Memorial Trail Functional Planning Study

Town of Sylvan Lake

Final Report

April 2022

ISL Engineering and Land Services Ltd. Is an award-winning full-service consulting firm dedicated to working with all levels of government and the private sector to deliver planning and design solutions for transportation, water, and land projects.

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Corporate Authorization

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1.0 Project Overview

The Town of Sylvan Lake (the Town) retained ISL Engineering and Land Services Ltd. (ISL) to update the Town's Transportation Master Plan (TMP) and develop a functional plan to address the long-term needs for the Memorial Trail corridor. This report summarizes the functional planning recommendations for Memorial Trail; the TMP update is summarized in a separate document.

1.1 Study Area

The Memorial Trail Functional Planning Study (FPS) includes the full extent of Memorial Trail within the town boundary, as shown on **Figure 1.1**. In addition to roadway upgrades to Memorial Trail, the study also includes an evaluation of 11 existing and future intersections along the 4 km corridor.

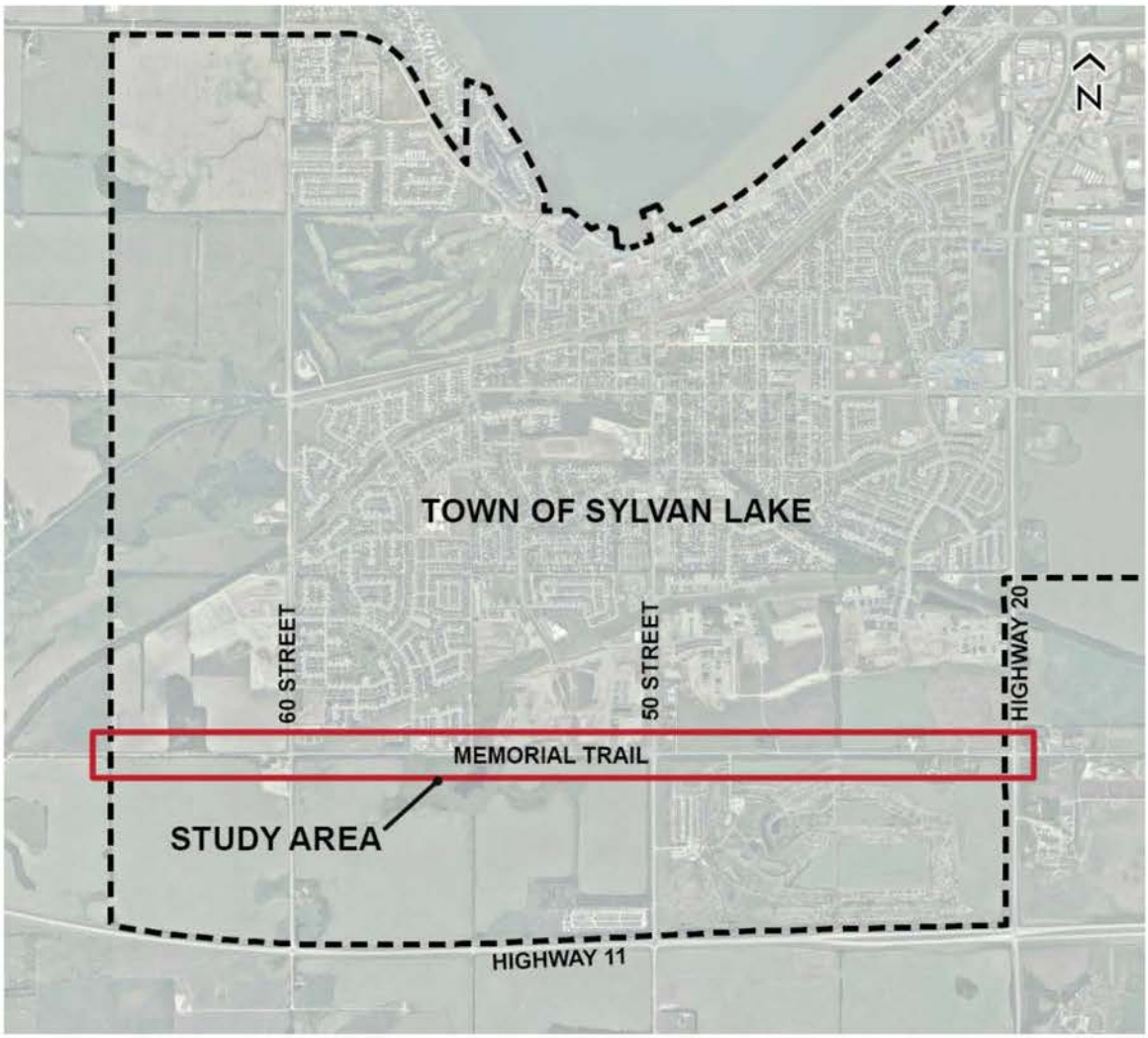

Figure 1.1: Study Area

1.2 Study Background and Previous Transportation Work

One of the key drivers of the FPS is sustained growth within the community of Sylvan Lake. As the lake forms the north boundary of the community, development is currently pushing east, west and south of existing community areas. As development continues to expand to the south towards and across Memorial Trail, an increase in traffic volumes and active mode use is expected along and across Memorial Trail. With advancing development in the area, the Town is looking to define the ultimate Memorial Trail corridor cross section, intersection configurations, and roadway right-of-way (ROW) requirements.

In the past decade, several planning studies have been completed along the Memorial Trail corridor and the adjacent Highway 20 and Highway 11 corridors. Studies reviewed as part of this FPS include:

- 50 Street and Memorial Trail Transportation and Planning Study (Associated Engineering Alberta Ltd., 2010);
- Highway 20 and Memorial Trail Intersection Options & Benefit Cost Analysis (CIMA+, 2019);
- Highway 20 / 781 Planning Study, Highway 11A to Township Road 382 (Dillon Consulting Ltd., 2011);
- Highway 11:12 Access Management Study, Highway 766 to Highway 781 (AMEC, 2014);
- Highway 11 Corridor Management Study Appendix (Dillon Consulting Ltd., 2005); and
- Highway 11 Functional Planning Study, Highway 20 to Highway 2 (McElhanney, 2013).

As noted above, in 2019, the Town completed an intersection analysis to compare the feasibility and benefit cost analysis of implementing a roundabout or a traffic signal at the Memorial Trail and Highway 20 intersection. This study demonstrated a higher benefit cost ratio for a roundabout solution when compared to a signal. It is noted that, in collaboration with AT, this benefit cost analysis was completed utilizing the existing Highway 20 profile.

In addition to previous planning studies along Memorial Trail, Alberta Transportation and the Town have several recently completed and ongoing construction projects on the highways in and around Sylvan Lake. Roundabouts were installed on Highway 20 at Highway 11A and Erickson Drive. Alberta Transportation also funded the twinning of Highway 11 between Sylvan Lake and Rocky Mountain House. Construction of the segment south of Sylvan Lake is expected to begin in 2022 and will include dual-lane roundabouts at the intersections of 50 Street and 60 Street with Highway 11. Alberta Transportation has plans to upgrade the Highway 20 and Highway 11 intersection to a roundabout in the next 10 years and to an interchange in 50+ years.

Per the Development Process and Design Guidelines the Town decided to proceed with roundabouts as the preferred intersection solution along Memorial Trail. Not only are roundabouts consistent upgrades proposed or already constructed at key entry points into the town from the surrounding provincial highway network, they also offer a number of safety, operational and long-term cost benefits. These include elimination of head-on and right-angle collisions, improved visibility and shorter crossings for pedestrians and cyclists, lower long-term maintenance costs, and they are not reliant on a power supply for operation. Furthermore, it is likely that roundabouts at other locations along the corridor would produce a favourable cost-benefit result when compared to a signalization, with an approach similar to the one taken at Memorial Trail and Highway 20.

1.3 Base Mapping and Plan Accuracy

Base mapping for the study was provided by the Town of Sylvan Lake, current to 2017. This includes LiDAR, utility base mapping, and ortho-photo mapping. Cadastral Legal was obtained from AltaList in January 2021. ISL completed a topographic survey at the intersections of Memorial Trail with Highway 20, 50 Street, and 60 Street. Additional utility records were obtained through Alberta OneCall.

All planning and design work was prepared in reference to this information, as is normal practice. The topographic survey, beyond the immediate extent of the intersections noted above, and legal surveys were not completed or referenced in the design work. All electronic CAD plans are 3TM NAD83 coordinates at grid level.

Future users of this report and design information are cautioned to note the level of accuracy inherent in functional planning.

1.4 Study Objectives

The key objectives of the functional planning study are:

1. To identify the preferred roadway alignment and cross section for the future widening of Memorial Trail to four lanes to accommodate vehicular traffic and active mode users;
2. To recommend intersection upgrades and intersection alignment / locations that address future traffic operations and adjacent development requirements;
3. To identify the roadway ROW requirements for the recommended roadway and intersection upgrades;
4. To identify a staging strategy for the future build-out of the corridor;
5. To prepare a streetscape design for the future build-out of the corridor; and
6. To develop a cost estimate for the recommended roadway and intersection upgrades.

2.0 Existing and Future Conditions

One of the key drivers of this FPS is sustained growth within the community of Sylvan Lake. Several new communities are expected to come online in the coming years. With these new communities comes an expansion of the roadway network and changes to land use along Memorial Trail.

2.1 Existing Land Use and Future Development

Seven Outline Plans (OP) have been approved along the corridor. To date, the Town has prioritized development north of Memorial Trail and Pogadl Park. The Lakeway Landing OP area has been fully developed; the Sixty West, Beacon Hill, Crestview and The Vista at Ryders Ridge OP areas are all at various stages of development. Properties to the south of Memorial Trail are primarily agricultural with some rural residential acreages, with the exception of the Meadowlands Golf Club east of 50 Street and the meter station west of 60 Street. Outline plans are currently approved for development of Pogadl Park at the very east end, and redevelopment of the golf course into Meadowlands Resort. The remaining parcels south of Memorial Trail are part of the West and South Area Structure Plans (ASP). Development in the ASP areas is not as imminent as the OP areas. Development areas adjacent to Memorial Trail are shown in **Figure 2.1.**

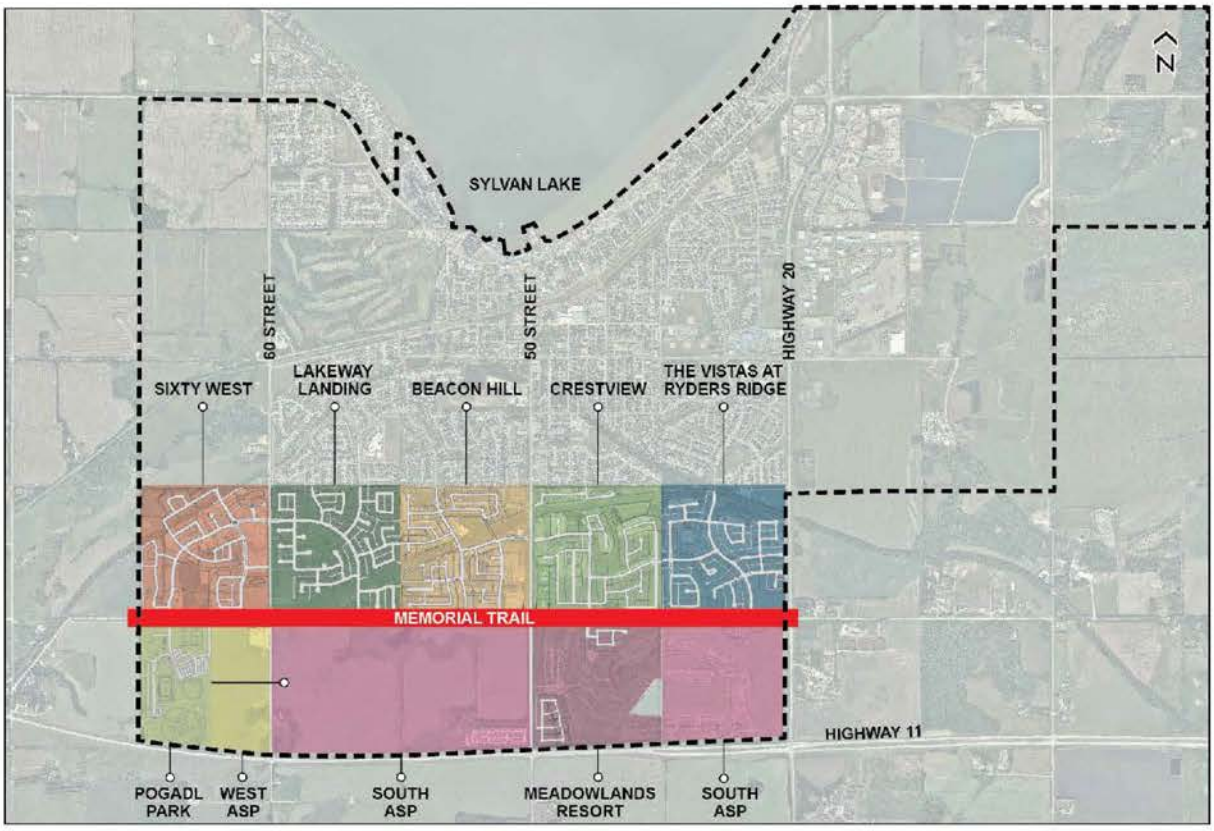

Figure 2.1: Future Development Adjacent to Memorial Trail

2.2 Roadway Network

In the TMP, Memorial Trail is identified as an arterial roadway in the existing and future roadway network. Today, Memorial Trail has a rural cross section with two 3.7 m lanes and 1.0 m paved shoulders and a posted speed of 60 km/h. Existing access to Memorial Trail is a mix of stop-controlled intersections, private accesses (12 total), and one commercial access. Currently, there are six intersections within the study area. Existing cross roads include 60 Street, Lakeway Boulevard, Broadway Rise, 50 Street, Ryders Ridge Boulevard, and Highway 20. In the future, an additional five intersections are planned within the study area. Ultimately, access to Memorial Trail will be limited to intersections and approved commercial access points, although commercial accesses will be limited to right-in/right-out (RIRO) access once Memorial Trail is widened to four lanes.

Highway 20 is a Level 2 arterial highway extending from Highway 11 north approximately 110 km to Highway 39. It provides regional access to Sylvan Lake and Jarvis Bay Provincial Park. Currently Highway 20 is a 2-lane rural undivided highway with a posted speed of 80 km/h between Highway 11 and south of 47 Avenue. Ultimately Highway 20 will be upgraded to a 4-lane divided semi-urban arterial standard between Highway 11 and Highway 11A.

50 Street and 60 Street are both 2-lane rural arterial roadways extending from Lakeshore Drive to Highway 11. Along with Highway 20, they act as gateways into Sylvan Lake and are the key north-south corridors in the roadway network. Posted speeds on 60 Street and 50 Street are 60 km/hnorth of Highway 11. Ultimately, these roadways will be upgraded to 4-lane urban undivided arterials.

The existing and future roadway network is shown on **Figure 2.2** and intersecting roadway details are summarized in **Table 2.1**.

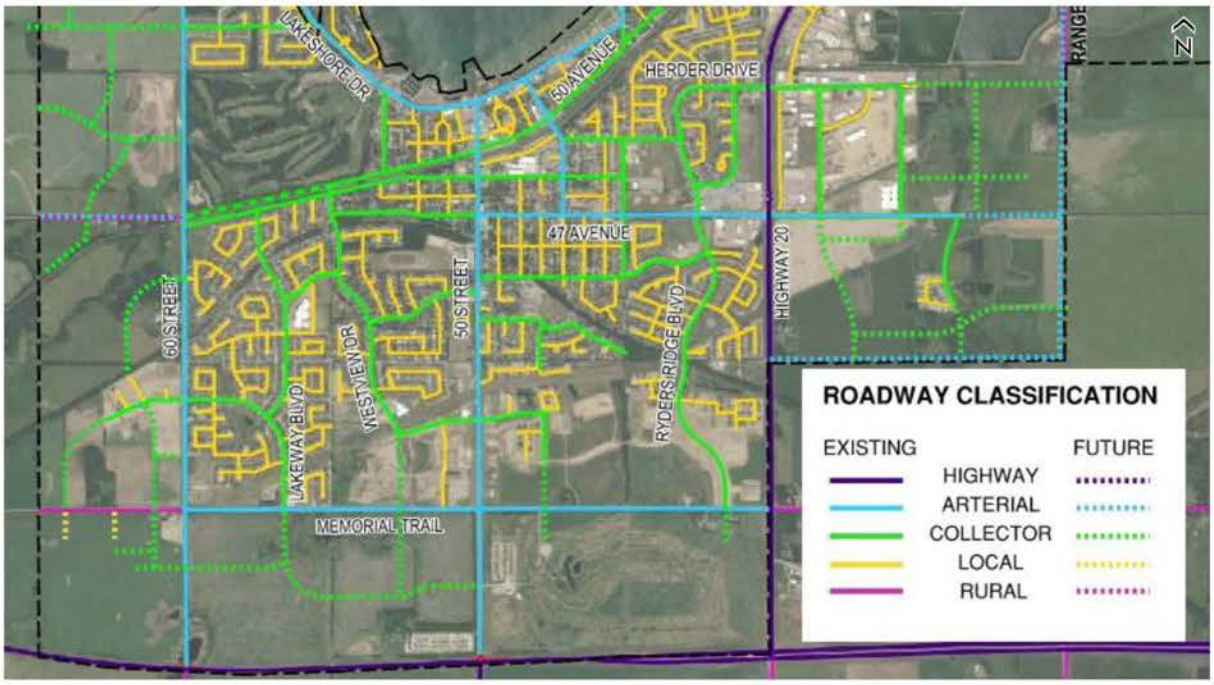

Figure 2.2: Existing and Future Roadway Classification

Table 2.1: Cross Street Classification and Spacing

Roadway	Existing (Future) Classification – Lanes	Existing Intersection Type	Approximate Existing (Future) Intersection Spacing to Next East Cross Street
Springfield Blvd / Pogadl Park Entrance #1	N/A (UCU-2/ULU-2)	N/A	N/A (243 m)
Pogadl Park Entrance #2	ULU-2 (ULU-2)	N/A	N/A (204 m)
Station Dr	UCU-2 (UCU-2)	N/A	N/A (191 m)
60 St	UAU-2 (UAU-4)	4-legged 2-way stop control on Memorial Trail	544 m (544 m)
Lakeway Blvd	UCU-2	3-legged stop control on Lakeway Boulevard	882 m (670 m)
Brookstone Dr	UCU-2 (UCU-2)	-	N/A (212 m)
Broadway Rise	ULU-2 (ULU-2)	3-legged stop control on Broadway Rise	201 m (201 m)
50 St	UAU-2 (UAU-4)	4-legged 2-way stop control on Memorial Trail	1370 m (350 m)
Crestview Blvd	UCU-2 (UCU-2)	-	N/A (1010 m)
Ryders Ridge Blvd	UCU-2 (UCU-2)	3-legged stop control on Ryders Ridge Boulevard	255 m (250 m)
Highway 20	RAU-2 (UAD-4)	4-legged 2-way stop control on Memorial Trail	Outside of Study Area

2.3 Key Site Constraints

There are a number of site constraints; some were addressed in the functional plans, and some will need to be addressed through future design progression. Key constraints influencing the functional plans include:

- **Development**: Lakeway Boulevard, Broadway Rise and Ryders Ridge Boulevard road connections have been constructed north of Memorial Trail. Residential and commercial developments are already in place adjacent to these new roadways in various locations along the corridor. Crestview Boulevard and the surrounding community are fairly advanced in the development process. Property lines and preliminary grading plans in this area are largely set. Avoiding impacts to these newly developed areas placed geometric constraints on roundabout placement at intersections along the corridor.
- **High-Pressure Pipelines:** The meter station and compressor site in the southwest corner of 60 Street and Memorial Trail places both alignment and profile constraints on the roadway and intersection improvements. Several operating and discontinued high-pressure gas transmission pipelines cross at or near the 60 Street and Memorial Trail intersection. Existing utility plans and further discussion on utility considerations are included in Section 8.

- **Other Shallow Utilities:** A number of other utility easements run along the north side of Memorial Trail and there are several fibre optic and telecommunication line crossings at existing intersections along the corridor. Existing utility plans and further discussion on utility considerations are included in Section 8.
- **Historical/Cultural Resources:** The Town's cemetery is in the northeast corner of the Memorial Trail and 60 Street intersection. In addition to avoiding the existing cemetery footprint, the Town has indicated plans to expand the cemetery to the south, closer to Memorial Trial.
- **Environmental:** A large wetland exists south of Memorial Trail and east of Lakeway Boulevard. Avoiding impacts to the wetland is complicated by its proximity to the developed area around Lakeway Boulevard. The ultimate alignment of Memorial Trail in this area must balance the competing environmental and development constraints.

3.0 Traffic Forecasting and Analysis

3.1 Design Traffic Volumes

The short-, medium- and long-term traffic volumes of Memorial Trail are derived from the Town's TMP that was completed by ISL in October 2021. In the TMP, travel demand models in the following three horizons were developed:

- Existing (short-term): 17,000 population, 7,300 households, 2,900 locally-based jobs;
- Medium-term: 30,000 population, 12,500 households, 5,200 locally-based jobs; and
- Long-term: 38,000 population, 16,000 households, 6,700 locally-based jobs.

The travel demand models were built using the VISUM travel forecasting software. VISUM is a transportation planning tool that can efficiently estimate changes in travel patterns and utilization of transportation systems in response to changes in land use, population, employment, and transportation infrastructure. It integrates mapping, land use planning, development projections, future traffic demand, and transportation networks to produce realistic traffic forecasts.

The long-term horizon is based on the build-out of the lands within the Town's boundary and includes the build-out of the lands along Memorial Trail. These include lands from the following Town planning documents: Waterford OP, Pogadl Park OP, Lakeway Landing OP, Beacon Hill OP, Crestview OP, Ryders Ridge OP, Meadowlands Resort OP, and South ASP. In the medium-term, the lands north of Memorial Trail were assumed to be developed, while lands south of Memorial Trail were assumed to be 50% developed. The existing, medium-term and long-term PM peak traffic volumes are shown on Exhibit 3.1 included at the end of this section. Note that in the TMP, only a PM peak model was developed.

3.2 SIDRA Analysis

Roundabout analyses were completed using SIDRA 8.0. SIDRA is a roundabout analysis software that considers traffic operations as well as geometric factors, environmental factors, and human behaviour factors. SIDRA also calculates the traffic operations of the roundabout based on Level of Service (LOS), volume to capacity (v/c) ratio, and queue length. Roundabout analysis results are included in Appendix A.

3.3 SIDRA Parameters

Based on observation and ISL's roundabout analysis experience, we used a combined set of urban (City of Calgary) and rural (Alberta Transportation) parameters to undertake the analysis. The parameters are summarized in Table 3.1.

Table 3.1: Recommended Sidra Parameters

Sidra	Parameters
Delay Model	SIDRA Standard
Queue Model	SIDRA Standard
LOS Method	SIDRA Roundabout LOS
Environment Factor	1.20
Evaluation Period	60 minutes with a 15-minute peak flow period
Peak Hour Factor	0.95

Sidra	Parameters
Queue Length	95th percentile back of queue
Ideal Degree of Saturation	1850
Lane Utilization	Default
Growth Factor = Flow Scale	1.00
LOS Threshold	LOS D
Practical Degree of Saturation	0.85
Exit and Approach Cruise Speed	35 km/h
Heavy Vehicles	2% truck
Pedestrians	20 crossings per hour per crosswalk
Geometry	Island Diameter: 30.0 m Circulating Width: 5.0 m Approach Lane Width: 4.3 m Entry Radius: 20.0 m Entry Angle: 30.0°

The acceptable performance criteria are LOS D or better with v/c ratio of 0.90 or less for each movement at the intersection. We used the default SIDRA LOS standard as shown in Table 3.2, which is between the thresholds for signalized and unsignalized intersections.

Table 3.2: SIDRA LOS Criteria

LOS	A	B	C	D	E	F
Average Delay per Vehicle (s/veh)	< 10	10 – 20	20 – 35	30 – 50	50 – 70	> 70

3.4 SIDRA Results

Long-Term Results

The SIDRA results of the long-term horizon are shown in Table 3.3. The analyses were undertaken with two lanes on Memorial Trail instead of four lanes, as included in the long-term design. From the analysis, the following conclusions were drawn:

- Memorial Trail / Collector Road: All intersections operated well as a 1-lane roundabout with two lanes on Memorial Trail and two lanes on the collector road. The analysis concluded that the designed four lanes on Memorial Trail along with the dual-lane roundabout are not required to accommodate the long-term traffic.
- Memorial Trail / 60 Street, Memorial Trail / 50 Street: Both intersections operated well as a single-lane roundabout with dual-lane approach at the northbound (added right turn lane) and westbound (added right turn lane) approaches; two lanes on Memorial Trail, 60 Street and 50 Street were assumed in the analysis. The analysis concluded that the designed four lanes on Memorial Trail, 60 Street and 50 Street, along with the dual-lane roundabout are not required to accommodate the long-term traffic.
- Memorial Trail / Highway 20: The intersection operated well with a dual lane roundabout with four lanes on Highway 20 and two lanes on Memorial Trail (with dual-lane approach at the eastbound approach) and Township Road 384). The analysis concluded that the designed four lanes on Memorial Trail and Township Road 384are not required to accommodate the long-term traffic.

Table 3.3: SIDRA Results for Long-Term

Intersection		PM Peak		
Name	Movement	v/c Ratio	LOS	Queue Length 95th (m)
Memorial Tr / Springfield Blvd	NBL/T/R	0.08	A	3
	WBL/T/R	0.15	A	5
	SBL/T/R	0.07	A	2
	EBL/T/R	0.00	A	0
Memorial Tr / Station Dr	NBL/T/R	0.20	A	7
	WBL/T/R	0.37	A	17
	SBL/T/R	0.15	A	5
	EBL/T/R	0.14	A	5
Memorial Tr / 60 St	NBL/T	0.64	A	6
	NBR	0.17	A	1
	WBL/T	0.38	A	3
	WBR	0.32	A	2
	SBL/T/R	0.59	A	5
	EBL/T/R	0.38	A	2
Memorial Tr / Lakeway Blvd	NBL/T/R	0.46	A	22
	WBL/T/R	0.64	A	44
	SBL/T/R	0.32	A	14
	EBL/T/R	0.47	A	23
Memorial Tr / Brookstone Dr	NBL/T/R	0.38	A	16
	WBL/T/R	0.65	A	45
	SBL/T/R	0.24	A	10
	EBL/T/R	0.41	A	19
Memorial Tr / 50 St	NBL/T	0.65	A	48
	NBR	0.28	A	10
	WBL/T	0.84	C	94
	WBR	0.11	A	4
	SBL/T/R	0.60	B	37
	EBL/T/R	0.66	B	46
Memorial Tr / Crestview Blvd	NBL/T/R	0.18	A	7
	WBL/T/R	0.55	A	29
	SBL/T/R	0.27	A	11
	EBL/T/R	0.43	A	21
Memorial Tr / Ryders Ridge Blvd	NBL/T/R	0.13	A	5
	WBL/T/R	0.82	A	86
	SBL/T/R	0.32	A	14
	EBL/T/R	0.44	A	21
Memorial Tr / Hwy 20	NBL/T,T/R	0.65	A	42
	WBL/T,T/R	0.20	A	6
	SBL/T,T/R	0.78	A	67
	EBL/T,T/R	0.51	A	24

Medium-Term Results

The SIDRA results of the medium-term horizon are shown in Table 3.4. From the analysis, the following conclusions were drawn:

- Memorial Trail / Collector Roads: As the single-lane roundabout could already accommodate the higher volume long-term traffic at all Memorial Trail / collector road intersections, the lower volume medium-term horizon was not analyzed.
- Memorial Trail / 60 Street, Memorial Trail / 50 Street: The intersections operated well per the medium-term design (single-lane roundabout with two lanes on Memorial Trail, 60 Street and 50 Street).
- Memorial Trail / Highway 20: The single-lane roundabout with two lanes on Memorial Trail and Highway 20 would operate at above capacity. Per the TMP, Highway 20 reaches capacity and is required to be twinned prior to the medium-term / 30,000 population. The results of the roundabout with Highway 20 twinned and two lanes on Memorial Trail are shown in Table 3.4. With four lanes on Highway 20, the roundabout operates well. Per previous discussions with the Town and Alberta Transportation, it was agreed to design the intersection with a single-lane roundabout in the medium-term as the TMP is based on an aggressive growth (5% / year). The Town's population growth of the past 5 years and 10-year historic traffic data at the intersection both indicates a growth rate of less than 2% per year. Two sensitivity analyses were undertaken by ISL:
  - Historic traffic growth on both Highway 20 (1.7% / year) and Memorial Trail (1.9% / year). Using the historic traffic growth, the single-lane roundabout with two lanes on both Memorial Trail and Highway 20 could accommodate 10 years of traffic growth. The 10-Year traffic volume using the historic traffic growth is shown in Table 3.5 below.
  - As Town residence are familiar with roundabouts, the Environmental Factor was adjusted from 1.2 (per Table 3.1) to 1.0. With this change, the 5-Year TMP traffic could be accommodated with a single-lane roundabout. The TMP 5-Year traffic volume is shown in Table 3.5 below.

Table 3.4: SIDRA Results for Medium-Term

Intersection		PM Peak		
Name	Movement	v/c Ratio	LOS	Queue Length 95th (m)
Memorial Tr / 60 St	NBL/T/R	0.60	A	37
	WBL/T/R	0.48	A	25
	SBL/T/R	0.37	A	16
	EBL/T/R	0.30	A	12
Memorial Tr / 50 St	NBL/T/R	0.69	A	54
	WBL/T/R	0.83	B	84
	SBL/T/R	0.38	A	18
	EBL/T/R	0.46	A	22
Memorial Tr / Hwy 20 (TMP Volumes, Two lanes Hwy 20)	NBL/T/R	1.25	F	674
	WBL/T/R	0.02	B	1
	SBL/T/R	1.35	F	1031
	EBL/T/R	0.70	B	53
Memorial Tr / Hwy 20 (TMP Volumes, Four lanes Hwy 20)	NBL/T,T/R	0.56	A	34
	WBL/T/R	0.01	A	0
	SBL/T,T/R	0.66	A	47
	EBL/T/R	0.80	B	52

Memorial Tr / Hwy 20 (5-Year TMP Volumes, Two lanes Hwy 20, Environment Factor 1.0)	NBL/T/R	0.74	A	69
	WBL/T/R	0.01	A	1
	SBL/T/R	0.84	A	107
	EBL/T/R	0.40	A	21
Memorial Tr / Hwy 20 (10-Year Historic Hwy Growth Volumes, Two lanes Hwy 20)	NBL/T/R	0.71	A	67
	WBL/T/R	0.04	A	2
	SBL/T/R	0.68	A	53
	EBL/T/R	0.34	A	15

Table 3.5: Sensitivity Test PM Peak Peak Hour Traffic Volumes

Sens Test	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
10 Yr Historic Growth Rate	53	2	140	4	1	12	82	804	1	7	615	177
5 Year TMP	219	1	65	1	1	2	233	607	1	2	580	366

Existing Results

The SIDRA results of the existing horizon are shown in Table 3.5. From the analysis, the following conclusions were drawn:

- Memorial Trail / 60 Street, Memorial Trail / 50 Street, Memorial Trail / Highway 20: The intersections operated well per the existing design (single-lane roundabout with two lanes on Memorial Trail, 60 Street, 50 Street, and Highway 20).

Table 3.6: SIDRA Results for Existing

Intersection		PM Peak		
Name	Movement	v/c Ratio	LOS	Queue Length 95th (m)
Memorial Tr / 60 St	NBL/T/R	0.18	A	6
	WBL/T/R	0.07	A	2
	SBL/T/R	0.10	A	3
	EBL/T/R	0.02	A	1
Memorial Tr / 50 St	NBL/T/R	0.11	A	4
	WBL/T/R	0.39	A	17
	SBL/T/R	0.12	A	4
	EBL/T/R	0.08	A	3
Memorial Tr / Hwy 20	NBL/T/R	0.60	A	6
	WBL/T/R	0.03	A	0
	SBL/T/R	0.56	A	5
	EBL/T/R	0.25	A	1

LEGEND
999 = LONG TERM (38,000 POPULATION) PM PEAK VOL
999 = MID TERM (30,000 POPULATION) PM PEAK VOL
999 = EXISTING PM PEAK VOL

SPRINGFIELD BLVD
STATION DR
LAKEWAY BLVD
BROOKSTONE DR
BROADWAY RISE
CRESTVIEW BLVD
RYDERS RIDGE BLVD
MEMORIAL TRAIL
60 STREET
50 STREET
HWY 20

Sylvan Lake

ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
TRAFFIC VOLUMES
MEMORIAL TRAIL
PM PEAK HOUR

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4.0 Design Criteria

Design standards for roadways within the study area are based on the following primary guiding documents:

- Sylvan Lake Development Process and Design Guidelines (DPDG) – 2018 Edition V2.0;
- Sylvan Lake General Construction Specifications – 2014 Edition V2.0;
- Transportation Association of Canada (TAC) Design Guide for Canadian Roads – 2017;
- Alberta Transportation Highway Geometric Design Guide (AT HGDG) – 2020; and
- Alberta Transportation Roadside Design Guide (AT RDG) – 2007.

Roundabout design for this FPS was completed in accordance with guidelines and requirements of the following documents:

- NCHRP Report 672 – Roundabouts: An Informational Guide – Second Edition;
- Alberta Transportation Design Bulletin #68/210 Roundabout Design Guidelines on Provincial Highways (DB#68); and
- Transportation Association of Canada (TAC) Canadian Roundabout Design Guide – 2017.

Recommended design criteria for roadways and intersections within the study area are presented below.

4.1 Roadway Classification and Design Parameters

Roadway classifications and design standards were assigned to roadways within the study area based on projected traffic volumes along the corridor and function and service classification of each roadway. **Table 4.1** summarizes the ultimate roadway designations and recommended design parameters.

Table 4.1: Roadway Design Parameters

Design Criteria		Memorial Trail / Arterial Roadways	Collector Roadways	Local Roadways	Standard	Highway 20	Standard
Designation		UAD	UCU	ULU	-	UAD	-
Design Speed		70 km/h	50 km/h	50 km/h	DPDG Table 12-1	70 km/h	AT HGDG
Posted Speed		60 km/h	40 km/h	40 km/h	DPDG Table 12-1	60 km/h	AT HGDG
Lanes		4	2	2	2	4	-
Decision SD		125 -275 m	75 – 200 m		TAC 2017 Table 2.5.6	275 - 315 m	AT HGDG Table A-10-1b
Horizontal Alignment	Minimum Curve Radius R_{min}	250 m	185 m (NC) 135 m (RC)	115 m	DPDG Table 12.A	190 m	AT HGDG Table B.3.6a
	Spiral Parameter A (Min)	N/A	N/A	N/A	DPDG Table 12.A	110 m	AT HGDG Table B.3.6a
	e_{max}	0.06	0.02	0.02	DPDG Table 12.B	0.06	AT HGDG B.3.6.2

Design Criteria		Memorial Trail / Arterial Roadways	Collector Roadways	Local Roadways	Standard	Highway 20	Standard
Vertical Alignment	Grade (Desirable)	1 - 3%	1 – 6%	1 – 6%	DPDG Table 12.B	0 - 2%	-
	Grade (Max)	6%	9%	9%	DPDG Table 12.B	6%	AT HGDG B.4.2
	Grade (Min)	1% (Des) 0.5 %(LOG)	1% (Des) 0.5 %(LOG)	1% (Des) 0.5 %(LOG)	DPDG Table 12.B	0.5%(Ditch) 0.35% (LOG)	AT HGDG Table B.4.3
	Crest K – SSD (Min)	17	7	7	TAC 2017 Table 3.3.2	17	AT HGDG Table B.4.4-2a
	Sag K – Headlight (Min)	10-12	5-6	5-6	TAC 2017 Table 3.3.5	23	AT HGDG Table B.4.4-2a
Cross Section	Lane Width (m)	3.5 m / 3.75 m	3.75 m	3.0 m	DPDG Dwg 12.02/12.03/ 12.07	3.7 m	AT HGDG Figure C-6.2c
	Parking Width	N/A	2.25 m	2.25 m	DPDG Dwg 12.02/12.03/ 12.07	N/A	-
	Median Width (m)	3.0 m	N/A	N/A	DPDG Dwg 12.02/12.03/ 12.07	6.0 m	AT HGDG Figure C-6.2c
	Median Type	Urban	N/A	N/A	DPDG Dwg 12.02/12.03/ 12.07	Urban	AT HGDG Figure C-6.2c
	Boulevard Width	4.5 m	N: 1.95 m S: 2.5 m	N/A	DPDG Dwg 12.02/12.03/ 12.07	4.5 m	-
	Active Modes	3.5m MUP / 3.0m MUP	N: 1.5m S/W S: 2.5 m S/W	N/A	DPDG Dwg 12.02/12.03/ 12.07	3.0m MUP	-
	ROW Width	40 m / 32 m	23 m	20 m	DPDG Dwg 12.02/12.03/ 12.07	60 m	AT HGDG Figure C-6.2c
	Curb Type	0.5 m 200mm Barrier	0.25 m Rolled	0.25 m Rolled	DPDG Dwg 12.02/12.03/ 12.07	0.5 m 200mm Barrier	-
	Sideslope Ratio (Normal – Fill Max)	3:1	3:1	3:1	DPDG Dwg 12.20	3:1 to 5:1	AT HGDG Figure C-6.2c
	Backslope Ratio (Normal – Max)	3:1	3:1	3:1	DPDG Dwg 12.20	3:1 to 5:1	AT HGDG Figure C-6.2c
	Clear Zones (m)	N/A	N/A	N/A	-	8 - 10 m	AT HGDG Table C.5.2a
	Shy Distance (m)	1.7	1.1	1.1	TAC 2017 Table 7.6.4	2.2	TAC 2017 Table 7.6.4

4.2 Typical Cross Sections

Memorial Trail

The recommended ultimate cross section for Memorial Trail is a 40 m wide 4-lane urban arterial street with a 3 m raised landscaped median. While traffic analysis in the TMP indicates only two lanes are needed in the long-term 38,000 population horizon, as the only east-west arterial within the Town, protecting for four-lanes will ensure a high-quality connection exists when population growth eventually exceeds 38,000. The TMP population estimates are based on information known today, further population growth could result from future Town annexation or proposed densifications in future Outline Plans (i.e. south of Memorial Trial). With development along the corridor still in early stages, protecting the space for a four-lane cross section now will provide the Town with the flexibility to add capacity when it is needed, without initiating land acquisition within established developments. The proposed laning and ROW width is consistent with recommendations from the 50 Street and Memorial Trail Transportation and Planning Study completed in 2010.

Memorial Trail is expected to be urbanized as development progresses along the corridor. Curb and gutter will be introduced in the medium-term when the existing lanes are upgraded, and the north boulevard is constructed. A ditch will remain along the south side of Memorial Trail, to facilitate drainage within the ROW. In the long-term, once communities are established north and south of Memorial Trail, a full urban cross section will be consistent with the development context. Furthermore, an urban roadway cross-section and drainage solution is required to fit within the proposed 40m ROW; maintaining rural roadway drainage with a four-lane arterial would require upwards of 60m.

The ROW width varies approaching intersections as deflection is introduced along Memorial Trail to generate the desired roundabout entry angle and fastest path speeds outlined in NCHRP 672 guideline. ISL and the Town investigated many configurations for the public realm areas; these options are included in **Appendix B.** Ultimately Council decided to move forward with 4.5 m landscaped boulevards and 3.5 m multi-use pathways as shown in **Figure 4.1.**

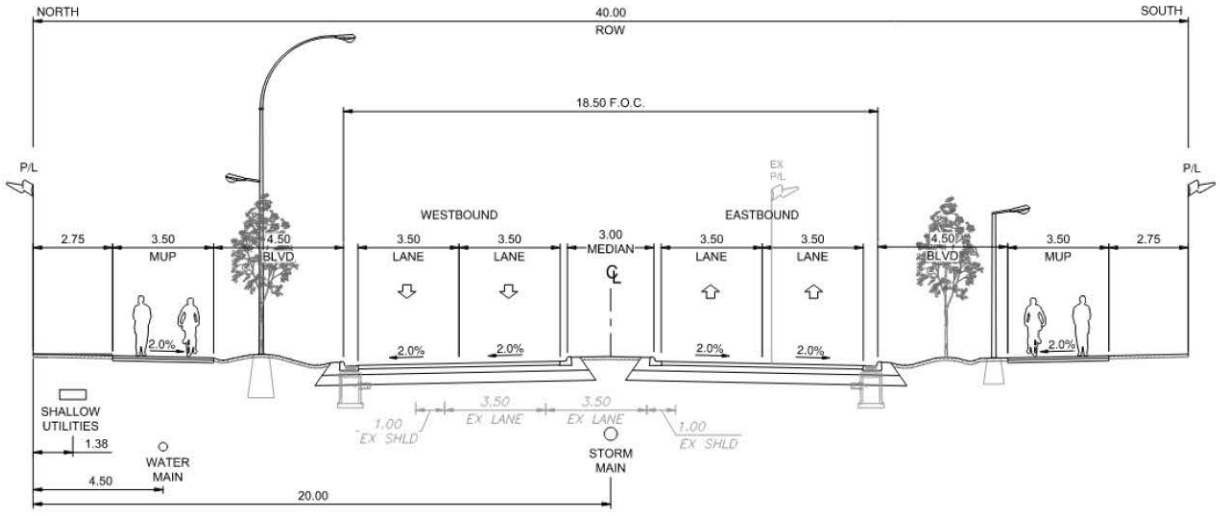


Figure 4.1: 40 m Arterial ROW Cross Section for Memorial Trail

Highway 20

Highway 20 was designed within the existing 60 m ROW as a 4-lane divided highway in the ultimate configuration. To minimize throwaway costs, the recommended cross section in **Figure 4.2** shows the highway widened to the east allowing the existing lanes to become the future southbound lanes. This leaves the roadway shifted to the east side of the existing ROW with minimum clear zone between the northbound lanes and the east pathway.

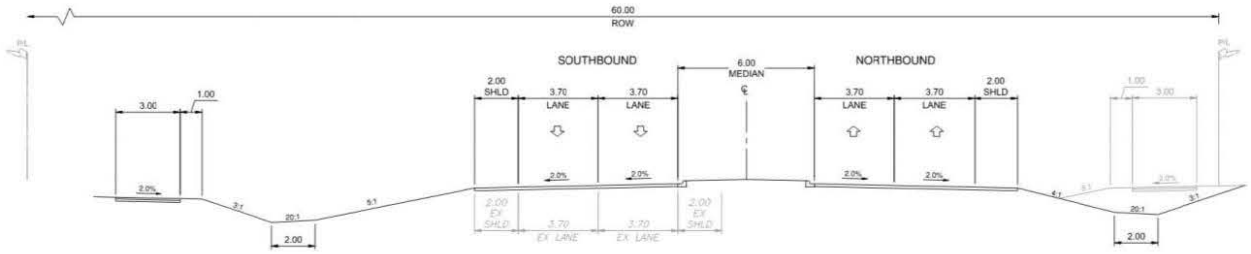


Figure 4.2: 60 m Highway 20 ROW Cross Section

Arterial Roadways

Ultimate cross sections for 50 Street and 60 Street are adopted from the Town's Development Process and Design Guidelines (DPDG) for a 32 m wide 4-lane undivided arterial roadway as shown in **Figure 4.3**. The cross section widens approaching Memorial Trail where a raised median and horizontal deflection are introduced to generate the desired roundabout entry angle and fastest path speeds outlined in NCHRP 672 guideline.

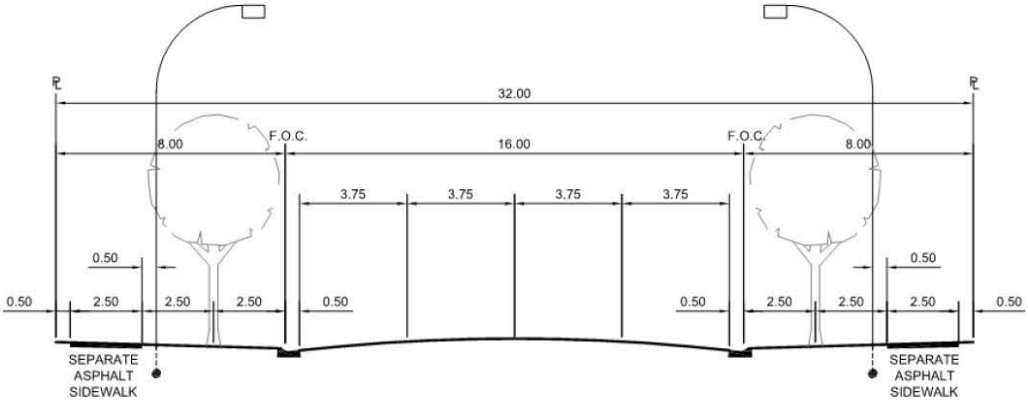


Figure 4.3: Typical 32 m Undivided Arterial Cross Section

Collector Roadways

Existing collector roadways on the north side of Memorial Trail follow the DPDG standard section for a redevelopment collector roadway, with one exception – separated sidewalks are typically included on both sides on the roadway in place of the mono concrete sidewalk as suggested in the DPDG and shown in **Figure 4.4**. This is consistent with the Lakeway Boulevard cross section in place today.

The recommended cross section for future collector roadways north and south of Memorial Trail was adopted from the DPDG standard section for an undivided collector residential roadway and is shown in **Figure 4.5.**

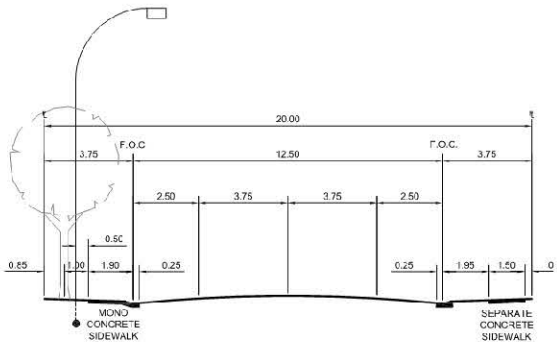


Figure 4.4: 20 m Collector ROW Cross Section Existing Development

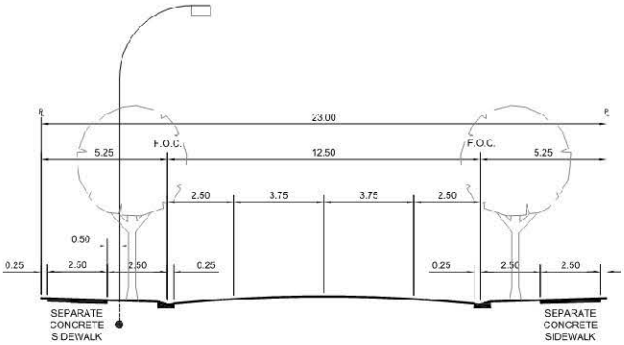


Figure 4.5: 23 m Collector ROW Cross Section New Developments

Local Roadways

Cross sections at the entrances to Pogadl Park were adapted from the typical 20 m wide section shown in **Figure 4.4.** The 20 m ROW width is maintained; however, as the park contains its own pathway network and parking areas, it is recommended that the roadway width is narrowed to 10.5 m (two 5.25 m lanes), consistent with other local roadway cross sections in the DPDG, and sidewalks do not need to be constructed within the road ROW. The roadway width could be narrowed further at future design stages to prevent parking on the side of the roadway.

4.3 Roundabout Design Parameters

In the long-term, all roundabouts along the corridor will be multi-lane roundabouts, with 2x2 roundabouts planned at Highway 20 and the arterial roadway intersections and 2x1 spiral roundabouts planned at collector roadway intersections.

Four key performance checks were completed at Highway 20 and the typical arterial and collector roundabout layouts:

- **Path Overlap:** The tangent method, outlined in Section 6.5.4 of NCHRP 672, was used for both the 2x1 and 2x2 roundabouts to avoid entry path overlap. This method uses tangents between the circulating lanes and the entry radii to control the entry angle and ensure vehicles enter along the correct circulatory path. Exit path overlap is avoided by using large exit radii.
- **Fastest Path**: The fastest path is the fastest theoretical speed by which a single vehicle can navigate the roundabout and is a measurement of the deflection provided at the entry and through the circulatory lanes. Fastest paths for all movements and all directions were calculated to confirm that speed differentials. However, the entry speed (V1) is the critical design parameter as generally if the entry speed is below the specified maximum, the speed differential will also be below the maximum.
- **Intersection Sight Distance**: At roundabouts, stopping and intersection sight distance are checked at each approach leg. Three stopping sight distances were checked: on approach to the crosswalk and yield line, to the crosswalk upon exit, and on the circulatory lane. Intersection sight distance is checked to both the upsteam entering and circulating vehicles. Finally, the visibility angle between consecutive entries is checked against the minimum requirement of 75 degrees.
- **Design Vehicle Accommodation:** Controlling design vehicles for this study include WB-17 for collector roadways, WB-21 on Memorial Trail, and WB-36 modified / low boy / platform trailer trucks on Highway 20. These vehicles were confirmed with the Town and Alberta Transportation (for Highway 20) and are consistent with roadway classification and the types of larger trucks that will periodically use each type of roadway. Vehicle movements were checked against the three cases outlined in AT DB#68. Case 2 is preferred for most turning movements involving larger trucks as it provides the best balance between vehicle accommodation and the footprint of the roundabout. Truck aprons were designed so that the controlling case for WB-21 and WB-17 movements fall under Case 2. It is generally acceptable for larger trucks to "take over" the adjacent lane at a multi-lane roundabout entry and track exclusively through the roundabout, especially if these movements are infrequent.

Design criteria for these four performance objectives, along with basic geometric parameters are included in **Table 4.2**.

Table 4.2: Roundabout Design Parameters

	Highway 20 2x2 Roundabout	Arterial 2x2 Roundabouts	Collector 2x1 Roundabouts	Reference
Vehicle Turning Movements				
Design Vehicle Case 1 – Use Both Lanes	Lowboy Platform Trailer Through on Hwy 20 WB-36 Modified All Turns	-	WB-21 Through (Memorial Trail only) WB-17 Right Turns	AT DB#68 Sections 3 & 4
Design Vehicle Case 2 – Stay in Lane to Yield, Then use Both Lanes after Yield	WB-21 and SU-9 Through WB-21 Right Turns	WB-21 and Passenger Car Through WB-21 Right Turns	WB-17 and Passenger Car Through WB-17 Left-Turn (Collector)	AT DB#68 Sections 3 & 4
Design Vehicle Case 3 – Stay in Lane at All Times	WB-21 Left Turns	WB-21 Left Turns	WB-17 Left-Turns (Memorial Trail)	AT DB#68 Sections 3 & 4
Circle Details				
Inscribed Circle Diameter	50-67 m	50-67 m	50-67 m	NCHRP 672 (Exhibit 6-9)
Circulatory Lane Width	4.5-5 m	4.5-5 m	4.5-5 m	NCHRP 672 (Section 6.5.3)
Truck Apron Width	1-4.5 m	1-4.5 m	1-4.5 m	NCHRP 672 (Section 6.4.7.1) As determined by truck tracking analyses
Truck Apron Height	AT = 60 mm	Typical 50-75 mm	Typical 50-75 mm	NCHRP 672 (Section 6.4.7.1) AT DB#68 (Dwg No. D-10.1a)
Curb Type	Semi Mountable ≤ 125 mm	Semi Mountable ≤ 125 mm	Semi Mountable ≤ 125 mm	AT Dwg CB6-4.2M89
Approach Legs				
High-Speed Approach Successive Curve Treatment	Yes	Yes	On Arterial Only	NCHRP 672 (Exhibit 6-70)
Approach Alignment	Offset Left of Centre	Offset Left of Centre	Centred	NCHRP 672 (Exhibit 6-10)
Entry Curve	30-45 m	30-45 m	N/A	NCHRP 672 (Exhibit 6-30)
Entry Path Overlap	Minimum: 8 m Desired: 12-15 m			Wisconsin DoT FDM (Figure 30.17)
Exit Curve	91-244 m			NCHRP 672 (Section 6.4.6)
Exit Path Overlap	Minimum: 8 m Desired: >12 m			Wisconsin DoT FDM (Figure 30.17)
Crosswalk Width at Splitter Islands	Minimum: 1.8 m Desired: 3.0-3.5 m			NCHRP 672 (Section 6.8.1.2)
Crosswalk Setback	Minimum: 15 m (Dual-Lane Exits)	Minimum: 15 m (Dual-Lane Exits)	Minimum: 7.5 m (Single-Lane Exits)	NCHRP 672 (Section 6.8.1.2)

	Highway 20 2x2 Roundabout	Arterial 2x2 Roundabouts	Collector 2x1 Roundabouts	Reference
Fastest Paths	*AT DB#68 Section 3.9 – Use Wisconsin DOT RDG Section 30.5.2 Wisconsin DOT FDM Attachment 50.1*			
R1 = Entry Path Radius -> V1 =	Acceptable Range: 40-50 km/h			NCHRP 672 (Exhibit 6-47)
R2 - Circulating Path Radius -> V2 =	Typical Range: 40-55 km/h			NCHRP 672 (Exhibit 6-47)
R3 - Exit Path Radius -> V3 =	Typical Range: 45-65 km/h			NCHRP 672 (Exhibit 6-47)
R4 - Left Turn Path Radius -> V4 =	Typical Range: 25-30 km/h			NCHRP 672 (Exhibit 6-47)
R5 - Right Turn Path Radius -> V5 =	Typical Range: 35-50 km/h			NCHRP 672 (Exhibit 6-47)
Speed Consistency/ Max Speed Diff.	Desired Range: 15-25 km/h Often higher than reference to achieve other objectives for dual-lane roundabout designs			NCHRP 672 (Section 6.7.1.3)
Sight Lines				
Approach Speed and SSD	Calculated per Equation 6-5			NCHRP 672 (Exhibit 6-55)
Circulatory SSD	Calculated per Equation 6-5			NCHRP 672 (Exhibit 6-56)
Crosswalk SSD (Per Leg)	Calculated per Equation 6-5			NCHRP 672 (Exhibit 6-57)
Entering ISD (Per Leg)				(TAC Figure 6.32
Circulatory ISD				NCHRP 672 (Exhibit 6-58)
Visibility Angle	Minimum: 75°			NCHRP 672 (Exhibit 6-61 & 6-62)

4.4 Right-In/Right-Out Design Parameters

For RIRO intersections, a 3-centre compound curve approach is recommended at the entrance and exit with 440 m radius taper and 6.0 m lane width. Key entry and exit radii are summarized in **Table 4.3.**

Table 4.3: Right-In/Right-Out Design Parameters

Element	Entry Radii	Exit Radii
Taper	440 m	440 m
Controlling Radius	15 m	12 m
Compounding Radii	50 m	36 m

5.0 Recommended Plan

This section summarizes the recommended long-term plan for widening Memorial Trail to a 4-lane urban arterial standard, upgrading existing intersections, and accommodating the future road network as development continues to expand along the corridor.

The following exhibits are referenced for the recommended long-term plans in this section:

- Exhibit 5.01 Plan/Profile Key Plan
- Exhibits 5.02 to 5.12 Memorial Trail Plan/Profiles
- Exhibits 5.13 to 5.23 Cross Road Plan/Profiles
- Exhibit 5.24 to 5.38 Intersection Details – Highway 20 Roundabout
- Exhibits 5.39 to 5.49 Intersection Details – Typical Arterial Roundabout
- Exhibits 5.50 to 5.60 Intersection Details – Typical Collector Roundabout
- Exhibit 5.61 Intersection Details – Typical Right-In/Right-Out

5.1 Roadway Plan Overview

Roadway plans for the widening and upgrading of Memorial Trail are shown on **Exhibits 5.02 to 5.12.** Plans and profiles for the cross roads are shown on **Exhibits 5.13 to 5.23.**

The design follows a handful of guiding principles:

- Match the existing Memorial Trail centreline profile, where possible;
- Minimize grading impacts and changes in cover depth over utility ROWs;
- Minimize impacts to private property and established residential developments;
- Minimize impacts to the wetland east of Lakeshore Boulevard; and
- Attempt to minimize earthwork.

The ultimate Memorial Trail alignment generally follows the existing east-west alignment with horizontal deflecting introduced at each of the roundabout approaches to encourage speed reduction and set up appropriate entry angles and tangent lengths to prevent entry path overlap at the dual-lane entrances. In addition to deflections introduced on approach to the roundabouts, the Memorial Trail alignment is deflected south at Lakeway Boulevard and Ryders Ridge Boulevard to avoid impacts to existing built-out areas along these roadways.

East of 60 Street, new development is focused on the north side of Memorial Trail. For this segment of the corridor, the north property line was maintained and Memorial Trail was widened to the south. However, as the existing roadway centreline sits approximately 20 m from the existing north property line, some widening to the north will be required to keep the 4-lane roadway centred in the ultimate 40 m ROW. West of 60 Street, the existing Memorial Trail alignment jogs south. The recommended Memorial Trail alignment eliminates this shift by widening primarily to the northwest of 60 Street. This approach also helps avoid above ground infrastructure on the meter station site.

Between the west project limit and Station Drive, the recommended Memorial Trail profile generally follows the existing centreline profile gradually climbing to a localized high point at Station Drive. The profile at Station Drive is raised approximately 1 m to maintain positive drainage through the 60 Street intersection while minimizing grade changes over the many high-pressure pipeline crossings in this area.

The recommended Memorial Trail alignment diverts south approaching Lakeview Drive avoiding impacts to the existing built-up area on the north side of the corridor. The recommended profile through this area follows the existing ground elevations south of the current alignment. Towards the end of the study, the profile through this area was reviewed to identify opportunities for further cost savings. An alternate profile, shown on **Exhibit 5.06**, extends the Memorial Trail to the south while minimizing cut along the existing carriageway. This alternate profile should be reviewed in greater detail during preliminary design once more is known with regards to staging and the cut and fil volumes along the corridor are further optimized.

Further east, the Memorial Trail profile continues with modest grades and gradual undulation before climbing at 3-4% east of Brookstone Drive and cresting at 50 Street. The 50 Street roundabout is positioned at the high point of both intersecting roadways. The Memorial Trail profile drops again east of 50 Street to a low point west of Crestview Boulevard before climbing again up to a local high point at the Ryders Ridge Boulevard intersection and dropping down to Highway 20.

While the existing Memorial Trail profile is relatively flat through the Highway 20 intersection, the existing Highway 20 profile is approximately 4% though the Memorial Trail intersection and steepens to over 5.5% just south of Memorial Trail. Two profile options were developed for Highway 20 to flatten the grade to a maximum of 3% across the roundabout. The option that raises the profiles of Highway 20 and Memorial Trail is preferred as it allows for more favourable grades on Memorial Trail (3.5% compared to 6% with the lowered profile option). The Highway 20 horizontal geometry and profiles recommended as part of this FPS are shown on **Exhibits 5.23.** Design and posted speeds between 60km/h and 80km/h were considered through the design process. As noted in Table 5.1, a design speed of 70km/h and posted speed of 60km/h is recommended for Highway 20. This eliminates the need for high-speed entry treatments and the resulting additional property impacts approaching the Memorial Trail intersection. As the project moves to future design phases options in between the two bookend options should be explored.

Profiles for the undeveloped intersecting roadways are designed to best fit the existing terrain; however, it is anticipated that these profiles will change as development advances and grading plans for the adjacent parcels are explored. It is expected that the adjacent developments will tie into the proposed grades at the Memorial Trail grades at the ROW, with the exception of areas south of Memorial Trail between Brookstone Drive and 50 Street, where the existing ground elevations south of Memorial Trail are significantly lower than areas to the north. With no south leg planned at Broadway Rise, there is an opportunity for future development to remain lower than the proposed elevation at the south edge of the Memorial Trail ROW. Refer to **Exhibit 5.19** for additional details.

5.2 Intersection Plans

Roundabouts were selected as the preferred intersection type as described in Section 1.2. Nine roundabouts are planned at intersections along the Memorial Trail corridor. Two RIRO intersections are proposed at the two local roadway intersections along the corridor where lower traffic volumes and tighter intersection spacing dictated an alternative solution. At the functional planning stage, roundabout design focused on balancing the four performance objectives noted in Section 4.3 and preserving sufficient but reasonable ROW width at the intersections to allow for some flexibility at future design stages when the geometric parameters will be reviewed in greater detail. Key features of the typical intersections along the corridor are summarized below.

Highway 20 Roundabout

The proposed roundabout layout at Highway 20 is designed as a full 2x2 lane roundabout. The circulatory lanes and truck apron are designed to accommodate low boy and platform trailer design vehicles in the north-south direction, per discussions with Alberta Transportation. Larger horizontal deflections are recommended on the north and south approaches to address the higher design and posted speeds along Highway 20.

Alberta Transportation currently does not have multi-use pathways included in their typical cross sections. However, pathways are recommended to complete a north-south link to the Memorial Trail pathway and provide a safer alternative to biking on the shoulders. Pathways could be staged and constructed as residential development expands to the east.

As noted in Section 5.1, two profiles were developed for Highway 20 to achieve a maximum grade of 3% across the roundabout. Both profile options are currently under review as part of the preliminary design of an initial stage, single-lane roundabout at Highway 20 and Memorial Trail.

Intersection geometry, entry paths, fastest paths, sight lines and vehicle turning movements for the Highway 20 roundabout are shown on **Exhibits 5.24 to 5.38** included at the end of the section.

Figure 5.1: Highway 20 Roundabout Layout

Arterial Roundabouts

Full 2x2 roundabouts are also recommended at 50 Street and 60 Street once these roadways are upgraded to a 4-lane urban arterial standard. The typical arterial roundabout layout shown in **Figure 5.2** is similar to the Highway 20 roundabout but with tighter radii entrances on the north and south legs as these approaches are required to accommodate a WB-21 and not the larger trucks specified by Alberta Transportation for Highway 20. All dual-lane entrances are designed on tangents to avoid entry path overlap and exits are designed with larger radii to avoid exit path overlap.

At 60 Street, the roundabout is positioned directly over the existing intersection due to hard constraints in both the northeast and southwest quadrants. As noted in Section 5.1, profile changes along both intersecting roadways were minimized due to the larger number of high-pressure transmission pipelines crossing through and adjacent to the intersection.

At 50 Street, the roundabout is shifted west of the existing intersection to minimize property impacts in the northeast quadrant during the initial stages of upgrades. As the existing 50 Street intersection is a high point along both existing roadway alignments, shifting the roundabout off the existing crossing results in significant fill requirement to tie into the existing Memorial Trial and 50 Street profiles. The grading impacts can be seen on **Exhibit 5.20**. Guardrail is currently in place along the north side of Memorial Trail, east of the intersection, to protect against steep sideslopes. Sloping issues will be resolved with the full build-out of the north half of the cross section and will require some property acquisition.

Intersection geometry, entry paths, fastest paths, sight lines and vehicle turning movements for a typical arterial roundabout are shown on **Exhibits 5.39 to 5.49** included at the end of the section.

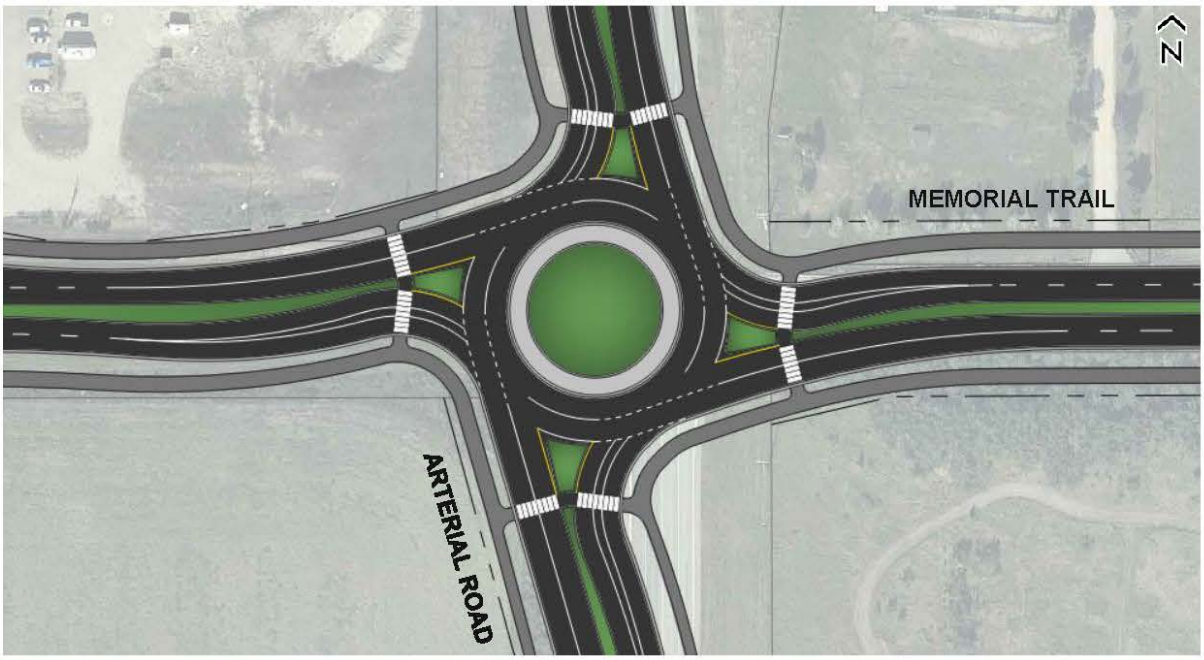


Figure 5.2: Typical Arterial Roundabout Layout

Collector Roundabouts

As the existing and future collectors are expected to maintain a 2-lane cross section in the long-term, 2x1 roundabouts must be accommodated at each collector intersections. That is, the east-west approaches have two approach lanes and the north-south approaches are single-lane approaches. Spiral roundabouts, as shown in **Figure 5.3**, are recommended at all collector intersections to address the asymmetrical lane configuration.

Deflection is introduced on the Memorial Trail approaches to encourage speed reduction and set up appropriate entry angles and tangent lengths to prevent entry path overlap at the dual-lane entrances.

As collector roads have a posted speed of 40 km/h, entry angles and speeds can be accommodated on the north-south approaches without additional deflection. The collector roadway width narrows down near the intersection physically delineating the parking areas and defining the entry and exit lanes. Ramps allow cyclists to enter the roadway as the width widens and the multi-use pathway transitions to separated sidewalks per the typical collector cross sections.
Intersection geometry, entry paths, fastest paths, sight lines and vehicle turning movements for a typical collector roundabout are shown on **Exhibits 5.50 to 5.60** included at the end of the section.

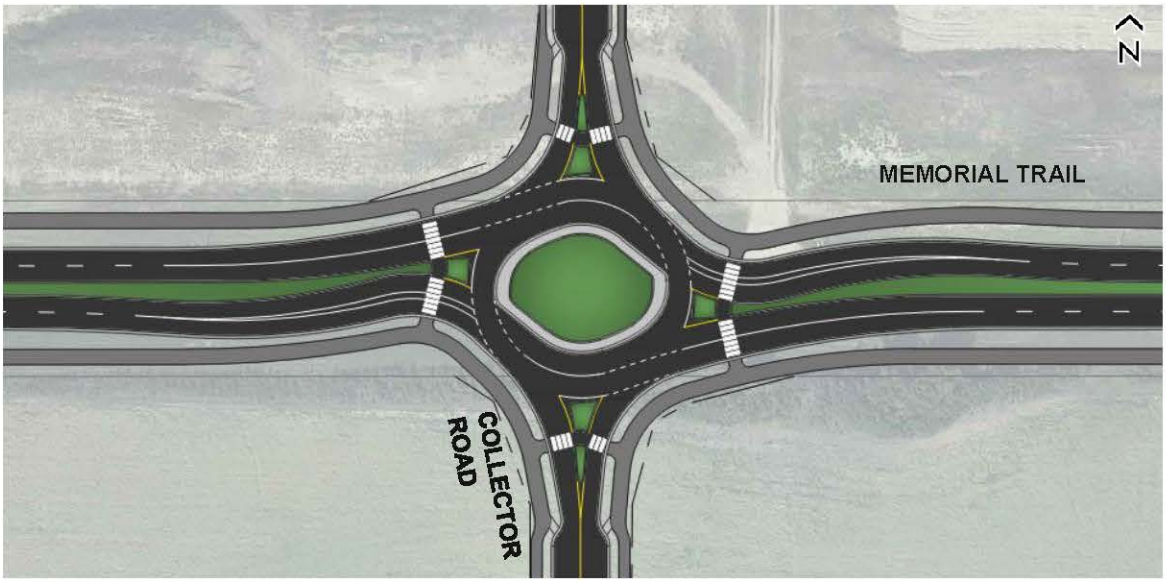


Figure 5.3: Typical Collector Roundabout Layout

Two of the most common types of collisions in 2x1 type roundabouts result from vehicles in the exterior approach lane failing to yield to circulating vehicles turning left or exiting the roundabout. These conflicts typically arise when vehicles entering from exterior approach lane assume the circulating vehicle will use the interior lane once it becomes available. The exterior approach lane on circular 2x1 roundabouts also enters at a flatter angle further compounding the likelihood for conflict by orienting the vehicle along an entry path that makes it more difficult for drivers to see circulating vehicles.

The spiral roundabout layout shown in **Figure 5.3** addresses this issue by using the roundabout geometry to physically limit the permitted movements in the interior and exterior circulating lanes. Vehicles at the dual lane entry from Memorial Trail must yield to all circulating vehicles regardless of the movement. It also improves the viewing angle to the left increasing the visibility of circulating vehicles.

In the east-west direction, vehicles in the exterior lane are only permitted to make right turn or through movements. Vehicles entering the interior lane are forced into the exterior lane as they circulate around the roundabout allowing them to make a left turn or complete a full U-turn. In the north-south direction, all movements are made from the exterior lane. By preventing continuous circulation in the interior lane, there is no opportunity for an entering vehicle to enter alongside another circulating vehicle. This creates consistent driver expectations for entry conditions and ideally will help minimize collisions resulting from failure to yield prior to entry. Permitted movements for eastbound/westbound and northbound/southbound traffic are shown on **Figures 5.4** and **5.5.**

The spiral lane configuration can be achieved either through a spiral shaped central island, as shown in Figure 5.3 and recommended in this study, or with a circular central island and paint marking to define the lanes and restrict vehicle access to the interior circulating path adjacent to Memorial Trail. While this approach has cost and constructability advantages, particularly when staging the roundabout from a single lane circular roundabout and to the ultimate spiral configuration, it has drawbacks in terms of performance and driver compliance. In an area where this configuration is new to drivers and winter road conditions may limit the visibility of pavement markings over long periods, there is a higher risk of driver confusion and incorrect movement with a painted spiral approach.

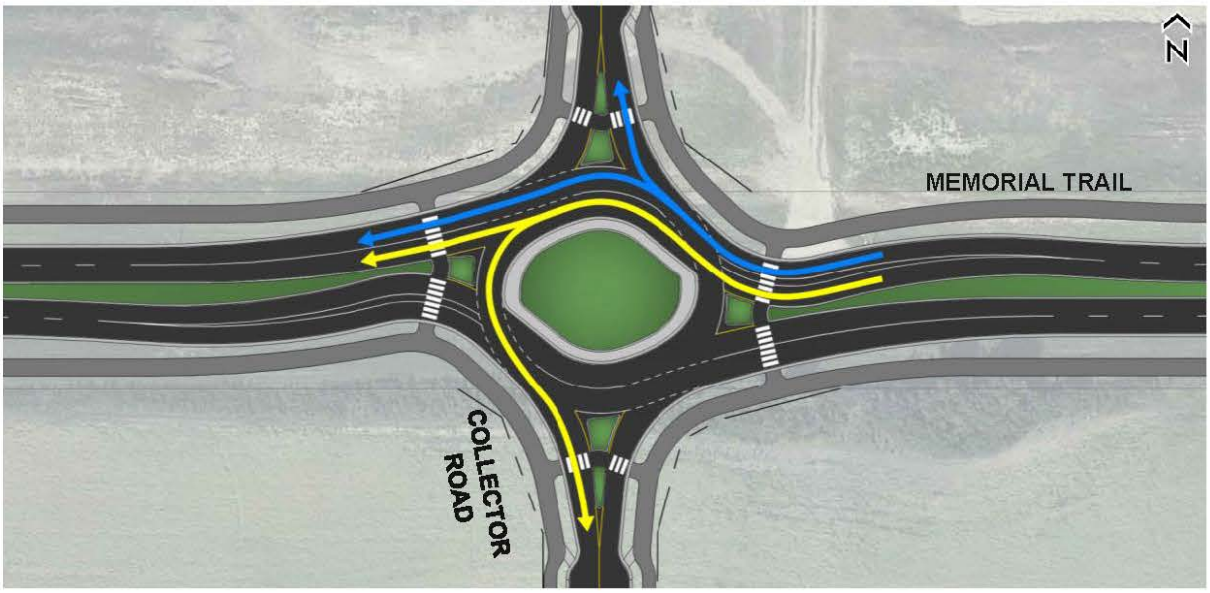


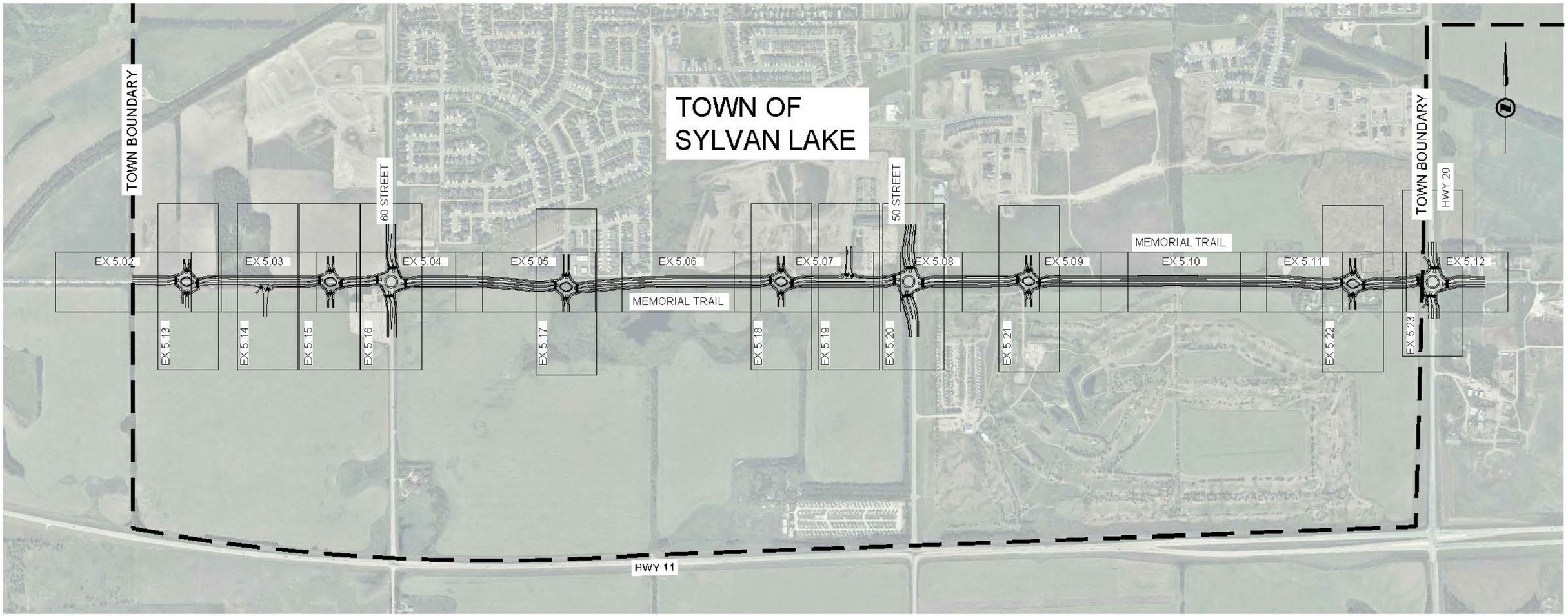
Figure 5.4: Collector Roundabouts – East-West Movements

Figure 5.5: Collector Roundabouts North-South Movements

Local Roadway Intersections

RIRO intersections are recommended at the two T-intersections along the corridor: Broadway Rise and Pogadl Park Access #2. Both of these cross roads are designated as local roadways with lower anticipated vehicle volumes. A roundabout was briefly considered at Broadway Rise; however, the limited spacing to adjacent intersections made it difficult to achieve the desired entry and exit geometry along Memorial Trail. Furthermore, the proximity of adjacent roundabouts to both of the RIRO intersections enables drivers to legally U-turn without a significant detour.

The recommended intersection geometry for a typical /RIRO intersection is shown on **Exhibit 5.61.**



Sylvan Lake

ISL

PROJECT

MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE

PLAN PROFILE
KEY PLAN

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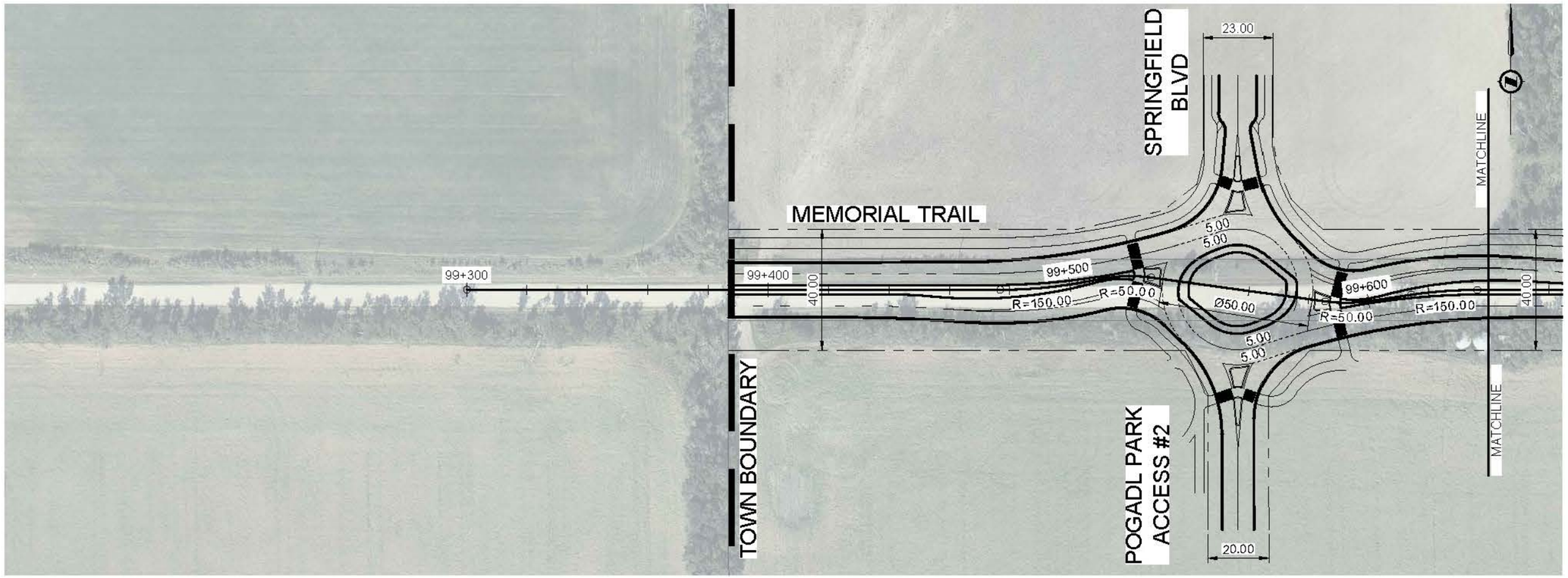
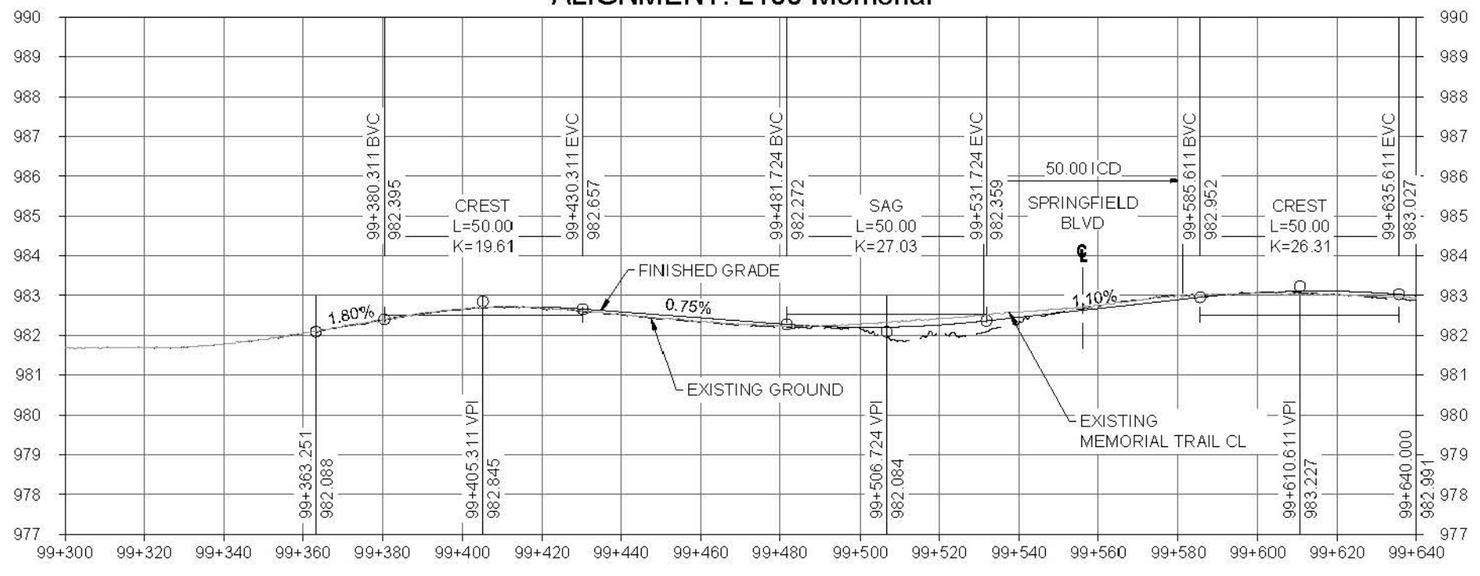


ALIGNMENT: L100-Memorial



1:1500 (HORZ) 0 30 60 m

1:150 (VERT) 0 3 6 m

LEGEND

PLAN
PROPOSED
EXISTING

PROFILE
EXISTING GROUND
FINAL GRADE

Sylvan Lake

ISL

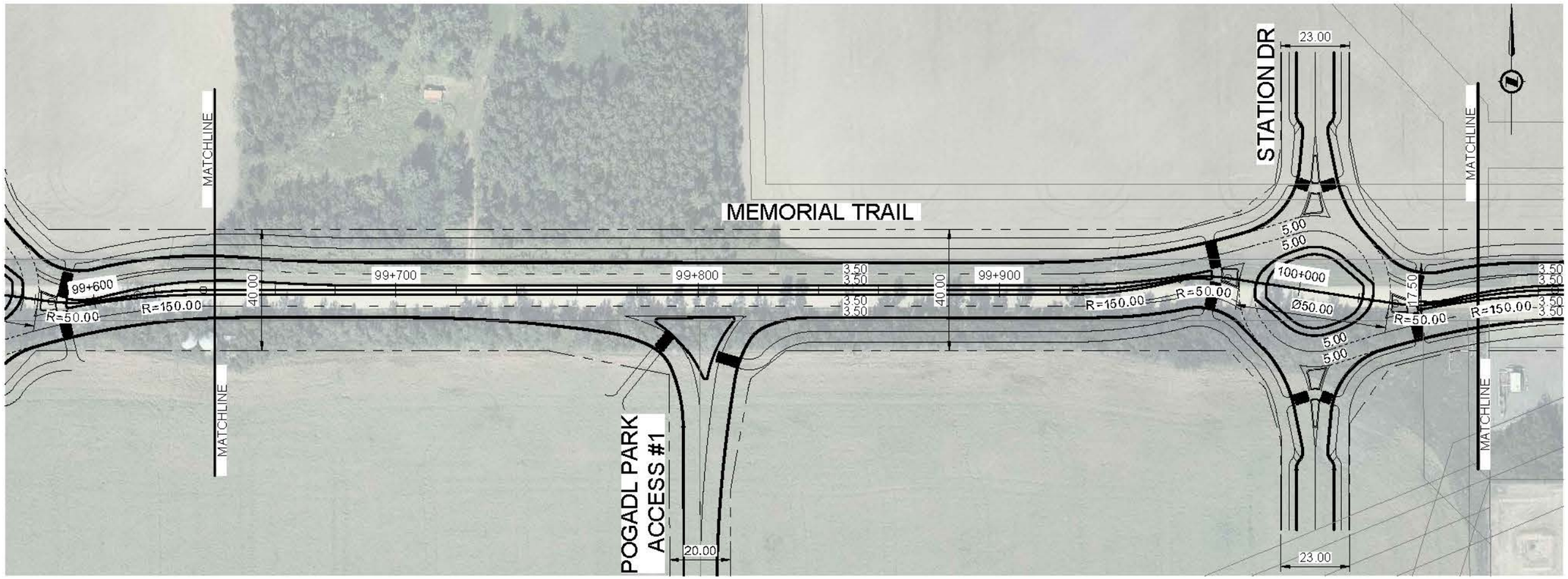
PROJECT
MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY

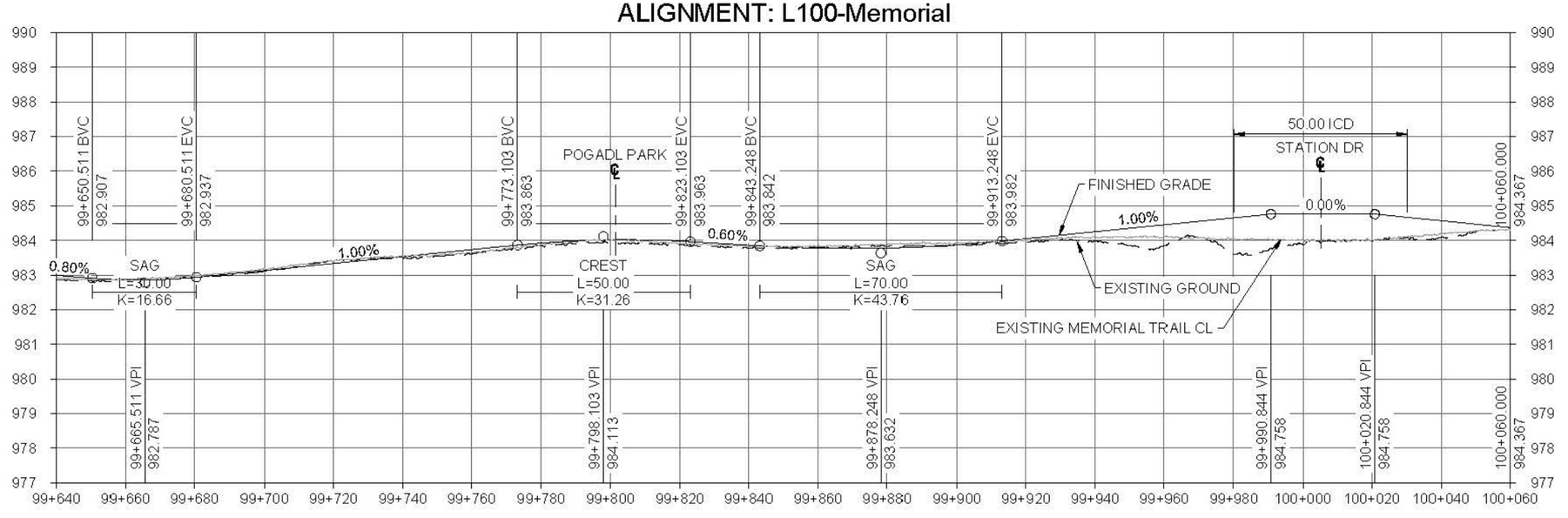
FIGURE TITLE
PLAN PROFILE MEMORIAL TRAIL STN 99+363 TO STN 99+640

FILE No.	SCALE	FIGURE No.
27613_Plan_Profiles_Memorial.dwg	AS SHOWN	5.02

ISC: #### SHEET SIZE ANSI B 20 mm

FILE:G:\PROJECTS\27600\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FP\3D_CAD\02_DRAFTING\03_SHEETS\2613_PLAN_PROFILES_MEMORIAL.DWG [DATE: March 16, 2022 5:11:48 PM]





1:1500 (HORZ) 0 30 60 m

1:150 (VERT) 0 3 6 m

LEGEND

PLAN
PROPOSED
EXISTING
PROFILE
EXISTING GROUND
FINAL GRADE

Sylvan Lake

ISL

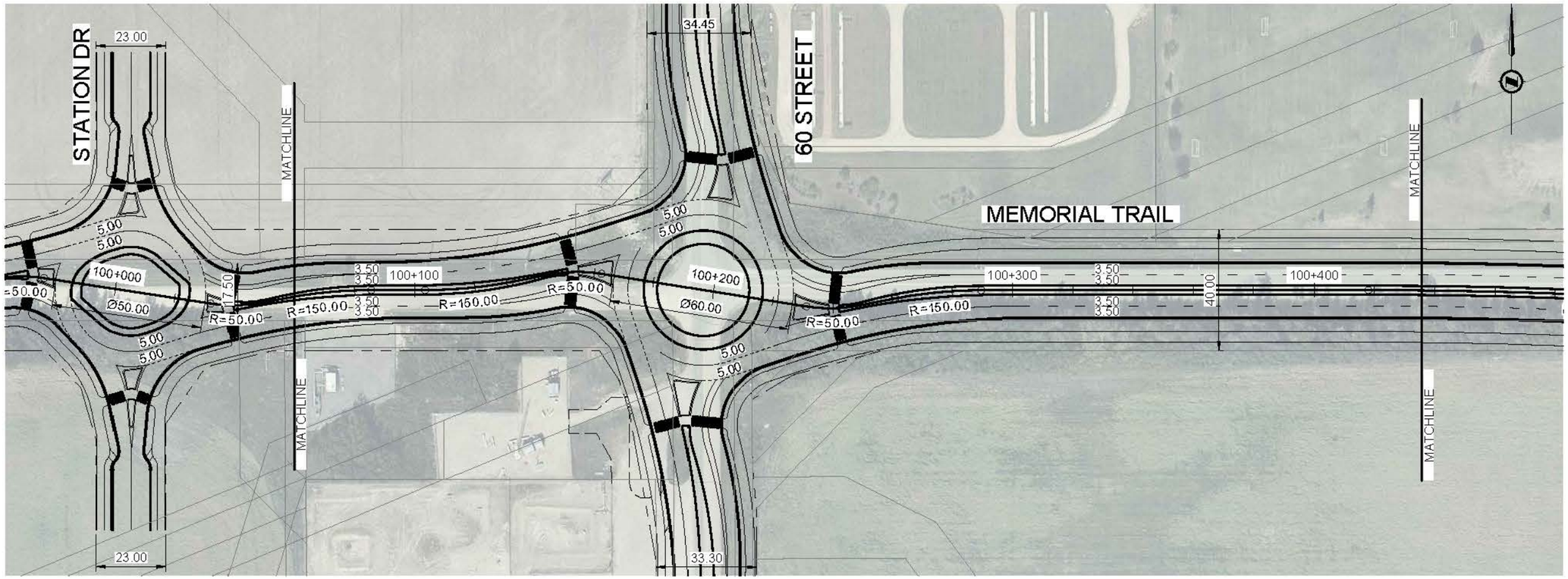
PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

