

# Preliminary Engineering Assessment

Ridge Road  
Complete Street  
October 2024  
REVISED: August 2025

Prepared For  
**Town of Munster**

Prepared By



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## **PURPOSE OF REPORT**

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The purpose of this report is to document the engineering assessment of project development including all coordination that has been completed in preparation for this roadway enhancement project. This document outlines the proposal and is intended to serve as a guide for subsequent design, environmental, right-of-way, and other project activities leading to construction. All alternatives identified in this document are pre-decisional, pending the outcome of community feedback, traffic studies, and environmental studies.

## **PROJECT LOCATION**

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The project is located on Ridge Road from State Line Road to Columbia Avenue and is approximately 1.35 miles in length. A location map is included in Appendix A.

The project is located completely within Section 24 and 19, Township 36 North, Range 10 West in Munster, North Township, Lake County, Indiana.

## **PROJECT NEED AND PURPOSE**

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The need for this project is based on the lack of viable non-motorized connectivity to the Munster Downtown core and high crash frequency along the Ridge Road corridor. This project is needed to help make Ridge Road more accessible for all users and to help foster growth and development as indicated in the Munster Calumet-Ridge Streetscape Plan Report. Additionally, this project is needed to specifically provide increased mobility and connectivity to the Monon Trail and the Munster Ridge Station of the Northern Indiana Commuter Transportation District (NICTD) West Lake Corridor, currently under construction at the time of this report, within the project limits near Manor Avenue.

The purpose of this project is to increase pedestrian and vehicular safety along Ridge Road through the town of Munster by improving roadway, pedestrian and bicycle infrastructure in a manner conducive to complete streets design guidelines within the project limits. The project will provide a safer roadway for all users, regardless of mode, and provide increased viability for non-motorized access to the new NICTD Munster Ridge Station.

## **EXISTING FACILITY**

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### **ROADWAY**

The existing roadway facility is classified as an Urban Minor Arterial from State Line Road to Calumet Avenue. It is classified as an Urban Principal Arterial from Calumet Avenue to Columbia Avenue. The posted speed limit within the project limits is 35 mph. The existing cross section of Ridge Road generally consists of two 11-foot-wide travel lanes in each direction separated by a two-way left turn lane (TWLTL) in the middle, with a combined curb and gutter on the outsides of the travel lanes. Behind the curbs is a paved variable width utility buffer and a 6' sidewalk on the outside of both sides of the corridor. The vertical profile is level, and the horizontal alignment is tangent consisting of slight no-curve deflections. Table 1 shows the existing roadway information for Ridge Road. The existing roadway cross section is shown in Appendix B.

**Table 1: Existing Roadway Information for Ridge Road**

<b>Geometric Criteria</b>			
<b>Posted Speed</b>	35 MPH	<b>Functional Class</b>	Arterial
<b>Design Criteria</b>	3R, Non-Freeway	<b>Rural/Urban</b>	Urban
<b>Terrain</b>	Level	<b>Access Control</b>	None
<b>Cross Section</b>			
<b>IDM Figure Reference</b>	IDM 55-3F Subcategory Built-Up		
<b>Travel Lane Count</b>	4	<b>Travel Lane Width</b>	11' (Existing)
<b>Median Width</b>	11' TWLTL (Existing)	<b>Curb Offset</b>	1' (Existing)
<b>Sidewalk Width</b>	5'-6' (Typ. each side)		
<b>Alignment</b>			
<b>Horizontal</b>	Tangent	<b>Vertical</b>	Level
Ridge Road in this section is not on the NHS or the NTN			

There are several minor road stop-controlled public roadway approaches from the north and south; State Line Road, Forest Avenue, Meadow Lane, Highland Place, Jackson Avenue, Monroe Avenue, Tapper Avenue, Municipal Drive, Howard Avenue, and Kooy Drive. There are also several roadways that cross Ridge Road at signalized intersections including Hohman Avenue, Manor Avenue, Harrison Avenue (West Leg and East Leg), Calumet Avenue, and Columbia Avenue.

**PEDESTRIAN INFRASTRUCTURE**

The existing sidewalks and curb ramps are in fair condition. Some sidewalk panels are cracked and in need of replacement. Some sidewalk transitions and curb ramps do not appear to meet PROWAG requirements for running space and cross slope and need to be replaced.

There are existing on-road bike lanes north of Ridge Road along Broadmoor Avenue and south of Ridge Road along Briar Lane. The two existing bike lanes are both connected to the Monon Trail. There is a demand for increased pedestrian and bicycle access along Ridge Road to help mitigate potentially increased traffic due to the new NICTD station.

**DRAINAGE**

The existing roadway drains to a network of storm-sewer inlets and manholes along Ridge Road. In general, the collected storm water outlets to the north into the Little Calumet River. The storm water leaves the project limits at several different outfall points.

## TRAFFIC DATA

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Intersection turning movement counts (TMCs) were conducted in June 2023 at the following intersections to identify existing traffic volumes:

- Ridge Road & Hohman Avenue
- Ridge Road & Manor Avenue
- Ridge Road & Harrison Avenue (West)
- Ridge Road & Harrison Avenue (East)
- Ridge Road & Jackson Avenue
- Ridge Road & Calumet Avenue
- Ridge Road & Columbia Avenue
- Broadmoor Avenue & Hohman Avenue
- Broadmoor Avenue & Manor Avenue
- Broadmoor Avenue & Calumet Avenue
- Broadmoor Avenue & Columbia Avenue

Counts were performed during the weekday morning and weekday evening peak periods (6:00-9:00AM and 3:00-6:00PM, respectively) to coincide with the typical periods of peak commuter activity. Based on the count data, the observed peak hour occurred from 8:00-9:00AM and from 4:30-5:30 PM during the weekday morning and weekday evening, respectively.

Traffic counts for this project were completed shortly before lane closures began on Ridge Road as part of the Northern Indiana Commuter Transportation District (NICTD) West Lake Corridor project to establish commuter rail stations in Munster and other nearby communities. Existing counts were therefore adjusted to account for schools not being in session during the data collection efforts. Adjustment factors were calculated by comparing field counts to October 2021 Average Daily Traffic (ADT) counts provided on the Indiana Department of Transportation (INDOT) Traffic Count Database System (TCDS) website. The resulting factors were applied to existing peak hour volumes. Additional adjustments at the intersection of Ridge Road and Manor Avenue were incorporated based on historical 2020 TMCs to account for the construction closure of Manor Avenue north of Ridge Road during data collection.

In addition to the TMC's listed above, mechanical volume counts were taken at two locations within the project area to establish baseline traffic volumes. There were counters placed between Hohman Avenue and Meadow Lane to pick up data for traffic volumes west of Calumet Avenue and counters placed just west of Columbia Avenue to pick up data for traffic volumes east of Calumet Avenue.

The resulting traffic volumes formed the basis for existing conditions capacity analysis. Capacity analysis was performed during the morning and evening weekday peak hours using Synchro 11 and SimTraffic capacity analysis software. The results of these analyses are summarized in the Level of Service (LOS) tables provided in Appendix D. Table 2 shows the annual daily traffic (ADT) for the count year (2023) for the existing configuration, and design year (2041) projected approximations for each alternative design. Refer to the "Project Alternatives" section of this document for additional information.

Table 2: Traffic Data

Ridge Road Segment	ADT		
	Existing (2023)	Alt 1 (2041)	Alt 2 (2041)
State Line to Calumet Ave.	20,680	20,790	22,790
Calumet Ave. to Columbia Ave.	19,100	18,200	20,100

## CRASH DATA

The original crash data and analysis was performed during the initial study phase for the Munster Calumet Ridge Streetscape Plan Report. The crash data was filtered and reviewed for crashes that occurred on Ridge Road or within approximately 500 feet of Ridge Road along the north/south approach street for the five-year period between 2016 and 2020. In that period, 619 total crashes were reported. One crash in 2020 (0.2 crashes per year) resulted in a fatality. 81 total crashes (16.2 crashes per year), involving at least 124 individuals, were reported. 537 total crashes (107.4 crashes per year) were reported as non-serious injury or property damage only. 6 total crashes (1.2 crashes per year) were reported involving a vehicle crashing into a bicyclist or pedestrian.

For the purpose of this report and final design additional crash data was requested for the four-year period including 2020 through 2023. The crash data was filtered and reviewed for crashes that occurred on Ridge Rd. or within approximately 500 feet of Ridge Rd. along the north/south approach street. In that period, 435 total crashes were reported. 36 total crashes (9 crashes per year), involving at least 62 individuals were reported. 399 total crashes (99.75 crashes per year) were reported as non-serious injury or property damage only. 11 total crashes (2.75 crashes per year) were reported involving a vehicle crashing into a bicyclist or pedestrian.

The updated crash data shows an overall decrease in crashes per year for all categories with the exception to those involving bicyclists/pedestrians. This is most likely attributed to less traffic volume on all roadways in 2020 and 2021 due to the COVID 19 pandemic.

Per the request of FHWA, safety modeling utilizing the Interactive Safety Design Model (IHSDM) program was utilized to compare crash projections between alternatives. Refer to the Safety Analysis section of this report for additional information.

## PUBLIC SAFETY STAKEHOLDER COORDINATION

One of the major points of emphasis for the Town for this project was to make sure that the public safety officials and emergency response personnel were included in the development of any design alternatives. Therefore, public safety coordination meetings were conducted by the project team at 10am and 1pm on October 13, 2023, to discuss existing concerns and future needs for the Ridge Road corridor through the Town of Munster. Members from the Munster Fire Department, Munster Police Department, MABAS 24 (Lansing Fire Department), Lansing Village, Franciscan Health Munster / Dyer, Superior Ambulance, and the Community Foundation of Northwest Indiana participated in these meetings. The minutes from this meeting are attached to this document as Appendix H. The most significant design related items resulting from this meeting were to not allow for a landscape median to reduce emergency

response time, add traffic signal preemption, evaluate intersection geometry to assist with turning movements.

## **PROJECT ALTERNATIVES**

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The initial project scoping completed by the Town of Munster provided a preliminary alternative (Alternative 1) to reduce the travel lanes on Ridge Road from five lanes to three lanes. Preliminary studies were conducted by the Town with the results documented in the Munster Calumet-Ridge Streetscape Plan Report. Additional traffic analysis, crash analysis, and public involvement was then conducted with the resultant data utilized for the Town of Munster's RAISE Grant application, which the Town ultimately received and is the primary funding source for this project.

Due to the timing of the traffic data utilized for the Grant application occurring during the reduced traffic timeframe of the COVID pandemic, the scope of services for the design of this project was negotiated to include an updated traffic analysis, review of the actual roadway capacity, public involvement, and the comparison of additional alternative designs. Following the notification of award for the RAISE Grant, members of the Town Council reported that many Town of Munster residents expressed concerns regarding lane reductions along Ridge Road and the Munster Town Council acted in support of those residents and requested an alternative design that did not reduce the vehicular capacity of Ridge Road, while still improving the safety along the corridor. The primary concern for reduced travel lanes was due to the frequency of the adjacent I-80/94 (Borman Expressway) traffic issues diverting traffic to Ridge Road and the ease of operation for emergency vehicles. While this is not the official state detour during construction activities, it is the most logical detour for residents who know the area and often the route that mobile mapping services direct traffic for faster routing options. Due to these public concerns and at the request of the Town Council, a secondary alternative (Alternative 2) not reducing the through roadway capacity was developed and analyzed in this report.

The following is a summary of the three alternatives being considered. Alternative 1 is the alternative as defined in the RAISE Grant application. Alternative 2 is the modified 5-lane alternative with safety improvements. Alternative 3 is the "Do-nothing" alternative. Preliminary layouts for each of the alternative designs are provided in Appendix F. Each alternative includes design considerations for eliminating the traffic signal at the west Harrison Avenue approach to Ridge Road. This modification is crucial to the flow of traffic through this area due to the proximity of three traffic signals within approximately 650' in the existing condition.

Final design will be completed utilizing the current Indiana Department of Transportation (INDOT) Standards and Specifications where applicable. Local ordinances shall override INDOT Standards if deemed necessary. In addition, final design will be completed with focus on the FHWA Safe Systems Approach and various guidelines for Complete Streets design. Minimum lane widths, per FHWA guidance and INDOT design standards, is 10' for urban arterial streets. Refer to Appendix C for the INDOT Design Criteria used with this project.

### **ALTERNATIVE 1: 3-LANE SECTION**

Alternative 1 is the preliminary design evaluated with the Munster Calumet-Ridge Streetscape Plan Report. This alternative focuses on laying out the roadway to meet the maximum capacity needs throughout the corridor by reducing the vehicular roadway width as much as possible. The available capacity of the roadway through the traffic modeling process allowed for most of the corridor to be reduced from a 5-lane section to a 3-lane section. One exception to this will be at the Calumet Avenue

intersection, where a 5-lane section will remain to accommodate the traffic volumes through each leg of the intersection.

The proposed cross section consists of one 12' lane in each direction with dedicated left turn lanes for public road approaches. A priority for this alternative is to modify private drive access to reduce the number of crash conflict points along the corridor and includes the addition of an off-road, multi-use path on the south side of the road. Traffic signals will be replaced and modernized at each of the signalized intersections. The sidewalk will be upgraded to be PROWAG compliant, and the lighting will be replaced to match the Town standard/preferred lights.

This alternative provides a significant improvement of separation from vehicular traffic and pedestrian traffic allowing for significant opportunities for trees, and other landscaping, and placemaking. In terms of safety, Alternative 1 provides the highest potential for safety improvements for non-motorized vehicles due to maximum reduction in pedestrian crossing lengths, and higher potential for reduction in right-angle crashes, that are typically more serious in nature, by reducing the amount of traffic lanes that turning vehicles need to cross, and higher potential for reduction in sideswipe crashes due to decrease in lane changing movements. The potential for head-on collisions will be reduced by better defining the center turn lane and access points along the project length.

While the traffic analysis does show a result that there is available capacity to reduce the number of lanes within the project limit, it doesn't account for decades of consistent construction, with significant planned construction activities on I-80/94, which runs generally parallel to Ridge Road, approximately 1-mile to the north. In addition to increased traffic utilizing Ridge Road during construction activities, traffic often utilizes Ridge Road as a detour when accidents occur on I-80/94. While Ridge Road is not a state route and therefore is not an official construction detour, it is the most logical route for local users and often the route that online mapping services will redirect traffic. These common occurrences are not accounted for in the traffic analysis. Additionally, community emergency response personnel have expressed concern for an increase in response times due to the reduction in available space to maneuver. There has been additional concern for this issue since the RAISE Grant application due to the closure of the Franciscan Health Hammond hospital in late 2022, rerouting additional ambulance traffic to the Community Hospital and the Franciscan Health Munster hospitals located in the Town of Munster.

This alternative achieves elements in each of the 4 hierarchies (remove severe conflicts, reduce vehicle speeds, manage conflicts in time, and increase attentiveness and awareness) defined by the FHWA Safe Systems Roadway Design. Removal of severe conflicts is achieved by better defining crossings and turning movements along the corridor by private drives being reduced or revised to be right-in/right-out controlled by splitter medians or center medians. Reduction in vehicle speeds is achieved by reducing the number of vehicular lanes. The management of conflicts in time is achieved by upgrading the traffic signals to current accessibility standards and adding signal preemption for emergency vehicles. Pedestrian activated mid-block crossing in segments with long distance between traffic signals will be considered in the design. Increased attentiveness and awareness is achieved by improving crossing visibility with new crosswalk markings and signing and upgrading the signals head with backplates with retroreflective borders.

Due to Alternative 1 not meeting the needs of the local emergency response personnel and the community as expressed through the Town Council and Town of Munster residents, it is not recommended to proceed with Alternative 1 through the environmental approval process and ultimate final design for construction.

## **ALTERNATIVE 2: MODIFIED EXISTING ROADWAY CROSS-SECTION**

Alternative 2 is the response to the community concerns relayed by the Town Council regarding lane eliminations along Ridge Road through the Town of Munster. The existing 5-lane section is modified to keep the same quantity of lanes but reduce lane widths in order to provide space in the right-of-way to improve pedestrian and bicycle access along Ridge Road.

This alternative focuses on maintaining the existing available through lane capacity of the roadway at two lanes in each direction. Changes for this alternative from existing condition within the curb lines include reducing lane width to from 11' to 10' and providing dedicated left turn lanes with the potential for traversable painted center medians where applicable to assist with access control and reduction in potential crash conflict points. The sidewalks will be upgraded to be PROWAG compliant, and the lighting will be replaced to match the Town's standard/preferred lights and includes the addition of an off-road, multi-use path on the south side of the road. The reduction in lane width allows design to include all pedestrian elements provided in Alternative 1, while still maintaining construction inside the 80' right-of-way.

This Alternative will allow for similar separation from vehicular traffic and pedestrian/bicyclist. The design does allow for space on the south side of Ridge Road for street trees to be planted, but fewer opportunities for additional landscaping and placemaking. In terms of safety, Alternative 2 will reduce the pedestrian crossing widths at signalized intersections, provide potential for a reduction in right-angle crash conflict points through the use of traversable painted center medians for driveway access control, and provide better defined access along the corridor to help mitigate the potential for sideswipes and head-on collisions.

This alternative achieves elements in each of the 4 hierarchies (remove severe conflicts, reduce vehicle speeds, manage conflicts in time, and increase attentiveness and awareness) defined by the FHWA Safe Systems Roadway Design. Removal of severe conflicts is achieved by better defining crossings and turning movements along the corridor by private drives being reduced or revised to be right-in/right-out controlled by splitter medians or center medians. Reduction in vehicle speeds is achieved by reducing the vehicular lane widths and trees along the roadway which helps to reduce the speed. Also permanent speed feedback signs or monitoring measures will be considered in the design. The management of conflicts in time is achieved by upgrading the traffic signals to current accessibility standards and adding signal preemption for emergency vehicles. Pedestrian activated mid-block crossing in segments with long distance between traffic signals will be considered in the design. Increased attentiveness and awareness is achieved by improving crossing visibility with new crosswalk markings and signing and upgrading the signals head with backplates with retroreflective borders.

While this alternative design does not meet the same level of potential crash point reductions – side swipe crashes from lane diversions and additional lanes for crossing movements - as Alternative 1, it does address recent community concerns expressed regarding emergency response and available roadway capacity during frequent traffic detours from I-80/94.

After completing the traffic analysis, preliminary design, cost estimating, evaluation of community impacts, and feedback from Munster residents as reported by the Town Council and presented at public meetings, Alternative 2 is the preliminary preferred Alternative recommended to proceed through the environmental approval process and ultimate final design for construction.

### **ALTERNATIVE 3: DO NOTHING**

If no action is taken, the Ridge Road Corridor will continue to be unsafe for pedestrian and bicycle traffic. The road will fail to provide safe connectivity to destinations along the corridor, such as the NICTD Train Station, the Monon Trail, and the Center for Visual and Performing Arts. The road will continue to alienate pedestrians, bicyclists, public transport users, children, older users, and users with disabilities.

It is not recommended to proceed with Alternative 3 because it does not address the need and purpose of this project.

### **MAINTENANCE OF TRAFFIC CONCEPT**

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The intent for maintenance of traffic for Alternative 1 or 2 is to keep the roadway open during construction. Alternative 1 will have a larger impact on traffic operations during construction. Multiple sub-phases of work are required through signalized intersections to maintain turning movements due to curb lines being relocated to reduce the overall roadway width. It is also likely that there may be defined duration one-way only traffic sub phasing needed to provide a safe working area. Alternative 2 requires significantly less reduction in roadway width; therefore, maintenance of traffic would be simpler to maintain one-lane of traffic in each direction utilizing the existing lanes while allowing consistent left-turns throughout construction without the need for extensive sub phasing operations.

Because this corridor is an artery for businesses in the Town of Munster, all businesses will be provided with access during construction in any design alternative.

### **TRAFFIC ANALYSIS**

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#### **FUTURE TRAFFIC VOLUME PROJECTIONS**

To evaluate future intersection operations, traffic volumes were forecasted for a "Build-plus-fifteen" design year. With the expectation that the proposed project would be completed by Year 2026, a Year 2041 design year was utilized. Future traffic forecasting was based on two main factors: changes in background traffic and trips generated by background developments.

In order to estimate future changes in background traffic for the Year 2041 design horizon, Year 2050 ADT projections were obtained from the Northwest Indiana Regional Planning Commission (NIRPC) for the major study roadways. Several background conditions that are expected to influence regional travel patterns and mode choice were incorporated into baseline future projections, including:

- The South Shore Line Double Track project
- The West Lake Corridor project
- Expected population changes in the area

For the purposes of the traffic analysis, two geometric alternatives were considered for Ridge Road: a three-lane cross-section (Alternative 1) and a five-lane cross-section (Alternative 2). Year 2050 ADT projections were provided by NIRPC for both alternatives on Ridge Road, and these future ADTs were used to derive compounded annual growth rates for each study roadway under each alternative. Those rates were applied to existing volumes to develop Year 2041 peak hour projections.

To accompany the new Ridge Road commuter rail station being built under the West Lake Corridor project, the Northwest Indiana Regional Development Authority (RDA) has established a Transit Development District (TDD) to incentivize the construction of high-quality Transit-Oriented Development (TOD) within the station area. The RDA led a study that identified future development concepts within the vicinity of the Ridge Road rail station and, therefore, within the traffic analysis study boundaries. Guided by these development parameters for the near-term and mid-term future (within 10 years), additional vehicle trips generated by area TODs were calculated based on the Institute of Transportation Engineers (ITE) manual Trip Generation, 11<sup>th</sup> Edition, and assigned to the study intersections.

Changes in background traffic and expected development traffic as described in the preceding section were added to existing traffic volumes to estimate Year 2041 traffic projections for Alternatives 1 and 2.

### **FUTURE MODIFICATIONS**

As a baseline for Year 2041 capacity analyses, several infrastructure modifications were established. On Ridge Road between Hohman Avenue and Columbia Avenue, the posted speed limit was assumed to be lowered from 35 MPH to 30 MPH for improved safety. Additionally, signal warrant analyses of the Ridge Road/Harrison Avenue (West) intersection revealed that existing traffic volumes do not meet warrant criteria in the Manual on Uniform Traffic Control Devices (MUTCD) Warrant 2 (4-Hour Vehicular Volume). It was therefore assumed that this intersection would operate under minor-leg stop control in the future, with southbound left-turn movements prohibited. Furthermore, it was assumed that the existing private driveway that aligns opposite Harrison Avenue (West) would be removed in the future as part of TOD investment envisioned by the RDA; it is recommended that the subject parcel be oriented with primary access to Harrison Avenue (East) instead of Ridge Road.

Several dedicated turn lanes were also assumed to be removed as part of this project due to insufficient volume to meet INDOT warrant criteria and adequate traffic operation with their removal. These include the northbound and southbound right-turn lanes at Broadmoor/Hohman and the southbound right-turn lane at Ridge/Hohman. At Ridge/Columbia, a northbound right-turn lane was added per INDOT turn lane warrant criteria and to provide acceptable operation on this approach under future conditions. Throughout the study area, signal timing and phasing were updated in each future alternative to optimize projected operations and traffic progression along the corridor.

For the purposes of Year 2041 capacity analyses, the geometric differences between Alternative 1 and Alternative 2 are as follows:

- Under Alternative 1, Ridge Road was analyzed with a single through lane in each direction (with shared right-turn movements) at its intersections with Hohman Avenue, Manor Avenue, Harrison Avenue (West), Harrison Avenue (East), and Jackson Avenue. Ridge Road was assumed to remain at a five-lane cross-section at Calumet Avenue and at Columbia Avenue, though a three-lane cross-section may be feasible for the segment of Ridge Road between these two cross streets.
- Under Alternative 2, Ridge Road was assumed to maintain two travel lanes in each direction throughout the study area. At the intersection of Ridge Road and Manor Avenue, the northbound left-turn lane (which is not required for sufficient traffic operation) was assumed to be removed to achieve symmetry with the opposite approach.

Alternative 1 and Alternative 2 were each analyzed using Synchro capacity analysis software. The Level of Service (LOS) results are attached.

As shown, under either scenario, the projected volume to capacity (v/c) ratio on Ridge Road between Hohman Avenue and Jackson Avenue is not expected to exceed a value of 0.81 and 0.70 under Alternative 1 and Alternative 2, respectively. From the Federal Highway Administration (FHWA) [Signalized Intersections: Informational Guide](#): "The v/c ratio, also referred to as degree of saturation, represents the sufficiency of an intersection to accommodate the vehicular demand. A v/c ratio less than 0.85 generally indicates that adequate capacity is available, and vehicles are not expected to experience significant queues and delays. For design purposes, a v/c ratio between 0.85 and 0.95 generally is used for the peak hour of the horizon year."

Additionally, no 95<sup>th</sup> percentile queue is projected to exceed the recommended storage capacity or result in spillback into adjacent signalized intersections.

## **SAFETY AND CRASH PREDICTION ANALYSIS**

### **INTERACTIVE SAFETY DESIGN MODEL**

Per the request of FHWA, safety modeling utilizing the Interactive Safety Design Model (IHSDM) program was utilized to compare crash projections between alternatives. A model was created for the existing condition, Alternative 1, and Alternative 2. A crash projection report was modeled for the 20-year period of 2025 through 2044. Each of those reports can be found in Appendix I. The summary of the outputs for predicted/expected crashes of each alternative design and the baseline existing conditions are summarized below in the tables for total crashes, fatality/serious injury (FI) accidents, and property damage only (PDO) accidents. "Predicted" numbers are computed utilizing the IHSDM internal predictive analysis tools for similar roadway characteristic and "Expected" numbers utilize the actual crash data as documented in the Crash Data section of this report for the four-year period of 2020 through 2023 to complete the predictive analysis.

### **IHSDM OUTPUT FOR PREDICTED/EXPECTED TOTAL CRASHES ON RIDGE ROAD (2025-2044)**

*Comparison of Existing to Each Alternative Design*

	Existing	
	Total Crashes	Crashes/Yr
Predicted	1194.19	59.7095
Expected	1943.57	97.1785

	Alt 1				
	Total Crashes	Δ Total Crashes	Crashes/Yr	Δ Crashes/Yr	% Δ
Predicted	990.46	-203.73	49.52	-10.19	-17.06%
Expected	1751.47	-192.10	87.57	-9.61	-9.88%

	Alt 2				
	Total Crashes	Δ Total Crashes	Crashes/Yr	Δ Crashes/Yr	% Δ
Predicted	1032.68	-161.51	51.63	-8.08	-13.52%
Expected	1651.40	-292.17	82.57	-14.61	-15.03%

**IHSDM OUTPUT FOR PREDICTED/EXPECTED PDO CRASHES ON RIDGE ROAD (2025-2044)**

*Comparison of Existing to Each Alternative Design*

Existing		
	Existing	
	PDO Crashes	PDO Crashes/Yr
Predicted	764.87	38.24
Expected	1708.74	85.44

Alt 1					
	PDO Crashes	Δ PDO Crashes	PDO Crashes/Yr	Δ PDO Crashes/Yr	% Δ
Predicted	626.40	-138.47	31.32	-6.92	-18.10%
Expected	1557.80	-150.94	77.89	-7.55	-8.83%

Alt 2					
	PDO Crashes	Δ PDO Crashes	PDO Crashes/Yr	Δ PDO Crashes/Yr	% Δ
Predicted	651.76	-113.11	32.59	-5.66	-14.79%
Expected	1433.65	-275.09	71.68	-13.75	-16.10%

**IHSDM OUTPUT FOR PREDICTED/EXPECTED FI CRASHES ON RIDGE ROAD (2025-2044)**

*Comparison of Existing to Each Alternative Design*

Existing		
	Existing	
	FI Crashes	FI Crashes/Yr
Predicted	429.32	21.47
Expected	234.83	11.74

Alt 1					
	FI Crashes	Δ FI Crashes	FI Crashes/Yr	Δ FI Crashes/Yr	% Δ
Predicted	364.06	-65.26	18.20	-3.26	-15.20%
Expected	193.67	-41.16	9.68	-2.06	-17.53%

Alt 2					
	FI Crashes	Δ FI Crashes	FI Crashes/Yr	Δ FI Crashes/Yr	% Δ
Predicted	380.91	-48.41	19.05	-2.42	-11.28%
Expected	217.75	-17.08	10.89	-0.85	-7.27%

## **SPEEDING COUNTERMEASURES**

The existing traffic data included a speed study which shows that approximately 60% of all vehicles travel at speeds greater than the posted 35 mph speed limit, with greater than 2% traveling at speeds greater than 55 mph.

Alternative 1 utilizes the concept of a road diet to reduce speed. The narrowing of the total roadway width and elimination of the ability to pass other vehicles traveling in the same direction are proven countermeasures to speeding concerns.

Alternative 2 utilizes the concept of reducing lane widths to reduce speed. Per the FHWA Highway Safety Programs guidance for speeding countermeasures, "...speeds may also decrease by on to three mph for each foot that the roadway is narrowed down to 10 feet." Since this is a low-speed urban arterial, the use of lane width reduction is a proven countermeasure to speeding concerns.

The use of traffic control devices will be implemented for speeding countermeasures in each alternative design. Permanent speed feedback signs that display the traveling speed of vehicles will be utilized in the development of the final design. In addition, in August 2024, the Munster Town Council passed a motion to add 6 additional police officers with the primary focus of monitoring speeding in Town, specifically along Ridge Road. Additional enforcement along with the speed feedback signs will aid in deterring excessive speeds along the Ridge Road corridor through Munster.

## **DRAINAGE CONCEPT**

---

The goal of drainage is to reuse as much existing infrastructure as possible is preferred for each alternative while updating the network as necessary.

The drainage concept goal for Ridge Road is to decrease the impervious area. The existing impervious area is 100%. For Alternative 1, there will be more available space to provide landscaping, so the goal is to reduce the impervious area to 75%. For Alternative 2, the goal is reduce the impervious area to 90%.

There are several points where water leaves the project site in the existing condition. It is intended to maintain each of these points and not add stormwater outlets within the project. Each point will be analyzed in the existing and proposed condition to assure that there is no increase to stormwater flow discharge at any point. Stormwater detention and quality will be evaluated in the final design process and coordinated with the Town and Lake County to meet all necessary ordinances or acquire project variances as necessary.

The existing storm sewer consists of inlets on each side of the roadway tying to a conveyance trunk line located under the eastbound lanes (primarily the outside lane).

### **ALTERNATIVE 1 DRAINAGE CONCEPT**

Both the north and south curb lines are completely relocated in this alternative, so all new inlets are required. Due to only one travel lane in each direction adjacent to the new curb lines, the maximum stormwater gutter spread will require an increase in the number of inlets along Ridge Road. Due to the relocation of the south curb line, the existing trunk line will need to be completely replaced. A new trunk line combining flow from the north and south will be constructed with this alternative.

## **ALTERNATIVE 2 DRAINAGE CONCEPT**

It is recommended to replace curb inlets on each side of the roadway with Alternative 2. Evaluation of maintaining and adjusting inlets along the north curb line can be considered in final design. Having two travel lanes in each direction adjacent to the curb line allows for the maximum design gutter spread to utilize one-half of the outside travel lane width. Therefore, inlet spacing will be greater in Alternative 2 than Alternative 1, requiring less total inlet structure and piping. Additionally, reuse of the existing trunk line under the eastbound lanes is possible. A new trunk line under the westbound lanes will be constructed where there is not sufficient capacity available in the existing storm sewer trunk line.

## **LIGHTING CONCEPT**

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For each Alternative, new lighting will be installed that meets Munster's current decorative standard, or the standard that is selected through stakeholder coordination. Along with meeting the decorative standard, new pedestrian lights will be Dark-Sky certified. Dark-Sky certified lights help provide pedestrian safety by directing the luminaire down towards the pavement where the pedestrian is. This helps light the pedestrian access routes while also reducing glare on vehicle operators. An emphasis will be made on improving lighting at intersections and pedestrian crossings. Lighting locations will be chosen to front-light pedestrians relative to traffic.

## **PEDESTRIAN/NON-MOTORIZED VEHICLE CONCEPT**

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For each alternative, curb ramps and sidewalks will be upgraded to meet PROWAG requirements. The minimum existing sidewalk width is 4'. For all alternatives, the sidewalk will be designed to 6' wherever possible. Multi-use paths will be designed to 10' desirable and 8' minimum. The multi-use path will provide a safer option for bicyclists and pedestrians by providing infrastructure dedicated for bicycle and pedestrian use with a buffer with street trees between vehicular traffic and multi-use path.

The cross section of the roadway will be reduced, traffic signals will be modernized and replaced with pedestrian activation and phasing, and hi-visibility crosswalks will be constructed with each alternative.

## **LANDSCAPING/PLACEMAKING CONCEPT**

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The Munster Calumet-Ridge Streetscape Plan Report recommends street trees, placemaking (i.e. gateway structures), wayfinding signage and other hardscape improvements as space allows. It is anticipated that approximately 250 trees can be planted with Alternative 1 or Approximately 120 trees can be planted with Alternative 2.

Alternative 1 allows for more space for placemaking and hardscaping. Gateway alternatives Budgets are established in the Opinion of Probable Construction Costs for each alternative scaled to the space available. Ultimately the street trees will be the only hard item carried until all other design elements are better understood and the known budget for placemaking and hardscaping can be established.

## **ENVIRONMENTAL IMPACTS**

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A Preliminary Red Flag Investigation was completed to identify potential environmental impacts within and reasonably adjacent to the project limits. The Red Flag Investigation is attached to this document

as Appendix E. Based on the findings, a Waters of the U.S. Report and Waterway Permitting are not anticipated to be required with this project.

According to the National Wetlands Inventory (NWI), two wetlands are located within 0.5 miles of the project site but are not expected to be impacted by the construction of this project.

Historic maps show the potential for a cemetery that may have been located at the west end of the project at the Indiana/Illinois state line, within the limits of the Strack & Van Til grocery store. Impacts are not anticipated, but additional research will be completed with the preparation of the environmental document.

There are 4 sites within the project area with coordination requirements for hazardous materials. The conditions and recommendations are noted in the Red Flag Investigation and a map of these sites is included in Appendix E for reference. Specifications will be provided based on final coordination with the environmental document.

Due to the funding source, a cultural resource investigation will need to be completed in compliance with historic preservation laws and regulations – most notably Section 106 of the National Historic Preservation Act and Section 4(f) of the Department of Transportation Act. Preliminary research shows that no impacts to archaeological resources are anticipated and there are two potential eligible historic properties within, or adjacent to, the project limits. One is a farm on the east end of the project [Stallbohm Barn and Kaske House (NR-1333/IHSSI #089-090-56118)] just east of Columbia Avenue, and the other is old Munster Town Hall (IHSSI #089-090-56074) located on the northeast corner of the Ridge Road intersection with Calumet Avenue. Based on the current scope, an adverse effect to either of the properties is anticipated.

## **PERMITS REQUIRED**

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More than one acre will be disturbed as part of this project and will require Construction Stormwater General Permit through the Indiana Department of Environmental Management (IDEM). No other permits are anticipated to be required for this project.

## **RIGHT-OF-WAY IMPACTS**

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Some right-of-way will need to be reacquired as part of this project. The project will be built within the existing 80' right-of-way footprint (40' each side of centerline). Reacquisition of previously constructed "corner cuts" for pedestrian access may also be required. All necessary acquisitions will be handled locally, with local dollars, in advance of construction of this project.

## **RAILROAD IMPACTS**

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There is a Railroad spur supporting the NICTD line near Manor Avenue, west of Calumet Avenue. Coordination with NICTD will be very important for including pedestrian accessibility to the train station and throughout the rest of the Munster Calumet-Ridge Streetscape Plan Report area. For all alternatives, the design will tie into the existing rail system. Preliminary coordination with NICTD has occurred. NICTD has provided their design plans for work within the limits of the Ridge Road project for reference. Coordination with NICTD will continue throughout the final design process.

## UTILITY IMPACTS

Initial Notices regarding the preliminary scope and limits of this project have been shared with the known utilities and schools within the project area. The goal is to design solutions around existing utilities where possible, but some minimal to moderate impacts to utilities are expected on this project. The largest of the impacts are overhead facilities along each side of Ridge Road. Portions of the overhead utility may need to be relocated and/or buried to accommodate the proposed design. The utility relocations for this project are expected to be non-reimbursable and are included in the Opinion of Probable Construction Costs for each alternative.

Utilities that are present within the project limits are AT&T (distribution), BP Pipeline, Comcast, Nipsco Gas, Nipsco Electric, TPE, and US Signal. US Signal early coordination shows that the active lines could potentially be TurnKey's property. TurnKey is an AT&T company.

BP Pipeline has three lines located just east, parallel to Columbia Avenue. AT&T, Comcast, Nipsco Gas, Nipsco Electric, and US Signal have multiple lines along Ridge Road both along the eastbound and westbound lanes.

For Alternative 1, all fire hydrants would need to be relocated closer to the roadway due to the lane reduction. In Alternative 2, the fire hydrants maintain an acceptable distance from the curb line to remain.

## OPINION OF PROBABLE CONSTRUCTION COSTS

The Opinion of Probable Construction Costs for each of the Alternative Designs is as follows:

Alternative 1: \$19,722,000.00

Alternative 2: \$18,890,000.00

The summary of the preliminary Opinion of Probable Construction Costs is provided for comparison between each Alternative design to the estimate that was completed for the RAISE grant application.

Table 3: Summary of Probable Construction Costs

Category	RAISE Grant	Alternative 1	Alternative 2
Demo Costs	\$9,105,295.00	\$996,000.00	\$870,000.00
Roadway Improvements		\$4,950,000.00	\$5,501,000.00
Drainage Improvements		\$4,413,000.00	\$3,632,000.00
Traffic Marking, Signing, and Signals		\$1,210,000.00	\$1,365,000.00
Lighting	\$1,480,000.00	\$1,639,000.00	\$1,639,000.00
Hardscape	\$758,275.00	\$350,000.00	\$350,000.00
Site Furnishings	\$176,000.00	\$100,000.00	\$100,000.00
Gateway and Wayfinding	\$371,000.00	\$200,000.00	\$200,000.00
Trees and Plantings	\$1,571,175.00	\$598,000.00	\$537,000.00
Maint. of Traffic and Mobilization	\$1,495,057.00	\$2,066,000.00	\$1,496,000.00
Utility Relocations	\$3,150,000.00	\$3,200,000.00	\$3,200,000.00
	<b>\$18,106,802.00</b>	<b>\$19,722,000.00</b>	<b>\$18,890,000.00</b>

The costs for Hardscape, Site Furnishings, Gateway & Wayfinding, and portions of the Trees and Planting categories have been set as budgets based on approximating the available budget. These items are essentially part of the contingency budget at this time and the design will be scaled to the appropriate budget available at the time of bidding. An additional 10% contingency has been added to each of the other categories to accommodate changes required with detailed final design. See Appendix J for the preliminary quantities and cost estimate.

It should be noted that the RAISE Grant Application estimate was completed in 2022, and the Alternative Design estimates were completed in 2024. Using a 4% rate of inflation for each year to the anticipated 2026 construction year, the anticipated construction costs are summarized below in Table 4.

Table 4: Projected Construction Year (2026) Construction Costs

Category	RAISE Grant	Alternative 1	Alternative 2
Base Year Estimate (2022 or 2024)	\$ 18,106,802.00	\$ 19,722,000.00	\$ 18,890,000.00
Projected Construction Year (2026) Estimate	\$ 21,183,000.00	\$ 21,332,000.00	\$ 20,432,000.00

When applying the inflation rate to each of the estimates, the costs for each alternative design are reasonably similar. The Alternative design estimates are also reasonably similar to the RAISE Grant established budget once escalated to 2026 dollars. Value engineering will occur prior to the submittal of Final Construction Documents to keep the overall cost in line with the established maximum grant amount.

## RECOMMENDATIONS

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After much discussion with the Town Council, stakeholders and residents, emergency personnel, and the design team, Alternative 2 is the preliminary preferred alternative. The primary focus of the scope of the project was to provide a safer roadway for all users. The IHSDM crash prediction analysis output shows reasonably similar expected crash reductions between the two alternatives with Alternative 2 showing a greater reduction in total crashes per year for the next 20 years. Each alternative provides proven design and enforcement considerations as countermeasures for speeding concerns along the corridor. Additionally, each alternative also includes the addition of an 8'-10' multi-modal pathway to provide a separate safe facility for pedestrians and bicycles along the south side of the roadway for the entire length of the project, and improved traffic signals with LED signals, backplates, and emergency vehicle preemption devices. Each of the alternatives meet the 4 hierarchies of the FHWA Safe Systems Roadway. Therefore, Alternative 2 addresses both the improvement in corridor safety for all users and the desire of the emergency service personnel and community to not restrict the existing capacity of Ridge Road by eliminating lanes through the Town of Munster. Preliminary Design Plans are included with this report as Appendix G.

**CONCURRENCE**

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This document was prepared and reviewed by:  
*Infrastructure Engineering, Inc.*

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Prepared by:



Katelyn Tedder  
Infrastructure Engineering, Inc.  
Project Design Engineer

10/4/2024  
[Date]

Revised: 8/11/2025  
[Date]

Reviewed by:



Dustin Quincy, P.E.  
Infrastructure Engineering, Inc.  
Project Principal

10/4/2024  
[Date]

Revised: 8/11/2025  
[Date]

Reviewed by:  
*Town of Munster*

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\_\_\_\_\_  
Patricia Abbott  
Controller/Interim Town Manager

\_\_\_\_\_  
[Date]

Reviewed by:  
*Federal Highway Administration*

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\_\_\_\_\_  
Abell Gelaye, P.E.  
Design Policy/Geometrics Program Manager  
FHWA-IN – Project Delivery Team

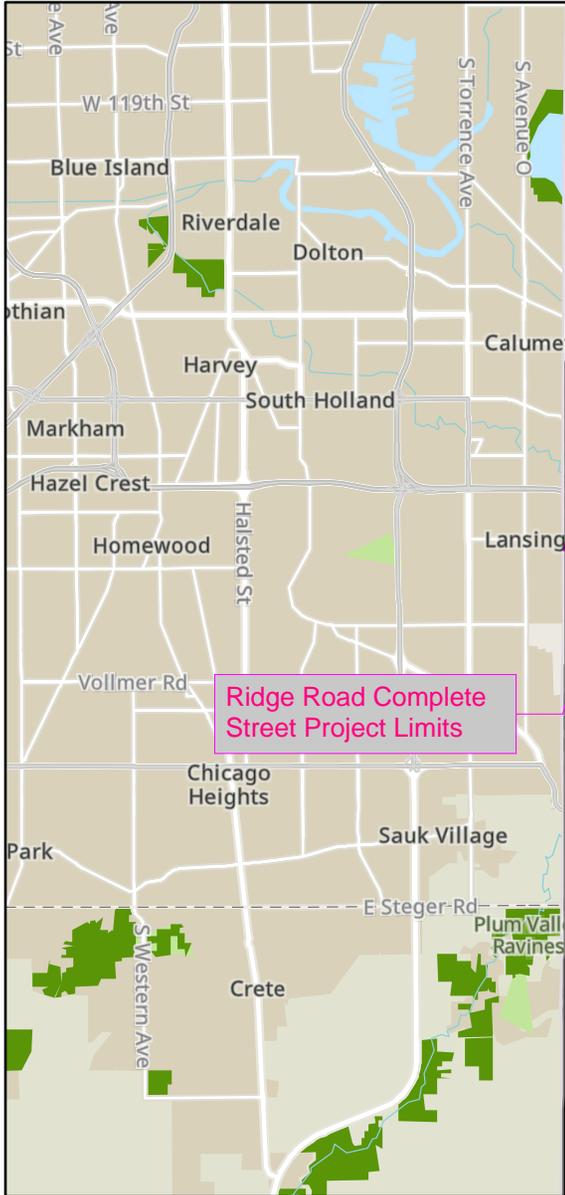
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**APPENDIX A – PROJECT LOCATION MAP**

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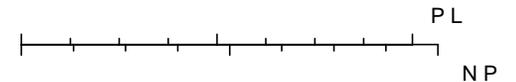
**APPENDIX A**  
**PROJECT LOCATION MAP**

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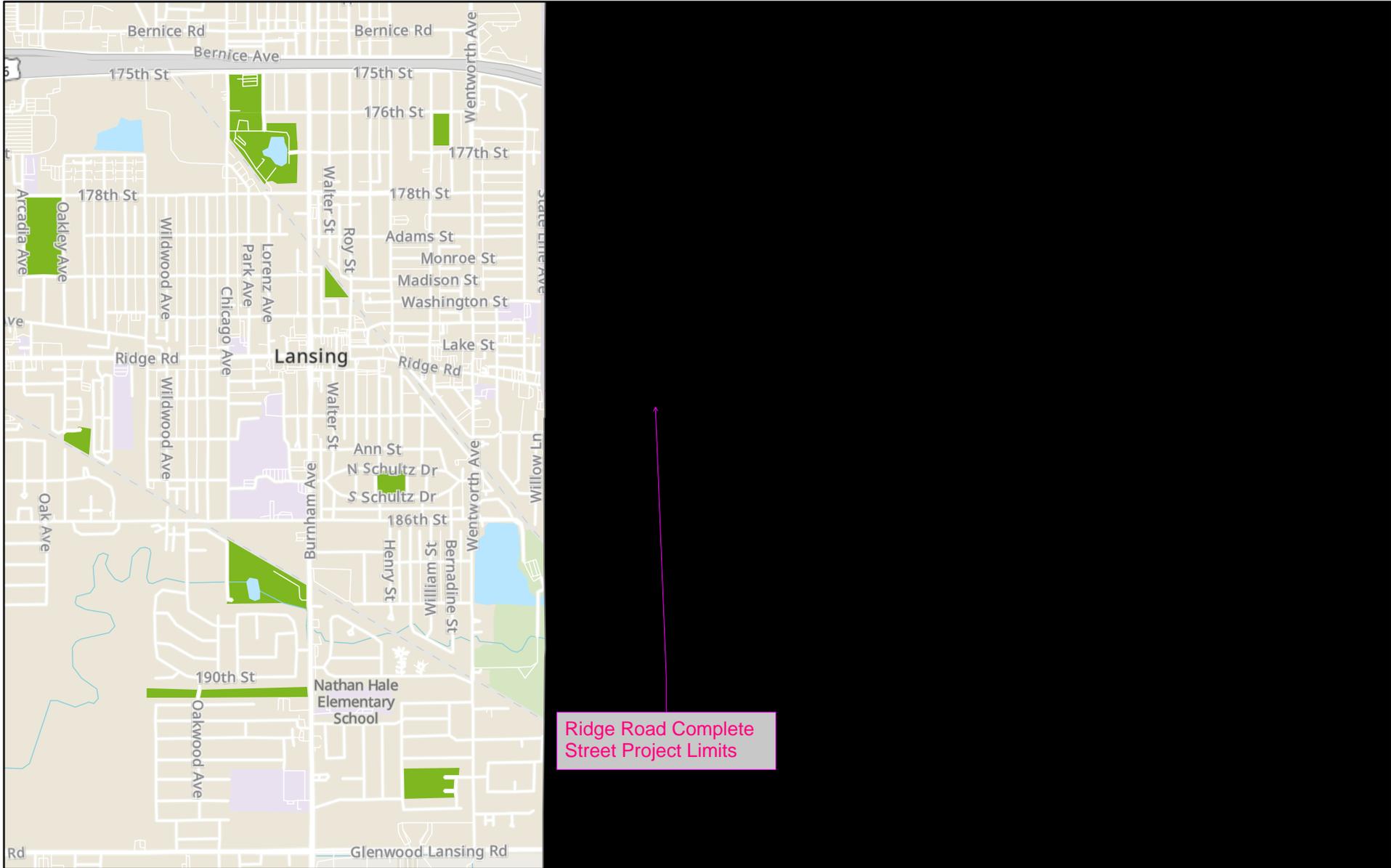
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**APPENDIX A**  
**PROJECT LOCATION MAP**

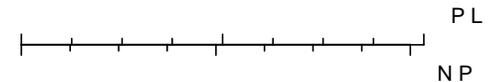
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Ridge Road Complete Street Project Limits

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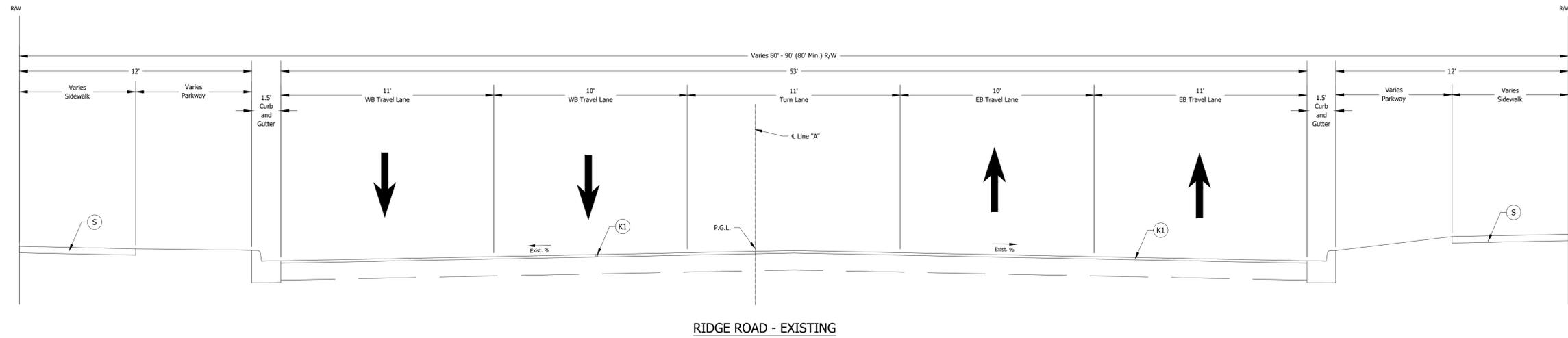
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**APPENDIX B – EXISTING ROAD LAYOUT**

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RIDGE ROAD - EXISTING

RECOMMENDED FOR APPROVAL _____	DESIGN ENGINEER _____	DATE _____
DESIGNED: _____ KRT _____	DRAWN: _____ KRT _____	
CHECKED: _____ APK _____	CHECKED: _____ APK _____	

**TOWN OF MUNSTER**

**APPENDIX B**  
**EXISTING ROAD LAYOUT**

HORIZONTAL SCALE	BRIDGE FILE
1" = 3'	N/A
VERTICAL SCALE	DESIGNATION
N/A	XXXXX
SURVEY BOOK	SHEETS
ELECTRONIC	B1 of B1
CONTRACT	PROJECT
	VALUE

**APPENDIX C – INDOT DESIGN CRITERIA**

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Design Element			Manual Section	Design Values (By Type of Area)			
				Suburban	Intermediate	Built-Up	
Design Controls	Design Forecast Period		55-4.01	20 Years (1)	20 Years (1)	20 Years (1)	
	*Design Speed, mph)(2)		55-4.01	Posted Speed Limit	Posted Speed Limit	Posted Speed Limit	
	Access Control		40-5.0	Partial Control / None	None	None	
	Level of Service		40-2.0	Des: B; Min: D	Des: C; Min: D	Des: C; Min: D	
	On-Street Parking		45-1.0	None	Optional (3)	Optional (3)	
Cross-Section Elements	Travel Lane	*Width (4)	55-4.05	Curbed: Des: 12 ft; Min: 11 ft Uncurbed: Des: 12 ft; Min: 11 ft	Curbed: Des: 12 ft; Min: 11 ft Uncurbed: Des: 12 ft; Min: 11 ft	Curbed: Des: 12 ft; Min: 10 ft	
		Typical Surface Type (5)	Ch. 52	Asphalt / Concrete	Asphalt / Concrete	Asphalt / Concrete	
	*Curb Offset (6)		55-4.05	Des: 2 ft; Min: 1 ft	Des: 2 ft; Min: 1 ft	Des: 2 ft; Min: 1 ft	
	Shoulder	*Paved Width (7)	55-4.05	Curbed, Rt. Des: 10 ft; Min 1 ft Curbed, Lt. Des: 4 ft; Min 1 ft Uncurbed, Rt.: 10 ft; Lt.: 4 ft	Curbed, Rt. Des: 8 ft; Min 1 ft Curbed, Lt. Des: 3 ft; Min 2 ft Uncurbed, Rt.: 8 ft; Lt.: 3 ft	Right: 6 ft; Left: 3 ft	
		Typical Surface Type (5)	Ch. 304	Asphalt / Concrete	Asphalt / Concrete	Asphalt / Concrete	
	Cross Slope	*Travel Lane (8)	55-4.05	2% - 3%	2% - 3%	2% - 3%	
		Shoulder (9)	55-4.05	Rt.: 4% - 6%; Lt.: 2% - 3%	Paved Width ≤ 4 ft: 2%-3%; Paved Width > 4 ft: 4%-6%	Paved Width ≤ 4 ft: 2%-3%; Paved Width > 4 ft: 4%-6%	
	Auxiliary Lane	Lane Width	55-4.05	Des: 12 ft; Min: 11 ft	Des: 12 ft; Min: 10 ft	Des: 12 ft; Min: 10 ft	
		Curb Offset		Des: 1 ft; Min: 0 ft	Des: 1 ft; Min: 0 ft	Des: 1 ft; Min: 0 ft	
		Shoulder Width	Des: 10 ft; Min: 2 ft	Des: 8 ft; Min: 2 ft	Des: 6 ft; Min: 2 ft		
		Typical Surface Type (5)	Ch. 304	Asphalt / Concrete	Asphalt / Concrete	Asphalt / Concrete	
	TWLTL Width		46-5.0	Des: 16 ft; Min: 14 ft	Des: 16 ft; Min: 12 ft	Des: 14 ft; Min: 11 ft	
	Parking-Lane Width		45-1.04	N/A	Des: 10 ft; Min: 8 ft (10)	Des: 10 ft; Min: 8 ft (10)	
	Median Width	Depressed	55-4.05	Existing	Existing	N/A	
		Raised Island		Des: 16 ft.; Min: 2 ft	Des: 16 ft; Min: 2 ft	Des: 16 ft; Min: 2 ft	
		Flush / Corrugated		Des: 16 ft.; Min: 2 ft	Des: 16 ft; Min: 2 ft	Des: 16 ft; Min: 2 ft	
	Sidewalk Width (11)		55-4.05	4 ft with 5 ft Buffer (Des)	Des: 6 ft. Min: 4 ft	Des: 6 ft; Min: 4 ft	
	Bicycle-Lane Width (12)		51-7.0	Curbed: 5 ft Uncurbed: Shld. Width +4 ft	Curbed: 5 ft Uncurbed: Shld. Width +4 ft	Curbed: 5 ft	
	Obstruction-Free-Zone Width		55-5.02	See Section 55-5.02	See Section 55-5.02	See Section 55-5.02	
	Typical Curbing Type, where used (13)		55-4.05	Vertical / Sloping	Vertical / Sloping	Vertical / Sloping	
	Side Slopes, Uncurbed	Cut	Foreslope	55-4.05	2:1 or Flatter	2:1 or Flatter (14)	N/A
			Ditch Width		(14)	(14)	N/A
			Backslope		2:1 or Flatter (14)	2:1 or Flatter (14)	N/A
Fill		2:1 or Flatter (14)	2:1 or Flatter (14)	N/A			
Side Slopes, Curbed	Cut, Backslope	55-4.05	(15)	(15)	(15)		
	Fill		2:1 or Flatter (14)	2:1 or Flatter (14)	2:1 or Flatter (14)		
Median Slopes, Depressed		55-4.05	Desirable: 8:1; Maximum: 4:1	Desirable: 8:1; Maximum: 4:1	Desirable: 8:1; Maximum: 4:1		

Des: Desirable; Min: Minimum

\* Level One controlling criterion, see page 2 of 4.

