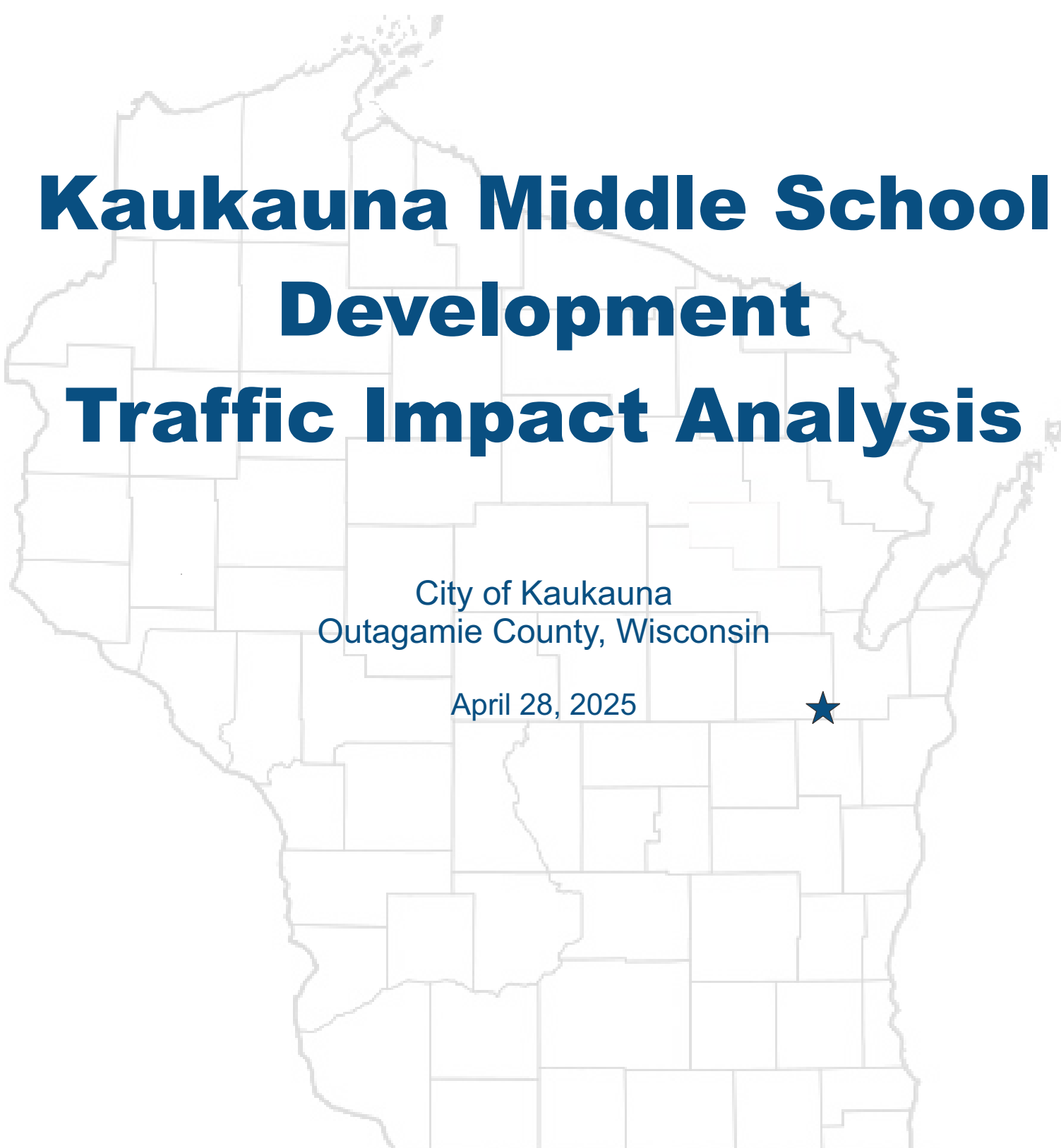




Kaukauna Middle School Development Traffic Impact Analysis

City of Kaukauna
Outagamie County, Wisconsin

April 28, 2025



TRAFFIC IMPACT STUDY FOR:

KAUKAUNA MIDDLE SCHOOL

CITY OF KAUKAUNA, OUTAGAMIE COUNTY, WISCONSIN

DATE SUBMITTED: April 28, 2025

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**Kaukauna Middle School
Traffic Impact Analysis
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CHAPTER I – INTRODUCTION & EXECUTIVE SUMMARY

PART A – PURPOSE OF REPORT AND STUDY OBJECTIVES

The Kaukauna Area School District is planning to construct a new Middle School to be located on a vacant parcel of land east of State Trunk Highway (STH) 55, south of County Trunk Highway (CTH) CE and southwest of the current high school in the City of Kaukauna, Outagamie County, Wisconsin. A new middle school with two outlots for potential future development, which are expected to include commercial and residential land uses along with a connection roadway to the Kaukauna High School, are being proposed for the development site.

As part of the proposed middle school plans, WisDOT, Outagamie County and the City of Kaukauna have requested a traffic impact analysis be conducted to determine the additional traffic expected to be generated by the proposed middle school and to identify roadway modifications, if any, attributed to the new school for the Build traffic volume scenario. Traffic volumes from the identified offsite developments, located within the western portion of the site along STH 55, were also included in the Total traffic volume scenario used in this study.

This report documents the procedures, findings, and conclusions of the traffic impact analysis. The analysis identifies recommended modifications based on existing intersection geometrics, existing traffic volumes and additional traffic expected to be generated by the anticipated middle school and potential off-site developments located within the limits of the study area.

PART B – EXECUTIVE SUMMARY

The executive summary includes a description of the study area, descriptions of the proposed middle school and potential off-site developments and conclusions based on the findings of the TIA.

B1. Location of Study Site with Respect to Area Roadway Network

A street map illustrating the location of the existing and proposed schools is shown in [Exhibit 1-1](#). A copy of the conceptual site plan for the proposed middle school is illustrated in [Exhibit 1-2A](#) and a conceptual site plan showing the potential off-site development areas is provided in [Exhibit 1-2B](#). As identified by the study team, the study area for the proposed middle school includes the following intersections:

- STH 55/Crooks Avenue with Ann Street (two-way stop control)
- STH 55/Crooks Avenue with CTH CE/College Avenue (roundabout control)
- STH 55/Crooks Avenue with Morningside Drive/Proposed West Access Drive (current one-way stop control)
- STH 55/Crooks Avenue with Ridgecrest Lane (one-way stop control)
- STH 55/Crooks Avenue with CTH KK/Calumet Street (roundabout control)
- CTH CE/College Avenue with Fieldcrest Drive (two-way stop control)
- CTH CE/College Avenue with Konkapot Trail Road/Forefront Dermatology Access Driveway (two-way stop control)
- CTH CE/College Avenue with the High School West (and future Middle School) Access Driveway (one-way stop control)
- Loderbauer Road with CTH CE/College Avenue (traffic signal control)

- Loderbauer Road with the High School northern (and future Middle School) Access Driveway (traffic signal control)
- Loderbauer Road with the High School middle (and future Middle School) Access Driveway (one-way stop control)
- Loderbauer Road with the Proposed South Access Driveway (one-way stop control)

B2. On-Site Development Description

As shown on the conceptual site plan in [Exhibit 1-2A](#), the middle school is proposed within the southeast portion of the overall site with parking lots proposed on the west and south sides of the middle school. Sports fields are proposed to the south of the school building. The following land uses are assumed for the proposed middle school site:

- Middle School – 1,200 students

The numbers of students shown are the anticipated maximum population at the proposed middle school. A map showing the limits of the student population for the Kaukauna School District is provided in the appendix.

It is anticipated that construction of the school will occur over a two-year period starting in the year 2026. Therefore, full build out of the development site is expected by the start of the fall semester in the year 2028. Therefore, traffic volumes from the proposed middle school were included in the Full Build traffic volumes.

B3. Off-site Development Description

As shown on the conceptual site plan in [Exhibit 1-2B](#), two off-site development areas were identified within the limits of the development site; specifically, two outlots located immediately east of STH 55 and west of the proposed middle school. There are no known plans for the development of these two 30-acre parcels; however, for planning purposes, the following land uses were assumed on the parcels:

West Parcel

- Shopping Plaza (40-150k - Supermarket - No), ITE LU821 – 100,000 square feet (sf)
- Strip Retail Plaza (<40k), ITE LU822 – 20,000 sf
- General Office Building – ITE LU710 – 15,000 sf

East Parcel

- Multifamily Housing (Low-Rise/Not Close to Rail Transit), ITE LU220 – 200 units

As stated above, the timing for the build out of these two parcels is unknown at this time. For purposes of this study, it was assumed that the parcels would be fully built out within the next ten years. Therefore, traffic volumes from these developments were included in the Total traffic volumes.

B4. Site Generated Traffic

The traffic volumes expected to be generated by the proposed middle schools were calculated based on the trip rates for a middle school (LU522) as published in the *Institute of Transportation Engineer's (ITE) Trip Generation Manual, 11th Edition*.

Under full build (highest student population) conditions and based on data provided by the school district, the proposed middle school development is expected to generate 2,270 weekday

daily trips: with 780 new trips in the AM peak hour, 380 new trips in the PM peak hour and 210 during a typical weekday sporting event at the middle school.

The potential off-site development area is expected to generate 6,750 weekday daily trips: with 290 new trips in the AM peak hour, 565 new trips in the PM peak hour and 565 during a typical weekday sporting event at the middle school.

B5. Proposed Access

As shown in [Exhibit 1-2A](#), two access connections are proposed for the school development site. The main access is proposed as a full access driveway onto a new roadway connection to Crooks Avenue/STH 55 directly across from the existing three-legged, one-way stop sign controlled STH 55 intersection with Morningside Drive. A second driveway is proposed to connect to the high school site located northeast of the proposed middle school site with further existing connections from the high school onto CTH CE/College Avenue and Loderbauer Road. An additional driveway is proposed along Loderbauer Road, immediately south of the high school. Finally, even though not proposed as this time, a future connection via a new north/south connection onto CTH CE to the north and Speedway Lane to the southwest is also planned for at some point in the future.

B6. Recommended Modifications

The study area intersections were analyzed based on the procedures set forth in the *Highway Capacity Manual* (HCM) 7th Edition. Intersection operation is defined by “level of service.” Level of Service (LOS) is a quantitative measure that refers to the overall quality of flow at an intersection ranging from very good, represented by LOS ‘A,’ to very poor, represented by LOS ‘F.’ For the purpose of this study, LOS D or better was used to define acceptable peak hour operating conditions.

Modifications to address traffic impacts are shown in [Exhibit 1-3](#) for the following traffic volume scenarios:

- ““Background Traffic” – These modifications are expected to be necessary to accommodate the Existing/Background traffic volumes.
- “Full Build Traffic” – These modifications are expected to be necessary to accommodate the Full Build traffic volumes which includes full build out of the proposed Middle School but does not include the identified off-site development areas.
- “Total Traffic” – These modifications are expected to be necessary to accommodate the Total traffic volumes which includes full build out of the proposed Middle School as well as the identified off-site development areas.

The analysis was conducted using existing intersection geometrics and traffic control and the existing traffic signal timings. The following modifications, as shown in [Exhibit 1-3](#), are recommended to accommodate the Existing/Background, Full Build, and Total traffic volumes, respectively. *Modifications are for jurisdictional consideration and are not legally binding. WisDOT, Outagamie County and the City of Kaukauna reserve the right to determine alternative solutions.*

Node 100: STH 55/Crooks Avenue with Ann Street

- *Background Traffic:*
 - Reconstruct the median to restrict through and left-turn exiting movements from the east and west approaches, thereby allowing left-in/right-in/right-out access at this intersection. The restricted movements would either

divert to other intersections or make a right-turn movement and then traverse the adjacent roundabout to continue to their ultimate destination.

- Maintain stop control on the east and west approaches.
- *Full Build Traffic:* No additional modifications.
- *Total Traffic:* No additional modifications.

Node 200: CTH CE/College Avenue with Fieldcrest Drive

- *Background Traffic:*
 - Reconstruct the median to restrict through and left-turn exiting movements from the north and south approaches, thereby allowing left-in/right-in/right-out access at this intersection. The restricted movements would either divert to other intersections or make a right-turn movement and then traverse the adjacent roundabout to continue to their ultimate destination.
 - Maintain stop control on the north and south approaches.
- *Full Build Traffic:* No additional modifications.
- *Total Traffic:* No additional modifications.

Node 300: STH 55/Crooks Avenue with CTH CE/College Avenue

- *Background Traffic:* No modifications.
- *Full Build Traffic.*
 - Consider reconstructing roundabout to provide a right-turn bypass lane on the north, south and east approaches.
- *Total Traffic:*
 - Reconstruct the roundabout to provide a multi-lane roundabout with three lane approaches on the north and south approaches, a two-lane approach with a bypass lane on the west approach and a three-lane approach with a bypass lane on the east approach.

Node 400: CTH CE/College Avenue with Konkapot Trail Road/Forefront Dermatology Access Driveway

- *Background Traffic:*
 - Construct a raised median through the limits of the intersection to allow only right-in/right-out access at this intersection. The restricted movements would either divert to other intersections or make a right-turn movement and then traverse the adjacent intersection to continue to their ultimate destination.
 - Maintain stop control on the north and south approaches.
- *Full Build Traffic:* No additional modifications.
- *Total Traffic:* No additional modifications.

Node 500: CTH CE/College Avenue with High School West Driveway

- *Background Traffic:*
 - Consider restricting all exiting northbound movements at this intersection during the weekday afternoon peak period. Diverted traffic would be expected to utilize the signalized intersection at Loderbauer Road.
- *Full Build Traffic:* No additional modifications.
- *Total Traffic:* No additional modifications.

Node 600: Loderbauer Road with CTH CE/College Avenue

- *Background Traffic:* No modifications.
- *Full Build Traffic:* No modifications.
- *Total Traffic:* No modifications.

Node 700: STH 55/Crooks Avenue with Morningside Drive/Proposed West Access Drive

- *Background Traffic:* No modifications.
- *Full Build Traffic.* Two modification options are recommended for consideration (see discussion below):
 - Option 1 – Provide fully actuated traffic signal control.
 - Provide southbound left-turn arrow with protected/permitted left-turn phasing.
 - No modifications recommended on the west approach.
 - Provide a shared through /left-turn lane and a dedicated right-turn lane on the east approach.
 - Provide a dedicated left-turn lane, through lane and right-turn lane on the north and south approaches (three lanes each).
 - Provide pedestrian crosswalk pavement markings along all approaches of the intersection.
 - Option 2 - Construct a single lane roundabout with single entrance lanes on all approaches.
- *Total Traffic:* Two modification options are recommended for consideration (see discussion below):
 - Option 1 – Provide fully actuated traffic signal control.
 - Provide westbound right-turn arrow with permitted/overlap right-turn phasing.
 - Option 2 – Modify roundabout to provide an additional northbound lane (two lanes) on the south approach with two northbound lanes through the roundabout. All other approaches to remain as single lane approaches.

Node 800: STH 55/Crooks Avenue with Ridgecrest Lane

- *Background Traffic:* No modifications.

- *Full Build Traffic:* No modifications.
- *Total Traffic:* No modifications.

Node 900: STH 55/Crooks Avenue with CTH KK/Calumet Street

- *Background Traffic:* No modifications.
- *Full Build Traffic:* No modifications.
- *Total Traffic:* No modifications.

Node 1000: Loderbauer Road with High School North Driveway

- *Background Traffic:* No modifications.
- *Full Build Traffic:* No modifications.
- *Total Traffic:* No modifications.

Node 1100: Loderbauer Road with High School Middle Driveway

- *Background Traffic:* No modifications.
- *Full Build Traffic:* No modifications.
- *Total Traffic:* No modifications.

Node 1200: Loderbauer Road with Proposed South Access Driveway

- *Background Traffic:* No modifications.
- *Full Build Traffic:*
 - Construct a full access driveway with stop sign control on the west approach.
- *Total Traffic:* No additional modifications.

A traffic signal warrant analysis was completed for the Crooks Avenue/STH 55 intersection with Morningside Drive/Proposed West Access Drive under Full Build and Total traffic volume conditions. The peak hour warrant is expected to be met for the Full Build traffic volume condition and the 8-Hour and 4-Hour warrants are expected to be met for the Total traffic volume condition. Per the WisDOT Facilities Development Manual (FDM), if an intersection warrants traffic signal control, a modern roundabout should also be evaluated. Therefore, roundabout control was also considered at the proposed intersection. Based on intersection operations and the analysis completed for this study, both traffic signal control and roundabout control are viable alternatives at the intersection. The decision to provide traffic signal or roundabout control is best made by the local communities and regulating agencies. However, based on the ICE analysis, even though both traffic control options provide acceptable operations from a delay perspective, traffic signal control is recommended for the Crooks Avenue/STH 55 intersection with Morningside Drive/Proposed West Access Drive due to less disruption to the traveling public and the significant difference in initial cost of the roundabout alternative. It is also noted that, in general, the typical cost of a single-lane roundabout in comparison to a signalized intersection is about two times the cost of a new signalized intersection with geometric modifications, dependent on right-of-way needs and complexity of the designs. In addition, since the proposed development is for a middle school and a large residential neighborhood is located immediately west of the site, a relatively high number of students are expected to cross STH 55 every weekday during the morning peak period and the afternoon peak

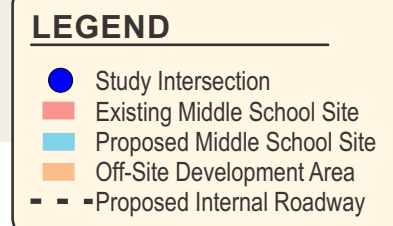
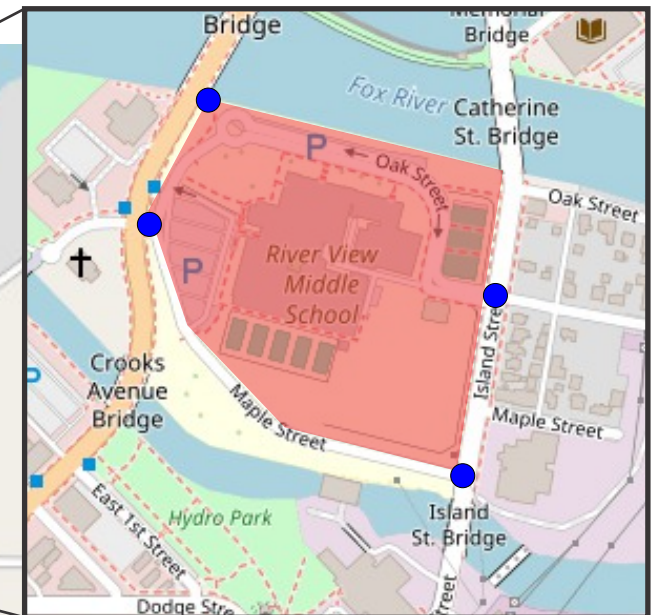
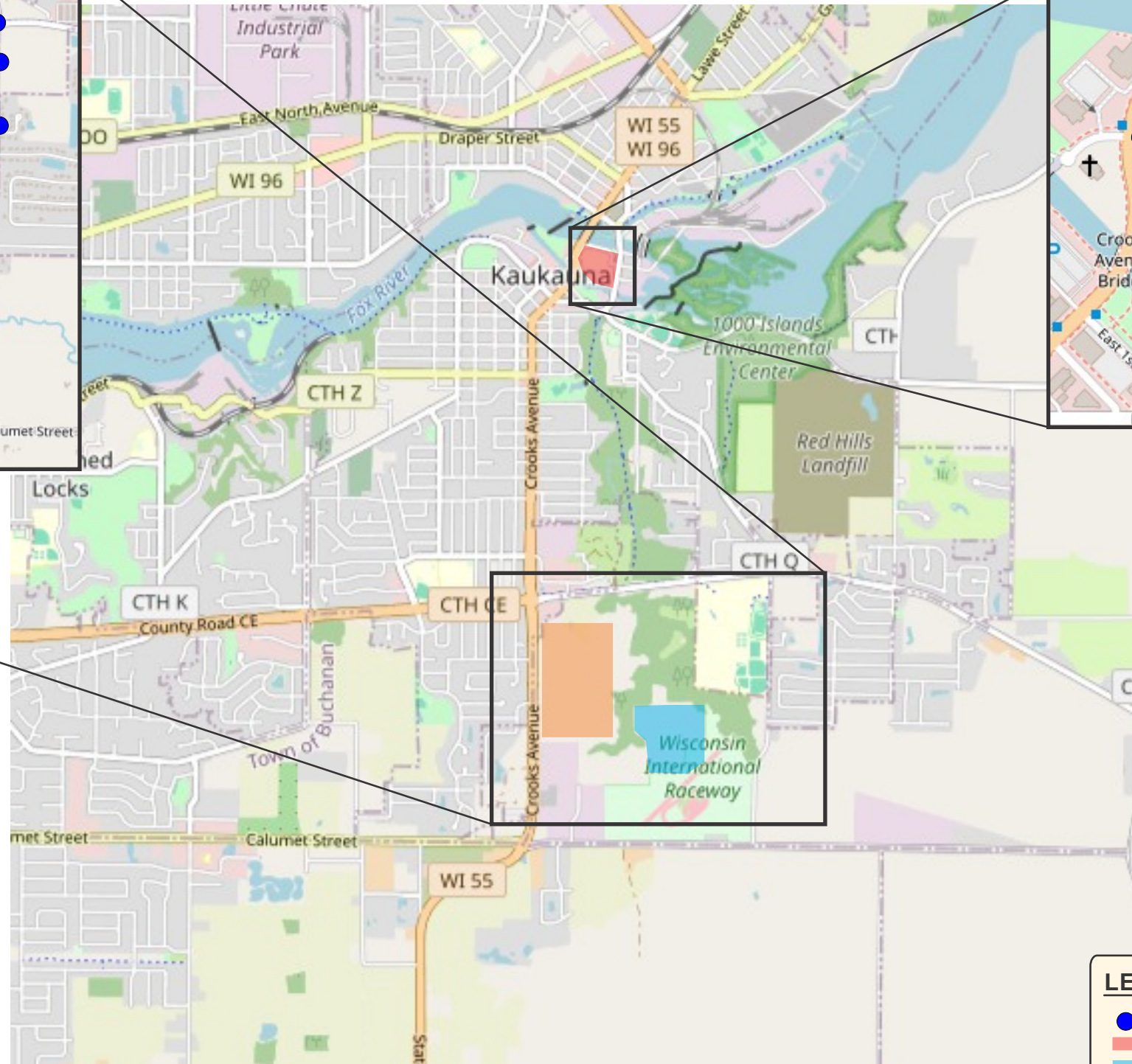
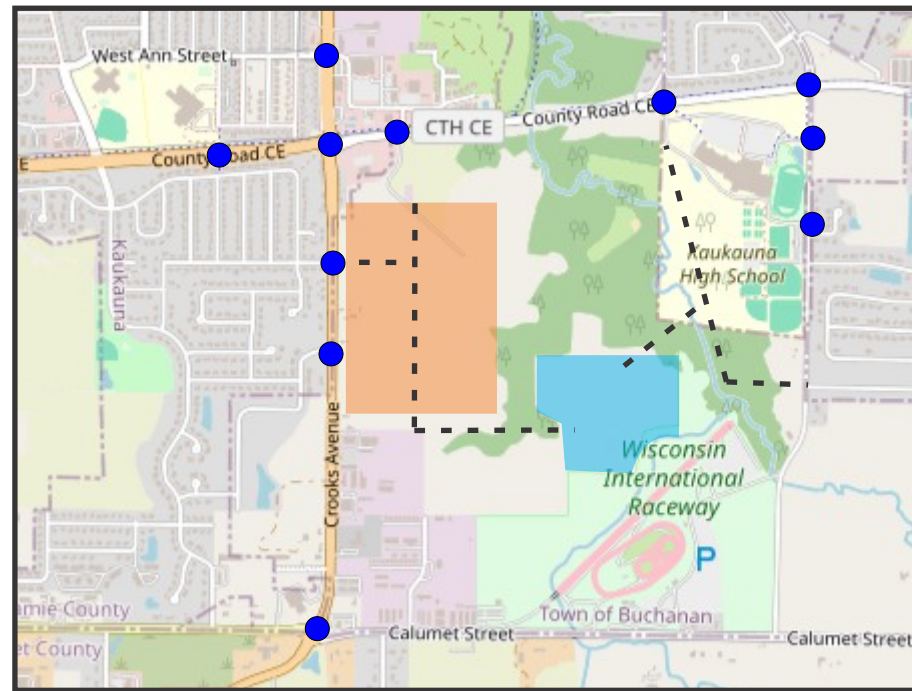
period. Traffic signal control would allow for a controlled (marked pedestrian crossings with push buttons and pedestrian countdown timers) crossing for the anticipated students, which could allow for a potentially safer pedestrian crossing situation and could remove the need for the proposed pedestrian tunnel under STH 55. Based on all of these factors, traffic signal control is recommended.

Higher delays (LOS E/F) are expected for several movements at the STH 55/Crooks Avenue intersection with CTH CE/College Avenue under the current dual lane roundabout controlled intersection under Full Build and Total traffic volume conditions. The recommended bypass lane additions under the Full Build traffic volume conditions and the recommended reconstruction to a 3-lane roundabout with bypass lanes under the Total traffic volume conditions are expected to provide acceptable operation for most movements; however, higher delays (LOS E) are still expected for some movements during the typical weekday morning peak period noting that the delays are only slightly higher than acceptable (about 6 seconds) and the reported queueing is expected to be reasonable (all less than 225 feet). Without the bypass lanes recommended under the Full Build traffic conditions, higher delays (about 60 seconds) are expected for several movements during the weekday morning peak school peak hour with maximum queues of about 400 feet (16 vehicles) or less. As with many schools, the morning peak period “surge” last about 20 to 30 minutes. However, acceptable delays are expected during all other hours of the typical weekday, including the typical school afternoon school discharge and weekday evening commuter peak hours.

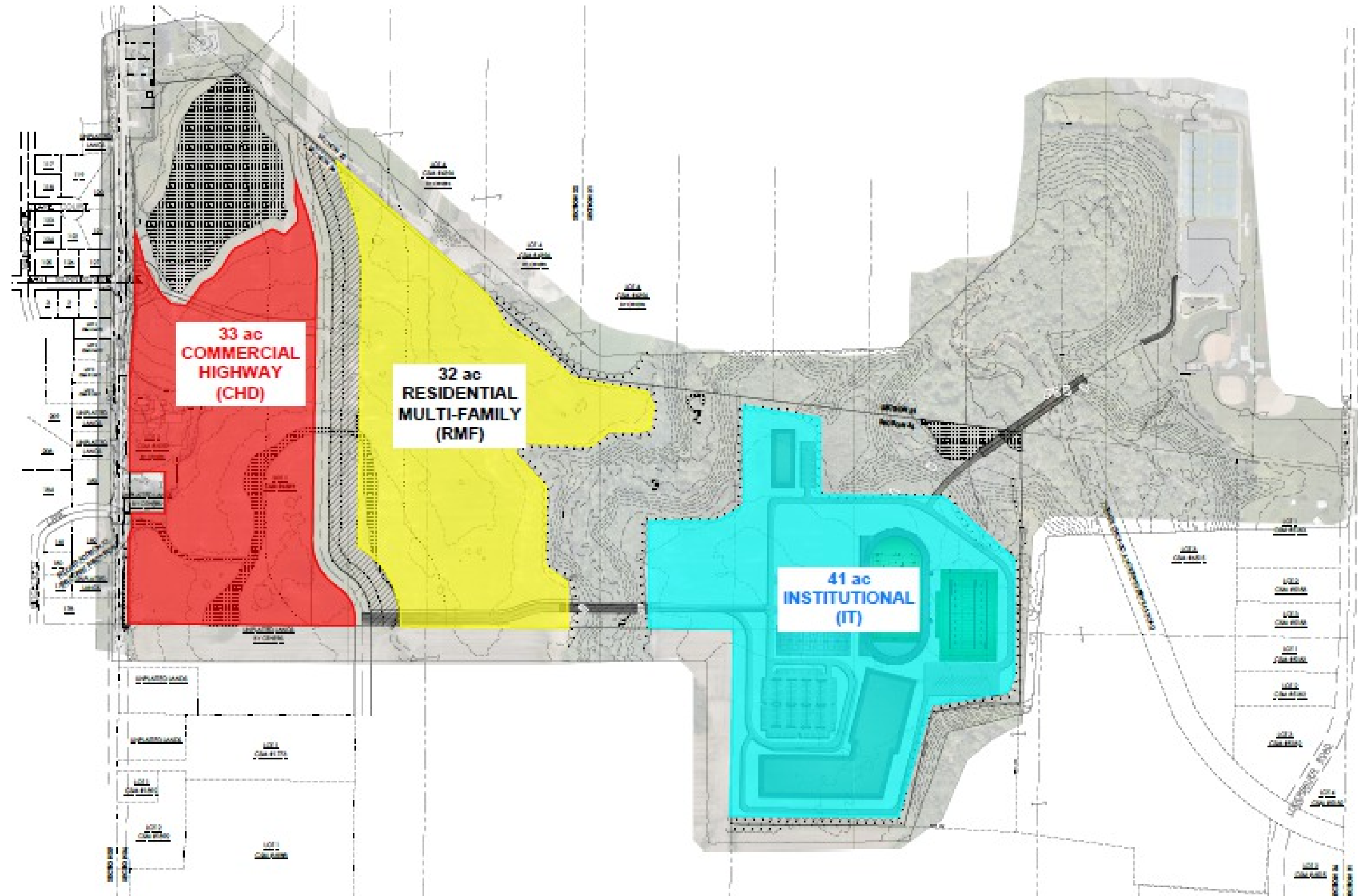
Higher delays (LOS F) are also expected at the College Avenue/CTH CE intersection with the High School West Driveway under Existing, Full Build and Total traffic conditions during the typical weekday afternoon peak period. Restricting these movements during this time period, with diverted traffic utilizing the signalized intersection at Loderbauer Road, would allow this and all study area intersections to operate acceptably under all peak periods.

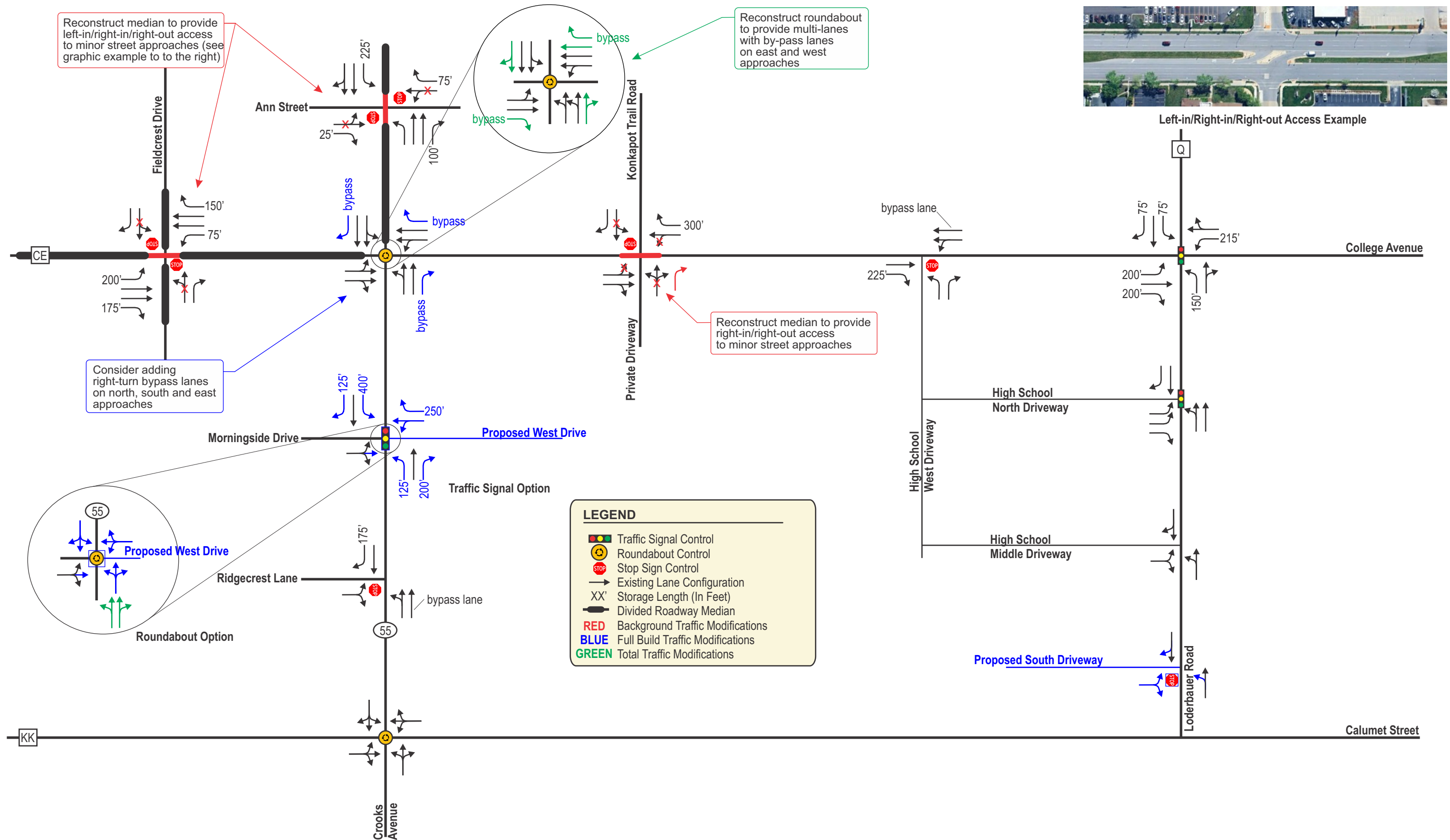
B8. Conclusion

To accommodate the full build out of the proposed middle school, recommended modifications are expected to be necessary to the transportation network. Except as noted, all movements at the study area intersections are expected to operate safely and efficiently with the modifications identified in this TIA with the proposed middle school site and identified off-site development areas.









