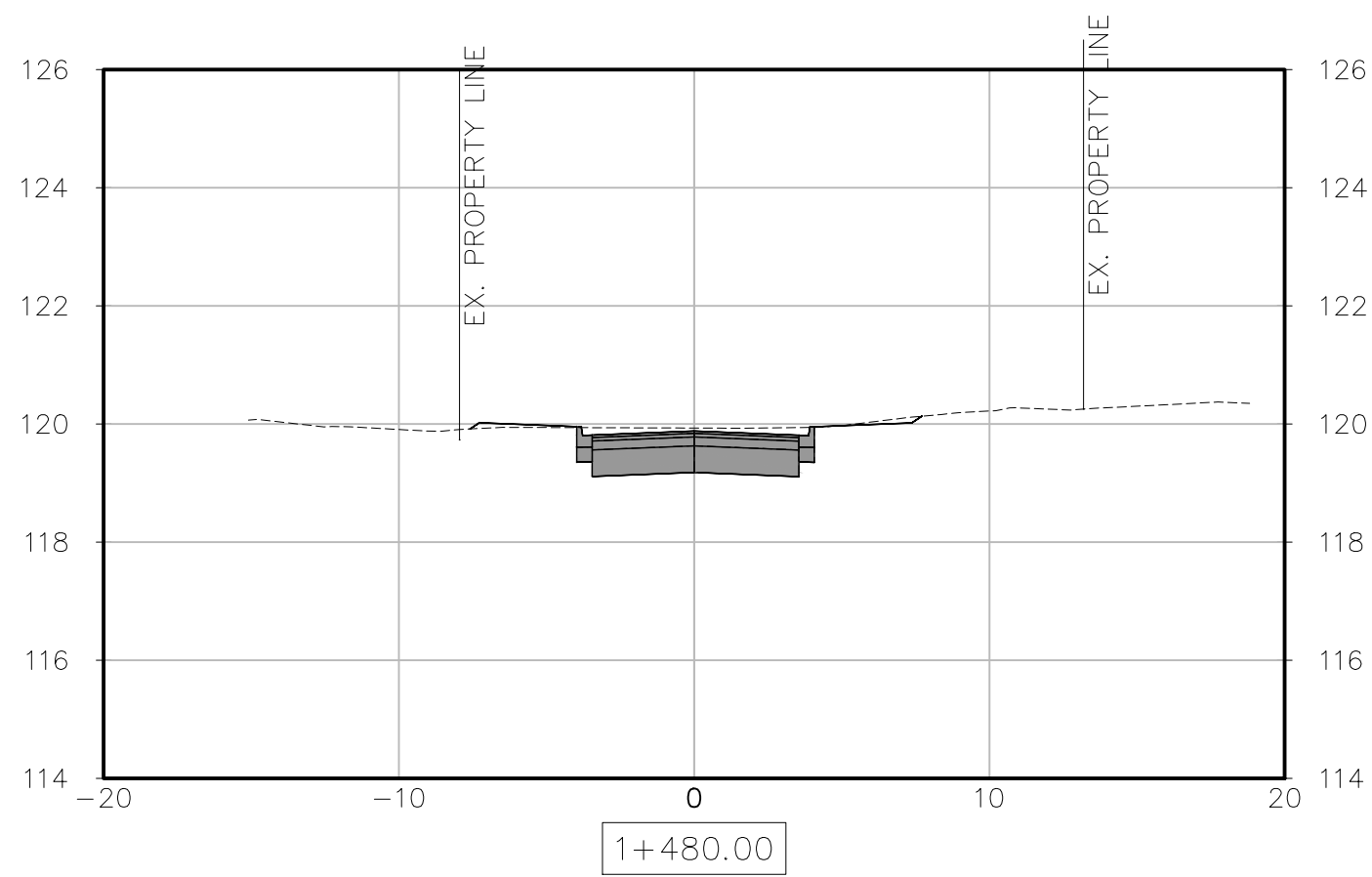
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B001271
DETAILED CROSS SECTIONS (20m)
YORK ROAD
TANBARK RD TO CONCESSION 3 RD
NIAGARA ON THE LAKE
DRAWING TYPE

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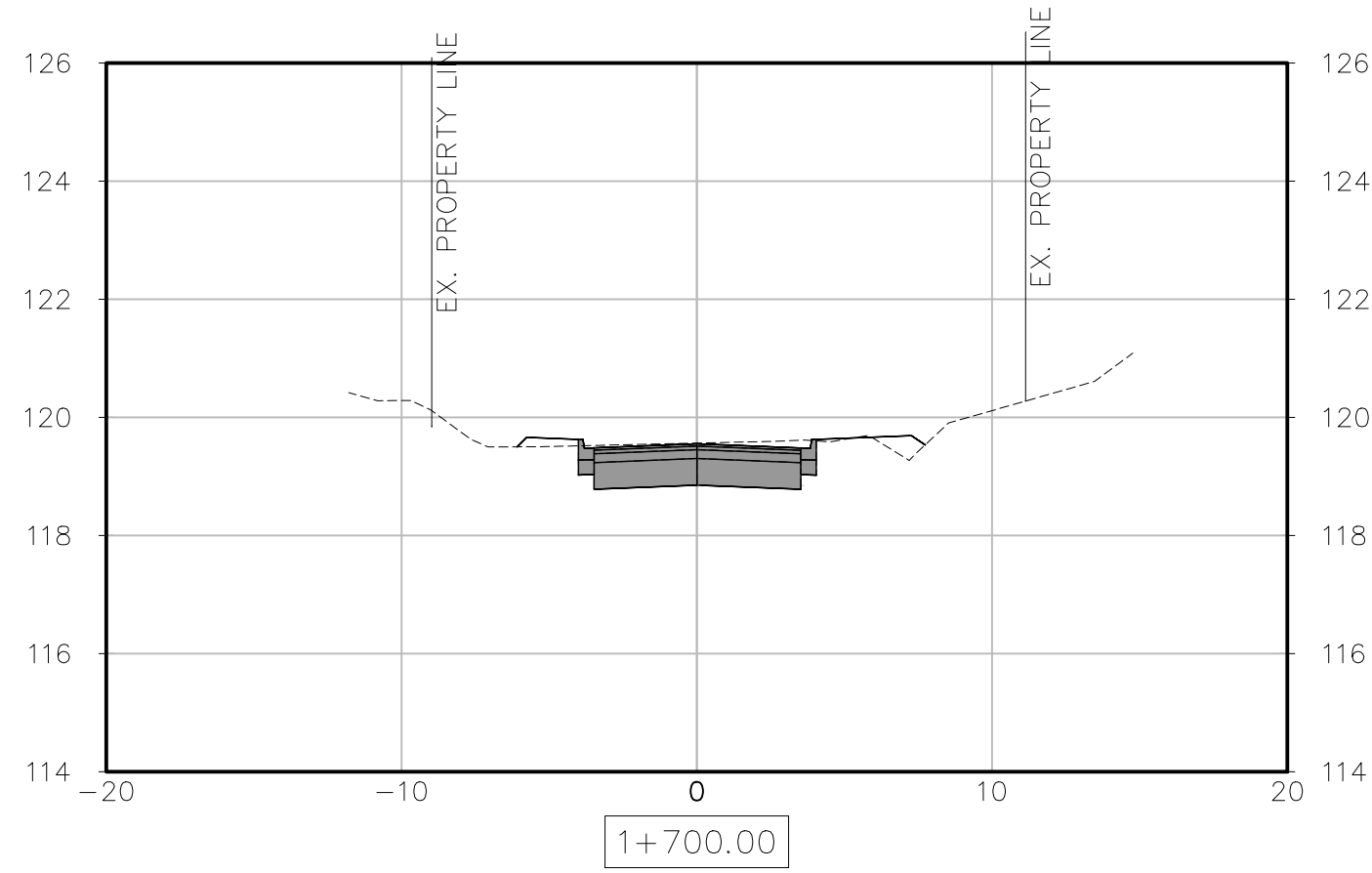
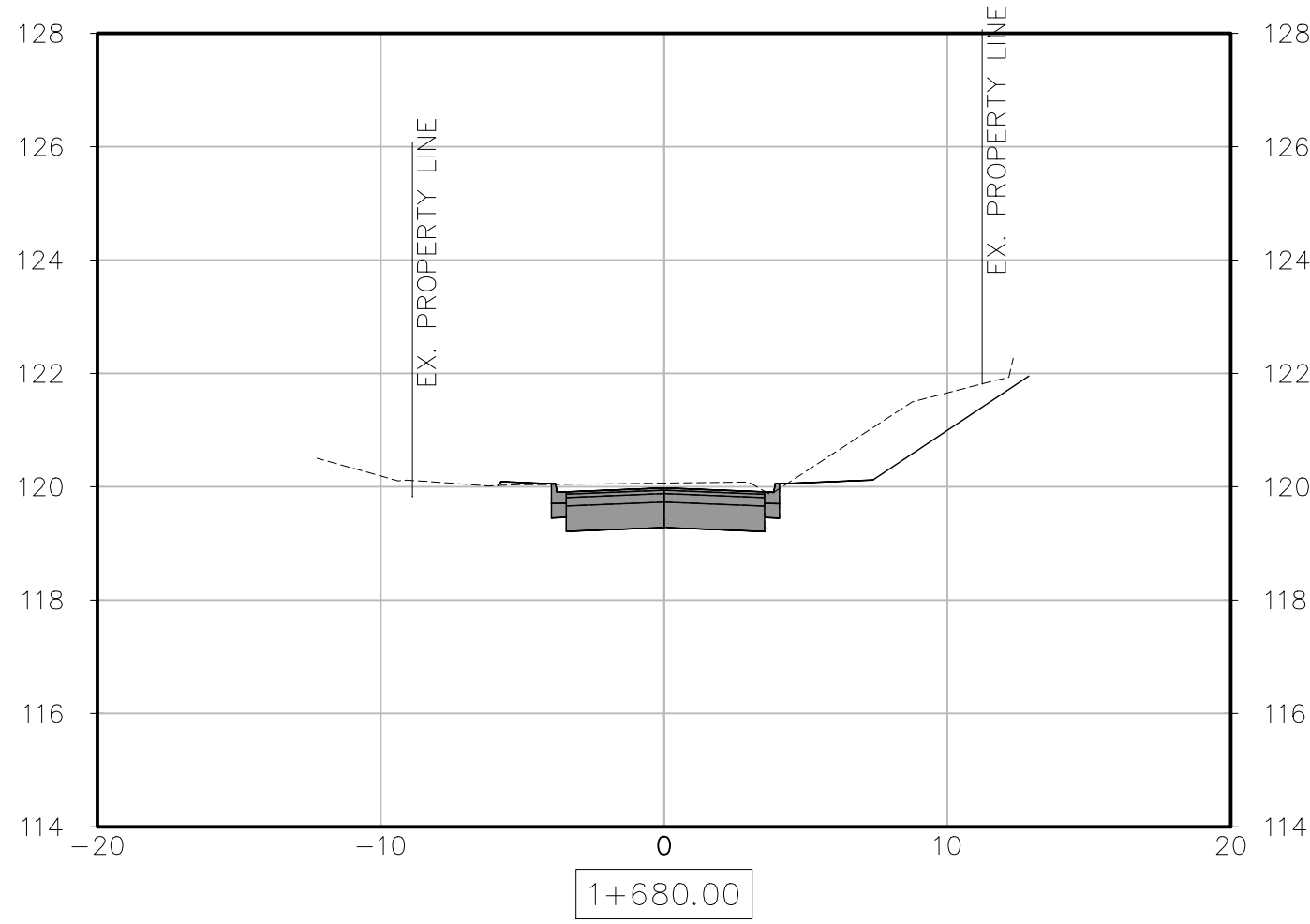
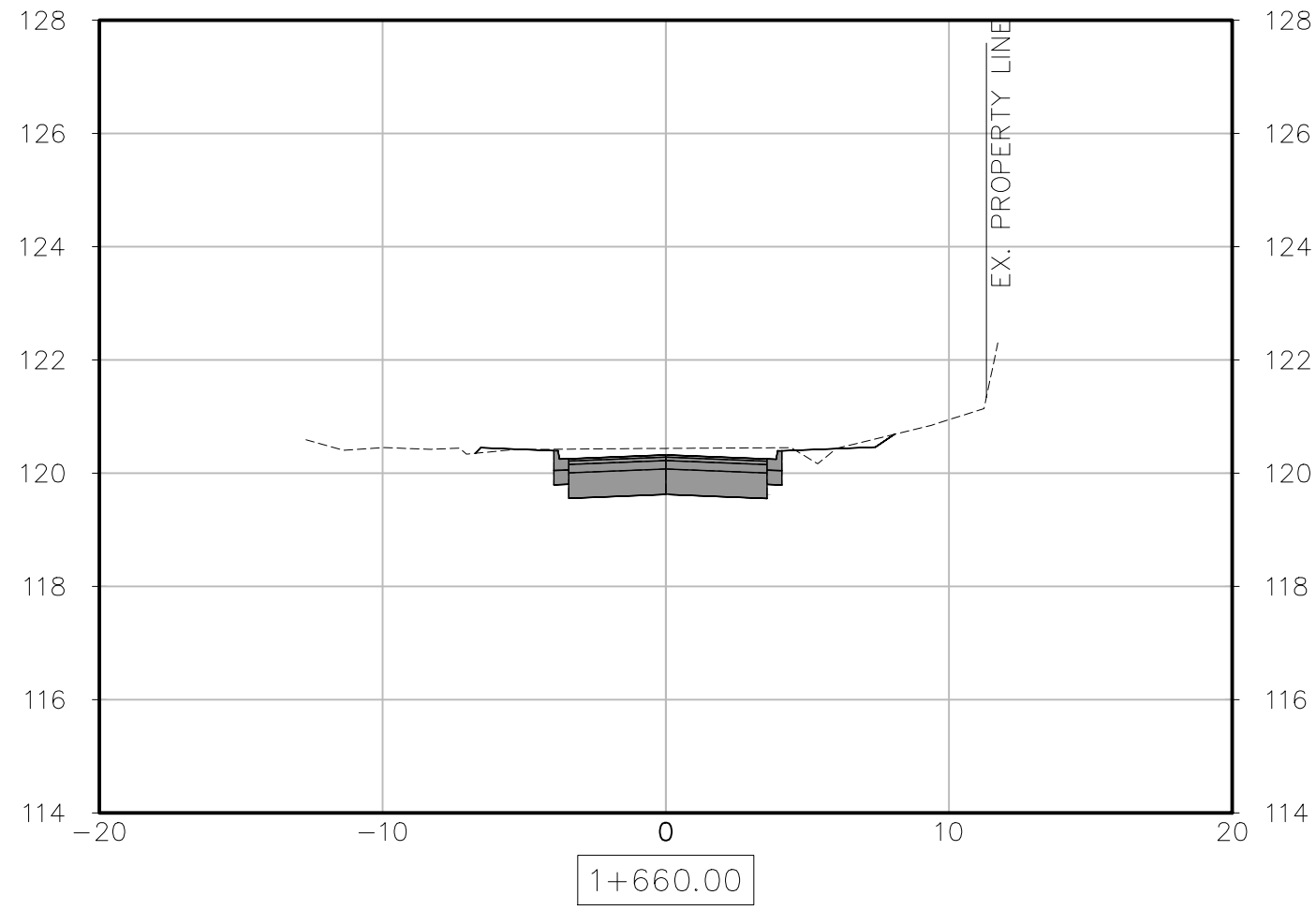
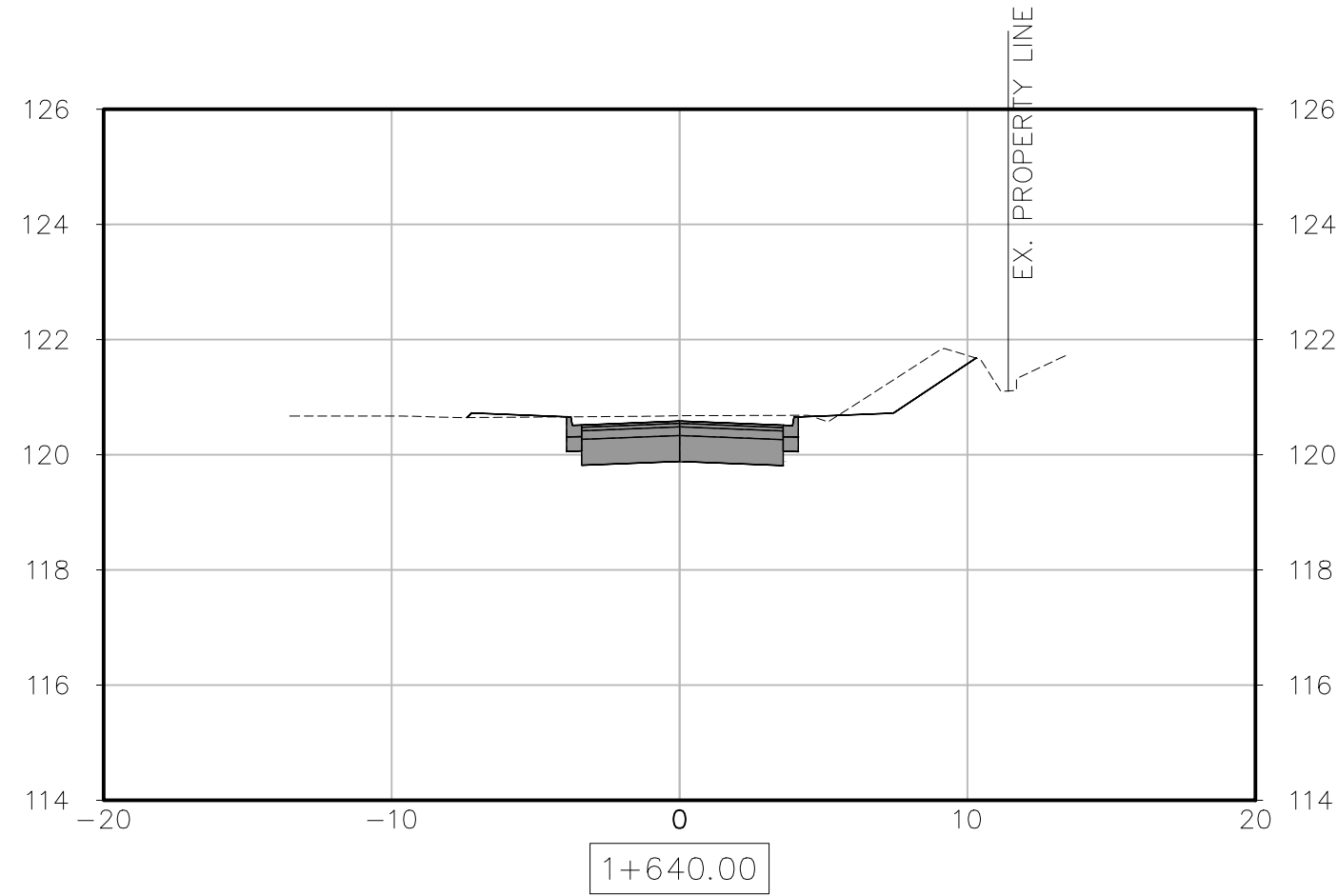
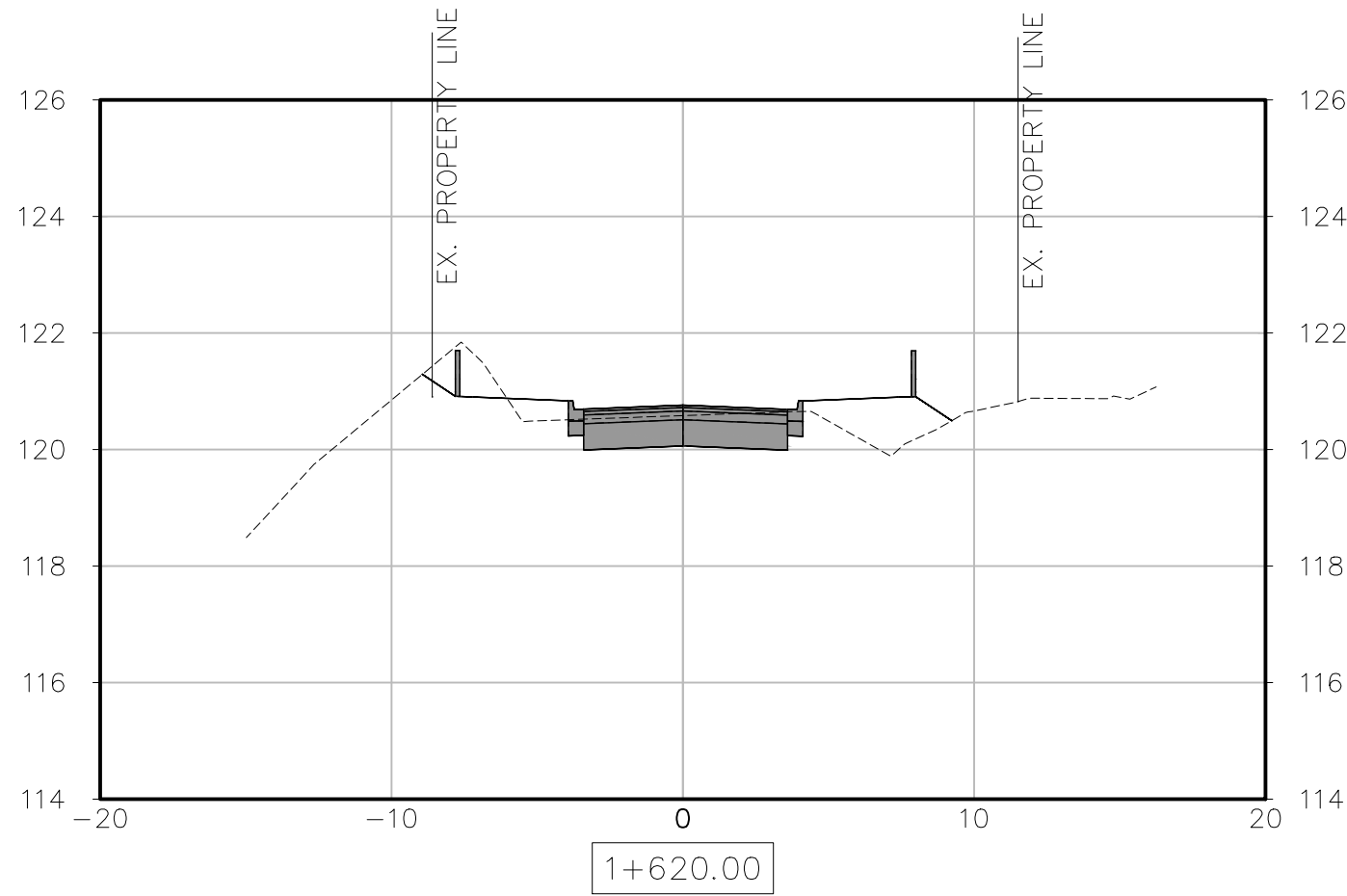
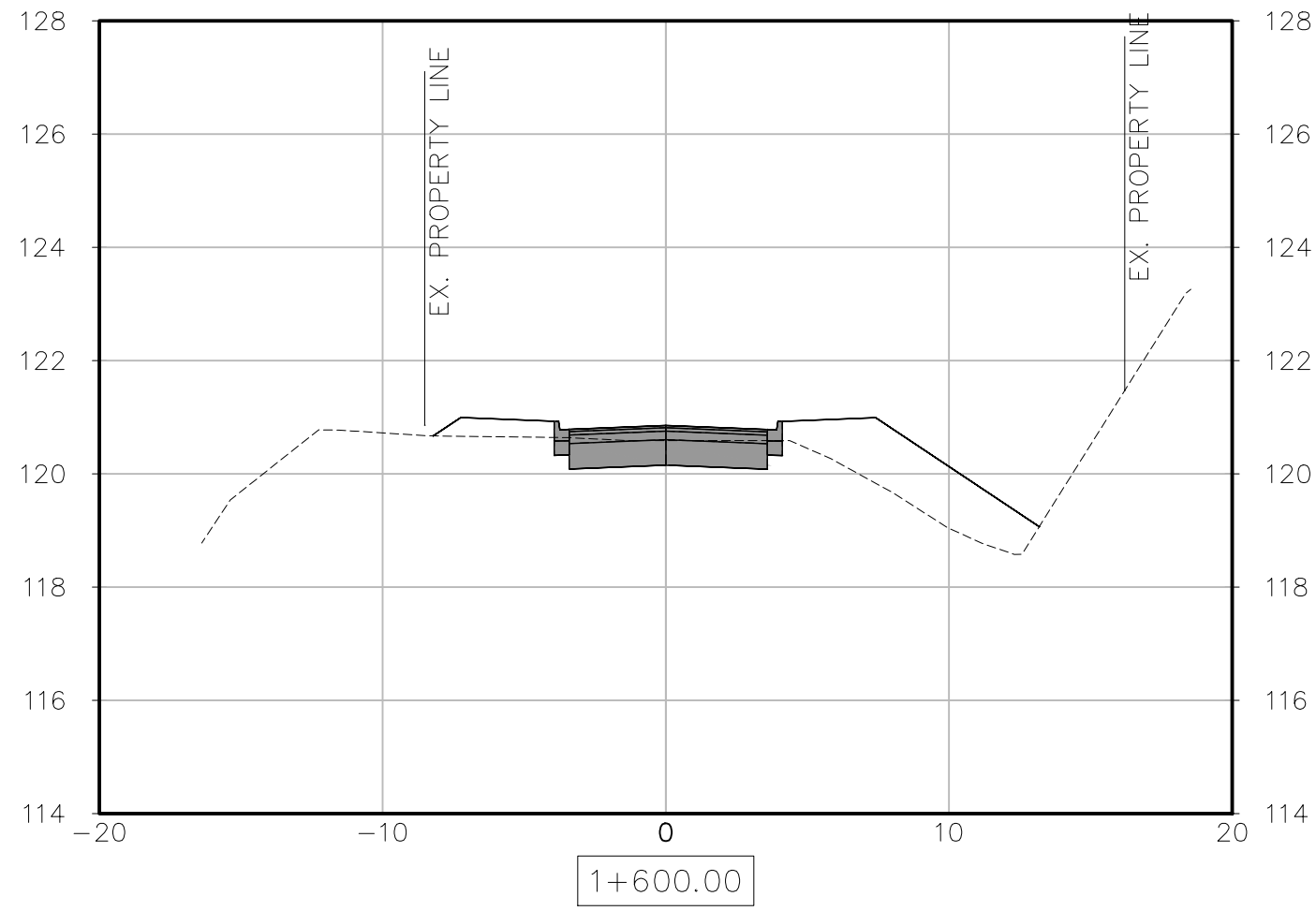
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DETAILED CROSS SECTIONS (20m)
YORK ROAD
TANBARK RD TO CONCESSION 3 RD
NIAGARA ON THE LAKE
DRAWING TYPE

