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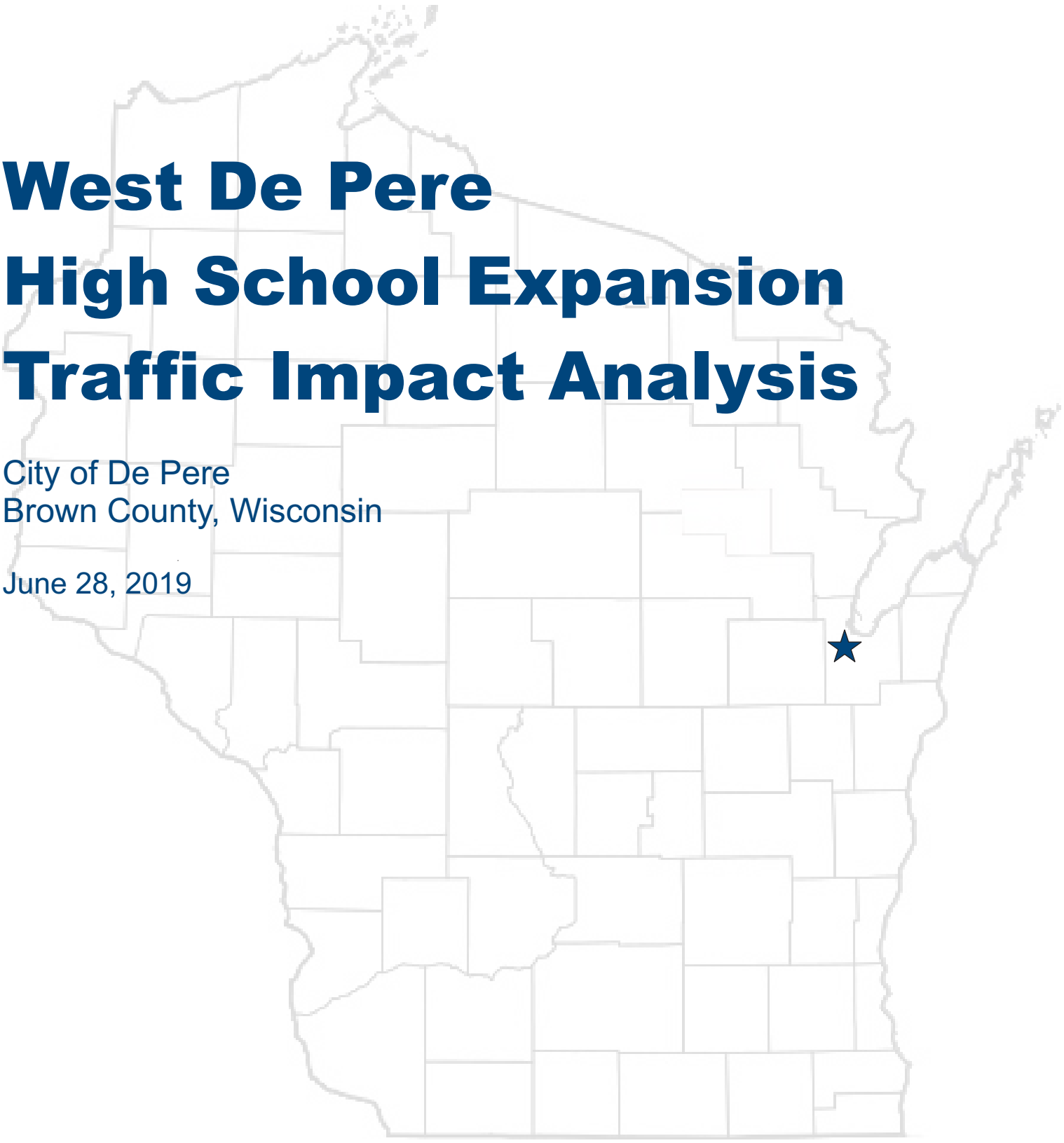
West De Pere High School Expansion Traffic Impact Analysis

City of De Pere
Brown County, Wisconsin

June 28, 2019



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TRAFFIC IMPACT STUDY FOR:

WEST DE PERE HIGH SCHOOL EXPANSION

CITY OF DE PERE, BROWN COUNTY, WISCONSIN

DATE SUBMITTED: June 28, 2019

PREPARED FOR:
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"I certify that this Traffic Impact Analysis has been prepared by me or under my immediate supervision and that I have experience and training in the field of traffic and transportation engineering."

_____
Donald J. Lee, P.E.
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West De Pere High School Expansion
Traffic Impact Analysis
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CHAPTER I – INTRODUCTION & EXECUTIVE SUMMARY

PART A – PURPOSE OF REPORT AND STUDY OBJECTIVES

The West De Pere School District is expecting significant growth within the district into the foreseeable future. To plan for this growth; an expansion of the West De Pere High School, as well as modifications to the Westwood Elementary School and construction of a new West De Pere Intermediate School have been proposed. The West De Pere High School is located on the south side of Grant Street immediately west of South 6th Street in the City of De Pere, Brown County, Wisconsin. The West De Pere Intermediate School is proposed to be constructed immediately north of the West De Pere Middle School which is located along the east side of South 9th Street, approximately ½ –mile south of Grand Street. The Westwood Elementary School is located immediately south of the middle school, on the south side of Westwood Drive and the Hemlock Creek Elementary School is located on the west side of CTH F, south of Scheuring Road. As part of the expansion plans, Brown County and the City of De Pere have requested a traffic impact analysis be conducted to determine the additional traffic expected to be generated by the high school expansion and to identify roadway modifications, if any, attributed to the high school expansion for the opening year traffic scenario. Brown County and the City of De Pere will review the traffic impact study.

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

PART B – EXECUTIVE SUMMARY

The executive summary includes a description of the study area, description of the high school expansion 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 high school is shown in Exhibit 1-1. The map also shows the locations of the proposed intermediate school and the existing middle and high school sites. A copy of the conceptual site plan for the high school expansion is illustrated in Exhibit 1-2. As identified by Brown County and the City of De Pere, the study area for the high school expansion includes the following intersections:

- Grant Street with South 6th Street (existing two-way stop control);
- Grant Street with the east high school driveway (existing one-way stop control);
- Grant Street with the west high school driveway (existing one-way stop control);
- Grant Street with the FW Park driveway (existing one-way stop control);
- Grant Street with Allard Street (existing one-way stop control);
- Grant Street with Apollo Way (existing one-way stop control);
- Grant Street with Suburban Drive (existing one-way stop control);
- Grant Street with Mid Valley Drive (existing two-way stop control);
- Helena Street with South 6th Street (existing one-way stop control); and
- Helena Street with South 7th Street (existing one-way stop control).

In addition to the intersections listed above, the South 6th Street intersection with Butler Street was also evaluated as part of the Butler Street access options.

B2. On-Site Development Description

An expansion of the West De Pere High School has been proposed on the south side of Grant Street immediately west of South 6th Street in the City of De Pere, Wisconsin. In addition to the renovation of the existing classrooms, a renovation/expansion of the existing auditorium as well as a two story classroom addition, fitness and locker room renovation/expansion and an indoor practice facility are planned. The existing high school currently (Fall 2018) includes the following:

- Student population – 959 students

The proposed facility is expected to include the following:

- Student population – 1,420 students (461 students increase)

Based on the West De Pere School District Community Growth and Projections Report; dated February 2018, student populations are expected to increase by approximately 50 percent over the next 10 to 15 years as listed above. The anticipated growth is expected to occur throughout the entire district; however, two areas (to the southwest and south of the school) are expected to see the most significant increases.

As shown on Exhibit 1-2, two existing driveways currently provide access to the high school along Grant Street. A potential additional access along Butler Street and/or a potential additional access along Helena Street are also being considered as part of the expansion plans. The potential new access along Butler Street could be either a full access (entrance and exit) or an exit only access, with the access being gated during the other time periods of the day. The potential new connection to Helena Street would be constructed along the north side of Helena Street, immediately west of the Helena Street intersection (offset intersections) with South 7th Street with stop sign control proposed on the north and south legs of the intersection. This additional access is being investigated as either a full access, partial access (bus/staff only) or an emergency access.

The high school expansion is planned to be constructed in year 2021 with completion by the end of the 2021 calendar year. Therefore, full build-out was included in the full build traffic conditions.

B3. Off-Site Development Description

Based on the discussions with the West De Pere School District team, the following additional changes are expected within the school district over the next few years:

- Construction of a new Intermediate School to serve 5th and 6th grades
- Existing elementary schools to serve K through 4th grade (currently also serve 5th grade)
- Existing middle school to serve 7th and 8th grade (currently also serve 6th grade)

To accommodate these expected changes the following modifications are planned for the school district facilities:

- High School expansion as described in previous section
- Middle School - no change to building capacity, revised parking lot
- New Intermediate School is to accommodate future projected 700 students (350 per grade)
- No additions planned at either elementary building
    - Hemlock Creek – no change to building capacity, no work is planned at this facility

- Westwood Elementary - no change to building capacity, an expanded parking lot is planned at this facility

To account for these changes as well as the anticipated growth within the district, the proposed intermediate school is expected to include the following:

- Student population – 700 students (341 students increase to the immediate area)

To determine the increase in students to the proposed intermediate school site, the existing class sizes as well as the expected growth based on future growth areas as described in the aforementioned West De Pere School District Community Growth and Projections Report; dated February 2018, were considered. The 5th and 6th grade students at the proposed intermediate school are expected to come from the existing middle school and the two existing elementary schools. Therefore, new students to the proposed school site (located immediately north of the existing middle school) are expected to be made up of 5th grade students from the Hemlock Creek Elementary School as well as the expected future growth projections over the next 10-15 years for the students from this school. Since the 5th grade students from the Westwood Elementary School as well as 6th grade students from the existing middle school are currently attending schools adjacent to the proposed Intermediate School, these traffic patterns are expected to be similar to the traffic patterns as they occur today; therefore, only the expected growth projections over the next 10-15 years for these students was taken into consideration when determining the increase in students to the immediate area. Calculations for the increase in student population as well as maps showing the growth areas for these schools, taken from the aforementioned report, are included in the appendix of this report.

B4. On-Site Generated Traffic

To address any potential future traffic impacts along study area roadways and at the intersections adjacent to the proposed school expansion, it is necessary to identify the hourly and daily volume of traffic generated by the high school. The current ***weekday peak hour*** traffic volumes at the existing high school were determined based on turning movement counts taken at the existing high school driveways over several typical weekdays during mid-November. In addition, ***the weekday daily traffic*** at the existing high school was extrapolated from the peak hour and 13-hour turning movement counts taken at the two driveways.

The existing high school is currently generating approximately 650 trips (455 entering/195 exiting) during a typical weekday morning peak hour for the current student/staff population. During a typical weekday evening peak hour, the existing high school is currently generating 385 new trips (90 entering/295 exiting) for the current student/staff population. On a typical weekday, the existing high school is currently generating approximately 2,010 new trips (1,005 entering/1,005 exiting) for the current student/staff population under existing conditions.

The expected future new trips (students and staff) for the planned expansion were calculated by factoring the existing traffic volumes (which included students and staff) by the expected percentage increase in student population (taken from the West De Pere School District Community Growth and Projections Report; dated February 2018). It is noted that the anticipated student population growth over the next 10 to 15 years is expected to be approximately 50 percent which equates to a student population increase of an additional 461 students.

Utilizing the actual trips (students and staff) counted at the existing high school and increasing those trips by the anticipated 50-percent growth to account for the expected increase in campus population (students and staff), the expansion is expected to generate approximately 330 additional trips (230 entering/100 exiting) during a typical weekday morning peak hour. During

a typical weekday evening peak hour, the proposed school expansion is expected to generate 195 additional trips (45 entering/150 exiting). On a typical weekday, the proposed school expansion is expected to generate approximately 1,010 additional trips (505 entering/505 exiting) under full build conditions. The expected growth at the high school is included in the on-site development traffic volumes.

B5. Off-Site Generated Traffic

It is noted that the trip generation rates as published in the Institute of Transportation Engineer's (ITE) *Trip Generation Manual, 10th Edition, 2017* for a high school land use were compared to the rates calculated from the existing traffic counts completed as part of this project as described in the previous section. As shown on the trip generation table included in the appendix of this report, the calculated rates are very similar to the actual rates. Therefore, the ITE rates in this school district seem to be consistent with the national averages.

Therefore, the traffic volumes expected to be generated by the proposed intermediate school are based on the trip rates for a middle school as published in the *ITE Trip Generation Manual, 10th Edition, 2017*. Trip rates were calculated based on the peak hour of generator instead of the peak hour of adjacent street traffic to account for the worst case school traffic conditions. The proposed intermediate school is expected to generate 240 new trips (130 entering/110 exiting) during a typical weekday morning peak hour. During a typical weekday afternoon peak hour, the proposed intermediate school is expected to generate 115 new trips (55 entering/60 exiting). On a typical weekday, the proposed intermediate school is expected to generate approximately 910 new trips (455 entering/455 exiting) under full build conditions. The expected growth for all non-high school traffic is included in the off-site development traffic volumes.

B6. Proposed Access

As shown in Exhibit 1-2, two existing driveways currently provide access to the high school along Grant Street. A potential additional access along Butler Street and/or a potential additional access along Helena Street are also being considered as part of the expansion plans. The potential new access along Butler Street could be either a full access (entrance and exit) or an exit only access, with the access being gated during the other time periods of the day. The potential new connection to Helena Street would be constructed along the north side of Helena Street, immediately west of the Helena Street intersection (offset intersections) with South 7th Street with stop sign control proposed on the north and south legs of the intersection. This additional access is being investigated as either a full access, partial access (bus/staff only) or an emergency access.

B7. Existing Traffic – Recommended Modifications

The study area intersections were analyzed based on the procedures set forth in the *Highway Capacity Manual* (HCM), *6th 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.

The existing traffic volumes do not include any school expansion plans. The analysis was conducted using existing intersection geometrics and traffic control. The following modifications, shown in Exhibit 1-3, are recommended to accommodate the existing traffic volumes. *Modifications are for jurisdictional consideration and are not legally binding. Brown County and the City of De Pere reserve the right to determine alternative solutions.*

Grant Street intersection with Apollo Way

- Reconstruct north leg of intersection to remove access from Apollo Way to Grant Street.

Grant Street intersection with Allard Street

- Provide fully actuated traffic signal control.
- Provide a dedicated left-turn lane and a dedicated through lane on the west approach.

Traffic signals are expected to be warranted at the Allard Street intersection with the Apollo Way access removed at Grant Street based on a traffic signal warrant analysis completed as part of this project. However, operational deficiencies (LOS E) are expected to remain at the Grant Street intersections with Mid Valley Drive and with Suburban Drive under existing conditions as traffic signals are not warranted at those intersections based on the traffic signal warrant study completed as part of this study. These intersections should be monitored and traffic signal or roundabout control should be considered at these intersections if traffic volumes increase in the future to a level where traffic signal volume thresholds are met.

Except as noted, all other intersections are currently operating at LOS D or better during the weekday peak periods.

B8. Full Build Traffic – Recommended Modifications

Full build traffic volumes include the full build of the proposed high school expansion site as well as the modifications at the other school district schools. The following ***additional*** modifications, above and beyond the existing traffic recommended modifications, shown in Exhibit 1-4, are recommended to accommodate the full build traffic volume conditions. *Modifications are for jurisdictional consideration and are not legally binding. Brown County and the City of De Pere reserve the right to determine alternative solutions.*

Grant Street intersection with Mid Valley Drive

- Provide single lane roundabout control with single lane approaches on all four legs of the intersection.

Helena Street intersection with South 7th Street

- Provide a new access driveway to the high school site with a single inbound and a single exit lane along the north approach of the intersection.
- Provide stop sign control on the north approach of the intersection.
- Maintain stop sign control on the south approach of the intersection.

Grant Street intersection with West High School Driveway

- Consider providing a high visibility cross walk (pavement marking) and a Rectangular Rapid Flashing Beacon (RRFB) on Grant Street, immediately west of the high school driveway with advanced yield lines with "Yield Here to Pedestrian" signs on the east and west approaches of the intersection.

Several access options were analyzed as part of this study including no additional access points to the high school, providing a new southern access to the site along Helena Street and providing a new eastern access point to the site along Butler Street. The only access option that allowed all driveways to the high school to operate acceptably during both peak periods was Access Option 2C which included providing a new access to Helena Street that would be fully accessible to all users of the high school.

Regardless of the access option evaluated, additional traffic control is recommended at the Grant Street intersection with Mid Valley Drive under the full build traffic condition. Due to the presence of existing roundabouts along the corridor and immediately adjacent to the Mid Valley intersection, roundabout control is the recommended traffic control at this intersection. However, it is noted that traffic signal control is also a viable traffic control option for this intersection and will also provide acceptable operations.

With a baseball field and park located immediately north of the high school, providing a controlled pedestrian crossing of Grant Street is recommended. It is noted that 15 to 20 students were observed crossing Grant Street as part of the data collection for this project on a typical day in mid-November. With these volumes and the expected expansion at the high school, vehicle and pedestrian volumes at this crossing are expected to exceed the levels for installation of a RRFB.

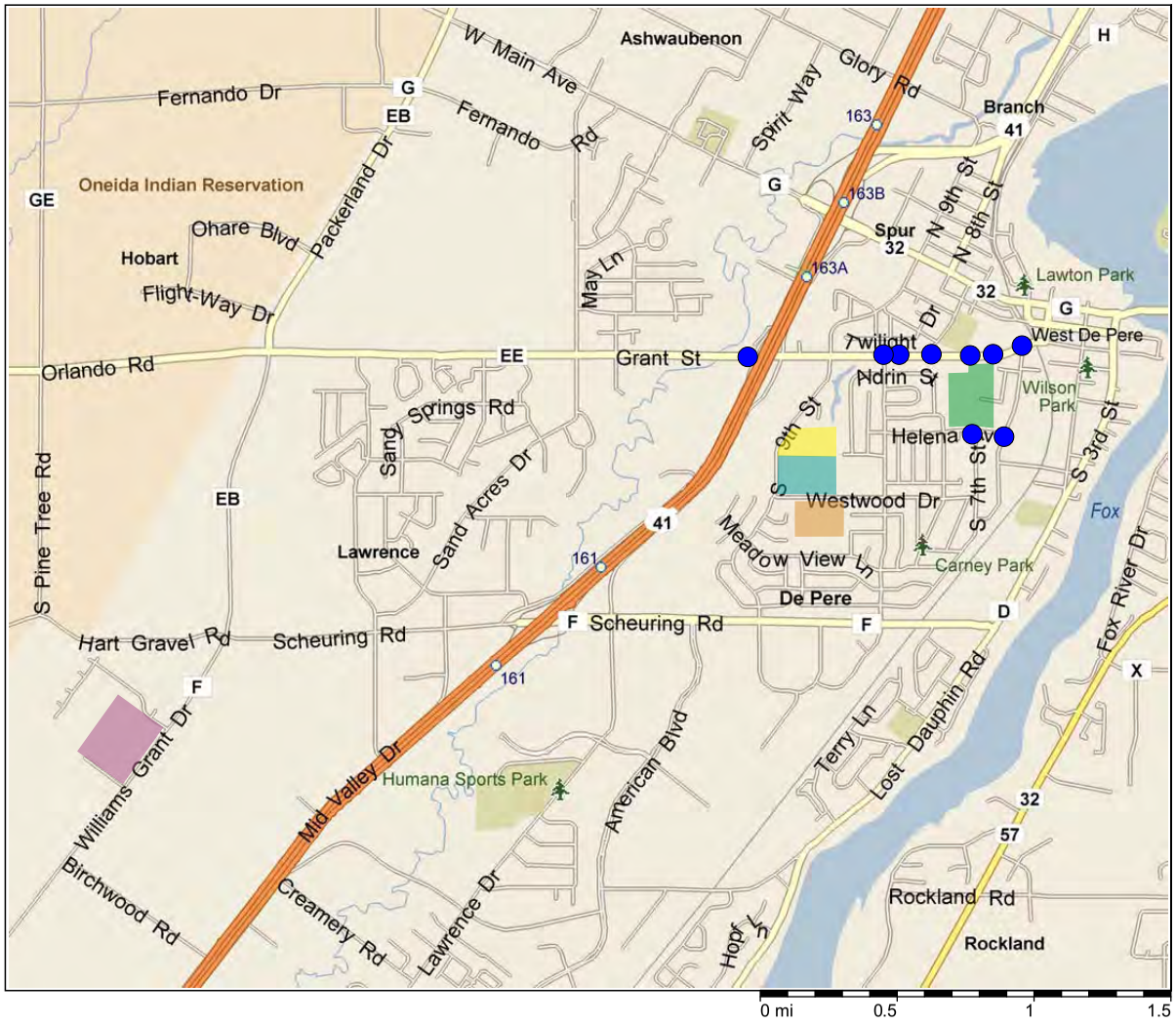
Operational deficiencies (LOS F) are expected to remain at the Grant Street intersection with Suburban Drive during the weekday morning peak hour under full build traffic volume conditions. However, traffic signals are not expected to be warranted at this intersection based on the traffic signal warrant study completed as part of this study. This intersection should be monitored and traffic signal or roundabout control should be considered at this location if traffic volumes increase in the future to a level where traffic signal volume thresholds are met. It is expected that the higher delays during the morning peak hour are due to the presence of three schools located immediately to the south of the intersection and the surge in traffic as parents drop off their children in the morning. If delays become excessive at this intersection, it is expected that drivers will utilize other routes (i.e. South 9th Street) to avoid this intersection.

Except as noted, all other intersections are expected to operate at LOS D or better during the weekday peak periods under the full build traffic volume conditions with the modifications listed in this report.

B9. Conclusion

To accommodate the full build out of the proposed high school expansion along Grant Street 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 high school expansion site as well as the expansion of the other school district schools.

West De Pere, Wisconsin



LEGEND

- Study Intersection
- Proposed Intermediate School
- West De Pere High School
- West De Pere Middle School
- Westwood Elementary School
- Hemlock Creek Elementary School

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EXHIBIT 1-1
PROJECT OVERVIEW MAP

DEPERE, WISCONSIN

bray architects
solid foundation. forward thinking.

Project #: 3273

Miron Building Excellence

Proposed Site Plan

SCALE: 1" = 140'-0"

West De Pere High School
De Pere, WI
August 9, 2018

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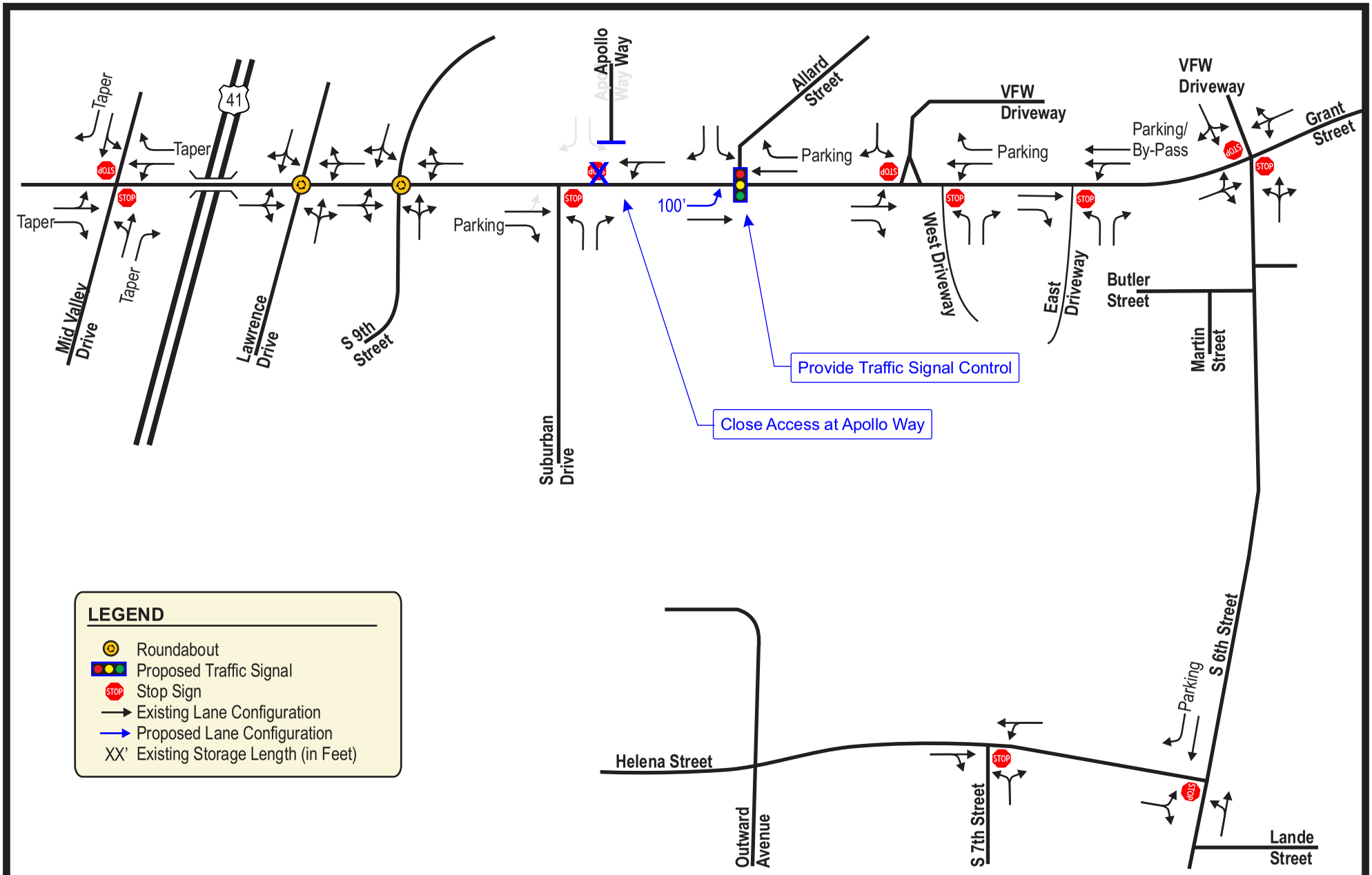
EXHIBIT 1-2
PROPOSED SCHOOL CONCEPTUAL SITE PLAN