CHAPTER II – PROPOSED DEVELOPMENT

PART A – DEVELOPMENT SITE

A1. Development Description and Site Location

The Kaukauna Area School District is planning to construct a new Middle School to be located on a vacant parcel of land east of State Trunk Highway (STH) 55, south of County Trunk Highway (CTH) CE and southwest of the current high school in the City of Kaukauna, Outagamie County, Wisconsin. A new middle school with two outlots for potential future development, which are expected to include commercial and residential land uses along with a connection roadway to the Kaukauna High School, are being proposed for the development site. A street map illustrating the locations of the existing and proposed schools is shown in [Exhibit 2-1](#).

A2. Land Use and Intensity

The proposed middle school site is currently being utilized for agricultural uses with several large, wooded areas located throughout. A river also runs through the site. The overall site is bordered by residential uses to the east, west and north with a few additional residential houses immediately to the south along the south side of CTH KK. The Kaukauna High School is located immediately to the northeast. Commercial uses currently exist adjacent to the site, to the north (along both sides of CTH CE) and to the southwest along STH 55. Light industrial land uses also exist to the southwest along STH 55. The Wisconsin International Raceway is located immediately to the southeast, adjacent to the site.

A3. Site Plan

A copy of the conceptual site plan for the proposed middle school is illustrated in [Exhibit 2-2A](#). The middle school is proposed within the southeast portion of the overall site with parking lots proposed on the west and south sides of the middle school. Sports fields are proposed to the south of the school building. Two access connections are proposed for the school development site. The main access is proposed as a full access driveway onto a new roadway connection to Crooks Avenue/STH 55 directly across from the existing three-legged, one-way stop sign controlled STH 55 intersection with Morningside Drive. A second driveway is proposed to connect to the high school site located northeast of the proposed middle school site with further existing connections from the high school onto CTH CE/College Avenue and Loderbauer Road. An additional driveway is proposed along Loderbauer Road, immediately south of the high school. Finally, even though not proposed as this time, a future connection via a new north/south connection onto CTH CE to the north and Speedway Lane to the southwest is also planned for at some point in the future.

A4. Development Phasing and Timing

The following land uses are assumed for the proposed middle school site:

- Middle School – 1,200 students

The numbers of students shown are the anticipated maximum population at the proposed middle school. A map showing the limits of the student population for the Kaukauna School District is provided in the appendix.

It is anticipated that construction of the school will occur over a two-year period starting in the year 2026. Therefore, full build out of the development site is expected by the start of the fall semester in the year 2028. Therefore, traffic volumes from the proposed middle school were included in the Full Build traffic volumes.

PART B – STUDY AREA

B1. Influence Area

Based on the type of proposed land uses and the location of the site, the proposed middle school development is expected to draw from a local and regional customer base. Therefore, the areas of significant influence include the City of Kaukauna and other surrounding cities, villages, and towns that are part of the Kaukauna Area School District. A map showing the limits of the school district in relation to the proposed middle school site is provided in the appendix.

B2. Area of Significant Traffic Impact

As identified by the study team, the study area for the proposed middle school includes the following intersections:

- STH 55/Crooks Avenue with Ann Street (two-way stop control)
- STH 55/Crooks Avenue with CTH CE/College Avenue (roundabout control)
- STH 55/Crooks Avenue with Morningside Drive/Proposed West Access Drive (current one-way stop control)
- STH 55/Crooks Avenue with Ridgecrest Lane (one-way stop control)
- STH 55/Crooks Avenue with CTH KK/Calumet Street (roundabout control)
- CTH CE/College Avenue with Fieldcrest Drive (two-way stop control)
- CTH CE/College Avenue with Konkapot Trail Road/Forefront Dermatology Access Driveway (two-way stop control)
- CTH CE/College Avenue with the High School West (and future Middle School) Access Driveway (one-way stop control)
- Loderbauer Road with CTH CE/College Avenue (traffic signal control)
- Loderbauer Road with the High School northern (and future Middle School) Access Driveway (traffic signal control)
- Loderbauer Road with the High School middle (and future Middle School) Access Driveway (one-way stop control)
- Loderbauer Road with the Proposed South Access Driveway (one-way stop control)

PART C – OFF-SITE LAND USE AND DEVELOPMENT

As shown on the conceptual site plan in [Exhibit 1-2B](#), two off-site development areas were identified within the limits of the development site; specifically, two outlots located immediately east of STH 55 and west of the proposed middle school. There are no known plans for the development of these two 30-acre parcels; however, for planning purposes, the following land uses were assumed on the parcels:

West Parcel

- Shopping Plaza (40-150k - Supermarket - No), ITE LU821 – 100,000 square feet (sf)
- Strip Retail Plaza (<40k), ITE LU822 – 20,000 sf
- General Office Building – ITE LU710 – 15,000 sf

East Parcel

- Multifamily Housing (Low-Rise/Not Close to Rail Transit), ITE LU220 – 200 units

As stated above, the timing for the build out of these two parcels is unknown at this time. For purposes of this study, it was assumed that the parcels would be fully built out within the next ten years. Therefore, traffic volumes from these developments were included in the Total traffic volumes.

PART D – SITE ACCESSIBILITY

D1. Study Area Roadways

The study area roadways for the proposed site include the following:

Crooks Avenue (STH 55) is a four-lane divided north/south principal arterial highway north of CTH KK and an undivided minor arterial to the south. The highway widens to provide a raised median section from immediately north of Ann Street to a point immediately south of the roundabout at CTH CE. The highway also transitions to a two-lane undivided cross section to the south of Morningside Drive. The posted speed limit on STH 55 is 25-mph north of CTH CE, 35-mph south of CTH CE, 45-mph between Morningside Drive and CTH KK and 55-mph to the south, starting at a point about ¼-mile south of CTH KK. According to the Wisconsin Department of Transportation (WisDOT), the Year 2023 average annual daily traffic volumes (AADT's) on STH 55 were approximately 14,700 vehicles per day (vpd) north of 16th Street, 14,100-vpd to the north of CTH CE, 10,700-vpd to the south of Ridgecrest Lane, and 4,800-vpd (2016 count) to the south of CTH KK. Sidewalks are provided along both sides of STH 55 to the north of CTH CE and exist only for a short distance to the south, up through the Forefront Dermatology driveway.

College Avenue (CTH CE) is a four-lane divided east/west principal arterial highway to the west of STH 55 and a two-lane undivided minor arterial to the east of STH 55. The posted speed limit on CTH CE is 45-mph to the west of STH 55 and changes to 35-mph to the east at a point about 850 feet east of Konkapot Trail Road. The Year 2023 WisDOT AADT volumes on CTH CE were approximately 15,800-vpd west of Fieldcrest Drive, 14,200-vpd to the west of STH 55, 9,300-vpd to the west of Loderbauer Road, and 4,800-vpd (2019 count) to the east. The CE multi-use trail currently exists along the north side CTH CE within the study limits. The CE Trail is a 5.8-mile paved trail that runs between Appleton and Kaukauna.

Calumet Street (CTH KK) is a two-lane undivided east/west minor arterial highway to the west of STH 55 and a major collector to the east of STH 55. The posted speed limit on CTH KK is 45-mph to the west of STH 55 and 55-mph to the east. The Year 2023 WisDOT AADT volumes on CTH KK were approximately 7,200 vpd west of STH 55 and 5,600-vpd (2019 count) to the east. Sidewalks are not currently provided along either side of CTH KK within the study limits.

Hillcrest Drive (CTH Q) is a two-lane undivided north/south minor arterial north of CTH CE with a posted speed limit of 25-mph within the study area. South of CTH CE the roadway is designated as Loderbauer Road. The Year 2016 WisDOT AADT volumes on Hillcrest Drive were approximately 2,800 vpd north of CTH CE. Sidewalks are provided along the west side of Hillcrest Drive within the study limits.

Loderbauer Road is a four-lane undivided north/south local street immediately south of CTH CE that transitions to a two-lane undivided cross section to the south of the high school's north driveway. The roadway also changes from an urban cross section to the north of Bear Paw Trail (adjacent neighborhood street) to a rural cross section to the south. North of CTH CE the

roadway is designated as Hillcrest Drive. The posted speed limit on Loderbauer Road is 35-mph within the study area. No AADT's are currently available for Loderbauer Road. Sidewalks are provided along the west side of Loderbauer Road within the limits of the high school property (from CTH CE down to a point near Bear Paw Trail) and along the east side of Loderbauer Road from the residential properties north of Andrea Michelle Court down to White Dove Lane.

Ann Street is a two-lane undivided east/west major collector with a posted speed limit of 25-mph within the study area. The Year 2019 WisDOT AADT volumes on Ann Street were approximately 1,600 vpd west of STH 55. Sidewalks are provided along both sides of Ann Street, west of STH 55 and along the south side of Ann Street to the east.

Konkapot Trail Road is a two-lane undivided north/south local street with a posted speed limit of 25-mph within the study area. No AADT's are currently available for Konkapot Trail Road. Sidewalks are provided along both sides of Konkapot Trail Road within the study limits.

Fieldcrest Drive is a two-lane undivided north/south major collector with a posted speed limit of 25-mph within the study area. The Year 2019 WisDOT AADT volumes on Fieldcrest Drive were approximately 2,500 vpd north of CTH CE. Sidewalks are provided along both sides of Fieldcrest Drive to the north of CTH CE; however, sidewalks are not currently provided on either side to the south.

Morningside Drive is a two-lane undivided east/west local residential street with a posted speed limit of 25-mph within the study area. No AADT's are currently available for Morningside Drive. Sidewalks are provided along both sides of Morningside Drive within the study limits.

Ridgecrest Lane is a two-lane undivided east/west local residential street with a posted speed limit of 25-mph within the study area. No AADT's are currently available for Ridgecrest Lane. Sidewalks are provided along both sides of Ridgecrest Lane within the study limits.

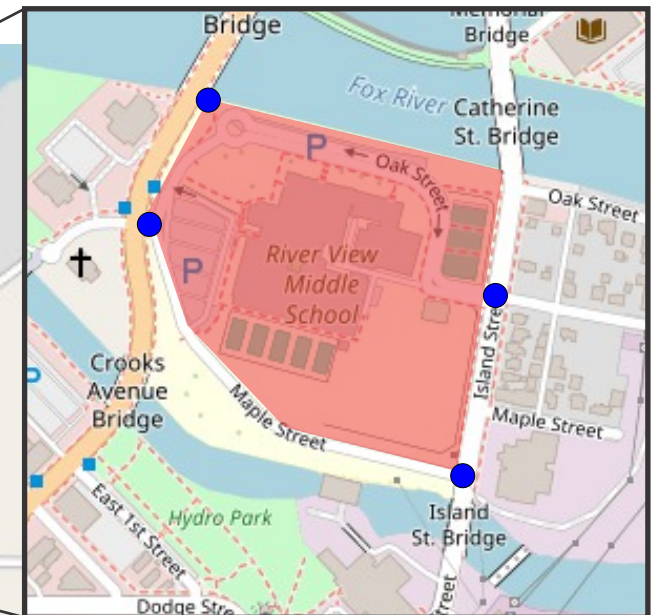
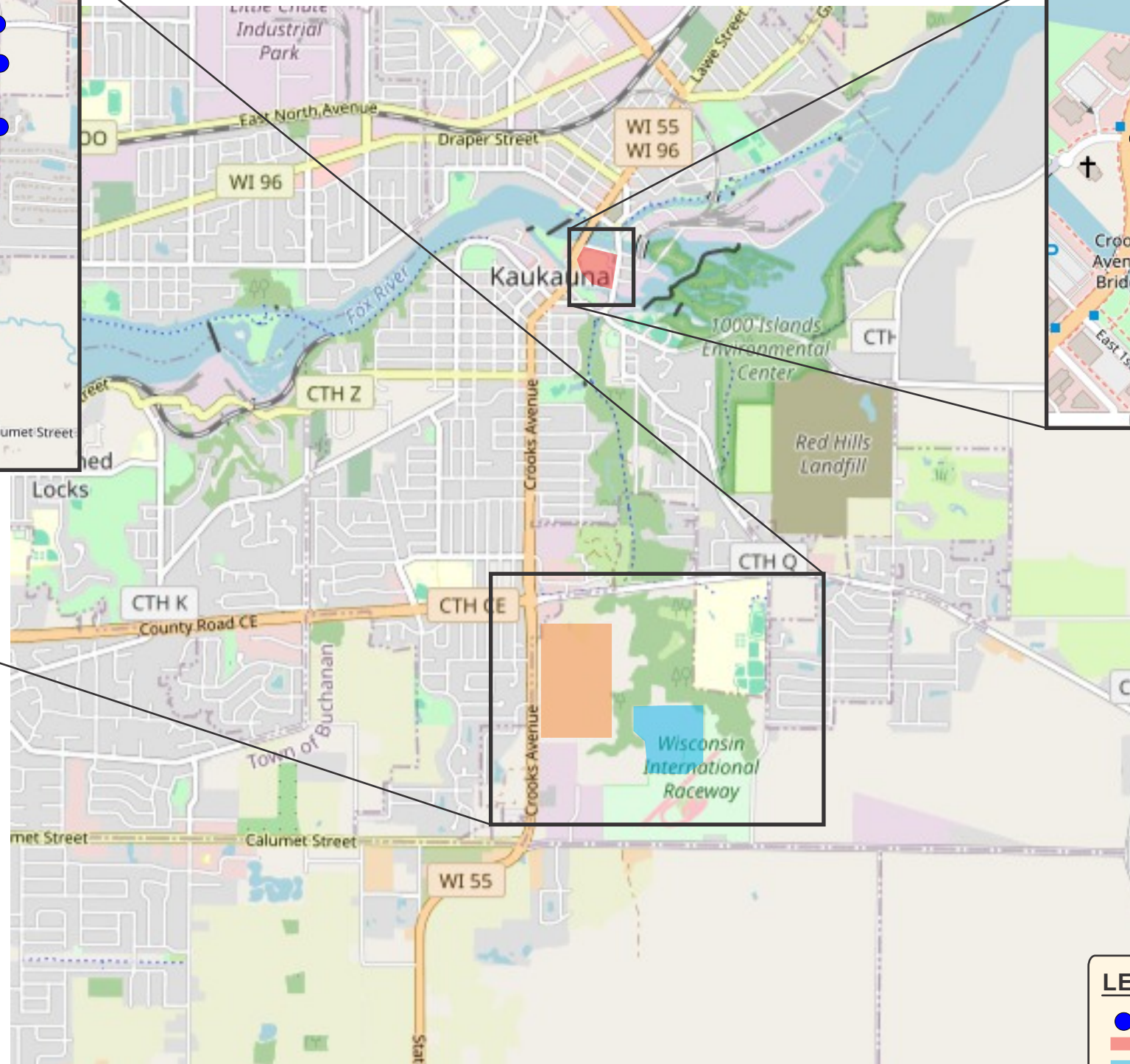
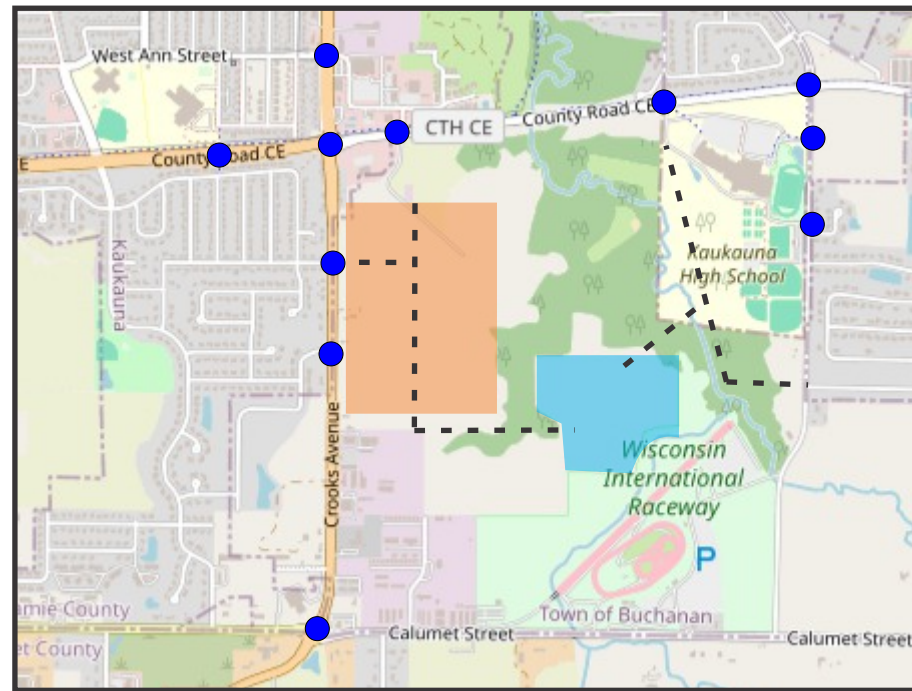
D2. Anticipated Infrastructure Projects

Based on information provided by WisDOT, NE Region, one improvement project was identified within the general study area. A mill/overlay project (WisDOT ID 4050-21-71) is planned along STH 55 between USH 10 and Ridgecrest Road during the year 2028 construction season.

D3. Alternative Modes of Transportation

As described above, sidewalks and a multi-use trail (CE Trail) are currently provided along many of the roadways within the study area. No designated on-street bicycle facilities were identified.

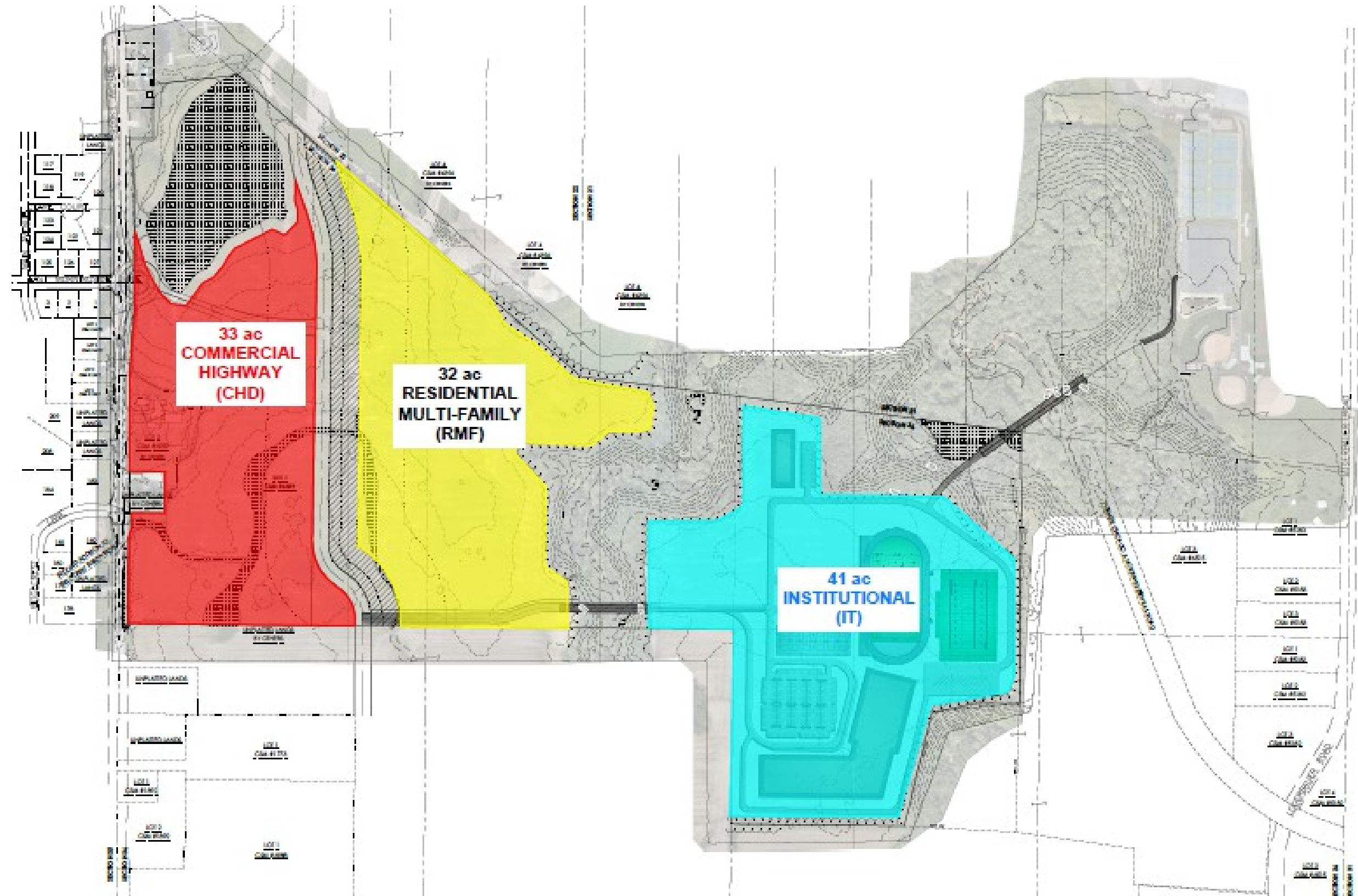
Due to the location of the proposed school in relation to the residential neighborhoods within the Kaukauna area, and with sidewalks and the CE Trail currently provided near the school, it was assumed that a fair number of students will walk or ride bikes to/from the school on a daily basis. See trip generation discussion in *Chapter IV* for further assumptions concerning students walking to school.



LEGEND

- Study Intersection
- Existing Middle School Site
- Proposed Middle School Site
- Off-Site Development Area
- Proposed Internal Roadway





CHAPTER III – ANALYSIS OF EXISTING CONDITIONS

PART A – PHYSICAL CHARACTERISTICS

[Exhibit 3-1](#) shows the existing transportation detail for the study area intersections. More specifically, the exhibit illustrates intersection lane configurations, intersection traffic controls, distances between intersections, and posted speed limits within the study area.

PART B – TRAFFIC VOLUMES

The weekday morning and weekday evening peak hours are expected to drive the improvements needed to adequately accommodate the proposed middle school development, as they represent the highest trip generation for the site and the highest volumes along the adjacent highways. TADI conducted weekday morning (6:30 – 8:30am) and weekday evening (2:30 – 6:00pm) peak hour turning movement traffic counts at the existing study area intersections in mid-February of 2025.

Based on the turning movement counts and the expected school bell schedule, the weekday morning and weekday afternoon peak hours were identified as being 7:00 to 8:00 am and 3:15 to 4:15 pm; respectively. These peak hours coincide with the expected school start and end times of 7:55 am and 3:20 pm, respectively. A separate weekday evening special event peak hour, identified as 4:30 to 5:30 pm, was also evaluated as part of the study. This peak hour is expected to coincide with a boy's middle school basketball game. Details and calculations for this peak hour are provided in the [appendix](#) of this study. The existing peak hour traffic volumes at the study area intersections, raw data/unbalanced, are shown in [Exhibit 3-2B](#). The existing peak hour traffic volumes at the study area intersections, balanced along the study area corridors, are shown in [Exhibit 3-2C](#). The traffic counts used to determine peak hour factors and truck percentages have been included in the [appendix](#) of this study.

In addition, to calculate local middle school trip generation rates for this study, TADI conducted weekday morning (6:30 – 8:30am) and weekday evening (2:30 – 6:00pm) peak hour turning movement traffic and pedestrian counts at the existing intersections/locations adjacent to the existing Riverview Middle School located along the Fox River in early-February of 2025. Specifically, counts were conducted at the following intersections/locations noting that the westerly entrance to the school off of STH 55 was blocked to vehicular traffic by bollards with all traffic accessing the site along Island Street to the east:

- Island Street with Maple Street School Access
- Island Street with Elm Street School Access
- STH 55/Crooks Avenue with pedestrian access tunnel (pedestrian count only)
- STH 55/Crooks Avenue with pedestrian access to the parking lot (pedestrian count only)

The existing peak hour traffic volumes (including pedestrian volumes) at these four intersections/locations adjacent to the existing Riverview Middle School are shown in [Exhibit 3-2A](#).

PART C – CAPACITY LEVEL OF SERVICE

C1. Level of Service Definitions

The study area intersections were analyzed based on the procedures set forth in the *Highway Capacity Manual* (HCM), 7th Edition. Intersection operation is defined by “level of service.” Level of service (LOS) is a quantitative measure that refers to the overall quality of flow at an intersection ranging from very good, represented by LOS ‘A,’ to very poor, represented by LOS ‘F.’ For the purpose of this study, LOS D was used to define acceptable peak hour operating

conditions. Peak hour factors (PHF's) in the modeling software were adjusted down slightly to calibrate the models to actual queues observed during data collection. The same PHF's at the existing middle school intersection were utilized at the intersections adjacent to the new middle school to allow for a more accurate build condition. Descriptions of the various levels of service are as follows:

LOS A is the highest level of service that can be achieved. Under this condition, intersection approaches appear quite open, turning movements are easily made, and nearly all drivers find freedom of operation. At signalized and unsignalized intersections, average delays are less than 10 seconds.

LOS B represents stable operation. At signalized intersections, average vehicle delays are 10 to 20 seconds. At unsignalized intersections, average delays are 10 to 15 seconds.

LOS C still represents stable operation, but periodic backups of a few vehicles may develop behind turning vehicles. Most drivers begin to feel restricted, but not objectionably so. At signalized intersections, average vehicle delays are 20 to 35 seconds. At unsignalized intersections, average delays are 15 to 25 seconds.

LOS D represents increasing traffic restrictions as the intersection approaches instability. Delays to approaching vehicles may be substantial during short peaks within the peak period, but periodic clearance of long lines occurs, thus preventing excessive backups. At signalized intersections, average vehicle delays are 35 to 55 seconds. At unsignalized intersections, average delays are 25 to 35 seconds.

LOS E represents the capacity of the intersection. At signalized intersections, average vehicle delays are 55 to 80 seconds. At unsignalized intersections, average delays are 35 to 50 seconds.

LOS F represents jammed conditions where the intersection is over capacity and acceptable gaps for unsignalized intersections in the mainline traffic flow are minimal. At signalized intersections, average vehicle delays exceed 80 seconds. At unsignalized intersections, average delays exceed 50 seconds.

C2. Existing Traffic Operations

[Exhibit 3-3](#) shows the existing traffic peak hour operating conditions at the study area intersections at the proposed school location. The existing traffic analysis was conducted using the existing lane configurations shown in [Exhibit 3-1](#), the existing traffic signal timings and the existing traffic volumes shown in [Exhibit 3-2C](#).

As shown in [Exhibit 3-3](#), all movements are currently operating acceptably at LOS D or better at the study area intersections under the existing traffic volumes conditions during the weekday morning, weekday afternoon and weekday evening special event peak periods except the following:

- The eastbound and westbound through/left-turn movements at the Crooks Avenue/STH 55 intersection with Ann Street which are currently operating at LOS F during the typical weekday morning, afternoon, and evening special event peak periods.
- The northbound through/left-turn movements at the College Avenue/CTH CE intersection with Fieldcrest Drive which are currently operating at LOS E during the typical weekday morning peak period.
- The northbound and southbound through/left-turn movements at the College Avenue/CTH CE intersection with Konkapot Trail Road which are currently operating at LOS E/F during the typical weekday morning and afternoon peak periods.

- The northbound left-turn movement at the College Avenue/CTH CE intersection with the High School West Driveway which is currently operating at LOS F during the typical weekday afternoon peak period.

PART D – SOURCES OF DATA

The following sources of data were obtained for use in conducting this traffic study:

- Turning movement traffic counts – TADI
- Existing transportation details – TADI along with Google Earth
- Existing Traffic Signal Timings – City of Kaukauna
- On-Site Development information – Point of Beginning and the Kaukauna Area School District
- Off-Site Development information – City of Kaukauna

LEGEND

Traffic Signal Control

Stop Sign Control

Roundabout Control

Existing Lane Configuration

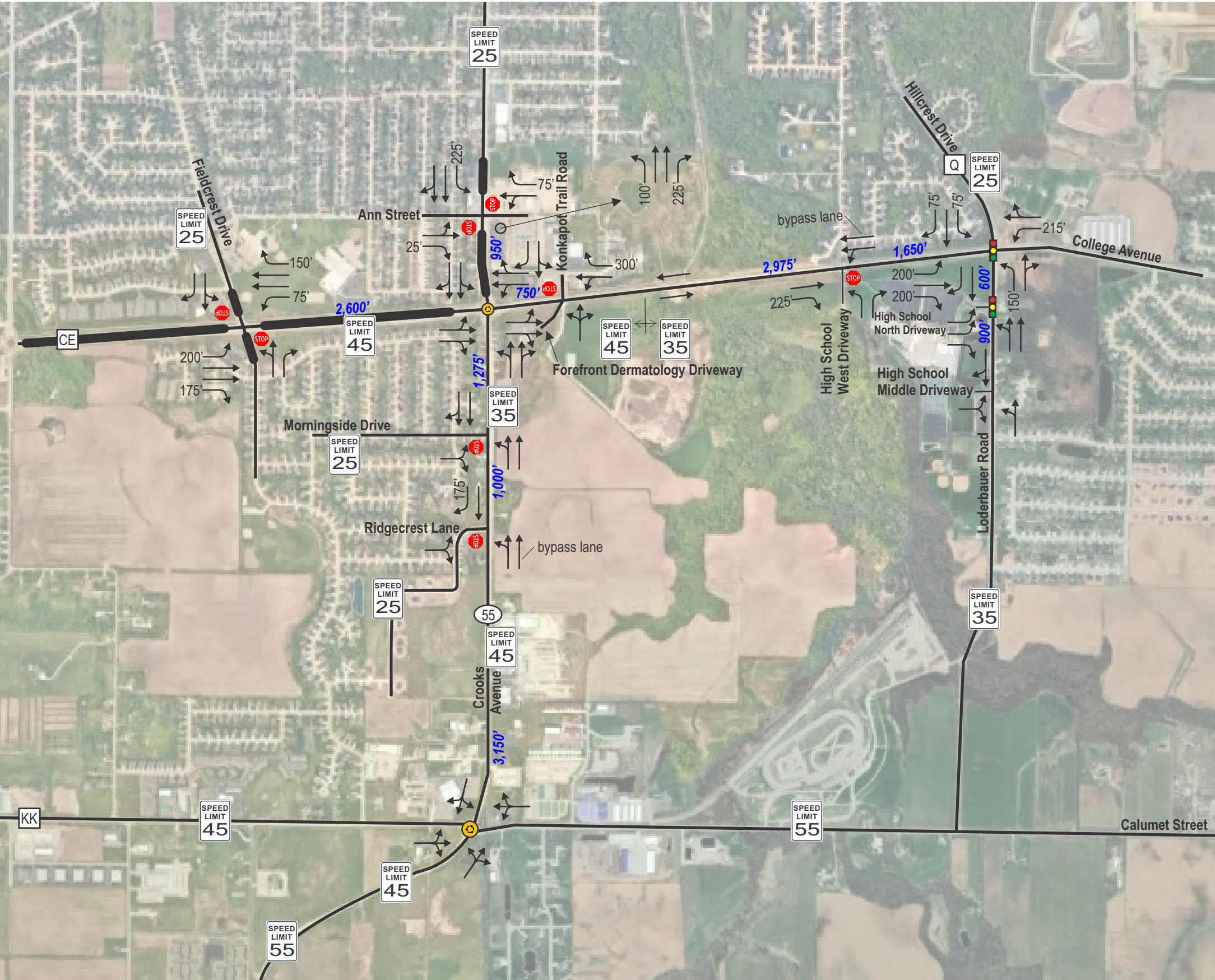
XX'

Existing Storage Length (in Feet)

XX'

Distance Between Roadways (in Feet)

Divided Roadway Median



LEGEND

XX

AM Peak Hour Volumes (7:00-8:00 AM)

(XX)

