

CHAPTER 3 – STUDY AREA OPERATIONAL OVERVIEW

This chapter describes the overall traffic operations within the study area under existing and future conditions and focuses on individual intersections not directly associated to interchange influences areas as described in the following chapters. The intersections analyzed in this chapter include State Avenue with 118th Street and 110th Street, and Parallel Parkway with 110th Street / Hutton Road and Village West Parkway.

3.1 EXISTING CONDITIONS

Analyses for existing conditions were completed using the existing weekday PM peak hour and Saturday peak hour traffic flows with the current geometric configurations and traffic controls to determine the existing operational levels of service and improvement needs at each of the intersections.

The existing weekday PM peak hour design volumes and existing Saturday peak hour design volumes for the intersections studied in this chapter are shown on **Exhibit 3.1.1** and the existing lanes and level of service (LOS) for the weekday PM peak hour are shown on **Exhibit 3.1.2**. The existing weekday PM peak hour levels of service, by roadway segment and intersections are displayed in **Figure 3.1**. In general, during the existing weekday PM peak hour, the roadways within the study area currently operate at good levels of service. However, there are a few exceptions, specifically the interchanges of I-70 with I-435 and I-435 with State Avenue which are discussed in the following chapters. Below is a summary of existing operations for the intersections analyzed as part of this chapter:

State Avenue and 118th Street

The existing signalized intersection of State Avenue and 118th Street operates at LOS C during the existing weekday PM peak hour with individual intersection movements operating with good to acceptable levels of service.

State Avenue and 110th Street

The existing signalized intersection of State Avenue and 110th Street operates at LOS A during the existing weekday PM peak hour. Many of the individual intersection movements operate at LOS A.

Parallel Parkway and 110th Street / Hutton Road

During the existing weekday PM peak hour, the signalized intersection of Parallel Parkway and 110th Street / Hutton Road has intersection LOS C with individual intersection movements operating between LOS B and LOS D.

Parallel Parkway and Village West Parkway

The intersection of Parallel Parkway and Village West Parkway is operating at a LOS C with many of the individual intersection movements operating between LOS B and LOS D.

It should be noted that the intersections of Parallel Parkway with 110th Street / Hutton Road, with Village West Parkway, and with 106th Street are currently running a north / south split phase signal timing plan due to geometry. The split phase timing acts as an operations constraint and forces poor signal timings, inefficient coordination of signals, and reduced intersection levels of service along the Parallel corridor.

