APPENDIX

8 Design Criteria

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

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Design Criteria for Thirty Road and Young Street

226468 – Thirty Road Class EA

Design Criteria for 30% Design - Environmental Study Report

Regional Municipality of Niagara

ITEM	REFERENCE	DESIGN STANDARD
ROAD		
Classification		
Road Classification	TAC Table 2.6.2	RAU70
Urban/ Rural		Rural
Local/ Collector/ Arterial		Arterial
Design Speed, (km/h)		70 km/h
Posted Speed, (km/h)		60 km/h
Horizontal Alignments		
Rmin. (m) – Minimum Radii		
NC – Normal Crown (+0.02m/m)	TAC Table 3.2.4	1680m
RC – Reverse Crown (+0.02m/m), e_{max}=0.04	TAC Table 3.2.4	290m
RC – Reverse Crown (+0.02m/m), e_{max}=0.06	TAC Table 3.2.4	330m
Superelevated Rate e=+0.04m/m	TAC Table 3.2.4	200m
Superelevated e=+0.64m/m	TAC Table 3.2.4	190m
Length of Superelevation Runoff for Two-Lane Crowned Urban Roadways		
Vertical Alignments		
Minimum Grade – With Curbs (%)	TAC 3.3.2.5	0.5%
Maximum Grade (% Rolling - % Mountainous)	TAC Table 3.3.1	4%
Crest Vertical Curve Kmin. – Stopping Sight Distance	TAC Table 3.3.2	17
Crest Vertical Curve Kmin. – Passing Sight Distance	TAC Table 3.3.3	255
Sag Vertical Curve Kmin. – Non-Illuminated Control	TAC Table 3.3.4	23
Sag Vertical Kmin. – Illuminated Control	TAC Table 3.3.5	10-12
Stopping Sight Distance – Level Roadway (m)	TAC Table 2.5.2	105 m
Stopping Sight Distance – On Grades (m)	TAC Table 2.5.3	Varies, to be calculated during design
Passing Sight Distance (m)	TAC Table 2.5.4	490 m
Cross Sections		
Through Lane Width (m)	TAC Table 4.2.3	3.0 – 3.7 m (3.5 m)