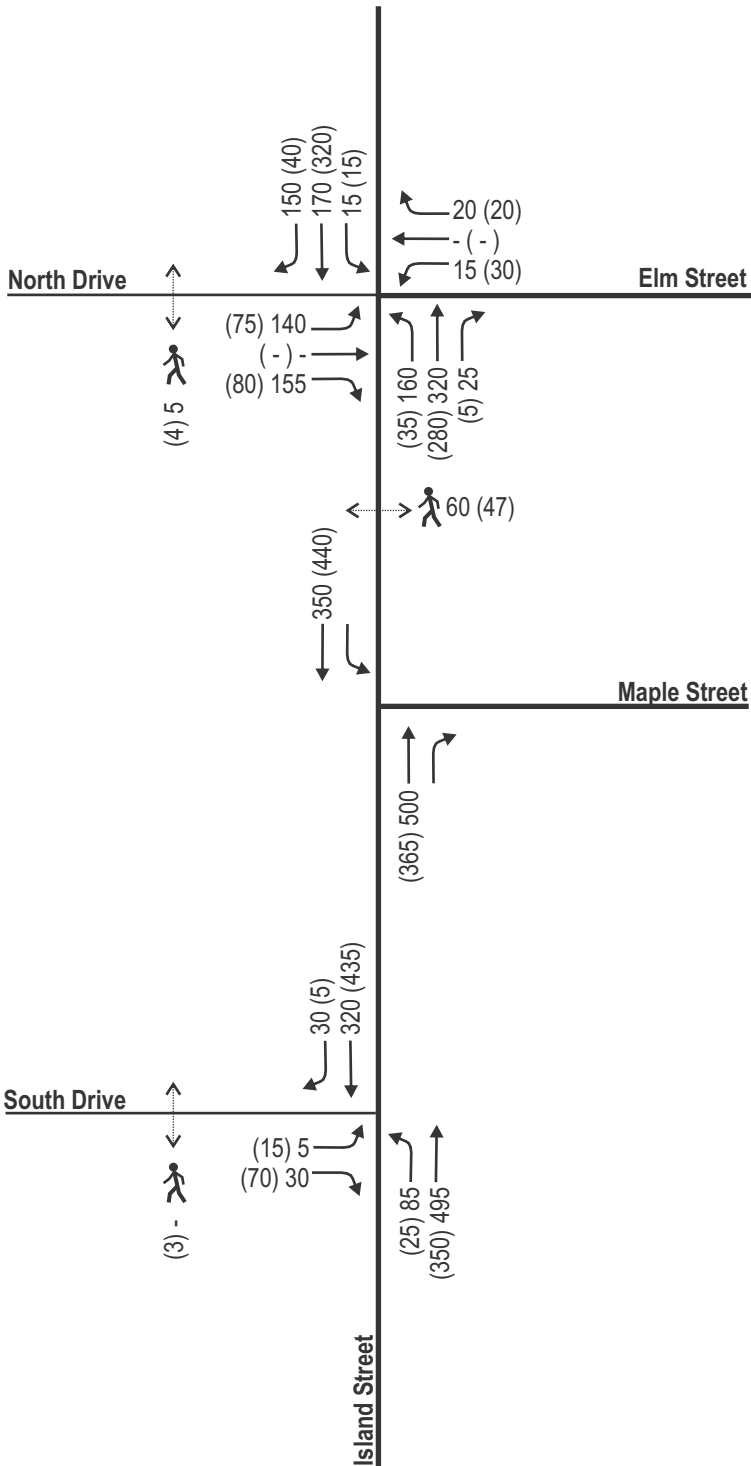
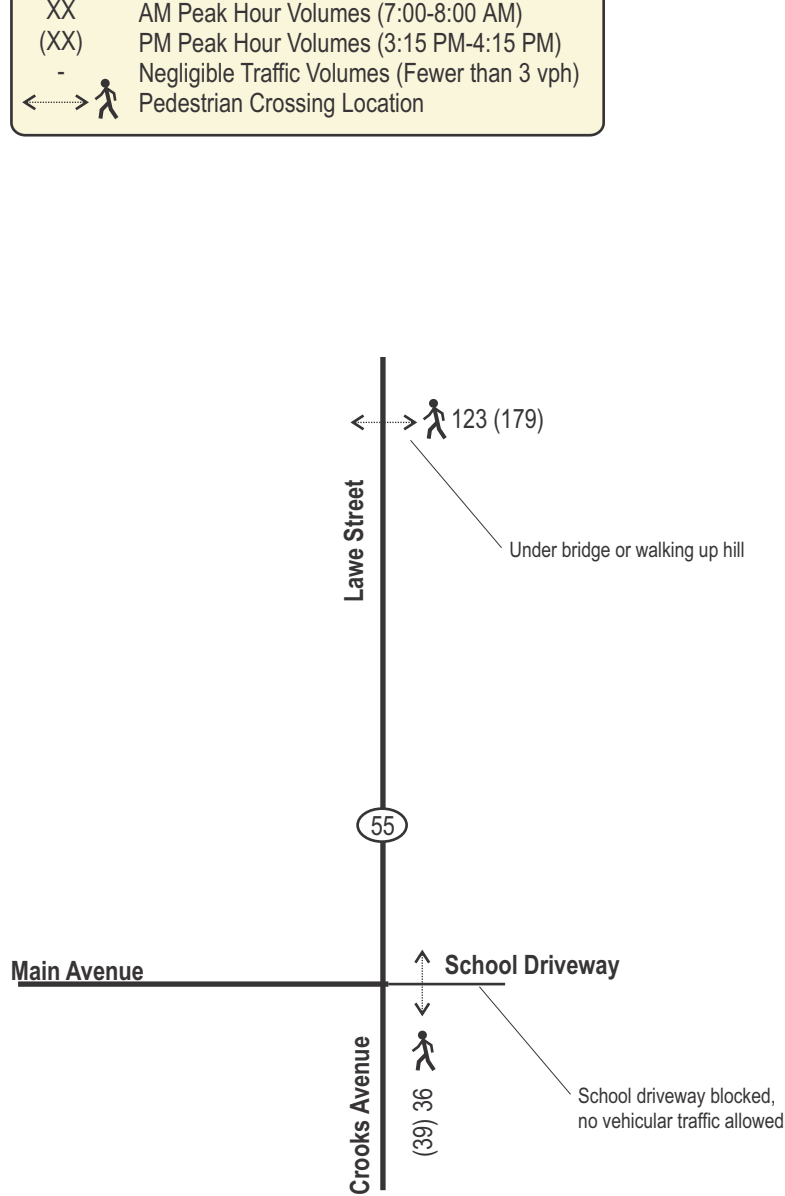
PM Peak Hour Volumes (3:15 PM-4:15 PM)

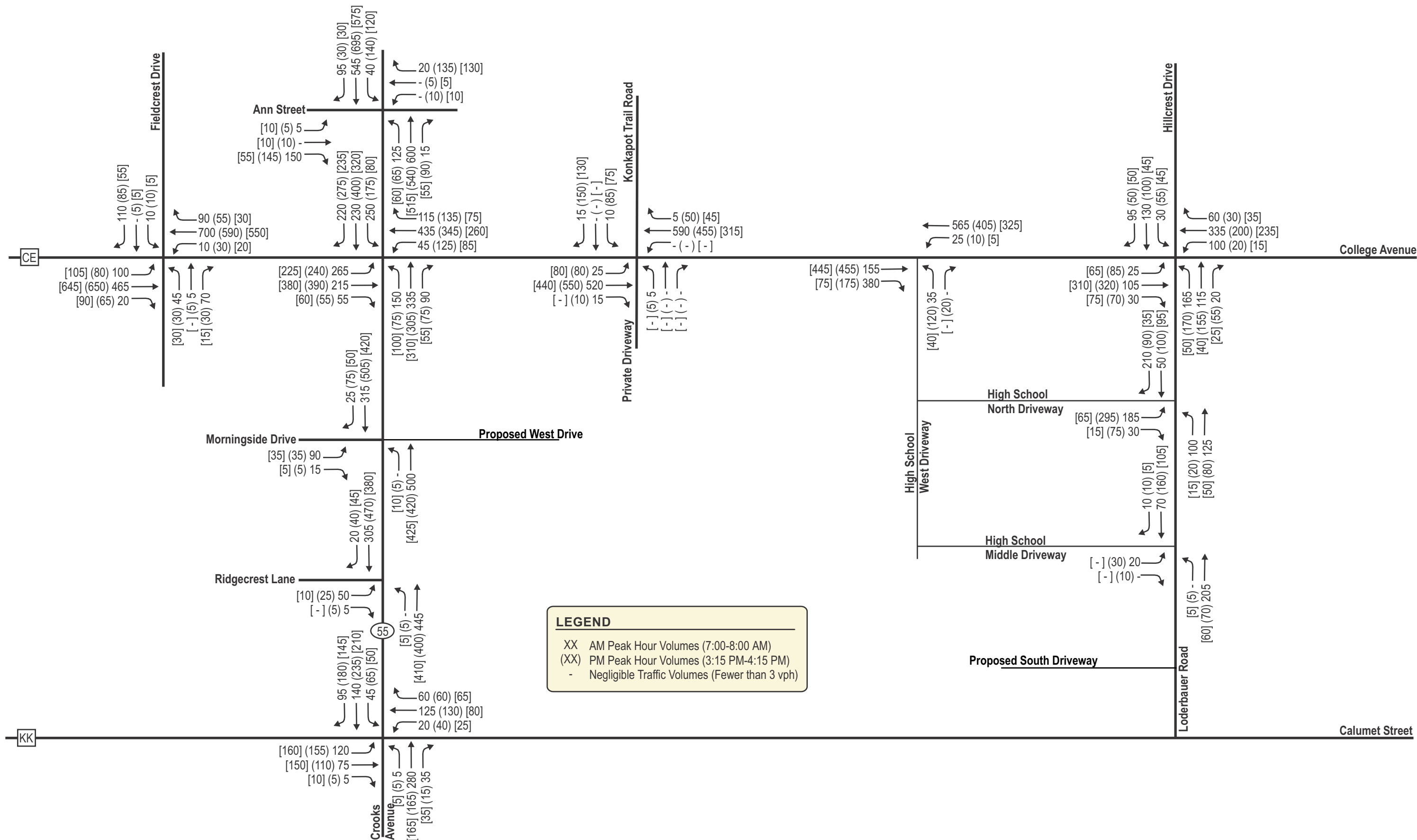
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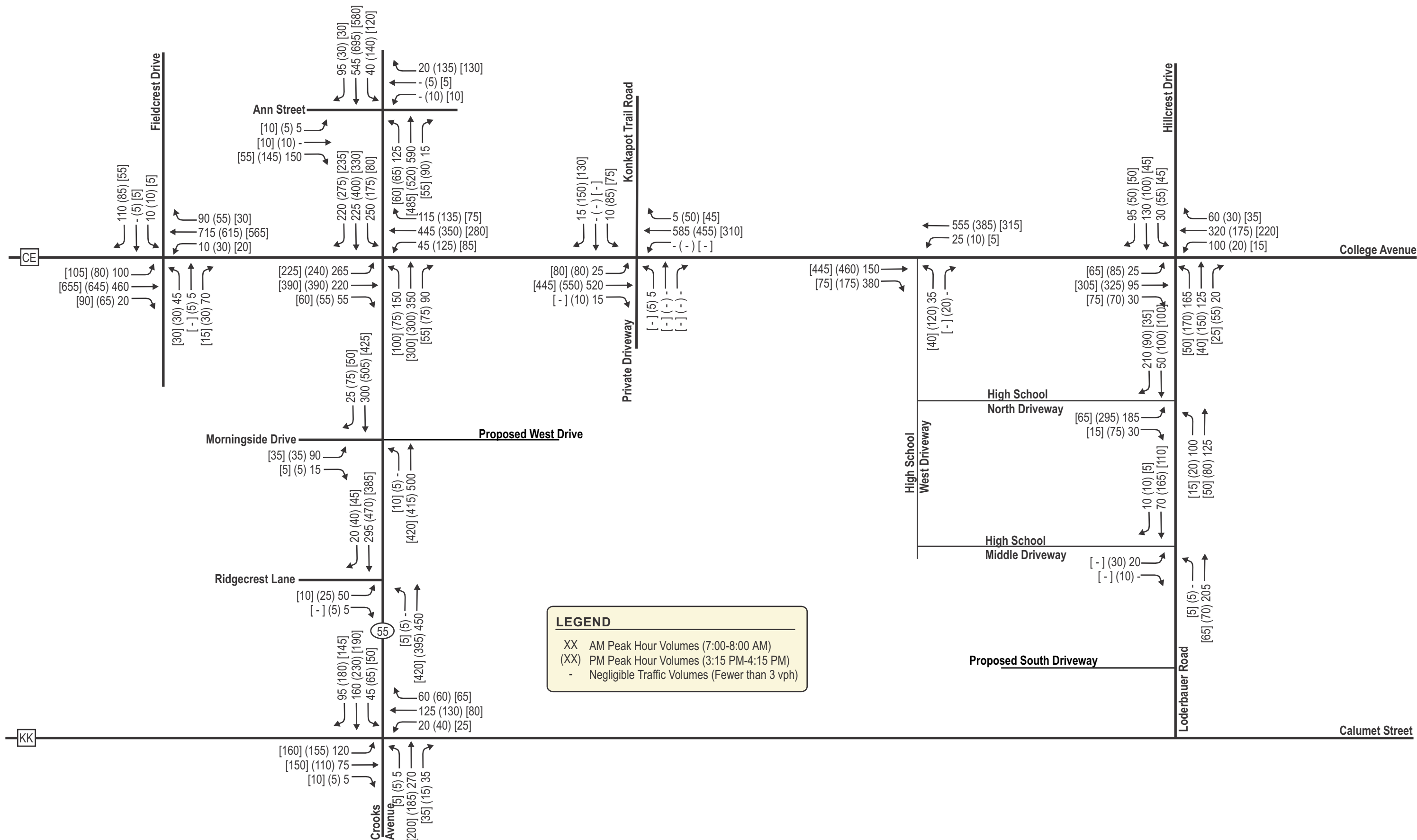
Negligible Traffic Volumes (Fewer than 3 vph)

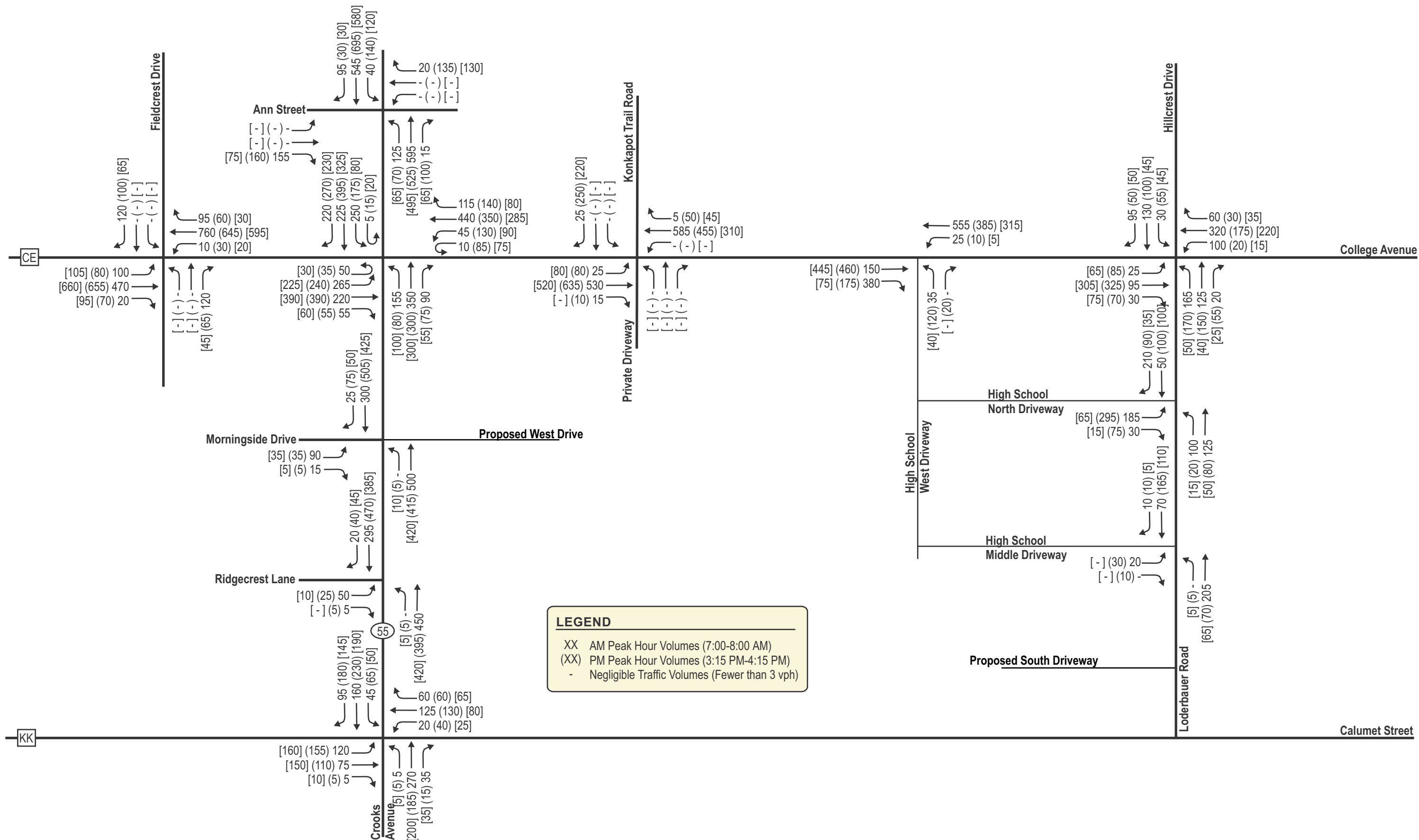
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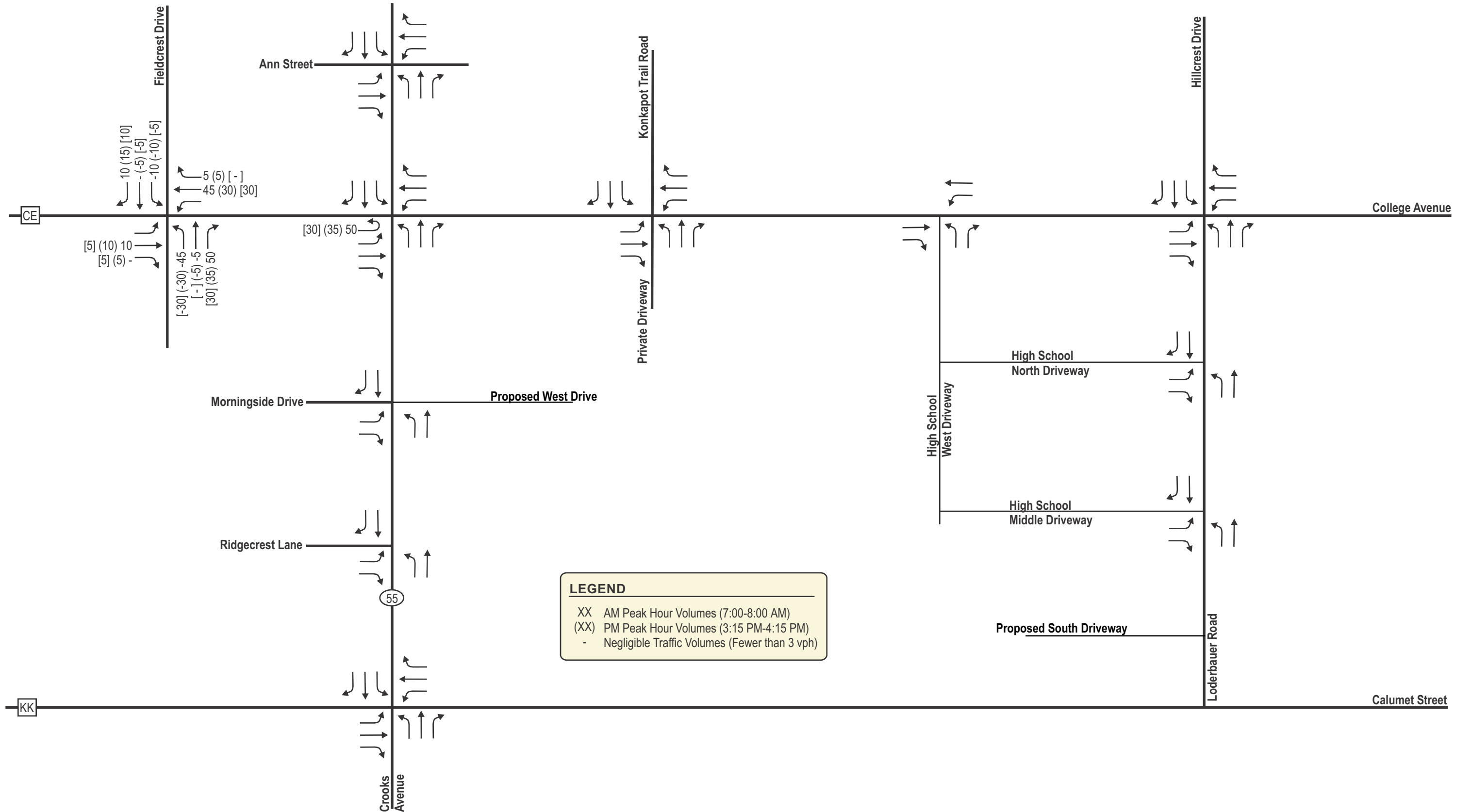
Pedestrian Crossing Location

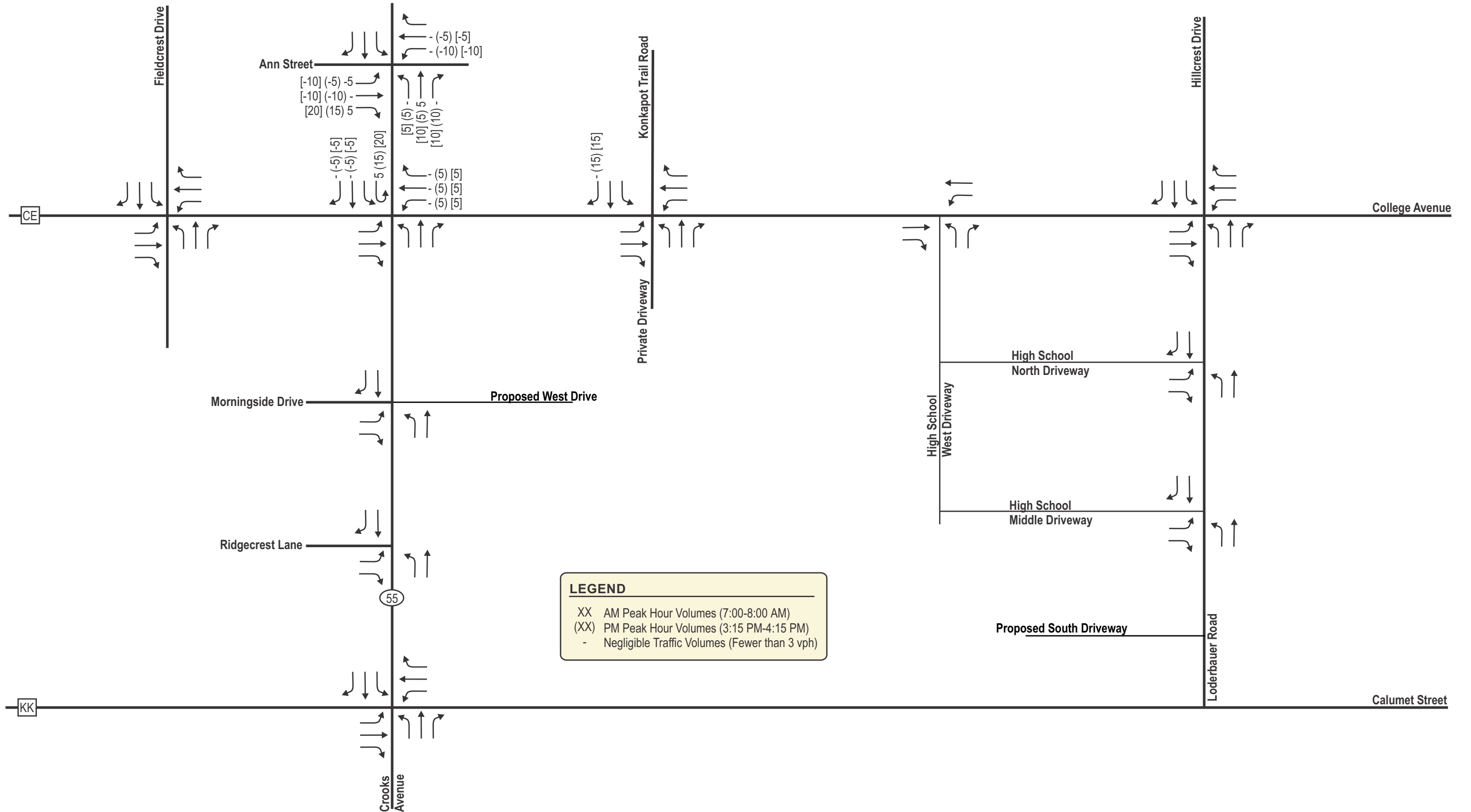












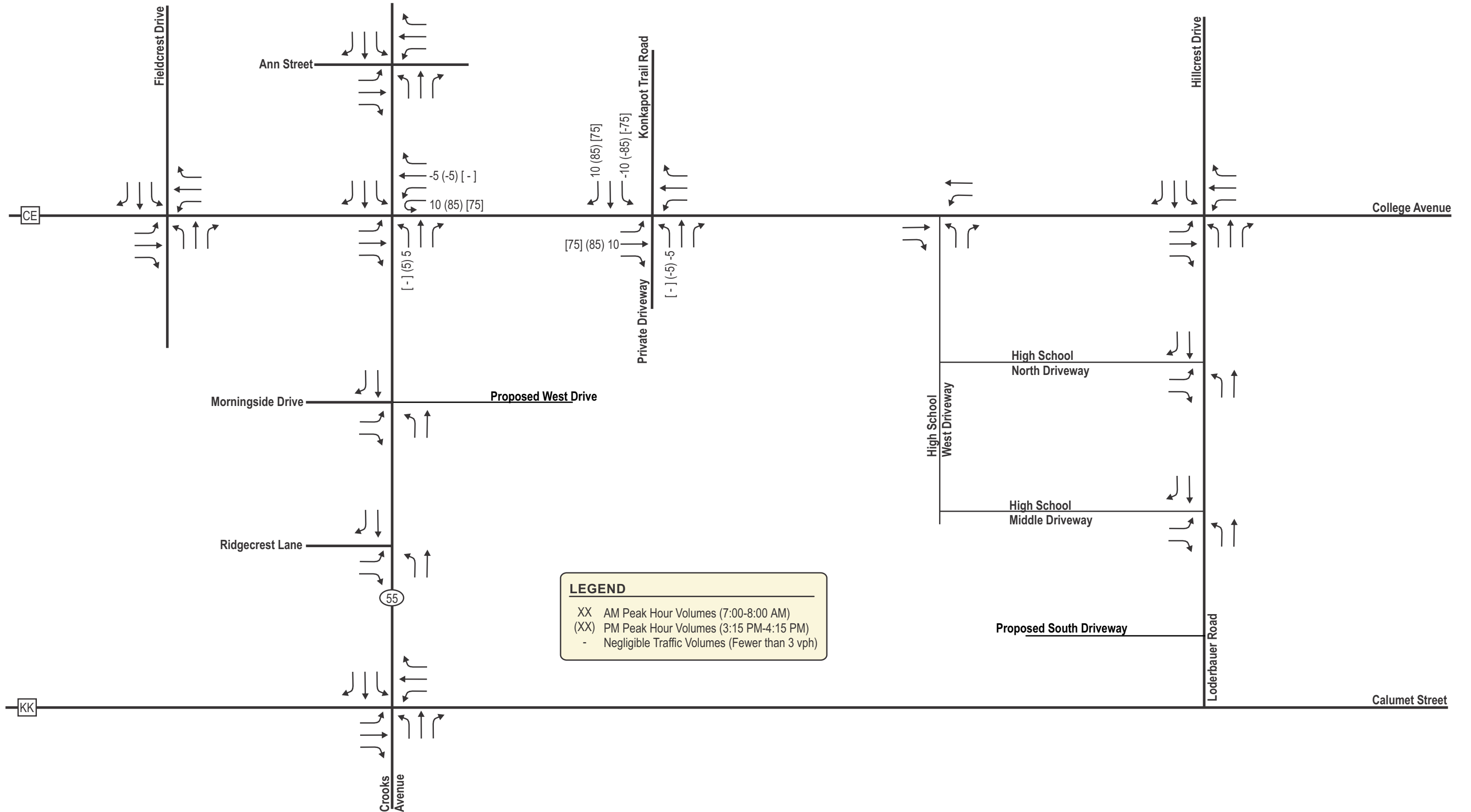


Exhibit 3-3
Existing Traffic Peak Hour Operating Conditions
With Existing Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach										I/S LOS & Delay								
			Eastbound			Westbound			Northbound			Southbound									
			↗	→	↘	↖	←	↗	↑	↘	↘	↓		↖							
Node 100: STH 55/Crooks Avenue & Ann Street Two-Way Stop Control	AM	Lanes->	1		1		1		1	2	1		1		2						
		LOS	F		B		F		B		*	*		A		*					
		Delay	94.4		14.4		111.1		11.4		10.8	*	*		9.7		*				
		v/c	0.16		-		0.07		-		-	-	-		-		-				
	PM	Queue	25'		40'		25'		25'		*	*	*		25'		*				
		LOS	F		B		F		B		A	*	*		A		*				
		Delay	125.0		13.5		120.9		11.5		9.9	*	*	*		9.8		*			
		v/c	0.37		-		0.36		-		-	-	-	-		-		-			
	PMSE	Queue	35'		30'		35'		25'		*	*	*		25'		*				
		LOS	F		B		F		B		A	*	*	*		A		*			
		Delay	63.5		10.9		52.2		11.0		9.2	*	*	*		9.2		*			
		v/c	0.26		-		0.17		-		-	-	-	-	-		-	-			
Queue	25'		25'		25'		25'		*	*	*	*		25'		*					
Node 200: CTH CE/College Avenue & Fieldcrest Drive Two-Way Stop Control	AM	Lanes->	1		2		1		2		1		1		1		1				
		LOS	B		*		*		A		*	*		E		B		D		B	
		Delay	11.6		*		*		8.8		*	*		44.6		10.9		28.1		13.5	
		v/c	-		*		*		-		*	*		0.41		-		-		-	
	PM	Queue	25'		*		*		25'		*	*		45'		25'		25'		25'	
		LOS	A		*		*		A		*	*		D		B		C		B	
		Delay	9.5		*		*		9.4		*	*		27.8		10.8		23.0		11.2	
		Queue	25'		*		*		25'		*	*		25'		25'		25'		25'	
	PMSE	LOS	A		*		*		A		*	*		D		B		C		B	
		Delay	9.4		*		*		9.6		*	*		29.6		10.8		24.4		10.8	
		Queue	25'		*		*		25'		*	*		25'		25'		25'		25'	
		Lanes->	1				1				1			1		1		1			
Node 300: STH 55/Crooks Avenue & CTH CE/ College Avenue** Roundabout Control	AM	LOS	B				B		C		C		C		C		C		C		
		Delay	11.0				11.1		21.6		21.5		19.3		19.2		19.3		19.9		
		Queue	60'				65'		120'		135'		105'		120'		125'		140'		
		LOS	C				C		B		B		B		B		B		C		
	PM	Delay	15.0				15.2		11.5		11.6		12.8		12.5		14.6		15.4		
		Queue	85'				95'		60'		65'		50'		55'		105'		120'		
		LOS	A				A		A		A		A		A		A		A		
		Delay	9.5				9.8		8.7		8.6		9.9		9.7		8.7		9.0		
	PMSE	Queue	55'				60'		35'		35'		40'		45'		45'		55'		
		Lanes->	1				1				1			1		1		1			
		LOS	A		*		*		A		*	*		F		E		C			
		Delay	9.8		*		*		9.3		*	*		72.0		41.9		15.8			
Node 400: CTH CE/College Avenue & Konkapot Trail Road Two-Way Stop Control	AM	Queue	25'		*		*		25'		*	*		25'		25'		25'		25'	
		LOS	A		*		*		A		*	*		F		F		C			
		Delay	9.2		*		*		9.0		*	*		73.6		71.1		15.5			
		v/c	-		*		*		-		*	*		0.16		0.14		-		-	
	PM	Queue	25'		*		*		25'		*	*		25'		105'		40'			
		LOS	A		*		*		A		*	*		F		F		C			
		Delay	9.2		*		*		9.0		*	*		73.6		71.1		15.5			
		v/c	-		*		*		-		*	*		0.14		0.70		-		-	
	PMSE	Queue	25'		*		*		25'		*	*		145'		25'		-		-	
		LOS	A		*		*		A		*	*		C		C		B			
		Delay	8.3		*		*		8.3		*	*		20.4		23.1		11.4			
		Queue	25'		*		*		25'		*	*		25'		30'		25'			
Node 500: CTH CE/College Avenue & High School West D/W One-Way Stop Control	AM	Lanes->	-		1		1		1		-		1		-		-				
		LOS	-		*		*		A		-		D		-		A		-		
		Delay	-		*		*		9.4		-		25.0		-		9.4		-		
		Queue	-		*		*		25'		-		25'		-		25'		-		
	PM	LOS	-		*		*		A		-		F		-		B		-		
		Delay	-		*		*		9.8		-		70.5		-		13.0		-		
		v/c	-		*		*		-		-		0.81		-		-		-		
		Queue	35'		*		*		25'		-		145'		-		25'		-		
	PMSE	LOS	-		*		*		A		-		C		-		B		-		
		Delay	-		*		*		8.6		-		17.9		-		11.4		-		
		Queue	-		*		*		25'		-		25'		-		25'		-		
		Lanes->	1		1		1		1		1		1		1		1		1		
Node 600: Loderbauer Road & CTH CE/College Avenue Traffic Signal Control	AM	LOS	B		A		A		B		B		B		B		C		B		B
		Delay	17.6		9.4		8.6		11.5		14.6		13.7		11.7		18.5		21.6		19.6
		Queue	25'		65'		25'		70'		260'		105'		95'		40'		125'		65'
		LOS	B		B		A		B		B		B		B		C		C		C
	PM	Delay	16.2		14.8		9.5		18.1		11.9		14.5		13.5		21.7		23.0		20.4
		Queue	65'		215'		35'		25'		130'		105'		125'		65'		100'		40'
		LOS	B		B		A		B		A		B		A		B		B		B
		Delay	11.7		10.1		7.6		11.4		9.7		10.6		9.8		14.6		14.5		14.4
	PMSE	Queue	35'		130'		25'		25'		110'		30'		40'		40'		40'		30'

Exhibit 3-3
Existing Traffic Peak Hour Operating Conditions
With Existing Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach										I/S LOS & Delay								
			Eastbound			Westbound			Northbound			Southbound									
			↗	→	↘	↙	←	↖	↖	↑	↗	↘		↓	↙						
Node 700: STH 55/Crooks Avenue & Morningside Drive One-Way Stop Control		Lanes->	1			-			2			-			2						
	AM	LOS	C			-			A			-			*						
		Delay	19.1			-			8.1			-			*						
		Queue	35'			-			25'			-			*						
	PM	LOS	C			-			A			-			*						
		Delay	20.5			-			9.0			-			*						
		Queue	25'			-			25'			-			*						
	PMSE	LOS	C			-			A			-			*						
		Delay	18.7			-			8.6			-			*						
		Queue	25'			-			25'			-			*						
Node 800: STH 55/Crooks Avenue & Ridgecrest Lane One-Way Stop Control		Lanes->	1			-			2			-			1			1			
	AM	LOS	B			-			A			-			-			-			
		Delay	13.9			-			8.1			-			-			-			
		Queue	25'			-			25'			-			-			-			
	PM	LOS	C			-			A			-			-			-			
		Delay	16.2			-			8.7			-			-			-			
		Queue	25'			-			25'			-			-			-			
	PMSE	LOS	B			-			A			-			-			-			
		Delay	14.1			-			8.4			-			-			-			
		Queue	25'			-			25'			-			-			-			
Node 900: STH 55/Crooks Road with CTH KK/Calumet Street Roundabout Control		Lanes->	1			1			1			-			1			1			
	AM	LOS	A			A			A			-			A						
		Delay	5.5			7.0			7.0			-			6.2						
		Queue	25'			30'			40'			-			35'						
	PM	LOS	A			A			A			-			A						
		Delay	7.0			6.7			6.7			-			8.4						
		Queue	35'			30'			25'			-			65'						
	PMSE	LOS	A			A			A			-			A						
		Delay	7.1			6.0			7.2			-			6.4						
		Queue	40'			25'			35'			-			40'						
Node 1000: Loderbauer Road & High School North Access D/W Traffic Signal Control		Lanes->	2	-	1	-			2	-	-	-	1	-	1						
	AM	LOS	A	-	A	-			A	-	-	-	A	-	A	A			8.6		
		Delay	9.7	-	8.8	-			8.7	-	-	-	6.8	-	8.2						
		Queue	30'	-	25'	-			30'	-	-	-	25'	-	40'						
	PM	LOS	B	-	A	-			A	-	-	-	A	-	A	A			9.6		
		Delay	11.0	-	9.1	-			8.0	-	-	-	8.5	-	8.0						
		Queue	45'	-	25'	-			25'	-	-	-	40'	-	25'						
	PMSE	LOS	A	-	A	-			A	-	-	-	A	-	A	A			7.0		
		Delay	9.7	-	9.4	-			5.6	-	-	-	6.3	-	5.5						
		Queue	25'	-	25'	-			25'	-	-	-	25'	-	25'						
Node 1100: Loderbauer Road & High School Middle Access D/W One-Way Stop Control		Lanes->	1			-			1			-			1						
	AM	LOS	B			-			A			-			-						
		Delay	13.5			-			7.5			-			-						
		Queue	25'			-			25'			-			-						
	PM	LOS	B			-			A			-			-						
		Delay	12.5			-			8.0			-			-						
		Queue	25'			-			25'			-			-						
	PMSE	LOS	A			-			A			-			-						
		Delay	9.4			-			7.5			-			-						
		Queue	25'			-			25'			-			-						

CHAPTER IV – FORECASTED TRAFFIC

PART A – TRAFFIC FORECASTING

To address any potential future traffic impacts along study area roadways and at the intersections adjacent to the proposed middle schools, it is necessary to identify the hourly and daily volume of traffic generated by the projected school's student population. The traffic volumes expected to be generated by the proposed middle schools were calculated two ways. The first method calculated the rates based on the vehicle and pedestrian counts that were conducted at the existing Riverview Middle School located about 2 miles north of the proposed new school site. To provide a comparison, the rates were also calculated based on the trip rates for a middle school (LU522) as published in the *Institute of Transportation Engineer's (ITE) Trip Generation Manual, 11th Edition*. For both methods, the trip rates were calculated based the expected student population for the peak hour of generator instead of the peak hour of adjacent street traffic to account for the worst-case (highest volume) school traffic conditions.