DEPERE, WISCONSIN



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NOT TO SCALE

EXHIBIT 1-3
EXISTING TRAFFIC RECOMMENDED MODIFICATIONS

DEPERE, WISCONSIN

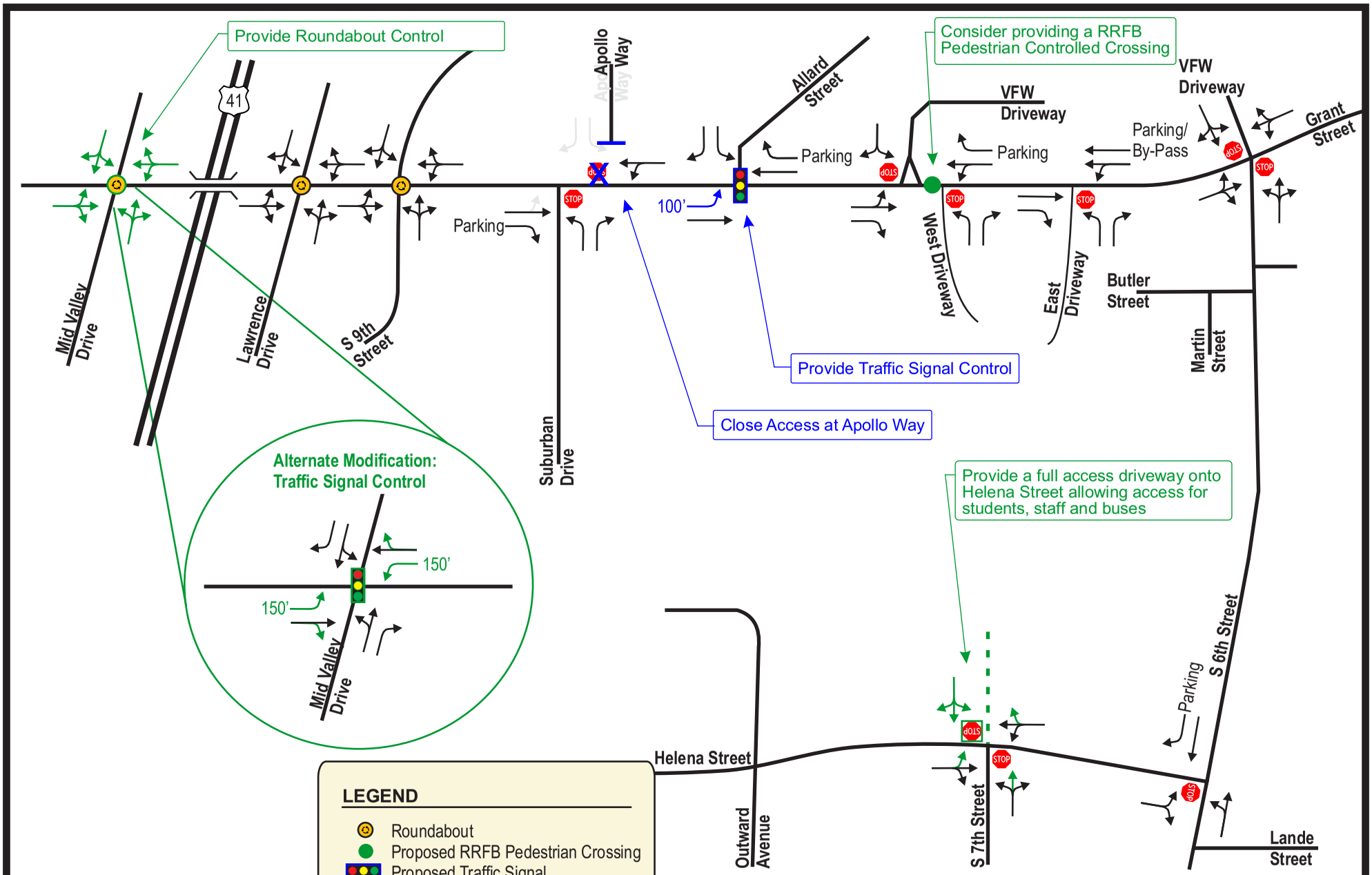

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EXHIBIT 1-4
FULL BUILD RECOMMENDED MODIFICATIONS

DEPERE, WISCONSIN

CHAPTER II – PROPOSED DEVELOPMENT

PART A – ON-SITE DEVELOPMENT

A1. Development Description and Site Location

The West De Pere School District is expecting significant growth within the district into the foreseeable future. To plan for this growth; an expansion of the West De Pere High School, as well as modifications to the Westwood Elementary School and construction of a new West De Pere Intermediate School have been proposed. The expected growth at the high school is included in the on-site development traffic volumes and the expected growth for all non-high school traffic is included in the off-site development traffic volumes. The West De Pere High School is located on the south side of Grant Street immediately west of South 6th Street in the City of De Pere, Brown County, Wisconsin. The West De Pere Intermediate School is proposed to be constructed immediately north of the West De Pere Middle School which is located along the east side of South 9th Street, approximately ½ –mile south of Grand Street. The Westwood Elementary School is located immediately south of the middle school, on the south side of Westwood Drive and the Hemlock Creek Elementary School is located on the west side of CTH F, south of Scheuring Road. A street map illustrating the location of the existing high school is shown in Exhibit 2-1. The map also shows the locations of the proposed intermediate school and the existing middle and high school expansions.

A2. Land Use and Intensity

The proposed expansion is expected within the existing footprint of the high school campus. The site is bordered by residential uses to the east, west and south of the site. To the north, on the north side of Grant Street, additional residential uses as well as a senior recreation facility and a Veteran of Foreign Wars (VFW) park are located. Light industrial uses are also present to the east, along the east side of South 6th Street. An aerial showing the existing high school campus is shown in Exhibit 2-2.

A3. Site Plan

A copy of the conceptual site plan for the high school expansion is illustrated in Exhibit 2-3. Two existing driveways currently provide access to the high school along Grant Street. A potential additional access along Butler Street and/or a potential additional access along Helena Street are also being considered as part of the expansion plans. The potential new access along Butler Street could be either a full access (entrance and exit) or an exit only access, with the access being gated during the other time periods of the day. The potential new connection to Helena Street would be constructed along the north side of Helena Street, immediately west of the Helena Street intersection (offset intersections) with South 7th Street with stop sign control proposed on the north and south legs of the intersection. This additional access is being investigated as either a full access, partial access (bus/staff only) or an emergency access.

A4. Development Phasing and Timing

An expansion of the West De Pere High School has been proposed on the south side of Grant Street immediately west of South 6th Street in the City of De Pere, Wisconsin. In addition to the renovation of the existing classrooms, a renovation/expansion of the existing auditorium as well as a two story classroom addition, fitness and locker room renovation/expansion and an indoor practice facility are planned. The existing high school currently (Fall 2018) includes the following:

- Student population – 959 students

The proposed facility is expected to include the following:

- Student population – 1,420 students (461 students increase)

The expected future new trips (students and staff) for the planned expansion were calculated by factoring the existing traffic volumes (which included students and staff) by the expected percentage increase in student population (taken from the West De Pere School District Community Growth and Projections Report; dated February 2018). It is noted that the anticipated student population growth over the next 10 to 15 years is expected to be approximately 50 percent which equates to a student population increase of an additional 461 students. The high school expansion is planned to be constructed in year 2021 with completion by the end of the 2021 calendar year. Therefore, full build-out was included in the full build traffic conditions.

PART B – STUDY AREA

B1. Influence Area

The proposed high school expansion is expected to draw from the local area based on the West De Pere School District Community Growth and Projections Report; dated February 2018. It is noted that the anticipated student population growth is expected throughout the entire district; however, two areas (to the southwest and south of the high school) are expected to see the most significant increases. For the new intermediate school, the most significant increases in anticipated student population growth are also expected to be concentrated within two areas (to the southwest and south of the exiting middle school). Maps showing the growth areas for the two schools, taken from the aforementioned report, are included in the appendix of this report.

B2. Area of Significant Traffic Impact

As identified by Brown County and the City of De Pere, the study area for the high school expansion includes the following intersections:

- Grant Street with South 6th Street (existing two-way stop control);
- Grant Street with the east high school driveway (existing one-way stop control);
- Grant Street with the west high school driveway (existing one-way stop control);
- Grant Street with the FW Park driveway (existing one-way stop control);
- Grant Street with Allard Street (existing one-way stop control);
- Grant Street with Apollo Way (existing one-way stop control);
- Grant Street with Suburban Drive (existing one-way stop control);
- Grant Street with Mid Valley Drive (existing two-way stop control);
- Helena Street with South 6th Street (existing one-way stop control); and
- Helena Street with South 7th Street (existing one-way stop control).

In addition to the intersections listed above, the South 6th Street intersection with Butler Street was also evaluated as part of the Butler Street access options.

PART C – OFF-SITE LAND USE AND DEVELOPMENT

Based on the discussions with the West De Pere School District team, the following additional changes are expected within the school district over the next few years:

- Construction of a new Intermediate School to serve 5th and 6th grades
- Existing elementary schools to serve K through 4th grade (currently also serve 5th grade)

- Existing middle school to serve 7th and 8th grade (currently also serve 6th grade)

To accommodate these expected changes the following modifications are planned for the school district facilities:

- High School expansion as described in previous section
- Middle School - no change to building capacity, revised parking lot
- New Intermediate School is to accommodate future projected 700 students (350 per grade)
- No additions planned at either elementary building
  - Hemlock Creek – no change to building capacity, no work is planned at this facility
  - Westwood Elementary - no change to building capacity, an expanded parking lot is planned at this facility

To account for these changes as well as the anticipated growth within the district, the proposed intermediate school is expected to include the following:

- Student population – 700 students (341 students increase to the immediate area)

To determine the increase in students to the proposed intermediate school site, the existing class sizes as well as the expected growth based on future growth areas as described in the aforementioned West De Pere School District Community Growth and Projections Report; dated February 2018, were considered. The 5th and 6th grade students at the proposed intermediate school are expected to come from the existing middle school and the two existing elementary schools. Therefore, new students to the proposed school site (located immediately north of the existing middle school) are expected to be made up of 5th grade students from the Hemlock Creek Elementary School as well as the expected future growth projections over the next 10-15 years for the students from this school. Since the 5th grade students from the Westwood Elementary School as well as 6th grade students from the existing middle school are currently attending schools adjacent to the proposed Intermediate School, these traffic patterns are expected to be similar to the traffic patterns as they occur today; therefore, only the expected growth projections over the next 10-15 years for these students was taken into consideration when determining the increase in students to the immediate area. The expected growth for all non-high school traffic is included in the off-site development traffic volumes. Calculations for the increase in student population as well as maps showing the growth areas for these schools, taken from the aforementioned report, are included in the appendix of this report. The location of the existing and proposed schools are shown in Exhibit 2-1.

PART D – SITE ACCESSIBILITY

D1. Study Area Roadways

The study area roadways are discussed below:

Grant Street (CTH HH) is a two-lane undivided east/west county highway with parking lanes on either side from Lawrence Drive to the east and no parking lanes provided to the west through the limits of the study area. The posted speed limit along Grant Street is 25 miles per hour (mph) except to the west of Mid Valley Drive where the speed limit is 35 mph. According to the WisDOT, the Year 2018 average annual daily traffic volumes (AADT's) on Grant Street were approximately 8,700 vehicles per day (vpd) west of Mid Valley Drive; 9,200-vpd east of Lawrence Drive; 7,600-vpd east of 9th Street; 8,600-vpd east of Apollo Way; 6,200-vpd immediately west of the high school and 7,700-vpd at 6th street.

Mid Valley Drive is a two-lane undivided north/south local collector street that runs parallel to Interstate 41, with a 45 mph posted speed limit. There are currently no available AADT volumes along Mid Valley Drive within the limits of the study area; however, ADT volumes of 3,900-vpd to the north of Grant Avenue and 2,400-vpd to the south were extrapolated from the 6.5 hours of peak hour turning movement counts taken as part of this study.

Suburban Drive is a two-lane undivided north/south local collector street that intersects Grant Avenue to provide a conventional three legged "T" intersection from the south. It is located approximately 115 feet west of the Apollo Way intersection, a three legged "T" intersection from the north. The posted speed limit on Suburban Drive is 25 mph within the limits of the study area. The WisDOT Year 2010 AADT's on Suburban Drive was approximately 3,900-vpd south of Grant Street. In addition, ADT volumes of 3,700-vpd were extrapolated from the 6.5 hours of peak hour turning movement counts taken as part of this study.

Apollo Way is a two-lane undivided north/south local residential roadway that intersects Grant Avenue to provide a conventional three legged "T" intersection from the north. It is located approximately 115 feet east of the Suburban Drive intersection, a three legged "T" intersection from the south. The posted speed limit on Apollo Way is 25 mph within the limits of the study area. The WisDOT Year 2009 AADT's on Apollo Way was approximately 2,500-vpd north of Grant Street. In addition, ADT volumes of 1,400-vpd were extrapolated from the 6.5 hours of peak hour turning movement counts taken as part of this study.

Allard Street is a two-lane undivided north/south local residential roadway that intersects Grant Avenue to provide a conventional three legged "T" intersection from the north. The posted speed limit on Allard Street is 25 mph within the limits of the study area. The WisDOT Year 2009 AADT's on Allard Street was approximately 1,800-vpd north of Grant Street. In addition, ADT volumes of 2,300-vpd were extrapolated from the 6.5 hours of peak hour turning movement counts taken as part of this study.

VFW West Driveway is a two-lane divided access driveway to the VFW Park and the De Pere Senior Recreational facility that intersects Grant Avenue from the north. ADT volumes of 200-vpd were extrapolated from the 12 hours of peak hour turning movement counts taken as part of this study in early November of 2018.

High School West Driveway is a two-lane access driveway to the De Pere High School that intersects Grant Avenue from the south. ADT volumes of 1,200-vpd were extrapolated from the 12 hours of peak hour turning movement counts taken as part of this study in early November of 2018.

High School East Driveway is a two-lane access driveway to the De Pere High School that intersects Grant Avenue from the south. ADT volumes of 900-vpd were extrapolated from the 6.5 hours of peak hour turning movement counts taken as part of this study in early November of 2018.

6th Street is a two-lane undivided north/south access local collector street that intersects Grant Avenue from the south at a four legged two-way stop controlled intersection. The north leg of the intersection is a driveway that provides the eastern access to the VFW Park and the De Pere Senior Recreational facility. An additional parking lane is also provided along the west side of the street through the project limits. The posted speed limit on 6th Street is 25 mph within the limits of the study area. The WisDOT Year 2009 AADT's on 6th Street was approximately 2,300-vpd south of Grant Street and 1,100-vpd south of Helena Avenue. In addition, ADT volumes of 2,600-vpd to the south of Grant Street and 1,100-vpd to the south of Helena Avenue

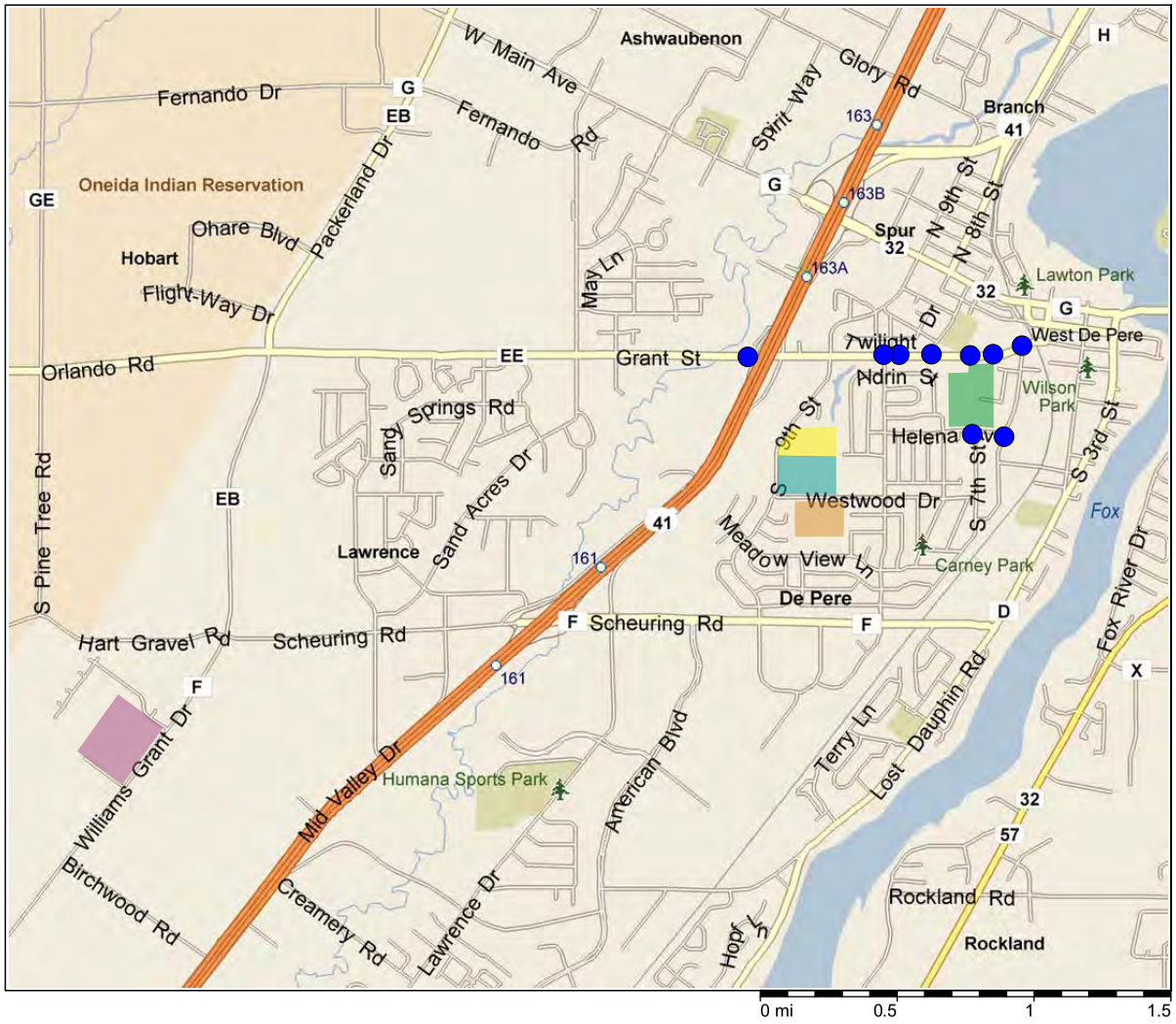
were extrapolated from the 6.5 hours of peak hour turning movement counts taken as part of this study.

Helena Street is a two-lane undivided east/west local residential roadway that intersects 6th Street to provide a conventional three legged "T" intersection from the west. The posted speed limit on Helena Street is 25 mph within the limits of the study area. The WisDOT Year 2018 AADT's on Helena Street was approximately 710-vpd west of 6th Street.

D2. Alternative Modes of Transportation

Sidewalks are provided along both sides of Grant Street from Mid Valley Drive to the east, through the project limits. With the exception of Mid Valley Drive, sidewalks are also provided along both sides of all other side streets within the limits of the study area intersections. No on-street bicycle facilities are provided along any of the roadways.

West De Pere, Wisconsin



LEGEND

- Study Intersection
- Proposed Intermediate School
- West De Pere High School
- West De Pere Middle School
- Westwood Elementary School
- Hemlock Creek Elementary School

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EXHIBIT 2-1
PROJECT OVERVIEW MAP

DEPERE, WISCONSIN

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N
NOT TO SCALE

EXHIBIT 2-2
PROJECT LOCATION AERIAL

DEPERE, WISCONSIN

bray architects
solid foundation. forward thinking.

Project #: 3273

Miron Building Excellence

Proposed Site Plan

SCALE: 1" = 140'-0"

West De Pere High School
De Pere, WI
August 9, 2018

TADI
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EXHIBIT 2-3
PROPOSED SCHOOL CONCEPTUAL SITE PLAN

DEPERE, WISCONSIN

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, posted speed limits, and approximate intersection spacing.

PART B – TRAFFIC VOLUMES

The weekday morning school arrival and weekday afternoon school discharge peak hours are expected to drive the improvements needed to adequately accommodate the high school expansion, as they represent the highest trip generation for the site. Therefore, in mid-November of 2018, Traffic Analysis & Design, Inc. conducted weekday morning (6:00 to 8:30 am) and weekday afternoon (2:00 to 6:00 pm) turning movement traffic counts at the Grant Street intersection with the east driveway. In addition, a full twelve hour (6:00 am to 6:00 pm) turning movement traffic count was conducted at the Grant Street intersection with the west driveway. Weekday morning (6:00 to 8:30 am) and weekday afternoon (2:00 to 6:00 pm) turning movement traffic counts were also conducted in mid-November of 2018 at the nine other study area intersections previously identified in this report.

Based on the turning movement counts; the weekday morning and weekday afternoon peak school hours were identified as being 7:00 to 8:00 am and 2:45 to 3:45 pm; respectively. These peak hours coincide with the school start and end times of 7:35 am and 2:45 pm, respectively. The existing traffic volumes balanced along the study area corridors are shown in Exhibit 3-2. The traffic counts used to determine peak hour factors and truck percentages have been included in the appendix of this study.

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), *6th 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. 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 – No Modifications

Exhibit 3-3 shows the existing traffic peak hour operating conditions at the study area intersections. The existing traffic analysis was conducted using the existing lane configurations shown in Exhibit 3-1 and the existing traffic volumes shown in Exhibit 3-2.

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 and weekday evening peak periods except:

- the southbound left-turn and through movements at the Grant Street intersection with Mid Valley Drive;
- the northbound left-turn movements at the Grant Street intersection with Suburban Drive; and
- the southbound left-turn movements at the Grant Street intersection with Apollo Way.

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
- On-site development information – Bray Architects and West De Pere School District
- Off-site development information – Bray Architects and West De Pere School District

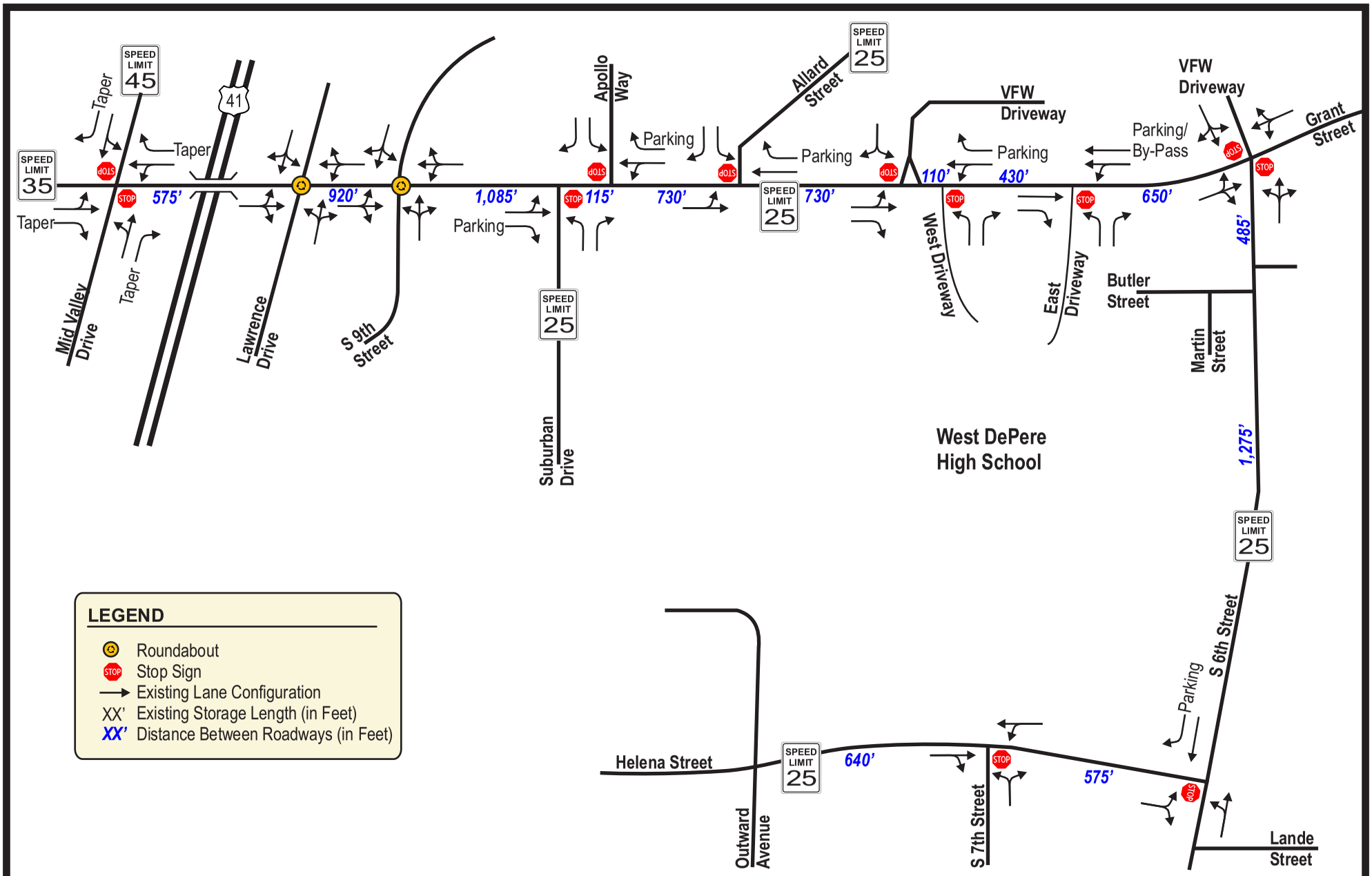

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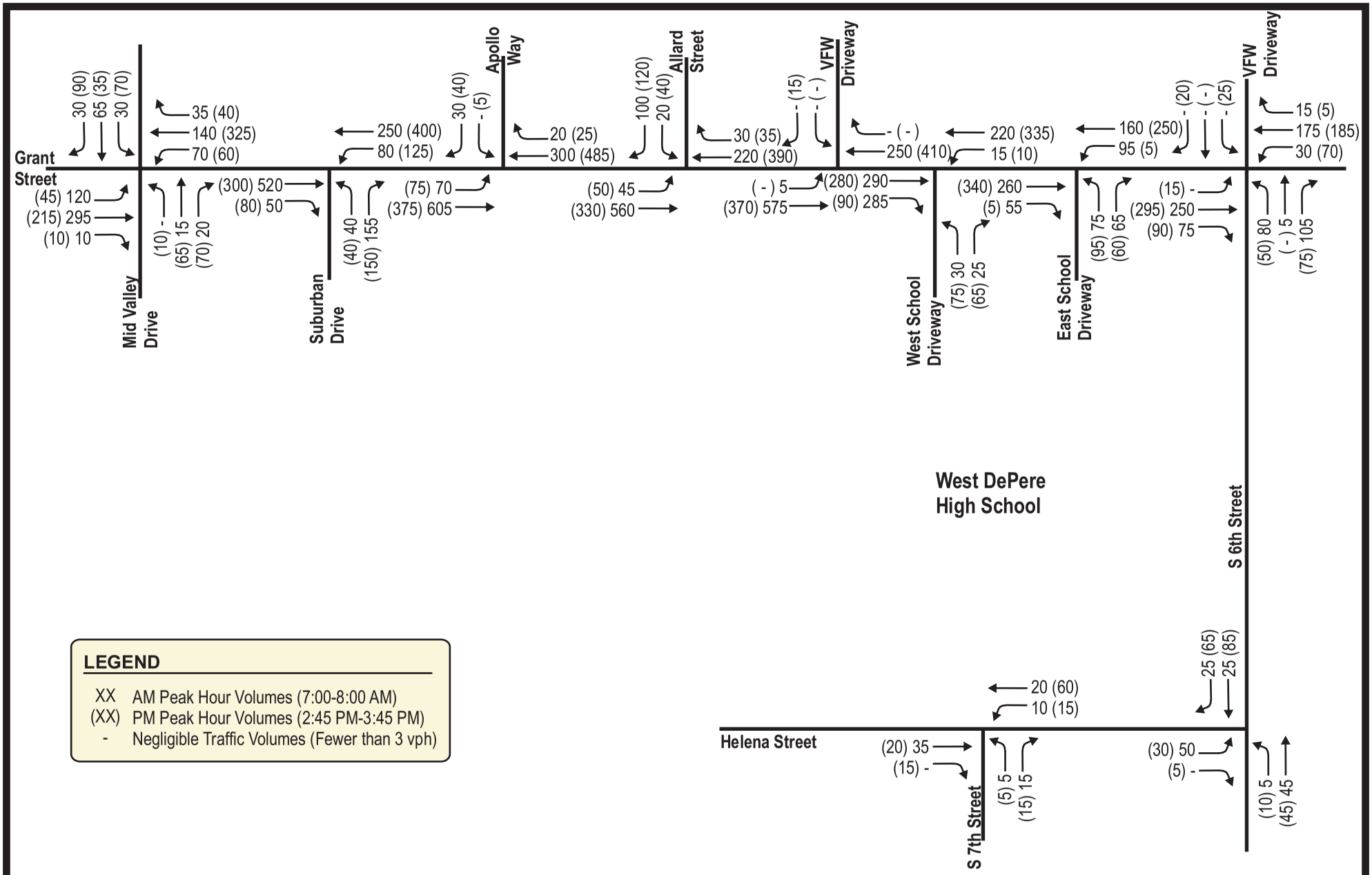
EXHIBIT 3-1
EXISTING TRANSPORTATION DETAIL

