

CHAPTER 4 - STATE AVENUE CORRIDOR IMPROVEMENTS

To better detail the results of the analyses and describe the necessary improvements anticipated to be required, due to the continued development within the Village West study area, critical corridors were identified and studied in detail. One of the most important corridors identified for additional detailed review and analysis is the section of State Avenue running from west of the at-grade intersection with Village West Parkway, through the existing partial cloverleaf interchange with I-435, and ending east of 98th Street.

This subsection of State Avenue is one of the most significant arterial and interchange systems within the study area, providing direct access to the Village West / Legends commercial and entertainment district, the Kansas Speedway complex, and the other developments situated along State Avenue to the west of I-435. In addition, immediately to the east of the I-435 interchange is the site of the Schlitterbahn Vacation Resort and Waterpark, approximately a 360-acre recreation and shopping development that will attract a significant number of visitors throughout the year.

4.1 EXISTING CONDITIONS

Analyses of the existing traffic flows under the current geometric and traffic control conditions on State Avenue, near the I-435 interchange, were performed to determine the existing operational levels of service and improvement needs within the study area. The existing weekday PM peak hour design volumes and the existing Saturday peak hour volumes are shown on **Exhibit 4.1.1** and the existing lanes and level of service (LOS) are shown on **Exhibit 4.1.2**. It should be noted that the levels of service for State Avenue weaves and merges / diverges are estimates only, due to limitations of the Highway Capacity Manual methodology as applied to low-speed arterial facilities. The existing level of service by road segment is displayed in **Figure 4.1**.



Figure 4.1 –Roadways and Intersection Levels of Service for Existing Weekday PM Peak Hour Traffic Volumes

As can be seen in **Figure 4.1**, the majority of the roadway segments in the I-435 / State Avenue area currently are operating at good levels of service during the weekday PM peak traffic period. One exception to this condition is the northbound I-435 cloverleaf ramp to westbound State Avenue, which operates at a LOS D. The I-435 northbound to westbound off-ramp currently experiences very poor operations on a daily basis during moderate to high traffic flow conditions. This is primarily due to the tight radius of the single lane ramp with a low speed design (25 mph), being used to serve the high traffic volume demand. A secondary constraint for this ramp's traffic movement is the short weave length on State Avenue between the I-435 northbound off-ramp and the on-ramp to southbound I-435. While this weave functions adequately at this time, increases in traffic volumes within the weave area quickly reduce the operations of westbound movements on State Avenue, under I-435, to poor or unacceptable levels of service. With continued development in the Village West area, this is one of the most desirable and important ingress movements to the region. The low capacity of this ramp movement limits traffic flows from northbound I-435 into the region.

The existing intersections of State Avenue with Village West Parkway and 98th Street both currently operate with good LOS B, during normal weekday PM peak commuter travel periods. It has been observed that traffic operations at Village West Parkway and State Avenue occasionally break down to poor LOS D, with the Village West Parkway north approach to State Avenue operating poorly and vehicles regularly queuing northward through the Cabela's Drive intersection. These poor operations occur intermittently during shopping and entertainment venue peak operating periods, such as Friday evenings, Saturday afternoons and evenings, and some periods on Sundays. Much of this off-peak congestion at Village West Parkway and State Avenue is greatly dependent upon special shopping events and entertainment schedules.

While the weekday evening design peak period of 5:00 to 6:00 PM primarily used in this study does not reflect some of the known congestion issues at State Avenue and Village West Parkway or along Village West Parkway, it is expected that as continued development occurs throughout the region, the weekday 5:00 to 6:00 PM peak period will become equally congested and as critical operationally as any of the off-peak periods are currently. This expectation is due to the planned diversity of the proposed land uses and developments which will add office, residential, and non-retail / entertainment land uses into the region. These new land uses will not exhibit the same peak traffic generation characteristics as the current retail and entertainment mix of land uses, and will significantly increase the expected traffic volumes during normal weekday commuter peak periods. While these new land uses will not decrease the current off-peak period's congestion or improve the existing operational deficiencies, they will increase traffic volumes during the weekday commuter 5:00 to 6:00 PM peak period to traffic levels that will equal or exceed the congested conditions that exist today. Throughout this study, continued review of the projected Saturday peak traffic operations has been completed to confirm the operational acceptability of the proposed recommendations.