**GEOMETRIC DESIGN CRITERIA FOR URBAN ARTERIAL, FOUR OR MORE LANES, 3R PROJECT**  
**Figure 55-3E (Page 1 of 4)**

Design Element			Manual Section	Design Values (By Type of Area)				
				Suburban		Intermediate		Built-Up
Bridges	New or Reconstructed Bridge	*Structural Capacity (16)	Ch. 403	HL-93				
		*Clear Roadway Width(17)	55-6.03	Curbed: Full Approach Curb-to-Curb Width Uncurbed: Full Approach Width				
	Existing Bridge to Remain in Place	*Structural Capacity	Ch. 72	HS-20				
		*Clear-Roadway Width	55-6.02	Curbed: Full Approach Curb-to-Curb Width; Uncurbed: Travelway Plus 2 ft. on Each Side				
	*Vertical Clearance, Arterial Under	New or Replaced Overpassing Bridge (18a & 18c)	55-6.0	16.5 ft	16.5 ft (18b)		16.5 ft (18b)	
		Existing Overpassing Bridge (19)		14.0 ft	14.0 ft		14.0 ft	
		Sign Truss / Pedestrian Bridge (18a & 18c)		New: 17.5 ft; Existing: 17.0 ft		New: 17.5 ft; Existing: 17.0 ft		New: 17.5 ft; Existing: 17.0 ft
Vertical Clearance, Arterial over Railroad (20)		Ch. 402-6.01	23.0 ft.					
Alignment Elements	Design Speed			30 mph	35 mph	45 mph	50 mph	55 mph
	*Stopping Sight Distance, Desirable		55-4.02	200 ft	250 ft	360 ft	425 ft	495 ft
	Decision Sight Distance	Speed / Path / Direction Change	42-2.0	U: 620 ft SU: 535 ft	U: 720 ft SU: 625 ft	U: 930 ft SU: 800 ft	U: 1030 ft SU: 890 ft	U: 1135 ft SU: 980 ft
		Stop Maneuver		490 ft	590 ft	800 ft	910 ft	1030 ft
	Intersection Sight Distance, -3% to +3% (21)		55-4.06	P: 355 ft SUT: 450 ft	P: 415 ft SUT: 525 ft	P: 530 ft SUT: 675 ft	P: 665 ft SUT: 825 ft	P: 770 ft SUT: 950 ft
	*Minimum Radius		55-4.03	See Section 55-4.03				
	*Superelevation Rate		55-4.03	See Section 55-4.03				
	*Horizontal Sight Distance		55-4.03	See Section 55-4.03				
	*Vertical Curvature, K-value	Crest	55-4.04	See Section 55-4.04				
		Sag		See Section 55-4.04				
	*Maximum Grade	Level	55-4.04	10%	9%	8.5%	8%	7%
Rolling		11%		10%	9.5%	9%	8%	
Minimum Grade		44-1.03	Curbed Des: 0.5%; Curbed Min: 0.3% Uncurbed: 0.0%					

SU: Suburban. U: Urban.

\* Level One controlling criterion. Except as noted in this chapter, the values shown in AASHTO's *A Policy on Geometric Design of Highways and Streets* (the *Green Book*) may be used as minimum values if they are lower than similar values shown herein. A controlling criterion that does not meet the minimum value is a design exception and is subject to approval. A streamlined design exception may be used for 3R projects. See Section 40-8.0.

**GEOMETRIC DESIGN CRITERIA FOR URBAN ARTERIAL, FOUR OR MORE LANES, 3R PROJECT**

**Figure 55-3E (Page 2 of 4)**

- (1) Design Forecast Period. For a partial 3R project, the pavement should be designed for at least a 10-year design life.
- (2) Design Speed. The minimum design speed should equal the anticipated posted speed limit after construction or the legal speed limit on a non-posted highway. This is 30 mph, but with an engineering study it may be raised to a maximum of 55 mph.
- (3) On-Street Parking. In general, on-street parking is discouraged.
- (4) Travel Lane, Width. For an arterial on the National Truck Network, the right lane must be 12 ft in width. For a non-National-Truck-Network route, a minimum 11 ft travel lane should be used where truck volume exceeds 200 trucks per day. See Section 55-4.05.
- (5) Surface Type. The pavement type selection will be determined by the Office of Pavement Engineering or by the local jurisdiction.
- (6) Curb Offset. Vertical curbs which are either continuous or introduced intermittently may be offset 1 ft.
- (7) Shoulder Width. The value applies to paved-shoulder width. The following will also apply:
  - a. For an uncurbed section, the shoulder is paved to the face of guardrail. The desirable guardrail offset is 2 ft from the usable-shoulder width. See Section 49-4.0 for more information.
  - b. For an uncurbed section, a desirable additional 1 ft of compacted aggregate will be provided.
  - c. If guardrail is present, the minimum offset from E.T.L. to face of guardrail should desirably be equal to the shy-line offset distance, but not less than 4 ft (see Section 49-4.0 for shy-line offsets). In a restrictive situation, the guardrail offset may be 0 ft from the usable-shoulder width.
  - d. For a curbed section, the curb offset is included in the paved-shoulder width.
- (8) Cross Slope, Travel Lane. Cross slopes of 1.5% are acceptable on an existing bridge to remain in place.
- (9) Cross Slope, Shoulder. Value is for a tangent section. See Figure 45-1A(1) or Figure 45-1A(2) for more-specific information. See Figure 43-3M or Figure 43-3N for shoulder cross slope on a horizontal curve.
- (10) Parking Lane Width. The following will apply:
  - a. Where the parking lane will be used as a travel lane during peak hours or may be converted to a travel lane in the future, the width should be equal to the travel lane width plus the curb offset width (if present).
  - b. A parking lane for residential usage may be 7 ft narrower.
  - c. The cross slope for a parking lane is typically 1% steeper than that of the adjacent travel lane.
- (11) Sidewalk Width. Value is for the installation of a new sidewalk. An existing sidewalk width of 3 ft or greater (with or without a buffer) may be retained. A buffer strip of 4 ft or more is desirable.
- (12) Bicycle-Lane Width. The value is in addition to the width of a parking lane, if present. See Section 51-7.0 for additional details.

## **GEOMETRIC DESIGN CRITERIA FOR URBAN ARTERIAL, FOUR OR MORE LANES, 3R PROJECT**

### **Figure 55-3E (Page 3 of 4)**

- (13) Curbing Type. Vertical curbs may only be used with design speed lower than 50 mph.
- (14) Side Slopes. Section 55-4.05 provides additional information for side slope criteria.
- (15) Side Slope, Curbed, Cut. A shelf or sidewalk will be present immediately behind the curb before the toe of the backslope. The minimum width of a shelf desirably should be 6 ft. Where a sidewalk is present, the toe of the backslope will be 1 ft beyond the edge of sidewalk. See Section 45-3.0 for more information.
- (16) Structural Capacity, New or Reconstructed Bridge. The following will apply:
  - a. Each State-highway bridge within 15 mi of a Toll-Road gate must be designed for Toll-Road loading.
  - b. Each bridge on an Extra-Heavy-Duty Highway must be designed for the Michigan Train truck loading configuration.
- (17) Width, New or Reconstructed Bridge. See Section 402-6.02(01) for more information. The clear-roadway width is the algebraic sum of the following:
  - a. the approach traveled way width;
  - b. the approach usable shoulder width without guardrail; and
  - c. a bridge-railing offset (see Figure 402-6H).
- (18) Vertical Clearance, Arterial Under Railroad. The following will apply:
  - a. Value includes an additional 6 in. allowance for a future pavement overlay.
  - b. In a highly-urbanized area, a minimum clearance of 14.0 ft may be provided if there is at least one route with a 16.0-ft clearance.
  - c. Vertical clearance applies from usable edge to usable edge of shoulder.
- (19) Vertical Clearance, Existing Bridge. See Section 55-6.02 for additional information on minimum allowable vertical clearance.
- (20) Vertical Clearance, Arterial Over Railroad. See Section 402-6.01(03) for additional information on railroad clearance under a highway.
- (21) Intersection Sight Distance. For left turn onto a two-way, 4-lane undivided roadway. P = Passenger car; SUT = single unit truck. See Figure 46-10G for value for a combination truck.

**APPENDIX D – TRAFFIC DATA AND ANALYSIS**

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**APPENDIX D - Ridge Road Complete Street Preliminary Engineering Assessment**  
**Intersection Level of Service Summary**

**AM Peak Hour Level of Service (Ridge Road Intersections)**

Intersection & Approach	Existing Conditions (Year 2023)					Future Conditions (Year 2040) - Alternative 1					Future Conditions (Year 2040) - Alternative 2				
	Lane Group	v/c Ratio	Delay (sec)	LOS	95th Percentile Queue (ft)	Lane Group	v/c Ratio	Delay (sec)	LOS	95th Percentile Queue (ft)	Lane Group	v/c Ratio	Delay (sec)	LOS	95th Percentile Queue (ft)
<b>Ridge Road &amp; Hohman Avenue*</b>															
Eastbound	L	0.12	10.6	B	32	L	0.11	10.4	B	34	L	0.31	14.9	B	83
	TR	0.31	14.6	B	144	TR	0.49	13.2	B	284	TR	0.40	12.1	B	221
Westbound	L	0.02	1.4	A	1	L	0.09	12.8	B	22	L	0.24	16.7	B	61
	TR	0.34	6.1	A	0	TR	0.47	13.4	B	190	TR	0.35	13.5	B	184
Northbound	L	0.08	17.0	B	33	L	0.13	20.6	C	37	L	0.28	24.7	C	59
	TR	0.32	28.1	C	111	TR	0.55	36.2	D	132	TR	0.46	33.5	C	137
Southbound	L	0.34	20.2	C	97	L	0.48	28.2	C	94	L	0.52	31.0	C	116
	T	0.24	26.3	C	105	TR	0.60	34.1	C	172	TR	0.70	40.7	D	213
	R	0.16	5.7	A	30										
	Intersection		13.9	B		Intersection		19.9	B		Intersection		19.2	B	
<b>Ridge Road &amp; Manor Avenue*</b>															
Eastbound	L	0.01	13.8	B	8	L	0.05	6.3	A	8	L	0.04	4.8	A	9
	TR	0.40	18.5	B	253	TR	0.56	8.7	A	193	TR	0.30	4.6	A	69
Westbound	L	0.15	4.7	A	14	L	0.31	9.4	A	44	L	0.26	10.3	B	68
	TR	0.29	5.5	A	43	TR	0.48	8.6	A	153	TR	0.25	7.6	A	121
Northbound	L	0.03	19.6	B	15	L	0.11	32.0	C	26	LTR	0.35	10.7	B	48
	TR	0.19	8.1	A	45	TR	0.50	21.4	C	84					
Southbound	LTR	0.07	22.1	C	42	L	0.30	26.3	C	65	LTR	0.44	33.0	C	87
						TR	0.15	19.4	B	49					
	Intersection		12.3	B		Intersection		11.5	B		Intersection		8.3	A	
<b>Ridge Road &amp; Harrison Avenue (West) (TWSC)**</b>															
Eastbound	L	0.07	47.6	D	10	L	0.02	9.7	A	3	L	0.02	10.1	B	3
	TR	0.45	13.3	B	56										
Westbound	L	0.07	30.0	C	19										
	TR	0.24	0.4	A	1										
Northbound	LTR	0.28	29.4	C	63										
Southbound	LTR	0.19	28.0	C	46	R	0.07	14.2	B	5	R	0.05	11.8	B	5
	Intersection		9.6	A		Intersection		-	-		Intersection		-	-	
<b>Ridge Road &amp; Harrison Avenue (East)*</b>															
Eastbound	L	0.03	36.2	D	9	L	0.02	3.4	A	1	L	0.02	4.2	A	4
	TR	0.33	1.6	A	44	TR	0.61	5.3	A	144	TR	0.35	5.3	A	98
Westbound	L	0.37	48.7	D	52	L	0.17	5.0	A	17	L	0.16	6.7	A	22
	TR	0.31	12.2	B	142	TR	0.51	5.7	A	148	TR	0.31	5.2	A	103
Northbound	L	0.35	42.7	D	58	L	0.51	42.6	D	95	L	0.38	34.7	C	78
	TR	0.36	13.6	B	37	TR	0.15	12.2	B	24	TR	0.14	9.8	A	23
Southbound	LTR	0.07	26.9	C	19	LTR	0.05	22.5	C	18	LTR	0.04	19.5	B	16
	Intersection		9.4	A		Intersection		8.1	A		Intersection		7.1	A	
<b>Ridge Road &amp; Jackson Avenue (TWSC)*</b>															
Eastbound (Left)	L	0.03	8.6	A	3	L	0.03	9.1	A	3	L	0.03	9.3	A	3
Westbound (Left)	L	0.02	9.6	A	3	L	0.02	9.5	A	3	L	0.02	10.1	B	3
Northbound	LTR	0.03	19.0	C	3	LTR	0.04	26.0	D	3	LTR	0.04	24.7	C	3
Southbound	LTR	0.15	16.2	C	13	LTR	0.49	47.3	E	57	LTR	0.39	34.1	D	43
	Intersection		-	-		Intersection		-	-		Intersection		-	-	
<b>Ridge Road &amp; Calumet Avenue*</b>															
Eastbound	L	0.72	34.3	C	154	L	0.84	45.0	D	219	L	0.91	50.4	D	240
	TR	0.52	28.1	C	141	TR	0.44	20.0	B	92	TR	0.46	15.2	B	91
Westbound	L	0.44	24.0	C	106	L	0.51	30.5	C	98	L	0.60	23.3	C	54
	TR	0.71	34.2	C	176	TR	0.82	41.3	D	165	TR	0.89	36.0	D	222
Northbound	L	0.48	18.0	B	79	L	0.72	31.7	C	114	L	0.75	33.8	C	122
	TR	0.59	26.2	C	286	TR	0.65	22.1	C	275	TR	0.65	22.2	C	277
Southbound	L	0.41	18.2	B	88	L	0.53	14.5	B	29	L	0.59	15.8	B	17
	T	0.74	30.2	C	332	T	0.82	17.7	B	131	T	0.81	14.7	B	47
	R	0.24	10.2	B	56	R	0.31	1.9	A	6	R	0.33	1.4	A	0
	Intersection		27.7	C		Intersection		24.0	C		Intersection		22.4	C	
<b>Ridge Road &amp; Columbia Avenue*</b>															
Eastbound	L	0.15	15.5	B	33	L	0.12	11.7	B	16	L	0.14	10.1	B	18
	TR	0.49	27.4	C	174	TR	0.35	19.3	B	153	TR	0.36	16.6	B	105
Westbound	L	0.33	16.9	B	87	L	0.33	15.1	B	92	L	0.32	14.6	B	86
	TR	0.66	26.4	C	308	TR	0.57	20.9	C	266	TR	0.57	20.9	C	282
Northbound	L	0.23	16.2	B	71	L	0.36	19.8	B	56	L	0.39	21.0	C	62
	TR	0.48	30.2	C	197	T	0.49	32.7	C	163	T	0.44	32.2	C	141
Southbound						R	0.16	0.7	A	0	R	0.16	0.7	A	0
	L	0.36	17.1	B	121	L	0.55	22.5	C	128	L	0.47	21.4	C	113
	TR	0.60	31.6	C	306	TR	0.76	36.9	D	308	TR	0.73	36.2	D	278
	Intersection		25.8	C		Intersection		23.4	C		Intersection		22.3	C	

Notes: L = Left Turn, T= Through, R = Right Turn, LOS = Level of Service.

\* =Signalized intersection

^ = Unsignalized intersection

\*\* =Intersection of Harrison Avenue (West) and Ridge Road is signalized under existing conditions and under two-way stop control under future conditions

**APPENDIX D - Ridge Road Complete Street Preliminary Engineering Assessment**  
**Intersection Level of Service Summary**

**AM Peak Hour Level of Service (Broadmoor Avenue Intersections)**

Intersection & Approach	Existing Conditions (2023)					Future Alternative 1 (3-Lane 2041)					Future Alternative 2 (5-Lane 2041)				
	Lane Group	v/c Ratio	Delay (sec)	LOS	95th Percentile Queue (ft)	Lane Group	v/c Ratio	Delay (sec)	LOS	95th Percentile Queue (ft)	Lane Group	v/c Ratio	Delay (sec)	LOS	95th Percentile Queue (ft)
<b>Broadmoor Avenue &amp; Hohman Avenue*</b>															
Eastbound	LTR	0.08	15.7	B	46	LTR	0.15	15.3	B	45	LTR	0.15	15.4	B	46
Westbound	L	0.09	11.4	B	31	L	0.11	12.3	B	34	L	0.11	12.4	B	34
	TR	0.07	7.3	A	32	TR	0.14	7.7	A	35	TR	0.13	8.1	A	35
Northbound	L	0.01	9.4	A	6	L	0.02	9.0	A	6	L	0.02	8.8	A	6
	T	0.28	18.7	B	158	TR	0.64	25.6	C	168	TR	0.64	25.8	C	172
	R	0.05	0.2	A	0										
Southbound	L	0.12	9.3	A	38	L	0.20	9.9	A	41	L	0.18	9.7	A	38
	T	0.28	14.0	B	169	TR	0.45	16.7	B	169	TR	0.45	16.7	B	171
	R	0.01	0.0	A	0										
	Intersection		13.7	B		Intersection		17.6	B		Intersection		17.9	B	
<b>Broadmoor Avenue &amp; Manor Avenue (AWSC)^</b>															
Eastbound	LTR	0	10	A	23	LTR	0.29	10.6	B	30	LTR	0.26	9.8	A	25
Westbound	LTR	0.191	8.6	A	18	LTR	0.31	10.1	B	33	LTR	0.27	9.3	A	28
Northbound	LTR	0.08	8.2	A	8	LTR	0.15	9.0	A	13	LTR	0.06	8.2	A	5
Southbound	LTR	0.138	8.7	A	13	LTR	0.20	9.6	A	18	LTR	0.13	8.8	A	10
	Intersection		8.9	A		Intersection		10.0	A		Intersection		9.3	A	
<b>Broadmoor Avenue &amp; Calumet Avenue*</b>															
Eastbound	L	0.60	40.0	D	133	L	0.69	39.6	D	114	L	0.61	33.9	C	108
	TR	0.66	43.6	D	168	TR	0.60	31.9	C	136	TR	0.58	30.7	C	128
Westbound	L	0.37	32.8	C	86	L	0.39	27.0	C	69	L	0.34	25.1	C	65
	TR	0.65	35.8	D	125	TR	0.54	21.5	C	98	TR	0.50	20.1	C	87
Northbound	L	0.19	14.2	B	32	L	0.29	9.4	A	20	L	0.28	9.9	A	15
	TR	0.61	26.8	C	457	TR	0.76	22.0	C	545	TR	0.80	21.7	C	573
Southbound	L	0.21	7.8	A	28	L	0.32	11.7	B	41	L	0.32	12.3	B	40
	TR	0.68	17.1	B	411	TR	0.85	25.7	C	680	TR	0.88	28.0	C	716
	Intersection		24.6	C		Intersection		24.7	C		Intersection		25.1	C	
<b>Broadmoor Avenue &amp; Columbia Avenue*</b>															
Eastbound	LTR	0.42	17.6	B	86	LTR	0.55	22.7	C	117	LTR	0.49	18.5	B	95
Westbound	LTR	0.13	17.8	B	40	LTR	0.15	19.5	B	45	LTR	0.15	17.5	B	43
Northbound	L	0.18	4.7	A	32	L	0.32	6.7	A	46	L	0.27	6.4	A	42
	TR	0.22	7.6	A	108	TR	0.35	8.9	A	152	TR	0.32	8.9	A	136
Southbound	L	0.01	4.4	A	4	L	0.01	5.4	A	5	L	0.01	5.2	A	5
	TR	0.50	16.0	B	231	TR	0.75	21.7	C	328	TR	0.69	18.8	B	270
	Intersection		12.9	B		Intersection		16.8	B		Intersection		14.8	B	

**Notes:** L = Left Turn, T= Through, R = Right Turn, LOS = Level of Service.

\* =Signalized intersection

^ = Unsignalized intersection

\*^ =Intersection of Harrison Avenue (West) and Ridge Road is signalized under existing conditions and under two-way stop control under future conditions

**APPENDIX D - Ridge Road Complete Street Preliminary Engineering Assessment**  
**Intersection Level of Service Summary**

**PM Peak Hour Level of Service (Ridge Road Intersections)**

Intersection & Approach	Existing Conditions (Year 2023)					Future Conditions (Year 2040) - Alternative 1					Future Conditions (Year 2040) - Alternative 2				
	Lane Group	v/c Ratio	Delay (sec)	LOS	95th Percentile Queue (ft)	Lane Group	v/c Ratio	Delay (sec)	LOS	95th Percentile Queue (ft)	Lane Group	v/c Ratio	Delay (sec)	LOS	95th Percentile Queue (ft)
<b>Ridge Road &amp; Hohman Avenue*</b>															
Eastbound	L	0.38	18.1	B	69	L	0.35	15.9	B	78	L	0.31	14.9	B	83
	TR	0.56	24.3	C	283	TR	0.71	19.6	B	524	TR	0.40	12.1	B	221
Westbound	L	0.07	3.4	A	1	L	0.32	16.4	B	36	L	0.24	16.7	B	61
	TR	0.56	14.6	B	262	TR	0.65	15.5	B	256	TR	0.35	13.5	B	184
Northbound	L	0.11	15.8	B	44	L	0.30	25.7	C	64	L	0.28	24.7	C	59
	TR	0.23	26.4	C	115	TR	0.56	39.2	D	164	TR	0.46	33.5	C	137
Southbound	L	0.28	17.3	B	98	L	0.46	28.9	C	108	L	0.52	31.0	C	116
	T	0.24	24.7	C	120	TR	0.76	46.1	D	247	TR	0.70	40.7	D	213
	R	0.19	5.3	A	38										
Intersection			19.2	B		Intersection		23.9	C		Intersection		19.2	B	
<b>Ridge Road &amp; Manor Avenue*</b>															
Eastbound	L	0.03	20.6	C	13	L	0.12	8.2	A	13	L	0.08	4.4	A	11
	TR	0.60	36.8	D	399	TR	0.79	14.4	B	376	TR	0.41	4.4	A	100
Westbound	L	0.27	8.0	A	18	L	0.28	9.2	A	19	L	0.18	6.9	A	24
	TR	0.43	7.8	A	68	TR	0.72	10.4	B	246	TR	0.38	5.7	A	108
Northbound	L	0.04	20.2	C	24	L	0.17	37.9	D	39	LTR	0.38	15.5	B	65
	TR	0.20	10.1	B	57	TR	0.63	39.9	D	136					
Southbound	LTR	0.13	24.9	C	71	L	0.47	34.9	C	100	LTR	0.65	47.5	D	133
						TR	0.21	24.3	C	80					
	Intersection			22.4	C		Intersection		16.4	B		Intersection		8.3	A
<b>Ridge Road &amp; Harrison Avenue (West) (TWSC) **</b>															
Eastbound	L	0.24	56.0	E	26	L	0.03	10.1	B	3	L	0.03	10.5	B	3
	TR	0.64	15.8	B	177										
Westbound	L	0.14	31.5	C	38										
	TR	0.34	0.7	A	0										
Northbound	LTR	0.36	33.1	C	98										
Southbound	LTR	0.30	32.5	C	81	R	0.10	17.6	C	8	R	0.07	13.1	B	5
Intersection			12.0	B		Intersection		-	-		Intersection		-	-	
<b>Ridge Road &amp; Harrison Avenue (East)*</b>															
Eastbound	L	0.02	39.8	D	5	L	0.01	3.6	A	1	L	0.01	4.0	A	1
	TR	0.47	2.4	A	47	TR	0.81	8.8	A	215	TR	0.47	6.1	A	177
Westbound	L	0.48	56.3	E	77	L	0.17	4.3	A	5	L	0.12	4.4	A	6
	TR	0.42	16.4	B	223	TR	0.57	5.2	A	98	TR	0.34	3.4	A	62
Northbound	L	0.56	53.0	D	103	L	0.77	63.2	E	182	L	0.63	48.1	D	145
	TR	0.34	13.4	B	45	TR	0.21	12.9	B	37	TR	0.20	10.6	B	36
Southbound	LTR	0.07	29.6	C	24	LTR	0.05	27.1	C	23	LTR	0.04	23.9	C	21
Intersection			12.2	B		Intersection		11.9	B		Intersection		8.1	A	
<b>Ridge Road &amp; Jackson Avenue (TWSC)^</b>															
Eastbound (Left)	L	0.03	9.3	A	3	L	0.03	9.4	A	3	L	0.03	9.7	A	3
Westbound (Left)	L	0.03	10.5	B	3	L	0.03	10.7	B	3	L	0.03	11.2	B	3
Northbound	LTR	0.13	27.5	D	10	LTR	0.24	52.9	F	23	LTR	0.18	38.0	E	15
Southbound	LTR	0.33	21.2	C	35	LTR	0.85	101.7	F	138	LTR	0.56	42.4	E	78
Intersection			-	-		Intersection		-	-		Intersection		-	-	
<b>Ridge Road &amp; Calumet Avenue*</b>															
Eastbound	L	0.76	38.5	D	195	L	0.88	47.7	D	213	L	0.95	64.9	E	310
	TR	0.88	49.9	D	383	TR	0.97	56.2	E	372	TR	0.92	38.8	D	367
Westbound	L	0.75	41.3	D	183	L	0.74	45.6	D	119	L	0.89	64.6	E	177
	TR	0.72	39.5	D	255	TR	0.89	40.0	D	156	TR	0.91	39.8	D	163
Northbound	L	0.68	32.6	C	130	L	0.89	61.8	E	170	L	0.93	71.3	E	199
	TR	0.95	53.3	D	585	TR	0.96	45.9	D	558	TR	0.98	52.1	D	571
Southbound	L	0.80	49.7	D	210	L	0.88	52.0	D	130	L	1.06	90.8	F	195
	T	0.81	37.7	D	371	T	0.84	15.4	B	106	T	0.88	19.3	B	183
	R	0.28	13.7	B	65	R	0.28	0.7	A	0	R	0.32	1.1	A	0
Intersection			43.5	D		Intersection		38.2	D		Intersection		42.6	D	
<b>Ridge Road &amp; Columbia Avenue*</b>															
Eastbound	L	0.42	27.5	C	93	L	0.54	23.5	C	26	L	0.58	28.2	C	31
	TR	0.87	47.6	D	621	TR	0.94	37.7	D	380	TR	0.91	33.6	C	419
Westbound	L	0.47	29.8	C	89	L	0.69	46.3	D	109	L	0.61	38.3	D	109
	TR	0.74	41.0	D	451	TR	0.74	33.5	C	314	TR	0.76	34.5	C	337
Northbound	L	0.24	18.0	B	65	L	0.25	14.9	B	46	L	0.29	16.2	B	51
	TR	0.86	54.6	D	477	T	0.93	63.3	E	470	T	0.85	53.6	D	372
						R	0.28	7.4	A	50	R	0.27	6.4	A	43
Southbound	L	0.89	52.8	D	349	L	0.88	46.1	D	363	L	0.82	36.6	D	252
	TR	0.60	32.3	C	396	TR	0.68	27.9	C	400	TR	0.68	29.8	C	355
	Intersection			43.5	D		Intersection		37.7	D		Intersection		34.3	C

Notes: L = Left Turn, T= Through, R = Right Turn, LOS = Level of Service.

\* =Signalized intersection

^ = Unsignalized intersection

\*\* =Intersection of Harrison Avenue (West) and Ridge Road is signalized under existing conditions and under two-way stop control under future conditions

**APPENDIX D - Ridge Road Complete Street Preliminary Engineering Assessment**  
**Intersection Level of Service Summary**

**PM Peak Hour Level of Service (Broadmoor Avenue Intersections)**

Intersection & Approach	Existing Conditions (2023)					Future Alternative 1 (3-Lane 2041)					Future Alternative 2 (5-Lane 2041)					
	Lane Group	v/c Ratio	Delay (sec)	LOS	95th Percentile Queue (ft)	Lane Group	v/c Ratio	Delay (sec)	LOS	95th Percentile Queue (ft)	Lane Group	v/c Ratio	Delay (sec)	LOS	95th Percentile Queue (ft)	
<b>Broadmoor Avenue &amp; Hohman Avenue*</b>																
Eastbound	LTR	0.29	23.4	C	87	LTR	0.31	24.2	C	99	LTR	0.31	24.3	C	100	
Westbound	L	0.12	13.0	B	42	L	0.16	16.1	B	54	L	0.16	16.3	B	54	
	TR	0.27	9.9	A	69	TR	0.33	15.2	B	105	TR	0.31	14.9	B	99	
Northbound	L	0.02	9.4	A	10	L	0.03	8.0	A	9	L	0.03	8.0	A	9	
	T	0.62	27.7	C	198	TR	0.72	27.4	C	234	TR	0.72	27.5	C	238	
	R	0.16	3.4	A	18											
Southbound	L	0.28	11.4	B	57	L	0.34	10.3	B	57	L	0.33	10.2	B	56	
	T	0.53	18.8	B	222	TR	0.50	15.2	B	198	TR	0.51	15.3	B	204	
	R	0.02	0.1	A	0											
Intersection			17.8	B		Intersection			19.1	B		Intersection			19.2	B
<b>Broadmoor Avenue &amp; Manor Avenue (AWSC)^</b>																
Eastbound	LTR	0	13	B	57	LTR	0.57	16.4	C	88	LTR	0.48	12.6	B	65	
Westbound	LTR	0.434	11.8	B	55	LTR	0.61	17.0	C	102	LTR	0.51	12.5	B	70	
Northbound	LTR	0.178	9.9	A	15	LTR	0.28	11.9	B	30	LTR	0.13	9.5	A	10	
Southbound	LTR	0.191	10.2	B	18	LTR	0.29	12.1	B	30	LTR	0.13	9.8	A	10	
Intersection			8.9	A		Intersection			10.0	A		Intersection			9.3	A
<b>Broadmoor Avenue &amp; Calumet Avenue*</b>																
Eastbound	L	0.65	40.0	D	162	L	0.74	41.8	D	152	L	0.76	44.7	D	152	
	TR	0.77	56.2	E	243	TR	0.76	47.7	D	227	TR	0.75	47.3	D	218	
Westbound	L	0.76	51.0	D	195	L	0.83	52.6	D	171	L	0.82	53.2	D	157	
	TR	0.83	66.9	E	259	TR	0.66	39.6	D	187	TR	0.64	38.3	D	175	
Northbound	L	0.28	19.7	B	35	L	0.35	9.4	A	13	L	0.35	8.5	A	14	
	TR	0.81	43.0	D	594	TR	1.05	54.4	D	733	TR	1.03	44.8	D	697	
Southbound	L	0.64	26.4	C	96	L	0.66	31.4	C	164	L	0.63	29.6	C	146	
	TR	0.75	23.1	C	499	TR	0.92	34.6	C	727	TR	0.91	33.2	C	745	
Intersection			37.4	D		Intersection			43.9	D		Intersection			39.8	D
<b>Broadmoor Avenue &amp; Columbia Avenue*</b>																
Eastbound	LTR	0.80	34.3	C	347	LTR	0.88	39.9	D	375	LTR	0.83	33.5	C	339	
Westbound	LTR	0.09	17.3	B	41	LTR	0.11	16.9	B	44	LTR	0.1	16	B	41	
Northbound	L	0.25	8.0	A	33	L	0.62	27.2	C	67	L	0.4	13.7	B	47	
	TR	0.55	15.0	B	249	TR	0.69	19.7	B	377	TR	0.64	18.7	B	334	
Southbound	L	0.03	6.2	A	9	L	0.05	8.2	A	11	L	0.05	8.9	A	12	
	TR	0.79	27.6	C	307	TR	0.88	32.4	C	523	TR	0.82	28.9	C	409	
Intersection			23.9	C		Intersection			29.3	C		Intersection			25.5	C

Notes: L = Left Turn, T= Through, R = Right Turn, LOS = Level of Service.

\* =Signalized intersection

^ = Unsignalized intersection

\*\* =Intersection of Harrison Avenue (West) and Ridge Road is signalized under existing conditions and under two-way stop control under future conditions

**APPENDIX D - Ridge Road Complete Street Preliminary Engineering Assessment**  
**Queuing and Blocking Report**

**AM Peak Period**

**Intersection: 1: Hohman Avenue & Ridge Road**

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	93	252	120	286	74	178	172	216
Average Queue (ft)	27	131	22	135	25	101	72	103
95th Queue (ft)	78	226	72	244	55	176	137	182
Link Distance (ft)		2654		911		3100		1207
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	140		190		125		135	
Storage Blk Time (%)		6		4		7	2	5
Queuing Penalty (veh)		3		1		3	5	7

**Intersection: 2: Manor Avenue & Ridge Road**

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	73	250	153	243	55	147	107	91
Average Queue (ft)	13	127	60	139	9	67	40	35
95th Queue (ft)	48	217	119	227	35	123	81	77
Link Distance (ft)		911		354		3870		1367
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	95		170		480		125	
Storage Blk Time (%)		12	0	4			0	0
Queuing Penalty (veh)		2	0	4			0	0

**Intersection: 3: Ridge Road & Harrison Avenue (West)**

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	R
Maximum Queue (ft)	54	158	146	52
Average Queue (ft)	12	22	24	19
95th Queue (ft)	42	81	87	46
Link Distance (ft)		354	159	2003
Upstream Blk Time (%)			0	
Queuing Penalty (veh)			0	
Storage Bay Dist (ft)	100			
Storage Blk Time (%)		0		
Queuing Penalty (veh)		0		

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**Intersection: 4: Harrison Avenue (East)/Private Access & Ridge Road**

Movement	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	TR	L	TR	L	TR	LTR
Maximum Queue (ft)	38	214	73	169	120	69	44
Average Queue (ft)	2	92	28	60	55	19	9
95th Queue (ft)	18	179	61	136	103	49	34
Link Distance (ft)		159		590		3733	2065
Upstream Blk Time (%)		2					
Queuing Penalty (veh)		12					
Storage Bay Dist (ft)	55		75		200		
Storage Blk Time (%)	0	12	0	3			
Queuing Penalty (veh)	0	1	2	2			

**Intersection: 5: Jackson Avenue & Ridge Road**

Movement	EB	EB	WB	WB	B31	NB	SB
Directions Served	L	TR	L	TR	T	LTR	LTR
Maximum Queue (ft)	36	116	67	118	98	56	102
Average Queue (ft)	11	15	7	16	5	6	37
95th Queue (ft)	33	62	35	62	46	30	77
Link Distance (ft)		590		238	967	3627	3015
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)	40		40				
Storage Blk Time (%)	0	1	1	1			
Queuing Penalty (veh)	2	0	4	0			

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**AM Peak Period**

**Intersection: 6: Calumet Avenue & Ridge Road**

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	T
Maximum Queue (ft)	363	178	241	144	313	320	262	307	304	163	269	267
Average Queue (ft)	215	58	93	66	157	156	122	166	175	70	148	159
95th Queue (ft)	380	120	172	120	279	285	280	266	265	133	237	243
Link Distance (ft)		967	967		2245	2245		4208	4208		1804	1804
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	595			435			525			580		
Storage Blk Time (%)							0					5
Queuing Penalty (veh)							1					12

**Intersection: 6: Calumet Avenue & Ridge Road**

Movement	SB
Directions Served	R
Maximum Queue (ft)	200
Average Queue (ft)	69
95th Queue (ft)	161
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	180
Storage Blk Time (%)	
Queuing Penalty (veh)	

**Intersection: 7: Columbia Avenue & Ridge Road**

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	
Directions Served	L	T	TR	L	T	TR	L	T	R	L	TR	
Maximum Queue (ft)	73	117	122	138	213	260	87	195	75	167	317	
Average Queue (ft)	17	44	58	56	110	136	37	97	33	85	162	
95th Queue (ft)	49	90	105	107	181	222	74	163	61	147	276	
Link Distance (ft)		2245	2245		5307	5307		3504			2265	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	130			150			300		130	390		
Storage Blk Time (%)		0		0	2			5				
Queuing Penalty (veh)		0		0	2			8				

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**AM Peak Period**

**Intersection: 8: Hohman Avenue & Broadmoor Avenue**

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	TR	L	TR	L	TR
Maximum Queue (ft)	72	89	88	66	176	121	181
Average Queue (ft)	29	29	33	5	92	42	76
95th Queue (ft)	64	69	67	32	153	85	136
Link Distance (ft)	2610	928			1207		3386
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			80	105		115	
Storage Blk Time (%)		1	0		4	0	1
Queuing Penalty (veh)		1	0		0	0	1

**Intersection: 9: Manor Avenue & Broadmoor Avenue**

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	93	105	79	90
Average Queue (ft)	50	58	39	43
95th Queue (ft)	79	92	67	75
Link Distance (ft)	928	2562	1367	3262
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 10: Calumet Avenue & Broadmoor Avenue**

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	199	195	127	185	237	436	442	190	561	568
Average Queue (ft)	83	105	54	85	50	224	243	73	309	327
95th Queue (ft)	149	176	102	152	146	377	391	180	509	524
Link Distance (ft)		2562		2315		1804	1804		3494	3494
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	215		215		155			85		
Storage Blk Time (%)	0	0		0		13		1	36	
Queuing Penalty (veh)	0	0		0		6		5	25	

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**Intersection: 11: Columbia Avenue & Broadmoor Avenue**

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (ft)	166	66	104	205	68	247
Average Queue (ft)	68	27	52	73	6	133
95th Queue (ft)	125	58	95	156	35	220
Link Distance (ft)	2315	1572		2265		2632
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			105		95	
Storage Blk Time (%)			0	2	0	14
Queuing Penalty (veh)			1	2	0	1

**Network Summary**

Network wide Queuing Penalty: 116

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**Intersection: 1: Hohman Avenue & Ridge Road**

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	240	539	259	358	132	218	234	318
Average Queue (ft)	104	272	61	208	46	103	81	155
95th Queue (ft)	232	453	144	319	103	181	171	254
Link Distance (ft)		2654		911		3100		1207
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	140		190		125		135	
Storage Blk Time (%)	9	21		15	0	6	1	17
Queuing Penalty (veh)	65	21		11	0	5	4	24

**Intersection: 2: Manor Avenue & Ridge Road**

Movement	EB	EB	WB	WB	NB	NB	SB	SB
Directions Served	L	TR	L	TR	L	TR	L	TR
Maximum Queue (ft)	170	437	269	359	70	198	127	127
Average Queue (ft)	40	236	100	204	17	89	60	50
95th Queue (ft)	118	403	226	360	49	161	110	103
Link Distance (ft)		911		354		3870		1367
Upstream Blk Time (%)				1				
Queuing Penalty (veh)				4				
Storage Bay Dist (ft)	95		170		480		125	
Storage Blk Time (%)	1	27	7	12			2	0
Queuing Penalty (veh)	5	8	58	6			2	0

**Intersection: 3: Ridge Road & Harrison Avenue (West)**

Movement	EB	EB	WB	SB
Directions Served	L	T	TR	R
Maximum Queue (ft)	81	244	160	69
Average Queue (ft)	15	56	53	24
95th Queue (ft)	60	166	150	54
Link Distance (ft)		354	159	2003
Upstream Blk Time (%)		0	1	
Queuing Penalty (veh)		0	4	
Storage Bay Dist (ft)	100			
Storage Blk Time (%)		2		
Queuing Penalty (veh)		0		

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**Intersection: 4: Harrison Avenue (East)/Private Access & Ridge Road**

Movement	EB	EB	WB	WB	NB	NB	SB
Directions Served	L	TR	L	TR	L	TR	LTR
Maximum Queue (ft)	28	233	62	210	199	98	55
Average Queue (ft)	2	160	21	99	102	36	14
95th Queue (ft)	14	250	52	177	180	74	43
Link Distance (ft)		159		590		3733	2065
Upstream Blk Time (%)		9					
Queuing Penalty (veh)		88					
Storage Bay Dist (ft)	55		75		200		
Storage Blk Time (%)		21	0	7	1		
Queuing Penalty (veh)		1	2	2	0		

**Intersection: 5: Jackson Avenue & Ridge Road**

Movement	EB	EB	WB	WB	B31	NB	SB
Directions Served	L	TR	L	TR	T	LTR	LTR
Maximum Queue (ft)	30	112	29	142	69	66	138
Average Queue (ft)	6	29	6	22	4	15	55
95th Queue (ft)	23	91	23	98	31	47	107
Link Distance (ft)		590		238	967	3627	3015
Upstream Blk Time (%)				0			
Queuing Penalty (veh)				1			
Storage Bay Dist (ft)	40		40				
Storage Blk Time (%)	0	2	0	1			
Queuing Penalty (veh)	2	0	2	0			

**APPENDIX D - Ridge Road Complete Street Preliminary Engineering Assessment**  
**Queuing and Blocking Report**  
**PM Peak Period**

**Intersection: 6: Calumet Avenue & Ridge Road**

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	T
Maximum Queue (ft)	533	567	563	470	476	457	500	699	709	552	578	577
Average Queue (ft)	322	323	333	220	225	215	208	418	434	299	185	199
95th Queue (ft)	575	596	565	418	435	421	486	701	710	524	424	441
Link Distance (ft)		967	967		2245	2245		4208	4208		1804	1804
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	595			435			525			580		
Storage Blk Time (%)	5	1		4	2		0	9		0	1	9
Queuing Penalty (veh)	13	3		7	3		0	14		1	2	17

**Intersection: 6: Calumet Avenue & Ridge Road**

Movement	SB
Directions Served	R
Maximum Queue (ft)	230
Average Queue (ft)	64
95th Queue (ft)	175
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	180
Storage Blk Time (%)	
Queuing Penalty (veh)	

**Intersection: 7: Columbia Avenue & Ridge Road**

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	
Directions Served	L	T	TR	L	T	TR	L	T	R	L	TR	
Maximum Queue (ft)	154	279	283	238	309	348	338	697	230	387	420	
Average Queue (ft)	67	160	166	87	177	208	98	360	139	209	196	
95th Queue (ft)	144	244	238	182	274	315	316	673	286	358	345	
Link Distance (ft)		2245	2245		5307	5307		3504			2265	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	130			150			300		130	390		
Storage Blk Time (%)	1	20		5	14			50	0	1	0	
Queuing Penalty (veh)	4	17		13	15			109	0	7	1	

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**PM Peak Period**

**Intersection: 8: Hohman Avenue & Broadmoor Avenue**

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	TR	L	TR	L	TR
Maximum Queue (ft)	115	132	102	64	240	144	220
Average Queue (ft)	54	36	57	10	121	58	92
95th Queue (ft)	104	88	98	42	195	102	160
Link Distance (ft)	2610	928			1207		3386
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			80	105		115	
Storage Blk Time (%)		0	4		9	0	3
Queuing Penalty (veh)		1	3		1	1	4

**Intersection: 9: Manor Avenue & Broadmoor Avenue**

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	168	224	102	78
Average Queue (ft)	82	92	48	41
95th Queue (ft)	140	168	81	66
Link Distance (ft)	928	2562	1367	3262
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 10: Calumet Avenue & Broadmoor Avenue**

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	262	344	263	283	239	1297	1294	190	938	933
Average Queue (ft)	121	159	119	133	99	795	816	145	504	518
95th Queue (ft)	211	271	217	229	249	1577	1589	236	901	905
Link Distance (ft)		2562		2315		1804	1804		3494	3494
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	215		215		155			85		
Storage Blk Time (%)	0	4	1	1		44		29	45	
Queuing Penalty (veh)	1	8	3	2		27		199	63	

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**Intersection: 11: Columbia Avenue & Broadmoor Avenue**

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (ft)	312	80	104	372	94	410
Average Queue (ft)	178	29	63	204	17	230
95th Queue (ft)	281	67	114	338	61	370
Link Distance (ft)	2315	1572		2265		2632
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			105		95	
Storage Blk Time (%)			1	17	0	28
Queuing Penalty (veh)			4	19	0	4

**Network Summary**

Network wide Queuing Penalty: 883

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**Intersection: 1: Hohman Avenue & Ridge Road**

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	TR
Maximum Queue (ft)	76	144	147	52	144	175	68	182	140	184
Average Queue (ft)	28	74	74	16	59	84	23	84	72	84
95th Queue (ft)	63	124	126	42	118	149	56	152	124	155
Link Distance (ft)		1979	1979		914	914		1741		1195
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	140			90			125		115	
Storage Blk Time (%)		0			3			3	3	5
Queuing Penalty (veh)		0			1			1	6	7

**Intersection: 2: Manor Avenue & Ridge Road**

Movement	EB	EB	EB	WB	WB	WB	NB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LTR
Maximum Queue (ft)	47	104	114	138	146	157	109	129
Average Queue (ft)	13	54	55	56	68	96	44	55
95th Queue (ft)	40	93	103	106	120	143	89	105
Link Distance (ft)		914	914		357	357	1369	1353
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	95			170				
Storage Blk Time (%)		1		0	0			
Queuing Penalty (veh)		0		0	0			

**Intersection: 3: Ridge Road & Harrison Avenue (West)**

Movement	EB	EB	EB	WB	WB	SB
Directions Served	L	T	T	T	TR	R
Maximum Queue (ft)	43	98	75	53	82	38
Average Queue (ft)	9	15	10	8	12	17
95th Queue (ft)	35	59	45	36	53	41
Link Distance (ft)		357	357	158	158	957
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)	100					
Storage Blk Time (%)		0				
Queuing Penalty (veh)		0				

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**Intersection: 4: Harrison Avenue (East)/Private Access & Ridge Road**

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	LTR
Maximum Queue (ft)	45	151	135	61	100	101	117	60	39
Average Queue (ft)	4	62	54	21	28	39	53	20	10
95th Queue (ft)	24	119	111	51	74	83	101	50	34
Link Distance (ft)		158	158		586	586		1784	1044
Upstream Blk Time (%)		0	0						
Queuing Penalty (veh)		0	0						
Storage Bay Dist (ft)	55			75			170		
Storage Blk Time (%)	0	5		0	1				
Queuing Penalty (veh)	1	0		0	0				

**Intersection: 5: Jackson Avenue & Ridge Road**

Movement	EB	EB	EB	WB	WB	WB	NB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LTR
Maximum Queue (ft)	30	79	74	50	48	67	52	85
Average Queue (ft)	10	9	6	5	5	11	7	42
95th Queue (ft)	29	43	32	25	24	39	33	76
Link Distance (ft)		586	586		1260	1260	1665	1534
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	100			100				
Storage Blk Time (%)		0						
Queuing Penalty (veh)		0						

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**AM Peak Period**

**Intersection: 6: Calumet Avenue & Ridge Road**

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	T
Maximum Queue (ft)	484	378	261	191	336	383	252	284	324	185	294	346
Average Queue (ft)	272	107	113	86	148	189	108	165	183	83	120	134
95th Queue (ft)	491	345	267	162	284	331	239	253	274	156	229	263
Link Distance (ft)		1260	1260		2245	2245		3316	3316		1808	1808
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	500			500			500			580		
Storage Blk Time (%)	4	3										3
Queuing Penalty (veh)	5	8										7

**Intersection: 6: Calumet Avenue & Ridge Road**

Movement	SB
Directions Served	R
Maximum Queue (ft)	227
Average Queue (ft)	68
95th Queue (ft)	163
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	180
Storage Blk Time (%)	
Queuing Penalty (veh)	

**Intersection: 7: Columbia Avenue & Ridge Road**

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	
Directions Served	L	T	TR	L	T	TR	L	T	R	L	TR	
Maximum Queue (ft)	57	106	136	196	264	289	124	187	104	171	314	
Average Queue (ft)	17	52	73	59	121	144	49	91	31	75	153	
95th Queue (ft)	46	99	116	127	213	236	95	164	71	143	276	
Link Distance (ft)		2245	2245		4270	4270		3004			2263	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	120			150			130		130	360		
Storage Blk Time (%)		0			3		0	3			0	
Queuing Penalty (veh)		0			4		0	5			1	

**APPENDIX D - Ridge Road Complete Street Preliminary Engineering Assessment**  
**Queuing and Blocking Report**

03/15/2024

**AM Peak Period**

**Intersection: 8: Hohman Avenue & Broadmoor Avenue**

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	TR	L	TR	L	TR
Maximum Queue (ft)	83	87	83	43	167	102	162
Average Queue (ft)	31	29	31	3	93	36	80
95th Queue (ft)	67	72	66	20	151	77	138
Link Distance (ft)	1232	934			1195		1579
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			65	105		115	
Storage Blk Time (%)		2	1		4		1
Queuing Penalty (veh)		1	0		0		1

**Intersection: 9: Manor Avenue & Broadmoor Avenue**

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	86	115	58	68
Average Queue (ft)	46	54	24	31
95th Queue (ft)	72	91	49	53
Link Distance (ft)	934	2568	1353	1547
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 10: Calumet Avenue & Broadmoor Avenue**

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	200	188	111	164	239	365	368	190	655	690
Average Queue (ft)	94	99	53	78	48	201	223	72	355	374
95th Queue (ft)	169	170	97	138	130	317	333	186	598	610
Link Distance (ft)		2568		2314		1808	1808		2599	2599
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	215		215		155			85		
Storage Blk Time (%)	0	0				10		1	39	
Queuing Penalty (veh)	0	0				5		8	25	

**APPENDIX D - Ridge Road Complete Street Preliminary Engineering Assessment**  
**Queuing and Blocking Report**

03/15/2024

**AM Peak Period**

**Intersection: 11: Columbia Avenue & Broadmoor Avenue**

Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (ft)	121	65	102	188	48	236
Average Queue (ft)	60	23	44	60	5	108
95th Queue (ft)	106	54	83	124	26	190
Link Distance (ft)	2314	1572		2263		2624
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			105		95	
Storage Blk Time (%)			0	1	0	8
Queuing Penalty (veh)			0	1	0	0

**Network Summary**

Network wide Queuing Penalty: 93

**APPENDIX D - Ridge Road Complete Street Preliminary Engineering Assessment**  
**Queuing and Blocking Report**

03/15/2024

**PM Peak Period**

**Intersection: 1: Hohman Avenue & Ridge Road**

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	L	TR
Maximum Queue (ft)	165	230	203	119	177	201	88	193	158	245
Average Queue (ft)	61	120	124	42	108	132	42	89	75	126
95th Queue (ft)	132	198	198	88	164	195	79	159	133	212
Link Distance (ft)		1979	1979		914	914		1741		1195
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)	140			90			125		115	
Storage Blk Time (%)	1	3		2	12			3	3	16
Queuing Penalty (veh)	2	3		5	9			3	9	26

**Intersection: 2: Manor Avenue & Ridge Road**

Movement	EB	EB	EB	WB	WB	WB	NB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LTR
Maximum Queue (ft)	52	128	122	77	144	146	134	155
Average Queue (ft)	18	63	65	31	70	93	55	70
95th Queue (ft)	47	107	110	66	130	149	110	127
Link Distance (ft)		914	914		357	357	1369	1353
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	95			170				
Storage Blk Time (%)		1			0			
Queuing Penalty (veh)		0			0			

**Intersection: 3: Ridge Road & Harrison Avenue (West)**

Movement	EB	EB	EB	WB	WB	SB
Directions Served	L	T	T	T	TR	R
Maximum Queue (ft)	48	95	112	85	104	50
Average Queue (ft)	15	19	22	13	22	17
95th Queue (ft)	42	63	74	54	73	44
Link Distance (ft)		357	357	158	158	957
Upstream Blk Time (%)	0					
Queuing Penalty (veh)	0					
Storage Bay Dist (ft)	100					
Storage Blk Time (%)		0				
Queuing Penalty (veh)		0				

**APPENDIX D - Ridge Road Complete Street Preliminary Engineering Assessment**  
**Queuing and Blocking Report**

03/15/2024

**PM Peak Period**

**Intersection: 4: Harrison Avenue (East)/Private Access & Ridge Road**

Movement	EB	EB	EB	WB	WB	WB	NB	NB	SB
Directions Served	L	T	TR	L	T	TR	L	TR	LTR
Maximum Queue (ft)	20	138	139	58	102	121	173	65	42
Average Queue (ft)	2	60	58	16	40	55	87	30	11
95th Queue (ft)	12	118	118	44	84	104	149	56	35
Link Distance (ft)		158	158		586	586		1784	1044
Upstream Blk Time (%)		0	0						
Queuing Penalty (veh)		0	0						
Storage Bay Dist (ft)	55			75			170		
Storage Blk Time (%)		6		0	1		0		
Queuing Penalty (veh)		0		0	0		0		

**Intersection: 5: Jackson Avenue & Ridge Road**

Movement	EB	EB	EB	WB	WB	WB	NB	SB
Directions Served	L	T	TR	L	T	TR	LTR	LTR
Maximum Queue (ft)	37	115	86	32	67	90	58	103
Average Queue (ft)	6	18	12	6	9	12	17	45
95th Queue (ft)	24	67	51	24	39	51	47	79
Link Distance (ft)		586	586		1260	1260	1665	1534
Upstream Blk Time (%)								
Queuing Penalty (veh)								
Storage Bay Dist (ft)	100			100				
Storage Blk Time (%)		0			0			
Queuing Penalty (veh)		0			0			

**APPENDIX D - Ridge Road Complete Street Preliminary Engineering Assessment**  
**Queuing and Blocking Report**

03/15/2024

**PM Peak Period**

**Intersection: 6: Calumet Avenue & Ridge Road**

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	TR	L	T	T
Maximum Queue (ft)	545	811	802	554	651	653	558	974	1001	710	1825	1842
Average Queue (ft)	419	469	427	379	286	313	371	583	602	632	1152	1152
95th Queue (ft)	706	1007	901	599	638	645	701	1081	1096	861	2209	2218
Link Distance (ft)		1260	1260		2245	2245		3316	3316		1808	1808
Upstream Blk Time (%)		1	0								4	3
Queuing Penalty (veh)		3	1								32	28
Storage Bay Dist (ft)	500			500			500			580		
Storage Blk Time (%)	38	15		12	7		9	28		73	30	32
Queuing Penalty (veh)	117	46		24	13		47	49		420	77	68

**Intersection: 6: Calumet Avenue & Ridge Road**

Movement	SB
Directions Served	R
Maximum Queue (ft)	230
Average Queue (ft)	146
95th Queue (ft)	300
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	180
Storage Blk Time (%)	
Queuing Penalty (veh)	

**Intersection: 7: Columbia Avenue & Ridge Road**

Movement	EB	EB	EB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	TR	L	T	R	L	TR
Maximum Queue (ft)	181	277	280	264	345	359	229	413	230	321	430
Average Queue (ft)	59	155	164	71	200	220	66	212	105	158	163
95th Queue (ft)	129	234	240	162	296	315	177	348	244	267	296
Link Distance (ft)		2245	2245		4270	4270		3004			2263
Upstream Blk Time (%)											
Queuing Penalty (veh)											
Storage Bay Dist (ft)	120			150			130		130	360	
Storage Blk Time (%)	1	20		1	16			29	0	0	1
Queuing Penalty (veh)	3	20		2	17			63	0	0	2

**APPENDIX D - Ridge Road Complete Street Preliminary Engineering Assessment**  
**Queuing and Blocking Report**

03/15/2024

**PM Peak Period**

**Intersection: 8: Hohman Avenue & Broadmoor Avenue**

Movement	EB	WB	WB	NB	NB	SB	SB
Directions Served	LTR	L	TR	L	TR	L	TR
Maximum Queue (ft)	108	120	89	40	200	145	201
Average Queue (ft)	52	39	54	9	107	50	94
95th Queue (ft)	95	92	90	32	176	98	166
Link Distance (ft)	1232	934			1195		1579
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)			65	105		115	
Storage Blk Time (%)		1	5		7	0	3
Queuing Penalty (veh)		2	4		1	1	4

**Intersection: 9: Manor Avenue & Broadmoor Avenue**

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	148	166	63	56
Average Queue (ft)	65	83	33	28
95th Queue (ft)	111	140	56	49
Link Distance (ft)	934	2568	1353	1547
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

**Intersection: 10: Calumet Avenue & Broadmoor Avenue**

Movement	EB	EB	WB	WB	NB	NB	NB	SB	SB	SB
Directions Served	L	TR	L	TR	L	T	TR	L	T	TR
Maximum Queue (ft)	261	288	245	349	239	1043	1034	190	2156	2111
Average Queue (ft)	116	153	129	134	87	545	570	128	803	810
95th Queue (ft)	211	253	227	266	236	1065	1078	234	1884	1868
Link Distance (ft)		2568		2314		1808	1808		2599	2599
Upstream Blk Time (%)									3	2
Queuing Penalty (veh)									0	0
Storage Bay Dist (ft)	215		215		155			85		
Storage Blk Time (%)	0	3	3	1		37		16	53	
Queuing Penalty (veh)	1	7	6	2		22		116	69	

**APPENDIX D - Ridge Road Complete Street Preliminary Engineering Assessment**  
**Queuing and Blocking Report**

03/15/2024

PM Peak Period

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**Intersection: 11: Columbia Avenue & Broadmoor Avenue**

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Movement	EB	WB	NB	NB	SB	SB
Directions Served	LTR	LTR	L	TR	L	TR
Maximum Queue (ft)	261	74	104	364	81	343
Average Queue (ft)	148	29	61	153	12	172
95th Queue (ft)	234	66	115	284	49	301
Link Distance (ft)	2314	1572		2263		2624
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)			105		95	
Storage Blk Time (%)			0	11	0	19
Queuing Penalty (veh)			2	11	0	3

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**Network Summary**

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Network wide Queuing Penalty: 1343

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**APPENDIX D - Ridge Road Complete Street Preliminary Engineering Assessment**  
**Existing Traffic Volume Counts - West of Calumet Ave. (Unadjusted)**

**MH Corbin Traffic Analyzer Study**  
**Computer Generated Summary Report**  
**City: MUNSTER**  
**Street: RIDGE RD**  
**Location: RIDGE RD BETWEEN HOLMAN AND MEADOW**

A study of vehicle traffic was conducted with the device having serial number 1644. The study was done in the COMBINED lane at RIDGE RD in MUNSTER, IN in LAKE county. The study began on 06/07/2023 at 12:00 PM and concluded on 06/09/2023 at 12:00 AM, lasting a total of 36.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 35,868 vehicles passed through the location with a peak volume of 455 on 06/07/2023 at [06:15 PM-06:30 PM] and a minimum volume of 13 on 06/08/2023 at [01:45 AM-02:00 AM]. The AADT count for this study was 23,912.

