Memo

To: David Hunter (City of Toronto)

From: Maria King (Dillon)

cc: Chris Haines (Dillon)

Date: May 28, 2021

Subject: Transportation Assessment, Rouge Park Bridges Transportation Master Plan

Our File: 19-1924

Introduction

The following technical memo provides an assessment of existing transportation-related conditions as well as the existing and planned multi-modal transportation network within the study limits for the Rouge Park Bridges Transportation Master Plan (Rouge Park Bridges TMP). As a component of the existing network assessment, compliance with applicable design standards was reviewed. Policy documents that specifically relate to the existing and future transportation network were also reviewed and summarized.

Relevant Guidelines and Policies

The following subsections provide an overview of policies that influence future City of Toronto transportation infrastructure within Rouge Urban National Park (RNUP).

City of Toronto Official Plan

The Official Plan (OP) sets forth Council-approved policies regarding how land within the City of Toronto should be used to help the City reach its full potential. The plan includes policies related areas such as transit, land use development, and the environment. The current consolidation for Chapter 1-5 and Schedules 1 to 4 are dated February 2019. Chapters 6 and 7 are dated June 2015. The OP breaks the City into a number of areas labeled A through K. The Rouge Park Bridges TMP Study Area is wholly located within Official Plan Area J. **Table 1** provides a summary of the OP policies that apply to the Rouge Park Bridges TMP, as well as an indication of how those policies are anticipated to be realized through completion of this study.

Table 1: Overview of Relevant Transportation Policies from the City OP.

OP Section	Applicable Policy	How the Policy is Being Realized through the Rouge Park Bridges TMP
2.1 Building a More Liveable Urban Region	1.k) protects, enhances and restores the region's system of green spaces and natural heritage features and functions and the natural corridors that connect these features, recognizes the role of river valleys that connect the Greenbelt to Lake Ontario and protects the region's prime agricultural land.	Impacts to natural heritage resources within the RNUP will be minimized and mitigated to the extent feasible. Access to natural features will be further enabled through the recommendations of this study.
	2. Toronto will consult with adjacent municipalities when making decisions regarding matters of mutual interest such as shared transportation corridors and cross-boundary service provision.	Representatives from both the City of Pickering and Durham Region have participated as members of the Stakeholder Committee
2.3.2 Toronto's Green Space System and Waterfront	1. Actions will be taken to improve, preserve and enhance the Green Space System by: a) improving public access and enjoyment of lands under public ownership; b) maintaining and increasing public access to privately owned lands, where appropriate;	The TMP will strive to maintain and/or improve multi-modal access to the natural heritage resources within the RNUP through consideration of improvements to vehicular, cycling and pedestrian safety and trail connectivity.
2.4 Bringing the City Together: A Progressive Agenda of Transportation Change	1. Given the health benefits of physical activity, active forms of transportation will be encouraged by integrating and giving full consideration to pedestrian and cycling infrastructure in the design of all streets, neighbourhoods, major destinations, transit facilities and mobility hubs throughout the City.	Provision of safe pedestrian and cyclist operating spaces will be considered as part of this study. It is anticipated that pedestrians will primarily utilize park-owned facilities within the study area; while cyclists will have access to both park facilities and City roadways.
3.1.5 Heritage Conservation	4. Properties on the Heritage Register will be conserved and maintained consistent with the Standards and Guidelines for the Conservation of Historic Places in Canada, as revised from time to time and as adopted by Council.	Decisions related to the heritage bridge structures that are the focus of the Rouge Park Bridges TMP will be made in accordance with the Ontario

	5. Proposed alterations, development, and/or public works on or adjacent to, a property on the Heritage Register will ensure that the integrity of the heritage property's cultural heritage value and attributes will be retained, prior to work commencing on the property and to the satisfaction of the City. Where a Heritage Impact Assessment is required in Schedule 3 of the Official Plan, it will describe and assess the potential impacts and mitigation strategies for the proposed alteration, development or public work. 13. In collaboration with First Nations, Métis and the Provincial Government, the City will develop a protocol for matters related to identifying, evaluating and protecting properties and cultural heritage landscapes on the Heritage Register, archaeological sites and artifacts here they may be of interest to First Nations or Métis.	Heritage Bridge Program, in consultation with specialists in the field of heritage structures, City of Toronto Heritage Conservation staff, Parks Canada, and Indigenous Communities.

Site and Area Specific Policies

Chapter 7 of the City's Official Plan, "Site and Area Specific Policies, in effect as of June 2015", outlines specific policies for various areas across the city. **Figure 1** illustrates the various Site and Area Specific Policies that apply to lands with the RNUP.

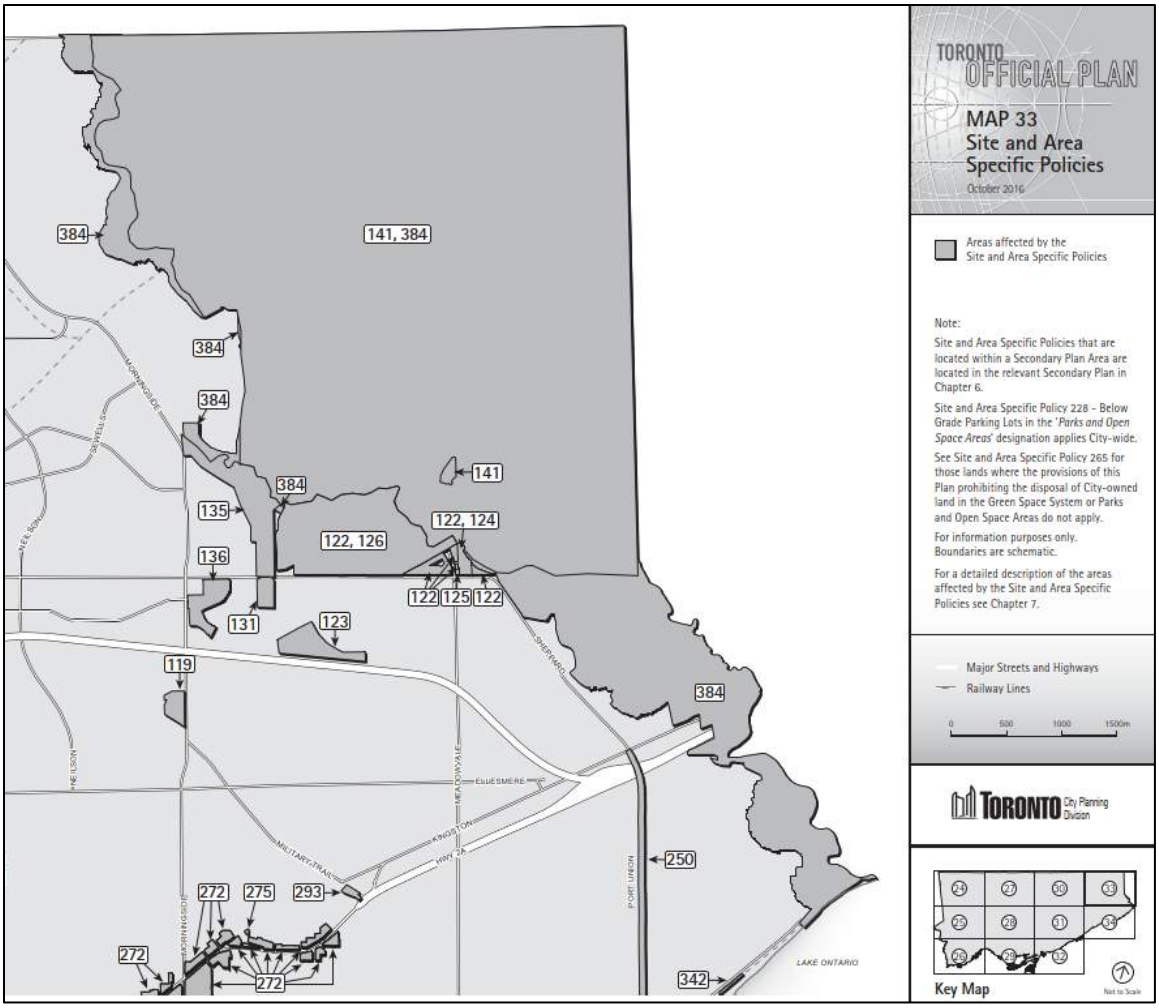


Figure 1: Excerpt from Toronto Official Plan Map 33 Indicating Site and Area Specific Policies that Apply to RNUP (Darker Shaded Area)

Site and Area Specific Policy Area 141

The Rouge Park Bridges TMP study area falls under Policy 141: lands north of Twyn Rivers Drive, east of Staines Road. Implementation of the policy will include creating a coordinated trail program by connecting compatible recreational uses that exist within the area[1]. Since the transfer of TRCA Lands within Rouge Park to Parks Canada in May of 2019, providing connectivity of the active transportation network outside of existing City of Toronto road right-of-ways is no longer being managed by the City of Toronto. Policy 141 also states that "27-metre rights-of-way [within the limits of the specific policy area] will not be used to accommodate four lane roads" [2]. In accordance with this policy, widening of roads to provide additional midblock vehicular capacity will not be considered.

[1] City of Toronto Official Plan, Chapter 7, pg. 96
[2] City of Toronto Official Plan, Chapter 7, pg. 97

Site and Area Specific Policy 384

Site and Area Specific Policy 384 applies solely to the lands within Rouge Park, and was put in place to exempt the park from OP Policies 2.3.2(4) and 4.3(8) which otherwise would have prevented the transfer of park lands to the Federal Government.

Official Plan Amendment 346

Amendment 346 to the Official Plan of the City of Toronto with respect to Conformity with the Provincial Greenbelt Plan (2005) and Greenbelt River Valley Connections was adopted in 2016, and contained amendments to Site and area Specific Policy 141, notably:

- A new policy 141 a) iii) has been added to indicate that the City will work with Parks Canada to support, implement and promote the policy objectives of the Rouge National Urban Park as well as other applicable Parks Canada plans and policies and to implement the Greenbelt Plan.
- Renumbered policy 141e) has been amended to add the requirement that any use of 27m rights-or-way will maintain the rural character of existing two lane roads.

Ten Year Cycling Implementation Plan Update (2019)

The City of Toronto's *Ten Year Cycling Implementation Plan* was initially approved by Council in 2016 and has since been updated in 2019. The plan outlines cycling priorities up to 2026, and integrates the outstanding projects from the *2012 Bikeway Trails Implementation Plan*.

Existing cycling network elements within the TMP study area include a Major Multi-Use Trail on Meadowvale Road from Sheppard Avenue East to Old Finch Avenue, with On-Street Cycling indicated on Meadowvale north of Old finch Avenue, continuing on Plug Hat Road to Beare Road north to Steeles Avenue East. (See **Figure 2**.)

The plan recommends a bike trail at the north perimeter of the study area along Steeles Avenue between Markham Road and Beare Road to connect two pre-existing bike lanes[3].

Toronto's Cycling Map had previously identified Old Finch Avenue as a suggested on-road cycling route, which would provide an additional east-west cyclist connection to Meadowvale Road.

Reesor Road (south of Steeles Avenue) features a central location within the RNUP and the road does not have narrow overhead structures that would constrain cycling facility widths, making it a potentially good fit for cycling access.

[3] Ten Year Cycling Implementation Plan, pg. 87

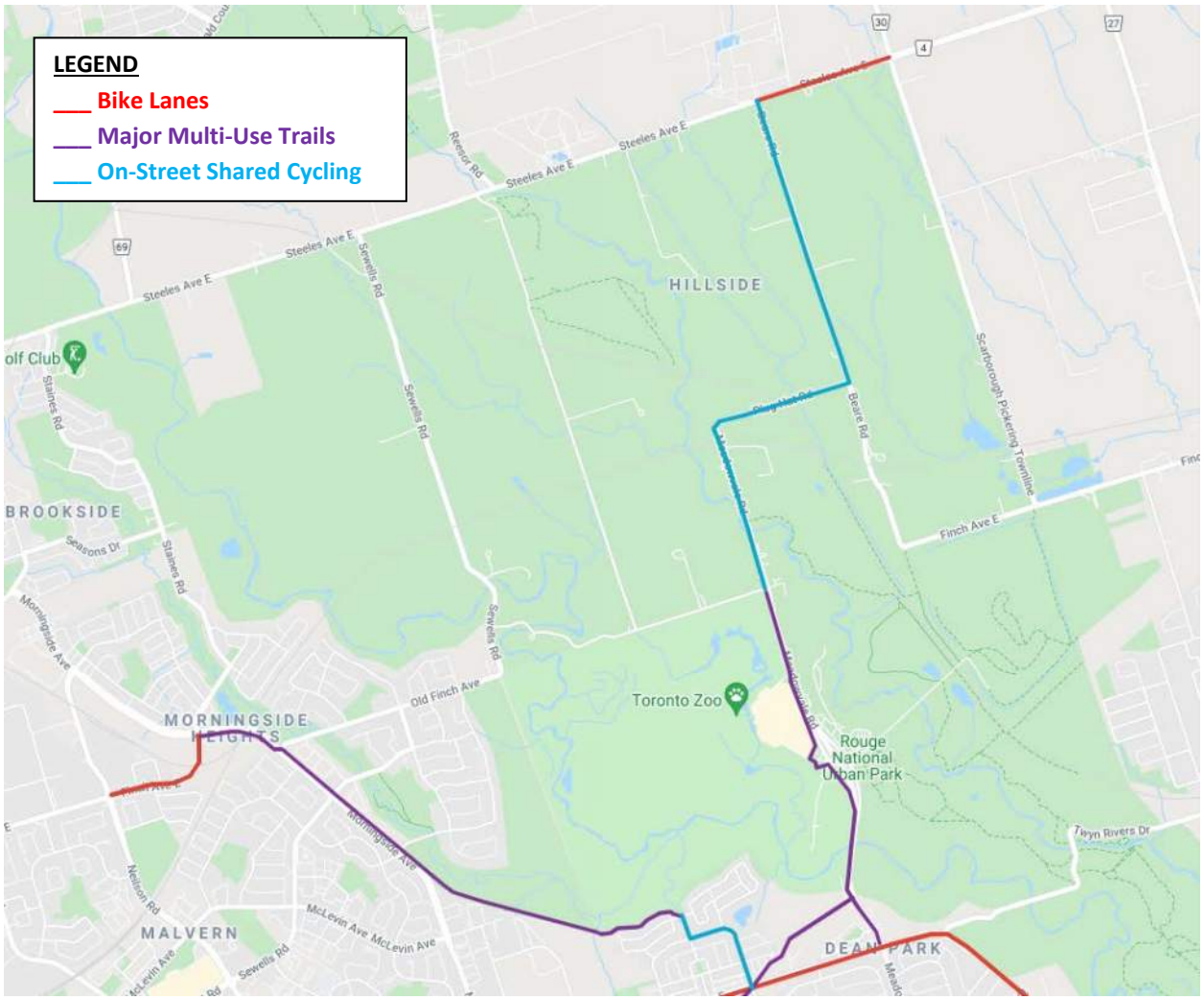


Figure 2: Excerpt from the Toronto Cycling Map (2021).

The Regional Municipality of York Transportation Master Plan (2016)

The Regional Municipality of York Transportation Master Plan was published in November of 2016, and highlights the needs and priorities of the transportation network in the region. The TMP indicates that Steeles Avenue (which forms the norther boundary of the TMP study area) is to be widened to a minimum 4 lane cross-section by 2041[4], however it does not discuss the specific year when the work is to be completed. The plan also makes note of a potential future BRT service on Steeles Avenue.

Parks Canada's Rouge National Urban Park Management Plan

The Rouge National Urban Park Management Plan (RNUP Management Plan) was published by Parks Canada in 2019 and outlines key strategies for the park in the 10 years following publication. The

[4] The Regional Municipality of York Transportation Master Plan, pg. 157

objectives of this plan vary from protecting the natural environment to improving user experience within the park by means of infrastructure and other services.

The RNUP Management Plan sets out actions for its various strategies, objectives and actions. **Table 2** summarizes the strategies, objectives and actions from the RNUP Management Plan that are particularly relevant to this project.

Table 2: Summary of Relevant Strategies from the Rouge National Urban Park Management Plan (Parks Canada)

Strategy	Objectives	Actions	How strategy relates to the TMP
1 – "Protect and restore natural heritage values in support of a resilient park landscape"[5]	2 – "Enhance ecological connectivity throughout the park and adjacent natural areas"[6]	Encourage the incorporation of connectivity improvements "in the planning, management and operation of roads, highways, rail lines, hydro corridors and other infrastructure that traverses the park" [7] Strengthen trail connections with adjacent natural areas and communities. [7]	• Mitigation measures will be identified to limit the impact of proposed infrastructure on existing wildlife habitats and movement corridors. • Recommended strategies for the watercourse crossings will be reflective of the desire to support active transportation linkages through the Park.

[5] Rouge National Urban Park Management Plan, pg. 17
[6] Rouge National Urban Park Management Plan, pg. 20
[7] Rouge National Urban Park Management Plan, pg. 21

Strategy	Objectives	Actions	How strategy relates to the TMP
2 – "Sustain a Living Landscape – Past, Present and Future"[8]	4 – "Conserve, celebrate, and manage the park's cultural resources and traditions"[9]	"Work to conserve structures, landscapes and viewscapes that are relevant to the park's heritage"[9] "Work collaboratively with Indigenous partners, governments, lessees and non-governmental organizations to identify and conserve cultural resources and to integrate their conservation with that of other park resources"[9] "Integrate and interpret, where feasible, ecological integrity in the management of cultural resources, such as allowing natural reclamation in old building foundations for snake hibernacula"[10]	• The recommendations of the TMP will recognize and reflect the heritage value of each of the five watercourse crossing that are the focus of this study. • Indigenous Partners and other key stakeholders will be consulted with and actively engaged throughout the duration of this study. • If the recommended strategy at any crossing includes relocation of a bridge, consideration will be given to leaving abutments in-situ to provide wildlife habitat.
3 – "Celebrate Rouge National Urban Park as a National and International Gateway to Discovering Canada's Environment and Heritage"[11]	3 – "Develop a range of infrastructure and supporting services to facilitate memorable experiences in the park's rich landscapes and features"[12]	Ensure the park meets universal design principles to allow for inclusive access.[12] Develop the park trail system by introducing new trails and creating connections to points of interest, various facilities and campgrounds, and the local and regional trail and cycling networks.[13]	• Wherever provision of pedestrian facilities are contemplated as a component of this study, those facilities will be AODA compliant. • Watercourse crossings will be maintained where existing and/or proposed trail connections have been identified.

[8] Rouge National Urban Park Management Plan, pg. 25
[9] Rouge National Urban Park Management Plan, pg. 30
[10] Rouge National Urban Park Management Plan, pg. 31
[11] Rouge National Urban Park Management Plan, pg. 32
[12] Rouge National Urban Park Management Plan, pg. 36
[13] Rouge National Urban Park Management Plan, pg. 37

Strategy	Objectives	Actions	How strategy relates to the TMP
4 – "Achieve Success through Collaboration"[14]	3 – "Collaborate with partners and stakeholders in park operations, access, infrastructure and planning"[15]	Provide low cost or free shuttle bus service to the park from various centres, including downtown Toronto and municipal transit hubs.[15] Create convenient, affordable and sustainable park access, including: links to transit (present and future) and commuter lots; local and regional trails; and carpooling options at parking lots within RNUP.[15]	• Selection of a recommended solution at each crossing location will consider potential impacts associated with any changes in multi-modal connectivity, as well as opportunities to support planned connections.

[14] Rouge National Urban Park Management Plan, pg. 40
[15] Rouge National Urban Park Management Plan, pg. 43

Vision Zero 2.0: Toronto's Road Safety Plan Update

Vision Zero 2.0: Toronto's Road Safety Plan Update was published in 2019 with the ultimate goal of reducing the number serious injuries and fatalities on Toronto roads to zero. The plan is focussed on addressing safety issues associated with pedestrians, cyclists, motorcyclists, school aged children, older adults, and aggressive and distracted driving.

In terms of engineered solutions, the changes necessary to achieve the Vision Zero goal includes implementation of speed management strategies, geometric design improvements, addressing high-risk mid-block crossings and addressing turning movement collisions at signalized intersections.

Existing and proposed transportation facilities within the focussed study areas will be examined from a Vision Zero lens by specifically considering the spatial needs of vulnerable road users and reviewing opportunities to improve safety where existing and future Parks Canada trails intersect or parallel roads within the Rouge Park Bridges TMP focussed study areas.

City of Toronto Infrastructure Standards

Transportation Facilities

Design of City transportation infrastructure is guided by a number of design standards, including Transportation Association of Canada's *Geometric Design Guide* (TAC GDG, 2017), the City's *Lane Widths Guideline* (2018) and the City's *Construction Specifications and Drawings for Roadworks* (Varies). In the rural environment of the RNUP, it is anticipated that design of vehicular and active transportation facilities will be completed primarily in accordance with the TAC GDG.

TRCA's Crossings Guidelines for Valley and Stream Corridors (2015)

TRCA's Crossings Guidelines outline study requirements and design recommendations for any crossing of a TRCA-regulated watercourse or valley system. As all crossings under study in the current TMP are located over TRCA-regulated watercourses, these guidelines must be applied if the existing bridges are identified for future replacement – particularly if the new bridge is to be at a different location than the existing structure.

Existing Transportation Network and Facilities

The following sections provide an overview of the existing transportation facilities within, and adjacent to, the TMP study area.

Vehicular Facilities

There are five primary north-south roads and four primarily east-west roads within the Rouge Park study area, which are mapped in **Appendix A**. Information on these roads, including road type, primary direction, classification, number of lanes, and posted speed limit, are provided in **Table 3**. Per the requirements of Site and Area Specific Policy Area 141, widening beyond a two lane cross-section for all roads that fall within SPA 141, with exception of Meadowvale Road south of Finch Avenue, is not to be considered.

Table 3: Overview of roadways within the study area

ROAD	PRIMARY DIRECTION	CLASSIFICATION	NUMBER OF LANES	POSTED SPEED (km/h)
Beare Road (North of Plug Hat)	North-South	Collector	2	60
Beare Road (South of Plug Hat)	North-South	Local	2	60
Meadowvale Road (North of Old Finch)	North-South	Collector	2	50
Meadowvale Road (South of Old Finch)	North-South	Collector	4	60
Old Finch Avenue	East-West	Collector	2 (1 over bridge)	50
Plug Hat Road	East-West	Collector	2	50
Reesor Road	North-South	Collector	2	60
Sewell's Road	North-South	Local	2 (1 over bridge)	50 (20 over bridge)
Steeles Avenue	East-West	Minor Arterial	2	60
Twyn Rivers Drive	East-West	Collector	2 (1 over Stotts' Bridge)	40 (50 west of Stotts' bridge)
York Durham Line	North-South	Local	2	60

Active Transportation Facilities

RNUP serves as a major destination for recreation for the public. It currently includes numerous hiking trails (with plans for several more), as well as on-road cycling routes for experienced riders. Due to travel distances, no roads covered within this study are considered to be used by pedestrians to access essential services – like school or work. Demand for pedestrian recreational amenities are addressed by Parks Canada Trails. As such, provision of dedicated pedestrian amenities within the City of Toronto right-of-ways is not warranted, nor desirable, within the study area.

Cycling Facilities

Within the Rouge Park study area, there are approximately 10 km of existing bicycle facilities identified within City of Toronto right-of-ways. The locations of these facilities are illustrated in mapping provided in **Appendix A**. **Table 4** below gives further detail on the various facilities.