DEPERE, WISCONSIN



LEGEND

XX	AM Peak Hour Volumes (7:00-8:00 AM)
(XX)	PM Peak Hour Volumes (2:45 PM-3:45 PM)
-	Negligible Traffic Volumes (Fewer than 3 vph)

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EXHIBIT 3-2
YEAR 2019 EXISTING TRAFFIC VOLUMES

DEPERE, WISCONSIN

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

Intersection	Peak Hour		Level of Service per Movement by Approach												Intersection Level of Service
			Eastbound			Westbound			Northbound			Southbound			
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
#100 - Grant Street & Mid Valley Drive Two-Way Stop Control	AM	LOS	A		*	A		*	C		B	E		A	A
		Delay	8		*	8		*	25		10	38		9	
		Queue	25		*	25		*	25		25	65		25	
	PM	LOS	A		*	A		*	D		B	E		B	A
		Delay	8		*	8		*	27		10	47		11	
		Queue	25		*	25		*	35		25	80		25	
#200 - Grant Street & Suburban Drive One-Way Stop Control	AM	LOS	-	*	*	B		A	E	-	C	-			A
		Delay	-	*	*	10		0	43	-	22	-			
		Queue	-	*	*	25		0	40	-	70	-			
	PM	LOS	-	*	*	A		A	D	-	B	-			A
		Delay	-	*	*	9		0	31	-	12	-			
		Queue	-	*	*	25		0	25	-	25	-			
#300 - Grant Street & Apollo Way One-Way Stop Control	AM	LOS	A		A	-	*	*	-			E	-	B	A
		Delay	8		0	-	*	*	-			35	-	11	
		Queue	25		0	-	*	*	-			25	-	25	
	PM	LOS	A		A	-	*	*	-			D	-	B	A
		Delay	9		0	-	*	*	-			25	-	13	
		Queue	25		0	-	*	*	-			25	-	25	
#400 - Grant Street & Allard Street One-Way Stop Control	AM	LOS	A		A	-	*	*	-			D	-	B	A
		Delay	8		0	-	*	*	-			33	-	11	
		Queue	25		0	-	*	*	-			25	-	25	
	PM	LOS	A		A	-	*	*	-			C	-	B	A
		Delay	9		0	-	*	*	-			23	-	13	
		Queue	25		0	-	*	*	-			25	-	25	
#500 - Grant Street & VFW D/W One-Way Stop Control	AM	LOS	A		A	-	*	*	-			C	-	A	A
		Delay	8		0	-	*	*	-			19	-	0	
		Queue	0		0	-	*	*	-			0	-	0	
	PM	LOS	A		A	-	*	*	-			B	-	A	A
		Delay	9		0	-	*	*	-			14	-	0	
		Queue	0		0	-	*	*	-			25	-	0	
#600 - Grant Street & West D/W One-Way Stop Control	AM	LOS	-	*	*	B		-	C	-	B	-			A
		Delay	-	*	*	10		-	19	-	11	-			
		Queue	-	*	*	25		-	25	-	25	-			
	PM	LOS	-	*	*	A		-	D	-	B	-			A
		Delay	-	*	*	9		-	27	-	12	-			
		Queue	-	*	*	25		-	50	-	25	-			
#700 - Grant Street & East D/W One-Way Stop Control	AM	LOS	-	*	*	A		-	D	-	B	-			A
		Delay	-	*	*	9		-	33	-	12	-			
		Queue	-	*	*	25		-	60	-	25	-			
	PM	LOS	-	*	*	A		-	C	-	B	-			A
		Delay	-	*	*	8		-	25	-	13	-			
		Queue	-	*	*	0		-	50	-	25	-			
#800 - Grant Street & 6th Street/VFW D/W Two-Way Stop Control	AM	LOS	A			A			C			C			A
		Delay	8			8			22			15			
		Queue	0			25			80			0			
	PM	LOS	A			A			C			C			A
		Delay	8			9			21			20			
		Queue	0			25			50			25			
#900 - Helena Street & 7th Street Two-Way Stop Control	AM	LOS	A			A			A			-			A
		Delay	0			8			9			-			
		Queue	0			0			25			-			
	PM	LOS	A			A			A			-			A
		Delay	0			7			9			-			
		Queue	0			25			25			-			
#950 - 6th Street & Helena Street One-Way Stop Control	AM	LOS	A			-			A		-	-	*	*	A
		Delay	9			-			9		-	-	*	*	
		Queue	0			-			25		-	-	*	*	
	PM	LOS	B			-			A		-	-	*	*	A
		Delay	10			-			8		-	-	*	*	
		Queue	25			-			0		-	-	*	*	

(-) movement that isn't available or allowed * free flow movement

EXHIBIT 3-3
YEAR 2019 EXISTING TRAFFIC OPERATIONS
WITHOUT MODIFICATIONS
DEPERE, WISCONSIN

TADI TRAFFIC ANALYSIS & DESIGN, INC.
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CHAPTER IV – FORECASTED TRAFFIC

PART A – BACKGROUND TRAFFIC FORECASTING

The high school expansion is expected to generate less than 500 new trips during the peak hours; therefore, future year forecasts were not developed for this abbreviated TIA.

PART B – SITE TRAFFIC FORECASTING

B1. On-Site Trip Generation

To address any potential future traffic impacts along study area roadways and at the intersections adjacent to the proposed school expansion, it is necessary to identify the hourly and daily volume of traffic generated by the high school. The current ***weekday peak hour*** traffic volumes at the existing high school were determined based on turning movement counts taken at the existing high school driveways over several typical weekdays during mid-November. A summary of the actual counts are shown on Exhibit 3-2. In addition, ***the weekday daily traffic*** at the existing high school was extrapolated from the peak hour and 13-hour turning movement counts taken at the two driveways. The existing trip generation for the current high school student population is shown in Exhibit 4-3A.

As shown in Exhibit 4-3A, the existing high school is currently generating approximately 650 trips (455 entering/195 exiting) during a typical weekday morning peak hour for the current student/staff population. During a typical weekday evening peak hour, the existing high school is currently generating 385 new trips (90 entering/295 exiting) for the current student/staff population. On a typical weekday, the existing high school is currently generating approximately 2,010 new trips (1,005 entering/1,005 exiting) for the current student/staff population under existing conditions.

The expected future new trips (students and staff) for the planned expansion were calculated by factoring the existing traffic volumes (which included students and staff) by the expected percentage increase in student population (taken from the West De Pere School District Community Growth and Projections Report; dated February 2018). It is noted that the anticipated student population growth over the next 10 to 15 years is expected to be approximately 50 percent which equates to a student population increase of an additional 461 students.

As shown in Exhibit 4-3B, utilizing the actual trips (students and staff) counted at the existing high school and increasing those trips by the anticipated 50-percent growth to account for the expected increase in campus population (students and staff), the expansion is expected to generate approximately 330 additional trips (230 entering/100 exiting) during a typical weekday morning peak hour. During a typical weekday evening peak hour, the proposed school expansion is expected to generate 195 additional trips (45 entering/150 exiting). On a typical weekday, the proposed school expansion is expected to generate approximately 1,010 additional trips (505 entering/505 exiting) under full build conditions. The expected growth at the high school is included in the on-site development traffic volumes.

B2. Off-Site Trip Generation

It is noted that the trip generation rates as published in the Institute of Transportation Engineer's (ITE) *Trip Generation Manual, 10th Edition, 2017* for a high school land use were compared the rates calculated from the existing traffic counts completed as part of this project as described in the previous section. As shown on the trip generation table included in the appendix of this report, the calculated rates are very similar to the actual rates. Therefore, the ITE rates in this school district seem to be consistent with the national averages.

Therefore, the traffic volumes expected to be generated by the proposed intermediate school are based on the trip rates for a middle school as published in the *ITE Trip Generation Manual, 10th Edition, 2017*. Trip rates were calculated based on the peak hour of generator instead of the peak hour of adjacent street traffic to account for the worst case school traffic conditions. The proposed intermediate school full build trip generation table is shown in Exhibit 4-3C.

As shown in Exhibit 4-3C, the proposed intermediate school is expected to generate 240 new trips (130 entering/110 exiting) during a typical weekday morning peak hour. During a typical weekday afternoon peak hour, the proposed intermediate school is expected to generate 115 new trips (55 entering/60 exiting). On a typical weekday, the proposed intermediate school is expected to generate approximately 910 new trips (455 entering/455 exiting) under full build conditions.

B3. Mode Split

Pedestrians and bicyclists users are expected to continue to use their respective modes to access the high school expansion; however, based on the West De Pere School District Community Growth and Projections Report; dated February 2018, even though anticipated growth for the expansion is expected to occur throughout the entire district; the most significant increases are expected within two areas (to the southwest and south of the school) which are both at least 3 miles from the high school. Therefore, for the purpose of this TIA, all trips to/from the proposed high school expansion were assumed to occur via motor vehicle.

B4. Trip Distribution

The trip distribution for the proposed high school expansion, listed below and shown in table format in Exhibits 4-3B, was determined based on the existing traffic counts conducted at the existing high school and the West De Pere School District Community Growth and Projections Report; dated February 2018. It is noted that the anticipated student population growth is expected throughout the entire district; however, two areas (to the southwest and south of the school) are expected to see the most significant increases.

- 1-percent to/from the east on Grant Street
- 45-percent to/from the west on Grant Street
- 35-percent to/from the south on South 6th Street
- 2-percent to/from the north on Allard Street
- 2-percent to/from the north on Apollo Way
- 7-percent to/from the south on Lawrence Drive or South 9th Street
- 5-percent to/from the north on Mid Valley Drive
- 3-percent to/from the south on Mid Valley Drive

The trip distribution for the proposed intermediate school expansion, listed below and shown in table format in Exhibits 4-3C, was determined based on the West De Pere School District Community Growth and Projections Report; dated February 2018. It is noted that the anticipated student population growth is expected throughout the entire district; however, two areas (to the southwest and south of the school) are expected to see the most significant increases.

- 0-percent to/from the east on Grant Street
- 28-percent to/from the west on Grant Street

- 72-percent to/from the south of the school along other non-study area intersections

Maps showing the growth areas for the high school and intermediate school expansions, taken from the aforementioned report, are included in the appendix of this report.

B5. Trip Assignment

As previously discussed, several access options are being evaluated as part of this study; specifically:

> *Access Option 1A – Utilize the two current access driveways located along Grant Street.*
>
> *Access Option 1B – Similar to Option 1A; however, under this access option, the intersection of Grant Street at Apollo Way is removed with traffic utilizing adjacent intersections to access Grant Street.*
>
> *Access Option 2A – In addition to the two current access driveways located along Grant Street, an additional access driveway would be included along Helena Street. The access along Helena Street would operate as a full access driveway during all hours of the day under this scenario.*
>
> *Access Option 2B – Similar to Option 2A; however, under this access option, the access along Helena Street would operate as a bus/staff only access under this scenario.*
>
> *Access Option 2C – Similar to Option 2A; however, under this access option, the intersection of Grant Street at Apollo Way is removed with traffic utilizing adjacent intersections to access Grant Street.*
>
> *Access Option 3A – In addition to the two current access driveways located along Grant Street, an additional access driveway would be included along Butler Street. The access along Butler Street would operate as an entrance and exit access under this scenario.*
>
> *Access Option 3B – Similar to Option 3A, an additional access driveway would be included along Butler Street. However, under this access option, the access along Butler Street would operate as an exit only access under this scenario.*

The proposed high school expansion new trips with access to the site as it currently exists (Access Option 1A) were assigned to the study area and are shown in Exhibit 4-5A. The proposed intermediate school expansion new trips were assigned to the study area and are shown in Exhibit 4-5B. The proposed school expansion new trips with an additional full access along Helena Street (Access Option 2A) are shown in Exhibit 4-5C. The proposed school expansion new trips with an additional full access along Butler Street (Access Option 3A) are shown in Exhibit 4-5D and the proposed school expansion new trips with the additional access along Butler Street as an exit only access (Access Option 3B) are shown in Exhibit 4-5E. With a new southern connection at Helena Street, the existing high school traffic patterns along 6th Street are expected to change with some of the school traffic expected to divert to Helena Street. The redistributed trips with a new southern connection at Helena Street are shown in Exhibit 4-5F. The redistributed trips with a bus/staff only additional full access along Helena Street (Access Option 2B) are shown in Exhibits 4-5G&H.

Under all access options, the City of De Pere has requested an additional scenario be analyzed looking at removing the Apollo Way access onto Grant Street. This intersection currently operates as a one-way stop intersection from the north; however, with the Suburban Drive intersection located approximately 100 feet to the west, these two intersections (Apollo Way from the north and Suburban Drive from the south) operate as a single offset intersection which is not an ideal design from a safety perspective. Therefore, the existing traffic patterns with Apollo Way intersection removed will change with much of the traffic from Apollo Way expected to divert to

Allard Street. The redistributed trips with Apollo Way intersection at Grant Street removed are shown in Exhibit 4-5J.

PART C – BUILD TRAFFIC

The proposed school full build traffic volumes with access to the site as it currently exists (Access Option 1A) were calculated by adding the proposed high school expansion new trips (Exhibit 4-5A) to the proposed intermediate school expansion new trips (Exhibit 4-5B) and the existing traffic volumes (Exhibit 3-2). The proposed school full build traffic volumes with access to the site as it currently exists (Access Option 1A) are shown in Exhibit 4-11A.

Under the additional access scenario, with the Apollo Way intersection at Grant Street removed, the proposed school full build traffic volumes were calculated by adding the proposed school full build traffic volumes with access to the site as it currently exists (Access Option 1B), shown in Exhibit 4-11A, to the redistributed trips with Apollo Way intersection at Grant Street removed (Exhibit 4-5J). The proposed school full build traffic volumes, with Apollo Way intersection at Grant Street removed, are shown in Exhibit 4-11B.

The proposed school full build traffic volumes with an additional full access along Helena Street (Access Option 2A) were calculated by adding the proposed high school expansion new trips with an additional full access along Helena Street (Exhibit 4-5C) to the proposed intermediate school expansion new trips (Exhibit 4-5B) and the redistributed trips with a new southern connection at Helena Street (Exhibit 4-5F) and the existing traffic volumes (Exhibit 3-2). The proposed school full build traffic volumes with an additional full access along Helena Street (Access Option 2A) are shown in Exhibit 4-11C.

The proposed school full build traffic volumes with a bus/staff only additional full access along Helena Street (Access Option 2B) were calculated by adding the proposed high school expansion new trips (Exhibit 4-5A) to the proposed intermediate school expansion new trips (Exhibit 4-5B) and the redistributed bus trips with a new southern connection at Helena Street (Exhibit 4-5G) and the redistributed staff trips with a new southern connection at Helena Street (Exhibit 4-5H) and the existing traffic volumes (Exhibit 3-2). The proposed school full build traffic volumes with a bus/staff only additional full access along Helena Street (Access Option 2B) are shown in Exhibit 4-11D.

Under Scenario 2, with the Apollo Way intersection at Grant Street removed, the proposed school full build traffic volumes with an additional full access along Helena Street (Access Option 2C) were calculated by adding the proposed high school expansion new trips with an additional full access along Helena Street (Exhibit 4-5C) to the proposed intermediate school expansion new trips (Exhibit 4-5B) and the redistributed trips with a new southern connection at Helena Street (Exhibit 4-5F) to the redistributed trips with Apollo Way intersection at Grant Street removed (Exhibit 4-5J) and the existing traffic volumes (Exhibit 3-2). The proposed school full build traffic volumes with an additional full access along Helena Street (Access Option 2C) and with the Apollo Way intersection at Grant Street removed are shown in Exhibit 4-11E.

The proposed school full build traffic volumes with an additional full access along Butler Street (Access Option 3A) were calculated by adding the proposed high school expansion new trips with an additional full access along Butler Street (Exhibit 4-5D) to the proposed intermediate school expansion new trips (Exhibit 4-5B) and to the existing traffic volumes (Exhibit 3-2). The proposed school full build traffic volumes with an additional full access along Butler Street (Access Option 3A) are shown in Exhibit 4-11F.

The proposed school full build traffic volumes with the additional access along Butler Street as an exit only access (Access Option 3B) were calculated by adding the proposed high school

expansion new trips with the additional access along Butler Street as an exit only access (Exhibit 4-5E) to the proposed intermediate school expansion new trips (Exhibit 4-5B) and to the existing traffic volumes (Exhibit 3-2). The proposed school full build traffic volumes with the additional access along Butler Street as an exit only access (Access Option 3B) are shown in Exhibit 4-11G.

Exhibit 4-3A
On-Site (Existing Campus) Trip Generation Table

Land Use	ITE Code	Proposed Size	Weekday Daily	AM Peak			PM Peak		
				In	Out	Total	In	Out	Total
High School (Existing)	TADI	959 Students	2,010	455 (70%)	195 (30%)	650	90 (23%)	295 (77%)	385
Total New Trips			**2,010**	**455**	**195**	**650**	**90**	**295**	**385**

Peak Hour volumes determined based on turning movmenet counts taken at both school driveways during typical weekday.
Weekday daily based on traffic counts taken at west driveway (6:00am to 5:00pm) and east driveway (6:00am to 8:30am and 2:00pm to 6:00pm) - total counted volume extrapolated to determine daily volume.

Exhibit 4-3B
On-Site (Expansion only) Trip Generation Table

Land Use	ITE Code	Proposed Size	Weekday Daily	AM Peak			PM Peak		
				In	Out	Total	In	Out	Total
High School (Expansion)	TADI	461 Students	1,010	230 (70%)	100 (30%)	330	45 (23%)	150 (77%)	195
Total New Trips			**1,010**	**230**	**100**	**330**	**45**	**150**	**195**

School expansion daily and peak hour volumes extrapolated from existing traffic counts based on expected increase in school population. Growth factor source: West De Pere School District Community Growth and Projections Report; February 2018.

TRIP DISTRIBUTION

East on Grant Street	1%	10	0	0	0	0	0	0
West on Grant Street	45%	450	105	50	155	20	65	85
South on 6th Street	35%	360	85	35	120	15	50	65
South on Suburban Drive	0%	0	0	0	0	0	0	0
North on Allard Street	2%	20	5	0	5	0	5	5
North on Apollo Way	2%	20	5	0	5	0	5	5
North on Lawrence Drive/9th Street	0%	0	0	0	0	0	0	0
South on Lawrence Drive/9th Street	7%	70	15	5	20	5	10	15
North on Mid Valley Drive	5%	50	10	5	15	5	10	15
South on Mid Valley Drive	3%	30	5	5	10	0	5	5
	100%	***1010***	***230***	***100***	***330***	***45***	***150***	***195***

Exhibit 4-3C

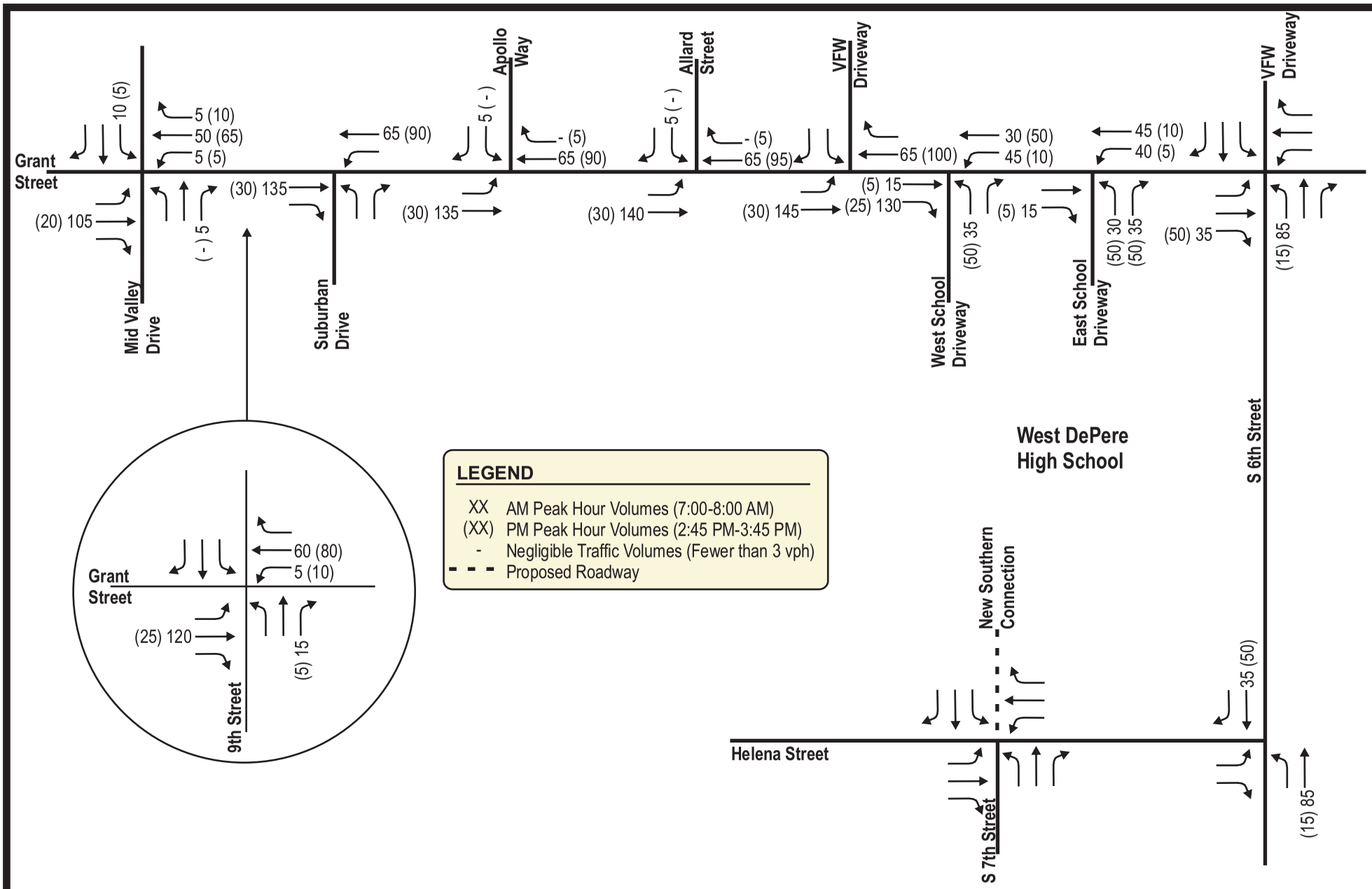
Off-Site (Intermediate School Expansion only) Trip Generation Table

Land Use	ITE Code	Proposed Size	Weekday Daily	AM Peak In	AM Peak Out	AM Peak Total	PM Peak In	PM Peak Out	PM Peak Total
Intermediate School (New - 5th & 6th grades)	522	453 Students	1,140 FCE	175 (55%)	140 (45%)	315 FCE	70 (46%)	80 (54%)	150 FCE
Total New Trips			**1,140**	**175**	**140**	**315**	**70**	**80**	**150**

Trip generation based on fitted curve equations per the ITE Trip Gen Manual 10th Edition, 2017
Projected future 5th grade class = 350 students, current class is 146 (Hemlock) + 125 (Westwood); expansion of Westwood 79
Projected future 6th grade class = 350 students, current class is 112 (Hemlock) + 122 (Westwood); expansion of Westwood 116
146+112+79+116 = 453 students