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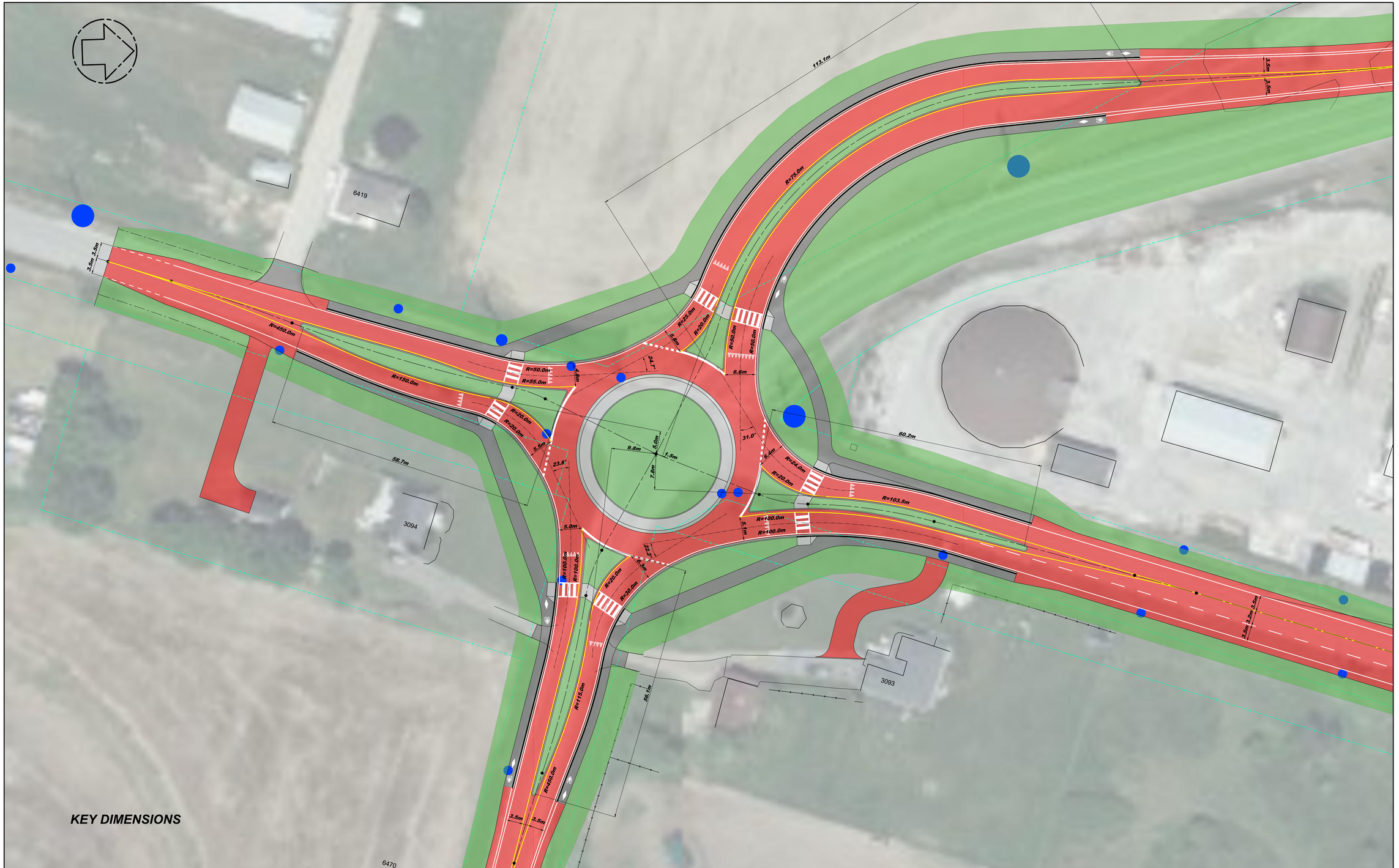
ITEM	REFERENCE	DESIGN STANDARD
Paved Shoulder Width (m)	-	1.5m
Tangent Section Cross Fall, %	-	2%
Clear zone (m)	TAC Table 7.3.1	6.0 – 8.5 m (3:1 fill Slopes)
Intersection		
Minimum Grade – Along Curb Radius (%)	TAC Table 3.3.2.5	0.6%
Design Vehicle for Turning Movements	-	HSU Truck
Control Vehicle for Turning Movements	-	WB-20 Truck
Control Vehicle for Turning Movements		Farm Vehicles, including Tractor with Trailer and Combine
Deceleration Length (m)	TAC 2.5.3	Varies, to be calculated during design
Left Turn Lanes		
Left Turn Lane Width – Not Adjacent to a Median (m)	TAC 4.3.2.3	0.0 m to 0.25 m less than through lane width (3.25m min.)
Left Turn Taper Ratio (m)	TAC Table 9.17.1	30:1 (105m)
Left Turn Horizontal Curve Radius (m)	TAC Table 9.17.1	1000m
Storage Length for Left Turn (m)	Per Transportation Study	15m



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0	ISSUED FOR ESR	2024-04-15	S.P.

NOTES/LEGEND

1 THE POSITION OF POLE LINES, CONDUITS, WATERMAINS, SEWER AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS AND, WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, THE CONTRACTOR SHALL INFORM HIMSELF OF THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND SHALL ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

2 PROPERTY LINES WERE PLOTTED USING REGISTERED PLANS AND BARS LOCATED IN THE FIELD. TO VERIFY THE ACCURACY OF THESE PROPERTY LINES, A LEGAL SURVEY SHOULD BE PERFORMED PRIOR TO CONSTRUCTION.

DRAFTING	S.P.
DESIGN	S.P.
CHECKED BY	H.H.
APPROVED BY	H.H.

