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Prince William Parkway
Clover Hill Road
Intersection Study
iCAP - VJuST Update

Prince William County/ATCS

NOT FINAL, UNDER REVIEW BY VDOT

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Overview

Initial VJuST-V Results

Generated using 2040 Total Volumes

Sorted based on Weighted Scoring (V/C x Safety x Cost)

Potential Options with Existing Right-of-Way Considerations

Both At-Grade and Grade-Separated Alternatives Screened

VJuST V/C Ratio Results

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2040 At-Grade Alternatives V/C Ratios – PW Pkwy 2 Lanes vs 3 Lanes

PW Pkwy Thru Lanes per Direction (At Grade)	2-Lane		3-Lane	
v/c	AM	PM	AM	PM
Conventional	0.93	1.06	0.69	0.78
Bowtie	0.95	1.08	0.72	0.79
Center Turn Overpass	0.89	1.01	0.66	0.72
Echelon	0.78	1.01	0.55	0.72
Full Displaced Left Turn	0.90	0.97	0.65	0.68
Median U-Turn	1.01	1.14	0.74	0.83
Partial Displaced Left Turn	0.90	0.97	0.65	0.68
Partial Median U-Turn	0.94	1.06	0.69	0.75
Quadrant Roadway	0.90	1.34	0.65	0.79
Restricted Crossing U-Turn	0.98	1.06	0.74	0.77
Split Intersection	0.93	1.17	0.69	0.86
Thru-Cut	0.97	1.02	0.74	0.74

Note : At-Grade Alternatives Need PW Pkwy 3 Lanes, According to VJuST Results.

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VJuST-V Screening Results

2040 AM

Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	Planning Level Cost Category	Weighted Score
Partial Cloverleaf	-	0.16		20	$$$$$	16
Single Roundabout	-	0.35	+	12	$$$$$	21
Double Roundabout	-	0.35	+	16	$$$$$	28
Diverging Diamond	-	0.28	-	20	$$$$$	28
Median U-Turn	-	0.74	+	20	$$	30
Restricted Crossing U-Turn	-	0.74		20	$$	30
Partial Median U-Turn	-	0.69	+	28	$$	39
Thru-Cut	-	0.74		28	$$	41
Displaced Left Turn	-	0.30	-	28	$$$$$	42
Single Point	-	0.28	-	32	$$$$$	45
Michigan Urban Diamond	-	0.43	+	24	$$$$$	52
Bowtie	-	0.72	+	24	$$$	52
Traditional Diamond	-	0.39		28	$$$$$	55
Echelon	-	0.55	+	28	$$$$	62
Conventional	-	0.69		48	$$	66
Contraflow Left	-	0.42		32	$$$$$	67
Split Intersection	-	0.69		36	$$$	75
Full Displaced Left Turn	-	0.65	-	40	$$$	78
Quadrant Roadway	S-E	0.65		40	$$$	78
Center Turn Overpass	-	0.66	+	32	$$$$	84
Partial Displaced Left Turn	-	0.65	-	44	$$$	86

2040 PM

Type	Dir	Maximum V/C	Accommodation Compared to Conventional	Weighted Total Conflict Points	Planning Level Cost Category	Weighted Score
Partial Cloverleaf	-	0.12		20	$$$$$	12
Single Roundabout	-	0.28	+	12	$$$$$	17
Double Roundabout	-	0.28	+	16	$$$$$	22
Diverging Diamond	-	0.24	-	20	$$$$$	24
Restricted Crossing U-Turn	-	0.77		20	$$	31
Median U-Turn	-	0.83	+	20	$$	33
Displaced Left Turn	-	0.26	-	28	$$$$$	36
Single Point	-	0.24	-	32	$$$$$	38
Thru-Cut	-	0.74		28	$$	41
Partial Median U-Turn	-	0.75	+	28	$$	42
Traditional Diamond	-	0.31		28	$$$$$	43
Michigan Urban Diamond	-	0.43	+	24	$$$$$	52
Contraflow Left	-	0.33		32	$$$$$	53
Bowtie	-	0.79	+	24	$$$	57
Conventional	-	0.78		48	$$	75
Echelon	-	0.72	+	28	$$$$	81
Full Displaced Left Turn	-	0.68	-	40	$$$	82
Partial Displaced Left Turn	-	0.68	-	44	$$$	90
Center Turn Overpass	-	0.72	+	32	$$$$	92
Split Intersection	-	0.86		36	$$$	93
Quadrant Roadway	S-E	0.79		40	$$$	95