TRIP DISTRIBUTION

East on Grant Street	0%	0	0	0	0	0	0	0
West on Grant Street	28%	320	50	40	90	20	20	40
South of School (outside study int)	72%	820	125	100	225	50	60	110
	100%	***1140***	***175***	***140***	***315***	***70***	***80***	***150***

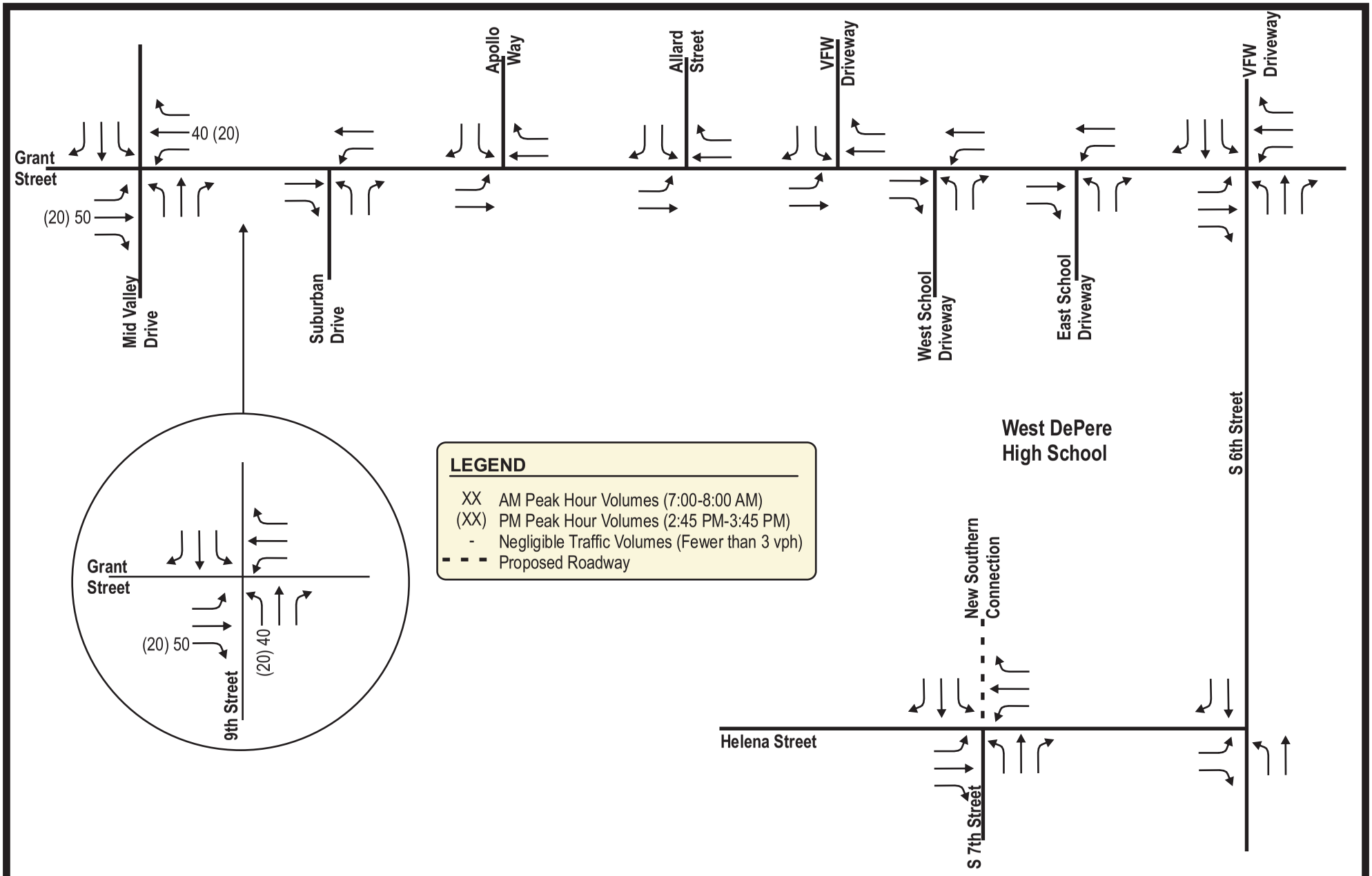


TADI
TRAFFIC ANALYSIS & DESIGN, INC.
2279: 6-28-19

N
NOT TO SCALE

EXHIBIT 4-5A
HIGH SCHOOL EXPANSION NEW TRIPS
EXISTING ACCESS

DEPERE, WISCONSIN



TRAFFIC ANALYSIS & DESIGN, INC.

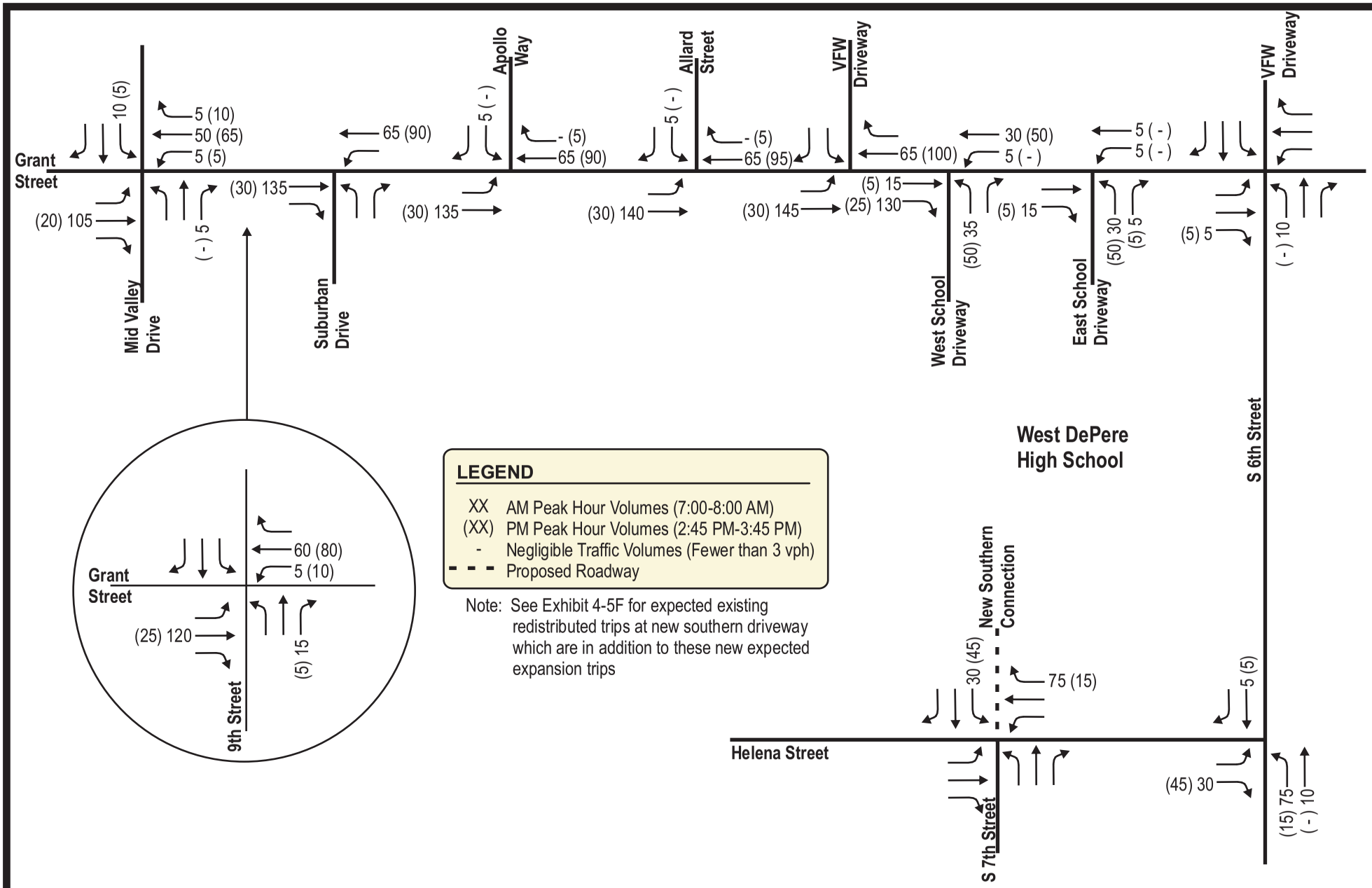
2279: 6-28-19

N

NOT TO SCALE

EXHIBIT 4-5B
INTERMEDIATE SCHOOL EXPANSION NEW TRIPS
EXISTING ACCESS

DEPERE, WISCONSIN

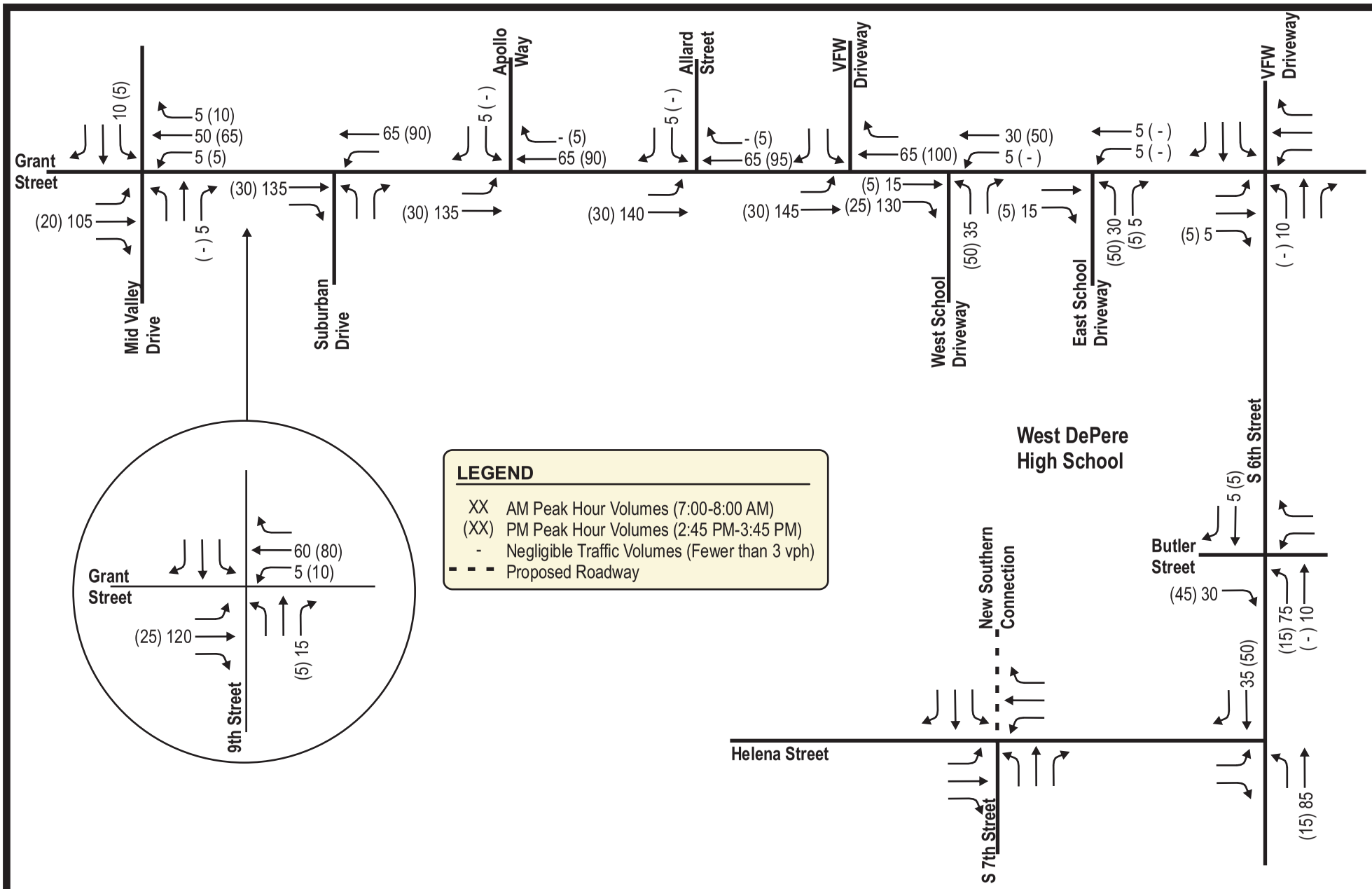


TRAFFIC ANALYSIS & DESIGN, INC.