Table 4: Cycling facilities within the study area

LOCATION	FACILITY TYPE	SURFACE TYPE	LENGTH	CONNECTIVITY
Steeles Avenue from west of Beare Road to York Durham Line	Bike Lanes	Asphalt	0.8 km	Connects to Beare Road Signed Route
Meadowvale Road from Old Finch Avenue to Sheppard Avenue	Multi-Use Pathway	Asphalt	2.4 km	Connects to Gatineau Hydro Corridor Trail, Sheppard Avenue Bike Lanes, Meadowvale Road Signed Route, and Old Finch Avenue Suggested On-Street Route
Beare Road from Steeles Avenue to Plug Hat Road	Signed Route with Narrow Paved Shoulder	Asphalt	1.7 km	Connects to Steeles Avenue Bike Lanes, Plug Hat Road Signed Route, and Beare Road Suggested On-Street Route
Plug Hat Road from Meadowvale Road to Beare Road	Signed Route, No Paved Shoulder	Asphalt	0.8 km	Connects to Meadowvale Road Signed Route, Beare Road Signed Route and Beare Road Suggested On-Street Route

LOCATION	FACILITY TYPE	SURFACE TYPE	LENGTH	CONNECTIVITY
Meadowvale Road from Plug Hat Road to Old Finch Road	Signed Route, No Paved Shoulder	Asphalt	1.0 km	Connects to Meadowvale Road Multi-Use Pathway and Old Finch Avenue Suggested On-Street Route
Old Finch Avenue from Morningside Avenue to Sewell's Road	Suggested On-Street Route	Asphalt	1.4 km	Connects to Scarborough Railpath Trail and Sewell's Road Suggested On-Street Route
Sewell's Road from Old Finch Avenue to Old Finch Avenue	Suggested On-Street Route	Asphalt	0.3 km	Connects the two sides of the Old Finch Avenue Suggested On-Street Route
Old Finch Avenue from Sewell's Road to Meadowvale Road	Suggested On-Street Route	Asphalt	1.7 km	Connects to Sewell's Road Suggested On-Street Route, Meadowvale Signed Route, and Meadowvale Road Multi-Use Pathway

Pedestrian Facilities

The Rouge Park study area currently contains roughly 16 km of pedestrian facilities, the majority of which are RNUP hiking trails. These pedestrian facilities are illustrated in Figure 2 of **Appendix A**. **Table 5** highlights key information about the various pedestrian facilities, including location and connectivity to nearby destinations. At present, the Mast Trail makes use of Maxwell's Bridge to connect two trail segments. Parks Canada is currently undertaking a study to relocate the trail segments and watercourse crossing away from Twyn Rivers Drive.

Table 5: Pedestrian facilities within the study area

LOCATION	FACILITY TYPE	SURFACE TYPE	LENGTH	CONNECTIVITY
Zoo Road North	Sidewalk	Asphalt	0.7km	Connects to the Toronto Zoo west of Meadowvale Road and Lot 2 of the zoo east of Meadowvale Road

LOCATION	FACILITY TYPE	SURFACE TYPE	LENGTH	CONNECTIVITY
Zoo Road South	Sidewalk	Asphalt	0.4km	Connects to the Toronto Zoo and Meadowvale Road Multi-Use Pathway east of Meadowvale Road, and the RNUP Trail Network and TTC bus stop west of Meadowvale Road.
Cedar Trail and the Beare Wetlands Loop (east of Meadowvale Road)	Trail	Grass/Dirt	4.5km	The north trail head connects to Meadowvale Road north of Hillside Bridge. As of 2019, there does not appear to be anywhere to park to access the trail at this north trail head. The south trail head connects to Orchard Trail and is close to the Toronto Zoo. parking and transit.
Mast Trail (southeast of Twyn Rivers Drive)	Trail	Grass/Dirt	2.5km	The north trail head connects to Vista Trail. The south trail head connects to Rouge River Park and Glen Rouge Campground.
Orchard Trail (east of Meadowvale Road between Zoo Road and Twyn Rivers Drive)	Trail	Grass/Dirt	2km	The north trail head connects close to the Toronto Zoo, parking and transit. The south trail head connects to the RNUP Twyn Rivers Area.
Vista Trail (east of Meadowvale Road and south of Zoo Road)	Trail	Grass/Dirt	1.5km	The north trail head connects close to the Toronto Zoo, parking and transit. The south trail head connects to Mast Trail. A portion of the trail is wheelchair accessible.
Woodland Trail (east of Reesor Road and south of Steeles Avenue)	Trail	Grass/Dirt	4.5km	The north trail head connects to parking and the RNUP Woodlands Area.

Rail Facilities

There are two active and one abandoned rail corridor that cross approximately east-west through the northern portion of the study area, as illustrated in **Figure 3** of **Appendix A**.

A portion of Canadian Pacific (CP) Rail's active line runs between Staines Terminal in Markham and Cherrywood Terminal in Pickering, with rail over road crossings on both Sewell's Road and Meadowvale Road and at-grade crossings on Reesor Road, Beare Road, and Scarborough-Pickering Townline. Vertical clearances for rail-over-road CP Rail crossings located within 500 m of the study watercourse crossings are summarized in **Table 6**.

Canadian National (CN) Rail's line enters the study area west of Sewell's Road at Steeles Avenue and travels southeast towards Plug Hat Road before turning southerly towards Twyn Rivers Drive and following north of that roadway into Pickering. With exception of the road-over-rail crossing on Plug Hat Road, all remaining CN crossings within the study area are at-grade. The abandoned rail corridor parallels the south side of the CP Rail Line.

Abutments from a previous rail-over-road bridge for the Northern Ontario Railway (decommissioned) can be seen south of the existing CP Rail Bridge on Sewell's Road.

Table 6: Vertical Clearances for Rail-Over-Road CP Rail Crossings

Crossing Location	Vertical Clearance	Clear Width of Bridge
Sewell's Road (north of Sewell's Suspension Bridge)*	3.5 m	5.66 m
Meadowvale Road (north of Hillside Bridge)	3.5 m	5.95 m

** - Sewell's Road (Suspension) Bridge itself has overhead vertical clearance of 4.1 m.*

Emergency Access Routes

EMS and Fire Services require access to RNUP when emergency situations arise. Figure 4 in **Appendix A** highlights the locations of Fire and Ambulance Stations that serve RNUP.

Due to load restrictions, Fire Services presently avoids the use of all five study bridges. In addition, the west end of Twyn Rivers Drive features an extremely steep roadway grade climbing to the west (posted signs indicate 30% gradient).

Consequently, the main routes utilized by Fire Services to access locations within and bounding RNUP include Reesor Road, Altona Road, Steeles Avenue, and Highway 2. A CP Rail level crossing intersects Reesor Road, which introduces potential delays for fire vehicles if a train is crossing or waiting on the tracks. It should also be noted that due to narrow road cross-sections and soft shoulders, there is limited

space for emergency vehicles to turn around if blocked at a train crossing. There is a Mutual Aid agreement in place between the City of Toronto and City of Pickering, and as such Fire Services must be able to access the City of Pickering.

Toronto Paramedic Services (TPS) are able to use all five bridges within the study area to gain access to locations within RNUP, however they cannot meet the vertical clearance requirements of the CP Rail crossing on Sewell's Road north of Sewell's Road Bridge and Meadowvale Road north of Hillside Bridge.

The main access routes currently used by TPS include Steeles Avenue, Finch Avenue, Morningside Avenue, and Meadowvale Road. In general, TPS vehicles do not travel through the park unless they are responding to a situation within RNUP. Due to the response process, TPS vehicles are dispatched from various locations within the community and are not necessarily coming from their base station. As a result, vehicular access should be maintained from various directions so as not to delay response times.

Access Routes to Park Amenities

Existing and proposed park amenities are identified within the Rouge Park Management Plan. Amenities located in close proximity to Rouge Park Bridges TMP crossings are identified within Management Area 1, as illustrated in **Figure 3.** Existing and planned parking lots and trail heads are identified in close proximity to both the Old Finch and Hillside Bridges.

Truck Access

It should be noted that Twyn Rivers Drive is marked as no trucks at the west entrance intersection with Sheppard Avenue East, Old Finch Avenue is marked as no trucks between Sewell's Road and Reesor Road, and Meadowvale Road is marked as no trucks north of Old Finch Avenue, continuing along Plug Hat Road to the intersection with Beare Road. The signage at all locations identified is Rb-62, per the Ontario Traffic Manual, Book 5.

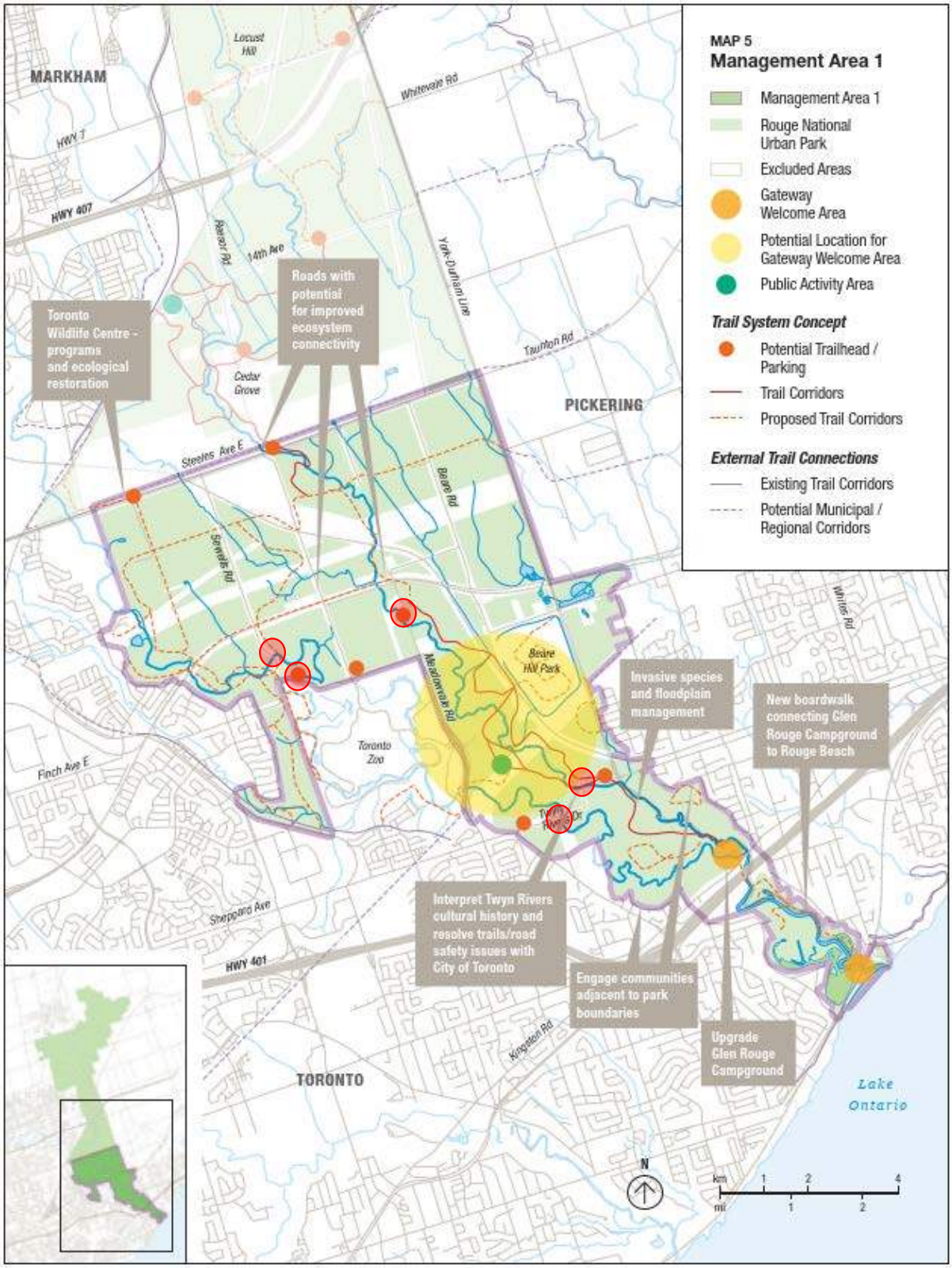


Figure 3: Rouge Park Management Area 1 (taken from the Rouge Management Plan, 2019).

Existing Transportation Design

The following subsections provide an overview of transportation design issues identified within the focussed study areas for each of the study bridges. The limits of the focussed study areas are illustrated on the mapping provided in **Appendix B.**

Vertical and Horizontal Alignment

Existing vertical and horizontal alignments were checked against the TAC Geometric Design Guide for Canadian Road standards, as they apply to rural, lower volume roadways. **Table 7** provides an overview of some of the geometric standards used in review of the roads within RNUP. Design Criteria for each of the study corridors has been provided in **Appendix C**. Note that not meeting standards does not necessarily indicate that the road is unsafe, but rather that site-specific mitigation measures may be required. These could include localized clearing of vegetation, changes to vertical and/or horizontal alignment, introduction of advisory speed limits, use of warning signs and/or putting limits on the types of vehicles using the corridor.

Corridor-specific details are provided in the following sub-sections.

Table 7: Design Criteria Used to Examine Alignments on Study Corridors

Roadway:		Sewell's Road	Old Finch Avenue	Meadowvale Road	Twyn Rivers Drive
Classification		Collector-Residential	Collector-Residential	Collector	Collector-Residential
Posted Speed*		50 km/h	50 km/h	50 km/h	40 km/h
AADT		4,800	8,900	7,200	8,000
Stopping Sight Distance[p] (m)		85	85	85	65
Decision Sight Distance[q] (m)		95	95	95	75
Recommended Minimum Horizontal Curve Radius (m)		150	150	150	130
Rate of Vertical Curvature (K[a])	Crest	11	11	11	7
	Sag	18	18	18	13
Clear Zone (m)		3.5-4.5	4.5-5.0	3.5-4.5	3.5-4.5

[p] Assuming grades of less than 3%.
[q] Assuming grades of less than 3%.

Roadway:	Sewell's Road	Old Finch Avenue	Meadowvale Road	Twyn Rivers Drive
Recommended Minimum Guiderail Length, Not Including End Treatments (m)	24.5	24.0	28.8	N/A

** - excluding local speed reductions at bridges.*

Twyn Rivers Drive

Based on the TAC GDG, the recommended elements for a design speed of 50km/h include a minimum horizontal curve radius of 130 m, a vertical sag with a minimum K-value of 13, and a minimum vertical crest with a K-value of 7. **Table 8** and **Map 1** are to be read in conjunction with each other, indicating locations along Twyn Rivers Drive that do not comply with current TAC design guidelines based on overall posted speed for the corridor. Existing and proposed measures to mitigate the presence of sub-standard elements are also identified in Table 8.

In addition, the west end of Twyn Rivers Drive features an extremely steep roadway grade climbing to the west (posted signs indicate 30% gradient).

Table 8: Identification of Twyn Rivers Drive Segments that Do Not Meet Current TAC Geometric Design Standards Based on a Design Speed of 50 km/h

LOCATION	HORIZONTAL CURVE DEFICIENCY	VERTICAL CURVE DEFICIENCY	EXISTING MITIGATION	POTENTIAL MITIGATION
395-296m West of Stotts' Bridge	--	K=6.2 (Crest) (<1 below guideline)	• Winding road sign • Steep hill sign	• Consider flatting vertical curve to meet TAC Standards as part of a future reconstruction project.
291-245m West of Stotts' Bridge	R=52.8m (~77 m below guideline)	--	• None	• Install 'Turn Ahead' sign (Wa-101), Advisory Speed Sign (estimated as 30 km/h) and Chevron Alignment Signs. • If collision frequencies warrant, consider road realignment. • Between 2015-2019, 24 collisions have occurred near Sheppard Ave. East.

LOCATION	HORIZONTAL CURVE DEFICIENCY	VERTICAL CURVE DEFICIENCY	EXISTING MITIGATION	POTENTIAL MITIGATION
234-197m West of Stotts' Bridge	R=71.8m (~58 m below guideline)	--	• Winding road sign	• Install 'Turn Ahead' sign (Wa-101), Advisory Speed Sign (estimated as 30 km/h) and Chevron Alignment Signs. • If collision frequencies warrant, consider road realignment. • Between 2015-2019, 24 collisions have occurred near Sheppard Ave. East.
211-81m West of Stotts Bridge	--	K=6.3 (Sag) (~ 7 below guideline)	• Advised speed is signed at 40 km/h near bridge structure	• Flatten vertical curve to meet TAC Standards as part of a future reconstruction project. • Confirm appropriateness of Advised Speed.
266-353m East of Stotts Bridge	--	K=5.2 (Sag) (~8 below guideline)	• "SLOW" pavement marking	• Flatten vertical curve to meet TAC Standards as part of a future reconstruction project. • Consider locally reducing advised speed to 10km/h
272-308m East of Stotts Bridge	R=21.7m (~110 m below guideline)	--	• Advised speed is signed at 20km/h • Turn warning sign is posted • Chevron alignment signs are present • Checkerboard (one direction) sign is posted	• If collision frequencies warrant, consider road realignment. • Between 2015-2019, 24 collisions have occurred near Sheppard Ave. East.

LOCATION	HORIZONTAL CURVE DEFICIENCY	VERTICAL CURVE DEFICIENCY	EXISTING MITIGATION	POTENTIAL MITIGATION
155-105m South of Maxwell's Bridge	R=75.1m (~ 55 m below guideline)	--	• Advised speed is signed at 40km/h • "SLOW" pavement marking	• Confirm appropriateness of Advised Speed. • If collision frequencies warrant, consider road realignment. • Between 2015-2019, 24 collisions have occurred near Sheppard Ave. East.
169-74m South of Maxwell's Bridge	--	K=2.7 (Crest) (~ 4 below guideline)	• "SLOW" pavement marking	• Consider locally reducing advised speed to 20km/h. • Consider addition of a 'Vertical Visibility Constraint' sign (MUTCD Wa-42)
85-25m South of Maxwell's Bridge	R=98.2m (~30 m below guideline)	--	• None	• Complete ball-bank testing to determine appropriate Advisory Speed. • If collision frequencies warrant, consider road realignment. • Between 2015-2019, 24 collisions have occurred near Sheppard Ave. East.
74-9m South of Maxwell's Bridge	--	K=5.1 (Sag) (~ 8 below guideline)	• None	• Flatten vertical curve to meet TAC Standards as part of a future reconstruction project. • Consider locally reducing advised speed to 10km/h

LOCATION	HORIZONTAL CURVE DEFICIENCY	VERTICAL CURVE DEFICIENCY	EXISTING MITIGATION	POTENTIAL MITIGATION
141-76m North of Maxwell's Bridge	R=27.8m (~100 m below guideline)	--	• Advisory Speed signed at 20km/h • Turn warning sign • Chevron alignment signs are present • Checkerboard (one direction) sign	• If collision frequencies warrant, consider road realignment. • Between 2015-2019, 24 collisions have occurred near Sheppard Ave. East.

ROUGE PARK TMP EA

NON-COMPLIANT CURVES
MAP 1
TWYN RIVERS DRIVE

- Non-compliant Horizontal Curve
- Non-compliant Vertical Curve
- Both Horizontal and Vertical Non-compliant Curve
- Railway

1:4,000

0 20 40 100 160 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, CITY OF TORONTO

MAP CREATED BY: GSI
MAP CHECKED BY: DK
MAP PROJECTION: NAD 1983 UTM Zone 17N

DILLON CONSULTING

PROJECT: 191501
STATUS: DRAFT
DATE: 2021-06-21

FILE LOCATION: G:\2019\191501 - Rouge Park TMP EA\mxd\Internal\Non-Compliant Curves.mxd

Sewell's Road

Per the guidance provided in the TAC GDG, a road with a design speed of 60 km/h should have a minimum horizontal curve radius of 150 m, vertical sag curves with a minimum K-value of 18 and vertical crest curves with a minimum K-value of 11. **Map 2** and **Table 9** are to be read in conjunction with each other, indicating locations along Sewell's Road that do not comply with the TAC GDG based on a design speed of 60 km/h. Existing and proposed measures to mitigate the presence of sub-standard elements are also identified in Table 9.

Table 9: Identification of Sewell's Road Segments that Do Not Meet Current TAC Geometric Design Standards Based on a Design Speed of 60 km/h

LOCATION	HORZONTAL CURVE DEFICIENCY	VERTICAL CURVE DEFICIENCY	EXISTING MITIGATION	POTENTIAL MITIGATION
77-175m South of Rail Bridge	--	K=16.2 (Sag) (~2 below guideline)	• None	• Consider locally reducing advised speed to ~ 40km/h • Flatten vertical curve to meet TAC Standards as part of a future reconstruction project.
184-134m North of Sewell's Rd. Bridge	R=70.9m (~80 m below guideline)	--	• Advised speed locally signed at 40km/h • Sharp turn warning sign • Chevron alignment signs are present	• Consider locally reducing advised speed to 30km/h. • If collision frequencies warrant, consider road realignment. • Between 2015-2019, 52 collisions have occurred between Steeles Ave. and Old Finch Ave.
108-65m North of Sewell's Rd. Bridge	--	K=6.9 (Crest) (~4 below guideline)	• Advisory signs recommend 20 km/h operating speed at bridge	• Flatten vertical curve to meet TAC Standards as part of a future reconstruction project. • Consider addition of a 'Vertical Visibility Constraint' sign (MUTCD Wa-42)

LOCATION	HORZONTAL CURVE DEFICIENCY	VERTICAL CURVE DEFICIENCY	EXISTING MITIGATION	POTENTIAL MITIGATION
23-50m South of Sewell's Rd. Bridge	R=46.2m (~100 m below guideline)	--	• Advisory signs recommend 20 km/h operating speed at bridge	• If collision frequencies warrant, consider road realignment. • Between 2015-2019, 52 collisions have occurred between Steeles Ave. and Old Finch Ave.
61-101.5m South of Sewell's Rd. Bridge	--	K=4.9 (Sag) (~ 13 below guideline)	• None	• Flatten vertical curve to meet TAC Standards as part of a future reconstruction project. • Consider locally reducing advised speed to 10 km/h.
88-124m South of Sewell's Rd. Bridge	R=79.5m (~70 m below guideline)	--	• None	• Install 'Turn Ahead' sign (Wa-101), Advisory Speed Sign (estimated as 30 km/h) and Chevron Alignment Signs. • If collision frequencies warrant, consider road realignment. • Between 2015-2019, 52 collisions have occurred between Steeles Ave. and Old Finch Ave.
162-181.5m South of Sewell's Rd. Bridge	R=102.3m (~ 50 m below guideline)	--	• None	• Consider adding Advisory Speed signage (estimated at 40 km/h) • If collision frequencies warrant, consider road realignment. • Between 2015-2019, 52 collisions have occurred between Steeles Ave. and Old Finch Ave.

LOCATION	HORZONTAL CURVE DEFICIENCY	VERTICAL CURVE DEFICIENCY	EXISTING MITIGATION	POTENTIAL MITIGATION
286.5-306m South of Sewell's Bridge	R=98.4m (~ 50 m below guideline)	--	• None	• Complete ball-bank testing and determine appropriate Advisory Speed • If collision frequencies warrant, consider road realignment. • Between 2015-2019, 52 collisions have occurred between Steeles Ave. and Old Finch Ave.
245-347m South of Sewell's Rd. Bridge	--	K=8.3 (Sag) (~10 below guideline)	• None	• Flatten vertical curve to meet TAC Standards as part of a future reconstruction project. • Consider locally reducing advised speed to 20km/h

ROUGE PARK TMP EA

NON-COMPLIANT CURVES
MAP 2
SEWELLS ROAD

- Non-compliant Horizontal Curve
- Non-compliant Vertical Curve
- Both Horizontal and Vertical Non-compliant Curve
- Railway

DILLON CONSULTING

Meadowvale Road

Based on the TAC GDG, the recommended design criteria for a road with a design speed of 60 km/h include minimum horizontal curves with a radius of 150 m, minimum vertical sag curves with a K-value of 18, and minimum vertical crest curves with a K-value of 11. Locations along Meadowvale Road that do not meet these minimum guidelines are identified in **Map 3** and **Table 10**.

Table 10: Identification of Meadowvale Road Segments that Do Not Meet Current TAC Geometric Design Standards Based on a Design Speed of 60 km/h

LOCATION	HORZONTAL CURVE DEFICIENCY	VERTICAL CURVE DEFICIENCY	EXISTING MITIGATION	POTENTIAL MITIGATION
188-119m North of Rail Bridge	--	K=5.2 (Crest) (~6 below guideline)	• None	• Consider addition of a 'Vertical Visibility Constraint' sign (MUTCD Wa-42)Consider locally reducing advised speed to 30km/h • Flatten vertical curve to meet TAC Standards as part of a future
72-134.5m North of Rail Bridge	R=46.6m (Spiral Curve) (~100 m below guideline)	--	• Advisory signage recommends 20km/h operating speed • Turn warning sign • Chevron alignment signs are present • Checkerboard (one direction) sign	• If collision frequencies warrant, consider road realignment. • Between 2015-2019, 17 collisions have occurred near Old Finch Ave. and Plug Hat Rd.
102.6(N)-8.5m(S) of Rail Bridge	--	K=14 (Sag) (~ 4 below guideline)	• None	• Potentially introduce advisory speed signs • Flatten vertical curve to meet TAC Standards as part of a future reconstruction project.

