

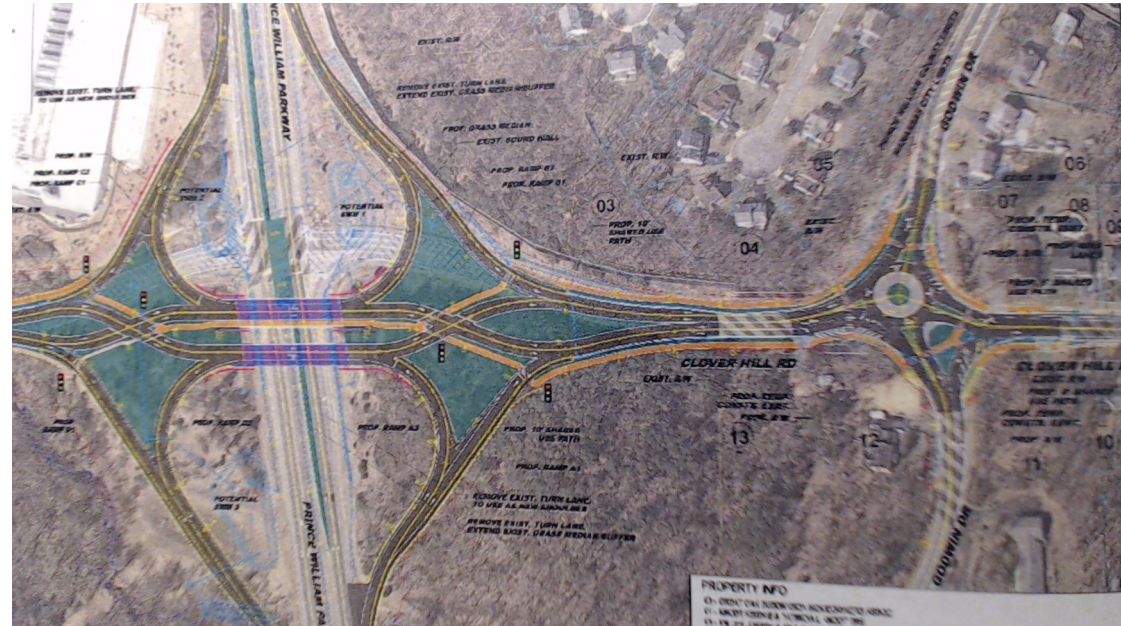
Clover Hill DDI Interchange and Roundabout Thoughts

Bottom Line Up Front

- Grade separation and innovative interchange design are welcome safety improvements
- Design as presented is over-specified for the amount of traffic, resulting in elevated project costs, extended project timelines, and potential for induced car and truck traffic demand
 - Reducing Clover Hill thru lanes to 1+1 should be aggressively pursued for cost and safety reasons, VJuST analysis results suggest that this is certainly possible without exceeding interchange capacity

Project Overview

- Diverging Diamond interchange replacing the traffic light between Clover Hill and 234
- Roundabout replacing the 4-way stop between Clover Hill and Godwin Drive
- Design scaled up from initial “Bowtie Intersection” to account for projected increase in traffic volume driven by airport
 - Traffic design year 2050 (VJuST used 2040)
- Comparisons by county staff to Balls Ford-234 and US15-I66 interchanges
- Bridge width includes accommodation for 6-lanes of 234 traffic + Shared Use Path
 - Exact dimensions/geometry not discussed



Clarifying note

- Project personnel describe 234 as E-W and Clover Hill as N-S
- This powerpoint orients itself with 234 traffic as N-S and Clover Hill traffic as E-W

Resident Concerns Heard

- Rampant speeding on Clover Hill and Godwin Drive is an existing problem. Traffic calming is highly desirable
- Lack of familiarity with intersection and left/right switchup was raised. Encouraged designing for out-of-town drivers that are not familiar with the area
- Cost, schedule, and construction disruption
- Road vehicle noise. Residents welcomed design features that would make neighborhood streets less appealing to large and loud commercial vehicles as a shortcut/backway
- Safety of intersections for both SUP users and road cyclists, particularly for the roundabout and Godwin Drive