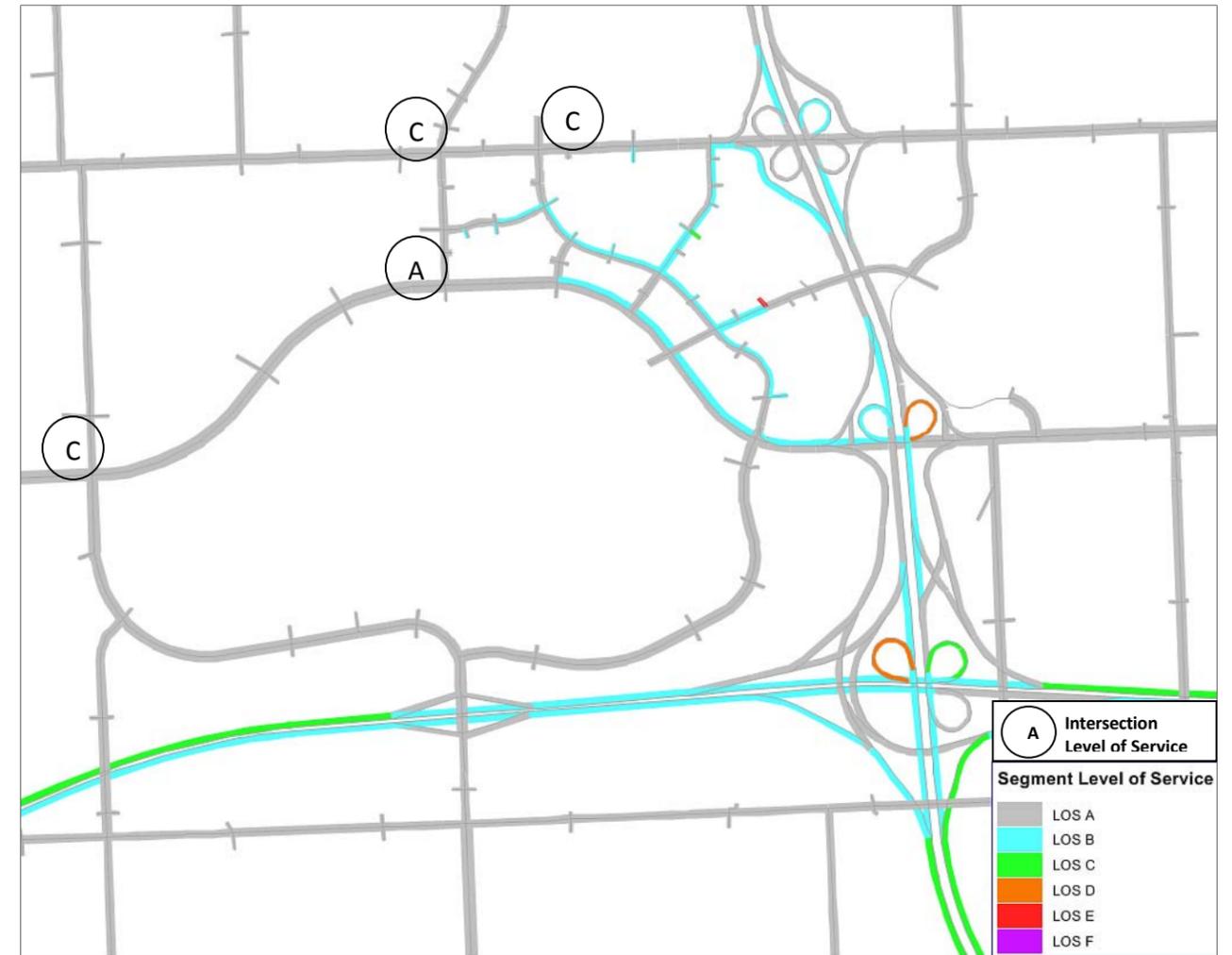


Figure 3.1 – Roadway and Intersection Levels of Service for Existing Weekday PM Peak Hour Traffic Volumes

3.2 DESIGN YEAR 2040 NO BUILD IMPROVEMENTS

A future travel demand model was developed to reflect the anticipated Design Year 2040 land uses and the committed roadway network improvements anticipated to be completed by 2040 (i.e. No Build condition). Improvements included in the modeling were widening improvements of State Avenue between K-7 and 94th Street, upgrading 118th Street between State Avenue and Donahoo Road, reconstructing the system interchange of I-70 / K-7 and widening of I-70 to 3 lanes in each direction through the study area, adding traffic signals at primary intersections throughout the study area, and other planned improvements listed in Chapter 2. Additionally, due to near term traffic congestion, improvements on State Avenue, as described in Chapter 4, were included in the Design Year 2040 No Build travel demand model. After running this version of the travel demand model, traffic volume projections were developed that would be expected during the Design Year 2040 weekday PM peak hour

The expected Design Year 2040 weekday PM peak hour traffic volumes at intersections of State Avenue with 118th Street and 110th Street, and Parallel Parkway with 110th Street / Hutton Road and Village West Parkway are displayed on Exhibit 3.2.1. Figure 3.2 is a graphical representation of the expected roadway segment level of service for the Design Year 2040 No Build Improvements.