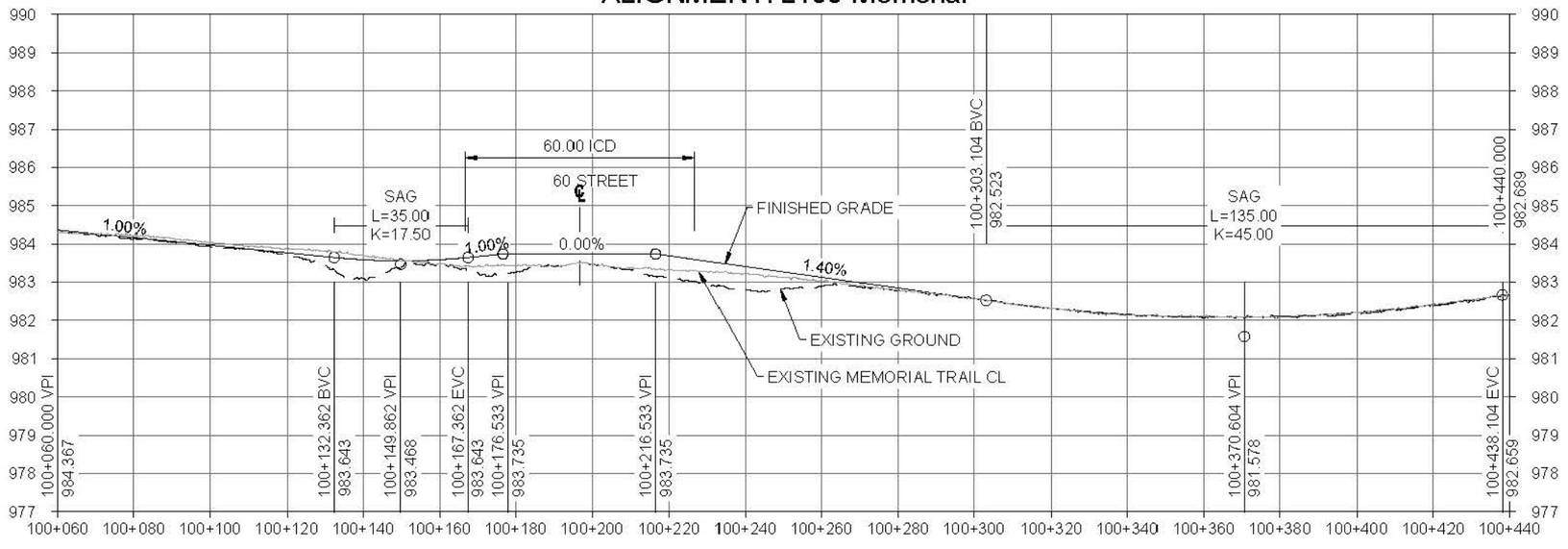
FIGURE TITLE
PLAN PROFILE
MEMORIAL TRAIL
STN 99+640 TO STN 100+060

FILE No.	SCALE	FIGURE No.
Z7613_Plan_Profiles_Memorial.dwg	AS SHOWN	5.03

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE G:\PROJECTS\2022\06\Z0602613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\02D_DRAFTING\02D_SHEETS\Z0613_PLAN_PROFILES_MEMORIAL.DWG | DATE: March 16, 2022 5:11:59 PM





1:1500 (HORZ) 0 30 60 m

1:150 (VERT) 0 3 6 m

LEGEND

PLAN
PROPOSED
EXISTING
PROFILE
EXISTING GROUND
FINAL GRADE

Sylvan Lake

ISL

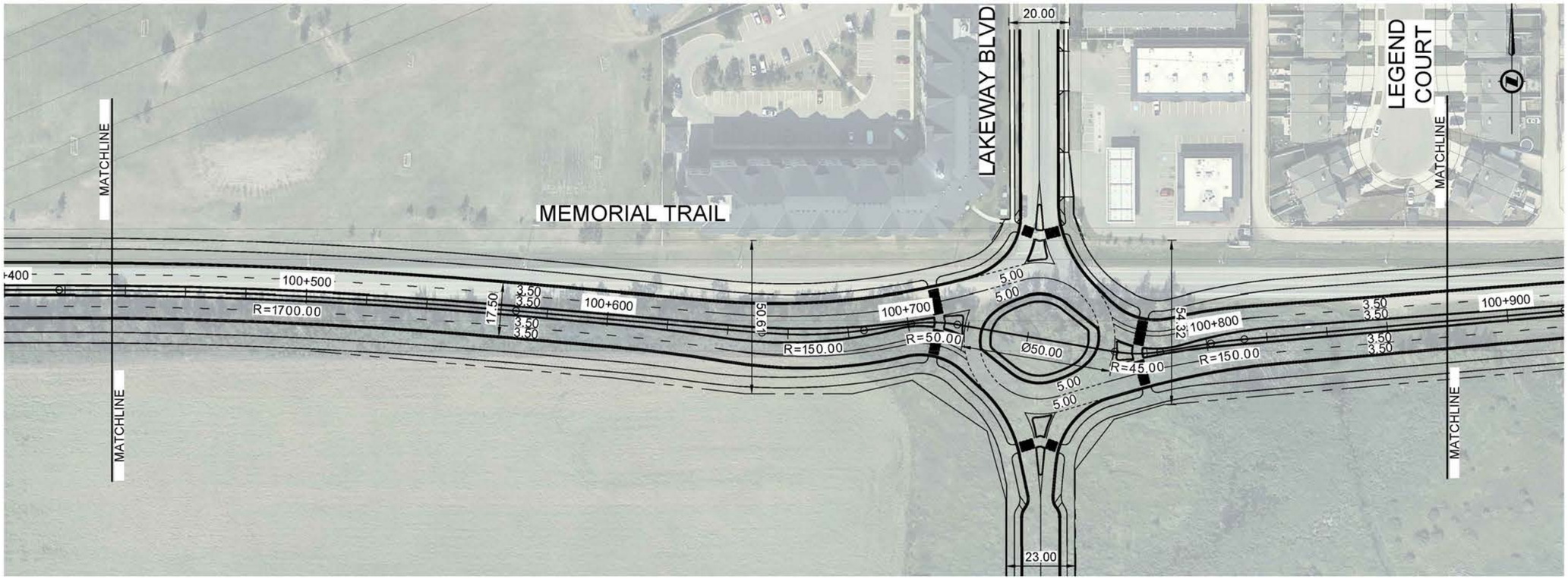
PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
PLAN PROFILE
MEMORIAL TRAIL
STN 100+060 TO STN 100+440

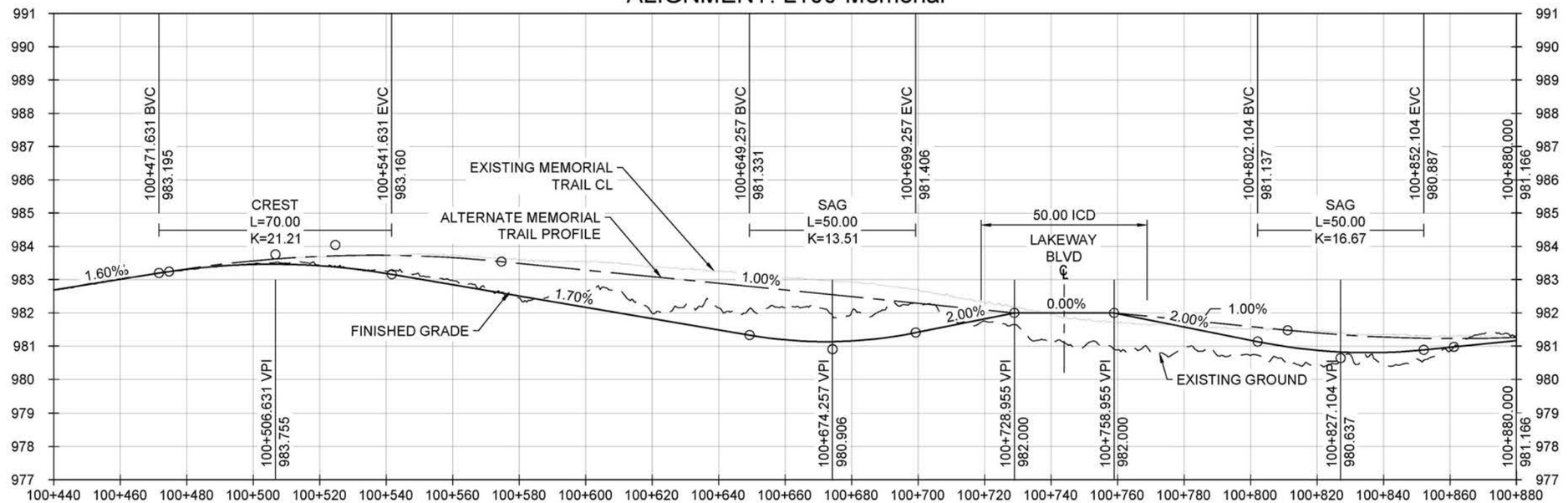
FILE No.	SCALE	FIGURE No.
Z7613_Plan_Profiles_Memorial.dwg	AS SHOWN	5.04

ISC: #### SHEET SIZE ANSI B 20 m 0

FILE G:\PROJECTS\7600\76002613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\02D_DRAFTING\02D3_SHEETS\02613_PLAN_PROFILES_MEMORIAL.DWG | DATE: March 16, 2022 5:18:19 PM



ALIGNMENT: L100-Memorial



1:1500 (HORZ) 0 30 60 m

1:150 (VERT) 0 3 6 m

LEGEND

PLAN
PROPOSED
EXISTING

PROFILE
EXISTING GROUND
FINAL GRADE

Sylvan Lake

ISL

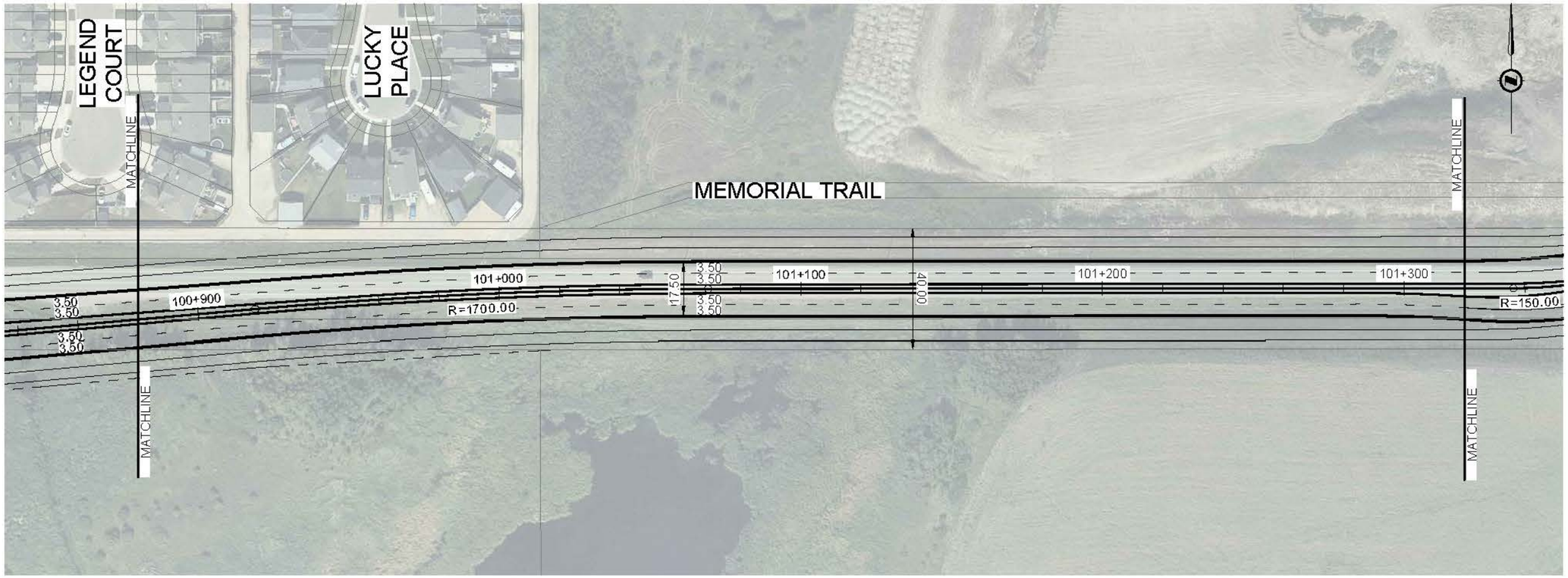
PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

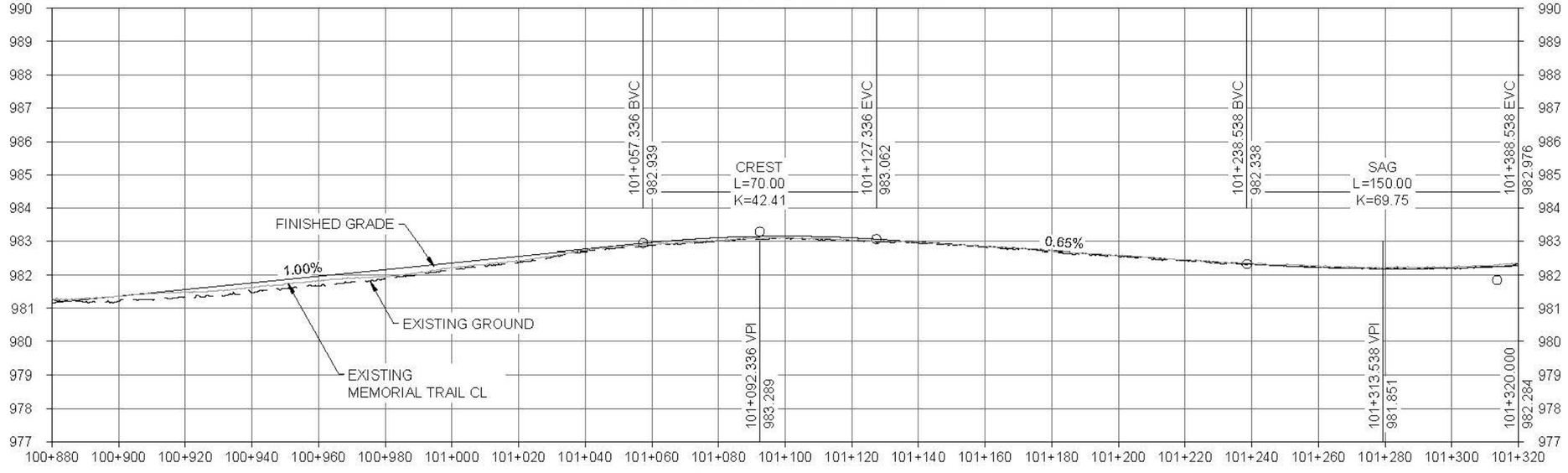
FIGURE TITLE
PLAN PROFILE
MEMORIAL TRAIL
STN 100+440 TO STN 100+880

FILE No.	SCALE	FIGURE No.
27613_Plan_Profiles_Memorial.dwg	AS SHOWN	5.05

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECT\27000\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CADD\00_DRAFTING\00_SHEETS\27613_PLAN_PROFILES_MEMORIAL.DWG | DATE: March 20, 2022 11:29:50 PM





1:1500 (HORZ) 0 30 60 m

1:150 (VERT) 0 3 6 m

LEGEND

PLAN

PROPOSED

EXISTING

PROFILE

EXISTING GROUND

FINAL GRADE

Sylvan Lake

ISL

PROJECT

MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY

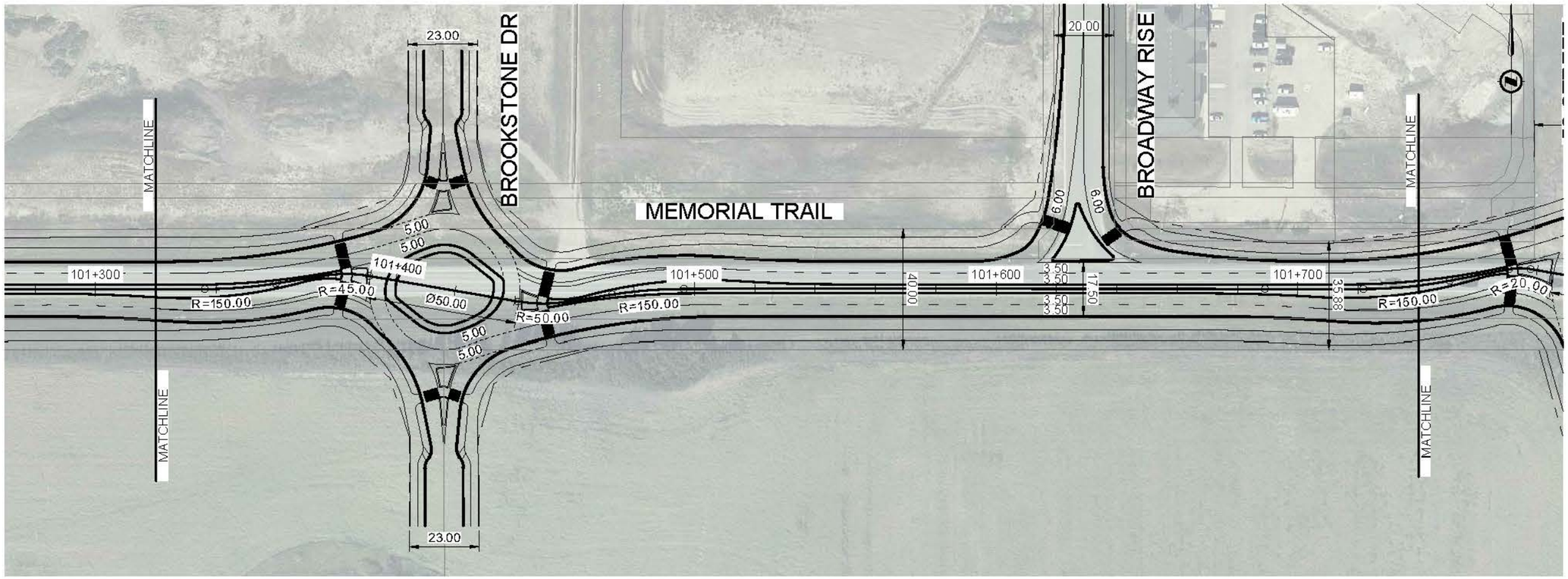
FIGURE TITLE

PLAN PROFILE MEMORIAL TRAIL STN 100+880 TO STN 101+320

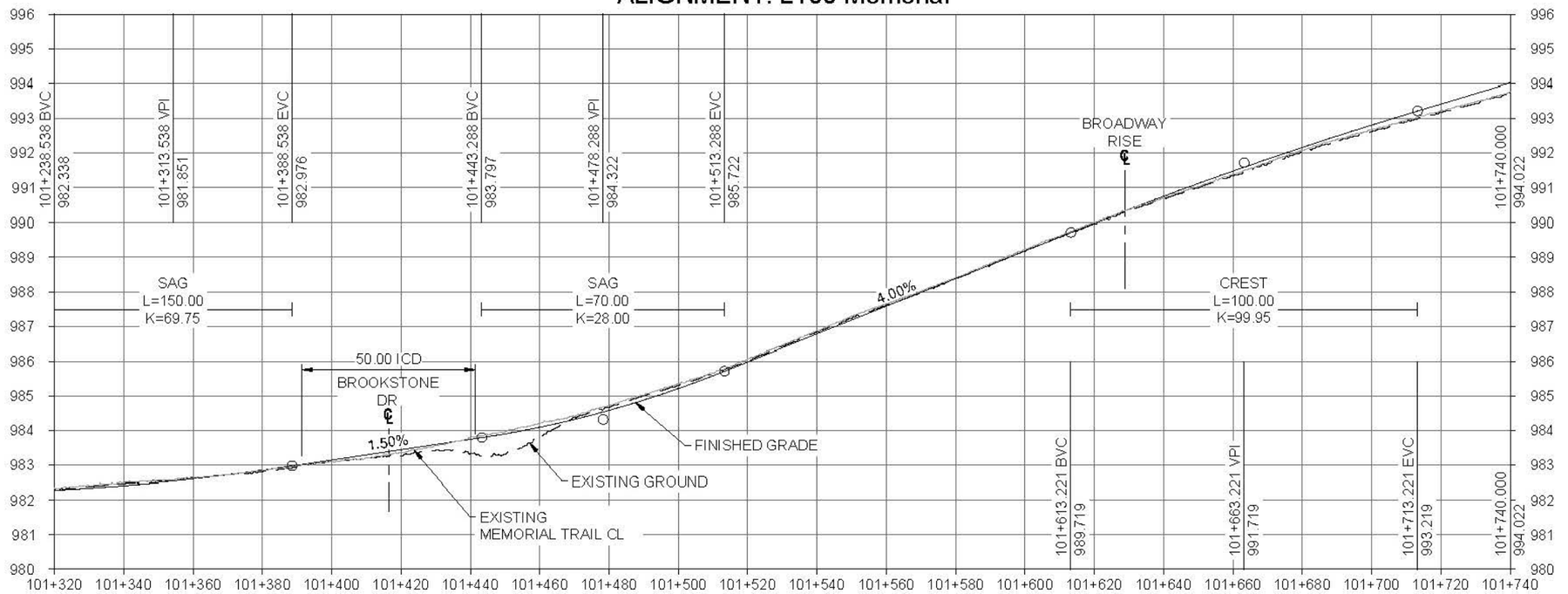
FILE No.	SCALE	FIGURE No.
27613_Plan_Profiles_Memorial.dwg	AS SHOWN	5.06

ISC: #### SHEET SIZE ANSI B 20 m 0

FILE: G:\PROJECTS\27000\27613\02\D\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\02D_DRAFTING\02D_SHEETS\27613_PLAN_PROFILES_MEMORIAL.DWG | DATE: March 16, 2022 2:24:59 PM



ALIGNMENT: L100-Memorial



1:1500 (HORZ) 0 30 60 m

1:150 (VERT) 0 3 6 m

LEGEND

PLAN
PROPOSED
EXISTING

PROFILE
EXISTING GROUND
FINAL GRADE

Sylvan Lake

ISL

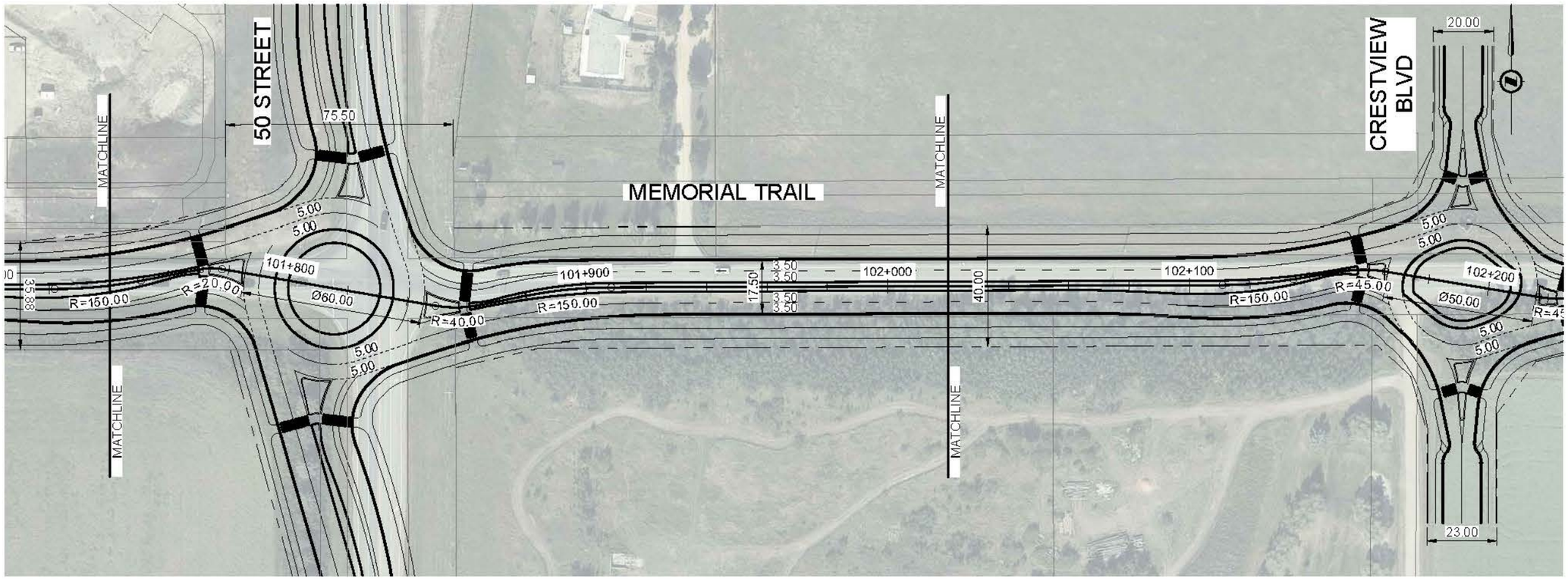
PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

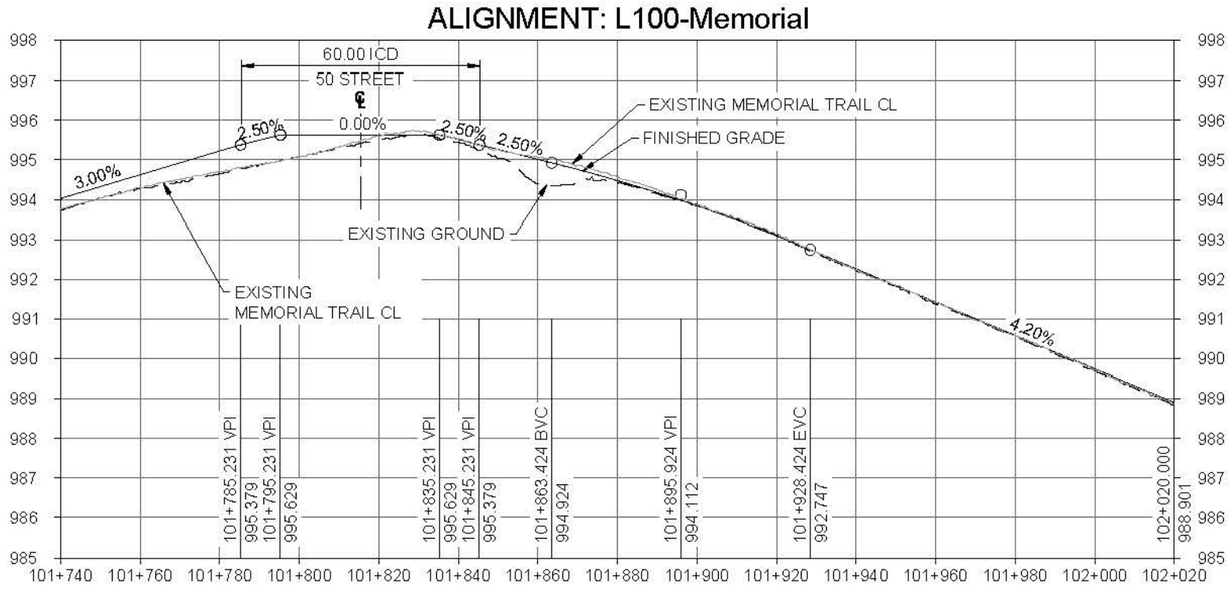
FIGURE TITLE
PLAN PROFILE
MEMORIAL TRAIL
STN 101+320 TO STN 101+740

FILE No.	SCALE	FIGURE No.
27613_Plan_Profiles_Memorial.dwg	AS SHOWN	5.07

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\27613\CAD\27613_SYLVAN_LAKE_TRP_MEMORIAL_TRAIL_FPS\02_CAD\03_DRAFTING\03_SHEETS\27613_PLAN_PROFILES_MEMORIAL.DWG | DATE: March 16, 2022 5:28:17 PM





1:1500 (HORZ) 0 30 60 m

1:150 (VERT) 0 3 6 m

LEGEND

PLAN

PROPOSED

EXISTING

PROFILE

EXISTING GROUND

FINAL GRADE

Sylvan Lake

ISL

PROJECT

MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY

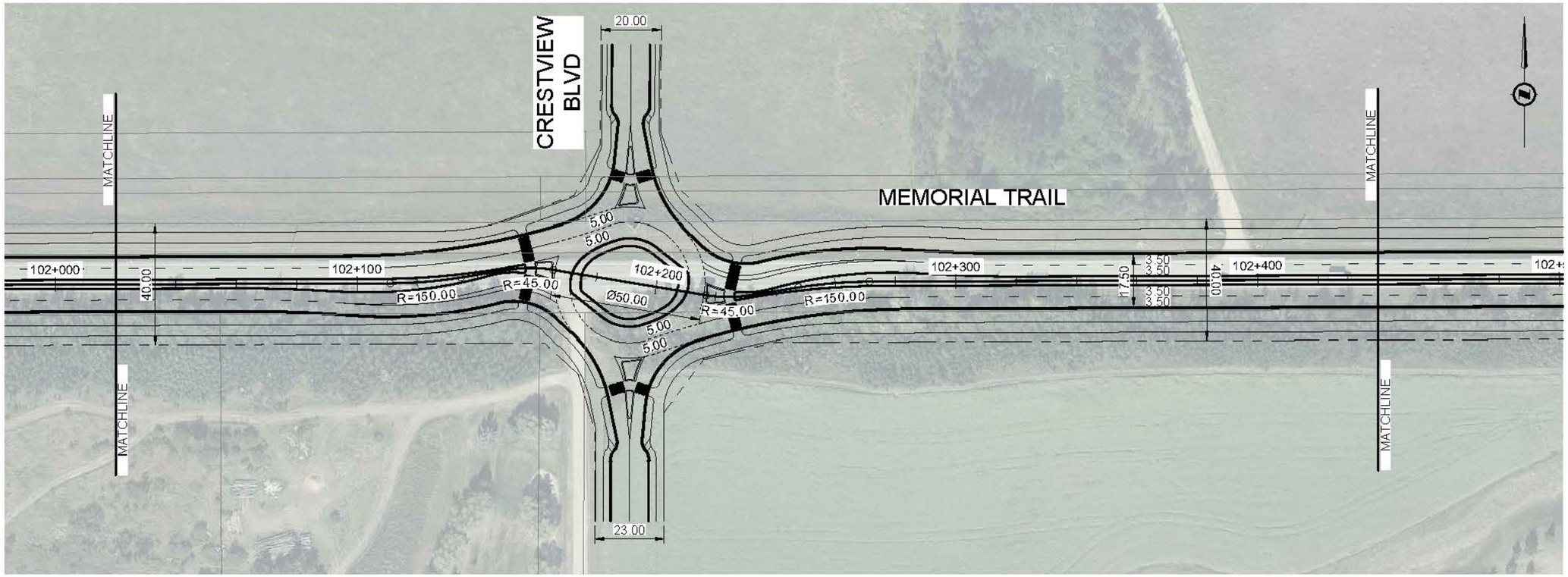
FIGURE TITLE

PLAN PROFILE MEMORIAL TRAIL STN 101+740 TO STN 102+020

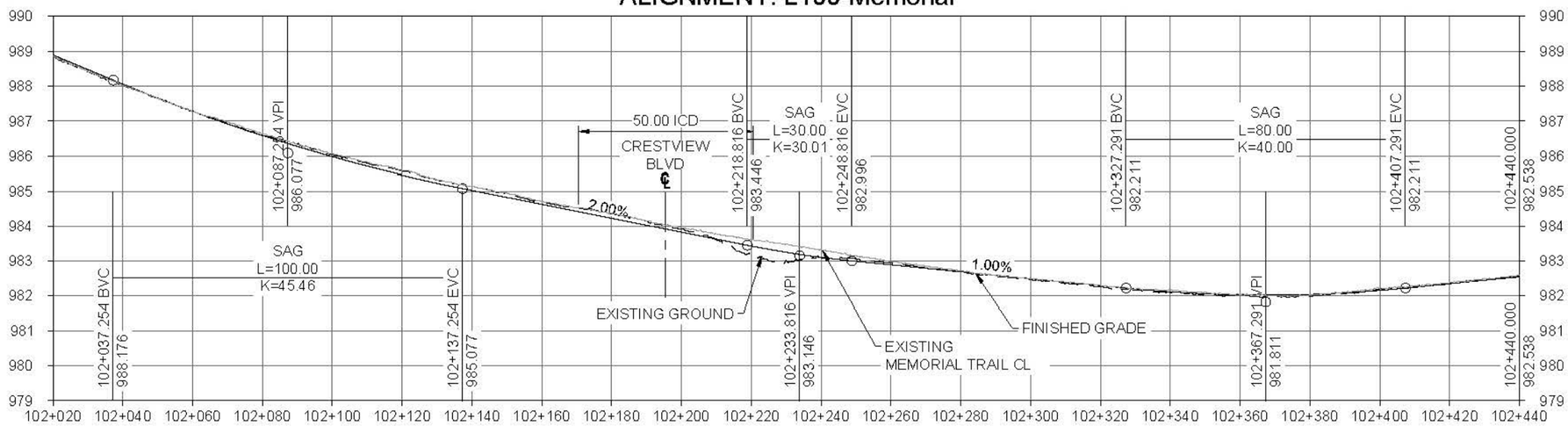
FILE No.	SCALE	FIGURE No.
27613_Plan_Profiles_Memorial.dwg	AS SHOWN	5.08

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\2022\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\02_DRAFTING\2D_SHEETS\27613_PLAN_PROFILES_MEMORIAL.DWG | DATE: March 16, 2022 5:31:35 PM



ALIGNMENT: L100-Memorial



1:1500 (HORZ) 0 30 60 m

1:150 (VERT) 0 3 6 m

LEGEND

PLAN
PROPOSED
EXISTING
PROFILE
EXISTING GROUND
FINAL GRADE

Sylvan Lake

ISL

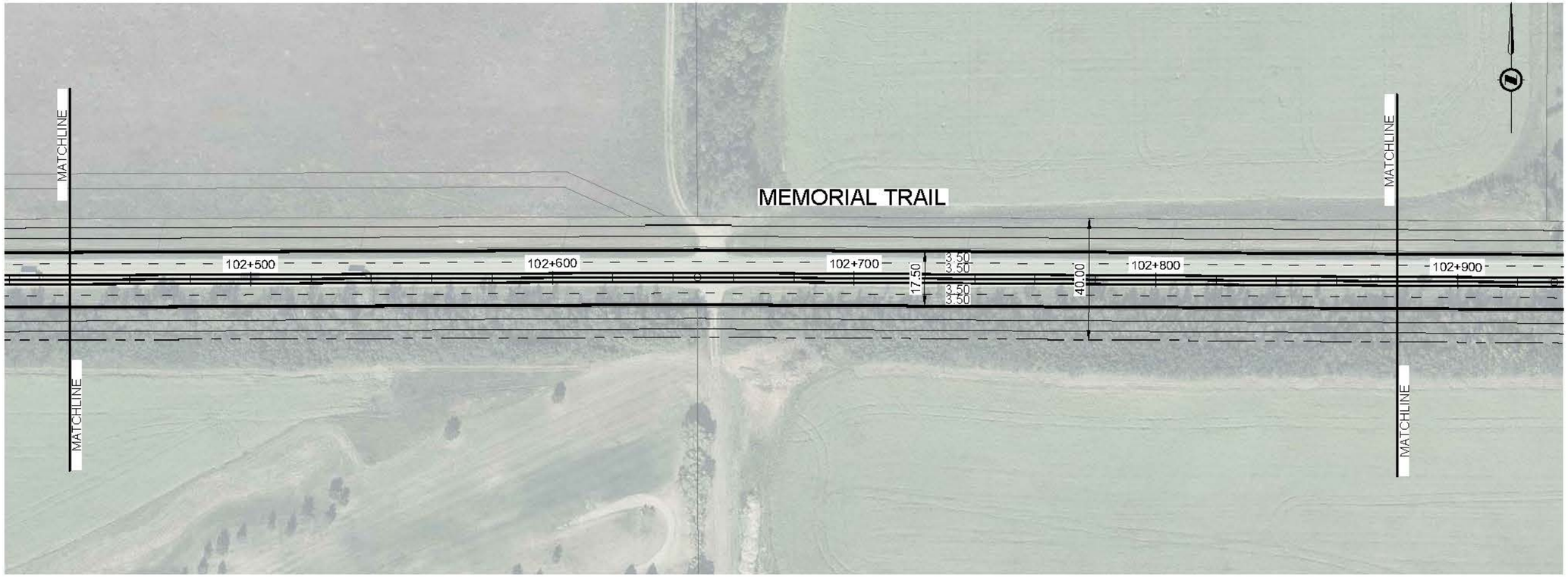
PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
PLAN PROFILE
MEMORIAL TRAIL
STN 102+020 TO STN 102+440

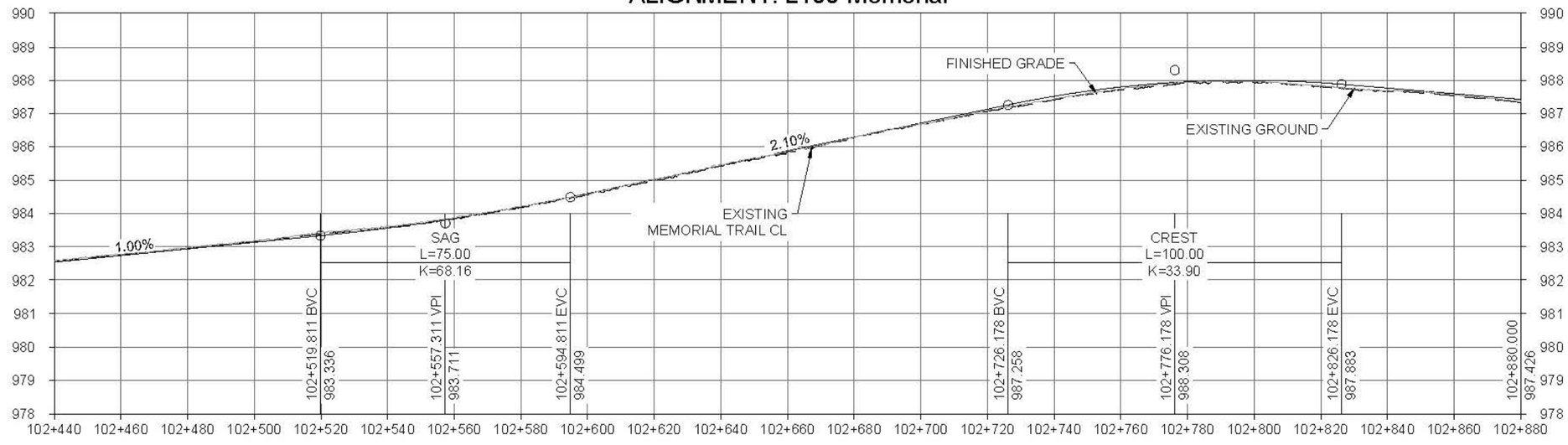
FILE No.	SCALE	FIGURE No.
27613_Plan_Profiles_Memorial.dwg	AS SHOWN	5.09

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\27000\27613\02\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\02D_DRAFTING\02D\SHEETS\27613_PLAN_PROFILES_MEMORIAL.DWG | DATE: March 16, 2022 5:34:54 PM



ALIGNMENT: L100-Memorial



1:1500 (HORZ) 0 30 60 m

1:150 (VERT) 0 3 6 m

LEGEND

PLAN
PROPOSED
EXISTING
PROFILE
EXISTING GROUND
FINAL GRADE

Sylvan Lake

ISL

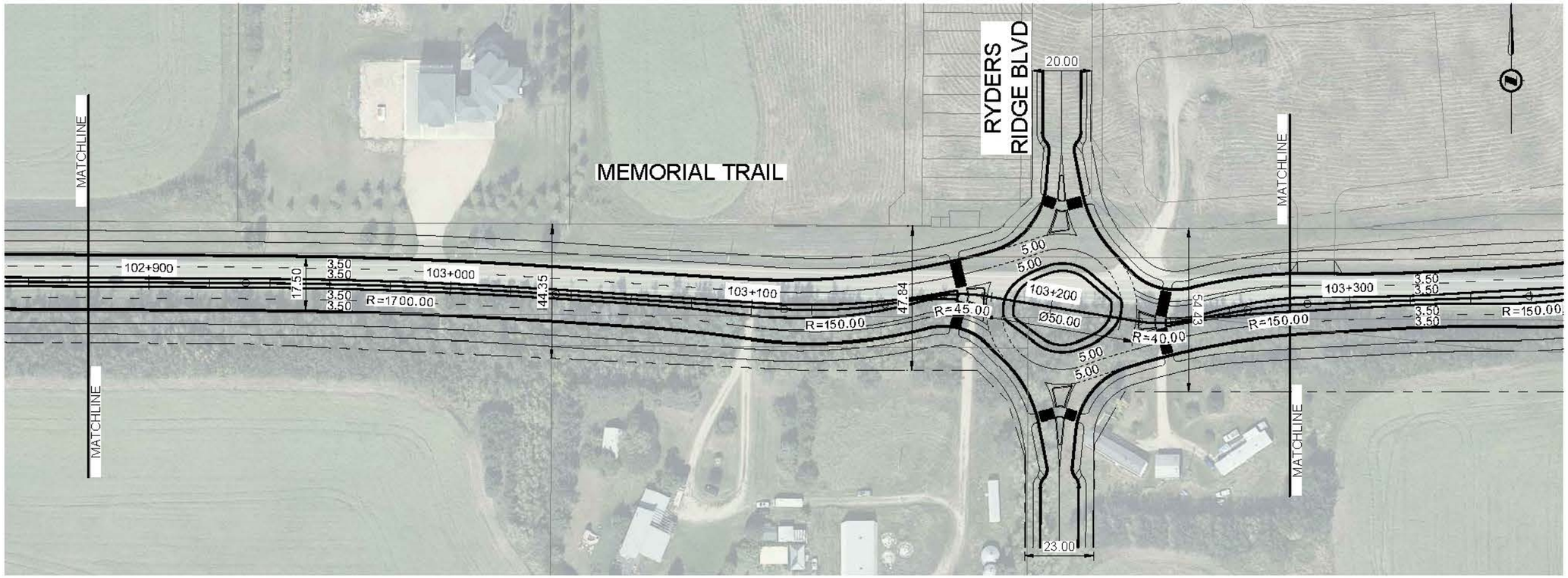
PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
PLAN PROFILE
MEMORIAL TRAIL
STN 102+440 TO STN 102+880

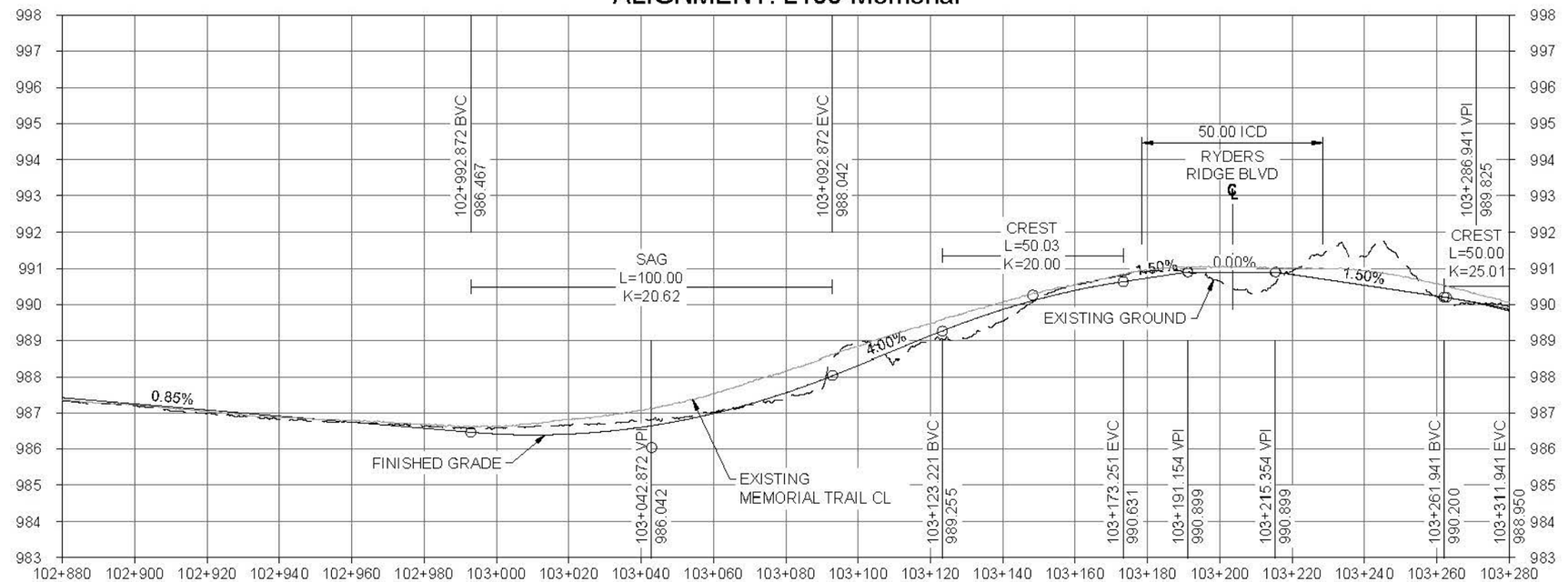
FILE No.	SCALE	FIGURE No.
27613_Plan_Profiles_Memorial.dwg	AS SHOWN	5.10

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\27613\26\CAD\27613_SYLVAN_LAKE_TRP_MEMORIAL_TRAIL_FPS\02_CAD\03_DRAFTING\03_SHEETS\27613_PLAN_PROFILES_MEMORIAL.DWG | DATE: March 16, 2022 5:38:11 PM



ALIGNMENT: L100-Memorial



1:1500 (HORZ) 0 30 60 m

1:150 (VERT) 0 3 6 m

LEGEND

PLAN
PROPOSED
EXISTING
PROFILE
EXISTING GROUND
FINAL GRADE

Sylvan Lake

ISL

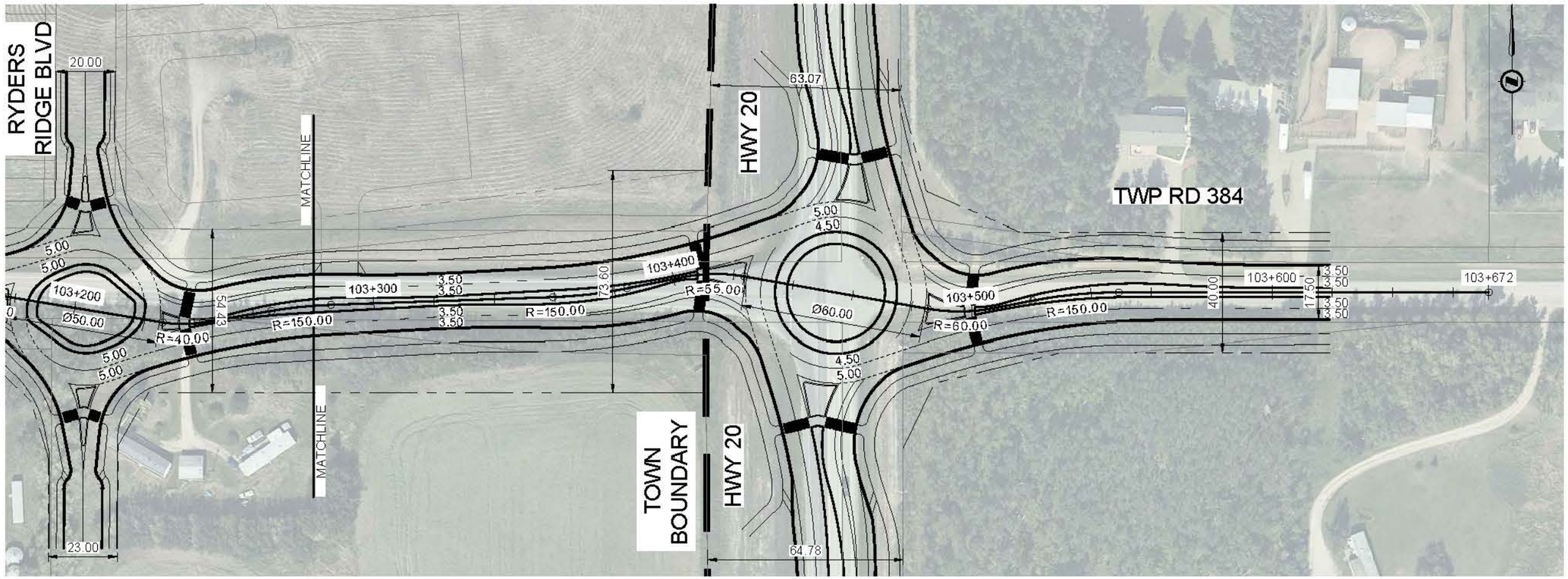
PROJECT
MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY

FIGURE TITLE
PLAN PROFILE MEMORIAL TRAIL STN 102+880 TO STN 103+280

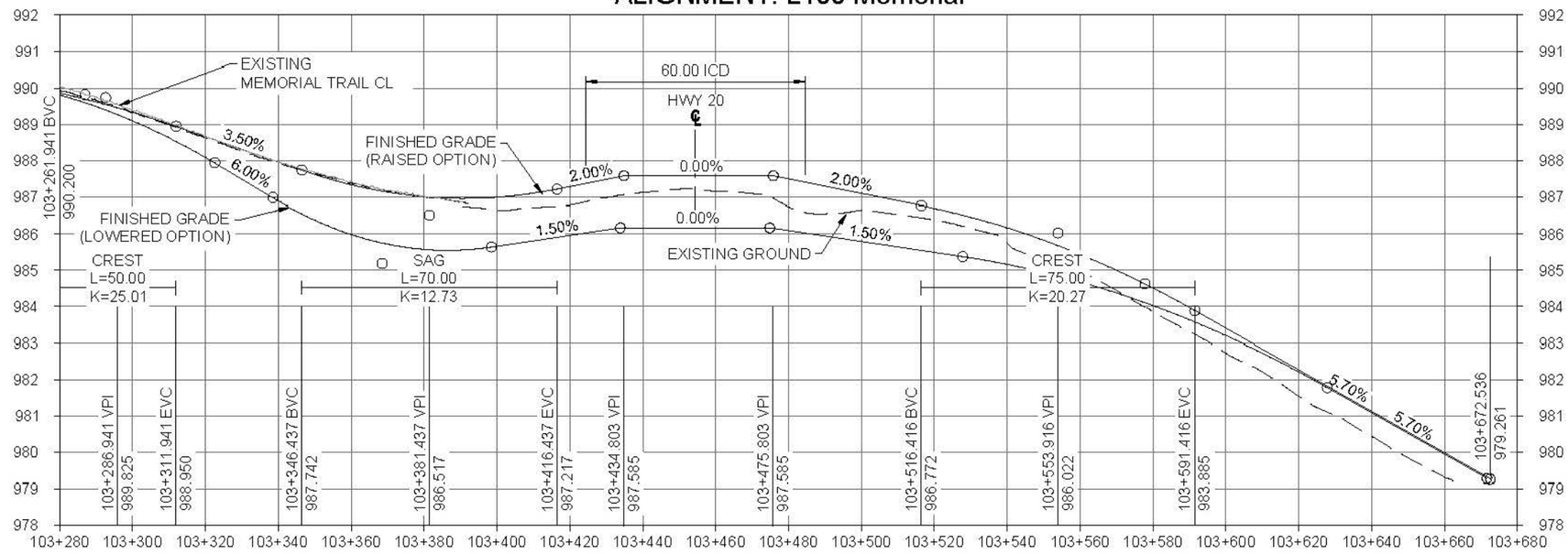
FILE No.	SCALE	FIGURE No.
27613_Plan_Profiles_Memorial.dwg	AS SHOWN	5.11

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\2022\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\02D_DRAFTING\02D_SHEETS\27613_PLAN_PROFILES_MEMORIAL.DWG | DATE: March 16, 2022 5:41:05 PM



ALIGNMENT: L100-Memorial



1:1500 (HORZ) 0 30 60 m

1:150 (VERT) 0 3 6 m

LEGEND

PLAN
PROPOSED
EXISTING

PROFILE
EXISTING GROUND
FINAL GRADE

Sylvan Lake

ISL

PROJECT

MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY

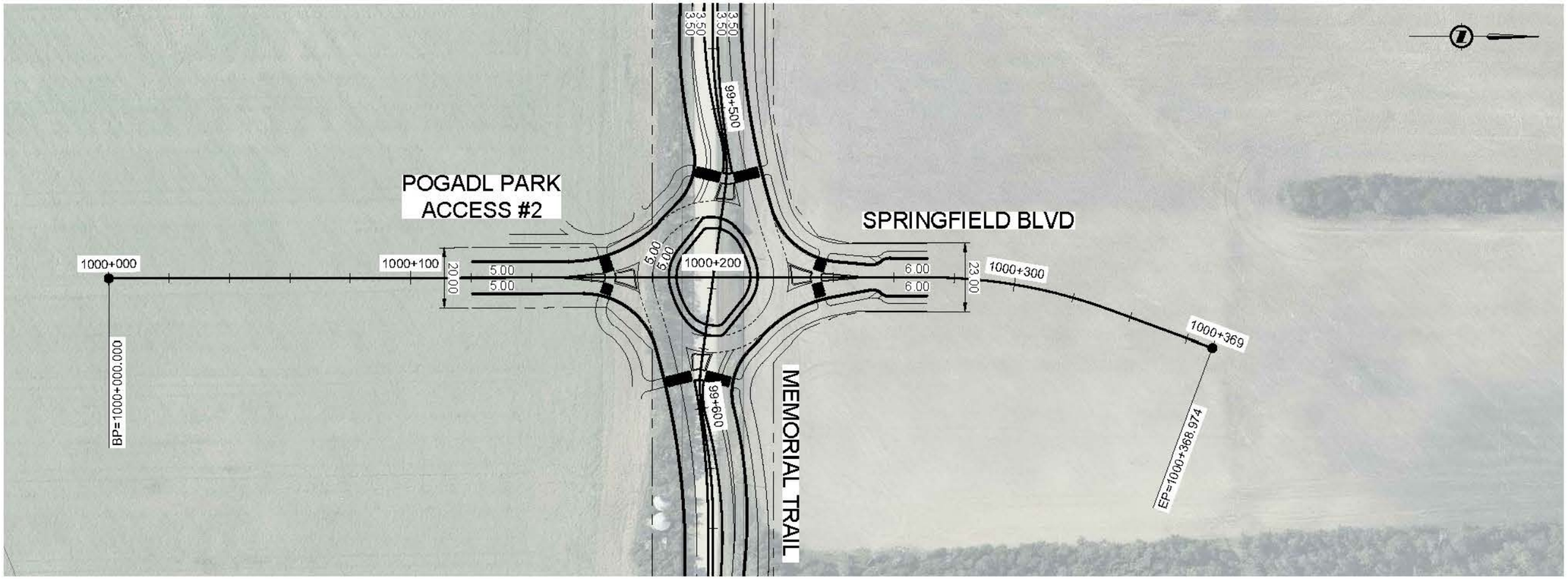
FIGURE TITLE

PLAN PROFILE MEMORIAL TRAIL STN 102+280 TO STN 103+680

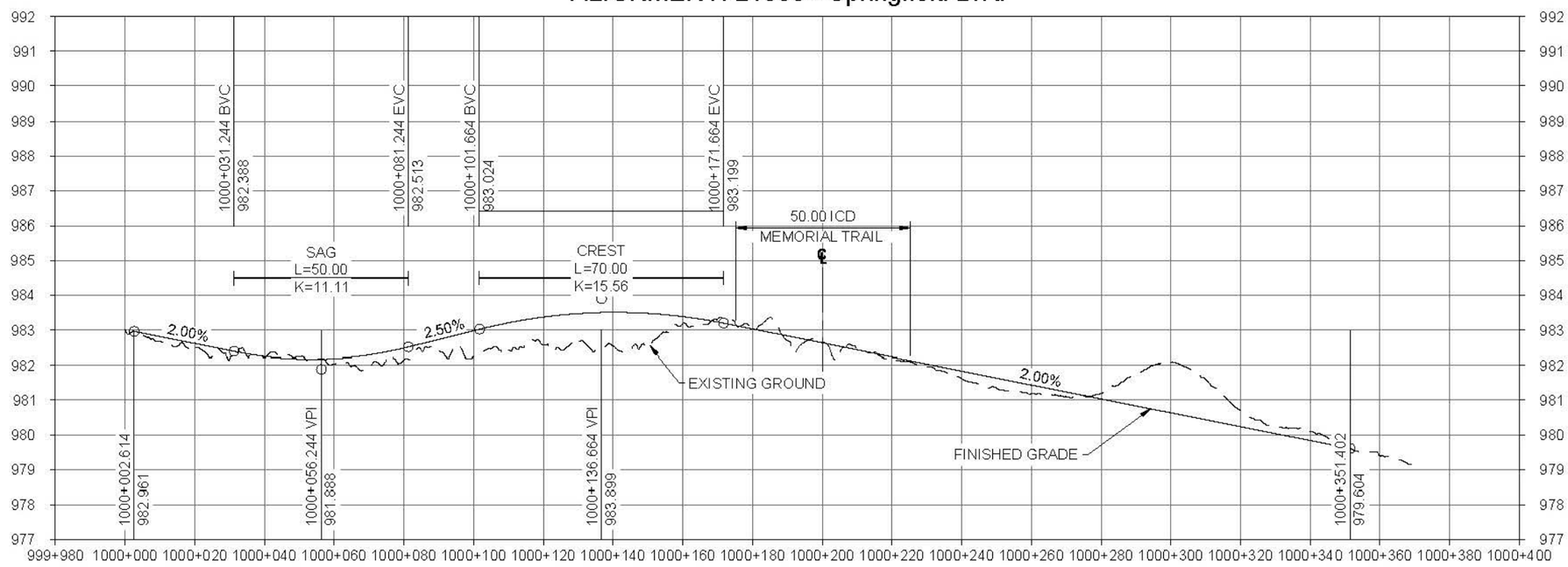
FILE No.	SCALE	FIGURE No.
27613_Plan_Profiles_Memorial.dwg	AS SHOWN	5.12

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\27600\27613\02\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FP\02_CAD\02D_DRAFTING\02D_SHEETS\27613_PLAN_PROFILES_MEMORIAL.DWG | DATE: March 16, 2022 5:44:12 PM



ALIGNMENT: L1000 - Springfield Blvd



1:1500 (HORZ) 0 30 60 m

1:300 (VERT) 0 6 12 m

LEGEND

PLAN
PROPOSED
EXISTING

PROFILE
EXISTING GROUND
FINAL GRADE

Sylvan Lake ISL

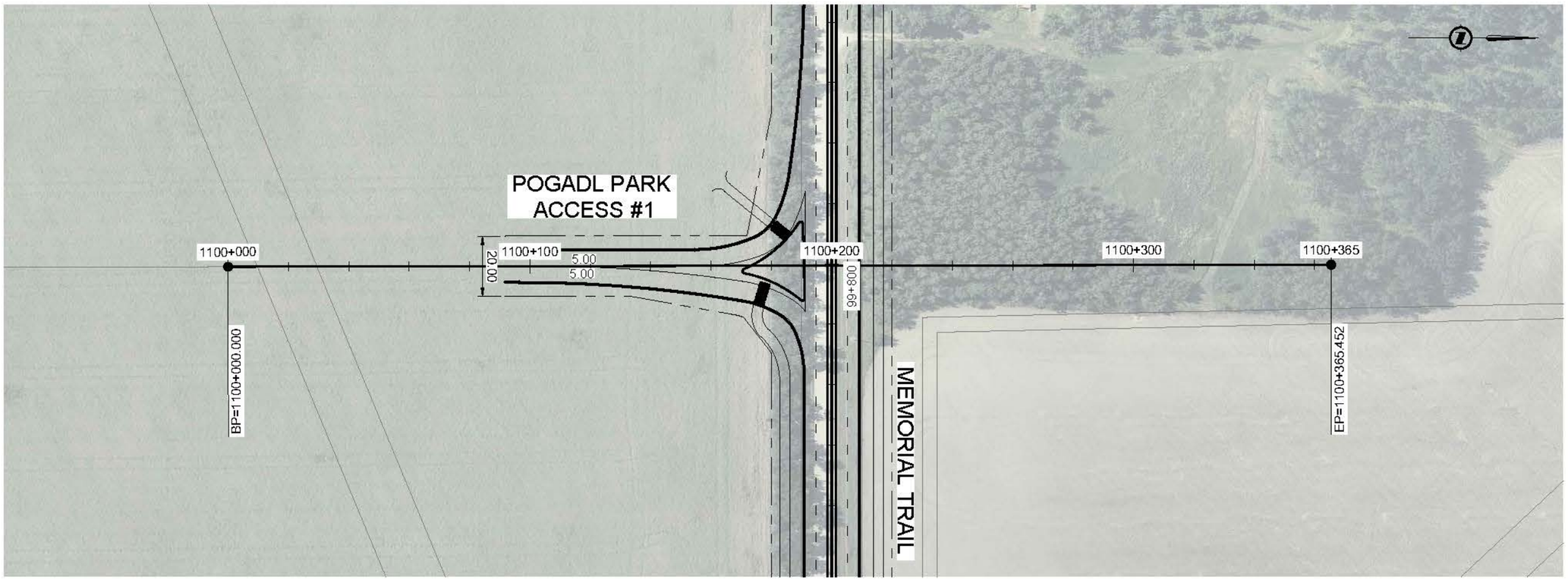
PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
PLAN PROFILE
SPRINGFIELD BLVD / POGADL PARK ACCESS #2

FILE No.	SCALE	FIGURE No.
27813_Plan_Profiles_Crossroads.dwg	AS SHOWN	5.13

ISC: #### SHEET SIZE ANSI B 20 mm 0

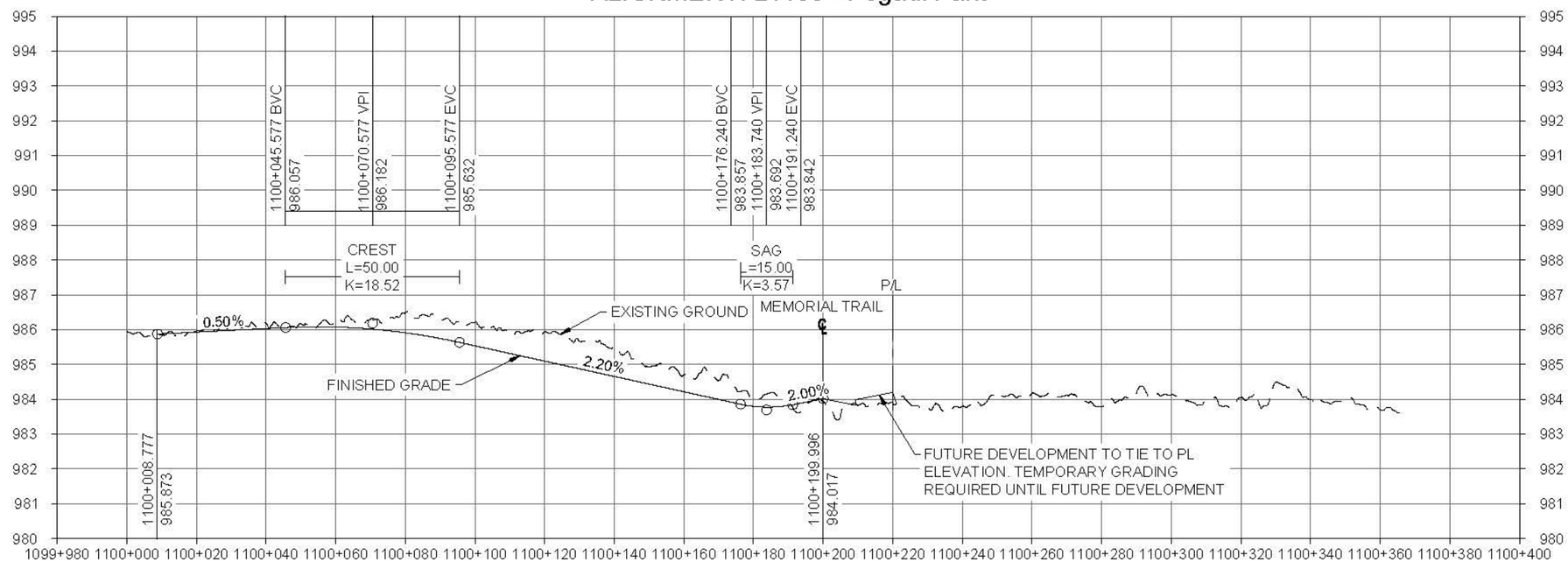
FILE: G:\PROJECTS\2022\02\27813-SYLVAN_LAKE_TRP_MEMORIAL_TRAIL_FS\02_CAD\00_DRAFTING\02_SHEETS\27813_PLAN_PROFILES_CROSSROADS.DWG | DATE: Mon, 16, 2022 5:59:40 PM



1:1500 (HORZ) 0 30 60 m

1:300 (VERT) 0 6 12 m

ALIGNMENT: L1100 - Pogadl Park

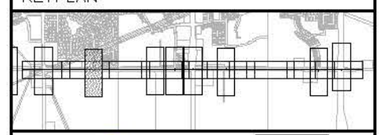


LEGEND

PLAN
PROPOSED
EXISTING

PROFILE
EXISTING GROUND
FINAL GRADE

KEYPLAN



Sylvan Lake ISL

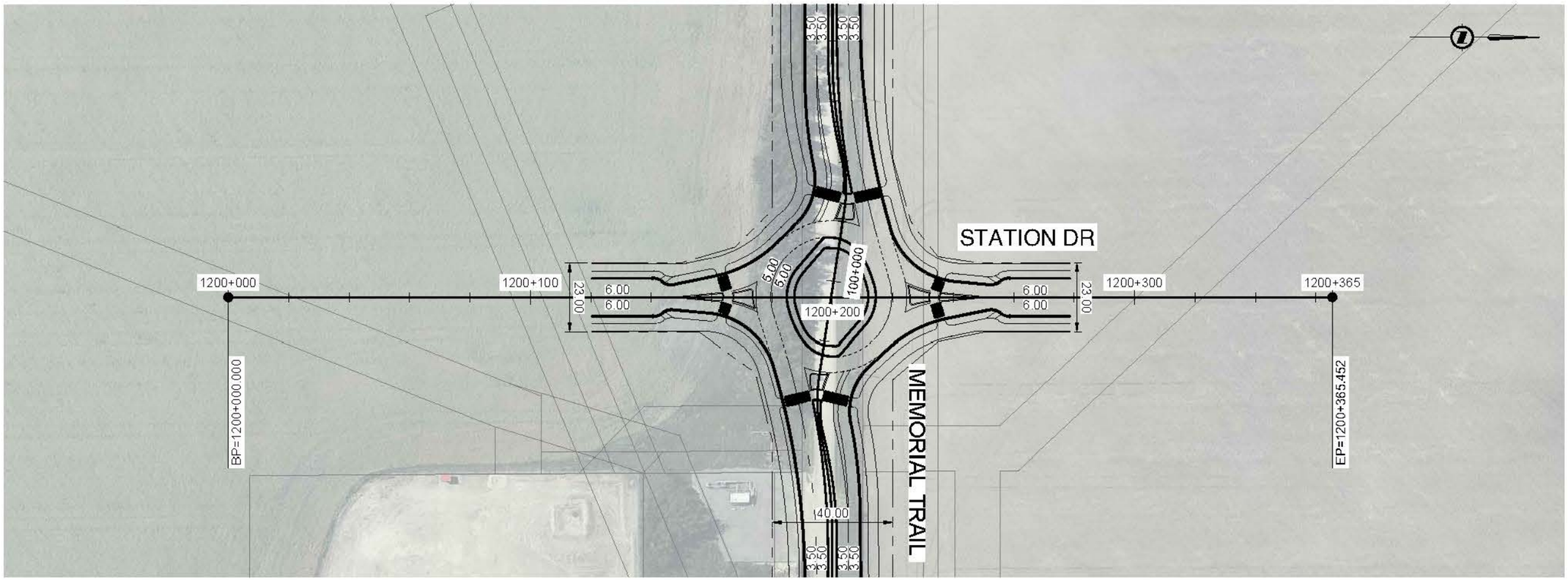
PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
PLAN PROFILE
POGADL PARK ACCESS #1

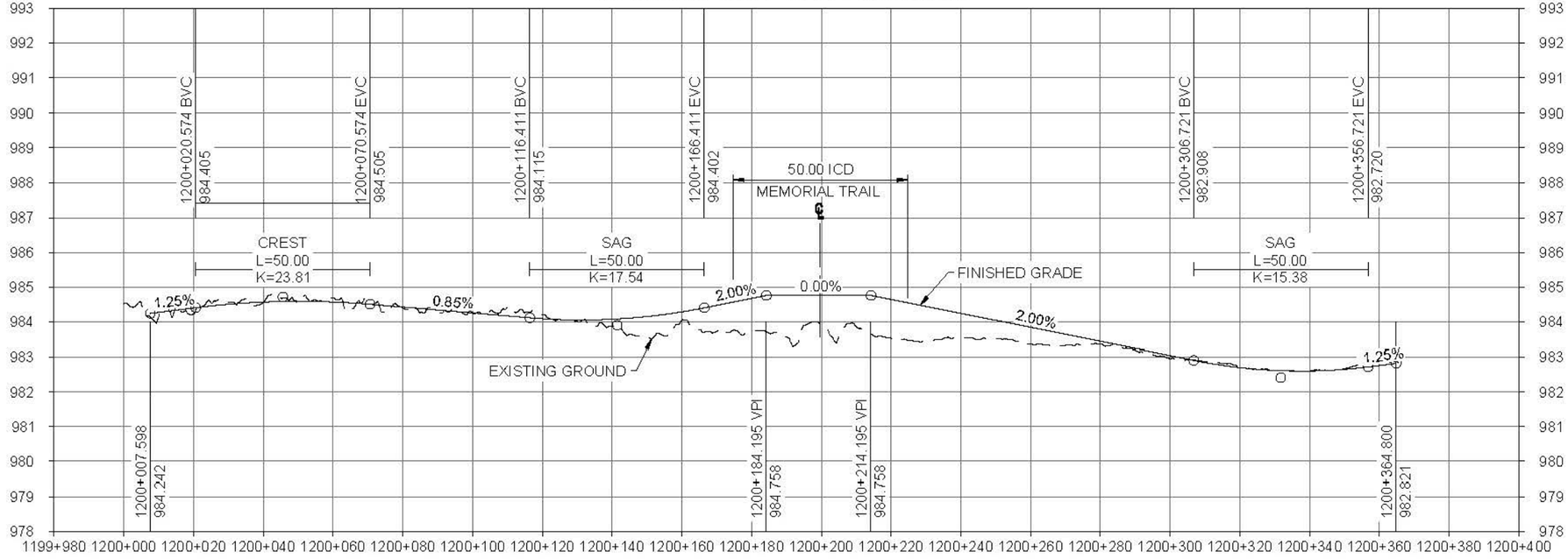
FILE No.	SCALE	FIGURE No.
27613_Plan_Profiles_Crossroads.dwg	AS SHOWN	5.14

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\02_DRAFTING\03_SHEETS\27613_PLAN_PROFILES_CROSSROADS.DWG | DATE: March 16, 2022 6:01:32 PM



ALIGNMENT: L1200 - Station Dr



1:1500 (HORZ) 0 30 60 m

1:300 (VERT) 0 6 12 m

LEGEND

PLAN
PROPOSED
EXISTING

PROFILE
EXISTING GROUND
FINAL GRADE

Sylvan Lake

ISL

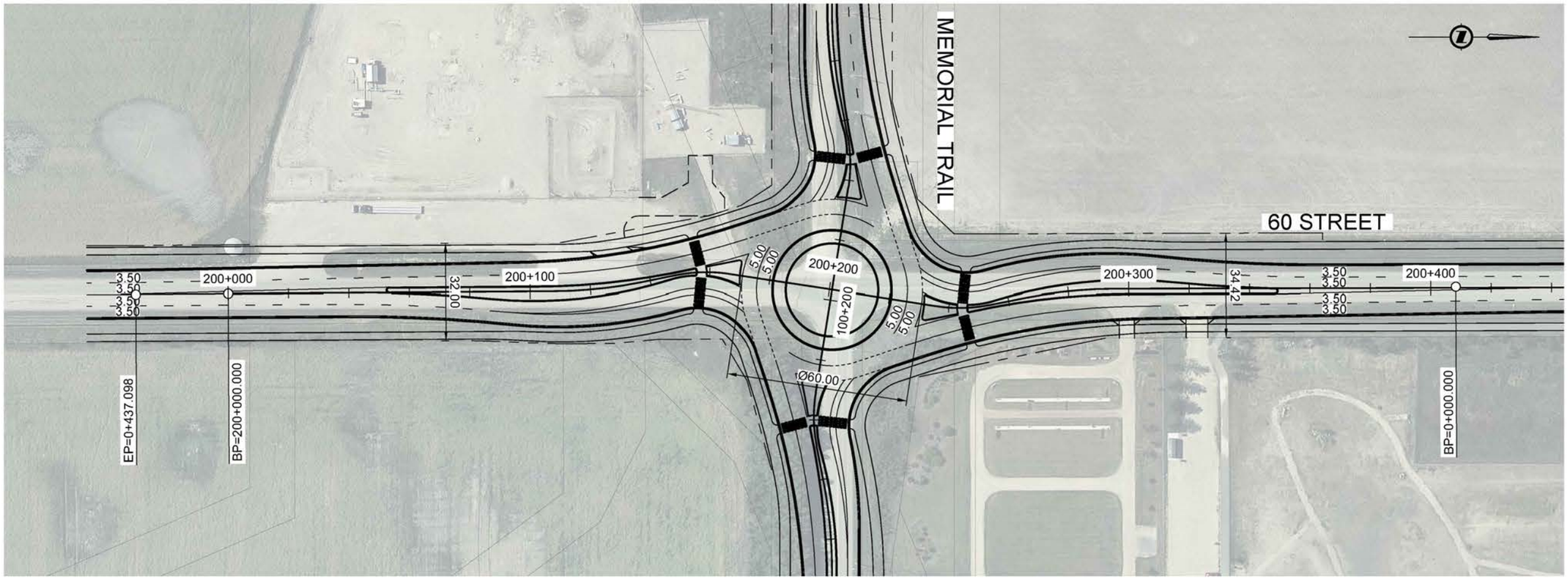
PROJECT
MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY

FIGURE TITLE
PLAN PROFILE STATION DR

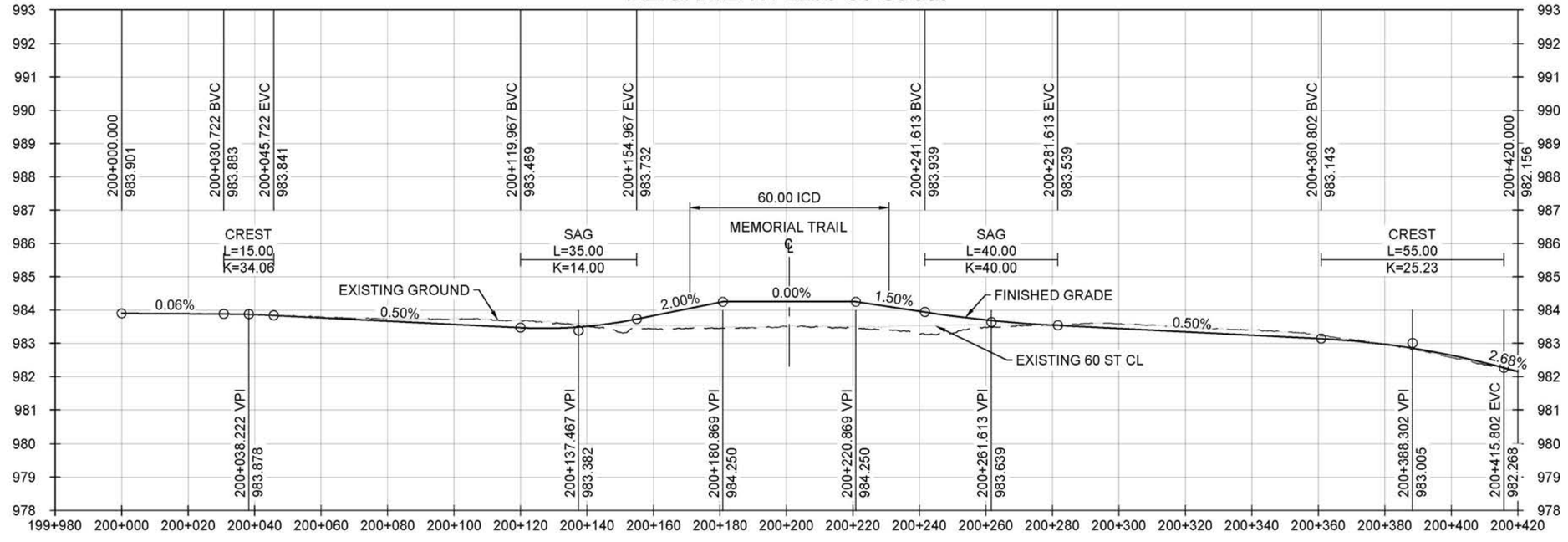
FILE No.	SCALE	FIGURE No.
27813_Plan_Profiles_Crossroads.dwg	AS SHOWN	5.15

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\27800\27813\02_DRAWING\27813_SYLVAN_LAKE_TRP_MEMORIAL_TRAIL_FPS\02_CAD\00_DRAFTING\03_SHEETS\27813_PLAN_PROFILES_CROSSROADS.DWG | DATE: Mon 16, 2022 6:02:57 PM



ALIGNMENT: L200-60 Street



1:1500 (HORZ) 0 30 60 m

1:300 (VERT) 0 6 12 m

LEGEND

PLAN
PROPOSED
EXISTING

PROFILE
EXISTING GROUND
FINAL GRADE

Sylvan Lake

ISL

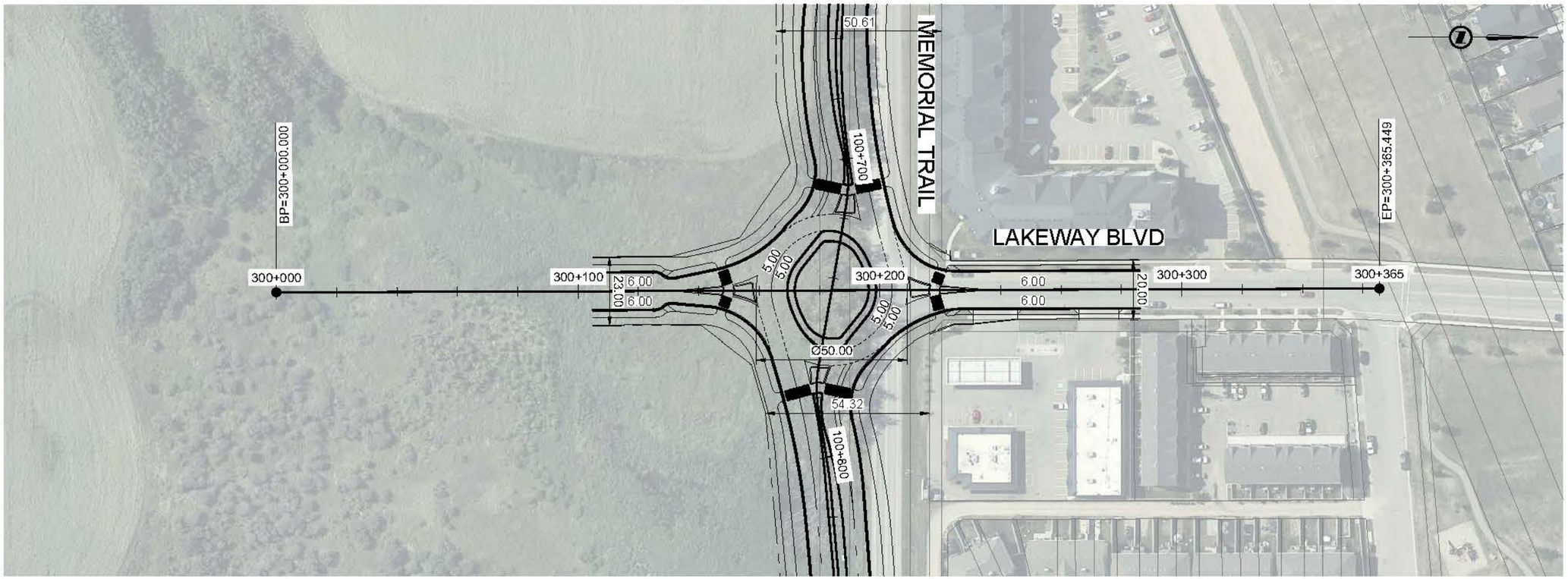
PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
PLAN PROFILE
60 STREET

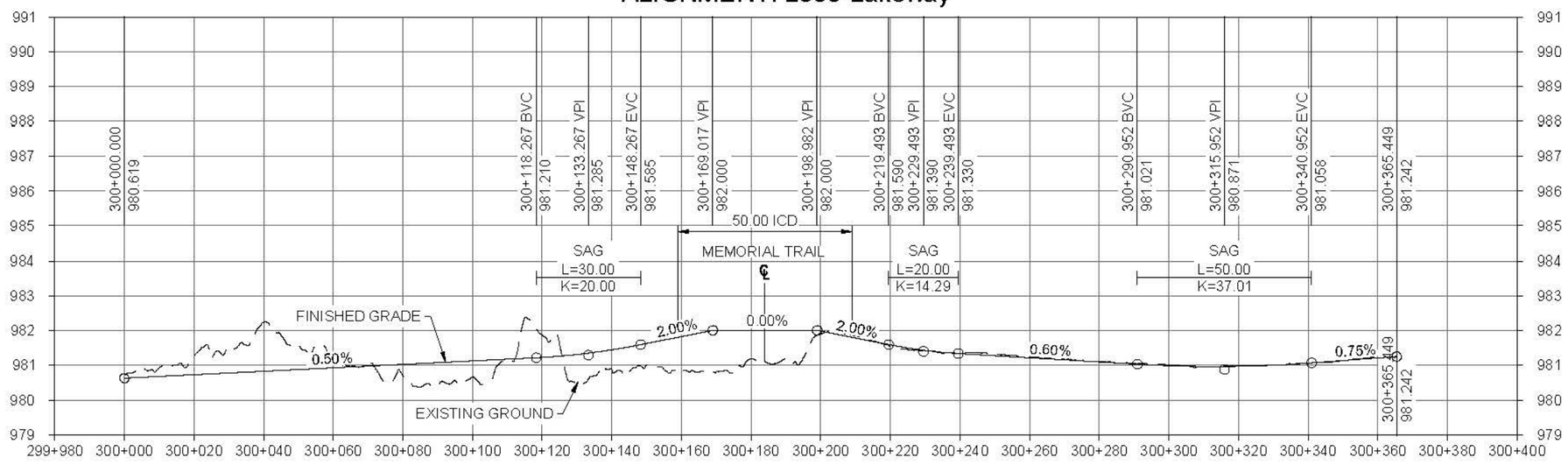
FILE No.	SCALE	FIGURE No.
27613_Plan_Profiles_Crossroads.dwg	AS SHOWN	5.16

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\27000\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FP\902_CAD\00_DRAFTING\203_SHEETS\27613_PLAN_PROFILES_CROSSROADS.DWG | DATE: March 16, 2022 9:06:17 PM



ALIGNMENT: L300-Lakeway



1:1500 (HORZ) 0 30 60 m

1:300 (VERT) 0 6 12 m

LEGEND

PLAN
PROPOSED
EXISTING
PROFILE
EXISTING GROUND
FINAL GRADE

Sylvan Lake

ISL

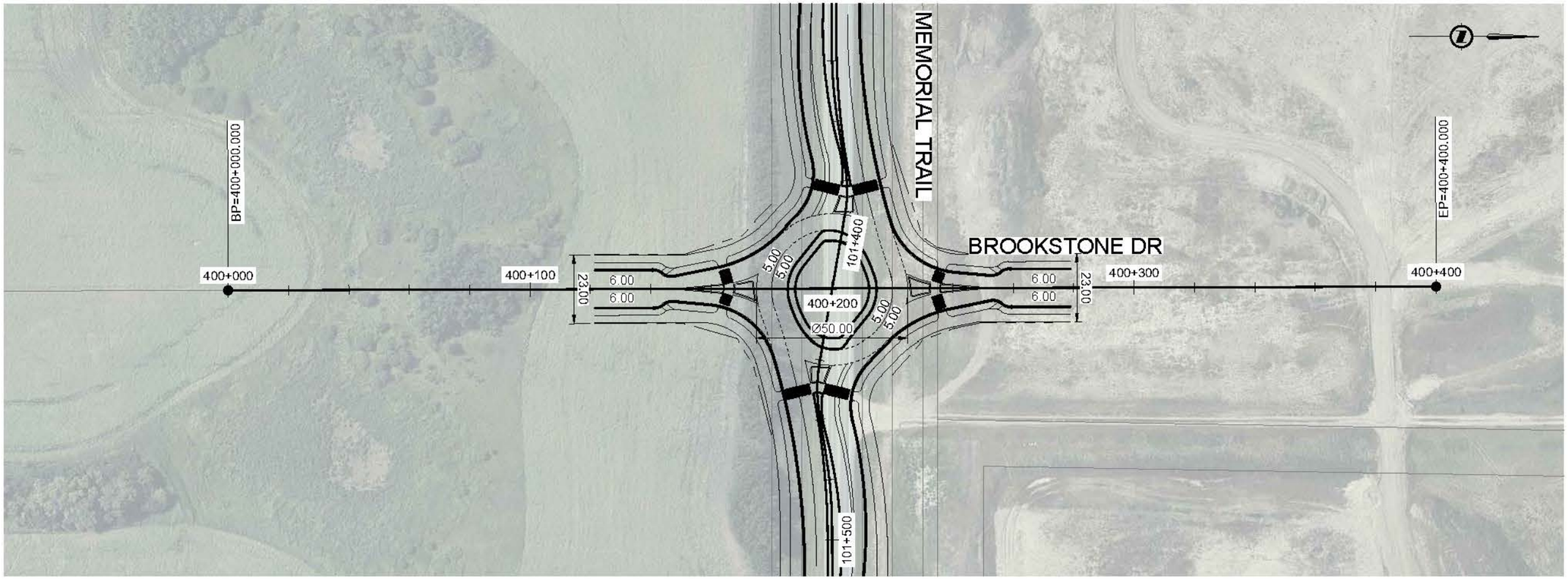
PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
PLAN PROFILE
LAKEWAY BLVD

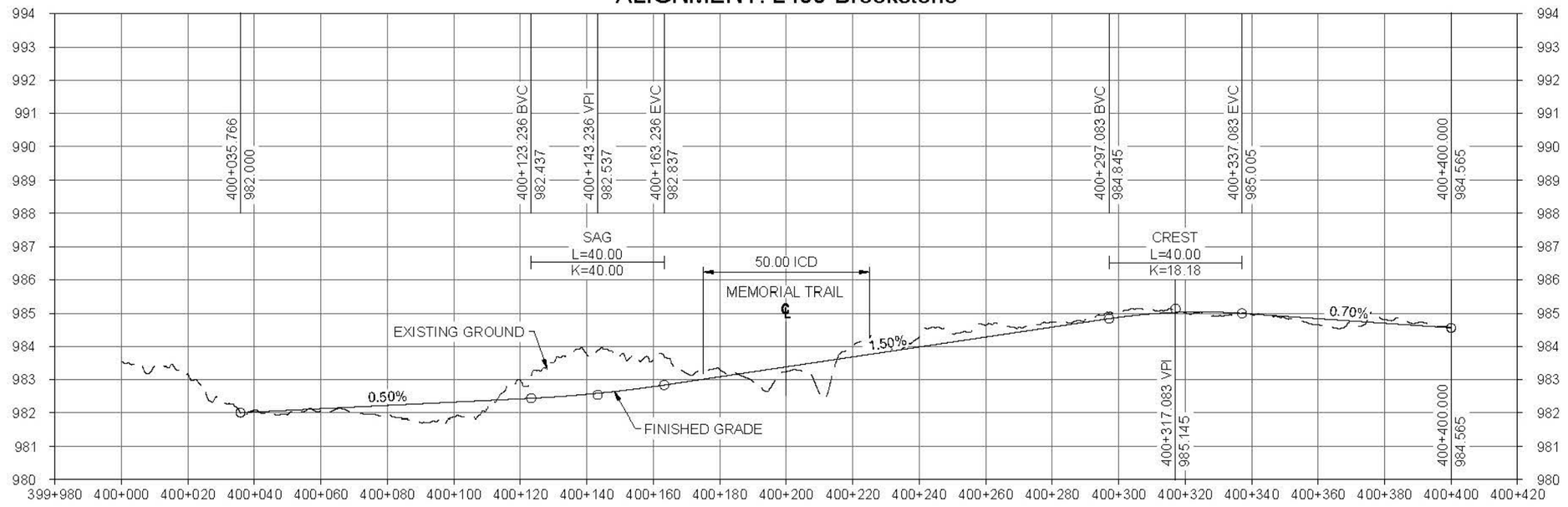
FILE No.	SCALE	FIGURE No.
27613_Plan_Profiles_Crossroads.dwg	AS SHOWN	5.17

ISC: #### SHEET SIZE ANSI B 20 mm

FILE: G:\PROJECTS\27000\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\00_DRAFTING\02_SHEETS\27613_PLAN_PROFILES_CROSSROADS.DWG | DATE: Mon, 16, 2022 6:35:45 PM



ALIGNMENT: L400-Brookstone



1:1500 (HORZ) 0 30 60 m

1:300 (VERT) 0 6 12 m

LEGEND

PLAN
PROPOSED
EXISTING

PROFILE
EXISTING GROUND
FINAL GRADE

Sylvan Lake

ISL

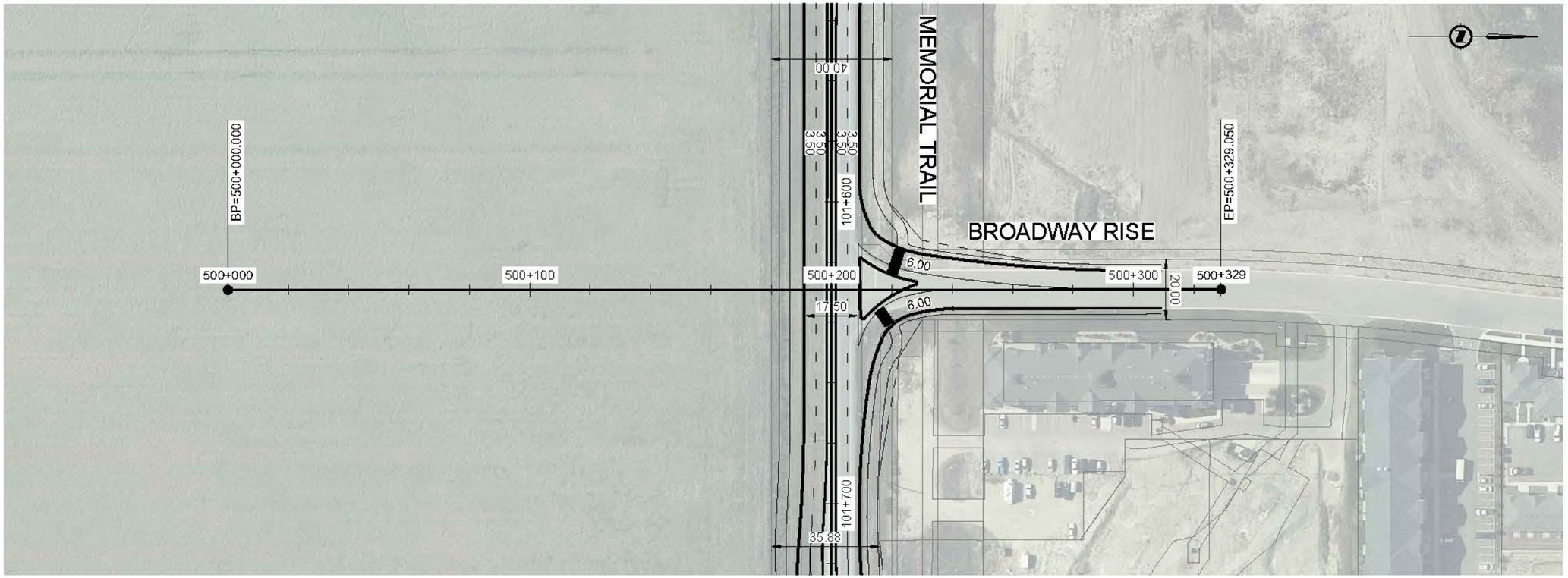
PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
PLAN PROFILE
BROOKSTONE DR