LOCATION	HORZONTAL CURVE DEFICIENCY	VERTICAL CURVE DEFICIENCY	EXISTING MITIGATION	POTENTIAL MITIGATION
27-49m South of Rail Bridge	--	K=9.9 (Crest) (~ 1 below guideline)	• None	• Potentially introduce advisory speed signs • Consider addition of a 'Vertical Visibility Constraint' sign (MUTCD Wa-42)
245-302m South of Rail Bridge	--	K=6.6 (Crest) (~ 5 below guideline)	• None	• Flatten vertical curve to meet TAC Standards as part of a future reconstruction project. • Consider locally reducing advised speed to 30km/h • Consider addition of a 'Vertical Visibility Constraint' sign (MUTCD Wa-42)
248-138m North of Hillside Bridge	--	K=11 (Sag) (~ 7 below guideline)	• None	• Flatten vertical curve to meet TAC Standards as part of a future reconstruction project. • Consider locally reducing advised speed to 30km/h
14-43m South of Hillside Bridge	--	K=4.1 (Sag) (~ 14 below guideline)	• Advised speed towards structure is 15km/h	• Flatten vertical curve to meet TAC Standards as part of a future reconstruction project. • Consider locally reducing advised speed to 10km/h

LOCATION	HORZONTAL CURVE DEFICIENCY	VERTICAL CURVE DEFICIENCY	EXISTING MITIGATION	POTENTIAL MITIGATION
69.5-120m South of Hillside Bridge	--	K=8.2 (Crest) (~ 3 below guideline)	• None	• Flatten vertical curve to meet TAC Standards as part of a future reconstruction project. • Consider locally reducing advised speed to 40km/h • Consider addition of a 'Vertical Visibility Constraint' sign (MUTCD Wa-42)

ROUGE PARK TMP EA

NON-COMPLIANT CURVES
MAP 3
MEADOWVALE ROAD/PLUG HAT ROAD

- Non-compliant Horizontal Curve
- Non-compliant Vertical Curve
- Both Horizontal and Vertical Non-compliant Curve
- Railway

1:4,000

0 20 40 80 120 160 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY MARK CITY OF TORONTO

MAP CREATED BY: GM
MAP CHECKED BY: DK
MAP PROJECTION: NAD 1983 UTM Zone 17N

DILLON CONSULTING

PROJECT: 191924
STATUS: DRAFT
DATE: 2021-09-21

Old Finch Avenue

Map 4 and **Table 11** are to be read in conjunction with each other, identifying locations along Old Finch Avenue that do not comply with the TAC GDG. Based on the TAC GDG, the recommended design criteria for a road with a design speed of 60 km/h include minimum horizontal curves with a radius of 150 m, minimum vertical sag curves with a K-value of 18, and minimum vertical crest curves with a K-value of 11.

Table 11: Identification of Old Finch Avenue Segments that Do Not Meet Current TAC Geometric Design Standards Based on a Design Speed of 60 km/h

LOCATION	HORZONTAL CURVE DEFICIENCY	VERTICAL CURVE DEFICIENCY	EXISTING MITIGATION	POTENTIAL MITIGATION
268-233m West of Milne Bridge	--	K=7.5 (Sag) (~ 10 below guideline)	• None	• Flatten vertical curve to meet TAC Standards as part of a future reconstruction project. • Consider locally reducing advised speed to 20km/h
166-112m West of Milne Bridge	--	K=7.3 (Crest) (~ 4 below guideline)	• None	• Flatten vertical curve to meet TAC Standards as part of a future reconstruction project. • Consider locally reducing advised speed to 40km/h
151.5-132m West of Milne Bridge	R=74.5m (~80 m below guideline)	--	• None	• Install 'Turn Ahead' sign (Wa-101), Advisory Speed Sign (estimated as 30 km/h) and Chevron Alignment Signs. • If collision frequencies warrant, consider road realignment.

LOCATION	HORZONTAL CURVE DEFICIENCY	VERTICAL CURVE DEFICIENCY	EXISTING MITIGATION	POTENTIAL MITIGATION
82-18m West of Milne Bridge	R=82.1m (~70 m below guideline)	--	• Checkerboard (one direction) sign • Traffic signals to control single lane crossing of the structure • Chevron Alignment signs	• If collision frequencies warrant, consider road realignment.
62(E)-50.2m(W) of Milne Bridge	--	K=9.4 (Sag) (~ 10 below guideline)	• None	• Flatten vertical curve to meet TAC Standards as part of a future reconstruction project. • Consider locally reducing advised speed to 30km/h
32-40m East of Milne Bridge	R=8.5m (~ 140 m below guideline)	--	• Checkerboard (one direction) sign • Traffic signals to control single lane crossing of the structure • Chevron Alignment signs	• Further investigate opportunities to use advisory signage and pavement markings to improve safe operations at this location • If collision frequencies warrant, consider road realignment.
207-260m East of Milne Bridge	R=75.2m (~ 80 m below guideline)	--	• None	• Install 'Turn Ahead' sign (Wa-101), Advisory Speed Sign (estimated as 30 km/h) and Chevron Alignment Signs. • If collision frequencies warrant, consider road realignment.

LOCATION	HORZONTAL CURVE DEFICIENCY	VERTICAL CURVE DEFICIENCY	EXISTING MITIGATION	POTENTIAL MITIGATION
261-344m East of Milne Bridge	--	K=11.3 (Sag) (~ 7 below guideline)	• None	• Flatten vertical curve to meet TAC Standards as part of a future reconstruction project. • Consider locally reducing advised speed to 30km/h

ROUGE PARK TMP EA

NON-COMPLIANT CURVES
MAP 4
OLD FINCH AVENUE

Non-compliant Horizontal Curve
Non-compliant Vertical Curve
Both Horizontal and Vertical Non-compliant Curve

1:4,000

0 20 40 80 120 160 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, CITY OF TORONTO

MAP CREATED BY: GH
MAP CHECKED BY: DR
MAP PROJECTION: NAD 1983 UTM Zone 17N

DILLON CONSULTING

PROJECT: 191924
STATUS: DRAFT
DATE: 2021-06-21

Sight Distances

Study Bridge Locations

The TAC GDG provides guidance related to the horizontal and vertical sight distances required to make critical decisions and maneuvers based on operating speed. The following sections outline the sight distance checks completed on approach to each of the study watercourse crossings and road under rail bridges. For single lane bridges, the minimum stopping sight distance requirements were extended to the far side of the bridge to check if drivers could see approaching vehicles on the far side of the bridge with adequate time to stop on the near side.

Hillside Bridge

Vertical and horizontal sight distances were checked for the approaches and departures to/from the Hillside Bridge, with sight distance diagrams provided in **Appendix D**. Stopping sight distances are identified in the Design Criteria provided in Appendix C. No deficiencies were identified.

CP Rail Bridge over Meadowvale Road

Vertical and horizontal sight distances were checked for the approaches and departures to/from the Hillside Bridge, with sight distance diagrams provided in **Appendix D**. Stopping sight distances are identified in the Design Criteria provided in Appendix C. No deficiencies were identified.

Milne Bridge

Vertical and horizontal sight distances were checked for the approaches and departures to/from Milne Bridge, with sight distance diagrams provided in **Appendix D**. Stopping sight distances for the posted speed are identified in the Design Criteria provided in Appendix C.

This location currently uses a signal to manage two way flow across the bridge. Horizontal and vertical sight distances to the signal heads are sufficient. However, on both the eastbound and westbound approaches there are insufficient sightlines to the bridge deck to allow approaching vehicles to see a vehicle that may have accessed the bridge erroneously. This can be partially mitigated through implementation of one or more of the following measures: removing vegetation and regrading in proximity to the crossing and/or providing appropriate advisory signage.

Additionally, south of the bridge armour stone have been installed near the parking area in line with the bridge that can pose a hazard to vehicles at night. These stones should be marked with reflectors.

CP Rail Bridge Over Sewell's Road

Vertical and horizontal stopping sight distances were checked for the approaches and departures to/from the CP Rail Bridge over Sewell's Road, with sight distance diagrams provided in **Appendix D**. Stopping sight distances are identified in the Design Criteria provided in Appendix C. No deficiencies were identified.

Sewell's Road Bridge

Vertical and horizontal stopping sight distances were checked for the approaches and departures to/from Sewell's Road Bridge, with sight distance diagrams provided in **Appendix D**.

Stopping sight distances for the posted speed on Sewell's Road are identified in the Design Criteria provided in Appendix C. Assuming vehicles are travelling at the posted speed, deficiencies were found on the northbound approach to the bridge, failing to meet horizontal sight lines due to the curvature of the road. Advisory Signage has been added on the bridges approaches to reduce operating speeds to 20 km/h and thereby reduce sight distances. Despite the advisory signage which would reduce the stopping distance to 20 m, a driver's view of vehicles on the far side of the bridge would still be obscured by existing trees.

As a result, some clearing of vegetation on the inside of the curve is recommended. Potential minor deficiencies in horizontal sight distances were identified for the southbound approach to the bridge. Partial clearing on the inside of the curve is recommended.

Stotts' Bridge

Vertical and horizontal sight distances were checked for the approaches and departures to/from Stotts' Bridge, with sight distance diagrams provided in **Appendix D**. Stopping sight distances based on the posted speed are identified in the Design Criteria provided in Appendix C. No deficiencies were identified.

There's a bend between Sheppard Avenue and Stotts Bridge that features a curve of 45m radius and two curves of 78m radius, all three below the needed 100m radius. Further, there is vegetation and topography in the curve that prevents the required sightlines along the road. This vegetation will need to be cleared and warning signs put up ahead of the bend. This condition is worsened by the extremely steep roadway grade (posted signs indicate a 30% gradient).

Maxwell's Bridge

Vertical and horizontal sight distances were checked for the approaches and departures to/from Maxwell's Bridge, with sight distance diagrams provided in **Appendix D**. Stopping sight distances are identified in the Design Criteria provided in Appendix C.

On the southbound approach the sight distance to the bridge deck meets minimum requirements for both horizontal and vertical sightlines. However, there's a gap in the approach guardrails for pedestrian access to a trail, and this location does not meet the horizontal sightline requirement. On the northbound approach, the bridge does not meet the minimum standard for horizontal sightlines as a result of vegetation. Issues with sightlines to the bridge can be mitigated through use of advisory speed limits and minor vegetation clearing.

Active Transportation Facility Crossings

There are a number of existing Parks Canada trail crossings/junctions with road corridors within the boundaries of RNUP, including:

- Eight (8) intersections with of Twyn Rivers Drive adjacent to Little Rouge River, with two (2) apparent roadway crossings.
- Shared use of the road corridor near Maxwell's Bridge on Twyn Rivers Drive
- Two (2) formal trail entrances on Meadowvale Road adjacent to the Toronto Zoo, and one (1) more north of the Little Rouge River
- Two (2) trail connections on Finch Avenue
- One (1) entrance on Plug Hat Road (just north of the Little Rouge River)

As previously noted, Beare Road, Plug Hat Road and the northern portion of Meadowvale Road have also been identified as part of a 'Signed Cycle Route' with connections to the on-road cycling lanes on Meadowvale Road adjacent to the Toronto Zoo.

Dillon has reviewed the sight distances of the the existing crossings and facilities noted above, with outcomes of that review summarized in **Table 12**. Note that we have not reviewed the safety implications of future crossings, as this review should be completed as part of the detailed design process.

Table 12: Assessment of Sight Distances on Approach to Trail Crossings of the Study Corridors.

Crossing	Location	Meets Vertical Sightline	Meets Horizontal Sightline	Potential Solutions
East of Stotts Bridge	280m East of Stotts Bridge	Yes	No	Relocate trail crossing, clear brush, implement speed reductions, provide advance warning signage, consider PXO or signalization.
Mast Trail	17.5m South of Maxwell's Bridge	No	Yes	Relocate trail crossing, provide speed reduction and advance warning signs
North of Maxwell Bridge	30.0m North of Maxwell's Bridge	Yes	No	Relocate crossing

Crossing	Location	Meets Vertical Sightline	Meets Horizontal Sightline	Potential Solutions
Orchard Trail	90.0m North of Maxwell's Bridge	Yes	No	Relocate or close crossing.
Orchard Trail	47m North of Hillside Bridge	Yes	No	Relocate or close crossing.
Finch Meander Trail	15m South of Bailey Bridge	Yes	Yes	Note: Trail loop is located in close proximity to Old Finch Avenue but does not cross it.

Future Conditions

Assessment of Alternative Linear Active Transportation Facilities

In support of the City of Toronto's modal split objectives, the desire to encourage active lifestyles for its citizens, and the RNUP's role in providing access for recreational cycling and hiking, Dillon has completed a review of existing and proposed on-road cycling facilities within the park's boundaries. This work has been completed in accordance with Ontario Traffic Manual (OTM) Book 18. The following subsections identify recommended cycling facility types for each of the study roadways.

It should be noted that cycling accommodation at all bridges in the study is currently achieved using a "share the road" approach, typically requiring single file alignment.

Cycling routes identified in the Toronto Cycling Map were described above. (Refer to **Figure 2**.)

Tywn Rivers Drive

Alternative cycling facility types were assessed for use along Twyn Rivers Drive using OTM Book 18. An overview of the alternatives assessment is provided in Table 13. Based on this assessment, implementation of paved shoulders along the length of Twyn Rivers Drive to accommodate cyclists is recommended.

Table 13: Cycling Facility Assessment for Twyn Rivers Drive Based on OTM Book 18.

Consideration		Description of Existing Condition	Suitable Cycling Facility Types			
			Shared Lane	Paved Shoulder	Cycling Lane	Cycle Track
Facility type recommended through previous study		None				
Desired Facility	Traffic Volume	8,000		X	X	
	Vehicle Operating Speed	50km/h				
Table 3.1 – 85th Percentile Motor Vehicle Operating Speeds		Moderate (50km/h)		X		
Table 3.2 – Motor Vehicle Volumes		Moderate Volume: where two-way daily average volume is 5,000 vpd on a two-lane road			X	
Table 3.3 – Function of Street or Road or Highway		Both mobility and access roads such as minor collectors plus similar roads and streets		X		
Table 3.4 – Vehicle Mix		N/A				
Table 3.5 – Collision History		No history of cyclist collision along corridor				
Table 3.6 – Available Space		Sight distance is limited at intersections, crossing locations or where cyclists and motor vehicles share limited road space.				X
Table 3.7 – Costs		N/A				
Table 3.8 – Anticipated Users in Terms of Skill and Trip Purpose		Novice cyclists (recreational / beginner utilitarian)		X		
Table 3.9 – Level of Bicycle Use		Low bicycle volumes (< 10 cyclists per hour)	X			
Table 3.10 – Function of Route within the Bicycle Facility Network		New route provides access to a neighbourhood, suburb or other locality			X	
Table 3.11 – Type of Roadway Improvement Project		Reconstruction		X		
Table 3.12 – On-Street Parking (for urban situations)		Parallel on-street parking is permitted in localized areas along the route	X			

Consideration	Description of Existing Condition	Suitable Cycling Facility Types			
		Shared Lane	Paved Shoulder	Cycling Lane	Cycle Track
Table 3.13 – Frequency of Intersections (for urban situations)	Limited intersection and driveway crossings are present along the route	X			
Preferred Option			X		

Sewell's Road

Alternative cycling facility types were assessed for use along Sewell's Road using OTM Book 18. An overview of the alternatives assessment is provided in Table 14. Based on this assessment, implementation of paved shoulders along the length of Sewell's Road to accommodate cyclists is recommended for consideration in future road reconstruction projects. Ahead of road reconstruction, shared lanes are identified as being a suitable solution.

Table 14: Cycling Facility Assessment for Sewell's Road Based on OTM Book 18.

Consideration		Description of Existing Condition	Suitable Cycling Facility Types			
			Shared Lane	Paved Shoulder	Cycling Lane	Cycle Track
Facility type recommended through previous study		None				
Desired Facility	Traffic Volume	4,800	X	X		
	Vehicle Operating Speed	60km/h				
Table 3.1 – 85th Percentile Motor Vehicle Operating Speeds		Moderate (60 km/h)		X		
Table 3.2 – Motor Vehicle Volumes		Moderate Volume: where two-way daily average volume is 3,000 vpd on a two-lane road			X	
Table 3.3 – Function of Street or Road or Highway		Both mobility and access roads such as minor collectors plus similar roads and streets		X		
Table 3.4 – Vehicle Mix		N/A				

Consideration	Description of Existing Condition	Suitable Cycling Facility Types			
		Shared Lane	Paved Shoulder	Cycling Lane	Cycle Track
Table 3.5 – Collision History	No history of cyclist collision along corridor				
Table 3.6 – Available Space	Sight distance is limited at intersections, crossing locations or where cyclists and motor vehicles share limited road space.				X
Table 3.7 – Costs	N/A				
Table 3.8 – Anticipated Users in Terms of Skill and Trip Purpose	Novice cyclists (recreational / beginner utilitarian)		X		
Table 3.9 – Level of Bicycle Use	Low bicycle volumes (< 10 cyclists per hour)	X			
Table 3.10 – Function of Route within the Bicycle Facility Network	New route provides access to a neighbourhood, suburb or other locality			X	
Table 3.11 – Type of Roadway Improvement Project	Reconstruction		X		
Table 3.12 – On-Street Parking (for urban situations)	Parallel on-street parking is permitted in localized areas along the route	X			
Table 3.13 – Frequency of Intersections (for urban situations)	Limited intersection and driveway crossings are present along the route	X			
Preferred Option			X		

Meadowvale Road (north of Old Finch Avenue)

Alternative cycling facility types were assessed for use along Meadowvale Road using OTM Book 18. An overview of the alternatives assessment is provided in Table 15. Based on this assessment, implementation of paved shoulders along Meadowvale Road (north of Old Finch Avenue) to accommodate cyclists is recommended as part of future road reconstruction projects. This cycling facility would extend onto Plug Hat Road and continue north on Beare Road to Steeles Avenue East. Meadowvale Road is currently a signed route with shared lanes.

Table 15: Cycling Facility Assessment for Meadowvale Road Based on OTM Book 18.

Consideration		Description of Existing Condition	Suitable Cycling Facility Types			
			Shared Lane	Paved Shoulder	Cycling Lane	Cycle Track
Facility type recommended through previous study		Signed Route	X	X		
Desired Facility	Traffic Volume	7,200		X	X	
	Vehicle Operating Speed	60km/h				
Table 3.1 – 85th Percentile Motor Vehicle Operating Speeds		Moderate (60km/h)		X		
Table 3.2 – Motor Vehicle Volumes		Moderate Volume: where two-way daily average volume is 5,400 vpd on a two-lane road			X	
Table 3.3 – Function of Street or Road or Highway		Both mobility and access roads such as minor collectors plus similar roads and streets		X		
Table 3.4 – Vehicle Mix		N/A				
Table 3.5 – Collision History		No history of cyclist collision along corridor				
Table 3.6 – Available Space		Sight distance is limited at intersections, crossing locations or where cyclists and motor vehicles share limited road space.				X
Table 3.7 – Costs		N/A				
Table 3.8 – Anticipated Users in Terms of Skill and Trip Purpose		Novice cyclists (recreational / beginner utilitarian)		X		
Table 3.9 – Level of Bicycle Use		Low bicycle volumes (< 10 cyclists per hour)	X			
Table 3.10 – Function of Route within the Bicycle Facility Network		New route provides access to a neighbourhood, suburb or other locality			X	
Table 3.11 – Type of Roadway Improvement Project		Reconstruction		X		

Consideration	Description of Existing Condition	Suitable Cycling Facility Types			
		Shared Lane	Paved Shoulder	Cycling Lane	Cycle Track
Table 3.12 – On-Street Parking (for urban situations)	Parallel on-street parking is permitted in localized areas along the route	X			
Table 3.13 – Frequency of Intersections (for urban situations)	Numerous low volume driveways or unsignalized intersections are encountered			X	
Preferred Option			X		

Old Finch Avenue

Alternative cycling facility types were assessed for use along Old Finch Avenue using OTM Book 18. An overview of the alternatives assessment is provided in Table 16. Based on this assessment, implementation of either a shared lane or addition of a paved shoulder along the length of Old Finch Avenue to accommodate cyclists is recommended. Given the roadway geometry and limited sight distances identified along Old Finch Road, paved shoulders are recommended. Ahead of a road reconstruction project being completed which would include the addition of these paved shoulders, shared lanes are a suitable solution.

Table 16: Cycling Facility Assessment for Old Finch Avenue Based on OTM Book 18.

