

# Ridge Road Corridor – Safety and Congestion Study

## Ultimate Build-out Condition



June 2024



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**APPENDICES**

- Appendix A: Ultimate Build-out Concept Drawings
- Appendix B: Detailed Cost Estimate

## **Executive Summary**

Based on the analysis of the existing transportation conditions in the corridor, this review presents the following summary findings:

- The study corridor consists of Ridge Road from Dorsey Road (MD 176) to Corporate Center Drive.
  - Six intersections were studied for capacity analysis and safety under existing and Year 2045 conditions.
- The typical section is one 11-12' travel lane in each direction with no shoulder. The posted speed limit is 35 mph. The average speed at the midpoint in the segment was measured at 41 mph, while the 85<sup>th</sup>% speed was 49 mph. ADT along Ridge Road is 2,380 vehicles, representing 15% decrease from the ADT counted in 2015.
- Based on a vehicle classification count, the primary vehicles were passenger vehicles and pickup trucks. No 5-axle tractor trailers were counted.
- Existing Capacity Analysis shows all intersections operating within acceptable levels of service.
- Year 2045 peak hour traffic demand estimates were developed using BMC's Activity Based Model
- An interchange was assumed for Hanover Road at MD-295, which resulted in a large increase in east-west traffic across the Ridge Road corridor. The County is designing for a new four-leg intersection for Hanover Road at Ridge Road, while leaving the existing one largely unchanged.
- Ridge Road has three classifications, each one having a unique cross section:
  - North of MD-295 is a scenic and historic road and a collector road.
  - South of MD-295 to Hanover Road is a collector road.
  - South of Hanover Road to Dorsey Road is minor arterial.
- Based on the Ultimate build condition, north of MD-295, Ridge Road would have bike lanes only, with additional safety treatments recommended.
- Between Hanover Road and MD-295, Ridge Road would have bike lanes and buffered sidewalk; with no additional traffic control devices or additional lanes required.
- Under Year 2045 conditions, all study intersections will have acceptable LOS, with the exception of Hanover Road – in its current design and based on estimate 2045 volumes.
- If the Hanover/MD-295 interchange is constructed, it is recommended to conduct new traffic projections and evaluate the traffic impacts to the east and west legs Hanover Road at Ridge Road (new signalized intersection) and Hanover Road Extended at New Ridge Road and at Telegraph Road, as the estimated new traffic is substantially higher than existing traffic on Hanover Road / Stoney Run Road and could be the result of east-west traffic diverting from MD-100.
- The combined cost for the ultimate build-out for the entire 4.5-mile segment of Ridge Road, including design, is \$19,750,000.

## **Introduction and Project Goals**

The objective of this report is to provide an approximate concept and cost estimate for an Ultimate buildout of Ridge Road from MD 176 to Furnace Ave. The purpose of the corridor review is to identify capital improvements needed in the long-term to address the ultimate build out for roadway. This includes identification of any needed right-of-way, as well as expected construction

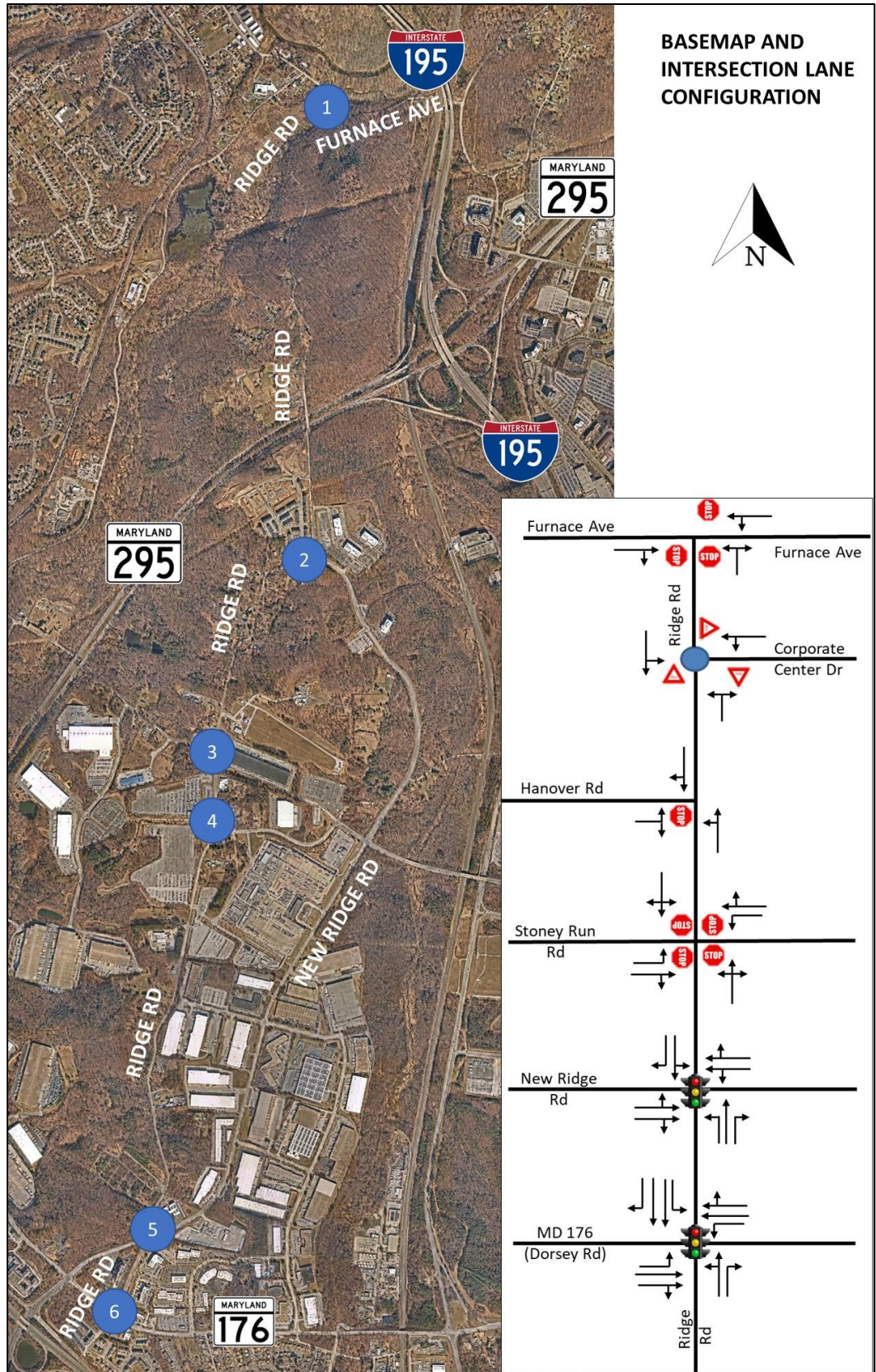
costs. The corridor is primarily open-section and currently serves light industrial use, with a mix of low-density residential land. The roadway is generally not up to current County standards, having no shoulders, bike lanes, or sidewalk and having horizontal and vertical combination curvatures that provide limit sight distance in several locations. The potential growth in industrial and mixed-use space, as well as a possible new connection to MD 295 (via Hanover Road interchange), would result in increased travel demand within the corridor. The goal of the study is to specify and provide cost estimates for elements needed to address the Ultimate Build conditions per the County’s Orange Notice guidelines.

## **Study Area**

The study corridor consists of Ridge Road from Dorsey Road (MD 176) to Furnace Ave. The following five intersections were included in the study:

1. Ridge Road at Furnace Ave
2. Ridge Road at Corporate Center Drive
3. Ridge Road at Hanover Road
4. Ridge Road at Stoney Run Road
5. Ridge Road at New Ridge Road
6. Ridge Road at Dorsey Road (MD 176)

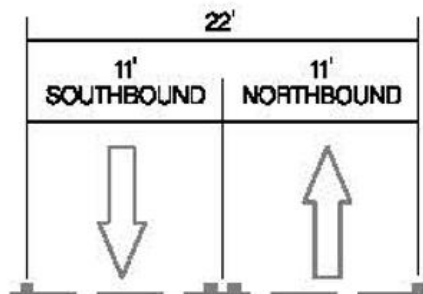
Ridge Road is a two-lane roadway, located just west of BWI airport, and is generally parallel to MD-295, New Ridge Road, and MD 170. An aerial map of the study area, as well as an intersection control and lane configuration diagram, is shown in Figure 1.



**Figure 1: Aerial map and Lane Configuration for each study intersection.**

## Roadway Characteristics

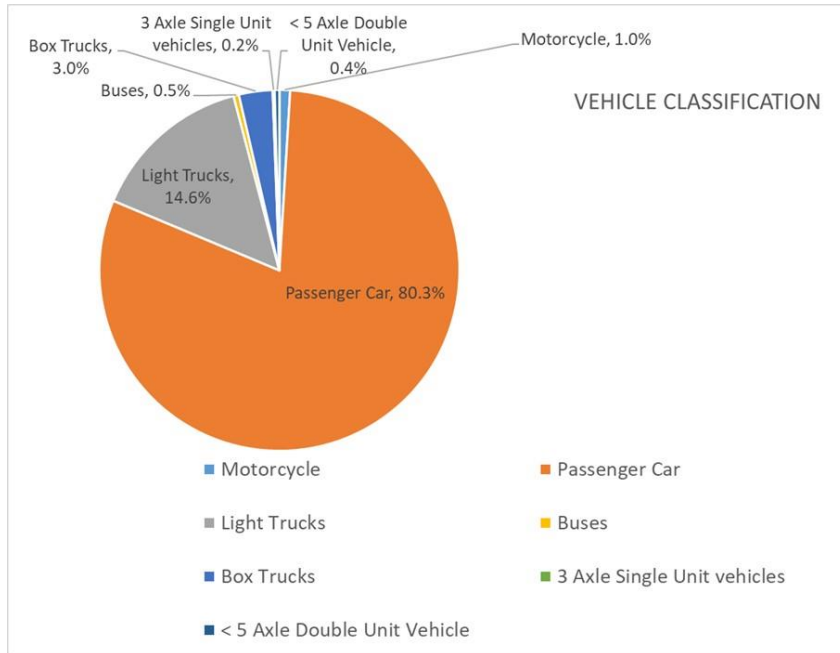
Ridge Road is a county-maintained roadway that extends from Ridge Commons Blvd in the south to Furnace Avenue, just north of MD-295. Typical lanes are ten to twelve-feet wide and there are no paved or unpaved shoulder. Ridge Road is a divided four-lane, two-way road between MD 176 and Mellon Road. Between Mellon Road and New Ridge Road, it is an undivided four-lane, two-way road. However, between New Ridge Road and Furnace Ave, Ridge Road is an undivided two-lane, two-way road, as shown in Figure 2 and is representative of almost the entirety of Ridge Road.



**Figure 2: Typical Section of Ridge Road**

The posted speed limit along Ridge Road is 35 mph. As of 2023, the ADT along Ridge Road is 2,380 vehicles per day, based on a 48-hour midweek traffic count. This represents a 15% decrease from the 2,800 vehicles per day counted in 2015 for a previous study<sup>1</sup>. An additional ADT count was conducted along Ridge Road, just north of MD-295; the ADT at that location was 1,670 vehicles per day. As shown in Figure 3, the vehicle classification for was almost exclusively passenger vehicles and pick-up trucks.

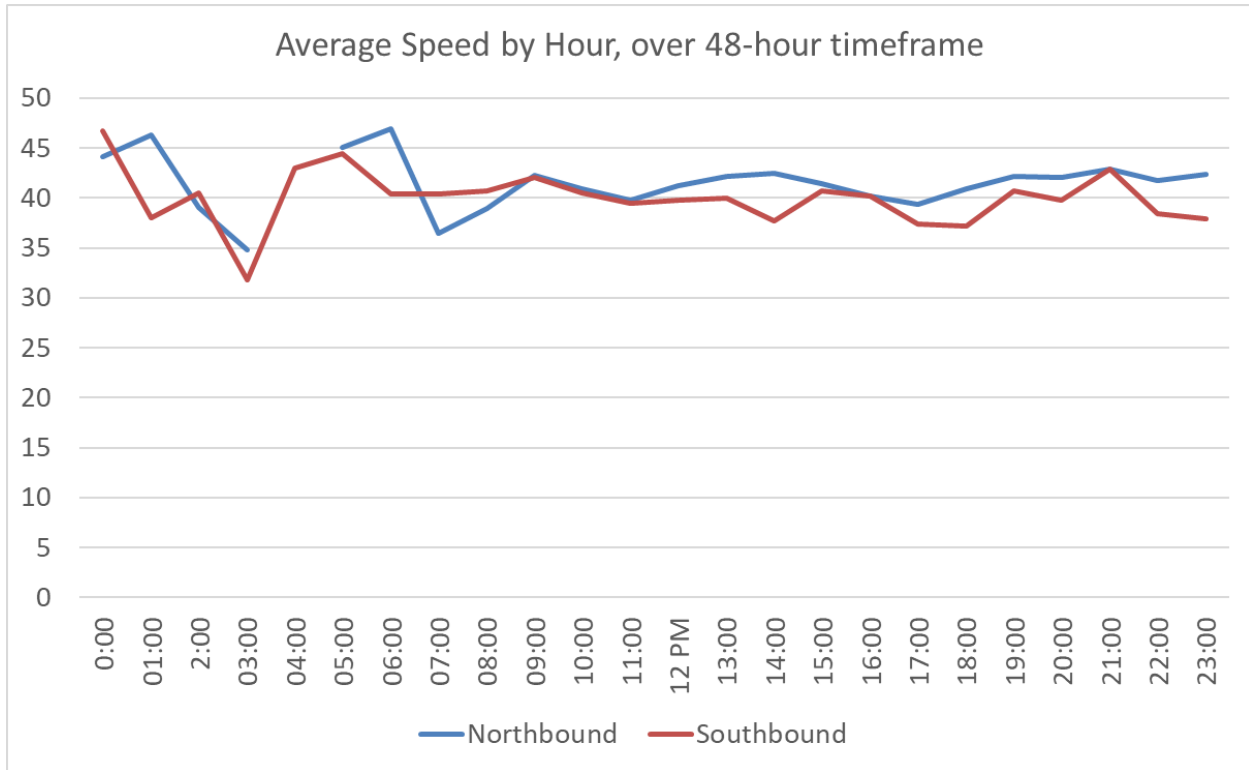
<sup>1</sup> A review of traffic counts along 4-lane New Ridge Road also saw a modest decrease from 8750 ADT to 8650 ADT between 2015 and the Fall of 2021. Source: SHA ITMS.



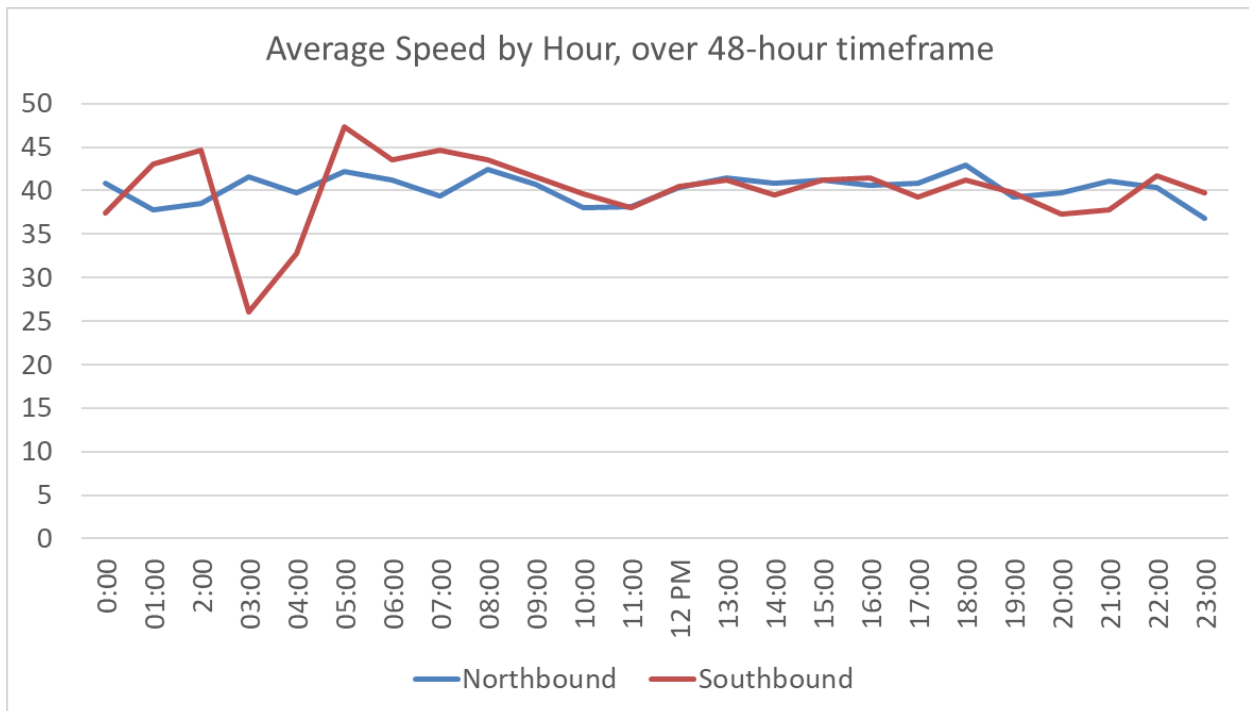
**Figure 3: Vehicle classification along Ridge Road**

The average speed at the midpoint of this road segment (just south of Stoney Run Road) was measured at 41 mph, while the 85<sup>th</sup> speed was 49 mph. These speed measurements are faster than the previous speed measurement from 2015, which showed an average speed of 35 mph and an 85<sup>th</sup> speed of 41 mph. An additional speed count was conducted along Ridge Road, north of MD-295, and this count showed an average speed of 41 mph, with an 85% speed of 48 mph. The average speed, by hour of day, for the location north of MD 295 is shown in Figure 4, while the average hourly speed for the location just south of Stoney Run Road is shown in Figure 5. As both figures show, the average speeds are generally consistent throughout the day.