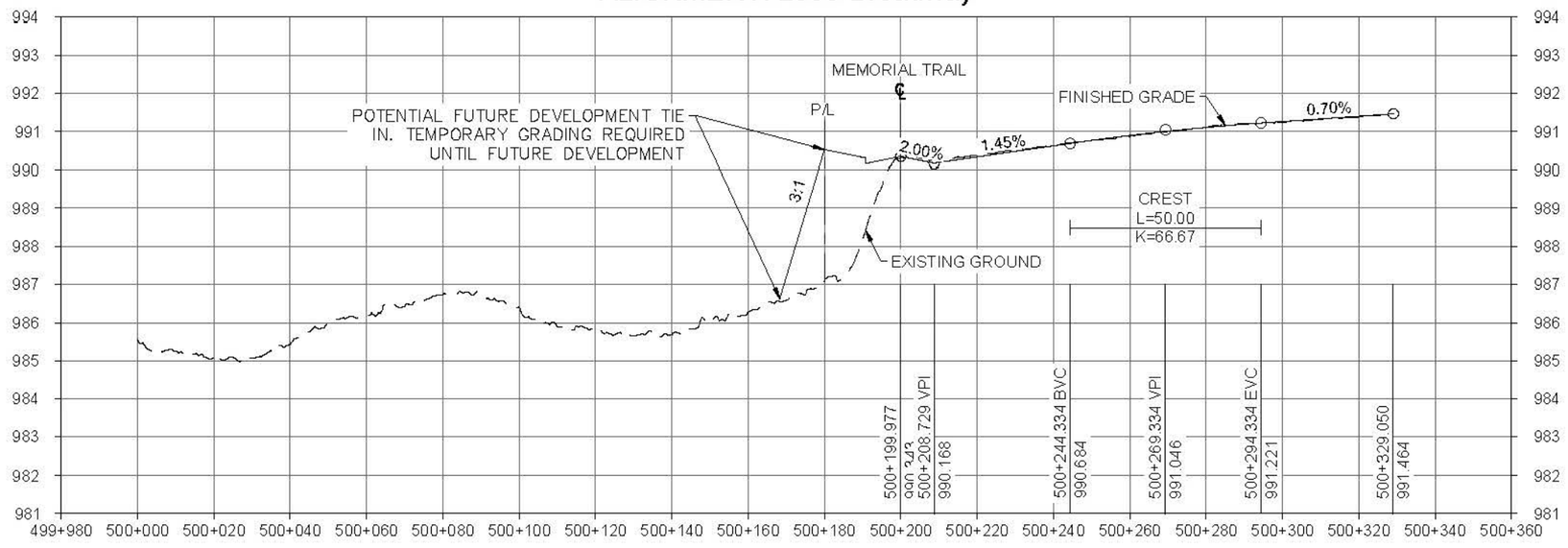
FILE No.	SCALE	FIGURE No.
27613_Plan_Profiles_Crossroads.dwg	AS SHOWN	5.18

ISC: #### SHEET SIZE ANSI B 20 mm

FILE: G:\P ROJECTS\27000\27613\02 613_SYLVAN_LAKE_TRP_MEMORIAL_TRAIL_FPS\02_CAD\00_DRAFTING \02D_SHEETS\27613_PLAN_PROFILES_CROSS ROADS.DWG | DATE: Mon Jun 16, 2022 6:07:09 PM



ALIGNMENT: L500-Broadway



1:1500 (HORZ) 0 30 60 m

1:300 (VERT) 0 6 12 m

LEGEND

PLAN
PROPOSED
EXISTING

PROFILE
EXISTING GROUND
FINAL GRADE

Sylvan Lake

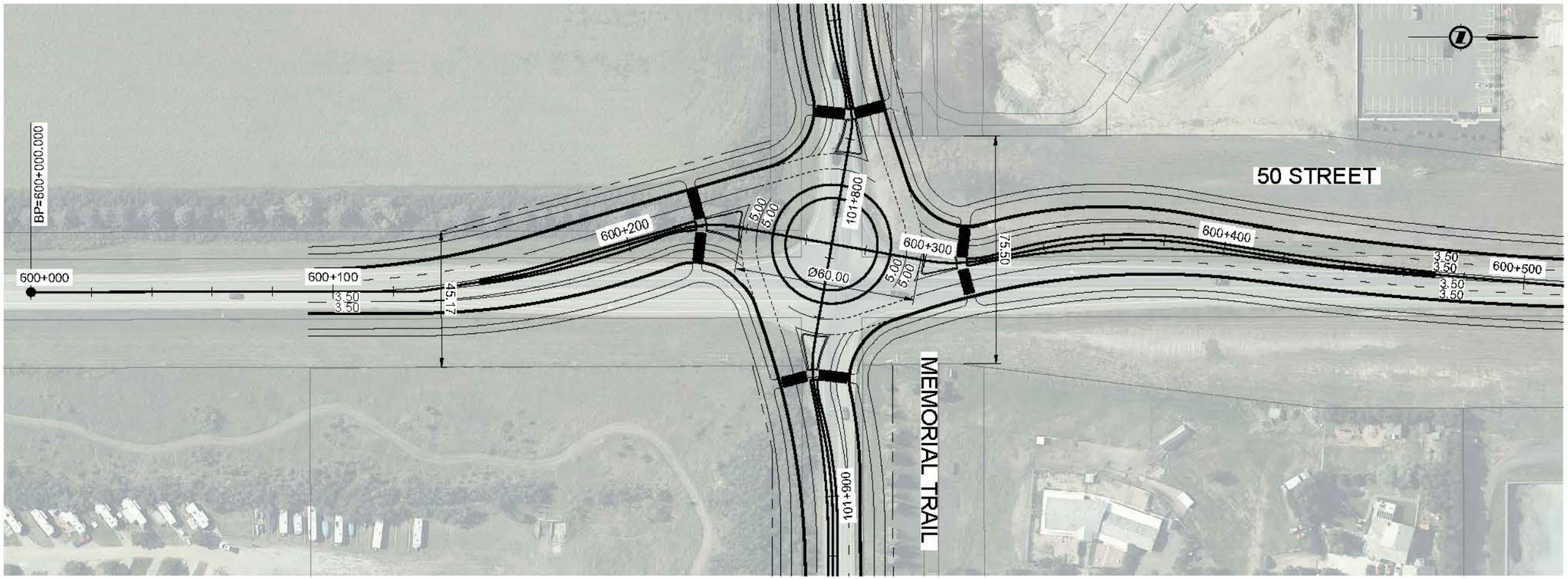
ISL

PROJECT
MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY

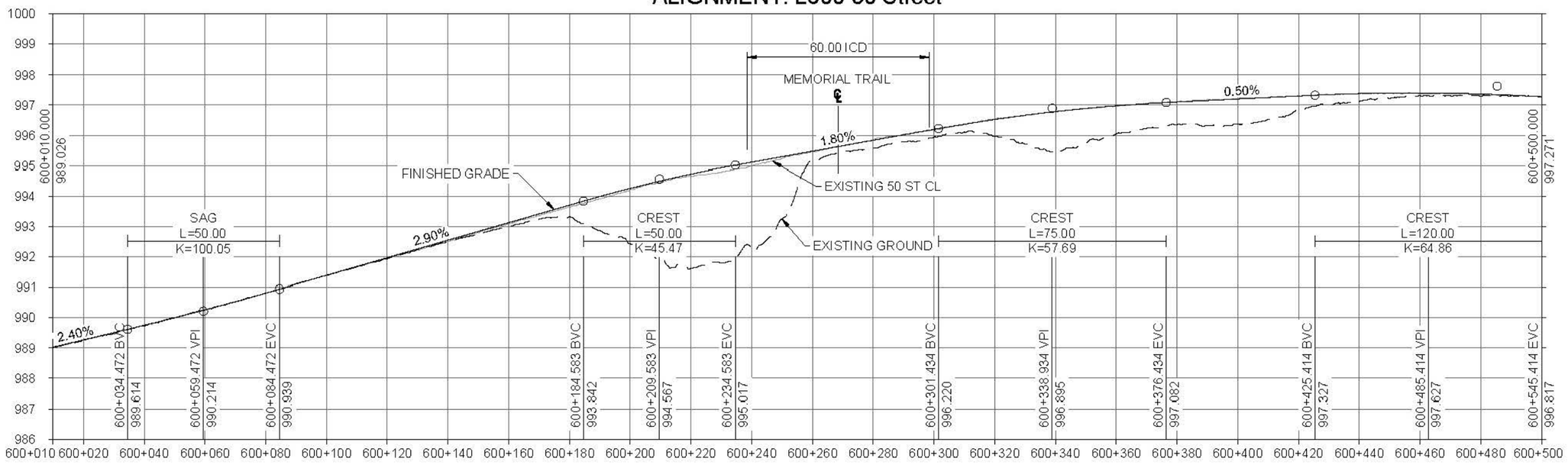
FIGURE TITLE
PLAN PROFILE BROADWAY RISE

FILE No.	SCALE	FIGURE No.
27813_Plan_Profiles_Crossroads.dwg	AS SHOWN	5.19

ISC: #### SHEET SIZE ANSI B 20 mm



ALIGNMENT: L600-50 Street



1:1500 (HORZ) 0 30 60 m

1:300 (VERT) 0 6 12 m

LEGEND

PLAN
PROPOSED
EXISTING

PROFILE
EXISTING GROUND
FINAL GRADE

Sylvan Lake

ISL

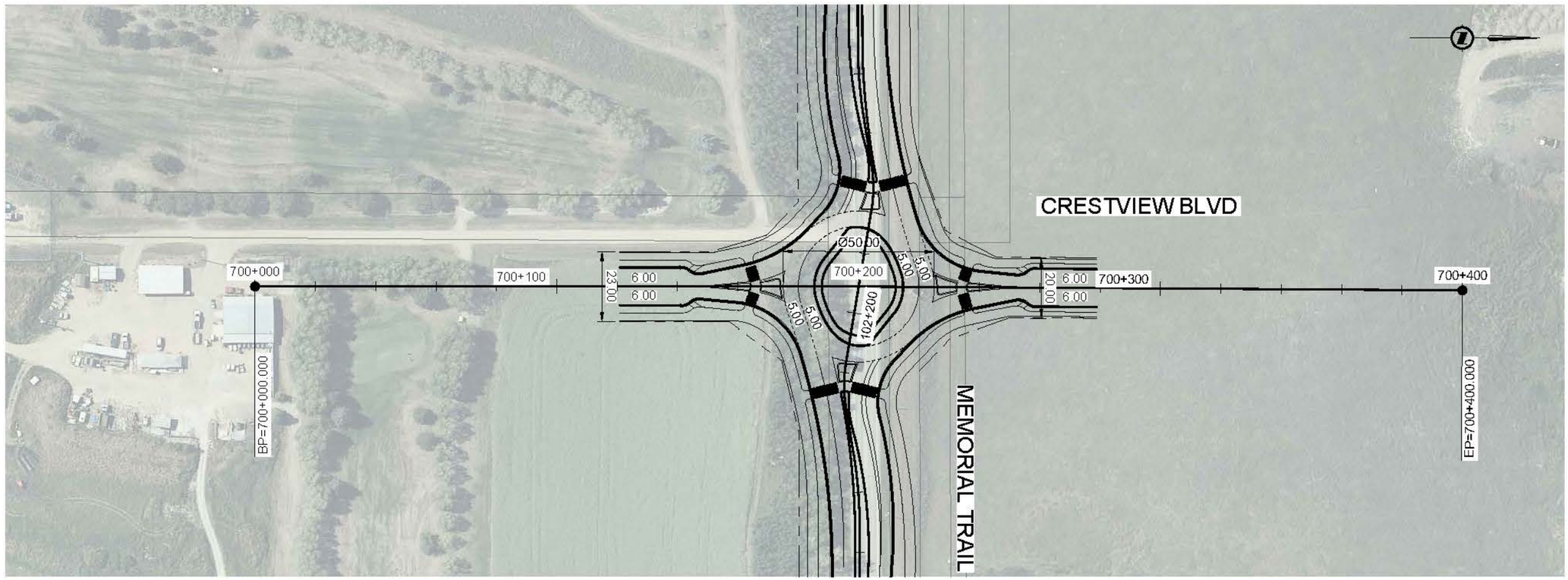
PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
PLAN PROFILE
50 STREET

FILE No.	SCALE	FIGURE No.
27813_Plan_Profiles_Crossroads.dwg	AS SHOWN	5.20

ISC: ### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\2022\02\27813_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\00_DRAFTING\2D_SHEETS\27813_PLAN_PROFILES_CROSSROADS.DWG | DATE: Mon, 16, 2022 6:10:02 PM

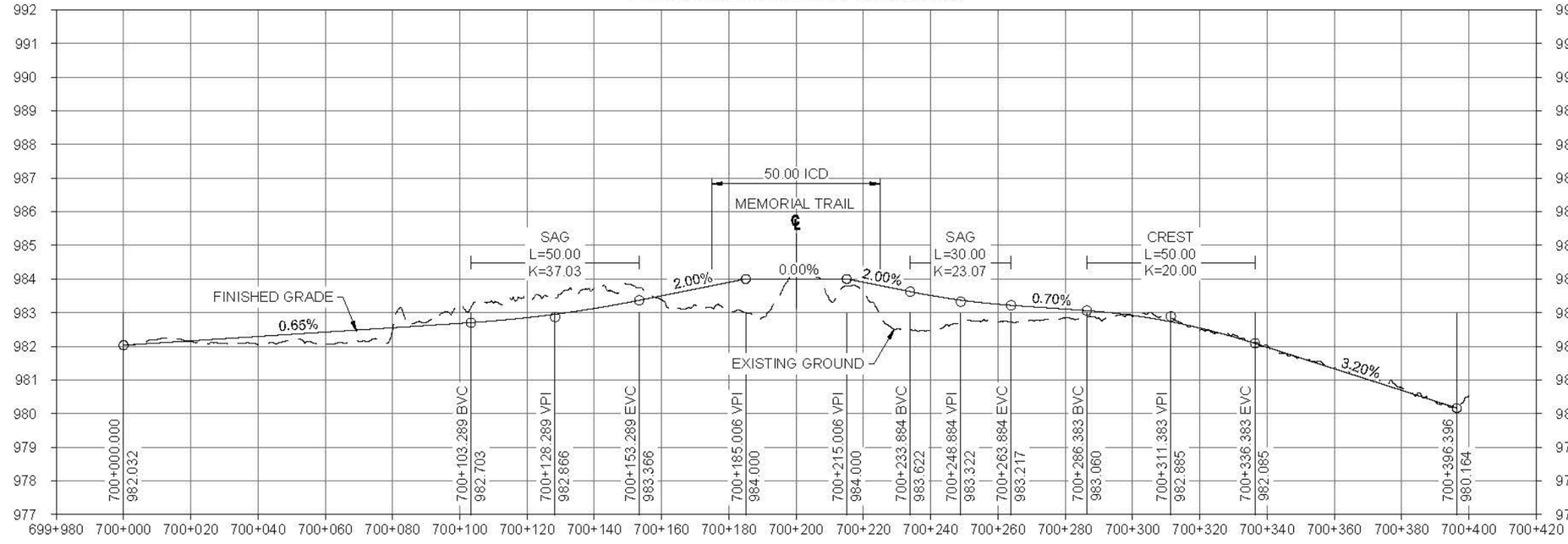


1:1500 (HORZ) 0 30 60 m

1:150 (VERT) 0 3 6 m

ALIGNMENT: L700-Crestview

PP CRESTVIEW

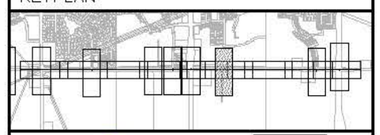


LEGEND

PLAN
PROPOSED
EXISTING

PROFILE
EXISTING GROUND
FINAL GRADE

KEYPLAN



Sylvan Lake ISL

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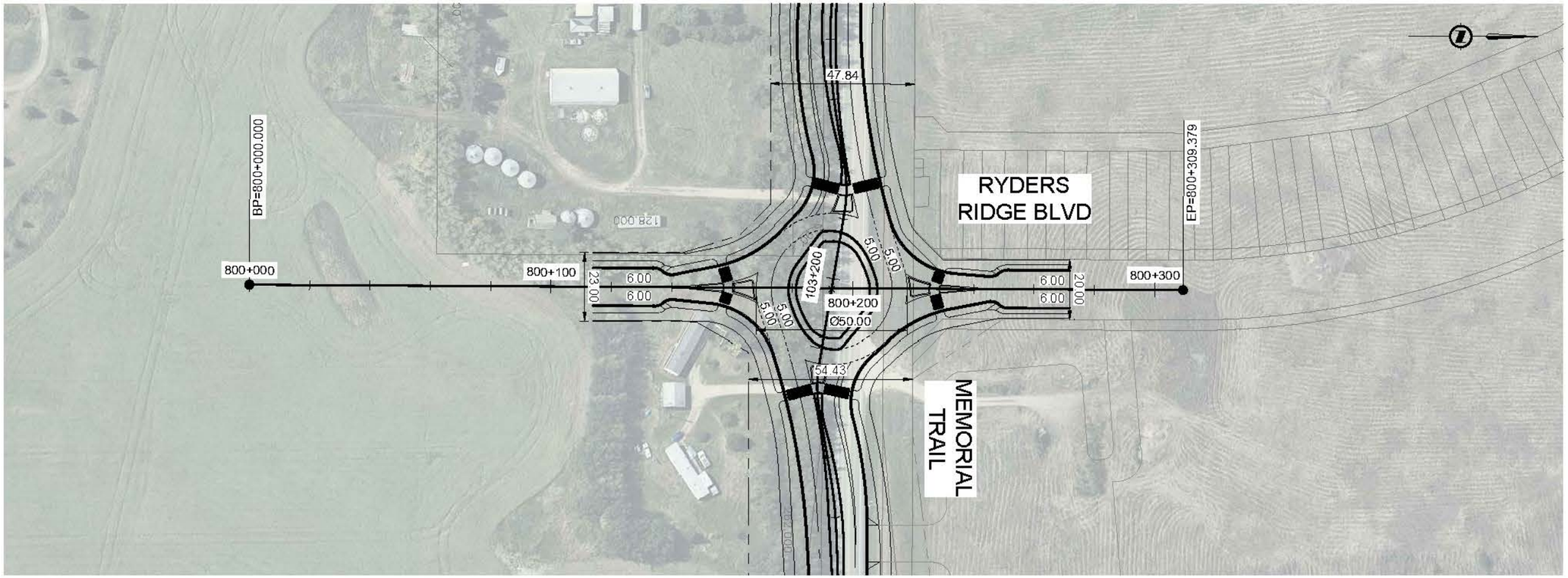
MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY

FIGURE TITLE
PLAN PROFILE CRESTVIEW BLVD

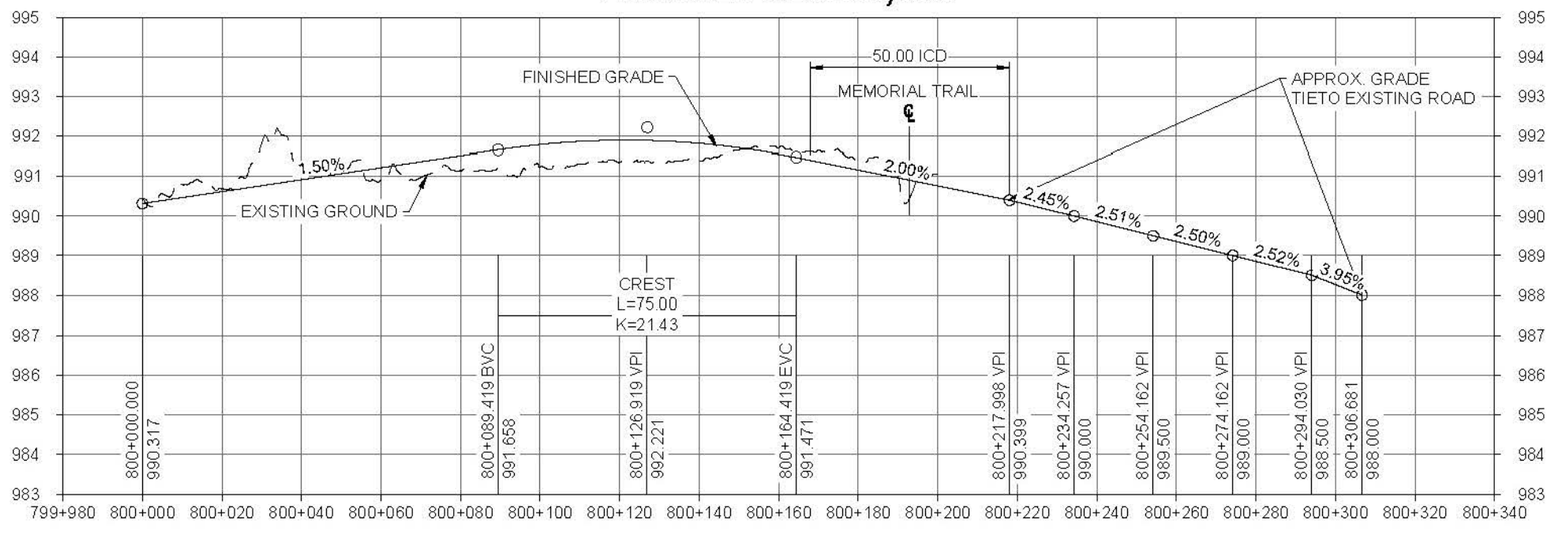
FILE No.	SCALE	FIGURE No.
27613_Plan_Profiles_Crossroads.dwg	AS SHOWN	5.21

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE G:\PROJECTS\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\02D_DRAFTING\02D3_SHEETS\27613_PLAN_PROFILES_CROSSROADS.DWG | DATE: March 16, 2022 6:11:49 PM



ALIGNMENT: L800-Ryders



1:1500 (HORZ) 0 30 60 m

1:150 (VERT) 0 3 6 m

LEGEND

PLAN
PROPOSED
EXISTING

PROFILE
EXISTING GROUND
FINAL GRADE

Sylvan Lake

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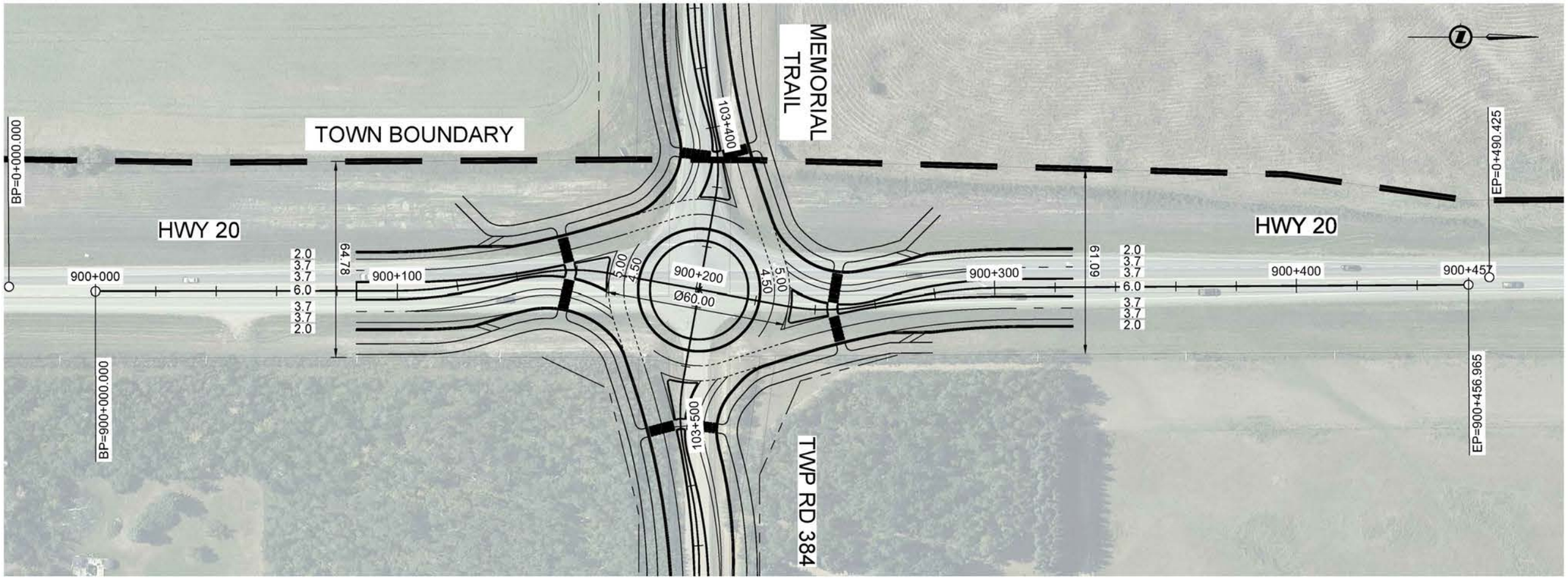
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
PLAN PROFILE
RYDERS RIDGE BLVD

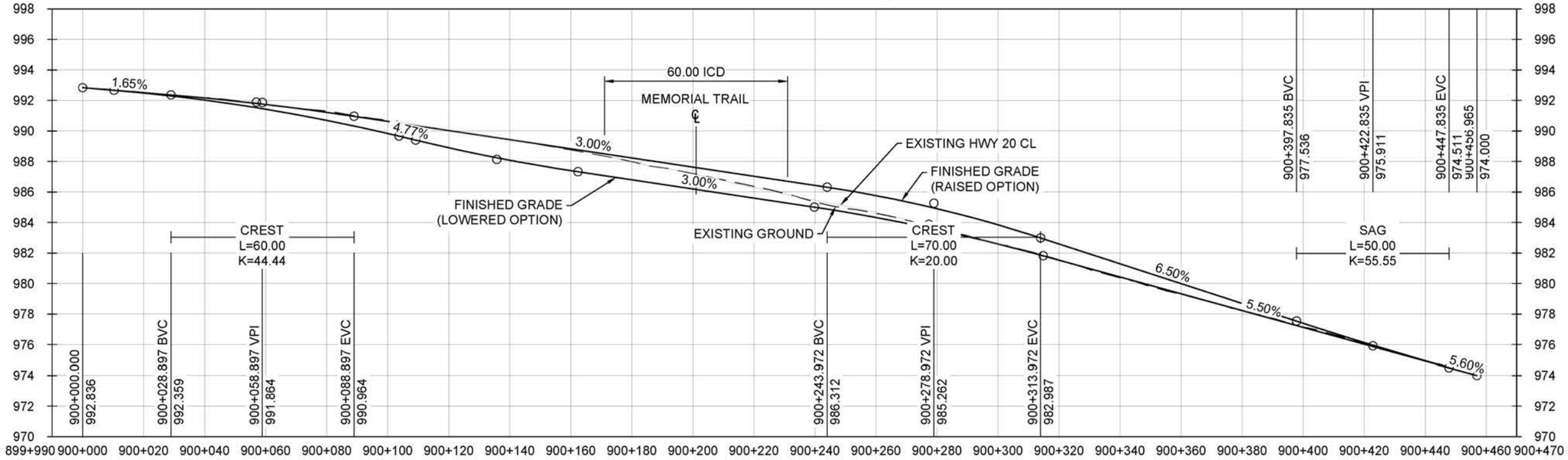
FILE No.	SCALE	FIGURE No.
27613_Plan_Profiles_Crossroads.dwg	AS SHOWN	5.22

ISC: ### SHEET SIZE ANSI B 20 mm

FILE: G:\PROJECTS\27000\27613\02\613_SYLVAN_LAKE_TWP_MEMORIAL_TRAIL_FPS\02_CAD\00_DRAFTING\02_SHEETS\27613_PLAN_PROFILES_CROSSROADS.DWG | DATE: March 16, 2022 6:13:14 PM



ALIGNMENT: L900-Hwy20



1:1500 (HORZ) 0 30 60 m

1:300 (VERT) 0 6 12 m

LEGEND

PLAN
PROPOSED
EXISTING

PROFILE
EXISTING GROUND
FINAL GRADE

Sylvan Lake

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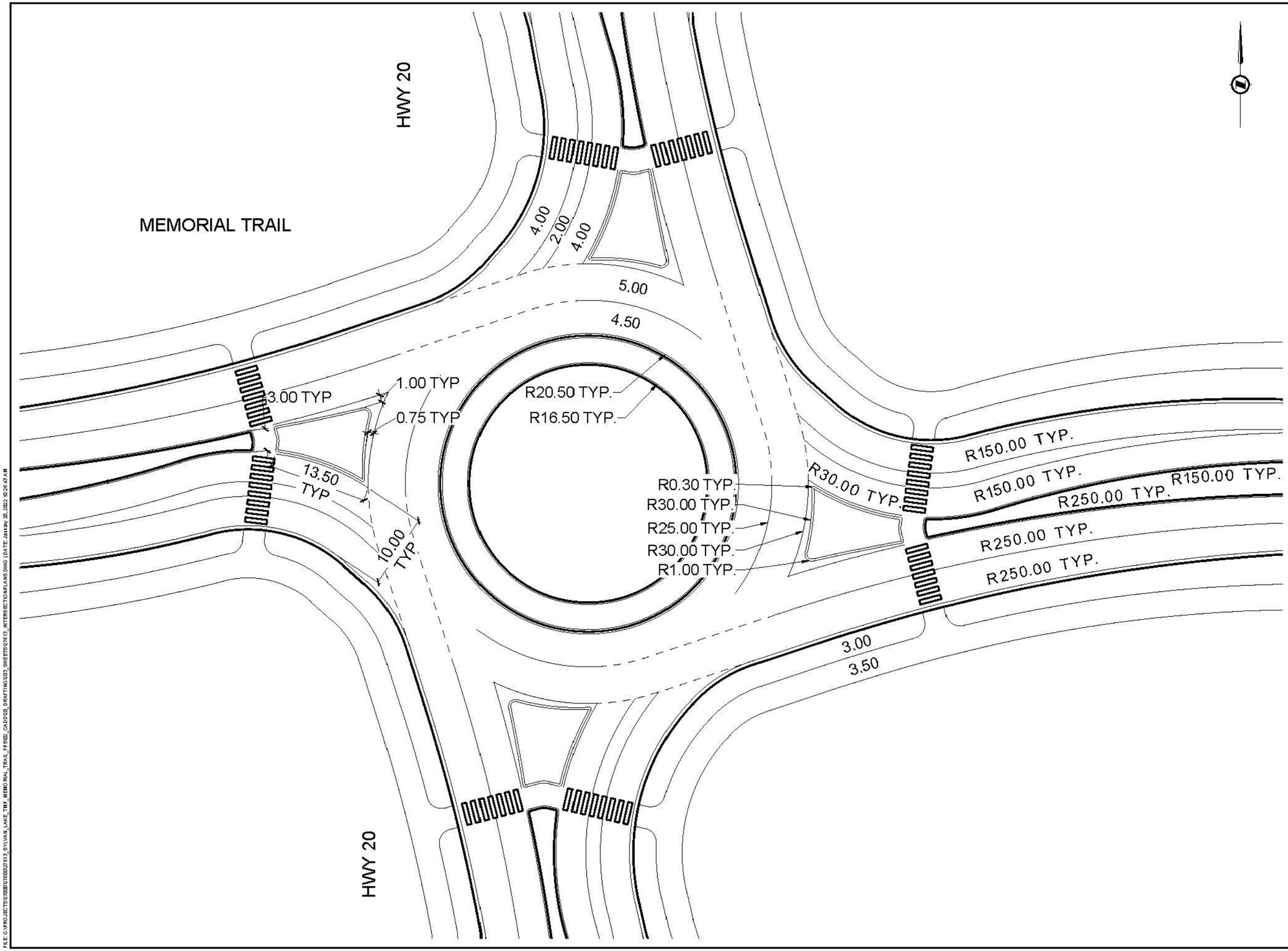
MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY

FIGURE TITLE
PLAN PROFILE HIGHWAY 20

FILE No.	SCALE	FIGURE No.
27613_Plan_Profiles_Crossroads.dwg	AS SHOWN	5.23

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\27000\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FP\902_CAD\00_DRAFTING\203_SHEETS\27613_PLAN_PROFILES_CROSSROADS.DWG | [DATE: March 16, 2022 8:59:44 PM]



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MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE

INTERSECTION PLAN
HIGHWAY 20 ROUNDABOUT

FILE No.	SCALE	FIGURE No.
27613_IntersectionPlans.dwg		5.24

ISC: #### SHEET SIZE ANSI B 20 m 0

FILE:G:\PROJECTS\27600\27660\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\03_DRAFTING\03D_SHEETS\27613_INTERSECTIONPLANS.DWG [DATE: January 20, 2022 10:26:43 AM]

HWY 20

MEMORIAL TRAIL

16.44m

18.21m

17.80m

14.41m

MEMORIAL TRAIL

HWY 20

0 15 30 m

1:750

LEGEND

PROPOSED ROADWAY

Sylvan Lake

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PROJECT

MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

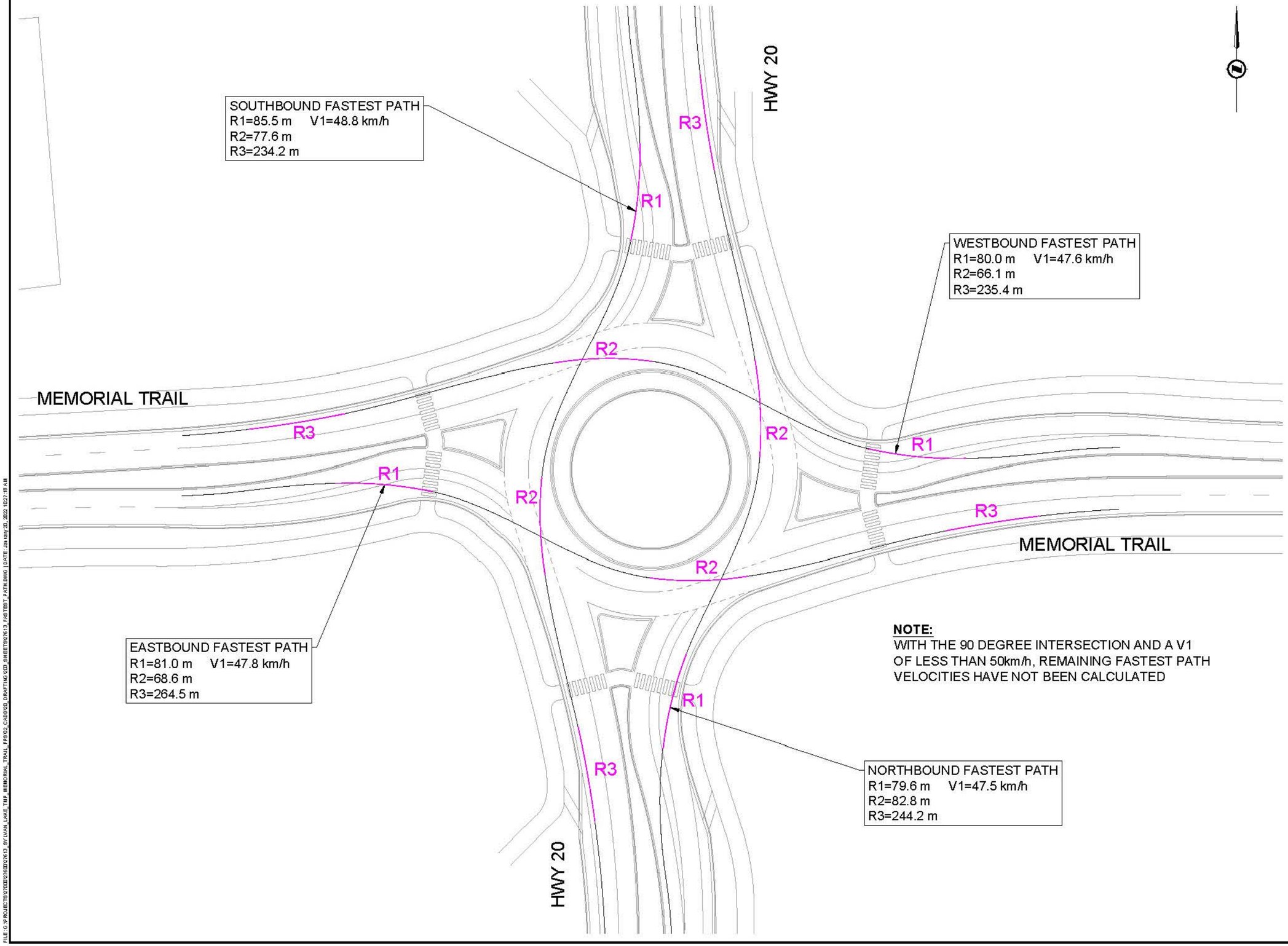
FIGURE TITLE

ENTRY PATH OVERLAP
HIGHWAY 20 ROUNDABOUT

FILE No.	SCALE	FIGURE No.
27613_Tangent_Path.dwg		5.25

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\27000\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\GIS_DRAFTING\GIS_SHEETS\27613_TANGENT_PATH.DWG | DATE: JANUARY 20, 2022 10:27:02 AM



NOTE:
WITH THE 90 DEGREE INTERSECTION AND A V1 OF LESS THAN 50km/h, REMAINING FASTEST PATH VELOCITIES HAVE NOT BEEN CALCULATED

0 15 30 m
1:750

LEGEND

PROPOSED ROADWAY

Sylvan Lake ISL

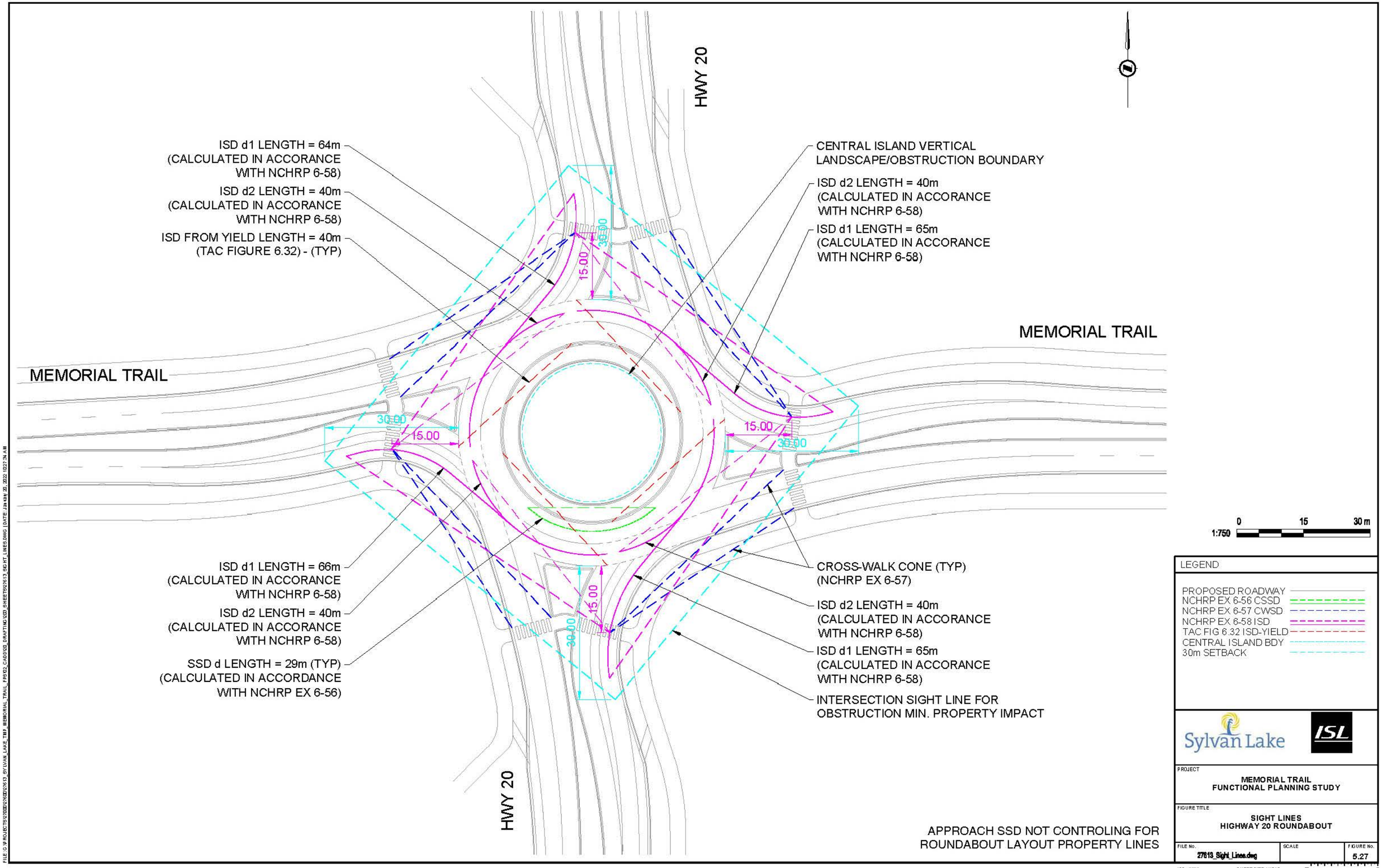
PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
FASTEST PATH
HIGHWAY 20 ROUNDABOUT

FILE No.	SCALE	FIGURE No.
27613_Fastest_Path.dwg		5.26

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\27000\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\02_DRAFTING\02D_SHEETS\27613_FASTEST_PATH.DWG | DATE: January 20, 2022 10:21:18 AM


HWY 20
MEMORIAL TRAIL
MEMORIAL TRAIL
HWY 20
ISD d1 LENGTH = 64m
(CALCULATED IN ACCORANCE
WITH NCHRP 6-58)
ISD d2 LENGTH = 40m
(CALCULATED IN ACCORANCE
WITH NCHRP 6-58)
ISD FROM YIELD LENGTH = 40m
(TAC FIGURE 6.32) - (TYP)
CENTRAL ISLAND VERTICAL
LANDSCAPE/OBSTRUCTION BOUNDARY
ISD d2 LENGTH = 40m
(CALCULATED IN ACCORANCE
WITH NCHRP 6-58)
ISD d1 LENGTH = 65m
(CALCULATED IN ACCORANCE
WITH NCHRP 6-58)
ISD d1 LENGTH = 66m
(CALCULATED IN ACCORANCE
WITH NCHRP 6-58)
ISD d2 LENGTH = 40m
(CALCULATED IN ACCORANCE
WITH NCHRP 6-58)
SSD d LENGTH = 29m (TYP)
(CALCULATED IN ACCORDANCE
WITH NCHRP EX 6-56)
CROSS-WALK CONE (TYP)
(NCHRP EX 6-57)
ISD d2 LENGTH = 40m
(CALCULATED IN ACCORANCE
WITH NCHRP 6-58)
ISD d1 LENGTH = 65m
(CALCULATED IN ACCORANCE
WITH NCHRP 6-58)
INTERSECTION SIGHT LINE FOR
OBSTRUCTION MIN. PROPERTY IMPACT
30.00
15.00
15.00
30.00
15.00
30.00
15.00
30.00
APPROACH SSD NOT CONTROLING FOR
ROUNDABOUT LAYOUT PROPERTY LINES
0
15
30 m
1:750
LEGEND
PROPOSED ROADWAY
NCHRP EX 6-56 CSSD
NCHRP EX 6-57 CWSD
NCHRP EX 6-58 ISD
TAC FIG 6.32 ISD-YIELD
CENTRAL ISLAND BDY
30m SETBACK
Sylvan Lake
ISL
PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY
FIGURE TITLE
SIGHT LINES
HIGHWAY 20 ROUNDABOUT
FILE No.
27613_Sight_Lines.dwg
SCALE
FIGURE No.
5.27
ISC: ####
SHEET SIZE ANSI B
20 mm
0
FILE: G:\PROJECTS\27000\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FS\02_CAD\00_DRAFTING\DWG\SHEETS\27613_SIGHT_LINES.DWG | DATE: January 20, 2022 10:27:34 AM

HWY 20

MEMORIAL TRAIL

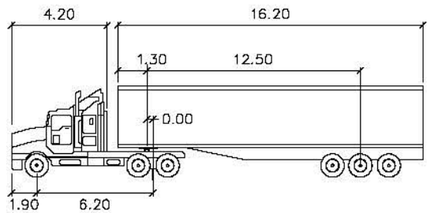
MEMORIAL TRAIL

CASE 2: WB-21 STAYS WITHIN IT'S OWN LANE ON THE OUTSIDE APPROACH LANE BUT ENCROACHES ON THE ADJACENT CIRCULATING LANE

CASE 2: WB-21 STAYS WITHIN IT'S OWN LANE ON THE OUTSIDE APPROACH LANE BUT ENCROACHES ON THE ADJACENT CIRCULATING LANE

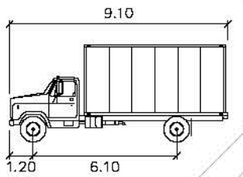
HWY 20

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h



WB21

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 26.6
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		



SU9

	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 31.5

0 15 30 m
1:750

Sylvan Lake

ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
HIGHWAY 20 ROUNDABOUT
EB-WB THROUGH - WB 21 OUTSIDE

FILE No.	SCALE	FIGURE No.
27613_TT_HWY_20.dwg		5.28

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE G:\PROJECTS\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\02D_DRAFTING\02D3_SHEETS\27613_TT_HWY_20.DWG | DATE: January 20, 2022 10:27:48 AM

HWY 20

MEMORIAL TRAIL

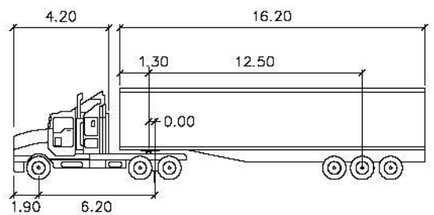
MEMORIAL TRAIL

CASE 3: WB-21 STAYS WITHIN IT'S OWN LANE ON THE INSIDE APPROACH LANE AND THE INSIDE CIRCULATING LANE WITH THE USE OF THE TRUCK APRON

CASE 3: WB-21 STAYS WITHIN IT'S OWN LANE ON THE INSIDE APPROACH LANE AND THE INSIDE CIRCULATING LANE WITH THE USE OF THE TRUCK APRON

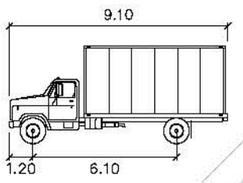
HWY 20

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h



WB21

meters			
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 26.6
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		



SU9

meters	
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 31.5

0 15 30 m
1:750

Sylvan Lake ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
HIGHWAY 20 ROUNDABOUT
EB-WB THROUGH - WB 21 INSIDE

FILE No.	SCALE	FIGURE No.
27613_TT_HWY_20.dwg		5.29

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\27600\27600\27613_SYLVAN_LAKE_TRP_MEMORIAL_TRAIL_FP\60_CAD\03_DRAFTING\03_SHEETS\27613_TT_HWY_20.DWG | DATE: January 20, 2022 10:27:52 AM

HWY 20

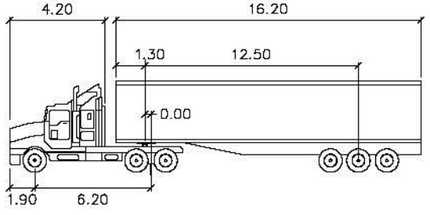
MEMORIAL TRAIL

MEMORIAL TRAIL

HWY 20

CASE 3: WB-21 STAYS WITHIN IT'S OWN LANE ON THE INSIDE APPROACH LANE AND THE INSIDE CIRCULATING LANE WITH THE USE OF THE TRUCK APRON

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h



WB21

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 26.6
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		

0 15 30 m
1:750

Sylvan Lake ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
HIGHWAY 20 ROUNDABOUT
EB-WB LEFT TURNS - WB 21

FILE No.	SCALE	FIGURE No.
27613_TT_HWY_20.dwg		5.30

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE:G:\PROJECTS\27600\27600\27613 SYLVAN LAKE TRP_MEMORIAL TRAIL_FP&D_CAD\03_DRAFTING\03_SHEETS\27613_TT_HWY_20.DWG [DATE: January 20, 2022 10:27:55 AM]

MEMORIAL TRAIL

HWY 20

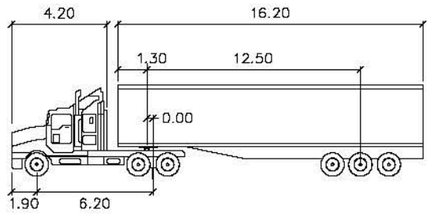
HWY 20

CASE 2: WB-21 STAYS WITHIN IT'S OWN LANE ON THE OUTSIDE APPROACH LANE BUT ENCROACHES ON THE ADJACENT CIRCULATING LANE

CASE 2: WB-21 STAYS WITHIN IT'S OWN LANE ON THE OUTSIDE APPROACH LANE BUT ENCROACHES ON THE ADJACENT CIRCULATING LANE

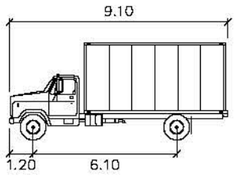
MEMORIAL TRAIL

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h



WB21

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 26.6
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		



SU9

	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 31.5

0 15 30 m
1:750

Sylvan Lake ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
HIGHWAY 20 ROUNDABOUT
NB-SB THROUGH - WB 21 OUTSIDE

FILE No.	SCALE	FIGURE No.
27613_TT_HWY_20.dwg		5.31

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE G:\PROJECTS\27600\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\02D_DRAFTING\02D3_SHEETS\27613_TT_HWY_20.DWG | DATE: JANUARY 20, 2022 10:27:58 AM

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h

MEMORIAL TRAIL

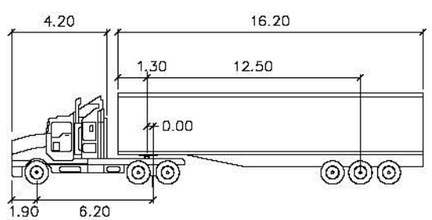
HWY 20

HWY 20

CASE 3: WB-21 STAYS WITHIN IT'S OWN LANE ON THE INSIDE APPROACH LANE AND THE INSIDE CIRCULATING LANE WITH THE USE OF THE TRUCK APRON

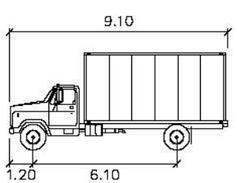
CASE 3: WB-21 STAYS WITHIN IT'S OWN LANE ON THE INSIDE APPROACH LANE AND THE INSIDE CIRCULATING LANE WITH THE USE OF THE TRUCK APRON

MEMORIAL TRAIL



WB21

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 26.6
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		



SU9

	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 31.5

1:750 0 15 30 m

Sylvan Lake ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
HIGHWAY 20 ROUNDABOUT
NB-SB THROUGH - WB 21 INSIDE

FILE No.	SCALE	FIGURE No.
27613_TT_HWY_20.dwg		5.32

ISC: #### SHEET SIZE ANSI B 20 mm

FILE:G:\PROJECTS\2020\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FP\02_CAD\03_DRAFTING\03_SHEETS\27613_TT_HWY_20.DWG | DATE:January 20, 2022 10:28:02 AM

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h

MEMORIAL TRAIL

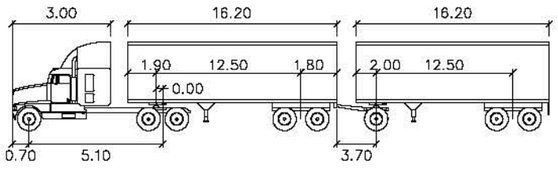
HWY 20

HWY 20

CASE 1: WB-36 ENCROACHES ON THE ADJACENT APPROACH AND CIRCULATORY LANES

CASE 1: WB-36 ENCROACHES ON THE ADJACENT APPROACH AND CIRCULATORY LANES

MEMORIAL TRAIL



WB36

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 17.1
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		

0 15 30 m
1:750

Sylvan Lake ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
HIGHWAY 20 ROUNDABOUT
NB-SB THROUGH - WB 36 OUTSIDE

FILE No.	SCALE	FIGURE No.
27613_TT_HWY_20.dwg		5.33

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\2020\27613_SYLVAN_LAKE_TRP_MEMORIAL_TRAIL_FPS\02_CAD\03_DRAFTING\03_SHEETS\27613_TT_HWY_20.DWG | DATE: January 20, 2022 10:29:05 AM

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h

MEMORIAL TRAIL

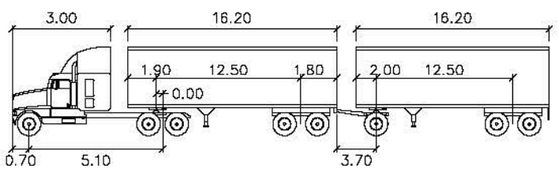
HWY 20

CASE 1: WB-36 ENCROACHES ON THE ADJACENT APPROACH LANE BUT STAYS WITH IT'S OWN LANE WITH THE USE OF THE TRUCK APRON

HWY 20

CASE 1: WB-36 ENCROACHES ON THE ADJACENT APPROACH LANE BUT STAYS WITH IT'S OWN LANE WITH THE USE OF THE TRUCK APRON

MEMORIAL TRAIL



WB36

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 17.1
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		

0 15 30 m
1:750

Sylvan Lake

ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
HIGHWAY 20 ROUNDABOUT
NB-SB THROUGH - WB 36 INSIDE

FILE No.	SCALE	FIGURE No.
27613_TT_HWY_20.dwg		5.34

ISC: #### SHEET SIZE ANSI B 20 mm

FILE: G:\PROJECTS\27000\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FP\602_CAD\03_DRAFTING\03_SHEETS\27613_TT_HWY_20.DWG | DATE: January 20, 2022 10:28:09 AM

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h

MEMORIAL TRAIL

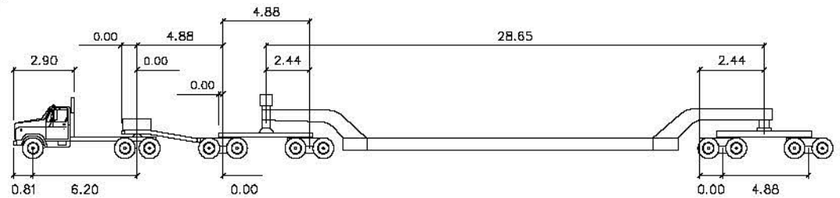
HWY 20

HWY 20

CASE 1: LOW BOY ENCROACHES ON THE ADJACENT APPROACH AND CIRCULATORY LANES

CASE 1: LOW BOY ENCROACHES ON THE ADJACENT APPROACH AND CIRCULATORY LANES

MEMORIAL TRAIL



Heavy Hauler (Low Boy)

	meters		
Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 1.52	Steering Angle	: 16.8
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailor Track	: 2.50		

0 15 30 m
1:750

Sylvan Lake ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
HIGHWAY 20 ROUNDABOUT
NB-SB THROUGH - LOW BOY

FILE No.	SCALE	FIGURE No.
27613_TT_HWY_20.dwg		5.35

ISC: #### SHEET SIZE ANSI B 20 mm

FILE: G:\PROJECTS\27000\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\00_DRAFTING\03_SHEETS\27613_TT_HWY_20.DWG | DATE: January 20, 2022 10:28:11 AM

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h

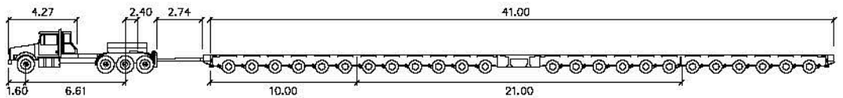
MEMORIAL TRAIL

HWY 20

HWY 20

CASE 1: PLATFORM TRAILER ENCROACHES ON THE ADJACENT APPROACH AND CIRCULATORY LANES

CASE 1: PLATFORM TRAILER ENCROACHES ON THE ADJACENT APPROACH AND CIRCULATORY LANES



Platform Trailer

meters

Tractor Width	: 2.50	Lock to Lock Time	: 6.0
Trailer Width	: 5.20	Steering Angle	: 18.4
Tractor Track	: 2.50	Articulating Angle	: 70.0
Trailer Track	: 5.20		

MEMORIAL TRAIL

0 15 30 m
1:750

Sylvan Lake

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PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
HIGHWAY 20 ROUNDABOUT
NB-SB THROUGH - PLATFORM TRAILER

FILE No.	SCALE	FIGURE No.
27613_TT_HWY_20.dwg		5.36

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\27600\27600\27613_SYLVAN_LAKE_TRP_MEMORIAL_TRAIL_FPS\02_CAD\02_DRAFTING\03_SHEETS\27613_TT_HWY_20.DWG | DATE: January 20, 2022 10:25:14 AM

MEMORIAL TRAIL

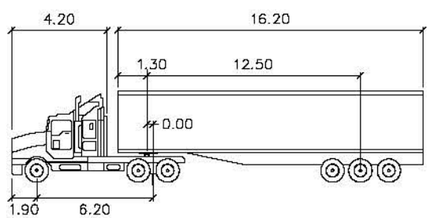
HWY 20

HWY 20

MEMORIAL TRAIL

CASE 3: WB-21 STAYS WITHIN IT'S OWN LANE ON THE INSIDE APPROACH LANE AND THE INSIDE CIRCULATING LANE WITH THE USE OF THE TRUCK APRON

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h



WB21

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 26.6
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		

0 15 30 m
1:750

Sylvan Lake ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
HIGHWAY 20 ROUNDABOUT
NB-SB LEFT TURNS - WB 21 INSIDE

FILE No.	SCALE	FIGURE No.
27613_TT_HWY_20.dwg		5.37

ISC: #### SHEET SIZE ANSI B 20 mm

FILE:G:\PROJECTS\27000\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\03_DRAFTING\03_SHEETS\27613_TT_HWY_20.DWG | DATE:January 20, 2022 10:28:17 AM

HWY 20

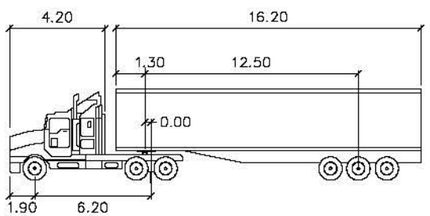
MEMORIAL TRAIL

MEMORIAL TRAIL

HWY 20

ALL RIGHT TURNS ARE CASE 2: WB-21 STAYS WITHIN IT'S OWN LANE ON THE OUTSIDE APPROACH LANE BUT ENCROACHES ON THE ADJACENT CIRCULATING OR EXIT LANE

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h



WB21

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 26.6
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		

0 15 30 m
1:750

Sylvan Lake ISL

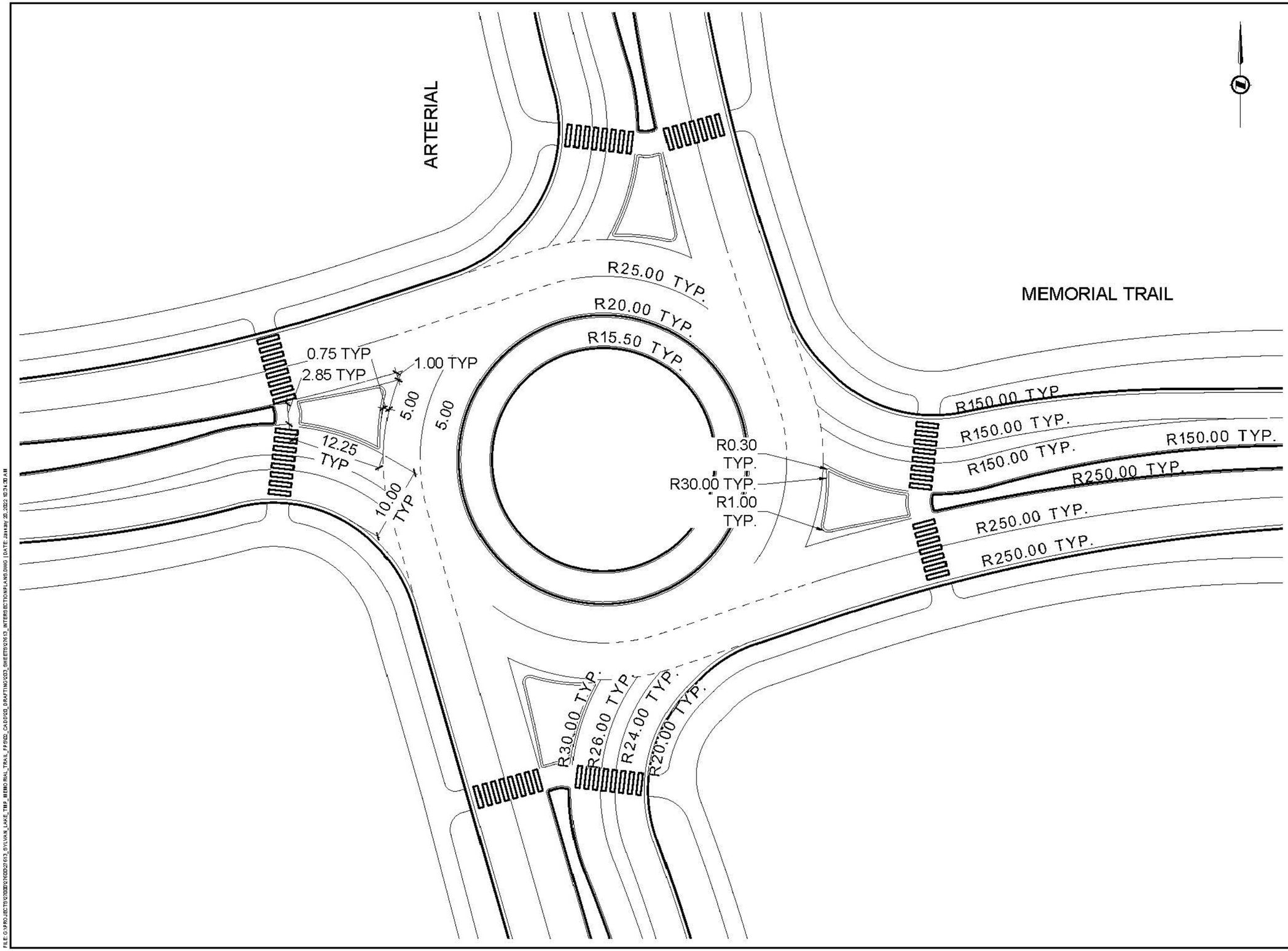
PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
HIGHWAY 20 ROUNDABOUT
RIGHT TURNS - WB 21

FILE No.	SCALE	FIGURE No.
27613_TT_HWY_20.dwg		5.38

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE:G:\PROJECTS\27000\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FP\502_CAD\00_DRAFTING\03_SHEETS\27613_TT_HWY_20.DWG | DATE: January 20, 2022 10:28:21 AM



Sylvan Lake

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MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

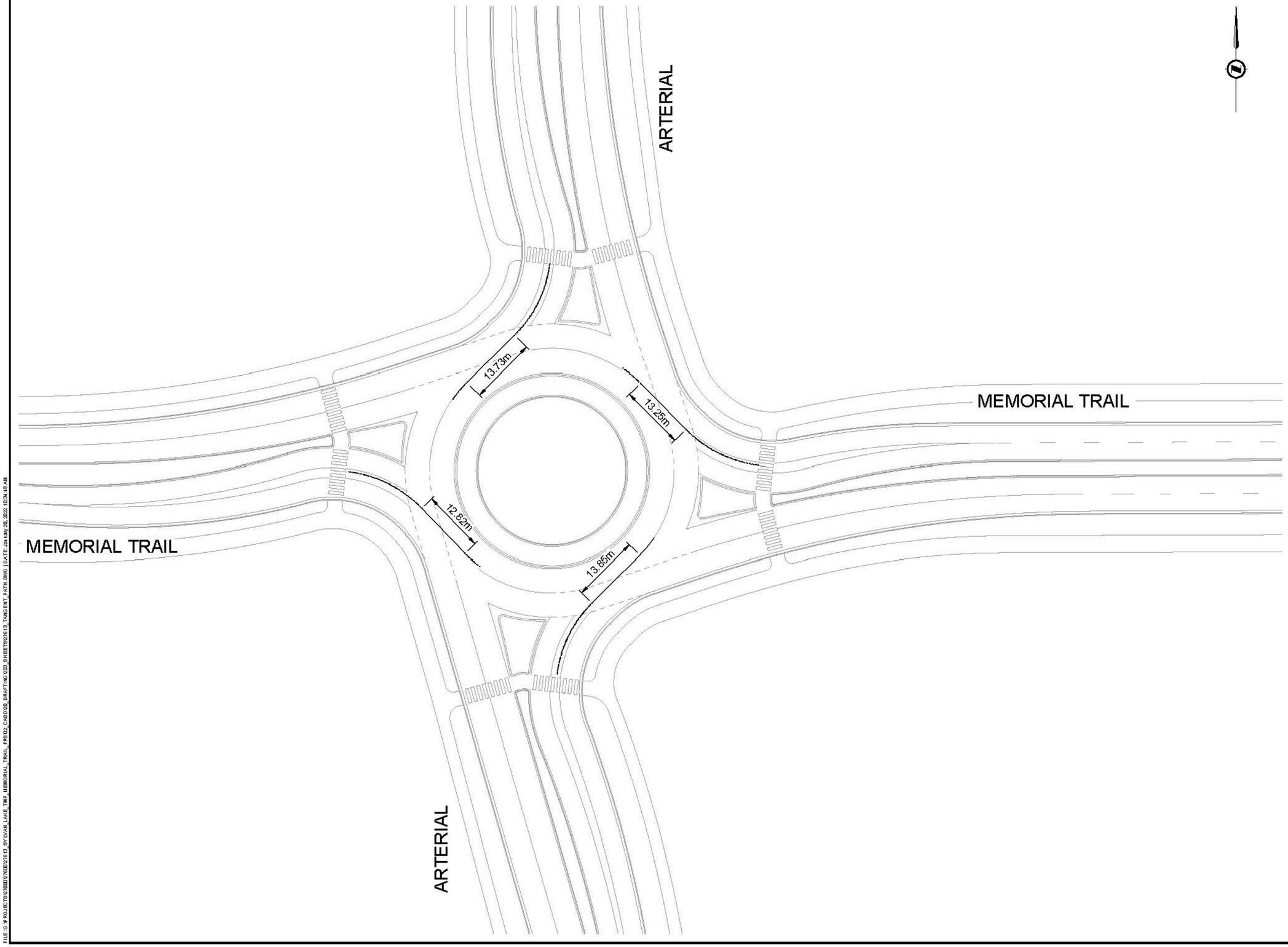
FIGURE TITLE

INTERSECTION PLAN
TYPICAL ARTERIAL ROUNDABOUT

FILE No.	SCALE	FIGURE No.
27613_IntersectionPlans.dwg	AS SHOWN	5.39

ISC: #### SHEET SIZE ANSI B 20 m 0

FILE: G:\PROJECTS\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FS\02_CAD\03_DRAFTING\03_SHEETS\27613_INTERSECTIONPLANS.DWG | DATE: January 20, 2022 10:34:30 AM



0 15 30 m
1:750

LEGEND

PROPOSED ROADWAY

Sylvan Lake

ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
ENTRY PATH OVERLAP
TYPICAL ARTERIAL ROUNDABOUT

FILE No.	SCALE	FIGURE No.
27613_Tangent_Path.dwg		5.40

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\2020\27613\27613_SYLVAN_LAKE_TRP_MEMORIAL_TRAIL_FPS\02_CAD\02_DRAFTING\SID_SHEETS\27613_TANGENT_PATH.DWG | DATE: Jan 13, 2022 10:24:48 AM

ARTERIAL

SOUTHBOUND FASTEST PATH
R1=57.6 m V1=41.9 km/h
R2=57.0 m
R3=235.3 m

WESTBOUND FASTEST PATH
R1=62.6 m V1=43.3 km/h
R2=59.5 m
R3=257.2 m

MEMORIAL TRAIL

MEMORIAL TRAIL

EASTBOUND FASTEST PATH
R1=58.8 m V1=42.2 km/h
R2=57.2 m
R3=247.7 m

NORTHBOUND FASTEST PATH
R1=58.5 m V1=42.2 km/h
R2=58.7 m
R3=241.4 m

ARTERIAL

R1
R2
R3

NOTE:
WITH THE 90 DEGREE INTERSECTION AND A V1 OF LESS THAN 50km/h, REMAINING FASTEST PATH VELOCITIES HAVE NOT BEEN CALCULATED

1:750 0 15 30 m

LEGEND

PROPOSED ROADWAY

Sylvan Lake ISL

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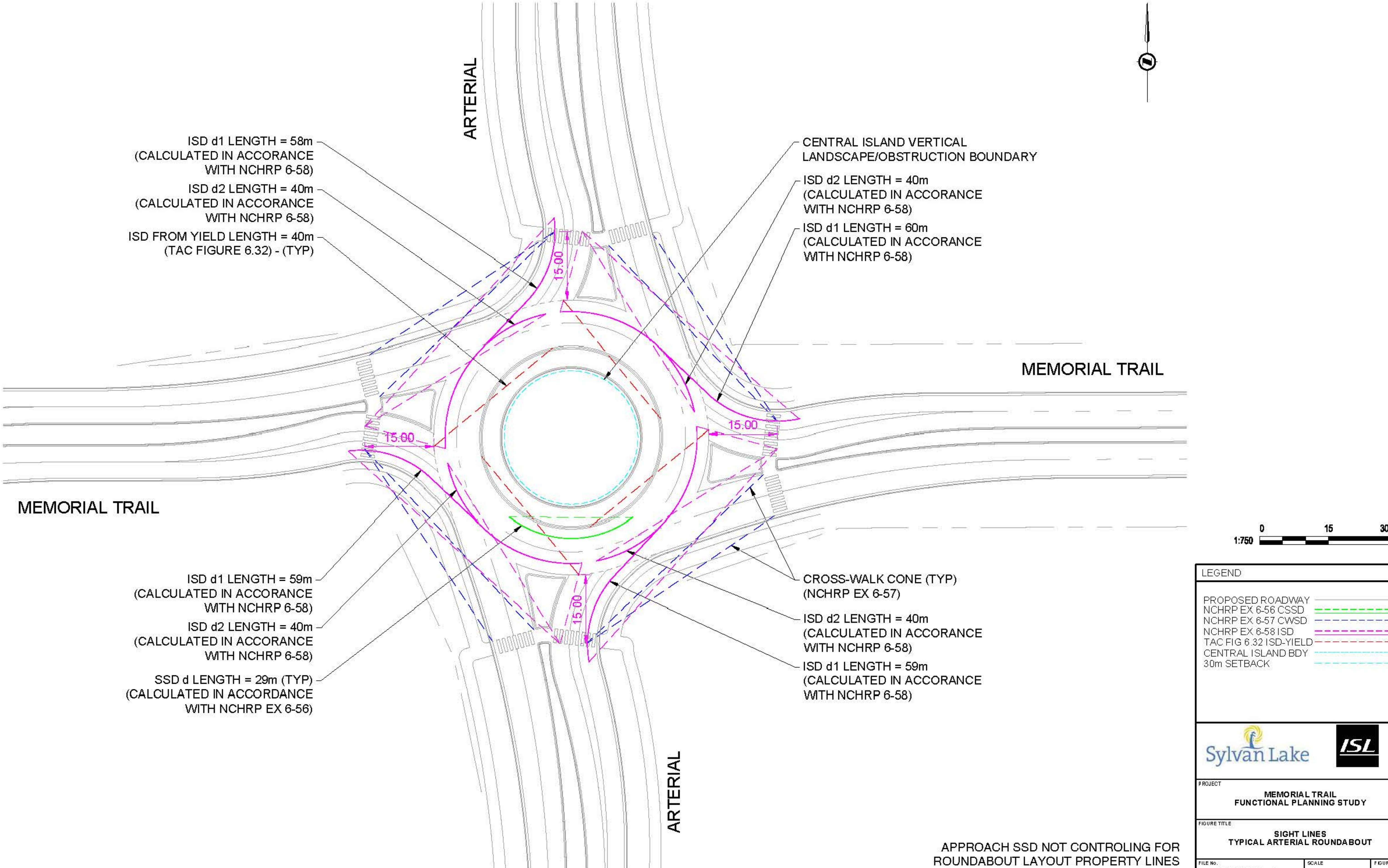
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
FASTEST PATH
TYPICAL ARTERIAL ROUNDABOUT

FILE No.	SCALE	FIGURE No.
27619_Fastest_Path.dwg		5.41

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\2019\01\N\02\27619_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\02_DRAFTING\02D_SHEETS\27619_FASTEST_PATH.DWG | DATE: January 20, 2022 10:32:04 AM



LEGEND

PROPOSED ROADWAY
NCHRP EX 6-56 CSSD
NCHRP EX 6-57 CWSD
NCHRP EX 6-58 ISD
TAC FIG 6.32 ISD-YIELD
CENTRAL ISLAND BDY
30m SETBACK

Sylvan Lake

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MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
SIGHT LINES
TYPICAL ARTERIAL ROUNDABOUT

FILE No.	SCALE	FIGURE No.
27613_Sight_Lines.dwg		5.42

ISC: #### SHEET SIZE ANSI B

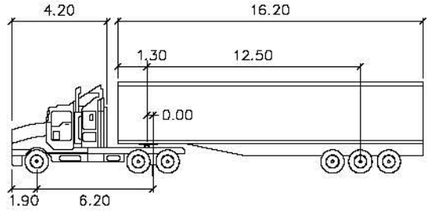
ARTERIAL ROADWAY

MEMORIAL TRAIL

CASE 2: WB-21 STAYS WITHIN IT'S OWN LANE ON THE OUTSIDE APPROACH LANE BUT ENCROACHES ON THE ADJACENT CIRCULATING LANE

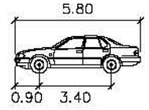
CASE 2: WB-21 STAYS WITHIN IT'S OWN LANE ON THE OUTSIDE APPROACH LANE BUT ENCROACHES ON THE ADJACENT CIRCULATING LANE

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h



WB21

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 26.6
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		



P

	meters
Width	: 2.10
Track	: 2.10
Lock to Lock Time	: 6.0
Steering Angle	: 32.1

0 15 30 m
1:750

Sylvan Lake

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PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
TYPICAL ARTERIAL ROUNDABOUT
EB-WB THROUGH - WB 21 OUTSIDE

FILE No.	SCALE	FIGURE No.
27613_TT_50_STREET.dwg		5.43

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE:G:\PROJECTS\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\00_DRAFTING\03_SHEETS\27613_TT_50_STREET.DWG | DATE:Jan 20, 2022 10:36:24 AM

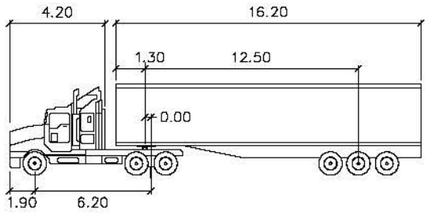
NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h

ARTERIAL ROADWAY

MEMORIAL TRAIL

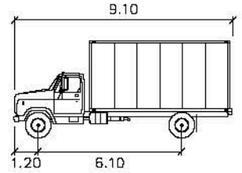
CASE 3: WB-21 STAYS WITHIN IT'S OWN LANE ON THE INSIDE APPROACH LANE AND THE INSIDE CIRCULATING LANE WITH THE USE OF THE TRUCK APRON

CASE 3: WB-21 STAYS WITHIN IT'S OWN LANE ON THE INSIDE APPROACH LANE AND THE INSIDE CIRCULATING LANE WITH THE USE OF THE TRUCK APRON



WB21

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 26.6
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		



SU9

	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 31.5

1:750 0 15 30 m

Sylvan Lake ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
TYPICAL ARTERIAL ROUNDABOUT
EB-WB THROUGH - WB 21 INSIDE

FILE No.	SCALE	FIGURE No.
27613_TT_50_STREET.dwg		5.44

ISC: #### SHEET SIZE ANSI B 20 mm

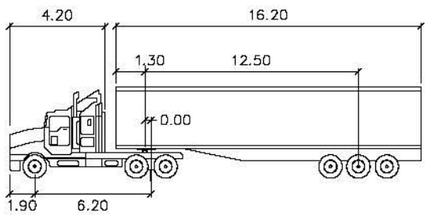
FILE:G:\PROJECTS\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\00_DRAFTING\03_SHEETS\27613_TT_50_STREET.DWG | DATE:JANuary 20, 2022 10:36:36 AM

ARTERIAL ROADWAY

MEMORIAL TRAIL

CASE 3: WB-21 STAYS WITHIN IT'S OWN LANE ON THE INSIDE APPROACH LANE AND THE INSIDE CIRCULATING LANE WITH THE USE OF THE TRUCK APRON

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h



WB21

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 26.6
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		

0 15 30 m
1:750

Sylvan Lake ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
TYPICAL ARTERIAL ROUNDABOUT
EB-WB LEFT TURNS -WB21

FILE No.	SCALE	FIGURE No.
27613_TT_50_STREET.dwg		5.45

ISC: ### SHEET SIZE ANSI B 20 mm 0

FILE:O:\PROJECTS\2020\D0276\D027613_SYLVAN_LAKE_TRP_MEMORIAL_TRAIL_FP\02D_CAD\02D_DRAFTING\003_SHEETS\27613_TT_50_STREET.DWG | DATE: January 20, 2022 10:39:39 AM

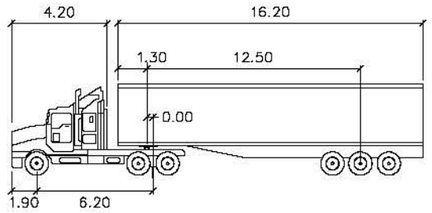
MEMORIAL TRAIL

ARTERIAL ROADWAY

CASE 2: WB-21 STAYS WITHIN IT'S OWN LANE ON THE OUTSIDE APPROACH LANE BUT ENCROACHES ON THE ADJACENT CIRCULATING LANE

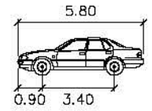
CASE 2: WB-21 STAYS WITHIN IT'S OWN LANE ON THE OUTSIDE APPROACH LANE BUT ENCROACHES ON THE ADJACENT CIRCULATING LANE

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h



WB21

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 26.6
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		



P

	meters
Width	: 2.10
Track	: 2.10
Lock to Lock Time	: 6.0
Steering Angle	: 32.1

0 15 30 m
1:750

Sylvan Lake ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
TYPICAL ARTERIAL ROUNDABOUT
NB-SB THROUGH - WB 21 OUTSIDE

FILE No.	SCALE	FIGURE No.
27613_TT_50_STREET.dwg		5.46

ISC: ### SHEET SIZE ANSI B 20 mm 0

FILE G:\PROJECTS\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FP\002_CAD\02D_DRAFTING\02D3_SHEETS\27613_TT_50_STREET.DWG | DATE: JAN MAY 20, 2022 10:36:42 AM

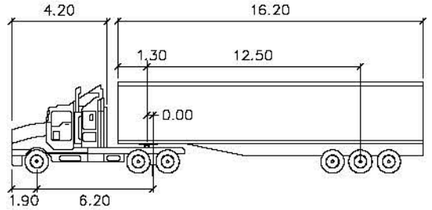
MEMORIAL TRAIL

ARTERIAL ROADWAY

CASE 3: WB-21 STAYS WITHIN IT'S OWN LANE ON THE INSIDE APPROACH LANE AND THE INSIDE CIRCULATING LANE WITH THE USE OF THE TRUCK APRON

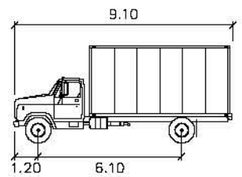
CASE 3: WB-21 STAYS WITHIN IT'S OWN LANE ON THE INSIDE APPROACH LANE AND THE INSIDE CIRCULATING LANE WITH THE USE OF THE TRUCK APRON

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h



WB21

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 26.6
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		



SU9

	meters
Width	: 2.60
Track	: 2.60
Lock to Lock Time	: 6.0
Steering Angle	: 31.5

0 15 30 m
1:750

Sylvan Lake ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
TYPICAL ARTERIAL ROUNDABOUT
NB-SB THROUGH - WB 21 INSDE

FILE No.	SCALE	FIGURE No.
27613_TT_60_STREET.dwg		5.47

ISC: #### SHEET SIZE ANSI B 20 mm 0

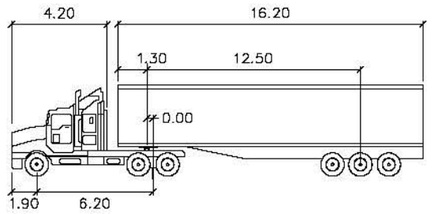
FILE: G:\PROJECTS\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\00_DRAFTING\03_SHEETS\27613_TT_60_STREET.DWG | DATE: JANUARY 20, 2022 10:36:44 AM

MEMORIAL TRAIL

ARTERIAL ROADWAY

CASE 3: WB-21 STAYS WITHIN IT'S OWN LANE ON THE INSIDE APPROACH LANE AND THE INSIDE CIRCULATING LANE WITH THE USE OF THE TRUCK APRON

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h



WB21

meters

Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 26.6
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		

0 15 30 m
1:750

Sylvan Lake ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
TYPICAL ARTERIAL ROUNDABOUT
NB-SB LEFT TURNS - WB 21

FILE No.	SCALE	FIGURE No.
27613_TT_50_STREET.dwg		5.48

ISC: #### SHEET SIZE ANSI B 20 mm 0

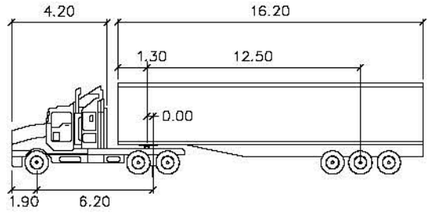
FILE G:\PROJECTS\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\02D_DRAFTING\02D3_SHEETS\27613_TT_50_STREET.DWG | DATE: JANUARY 20, 2022 10:36:17 AM

ARTERIAL ROADWAY

MEMORIAL TRAIL

ALL RIGHT TURNS ARE CASE 2: WB-21 STAYS WITHIN IT'S OWN LANE ON THE OUTSIDE APPROACH LANE BUT ENCROACHES ON THE ADJACENT CIRCULATING OR EXIT LANE

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h



WB21

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 26.6
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		

0 15 30 m
1:750

Sylvan Lake

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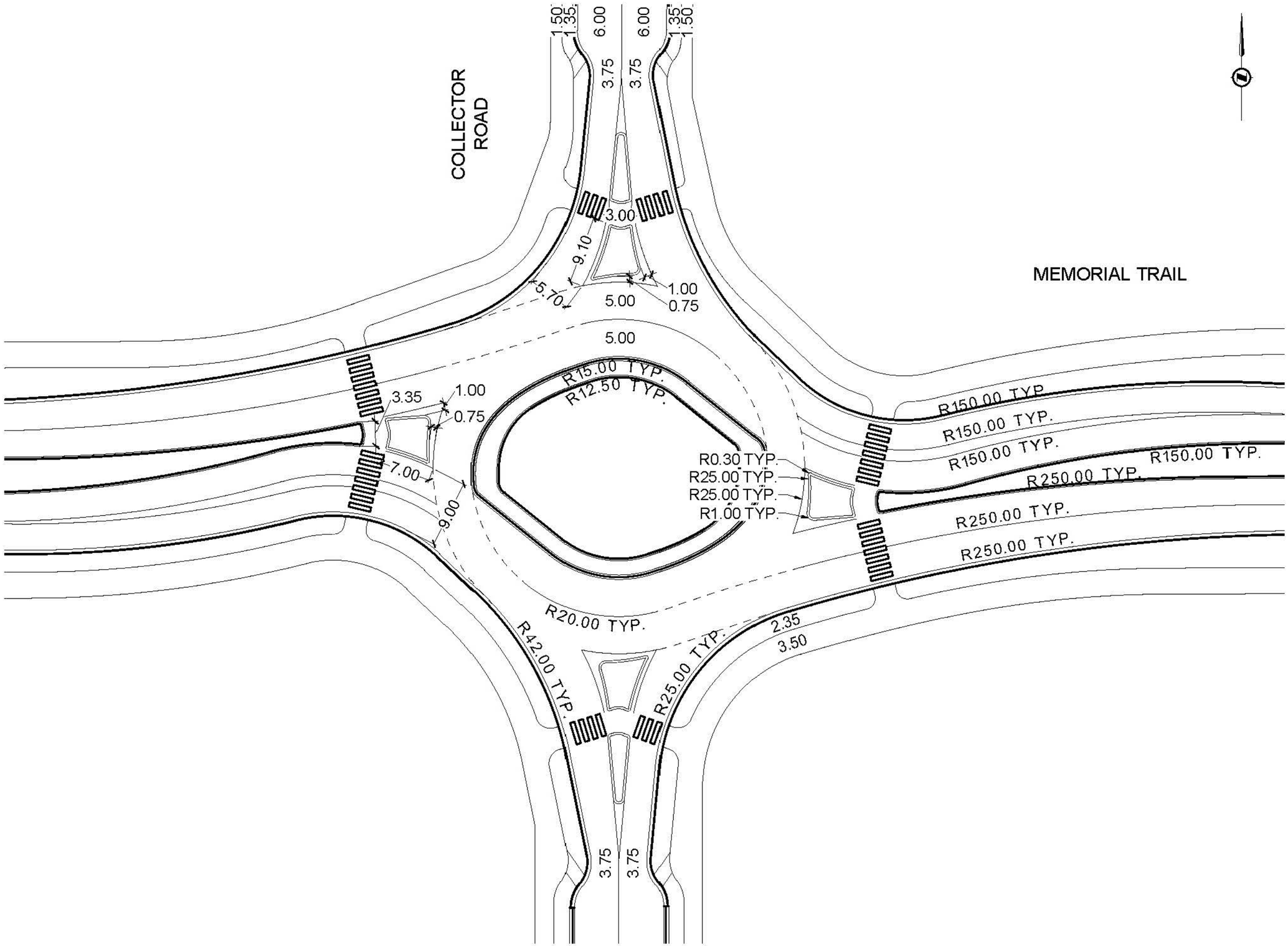
PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
TYPICAL ARTERIAL ROUNDABOUT
RIGHT TURNS - WB 21

FILE No.	SCALE	FIGURE No.
27613_TT_50_STREET.dwg		5.49

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE G:\PROJECTS\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\02D_DRAFTING\02D3_SHEETS\27613_TT_50_STREET.DWG | DATE: JAN 01, 2022 10:36:50 AM



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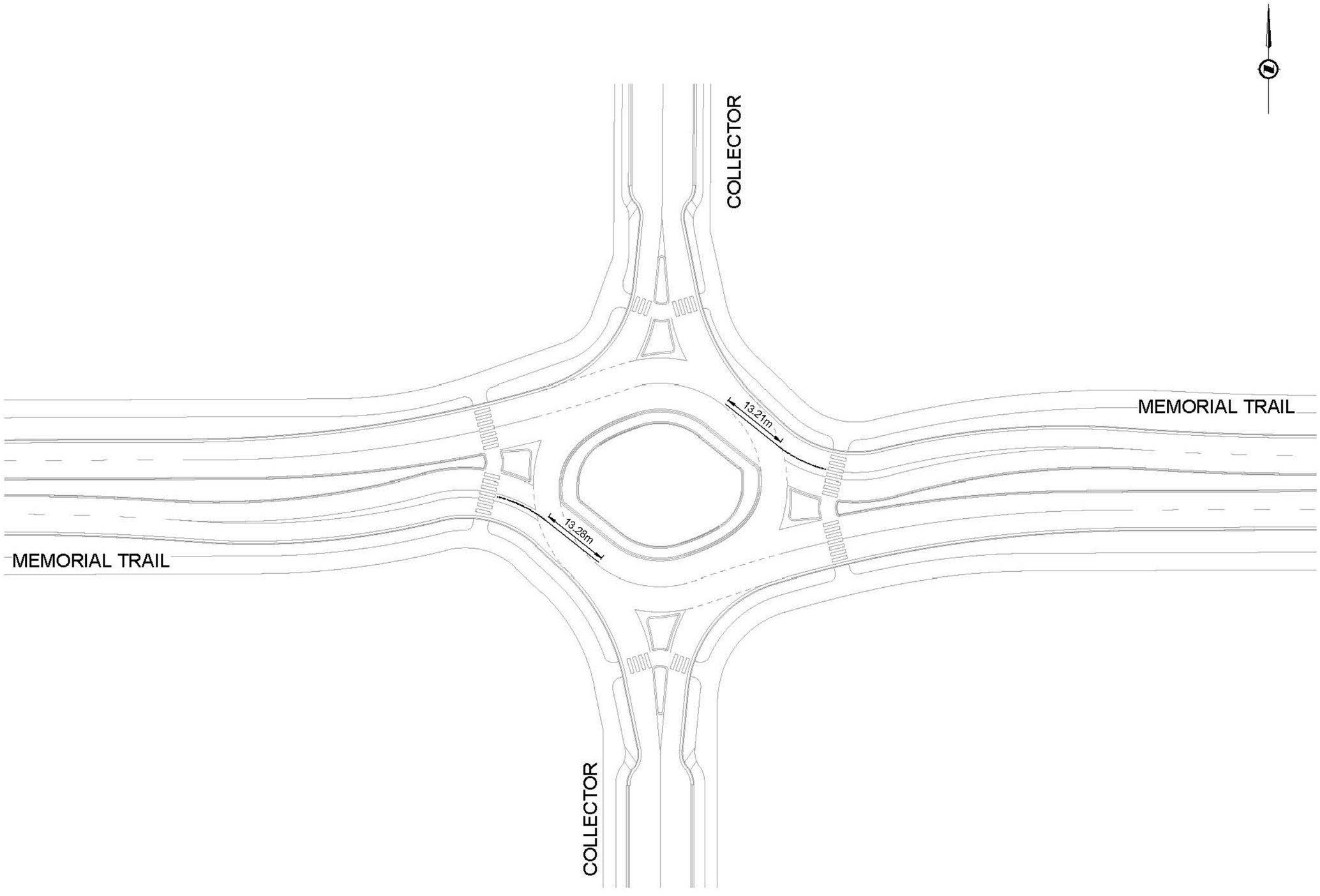
PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
INTERSECTION PLAN
TYPICAL COLLECTOR ROUNDABOUT

FILE No.	SCALE	FIGURE No.
27613_IntersectionPlans.dwg		5.50

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE G:\PROJECTS\27000\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPSDS\2_CAD\03_DRAFTING\03D_SHEETS\27613_INTERSECTIONPLANS.DWG [DATE: January 20, 2022 10:52:40 AM]



0 15 30 m
1:750

LEGEND

PROPOSED ROADWAY

Sylvan Lake

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PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
ENTRY PATH OVERLAP
TYPICAL COLLECTOR ROUNDABOUT

FILE No.	SCALE	FIGURE No.
27613_Tangent_Path.dwg		5.51

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\27000\27600\27613_SYLVAN_LAKE_TMP - MEMORIAL TRAIL_FPS\02_CAD\03_DRAFTING\03_SHEETS\27613_TANGENT_PATH.DWG | DATE: JANUARY 20, 2026 10:52:58 AM

SOUTHBOUND FASTEST PATH
R1=50.0 m V1=39.7 km/h
R2=21.0 m
R3=62.6 m

WESTBOUND FASTEST PATH
R1=68.8 m V1=44.9 km/h
R2=65.2 m
R3=260.8 m

EASTBOUND FASTEST PATH
R1=67.9 m V1=44.7 km/h
R2=65.6 m
R3=259.9 m

NORTHBOUND FASTEST PATH
R1=51.1 m V1=40.0 km/h
R2=21.6 m
R3=65.5 m

COLLECTOR

COLLECTOR

MEMORIAL TRAIL

MEMORIAL TRAIL

R1 R2 R3

NOTE:
WITH THE 90 DEGREE INTERSECTION AND A V1 OF LESS THAN 50km/h, REMAINING FASTEST PATH VELOCITIES HAVE NOT BEEN CALCULATED