Consideration		Description of Existing Condition	Suitable Cycling Facility Types			
			Shared Lane	Paved Shoulder	Cycling Lane	Cycle Track
Facility type recommended through previous study		None				
Desired Facility	Traffic Volume	8,900		X	X	
	Vehicle Operating Speed	60km/h				
Table 3.1 – 85th Percentile Motor Vehicle Operating Speeds		Moderate (60km/h)		X		
Table 3.2 – Motor Vehicle Volumes		Moderate Volume: where two-way daily average volume is 7,000 vpd on a two-lane road			X	

Consideration	Description of Existing Condition	Suitable Cycling Facility Types			
		Shared Lane	Paved Shoulder	Cycling Lane	Cycle Track
Table 3.3 – Function of Street or Road or Highway	Both mobility and access roads such as minor collectors plus similar roads and streets		X		
Table 3.4 – Vehicle Mix	N/A				
Table 3.5 – Collision History	No history of cyclist collision along corridor				
Table 3.6 – Available Space	Sight distance is limited at intersections, crossing locations or where cyclists and motor vehicles share limited road space.				X
Table 3.7 – Costs	N/A				
Table 3.8 – Anticipated Users in Terms of Skill and Trip Purpose	Novice cyclists (recreational / beginner utilitarian)		X		
Table 3.9 – Level of Bicycle Use	Low bicycle volumes (< 10 cyclists per hour)	X			
Table 3.10 – Function of Route within the Bicycle Facility Network	New route provides access to a neighbourhood, suburb or other locality			X	
Table 3.11 – Type of Roadway Improvement Project	Reconstruction		X		
Table 3.12 – On-Street Parking (for urban situations)	Parallel on-street parking is permitted in localized areas along the route	X			
Table 3.13 – Frequency of Intersections (for urban situations)	Limited intersection and driveway crossings are present along the route	X			
Preferred Option		X	X		

APPENDIX A

EXISTING TRANSPORTATION FACILITIES

ROUGE PARK BRIDGES TMP

EXISTING NETWORK

- Pedestrian Crossover
- Flashing Beacon
- Traffic Signal

RoW Width and Road Class

- 36 m Arterial
- 20 m Arterial
- Arterial
- 36 m Collector
- 33 m Collector
- 20 m Collector
- 12 m Collector
- Collector
- 20 m Local
- Local

- Study Area
- Railway
- Municipal Boundary
- Rouge Park Boundary
- Water Body

1:35,000

0 250 500 1,000 1,500 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, CITY OF TORONTO

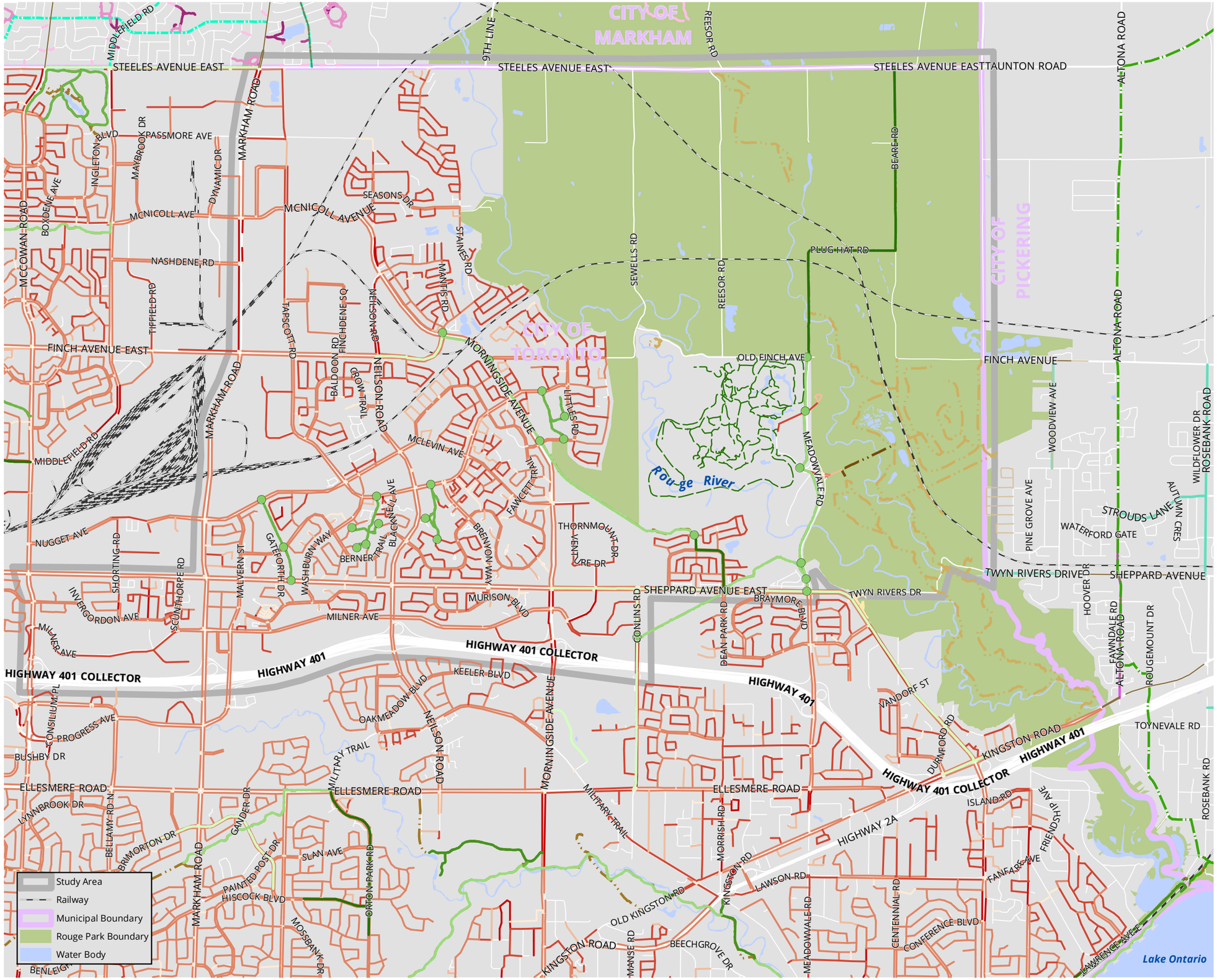
MAP CREATED BY: GM
MAP CHECKED BY: DK
MAP PROJECTION: NAD 1983 UTM Zone 17N

DILLON CONSULTING

PROJECT: 191924

DATE: 2020-04-28

FILE LOCATION: I:\GIS\191924 - Rouge Park TMP EA\mxd\TMP\Existing Network Map.mxd



ROUGE PARK BRIDGES TMP

EXISTING ACTIVE TRANSPORTATION

- Trail Entrance (City of Toronto)
- Toronto Zoo Trail
- Existing Sidewalk on Both Sides
- Existing Sidewalk on One Side

Cycle Tour Route (Region of Durham)

- Cycle Tour Route

Existing Bicycle Infrastructure (Region of Durham)

- Existing Municipal Cycling Network
- Existing Primary Cycling Network

Existing Bicycle Infrastructure (City of Toronto)

- Bike Lanes
- Major Multi-use Pathway
- Minor Multi-use Pathway
- Park Roads Cycling Connections
- Signed Routes

Existing Pedestrian Infrastructure (City of Toronto)

- City Walkway
- Partial Sidewalk on One Side
- Sidewalk on Both Sides
- Sidewalk on One Side
- Sidewalk on One Side and Partially on Other Side

Rouge Park Trail

- Gravel
- Grass/Dirt
- Trail (Unknown)
- Hard Surface Trail

Trail (City of Markham)

- Unknown
- Ashphalt
- Concrete
- Gravel

Bike Path (Region of York)

- Bike Path (Unknown Material)

1:35,000

0 250 500 1,000 1,500 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, CITY OF TORONTO

MAP CREATED BY: GM
MAP CHECKED BY: DK
MAP PROJECTION: NAD 1983 UTM Zone 17N

DILLON CONSULTING

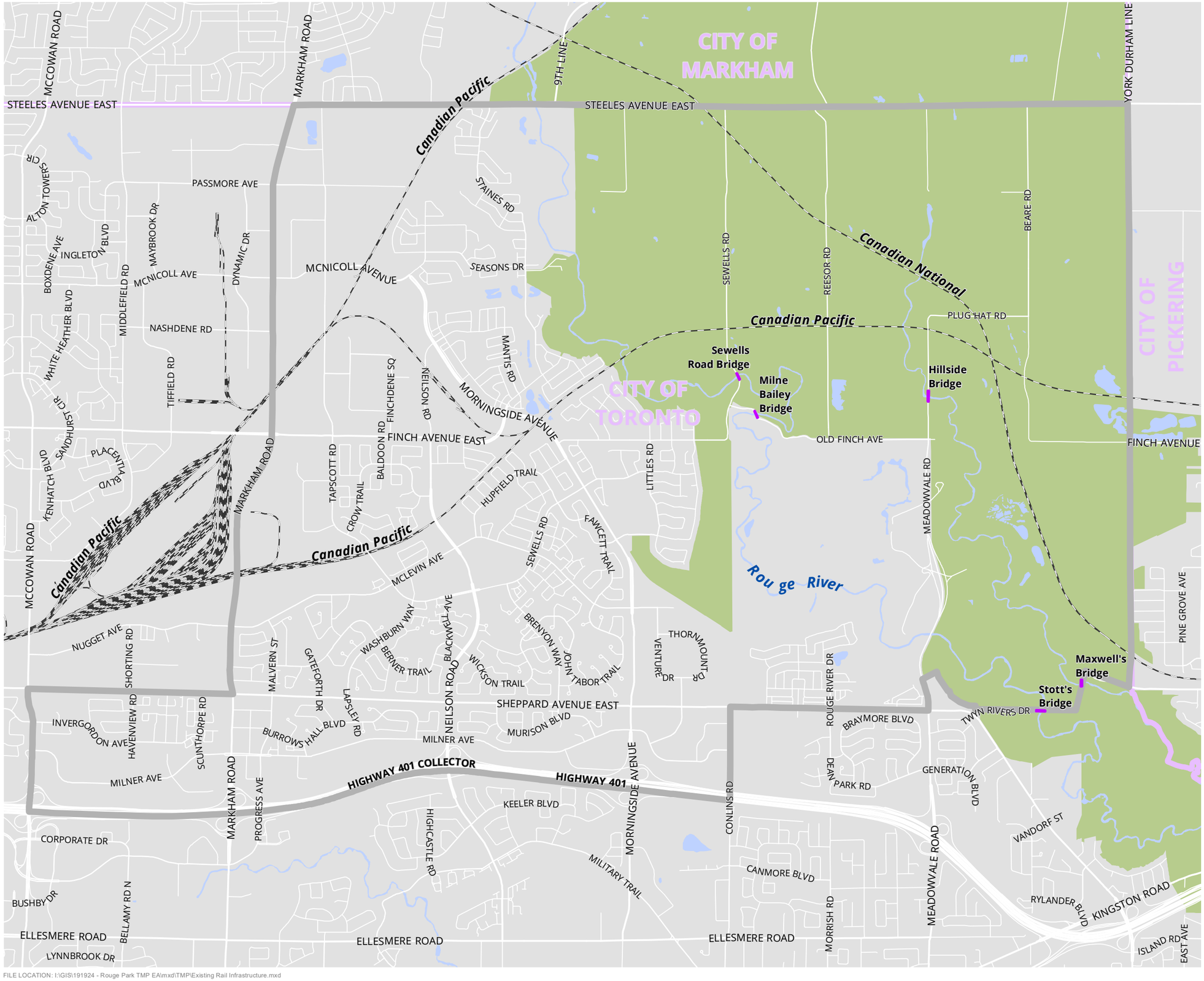
PROJECT: 191924

DATE: 2020-04-28

FILE LOCATION: I:\GIS\191924 - Rouge Park TMP EA\mxd\TMP\Existing Active Transportation.mxd

ROUGE PARK BRIDGES TMP

EXISTING RAIL INFRASTRUCTURE



- Study Area
- Bridge Location
- Railway
- Municipal Boundary
- Rouge Park Boundary
- Water Body

1:30,000

0 250 500 1,000 1,500 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, CITY OF TORONTO

MAP CREATED BY: GM
MAP CHECKED BY: DK
MAP PROJECTION: NAD 1983 UTM Zone 17N

DILLON CONSULTING

PROJECT: 191924

DATE: 2021-05-27

FILE LOCATION: I:\GIS\191924 - Rouge Park TMP EA\mxd\TMP\Existing Rail Infrastructure.mxd

ROUGE PARK BRIDGES TMP

LOCATION OF EXISTING CITY OF TORONTO EMS AND FIRE STATIONS THAT SERVICE ROUGE NATIONAL URBAN PARK

CITY OF MARKHAM

CITY OF TORONTO

CITY OF PICKERING

EMS STATION 27/ FIRE STATION 211

EMS STATION 25/ FIRE STATION 212

FIRE STATION 213

Sewells Road Bridge

Milne Bailey Bridge

Hillside Bridge

Maxwell's Bridge

Stott's Bridge

Rou ge River

STEELES AVENUE EAST

FINCH AVENUE EAST

FINCH AVENUE

HIGHWAY 401 COLLECTOR

HIGHWAY 401

MARKHAM ROAD

MCCOWAN ROAD

9TH LINE

YORK DURHAM LINE

SEWELLS RD

REESOR RD

BEARE RD

MEADOWVALE RD

CONLINS RD

NEILSON ROAD

MORNINGSIDE AVENUE

MCNICOLL AVENUE

SHEPPARD AVENUE EAST

ELLESMERE ROAD

OLD FINCH AVE

PLUG HAT RD

ROUGE RIVER DR

BRAYMORE BLVD

TWYN RIVERS DR

KEELER BLVD

MILNER AVE

PASSMORE AVE

NASHDENE RD

MILITARY TRAIL

CANMORE BLVD

KINGSTON ROAD

Study Area

Bridge Location

Railway

Municipal Boundary

Rouge Park Boundary

Water Body

1:30,000

0 250 500 1,000 1,500 m

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, CITY OF TORONTO

MAP CREATED BY: GM
MAP CHECKED BY: DK
MAP PROJECTION: NAD 1983 UTM Zone 17N

DILLON CONSULTING

PROJECT: 191924

DATE: 2021-05-27

FILE LOCATION: I:\GIS\191924 - Rouge Park TMP EA\mxd\TMP\Existing Fire and EMS Stations.mxd

APPENDIX B

FOCUSED STUDY AREAS

ROUGE PARK BRIDGES TMP

Sewell's Road Bridge

Bridge Location
Railway
500 m Study Area
Parcel Boundary

SCALE 1:4,000

0 25 50 100 150 m

N
W E
S

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, CITY OF TORONTO

MAP CREATED BY: GM
MAP CHECKED BY: DR
MAP PROJECTION: NAD 1983 UTM Zone 17N

DILLON CONSULTING

PROJECT: 19xxxx

DATE: 2019-11-12

FILE LOCATION: I:\GIS\19xxxx - Rouge Park TMP EA\mxd\Project Locations.mxd

ROUGE PARK BRIDGES TMP

Milne Bailey Bridge

Bridge Location
Railway
500 m Study Area
Parcel Boundary

SCALE 1:4,000

0 25 50 100 150 m

N
W E
S

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, CITY OF TORONTO

MAP CREATED BY: GM
MAP CHECKED BY: DR
MAP PROJECTION: NAD 1983 UTM Zone 17N

DILLON CONSULTING

PROJECT: 19xxxx

DATE: 2019-11-12

FILE LOCATION: I:\GIS\19xxxx - Rouge Park TMP EA\mxd\Project Locations.mxd

ROUGE PARK BRIDGES TMP

Hillside Bridge

- Bridge Location
- Railway
- 500 m Study Area
- Parcel Boundary

SCALE 1:4,100

0 25 50 100 150 m

N
W E
S

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, CITY OF TORONTO

MAP CREATED BY: GM
MAP CHECKED BY: DR
MAP PROJECTION: NAD 1983 UTM Zone 17N

DILLON CONSULTING

PROJECT: 19xxxx

DATE: 2019-11-12

FILE LOCATION: I:\GIS\19xxxx - Rouge Park TMP EA\mxd\Project Locations.mxd

ROUGE PARK BRIDGES TMP

Stotts' Bridge

Bridge Location
Hydro Line
500 m Study Area
Parcel Boundary

SCALE 1:3,900

0 25 50 100 150 m

N
W E
S

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, CITY OF TORONTO

MAP CREATED BY: GM
MAP CHECKED BY: DR
MAP PROJECTION: NAD 1983 UTM Zone 17N

DILLON CONSULTING

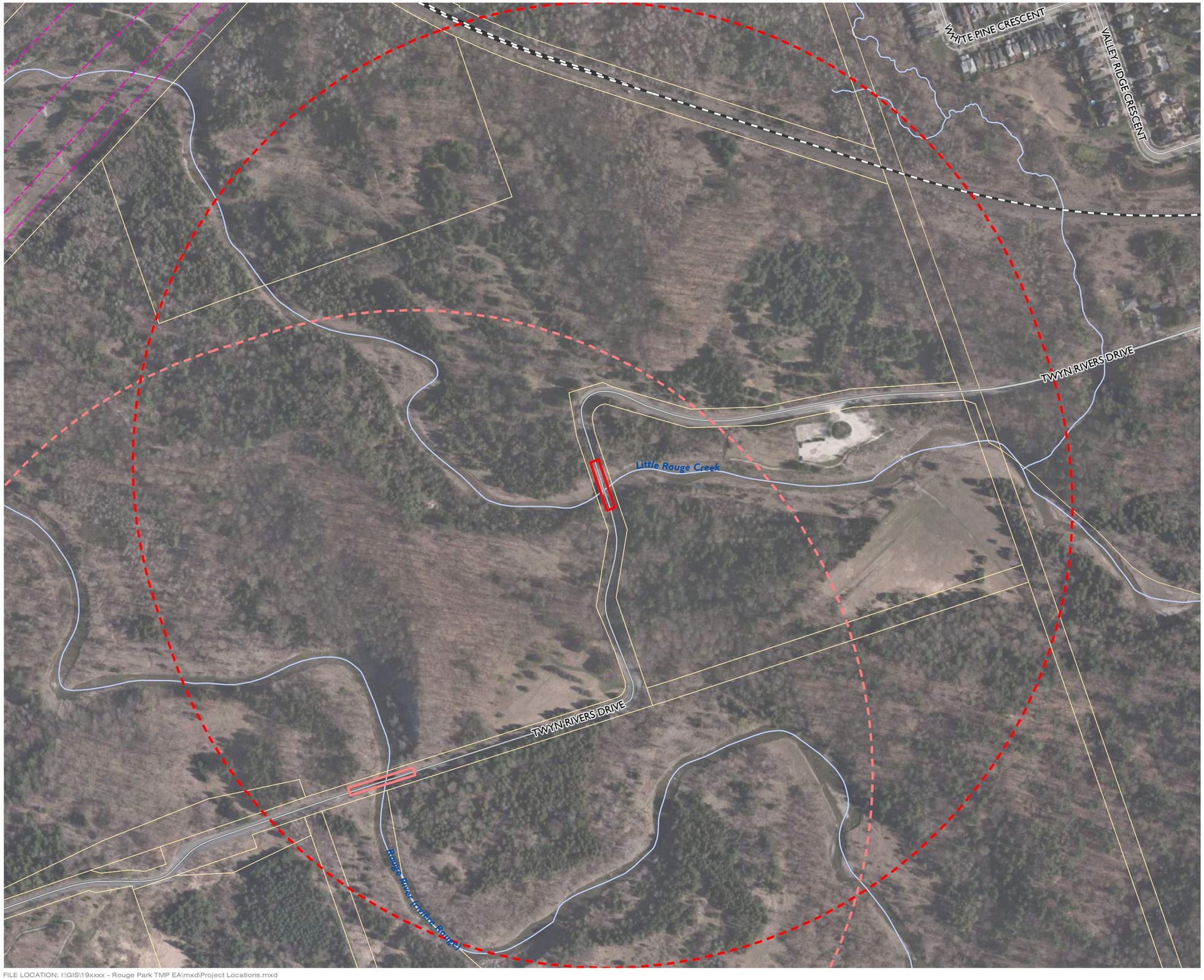
PROJECT: 19xxxx

DATE: 2019-11-12

FILE LOCATION: I:\GIS\19xxxx - Rouge Park TMP EA\mxd\Project Locations.mxd

ROUGE PARK BRIDGES TMP

Maxwell's Bridge



- Bridge Location
- Railway
- Hydro Line
- 500 m Study Area
- Parcel Boundary

SCALE 1:4,000

0 25 50 100 150 m

N
W E
S

MAP DRAWING INFORMATION:
DATA PROVIDED BY MNRF, CITY OF TORONTO

MAP CREATED BY: GM
MAP CHECKED BY: DR
MAP PROJECTION: NAD 1983 UTM Zone 17N

DILLON CONSULTING

PROJECT: 19xxxx

DATE: 2019-11-12

FILE LOCATION: I:\GIS\19xxxx - Rouge Park TMP EA\mxd\Project Locations.mxd

APPENDIX C

DESIGN CRITERIA

DILLON
CONSULTING

Meadowvale Road

Roadway Design Criteria		Existing	Current Standards
Classification		Collector[a]	RCU60[b]
Design Vehicle			WB-20[c]
Right-of-Way Width, m		20 m	20 m
Design Speed, km/h			60km/h
Posted Speed, km/h		50km/h	50km/h
Facility Widths	Through Lane, m	~3.2 m	3.5 m[d]
	Shoulder, m	1.0 m	2.5 m[e]
	Rounding, m	0.5 m	0.5 m[f]
	Cycling Lane, m	Existing Signed Cycling Route	1.8 m[g]
	Sidewalk, m		N/A
	Multi-Use Pathway, m		N/A
Auxiliary Lanes	Lane Width, m		3.5
	Right Turn Parallel Length, m		40 m minimum[h]
	Right Turn Taper Ratio		14:1[i]
	Left Turn Parallel Length, m		15 m minimum[j]
	Left Turn Taper Ratio		15:1[k]
Horizontal Alignment	Minimum Curve Radius, m	28 m (at the turn onto Plug Hat Road)	1290m[l]
	Maximum Rate of Superelevation		0.04m/m[m]
	Minimum Curve Radius for reverse crown section, e_{max}=0.04 m/m		185 m[n]
	Minimum Curve Radius for superelevated section, e_{max}=0.04 m/m		130 m[o]
	Horizontal Curve, Normal Crown		1290 m[p]

[a] Per City of Toronto Road Classification of Streets List 2012
[b] Per TAC GDG Table 2.6.2
[c] Per TAC GDG Table 2.6.4
[d] Per City of Toronto Road Engineering Design Guidelines Table 2.4.1
[e] Per TAC GDG Table 4.13.4
[f] Per TAC GDG Table 4.13.4
[g] Per OTM Book 18 Table 4.2
[h] Per TAC GDG Table 9.14.2
[i] Per TAC GDG Table 9.14.2
[j] Per TAC GDG Section 9.17.4.3
[k] Per TAC GDG Table 9.17.1
[l] Per TAC GDG Table 3.2.4
[m] Per TAC GDG Section 3.2.2.4.
[n] Per TAC GDG Table 3.2.4
[o] Per TAC GDG Table 3.2.3
[p] Per TAC GDG Table 3.2.8

Meadowvale Road

Roadway Design Criteria		Existing	Current Standard
Vertical Alignment	Minimum Grade	0.1%	0.0 %[q]
	Maximum Grade	10.7%	10%[r]
	Minimum Crest 'K'	4.6	11[s]
	Minimum Sag 'K' (Headlight)	2.3	18[t]
	Minimum Sag 'K' (Comfort)	2.3	9[u]
Clear Zone	AADT at Crossing	5,400	
	Clear Zone Width, m		4.5-5.0m[v]
	Suggested Shy Line Offset, A, m		1.4m[w]
	Encroachment Distance, E, m		40[x]
	Guiderail Approach Length $L_a = E\ (1-A/B^y)$		28.8m[z]
Sight Distances	Stopping Sight Distance, m		85m[aa]
	B1, Left Turn from the Minor, m		130m[bb]
	B2, Right Turn from the Minor, m		110m[cc]
	B3 – Crossing the Major, m		110m[dd]
	F – Left Turn from the Major, m		95m[ee]
Intersection	Minimum Tangent at Intersection		20 m[ff]
	Minimum Curb Return Radius	8.25m	15 m

[q] Per TAC GDG Section 3.3.2.5
[r] Per TAC GDG Table 3.3.1
[s] Per TAC GDG Table 3.3.2
[t] Per TAC GDG Table 3.3.4
[u] Per TAC GDG Table 3.3.5
[v] Per TAC GDG Table 7.3.1
[w] Per TAC GDG Table 7.6.4
[x] Per TAC GDG Table 7.6.6
[y] B assumed to be equivalent to Clear Zone width for watercourse crossings.
[z] Per TAC GDG Figure 7.6.6
[aa] Per TAC GDG Figure 9.9.4
[bb] Per TAC GDG Figure 9.9.4
[cc] Per TAC GDG Figure 9.9.6
[dd] Per TAC GDG Figure 9.9.6
[ee] Per TAC GDG Figure 9.9.12
[ff] Per TAC GDG Section 9.7.2

Old Finch Avenue

Roadway Design Criteria		Existing	Current Standards
Classification		Collector[a]	RCU60[b]
Design Vehicle			WB-20[c]
Right-of-Way Width, m		20 m	20 m
Design Speed, km/h			60km/h
Posted Speed, km/h		50km/h	50km/h
Facility Widths	Through Lane, m	~3.6m	4.3m[d]
	Shoulder, m	1.0m	2.5m[e]
	Rounding, m	0.5m	0.5m[f]
	Cycling Lane, m		-
	Sidewalk, m		N/A
	Multi-Use Pathway, m		N/A
Auxiliary Lanes	Lane Width, m		3.75
	Right Turn Parallel Length, m		40 m minimum[g]
	Right Turn Taper Ratio		14:1[h]
	Left Turn Parallel Length, m		15 m minimum[i]
	Left Turn Taper Ratio		15:1[j]
Horizontal Alignment	Minimum Curve Radius, m	8.5m (immediately east of Old Finch Bailey Bridge)	
	Maximum Rate of Superelevation		0.04m/m[k]
	Minimum Curve Radius for reverse crown section, e_{max}=0.04 m/m		185 m[l]
	Minimum Curve Radius for superelevated section, e_{max}=0.04 m/m		130 m[m]
	Horizontal Curve, Normal Crown		1290 m[n]

[a] Per City of Toronto Road Classification of Streets List 2012
[b] Per TAC GDG Table 2.6.2
[c] Per TAC GDG Table 2.6.4
[d] Per City of Toronto Road Engineering Design Guidelines V2.0, Table 2.4.1
[e] Per TAC GDG Table 4.13.4
[f] Per TAC GDG Table 4.13.4
[g] Per TAC GDG Table 9.14.2
[h] Per TAC GDG Table 9.14.2
[i] Per TAC GDG Section 9.17.4.3
[j] Per TAC GDG Table 9.17.1
[k] Per TAC GDG Section 3.2.2.4.
[l] Per TAC GDG Table 3.2.4
[m] Per TAC GDG Table 3.2.3
[n] Per TAC GDG Table 3.2.8