2279: 6-28-19

EXHIBIT 4-5C
HIGH SCHOOL EXPANSION NEW TRIPS
NEW SOUTHERN ACCESS

DEPERE, WISCONSIN

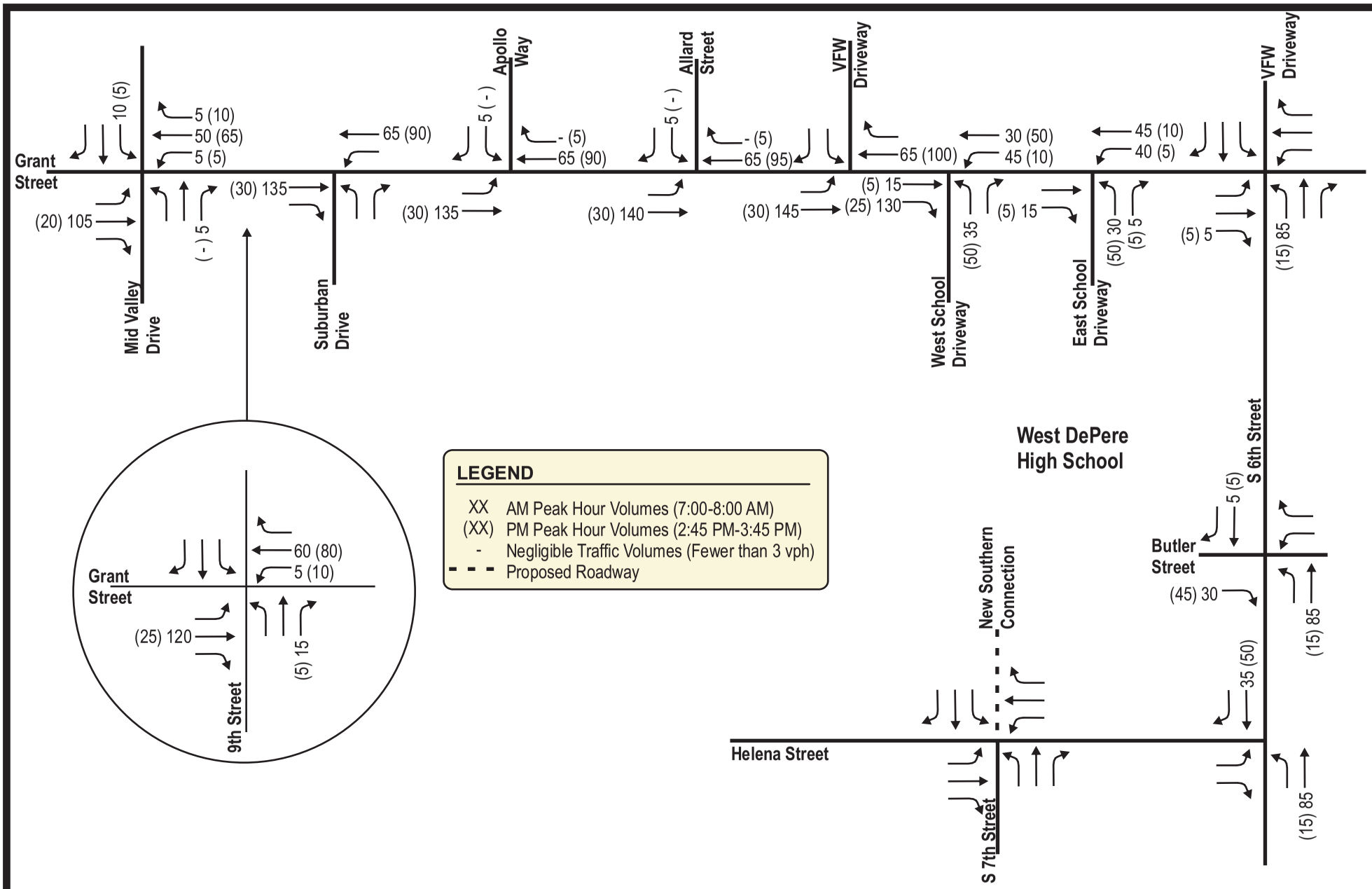


TADI
TRAFFIC ANALYSIS & DESIGN, INC.
2279: 6-28-19

N
NOT TO SCALE

EXHIBIT 4-5D
HIGH SCHOOL EXPANSION NEW TRIPS
NEW BUTLER STREET FULL ACCESS

DEPERE, WISCONSIN

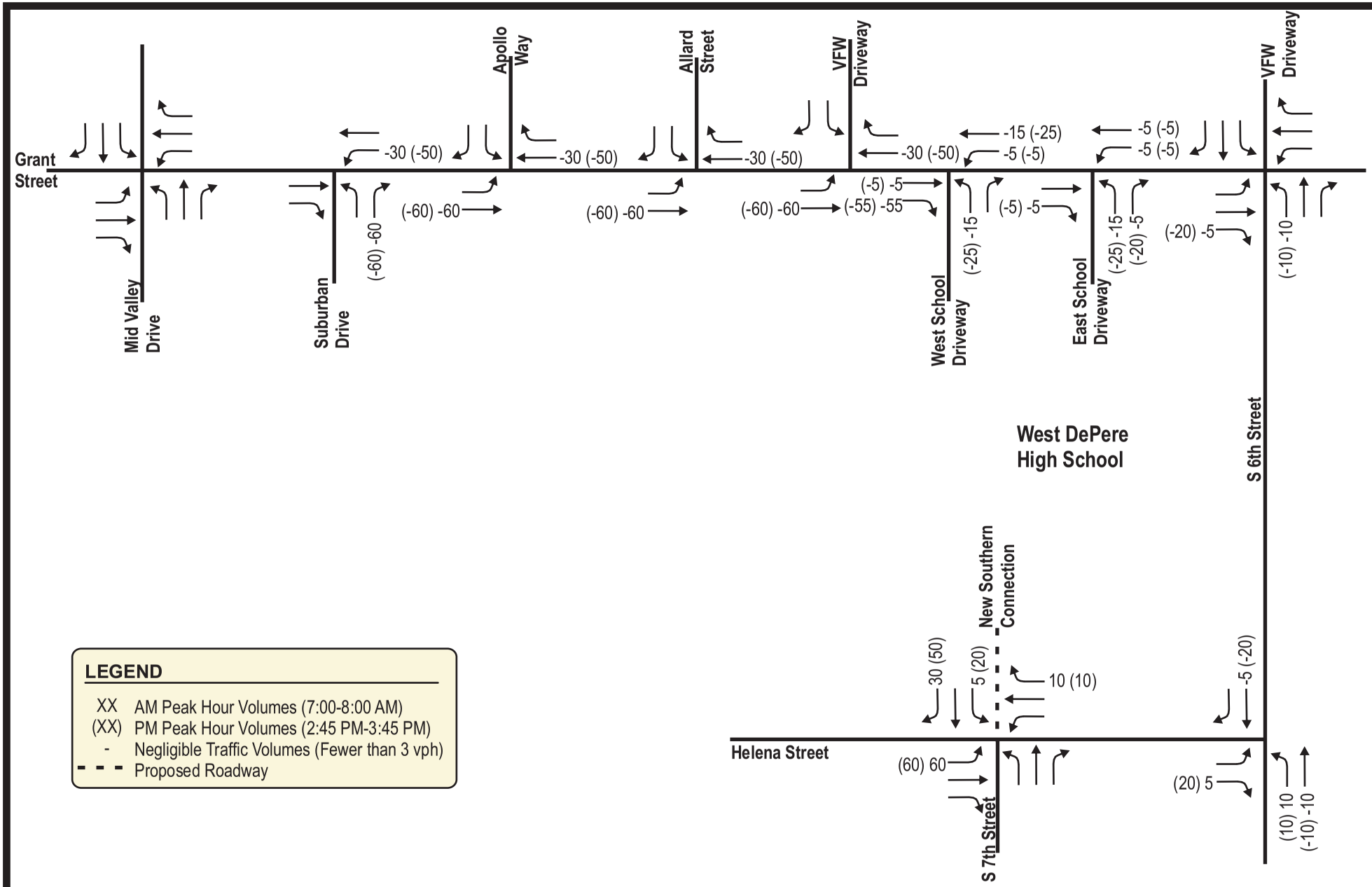


TADI
TRAFFIC ANALYSIS & DESIGN, INC.
2279: 6-28-19

N
NOT TO SCALE

EXHIBIT 4-5E
HIGH SCHOOL EXPANSION NEW TRIPS
NEW BUTLER STREET EXIT ONLY ACCESS

DEPERE, WISCONSIN

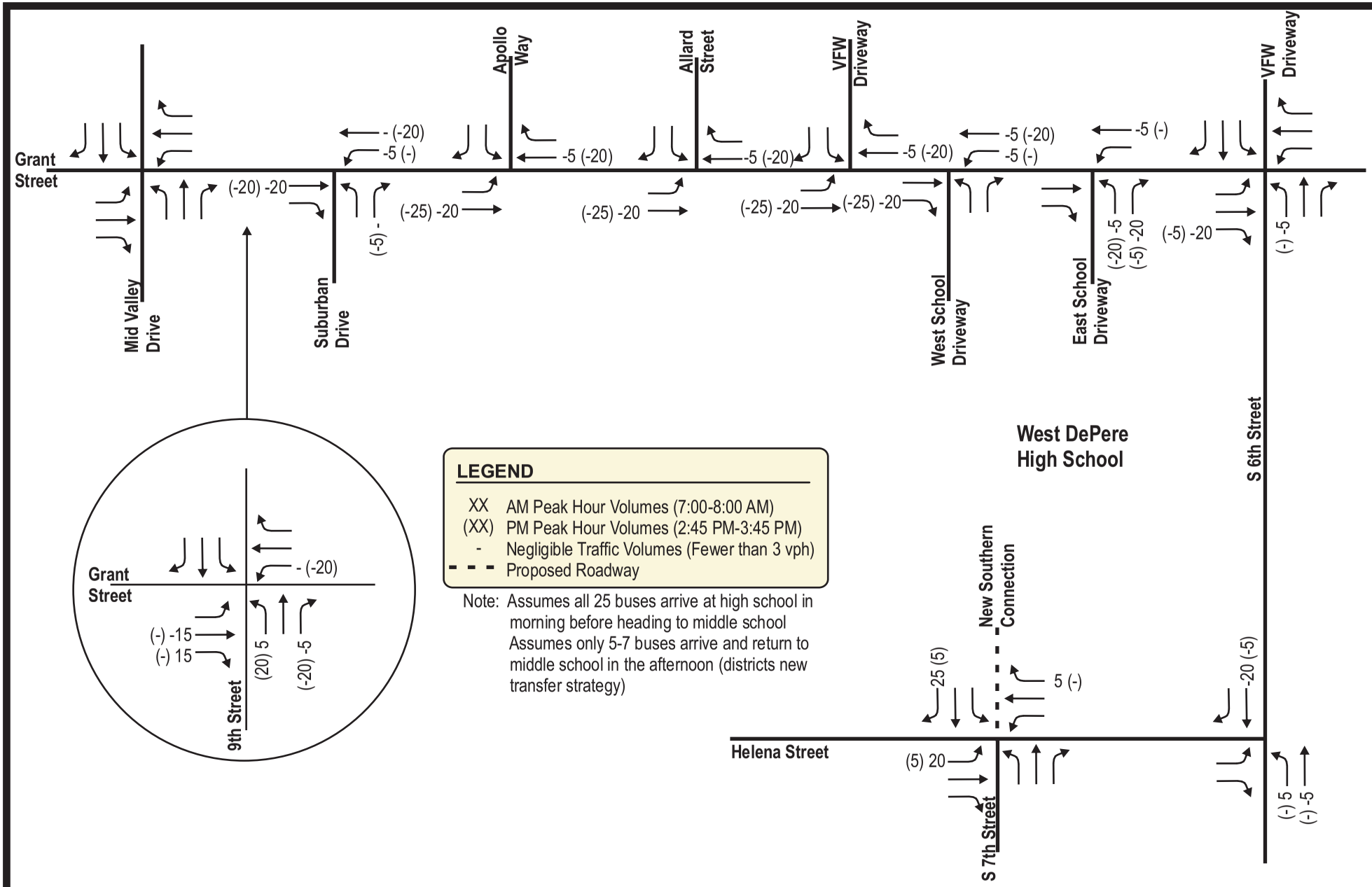


TADI
TRAFFIC ANALYSIS & DESIGN, INC.
2279: 6-28-19

N
NOT TO SCALE

EXHIBIT 4-5F
REDISTRIBUTED TRIPS
NEW SOUTHERN ACCESS

DEPERE, WISCONSIN

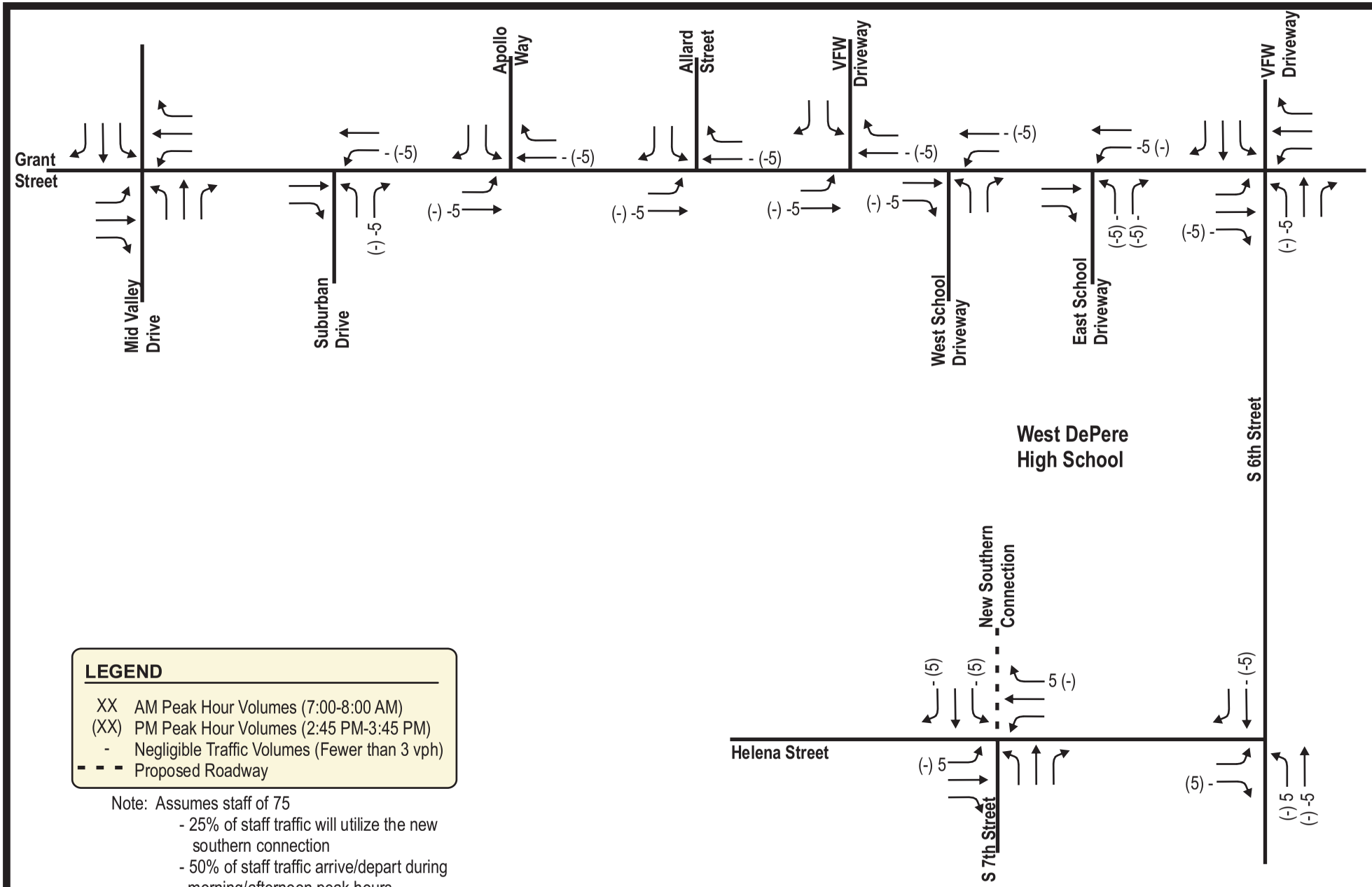


TADI
TRAFFIC ANALYSIS & DESIGN, INC.
2279: 6-28-19

N
NOT TO SCALE

EXHIBIT 4-5G
REDISTRIBUTED BUS TRIPS
NEW SOUTHERN ACCESS

DEPERE, WISCONSIN

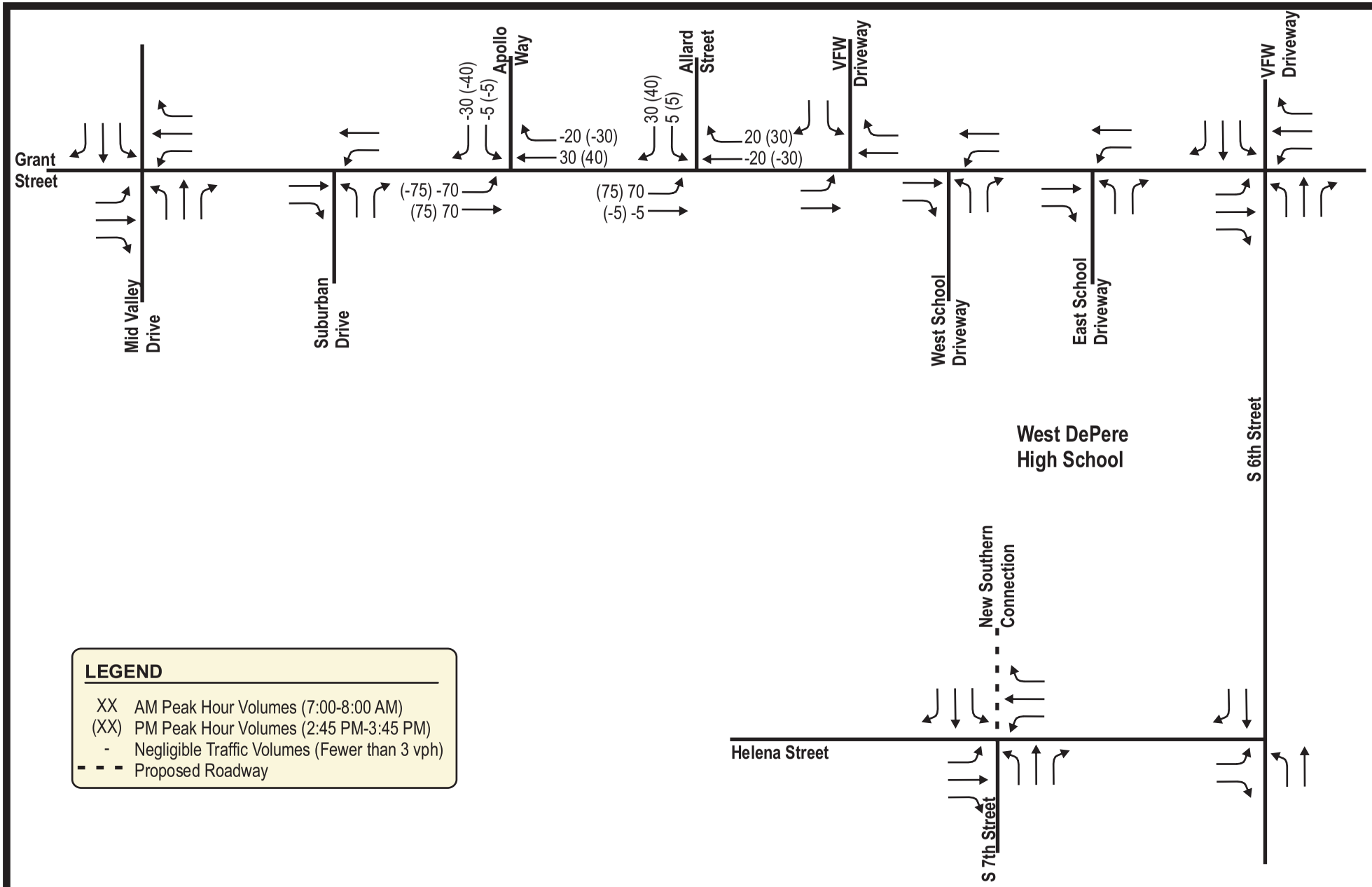


TRAFFIC ANALYSIS & DESIGN, INC.

2279: 6-28-19

EXHIBIT 4-5H
REDISTRIBUTED STAFF TRIPS
NEW SOUTHERN ACCESS

DEPERE, WISCONSIN

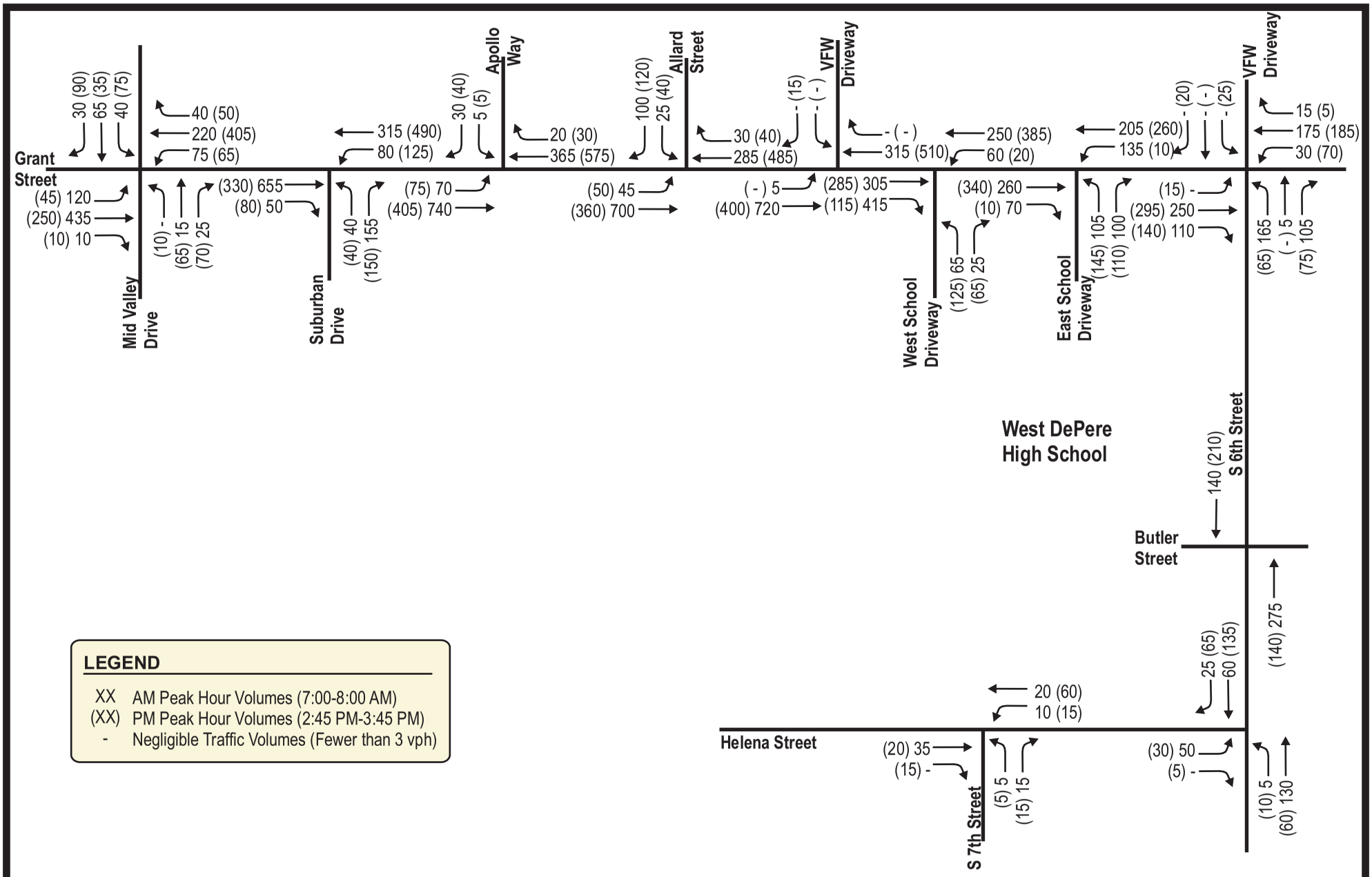


TADI
TRAFFIC ANALYSIS & DESIGN, INC.
2279: 6-28-19

N
NOT TO SCALE

EXHIBIT 4-5J
REDISTRIBUTED TRIPS
APOLLO WAY REMOVED

DEPERE, WISCONSIN



LEGEND

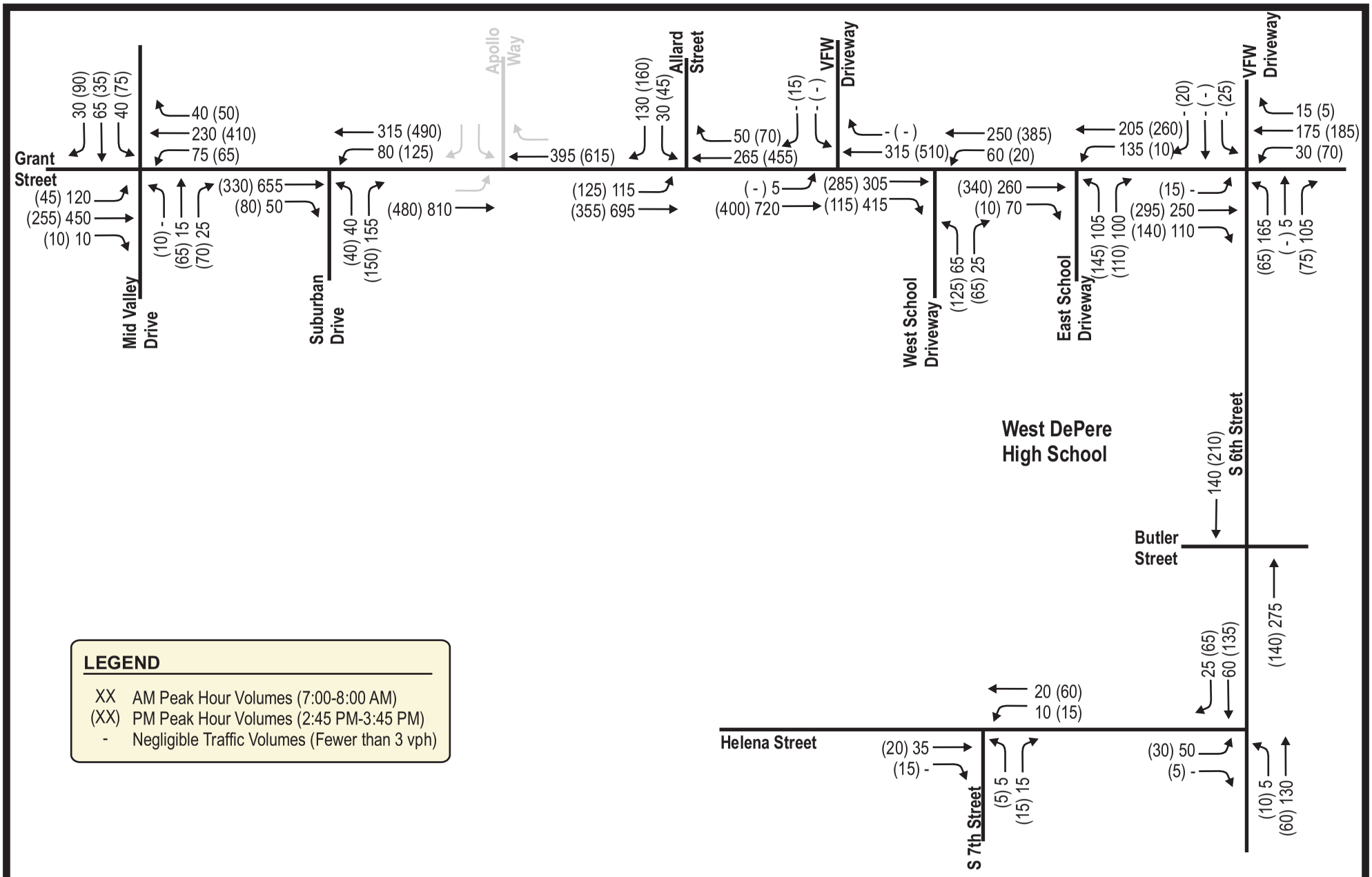
XX	AM Peak Hour Volumes (7:00-8:00 AM)
(XX)	PM Peak Hour Volumes (2:45 PM-3:45 PM)
-	Negligible Traffic Volumes (Fewer than 3 vph)

TADI
TRAFFIC ANALYSIS & DESIGN, INC.
2279: 6-28-19

N
NOT TO SCALE

EXHIBIT 4-11A
FULL BUILD TRAFFIC VOLUMES
OPTION 1A - EXISTING ACCESS

DEPERE, WISCONSIN



TADI TRAFFIC ANALYSIS & DESIGN, INC.

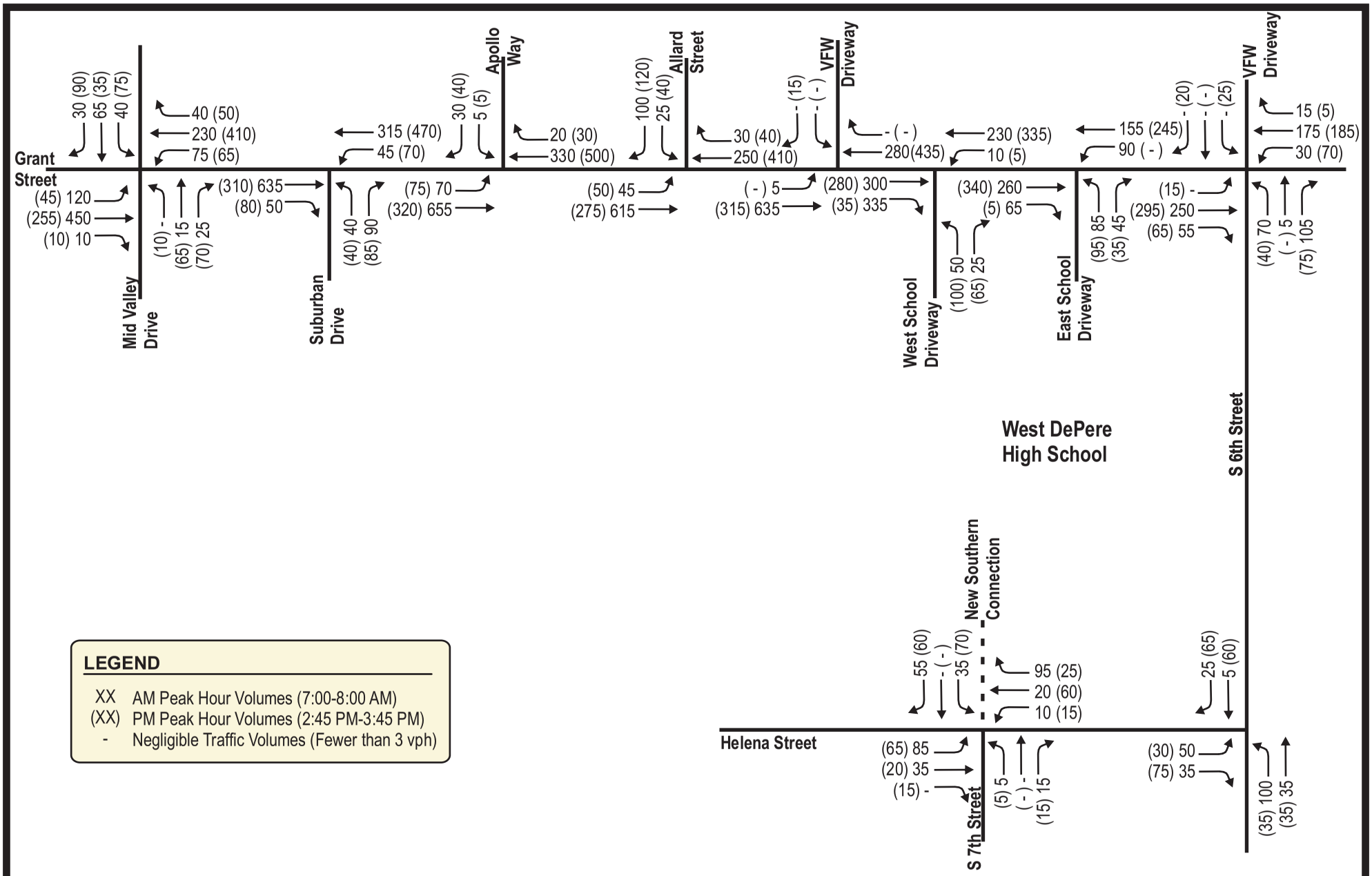
2279: 6-28-19

N

NOT TO SCALE

EXHIBIT 4-11B
FULL BUILD TRAFFIC VOLUMES
OPTION 1B - EXISTING ACCESS WITH APOLLO WAY REMOVED

DEPERE, WISCONSIN



LEGEND

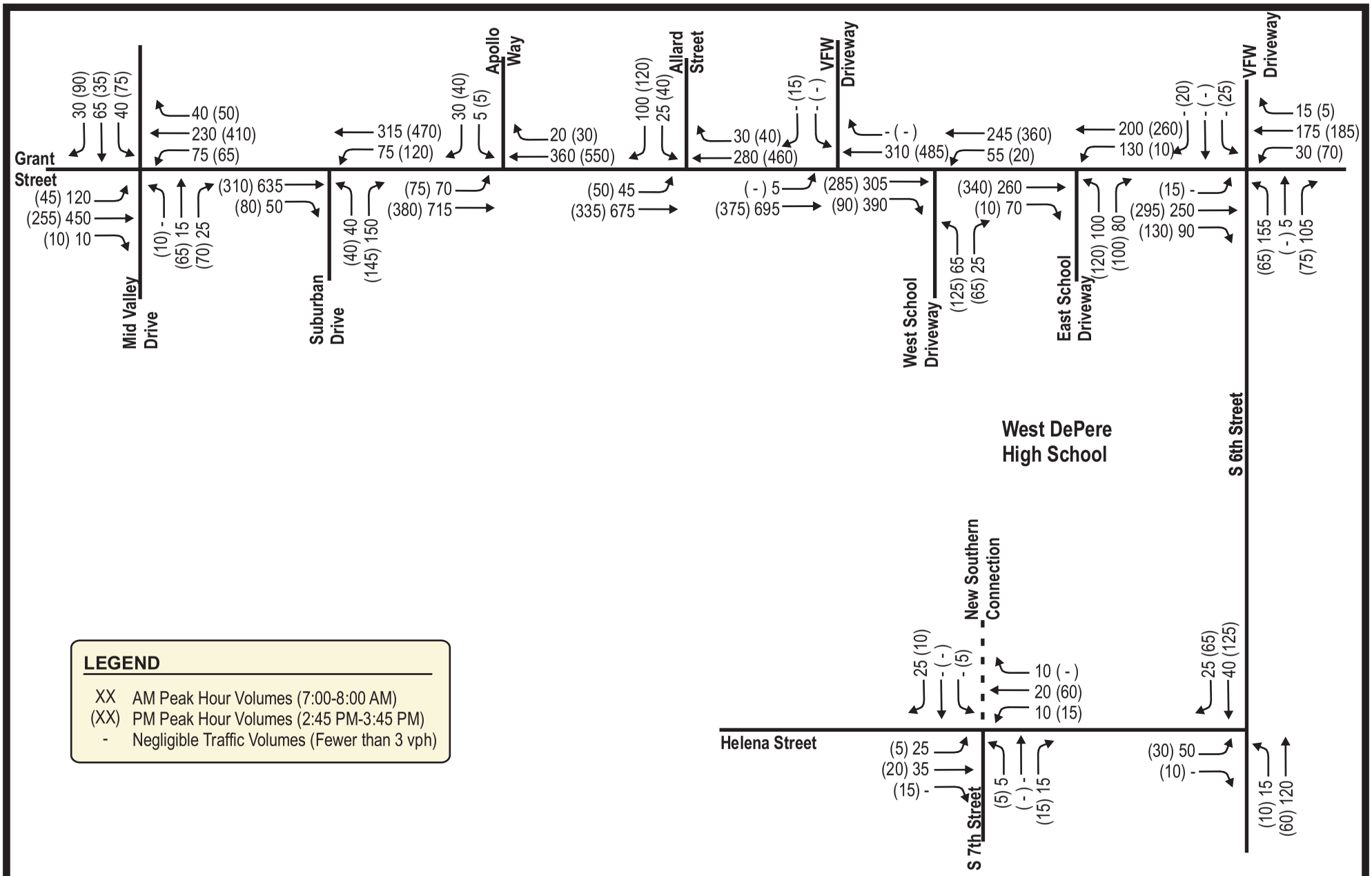
XX	AM Peak Hour Volumes (7:00-8:00 AM)
(XX)	PM Peak Hour Volumes (2:45 PM-3:45 PM)
-	Negligible Traffic Volumes (Fewer than 3 vph)

TADI
TRAFFIC ANALYSIS & DESIGN, INC.
2279: 6-28-19

N
NOT TO SCALE

EXHIBIT 4-11C
FULL BUILD TRAFFIC VOLUMES
OPTION 2A - WITH NEW SOUTHERN ACCESS

DEPERE, WISCONSIN



TRAFFIC ANALYSIS & DESIGN, INC.