1:750 0 15 30 m

LEGEND

PROPOSED ROADWAY

Sylvan Lake ISL

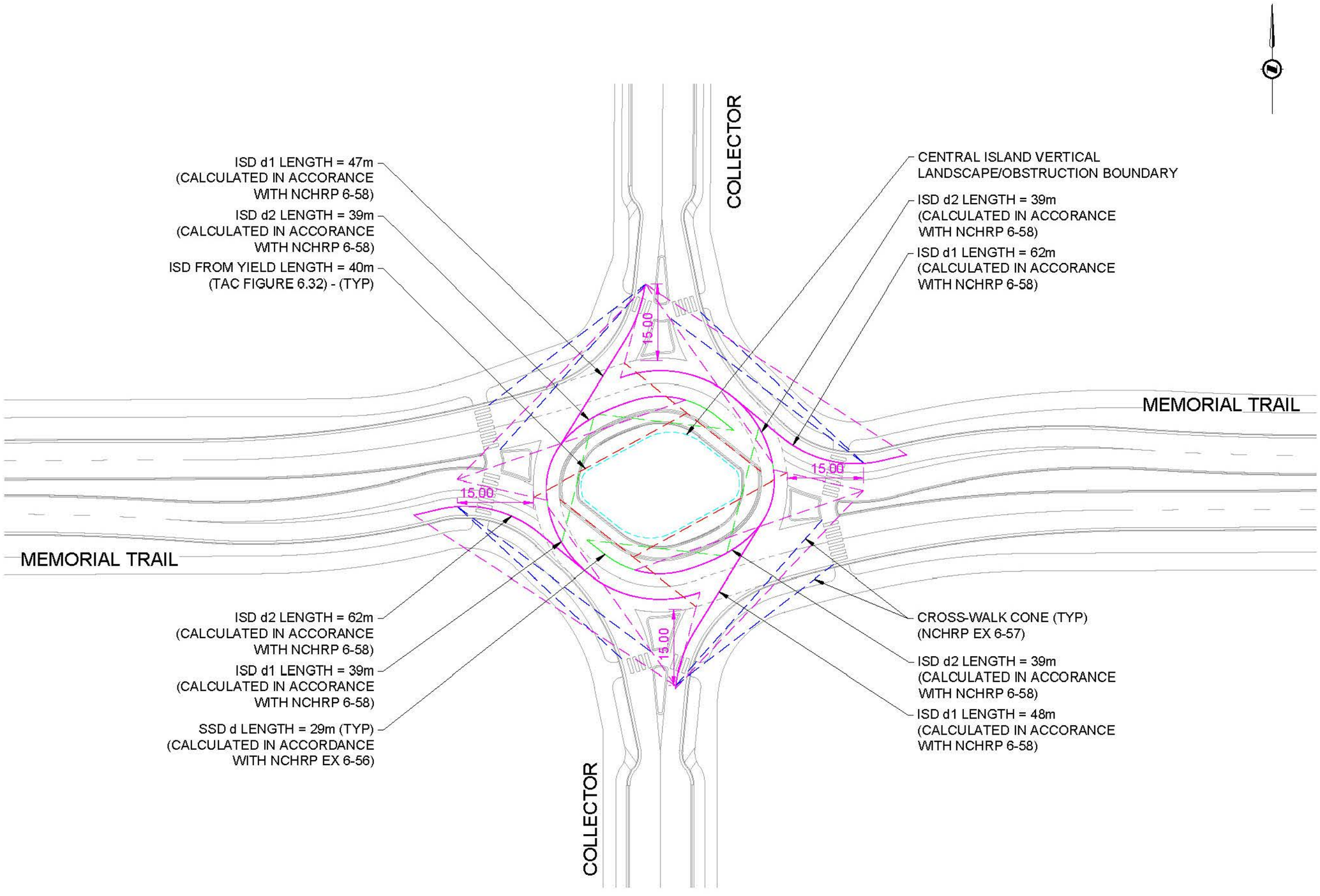
PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
FASTEST PATH
TYPICAL COLLECTOR ROUNDABOUT

FILE No.	SCALE	FIGURE No.
27613_Fastest_Path.dwg		5.52

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\27000\27600\27613_SYLVAN_LAKE_TMP - MEMORIAL TRAIL_FPS\02_CAD\03_DRAFTING\03_SHEETS\27613_FASTEST_PATH.DWG [DATE: Jan May 20, 2022 10:53:13 AM



APPROACH SSD NOT CONTROLING FOR
ROUNDABOUT LAYOUT PROPERTY LINES

0 15 30 m
1:750

LEGEND

- PROPOSED ROADWAY
- NCHRP EX 6-56 CSSD
- NCHRP EX 6-57 CWSD
- NCHRP EX 6-58 ISD
- TAC FIG 6.32 ISD-YIELD
- CENTRAL ISLAND BDY
- 30m SETBACK

Sylvan Lake

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PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
SIGHT LINES
TYPICAL COLLECTOR ROUNDABOUT

FILE No.	SCALE	FIGURE No.
27613_Sight_Lines.dwg		5.53

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\27000\27600\27613_SYLVAN_LAKE_TMP - MEMORIAL TRAIL_FPS\02_CAD\03_DRAFTING\03_SHEETS\27613_SIGHT_LINES.DWG | DATE: January 20, 2022 10:53:30 AM

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h

COLLECTOR ROADWAY

CASE 1: WB-21 ENCROACHES ON THE ADJACENT APPROACH AND CIRCULATORY LANES

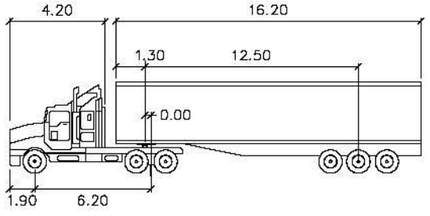
MEMORIAL TRAIL

5.00
5.00
Ø50.00
5.00
5.00

3.50
3.50
17.50
3.50
3.50

CASE 1: WB-21 ENCROACHES ON THE ADJACENT APPROACH AND CIRCULATORY LANES

COLLECTOR ROADWAY



WB21

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 26.6
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		

0 15 30 m
1:750

Sylvan Lake ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
TYPICAL COLLECTOR ROUNDABOUT
EB-WB THROUGH - WB 21

FILE No.	SCALE	FIGURE No.
Z7613_TT_CRESTVIEW.dwg		5.54

ISC: #### SHEET SIZE ANSI B 20 mm

FILE: G:\PROJECTS\2020\Z7613\CAD\Z7613_SYLVAN_LAKE_TMP - MEMORIAL TRAIL_FPS\02_CAD\03_DRAFTING\03 SHEETS\Z7613_TT_CRESTVIEW.DWG [DATE: January 20, 2022 10:54:44 AM]

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h

COLLECTOR ROADWAY

CASE 3: WB-17 STAYS WITHIN ITS OWN LANE ON THE INSIDE APPROACH LANE AND THE INSIDE CIRCULATING LANE WITH THE USE OF THE TRUCK APRON

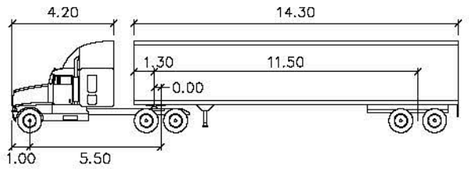
MEMORIAL TRAIL

5.00
5.00
Ø50.00
5.00
5.00

3.50
3.50
17.50
3.50
3.50

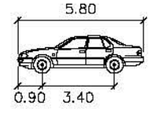
CASE 3: WB-17 STAYS WITHIN ITS OWN LANE ON THE INSIDE APPROACH LANE AND THE INSIDE CIRCULATING LANE WITH THE USE OF THE TRUCK APRON

COLLECTOR ROADWAY



WB17

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 24.2
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		



P

	meters
Width	: 2.10
Track	: 2.10
Lock to Lock Time	: 6.0
Steering Angle	: 32.1

0 15 30 m
1:750

Sylvan Lake ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
TYPICAL COLLECTOR ROUNDABOUT
EB-WB THROUGH - WB 17 INSIDE

FILE No.	SCALE	FIGURE No.
27613_TT_CRESTVIEW.dwg		5.55

ISC: ### SHEET SIZE ANSI B 20 mm

FILE: G:\PROJECTS\27000\27600\27613-SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FP\602_CAD\03_DRAFTING\03_SHEETS\27613_TT_CRESTVIEW.DWG | DATE: JANUARY 20, 2022 10:56:20 AM

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h

COLLECTOR ROADWAY

CASE 2: WB-17 STAYS WITHIN ITS OWN LANE ON THE OUTSIDE APPROACH LANE BUT ENCROACHES ON THE ADJACENT CIRCULATING LANE

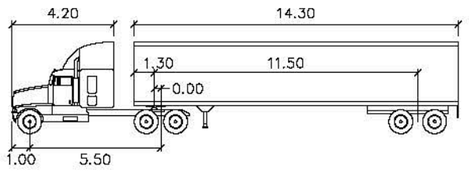
MEMORIAL TRAIL

5.00
5.00
Ø50.00
5.00
5.00

3.50
3.50
3.50
3.50
17.50

CASE 2: WB-17 STAYS WITHIN ITS OWN LANE ON THE OUTSIDE APPROACH LANE BUT ENCROACHES ON THE ADJACENT CIRCULATING LANE

COLLECTOR ROADWAY



WB17

meters			
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 24.2
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		

0 15 30 m
1:750

Sylvan Lake ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
TYPICAL COLLECTOR ROUNDABOUT
EB-WB THROUGH - WB 17 OUTSIDE

FILE No.	SCALE	FIGURE No.
27613_TT_CRESTVIEW.dwg		5.56

ISC: ### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\27000\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FP\600_CAD\000_DRAFTING\003_SHEETS\27613_TT_CRESTVIEW.DWG | DATE: January 20, 2022 10:55:55 AM

NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h

COLLECTOR ROADWAY

CASE 3: WB-17 STAYS WITHIN ITS OWN LANE ON THE INSIDE APPROACH LANE AND THE INSIDE CIRCULATING LANE WITH THE USE OF THE TRUCK APRON

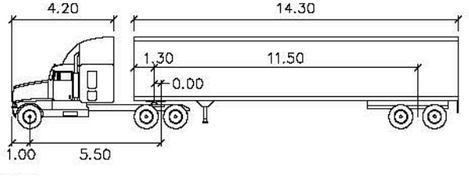
MEMORIAL TRAIL

5.00
5.00
Ø50.00
5.00
5.00

3.50
3.50
17.50
3.50
3.50

CASE 3: WB-17 STAYS WITHIN ITS OWN LANE ON THE INSIDE APPROACH LANE AND THE INSIDE CIRCULATING LANE WITH THE USE OF THE TRUCK APRON

COLLECTOR ROADWAY



WB17

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 24.2
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		

0 15 30 m
1:750

Sylvan Lake ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
TYPICAL COLLECTOR ROUNDABOUT
EB-WB LEFT TURNS - WB 17

FILE No.	SCALE	FIGURE No.
27613_TT_CRESTVIEW.dwg		5.57

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\27613\CAD\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\03_DRAFTING\03_SHEETS\27613_TT_CRESTVIEW.DWG | DATE: January 20, 2022 10:56:31 AM

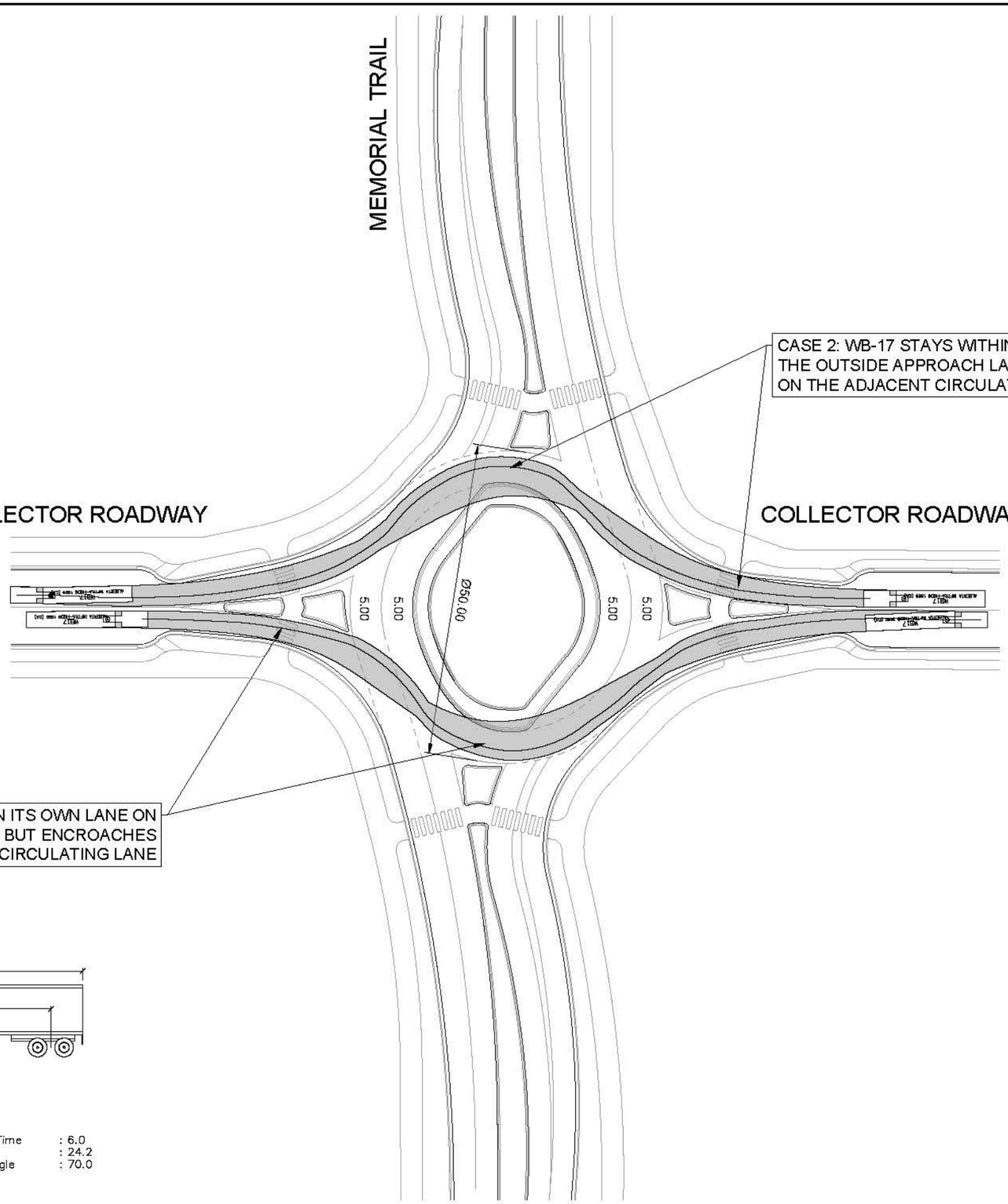
NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h

MEMORIAL TRAIL

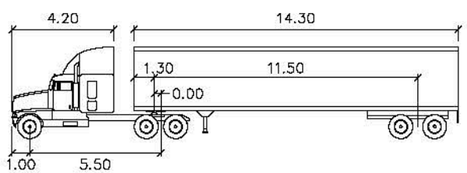
COLLECTOR ROADWAY

COLLECTOR ROADWAY

CASE 2: WB-17 STAYS WITHIN ITS OWN LANE ON THE OUTSIDE APPROACH LANE BUT ENCROACHES ON THE ADJACENT CIRCULATING LANE



CASE 2: WB-17 STAYS WITHIN ITS OWN LANE ON THE OUTSIDE APPROACH LANE BUT ENCROACHES ON THE ADJACENT CIRCULATING LANE



WB17

meters

Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 24.2
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		

0 15 30 m
1:750

Sylvan Lake

ISL

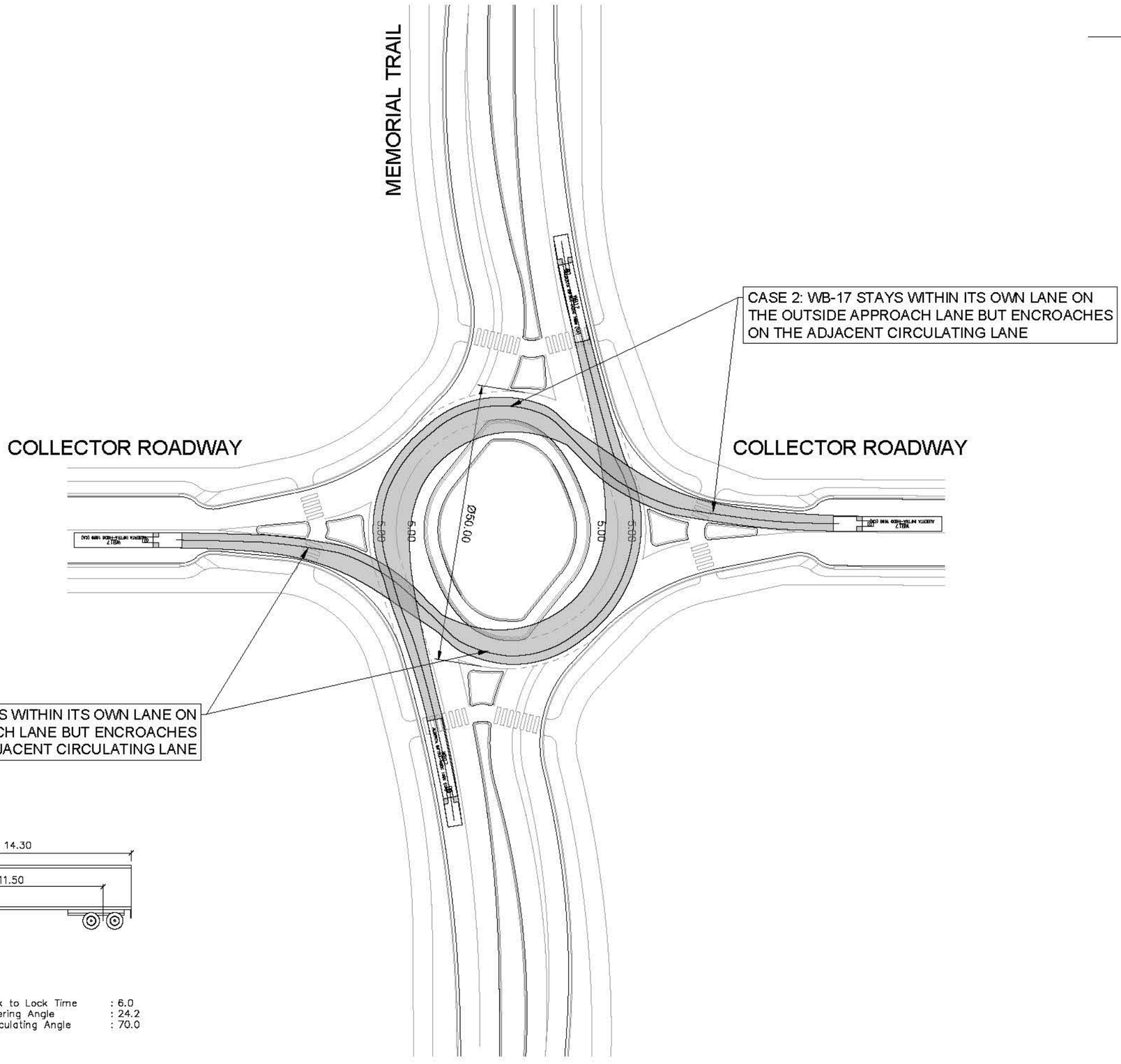
PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
TYPICAL COLLECTOR ROUNDABOUT
NB-SB THROUGH - WB 17

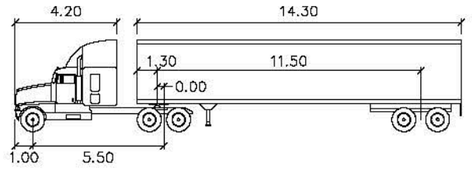
FILE No.	SCALE	FIGURE No.
Z7613_TT_CRESTVIEW.dwg		5.58

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\Z7600\Z7613\02\0D\Z7613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FPS\02_CAD\03D_DRAFTING\03_SHEETS\Z7613_TT_CRESTVIEW.DWG [DATE: January 20, 2022 10:51:07 AM]



NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h



WB17

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 24.2
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		

0 15 30 m
1:750

Sylvan Lake ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
TYPICAL COLLECTOR ROUNDABOUT
NB-SB LEFT TURNS - WB 17

FILE No.	SCALE	FIGURE No.
Z7613_TT_CRESTVIEW.dwg		5.59

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NOTES:
1. TURNING MOVEMENTS SHOW BODY SWEPT PATH
2. TURNING MOVEMENTS GENERATED BY AUTOTURN 10 SOFTWARE
3. ALL TURNING TEMPLATES REPRESENT CONTINUOUS FLOW PATHWAY WITH A VEHICLE SPEED OF 15 km/h

ALL RIGHT TURNS ARE CASE 2: WB-17 ENCROACHES ON THE ADJACENT APPROACH AND CIRCULATORY LANES

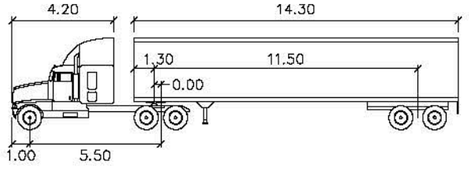
COLLECTOR ROADWAY

MEMORIAL TRAIL

5.00
5.00
Ø50.00
5.00
5.00

3.50
3.50
17.50
3.50
3.50

COLLECTOR ROADWAY



WB17

	meters		
Tractor Width	: 2.60	Lock to Lock Time	: 6.0
Trailer Width	: 2.60	Steering Angle	: 24.2
Tractor Track	: 2.60	Articulating Angle	: 70.0
Trailer Track	: 2.60		

0 15 30 m
1:750

Sylvan Lake ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
VEHICLE PATHS
TYPICAL COLLECTOR ROUNDABOUT
RIGHT TURNS - WB 17

FILE No.	SCALE	FIGURE No.
27613_TT_CRESTVIEW.dwg		5.60

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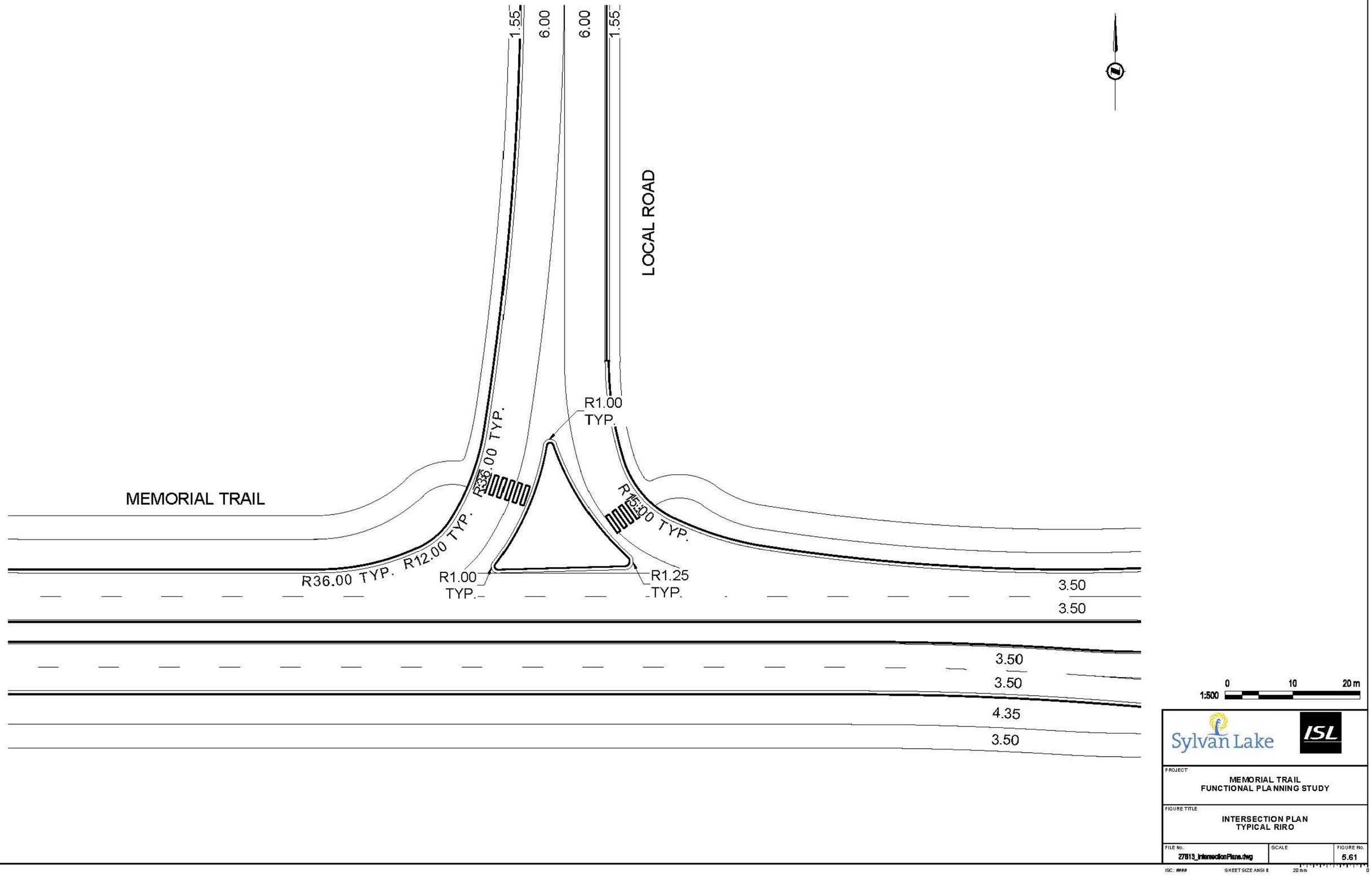

0 10 20 m
1:500

Sylvan Lake

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MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
INTERSECTION PLAN
TYPICAL RIRO

FILE No.	SCALE	FIGURE No.
27613_IntersectionPlans.dwg		5.61

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6.0 Streetscape Design

Through the streetscaping design process, several concepts were developed for the public realm. All concepts started with the same 18.5 m basic roadway width centred within a 40 m ROW but differed in the placement, type, and extent of plantings, streetlighting and accommodation of active modes. Concepts were developed with user needs in mind and municipal growth projections to facilitate future densities. The three concepts presented to Council in August 2021 are included in **Appendix B.**

The recommended streetscaping strategy is shown in **Figure 6.1**. A 3.5 m multi-use pathway is proposed on each side of Memorial Trail. Boulevard trees frame the roadway and create separation between pathway users and vehicles. Boulevards also provide space for snow storage during the winter months. Streetlights are placed between the trees, and pedestrian-scale backlighting helps create a sense of safety and security for pathway users. Community banners or seasonal decorations can be mounted on the streetlights creating placemaking opportunities.

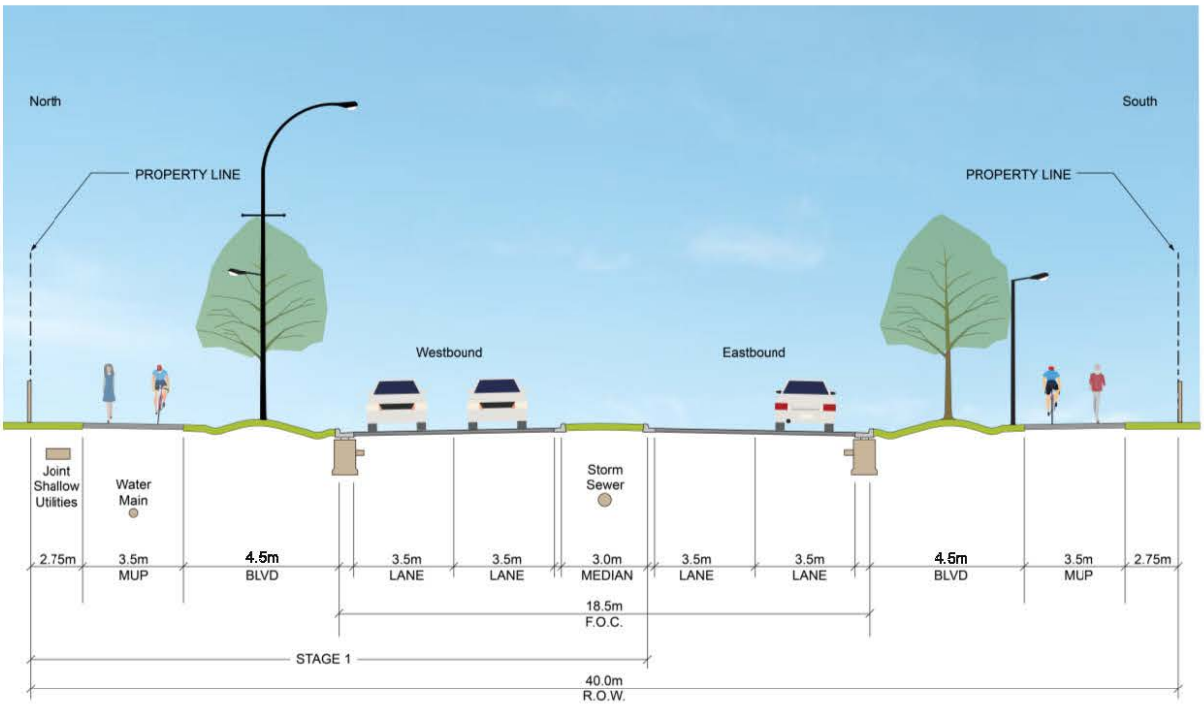


Figure 6.1: Streetscaping Recommendations – Memorial Trail

The recommended streetscaping design assumes a 2% grade from the roadway to the edge of the ROW with grass areas behind the pathways. However, future design stages could explore the use of additional plantings, berms or LID features along the ROW in locations where there are larger grade differentials between the proposed roadway profile and the adjacent properties. These options would need to be coordinated within utility line assignments and with developers, but may provide a cost-effective option to create an enhanced buffer between the roadway and adjacent developments.

Several landscaping options were also developed for the central islands of the roundabouts and presented to Council (refer to **Appendix C**). Based on feedback from Council, two options were carried forward for consideration at future design stages.

- The mountain concept shown in in **Figure 6.2**, proposes a mixture of gravel, boulders, juniper, white spruce, and wild rose plantings in the central island.
- The prairie concept, shown in in **Figure 6.3**, includes perennial grasses and shrubs in the central island.

Both concepts build on simple, minimal maintenance, resilient planting strategies to soften the intersections, deter pedestrian use, and create year-round colour. The plantings create a focal point in the centre of the intersection while maintaining sight lines necessary for driver safety.

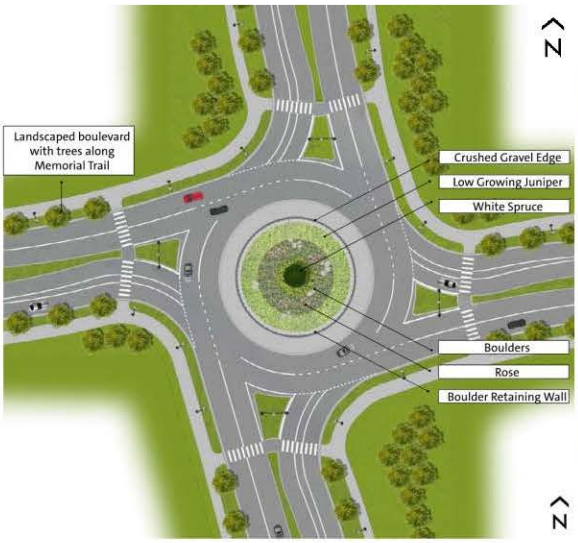


Figure 6.2: Roundabout Landscaping – Mountain Concept

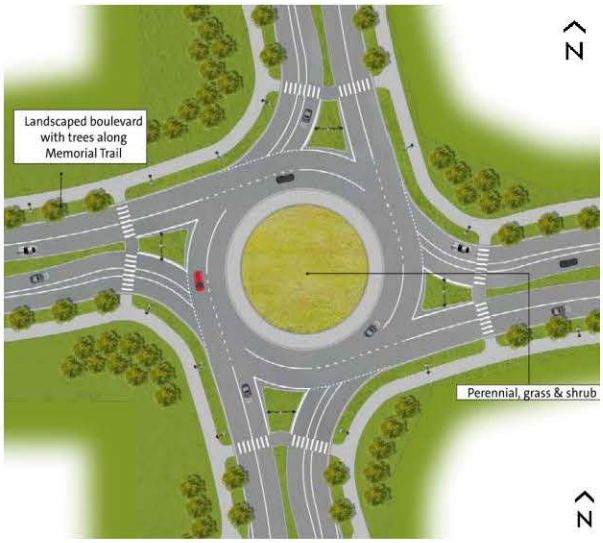


Figure 6.3: Roundabout Landscaping – Prairie Concept

7.0 Stormwater Drainage Planning

Stormwater planning was completed at a functional level to understand the catchment areas, flow paths and receiving stormwater management facilities (SWMF) for drainage. A stormwater management memo was prepared as a separate stand-alone document and is included in **Appendix C**.

Key drainage considerations for future design stages are summarized below:

- **Stormwater Planning for Intersecting Roadways:** The stormwater management planning completed as part of this FPS focused on drainage along Memorial Trail. Eventually, cross roads at each intersection will require their own stormwater management plans to properly account for intersection drainage. Due to the varying stages of adjacent development, stormwater planning for cross roads is considered beyond the scope of this study. However, as upgrades to the Memorial Trail include installation of a minor storm system along many portions of Memorial Trail (with estimated diameters ranging from 300 to 900mm), it is expected that the contribution of roadway runoff from Memorial Trail onto the intersecting roadways will be minimal. **Coordination with Developers**: Where the ultimate receiving waterbody is a SWMF within future development area, conveyance to and sizing of this facility must be coordinated with the developer. Property acquisitions, easements, and environmental approvals may be required to secure the proposed facilities. Proposed release rates and water quality criteria should be evaluated and confirmed with adjacent developers.
- **Temporary Drainage Measures:** As the roundabouts and initial roadway improvements are staged along the corridor, temporary drainage solutions will need to be explored before the full cross section is urbanized, the minor system is in place, and the ultimate SWMFs are constructed. These temporary measures should manage the release rate to prevent adverse impacts on the downstream stormwater management systems and the ultimate receiving waterbodies. Flexibility to allow for temporary, non-permanent, and potentially unconventional solutions is encouraged to allow temporary measures to be implemented in a cost-effective manner. One such solution could be use of rock check dams in the ditch to temporarily control runoff rates and quality should construction of the Memorial Trail and Highway 20 roundabout proceed prior to completion of a long-term drainage strategy for Highway 20.

8.0 Utilities

8.1 Existing Utility Conflicts

A desktop review of utilities was completed for this FPS. Existing shallow and deep utilities within the study area were identified through base mapping provided by the Town and through Alberta OneCall records. Third-party utility owners were contacted to confirm the location and status of existing infrastructure and any planned upgrades. To date, no plans for future upgrades or expansions to shallow utilities have been identified by third-party owners. If and when major utility expansions or relocations are implemented along the corridor, infrastructure changes should be cross-referenced with the medium- and long-term plans to ensure consistency with the long-term roadway and public realm improvements. Future deep utility upgrades are discussed in Section 8.2.

Existing utilities from west to east and are shown on **Exhibits 8.01 to 8.09**. Notable potential utility conflicts are summarized below for consideration and further coordination with utility owners at future design stages. All underground lines should be hydrovacced and surveyed during preliminary design to better access the potential for conflicts with the road design.

Table 8.1: Existing Utility Conflicts

Potential Conflict	Mitigation Strategy
Several operating and discontinued high-pressure gas pipelines cross at or near the 60 Street / Memorial Trail intersection tying into the compressor site and meter station at the southwest corner of the intersection.	• Maintaining the existing grade as much as practical at the intersection and along the north side of Memorial Trail will reduce the need to relocate or provide structural protection over the pipelines. • Manual excavation and coordination with the owners will be required during construction.
Several low-pressure gas pipelines along and across Memorial Trail including: • An ATCO gas line along the north side of the existing Memorial Trail ROW from 60 Street to 50 Street and along the south side from 50 Street to Ryders Ridge Boulevard; and • A TAQA (Canadian Natural Resources) gas line running parallel to Memorial Trail and crossing near 50 Street.	• Minimizing grade changes along the north property line will minimize grading encroachment into the pipeline easement. • Where the existing cover is not reduced, existing crossings can likely remain in place.
Overhead power lines run within the existing ROW along Highway 20, 50 Street, and 60 Street. Along Memorial Trail, overhead power lines run within the proposed ROW at the following locations: • 60 Street to Lakeview Boulevard; • Broadway Rise to Crestview Boulevard; and • Ryders Ridge Boulevard and Highway 20.	• Once Memorial Trail, 50 Street, and 60 Street are upgraded to urban cross sections, overhead power lines will be relocated underground. • Power lines are expected to remain overhead along Highway 20. Poles may need to be relocated to accommodate the ultimate roadway and pathway alignments.
Underground power lines are within the proposed ROW at the following locations: • East side of Lakeway Boulevard; • East side of Broadway Rise; • East side of Ryders Ridge Boulevard; and • North side of Memorial Trail between Ryders Ridge Boulevard and Highway 20.	• Where the existing cover is not reduced, existing lines/ducts can likely stay in place; some hand wells and pull points may need to be adjusted. • Consider relocation of lines along Memorial Trail to the boulevards behind the pathways for consistency with the preferred utility line

Potential Conflict	Mitigation Strategy
	assignments shown on **Figure 4.1** and ease of access for future maintenance needs.
Numerous communication lines along and across Memorial Trail including: • Telus fibre optic and copper lines running along Memorial Trail, 60 Street, 50 Street, and Highway 20, and servicing the subdivision north of Memorial Trail; • An underground Axia communication line running along the east side of 50 Street; • An underground Zayo communication line running along the east side of Highway 20; and • Underground Shaw communication lines servicing existing subdivisions north of Memorial Trail.	• Where the existing cover is not reduced, existing lines/ducts can likely stay in place; some hand wells and pull points may need to be adjusted. • Consider relocation of lines along Memorial Trail to the boulevards behind the pathways for consistency with the preferred utility line assignments shown on **Figure 4.1** and ease of access for future maintenance needs.
Water, storm and sanitary services along newly developed collector roads near Memorial Trail.	• Minor adjustments to catchbasins, manhole rim elevations and other appurtenances will be needed to match final roadway elevations. • Major relocations are not anticipated as recommended plans largely avoid impacts to newly developed areas.
Culverts are present at most existing approaches to Memorial Trail, Highway 20, 50 Street, and 60 Street.	• Once roadways are upgraded to an urban standard, culverts will be removed and runoff will be managed through the minor system. • Major and minor system drainage requirements along 50 Street, 60 Street and Highway 20 to be reviewed in more detail prior to culvert removal.

8.2 Future Utility Considerations

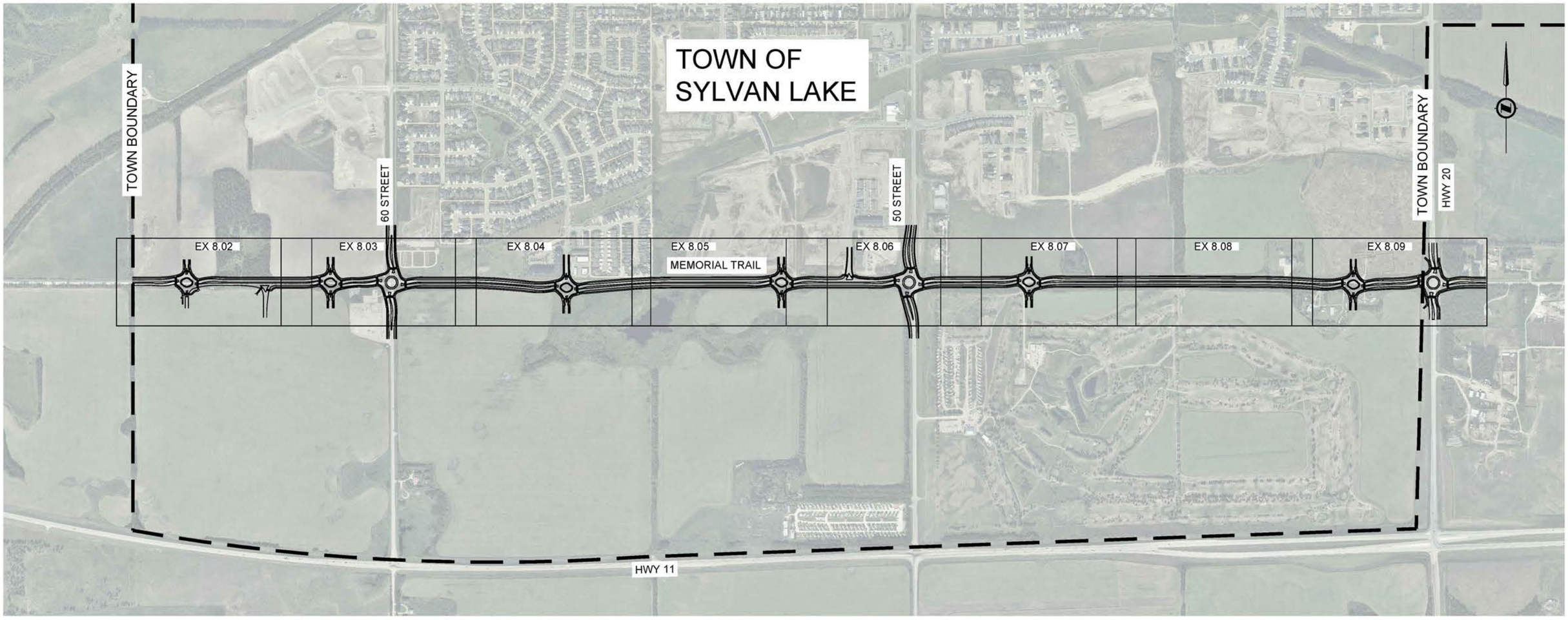
Future utility line assignments were reviewed at a high level to confirm preferred locations within the ultimate cross section. Once the Memorial Trail cross section is urbanized, overhead utilities will need to be relocated underground, an underground stormwater system will be needed to manage roadway drainage, and water and sanitary lines will be needed to support the adjacent communities and connect to the broader deep utility network within the town.

To enable utility installations and relocations to proceed ahead of widening of Memorial Trail, recommended line assignments are all within the north half of the ROW. Placement of utilities outside of the roadway areas helps to facilitate access for inspections and maintenance while minimizing closures along Memorial Trail and costs associated with removal and replacement of pavement structure. To that end, space is allocated for a future stormwater main beneath the landscaped median, water mains will be placed underneath the multi-use pathway, and shallow utilities will be run in the boulevard between the pathway and the north edge of the ROW.

Utility line assignments are shown in cross section on **Figure 4.1**. Detailed alignments, depths and timing of installations and relocations will need to be coordinated with adjacent developers and utility owners. As utility alignments are confirmed, it is important to note that:

- A 3 m horizontal buffer is typically recommended between deep utility alignments and the trees planned for the boulevards north and south of Memorial Trail. This buffer will minimize interference with the root system and potential damage to deep utilities.

- Roadway streetlighting is currently shown on the north side of Memorial Trial only with pedestrian-scale lighting for multi-use pathways of the roadway. A number of factors should be explored in more detail at future design stages to confirm the optimal streetlighting layout, including height and cost of streetlighting poles for lighting from one vs two sides of the roadway, pole spacing relative to spacing requirements for pedestrian scale lighting, and offsets required from boulevard trees.
- If sanitary services are required for development on the south side of Memorial Trail, in advance of Memorial Trail widening, utility line assignments will need to be reviewed to determine the best way to accommodate the mains outside of the roadway.



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MEMORIAL TRAIL
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FIGURE TITLE

EXISTING UTILITIES
KEY PLAN

FILE No.	SCALE	FIGURE No.
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TOWN BOUNDARY

SPRINGFIELD BLVD

MEMORIAL TRAIL

POGADL PARK ACCESS #2

POGADL PARK ACCESS #1

R/W PLAN 882

0 30 60 m

1:1500

LEGEND

- PROPOSED ROADWAY
- EXISITNG STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATER MAIN
- EXISTING TELUS FIBRE OPTIC
- EXISITNG TELUS COPPER
- EXISTING AXIA
- EXISTING GAS LINE
- EXISTING U/G ELECTRICAL
- EXISTING O/H ELECTRICAL
- EXISTING SHAWCABLE
- EXISTING POLES
- EXISTING STREETLIGHTING
- EXISTING WELLS
- EXISTING STORM CULVERT
- EXISTING STORM MANHOLE
- EXISTING STORM CATCHBASIN
- EXISTING SANITARY MANHOLE
- EXISTING FIRE HYDRANT
- EXISTING WATER VALVE

STREETLIGHTING DUCTS NOT SHOWN

UTILITY LOCATIONS APPROXIMATE ONLY, ALL UTILITIES REQUIRE LOCATES FOR DETAILED DESIGN

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MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY

FIGURE TITLE

EXISTING UTILITIES MEMORIAL TRAIL STA 99+300TO STA 99+900

FILE No.	SCALE	FIGURE No.
27613_Utilites_Profile_Circ.dwg		8.02

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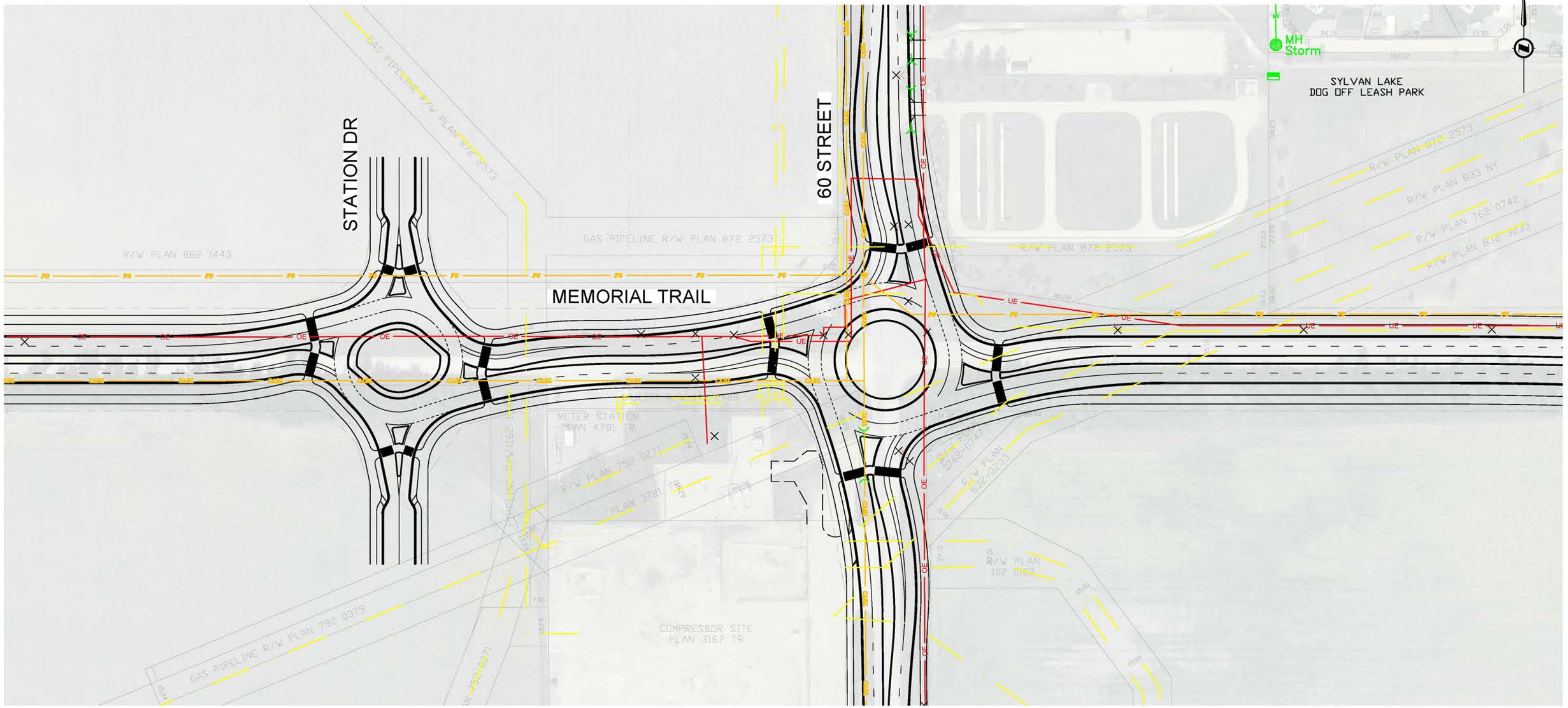

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LEGEND

PROPOSED ROADWAY		EXISTING STORM CULVERT	
EXISITNG STORM SEWER		EXISTING STORM MANHOLE	MH Storm
EXISTING SANITARY SEWER		EXISTING STORM CATCHBASIN	
EXISTING WATER MAIN		EXISTING SANITARY MANHOLE	MH San
EXISTING TELUS FIBRE OPTIC	FO	EXISTING FIRE HYDRANT	FH
EXISITNG TELUS COPPER	CABL	EXISTING WATER VALVE	WV
EXISTING AXIA	T		
EXISTING GAS LINE			
EXISTING U/G ELECTRICAL	UE		
EXISTING O/H ELECTRICAL	OE		
EXISTING SHAW/ZAYO			
EXISTING POLES	×		
EXISTING STREETLIGHTING	×		
EXISTING WELLS	×		

STREETLIGHTING DUCTS NOT SHOWN

UTILITY LOCATIONS APPROXIMATE ONLY, ALL UTILITIES REQUIRE LOCATES FOR DETAILED DESIGN

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MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY

FIGURE TITLE

EXISTING UTILITIES MEMORIAL TRAIL STA 99+900 TO STA 100+425

FILE No.	SCALE	FIGURE No.
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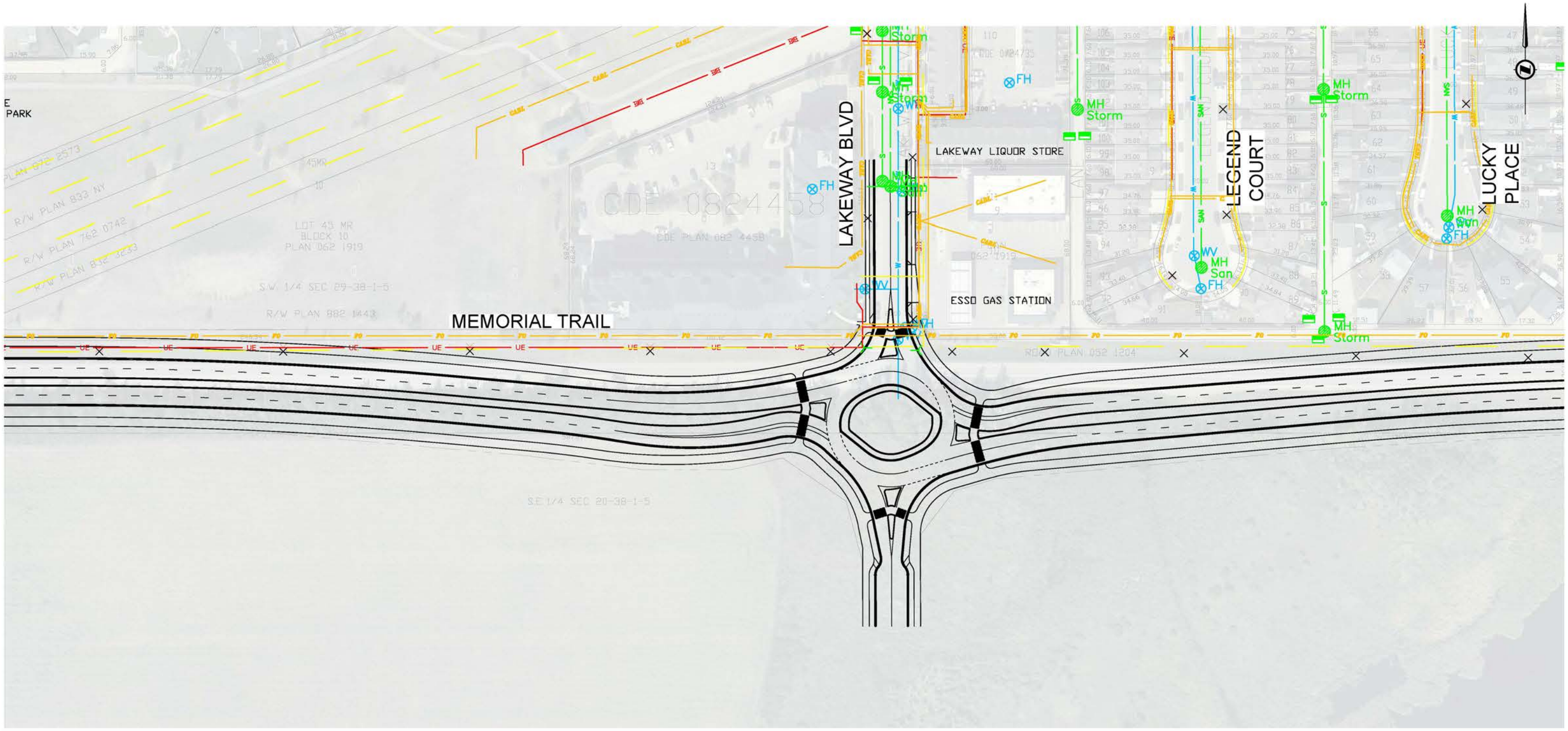

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LEGEND

- PROPOSED ROADWAY
- EXISITNG STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATER MAIN
- EXISTING TELUS FIBRE OPTIC
- EXISITNG TELUS COPPER
- EXISTING AXIA
- EXISTING GAS LINE
- EXISTING U/G ELECTRICAL
- EXISTING O/H ELECTRICAL
- EXISTING SHAW/ZAYO
- EXISTING POLES
- EXISTING STREETLIGHTING
- EXISTING WELLS
- EXISTING STORM CULVERT
- EXISTING STORM MANHOLE
- EXISTING STORM CATCHBASIN
- EXISTING SANITARY MANHOLE
- EXISTING FIRE HYDRANT
- EXISTING WATER VALVE

STREETLIGHTING DUCTS NOT SHOWN

UTILITY LOCATIONS APPROXIMATE ONLY, ALL UTILITIES REQUIRE LOCATES FOR DETAILED DESIGN

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FIGURE TITLE
EXISTING UTILITIES MEMORIAL TRAIL STA 100+425 TO STA 100+980

FILE No.	SCALE	FIGURE No.
27613_Utilites_Profile_Circ.dwg		8.04

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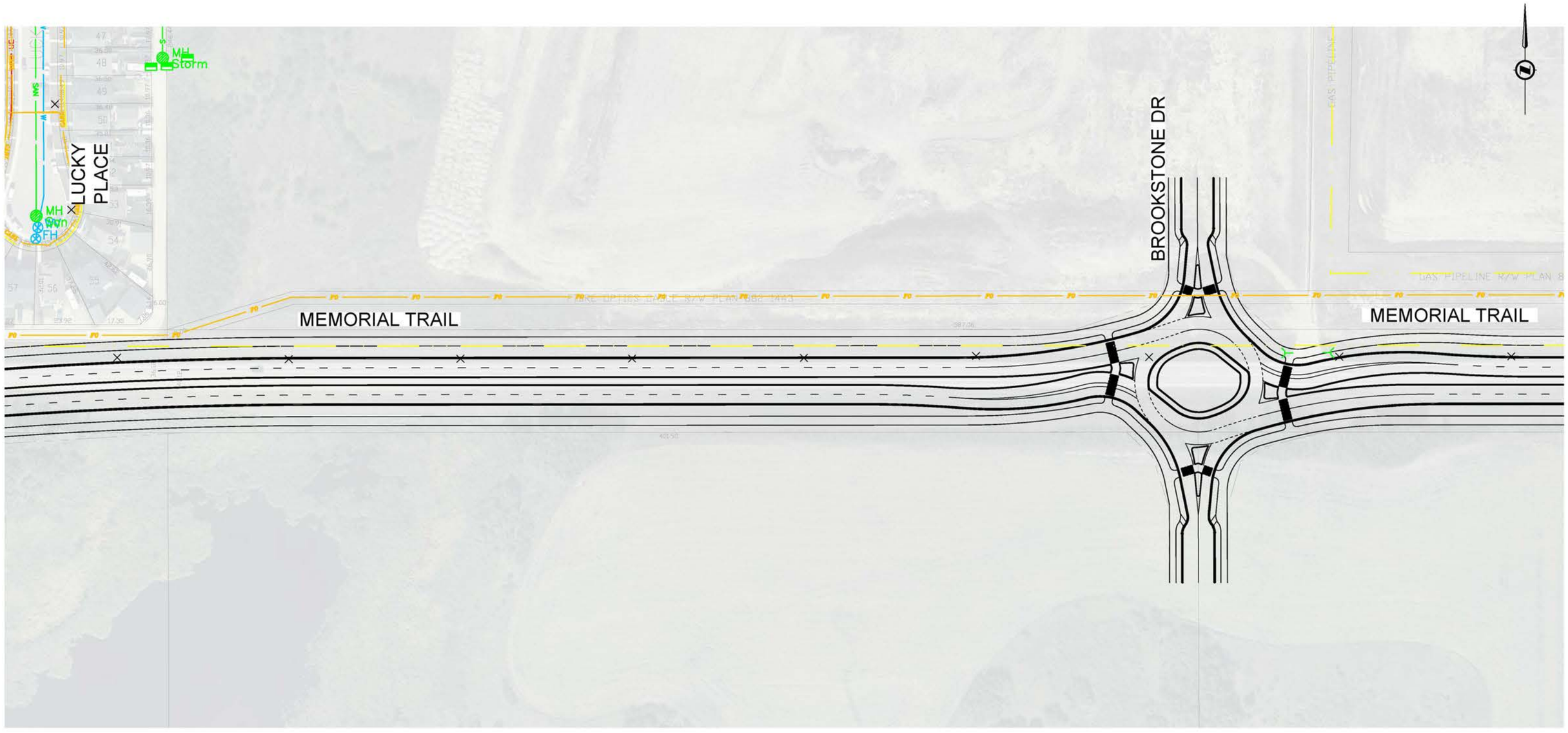

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LEGEND

- PROPOSED ROADWAY
- EXISITNG STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATER MAIN
- EXISTING TELUS FIBRE OPTIC (FO)
- EXISITNG TELUS COPPER (CURE)
- EXISTING AXIA (T)
- EXISTING GAS LINE
- EXISTING U/G ELECTRICAL (UE)
- EXISTING O/H ELECTRICAL (OE)
- EXISTING SHAW/ZAYO
- EXISTING POLES
- EXISTING STREETLIGHTING
- EXISTING WELLS
- EXISTING STORM CULVERT
- EXISTING STORM MANHOLE
- EXISTING STORM CATCHBASIN
- EXISTING SANITARY MANHOLE
- EXISTING FIRE HYDRANT
- EXISTING WATER VALVE

STREETLIGHTING DUCTS NOT SHOWN

UTILITY LOCATIONS APPROXIMATE ONLY, ALL UTILITIES REQUIRE LOCATES FOR DETAILED DESIGN

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MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY

FIGURE TITLE
EXISTING UTILITIES MEMORIAL TRAIL STA 100+980 TO STA 101+520

FILE No.	SCALE	FIGURE No.
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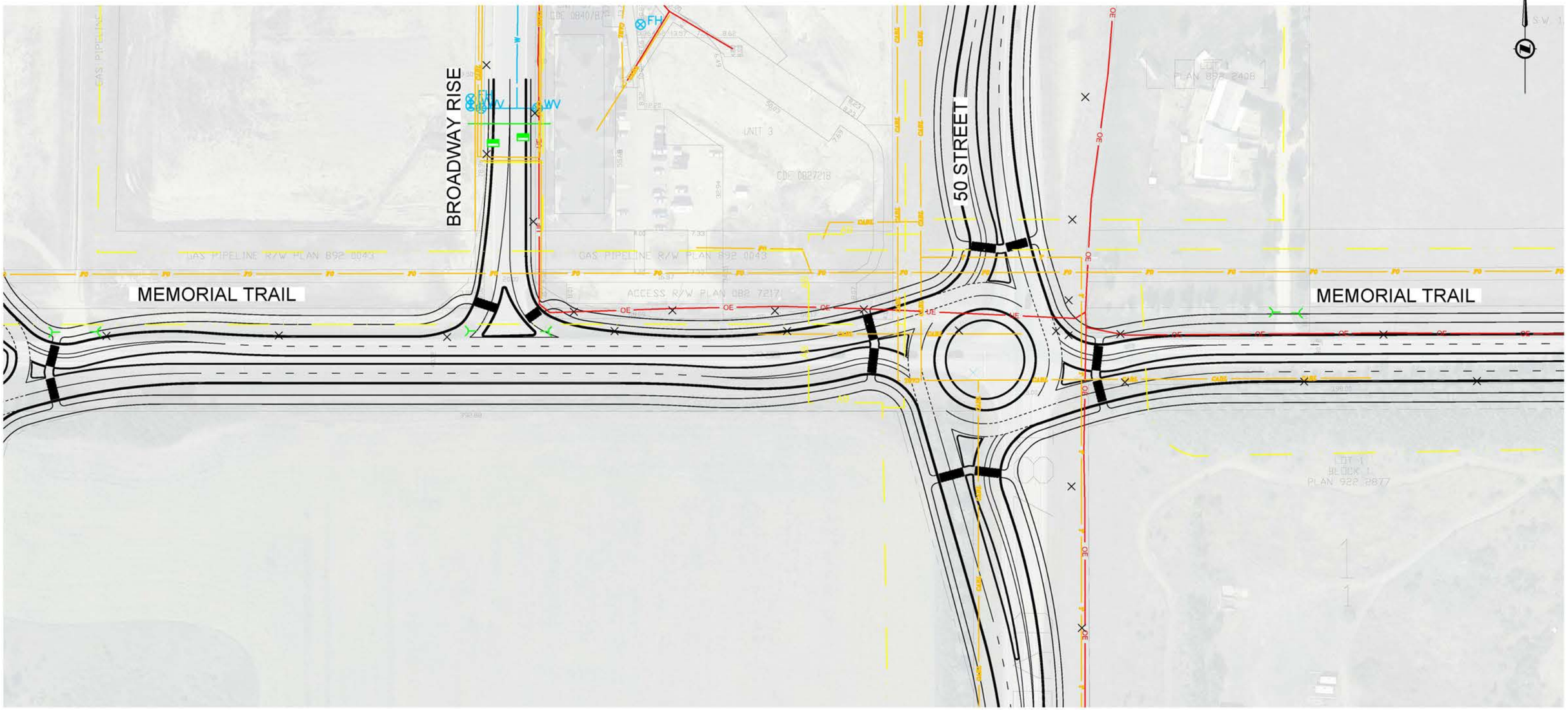

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LEGEND

- PROPOSED ROADWAY
- EXISITNG STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATER MAIN
- EXISTING TELUS FIBRE OPTIC
- EXISITNG TELUS COPPER
- EXISTING AXIA
- EXISTING GAS LINE
- EXISTING U/G ELECTRICAL
- EXISTING O/H ELECTRICAL
- EXISTING SHAW/ZAYO
- EXISTING POLES
- EXISTING STREETLIGHTING
- EXISTING WELLS
- EXISTING STORM CULVERT
- EXISTING STORM MANHOLE
- EXISTING STORM CATCHBASIN
- EXISTING SANITARY MANHOLE
- EXISTING FIRE HYDRANT
- EXISTING WATER VALVE

STREETLIGHTING DUCTS NOT SHOWN

UTILITY LOCATIONS APPROXIMATE ONLY, ALL UTILITIES REQUIRE LOCATES FOR DETAILED DESIGN

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MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
EXISTING UTILITIES
MEMORIAL TRAIL
STA 101+520 TO STA 102+020

FILE No.	SCALE	FIGURE No.
27613_Utilites_Profile_Circ.dwg		8.06

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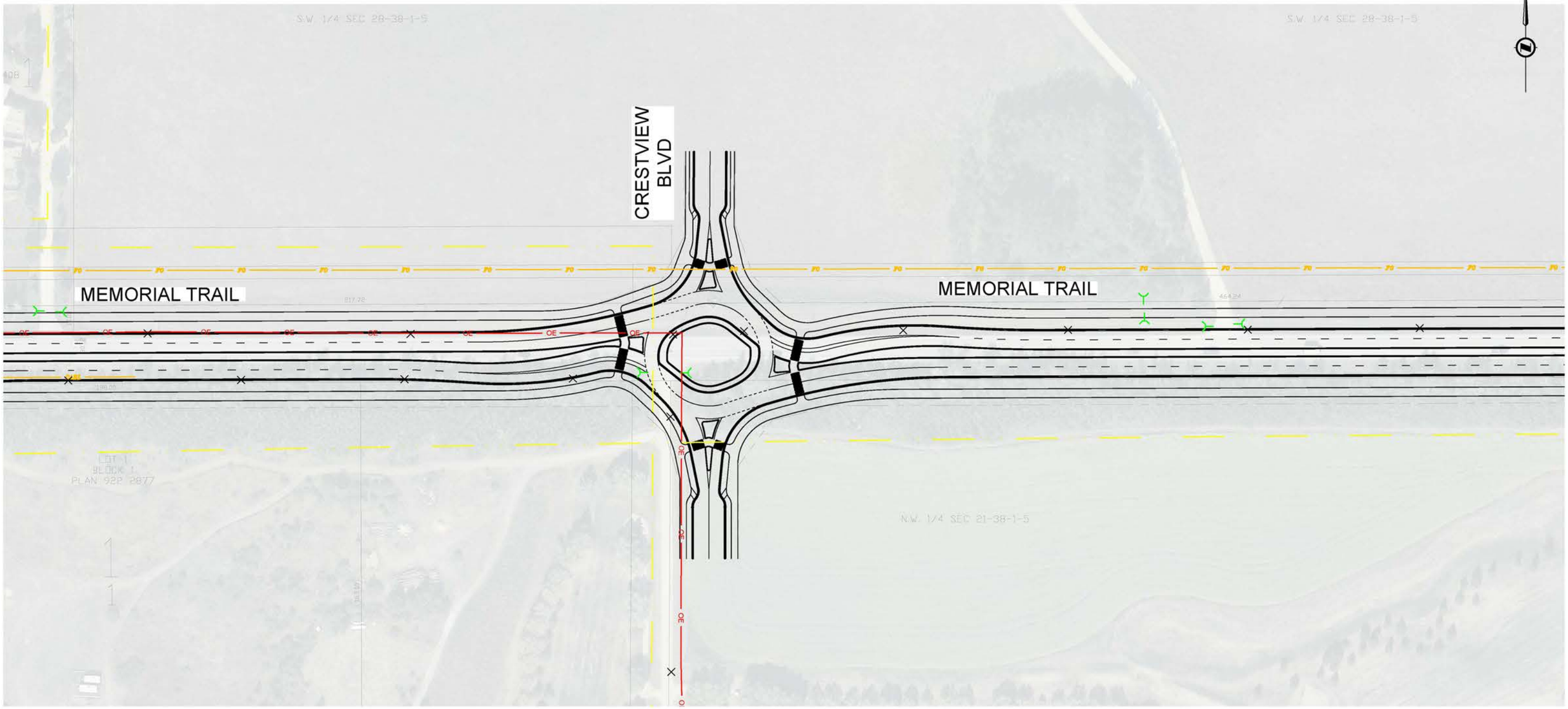

LEGEND

- PROPOSED ROADWAY
- EXISITNG STORM SEWER
- EXISTING SANITARY SEWER
- EXISTING WATER MAIN
- EXISTING TELUS FIBRE OPTIC (FO)
- EXISITNG TELUS COPPER (CABLE)
- EXISTING AXIA (T)
- EXISTING GAS LINE
- EXISTING U/G ELECTRICAL (UE)
- EXISTING O/H ELECTRICAL (OE)
- EXISTING SHAW/ZAYO
- EXISTING POLES
- EXISTING STREETLIGHTING
- EXISTING WELLS
- EXISTING STORM CULVERT
- EXISTING STORM MANHOLE (MH Storm)
- EXISTING STORM CATCHBASIN
- EXISTING SANITARY MANHOLE (MH San)
- EXISTING FIRE HYDRANT (FH)
- EXISTING WATER VALVE (WV)

STREETLIGHTING DUCTS NOT SHOWN

UTILITY LOCATIONS APPROXIMATE ONLY, ALL UTILITIES REQUIRE LOCATES FOR DETAILED DESIGN

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MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY

FIGURE TITLE
EXISTING UTILITIES MEMORIAL TRAIL STA 102+020 TO STA 102+500

FILE No.	SCALE	FIGURE No.
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0 30 60 m
1:1500

LEGEND

PROPOSED ROADWAY	EXISTING STORM CULVERT
EXISITNG STORM SEWER	EXISTING STORM MANHOLE (MH Storm)
EXISTING SANITARY SEWER	EXISTING STORM CATCHBASIN
EXISTING WATER MAIN	EXISTING SANITARY MANHOLE (MH San)
EXISITNG TELUS FIBRE OPTIC (FO)	EXISTING FIRE HYDRANT (FH)
EXISTING TELUS COPPER (CABL)	EXISTING WATER VALVE (WV)
EXISTING AXIA (T)	
EXISTING GAS LINE	
EXISTING U/G ELECTRICAL (UE)	
EXISTING O/H ELECTRICAL (OE)	
EXISTING SHAW/ZAYO	
EXISTING POLES	
EXISTING STREETLIGHTING	
EXISTING WELLS	

STREETLIGHTING DUCTS NOT SHOWN

UTILITY LOCATIONS APPROXIMATE ONLY, ALL UTILITIES REQUIRE LOCATES FOR DETAILED DESIGN

Sylvan Lake | ISL

PROJECT
**MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY**

FIGURE TITLE
**EXISTING UTILITIES
MEMORIAL TRAIL
STA 102+500 TO STA 103+045**

FILE No.	SCALE	FIGURE No.
27613_Utilites_Profile_Circ.dwg		8.08

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RYDERS RIDGE BLVD

MEMORIAL TRAIL

TOWN BOUNDARY

HWY 20

TWP RD 384

0 30 60 m

1:1500

LEGEND

PROPOSED ROADWAY		EXISTING STORM CULVERT	
EXISITNG STORM SEWER		EXISTING STORM MANHOLE	MH Storm
EXISTING SANITARY SEWER		EXISTING STORM CATCHBASIN	
EXISTING WATER MAIN		EXISTING SANITARY MANHOLE	MH San
EXISTING TELUS FIBRE OPTIC	FO	EXISTING FIRE HYDRANT	FH
EXISITNG TELUS COPPER	CABLE	EXISTING WATER VALVE	WV
EXISTING AXIA	T		
EXISTING GAS LINE			
EXISTING U/G ELECTRICAL	UE		
EXISTING O/H ELECTRICAL	OE		
EXISTING SHAW/ZAYO			
EXISTING POLES			
EXISTING STREETLIGHTING			
EXISTING WELLS			

STREETLIGHTING DUCTS NOT SHOWN

UTILITY LOCATIONS APPROXIMATE ONLY, ALL UTILITIES REQUIRE LOCATES FOR DETAILED DESIGN

Sylvan Lake

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PROJECT

MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY

FIGURE TITLE

EXISTING UTILITIES MEMORIAL TRAIL STA 103+045 TO STA 103+620

FILE No.	SCALE	FIGURE No.
27613_Utilites_Profile_Circ.dwg		8.09

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9.0 Stakeholder Engagement

At the start of the joint TMP and FPS project, ISL prepared a communications plan. This document identified key internal and external stakeholders and established the overall objectives and phases of engagement. As part of the engagement plan, the following stakeholders were identified and targeted: Town Administration, Town Council, Alberta Transportation, Red Deer County, adjacent landowners and developers, and the public.

Key engagement activities included:

- Presentation of functional planning concepts to Town Council;
- Two online public engagement opportunities;
- Coordination with adjacent developers; and
- Coordination with Alberta Transportation for the Memorial Trail and Highway 20 Roundabout.

Due to provincial public health orders in place during the COVID-19 pandemic, in-person engagement could not be accommodated for the project. Instead, stakeholder meetings were held virtually, and online tools were developed to provide opportunities for the public to learn about and contribute their input on the project.

Figure 9.1 provides an overview of the timeline for the key public and Council engagement activities.

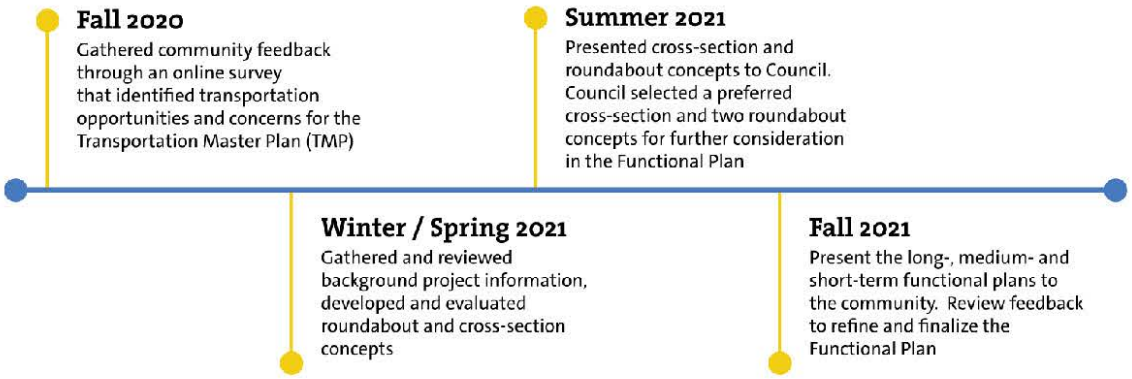


Figure 9.1: Engagement Process

9.1 Council Presentation

On July 7, 2021, ISL presented three cross section concepts (pathway near property lines, pathway at centre on boulevard, pathway with bikeway) and five roundabout concepts (monuments / art, naturalized features) to Town Council. For the cross section, the cross section with the pathway near the property lines is preferred; in addition, a wider pathway, no trees in the median and utilities moved to the side of the road (under pathway) or median were also requested. For the roundabout, the grass option and rock + tree option were preferred.

The materials presented to Town Council are included in **Appendix D.1**.

9.2 Public Engagement

In September 2020, an online survey was used to gather feedback from the public on the Town's transportation network as part of the TMP update. Participants were asked to identify various types of transportation concerns, experiences, or ideas and use a social mapping tool to place a pin and comments. In addition to feedback gathered on the entire transportation network, participants were also asked to provide input on the intersection of 50 Street and Memorial Trail. Some of the key themes that emerged in the feedback about Memorial Trail included:

- Concerns about driver sightlines and congestion at the intersections of Memorial Trail at Highway 20 and 50 Street;
- Suggestions for controlled intersections along Memorial Trail; and
- Suggestions for a pathway along Memorial Trail connecting to community destinations and other pathways.

In October 2021, engagement and communication opportunities were made available for participants to ask questions and provide input on the short-, medium-, and long-term functional plans. A live Q&A session with presentation occurred on October 14, and had a total of 15 participants. An online survey was open from October 4 to October 25, and had a total of 41 respondents. An online mapping tool, open from October 4 to October 25, had a total of 17 responses. In addition, three communications were received by the project team by interested residents and stakeholders. Key themes noted by participants included:

- Concerns about the ability of large trucks and trailers to navigate the roundabouts, particularly on a slope and in winter;
- Support for the multi-use trail and keeping it separated from the roadway; and
- General support for the plan but concerns about cost and timing of implementation.

The materials and What We Heard Reports for both public engagement opportunities are included in **Appendix D.2 and D.3**.

9.3 Alberta Transportation Coordination

Meetings were held with Alberta Transportation on July 6, 2021, and August 31, 2021, to review the recommended roundabout layout at Memorial Trail and Highway 20. Alberta Transportation and the town agreed that building a single lane roundabout at this location is the best first stage, similar to what was recently constructed at Erickson Drive. The roundabout design and profile of Hwy 20 will be explored further during preliminary design with an expected completion date in Q1 of 2022.

9.4 Developer Coordination

The project team provided support to the Town throughout the study to ensure project details were coordinated with ongoing development adjacent to the study area.

10.0 Project Implementation

It is expected that improvements along Memorial Trail will be implemented through a staged approach as development progresses and traffic volumes increase along the corridor. Review of project implementation included recommendation for construction staging, development of projected capital construction costs, and definition of property requirements.

10.1 Construction Staging

Overall Staging Strategy

The overall staging strategy for the corridor is split into three time horizons:

- **Short-term Plan:** Memorial Trail will remain as it is today with one eastbound and one westbound lane. Single-lane roundabouts will be constructed at Highway 20, 50 Street and 60 Street. Short-term plan elements are shown in orange on **Figure 10.1.**
- **Medium-term Plan:** Memorial Trail will remain as a two-lane roadway but will be upgraded to an urban cross section with a landscaped boulevard and a parallel multi-use pathway on the north side. Single-lane roundabouts will be constructed at most of the remaining intersections along the corridor, with the exception of Broadway Rise and the east access to Pogadl Park, which will be constructed as RIRO intersections. Additional intersections may be initially staged as RIRO intersections, rather than roundabouts with the option to upgrade to a roundabout in the long-term if needed. Decisions related to intersection type and staging will be made on a case-by case basis as development unfolds. Medium-term plan elements are shown in green on **Figure 10.1**.
- **Long-term Plan:** As development expands south of Memorial Trail, collector roads will be extended to the south. Most intersections along the corridor are expected to operate successfully with single-lane roundabouts and two lanes on Memorial Trail well beyond the long-term growth scenario analysed in the TMP. Eventually, Memorial Trail will be widened to the south to a 4-lane divided urban cross section. The multi-use pathway network will be expanded to the south side of Memorial Trail with crossings at each intersection. At this point, single-lane roundabouts will be upgraded to multi-lane lane roundabouts. Access to Memorial Trail will be permitted at intersections only; private accesses will be closed or consolidated with the surrounding local road network. Commercial accesses may be permitted pending approval from the Town. Long-term plan elements are shown in blue on **Figure 10.1**.

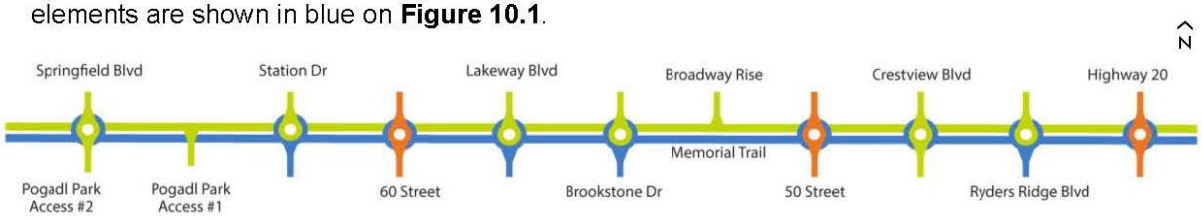


Figure 10.1: Staging Strategy

The short term-plan is expected to be implemented within the next 10 years. At the time this report was compiled, the Town had initiated preliminary design of a single-lane roundabout at Highway 20. Timing of further improvements along the corridor and implementation of the medium- and long-term plans currently are undefined and will depend largely on the timing of new roadway construction, changes in traffic volumes along Memorial Trail, and operational conditions at intersections as development progresses along the corridor.

Roundabout Staging Strategy

Typically, multi-lane roundabouts are staged from inside to outside to maintain the fastest path within an acceptable range. This approach ensures that the roundabout can operate safely and effectively on opening day, while minimizing upfront construction costs. This approach is recommended at Highway 20 and the arterial roundabouts, allowing the ultimate central island to be constructed with the initial stages. Splitter islands are initially extended along their ultimate alignments, allowing them to be cut back when the additional circulatory lane is added. All openings in the splitter islands are constructed at the initial stage allowing pedestrian crossings to be added as the multi-use pathway network is built. This approach is shown below in **Figure 10.2.**

The non-circular shape of the ultimate collector roundabouts presents additional staging challenges. An outside to inside approach is recommended for all collector roundabouts to minimize throwaway costs between stages. In this approach, an initial circular central island is constructed with the same inscribed circle diameter (ICD) at the ultimate stage allowing the outer lane to be used for vehicle circulation at the initial stage. This central island will be cut back at future stages to make room for the additional circulatory lanes. The splitter islands are sized and positioned to match the ultimate, allowing them to remain in place when the dual-lane roundabouts are constructed. The lane width and approach angle are controlled by tightening the radii on the outer curbs and using a wider pained gore area around the splitter islands in the initial stage. Similar to the arterial roundabouts, openings in the splitter islands are constructed at the initial stage allowing pedestrian crossings to be added as the multi-use pathway network is built. This approach is shown below in **Figure 10.3.**

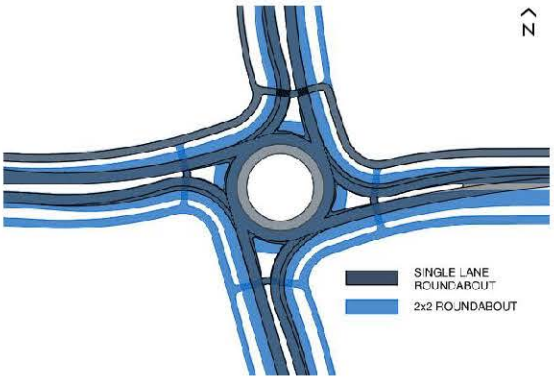


Figure 10.2: Roundabout Staging – Highway 20 and Arterial Roadways

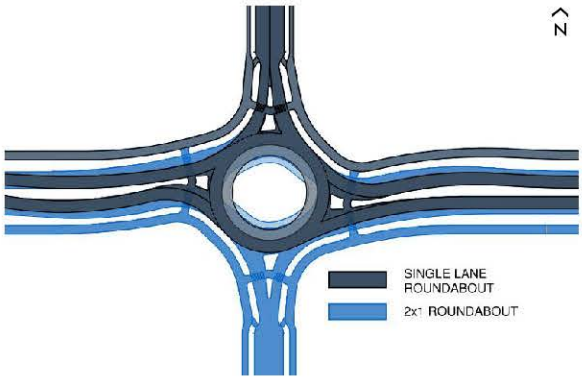


Figure 10.3: Roundabout Staging – Collector Roadways

An alternate approach to staging the collector roundabouts would be to construct the ultimate spiral shaped central island and truck apron, and extend or "fill in" the truck apron to the extents required for the single lane configuration, either with pavement markings or concrete blocks. This would reduce throw away costs when transitioning to the ultimate configuration, however, drivers may use the painted gores or extended truck apron allowing for an increased fastest path and reduced safety performance. Furthermore, would introduce additional maintenance challenges and may not be as aesthetically pleasing. The Town will want to consider how long the single lane roundabout will be in place, when deciding on a staging approach. A painted or extended truck apron approach may be more appropriate for a shorter term or temporary solution.

10.2 Property Requirements

ROW requirements for the ultimate plan are shown on **Exhibits 10.01 to 10.09** included at the end of the section. On these exhibits, new property needed to accommodate the widening of Memorial Trial and the recommended intersection upgrades are hatched in red. In total, 22 parcels are expected to be impacted. Several utility easements fall within the proposed roadway ROW boundaries. Coordination with the landowner and the utility owners will be required at the time of land acquisition.

Where feasible, Memorial Trail is widened to the south to minimize property impacts on existing built-out areas to the north. At intersections, property requirements were calculated for the additional corner cut areas needed to construct the intersection. Where the future roadway network has not yet been developed, this includes future roadway areas north and south of the intersection up to the tie-in with the basic ROW width assigned to each future roadway. This would enable adequate property acquisition to complete construction of the intersection ahead of full build-out of the future roadway network.

An approximate grading limit is shown on **Exhibits 10.01 to 10.09**, indicating where the proposed roadway surface ties into the existing grade with a 3:1 sideslope from the existing property line. It is expected that adjacent developments will eventually tie into the grades at the edge of roadway ROW, assuming a 2% slope from the back of curb the ROW edge.

Roadway ROW requirements, by development area are summarized below in **Table 10.1.** Refer to **Figure 2.1** in Section 2 for locations of the development areas listed below.

Table 10.1: Roadway ROW Requirements

Development	Title Numbers	Roadway ROW Required	
		Ha	Acres
Pogadl Park OP	172 240 641	0.52	1.29
Sixty West OP	172 213 349+102	1.10	2.72
West ASP	172 240 640+001 162 103 329 212 005 949	0.64	1.59
Lakeway Landing OP	052 082 863 0824458 CS5 072 328 415	0.03	0.06
Beacon Hill OP	212 180 393+40 122 413 251 112 024 293	0.21	0.52
South ASP	142 055 152+002 142 055 152+001C 142 055 152 192 070 634+002	1.79	4.43
Crestview OP	002 178 642 192 098 687+003	0.19	0.47
Meadowlands Resort OP	192 070 634+001 192 070 634	0.91	2.24
The Vista at Ryders Ridge OP	-	-	-
Red Deer County	92M223 952 024 352+001	0.22	0.54
	Total	**5.95**	**14.70**

10.3 Capital Cost Estimates

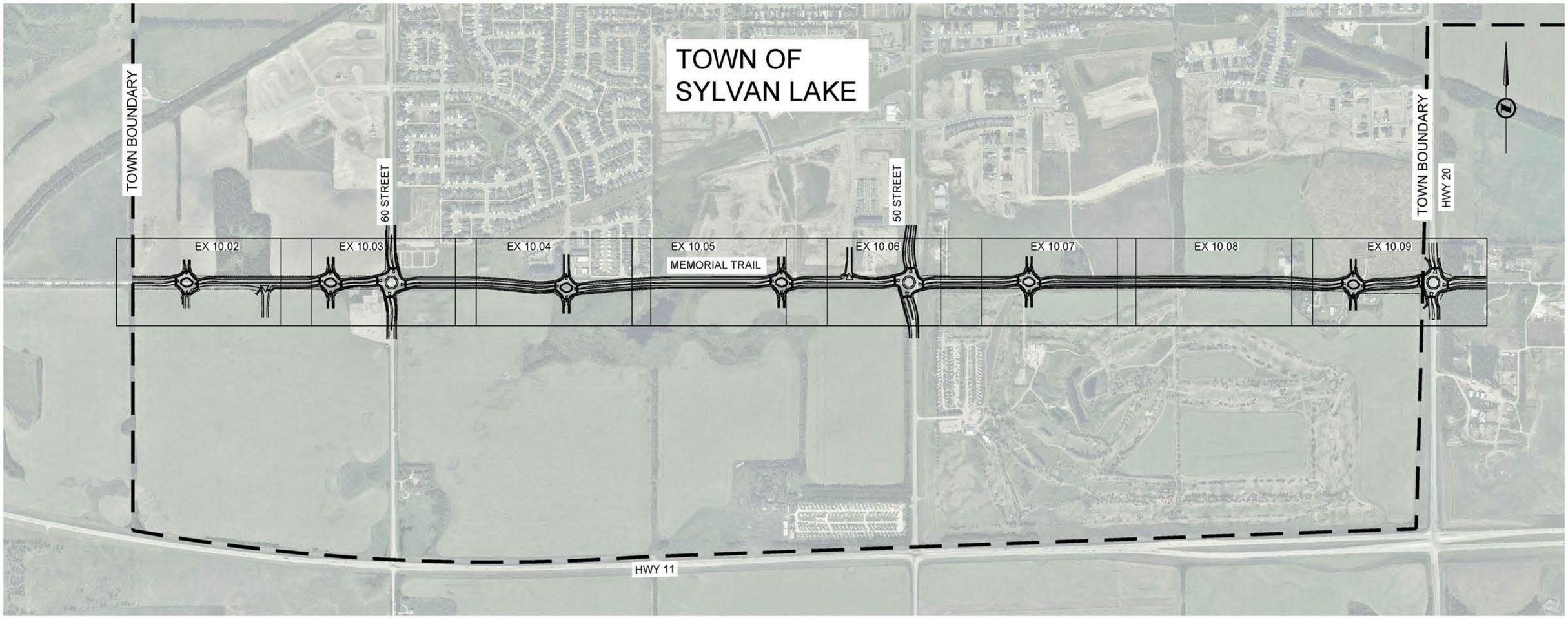
Class 4 conceptual cost estimates (-30 to +50% variance) were prepared in October 2021 for the short-, medium- and long-term plans. The cost estimate at each horizon is presented as a complete construction cost estimate starting from existing conditions; they are not incremental between horizons. The long-term operating costs of the proposed upgrades and land acquisition costs are not included in the estimates.

A 30% contingency was included due to the level of detail available. Engineering and testing was estimated at 15% of the construction subtotal including contingency. The estimate is considered an opinion of probable construction costs; unit prices reflect recent comparable projects in central Alberta in 2021.

The detailed breakdown of the Class 4 estimate is provided in **Appendix E**. The summary of the cost estimate is provided in **Table 10.2**. A map showing a breakdown of the corridor into smaller segments for future programming of the corridor is included in the Appendix.