**Figure 4: Average hourly speed for northbound and south vehicles, north of MD 295**

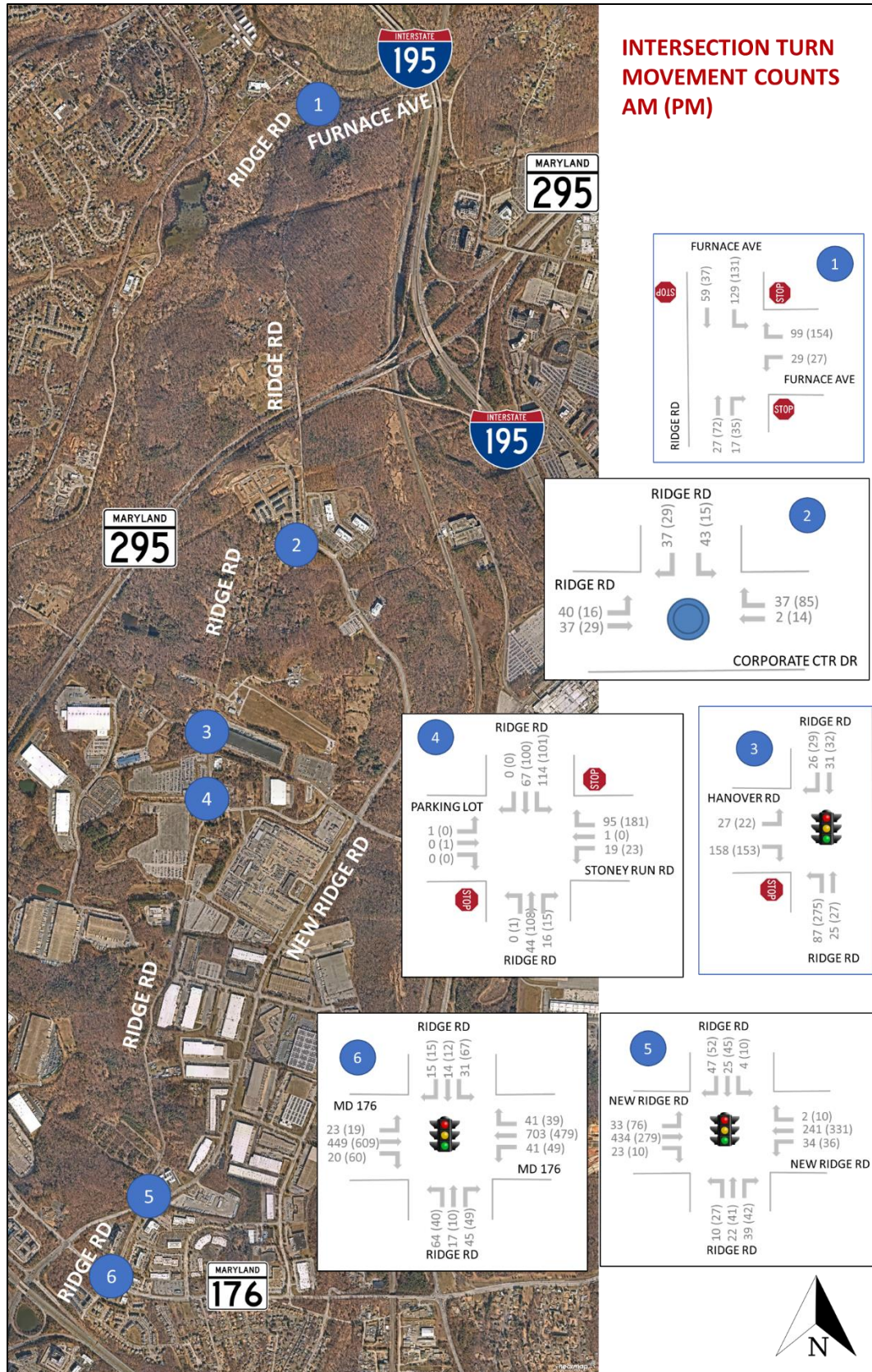


**Figure 5: Average hourly speed for northbound and south vehicles, south of Stoney Run Rd**

**Appendix A** contains raw ADT counts including speed and vehicle classification.

## **Existing Peak Hour Traffic Volumes**

Weekday AM and PM peak period traffic data was collected in January 2023, midweek, when school was in session, between 7:00 and 9:00 AM and 4:00 to 7:00 PM for the study intersections. Generally, peak hour volumes along Ridge Road are less than 200 cars/hour/lane. Figure 6 summarizes the existing weekday AM and weekday PM peak hour traffic volume.



**Figure 6: AM and PM Peak hour intersection volumes.**

Detailed raw traffic counts are included in **Appendix C**.

### Peak Hour Travel Time Runs

Peak hour travel time runs were conducted to assist with validating a traffic model. Five runs were conducted using time-stamped GPS; the following table summarizes the run times and the corresponding average speed (note these times and speed include times when the vehicles stationary at a signal or slowing to a stop).

**Table 1: Peak Hour Travel Time runs (mins)**

Run #	Northbound AM Peak	Southbound AM Peak	Northbound PM Peak	Southbound PM Peak
#1	0:11:16	0:09:43	0:09:26	0:10:33
#2	0:10:17	0:10:15	0:09:29	0:09:23
#3	0:09:13	0:09:00	0:10:30	0:09:49
#4	0:09:18	0:09:35	0:09:40	0:09:25
#5	0:09:25	0:09:53	0:11:05	0:10:23
Average travel time Run	0:09:54	0:09:41	0:10:02	0:09:55
Average speed Including stopping times (mph)	25.8	26.3	25.4	25.7

**Figure 7: Peak hour travel times and average speeds**

### Existing Capacity Analysis

All study intersections and intersection traffic volumes were coded into a Synchro network (version 11) to perform capacity analysis. Synchro is a deterministic and macroscopic signal analysis computer software program that models street networks and traffic signal systems. Geometric data such as number of lanes, lane configuration, storage lengths, tapers, and distances between intersections were inputted into Synchro. Additionally, existing signal timings and phasing were obtained from the Maryland State Highway Administration and from Anne Arundel County and were coded into the Synchro traffic model along with existing traffic volumes. The two signalized intersections along the study corridor operate as actuated-uncoordinated signals during the AM and PM peak hours. Ridge Road at MD 176 is maintained by SHA. Ridge Road at New Ridge Road is maintained by Anne Arundel County.

The Synchro model was validated via travel time runs in the AM and PM peak hours (see Table 2). No modifications to Synchro/SimTraffic parameters, such as link speeds and headway factors, were necessary, as travel times aligned very closely with the default SimTraffic travel times. This is likely due to the absence of congestion and signalized intersections within the corridor.

**Table 2: corridor-wide travel Time Runs and SimTraffic validation.**

Travel Time Summary Table (min)				
Ridge Rd: Furnace Ave to Dorsey Rd				
Direction	Field Measured		SimTraffic	
	AM	PM	AM	PM
Northbound	9.9	10.0	9.3	9.9
Southbound	9.7	9.9	9.4	9.7

Intersection capacity analyses were performed using the industry standard National Academy of Sciences Transportation Research Board’s Highway Capacity Manual (HCM) methodology for all study intersections. Performance measures of effectiveness include level of service (LOS), volume-to-capacity (v/c) ratio, and average vehicle delay and queue lengths. Synchro implements HCM 2000 methods of analysis to determine LOS. Table 3 summarizes the HCM analysis performed under existing traffic conditions and detailed HCM queuing reports are in **Appendix D**. The results of the existing conditions capacity analysis indicate that all intersections experience an LOS A or B during the AM and PM peak hours. Additionally, all intersection *approaches* have an LOS A or B, with exception of northbound and southbound Ridge Road at MD 176, which have an LOS C.

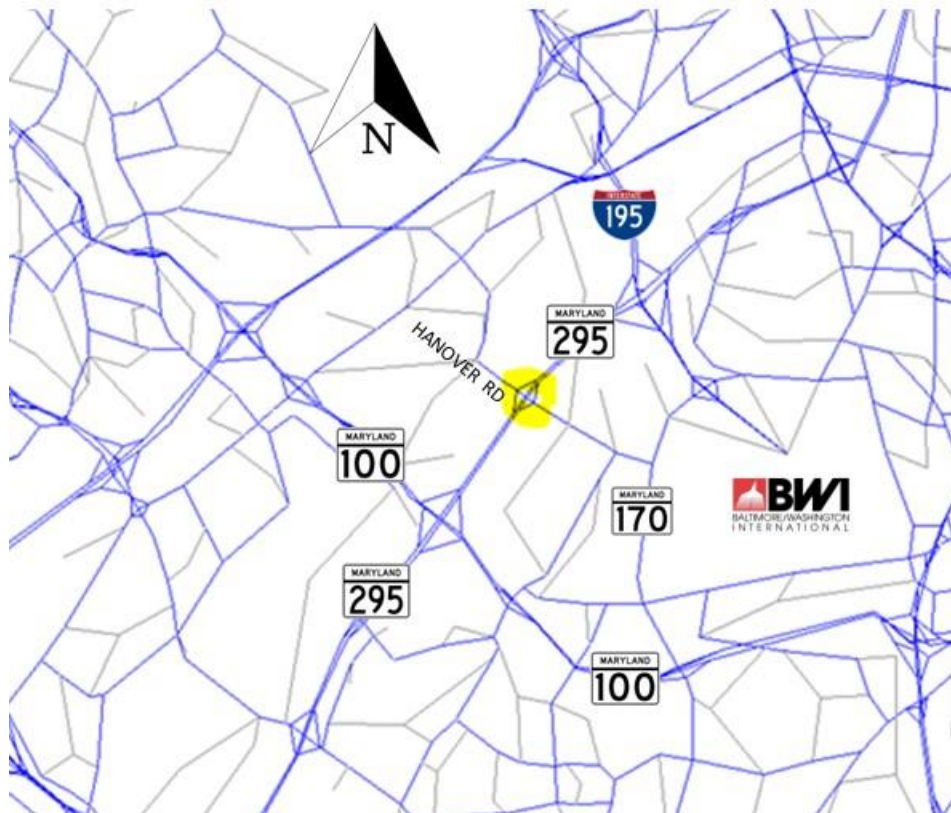
**Table 3: Existing Intersection Capacity Analysis Results**

ID	Intersection	Approach	Movement	Existing Conditions			
				Delay	LOS	V/C	95th Q
1	Ridge Rd & Furnace Ave	<b>Control Type</b>		<b>Stop (All-Way)</b>			
		<b>Overall</b>		<b>8.3 (8.8)</b>	<b>A (A)</b>	<b>0.32 (0.36)</b>	<b>- (-)</b>
		Eastbound	Left-Through	8.0 (8.8)	A (A)	0.06 (0.17)	50 (75)
		Westbound	Through-Right	7.8 (8.4)	A (A)	0.16 (0.24)	50 (75)
		Southbound	Left	8.7 (9.4)	A (A)	0.25 (0.26)	75 (75)
2	Ridge Rd & Corporate Center Rd	<b>Control Type</b>		<b>Roundabout</b>			
		<b>Overall</b>		<b>3.4 (3.3)</b>	<b>A (A)</b>	<b>- (-)</b>	<b>- (-)</b>
		Eastbound	Left-Through	3.5 (3.0)	A (A)	0.09 (.04)	25 (25)
		Westbound	Through-Right	3.2 (3.5)	A (A)	0.04 (.10)	25 (25)
		Southbound	Left-Right	3.3 (3.0)	A (A)	0.08 (.04)	0 (25)
3	Ridge Rd & Hanover Rd	<b>Control Type</b>		<b>Stop (2 - Way)</b>			
		<b>Overall</b>		<b>- (-)</b>	<b>- (-)</b>	<b>- (-)</b>	<b>- (-)</b>
		Eastbound	Left	10.1 (10.8)	B (B)	0.24 (0.23)	75 (75)
		Northbound	Left-Through	6.0 (7.3)	A (A)	0.07 (0.19)	25 (50)
		Southbound	Through-Right	0.0 (0.0)	A (A)	0.04 (0.04)	0 (0)
4	Ridge Rd & Stoney Run Rd	<b>Control Type</b>		<b>Stop (All-Way)</b>			
		<b>Overall</b>		<b>8.1 (8.7)</b>	<b>A (A)</b>	<b>0.31 (0.39)</b>	<b>- (-)</b>
		Eastbound	Left	7.6 (7.4)	A (A)	0.00 (0.00)	25 (0)
			Through-Right	7.1 (7.4)	A (A)	0.00 (0.00)	0 (25)
		Westbound	Left	7.7 (7.9)	A (A)	0.03 (0.04)	50 (50)
			Through-Right	7.0 (8.0)	A (A)	0.14 (0.25)	50 (75)
		Northbound	Left-Through-Right	7.7 (8.6)	A (A)	0.08 (0.17)	50 (75)
Southbound	Left-Through-Right	9.0 (9.5)	A (A)	0.25 (0.28)	75 (75)		
5	Ridge Rd & New Ridge Rd	<b>Control Type</b>		<b>Signal</b>			
		<b>Overall</b>		<b>5.1 (6.0)</b>	<b>A (A)</b>	<b>0.24 (0.22)</b>	<b>- (-)</b>
		Eastbound	Left-Through-Right	3.1 (3.1)	A (A)	0.25 (0.20)	75 (100)
		Westbound	Left-Through-Right	2.8 (3.1)	A (A)	0.15 (0.19)	75 (100)
		Northbound	Left	16.3 (15.6)	B (B)	0.06 (0.14)	25 (50)
			Through	16.6 (15.9)	B (B)	0.13 (0.21)	50 (50)
			Right	16.2 (15.2)	B (B)	0.03 (0.03)	25 (25)
Southbound	Left-Through	16.8 (16.5)	B (B)	0.17 (0.30)	50 (75)		
	Right	16.2 (15.2)	B (B)	0.03 (0.03)	50 (50)		
6	Ridge Rd & MD 176 (Dorsey Rd)	<b>Control Type</b>		<b>Signal</b>			
		<b>Overall</b>		<b>9.9 (9.3)</b>	<b>A (A)</b>	<b>0.41 (0.37)</b>	<b>- (-)</b>
		Eastbound	Left	5.5 (5.5)	A (A)	0.06 (0.04)	50 (50)
			Through-Right	7.5 (7.6)	A (A)	0.27 (0.37)	100 (125)
		Westbound	Left	5.3 (3.6)	A (A)	0.08 (0.11)	50 (50)
			Through-Right	8.3 (5.7)	A (A)	0.42 (0.26)	125 (75)
		Northbound	Left-Through	25.3 (27.0)	C (C)	0.47 (0.43)	75 (75)
			Right	22.1 (23.8)	C (C)	0.03 (0.03)	50 (50)
		Southbound	Left	23.1 (29.9)	C (C)	0.19 (0.55)	50 (75)
Through	22.1 (23.8)		C (C)	0.03 (0.04)	25 (25)		
		Right	22.0 (23.7)	C (C)	0.01 (0.01)	0 (0)	

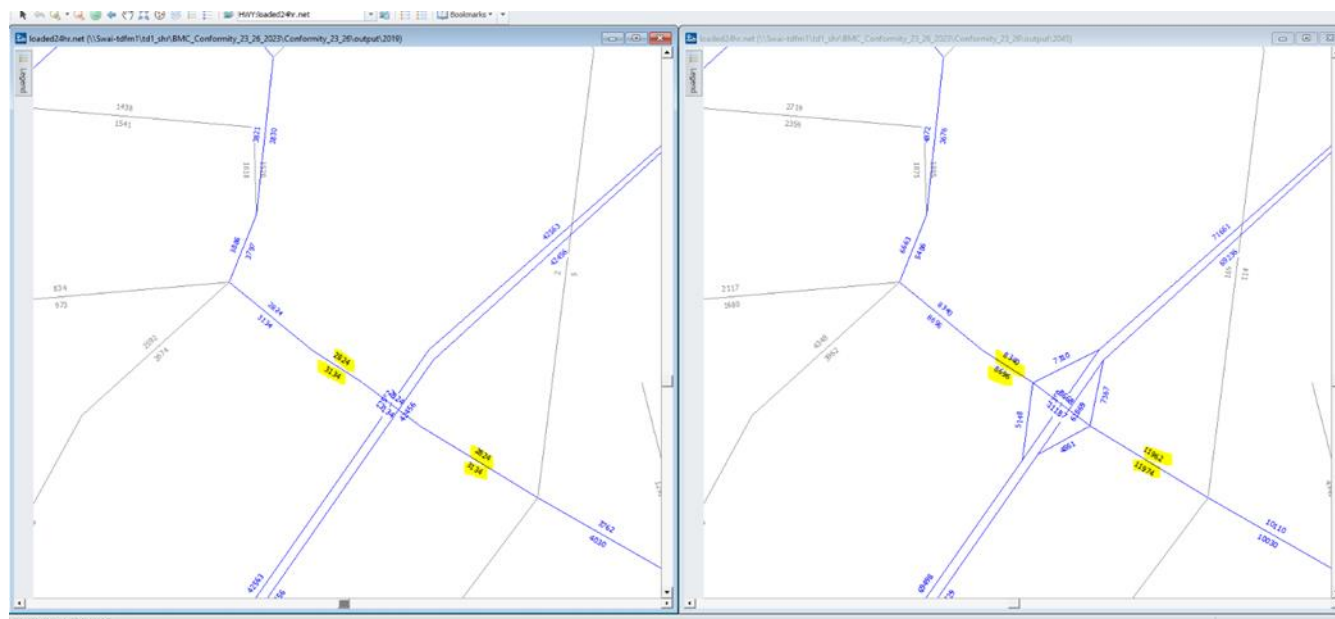
## 2045 Volume Development along Ridge Road

2045 Volume Growth Assumptions were developed using The Baltimore Metropolitan Council's activity-based model (ABM). Of note:

- Ridge Rd was not present as a link in the ABM for 2045 (see Figure 8).
- New Ridge Road was only present in the ABM from Dorset Road north to Stoney Run Rd, and *not* beyond toward MD-295 (see Figure 8).
- Per the ABM model results from the BMC\_Conformity\_23\_26\_2023 forecasts for 2019 and 2045 show that the traffic volume along the Hanover leg that approaches Ridge Road increased from ~6,100 ADT (in 2019 without the interchange) to ~24000 with the interchange (see Figure 9).
- For Ridge Road future estimates, growth along adjacent TAZ's and parallel roads (e.g., New Ridge Rd) was reviewed; and accordingly, a conservative growth rate of 3% applied globally per year to develop 2045 counts on Ridge Road
  - Note that that is growth rated was applied to year 2023 counts – not over 2015, which was 20% higher, and this growth rate was applied despite declining ADT.
- For the new Hanover Rd connection, peak hour forecasts were used from the regional model and adjusted through volumes and turning movements based on engineering judgement.
- Finally, nominal increases in volumes were added on top of the background growth to capture changes in traffic patterns and new development.



**Figure 8: 2045 ABM, highlighting Hanover/MD-295 interchange.**



**Figure 9: Travel demand model outputs (2019 and 2045) Hanover at MD-295 interchange**

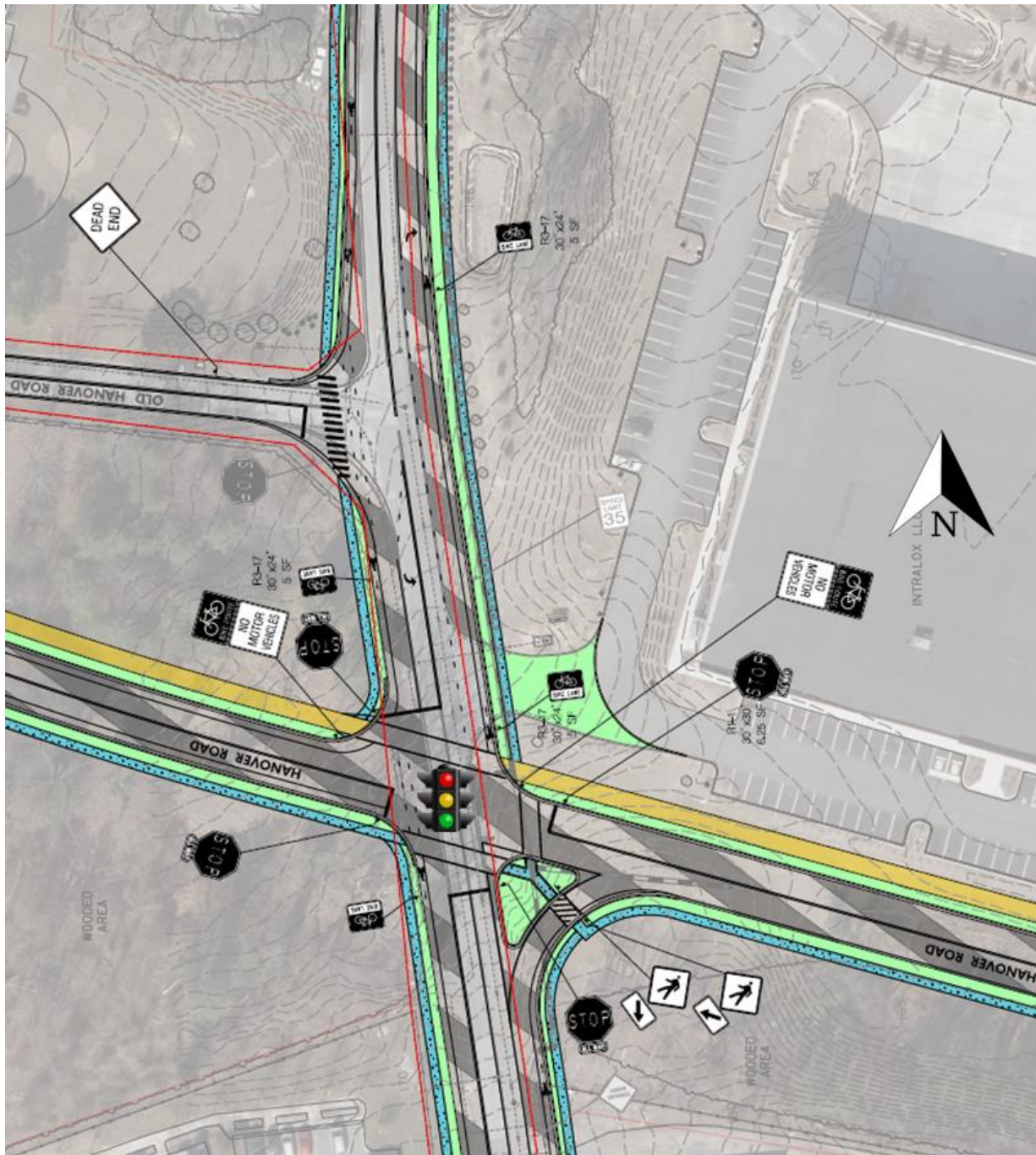
### **Hanover Road intersection at Ridge Road**

Hanover Road currently traverses under MD 295 and has no direct connection to or from it. However, in the 2045 ABM model, Hanover Road is shown with a full-movement interchange to and from MD-295, approximately 1 mile south of MD I-195 interchange and 1 mile north of the MD-100 interchange, respectively.