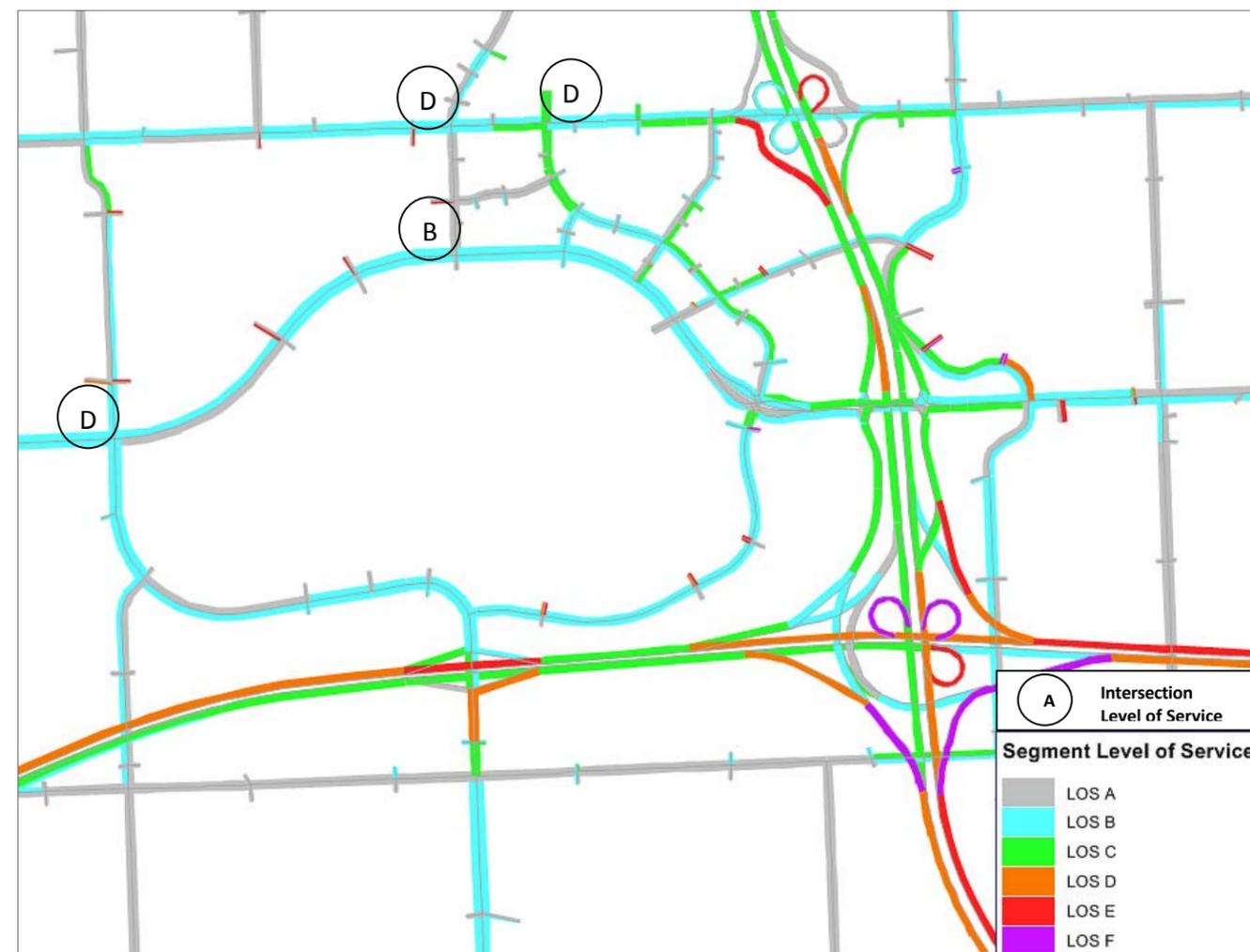


Figure 3.2 – Roadway and Intersection Levels of Service for No Build Design Year 2040 Weekday PM Peak Hour Traffic Volumes

The study area local roadway network would be expected to operate at acceptable levels of service during the Design Year 2040 PM peak traffic period with reduced levels of service expected on I-70 and on I-435. The reduction in level of service is directly related to future new development and to the projected three percent traffic growth rates per year that would be expected on I-70 and on I-435. Under this scenario, poor levels of service would be expected at the I-435 interchange with Parallel Parkway and at the I-70 and I-435 interchange.

Each of the interchanges and influence areas will be discussed in detail in the following chapters. Below is a summary of Design Year 2040 weekday peak period operations for the intersections analyzed as part of this chapter:

State Avenue and 118th Street

During the Design Year 2040 weekday PM peak hour the overall intersection level of service would be expected to be D with the eastbound and westbound left-turn movements expected to operate at LOS E.