**SPEED**

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 30 - 35 MPH range or lower. The average speed for all classified vehicles was 31 MPH with 27.10% vehicles exceeding the posted speed of 35 MPH. 1.62% percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 30MPH and the 85th percentile was 38.47 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >
518	1069	1457	4032	7590	10581	6040	1921	607	256	137	91	73	50	210

CHART 1

**CLASSIFICATION**

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 33168 which represents 96 percent of the total classified vehicles. The number of Single Unit Vehicles in the study was 930 which represents 3 percent of the total classified vehicles. The number of Multi Unit Vehicles in the study was 534 which represents 2 percent of the total classified vehicles. The number of Unclassified in the study was 0 which represents 0 percent of the total classified vehicles.

< to 23	24 to 38	39 to 99	100 to >											
33168	930	534	0											

CHART 2

**HEADWAY**

During the peak traffic period, on 06/07/2023 at [06:15 PM-06:30 PM] the average headway between vehicles was 1.974 seconds. During the slowest traffic period, on 06/08/2023 at [01:45 AM-02:00 AM] the average headway between vehicles was 64.286 seconds.

**WEATHER**

The roadway surface temperature over the period of the study varied between 63.00 and 122.00 degrees F.

**APPENDIX D - Ridge Road Complete Street Preliminary Engineering Assessment**  
**Existing Traffic Volume Counts - East of Calumet Ave. (Unadjusted)**

**MH Corbin Traffic Analyzer Study**  
**Computer Generated Summary Report**  
**City: MUNSTER**  
**Street: RIDGE RD**  
**Location: RIDGE RD BETWEEN HOWARD AND KOOY**

A study of vehicle traffic was conducted with the device having serial number 304400. The study was done in the COMBINED lane at RIDGE RD in MUNSTER, IN in LAKE county. The study began on 06/07/2023 at 12:00 PM and concluded on 06/09/2023 at 12:00 AM, lasting a total of 36.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 32,610 vehicles passed through the location with a peak volume of 433 on 06/08/2023 at [04:30 PM-04:45 PM] and a minimum volume of 6 on 06/08/2023 at [02:45 AM-03:00 AM]. The AADT count for this study was 21,740.

**SPEED**

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 35 - 40 MPH range or lower. The average speed for all classified vehicles was 37 MPH with 60.22% vehicles exceeding the posted speed of 35 MPH. 2.19% percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 35MPH and the 85th percentile was 43.48 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >
65	254	503	944	2976	8064	10503	5832	1819	532	227	131	95	64	187

CHART 1

**CLASSIFICATION**

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin. Most of the vehicles classified during the study were Passenger Vehicles. The number of Passenger Vehicles in the study was 31065 which represents 96 percent of the total classified vehicles. The number of Single Unit Vehicles in the study was 855 which represents 3 percent of the total classified vehicles. The number of Multi Unit Vehicles in the study was 276 which represents 1 percent of the total classified vehicles. The number of Unclassified in the study was 0 which represents 0 percent of the total classified vehicles.

< to 23	24 to 38	39 to 99	100 to >											
31065	855	276	0											

CHART 2

**HEADWAY**

During the peak traffic period, on 06/08/2023 at [04:30 PM-04:45 PM] the average headway between vehicles was 2.074 seconds. During the slowest traffic period, on 06/08/2023 at [02:45 AM-03:00 AM] the average headway between vehicles was 128.571 seconds.

**WEATHER**

The roadway surface temperature over the period of the study varied between 64.00 and 122.00 degrees F.

**APPENDIX E – PRELIMINARY ENVIRONMENTAL RED FLAG INVESTIGATION**

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Date: January 19, 2024

To: Kari Carmany-George  
Sr. Environmental Specialist  
Federal Highway Administration  
575 North Pennsylvania Street, Room 254  
Indianapolis, IN 46204

From: Megan Moss  
Butler, Fairman, & Seufert, Inc.  
8450 Westfield Boulevard, Suite 300  
Indianapolis, IN 46240  
Mmoss@bfsengr.com

Re: RED FLAG INVESTIGATION  
DES #N/A, Local Project  
Ridge Road Complete Street Project  
Ridge Road between Indiana/Illinois State Line and Columbia Avenue  
Lake County, Indiana

**PROJECT DESCRIPTION**

The Town of Munster proposes a complete street project along Ridge Road utilizing funds from the Rebuilding American Infrastructure with Sustainability and Equity (RAISE) discretionary grant program. The 1.3-mile-long project consists of reconfiguring vehicle travel lanes on Ridge Road from five lanes to three lanes, adding on-street parking, creating a new 10-foot-wide multi-use path on the south side of the street, adding tree plantings and other amenities including landscaping improvements, gateway and wayfinding signage, pedestrian seating, and other decorative features. In addition, the project proposes to install curb bumpouts at several locations to reduce pedestrian crossing distance. All improvements are anticipated to occur within the existing 80-foot-wide right-of-way along Ridge Road.

Brief Description of Project:

Bridge Work Included: Yes  No  Structure #(s) \_\_\_\_\_

If this is a bridge project, is the bridge Historical? Yes  No  , Select  Non-Select

(Note: If the project involves a historical bridge, please include the bridge information in the Recommendations Section of the report).

Culvert Work Included in Project: Yes  No  Structure #(s) \_\_\_\_\_

Proposed right of way: Temporary  # Acres \_\_\_\_\_, Permanent  # Acres \_\_\_\_\_, Not Applicable

Type and proposed depth of excavation:

Maintenance of traffic (MOT): A plan will be developed for maintaining vehicular traffic and pedestrian movements through the project area during construction.

Work in waterway: Yes  No  Below ordinary high water mark: Yes  No

State Project:  LPA:

Any other factors influencing recommendations: N/A

**INFRASTRUCTURE TABLE AND SUMMARY**

<b>Infrastructure</b>			
Indicate the number of items of concern found within the 0.5 mile search radius. If there are no items, please indicate N/A:			
Religious Facilities	<b>9*</b>	Recreational Facilities	<b>8</b>
Airports <sup>1</sup>	<b>N/A</b>	Pipelines	<b>2</b>
Cemeteries	<b>1</b>	Railroads	<b>3*</b>
Hospitals	<b>N/A</b>	Trails	<b>6</b>
Schools	<b>8*</b>	Managed Lands	<b>6</b>

<sup>1</sup>In order to complete the required airport review, a review of public-use airports within 3.8 miles (20,000 feet) is required.

\*Additional reconnaissance using Google Earth revealed resources not mapped in the GIS layers.

\*Additional reconnaissance using Google Earth revealed the GIS map is incorrect, abandoned/active railroad segments intersecting project area are now trail segments.

**Explanation:**

**Religious Facilities\*:** Nine (9) religious facilities, six (6) mapped and three (3) unmapped, are located within the 0.5 mile search radius. Three (3) religious facilities are located adjacent to the project area.

- Chabad-Lubavitch of Northwest Indiana Inc., 1113 Ridge Road, is located on the north side of Ridge Road between Kooy Drive and Howard Avenue. Coordination with Chabad-Lubavitch of Northwest Indiana Inc. should occur.
- Munster Christian Reformed Church, 214 Ridge Road, is located in the southeast quadrant of Ridge Road near and Hohman Avenue. Coordination with Munster Christian Reformed Church should occur.
- Faith Church Munster, 8411 Columbia Avenue, is unmapped and located in the northeast quadrant of Ridge Road and Columbia Avenue. Coordination with Faith Church Munster should occur.

**Recreational Facilities:** Eight (8) recreational facilities are located within the 0.5 mile search radius. Three (3) recreational facilities are located adjacent to the project area.

- Bieker Woods, 1050 Ridge Road, is located on the southwest corner of the intersection of Ridge Road and Columbia Avenue. Coordination with Munster Parks and Recreation Board should occur.
- Heritage Park, 1154 Ridge Road, is located on the southeast corner of the intersection of Ridge Road and Columbia Avenue. Coordination with Munster Parks and Recreation Board should occur.
- Rotary Park, 1051 Ridge Road, is located on the northwest corner of the intersection of Ridge Road and Columbia Avenue. Coordination with Munster Parks and Recreation Board should occur.

**Pipelines:** Two (2) pipeline segments are located within the 0.5 mile search radius. Two (2) segments are located within 0.05 mile of the project area.

- The nearest segment, Amoco Oil Company, is located 0.01 mile east of the project area. Coordination with Amoco Oil Company should occur.
- The second nearest segment, Amoco Pipeline Company, is located 0.04 mile east of the project area. Coordination with Amoco Pipeline Company should occur.

**Cemeteries:** One (1) cemetery is located within the 0.5 mile search radius. Schoon Cemetery is located east of Hohman Avenue, 0.03 mile south of the project area. No impact is expected.

**Railroads\*:** Three (3) railroad segments are located within the 0.5 mile search radius. The nearest segment, Unknown Railroad, intersects the project area near Manor Avenue. This railroad segment is inactive and has been converted to a recreational trail. See Trails for more information.

**Trails:** Six (6) trail segments are located within the 0.5 mile search radius. One (1) trail segment, Monon Trail – Douglas Street South to Fisher Street, intersects the project area at the intersection of Ridge Road and Manor Avenue. Coordination with Hammond Parks and Recreation should occur.

**Schools\*:** Eight (8) schools, five (5) mapped and three (3) unmapped, are located within the 0.5 mile search radius. The nearest school, Saint Thomas More School, is located approximately 0.04 mile south of the project area. Coordination with Saint Thomas More School should occur.

**Managed Lands:** Six (6) Managed Lands are located within the 0.5 mile search radius. Two (2) managed lands are located adjacent to the project area.

- Bieker Woods Park is located on the southwest corner of the intersection of Ridge Road and Columbia Avenue. Coordination with Munster Parks and Recreation Department should occur.
- Heritage Park is located on the southeast corner of the intersection of Ridge Road and Columbia Avenue. Coordination with Munster Parks and Recreation should occur.

**WATER RESOURCES TABLE AND SUMMARY**

<b>Water Resources</b>			
Indicate the number of items of concern found within the 0.5 mile search radius. If there are no items, please indicate N/A:			
NWI - Points	N/A	Canal Routes - Historic	N/A
Karst Springs	N/A	NWI - Wetlands	2
Canal Structures – Historic	N/A	Lakes	2
NPS NRI Listed	N/A	Floodplain - DFIRM	N/A
NWI-Lines	N/A	Cave Entrance Density	N/A
IDEM 303d Listed Streams and Lakes (Impaired)	N/A	Sinkhole Areas	N/A
Rivers and Streams	N/A	Sinking-Stream Basins	N/A

Explanation:

**NWI – Wetlands:** Two (2) wetland polygons are located within the 0.5 mile search radius. The nearest wetland polygon is located approximately 0.37 mile south of the project area. No impact is expected.

**Lakes:** Two (2) lake polygons are located within the 0.5 mile search radius. The nearest lake polygon is located approximately 0.38 mile southwest of the project area. No impact is expected.

**MINING AND MINERAL EXPLORATION TABLE AND SUMMARY**

<b>Mining/Mineral Exploration</b>			
Indicate the number of items of concern found within the 0.5 mile search radius. If there are no items, please indicate N/A:			
Petroleum Wells	N/A	Mineral Resources	N/A
Mines – Surface	N/A	Mines – Underground	N/A

Explanation: No mining and mineral resources were located within the 0.5 mile search radius. No impact is expected.

## HAZARDOUS MATERIAL CONCERNS TABLE AND SUMMARY

<b>Hazardous Material Concerns</b>			
Indicate the number of items of concern found within the 0.5 mile search radius. If there are no items, please indicate N/A:			
Superfund	<b>N/A</b>	Manufactured Gas Plant Sites	<b>N/A</b>
RCRA Generator/ TSD	<b>3</b>	Open Dump Waste Sites	<b>N/A</b>
RCRA Corrective Action Sites	<b>N/A</b>	Restricted Waste Sites	<b>N/A</b>
State Cleanup Sites	<b>1</b>	Waste Transfer Stations	<b>N/A</b>
Septage Waste Sites	<b>N/A</b>	Tire Waste Sites	<b>N/A</b>
Underground Storage Tank (UST) Sites	<b>3</b>	Confined Feeding Operations (CFO)	<b>N/A</b>
Voluntary Remediation Program	<b>N/A</b>	Brownfields	<b>1</b>
Construction Demolition Waste	<b>N/A</b>	Institutional Controls	<b>4</b>
Solid Waste Landfill	<b>N/A</b>	NPDES Facilities	<b>3</b>
Infectious/Medical Waste Sites	<b>N/A</b>	NPDES Pipe Locations	<b>4</b>
Leaking Underground Storage (LUST) Sites	<b>8</b>	Notice of Contamination Sites	<b>N/A</b>

Unless otherwise noted, site specific details presented in this section were obtained from documents reviewed on the Indiana Department of Environmental Management (IDEM) Virtual File Cabinet (VFC).

Explanation:

**RCRA Generator/ TSD:** Three (3) RCRA Generator/ TSD sites are located within the 0.5 mile search radius. Two (2) sites are located adjacent to the project area.

- Pride Cleaners, 132 Ridge Road, Agency Interest (AI) #16508, is incorrectly mapped and is located on the southwest corner of the intersection of Ridge Road and Hohman Avenue and is the site of a former dry cleaning facility. The last available IDEM VFC record, dated June 18, 2002, indicated that the site was a conditionally exempt small quantity generator of variations of tetrachloroethane and tetrachloroethylene. According to a desktop review of various mapping services, the site no longer operates as a dry cleaning facility. No impact is expected.
- Mobil, formerly known as Phillips 66 Service Station, 323 Ridge Road, AI #17600, is located on the northwest corner of Ridge Road and Manor Avenue and is the site of an active gas station. See Institutional Controls for more information.

**State Cleanup Sites:** One (1) state cleanup site is located within the 0.5 mile search radius. Marathon Munster, 7946 Calumet Avenue, AI# 23290, is located approximately 0.47 mile north of the project area and is the site of a former gas station. IDEM issued a no further action (NFA) letter on February 2, 2005. According to the NFA letter, four (4) unregistered 4,000 gallon USTs that contained gasoline and one (1) 4,000 gallon UST that contained either diesel or kerosene were removed from the site in August 2002, and 1,107 tons of petroleum contaminated soils were removed from the site. All confirmatory sample results were below Risk Integrated System of Closure Industrial Groundwater Default Levels. No impact is expected.

**Underground Storage Tanks (USTs):** Three (3) UST sites are located within the 0.5 mile search radius. Two (2) USTs are located adjacent to the project area.

- Duke of Oil, 449 Ridge Road, AI# 20419, is located north of the “T” intersection of Ridge Road and Harrison Avenue area and is the site of an oil change facility. The site maintains one (1) 4,000 gallon steel UST for new oil and one (1) 3,000 gallon steel UST for used oil, both installed in 1988. IDEM conducted an Underground Storage Tank Inspection on June 12, 2023, and the facility was found to be out of compliance with equipment, operating, and maintenance requirements set forth in Indiana’s UST Rule 329 IAC 9; however, documentation reviewed does not indicate that a release occurred. No impact is expected.
- Munster Police Department, 1001 Ridge Road, AI# 23566, is incorrectly mapped and is located on Municipal Drive 0.13 mile north of the project area. IDEM received a UST closure report on December 20, 2001, stating that levels of TPH from confirmatory samples were below detection levels. No impact is expected.

**Brownfields:** One (1) brownfield is located within the 0.5 mile search radius. Target Store T1913, formerly known as Montgomery Ward Automotive Express (F) 4050029, 8005 Calumet Avenue, AI# 24395, is incorrectly mapped and is located 0.37 mile north of the project area. The site once operated as a retail automotive supply store and service garage from 1962 to 2000 and contained a retail fuel service station from 1962 to 1984. IDEM issued a Comment Letter on December 21, 2004, indicating there were three (3) 10,000 gallon gasoline underground storage tanks and one (1) 500 gallon used oil UST at the site that were removed in 1986. An ERC was recorded on January 5, 2012. The ERC specifically prohibits the use or extraction of groundwater for any purpose. No impact is expected.

**Institutional Controls:** Four (4) institutional controls are located within the 0.5 mile search radius. Two (2) institutional controls sites are located adjacent to the project area.

- Speedway #7680, 444 Ridge Road, IC ID# 288, is located on the southwest corner of the intersection of Ridge Road and Harrison Avenue and is the site of an active gas station. An Environmental Restrictive Covenant (ERC) was recorded on April 19, 2011. The ERC specifically prohibits the use of real estate for residential purposes, the installation or use of drinking water wells, agricultural use, and construction restrictions. IDEM issued a No Further Action Letter on August 24, 2011, indicating that soil contaminated with total petroleum hydrocarbons (TPH) at 2,210 ppm remains on the site in soil and/or groundwater. If excavation occurs in this area, it is possible petroleum contamination will be encountered. Proper handling, removal, and disposal of soil and/or groundwater may be necessary. Coordination should be conducted with the IDEM Institutional Controls section ([institutionalcontrols@idem.IN.gov](mailto:institutionalcontrols@idem.IN.gov)) if impacts to this site are anticipated.
- Mobil, formerly known as Phillips 66 Service Station, 323 Ridge Road, IC ID# 1, is an active gas station incorrectly mapped and is located on the northwest corner of the intersection of Ridge Road and Manor Avenue. An ERC was recorded on July 1, 2019. The ERC specifically restricts the use or extraction of groundwater for any purpose, and prior to the change in use of the site or construction of new structures to confirm there is no unacceptable exposure risk due to vapor migration. IDEM issued a No Further Action Letter on July 24, 2019, indicating that soil contaminated with ethylbenzene and xylenes remains on site at a depth greater than six feet below ground. Groundwater contaminated with benzene and ethylbenzene also remains on site. Proper handling, removal, and disposal of soil and/or groundwater may be necessary. Coordination should be conducted with IDEM Institutional Controls section ([institutionalcontrols@idem.IN.gov](mailto:institutionalcontrols@idem.IN.gov)) if impacts to this site are anticipated.

**NPDES Facilities:** Three (3) NPDES facilities are located within the 0.5 mile search radius. Two (2) NPDES facilities are located adjacent to the project area.

- Speedway #7680, 444 Ridge Road, permit # ING080115, is located on the southwest corner of the intersection of Ridge Road and Harrison Avenue and is the site of an active gas station. The permit expired on November 30, 2004. No impact is expected.
- Munster Car Wash, 111 Ridge Road, permit #INRA11082, is located on the northeast corner of the intersection of Ridge Road and Forest Avenue. The permit was terminated on April 11, 2022. No impact is expected.

**NPDES Pipe Locations:** Four (4) NPDES pipe locations are located within the 0.5 mile search radius. The nearest NPDES Pipe Location, NPDES ID# ING340036, is located approximately 0.44 mile south of the project area. No impact is expected.

**Leaking Underground Storage (LUST) Sites:** Eight (8) LUST sites are located within the 0.5 mile search radius. Four (4) LUST sites are located adjacent to the project area.

- Amoco Service Station 06258, 747 Ridge Road, AI# 17548, is located on the northwest corner of Ridge Road and Calumet Avenue and is the site of an active gas station. The site maintains two (2) 10,000 gallon Gasoline USTs and one (1) 12,000 gallon gasoline UST installed March 21, 1988. One (1) UST was removed on August 10, 1990. IDEM issued a Release from Investigation and Confirmation Steps Letter on November 17, 2016, indicating that a suspected release from the facility was reported by the Munster Fire Department. According to the letter, petroleum or gasoline odors were reported at Munster Donuts, 8314 Calumet Avenue, adjacent to the Amoco Service Station. IDEM conducted an Underground Storage Tank Inspection on March 25, 2021, and the facility was found to be out of compliance with equipment, operating, and maintenance requirements set forth in Indiana's UST Rule 329 IAC 9. Documentation reviewed indicates that a release occurred. If excavation occurs in this area, it is possible that petroleum contamination may be encountered. Proper handling, removal, and disposal of soil and/or groundwater may be necessary.
- Speedway #7680, 444 Ridge Road, AI# 12371, is located on the southwest corner of the intersection of Ridge Road and Harrison Avenue and is the site of an active gas station. The site maintains four (4) 10,000 gallon steel STIP3 USTs, installed in November 1999, one (1) 15,000 gallon Regular A gasoline UST, one (1) 15,000 gallon Regular B gasoline (manifolded - Syphon) UST, one (1) 15,000 gallon premium gasoline UST, one (1) 6,000 gallon diesel UST, one (1) 4,000 gallon kerosene UST. IDEM conducted an Underground Storage Tank Inspection on June 2, 2023, and the facility was found to be out of compliance with equipment, operating, and maintenance requirements set forth in Indiana's UST Rule 329 IAC 9. Documentation reviewed indicates that a release occurred. See Institutional Controls for more information.
- Mobil, formerly known as Phillips 66 Service Station, 323 Ridge Road, AI #17600, is an active gas station incorrectly mapped and located on the northwest corner of the intersection of Ridge Road and Manor Avenue. See Institutional Controls for more information.
- Munster Car Wash, 111 Ridge Road, AI# 19325 is located on the northeast corner of the intersection of Ridge Road and Forest Avenue and is the site of a former car wash facility. IDEM issued an Initial Site Characterization letter on November 19, 1998, indicating a release of gasoline during the removal of underground storage tanks at the site on June 30, 1992. IDEM issued a No Further Action letter on January 29, 1999 indicating that TPH contamination in soils was below 100 ppm. If excavation occurs in this area, it is possible that petroleum contamination may be encountered. Proper removal and disposal of soil and/or groundwater may be necessary.

### **ECOLOGICAL INFORMATION SUMMARY**

The Lake County listing of the Indiana Natural Heritage Data Center information on endangered, threatened, or rare (ETR) species and high quality natural communities is provided at ([https://www.in.gov/dnr/nature-preserves/files/np\\_lake.pdf](https://www.in.gov/dnr/nature-preserves/files/np_lake.pdf)). No impacts to ETR species is expected.

### **RECOMMENDATIONS SECTION**

Include recommendations from each section. If there are no recommendations, please indicate N/A:

INFRASTRUCTURE:

**Religious Facilities:** Two (2) religious facilities are located adjacent to the project area.

- Chabad-Lubavitch of Northwest Indiana Inc., 1113 Ridge Road, is incorrectly mapped and is located on Ridge Road between Kooy Drive and Howard Avenue adjacent to the project area. Coordination with Chabad-Lubavitch of Northwest Indiana Inc. should occur.
- Munster Christian Reformed Church, 214 Ridge Road, is incorrectly mapped and is located on the south side of Ridge Road near the intersection of Ridge Road and Hohman Avenue adjacent to the project area. Coordination with Munster Christian Reformed Church should occur.

**Recreational Facilities:** Three (3) recreational facilities are located adjacent to the project area.

- Bieker Woods, 1050 Ridge Road, is located on the southwest corner of the intersection of Ridge Road and Columbia Avenue adjacent to the project area. Coordination with Munster Parks and Recreation Board should occur.
- Heritage Park, 1154 Ridge Road, is located on the southeast corner of the intersection of Ridge Road and Columbia Avenue adjacent to the project area. Coordination with Munster Parks and Recreation Board should occur.
- Rotary Park, 1051 Ridge Road, is located on the northwest corner of the intersection of Ridge Road and Columbia Avenue adjacent to the project area. Coordination with Munster Parks and Recreation Board should occur.

**Pipelines:** Two (2) segments are located within 0.05 mile of the project area.

- The nearest segment, Amoco Oil Company, is located 0.01 mile east of the project area. Coordination with Amoco Oil Company should occur.
- The second nearest segment, Amoco Pipeline Company, is located 0.04 mile east of the project area. Coordination with Amoco Pipeline Company should occur.

**Trails:** One (1) trail segment, Monon Trail – Douglas Street South to Fisher Street, intersects the project area near the intersection of Ridge Road and Manor Avenue. Coordination with Hammond Parks and Recreation should occur.

**Schools:** The nearest school, Saint Thomas More School, 8453 Calumet Avenue, is incorrectly mapped and is located approximately 0.08 mile south of the project area. Coordination with Saint Thomas More School should occur.

**Managed Lands:** Two (2) managed lands are located adjacent to the project area.

- Bieker Woods Park is located on the southwest corner of the intersection of Ridge Road and Columbia Avenue adjacent to the project area. Coordination with Munster Parks and Recreation Department should occur.
- Heritage Park is located on the southeast corner of the intersection of Ridge Road and Columbia Avenue adjacent to the project area. Coordination with Munster Parks and Recreation should occur.

WATER RESOURCES: N/A

MINING/MINERAL EXPLORATION: N/A

HAZARDOUS MATERIAL CONCERNS:

**Institutional Controls:**

- Speedway #7680, 444 Ridge Road, IC ID# 288, is located on the southwest corner of the intersection of Ridge Road and Harrison Avenue and is the site of an active gas station. An ERC was recorded on April 19, 2011. The ERC specifically prohibits the use of real estate for residential purposes, the installation or use of drinking water wells, agricultural use, and excavation restrictions. IDEM issued a No Further Action Letter on August 24, 2011, indicating

that soil contaminated with TPH at 2,210 ppm remains on the site in soil and/or groundwater. If excavation occurs in this area, it is possible petroleum contamination will be encountered. Proper handling, removal, and disposal of soil and/or groundwater may be necessary. Coordination should be conducted with the IDEM Institutional Controls section ([institutionalcontrols@idem.IN.gov](mailto:institutionalcontrols@idem.IN.gov)) if impacts to this site are anticipated.

- Mobil, formerly known as Phillips 66 Service Station, 323 Ridge Road, IC ID# 1, is located on the northwest corner of the intersection of Ridge Road and Manor Avenue and is the site of an active gas station. An ERC was recorded on July 1, 2019. The ERC specifically restricts the use or extraction of groundwater for any purpose, and the use of the site for residential purposes. IDEM issued a No Further Action Letter on July 24, 2019, indicating that soil contaminated with ethylbenzene and xylenes remains on site at a depth greater than six feet below ground. Groundwater contaminated with benzene and ethylbenzene also remains on site. Proper handling, removal, and disposal of soil and/or groundwater may be necessary. Coordination should be conducted with IDEM Institutional Controls section ([institutionalcontrols@idem.IN.gov](mailto:institutionalcontrols@idem.IN.gov)) if impacts to this site are anticipated.

#### **Leaking Underground Storage (LUST) Sites:**

- Amoco Service Station 06258, 747 Ridge Road, AI# 17548, is located on the northwest corner of Ridge Road and Calumet Avenue and is the site of an active gas station. The site maintains two (2) 10,000 gallon Gasoline USTs and one (1) 12,000 gallon gasoline UST installed March 21, 1988. One (1) UST was removed on August 10, 1990. IDEM issued a Release from Investigation and Confirmation Steps Letter on November 17, 2016, indicating that a suspected release from the facility was reported by the Munster Fire Department. According to the letter, petroleum or gasoline odors were reported at Munster Donuts, 8314 Calumet Avenue, adjacent to the Amoco Service Station. IDEM conducted an Underground Storage Tank Inspection on March 25, 2021, and the facility was found to be out of compliance with equipment, operating, and maintenance requirements set forth in Indiana's UST Rule 329 IAC 9. Documentation reviewed indicates that a release occurred. If excavation occurs in this area, it is possible that petroleum contamination may be encountered. Proper handling, removal, and disposal of soil and/or groundwater may be necessary.
- Munster Car Wash, 111 Ridge Road, AI# 19325 is located on the northeast corner of the intersection of Ridge Road and Forest Avenue adjacent to the project area and is the site of a former car wash facility. IDEM issued an Initial Site Characterization letter on November 19, 1998, indicating a release of gasoline during the removal of underground storage tanks at the site on June 30, 1992. IDEM issued a No Further Action letter on January 29, 1999, indicating that TPH contamination in soils was below 100 ppm. If excavation occurs in this area, it is possible that petroleum contamination may be encountered. Proper removal and disposal of soil and/or groundwater may be necessary.

ECOLOGICAL INFORMATION: N/A

Prepared by:

Megan Moss

Environmental Services

Butler, Fairman and Seufert, Inc.

#### **Graphics:**

A map for each report section with a 0.5 mile search radius buffer around all project area(s) showing all items identified as possible items of concern is attached. If there is not a section map included, please change the YES to N/A:

SITE LOCATION: YES

INFRASTRUCTURE: YES

WATER RESOURCES: N/A

MINING/MINERAL EXPLORATION: N/A

HAZARDOUS MATERIAL CONCERNS: YES

**Hazardous Materials**  
**Ridge Road Complete Street Project**  
**Munster, Indiana**

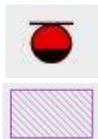


Munster Car Wash  
111 Ridge Road

Mobil  
323 Ridge Road

Amoco Service  
Station 06258  
747 Ridge Road

Speedway #7680  
444 Ridge Road



Leaking Underground Storage Tank (LUST)

Institutional Control



Project Area



0.5 Mile Radius



This map is intended to serve as an aid in graphic representation only. This information is not warranted for accuracy or other purposes.

**Sources:**

**Non Orthophotography**

**Data** - Obtained from the State of Indiana Geographical Information Office Library

**Orthophotography** - Obtained from Indiana Map Framework Data ([www.indianamap.org](http://www.indianamap.org))

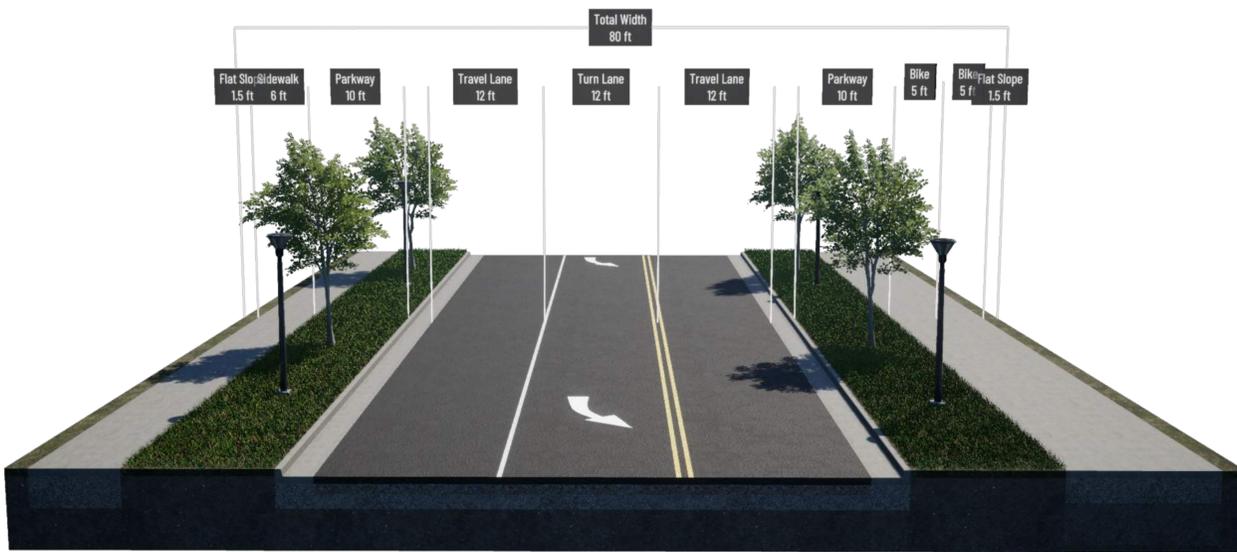
**Map Projection:** UTM Zone 16 N **Map Datum:** NAD83

**APPENDIX F – PRELIMINARY LAYOUTS**

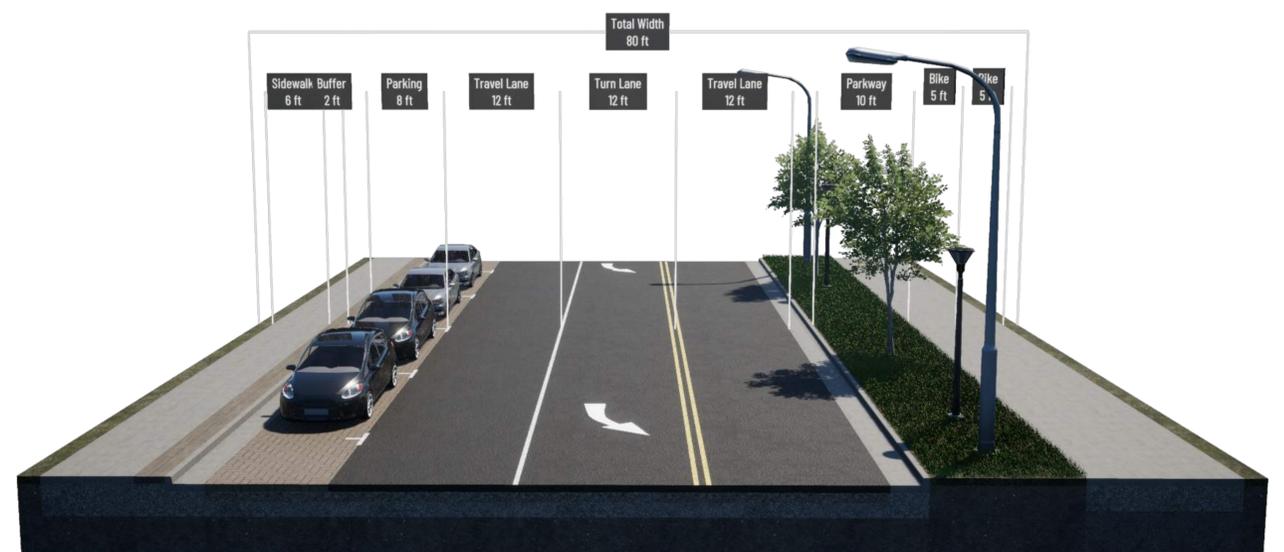
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**PLAN VIEW - HOHMAN AVENUE TO MANOR AVENUE**

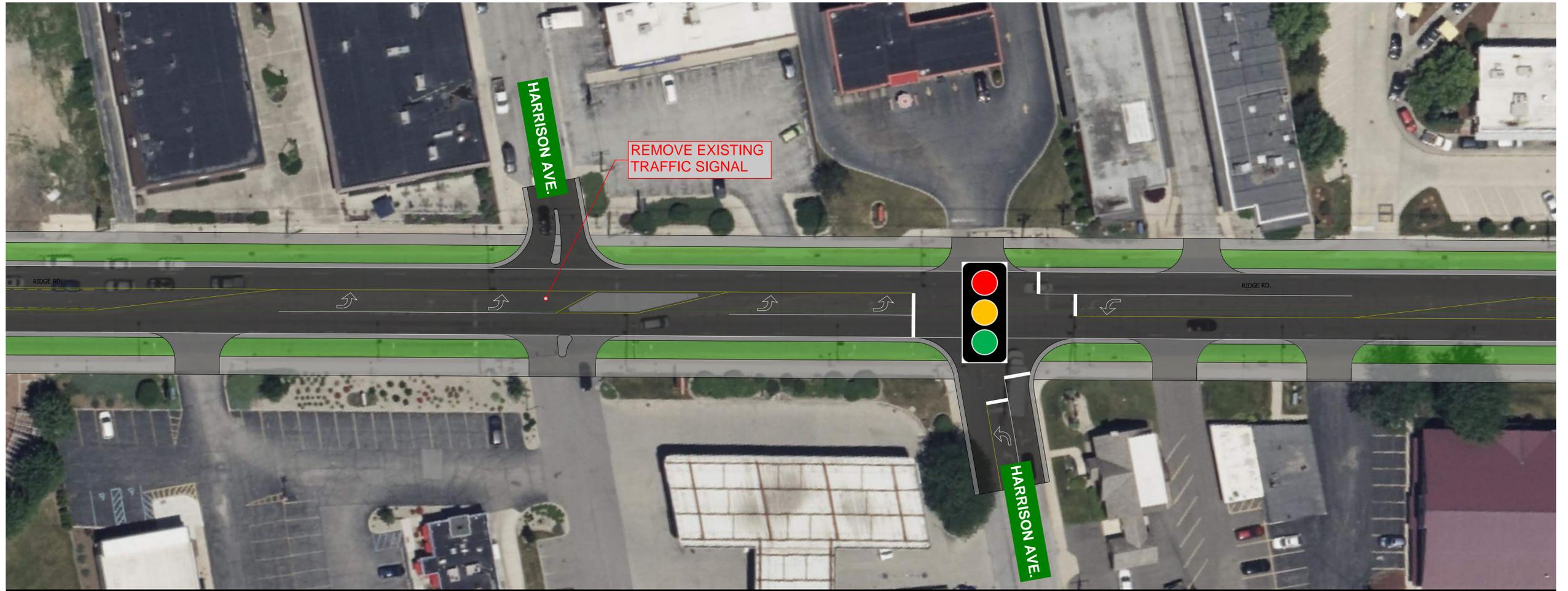


**SECTION B1**



**SECTION B2**

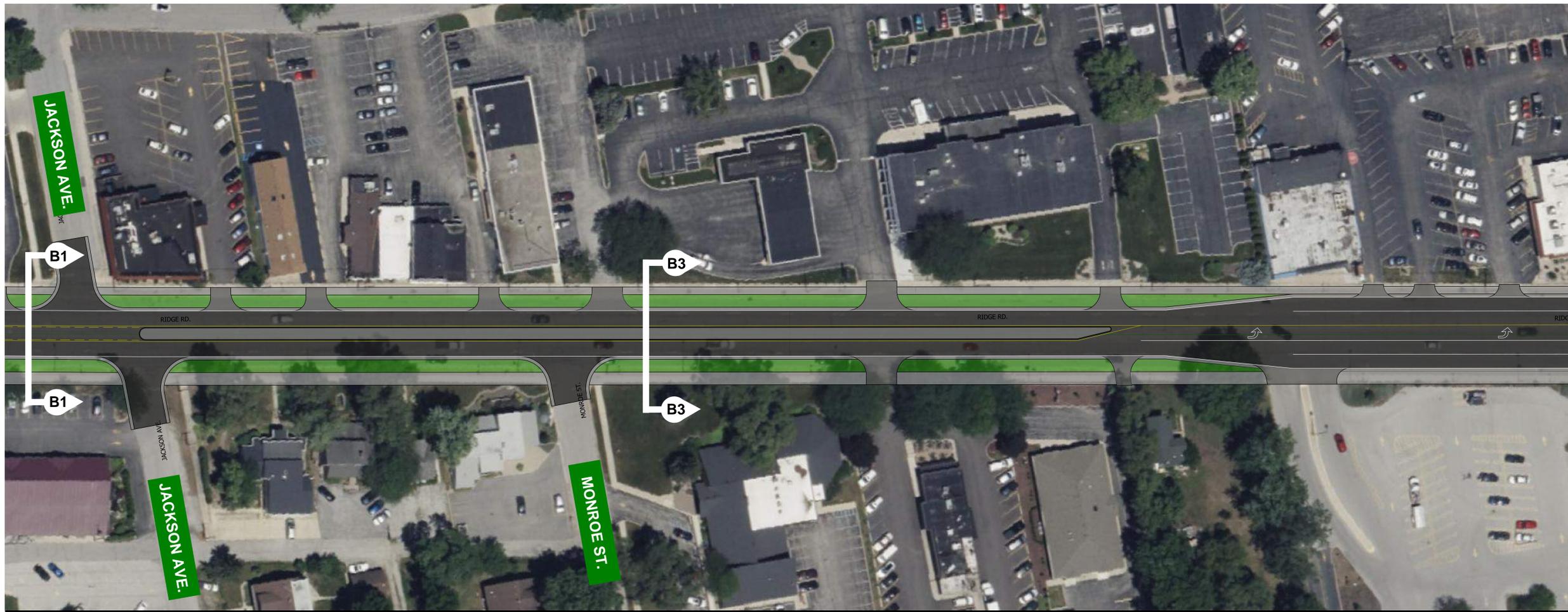
**RIDGE ROAD - HOHMAN AVENUE TO MANOR AVENUE  
ALTERNATIVE 1 - TRAVEL LANES PER PROJECTED CAPACITY**



**PLAN VIEW - HARRISON AVENUE INTERSECTION IMPROVEMENTS**

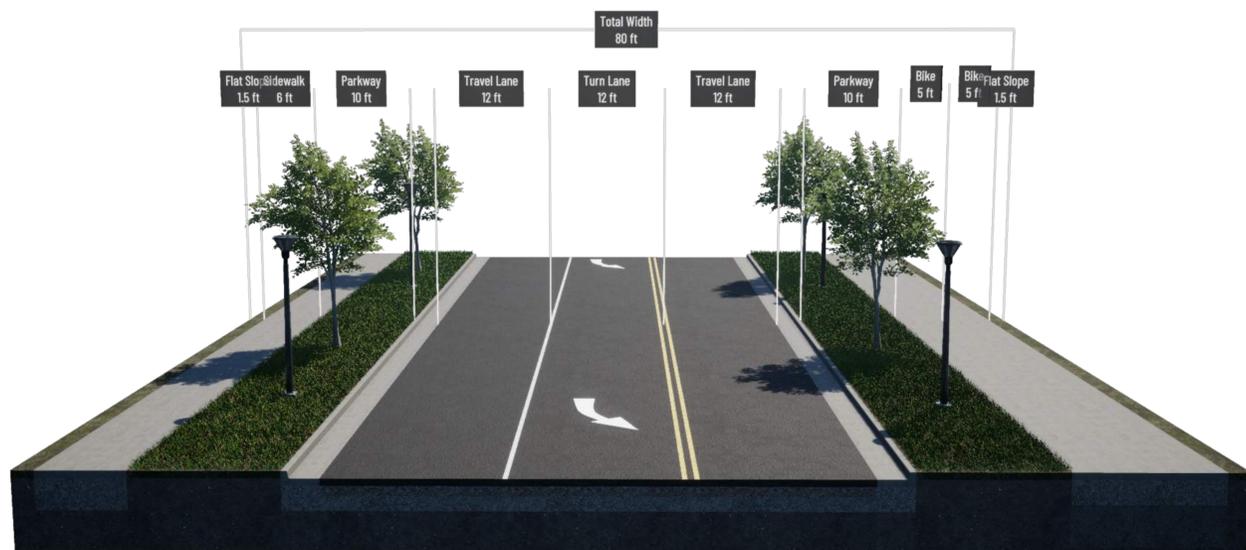
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ALTERNATIVE 1 - TRAVEL LANES PER PROJECTED CAPACITY**



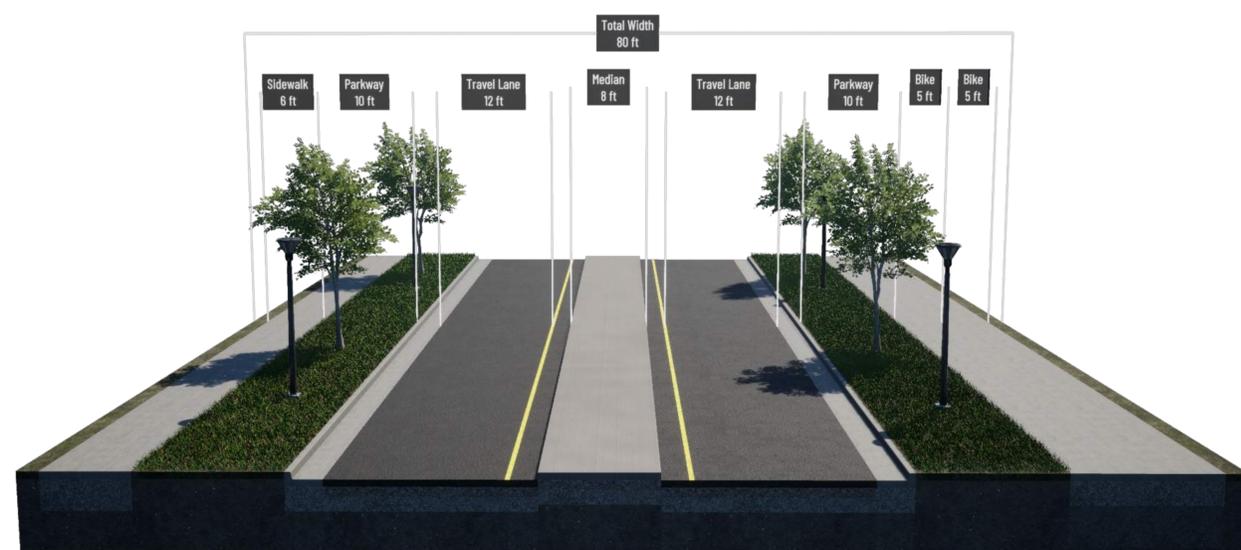


**PLAN VIEW - JACKSON AVENUE TO CALUMET AVENUE**

**INFRASTRUCTURE ENGINEERING** | INCORPORATED  
201 North Illinois Street | Suite 1720 | Indianapolis, IN 46204  
P 317.445.9800 | F 317.445.9100 | www.infrastructure-eng.com



**SECTION B1**



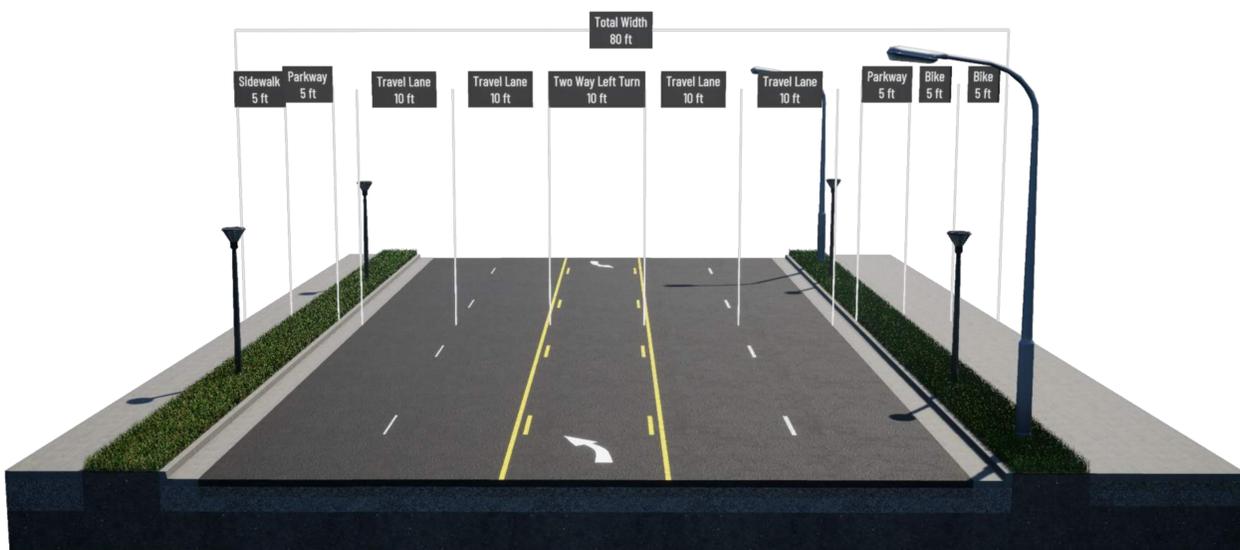
**SECTION B3**

**RIDGE ROAD - JACKSON AVENUE TO CALUMET AVENUE  
ALTERNATIVE 1 - TRAVEL LANES PER PROJECTED CAPACITY**



**PLAN VIEW - CALUMET AVENUE INTERSECTION**

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201 North Illinois Street | Suite 1720 | Indianapolis, IN 46204  
P 317.245.9800 | F 317.245.9100 | www.infrastructure-eng.com