Old Finch Avenue

Roadway Design Criteria		Existing	Current Standard
Vertical Alignment	Minimum Grade	0.1%	0.0 %[o]
	Maximum Grade	9.5%	10%[p]
	Minimum Crest 'K'	1.8 (approximately 110 m west of Reesor Road)	11[q]
	Minimum Sag 'K' (Headlight)	4.9	18[r]
	Minimum Sag 'K' (Comfort)	4.9	9[s]
Clear Zone	AADT at Crossing	7,000	
	Clear Zone Width, m		4.5-5.0m[t]
	Suggest Shy Line Offset, A, m		1.4m[u]
	Encroachment Distance, E, m		40[v]
	Guiderail Approach Length $L_a = E (1-A/B^w)$		28.8m[x]
Sight Distances	Stopping Sight Distance, m		85m[y]
	B1, Left Turn from the Minor, m		130m[z]
	B2, Right Turn from the Minor, m		110m[aa]
	B3 – Crossing the Major, m		110m[bb]
	F – Left Turn from the Major, m		95m[cc]
Intersection	Minimum Tangent at Intersection		20 m[dd]
	Minimum Curb Return Radius	8.25m	15 m

[o] Per TAC GDG Section 3.3.2.5
[p] Per TAC GDG Table 3.3.1
[q] Per TAC GDG Table 3.3.2
[r] Per TAC GDG Table 3.3.4
[s] Per TAC GDG Table 3.3.5
[t] Per TAC GDG Table 7.3.1
[u] Per TAC GDG Table 7.6.4
[v] Per TAC GDG Table 7.6.6
[w] B assumed to be equivalent to Clear Zone width for watercourse crossings.
[x] Per TAC GDG Figure 7.6.6
[y] Per TAC GDG Figure 9.9.4
[z] Per TAC GDG Figure 9.9.4
[aa] Per TAC GDG Figure 9.9.6
[bb] Per TAC GDG Figure 9.9.6
[cc] Per TAC GDG Figure 9.9.12
[dd] Per TAC GDG Section 9.7.2

Sewells Road

Roadway Design Criteria		Existing	Current Standards
Classification		Collector[a]	RCU60[b]
Design Vehicle			WB-20[c]
Right-of-Way Width, m		20 m	20 m
Design Speed, km/h			60km/h
Posted Speed, km/h		50km/h	50km/h
Facility Widths	Through Lane, m	~3.75m	4.3m[d]
	Shoulder, m	1.0m	2.5m[e]
	Rounding, m	0.5m	0.5m[f]
	Cycling Lane, m	N/A	N/A
	Sidewalk, m	N/A	N/A
	Multi-Use Pathway, m	N/A	N/A
Auxiliary Lanes	Lane Width, m		
	Right Turn Parallel Length, m		40 m minimum[g]
	Right Turn Taper Ratio		14:1[h]
	Left Turn Parallel Length, m		15 m minimum[i]
	Left Turn Taper Ratio		15:1[j]
Horizontal Alignment	Minimum Curve Radius, m	46 m (south of Sewells Suspension Bridge)	
	Maximum Rate of Superelevation		0.04m/m[k]
	Minimum Curve Radius for reverse crown section, e_{max}=0.04 m/m		185 m[l]
	Minimum Curve Radius for superelevated section, e_{max}=0.04 m/m		130 m[m]
	Horizontal Curve, Normal Crown		1290 m[n]

[a] Per City of Toronto Road Classification of Streets List 2012
[b] Per TAC GDG Table 2.6.2
[c] Per TAC GDG Table 2.6.4
[d] Per City of Toronto Road Engineering Design Guidelines Table 2.4.1
[e] Per TAC GDG Table 4.13.4
[f] Per TAC GDG Table 4.13.4
[g] Per TAC GDG Table 9.14.2
[h] Per TAC GDG Table 9.14.2
[i] Per TAC GDG Section 9.17.4.3
[j] Per TAC GDG Table 9.17.1
[k] Per TAC GDG Section 3.2.2.4.
[l] Per TAC GDG Table 3.2.4
[m] Per TAC GDG Table 3.2.3
[n] Per TAC GDG Table 3.2.8

Sewells Road

Roadway Design Criteria		Existing	Current Standard
Vertical Alignment	Minimum Grade	0.6%	0.0 %[o]
	Maximum Grade	9.0%	10%[p]
	Minimum Crest 'K'	8.5	11[q]
	Minimum Sag 'K' (Headlight)	8.1	18[r]
	Minimum Sag 'K' (Comfort)	8.1	9[s]
Clear Zone	AADT at Crossing	3,000	
	Clear Zone Width, m		4.5-5.0[t]
	Suggest Shy Line Offset, A, m		1.4m[u]
	Encroachment Distance, E, m		34[v]
	Guiderail Approach Length $L_a = E (1-A/B^w)$		24.5m[x]
Sight Distances	Stopping Sight Distance, m		85m[y]
	B1, Left Turn from the Minor, m		130m[z]
	B2, Right Turn from the Minor, m		110m[aa]
	B3 – Crossing the Major, m		110m[bb]
	F – Left Turn from the Major, m		95m[cc]
Intersection	Minimum Tangent at Intersection		20 m[dd]
	Minimum Curb Return Radius	21.75m	15 m

[o] Per TAC GDG Section 3.3.2.5
[p] Per TAC GDG Table 3.3.1
[q] Per TAC GDG Table 3.3.2
[r] Per TAC GDG Table 3.3.4
[s] Per TAC GDG Table 3.3.5
[t] Per TAC GDG Table 7.3.1
[u] Per TAC GDG Table 7.6.4
[v] Per TAC GDG Table 7.6.6
[w] B assumed to be equivalent to Clear Zone width for watercourse crossings.
[x] Per TAC GDG Figure 7.6.6
[y] Per TAC GDG Figure 9.9.4
[z] Per TAC GDG Figure 9.9.4
[aa] Per TAC GDG Figure 9.9.6
[bb] Per TAC GDG Figure 9.9.6
[cc] Per TAC GDG Figure 9.9.12
[dd] Per TAC GDG Section 9.7.2

Twyn River Drive

Roadway Design Criteria		Existing	Current Standards
Classification		Collector[a]	RCU50[b]
Design Vehicle			Heavy Truck[c]
Right-of-Way Width, m		20 m	20 m
Design Speed, km/h			50km/h
Posted Speed, km/h		40km/h	40km/h
Facility Widths	Through Lane, m	~3.0m	4.3m[d]
	Shoulder, m	~2.0m	2.0m[e]
	Rounding, m	0.5m	0.5m[f]
	Cycling Lane, m		N/A
	Sidewalk, m		N/A
	Multi-Use Pathway, m		N/A
Auxiliary Lanes	Lane Width, m		3.75
	Right Turn Parallel Length, m		40 m minimum[g]
	Right Turn Taper Ratio		14:1[h]
	Left Turn Parallel Length, m		15 m minimum[i]
	Left Turn Taper Ratio		15:1[j]
Horizontal Alignment	Minimum Curve Radius, m	21 m (between two watercourse crossings)	
	Maximum Rate of Superelevation		0.04m/m[k]
	Minimum Curve Radius for reverse crown section, e_{max}=0.04 m/m		185 m[l]
	Minimum Curve Radius for superelevated section, e_{max}=0.04 m/m		130 m[m]
	Horizontal Curve, Normal Crown		1290 m[n]

[a] Per City of Toronto Road Classification of Streets List 2012
[b] Per TAC GDG Table 2.6.2 (*No similar classification exist for Collector posted at 50 based on TAC manual)
[c] Per TAC GDG Table 2.6.4
[d] Per City of Toronto Road Engineering Design Guidelines Table 2.4.1
[e] Per TAC GDG Table 4.13.4
[f] Per TAC GDG Table 4.13.4
[g] Per TAC GDG Table 9.14.2
[h] Per TAC GDG Table 9.14.2
[i] Per TAC GDG Section 9.17.4.3
[j] Per TAC GDG Table 9.17.1
[k] Per TAC GDG Section 3.2.2.4.
[l] Per TAC GDG Table 3.2.4
[m] Per TAC GDG Table 3.2.3
[n] Per TAC GDG Table 3.2.8

Twyn River Drive

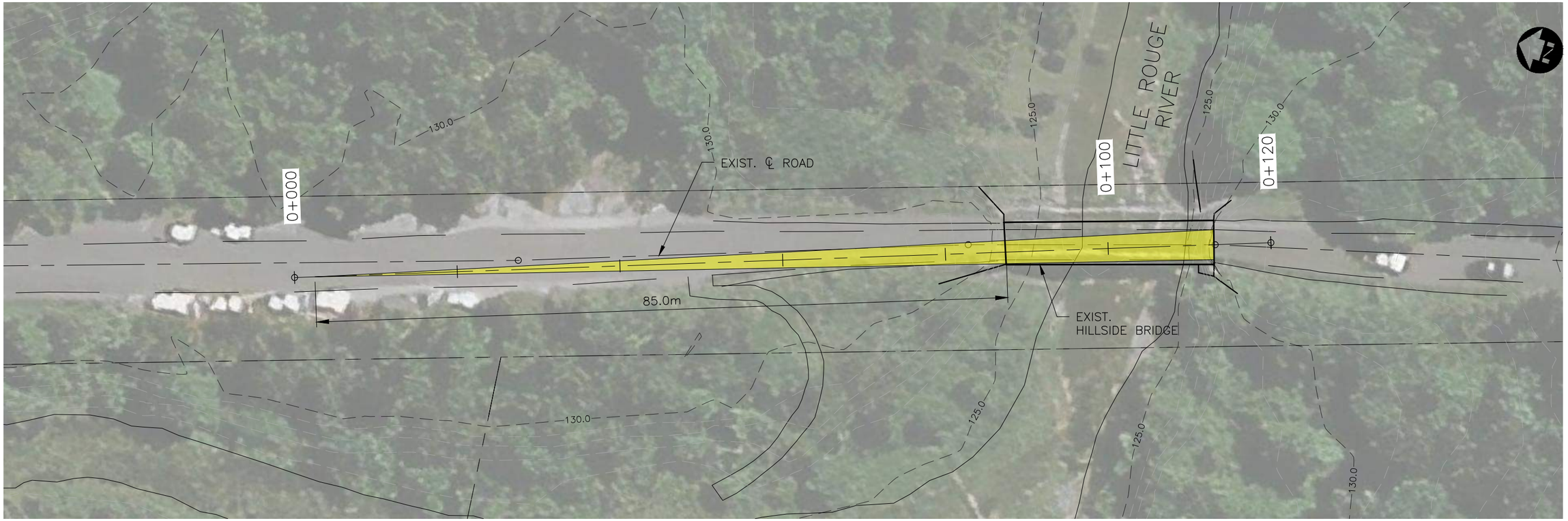
Roadway Design Criteria		Existing	Current Standard
Vertical Alignment	Minimum Grade	0.0%	0.0 %[o]
	Maximum Grade	20.9%	10%[p]
	Minimum Crest 'K'	2.9	7[q]
	Minimum Sag 'K' (Headlight)	3.2	13[r]
	Minimum Sag 'K' (Comfort)	3.2	5-6[s]
Clear Zone	AADT at Crossing	5,000	
	Clear Zone Width, m		3.5-4.5[t]
	Suggest Shy Line Offset, A, m		N/A[u]
	Encroachment Distance, E, m		N/A[v]
	Guiderail Approach Length $L_a = E (1-A/B^{w})$		N/A[x]
Sight Distances	Stopping Sight Distance, m		65m[y]
	B1, Left Turn from the Minor, m		105m[z]
	B2, Right Turn from the Minor, m		95m[aa]
	B3 – Crossing the Major, m		95m[bb]
	F – Left Turn from the Major, m		80m[cc]
Intersection	Minimum Tangent at Intersection		20 m[dd]
	Minimum Curb Return Radius	14m	15 m

[o] Per TAC GDG Section 3.3.2.5
[p] Per TAC GDG Table 3.3.1
[q] Per TAC GDG Table 3.3.2
[r] Per TAC GDG Table 3.3.4
[s] Per TAC GDG Table 3.3.5
[t] Per TAC GDG Table 7.3.1
[u] Per TAC GDG Table 7.6.4
[v] Per TAC GDG Table 7.6.6
[w] B assumed to be equivalent to Clear Zone width for watercourse crossings.
[x] Per TAC GDG Figure 7.6.6
[y] Per TAC GDG Figure 9.9.4
[z] Per TAC GDG Figure 9.9.4
[aa] Per TAC GDG Figure 9.9.6
[bb] Per TAC GDG Figure 9.9.6
[cc] Per TAC GDG Figure 9.9.12
[dd] Per TAC GDG Section 9.7.2

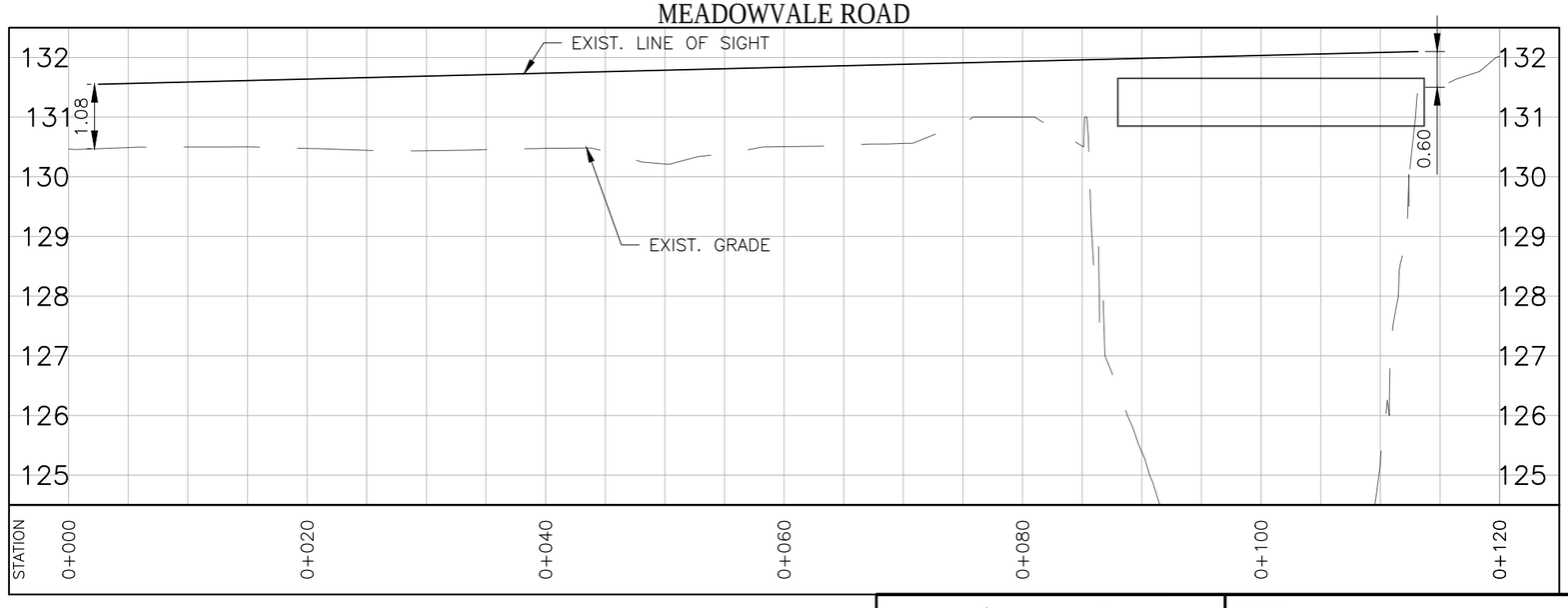
APPENDIX D

SIGHT DISTANCE CHECKS

DILLON
CONSULTING



MEADOWVALE ROAD



H. SCALE 10 0 10 SCALE 1:500 METRES

V. SCALE 2 0 2 SCALE 1:100 METRES

DILLON CONSULTING

DATE April 21

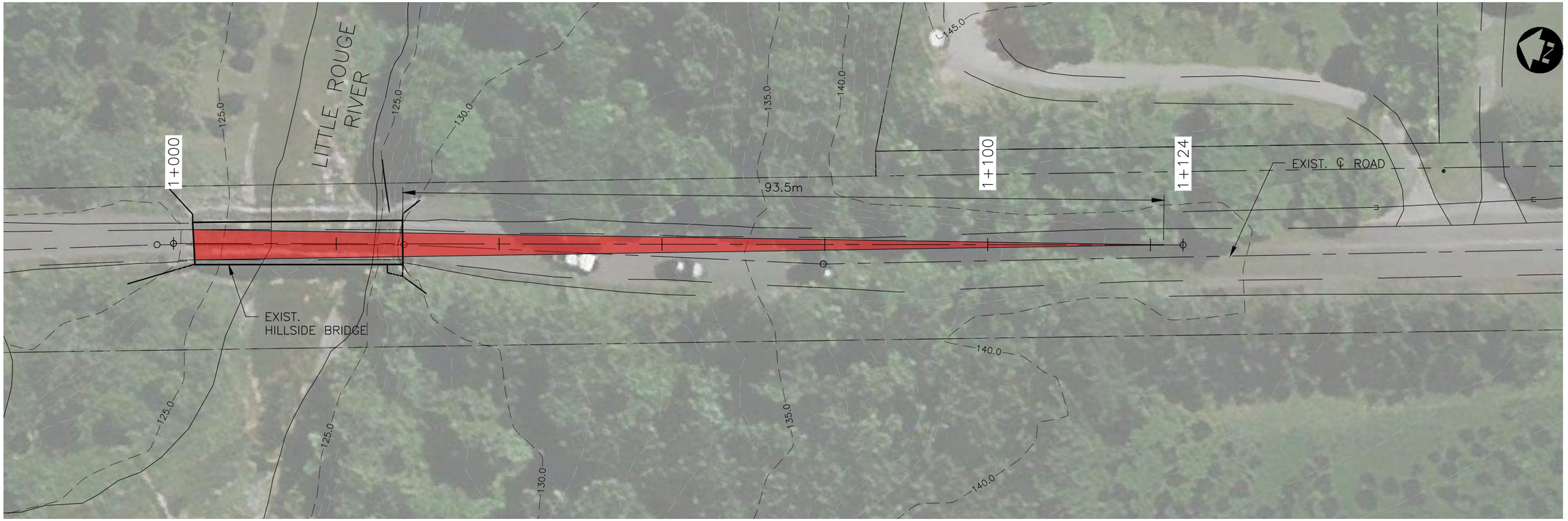
PROJECT ROUGE PARK BRIDGE TRANSPORTATION MASTER PLAN

PROJECT NO. 191924

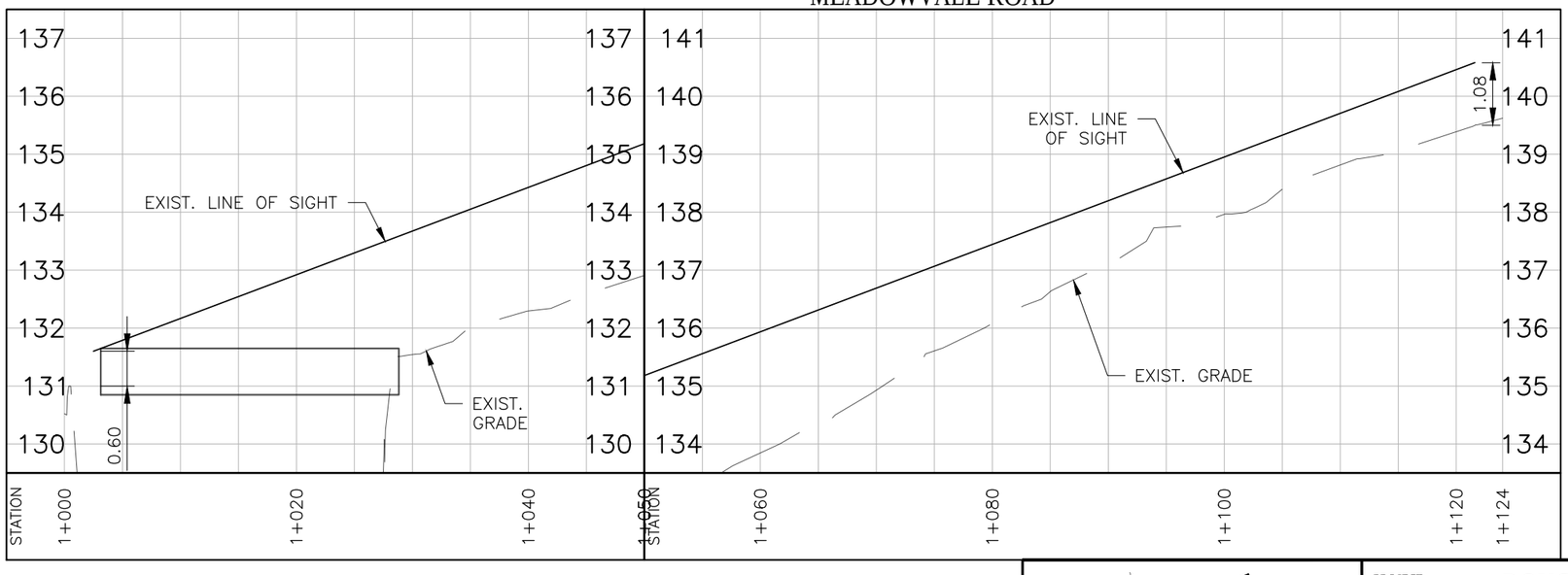
TITLE EXISTING SIGHT DISTANCES HILLSIDE BRIDGE (NORTH)

FIGURE NO. FIGNO.

FileName:c:\pw working directory\projects 2019\34kmg\dms80925\191924-08-plan-meadowvale-fig.dwg



MEADOWVALE ROAD



H. SCALE 10 0 10 SCALE 1:500 METRES

V. SCALE 2 0 2 SCALE 1:100 METRES

DILLON CONSULTING

DATE April 21

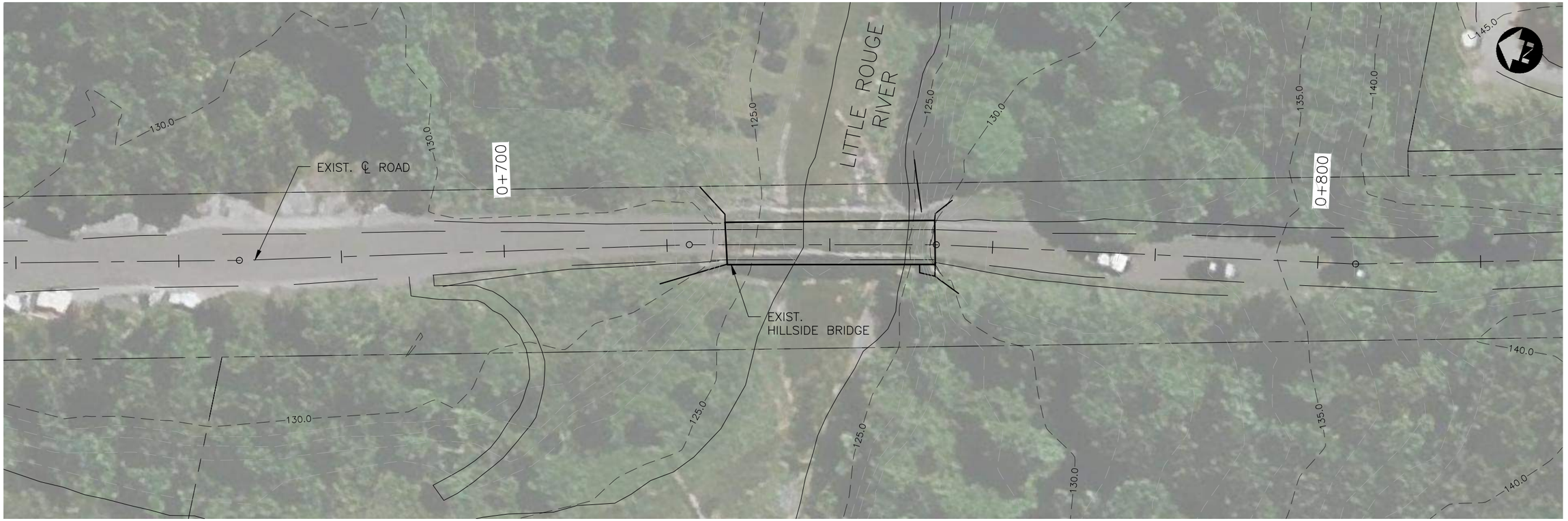
PROJECT ROUGE PARK BRIDGE TRANSPORTATION MASTER PLAN

PROJECT NO. 191924

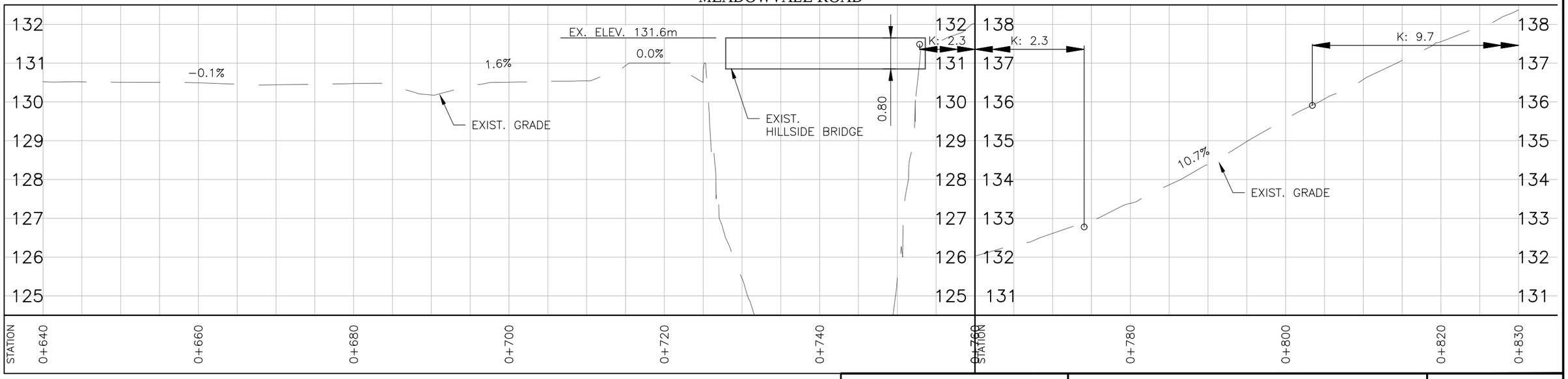
TITLE EXISTING SIGHT DISTANCES HILLSIDE BRIDGE (SOUTH)

FIGURE NO. FIGNO.