Table 10.2: Construction Cost Estimate Summary

Description	Long-term Plan	Medium-Term Plan	Short-term Plan
Removals (includes disposal)	$ 1,640,000	$ 1,650,000	$ 470,000
Earthworks	$ 8,110,000	$ 4,570,000	$ 1,490,000
Roadworks	$ 12,400,000	$ 7,860,000	$ 2,550,000
Concrete	$ 3,440,000	$ 3,090,000	$ 850,000
Traffic and Way Finding	$ 1,570,000	$ 1,390,000	$ 560,000
Utilities (Third-Party)	$ 2,760,000	$ 2,450,000	$ 230,000
Detours	$ 17,500,000	$ 15,860,000	$ 5,930,000
Landscaping, Site Furniture and Features	$ 1,470,000	$ 1,080,000	$ 180,000
Construction Subtotal (Approximate)	**$ 48,890,000**	**$ 37,950,000**	**$ 12,260,000**
Contingency (30%)	$ 14,667,000	$ 11,385,000	$ 3,678,000
Subtotal Including Contingency	**$ 63,557,000**	**$ 49,335,000**	**$15,938,000**
Engineering and Testing (15%)	$ 9,533,550	$ 7,400,250	$ 2,390,000
Class 4 Cost Estimate	**$ 73,100,000**	**$ 56,740,000**	**$ 18,330,000**
Class 4 Cost Estimate Expected Maximum Cost (+50%)	**$ 109,650,000**	**$ 85,110,000**	**$ 27,500,000**
Class 4 Cost Estimate Expected Minimum Cost (-30%)	**$ 51,170,000**	**$ 39,720,000**	**$ 12,830,000**



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FUNCTIONAL PLANNING STUDY

FIGURE TITLE
ROW REQUIREMENTS
KEY PLAN

FILE No.	SCALE	FIGURE No.
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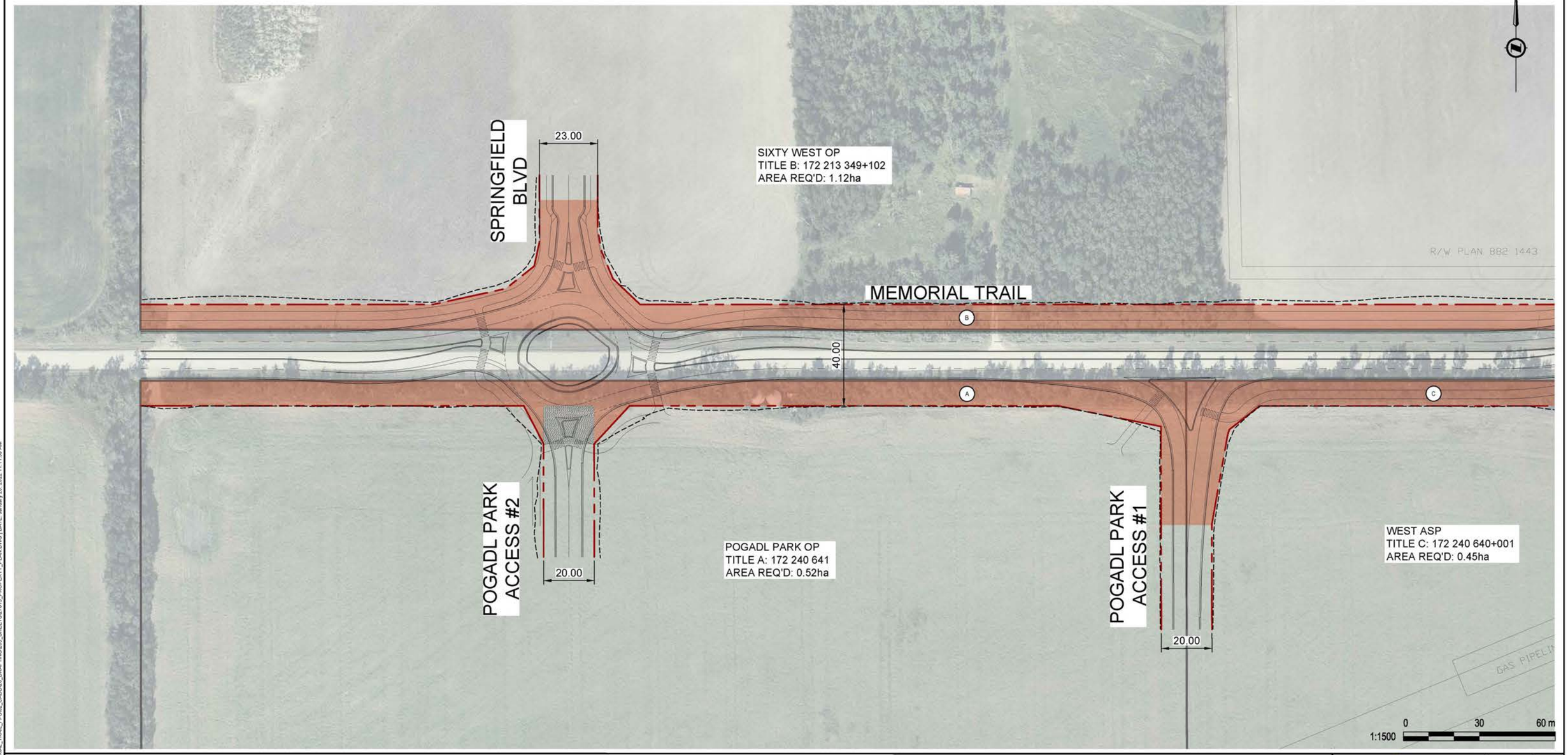

LEGEND

- APPROXIMATE GRADING LIMIT
- REQUIRED ROW
- PROPOSED ROADWAY
- PROPOSED ROADWAY ROW
- EXISTING LEGAL LINE
- EXISTING PARCEL BOUNDARY

Sylvan Lake

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PROJECT

MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE

ROW REQUIREMENTS
MEMORIAL TRAIL
STA 99+300TO STA 99+900

FILE No.	SCALE	FIGURE No.
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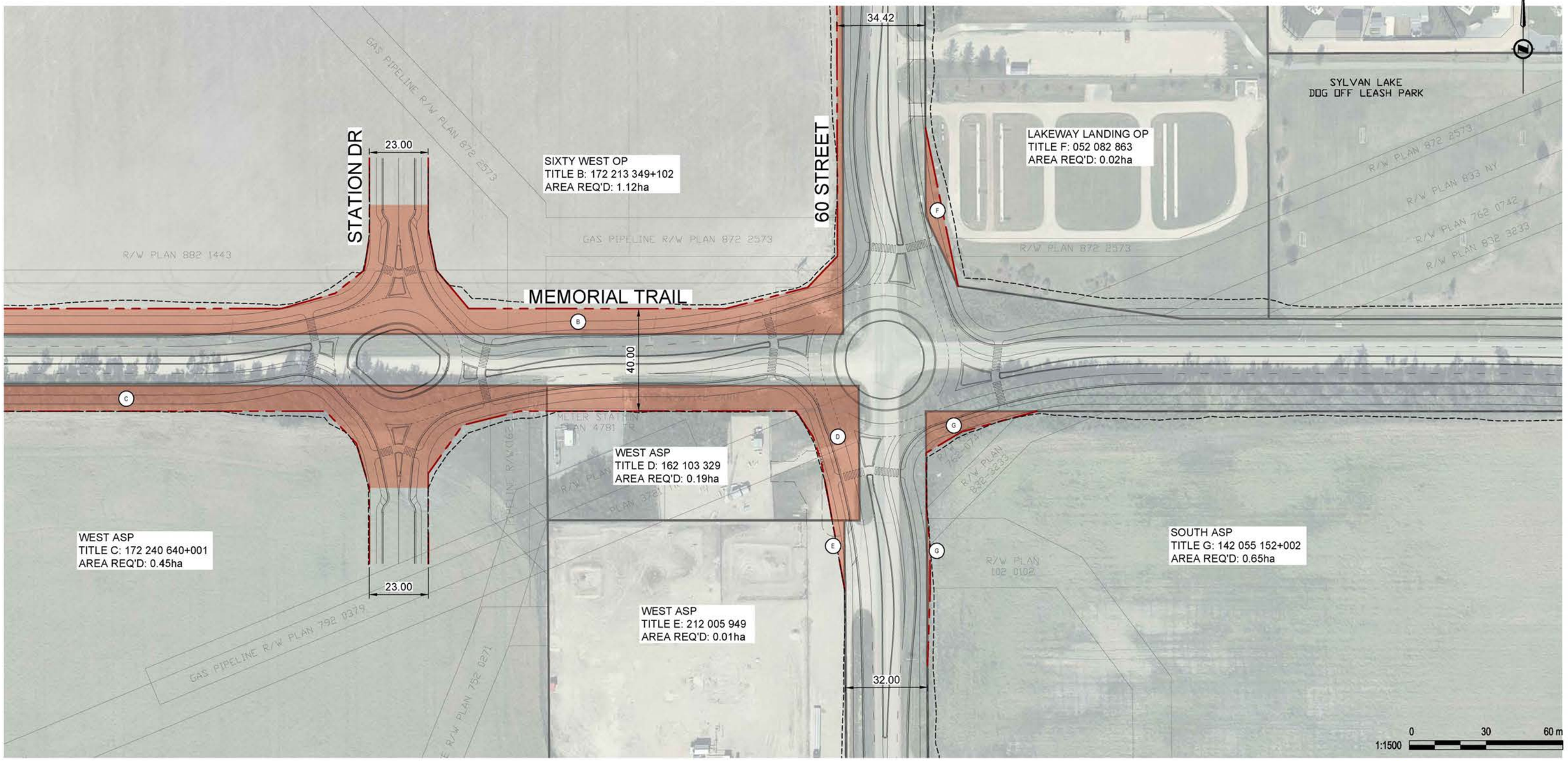

LEGEND

- APPROXIMATE GRADING LIMIT
- REQUIRED ROW
- PROPOSED ROADWAY
- PROPOSED ROADWAY ROW
- EXISTING LEGAL LINE
- EXISTING PARCEL BOUNDARY

Sylvan Lake

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PROJECT

MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE

ROW REQUIREMENTS
MEMORIAL TRAIL
STA 99+900 TO STA 100+425

FILE No.	SCALE	FIGURE No.
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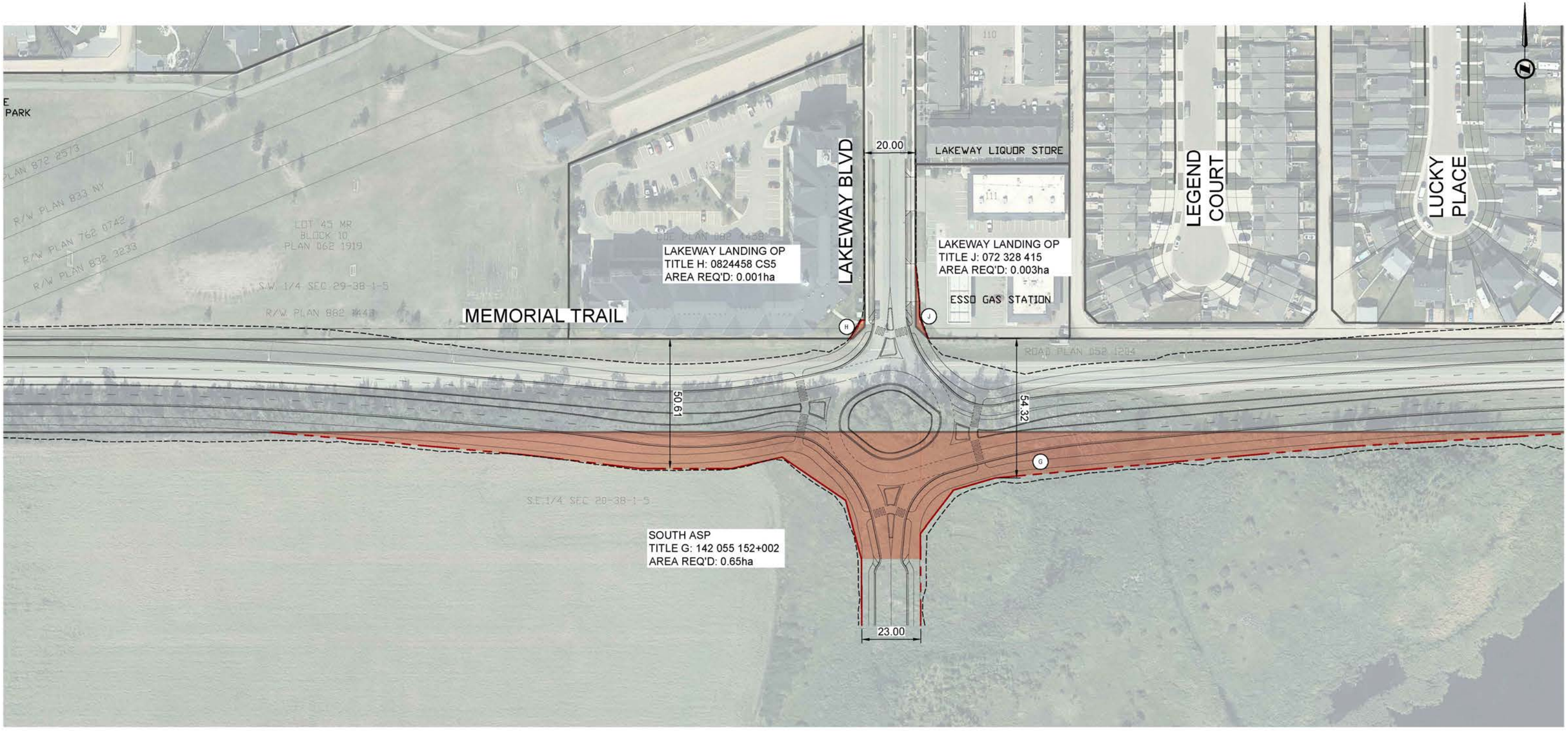

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LEGEND

- APPROXIMATE GRADING LIMIT
- REQUIRED ROW
- PROPOSED ROADWAY
- PROPOSED ROADWAY ROW
- EXISTING LEGAL LINE
- EXISTING PARCEL BOUNDARY

Sylvan Lake

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PROJECT
SYLVAN LAKE TMP
MEMORIAL TRAIL FPS

FIGURE TITLE
ROW REQUIREMENTS
MEMORIAL TRAIL
STA 100+425 TO STA 100+980

FILE No.	SCALE	FIGURE No.
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LUCKY PLACE

BEACON HILL OP
TITLE N: 212 180 393+40
AREA REQ'D: 0.16ha

BROOKSTONE DR

23.00

GAS PIPELINE R/W PLAN

MEMORIAL TRAIL

FIBRE OPTICS CABLE R/W PLAN BBC 1443

MEMORIAL TRAIL

40.00

40.00

N

K

M

SOUTH ASP
TITLE K: 142 055 152+001C
AREA REQ'D: 0.05ha

SOUTH ASP
TITLE M: 142 055 152
AREA REQ'D: 0.22ha

23.00

1:1500 0 30 60 m

LEGEND

- APPROXIMATE GRADING LIMIT
- REQUIRED ROW
- PROPOSED ROADWAY
- PROPOSED ROADWAY ROW
- EXISTING LEGAL LINE
- EXISTING PARCEL BOUNDARY

Sylvan Lake

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PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
ROW REQUIREMENTS
MEMORIAL TRAIL
STA 100+980 TO STA 101+520

FILE No.	SCALE	FIGURE No.
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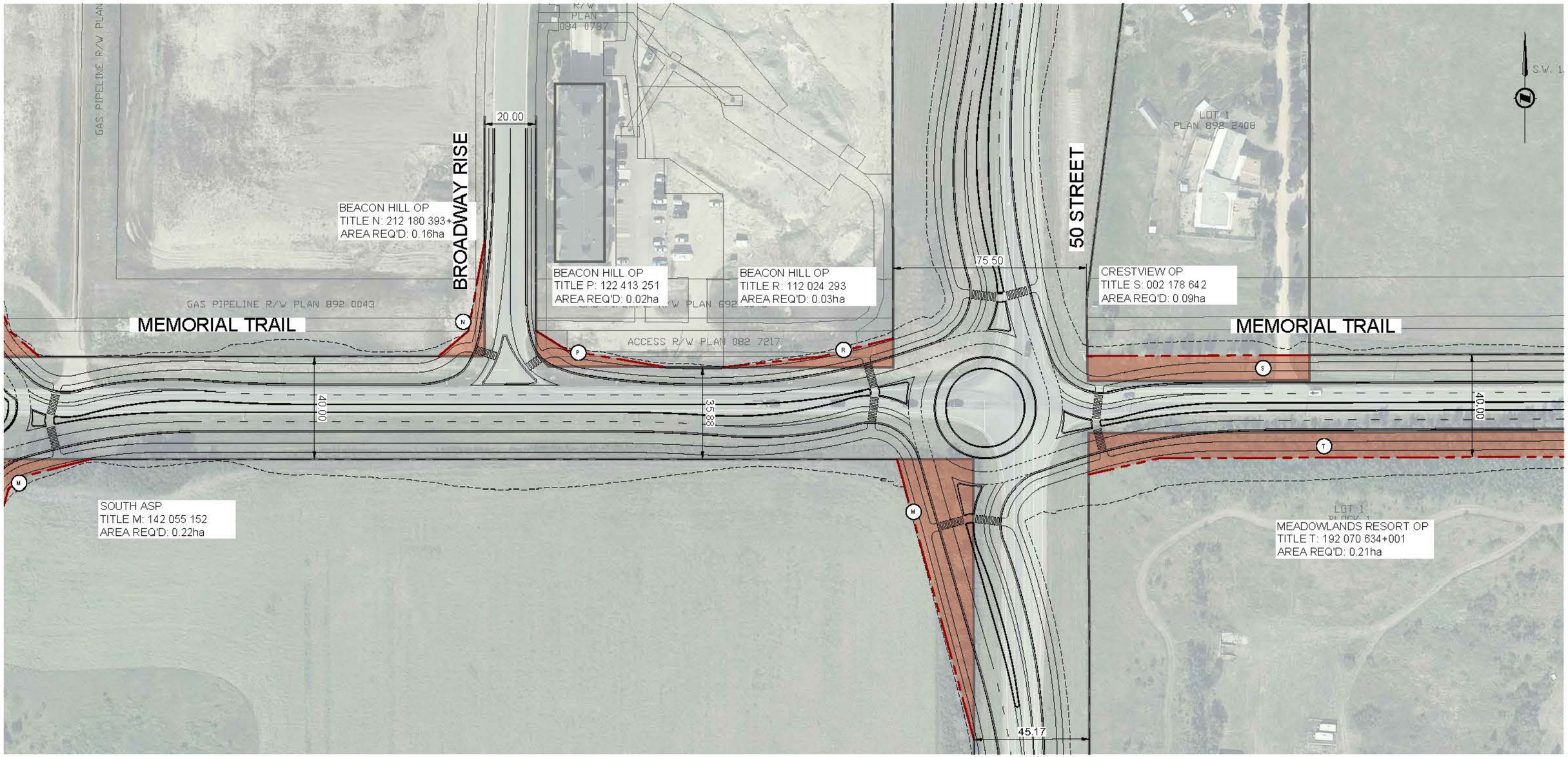

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LEGEND

- APPROXIMATE GRADING LIMIT
- REQUIRED ROW
- PROPOSED ROADWAY
- PROPOSED ROADWAY ROW
- EXISTING LEGAL LINE
- EXISTING PARCEL BOUNDARY

Sylvan Lake

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MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
ROW REQUIREMENTS
MEMORIAL TRAIL
STA 101+520 TO STA 102+020

FILE No.	SCALE	FIGURE No.
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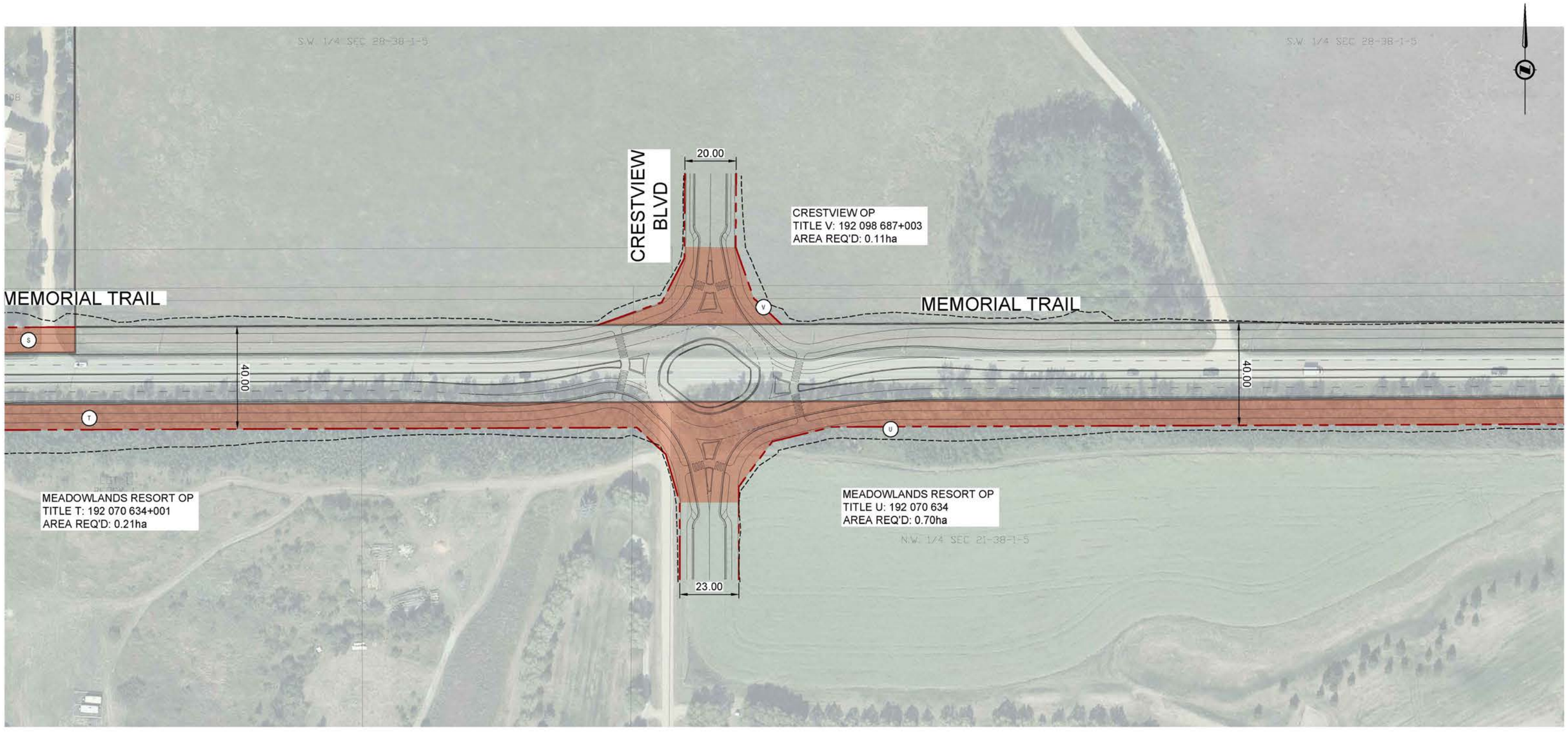

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LEGEND

- APPROXIMATE GRADING LIMIT
- REQUIRED ROW
- PROPOSED ROADWAY
- PROPOSED ROADWAY ROW
- EXISTING LEGAL LINE
- EXISTING PARCEL BOUNDARY

Sylvan Lake

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PROJECT

MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE

ROW REQUIREMENTS
MEMORIAL TRAIL
STA 102+020 TO STA 102+500

FILE No.	SCALE	FIGURE No.
27613_Property_Plan.dwg		10.07

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S.E. 1/4 SEC 28-38-1-5

LOT 1
BLOCK 1
PLAN 942 1135

MEMORIAL TRAIL

40.00

44.35

U

W

X

MEADOWLANDS RESORT OP
TITLE U: 192 070 634
AREA REQ'D: 0.70ha

SOUTH ASP
TITLE W: 192 070 634+002
AREA REQ'D: 0.87ha

SOUTH ASP
TITLE X: 142 055 152+003
AREA REQ'D: 0.13ha

N.E. 1/4 SEC 21-38-1-5

0 30 60 m
1:1500

LEGEND

- APPROXIMATE GRADING LIMIT
- REQUIRED ROW
- PROPOSED ROADWAY
- PROPOSED ROADWAY ROW
- EXISTING LEGAL LINE
- EXISTING PARCEL BOUNDARY

Sylvan Lake

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PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
ROW REQUIREMENTS
MEMORIAL TRAIL
STA 102+500 TO STA 103+045

FILE No.	SCALE	FIGURE No.
27613_Property_Plan.dwg		10.08

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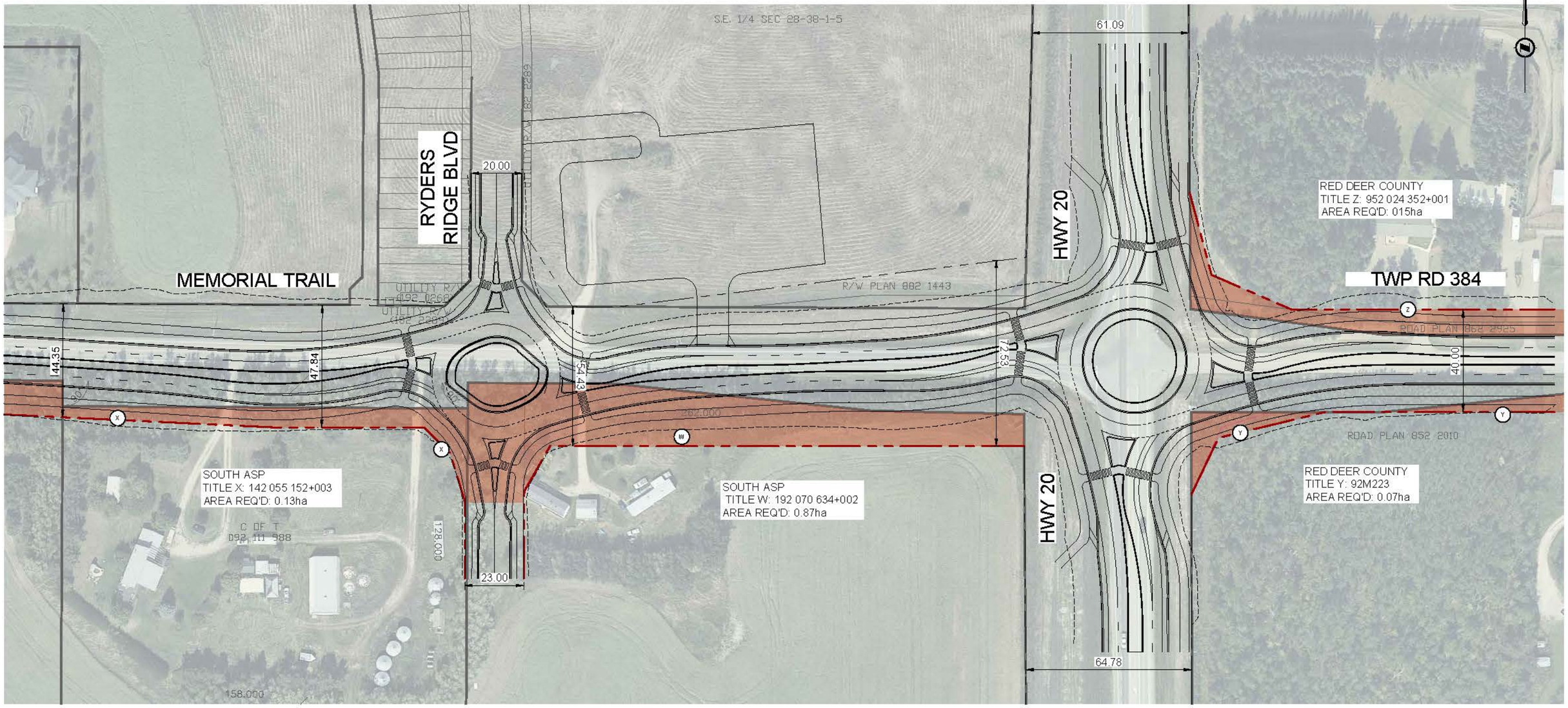

LEGEND

- APPROXIMATE GRADING LIMIT
- REQUIRED ROW
- PROPOSED ROADWAY
- PROPOSED ROADWAY ROW
- EXISTING LEGAL LINE
- EXISTING PARCEL BOUNDARY

Sylvan Lake

ISL

PROJECT

MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE

ROW REQUIREMENTS
MEMORIAL TRAIL
STA 103+045 TO STA 103+620

FILE No.	SCALE	FIGURE No.
27613_Property_Plan.dwg		10.09

ISC: ### SHEET SIZE ANSI B 20 mm 0

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11.0 Summary and Recommendations

The study objectives explored through the roadway functional planning process including stakeholder and public engagement has resulted in the development in a vision for Memorial Trail that will accommodate all modes and serve the Town of Sylvan Lake for years to come. A brief summary of the study findings and possible next steps are listed below.

11.1 Key Findings

- Roundabouts are the preferred intersection control for this corridor by the Town, Alberta Transportation, developers, and residents.
- Single lane roundabouts and a 2-lane corridor should be adequate for 10-20 years.
- Multi-lane roundabouts and the required road right-of-way have been identified for protection.
- 2x1 roundabouts are proposed as the ultimate condition for all Memorial Trail all-turns collector intersections along the corridor. 2x1 roundabouts with spirals have been implemented in Red Deer and planned for at other intersections in Sylvan Lake. Protecting for this type of roundabout accommodates for circular 2x1 roundabouts.
- 2x2 roundabouts are proposed as the ultimate condition along Memorial Trail at 50 Street, 60 Street and Highway 20.
- The Town is looking for clean and minimal maintenance landscaping throughout the corridor.
- The Town is looking for minimal maintenance landscaping in the central islands of the roundabouts.
- The corridor can be upgraded in logical steps / portions and the priorities can be shifted based on development success along the corridor.
- Upgrading the Highway 20 intersection to a roundabout is the top priority and can be implemented in the next 2-5 years. Timing for other short-term improvements and other parts of the medium-term upgrades will depend on a variety of factors and will be monitored by the Town.

11.2 Next Steps

- Functional Planning Studies along 60 Street and 50 Street
- Preliminary roundabout designs for 60 Street / 50 Street and Highway 20.
- Discussions with utility companies should occur as part of preliminary designs for each of the initial single-lane roundabouts.
- Continued coordination with all area developers in regard to many aspects including: road ROW dedication, roadway profiles, property line grading, stormwater management, shallow utilities and construction timing.
- The need for corridor and intersection upgrades should be monitored through development applications.
- Discussions with property owners and leases / residents in regard to access management as upgrade projects occur over time.
- The Town can adjust unit prices and quantities in the cost estimates in future years to update budgets as the corridor is upgraded.
- An infrastructure masterplan update is suggested to better define these requirements and costs to be coordinated with area developers.

APPENDIX A
Traffic Modelling Results

MOVEMENT SUMMARY

Site: 74 [Memorial Trail / Springfield Blvd - 25 Yrs]

Memorial Trail / Springfield Blvd
25 Year Horizon
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Springfield Blvd												
1	L2	1	2.0	0.081	4.4	LOS A	0.4	2.7	0.22	0.13	0.22	36.8
2	T1	26	2.0	0.081	0.4	LOS A	0.4	2.7	0.22	0.13	0.22	34.6
3	R2	62	2.0	0.081	0.8	LOS A	0.4	2.7	0.22	0.13	0.22	35.1
Approach		89	2.0	0.081	0.7	LOS A	0.4	2.7	0.22	0.13	0.22	34.9
East: Memorial Trail												
4	L2	59	2.0	0.151	4.1	LOS A	0.8	5.4	0.13	0.22	0.13	36.6
5	T1	1	2.0	0.151	0.1	LOS A	0.8	5.4	0.13	0.22	0.13	34.4
6	R2	136	2.0	0.151	0.5	LOS A	0.8	5.4	0.13	0.22	0.13	34.9
Approach		196	2.0	0.151	1.6	LOS A	0.8	5.4	0.13	0.22	0.13	35.4
North: Springfield Blvd												
7	L2	72	2.0	0.073	4.3	LOS A	0.3	2.3	0.19	0.40	0.19	35.7
8	T1	9	2.0	0.073	0.3	LOS A	0.3	2.3	0.19	0.40	0.19	33.7
9	R2	1	2.0	0.073	0.7	LOS A	0.3	2.3	0.19	0.40	0.19	34.1
Approach		82	2.0	0.073	3.8	LOS A	0.3	2.3	0.19	0.40	0.19	35.4
West: Memorial Trail												
10	L2	1	2.0	0.003	4.6	LOS A	0.0	0.1	0.28	0.26	0.28	36.3
11	T1	1	2.0	0.003	0.7	LOS A	0.0	0.1	0.28	0.26	0.28	34.1
12	R2	1	2.0	0.003	1.1	LOS A	0.0	0.1	0.28	0.26	0.28	34.6
Approach		3	2.0	0.003	2.1	LOS A	0.0	0.1	0.28	0.26	0.28	35.0
All Vehicles		371	2.0	0.151	1.9	LOS A	0.8	5.4	0.16	0.24	0.16	35.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 74 [Memorial Trail / Station Dr - 25 Yrs]

Memorial Trail / Station Dr
25 Year Horizon
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Station Dr												
1	L2	27	2.0	0.201	5.4	LOS A	1.0	7.3	0.42	0.32	0.42	36.3
2	T1	97	2.0	0.201	1.4	LOS A	1.0	7.3	0.42	0.32	0.42	34.1
3	R2	67	2.0	0.201	1.8	LOS A	1.0	7.3	0.42	0.32	0.42	34.6
Approach		192	2.0	0.201	2.1	LOS A	1.0	7.3	0.42	0.32	0.42	34.6
East: Memorial Trail												
4	L2	71	2.0	0.371	4.9	LOS A	2.4	17.0	0.40	0.28	0.40	36.3
5	T1	162	2.0	0.371	1.0	LOS A	2.4	17.0	0.40	0.28	0.40	34.1
6	R2	177	2.0	0.371	1.3	LOS A	2.4	17.0	0.40	0.28	0.40	34.6
Approach		409	2.0	0.371	1.8	LOS A	2.4	17.0	0.40	0.28	0.40	34.7
North: Station Dr												
7	L2	96	2.0	0.145	5.6	LOS A	0.7	5.2	0.45	0.50	0.45	35.5
8	T1	32	2.0	0.145	1.6	LOS A	0.7	5.2	0.45	0.50	0.45	33.5
9	R2	5	2.0	0.145	2.0	LOS A	0.7	5.2	0.45	0.50	0.45	34.0
Approach		133	2.0	0.145	4.5	LOS A	0.7	5.2	0.45	0.50	0.45	35.0
West: Memorial Trail												
10	L2	8	2.0	0.137	5.2	LOS A	0.7	4.8	0.39	0.23	0.39	36.4
11	T1	113	2.0	0.137	1.2	LOS A	0.7	4.8	0.39	0.23	0.39	34.2
12	R2	12	2.0	0.137	1.6	LOS A	0.7	4.8	0.39	0.23	0.39	34.7
Approach		133	2.0	0.137	1.5	LOS A	0.7	4.8	0.39	0.23	0.39	34.4
All Vehicles		866	2.0	0.371	2.2	LOS A	2.4	17.0	0.41	0.32	0.41	34.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 62 [Memorial Trail / 60 Street - 25 Yrs (Improve)]

Memorial Trail / 60 Street
25 Year Horizon
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: 60 Street												
1	L2	127	2.0	0.641	7.9	LOS A	6.1	43.8	0.75	0.72	0.85	35.4
2	T1	537	2.0	0.641	3.9	LOS A	6.1	43.8	0.75	0.72	0.85	33.4
3	R2	98	2.0	0.165	4.1	LOS A	0.8	5.6	0.56	0.53	0.56	34.1
Approach		762	2.0	0.641	4.6	LOS A	6.1	43.8	0.72	0.70	0.81	33.8
East: Memorial Trail												
4	L2	34	2.0	0.380	8.5	LOS A	2.7	19.1	0.84	0.76	0.84	35.3
5	T1	236	2.0	0.380	4.5	LOS A	2.7	19.1	0.84	0.76	0.84	33.3
6	R2	193	2.0	0.318	5.7	LOS A	2.0	14.5	0.81	0.79	0.81	33.7
Approach		462	2.0	0.380	5.3	LOS A	2.7	19.1	0.82	0.77	0.82	33.6
North: 60 Street												
7	L2	158	2.0	0.585	9.0	LOS A	5.0	35.7	0.77	0.82	0.89	35.0
8	T1	258	2.0	0.585	5.1	LOS A	5.0	35.7	0.77	0.82	0.89	33.0
9	R2	46	2.0	0.585	5.4	LOS A	5.0	35.7	0.77	0.82	0.89	33.5
Approach		462	2.0	0.585	6.4	LOS A	5.0	35.7	0.77	0.82	0.89	33.7
West: Memorial Trail												
10	L2	37	2.0	0.375	7.4	LOS A	2.4	16.8	0.70	0.62	0.70	35.6
11	T1	166	2.0	0.375	3.5	LOS A	2.4	16.8	0.70	0.62	0.70	33.6
12	R2	73	2.0	0.375	3.8	LOS A	2.4	16.8	0.70	0.62	0.70	34.0
Approach		276	2.0	0.375	4.1	LOS A	2.4	16.8	0.70	0.62	0.70	33.9
All Vehicles		1962	2.0	0.641	5.1	LOS A	6.1	43.8	0.76	0.73	0.82	33.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 74 [Memorial Trail / Lakeway Blvd - 25 Yrs]

Memorial Trail / Lakeway Blvd
25 Year Horizon
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Lakeway Blvd												
1	L2	166	2.0	0.463	7.3	LOS A	3.1	21.9	0.68	0.66	0.69	35.3
2	T1	134	2.0	0.463	3.3	LOS A	3.1	21.9	0.68	0.66	0.69	33.3
3	R2	76	2.0	0.463	3.7	LOS A	3.1	21.9	0.68	0.66	0.69	33.8
Approach		376	2.0	0.463	5.1	LOS A	3.1	21.9	0.68	0.66	0.69	34.3
East: Memorial Trail												
4	L2	102	2.0	0.637	9.3	LOS A	6.1	43.5	0.80	0.83	0.94	35.1
5	T1	264	2.0	0.637	5.3	LOS A	6.1	43.5	0.80	0.83	0.94	33.1
6	R2	161	2.0	0.637	5.7	LOS A	6.1	43.5	0.80	0.83	0.94	33.5
Approach		527	2.0	0.637	6.2	LOS A	6.1	43.5	0.80	0.83	0.94	33.6
North: Lakeway Blvd												
7	L2	92	2.0	0.319	7.9	LOS A	1.9	13.5	0.70	0.71	0.70	35.2
8	T1	99	2.0	0.319	4.0	LOS A	1.9	13.5	0.70	0.71	0.70	33.2
9	R2	32	2.0	0.319	4.4	LOS A	1.9	13.5	0.70	0.71	0.70	33.7
Approach		222	2.0	0.319	5.7	LOS A	1.9	13.5	0.70	0.71	0.70	34.1
West: Memorial Trail												
10	L2	65	2.0	0.472	6.4	LOS A	3.2	22.7	0.63	0.49	0.63	35.8
11	T1	221	2.0	0.472	2.5	LOS A	3.2	22.7	0.63	0.49	0.63	33.7
12	R2	135	2.0	0.472	2.9	LOS A	3.2	22.7	0.63	0.49	0.63	34.2
Approach		421	2.0	0.472	3.2	LOS A	3.2	22.7	0.63	0.49	0.63	34.2
All Vehicles		1546	2.0	0.637	5.1	LOS A	6.1	43.5	0.71	0.68	0.76	34.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 74 [Memorial Trail / Brookstone Drive - 25 Yrs]

Memorial Trail / Brookstone Drive
25 Year Horizon
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Brookstone Drive												
1	L2	79	2.0	0.380	7.1	LOS A	2.3	16.4	0.65	0.61	0.65	35.6
2	T1	106	2.0	0.380	3.2	LOS A	2.3	16.4	0.65	0.61	0.65	33.5
3	R2	117	2.0	0.380	3.5	LOS A	2.3	16.4	0.65	0.61	0.65	34.0
Approach		302	2.0	0.380	4.3	LOS A	2.3	16.4	0.65	0.61	0.65	34.3
East: Memorial Trail												
4	L2	102	2.0	0.654	6.8	LOS A	6.4	45.4	0.70	0.54	0.74	35.7
5	T1	422	2.0	0.654	2.8	LOS A	6.4	45.4	0.70	0.54	0.74	33.6
6	R2	134	2.0	0.654	3.2	LOS A	6.4	45.4	0.70	0.54	0.74	34.1
Approach		658	2.0	0.654	3.5	LOS A	6.4	45.4	0.70	0.54	0.74	34.0
North: Brookstone Drive												
7	L2	71	2.0	0.244	8.3	LOS A	1.4	10.1	0.72	0.73	0.72	35.1
8	T1	60	2.0	0.244	4.4	LOS A	1.4	10.1	0.72	0.73	0.72	33.1
9	R2	25	2.0	0.244	4.7	LOS A	1.4	10.1	0.72	0.73	0.72	33.5
Approach		156	2.0	0.244	6.2	LOS A	1.4	10.1	0.72	0.73	0.72	34.0
West: Memorial Trail												
10	L2	34	2.0	0.406	5.8	LOS A	2.6	18.5	0.53	0.35	0.53	36.0
11	T1	301	2.0	0.406	1.8	LOS A	2.6	18.5	0.53	0.35	0.53	33.9
12	R2	54	2.0	0.406	2.2	LOS A	2.6	18.5	0.53	0.35	0.53	34.4
Approach		388	2.0	0.406	2.2	LOS A	2.6	18.5	0.53	0.35	0.53	34.2
All Vehicles		1504	2.0	0.654	3.6	LOS A	6.4	45.4	0.65	0.52	0.67	34.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 32 [Memorial Trail / 50 Street - 25 Yrs (Improve)]

Memorial Trail / 50 Street Improve
25 Year Horizon
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: 50 Street												
1	L2	238	2.0	0.653	8.7	LOS A	6.7	48.0	0.83	0.85	0.97	35.0
2	T1	381	2.0	0.653	4.8	LOS A	6.7	48.0	0.83	0.85	0.97	33.0
3	R2	155	2.0	0.284	5.0	LOS A	1.5	10.8	0.66	0.65	0.66	33.9
Approach		774	2.0	0.653	6.0	LOS A	6.7	48.0	0.80	0.81	0.91	33.8
East: Memorial Trail												
4	L2	221	2.0	0.836	20.7	LOS C	13.2	93.8	1.00	1.46	1.74	31.6
5	T1	374	2.0	0.836	16.8	LOS B	13.2	93.8	1.00	1.46	1.74	29.9
6	R2	44	2.0	0.109	7.2	LOS A	0.6	4.0	0.74	0.72	0.74	33.2
Approach		639	2.0	0.836	17.5	LOS B	13.2	93.8	0.98	1.41	1.67	30.7
North: 50 Street												
7	L2	45	2.0	0.596	16.8	LOS B	5.2	37.1	0.96	1.14	1.27	32.8
8	T1	172	2.0	0.596	12.9	LOS B	5.2	37.1	0.96	1.14	1.27	31.0
9	R2	62	2.0	0.596	13.2	LOS B	5.2	37.1	0.96	1.14	1.27	31.5
Approach		279	2.0	0.596	13.6	LOS B	5.2	37.1	0.96	1.14	1.27	31.4
West: Memorial Trail												
10	L2	73	2.0	0.659	10.9	LOS B	6.5	46.4	0.84	0.94	1.06	34.6
11	T1	294	2.0	0.659	7.0	LOS A	6.5	46.4	0.84	0.94	1.06	32.7
12	R2	138	2.0	0.659	7.3	LOS A	6.5	46.4	0.84	0.94	1.06	33.1
Approach		504	2.0	0.659	7.6	LOS A	6.5	46.4	0.84	0.94	1.06	33.1
All Vehicles		2196	2.0	0.836	10.7	LOS B	13.2	93.8	0.88	1.06	1.21	32.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 74 [Memorial Trail / Crestview Blvd - 25 Yrs]

Memorial Trail / Crestview Blvd
25 Year Horizon
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Crestview Blvd												
1	L2	82	2.0	0.177	7.1	LOS A	0.9	6.6	0.59	0.63	0.59	35.3
2	T1	18	2.0	0.177	3.1	LOS A	0.9	6.6	0.59	0.63	0.59	33.2
3	R2	34	2.0	0.177	3.5	LOS A	0.9	6.6	0.59	0.63	0.59	33.7
Approach		134	2.0	0.177	5.6	LOS A	0.9	6.6	0.59	0.63	0.59	34.6
East: Memorial Trail												
4	L2	52	2.0	0.555	6.1	LOS A	4.1	29.3	0.60	0.39	0.60	35.9
5	T1	433	2.0	0.555	2.1	LOS A	4.1	29.3	0.60	0.39	0.60	33.8
6	R2	71	2.0	0.555	2.5	LOS A	4.1	29.3	0.60	0.39	0.60	34.3
Approach		555	2.0	0.555	2.5	LOS A	4.1	29.3	0.60	0.39	0.60	34.0
North: Crestview Blvd												
7	L2	48	2.0	0.274	8.1	LOS A	1.6	11.3	0.70	0.69	0.70	35.4
8	T1	12	2.0	0.274	4.2	LOS A	1.6	11.3	0.70	0.69	0.70	33.3
9	R2	125	2.0	0.274	4.5	LOS A	1.6	11.3	0.70	0.69	0.70	33.8
Approach		185	2.0	0.274	5.4	LOS A	1.6	11.3	0.70	0.69	0.70	34.1
West: Memorial Trail												
10	L2	126	2.0	0.427	4.8	LOS A	3.0	21.0	0.38	0.26	0.38	36.2
11	T1	298	2.0	0.427	0.8	LOS A	3.0	21.0	0.38	0.26	0.38	34.0
12	R2	68	2.0	0.427	1.2	LOS A	3.0	21.0	0.38	0.26	0.38	34.5
Approach		493	2.0	0.427	1.9	LOS A	3.0	21.0	0.38	0.26	0.38	34.6
All Vehicles		1366	2.0	0.555	3.0	LOS A	4.1	29.3	0.53	0.41	0.53	34.3

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 78 [Memorial Trail / Ryders Ridge Boulevard - 25 Yrs]

Memorial Trail / Ryders Ridge Boulevard
25 Year Horizon
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Ryders Ridge Boulevard												
1	L2	22	2.0	0.132	7.3	LOS A	0.7	4.9	0.61	0.57	0.61	35.7
2	T1	18	2.0	0.132	3.3	LOS A	0.7	4.9	0.61	0.57	0.61	33.6
3	R2	55	2.0	0.132	3.7	LOS A	0.7	4.9	0.61	0.57	0.61	34.0
Approach		95	2.0	0.132	4.5	LOS A	0.7	4.9	0.61	0.57	0.61	34.3
East: Memorial Trail												
4	L2	104	2.0	0.819	6.7	LOS A	12.1	86.2	0.81	0.52	0.84	35.6
5	T1	581	2.0	0.819	2.8	LOS A	12.1	86.2	0.81	0.52	0.84	33.5
6	R2	271	2.0	0.819	3.1	LOS A	12.1	86.2	0.81	0.52	0.84	34.0
Approach		956	2.0	0.819	3.3	LOS A	12.1	86.2	0.81	0.52	0.84	33.8
North: Ryders Ridge Boulevard												
7	L2	120	2.0	0.319	9.5	LOS A	2.0	14.4	0.82	0.86	0.82	34.4
8	T1	12	2.0	0.319	5.6	LOS A	2.0	14.4	0.82	0.86	0.82	32.5
9	R2	41	2.0	0.319	6.0	LOS A	2.0	14.4	0.82	0.86	0.82	32.9
Approach		173	2.0	0.319	8.4	LOS A	2.0	14.4	0.82	0.86	0.82	33.9
West: Memorial Trail												
10	L2	97	2.0	0.443	5.9	LOS A	3.0	21.1	0.56	0.40	0.56	35.9
11	T1	298	2.0	0.443	1.9	LOS A	3.0	21.1	0.56	0.40	0.56	33.8
12	R2	28	2.0	0.443	2.3	LOS A	3.0	21.1	0.56	0.40	0.56	34.2
Approach		423	2.0	0.443	2.9	LOS A	3.0	21.1	0.56	0.40	0.56	34.2
All Vehicles		1646	2.0	0.819	3.8	LOS A	12.1	86.2	0.73	0.53	0.75	34.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 21 [Memorial Trail / Highway 20 - 25 Yrs (Improve)]

Memorial Trail / Highway 20
25 Year Horizon
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Highway 20												
1	L2	268	3.0	0.654	6.4	LOS A	5.9	42.4	0.73	0.68	0.82	36.4
2	T1	1014	3.0	0.654	3.2	LOS A	5.9	42.6	0.73	0.62	0.82	33.5
3	R2	5	3.0	0.654	3.2	LOS A	5.9	42.6	0.73	0.58	0.81	33.6
Approach		1287	3.0	0.654	3.9	LOS A	5.9	42.6	0.73	0.63	0.82	34.1
East: Memorial Trail												
4	L2	5	2.0	0.195	9.6	LOS A	0.8	6.0	0.77	0.78	0.77	35.9
5	T1	64	2.0	0.195	6.6	LOS A	0.8	6.0	0.77	0.78	0.77	32.9
6	R2	5	2.0	0.195	6.6	LOS A	0.8	6.0	0.77	0.78	0.77	32.9
Approach		75	2.0	0.195	6.8	LOS A	0.8	6.0	0.77	0.78	0.77	33.1
North: Highway 20												
7	L2	5	3.0	0.778	8.4	LOS A	9.3	66.9	0.82	0.85	1.02	36.4
8	T1	952	3.0	0.778	5.2	LOS A	9.4	67.3	0.82	0.85	1.02	33.4
9	R2	623	3.0	0.778	5.0	LOS A	9.4	67.3	0.82	0.83	1.01	33.4
Approach		1580	3.0	0.778	5.2	LOS A	9.4	67.3	0.82	0.84	1.02	33.4
West: Memorial Trail												
10	L2	331	2.0	0.507	8.4	LOS A	3.3	23.8	0.82	0.97	0.97	35.4
11	T1	5	2.0	0.507	5.3	LOS A	3.3	23.8	0.82	0.97	0.97	32.6
12	R2	141	2.0	0.295	5.0	LOS A	1.4	9.9	0.74	0.74	0.74	33.4
Approach		477	2.0	0.507	7.3	LOS A	3.3	23.8	0.80	0.90	0.90	34.8
All Vehicles		3419	2.8	0.778	5.0	LOS A	9.4	67.3	0.78	0.77	0.92	33.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 62 [Memorial Trail / 60 Street - 15 Yrs]

Memorial Trail / 60 Street
15 Year Horizon
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: 60 Street												
1	L2	83	2.0	0.603	7.6	LOS A	5.2	37.2	0.70	0.65	0.77	35.6
2	T1	411	2.0	0.603	3.7	LOS A	5.2	37.2	0.70	0.65	0.77	33.5
3	R2	59	2.0	0.603	4.0	LOS A	5.2	37.2	0.70	0.65	0.77	34.0
Approach		553	2.0	0.603	4.3	LOS A	5.2	37.2	0.70	0.65	0.77	33.8
East: Memorial Trail												
4	L2	43	2.0	0.483	9.6	LOS A	3.5	25.2	0.80	0.84	0.89	35.1
5	T1	132	2.0	0.483	5.6	LOS A	3.5	25.2	0.80	0.84	0.89	33.0
6	R2	149	2.0	0.483	6.0	LOS A	3.5	25.2	0.80	0.84	0.89	33.5
Approach		324	2.0	0.483	6.3	LOS A	3.5	25.2	0.80	0.84	0.89	33.5
North: 60 Street												
7	L2	102	2.0	0.369	5.9	LOS A	2.3	16.4	0.55	0.45	0.55	35.8
8	T1	181	2.0	0.369	2.0	LOS A	2.3	16.4	0.55	0.45	0.55	33.7
9	R2	53	2.0	0.369	2.4	LOS A	2.3	16.4	0.55	0.45	0.55	34.2
Approach		336	2.0	0.369	3.2	LOS A	2.3	16.4	0.55	0.45	0.55	34.4
West: Memorial Trail												
10	L2	60	2.0	0.301	6.3	LOS A	1.7	12.4	0.57	0.48	0.57	35.8
11	T1	132	2.0	0.301	2.4	LOS A	1.7	12.4	0.57	0.48	0.57	33.7
12	R2	64	2.0	0.301	2.7	LOS A	1.7	12.4	0.57	0.48	0.57	34.2
Approach		256	2.0	0.301	3.4	LOS A	1.7	12.4	0.57	0.48	0.57	34.3
All Vehicles		1468	2.0	0.603	4.3	LOS A	5.2	37.2	0.67	0.62	0.71	34.0

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 32 [Memorial Trail / 50 Street - 15 Yrs]

Memorial Trail / 50 Street
15 Year Horizon
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: 50 Street												
1	L2	213	2.0	0.693	9.8	LOS A	7.5	53.6	0.83	0.88	1.00	34.8
2	T1	304	2.0	0.693	5.8	LOS A	7.5	53.6	0.83	0.88	1.00	32.8
3	R2	79	2.0	0.693	6.2	LOS A	7.5	53.6	0.83	0.88	1.00	33.2
Approach		596	2.0	0.693	7.3	LOS A	7.5	53.6	0.83	0.88	1.00	33.5
East: Memorial Trail												
4	L2	127	2.0	0.829	19.8	LOS B	11.8	84.0	1.00	1.40	1.66	31.9
5	T1	356	2.0	0.829	15.8	LOS B	11.8	84.0	1.00	1.40	1.66	30.3
6	R2	51	2.0	0.829	16.2	LOS B	11.8	84.0	1.00	1.40	1.66	30.6
Approach		534	2.0	0.829	16.8	LOS B	11.8	84.0	1.00	1.40	1.66	30.7
North: 50 Street												
7	L2	34	2.0	0.380	9.9	LOS A	2.5	17.6	0.82	0.84	0.85	35.0
8	T1	138	2.0	0.380	5.9	LOS A	2.5	17.6	0.82	0.84	0.85	33.0
9	R2	42	2.0	0.380	6.3	LOS A	2.5	17.6	0.82	0.84	0.85	33.4
Approach		214	2.0	0.380	6.6	LOS A	2.5	17.6	0.82	0.84	0.85	33.4
West: Memorial Trail												
10	L2	53	2.0	0.459	6.5	LOS A	3.0	21.7	0.62	0.48	0.62	35.8
11	T1	253	2.0	0.459	2.5	LOS A	3.0	21.7	0.62	0.48	0.62	33.7
12	R2	99	2.0	0.459	2.9	LOS A	3.0	21.7	0.62	0.48	0.62	34.2
Approach		404	2.0	0.459	3.1	LOS A	3.0	21.7	0.62	0.48	0.62	34.1
All Vehicles		1747	2.0	0.829	9.1	LOS A	11.8	84.0	0.83	0.94	1.09	32.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 78 [Memorial Trail / Highway 20 - 15 Yrs] (Single Lane Roundabout, 2 Lane Hwy 20)

Memorial Trail / Highway 20
15 Year Horizon
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Highway 20												
1	L2	260	3.0	1.250	126.5	LOS F	93.8	673.8	1.00	4.13	5.40	16.7
2	T1	846	3.0	1.250	122.6	LOS F	93.8	673.8	1.00	4.13	5.40	16.2
3	R2	1	3.0	1.250	122.9	LOS F	93.8	673.8	1.00	4.13	5.40	16.3
Approach		1107	3.0	1.250	123.5	LOS F	93.8	673.8	1.00	4.13	5.40	16.3
East: Memorial Trail												
4	L2	1	2.0	0.017	17.6	LOS B	0.1	0.7	0.93	0.74	0.93	32.5
5	T1	1	2.0	0.017	13.7	LOS B	0.1	0.7	0.93	0.74	0.93	30.7
6	R2	2	2.0	0.017	14.0	LOS B	0.1	0.7	0.93	0.74	0.93	31.1
Approach		4	2.0	0.017	14.8	LOS B	0.1	0.7	0.93	0.74	0.93	31.3
North: Highway 20												
7	L2	2	3.0	1.345	165.7	LOS F	143.7	1031.5	1.00	4.59	5.46	14.1
8	T1	781	3.0	1.345	161.8	LOS F	143.7	1031.5	1.00	4.59	5.46	13.8
9	R2	618	3.0	1.345	162.1	LOS F	143.7	1031.5	1.00	4.59	5.46	13.9
Approach		1401	3.0	1.345	161.9	LOS F	143.7	1031.5	1.00	4.59	5.46	13.8
West: Memorial Trail												
10	L2	318	2.0	0.703	14.5	LOS B	7.5	53.1	0.97	1.19	1.32	32.8
11	T1	1	2.0	0.703	10.6	LOS B	7.5	53.1	0.97	1.19	1.32	31.1
12	R2	102	2.0	0.703	10.9	LOS B	7.5	53.1	0.97	1.19	1.32	31.5
Approach		421	2.0	0.703	13.6	LOS B	7.5	53.1	0.97	1.19	1.32	32.5
All Vehicles		2934	2.9	1.345	125.9	LOS F	143.7	1031.5	1.00	3.92	4.84	16.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 78 [Memorial Trail / Highway 20 - 15 Yrs (Improve)] (Dual Lane Roundabout, 4 Lane Hwy 20)

Memorial Trail / Highway 20
15 Year Horizon
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Highway 20												
1	L2	260	3.0	0.564	6.8	LOS A	4.8	34.2	0.73	0.61	0.76	35.3
2	T1	846	3.0	0.564	2.6	LOS A	4.8	34.4	0.73	0.49	0.75	33.5
3	R2	1	3.0	0.564	3.1	LOS A	4.8	34.4	0.73	0.42	0.75	34.1
Approach		1107	3.0	0.564	3.6	LOS A	4.8	34.4	0.73	0.52	0.76	33.9
East: Memorial Trail												
4	L2	1	2.0	0.011	9.7	LOS A	0.0	0.3	0.70	0.66	0.70	34.9
5	T1	1	2.0	0.011	5.7	LOS A	0.0	0.3	0.70	0.66	0.70	32.9
6	R2	2	2.0	0.011	6.1	LOS A	0.0	0.3	0.70	0.66	0.70	33.3
Approach		4	2.0	0.011	6.9	LOS A	0.0	0.3	0.70	0.66	0.70	33.6
North: Highway 20												
7	L2	2	3.0	0.656	7.0	LOS A	6.5	46.7	0.74	0.54	0.79	35.7
8	T1	781	3.0	0.656	3.0	LOS A	6.5	46.7	0.74	0.55	0.79	33.6
9	R2	618	3.0	0.656	3.2	LOS A	6.5	46.7	0.73	0.59	0.77	34.2
Approach		1401	3.0	0.656	3.1	LOS A	6.5	46.7	0.73	0.57	0.78	33.9
West: Memorial Trail												
10	L2	318	2.0	0.800	17.2	LOS B	7.3	52.3	0.91	1.25	1.49	32.1
11	T1	1	2.0	0.800	13.2	LOS B	7.3	52.3	0.91	1.25	1.49	30.4
12	R2	102	2.0	0.800	13.6	LOS B	7.3	52.3	0.91	1.25	1.49	30.8
Approach		421	2.0	0.800	16.3	LOS B	7.3	52.3	0.91	1.25	1.49	31.8
All Vehicles		2934	2.9	0.800	5.2	LOS A	7.3	52.3	0.76	0.65	0.87	33.6

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 21 [Memorial Trail / Highway 20 - ENV1] (Sensitivity Test: Single Lane Roundabout, 2 Lane Hwy 20, 5 Year TMP Traffic, Env Factor 1)

Memorial Trail / Highway 20
22K Population (5 Year)
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Highway 20												
1	L2	245	3.0	0.741	7.1	LOS A	9.6	68.7	0.81	0.62	0.88	35.3
2	T1	639	3.0	0.741	3.1	LOS A	9.6	68.7	0.81	0.62	0.88	33.3
3	R2	1	3.0	0.741	3.5	LOS A	9.6	68.7	0.81	0.62	0.88	33.7
Approach		885	3.0	0.741	4.2	LOS A	9.6	68.7	0.81	0.62	0.88	33.8
East: Memorial Trail												
4	L2	1	2.0	0.010	12.6	LOS B	0.1	0.5	0.92	0.65	0.92	33.9
5	T1	1	2.0	0.010	8.7	LOS A	0.1	0.5	0.92	0.65	0.92	32.0
6	R2	2	2.0	0.010	9.0	LOS A	0.1	0.5	0.92	0.65	0.92	32.5
Approach		4	2.0	0.010	9.8	LOS A	0.1	0.5	0.92	0.65	0.92	32.7
North: Highway 20												
7	L2	2	3.0	0.841	9.6	LOS A	15.0	107.4	0.96	0.88	1.15	35.2
8	T1	611	3.0	0.841	5.6	LOS A	15.0	107.4	0.96	0.88	1.15	33.1
9	R2	385	3.0	0.841	6.0	LOS A	15.0	107.4	0.96	0.88	1.15	33.6
Approach		998	3.0	0.841	5.8	LOS A	15.0	107.4	0.96	0.88	1.15	33.3
West: Memorial Trail												
10	L2	231	4.0	0.396	7.7	LOS A	2.9	21.4	0.84	0.81	0.84	34.9
11	T1	1	4.0	0.396	3.8	LOS A	2.9	21.4	0.84	0.81	0.84	32.9
12	R2	68	4.0	0.396	4.1	LOS A	2.9	21.4	0.84	0.81	0.84	33.4
Approach		300	4.0	0.396	6.9	LOS A	2.9	21.4	0.84	0.81	0.84	34.5
All Vehicles		2187	3.1	0.841	5.3	LOS A	15.0	107.4	0.88	0.76	1.00	33.7

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 21 [Memorial Trail / Highway 20 - AT Hwy Growtl]

(Sensitivity Test: Single Lane Roundabout, 2 Lane Hwy 20, 10 Year AT Growth Traffic)

Memorial Trail / Highway 20
(10 Year with AT Hwy Growth)
Site Category: (None)
Roundabout

Movement Performance - Vehicles

Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Highway 20												
1	L2	86	3.0	0.714	4.7	LOS A	9.3	67.0	0.51	0.17	0.51	36.1
2	T1	846	3.0	0.714	0.8	LOS A	9.3	67.0	0.51	0.17	0.51	33.9
3	R2	1	3.0	0.714	1.2	LOS A	9.3	67.0	0.51	0.17	0.51	34.4
Approach		934	3.0	0.714	1.2	LOS A	9.3	67.0	0.51	0.17	0.51	34.1
East: Memorial Trail												
4	L2	4	2.0	0.043	12.5	LOS B	0.2	1.8	0.82	0.72	0.82	34.0
5	T1	1	2.0	0.043	8.5	LOS A	0.2	1.8	0.82	0.72	0.82	32.1
6	R2	13	2.0	0.043	8.9	LOS A	0.2	1.8	0.82	0.72	0.82	32.5
Approach		18	2.0	0.043	9.7	LOS A	0.2	1.8	0.82	0.72	0.82	32.8
North: Highway 20												
7	L2	7	3.0	0.679	5.0	LOS A	7.4	53.4	0.52	0.20	0.52	36.2
8	T1	647	3.0	0.679	1.0	LOS A	7.4	53.4	0.52	0.20	0.52	34.0
9	R2	186	3.0	0.679	1.4	LOS A	7.4	53.4	0.52	0.20	0.52	34.5
Approach		841	3.0	0.679	1.2	LOS A	7.4	53.4	0.52	0.20	0.52	34.1
West: Memorial Trail												
10	L2	56	4.0	0.341	9.3	LOS A	2.1	14.9	0.77	0.79	0.77	34.9
11	T1	2	4.0	0.341	5.4	LOS A	2.1	14.9	0.77	0.79	0.77	32.9
12	R2	147	4.0	0.341	5.7	LOS A	2.1	14.9	0.77	0.79	0.77	33.4
Approach		205	4.0	0.341	6.7	LOS A	2.1	14.9	0.77	0.79	0.77	33.8
All Vehicles		1998	3.1	0.714	1.8	LOS A	9.3	67.0	0.55	0.25	0.55	34.1

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 62 [Memorial Trail / 60 Street - Exist]

Memorial Trail / 60 Street
Exist
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: 60 Street												
1	L2	5	2.0	0.177	4.1	LOS A	0.9	6.4	0.11	0.04	0.11	37.0
2	T1	196	2.0	0.177	0.1	LOS A	0.9	6.4	0.11	0.04	0.11	34.7
3	R2	38	2.0	0.177	0.5	LOS A	0.9	6.4	0.11	0.04	0.11	35.3
Approach		239	2.0	0.177	0.3	LOS A	0.9	6.4	0.11	0.04	0.11	34.9
East: Memorial Trail												
4	L2	36	2.0	0.072	5.1	LOS A	0.3	2.3	0.36	0.40	0.36	35.9
5	T1	5	2.0	0.072	1.2	LOS A	0.3	2.3	0.36	0.40	0.36	33.8
6	R2	28	2.0	0.072	1.5	LOS A	0.3	2.3	0.36	0.40	0.36	34.3
Approach		69	2.0	0.072	3.3	LOS A	0.3	2.3	0.36	0.40	0.36	35.1
North: 60 Street												
7	L2	13	2.0	0.101	4.2	LOS A	0.5	3.5	0.17	0.10	0.17	36.7
8	T1	102	2.0	0.101	0.2	LOS A	0.5	3.5	0.17	0.10	0.17	34.5
9	R2	5	2.0	0.101	0.6	LOS A	0.5	3.5	0.17	0.10	0.17	35.0
Approach		120	2.0	0.101	0.7	LOS A	0.5	3.5	0.17	0.10	0.17	34.8
West: Memorial Trail												
10	L2	5	2.0	0.016	4.7	LOS A	0.1	0.5	0.30	0.28	0.30	36.3
11	T1	5	2.0	0.016	0.8	LOS A	0.1	0.5	0.30	0.28	0.30	34.1
12	R2	5	2.0	0.016	1.1	LOS A	0.1	0.5	0.30	0.28	0.30	34.6
Approach		16	2.0	0.016	2.2	LOS A	0.1	0.5	0.30	0.28	0.30	35.0
All Vehicles		444	2.0	0.177	0.9	LOS A	0.9	6.4	0.17	0.12	0.17	34.9

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

Site: 32 [Memorial Trail / 50 Street - Exist]

Memorial Trail / 50 Street
Exist
Site Category: (None)
Roundabout

Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: 50 Street												
1	L2	92	2.0	0.114	4.6	LOS A	0.5	3.8	0.28	0.41	0.28	35.7
2	T1	27	2.0	0.114	0.7	LOS A	0.5	3.8	0.28	0.41	0.28	33.7
3	R2	1	2.0	0.114	1.1	LOS A	0.5	3.8	0.28	0.41	0.28	34.1
Approach		120	2.0	0.114	3.7	LOS A	0.5	3.8	0.28	0.41	0.28	35.2
East: Memorial Trail												
4	L2	5	2.0	0.394	5.5	LOS A	2.4	17.2	0.47	0.32	0.47	36.4
5	T1	153	2.0	0.394	1.5	LOS A	2.4	17.2	0.47	0.32	0.47	34.2
6	R2	245	2.0	0.394	1.9	LOS A	2.4	17.2	0.47	0.32	0.47	34.7
Approach		403	2.0	0.394	1.8	LOS A	2.4	17.2	0.47	0.32	0.47	34.5
North: 50 Street												
7	L2	34	2.0	0.118	5.4	LOS A	0.6	4.1	0.42	0.38	0.42	36.1
8	T1	35	2.0	0.118	1.5	LOS A	0.6	4.1	0.42	0.38	0.42	33.9
9	R2	41	2.0	0.118	1.9	LOS A	0.6	4.1	0.42	0.38	0.42	34.4
Approach		109	2.0	0.118	2.8	LOS A	0.6	4.1	0.42	0.38	0.42	34.8
West: Memorial Trail												
10	L2	76	2.0	0.081	4.4	LOS A	0.4	2.8	0.23	0.41	0.23	35.7
11	T1	7	2.0	0.081	0.4	LOS A	0.4	2.8	0.23	0.41	0.23	33.6
12	R2	5	2.0	0.081	0.8	LOS A	0.4	2.8	0.23	0.41	0.23	34.1
Approach		88	2.0	0.081	3.8	LOS A	0.4	2.8	0.23	0.41	0.23	35.4
All Vehicles		721	2.0	0.394	2.5	LOS A	2.4	17.2	0.40	0.36	0.40	34.8

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

MOVEMENT SUMMARY

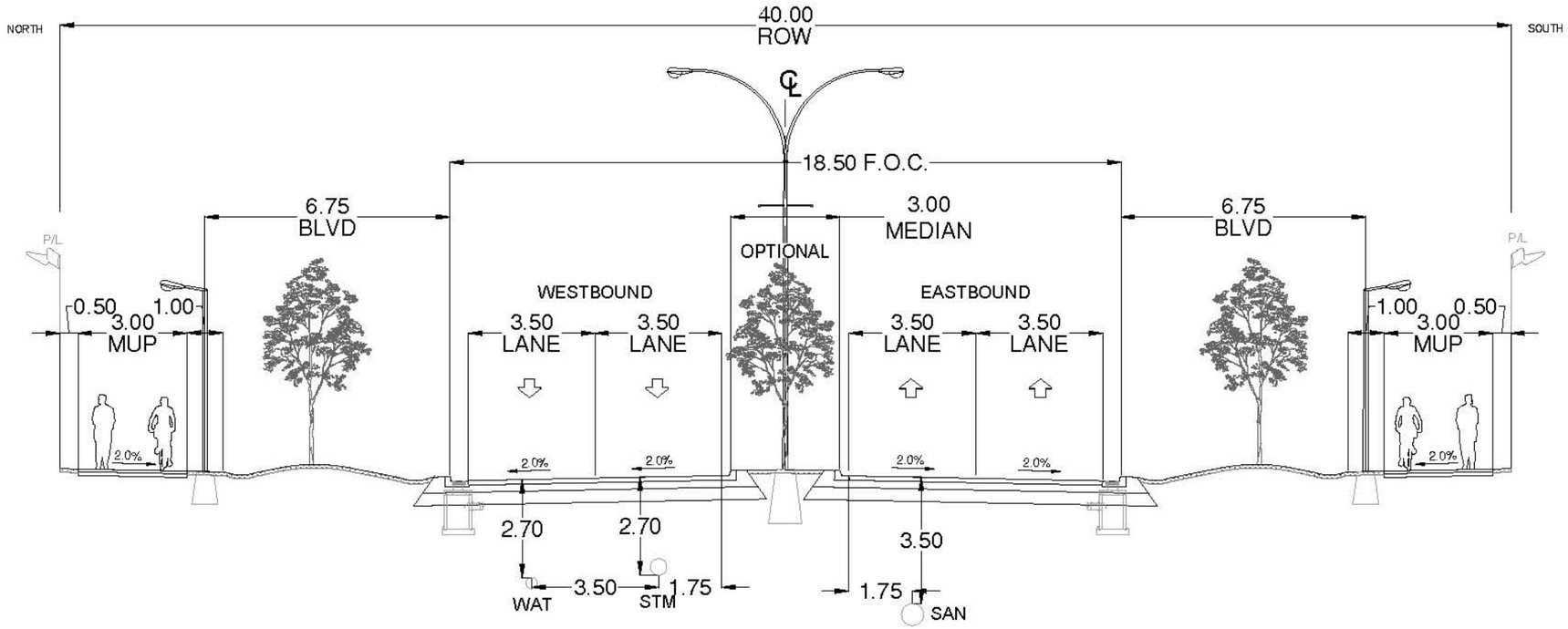
Site: 78 [Memorial Trail / Highway 20 - Exist]

Memorial Trail / Highway 20
Exist
Site Category: (None)
Roundabout

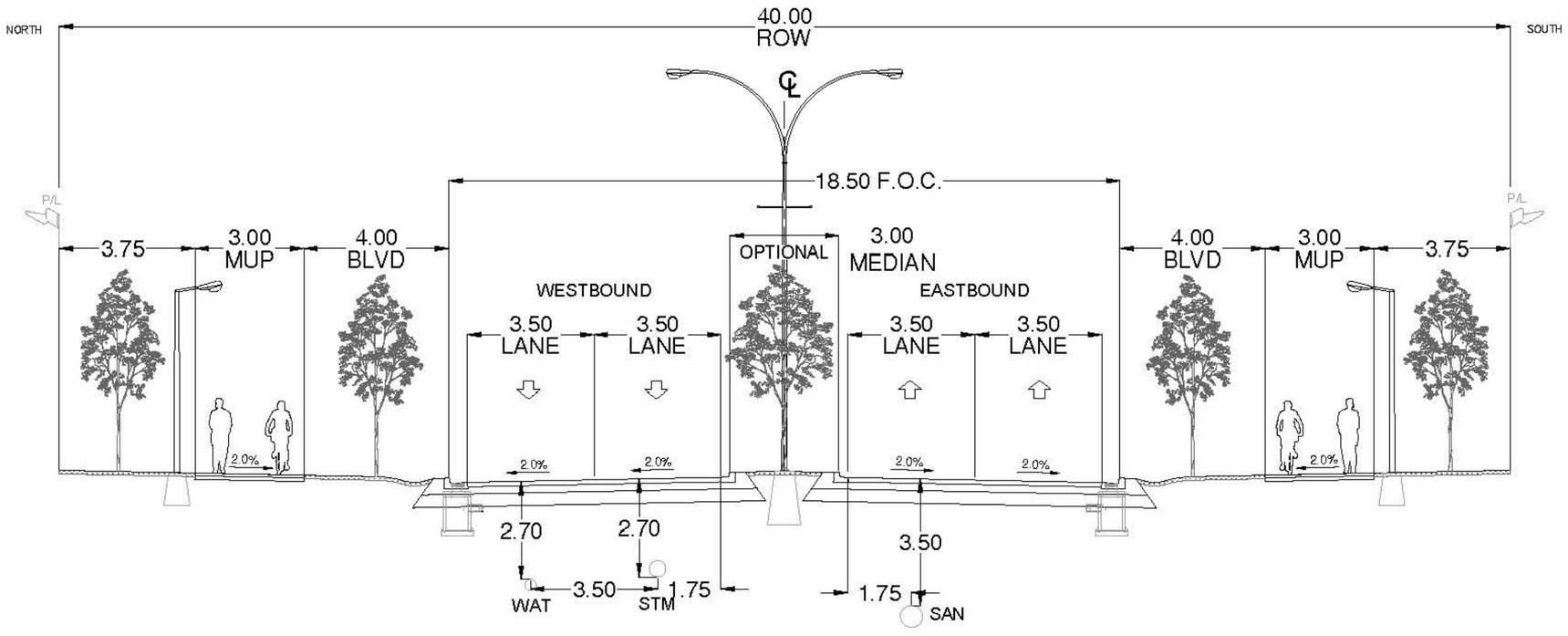
Movement Performance - Vehicles												
Mov ID	Turn	Demand Flows Total veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m	Prop. Queued	Effective Stop Rate	Aver. No. Cycles	Average Speed km/h
South: Highway 20												
1	L2	73	3.0	0.595	4.5	LOS A	6.0	42.9	0.36	0.12	0.36	36.4
2	T1	712	3.0	0.595	0.5	LOS A	6.0	42.9	0.36	0.12	0.36	34.2
3	R2	1	3.0	0.595	0.9	LOS A	6.0	42.9	0.36	0.12	0.36	34.7
Approach		785	3.0	0.595	0.9	LOS A	6.0	42.9	0.36	0.12	0.36	34.4
East: Memorial Trail												
4	L2	3	2.0	0.028	10.0	LOS A	0.1	1.1	0.73	0.61	0.73	34.8
5	T1	1	2.0	0.028	6.0	LOS A	0.1	1.1	0.73	0.61	0.73	32.8
6	R2	11	2.0	0.028	6.4	LOS A	0.1	1.1	0.73	0.61	0.73	33.3
Approach		15	2.0	0.028	7.1	LOS A	0.1	1.1	0.73	0.61	0.73	33.5
North: Highway 20												
7	L2	6	3.0	0.563	4.6	LOS A	4.9	34.9	0.38	0.14	0.38	36.4
8	T1	544	3.0	0.563	0.7	LOS A	4.9	34.9	0.38	0.14	0.38	34.3
9	R2	157	3.0	0.563	1.1	LOS A	4.9	34.9	0.38	0.14	0.38	34.8
Approach		707	3.0	0.563	0.8	LOS A	4.9	34.9	0.38	0.14	0.38	34.4
West: Memorial Trail												
10	L2	47	2.0	0.252	8.0	LOS A	1.4	10.0	0.67	0.67	0.67	35.4
11	T1	2	2.0	0.252	4.0	LOS A	1.4	10.0	0.67	0.67	0.67	33.3
12	R2	126	2.0	0.252	4.4	LOS A	1.4	10.0	0.67	0.67	0.67	33.8
Approach		176	2.0	0.252	5.3	LOS A	1.4	10.0	0.67	0.67	0.67	34.2
All Vehicles		1683	2.9	0.595	1.4	LOS A	6.0	42.9	0.40	0.19	0.40	34.4

Site Level of Service (LOS) Method: Delay (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Site tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay per movement.
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model is used. Control Delay includes Geometric Delay.
Gap-Acceptance Capacity: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

APPENDIX B
Memorial Trail Cross Section Options



40m OPTION 1: 3m MEDIAN WITH MUP AT PROPERTY



40m OPTION 2: 3m MEDIAN WITH MUP CENTRED

1:150 0 3 6 m

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FIGURE TITLE
TYPICAL SECTIONS
40 m ARTERIAL ROAD
3 m MEDIAN (1 OF 4)

FILE No.	SCALE	FIGURE No.
27613_Typ-Sect.dwg		1

ISC: #### SHEET SIZE ANSI B 20 mm 0

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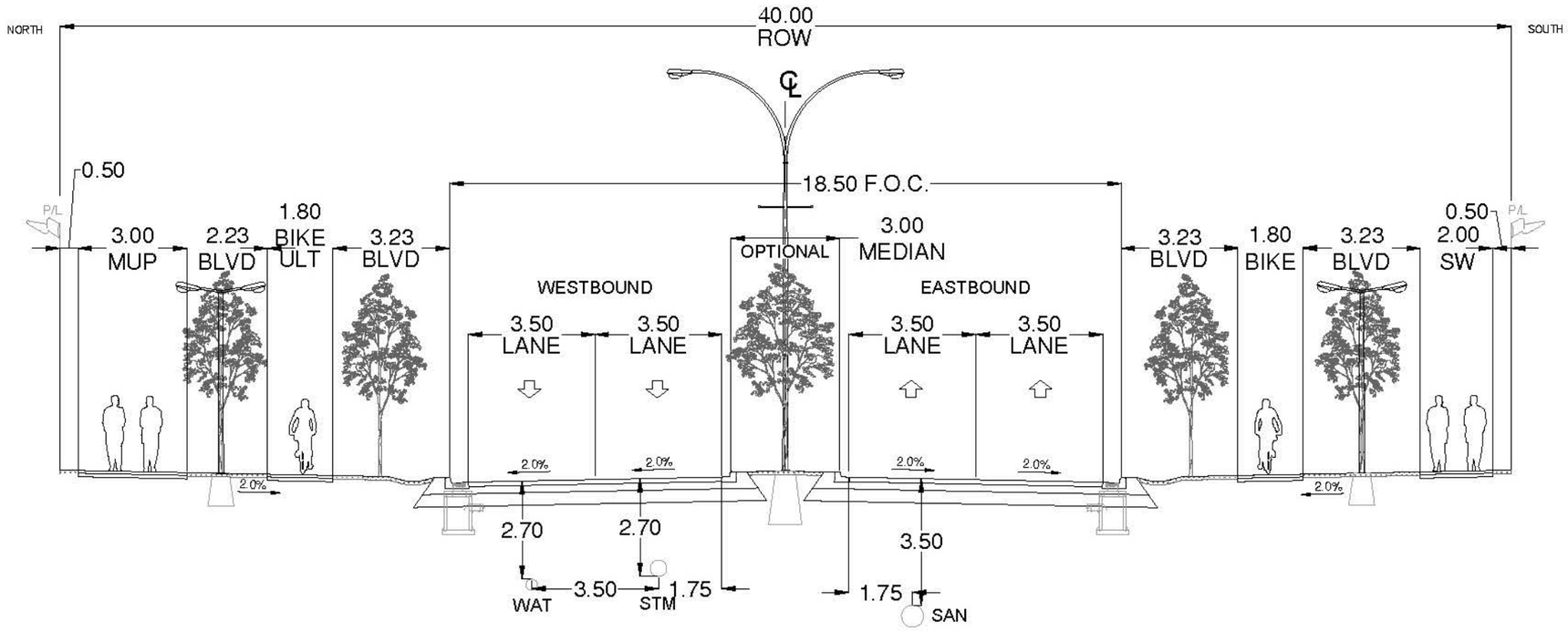
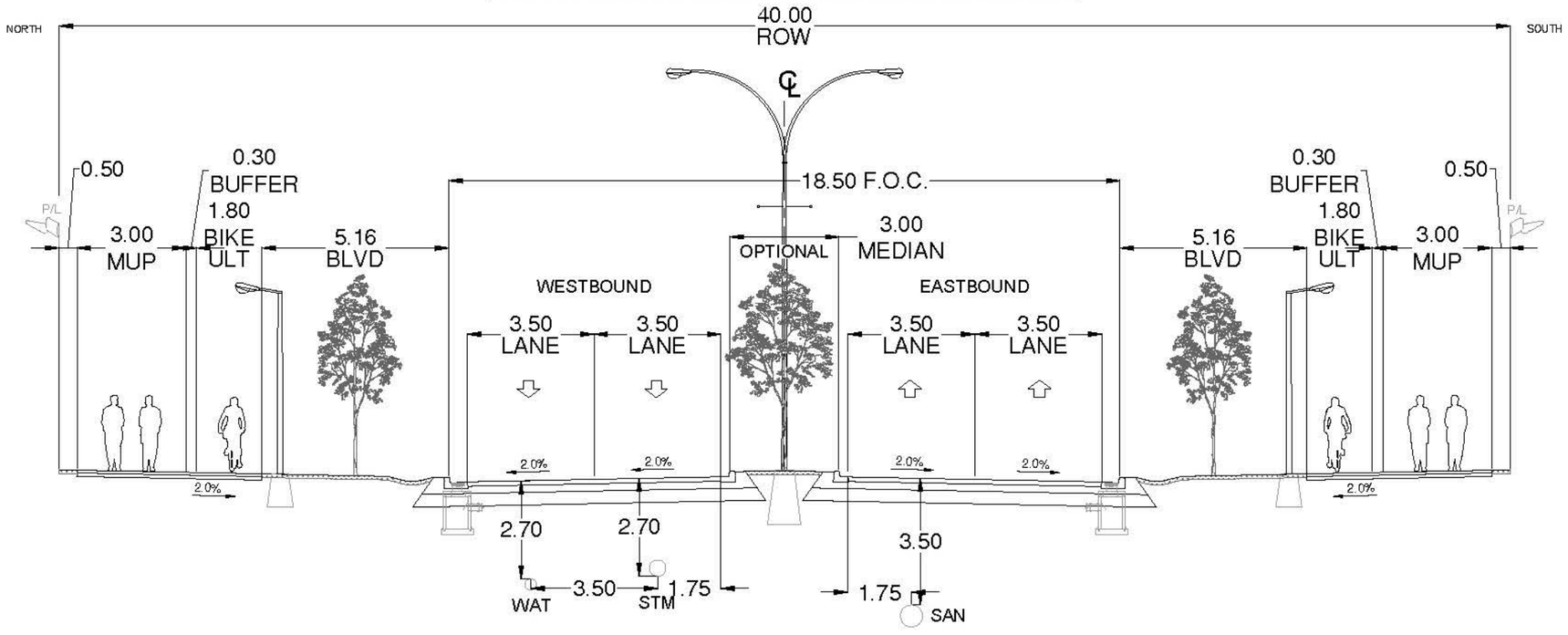


40m OPTION 3: 3m MEDIAN WITH SEPARATED BIKE AND SIDEWALK/MUP - FOUR TREES IN BLVD
(NOTE: OPTION CANNOT BE ACCOMMODATED AT ROUNDABOUT)



40m OPTION 3A: 3m MEDIAN WITH COMBINED MUP/BIKE - TWO TREES IN BLVD
(NOTE: OPTION CANNOT BE ACCOMMODATED AT ROUNDABOUT)

1:150 0 3 6 m

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FIGURE TITLE
TYPICAL SECTIONS
40 m ARTERIAL ROAD
3 m MEDIAN (2 OF 4)

FILE No.	SCALE	FIGURE No.
27613_Typ-Sect.dwg		2

ISC: #### SHEET SIZE ANSI B 20 mm 0

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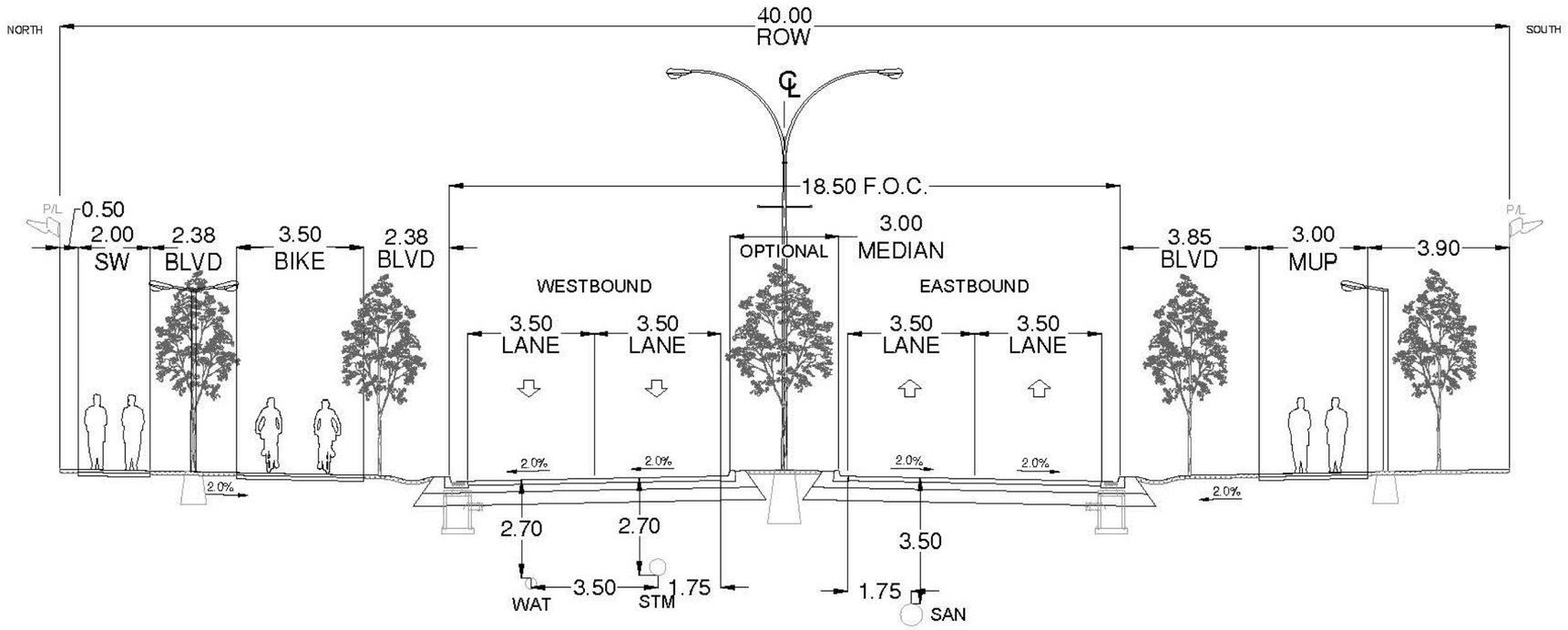
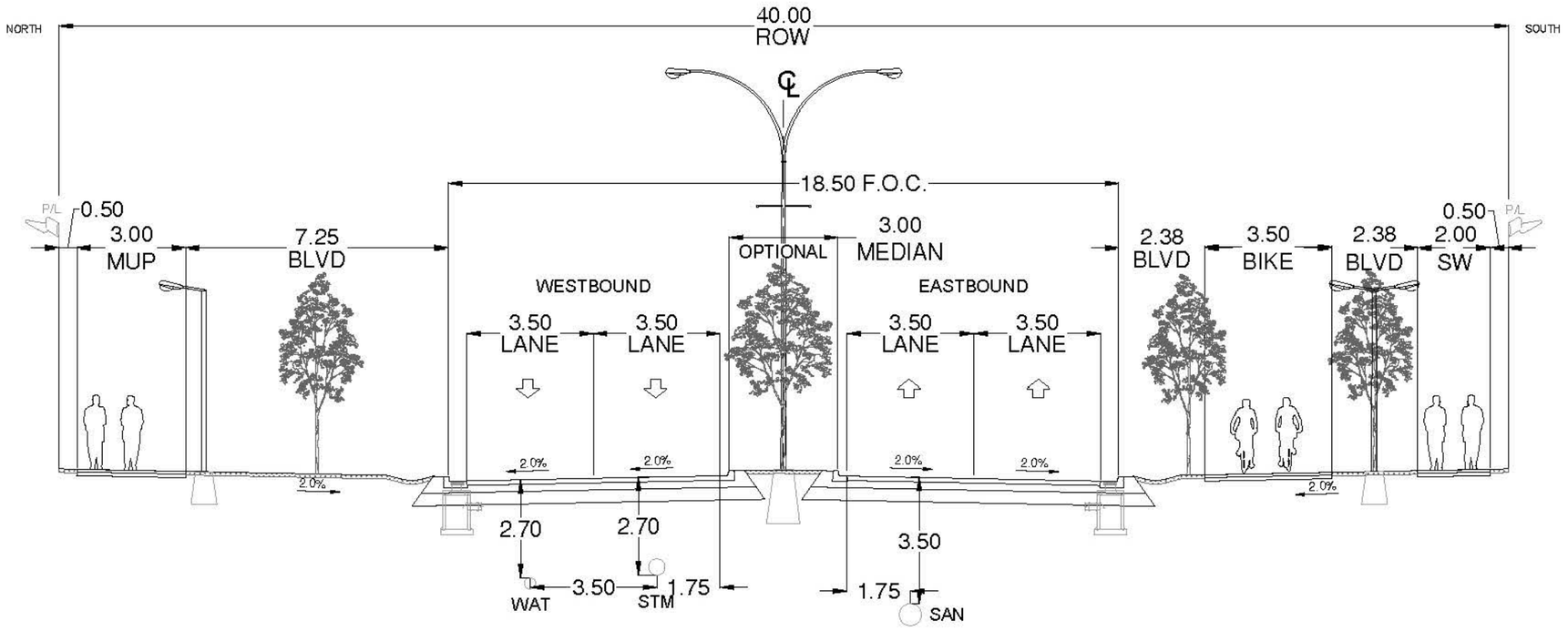


40m OPTION 4: 3m MEDIAN WITH SEPARATED TWO-WAY BIKE ON ONE SIDE AND SIDEWALK/MUP - FOUR TREES IN BLVD
(NOTE: OPTION CANNOT BE ACCOMMODATED AT ROUNDABOUT)



40m OPTION 5: 3m MEDIAN WITH SEPARATED TWO-WAY BIKE ON ONE SIDE AND SIDEWALK/MUP - THREE TREES IN BLVD

1:150 0 3 6 m

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FIGURE TITLE
TYPICAL SECTIONS
40 m ARTERIAL ROAD
3 m MEDIAN (3 OF 4)

FILE No.	SCALE	FIGURE No.
27613_Typ-Sect.dwg		3

ISC: #### SHEET SIZE ANSI B 20 mm 0

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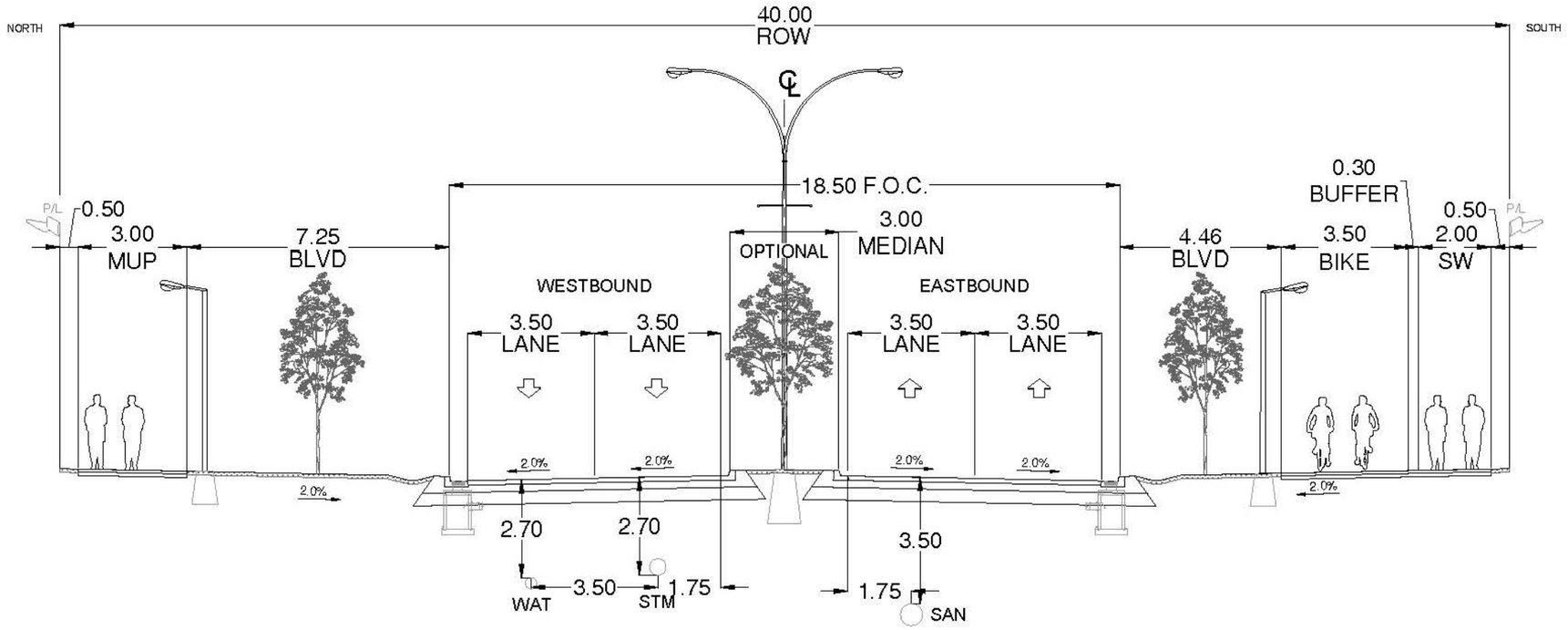

40m OPTION 5A: 3m MEDIAN WITH COMBINED MUP/BIKE ON ONE SIDE - TWO TREES IN BLVD

0 3 6 m
1:150

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FIGURE TITLE
TYPICAL SECTIONS
40 m ARTERIAL ROAD
3 m MEDIAN (4 OF 4)

FILE No.	SCALE	FIGURE No.
27613_Typ-Sect.dwg		4

ISC: #### SHEET SIZE ANSI B 20 mm 0

APPENDIX C
Stormwater Management Memo

4015 7 Street SE, Calgary, AB T2G 2Y9 T: 403.254.0544 F: 403.254.9186

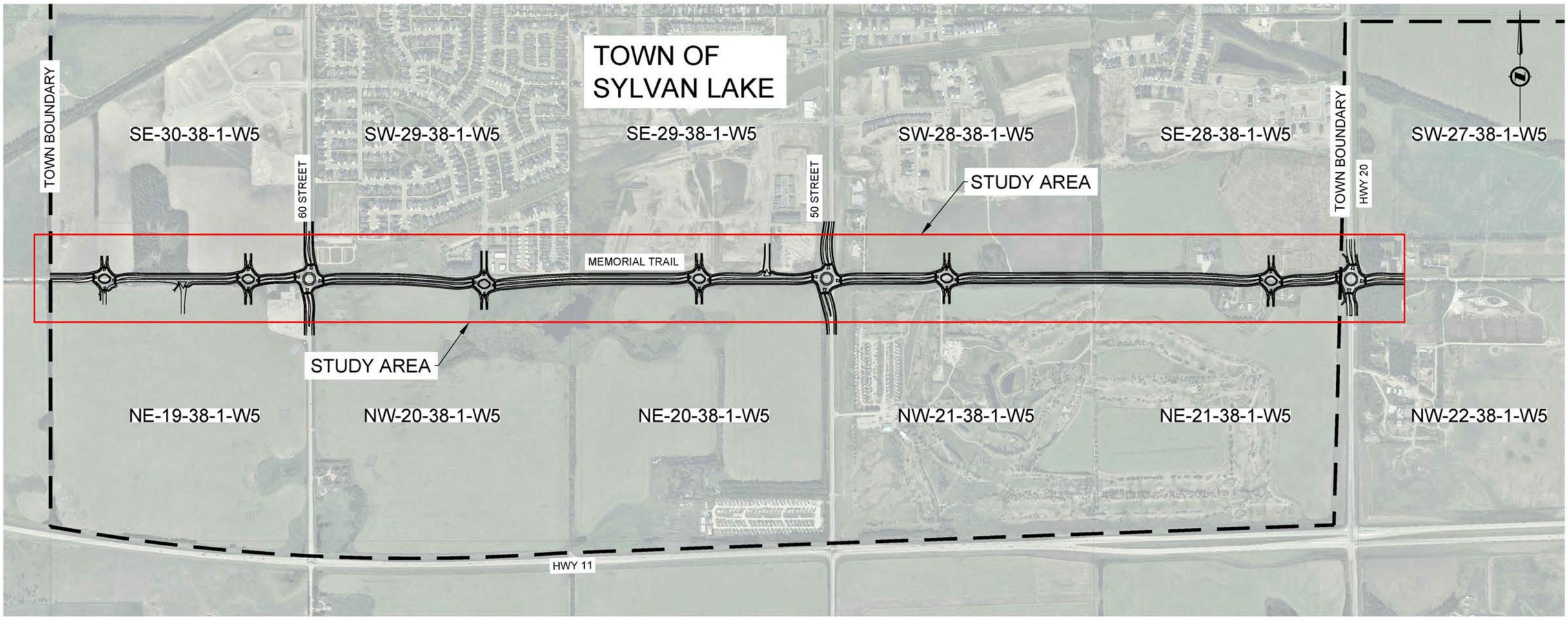
To:	**The Town of Sylvan Lake**	Date:	**March 15, 2022**
Attention:	**Eric Boudreau, P.Tech. (Eng.)**	Project No.:	**27613**
Cc:	**Alex Ho, P.Eng.; Dave Breu, P.Eng.; Gavin Wyman, AALA**		
Reference:	**Functional Stormwater Management Concept for Memorial Trail FPS**		
From:	**Lori Hu, P.Eng., MASc.; Garnet Dawes, P.Eng., DBIA**		

1.0 Introduction

ISL Engineering and Land Services Ltd. (ISL) was retained by the Town of Sylvan Lake (the Town) to prepare a Transportation Functional Planning Study (FPS) for Memorial Trail south of the Town of Sylvan Lake. The study extent is the full Memorial Trail right-of-way (ROW) within the town boundary from 60 Street to Highway 20. The subject roadway ROW lies within the legal sections of SE-30-38-1-W5, SW/SE-29-38-1-W5, SW/SE-28-38-1-W5, SW-27-38-1-W5, NE-19-38-1-W5, NW/NE-20-38-1-W5, NW/NE-21-38-1-W5, and NW-22-38-1-W5. Figure 1.1 presents the project location.