The Good

- Grade separation significantly reduces the amount and the speed of traffic that vulnerable road users encounter when crossing 234
- Provides a missing pedestrian/cyclist connection between Manassas sidewalk network, the airport, and the planned 234 SUP
- Roundabout is safer design than 4-way stop and encourages slower speeds if designed and implemented well

Potential Missed Opportunities

- The project scope does not extend far enough to provide a connection with painted bicycle lanes on Godwin north of roundabout
 - Suggest sharrows in roundabout to provide additional visual friction and encourage reduced vehicle speeds and increased driver awareness
- Space is made for 234 SUP to pass under overpass, but no allowance for how to get trail there might mean expensive and disruptive construction to install an overpass or underpass to get the trail from the outside to the inside of the exit ramps
 - Could be avoided by installing box-culverts under east-side ramps of 234 during earthworks buildup to reduce/eliminate traffic disruption when that trail is connected to this project area

My Overall Opinion Coming Out of the Meeting

- Grade separation and roundabout are necessary improvements for safe multimodal traffic flow in this area
- DDI design is not inherently bad, but is overbuilt and evokes arterial connections to controlled-access highways (e.g.: Balls Ford-234, US15-I66, Courthouse Rd-I95, where the minor road is a 40+mph divided highway and dominated by car traffic).
 - Design considerations are necessary (and missing) to reflect the reality that this is connecting directly to neighborhood streets to avoid inducing high speed and volumes of traffic onto those roads
- I'd like to see more focus on public transportation access to HEF to address possible (not guaranteed) airport expansion impacts rather than the focus on building out more POV capacity

Interchange Feedback

VJuST Analysis Critique

- Scoring criteria method rewards overdesigning vehicle capacity by scoring V/C as a continuous numeric criteria rather than against a pass/fail or red/yellow/green discrete threshold
 - I don't think anybody would opt to kill or maim somebody to take cars off an already half-empty road, but the scoring system weighs that tradeoff
- It's not clear if V/C numbers presented assume 2 (1+1, aligned to previous bowtie intersection design) lanes or 4 (2+2, aligned to design as presented) lanes on CHR.
 - For the recommended configurations, it seems extremely plausible that 2-lane designs would maintain a satisfactory (e.g.: below 0.8 based on slide 3) V/C either way.
 - Reducing bridge lanes could provide major cost/schedule savings to the project, increase safety by reducing conflict points, and reduce effect of induced demand from overcapacity.

VJuST Analysis Critique (cont.)

- Analysis presents cost/space considerations based on default layout of design configurations. Alternate layouts (e.g.: offset AB-ParClo configuration resembling Sudley Manor-234 Interchange project or squeezed single roundabout resembling interchanges in Carmel, IN) may have evaluated better in subjective assessment portion
- Analysis claims that roundabout capacity is permanent once built, but aftermarket slip lanes can provide significant opportunities to increase capacity if volume is high in an unexpected direction. It is not clear that roundabouts are any more capacity-static than other interchange designs