State Avenue and 110th Street

This intersection would be expected to operate at LOS B during the Design Year 2040 weekday PM peak hour with all movements operating at LOS D or better.

Parallel Parkway and Hutton Road / 110th Street

This intersection would be expected to operate at LOS D during the Design Year 2040 PM peak hour. Each left-turn movement would be expected to operate at LOS E. The split phase timing plan contributes to the poor level of service at this intersection. If geometric improvements are not made at this intersection and it continues to operate under a split phase timing plan, the expected intersection level of service would be E.

Parallel Parkway and Village West Parkway

During the Design Year 2040 weekday PM peak hour, this intersection would be expected to operate at LOS D with the eastbound, northbound, and southbound left-turns expected to operate at LOS E. The westbound left-turn would be expected to fail with 86 seconds of delay. In Design Year 2040, this intersection would be expected to fail operating under the current split phase timing plan and existing geometrics.

3.3 DESIGN YEAR 2040 COLLECTOR-DISTRIBUTOR ROAD IMPROVEMENTS

A scenario was developed to analyze the impacts of consolidating the I-435 interchanges at State Avenue and at Parallel Parkway into one large interchange system, connected by 3-lane northbound and southbound, one-way collector-distributor (C-D) roads. Northbound traffic would exit I-435 south of the State Avenue interchange to access State Avenue or Parallel Parkway. To access State Avenue or Parallel Parkway, southbound traffic would be required to exit I-435 north of Parallel Parkway. This scenario increases traffic on the I-435 off-ramps by moving the access from I-435 to a C-D road for northbound I-435 to Parallel Parkway and for southbound I-435 to State Avenue. Likewise, traffic on the I-435 on-ramps is expected to increase due to eliminating direct access to southbound I-435 from Parallel Parkway and to northbound I-435 from State Avenue.

This C-D roadway must be three lanes in each direction due to the expected traffic volumes, the required lane geometry at each interchange, and the short weaving segments between State Avenue and Parallel Parkway. Reducing the number of lanes on the C-D roads to two lanes would cause the weaves and the ramps to State Avenue and Parallel Parkway to fail. Additionally, the reduced number of lanes on the C-D roads between State Avenue and Parallel Parkway would operate with high congestion and poor levels of service. See **Figure 3.3.1** for projected traffic volumes and lane configurations for the C-D roadway system.

Figure 3.3.2 is a graphical representation of the expected roadway and intersection levels of service for the C-D road scenario. The 3-lane northbound off-ramps from the C-D road to State Avenue and Parallel Parkway would be expected to fail in the Design Year 2040 weekday PM peak hour. Additionally, the 3-lane southbound on-ramp from Parallel Parkway would be expected to operate at a poor LOS E.

When compared to the Design Year 2040 weekday PM peak hour travel demand model with State Avenue interchange improvements, discussed in detail in Chapter 4, this scenario would be expected to accommodate between 20 and 30 percent less traffic due to capacity constraints on the I-435 off-ramps at the State Avenue and Parallel Parkway interchanges.

The northbound and southbound weaves on the C-D roads between State Avenue and Parallel Parkway would be expected to operate at LOS C and LOS B respectively. Additionally, under the C-D road scenario, the northbound and southbound I-435 weaves north of Parallel Parkway would both be expected to operate at LOS C during the Design Year 2040 weekday PM peak hour.

Due to the capacity constrained C-D road system, the signalized ramp intersections would be expected to operate at LOS C or better. As shown on **Figure 3.3.2**, the northbound and southbound signalized intersection ramps at State