The objectives of this technical memorandum (memo) are as follows:

- Identify the existing drainage characteristics along Memorial Trail;
- Estimate the existing peak flows across the roadway;
- Present the proposed roadway realignment and profile;
- Set up the design criteria of the Stormwater Management System (SWMS) in compliance with the governmental design guidelines and standards;
- Estimate the runoff in peak flow rates caused by the proposed roadway plan;
- Provide options for stormwater management mitigation measures; and
- Evaluate the options for discharge to downstream SWMS.



Sylvan Lake

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FUNCTIONAL PLANNING STUDY

FIGURE TITLE

STORMWATER MANAGEMENT PLAN
STUDY AREA

FILE No.	SCALE	FIGURE No.
27613_Location_Plan_PO.dwg		1.1

ISC: #### SHEET SIZE ANSI B 20 mm 0

FILE: G:\PROJECTS\27000\27600\27613_SYLVAN_LAKE_TMP_MEMORIAL_TRAIL_FP\902_CADD\20_DRAFTING\203_SHEETS\27613_LOCATION_PLAN_PO.DWG | DATE: March 16, 2022 11:18:17 PM

2.0 Design Document Review

Several documents were reviewed as background for this memo:

- Town of Sylvan Lake Stormwater Master Plan, McElhanney Consulting Services Ltd., 2019 (2019 SMP)
- Town of Sylvan Lake South Area Structure Plan Bylaw 1426 / 2007, Parkland Community Planning Services, 2007 (South ASP)
- Beacon Hill Outline Plan, Focus, 2013 (Beacon Hill OP)
- Crestview Outline Plan, Lamont, 2016 (Crestview OP)
- Lakeway Landing SW ¼ Section 29-38-1-W5 Outline Plan Report, Stantec Consulting Ltd., 2004 (Lakeway Landing OP)
- Meadowlands Resort Outline Plan, Scheffer Andrew Ltd., 2015 (Meadowlands Resort OP)
- Pogadl Park Outline Plan, Select Engineering Consultants, 2019 (Pogadl OP)
- Ryders Ridge Outline Plan, Town of Sylvan Lake, 2012 (Ryders Ridge OP)
- The Vista at Ryders Ridge Outline Plan, Stantec Consulting Ltd., 2017 (Vista at Ryders Ridge OP)
- Waterford Station Outline Plan, Blackstone Developments Inc., 2016 (Waterford OP)

Figure 2.1 presents the information compiled from these documents including existing and future infrastructure in the vicinity of project area.

2.1 Summary of Findings from Document Review

The following is a summary of the existing conditions derived from the 2019 SMP, the South ASP and the OPs listed above:

- The project area is contained within two Master Plan catchments: the Golf Course Creek watershed to the west of 50 Street and the Cygnet Creek watershed to the east of 50 Street.
- Each development OP study area includes a strip of roadway widening along Memorial Trail in its contributing boundary. The width of the roadway widenings considered varies from 6 m to 11.5 m which are less than the half-width of the road ROW (20 m).
- According to the 2019 SMP, there is a wetland immediately south of Memorial Trail between 60 Street and 50 Street.
- According to Figure 11 of the 2019 SMP, the minor systems north of Memorial Trail are fully or partially installed within the communities of Lakeway Landing, Beacon Hill, Crestview, and Vista at Ryders Ridge. PVC pipes are the main types of storm sewer material in addition to some concrete pipes.
- The minor systems within Beacon Hill and Lakeway Landing discharge to Golf Course Creek. The minor systems of Crestview and Vista at Ryders Ridge tie to existing sewers and ditches that flow to Sylvan Creek / Cygnet Creek.
- The minor system capacity within Beacon Hill and the downstream receiving trunk is deficient and should be upgraded according to the 2019 SMP.
- Currently, there are no storm sewers running along the Memorial Trail ROW.
- With the exception of isolated areas within the project area, Memorial Trail forms a drainage breakline with overland flows to the north flowing north and overland flows to the south flowing towards the south.
- The Lakeway Landing community contains two newly constructed wet stormwater management ponds.
- The Beacon Hill Pond is a dry pond and provides no water treatments.

For proposed conditions, the main contents extracted from the 2019 SMP, the South ASP, and OPs that are related to this study are summarized below:

- Oil-grit separators (OGS) were recommended at all existing dry ponds including in the Beacon Hill dry pond.
- As per Figure 24 of 2019 SMP, a wet pond (Pond 2) is planned within the future industrial area northeast of the Memorial Trail / 60 Street intersection. Its contributing area is comprised of Pogadl Park and the future industrial area covering about 64 ha. The controlled release rate will be 2.1 L/s/ha. The pond is to discharge through a culvert across Memorial Trail into the 60 Street roadside ditch. From there discharge is to follow existing drainage channels to Golf Course Creek.
- Pogadl Park OP will introduce two stormwater management facilities (SWMF) within its planning area and thus the actual contributing area of the future Pond 2 may only be the future industrial area.
- As per Figure 24 of 2019 SMP, the wetland south of Memorial Trail between 60 Street and 50 Street will be developed into a storm pond, identified as Pond 8. The outlet of Pond 8 will cross Memorial Trail tying to the overland swale in Beacon Hill. The discharge is to be carried by the drainage system of Beacon Hill and discharged through its ponds. As per the Crestview OP, a small wetland identified just north of Memorial Trail is to be retained to receive overland flows from adjacent lands, including the roadway widening areas. Maintaining some drainage to this wetland will be necessary to sustain it.
- As per the South ASP and Meadowlands Resort OP, the future overland drainage within the golf course south of Memorial Trail between 50 Street and Highway 20 is to be towards the south, tying to the roadside ditch of Highway 11.

It was noted that in the 2019 SMP, the contributing area of Pond 2 was estimated as 64 ha and the contributing area of Pond 8 was about 133 ha (Table 20, 2019 SMP). Sizing of the future Pond 2 and Pond 8 was quite conceptual in the 2019 SMP.

The actual contributing area of Memorial Trail ROW to Pond 2 and Pond 8 will be refined at the time of the OP preparation, in collaboration with the OPs approved for the north of the roadway. Water Act and EPEA application of the storm ponds and outfalls will be required for installation and implementation.

WATERFORD STATION
LAKEWAY LANDING
BEACON HILL
CRESTVIEW
VISTA AT RYDER RIDGE
SPRINGFIELD BLVD
STATION DR
60 STREET
LAKEWAY BLVD
BROOKSTONE DR
BROADWAY RISE
50 STREET
CRESTVIEW BLVD
RYDERS RIDGE BLVD
HWY 20
MEMORIAL TRAIL
MEMORIAL TRAIL
POGADL PARK ACCESS #2
POGADL PARK ACCESS #1
POGADL PARK
FUTURE INDUSTRIAL
MEADOWLANDS RESORT
SWMF
Pond 1
Pond 2
0 200 400m
1:12000

LEGEND

- SOUTH AREA STRUCTURAL PLAN (ASP) BOUNDARY
- OVERLAND FLOW IDENTIFIED IN ASP
- SWMF — STORM WATER MANAGEMENT FACILITY IDENTIFIED IN ASP AND OPS
- DEVELOPMENT OUTLINE PLANS (OPs) BOUNDARIES
- OVERLAND FLOW IDENTIFIED IN OPs
- MINOR STORM SYSTEM IDENTIFIED IN OPs
- EXISTING OUTLET OF DEVELOPMENT
- FUTURE OUTLET OF DEVELOPMENT
- PROPOSED ROADWAY ALIGNMENT

Sylvan Lake

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PROJECT
MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY

FIGURE TITLE
STORMWATER MANAGEMENT PLAN EXISTING AND PLANNED DRAINAGE

FILE No.	SCALE	FIGURE No.
27613_Drainage_Analysis.dwg	1:12000	2.1

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FILE: G:\PROJECTS\27600\27613_SYLVAN_LAKE_TRP_MEMORIAL_TRAIL_FS\02_CAD\02D_DRAFTING\02D_SHEETS\STORM DRAWINGS\27613_DRAINAGE_ANALYSIS.DWG | DATE: JANUARY 22, 2022 6:49:51 PM

3.0 Proposed Roadway Widening and Re-alignment

Figure 2.1 also presents the proposed Memorial Trail functional layout. The new 4-lane roadway is to carry the west-east traffic within a 40-m-wide ROW. The typical cross section is shown in Exhibit 1. It indicates that the road is to crown in the middle and drain to the north or south evenly. Grassed medians, planting zones, and pathways are proposed within the 40 m ROW to improve the road function and aesthetic.

Surface runoff is to be collected by catchbasins installed along the curbs and gutters and then delivered through the underground storm sewers. The pipes are to tie into the downstream SWMS which should have sufficient capacity to accommodate and manage the roadway runoff.

The overland flow is to be carried by the entire roadway cross section at a safe depth and velocity that complies with the provincial standards.

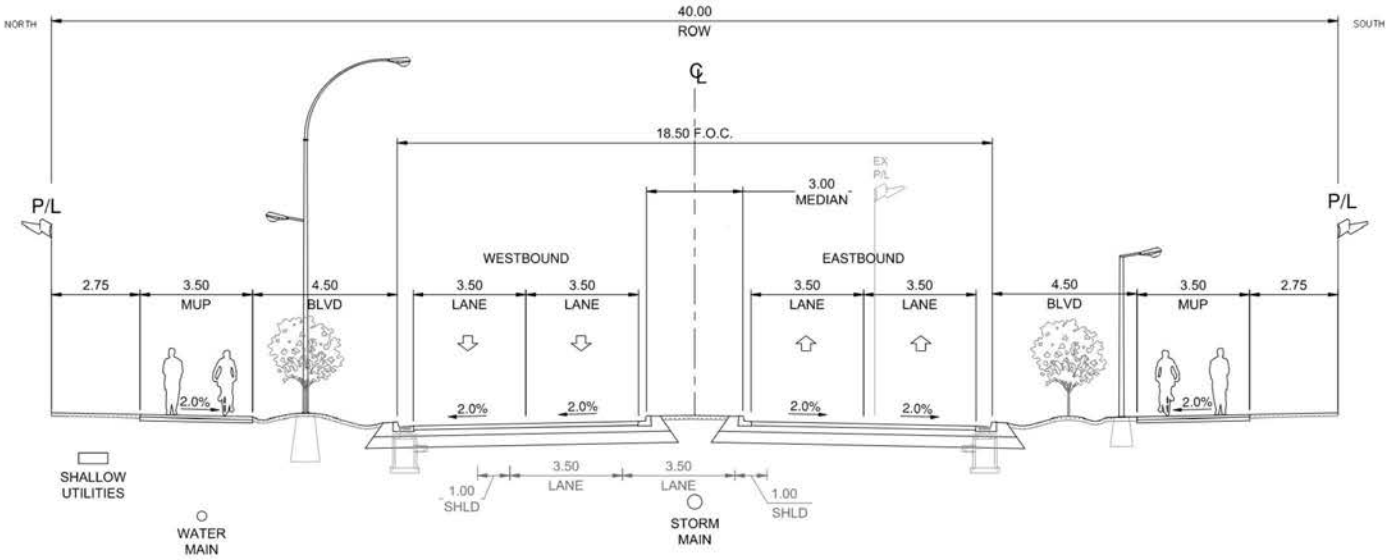


Exhibit 1: Typical Cross Section of Proposed Memorial Trail

4.0 Design Criteria and Methodology for Conceptual Design

The following documents outline stormwater management design standards and guidelines for this memo:

- Development Process and Design Guidelines, Town of Sylvan Lake, 2018
- Stormwater Management Design Guidelines, Province of Alberta, 1999

4.1 Design Criteria

Integrating the ongoing design documents and the design standards/guidelines at municipal and provincial levels, the following design criteria shall be used for this conceptual study:

- The proposed roadway grading is to incorporate the existing drainage pattern and have minimum topographic disturbance if possible.
- A dual drainage system, comprised of the minor system and the major system, is to be designed along the Memorial Trail within its ROW to manage any excess runoff caused by the roadway widening and realignment project.
- The proposed minor system shall consist of catchbasins and leads, manholes, and underground pipes for a service level to manage the 1:5-year design storm at least.
- The proposed major system shall consist of curb/gutters, trap lows, roadway within ROW, and roadside ditches for a service level to manage the 1:100-year design storm.
- The 2-hour Chicago 1:5-year design storm derived from the 2014 IDF for the Red Deer Airport station and used for the 2019 SMP is suitable for the minor system design and evaluation; the 24-hour Chicago 1:100-year design storm is to be used for the major system including the sizing and evaluation processes of required storage volumes. Table 7 of the 2019 SMP provides the distribution parameters of storms with a return period of 2 years, 5 years, and 100 years.
- The allowed ponding depth along the proposed Memorial Trail ROW shall not exceed 0.5 m during the 1:100-year design storm
- To manage runoff water quality, OGS shall be installed at strategically selected locations.
- To improve runoff water quality and quantity management, Low Impact Design (LID) features, such as grassed swales, bio-retention cells, and rain gardens shall be designed at strategically selected locations.
- The outlets to discharge the roadway runoff shall be designed at appropriate locations at the controlled release rates without any adverse impacts to the downstream stormwater management systems and the ultimate receiving waterbodies and/or SWMFs.
- According to the Town's Stormwater Design Standard (Sylvan Lake, 2018), the controlled release rates shall be determined by either:
  - the approved unit area release rate if a servicing plan for the development area is available; or
  - the capacity of the receiving storm main; or
  - the 1:5-year discharge as calculated for the new development areas.

4.2 Methodology for Conceptual Design

A conceptual layout of the SWMS for the Memorial Trail is to be provided for this FPS as well as alternative outlet and tie-in locations. In summary, the methodology for the conceptual design is to:

- Understand the existing drainage conditions;
- Understand the proposed subdivision and existing SWM utilities identified in the OPs and the South ASP;
- Provide the SWMS layout along the upgraded Memorial Trail carriage lanes;
- Identify preferred roadway runoff outlet locations and evaluate these options at a conceptual level; and
- Provide recommendations on the SWMS design concept.

The subsequent sections describe the steps following the above methodology.

4.3 Computer Modelling for Study

PCSWMM software developed by Computational Hydraulics International (CHI) was selected for this project. PCSWMM, as a trusted spatial decision support system for US EPA SWMM's stormwater management, wastewater and watershed modelling system, has been widely used for municipal drainage projects. The version of PCSWMM software used is 7.4.3240. The design intensities calculated by PCSWMM using the parameters in Table 7 of 2019 SMP are shown in Figure 4.1.

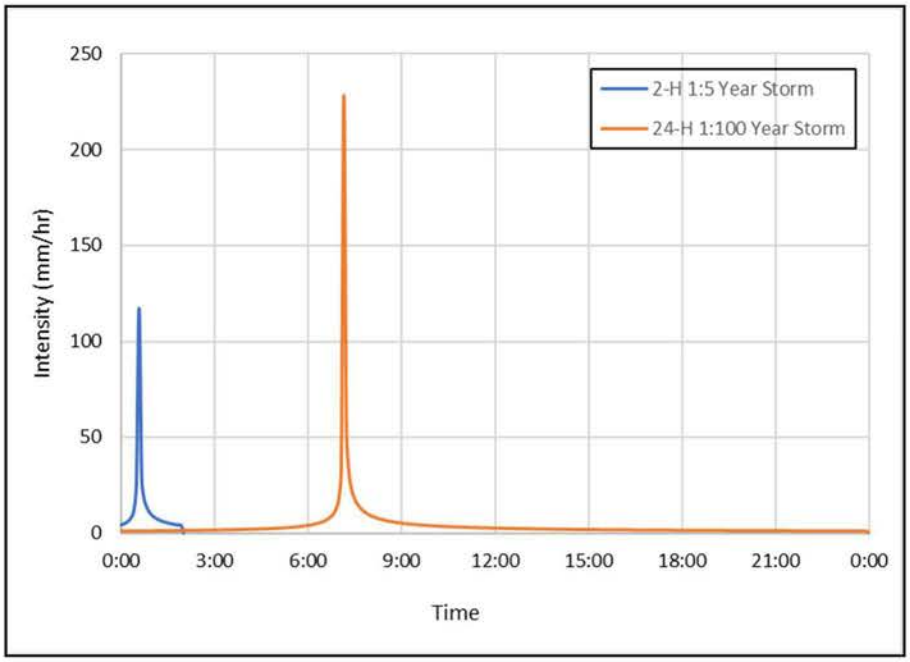


Figure 4.1: Design Storms for 1:5-Year and 1:100-Year

5.0 Existing Drainage Conditions

The location of existing storm management utilities and the Digital Elevation Model (DEM) were analyzed to understand the existing drainage conditions. Figure 5.1 shows the project catchment area delineated based on the existing DEM.

5.1 Existing Storm Minor Systems

The existing minor storm sewer systems are confined to the communities north of Memorial Trail. The minor systems in these communities appear to account for a 6 m to 10 m strip on the north side of Memorial Trail.

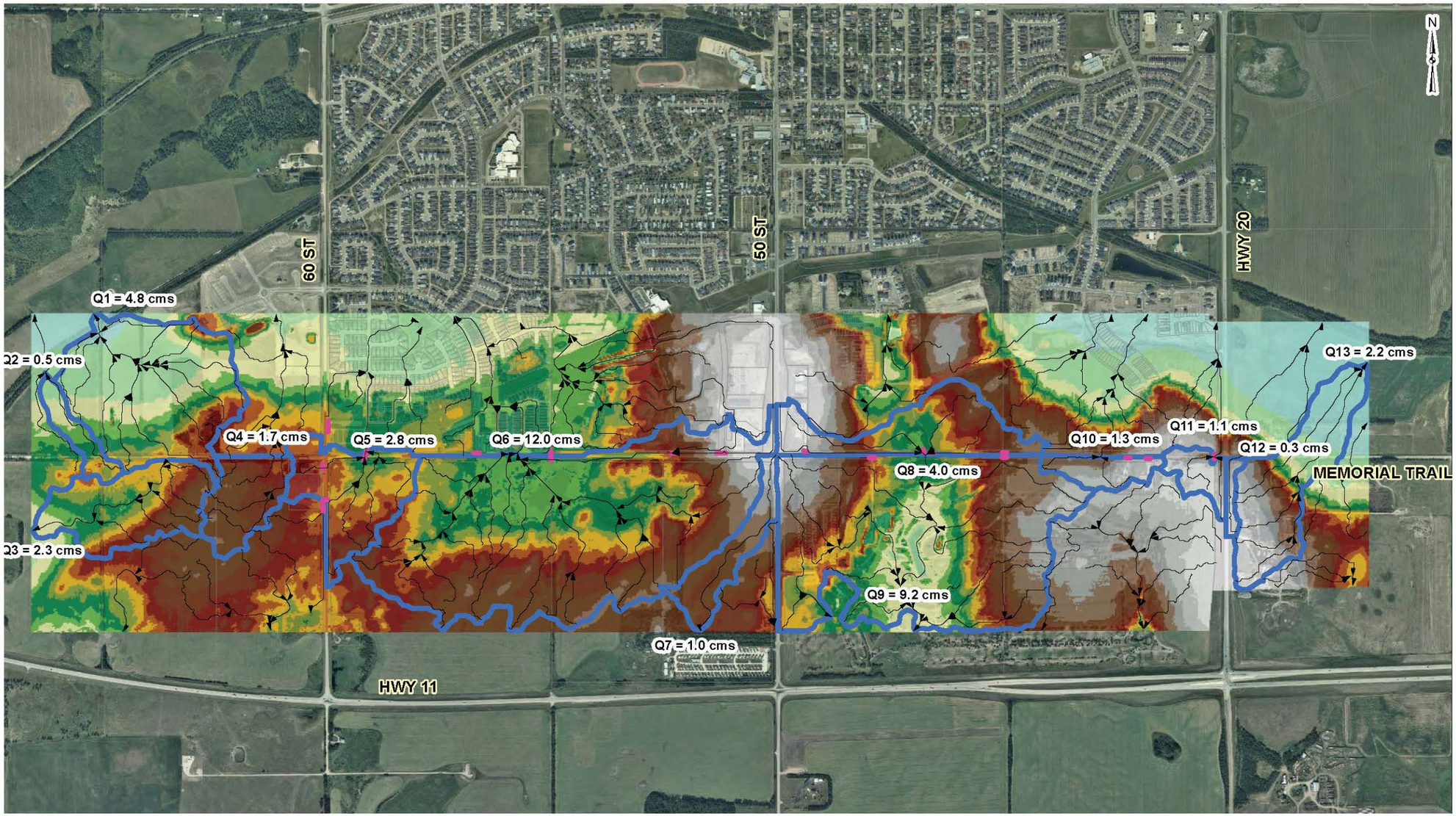
5.2 Existing Overland Flow Drainage Pattern

ISL was able to locate three culverts below Memorial Trail:

- To the west of Highway 20 to deliver runoff from the south side to the north side of Memorial Trail;
- At the west edge of Leader Field Park to deliver runoff from the south side to the north side of Memorial Trail; and
- 100 m east of Lakeview Boulevard to deliver runoff from the north side to the south side of Memorial Trail.

According to the results of the existing DEM analysis and catchment delineation, runoff north of the Memorial Trail centerline between 50 Street and Highway 20 simply overpasses the road during major flood events, joining the major systems of the northern subdivisions. South of the centerline, most overland flow drains to undeveloped or underdeveloped land to the south of Memorial Trail. At the east end of the project, ditches on both sides of Memorial Trail convey overland flow towards the east to the ditches along Highway 20.

The existing drainage patterns were identified and the peak 1:100-year flow was simulated when using the Chicago 2-hour 1:100-year storm with the parameters provided in Table 7 of the 2019 SMP report by McElhanney. Figure 5.1 shows the estimated peak flow drainage patterns.



LEGEND

- Ext Culverts
- Ext Overland Flow
- Ext CA passing Memorial Trail
- Legal Parcel

Elevation (m)

- 949.4 - 970.263
- 970.264 - 978.06
- 978.061 - 980.168
- 980.169 - 981.011
- 981.012 - 981.854
- 981.855 - 982.486
- 982.487 - 983.118
- 983.119 - 983.75
- 983.751 - 984.383
- 984.384 - 985.226
- 985.227 - 986.279
- 986.28 - 987.965
- 987.966 - 989.651
- 989.652 - 991.548
- 991.549 - 1,003.138

Sylvan Lake

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PROJECT

MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE

STORMWATER MANAGEMENT PLAN
EXISTING DRAINAGE PATTERNS

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6.0 Proposed SWMS along Memorial Trail

The proposed SWMS along Memorial Trail will be designed in terms of the proposed grading and road profile, impervious paving areas, pervious areas such as grassed medians and planting areas, the outlets tying to downstream SWMS for further delivery and treatment, and the receiving SWMS for the adjacent communities under the ultimate conditions.

6.1 Alternatives of Outlet Tie-in Locations

Figures 6.1 through 6.3 show possible outlet locations from the roadway to the downstream SWMS. In general, the additional runoff generated from the widened road surface can discharge to the north, the south, or both. Full discharge to the south has a benefit that the lands south of Memorial Trail have not yet been developed. As such, the future south SWMFs including Pond 2, Pond 8 and the facility for Meadowlands Resort can be designed to accommodate the roadway runoff.

The likely maximum Memorial Trail roadway area contributing to Pond 2 is about 0.6 ha, 1% of the estimated contributing area of Pond 2 in 2019 SMP; while the maximum Memorial Trail roadway area that might discharge to Pond 8 is about 6.8 ha, 5% of the contributing area of Pond 8 used in 2019 SMP.

The OPs and the South ASP defined the individual SWMS for each subdivision with consideration of a 6 m to 11.5 m widening area. The capacity of each SWMS in the north and the proposed future SWMFs in the south should be evaluated in the next design stage to confirm that the SWMS and the SWMFs can accommodate runoff from Memorial Trail under the proposed condition.

6.2 Estimated Peak Flows

The subcatchment boundaries shown in Figures 6.1 through 6.3 were delineated based on the proposed roadway profile. The runoff generated from these subcatchments and accumulated at the selected outlets were evaluated by a PCSWMM model for both the 2-hour 1:5-year storm and the 24-hour 1:100-year storm.

Table 6.1 shows catchment parameters used in the PCSWMM models for peak flow estimation. The soil parameters are the same as those used for the 2019 SMP. The imperviousness of the ROW with the upgraded roadway was assumed to be 70%.

Table 6.1: Modelling Parameters for Subcatchments

Runoff Calculation Parameter		Value
Depression Storage	Impervious Area	1.6 mm
	Pervious Area	3.2 mm
Manning 'n'	Impervious Area	0.015
	Pervious Area	0.25
Green-Ampt method	Suction Head (mm)	292.2
	Saturated Hydraulic Conductivity (mm/hr)	1.0
	Initial Deficit (fraction)	0.229

The peak flow results are shown in Figures 6.1 through 6.3. Since the roadway cross section is almost symmetrical, the runoff generated from the north portion will be almost equal to that generated from the south portion. The roadway runoff peak flows at some design outlet locations in Figures 6.1, 6.2 and 6.3 are shown as 'half' for the north or south portion only, and 'total' for the total flows joining the north and south runoff.

6.3 Estimated Pipe Sizes

Based on the estimated peak flows, the size of the underground storm sewers can be estimated using Manning's equation. Table 6.2 summarizes estimated sizes for different flow rates. Both PVC pipes and concrete pipes may be suitable for the minor system.

Table 6.2: Estimated Pipe Size for Project Flowrates

Material	Manning's N Value	Slope (%)	Pipe Diameter (mm)	Velocity (m/s)	Capacity (m^3/s)
PVC Pipe	0.013	0.5	250	0.857	0.04
PVC Pipe	0.013	0.5	375	1.123	0.12
PVC Pipe	0.013	0.5	450	1.268	0.20
PVC Pipe	0.013	0.5	600	1.536	0.43
PVC Pipe	0.013	0.5	750	1.782	0.79
Concrete Pipe	0.013	0.5	900	2.012	1.28

6.4 Recommended SWMS Outlets and SWMS Concept

Figures 6.4 through 6.7 show a conceptual stormwater sewer profile and alignment as well as recommender outlet and overland discharge locations. Based on the analysis above, our recommendations are as follows:

- West of 60 Street: the drainage is to be split into two catchments:
  - Between the proposed Pogadl Park Access #2 and 60 Street, the proposed minor system ties to the future storm sewer within the industrial area and the overland flow spills to the south through the trap low areas; Pond 2 is to be the receiving SWMF; and
  - Between the project boundary and Pogadl Park Access #2 including the intersection of Pogadl Park Access #1 and Springfield Boulevard, the proposed minor system ties to the future storm sewer within the boundary of Pogadl Park development, and the overland flow spills to the south through the trap low areas; the north SWMF of Pogadl Park is the receiving SWMF.
- From 60 Street to 50 Street: it is recommended that the minor system and overland flow during high intensity events discharge to the wetland/future Pond 8 south of Memorial Trail. It is likely that this can be accomplished using one or two outlet pipes. The size of Pond 8 should be estimated in a detailed storm pond design report. Although the existing drainage system discharges to the wetland, it is anticipated that significant environmental approvals (e.g., Water Act and EPEA application) will be required to convert the existing wetland to a stormwater management pond. In addition, it may be advisable to convert the existing wetland to a SWMF concurrently with reconstruction of Memorial Trail to consolidate approvals and prepare the area south of Memorial Trail for development.
- The proposed trap low just west of Brookstone Drive has a depth of one metre and no obvious overland discharge as the road at that location is lower than the surrounding terrain. The road profile can be modified during preliminary design to either remove the trap low altogether or reduce its depth to be less than 500 mm, so that runoff can flow west without exceeding the maximum allowable ponding depth of the arterial road.
- Between 50 Street and Ryders Ridge Boulevard: it is recommended that the minor system and overland flow during discharge to the south towards the Meadowlands Golf Club (Meadowlands Resort). It is not known what agreement, if any the Town has with the Club; however, this appears to be a discharge

location for the current SWMS. It is anticipated that runoff can be discharged to the south using two outlets at the trap lows.

- East of Ryders Ridge Boulevard: the Memorial Trail SWMS must tie into the existing ditches along Highway 20 which have significant downward slope and will convey runoff towards the north.
- East of Highway 20: the existing drainage pattern is retained to deliver runoff through roadways as an open channel further to the east.

Grades at the outlet locations were not fully analyzed to confirm the required outlet lengths. The depths of existing buried utilities may also impact the minor system elevations and the feasibility of outlets at certain locations.

ROAD SEGMENT: WEST OF 60 STREET

DISCHARGE OPTION 1:
TIE THE PROPOSED MINOR SYSTEM TO THE ROADSIDE DITCHES IN SOUTH. SPILL TO SOUTH. OGS MAY BE REQUIRED FOR DIRECT DISCHARGE.

WATERFORD STATION

SWMF

SPRINGFIELD BLVD

STATION DR

60 STREET

LAKEWAY LANDING

LAKEWAY BLVD

POGADL PARK ACCESS #2

POGADL PARK ACCESS #1

POGADL PARK

HALF Q - NORTH OR SOUTH SIDE RUNOFF
Q1:5 = 0.06 cms
Q1:100 = 0.15 cms

HALF Q - NORTH OR SOUTH SIDE RUNOFF
Q1:5 = 0.07 cms
Q1:100 = 0.17 cms

HALF Q - NORTH OR SOUTH SIDE RUNOFF
Q1:5 = 0.08 cms
Q1:100 = 0.21 cms

HALF Q - NORTH OR SOUTH SIDE RUNOFF
Q1:5 = 0.07 cms
Q1:100 = 0.18 cms

HALF Q - NORTH OR SOUTH SIDE RUNOFF
Q1:5 = 0.09 cms
Q1:100 = 0.22 cms

Pond 2

FUTURE INDUSTRIAL

MEADOWLANDS RESORT

ROAD SEGMENT: 60 STREET TO LAKEWAY BLVD

DISCHARGE OPTION 1:
DISCHARGE ROADWAY RUNOFF TO NORTH THROUGH OVERLAND FLOW TO LEADER FEILD PARK AND THEN JOIN IN THE MAJOR SYSTEM IN LAKEWAY LANDING COMMUNITY. SPILL TO NORTH. OGS MAY BE REQUIRED FOR WQ CONTROL.

0 80 160 m
1:4000

LEGEND

- SOUTH AREA STRUCTURAL PLAN (ASP) BOUNDARY
- OVERLAND FLOW IDENTIFIED IN ASP
- SWMF — STORM WATER MANAGEMENT FACILITY IDENTIFIED IN ASP AND OPS
- DEVELOPMENT OUTLINE PLANS (OPs) BOUNDARIES
- OVERLAND FLOW IDENTIFIED IN OPs
- MINOR STORM SYSTEM IDENTIFIED IN OPs
- EXISTING OUTLET OF DEVELOPMENT
- FUTURE OUTLET OF DEVELOPMENT
- PROPOSED ROADWAY ALIGNMENT
- PROPOSED ROADWAY OVERLAND FLOW
- PROPOSED SUB-CATCHMENTS
- PROPOSED ROADWAY CONTOURS
- PROPOSED ROADWAY SPILL
- PROPOSED CATCH BASINS

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MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY

FIGURE TITLE
STORMWATER MANAGEMENT CONCEPT WEST PROJECT LIMIT TO LAKEWAY BLVD

FILE No.	SCALE	FIGURE No.
27613_Drainage_Analysis.dwg	1:4000	6.1

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LAKEWAY LANDING

BEACON HILL

CREST VIEW

SWMF

LAKEWAY BLVD

ROAD SEGMENT: LAKEWAY BLVD TO 300 m WEST OF BROOKSTONE DR

DISCHARGE OPTION 1:
DISCHARGE ROADWAY RUNOFF TO SOUTH AND THEN TO POND 8 THROUGH OVERLAND FLOWS. SPILL TO SOUTH.

BROOKSTONE DR

BROADWAY RISE

50 STREET

CRESTVIEW BLVD

MEMORIAL TRAIL

HALF Q - NORTH OR SOUTH SIDE RUNOFF
Q1:5 = 0.09 cms
Q1:100 = 0.22 cms

HALF Q - NORTH OR SOUTH SIDE RUNOFF
Q1:5 = 0.09 cms
Q1:100 = 0.21 cms

Pond 8

ROADWAY SEGMENT: 300 m WEST OF BROOKSTONE DR TO 50 STREET

DISCHARGE OPTION 1:
DISCHARGE ROADWAY RUNOFF TO NORTH AS OVERLAND FLOW AND THEN FOLLOW THE SWMS WITHIN BEACON HILL; LID MAY BE DESIGNED FOR WATER QUALITY. SPILL TO NORTH.

DISCHARGE OPTION 2:
USE MINOR SYSTEM ALONG MEMORIAL TRAIL TO CONVEY RUNOFF WEST DIRECTLY TO POND 8. SPILL TO SOUTH.

MEADOWLANDS RESORT

0 80 160 m
1:4000

LEGEND

- SOUTH AREA STRUCTURAL PLAN (ASP) BOUNDARY
- OVERLAND FLOW IDENTIFIED IN ASP
- SWMF — STORM WATER MANAGEMENT FACILITY IDENTIFIED IN ASP AND OPS
- DEVELOPMENT OUTLINE PLANS (OPs) BOUNDARIES
- OVERLAND FLOW IDENTIFIED IN OPs
- MINOR STORM SYSTEM IDENTIFIED IN OPs
- EXISTING OUTLET OF DEVELOPMENT
- FUTURE OUTLET OF DEVELOPMENT
- PROPOSED ROADWAY ALIGNMENT
- PROPOSED ROADWAY OVERLAND FLOW
- PROPOSED SUB-CATCHMENTS
- PROPOSED ROADWAY CONTOURS
- PROPOSED ROADWAY SPILL
- PROPOSED CATCH BASINS

Sylvan Lake

ISL

PROJECT
MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY

FIGURE TITLE
STORMWATER MANAGEMENT CONCEPT LAKEWAY BLVD TO CRESTVIEW BLVD

FILE No.	SCALE	FIGURE No.
27613_Drainage_Analysis.dwg	1:4000	6.2

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CREST VIEW

VISTA AT RYDER RIDGE

CRESTVIEW BLVD

EXISTING WETLAND TO BE RETAINED

RYDERS RIDGE BLVD

HWY 20

ROADWAY SEGMENT:
RYDERS RIDGE BLVD TO HWY 20

DISCHAGRE OPTION 1:
DISCHARGE TO THE NORTH AND TIE TO THE ROADSIDE DTICH OF HWY 20 AND THEN FOLLOW ITS DRAINAGE PATTERN.

HALF Q - NORTH OR SOUTH SIDE RUNOFF
Q1:5 = 0.07 cms
Q1:100 = 0.18 cms

HALF Q - NORTH OR SOUTH SIDE RUNOFF
Q1:5 = 0.08 cms
Q1:100 = 0.20 cms

MEMORIAL TRAIL

HALF Q - NORTH OR SOUTH SIDE RUNOFF
Q1:5 = 0.08 cms
Q1:100 = 0.21 cms

ROADWAY SEGMENT: 50 STREET TO 600 m EAST OF CRESTVIEW BLVD

DISCHARGE OPTION 1:
DISCHARGE ROADWAY RUNOFF TO THE RETAINED WETLAND USING OGS. SPILL TO NORTH

DISCHARGE OPTION 2:
IF THE WETLAND WILL NOT ACCOMMODATE THE FLOWS FROM MEMORIAL, AND THE CRESTVIEW SWMS CANNOT BE MODIFIED TO ACCOMMODATE THE FLOWS, PARTIAL OR FULL DISCHARGE TO THE SOUTH TO USE THE SWMS FOR MEADOWLANDS RESORT (A PRIVATE SITE) MAY BE REQUIRED. SPILL TO SOUTH.

ROADWAY SEGMENT: 600 m EAST OF CRESTVIEW BLVD TO RYDERS RIDGE BLVD

DISCHARGE OPTION 1:
USE MINOR SYSTEM ALONG MEMORIAL TRAIL TO CONVEY RUNOFF WEST AND THEN NORTH, TYING TO THE SWMS VISTA COMMUNITY. SPILL TO NORTH.

DISCHARGE OPTION 2:
DISCHARGE SOUTH TO THE SWMS FOR THE MEADOWSLAND GOLF CLUB (A PRIVATE SITE). SPILL TO SOUTH.

MEADOWLANDS RESORT

SWMF

0 80 160 m
1:4000

LEGEND

- AREA STRUCTURE PLAN (ASP) BOUNDARY
- OVERLAND FLOW IDENTIFIED IN ASP
- SWMF — STORM WATER MANAGEMENT FACILITY IDENTIFIED IN ASP AND OPs
- DEVELOPMENT OUTLINE PLANS (OPs) BOUNDARIES
- OVERLAND FLOW IDENTIFIED IN OPs
- MINOR STORM SYSTEM IDENTIFIED IN OPs
- EXISTING OUTLET OF DEVELOPMENT
- FUTURE OUTLET OF DEVELOPMENT
- PROPOSED ROADWAY ALIGNMENT
- PROPOSED ROADWAY OVERLAND FLOW
- PROPOSED SUB-CATCHMENTS
- PROPOSED ROADWAY CONTOURS
- PROPOSED ROADWAY SPILL
- PROPOSED CATCH BASINS

Sylvan Lake

ISL

PROJECT
MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE
STORMWATER MANAGEMENT CONCEPT
CRESTVIEW BLVD TO HWY 20

FILE No.	SCALE	FIGURE No.
27613_Drainage_Analysis.dwg	1:4000	6.3

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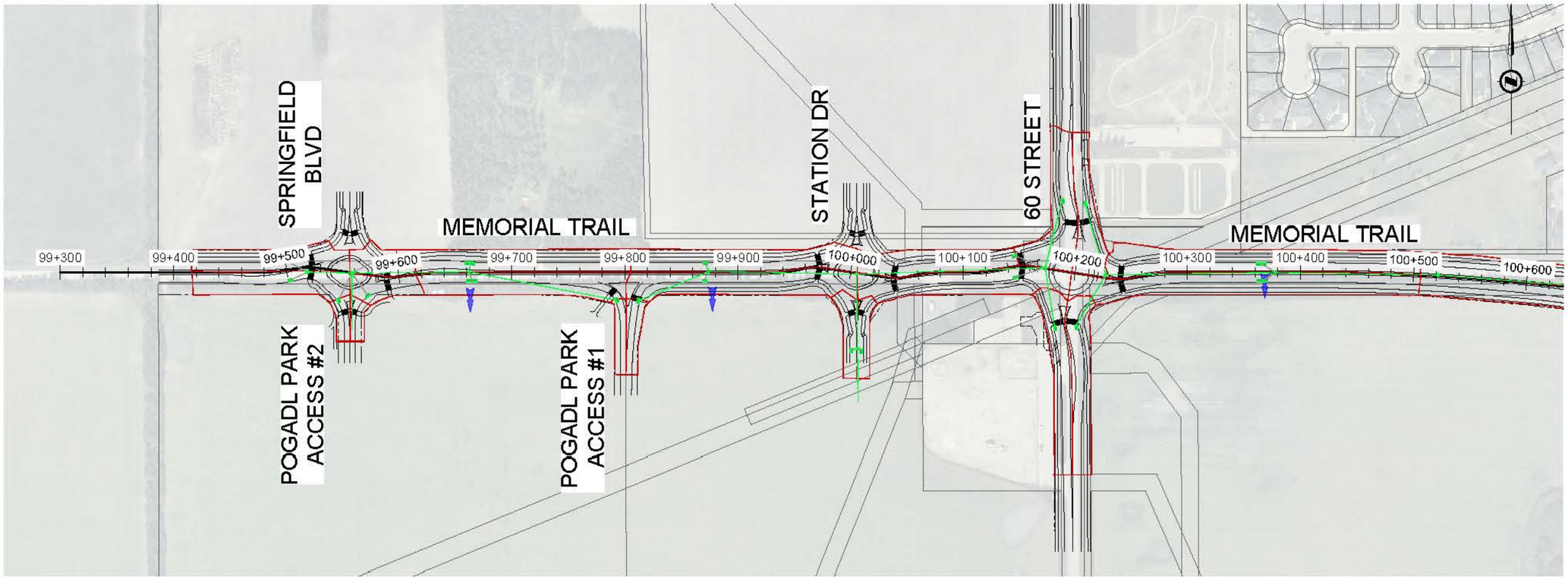

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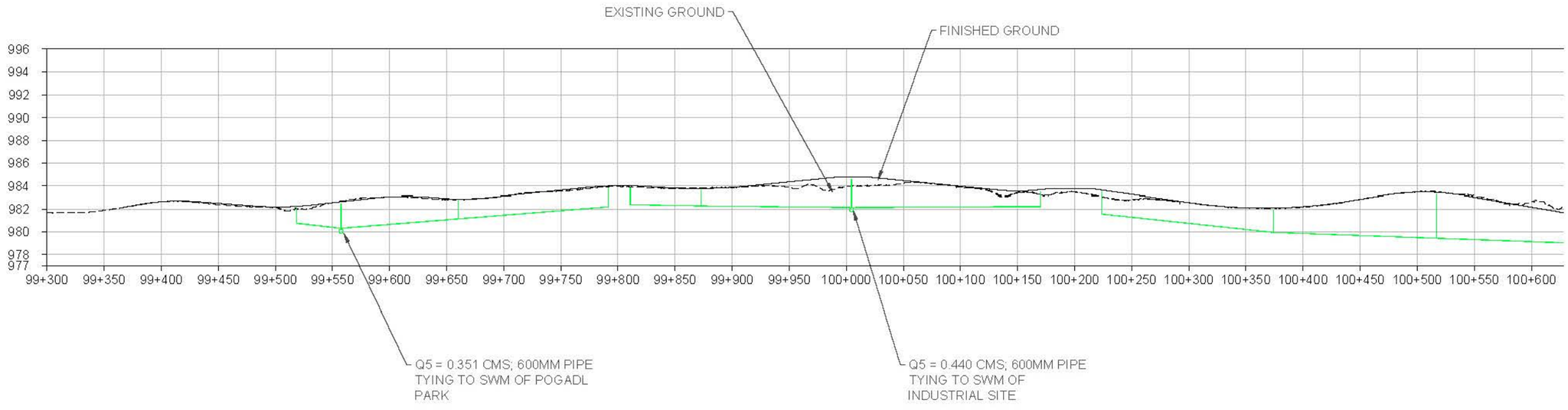

LEGEND

- PROPOSED ST MANHOLE
- PROPOSED ST PIPE
- PROPOSED CATCH BASINS
- PROPOSED SPILL
- PROPOSED ROADWAY
- PROPOSED SUB-CATCHMENTS

Sylvan Lake

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MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY

FIGURE TITLE

STORMWATER MANAGEMENT CONCEPT PLAN / PROFILE WEST PROJECT LIMIT TO 60 STREET

FILE No.	SCALE	FIGURE No.
27613_Drainage_Utility_Profile.dwg	AS SHOWN	6.4

ISC: #### SHEET SIZE ANSI B 20 mm 0

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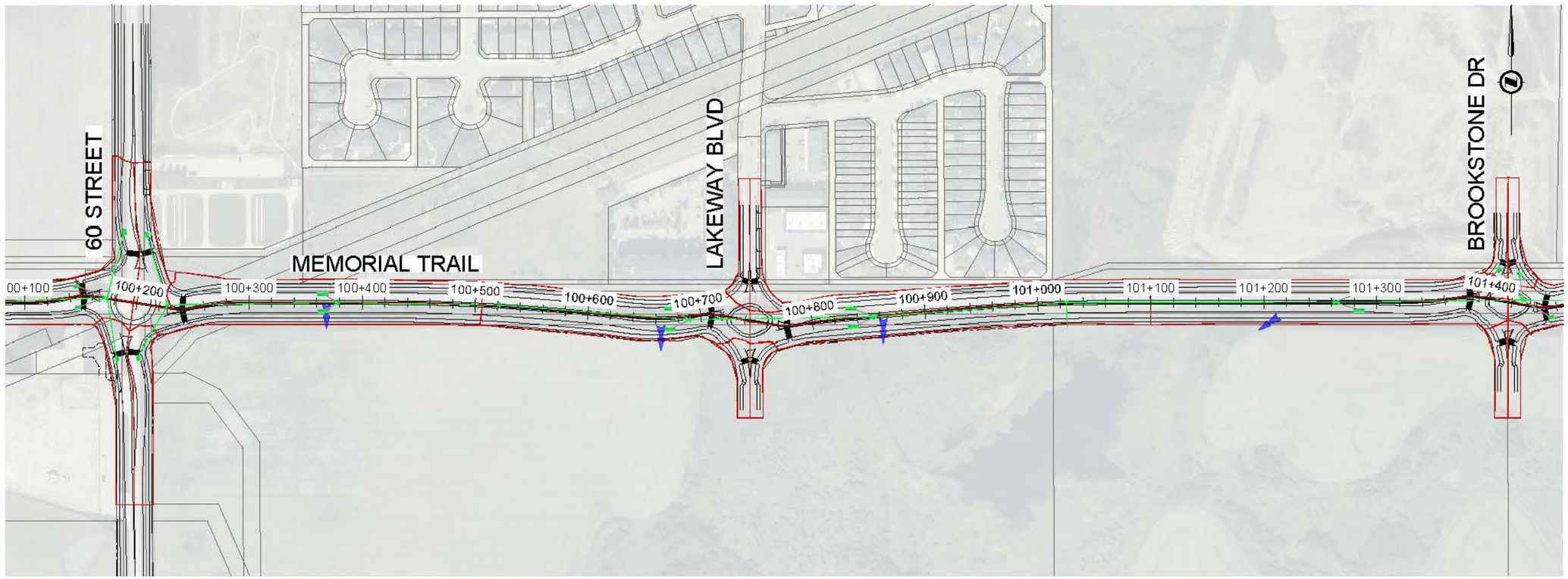

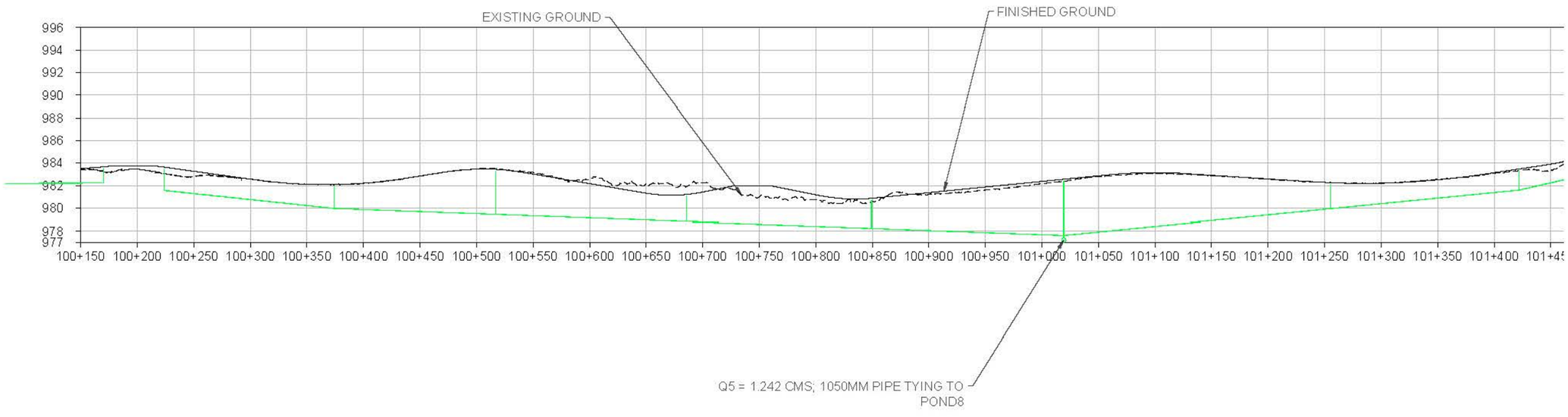

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LEGEND

- PROPOSED ST MANHOLE
- PROPOSED ST PIPE
- PROPOSED CATCH BASINS
- PROPOSED SPILL
- PROPOSED ROADWAY
- PROPOSED SUB-CATCHMENTS

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MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY

FIGURE TITLE

STORMWATER MANAGEMENT CONCEPT PLAN / PROFILE 60 STREET TO BROOKSTONE DR

FILE No.	SCALE	FIGURE No.
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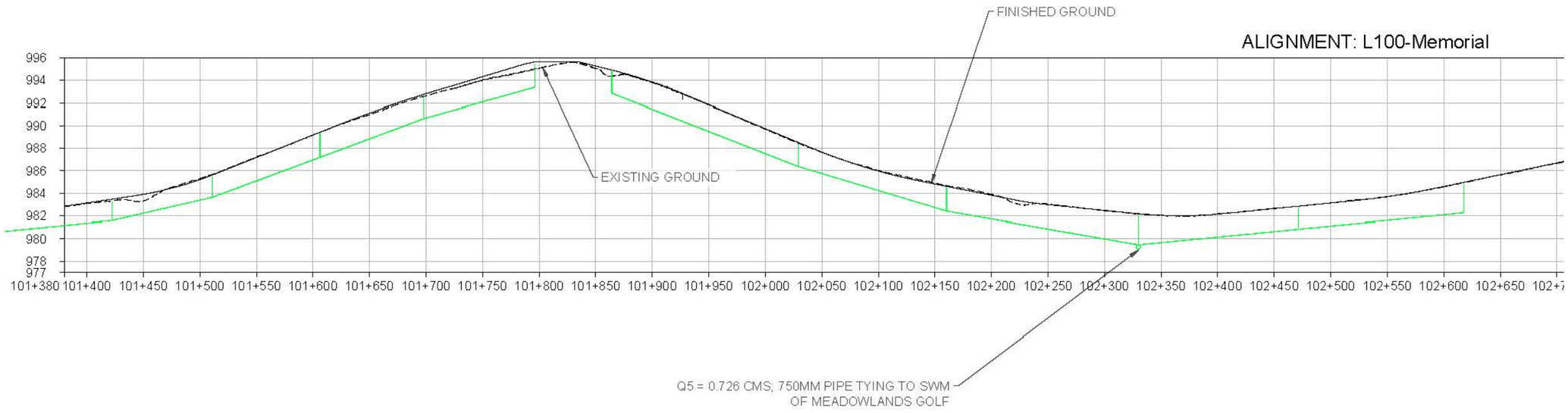

LEGEND

- PROPOSED ST MANHOLE
- PROPOSED ST PIPE
- PROPOSED CATCH BASINS
- PROPOSED SPILL
- PROPOSED ROADWAY
- PROPOSED SUB-CATCHMENTS

Sylvan Lake

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MEMORIAL TRAIL
FUNCTIONAL PLANNING STUDY

FIGURE TITLE

STORMWATER MANAGEMENT CONCEPT
PLAN / PROFILE
BROOKSTONE DR TO EAST OF CRESTVIEW BLVD

FILE No.	SCALE	FIGURE No.
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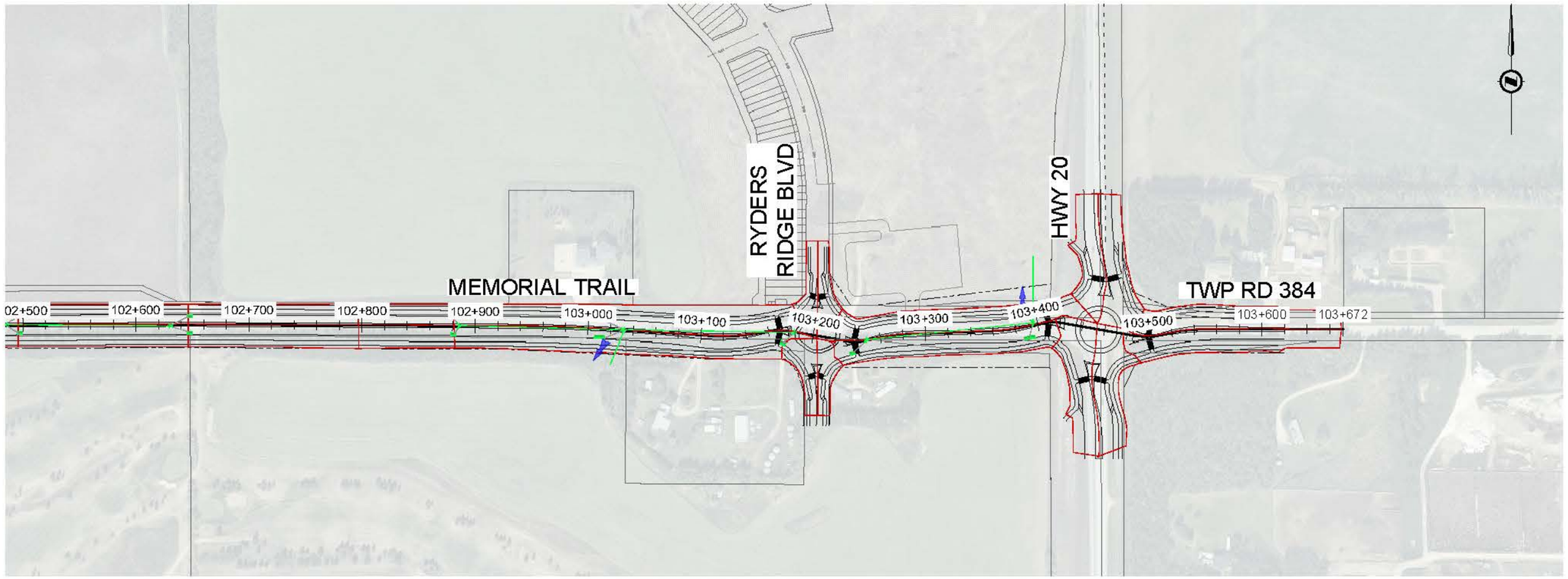

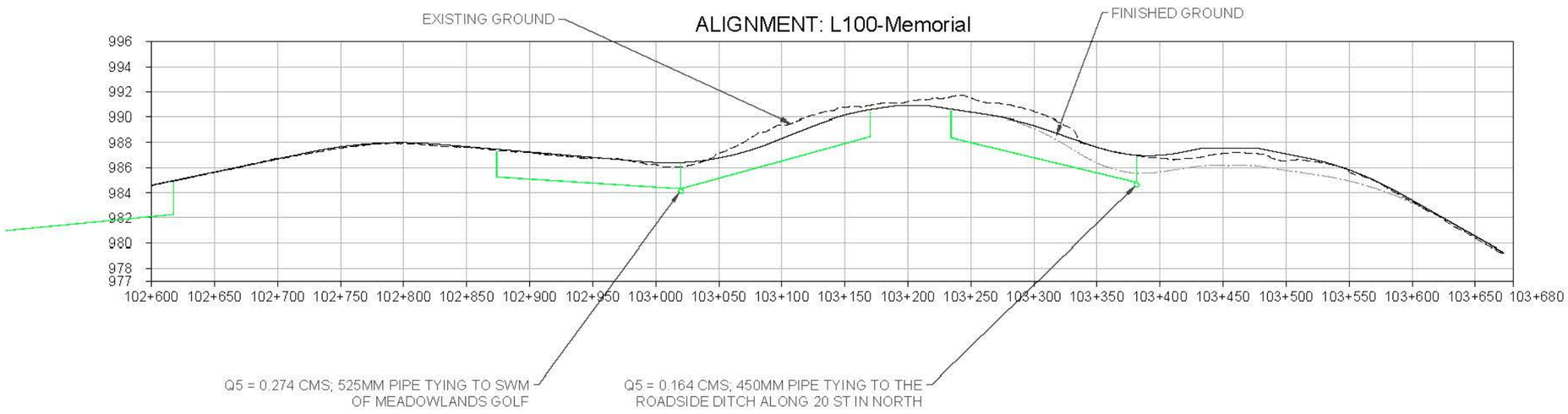

1:4000 (HORZ) 0 80 160 m

1:400 (VERT) 0 8 16 m

LEGEND

- PROPOSED ST MANHOLE
- PROPOSED ST PIPE
- PROPOSED CATCH BASINS
- PROPOSED SPILL
- PROPOSED ROADWAY
- PROPOSED SUB-CATCHMENTS

Sylvan Lake

ISL

PROJECT

MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY

FIGURE TITLE

STORMWATER MANAGEMENT CONCEPT PLAN / PROFILE
EAST OF CRESTVIEW BLVD TO EAST PROJECT LIMIT

FILE No.	SCALE	FIGURE No.
27613_Drainage_Utility_Profile.dwg	AS SHOWN	6.7

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7.0 Conclusions and Recommendations

The proposed SWMS along Memorial Trail is to be a dual drainage system comprised of a minor system and a major system. The receiving SWMFs, and the proposed storm sewers and overland flow routes will be designed to accommodate the detailed design flows. Existing, proposed, and future SWMFs were identified at proposed outlet locations. Some proposed SWMFs are located on private property. The capacity of the receiving facilities including the future storm ponds, such as Pond 8, should be evaluated and confirmed to function well. Property acquisitions, easements, and environmental approvals may be required to secure the proposed facilities.

8.0 References

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APPENDIX D
Stakeholder Engagement

APPENDIX D.1
Countil Presentation Materials

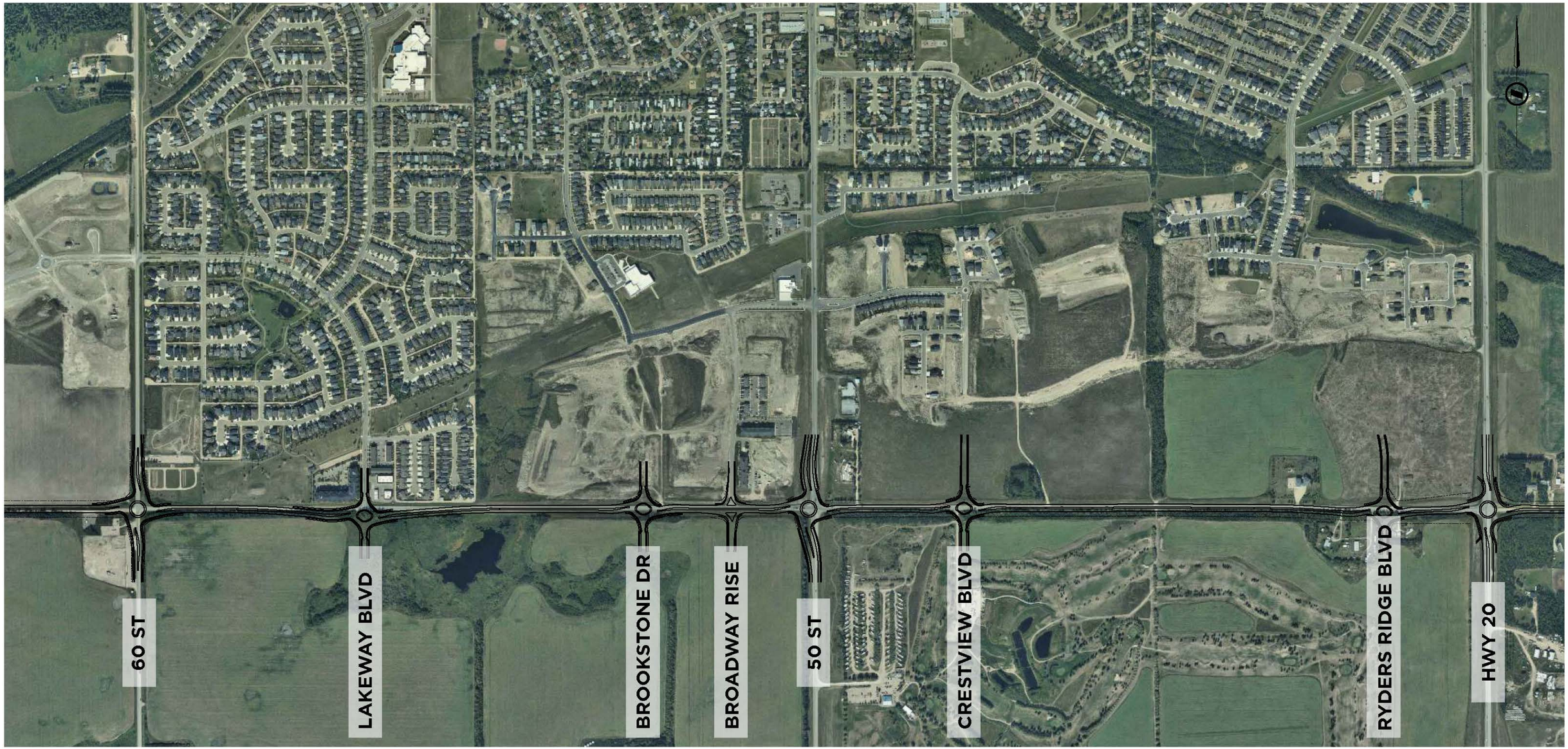
TOWN OF SYLVAN LAKE

MEMORIAL TRAIL

Cross-Section and Roundabout Concepts

July 7, 2021

STUDY AREA OVERVIEW



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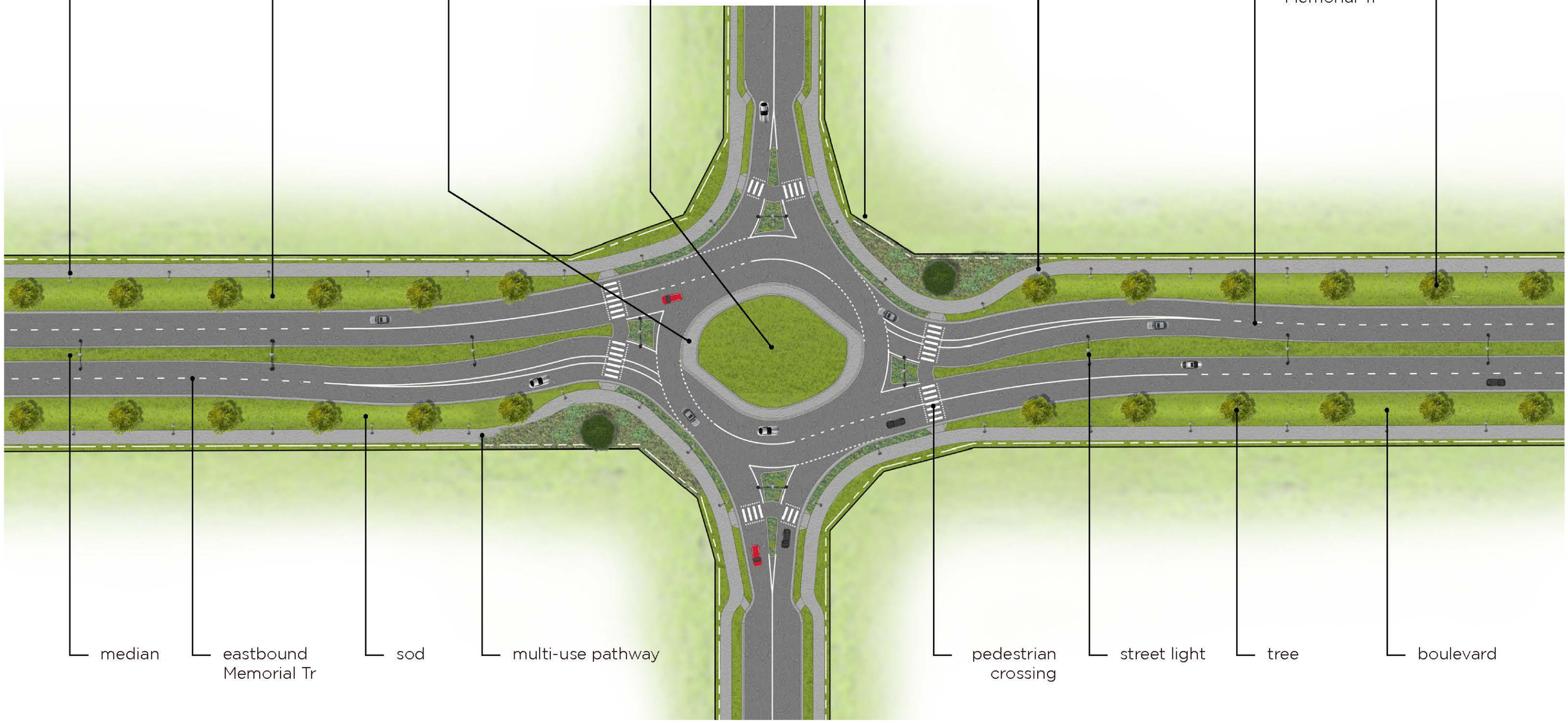
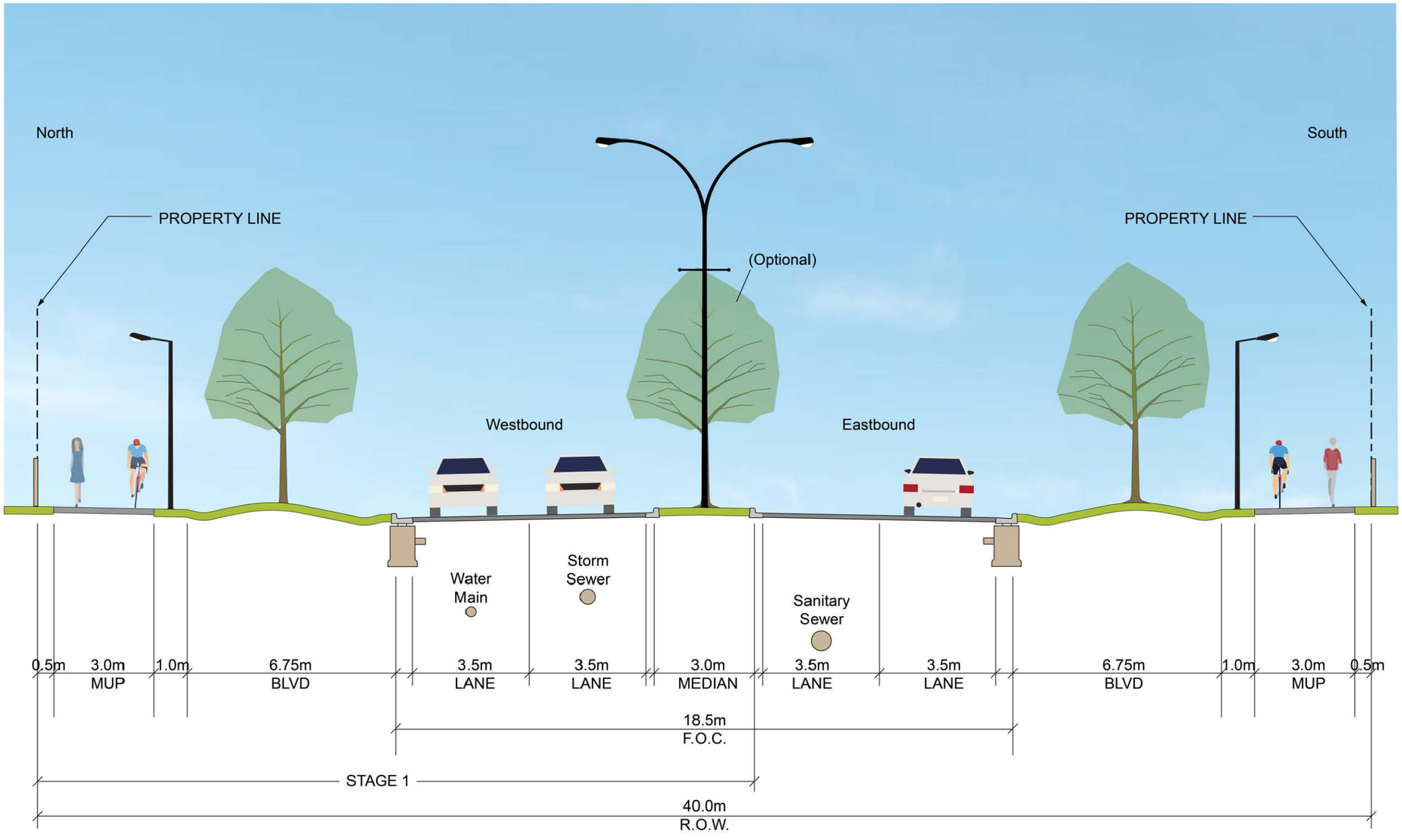
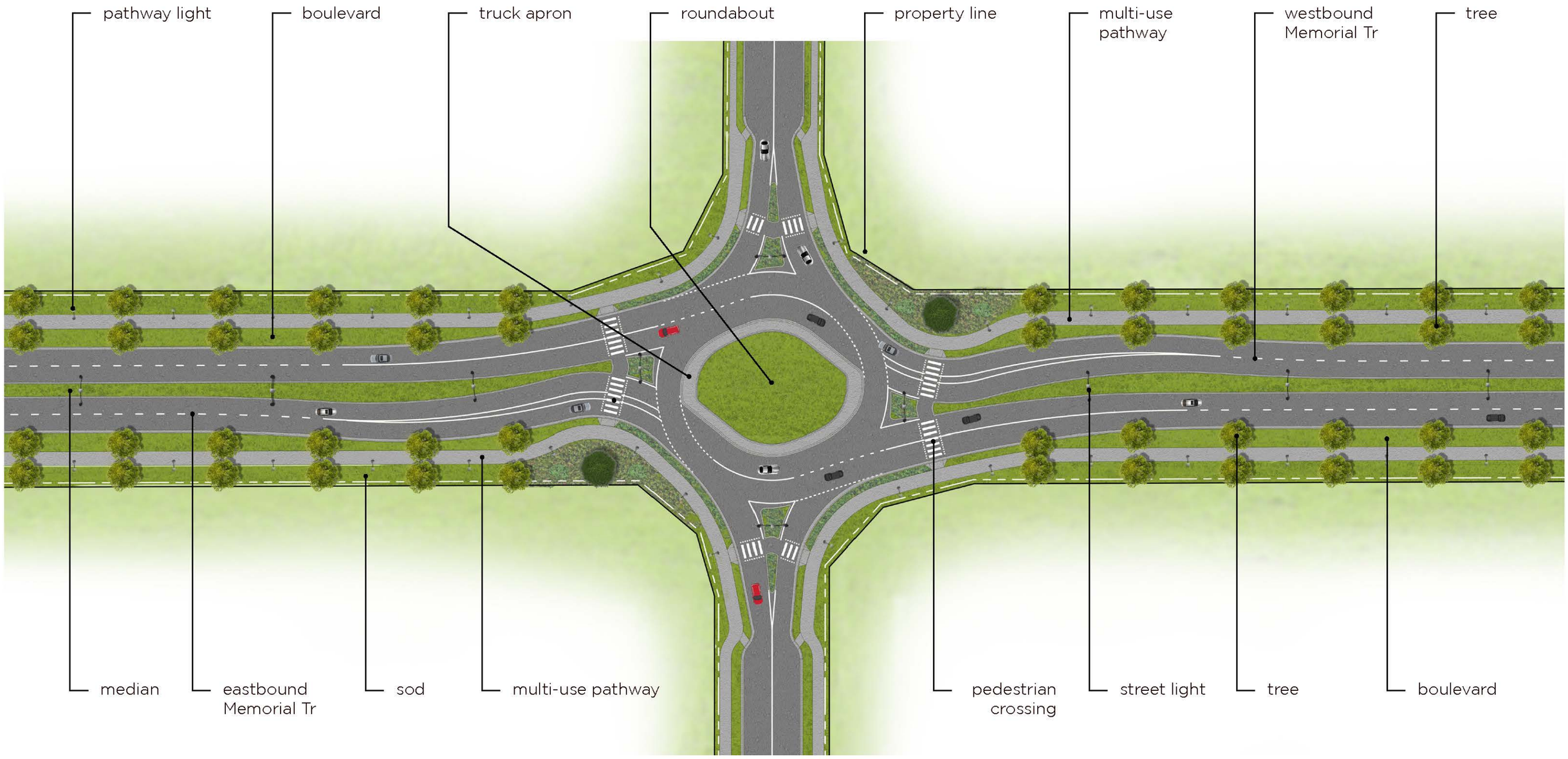

pathway light
boulevard
truck apron
roundabout
property line
multi-use pathway
westbound Memorial Tr
tree
median
eastbound Memorial Tr
sod
multi-use pathway
pedestrian crossing
street light
tree
boulevard

OPTION 1 - CROSS SECTION

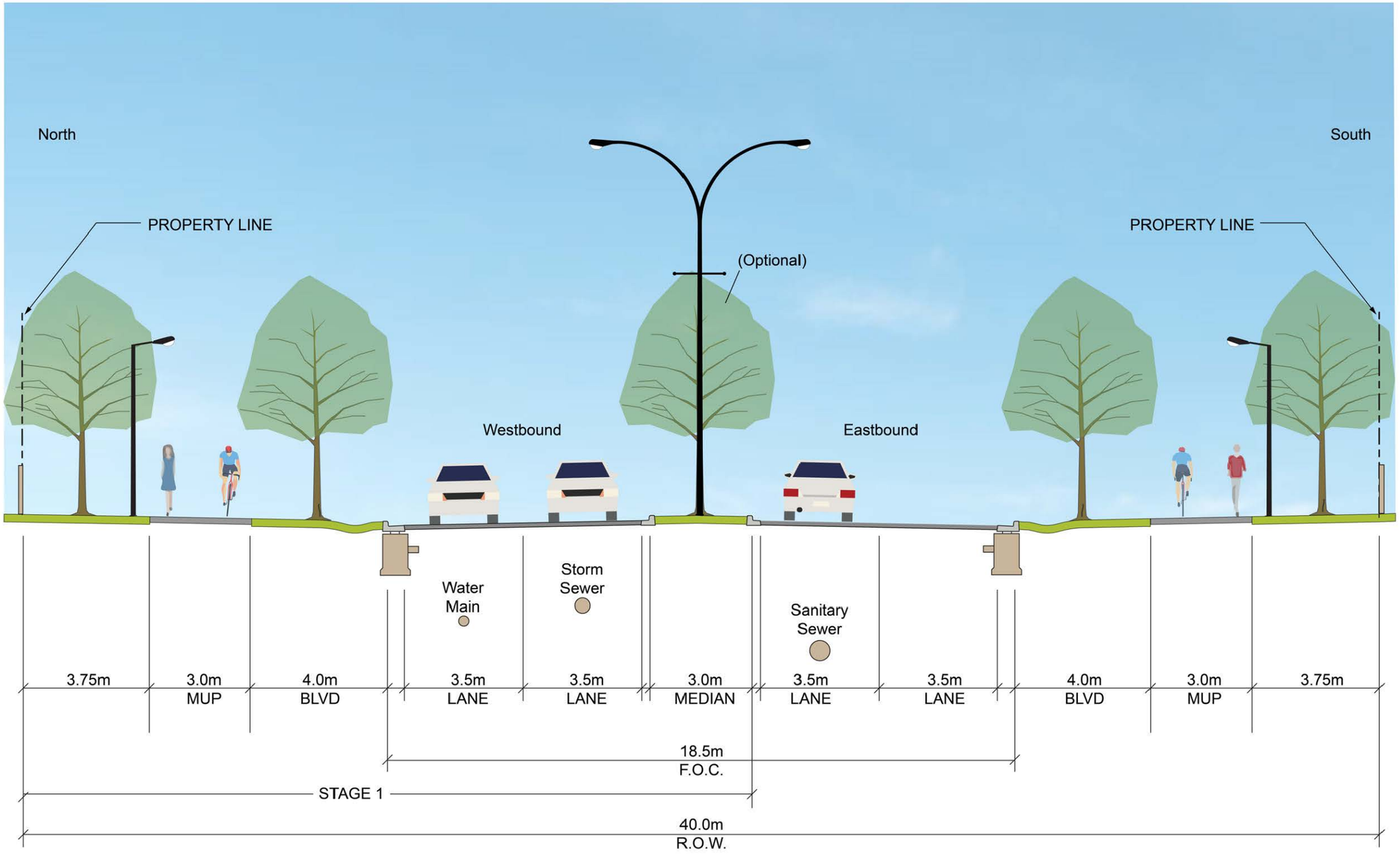


OPTION 1: 3m MEDIAN WITH MUP AT PROPERTY

OPTION 2

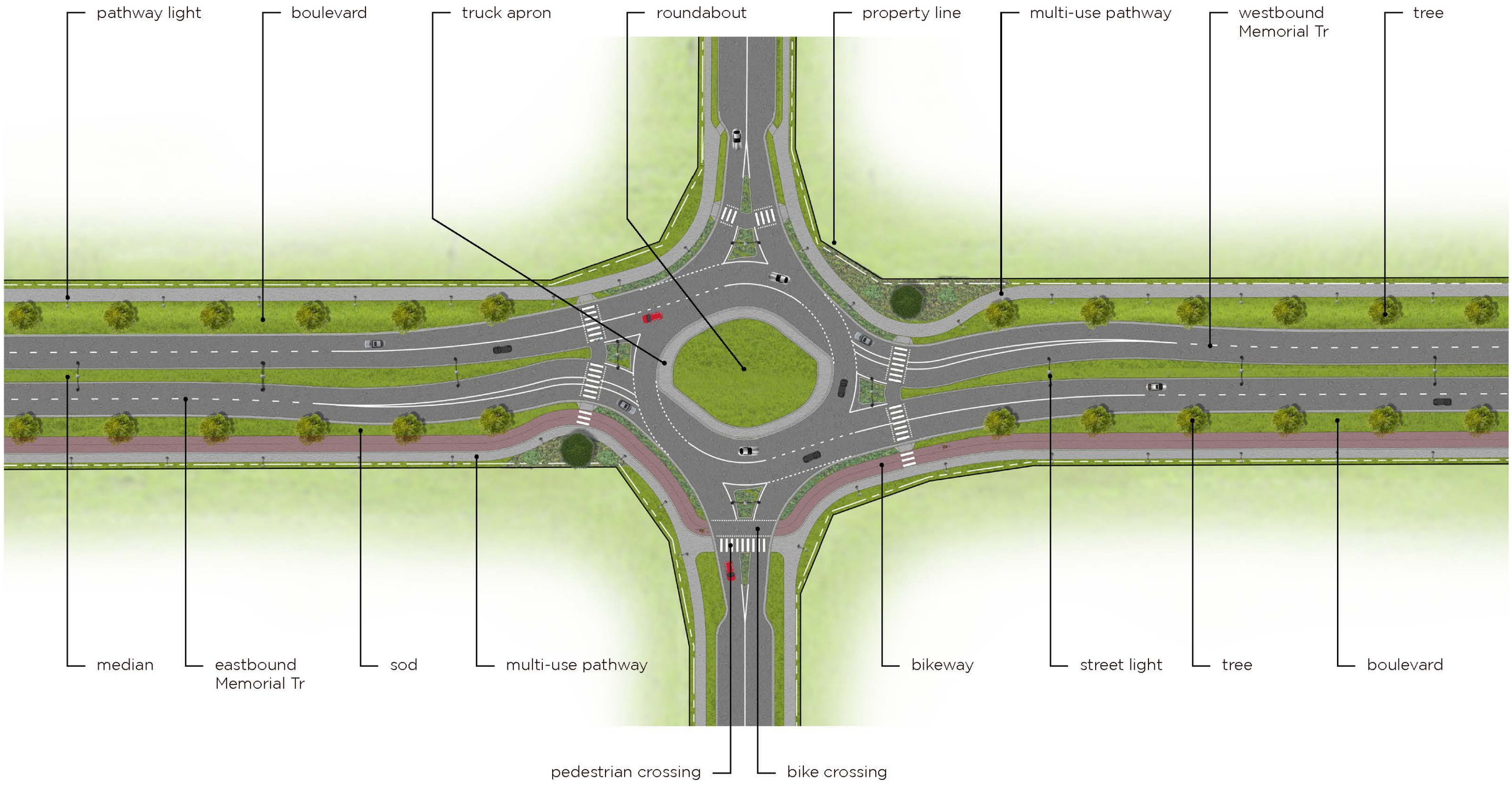

pathway light
boulevard
truck apron
roundabout
property line
multi-use pathway
westbound Memorial Tr
tree
median
eastbound Memorial Tr
sod
multi-use pathway
pedestrian crossing
street light
tree
boulevard

OPTION 2 - CROSS SECTION

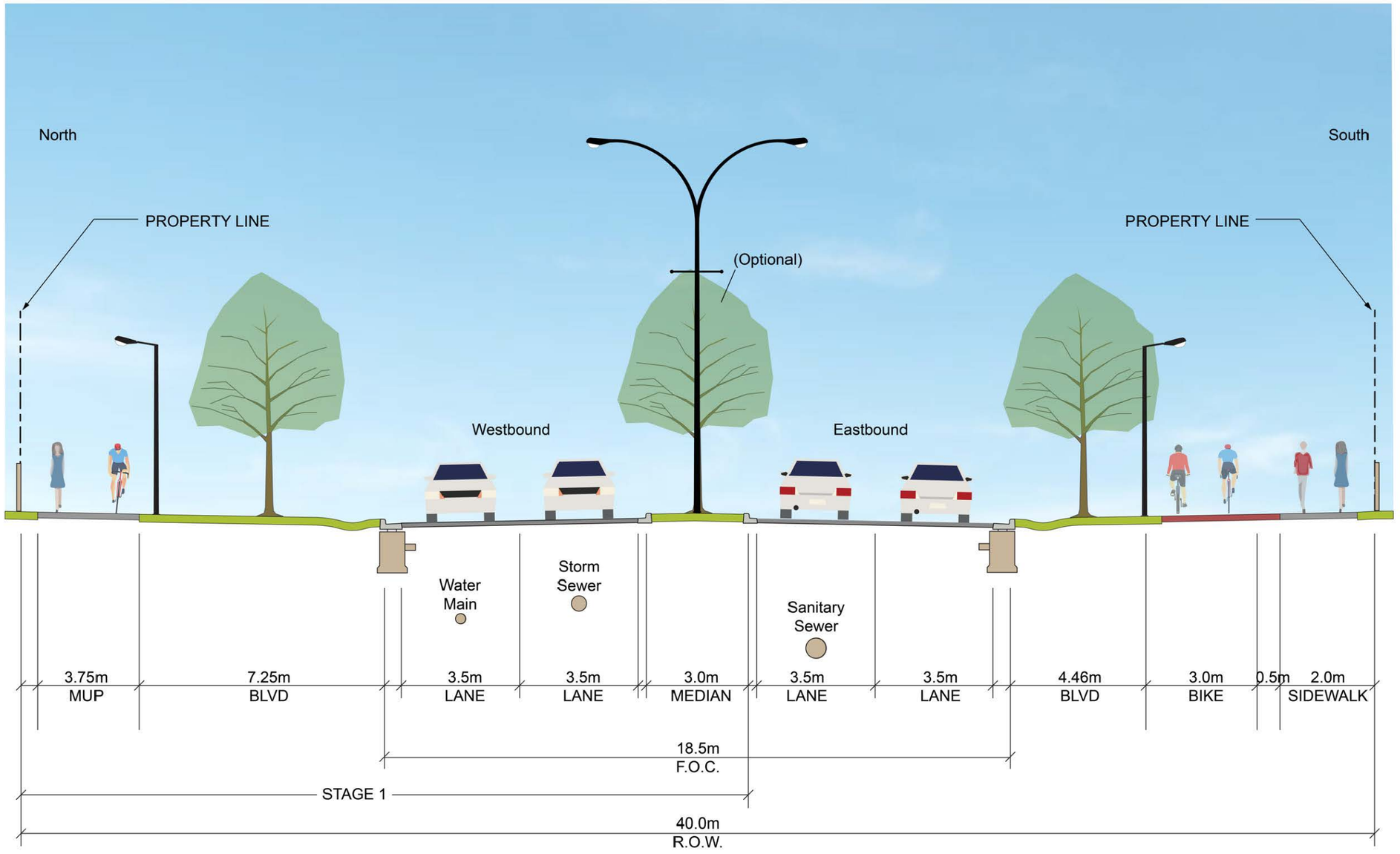


OPTION 2: 3m MEDIAN WITH MUP CENTRED

OPTION 3


pathway light
boulevard
truck apron
roundabout
property line
multi-use pathway
westbound Memorial Tr
tree
median
eastbound Memorial Tr
sod
multi-use pathway
bikeway
street light
tree
boulevard
pedestrian crossing
bike crossing

OPTION 3 - CROSS SECTION



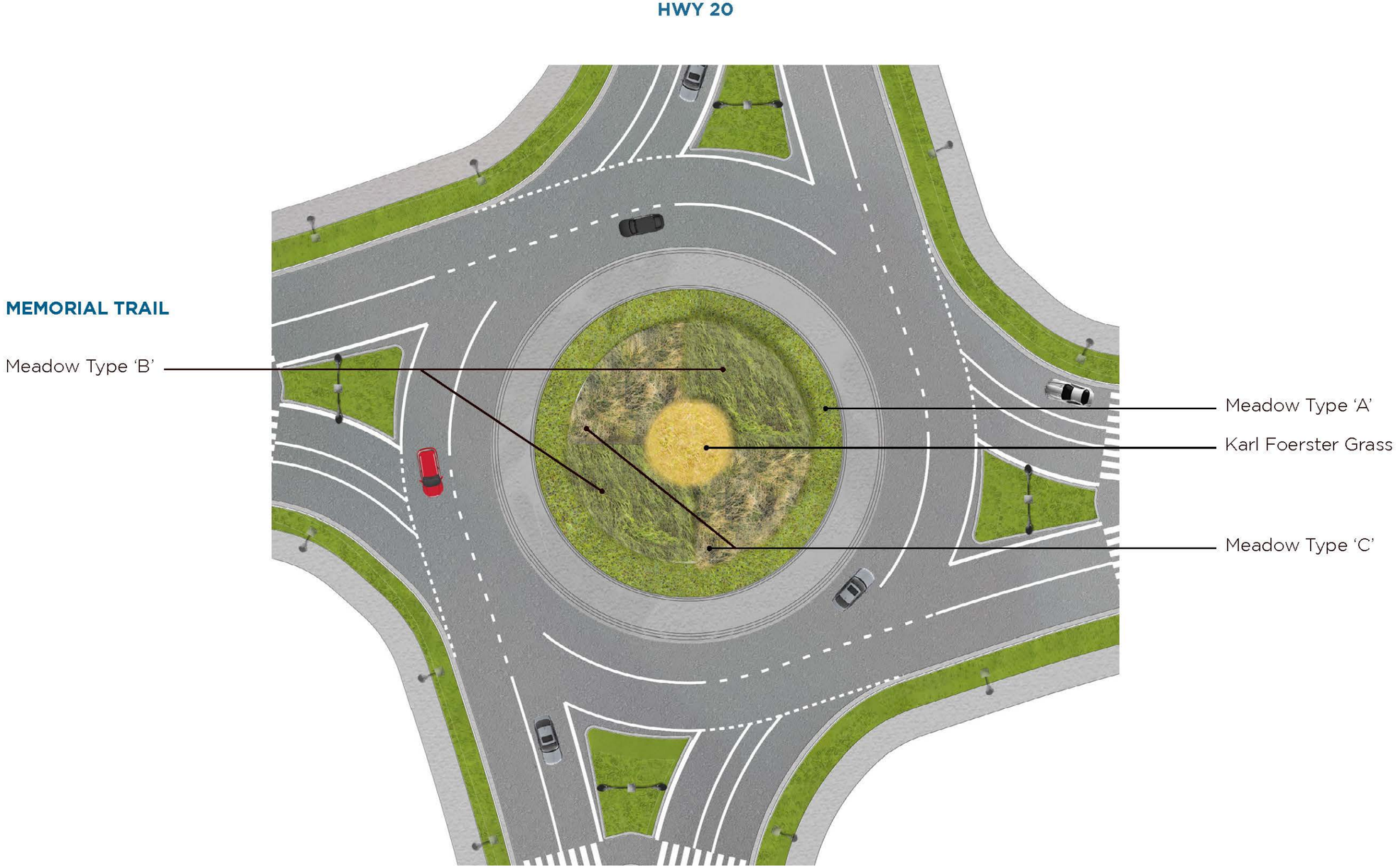
OPTION 3: 3m MEDIAN WITH COMBINED SIDEWALK/ 2-WAY BIKE

HWY 20 OPTION A: GRASSLAND

This option uses a range of grass types with varying heights to create a flowing, prairie setting

- Grass (Kentucky Bluegrass dominant)
- Grass (Rough Fescue dominant)
- Grass (Blue Wildrye dominant)
- Karl Foerster Grass