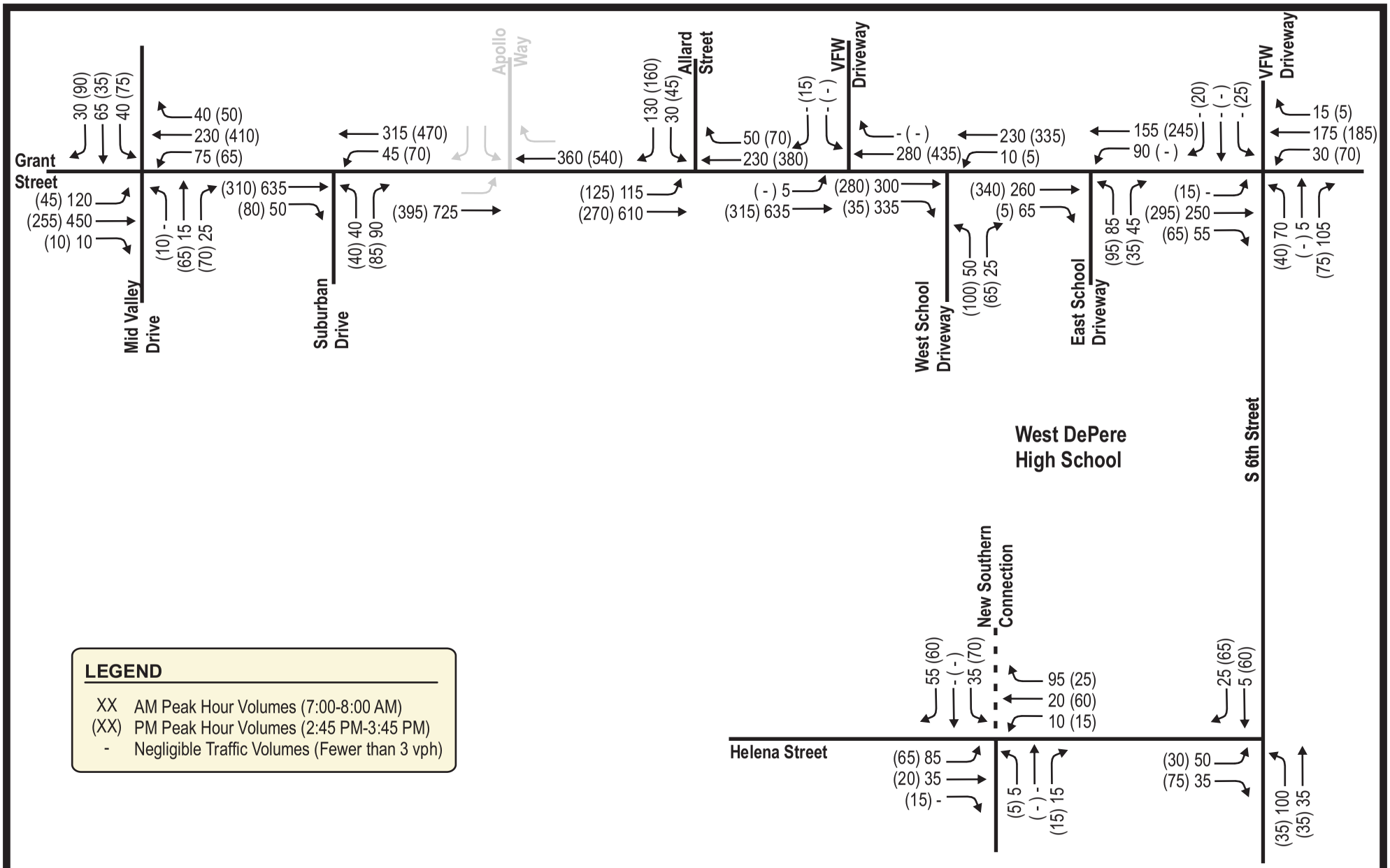
2279: 6-28-19

N

NOT TO SCALE

EXHIBIT 4-11D
FULL BUILD TRAFFIC VOLUMES
WITH NEW SOUTHERN ACCESS - BUS/STAFF ACCESS ONLY

DEPERE, WISCONSIN



LEGEND

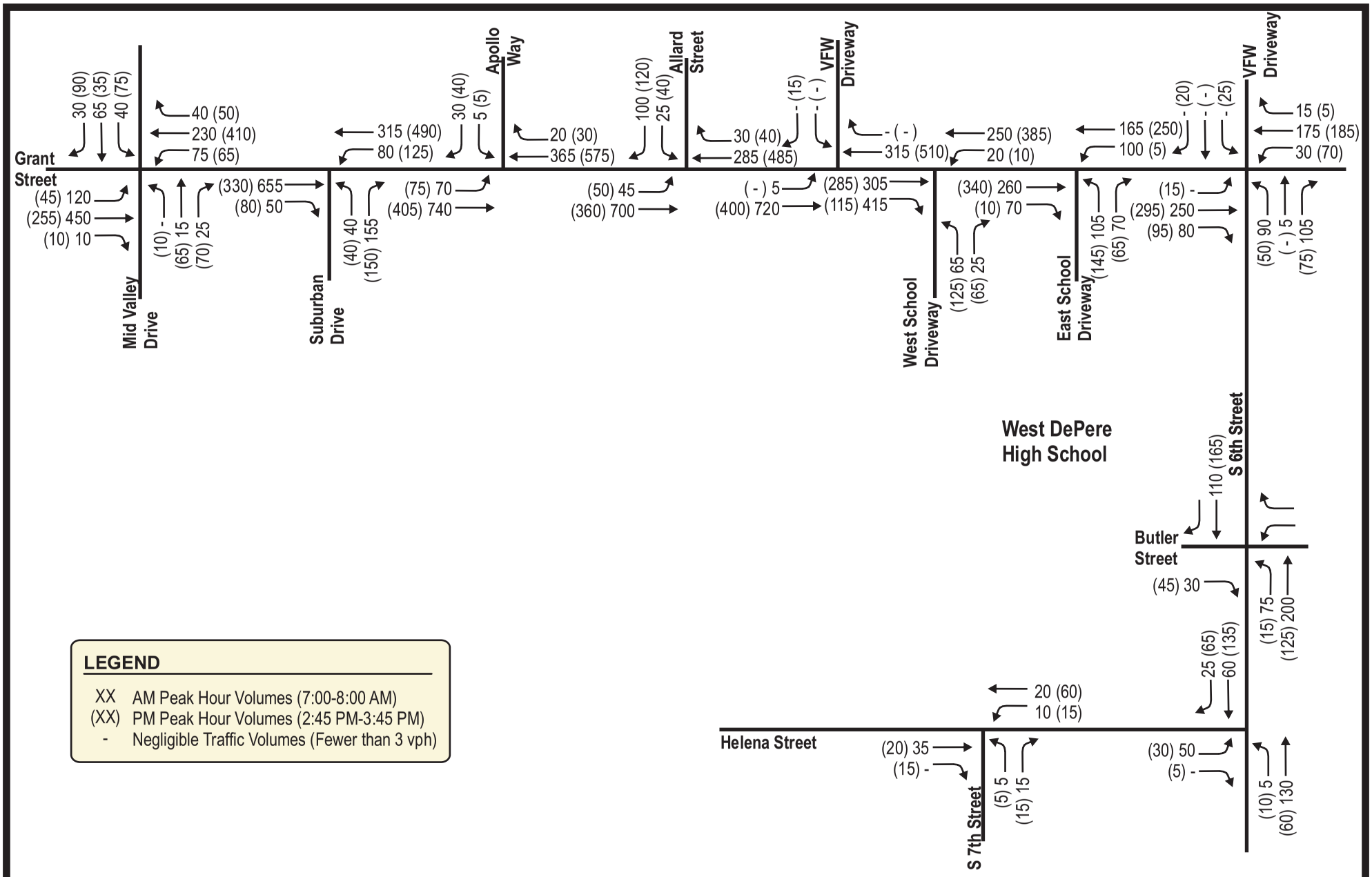
XX	AM Peak Hour Volumes (7:00-8:00 AM)
(XX)	PM Peak Hour Volumes (2:45 PM-3:45 PM)
-	Negligible Traffic Volumes (Fewer than 3 vph)

TADI
TRAFFIC ANALYSIS & DESIGN, INC.
2279: 6-28-19

N
NOT TO SCALE

EXHIBIT 4-11E
FULL BUILD TRAFFIC VOLUMES
OPTION 2C - WITH NEW SOUTHERN ACCESS WITH APOLLO WAY REMOVED

DEPERE, WISCONSIN

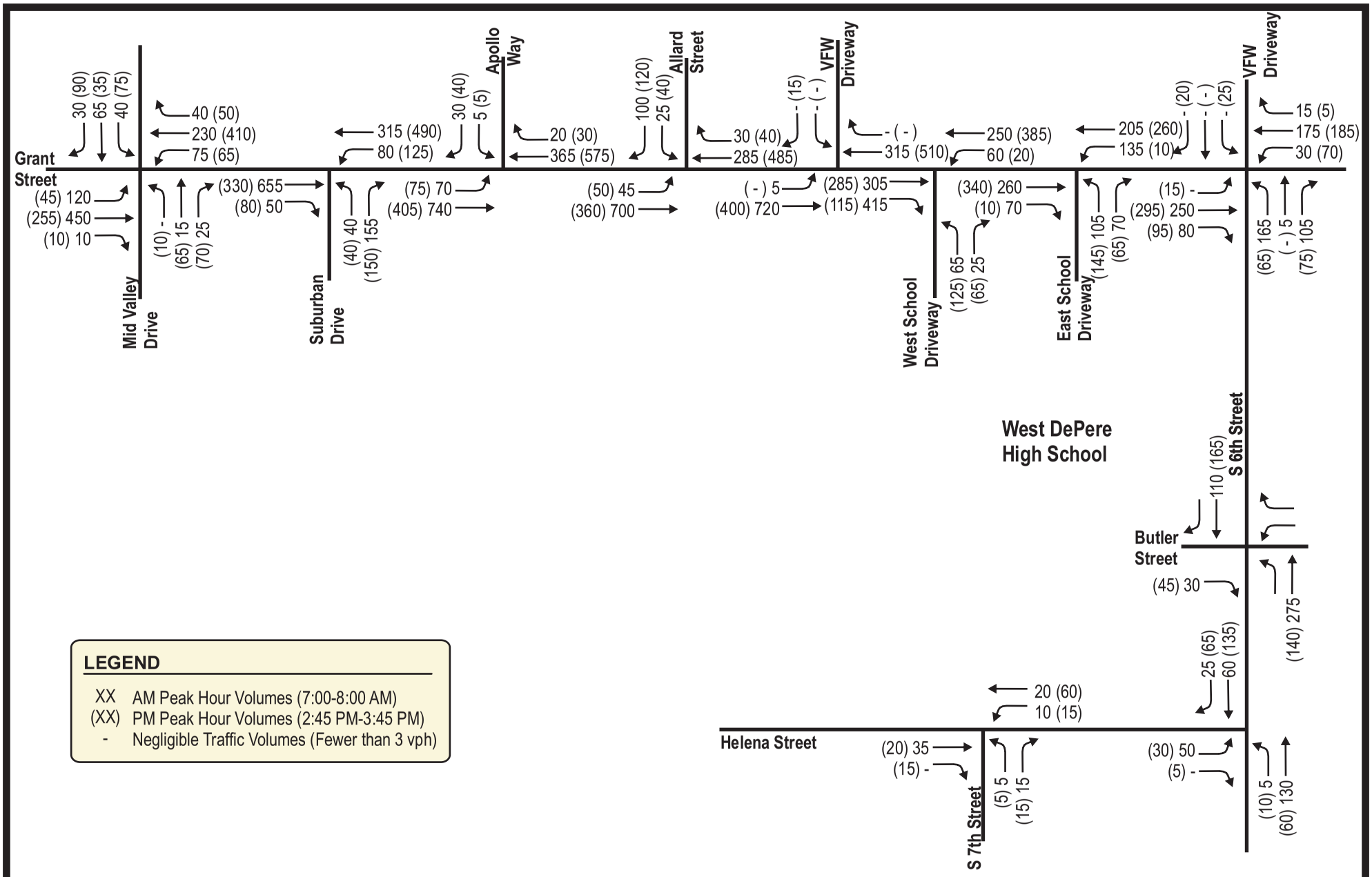


TADI
TRAFFIC ANALYSIS & DESIGN, INC.
2279: 6-28-19

N
NOT TO SCALE

EXHIBIT 4-11F
FULL BUILD TRAFFIC VOLUMES
OPTION 3A - WITH NEW BUTLER STREET FULL ACCESS

DEPERE, WISCONSIN



LEGEND

XX	AM Peak Hour Volumes (7:00-8:00 AM)
(XX)	PM Peak Hour Volumes (2:45 PM-3:45 PM)
-	Negligible Traffic Volumes (Fewer than 3 vph)

TRAFFIC ANALYSIS & DESIGN, INC.

2279: 6-28-19

N

NOT TO SCALE

EXHIBIT 4-11G
FULL BUILD TRAFFIC VOLUMES
OPTION 3B - WITH NEW BUTLER STREET EXIT ONLY ACCESS

DEPERE, WISCONSIN

CHAPTER V – TRAFFIC AND IMPROVEMENT ANALYSIS

PART A – SITE ACCESS

Two existing driveways currently provide access to the high school along Grant Street. A potential additional access along Butler Street and/or a potential additional access along Helena Street are also being considered as part of the expansion plans. The potential new access along Butler Street could be either a full access (entrance and exit) or an exit only access, with the access being gated during the other time periods of the day. The potential new connection to Helena Street would be constructed along the north side of Helena Street, immediately west of the Helena Street intersection (offset intersections) with South 7th Street with stop sign control proposed on the north and south legs of the intersection. This additional access is being investigated as either a full access, partial access (bus/staff only) or an emergency access. The access options being evaluated as part of this study include:

Access Option 1A – Utilize the two current access driveways located along Grant Street.

Access Option 1B – Similar to Option 1A; however, under this access option, the intersection of Grant Street at Apollo Way is removed with traffic utilizing adjacent intersections to access Grant Street.

Access Option 2A – In addition to the two current access driveways located along Grant Street, an additional access driveway would be included along Helena Street. The access along Helena Street would operate as a full access driveway during all hours of the day under this scenario.

Access Option 2B – Similar to Option 2A; however, under this access option, the access along Helena Street would operate as a bus/staff only access under this scenario.

Access Option 2C – Similar to Option 2A; however, under this access option, the intersection of Grant Street at Apollo Way is removed with traffic utilizing adjacent intersections to access Grant Street.

Access Option 3A – In addition to the two current access driveways located along Grant Street, an additional access driveway would be included along Butler Street. The access along Butler Street would operate as an entrance and exit access under this scenario.

Access Option 3B – Similar to Option 3A, an additional access driveway would be included along Butler Street. However, under this access option, the access along Butler Street would operate as an exit only access under this scenario.

PART B – CAPACITY LEVEL OF SERVICE ANALYSIS

B1. Full Build (Option 1A - Existing Access) Traffic Operating Conditions – No Modifications

Exhibit 5-3A shows the full build (Option 1A - existing access) traffic peak hour operating conditions at the study area intersections. The full build (Option 1A - existing access) traffic analysis was conducted using existing intersection configurations and traffic control.

As shown, all movements are expected to continue to operate acceptably at LOS D or better at the study area intersections under the full build (Option 1A - existing access) traffic volume conditions during the weekday morning and weekday evening peak periods except:

- the northbound and southbound left-turn and through movements at the Grant Street intersection with Mid Valley Drive;

- the northbound left-turn movements at the Grant Street intersection with Suburban Drive;
- the southbound left-turn movements at the Grant Street intersection with Apollo Way;
- the southbound left-turn movements at the Grant Street intersection with Allard Street;
- the northbound left-turn movements at the Grant Street intersection with the west high school driveway;
- the northbound left-turn movements at the Grant Street intersection with the east high school driveway; and
- the northbound movements at the Grant Street intersection with 6th Street.

B2. Full Build (Option 1B - Existing Access with Apollo Way Removed) Traffic Operating Conditions – No Modifications

Exhibit 5-3B shows the full build (Option 1B - existing access with Apollo Way removed) traffic peak hour operating conditions at the study area intersections. The full build (Option 1B - existing access with Apollo Way removed) traffic analysis was conducted using existing intersection configurations and traffic control.

As shown, all movements are expected to continue to operate acceptably at LOS D or better at the study area intersections under the full build (Option 1B - existing access with Apollo Way removed) traffic volume conditions during the weekday morning and weekday evening peak periods except:

- the northbound and southbound left-turn and through movements at the Grant Street intersection with Mid Valley Drive;
- the northbound left-turn movements at the Grant Street intersection with Suburban Drive;
- the southbound left-turn movements at the Grant Street intersection with Allard Street;
- the northbound left-turn movements at the Grant Street intersection with the west high school driveway;
- the northbound left-turn movements at the Grant Street intersection with the east high school driveway; and
- the northbound movements at the Grant Street intersection with 6th Street.

B3. Full Build (Option 2A - With New Southern Access) Traffic Operating Conditions – No Modifications

Exhibit 5-3C shows the full build (Option 2A - with new southern access) traffic peak hour operating conditions at the study area intersections. The full build (Option 2A - with new southern access) traffic analysis was conducted using existing intersection configurations and traffic control.

As shown, all movements are expected to continue to operate acceptably at LOS D or better at the study area intersections under the full build (Option 2A - with new southern access) traffic volume conditions during the weekday morning and weekday evening peak periods except:

- the northbound and southbound left-turn and through movements at the Grant Street intersection with Mid Valley Drive;
- the northbound left-turn movements at the Grant Street intersection with Suburban Drive;

- the southbound left-turn movements at the Grant Street intersection with Apollo Way; and
- the southbound left-turn movements at the Grant Street intersection with Allard Street.

B4. Full Build (Option 2B - With New Southern Access – Bus/Staff Access Only) Traffic Operating Conditions – No Modifications

Exhibit 5-3D shows the full build (Option 2B - with new southern access – bus/staff access only) traffic peak hour operating conditions at the study area intersections. The full build (Option 2B - with new southern access – bus/staff access only) traffic analysis was conducted using existing intersection configurations and traffic control.

As shown, all movements are expected to continue to operate acceptably at LOS D or better at the study area intersections under the full build (Option 2B - with new southern access – bus/staff access only) traffic volume conditions during the weekday morning and weekday evening peak periods except:

- the northbound and southbound left-turn and through movements at the Grant Street intersection with Mid Valley Drive;
- the northbound left-turn movements at the Grant Street intersection with Suburban Drive;
- the southbound left-turn movements at the Grant Street intersection with Apollo Way;
- the southbound left-turn movements at the Grant Street intersection with Allard Street;
- the northbound left-turn movements at the Grant Street intersection with the west high school driveway;
- the northbound left-turn movements at the Grant Street intersection with the east high school driveway; and
- the northbound movements at the Grant Street intersection with 6th Street.

B5. Full Build (Option 2C - With New Southern Access with Apollo Way Removed) Traffic Operating Conditions – No Modifications

Exhibit 5-3E shows the full build (Option 2C - with new southern access with Apollo Way removed) traffic peak hour operating conditions at the study area intersections. The full build (Option 2C - with new southern access with Apollo Way removed) traffic analysis was conducted using existing intersection configurations and traffic control.

As shown, all movements are expected to continue to operate acceptably at LOS D or better at the study area intersections under the full build (Option 2C - with new southern access with Apollo Way removed) traffic volume conditions during the weekday morning and weekday evening peak periods except:

- the northbound and southbound left-turn and through movements at the Grant Street intersection with Mid Valley Drive;
- the northbound left-turn movements at the Grant Street intersection with Suburban Drive; and
- the southbound left-turn movements at the Grant Street intersection with Allard Street.

B6. Full Build (Option 3A - With New Butler Street Full Access) Traffic Operating Conditions – No Modifications

Exhibit 5-3F shows the full build (Option 3A - with new Butler Street full access) traffic peak hour operating conditions at the study area intersections. The full build (Option 3A - with new Butler Street full access) traffic analysis was conducted using existing intersection configurations and traffic control.

As shown, all movements are expected to continue to operate acceptably at LOS D or better at the study area intersections under the full build (Option 3A - with new Butler Street full access) traffic volume conditions during the weekday morning and weekday evening peak periods except:

- the northbound and southbound left-turn and through movements at the Grant Street intersection with Mid Valley Drive;
- the northbound left-turn movements at the Grant Street intersection with Suburban Drive;
- the southbound left-turn movements at the Grant Street intersection with Apollo Way;
- the southbound left-turn movements at the Grant Street intersection with Allard Street;
- the northbound left-turn movements at the Grant Street intersection with the west high school driveway;
- the northbound left-turn movements at the Grant Street intersection with the east high school driveway; and
- the northbound movements at the Grant Street intersection with 6th Street.

B7. Full Build (Option 3B - With New Butler Street Exit Only Access) Traffic Operating Conditions – No Modifications

Exhibit 5-3G shows the full build (Option 3B - with new Butler Street exit only access) traffic peak hour operating conditions at the study area intersections. The full build (Option 3B - with new Butler Street exit only access) traffic analysis was conducted using existing intersection configurations and traffic control.

As shown, all movements are expected to continue to operate acceptably at LOS D or better at the study area intersections under the full build (Option 3B - with new Butler Street exit only access) traffic volume conditions during the weekday morning and weekday evening peak periods except:

- the northbound and southbound left-turn and through movements at the Grant Street intersection with Mid Valley Drive;
- the northbound left-turn movements at the Grant Street intersection with Suburban Drive;
- the southbound left-turn movements at the Grant Street intersection with Apollo Way;
- the southbound left-turn movements at the Grant Street intersection with Allard Street;
- the northbound left-turn movements at the Grant Street intersection with the west high school driveway; and
- the northbound left-turn movements at the Grant Street intersection with the east high school driveway.

B8. Existing Traffic Operating Conditions – *With Modifications*

Modifications to accommodate the existing traffic (with Apollo Way removed) are summarized in *Chapter VI – Recommendations and Conclusion*.

As shown in Exhibit 5-12A, all movements are expected to continue to operate at LOS D or better conditions with the modifications recommended to accommodate the existing traffic (with Apollo Way removed) volume conditions during the weekday morning and weekday evening peak periods except:

- the southbound left-turn and through movements at the Grant Street intersection with Mid Valley Drive; and
- the northbound left-turn movements at the Grant Street intersection with Suburban Drive.

B9. Full Build (Option 2C - With New Southern Access with Apollo Way Removed) Traffic Operating Conditions – *With Modifications*

Modifications to accommodate full build (Option 2C - with new southern access with Apollo Way removed) traffic are summarized in *Chapter VI – Recommendations and Conclusion*.

As shown in Exhibit 5-12B, all movements are expected to continue to operate at LOS D or better conditions with the modifications recommended to accommodate full build (Option 2C - with new southern access with Apollo Way removed) traffic volume conditions during the weekday morning and weekday evening peak periods except:

- the northbound left-turn movements at the Grant Street intersection with Suburban Drive.

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 controlled intersections. The following is a list of where the results of the queuing analysis can be found. The background scenarios as well as the scenarios with identified modifications are shown.

- Existing Traffic Expected Maximum Queues – Exhibit 5-12A
- Full Build (Option 2C - with new southern access with Apollo Way removed) Traffic Expected Maximum Queues – Exhibit 5-12B

PART D – PEDESTRIAN, BICYCLE AND MULTI-USE TRAIL CONSIDERATIONS

Sidewalks are provided along both sides of Grant Street from Mid Valley Drive to the east, through the project limits. With the exception of Mid Valley Drive, sidewalks are also provided along both sides of all other side streets within the limits of the study area intersections. No on-street bicycle facilities are provided along any of the roadways.

Pedestrians and bicyclists users are expected to continue to use their respective modes to access the high school expansion; however, based on the West De Pere School District Community Growth and Projections Report; dated February 2018, even though anticipated growth for the expansion is expected to occur throughout the entire district; the most significant increases are expected within two areas (to the southwest and south of the school) which are both at least 3 miles from the high school. Therefore, for the purpose of this TIA, all trips to/from the proposed high school expansion were assumed to occur via motor vehicle.

PART E – TRAFFIC CONTROL NEEDS

Because modifications to the traffic control are necessary at several of the study area intersections, an Intersection Control Evaluation (ICE) was completed for the Grant Street corridor at the Grant Street intersections with Mid Valley Drive and Allard Street. Traffic signal control as well as roundabout control was considered at the two intersections. Based on the analysis, either traffic signal control or roundabout control would be appropriate traffic control at the Mid Valley intersection; however, roundabout control is recommended. In addition, traffic signal control would be the recommended traffic control at the Allard Street intersection under both existing and full build traffic volumes which include the expected expansion of all schools. The results of the analysis are included in the Appendix of this report.

PART F – WARRANT ANALYSIS

F1. Traffic Signal Warrant Analysis

To provide safe and efficient traffic operations along the Grant Street corridor, installing traffic signals at several intersections was investigated. The need for traffic signals at the Grant Street intersections with Mid Valley Drive, Suburban Drive, Allard Street and the west high school driveway were all investigated by Traffic Analysis & Design, Inc. under the full build traffic volume conditions. In addition, the Grant Street intersection with Allard Drive was investigated under a scenario with the Apollo Way access removed at Grant Street. For the study, the warrant analysis assumes Grant Street as a highway with one approach lane and the minor street movements as a one-lane minor street approach for all four locations. Based on the WisDOT Traffic Signal Design Manual (TSDM), since the minor street is proposed to include a single shared lane, the minor street right-turn volume should be included in the warrant analysis. Therefore, the right turn volume at all intersections was included in the analysis.

Chapter 4C of the 2009 *Manual on Uniform Traffic Control Devices* (MUTCD) outlines the standards for determining the need for traffic signals at a particular location. For a traffic signal to be installed, at least one of the following warrants must be satisfied. The nine signal warrants are listed below:

- Warrant 1, Eight-Hour Vehicular Volume;
- Warrant 2, Four-Hour Vehicular Volume;
- Warrant 3, Peak Hour;
- Warrant 4, Pedestrian Hour;
- Warrant 5, School Crossing;
- Warrant 6, Coordinated Signal Systems;
- Warrant 7, Crash Experience;
- Warrant 8, Roadway Network;
- Warrant 9, Intersection Near a Grade Crossing.

The posted speed limit along Grant Street is 35-mph to the west of Mid Valley Drive and 25-mph for the remaining portion of the corridor within the limits of the study area. The MUTCD has different criteria based on urban speeds (less than or equal to 40-mph) and rural speeds (greater than 40-mph). In addition, the MUTCD has different criteria for communities with populations less than 10,000. Per the MUTCD, the urban traffic signal warrant analysis volume thresholds (100%) were used in this analysis. Warrants 1, 2, 3 and a left-turn conflict analysis were evaluated as a part of this study under urban thresholds and are described below.

> ***Warrant 1, Eight Hour Vehicular Volume*** *states that a traffic signal may be considered if one of the following conditions exists for at least eight hours of an average day:*

A. *The vehicles per hour given on the major street (Grant Street) meet or exceed 500 and the vehicles per hour on the higher volume minor street approach (Mid Valley Drive, Suburban Drive, Allard Street or west high school driveway) meet or exceed 150; or*

B. *The vehicles per hour given on the major street (Grant Street) meet or exceed 750 and the vehicles per hour on the higher volume minor street (Mid Valley Drive, Suburban Drive, Allard Street or west high school driveway) approach exceed 75. Table 4C-1, MUTCD p. 4C-3.*

Or if the following two conditions exist for eight hours of an average day after adequate trial of other alternatives that could cause less day and inconvenience has failed to solve traffic problems:

A. *The vehicles per hour on the major street (Grant Street) and the higher volume minor street approach (Mid Valley Drive, Suburban Drive, Allard Street or west high school driveway) meet or exceed 80% of the values stated in A (400 major, 120 minor); and*

B. *The vehicles per hour on the major street (Grant Street) and the higher volume minor street approach (Mid Valley Drive, Suburban Drive, Allard Street or west high school driveway) meet or exceed 80% of the values stated in B (600 major, 60 minor).*

***Warrant 2, Four Hour Volume** is satisfied if during any four hours of an average day the major street (Grant Street) and higher volume minor street approach (Mid Valley Drive, Suburban Drive, Allard Street or west high school driveway) volumes fall above the 100 percent four-hour curve shown in the appendix.*

***Warrant 3, Peak Hour Volume** is satisfied if during any hour of an average day the major street and minor street volumes fall above the 100 percent peak hour curves shown on the graph in the Appendix of this report. Note that this signal warrant is applied by WisDOT and other communities only in unusual cases, such as office complexes, manufacturing plants, industrial complexes, or high-occupancy vehicle facilities that attract or discharge large numbers of vehicles over a short time. Since the high school is expected to fit under this description, this warrant is expected to be appropriate at Suburban Drive and the west high school driveway but not at Mid Valley Drive or Allard Street due to the location of the intersection.*

***Left Turn Conflict Analysis** is met if the product of the major street left turn volume and opposing through plus right-turn movements exceed 50,000 for a one-lane roadway. This analysis is used to determine if a left-turn phase is necessary at a signalized intersection.*

Existing Traffic Condition

The traffic signal warrant analysis was completed based on turning movement counts taken as part of this study. Twelve hour tuning movement counts were taken at the Grant Street intersection with the west driveway and the Grant Street intersections with Mid Valley Drive and Suburban Drive; however, only 6 hours of peak hour turning movement counts (6:00 am to 8:00 am and 2:00 pm to 6:00 pm) were taken at the Grant Street intersection with Allard Street. Table 1 shows the results of the traffic signal warrant analysis.