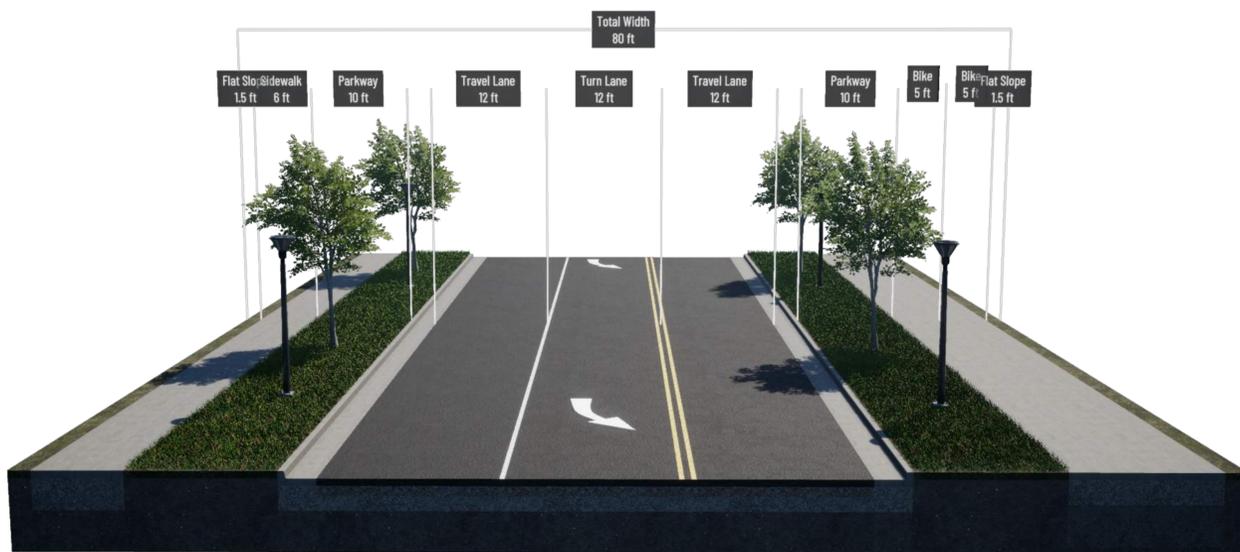


**SECTION B4**

**RIDGE ROAD - CALUMET AVENUE INTERSECTION  
ALTERNATIVE 1 - TRAVEL LANES PER PROJECTED CAPACITY**



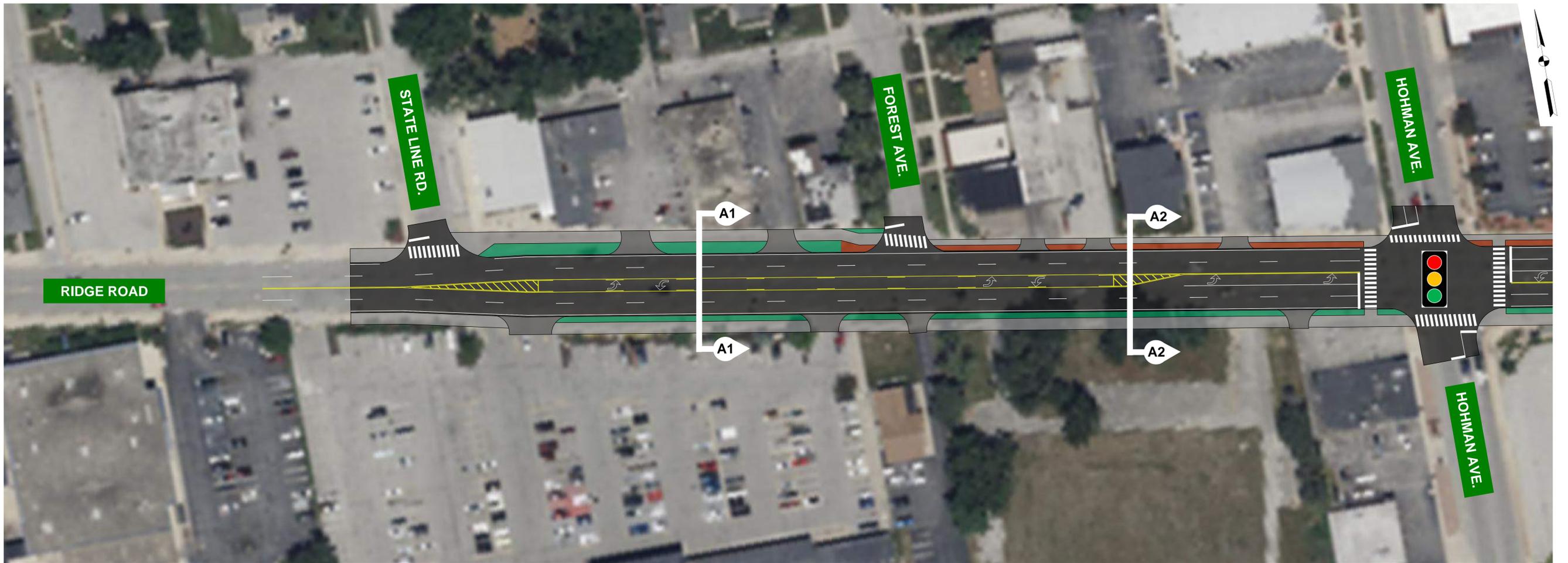
PLAN VIEW - MUNSTER TOWN HALL TO COLUMBIA AVENUE



SECTION B1

RIDGE ROAD - MUNSTER TOWN HALL TO COLUMBIA AVENUE  
ALTERNATIVE 1 - TRAVEL LANES PER PROJECTED CAPACITY





**PLAN VIEW - STATE LINE ROAD TO HOHMAN AVENUE**



**EXISTING RIDGE ROAD**

**SECTION A1**

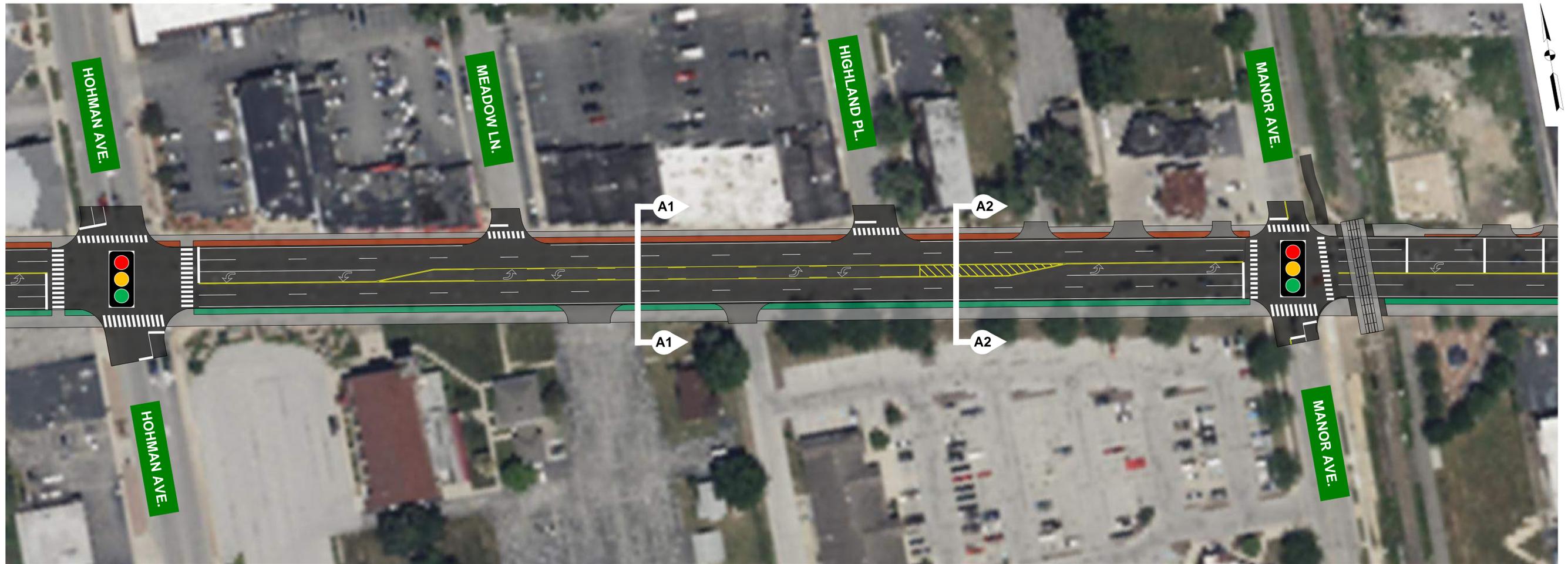
**SECTION A2**



**RIDGE ROAD**



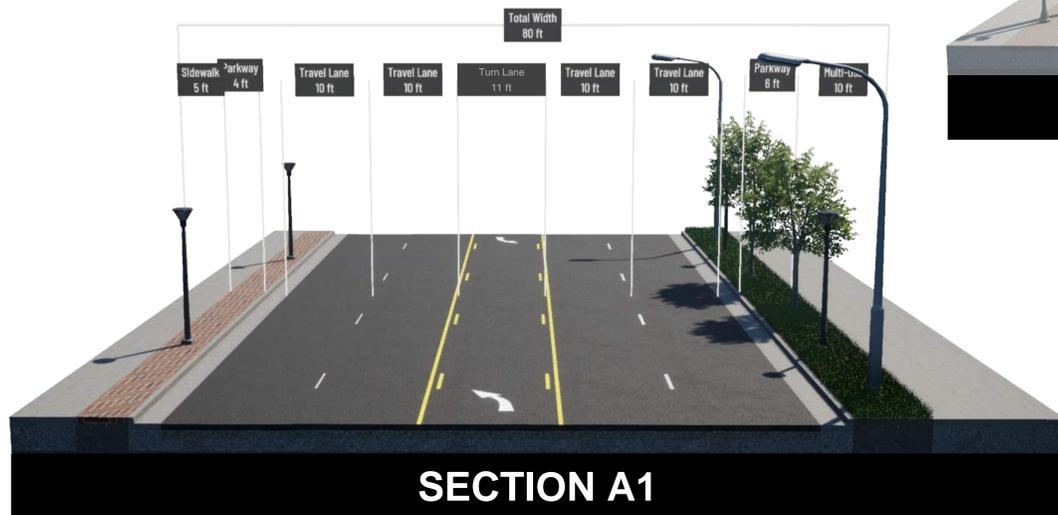
**ALTERNATIVE 2**  
 10' LANES / MIXED-USE PATHWAY / STREET TREES (RAISED MEDIANS TBD)



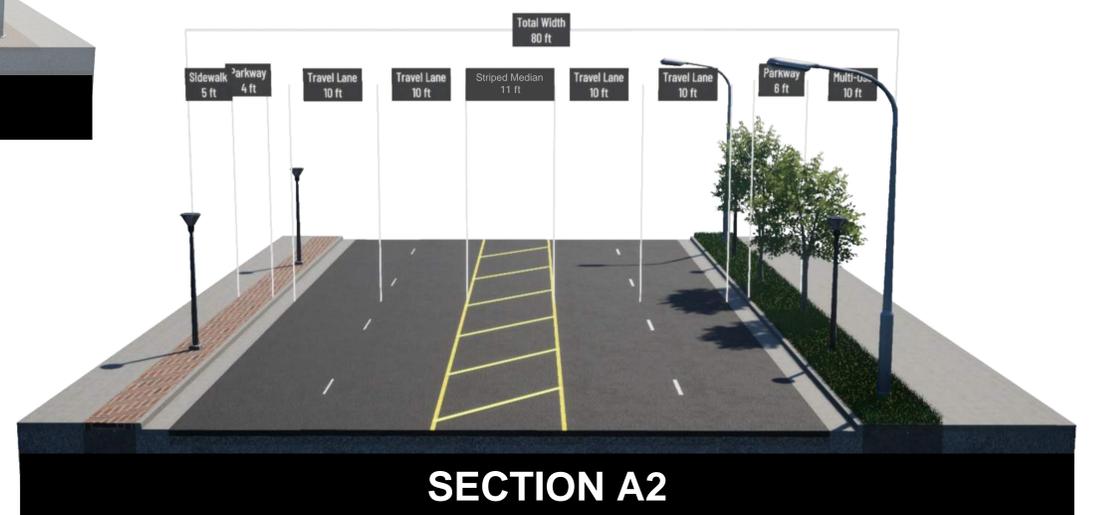
PLAN VIEW - HOHMAN AVENUE TO MANOR AVENUE



EXISTING RIDGE ROAD



SECTION A1



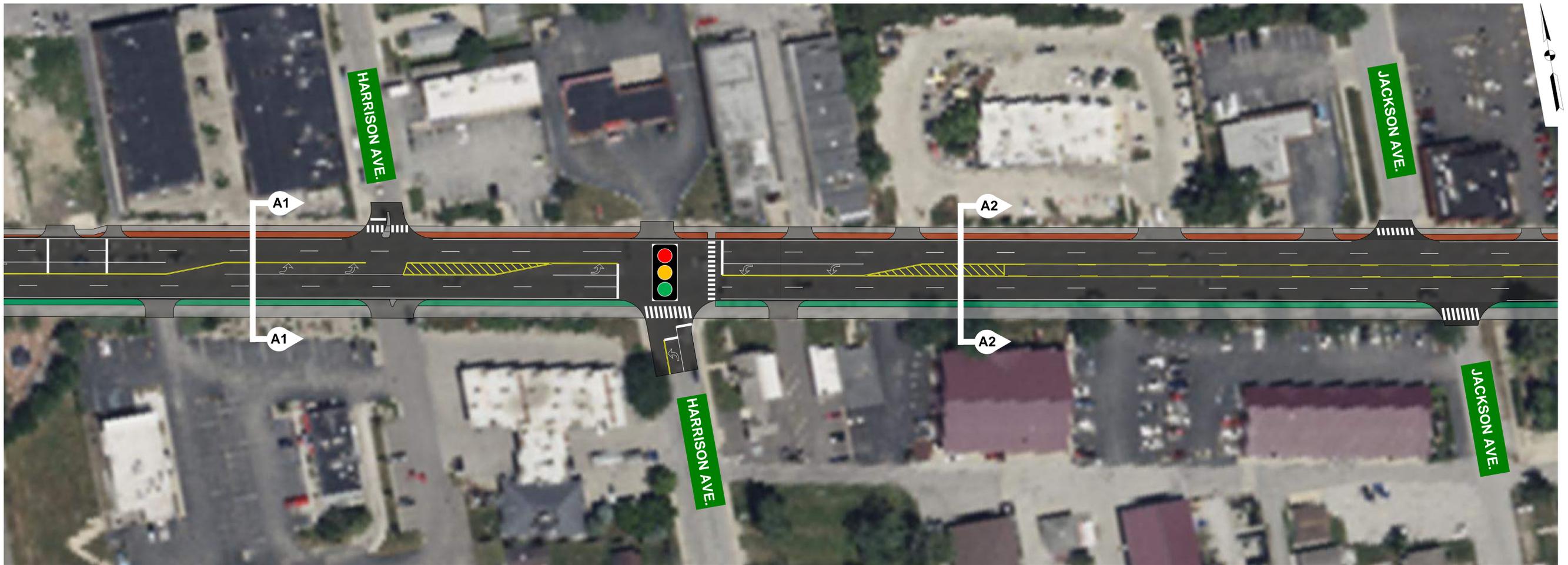
SECTION A2



RIDGE ROAD



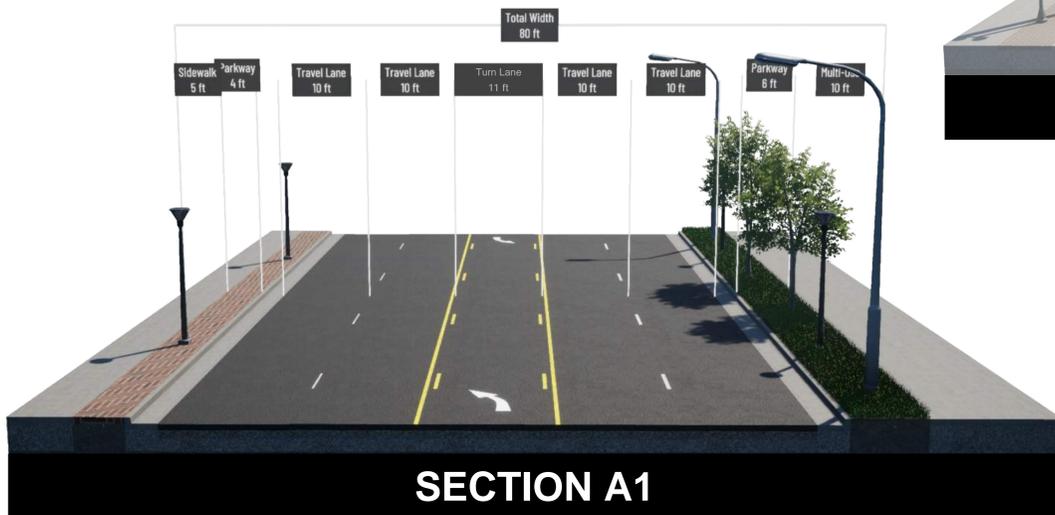
ALTERNATIVE 2  
10' LANES / MIXED-USE PATHWAY / STREET TREES (RAISED MEDIANS TBD)



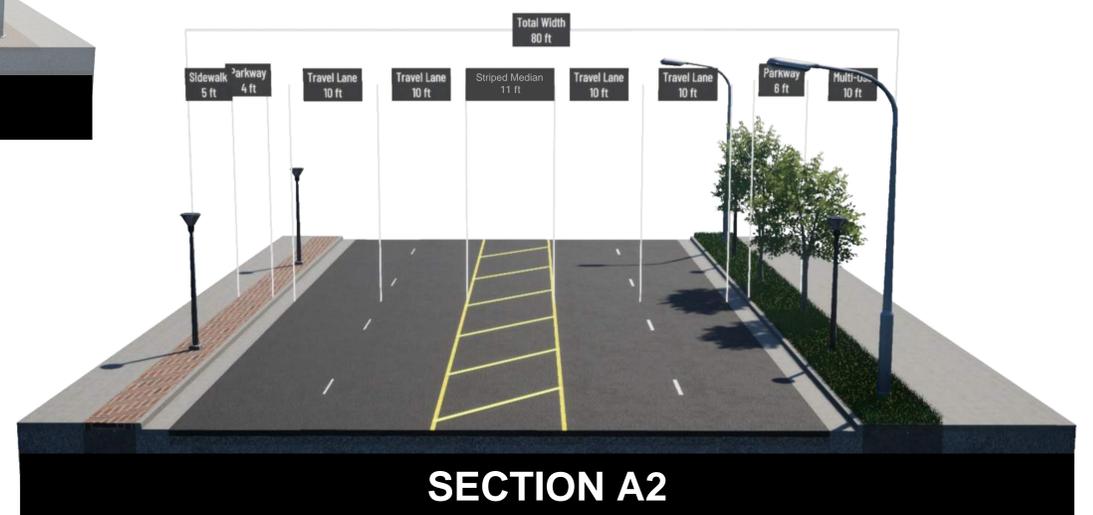
**PLAN VIEW - MANOR AVENUE TO JACKSON AVENUE**



**EXISTING RIDGE ROAD**



**SECTION A1**



**SECTION A2**



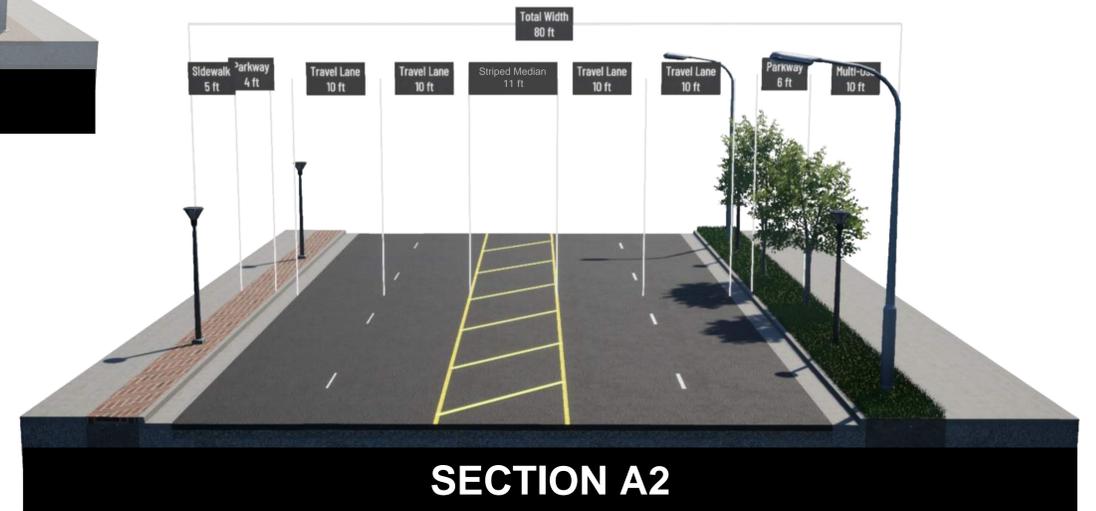
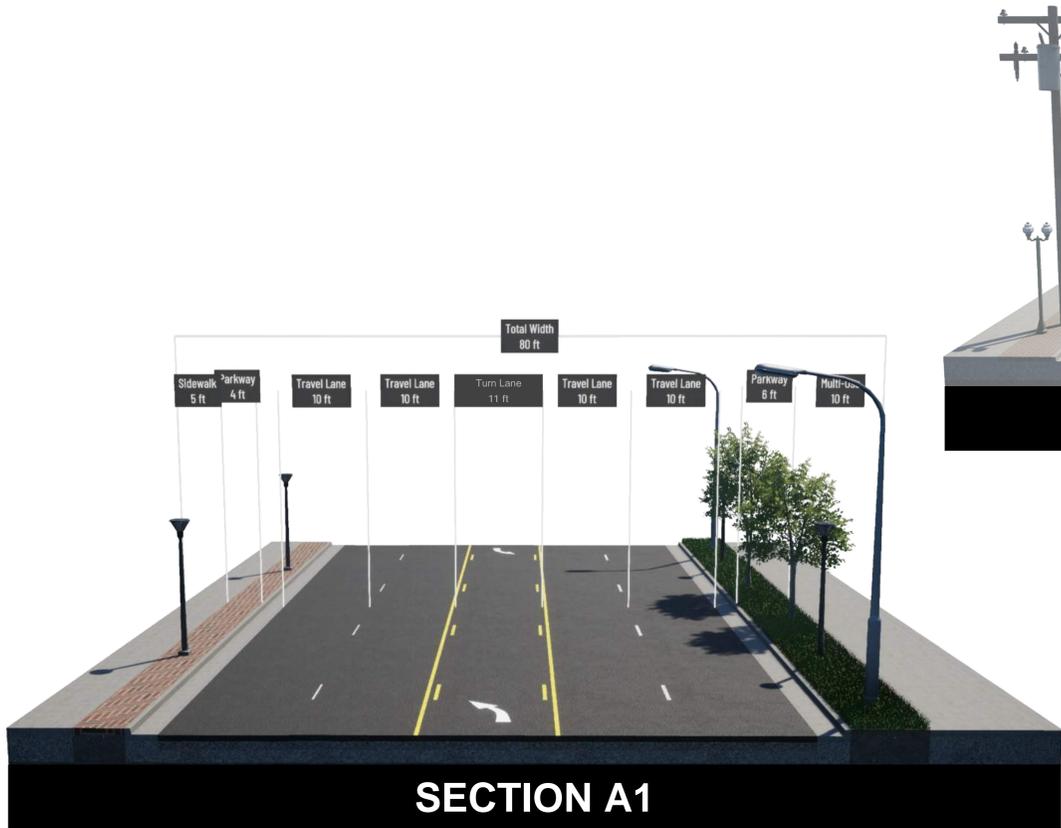
**RIDGE ROAD**



**ALTERNATIVE 2**  
 10' LANES / MIXED-USE PATHWAY / STREET TREES (RAISED MEDIANS TBD)



**PLAN VIEW - JACKSON AVENUE TO RIDGE ROAD**



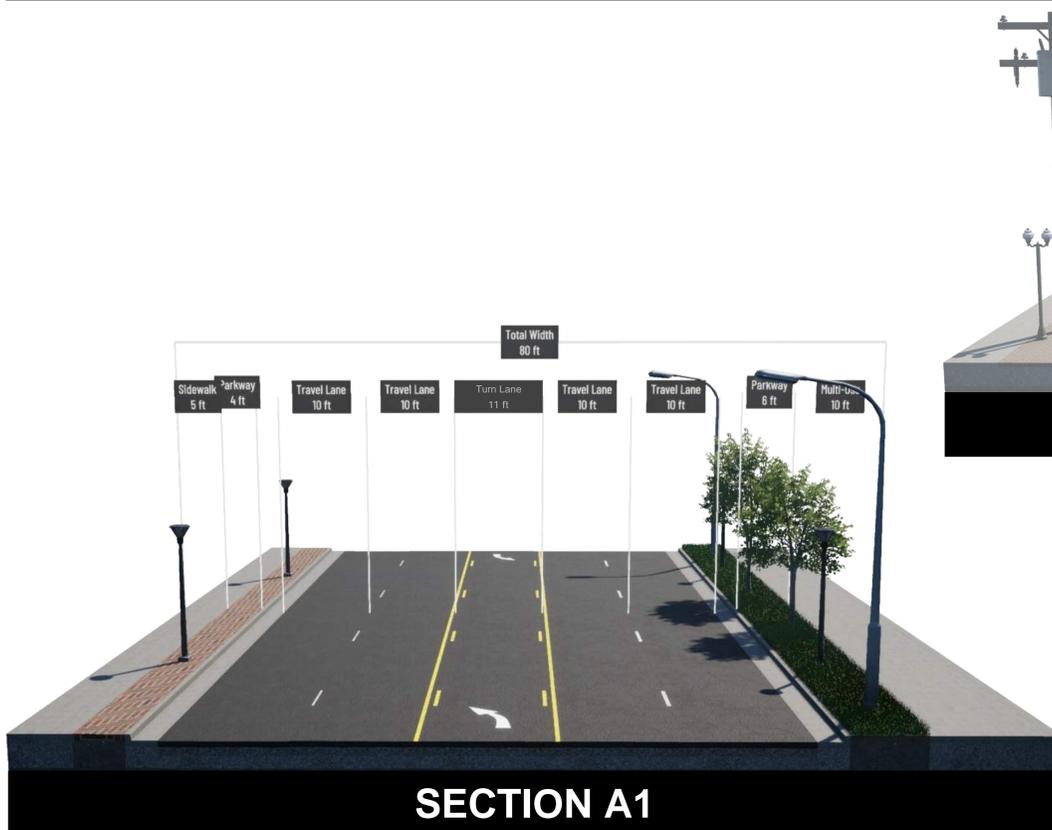
**RIDGE ROAD**



**ALTERNATIVE 2**  
 10' LANES / MIXED-USE PATHWAY / STREET TREES (RAISED MEDIANS TBD)



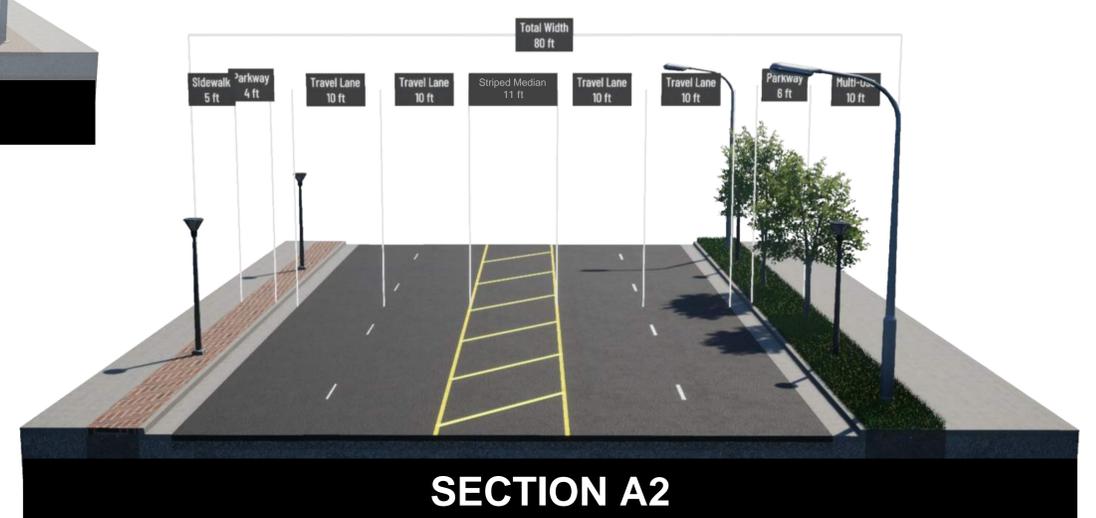
PLAN VIEW - CALUMET AVENUE TO ~TAPPER AVENUE



SECTION A1



EXISTING RIDGE ROAD



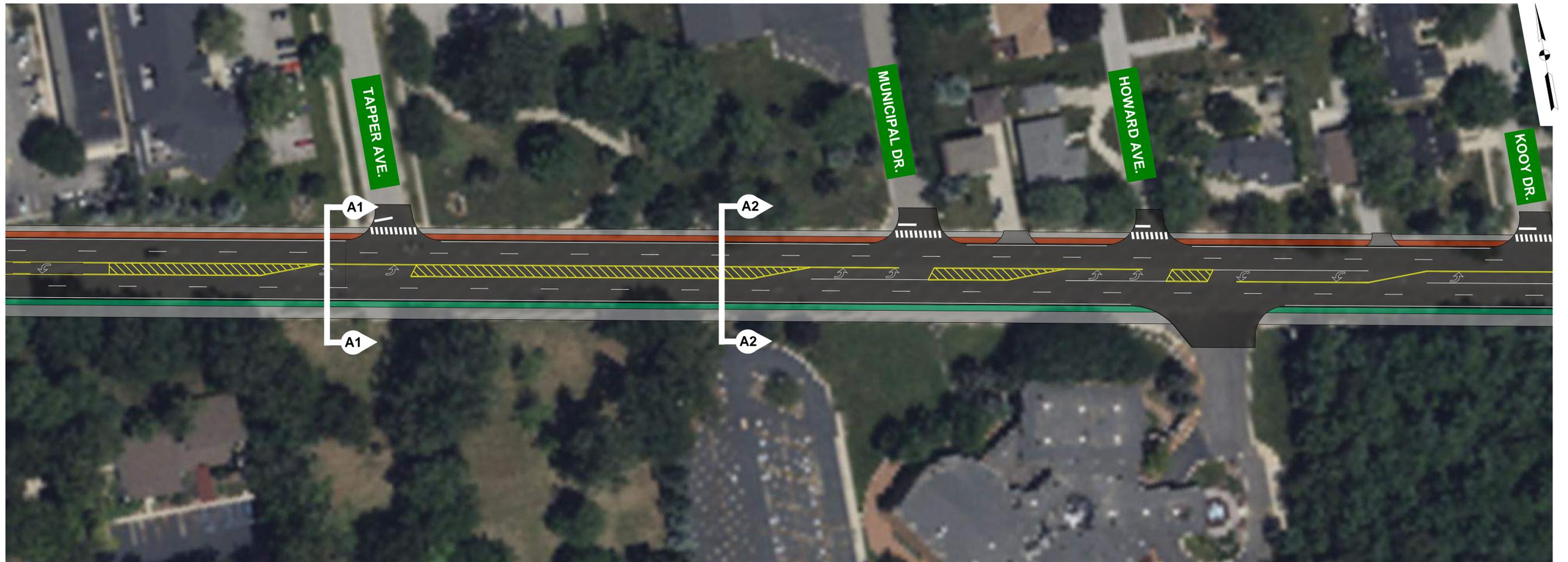
SECTION A2



RIDGE ROAD



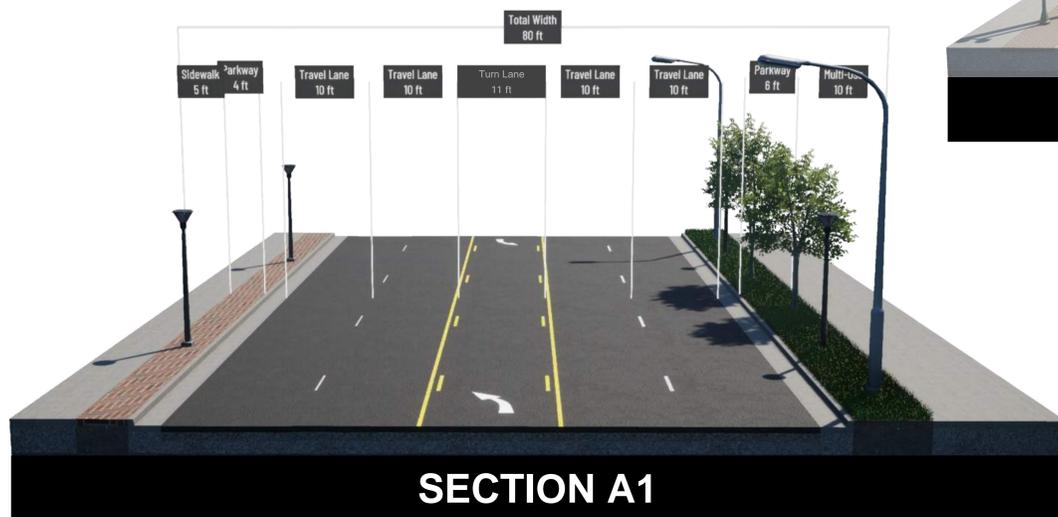
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10' LANES / MIXED-USE PATHWAY / STREET TREES (RAISED MEDIANS TBD)



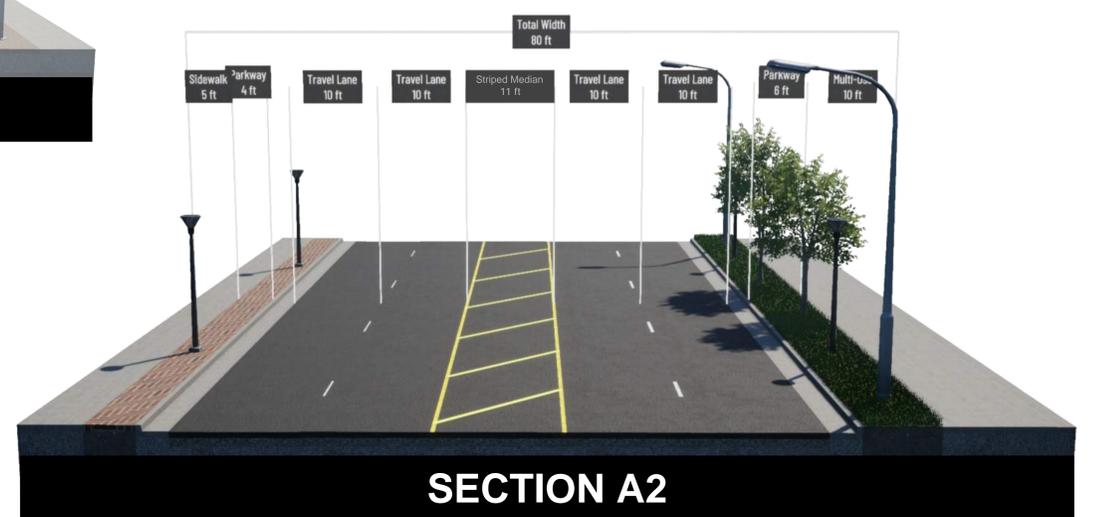
**PLAN VIEW - TAPPER AVENUE TO KOOY DRIVE**



**EXISTING RIDGE ROAD**



**SECTION A1**



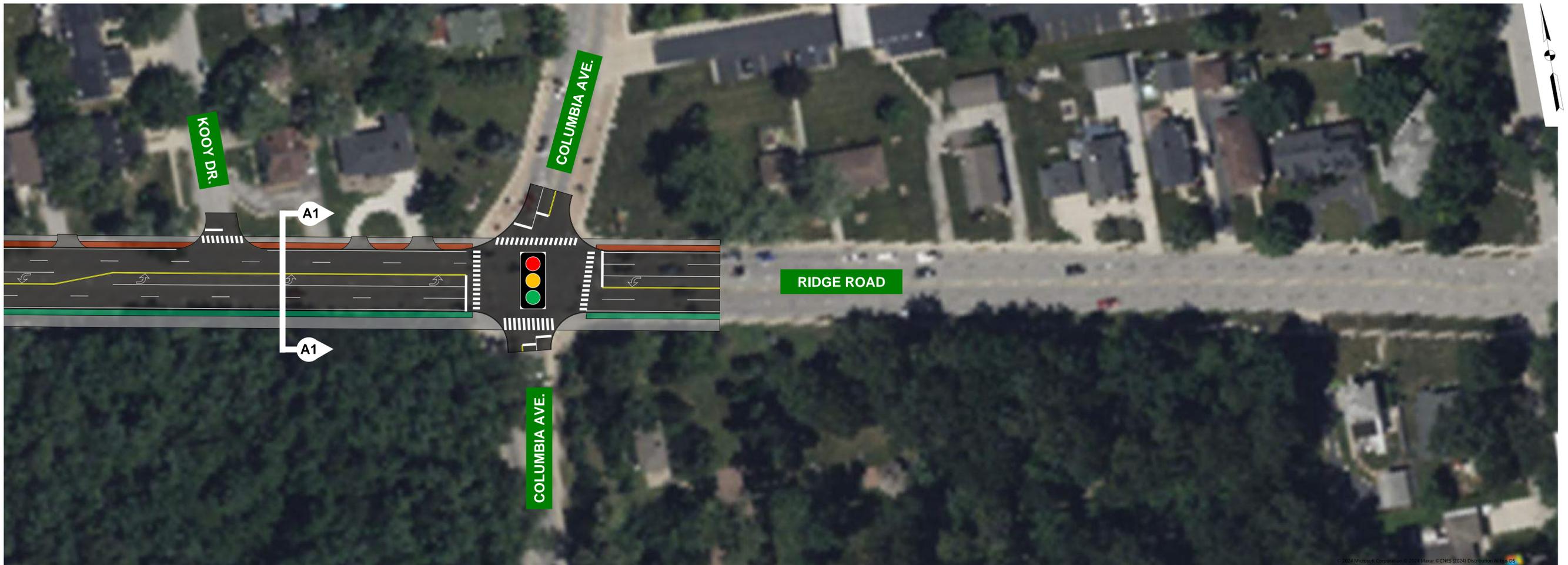
**SECTION A2**



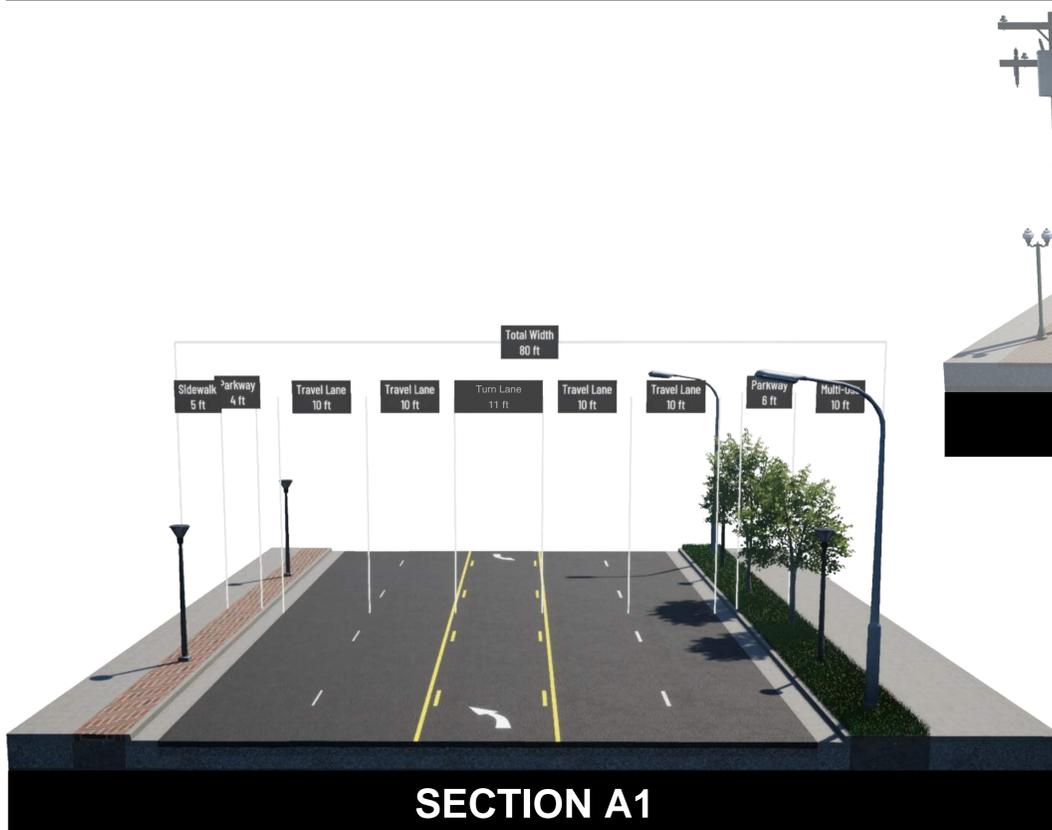
**RIDGE ROAD**



**ALTERNATIVE 2**  
 10' LANES / MIXED-USE PATHWAY / STREET TREES (RAISED MEDIANS TBD)



PLAN VIEW - KOOY DRIVE TO SCHREIBER DRIVE



SECTION A1



EXISTING RIDGE ROAD



# RIDGE ROAD



**ALTERNATIVE 2**  
 10' LANES / MIXED-USE PATHWAY / STREET TREES (RAISED MEDIANS TBD)

**APPENDIX G – PRELIMINARY PREFERRED ALTERNATIVE CONCEPT PLANS**

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PROJECT	DESIGNATION
VALUE	XXXX
CONTRACT	BRIDGE FILE
XXXX	N/A

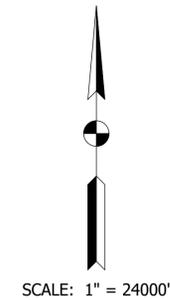
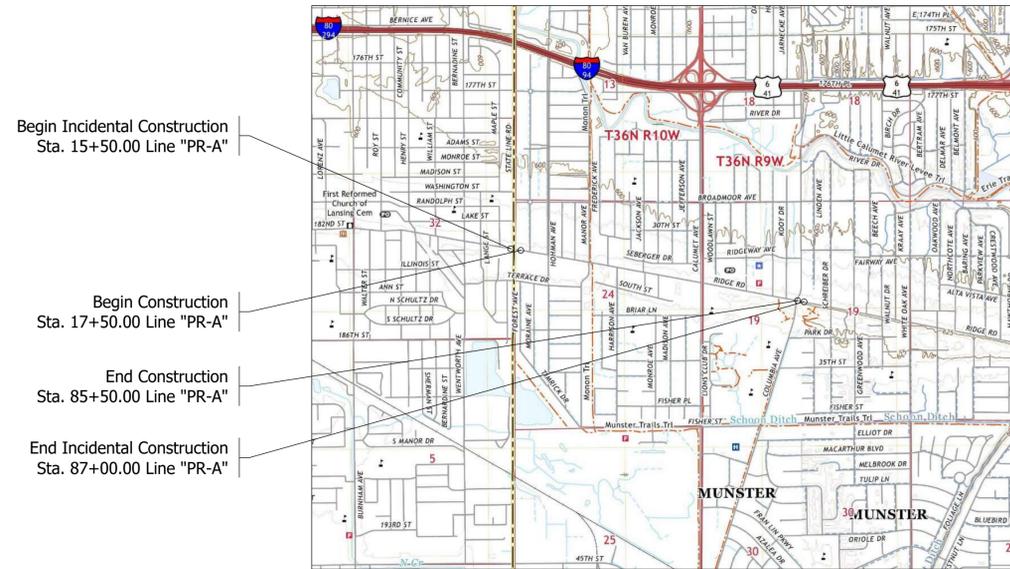
# TOWN OF MUNSTER



## APPENDIX G PRELIMINARY PREFERRED ALTERNATIVE CONCEPT PLANS

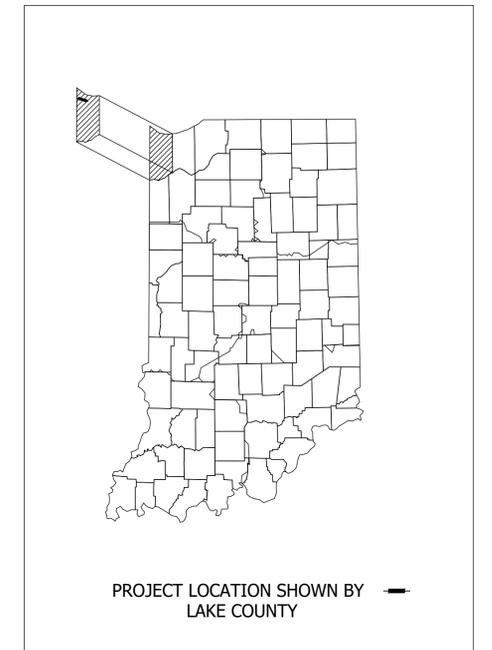
### MUNSTER, IN NORTH TOWNSHIP LAKE COUNTY

Lane Configuration and Mill and Overlay on Ridge Road through the Town of Munster.  
Section 32, Township 36 North, Range 15 East, Thornton Township, Cook County, Illinois  
Section 19, Township 36 North, Range 9 West, North Township, Lake County, Indiana  
Section 24, Township 36 North, Range 10 West, North Township, Lake County, Indiana



LOCATION MAP  
LAKE COUNTY

TRAFFIC DATA	
A.A.D.T. (-----)	----- V.P.D.
A.A.D.T. (-----)	----- V.P.D.
D.H.V. (-----)	----- V.P.H.
DIRECTIONAL DISTRIBUTION	----- %
TRUCKS	-----% A.A.D.T.
	-----% D.H.V.
DESIGN DATA	
DESIGN SPEED	----- M.P.H.
PROJECT DESIGN CRITERIA	-----
FUNCTIONAL CLASSIFICATION	-----
RURAL/URBAN	-----
TERRAIN	-----
ACCESS CONTROL	-----



LATITUDE: ----	LONGITUDE: ----
BRIDGE LENGTH: _____	0.00 _____ MI.
ROADWAY LENGTH: _____	1.35 _____ MI.
TOTAL LENGTH: _____	1.35 _____ MI.
MAX. GRADE: _____	---- %

INDIANA DEPARTMENT OF TRANSPORTATION  
STANDARD SPECIFICATIONS DATED 2024  
TO BE USED WITH THESE PLANS

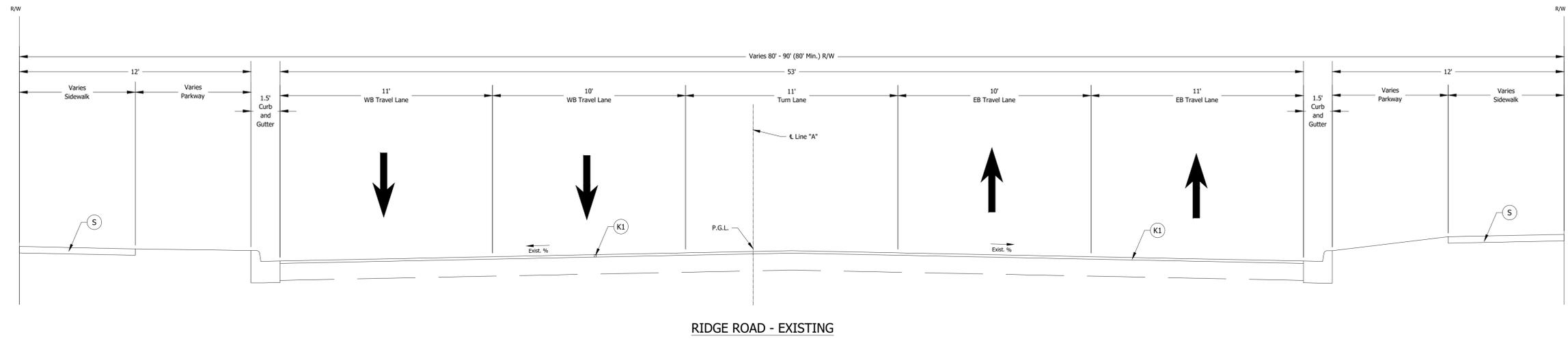
PLANS PREPARED BY: -----	(---) -----
	PHONE NUMBER
CERTIFIED BY: _____	---/---/---
	DATE
APPROVED FOR LETTING: _____	INDIANA DEPARTMENT OF TRANSPORTATION
	DATE

	BRIDGE FILE
	N/A
	DESIGNATION
	XXXX
SURVEY BOOK	SHEET
ELECTRONIC	1 of 16
CONTRACT	PROJECT
XXXX	VALUE

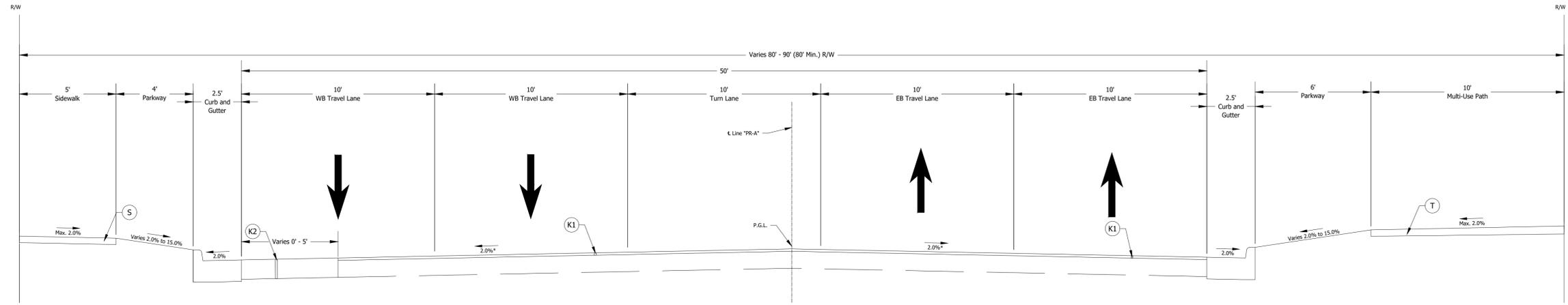




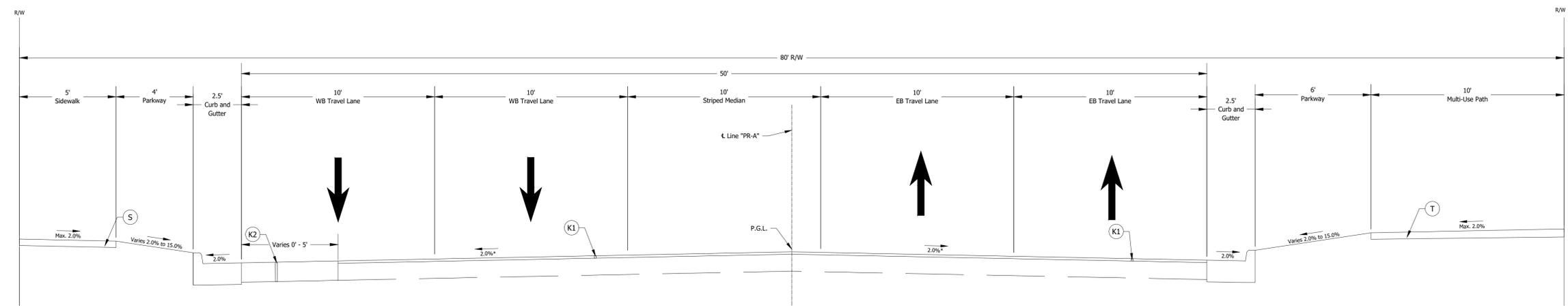
Last Update: Sep 03, 2024 - 5:07pm  
 Drawing name: Q:\P-22\4695-00 - Ridge Road Complete Street (Munster)\DWG\Sheets\Pr Typical.dwg



RIDGE ROAD - EXISTING



RIDGE ROAD - A1



RIDGE ROAD - A2

\* Cross slope proposed to generally match the existing cross slope, but shall be 2.0% wherever feasible.