Additionally, previous travel demand models showed Hanover Road proposed to traverse through Ridge Road east/west *straight* to Stoney Run Road, which currently intersects with Telegraph Road (MD 170). However, there is currently a large warehouse/industrial facility along Ridge Road, opposite of the west leg of Hanover Road at its “T” intersection with Ridge. Since the warehouse is to remain, the County has redesigned the intersection of Hanover/Ridge with 1) the existing Hanover/Ridge T intersection to remain; and 2) a new relocated four-legged intersection offset to the south, as shown in Figure 10. Figure 10 shows this new design with the existing west leg of Hanover terminating at the warehouse frontage, and a new west leg of Hanover (that ties into the existing west leg further to the west) that intersects with Hanover and traverse through it along a narrow forest stand south of the warehouse – to the east of Ridge Road, where it connects to Stoney Run Road further in the east (not shown). The center of these two intersections, as shown, would be about 280 feet apart. At this time, this report is showing a proposed signalization of the new four-legged intersection, while the existing T-intersection at Hanover Road / Ridge Road remains a one-way stop-controlled intersection. Only the new intersection will have opposing left turn bays, while the each of the intersections will have right turn lanes. If traffic modeling ultimately shows that this configuration does not work during the preliminary engineering phase of design of the Hanover Road interchange with MD-295, then adjustments to lane configuration may be



needed for Hanover Road eastbound and westbound at Ridge Road<sup>2</sup>. The volumes on Ridge Road are expected to remain low, such that this configuration of left turn and right turn lanes is sufficient in the future, as discussed in the next section.



**Figure 10: Hanover Road at Ridge Road configuration if Hanover/MD-295 interchange is constructed.**

<sup>2</sup> It is expected that, in the future, if the Hanover Road / MD 295 interchange is constructed, new traffic counts will be conducted, and the latest modeling will be employed to determine expected peak hour turn movement and the need for turn bays, number of lanes, etc.

## **Ridge Road Volumes**

Based on the findings listed in the previous section, estimated Year 2045 AM and PM peak hours are shown in Figure 11. Of note, the volumes along Ridge Road are expected to be remain low – consistent with a two-lane facility – even with a generous 3% annualize growth rate<sup>3</sup>. Additionally, the Hanover Road extension, through this corridor, is expected to have approximately 1800 vehicles in both directions during the AM and PM peak hours, per the travel demand model. Given that New Ridge Road currently only has about 600 vehicles in any peak hour (northbound *and* southbound), while Ridge Road only has about 300 vehicles combined, the only possible source of these new trips are: 1) a large increase in activity/density along the Ridge Road / New Ridge Corridors; or 2) these new trips are *diverted* trips that would normally use MD 100 to access MD-295 and points beyond but have diverted to Telegraph Road (MD 170) and a new Hanover Road extended. If this latter case proves correct, then significant geometric changes would also be needed along Stoney Run Rd (Hanover Rd extended) in between Ridge Road and Md 170.

At this time, there are no design plans in place for the Hanover Road interchange. It is recommended that if preliminary engineering and design plans begin for a Hanover Road interchange, that a larger holistic traffic evaluation is needed for east-west traffic along Hanover Road – from Ridge Road to MD 170 – to ensure that projected Hanover Road traffic cannot only traverse through Ridge Road, but also through New Ridge Road and onto MD 170 via Stoney Run Road. Because of the current configuration of Stoney Run Road, there is likely to be insufficient capacity at all of its intersections to accommodate the level of traffic demand projected.

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<sup>3</sup> Ridge Road traffic volumes actually declined 15% from 2015 to 2023, while New Ridge Road ADT has remained the same at 8700 vehicles per day from 2015 to the fall of 2021, when the last SHA count was conducted.

# Congestion and Safety Study – Ridge Road

## Ultimate Buildout Recommendations



		Ridge Rd					
1		(285)	320	210	(380)		
Furnace Ave		(0)	0	R	165	(260)	(305)
	0	(65)	(220)	T	0	(0)	215
	0	100	220	L	50	(45)	
	0	(0)	0	L	T	R	250
	0	(0)	0	T	0	45	30
	0	(0)	0	R	(0)	(120)	(60)
		(110)	150	75	(180)		
		(35)	10	60	(10)		
2		(75)	140	135	(170)		
Corporate Center Dr		(0)	0	R	65	(145)	(170)
	0	(50)	(25)	T	0	(0)	70
	0	65	75	L	5	(25)	
	0	(0)	0	L	T	R	140
	0	(0)	0	T	0	70	65
	0	(0)	0	R	(0)	(25)	(50)
		(75)	70	135	(75)		
		(105)	100	45	(95)		
3		(180)	170	180	(170)		
Hanover Rd (west)		(100)	95	R	0	(0)	
	95	(80)	(0)	T	0	65	
	115	115	L	L	T		
	0	0	T	0	70	65	
	0	0	R	(0)	(70)	(50)	
		(80)	75	65	(70)		
		(0)	0	0	(0)		
7		(80)	75	65	(70)		
Hanover Rd (west)		(0)	0	R	0	(0)	
	1,015	(80)	(0)	T	1,075	(725)	(775)
	1,195	75	0	L	50	(50)	1,125
	1,080	0	0	L	T	R	750
	1,215	(1,075)	725	T	120	65	25
		(140)	355	R	(290)	(70)	(25)
		(270)	480	210	(385)		
		(70)	120	25	(105)		
4		(340)	360	235	(490)		
Stoney Run Rd		(0)	0	R	160	(305)	(345)
	0	(170)	(170)	T	0	(0)	190
	0	115	245	L	30	(40)	
	0	(0)	0	L	T	R	270
	0	(0)	0	T	0	75	25
	0	(0)	0	R	(0)	(185)	(25)
		(210)	145	100	(210)		
		(30)	20	5	(5)		
5		(180)	125	95	(215)		
New Ridge Rd		(90)	80	R	5	(15)	(635)
	500	(75)	(15)	T	405	(560)	465
	830	80	40	L	55	(60)	805
	615	(130)	55	L	T	R	885
		(470)	735	T	15	35	65
		(15)	40	R	(45)	(70)	(70)
		(150)	135	115	(185)		
		(10)	35	25	(75)		
6		(160)	100	140	(110)		
Dorsey Rd		(25)	25	R	70	(65)	(960)
	1,325	(20)	(115)	T	1,190	(810)	1,330
	835	25	50	L	70	(85)	885
	1,160	(30)	40	L	T	R	885
		(1,030)	760	T	110	30	75
		(100)	35	R	(70)	(15)	(85)
		(205)	130	215	(170)		

Figure 11: 2045 Peak Hour Volume estimates for Ridge Road Corridor

## **Ultimate Buildout Condition for Ridge Road**

Based on discussions with County Planning and DPW staff, it was determined that the ultimate buildout for Ridge Road along the previously defined project area would include one planning option for in-lane bike lanes and sidewalk, throughout the length of the project, with the exception of the segment north of MD-295, which would only have in-road bike lanes, but no sidewalk (BMC is currently studying a new trail connection in this area). Specifically, the ultimate build out will be designed per the County’s Orange Notice guidelines<sup>4</sup>, as follows:

- Ridge Rd north of MD-295 is designated scenic and historic and will have an ultimate build out that includes curbside bike lanes but not sidewalk.
- Ridge Road south of MD-295 to Hanover Road will be designed as a closed-section collector road with curbside bike lanes and sidewalk.
- Ridge Road south of Hanover Road will be designed as a closed-section minor arterial road with curbside bike lanes and sidewalk.

Applying the Orange Notice guidelines to the expected volumes along Ridge Road, will allow for proper sizing of the ultimate roadway right of way and typical section. The Orange Notice consists of a matrix outlining the required improvements for each road classification, including turn lanes, bike accommodations, and pedestrian infrastructure. Each of the identified improvements are to be constructed for all new and improved roads based on the specific conditions as outlined in the matrix, with the total pavement and right-of-way width needed, based on the required improvements for each road classification.

### **Ridge Road, north of MD-295**

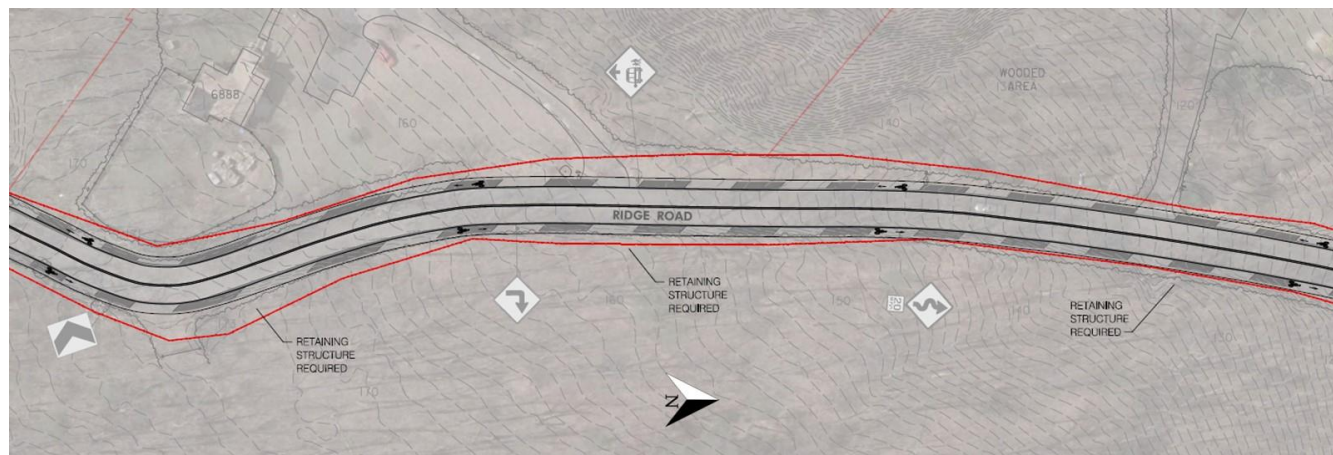
Ridge Road, north of MD-295 is designated scenic and historic. Generally, this designation implies that improvements to this road segment will be limited to minimal safety improvements, with development on land *abutting* the road being required to meet the 14 criteria in Article 17-6-504 of the County Code in order to minimize any adverse impacts. Per discussions with County Staff, safety improvements will include new bike lanes on either side of the road, as this roadway is often-utilized cycling route in the County. While four-foot wide shoulder/lanes are proposed, for the ultimate buildout, based on discussions with Staff, additional safety measurements are recommended to both keep vehicle speeds low and warn drivers of the potential presence of cyclists. These additional safety measures, to be determined during the design phase, can include:

- Lowered speed limit (20 mph recommended)
- Bike lane signage.
- Rumble strips to provide audible warnings near vertical and horizontal curvatures.
- Grooved pavement along the edge line separating the travel lanes from the bike lanes.

An example of what this segment of Ridge Road is shown in Figure 12. As shown in the figure, roadway widening will be needed to provide additional bike lanes. Additionally, some locations along this segment of Ridge Road will also need retaining structures as the topography on either side of the road is often steep.

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<sup>4</sup> Updated Road Cross-Section requirements have been developed that replace County DPW Standard Details P-1 through P-9 in Section 6 of the “Standard Details for Construction” of the County Design Manual, effective August 24, 2020.



**Figure 12: Example of Ridge Road, ultimate buildout, north of MD-295**

No new sidewalk or turn lanes or auxiliary lanes are proposed. Finally, existing flooding concerns have been noted at the intersection of Ridge Road at Furnace Ave.

### ***Cultural Resources***

The County’s Cultural Resources Section will review future design plans for potential impact and to determine whether archaeological survey work shall be necessary within AA-2290 Patapsco Park, an area of high archaeological potential, with multiple cemeteries. The Cultural Resources Section will evaluate proposed design plans here closely and conduct a site visit in order to confirm that there is no adverse impact.

Additionally, any development or improvements along Scenic and Historic roads will need to comply with the criteria in Article 17-6-504. Of note, Article 17-6-504 states the following:

- “the design shall minimize tree and vegetation removal and protect existing vegetation adjacent to the road”;
- “the development shall minimize grading and retain existing slopes along the road frontage”;
- “utilities, storm water management facilities, drainage structures, bridges, lighting, fences, and walls shall be located and designed to have the least impact, be unobtrusive, and harmonize with the surroundings and character of the road”;
- “road improvements required as a result of new development shall preserve, maintain, and enhance existing road alignments and be limited to those minimal improvements required for purposes of safety”;
- “the scenic or historic character of each road shall guide the design of visible shoulders, curbs, and sidewalks”

The County’s Cultural Resources Section will review all plans for compliance the criteria in Article 17-6-504.

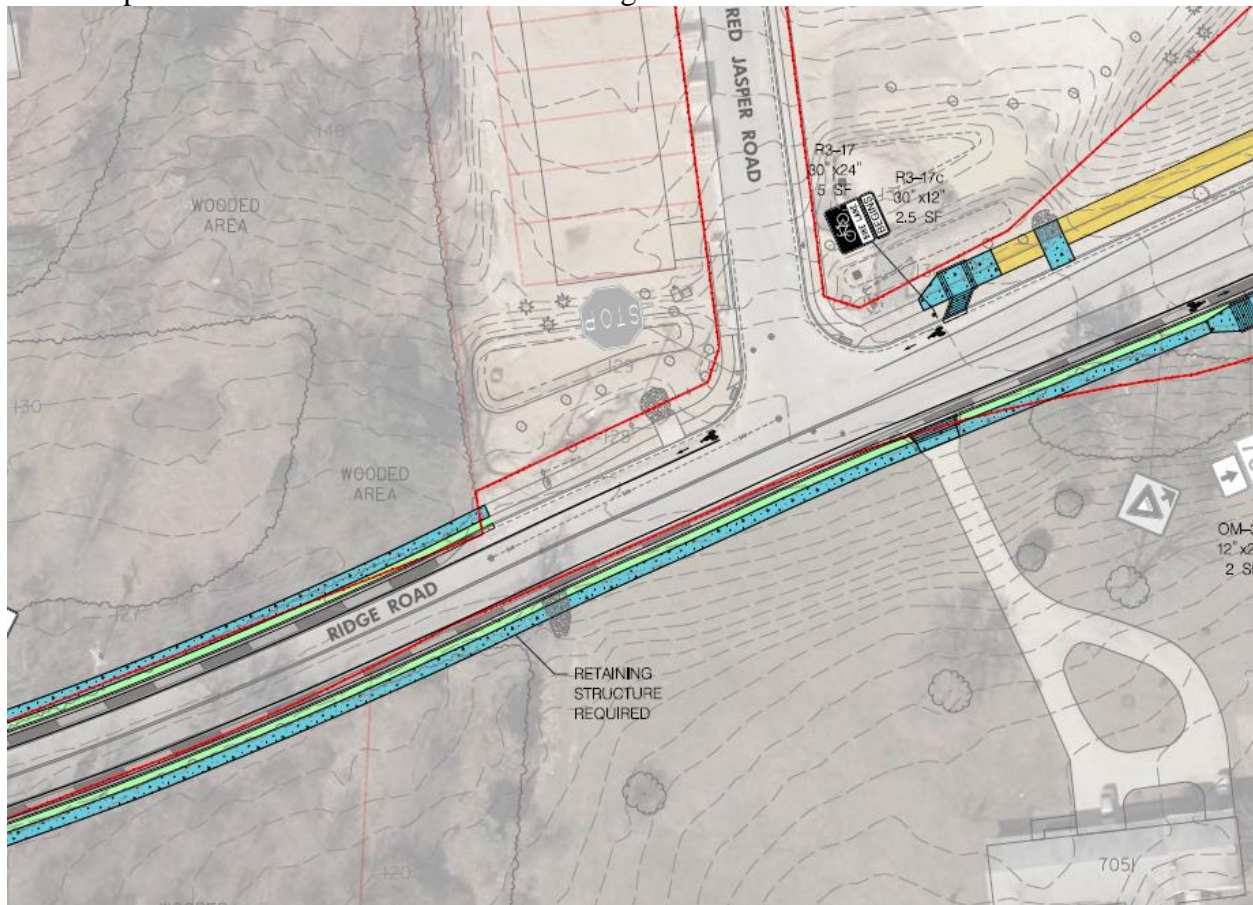
### **Ridge Road, south of MD-295 to Hanover Road**

Ridge Road, south of MD-295 to Hanover Road is designated as a collector road and will remain one in the ultimate buildout condition. Per the Orange Notice matrix, the need for bike lanes, sidewalk, turns, and lane width were evaluated.

Based on the functional classification of the roadway and the anticipated volumes, this roadway segment will have the following characteristics:

- 5-foot wide inroad bike lanes
- 5-foot wide sidewalk
- Curb and gutter
- 4-foot wide utility strip (grass buffer) between the sidewalk and curb;
- 11-foot wide travel lanes;
- No new turn lanes are warranted.
  - existing turn bays will remain.

An example of this full-build-out is shown in Figure 13.