4.2 DESIGN YEAR 2040 NO BUILD IMPROVEMENTS

A travel demand model, including the widening of State Avenue to 3-lanes between K-7 and 94th Street; upgrading 118th Street between State Avenue and Donahoo Road; reconstructing the system interchange of I-70 / K-7; adding traffic signals at primary intersections throughout the study area; and other planned improvements listed in Chapter 2, was created based upon the Design Year 2040 land uses and the committed roadway network improvements planned to be completed by 2040 (i.e. the No Build condition). 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, assuming no major improvements were constructed at the I-435 interchange or at major at-grade intersections were completed.

The expected Design Year 2040 traffic volumes with the existing I-435 interchange configuration and an at-grade intersection at State Avenue and Village West Parkway are displayed on **Exhibit 4.2.1**. **Figure 4.2** is a graphical representation of expected LOS for the Year 2040 No Build improvements.

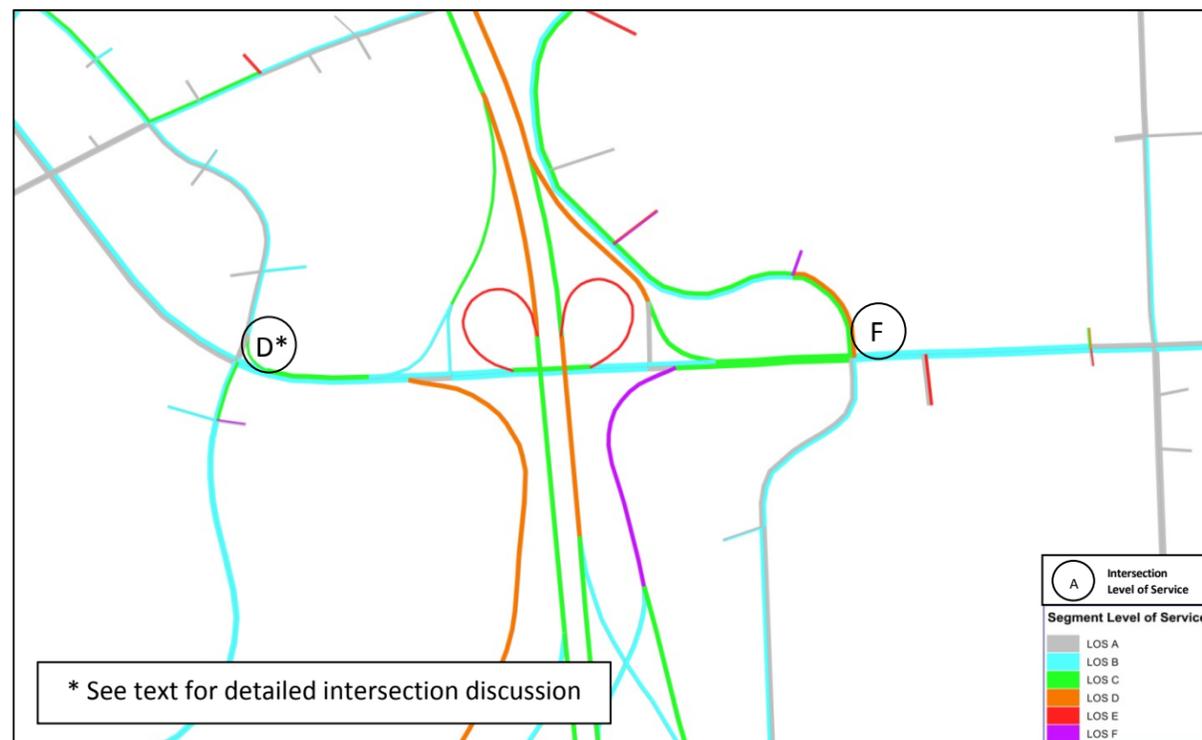


Figure 4.2 – Roadways and Intersection Levels of Service for No Build Design Year 2040 PM Peak Hour Traffic Volumes

The completed travel demand model analysis indicates the interchange of I-435 with State Avenue will be expected to experience very poor operations with levels of service for the majority of the ramp movements in the unacceptable LOS D, LOS E, or even LOS F range. The northbound I-435 to eastbound State Avenue right-turn movement is expected to fail due to the high traffic volume expected to access the Schlitterbahn development from State Avenue. Each of the loop ramps at the I-435 interchange at State Avenue would be expected to operate at LOS E or worse and the weave between the ramps would be expected to operate poorly.