Table 1
Traffic Signal Warrant Analysis
Existing (No Build) Traffic Conditions

Location	Traffic Signal Warrant				Warrant Met
	1	2	3	Left-turn	
Grant Street at Mid Valley Drive	No (6)	No (3)	N/A	No	No
Grant Street at Suburban Drive/Apollo Way	No (5)	No (3)	No	No	No
Grant Street at Allard Street	No (5)	No (1)	N/A	No	No
Grant Street at Allard Street*	No (5)	**Yes (4)**	N/A	No	**Yes**
Grant Street at West High School Driveway	No (0)	No (0)	No	No	No

Note: number in parenthesis is number of hours warrant is met for that particular warrant.
* with Apollo Way removed and traffic redistributed to Allard Street

As shown in Table 1, based on the warrant analysis completed as part of this study, traffic signals are not warranted under the existing conditions at any of the study area intersections. However, if Apollo Way intersection was eliminated, with the traffic expected to divert to Allard Street, the Grant Street intersection with Allard Street is expected to increase to a level where traffic signal warrants are expected to be met.

Full Build Traffic Condition

Table 2 shows the results of the traffic signal warrant analysis under full build traffic conditions which include all planned school expansions.

Table 2
Traffic Signal Warrant Analysis
Full Build Traffic Conditions

Location	Traffic Signal Warrant				Warrant Met
	1	2	3	Left-turn	
Grant Street at Mid Valley Drive	No (5)	**Yes (4)**	N/A	No	**Yes**
Grant Street at Suburban Drive/Apollo Way*	No (5)	No (3)	No	No	No
Grant Street at Allard Street**	No (5)	**Yes (4)**	No	No	**Yes**
Grant Street at West High School Driveway***	No (1)	No (0)	No	No	No

Note: number in parenthesis is number of hours warrant is met for that particular warrant.
* Scenario 2A traffic volume condition – as 4 legged intersection.
** Scenario 2C traffic volume condition - with Apollo Way removed and traffic redistributed to Allard Street.
*** Scenario 1A traffic volume condition – highest traffic volume condition.

As shown in Table 2, based on the warrant analysis completed as part of this study, traffic signals are expected to be warranted at the Grant Street intersection with Mid Valley Drive based on the 4-hour warrant completed as part of this study; however, traffic signals are not expected to be warranted at the Suburban Drive/Apollo Way or west high school driveway intersections under the full build conditions.

All data pertaining to this signal warrant analysis are included in the appendix of this report.

F2. Pedestrian Hybrid Beacon (PHB) Warrant

An evaluation of pedestrian control was evaluated for the Grant Street intersection with the west driveway to provide some form of supplemental pedestrian crossing treatment to improve the safety for both the pedestrian and motoring public at this location. With a baseball field and park located immediately north of the high school, providing a controlled pedestrian crossing of Grant Street was considered. As part of the evaluation a pedestrian crossing beacon was considered for this location. The MUTCD includes an additional warrant analysis for a pedestrian crossing beacon as described below.

> ***Pedestrian Hybrid Beacon Warrant*** *is satisfied if during any hour of an average day the pedestrian volume crossing the major street and the vehicular volume on the major street fall above the peak hour curve shown in the Appendix of this report.*

As shown in the graphs located in the Appendix of this report, with a roadway width of approximately 44-feet at the proposed pedestrian crossing, vehicular and pedestrian volumes are not high enough to warrant the installation of a pedestrian hybrid beacon at this location. Note that the posted speed limit along Grant Street is 25 mph and the pedestrian crossing distance (curb-to-curb) is approximately 44-feet. The volume (two-way) of traffic along Grant Street at the crossing location during the weekday morning and weekday afternoon peak hours are approximately 915 and 750 vehicles, respectively. Therefore, based on the MUTCD graph, there would need to be well over 75 pedestrians crossing Grant Street during any peak hour of a typical weekday. Since the volumes expected are considerably less than this for a typical weekday, the PHB warrant is not expected to be met for this location. Therefore, a RRFB may be a more appropriate application for this location.

F3. Rapid Rectangular Flashing Beacon (RRFB)

The MUTCD does not include a warrant for the installation of a RRFB. However, WisDOT and many communities allow the installation of a RRFB at pedestrian locations where a marked crossing exists and higher volumes of pedestrians are present. There are also studies from other states that utilize thresholds of 300 vehicles and 20 pedestrians present at the crossing or more than one pedestrian being struck over a ten-year period.

It is noted that 15 to 20 students were observed crossing Grant Street as part of the data collection for this project on a typical day in mid-November. With these existing pedestrian volumes, the existing vehicular volumes listed in the previous section and the expected expansion at the high school, vehicle and pedestrian volumes at this crossing are expected to exceed the levels considered for installation of a RRFB. Therefore, a RRFB could be considered a good application for this location. It is noted that the Grant Street vertical profile is relatively flat within the limits of the study area and site distance is not expected to be an issue at the proposed pedestrian crossing. It should also be noted that RRFB's are being used throughout the country and have been installed successfully at many locations in Wisconsin where high volumes of pedestrians are present.

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

Intersection	Peak Hour		Level of Service per Movement by Approach												Intersection Level of Service
			Eastbound			Westbound			Northbound			Southbound			
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
#100 - Grant Street & Mid Valley Drive Two-Way Stop Control	AM	LOS	A		*	A		*	**E**		B	**F**		A	B
		Delay	8		*	9		*	37		12	109		10	
		Queue	25		*	25		*	25		25	140		25	
	PM	LOS	A		*	A		*	**E**		B	**F**		B	B
		Delay	9		*	8		*	37		10	91		12	
		Queue	25		*	25		*	50		25	130		25	
#200 - Grant Street & Suburban Drive One-Way Stop Control	AM	LOS	-	*	*	B		A	**F**	-	D	-			A
		Delay	-	*	*	11		0	86	-	34	-			
		Queue	-	*	*	25		0	70	-	110	-			
	PM	LOS	-	*	*	A		A	**E**	-	B	-			A
		Delay	-	*	*	9		0	40	-	13	-			
		Queue	-	*	*	25		0	35	-	25	-			
#300 - Grant Street & Apollo Way One-Way Stop Control	AM	LOS	A		A	-	*	*	-			**F**	-	B	A
		Delay	9		0	-	*	*	-			58	-	12	
		Queue	25		0	-	*	*	-			25	-	25	
	PM	LOS	A		A	-	*	*	-			D	-	B	A
		Delay	10		0	-	*	*	-			30	-	14	
		Queue	25		0	-	*	*	-			25	-	25	
#400 - Grant Street & Allard Street One-Way Stop Control	AM	LOS	A		A	-	*	*	-			**F**	-	B	A
		Delay	9		0	-	*	*	-			63	-	13	
		Queue	25		0	-	*	*	-			40	-	25	
	PM	LOS	A		A	-	*	*	-			D	-	B	A
		Delay	9		0	-	*	*	-			28	-	15	
		Queue	25		0	-	*	*	-			25	-	30	
#500 - Grant Street & VFW D/W One-Way Stop Control	AM	LOS	A		A	-	*	*	-			D	-	A	A
		Delay	9		0	-	*	*	-			26	-	0	
		Queue	0		0	-	*	*	-			0	-	0	
	PM	LOS	A		A	-	*	*	-			C	-	A	A
		Delay	9		0	-	*	*	-			16	-	0	
		Queue	0		0	-	*	*	-			25	-	0	
#600 - Grant Street & West D/W One-Way Stop Control	AM	LOS	-	*	*	B		-	**E**	-	B	-			A
		Delay	-	*	*	12		-	43	-	12	-			
		Queue	-	*	*	25		-	70	-	25	-			
	PM	LOS	-	*	*	A		-	**F**	-	B	-			A
		Delay	-	*	*	9		-	64	-	12	-			
		Queue	-	*	*	25		-	150	-	25	-			
#700 - Grant Street & East D/W One-Way Stop Control	AM	LOS	-	*	*	A		-	**F**	-	B	-			B
		Delay	-	*	*	9		-	104	-	13	-			
		Queue	-	*	*	25		-	60	-	25	-			
	PM	LOS	-	*	*	A		-	**E**	-	B	-			A
		Delay	-	*	*	9		-	39	-	14	-			
		Queue	-	*	*	0		-	115	-	30	-			
#800 - Grant Street & 6th Street/VFW D/W Two-Way Stop Control	AM	LOS	A			A			**F**			C			C
		Delay	8			9			58			16			
		Queue	0			25			240			0			
	PM	LOS	A			A			D			C			A
		Delay	8			9			27			21			
		Queue	0			25			70			25			
#900 - Helena Street & 7th Street Two-Way Stop Control	AM	LOS	A			A			A			-			A
		Delay	0			8			9			-			
		Queue	0			0			25			-			
	PM	LOS	A			A			A			-			A
		Delay	0			7			9			-			
		Queue	0			25			25			-			
#950 - 6th Street & Helena Street One-Way Stop Control	AM	LOS	B			-			A		-	-	*	*	A
		Delay	10			-			8		-	-	*	*	
		Queue	0			-			25		-	-	*	*	
	PM	LOS	B			-			A		-	-	*	*	A
		Delay	11			-			8		-	-	*	*	
		Queue	25			-			0		-	-	*	*	

(-) movement that isn't available or allowed * free flow movement

EXHIBIT 5-3A
FULL BUILD TRAFFIC OPERATIONS
OPTION 1A - EXISTING ACCESS
DEPERE, WISCONSIN

TADI TRAFFIC ANALYSIS & DESIGN, INC.
2279: 6-28-19

Exhibit 5-3B
Full Build (Option 1B) Traffic Peak Hour Operating Conditions
Existing Geometrics and Traffic Control with modified access

Intersection	Peak Hour		Level of Service per Movement by Approach												Intersection Level of Service
			Eastbound			Westbound			Northbound			Southbound			
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
#100 - Grant Street & Mid Valley Drive Two-Way Stop Control	AM	LOS	A		*	A		*	**E**		B	**F**		A	B
		Delay	8		*	9		*	37		12	109		10	
		Queue	25		*	25		*	25		25	140		25	
	PM	LOS	A		*	A		*	**E**		B	**F**		B	B
		Delay	9		*	8		*	37		10	91		12	
		Queue	25		*	25		*	50		25	130		25	
#200 - Grant Street & Suburban Drive One-Way Stop Control	AM	LOS	-	*	*	B		A	**F**	-	D	-			A
		Delay	-	*	*	11		0	86	-	34	-			
		Queue	-	*	*	25		0	70	-	110	-			
	PM	LOS	-	*	*	A		A	**E**	-	B	-			A
		Delay	-	*	*	9		0	40	-	13	-			
		Queue	-	*	*	25		0	35	-	25	-			
#300 - Grant Street & Apollo Way One-Way Stop Control	AM	LOS	-	*	-	-	*	-	-			-			A
		Delay	-	*	-	-	*	-	-			-			
		Queue	-	*	-	-	*	-	-			-			
	PM	LOS	-	*	-	-	*	-	-			-			A
		Delay	-	*	-	-	*	-	-			-			
		Queue	-	*	-	-	*	-	-			-			
#400 - Grant Street & Allard Street One-Way Stop Control	AM	LOS	A		A	-	*	*	-			**F**	-	B	A
		Delay	9		0	-	*	*	-			183	-	13	
		Queue	25		0	-	*	*	-			90	-	30	
	PM	LOS	10		A	-	*	*	-			**E**	-	C	A
		Delay	9		0	-	*	*	-			45	-	16	
		Queue	25		0	-	*	*	-			40	-	40	
#500 - Grant Street & VFW D/W One-Way Stop Control	AM	LOS	A		A	-	*	*	-			D	-	A	A
		Delay	9		0	-	*	*	-			26	-	0	
		Queue	0		0	-	*	*	-			25	-	0	
	PM	LOS	A		A	-	*	*	-			C	-	A	A
		Delay	9		0	-	*	*	-			16	-	0	
		Queue	0		0	-	*	*	-			25	-	0	
#600 - Grant Street & West D/W One-Way Stop Control	AM	LOS	-	*	*	B		-	**E**	-	B	-			A
		Delay	-	*	*	12		-	43	-	12	-			
		Queue	-	*	*	25		-	70	-	25	-			
	PM	LOS	-	*	*	A		-	**F**	-	B	-			A
		Delay	-	*	*	9		-	64	-	12	-			
		Queue	-	*	*	25		-	150	-	25	-			
#700 - Grant Street & East D/W One-Way Stop Control	AM	LOS	-	*	*	A		-	**F**	-	B	-			C
		Delay	-	*	*	9		-	104	-	13	-			
		Queue	-	*	*	25		-	60	-	25	-			
	PM	LOS	-	*	*	A		-	**E**	-	B	-			A
		Delay	-	*	*	9		-	39	-	14	-			
		Queue	-	*	*	0		-	115	-	30	-			
#800 - Grant Street & 6th Street/VFW D/W Two-Way Stop Control	AM	LOS	A			A			**F**			C			C
		Delay	8			9			58			16			
		Queue	0			25			240			0			
	PM	LOS	A			A			D			C			A
		Delay	8			9			27			21			
		Queue	0			25			70			25			
#900 - Helena Street & 7th Street Two-Way Stop Control	AM	LOS	A			A			A			-			A
		Delay	0			8			9			-			
		Queue	0			0			25			-			
	PM	LOS	A			A			A			-			A
		Delay	0			7			9			-			
		Queue	0			25			25			-			
#950 - 6th Street & Helena Street One-Way Stop Control	AM	LOS	B			-			A		-	-	*	*	A
		Delay	10			-			8		-	-	*	*	
		Queue	0			-			25		-	-	*	*	
	PM	LOS	B			-			A		-	-	*	*	A
		Delay	11			-			8		-	-	*	*	
		Queue	25			-			0		-	-	*	*	

(-) movement that isn't available or allowed * free flow movement

EXHIBIT 5-3B
FULL BUILD TRAFFIC OPERATIONS
OPTION 1B - EXISTING ACCESS WITH APOLLO WAY REMOVED
DEPERE, WISCONSIN

TADI TRAFFIC ANALYSIS & DESIGN, INC.
2279: 6-28-19

Exhibit 5-3C
Full Build (Option 2A) Traffic Peak Hour Operating Conditions
Existing Geometrics and Traffic Control with modified access

Intersection	Peak Hour		Level of Service per Movement by Approach												Intersection Level of Service
			Eastbound			Westbound			Northbound			Southbound			
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
#100 - Grant Street & Mid Valley Drive Two-Way Stop Control	AM	LOS	A		*	A		*	**E**		B	**F**		A	B
		Delay	8		*	9		*	37		12	109		10	
		Queue	25		*	25		*	25		25	140		25	
	PM	LOS	A		*	A		*	**E**		B	**F**		B	B
		Delay	9		*	8		*	37		10	91		12	
		Queue	25		*	25		*	50		25	130		25	
#200 - Grant Street & Suburban Drive One-Way Stop Control	AM	LOS	-	*	*	B		A	**F**	-	C	-			A
		Delay	-	*	*	11		0	53	-	21	-			
		Queue	-	*	*	25		0	50	-	40	-			
	PM	LOS	-	*	*	A		A	D	-	B	-			A
		Delay	-	*	*	9		0	27	-	11	-			
		Queue	-	*	*	25		0	25	-	25	-			
#300 - Grant Street & Apollo Way One-Way Stop Control	AM	LOS	A		A	-	*	*	-			**E**	-	B	A
		Delay	9		0	-	*	*	-			44	-	11	
		Queue	25		0	-	*	*	-			25	-	25	
	PM	LOS	A		A	-	*	*	-			C	-	B	A
		Delay	9		0	-	*	*	-			24	-	13	
		Queue	25		0	-	*	*	-			25	-	25	
#400 - Grant Street & Allard Street One-Way Stop Control	AM	LOS	A		A	-	*	*	-			**E**	-	B	A
		Delay	8		0	-	*	*	-			43	-	12	
		Queue	25		0	-	*	*	-			30	-	25	
	PM	LOS	A		A	-	*	*	-			C	-	B	A
		Delay	9		0	-	*	*	-			21	-	13	
		Queue	25		0	-	*	*	-			25	-	25	
#500 - Grant Street & VFW D/W One-Way Stop Control	AM	LOS	A		A	-	*	*	-			C	-	A	A
		Delay	8		0	-	*	*	-			21	-	0	
		Queue	0		0	-	*	*	-			0	-	0	
	PM	LOS	A		A	-	*	*	-			B	-	A	A
		Delay	9		0	-	*	*	-			14	-	0	
		Queue	0		0	-	*	*	-			25	-	0	
#600 - Grant Street & West D/W One-Way Stop Control	AM	LOS	-	*	*	B		-	C	-	B	-			A
		Delay	-	*	*	11		-	21	-	12	-			
		Queue	-	*	*	25		-	25	-	25	-			
	PM	LOS	-	*	*	A		-	D	-	B	-			A
		Delay	-	*	*	8		-	31	-	12	-			
		Queue	-	*	*	25		-	70	-	25	-			
#700 - Grant Street & East D/W One-Way Stop Control	AM	LOS	-	*	*	A		-	D	-	B	-			B
		Delay	-	*	*	9		-	34	-	12	-			
		Queue	-	*	*	25		-	70	-	25	-			
	PM	LOS	-	*	*	A		-	C	-	B	-			A
		Delay	-	*	*	8		-	24	-	12	-			
		Queue	-	*	*	0		-	50	-	25	-			
#800 - Grant Street & 6th Street/VFW D/W Two-Way Stop Control	AM	LOS	A			A			C			C			A
		Delay	8			8			20			15			
		Queue	0			25			70			0			
	PM	LOS	A			A			C			C			A
		Delay	8			9			19			19			
		Queue	0			25			40			25			
#900 - Helena Street & 7th Street Two-Way Stop Control	AM	LOS	A			A			B			B			A
		Delay	8			8			10			12			
		Queue	25			0			25			25			
	PM	LOS	A			A			B			C			A
		Delay	8			7			11			15			
		Queue	0			25			25			0			
#950 - 6th Street & Helena Street One-Way Stop Control	AM	LOS	B			-			A		-	-	*	*	A
		Delay	11			-			8		-	-	*	*	
		Queue	25			-			25		-	-	*	*	
	PM	LOS	B			-			A		-	-	*	*	A
		Delay	10			-			8		-	-	*	*	
		Queue	25			-			25		-	-	*	*	

(-) movement that isn't available or allowed * free flow movement

EXHIBIT 5-3C
FULL BUILD TRAFFIC OPERATIONS
OPTION 2A - WITH NEW SOUTHERN ACCESS
DEPERE, WISCONSIN

TADI TRAFFIC ANALYSIS & DESIGN, INC.
2279: 6-28-19

Exhibit 5-3D
Full Build (Option 2B) Traffic Peak Hour Operating Conditions
Existing Geometrics and Traffic Control with modified access

Intersection	Peak Hour		Level of Service per Movement by Approach												Intersection Level of Service
			Eastbound			Westbound			Northbound			Southbound			
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
#100 - Grant Street & Mid Valley Drive Two-Way Stop Control	AM	LOS	A		*	A		*	**E**		B	**F**		A	B
		Delay	8		*	9		*	37		12	109		10	
		Queue	25		*	25		*	25		25	140		25	
	PM	LOS	A		*	A		*	**E**		B	**F**		B	B
		Delay	9		*	8		*	37		10	91		12	
		Queue	25		*	25		*	50		25	130		25	
#200 - Grant Street & Suburban Drive One-Way Stop Control	AM	LOS	-	*	*	B		A	**F**	-	D	-			A
		Delay	-	*	*	11		0	74	-	31	-			
		Queue	-	*	*	25		0	65	-	95	-			
	PM	LOS	-	*	*	A		A	**E**	-	B	-			A
		Delay	-	*	*	9		0	36	-	12	-			
		Queue	-	*	*	25		0	30	-	25	-			
#300 - Grant Street & Apollo Way One-Way Stop Control	AM	LOS	A		A	-	*	*	-			**F**	-	B	A
		Delay	9		0	-	*	*	-			54	-	12	
		Queue	25		0	-	*	*	-			25	-	25	
	PM	LOS	A		A	-	*	*	-			D	-	B	A
		Delay	10		0	-	*	*	-			28	-	14	
		Queue	25		0	-	*	*	-			25	-	25	
#400 - Grant Street & Allard Street One-Way Stop Control	AM	LOS	A		A	-	*	*	-			**F**	-	B	A
		Delay	9		0	-	*	*	-			57	-	12	
		Queue	25		0	-	*	*	-			35	-	25	
	PM	LOS	A		A	-	*	*	-			D	-	B	A
		Delay	9		0	-	*	*	-			26	-	14	
		Queue	25		0	-	*	*	-			25	-	30	
#500 - Grant Street & VFW D/W One-Way Stop Control	AM	LOS	A		A	-	*	*	-			C	-	A	A
		Delay	9		0	-	*	*	-			25	-	0	
		Queue	0		0	-	*	*	-			25	-	0	
	PM	LOS	A		A	-	*	*	-			C	-	A	A
		Delay	9		0	-	*	*	-			15	-	0	
		Queue	0		0	-	*	*	-			25	-	0	
#600 - Grant Street & West D/W One-Way Stop Control	AM	LOS	-	*	*	B		-	**E**	-	B	-			A
		Delay	-	*	*	12		-	39	-	12	-			
		Queue	-	*	*	25		-	65	-	25	-			
	PM	LOS	-	*	*	A		-	**F**	-	B	-			A
		Delay	-	*	*	9		-	56	-	12	-			
		Queue	-	*	*	25		-	140	-	25	-			
#700 - Grant Street & East D/W One-Way Stop Control	AM	LOS	-	*	*	A		-	**F**	-	B	-			B
		Delay	-	*	*	9		-	85	-	13	-			
		Queue	-	*	*	25		-	150	-	25	-			
	PM	LOS	-	*	*	A		-	D	-	B	-			A
		Delay	-	*	*	9		-	31	-	14	-			
		Queue	-	*	*	0		-	80	-	30	-			
#800 - Grant Street & 6th Street/VFW D/W Two-Way Stop Control	AM	LOS	A			A			**E**			C			A
		Delay	8			8			48			16			
		Queue	0			25			210			0			
	PM	LOS	A			A			D			C			A
		Delay	8			9			26			21			
		Queue	0			25			70			25			
#900 - Helena Street & 7th Street Two-Way Stop Control	AM	LOS	A			A			A			A			A
		Delay	7			8			9			9			
		Queue	25			0			25			25			
	PM	LOS	A			A			A			A			A
		Delay	8			7			9			10			
		Queue	0			25			25			25			
#950 - 6th Street & Helena Street One-Way Stop Control	AM	LOS	B			-			A		-	-	*	*	A
		Delay	10			-			8		-	-	*	*	
		Queue	25			-			0		-	-	*	*	
	PM	LOS	B			-			A		-	-	*	*	A
		Delay	11			-			8		-	-	*	*	
		Queue	25			-			0		-	-	*	*	

(-) movement that isn't available or allowed * free flow movement

EXHIBIT 5-3D
FULL BUILD TRAFFIC OPERATIONS
OPTION 2B - WITH NEW SOUTHERN ACCESS - BUS/STAFF ACCESS ONLY
DEPERE, WISCONSIN

TADI TRAFFIC ANALYSIS & DESIGN, INC.
2279: 6-28-19

Exhibit 5-3E
Full Build (Option 2C) Traffic Peak Hour Operating Conditions
Existing Geometrics and Traffic Control with modified access

Intersection	Peak Hour		Level of Service per Movement by Approach												Intersection Level of Service
			Eastbound			Westbound			Northbound			Southbound			
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
#100 - Grant Street & Mid Valley Drive Two-Way Stop Control	AM	LOS	A		*	A		*	**E**		B	**F**		A	B
		Delay	8		*	9		*	37		12	109		10	
		Queue	25		*	25		*	25		25	140		25	
	PM	LOS	A		*	A		*	**E**		B	**F**		B	B
		Delay	9		*	8		*	37		10	91		12	
		Queue	25		*	25		*	50		25	130		25	
#200 - Grant Street & Suburban Drive One-Way Stop Control	AM	LOS	-	*	*	B		A	**F**	-	C	-			A
		Delay	-	*	*	11		0	53	-	21	-			
		Queue	-	*	*	25		0	50	-	40	-			
	PM	LOS	-	*	*	A		A	D	-	B	-			A
		Delay	-	*	*	9		0	27	-	11	-			
		Queue	-	*	*	25		0	25	-	25	-			
#300 - Grant Street & Apollo Way One-Way Stop Control	AM	LOS	-	*	-	-	*	-	-			-			A
		Delay	-	*	-	-	*	-	-			-			
		Queue	-	*	-	-	*	-	-			-			
	PM	LOS	-	*	-	-	*	-	-			-			A
		Delay	-	*	-	-	*	-	-			-			
		Queue	-	*	-	-	*	-	-			-			
#400 - Grant Street & Allard Street One-Way Stop Control	AM	LOS	A		A	-	*	*	-			**F**	-	B	A
		Delay	8		0	-	*	*	-			94	-	12	
		Queue	25		0	-	*	*	-			60	-	25	
	PM	LOS	A		A	-	*	*	-			D	-	B	A
		Delay	9		0	-	*	*	-			31	-	14	
		Queue	25		0	-	*	*	-			30	-	25	
#500 - Grant Street & VFW D/W One-Way Stop Control	AM	LOS	A		A	-	*	*	-			C	-	A	A
		Delay	8		0	-	*	*	-			21	-	0	
		Queue	0		0	-	*	*	-			0	-	0	
	PM	LOS	A		A	-	*	*	-			B	-	A	A
		Delay	9		0	-	*	*	-			14	-	0	
		Queue	0		0	-	*	*	-			25	-	0	
#600 - Grant Street & West D/W One-Way Stop Control	AM	LOS	-	*	*	B		-	C	-	B	-			A
		Delay	-	*	*	11		-	21	-	12	-			
		Queue	-	*	*	25		-	25	-	25	-			
	PM	LOS	-	*	*	A		-	D	-	B	-			A
		Delay	-	*	*	8		-	31	-	12	-			
		Queue	-	*	*	25		-	70	-	25	-			
#700 - Grant Street & East D/W One-Way Stop Control	AM	LOS	-	*	*	A		-	D	-	B	-			B
		Delay	-	*	*	9		-	34	-	12	-			
		Queue	-	*	*	25		-	70	-	25	-			
	PM	LOS	-	*	*	A		-	C	-	B	-			A
		Delay	-	*	*	8		-	24	-	12	-			
		Queue	-	*	*	0		-	50	-	25	-			
#800 - Grant Street & 6th Street/VFW D/W Two-Way Stop Control	AM	LOS	A			A			C			C			A
		Delay	8			8			20			15			
		Queue	0			25			70			0			
	PM	LOS	A			A			C			C			A
		Delay	8			9			19			19			
		Queue	0			25			40			25			
#900 - Helena Street & 7th Street Two-Way Stop Control	AM	LOS	A			A			B			B			A
		Delay	8			8			10			12			
		Queue	25			0			25			25			
	PM	LOS	A			A			B			C			A
		Delay	8			7			11			15			
		Queue	0			25			25			0			
#950 - 6th Street & Helena Street One-Way Stop Control	AM	LOS	B			-			A		-	-	*	*	A
		Delay	11			-			8		-	-	*	*	
		Queue	25			-			25		-	-	*	*	
	PM	LOS	B			-			A		-	-	*	*	A
		Delay	10			-			8		-	-	*	*	
		Queue	25			-			25		-	-	*	*	