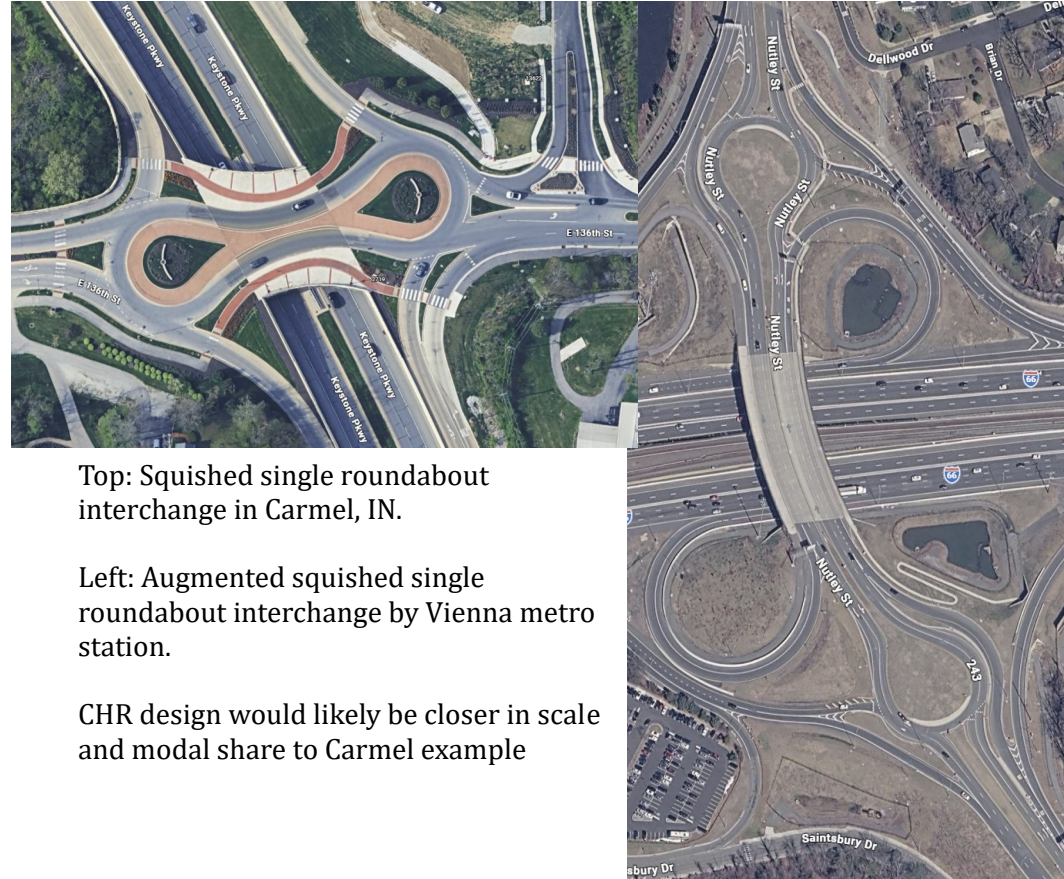
Alternate Configuration 1: Squished Single Roundabout

Pros:

- Safety benefit from single roundabout, footprint of double roundabout
- Does not require queuing space on bridge like double roundabout, permits wider spacing with Godwin roundabout
- No traffic lights = lower operational cost of interchange

Cons:

- Crosswalks are not signal-controlled, rely on traffic calming effect of roundabout design to provide pedestrian safety at point of interaction (consider raised crosswalks to further reduce vehicle speed)



Top: Squished single roundabout interchange in Carmel, IN.

Left: Augmented squished single roundabout interchange by Vienna metro station.

CHR design would likely be closer in scale and modal share to Carmel example

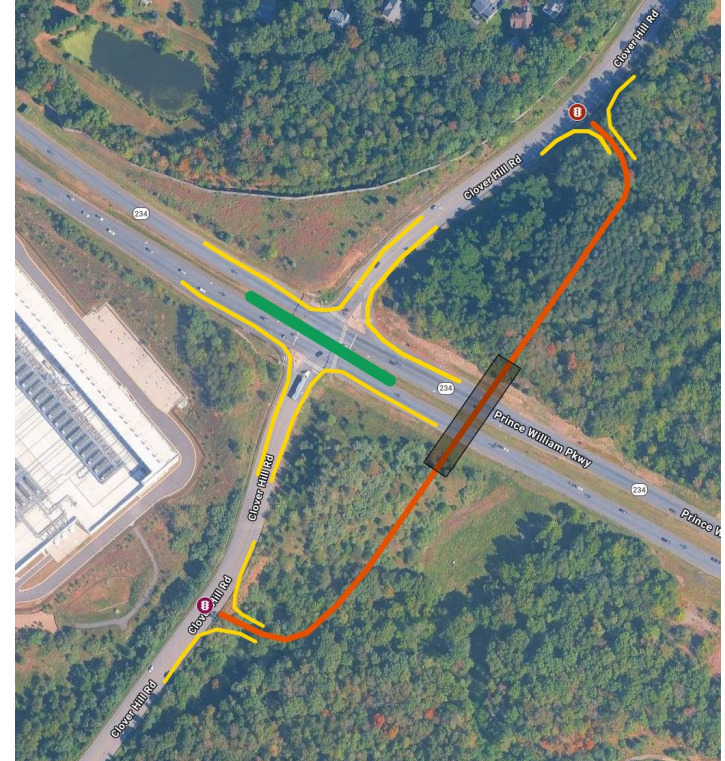
Alternate Configuration 2: Offset ParClo-AB