The intersection of State Avenue with realigned 98th Street, the primary access for the Schlitterbahn Vacation Resort and Waterpark and other developments east of I-435, would be expected to operate at an unacceptable LOS F in the Design Year 2040 traffic condition under the geometric No Build scenario. The geometrics at the realigned 98th Street

intersection under the No Build scenario were based upon the planned 3-lane section of State Avenue between K-7 and 94th Street, improvements recommended by the approved Schlitterbahn development plan, and the recommended realignment of the south leg of 98th Street to intersect at the new 98th Street location. The operational deficiencies are in part due to the free-flow nature of the northbound I-435 to eastbound State Avenue movement overloading the west leg of the signalized intersection of 98th Street and State Avenue. A significant portion of the heavy northbound right turn movement projected from I-435 feeds into the eastbound left turn volume destined for the Schlitterbahn site or other commercial development along 98th Street. Section 4.5 of this chapter evaluates various improvement alternatives for this location.

One interesting result of the Design Year 2040 No Build scenario is that the intersection of State Avenue with Village West Parkway would be expected to operate at LOS D during the future weekday PM peak hour. Please note that the eastbound left turn, northbound through, and westbound left turn movements are all expected to operate with unacceptable LOS E or F under this design scenario. A further analysis of the future No Build Saturday peak period traffic volumes reveals that the overall intersection would be expected to function at an unacceptable LOS F under this design scenario, with the southbound left turn movement failing badly.

The primary reason that this intersection is not projected to experience very poor LOS F operations under this scenario is the limiting nature of the existing interchange of I-435 and State Avenue, which meters traffic flows into this intersection. With the interchange of I-435 and State Avenue projected to have poor operational characteristics, traffic that would typically use State Avenue for access to and from this area instead diverting to other area roadways and interchanges to avoid this congested corridor. Much of this diverted traffic would be expected to utilize the Parallel Parkway and I-435 interchange or the I-70 and 110th Street interchange for area access. These longer travel path diversions limit the traffic that would otherwise use State Avenue with Village West Parkway or 98th Street to access regional developments.

While some diversion of traffic to other area interchanges is not a concern, significant rerouting of traffic to longer travel paths that also have congestion issues is not acceptable. The Design Year 2040 No Build does require longer travel paths for State Avenue drivers destined to local attractions and significantly adds to congestion and poor operations of other corridors and interchanges.

As the No Build analysis was completed for this segment of State Avenue, it became apparent additional review and analysis was needed. A series of Design Year 2040 weekday PM peak period demand models were constructed to evaluate geometric modification alternatives along this section of State Avenue at the major intersections between the France Family Drive overpass and 94th Street including the I-435 interchange. The design scenarios reviewed are detailed in the following sections of the report and include:

- **Section 4.3: I-435 Interchange Improvement Review**
 - *Standard Diamond Interchange*
 - *Single Point Urban Interchange*
 - *Diverging Diamond Interchange*
- **Section 4.4: State Avenue and Village West Parkway Intersection Improvement Review**
 - *At-grade Intersection Enhancements*
 - *Conversion to Single Point Urban Interchange (SPUI)*
- **Section 4.5: State Avenue and 98th Street Intersection Improvement Review**
 - *Signal with Triple Eastbound Left Turn Enhancements*
 - *Post - 98th Street Loop Configuration*
 - *Pre - 98th Street Loop Configuration*
 - *Pre - 98th Street Loop Configuration (One-Way Alternate)*

4.3 DESIGN YEAR 2040 I-435 INTERCHANGE IMPROVEMENT REVIEW

I-435 and State Avenue: Standard Diamond Interchange

The modification of the existing partial cloverleaf interchange into a standard diamond type interchange was evaluated at I-435 and State Avenue. The projected traffic volumes and lane arrangements for the standard diamond interchange are shown on **Exhibit 4.3.1**. As can be seen on **Figure 4.3.1**, traffic operations on the majority of the ramp and arterial roadway segments would be expected to function with acceptable levels of service during the Design Year 2040 scenario. One notable exception is the northbound I-435 off-ramp to State Avenue which is projected to operate with a LOS C, even with triple turn lanes for both left and right turning movements.