**Figure 13: Example of ultimate buildout, south of MD-295**

Some of the frontage along this segment of Ridge Road has recently been reconstructed or is under construction. For example, from Red Jasper Road north to the MD-295 driveway entrance (7031 Ridge Rd), no roadway modifications are required to meet the ultimate buildout - just restriping existing shoulders for bike lanes (note that the east side of Ridge Road – along this specific segment – will replace the existing sidewalk with a County standard Shared use path up to and inclusive of the bridge over MD-295). However, for most of this segment of Ridge Road, major reconstruction is needed. For example, from Red Jasper Rd south to Hanover Road, roadway

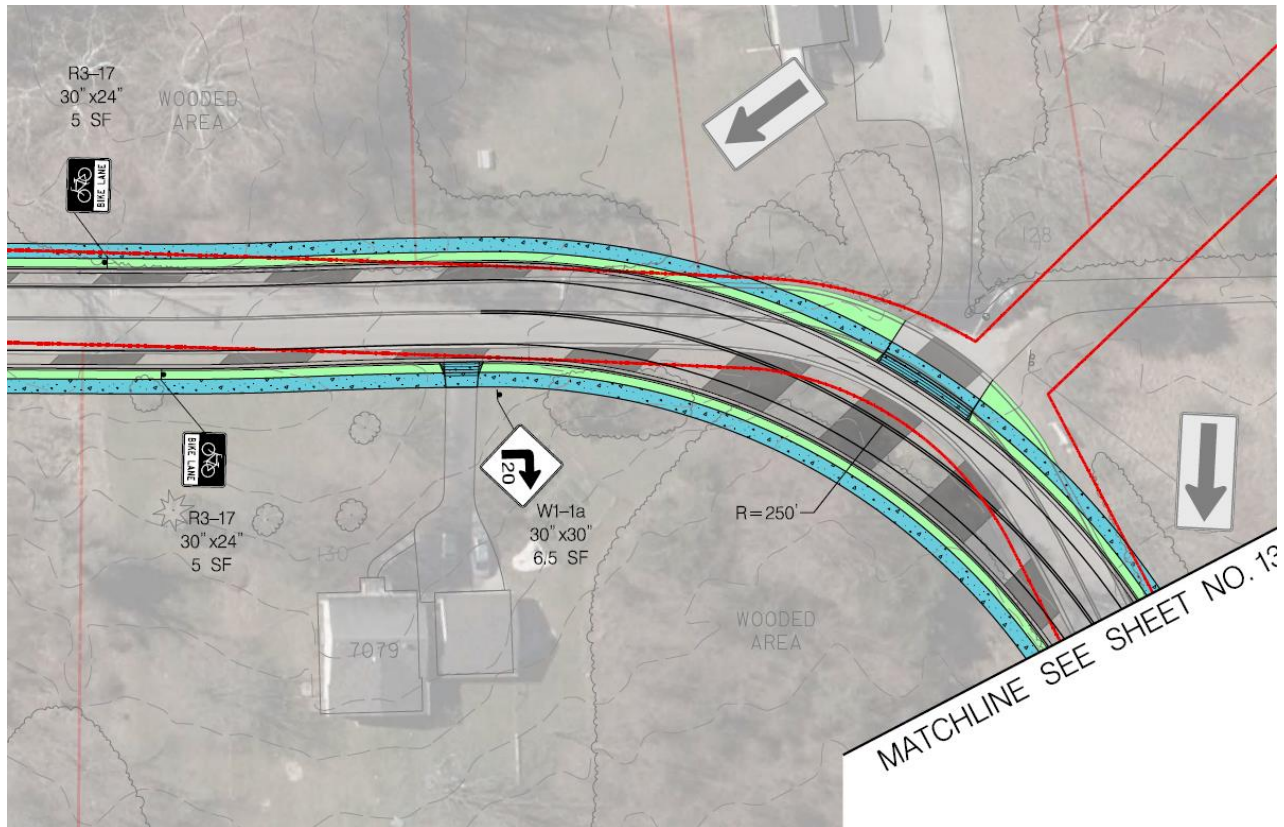
widening is needed for curbside bike lanes in both directions. Right of way is needed on both sides of the roadway to accommodate new sidewalk and utility strips.

Additionally, the Right of way is needed for the ultimate buildout in order to alleviate substandard horizontal curvatures in this segment of the Ridge Road. As shown in Figure 14, there are successive roadway curves south of The Ridge development that have tight horizontal radii.



**Figure 14: Substandard horizontal curvature, south of The Ridge development**

To address these, the ultimate build shows horizontal roadway realignments at the three locations noted in the above figure. These realignments reflect new curvatures with 250 feet radius (per AAHSTO's *Policy of Geometric Design of Highways and Streets* to reflect a design speed of 30 mph, based on discussions with County staff. An example of this can be seen in Figure 15.



**Figure 15: Realignment of horizontal curvature, south of Red Jasper Road, for AASHTO compliance**

Finally, a new signal at Hanover/Ridge Rd is being designed in conjunction with a new four-legged intersection, just south of the current Hanover/Ridge “T” intersection.

### ***Ridge Road, from Hanover Road to Dorsey Road (MD 176)***

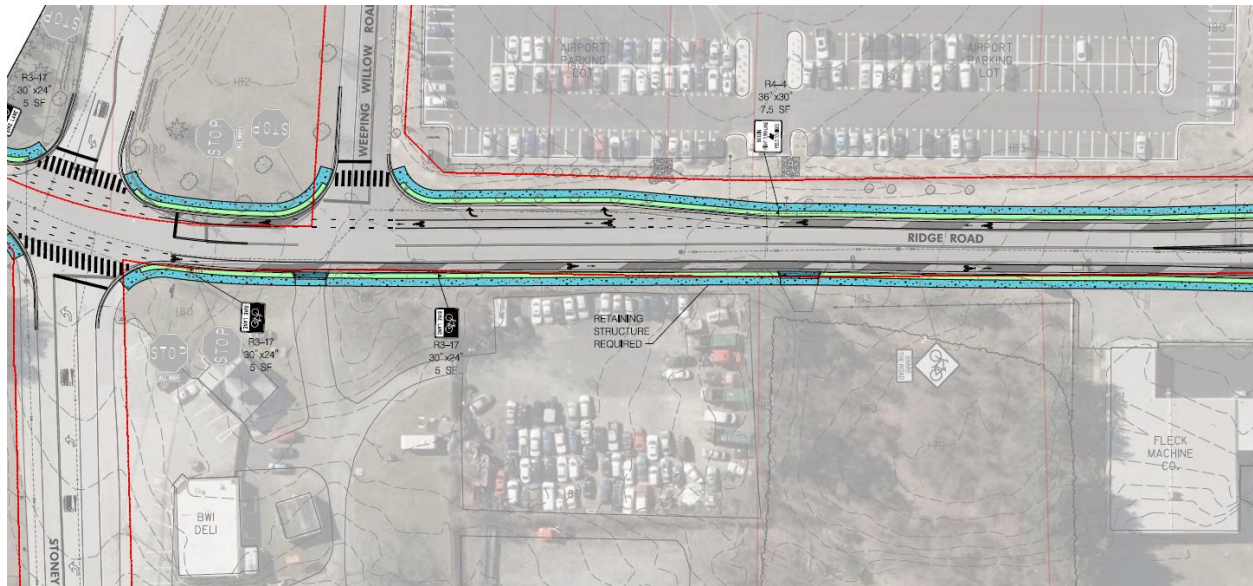
Ridge Road, south of Hanover Road is designated as a minor arterial and will remain one in the ultimate buildout condition. Per the Orange Notice matrix, the need for bike lanes, sidewalk, turns, and lane width were evaluated.

Based on the functional classification of the roadway and the anticipated volumes, this roadway segment will have the following characteristics:

- 5-foot wide inroad bike lanes
- 5-foot wide sidewalk
- Curb and gutter
- 4-foot wide utility strip (grass buffer) between the sidewalk and curb;
- 11-foot wide travel lanes;
- No new turn lanes are warranted.
  - existing turn bays will remain.

Additionally, a one-way stop controlled intersection is proposed for Ridge Rd at the Hanover Roadway extension eastward, with the stop control on the Hanover Road approach. Again, this traffic control is recommended only if the Hanover Road interchange is constructed.





**Figure 16: Example of ultimate build-out south of Hanover Road**

To accommodate these improvements, minor widening throughout this segment to accommodate on-road bike lanes.

### **Capacity Analysis – Ultimate Buildout Condition**

Based on the projected 2045 peak hour traffic volumes, the Ridge Road corridor as described herein and detailed in the Ultimate Buildout drawings (Appendix A), will result in acceptable levels of service and minimal queuing throughout, with the exception of the proposed new intersection of Hanover Road at Ridge Road. However, it should be noted that no signal timing or phasing has been designed for this intersection. Accordingly, estimates were made for both when analyzing the future traffic conditions of this intersection. Optimized phasing and timing were applied based on the designed lane configuration and estimated peak hour volumes. Despite the optimization – two movements failed: northbound left turns and westbound through movements, as shown in Table 4. Because the main vehicle movement at the intersection is expected to be east and west along Hanover Road, through Ridge Road, the new east and west legs of the new signalized 4-legged intersection may have an insufficient number of turn lanes (specifically left turns bays), since the current design has none, and large 2045 through volumes are estimated. A short left turn bay will likely alleviate the large delay in westbound traffic, while more green time to northbound left turning traffic would alleviate the capacity concerns with that movement. When and if the Hanover Road interchange is designed, updated traffic projections are recommended.

**Table 4: Capacity Analysis results, existing and Year 2045– New Intersection of Hanover at Ridge**

Ridge Rd - Capacity Analysis Summary Table - AM (PM)											
ID	Intersection	Approach	Movement	Existing Conditions				2045 No Build			
				Delay	LOS	V/C	95th Q	Delay	LOS	V/C	95th Q
1	Ridge Rd & Furnace Ave	Control Type		Stop (All-Way)				Stop (All-Way)			
		Overall		8.3 (8.8)	A (A)	0.32 (0.36)	- (-)	10.4 (12.4)	B (B)	0.45 (0.54)	- (-)
		Eastbound	Left-Through	8.0 (8.8)	A (A)	0.06 (0.17)	50 (75)	8.9 (11.2)	A (B)	0.12 (0.33)	75 (100)
		Westbound	Through-Right	7.8 (8.4)	A (A)	0.16 (0.24)	50 (75)	9.3 (11.2)	A (B)	0.29 (0.47)	75 (100)
		Southbound	Left	8.7 (9.4)	A (A)	0.25 (0.26)	75 (75)	11.5 (13.7)	B (B)	0.45 (0.50)	100 (100)
2	Ridge Rd & Corporate Center Rd	Control Type		Roundabout				Roundabout			
		Overall		3.4 (3.3)	A (A)	- (-)	- (-)	4.0 (3.8)	A (A)	- (-)	- (-)
		Eastbound	Left-Through	3.5 (3.0)	A (A)	0.09 (.04)	25 (25)	4.3 (3.4)	A (A)	0.16 (.08)	50 (25)
		Westbound	Through-Right	3.2 (3.5)	A (A)	0.04 (.10)	25 (25)	3.6 (4.2)	A (A)	0.08 (.17)	25 (25)
		Southbound	Left-Right	3.3 (3.0)	A (A)	0.08 (.04)	0 (25)	3.9 (3.4)	A (A)	0.15 (.08)	25 (25)
3	Ridge Rd & Hanover Rd	Control Type		Stop (1 - Way)				Stop (1 - Way)			
		Overall		- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
		Eastbound	Left	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
			Left-Right	10.1 (10.8)	B (B)	0.24 (0.23)	75 (75)	10.1 (10.8)	B (B)	0.17 (0.13)	75 (75)
		Northbound	Right	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
			Left-Through	6.0 (7.3)	A (A)	0.07 (0.19)	25 (50)	0.0 (0.0)	A (A)	0.05 (0.04)	25 (50)
		Southbound	Through-Right	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
			Left-Through	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)	- (-)
		Southbound	Through-Right	0.0 (0.0)	A (A)	0.04 (0.04)	0 (0)	0.0 (0.0)	A (A)	0.05 (0.05)	0 (0)
			Right	- (-)	- (-)	- (-)	- (-)	0.0 (0.0)	A (A)	0.07 (0.06)	- (-)
4	Ridge Rd & Stoney Run Rd	Control Type		Stop (All-Way)				Stop (All-Way)			
		Overall		8.1 (8.7)	A (A)	0.31 (0.39)	- (-)	11.3 (12.6)	B (B)	0.43 (0.59)	- (-)
		Eastbound	Left	7.6 (7.4)	A (A)	0.00 (0.00)	25 (0)	7.9 (8.5)	A (A)	0.00 (0.00)	0 (0)
			Through-Right	7.1 (7.4)	A (A)	0.00 (0.00)	0 (25)	7.9 (8.5)	A (A)	0.00 (0.00)	0 (0)
		Westbound	Left	7.7 (7.9)	A (A)	0.03 (0.04)	50 (50)	8.5 (8.9)	A (B)	0.06 (0.08)	50 (50)
			Through-Right	7.0 (8.0)	A (A)	0.14 (0.25)	50 (75)	8.7 (12.0)	A (B)	0.26 (0.48)	100 (100)
		Northbound	Left-Through-Right	7.7 (8.6)	A (A)	0.08 (0.17)	50 (75)	8.8 (11.1)	A (B)	0.15 (0.33)	75 (125)
Southbound	Left-Through-Right	9.0 (9.5)	A (A)	0.25 (0.28)	75 (75)	13.3 (14.4)	B (B)	0.54 (0.53)	75 (100)		
5	Ridge Rd & New Ridge Rd	Control Type		Signal				Signal			
		Overall		5.1 (6.0)	A (A)	0.24 (0.22)	- (-)	6.0 (7.0)	A (A)	0.40 (0.40)	- (-)
		Eastbound	Left-Through-Right	3.1 (3.1)	A (A)	0.25 (0.20)	75 (100)	4.3 (3.1)	A (A)	0.44 (0.41)	150 (200)
		Westbound	Left-Through-Right	2.8 (3.1)	A (A)	0.15 (0.19)	75 (100)	3.7 (3.1)	A (A)	0.27 (0.36)	125 (150)
		Northbound	Left	16.3 (15.6)	B (B)	0.06 (0.14)	25 (50)	16.5 (15.6)	B (B)	0.09 (0.22)	25 (50)
			Through	16.6 (15.9)	B (B)	0.13 (0.21)	50 (50)	16.8 (15.9)	B (B)	0.15 (0.24)	50 (75)
		Southbound	Right	16.2 (15.2)	B (B)	0.03 (0.03)	25 (25)	16.3 (15.2)	B (B)	0.04 (0.05)	50 (50)
Southbound	Left-Through	16.8 (16.5)	B (B)	0.17 (0.30)	50 (75)	17 (16.5)	B (B)	0.20 (0.34)	50 (75)		
Southbound	Right	16.2 (15.2)	B (B)	0.03 (0.03)	50 (50)	16.4 (15.2)	B (B)	0.05 (0.06)	50 (50)		
6	Ridge Rd & MD 176 (Dorsey Rd)	Control Type		Signal				Signal			
		Overall		9.9 (9.3)	A (A)	0.41 (0.37)	- (-)	15.3 (13.5)	B (B)	0.67 (0.62)	- (-)
		Eastbound	Left	5.5 (5.5)	A (A)	0.06 (0.04)	50 (50)	9.4 (6.7)	A (A)	0.21 (0.09)	50 (50)
			Through-Right	7.5 (7.6)	A (A)	0.27 (0.37)	100 (125)	12.2 (12.6)	B (B)	0.49 (0.64)	150 (200)
		Westbound	Left	5.3 (3.6)	A (A)	0.08 (0.11)	50 (50)	6.4 (6.7)	A (A)	0.19 (0.30)	50 (75)
			Through-Right	8.3 (5.7)	A (A)	0.42 (0.26)	125 (75)	15 (8.6)	B (A)	0.73 (0.45)	200 (125)
		Northbound	Left-Through	25.3 (27.0)	C (C)	0.47 (0.43)	75 (75)	30.1 (29.9)	C (C)	0.60 (0.48)	125 (100)
			Right	22.1 (23.8)	C (C)	0.03 (0.03)	50 (50)	23.8 (26.5)	C (C)	0.05 (0.06)	50 (50)
		Southbound	Left	23.1 (29.9)	C (C)	0.19 (0.55)	50 (75)	25.1 (40.2)	C (D)	0.24 (0.70)	75 (100)
			Through	22.1 (23.8)	C (C)	0.03 (0.04)	25 (25)	23.7 (26.4)	C (C)	0.04 (0.05)	50 (25)
Southbound	Right	22.0 (23.7)	C (C)	0.01 (0.01)	0 (0)	23.6 (26.3)	C (C)	0.02 (0.02)	25 (25)		
7	Ridge Rd & Hanover Rd (new 4-leg)	Control Type		Future Intersection				Signal			
		Overall						80.1 (185.9)	F (F)	1.24 (1.83)	- (-)
		Eastbound	Left-Through-Right					14.3 (29.4)	B (C)	0.84 (0.95)	175 (225)
		Westbound	Left-Through-Right					145.4 (401.4)	F (F)	1.27 (1.83)	>1,000 (>1,000)
		Northbound	Left					89.3 (343.1)	F (F)	0.83 (1.58)	150 (150)
			Through					54.6 (51.2)	D (D)	0.26 (0.23)	250 (250)
		Southbound	Right					52.2 (48.9)	D (D)	0.02 (0.02)	250 (250)
			Left					0.0 (0.0)	A (A)	0.0 (0.0)	0 (0)
Southbound	Through	67.3 (67.3)	E (E)	0.55 (0.56)	50 (50)						

## **Stormwater Management**

Stormwater management for all segments of the Ultimate Buildout condition will be required in accordance with County Memo for Stormwater Management for Linear Capital Projects. The use of any proprietary stormwater products such as Filtreras will need to be cleared by the County's Department of Public Works to confirm acceptance of systems and their maintenance. Additionally, a geotechnical analysis per *Practices and Procedures Manual* Section 5.1.2 will need to be provided to support siting and suitability of stormwater management practices. Geotechnical analysis should occur as early in the design phase as possible to inform the stormwater management feasibility.

## **Utility Coordination**

BGE maintains both overhead and underground facilities in the vicinity of Ridge Road. BGE has reviewed the proposed concept and determined that there are approximately 80 poles and 1500 feet of underground cable along Ridge Rd that are in direct conflict with the proposed Ultimate Buildout; and that these cables/poles would need to be relocated.

During the design phase, BGE requests that all poles, and underground located and plotted for the most accurate scope of work. Additionally, any overhead facilities in the area, the contractor should adhere to the Maryland High Voltage Line Act. The final design should include notes that indicate:

To provide protection of our facilities from damage during construction, it is required that the contractor installing these facilities notify "Miss Utility" on 1-800-257-7777 at least three (3) days prior to starting work so that we can arrange to mark the location of our facilities. The contractor should also be advised to exercise care when digging adjacent to and crossing these facilities.

## **Ultimate Buildout Cost Estimate**

The projected ultimate buildout cost was based on several factors:

- Roadway improvements, such as widening;
- New sidewalk and curb and gutter;
- Right of Way needs;
- New stormwater needs;
- New drainage needs;
- Earthwork and other re-grading;
- Retaining structures; and
- New traffic control devices

The cost per segment is as follows:

- North of MD 295 to Furnace Ave: \$5,075,000
- Hanover Road to MD-295: \$6,816,000
  - Inclusive of a new full signal at Hanover/Ridge
- Dorsey Road (MD 176) to Hanover Road: \$7,862,000

The combined cost for the entire 4.5-mile segment is \$19,751,000. These costs also include some contingency as well as design costs. All costs are in 2023 dollars.

In addition, there will be other costs associated with Hanover Road, if it is reconstructed as an interchange with MD-295. In this case, Hanover Road will likely need to be realigned to the south and the Hanover Road extension to and through Stoney Run Road will likely have to be upgraded to a 4-lane section all the way to Telegraph Road.

## **Summary Of Findings and Next Steps**

Based on the analysis of the existing transportation conditions in the corridor, this review presents the following summary findings:

- The study corridor consists of Ridge Road from Dorsey Road (MD 176) to Corporate Center Drive.
  - Six intersections were studied for capacity analysis and safety under existing and Year 2045 conditions.
- The typical section is one 11-12' travel lane in each direction with no shoulder. The posted speed limit is 35 mph. The average speed at the midpoint in the segment was measured at 41 mph, while the 85<sup>th</sup> speed was 49 mph. ADT along Ridge Road is 2,380 vehicles, representing 15% decrease from the ADT counted in 2015.
- Based on a vehicle classification count, the primary vehicles were passenger vehicles and pickup trucks. No 5-axle tractor trailers were counted.
- Existing Capacity Analysis shows all intersections operating within acceptable levels of service.
- Year 2045 peak hour traffic demand estimates were developed using BMC's Activity Based Model
- An interchange was assumed for Hanover Road at MD-295, which resulted in a large increase in east-west traffic across the Ridge Road corridor. The County is designing for a new four-leg intersection for Hanover Rod at Ridge Road, while leaving the existing one largely unchanged.
- Ridge Road has three classifications, each one having a unique cross section:
  - North of MD-295 is a scenic and historic road and a collector road.
  - South of MD-295 to Hanover Road is a collector road.
  - South of Hanover Road to Dorsey Road is minor arterial.
- Based on the Ultimate build condition, north of MD-295, Ridge Road would have bike lanes only, with additional safety treatments recommended.
- Between Hanover Road and MD-295, Ridge Road would have bike lanes and buffered sidewalk; with no additional traffic control devices or additional lanes required.
- Under Year 2045 conditions, all study intersections will have acceptable LOS, with the exception of Hanover Road – in its current design and based on estimate 2045 volumes.
- If the Hanover/MD-295 interchange is constructed, it is recommended to conduct new traffic projections and evaluate the traffic impacts to the east and west legs Hanover Road at Ridge Road (new signalized intersection) and Hanover Road Extended at New Ridge Road and at Telegraph Road, as the estimated new traffic is substantially higher than existing traffic on Hanover Road / Stoney Run Road and could be the result of east-west traffic diverting from MD-100.
- The combined cost for the ultimate build-out for the entire 4.5-mile segment of Ridge Road, including design, is \$19,750,000.