HWY 20 OPTION A- PLAN



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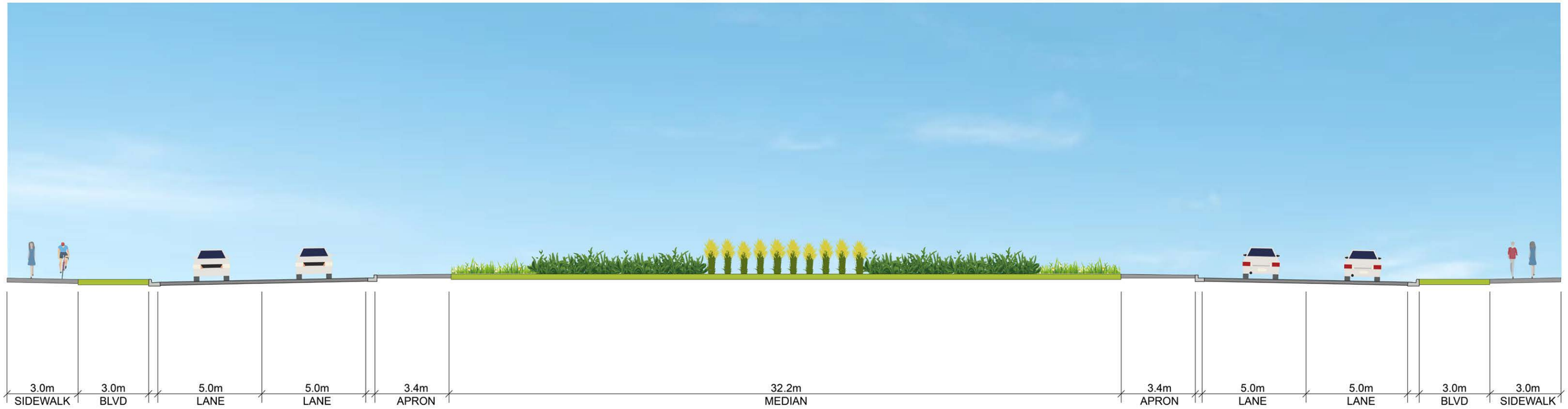
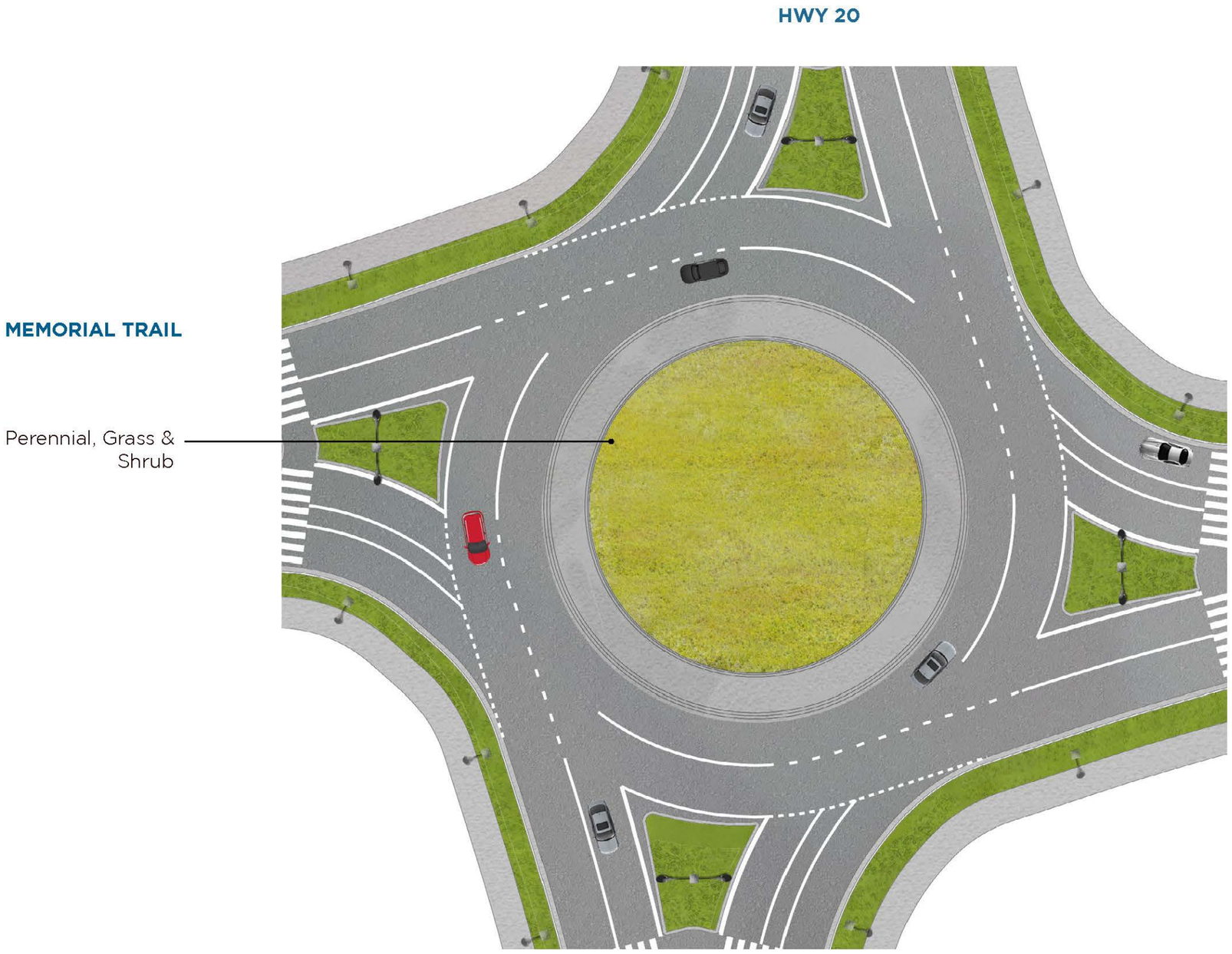


HWY 20 OPTION B: GRASSLAND & PERENNIALS

This option uses a range of perennial, grasses and shrubs to create a colourful roundabout with year-round interest

- Tufted Hair Grass
- Karl Foerster Grass
- Blue WIldrye/Kentucky Bluegrass
- Diverse Perennials

HWY 20 OPTION B- PLAN



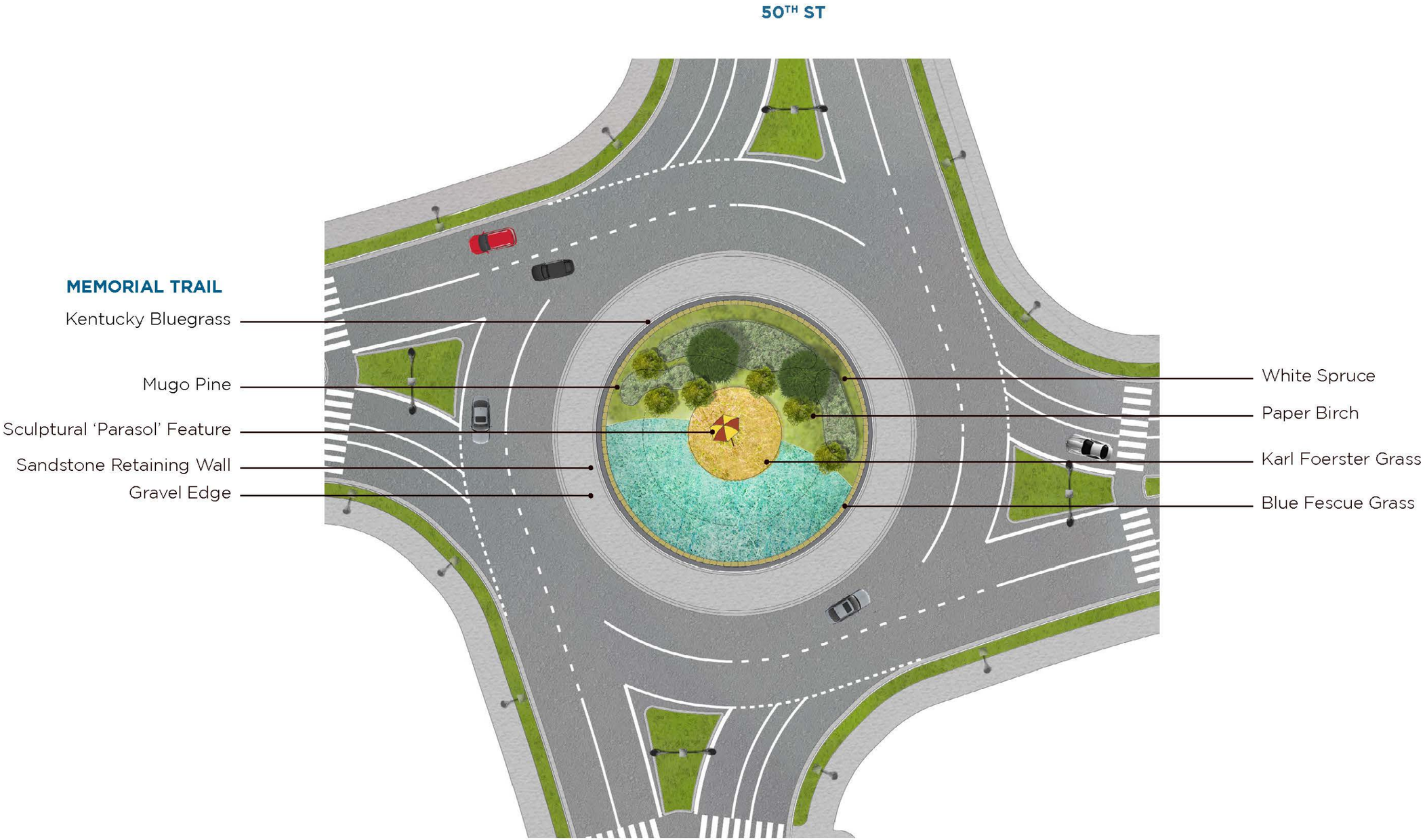
HWY 20 OPTION B- SECTION

ARTERIAL OPTION A (PROJECT EXAMPLE 50 STREET)

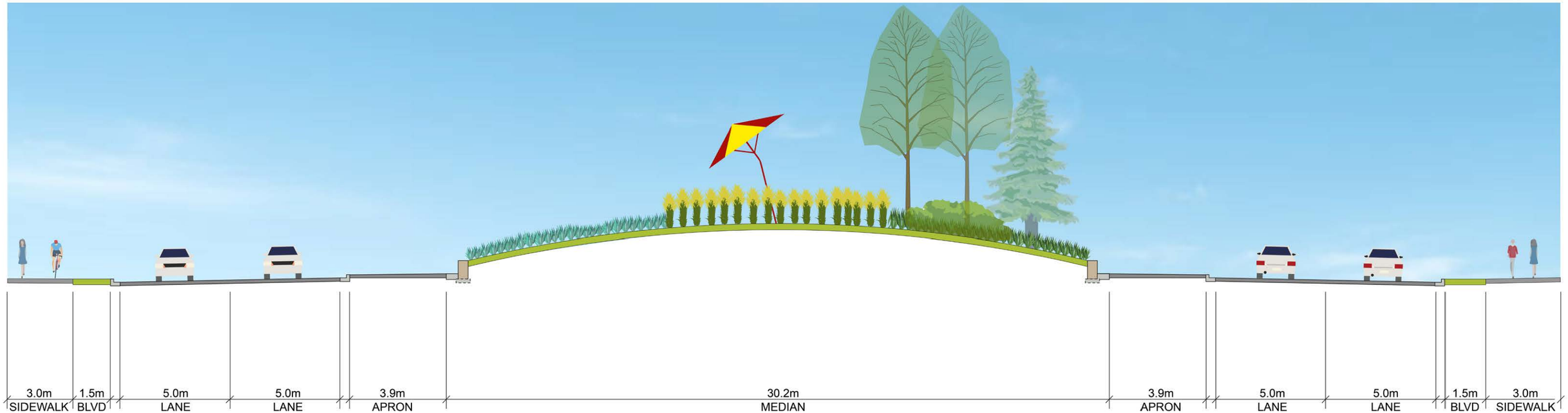
This option reflects the resort town environment, with a proposed parasol adding playful touch

- Stacked Stone Retaining Wall
- Paper Birch
- White Spruce
- Mugo Pine
- Karl Foerster Grass
- Kentucky Bluegrass
- Blue Fescue Grass
- Parasol feature

ARTERIAL OPTION A (PROJECT EXAMPLE 50 STREET)



ARTERIAL OPTION A (PROJECT EXAMPLE 50 STREET)

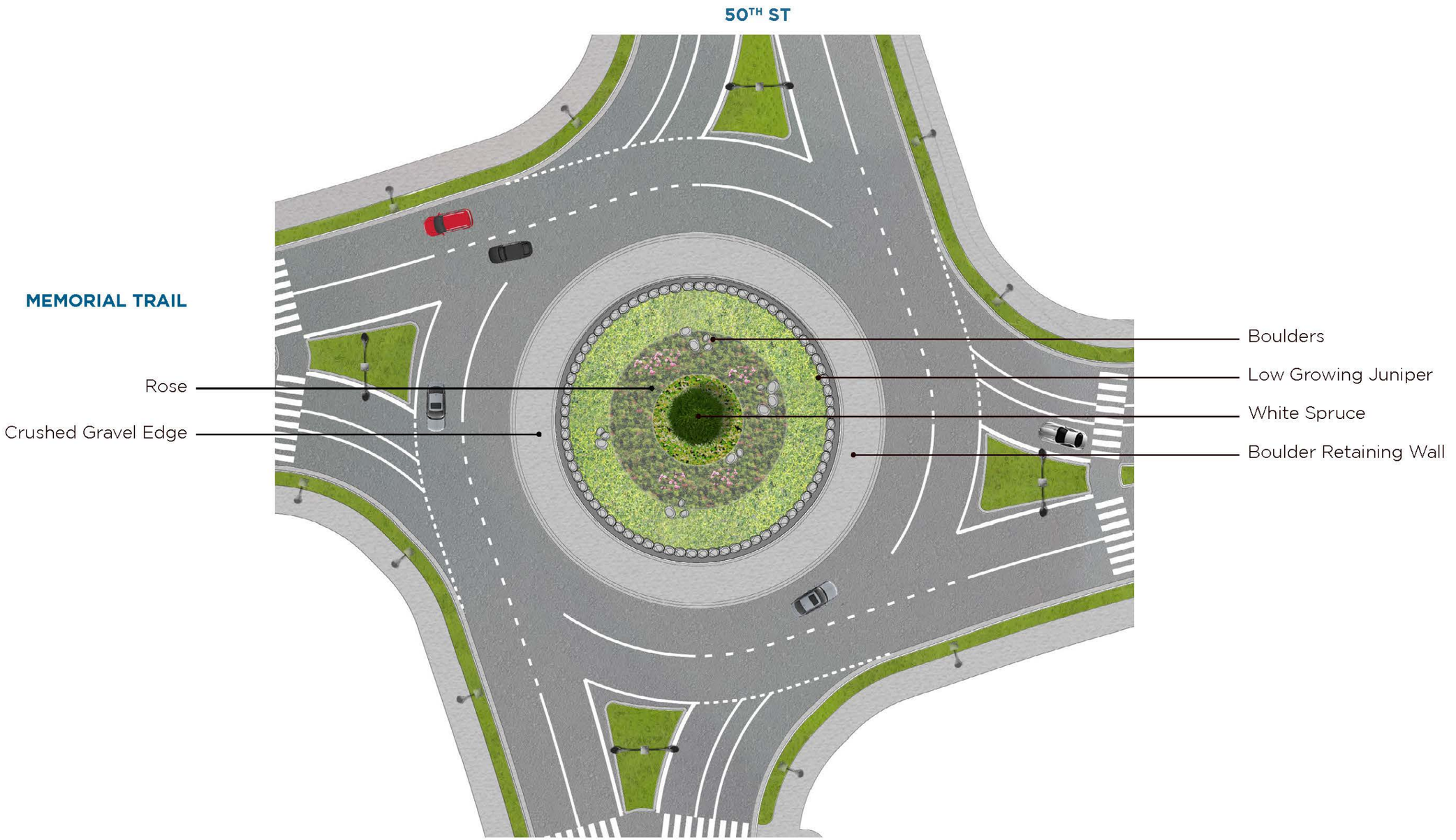


ARTERIAL OPTION B (PROJECT EXAMPLE 50 STREET)

This option uses a mixture of shrubs and White Spruce to create an attractive planting bed with seasonal interest

- Stacked Stone Retaining Wall
- Low-Growing Juniper
- Native Rose varieties
- Red Twig Dogwood
- White Cedar

ARTERIAL OPTION B (PROJECT EXAMPLE 50 STREET)



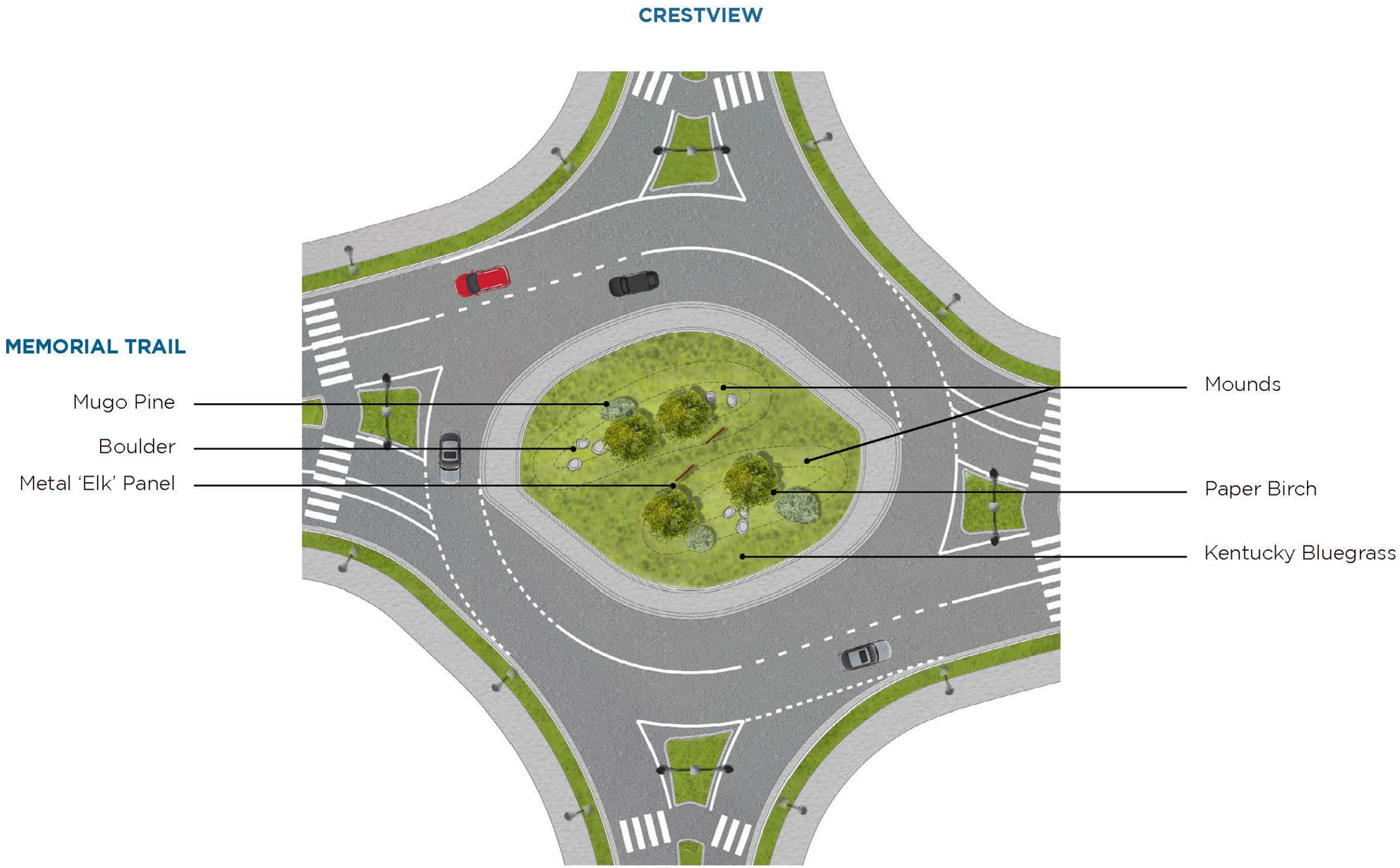
ARTERIAL OPTION B (PROJECT EXAMPLE 50 STREET)

LOCAL OPTION (PROJECT EXAMPLE CRESTVIEW BLVD)

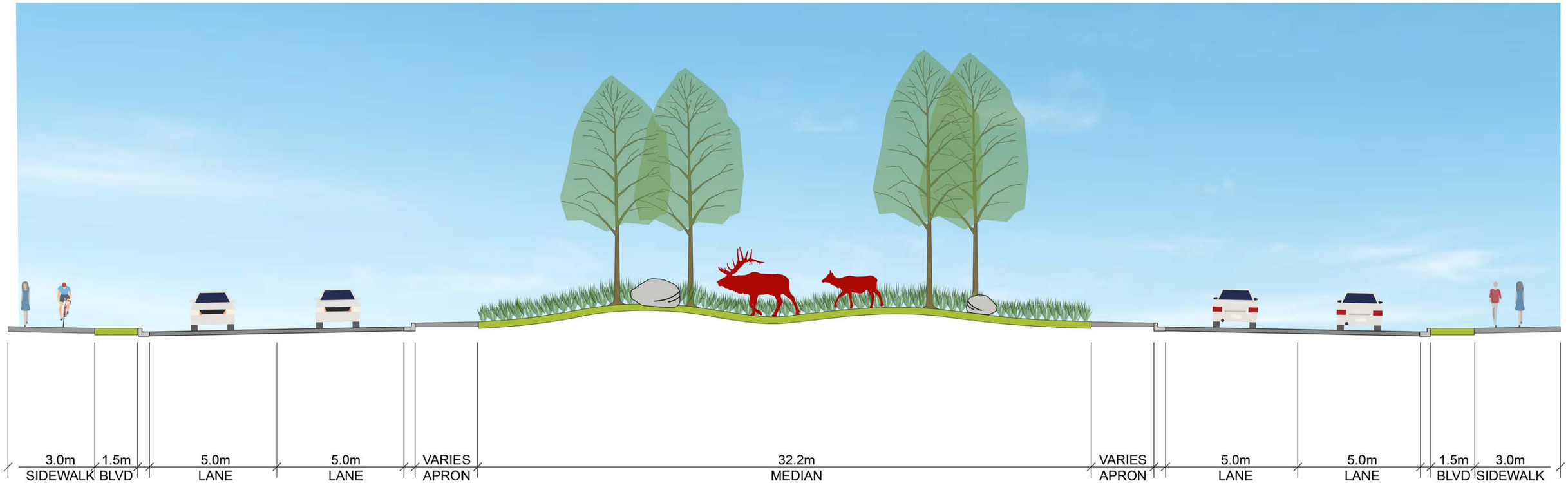
This option pays homage to the area's natural beauty, representing a grassy woodland with an eye-catching elk amongst the trees- especially interesting in winter

- Paper Birch
- Mugo Pine
- Blue WIldrye/Kentucky Bluegrass
- Boulders
- Elk feature

LOCAL OPTION (PROJECT EXAMPLE CRESTVIEW BLVD)



LOCAL OPTION (PROJECT EXAMPLE CRESTVIEW BLVD)



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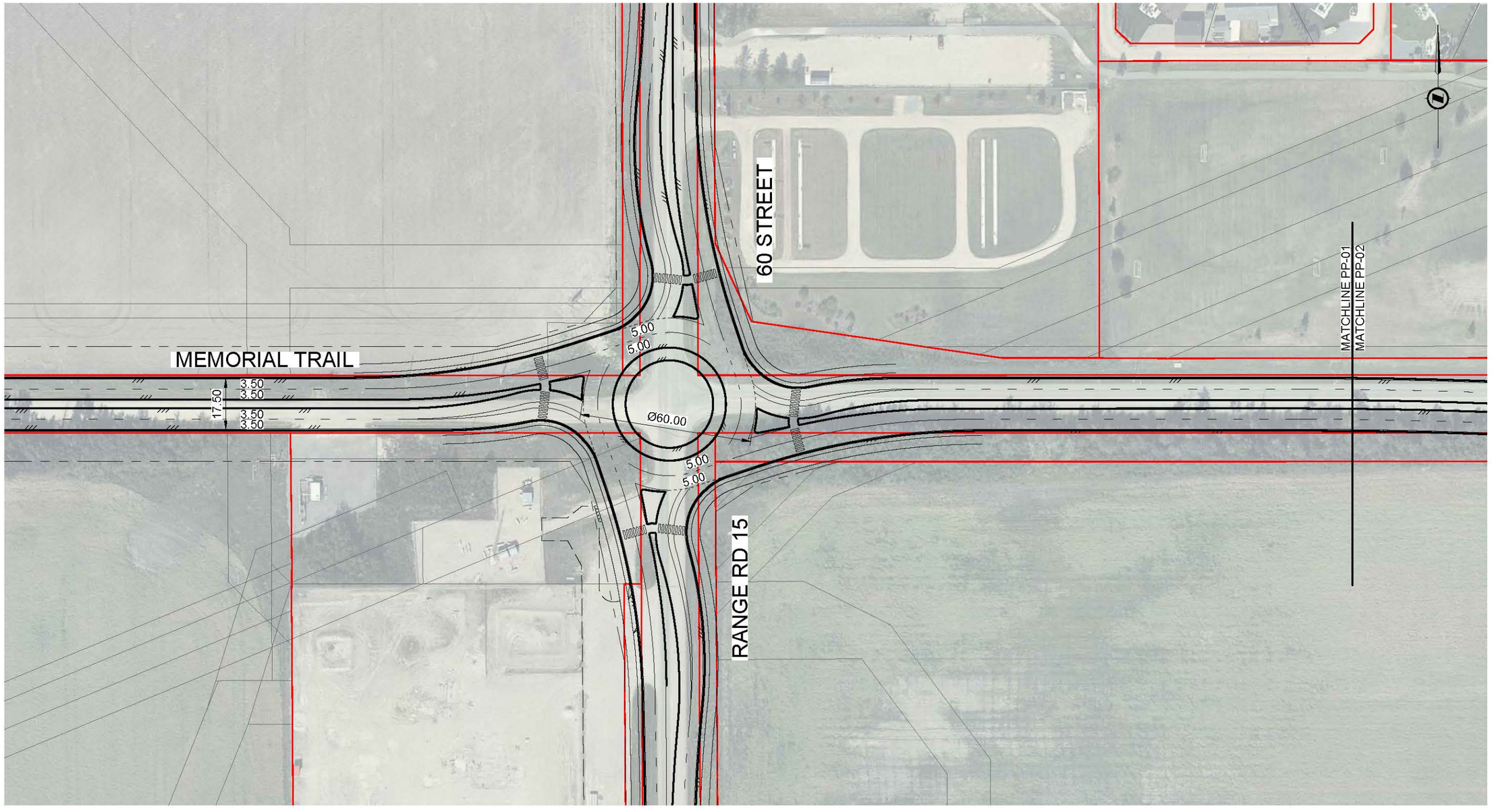

For discussion only subject to revision

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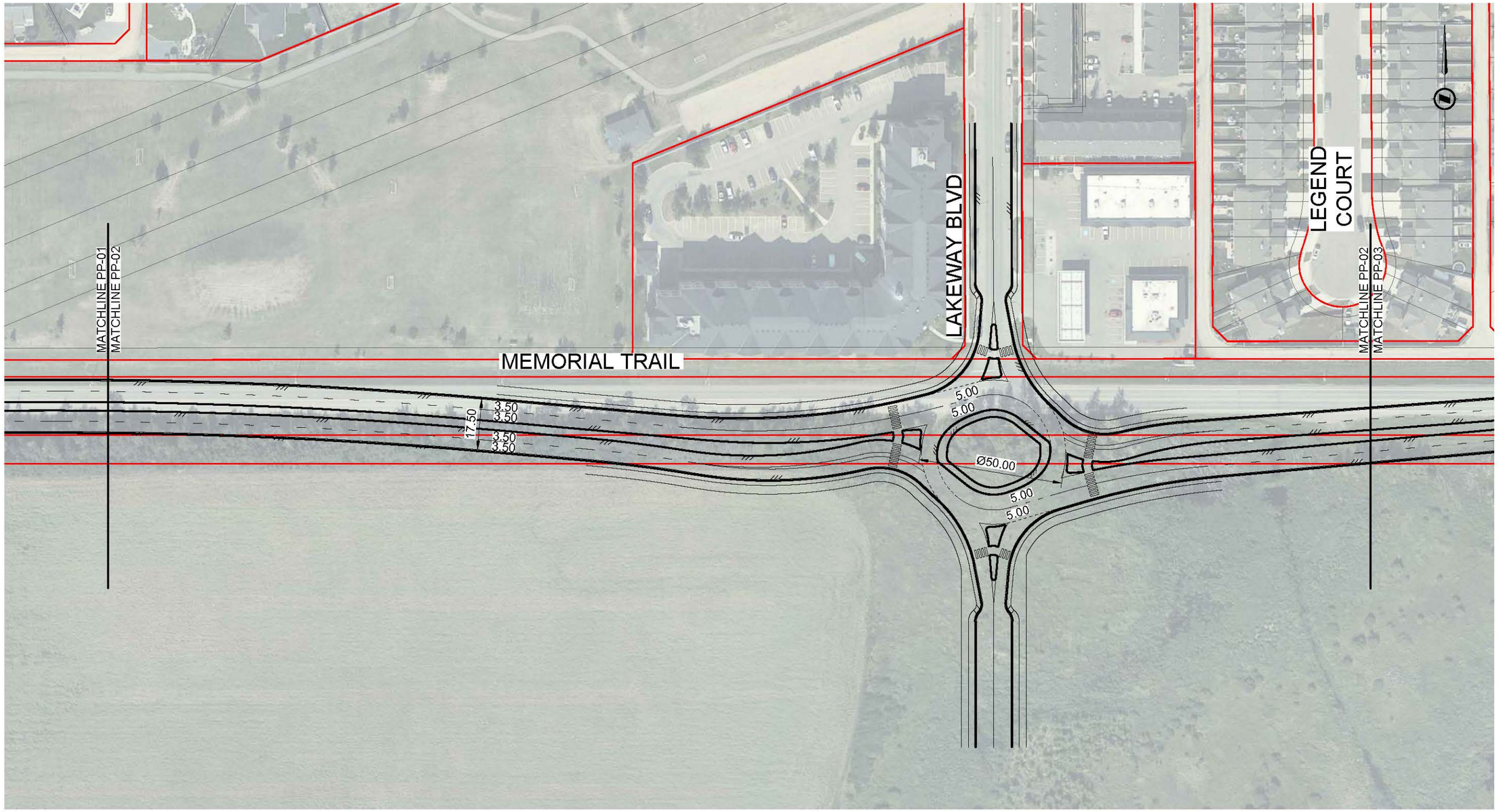

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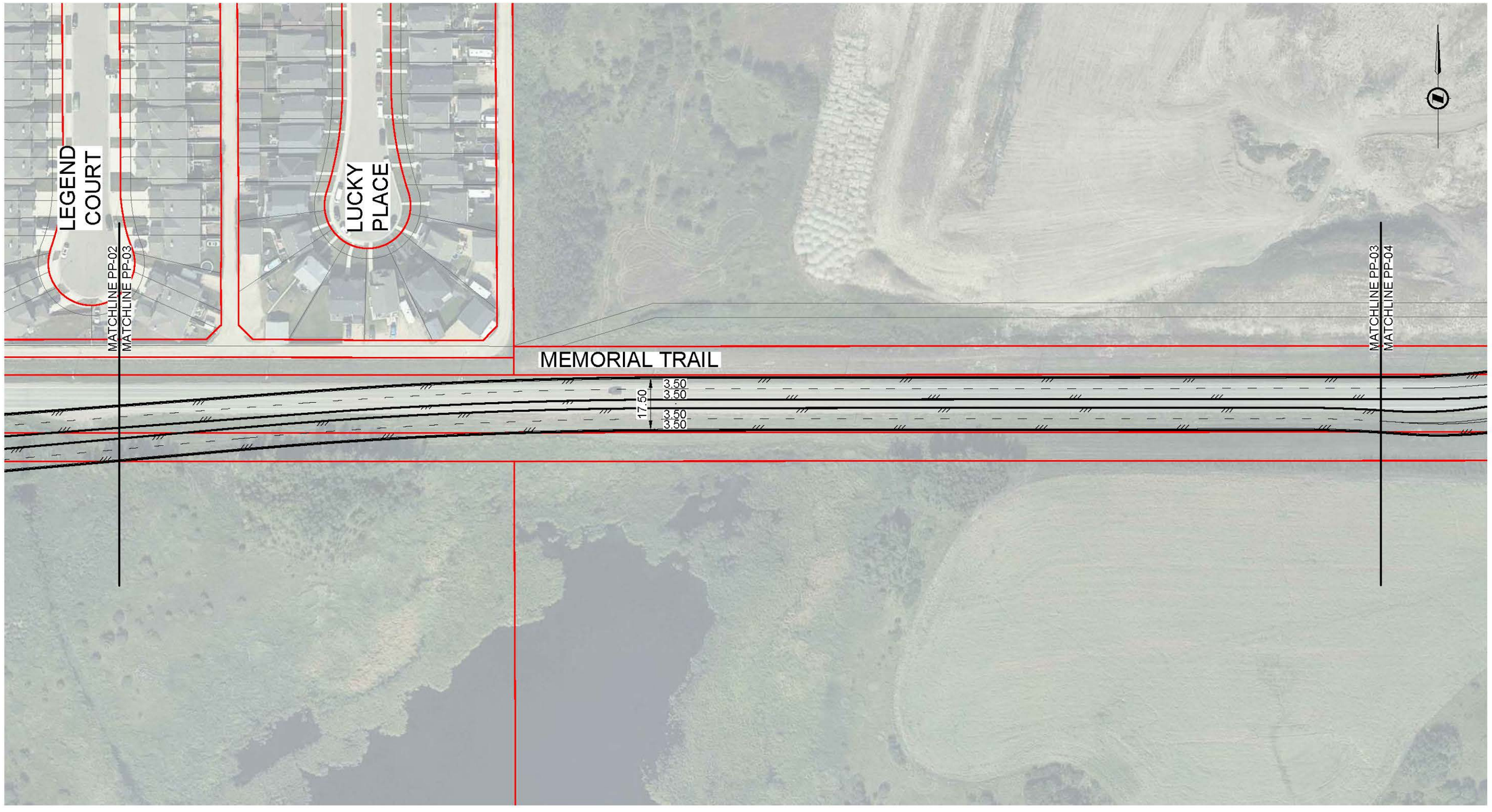

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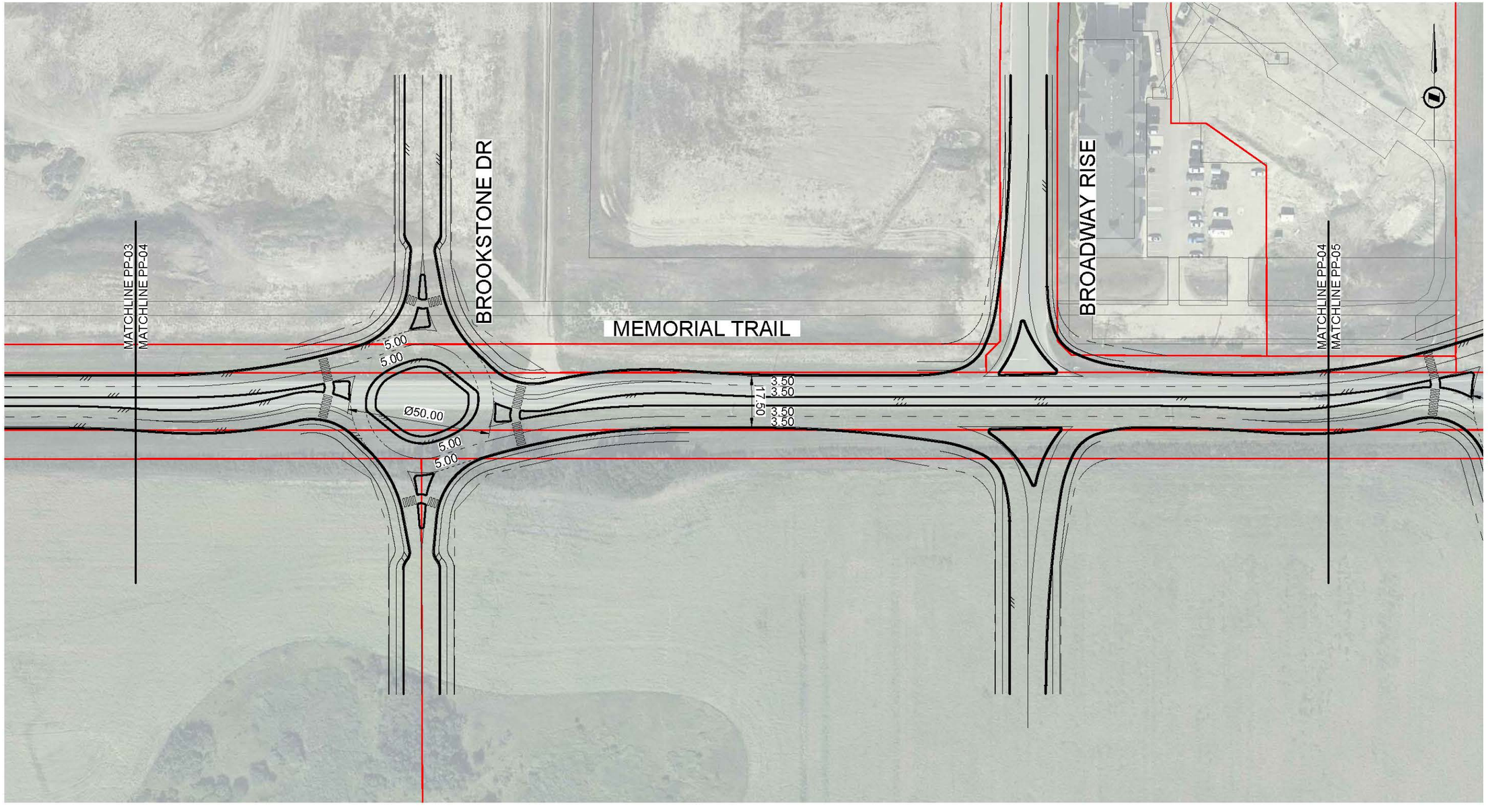

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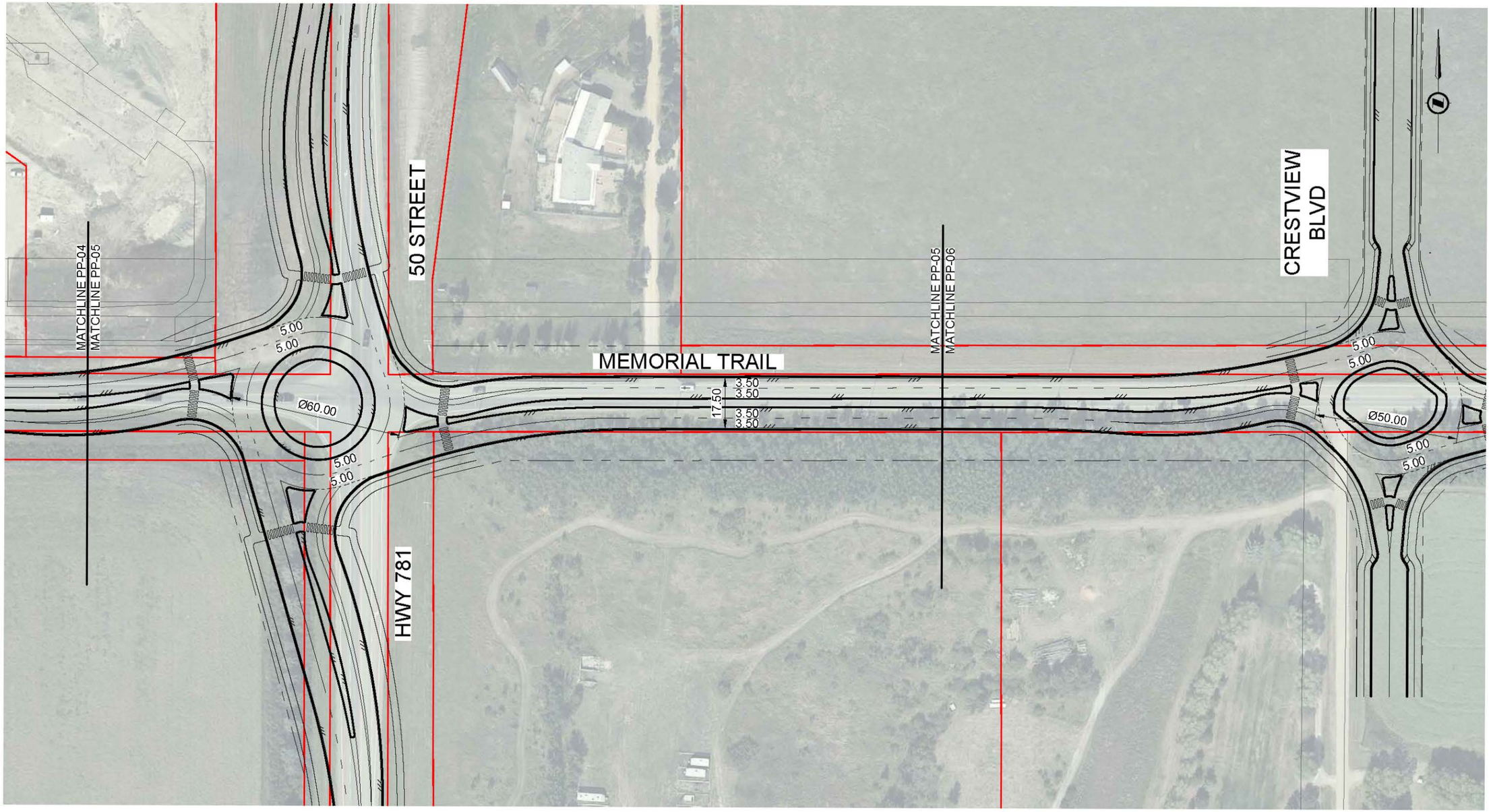

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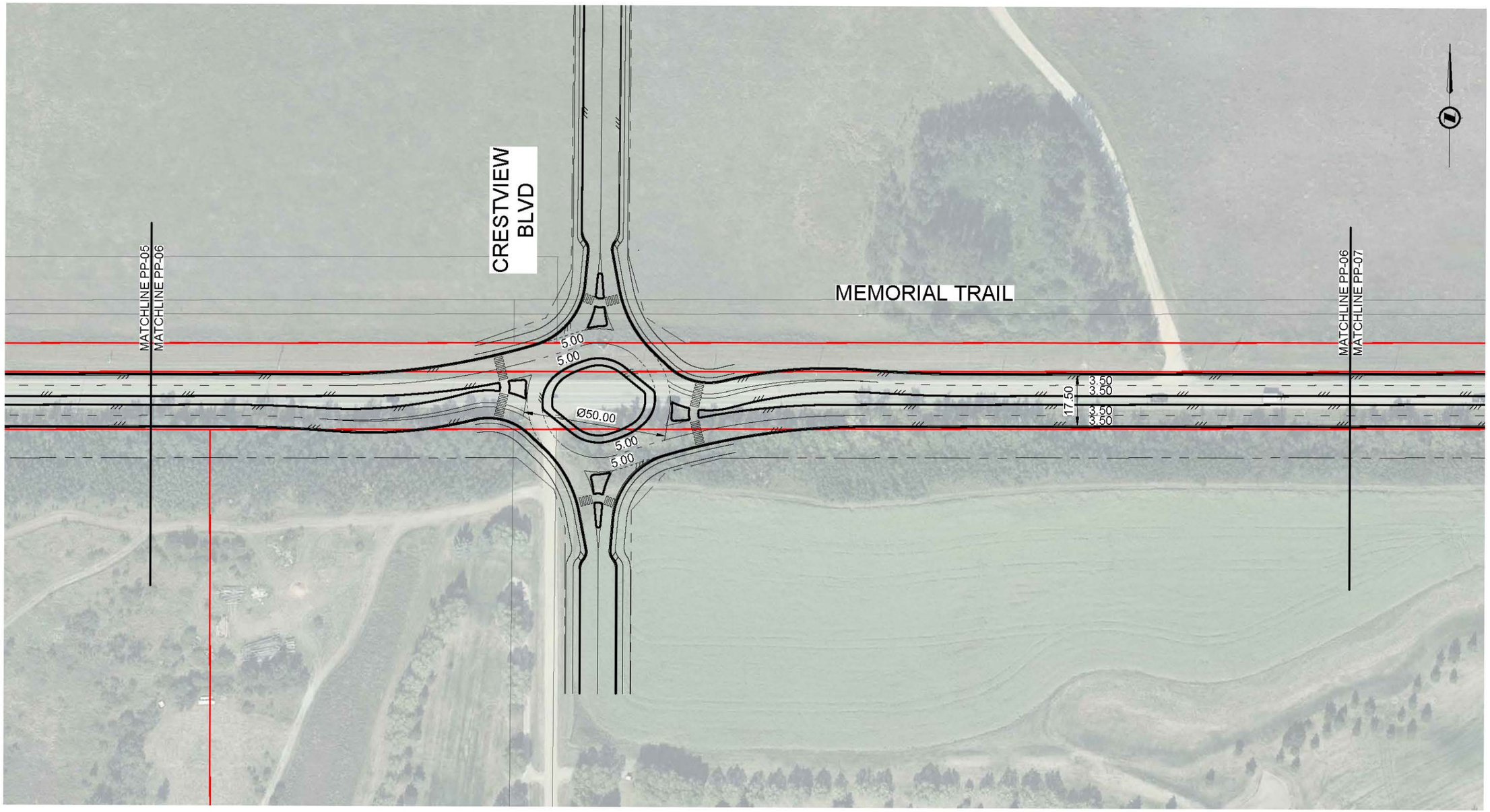

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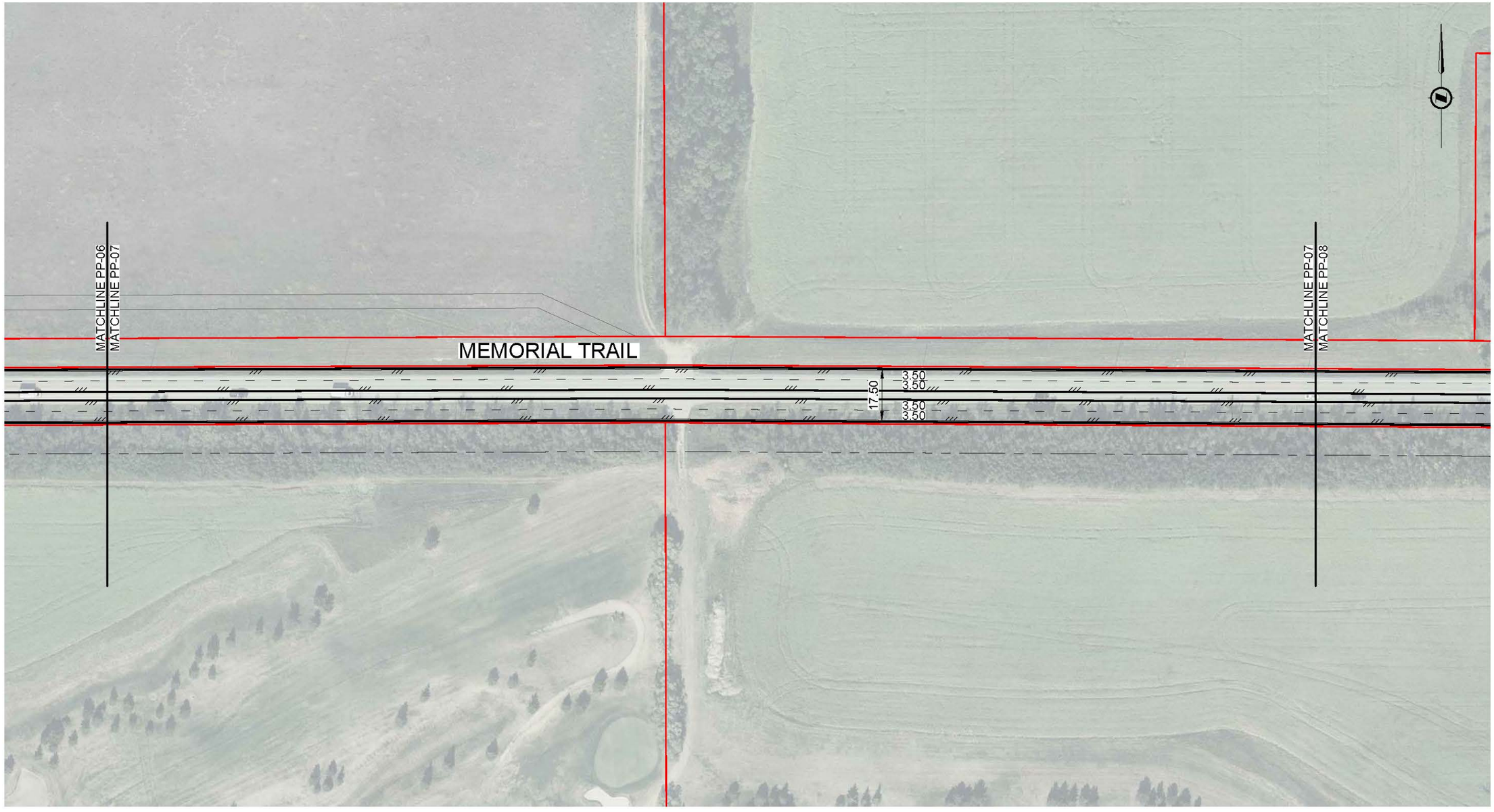

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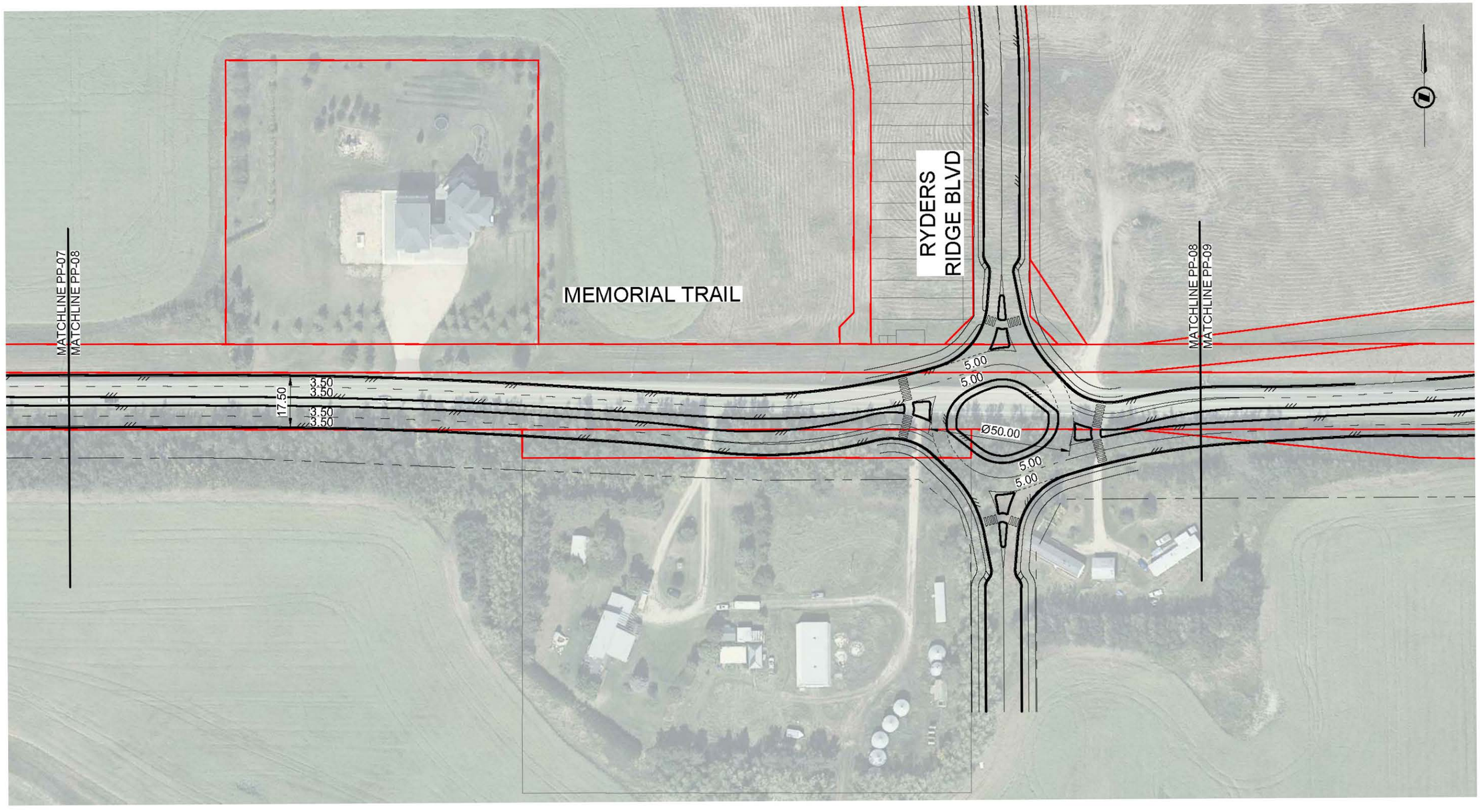

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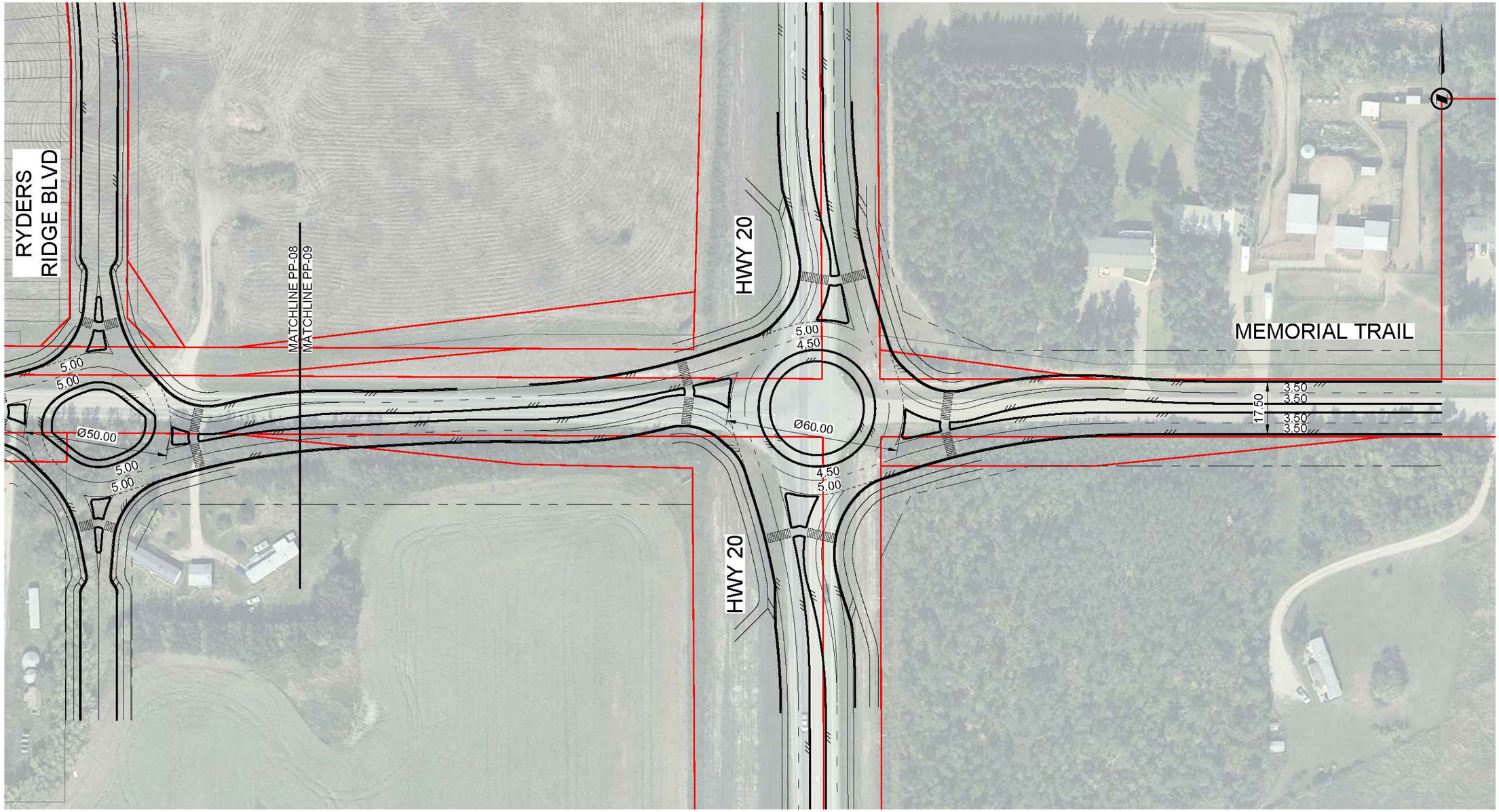

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APPENDIX D.2
Fall 2020 Public Engagmenet

Sylvan Lake

TRANSPORTATION STUDY

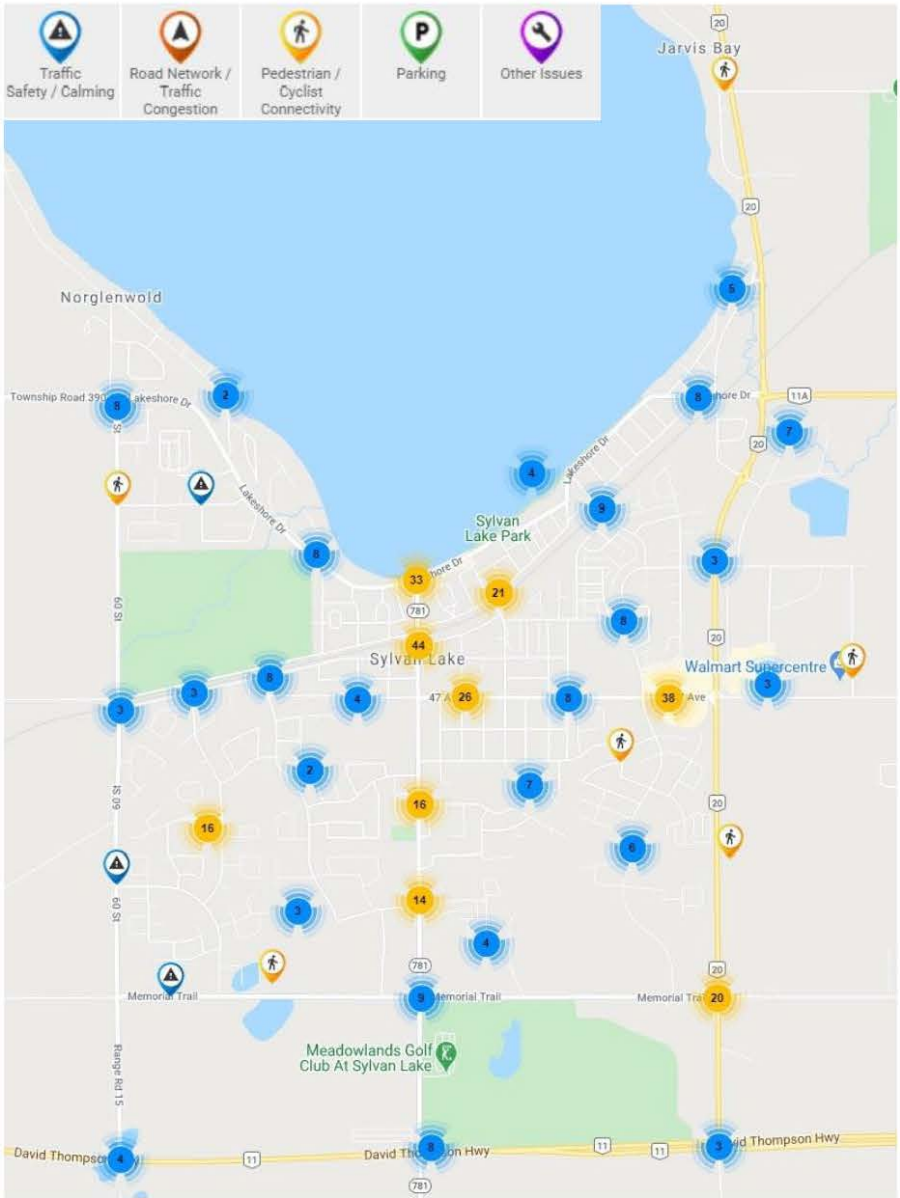
Online Public Survey Results Summary

December 2020

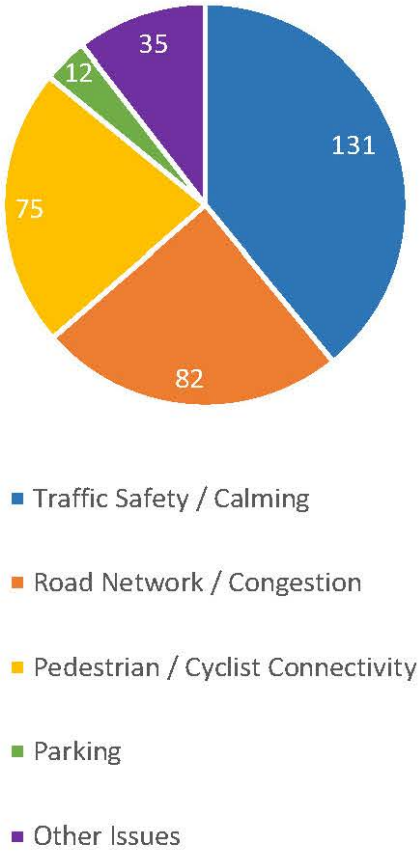
SURVEY OVERVIEW

In October 2020 the Town posted an online survey asking residents to identify various types of transportation concerns, experiences or ideas they had. Participants could using a social mapping tool to place a pin (organized by category) as well as respond to two additional questions seeking input specifically on the intersections of 50 Street at 50 Avenue and at Memorial Trail.

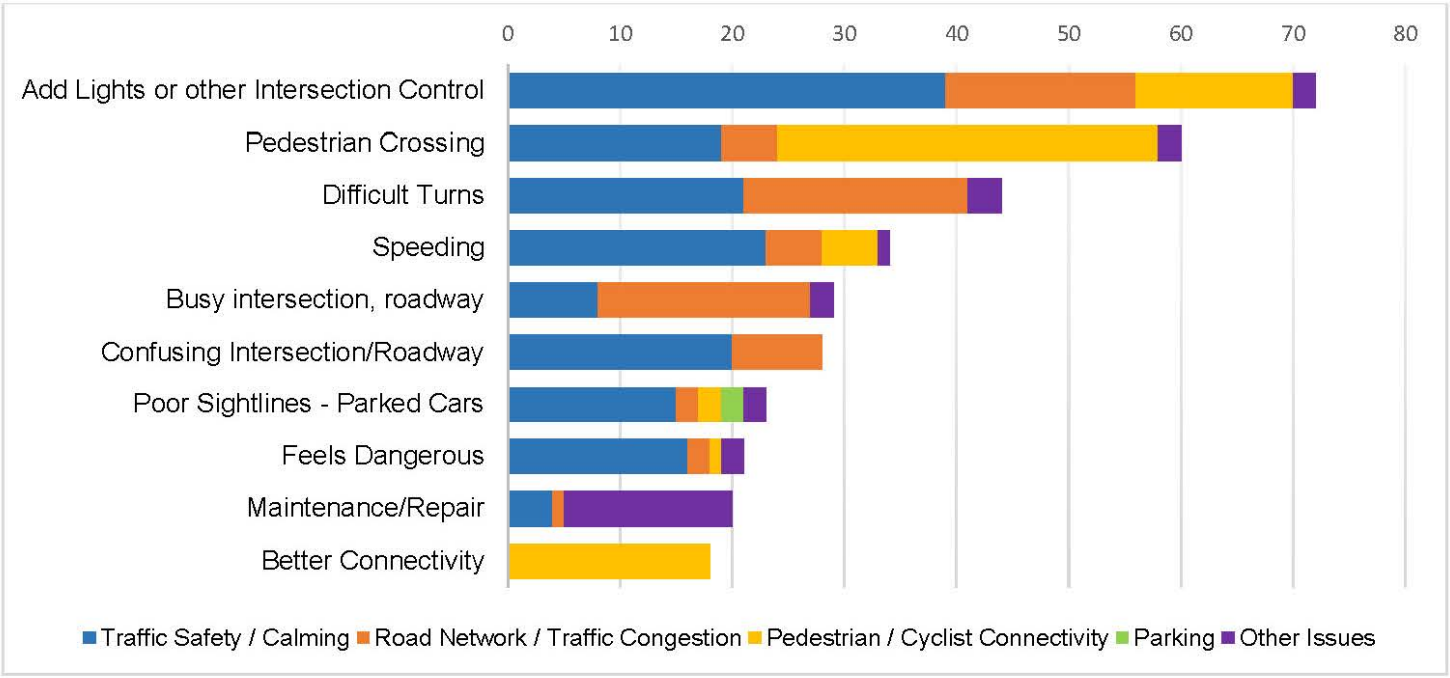
This report contains a summary of the feedback received through the survey.

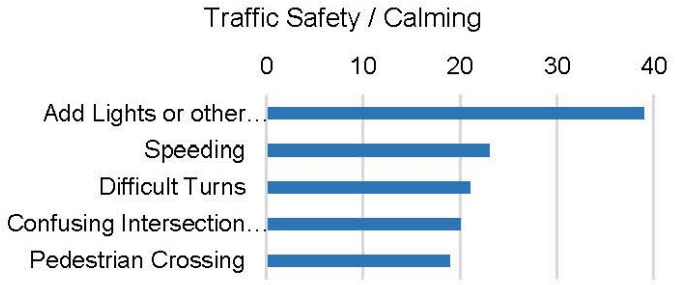


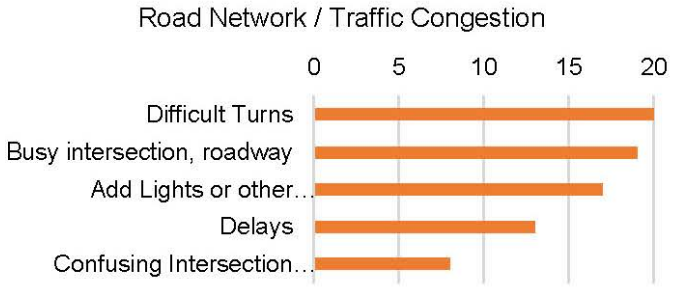
Comments Received

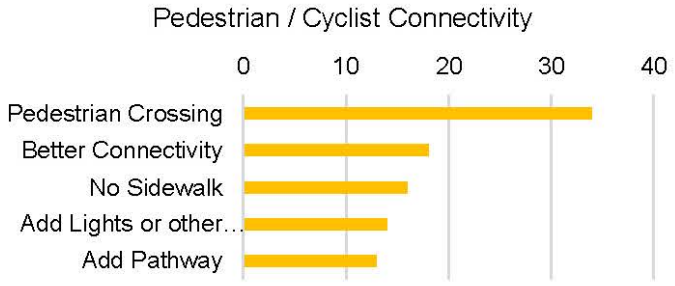


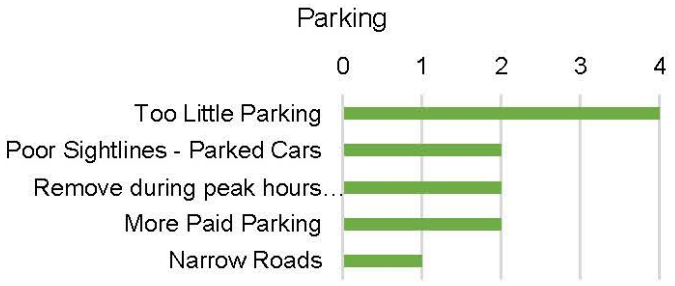
Mapping Comments – Overview of Key Themes by Pin Category

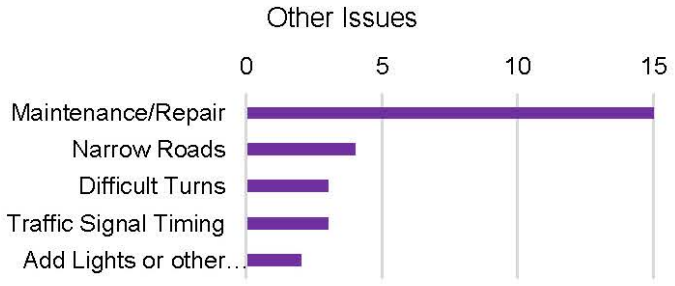




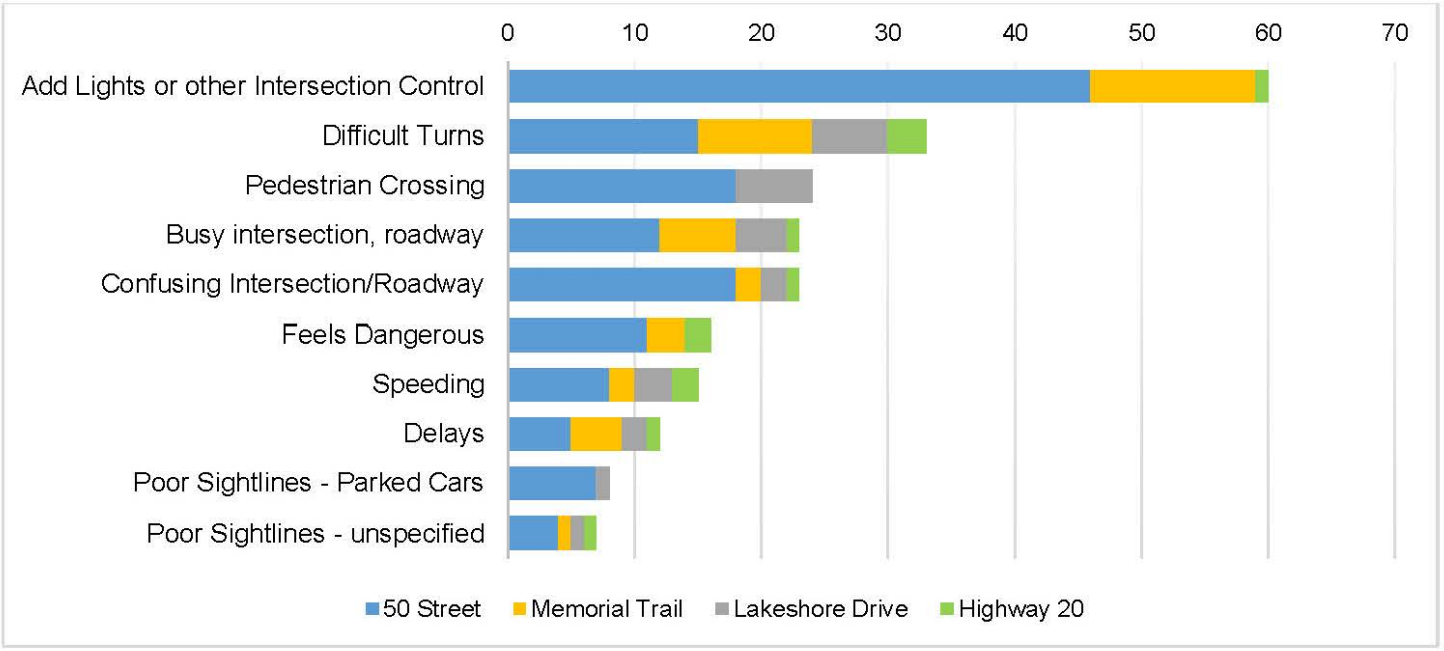


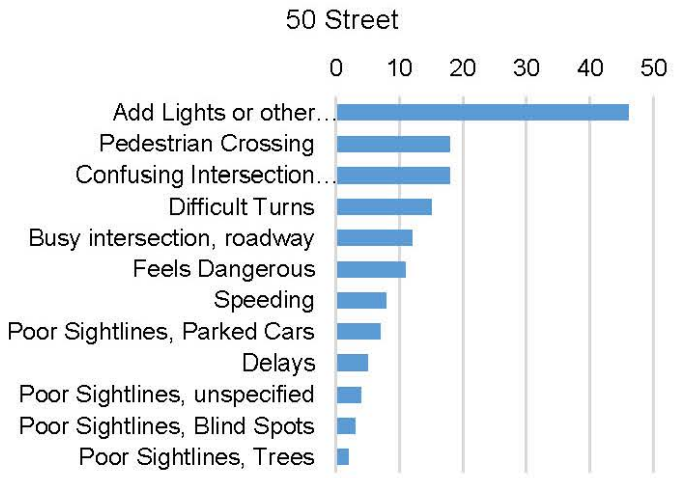


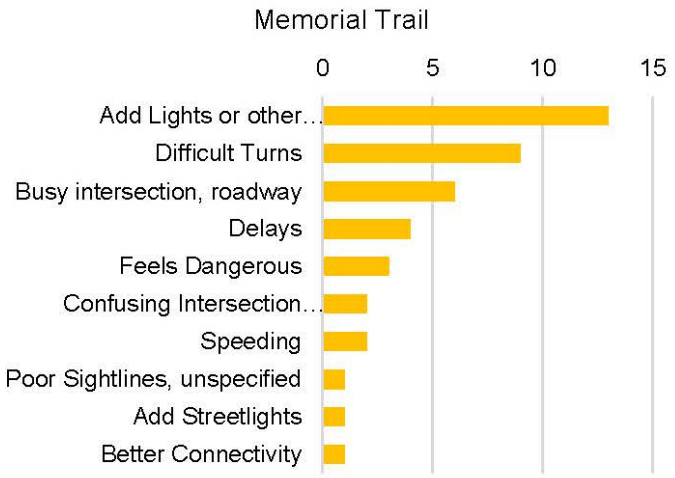


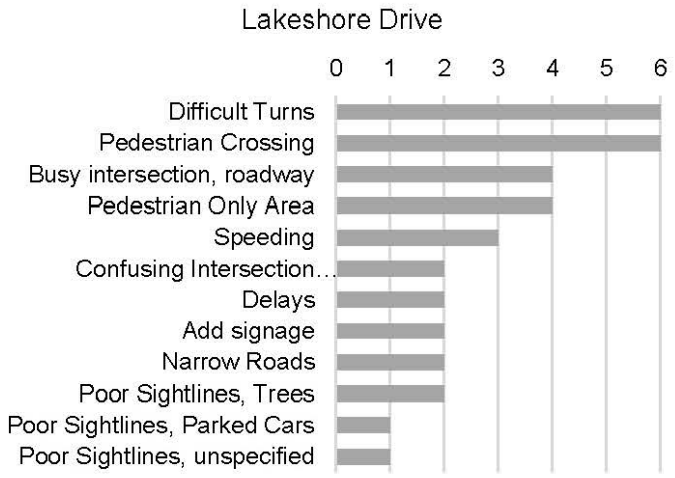


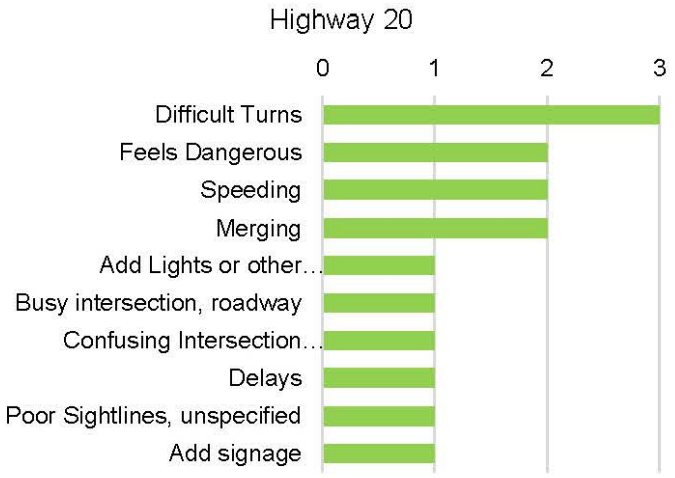
Mapping Comments – Overview of Key Themes by Major Road Location (as identified by participants)











SURVEY SUMMARY OF RESULTS

Traffic Safety and Calming

Participants were asked to place a pin on the map and identify what type of transportation concern they have, and where. Key themes from the feedback include:

- Respondents expressed a great deal of concern about the intersection of 50 Street and 50 Avenue as a confusing and unsafe intersection. Suggestions included adding traffic signals or a roundabout, pedestrian crossings, and using the parking lot space to realign the intersection.
- Other areas of concerns included speeding and difficulties using Lakeshore Drive in the summer months, turns and merging at Highway 20 and 47 Avenue, and concerns about safety, congestion and parking during school drop-off and pick-up times

Summary of Feedback – Traffic Safety and Calming

50 Street (Highway 781)

- The intersection at 50 Avenue is confusing and busy – suggestions to use traffic signals or a roundabout to control traffic, or to re-align the intersection using the adjacent park space
- Poor visibility at the intersection of 50 Avenue – suggestions to trim back the trees
- Concerns about visibility and pedestrian crossing near 45 Avenue and Sylvan Drive
- Suggestions for streetlights near Beacon Hill Drive
- Desire for traffic signals and safer crossing for school children near Memorial Trail

Highway 20

- Concerns about left turning and merge lanes at 47 Avenue and Herder Drive
- Suggestions for lane signage at traffic circle at Lakeshore Drive at Erickson Drive
- Concerns about paving maintenance near 47 Avenue
- Busy intersection at Memorial Trail needs traffic signals

Lakeshore Drive

- Concerns about vehicle and pedestrian congestion at 45 Street, and turning left onto Lakeshore Drive in the summer from Hwy 20
- Shrubs impede driver sightlines at 44 Street
- Speeding westbound traffic after 53 Street

Memorial Trail

- Concerns about driver sightlines and congestion at the intersections of 50 Street and Highway 20

NW Quadrant *North of 47 Avenue, West of 50 Street* • The playground zone near 48 Avenue and 50 Street is often ignored • Concerns about driver sightlines being compromised by trees, signage or grade changes near 48 Avenue, 60 Street and Fox Run signage at 48 Ave / Old Boomer Rd • Suggestion to extend 30 km/h speed limit past the mini-golf course near Marina Bay Court as many children play at the course	**NE Quadrant** *North of 47 Avenue, East of 50 Street* • Concerns about drivers running stop signs near 50 Avenue and 46 Street
SW Quadrant *South of 47 Avenue, West of 50 Street* • Suggestion for traffic signals at the David Thompson Highway; additional playground zone signage on Lakeway Blvd south of Laurel Close; and 4-way stop at Old Boomer Road and Firdale Dr • Concerns about parked cars on Old Boomer Road compromising driver sightlines • Concerns about speed on Old Boomer Road	**SE Quadrant** *South of 47 Avenue, East of 50 Street* • Difficult left turns near Ryders Ridge Boulevard at Reynolds road • Concerns about speeding on Ryders Ridge Boulevard and Cole Way

Road Network/Traffic Congestion

Participants were asked to place a pin on the map and identify what type of transportation concern they have, and where. Key themes from the feedback include:

- Respondents higlighted area of congestion along 50 Street at Lakeshore, 50 Avenue and Memorial Trail, and along Highway 20 at Memorial Trail and 47 Avenue
- Suggestions included the addition of traffic signals or improved timing of signals at several locations and to consider removing on-street parking during peak hours to improve traffic flow and driver sightlines

Summary of Feedback – Road Network/ Traffic Congestion

50 Street (Highway 781)

- Needs lights, roundabout or other intersection controls at 50 Avenue
- Difficult vehicle turning onto 50 Street at 45, 48 and 50 Avenues

Highway 20

- The merge lane in the double turning lane from 47 Avenue is too short and is confusing to drivers
- The lanes on the east and west sides of the intersection at 47 Avenue don't align, the right through lane travelling east ends to quickly
- The traffic circle at Lakeshore Drive is experiencing congestion for longer periods

Lakeshore Drive

- Suggestion for pedestrian only area between 50 Street and 46 Street during the summer months as the area is congested with both vehicle and pedestrian traffic
- Turning is difficult and dangerous for vehicles and pedestrians due to speed and congestion
- Suggestion to create truck route on Lakeshore west of 50 Street to alleviate heavy truck traffic at 50 Ave and 50 Street intersection

Memorial Trail

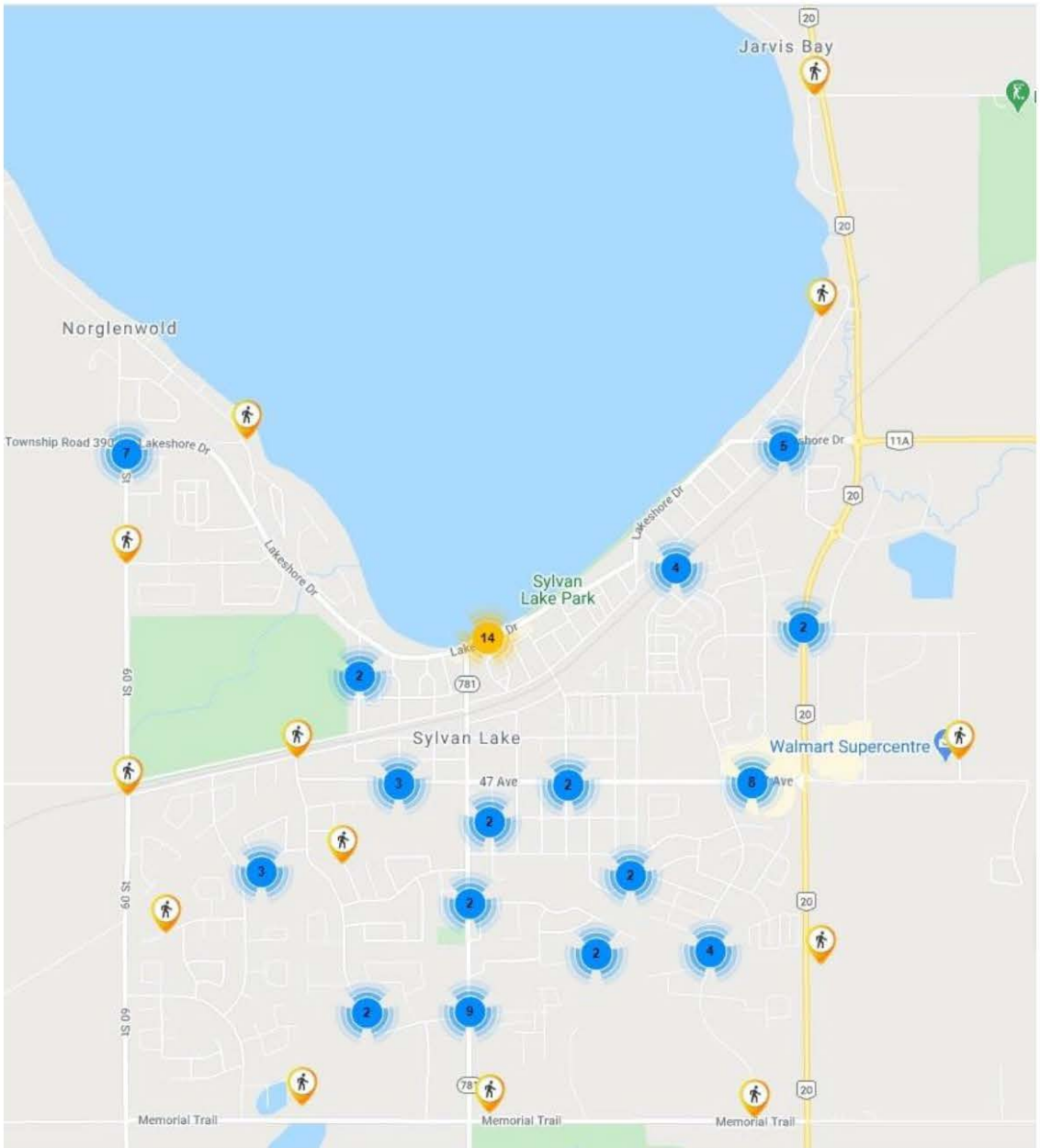
- Intersection at 50th street is very busy, congested, and suggestions for a controlled intersection
- Intersection at Highway 20 is very difficult to turn north, becomes congested, and suggestions for a controlled intersection
- Suggestion for speed limit to be 80km/hr

NW Quadrant *North of 47 Avenue, West of 50 Street* • Difficulty turning left at Fern Crescent • Poor driver visibility on 48 Avenue near Westview Drive	**NE Quadrant** *North of 47 Avenue, East of 50 Street* • Concern about excessive speeding on Herder Dr • Congestion and narrow intersection at Hewlett Park Landing • Long wait times at the four-way stop at 46 Street • Congestion and difficulty turning left along 47 Avenue between 43 and 46 Streets, suggestion to remove on-street parking during peak hours
SW Quadrant *South of 47 Avenue, West of 50 Street* • Congestion near Fox Run and Ecole Mother Teresa School during high traffic hours • Suggestion for a path or sidewalk through the field to access the school • Suggestion for traffic signals at 60 Street and Highway 11	**SE Quadrant** *South of 47 Avenue, East of 50 Street* • Concern about incomplete roads in the Crestwood neighbourhood • Desired for improvements to traffic signal timing at Ryders Ridge Boulevard and 47 Avenue

Pedestrian and Cyclist Connectivity

Participants were asked to place a pin on the map and identify what type of transportation concern they have, and where. Key themes from the feedback include:

- Suggestions for pathways connections included connecting from the lake to Memorial Trail on both the east and west sides of town as well as adding an east-west connection on the south side of town. There is also a desire for safer crossing of railway tracks.
- There is a desire for more formal pedestrian crossings in a number of areas including busy intersections and near schools. Missing sidewalks were noted on Ryders Ridge Boulevard and in the area near Cuendet Ind. Way.