FileName:c:\pw working directory\projects 2019\34kmg\dms80925\191924-08-plan-meadowvale-fig.dwg



MEADOWVALE ROAD



H. SCALE 10 0 10 — SCALE 1:500 METRES

V. SCALE 2 0 2 — SCALE 1:100 METRES

DILLON CONSULTING

DATE April 21

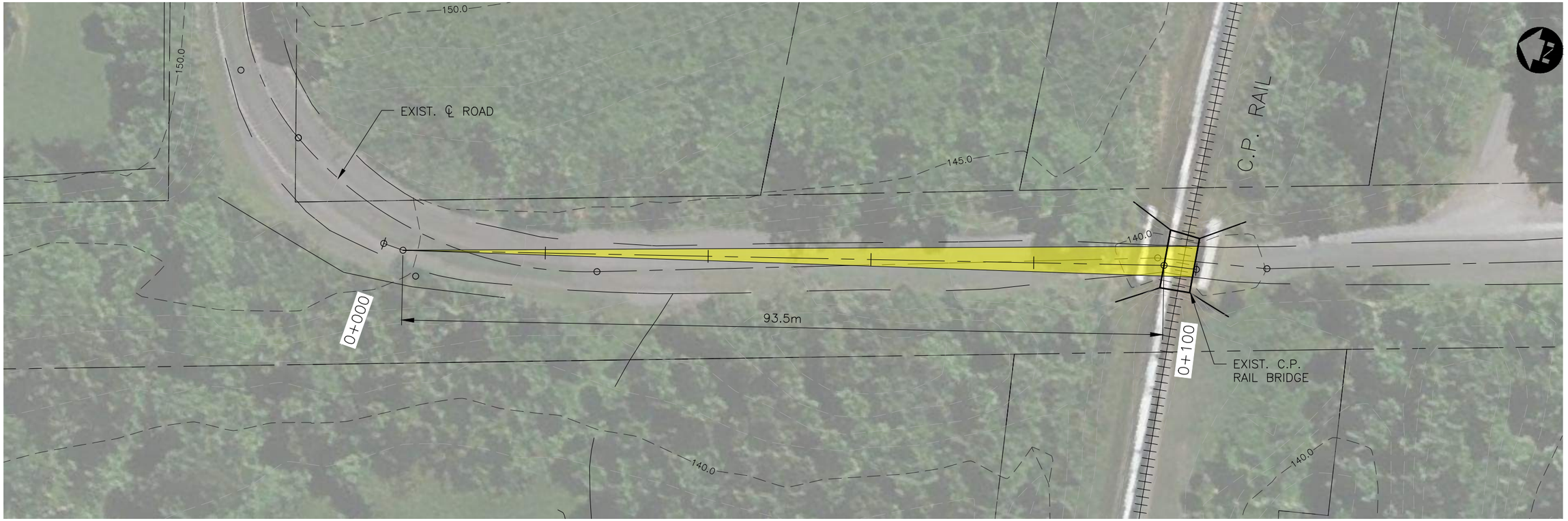
PROJECT ROUGE PARK BRIDGE TRANSPORTATION MASTER PLAN

PROJECT NO. 191924

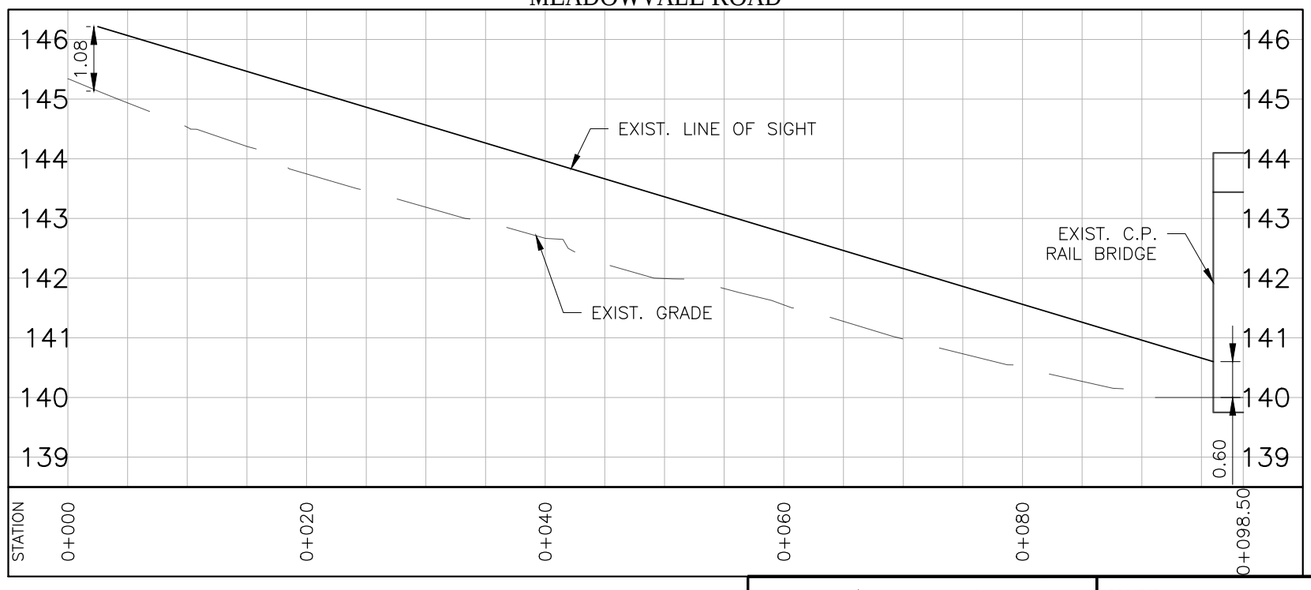
TITLE EXISTING ROADWAY CONDITIONS HILLSIDE BRIDGE

FIGURE NO. FIGNO.

FileName:c:\pw working directory\projects 2019\34kmg\dms80925\191924-08-plan-meadowvale-fig.dwg



MEADOWVALE ROAD



H. SCALE 10 0 10
SCALE 1:500 METRES

V. SCALE 2 0 2
SCALE 1:100 METRES

DILLON CONSULTING

DATE April 21

PROJECT ROUGE PARK BRIDGE
TRANSPORTATION MASTER PLAN

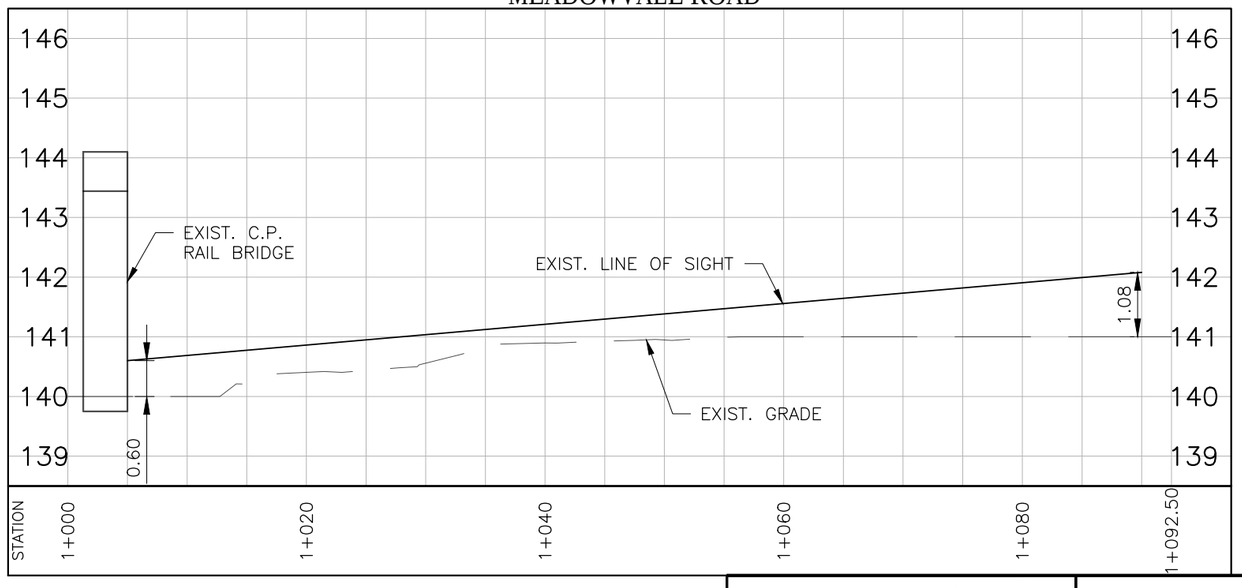
PROJECT NO. 191924

TITLE EXISTING SIGHT DISTANCES
C.P. RAIL BRIDGE (NORTH)

FIGURE NO. FIGNO.

FileName:c:\pw working directory\projects 2019\34kng\dms80925\191924-08-plan-meadowvale-fig.dwg

MEADOWVALE ROAD



H. SCALE 10 0 10 — SCALE 1:500 METRES

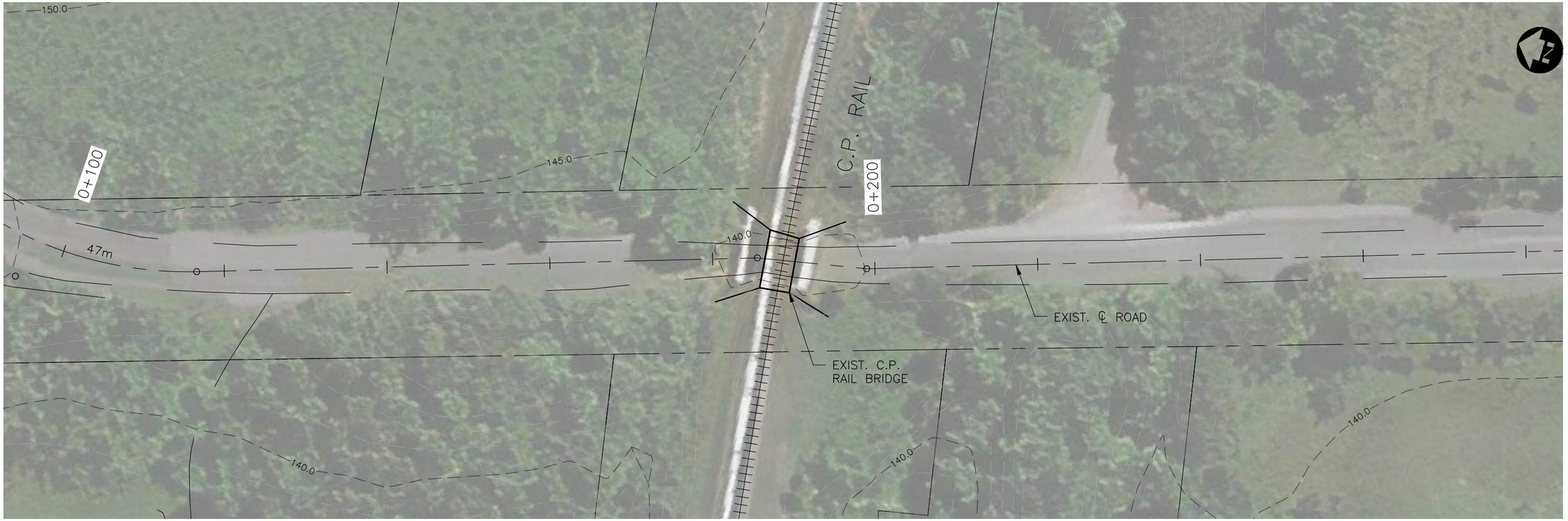
V. SCALE 2 0 2 — SCALE 1:100 METRES

DILLON CONSULTING

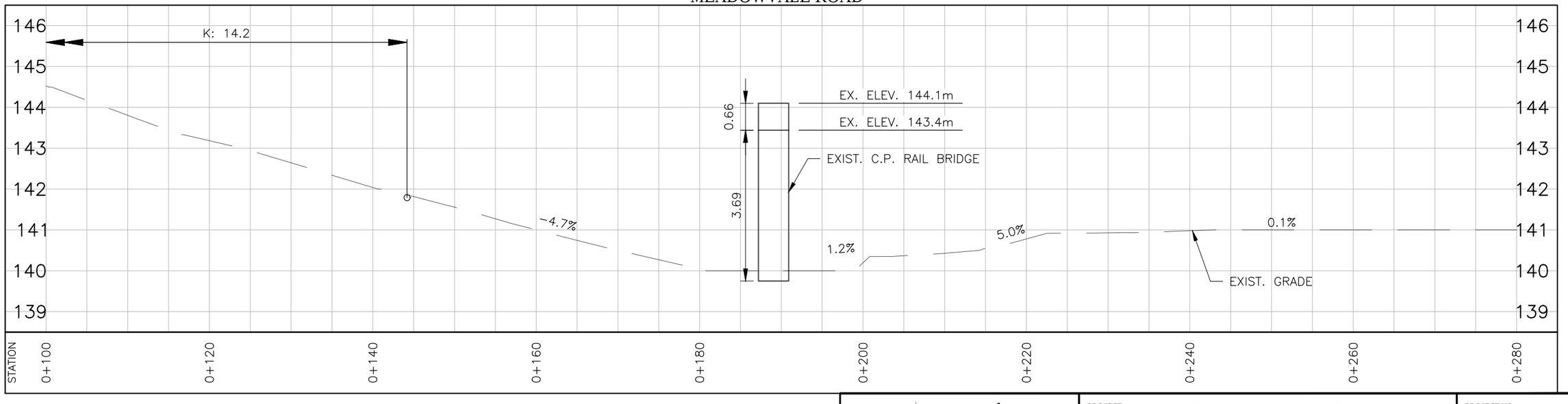
DATE April 21

PROJECT: ROUGE PARK BRIDGE TRANSPORTATION MASTER PLAN		PROJECT NO. 191924
TITLE: EXISTING SIGHT DISTANCES C.P. RAIL BRIDGE (SOUTH)		FIGURE NO. FIGNO.

FileName:c:\pw working directory\projects 2019\34kng\dms80925\191924-08-plan-meadowvale-fig.dwg



MEADOWVALE ROAD



H. SCALE 10 0 10 — SCALE 1:500 METRES

V. SCALE 2 0 2 — SCALE 1:100 METRES

DILLON CONSULTING

DATE April 21

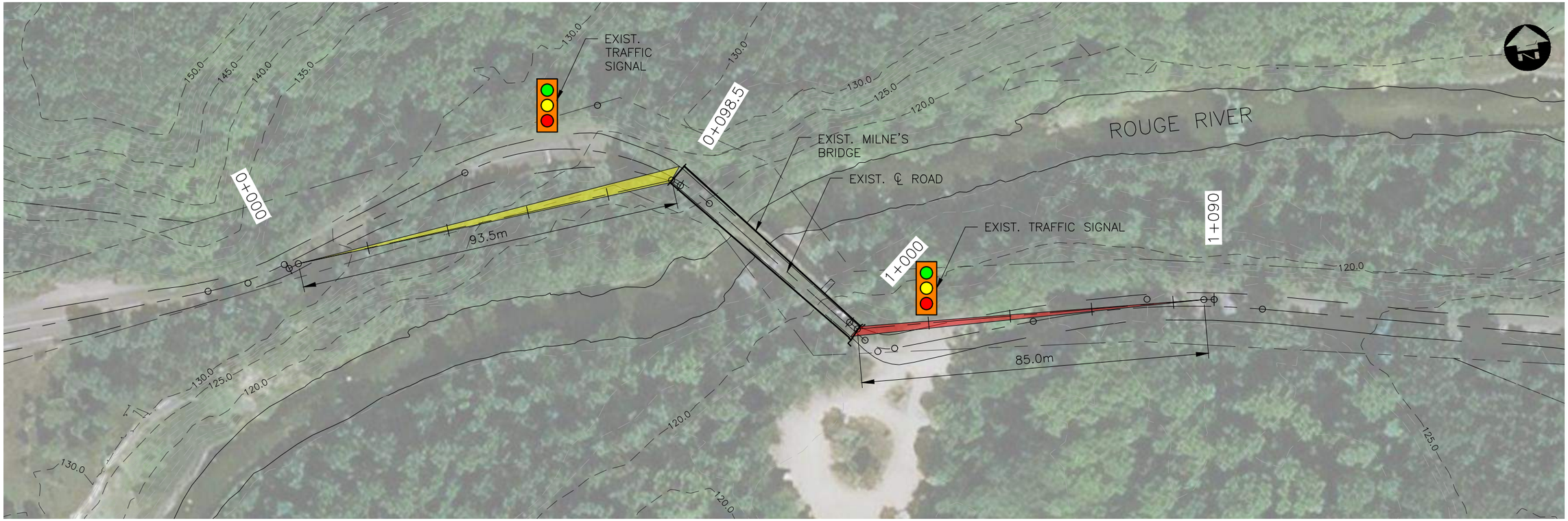
PROJECT ROUGE PARK BRIDGE TRANSPORTATION MASTER PLAN

PROJECT NO. 191924

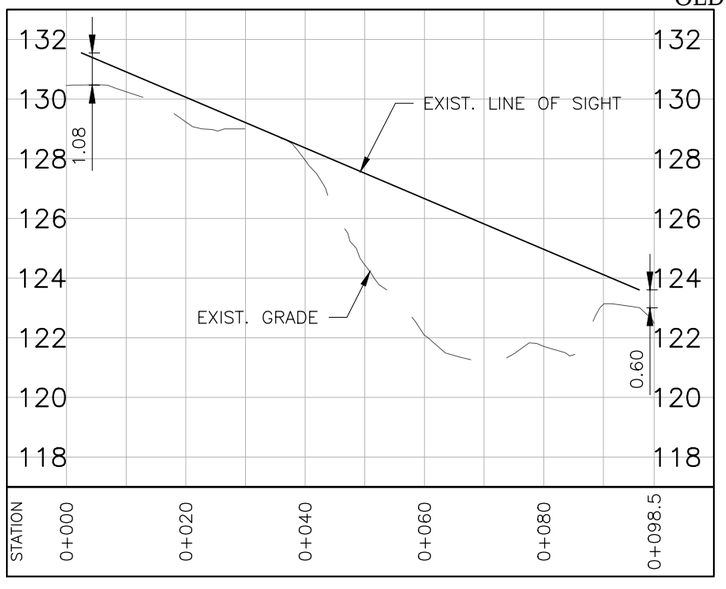
TITLE EXISTING ROADWAY CONDITIONS C.P. RAIL BRIDGE

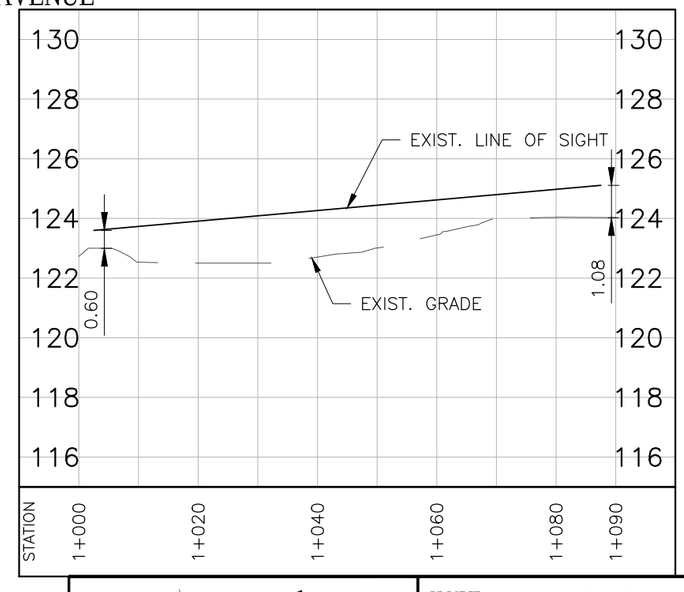
FIGURE NO. FIGNO.