Pros:

- Similar to Sudley Manor Interchange project (design is a known quantity)
- Takes advantage of ParClo's high V/C score (caveat: ParClo-AB performance likely differs from ParClo-B performance)
- Utilizes rather than discards existing pavement

Cons:

- Right-turn lanes/ramps on existing pavement present obstacle for planned 234 SUP, designs with new ramps offer more clear opportunity for eliminating this obstacle in advance with minimum additional disruption/cost
- Wider interchange footprint risks queuing interference with Godwin roundabout
- AB ParClo layout has more crossing conflicts than the VJuST assumed layout: +8 to weighted conflict points, equivalent to traditional diamond



AB ParClo overlaid on project area. Replacing traffic lights w/ roundabouts takes this from 28 weighted CP to 16, replicating a double roundabout from a safety perspective

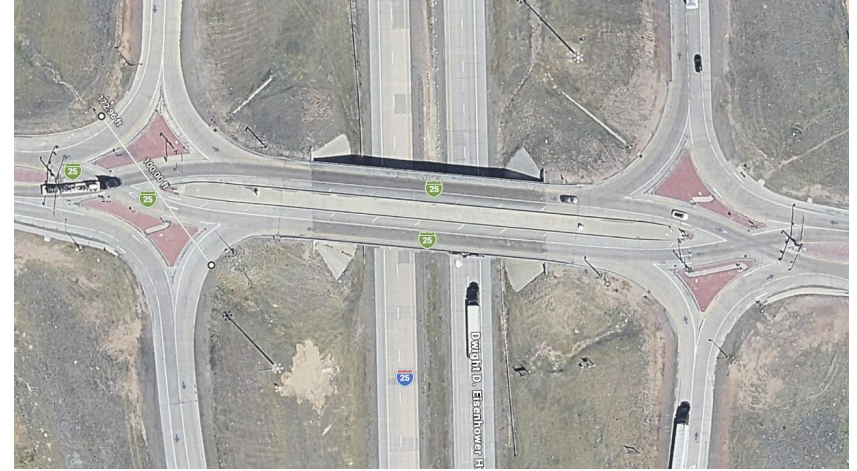
Alternate Configuration 3: Smaller DDI

Pros:

- Similarity to design as-presented (project momentum)
- Right-sized infrastructure for non-arterial Clover Hill Road
- Tighter turns = slower vehicles = fewer crashes and safer pedestrians

Cons:

- Single-lane DDI designs with significant ped/bike infrastructure are not super common
- DDI is outperformed in safety by single roundabout, in vehicle capacity by ParClo, no strong reason justifying this design aside from project momentum



Single-Lane DDI in Cheyenne, WI. Significantly less grading and bridge real-estate required for an intersection of this footprint compared to presented design.

Scaling up ped/bike infrastructure within a design like this to meet PWC standards would marginally increase crossover footprint, but still be well below size of design as presented.

Interchange Design Considerations

Design Consideration 1: Ramp Angles

- Project personnel stated that design speed in the interchange was 25 mph, accelerating to 30 mph going down the ramps toward 234. 25 mph is VDOT's minimum design speed for loop ramps in system (highway-to-highway) interchanges
- Rough measurements that the WB CHR to NB 234 ramp has a curve radius roughly equivalent to the ramps that interface with Balls Ford Road, but Balls Ford Road is a 45 mph divided highway arterial.
- At a minimum, this ramp should be reduced to the curve radius of the other ramps and the design speed of these ramps at the point of interface with CHR should be reduced to 20 or even 15 mph

Ramp Angles (cont.)