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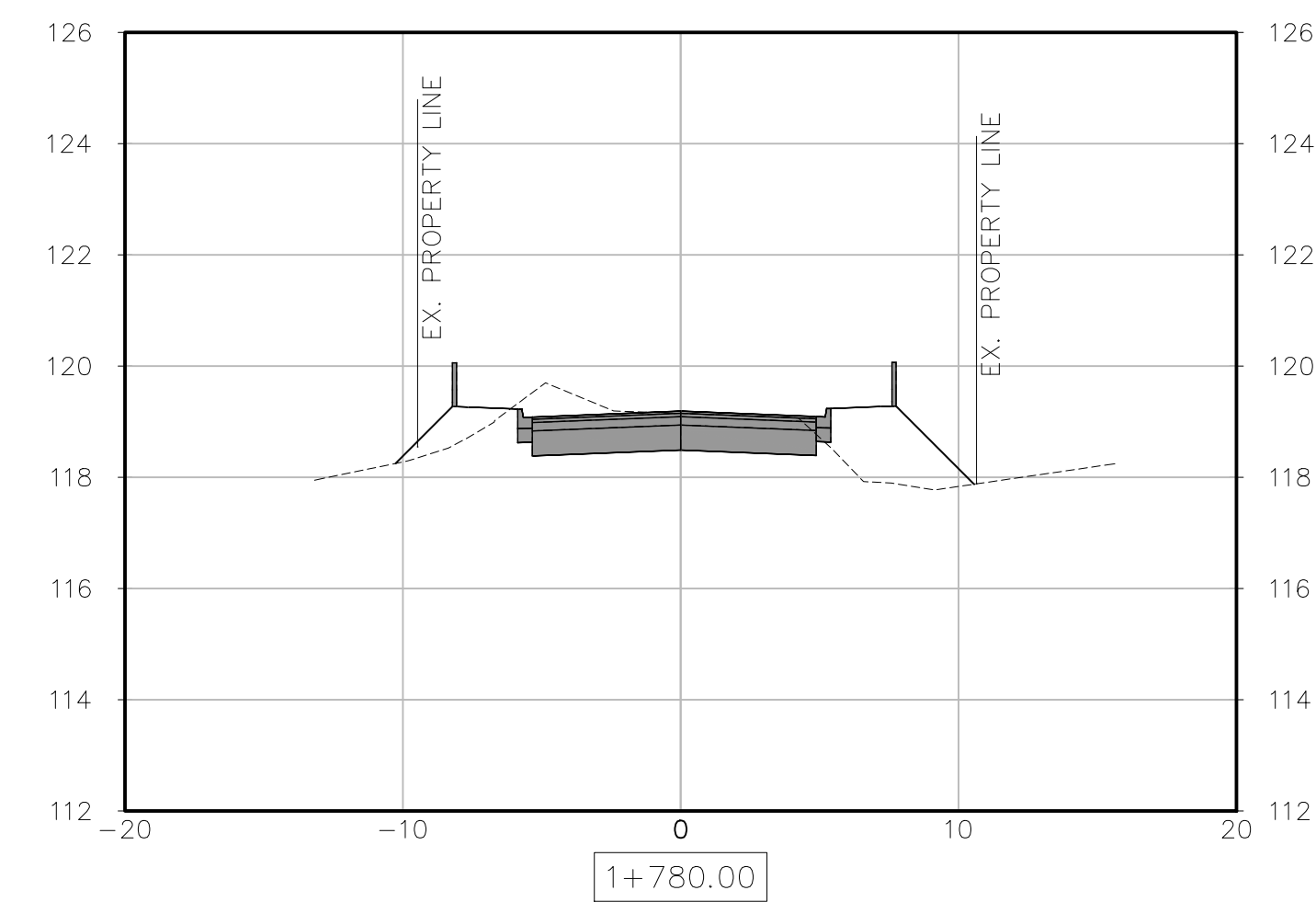
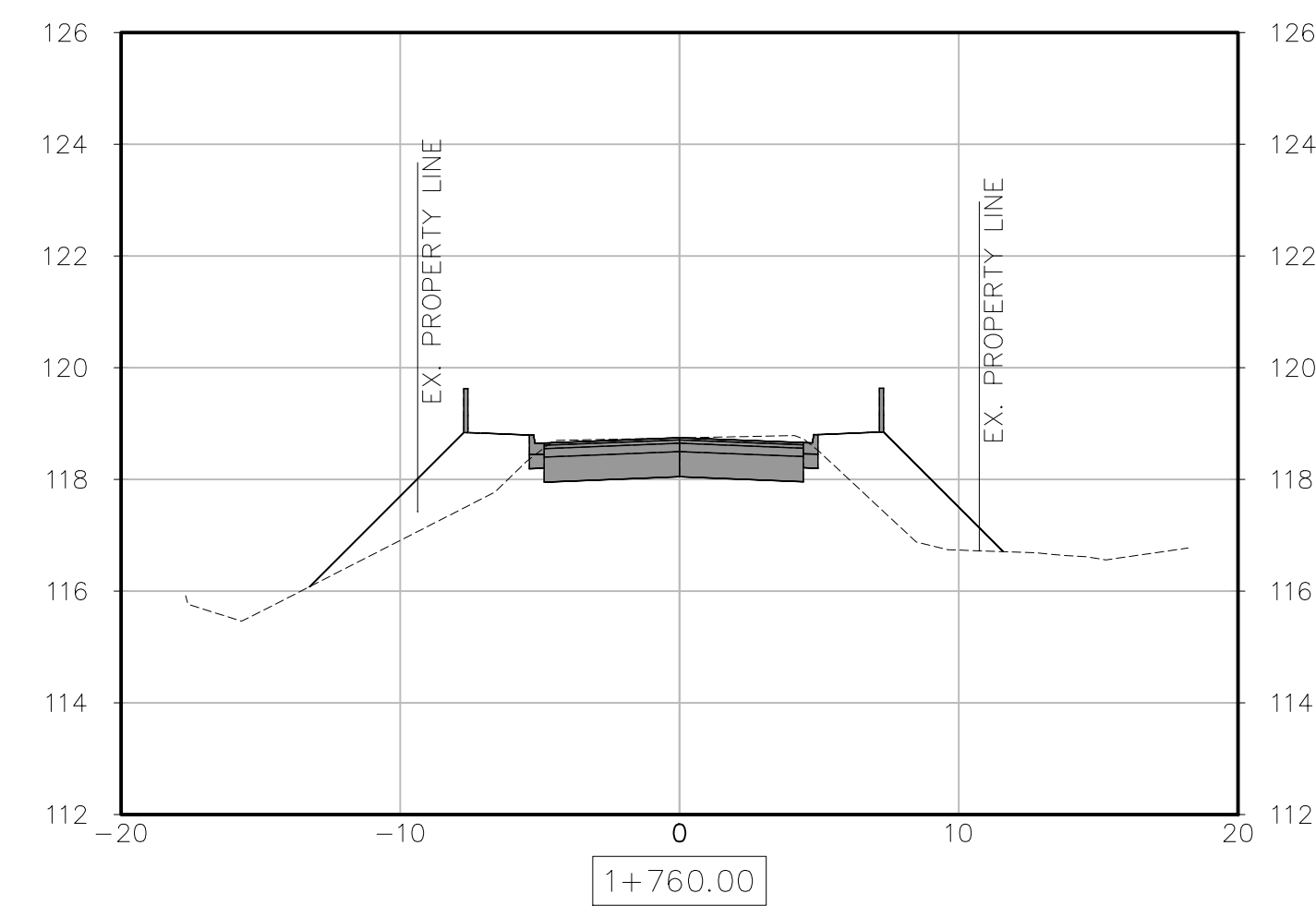
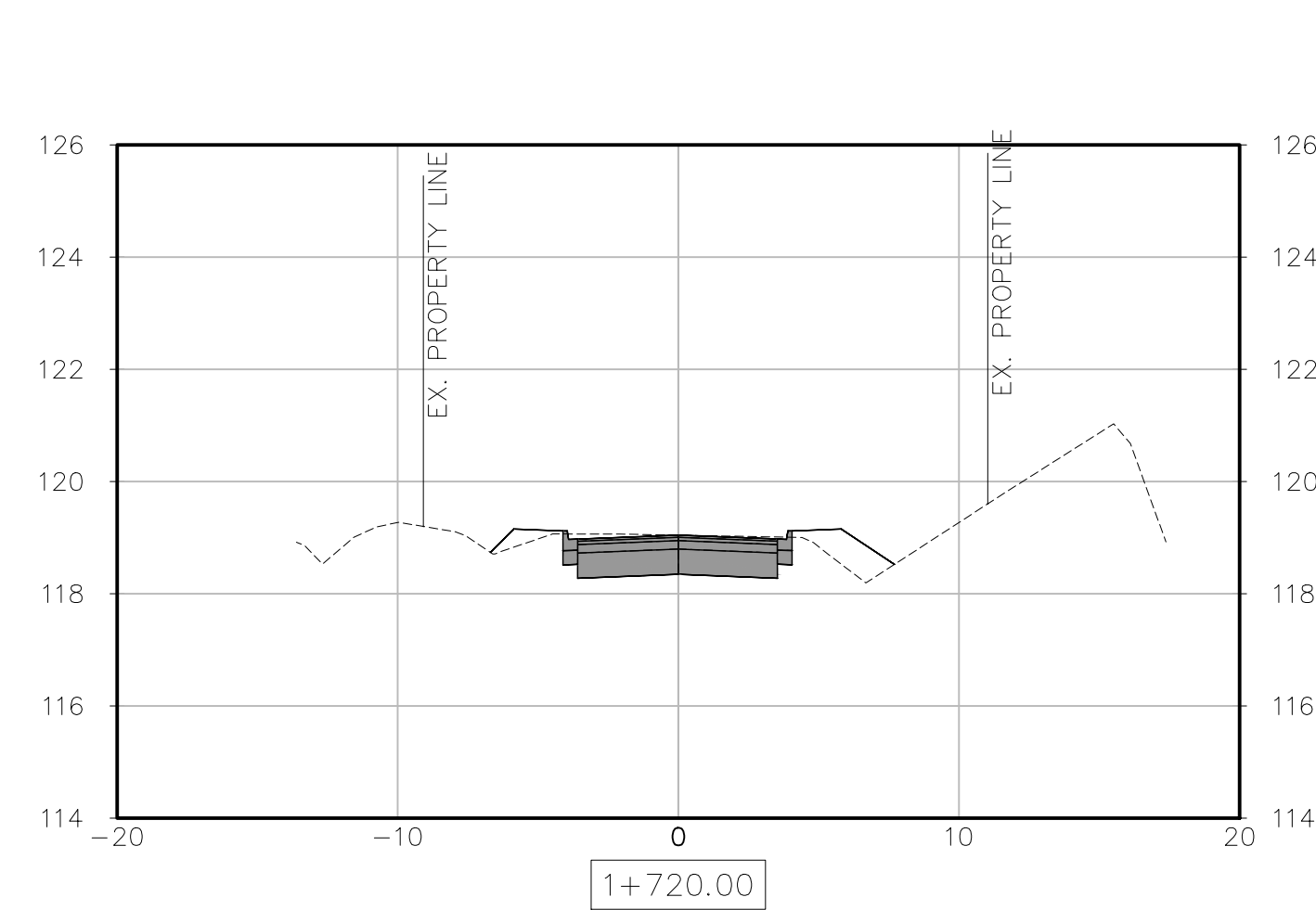
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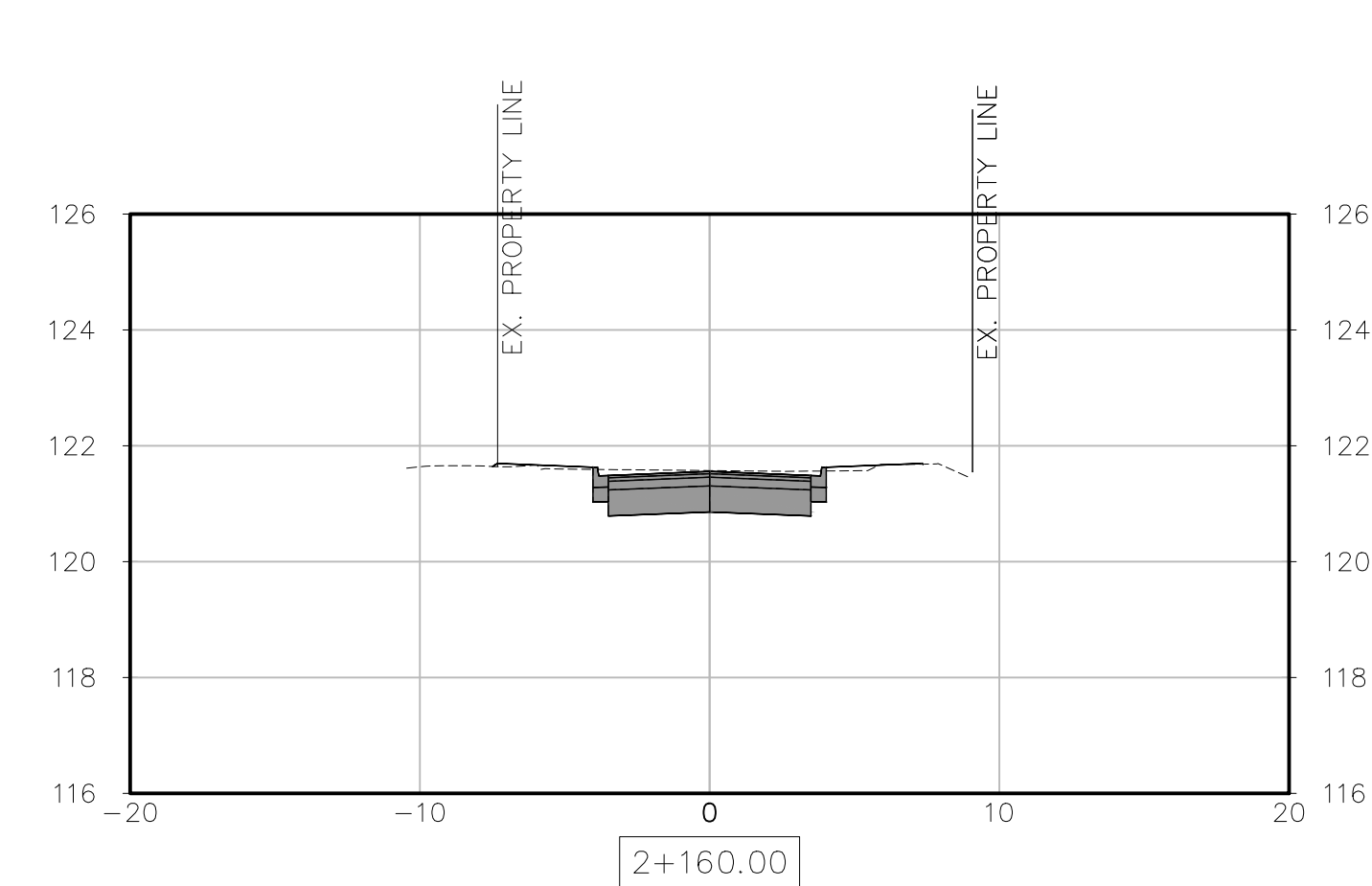
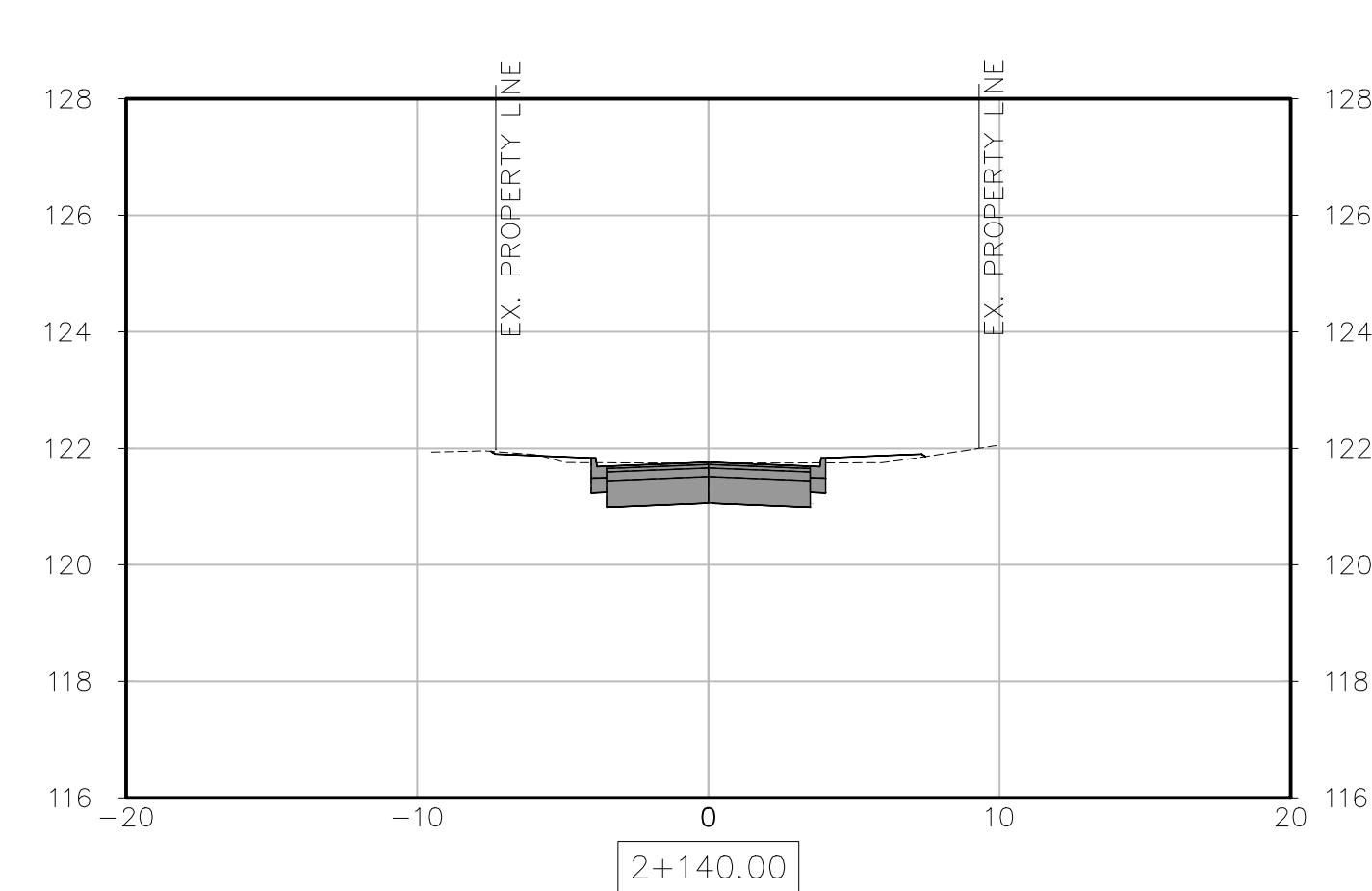