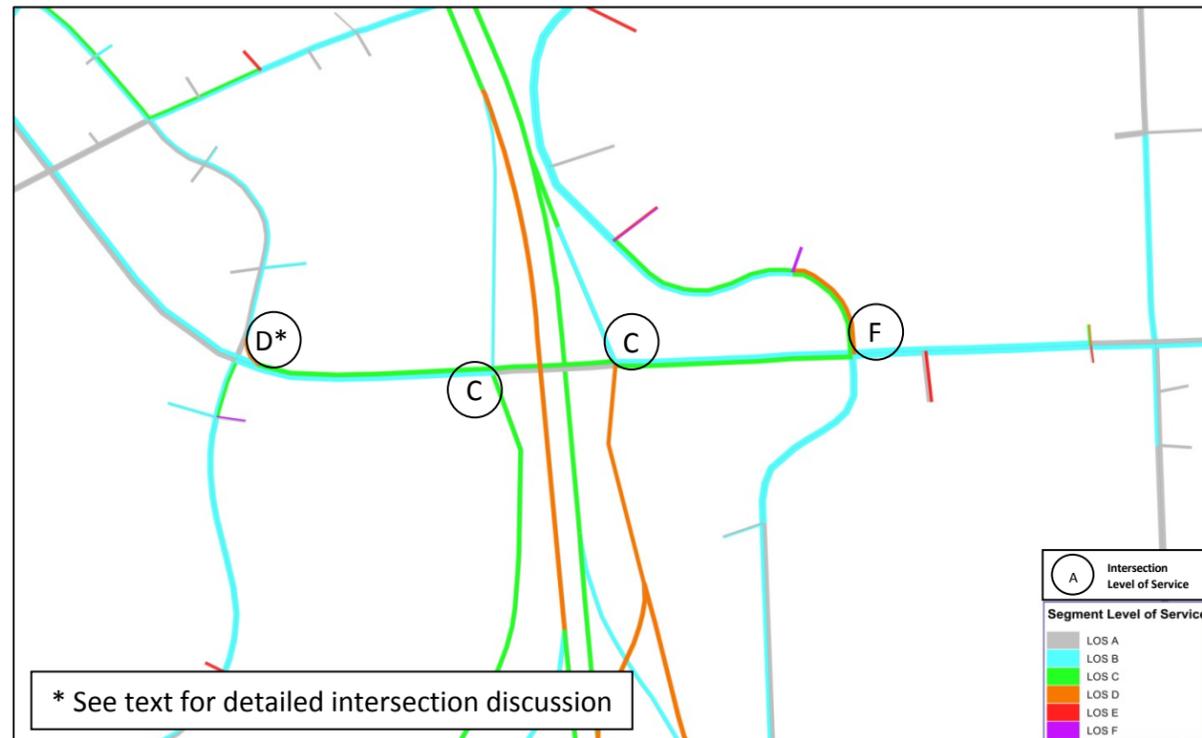


Figure 4.3.1 - Roadways and Intersection Levels of Service for Standard Diamond Interchange Design Year 2040 PM Peak Hour Traffic Volumes

Under this scenario the intersection of State Avenue with Village West Parkway would again be expected to operate at a poor LOS D during the future weekday PM peak hour, but the eastbound and northbound left-turn movements are projected to experience unacceptable LOS E operations. When the Design Year 2040 Saturday peak period traffic volumes were reviewed at this intersection, the overall intersection would be expected to function at an unacceptable LOS F, with the southbound movements all operating poorly.

This interchange improvement concept 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 interchange 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.

I-435 and State Avenue: Single Point Urban Interchange (SPUI)

The modification of the existing partial cloverleaf interchange into a Single Point Urban Interchange (SPUI) was next evaluated at I-435 and State Avenue. The projected traffic volumes for the SPUI are shown on **Exhibit 4.3.2**. As can be seen on **Figure 4.3.2**, traffic flows for the majority of the ramp and arterial roadway segments would again be expected to operate with acceptable levels of service during the Design Year 2040 scenario.