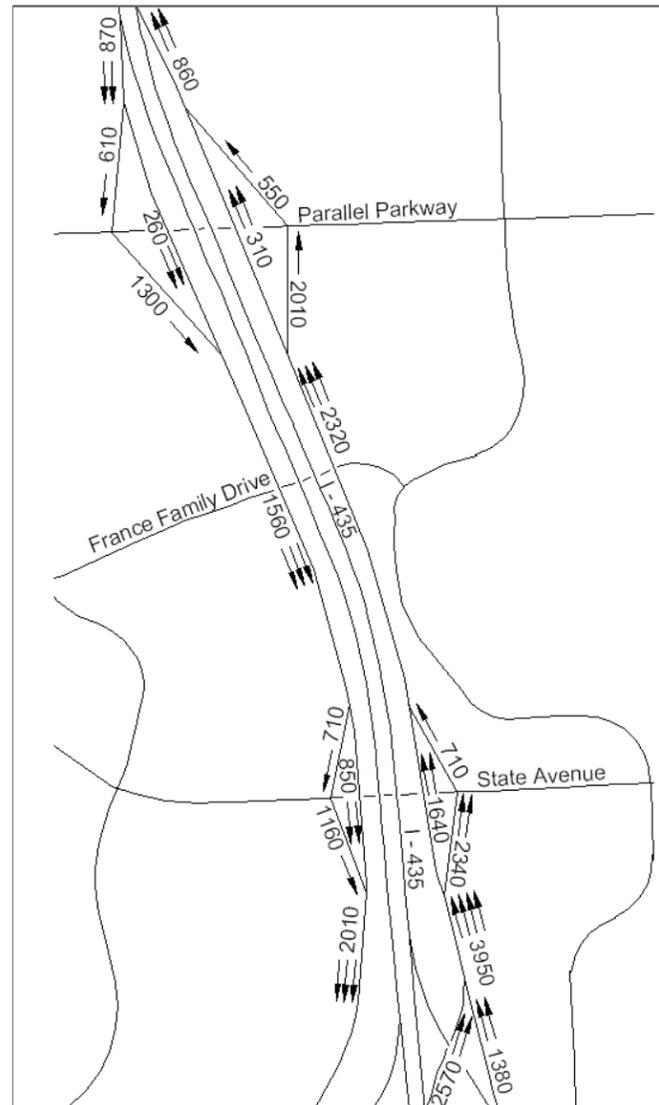


Figure 3.3.1 – C-D Roadway Traffic Volumes and Lane Configuration



Figure 3.3.2 – Roadway and Intersection Levels of Service for Frontage Roads Design Year 2040 Weekday PM Peak Hour Traffic Volumes

Avenue would be expected to operate at LOS C and LOS B respectively. The signalized intersections of northbound and southbound ramps with Parallel Parkway would also be expected to operate at LOS C and LOS B respectively.

To accommodate the three-12' lanes, two-10' Shoulders, a 30' clear zone between the highway and the C-D road, and an outside clear zone, it would be necessary to acquire an estimated 130' right-of-way outside of the existing I-435 right-of-way for both the northbound and southbound frontage road. The frontage road system would also require construction of six additional bridges parallel to I-435. A pair of bridges, northbound and southbound, would need to be constructed over State Avenue, over France Family Drive, and over Parallel Parkway on each side of existing I-435.

Under this scenario, the footprint required for the northbound C-D road, between State Avenue and Parallel Parkway, would conflict with the relocated 98th Street through the Schlitterbahn Vacation Resort and Waterpark development. West of I-435, the required right-of-way for the southbound C-D road between Parallel Parkway and State Avenue, would be expected to encroach on both the Nebraska Furniture Mart property and the Cabela's property.

The diamond type interchange at State Avenue would require three through lanes in each direction on State Avenue, along with dual left turn lanes for both eastbound and westbound movements. The segment of State Avenue under I-435 would need to provide an 8 to 10-lane section, requiring the construction of new mainline I-435 bridges. While this type of reconstruction is not abnormal for a major reconfiguration project, the construction of new I-435 mainline bridges would be very costly and would create significant traffic management issues for this region during construction.

A similar diamond interchange at Parallel Parkway would also require three through lanes in each direction in addition to a single left-turn lane for the eastbound movement and dual left-turn lanes for westbound movements. The segment of Parallel Parkway under I-435 would need to provide for an 8 to 10-lane cross section. The current I-435 bridge over Parallel Parkway could accommodate 4 lanes (three through lanes and a left-turn lane) in each direction with no additional room for widening improvements. The required second westbound left-turn lane could be constructed between the bridge column and the signalized intersection. Utilizing the existing bridge reduces construction cost for this improvement type and minimizes traffic management issues for this region.