# Ridge Road Corridor – Safety and Congestion Study

## **APPENDICES** Ultimate Build-out Condition



June 2024

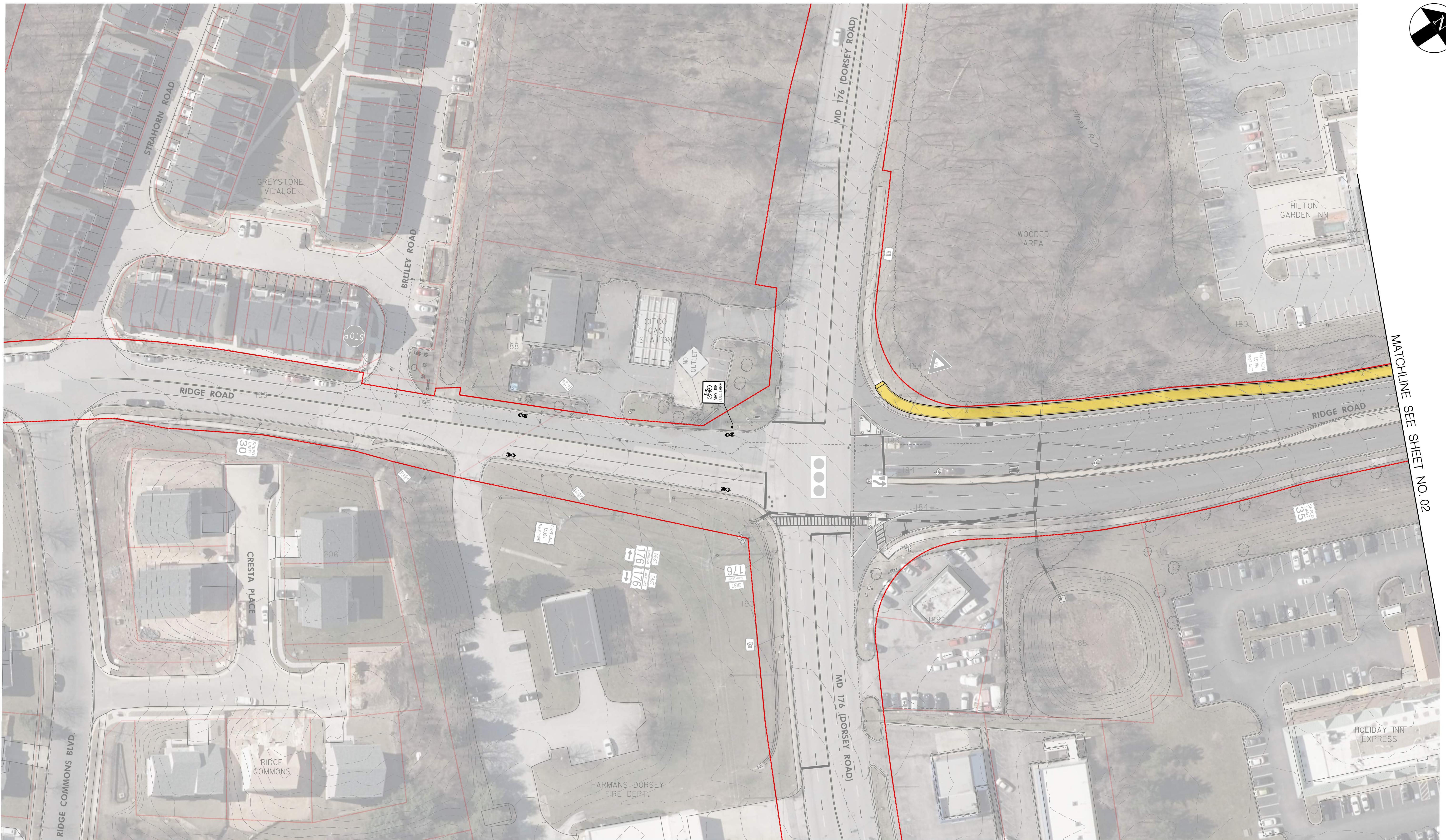
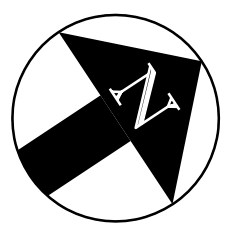


**Appendix A: Ultimate Build-out Concept Drawings**  
**Appendix B: Detailed Cost Estimate**

## **Appendix A: Ultimate Build-out Concept Drawings**





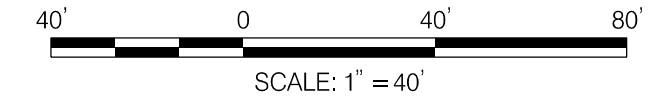


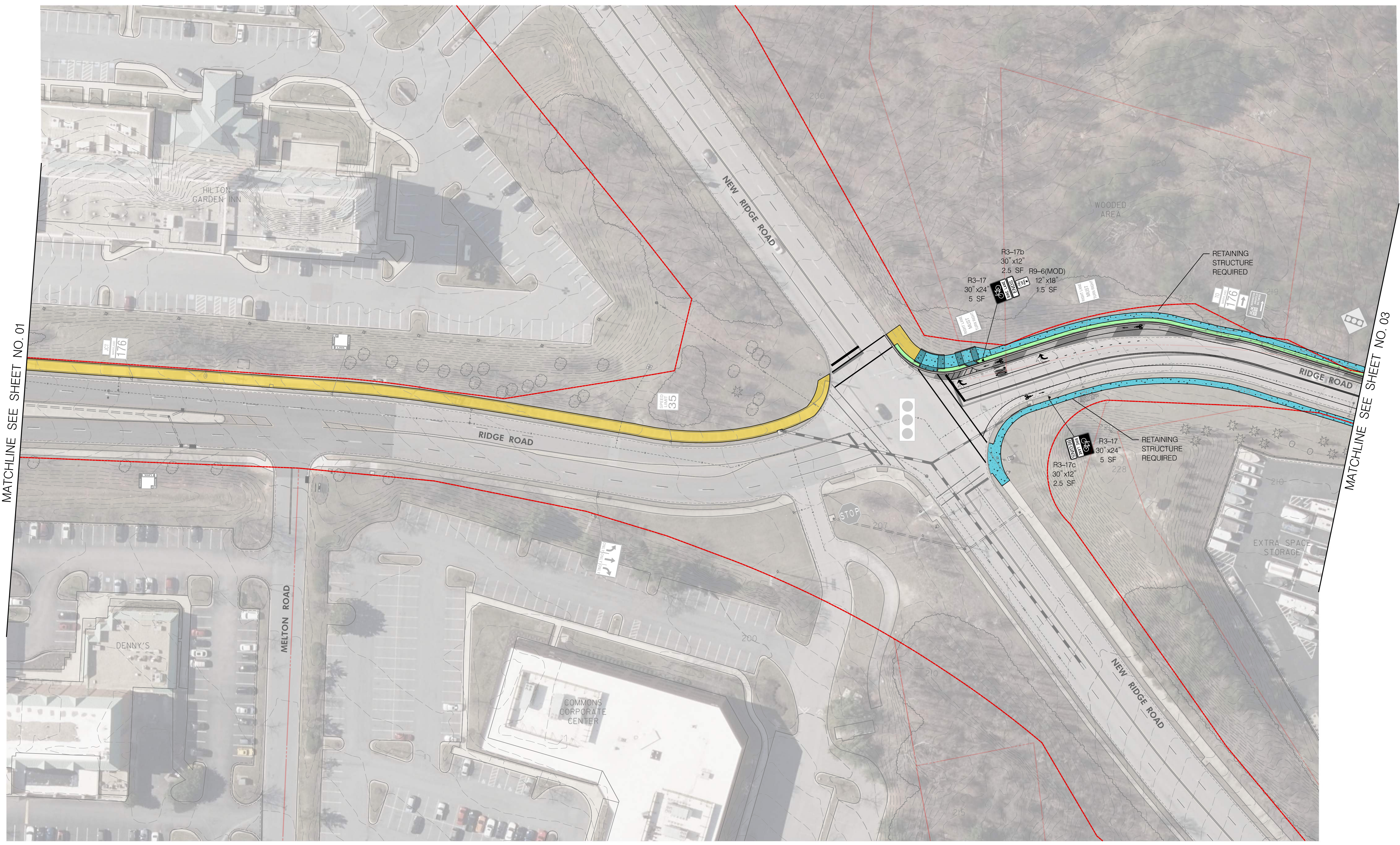
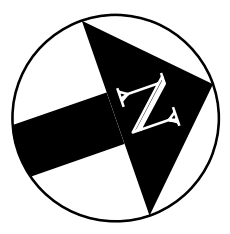
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# Ridge Road Proposed Bicycle Facilities: Ultimate Build Out





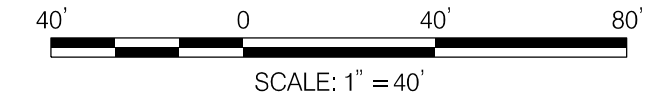
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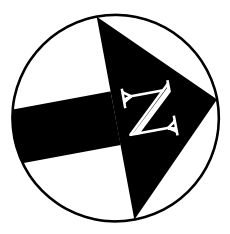
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# Ridge Road Proposed Bicycle Facilities: Ultimate Build Out

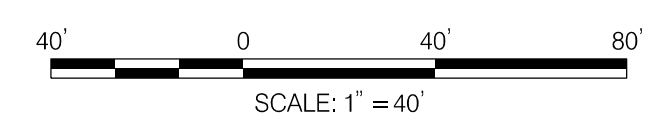


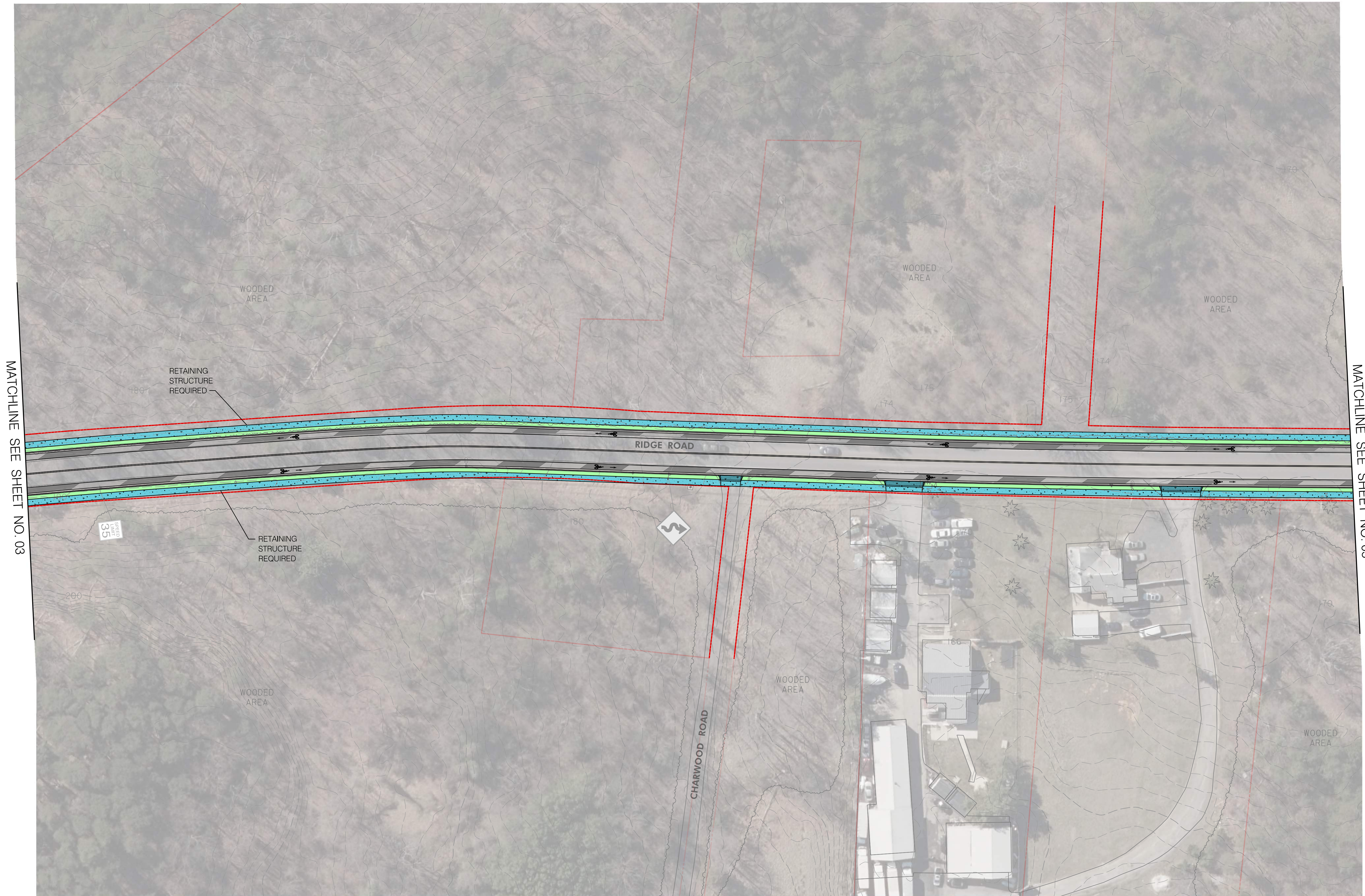
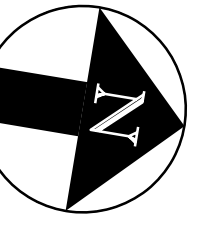


OPERATOR02430 - PLOTTED: 6/4/2024  
FILE NAME: \2018\18 - Anne Arundel County A-E Roads and Bridges Agrt 15010\task 15 Ridge Rd Corridor Study Update\dwg\Print Sheets\Ultimate build out\p1D-P303\_RidgeRd.dgn



# Ridge Road Proposed Bicycle Facilities: Ultimate Build Out

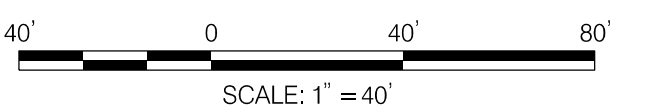


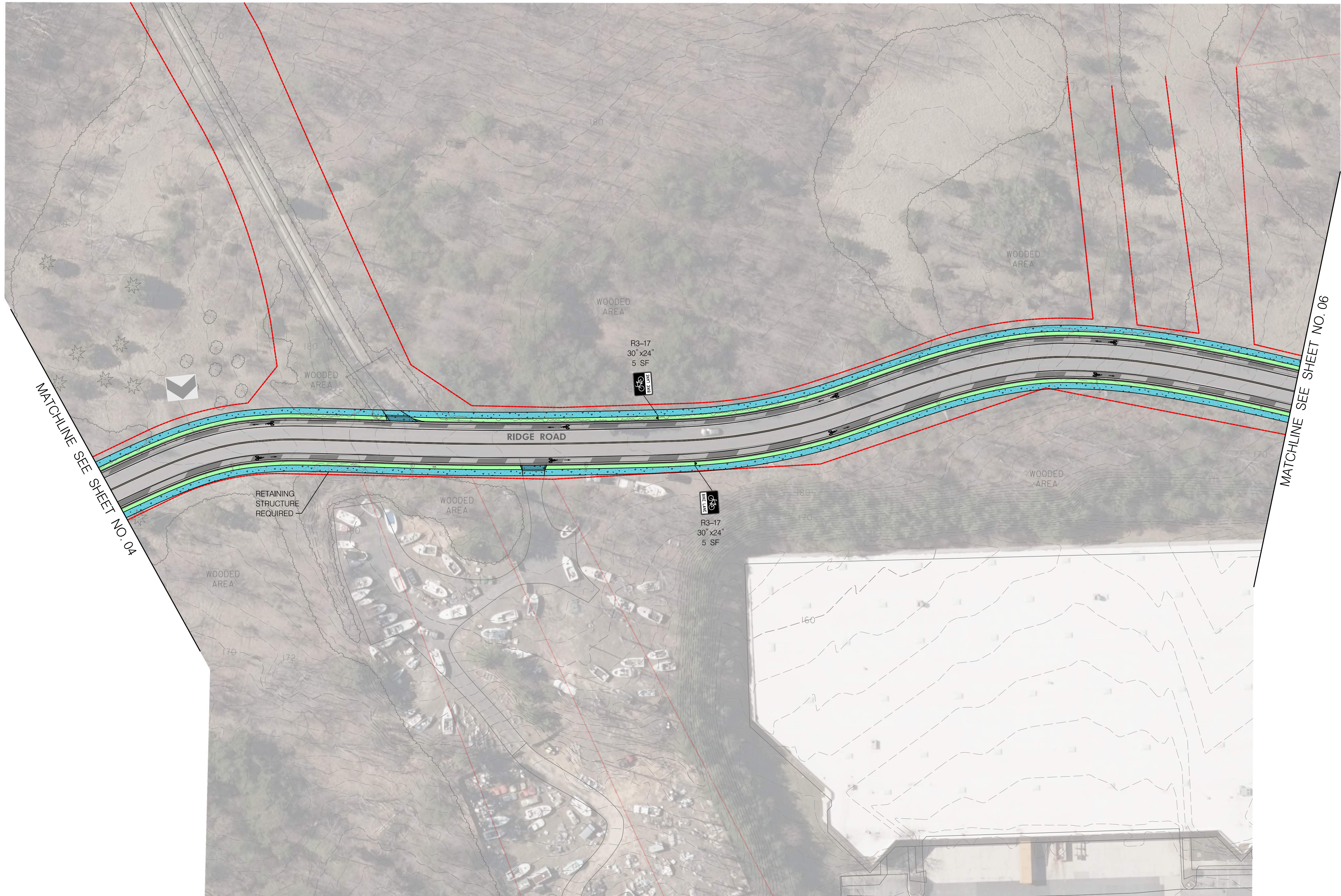
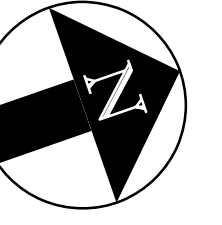