FileName:c:\pw working directory\projects 2019\34kng\dms80925\191924-08-plan-meadowvale-fig.dwg



OLD FINCH AVENUE





H. SCALE 20 0 20 SCALE 1:1,000 METRES

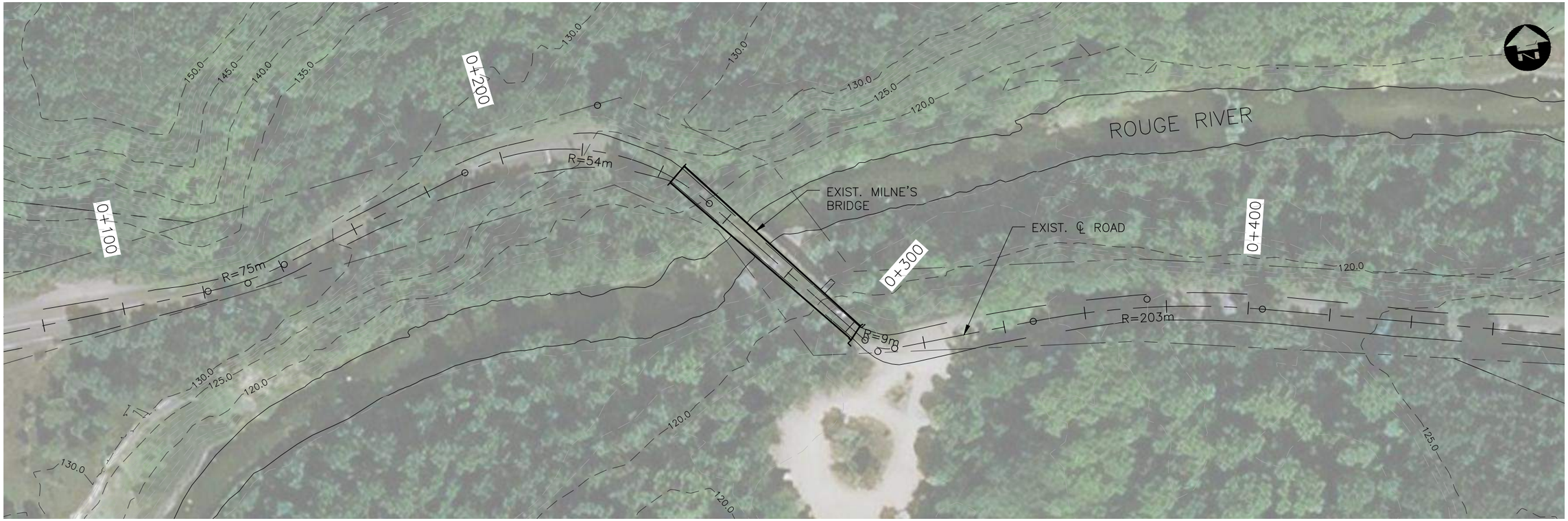
V. SCALE 5 0 5 SCALE 1:200 METRES

DILLON CONSULTING

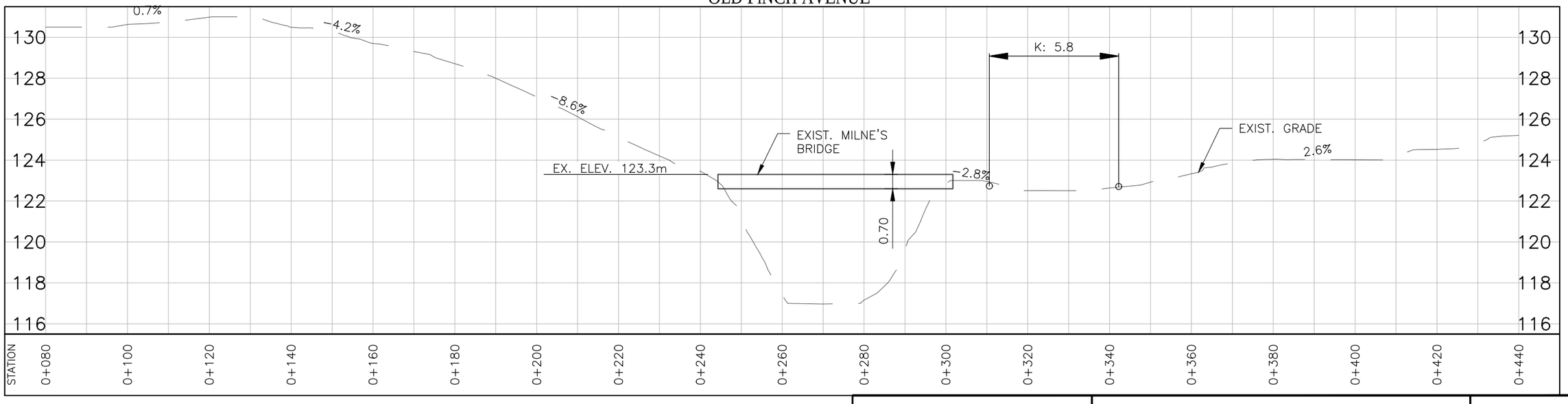
DATE April 21

PROJECT: ROUGE PARK BRIDGE TRANSPORTATION MASTER PLAN		PROJECT NO.: 191924
TITLE: EXISTING SIGHT DISTANCES MILNE'S BRIDGE		FIGURE NO.: FIGNO.

FileName:c:\pw working directory\projects 2019\34kmg\dms80925\191924-08-plan-old finch-fig.dwg



OLD FINCH AVENUE



H. SCALE 20 0 20 SCALE 1:1,000 METRES

V. SCALE 5 0 5 SCALE 1:200 METRES

DILLON CONSULTING

DATE April 21

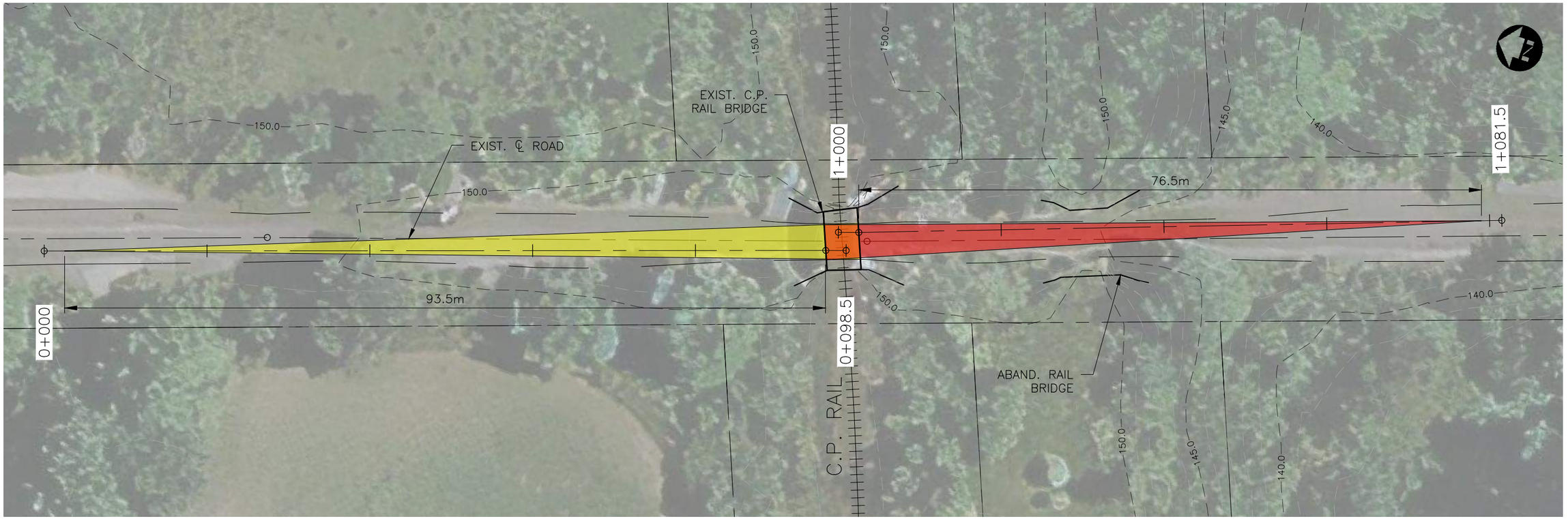
PROJECT ROUGE PARK BRIDGE TRANSPORTATION MASTER PLAN

PROJECT NO. 191924

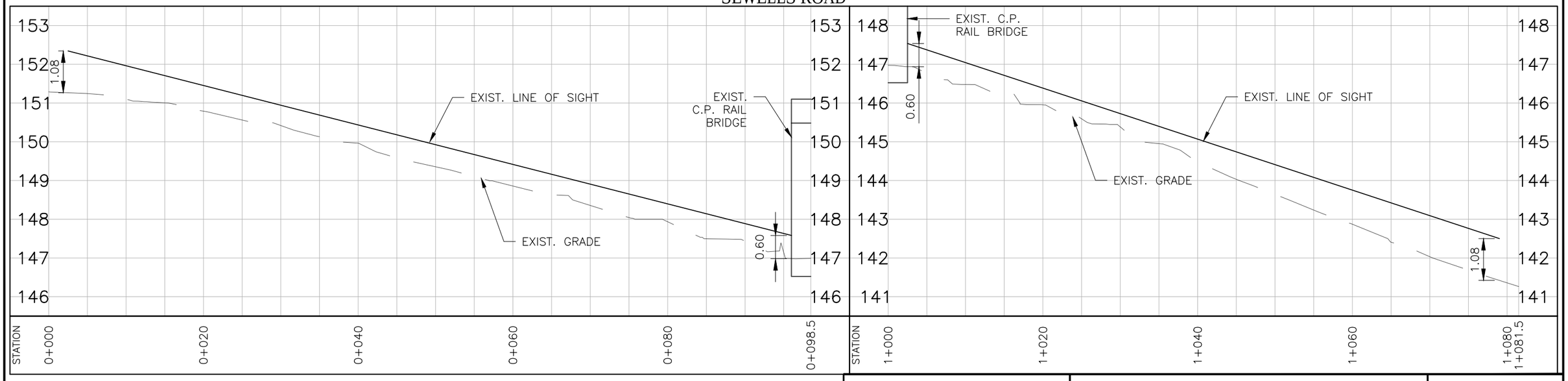
TITLE EXISTING ROADWAY CONDITIONS MILNE'S BRIDGE

FIGURE NO. FIGNO.

FileName:c:\pw working directory\projects 2019\34kmg\dms80925\191924-08-plan-old finch-fig.dwg



SEWELLS ROAD



H. SCALE 10 0 10 SCALE 1:500 METRES

V. SCALE 2 0 2 SCALE 1:100 METRES

DILLON CONSULTING

DATE April 21

PROJECT ROUGE PARK BRIDGE TRANSPORTATION MASTER PLAN

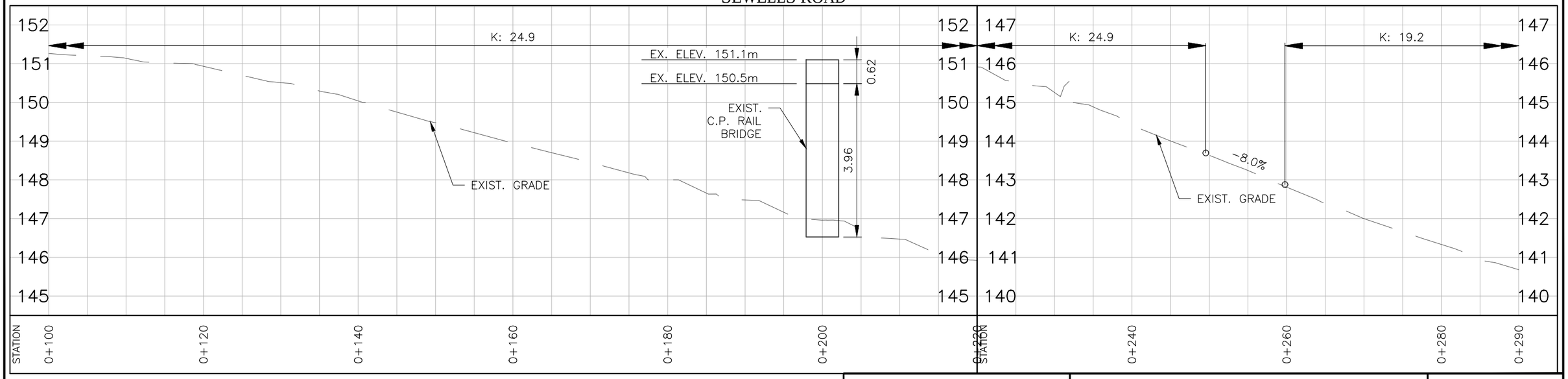
PROJECT NO. 191924

TITLE EXISTING SIGHT DISTANCES C.P. RAIL BRIDGE

FIGURE NO. FIGNO.

FileName:c:\pw working directory\projects 2019\34kmg\dms80925\191924-08-plan-sewells-fig.dwg

SEWELLS ROAD



H. SCALE 10 0 10 SCALE 1:500 METRES

V. SCALE 2 0 2 SCALE 1:100 METRES

DILLON CONSULTING

DATE April 21

PROJECT ROUGE PARK BRIDGE TRANSPORTATION MASTER PLAN

PROJECT NO. 191924

TITLE EXISTING ROADWAY CONDITIONS C.P. RAIL BRIDGE

FIGURE NO. FIGNO.

FileName:c:\pw working directory\projects 2019\34kmg\dms80925\191924-08-plan-sewells-fig.dwg

SEWELLS ROAD

H. SCALE 10 0 10 SCALE 1:500 METRES

V. SCALE 2 0 2 SCALE 1:100 METRES

DILLON CONSULTING

DATE April 21

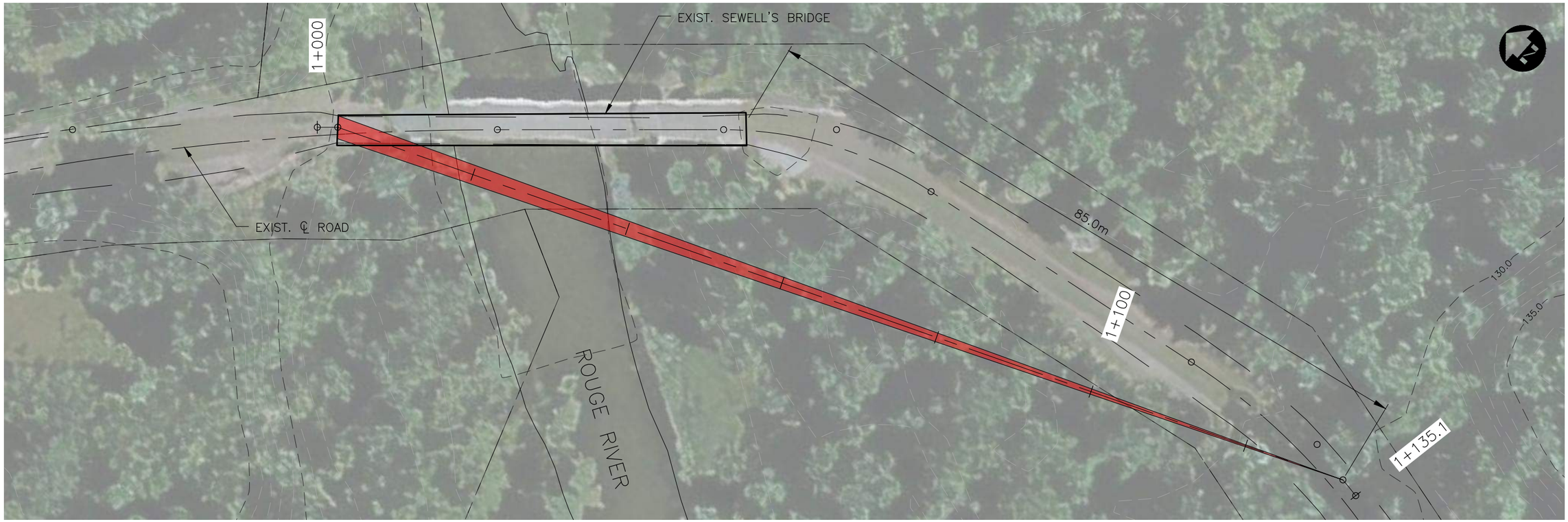
PROJECT ROUGE PARK BRIDGE TRANSPORTATION MASTER PLAN

PROJECT NO. 191924

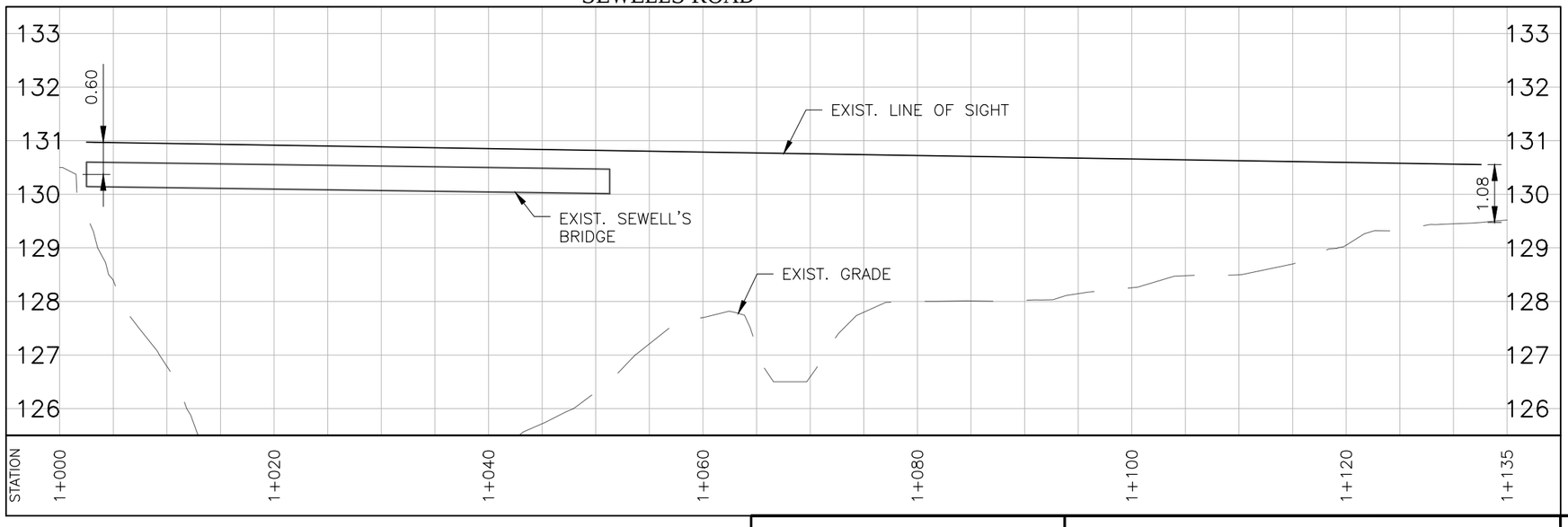
TITLE EXISTING SIGHT DISTANCES SEWELL'S BRIDGE (NORTH)

FIGURE NO. FIGNO.

FileName:c:\pw working directory\projects 2019\34kmg\dms80925\191924-08-plan-sewells-fig.dwg



SEWELLS ROAD



H. SCALE 10 0 10 SCALE 1:500 METRES

V. SCALE 2 0 2 SCALE 1:100 METRES

DILLON CONSULTING

DATE April 21

PROJECT ROUGE PARK BRIDGE TRANSPORTATION MASTER PLAN

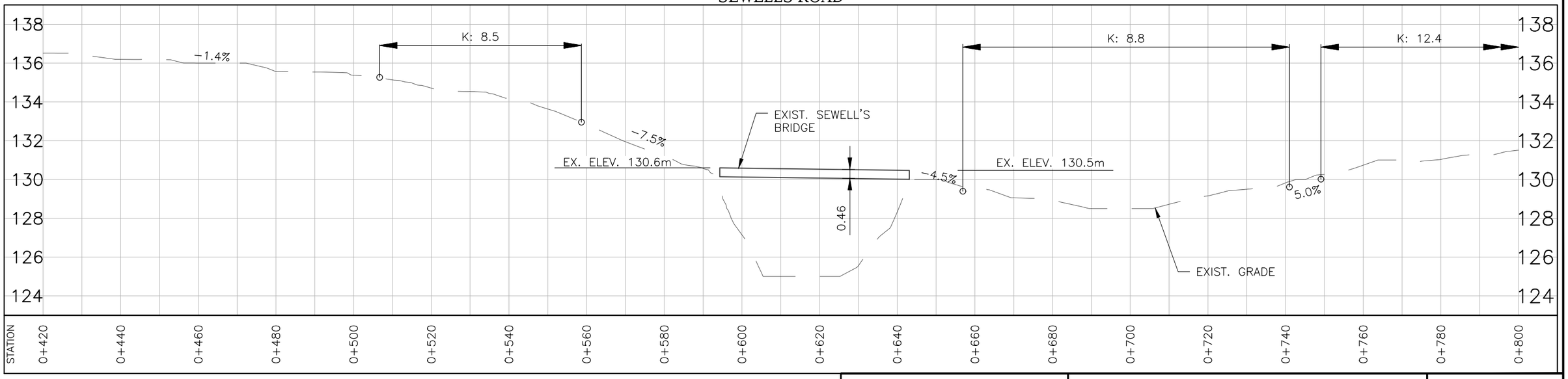
PROJECT NO. 191924

TITLE EXISTING SIGHT DISTANCES SEWELL'S BRIDGE (SOUTH)

FIGURE NO. FIGNO.

FileName:c:\pw working directory\projects 2019\34kmg\dms80925\191924-08-plan-sewells-fig.dwg

SEWELLS ROAD



H. SCALE 20 0 20 SCALE 1:1,000 METRES

V. SCALE 5 0 5 SCALE 1:200 METRES

DILLON CONSULTING

DATE April 21

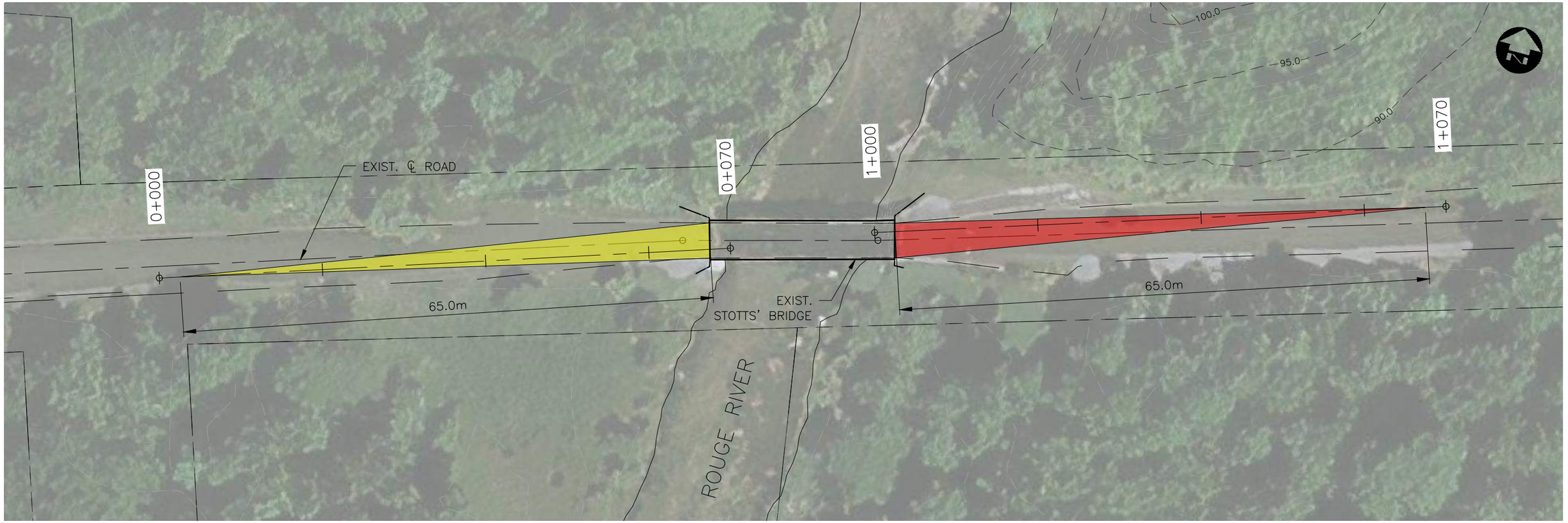
PROJECT ROUGE PARK BRIDGE TRANSPORTATION MASTER PLAN

PROJECT NO. 191924

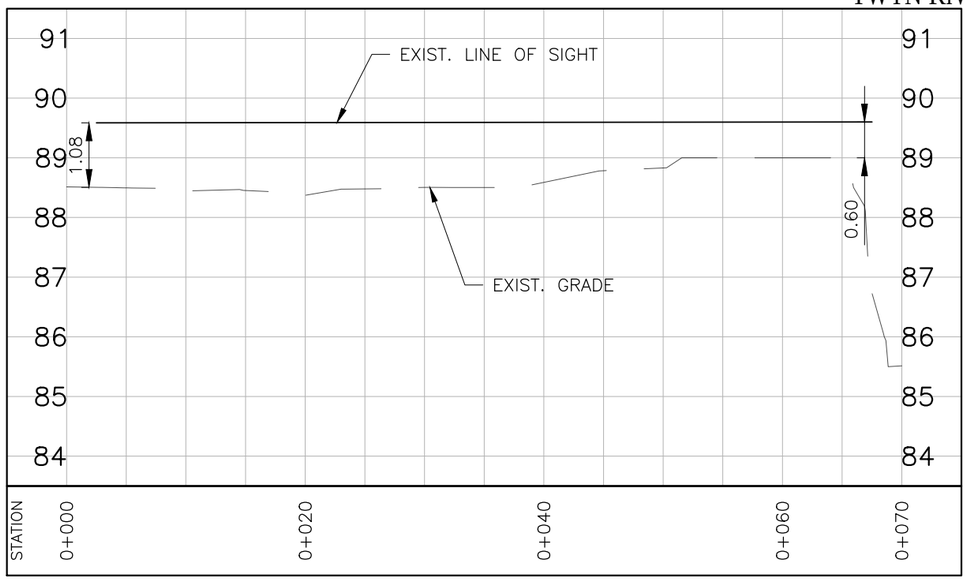
TITLE EXISTING ROADWAY CONDITIONS SEWELL'S BRIDGE

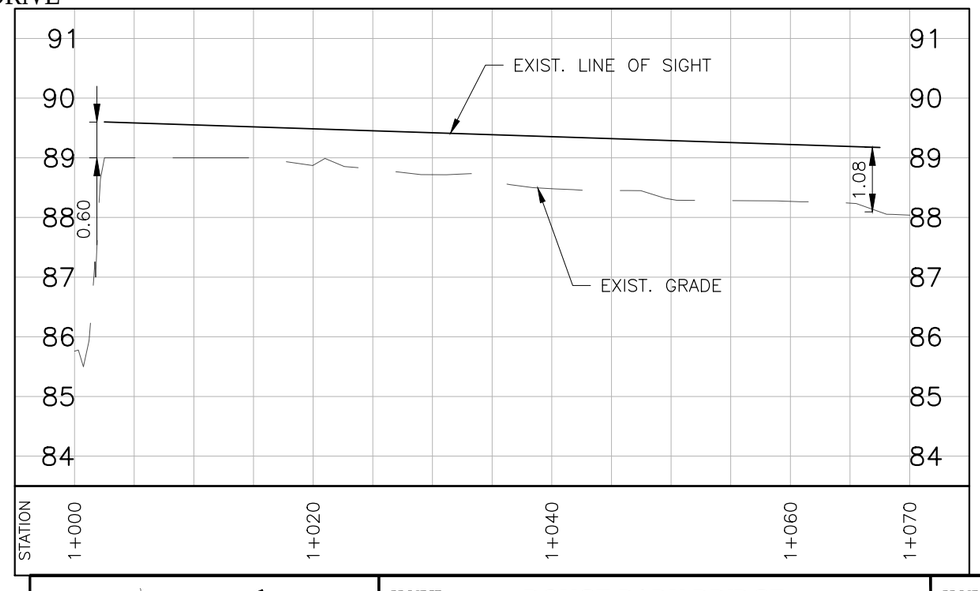
FIGURE NO. FIGNO.