As shown in [Appendix A](#), using the current student population of 1,150 students, a weekday morning trip generation rate of 0.66 trips per student and a weekday afternoon trip generation rate of 0.30 trips per student were calculated based on traffic counts conducted on a typical weekday in early-February at the access driveways to the existing school. [Appendix A](#) also shows a comparison of the local rates when compared to the national ITE rates. As shown, the ITE rate weekday morning trips are calculated as being about 11-percent higher than the local trip volumes and the ITE weekday afternoon trips are calculated as being about 19-percent higher than the local trip volumes. Since the ITE calculations were similar but slightly higher, it is recommended to use the ITE rate calculations for this study as a worst-case (highest volume) traffic condition. The number of students that are currently walking or riding to school is also included in the calculations. As shown, about 225 students were counted walking to school during a typical weekday morning in early February of 2025. In addition, about 270 students were counted walking home from school during a typical weekday afternoon in early February of 2025. With both the existing middle school and the proposed middle school being located in close proximity to a high density of residential neighborhoods, it was felt that a similar percentage of students will walk to the new school site as previously walked to the existing Riverview Middle School site.

The Special Event peak hour is expected to coincide with a boy's middle school basketball game. Vehicle trips for this peak hour were calculated based on the expected attendance and expected number of teams/players. Details and calculations for this peak hour are provided in the [appendix](#) of this study.

A1. Trip Generation

The proposed middle school development trip generation and distribution tables are shown in [Exhibit 4-3A](#). As shown, using ITE trip generation rates as described above under full build out and after linked trip reductions, the proposed middle school development is expected to generate 2,270 weekday daily trips; with 780 new trips in the AM peak hour, 380 new trips in the PM peak hour and 210 during a typical weekday sporting event at the middle school.

The potential off-site development area trip generation and distribution tables are shown in [Exhibit 4-3B](#). As shown, under full build out and after linked and pass-by trip reductions, the potential off-site development area is expected to generate 6,750 weekday daily trips; with 290 new trips in the AM peak hour, 565 new trips in the PM peak hour and 565 during a typical weekday sporting event at the middle school.

A2. Mode Split

Pedestrians and bicyclists are expected to continue to use their respective modes to access the proposed middle school.

Due to the proximity of the proposed middle school to the existing high school located adjacent to the site, the school development site is expected to include linked trips. A linked trip occurs when a patron of one school visits the second school prior to exiting the site (e.g., students from one family or car poolers from several families who attend both schools). It is estimated that approximately 10 percent of the new school trips are expected to be linked trips. Due to the proposed school land use, pass-by trips are not expected for the site. Pass-by trips occur when motorists already on the highway system stop at a development site prior to continuing on their intended route (e.g., an existing motorist northbound on STH 55 stops at the school prior to continuing northbound on STH 55).

The off-site development site is expected to include both linked trips and pass-by trips. Using NCHRP 684 and based on calculations provided in the [appendix](#) of this study, it is estimated that approximately 2 percent of the weekday morning new trips and 14 percent of the weekday evening new trips are expected to be linked trips. In addition, approximately 20 percent of the potential retail driveway trips are expected to be pass-by trips. No pass-by trip reduction was included for the apartment or office land uses.

A3. Trip Distribution

The trip distribution for the proposed middle school development, listed below and shown in table format in [Exhibit 4-3A](#) and graphically in [Exhibit 4-4](#) was determined based on the existing traffic patterns at the adjacent study area intersections, the school's location in proximity to the adjacent highways and the overall location of the Kaukauna Area School District school populations which are expected to feed the proposed middle schools. Utilizing the boundary limits for the school district, population density clusters were identified, and percentages were distributed onto the adjacent highways. A map showing the limits of the Kaukauna Area School District boundary is included in the [appendix](#) of this report. The trip distribution for the proposed middle school is as follows:

- 8% to/from the west on CTH CE
- 9% to/from the east on CTH CE
- 47% to/from the north on STH 55
- 12% to/from the south on STH 55
- 3% to/from the west on CTH KK
- 3% to/from the east on CTH KK
- 5% to/from the north on Hillcrest Drive
- 5% to/from the west on Morningside Drive
- 1% to/from the west on Ridgecrest Drive
- 1% to/from the west on Ann Street
- 6% to/from the north on Fieldcrest Drive

The trip distribution for the potential future off-site development areas, listed below and shown in table format in [Exhibit 4-3B](#) and graphically in [Exhibit 4-4](#) was determined based on the existing traffic patterns at the adjacent study area intersections, the development site in proximity to the adjacent highways and the population areas within the overall area. The trip distribution for the potential future off-site development areas is as follows:

- 25% to/from the west on CTH CE
- 9% to/from the east on CTH CE
- 23% to/from the north on STH 55
- 8% to/from the south on STH 55
- 12% to/from the west on CTH KK
- 5% to/from the east on CTH KK
- 6% to/from the north on Hillcrest Drive
- 1% to/from the west on Morningside Drive
- 2% to/from the west on Ridgecrest Drive
- 3% to/from the west on Ann Street
- 6% to/from the north on Fieldcrest Drive

A4. Trip Assignment

New trips expected to be generated proposed middle school development, and the potential future off-site development areas were assigned based on the trip distribution shown in tabular format in [Exhibits 4-3A&B](#) and graphically in [Exhibit 4-4](#). As shown in the table at the bottom of the trip generation exhibits, new trips were assigned to the study corridors for the typical school day. The new trips for the proposed middle school development are shown graphically in [Exhibit 4-5A&B](#).

Due to existing operational concerns at the CTH CE/College Avenue intersection with Fieldcrest Drive, two access scenarios were evaluated as part of this study to look at the operation of the Fieldcrest Drive under restricted movement assumptions. The following scenarios were evaluated:

Scenario 1 – Fieldcrest Drive intersection approaches operating with full access movements; that is, no restrictions to movements. New Trips for the proposed middle school under this scenario are shown in [Exhibit 4-5A](#). New Trips for the potential future off-site development areas under this scenario are shown in [Exhibit 4-9A](#).

Scenario 2 – Fieldcrest Drive intersection approaches operating under left-in/right-in/right-out access movements; that is no northbound or southbound through or left-turn movements allowed from Fieldcrest Drive. Vehicles wanting to make a northbound or southbound through or left-turn movement would either make a right-turn movement and then utilize/traverse the roundabouts located to the east or west to continue their route; or would divert within the neighborhoods to an adjacent intersection. New Trips for the proposed middle school under this scenario are shown in [Exhibit 4-5B](#). New Trips for the potential future off-site development areas under this scenario are shown in [Exhibit 4-9B](#). In addition, Redistributed Trips, existing movements that would need to divert based on the restricted movements at the Fieldcrest Drive intersection, are shown in [Exhibit 3-2E](#).

In addition, due to existing operational concerns at the STH 55/Crooks Avenue intersection with Ann Street and the CTH CE/College Avenue intersection with Konkapot Trail Road/Forefront Dermatology Access Driveway, restricted movement assumptions were also considered at these two intersections under the improvement/modification scenarios analyzed as part of this study. Redistributed Trips at the Ann Street intersection are shown in [Exhibit 3-2F](#) and Redistributed Trips at the Konkapot Trail Road intersection are shown in [Exhibit 3-2G](#).

PART B – BACKGROUND, FULL BUILD & TOTAL TRAFFIC

B1. Background Traffic

The Existing traffic volumes, [Exhibit 3-2C](#), were added to the redistributed (Access Scenario 2 - Left-in/Right-in/Right-out at Fieldcrest Drive) trips shown in [Exhibit 3-2E](#), the redistributed (Left-in/Right-in/Right-out at Ann Street) trips shown in [Exhibit 3-2F](#), and the redistributed (Left-in/Right-in/Right-out at Konkapot Trail Road) trips shown in [Exhibit 3-2G](#), to determine the Background (Left-in/Right-in/Right-out at Fieldcrest Drive, Ann Street and Konkapot Trail) traffic volumes ([Exhibit 3-2D](#)).

B2. Full Build Traffic

The Existing traffic volumes, [Exhibit 3-2C](#), were added to the on-site (Access Scenario 1 - Full Access at Fieldcrest Drive) new trips shown in [Exhibit 4-5A](#), to determine the Full Build (Access Scenario 1 - Full Access at Fieldcrest Drive) traffic volumes ([Exhibit 4-11A](#)).

The Existing traffic volumes, [Exhibit 3-2C](#), were added to the on-site (Access Scenario 2 - Left-in/Right-in/Right-out at Fieldcrest Drive) new trips shown in [Exhibit 4-5B](#), and the redistributed (Access Scenario 2 - Left-in/Right-in/Right-out at Fieldcrest Drive) trips shown in [Exhibit 3-2E](#), to determine the Full Build (Access Scenario 2 - Left-in/Right-in/Right-out at Fieldcrest Drive) traffic volumes ([Exhibit 4-11B](#)).

Under the recommended modifications scenario, the Full Build (Access Scenario 2 - Left-in/Right-in/Right-out at Fieldcrest Drive) traffic volumes, [Exhibit 4-11B](#), the redistributed (Left-in/Right-in/Right-out at Ann Street) trips shown in [Exhibit 3-2F](#), and the redistributed (Left-in/Right-in/Right-out at Konkapot Trail Road) trips shown in [Exhibit 3-2G](#), to determine the Full Build (Left-in/Right-in/Right-out at Fieldcrest Drive, Ann Street and Konkapot Trail) traffic volumes ([Exhibit 4-11C](#)).

B3. Total Traffic

The Full Build (Access Scenario 1 - Full Access at Fieldcrest Drive) traffic volumes, [Exhibit 4-11A](#), were added to the off-site (Access Scenario 1 - Full Access at Fieldcrest Drive) new trips shown in [Exhibit 4-9A](#), to determine the Total (Access Scenario 1 - Full Access at Fieldcrest Drive) traffic volumes ([Exhibit 4-14A](#)).

The Full Build (Access Scenario 2 - Left-in/Right-in/Right-out at Fieldcrest Drive) traffic volumes, [Exhibit 4-11B](#) were added to the off-site (Access Scenario 2 - Left-in/Right-in/Right-out at Fieldcrest Drive) new trips shown in [Exhibit 4-9B](#), to determine the Total (Access Scenario 2 - Left-in/Right-in/Right-out at Fieldcrest Drive) traffic volumes ([Exhibit 4-14B](#)).

Under the recommended modifications scenario, the Total (Access Scenario 2 - Left-in/Right-in/Right-out at Fieldcrest Drive) traffic volumes, [Exhibit 4-14B](#), the redistributed (Left-in/Right-in/Right-out at Ann Street) trips shown in [Exhibit 3-2F](#), and the redistributed (Left-in/Right-in/Right-out at Konkapot Trail Road) trips shown in [Exhibit 3-2G](#), to determine the Total (Left-in/Right-in/Right-out at Fieldcrest Drive, Ann Street and Konkapot Trail) traffic volumes ([Exhibit 4-14C](#)).

Exhibit 4-3A
On-Site Trip Generation Table ¹

Land Use	ITE Code	Proposed Size	Weekday Daily	AM Peak			PM Peak			Special Event Peak ³		
				In	Out	Total	In	Out	Total	In	Out	Total
Middle School/Junior High School (Maximum Expected Student Population)	522	1200 Students	2,520 (2.10)	480 (55%)	390 (45%)	870 FCE	195 (46%)	230 (54%)	425 (0.36)	105 (50%)	105 (50%)	210 TADI
Total Trips			2,520	480	390	870	195	230	425	105	105	210
Minus Linked Trips ² (522)			-250	-50	-40	-90	-20	-25	-45	0	0	0
Total New Trips			2,270	430	350	780	175	205	380	105	105	210

¹ ITE Trip Rates (X.XX) and/or Fitted Curve Equations (FCE) are from the ITE Trip Generation Manual, 11th Edition; note rates including a variety of walking/busing sites in US
Peak hour of generator rates used for expected school traffic to account for worst case (highest volume) traffic scenario.
² Linked trips expected between Middle School and High School due to multiple children in single family and/or carpooling
³ Special Event peak hour assumes middle school high school basketball game. See appendix for detailed calculations.

TRIP DISTRIBUTION (New Trips)

West on College Avenue/CTH CE	8%	180	35	30	15	15	10	10
East on College Avenue/CTH CE	9%	205	40	30	15	20	10	10
North on Crooks Avenue/STH 55	47%	1065	200	165	85	95	50	50
South on Crooks Avenue/STH 55	12%	265	50	40	20	25	10	10
West on Calumet Street/CTH KK	3%	70	15	10	5	5	5	5
East on Calumet Street/CTH KK	3%	70	15	10	5	5	5	5
North on Hillcrest Drive	5%	115	20	20	10	10	5	5
West on Morningside Drive	5%	115	20	20	10	10	5	5
West on Ridgecrest Lane	1%	25	5	0	0	0	0	0
West on Ann Street	1%	25	5	5	0	5	0	0
North on Fieldcrest Drive	6%	135	25	20	10	15	5	5
	100%	2270	430	350	175	205	105	105

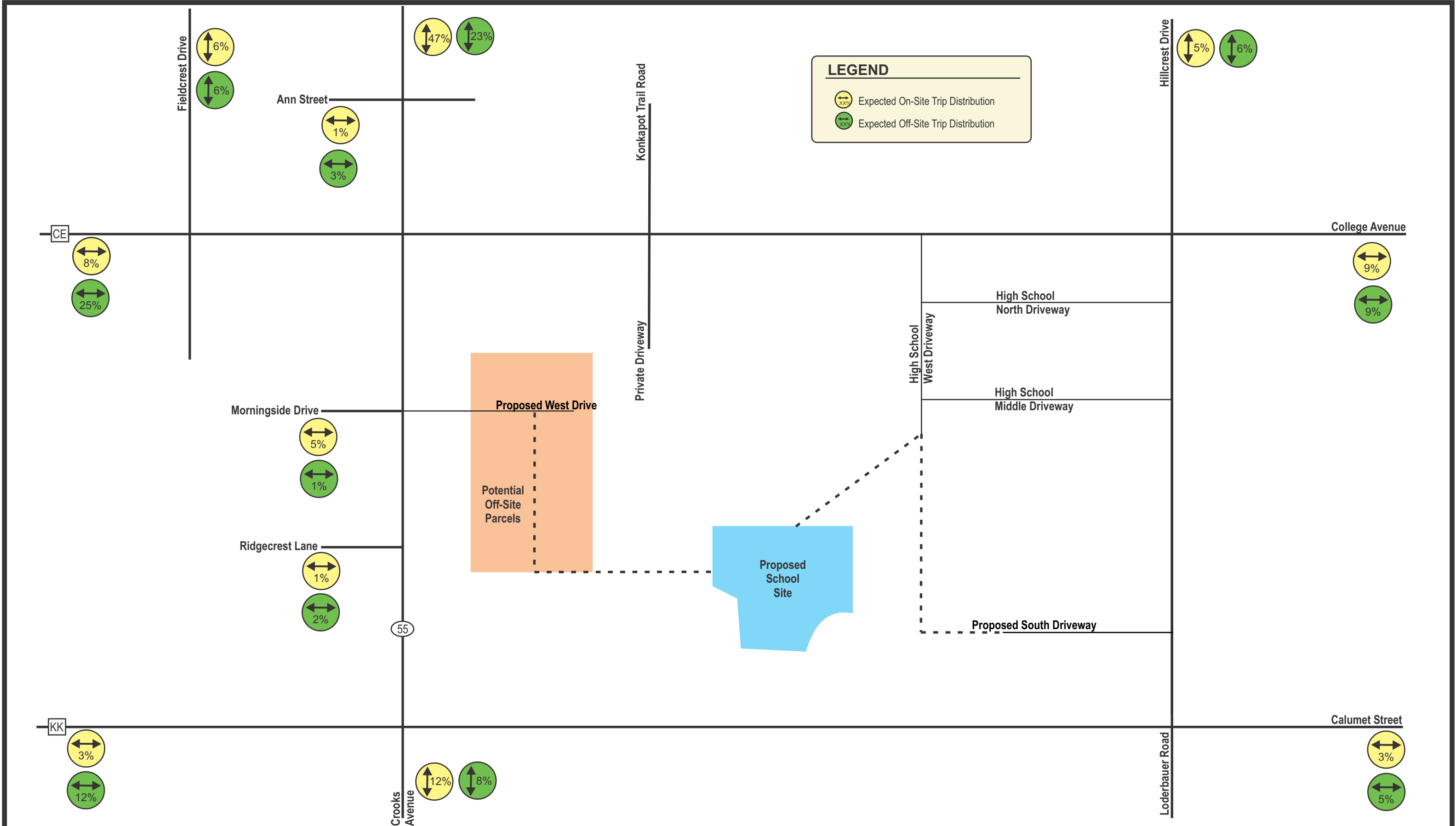
Exhibit 4-3B
Off-Site Trip Generation Table¹

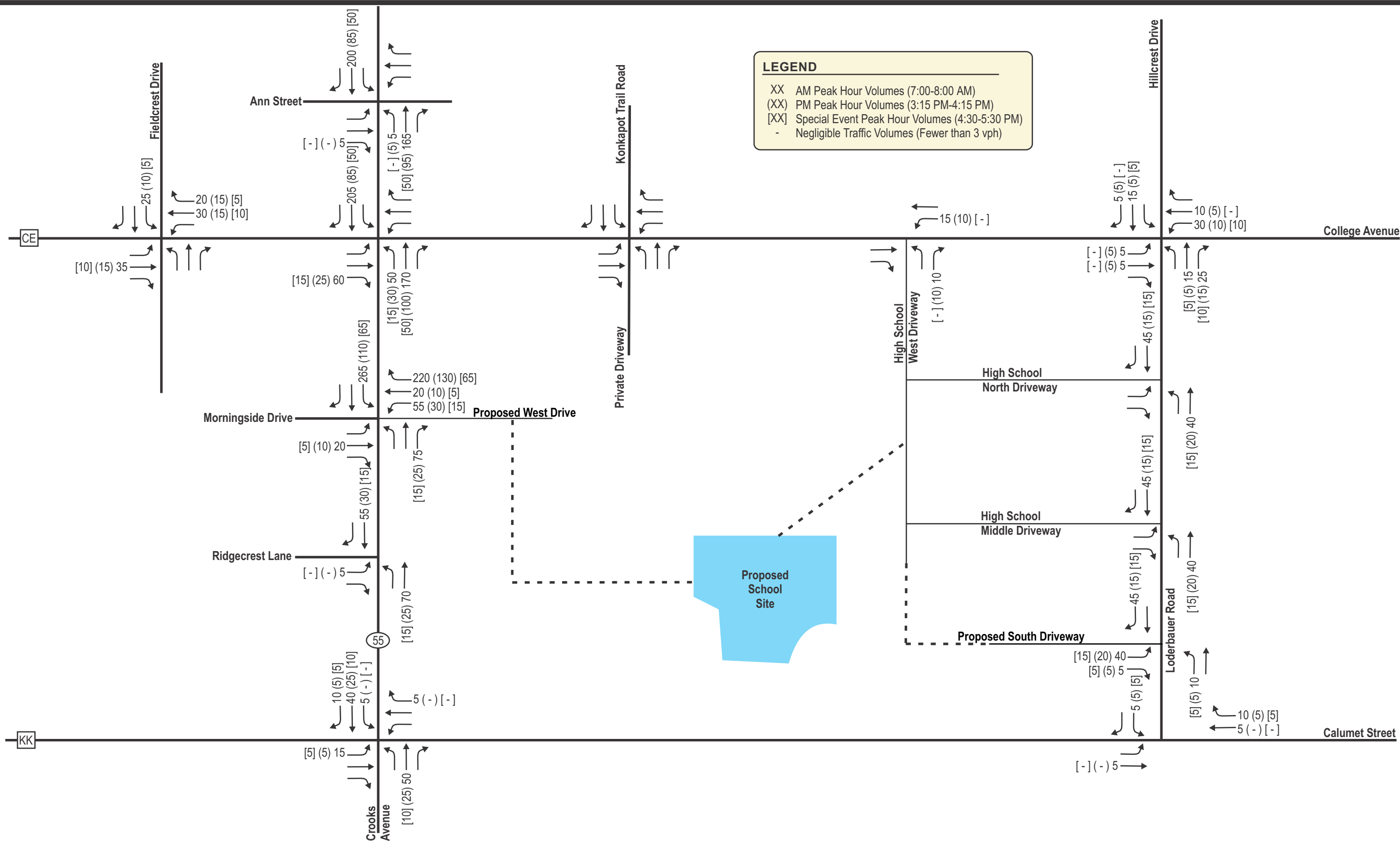
Land Use	ITE Code	Proposed Size	Weekday Daily	AM Peak			PM Peak			Special Event Peak ²		
				In	Out	Total	In	Out	Total	In	Out	Total
Multifamily Housing (Low-Rise) (Not Close to Rail Transit)	220	200 Units	1,360 FCE	20 (24%)	65 (76%)	85 FCE	65 (63%)	40 (37%)	105 FCE	65 (63%)	40 (37%)	105 FCE
Shopping Plaza (40-150k) - Supermarket No	821	100.000 x 1,000 SF	6,750 (67.52)	110 (62%)	65 (38%)	175 (1.73)	255 (49%)	265 (51%)	520 (5.19)	255 (49%)	265 (51%)	520 (5.19)
Strip Retail Plaza (<40k)	822	20.000 x 1,000 SF	1,090 (54.45)	25 (60%)	20 (40%)	45 (2.36)	65 (50%)	60 (50%)	125 FCE	65 (50%)	60 (50%)	125 FCE
General Office Building	710	15.000 x 1,000 SF	220 FCE	30 (88%)	5 (12%)	35 FCE	5 (17%)	30 (83%)	35 FCE	5 (17%)	30 (83%)	35 FCE
Total Trips			9,420	185	155	340	390	395	785	390	395	785
Minus Linked Trips (220)			-190	0	0	0	-10	-5	-15	-10	-5	-15
Minus Linked Trips (821)			-950	0	0	0	-35	-35	-70	-35	-35	-70
Minus Linked Trips (822)			-150	0	0	0	-10	-10	-20	-10	-10	-20
Minus Linked Trips (710)			-30	0	0	0	0	-5	-5	0	-5	-5
Total Linked Trip Reduction			-1,320	0	0	0	-55	-55	-110	-55	-55	-110
Total Driveway Trips			8,100	185	155	340	335	340	675	335	340	675
Wkday: AM (PM) Pass-by Trips (220)			0	0	0	0	0	0	0	0	0	0
Wkday: AM (PM) Pass-by Trips (821)			-1,160	-20	-20	-40	-45	-45	-90	-45	-45	-90
Wkday: AM (PM) Pass-by Trips (822)			-190	-5	-5	-10	-10	-10	-20	-10	-10	-20
Wkday: AM (PM) Pass-by Trips (710)			0	0	0	0	0	0	0	0	0	0
Total Pass-by Trip Reduction			-1,350	-25	-25	-50	-55	-55	-110	-55	-55	-110
Total New Trips			6,750	160	130	290	280	285	565	280	285	565

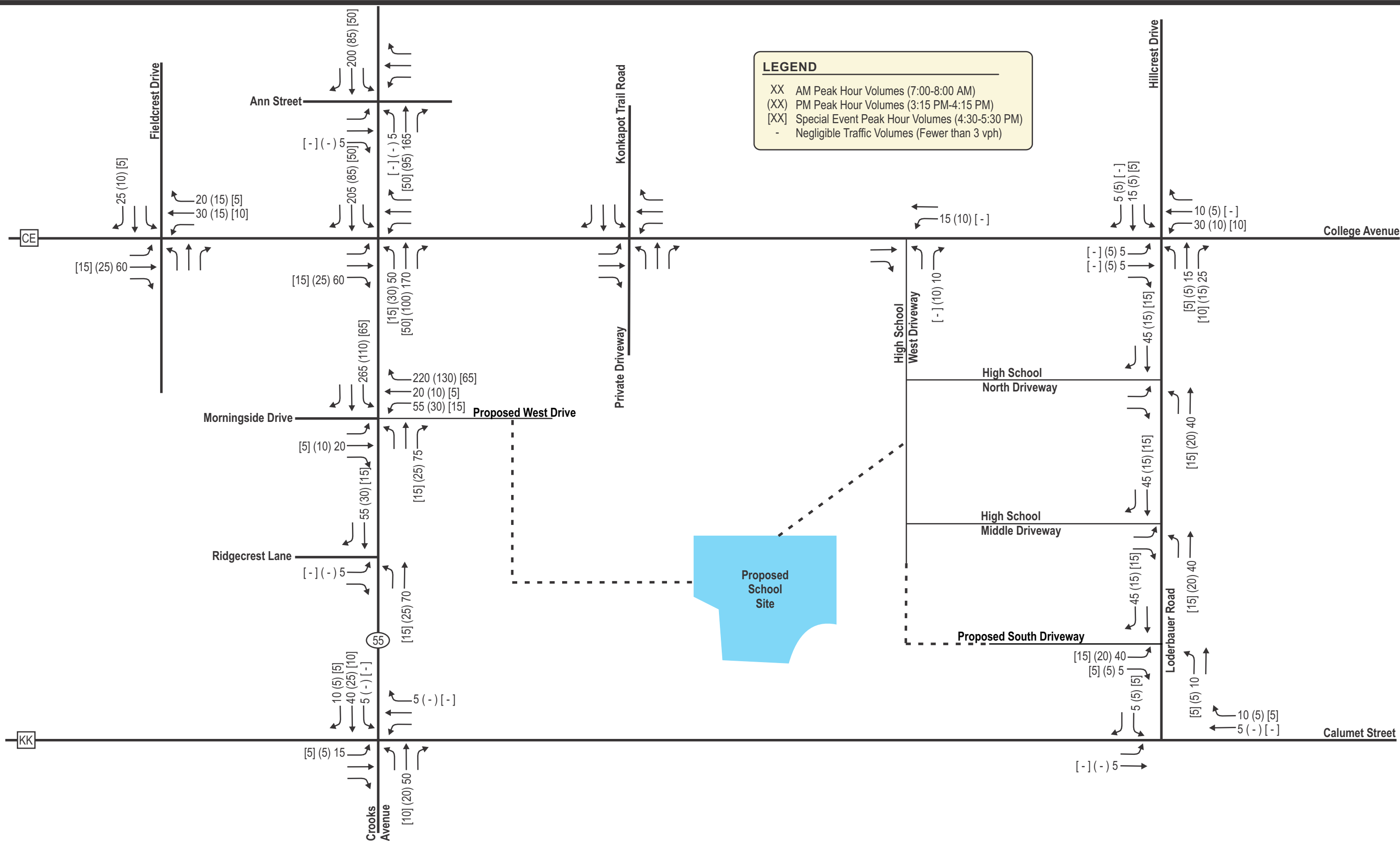
¹ ITE Trip Rates (X.XX) and/or Fitted Curve Equations (FCE) are from the ITE Trip Generation Manual, 11th Edition
² For off-site development trip generation, special event peak hour assumed same as school dismissal peak hour, also see special event peak hour note in Exhibit 4-3.