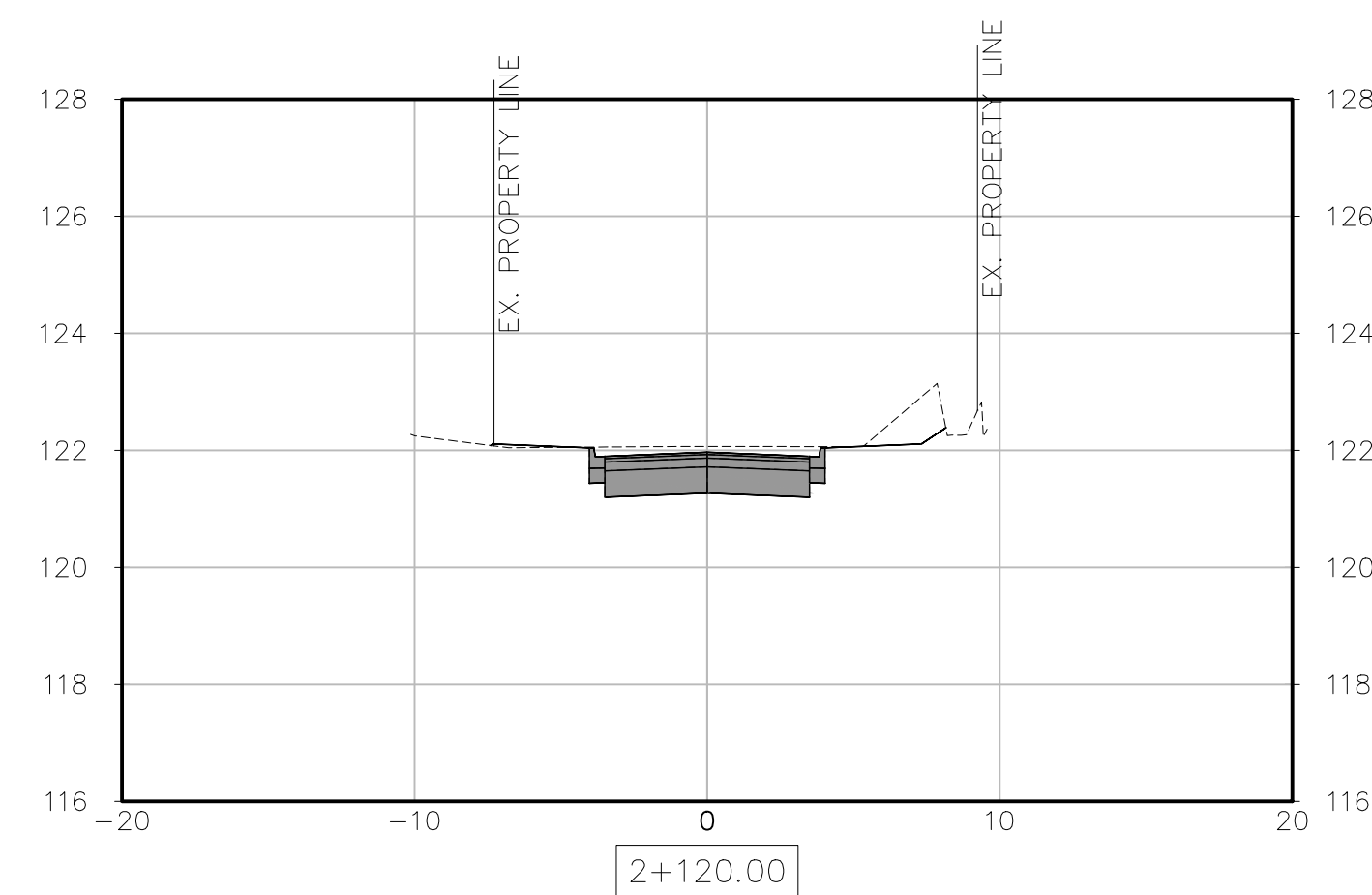
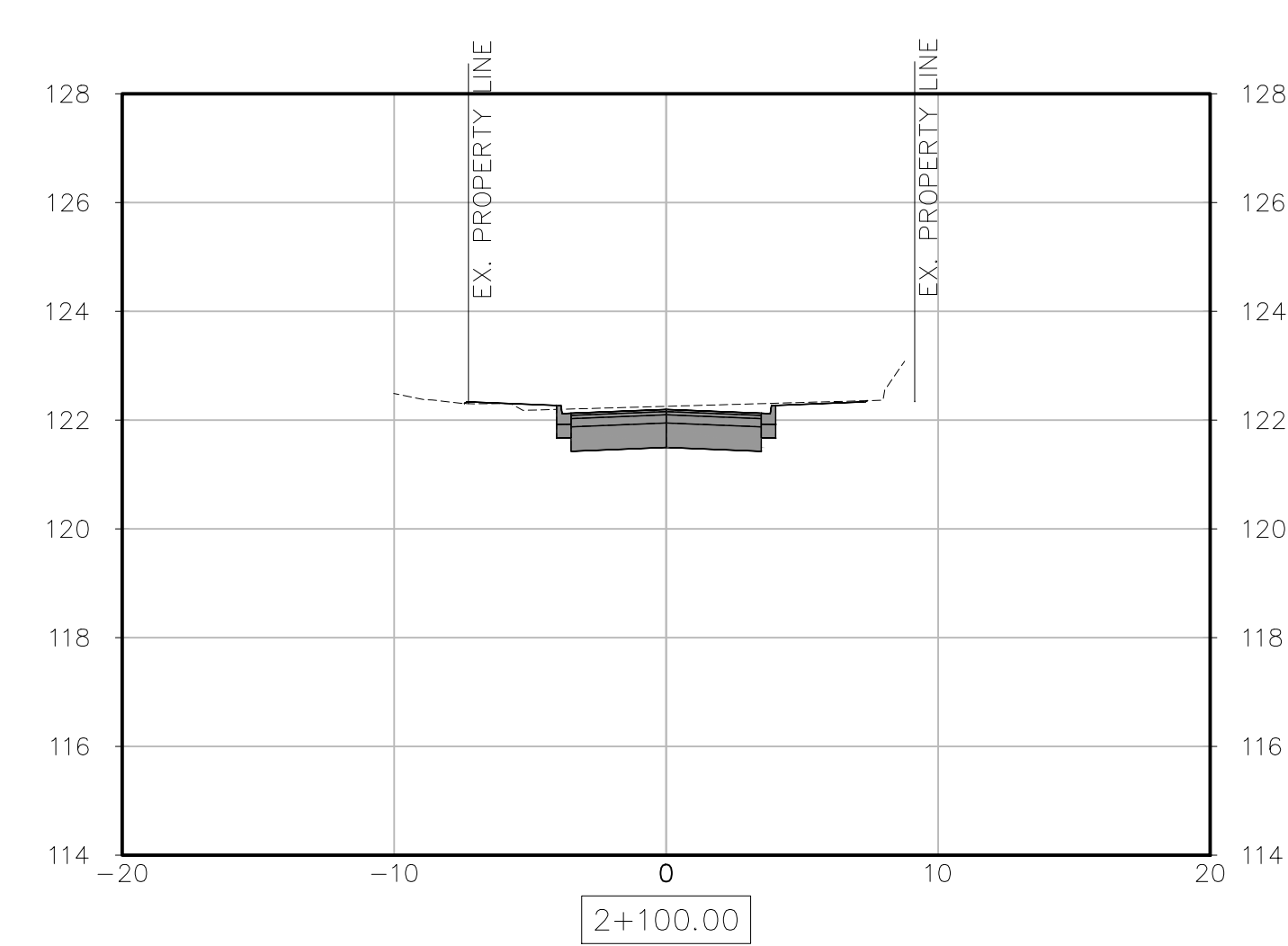
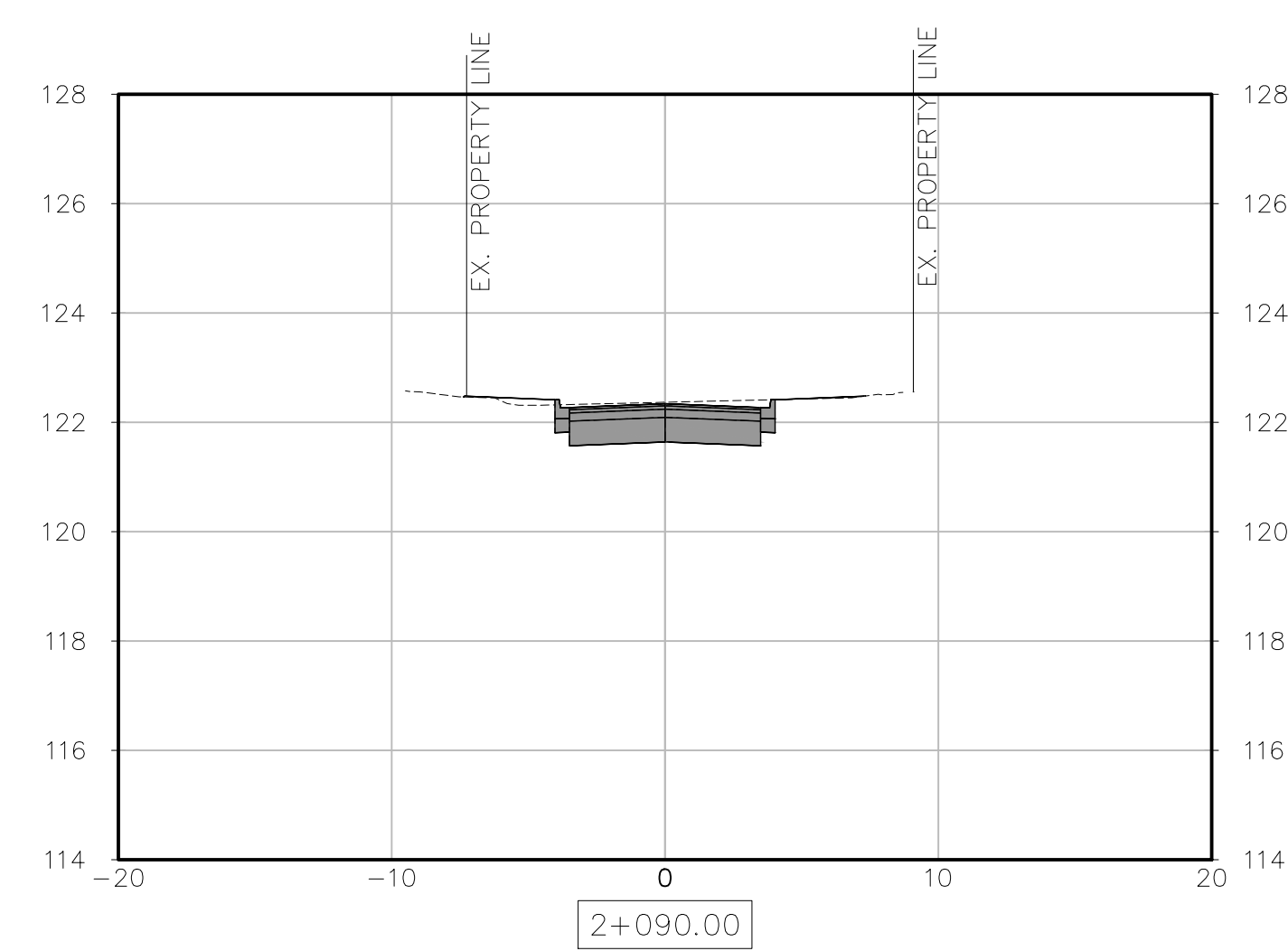
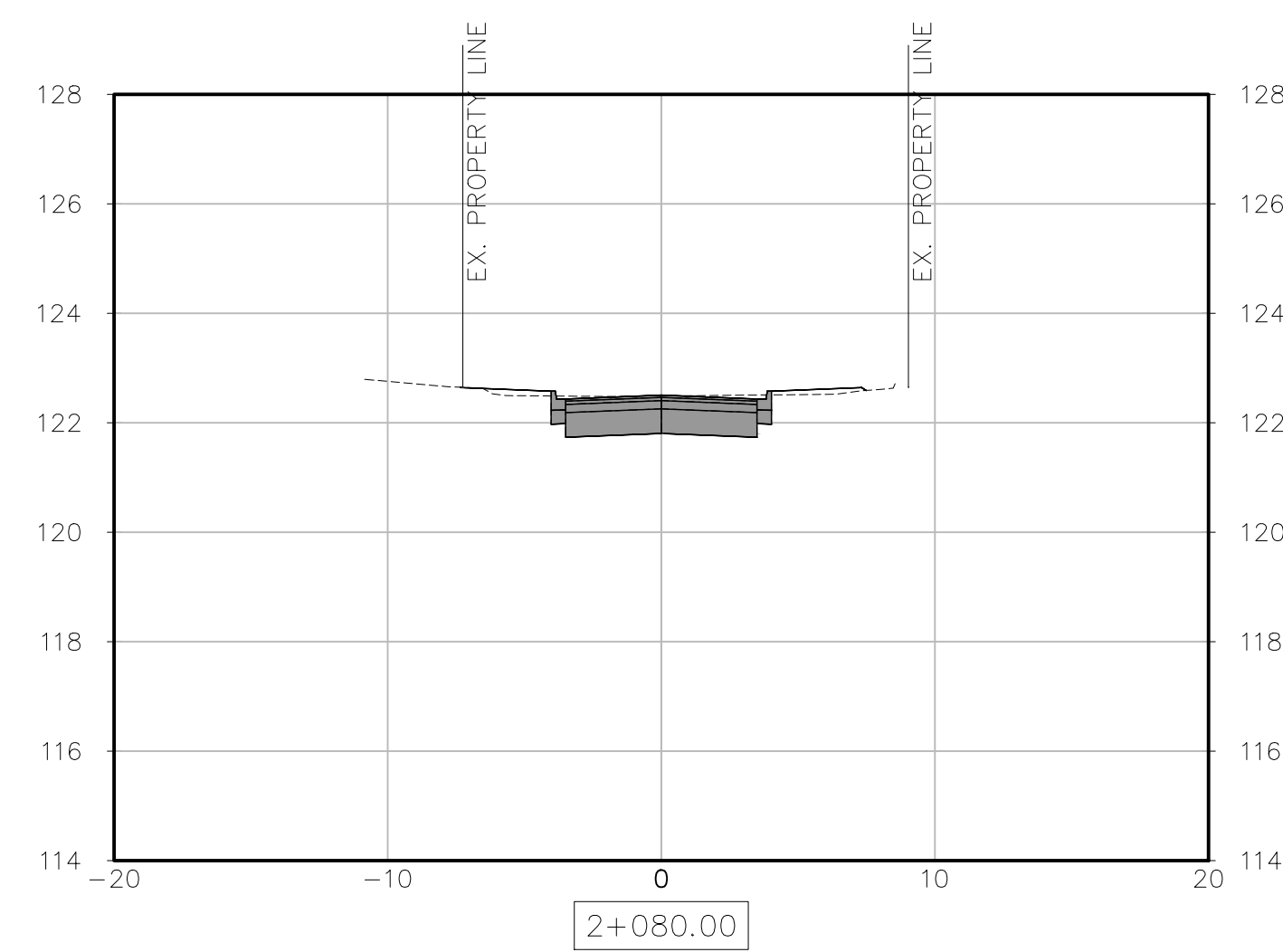
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DETAILED CROSS SECTIONS (20m)
YORK ROAD
TANBARK RD TO CONCESSION 3 RD
NIAGARA ON THE LAKE
DRAWING TYPE