Note : At-Grade Alternatives have PW Pkwy 3 Lanes Input Reflecting in the above Result Tables. Number of Lanes on PW Pkwy is not required as Inputs for Grade-Separated Alternatives in VJuST.

VJuST-V Screening Results

Top Alternatives Based on the VJuST Screening Results:

- **Partial Cloverleaf (Grade-Separated)**
- **Diverging Diamond (Grade-Separated)**
- **Single Roundabout (Grade-Separated)**
- **Double Roundabout (Grade-Separated)**
- **Median U-turn (At-Grade)**
- **Restricted Crossing U-Turn (At-Grade)**

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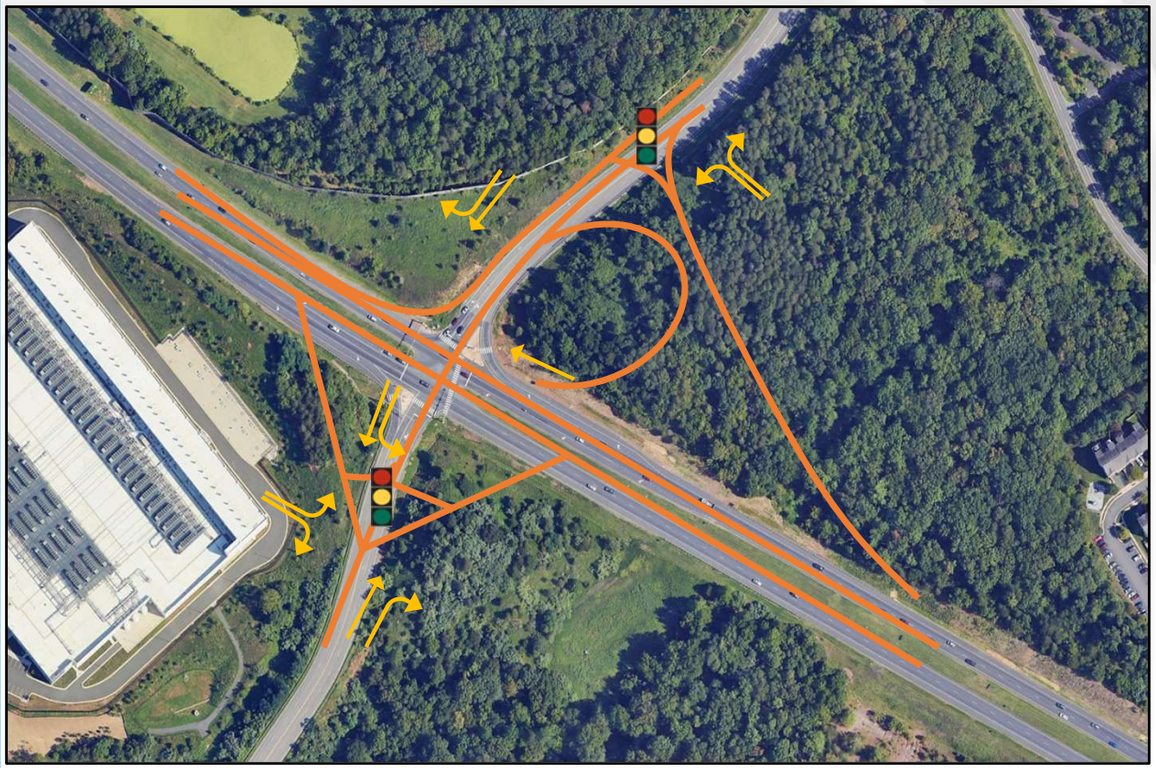
Partial Cloverleaf (Grade-Separated)