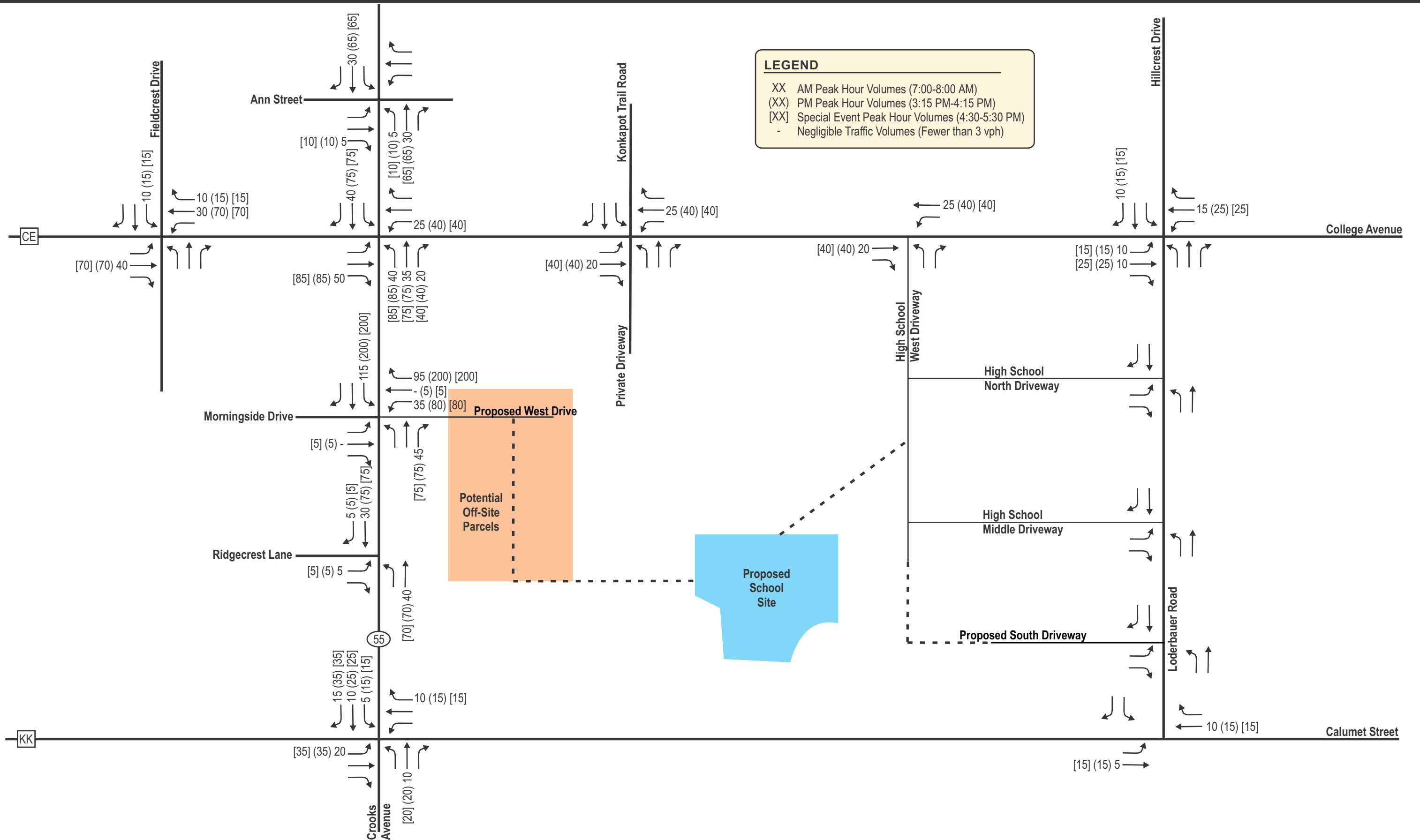
TRIP DISTRIBUTION (New Trips)

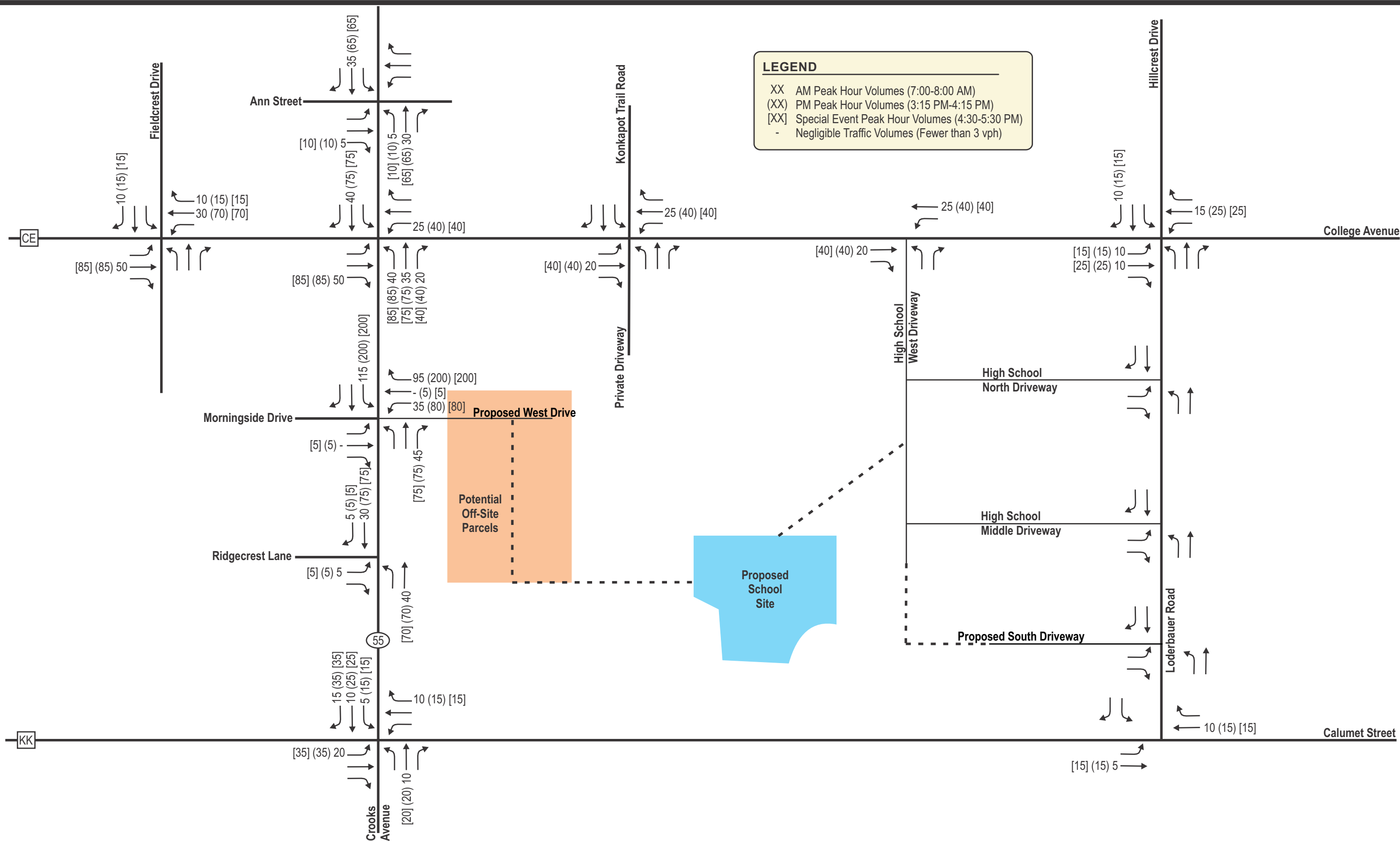
West on College Avenue/CTH CE	25%	1685	40	30	70	70	70	70
East on College Avenue/CTH CE	9%	605	15	10	25	25	25	25
North on Crooks Avenue/STH 55	23%	1550	35	30	65	65	65	65
South on Crooks Avenue/STH 55	8%	540	10	10	20	25	20	25
West on Calumet Street/CTH KK	12%	810	20	15	35	35	35	35
East on Calumet Street/CTH KK	5%	340	10	5	15	15	15	15
North on Hillcrest Drive	6%	405	10	10	15	15	15	15
West on Morningside Drive	1%	70	0	0	5	5	5	5
West on Ridgecrest Lane	2%	135	5	5	5	5	5	5
West on Ann Street	3%	205	5	5	10	10	10	10
North on Fieldcrest Drive	6%	405	10	10	15	15	15	15
	100%	6750	160	130	280	285	280	285

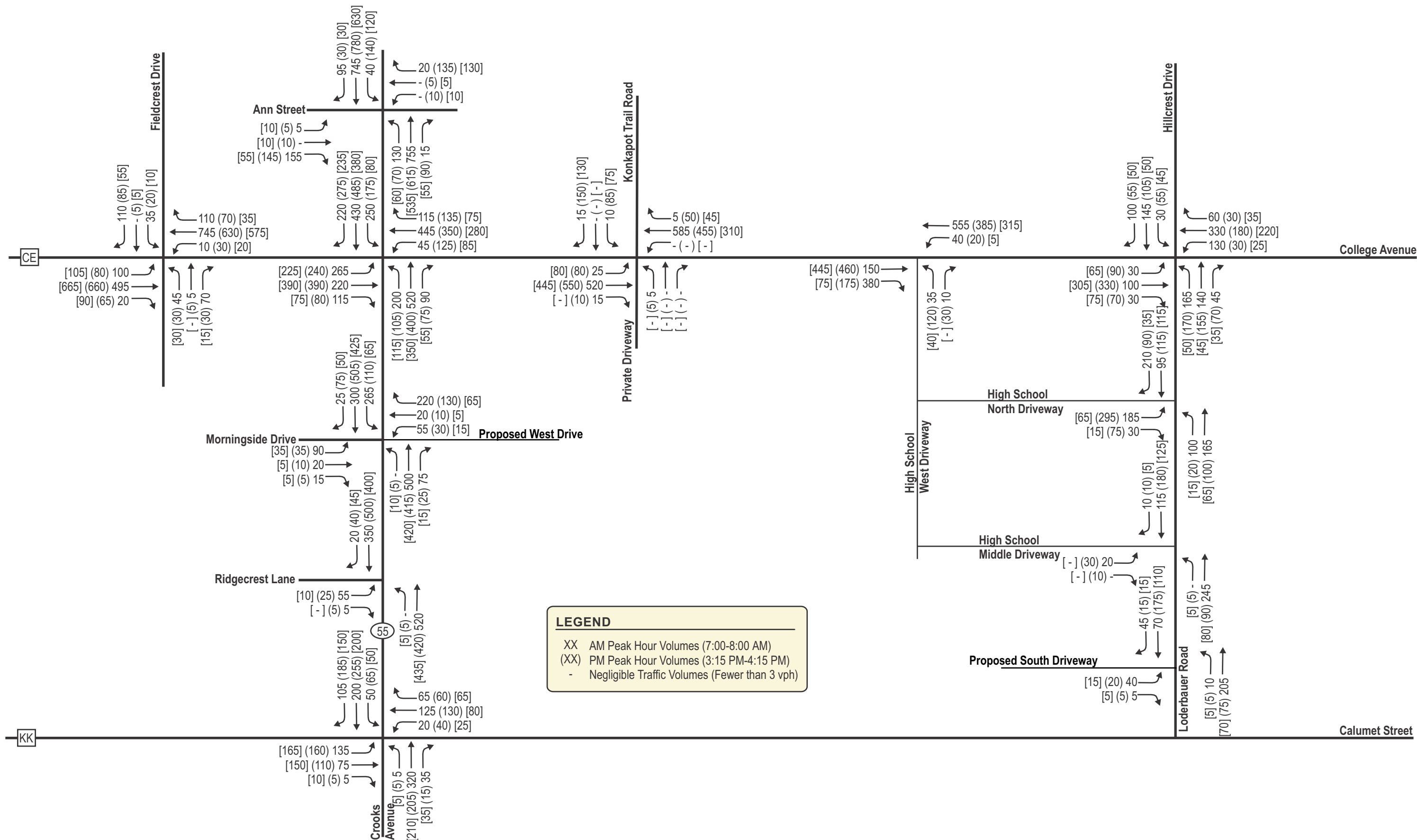


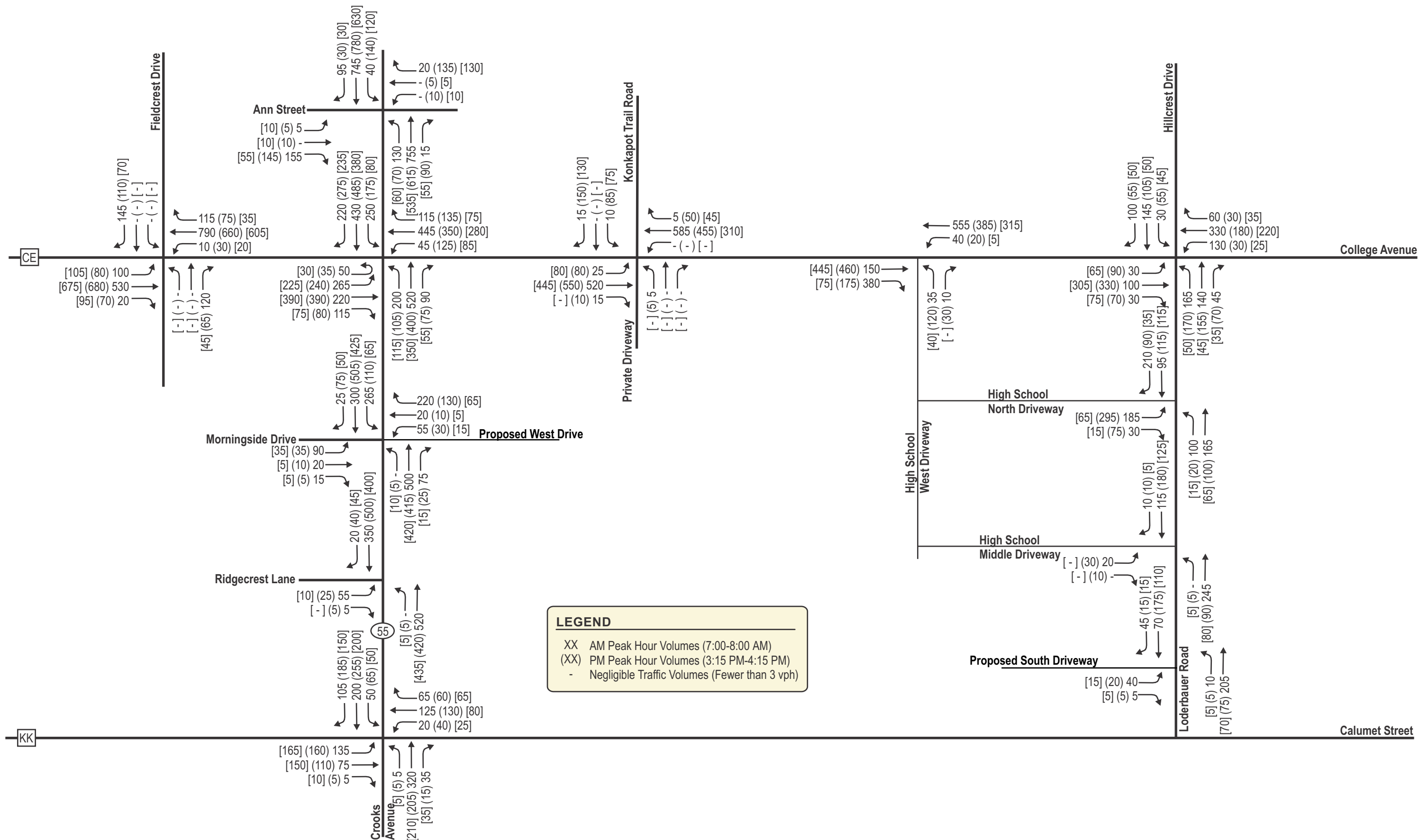


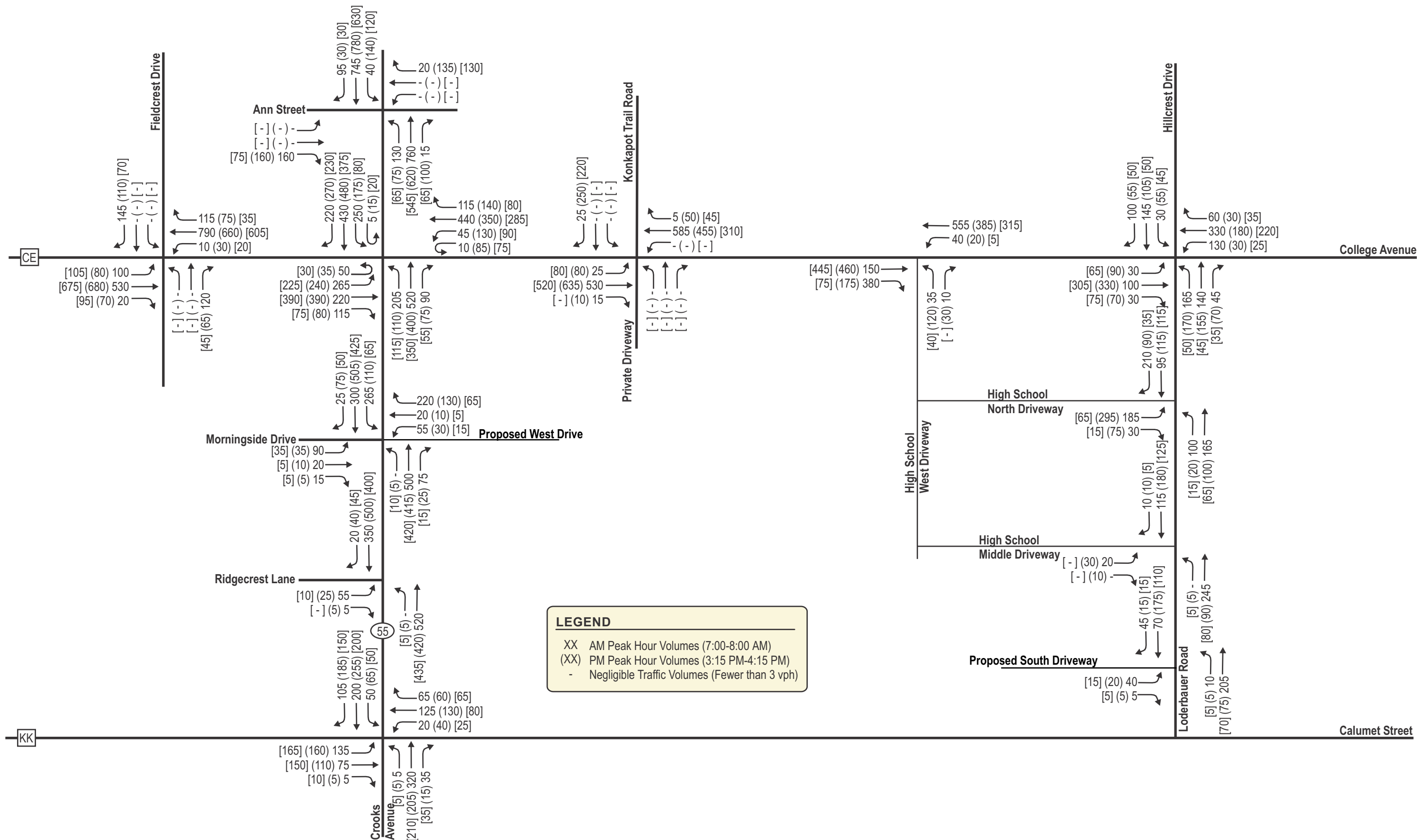


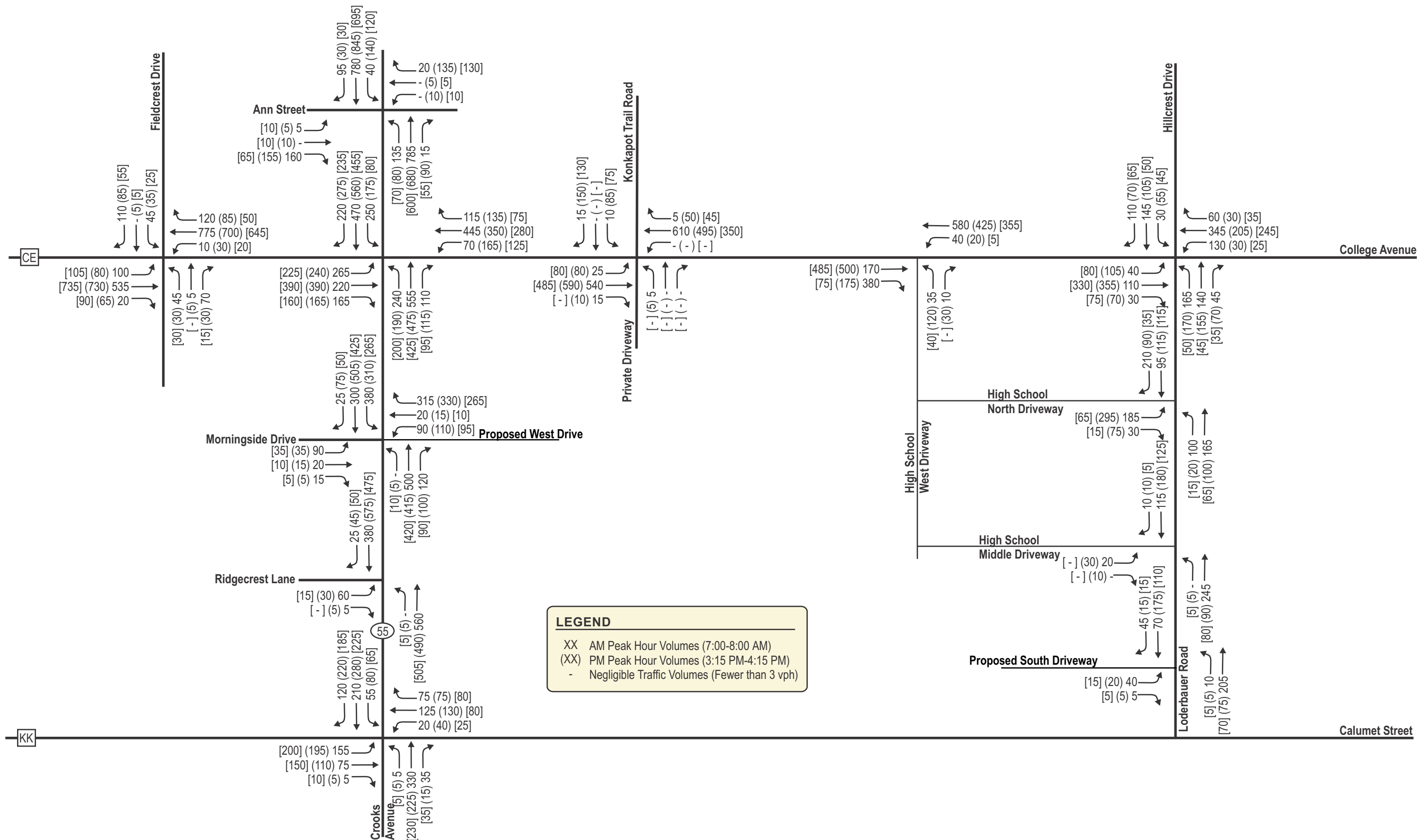


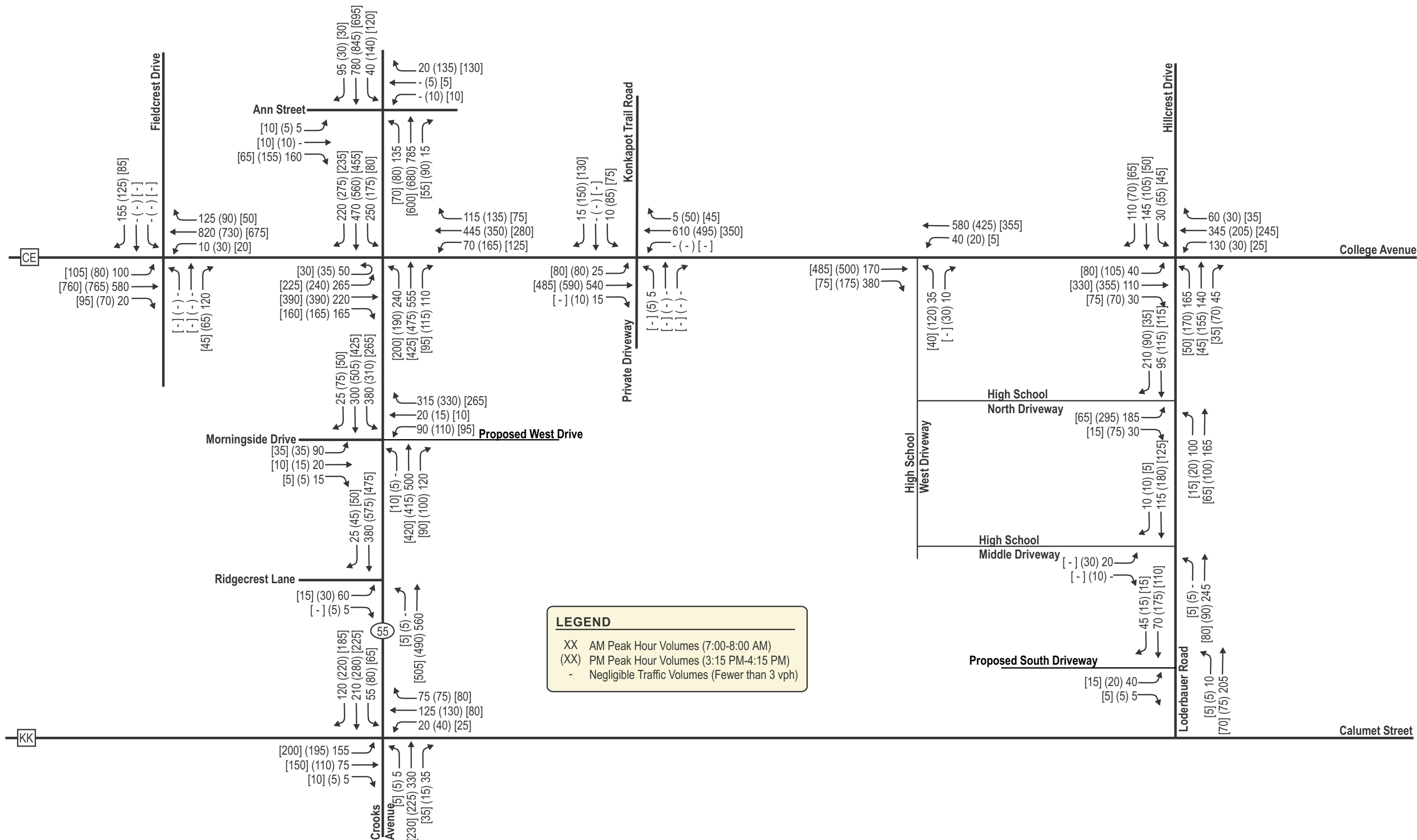


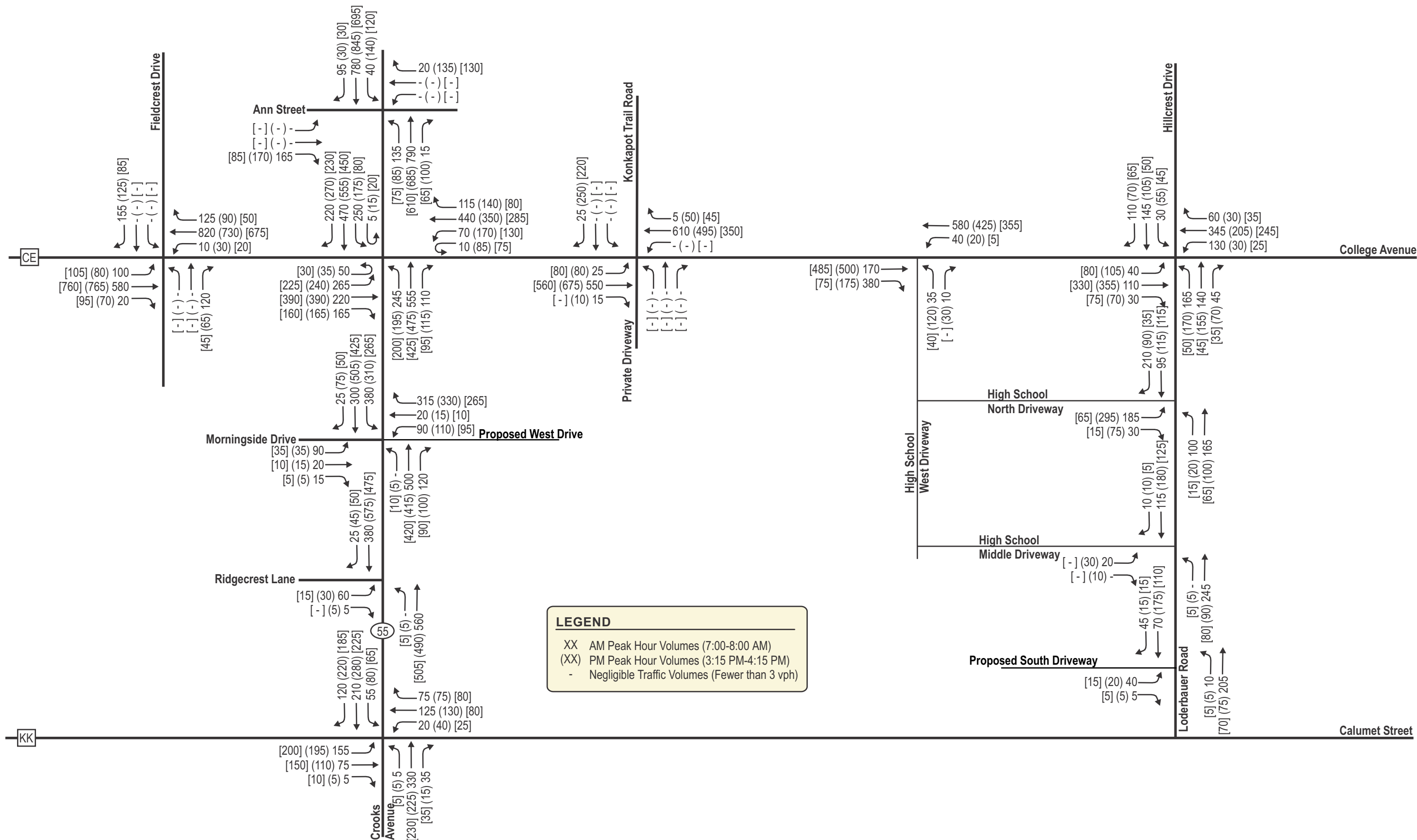












CHAPTER V – TRAFFIC AND IMPROVEMENT ANALYSIS

PART A – SITE ACCESS

Two access connections are proposed for the school development site. The main access is proposed as a full access driveway onto a new roadway connection to Crooks Avenue/STH 55 directly across from the existing three-legged, one-way stop sign controlled STH 55 intersection with Morningside Drive. A second driveway is proposed to connect to the high school site located northeast of the proposed middle school site with further existing connections from the high school onto CTH CE/College Avenue and Loderbauer Road. An additional driveway is proposed along Loderbauer Road, immediately south of the high school. Finally, even though not proposed as this time, a future connection via a new north/south connection onto CTH CE to the north and Speedway Lane to the southwest is also planned for at some point in the future.

PART B – CAPACITY LEVEL OF SERVICE ANALYSIS

B1. Full Build Traffic Operating Conditions – No Modifications

[Exhibits 5-3A&B](#) show the Full Build traffic peak hour operating conditions at the study area intersections under the two access scenarios as previously described. The Full Build traffic analysis was conducted using existing intersection configurations except with the addition of the new access drives to the site and the access restrictions as previously described for the two respective access options.

As shown in [Exhibit 5-3A](#), under Access Scenario 1 with full access at Fieldcrest Drive, all movements are expected to continue to operate at LOS D or better conditions at the study area intersections under the Full Build traffic volume conditions during the weekday morning, weekday afternoon and weekday evening special event peak periods except the following:

- The eastbound and westbound through/left-turn movements at the Crooks Avenue/STH 55 intersection with Ann Street which are expected to continue to operate at LOS F during the typical weekday morning, afternoon, and evening special event peak periods.
- The northbound and southbound through/left-turn movements at the College Avenue/CTH CE intersection with Fieldcrest Drive which are expected to continue to operate at LOS E/F during the typical weekday morning peak period.
- The westbound, northbound, and southbound movements at the Crooks Avenue/STH 55 intersection with College Avenue/CTH CE which are expected to operate at LOS E during the typical weekday morning peak period.
- The northbound and southbound through/left-turn movements at the College Avenue/CTH CE intersection with Konkapot Trail Road which are expected to continue to operate at LOS E/F during the typical weekday morning and afternoon peak periods.
- The northbound left-turn movement at the College Avenue/CTH CE intersection with the High School West Driveway which is expected to continue to operate at LOS F during the typical weekday afternoon peak period.
- The eastbound and westbound movements at the Crooks Avenue/STH 55 intersection with Morningside Drive/Proposed West Access Drive which are expected to operate at LOS F during the typical weekday morning and afternoon peak periods.

As shown in [Exhibit 5-3B](#), under Access Scenario 2 with Left-in/Right-in/Right-out at Fieldcrest Drive, all movements are expected to continue to operate at LOS D or better conditions at the study area intersections under the Full Build traffic volume conditions during the weekday morning, weekday afternoon and weekday evening special event peak periods except the following:

- The eastbound and westbound through/left-turn movements at the Crooks Avenue/STH 55 intersection with Ann Street which are expected to continue to operate at LOS F during the typical weekday morning, afternoon, and evening special event peak periods.
- The westbound, northbound, and southbound movements at the Crooks Avenue/STH 55 intersection with College Avenue/CTH CE which are expected to operate at LOS E/F during the typical weekday morning peak period.
- The northbound and southbound through/left-turn movements at the College Avenue/CTH CE intersection with Konkapot Trail Road which are expected to continue to operate at LOS E/F during the typical weekday morning and afternoon peak periods.
- The northbound left-turn movement at the College Avenue/CTH CE intersection with the High School West Driveway which is expected to continue to operate at LOS F during the typical weekday afternoon peak period.
- The eastbound and westbound movements at the Crooks Avenue/STH 55 intersection with Morningside Drive/Proposed West Access Drive which are expected to operate at LOS F during the typical weekday morning and afternoon and peak periods.

B2. Total Traffic Operating Conditions – No Modifications

[Exhibits 5-6A&B](#) show the Total traffic peak hour operating conditions at the study area intersections under the two trip generation assumptions as previously described. The Total traffic analysis was conducted using existing intersection configurations except with the addition of the new access drives to the site and the access restrictions as previously described for the two respective access options.

As shown in [Exhibit 5-6A](#), all movements are expected to continue to operate at LOS D or better conditions at the study area intersections under the Total traffic volume conditions during the weekday morning, weekday afternoon and weekday evening special event peak periods except the following:

- The eastbound and westbound through/left-turn movements at the Crooks Avenue/STH 55 intersection with Ann Street which are expected to continue to operate at LOS F during the typical weekday morning, afternoon, and evening special event peak periods.
- The northbound and southbound through/left-turn movements at the College Avenue/CTH CE intersection with Fieldcrest Drive which are expected to continue to operate at LOS E/F during the typical weekday morning peak period.
- The westbound, northbound, and southbound movements at the Crooks Avenue/STH 55 intersection with College Avenue/CTH CE which are expected to operate at LOS F during the typical weekday morning peak period.
- The southbound movement at the Crooks Avenue/STH 55 intersection with College Avenue/CTH CE which is expected to operate at LOS E during the typical weekday afternoon peak period.
- The northbound and southbound through/left-turn movements at the College Avenue/CTH CE intersection with Konkapot Trail Road which are expected to continue to operate at LOS E/F during the typical weekday morning and afternoon peak periods.
- The northbound left-turn movement at the College Avenue/CTH CE intersection with the High School West Driveway which is expected to continue to operate at LOS F during the typical weekday afternoon peak period.
- The eastbound and westbound movements at the Crooks Avenue/STH 55 intersection with Morningside Drive/Proposed West Access Drive which are expected to operate at LOS F during the typical weekday morning, afternoon, and evening special event peak periods.

As shown in [Exhibit 5-6B](#) under Access Scenario 2 with Left-in/Right-in/Right-out at Fieldcrest Drive, all movements are expected to continue to operate at LOS D or better conditions at the study area intersections under the Total traffic volume conditions during the weekday morning, weekday afternoon and weekday evening special event peak periods except the following:

- The eastbound and westbound through/left-turn movements at the Crooks Avenue/STH 55 intersection with Ann Street which are expected to continue to operate at LOS F during the typical weekday morning, afternoon, and evening special event peak periods.
- The westbound, northbound, and southbound movements at the Crooks Avenue/STH 55 intersection with College Avenue/CTH CE which are expected to operate at LOS F during the typical weekday morning peak period.
- The eastbound and southbound movements at the Crooks Avenue/STH 55 intersection with College Avenue/CTH CE which are expected to operate at LOS E during the typical weekday afternoon peak period.
- The northbound and southbound through/left-turn movements at the College Avenue/CTH CE intersection with Konkapot Trail Road which are expected to continue to operate at LOS E/F during the typical weekday morning and afternoon peak periods.
- The northbound left-turn movement at the College Avenue/CTH CE intersection with the High School West Driveway which is expected to continue to operate at LOS F during the typical weekday afternoon peak period.
- The eastbound and westbound movements at the Crooks Avenue/STH 55 intersection with Morningside Drive/Proposed West Access Drive which are expected to operate at LOS F during the typical weekday morning, afternoon, and evening special event peak periods.

B3. Existing Traffic Operating Conditions – With Modifications

Modifications to the existing transportation system to accommodate the Existing traffic conditions are recommended at the existing study area intersections. Recommended modifications are summarized in *Chapter VI – Recommendations and Conclusion*.

As shown in [Exhibit 5-9](#), all movements are expected to operate at LOS D or better conditions during the weekday morning, weekday afternoon and weekday evening special event peak periods under the Existing traffic volume conditions with modifications except the northbound left-turn movement at the College Avenue/CTH CE intersection with the High School West Driveway which is expected to continue to operate at LOS F during the typical weekday afternoon peak period. Restricting this movement during this time period, with diverted traffic utilizing the signalized intersection at Loderbauer Road, would allow all intersections to operate acceptably under all peak periods.

B4. Full Build Traffic Operating Conditions – With Modifications

Modifications to the existing transportation system to accommodate the Full Build traffic conditions, including traffic signals at the STH 42 intersection with Mill Road and at the 21st Street/Mill Road intersection with Eisner Avenue, are recommended at the existing study area intersections. Recommended modifications are summarized in *Chapter VI – Recommendations and Conclusion*.

As shown in [Exhibit 5-12](#), all movements are expected to improve to operate at LOS D or better conditions during the weekday morning, weekday afternoon and weekday evening special event peak periods under the full build traffic volume conditions with modifications except:

- The westbound and northbound through/left-turn movements at the Crooks Avenue/STH 55 intersection with College Avenue/CTH CE which are expected to operate at LOS E during the typical weekday morning peak period. It is noted that the delays are only

slightly higher than acceptable (about 6 seconds), and the reported queueing is expected to be reasonable (all less than 225 feet).