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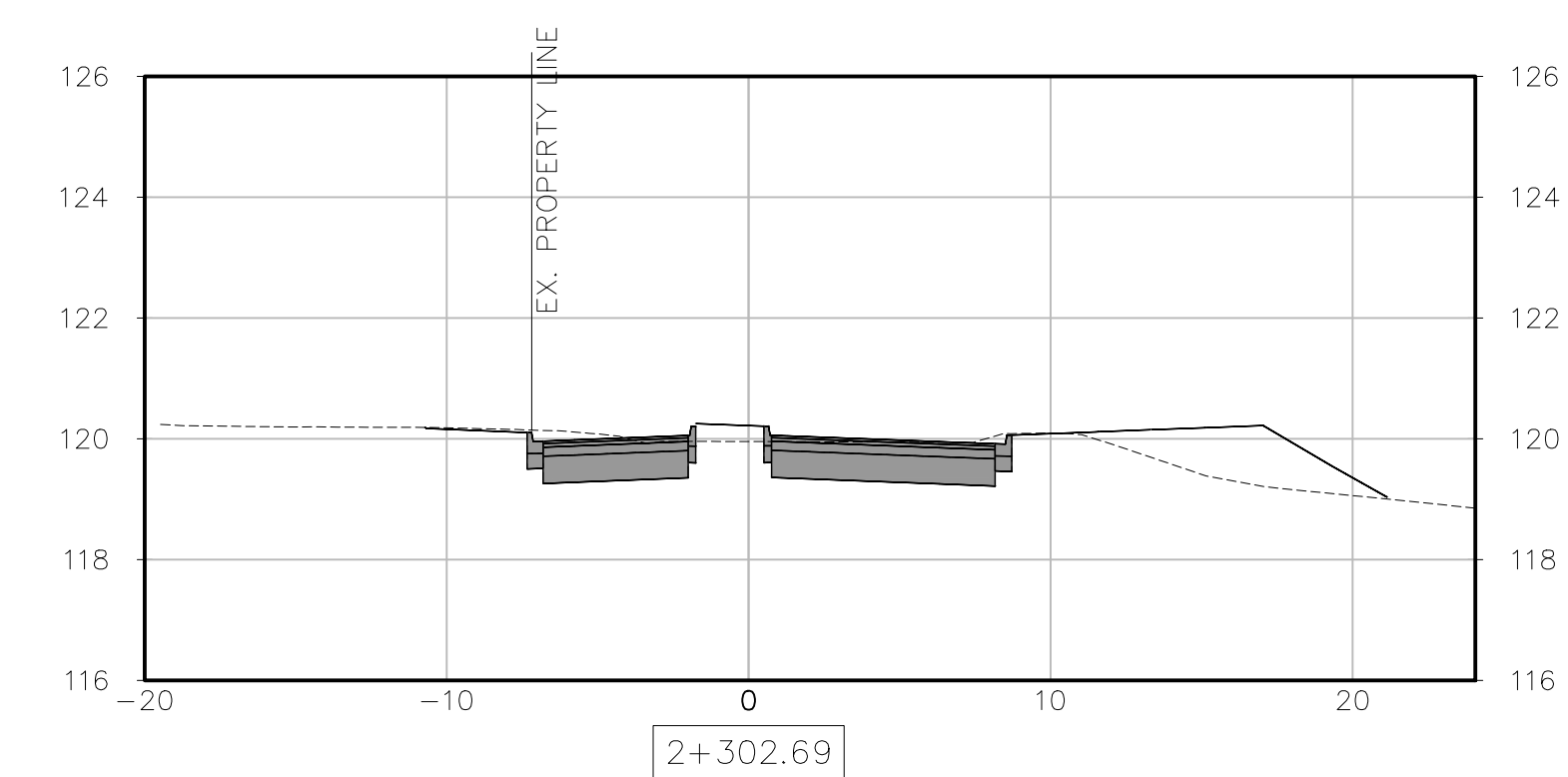
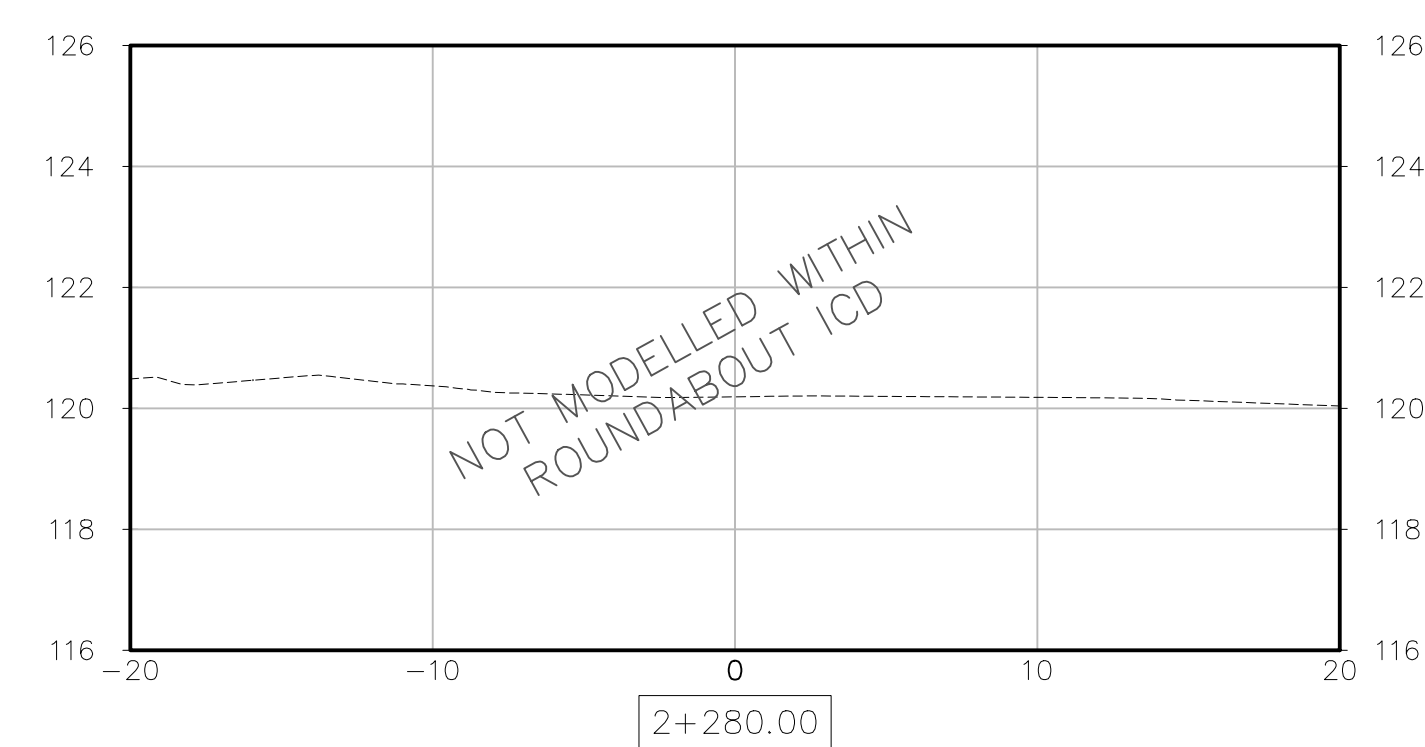
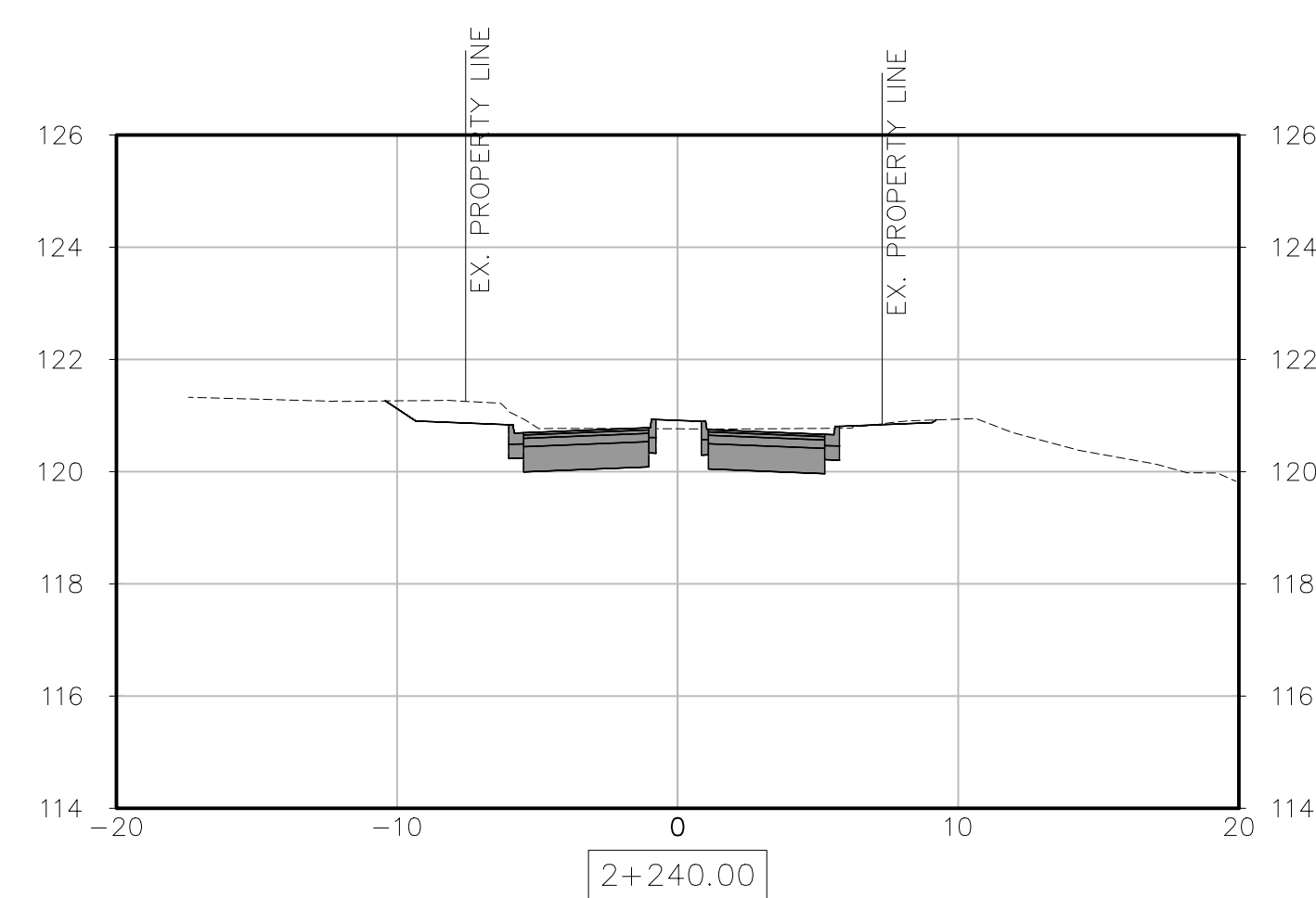
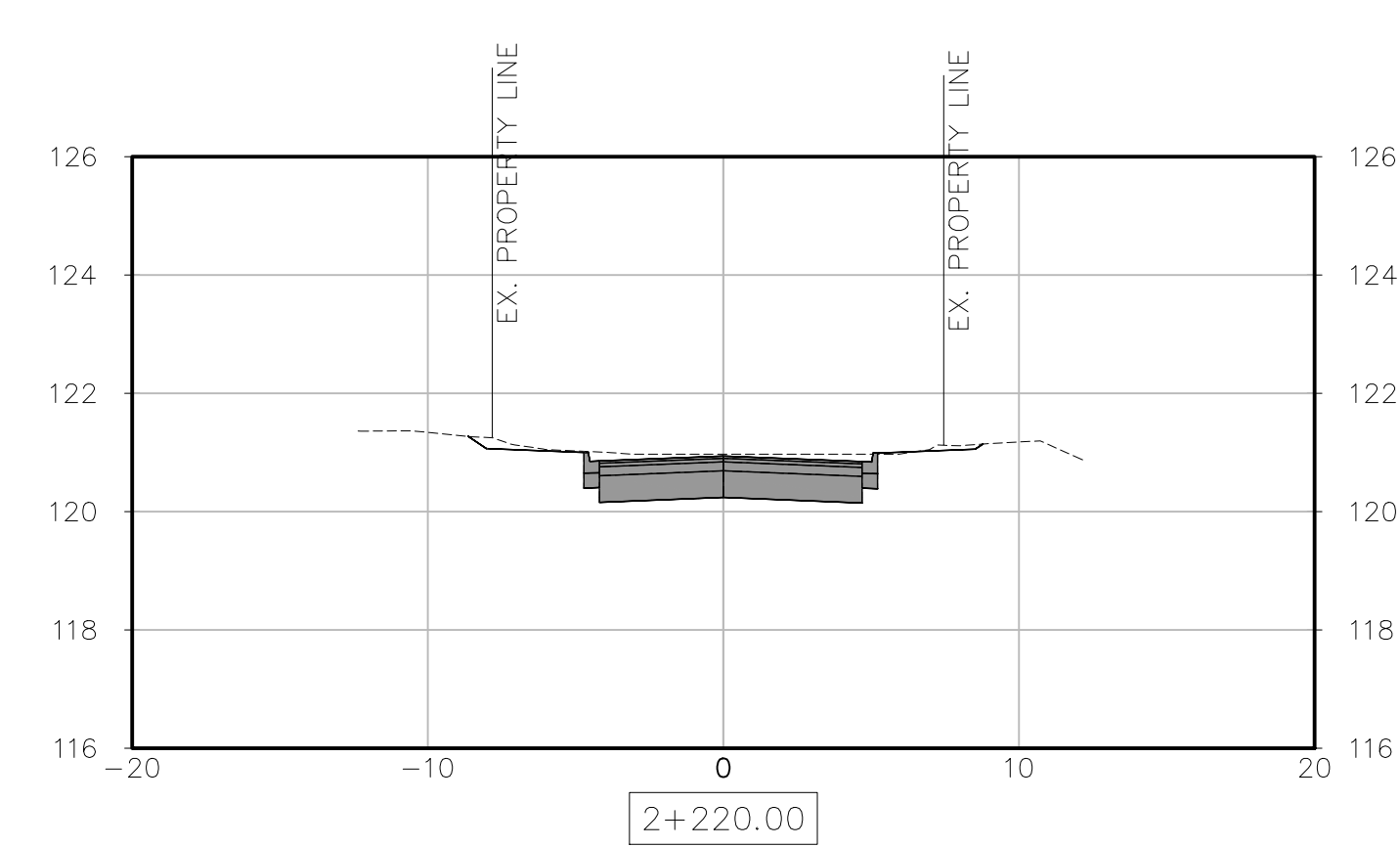
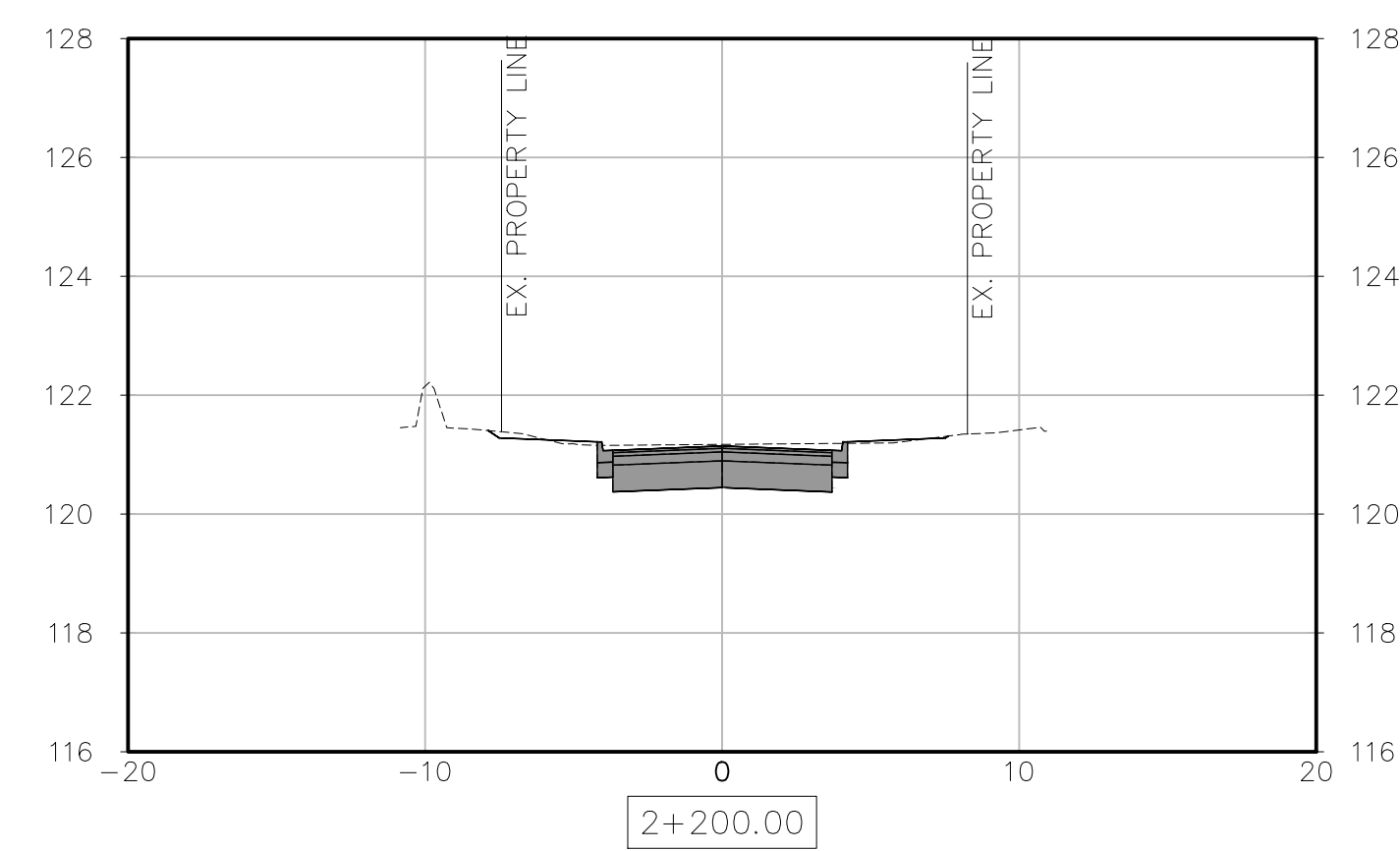
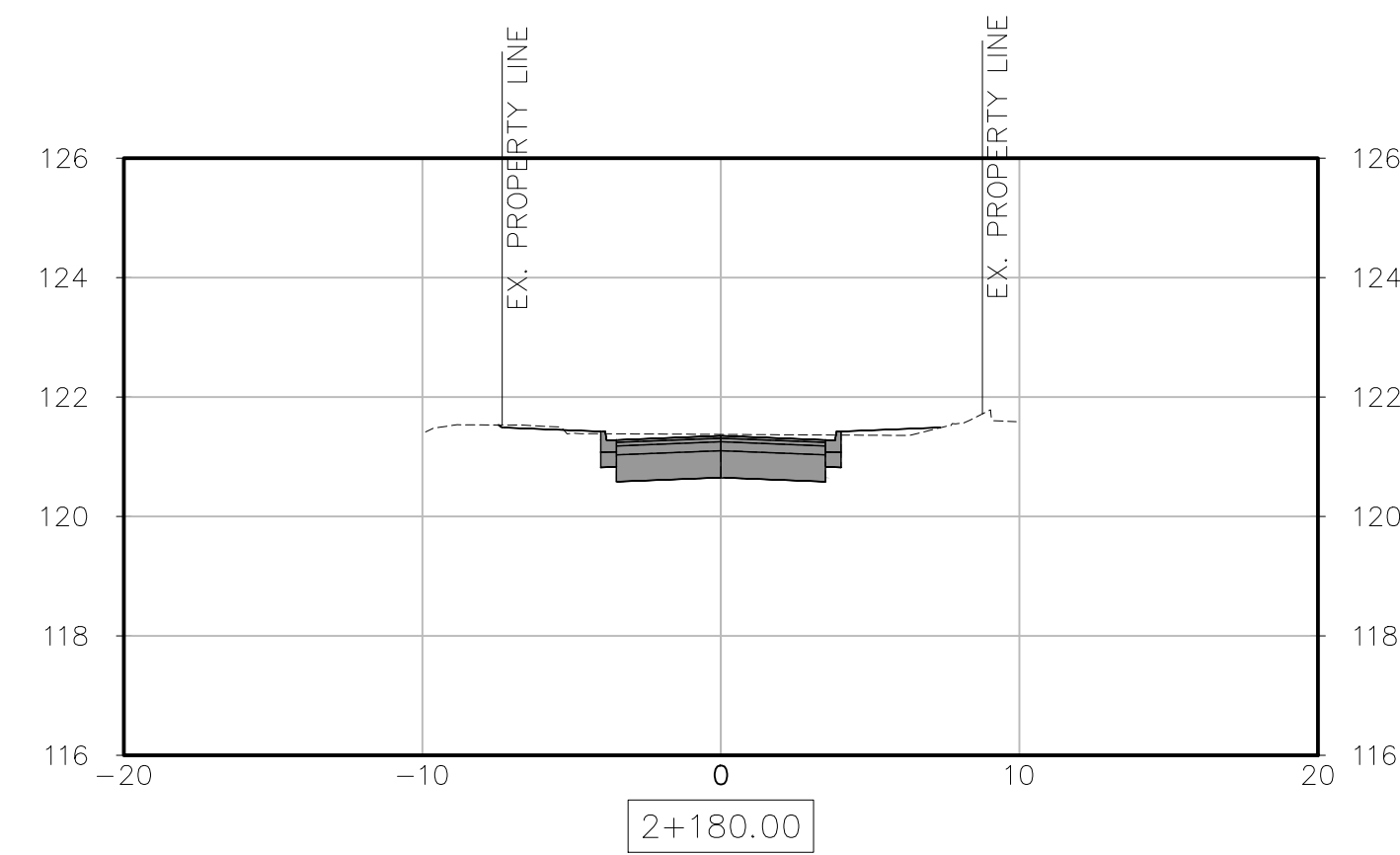
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DETAILED CROSS SECTIONS (20m)
FOUR MILE CREEK ROAD
WARNER RD TO 200m NORTH OF YORK RD
NIAGARA ON THE LAKE
DRAWING TYPE