FileName:c:\pw working directory\projects 2019\34kmg\dms80925\191924-08-plan-sewells-fig.dwg



TWYN RIVERS DRIVE





H. SCALE 10 0 10 SCALE 1:500 METRES

V. SCALE 2 0 2 SCALE 1:100 METRES

DILLON CONSULTING

DATE April 21

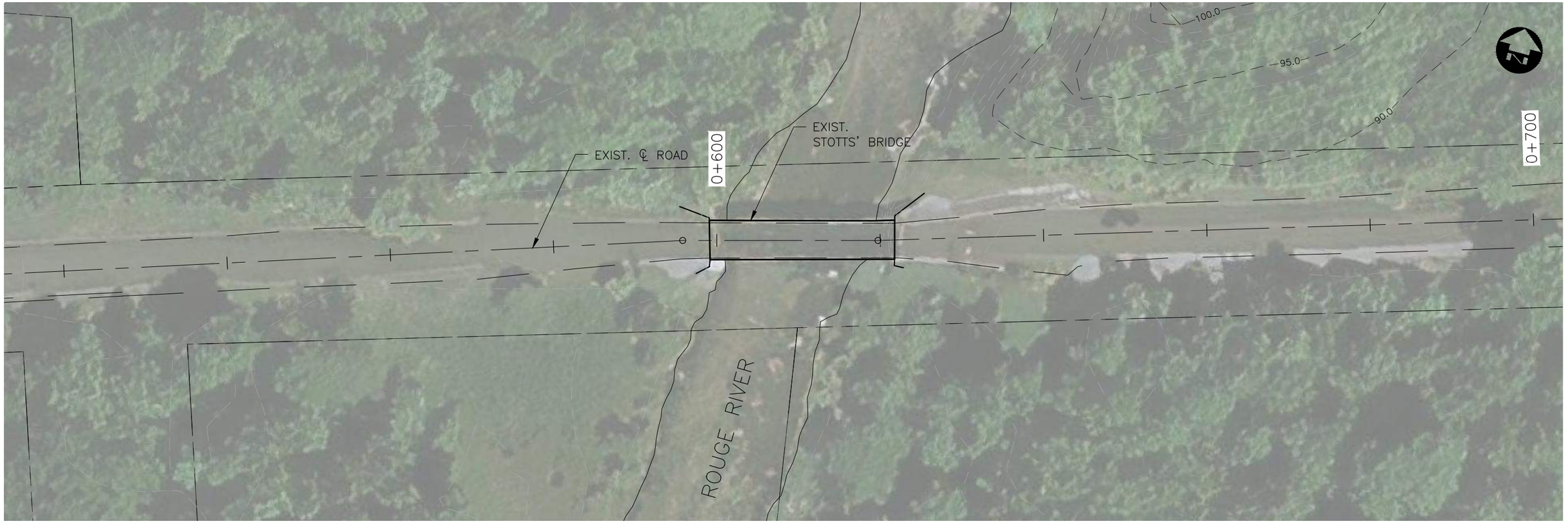
PROJECT ROUGE PARK BRIDGE TRANSPORTATION MASTER PLAN

PROJECT NO. 191924

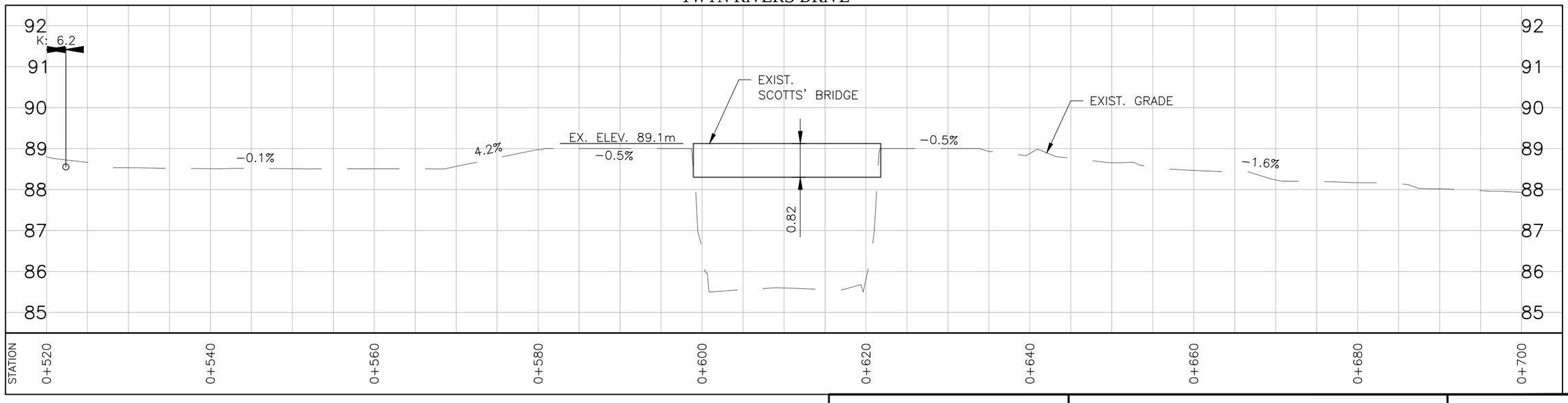
TITLE EXISTING SIGHT DISTANCES STOTTS' BRIDGE

FIGURE NO. FIGNO.

FileName:c:\pw working directory\projects 2019\34kmg\dms80925\191924-08-plan-twyn rivers-fig.dwg



TWYN RIVERS DRIVE



H. SCALE 10 0 10 — SCALE 1:500 METRES

V. SCALE 2 0 2 — SCALE 1:100 METRES

DILLON CONSULTING

DATE April 21

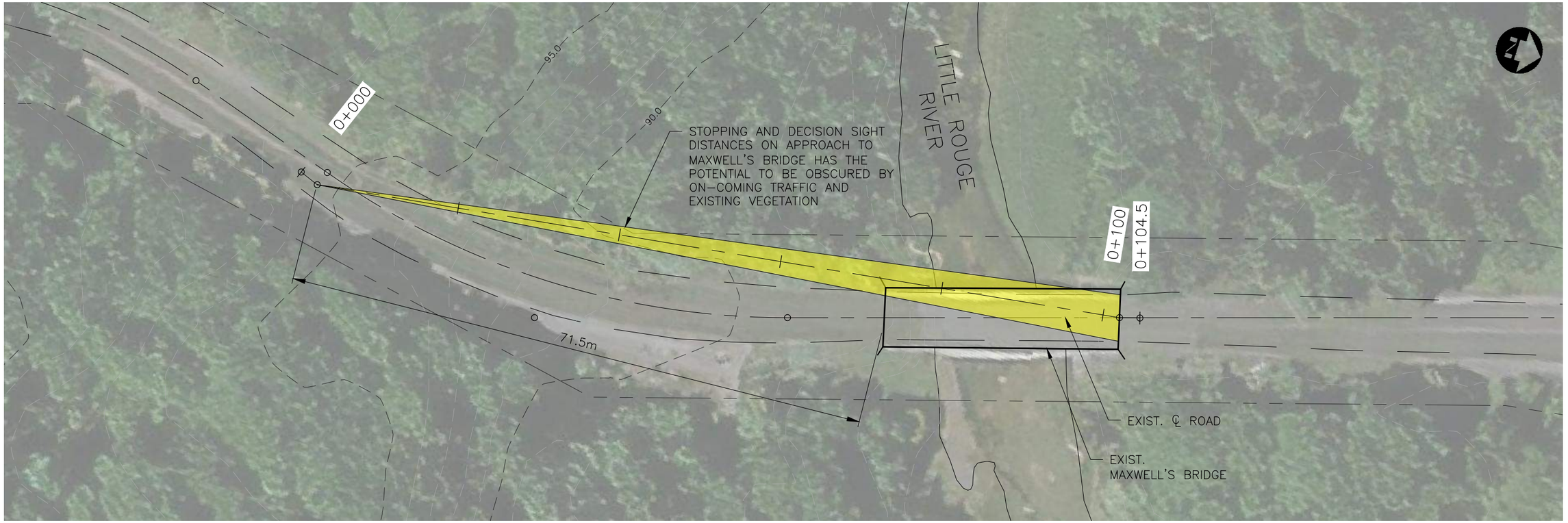
PROJECT ROUGE PARK BRIDGE TRANSPORTATION MASTER PLAN

PROJECT NO. 191924

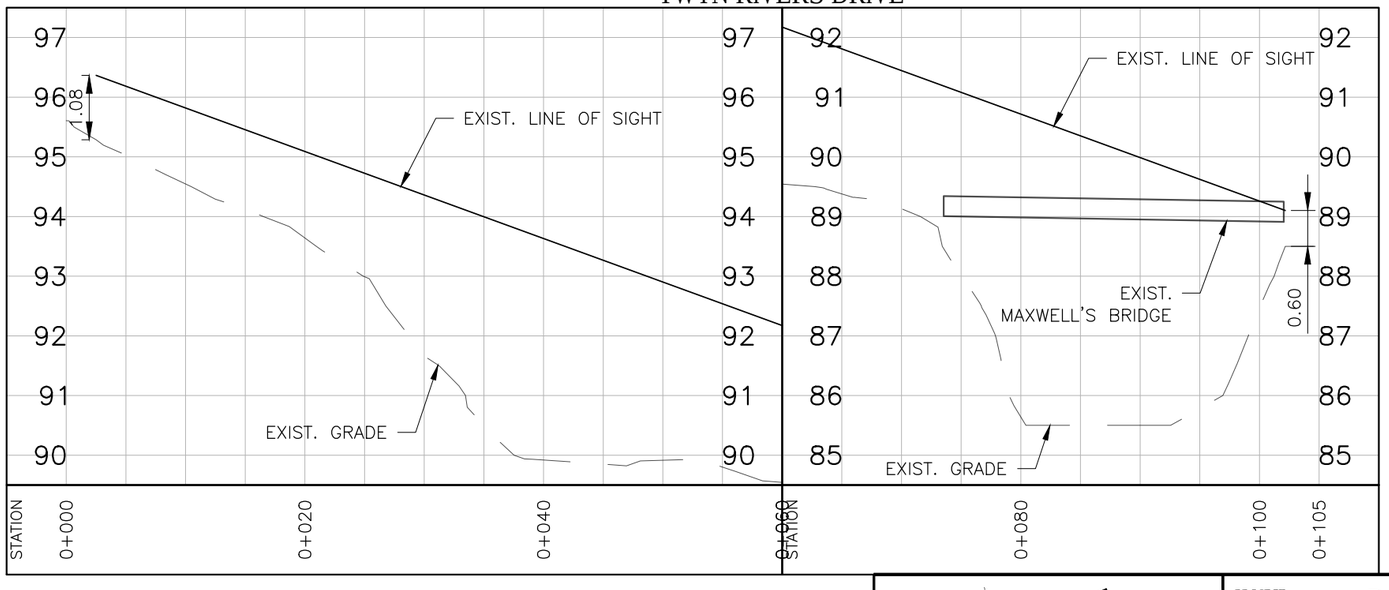
TITLE EXISTING ROADWAY CONDITIONS STOTTS' BRIDGE

FIGURE NO. FIGNO.

FileName:c:\pw working directory\projects 2019\34kmg\dms80925\191924-08-plan-twyn rivers-fig.dwg



TWYN RIVERS DRIVE



H. SCALE 10 0 10 SCALE 1:500 METRES

V. SCALE 2 0 2 SCALE 1:100 METRES

DILLON CONSULTING

DATE April 21

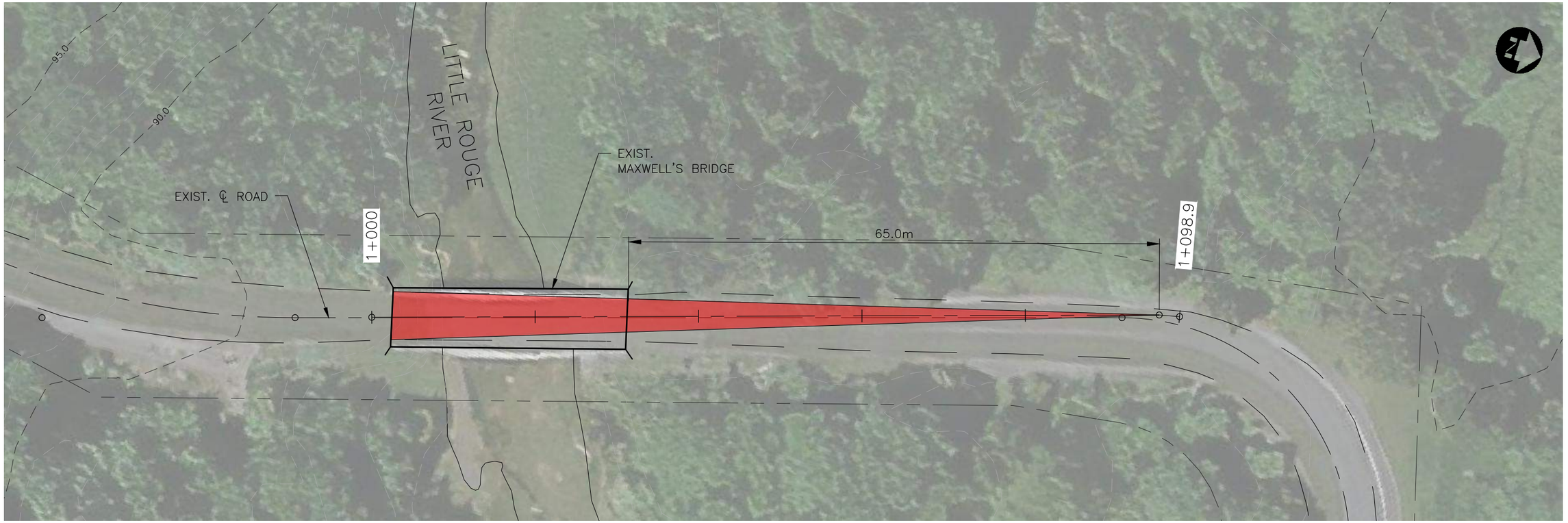
PROJECT ROUGE PARK BRIDGE TRANSPORTATION MASTER PLAN

PROJECT NO. 191924

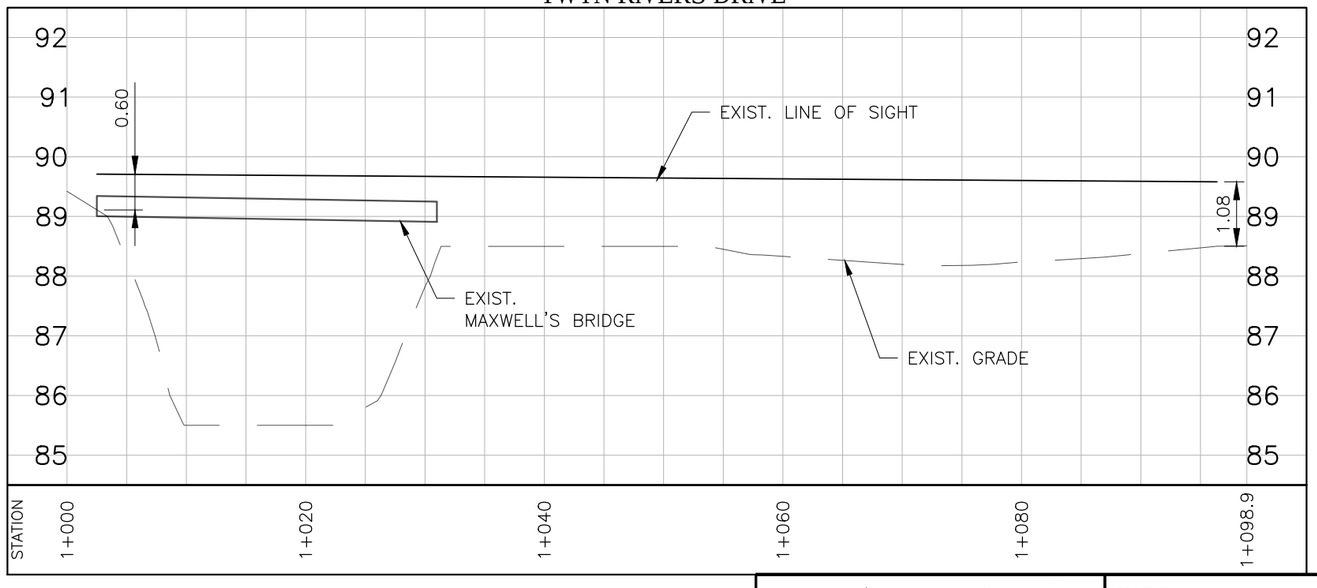
TITLE EXISTING SIGHT DISTANCES MAXWELL'S BRIDGE

FIGURE NO. FIGNO.

FileName:c:\pw working directory\projects 2019\34kmg\dms80925\191924-08-plan-twyn rivers-fig.dwg



TWYN RIVERS DRIVE



H. SCALE 10 0 10 — SCALE 1:500 METRES

V. SCALE 2 0 2 — SCALE 1:100 METRES

DILLON CONSULTING

DATE April 21

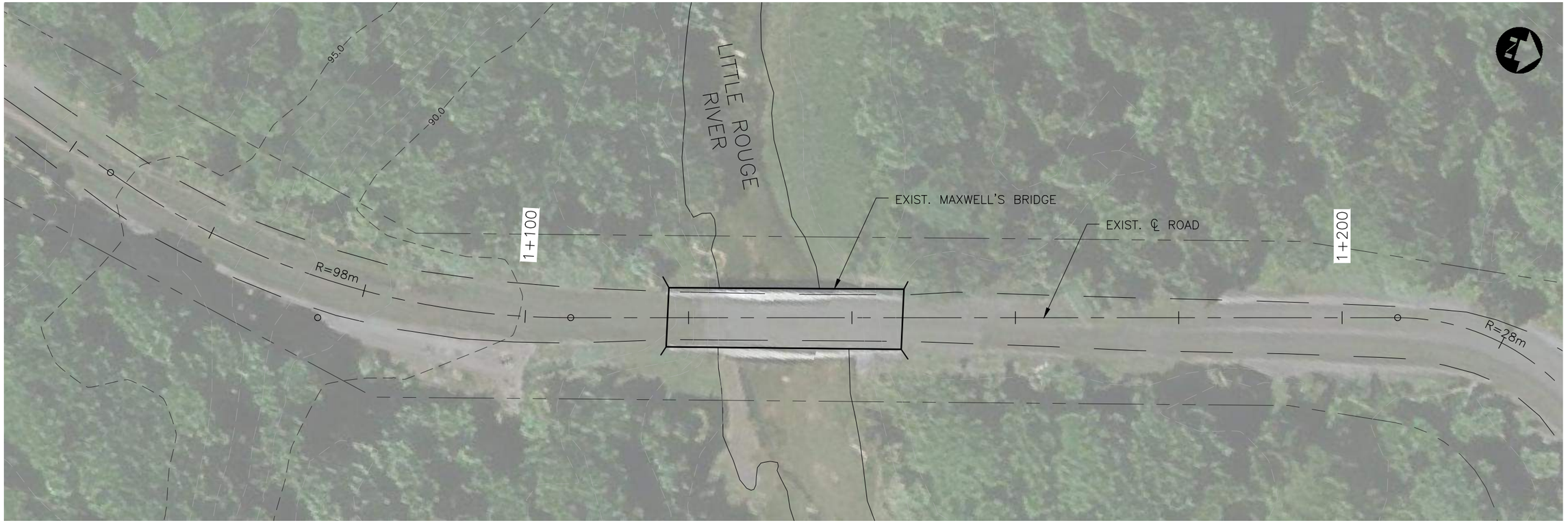
PROJECT ROUGE PARK BRIDGE TRANSPORTATION MASTER PLAN

PROJECT NO. 191924

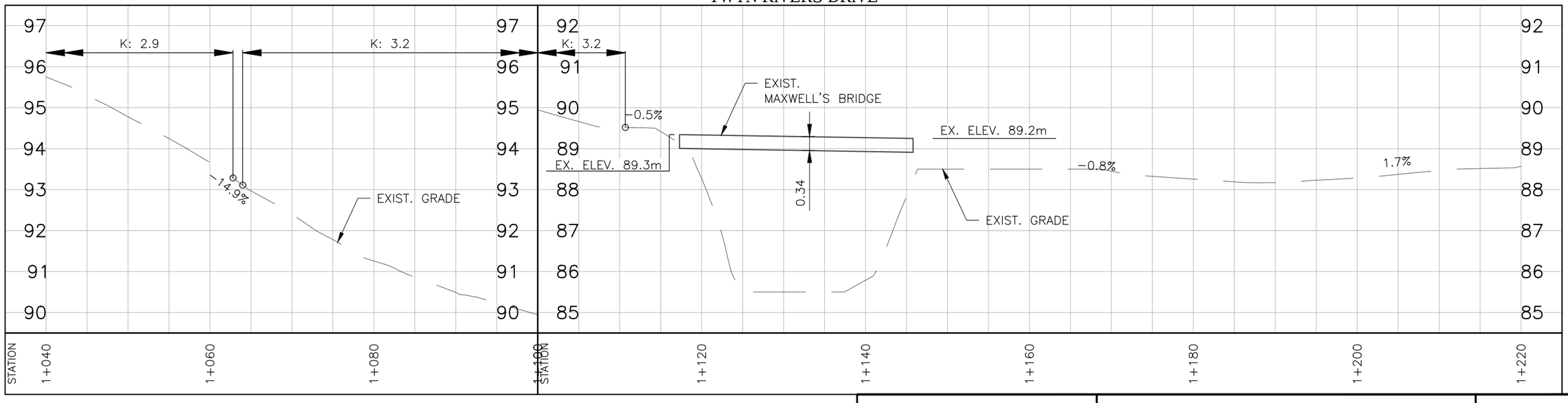
TITLE EXISTING SIGHT DISTANCES MAXWELL'S BRIDGE (NORTH)

FIGURE NO. FIGNO.

FileName:c:\pw working directory\projects 2019\34kmg\dms80925\191924-08-plan-twyn rivers-fig.dwg



TWYN RIVERS DRIVE



H. SCALE 10 0 10 SCALE 1:500 METRES

V. SCALE 2 0 2 SCALE 1:100 METRES

DILLON CONSULTING

DATE April 21

PROJECT ROUGE PARK BRIDGE TRANSPORTATION MASTER PLAN

PROJECT NO. 191924

TITLE EXISTING ROADWAY CONDITIONS MAXWELL'S BRIDGE

FIGURE NO. FIGNO.

FileName:c:\pw working directory\projects 2019\34kmg\dms80925\191924-08-plan-twyn rivers-fig.dwg