- The northbound left-turn movement at the College Avenue/CTH CE intersection with the High School West Driveway which is expected to continue to operate at LOS F during the typical weekday afternoon peak period. Restricting this movement during this time period, with diverted traffic utilizing the signalized intersection at Loderbauer Road, would allow all intersections to operate acceptably under all peak periods.

B5. Total Traffic Operating Conditions – With Modifications

Modifications to the existing transportation system to accommodate the Total traffic conditions, including traffic signals at the STH 42 intersection with Mill Road and at the 21st Street/Mill Road intersection with Eisner Avenue, are recommended at the existing study area intersections. Recommended modifications are summarized in *Chapter VI – Recommendations and Conclusion*.

As shown in [Exhibit 5-15](#), all movements are expected to improve to operate at LOS D or better conditions during the weekday morning, weekday afternoon and weekday evening special event peak periods under the full build traffic volume conditions with modifications except:

- The westbound and southbound through/left-turn movements at the Crooks Avenue/STH 55 intersection with College Avenue/CTH CE which are expected to operate at LOS E during the typical weekday morning peak period. It is noted that the delays are only slightly higher than acceptable (about 5 seconds), and the reported queueing is expected to be reasonable (all less than 200 feet).
- The northbound left-turn movement at the College Avenue/CTH CE intersection with the High School West Driveway which is expected to continue to operate at LOS F during the typical weekday afternoon peak period. Restricting this movement during this time period, with diverted traffic utilizing the signalized intersection at Loderbauer Road, would allow all intersections to operate acceptably under all peak periods.

PART C – QUEUEING ANALYSIS

To estimate storage length requirements for turn bays at the study area intersections with modifications, a queuing analysis has been conducted. Note that the 95th percentile probable queue lengths were used for the design of turn bay storage at stop sign and traffic signal-controlled intersections. The following is a list of where the results of the queuing analysis can be found.

- Existing Traffic Expected Maximum Queues – [Exhibit 5-9 & 5-18](#)
- Full Build (Access Scenario 2 - Left-in/Right-in/Right-out at Fieldcrest Drive) Traffic Expected Maximum Queues – [Exhibits 5-12 & 5-21](#)
- Total (Access Scenario 2 - Left-in/Right-in/Right-out at Fieldcrest Drive) Traffic Expected Maximum Queues – [Exhibits 5-15 & 5-24](#)

PART D – WARRANT ANALYSIS

Warrants should be viewed as guidelines to help decide whether traffic signal controls may be installed. Meeting warrants does not translate to a legal requirement for their installation.

Completed warrant analysis worksheets are included in the appendix of this report. Due to the type of development for the site development; specifically, a middle school, only Warrant 3 (Peak Hour) was evaluated for the Full Build traffic scenario as a part of this study. The Peak Hour warrant was considered as it is typically used for proposed facilities that have peak discharge characteristics such as schools or factories with high volume shift changes. Warrant 1

(8 Hour) and Warrant 2 (4-Hour) were evaluated for the Total traffic scenario since they also include residential, retail, and other commercial land uses.

Traffic signal warrants were investigated at the Crooks Avenue/STH 55 intersection with Morningside Drive/Proposed West Access Drive under Full Build and Total traffic volumes in accordance with the *MUTCD 11th Edition*. Crooks Avenue/STH 55 was analyzed as a major street with one lane on each approach and Morningside Drive/Proposed West Access Drive was analyzed as a minor street with one lane. The posted speed limit is 35-mph along the Crooks Avenue/STH 55 corridor at this location and therefore urban warrant thresholds were utilized.

The warrant analysis was conducted based on the weekday peak hour turning movement counts collected as part of this study at the intersection in mid-February of 2025. Based on the warrant analysis, the Warrant 3 (Peak Hour) warrant is expected to be met at the Crooks Avenue/STH 55 intersection with Morningside Drive/Proposed West Access Drive under Full Build traffic conditions. Specifically, the weekday morning peak hour is met for Warrant 3. It is noted 50-percent of the minor street right-turn volumes were included in the calculations due to the high delay expected for this movement. In addition, Warrant 1 (8-Hour) and Warrant 2 (4-Hour) are also expected to be met under the Total traffic volume condition.

Therefore, traffic signal control could be considered at this intersection with the proposed development.

PART E – TRAFFIC CONTROL COMPARISON

Because operational deficiencies are expected to remain at the Crooks Avenue/STH 55 intersection with Morningside Drive/Proposed West Access Drive under Full Build and Total traffic volumes conditions under the existing stop control conditions, alternate control conditions were considered.

Two possible modification scenarios were considered: specifically, traffic signal control with additional lanes and roundabout control with two-lane approaches and circulating lanes for the south approach and single lane approaches and circulating lanes for all other approaches.

Operations and queueing comparison tables have been provided to show the operation at the subject intersection under the two modification scenarios. As shown in [Exhibits 5-16A & 5-21](#), under traffic signal and roundabout control, all movements are expected to operate at LOS C or better during all three peak periods under Full Build traffic conditions with reasonable queue lengths (all less than 375 feet). In addition, and as shown in [Exhibits 5-16B & 5-24](#), all movements are expected to operate at LOS C or better during all three peak periods under Total traffic conditions with reasonable queue lengths (all less than 400 feet).

A Phase I Intersection Control Evaluation (ICE) comparing the two modification scenarios has been included in the appendix of this report. Per request from WisDOT, an additional IHSDM evaluation was also completed and is included along with the ICE analysis provided in the [appendix](#) of this report.

Based on the ICE analysis, even though both traffic control options provide acceptable operations from a delay perspective, traffic signal control is recommended for the Crooks Avenue/STH 55 intersection with Morningside Drive/Proposed West Access Drive due to less disruption to the traveling public and the significant difference in initial cost of the roundabout alternative. It is also noted that, in general, the typical cost of a single-lane roundabout in comparison to a signalized intersection is about two times the cost of a new signalized intersection with geometric modifications, dependent on right-of-way needs and complexity of the designs. In addition, since the proposed development is for a middle school and a large

residential neighborhood is located immediately west of the site, a relatively high number of students are expected to cross STH 55 every weekday during the morning peak period and the afternoon peak period. Traffic signal control would allow for a controlled (marked pedestrian crossings with push buttons and pedestrian countdown timers) crossing for the anticipated students, which could allow for a potentially safer pedestrian crossing situation and could remove the need for the proposed pedestrian tunnel under STH 55. Based on all of these factors, traffic signal control is recommended.

Exhibit 5-3A
Full Build (Scenario 1 - Full Access) Traffic Peak Hour Operating Conditions
With Existing Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach												I/S LOS & Delay				
			Eastbound				Westbound				Northbound					Southbound			
			↗	→	↘		↙	←	↖		↗	→	↘	↙		↓	↖		
Node 100: STH 55/Crooks Avenue & Ann Street <i>Two-Way Stop Control</i>	AM	Lanes->	1		1		1		1		1		2						
		LOS	F	C	F		B	B	*	*	B	*							
		Delay	249.8	18.2	283.1		12.5	12.9	*	*	10.8	*							
		v/c	0.37	-	0.17		-	-	-	-	-	-	-						
	PM	Queue	30'	55'	25'		30'	25'	*	*	25'	*							
		LOS	F	B	F		B	B	*	*	B	*							
		Delay	207.1	14.4	219.4		12.1	10.5	*	*	10.4	*							
		v/c	0.53	-	0.55		-	-	-	-	-	-	-						
	PMSE	Queue	45'	30'	45'		25'	25'	*	*	25'	*							
		LOS	F	B	F		B	A	*	*	A	*							
		Delay	77.8	11.1	62.8		11.3	9.4	*	*	9.4	*							
		v/c	0.31	-	0.21		-	-	-	-	-	-	-						
	Queue	30'	25'	25'		25'	25'	*	*	25'	*								
Node 200: CTH CE/College Avenue & Fieldcrest Drive <i>Two-Way Stop Control</i>	AM	Lanes->	1	2	1	1	2	1		1		1		1					
		LOS	B	*	*		A	*	*		F	B	E	B					
		Delay	12.1	*	*		8.9	*	*		50.3	11.1	36.4	13.8					
		v/c	-	*	*		-	*	*		0.45	-	0.28	-					
	PM	Queue	25'	*	*		25'	*	*		45'	25'	25'	25'					
		LOS	A	*	*		A	*	*		D	B	C	B					
		Delay	9.7	*	*		9.4	*	*		28.7	10.9	24.1	11.3					
		Queue	25'	*	*		25'	*	*		25'	25'	25'	25'					
	PMSE	LOS	A	*	*		A	*	*		D	B	C	B					
		Delay	9.5	*	*		9.6	*	*		30.2	10.9	24.4	10.8					
		Queue	25'	*	*		25'	*	*		25'	25'	25'	25'					
		Queue	25'	*	*		25'	*	*		25'	25'	25'	25'					
Node 300: STH 55/Crooks Avenue & CTH CE/ College Avenue** <i>Roundabout Control</i>	AM	Lanes->	1		1		1		1		1		1		1				
		LOS	C	C	E		E	E	E	E	E	E	E						
		Delay	19.5	19.4	45.6		43.9	36.7	39.4	42.8	48.3								
		Queue	110'	120'	215'		225'	235'	270'	280'	335'								
	PM	LOS	C	C	B		B	C	C	C	C	C	C						
		Delay	19.0	19.1	14.6		14.5	16.0	15.8	18.0	19.4								
		Queue	110'	125'	75'		85'	81'	90'	135'	160'								
		Queue	110'	125'	75'		85'	81'	90'	135'	160'								
	PMSE	LOS	B	B	A		A	B	B	A	A	A							
		Delay	10.4	10.6	9.6		9.4	10.8	10.7	9.5	9.7								
		Queue	60'	65'	35'		40'	50'	55'	55'	60'								
		Queue	60'	65'	35'		40'	50'	55'	55'	60'								
Node 400: CTH CE/College Avenue & Konkapot Trail Road <i>Two-Way Stop Control</i>	AM	Lanes->	1	1	1		1		1		1		1						
		LOS	A	*	*		A	*		F	E	C							
		Delay	9.8	*	*		9.3	*		72.0	41.9	15.8							
		v/c	-	-	-		-	-	0.16	0.14	-								
	PM	Queue	25'	*	*		25'	*		25'	25'	25'							
		LOS	A	-	A		-		F	F	C								
		Delay	9.2	-	9.0		-	73.6	71.1	15.5									
		v/c	-	-	-		-	0.14	0.70	-									
	PMSE	Queue	25'	-	25'		-	25'	105'	40'									
		LOS	A	-	A		-	C	C	B									
		Delay	8.3	-	8.3		-	20.4	23.1	11.4									
		Queue	25'	-	25'		-	25'	30'	25'									
Node 500: CTH CE/College Avenue & High School West D/W <i>One-Way Stop Control</i>	AM	Lanes->	-	1	1		1		-		1		-						
		LOS	-	*	*		A	-	D	-	A		-						
		Delay	-	*	*		9.6	-	27.9	-	9.6		-						
		Queue	-	*	*		25'	-	25'	-	25'		-						
	PM	LOS	-	*	*		A	-	F	-	B		-						
		Delay	-	*	*		9.9	-	83.7	-	13.2		-						
		v/c	-	-	-		-	-	0.86	-	-		-						
		Queue	-	*	*		25'	-	160'	-	25'		-						
	PMSE	LOS	-	*	*		A	-	C	-	B		-						
		Delay	-	*	*		8.6	-	17.9	-	11.4		-						
		Queue	-	*	*		25'	-	25'	-	25'		-						
		Queue	-	*	*		25'	-	25'	-	25'		-						
Node 600: Loderbauer Road & CTH CE/College Avenue <i>Traffic Signal Control</i>	AM	Lanes->	1	1	1	1	1	1	1	1	1	1	1						
		LOS	B	A	A	B	B	B	B	B	C	C	C	B					
		Delay	18.2	9.4	8.6	12.2	14.7	14.4	12.8	19.2	23.2	20.3		15.1					
		Queue	30'	70'	25'	95'	275'	105'	120'	40'	135'	65'							
	PM	LOS	B	B	A	B	B	B	B	C	C	C	C	B					
		Delay	16.5	14.7	9.5	18.7	11.9	15.4	14.5	22.3	23.9	21.1		15.5					
		Queue	70'	220'	35'	30'	135'	105'	140'	65'	100'	40'							
		Queue	70'	220'	35'	30'	135'	105'	140'	65'	100'	40'							
	PMSE	LOS	B	B	A	B	A	B	A	B	B	B	B	B					
		Delay	11.8	10.2	7.7	11.8	9.8	10.6	9.9	14.5	14.5	14.3		10.7					
		Queue	35'	130'	25'	25'	110'	30'	40'	40'	40'	30'							
		Queue	35'	130'	25'	25'	110'	30'	40'	40'	40'	30'							

Exhibit 5-3A
Full Build (Scenario 1 - Full Access) Traffic Peak Hour Operating Conditions
With Existing Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach												I/S LOS & Delay			
			Eastbound			Westbound			Northbound			Southbound						
			↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙				
Node 700: STH 55/Crooks Avenue & Morningside Drive/Proposed West Access Drive Two-Way Stop Control	AM	Lanes->	1			1			2			2						
		LOS	F			F			A			B						
		Delay	1495.8			742.2			8.1			11.4						
		Queue	425'			760'			25'			40'						
	PM	LOS	F			C			A			A						
		Delay	57.8			24.2			9.0			8.9						
		Queue	50'			70'			25'			25'						
	PMSE	LOS	D			C			A			A						
		Delay	30.1			15.3			8.6			8.6						
		Queue	25'			25'			25'			25'						
	Node 800: STH 55/Crooks Avenue & Ridgecrest Lane One-Way Stop Control	AM	Lanes->	1			-			2			-			1	1	
			LOS	C			-			A			-			-	-	
Delay			15.7			-			8.2			-			-	-		
Queue			25'			-			25'			-			-	-		
PM		LOS	C			-			A			-			-	-		
		Delay	17.1			-			8.8			-			-	-		
		Queue	25'			-			25'			-			-	-		
PMSE		LOS	B			-			A			-			-	-		
		Delay	14.5			-			8.4			-			-	-		
		Queue	25'			-			25'			-			-	-		
Node 900: STH 55/Crooks Road with CTH KK/Calumet Street Roundabout Control		AM	Lanes->	1			1			1			1					
			LOS	A			A			A			A					
	Delay		6.0			7.7			8.0			6.9						
	Queue		25'			30'			50'			45'						
	PM	LOS	A			A			A			A						
		Delay	7.4			6.9			7.0			8.9						
		Queue	35'			30'			30'			75'						
	PMSE	LOS	A			A			A			A						
		Delay	7.3			6.1			7.4			6.6						
		Queue	40'			25'			35'			45'						
	Node 1000: Loderbauer Road & High School North Access D/W Traffic Signal Control	AM	Lanes->	2	-	1	-			2			-	-	1	1	A 8.7	
			LOS	A	-	A	-			A			-	-	A	A		
Delay			9.7	-	8.8	-			9.4			-	-	7.2	8.2			
Queue			35'	-	25'	-			35'			-	-	30'	40'			
PM		LOS	B	-	A	-			A			-	-	A	A	A 9.6		
		Delay	11.0	-	9.1	-			8.2			-	-	8.9	8.0			
		Queue	55'	-	25'	-			25'			-	-	45'	25'			
PMSE		LOS	A	-	A	-			A			-	-	A	A	A 7.0		
		Delay	9.7	-	9.4	-			5.7			-	-	6.5	5.5			
		Queue	25'	-	25'	-			25'			-	-	30'	25'			
Node 1100: Loderbauer Road & High School Middle Access D/W One-Way Stop Control		AM	Lanes->	1			-			1			-	-	1			
			LOS	C			-			A			-	-	*			
	Delay		15.5			-			7.6			-	-	*				
	Queue		25'			-			25'			-	-	*				
	PM	LOS	B			-			A			-	-	*				
		Delay	13.2			-			8.0			-	-	*				
		Queue	25'			-			25'			-	-	*				
	PMSE	LOS	A			-			A			-	-	*				
		Delay	9.6			-			7.6			-	-	*				
		Queue	25'			-			25'			-	-	*				
	Node 1200: Loderbauer Road & New South D/W One-Way Stop Control	AM	Lanes->	1			-			1			-	-	1			
			LOS	B			-			A			-	-	*			
Delay			12.6			-			7.6			-	-	*				
Queue			25'			-			25'			-	-	*				
PM		LOS	B			-			A			-	-	*				
		Delay	11.6			-			8.0			-	-	*				
		Queue	25'			-			25'			-	-	*				
PMSE		LOS	A			-			A			-	-	*				
		Delay	9.9			-			7.6			-	-	*				
		Queue	25'			-			25'			-	-	*				

Exhibit 5-3B
Full Build (Scenario 2 - Left-in/Right-in/Right-out Access) Traffic Peak Hour Operating Conditions
With Existing Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach												LOS & Delay				
			Eastbound				Westbound				Northbound					Southbound			
			↗	→	↘		↙	←	↖		↗	↑	↘	↙		↓	↖		
Node 100: STH 55/Crooks Avenue & Ann Street Two-Way Stop Control	AM	Lanes->	1		1		1		1		1	2	1		2				
		LOS	F		C		F		B		B	*	*	B		*			
		Delay	249.8		18.2		283.1		12.5		12.9	*	*	10.8		*			
		v/c	0.37		-		0.17		-		-	-	-	-		-			
		Queue	30'		55'		25'		30'		25'	*	*	25'		*			
		LOS	F		B		F		B		B	*	*	B		*			
	PM	Delay	207.1		14.4		219.4		12.1		10.5	*	*	10.4		*			
		v/c	0.53		-		0.55		-		-	-	-	-		-			
		Queue	45'		30'		45'		25'		25'	*	*	25'		*			
	PMSE	LOS	F		B		F		B		A	*	*	A		*			
		Delay	77.8		11.1		62.8		11.3		9.4	*	*	9.4		*			
		v/c	0.31		-		0.21		-		-	-	-	-		-			
Queue		30'		25'		25'		25'		*	*	*	25'		*				
Node 200: CTH CE/College Avenue & Fieldcrest Drive Two-Way Stop Control	AM	Lanes->	1		2		1		2		1		1		1				
		LOS	B		*		A		*		*		B		-	C			
		Delay	12.6		*		9.1		*		*		-	12.1		-	15.5		
		Queue	25'		*		25'		*		*		-	25'		-	40'		
	PM	LOS	A		*		A		*		*		-	B		-	B		
		Delay	9.8		*		9.5		*		*		-	11.4		-	11.8		
		Queue	25'		*		25'		*		*		-	25'		-	25'		
	PMSE	LOS	A		*		A		*		*		-	B		-	B		
		Delay	9.6		*		9.7		*		*		-	11.2		-	11.1		
		Queue	25'		*		25'		*		*		-	25'		-	25'		
		Node 300: STH 55/Crooks Avenue & CTH CE/ College Avenue** Roundabout Control	AM	Lanes->	1		1		1		1		1		1		1		
	LOS			C		C		F		F		E		E		F		F	
Delay	21.9				22.1		55.9		53.3		45.8		49.0		54.7		61.3		
Queue	130'				145'		240'		255'		265'		305'		325'		380'		
PM	LOS		C		C		C		C		C		C		C		C		
	Delay		20.4		20.6		15.6		15.4		17.2		16.9		19.7		21.3		
	Queue		125'		135'		80'		90'		90'		95'		145'		175'		
PMSE	LOS		B		B		B		A		B		B		A		B		
	Delay		10.8		11.1		10.0		9.7		11.3		11.1		9.9		10.2		
	Queue		65'		70'		40'		40'		50'		55'		55'		65'		
	Node 400: CTH CE/College Avenue & Konkapot Trail Road Two-Way Stop Control		AM	Lanes->	1		1		1		1		1		1		1		
LOS				A		*		A		*		F			E		C		
Delay		9.8			*		9.3		*		72.0			41.9		15.8			
Queue		25'			*		25'		*		25'			25'		25'			
PM		LOS	A		*		A		*		F			F		C			
		Delay	9.2		*		9.0		*		73.6			71.1		15.5			
		Queue	25'		*		25'		*		0.14			0.70		-			
PMSE		LOS	A		*		A		*		C			C		B			
		Delay	8.3		*		8.3		*		20.4			23.1		11.4			
		Queue	25'		*		25'		*		25'			30'		25'			
		Node 500: CTH CE/College Avenue & High School West D/W One-Way Stop Control	AM	Lanes->	-		1		1		-		1		-		1		
LOS				-		*		*		A		-		D		-	A		
Delay	-				*		*		9.6		-		27.9		-	9.6			
Queue	-				*		*		25'		-		25'		-	25'			
PM	LOS		-		*		*		A		-		F		-	B			
	Delay		-		*		*		9.9		-		83.7		-	13.2			
	Queue		-		*		*		25'		-		0.86		-	-			
PMSE	LOS		-		*		*		A		-		C		-	B			
	Delay		-		*		*		8.6		-		17.9		-	11.4			
	Queue		-		*		*		25'		-		25'		-	25'			
	Node 600: Loderbauer Road & CTH CE/College Avenue Traffic Signal Control		AM	Lanes->	1		1		1		1		1		1		1		
LOS				B		A		A		B		B		B		B	C		
Delay		18.2			9.4		8.6		12.2		14.7		14.4		12.8		19.2		
Queue		30'			70'		25'		95'		275'		105'		120'		40'		
PM		LOS	B		B		A		B		B		B		C		C		
		Delay	16.5		14.7		9.5		18.7		11.9		15.4		14.5		22.3		
		Queue	70'		220'		35'		30'		135'		105'		140'		65'		
PMSE		LOS	B		B		A		B		A		B		A		B		
		Delay	11.8		10.2		7.7		11.8		9.8		10.6		9.9		14.5		
		Queue	35'		130'		25'		25'		110'		30'		40'		40'		
		Queue	35'		130'		25'		25'		110'		30'		40'		40'		

Exhibit 5-3B
Full Build (Scenario 2 - Left-in/Right-in/Right-out Access) Traffic Peak Hour Operating Conditions
With Existing Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach										I/S LOS & Delay			
			Eastbound			Westbound			Northbound		Southbound					
			↗	→	↘	↙	←	↖	↗	↘	↙	↖				
Node 700: STH 55/Crooks Avenue & Morningside Drive/Proposed West Access Drive Two-Way Stop Control	Lanes->		1			1			2		2					
		AM	LOS	F			F			A		B				
			Delay	1495.8			742.2			8.1		11.4				
			Queue	425'			760'			25'		40'				
	PM	LOS	F			C			A		A					
		Delay	57.8			24.2			9.0		8.9					
		Queue	50'			70'			25'		25'					
	PMSE	LOS	D			C			A		A					
		Delay	30.1			15.3			8.6		8.6					
		Queue	25'			25'			25'		25'					
Node 800: STH 55/Crooks Avenue & Ridgecrest Lane One-Way Stop Control	Lanes->		1			-			2		-	-	1	1		
		AM	LOS	C			-			A		-	-	-	-	
			Delay	15.7			-			8.2		-	-	-	-	
			Queue	25'			-			25'		-	-	-	-	
	PM	LOS	C			-			A		-	-	-	-		
		Delay	17.1			-			8.8		-	-	-	-		
		Queue	25'			-			25'		-	-	-	-		
	PMSE	LOS	B			-			A		-	-	-	-		
		Delay	14.5			-			8.4		-	-	-	-		
		Queue	25'			-			25'		-	-	-	-		
Node 900: STH 55/Crooks Road with CTH KK/Calumet Street Roundabout Control	Lanes->		1			1			1		1					
		AM	LOS	A			A			A		A				
			Delay	6.0			7.7			8.0		6.9				
			Queue	25'			30'			50'		45'				
	PM	LOS	A			A			A		A					
		Delay	7.4			6.9			7.0		8.9					
		Queue	35'			30'			30'		75'					
	PMSE	LOS	A			A			A		A					
		Delay	7.3			6.1			7.4		6.6					
		Queue	40'			25'			35'		45'					
Node 1000: Loderbauer Road & High School North Access D/W Traffic Signal Control	Lanes->		2	-	1	-			2		-	-	1	1		
		AM	LOS	A	-	A	-			A		-	-	A	A	A
			Delay	9.7	-	8.8	-			9.4		-	-	7.2	8.2	8.7
			Queue	35'	-	25'	-			35'		-	-	30'	40'	
	PM	LOS	B	-	A	-			A		-	-	A	A	A	
		Delay	11.0	-	9.1	-			8.2		-	-	8.9	8.0	9.6	
		Queue	55'	-	25'	-			25'		-	-	45'	25'		
	PMSE	LOS	A	-	A	-			A		-	-	A	A	A	
		Delay	9.7	-	9.4	-			5.7		-	-	6.5	5.5	7.0	
		Queue	25'	-	25'	-			25'		-	-	30'	25'		
Node 1100: Loderbauer Road & High School Middle Access D/W One-Way Stop Control	Lanes->		1			-			1		-	-	1			
		AM	LOS	C			-			A		-	-	*		
			Delay	15.5			-			7.6		-	-	*		
			Queue	25'			-			25'		-	-	*		
	PM	LOS	B			-			A		-	-	*			
		Delay	13.2			-			8.0		-	-	*			
		Queue	25'			-			25'		-	-	*			
	PMSE	LOS	A			-			A		-	-	*			
		Delay	9.6			-			7.6		-	-	*			
		Queue	25'			-			25'		-	-	*			
Node 1200: Loderbauer Road & New South D/W One-Way Stop Control	Lanes->		1			-			1		-	-	1			
		AM	LOS	B			-			A		-	-	*		
			Delay	12.6			-			7.6		-	-	*		
			Queue	25'			-			25'		-	-	*		
	PM	LOS	B			-			A		-	-	*			
		Delay	11.6			-			8.0		-	-	*			
		Queue	25'			-			25'		-	-	*			
	PMSE	LOS	A			-			A		-	-	*			
Delay		9.9			-			7.6		-	-	*				
Queue	25'			-			25'		-	-	*					

Exhibit 5-6A
Total (Scenario 1 - Full Access) Traffic Peak Hour Operating Conditions
With Existing Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach												I/S LOS & Delay				
			Eastbound				Westbound				Northbound					Southbound			
			↗	→	↘		↙	←	↖		↗	↑	↘	↓		↖	↙		
Node 100: STH 55/Crooks Avenue & Ann Street <i>Two-Way Stop Control</i>	AM	Lanes->	1		1		1		1		1		2						
		LOS	F	C	F	B	B	*	*	B	*								
		Delay	317.0	19.3	358.8	12.8	13.5	*	*	11.0	*								
		v/c	0.44	-	0.21	-	-	-	-	-	-	-	-	-	-				
	PM	Queue	30'	60'	25'	25'	30'	*	*	25'	*								
		LOS	F	C	F	B	B	*	*	B	*								
		Delay	324.0	15.5	405.7	12.7	11.0	*	*	10.8	*								
		v/c	0.71	-	0.83	-	-	-	-	-	-	-	-	-	-				
	PMSE	Queue	55'	40'	60'	25'	25'	*	*	25'	*								
		LOS	F	B	F	B	A	*	*	A	*								
		Delay	110.8	11.6	88.4	11.7	9.8	*	*	9.7	*								
		v/c	0.40	-	0.27	-	-	-	-	-	-	-	-	-	-				
		Queue	40'	25'	25'	25'	*	*	25'	*									
Node 200: CTH CE/College Avenue & Fieldcrest Drive <i>Two-Way Stop Control</i>	AM	Lanes->	1	2	1	1	2	1	1		1	1	1						
		LOS	B	*	*	A	*	*	F	B	E	B							
		Delay	12.5	*	*	9.1	*	*	57.4	11.4	43.7	14.2							
		v/c	-	*	*	-	*	*	0.49	-	0.39	-							
	PM	Queue	25'	*	*	25'	*	*	45'	25'	25'	25'							
		LOS	B	*	*	A	*	*	D	B	D	B							
		Delay	10.1	*	*	9.7	*	*	32.6	11.3	28.5	11.7							
		Queue	25'	*	*	25'	*	*	25'	25'	25'	25'							
	PMSE	LOS	A	*	*	A	*	*	D	B	D	B							
		Delay	9.9	*	*	9.9	*	*	34.6	11.2	28.1	11.2							
		Queue	25'	*	*	25'	*	*	25'	25'	25'	25'							
Node 300: STH 55/Crooks Avenue & CTH CE/ College Avenue** <i>Roundabout Control</i>	AM	Lanes->	1		1		1		1		1	1	1						
		LOS	D	D	F	F	F	F	F	F	F								
		Delay	26.9	27.0	70.9	67.7	53.0	59.4	70.0	78.6									
		Queue	155'	170'	280'	300'	315'	370'	385'	450'									
	PM	LOS	D	D	C	C	C	D	D	E									
		Delay	32.3	33.0	22.5	22.4	24.4	25.1	31.7	35.5									
		Queue	190'	210'	120'	135'	155'	175'	230'	275'									
		LOS	B	B	B	B	B	B	B	B									
	PMSE	Delay	14.3	14.7	12.9	12.5	14.4	14.6	12.9	13.2									
		Queue	90'	100'	55'	60'	85'	95'	80'	90'									
		Node 400: CTH CE/College Avenue & Konkapot Trail Road <i>Two-Way Stop Control</i>	AM	Lanes->	1	1	1	1	1	1		1	1	1					
LOS	B			*	A	*	F		E	C									
Delay	10.0			*	9.4	*	81.8		46.0	16.4									
v/c	-			-	-	-	0.18		0.15	-									
PM	Queue		25'	*	25'	*	25'		25'	25'									
	LOS		A	-	A	-	F		F	C									
	Delay		9.4	-	9.2	-	92.7		95.8	16.6									
	v/c		-	-	-	-	0.18		0.80	-									
PMSE	Queue		25'	-	25'	-	25'		125'	45'									
	LOS		A	-	A	-	C		D	B									
	Delay		8.4	-	8.5	-	22.7		26.2	11.9									
	Queue		25'	-	25'	-	25'		35'	25'									
Node 500: CTH CE/College Avenue & High School West D/W <i>One-Way Stop Control</i>	AM	Lanes->	-	1	1	1	-	1	-	1	-	-	-						
		LOS	-	*	*	A	-	D	-	A	-	-	-						
		Delay	-	*	*	9.7	-	31.0	-	9.6	-	-	-						
		Queue	-	*	*	25'	-	25'	-	25'	-	-	-						
	PM	LOS	-	*	*	B	-	F	-	B	-	-	-						
		Delay	-	*	*	10.1	-	129.1	-	13.9	-	-	-						
		v/c	-	-	-	-	-	1.01	-	-	-	-	-						
		Queue	-	*	*	25'	-	200'	-	25'	-	-	-						
	PMSE	LOS	-	*	*	A	-	C	-	B	-	-	-						
		Delay	-	*	*	8.8	-	19.9	-	11.7	-	-	-						
		Queue	-	*	*	25'	-	25'	-	25'	-	-	-						
		Node 600: Loderbauer Road & CTH CE/College Avenue <i>Traffic Signal Control</i>	AM	Lanes->	1	1	1	1	1	1	1	1	1	1	1				
LOS	B			A	A	B	B	B	B	B	C	C	C		B				
Delay	19.3			9.5	8.6	12.4	14.0	14.9	13.3	19.8	23.9	21.2			15.5				
Queue	40'			75'	25'	95'	290'	105'	120'	40'	135'	70'							
PM	LOS		B	B	A	B	B	B	B	C	C	C			B				
	Delay		17.8	14.7	9.2	19.5	12.0	16.8	16.3	24.6	26.7	23.8			16.5				
	Queue		80'	240'	35'	30'	155'	105'	140'	65'	100'	50'							
	LOS		B	B	A	B	B	B	B	B	B	B			B				
PMSE	Delay		12.7	10.6	7.6	12.2	10.1	10.7	10.0	14.7	14.6	14.6			11.0				
	Queue		40'	140'	25'	25'	120'	35'	50'	40'	45'	40'							

Exhibit 5-6A
Total (Scenario 1 - Full Access) Traffic Peak Hour Operating Conditions
With Existing Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach												I/S LOS & Delay	
			Eastbound			Westbound			Northbound			Southbound				
			↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙		
Node 700: STH 55/Crooks Avenue & Morningside Drive/Proposed West Access Drive Two-Way Stop Control	AM	Lanes->	1			1			2			2				
		LOS	F			F			A			B				
		Delay	2191.0			10609.0			8.1			14.1				
		Queue	515'			1620'			25'			40'				
	PM	LOS	F			F			A			B				
		Delay	1274.0			1708.0			9.0			10.7				
		Queue	200'			1330'			25'			40'				
	PMSE	LOS	F			F			A			B				
		Delay	451.0			793.0			8.6			10.2				
		Queue	145'			920'			25'			35'				
Node 800: STH 55/Crooks Avenue & Ridgecrest Lane One-Way Stop Control	AM	Lanes->	1			-			2			-	-	1	1	
		LOS	C			-			A			-	-	-	-	
		Delay	17.0			-			8.3			-	-	-	-	
		Queue	25'			-			25'			-	-	-	-	
	PM	LOS	C			-			A			-	-	-	-	
		Delay	20.3			-			9.1			-	-	-	-	
		Queue	25'			-			25'			-	-	-	-	
	PMSE	LOS	C			-			A			-	-	-	-	
		Delay	16.7			-			8.7			-	-	-	-	
		Queue	25'			-			25'			-	-	-	-	
Node 900: STH 55/Crooks Road with CTH KK/Calumet Street Roundabout Control	AM	Lanes->	1			1			1			1				
		LOS	A			A			A			A				
		Delay	6.4			8.3			8.5			7.3				
		Queue	30'			35'			55'			50'				
	PM	LOS	A			A			A			B				
		Delay	8.4			7.8			7.9			10.3				
		Queue	45'			35'			40'			95'				
	PMSE	LOS	A			A			A			A				
		Delay	8.4			6.8			8.4			7.5				
		Queue	55'			25'			40'			60'				
Node 1000: Loderbauer Road & High School North Access D/W Traffic Signal Control	AM	Lanes->	2	-	1	-			2			-	-	1	1	A 8.7
		LOS	A	-	A	-			A			-	-	A	A	
		Delay	9.7	-	8.8	-			9.4			-	-	7.2	8.2	
		Queue	35'	-	25'	-			35'			-	-	30'	40'	
	PM	LOS	B	-	A	-			A			-	-	A	A	A 9.6
		Delay	11.0	-	9.1	-			8.2			-	-	8.9	8.0	
		Queue	55'	-	25'	-			25'			-	-	45'	25'	
	PMSE	LOS	A	-	A	-			A			-	-	A	A	A 7.0
		Delay	9.7	-	9.4	-			5.7			-	-	6.5	5.5	
		Queue	25'	-	25'	-			25'			-	-	30'	25'	
Node 1100: Loderbauer Road & High School Middle Access D/W One-Way Stop Control	AM	Lanes->	1			-			1			-	-	1		
		LOS	C			-			A			-	-	*		
		Delay	15.5			-			7.6			-	-	*		
		Queue	25'			-			25'			-	-	*		
	PM	LOS	B			-			A			-	-	*		
		Delay	13.2			-			8.0			-	-	*		
		Queue	25'			-			25'			-	-	*		
	PMSE	LOS	A			-			A			-	-	*		
		Delay	9.6			-			7.6			-	-	*		
		Queue	25'			-			25'			-	-	*		
Node 1200: Loderbauer Road & New South D/W One-Way Stop Control	AM	Lanes->	1			-			1			-	-	1		
		LOS	B			-			A			-	-	*		
		Delay	12.6			-			7.6			-	-	*		
		Queue	25'			-			25'			-	-	*		
	PM	LOS	B			-			A			-	-	*		
		Delay	11.6			-			8.0			-	-	*		
		Queue	25'			-			25'			-	-	*		
	PMSE	LOS	A			-			A			-	-	*		
Delay		9.9			-			7.6			-	-	*			
Queue	25'			-			25'			-	-	*				