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DETAILED CROSS SECTIONS (20m)
FOUR MILE CREEK ROAD
WARNER RD TO 200m NORTH OF YORK RD
NIAGARA ON THE LAKE
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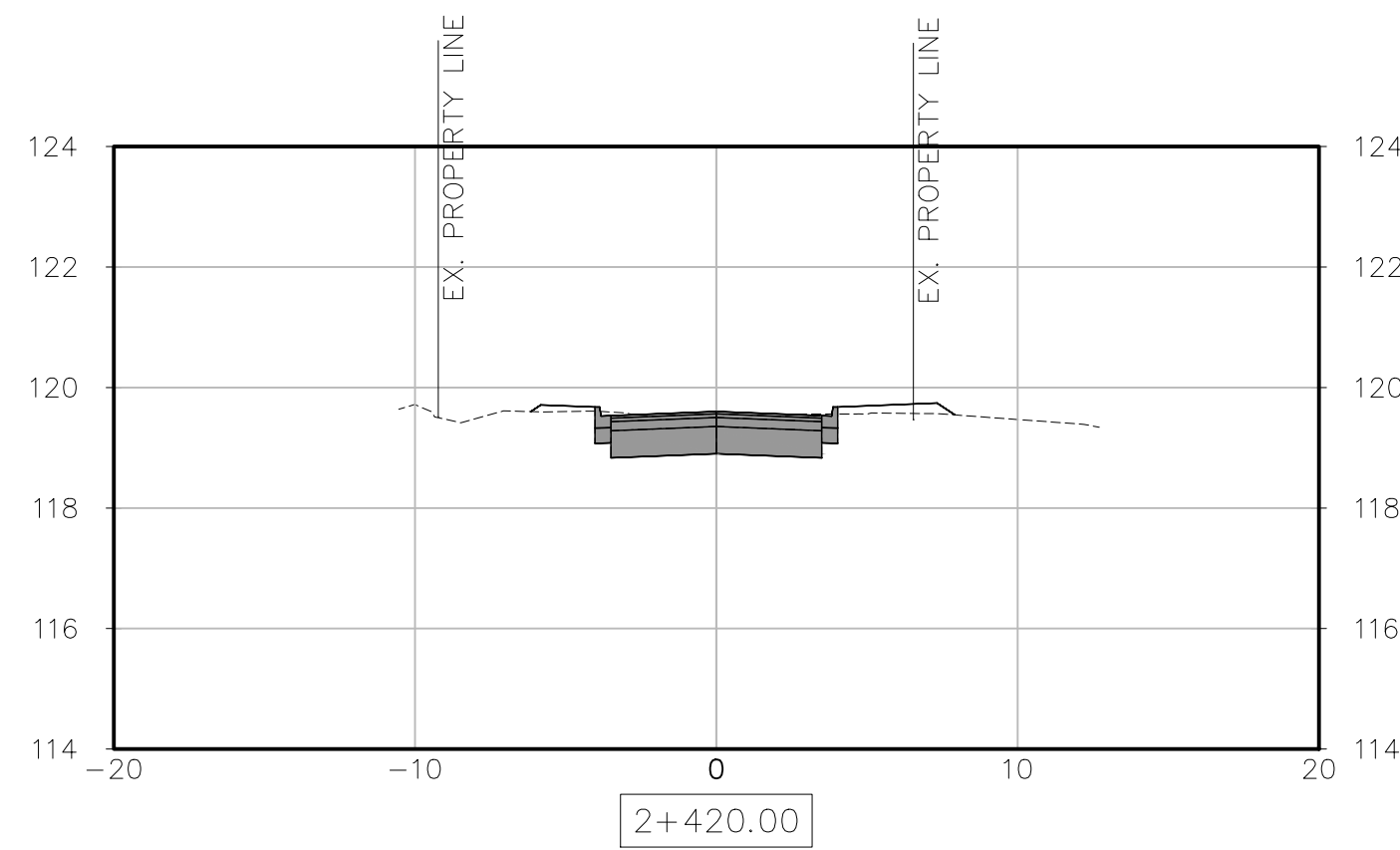
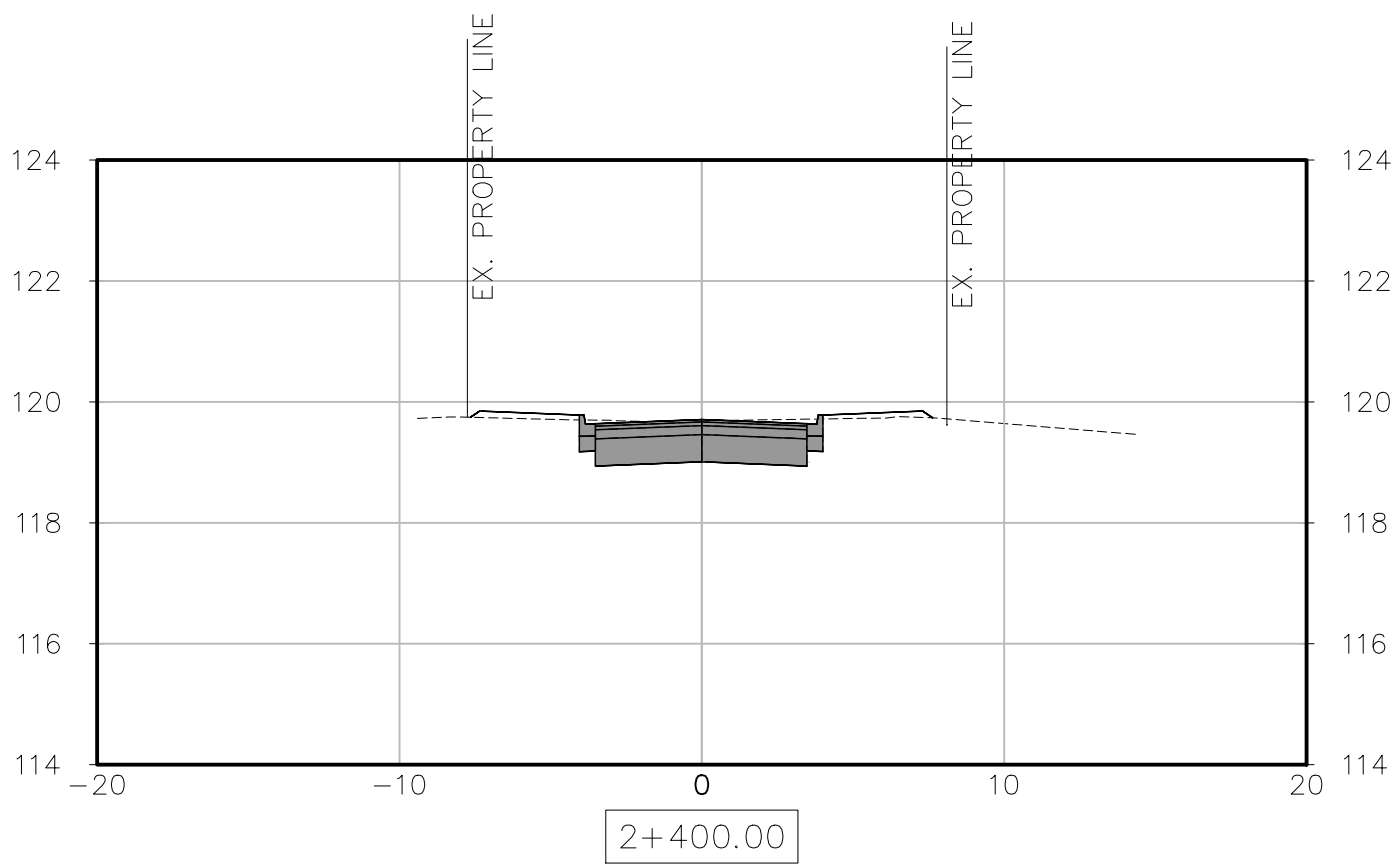
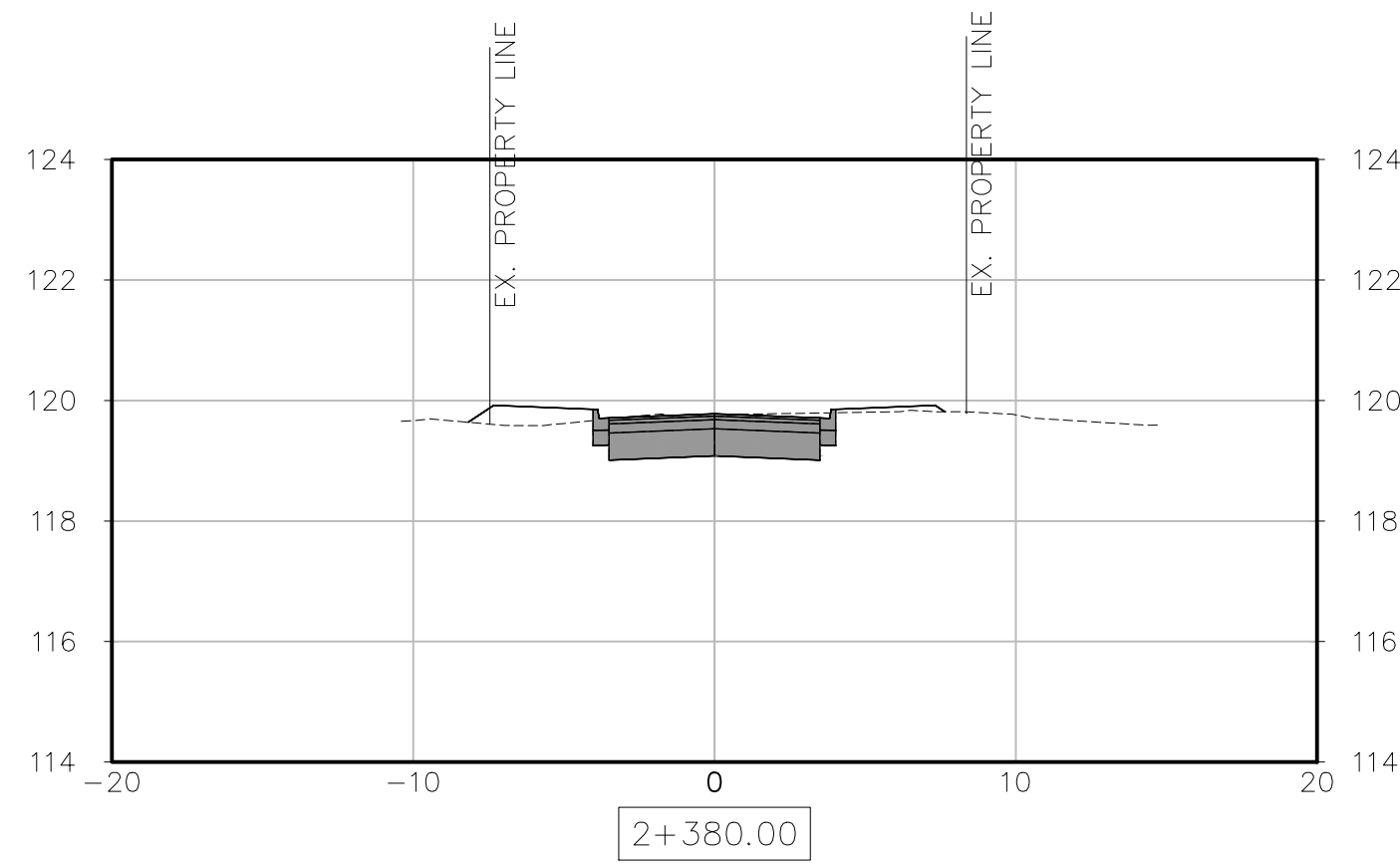
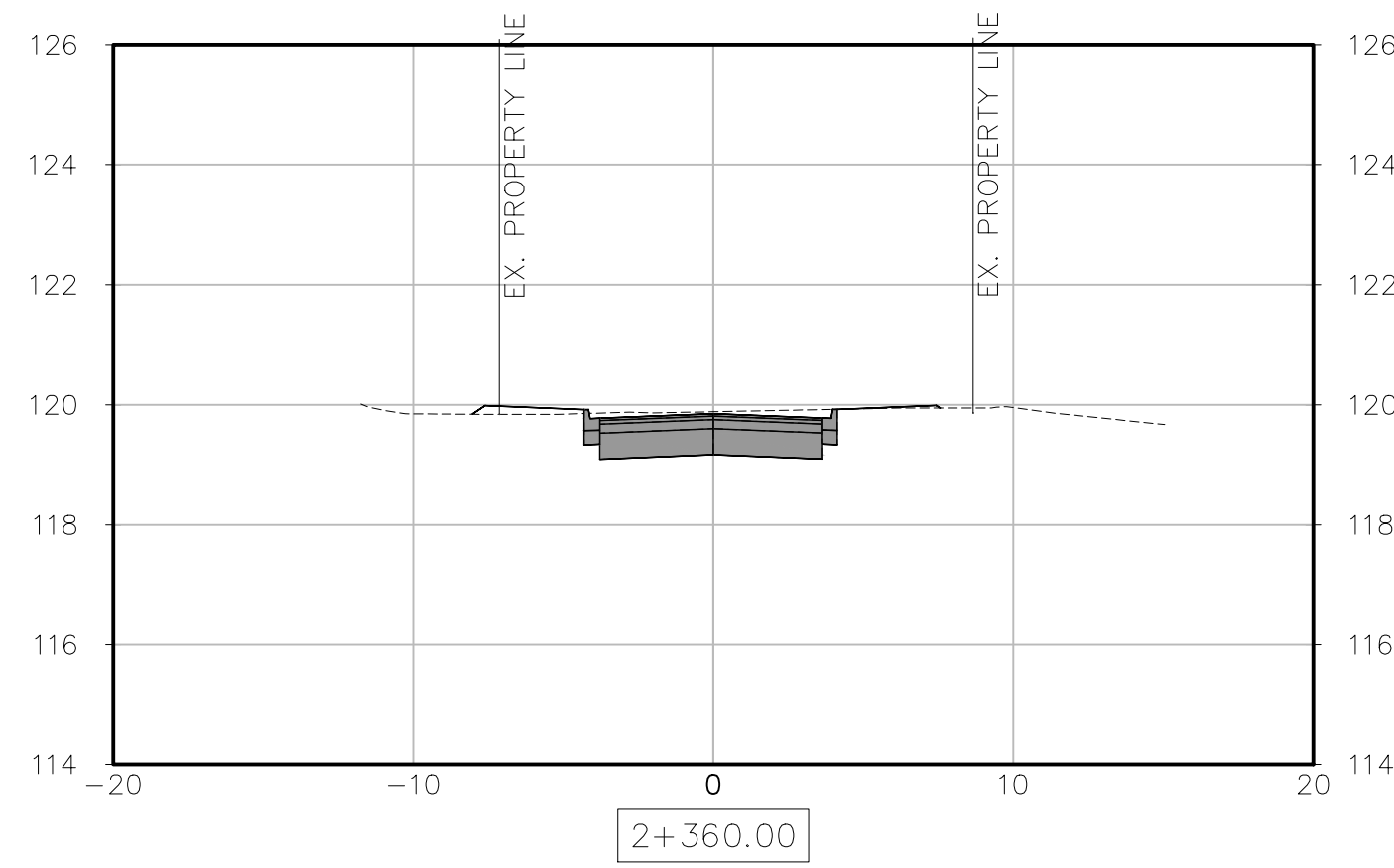
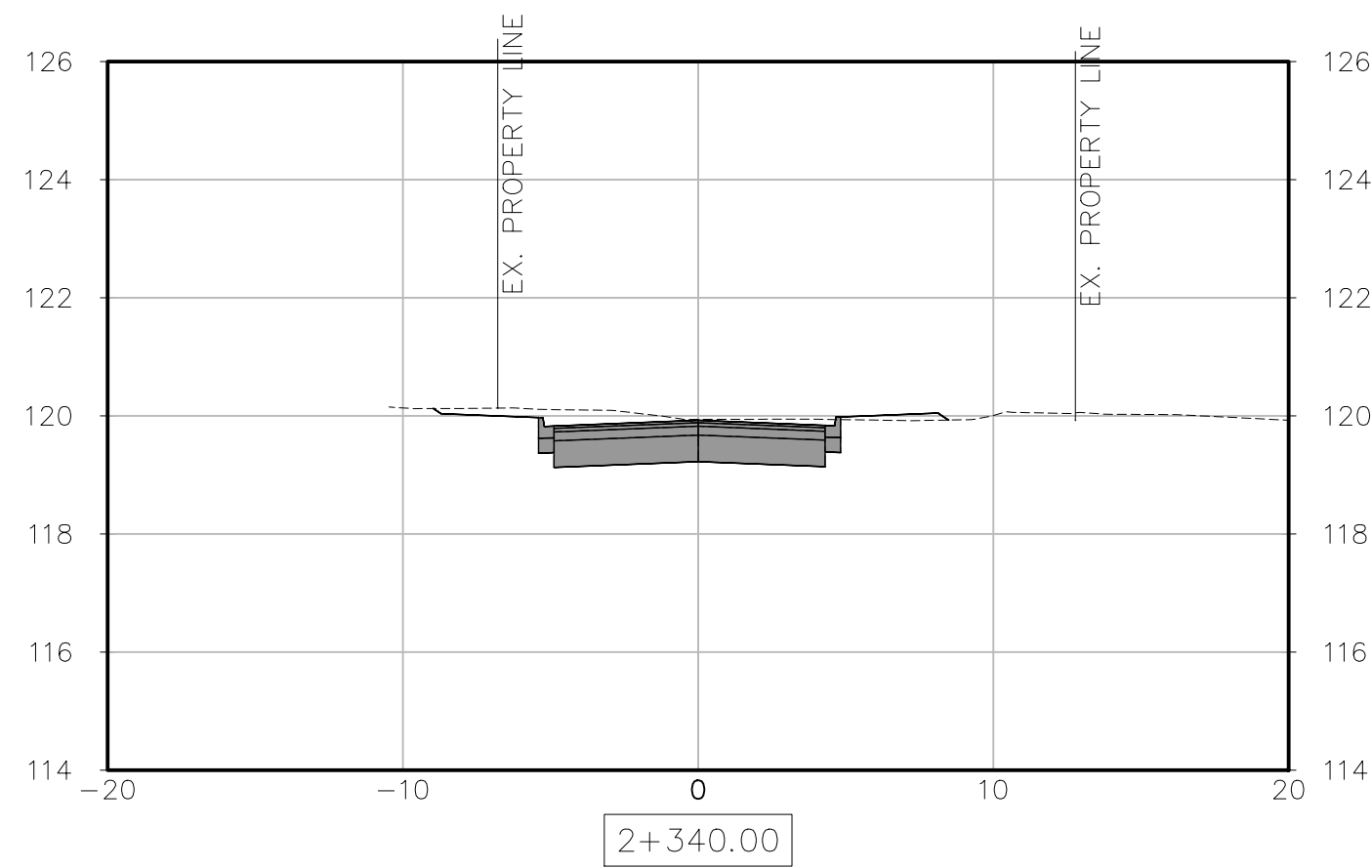
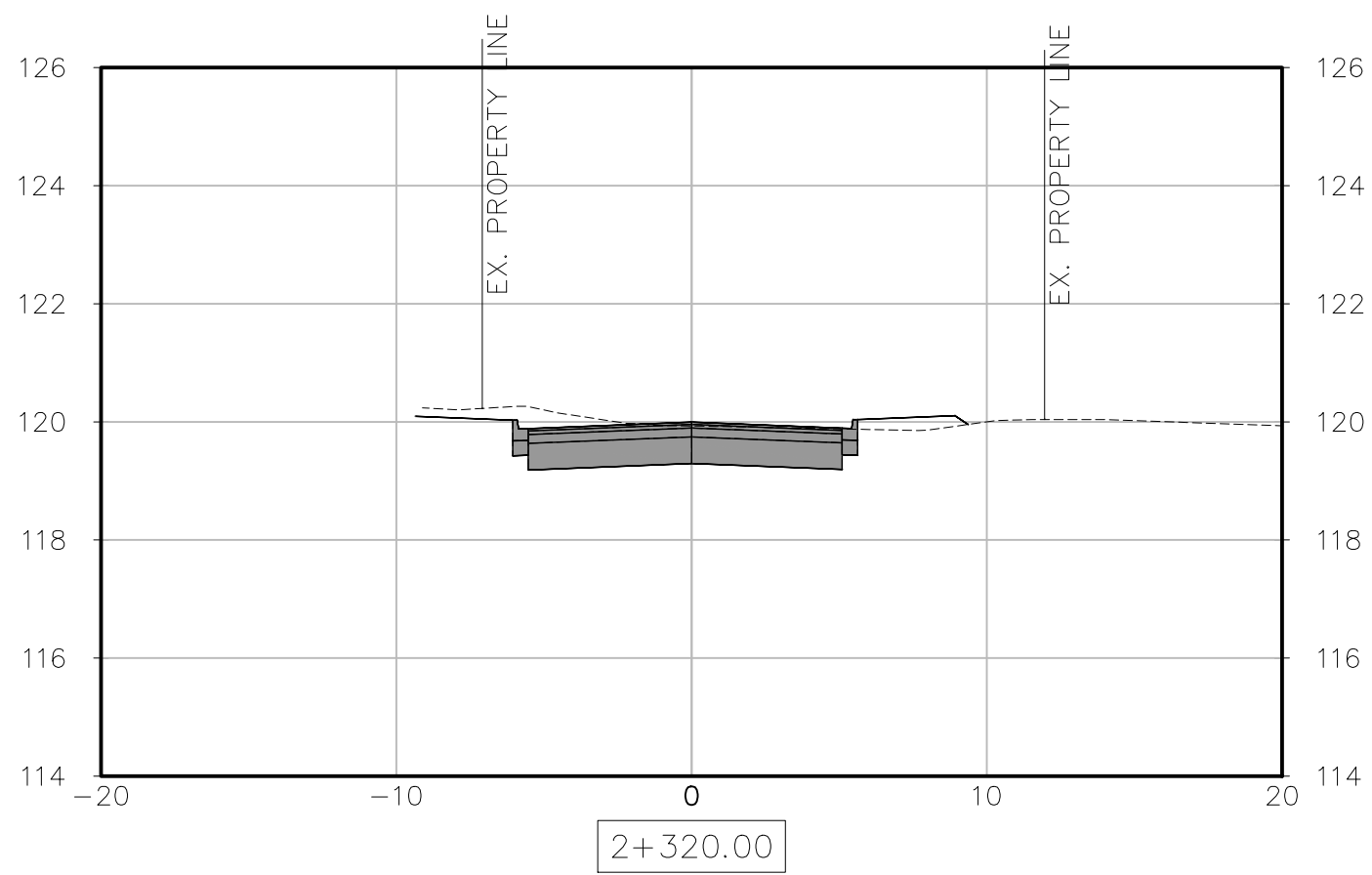
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DETAILED CROSS SECTIONS (20m)
FOUR MILE CREEK ROAD
WARNER RD TO 200m NORTH OF YORK RD
NIAGARA ON THE LAKE
DRAWING TYPE