Pro:

- Avoids Wetland in NW Quadrant
- V/C Ratio: 0.16 (AM) and 0.12 (PM)
- Preserves Most of the Land
- Safety (Low Conflict Points)
- Continuous Flow on Loop Ramp for Heavy NBL Traffic Exiting Airport
- Improves Merging for Heavy SBR Traffic from Clover Hill Rd
- Continuous Flow on PW Pkwy EB/WB
- Reduced Signal Phasing (Off Ramp vs Clover Hill Rd)
- SUP on Clover Hill Rd throughout Interchange

Con:

- Two Traffic Signals
- Cost could be a Potential Drawback

Note : Lane Configurations for Illustration Purpose, Pending on Further Analysis.

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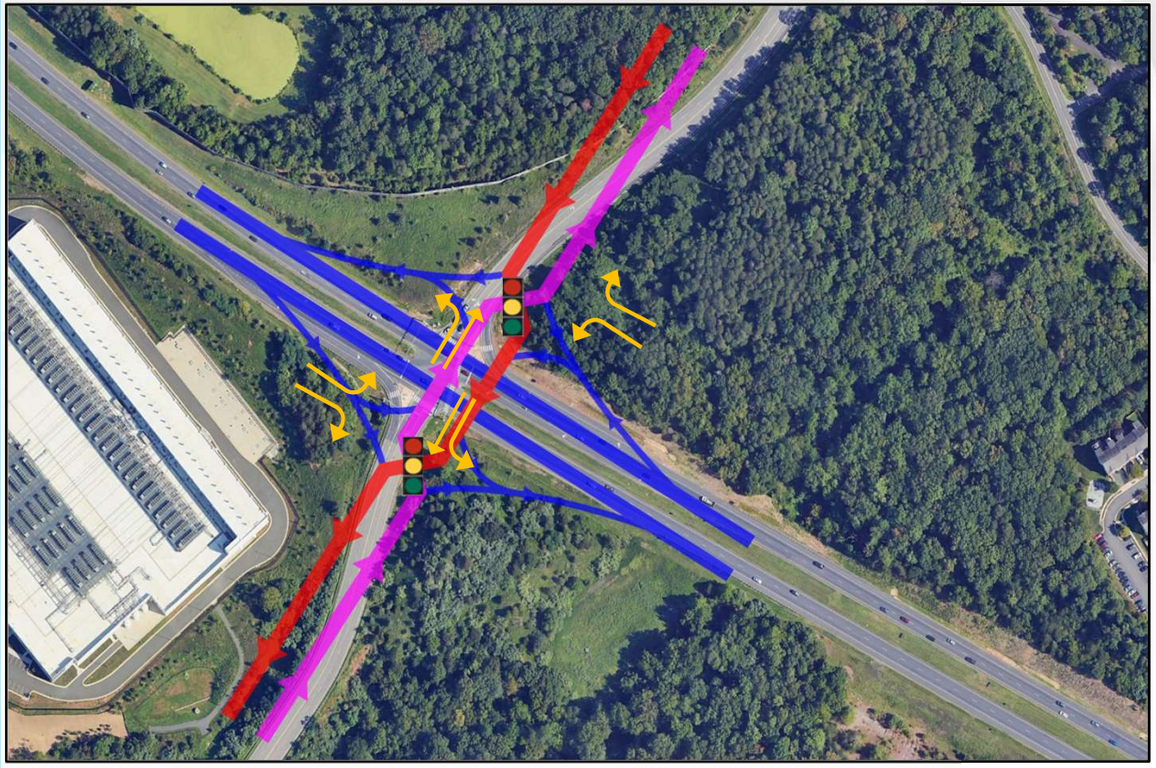
DDI (Grade-Separated)



Pro:

- V/C Ratio: 0.28 (AM) and 0.24 (PM)
- EBL and WBL could Move without Conflicting Traffic (Pending on Design), thus Reducing Queues
- Compact in Acquiring Land
- Safety (Low Conflict Points)
- Improves Merging for Heavy SBR Traffic from Clover Hill Rd
- Reduce Signal Phasing
- Continuous Flow on PW Pkwy EB/WB
- SUP on Clover Hill Rd throughout Interchange

Con:

- Two Traffic Signals
- Cost could be a Potential Drawback

Note : Lane Configurations for Illustration Purpose, Pending on Further Analysis.