Exhibit 5-6B
Total (Scenario 2 - Left-in/Right-in/Right-out Access) Traffic Peak Hour Operating Conditions
With Existing Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach												I/S LOS & Delay		
			Eastbound				Westbound		Northbound			Southbound					
			↗	→	↘		↙	←	↖	↑	↗	↘	↓	↖			
Node 100: STH 55/Crooks Avenue & Ann Street <i>Two-Way Stop Control</i>		Lanes→	1		1		1		1	2	1	1		2			
	AM	LOS	F		C		F		B	B	*	*	B		*		
		Delay	317.0		19.3		358.8		12.8	13.5	*	*	11.0		*		
		v/c	0.44		-		0.21		-	-	-	-	-		-		
		Queue	30'		60'		25'		25'	30'	*	*	25'		*		
	PM	LOS	F		C		F		B	B	*	*	B		*		
		Delay	324.0		15.5		405.7		12.7	11.0	*	*	10.8		*		
		v/c	0.71		-		0.83		-	-	-	-	-		-		
		Queue	55'		40'		60'		25'	25'	*	*	25'		*		
	PMSE	LOS	F		B		F		B	A	*	*	A		*		
		Delay	110.8		11.6		88.4		11.7	9.8	*	*	9.7		*		
		v/c	0.40		-		0.27		-	-	-	-	-		-		
Queue		40'		25'		25'		25'	*	*	*	25'		*			
Node 200: CTH CE/College Avenue & Fieldcrest Drive <i>Two-Way Stop Control</i>		Lanes→	1	2	1	1	2	1			1		1	1			
	AM	LOS	B	*	*		A	*	*	-		B	-		C		
		Delay	13.0	*	*		9.3	*	*	-		12.6	-		16.4		
		v/c	-	*	*	-	-	*	*	-		-	-		-		
		Queue	25'	*	*		25'	*	*	-		25'	-		45'		
	PM	LOS	B	*	*		A	*	*	-		B	-		B		
		Delay	10.3	*	*		9.9	*	*	-		11.9	-		12.5		
		Queue	25'	*	*		25'	*	*	-		25'	-		25'		
		LOS	B	*	*		B	*	*	-		B	-		B		
	PMSE	Delay	10.1	*	*		10.1	*	*	-		11.7	-		11.8		
		Queue	25'	*	*		25'	*	*	-		25'	-		25'		
		Node 300: STH 55/Crooks Avenue & CTH CE/ College Avenue** <i>Roundabout Control</i>		Lanes→	1		1		1		1		1		1	1	
AM			LOS	D		D		F		F	F		F		F	F	
	Delay		31.5		32.1		88.1		83.3	68.2		75.2		89.5	98.6		
	Queue		185'		205'		315'		340'	365'		420'		440'	510'		
	LOS		E		E		C		C	D		D		E	E		
PM	Delay		36.0		37.2		24.6		24.0	27.0		27.7		36.2	40.7		
	Queue		210'		235'		130'		140'	165'		190'		255'	300'		
	LOS		C		C		B		B	C		C		B	B		
	Delay		15.0		15.5		13.5		13.0	15.2		15.4		13.6	13.9		
PMSE	Queue		95'		110'		55'		60'	90'		100'		85'	95'		
	Node 400: CTH CE/College Avenue & Konkapot Trail Road <i>Two-Way Stop Control</i>			Lanes→	1		1		1		1		1		1	1	
			AM	LOS	B	*	*		A	*		F			E		C
		Delay		10.0	*	*		9.4	*		81.8			46.0		16.4	
v/c		-		-	-		-	-		0.18			0.15		-		
Queue		25'		*	*		25'	*		25'			25'		25'		
PM		LOS	A	-	-		A	-		F			F		C		
		Delay	9.4	-	-		9.2	-		92.7			95.8		16.6		
		v/c	-	-	-		-	-		0.18			0.80		-		
		Queue	25'	-	-		25'	-		25'			125'		45'		
PMSE		LOS	A	-	-		A	-		C			D		B		
		Delay	8.4	-	-		8.5	-		22.7			26.2		11.9		
		Queue	25'	-	-		25'	-		25'			35'		25'		
	Node 500: CTH CE/College Avenue & High School West D/W <i>One-Way Stop Control</i>		Lanes→	-	1	1		1	-	1	-	1		-			
AM		LOS	-	*	*		A	-	D	-	A		-				
		Delay	-	*	*		9.7	-	31.0	-	9.6		-				
		Queue	-	*	*		25'	-	25'	-	25'		-				
		LOS	-	*	*		B	-	F	-	B		-				
PM		Delay	-	*	*		10.1	-	129.1	-	13.9		-				
		v/c	-	-	-		-	-	1.01	-	-		-				
		Queue	-	*	*		25'	-	200'	-	25'		-				
		LOS	-	*	*		A	-	C	-	B		-				
PMSE		Delay	-	*	*		8.8	-	19.9	-	11.7		-				
		Queue	-	*	*		25'	-	25'	-	25'		-				
		Node 600: Loderbauer Road & CTH CE/College Avenue <i>Traffic Signal Control</i>		Lanes→	1	1	1	1	1	1	1	1	1	1	1	1	
	AM		LOS	B	A	A	A	B		B	B		B	C	C	B	15.5
Delay			19.3	9.5	8.6	12.4	14.0		14.9	13.3		19.8	23.9	21.2			
Queue			40'	75'	25'	95'	290'		105'	120'		40'	135'	70'			
LOS			B	B	A	A	B		B	B		C	C	C	B	16.5	
PM	Delay		17.8	14.7	9.2	19.5	12.0		16.8	16.3		24.6	26.7	23.8			
	Queue		80'	240'	35'	30'	155'		105'	140'		65'	100'	50'			
	LOS		B	B	A	A	B		B	B		B	B	B	B	11.0	
	Delay		12.7	10.6	7.6	12.2	10.1		10.7	10.0		14.7	14.6	14.6			
PMSE	Queue		40'	140'	25'	25'	120'		35'	50'		40'	45'	40'			

Exhibit 5-6B
Total (Scenario 2 - Left-in/Right-in/Right-out Access) Traffic Peak Hour Operating Conditions
With Existing Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach												I/S LOS & Delay	
			Eastbound			Westbound			Northbound			Southbound				
			↗	→	↘	↙	←	↖	↗	↑	↘	↓	↖			
Node 700: STH 55/Crooks Avenue & Morningside Drive/Proposed West Access Drive <i>Two-Way Stop Control</i>	Lanes→		1			1			2			2				
	AM	LOS	F			F			A			B				
		Delay	2191.0			10609.0			8.1			14.1				
		Queue	515'			1620'			25'			40'				
	PM	LOS	F			F			A			B				
		Delay	1274.0			1708.0			9.0			10.7				
		Queue	200'			1330'			25'			40'				
	PMSE	LOS	F			F			A			B				
		Delay	451.0			793.0			8.6			10.2				
		Queue	145'			920'			25'			35'				
Node 800: STH 55/Crooks Avenue & Ridgecrest Lane <i>One-Way Stop Control</i>	Lanes→		1			-			2			-	-	1	1	
	AM	LOS	C			-			A			-	-	-	-	
		Delay	17.0			-			8.3			-	-	-	-	
		Queue	25'			-			25'			-	-	-	-	
	PM	LOS	C			-			A			-	-	-	-	
		Delay	20.3			-			9.1			-	-	-	-	
		Queue	25'			-			25'			-	-	-	-	
	PMSE	LOS	C			-			A			-	-	-	-	
		Delay	16.7			-			8.7			-	-	-	-	
		Queue	25'			-			25'			-	-	-	-	
Node 900: STH 55/Crooks Road with CTH KK/Calumet Street <i>Roundabout Control</i>	Lanes→		1			1			1			1				
	AM	LOS	A			A			A			A				
		Delay	6.4			8.3			8.5			7.3				
		Queue	30'			35'			55'			50'				
	PM	LOS	A			A			A			B				
		Delay	8.4			7.8			7.9			10.3				
		Queue	45'			35'			40'			95'				
	PMSE	LOS	A			A			A			A				
		Delay	8.4			6.8			8.4			7.5				
		Queue	55'			25'			40'			60'				
Node 1000: Loderbauer Road & High School North Access D/W <i>Traffic Signal Control</i>	Lanes→		2	-	1	-			2	-	-	1	1			
	AM	LOS	A	-	A	-			A	-	-	A	A	A	8.7	
		Delay	9.7	-	8.8	-			9.4	-	-	7.2	8.2			
		Queue	35'	-	25'	-			35'	-	-	30'	40'			
	PM	LOS	B	-	A	-			A	-	-	A	A	A	9.6	
		Delay	11.0	-	9.1	-			8.2	-	-	8.9	8.0			
		Queue	55'	-	25'	-			25'	-	-	45'	25'			
	PMSE	LOS	A	-	A	-			A	-	-	A	A	A	7.0	
		Delay	9.7	-	9.4	-			5.7	-	-	6.5	5.5			
		Queue	25'	-	25'	-			25'	-	-	30'	25'			
Node 1100: Loderbauer Road & High School Middle Access D/W <i>One-Way Stop Control</i>	Lanes→		1			-			1			-	-	1		
	AM	LOS	C			-			A			-	-	*		
		Delay	15.5			-			7.6			-	-	*		
		Queue	25'			-			25'			-	-	*		
	PM	LOS	B			-			A			-	-	*		
		Delay	13.2			-			8.0			-	-	*		
		Queue	25'			-			25'			-	-	*		
	PMSE	LOS	A			-			A			-	-	*		
		Delay	9.6			-			7.6			-	-	*		
		Queue	25'			-			25'			-	-	*		
Node 1200: Loderbauer Road & New South D/W <i>One-Way Stop Control</i>	Lanes→		1			-			1			-	-	1		
	AM	LOS	B			-			A			-	-	*		
		Delay	12.6			-			7.6			-	-	*		
		Queue	25'			-			25'			-	-	*		
	PM	LOS	B			-			A			-	-	*		
		Delay	11.6			-			8.0			-	-	*		
		Queue	25'			-			25'			-	-	*		
	PMSE	LOS	A			-			A			-	-	*		
		Delay	9.9			-			7.6			-	-	*		
Queue		25'			-			25'			-	-	*			

Exhibit 5-9
Existing/Background Traffic Peak Hour Operating Conditions
With Modified Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach												I/S LOS & Delay			
			Eastbound				Westbound				Northbound					Southbound		
			↗	→	↘		↙	←	↖		↗	↑	↘	↓	↖	↙		
Node 100: STH 55/Crooks Avenue & Ann Street <i>Two-Way Stop Control</i>	Lanes->		-		1		1		1		1	2	1		2			
	AM	LOS	-		B		-		B	B	*	*	A		*			
		Delay	-		14.6		-		11.4	10.8	*	*	9.7		*			
		Queue	-		25'		-		40'	25'	*	*	25'		*			
	PM	LOS	-		B		-		B	B	*	*	A		*			
		Delay	-		13.9		-		11.5	10.0	*	*	9.9		*			
		Queue	-		35'		-		25'	25'	*	*	25'		*			
	PMSE	LOS	-		B		-		B	A	*	*	A		*			
		Delay	-		11.1		-		11.0	9.2	*	*	9.2		*			
Queue		-		25'		-		25'	25'	*	*	25'		*				
Node 200: CTH CE/College Avenue & Fieldcrest Drive <i>Two-Way Stop Control</i>	Lanes->		1	2	1	1	2	1			1		1		1			
	AM	LOS	B	*	*		A	*	*		-		B		-		B	
		Delay	12.1	*	*		8.8	*	*		-		11.6		-		14.3	
		Queue	25'	*	*		25'	*	*		-		25'		-		30'	
	PM	LOS	A	*	*		A	*	*		-		B		-		B	
		Delay	9.7	*	*		9.4	*	*		-		11.3		-		11.5	
		Queue	25'	*	*		25'	*	*		-		25'		-		25'	
	PMSE	LOS	A	*	*		A	*	*		-		B		-		B	
		Delay	9.5	*	*		9.6	*	*		-		11.2		-		11.0	
Queue		25'	*	*		25'	*	*		-		25'		-		25'		
Node 300: STH 55/Crooks Avenue & CTH CE/ College Avenue** <i>Roundabout Control</i>	Lanes->		1		1		1		1		1		1		1			
	AM	LOS	B		B		C		C	C	C	C	C	C	C	C		
		Delay	11.0		11.1		21.6		21.5	19.3	19.2	19.3	19.9					
		Queue	60'		65'		120'		135'	105'	120'	125'	140'					
	PM	LOS	C		C		B		B	B	B	B	B	C				
		Delay	15.0		15.2		11.5		11.6	12.8	12.5	14.6	15.4					
		Queue	85'		95'		60'		65'	50'	55'	105'	120'					
	PMSE	LOS	A		A		A		A	A	A	A	A	A				
		Delay	9.5		9.8		8.7		8.6	9.9	9.7	8.7	9.0					
Queue		55'		60'		35'		35'	40'	45'	45'	55'						
Node 400: CTH CE/College Avenue & Konkapot Trail Road <i>Two-Way Stop Control</i>	Lanes->		1		1		1		1		1		1		1			
	AM	LOS	A		*		A		*		-		B		-		C	
		Delay	9.8		*		9.3		*		-		11.4		-		16.3	
		Queue	25'		*		25'		*		-		25'		-		25'	
	PM	LOS	A		-		A		-		-		B		-		C	
		Delay	9.2		-		9.4		-		-		11.5		-		21.1	
		Queue	25'		-		25'		-		-		25'		-		95'	
	PMSE	LOS	A		-		A		-		-		B		-		B	
		Delay	8.3		-		8.6		-		-		10.1		-		12.7	
Queue		25'		-		25'		-		-		25'		-		40'		
Node 500: CTH CE/College Avenue & High School West D/W <i>One-Way Stop Control</i>	Lanes->		-		1		1		-		1		1		-			
	AM	LOS	-		*	*		A		D		-	A		-			
		Delay	-		*	*		9.4		25.0		-	9.4		-			
		Queue	-		*	*		25'		25'		-	25'		-			
	PM	LOS	-		*	*		A		-		F		B		-		
		Delay	-		*	*		9.8		-		70.5		13.0		-		
		v/c	-		-	-		-		0.81		-	-	-		-		
	PMSE	Queue	-		*	*		25'		-		145'		25'		-		
		LOS	-		*	*		A		-		C		B		-		
Delay		-		*	*		8.6		-		17.9		11.4		-			
Queue	-		*	*		25'		-		25'		25'		-				
Node 600: Loderbauer Road & CTH CE/College Avenue <i>Traffic Signal Control</i>	Lanes->		1	1	1	1		1		1		1		1	1	1		
	AM	LOS	B		A		A		B	B	B	B	B	C	B	B	B	
		Delay	17.6		9.4		8.6		11.5	14.6	13.7	11.7	18.5	21.6	19.6		14.5	
		Queue	25'		65'		25'		70'	260'	105'	95'	40'	125'	65'			
	PM	LOS	B		B		A		B	B	B	B	C	C	C	C	B	
		Delay	16.2		14.8		9.5		18.1	11.9	14.5	13.5	21.7	23.0	20.4		15.1	
		Queue	65'		215'		35'		25'	130'	105'	125'	65'	100'	40'			
	PMSE	LOS	B		B		A		B	A	B	A	B	B	B	B	B	
		Delay	11.7		10.1		7.6		11.4	9.7	10.6	9.8	14.6	14.5	14.4		10.6	
Queue		35'		130'		25'		25'	110'	30'	40'	40'	40'	30'				

Exhibit 5-9
Existing/Background Traffic Peak Hour Operating Conditions
With Modified Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach												LOS & Delay
			Eastbound			Westbound			Northbound			Southbound			
			↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙	
Node 700: STH 55/Crooks Avenue & Morningside Drive <i>One-Way Stop Control</i>	AM	Lanes→	1						2			2			
		LOS	C			-			A			-			
		Delay	19.1			-			8.1			-			
	PM	Queue	35'			-			25'			-			
		LOS	C			-			A			-			
		Delay	20.5			-			9.0			-			
	PMSE	Queue	25'			-			25'			-			
		LOS	C			-			A			-			
		Delay	18.7			-			8.6			-			
Node 800: STH 55/Crooks Avenue & Ridgecrest Lane <i>One-Way Stop Control</i>	AM	Lanes→	1			-			2			1			
		LOS	B			-			A			-			
		Delay	13.9			-			8.1			-			
	PM	Queue	25'			-			25'			-			
		LOS	C			-			A			-			
		Delay	16.2			-			8.7			-			
	PMSE	Queue	25'			-			25'			-			
		LOS	B			-			A			-			
		Delay	14.1			-			8.4			-			
Node 900: STH 55/Crooks Road with CTH KK/Calumet Street <i>Roundabout Control</i>	AM	Lanes→	1			1			1			1			
		LOS	A			A			A			A			
		Delay	5.5			7.0			7.0			6.2			
	PM	Queue	25'			30'			40'			35'			
		LOS	A			A			A			A			
		Delay	7.0			6.7			6.7			8.4			
	PMSE	Queue	35'			30'			25'			65'			
		LOS	A			A			A			A			
		Delay	7.1			6.0			7.2			6.4			
Node 1000: Loderbauer Road & High School North Access D/W <i>Traffic Signal Control</i>	AM	Lanes→	2	-	1	-			2	-	-	1	1	8.6	
		LOS	A	-	A	-			A	-	-	A	A		
		Delay	9.7	-	8.8	-			8.7	-	-	6.8	8.2		
	PM	Queue	30'	-	25'	-			30'	-	-	25'	40'		
		LOS	B	-	A	-			A	-	-	A	A		9.6
		Delay	11.0	-	9.1	-			8.0	-	-	8.5	8.0		
	PMSE	Queue	45'	-	25'	-			25'	-	-	40'	25'		
		LOS	A	-	A	-			A	-	-	A	A		7.0
		Delay	9.7	-	9.4	-			5.6	-	-	6.3	5.5		
Node 1100: Loderbauer Road & High School Middle Access D/W <i>One-Way Stop Control</i>	AM	Lanes→	1			-			1			1			
		LOS	B			-			A			-			
		Delay	13.5			-			7.5			-			
	PM	Queue	25'			-			25'			-			
		LOS	B			-			A			-			
		Delay	12.5			-			8.0			-			
	PMSE	Queue	25'			-			25'			-			
		LOS	A			-			A			-			
		Delay	9.4			-			7.5			-			

(-) indicates a movement that is prohibited or does not exist; (*) indicates a freeflow movement.
Delay is reported in seconds. Queue is the maximum of the 50th & 95th percentile queue, measured in feet.
** node 300 dual lane roundabout, left values in table per approach are inside shared lanes and right values are outside shared lanes

Exhibit 5-12
Full Build (Scenario 2 - Left-in/Right-in/Right-out Access) Traffic Peak Hour Operating Conditions
With Modified Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach												I/S LOS & Delay
			Eastbound				Westbound		Northbound			Southbound			
			↗	→	↘	↙	←	↖	↗	↑	↘	↙	↓	↘	
Node 100: STH 55/Crooks Avenue & Ann Street <i>Two-Way Stop Control</i>	AM	Lanes->	-	1	1	1	1	1	2	1	1	2			
		LOS	-	C	-	B	B	*	*	B	*				
		Delay	-	18.5	-	12.6	12.9	*	*	10.8	*				
		Queue	-	55'	-	25'	30'	*	*	25'	*				
	PM	LOS	-	B	-	B	B	*	*	B	*				
		Delay	-	14.8	-	12.2	10.5	*	*	10.5	*				
		Queue	-	35'	-	25'	25'	*	*	25'	*				
	PMSE	LOS	-	B	-	B	A	*	*	A	*				
		Delay	-	11.4	-	11.3	9.4	*	*	9.5	*				
Queue		-	25'	-	25'	25'	*	*	25'	*					
Node 200: CTH CE/College Avenue & Fieldcrest Drive <i>Two-Way Stop Control</i>	AM	Lanes->	1	2	1	1	2	1	-	1	1	1			
		LOS	B	*	*	A	*	*	-	B	-	C			
		Delay	12.6	*	*	9.1	*	*	-	12.1	-	15.5			
		Queue	25'	*	*	25'	*	*	-	25'	-	40'			
	PM	LOS	A	*	*	A	*	*	-	B	-	B			
		Delay	9.8	*	*	9.5	*	*	-	11.4	-	11.8			
		Queue	25'	*	*	25'	*	*	-	25'	-	25'			
	PMSE	LOS	A	*	*	A	*	*	-	B	-	B			
		Delay	9.6	*	*	9.7	*	*	-	11.2	-	11.1			
Queue		25'	*	*	25'	*	*	-	25'	-	25'				
Node 300: STH 55/Crooks Avenue & CTH CE/ College Avenue <i>Roundabout Control</i>	AM	Lanes->	1	1	2	1	2	1	2	1	1				
		LOS	D	C	E	B	E	A	D	C					
		Delay	26.7	24.7	39.4	12.8	41.2	7.1	31.4	17.5					
		v/c	-	-	0.78	-	0.86	-	-	-					
	PM	Queue	135'	130'	115'	30'	210'	25'	160'	70'					
		LOS	D	D	C	A	C	A	C	B					
		Delay	29.1	27.5	15.9	9.2	21.3	7.8	16.8	10.7					
	PMSE	Queue	145'	145'	75'	25'	75'	25'	95'	55'					
		LOS	B	B	B	A	B	A	A	A					
Delay		13.2	12.6	10.7	6.7	12.7	6.0	9.0	7.9						
Node 400: CTH CE/College Avenue & Konkapot Trail Road <i>Two-Way Stop Control</i>	AM	Lanes->	1	1	1	1	-	1	1	1					
		LOS	A	*	A	*	-	B	-	C					
		Delay	9.8	*	9.3	*	-	11.4	-	16.3					
		Queue	25'	*	25'	*	-	25'	-	25'					
	PM	LOS	A	-	A	-	-	B	-	C					
		Delay	9.2	-	9.4	-	-	11.5	-	21.1					
		Queue	25'	-	25'	-	-	25'	-	95'					
	PMSE	LOS	A	-	A	-	-	B	-	B					
		Delay	8.3	-	8.6	-	-	10.1	-	12.7					
Queue		25'	-	25'	-	-	25'	-	40'						
Node 500: CTH CE/College Avenue & High School West D/W <i>One-Way Stop Control</i>	AM	Lanes->	-	1	1	1	-	1	-	1	-				
		LOS	-	*	*	A	-	D	-	A	-				
		Delay	-	*	*	9.6	-	27.9	-	9.6	-				
		Queue	-	*	*	25'	-	25'	-	25'	-				
	PM	LOS	-	*	*	A	-	F	-	B	-				
		Delay	-	*	*	9.9	-	83.7	-	13.2	-				
		v/c	-	-	-	-	-	0.86	-	-	-				
	PMSE	Queue	-	*	*	25'	-	160'	-	25'	-				
		LOS	-	*	*	A	-	C	-	B	-				
Delay		-	*	*	8.6	-	17.9	-	11.4	-					
Node 600: Loderbauer Road & CTH CE/College Avenue <i>Traffic Signal Control</i>	AM	Lanes->	1	1	1	1	1	1	1	1	1				
		LOS	B	A	A	B	B	B	B	C	C	B			
		Delay	18.2	9.4	8.6	12.2	14.7	14.4	12.8	19.2	23.2	20.3			
		Queue	30'	70'	25'	95'	275'	105'	120'	40'	135'	65'			
	PM	LOS	B	B	A	B	B	B	B	C	C	B			
		Delay	16.5	14.7	9.5	18.7	11.9	15.4	14.5	22.3	23.9	21.1			
		Queue	70'	220'	35'	30'	135'	105'	140'	65'	100'	40'			
	PMSE	LOS	B	B	A	B	A	B	A	B	B	B			
		Delay	11.8	10.2	7.7	11.8	9.8	10.6	9.9	14.5	14.5	14.3			
Queue		35'	130'	25'	25'	110'	30'	40'	40'	40'	30'				

Exhibit 5-12
Full Build (Scenario 2 - Left-in/Right-in/Right-out Access) Traffic Peak Hour Operating Conditions
With Modified Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach												I/S LOS & Delay
			Eastbound			Westbound			Northbound			Southbound			
			↗	→	↘	↙	←	↖	↗	↑	↘	↙	↓	↖	
Node 700: STH 55/Crooks Avenue & Morningside Drive/Proposed West Access Drive Traffic Signal Control	AM	Lanes→	1			1		1	1	1	1	1	1	1	
		LOS	B			C		C	B	B	B	A	A	A	B
		Delay	19.9			20.6		28.2	11.6	19.5	12.4	14.9	6.3	5.0	16.8
		Queue	45'			80'		#225'	25'	365'	55'	140'	115'	25'	
	PM	LOS	B			B		B	B	B	A	A	A	A	B
		Delay	16.0			15.8		17.9	10.6	16.1	10.8	8.9	7.5	5.2	11.8
		Queue	50'			45'		110'	25'	245'	25'	40'	200'	30'	
	PMSE	LOS	B			B		B	A	B	A	A	A	A	B
		Delay	15.2			14.9		15.8	9.7	14.5	9.6	8.1	6.6	4.9	10.7
		Queue	45'			25'		60'	25'	205'	25'	25'	125'	25'	
		Lanes→	1			-			2		-	-	1	1	
Node 800: STH 55/Crooks Avenue & Ridgecrest Lane One-Way Stop Control	AM	LOS	C			-			A		-	-	-	-	
		Delay	15.7			-			8.2		-	-	-	-	
		Queue	25'			-			25'		-	-	-	-	
		LOS	C			-			A		-	-	-	-	
	PM	Delay	17.1			-			8.8		-	-	-	-	
		Queue	25'			-			25'		-	-	-	-	
		LOS	C			-			A		-	-	-	-	
	PMSE	Delay	16.7			-			8.7		-	-	-	-	
		Queue	25'			-			25'		-	-	-	-	
		Lanes→	1			-			1		-	-	1	1	
		LOS	A			A			A		-	-	A	A	
Node 900: STH 55/Crooks Road with CTH KK/Calumet Street Roundabout Control	AM	Delay	6.0			7.7			8.0			6.9			
		Queue	25'			30'			50'			45'			
		LOS	A			A			A			A			
		Delay	7.4			6.9			7.0			8.9			
	PM	Queue	35'			30'			30'			75'			
		LOS	A			A			A			A			
		Delay	7.3			6.1			7.4			6.6			
	PMSE	Queue	40'			25'			35'			45'			
		Lanes→	2	-	1	-			2		-	-	1	1	
		LOS	A	-	A	-			A		-	-	A	A	A
		Delay	9.7	-	8.8	-			9.4	-	-	-	7.2	8.2	8.7
Node 1000: Loderbauer Road & High School North Access D/W Traffic Signal Control	AM	Queue	35'	-	25'	-			35'	-	-	-	30'	40'	
		LOS	B	-	A	-			A		-	-	A	A	A
		Delay	11.0	-	9.1	-			8.2	-	-	-	8.9	8.0	9.6
	PM	Queue	55'	-	25'	-			25'	-	-	-	45'	25'	
		LOS	A	-	A	-			A		-	-	A	A	A
		Delay	9.7	-	9.4	-			5.7	-	-	-	6.5	5.5	7.0
	PMSE	Queue	25'	-	25'	-			25'	-	-	-	30'	25'	
		Lanes→	1			-			1		-	-	1	1	
		LOS	C			-			A		-	-	*	*	
		Delay	15.5			-			7.6		-	-	*	*	
	Node 1100: Loderbauer Road & High School Middle Access D/W One-Way Stop Control	AM	Queue	25'			-			25'		-	-	*	*
LOS			B			-			A		-	-	*	*	
Delay			13.2			-			8.0		-	-	*	*	
PM		Queue	25'			-			25'		-	-	*	*	
		LOS	A			-			A		-	-	*	*	
		Delay	9.6			-			7.6		-	-	*	*	
PMSE		Queue	25'			-			25'		-	-	*	*	
		Lanes→	1			-			1		-	-	1	1	
		LOS	B			-			A		-	-	*	*	
		Delay	12.6			-			7.6		-	-	*	*	
Node 1200: Loderbauer Road & New South D/W One-Way Stop Control		AM	Queue	25'			-			25'		-	-	*	*
	LOS		B			-			A		-	-	*	*	
	Delay		11.6			-			8.0		-	-	*	*	
	PM	Queue	25'			-			25'		-	-	*	*	
		LOS	A			-			A		-	-	*	*	
		Delay	9.9			-			7.6		-	-	*	*	
	PMSE	Queue	25'			-			25'		-	-	*	*	
		Lanes→	1			-			1		-	-	1	1	
		LOS	B			-			A		-	-	*	*	
		Delay	12.6			-			7.6		-	-	*	*	

Exhibit 5-15
Total (Scenario 2 - Left-in/Right-in/Right-out Access) Traffic Peak Hour Operating Conditions
With Modified Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach												I/S LOS & Delay
			Eastbound			Westbound			Northbound			Southbound			
			↗	→	↘	↖	←	↗	↑	↘	↖	↓	↗		
Node 100: STH 55/Crooks Avenue & Ann Street <i>Two-Way Stop Control</i>	AM	Lanes->	-	1	1	1	1	1	2	1	1	2			
		LOS	-	C	-	B	B	*	*	B	*				
		Delay	-	19.7	-	12.8	13.5	*	*	11.0	*				
		Queue	-	65'	-	25'	30'	*	*	25'	*				
	PM	LOS	-	C	-	B	B	*	*	B	*				
		Delay	-	16.0	-	12.7	11.0	*	*	10.9	*				
		Queue	-	45'	-	25'	25'	*	*	25'	*				
	PMSE	LOS	-	B	-	B	A	*	*	A	*				
		Delay	-	11.9	-	11.8	9.8	*	*	9.8	*				
Queue		-	25'	-	25'	25'	*	*	25'	*					
Node 200: CTH CE/College Avenue & Fieldcrest Drive <i>Two-Way Stop Control</i>	AM	Lanes->	1	2	1	1	2	1	-	1	1	1			
		LOS	B	*	*	A	*	*	-	B	-	C			
		Delay	13.0	*	*	9.3	*	*	-	12.6	-	16.4			
		Queue	25'	*	*	25'	*	*	-	25'	-	45'			
	PM	LOS	B	*	*	A	*	*	-	B	-	B			
		Delay	10.3	*	*	9.9	*	*	-	11.9	-	12.5			
		Queue	25'	*	*	25'	*	*	-	25'	-	25'			
	PMSE	LOS	B	*	*	B	*	*	-	B	-	B			
		Delay	10.1	*	*	10.1	*	*	-	11.7	-	11.8			
Queue		25'	*	*	25'	*	*	-	25'	-	25'				
Node 300: STH 55/Crooks Avenue & CTH CE/ College Avenue <i>Roundabout Control</i>	AM	Lanes->	2	1	3	1	2	1	2	1	2	1			
		LOS	D	B	E	B	D	D	D	E	E				
		Delay	34.1	10.1	36.6	13.6	28.3	29.7	36.8	38.5					
		v/c	-	-	0.75	-	-	-	0.84	0.84					
	PM	LOS	D	B	C	B	C	C	D	D					
		Delay	33.0	11.0	20.1	10.3	23.2	24.5	31.2	32.7					
		Queue	130'	35'	80'	25'	100'	100'	190'	185'					
	PMSE	LOS	B	A	B	A	B	B	B	B					
		Delay	14.5	8.1	12.7	7.3	12.2	13.2	12.8	13.6					
Queue		80'	25'	45'	25'	60'	60'	85'	80'						
Node 400: CTH CE/College Avenue & Konkpot Trail Road <i>Two-Way Stop Control</i>	AM	Lanes->	1	1	1	1	-	1	1	1	1				
		LOS	B	*	A	*	-	B	-	C					
		Delay	10.0	*	9.5	*	-	11.5	-	16.9					
		Queue	25'	*	25'	*	-	25'	-	25'					
	PM	LOS	A	-	A	-	-	B	-	C					
		Delay	9.4	-	9.6	-	-	11.7	-	23.8					
		Queue	25'	-	25'	-	-	25'	-	105'					
	PMSE	LOS	A	-	A	-	-	B	-	B					
		Delay	8.4	-	8.7	-	-	10.2	-	13.4					
Queue		25'	-	25'	-	-	25'	-	40'						
Node 500: CTH CE/College Avenue & High School West D/W <i>One-Way Stop Control</i>	AM	Lanes->	-	1	1	1	-	1	-	1	-				
		LOS	-	*	*	A	-	D	-	A	-				
		Delay	-	*	*	9.7	-	31.0	-	9.6	-				
		Queue	-	*	*	25'	-	25'	-	25'	-				
	PM	LOS	-	*	*	B	-	F	-	B	-				
		Delay	-	*	*	10.1	-	129.1	-	13.9	-				
		v/c	-	-	-	-	-	1.01	-	-	-				
	PMSE	Queue	-	*	*	25'	-	200'	-	25'	-				
		LOS	-	*	*	A	-	C	-	B	-				
Delay		-	*	*	8.8	-	19.9	-	11.7	-					
Node 600: Loderbauer Road & CTH CE/College Avenue <i>Traffic Signal Control</i>	AM	Lanes->	1	1	1	1	1	1	1	1	1	1			
		LOS	B	A	A	B	B	B	B	C	C		B		
		Delay	19.3	9.5	8.6	12.4	14.0	14.9	13.3	19.8	23.9	21.2		15.5	
		Queue	40'	75'	25'	95'	290'	105'	120'	40'	135'	70'			
	PM	LOS	B	B	A	B	B	B	B	C	C		B		
		Delay	17.8	14.7	9.2	19.5	12.0	16.8	16.3	24.6	26.7	23.8		16.5	
		Queue	80'	240'	35'	30'	155'	105'	140'	65'	100'	50'			
	PMSE	LOS	B	B	A	B	B	B	B	B	B		B		
		Delay	12.7	10.6	7.6	12.2	10.1	10.7	10.0	14.7	14.6	14.6		11.0	
Queue		40'	140'	25'	25'	120'	35'	50'	40'	45'	40'				