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Table 6-1: Roundabout Design Criteria

Design Criteria	Typical Range for Single-Lane Roundabout*	Proposed Value
Inscribed Circle Diameter	28–60 m	38–42 m
Circulatory Roadway Width	4.2–7.2 m	6 m
Central Island Diameter	> 4.0m	20–24 m
Entry Width	70 m max.	14–24 m
Entry Radius	20–100 m	50–100 m
Exit Width	< 70 m	37–55 m
Exit Radius	28–60 m	38–42 m
Entry Path Curvature	> 4.0m	20–24 m

* Transportation Association of Canada (TAC) Canadian Roundabout Design Guide, January 2017.

Entry path curvature is a measure of the lateral deflection imposed on a vehicle entering a roundabout. It is the most important determinant of safety at a roundabout because it governs the speed of entering drivers and how likely they are to yield to circulating traffic. Therefore, the lower the entry path curvature value (to a certain limit), the lower entry speeds will be and the safer a roundabout is likely to be for all users (motorists, pedestrians, and cyclists).

Table 6-2: York Road and Four Mile Creek Road Design Criteria

Design Criteria	Existing Conditions	Design Guideline*	Proposed Standard
Posted Speed	50 km/h	50 km/h	50 km/h
Design Speed	60 km/h	60 km/h	60 km/h
Minimum Horizontal Radius	N/A	220 m	N/A

Design Criteria	Existing Conditions	Design Guideline*	Proposed Standard
Minimum K Factor for Crest Vertical Curve	9	11	9
Minimum K Factor for Sag Vertical Curve	23	18	23
Maximum Vertical Grade	7% at north end of study area, 2.6% otherwise	6%	7% at north end of study area, 2.6% otherwise
Minimum Vertical Grade	N/A	<0.5% in retrofit projects	0.14%
Right-of-way	20 m York Road 16 m Four Mile Creek Road	N/A	20 m York Road 16 m Four Mile Creek Road
Lane Widths (measured to edge of pavement)	7.7 m pavement width York Road 7.1–11.5 m pavement width Four Mile Creek Road	N/A	3.5 m for through lanes, 3.0 m for turning lanes
Provision for Pedestrians and Cyclists	1.0–1.4 m sidewalk, varying locations No dedicated cyclist facilities	1.5 m sidewalk minimum width 1.5 m one-way cycle track**	1.8 m sidewalk on both sides of road 1.5 m one-way cycle track on both sides of road

* Transportation Association of Canada (TAC) Geometric Design Guide for Canadian Roads, Chapter 3, June 2017.

** Ontario Traffic Manual (OTM) Book 18, June 2021, Table 4.4.

6.2 Horizontal Alignment

Both York Road and Four Mile Creek Road are essentially on tangents through the study area, with no horizontal curvature. Four Mile Creek Road intersects York Road at a 68-degree angle to the south and a 60-degree angle to the north. This has been maintained with the proposed road design, with the roundabout accommodating the skew angle of the intersection through its slightly elliptical diameter.

6.3 Profile and Grade

Due to the narrow existing rights-of-way and constrained topography, the vertical profile of York Road and Four Mile Creek Road will closely follow the existing profile of both roads within the study area.

K values are provided in **Table 6-2**. They are a measure of the flatness of a vertical curve. The larger the K value, the flatter the curve, in the same way that R (radius) values are used for horizontal curves. Minimum guidelines for K values are used to provide adequate stopping sight distance for drivers. Values are given for crest vertical curves (on hills) and sag vertical curves (in valleys).

In **Table 6-2** it can be seen that the proposed design follows the existing road profile. The existing and proposed K value for crest vertical curves is slightly below the minimum guideline of 11 at the north end of the study area, on Four Mile Creek Road where it matches to the existing road profile at a 7% grade (slightly above the suggested maximum of 6%). This section of the study area will be examined more closely during detailed design.

There is a short section along York Road just west of Concession 3 Road with a sag vertical curve having a K value of 6. However, that section is very short (just 29 m long), and so was not considered an issue in terms of stopping sight distance.

6.4 Recommended Active Transportation Alternative

The recommended active transportation alternative is 1.8 m wide sidewalks and 1.5 m wide one-way cycle tracks on both sides of York Road and Four Mile Creek Road. The sidewalks match to existing sidewalks at the west end of the study area on York Road, and south end of the study area on Four Mile Creek Road. The cycle tracks transition from the road to behind the curb at the ends of the study area.

Pedestrians cross at the roundabout via pedestrian crossovers (PXOs) located approximately 1 to 2 passenger car lengths (6 to 12 m) from the entries and exits in accordance with Ontario Traffic Manual (OTM) Book 15. PXOs require that motorists yield to pedestrians within the crosswalk. See **Figure 6-19**.

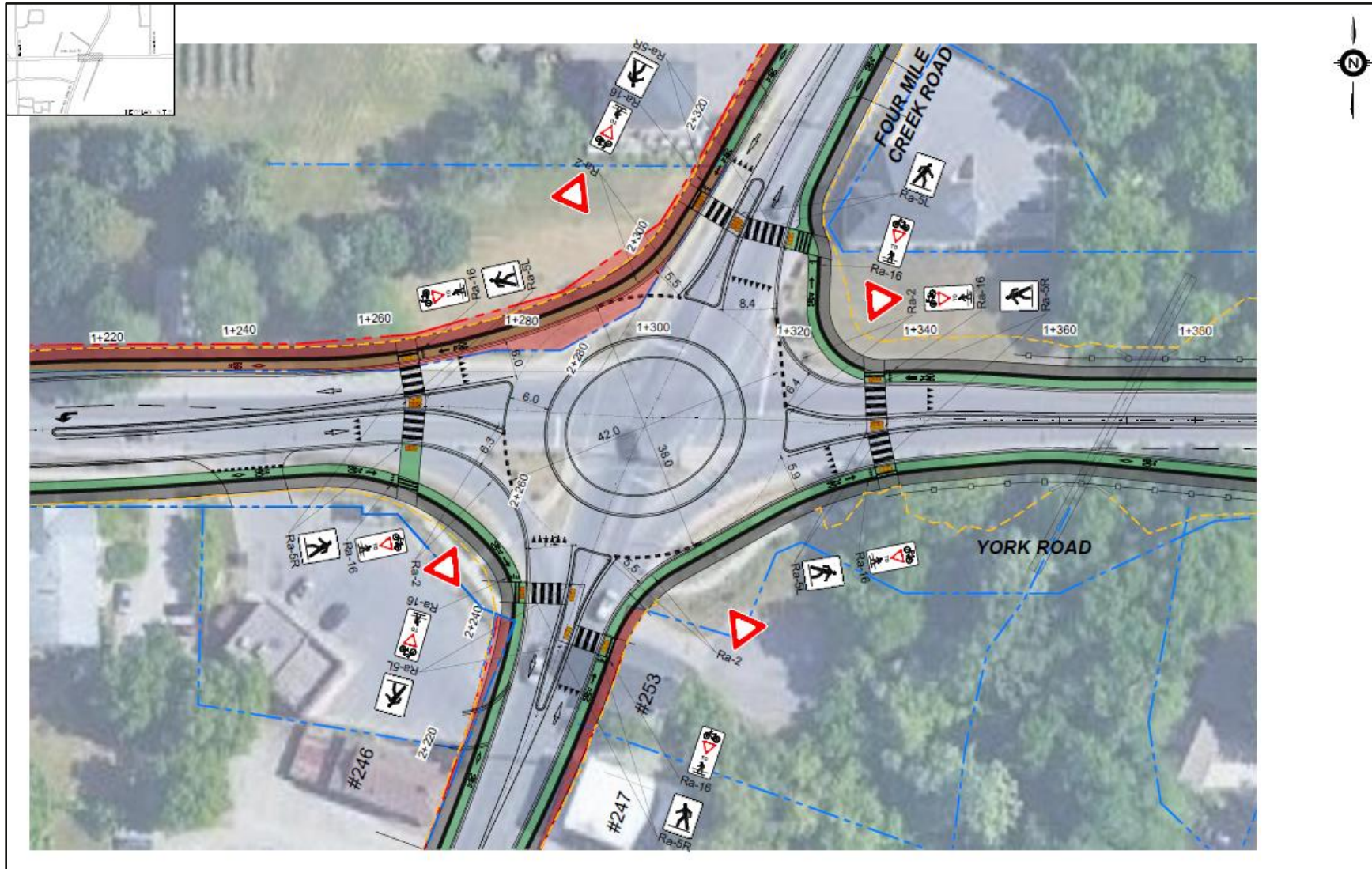


Figure 6-19: Roundabout Signage

Cycle tracks at the roundabout are shown in accordance with OTM Book 18. Cyclists riding on the cycle tracks will legally have to dismount and walk their bike to cross the roundabout entries and exits. Cyclists will also have the option of staying on the road and riding through the roundabout as a motor vehicle.

The crosswalk is currently shown as staggered through the south leg splitter island, on the east side to avoid the existing driveway at #253 Four Mile Creek Road and on the west side to keep the crosswalk close to the intersection. This will be revisited during detailed design.

6.5 Typical Cross Section

Within the study area, York Road has a 20 m right-of-way and Four Mile Creek Road has a 16 m right-of-way. Typical cross sections for both roads are shown in **Figure 6-20** and **Figure 6-21** on the following pages. All dimensions in the cross sections are shown in metres. Although some of the existing study area is rural, all of the proposed will be constructed as two-lane urban sections. Urban cross sections use curbs and gutters to direct stormwater from the road surface, compared with rural sections that use ditches for stormwater drainage.

The boulevard width on York Road will vary based on the road right-of-way widths. In general, the boulevard width will be about 2 m on either side along York Road. There will not be space for any appreciable boulevard along Four Mile Creek Road. Other dimensions in the typical cross section may vary at constrained locations in the study area.

The cycle tracks will be next to the sidewalks. A tactile strip will be provided between the sidewalk and cycle track to assist people with vision loss in discerning between the two facilities.

Typical cross-section elements and dimensions will be reviewed and confirmed by the Region during detailed design.

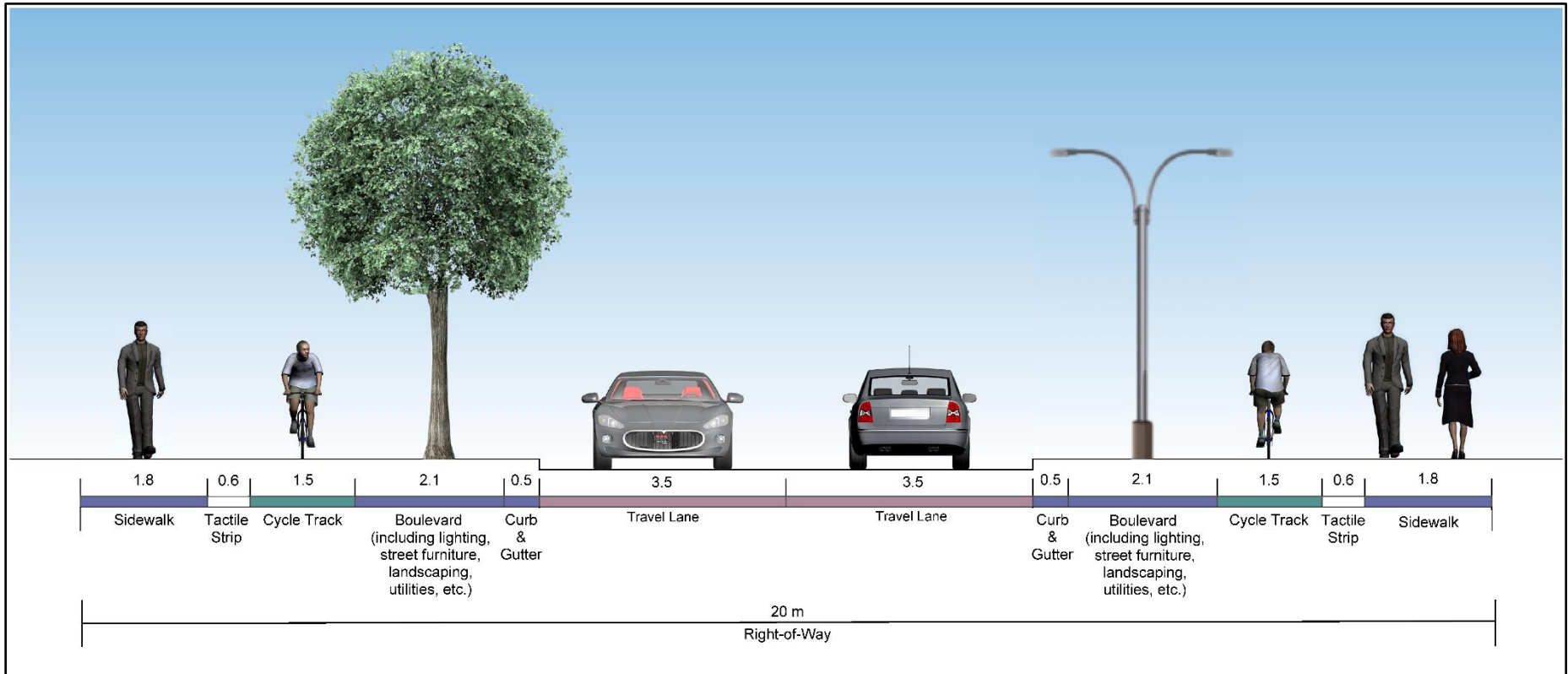


Figure 6-20: Typical Cross Section on York Road (20 m Right-of-Way)

Note all dimensions are shown in metres. The trees and streetlight are shown for illustrative purposes. Landscaping and light standards will be confirmed in the subsequent design phase.

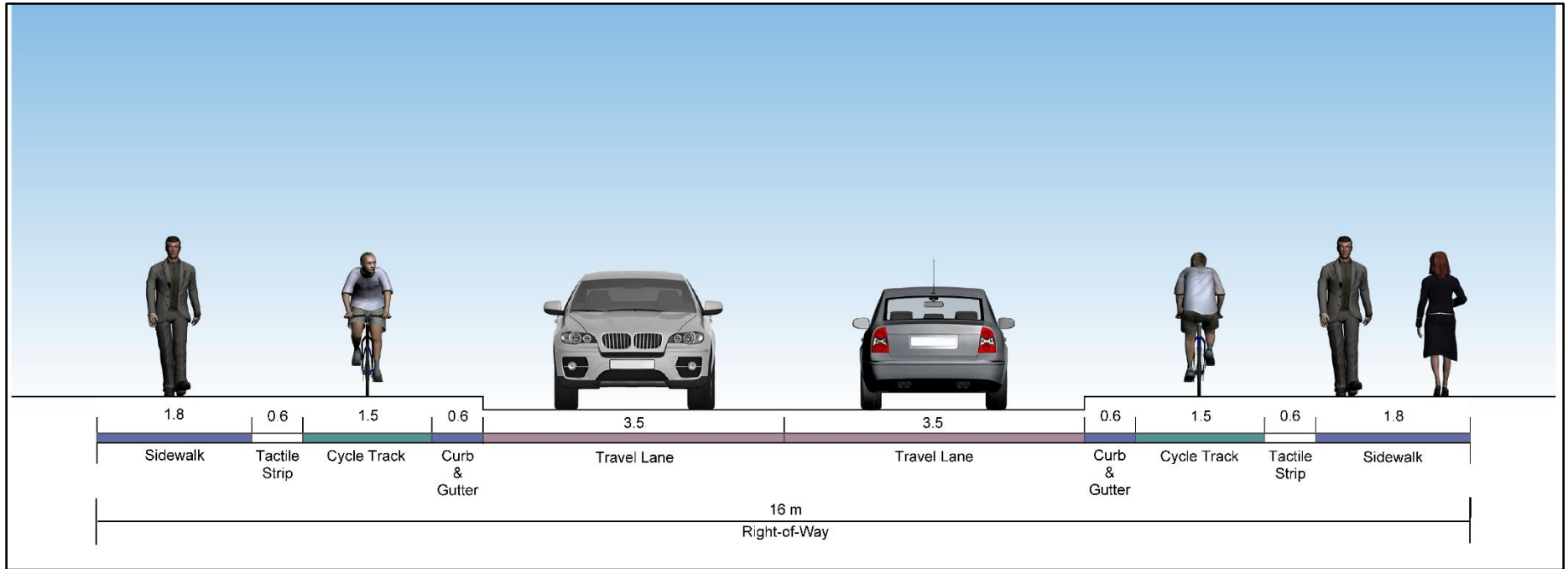


Figure 6-21: Typical Cross Section on Four Mile Creek Road (16 m Right-of-Way)

Note all dimensions are shown in metres.

6.6 Access Management

As mentioned, the raised splitter islands at the roundabout will restrict existing accesses or future developments with accesses to right-in/right-out movements only. This will include the existing Avondale Food Stores driveway on York Road (leaving the driveway on Four Mile Creek Road as full movements), and the existing driveway at #253 Four Mile Creek Road (just south of the intersection). The future Village Square development on the southwest quadrant of the intersection will have a full movements driveway just beyond the west leg splitter island of the roundabout. Refer to **Figure 6-22**.

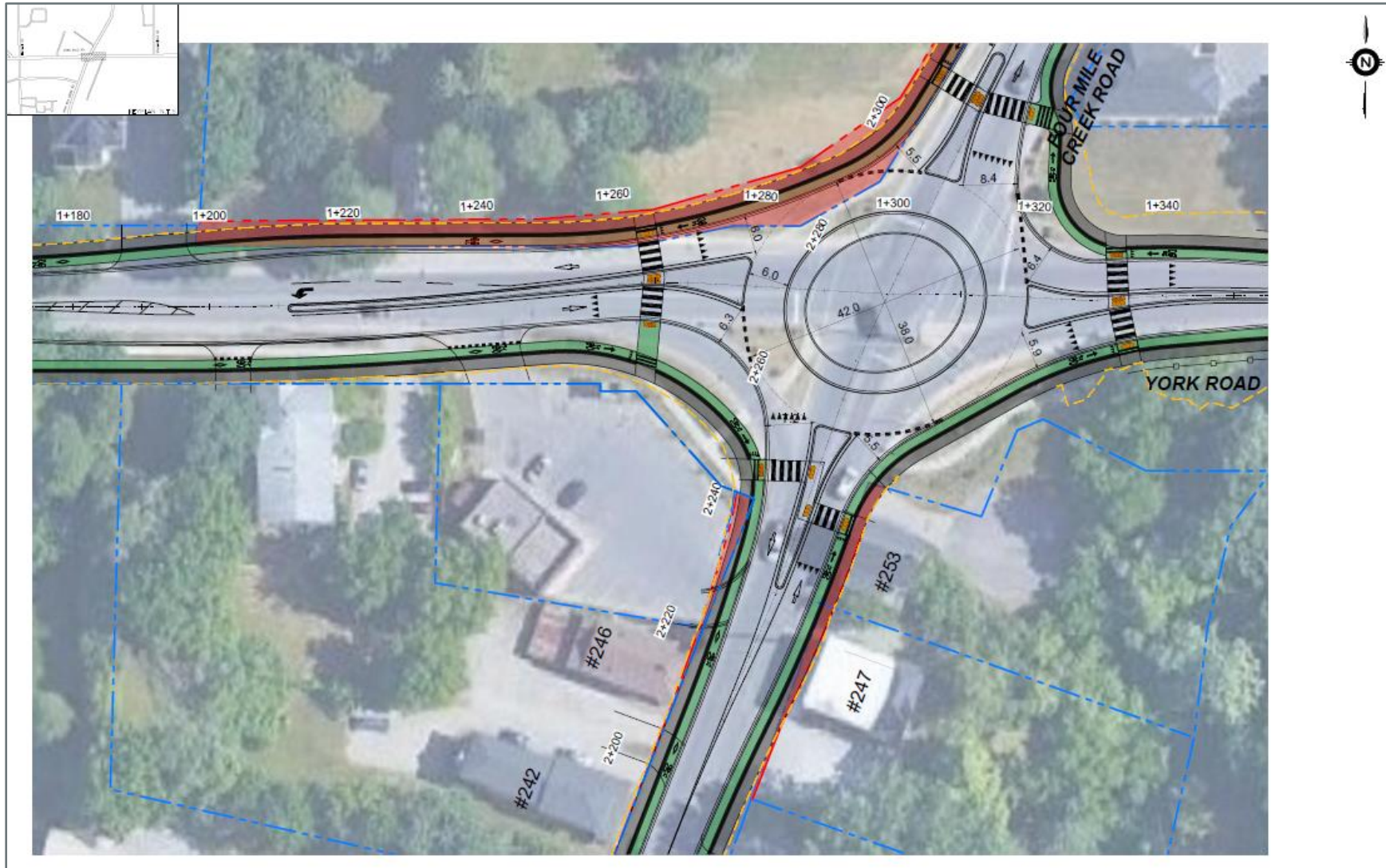


Figure 6-22: Access Management

6.7 On-Street Parking

There is currently on-street parking along Four Mile Creek Road south of York Road, on the west side any time and on the east side for one hour and not overnight between 2:00 am and 6:00 am. There is no other on-street parking within the study area, although some informal on-street parking occasionally occurs along York Road on the north side just west of Four Mile Creek Road.