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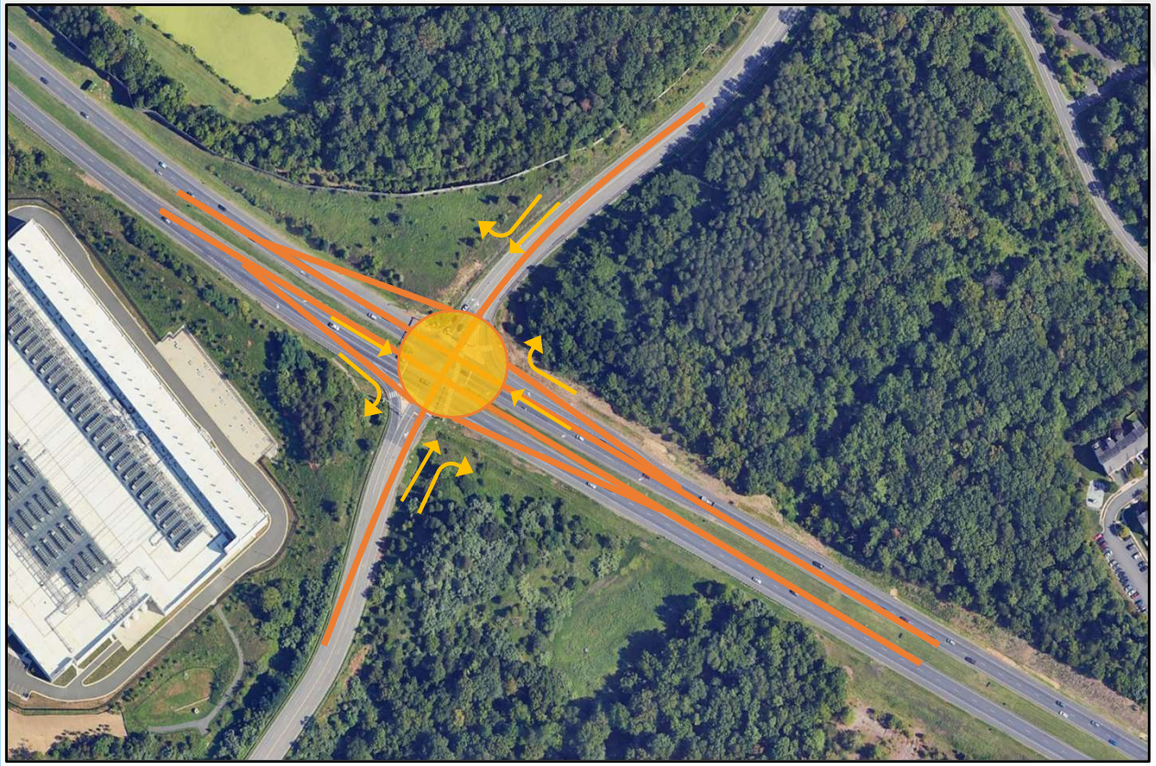
Single Roundabout (Grade-Separated)



Pro:

V/C Ratio: 0.35 (AM) and 0.28 (PM)

Safety (Lowest Conflict Points)

Eliminate Traffic Signal

Continuous Flow for All Movements

Con:

Interchange Footprint could be Potentially Large

Once Built, Capacity is Permanent

Challenge for SUP, with Non-Stopping Traffic

Cost could be a Potential Drawback

Note : Lane Configurations for Illustration Purpose, Pending on Further Analysis.