Exhibit 5-15
Total (Scenario 2 - Left-in/Right-in/Right-out Access) Traffic Peak Hour Operating Conditions
With Modified Geometrics and Traffic Control

Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach												I/S LOS & Delay					
			Eastbound				Westbound		Northbound				Southbound							
			↗	→	↘		↖	←	↖	↗	↘	↙	↑	↗	↘	↙	↓			
Node 700: STH 55/Crooks Avenue & Morningside Drive/Proposed West Access Drive Traffic Signal Control	AM	Lanes->	1				1		1		1		1		1		C	22.4		
		LOS	C				C		B		B		C		A					
		Delay	34.7				26.2		18.4		14.6		27.9		16.3				29.0	
		Queue	#150'				120'		200'		25'		385'		85'				#265'	
	PM	LOS	B				B		B		B		C		B		A		B	
		Delay	18.9				19.3		14.9		13.7		20.9		14.9		13.6			
		Queue	65'				130'		215'		25'		305'		75'		100'			
		LOS	B				B		B		B		B		B		A			
	PMSE	Delay	18.1				18.1		14.5		11.9		17.8		12.7		11.5		7.0	
		Queue	55'				105'		165'		25'		270'		60'		75'			
Node 800: STH 55/Crooks Avenue & Ridgecrest Lane One-Way Stop Control	AM	Lanes->	1				-		2		-		-		1		-			
		LOS	C				-		C		-		-							
		Delay	17.0				-		18.3		-		-							
		Queue	25'				-		25'		-		-							
	PM	LOS	C				-		A		-		-		-		-			
		Delay	20.3				-		9.1		-		-							
		Queue	25'				-		25'		-		-							
		LOS	C				-		A		-		-							
	PMSE	Delay	16.7				-		8.7		-		-		-		-			
		Queue	25'				-		25'		-		-							
		Node 900: STH 55/Crooks Road with CTH KK/Calumet Street Roundabout Control	AM	Lanes->	1				1		1				1					
				LOS	A				A		A				A					
Delay	6.4				8.3		8.5				7.3									
Queue	30'				35'		55'				50'									
PM	LOS		A				A		A				B							
	Delay		8.4				7.8		7.9				10.3							
	Queue		45'				35'		40'				95'							
	LOS		A				A		A				A							
PMSE	Delay		8.4				6.8		8.4				7.5							
	Queue		55'				25'		40'				60'							
	Node 1000: Loderbauer Road & High School North Access D/W Traffic Signal Control		AM	Lanes->	2	-	1	-		2		-		-		1	1	A	8.7	
				LOS	A	-	A	-		A		-		A		A				
Delay		9.7		-	8.8	-		9.4		-		7.2		8.2						
Queue		35'		-	25'	-		35'		-		30'		40'						
PM		LOS	B	-	A	-		A		-		-		A	A	A	9.6			
		Delay	11.0	-	9.1	-		8.2		-		-		8.9	8.0					
		Queue	55'	-	25'	-		25'		-		-		45'	25'					
		LOS	A	-	A	-		A		-		-		A	A					
PMSE		Delay	9.7	-	9.4	-		5.7		-		-		6.5	5.5	A	7.0			
		Queue	25'	-	25'	-		25'		-		-		30'	25'					
		Node 1100: Loderbauer Road & High School Middle Access D/W One-Way Stop Control	AM	Lanes->	1				-		1		-		-			1		
				LOS	C				-		A		-		*					
Delay	15.5				-		7.6		-		-									
Queue	25'				-		25'		-		-									
PM	LOS		B				-		A		-		-		*					
	Delay		13.2				-		8.0		-		-							
	Queue		25'				-		25'		-		-							
	LOS		A				-		A		-		-							
PMSE	Delay		9.6				-		7.6		-		-		*					
	Queue		25'				-		25'		-		-							
	Node 1200: Loderbauer Road & New South D/W One-Way Stop Control		AM	Lanes->	1				-		1		-		-			1		
				LOS	B				-		A		-		-					
Delay		12.6				-		7.6		-		-								
Queue		25'				-		25'		-		-								
PM		LOS	B				-		A		-		-		*					
		Delay	11.6				-		8.0		-		-							
		Queue	25'				-		25'		-		-							
		LOS	A				-		A		-		-							
PMSE		Delay	9.9				-		7.6		-		-		*					
		Queue	25'				-		25'		-		-							

Exhibit 5-16A
STH 55/Crooks Avenue & Morningside Drive/Proposed West Access Drive
Full Build Traffic Peak Hour Operating Conditions Comparison Table

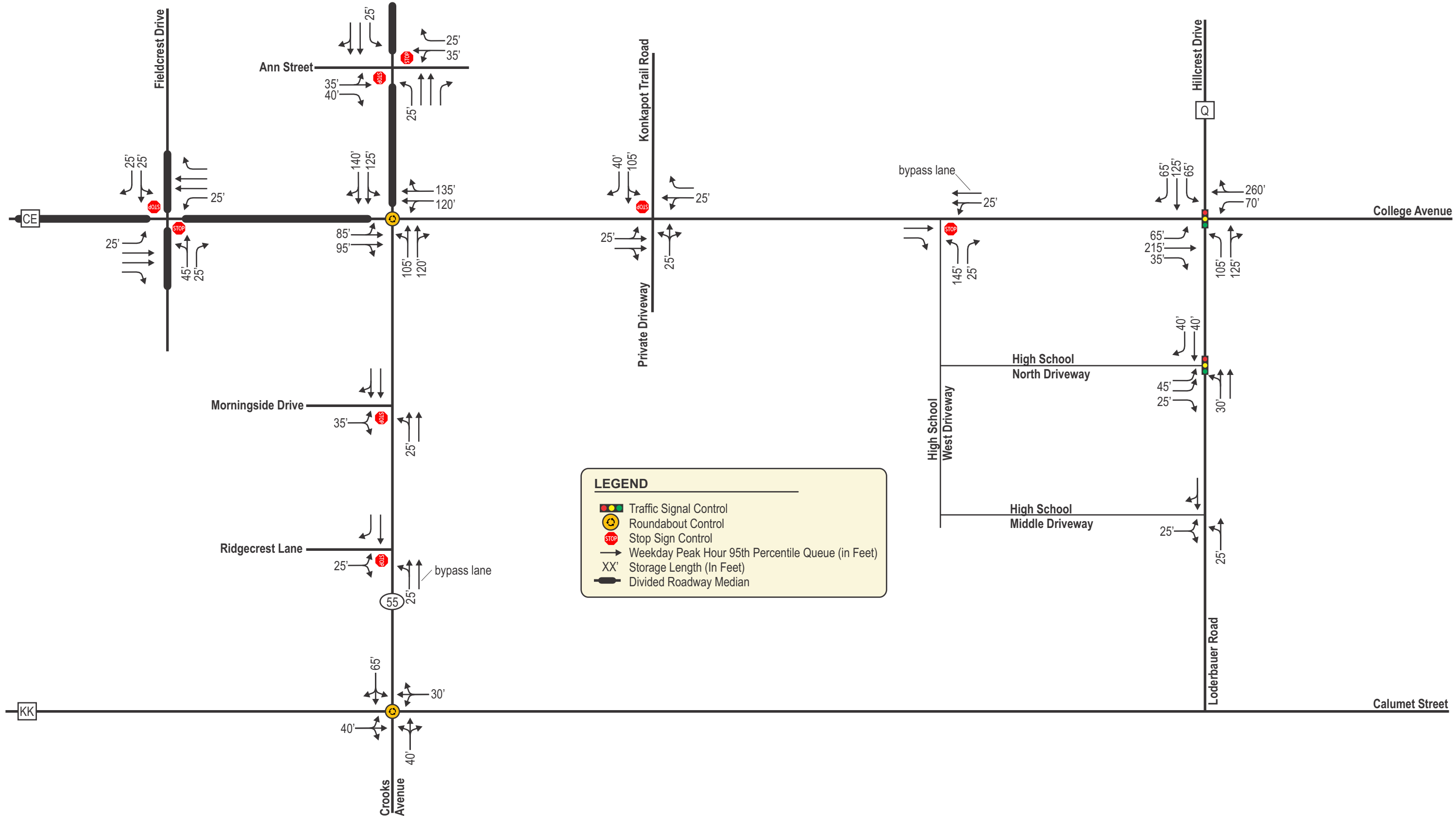
Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach												I/S
			Eastbound			Westbound			Northbound			Southbound			LOS & Delay
			↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙	
Node 700: STH 55/Crooks Avenue & Morningside Drive/Proposed West Access Drive Roundabout Control		Lanes->	1			1			1			1			
	AM	LOS	A			B			C			B			B
		Delay	8.2			13.1			22.2			10.2			14.9
		Queue	25'			75'			215'			105'			
		PM	LOS	A			A			A			B		
	Delay		6.3			6.9			8.3			10.4			9.1
	Queue		25'			25'			65'			115'			
	PMSE	LOS	A			A			A			A			A
		Delay	5.2			5.6			7.3			7.4			7.1
		Queue	25'			25'			55'			65'			
Node 700: STH 55/Crooks Avenue & Morningside Drive/Proposed West Access Drive Traffic Signal Control		Lanes->	1			1	1	1	1	1	1	1	1		
	AM	LOS	B			C	C	B	B	B	B	A	A	B	
		Delay	19.9			20.6	28.2	11.6	19.5	12.4	14.9	6.3	5.0	16.8	
		Queue	45'			80'	#225'	25'	365'	55'	140'	115'	25'		
		PM	LOS	B			B	B	B	B	B	A	A	A	B
	Delay		16.0			15.8	17.9	10.6	16.1	10.8	8.9	7.5	5.2	11.8	
	Queue		50'			45'	110'	25'	245'	25'	40'	200'	30'		
	PMSE	LOS	B			B	B	A	B	A	A	A	A	B	
		Delay	15.2			14.9	15.8	9.7	14.5	9.6	8.1	6.6	4.9	10.7	
		Queue	45'			25'	60'	25'	205'	25'	25'	125'	25'		

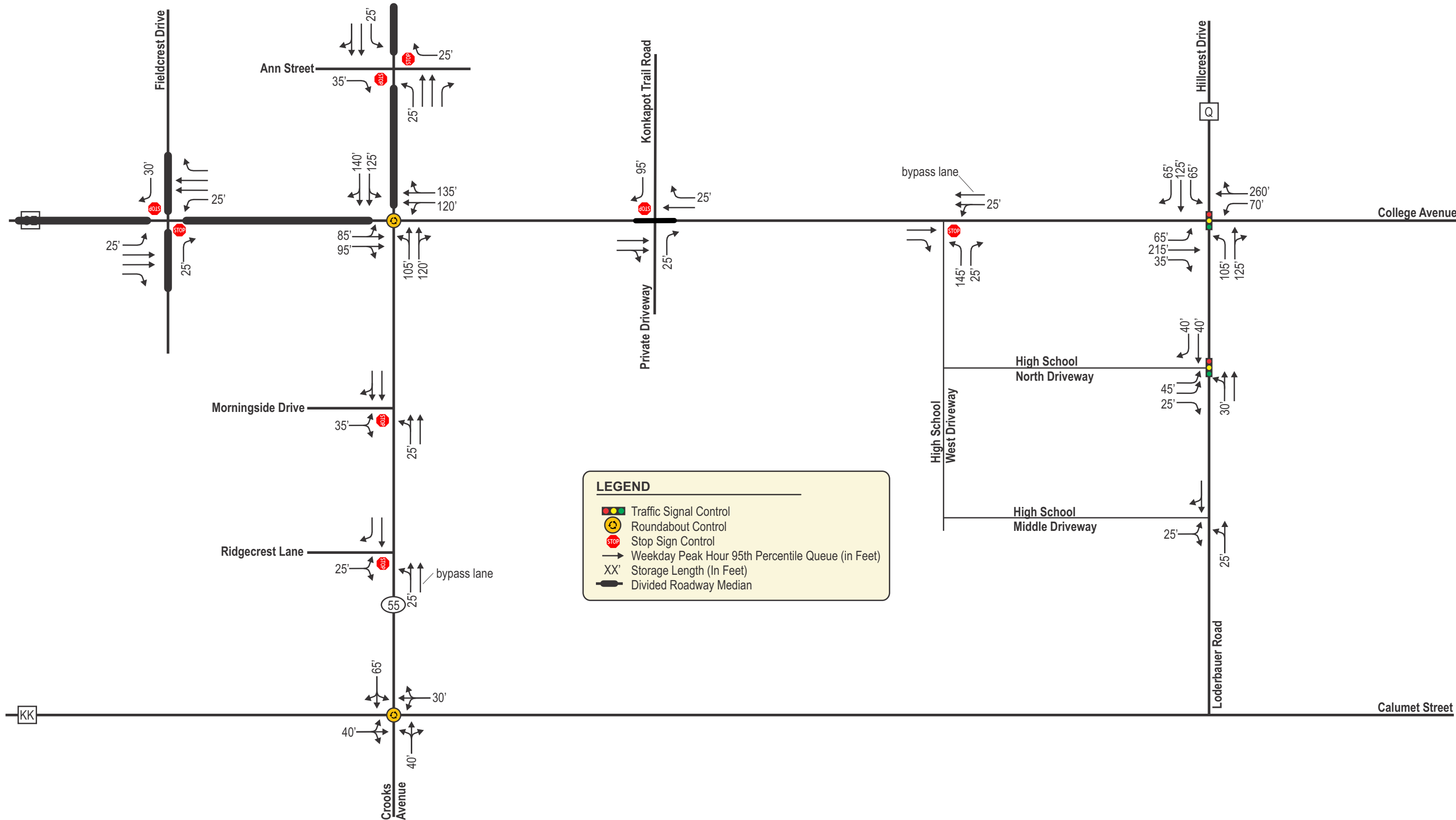
(-) indicates a movement that is prohibited or does not exist; (*) indicates a freeflow movement.
Delay is reported in seconds. Queue is the maximum of the 50th & 95th percentile queue, measured in feet.

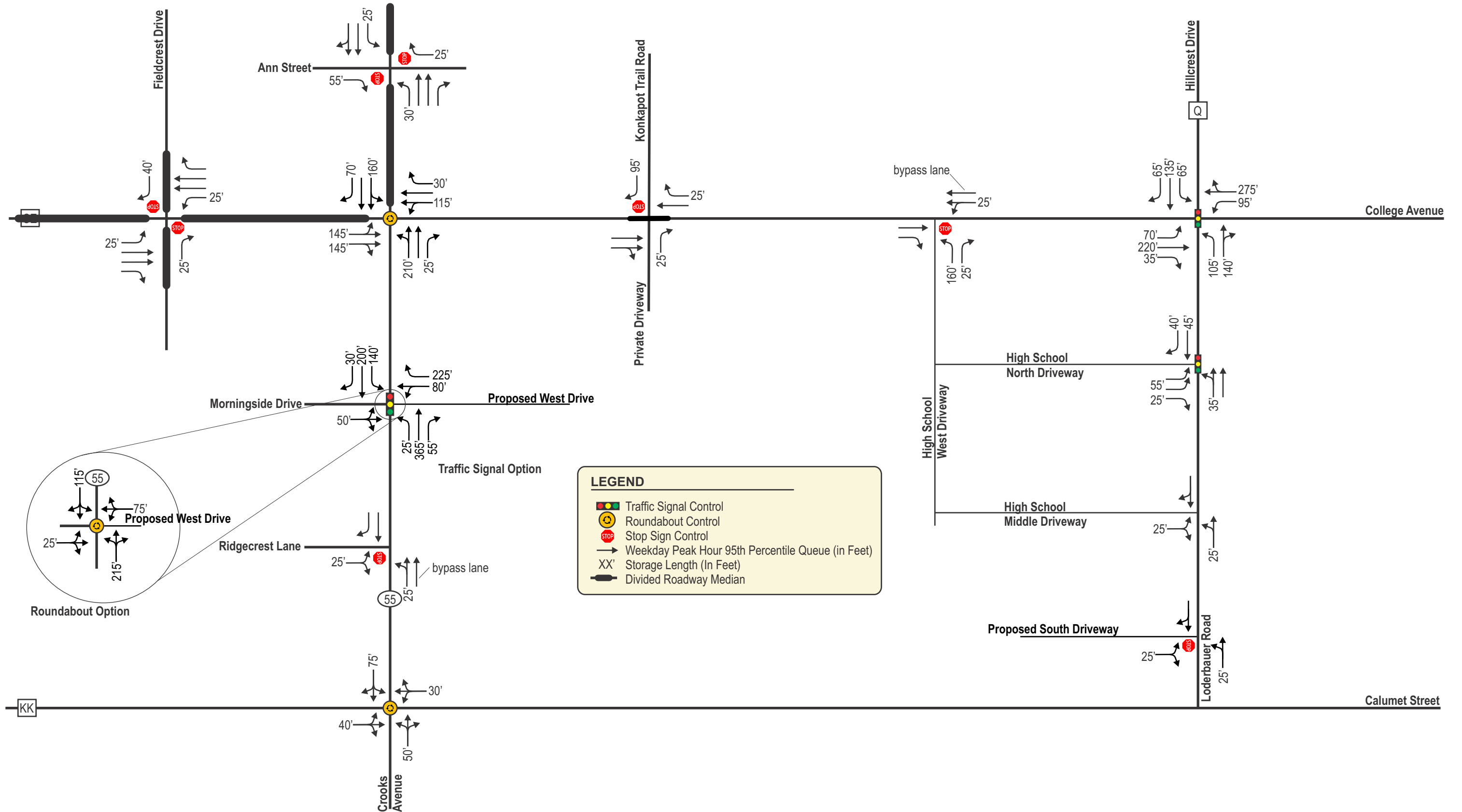
Exhibit 5-16B
Total (Scenario 2 - Left-in/Right-in/Right-out Access) Traffic Peak Hour Operating Conditions
Total Traffic Peak Hour Operating Conditions Comparison Table

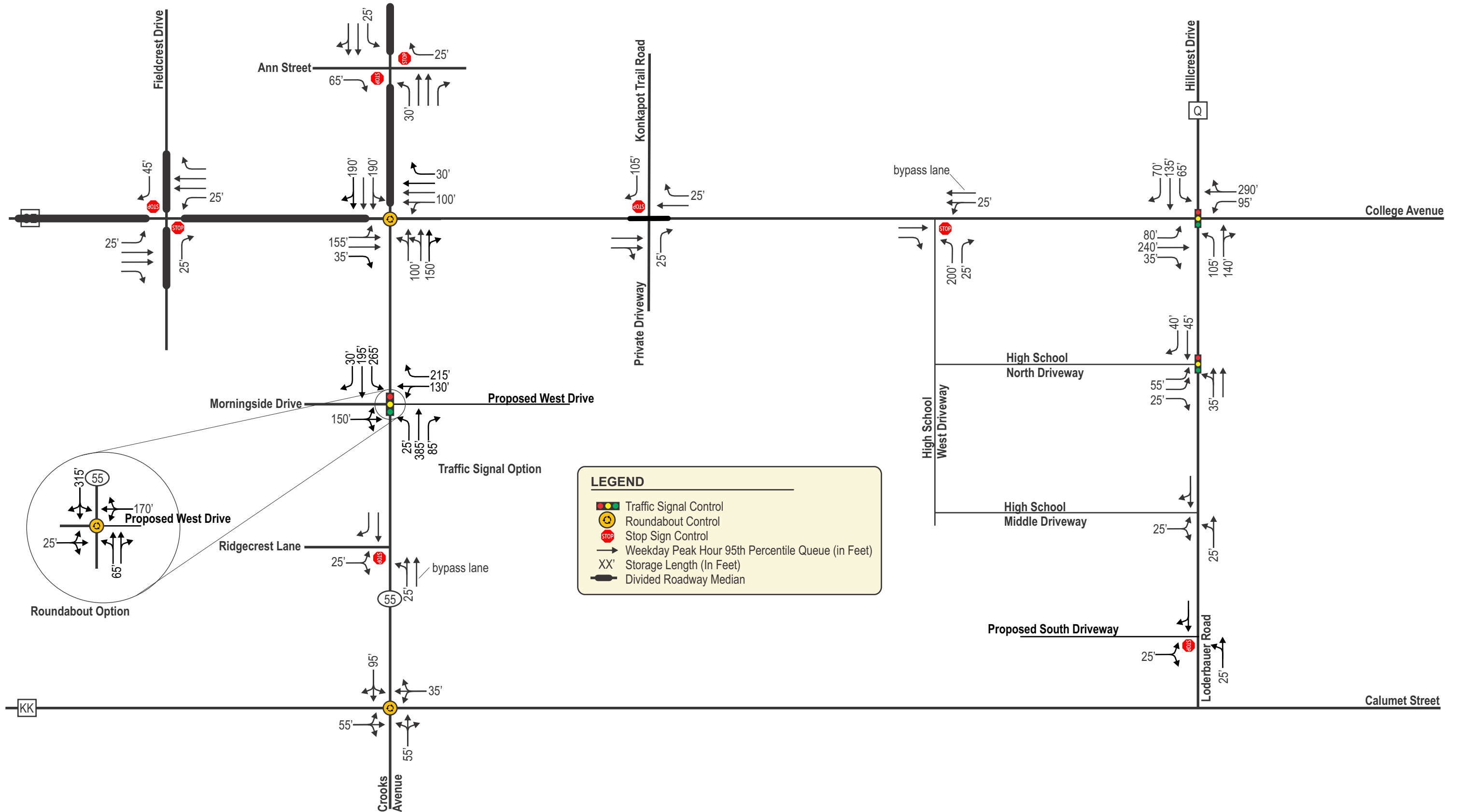
Intersection	Peak Hour	Metric	Level of Service (LOS) per Movement by Approach												I/S	
			Eastbound			Westbound			Northbound			Southbound			LOS & Delay	
			↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙		
Node 700: STH 55/Crooks Avenue & Morningside Drive/Proposed West Access Drive Roundabout Control		Lanes->	1			1			2			1				
	AM	LOS	B			C			B			B			C 15.0	
		Delay	10.3			23.1			10.8			14.8				
		Queue	25'			170'			65'			180'				
	PM	LOS	A			C			A			C			C 16.7	
		Delay	9.0			15.0			7.4			23.6				
		Queue	25'			115'			35'			315'				
	PMSE	LOS	A			B			A			B			B 10.7	
		Delay	7.3			12.1			6.6			13.1				
Queue		25'			80'			35'			155'					
Node 700: STH 55/Crooks Avenue & Morningside Drive/Proposed West Access Drive Traffic Signal Control		Lanes->	1			1			1	1	1	1	1	1		
	AM	LOS	C			C			B	B	C	B	C	A	A	C 22.4
		Delay	34.7			26.2			18.4	14.6	27.9	16.3	29.0	6.3	5.0	
		Queue	#150'			120'			200'	25'	385'	85'	#265'	90'	25'	
	PM	LOS	B			B			B	B	C	B	B	A	A	B 14.4
		Delay	18.9			19.3			14.9	13.7	20.9	14.9	13.6	8.6	6.0	
		Queue	65'			130'			215'	25'	305'	75'	100'	195'	30'	
	PMSE	LOS	B			B			B	B	B	B	B	A	A	B 12.9
		Delay	18.1			18.1			14.5	11.9	17.8	12.7	11.5	7.0	5.2	
Queue		55'			105'			165'	25'	270'	60'	75'	140'	25'		

(-) indicates a movement that is prohibited or does not exist; (*) indicates a freeflow movement.
Delay is reported in seconds. Queue is the maximum of the 50th & 95th percentile queue, measured in feet.









CHAPTER VI – RECOMMENDATIONS AND CONCLUSION

PART A – RECOMMENDATIONS

The study area intersections were analyzed based on the procedures set forth in the *Highway Capacity Manual* (HCM) 7th Edition. Intersection operation is defined by “level of service.” Level of Service (LOS) is a quantitative measure that refers to the overall quality of flow at an intersection ranging from very good, represented by LOS ‘A,’ to very poor, represented by LOS ‘F.’ For the purpose of this study, LOS D or better was used to define acceptable peak hour operating conditions.

Modifications to address traffic impacts are shown in [Exhibit 1-3](#) for the following traffic volume scenarios:

- “Background Traffic” – These modifications are expected to be necessary to accommodate the Existing/Background traffic volumes.
- “Full Build Traffic” – These modifications are expected to be necessary to accommodate the Full Build traffic volumes which includes full build out of the proposed Middle School but does not include the identified off-site development areas.
- “Total Traffic” – These modifications are expected to be necessary to accommodate the Total traffic volumes which includes full build out of the proposed Middle School as well as the identified off-site development areas.

The analysis was conducted using existing intersection geometrics and traffic control and the existing traffic signal timings. The following modifications, as shown in [Exhibit 1-3](#), are recommended to accommodate the Existing/Background, Full Build, and Total traffic volumes, respectively. *Modifications are for jurisdictional consideration and are not legally binding. WisDOT, Outagamie County and the City of Kaukauna reserve the right to determine alternative solutions.*

Node 100: STH 55/Crooks Avenue with Ann Street

- *Background Traffic:*
 - Reconstruct the median to restrict through and left-turn exiting movements from the east and west approaches, thereby allowing left-in/right-in/right-out access at this intersection. The restricted movements would either divert to other intersections or make a right-turn movement and then traverse the adjacent roundabout to continue to their ultimate destination.
 - Maintain stop control on the east and west approaches.
- *Full Build Traffic:* No additional modifications.
- *Total Traffic:* No additional modifications.

Node 200: CTH CE/College Avenue with Fieldcrest Drive

- *Background Traffic:*
 - Reconstruct the median to restrict through and left-turn exiting movements from the north and south approaches, thereby allowing left-in/right-in/right-out access at this intersection. The restricted movements would either divert to other intersections or make a right-turn movement and then traverse the adjacent roundabout to continue to their ultimate destination.

- Maintain stop control on the north and south approaches.
- *Full Build Traffic:* No additional modifications.
- *Total Traffic:* No additional modifications.

Node 300: STH 55/Crooks Avenue with CTH CE/College Avenue

- *Background Traffic:* No modifications.
- *Full Build Traffic:*
 - Consider reconstructing roundabout to provide a right-turn bypass lane on the north, south and east approaches.
- *Total Traffic:*
 - Reconstruct the roundabout to provide a multi-lane roundabout with three lane approaches on the north and south approaches, a two-lane approach with a bypass lane on the west approach and a three-lane approach with a bypass lane on the east approach.

Node 400: CTH CE/College Avenue with Konkapot Trail Road/Forefront Dermatology Access Driveway

- *Background Traffic:*
 - Construct a raised median through the limits of the intersection to allow only right-in/right-out access at this intersection. The restricted movements would either divert to other intersections or make a right-turn movement and then traverse the adjacent intersection to continue to their ultimate destination.
 - Maintain stop control on the north and south approaches.
- *Full Build Traffic:* No additional modifications.
- *Total Traffic:* No additional modifications.

Node 500: CTH CE/College Avenue with High School West Driveway

- *Background Traffic:*
 - Consider restricting all exiting northbound movements at this intersection during the weekday afternoon peak period. Diverted traffic would be expected to utilize the signalized intersection at Loderbauer Road.
- *Full Build Traffic:* No additional modifications.
- *Total Traffic:* No additional modifications.

Node 600: Loderbauer Road with CTH CE/College Avenue

- *Background Traffic:* No modifications.
- *Full Build Traffic:* No modifications.
- *Total Traffic:* No modifications.

Node 700: STH 55/Crooks Avenue with Morningside Drive/Proposed West Access Drive

- *Background Traffic:* No modifications.

- *Full Build Traffic*. Two modification options are recommended for consideration (see discussion below):
 - Option 1 – Provide fully actuated traffic signal control.
 - Provide southbound left-turn arrow with protected/permitted left-turn phasing.
 - No modifications recommended on the west approach.
 - Provide a shared through /left-turn lane and a dedicated right-turn lane on the east approach.
 - Provide a dedicated left-turn lane, through lane and right-turn lane on the north and south approaches (three lanes each).
 - Provide pedestrian crosswalk pavement markings along all approaches of the intersection.
 - Option 2 - Construct a single lane roundabout with single entrance lanes on all approaches.
- *Total Traffic*: Two modification options are recommended for consideration (see discussion below):
 - Option 1 – Provide fully actuated traffic signal control.
 - Provide westbound right-turn arrow with permitted/overlap right-turn phasing.
 - Option 2 – Modify roundabout to provide an additional northbound lane (two lanes) on the south approach with two northbound lanes through the roundabout. All other approaches to remain as single lane approaches.

Node 800: STH 55/Crooks Avenue with Ridgecrest Lane

- *Background Traffic*: No modifications.
- *Full Build Traffic*: No modifications.
- *Total Traffic*: No modifications.

Node 900: STH 55/Crooks Avenue with CTH KK/Calumet Street

- *Background Traffic*: No modifications.
- *Full Build Traffic*: No modifications.
- *Total Traffic*: No modifications.

Node 1000: Loderbauer Road with High School North Driveway

- *Background Traffic*: No modifications.
- *Full Build Traffic*: No modifications.
- *Total Traffic*: No modifications.

Node 1100: Loderbauer Road with High School Middle Driveway

- *Background Traffic*: No modifications.
- *Full Build Traffic*: No modifications.

- *Total Traffic:* No modifications.

Node 1200: Loderbauer Road with Proposed South Access Driveway

- *Background Traffic:* No modifications.
- *Full Build Traffic:*
 - Construct a full access driveway with stop sign control on the west approach.
- *Total Traffic:* No additional modifications.

A traffic signal warrant analysis was completed for the Crooks Avenue/STH 55 intersection with Morningside Drive/Proposed West Access Drive under Full Build and Total traffic volume conditions. The peak hour warrant is expected to be met for the Full Build traffic volume condition and the 8-Hour and 4-Hour warrants are expected to be met for the Total traffic volume condition. Per the WisDOT Facilities Development Manual (FDM), if an intersection warrants traffic signal control, a modern roundabout should also be evaluated. Therefore, roundabout control was also considered at the proposed intersection. Based on intersection operations and the analysis completed for this study, both traffic signal control and roundabout control are viable alternatives at the intersection. The decision to provide traffic signal or roundabout control is best made by the local communities and regulating agencies. However, based on the ICE analysis, even though both traffic control options provide acceptable operations from a delay perspective, traffic signal control is recommended for the Crooks Avenue/STH 55 intersection with Morningside Drive/Proposed West Access Drive due to less disruption to the traveling public and the significant difference in initial cost of the roundabout alternative. It is also noted that, in general, the typical cost of a single-lane roundabout in comparison to a signalized intersection is about two times the cost of a new signalized intersection with geometric modifications, dependent on right-of-way needs and complexity of the designs. In addition, since the proposed development is for a middle school and a large residential neighborhood is located immediately west of the site, a relatively high number of students are expected to cross STH 55 every weekday during the morning peak period and the afternoon peak period. Traffic signal control would allow for a controlled (marked pedestrian crossings with push buttons and pedestrian countdown timers) crossing for the anticipated students, which could allow for a potentially safer pedestrian crossing situation and could remove the need for the proposed pedestrian tunnel under STH 55. Based on all of these factors, traffic signal control is recommended.

Higher delays (LOS E/F) are expected for several movements at the STH 55/Crooks Avenue intersection with CTH CE/College Avenue under the current dual lane roundabout controlled intersection under Full Build and Total traffic volume conditions. The recommended bypass lane additions under the Full Build traffic volume conditions and the recommended reconstruction to a 3-lane roundabout with bypass lanes under the Total traffic volume conditions are expected to provide acceptable operation for most movements; however, higher delays (LOS E) are still expected for some movements during the typical weekday morning peak period noting that the delays are only slightly higher than acceptable (about 6 seconds) and the reported queueing is expected to be reasonable (all less than 225 feet). Without the bypass lanes recommended under the Full Build traffic conditions, higher delays (about 60 seconds) are expected for several movements during the weekday morning peak school peak hour with maximum queues of about 400 feet (16 vehicles) or less. As with many schools, the morning peak period “surge” last about 20 to 30 minutes. However, acceptable delays are expected during all other hours of the typical

weekday, including the typical school afternoon school discharge and weekday evening commuter peak hours.

Higher delays (LOS F) are also expected at the College Avenue/CTH CE intersection with the High School West Driveway under Existing, Full Build and Total traffic conditions during the typical weekday afternoon peak period. Restricting these movements during this time period, with diverted traffic utilizing the signalized intersection at Loderbauer Road, would allow this and all study area intersections to operate acceptably under all peak periods.

PART B – CONCLUSION

To accommodate the full build out of the proposed middle school, recommended modifications are expected to be necessary to the transportation network. Except as noted, all movements at the study area intersections are expected to operate safely and efficiently with the modifications identified in this TIA with the proposed middle school site and identified off-site development areas.