MATCHLINE SEE SHEET NO. 03

MATCHLINE SEE SHEET NO. 05

Ridge Road Proposed Bicycle Facilities: Ultimate Build Out





MATCHLINE SEE SHEET NO. 04

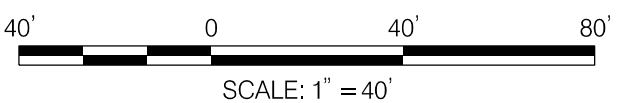
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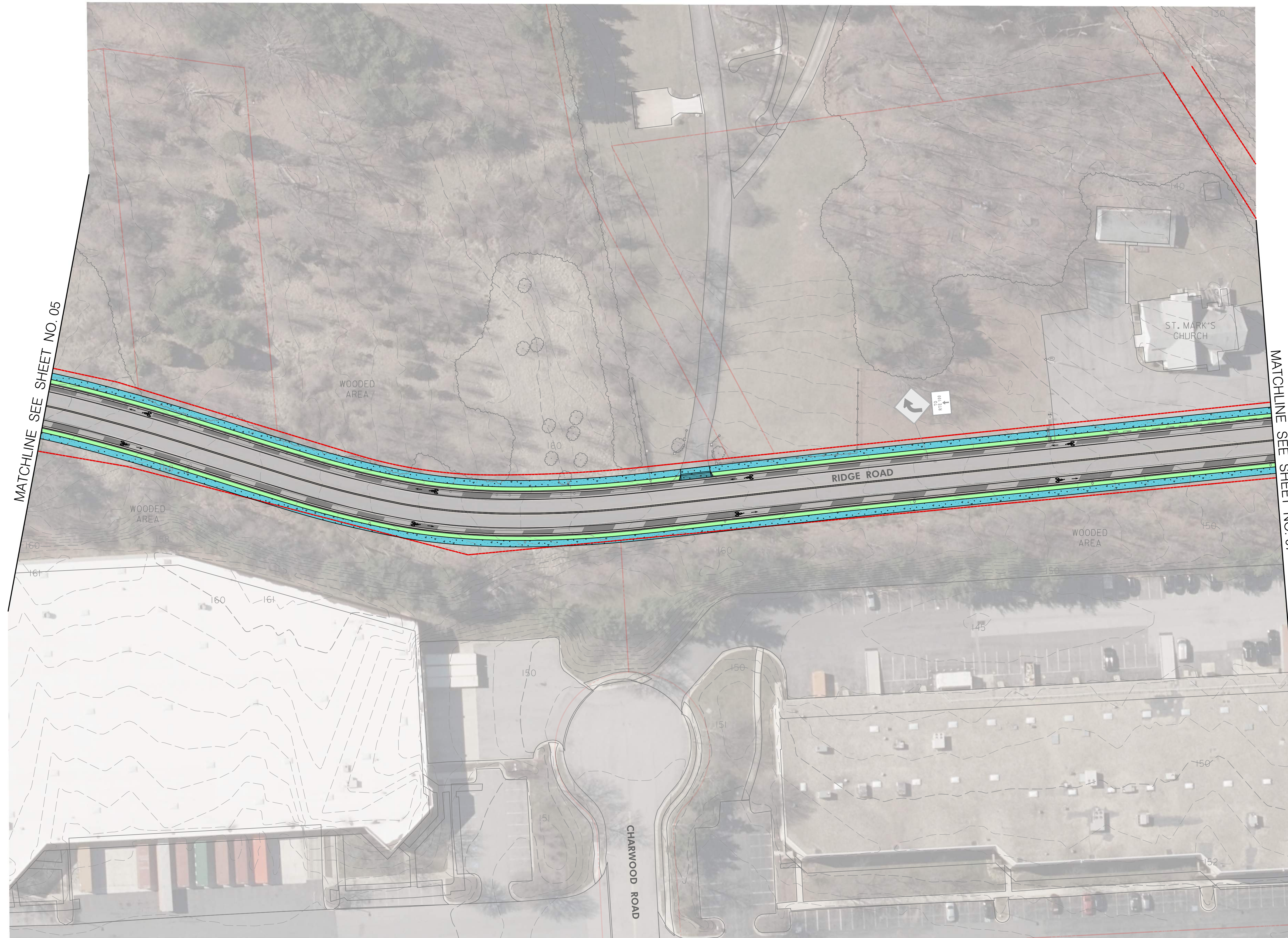
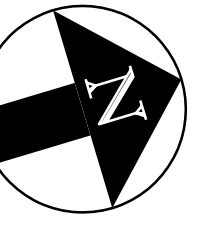
RETAINING  
STRUCTURE  
REQUIRED

R3-17  
30" x 24"  
5 SF

R3-17  
30" x 24"  
5 SF

*Ridge Road Proposed Bicycle Facilities: Ultimate Build Out*

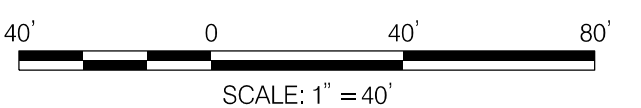


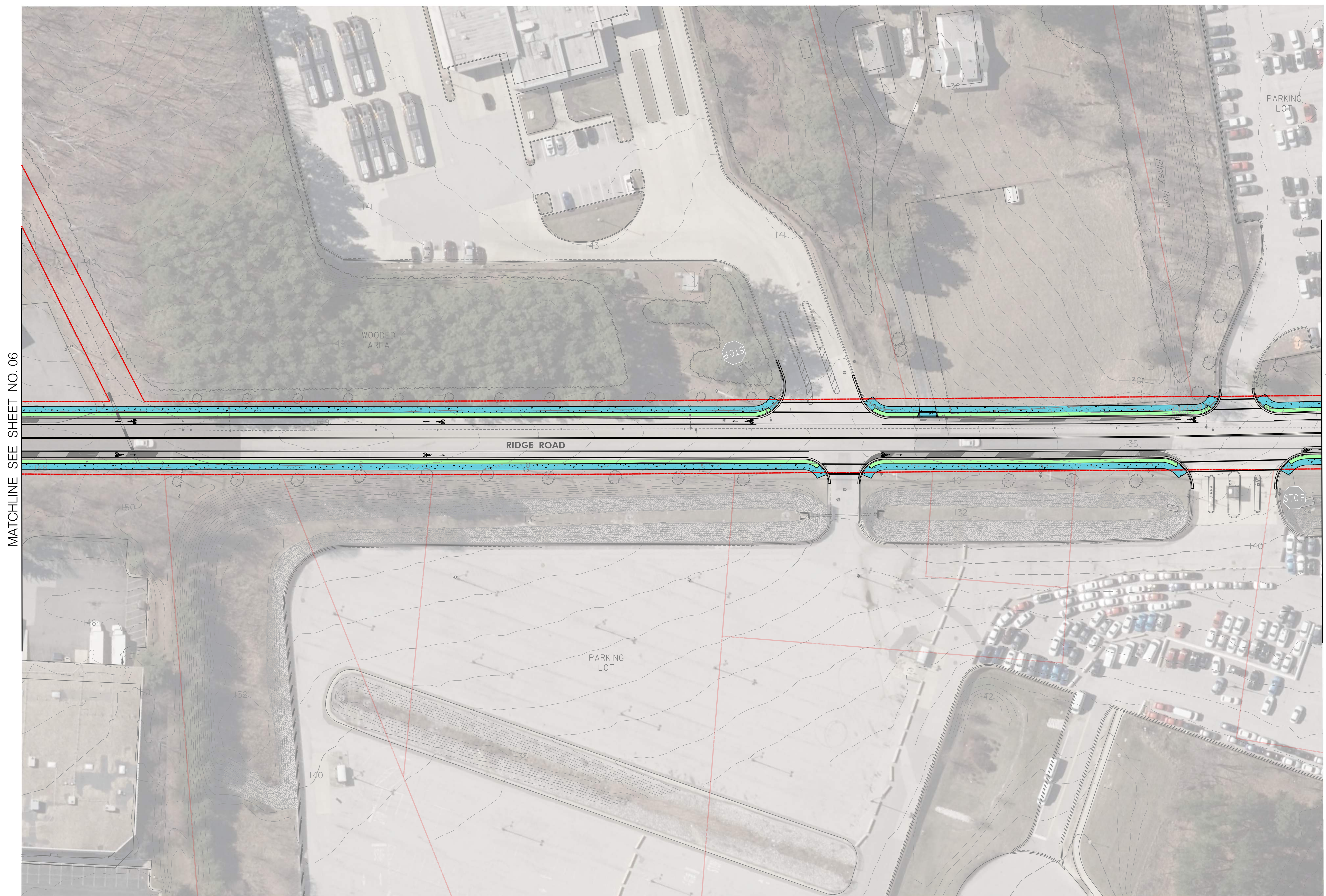
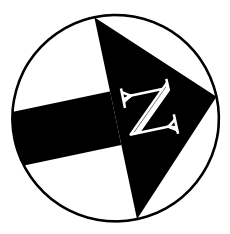


MATCHLINE SEE SHEET NO. 05

MATCHLINE SEE SHEET NO. 07

# Ridge Road Proposed Bicycle Facilities: Ultimate Build Out

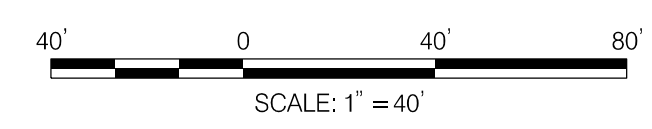


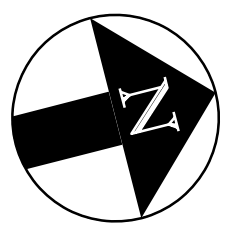


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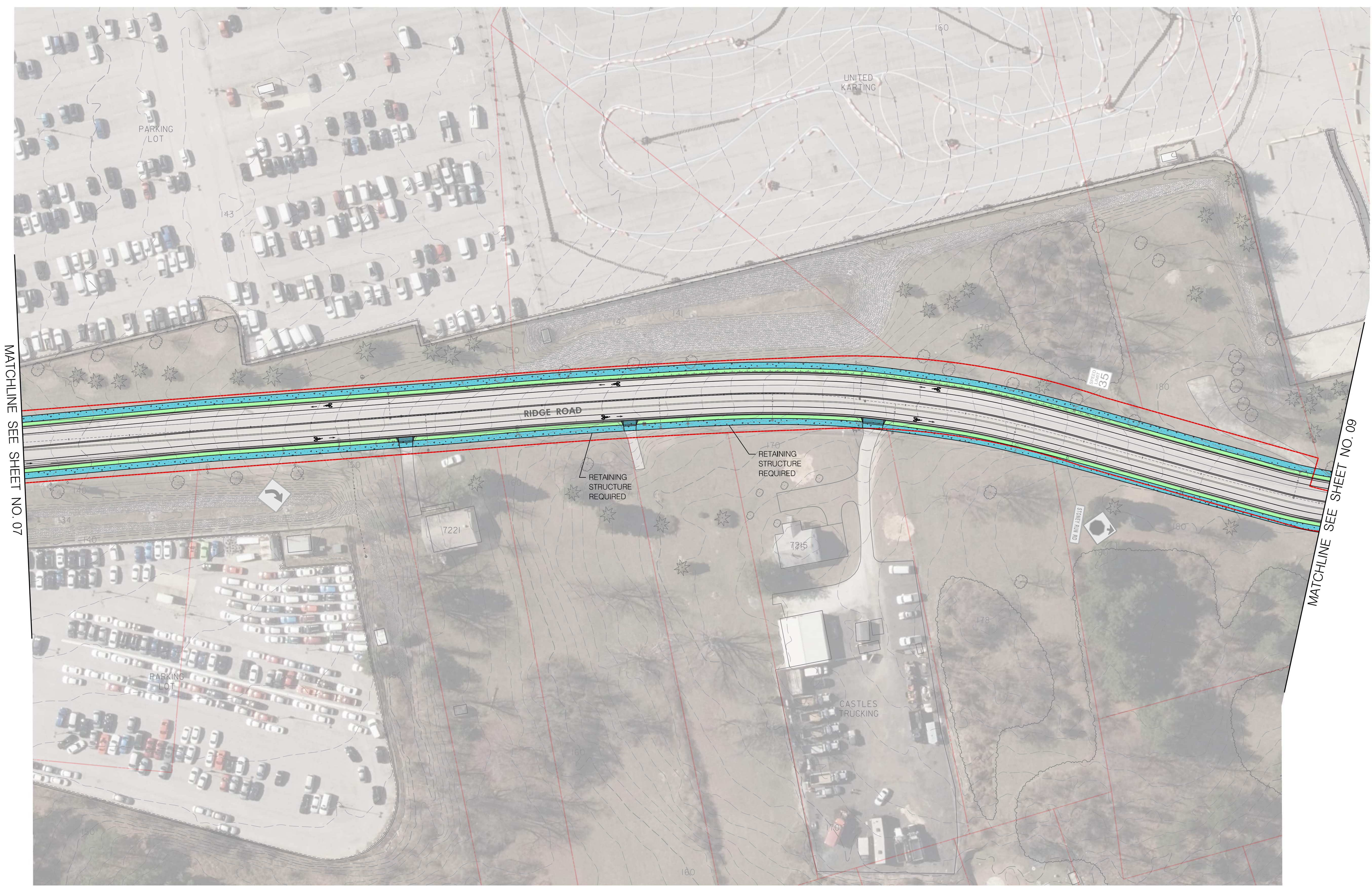
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# Ridge Road Proposed Bicycle Facilities: Ultimate Build Out

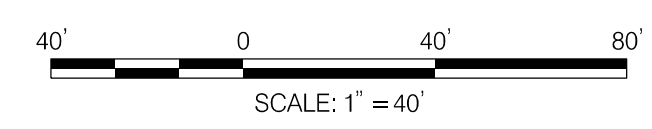




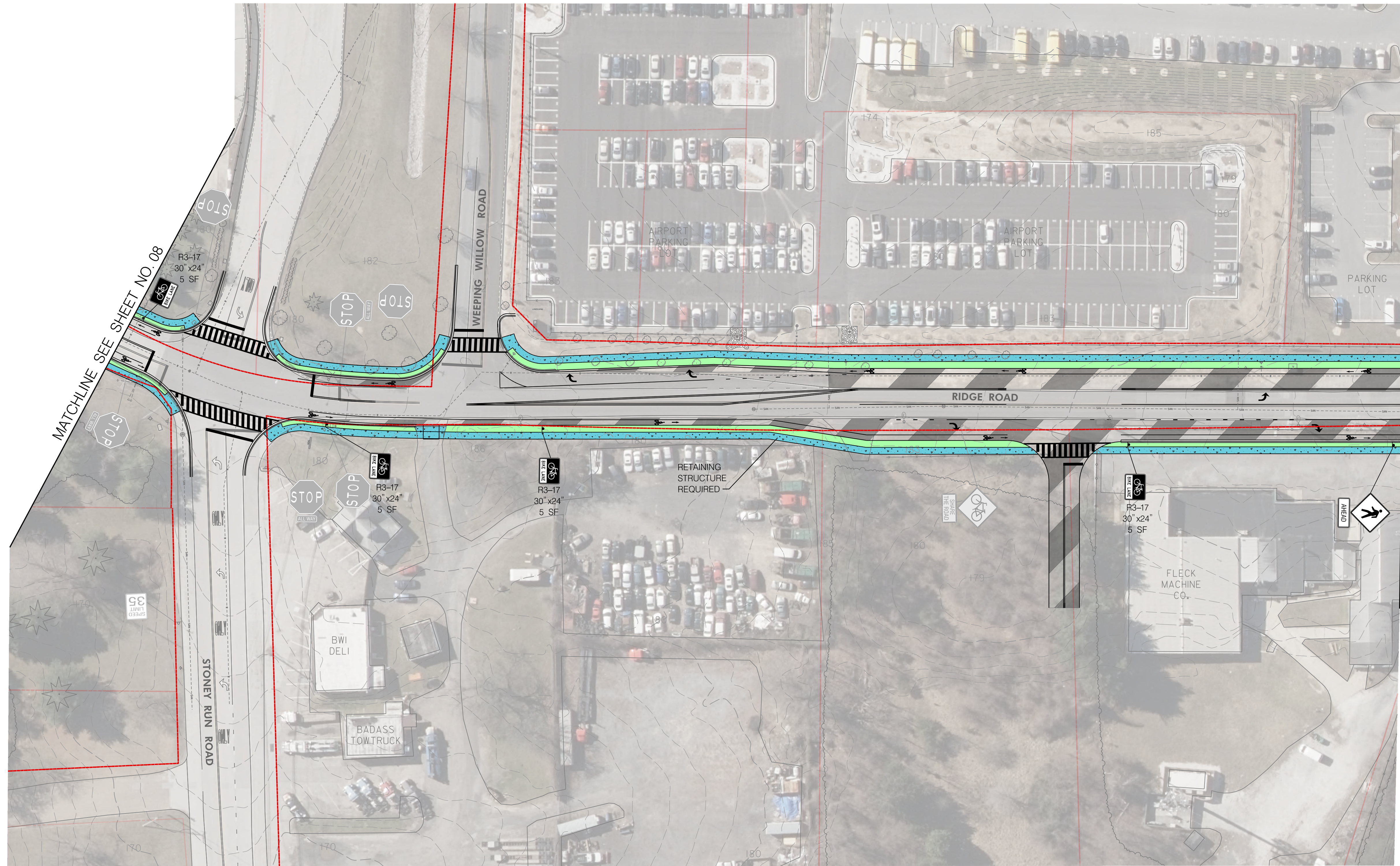
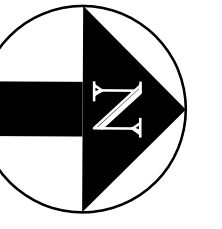
OPERATOR02430 - PLOTTED: 1/11/2024  
FILE NAME: \2018\18 - Anne Arundel County A-E Roads and Bridges Agrt 15010\task 15 Ridge Rd Corridor Study Update\dwg\Print Sheets\Ultimate build out\PTD-P308\_RidgeRd.dgn



# Ridge Road Proposed Bicycle Facilities: Ultimate Build Out



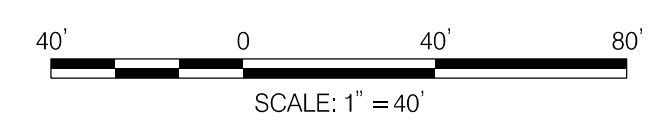


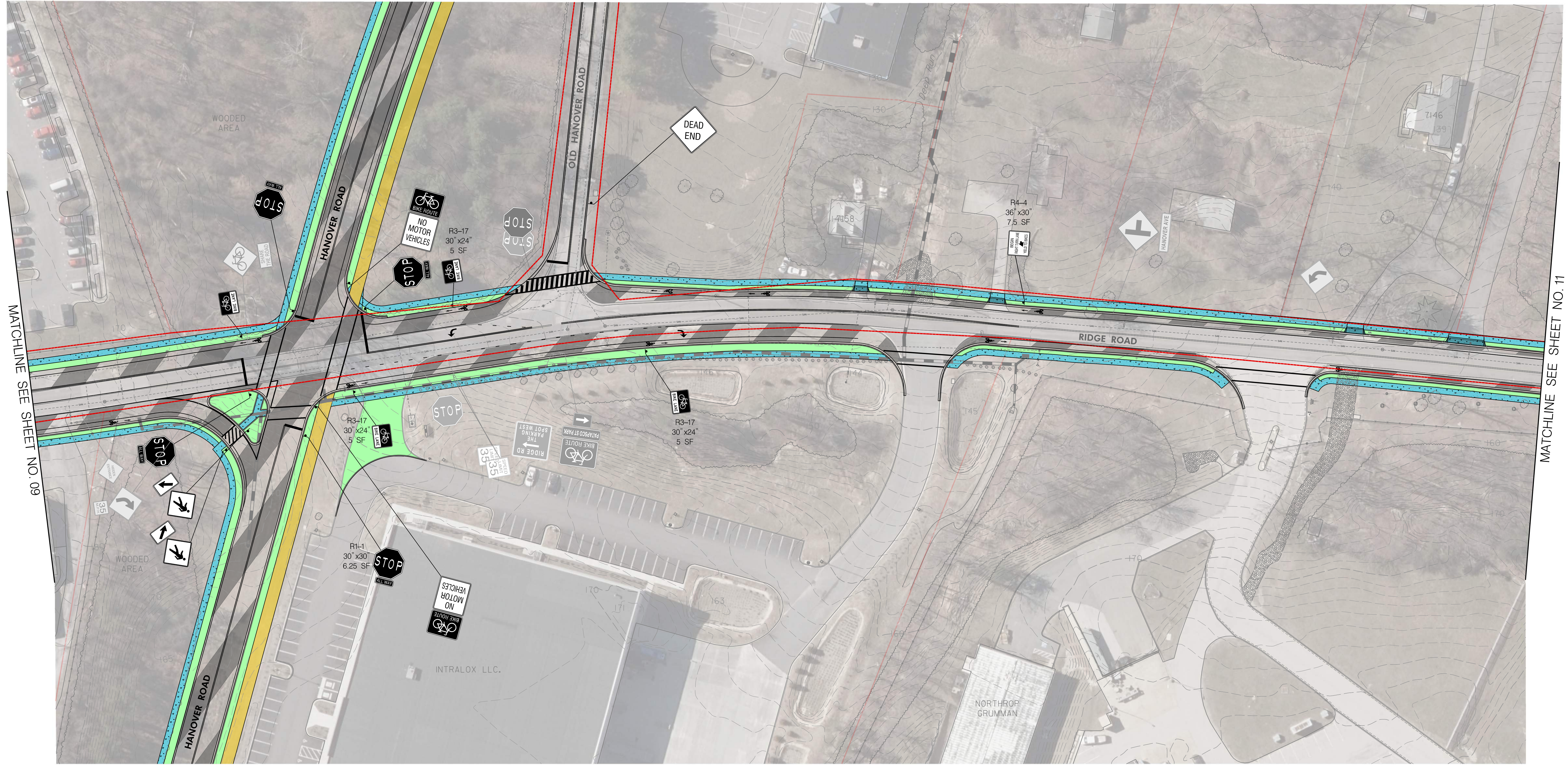
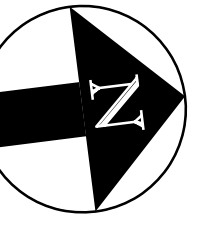