Niagara Region
PUBLIC WORKS
R.V. ANDERSON ASSOCIATES LIMITED

THIRTY ROAD CLASS EA
PRELIMINARY DESIGN
THIRTY ROAD

TOWN OF SMITHVILLE
ROUNDABOUT DESIGN PARAMETERS

CONSULTANT FILE No.	#226468
DATE	2024-04-15
SCALE	Hor : 1:400 m Ver : 1:50 m
REF. No.	#
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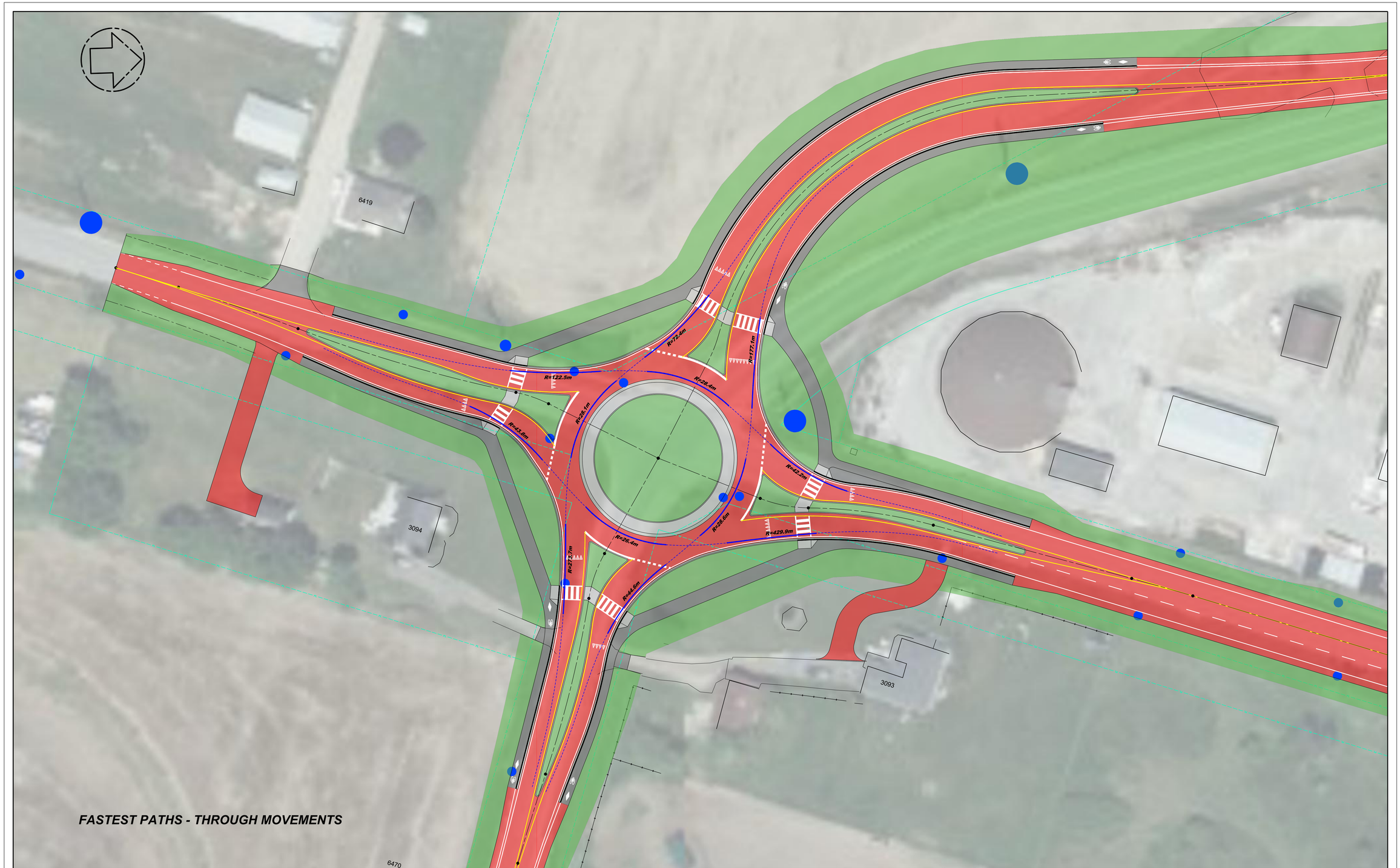
DRAWING FILE: R:\2022\226468 - Niagara-Thirty(Rd) at Young St Class EA\10 CADDwg\01 Linear\03 Design\226468-Preferred Alternative-Sheets for Report.dwg PLOTTED: May 07, 2024 - 1:54pm PLOTTED BY: Piji