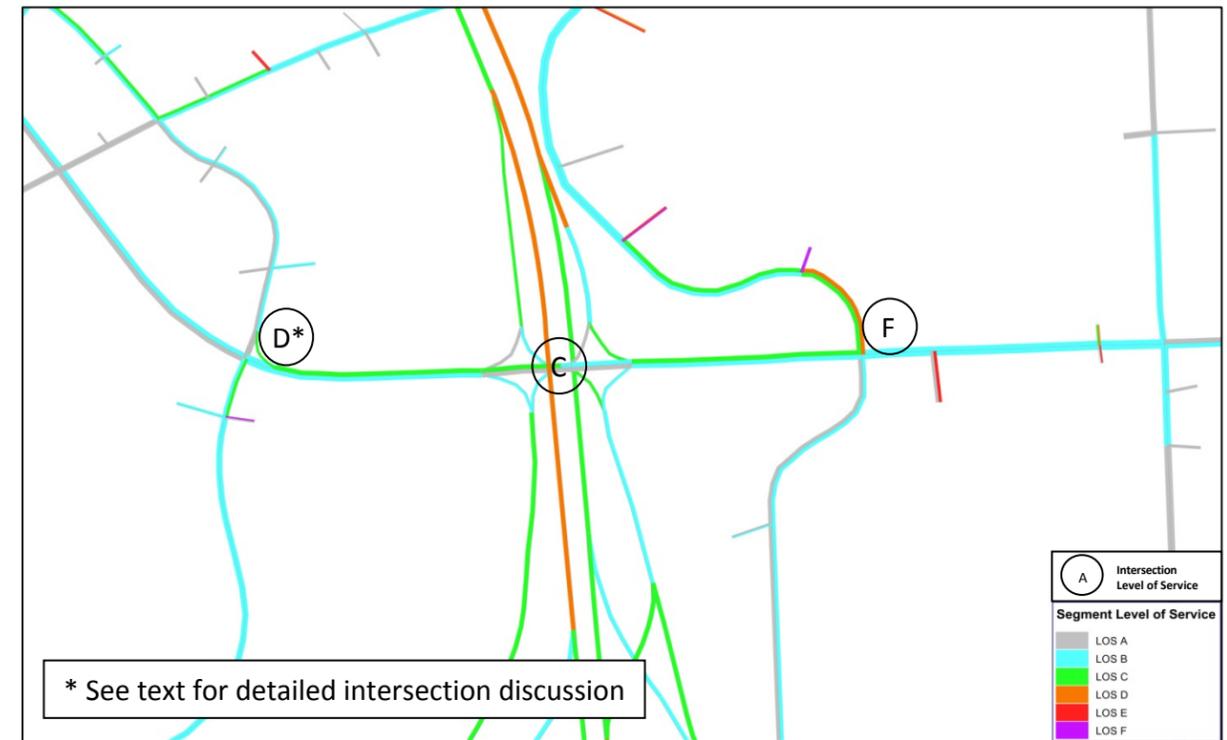


Figure 4.3.2 - Roadways and Intersection Levels of Service for Single Point Urban Interchange Design Year 2040 PM Peak Hour Traffic Volumes

Under this scenario, the intersection of State Avenue with Village West Parkway would be expected to operate at a LOS C during the future weekday PM peak period, but again the eastbound and northbound left-turn movements are projected to experience unacceptable LOS E operations. The review of the future Saturday peak period traffic volumes reveals that the overall intersection would be expected to operate with an unacceptable LOS F, under this design scenario, with the southbound movements functioning poorly.

Similar to the standard diamond interchange alternative, the SPUI improvement concept would require three through lanes in each direction on State Avenue along with dual left turn lanes for both eastbound and west bound movements. This configuration would also require an unobstructed 8-lane section on State Avenue under I-435, requiring new mainline I-435 bridges with very long center spans to be constructed. Bridges of this type are very expensive and the modification of mainline I-435 for interchange construction would again be very costly and create significant traffic management issues during construction.

