

Riverton Roundabout Design

TGP
Engineering

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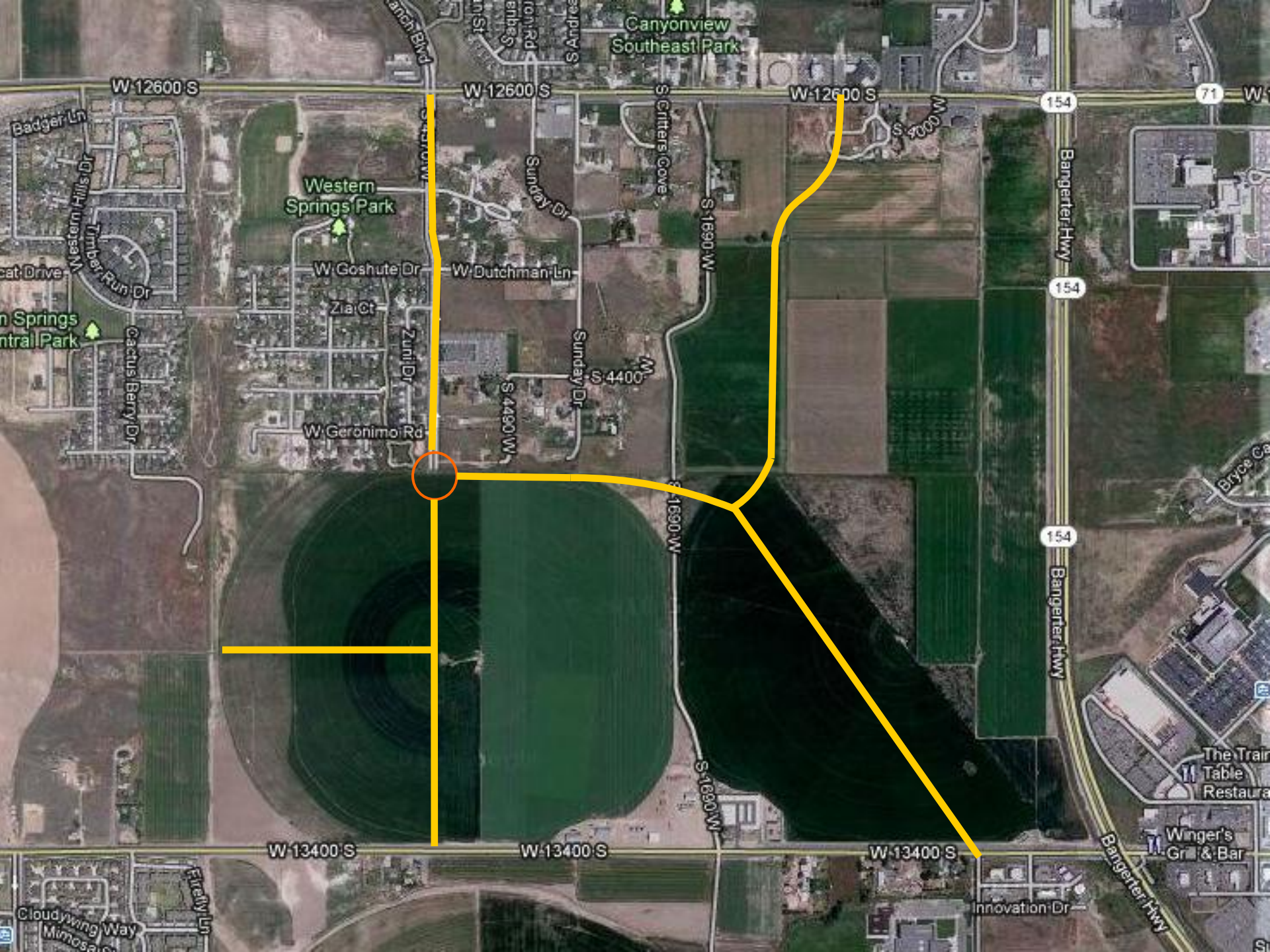
Final Report
9 April 2012