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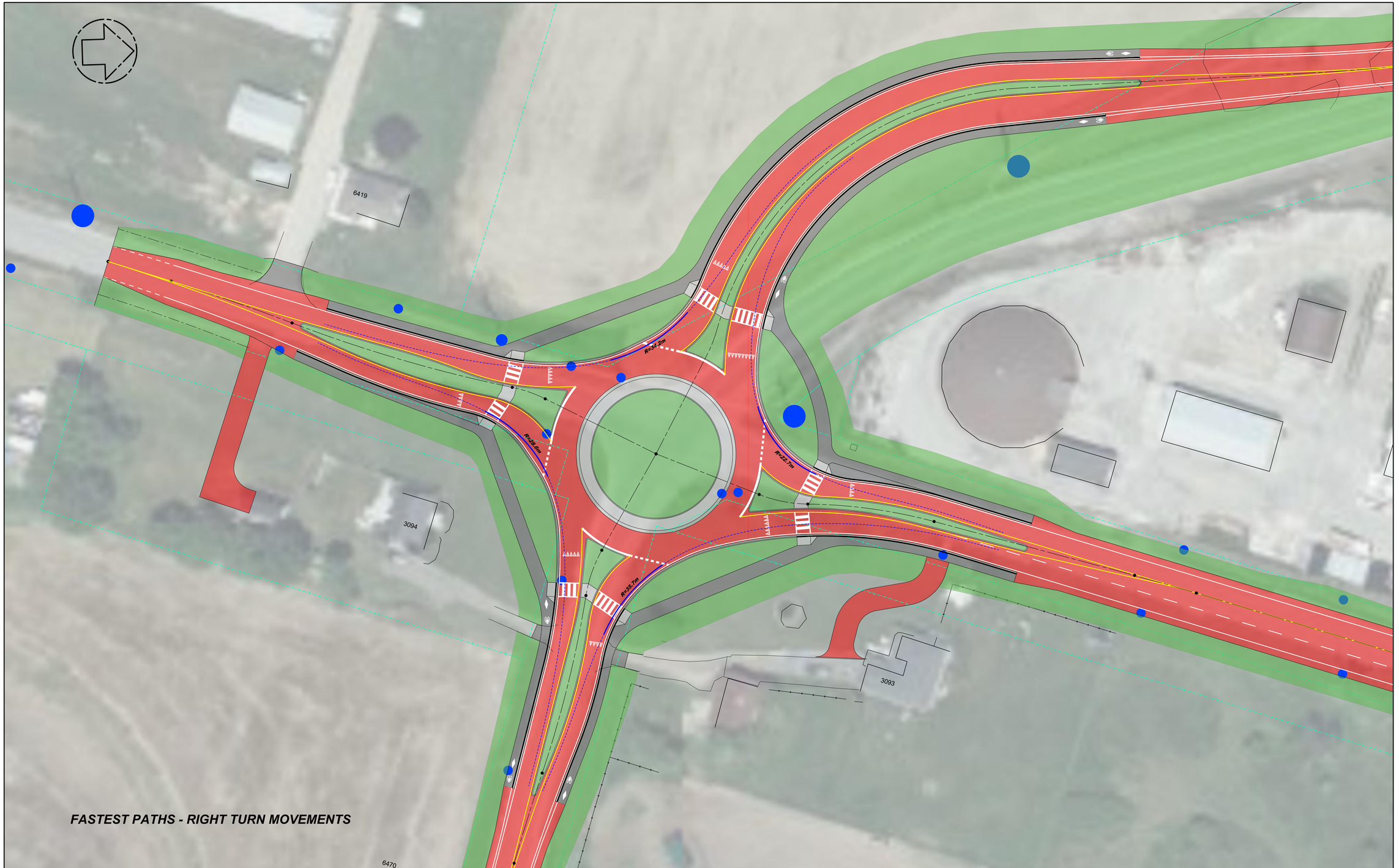

FASTEST PATHS - RIGHT TURN MOVEMENTS

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THIRTY ROAD CLASS EA PRELIMINARY DESIGN

THIRTY ROAD

TOWN OF SMITHVILLE

ROUNDABOUT DESIGN PARAMETERS

CONSULTANT FILE No.	#226468
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Roundabout Critical Design Parameters
Location: Intersection of Regional Road 14 (Thirty Road) and Young Street
Township of West Lincoln

R.V. ANDERSON ASSOCIATES LIMITED

General Design Parameters

		Design Parameter	Standard (TAC Reference)	Desired Value	Design Value
Roundel	1	Design Vehicle	to be determined by Engineer		HSU and WB-20.5
	2	# Lanes	based on traffic analysis		1
	3	Inscribed Circle Diameter	NCHRP 6.3.1	28.0 to 60.0m	46.0m
	4	Case 1/2/3?	CRDG 6.2.4	Case 3	N/A
	5	Lane 1 (outside) Width	CRDG 6.3.2	4.2m to 7.2m	5.5m
	6	Lane 2 Width			N/A
	7	Lane 3 Width			N/A
	8	Apron Width	based on design vehicle swept path		2.5m

Case 1 — Design vehicles overlap or straddle adjacent lanes on entry, around the circulatory roadway, and on exit.

Case 2 - Design vehicles maintain their own lane on entry, but straddle adjacent lanes around the circulatory roadway, and on exit.

Case 3 - Design vehicles stay in their own lane on entry, within the circulatory roadway, and upon exit.