As part of the implementation of the Preferred Design Concept, which includes widened sidewalks and cycle tracks, the on-street parking on the south leg of Four Mile Creek Road will be removed.

6.8 Large Truck Accommodation

The roundabout has been designed to accommodate large trucks and farm equipment, although at low speeds as appropriate for a village setting. **Figure 6-23** and **Figure 6-24** show left and right turns, respectively, for a tractor semi-trailer at the roundabout. This vehicle is the largest vehicle, or design vehicle, expected to use the roundabout in terms of turning radius and swept path. Some farm equipment may be wider, but they turn over a smaller radius, and some trucks are longer, but because they have two shorter trailers, they have a smaller swept path.



Figure 6-23: Roundabout Design – Vehicle Left Turns



Figure 6-24: Roundabout Design – Vehicle Right Turns

6.9 Urban Design / Streetscaping

Streetscape is a term used to refer to the natural and built elements of the street. The elements may be functional or aesthetic items that provide amenity or utility to street users, such as street trees, landscaping, lighting, and street furnishings. These elements contribute to the overall character of the area and shape the user experience. A series of streetscape design techniques may be employed to balance the needs of all road users.

The boulevards along York Road provide some opportunity for streetscaping. The roundabout presents a more significant and unique opportunity for streetscaping and a focal point for the village of St. Davids. In particular, landscaping and elements of height can be placed in the central island. This will discourage pedestrians from crossing the circulatory road and redirect them to the crosswalks, block sightlines through the roundabout so that drivers focus their attention on pedestrians and circulating traffic (and also not see oncoming vehicle headlights at night and under conditions of poor visibility and drive right through the roundabout) and contribute to streetscaping and creating a sense of place.

Figure 6-25 shows some ideas for landscaping and art within the central island of a roundabout in a village location.

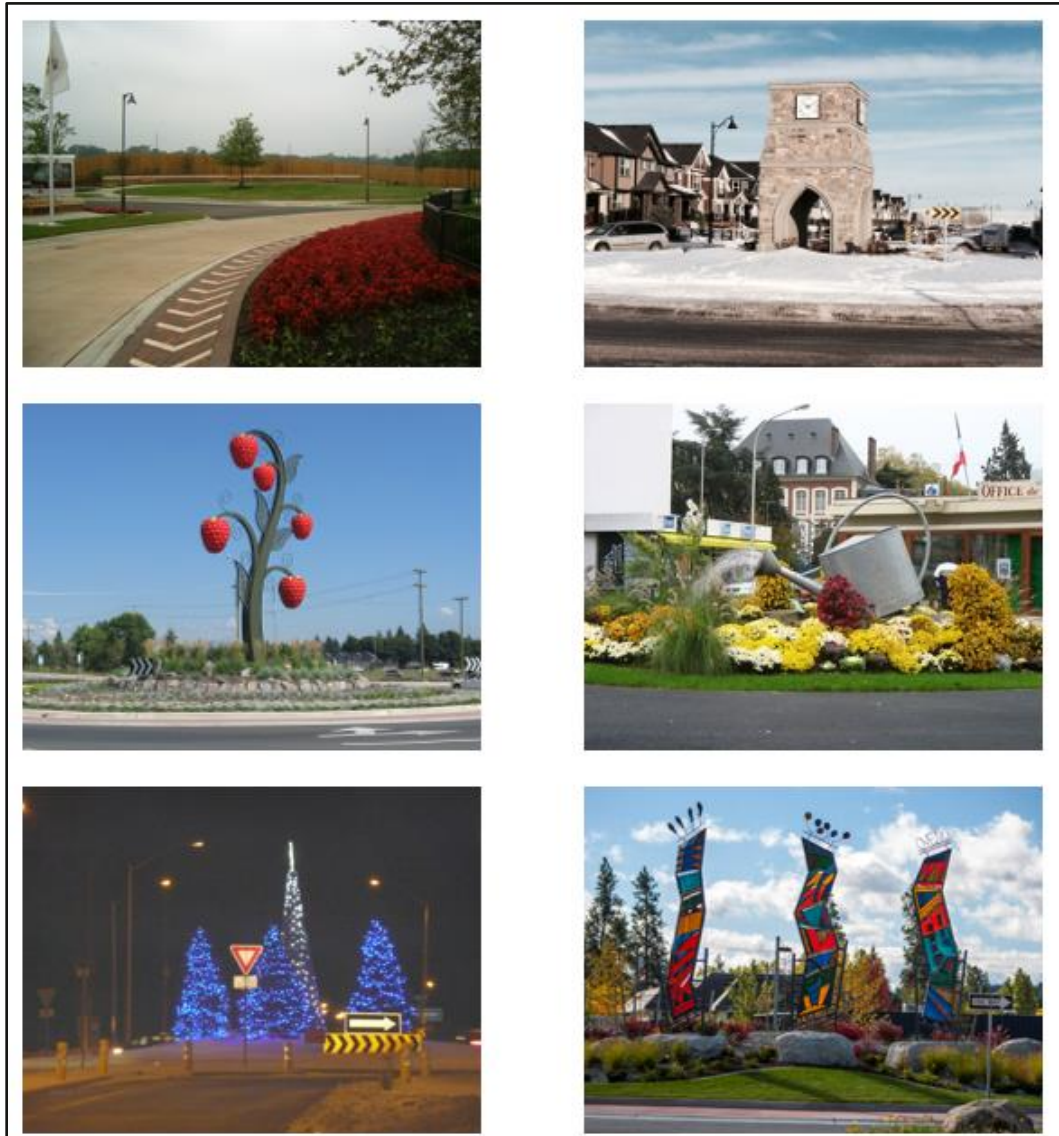


Figure 6-25: Ideas for a Roundabout Central Island

There will be an opportunity to work with the community during detailed design on what to install in the roundabout to signify the historical importance of the village of St. Davids. Specific details about streetscape elements in general will also be identified during detailed design. A comprehensive landscaping plan will be developed at that time, in consultation with the Town of Niagara-on-the-Lake. Typically, the Town would share the cost with the Region of ornamental features beyond minimum requirements, and the Town would be responsible for landscaping maintenance.



It is worth noting that roundabouts can be a tourist attraction. The City of Bend, Oregon, offers a Roundabout Art Route consisting of 24 roundabouts, each with central island artwork created by artists from around the world.

A memo providing additional details related to landscaping at roundabouts, including additional ideas for landscaping and art, is contained in **Appendix I**.

6.10 Drainage and Stormwater Management

6.10.1 Drainage

The Recommended Plan will impact the hydraulics of three culvert crossings on York Road, east of the intersection. The westernmost culvert conveys flow for Four Mile Creek, and the other two provide drainage for tributaries of Two Mile Creek. All three flow north to Lake Ontario. The existing culverts need to be lengthened due to the addition of cycle tracks and sidewalks along York Road.

A hydraulic assessment for each culvert was undertaken to determine performance under existing and proposed conditions. The following recommendations were made for each culvert:

Culvert C1

Culvert C1 serves Four Mile Creek. Due to its deteriorating condition, options to extend and replace the culvert were reviewed. The culvert may function for a few more years, however replacement is considered the preferred option. The recommended replacement culvert is a 2.70 m span x 2.4 m rise concrete box culvert with 0.30 m embedment. The new culvert will require an extension of 3 m on the downstream end at the existing slope, for a total culvert length of 49 m.

An outlet pool with a rocky ramp is recommended on the downstream end of the culvert to protect from bed scour, avoid perched condition, and allow aquatic species movement from downstream to upstream. The pool and rock ramp design will be completed with input from a Fluvial Geomorphologist.

Culvert C2

Culvert C2 is located between #1476 and #1482 York Road. It is recommended to be replaced due to its poor condition with an 825 mm diameter concrete pipe. The replacement culvert will be slightly longer than the existing culvert to accommodate the

new cross-section on York Road. Based on the proposed grading, the upstream end of the new culvert will require an extension of 3 m, for a total culvert length of 28 m.

Culvert C3

Culvert C3 is located just west of Concession Road 3. Due to the poor condition and performance of this culvert observed during the site investigation, it is recommended to be replaced with an 825 mm diameter concrete pipe with 0.25 m embedment. The embedment will help to establish the natural channel condition and reduce the flow velocity. The replacement culvert will be 10 m longer than the existing culvert.

6.10.2 Stormwater Management

Modifications to the intersection of York Road and Four Mile Creek Road and their cross-sections will increase the overall impervious area and runoff. Stormwater management measures are required to control peak flows, water quality, and provide water balance in the study area.

Water Conveyance

With the Recommended Plan, York Road and Four Mile Creek Road will have urban cross sections with curbs and gutters conveying runoff to existing storm sewers. CCTV inspection of the existing storm sewers to confirm their structural conditions is recommended during detailed design. If conditions are found to be satisfactory, relocation of catch basins may be required to use the existing storm sewers.

Approximately 420 m of new storm sewer will be required on York Road, and 150 m of new storm sewer will be required on Four Mile Creek Road. For both, the condition and capacity of the existing storm sewer should be reviewed to confirm if replacement is required.

Preliminary Stormwater Management Strategy

Low Impact Development (LID) facilities with bioswales and infiltration basins are proposed within the roundabout and the northeast corner of the intersection of York Road and Four Mile Creek Road (within property owned by the Region). The location of the LID facilities should be confirmed during detailed design based on an assessment of potential utility constraints. A soil conditions assessment and in-site infiltration test should be completed during detailed design to review soil conditions and confirm the function of the LID facilities. LID facilities are proposed instead of traditional stormwater management facilities (i.e., wet pond, dry pond or wetland) or roadside ditches due to the lack of open space in the roadway and the urban cross sections on York Road and Four Mile Creek Road.

Further details about the proposed drainage and stormwater management conditions can be found in the Drainage and Stormwater Management Report in **Appendix D**.

6.11 Construction Staging

Typically, when a single-lane roundabout is constructed, as much of the roundabout that is outside of the existing intersection right-of-way is built first while maintaining traffic at the prior intersection. Then traffic is redirected to the newly built areas around the outside while the central island and splitter islands of the roundabout are constructed. A full construction staging plan will be developed during detailed design.

It will be the Region's intent to keep the intersection of York Road and Four Mile Creek Road open during construction of the roundabout, although temporary one-way operation under flag-person control may be necessary during certain time periods. It will also be the Region's intent to maintain access to all residences and businesses within the study area during construction.

6.12 Preliminary Construction Cost Estimate

A high-level preliminary construction cost estimate was developed for the recommended modifications to York Road and Four Mile Creek Road. The preliminary cost is estimated to be approximately **\$3,900,000**. This preliminary cost estimate includes road work, culvert replacements, illumination, and utility relocation. Property acquisitions costs are not included in the estimate.

The breakdown of the preliminary cost estimate is included in **Appendix J**. The estimated costs are preliminary only and will be reviewed and confirmed during detailed design.

7 Potential Environmental Impacts, Proposed Mitigation, and Commitments to Further Work

The Recommended Plan has incorporated specific measures to mitigate potential negative impacts, where possible. Where impacts cannot be entirely avoided, mitigation recommendations for review and commitments for further work during detailed design and/or construction have been developed.

7.1 Socio-Economic Environment

7.1.1 Land Use

The Recommended Plan is considered compatible with the existing and future land use in the study area and the Region's and Town's Official Plans. The roundabout intersection addresses capacity issues for the area, and the addition of cycle track and sidewalk provide active transportation facilities to support cyclists and pedestrians along York Road and Four Mile Creek Road.

7.1.2 Access

While most of the existing access to the properties along Four Mile Creek Road and York Road will remain the same, there will be minor changes to existing access to properties in the southwest and southeast corner of York Road and Four Mile Creek Road. Access to the property in the southeast corner will become right-in/right-out only, and access to the property in the southwest corner will become right-in/right-out only on York Road, both due to the implementation of raised medians or splitter islands for the roundabout.

During construction, temporary traffic management measures may potentially be required to facilitate construction vehicle access and will be confirmed during detailed design. The Region will notify all area residents of construction plans, staging and traffic management measures in advance of construction.

7.1.3 Property Requirements

Some property along York Road and Four Mile Creek Road will be required to accommodate the Recommended Plan. Where possible, efforts were made to minimize the amount of property required and property requirements will generally be along their frontage. Refer to **Table 7-1**. Final property requirements will be confirmed during detailed design, subject to minor modification. The Region will continue to consult with

affected property owners, and property acquisition will be in accordance with the Region's realty policies and procedures.

Table 7-1: Property Requirements

Property	Approximate Property Requirement
#246 Four Mile Creek Road	35 m ²
#247 Four Mile Creek Road	30 m ²
#253 Four Mile Creek Road	35 m ²
#268 Four Mile Creek Road	80 m ²
#272 Four Mile Creek Road	30 m ²
#1394 York Road (old barn property)	595 m ²

7.1.4 Noise

Long Term Noise Impacts

A noise assessment was not completed as part of the Class EA Study, as all properties within the study area along Four Mile Creek Road and York Road have frontage onto the corridors. This does not qualify for the consideration of noise mitigation measures and as break in noise barrier (for access) will not be effective towards noise reduction even if noise mitigation is proposed. In addition, some properties are commercial properties which are not considered to be Noise Sensitive receptors. Therefore, a noise assessment was not carried out.

In general, the Recommended Plan is not anticipated to increase noise levels in the area and may in fact decrease the amount of vehicular noise, as motor vehicles will no longer be stopping and starting at the intersection (traffic will move more smoothly) with the introduction of a roundabout.

Construction Noise

The potential for construction noise issues will be reviewed further during detailed design when the construction methodology and schedule are fully developed. Construction activities will conform to all Noise Control By-Laws. In the Contract Documents, there shall be an explicit indication that Contractors are expected to comply with all applicable requirements of the contract and local noise by-laws. Enforcement of

noise control by-laws is the responsibility of, in this case, the Town of Niagara-on-the-Lake, for all work done by Contractors.

7.1.5 Climate Change Considerations

The Ministry of the Environment, Conservation and Parks (MECP) guide titled *“Consideration of Climate Change in Environmental Assessment in Ontario”* sets out the Ministry’s expectations and supports the province’s Climate Change Action Plan by outlining climate change considerations for environmental assessment studies. The guide notes that ‘climate consideration’ within a project means: 1) that consideration has been given to methods to reduce greenhouse gas emissions; and 2) developing a design that is more resilient to future changes in climate and helps maintain the ecological integrity of the local environment in the face of a changing climate. Considering how a project may contribute to climate change through its greenhouse gas emissions or its effects on the natural landscape is important to the planning process as it allows proponents to consider climate mitigation measures to avoid, minimize, or offset such effects.

Niagara Region’s Approach to Climate Change

The Region’s Official Plan makes a significant contribution to reducing greenhouse gas emissions by:

- Promoting energy efficiency and alternatives to fossil fuel energy in Regional facilities and operations;
- Emphasizing compact mixed-use development to reduce the need for travelling;
- Supporting transit, walking and cycling’
- Encouragement of waste reduction and diversion; and
- Promoting green space, tree planting and natural heritage conservation.

By implementing the specific adaption actions outlined in the Plan, the Region will be positioned to mitigate, respond and adapt to the local impacts of climate change, such as the rise of extreme heat, increased precipitation levels, and extreme weather events.

The goals and adaptation actions of the Plan have been factored into the project-specific climate considerations discussed below.

Consideration of Climate Change Factors in the Development of the Recommended Plan

The Recommended Plans involve the construction of active transportation facilities to provide another method of transportation to members of the village and thus help

reduce the reliance on vehicles to move around. The recommended plan also involves the replacing of culverts, new storm sewers and the consideration of LID facilities to account for future changes in flow rates. A landscaping plan will also be developed during detailed design to add to already existing vegetation and to replace any vegetation that is removed due to construction.

As documented in **Chapter 4** of this ESR, several design concepts were evaluated. The Recommended Plans were selected as they resulted in the least impact to natural environmental and cultural heritage resources while addressing the needs of the community as described in the problem/opportunity statement.

Resiliency Planning Within the Project

Resiliency planning in this project involves:

1. Infrastructure design will follow the criteria/requirements set out by Niagara Region and Niagara Peninsula Conservation Authority, as appropriate and applicable. This applies to stormwater management and the sizing of the new culverts. Post construction, overland flow, and infrastructure flooding will be handled through the design, incorporating measures that mitigate these issues. This ESR commits to further investigation, assessment, and design work to be completed in the future detailed design phase.
2. The detailed design and Contract Package should include construction mitigation and best practices including Erosion and Sediment Control, measures to manage extreme weather events during construction (i.e., management of construction site drainage, dewatering capabilities etc.).
3. Action to reduce direct or indirect greenhouse gas emissions during construction and maintenance of the project. The Region can look for bidders to demonstrate good environmental stewardship practices for the management of construction projects through the following:
 - A documented environmental or environmental, health & safety (EHS) policy statement endorsed by senior management;
 - A documented environmental, EHS, and/or vehicle fleet management system or program;
 - Third-party review of environmental or environmental, health & safety system or program (i.e., ISO 14001 certification, E3 Fleet Rating);
 - A documented program for reducing idling for company vehicles and sub-contractor vehicles; and

- Documentation that demonstrates that vehicle fleets, including sub-contractor fleets, contain vehicles that are model year 2004 or later that conform to the federal On-Road Vehicles and Engine Emission Regulations (SOR/2003-2).
- 4. Opportunities to enhance existing conditions should be considered in detailed design, i.e., an opportunity to enhance stormwater quality through incorporation of oil/grit separators into the local storm sewer system to improve conditions within Four Mile Creek.
- 5. Opportunities to contribute to a restoration/planting plan will be developed in detailed design.

7.1.6 Air Quality During Construction

During construction of a roadway, dust is the primary contaminant of concern. Other contaminants including NO_x and VOC's may be emitted from equipment used during construction activities. Due to the temporary nature of construction, there are no air quality criteria specific to construction activities. However, the Environment Canada *"Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities"* document provides several mitigation measures for reducing emissions during construction. Mitigation techniques discussed in the document include material wetting or use of chemical suppressants to reduce dust, use of wind barriers, and limiting exposed areas which may be a source of dust and equipment washing. It is recommended that these best management practices be followed during construction of this project to reduce any air quality impacts that may occur. It is noted that MECP recommends that non-chloride dust suppressants be applied. MECP also recommends referring to the following publication in developing dust control measures: Cheminfo Services Inc. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities. Report prepared for Environment Canada. March 2005.

7.2 Cultural Environment

7.2.1 Archaeological Resources

The Stage 1 Archaeological Assessment can be found in **Appendix E** and provided the following conclusions / recommendations:

- The study area is adjacent to the St. Davids Queenston United Cemetery. The York Road right-of-way has the potential for unmarked or shifted burials, and therefore it is recommended that any impacts adjacent to this area are subject to a Stage 3 cemetery investigation;

- The Stage 3 cemetery investigation entails the mechanical removal of topsoil where possible, under the supervision of a licensed archaeologist. Work should begin away from the cemetery boundary, moving towards the cemetery property line to confirm the outer limits of the cemetery and reduce impacts to unmarked burials. The exposed subsoil will then be shovel-shined and thoroughly examined for the presence of burial shafts.
 - Where conditions, such as deeply buried utility locates and the existing road infrastructure, do not permit the mechanical removal of topsoil, then it is recommended that a program of archaeological construction monitoring to monitor for the recovery of unmarked burials in this area be implemented.
 - Given the potential for burials to be located outside the known limits of the cemetery, an Investigation Authorization may be required from the Bereavement Authority of Ontario. Prior to the Stage 2 and Stage 3 Archaeological Assessments, consultation with the Bereavement Authority of Ontario is required.
- Areas to the east of the intersection have archaeological potential and a Stage 2 Assessment is recommended. This will require a test pit survey at 5 m intervals prior to any impacts to the property; and
 - Should the proposed work extend beyond the current Study Area, further Stage 1 archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands.

The report was reviewed and received clearance from the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) on January 5, 2022. A copy of this letter has been provided in **Appendix A**.