MATCHLINE SEE SHEET NO. 08

MATCHLINE SEE SHEET NO. 10

Ridge Road Proposed Bicycle Facilities: Ultimate Build Out

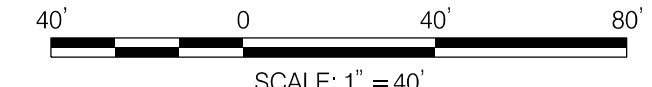


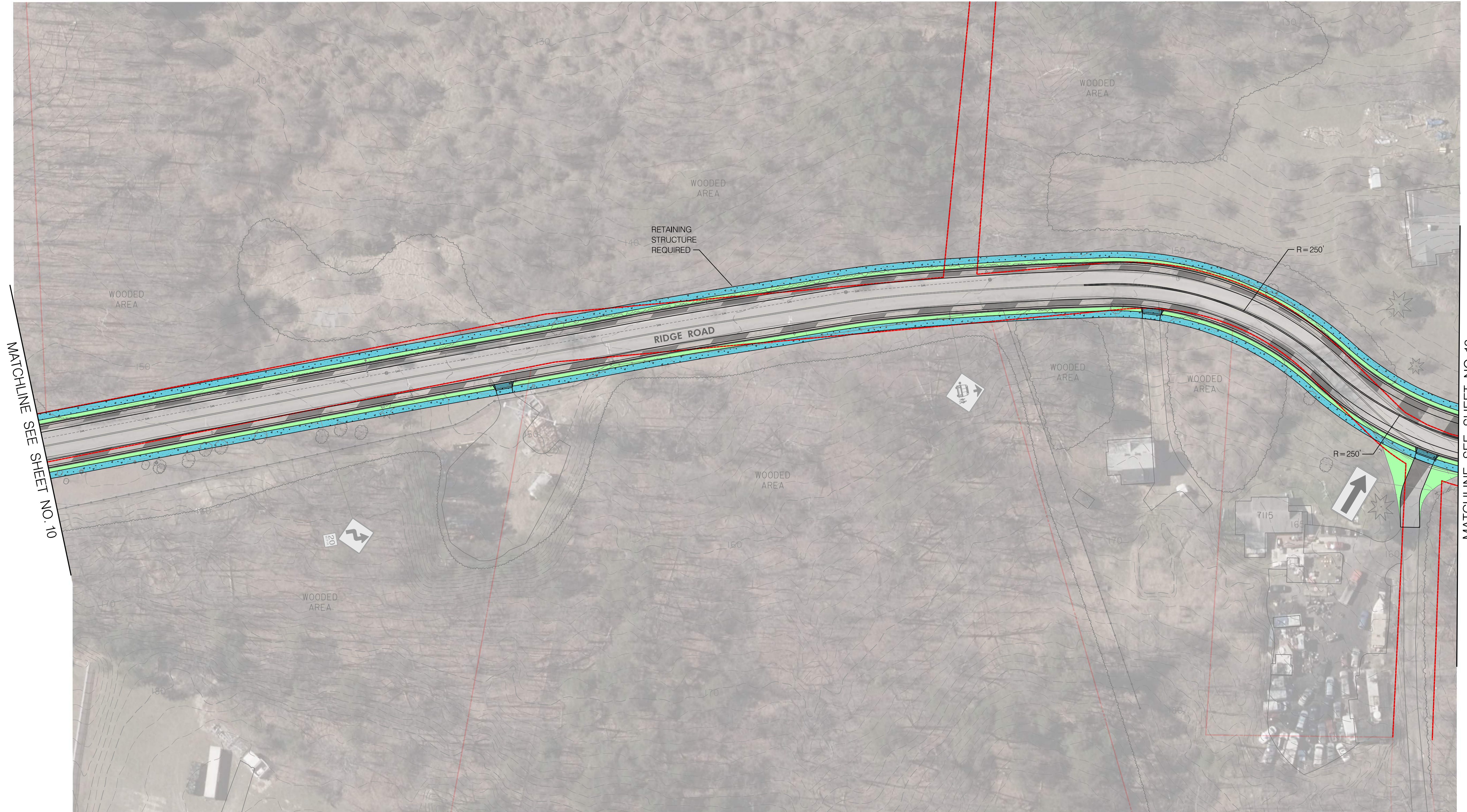
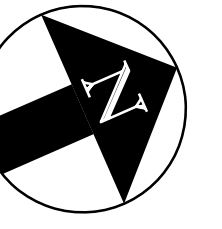


OPERATOR02430 - PLOTTED: 6/4/2024  
 FILE NAME: \2018\18 - Anne Arundel County A-E Roads and Bridges Agrt 15010\task 15 Ridge Rd Corridor Study Update\dwg\Print Sheets\Ultimate build out\p10-P310\_RidgeRd.dgn



Ridge Road Proposed Bicycle Facilities: Ultimate Build Out

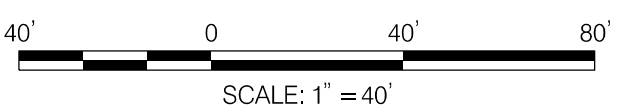


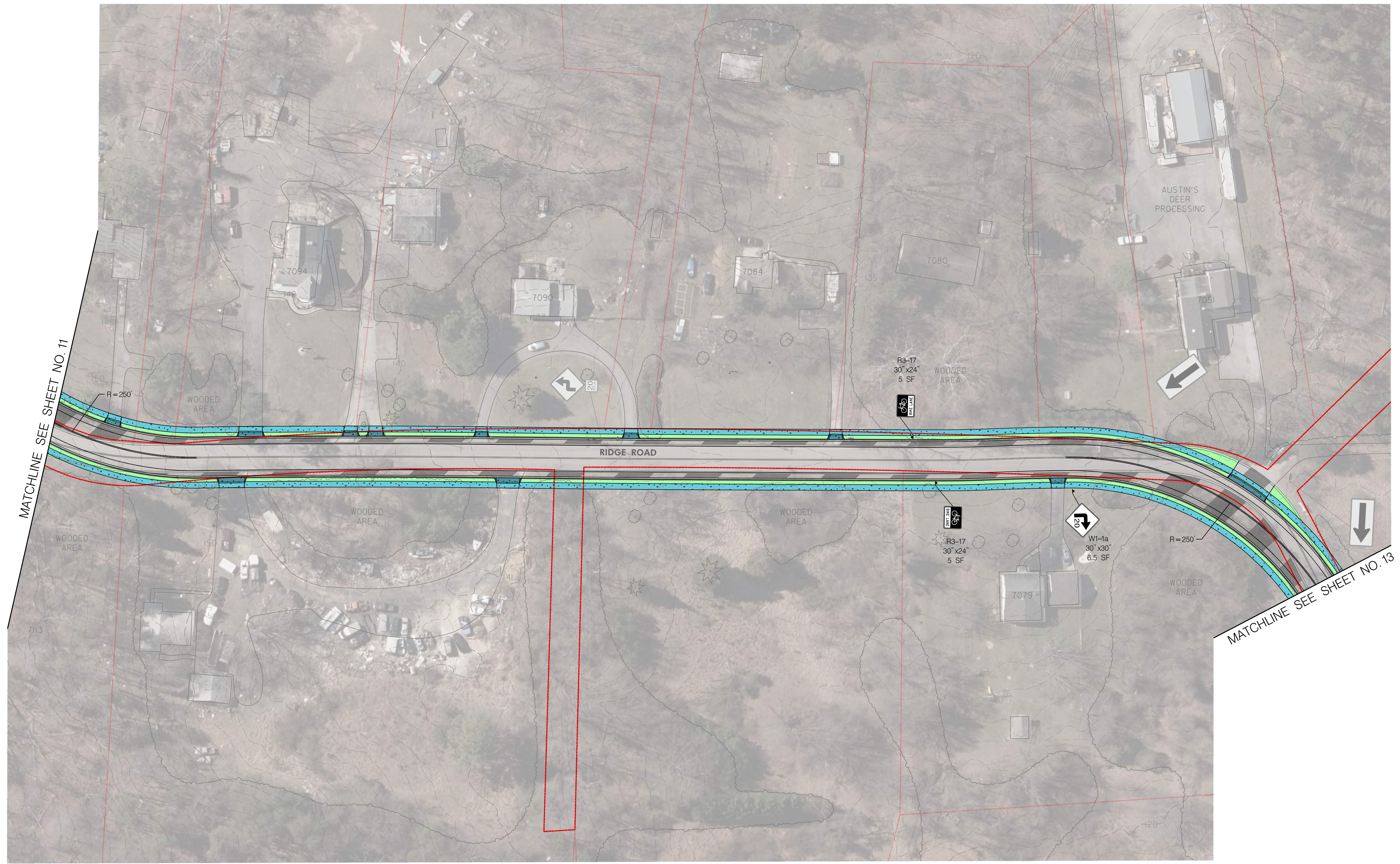
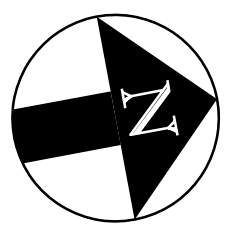


MATCHLINE SEE SHEET NO. 10

MATCHLINE SEE SHEET NO. 12

# Ridge Road Proposed Bicycle Facilities: Ultimate Build Out

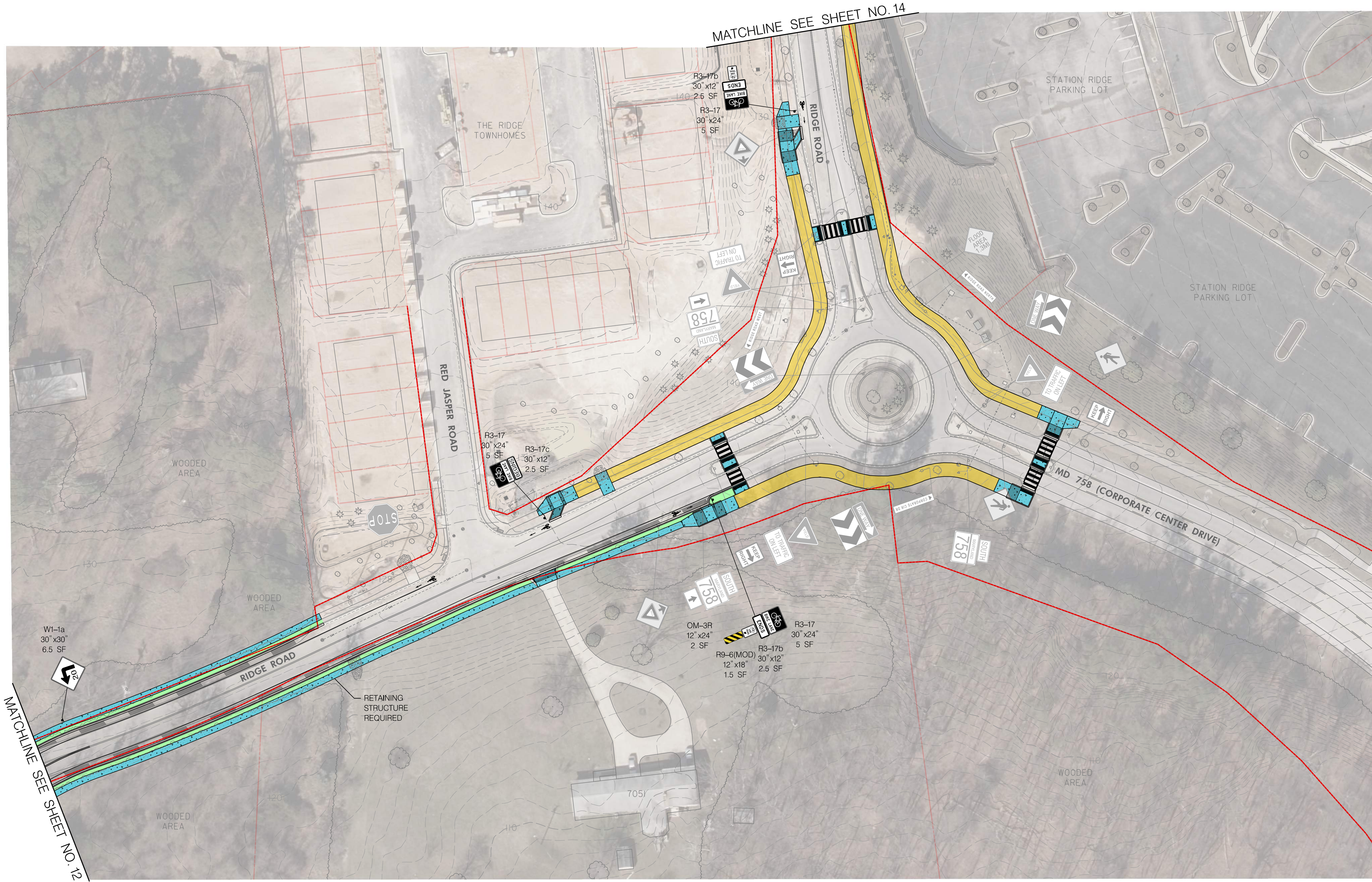
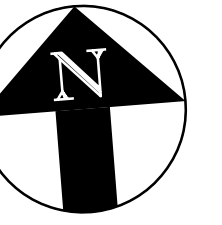




MATCHLINE SEE SHEET NO. 11

MATCHLINE SEE SHEET NO. 13

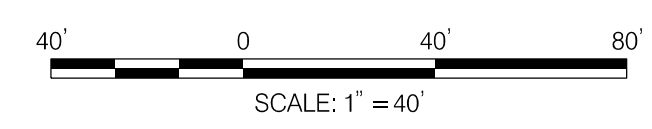
RIDGE ROAD



MATCHLINE SEE SHEET NO. 14

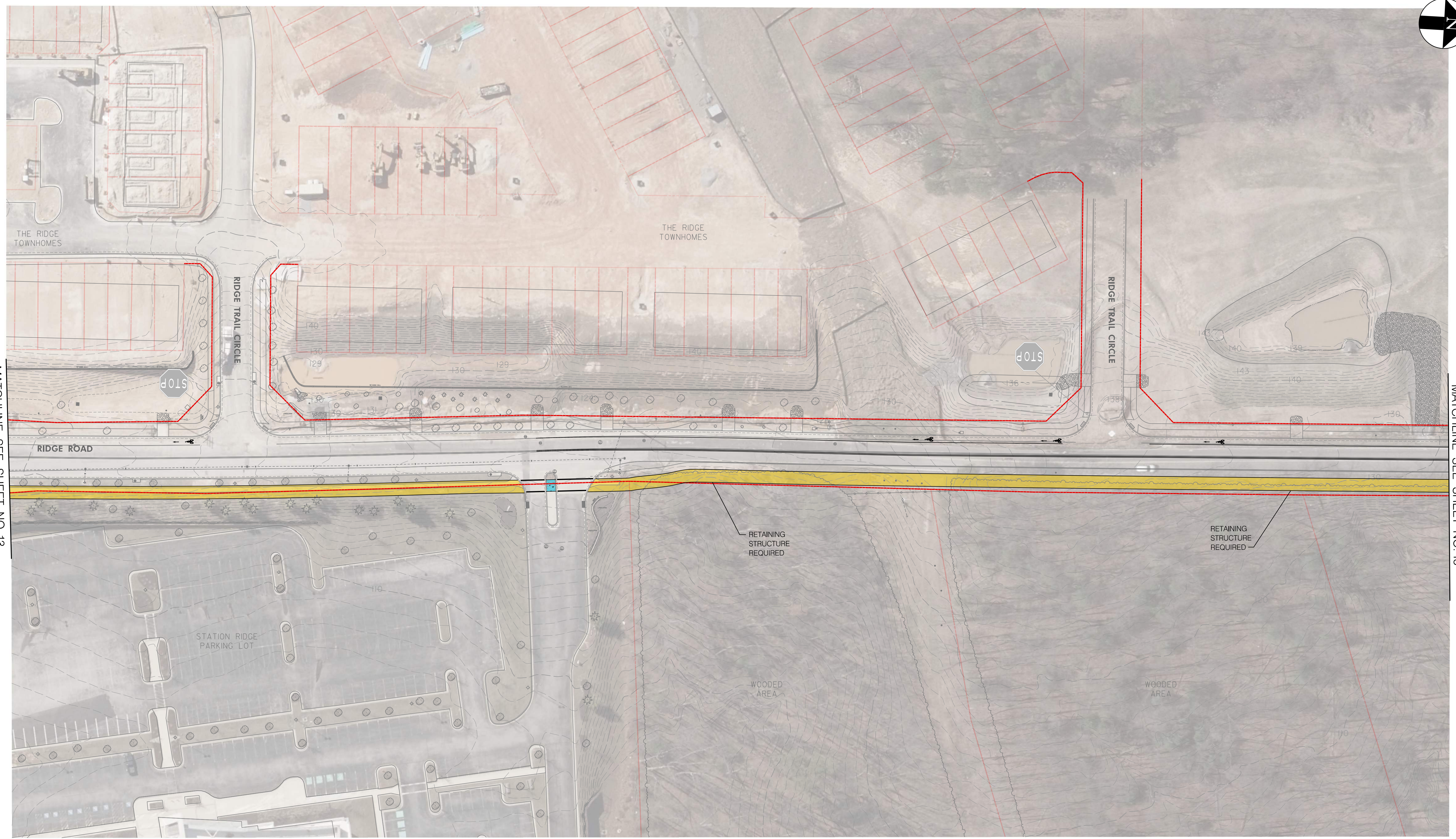
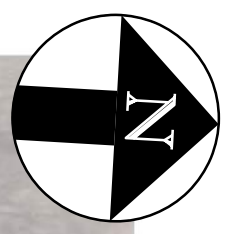
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Ridge Road Proposed Bicycle Facilities: Ultimate Build Out



OPERATOR02430 - PLOTTED: 6/4/2024  
FILE NAME: \2018\18 - Anne Arundel County A-E Roads and Bridges Agrt 15010\task 15 Ridge Rd Corridor Study Update\dwg\Print Sheets\Ultimate build out\p13\_RidgeRa.dgn