Summary of Feedback – Pedestrian and Cyclist Connectivity

50 Street (Highway 781)

- Difficult to cross the CP Rail Trail near 50 Avenue
- Consider a bike route connecting to Lakeshore from around 42 Avenue
- Sidewalks on both sides of the street south of 50 Avenue, especially to the library
- Add pedestrian lights near Perry Drive
- Crossing safety concerns near Beacon Hill Drive

Highway 20

- Concerns about crossing the railway, and missing sidewalks near 47 Avenue
- Suggestion to build a bike trail all the way around the lake

Lakeshore Drive

- Need pedestrian crossing lights near 47 and 44 Streets as parked cars obscure pedestrians trying to cross
- Extend the shared pathway to Erickson Drive
- Parked cars often block the crosswalk near and entrance to the library
- Need separate pathways for pedestrians and cyclists along Lakeshore

Memorial Trail

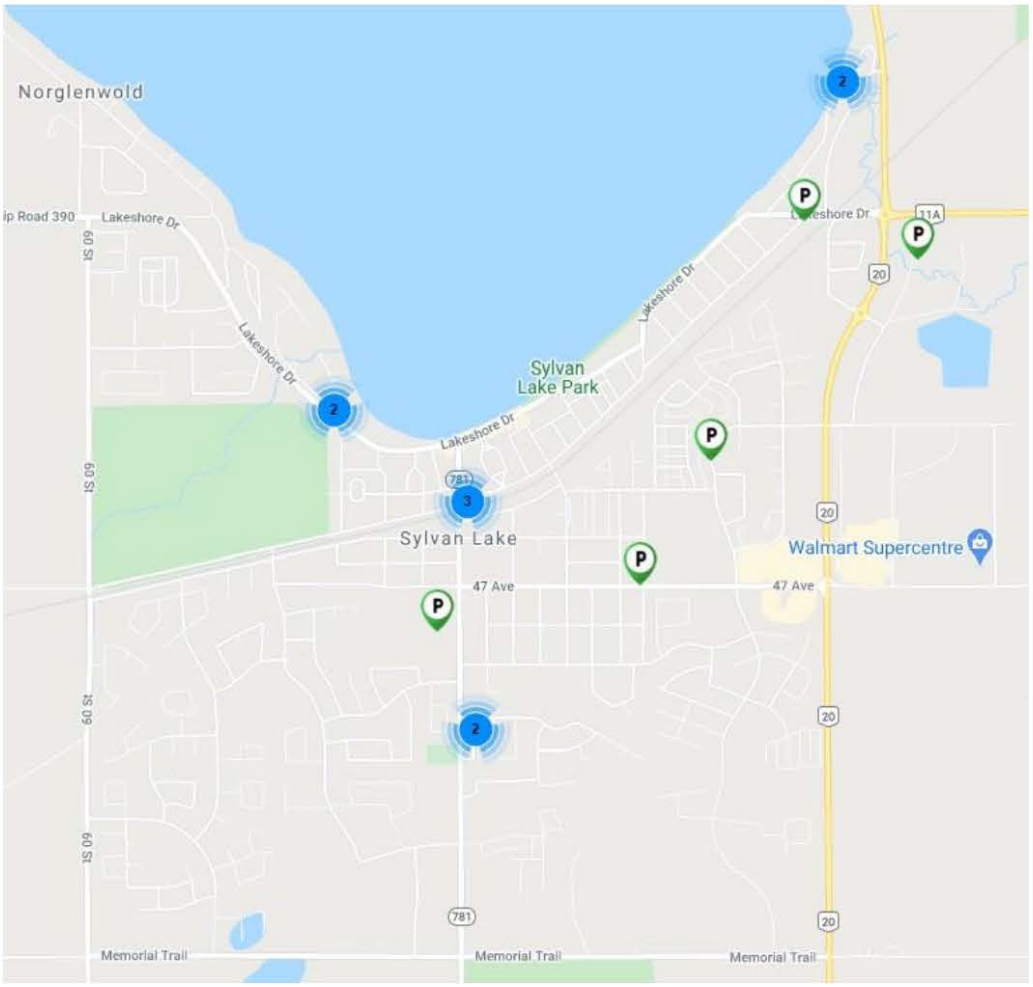
- Consider a pathway along memorial connecting Ryders Ridge and the Vista to the dog park

NW Quadrant *North of 47 Avenue, West of 50 Street* • It would be nice to see a trail connect between the lake and Highway 11 near 52 Street • Sidewalk needed from end of walking trail to north end of 60th. • Difficult for pedestrians to cross near Westwood Crescent at 60 Street	**NE Quadrant** *North of 47 Avenue, East of 50 Street* • Need sidewalks connecting the Hewlett Park and Ryders Ridge shopping areas • There are many employees along Cuendet Ind. Way who walk/cycle to work and on their breaks but there is no sidewalk • Difficult for pedestrians to cross 50 Avenue between 39 and 47 Streets
SW Quadrant *South of 47 Avenue, West of 50 Street* • Need crossing lights at 52 Street and 47 Avenue • An east-west bike path connection on the south side of town connecting Leader Park to Crestview • Need a better pedestrian railway crossing at 60 Street and 48 Avenue	**SE Quadrant** *South of 47 Avenue, East of 50 Street* • Need crosswalks on 45 Avenue and Regatta Way near Reynolds Road • Missing or inconsistent sidewalks on Ryders Ridge Boulevard

Parking

Participants were asked to place a pin on the map and identify what type of transportation concern they have, and where. Key themes from the feedback include:

- There is a need for more paid parking downtown
- In a number of places on-street parking was identified as obstructing driver sightlines



Summary of Feedback – Parking

50 Street (Highway 781)

- Student and street parking is an issue near 45 Avenue
- On-street parking causes issues with traffic flow

Lakeshore Drive

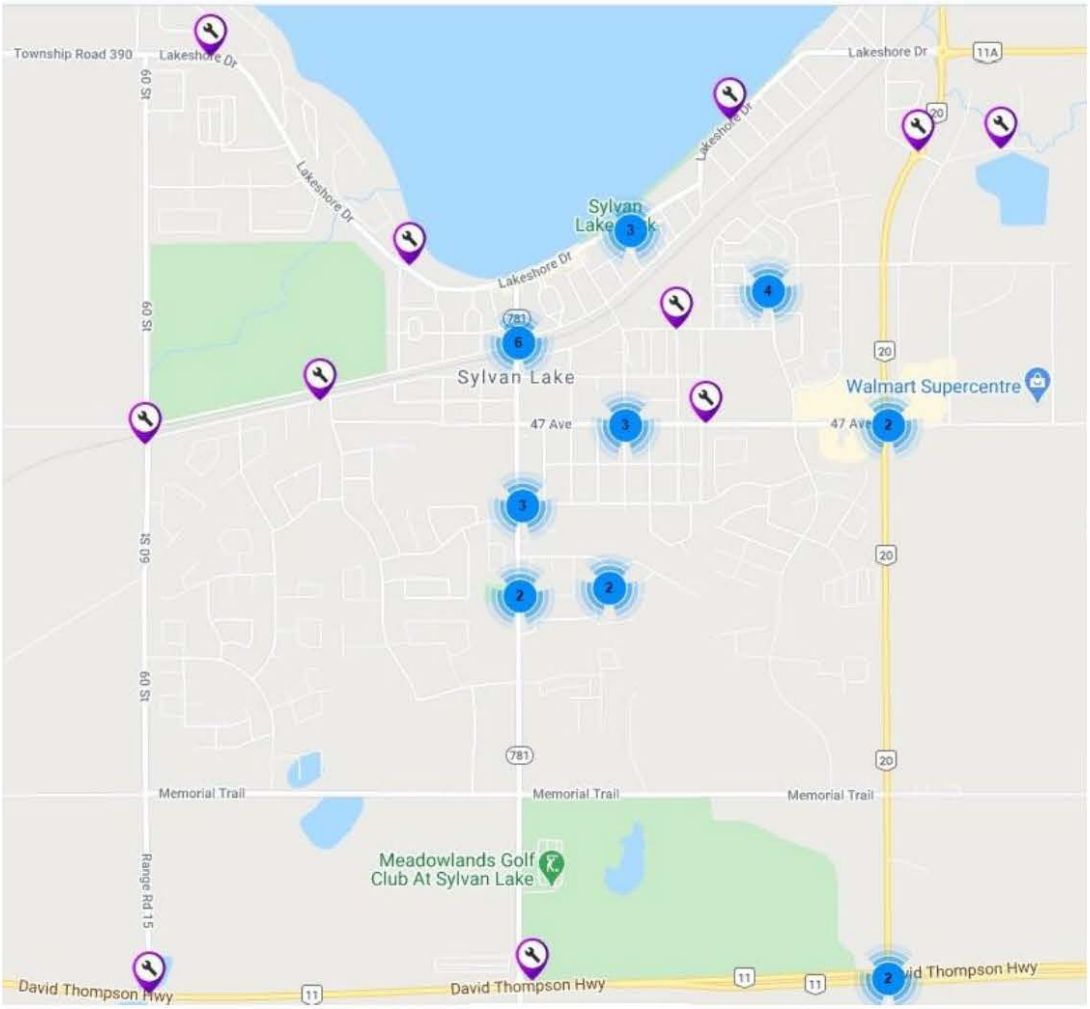
- Need more parking near restaurants
- Need more paid parking
- Large parked vehicles or trailers causes issues with visibility near 53 Street

NW Quadrant *North of 47 Avenue, West of 50 Street* • Need more paid parking near 50 Avenue	**NE Quadrant** *North of 47 Avenue, East of 50 Street* • Parking on Herder Dr compromising visibility, suggestion for driveway or laneway parking
	SE Quadrant *South of 47 Avenue, East of 50 Street* • On street parking on Pelican Place narrows the road too much, particularly during winter • More parking is required near Pelican Place to access businesses

Other Issues

Participants were asked to place a pin on the map and identify what type of transportation concern they have, and where. Key themes from the feedback include:

- There were some notes about maintenance needed to fix potholes or heaving in areas such at 47 Avenue and Highway 20, and 50 Street and 45 Avenue
- There is a concern about pedestrian safety on Lakeshore Drive, and a suggestion to close off Lakeshore Drive to pedestrians more regularly as was done during the weekends this past summer



Summary of Feedback – Other Issues

50 Street (Highway 781)

- It is difficult to turn onto 50 Street at 50, 47, and 44 Avenues, particularly at peak hours
- Road maintenance required at 45 Avenue
- Needs consistent posted speed limit, currently it changes

Highway 20

- Merge lane at 47 Avenue is too short
- Lifting manhole cover at 47 Avenue
- Turn Signal at David Thompson Highway sometimes does not turn on

Lakeshore Drive

- Concern about pedestrian safety during farmers' market
- Narrow streets at 49 Avenue
- Raised crosswalks causes trailers to bottom out
- Needs a street light on Lakeshore Drive between Rustic Road and Range Road 15
- It created a nice environment to close off lakeshore on weekends during the summer

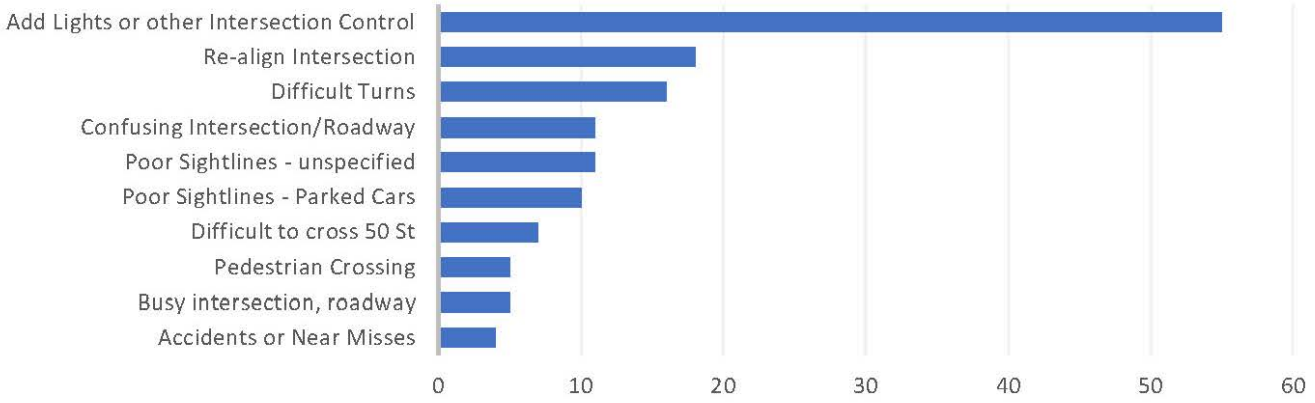
NW Quadrant *North of 47 Avenue, West of 50 Street* • 48 Ave between 60 St and Westview Drive speed limit could be increased to 50 km/hour • Poor drainage in the area	**NE Quadrant** *North of 47 Avenue, East of 50 Street* • Requires road maintenance to address potholes and cracking or unfinished pavement at Herder Drive • Poor visibility and pedestrian crossings at 44 Street and 49 Avenue
SW Quadrant *South of 47 Avenue, West of 50 Street* • Stop sign needs to be moved closer to the intersection to improve visibility on 60 Street	**SE Quadrant** *South of 47 Avenue, East of 50 Street* • Manholes are higher than the pavement • Requires slow down signs by Cole Way and 50 Street due to children playing

Additional Questions

Participants were asked to describe their concerns, experiences and ideas for the instersections of 50 Street with 50 Avenue and with Memorial Trail. Key themes from the feedback included:

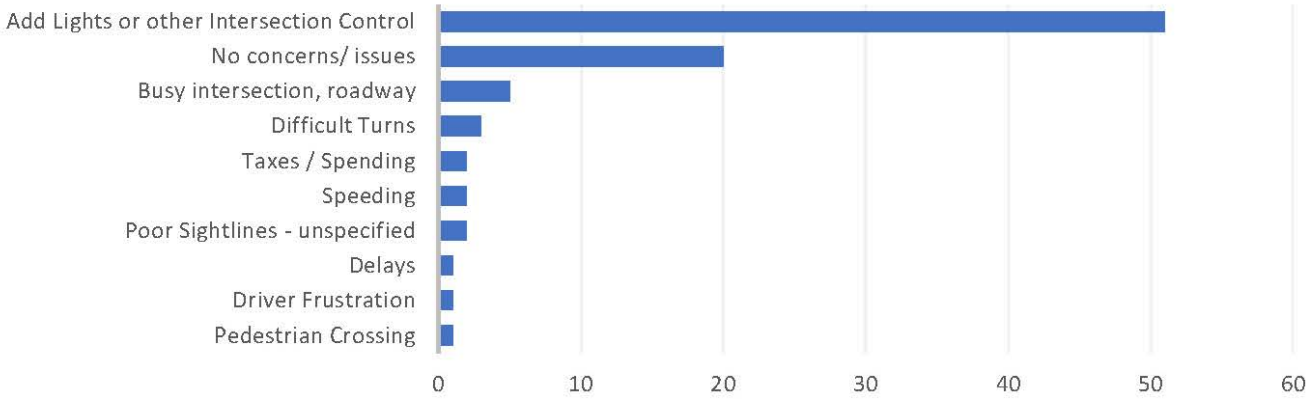
50 Avenue and 50 Street

- The intersection was described as difficult and confusing to navigate
- Suggestion for a pedestrian crossing light as it feels unsafe to navigate the intersection on foot
- Comments described drivers using the intersection improperly, which causes safety concerns
- There is difficulty turning left from 50 Avenue onto 50 Street due to blind spots and busy traffic
- Suggestions to add traffic signals, a roundabout, or a 4-way stop
- Suggestion to allow right turns only at the intersection
- Suggestion to remove or move the parking lot or the park adajcent to 50 Avenue to realign the intersection



Memorial Trail and 50 Street

- Some congestion is experienced at this intersection during peak hours
- It can be difficult to make left turns
- Speeding is a concern
- Does not feel safe to cross as a pedestrian
- Many suggestions to add a roundabout or set of traffic signals



APPENDIX D.3
Fall 2021 Public Engagement

Memorial Trail Upgrades

Welcome

Learn about the project and share your input on the proposed Memorial Trail Upgrades

Learn about the project by visiting: **sylvanlake.ca/communications**

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Project Overview

The Memorial Trail Upgrades study area covers Memorial Trail between Pogadl Park and Highway 20. The study aims to better accommodate and improve safety for all types of travel. This includes continuous multi-use pathways, and roundabouts at intersections along the study area.

As part of this project, short-, medium-, and long-term functional plans have been developed for the study area to allow improvements to be implemented over time to accommodate travel and development growth.

Study Area Map

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Project Timeline

Fall 2020

Gathered community feedback through an online survey that identified transportation opportunities and concerns for the Transportation Master Plan (TMP)

Winter / Spring 2021

Gathered and reviewed background project information, developed and evaluated roundabout and cross-section concepts

Summer 2021

Presented cross-section and roundabout concepts to Council. Council selected a preferred cross-section and two roundabout concepts for further consideration in the Functional Plan

Fall 2021

Present the long-, medium- and short-term functional plans to the community. Review feedback to refine and finalize the Functional Plan

WE ARE HERE

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Community Engagement

In September 2020, the Town posted an online survey asking residents to identify their transportation concerns, experiences, or ideas. Participants could use a social mapping tool to place a pin and comment throughout the Town, as well as respond to a question specifically about the intersection of Memorial Trail at 50 Street.

Some of the key themes that emerged in the feedback about Memorial Trail included:

- Concerns about driver sightlines and congestion at the intersections of Memorial Trail at Highway 20 and 50 Street.
- Suggestions for controlled intersections along Memorial Trail
- Suggestions for a pathway along Memorial Trail connecting to community destinations and other pathways

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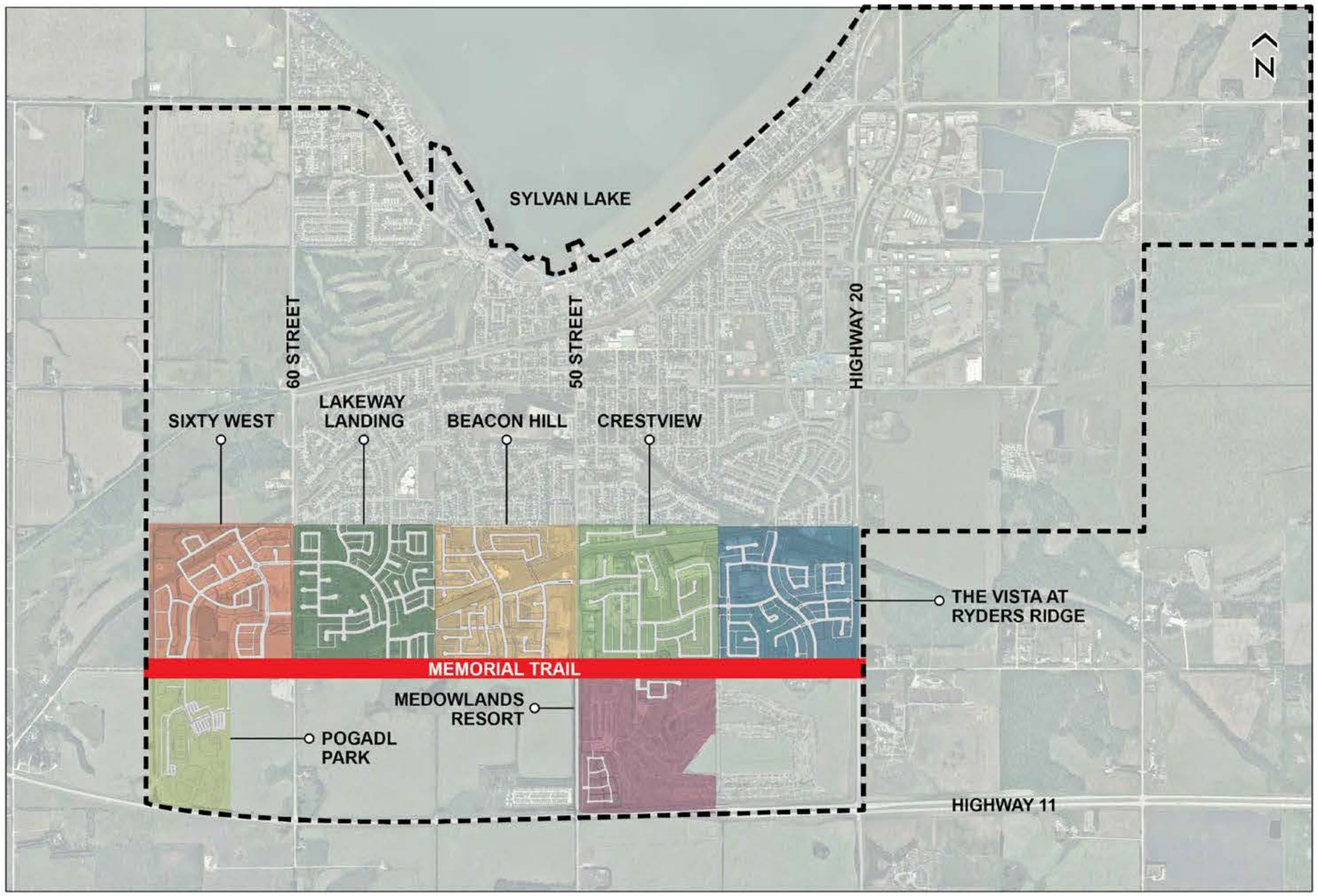
How will the project tie into the future roadway network?



This map shows the future roadway network as detailed in each approved Outline Plan in the area adjacent to the project. The project area is shown in the red box.

Each Outline Plan is coloured and labeled. An Outline Plan is a planning document that focuses on a small section of land, showing how an area will be developed.

The future roadways shown in grey within each Outline Plan indicate where future development will access Memorial Trail.

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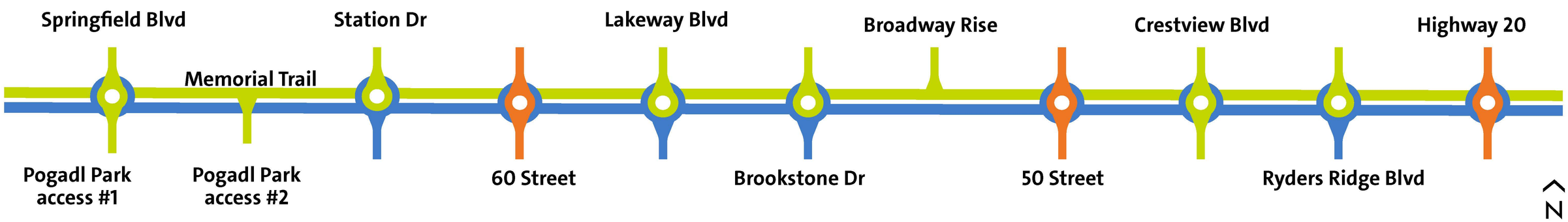
Staging Plan



Short-term Plan

One eastbound and one westbound lane maintained on Memorial Trail. Single lane roundabouts on Memorial Trail at the intersections at Highway 20, 50 Street and 60 Street.

Medium-term Plan

One eastbound and one westbound lane maintained on Memorial Trail. Single lane roundabouts at each intersection. Landscaped boulevard and multi-use pathway parallel to and on the north side of Memorial Trail.

Long-term Plan

Two eastbound and two westbound lanes on Memorial Trail separated by a median. Two northbound and two southbound lanes on Highway 20, 50 Street and 60 Street. Dual lane roundabouts at each intersection. Landscaped boulevards and multi-use pathways parallel to and on both sides of Memorial Trail.

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Short-term Plan

In the short-term, single lane roundabouts will improve traffic flow and turning on Memorial Trail at 60 Street, 50 Street, and Highway 20. These roundabouts will tie into the existing two-lane undivided roadways. All existing driveways are maintained with no turn restrictions. The construction timing of the three roundabouts is anticipated to be in the next 10 years.

60 Street

50 Street

Highway 20

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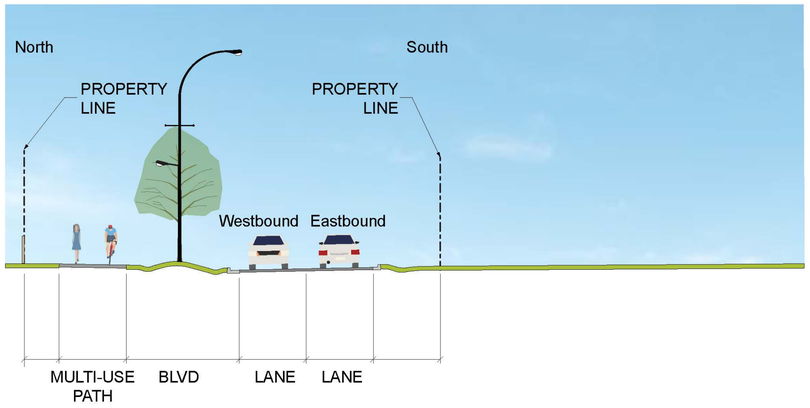
The following four boards show the deails of the medium- and long-term plans. Memorial Trail has been sectioned into three parts: the west section, central section, and east section. Future roads are shown in light grey as per the approved Outline Plans, and may change as development occurs.

Medium-term Plan

In the medium-term, Memorial Trail will remain as a two-lane roadway. Existing intersections will be upgraded and new intersections established as development continues to expand north of Memorial Trail. Single-lane roundabouts will be constructed at most intersections. These upgrades will improve safety and accommodate growing traffic volumes along Memorial Trail. Existing driveways with direct access to Memorial Trail will be maintained or realigned where required.

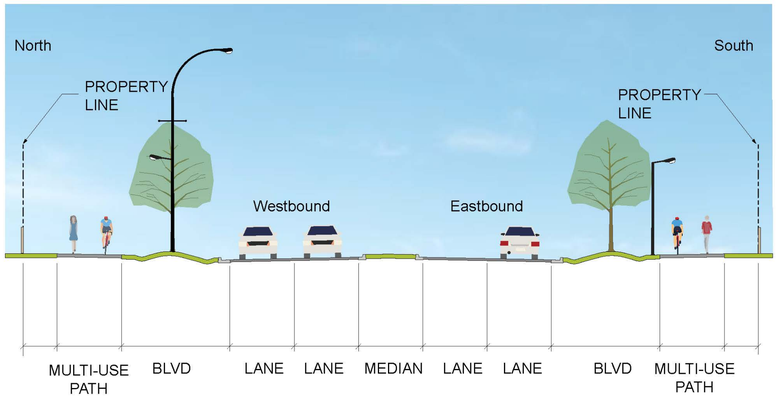
Memorial Trail - Looking East



Long-term Plan

In the long-term, Memorial Trail will be widened to the south to provide a total of 4 lanes and new roadways will be extended to the south as development expands south of Memorial Trail. Roundabouts will be upgraded to dual-lanes to accommodate growing traffic volumes. In the long-term, direct access will be provided at the intersections shown below. Existing driveways with direct access to memorial Trail will be closed as development occurs.

Memorial Trail - Looking East



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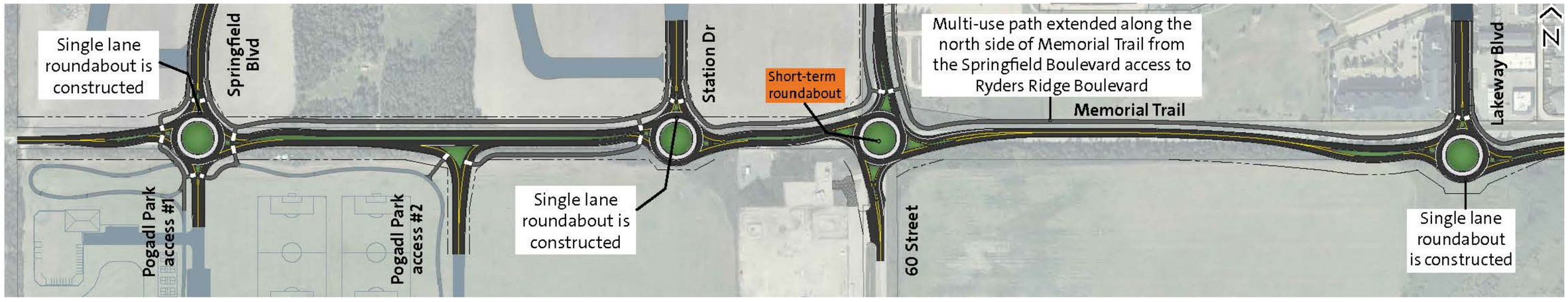
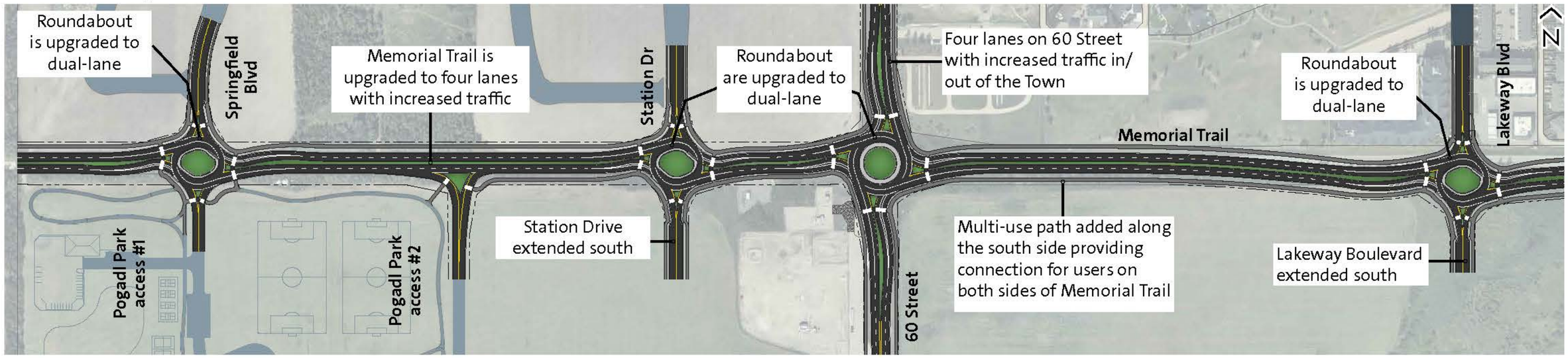
Medium-term Plan - West Section



Long-term Plan - West Section



Note: Future roads are shown in light grey as per the approved outline plans. Newly built roads are in dark grey.

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Medium-term Plan - Central Section

Long-term Plan - Central Section

Note: Future roads are shown in light grey as per the approved outline plans. Newly built roads are in dark grey.

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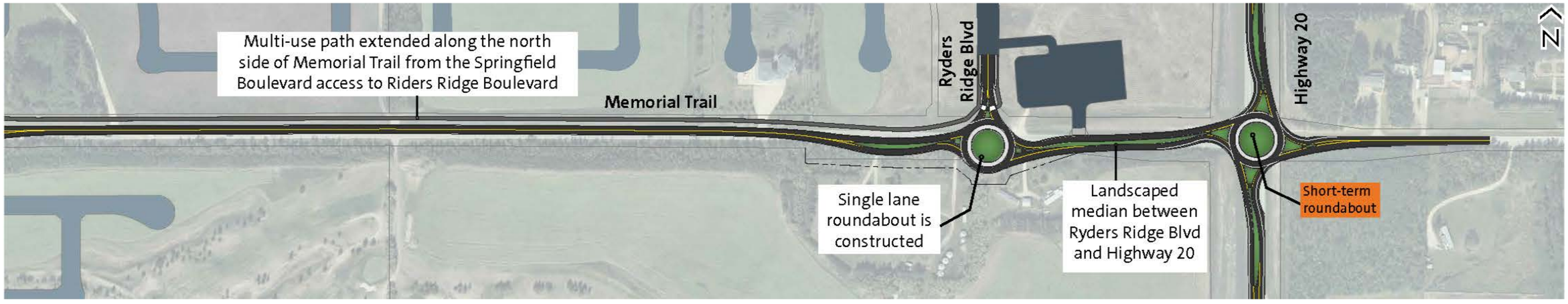
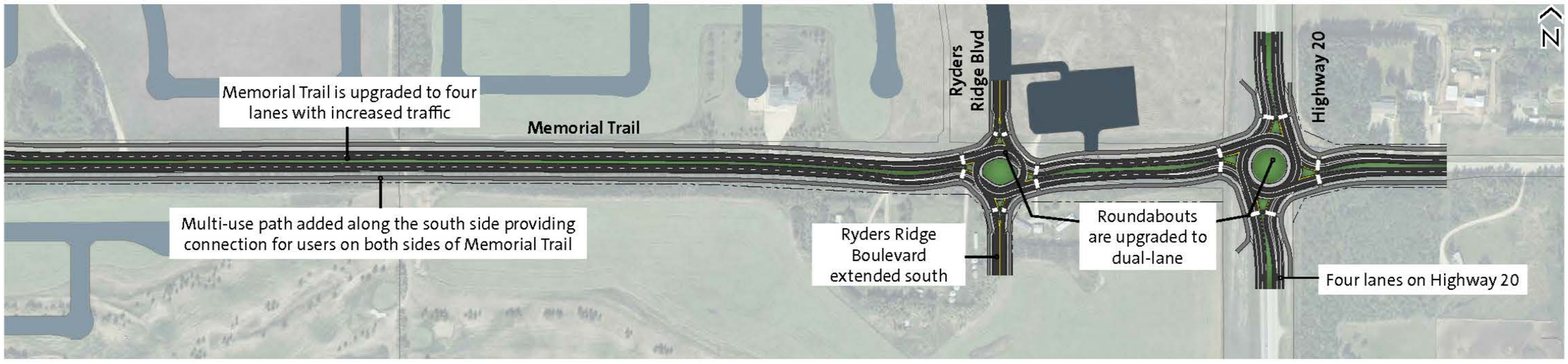
Medium-term Plan - East Section



Long-term Plan - East Section



Note: Future roads are shown in light grey as per the approved outline plans. Newly built roads are in dark grey.

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Roundabout Types

There are two types of roundabouts proposed in the long-term plan for Memorial Trail. The images below show an example of each type of roundabout, and highlights where they are located in the long-term plan.

Type A

Four lanes all directions

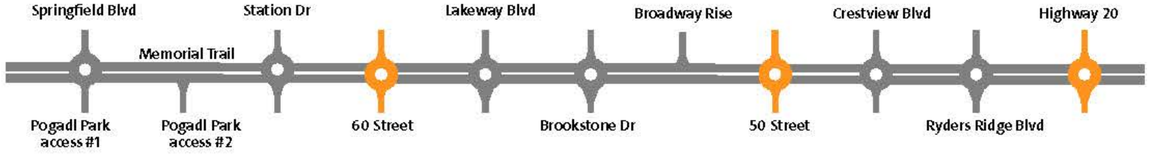
Lanes: both Memorial Trail and the cross street have four lanes of travel (two in each direction).

How it works:

When you enter this type of roundabout from any direction:

- The inside (left) lane is used travel straight through the intersection or to turn left by travelling around the intersection
- The outside (right) lane is used to turn right or travel straight through.

Locations indicated in orange:



Type A Plan View

The image below shows how to navigate a four lane roundabout from all directions

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Roundabout Types

Type B

Four lanes by two lanes

Lanes: Memorial Trail has four lanes of travel (two in each direction) while the cross street has two lanes of travel (one in each direction).

How it works:

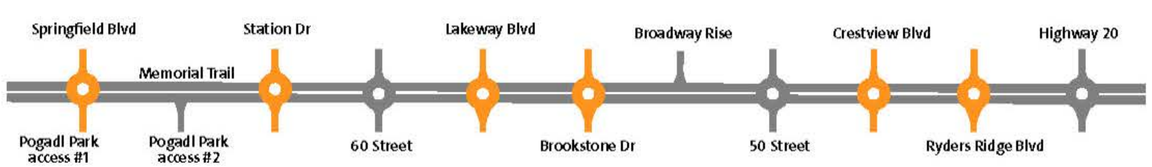
When you enter from Memorial Trail (east-west):

- The inside (left) lane is used to travel straight through the intersection or to turn left by travelling around the intersection
- The outside (right) lane is used to turn right or travel straight through

When you enter from a cross street (north-south):

- Turn right, travel straight or turn left by traveling along the outside lane.

Locations indicated in orange:



Type B Plan View

The image below shows how to navigate a four lane by two lane roundabout from Memorial Trail.

The image below shows how to navigate a four lane by two lane roundabout from the cross street.

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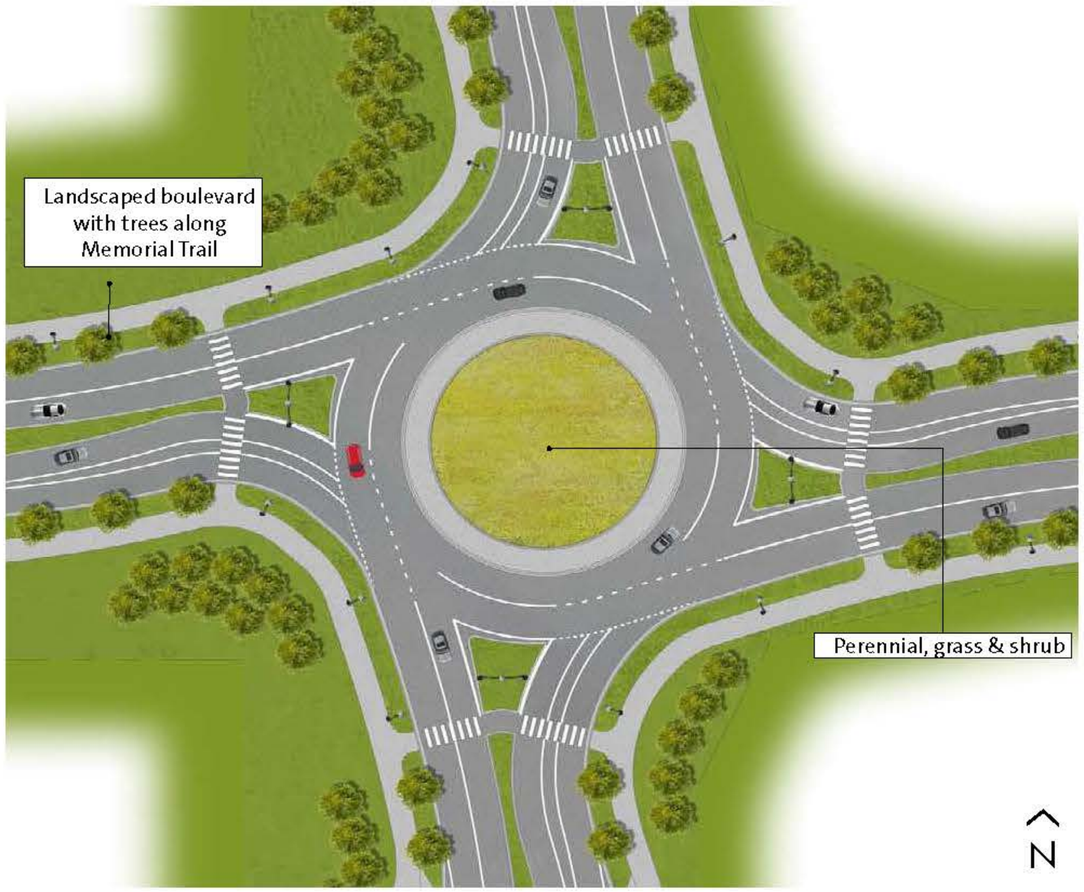
Roundabout Landscaping Options

Two landscaping themes, prairies or mountains, are proposed for the roundabouts in the long-term plan. The theme that will be used for the roundabouts will be determined during detailed design closer to when the plans are implemented.

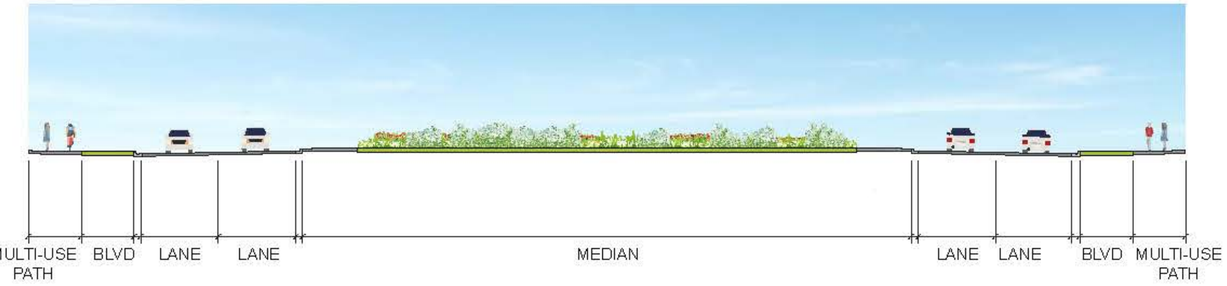
Prairies

This option uses a range of perennials, grasses and shrubs to create a colourful roundabout with year-round interest.

Plan View



Cross-section



Examples

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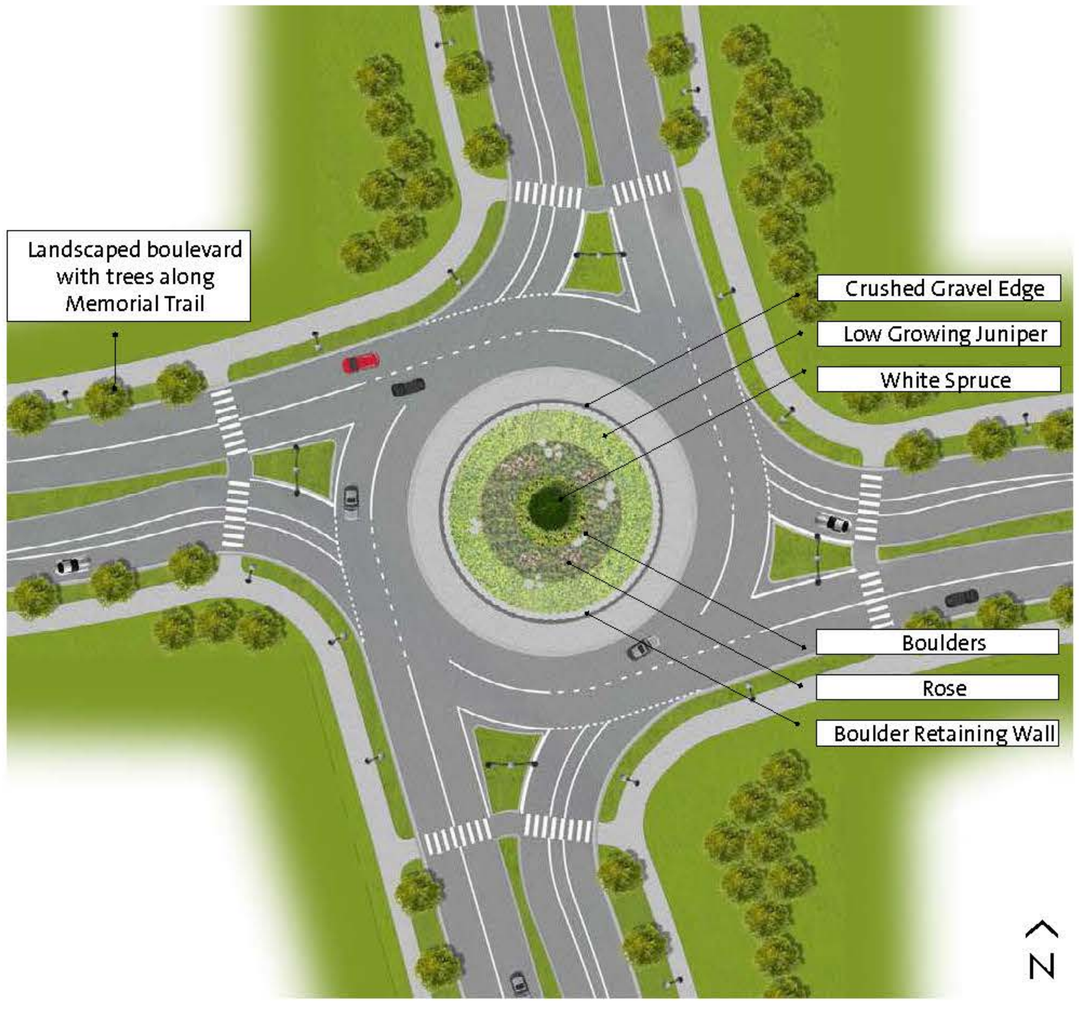
Roundabout Landscaping Options

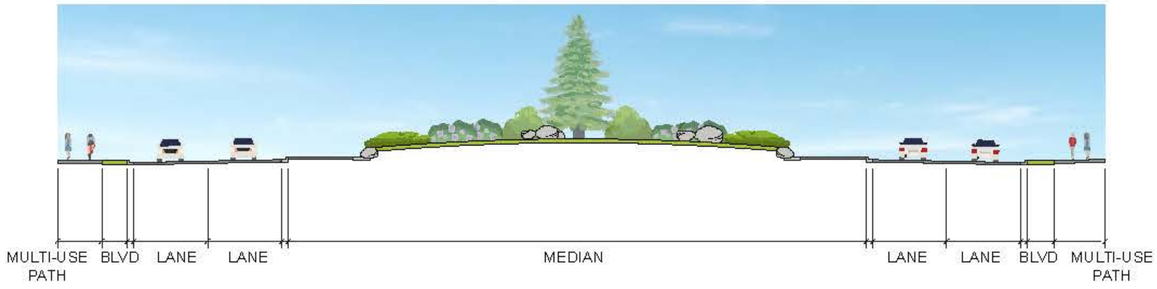
Mountains

This option uses boulders and a mixture of shrubs and trees to create an attractive planting bed with seasonal interest.

Plan View



Cross-section



Examples

Sylvan Lake
TOWN OF SYLVAN LAKE

How to Provide Input and Next Steps

We want to hear from you!

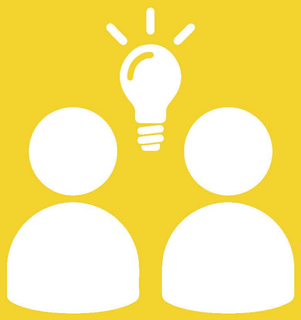
Please visit sylvanlake.ca/communications to learn about the project, register for the Live Q&A and provide your feedback.

Online Survey and Mapping Tool

Available October 4 to October 25, 2021

Live Q&A

October 14, 2021 @ 5:30 P.M.



Next Steps

The project team will review the input gathered during this phase of engagement to finalize the short-, medium- and long term Functional Plans for Memorial Trail. Next steps for the corridor will be preliminary design of the short-term plan of the Highway 20 and Memorial Trail roundabout.

Sylvan Lake
TOWN OF SYLVAN LAKE

Sylvan Lake

Memorial Trail Upgrades Project
Engagement Summary

November 2021

Memorial Trail Upgrades Project - Engagement Summary

Introduction

The Town of Sylvan Lake is doing a study of Memorial Trail to accommodate and improve safety for all types of travel. The Memorial Trail Upgrades study area covers Memorial Trail between Pogadl Park and Highway 20. This includes multi-use pathways and roundabouts at intersections along the study area.

As part of this project, short-, medium-, and long-term functional plans were developed for the study area to allow improvements to be implemented over time to accommodate travel and development growth.

Engagement Process

In October 2021, engagement and communication opportunities were made available for participants to ask questions and provide input on the short-, medium-, and long-term functional plans. A live Q&A session with presentation occurred on Thursday, Oct 14, had a total of 15 participants. An online survey was open from Oct 4 to Oct 25, had a total of 41 respondents. An online mapping tool, open from Oct 4 to Oct 25, had a total of 17 responses. In addition, 3 correspondence were received by the project team by interested residents and stakeholders.

This report includes a summary of input received.

Online Survey

SHORT-TERM PLAN

Participants were asked if there was anything the project team should know about the short-term plan.
23 Responses

- General support for the plan
- Concern about the ability of large trucks and trailers to navigate the roundabouts, particularly on a slope and in winter
- The multi-use trail is supported but some concern about pedestrian and cyclist safety at the roundabouts
- The plan should be implemented as soon as possible
  - Suggestion that Highway 20 should be a dual lane roundabout in the short-term
- Suggestion to limit the number of roundabouts on Memorial Trail to only the proposed short-term
- Some did not want roundabouts and a suggestion for traffic lights be implemented instead
- Concern about winter maintenance on Highway 20
- Suggestion that cost sharing should be explored at Highway 20 with the County

MEDIUM-TERM PLAN

Participants were asked if there was anything the project team should know about the medium-term plan.
17 Responses

- General support for the plan
- Some did not want roundabouts or felt that there were too many roundabouts and lights should be at some of the intersections
- Suggestion for the multi-use trail to be far enough away from traffic to allow to feel safe for those walking or cycling
- Suggestion for the speed to be reduced to 40 km/hr
- Concern that the Memorial Trail upgrades should only occur when traffic counts increase
- Suggestion that as many mature trees should be preserved if possible
- Concern about the ability for trucks to navigate a bend in the road before entering the roundabouts

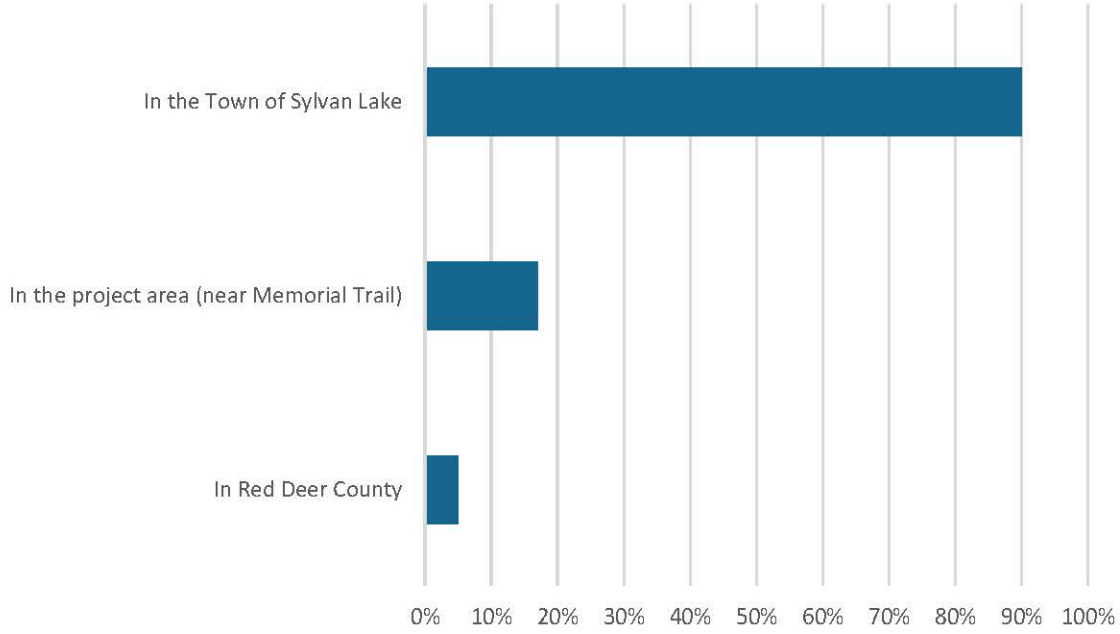
LONG-TERM PLAN

Participants were asked if there was anything the project team should know about the long-term plan.
20 Responses

- General support for the plan
- Some did not support roundabouts at all or felt that there were too many roundabouts
  - Suggestion for turn lanes instead
- Suggestion for the long term to be built rather than the medium-term to reduce costs and construction impacts
- The multi-use trail is supported but some concern about pedestrian and cyclist safety at the roundabouts
- Suggestion that no Type B (two lanes by four lanes) roundabouts should be constructed
- Concern about increased noise for adjacent residents
- Concern about the ability for trucks to navigate a bend in the road before entering the roundabouts as well as the ability to stop at the Highway 20 roundabout in winter

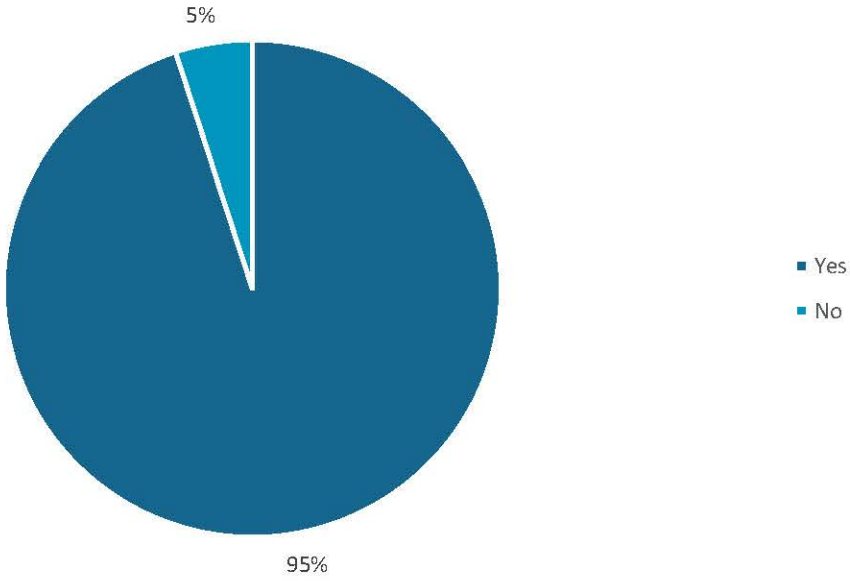
ABOUT YOU

Participants were asked where they live in relation to the project area.
41 Responses



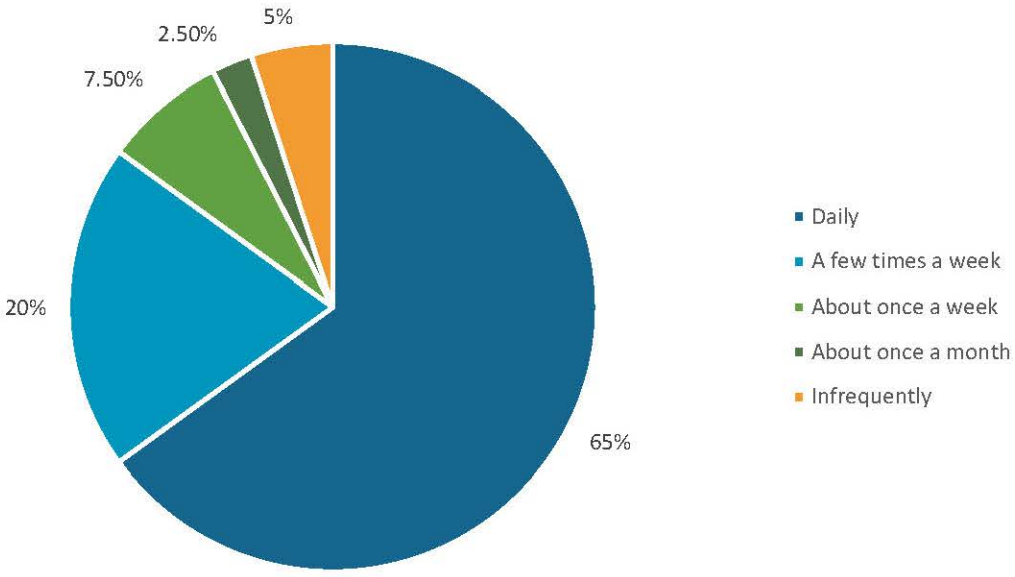
ORGANIZATIONS

Participants were asked if they represent an organization.
41 Responses



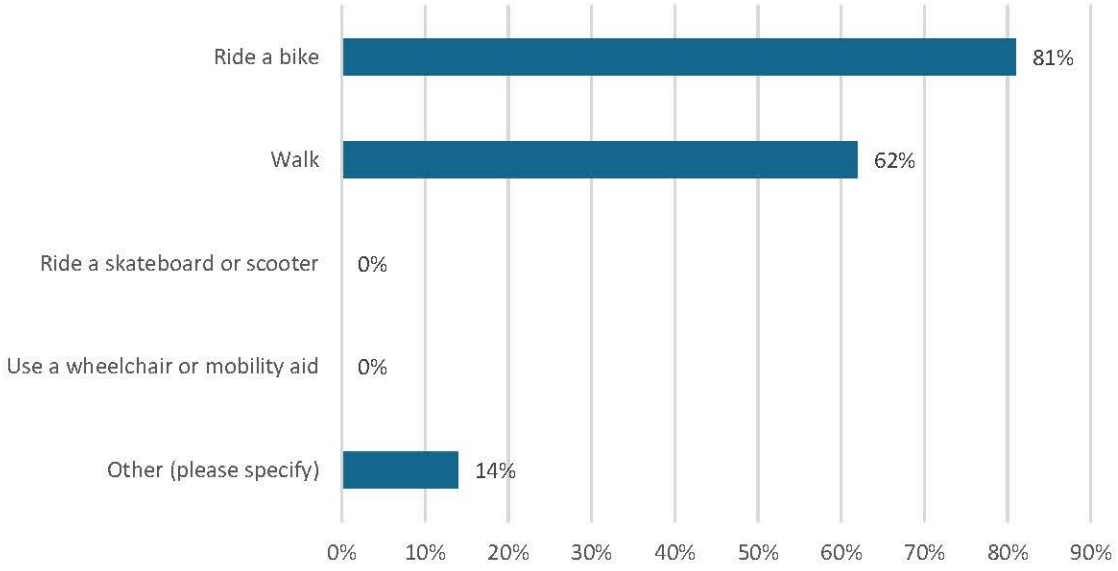
FREQUENCY OF USE

Participants were asked how frequently they drive in the project area.
40 Responses



ACTIVE MODE USE

Participants were asked what types of active or other types of transportation along Memorial Trail.
21 Responses



Other: drive, roller blade

Mapping Tool

50 Street and Memorial Trail

- Questions about accesses and businesses shown on the map
- Concern about the safety of slope of the road to the ditch
- Concern about land ownership

Highway 20 and Memorial Trail

- Suggestion to make a free flow lane instead of a roundabout
- Concern about larger trucks to navigate the roundabout on a hill during winter

Ryders Ridge and Memorial Trail

- Question about adding an access here
- Concern about the proximity to Highway 20

Correspondence

- General Support for the plan
- Concern about landscaping in the center of the roundabouts causing poor sightlines across the roundabout for people driving and using motorcycles
- Suggestion to connect the multi-use trail with the future multi-use path at the abandoned rail line in the county
- Concern for current safety at Highway 20 and Memorial Trail as well as safety for those who walk on Memorial Trail
- Concern about farm equipment and large trucks to navigate a roundabout at Highway 20

Next Steps

The project team will review the input gathered during this phase of engagement to finalize the short-, medium- and long-term Functional Plans for Memorial Trail. Next steps for the corridor will be preliminary design of the short-term plan of the Highway 20 and Memorial Trail roundabout.

APPENDIX E
Cost Estimate

Memorial Trail Functional Planning Study Class 4 Cost Estimate

CONFIDENTIAL

Project No.	27613
Project Ref.	Memorial Trail FPS
Client	Town of Sylvan Lake
Subject	Class 4 Cost Estimate
ISL Project Manager	Alex Ho
Last Edit	2021-10-25

MEMORIAL TRAIL FUNCTIONAL PLANNING STUDY - CLASS 4 COST ESTIMATE

ITEM	DESCRIPTION		LONG-TERM	MEDIUM-TERM	SHORT-TERM
1	REMOVALS (INCLUDES DISPOSAL)		$ 1,640,000	$ 1,650,000	$ 470,000
2	EARTHWORKS		$ 8,110,000	$ 4,570,000	$ 1,490,000
3	ROADWORKS		$ 12,400,000	$ 7,860,000	$ 2,550,000
4	CONCRETE WORKS		$ 3,440,000	$ 3,090,000	$ 850,000
5	TRAFFIC & WAYFINDING		$ 1,570,000	$ 1,390,000	$ 560,000
6	STORMWATER MANAGEMENT		$ 2,760,000	$ 2,450,000	$ 230,000
7	UTILITIES		$ 17,500,000	$ 15,860,000	$ 5,930,000
8	LANDSCAPING AND MISCELLANEOUS		$ 1,470,000	$ 1,080,000	$ 180,000
	Construction Sub-Total (Approximate)		**$ 48,890,000**	**$ 37,950,000**	**$ 12,260,000**
	Contingency	**30%**	$ 14,667,000	$ 11,385,000	$ 3,678,000
	Subtotal including contingency		**$ 63,557,000**	**$ 49,335,000**	**$ 15,938,000**
	Engineering and Testing	**15%**	$ 9,533,550	$ 7,400,250	$ 2,390,700
	Class 4 Cost Estimate		**$ 73,100,000**	**$ 56,740,000**	**$ 18,330,000**
	Expected Maximum Cost (+50%)		**$ 109,700,000**	**$ 85,100,000**	**$ 27,500,000**
	Expected Minimum Cost (-30%)		**$ 51,200,000**	**$ 39,700,000**	**$ 12,800,000**

Note: Estimate does not include land aqcuisition


Memorial Trail Functional Planning Study Class 4 Cost Estimate - Segment Boundaries
Memorial Trail
Memorial Trail
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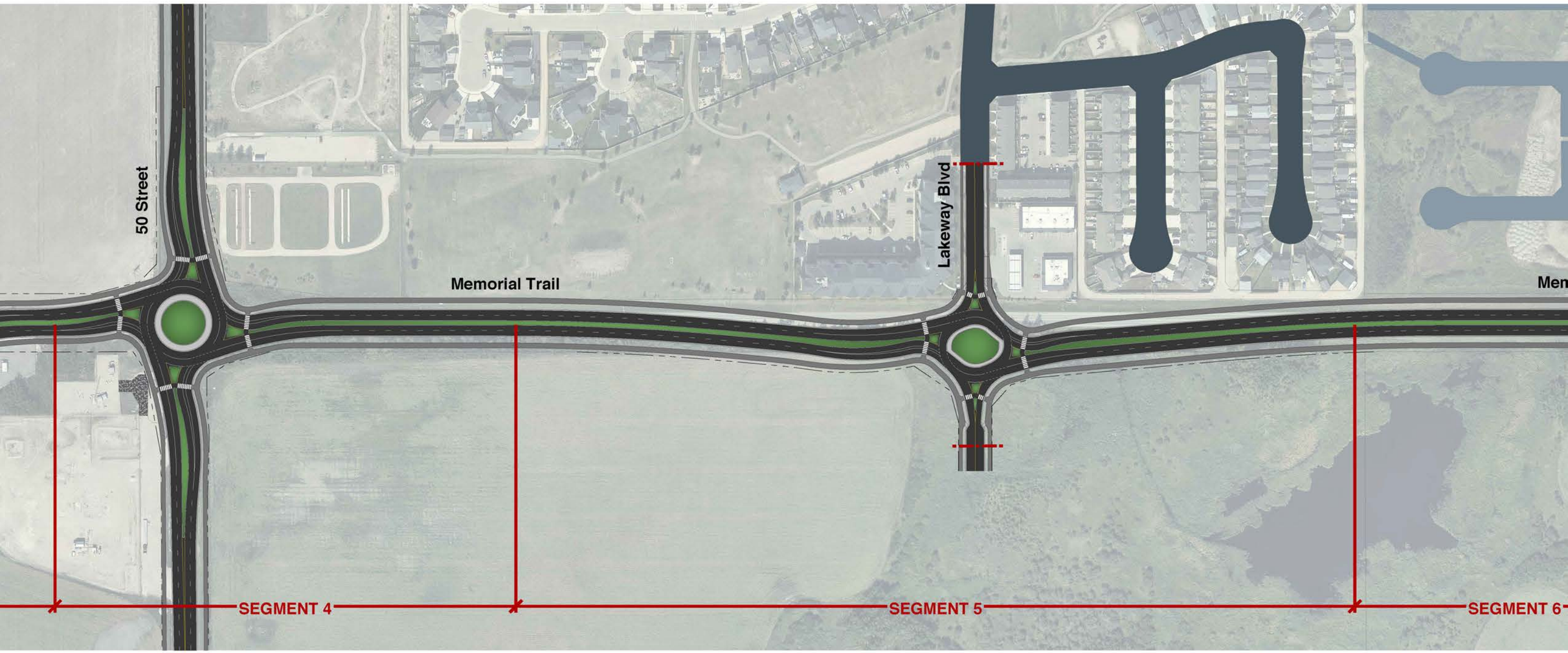
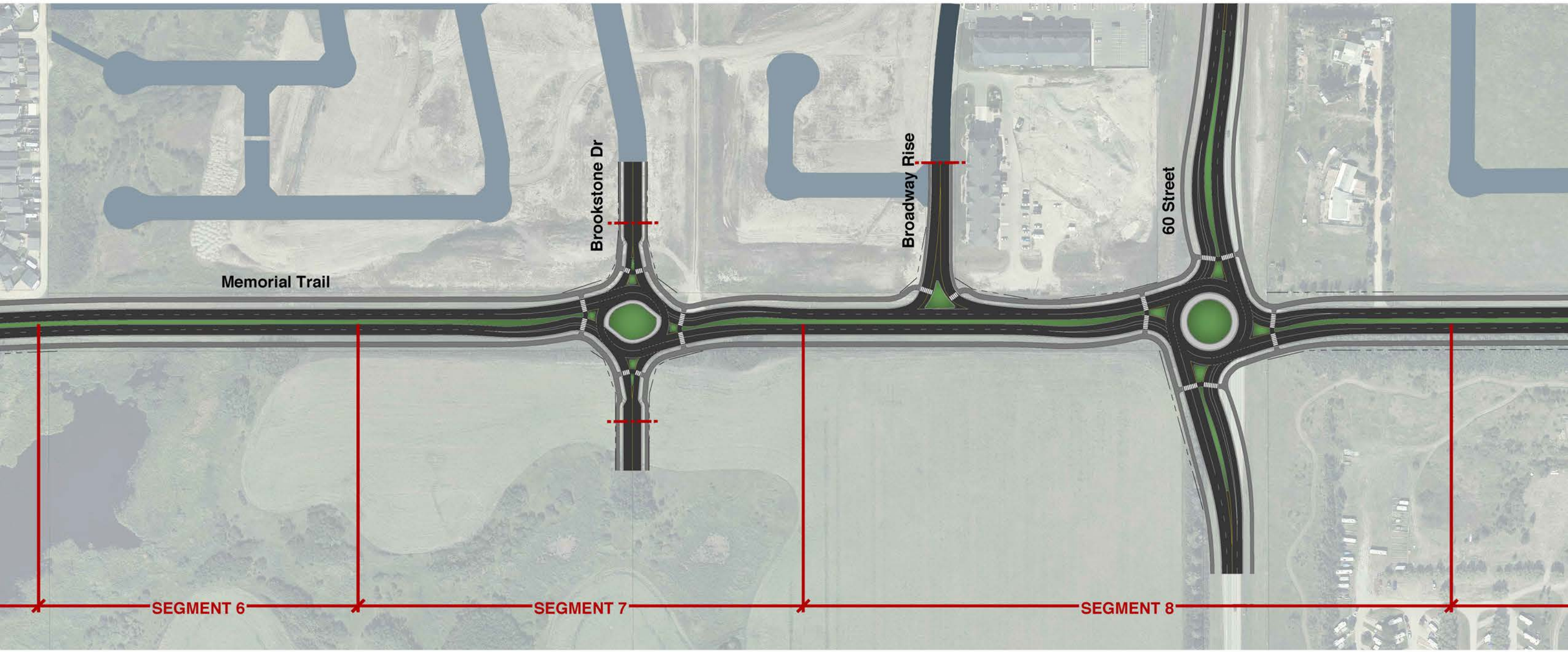
Memorial Trail Functional Planning Study Class 4 Cost Estimate - Segment Boundaries

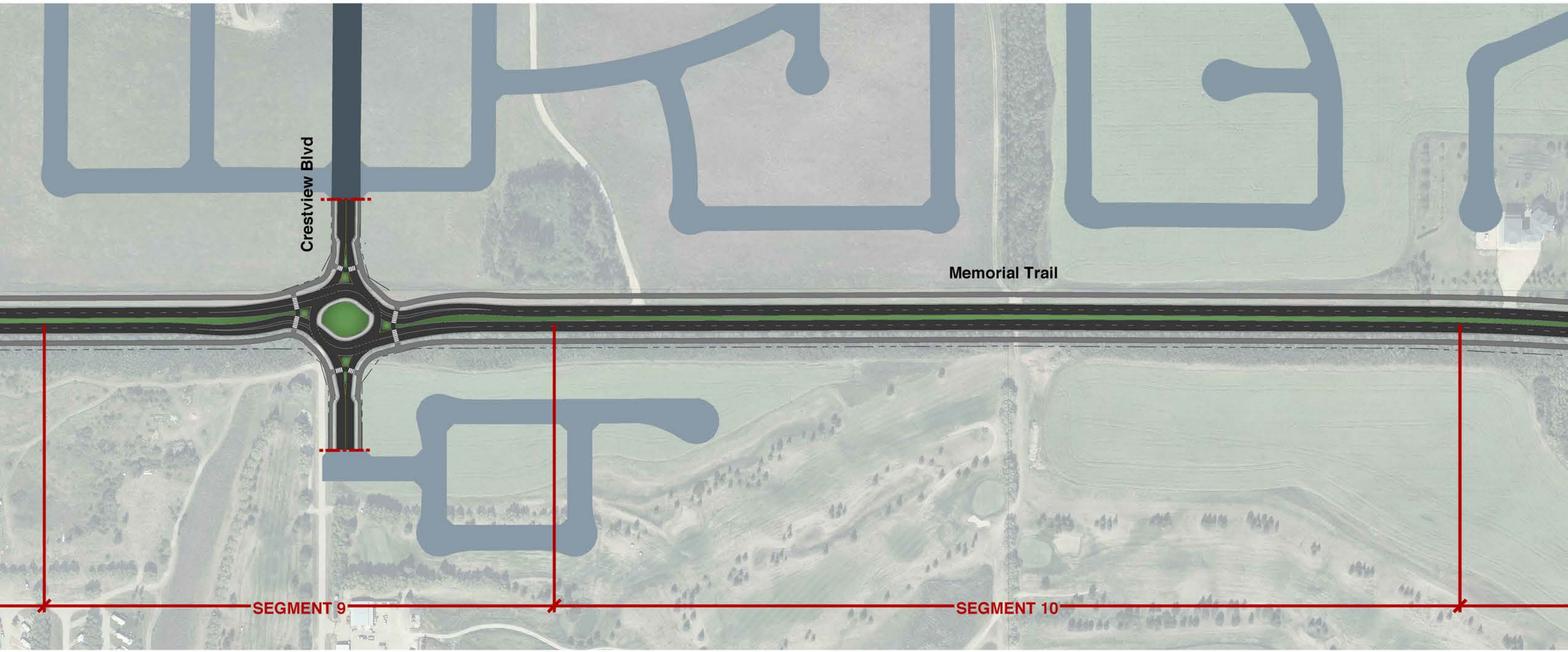
Memorial Trail Functional Planning Study Class 4 Cost Estimate - Segment Boundaries



Memorial Trail Functional Planning Study Class 4 Cost Estimate - Segment Boundaries



Memorial Trail Functional Planning Study Class 4 Cost Estimate - Segment Boundaries



Memorial Trail Functional Planning Study Class 4 Cost Estimate - Segment Boundaries

Long-Term Plan

ITEM	DESCRIPTION	UNIT	UNIT RATE	QUANTITY													COST												
				SEGMENT 1 Springfield Blvd / Pogadl Park Access #1	SEGMENT 2 Pogadl Park Access #2	SEGMENT 3 Station Dr.	SEGMENT 4 60 St	SEGMENT 5 Lakeway Bvld	SEGMENT 6 Memorial Tr.	SEGMENT 7 Brookstone Dr.	SEGMENT 8 50 St & Broadway Rise	SEGMENT 9 Crestview Bvld	SEGMENT 10 Memorial Tr.	SEGMENT 11 Ryders Ridge Bvld.	SEGMENT 12 Hwy 20.	TOTAL	SEGMENT 1 Springfield Blvd / Pogadl Park Access #1	SEGMENT 2 Pogadl Park Access #2	SEGMENT 3 Station Dr.	SEGMENT 4 60 St	SEGMENT 5 Lakeway Bvld	SEGMENT 6 Memorial Tr.	SEGMENT 7 Brookstone Dr.	SEGMENT 8 50 St & Broadway Rise	SEGMENT 9 Crestview Bvld	SEGMENT 10 Memorial Tr.	SEGMENT 11 Ryders Ridge Bvld.	SEGMENT 12 Hwy 20.	TOTAL COST (ROUNDED)
			LENGTH (m)	320	200	200	320	580	220	310	450	350	630	340	315	4,235													
1	REMOVALS (INCLUSES DISPOSAL)																$ 30,500	$ 64,000	$ 29,000	$ 184,100	$ 180,000	$ 43,000	$ 71,500	$ 266,200	$ 136,000	$ 276,000	$ 157,500	$ 201,200	$ 1,640,000
1.01	Asphalt (Full Depth Removal)	m^2	$ 15	-	-	-	8,000	6,400	2,200	2,900	12,400	4,200	8,800	4,100	7,400	56,400	$ -	$ -	$ -	$ 120,000	$ 96,000	$ 33,000	$ 43,500	$ 186,000	$ 63,000	$ 132,000	$ 61,500	$ 111,000	$ 846,000
1.02	Tree Clearing	m^2	$ 10	2,800	6,300	2,700	5,700	8,200	1,000	2,800	7,300	7,300	14,400	9,600	7,300	75,400	$ 28,000	$ 63,000	$ 27,000	$ 57,000	$ 82,000	$ 10,000	$ 28,000	$ 73,000	$ 73,000	$ 144,000	$ 96,000	$ 73,000	$ 754,000
1.03	Curb and Gutter	m	$ 25	-	-	-	-	-	-	-	80	-	-	-	-	80	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 2,000	$ -	$ -	$ -	$ -	$ 2,000
1.04	Guardrail	m	$ 100	-	-	-	-	-	-	-	-	-	-	-	80	80	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 8,000
1.05	Fencing	m	$ 10	250	100	200	310	-	-	-	120	-	-	-	320	1,300	$ 2,500	$ 1,000	$ 2,000	$ 3,100	$ -	$ -	$ -	$ 1,200	$ -	$ -	$ -	$ 3,200	$ 13,000
1.06	Roadside Sign	ea	$ 1,000	-	-	-	4	2	-	-	4	-	-	-	6	16	$ -	$ -	$ -	$ 4,000	$ 2,000	$ -	$ -	$ 4,000	$ -	$ -	$ -	$ 6,000	$ 16,000
2	EARTHWORKS																$ 696,500	$ 297,500	$ 282,500	$ 383,500	$ 548,000	$ 266,500	$ 1,041,000	$ 2,059,500	$ 316,000	$ 334,000	$ 446,000	$ 1,432,000	$ 8,110,000
2.01	Stripping (0.3m depth)	m^3	$ 10	6,300	3,400	3,600	7,200	7,100	2,800	3,200	12,400	4,900	5,700	5,000	5,800	67,400	$ 63,000	$ 34,000	$ 36,000	$ 72,000	$ 71,000	$ 28,000	$ 32,000	$ 124,000	$ 49,000	$ 57,000	$ 50,000	$ 58,000	$ 674,000
2.02	Common Excavation	m^3	$ 10	600	100	1,900	2,400	13,200	1,100	4,400	2,800	2,200	3,700	8,100	36,900	77,400	$ 6,000	$ 1,000	$ 19,000	$ 24,000	$ 132,000	$ 11,000	$ 44,000	$ 28,000	$ 22,000	$ 37,000	$ 81,000	$ 369,000	$ 774,000
2.03	Waste Excavation Off-Site	m^3	$ 25	-	-	-	-	8,000	-	4,000	-	-	-	-	35,000	47,000	$ -	$ -	$ -	$ -	$ 200,000	$ -	$ 875,000	$ 1,175,000	$ -	$ -	$ -	$ 875,000	$ 3,125,000
2.04	Import Borrow Excavation	m^3	$ 25	21,500	8,500	6,500	4,500	-	7,500	-	20,500	6,000	5,000	9,000	-	89,000	$ 537,500	$ 212,500	$ 162,500	$ 112,500	$ -	$ 187,500	$ -	$ 512,500	$ 150,000	$ 125,000	$ 225,000	$ -	$ 2,225,000
2.05	Subgrade Preparation	m^2	$ 10	9,000	5,000	6,500	17,500	14,500	4,000	9,000	22,000	9,500	11,500	9,000	13,000	130,500	$ 90,000	$ 50,000	$ 65,000	$ 175,000	$ 145,000	$ 40,000	$ 90,000	$ 220,000	$ 95,000	$ 115,000	$ 90,000	$ 130,000	$ 1,305,000
3	ROADWORKS																$ 879,000	$ 477,000	$ 599,000	$ 1,645,000	$ 1,391,000	$ 422,000	$ 815,000	$ 2,044,000	$ 889,000	$ 1,205,000	$ 866,000	$ 1,163,000	$ 12,400,000
3.01	Pavement Structure (665mm depth)	m^2	$ 100	7,600	4,000	4,800	13,300	10,900	3,100	6,400	16,800	7,000	8,900	6,700	9,600	99,100	$ 760,000	$ 400,000	$ 480,000	$ 1,330,000	$ 1,090,000	$ 310,000	$ 640,000	$ 1,680,000	$ 700,000	$ 890,000	$ 670,000	$ 960,000	$ 9,910,000
3.02	Asphalt Multi-use Pathways	m^2	$ 70	1,700	1,100	1,700	4,500	4,300	1,600	2,500	5,200	2,700	4,500	2,800	2,900	35,500	$ 119,000	$ 77,000	$ 119,000	$ 315,000	$ 301,000	$ 112,000	$ 175,000	$ 364,000	$ 189,000	$ 315,000	$ 196,000	$ 203,000	$ 2,485,000
4	CONCRETE WORKS																$ 251,000	$ 112,600	$ 216,800	$ 423,000	$ 444,000	$ 99,000	$ 243,300	$ 528,600	$ 269,700	$ 277,200	$ 253,100	$ 326,100	$ 3,440,000
4.01	Curb & Gutter (250 mm)	m	$ 100	550	480	330	890	1,250	450	570	1,280	610	1,260	600	750	9,020	$ 55,000	$ 48,000	$ 33,000	$ 89,000	$ 125,000	$ 45,000	$ 57,000	$ 128,000	$ 61,000	$ 126,000	$ 60,000	$ 75,000	$ 902,000
4.02	Curb and Gutter (300 mm)	m	$ 110	100	-	100	140	100	-	100	150	100	-	100	160	1,050	$ 11,000	$ -	$ 11,000	$ 15,400	$ 11,000	$ -	$ 11,000	$ 16,500	$ 11,000	$ -	$ 11,000	$ 17,600	$ 115,500
4.03	Curb and Gutter (500 mm)	m	$ 120	800	480	540	1,480	1,250	450	740	1,880	860	1,260	830	950	11,520	$ 96,000	$ 57,600	$ 64,800	$ 177,600	$ 150,000	$ 54,000	$ 88,800	$ 225,600	$ 103,200	$ 151,200	$ 99,600	$ 114,000	$ 1,382,400
4.04	Concrete Truck Apron (Inc. 250 and 300 C&G)	m^2	$ 200	300	-	300	540	300	-	300	540	300	-	300	510	3,390	$ 60,000	$ -	$ 60,000	$ 108,000	$ 60,000	$ -	$ 60,000	$ 108,000	$ 60,000	$ -	$ 60,000	$ 102,000	$ 678,000
4.05	Concrete Median / Island	m^2	$ 100	110	-	120	330	400	-	100	100	80	-	90	100	1,430	$ 11,000	$ -	$ 12,000	$ 33,000	$ 40,000	$ -	$ 10,000	$ 10,000	$ 8,000	$ -	$ 9,000	$ 10,000	$ 143,000
4.06	Concrete Sidewalks (incl. Driveways, Bike Ramps, WCRs)	m^2	$ 150	50	-	170	-	340	-	110	270	110	-	90	50	1,190	$ 7,500	$ -	$ 25,500	$ -	$ 51,000	$ -	$ 16,500	$ 40,500	$ 16,500	$ -	$ 13,500	$ 7,500	$ 178,500
4.07	Concrete Barrier	m	$ 350	30	20	30	-	20	-	-	-	-	-	-	-	100	$ 10,500	$ 7,000	$ 10,500	$ -	$ 7,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 35,000
5	TRAFFIC & WAYFINDING																$ 105,000	$ 105,000	$ 105,000	$ 105,000	$ 105,000	$ 105,000	$ 105,000	$ 115,000	$ 105,000	$ 105,000	$ 105,000	$ 405,000	$ 1,570,000
5.01	Signage	LS	$ 85,000	1	1	1	1	1	1	1	1	1	1	1	1	12	$ 85,000	$ 85,000	$ 85,000	$ 85,000	$ 85,000	$ 85,000	$ 85,000	$ 85,000	$ 85,000	$ 85,000	$ 85,000	$ 85,000	$ 1,020,000
5.02	Pavement Markings	LS	$ 20,000	1	1	1	1	1	1	1	1.5	1	1	1	1	13	$ 20,000	$ 20,000	$ 20,000	$ 20,000	$ 20,000	$ 20,000	$ 20,000	$ 30,000	$ 20,000	$ 20,000	$ 20,000	$ 20,000	$ 250,000
5.03	Detour Roads	LS	$ 300,000					-	-	-	-	-	-	-	1	1	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 300,000	$ 300,000
6	STORMWATER MANAGEMENT																$ 208,000	$ 84,500	$ 130,000	$ 162,500	$ 627,000	$ 412,500	$ 451,500	$ -	$ 166,000	$ 299,000	$ 166,000	$ 71,500	$ 2,760,000
6.01	Stormwater Allowance for SWMF Improvements	LS	$ 500,000					0.5	0.5	0.5	-	-	-	-	-	2	$ -	$ -	$ -	$ -	$ 250,000	$ 250,000	$ 250,000	$ -	$ -	$ -	$ -	$ -	$ 750,000
6.02	Future Stormwater Minor System (incl. MHs and CBs)	m	$ 650	320	130	200	250	580	250	310	-	240	460	240	110	3,090	$ 208,000	$ 84,500	$ 130,000	$ 162,500	$ 377,000	$ 162,500	$ 201,500	$ -	$ 166,000	$ 299,000	$ 166,000	$ 71,500	$ 2,008,500
7	UTILITIES																$ 1,754,000	$ 962,500	$ 1,086,500	$ 2,562,000	$ 964,000	$ 614,000	$ 1,161,500	$ 1,891,500	$ 1,331,000	$ 1,278,500	$ 2,212,500	$ 1,681,000	$ 17,500,000
7.01	Future Sanitary Forcemain - 250mm PVC	m	$ 800	-	-	-	-	-	-	-	-	-	600	400	200	1,200	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 480,000	$ 320,000	$ 160,000	$ 960,000
7.02	Future Sanitary Main - 250mm PVC	m	$ 550	320	200	200	610	-	-	-	-	-	-	-	170	1,500	$ 176,000	$ 110,000	$ 110,000	$ 335,500	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 93,500	$ 825,000
7.03	Future Watermain - 300mm PVC	m	$ 650	320	200	200	810	690	220	530	900	530	630	460	550	6,040	$ 208,000	$ 130,000	$ 130,000	$ 526,500	$ 448,500	$ 143,000	$ 344,500	$ 585,000	$ 344,500	$ 409,500	$ 299,000	$ 357,500	$ 3,926,000
7.04	Gas Line Relocation	m	$ 1,500	-	-	-	220	-	220	300	-	30	-	130	-	900	$ -	$ -	$ -	$ 330,000	$ -	$ 330,000	$ 450,000	$ -	$ 45,000	$ -	$ 195,000	$ -	$ 1,350,000
7.05	Communications Relocation	m	$ 1,000	350	200	200	350	30	-	50	350	-	-	500	450	2,480	$ 350,000	$ 200,000	$ 200,000	$ 350,000	$ 30,000	$ -	$ 50,000	$ 350,000	$ -	$ -	$ 500,000	$ 450,000	$ 2,480,000
7.06	Power Relocation	m	$ 2,000	350	200	200	350	-	-	-	280	300	-	280	150	2,110	$ 700,000	$ 400,000	$ 400,000	$ 700,000	$ -	$ -	$ -	$ 560,000	$ 600,000	$ -	$ 560,000	$ 300,000	$ 4,220,000
7.07	Streetlighting - Roadway Lighting	ea	$ 12,500	16	5	13	16	23	6	16	19	17	16	17	16	180	$ 200,000	$ 62,500	$ 162,500	$ 200,000	$ 287,500	$ 75,000	$ 200,000	$ 237,500	$ 212,500	$ 200,000	$ 212,500	$ 200,000	$ 2,250,000
7.08	Streetlighting - Pedestrian Lighting	ea	$ 3,000	40	20	28	40	66	22	39	53	43	63	42	40	496	$ 120,000	$ 60,000	$ 84,000	$ 120,000	$ 198,000	$ 66,000	$ 117,000	$ 159,000	$ 129,000	$ 189,000	$ 126,000	$ 120,000	$ 1,488,000
8	LANDSCAPING AND MISCELLANEOUS																$ 95,400	$ 65,500	$ 71,300	$ 152,400	$ 174,150	$ 66,450	$ 95,900	$ 227,750	$ 113,800	$ 172,100	$ 112,950	$ 119,850	$ 1,470,000
8.01	Topsoil Respread (0.2m depth)	m^3	$ 10	600	1,400	1,200	3,400	2,800	1,300	1,400	5,900	1,900	2,700	2,000	1,800	26,400	$ 6,000	$ 14,000	$ 12,000	$ 34,000	$ 28,000	$ 13,000	$ 14,000	$ 59,000	$ 19,000	$ 27,000	$ 20,000	$ 18,000	$ 264,000
8.02	Seeding	m^2	$ 2	9,700	7,000	5,900	16,700	13,700	6,100	6,700	29,500	9,400	13,300	9,600	8,800	136,400	$ 19,400	$ 14,000	$ 11,800	$ 33,400	$ 27,400	$ 12,200	$ 13,400	$ 59,000	$ 18,800	$ 26,600	$ 19,200	$ 17,600	$ 272,800
8.03	Trees	ea	$ 750	80	50	50	80	145	55	78	113	88	158	85	79	1,061	$ 60,000	$ 37,500	$ 37,500	$ 60,000	$ 108,750	$ 41,250	$ 58,500	$ 84,750	$ 66,000	$ 118,500	$ 63,750	$ 59,250	$ 795,750
8.04	Roundabout Central Island Landscaping (4x4 Roundabouts)	ea	$ 25,000	-	-	-	1	-	-	-	1	-	-	-	1	3	$ -	$ -	$ -	$ 25,000	$ -	$ -	$ -	$ 25,000	$ -	$ -	$ -	$ 25,000	$ 75,000
8.05	Roundabout Central Island Landscaping (4x2 Roundabouts)	ea	$ 10,000	1	-	1	-	1	-	1	-	1	-	1	-	6	$ 10,000	$ -	$ 10,000	$ -	$ 10,000	$ -	$ 10,000	$ -	$ 10,000	$ -	$ 10,000	$ -	$ 60,000
	Construction Sub-Total (Approximate)																$ 4,019,400	$ 2,168,600	$ 2,520,100	$ 5,617,500	$ 4,433,150	$ 2,028,450	$ 3,984,700	$ 7,132,550	$ 3,306,500	$ 3,946,800	$ 4,309,050	$ 5,399,650	$ 48,890,000
	Contingency 30%																$ 1,205,820	$ 650,580	$ 756,030	$ 1,685,250	$ 1,329,945	$ 608,535	$ 1,195,410	$ 2,139,765	$ 991,950	$ 1,184,040	$ 1,292,715	$ 1,619,895	$ 14,667,000
	Subtotal including Contingency																**$ 5,225,220**	**$ 2,819,180**	**$ 3,276,130**	**$ 7,302,750**	**$ 5,763,095**	**$ 2,636,985**	**$ 5,180,110**	**$ 9,272,315**	**$ 4,298,450**	**$ 5,130,840**	**$ 5,601,765**	**$ 7,019,545**	**$ 63,557,000**
	Engineering and Testing 15%																$ 783,783	$ 422,877	$ 491,420	$ 1,095,413	$ 864,464	$ 395,548	$ 777,017	$ 1,390,847	$ 644,768	$ 769,626	$ 840,265	$ 1,052,932	$ 9,533,550
	Class 4 Cost Estimate																$ 6,010,000	$ 3,250,000	$ 3,770,000	$ 8,400,000	$ 6,630,000	$ 3,040,000	$ 5,960,000	$ 10,670,000	$ 4,950,000	$ 5,910,000	$ 6,450,000	$ 8,080,000	$ 73,100,000
	Expected Maximum Cost (+50%)																$ 9,000,000	$ 4,900,000	$ 5,700,000	$ 12,600,000	$ 9,900,000	$ 4,600,000	$ 8,900,000	$ 16,000,000	$ 7,400,000	$ 8,900,000	$ 9,700,000	$ 12,100,000	$ 109,700,000
	Expected Minimum Cost (-30%)																$ 4,200,000	$ 2,300,000	$ 2,600,000	$ 5,900,000	$ 4,600,000	$ 2,100,000	$ 4,200,000	$ 7,500,000	$ 3,500,000	$ 4,100,000	$ 4,500,000	$ 5,700,000	$ 51,200,000

Assumptions:

General

1. Unit prices are inclusive of mobilization and demobilization
2. Unit prices are based on tender pricing for projects of similar level with subjective adjustments made to reflect 2021 pricing and amount of quantity
3. Pricing does not account for future inflation
3. Estimates account for full build-out from existing conditions at each time horizon and are not incremental between short-, medium- and long-term.

Removals

1. Assumed all of existing pavement has to be removed
2. Tree removals included clearing within grading limits. Areas were based on current aerial images

Earthworks

1. Stripping depth was assumed to be 0.3m
2. Cut slopes were assumed to be 3:1 and fill slopes were assumed to be 4:1
3. Ultimate earthworks assumed no shrinkage factors
4. Jct of Hwy 20 & Memorial Trail to be lowered about 1.8m to accommodate roundabout approaches. If the raised profile is selected, cost savings are expected.
5. Grading volumes have been calculated for each segment individually, potential to balance quantities between segments once staging plan is known
6. Excess material to be hauled offsite if construction is staged per segment.

Roadworks

1. Pavement design per Town of Sylvan Lake Design Manual (125mm ACP, 200mm GBC Base, 350mm GBC Subbase), to be confirmed with geotechnical investigations at preliminary design

Concrete Works

1. Assume concrete pink salmon in all aprons per AT Design Bulletin 68
2. Medians and Splitter Islands were assumed to be concrete where 3m or less, and grassed everywhere else
3. 0.25 C&G at roundabout splitter islands and raised median, 0.5 C&G on outer curb alignments

Traffic and Wayfinding

1. In the medium-term, assumed 40 signs as per AT's Std Dwg TCS-A7-100.1 Typical Signing at Single-Lane roundabout (Urban)
2. In the long-term, assumed 15% increase in the number of signs needed for a dual lane roundabout
3. Detour roads considered at Hwy 20, detours are not expected to result in significant costs and/or traffic can be detoured within the local road network.
4. Detour roads per AT Table B.7.2 Guidelines for Surfacing Detours and Table B.7.2.2a Geometric parameters of Detours. Assumed 600 m including Hwy 20 and Memorial Trail with 10m wide paved surface. AADT >4000, Long duration >4 Months, Road type =Undivided Primary

Stormwater Management

1. SWMF improvements to be determined at future design stages based on status of development adjacent to Memorial Trail when roadway the medium- and long-term plans are implemented
2. Wetland impacts, mitigation and compensation have not reviewed as part of the FPS
3. All future deep utility mains and MHs installed at medium-term. CBs installed on north curb alignment only in medium-term.

Utilities

1. Roadway streetlighting spaced at 60m, pedestrian streetlighting at 20m (each side of roadway), roundabout lighting per TAC Guide for the Design of Roadway Lighting
2. In medium-term, streetlighting constructed on north side, streetlighting expanded to
3. Shallow utilities relocation reviewed for potential conflicts, conflict extent, mitigation and costs have not been confirmed with utility owners
4. Future deep utilities are per preliminary review of the Town of Sylvan Lane master plans
5. ATCO Gas Line High Pressure at 60 St. will be impacted

Landscaping

1. Stripped topsoil is suitable for re-spread
2. No trees are planting in the short-term
3. Only tree planting on the north bold during medium-term

Memorial Trail Functional Planning Study Class 4 Cost Estimate

CONFIDENTIAL

Project No.	27613
Project Ref.	Memorial Trail FPS
Client	Town of Sylvan Lake
Subject	Class 4 Cost Estimate
ISL Project Manager	Alex Ho
Last Edit	2021-10-25

Short-Term Plan

ITEM	DESCRIPTION	UNIT	UNIT RATE	QUANTITY				COST			
				60 St	50 St	Hwy 20	TOTAL QUANTITY	60 St	50 St	Hwy 20	TOTAL COST (ROUNDED)
1	**REMOVALS (INCLUDES DISPOSAL)**							$ 93,500	$ 173,000	$ 195,500	$ 470,000
1.01	Asphalt (Full Depth Removal)	m^2	$ 15	4,500	9,000	7,500	21,000	$ 67,500	$ 135,000	$ 112,500	$ 315,000
1.02	Tree Clearing	m^2	$ 10	1,800	2,200	7,300	11,300	$ 18,000	$ 22,000	$ 73,000	$ 113,000
1.03	Curb and Gutter	m	$ 25	-	-	-	-	$ -	$ -	$ -	$ -
1.04	Guardrail	m	$ 100	-	100	-	100	$ -	$ 10,000	$ -	$ 10,000
1.05	Fencing	m	$ 10	400	200	400	1,000	$ 4,000	$ 2,000	$ 4,000	$ 10,000
1.06	Roadside Sign	ea.	$ 1,000	4	4	6	14	$ 4,000	$ 4,000	$ 6,000	$ 14,000
2	**EARTHWORKS**							$ 188,500	$ 358,000	$ 936,000	$ 1,490,000
2.01	Stripping (0.3m depth)	m^3	$ 10	1,700	4,100	1,600	7,400	$ 17,000	$ 41,000	$ 16,000	$ 74,000
2.02	Common Excavation	m^3	$ 10	3,400	6,100	9,500	19,000	$ 34,000	$ 61,000	$ 95,000	$ 190,000
2.03	Waste Excavation Off-Site	m^3	$ 25	500	-	12,300	12,800	$ 12,500	$ -	$ 307,500	$ 320,000
2.04	Import Borrow Excavation	m^3	$ 25	2,200	2,600	12,300	17,100	$ 55,000	$ 65,000	$ 307,500	$ 427,500
2.05	Subgrade Preparation	m^2	$ 10	7,000	11,000	21,000	39,000	$ 70,000	$ 110,000	$ 210,000	$ 390,000
3	**ROADWORKS**							$ 630,000	$ 830,000	$ 1,090,000	$ 2,550,000
3.01	Pavement Structure (665mm depth)	m^2	$ 100	6,300	8,300	10,900	25,500	$ 630,000	$ 830,000	$ 1,090,000	$ 2,550,000
4	**CONCRETE WORKS**							$ 214,000	$ 367,000	$ 262,000	$ 850,000
4.01	Curb & Gutter (250 mm)	m	$ 100	210	830	730	1,770	$ 21,000	$ 83,000	$ 73,000	$ 177,000
4.02	Curb and Gutter (300 mm)	m	$ 110	200	-	-	200	$ 22,000	$ -	$ -	$ 22,000
4.03	Curb and Gutter (500 mm)	m	$ 120	400	1,100	600	2,100	$ 48,000	$ 132,000	$ 72,000	$ 252,000
4.04	Concrete Apron (Inc. 250 and 300 C&G)	m^2	$ 200	540	540	510	1,590	$ 108,000	$ 108,000	$ 102,000	$ 318,000
4.05	Concrete Splitter Island	m^2	$ 100	150	440	150	740	$ 15,000	$ 44,000	$ 15,000	$ 74,000
4.06	Concrete Sidewalks (incl. Driveways, Bike Ramps, WCRs)	m^2	$ 150	-	-	-	-	$ -	$ -	$ -	$ -
4.07	Concrete Barrier	m	$ 350	-	-	-	-	$ -	$ -	$ -	$ -
5	**TRAFFIC & WAYFINDING**							$ 85,000	$ 85,000	$ 385,000	$ 560,000
5.01	Signage	LS	$ 75,000	1	1	1	3	$ 75,000	$ 75,000	$ 75,000	$ 225,000
5.02	Pavement Markings	LS	$ 10,000	1	1.0	1	3.0	$ 10,000	$ 10,000	$ 10,000	$ 30,000
5.03	Detour Roads	LS	$ 300,000	-	-	1	1	$ -	$ -	$ 300,000	$ 300,000
6	**STORMWATER MANAGEMENT**							$ 165,000	$ -	$ 60,500	$ 230,000
6.01	Future Stormwater Minor System (incl. MHs and CBs)	m	$ 550	300	-	110	410	$ 165,000	$ -	$ 60,500	$ 225,500
7	**UTILITIES**							$ 2,714,000	$ 1,695,000	$ 1,521,000	$ 5,930,000
7.01	Future Sanitary Forcemain - 250mm DIP	m	$ 800	-	-	150	150	$ -	$ -	$ 120,000	$ 120,000
7.02	Future Sanitary Main - 250mm PVC	m	$ 550	520	-	170	690	$ 286,000	$ -	$ 93,500	$ 379,500
7.03	Future Watermain - 300mm PVC	m	$ 650	520	900	550	1,970	$ 338,000	$ 585,000	$ 357,500	$ 1,280,500
7.04	Gas Relocation	m	$ 1,500	220	-	-	220	$ 330,000	$ -	$ -	$ 330,000
7.05	Communications Relocation	m	$ 1,000	520	350	450	1,320	$ 520,000	$ 350,000	$ 450,000	$ 1,320,000
7.06	Power Relocation	m	$ 2,000	520	280	150	950	$ 1,040,000	$ 560,000	$ 300,000	$ 1,900,000
7.07	Streetlighting - Roadway Lighting	ea	$ 12,500	16	16	16	48	$ 200,000	$ 200,000	$ 200,000	$ 600,000
8	**LANDSCAPING AND MISCELLANEOUS**							$ 50,800	$ 79,000	$ 46,200	$ 180,000
8.01	Topsoil Respread (0.2m depth)	m^3	$ 10	1,500	2,700	1,100	5,300	$ 15,000	$ 27,000	$ 11,000	$ 53,000
8.02	Seeding	m^2	$ 2	5,400	13,500	5,100	24,000	$ 10,800	$ 27,000	$ 10,200	$ 48,000
8.03	Roundabout Central Island Landscaping (2x2 Roundabouts)	ea	$ 25,000	1	1	1	3	$ 25,000	$ 25,000	$ 25,000	$ 75,000
	Construction Sub-Total (Approximate)							$ 4,140,800	$ 3,587,000	$ 4,496,200	$ 12,280,000
	Contingency	**30%**						$ 1,242,240	$ 1,076,100	$ 1,348,860	$ 3,678,000
	Subtotal including contingency							**$ 5,383,040**	**$ 4,663,100**	**$ 5,845,060**	**$ 15,938,000**
	Engineering and Testing	**15%**						$ 807,456	$ 699,465	$ 876,759	$ 2,390,700
	Subtotal							$ 6,200,000	$ 5,370,000	$ 6,730,000	$ 18,330,000
	Expected Maximum Cost (+50%)							$ 9,300,000	$ 8,100,000	$ 10,100,000	$ 27,500,000
	Expected Minimum Cost (-30%)							$ 4,300,000	$ 3,800,000	$ 4,700,000	$ 12,800,000

Memorial Trail Functional Planning Study Class 4 Cost Estimate

CONFIDENTIAL

Project No.	27613
Project Ref.	Memorial Trail FPS
Client	Town of Sylvan Lake
Subject	Class 4 Cost Estimate
ISL Project Manager	Alex Ho
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