**LEGEND**

(K1)	HMA Overlay
(K2)	HMA for Widening, Type B
(S)	Sidewalk, Concrete
(T)	Multi-Use Trail
(26)	Mulched Seeding, U

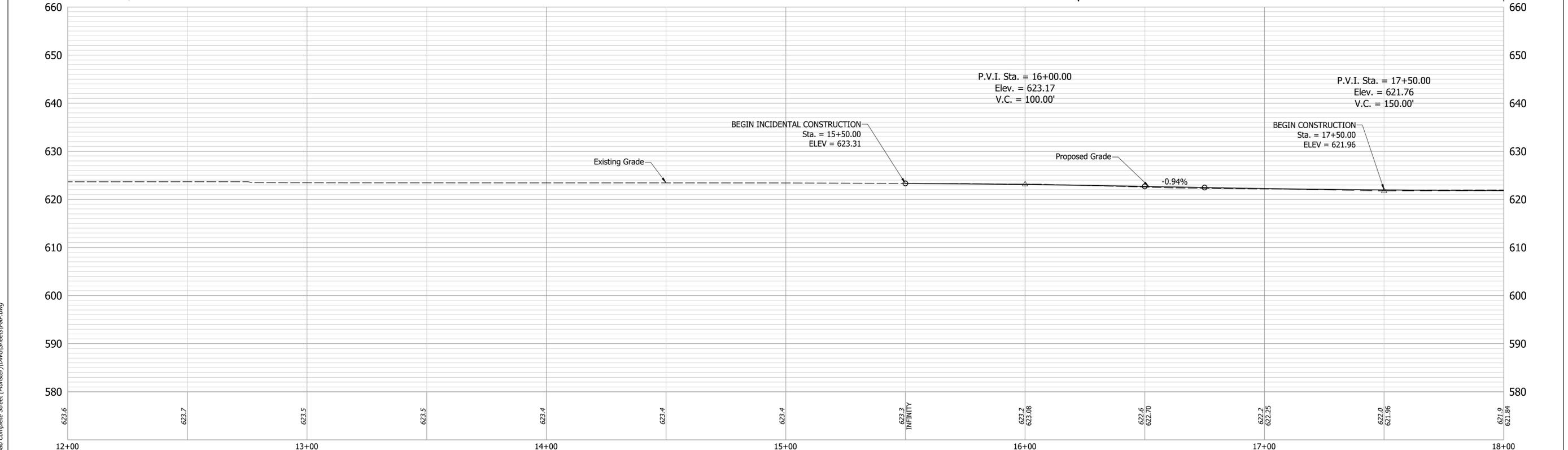
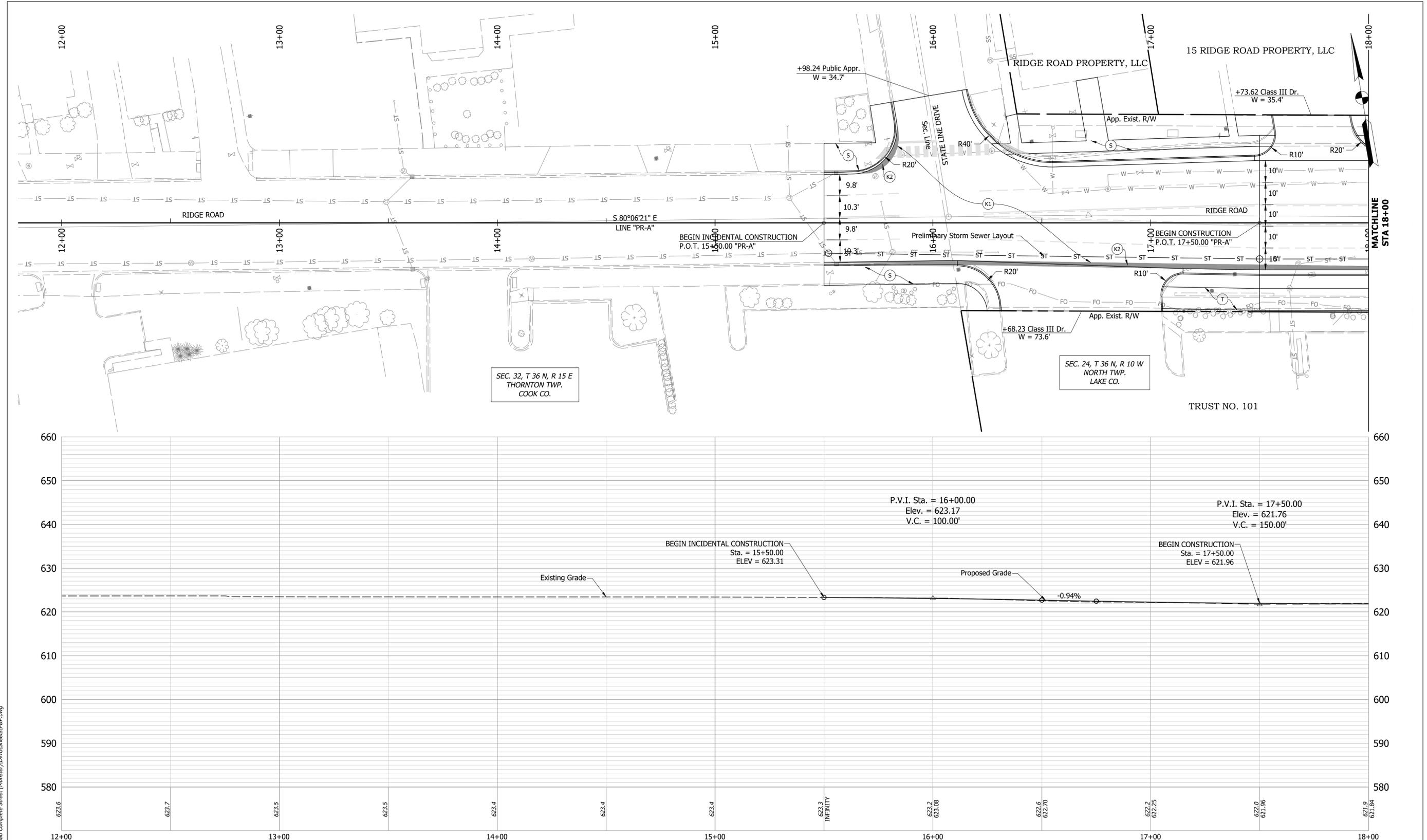
RECOMMENDED FOR APPROVAL _____	DESIGN ENGINEER _____	DATE _____
DESIGNED: _____	KRT	DRAWN: _____
_____	KRT	_____
CHECKED: _____	APK	CHECKED: _____
_____	APK	_____

TOWN OF MUNSTER	
APPENDIX G	
PRELIM. PREFERRED ALT. CONCEPT PLANS	

HORIZONTAL SCALE	BRIDGE FILE
1" = 3'	N/A
VERTICAL SCALE	DESIGNATION
N/A	XXXXX
SURVEY BOOK	SHEETS
ELECTRONIC	3 of 16
CONTRACT	PROJECT
XXXXX	VALUE



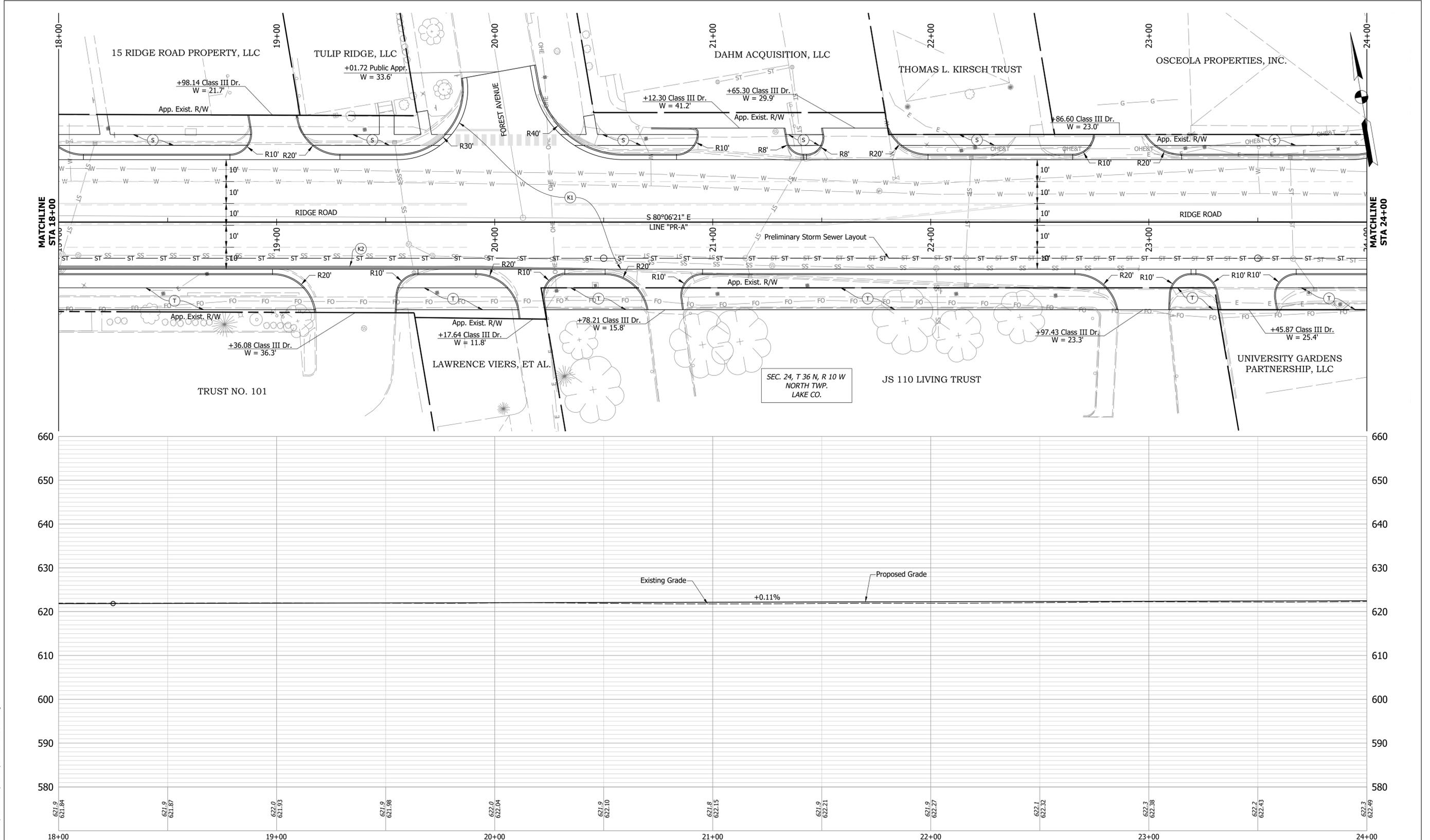
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 File: C:\P\2114695-00 - Ridge Road Complete Street (Munster)\DWG\Sheets\PRP.dwg



<b>LEGEND</b> (K1) HMA Overlay (K2) HMA for Widening, Type B (S) Sidewalk, Concrete (T) Multi-Use Trail (X) Curb Ramp, Concrete (26) Mulched Seeding, U	RECOMMENDED FOR APPROVAL _____ DESIGN ENGINEER _____ DATE _____	<b>TOWN OF MUNSTER</b>  <b>APPENDIX G</b> <b>PRELIM. PREFERRED ALT. CONCEPT PLANS</b>	HORIZONTAL SCALE 1" = 20' VERTICAL SCALE 1" = 10'	BRIDGE FILE N/A DESIGNATION XXXXX
	DESIGNED: KRT DRAWN: KRT CHECKED: APK CHECKED: APK		SURVEY BOOK SHEETS ELECTRONIC 4 of 16 CONTRACT PROJECT XXXXX VALUE	



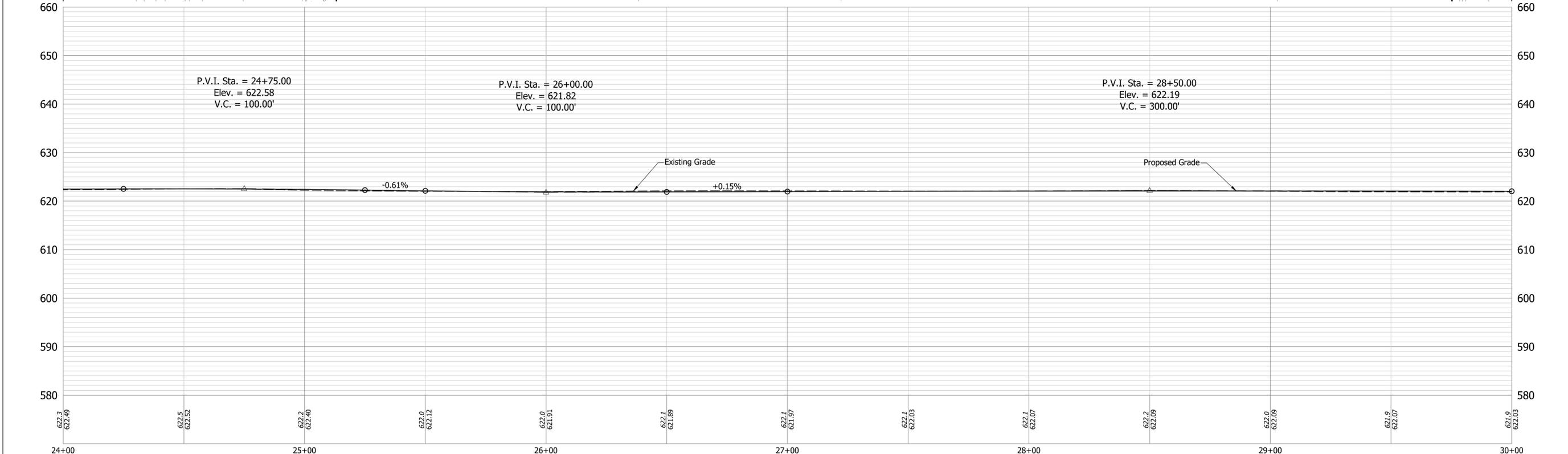
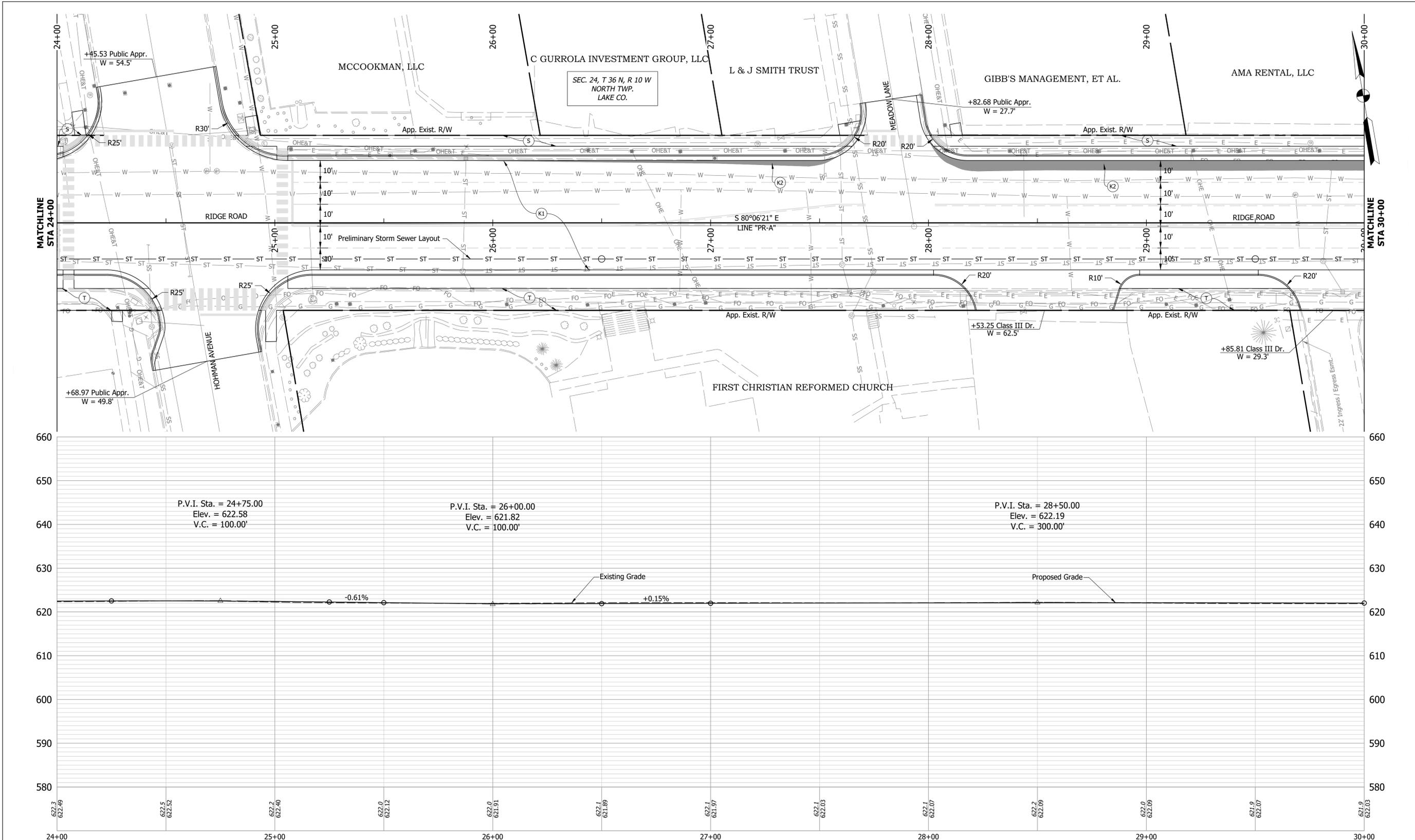
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<b>LEGEND</b> (K1) HMA Overlay (K2) HMA for Widening, Type B (S) Sidewalk, Concrete (T) Multi-Use Trail (X) Curb Ramp, Concrete (26) Mulched Seeding, U	RECOMMENDED FOR APPROVAL _____ DESIGN ENGINEER _____ DATE _____	<b>TOWN OF MUNSTER</b>  <b>APPENDIX G</b> <b>PRELIM. PREFERRED ALT. CONCEPT PLANS</b>	HORIZONTAL SCALE 1" = 20' VERTICAL SCALE 1" = 10'	BRIDGE FILE N/A DESIGNATION XXXXX
	DESIGNED: KRT DRAWN: KRT CHECKED: APK CHECKED: APK		SURVEY BOOK SHEETS ELECTRONIC 5 of 16 CONTRACT PROJECT XXXXX VALUE	



Date: Sep 12, 2024, 10:31am User Name: Kredder  
 File: C:\P21\4695-00 - Ridge Road Complete Street (Munster)\DWG\Sheets\PR-P.R.dwg



**LEGEND**

(K1)	HMA Overlay	(26)	Mulched Seeding, U
(K2)	HMA for Widening, Type B		
(S)	Sidewalk, Concrete		
(T)	Multi-Use Trail		
(X)	Curb Ramp, Concrete		

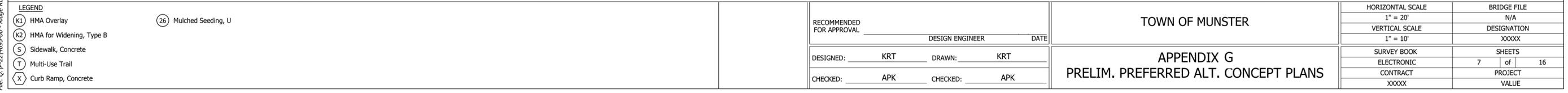
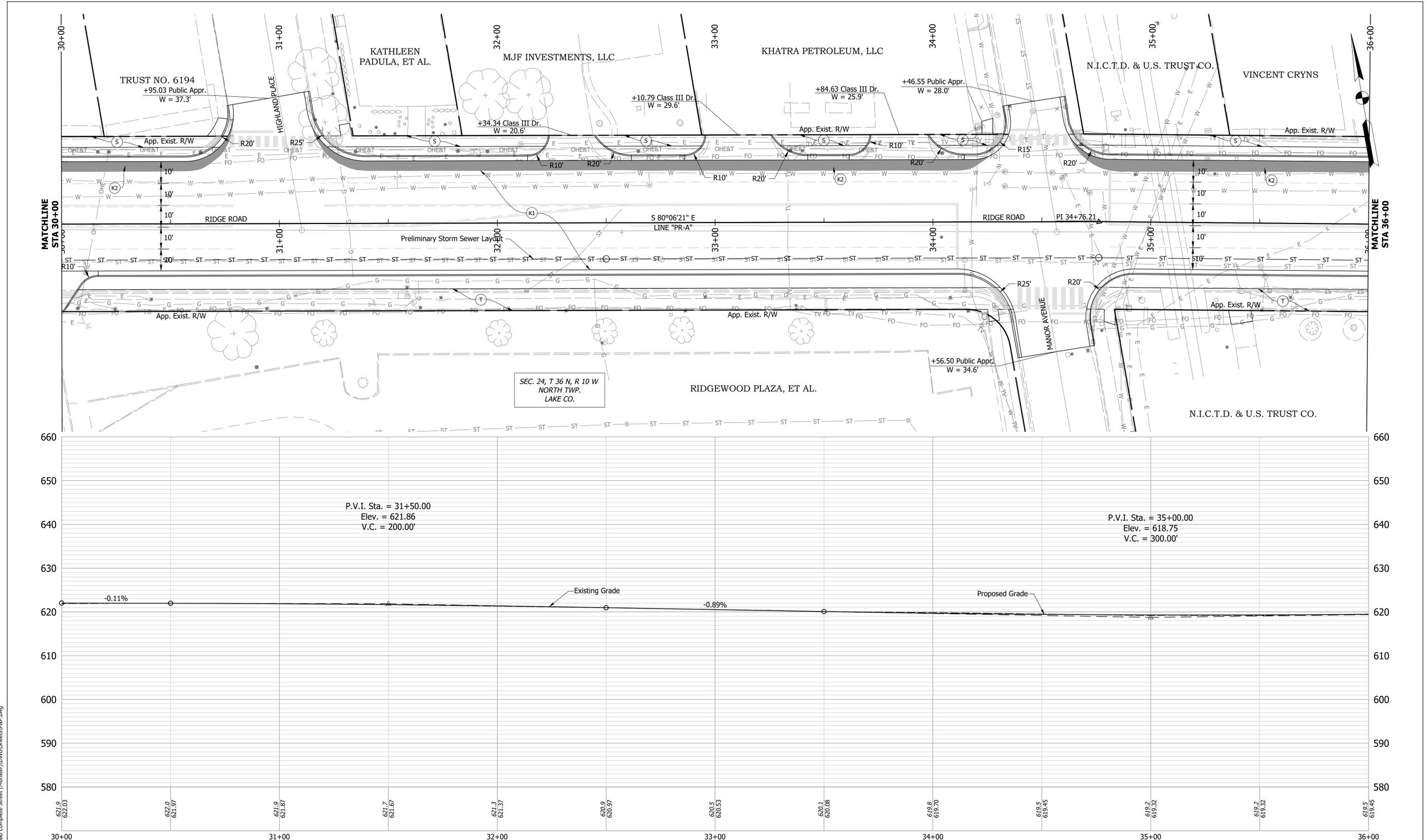
RECOMMENDED FOR APPROVAL	DESIGN ENGINEER	DATE
DESIGNED: KRT	DRAWN: KRT	
CHECKED: APK	CHECKED: APK	

<b>TOWN OF MUNSTER</b>	
<b>APPENDIX G</b>	
<b>PRELIM. PREFERRED ALT. CONCEPT PLANS</b>	

HORIZONTAL SCALE	BRIDGE FILE
1" = 20'	N/A
VERTICAL SCALE	DESIGNATION
1" = 10'	XXXXX
SURVEY BOOK	SHEETS
ELECTRONIC	6 of 16
CONTRACT	PROJECT
XXXXX	VALUE



Date: Sep 12, 2024, 10:31am User Name: Kredder  
 File: C:\P214695-00 - Ridge Road Complete Street (Munster)\DWG\Sheets\PRP.dwg



**LEGEND**

(K1)	HMA Overlay	(26)	Mulched Seeding, U
(K2)	HMA for Widening, Type B		
(S)	Sidewalk, Concrete		
(T)	Multi-Use Trail		
(X)	Curb Ramp, Concrete		

RECOMMENDED FOR APPROVAL	DESIGN ENGINEER	DATE
DESIGNED: KRT	DRAWN: KRT	
CHECKED: APK	CHECKED: APK	

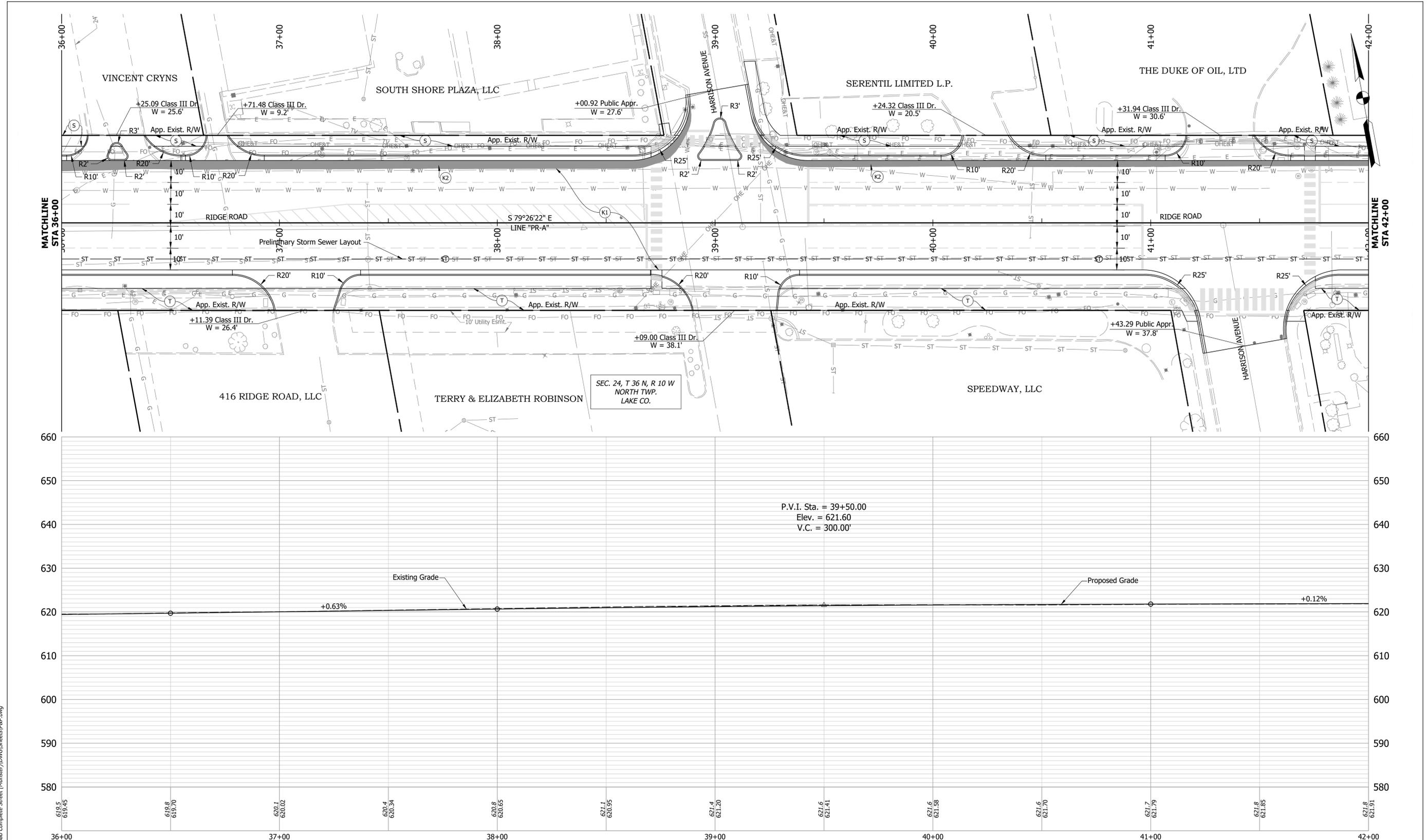
**TOWN OF MUNSTER**

**APPENDIX G**  
**PRELIM. PREFERRED ALT. CONCEPT PLANS**

HORIZONTAL SCALE	BRIDGE FILE
1" = 20'	N/A
VERTICAL SCALE	DESIGNATION
1" = 10'	XXXXX
SURVEY BOOK	SHEETS
ELECTRONIC	7 of 16
CONTRACT	PROJECT
XXXXX	VALUE



Date: Sep 12, 2024, 10:31am User Name: Kredder  
 File: C:\P\2214695-00 - Ridge Road Complete Street (Munster)\DWG\Sheets\PRP.dwg



<p><b>LEGEND</b></p> <ul style="list-style-type: none"> <li>(K1) HMA Overlay</li> <li>(K2) HMA for Widening, Type B</li> <li>(S) Sidewalk, Concrete</li> <li>(T) Multi-Use Trail</li> <li>(X) Curb Ramp, Concrete</li> <li>(26) Mulched Seeding, U</li> </ul>	<p>RECOMMENDED FOR APPROVAL _____</p> <p>DESIGNED: <u>KRT</u> DRAWN: <u>KRT</u></p> <p>CHECKED: <u>APK</u> CHECKED: <u>APK</u></p>	<p><b>TOWN OF MUNSTER</b></p> <p><b>APPENDIX G</b></p> <p><b>PRELIM. PREFERRED ALT. CONCEPT PLANS</b></p>	<p>HORIZONTAL SCALE 1" = 20'</p> <p>VERTICAL SCALE 1" = 10'</p> <p>SURVEY BOOK ELECTRONIC</p> <p>CONTRACT XXXXX</p>	<p>BRIDGE FILE N/A</p> <p>DESIGNATION XXXXX</p> <p>SHEETS 8 of 16</p> <p>PROJECT VALUE</p>
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P.V.I. Sta. = 39+50.00  
 Elev. = 621.60  
 V.C. = 300.00'

Existing Grade

Proposed Grade

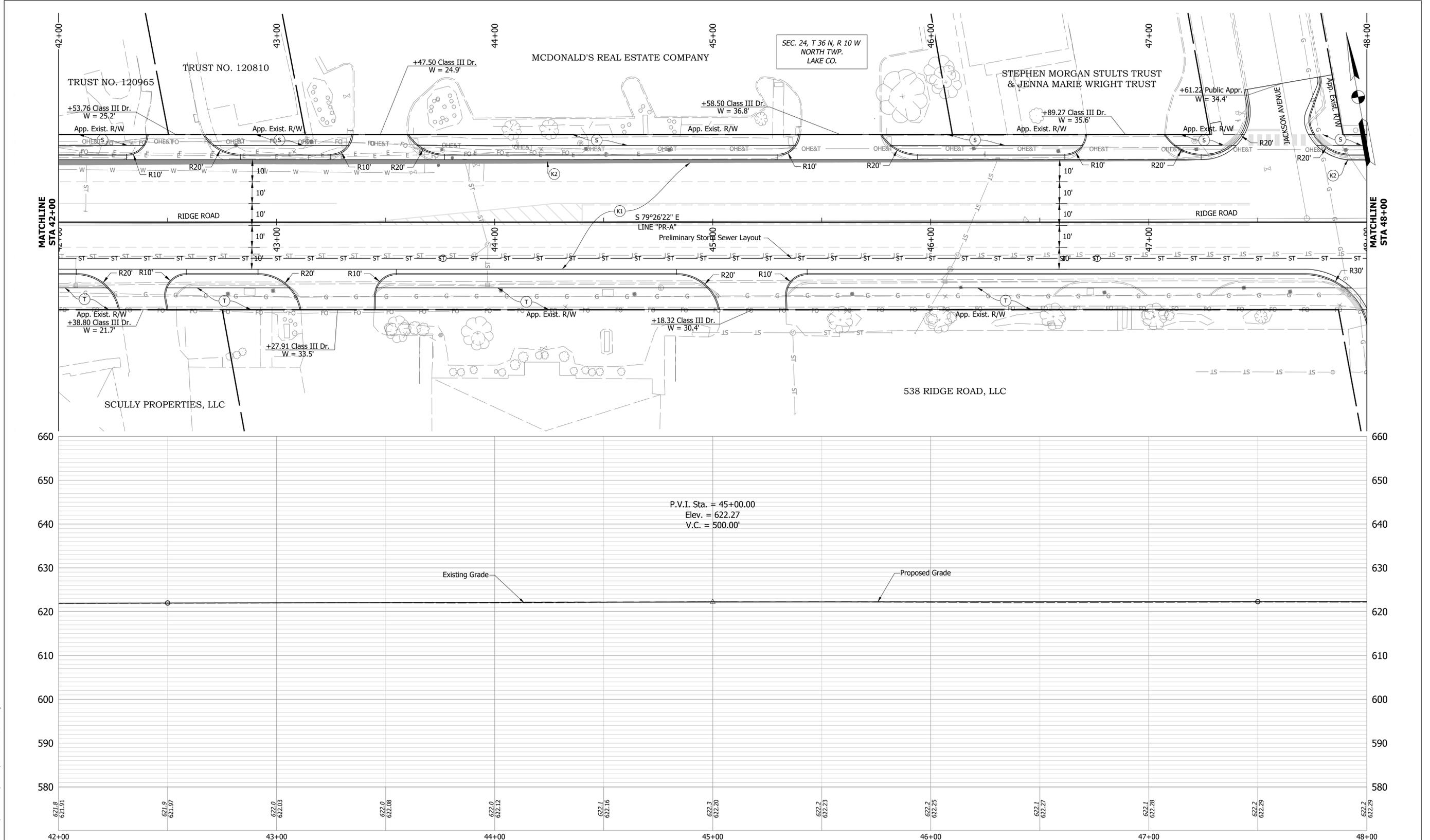
+0.63%

+0.12%

619.5 619.45 619.8 619.70 620.1 620.02 620.4 620.34 620.8 620.65 621.1 620.95 621.4 621.20 621.6 621.41 621.8 621.58 621.6 621.70 621.7 621.79 621.8 621.85 621.8 621.91

36+00 37+00 38+00 39+00 40+00 41+00 42+00

Date: Sep 12, 2024, 10:32am User Name: Kredder  
 File: C:\P2114695-00 - Ridge Road Complete Street (Munster)\DWG\Sheets\PRG.dwg



**LEGEND**

(K1)	HMA Overlay	(26)	Mulched Seeding, U
(K2)	HMA for Widening, Type B		
(S)	Sidewalk, Concrete		
(T)	Multi-Use Trail		
(X)	Curb Ramp, Concrete		

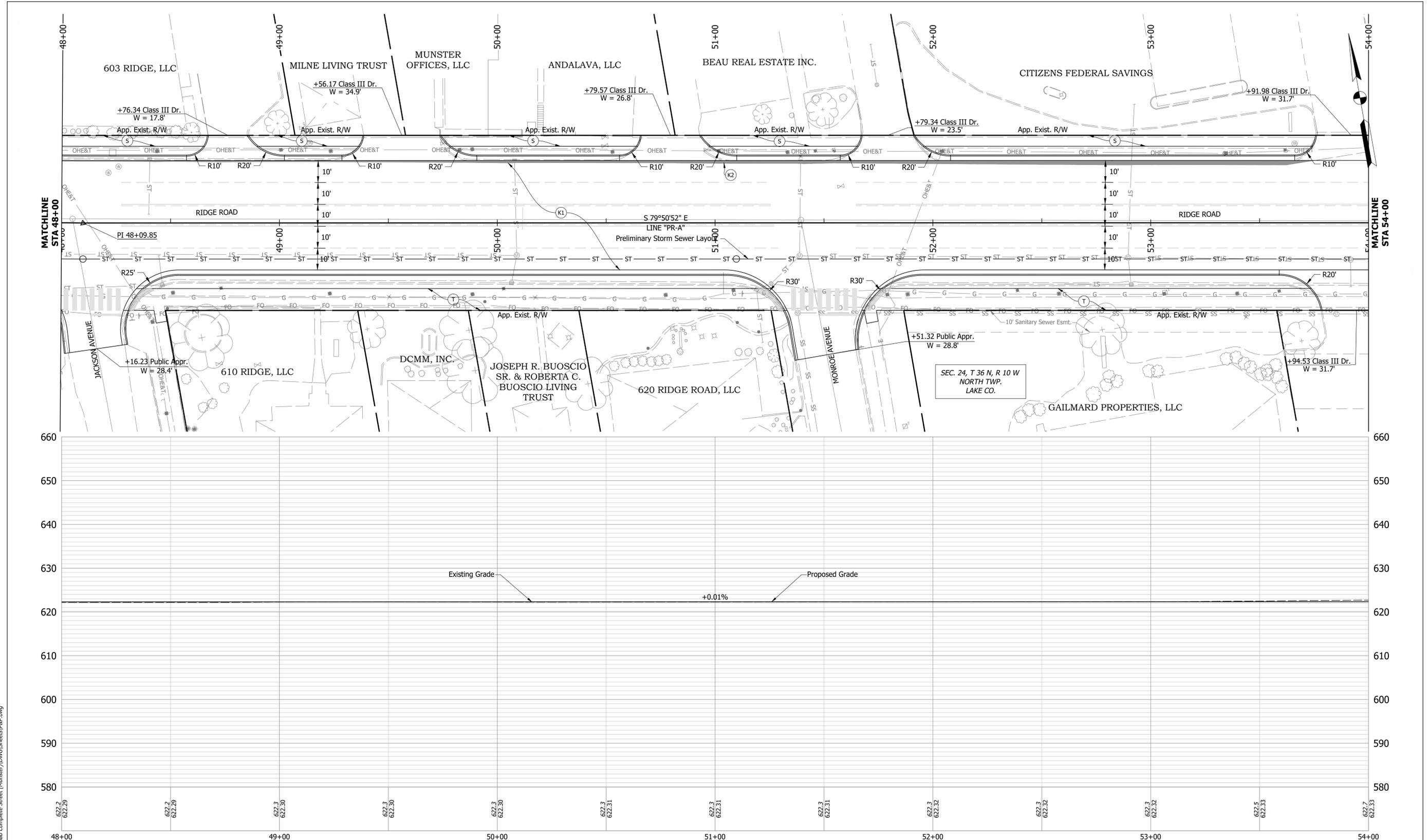
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DESIGNED: KRT	DRAWN: KRT	
CHECKED: APK	CHECKED: APK	

<b>TOWN OF MUNSTER</b>	
<b>APPENDIX G</b>	
<b>PRELIM. PREFERRED ALT. CONCEPT PLANS</b>	

HORIZONTAL SCALE	BRIDGE FILE
1" = 20'	N/A
VERTICAL SCALE	DESIGNATION
1" = 10'	XXXXX
SURVEY BOOK	SHEETS
ELECTRONIC	9 of 16
CONTRACT	PROJECT
XXXXX	VALUE



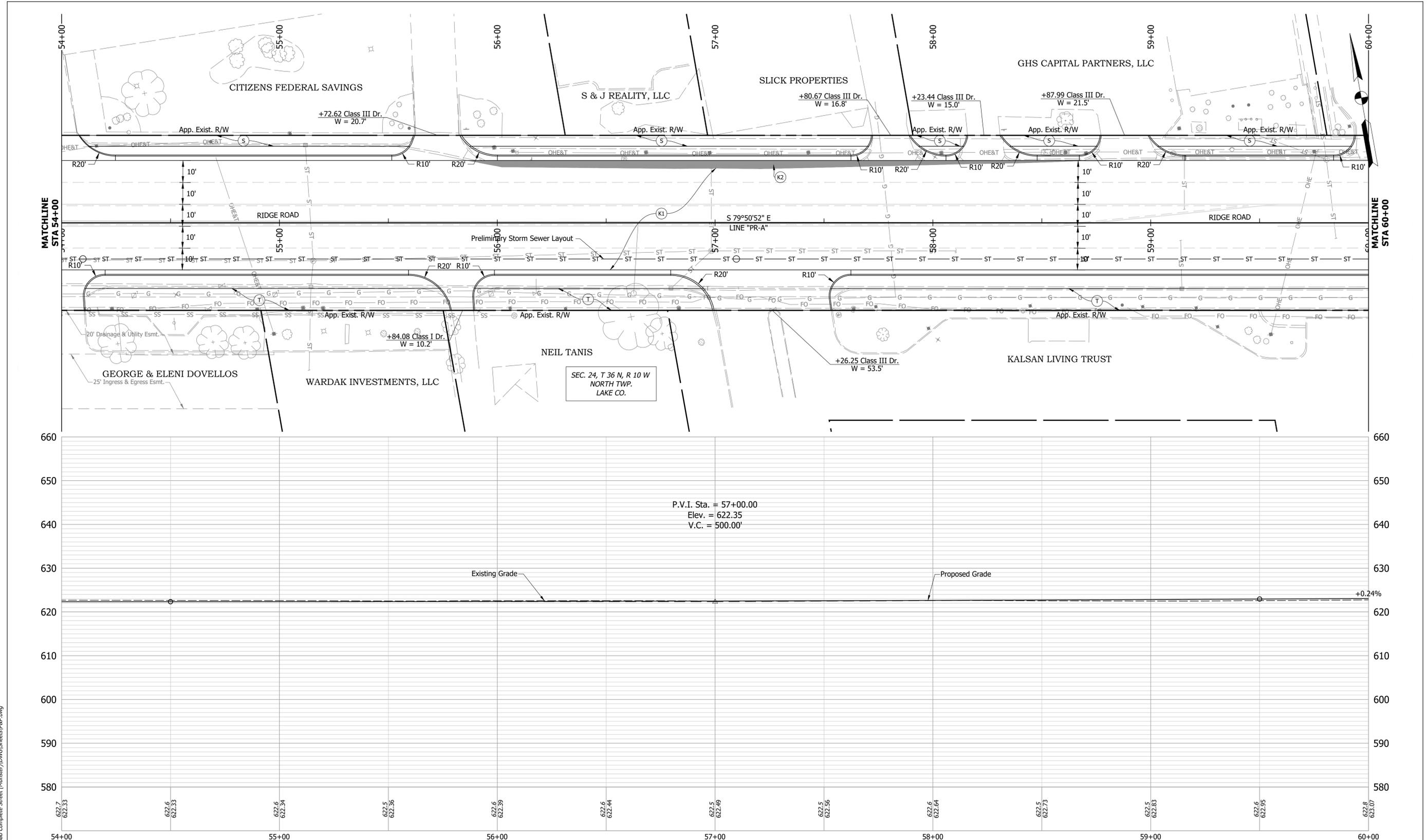
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<b>LEGEND</b> (K1) HMA Overlay (K2) HMA for Widening, Type B (S) Sidewalk, Concrete (T) Multi-Use Trail (X) Curb Ramp, Concrete (26) Mulched Seeding, U	RECOMMENDED FOR APPROVAL _____ DESIGN ENGINEER _____ DATE _____ DESIGNED: KRT DRAWN: KRT CHECKED: APK CHECKED: APK	<b>TOWN OF MUNSTER</b>  <b>APPENDIX G</b> <b>PRELIM. PREFERRED ALT. CONCEPT PLANS</b>	HORIZONTAL SCALE 1" = 20' VERTICAL SCALE 1" = 10' SURVEY BOOK SHEETS ELECTRONIC 10 of 16 CONTRACT PROJECT XXXXX VALUE
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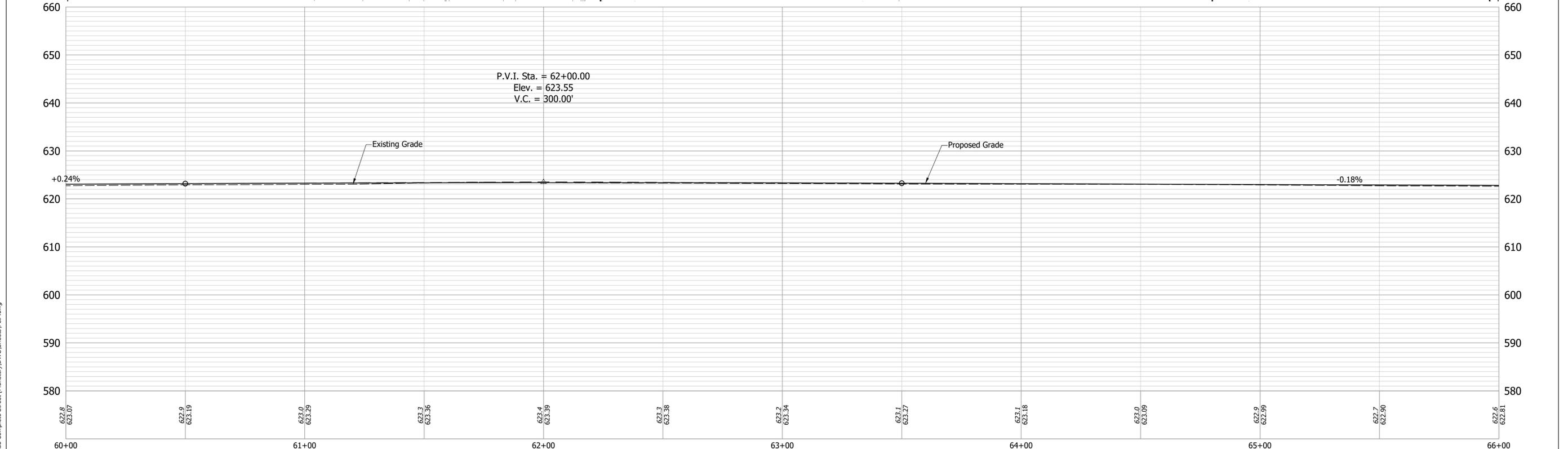
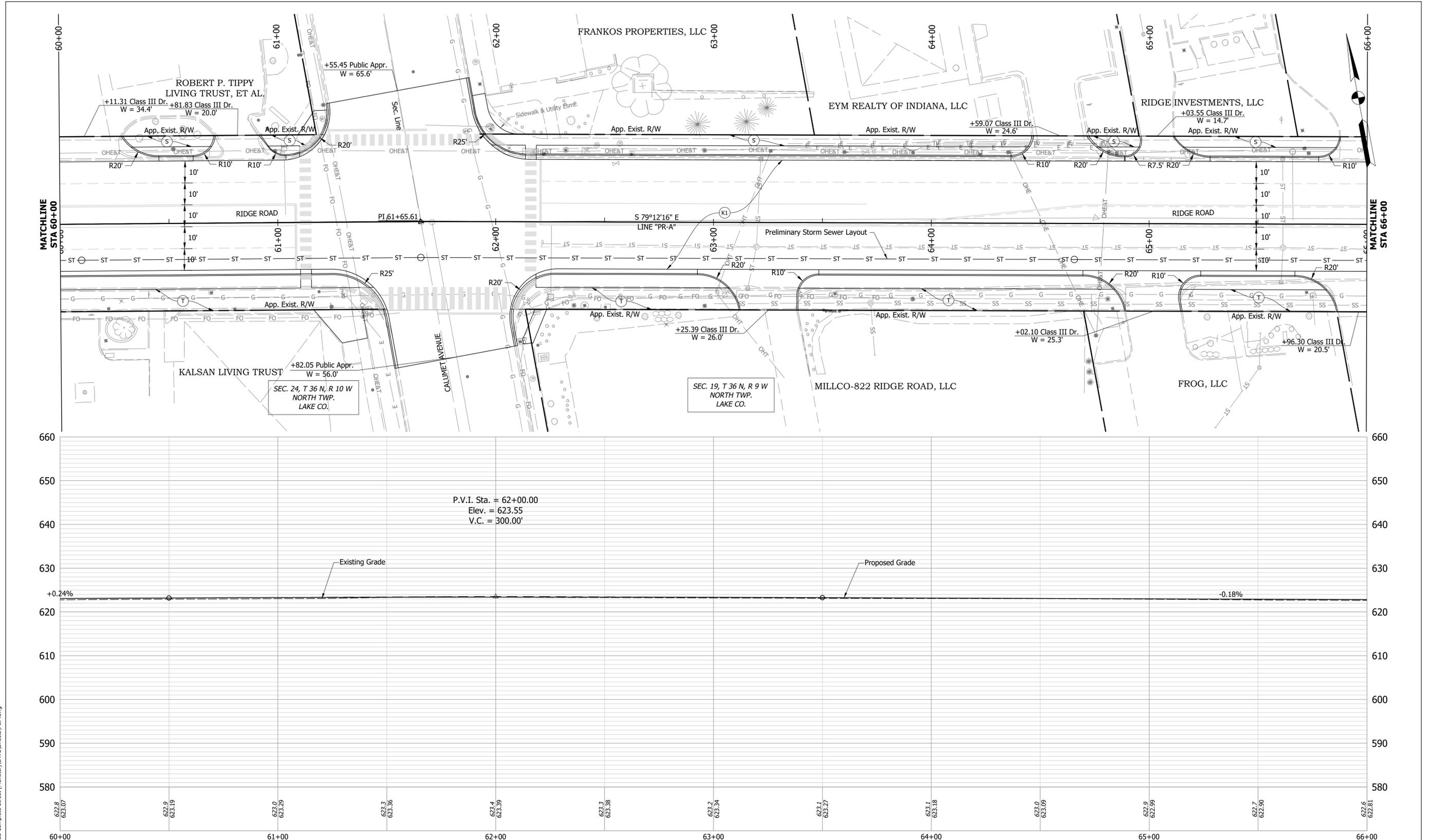
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 File: C:\P\2114695-00 - Ridge Road Complete Street (Munster)\DWG\Sheets\PR-P.R.dwg



<b>LEGEND</b> (K1) HMA Overlay (K2) HMA for Widening, Type B (S) Sidewalk, Concrete (T) Multi-Use Trail (X) Curb Ramp, Concrete (26) Mulched Seeding, U	RECOMMENDED FOR APPROVAL _____ DESIGN ENGINEER DATE _____	TOWN OF MUNSTER  <b>APPENDIX G</b> PRELIM. PREFERRED ALT. CONCEPT PLANS	HORIZONTAL SCALE 1" = 20' VERTICAL SCALE 1" = 10'	BRIDGE FILE N/A DESIGNATION XXXXX
	DESIGNED: KRT DRAWN: KRT CHECKED: APK CHECKED: APK		SURVEY BOOK SHEETS ELECTRONIC 11 of 16 CONTRACT PROJECT XXXXX VALUE	



Date: Sep 12, 2024, 10:33am User Name: Kreddler  
 File: C:\P21\4695-00 - Ridge Road Complete Street (Munster)\DWG\Sheets\PR-P.R.dwg



**LEGEND**

(K1)	HMA Overlay	(26)	Mulched Seeding, U
(K2)	HMA for Widening, Type B		
(S)	Sidewalk, Concrete		
(T)	Multi-Use Trail		
(X)	Curb Ramp, Concrete		

RECOMMENDED FOR APPROVAL	DESIGN ENGINEER	DATE
DESIGNED: KRT	DRAWN: KRT	
CHECKED: APK	CHECKED: APK	

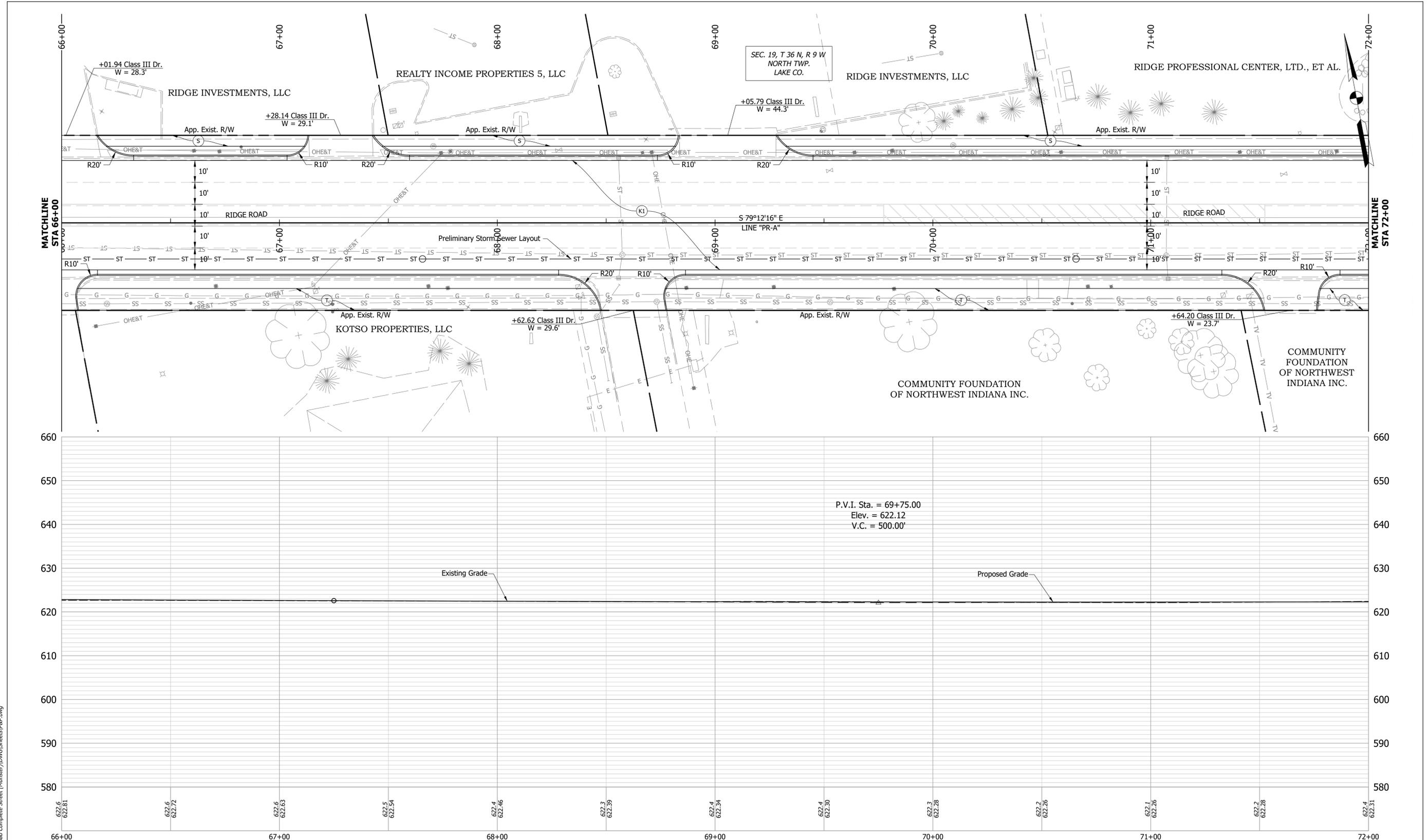
**TOWN OF MUNSTER**

**APPENDIX G**  
**PRELIM. PREFERRED ALT. CONCEPT PLANS**

HORIZONTAL SCALE	BRIDGE FILE
1" = 20'	N/A
VERTICAL SCALE	DESIGNATION
1" = 10'	XXXXX
SURVEY BOOK	SHEETS
ELECTRONIC	12 of 16
CONTRACT	PROJECT
XXXXX	VALUE