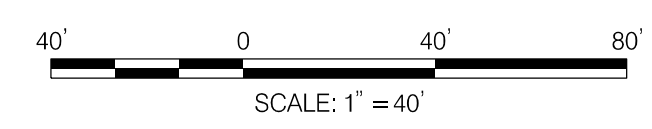
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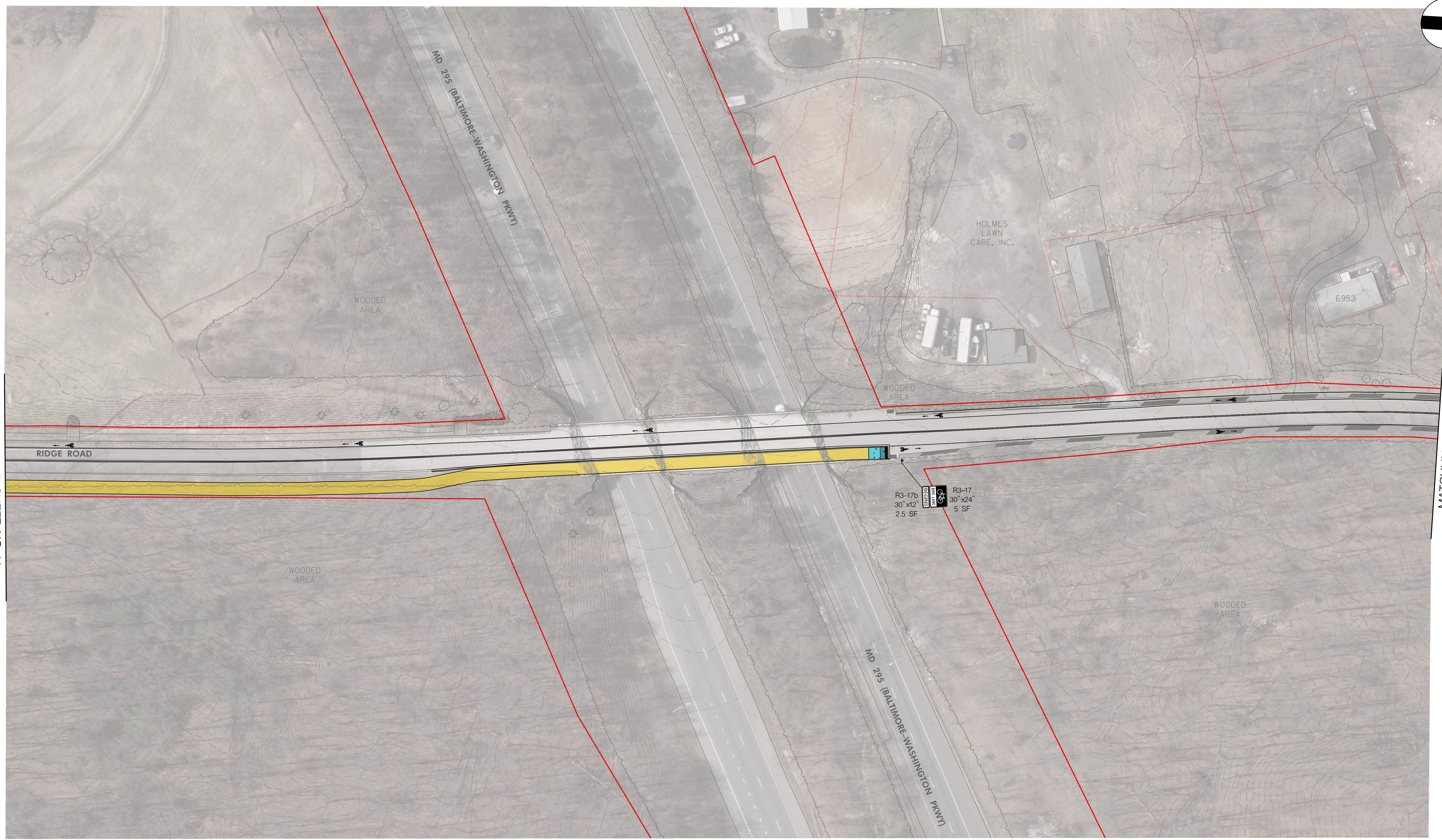
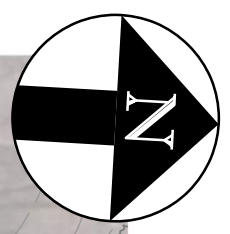
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OPERATOR02430 - PLOTTED: 6/4/2024  
FILE NAME: \2018\18 Anne Arundel County A-E Roads and Bridges Agrt 15010\task 15 Ridge Rd Corridor Study Update\dwg\Print Sheets\Ultimate build out\PTD-P314\_RidgeRd.dgn



# Ridge Road Proposed Bicycle Facilities: Ultimate Build Out





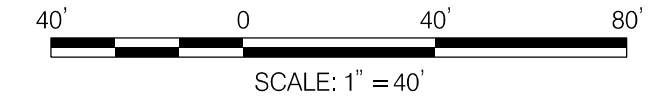
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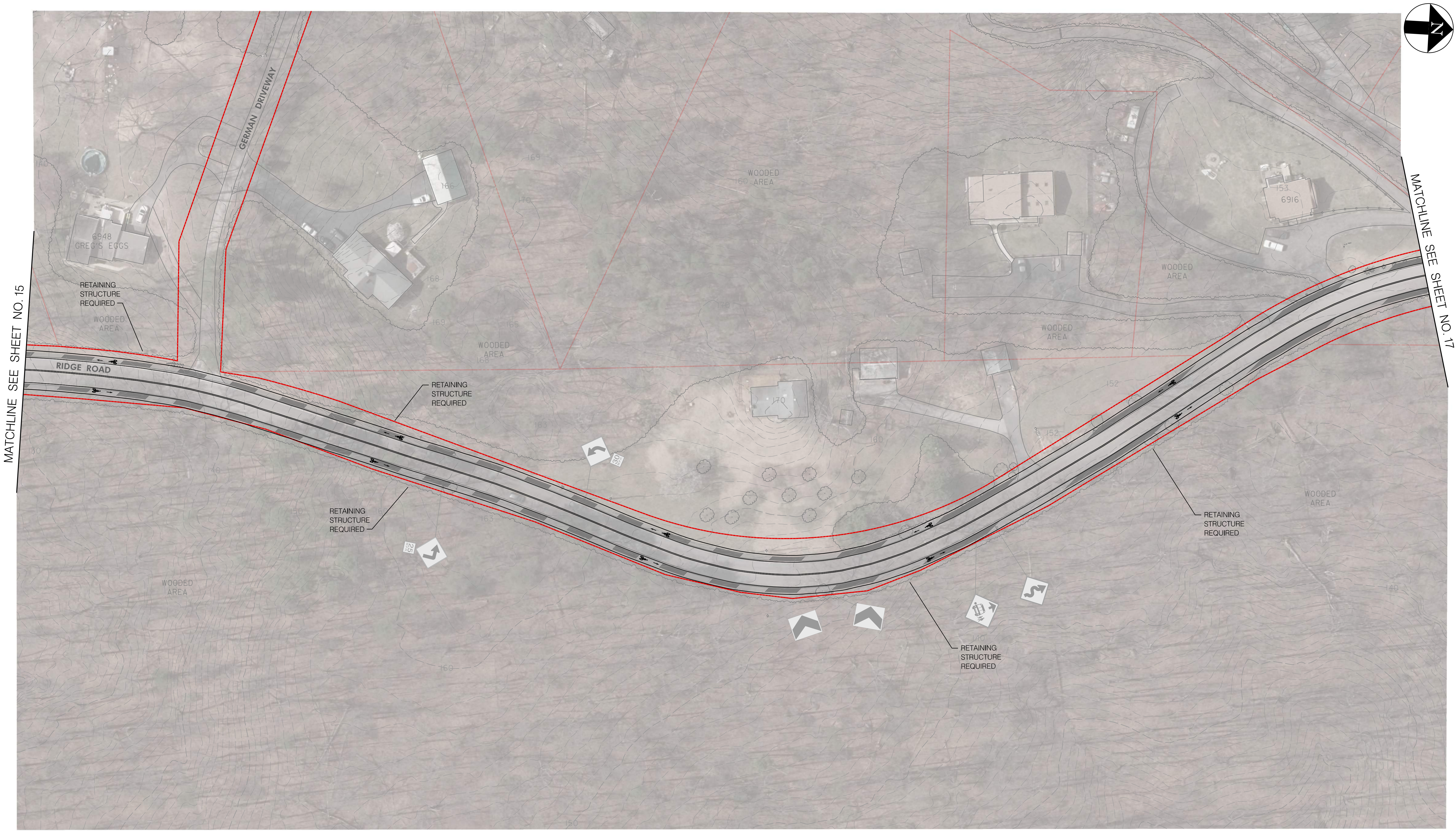
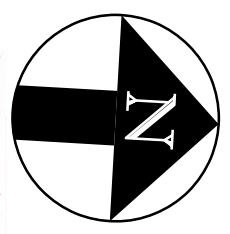
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OPERATOR02430 - PLOTTED: 6/4/2024  
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# Ridge Road Proposed Bicycle Facilities: Ultimate Build Out





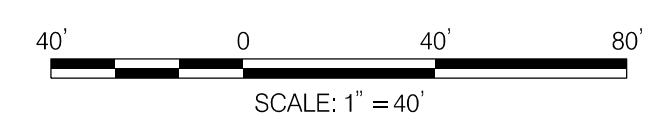
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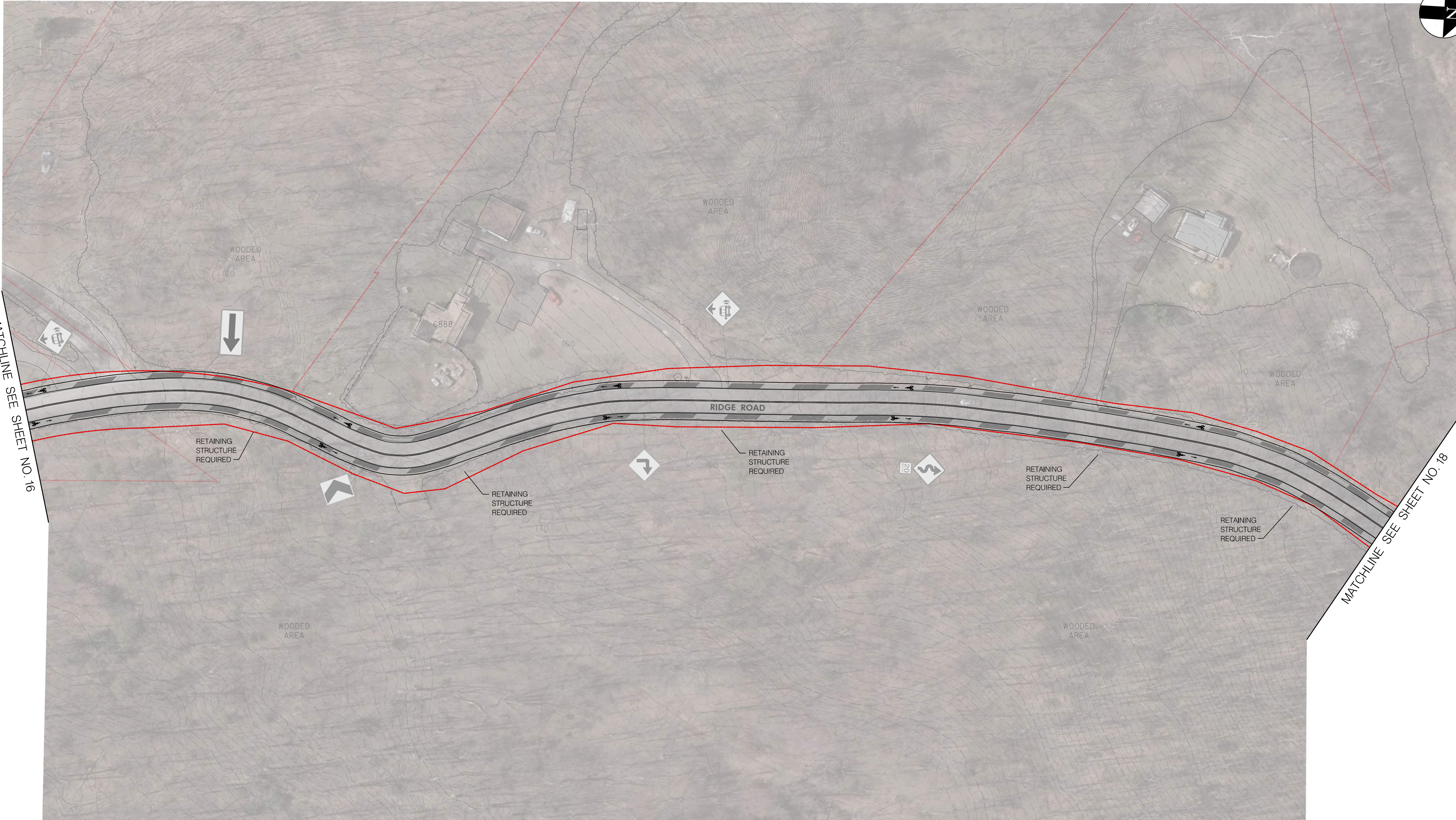
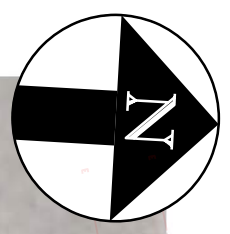
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# Ridge Road Proposed Bicycle Facilities: Ultimate Build Out







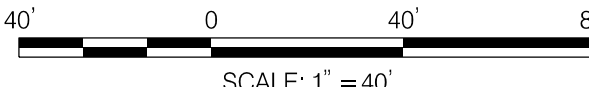
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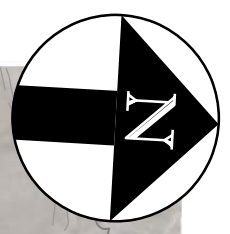
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OPERATOR02430 - PLOTTED: 1/11/2024  
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# Ridge Road Proposed Bicycle Facilities: Ultimate Build Out

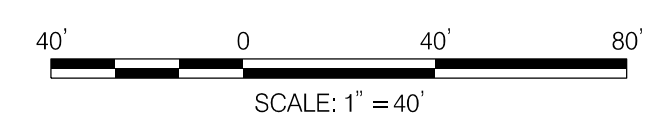


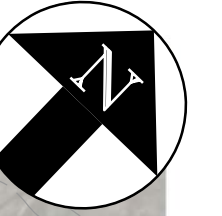


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# Ridge Road Proposed Bicycle Facilities: Ultimate Build Out

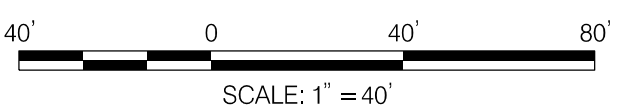




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Ridge Road Proposed Bicycle Facilities: Ultimate Build Out



## **Appendix B: Detailed Cost Estimate**

**Assumptions Based on Staff Discussions:**

1. North of MD-295, scenic and historic designation: 4' bike lane / shoulder only on each side. BMC trail study obviates need for parallel sidewalk.
2. South of MD 295 to Hanover Road: Functional Classification is Collector and will be designed per Orange Notice
3. South of Hanover, functional classification is Minor Arterial and will be designed per Orange Notice

Item name	Units	Unit Cost	North of MD 295		Hanover to MD 295		Dorsey Rd to Hanover	
			historic/scenic 5000LF		Collector (closed) 6000 LF		Minor Arterial (closed) 9500 LF	
			Quantity	Cost	Quantity	Cost	Quantity	Cost
<b>Category 1 Preliminary</b>								
% of Cat 2, 4, 5, & 6 General	%		8%	\$129,242	8%	\$145,645	8%	\$179,641
Maintenance of Traffic (% of Cat 2 through 8)	%		3%	\$92,029	3%	\$69,937	3%	\$85,423
Mobilization (% of Cat 1 through 8 except Mobilization)	%		5%	\$164,444	5%	\$127,341	5%	\$155,625
<b>Category 2 Grading/Earthwork</b>								
Excavation	CY	\$60.00	711	\$42,667	1,259	\$75,556	1,593	\$95,556
Hard Surface Excavation	CY	\$65.00	0	\$0				
Borrow	CY	\$45.00	20,859	\$938,667				
Milling of Existing Pavement	SY	\$13.00	12,222	\$158,889	14667	\$190,667	22000	\$286,000
<b>Category 3 Drainage</b>								
Culverts and outfalls	EA	\$20,000	4	\$80,000	3	\$60,000	2	\$40,000
Bioretention	SY	\$500	0	\$0	100	\$50,000	200	\$100,000
% of Cat 2, 4, 5, & 6	%		5%	\$80,777	5%	\$77,028	5%	\$107,276
<b>Category 4 Structures</b>								
Full Depth Retaining Wall 8' above grade	SF	\$250	4,800	\$1,200,000				
Inlets and storm sewer piping	LS				1	\$50,000	1	\$100,000
<b>Category 5 Paving</b>								
Asphalt Surface 1"	Ton	\$225.00	247	\$55,556	290	\$65,260	265	\$59,722
Asphalt Base 4"	Ton	\$200.00	988	\$197,531	1,160	\$232,037	1,062	\$212,346
Aggregate Base (6")	SY	\$50.00	4,444	\$222,222	5221	\$261,042	4778	\$238,889
<b>Category 6 Shoulders</b>								
Sidewalk	SF	\$9.00	0	\$0	44000	\$396,000	77000	\$693,000
Curb and gutter	LF	\$40.00			8000	\$320,000	14000	\$560,000
10' asphalt side path	LF	\$100.00			2800	\$280,000	1000	\$100,000
<b>Category 7 Roadside (Landscape Beautification)</b>								
Percentage of Cat 2, 4, 5, & 6	%		2%	\$56,311	8%	\$149,645	8%	\$187,641
<b>Category 8 Traffic</b>								
Signage	LS	VAR		\$5,000	1	\$8,000	1	\$13,000
Markings	LF	\$6	5,000	\$30,000	6000	\$36,000	9000	\$54,000
Lighting	LS	VAR						
Actuated sign systems	EA	\$10,000.00		\$0	8	\$80,000		
Traffic signal at Hanover Rd (future)	LS	\$300,000.00			1	\$300,000		
<b>Category 8 Utilities</b>								
Utility Pole Relocations	EA	\$85,000.00	0	\$0	12	\$1,020,000	24	\$2,040,000
New Guy pole	EA	\$5,000.00						
Guy pole relocation	EA	\$5,000.00						
Fire Hydrant Relocation	EA	\$10,000.00	0	\$0	2	\$20,000	7	\$70,000
<b>Summary</b>								
Sub-total items				\$3,453,333		\$4,014,157		\$5,378,117
Contingency		20%		\$690,667		\$802,831		\$1,075,623
<b>CONCEPTUAL ESTIMATE OF CONSTRUCTION COST</b>				<b>\$4,144,000</b>		<b>\$4,817,000</b>		<b>\$6,454,000</b>
<b>NOT INCLUDED:</b>								
<i>Right of way</i>	<i>SF</i>	<i>\$20</i>	12000	\$240,000	60000	\$1,200,000	17200	\$344,000
<i>Perpetual Easements</i>	<i>% of fee</i>	<i>50%</i>						
<i>Temporary Easements</i>	<i>% of fee</i>	<i>10%</i>						
<i>Design and Construction Administration</i>	<i>% of fee</i>	<i>20%</i>		\$690,667		\$798,831		\$1,061,623
<b>CONCEPTUAL ESTIMATE OF TOTAL COSTS</b>				<b>\$5,075,000</b>		<b>\$6,816,000</b>		<b>\$7,860,000</b>

Notes: 3:1 slope for widened roadway to the west to accommodate two 4' bike lanes: 4400 LF. Regrade at 3:1 slope. Exception is where Furnace Ace is adjacent to Deep Run, where cutting to the east is required: 600 LF.  
No new sidewalk required.  
No Turn Lanes warranted.

Notes: 5' bike lanes and 5' sidewalk and 4' utility strip; curb and gutter; 11' travel lanes; no turn lanes warranted (existing turn bays to remain).  
New signal and intersection at Hanover/Ridge Rd.  
From Red Jasper Road north to the Ciena d/w entrance (7031 Ridge Rd), no roadway modifications are required - new Northbound side path behind existing curb.  
From Red Jasper Rd south to Hanover Road, roadway widening is needed for curbside bike lanes

Notes: 5' bike lanes and 5' sidewalk and 4' utility strip; curb and gutter; 11' travel lanes; no turn lanes warranted (existing turn bays to remain).  
Stop control at Ridge Rd/Hanover Extended.  
Minor widening throughout for on-road bike lanes.  
Between New Ridge Road and Dorsey Road, a 1000-ft side path is presumed in lieu of curbside bike lanes - this path will tie in to the path being designed along Dorsey Road.

Note: all costs are in current year dollars