

One Renner Ridge
9801 Renner Boulevard
Lenexa, Kansas 66219
Phone: 913-492-0400
Fax: 913-577-8380

Project Name: VH Dr / VH Pkwy / Paragon Pkwy
GBA Project No.: 12720
Client Project No.:
Calculated By: JRH
Date: 6/15/2020
Checked By:
Date:

User must insert data into yellow shaded areas.

References:

NCHRP Report 672, Equation 6-1 & 6-2
AASHTO 2011 "Green Book," Equation 3-7

Roundabout Design Speed =

25

Step 1 - Calculate initial V and f values

$$f = \frac{V^2}{15 R} - 0.01e$$

Approach	Radius Location	Radius (ft) (Meas. value)	e (%) (Pvm't Slope)	V (mph) (Eq. 6-1 or Eq. 6-2)	f (Eq. 3-7)
NB View High Dr	R ₁	200.00	2.00	26.6	0.22
	R ₂	100.00	-2.00	18.8	0.26
	R ₃	150.00	2.00	23.8	0.23
	R ₄	59.50	-2.00	15.5	0.29
	R ₅	73.00	2.00	18.0	0.28
WB Paragon Pkwy	R ₁	210.93	2.00	27.2	0.21
	R ₂	59.50	-2.00	15.5	0.29
	R ₃	118.89	2.00	21.8	0.25
	R ₄	59.50	-2.00	15.5	0.29
	R ₅	159.04	2.00	24.4	0.23
SB View High Pkwy	R ₁	262.97	2.00	29.6	0.20
	R ₂	59.50	-2.00	15.5	0.29
	R ₃	437.68	2.00	36.0	0.18
	R ₄	59.50	-2.00	15.5	0.29
	R ₅	100.72	2.00	20.4	0.26
EB View High Dr	R ₁	275.90	2.00	30.1	0.20
	R ₂	59.50	-2.00	15.5	0.29
	R ₃	232.11	2.00	28.2	0.21
	R ₄	59.50	-2.00	15.5	0.29
	R ₅	202.00	2.00	26.7	0.22

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Step 2 - Recalculate V based on calculated f values

$$V = \sqrt{15(R)(0.01e + f)}$$

Approach	Radius Location	Radius (ft)	e	f	V (mph)
		(Meas. value)	(Pvm't Slope)	(From above)	(Eq. 3-7)
NB View High Dr	R ₁	200	2.00	0.22	26.8
	R ₂	100	-2.00	0.26	19.0
	R ₃	150	2.00	0.23	23.7
	R ₄	59.5	-2.00	0.29	15.5
	R ₅	73	2.00	0.28	18.1
WB Paragon Pkwy	R ₁	210.93	2.00	0.21	27.0
	R ₂	59.5	-2.00	0.29	15.5
	R ₃	118.89	2.00	0.25	21.9
	R ₄	59.5	-2.00	0.29	15.5
	R ₅	159.04	2.00	0.23	24.4
SB View High Pkwy	R ₁	262.97	2.00	0.20	29.5
	R ₂	59.5	-2.00	0.29	15.5
	R ₃	437.68	2.00	0.18	36.2
	R ₄	59.5	-2.00	0.29	15.5
	R ₅	100.72	2.00	0.26	20.6
EB View High Dr	R ₁	275.9	2.00	0.20	30.2
	R ₂	59.5	-2.00	0.29	15.5
	R ₃	232.11	2.00	0.21	28.3
	R ₄	59.5	-2.00	0.29	15.5
	R ₅	202.00	2.00	0.22	27.0

Step 4 - Calculate V₃ exit speed

Approach	Radius Location	V ₂	V _{3base}	Eq. 6-4	V ₃
NB View High Dr	R ₃	19.0	23.7	29.6	23.7
WB Paragon Pkwy	R ₃	15.5	21.9	29.9	21.9
SB View High Pkwy	R ₃	15.5	36.2	30.3	30.3
EB View High Dr	R ₃	15.5	28.3	31.7	28.3

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Step 5 - Compare estimated speeds to calculated speeds.