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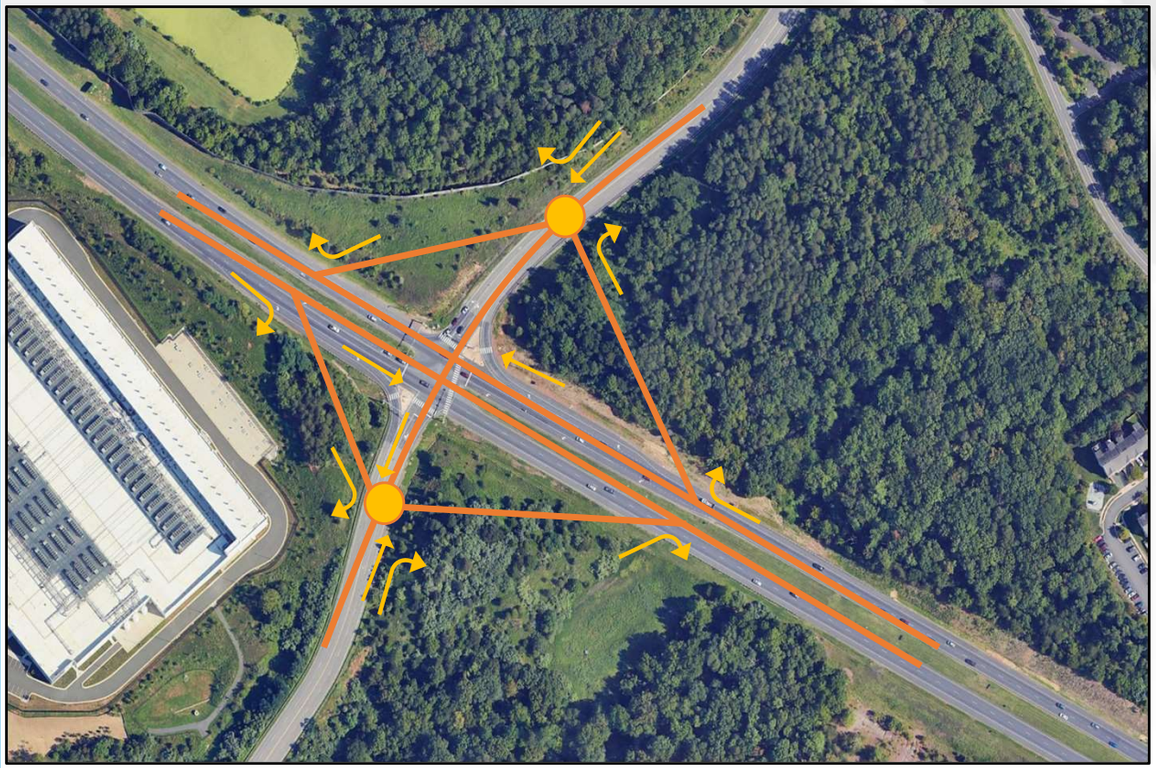
Double Roundabout (Grade-Separated)



Pro:

- V/C Ratio: 0.35 (AM) and 0.28 (PM)
- Elevated Bowtie Essentially without Conflicting PW Pkwy Mainline Traffic
- Safety (Low Conflict Points)
- Eliminate Traffic Signal

Con:

- Spacing Needed between Roundabouts to Store Queues
- Queues at WB Off-Ramp could be Potential Concern, since Both Heavy NBL and WBL Traffic Compete the One-Lane Circulatory Lane in the Northern Roundabout.
- Interchange Footprint could be Potentially Large
- Once Built, Capacity is Permanent
- Challenge for SUP, with Non-Stopping Traffic
- Cost could be a Potential Drawback

Note : Lane Configurations for Illustration Purpose, Pending on Further Analysis.