Purpose and Need

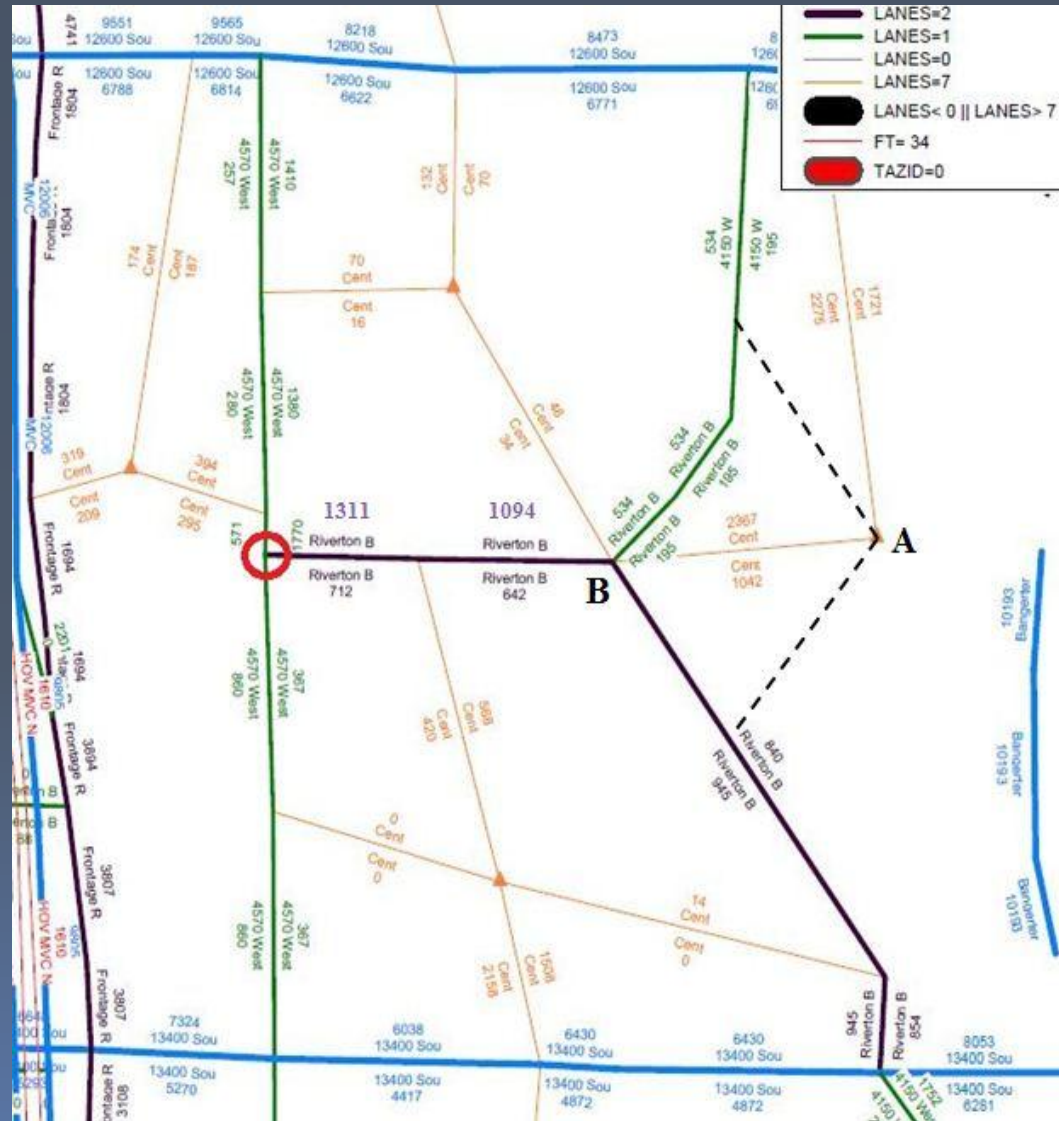


- Future commercial and residential development in area
- Design intersection now to reduce right-of-way cost
- Roundabout preferred by Riverton City
- Provides safe and efficient traffic control



Traffic Volume Data

- Future volumes needed for analysis
- CUBE used to model 2040 traffic conditions
- Very high westbound traffic
- Assumptions were made to correct problems



Traffic Analysis

- Design Level of Service: C
- 2010 Highway Capacity Manual (HCM) methodology used
- Spreadsheet developed