7.2.2 Cultural Heritage

To protect the cultural heritage landscape, the built heritage assessment (see **Appendix F**) proposed the following mitigation measures:

- Construction activities and staging should be suitably planned and undertaken to avoid impacts to identified cultural heritage resources;
- Suitable mitigation including establishing no-go zones with fencing and issuing instructions to construction crews to avoid the resources should be considered during detailed design;

- The properties at #246 Four Mile Creek Road, #253 Four Mile Creek Road, #268 Four Mile Creek Road, and #1394 York Road (within CHL 1) may be subject to indirect impacts including encroachment of the ROW onto the subject properties. As #246 Four Mile Creek Road, #253 Four Mile Creek Road, and #1394 York Road are listed on the Town of Niagara-on-the-Lake Heritage Register, resource-specific HIAs may be required by planning staff at the Town of Niagara-on-the-Lake per Official Plan clause 18.4 (5). However, given that there are no direct impacts to any structures or heritage attributes on these properties anticipated in Recommended Plans, it is recommended that the Town of Niagara-on-the-Lake consider waiving the requirement for HIAs in these cases in favour of suitable avoidance measures and post-construction rehabilitation;
- Two commemorative features, including “The Burning of St. Davids 1814” plaque on the northwest corner of the intersection of Four Mile Creek and York Road, and the Queenston Quarry Cement Mill Stones and Interpretation on the southeast corner will be impacted with implementation of the roundabout. These commemorative features should be removed prior to construction and stored in a secure facility to prevent damage. Following intersection improvements, these commemorative features should be reinstalled at the intersection, or in a similarly accessible locations, based on consultation with the Ontario Heritage Trust, the Town of Niagara-on-the-Lake, and the Region;
- Post-construction rehabilitation should be conducted to all properties that are indirectly impacted as a result of the preferred alternative to ensure the properties within CHL 1 retain their historically-sympathetic aesthetic at the crossroads of the community of St. Davids;
- To ensure the properties within CHL 1, specifically #1394 York Road, #268 Four Mile Creek Road, #246 Four Mile Creek Road, and #253 Four Mile Creek Road are not adversely impacted during construction, baseline vibration monitoring should be undertaken during detailed design. Should this advance monitoring assessment conclude that the structures on these properties will be subject to vibrations, a vibration monitoring plan should be prepared and implemented as part of the detailed design phase of the project to lessen vibration impacts related to construction;
- Where tree removals are anticipated, post construction rehabilitation including planting with sympathetic plant species should be considered to mitigate any impacts; and

- Should future work require an expansion of the study area then a qualified heritage consultant should be contacted in order to confirm the impacts of the proposed work on potential heritage resources.

The report was reviewed the MHSTCI and as per their email on December 1, 2021, they had no concerns or comments. A copy of the letter can be found in **Appendix A**.

7.3 Natural Environment

It is anticipated that impacts to natural heritage features at the Four Mile Creek crossing can be minimized or mitigated through the implementation of construction best management practices outlined in the NEA Report provided in **Appendix C**. A summary of the proposed mitigation measures / recommendations are provided below:

7.3.1 Vegetation Cover and Tree Conservation

Tree and vegetation removal are anticipated to occur in advance of construction to facilitate access, grading and to provide set up and laydown space. Most of the impacts will occur within the existing right-of-way. Limited impacts to adjacent vegetation communities will occur along the margins of previously disturbed roadway. Since the design is only preliminary in nature, the exact extent of the tree and vegetation removal will be confirmed during detailed design. The following general mitigation measures are proposed to mitigate potential impacts to the vegetation and tree cover within the study area:

- Clearing of vegetation should be kept to a minimum whenever possible and it should be clearly delineated on construction drawings;
- A tree protection plan should be developed. The root system, trunk and branches of any tree not designated for removal should be protected from damage. In the event of accidental damage, vegetation should be replaced with native species; and
- Construction vehicles will have designated access routes and exhaust fumes from equipment will not be directed towards any tree's canopy.

7.3.2 Drainage, Erosion, Sediment Control and Protection of Fish Habitat

Most works for this project will occur above the watercourse on the existing roadbed; however, vegetation clearing, construction activities and replacement of the culverts will affect the watercourse and will require mitigation measures and review by DFO / NPCA.

The following mitigation measures are proposed to avoid/mitigate impacts:

- In-water work must abide by in-water timing restrictions and must be confirmed with the Ministry of Northern Development, Mines, Natural Resources and Forestry;
- Construction activities should be suspended during heavy periods of rain and machinery should be free of leaks and in good working order;
- An erosion and sediment control plan will need to be developed by the contractor and the contractor will be responsible to ensure that all measures are functioning as intended during construction. No work will occur within 30 m of the water until the appropriate erosion and sediment controls measures have been implemented; and
- Refuelling of equipment and maintenance will need to be conducted away from water bodies on impermeable pads or buried liners. Emergency spill kits will also need to be located in the study area for construction. Any spills need to be immediately reported to the MECP Spills Action Centre.

7.3.3 Wildlife and Migratory Birds

Several wildlife and bird species were observed and documented by CIMA+ during the field investigations and background review for this Class EA Study. The following mitigation measures are proposed to avoid/mitigate impacts to wildlife and birds:

- Removal of woody vegetation should not occur during the breeding bird season from April 15 to August 31 inclusive, unless a qualified biologist has searched the study area for nests, no more than 2 days prior to clearing;
- When possible, work should be completed during daylight hours and if nighttime work is necessary lights should be installed in a way to minimize any effects on wildlife;
- Stockpiled materials should be surrounded by sediment control fencing to prevent nesting;
- Vehicle idling should be minimized, and vehicles and equipment should have the appropriate mufflers installed; and
- If a rare plant or animal species is encountered, construction activities will be halted and MECP will be contacted.

7.3.4 Source Water Protection

As stated in Section 2.3.3, there are areas within the study area within a Highly Vulnerable Aquifer (HVA). These areas are susceptible to contamination such as road salt. To help mitigate the impact of road salt to HVAs, it is recommended to use Best Management Practices such as:

- Washing all equipment in an area that all water is intercepted and does not directly enter into the environment.
- Electronic spreader controls to allow for better control of the rate of salt application.
- All storage areas and transfer areas are kept in good repair and have impermeable floors.
- All maintenance staff will have the required training on when and how to apply salt.
- Excess snow from snow removal will be stored at preselected sites that will be monitored throughout the winter to ensure run off or groundwater contamination is not occurring.

During construction a spills management plan should be in place including an emergency response spill kit, and direction should be provided in the contract documents for stockpiling of materials, monitoring of leaks and location for refueling areas.

7.3.5 Species at Risk (SAR)

While no SARs were identified on site during the field investigations, there is potential for seven (7) SAR and their habitat to be found within the Study Area. As such, it is the Region's responsibility to ensure that Species at Risk are not killed, harmed, or harassed, and that their habitat is not damaged or destroyed through the proposed activities to be carried out on the site. If during detailed design, it is determined that proposed activities cannot avoid impacting protected species and their habitats, then the Region will need to apply for an authorization under the *Endangered Species Act* (ESA).

7.4 Technical Considerations

7.4.1 Road Profile and Cross Section

The final profile and cross section will be refined modified during detailed design subject to the latest design standards at that time, as well as ongoing consultation with relevant technical agencies such as Town of Niagara-on-the-Lake, NPCA and other agencies where permits will be required.

7.4.2 Utilities

As noted in the evaluation, the roundabout has been located so as to not impact the Bell Canada infrastructure located on/under the northeast corner of the intersection. The outer curb of the roundabout is located approximately at existing curb, and the proposed sidewalk and cycle track is behind the two interface boxes.

Seventeen (17) of the existing Niagara-on-the-Lake Hydro poles on the south side of York Road and three (3) on east side of Four Mile Creek Road will need to be relocated because of the Recommended Plan. Locations for the other utilities within the study area, namely Enbridge Gas and Niagara Region Broadband Network (NRBN), shall be confirmed during detailed design and, if required, a protection plan or utility relocation will be completed.

7.4.3 Geotechnical

A geotechnical investigation will be completed by the Region during detailed design. This will also include an On-Site and Excess Soil Management Plan as required under O.Reg. 406/19.

7.4.4 Drainage and Stormwater Management

As discussed in **Section 6.10**, the stormwater design will be updated in detailed design, including the consideration of LID facility and storm sewer. The location of the LID facilities should be confirmed after a utility assessment has been completed to confirm the location and relocation requirements of utilities in the study area. A soil conditions assessment and in-site infiltration test are required to review and confirm the design of the facilities.

For Culvert C1, a pool with rocky ramp or a similar alternative may be required on the downstream end to avoid perched conditions and facilitate movement of aquatic species. As Four Mile Creek is a regulated watercourse, a fluvial meander belt assessment of the watercourse may be required in detailed design, subject to

consultation with Niagara Region Drainage staff and Niagara Peninsula Conservation Authority. If the span recommendation to meet the fluvial requirement is larger than the proposed 2.7 m span, further hydraulic assessment will be required to confirm the water surface elevations of the future culvert.

The condition of the existing storm sewer should be reviewed to assess its condition and determine if replacement is required. If the conditions are found to be satisfactory, relocation of catch basins may be required to use the existing storm sewer. An alternative storm sewer layout for Catchment 130 has been proposed to avoid regular access to private property for inspection and maintenance activities. This layout should be reviewed in detailed design.

Stormwater management solutions other than those proposed as part of the Class EA Study may be considered in detailed design, so long as they meet the water quantity, quality, and balance requirements outlined in the Drainage and Stormwater Management Report in **Appendix D**.

7.5 Monitoring

Monitoring requirements will be fulfilled by Niagara Region. Monitoring may encompass the following aspects:

- Monitoring of EA commitments to further work through the future detailed design and construction phases to ensure these commitments are fulfilled or addressed;
- Monitoring associated with any conditions of approvals / permits to be obtained;
- Monitoring during construction (by Region, Town and/or contractor) to ensure construction mitigation measures are implemented as planned; and
- Monitoring of site restoration aspects including landscape plantings (under warranty).

Other monitoring requirements may be identified in future project phases.

7.6 Summary of Proposed Mitigation and Commitments to Further Work

Table 7-2 summarizes the identified concerns and the proposed mitigation measures and commitments to future work based on the identified environmental sensitivities and the proposed works.

Table 7-2: Mitigation Measures and Commitments to Future Work

Mitigation Measures and Commitment to Further Work
Property and Access
1) Final impacts to private property will be confirmed during detailed design. The Region will continue to consult with affected property owner on an individual basis during detailed design. 2) Property acquisition will occur, in accordance with the Region's procedures. 3) It is the Region's intent to plan for an efficient construction process to minimize impacts to residents and businesses and this will be one of the primary objectives of the detailed design phase. 4) Permission to enter or temporary construction easements may be required at some locations. These locations will be finalized in detailed design and the Region will contact property owners well in advance of construction to seek permission to grade on private lands. 5) The Region will work with area property owners in the implementation of the Streetscape Plan and tree management strategies to mitigate impacts associated with removal of trees and landscape features on affected properties.
Community Engagement
6) The Region commits to ongoing meaningful engagement of the community through the future detailed design process. 7) Consider preparing a public information package/newsletter during detailed design to provide community members with an opportunity to review the detailed design plan, construction staging and phasing, including the sequence of municipal services and road construction.
Indigenous Community Engagement
8) The Region remains committed to engagement of Indigenous communities and will continue to provide information, invite feedback and extend the invitation to meet with Indigenous Communities during detailed design.

Mitigation Measures and Commitment to Further Work

9) Where Stage 2 Archaeological Assessment is required, the Region will coordinate with interested communities in coordinating field monitors, as appropriate. Specifically, the Six Nations of the Grand River have requested to be involved in construction monitoring of the project and MCFN confirmed that they will require the same level of engagement on the Stage 3 cemetery investigation. It is understood that First Nations' ability to respond to various notices and invitations for engagement were compromised during COVID-19, with band offices shut down for long periods of time during 2020 and 2021. Therefore, engagement should be carried forward with all three Indigenous Communities through detailed design.

Traffic Management During Construction

- 10) A construction staging and traffic management plan will be developed and communicated to area residents well in advance of execution. Communication would typically involve a direct mailout to all residents and information posted on the Region's website.
- 11) Emergency vehicle access will be maintained at all times.

Noise and Vibration

- 12) Construction noise and vibration issues will be further reviewed during detailed design when construction methodology and schedule is fully developed.
- 13) All equipment shall be properly maintained to limit noise emissions. As such, all construction equipment will be operated with effective muffling devices that are in good working order.
- 14) The Contract Documents will contain a reference to appropriate Town of Niagara-on-the-Lake Noise By-laws. Contractor is expected to adhere to these unless otherwise permitted.

Mitigation Measures and Commitment to Further Work

Climate Change

15) Consistent with the Region's Official Plan, the following aspects of resiliency and adaptation will be considered during detailed design:

- Action to reduce direct or indirect greenhouse gas emissions during construction and maintenance of the project.
- Opportunities to enhance stormwater quality through incorporation of oil/grit separators into the local storm sewer system to improve conditions (also noted under Drainage and Stormwater)
- Opportunities to contribute to the implementation of the Urban Forestry Management Plan objectives through a restoration/planting plan will be developed in detailed design.

Air Quality

16) During construction, vehicles/machinery and equipment will be in good repair, equipped with emission controls, as applicable, properly maintained and operated within regulatory requirements.

17) Refer to Environment Canada "Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities" for mitigation measures for reducing emissions during construction activities. Mitigation techniques discussed in the document include material wetting or use of chemical suppressants to reduce dust, use of wind barriers, and limiting exposed areas which may be a source of dust and equipment washing. It is recommended that these best management practices be followed during construction of the roadway to reduce any air quality impacts that may occur.

18) It is noted that MECP recommends that non-chloride dust suppressants be applied. MECP also recommends referring to the following publication in developing dust control measures: Cheminfo Services Inc. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities. Report prepared for Environment Canada, March 2005.

Mitigation Measures and Commitment to Further Work

Cultural Heritage and Archaeology

- 19) Construction activities and staging should be suitably planned and undertaken to avoid impacts to identified cultural heritage resources.
- 20) Suitable mitigation including establishing no-go zones with fencing and issuing instructions to construction crews to avoid the resources should be considered during detailed design.
- 21) Consultation with the Town of Niagara-on-the-Lake to determine if the identified prosperities will require a Heritage Impact Assessment (HIA) or if they will wave the requirement for HIAs in these cases in favour of suitable avoidance measures and post-construction rehabilitation if the Roundabout Concept is carried forward to detailed design.
- 22) Commemorative features near the future roundabout should be removed prior to construction and stored in a secure facility to prevent damage. Following intersection improvements, these commemorative features should be reinstalled at the intersection, or in a similarly accessible locations, based on consultation with the Ontario Heritage Trust, the Town of Niagara-on-the-Lake, and the Region.
- 23) Post-construction rehabilitation should be conducted to all properties that are indirectly impacted as a result of the preferred alternative to ensure the properties within CHL 1 retain their historically-sympathetic aesthetic at the crossroads of the community of St. Davids.
- 24) Baseline vibration monitoring should be undertaken on the identified properties during detailed design. Should this advance monitoring assessment conclude that the structures on these properties will be subject to vibrations, a vibration monitoring plan should be prepared and implemented as part of the detailed design phase of the project to lessen vibration impacts related to construction.
- 25) Where tree removals are anticipated, post construction rehabilitation including planting with sympathetic plant species should be considered to mitigate any impacts.

Mitigation Measures and Commitment to Further Work

- 26) Should future work require an expansion of the study area then a qualified heritage consultant should be contacted in order to confirm the impacts of the proposed work on potential heritage resources.
- 27) The study area is adjacent to the St. Davids Queenston United Cemetery and is subject to a Stage 3 cemetery investigation.
- 28) Prior to the Stage 2 and Stage 3 Archaeological Assessments, consultation with the Bereavement Authority of Ontario is required.
- 29) Areas to the east of the intersection have archaeological potential and a Stage 2 Assessment is recommended. This will require a test pit survey at 5 m intervals prior to any impacts to the property; and
- 30) Should the proposed work extend beyond the current Study Area, further Stage 1 archaeological assessment should be conducted to determine the archaeological potential of the surrounding lands.

Natural Environment

Vegetation Cover and Tree Conservation

- 31) Vegetation / tree removal should be limited where possible, and a tree protection plan should be in place. Removal should also be outside of the breeding bird window (April 15th – August 31st inclusive).

Drainage, Erosion, Sediment Control and Protection of Fish Habitat

- 32) Erosion and sediment control measures will be required (see below under “Erosion and Sediment Control”).
- 33) In-water work timing will need to be confirmed with the MNDMNRF during detailed design.
- 34) DFO and NPCA review/approval will be required for the replacement of the culverts during detailed design.

Wildlife and Migratory Birds

Mitigation Measures and Commitment to Further Work

35) Construction vehicles should be in proper working order (no leaks, proper mufflers) and have specified access routes to and from the site.

36) If any rare plant or animal species is found MECP is to be contact immediately.

Source Water Protection

37) Follow best management practices for road salt application.

38) A spills management plan should be in place during construction.

Streetscape / Landscape Plans and Tree Management

39) A landscape / streetscape plan for the study area should be prepared during detailed design in consultation with the Town of Niagara-on-the-Lake, with input from the community regarding landscaping in the central island of the roundabout.

40) A Tree Management Plan will be prepared that details specific tree impacts, mitigation and replacement (in conjunction with the landscape plan), and detailed tree protection strategies and mitigation. Replacement and compensation strategies will be discussed with the NPCA.

Erosion and Sediment Control

41) Stringent erosion and sediment control measures will be implemented during all phases of construction, clean-up and restoration to prevent sediment laden runoff from entering any of the watercourses directly from the construction zone.

42) Appropriate sediment and erosion control measures must be maintained during and following construction until all disturbed areas have been stabilized. The contractor will identify a contingency plan for accidental sediment release.

Mitigation Measures and Commitment to Further Work

- 43) In addition to the installation of silt fencing, other measures to reduce or eliminate sediment loading into the adjacent natural features includes temporary siltation ponds, riprap swales and hay-bale check dams can be installed prior to construction activities. Similarly, to mitigate dust deposition, a dust suppressant can be applied to areas of exposed soils to reduce or eliminate dust generation.
- 44) All salvaged or stockpiled materials will be isolated, located a safe distance from the watercourse edges and stabilized to prevent migration of any sediment or other material to the watercourse.
- 45) All work areas or other disturbed surfaces draining to the watercourses and/or in the floodplain will be stabilized and re-vegetated with appropriate native, non-invasive species as soon as feasible following construction.
- 46) The interim erosion and sediment control measures will be left in place, monitored and maintained in proper working order until all disturbed areas draining to the watercourses are fully stabilized, including establishment of vegetative cover.
- 47) All activity will be controlled so as to prevent entry of any petroleum products, debris or other potential contaminants/deleterious substances, in addition to sediment as outlined above, to the watercourses. Storage, maintenance or re-fueling or maintenance of equipment will be conducted at least 30 m away from the watercourses. The Contractor will have an appropriate spills management/response plan in place throughout construction, including spill control and absorbent materials, instructions regarding their use and notification procedures.

Road Design and Utilities

- 48) The road profile and typical cross section will be refined in detailed design.
- 49) Utility relocations shall be coordinated to minimize service disruptions where possible through liaison and contract requirements.

Mitigation Measures and Commitment to Further Work

Drainage and Stormwater Management

- 50) The location of the proposed Low Impact Development (LID) facilities will be confirmed after a utility assessment has been completed to identify potential utility constraints.
- 51) A soil conditions assessment and in-site infiltration test are required to review and confirm the design of the LID facilities.
- 52) A conditions assessment of the existing storm sewers and outlets will be completed to determine if replacement is required. If the conditions are found to be satisfactory, the location of the catch basins will need to be confirmed.
- 53) The proposed storm sewer layout for Catchment 130 will be reviewed. This layout is proposed to avoid regular access to private property for inspection and maintenance activities.
- 54) For Culvert C1, a pool with rocky ramp or other similar alternative may be required on the downstream end to avoid perched conditions and facilitate movement of aquatic species. Input from a fluvial geomorphologist will be required to design this facility.
- 55) As Four Mile Creek is a regulated watercourse, a fluvial meander belt assessment of the watercourse may be required in detailed design, subject to consultation with Niagara Region Drainage staff and Niagara Peninsula Conservation Authority. If the span recommendation to meet the fluvial requirement is larger than the proposed 2.7 m span of Culvert C1, further hydraulic assessment will be required to confirm the water surface elevations of the future culvert.

Geotechnical and Groundwater Investigations

- 56) Geotechnical investigations will be required to support detailed design.
- 57) The potential need for dewatering will be investigated during detailed design. A Permit To Take Water application, and supporting documentation, will be prepared as necessary. Resources are provided to guide this process

Mitigation Measures and Commitment to Further Work

<https://www.ontario.ca/page/water-taking-and-transfer-user-guide-clarifications-and-exemptions> and
<https://www.ontario.ca/page/water-taking-user-guide-environmental-activity-and-sector-registry>

Construction Monitoring

58) Mitigation measures shall be implemented and maintained through on-site inspections by the Region staff who will ensure that the natural, social, and economic environments are not impacted by the construction activities and/or that impacts are minimized. The inspection staff will also ensure that items such as sedimentation controls and appropriate signage are maintained throughout construction.



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