(-) movement that isn't available or allowed * free flow movement

EXHIBIT 5-3E
FULL BUILD TRAFFIC OPERATIONS
OPTION 2C - WITH NEW SOUTHERN ACCESS - WITH APOLLO WAY REMOVED
DEPERE, WISCONSIN

TADI TRAFFIC ANALYSIS & DESIGN, INC.
2279: 6-28-19

Exhibit 5-3F
Full Build (Option 3A) Traffic Peak Hour Operating Conditions
Existing Geometrics and Traffic Control with modified access

Intersection	Peak Hour		Level of Service per Movement by Approach												Intersection Level of Service
			Eastbound			Westbound			Northbound			Southbound			
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
#100 - Grant Street & Mid Valley Drive Two-Way Stop Control	AM	LOS	A		*	A		*	**E**		B	**F**		A	B
		Delay	8		*	9		*	37		12	109		10	
		Queue	25		*	25		*	25		25	140		25	
	PM	LOS	A		*	A		*	**E**		B	**F**		B	B
		Delay	9		*	8		*	37		10	91		12	
		Queue	25		*	25		*	50		25	130		25	
#200 - Grant Street & Suburban Drive One-Way Stop Control	AM	LOS	-	*	*	B		A	**F**	-	D	-			A
		Delay	-	*	*	11		0	86	-	34	-			
		Queue	-	*	*	25		0	70	-	110	-			
	PM	LOS	-	*	*	A		A	**E**	-	B	-			A
		Delay	-	*	*	9		0	40	-	13	-			
		Queue	-	*	*	25		0	35	-	25	-			
#300 - Grant Street & Apollo Way One-Way Stop Control	AM	LOS	A		A	-	*	*	-			**F**	-	B	A
		Delay	9		0	-	*	*	-			58	-	12	
		Queue	25		0	-	*	*	-			0	-	25	
	PM	LOS	A		A	-	*	*	-			D	-	B	A
		Delay	10		0	-	*	*	-			30	-	14	
		Queue	25		0	-	*	*	-			25	-	25	
#400 - Grant Street & Allard Street One-Way Stop Control	AM	LOS	A		A	-	*	*	-			**F**	-	B	A
		Delay	9		0	-	*	*	-			63	-	13	
		Queue	25		0	-	*	*	-			40	-	25	
	PM	LOS	A		A	-	*	*	-			D	-	B	A
		Delay	9		0	-	*	*	-			28	-	15	
		Queue	25		0	-	*	*	-			25	-	30	
#500 - Grant Street & VFW D/W One-Way Stop Control	AM	LOS	A		A	-	*	*	-			D	-	A	A
		Delay	9		0	-	*	*	-			26	-	0	
		Queue	0		0	-	*	*	-			25	-	0	
	PM	LOS	A		A	-	*	*	-			C	-	A	A
		Delay	9		0	-	*	*	-			16	-	0	
		Queue	0		0	-	*	*	-			25	-	0	
#600 - Grant Street & West D/W One-Way Stop Control	AM	LOS	-	*	*	B		-	D	-	B	-			A
		Delay	-	*	*	11		-	26	-	12	-			
		Queue	-	*	*	25		-	45	-	25	-			
	PM	LOS	-	*	*	A		-	**F**	-	B	-			A
		Delay	-	*	*	9		-	54	-	12	-			
		Queue	-	*	*	25		-	135	-	25	-			
#700 - Grant Street & East D/W One-Way Stop Control	AM	LOS	-	*	*	A		-	**E**	-	B	-			B
		Delay	-	*	*	9		-	49	-	12	-			
		Queue	-	*	*	25		-	110	-	25	-			
	PM	LOS	-	*	*	A		-	**E**	-	B	-			A
		Delay	-	*	*	8		-	35	-	13	-			
		Queue	-	*	*	0		-	105	-	25	-			
#800 - Grant Street & 6th Street/VFW D/W Two-Way Stop Control	AM	LOS	A			A			C			C			A
		Delay	8			8			24			15			
		Queue	0			25			95			0			
	PM	LOS	A			A			C			C			A
		Delay	8			9			21			20			
		Queue	0			25			50			25			
#900 - Helena Street & 7th Street Two-Way Stop Control	AM	LOS	A			A			A			-			A
		Delay	0			8			9			-			
		Queue	0			0			25			-			
	PM	LOS	A			A			A			-			A
		Delay	0			7			9			-			
		Queue	0			25			25			-			
#950 - 6th Street & Helena Street One-Way Stop Control	AM	LOS	B			-			A		-	-	*	*	A
		Delay	10			-			8		-	-	*	*	
		Queue	25			-			0		-	-	*	*	
	PM	LOS	B			-			A		-	-	*	*	A
		Delay	11			-			8		-	-	*	*	
		Queue	25			-			0		-	-	*	*	
#960 - 6th Street & Butler Street One-Way Stop Control	AM	LOS	A			-			A		-	-	*	*	A
		Delay	9			-			8		-	-	*	*	
		Queue	25			-			25		-	-	*	*	
	PM	LOS	B			-			A		-	-	*	*	A
		Delay	10			-			8		-	-	*	*	
		Queue	25			-			25		-	-	*	*	

(-) movement that isn't available or allowed * free flow movement

EXHIBIT 5-3F
FULL BUILD TRAFFIC OPERATIONS
OPTION 3A - WITH NEW BUTLER STREET FULL ACCESS
DEPERE, WISCONSIN

TADI TRAFFIC ANALYSIS & DESIGN, INC.
2279: 6-28-19

Exhibit 5-3G
Full Build (Option 3B) Traffic Peak Hour Operating Conditions
Existing Geometrics and Traffic Control with modified access

Intersection	Peak Hour		Level of Service per Movement by Approach												Intersection Level of Service
			Eastbound			Westbound			Northbound			Southbound			
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
#100 - Grant Street & Mid Valley Drive Two-Way Stop Control	AM	LOS	A		*	A		*	E		B	F		A	B
		Delay	8		*	9		*	37		12	109		10	
		Queue	25		*	25		*	25		25	140		25	
	PM	LOS	A		*	A		*	E		B	F		B	B
		Delay	9		*	8		*	37		10	91		12	
		Queue	25		*	25		*	50		25	130		25	
#200 - Grant Street & Suburban Drive One-Way Stop Control	AM	LOS	-	*	*	B		A	F	-	D	-			A
		Delay	-	*	*	11		0	86	-	34	-			
		Queue	-	*	*	25		0	70	-	110	-			
	PM	LOS	-	*	*	A		A	E	-	B	-			A
		Delay	-	*	*	9		0	40	-	13	-			
		Queue	-	*	*	25		0	35	-	25	-			
#300 - Grant Street & Apollo Way One-Way Stop Control	AM	LOS	A		A	-	*	*	-			F	-	B	A
		Delay	9		0	-	*	*	-			58	-	12	
		Queue	25		0	-	*	*	-			0	-	25	
	PM	LOS	A		A	-	*	*	-			D	-	B	A
		Delay	10		0	-	*	*	-			30	-	14	
		Queue	25		0	-	*	*	-			25	-	25	
#400 - Grant Street & Allard Street One-Way Stop Control	AM	LOS	A		A	-	*	*	-			F	-	B	A
		Delay	9		0	-	*	*	-			63	-	13	
		Queue	25		0	-	*	*	-			40	-	25	
	PM	LOS	A		A	-	*	*	-			D	-	B	A
		Delay	9		0	-	*	*	-			28	-	15	
		Queue	25		0	-	*	*	-			25	-	30	
#500 - Grant Street & VFW D/W One-Way Stop Control	AM	LOS	A		A	-	*	*	-			D	-	A	A
		Delay	9		0	-	*	*	-			26	-	0	
		Queue	0		0	-	*	*	-			25	-	0	
	PM	LOS	A		A	-	*	*	-			C	-	A	A
		Delay	9		0	-	*	*	-			16	-	0	
		Queue	0		0	-	*	*	-			25	-	0	
#600 - Grant Street & West D/W One-Way Stop Control	AM	LOS	-	*	*	B		-	E	-	B	-			A
		Delay	-	*	*	12		-	43	-	12	-			
		Queue	-	*	*	25		-	70	-	25	-			
	PM	LOS	-	*	*	A		-	F	-	B	-			A
		Delay	-	*	*	9		-	64	-	12	-			
		Queue	-	*	*	25		-	150	-	25	-			
#700 - Grant Street & East D/W One-Way Stop Control	AM	LOS	-	*	*	A		-	F	-	B	-			B
		Delay	-	*	*	9		-	104	-	12	-			
		Queue	-	*	*	25		-	175	-	25	-			
	PM	LOS	-	*	*	A		-	E	-	B	-			A
		Delay	-	*	*	8		-	39	-	13	-			
		Queue	-	*	*	0		-	115	-	25	-			
#800 - Grant Street & 6th Street/VFW D/W Two-Way Stop Control	AM	LOS	A			A			F			C			C
		Delay	8			8			53			15			
		Queue	0			25			230			0			
	PM	LOS	A			A			C			C			A
		Delay	8			9			25			20			
		Queue	0			25			65			25			
#900 - Helena Street & 7th Street Two-Way Stop Control	AM	LOS	A			A			A			-			A
		Delay	0			8			9			-			
		Queue	0			0			25			-			
	PM	LOS	A			A			A			-			A
		Delay	0			7			9			-			
		Queue	0			25			25			-			
#950 - 6th Street & Helena Street One-Way Stop Control	AM	LOS	B			-			A		-	-	*	*	A
		Delay	10			-			8		-	-	*	*	
		Queue	25			-			0		-	-	*	*	
	PM	LOS	B			-			A		-	-	*	*	A
		Delay	11			-			8		-	-	*	*	
		Queue	25			-			0		-	-	*	*	
#960 - 6th Street & Butler Street One-Way Stop Control	AM	LOS	A			-			A		-	-	*	*	A
		Delay	9			-			8		-	-	*	*	
		Queue	25			-			0		-	-	*	*	
	PM	LOS	B			-			A		-	-	*	*	A
		Delay	10			-			8		-	-	*	*	
		Queue	25			-			0		-	-	*	*	

(-) movement that isn't available or allowed * free flow movement

EXHIBIT 5-3G
FULL BUILD TRAFFIC OPERATIONS
OPTION 3B - WITH NEW BUTLER STREET EXIT ONLY ACCESS
DEPERE, WISCONSIN

TADI TRAFFIC ANALYSIS & DESIGN, INC.
2279: 6-28-19

Exhibit 5-12A
Existing Traffic Peak Hour Operating Conditions
Modified Geometrics and Traffic Control

Intersection	Peak Hour		Level of Service per Movement by Approach												Intersection Level of Service
			Eastbound			Westbound			Northbound			Southbound			
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
#100 - Grant Street & Mid Valley Drive Two-Way Stop Control	AM	LOS	A		*	A		*	C		B	E		A	A
		Delay	8		*	8		*	25		10	38		9	
		Queue	25		*	25		*	25		25	65		25	
	PM	LOS	A		*	A		*	D		B	E		B	A
		Delay	8		*	8		*	27		10	47		11	
		Queue	25		*	25		*	35		25	80		25	
#200 - Grant Street & Suburban Drive One-Way Stop Control	AM	LOS	-	*	*	B		A	E	-	C	-			A
		Delay	-	*	*	10		0	43	-	22	-			
		Queue	-	*	*	25		0	40	-	70	-			
	PM	LOS	-	*	*	A		A	D	-	B	-			A
		Delay	-	*	*	9		0	31	-	12	-			
		Queue	-	*	*	25		0	25	-	25	-			
#300 - Grant Street & Apollo Way One-Way Stop Control	AM	LOS	-	*	-	-	*	-	-			-			A
		Delay	-	*	-	-	*	-	-			-			
		Queue	-	*	-	-	*	-	-			-			
	PM	LOS	-	*	-	-	*	-	-			-			A
		Delay	-	*	-	-	*	-	-			-			
		Queue	-	*	-	-	*	-	-			-			
#400 - Grant Street & Allard Street One-Way Stop Control	AM	LOS	A	A	-	-	A	A	-			B	-	B	A
		Delay	7	9	-	-	5	4	-			14	-	18	
		Queue	30	140	-	-	40	25	25			30	-	25	
	PM	LOS	B	A	-	-	A	A	-			B	-	B	A
		Delay	11	7	-	-	7	5	-			11	-	12	
		Queue	40	85	-	-	95	25	-			25	-	30	
#500 - Grant Street & VFW D/W One-Way Stop Control	AM	LOS	A		A	-	*	*	-			C	-	A	A
		Delay	8		0	-	*	*	-			19	-	0	
		Queue	0		0	-	*	*	-			0	-	0	
	PM	LOS	A		A	-	*	*	-			B	-	A	A
		Delay	9		0	-	*	*	-			14	-	0	
		Queue	0		0	-	*	*	-			25	-	0	
#600 - Grant Street & West D/W One-Way Stop Control	AM	LOS	-	*	*	B		-	C	-	B	-			A
		Delay	-	*	*	10		-	19	-	11	-			
		Queue	-	*	*	25		-	25	-	25	-			
	PM	LOS	-	*	*	A		-	D	-	B	-			A
		Delay	-	*	*	9		-	27	-	12	-			
		Queue	-	*	*	25		-	50	-	25	-			
#700 - Grant Street & East D/W One-Way Stop Control	AM	LOS	-	*	*	A		-	D	-	B	-			A
		Delay	-	*	*	9		-	33	-	12	-			
		Queue	-	*	*	25		-	60	-	25	-			
	PM	LOS	-	*	*	A		-	C	-	B	-			A
		Delay	-	*	*	8		-	25	-	13	-			
		Queue	-	*	*	0		-	50	-	25	-			
#800 - Grant Street & 6th Street/VFW D/W Two-Way Stop Control	AM	LOS	A			A			C			C			A
		Delay	8			8			22			15			
		Queue	0			25			80			0			
	PM	LOS	A			A			C			C			A
		Delay	8			9			21			20			
		Queue	0			25			50			25			
#900 - Helena Street & 7th Street Two-Way Stop Control	AM	LOS	A			A			A			-			A
		Delay	0			8			9			-			
		Queue	0			0			25			-			
	PM	LOS	A			A			A			-			A
		Delay	0			7			9			-			
		Queue	0			25			25			-			
#950 - 6th Street & Helena Street One-Way Stop Control	AM	LOS	A			-			A		-	-	*	*	A
		Delay	9			-			9		-	-	*	*	
		Queue	0			-			25		-	-	*	*	
	PM	LOS	B			-			A		-	-	*	*	A
		Delay	10			-			8		-	-	*	*	
		Queue	25			-			0		-	-	*	*	

(-) movement that isn't available or allowed * free flow movement

EXHIBIT 5-12A
EXISTING TRAFFIC OPERATIONS
WITH MODIFICATIONS
DEPERE, WISCONSIN

TADI TRAFFIC ANALYSIS & DESIGN, INC.
2279: 6-28-19

Exhibit 5-12B

Full Build (Option 2C) Traffic Peak Hour Operating Conditions

Modified Geometrics and Traffic Control with modified access

Intersection	Peak Hour		Level of Service per Movement by Approach												Intersection Level of Service
			Eastbound			Westbound			Northbound			Southbound			
			LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT	
#100 - Grant Street & Mid Valley Drive Traffic Signal Control	AM	LOS	A	A		B	A		A		A	B		A	A
		Delay	9	8		11	6		10		10	10		10	
		Queue	40	135		30	70		25		25	60		255	
	PM	LOS	B	A		A	A		A		A	B		A	A
		Delay	12	7		9	9		10		10	10		10	
		Queue	25	75		25	145		45		25	65		25	
#200 - Grant Street & Suburban Drive One-Way Stop Control	AM	LOS	-	*	*	B		A	F	-	C	-			A
		Delay	-	*	*	11		0	53	-	21	-			
		Queue	-	*	*	25		0	50	-	40	-			
	PM	LOS	-	*	*	A		A	D	-	B	-			A
		Delay	-	*	*	9		0	27	-	11	-			
		Queue	-	*	*	25		0	25	-	25	-			
#300 - Grant Street & Apollo Way One-Way Stop Control	AM	LOS	-	*	-	-	*	-	-			-			A
		Delay	-	*	-	-	*	-	-			-			
		Queue	-	*	-	-	*	-	-			-			
	PM	LOS	-	*	-	-	*	-	-			-			A
		Delay	-	*	-	-	*	-	-			-			
		Queue	-	*	-	-	*	-	-			-			
#400 - Grant Street & Allard Street Traffic Signal Control	AM	LOS	A	B	-	-	A	A	-			B	-	C	B
		Delay	8	11	-	-	5	4	-			16	-	21	
		Queue	30	160	-	-	50	25	-			30	-	25	
	PM	LOS	B	A	-	-	A	A	-			B	-	B	A
		Delay	12	7	-	-	7	5	-			11	-	12	
		Queue	40	65	-	-	100	25	-			30	-	30	
#500 - Grant Street & VFW D/W One-Way Stop Control	AM	LOS	A		A	-	*	*	-			C	-	A	A
		Delay	8		0	-	*	*	-			21	-	0	
		Queue	0		0	-	*	*	-			0	-	0	
	PM	LOS	A		A	-	*	*	-			B	-	A	A
		Delay	9		0	-	*	*	-			14	-	0	
		Queue	0		0	-	*	*	-			25	-	0	
#600 - Grant Street & West D/W One-Way Stop Control	AM	LOS	-	*	*	B		-	C	-	B	-			A
		Delay	-	*	*	11		-	21	-	12	-			
		Queue	-	*	*	25		-	25	-	25	-			
	PM	LOS	-	*	*	A		-	D	-	B	-			A
		Delay	-	*	*	8		-	31	-	12	-			
		Queue	-	*	*	25		-	70	-	25	-			
#700 - Grant Street & East D/W One-Way Stop Control	AM	LOS	-	*	*	A		-	D	-	B	-			B
		Delay	-	*	*	9		-	34	-	12	-			
		Queue	-	*	*	25		-	70	-	25	-			
	PM	LOS	-	*	*	A		-	C	-	B	-			A
		Delay	-	*	*	8		-	24	-	12	-			
		Queue	-	*	*	0		-	50	-	25	-			
#800 - Grant Street & 6th Street/VFW D/W Two-Way Stop Control	AM	LOS	A			A			C			C			A
		Delay	8			8			20			15			
		Queue	0			25			70			0			
	PM	LOS	A			A			C			C			A
		Delay	8			9			19			19			
		Queue	0			25			40			25			
#900 - Helena Street & 7th Street Two-Way Stop Control	AM	LOS	A			A			B			B			A
		Delay	8			8			10			12			
		Queue	25			0			25			25			
	PM	LOS	A			A			B			C			A
		Delay	8			7			11			15			
		Queue	0			25			25			0			
#950 - 6th Street & Helena Street One-Way Stop Control	AM	LOS	B			-			A		-	-	*	*	A
		Delay	11			-			8		-	-	*	*	
		Queue	25			-			25		-	-	*	*	
	PM	LOS	B			-			A		-	-	*	*	A
		Delay	10			-			8		-	-	*	*	
		Queue	25			-			25		-	-	*	*	

(-) movement that isn't available or allowed * free flow movement

EXHIBIT 5-12B
FULL BUILD TRAFFIC OPERATIONS
WITH MODIFICATIONS
OPTION 2C - WITH NEW SOUTHERN ACCESS WITH APOLLO WAY REMOVED
DEPERE, WISCONSIN

TADI TRAFFIC ANALYSIS & DESIGN, INC.

2279: 6-28-19

CHAPTER VI – RECOMMENDATIONS AND CONCLUSION

PART A – RECOMMENDATIONS

A1. Existing Traffic – Recommended Modifications

The study area intersections were analyzed based on the procedures set forth in the *Highway Capacity Manual* (HCM), *6th 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.

The existing traffic volumes do not include any school expansion plans. The analysis was conducted using existing intersection geometrics and traffic control. The following modifications, shown in Exhibit 1-3, are recommended to accommodate the existing traffic volumes. *Modifications are for jurisdictional consideration and are not legally binding. Brown County and the City of De Pere reserve the right to determine alternative solutions.*

Grant Street intersection with Apollo Way

- Reconstruct north leg of intersection to remove access from Apollo Way to Grant Street.

Grant Street intersection with Allard Street

- Provide fully actuated traffic signal control.
- Provide a dedicated left-turn lane and a dedicated through lane on the west approach.

Traffic signals are expected to be warranted at the Allard Street intersection with the Apollo Way access removed at Grant Street based on a traffic signal warrant analysis completed as part of this project. However, operational deficiencies (LOS E) are expected to remain at the Grant Street intersections with Mid Valley Drive and with Suburban Drive under existing conditions as traffic signals are not warranted at those intersections based on the traffic signal warrant study completed as part of this study. Specifically; at the Mid Valley Drive intersection, only 6 of the 8 required hours are met for the 8-hour warrant and only 3 of the 4 required hours are met for the 4-hour warrant. At the Suburban Drive intersection, only 5 of the 8 required hours are met for the 8-hour warrant and only 3 of the 4 required hours are met for the 4-hour warrant. These intersections should be monitored and traffic signal or roundabout control should be considered at these intersections if traffic volumes increase in the future to a level where traffic signal volume thresholds are met.

Except as noted, all other intersections are currently operating at LOS D or better during the weekday peak periods.

A2. Full Build Traffic – Recommended Modifications

Full build traffic volumes include the full build of the proposed high school expansion site as well as the modifications at the other school district schools. The following ***additional*** modifications, above and beyond the existing traffic recommended modifications, shown in Exhibit 1-4, are recommended to accommodate the full build traffic volume conditions. *Modifications are for jurisdictional consideration and are not legally binding. Brown County and the City of De Pere reserve the right to determine alternative solutions.*

Grant Street intersection with Mid Valley Drive

- Provide single lane roundabout control with single lane approaches on all four legs of the intersection.

Helena Street intersection with South 7th Street

- Provide a new access driveway to the high school site with a single inbound and a single exit lane along the north approach of the intersection.
- Provide stop sign control on the north approach of the intersection.
- Maintain stop sign control on the south approach of the intersection.

Grant Street intersection with West High School Driveway

- Consider providing a high visibility cross walk (pavement marking) and a Rectangular Rapid Flashing Beacon (RRFB) on Grant Street, immediately west of the high school driveway with advanced yield lines with "Yield Here to Pedestrian" signs on the east and west approaches of the intersection.

Several access options were analyzed as part of this study including no additional access points to the high school, providing a new southern access to the site along Helena Street and providing a new eastern access point to the site along Butler Street. The only access option that allowed all driveways to the high school to operate acceptably during both peak periods was Access Option 2C which included providing a new access to Helena Street that would be fully accessible to all users of the high school.

Regardless of the access option evaluated, additional traffic control is recommended at the Grant Street intersection with Mid Valley Drive under the full build traffic condition. Due to the presence of existing roundabouts along the corridor and immediately adjacent to the Mid Valley intersection, roundabout control is the recommended traffic control at this intersection. However, it is noted that traffic signal control is also a viable traffic control option for this intersection and will also provide acceptable operations.

With a baseball field and park located immediately north of the high school, providing a controlled pedestrian crossing of Grant Street is recommended. It is noted that 15 to 20 students were observed crossing Grant Street as part of the data collection for this project on a typical day in mid-November. With these volumes and the expected expansion at the high school, vehicle and pedestrian volumes at this crossing are expected to exceed the levels for installation of a RRFB.

Operational deficiencies (LOS F) are expected to remain at the Grant Street intersection with Suburban Drive during the weekday morning peak hour under full build traffic volume conditions. However, traffic signals are not expected to be warranted at this intersection based on the traffic signal warrant study completed as part of this study. Specifically; at the Suburban Drive intersection, only 4 of the 8 required hours are met for the 8-hour warrant and only 3 of the 4 required hours are met for the 4-hour warrant. This intersection should be monitored and traffic signal or roundabout control should be considered at this location if traffic volumes increase in the future to a level where traffic signal volume thresholds are met. It is expected that the higher delays during the morning peak hour are due to the presence of three schools located immediately to the south of the intersection and the surge in traffic as parents drop off their children in the morning. If delays become excessive at this intersection, it is expected that drivers will utilize other routes (i.e. South 9th Street) to avoid this intersection.

Except as noted, all other intersections are expected to operate at LOS D or better during the weekday peak periods under the full build traffic volume conditions with the modifications listed in this report.

PART B – CONCLUSION

To accommodate the full build out of the proposed high school expansion along Grant Street 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 high school expansion site as well as the expansion of the other school district schools.