Analysis Spreadsheet

3-LEG ROUNDABOUT TRAFFIC DESIGN CALCULATIONS

Intersection Design Parameters		
Peak Hour Factor:	0.92	PHF
Percent Trucks:	2.0	%
Heavy-Vehicle PCE:	2.0	Passenger Cars
Heavy-Vehicle Factor:	0.980	F _{HV}
Pedestrians/Hour	110	p/h
Analysis Time Period	0.25	hr

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Level of Service Table	
Control Delay (s/veh)	v/c ≤ 1.0
0 - 10	A
> 10 - 15	B
> 15 - 25	C
> 25 - 35	D
> 35 - 50	E
> 50	F

Modified HCM Exhibit 21-14			Traffic Distribution	
Case	Entry Lanes	% Left Lane	% Right Lane	
0	LTR	NA	NA	
1	L, TR	NA	NA	
2	LT, R	NA	NA	
3	LT, TR	0.47	0.53	
4	L, LTR	0.47	0.53	
5	LTR, R	0.47	0.53	

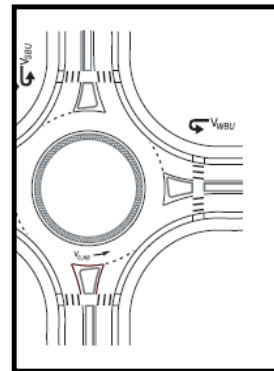
Design Calculations

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Case (HCM Exhibit 21-14)	SB		NB		WB	
	Circulating Lanes	Exiting Lanes	Circulating Flow _{PCE}	Exiting Flow _{PCE}	Circulating Flow _{PCE}	Exiting Flow _{PCE}
Case (HCM Exhibit 21-14)	2	2	2	2	2	2
Circulating Lanes	1	1	1	1	1	1
Exiting Lanes	1	1	1	1	1	1
Circulating Flow _{PCE}	498		523		114	
Exiting Flow _{PCE}	112		606		521	
Entry Lane	Left	Right	Left	Right	Left	Right
Entering Volume _{PCE}	521	110	112	293	496	959
Lane Capacity _{PCE}	686	1130	669	1130	1008	1130
Pedestrian Factor	0.986		0.986		0.982	
Lane Flow Rate (veh/hr)	510	107	109	287	486	940

	SB Thru	SB Left	SB U-Turn	Total
Entry VPH	100	469	2	571
Entry VPH _{PCE}	110	519	2	631
Bypass Lane?	Yes			

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	Entry VPH	Entry VPH _{PCE}	Bypass Lane?
WB Right	865	959	Yes
WB Left	446	494	
WB U-Turn	2	2	
Total	1313	1455	

Performance Measures

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Entry Lane	SB		NB		WB	
	Left	Right	Left	Right	Left	Right
Lane Capacity (veh/hr)	663	1092	646	1092	970	1088
V/C Ratio	0.8	0	0.2	0.3	0.5	0.9
Avg. Control Delay (s/veh)	25.0	4	7.5	5.8	9.9	24.2
Lane Level of Service	C	A	A	A	A	C
Approach Delay (s/veh)	21.4		6.3		19.3	
Approach Level of Service	C		A		C	
95th Percentile Queue (veh)	7	0	1	1	3	12

	NB U-Turn	NB Thru	NB Right	Total
Entry VPH	2	100	265	367
Entry VPH _{PCE}	2	110	293	405
Bypass Lane?	Yes			

This spreadsheet performs calculations using the methodology from HCM 2010 Chapter 21: Roundabouts. The spreadsheet can analyze any 3-Leg roundabout configuration with up to two entry lanes (one of which may be a right-turn or thru bypass lane) and up to two circulating lanes. Basic instructions are included below.