Approach Design Parameters

		Design Parameter	Standard (TAC Reference)	Desired Value	Leg 1 (south leg)	Leg 2 (east leg)	Leg 3 (north leg)	Leg 4 (west leg)
Approaches	9	Design Speed	based on road approaches		70km/hr	100km/hr	70km/hr	100km/hr
	10	Deceleration Distance	CRDG Table 6.3		75.0m	155.0m	75.0m	155.0m
	11	# Lanes	based on traffic analysis		1	1	1	1
	12	Splitter Island Width	CRDG 6.3.4	2.4m min. for ped refuge	>2.4m	>2.4m	>2.4m	>2.4m
	13	Splitter Island Length	CRDG 6.3.4	12m minimum	56.1m	60.2m	113.1m	58.7m
	14	Lane Widths	GDGCR Table 4.2.3	Based on design speed	3.5m	3.5m	4.3m (SB) to 5.0m (NB)	3.5m
	15	Rural/Urban		Urban at roundabout to at least end of splitter island	urban	urban	urban	urban
	16	Multi-use Path Width	Based on local standards	N/A	3.0m	3.0m	3.0m	3.0m
	17	On-Road Bike Lane Width	Based on local standards	N/A	1.5m	N/A	1.5m	N/A
	18	Cycle Track Width	Based on local standards	N/A	N/A	N/A	N/A	N/A
	19	Approach Stopping Sight Distance	TAC Table 2.5.2	Based on design speed	105.0m	185.0m	105.0m	185.0m
Entry's	20	Entry Radus - Inner	Based on design vehicle movements		30.0m	24.0m	25.0m	20.0m
	21	Entry Radus - Outer	CRDG 6.3.12	20m minimum	20.0m	20.0m	20.0m	20.0m
	22	Entry Width	CRDG 6.2.5, MTO	between 7.3m and 9.1m	6.3m	6.4m	5.8m	5.5m
	23	High Speed Approach - Moderate Radius	CRDG 6.6.2	120m	115.0m	103.5m	75.0m	150.0m
	24	High Speed Approach - Broad Radius	CRDG 6.6.2	200m minimum	450.0m	N/A	N/A	450.0m
Exit's	25	Exit Radius - Inner	Based on design vehicle movements		100.0m	100.0m	50.0m	50.0m
	26	Exit Radius - Outer	CRDG 6.3.14		100.0m	100.0m	50.0m	55.0m
	27	Exit Width	CRDG 6.3.13	Similar to or slightly less than entry width	5.0m	5.1m	6.6m	4.8m

Approach Design Checks

		Design Check	Standard (TAC Reference)	Desired Value	Leg 1 (south leg - NB movements)		Leg 2 (east leg - WB movements)		Leg 3 (north leg - SB movements)		Leg 4 (west leg - EB movements)	
					RADIUS (m)	SPEED (km/hr)	RADIUS (m)	SPEED (km/hr)	RADIUS (m)	SPEED (km/hr)	RADIUS (m)	SPEED (km/hr)
Fastest Paths	28	R1 Through - Entry	NCHRP 6.7.1	40.0 to 50.0 km/hr	44.6	32.8	42.2	32.0	72.4	41.2	43.8	32.6
Outside Lanes	29	R2 Through - Roundel			28.6	26.7	28.4	26.6	28.1	26.5	26.4	25.7
	30	R3 Through - Exit (Based On Fastest Path)			177.1	62.6	122.5	52.7	274.7	76.9	429.9	94.8
	31	R3 Through - Exit (Based On Acceleration)			26	46.1	26.0	46.1	26	46.0	26.0	45.6
	32	R4 Circulating			18.5	21.8	18.5	21.8	18.5	21.8	18.5	21.8
	33	R5 Right			35.7	29.6	22.7	23.9	34.2	29.0	28.6	26.7
	34	Max V				46.1		46.1		46.0		45.6
	35	Min V				21.8		21.8		21.8		21.8
	36	Delta V (R1 - R4)		25.0 km/hr		11.1		10.2		19.4		10.8
Entry Angle	37	Entry Angle	CRDG 6.3.11	between 20 and 60 degrees	22.2°		31.0°		24.7°		23.8°	

GDGCR = GEOMETRIC DESIGN GUIDELINES FOR CANADIAN ROADS (TAC 2017)
RAIG = FEDERAL HIGHWAY ADMINISTRATION - ROUNDABOUTS - AN INFORMATIONAL GUIDE (FHWA 2000)
MTO = IMPLEMENTATION OF TAC CANADIAN ROUNDABOUT DESIGN GUIDE AND MTO DESIGN EXCPETIONS (MT0 DSCO 2017)
NCHRP = NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM - REPORT 672 (NCHRP 2010)

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