Date: Sep 12, 2024, 10:33am User Name: Kreddler  
 File: C:\P-2314695-00 - Ridge Road Complete Street (Munster)\DWG\Sheets\PRP.dwg



**LEGEND**

(K1)	HMA Overlay	(26)	Mulched Seeding, U
(K2)	HMA for Widening, Type B		
(S)	Sidewalk, Concrete		
(T)	Multi-Use Trail		
(X)	Curb Ramp, Concrete		

RECOMMENDED FOR APPROVAL	DESIGN ENGINEER	DATE
DESIGNED: KRT	DRAWN: KRT	
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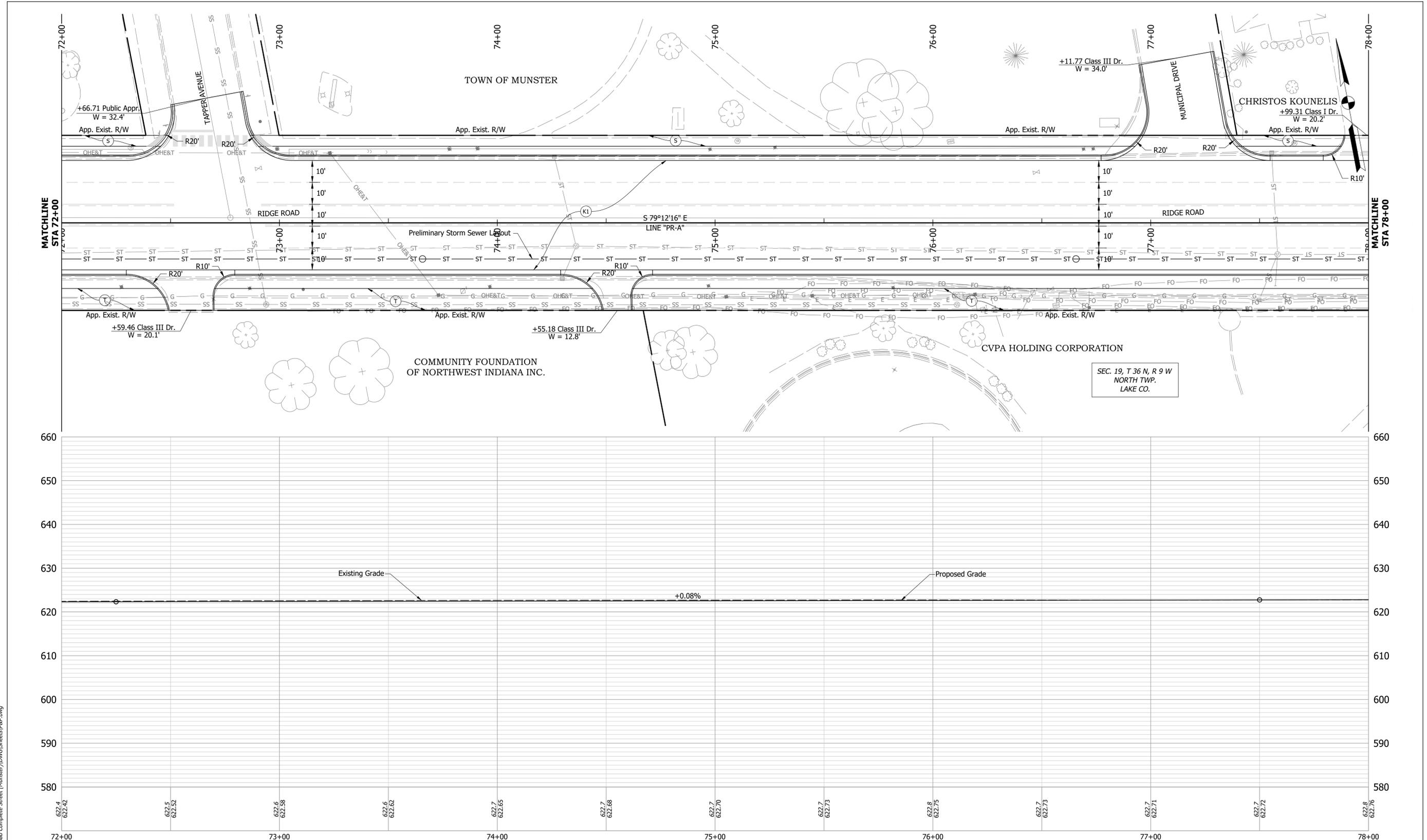
**TOWN OF MUNSTER**

**APPENDIX G**  
**PRELIM. PREFERRED ALT. CONCEPT PLANS**

HORIZONTAL SCALE	BRIDGE FILE
1" = 20'	N/A
VERTICAL SCALE	DESIGNATION
1" = 10'	XXXXX
SURVEY BOOK	SHEETS
ELECTRONIC	13 of 16
CONTRACT	PROJECT
XXXXX	VALUE



Date: Sep 12, 2024, 10:33am User Name: Kredder  
 File: C:\P-2314695-00 - Ridge Road Complete Street (Munster)\DWG\Sheets\PRP.dwg



**LEGEND**

(K1)	HMA Overlay	(26)	Mulched Seeding, U
(K2)	HMA for Widening, Type B		
(S)	Sidewalk, Concrete		
(T)	Multi-Use Trail		
(X)	Curb Ramp, Concrete		

RECOMMENDED FOR APPROVAL	DESIGN ENGINEER	DATE
DESIGNED: KRT	DRAWN: KRT	
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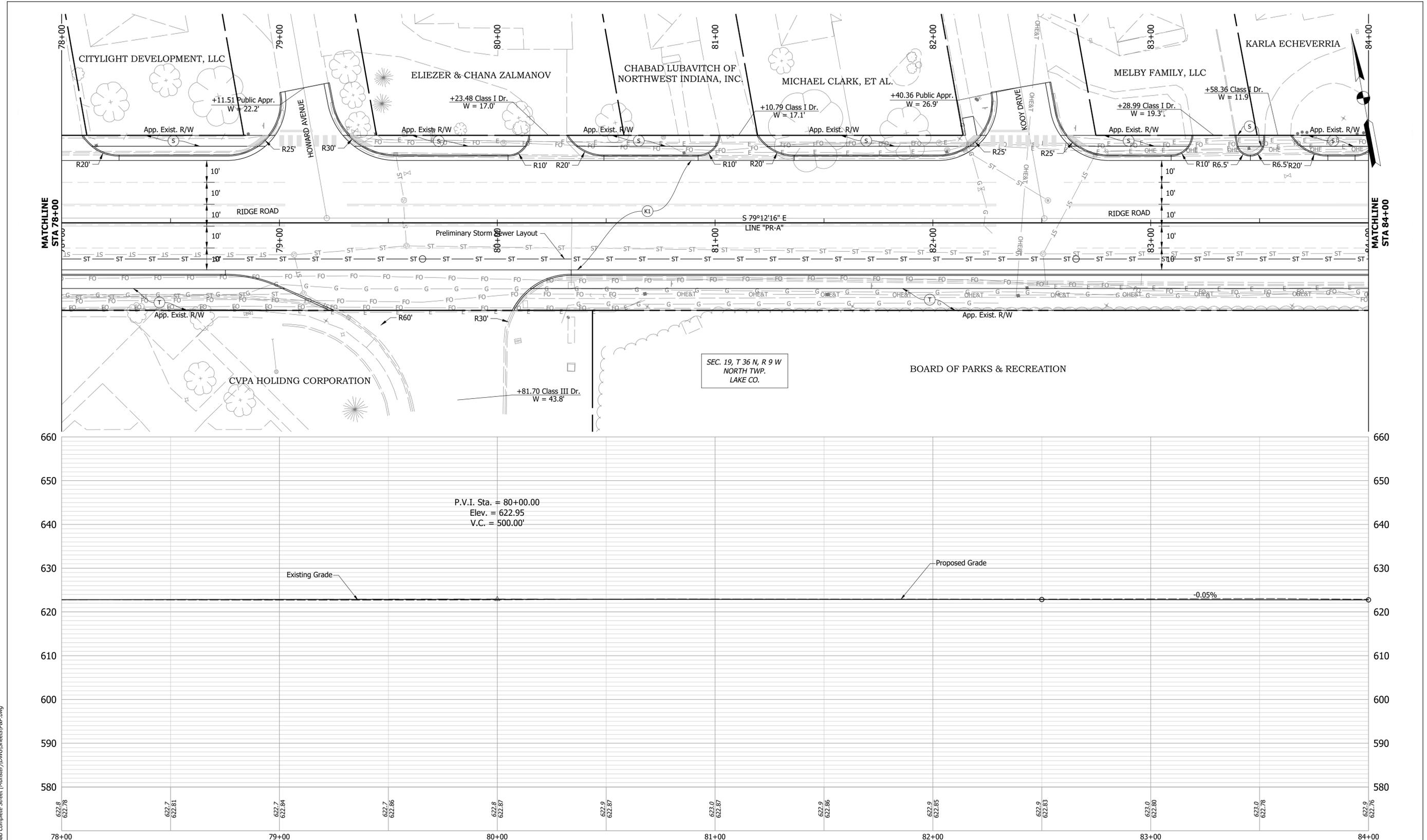
**TOWN OF MUNSTER**

**APPENDIX G**  
**PRELIM. PREFERRED ALT. CONCEPT PLANS**

HORIZONTAL SCALE	BRIDGE FILE
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VERTICAL SCALE	DESIGNATION
1" = 10'	XXXXX
SURVEY BOOK	SHEETS
ELECTRONIC	14 of 16
CONTRACT	PROJECT
XXXXX	VALUE



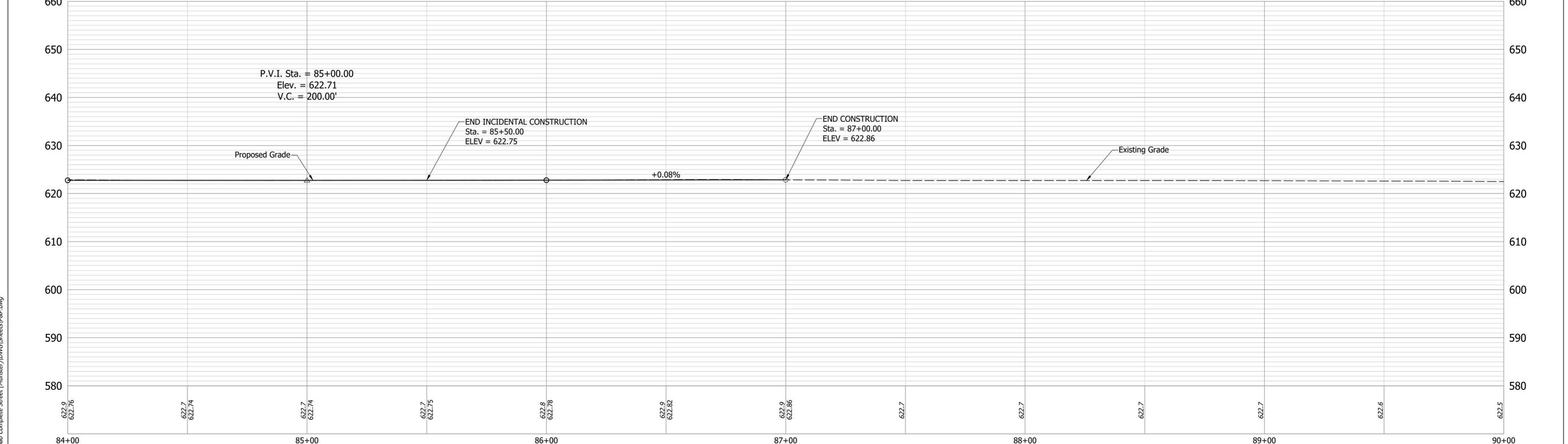
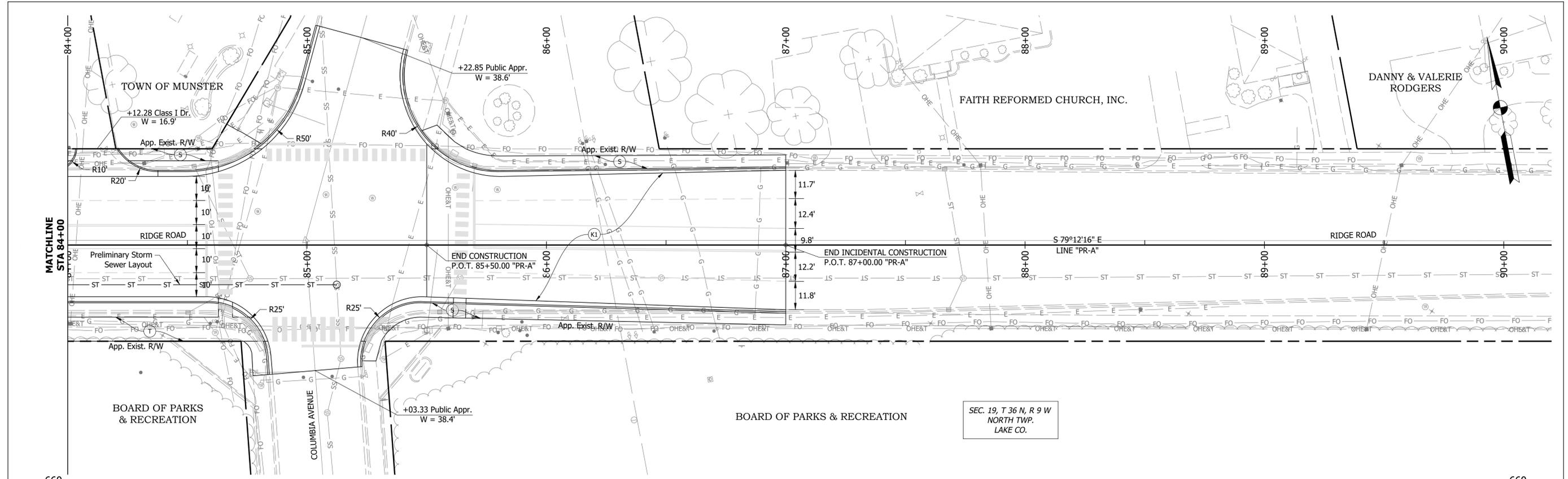
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 File: C:\P214695-00 - Ridge Road Complete Street (Munster)\DWG\Sheets\PRP.dwg



<p><b>LEGEND</b></p> <ul style="list-style-type: none"> <li>(K1) HMA Overlay</li> <li>(K2) HMA for Widening, Type B</li> <li>(S) Sidewalk, Concrete</li> <li>(T) Multi-Use Trail</li> <li>(X) Curb Ramp, Concrete</li> <li>(26) Mulched Seeding, U</li> </ul>	<p>RECOMMENDED FOR APPROVAL _____</p> <p>DESIGNED: <u>KRT</u> DRAWN: <u>KRT</u></p> <p>CHECKED: <u>APK</u> CHECKED: <u>APK</u></p>	<p><b>TOWN OF MUNSTER</b></p> <p><b>APPENDIX G</b></p> <p><b>PRELIM. PREFERRED ALT. CONCEPT PLANS</b></p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>HORIZONTAL SCALE</td> <td>BRIDGE FILE</td> </tr> <tr> <td>1" = 20'</td> <td>N/A</td> </tr> <tr> <td>VERTICAL SCALE</td> <td>DESIGNATION</td> </tr> <tr> <td>1" = 10'</td> <td>XXXXX</td> </tr> <tr> <td>SURVEY BOOK</td> <td>SHEETS</td> </tr> <tr> <td>ELECTRONIC</td> <td>15 of 16</td> </tr> <tr> <td>CONTRACT</td> <td>PROJECT</td> </tr> <tr> <td>XXXXX</td> <td>VALUE</td> </tr> </table>	HORIZONTAL SCALE	BRIDGE FILE	1" = 20'	N/A	VERTICAL SCALE	DESIGNATION	1" = 10'	XXXXX	SURVEY BOOK	SHEETS	ELECTRONIC	15 of 16	CONTRACT	PROJECT	XXXXX	VALUE
HORIZONTAL SCALE	BRIDGE FILE																		
1" = 20'	N/A																		
VERTICAL SCALE	DESIGNATION																		
1" = 10'	XXXXX																		
SURVEY BOOK	SHEETS																		
ELECTRONIC	15 of 16																		
CONTRACT	PROJECT																		
XXXXX	VALUE																		



Date: Sep 12, 2024, 10:34am User Name: Kredder  
 File: C:\P\2114695-00 - Ridge Road Complete Street (Munster)\DWG\Sheets\PRP.dwg



<b>LEGEND</b> (K1) HMA Overlay (K2) HMA for Widening, Type B (S) Sidewalk, Concrete (T) Multi-Use Trail (X) Curb Ramp, Concrete (26) Mulched Seeding, U		RECOMMENDED FOR APPROVAL _____ DESIGN ENGINEER _____ DATE _____ DESIGNED: KRT DRAWN: KRT CHECKED: APK CHECKED: APK		TOWN OF MUNSTER  <b>APPENDIX G</b> PRELIM. PREFERRED ALT. CONCEPT PLANS		HORIZONTAL SCALE 1" = 20' VERTICAL SCALE 1" = 10' SURVEY BOOK ELECTRONIC CONTRACT XXXXX		BRIDGE FILE N/A DESIGNATION XXXXX SHEETS 16 of 16 PROJECT VALUE	
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**APPENDIX H – PUBLIC SAFETY OFFICIALS MEETING MINUTES (10/13/2023)**

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**Infrastructure Engineering Inc.**  
201 North Illinois St | Suite 1720  
Indianapolis, IN 46204  
[www.infrastructure-eng.com/](http://www.infrastructure-eng.com/)

**MEETING MINUTES**  
**PUBLIC SAFETY MEETINGS, 10am + 1pm**

Relmagine Ridge Road  
Town of Munster

Date: October 13, 2023  
Time: 10am and 1pm  
Place: Munster Town Hall  
Attendees: Meeting invites and meeting sign in sheet, attached

**10am Morning Session Attendees:**

David Strbjak, Munster Fire Department, [dstrbjak@munster.org](mailto:dstrbjak@munster.org)  
Kevin Nowaczyk, Munster Fire Department, [knowaczyk@munster.org](mailto:knowaczyk@munster.org)  
Brian Kolosh, MABAS 24, [bkolosh@southholland.org](mailto:bkolosh@southholland.org)  
Kevin Welsh, MABAS 24, [kwelsh@villageofglenwood.com](mailto:kwelsh@villageofglenwood.com)  
Chris Winkelmann, Franciscan Health Munster / Dyer, [Christian.Winkelmann@franciscanalliance.org](mailto:Christian.Winkelmann@franciscanalliance.org)  
Sean Leahy, Franciscan Health Munster / Dyer, [Sean.leahy@franciscanalliance.org](mailto:Sean.leahy@franciscanalliance.org)  
Dayman Johnston, Munster Police Department, [djohnston@munster.org](mailto:djohnston@munster.org)  
Stephen Scheckel, Munster Police Department, [sscheckel@munster.org](mailto:sscheckel@munster.org)  
Dan Broelmann, Munster Police Department, [dbroelmann@munster.org](mailto:dbroelmann@munster.org)

**1pm Afternoon Session Attendees:**

Dan Podgorski, Lansing Village Administrator, [dpodgorski@villageoflansing.org](mailto:dpodgorski@villageoflansing.org)  
Janice Cox, Superior Ambulance, [jcox@superiorambulance.com](mailto:jcox@superiorambulance.com)  
Paola Pescara, Community Foundation of NWI, [paula.r.pescara@comhs.org](mailto:paula.r.pescara@comhs.org)

The purpose the Public Safety Meetings was to meet with public safety officials to discuss the scope of the project and to receive feedback about public safety operations, needs and concerns related to the Ridge Road improvement project.

Meetings were conducted on Friday October 13<sup>th</sup>, and occurred over the course of two sessions: 10am and 1pm. Each meeting was approximately one hour in length. The meeting invitee list, agenda and sign in sheets are attached to this summary. A summary of participant questions / consultant team answers and participant comments follows below.

Public safety official comments are documented for incorporation into the engineering design plans for the Relmagine Ridge Road Project.

### QUESTIONS

Q1: RAISE Grant requirements. Does the RAISE Grant funding require that the final Ridge Road Plan match exactly the Ridge Road concept from the Streetscape Plan?

A1: *The funding does not require that the final Ridge Road plan matches exactly to the Streetscape Plan.*

Q2: The NICTD West Lake Corridor Project. The new train station is anticipated to draw more traffic and pedestrian activity to the area. Is the project team incorporating this data into the engineering design?

A2: *Yes, this information is incorporated into the traffic analysis and engineering.*

Q3: Traffic impacts to neighborhood streets. What will be the impacts to neighborhood streets and how can we prepare for potential increases in traffic?

A3: *The engineering team is currently evaluating the traffic data and analysis. Neighborhood traffic impacts and opportunities for enhancements were addressed as part of the Calumet-Ridge Streetscape Plan Appendix. See Appendix section A4 – TOD Roadway Planning Memo, available at the project website under 'Documents' and linked below. **Neighborhood enhancements are under consideration by Town Council for implementation.***

<https://munsterstreetscape.files.wordpress.com/2023/10/munster-streetscape-appendix-2021-06-21-binder-rdx.pdf>

### COMMENTS

1. Ambulance access. Since the closing of Franciscan Hospital in Hammond, additional ambulance trips have been witnessed along Ridge Road.
2. Vehicle design. The largest vehicle that needs to be accommodated in a fire truck. Note that fire trucks require 1-1/2 lanes to accommodate outriggers. It was noted that full and partial Ridge Road closures sometimes occur to accommodate emergency response.
3. Landscaped medians. The Streetscape Plan contemplates raised landscaped medians located along Ridge Road. It was noted that the medians need to remain open and accessible for emergency vehicles. Pavements may be decorative provided they can support traffic.
4. Traffic analysis. Confirm traffic analysis tracks emergency vehicles.

5. Traffic signals. All signals require upgrades for preemption. Consider signaled left turn only on arrows so that no open left turns are allowed (it was suggested that most accidents are left turning vehicles that 'cheat' the signal at intersections).
6. Intersection geometrics. It was suggested that the intersection corners are too tight to accommodate some emergency vehicles and they travers the curb and sometimes conflict with poles and other structures.
7. Intersection amenities. It was noted that intersections generally need better pedestrian amenities at crossings, including pavement markings, signal upgrades and signage.
8. Street clutter. It was suggested that there is too much clutter along the roadway, including light poles, utility poles and sign poles.
9. Fiber optic updates. Fiber should be updated to accommodate cameras and signals. Cameras are currently mounted to signal poles now.
10. Bike and pedestrian access. Better lighting and accommodations should be provided for cyclists and pedestrians.
11. Construction impacts. Impacts to emergency vehicle operations are a concern and require continued coordination.
12. Design coordination with Ridge Road, Lansing. Ridge Road through Lansing is a 3-lane roadway today with a 5-lane transition from Wentworth to State Line. It was suggested that if Ridge Road becomes 3-lanes, Lansing may consider reducing roadway width to 3-lanes in the section between Wentworth to State Line.

**APPENDIX I – IHSDM CRASH PREDICTION REPORTS**

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*Interactive Highway Safety Design Model*

**Crash Prediction Evaluation Report**

January 28, 2025



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## Report Overview

**Report Generated:** Jan 28, 2025 9:04 AM

**Report Template:** System: Multi-Page, 508 Compliant [System] (mlcpm4, Nov 19, 2024 9:36 AM)

**Evaluation Date:** Tue Jan 28 08:59:49 EST 2025

**IHSDM Version:** v17.0.0 (Sep 22, 2021)

**Crash Prediction Module:** v12.0.0 (Sep 22, 2021)

**User Name:** ktedder

**Organization Name:** Infrastructure Engineering

**Phone:** 3174172267

**E-Mail:** ktedder@infrastructure-eng.com

**Project Title:** Ridge Road 5 Existing

**Project Comment:** Created using wizard

**Project Unit System:** U.S. Customary

**Highway Title:** Ridge Road

**Highway Comment:** Created using wizard

**Highway Version:** 2

**Evaluation Title:** Ridge Rd. Existing Conditions

**Evaluation Comment:** Created Tue Jan 28 08:58:47 EST 2025

**Minimum Location:** 15+50.000

**Maximum Location:** 87+00.000

**Policy for Superelevation:** AASHTO 2011 U.S. Customary

**Calibration:** HSM Configuration

**Crash Distribution:** HSM Configuration

**Model/CMF:** HSM Configuration

**First Year of Analysis:** 2025

**Last Year of Analysis:** 2044

**Empirical-Bayes Analysis:** Site-Specific

**Highway with Crash History:** Ridge Road

**Highway with Crash History Comment:** Created using wizard

**Highway with Crash History Version:** 2

**First Year of Observed Crashes:** 2020

**Last Year of Observed Crashes:** 2023

## Disclaimer Regarding Crash Prediction Method

### IMPORTANT NOTICE ABOUT COMPARING RESULTS FROM HIGHWAY SAFETY MANUAL FIRST EDITION (2010) MODELS TO RESULTS FROM NEW MODELS DEVELOPED UNDER NCHRP PROJECTS 17-70, 17-58, AND 17-68

Since the publication of the Highway Safety Manual - First Edition (HSM-1), in 2010 by the American Association of State Highway and Transportation Officials (AASHTO), multiple research efforts have been undertaken through the National Cooperative Highway Research Program (NCHRP) to develop safety performance models for road segment and intersection facility types that were not initially reflected in the HSM-1, in order to expand the breadth and depth of the HSM in the future.

The IHSDM Crash Prediction Module (CPM) is intended as a faithful implementation of HSM Part C predictive methods. As NCHRP projects to develop new predictive methods for the HSM are completed, FHWA works to incorporate the new methods into IHSDM, sometimes in advance of publication in the HSM. The following new crash predictive methods have been accepted by NCHRP project panels and incorporated into IHSDM, while pending AASHTO's approval for incorporation into a future edition of the HSM:

- Roundabouts: completed in 2018 under NCHRP Project 17-70, the new methods will provide improved outcomes for the safety analysis of roundabouts.
- 6+ lane and one-way urban/suburban arterials (including models for segments and intersections): completed under NCHRP Project 17-58.
- Intersection crash prediction methods for some intersection configurations and traffic control types not currently addressed in the HSM (e.g., all-way stop; rural 3-leg signalized; 3-leg stop-controlled where the major leg turns; urban 5-leg signalized; urban high-speed intersections): completed in 2021 under NCHRP Project 17-68.

However, in the absence of local calibration factors (see HSM-1 Part C, Appendix A for guidance on calibration of the predictive models), it is neither appropriate nor advisable to directly compare the results from new models (from NCHRP Projects 17-58, 17-68, and 17-70) to results from HSM-1 models, as the models were not calibrated to the same base state data sets, and consequently can produce unexpected results. If local calibration factors are available and applied to both new models and HSM-1 models, then it may be appropriate to directly compare the results. [Note: Work being performed under NCHRP Project 17-72 (Update of Crash Modification Factors for the Highway Safety Manual) is expected to re-calibrate many of the old (HSM-1) and new (e.g., NCHRP 17-70) models to data from a single (or small number of) states, that would allow results from all models to be directly compared.]

The models produced for NCHRP Project 17-70 have independent value in terms of informing the design of a roundabout and assessing the effects of different design characteristics on the expected safety performance of a roundabout.

The HSM-1 interim method previously included in IHSDM for evaluating roundabouts on urban/suburban arterials (i.e., evaluating an existing intersection and then applying a Crash Modification Factor for replacing the existing intersection with a roundabout) has been deactivated in IHSDM, to minimize any confusion with the new roundabout methodology.

## **Section Types**

### **Section 1 Evaluation**

**Section:** Section 1

**Evaluation Start Location:** 15+50.000

**Evaluation End Location:** 87+00.000

**Area Type:** Suburban

**Functional Class:** Arterial

**Type of Alignment:** Undivided, Multilane

**Model Category:** Urban/Suburban Arterial

**Calibration Factor:** 3SG=1.0; 3ST=1.0; 4SG=1.0; 5T=1.0;

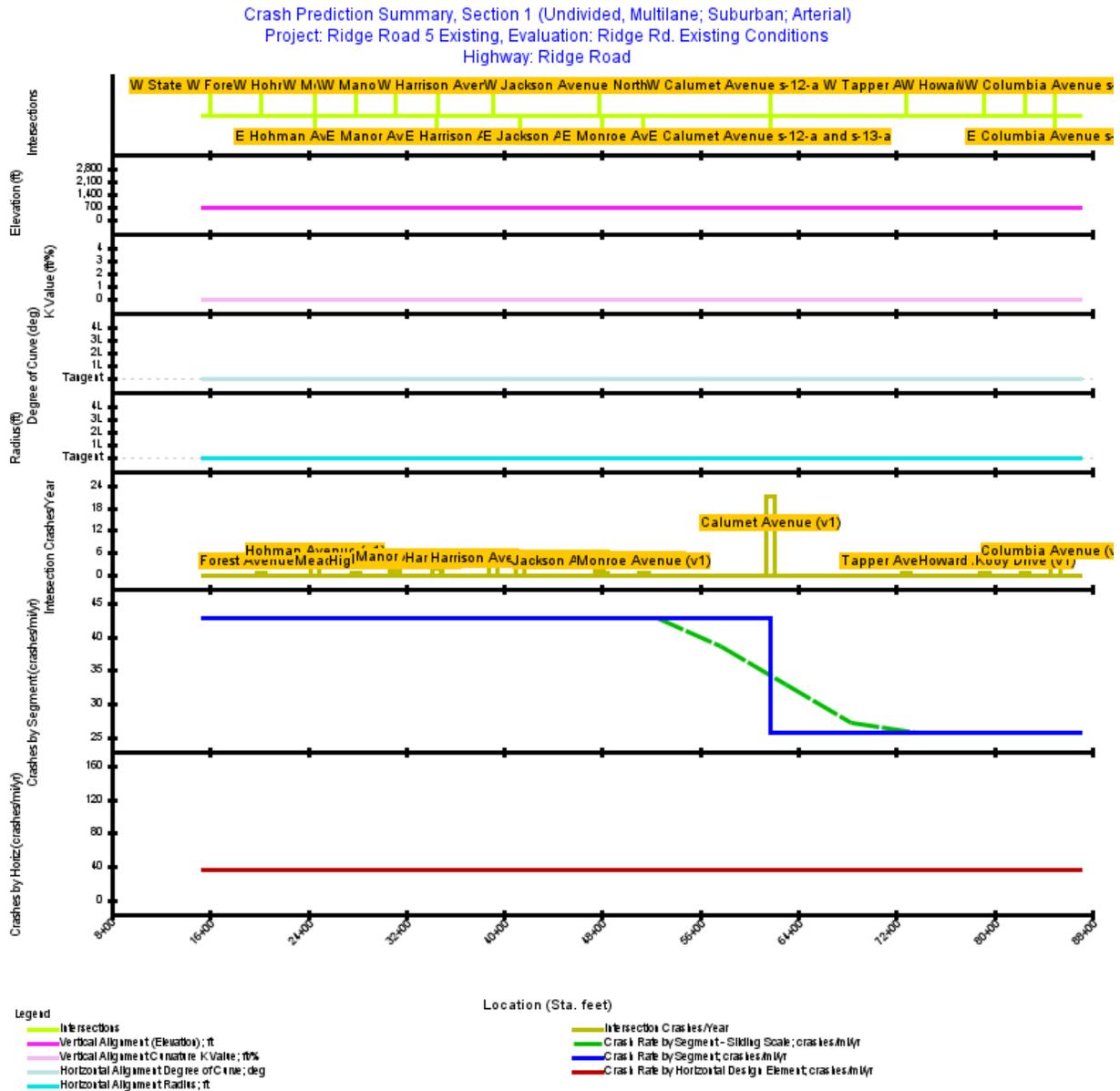


Figure 1. Crash Prediction Summary (Section 1)

**Table 1. Observed Crashes Used in the Evaluation (Section 1)**

Year	Observed Crashes	Total Crashes Used	FI Crashes	FI no/C Crashes	PDO Crashes
2020	76	69	3	0	66
2021	134	127	3	0	124
2022	99	96	2	0	94
2023	77	57	3	0	54
All Years	386 &nbsp; <sup>[1]</sup>	349	11	0	338

**Footnotes**

<sup>[1]</sup> Note: Observed crash data that does not comply with the associated CPM model requirements may not be used in EB processing.

**Table 2. Evaluation Highway - Homogeneous Segments (Section 1)**

Seg. No.	Type	Start Location (Sta. ft)	End Location (Sta. ft)	Length (ft)	Length (mi)	AADT	Number Major Commercial Driveways	Number Minor Commercial Driveways	Number Major Industrial/Institutional	Number Minor Industrial/Institutional	Number Major Residential Driveways	Number Minor Residential Driveways	Number Other Driveways	Lighting	Automated Speed Enforcement	Density (fixed objects/mi)	Median Width (ft)	Type	Effective Median Width (ft)	Speed Level	Number Rail Highway Crossings	Average Shoulder Width (ft)	Average Lane Width (ft)
1	Urban/Suburban Arterial Segment Five-lane including center TWLTL	15+50.000	61+70.730	4,620.73	0.8751	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	3	39	0	0	0	1	0	false	false	0.0	0.00	None	0.00	Low	1	0.00	10.00
2	Urban/Suburban Arterial Segment Five-lane including center TWLTL	61+70.730	87+00.000	2,529.27	0.4790	2025: 19,211; 2026: 19,266; 2027: 19,322; 2028: 19,377; 2029: 19,433; 2030: 19,488; 2031: 19,544; 2032: 19,600; 2033: 19,655; 2034: 19,711; 2035: 19,766; 2036: 19,822; 2037: 19,877; 2038: 19,933; 2039: 19,988; 2040: 20,044; 2041-2044: 20,100	1	11	0	0	0	6	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00

**Table 3. Crash Highway Highway - Homogeneous Segments (Section 1)**

Seg. No.	Type	Start Location (Sta. ft)	End Location (Sta. ft)	Length (ft)	Length (mi)	AADT	Number Major Commercial Driveways	Number Minor Commercial Driveways	Number Major Industrial/Institutional	Number Minor Industrial/Institutional	Number Major Residential Driveways	Number Minor Residential Driveways	Number Other Driveways	Lighting	Automated Speed Enforcement	Density (fixed objects /mi)	Median Width (ft)	Type	Effective Median Width (ft)	Speed Level	Number Rail Highway Crossings	Average Shoulder Width (ft)	Average Lane Width (ft)
1	Urban/Suburban Arterial Segment Five-lane including center TWLTL	15+50.000	61+70.730	4,620.73	0.8751	2020-2023: 20,680	3	39	0	0	0	1	0	false	false	0.0	0.00	None	0.00	Low	1	0.00	10.00
2	Urban/Suburban Arterial Segment Five-lane including center TWLTL	61+70.730	87+00.000	2,529.27	0.4790	2020-2023: 19,100	1	11	0	0	0	6	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00

**Table 4. Evaluation Intersection (Section 1)**

Inter. No.	Title	Type	Location (Sta. ft)	Major AADT	Minor AADT	Legs	Traffic Control	Approach es w/Left Turn Lanes	Approach es w/Right Turn Lanes	Approach es w/o Right Turn on Red	Pedestrian Volume (crossings/day)	Lighted at Night	Red Light Camera	School Near by	Number of Bus Stops	Number of Alcohol Sales Establishments	Max Lanes Crossed
2	Forest Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	20+13.30	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025-2044: 500	3	Stop-Controlled	0	0			false					
3	Hohman Avenue (v1)	Urban/Suburban Arterial Intersection Four-Legged Signalized	24+57.740	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025: 6,315; 2026: 6,383; 2027: 6,451; 2028: 6,519; 2029: 6,587; 2030: 6,654; 2031: 6,722; 2032: 6,790; 2033: 6,858; 2034: 6,926; 2035: 6,994; 2036: 7,061; 2037: 7,129; 2038: 7,197; 2039: 7,265; 2040: 7,333; 2041-2044: 7,401	4	Signalized	0	0	0	20	false	false	false	0	0	4
4	Meadow Lane (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	27+93.140	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025-2044: 500	3	Stop-Controlled	0	0			false					
5	Highland Place (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	31+09.730	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025-2044: 500	3	Stop-Controlled	0	0			false					
6	Manor Avenue South (v1)	Urban/Suburban Arterial Intersection Three-Legged Signalized	34+46.240	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025: 1,002; 2026: 1,013; 2027: 1,024; 2028: 1,035; 2029: 1,047; 2030: 1,058; 2031: 1,069; 2032: 1,080; 2033: 1,091; 2034: 1,102; 2035: 1,114; 2036: 1,125; 2037: 1,136; 2038: 1,147; 2039: 1,158; 2040: 1,169; 2041-2044: 1,181	3	Signalized	0	0	0	15	false	false	false	0	0	4
7	Manor Avenue North (v1)	Urban/Suburban Arterial Intersection Three-Legged Signalized	34+56.200	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025: 512; 2026: 518; 2027: 524; 2028: 530; 2029: 536; 2030: 542; 2031: 548; 2032: 554; 2033: 560; 2034: 566; 2035: 572; 2036: 578; 2037: 584; 2038: 590; 2039: 596; 2040: 602; 2041-2044: 608	3	Signalized	0	0	0	15	false	false	false	0	0	4
8	Harrison Avenue North (v1)	Urban/Suburban Arterial Intersection Three-Legged Signalized	39+12.300	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025: 757; 2026: 765; 2027: 774; 2028: 782; 2029: 791; 2030: 799; 2031: 808; 2032: 817; 2033: 825; 2034: 834; 2035: 842; 2036: 851; 2037: 859; 2038: 868; 2039: 876; 2040: 885; 2041-2044: 894	3	Signalized	0	0	0	15	false	false	false	0	0	4
9	Harrison Avenue South (v1)	Urban/Suburban Arterial Intersection Three-Legged Signalized	41+33.120	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025: 1,666; 2026: 1,684; 2027: 1,703; 2028: 1,721; 2029: 1,739; 2030: 1,757; 2031: 1,776; 2032: 1,794; 2033: 1,812; 2034: 1,831; 2035: 1,849; 2036: 1,867; 2037: 1,885; 2038: 1,904; 2039: 1,922; 2040: 1,940; 2041-2044: 1,959	3	Signalized	0	0	0	15	false	false	false	0	0	4
10	Jackson Avenue North (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	47+72.460	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025-2044: 500	3	Stop-Controlled	0	0			false					
11	Jackson Avenue South (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	48+05.610	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025-2044: 500	3	Stop-Controlled	0	0			false					
12	Monroe Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	51+39.440	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025-2044: 500	3	Stop-Controlled	0	0			false					

Inter. No.	Title	Type	Location (Sta. ft)	Major AADT	Minor AADT	Legs	Traffic Control	Approaches w/Left Turn Lanes	Approaches w/Right Turn Lanes	Approaches w/o Right Turn on Red	Pedestrian Volume (crossings/day)	Lighted at Night	Red Light Camera	School Near by	Number of Bus Stops	Number of Alcohol Sales Establishments	Max Lanes Crossed
13	Calumet Avenue (v1)	Urban/Suburban Arterial Intersection Four-Legged Signalized	61+70.30	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025: 13,856; 2026: 14,004; 2027: 14,152; 2028: 14,301; 2029: 14,449; 2030: 14,597; 2031: 14,745; 2032: 14,894; 2033: 15,042; 2034: 15,190; 2035: 15,338; 2036: 15,486; 2037: 15,635; 2038: 15,783; 2039: 15,931; 2040: 16,079; 2041-2044: 16,228	4	Signalized	0	0	0	20	false	false	false	0	0	4
14	Tapper Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	72+77.510	2025: 19,211; 2026: 19,266; 2027: 19,322; 2028: 19,377; 2029: 19,433; 2030: 19,488; 2031: 19,544; 2032: 19,600; 2033: 19,655; 2034: 19,711; 2035: 19,766; 2036: 19,822; 2037: 19,877; 2038: 19,933; 2039: 19,988; 2040: 20,044; 2041-2044: 20,100	2025-2044: 500	3	Stop-Controlled	0	0			false					
15	Howard Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	79+21.750	2025: 19,211; 2026: 19,266; 2027: 19,322; 2028: 19,377; 2029: 19,433; 2030: 19,488; 2031: 19,544; 2032: 19,600; 2033: 19,655; 2034: 19,711; 2035: 19,766; 2036: 19,822; 2037: 19,877; 2038: 19,933; 2039: 19,988; 2040: 20,044; 2041-2044: 20,100	2025-2044: 500	3	Stop-Controlled	0	0			false					
16	Kooy Drive (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	82+51.180	2025: 19,211; 2026: 19,266; 2027: 19,322; 2028: 19,377; 2029: 19,433; 2030: 19,488; 2031: 19,544; 2032: 19,600; 2033: 19,655; 2034: 19,711; 2035: 19,766; 2036: 19,822; 2037: 19,877; 2038: 19,933; 2039: 19,988; 2040: 20,044; 2041-2044: 20,100	2025-2044: 500	3	Stop-Controlled	0	0			false					
17	Columbia Avenue (v1)	Urban/Suburban Arterial Intersection Four-Legged Signalized	84+99.410	2025: 19,211; 2026: 19,266; 2027: 19,322; 2028: 19,377; 2029: 19,433; 2030: 19,488; 2031: 19,544; 2032: 19,600; 2033: 19,655; 2034: 19,711; 2035: 19,766; 2036: 19,822; 2037: 19,877; 2038: 19,933; 2039: 19,988; 2040: 20,044; 2041-2044: 20,100	2025: 11,700; 2026: 11,826; 2027: 11,951; 2028: 12,076; 2029: 12,202; 2030: 12,327; 2031: 12,452; 2032: 12,578; 2033: 12,703; 2034: 12,828; 2035: 12,954; 2036: 13,079; 2037: 13,204; 2038: 13,330; 2039: 13,455; 2040: 13,580; 2041-2044: 13,706	4	Signalized	0	0	0	20	false	false	false	0	0	4

**Table 5. Crash History Intersection (Section 1)**

Inter. No.	Title	Type	Location (Sta. ft)	Major AADT	Minor AADT	Legs	Traffic Control	Approaches w/Left Turn Lanes	Approaches w/Right Turn Lanes	Approaches w/o Right Turn on Red	Pedestrian Volume (crossings/day)	Lighted at Night	Red Light Camera	School Nearby	Number of Bus Stops	Number of Alcohol Sales Establishments	Max Lanes Crossed
2	Forest Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	20+13.320	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
3	Hohman Avenue (v1)	Urban/Suburban Arterial Intersection Four-Legged Signalized	24+57.740	2020-2023: 20,680	2020-2023: 6,180	4	Signalized	0	0	0	20	false	false	false	0	0	4
4	Meadow Lane (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	27+93.140	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
5	Highland Place (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	31+09.730	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
6	Manor Avenue South (v1)	Urban/Suburban Arterial Intersection Three-Legged Signalized	34+46.240	2020-2023: 20,680	2020-2023: 980	3	Signalized	0	0	0	15	false	false	false	0	0	4
7	Manor Avenue North (v1)	Urban/Suburban Arterial Intersection Three-Legged Signalized	34+56.200	2020-2023: 20,680	2020-2023: 500	3	Signalized	0	0	0	15	false	false	false	0	0	4
8	Harrison Avenue North (v1)	Urban/Suburban Arterial Intersection Three-Legged Signalized	39+12.300	2020-2023: 20,680	2020-2023: 740	3	Signalized	0	0	0	15	false	false	false	0	0	4
9	Harrison Avenue South (v1)	Urban/Suburban Arterial Intersection Three-Legged Signalized	41+33.120	2020-2023: 20,680	2020-2023: 1,630	3	Signalized	0	0	0	15	false	false	false	0	0	4
10	Jackson Avenue North (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	47+72.460	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
11	Jackson Avenue South (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	48+05.010	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
12	Monroe Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	51+39.440	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
13	Calumet Avenue (v1)	Urban/Suburban Arterial Intersection Four-Legged Signalized	61+70.730	2020-2023: 20,680	2020-2023: 13,560	4	Signalized	0	0	0	20	false	false	false	0	0	4
14	Tapper Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	72+77.510	2020-2023: 19,100	2020-2023: 500	3	Stop-Controlled	0	0			false					
15	Howard Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	79+21.750	2020-2023: 19,100	2020-2023: 500	3	Stop-Controlled	0	0			false					
16	Kooy Drive (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	82+51.180	2020-2023: 19,100	2020-2023: 500	3	Stop-Controlled	0	0			false					
17	Columbia Avenue (v1)	Urban/Suburban Arterial Intersection Four-Legged Signalized	84+99.410	2020-2023: 19,100	2020-2023: 11,450	4	Signalized	0	0	0	20	false	false	false	0	0	4

**Table 6. Expected Highway Crash Rates and Frequencies Summary (Section 1)**

First Year of Analysis	2025
Last Year of Analysis	2044
Evaluated Length (mi)	1.3542
Average Future Road AADT (vpd)	21,189
<b>Expected Crashes</b>	
Total Crashes	1,943.57
Fatal and Injury Crashes	234.83
Property-Damage-Only Crashes	1,708.74
<b>Percent of Total Expected Crashes</b>	
Percent Fatal and Injury Crashes (%)	12
Percent Property-Damage-Only Crashes (%)	88
<b>Expected Crash Rate</b>	
Crash Rate (crashes/mi/yr)	71.7625
FI Crash Rate (crashes/mi/yr)	8.6707
PDO Crash Rate (crashes/mi/yr)	63.0918
<b>Expected Travel Crash Rate</b>	
Total Travel (million veh-mi)	209.46
Travel Crash Rate (crashes/million veh-mi)	9.28
Travel FI Crash Rate (crashes/million veh-mi)	1.12
Travel PDO Crash Rate (crashes/million veh-mi)	8.16

**Table 7. Expected Crash Frequencies and Rates by Highway Segment/Intersection (Section 1)**

Segment Number/Intersection Name/Cross Road	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Expected Crashes for Evaluation Period	Total Predicted Crashes for Evaluation Period	Expected Total Crash Frequency (crashes/yr)	Expected FI Crash Frequency (crashes/yr)	Expected PDO Crash Frequency (crashes/yr)	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	(Expected - Predicted) Total Crash Frequency (crashes/yr)	(Expected - Predicted) FI Crash Frequency (crashes/yr)	(Expected - Predicted) PDO Crash Frequency (crashes/yr)	Expected Crash Rate (crashes/mi/yr)	Expected Travel Crash Rate (crashes/million veh-mi)	Expected Intersection Travel Crash Rate (crashes/million veh)
1	15+50.000	61+70.730	0.8751	749.099	260.369	37.4549	3.2189	34.2361	13.0185	4.1481	8.8704	24.4365	-0.9292	25.3657	42.7989	5.33	
Forest Avenue (v1)	20+13.320			8.067	30.310	0.4034	0.2175	0.1858	1.5155	0.6505	0.8650	-1.1122	-0.4329	-0.6792			0.05
Hohman Avenue (v1)	24+57.740			116.481	118.722	5.8240	0.7194	5.1047	5.9361	2.0162	3.9199	-0.1121	-1.2968	1.1848			0.55
Meadow Lane (v1)	27+93.140			12.346	30.310	0.6173	0.2555	0.3618	1.5155	0.6505	0.8650	-0.8982	-0.3950	-0.5032			0.08
Highland Place (v1)	31+09.730			16.624	30.310	0.8312	0.2767	0.5545	1.5155	0.6505	0.8650	-0.6843	-0.3738	-0.3105			0.10
Manor Avenue South (v1)	34+46.240			30.706	45.950	1.5353	0.4382	1.0971	2.2975	0.8916	1.4059	-0.7622	-0.4534	-0.3088			0.19
Manor Avenue North (v1)	34+56.200			55.381	38.831	2.7690	0.4652	2.3039	1.9416	0.7907	1.1509	0.8275	-0.3255	1.1530			0.34
Harrison Avenue North (v1)	39+12.300			47.816	38.837	2.3908	0.5780	1.8128	1.9418	0.7693	1.1726	0.4490	-0.1912	0.6402			0.29
Harrison Avenue South (v1)	41+33.120			48.928	53.711	2.4464	0.5041	1.9423	2.6855	1.0044	1.6811	-0.2391	-0.5003	0.2612			0.29
Jackson Avenue North (v1)	47+72.460			20.903	30.310	1.0451	0.2902	0.7549	1.5155	0.6505	0.8650	-0.4704	-0.3603	-0.1101			0.13
Jackson Avenue South (v1)	48+05.010			8.067	30.310	0.4034	0.2175	0.1858	1.5155	0.6505	0.8650	-1.1122	-0.4329	-0.6792			0.05
Monroe Avenue (v1)	51+39.440			8.067	30.310	0.4034	0.2175	0.1858	1.5155	0.6505	0.8650	-1.1122	-0.4329	-0.6792			0.05
Calumet Avenue (v1)	61+70.730			420.941	142.542	21.0470	1.8395	19.2075	7.1271	2.4010	4.7260	13.9199	-0.5615	14.4814			1.64
2	61+70.730	87+00.000	0.4790	246.567	109.717	12.3283	1.0862	11.2421	5.4858	1.7498	3.7360	6.8425	-0.6636	7.5061	25.7361	3.57	
Tapper Avenue (v1)	72+77.510			11.731	27.117	0.5866	0.2402	0.3464	1.3558	0.5823	0.7735	-0.7693	-0.3421	-0.4272			0.08
Howard Avenue (v1)	79+21.750			11.731	27.117	0.5866	0.2402	0.3464	1.3558	0.5823	0.7735	-0.7693	-0.3421	-0.4272			0.08
Kooy Drive (v1)	82+51.180			7.666	27.117	0.3833	0.2045	0.1788	1.3558	0.5823	0.7735	-0.9725	-0.3778	-0.5947			0.05
Columbia Avenue (v1)	84+99.410			122.446	122.296	6.1223	0.7322	5.3901	6.1148	2.0450	4.0698	0.0075	-1.3128	1.3204			0.51
All Segments			1.3542	995.665	370.086	49.7833	4.3051	45.4782	18.5043	5.8979	12.6064	31.2790	-1.5928	32.8718	36.7630	4.75	
All Intersections				947.903	824.101	47.3951	7.4365	39.9587	41.2051	15.5681	25.6370	6.1901	-8.1316	14.3217			0.34
Total			1.3542	1,943.568	1,194.187	97.1784	11.7415	85.4369	59.7093	21.4660	38.2434	37.4691	-9.7244	47.1935	71.7625		

**Table 8. Expected Crash Frequencies and Rates by Horizontal Design Element (Section 1)**

Title	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Expected Crashes for Evaluation Period	Total Predicted Crashes for Evaluation Period	Expected Total Crash Frequency (crashes/yr)	Expected FI Crash Frequency (crashes/yr)	Expected PDO Crash Frequency (crashes/yr)	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	(Expected - Predicted) Total Crash Frequency (crashes/yr)	(Expected - Predicted) FI Crash Frequency (crashes/yr)	(Expected - Predicted) PDO Crash Frequency (crashes/yr)	Expected Crash Rate (crashes/mi/yr)	Expected Travel Crash Rate (crashes/million veh-mi)
Tangent	15+50.000	87+00.000	1.3542	995.665	370.086	49.7833	4.3051	45.4782	18.5043	5.8979	12.6064	31.2790	-1.5928	32.8718	36.7630	4.71

**Table 9. Predicted Crash Frequencies by Year (Section 1)**

Year	Total Crashes	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)
2025	56.38	20.30	35.999	36.09	64.001
2026	56.74	20.42	35.993	36.32	64.007
2027	57.10	20.55	35.988	36.55	64.012
2028	57.46	20.68	35.983	36.79	64.017
2029	57.83	20.80	35.977	37.02	64.023
2030	58.19	20.93	35.972	37.25	64.028
2031	58.55	21.06	35.967	37.49	64.033
2032	58.91	21.18	35.962	37.73	64.038
2033	59.27	21.31	35.957	37.96	64.043
2034	59.63	21.44	35.952	38.19	64.048
2035	59.99	21.57	35.947	38.43	64.053
2036	60.36	21.69	35.942	38.66	64.058
2037	60.72	21.82	35.937	38.90	64.063
2038	61.08	21.95	35.932	39.13	64.067
2039	61.45	22.08	35.928	39.37	64.072
2040	61.81	22.20	35.923	39.61	64.077
2041	62.18	22.33	35.918	39.84	64.082
2042	62.18	22.33	35.918	39.84	64.082
2043	62.18	22.33	35.918	39.84	64.082
2044	62.18	22.33	35.918	39.84	64.082
Total	1,194.19	429.32	35.951	764.87	64.049
Average	59.71	21.47	35.951	38.24	64.049

**Note:** *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

**Table 10. Expected Crash Frequencies by Year (Section 1)**

Year	Total Crashes	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)
2025	91.77	11.10	12.098	80.62	87.852
2026	92.35	11.17	12.097	81.14	87.859
2027	92.94	11.24	12.095	81.66	87.867
2028	93.52	11.31	12.093	82.18	87.874
2029	94.11	11.38	12.091	82.71	87.881
2030	94.70	11.45	12.090	83.23	87.888
2031	95.28	11.52	12.088	83.75	87.895
2032	95.88	11.59	12.086	84.28	87.902
2033	96.46	11.66	12.085	84.80	87.909
2034	97.05	11.73	12.083	85.33	87.916
2035	97.64	11.80	12.081	85.85	87.923
2036	98.23	11.87	12.080	86.38	87.929
2037	98.82	11.94	12.078	86.90	87.936
2038	99.42	12.01	12.076	87.43	87.943
2039	100.01	12.07	12.075	87.95	87.949
2040	100.60	12.14	12.073	88.48	87.956
2041	101.20	12.22	12.072	89.01	87.962
2042	101.20	12.22	12.072	89.01	87.962
2043	101.20	12.22	12.072	89.01	87.962
2044	101.20	12.22	12.072	89.01	87.962
Total	1,943.57	234.83	12.082	1,708.74	87.918
Average	97.18	11.74	12.082	85.44	87.918

**Note:** *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

**Table 11. Comparing Predicted and Expected Crashes for the Evaluation Period (Section 1)**

Scope	Total Crashes	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)
Predicted	1,194.19	429.32	35.951	764.87	64.049
Expected	1,943.57	234.83	12.082	1,708.74	87.918
Expected - Predicted	749.38	-194.49		943.87	
Percent Difference	38.56	-82.82		55.24	

**Note:** *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

**Table 12. Expected Five Lane or Fewer Crash Type Distribution (Section 1)**

Element Type	Crash Type	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)	Total Crashes	Percent Total (%)
Highway Segment	Collision with Animal	0.12	0.0	3.07	0.2	3.20	0.2
Highway Segment	Collision with Bicycle	17.13	0.9	0.00	0.0	17.13	0.9
Highway Segment	Collision with Fixed Object	3.02	0.2	48.18	2.5	51.20	2.6
Highway Segment	Collision with Other Object	0.04	0.0	3.83	0.2	3.87	0.2
Highway Segment	Other Single-vehicle Collision	4.40	0.2	7.65	0.4	12.06	0.6
Highway Segment	Collision with Pedestrian	10.28	0.5	0.00	0.0	10.28	0.5
Highway Segment	Total Single Vehicle Crashes	34.99	1.8	62.74	3.2	97.73	5.0
Highway Segment	Angle Collision	1.71	0.1	47.82	2.5	49.53	2.5
Highway Segment	Driveway-related Collision	16.85	0.9	36.32	1.9	53.16	2.7
Highway Segment	Head-on Collision	0.72	0.0	3.24	0.2	3.96	0.2
Highway Segment	Other Multi-vehicle Collision	0.62	0.0	23.50	1.2	24.12	1.2
Highway Segment	Rear-end Collision	28.99	1.5	527.64	27.1	556.62	28.6
Highway Segment	Sideswipe, Opposite Direction Collision	0.14	0.0	7.29	0.4	7.43	0.4
Highway Segment	Sideswipe, Same Direction Collision	2.09	0.1	201.00	10.3	203.09	10.4
Highway Segment	Total Multiple Vehicle Crashes	51.11	2.6	846.82	43.6	897.93	46.2
Highway Segment	Total Highway Segment Crashes	86.10	4.4	909.56	46.8	995.66	51.2
Intersection	Collision with Animal	0.03	0.0	0.21	0.0	0.24	0.0
Intersection	Collision with Bicycle	11.64	0.6	0.00	0.0	11.64	0.6
Intersection	Collision with Fixed Object	10.00	0.5	27.88	1.4	37.88	1.9
Intersection	Non-Collision	1.85	0.1	0.94	0.0	2.78	0.1
Intersection	Collision with Other Object	1.12	0.1	2.44	0.1	3.57	0.2
Intersection	Other Single-vehicle Collision	0.55	0.0	0.71	0.0	1.26	0.1
Intersection	Collision with Parked Vehicle	0.01	0.0	0.05	0.0	0.06	0.0
Intersection	Collision with Pedestrian	6.75	0.3	0.00	0.0	6.75	0.3
Intersection	Total Intersection Single Vehicle Crashes	31.96	1.6	32.22	1.7	64.18	3.3

Element Type	Crash Type	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)	Total Crashes	Percent Total (%)
Intersection	Angle Collision	38.05	2.0	182.62	9.4	220.67	11.4
Intersection	Head-on Collision	5.22	0.3	21.27	1.1	26.49	1.4
Intersection	Other Multi-vehicle Collision	6.77	0.3	161.33	8.3	168.10	8.6
Intersection	Rear-end Collision	55.23	2.8	376.77	19.4	432.00	22.2
Intersection	Sideswipe	11.50	0.6	24.97	1.3	36.47	1.9
Intersection	Total Intersection Multiple Vehicle Crashes	116.77	6.0	766.95	39.5	883.72	45.5
Intersection	Total Intersection Crashes	148.73	7.7	799.17	41.1	947.90	48.8
	Total Crashes	234.83	12.1	1,708.74	87.9	1,943.57	100.0

**Note:** *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

**Table 13. Evaluation Message**

Start Location (Sta. ft)	End Location (Sta. ft)	Message
16+07.670	16+07.670	Warning: for intersection #1 (16+07.670 to 16+07.670 ), incomplete traffic volume
16+07.670	16+07.670	Warning: for intersection #1 (16+07.670 to 16+07.670 ), No AADT at 16+07.670 (Ridge Road) for 2020 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2021 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2022 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2023 at intersection #1.
16+07.670	16+07.670	Warning: for intersection #1 (16+07.670 to 16+07.670 ),
16+07.670	16+07.670	Warning: for intersection #1 (16+07.670 to 16+07.670 ), incomplete traffic volume
16+07.670	16+07.670	Warning: for intersection #1 (16+07.670 to 16+07.670 ), No AADT at 16+07.670 (Ridge Road) for 2025 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2026 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2027 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2028 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2029 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2030 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2031 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2032 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2033 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2034 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2035 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2036 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2037 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2038 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2039 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2040 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2041 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2042 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2043 at intersection #1. No AADT at 16+07.670 (Ridge Road) for 2044 at intersection #1.
16+07.670	16+07.670	Warning: for intersection #1 (16+07.670 to 16+07.670 ),

*Interactive Highway Safety Design Model*

**Crash Prediction Evaluation Report**

January 28, 2025



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## Report Overview

**Report Generated:** Jan 28, 2025 9:35 AM

**Report Template:** System: Multi-Page, 508 Compliant [System] (mlcpm4, Nov 19, 2024 9:36 AM)

**Evaluation Date:** Tue Jan 28 09:26:02 EST 2025

**IHSDM Version:** v17.0.0 (Sep 22, 2021)

**Crash Prediction Module:** v12.0.0 (Sep 22, 2021)

**User Name:** ktedder

**Organization Name:** Infrastructure Engineering

**Phone:** 3174172267

**E-Mail:** ktedder@infrastructure-eng.com

**Project Title:** Ridge Road 3 Lane Proposed

**Project Comment:** Created using wizard

**Project Unit System:** U.S. Customary

**Highway Title:** Alignment PR-A

**Highway Comment:** Imported from Alignments.xml

**Highway Version:** 2

**Evaluation Title:** Ridge Rd. Alternative 2

**Evaluation Comment:** Created Tue Jan 28 09:25:21 EST 2025

**Minimum Location:** 15+50.000

**Maximum Location:** 87+00.000

**Policy for Superelevation:** AASHTO 2011 U.S. Customary

**Calibration:** HSM Configuration

**Crash Distribution:** HSM Configuration

**Model/CMF:** HSM Configuration

**First Year of Analysis:** 2025

**Last Year of Analysis:** 2044

**Empirical-Bayes Analysis:** Site-Specific

**Highway with Crash History:** Alignment PR-A

**Highway with Crash History Comment:** Imported from Alignments.xml

**Highway with Crash History Version:** 2

**First Year of Observed Crashes:** 2020

**Last Year of Observed Crashes:** 2023

## Disclaimer Regarding Crash Prediction Method

### IMPORTANT NOTICE ABOUT COMPARING RESULTS FROM HIGHWAY SAFETY MANUAL FIRST EDITION (2010) MODELS TO RESULTS FROM NEW MODELS DEVELOPED UNDER NCHRP PROJECTS 17-70, 17-58, AND 17-68

Since the publication of the Highway Safety Manual - First Edition (HSM-1), in 2010 by the American Association of State Highway and Transportation Officials (AASHTO), multiple research efforts have been undertaken through the National Cooperative Highway Research Program (NCHRP) to develop safety performance models for road segment and intersection facility types that were not initially reflected in the HSM-1, in order to expand the breadth and depth of the HSM in the future.