Traffic Analysis

Performance Measures

Entry Lane	SB		NB		WB	
	Left	Right	Left	Right	Left	Right
Lane Capacity (veh/hr)	663	1092	646	1092	970	1088
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Approach Level of Service	C		A		C	
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Synchro

- Use for traffic simulation







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River

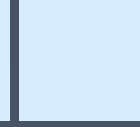
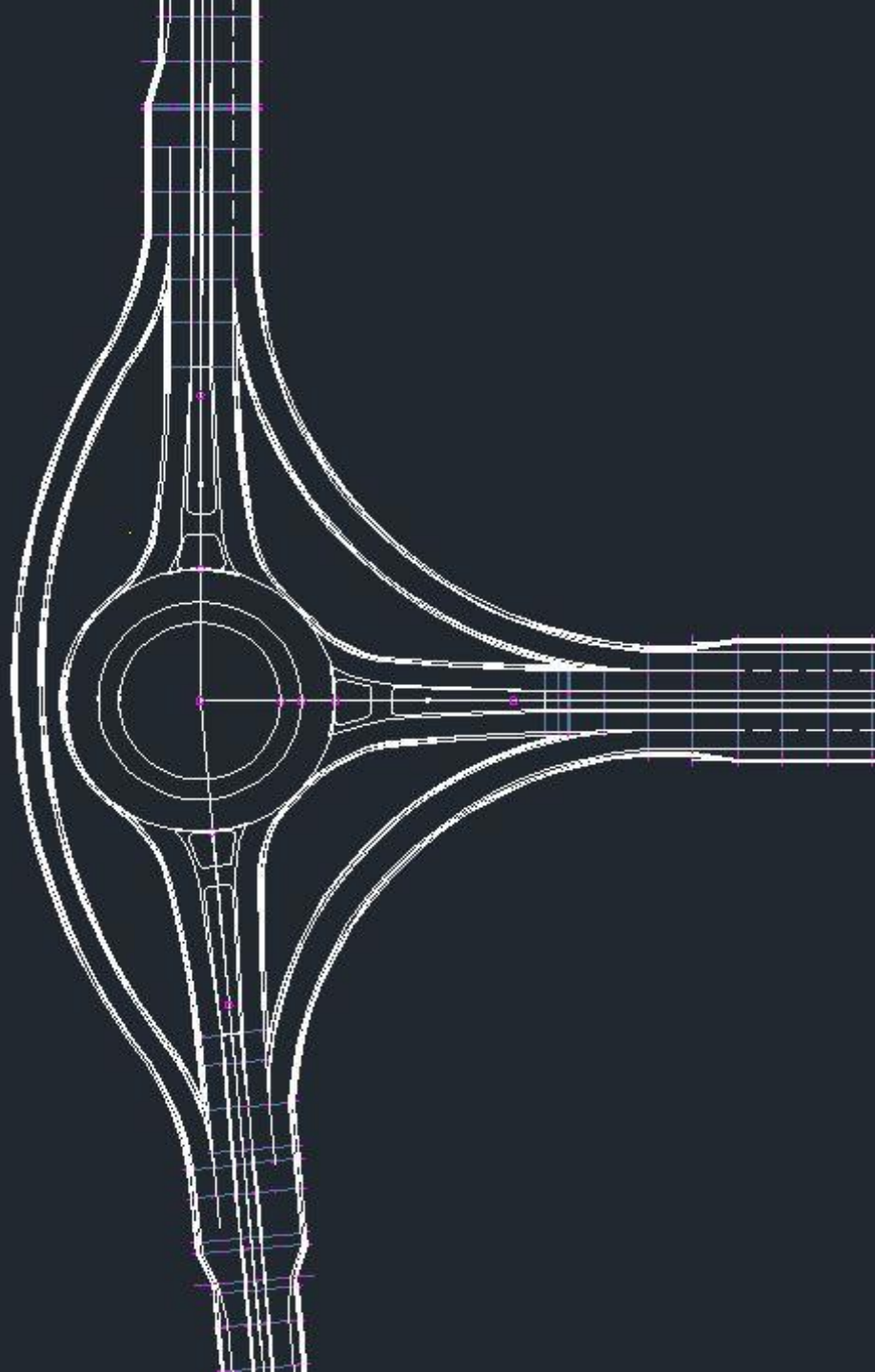
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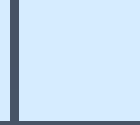
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Design Recommendations

- Single Lane Roundabout
 - Diameter: 150 feet
 - Circulatory Road Width: 18 feet
 - Apron Width: 12 feet
 - Crosswalk Length: 10 feet
- Single entry lane for each approach with right-turn or through bypass lane
- Add additional lane to 4570 West northbound from the roundabout to 12600 South





Questions?