Due to the limited roadway capacity of this scenario, construction costs, right-of-way cost, and likely utility relocation cost, it is not recommended to pursue the option of a C-D road system between State Avenue and Parallel Parkway.

3.4 DESIGN YEAR 2040 RECOMMENDED IMPROVEMENTS

A Design Year 2040 model was developed with recommended improvements on State Avenue, on Parallel Parkway, and at the I-70 / I-435 interchange as described in detail in the following chapters. Additionally, as a quick model-wide check, a 2040 Saturday peak hour model was developed for this scenario to determine any unexpected problems with the recommended improvements. When compared to the Design Year 2040 weekday PM peak hour, the 2040 Saturday peak hour traffic volumes would be expected to decrease on the interstate highways while the traffic volumes on the local system would be expected to increase.

Under the recommended improvement scenario, the expected Design Year 2040 weekday PM peak hour traffic volumes for the intersections of State Avenue with 118th Street and 110th Street, and Parallel Parkway with 110th Street / Hutton Road and Village West Parkway are displayed on **Exhibit 3.4.1**. **Figure 3.4** is a graphical representation of the expected roadway segment level of service for the Design Year 2040 Recommended Improvements.

Below is a summary of intersection operations analyzed as part of this chapter for Design Year 2040 weekday peak period:

State Avenue and 118th Street

During the Design Year 2040 weekday PM peak hour, the overall intersection level of service would be expected to be a D with the eastbound and westbound left-turn movements expected to operate at LOS E. No additional improvements are required at this intersection.

State Avenue and 110th Street

At this intersection, the Design Year 2040 weekday PM peak hour level of service would be expected to be B with all movements operating at LOS D or better. No additional improvements are required at this intersection.

Parallel Parkway and Hutton Road / 110th Street

During the Design Year 2040 weekday PM peak hour, this intersection would be expected to operate at LOS D. Except for two movements, the intersection's individual movements would be expected to operate at LOS D or better. The eastbound and northbound left-turn movement would be expected to operate at LOS E.

Parallel Parkway and Village West Parkway

This intersection would be expected to operate at LOS D during the Design Year 2040 weekday PM peak hour. All intersection movements would be expected to operate at LOS E or better.

Without the addition of separate left-turn phases for north / south traffic and geometric improvements at the intersections along Parallel Parkway, this corridor would be expected to operate at very poor levels of service or fail.