I-435 and State Avenue: Diverging Diamond Interchange (DDI)

The final interchange option evaluated at this location was the conversion of the State Avenue intersection with I-435 from the existing partial cloverleaf interchange into a diverging diamond type interchange. A diverging diamond interchange has the traffic on the non-freeway road cross to the opposite side of the through roadway at the freeway underpass. This is a significant improvement in safety, since no left turns must clear opposing traffic, all movements have discrete lanes and most movements are controlled by traffic signals. Additionally, this design can improve the efficiency of an interchange, as the lost time for various phases in the cycle can be redistributed as green time; there are only two clearance intervals (the time for traffic signals to change from green to yellow to red) instead of the six or more required for other interchange designs. **Figure 4.3.3** shows a simplified diagram of a diverging diamond interchange.

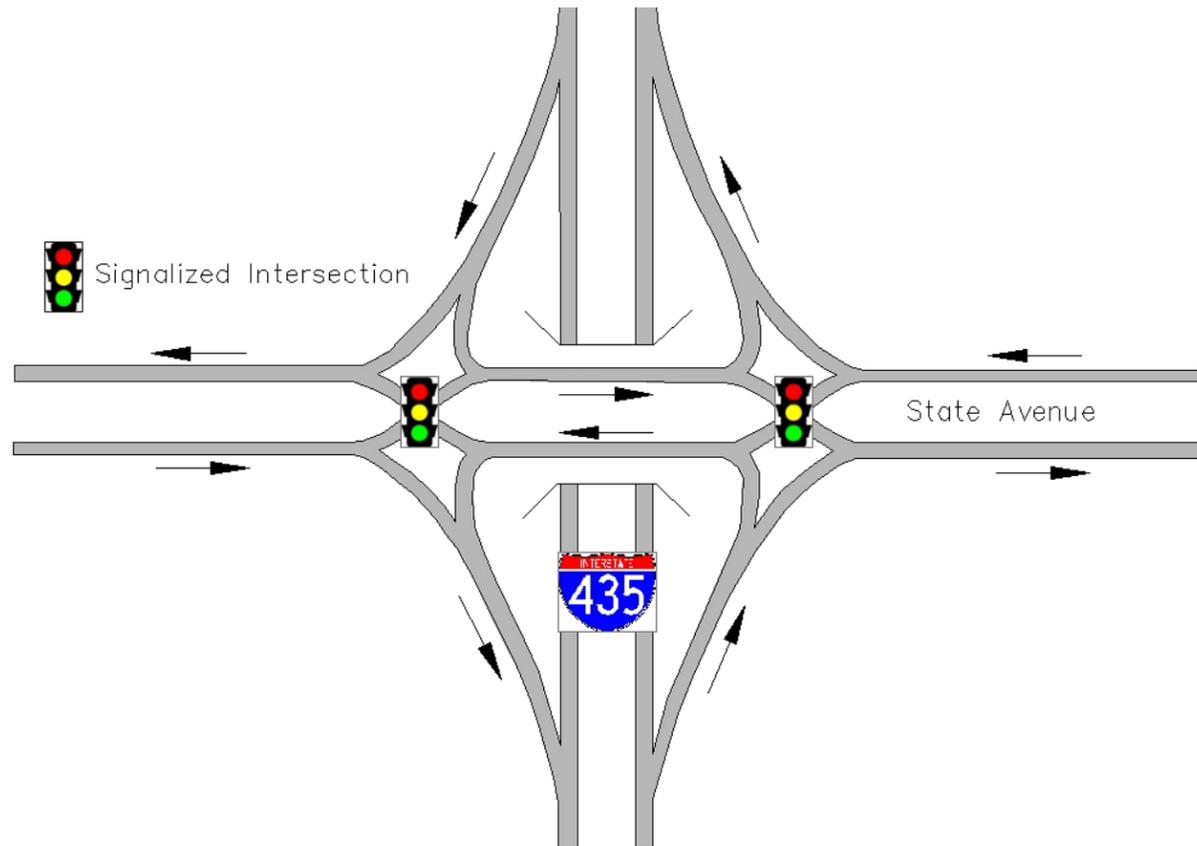


Figure 4.3.3 - Diverging Diamond Configuration

The projected traffic volumes for the DDI are shown on **Exhibit 4.3.3** and as can be seen in **Figure 4.3.4**, the expected operations of the area roadway segments with the DDI concept are better than either of the other two I-435 interchange improvement configurations. All ramp and arterial movements are projected to operate at LOS C under this interchange alternative.