- Reduced ramp angles will reduce the size of the earthworks needed to build this intersection (reduced cost and disruption)
- Reduced ramp design speed will communicate clearly to drivers that they are leaving the highway system and entering the local urban road system (road design for out-of-towners)
- Reduced ramp design speed may require longer entrance and exit ramps to allow for traffic to reach or leave highway speeds, but the project design area well exceeds the length of the current ramps, so this should not cause scope issues, and the cost will be offset by reduced earthworks

Design Consideration 2: Lane Width

- Bridge design consists of 2 40+' wide bridges carrying 2 15' lanes of traffic and a 10' shoulder, which is devoted to the SUP on the north bridge
- Pro: Separate bridges should reduce the perception of left-hand traffic flows that residents expressed concern about and provide opportunities for phased construction and operational redundancy
- Con: 86' of total bridge width (when accounting for 5 1.2' barrier segments; drawings presented include an additional ~6' shoulder on the SUP bridge to bring the total north of 90') is likely a cost driver and 15' lanes encourage high speed driving

Lane Width Continued

- 15' lanes are above normal lane design spec but justified by project personnel referencing VDOT design standard for 15' approaches on DDI. VDOT design standard in question is found on page A3-40 of the VDOT RDM and references Figure 3-23 in Appendix F (depicted here).
- The Balls Ford Road DDI uses 12' bridge lanes.

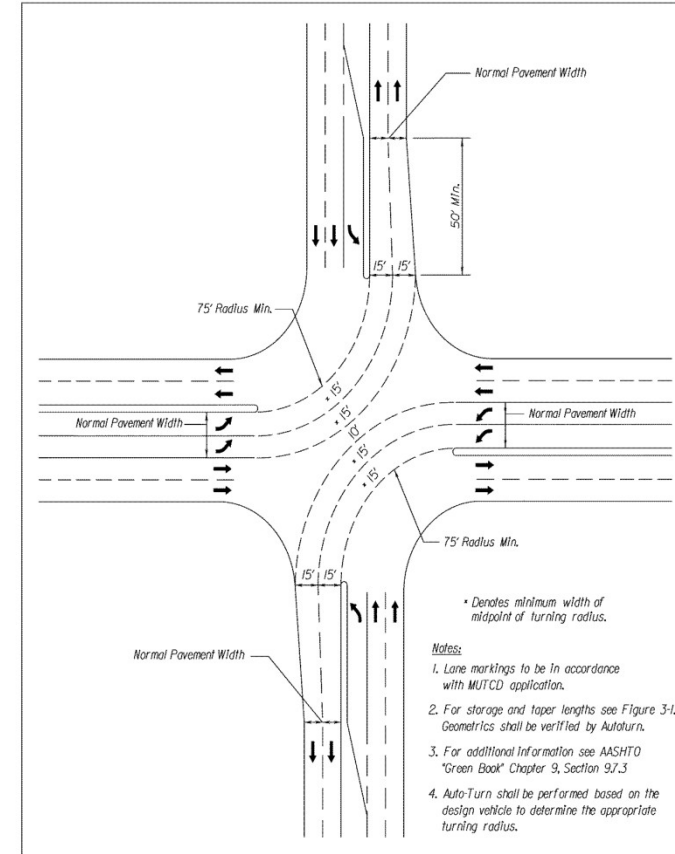
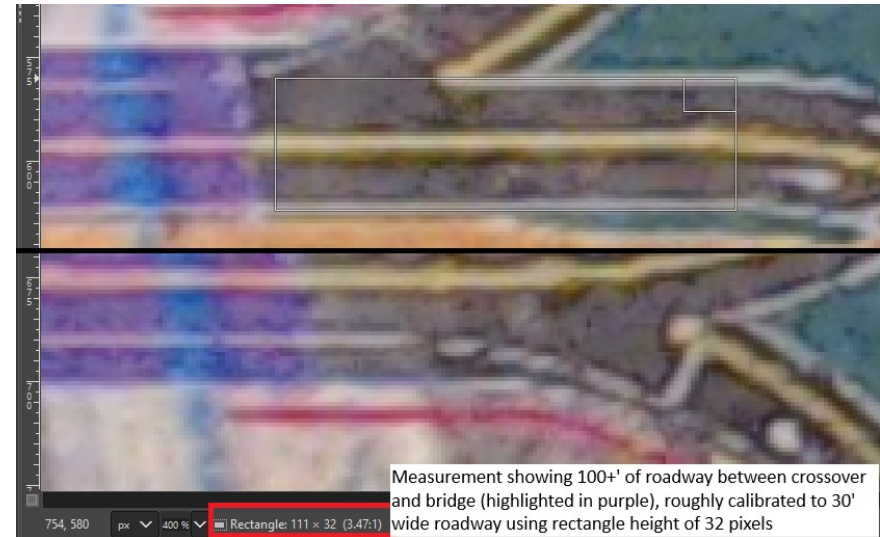