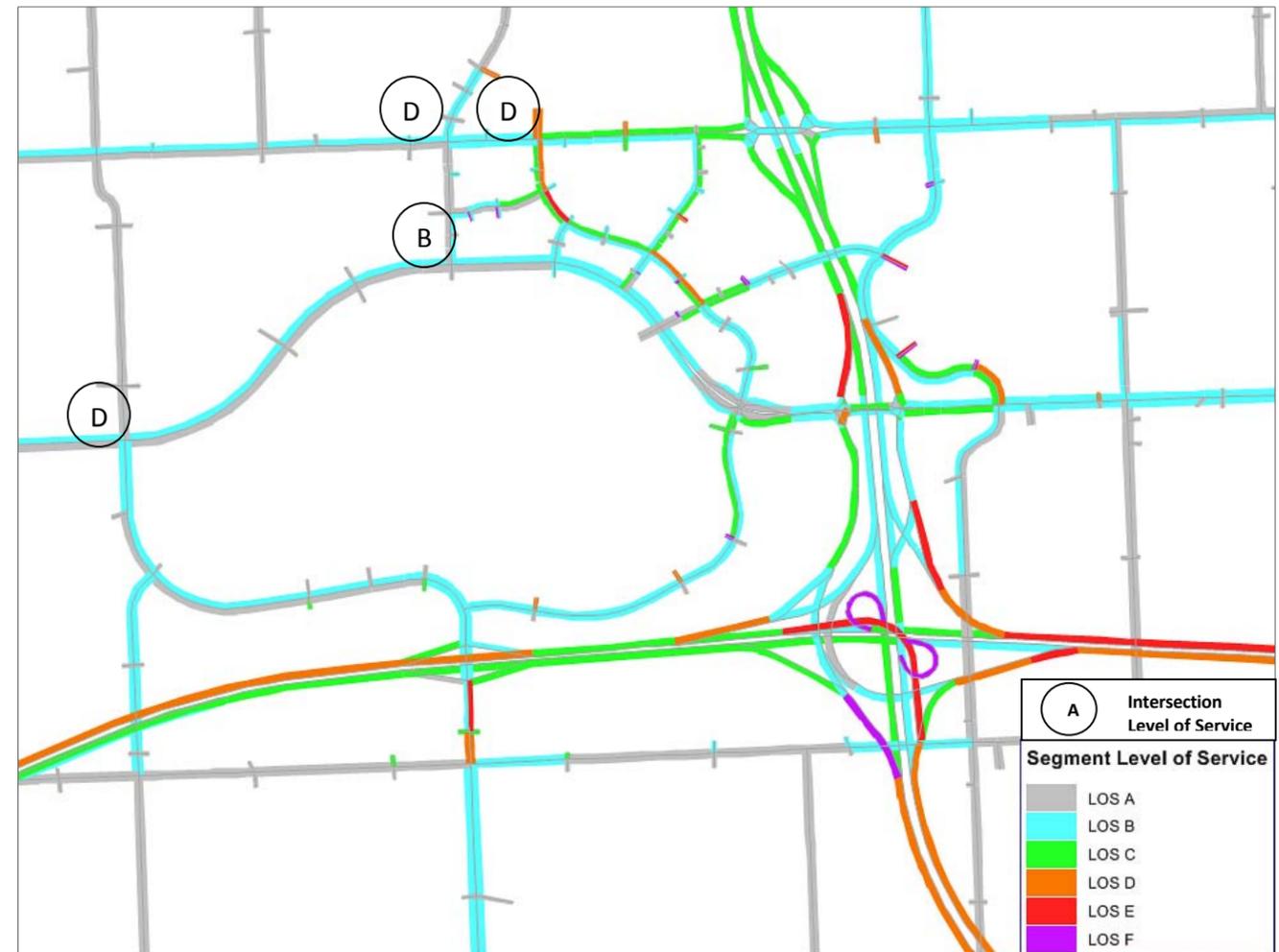


Figure 3.4 – Roadway and Intersection Levels of Service for Recommended Improvements Design Year 2040 Weekday PM Peak Hour Traffic Volumes

3.5 DESIGN YEAR 2070 RECOMMENDED IMPROVEMENTS

A Design Year 2070 Full Build-out model was developed with recommended improvements on State Avenue, on Parallel Parkway, and at the I-70 / I-435 interchange as described in detail in the following chapters. The full build-out model includes 100% of projected development within the study area and all foreseeable roadway improvements completed. The traffic volumes near the Kansas Speedway and the Village West / Legends commercial and entertainment district would not be expected to increase significantly due to development in this area considered to be almost fully built out by 2040.

Under the recommended improvement scenario, the expected Design Year 2070 weekday PM peak hour traffic volumes for the intersections of State Avenue with 118th Street and 110th Street, and Parallel Parkway with 110th Street / Hutton Road and Village West Parkway are displayed on **Exhibit 3.5.1**. **Figure 3.5** is a graphical representation of the expected roadway segment level of service for the Design Year 2070 Recommended Improvements.