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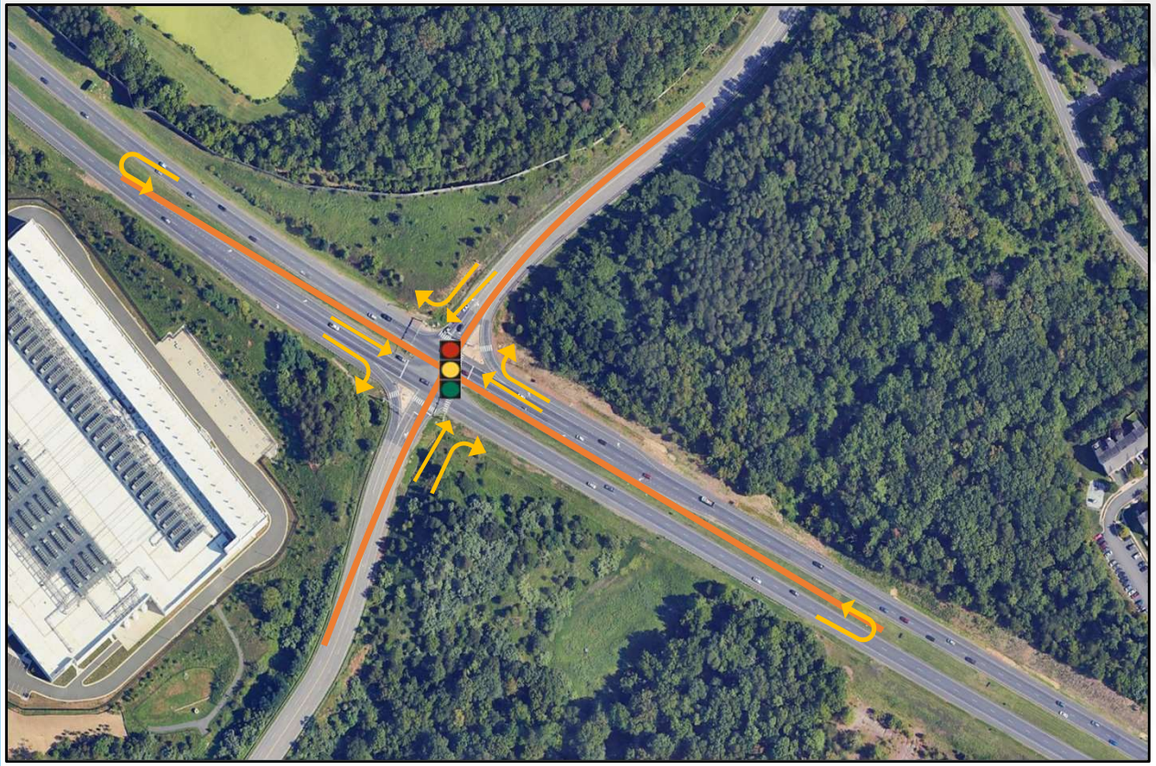
Median U-turn (At-Grade)



Pro:

V/C Ratio: 0.74 (AM) and 0.83 (PM), Assuming 3 Lanes per Direction on PW Pkwy

Cost-Effective At-Grade Alternative

Safer Compared to Partial Median U-Turn and Thru-Cut

Eliminate Mainline/Side Street Left-Turn Signal Phase

Better Use of Existing Lanes

Potentially Less Land Needed Compared to Grade-Separated Alternatives

SUP on Clover Hill Rd throughout Intersection

Con:

Large Trucks U-Turn Radius Concern at the Median – Jughandle Needed

Large Left-Turn Volumes Need to U-Turn

Note : Lane Configurations for Illustration Purpose, Pending on Further Analysis.