Approach	Radius Location	V (mph) (Eq. 6-1 or Eq. 6-2)	V (mph) (Eq. 3-7)	Difference (Calc.)	Conclusion (User Input)
NB View High Dr	R ₁	26.6	26.8	0.2	
	R ₂	18.8	19.0	0.2	
	R ₃	23.8	23.7	-0.1	
	R ₄	15.5	15.5	0.0	
	R ₅	18.0	18.1	0.1	
WB Paragon Pkwy	R ₁	27.2	27.0	-0.2	
	R ₂	15.5	15.5	0.0	
	R ₃	21.8	21.9	0.1	
	R ₄	15.5	15.5	0.0	
	R ₅	24.4	24.4	0.0	
SB View High Pkwy	R ₁	29.6	29.5	-0.1	
	R ₂	15.5	15.5	0.0	
	R ₃	36.0	30.3	-5.7	
	R ₄	15.5	15.5	0.0	
	R ₅	20.4	20.6	0.2	
EB View High Dr	R ₁	30.1	30.2	0.1	
	R ₂	15.5	15.5	0.0	
	R ₃	28.2	28.3	0.1	
	R ₄	15.5	15.5	0.0	
	R ₅	26.7	27.0	0.3	

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Step 6 - Compare V to Design V

Approach	Radius Location	V (mph)	Design V (mph)	Difference	Conclusion
		(From above)	(From above)	(Calc.)	(User Input)
NB View High Dr	R ₁	26.8	25	1.8	
	R ₂	19.0	25	-6.0	
	R ₃	23.7	25	-1.3	
	R ₄	15.5	25	-9.5	
	R ₅	18.1	25	-6.9	
WB Paragon Pkwy	R ₁	27.0	25	2.0	
	R ₂	15.5	25	-9.5	
	R ₃	21.9	25	-3.1	
	R ₄	15.5	25	-9.5	
	R ₅	24.4	25	-0.6	
SB View High Pkwy	R ₁	29.5	25	4.5	
	R ₂	15.5	25	-9.5	
	R ₃	30.3	25	5.3	
	R ₄	15.5	25	-9.5	
	R ₅	20.6	25	-4.4	
EB View High Dr	R ₁	30.2	25	5.2	
	R ₂	15.5	25	-9.5	
	R ₃	28.3	25	3.3	
	R ₄	15.5	25	-9.5	
	R ₅	27.0	25	2.0	

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Step 7 - Compare V within approach

Approach	Radius Location	V (mph) (From above)	Relative V Diff. * (mph) (Calc.)	Results (Calc.)	Comments (User Input)
NB View High Dr	R ₁	26.8	11.3	Acceptable Design	
	R ₂	19.0	3.5	Acceptable Design	
	R ₃	23.7	8.2	Acceptable Design	
	R ₄	15.5	-	-	
	R ₅	18.1	2.6	Acceptable Design	
WB Paragon Pkwy	R ₁	27.0	11.5	Acceptable Design	
	R ₂	15.5	0.0	Acceptable Design	
	R ₃	21.9	6.4	Acceptable Design	
	R ₄	15.5	-	-	
	R ₅	24.4	8.9	Acceptable Design	
SB View High Pkwy	R ₁	29.5	13.9	Acceptable Design	
	R ₂	15.5	0.0	Acceptable Design	
	R ₃	30.3	14.8	Acceptable Design	
	R ₄	15.5	-	-	
	R ₅	20.6	5.0	Acceptable Design	
EB View High Dr	R ₁	30.2	14.7	Acceptable Design	
	R ₂	15.5	0.0	Acceptable Design	
	R ₃	28.3	12.8	Acceptable Design	
	R ₄	15.5	-	-	
	R ₅	27.0	11.4	Acceptable Design	

*Relative difference is from minimum speed within roundabout approach (typicall R₄ speed).