The IHSDM Crash Prediction Module (CPM) is intended as a faithful implementation of HSM Part C predictive methods. As NCHRP projects to develop new predictive methods for the HSM are completed, FHWA works to incorporate the new methods into IHSDM, sometimes in advance of publication in the HSM. The following new crash predictive methods have been accepted by NCHRP project panels and incorporated into IHSDM, while pending AASHTO's approval for incorporation into a future edition of the HSM:

- Roundabouts: completed in 2018 under NCHRP Project 17-70, the new methods will provide improved outcomes for the safety analysis of roundabouts.
- 6+ lane and one-way urban/suburban arterials (including models for segments and intersections): completed under NCHRP Project 17-58.
- Intersection crash prediction methods for some intersection configurations and traffic control types not currently addressed in the HSM (e.g., all-way stop; rural 3-leg signalized; 3-leg stop-controlled where the major leg turns; urban 5-leg signalized; urban high-speed intersections): completed in 2021 under NCHRP Project 17-68.

However, in the absence of local calibration factors (see HSM-1 Part C, Appendix A for guidance on calibration of the predictive models), it is neither appropriate nor advisable to directly compare the results from new models (from NCHRP Projects 17-58, 17-68, and 17-70) to results from HSM-1 models, as the models were not calibrated to the same base state data sets, and consequently can produce unexpected results. If local calibration factors are available and applied to both new models and HSM-1 models, then it may be appropriate to directly compare the results. [Note: Work being performed under NCHRP Project 17-72 (Update of Crash Modification Factors for the Highway Safety Manual) is expected to re-calibrate many of the old (HSM-1) and new (e.g., NCHRP 17-70) models to data from a single (or small number of) states, that would allow results from all models to be directly compared.]

The models produced for NCHRP Project 17-70 have independent value in terms of informing the design of a roundabout and assessing the effects of different design characteristics on the expected safety performance of a roundabout.

The HSM-1 interim method previously included in IHSDM for evaluating roundabouts on urban/suburban arterials (i.e., evaluating an existing intersection and then applying a Crash Modification Factor for replacing the existing intersection with a roundabout) has been deactivated in IHSDM, to minimize any confusion with the new roundabout methodology.

## **Section Types**

### **Section 2 Evaluation**

**Section:** Section 2

**Evaluation Start Location:** 15+50.000

**Evaluation End Location:** 87+00.000

**Area Type:** Suburban

**Functional Class:** Arterial

**Type of Alignment:** Undivided, Two Lane

**Model Category:** Urban/Suburban Arterial

**Calibration Factor:** 3SG=1.0; 3ST=1.0; 3T=1.0; 4SG=1.0;

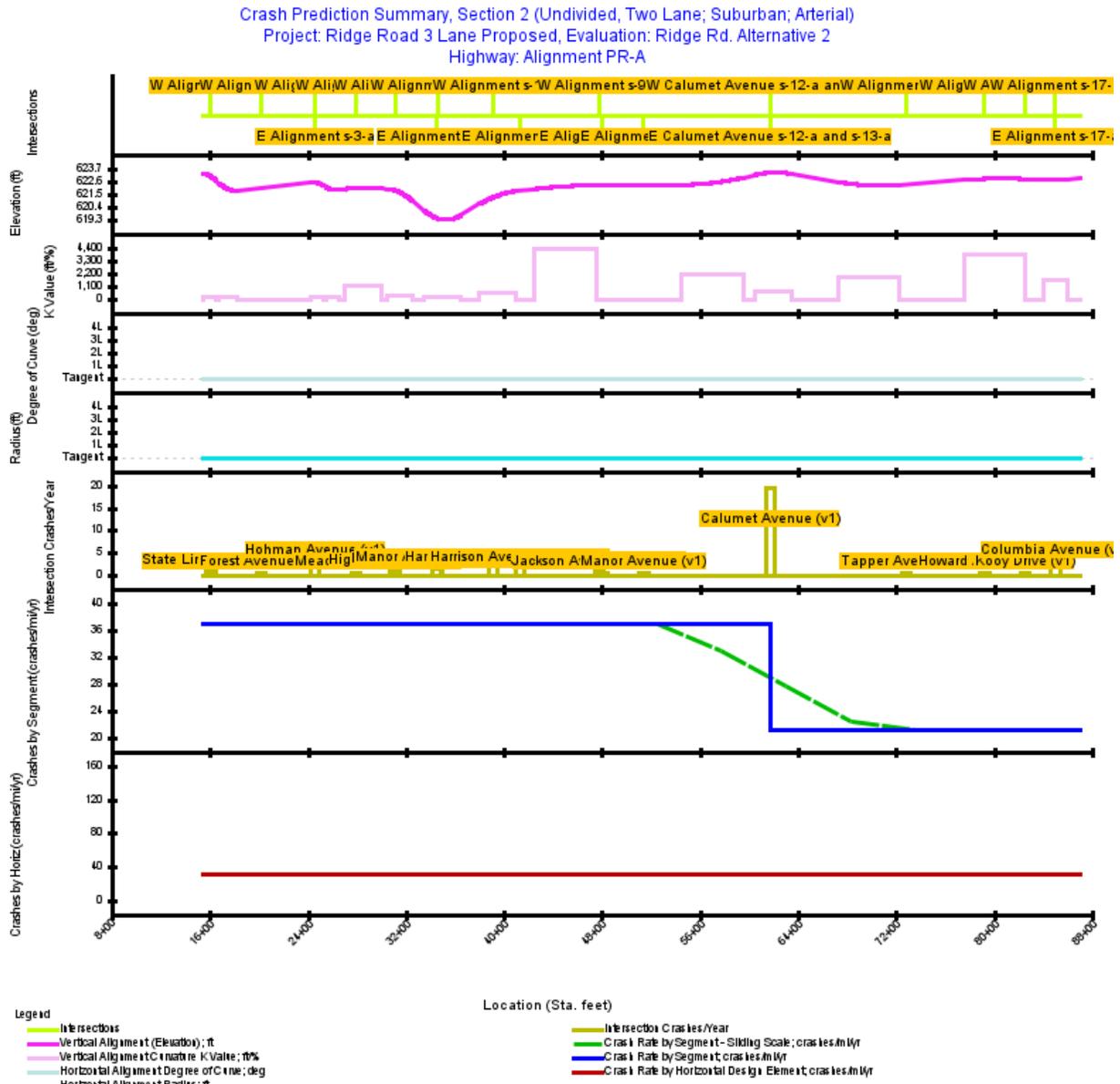


Figure 1. Crash Prediction Summary (Section 2)

**Table 1. Observed Crashes Used in the Evaluation (Section 2)**

Year	Observed Crashes	Total Crashes Used	FI Crashes	FI no/C Crashes	PDO Crashes
2020	76	70	3	0	67
2021	135	129	3	0	126
2022	99	96	2	0	94
2023	77	57	3	0	54
All Years	387 &nbsp; <sup>[1]</sup>	352	11	0	341

**Footnotes**

<sup>[1]</sup> Note: Observed crash data that does not comply with the associated CPM model requirements may not be used in EB processing.

**Table 2. Evaluation Highway - Homogeneous Segments (Section 2)**

Seg. No.	Type	Start Location (Sta. ft)	End Location (Sta. ft)	Length (ft)	Length (mi)	AADT	Number Major Commercial Driveways	Number Minor Commercial Driveways	Number Major Industrial/Institutional	Number Minor Industrial/Institutional	Number Major Residential Driveways	Number Minor Residential Driveways	Number Other Driveways	Lighting	Automated Speed Enforcement	Density (fixed objects/mi)	Median Width (ft)	Type	Effective Median Width (ft)	Speed Level	Number Rail Highway Crossings	Average Shoulder Width (ft)	Average Lane Width (ft)
1	Urban/Suburban Arterial Segment Three-lane including center TWLTL	15+50.000	61+70.730	4,620.73	0.8751	2025: 20,692; 2026: 20,698; 2027: 20,704; 2028: 20,710; 2029: 20,716; 2030: 20,722; 2031: 20,728; 2032: 20,735; 2033: 20,741; 2034: 20,747; 2035: 20,753; 2036: 20,759; 2037: 20,765; 2038: 20,771; 2039: 20,777; 2040: 20,783; 2041-2044: 20,790	2	40	0	0	0	1	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00
2	Urban/Suburban Arterial Segment Three-lane including center TWLTL	61+70.730	87+00.000	2,529.27	0.4790	2025: 19,000; 2026: 18,950; 2027: 18,900; 2028: 18,850; 2029: 18,800; 2030: 18,750; 2031: 18,700; 2032: 18,650; 2033: 18,600; 2034: 18,550; 2035: 18,500; 2036: 18,450; 2037: 18,400; 2038: 18,350; 2039: 18,300; 2040: 18,250; 2041-2044: 18,200	0	12	0	0	0	6	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00

**Table 3. Crash Highway Highway - Homogeneous Segments (Section 2)**

Seg. No.	Type	Start Location (Sta. ft)	End Location (Sta. ft)	Length (ft)	Length (mi)	AADT	Number Major Commercial Driveways	Number Minor Commercial Driveways	Number Major Industrial/Institutional	Number Minor Industrial/Institutional	Number Major Residential Driveways	Number Minor Residential Driveways	Number Other Driveways	Lighting	Automated Speed Enforcement	Density (fixed objects /mi)	Median Width (ft)	Type	Effective Median Width (ft)	Speed Level	Number Rail Highway Crossings	Average Shoulder Width (ft)	Average Lane Width (ft)
1	Urban/Suburban Arterial Segment Three-lane including center TWLTL	15+50.000	61+70.730	4,620.73	0.8751	2020-2023: 20,680	2	40	0	0	0	1	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00
2	Urban/Suburban Arterial Segment Three-lane including center TWLTL	61+70.730	87+00.000	2,529.27	0.4790	2020-2023: 19,100	0	12	0	0	0	6	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00

**Table 4. Evaluation Intersection (Section 2)**

Inter. No.	Title	Type	Location (Sta. ft)	Major AADT	Minor AADT	Legs	Traffic Control	Approach es w/Left Turn Lanes	Approach es w/Right Turn Lanes	Approach es w/o Right Turn on Red	Pedestrian Volume (crossings/day)	Lighted at Night	Red Light Camera	School Near by	Number of Bus Stops	Number of Alcohol Sales Establishments	Max Lanes Crossed
1	State Line Road (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	16+07.670	2025: 20,692; 2026: 20,698; 2027: 20,704; 2028: 20,710; 2029: 20,716; 2030: 20,722; 2031: 20,728; 2032: 20,735; 2033: 20,741; 2034: 20,747; 2035: 20,753; 2036: 20,759; 2037: 20,765; 2038: 20,771; 2039: 20,777; 2040: 20,783; 2041-2044: 20,790	2025-2044: 500	3	Stop-Controlled	0	0			false					
2	Forest Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	20+13.320	2025: 20,692; 2026: 20,698; 2027: 20,704; 2028: 20,710; 2029: 20,716; 2030: 20,722; 2031: 20,728; 2032: 20,735; 2033: 20,741; 2034: 20,747; 2035: 20,753; 2036: 20,759; 2037: 20,765; 2038: 20,771; 2039: 20,777; 2040: 20,783; 2041-2044: 20,790	2025-2044: 500	3	Stop-Controlled	0	0			false					
3	Hohman Avenue (v1)	Urban/Suburban Arterial Intersection Four-Legged Signalized	24+57.400	2025: 20,692; 2026: 20,698; 2027: 20,704; 2028: 20,710; 2029: 20,716; 2030: 20,722; 2031: 20,728; 2032: 20,735; 2033: 20,741; 2034: 20,747; 2035: 20,753; 2036: 20,759; 2037: 20,765; 2038: 20,771; 2039: 20,777; 2040: 20,783; 2041-2044: 20,790	2025: 6,315; 2026: 6,383; 2027: 6,451; 2028: 6,519; 2029: 6,587; 2030: 6,654; 2031: 6,722; 2032: 6,790; 2033: 6,858; 2034: 6,926; 2035: 6,994; 2036: 7,061; 2037: 7,129; 2038: 7,197; 2039: 7,265; 2040: 7,333; 2041-2044: 7,401	4	Signalized	0	0	0	20	false	false	false	0	0	3
4	Meadow Lane (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	27+93.140	2025: 20,692; 2026: 20,698; 2027: 20,704; 2028: 20,710; 2029: 20,716; 2030: 20,722; 2031: 20,728; 2032: 20,735; 2033: 20,741; 2034: 20,747; 2035: 20,753; 2036: 20,759; 2037: 20,765; 2038: 20,771; 2039: 20,777; 2040: 20,783; 2041-2044: 20,790	2025-2044: 500	3	Stop-Controlled	0	0			false					
5	Highland Place (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	31+09.730	2025: 20,692; 2026: 20,698; 2027: 20,704; 2028: 20,710; 2029: 20,716; 2030: 20,722; 2031: 20,728; 2032: 20,735; 2033: 20,741; 2034: 20,747; 2035: 20,753; 2036: 20,759; 2037: 20,765; 2038: 20,771; 2039: 20,777; 2040: 20,783; 2041-2044: 20,790	2025-2044: 500	3	Stop-Controlled	0	0			false					
6	Manor Avenue South (v1)	Urban/Suburban Arterial Intersection Three-Legged Signalized	34+46.240	2025: 20,692; 2026: 20,698; 2027: 20,704; 2028: 20,710; 2029: 20,716; 2030: 20,722; 2031: 20,728; 2032: 20,735; 2033: 20,741; 2034: 20,747; 2035: 20,753; 2036: 20,759; 2037: 20,765; 2038: 20,771; 2039: 20,777; 2040: 20,783; 2041-2044: 20,790	2025: 1,002; 2026: 1,013; 2027: 1,024; 2028: 1,035; 2029: 1,047; 2030: 1,058; 2031: 1,069; 2032: 1,080; 2033: 1,091; 2034: 1,102; 2035: 1,114; 2036: 1,125; 2037: 1,136; 2038: 1,147; 2039: 1,158; 2040: 1,169; 2041-2044: 1,181	3	Signalized	0	0	0	15	false	false	false	0	0	2
7	Manor Avenue North (v1)	Urban/Suburban Arterial Intersection Three-Legged Signalized	34+56.200	2025: 20,692; 2026: 20,698; 2027: 20,704; 2028: 20,710; 2029: 20,716; 2030: 20,722; 2031: 20,728; 2032: 20,735; 2033: 20,741; 2034: 20,747; 2035: 20,753; 2036: 20,759; 2037: 20,765; 2038: 20,771; 2039: 20,777; 2040: 20,783; 2041-2044: 20,790	2025: 512; 2026: 518; 2027: 524; 2028: 530; 2029: 536; 2030: 542; 2031: 548; 2032: 554; 2033: 560; 2034: 566; 2035: 572; 2036: 578; 2037: 584; 2038: 590; 2039: 596; 2040: 602; 2041-2044: 608	3	Signalized	0	0	0	15	false	false	false	0	0	2
8	Harrison Avenue North (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	39+12.300	2025: 20,692; 2026: 20,698; 2027: 20,704; 2028: 20,710; 2029: 20,716; 2030: 20,722; 2031: 20,728; 2032: 20,735; 2033: 20,741; 2034: 20,747; 2035: 20,753; 2036: 20,759; 2037: 20,765; 2038: 20,771; 2039: 20,777; 2040: 20,783; 2041-2044: 20,790	2025-2044: 500	3	Stop-Controlled	0	0			false					
9	Harrison Avenue South (v1)	Urban/Suburban Arterial Intersection Three-Legged Signalized	41+33.120	2025: 20,692; 2026: 20,698; 2027: 20,704; 2028: 20,710; 2029: 20,716; 2030: 20,722; 2031: 20,728; 2032: 20,735; 2033: 20,741; 2034: 20,747; 2035: 20,753; 2036: 20,759; 2037: 20,765; 2038: 20,771; 2039: 20,777; 2040: 20,783; 2041-2044: 20,790	2025: 1,666; 2026: 1,684; 2027: 1,703; 2028: 1,721; 2029: 1,739; 2030: 1,757; 2031: 1,776; 2032: 1,794; 2033: 1,812; 2034: 1,831; 2035: 1,849; 2036: 1,867; 2037: 1,885; 2038: 1,904; 2039: 1,922; 2040: 1,940; 2041-2044: 1,959	3	Signalized	0	0	0	15	false	false	false	0	0	2
10	Jackson Avenue North (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	47+72.460	2025: 20,692; 2026: 20,698; 2027: 20,704; 2028: 20,710; 2029: 20,716; 2030: 20,722; 2031: 20,728; 2032: 20,735; 2033: 20,741; 2034: 20,747; 2035: 20,753; 2036: 20,759; 2037: 20,765; 2038: 20,771; 2039: 20,777; 2040: 20,783; 2041-2044: 20,790	2025-2044: 500	3	Stop-Controlled	0	0			false					
11	Jackson Avenue South (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	48+05.100	2025: 20,692; 2026: 20,698; 2027: 20,704; 2028: 20,710; 2029: 20,716; 2030: 20,722; 2031: 20,728; 2032: 20,735; 2033: 20,741; 2034: 20,747; 2035: 20,753; 2036: 20,759; 2037: 20,765; 2038: 20,771; 2039: 20,777; 2040: 20,783; 2041-2044: 20,790	2025-2044: 500	3	Stop-Controlled	0	0			false					

Inter. No.	Title	Type	Location (Station)	Major AADT	Minor AADT	Legs	Traffic Control	Approaches w/Left Turn Lanes	Approaches w/Right Turn Lanes	Approaches w/o Right Turn on Red	Pedestrian Volume (crossings/day)	Lighted at Night	Red Light Camera	School Near by	Number of Bus Stops	Number of Alcohol Sales Establishments	Max Lanes Crossed	
12	Manor Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	51+39.4 40	2025: 20,692; 2026: 20,698; 2027: 20,704; 2028: 20,710; 2029: 20,716; 2030: 20,722; 2031: 20,728; 2032: 20,735; 2033: 20,741; 2034: 20,747; 2035: 20,753; 2036: 20,759; 2037: 20,765; 2038: 20,771; 2039: 20,777; 2040: 20,783; 2041-2044: 20,790	2025-2044: 500	3	Stop-Controlled	0	0			false						
13	Calumet Avenue (v1)	Urban/Suburban Arterial Intersection Four-Legged Signalized	61+70.7 30	2025: 20,692; 2026: 20,698; 2027: 20,704; 2028: 20,710; 2029: 20,716; 2030: 20,722; 2031: 20,728; 2032: 20,735; 2033: 20,741; 2034: 20,747; 2035: 20,753; 2036: 20,759; 2037: 20,765; 2038: 20,771; 2039: 20,777; 2040: 20,783; 2041-2044: 20,790	2025: 13,856; 2026: 14,004; 2027: 14,152; 2028: 14,301; 2029: 14,449; 2030: 14,597; 2031: 14,745; 2032: 14,894; 2033: 15,042; 2034: 15,190; 2035: 15,338; 2036: 15,486; 2037: 15,635; 2038: 15,783; 2039: 15,931; 2040: 16,079; 2041-2044: 16,228	4	Signalized	1	1	0	20	false	false	false	0	0	6	
14	Tapper Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	72+77.5 10	2025: 19,000; 2026: 18,950; 2027: 18,900; 2028: 18,850; 2029: 18,800; 2030: 18,750; 2031: 18,700; 2032: 18,650; 2033: 18,600; 2034: 18,550; 2035: 18,500; 2036: 18,450; 2037: 18,400; 2038: 18,350; 2039: 18,300; 2040: 18,250; 2041-2044: 18,200	2025-2044: 500	3	Stop-Controlled	0	0			false						
15	Howard Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	79+21.7 50	2025: 19,000; 2026: 18,950; 2027: 18,900; 2028: 18,850; 2029: 18,800; 2030: 18,750; 2031: 18,700; 2032: 18,650; 2033: 18,600; 2034: 18,550; 2035: 18,500; 2036: 18,450; 2037: 18,400; 2038: 18,350; 2039: 18,300; 2040: 18,250; 2041-2044: 18,200	2025-2044: 500	3	Stop-Controlled	0	0			false						
16	Kooy Drive (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	82+51.1 80	2025: 19,000; 2026: 18,950; 2027: 18,900; 2028: 18,850; 2029: 18,800; 2030: 18,750; 2031: 18,700; 2032: 18,650; 2033: 18,600; 2034: 18,550; 2035: 18,500; 2036: 18,450; 2037: 18,400; 2038: 18,350; 2039: 18,300; 2040: 18,250; 2041-2044: 18,200	2025-2044: 500	3	Stop-Controlled	0	0			false						
17	Columbia Avenue (v1)	Urban/Suburban Arterial Intersection Four-Legged Signalized	84+99.4 10	2025: 19,000; 2026: 18,950; 2027: 18,900; 2028: 18,850; 2029: 18,800; 2030: 18,750; 2031: 18,700; 2032: 18,650; 2033: 18,600; 2034: 18,550; 2035: 18,500; 2036: 18,450; 2037: 18,400; 2038: 18,350; 2039: 18,300; 2040: 18,250; 2041-2044: 18,200	2025: 11,700; 2026: 11,826; 2027: 11,951; 2028: 12,076; 2029: 12,202; 2030: 12,327; 2031: 12,452; 2032: 12,578; 2033: 12,703; 2034: 12,828; 2035: 12,954; 2036: 13,079; 2037: 13,204; 2038: 13,330; 2039: 13,455; 2040: 13,580; 2041-2044: 13,706	4	Signalized	0	0	0	20	false	false	false	0	0	2	

**Table 5. Crash History Intersection (Section 2)**

Inter. No.	Title	Type	Location (Sta. ft)	Major AADT	Minor AADT	Legs	Traffic Control	Approaches w/Left Turn Lanes	Approaches w/Right Turn Lanes	Approaches w/o Right Turn on Red	Pedestrian Volume (crossings/day)	Lighted at Night	Red Light Camera	School Nearby	Number of Bus Stops	Number of Alcohol Sales Establishments	Max Lanes Crossed
1	State Line Road (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	16+07.670	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
2	Forest Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	20+13.320	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
3	Hohman Avenue (v1)	Urban/Suburban Arterial Intersection Four-Legged Signalized	24+57.400	2020-2023: 20,680	2020-2023: 6,180	4	Signalized	0	0	0	20	false	false	false	0	0	3
4	Meadow Lane (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	27+93.140	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
5	Highland Place (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	31+09.730	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
6	Manor Avenue South (v1)	Urban/Suburban Arterial Intersection Three-Legged Signalized	34+46.240	2020-2023: 20,680	2020-2023: 980	3	Signalized	0	0	0	15	false	false	false	0	0	2
7	Manor Avenue North (v1)	Urban/Suburban Arterial Intersection Three-Legged Signalized	34+56.200	2020-2023: 20,680	2020-2023: 500	3	Signalized	0	0	0	15	false	false	false	0	0	2
8	Harrison Avenue North (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	39+12.300	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
9	Harrison Avenue South (v1)	Urban/Suburban Arterial Intersection Three-Legged Signalized	41+33.120	2020-2023: 20,680	2020-2023: 1,630	3	Signalized	0	0	0	15	false	false	false	0	0	2
10	Jackson Avenue North (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	47+72.460	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
11	Jackson Avenue South (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	48+05.100	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
12	Manor Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	51+39.440	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
13	Calumet Avenue (v1)	Urban/Suburban Arterial Intersection Four-Legged Signalized	61+70.730	2020-2023: 20,680	2020-2023: 13,560	4	Signalized	1	1	0	20	false	false	false	0	0	6
14	Tapper Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	72+77.510	2020-2023: 19,100	2020-2023: 500	3	Stop-Controlled	0	0			false					
15	Howard Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	79+21.750	2020-2023: 19,100	2020-2023: 500	3	Stop-Controlled	0	0			false					
16	Kooy Drive (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	82+51.180	2020-2023: 19,100	2020-2023: 500	3	Stop-Controlled	0	0			false					
17	Columbia Avenue (v1)	Urban/Suburban Arterial Intersection Four-Legged Signalized	84+99.410	2020-2023: 19,100	2020-2023: 11,450	4	Signalized	0	0	0	20	false	false	false	0	0	2

**Table 6. Expected Highway Crash Rates and Frequencies Summary (Section 2)**

First Year of Analysis	2025
Last Year of Analysis	2044
Evaluated Length (mi)	1.3542
Average Future Road AADT (vpd)	19,967
<b>Expected Crashes</b>	
Total Crashes	1,751.47
Fatal and Injury Crashes	193.67
Property-Damage-Only Crashes	1,557.80
<b>Percent of Total Expected Crashes</b>	
Percent Fatal and Injury Crashes (%)	11
Percent Property-Damage-Only Crashes (%)	89
<b>Expected Crash Rate</b>	
Crash Rate (crashes/mi/yr)	64.6697
FI Crash Rate (crashes/mi/yr)	7.1510
PDO Crash Rate (crashes/mi/yr)	57.5187
<b>Expected Travel Crash Rate</b>	
Total Travel (million veh-mi)	197.38
Travel Crash Rate (crashes/million veh-mi)	8.87
Travel FI Crash Rate (crashes/million veh-mi)	0.98
Travel PDO Crash Rate (crashes/million veh-mi)	7.89

**Table 7. Expected Crash Frequencies and Rates by Highway Segment/Intersection (Section 2)**

Segment Number/Intersection Name/Cross Road	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Expected Crashes for Evaluation Period	Total Predicted Crashes for Evaluation Period	Expected Total Crash Frequency (crashes/yr)	Expected FI Crash Frequency (crashes/yr)	Expected PDO Crash Frequency (crashes/yr)	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	(Expected - Predicted) Total Crash Frequency (crashes/yr)	(Expected - Predicted) FI Crash Frequency (crashes/yr)	(Expected - Predicted) PDO Crash Frequency (crashes/yr)	Expected Crash Rate (crashes/mi/yr)	Expected Travel Crash Rate (crashes/million veh-mi)	Expected Intersection Travel Crash Rate (crashes/million veh)
1	15+50.000	61+70.730	0.8751	646.005	151.074	32.3003	1.9947	30.3055	7.5537	2.4017	5.1520	24.7465	-0.4069	25.1535	36.9087	4.87	
State Line Road (v1)	16+07.670			15.675	28.555	0.7838	0.2614	0.5224	1.4278	0.6130	0.8147	-0.6440	-0.3517	-0.2923			0.10
Forest Avenue (v1)	20+13.320			7.654	28.555	0.3827	0.2059	0.1768	1.4278	0.6130	0.8147	-1.0450	-0.4071	-0.6379			0.05
Hohman Avenue (v1)	24+57.400			109.512	111.665	5.4756	0.6777	4.7979	5.5832	1.8865	3.6967	-0.1076	-1.2088	1.1012			0.54
Meadow Lane (v1)	27+93.140			11.665	28.555	0.5832	0.2415	0.3418	1.4278	0.6130	0.8147	-0.8445	-0.3715	-0.4730			0.08
Highland Place (v1)	31+09.730			15.675	28.555	0.7838	0.2614	0.5224	1.4278	0.6130	0.8147	-0.6440	-0.3517	-0.2923			0.10
Manor Avenue South (v1)	34+46.240			28.848	43.145	1.4424	0.4113	1.0311	2.1573	0.8399	1.3174	-0.7149	-0.4286	-0.2863			0.19
Manor Avenue North (v1)	34+56.200			51.950	36.453	2.5975	0.4363	2.1612	1.8226	0.7445	1.0782	0.7748	-0.3082	1.0830			0.34
Harrison Avenue North (v1)	39+12.300			43.748	28.555	2.1874	0.4608	1.7266	1.4278	0.6130	0.8147	0.7597	-0.1522	0.9119			0.29
Harrison Avenue South (v1)	41+33.120			45.938	50.441	2.2969	0.4734	1.8235	2.5220	0.9465	1.5755	-0.2252	-0.4731	0.2480			0.29
Jackson Avenue North (v1)	47+72.460			23.696	28.555	1.1848	0.2829	0.9020	1.4278	0.6130	0.8147	-0.2429	-0.3302	0.0872			0.15
Jackson Avenue South (v1)	48+05.100			7.654	28.555	0.3827	0.2059	0.1768	1.4278	0.6130	0.8147	-1.0450	-0.4071	-0.6379			0.05
Manor Avenue (v1)	51+39.440			7.654	28.555	0.3827	0.2059	0.1768	1.4278	0.6130	0.8147	-1.0450	-0.4071	-0.6379			0.05
Calumet Avenue (v1)	61+70.730			388.778	115.944	19.4389	1.6527	17.7861	5.7972	1.9465	3.8507	13.6417	-0.2938	13.9355			1.57
2	61+70.730	87+00.000	0.4790	202.898	62.289	10.1449	0.5788	9.5661	3.1144	0.9860	2.1284	7.0304	-0.4072	7.4377	21.1780	3.13	
Tapper Avenue (v1)	72+77.510			11.050	25.468	0.5525	0.2264	0.3261	1.2734	0.5471	0.7263	-0.7209	-0.3207	-0.4002			0.08
Howard Avenue (v1)	79+21.750			11.050	25.468	0.5525	0.2264	0.3261	1.2734	0.5471	0.7263	-0.7209	-0.3207	-0.4002			0.08
Kooy Drive (v1)	82+51.180			7.255	25.468	0.3627	0.1930	0.1697	1.2734	0.5471	0.7263	-0.9107	-0.3541	-0.5566			0.05
Columbia Avenue (v1)	84+99.410			114.764	114.600	5.7382	0.6872	5.0510	5.7300	1.9058	3.8241	0.0082	-1.2187	1.2269			0.50
All Segments			1.3542	848.903	213.363	42.4451	2.5736	39.8716	10.6681	3.3877	7.2804	31.7770	-0.8142	32.5912	31.3441	4.30	
All Intersections				902.567	777.094	45.1284	7.1100	38.0183	38.8547	14.8152	24.0394	6.2737	-7.7052	13.9789			0.32
Total			1.3542	1,751.470	990.457	87.5735	9.6836	77.8899	49.5228	18.2030	31.3199	38.0507	-8.5194	46.5700	64.6697		

**Table 8. Expected Crash Frequencies and Rates by Horizontal Design Element (Section 2)**

Title	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Expected Crashes for Evaluation Period	Total Predicted Crashes for Evaluation Period	Expected Total Crash Frequency (crashes/yr)	Expected FI Crash Frequency (crashes/yr)	Expected PDO Crash Frequency (crashes/yr)	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	(Expected - Predicted) Total Crash Frequency (crashes/yr)	(Expected - Predicted) FI Crash Frequency (crashes/yr)	(Expected - Predicted) PDO Crash Frequency (crashes/yr)	Expected Crash Rate (crashes/mi/yr)	Expected Travel Crash Rate (crashes/million veh-mi)
Tangent	15+50.000	87+00.000	1.3542	848.903	213.363	42.4451	2.5736	39.8716	10.6681	3.3877	7.2804	31.7770	-0.8142	32.5912	31.3441	4.26

**Table 9. Predicted Crash Frequencies by Year (Section 2)**

Year	Total Crashes	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)
2025	49.22	18.12	36.823	31.10	63.177
2026	49.26	18.13	36.816	31.12	63.184
2027	49.29	18.14	36.808	31.15	63.192
2028	49.33	18.15	36.801	31.17	63.199
2029	49.36	18.16	36.793	31.20	63.207
2030	49.39	18.17	36.786	31.22	63.214
2031	49.43	18.18	36.779	31.25	63.221
2032	49.46	18.19	36.772	31.27	63.228
2033	49.49	18.20	36.764	31.30	63.236
2034	49.52	18.20	36.758	31.32	63.242
2035	49.55	18.21	36.750	31.34	63.250
2036	49.59	18.22	36.743	31.37	63.257
2037	49.62	18.23	36.737	31.39	63.263
2038	49.65	18.23	36.730	31.41	63.270
2039	49.67	18.24	36.723	31.43	63.277
2040	49.70	18.25	36.716	31.45	63.284
2041	49.73	18.26	36.710	31.48	63.290
2042	49.73	18.26	36.710	31.48	63.290
2043	49.73	18.26	36.710	31.48	63.290
2044	49.73	18.26	36.710	31.48	63.290
Total	990.46	364.06	36.757	626.40	63.243
Average	49.52	18.20	36.757	31.32	63.243

**Note:** *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

**Table 10. Expected Crash Frequencies by Year (Section 2)**

Year	Total Crashes	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)
2025	87.04	9.64	11.078	77.33	88.849
2026	87.10	9.65	11.075	77.40	88.860
2027	87.16	9.65	11.073	77.46	88.870
2028	87.22	9.66	11.071	77.53	88.881
2029	87.28	9.66	11.069	77.59	88.891
2030	87.34	9.67	11.066	77.65	88.901
2031	87.40	9.67	11.064	77.71	88.911
2032	87.46	9.68	11.062	77.77	88.921
2033	87.52	9.68	11.060	77.83	88.931
2034	87.57	9.68	11.058	77.89	88.941
2035	87.63	9.69	11.056	77.95	88.951
2036	87.68	9.69	11.054	78.00	88.961
2037	87.74	9.70	11.052	78.06	88.971
2038	87.79	9.70	11.050	78.11	88.980
2039	87.84	9.70	11.047	78.17	88.990
2040	87.89	9.71	11.046	78.22	88.999
2041	87.95	9.71	11.043	78.28	89.009
2042	87.95	9.71	11.043	78.28	89.009
2043	87.95	9.71	11.043	78.28	89.009
2044	87.95	9.71	11.043	78.28	89.009
Total	1,751.47	193.67	11.058	1,557.80	88.942
Average	87.57	9.68	11.058	77.89	88.942

**Note:** *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

**Table 11. Comparing Predicted and Expected Crashes for the Evaluation Period (Section 2)**

Scope	Total Crashes	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)
Predicted	990.46	364.06	36.757	626.40	63.243
Expected	1,751.47	193.67	11.058	1,557.80	88.942
Expected - Predicted	761.01	-170.39		931.40	
Percent Difference	43.45	-87.98		59.79	

**Note:** *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

**Table 12. Expected Five Lane or Fewer Crash Type Distribution (Section 2)**

Element Type	Crash Type	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)	Total Crashes	Percent Total (%)
Highway Segment	Collision with Animal	0.00	0.0	0.06	0.0	0.06	0.0
Highway Segment	Collision with Bicycle	5.39	0.3	0.00	0.0	5.39	0.3
Highway Segment	Collision with Fixed Object	2.12	0.1	55.55	3.2	57.68	3.3
Highway Segment	Collision with Other Object	0.00	0.0	0.06	0.0	0.06	0.0
Highway Segment	Other Single-vehicle Collision	0.96	0.1	2.02	0.1	2.98	0.2
Highway Segment	Collision with Pedestrian	8.19	0.5	0.00	0.0	8.19	0.5
Highway Segment	Total Single Vehicle Crashes	16.67	1.0	57.69	3.3	74.36	4.2
Highway Segment	Angle Collision	2.14	0.1	14.57	0.8	16.71	1.0
Highway Segment	Driveway-related Collision	3.78	0.2	11.46	0.7	15.23	0.9
Highway Segment	Head-on Collision	1.05	0.1	14.57	0.8	15.62	0.9
Highway Segment	Other Multi-vehicle Collision	1.05	0.1	14.57	0.8	15.62	0.9
Highway Segment	Rear-end Collision	26.21	1.5	613.22	35.0	639.43	36.5
Highway Segment	Sideswipe, Opposite Direction Collision	0.53	0.0	14.57	0.8	15.09	0.9
Highway Segment	Sideswipe, Same Direction Collision	0.03	0.0	56.81	3.2	56.84	3.2
Highway Segment	Total Multiple Vehicle Crashes	34.80	2.0	739.74	42.2	774.54	44.2
Highway Segment	Total Highway Segment Crashes	51.47	2.9	797.43	45.5	848.90	48.5
Intersection	Collision with Animal	0.03	0.0	0.24	0.0	0.27	0.0
Intersection	Collision with Bicycle	11.16	0.6	0.00	0.0	11.16	0.6
Intersection	Collision with Fixed Object	10.30	0.6	26.96	1.5	37.26	2.1
Intersection	Non-Collision	1.81	0.1	0.93	0.1	2.74	0.2
Intersection	Collision with Other Object	1.16	0.1	2.42	0.1	3.58	0.2
Intersection	Other Single-vehicle Collision	0.56	0.0	0.70	0.0	1.25	0.1
Intersection	Collision with Parked Vehicle	0.01	0.0	0.05	0.0	0.07	0.0
Intersection	Collision with Pedestrian	7.46	0.4	0.00	0.0	7.46	0.4
Intersection	Total Intersection Single Vehicle Crashes	32.49	1.9	31.29	1.8	63.79	3.6

Element Type	Crash Type	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)	Total Crashes	Percent Total (%)
Intersection	Angle Collision	36.37	2.1	175.81	10.0	212.19	12.1
Intersection	Head-on Collision	4.97	0.3	20.24	1.2	25.21	1.4
Intersection	Other Multi-vehicle Collision	6.45	0.4	154.91	8.8	161.37	9.2
Intersection	Rear-end Collision	50.57	2.9	354.00	20.2	404.57	23.1
Intersection	Sideswipe	11.34	0.6	24.10	1.4	35.44	2.0
Intersection	Total Intersection Multiple Vehicle Crashes	109.71	6.3	729.07	41.6	838.78	47.9
Intersection	Total Intersection Crashes	142.20	8.1	760.37	43.4	902.57	51.5
	Total Crashes	193.67	11.1	1,557.80	88.9	1,751.47	100.0

**Note:** *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

*Interactive Highway Safety Design Model*

**Crash Prediction Evaluation Report**

January 28, 2025



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## Report Overview

**Report Generated:** Jan 28, 2025 9:34 AM

**Report Template:** System: Multi-Page, 508 Compliant [System] (mlcpm4, Nov 19, 2024 9:36 AM)

**Evaluation Date:** Tue Jan 28 09:02:44 EST 2025

**IHSDM Version:** v17.0.0 (Sep 22, 2021)

**Crash Prediction Module:** v12.0.0 (Sep 22, 2021)

**User Name:** ktedder

**Organization Name:** Infrastructure Engineering

**Phone:** 3174172267

**E-Mail:** ktedder@infrastructure-eng.com

**Project Title:** Ridge Road 5 Lane Proposed

**Project Comment:** Created using wizard

**Project Unit System:** U.S. Customary

**Highway Title:** Alignment PR-A

**Highway Comment:** Imported from Alignments.xml

**Highway Version:** 1

**Evaluation Title:** Ridge Rd. Alternative 1

**Evaluation Comment:** Created Tue Jan 28 09:02:12 EST 2025

**Minimum Location:** 15+50.000

**Maximum Location:** 87+00.000

**Policy for Superelevation:** AASHTO 2011 U.S. Customary

**Calibration:** HSM Configuration

**Crash Distribution:** HSM Configuration

**Model/CMF:** HSM Configuration

**First Year of Analysis:** 2025

**Last Year of Analysis:** 2044

**Empirical-Bayes Analysis:** Site-Specific

**Highway with Crash History:** Alignment PR-A

**Highway with Crash History Comment:** Imported from Alignments.xml

**Highway with Crash History Version:** 1

**First Year of Observed Crashes:** 2020

**Last Year of Observed Crashes:** 2023

## Disclaimer Regarding Crash Prediction Method

### IMPORTANT NOTICE ABOUT COMPARING RESULTS FROM HIGHWAY SAFETY MANUAL FIRST EDITION (2010) MODELS TO RESULTS FROM NEW MODELS DEVELOPED UNDER NCHRP PROJECTS 17-70, 17-58, AND 17-68

Since the publication of the Highway Safety Manual - First Edition (HSM-1), in 2010 by the American Association of State Highway and Transportation Officials (AASHTO), multiple research efforts have been undertaken through the National Cooperative Highway Research Program (NCHRP) to develop safety performance models for road segment and intersection facility types that were not initially reflected in the HSM-1, in order to expand the breadth and depth of the HSM in the future.

The IHSDM Crash Prediction Module (CPM) is intended as a faithful implementation of HSM Part C predictive methods. As NCHRP projects to develop new predictive methods for the HSM are completed, FHWA works to incorporate the new methods into IHSDM, sometimes in advance of publication in the HSM. The following new crash predictive methods have been accepted by NCHRP project panels and incorporated into IHSDM, while pending AASHTO's approval for incorporation into a future edition of the HSM:

- Roundabouts: completed in 2018 under NCHRP Project 17-70, the new methods will provide improved outcomes for the safety analysis of roundabouts.
- 6+ lane and one-way urban/suburban arterials (including models for segments and intersections): completed under NCHRP Project 17-58.
- Intersection crash prediction methods for some intersection configurations and traffic control types not currently addressed in the HSM (e.g., all-way stop; rural 3-leg signalized; 3-leg stop-controlled where the major leg turns; urban 5-leg signalized; urban high-speed intersections): completed in 2021 under NCHRP Project 17-68.

However, in the absence of local calibration factors (see HSM-1 Part C, Appendix A for guidance on calibration of the predictive models), it is neither appropriate nor advisable to directly compare the results from new models (from NCHRP Projects 17-58, 17-68, and 17-70) to results from HSM-1 models, as the models were not calibrated to the same base state data sets, and consequently can produce unexpected results. If local calibration factors are available and applied to both new models and HSM-1 models, then it may be appropriate to directly compare the results. [Note: Work being performed under NCHRP Project 17-72 (Update of Crash Modification Factors for the Highway Safety Manual) is expected to re-calibrate many of the old (HSM-1) and new (e.g., NCHRP 17-70) models to data from a single (or small number of) states, that would allow results from all models to be directly compared.]

The models produced for NCHRP Project 17-70 have independent value in terms of informing the design of a roundabout and assessing the effects of different design characteristics on the expected safety performance of a roundabout.

The HSM-1 interim method previously included in IHSDM for evaluating roundabouts on urban/suburban arterials (i.e., evaluating an existing intersection and then applying a Crash Modification Factor for replacing the existing intersection with a roundabout) has been deactivated in IHSDM, to minimize any confusion with the new roundabout methodology.

## **Section Types**

### **Section 2 Evaluation**

**Section:** Section 2

**Evaluation Start Location:** 15+50.000

**Evaluation End Location:** 87+00.000

**Area Type:** Suburban

**Functional Class:** Arterial

**Type of Alignment:** Undivided, Multilane

**Model Category:** Urban/Suburban Arterial

**Calibration Factor:** 3SG=1.0; 3ST=1.0; 4D=1.0; 4SG=1.0; 4U=1.0; 5T=1.0;

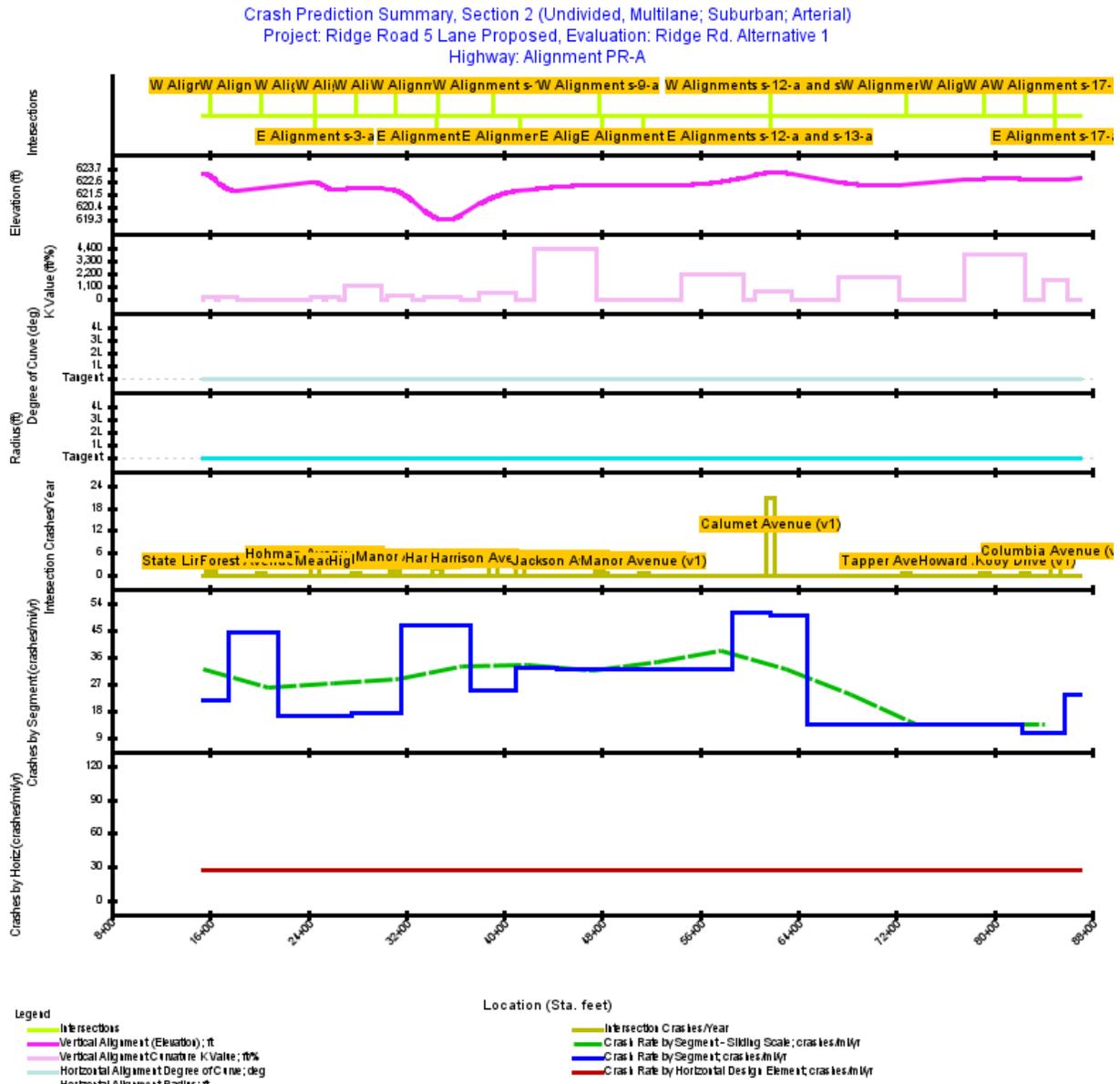


Figure 1. Crash Prediction Summary (Section 2)

**Table 1. Observed Crashes Used in the Evaluation (Section 2)**

Year	Observed Crashes	Total Crashes Used	FI Crashes	FI no/C Crashes	PDO Crashes
2020	75	69	3	0	66
2021	132	126	3	0	123
2022	96	93	2	0	91
2023	77	57	3	0	54
All Years	380 &nbsp; <sup>[1]</sup>	345	11	0	334

**Footnotes**

<sup>[1]</sup> Note: Observed crash data that does not comply with the associated CPM model requirements may not be used in EB processing.