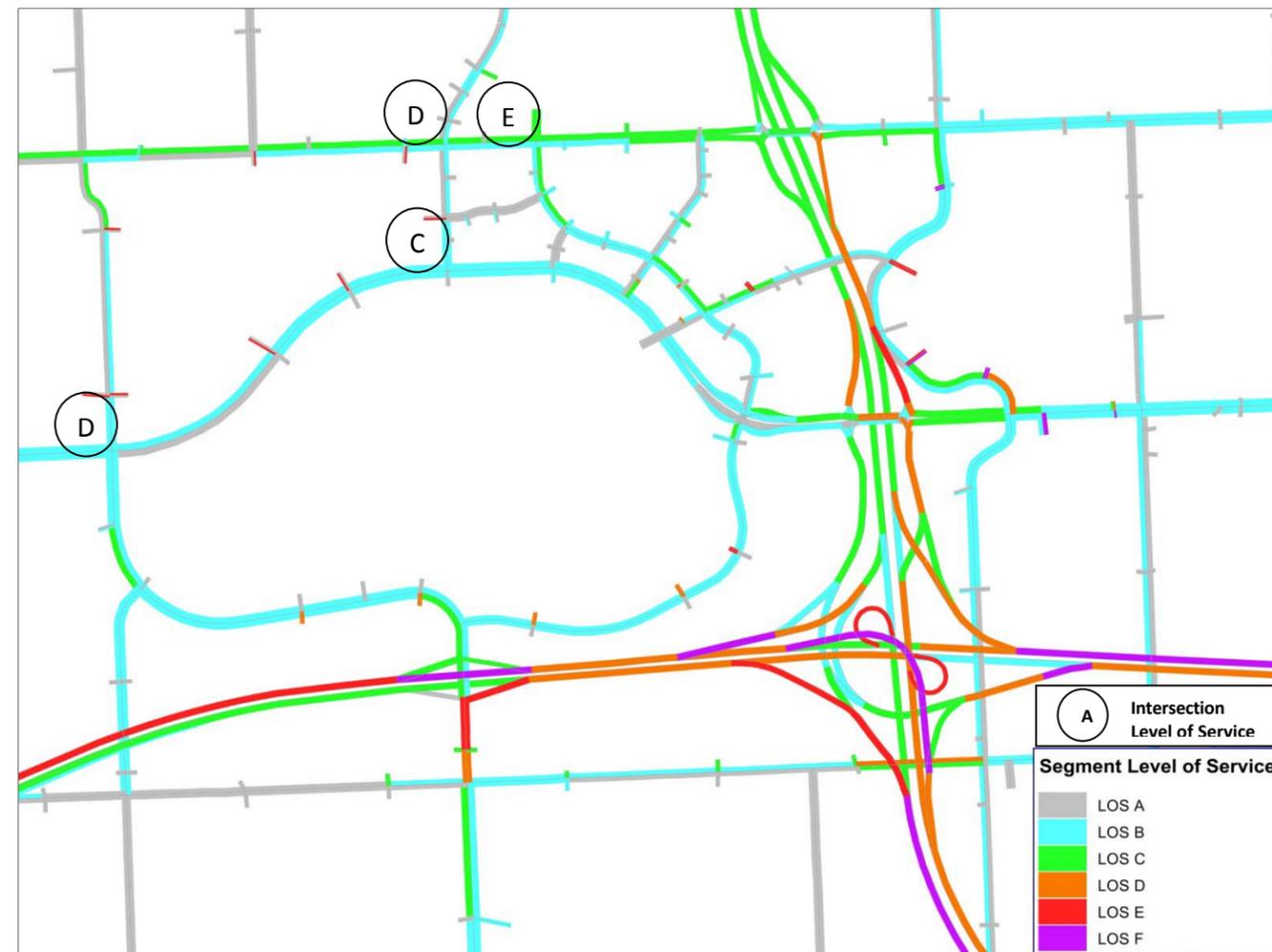


Figure 3.5 – Roadway Levels of Service for Full Build-out Weekday PM Peak Hour Traffic Volumes

Below is a summary of intersection operations analyzed as part of this chapter for Design Year 2070 weekday peak period with all anticipated improvements:

State Avenue and 118th Street

During the Design Year 2070 weekday PM peak hour the overall intersection level of service would be expected to be D with the eastbound and southbound left-turn movements expected to fail.

State Avenue and 110th Street

This intersection would be expected to operate at LOS C during the Design Year 2070 weekday PM peak hour with all movements operating at LOS D or better.

Parallel Parkway and Hutton Road / 110th Street

During the Design Year 2070 PM peak hour, this intersection would be expected to operate at LOS D. Many of the movements would be expected to operate at LOS E or better with the eastbound left-turn movement expected to fail.

Parallel Parkway and Village West Parkway

This intersection would be expected to operate at LOS E during the Design Year 2070 weekday PM peak hour. The eastbound and northbound left-turns would be expected to fail during the peak hour.

Without geometric and signal improvements to the intersections along Parallel Parkway, this corridor would operate at very poor levels of service or fail.