FIGURE 3-23 DOUBLE LEFT TURN LANES

Lane Width Continued

- There is roughly 100' between the crossovers in the drawings and the start of the bridge, well above the 50' minimum taper length recommended by the RDM.

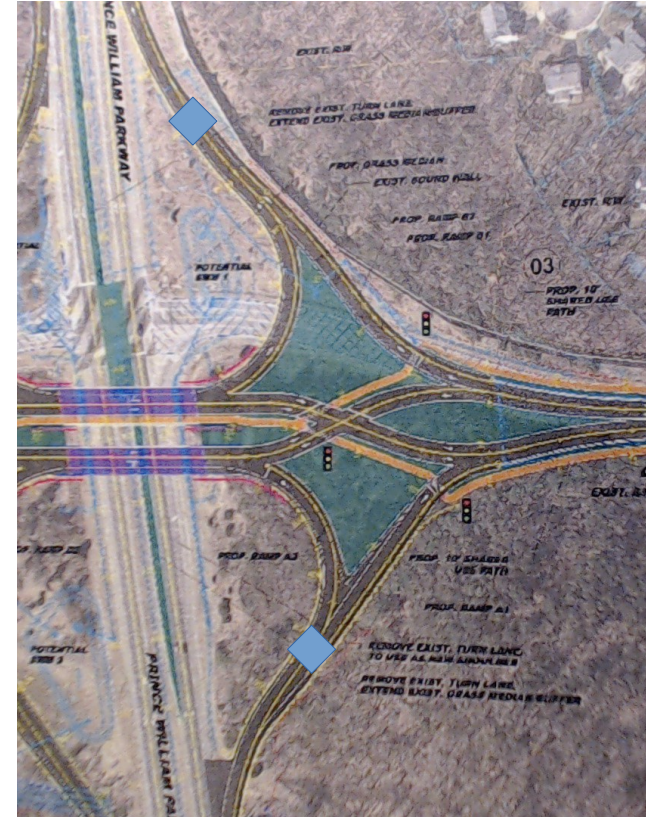


Lane Width Continued

- Freeing up 6' of space can be spent increasing the buffer width between the SUP and the car lanes and providing a shoulder for the northbound or discarded as cost-savings for the project
- Reducing the lane width approaching the crossover relative to the lane width exiting the crossover will also provide additional visual cues for drivers to avoid driving onto the oncoming bridge
- It will also reduce the crossing distance for SUP users crossing the approaching bridge lanes

Design Consideration 3: 234 SUP

- Providing connections between the outside of the interchange and the space allocated under the bridge for the 234 SUP will be easiest/most cost effective/least disruptive while the new highway ramps are being constructed.
- Recommend installing a box culvert under the east-side ramps during earthworks/grading to provide an easy connection for future path construction efforts



Blue boxes represent possible box culvert sites to provide connectivity to the underpass before doing so would disrupt traffic and cost big bucks