**Table 2. Evaluation Highway - Homogeneous Segments (Section 2)**

Seg. No.	Type	Start Location (Sta. ft)	End Location (Sta. ft)	Length (ft)	Length (mi)	AADT	Number Major Commercial Driveways	Number Minor Commercial Driveways	Number Major Industrial/Institutional	Number Minor Industrial/Institutional	Number Major Residential Driveways	Number Minor Residential Driveways	Number Other Driveways	Lighting	Automated Speed Enforcement	Density (fixed objects/mi)	Median Width (ft)	Type	Effective Median Width (ft)	Speed Level	Number Rail Highway Crossings	Average Shoulder Width (ft)	Average Lane Width (ft)	
1	Urban/Suburban Arterial Segment Four-lane Undivided	15+50.000	17+50.000	200.00	0.0379	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	0	1	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00
2	Urban/Suburban Arterial Segment Four-lane Divided	17+50.000	21+51.000	401.00	0.0759	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	1	5	0	0	0	0	0	0	false	false	0.0	11.0	Traversable Median	5.50	Low	0	0.00	10.00
3	Urban/Suburban Arterial Segment Five-lane including center TWLTL	21+51.000	27+59.000	608.00	0.1152	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	0	4	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00
4	Urban/Suburban Arterial Segment Four-lane Divided	27+59.000	31+62.000	403.00	0.0763	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	1	1	0	0	0	0	0	0	false	false	0.0	11.0	Traversable Median	5.50	Low	0	0.00	10.00
5	Urban/Suburban Arterial Segment Five-lane including center TWLTL	31+62.000	37+32.000	570.00	0.1080	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	0	6	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00
6	Urban/Suburban Arterial Segment Four-lane Divided	37+32.000	40+97.000	365.00	0.0691	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	0	2	0	0	0	0	0	0	false	false	0.0	11.0	Traversable Median	5.50	Low	0	0.00	10.00
7	Urban/Suburban Arterial Segment Five-lane including center TWLTL	40+97.000	44+28.000	331.00	0.0627	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	0	5	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00
8	Urban/Suburban Arterial Segment Four-lane Divided	44+28.000	58+59.000	1,431.00	0.2710	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	0	13	0	0	0	1	0	0	false	false	0.0	11.0	Traversable Median	5.50	Low	0	0.00	10.00
9	Urban/Suburban Arterial Segment Five-lane including center TWLTL	58+59.000	61+70.730	311.73	0.0590	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	0	3	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00
10	Urban/Suburban Arterial Segment Five-lane including center TWLTL	61+70.730	64+71.000	300.27	0.0569	2025: 19,211; 2026: 19,266; 2027: 19,322; 2028: 19,377; 2029: 19,433; 2030: 19,488; 2031: 19,544; 2032: 19,600; 2033: 19,655; 2034: 19,711; 2035: 19,766; 2036: 19,822; 2037: 19,877; 2038: 19,933; 2039: 19,988; 2040: 20,044; 2041-2044: 20,100	0	2	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00
11	Urban/Suburban Arterial Segment Four-lane Divided	64+71.000	82+30.000	1,759.00	0.3331	2025: 19,211; 2026: 19,266; 2027: 19,322; 2028: 19,377; 2029: 19,433; 2030: 19,488; 2031: 19,544; 2032: 19,600; 2033: 19,655; 2034: 19,711; 2035: 19,766; 2036: 19,822; 2037: 19,877; 2038: 19,933; 2039: 19,988; 2040: 20,044; 2041-2044: 20,100	0	10	0	0	0	3	0	0	false	false	0.0	11.0	Traversable Median	5.50	Low	0	0.00	10.00
12	Urban/Suburban Arterial Segment Five-lane including center TWLTL	82+30.000	85+69.870	339.87	0.0644	2025: 19,211; 2026: 19,266; 2027: 19,322; 2028: 19,377; 2029: 19,433; 2030: 19,488; 2031: 19,544; 2032: 19,600; 2033: 19,655; 2034: 19,711; 2035: 19,766; 2036: 19,822; 2037: 19,877; 2038: 19,933; 2039: 19,988; 2040: 20,044; 2041-2044: 20,100	0	0	0	0	0	3	0	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00
13	Urban/Suburban Arterial Segment Four-lane Undivided	85+69.870	87+00.000	130.13	0.0246	2025: 19,211; 2026: 19,266; 2027: 19,322; 2028: 19,377; 2029: 19,433; 2030: 19,488; 2031: 19,544; 2032: 19,600; 2033: 19,655; 2034: 19,711; 2035: 19,766; 2036: 19,822; 2037: 19,877; 2038: 19,933; 2039: 19,988; 2040: 20,044; 2041-2044: 20,100	0	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00



**Table 3. Crash Highway Highway - Homogeneous Segments (Section 2)**

Se g. No	Type	Start Locatio n (Sta. ft)	End Locatio n (Sta. ft)	Length (ft)	Length (mi)	AADT	Number Major Commerci al Driveways	Number Minor Commerci al Driveways	Number Major Industrial/Inst itutional	Number Minor Industrial/Inst itutional	Number Major Residential Driveways	Number Minor Residential Driveways	Number Other Drivewa ys	Lightin g	Automated Speed Enforceme nt	Densit y (fixed object s/mi)	Medi an Widt h (ft)	Type	Effective Median Width (ft)	Spe ed Lev el	Number Rail Highway Crossing s	Averag e Should er Width (ft)	Avera ge Lane Width (ft)
1	Urban/Suburban Arterial Segment Four-lane Undivided	15+50.00	17+50.00	200.00	0.0379	2020-2023: 20,680	0	1	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00
2	Urban/Suburban Arterial Segment Four-lane Divided	17+50.00	21+51.00	401.00	0.0759	2020-2023: 20,680	1	5	0	0	0	0	0	false	false	0.0	11.00	Traversable Median	5.50	Low	0	0.00	10.00
3	Urban/Suburban Arterial Segment Five-lane including center TWLTL	21+51.00	27+59.00	608.00	0.1152	2020-2023: 20,680	0	4	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00
4	Urban/Suburban Arterial Segment Four-lane Divided	27+59.00	31+62.00	403.00	0.0763	2020-2023: 20,680	1	1	0	0	0	0	0	false	false	0.0	11.00	Traversable Median	5.50	Low	0	0.00	10.00
5	Urban/Suburban Arterial Segment Five-lane including center TWLTL	31+62.00	37+32.00	570.00	0.1080	2020-2023: 20,680	0	6	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00
6	Urban/Suburban Arterial Segment Four-lane Divided	37+32.00	40+97.00	365.00	0.0691	2020-2023: 20,680	0	2	0	0	0	0	0	false	false	0.0	11.00	Traversable Median	5.50	Low	0	0.00	10.00
7	Urban/Suburban Arterial Segment Five-lane including center TWLTL	40+97.00	44+28.00	331.00	0.0627	2020-2023: 20,680	0	5	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00
8	Urban/Suburban Arterial Segment Four-lane Divided	44+28.00	58+59.00	1,431.00	0.2710	2020-2023: 20,680	0	13	0	0	0	1	0	false	false	0.0	11.00	Traversable Median	5.50	Low	0	0.00	10.00
9	Urban/Suburban Arterial Segment Five-lane including center TWLTL	58+59.00	61+70.730	311.730	0.0593	2020-2023: 20,680	0	3	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00
10	Urban/Suburban Arterial Segment Five-lane including center TWLTL	61+70.730	64+71.000	300.270	0.0569	2020-2023: 19,100	0	2	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00
11	Urban/Suburban Arterial Segment Four-lane Divided	64+71.000	82+30.000	1,759.000	0.3331	2020-2023: 19,100	0	10	0	0	0	3	0	false	false	0.0	11.00	Traversable Median	5.50	Low	0	0.00	10.00
12	Urban/Suburban Arterial Segment Five-lane including center TWLTL	82+30.000	85+69.870	339.870	0.0644	2020-2023: 19,100	0	0	0	0	0	3	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00
13	Urban/Suburban Arterial Segment Four-lane Undivided	85+69.870	87+00.000	130.130	0.0246	2020-2023: 19,100	0	0	0	0	0	0	0	false	false	0.0	0.00	None	0.00	Low	0	0.00	10.00

**Table 4. Evaluation Intersection (Section 2)**

Inter. No.	Title	Type	Location (Sta. ft)	Major AADT	Minor AADT	Legs	Traffic Control	Approach w/Left Turn Lanes	Approach w/Right Turn Lanes	Approach w/o Right Turn on Red	Pedestrian Volume (crossings/day)	Lighted at Night	Red Light Camera	School Near by	Number of Bus Stops	Number of Alcohol Sales Establishments	Max Lanes Crossed
1	State Line Road (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	16+07.670	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025-2044: 500	3	Stop-Controlled	0	0			false					
2	Forest Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	20+13.320	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025-2044: 500	3	Stop-Controlled	0	0			false					
3	Hohman Avenue (v1)	Urban/Suburban Arterial Intersection Four-Legged Signalized	24+57.400	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025: 6,315; 2026: 6,383; 2027: 6,451; 2028: 6,519; 2029: 6,587; 2030: 6,654; 2031: 6,722; 2032: 6,790; 2033: 6,858; 2034: 6,926; 2035: 6,994; 2036: 7,061; 2037: 7,129; 2038: 7,197; 2039: 7,265; 2040: 7,333; 2041-2044: 7,401	4	Signalized	0	0	20	false	false	false	0	0	0	4
4	Meadow Lane (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	27+93.140	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025-2044: 500	3	Stop-Controlled	0	0			false					
5	Highland Place (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	31+09.730	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025-2044: 500	3	Stop-Controlled	0	0			false					
6	Manor Avenue South (v1)	Urban/Suburban Arterial Intersection Three-Legged Signalized	34+46.240	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025: 1,002; 2026: 1,013; 2027: 1,024; 2028: 1,035; 2029: 1,047; 2030: 1,058; 2031: 1,069; 2032: 1,080; 2033: 1,091; 2034: 1,102; 2035: 1,114; 2036: 1,125; 2037: 1,136; 2038: 1,147; 2039: 1,158; 2040: 1,169; 2041-2044: 1,181	3	Signalized	0	0	15	false	false	false	0	0	0	4
7	Manor Avenue North (v1)	Urban/Suburban Arterial Intersection Three-Legged Signalized	34+56.200	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025: 512; 2026: 518; 2027: 524; 2028: 530; 2029: 536; 2030: 542; 2031: 548; 2032: 554; 2033: 560; 2034: 566; 2035: 572; 2036: 578; 2037: 584; 2038: 590; 2039: 596; 2040: 602; 2041-2044: 608	3	Signalized	0	0	15	false	false	false	0	0	0	4
8	Harrison Avenue North (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	39+12.300	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025-2044: 500	3	Stop-Controlled	0	0			false					
9	Harrison Avenue South (v1)	Urban/Suburban Arterial Intersection Three-Legged Signalized	41+33.120	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025: 1,666; 2026: 1,684; 2027: 1,703; 2028: 1,721; 2029: 1,739; 2030: 1,757; 2031: 1,776; 2032: 1,794; 2033: 1,812; 2034: 1,831; 2035: 1,849; 2036: 1,867; 2037: 1,885; 2038: 1,904; 2039: 1,922; 2040: 1,940; 2041-2044: 1,959	3	Signalized	1	0	15	false	false	false	0	0	0	4
10	Jackson Avenue North (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	47+72.460	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025-2044: 500	3	Stop-Controlled	0	0			false					
11	Jackson Avenue South (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	48+05.100	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025-2044: 500	3	Stop-Controlled	0	0			false					

Inter. No.	Title	Type	Location (Station)	Major AADT	Minor AADT	Legs	Traffic Control	Approaches w/Left Turn Lanes	Approaches w/Right Turn Lanes	Approaches w/o Right Turn on Red	Pedestrian Volume (crossings/day)	Lighted at Night	Red Light Camera	School Near by	Number of Bus Stops	Number of Alcohol Sales Establishments	Max Lanes Crossed
12	Manor Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	51+39.40	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025-2044: 500	3	Stop-Controlled	0	0			false					
13	Calumet Avenue (v1)	Urban/Suburban Arterial Intersection Four-Legged Signalized	61+70.730	2025: 20,914; 2026: 21,031; 2027: 21,148; 2028: 21,266; 2029: 21,383; 2030: 21,500; 2031: 21,617; 2032: 21,735; 2033: 21,852; 2034: 21,969; 2035: 22,086; 2036: 22,203; 2037: 22,321; 2038: 22,438; 2039: 22,555; 2040: 22,672; 2041-2044: 22,790	2025: 13,856; 2026: 14,004; 2027: 14,152; 2028: 14,301; 2029: 14,449; 2030: 14,597; 2031: 14,745; 2032: 14,894; 2033: 15,042; 2034: 15,190; 2035: 15,338; 2036: 15,486; 2037: 15,635; 2038: 15,783; 2039: 15,931; 2040: 16,079; 2041-2044: 16,228	4	Signalized	1	1	0	20	false	false	false	0	0	6
14	Tapper Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	72+77.510	2025: 19,211; 2026: 19,266; 2027: 19,322; 2028: 19,377; 2029: 19,433; 2030: 19,488; 2031: 19,544; 2032: 19,600; 2033: 19,655; 2034: 19,711; 2035: 19,766; 2036: 19,822; 2037: 19,877; 2038: 19,933; 2039: 19,988; 2040: 20,044; 2041-2044: 20,100	2025-2044: 500	3	Stop-Controlled	0	0			false					
15	Howard Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	79+21.750	2025: 19,211; 2026: 19,266; 2027: 19,322; 2028: 19,377; 2029: 19,433; 2030: 19,488; 2031: 19,544; 2032: 19,600; 2033: 19,655; 2034: 19,711; 2035: 19,766; 2036: 19,822; 2037: 19,877; 2038: 19,933; 2039: 19,988; 2040: 20,044; 2041-2044: 20,100	2025-2044: 500	3	Stop-Controlled	0	0			false					
16	Kooy Drive (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	82+51.180	2025: 19,211; 2026: 19,266; 2027: 19,322; 2028: 19,377; 2029: 19,433; 2030: 19,488; 2031: 19,544; 2032: 19,600; 2033: 19,655; 2034: 19,711; 2035: 19,766; 2036: 19,822; 2037: 19,877; 2038: 19,933; 2039: 19,988; 2040: 20,044; 2041-2044: 20,100	2025-2044: 500	3	Stop-Controlled	0	0			false					
17	Columbia Avenue (v1)	Urban/Suburban Arterial Intersection Four-Legged Signalized	84+99.410	2025: 19,211; 2026: 19,266; 2027: 19,322; 2028: 19,377; 2029: 19,433; 2030: 19,488; 2031: 19,544; 2032: 19,600; 2033: 19,655; 2034: 19,711; 2035: 19,766; 2036: 19,822; 2037: 19,877; 2038: 19,933; 2039: 19,988; 2040: 20,044; 2041-2044: 20,100	2025: 11,700; 2026: 11,826; 2027: 11,951; 2028: 12,076; 2029: 12,202; 2030: 12,327; 2031: 12,452; 2032: 12,578; 2033: 12,703; 2034: 12,828; 2035: 12,954; 2036: 13,079; 2037: 13,204; 2038: 13,330; 2039: 13,455; 2040: 13,580; 2041-2044: 13,706	4	Signalized	1	0	0	20	false	false	false	0	0	4

**Table 5. Crash History Intersection (Section 2)**

Inter. No.	Title	Type	Location (Sta. ft)	Major AADT	Minor AADT	Legs	Traffic Control	Approaches w/Left Turn Lanes	Approaches w/Right Turn Lanes	Approaches w/o Right Turn on Red	Pedestrian Volume (crossings/day)	Lighted at Night	Red Light Camera	School Nearby	Number of Bus Stops	Number of Alcohol Sales Establishments	Max Lanes Crossed
1	State Line Road (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	16+07.670	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
2	Forest Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	20+13.320	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
3	Hohman Avenue (v1)	Urban/Suburban Arterial Intersection Four-Legged Signalized	24+57.400	2020-2023: 20,680	2020-2023: 6,180	4	Signalized	0	0	0	20	false	false	false	0	0	4
4	Meadow Lane (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	27+93.140	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
5	Highland Place (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	31+09.730	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
6	Manor Avenue South (v1)	Urban/Suburban Arterial Intersection Three-Legged Signalized	34+46.240	2020-2023: 20,680	2020-2023: 980	3	Signalized	0	0	0	15	false	false	false	0	0	4
7	Manor Avenue North (v1)	Urban/Suburban Arterial Intersection Three-Legged Signalized	34+56.200	2020-2023: 20,680	2020-2023: 500	3	Signalized	0	0	0	15	false	false	false	0	0	4
8	Harrison Avenue North (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	39+12.300	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
9	Harrison Avenue South (v1)	Urban/Suburban Arterial Intersection Three-Legged Signalized	41+33.120	2020-2023: 20,680	2020-2023: 1,630	3	Signalized	1	0	0	15	false	false	false	0	0	4
10	Jackson Avenue North (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	47+72.460	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
11	Jackson Avenue South (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	48+05.100	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
12	Manor Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	51+39.440	2020-2023: 20,680	2020-2023: 500	3	Stop-Controlled	0	0			false					
13	Calumet Avenue (v1)	Urban/Suburban Arterial Intersection Four-Legged Signalized	61+70.730	2020-2023: 20,680	2020-2023: 13,560	4	Signalized	1	1	0	20	false	false	false	0	0	6
14	Tapper Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	72+77.510	2020-2023: 19,100	2020-2023: 500	3	Stop-Controlled	0	0			false					
15	Howard Avenue (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	79+21.750	2020-2023: 19,100	2020-2023: 500	3	Stop-Controlled	0	0			false					
16	Kooy Drive (v1)	Urban/Suburban Arterial Intersection Three-Legged w/STOP control	82+51.180	2020-2023: 19,100	2020-2023: 500	3	Stop-Controlled	0	0			false					
17	Columbia Avenue (v1)	Urban/Suburban Arterial Intersection Four-Legged Signalized	84+99.410	2020-2023: 19,100	2020-2023: 11,450	4	Signalized	1	0	0	20	false	false	false	0	0	4

**Table 6. Expected Highway Crash Rates and Frequencies Summary (Section 2)**

First Year of Analysis	2025
Last Year of Analysis	2044
Evaluated Length (mi)	1.3542
Average Future Road AADT (vpd)	21,189
<b>Expected Crashes</b>	
Total Crashes	1,651.40
Fatal and Injury Crashes	217.75
Property-Damage-Only Crashes	1,433.65
<b>Percent of Total Expected Crashes</b>	
Percent Fatal and Injury Crashes (%)	13
Percent Property-Damage-Only Crashes (%)	87
<b>Expected Crash Rate</b>	
Crash Rate (crashes/mi/yr)	60.9747
FI Crash Rate (crashes/mi/yr)	8.0401
PDO Crash Rate (crashes/mi/yr)	52.9346
<b>Expected Travel Crash Rate</b>	
Total Travel (million veh-mi)	209.46
Travel Crash Rate (crashes/million veh-mi)	7.88
Travel FI Crash Rate (crashes/million veh-mi)	1.04
Travel PDO Crash Rate (crashes/million veh-mi)	6.84

**Table 7. Expected Crash Frequencies and Rates by Highway Segment/Intersection (Section 2)**

Segment Number/Intersection Name/Cross Road	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Expected Crashes for Evaluation Period	Total Predicted Crashes for Evaluation Period	Expected Total Crash Frequency (crashes/yr)	Expected FI Crash Frequency (crashes/yr)	Expected PDO Crash Frequency (crashes/yr)	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	(Expected - Predicted) Total Crash Frequency (crashes/yr)	(Expected - Predicted) FI Crash Frequency (crashes/yr)	(Expected - Predicted) PDO Crash Frequency (crashes/yr)	Expected Crash Rate (crashes/mi/yr)	Expected Travel Crash Rate (crashes/million veh-mi)	Expected Intersection Travel Crash Rate (crashes/million veh)
1	15+50.000	17+50.000	0.0379	16.290	6.898	0.8145	0.1011	0.7134	0.3449	0.1122	0.2327	0.4696	-0.0111	0.4807	21.5027	2.68	
State Line Road (v1)	16+07.670			16.624	30.310	0.8312	0.2767	0.5545	1.5155	0.6505	0.8650	-0.6843	-0.3738	-0.3105			0.10
2	17+50.000	21+51.000	0.0759	67.176	9.928	3.3588	0.2273	3.1316	0.4964	0.1599	0.3365	2.8624	0.0674	2.7950	44.2257	5.51	
Forest Avenue (v1)	20+13.320			8.067	30.310	0.4034	0.2175	0.1858	1.5155	0.6505	0.8650	-1.1122	-0.4329	-0.6792			0.05
3	21+51.000	27+59.000	0.1152	38.153	29.956	1.9077	0.3832	1.5245	1.4978	0.4763	1.0215	0.4099	-0.0931	0.5030	16.5666	2.06	
Hohman Avenue (v1)	24+57.400			82.444	118.722	4.1222	0.6991	3.4231	5.9361	2.0162	3.9199	-1.8139	-1.3171	-0.4968			0.39
4	27+59.000	31+62.000	0.0763	26.528	8.497	1.3264	0.1173	1.2091	0.4249	0.1357	0.2891	0.9015	-0.0185	0.9200	17.3783	2.17	
Meadow Lane (v1)	27+93.140			12.346	30.310	0.6173	0.2555	0.3618	1.5155	0.6505	0.8650	-0.8982	-0.3950	-0.5032			0.08
Highland Place (v1)	31+09.730			16.624	30.310	0.8312	0.2767	0.5545	1.5155	0.6505	0.8650	-0.6843	-0.3738	-0.3105			0.10
5	31+62.000	37+32.000	0.1080	100.792	32.118	5.0396	0.4315	4.6081	1.6059	0.5117	1.0942	3.4337	-0.0802	3.5139	46.6827	5.82	
Manor Avenue South (v1)	34+46.240			30.706	45.950	1.5353	0.4382	1.0971	2.2975	0.8916	1.4059	-0.7622	-0.4534	-0.3088			0.19
Manor Avenue North (v1)	34+56.200			55.381	38.831	2.7690	0.4652	2.3039	1.9416	0.7907	1.1509	0.8275	-0.3255	1.1530			0.34
6	37+32.000	40+97.000	0.0691	34.492	7.101	1.7246	0.1013	1.6234	0.3551	0.1129	0.2421	1.3696	-0.0117	1.3812	24.9480	3.11	
Harrison Avenue North (v1)	39+12.300			46.574	30.310	2.3287	0.4894	1.8393	1.5155	0.6505	0.8650	0.8132	-0.1610	0.9742			0.29
7	40+97.000	44+28.000	0.0627	40.444	21.368	2.0222	0.3797	1.6425	1.0684	0.3410	0.7274	0.9538	0.0387	0.9151	32.2574	4.02	
Harrison Avenue South (v1)	41+33.120			47.886	49.959	2.3943	0.4875	1.9068	2.4979	0.9345	1.5634	-1.0366	-0.4470	0.3433			0.29
8	44+28.000	58+59.000	0.2710	173.306	29.832	8.6653	0.6293	8.0360	1.4916	0.4763	1.0153	7.1737	0.1531	7.0206	31.9726	3.98	
Jackson Avenue North (v1)	47+72.460			25.181	30.310	1.2591	0.2996	0.9595	1.5155	0.6505	0.8650	-0.2564	-0.3509	0.0944			0.16
Jackson Avenue South (v1)	48+05.100			8.067	30.310	0.4034	0.2175	0.1858	1.5155	0.6505	0.8650	-1.1122	-0.4329	-0.6792			0.05
Manor Avenue (v1)	51+39.440			8.067	30.310	0.4034	0.2175	0.1858	1.5155	0.6505	0.8650	-1.1122	-0.4329	-0.6792			0.05
9	58+59.000	61+70.730	0.0590	60.131	17.061	3.0065	0.3153	2.6913	0.8530	0.2717	0.5813	2.1535	0.0436	2.1099	50.9240	6.34	
Calumet Avenue (v1)	61+70.730			413.708	123.244	20.6854	1.7560	18.9294	6.1622	2.0789	4.0833	14.5232	-0.3229	14.8461			1.61
10	61+70.730	64+71.000	0.0569	56.855	13.198	2.8427	0.1970	2.6458	0.6599	0.2105	0.4494	2.1828	-0.0136	2.1964	49.9874	6.94	
11	64+71.000	82+30.000	0.3331	88.898	30.424	4.4449	0.3052	4.1397	1.5212	0.4838	1.0373	2.9237	-0.1787	3.1024	13.3423	1.85	
Tapper Avenue (v1)	72+77.510			11.731	27.117	0.5866	0.2402	0.3464	1.3558	0.5823	0.7735	-0.7693	-0.3421	-0.4272			0.08
Howard Avenue (v1)	79+21.750			11.731	27.117	0.5866	0.2402	0.3464	1.3558	0.5823	0.7735	-0.7693	-0.3421	-0.4272			0.08
12	82+30.000	85+69.870	0.0644	13.516	12.796	0.6758	0.1722	0.5035	0.6398	0.2037	0.4361	0.0360	-0.0314	0.0674	10.4985	1.46	
Kooy Drive (v1)	82+51.180			7.666	27.117	0.3833	0.2045	0.1788	1.3558	0.5823	0.7735	-0.9725	-0.3778	-0.5947			0.05
Columbia Avenue (v1)	84+99.410			120.356	110.104	6.0178	0.7000	5.3178	5.5052	1.8424	3.6628	0.5126	-1.1424	1.6550			0.51
13	85+69.870	87+00.000	0.0246	11.655	2.855	0.5828	0.0459	0.5369	0.1427	0.0448	0.0979	0.4400	0.0011	0.4389	23.6453	3.29	
All Segments			1.3542	728.237	222.033	36.4118	3.4062	33.0056	11.1016	3.5406	7.5610	25.3102	-0.1344	25.4446	26.8888	3.48	
All Intersections				923.161	810.643	46.1581	7.4814	38.6767	40.5322	15.5050	25.0271	5.6259	-8.0236	13.6495			0.31
Total			1.3542	1,651.398	1,032.676	82.5699	10.8876	71.6823	51.6338	19.0456	32.5882	30.9361	-8.1580	39.0941	60.9747		

**Table 8. Expected Crash Frequencies and Rates by Horizontal Design Element (Section 2)**

Title	Start Location (Sta. ft)	End Location (Sta. ft)	Length (mi)	Total Expected Crashes for Evaluation Period	Total Predicted Crashes for Evaluation Period	Expected Total Crash Frequency (crashes/yr)	Expected FI Crash Frequency (crashes/yr)	Expected PDO Crash Frequency (crashes/yr)	Predicted Total Crash Frequency (crashes/yr)	Predicted FI Crash Frequency (crashes/yr)	Predicted PDO Crash Frequency (crashes/yr)	(Expected - Predicted) Total Crash Frequency (crashes/yr)	(Expected - Predicted) FI Crash Frequency (crashes/yr)	(Expected - Predicted) PDO Crash Frequency (crashes/yr)	Expected Crash Rate (crashes/mi/yr)	Expected Travel Crash Rate (crashes/million veh-mi)
Tangent	15+50.000	87+00.000	1.3542	728.237	222.033	36.4118	3.4062	33.0056	11.1016	3.5406	7.5610	25.3102	-0.1344	25.4446	26.8888	3.44

**Table 9. Predicted Crash Frequencies by Year (Section 2)**

Year	Total Crashes	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)
2025	48.73	18.00	36.934	30.73	63.066
2026	49.04	18.11	36.929	30.93	63.071
2027	49.36	18.22	36.923	31.13	63.077
2028	49.67	18.34	36.918	31.33	63.082
2029	49.99	18.45	36.913	31.54	63.087
2030	50.30	18.57	36.908	31.74	63.092
2031	50.62	18.68	36.903	31.94	63.097
2032	50.94	18.79	36.897	32.14	63.103
2033	51.25	18.91	36.892	32.34	63.108
2034	51.57	19.02	36.887	32.55	63.113
2035	51.88	19.14	36.882	32.75	63.118
2036	52.20	19.25	36.877	32.95	63.123
2037	52.52	19.36	36.872	33.15	63.128
2038	52.84	19.48	36.867	33.36	63.133
2039	53.15	19.59	36.863	33.56	63.137
2040	53.47	19.71	36.858	33.76	63.142
2041	53.79	19.82	36.853	33.97	63.147
2042	53.79	19.82	36.853	33.97	63.147
2043	53.79	19.82	36.853	33.97	63.147
2044	53.79	19.82	36.853	33.97	63.147
Total	1,032.68	380.91	36.886	651.76	63.114
Average	51.63	19.05	36.886	32.59	63.114

**Note:** *Fatal and Injury Crashes and Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

**Table 10. Expected Crash Frequencies by Year (Section 2)**

Year	Total Crashes	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)
2025	77.92	10.29	13.203	67.60	86.748
2026	78.43	10.35	13.201	68.04	86.755
2027	78.93	10.42	13.199	68.48	86.763
2028	79.43	10.48	13.197	68.92	86.770
2029	79.94	10.55	13.195	69.37	86.777
2030	80.44	10.61	13.194	69.81	86.784
2031	80.94	10.68	13.192	70.25	86.791
2032	81.45	10.74	13.190	70.70	86.799
2033	81.96	10.81	13.188	71.14	86.805
2034	82.46	10.87	13.186	71.59	86.812
2035	82.97	10.94	13.185	72.03	86.819
2036	83.47	11.00	13.183	72.48	86.826
2037	83.98	11.07	13.181	72.92	86.833
2038	84.49	11.13	13.179	73.37	86.840
2039	85.00	11.20	13.178	73.82	86.846
2040	85.50	11.27	13.176	74.26	86.853
2041	86.02	11.33	13.174	74.72	86.859
2042	86.02	11.33	13.174	74.72	86.859
2043	86.02	11.33	13.174	74.72	86.859
2044	86.02	11.33	13.174	74.72	86.859
Total	1,651.40	217.75	13.186	1,433.65	86.814
Average	82.57	10.89	13.186	71.68	86.814

**Note:** *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

**Table 11. Comparing Predicted and Expected Crashes for the Evaluation Period (Section 2)**

Scope	Total Crashes	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)
Predicted	1,032.68	380.91	36.886	651.76	63.114
Expected	1,651.40	217.75	13.186	1,433.65	86.814
Expected - Predicted	618.72	-163.16		781.88	
Percent Difference	37.47	-74.93		54.54	

**Note:** *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

**Table 12. Expected Five Lane or Fewer Crash Type Distribution (Section 2)**

Element Type	Crash Type	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)	Total Crashes	Percent Total (%)
Highway Segment	Collision with Animal	0.06	0.0	2.37	0.1	2.43	0.1
Highway Segment	Collision with Bicycle	6.99	0.4	0.00	0.0	6.99	0.4
Highway Segment	Collision with Fixed Object	2.55	0.2	33.56	2.0	36.12	2.2
Highway Segment	Collision with Other Object	0.08	0.0	1.44	0.1	1.51	0.1
Highway Segment	Other Single-vehicle Collision	3.09	0.2	4.84	0.3	7.93	0.5
Highway Segment	Collision with Pedestrian	9.04	0.5	0.00	0.0	9.04	0.5
Highway Segment	Total Single Vehicle Crashes	21.82	1.3	42.21	2.6	64.03	3.9
Highway Segment	Angle Collision	1.81	0.1	28.67	1.7	30.48	1.8
Highway Segment	Driveway-related Collision	11.57	0.7	31.59	1.9	43.16	2.6
Highway Segment	Head-on Collision	0.81	0.0	3.33	0.2	4.15	0.3
Highway Segment	Other Multi-vehicle Collision	1.20	0.1	32.01	1.9	33.21	2.0
Highway Segment	Rear-end Collision	28.54	1.7	381.95	23.1	410.49	24.9
Highway Segment	Sideswipe, Opposite Direction Collision	0.38	0.0	3.15	0.2	3.54	0.2
Highway Segment	Sideswipe, Same Direction Collision	1.99	0.1	137.20	8.3	139.19	8.4
Highway Segment	Total Multiple Vehicle Crashes	46.30	2.8	617.90	37.4	664.21	40.2
Highway Segment	Total Highway Segment Crashes	68.12	4.1	660.11	40.0	728.24	44.1
Intersection	Collision with Animal	0.03	0.0	0.24	0.0	0.27	0.0
Intersection	Collision with Bicycle	11.65	0.7	0.00	0.0	11.65	0.7
Intersection	Collision with Fixed Object	10.38	0.6	27.27	1.7	37.65	2.3
Intersection	Non-Collision	1.82	0.1	0.94	0.1	2.76	0.2
Intersection	Collision with Other Object	1.17	0.1	2.45	0.1	3.62	0.2
Intersection	Other Single-vehicle Collision	0.56	0.0	0.70	0.0	1.26	0.1
Intersection	Collision with Parked Vehicle	0.01	0.0	0.05	0.0	0.07	0.0
Intersection	Collision with Pedestrian	7.93	0.5	0.00	0.0	7.93	0.5
Intersection	Total Intersection Single Vehicle Crashes	33.55	2.0	31.65	1.9	65.20	3.9

Element Type	Crash Type	FI Crashes	Percent FI (%)	PDO Crashes	Percent PDO (%)	Total Crashes	Percent Total (%)
Intersection	Angle Collision	38.48	2.3	178.82	10.8	217.31	13.2
Intersection	Head-on Collision	5.26	0.3	20.52	1.2	25.78	1.6
Intersection	Other Multi-vehicle Collision	6.83	0.4	157.70	9.5	164.53	10.0
Intersection	Rear-end Collision	53.49	3.2	360.27	21.8	413.77	25.1
Intersection	Sideswipe	12.01	0.7	24.57	1.5	36.57	2.2
Intersection	Total Intersection Multiple Vehicle Crashes	116.08	7.0	741.88	44.9	857.96	52.0
Intersection	Total Intersection Crashes	149.63	9.1	773.53	46.8	923.16	55.9
	Total Crashes	217.75	13.2	1,433.65	86.8	1,651.40	100.0

**Note:** *Fatal and Injury Crashes* and *Property Damage Only Crashes* do not necessarily sum up to *Total Crashes* because the distribution of these three crashes had been derived independently.

**APPENDIX J – PRELIMINARY QUANTITIES AND COST ESTIMATE**

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## RIDGE ROAD COMPLETE STREET

### Summary of Preliminary Opinion of Construction Costs

Category	RAISE Grant	Alternative 1	Alternative 2
1) Demo Costs	\$ 9,105,295.00	\$ 996,000.00	\$ 870,000.00
2) Roadway Improvements		\$ 4,950,000.00	\$ 5,501,000.00
3) Drainage Improvements		\$ 4,413,000.00	\$ 3,632,000.00
4) Traffic Marking, Signing, and Signals		\$ 1,210,000.00	\$ 1,365,000.00
5) Lighting	\$ 1,480,000.00	\$ 1,639,000.00	\$ 1,639,000.00
6) Maintenance of Traffic and Mobilization	\$ 1,495,057.00	\$ 2,066,000.00	\$ 1,496,000.00
7) Trees and Plantings	\$ 1,571,175.00	\$ 598,000.00	\$ 537,000.00
B1) Hardscape	\$ 758,275.00	\$ 350,000.00	\$ 350,000.00
B2) Site Furnishings	\$ 176,000.00	\$ 100,000.00	\$ 100,000.00
B3) Gateway and Wayfinding	\$ 371,000.00	\$ 200,000.00	\$ 200,000.00
B4) Utility Relocations	\$ 3,150,000.00	\$ 3,200,000.00	\$ 3,200,000.00
	<b>\$ 18,106,802.00</b>	<b>\$ 19,722,000.00</b>	<b>\$ 18,890,000.00</b>

*RAISE Grant estimate included each of the categories in gray without a breakout for the other sub-categories*

Use same budget for each alternative. There is more space available in alternative 1 for these items, but design will need to fit budget

### ESCALATION OF PROBABLE COSTS TO BUILD YEAR OF 2027

Estimate Year	RAISE Grant	Alternative 1	Alternative 2
Base Year Estimate (2022 [RAISE] or 2024)	\$ 18,106,802.00	\$ 19,722,000.00	\$ 18,890,000.00
Projected Construction Year (2027) Estimate	\$ 22,030,000.00	\$ 22,185,000.00	\$ 21,249,000.00

Pay Item	Description	Category	Estimated Quantity	Unit	Unit Price	Extension
105-06845	CONSTRUCTION ENGINEERING (1.5%)	2	1	LS	\$ 177,700.00	\$ 177,700.00
110-01001	MOBILIZATION AND DEMOBILIZATION (5%)	6	1	LS	\$ 592,200.00	\$ 592,200.00
201-52370	CLEARING RIGHT OF WAY (2%)	1	1	LS	\$ 236,900.00	\$ 236,900.00
202-02278	CURB, CONCRETE, REMOVE	1	15,230	LFT	\$ 6.50	\$ 98,995.00
202-52710	SIDEWALK, CONCRETE, REMOVE	1	7,550	SYS	\$ 14.00	\$ 105,700.00
202-91385	INLET, REMOVE	1	70	EACH	\$ 655.50	\$ 45,885.00
202-96133	PIPE, REMOVE	1	5,586	LFT	\$ 16.00	\$ 89,376.00
203-02000	EXCAVATION, COMMON	1	5,900	CYS	\$ 36.50	\$ 215,350.00
205-12108	STORMWATER MANAGEMENT BUDGET	2	20,418	DOL	\$ 1.00	\$ 20,418.00
205-12616	STORMWATER MANAGEMENT IMPLEMENTATION	2	1	LS	\$ 16,800.00	\$ 16,800.00
205-12618	SWQCP PREPARATION	2	1	LS	\$ 20,000.00	\$ 20,000.00
207-08264	SUBGRADE TREATMENT, TYPE II	2	5,000	SYS	\$ 21.50	\$ 107,500.00
207-09935	SUBGRADE TREATMENT, TYPE IC	2	5,200	SYS	\$ 33.00	\$ 171,600.00
211-09265	STRUCTURE BACKFILL, TYPE 2	3	12,300	CYS	\$ 62.50	\$ 768,750.00
214-11796	GEOGRID, TYPE IB	2	5,000	SYS	\$ 2.50	\$ 12,500.00
302-07455	DENSE GRADED SUBBASE	2	5,000	CYS	\$ 69.50	\$ 347,500.00
304-07493	WIDENING WITH HMA, TYPE B	2	400	TON	\$ 250.00	\$ 100,000.00
304-12623	HMA PATCHING FULL DEPTH, TYPE B	2	5,200	TON	\$ 250.00	\$ 1,300,000.00
306-08034	MILLING, ASPHALT, 1 1/2 IN.	1	36,700	SYS	\$ 2.00	\$ 73,400.00
401-07328	QC/QA-HMA, 3, 70, SURFACE, 9.5 mm	2	3,100	TON	\$ 150.00	\$ 465,000.00
406-05520	ASPHALT FOR TACK COAT	2	12	TON	\$ 750.00	\$ 9,000.00
604-06070	SIDEWALK, CONCRETE	2	4,550	SYS	\$ 86.00	\$ 391,300.00
604-08086	CURB RAMP, CONCRETE	2	630	SYS	\$ 250.00	\$ 157,500.00
604-12083	DETECTABLE WARNING SURFACES	2	70	SYS	\$ 300.00	\$ 21,000.00
605-06120	CURB, CONCRETE	2	1,250	LFT	\$ 90.00	\$ 112,500.00
605-06140	CURB AND GUTTER, CONCRETE	2	14,440	LFT	\$ 28.00	\$ 404,320.00
605-06245	CENTER CURB, CONCRETE, TYPE B	2	0	SYS	\$ 350.00	\$ -
610-08446	PCCP FOR APPROACHES, 6 IN	2	400	SYS	\$ 110.00	\$ 44,000.00
610-09108	PCCP FOR APPROACHES, 9 IN	2	5,000	SYS	\$ 85.00	\$ 425,000.00
621-01004	MOBILIZATION AND DEMOBILIZATION FOR SEEDING	7	4	EA	\$ 448.50	\$ 1,794.00
621-06560	MULCHED SEEDING U	7	10,400	SYS	\$ 2.50	\$ 26,000.00
621-06570	TOP SOIL	7	1,734	CYS	\$ 60.00	\$ 104,040.00
622-XXXXX	STREET TREE	7	125	EA	\$ 1,500.00	\$ 187,500.00
622-XXXXX	LANDSCAPING BUDGET	7	1	LS	\$ 200,000.00	\$ 200,000.00
715-05024	PIPE, TYPE 2, CIRCULAR, DIAMETER 36 IN.	3	7,800	LFT	\$ 170.00	\$ 1,326,000.00
715-05149	PIPE, TYPE 2, CIRCULAR, 12 IN.	3	2,200	LFT	\$ 74.00	\$ 162,800.00
720-45415	MANHOLE, TYPE D4	3	110	EA	\$ 7,500.00	\$ 825,000.00
720-98174	INLET, B15	3	200	EA	\$ 3,770.00	\$ 754,000.00
801-06207	TEMPORARY PAVEMENT MARKING, REMOVABLE, 4 IN.	6	171,600	LFT	\$ 1.15	\$ 197,340.00
801-06640	CONSTRUCTION SIGN, A	6	40	EA	\$ 220.50	\$ 8,820.00
801-06645	CONSTRUCTION SIGN, B	6	20	EA	\$ 125.50	\$ 2,510.00
801-06710	FLASHING ARROW SIGN	6	560	DAY	\$ 16.00	\$ 8,960.00
801-06775	MAINTAINING TRAFFIC	6	1	LS	\$ 947,500.00	\$ 947,500.00
801-07118	BARRICADE, III-A	6	2,200	LFT	\$ 17.50	\$ 38,500.00
802-XXXXX	SIGNING	4	1	LSUM	\$ 50,000.00	\$ 50,000.00
805-XXXXX	TRAFFIC SIGNAL, HOHMAN AVENUE	4	1	EA	\$ 170,000.00	\$ 170,000.00
805-XXXXX	TRAFFIC SIGNAL, MANOR AVENUE	4	1	EA	\$ 170,000.00	\$ 170,000.00
805-XXXXX	TRAFFIC SIGNAL, HARRISON AVENUE	4	1	EA	\$ 200,000.00	\$ 200,000.00
805-XXXXX	TRAFFIC SIGNAL, CALUMET AVENUE	4	1	EA	\$ 210,000.00	\$ 210,000.00
805-XXXXX	TRAFFIC SIGNAL, COLUMBIA AVENUE	4	1	EA	\$ 170,000.00	\$ 170,000.00
807-XXXXX	LIGHTING	5	150	EA	\$ 9,500.00	\$ 1,425,000.00
808-06703	LINE, THERMOPLASTIC, SOLID, WHITE, 4 IN.	4	2,700	LFT	\$ 2.00	\$ 5,400.00
808-06701	LINE, THERMOPLASTIC, BROKEN, WHITE, 4 IN.	4	0	LFT	\$ 2.00	\$ -
808-75245	LINE, THERMOPLASTIC, SOLID, YELLOW, 4 IN.	4	14,300	LFT	\$ 2.00	\$ 28,600.00
808-03439	TRANSVERSE MARKING, THERMOPLASTIC, CROSSWALK LINE, WHITE, 24 IN.	4	3,000	LFT	\$ 10.00	\$ 30,000.00
808-75297	TRANSVERSE MARKING, THERMOPLASTIC, STOP LINE, WHITE, 24 IN.	4	650	LFT	\$ 14.50	\$ 9,425.00
808-75320	PAVEMENT MESSAGE MARKING, THERMO LANE INDICATION ARROW	4	50	EA	\$ 168.00	\$ 8,400.00

Subtotal = \$ 13,798,000

Contingency (~15%) = \$ 2,074,000

Pay Item	Description	Category	Estimated Quantity	Unit	Unit Price	Extension
<b>BUDGETARY ITEMS</b>						
Pay Item	Description	Category	Estimated Quantity	Unit	Unit Price	Extension
XXX-XXXXX	HARDSCAPE ELEMENTS	B1	1	LS	\$ 350,000.00	\$ 350,000.00
XXX-XXXXX	SITE FURNISHINGS	B2	1	LS	\$ 100,000.00	\$ 100,000.00
XXX-XXXXX	GATEWAY AND WAYFINDING	B3	1	LS	\$ 200,000.00	\$ 200,000.00
XXX-XXXXX	UTILITY RELOCATIONS	B4	1	LS	\$ 3,200,000.00	\$ 3,200,000.00
<b>BUDGETARY ITEM SUBTOTAL</b>						<b>\$ 3,850,000</b>

<b>ALTERNATIVE 1</b>	<b>Total Opinion of Probable Construction Costs = \$ 19,722,000</b>
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Pay Item	Description	Category	Estimated Quantity	Unit	Unit Price	Extension
105-06845	CONSTRUCTION ENGINEERING (1.5%)	2	1	LS	\$ 172,900.00	\$ 172,900.00
110-01001	MOBILIZATION AND DEMOBILIZATION (5%)	6	1	LS	\$ 576,100.00	\$ 576,100.00
201-52370	CLEARING RIGHT OF WAY (2%)	1	1	LS	\$ 230,500.00	\$ 230,500.00
202-02278	CURB, CONCRETE, REMOVE	1	15,230	LFT	\$ 6.50	\$ 98,995.00
202-52710	SIDEWALK, CONCRETE, REMOVE	1	7,550	SYS	\$ 14.00	\$ 105,700.00
202-91385	INLET, REMOVE	1	70	EACH	\$ 655.50	\$ 45,885.00
202-96133	PIPE, REMOVE	1	5,586	LFT	\$ 16.00	\$ 89,376.00
203-02000	EXCAVATION, COMMON	1	2,000	CYS	\$ 50.00	\$ 100,000.00
205-12108	STORMWATER MANAGEMENT BUDGET	2	17,599	DOL	\$ 1.00	\$ 17,599.00
205-12616	STORMWATER MANAGEMENT IMPLEMENTATION	2	1	LS	\$ 16,800.00	\$ 16,800.00
205-12618	SWQCP PREPARATION	2	1	LS	\$ 20,000.00	\$ 20,000.00
207-08264	SUBGRADE TREATMENT, TYPE II	2	4,200	SYS	\$ 21.50	\$ 90,300.00
207-09935	SUBGRADE TREATMENT, TYPE IC	2	5,000	SYS	\$ 33.00	\$ 165,000.00
211-09265	STRUCTURE BACKFILL, TYPE 2	3	11,500	CYS	\$ 62.50	\$ 718,750.00
214-11796	GEOGRID, TYPE IB	2	4,200	SYS	\$ 2.50	\$ 10,500.00
302-07455	DENSE GRADED SUBBASE	2	4,200	CYS	\$ 69.50	\$ 291,900.00
304-07493	WIDENING WITH HMA, TYPE B	2	2,100	TON	\$ 300.00	\$ 630,000.00
304-12623	HMA PATCHING FULL DEPTH, TYPE B	2	5,000	TON	\$ 250.00	\$ 1,250,000.00
306-08034	MILLING, ASPHALT, 1 1/2 IN.	1	43,000	SYS	\$ 2.00	\$ 86,000.00
401-07328	QC/QA-HMA, 3, 70, SURFACE, 9.5 mm	2	3,700	TON	\$ 150.00	\$ 555,000.00
406-05520	ASPHALT FOR TACK COAT	2	13	TON	\$ 750.00	\$ 9,750.00
604-06070	SIDEWALK, CONCRETE	2	3,630	SYS	\$ 90.00	\$ 326,700.00
604-08086	CURB RAMP, CONCRETE	2	630	SYS	\$ 250.00	\$ 157,500.00
604-12083	DETECTABLE WARNING SURFACES	2	65	SYS	\$ 300.00	\$ 19,500.00
605-06120	CURB, CONCRETE	2	1,250	LFT	\$ 90.00	\$ 112,500.00
605-06140	CURB AND GUTTER, CONCRETE	2	14,440	LFT	\$ 28.00	\$ 404,320.00
605-06245	CENTER CURB, CONCRETE, TYPE B	2	300	SYS	\$ 400.00	\$ 120,000.00
610-08446	PCCP FOR APPROACHES, 6 IN	2	300	SYS	\$ 115.00	\$ 34,500.00
610-09108	PCCP FOR APPROACHES, 9 IN	2	4,200	SYS	\$ 90.00	\$ 378,000.00
621-01004	MOBILIZATION AND DEMOBILIZATION FOR SEEDING	7	4	EA	\$ 448.50	\$ 1,794.00
621-06560	MULCHED SEEDING U	7	6,173	SYS	\$ 2.50	\$ 15,432.50
621-06570	TOP SOIL	7	1,029	CYS	\$ 60.00	\$ 61,740.00
622-XXXXX	STREET TREE	7	125	EA	\$ 1,500.00	\$ 187,500.00
622-XXXXX	LANDSCAPING BUDGET	7	1	LS	\$ 200,000.00	\$ 200,000.00
715-05024	PIPE, TYPE 2, CIRCULAR, DIAMETER 36 IN.	3	7,200	LFT	\$ 170.00	\$ 1,224,000.00
715-05149	PIPE, TYPE 2, CIRCULAR, 12 IN.	3	2,200	LFT	\$ 74.00	\$ 162,800.00
720-45415	MANHOLE, TYPE D4	3	90	EA	\$ 7,500.00	\$ 675,000.00
720-98174	INLET, B15	3	100	EA	\$ 3,770.00	\$ 377,000.00
801-06207	TEMPORARY PAVEMENT MARKING, REMOVABLE, 4 IN.	6	85,800	LFT	\$ 1.15	\$ 98,670.00
801-06640	CONSTRUCTION SIGN, A	6	20	EA	\$ 220.50	\$ 4,410.00
801-06645	CONSTRUCTION SIGN, B	6	20	EA	\$ 125.50	\$ 2,510.00
801-06710	FLASHING ARROW SIGN	6	280	DAY	\$ 16.00	\$ 4,480.00
801-06775	MAINTAINING TRAFFIC	6	1	LS	\$ 576,100.00	\$ 576,100.00
801-07118	BARRICADE, III-A	6	2,200	LFT	\$ 17.50	\$ 38,500.00
802-XXXXX	SIGNING	4	1	LS	\$ 50,000.00	\$ 50,000.00
805-XXXXX	TRAFFIC SIGNAL, HOHMAN AVENUE	4	1	EA	\$ 190,000.00	\$ 190,000.00
805-XXXXX	TRAFFIC SIGNAL, MANOR AVENUE	4	1	EA	\$ 190,000.00	\$ 190,000.00
805-XXXXX	TRAFFIC SIGNAL, HARRISON AVENUE	4	1	EA	\$ 225,000.00	\$ 225,000.00
805-XXXXX	TRAFFIC SIGNAL, CALUMET AVENUE	4	1	EA	\$ 250,000.00	\$ 250,000.00
805-XXXXX	TRAFFIC SIGNAL, COLUMBIA AVENUE	4	1	EA	\$ 190,000.00	\$ 190,000.00
807-XXXXX	LIGHTING	5	150	EA	\$ 9,500.00	\$ 1,425,000.00
808-06701	LINE, THERMOPLASTIC, BROKEN, WHITE, 4 IN.	4	3,600	LFT	\$ 2.00	\$ 7,200.00
808-06703	LINE, THERMOPLASTIC, SOLID, 4 IN.	4	2,700	LFT	\$ 2.00	\$ 5,400.00
808-75245	LINE, THERMOPLASTIC, SOLID, YELLOW, 4 IN.	4	14,300	LFT	\$ 2.00	\$ 28,600.00
808-03439	TRANSVERSE MARKING, THERMOPLASTIC, CROSSWALK LINE, WHITE, 24 IN.	4	3,200	LFT	\$ 10.00	\$ 32,000.00
808-75297	TRANSVERSE MARKING, THERMOPLASTIC, STOP LINE, WHITE, 24 IN.	4	700	LFT	\$ 14.50	\$ 10,150.00
808-75320	PAVEMENT MESSAGE MARKING, THERMO LANE INDICATION ARROW	4	50	EA	\$ 168.00	\$ 8,400.00

PAY ITEMS SUBTOTAL = \$ 13,076,000  
Contingency (~15%) = \$ 1,964,000

Pay Item	Description	Category	Estimated Quantity	Unit	Unit Price	Extension
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**BUDGETARY ITEMS**

Pay Item	Description	Category	Estimated Quantity	Unit	Unit Price	Extension
XXX-XXXXX	HARDSCAPE ELEMENTS	B1	1	LS	\$ 350,000.00	\$ 350,000.00
XXX-XXXXX	SITE FURNISHINGS	B2	1	LS	\$ 100,000.00	\$ 100,000.00
XXX-XXXXX	GATEWAY AND WAYFINDING	B3	1	LS	\$ 200,000.00	\$ 200,000.00
XXX-XXXXX	UTILITY RELOCATIONS	B4	1	LS	\$ 3,200,000.00	\$ 3,200,000.00

**BUDGETARY ITEM SUBTOTAL \$ 3,850,000**

**ALTERNATIVE 2** **Total Opinion of Probable Construction Costs = \$ 18,890,000**