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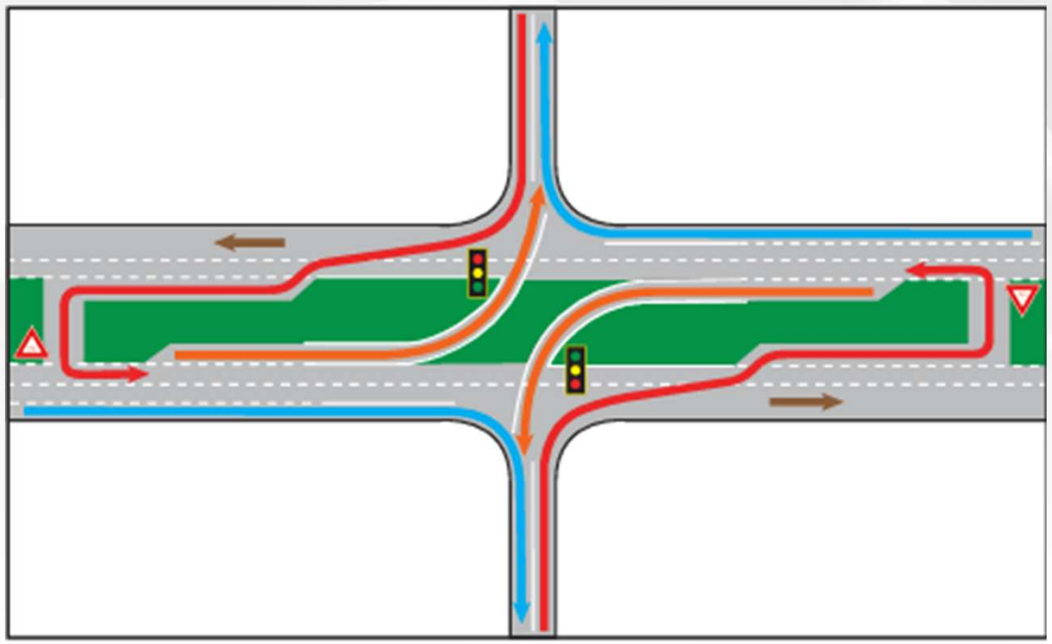
Restricted Crossing U-Turn (At-Grade)



Pro:

V/C Ratio: 0.74 (AM) and 0.77 (PM), Assuming 3 Lanes per Direction on PW Pkwy

Cost-Effective At-Grade Alternative

Safer Compared to Partial Median U-Turn and Thru-Cut

Reduced Signal Phasing (PW Pkwy Mainline vs Left Turn)

Better Use of Existing Lanes

SUP on Clover Hill Rd throughout Intersection, Requiring Additional Signal Phasing

Con:

Large Trucks U-Turn Radius Concern at the Median – Jughandle Needed

Large Left-Turn Volumes Need to U-Turn

Note : Lane Configurations for Illustration Purpose, Pending on Further Analysis.

Recommendation

Top Picks for PW Pkwy / Clover Hill Rd Alternatives:

- **Partial Cloverleaf (Grade Separated)**
- **Diverging Diamond (Grade Separated)**

Leaning Towards Grade-Separated Solutions:

- **Effectively Handles Heavy EB/WB PW Pkwy Traffic. Accommodates Airport Expansion. Resident Preference. Allows for Green Space between Ramps, unlike At-Grade Intersections Filled with Pavement.**

Other Potential Alternative Candidates:

- **Single Roundabout (Grade Separated)**
- **Double Roundabout (Grade Separated)**
- **Median U-Turn**
- **Restricted Crossing U-Turn**

Double Roundabout – VJuST Shows Good Results but may Face Excessive Queueing, Similar to the Bowtie Roundabout.

Median U-turn and R-CUT are the better Options Considering Cost and V/C Ratios, with Large U-Turn Volumes and Large Truck U-Turn Radius Concerns

2040 DDI and Par-Clo Conclusion

- Under DDI and Par-Clo conditions
  - DDI and Par-Clo provided comparable performance on both PWP mainline and ramp terminal intersections.
  - DDI provided most safety by providing signal-controlled pedestrian crossing at all crosswalks on the interchange and ramps.
  - Par-Clo provided signal-controlled pedestrian crossing at most crosswalks on the interchange and ramps, except for crossing PWP westbound on-ramp and PWP westbound loop on-ramp.
  - Both DDI and Par-Clo have 20 conflict points between vehicle paths.
  - DDI cost of $72,557,000 vs Par-Clo cost of $65,694,000.
  - DDI contains tighter footprint compared with Par-Clo for land occupation, which could offset the cost.
  - This project recommended DDI as the preferred alternative being similar performance and cost, but more safety for pedestrian crossing.