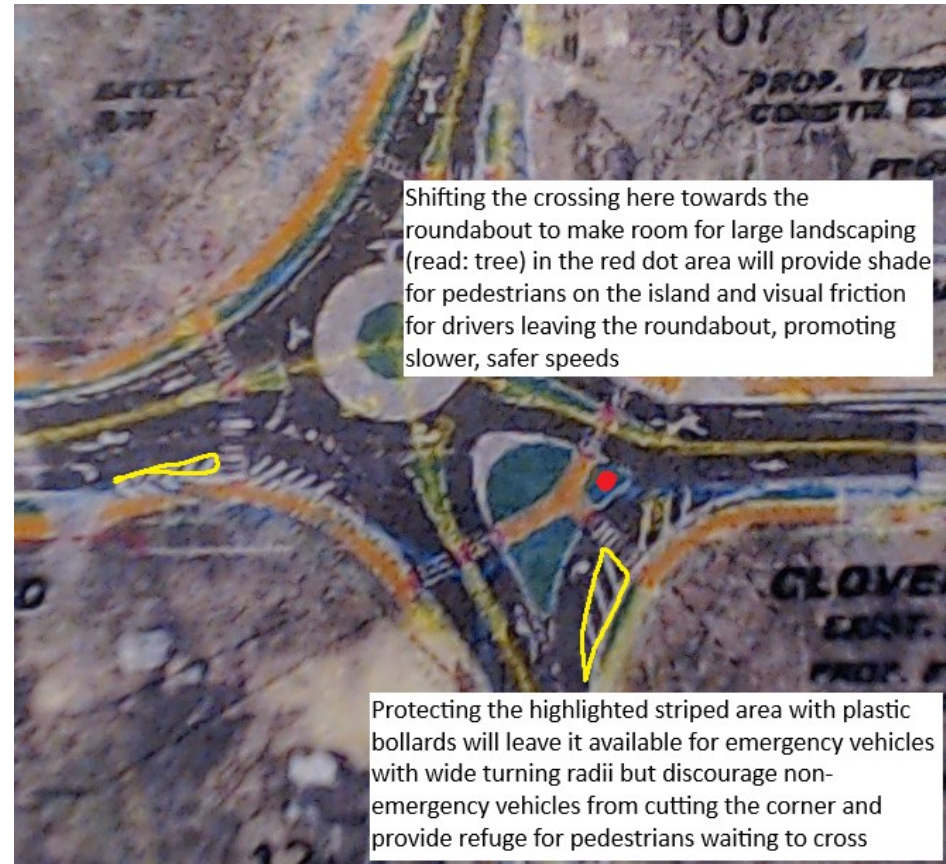
Roundabout Feedback

Roundabout Design

- The chicane-inducing offset of the roundabout from the centerlines of Clover Hill and Godwin is a welcome traffic calming feature, although its northward bias amplifies the effect for traffic leaving neighborhood streets and approaching the highway and reduces the effect on traffic leaving the highway and approaching neighborhood streets, which is unfortunate
- The slip ramp from NB Godwin to EB CHR is a potentially dangerous crossing given its pavement width, should be managed with additional ped. safety features
- There are opportunities for additional traffic calming and multimodality measures available in the City of Manassas adjacent to the project area, they should be considered in conjunction with or as part of this improvement

Slip Ramp Crossing and Island

- Slip ramps are generally dangerous features for pedestrians, but this one is likely necessary to provide a reasonable curve radius.
- Recommend providing mountable physical protection for crossings in striped zones to encourage non-emergency vehicle compliance and utilizing the pedestrian island for large landscaping features to increase the visual weight of the roundabout and its traffic calming qualities



Adjacent Traffic Calming Opportunities

- The car lanes on CHR adjacent to the project area are 12.5' wide, 2.5' wider than the Manassas MMP recommended width for neighborhood connector streets and 3' wider than its narrowest point on the approach to Hastings Drive intersection. Reclaiming 2-3' of space on each side of the roadway to provide a buffer (painted or physical) for the bike lanes here will encourage legal and safer speeds on this road. Particularly useful on the north side where parked cars present additional risk to cyclists
- The car lanes on Godwin north of the project area are also 12.5 feet and include a painted median up to 12.5 feet in width. Reclaiming that space could allow for the unprotected bike lanes that terminate at Winged Elm Circle to connect to the project SUP and encourage legal and safer speeds on this road