When comparing the operational characteristics of the three I-435 and State Avenue interchange alternatives, both the standard diamond and SPUI alternates have capacity issues with the northbound off-ramp. While a LOS D for this off-ramp movement is expected under both of these concepts, and would not normally be acceptable, it would be an improvement over the LOS E or F expected for the partial cloverleaf interchange configuration of the northbound I-435 off-ramps to eastbound or westbound State Avenue that currently exists. The DDI interchange would be expected to have better operations for all ramp movements than either the standard diamond or single point

interchange options. One reason for this improvement is the ability of the traffic signals at the ramp intersections with State Avenue to operate with only two signal phases to manage all traffic movements, instead of the three signal phases normally required for either diamond or single point interchange operations. As stated previously, by only having two phase signals, less time is lost as yellow and red change intervals and a greater ratio of green time can be maintained for moving traffic through the intersections.

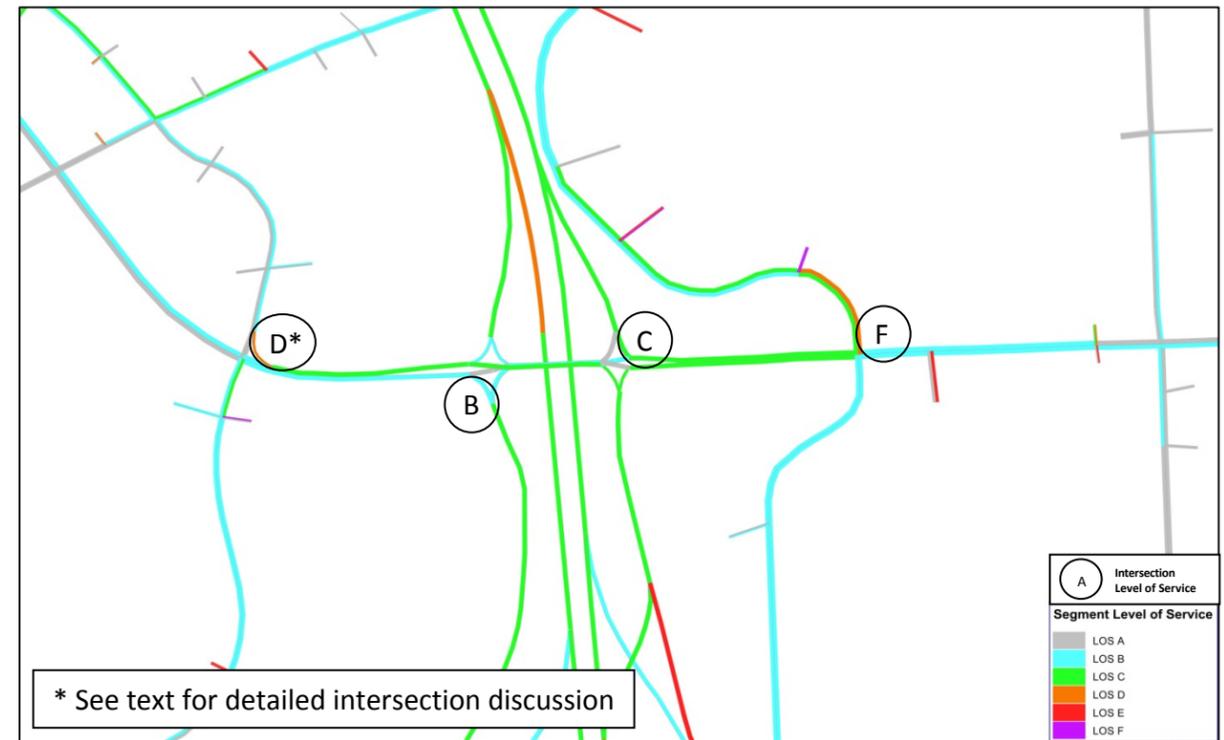


Figure 4.3.4 - Roadways and Intersection Levels of Service for Diverging Diamond Interchange Design Year 2040 PM Peak Hour Traffic Volumes

Under this scenario, the intersection of State Avenue with Village West Parkway would again be expected to operate at a poor LOS D during the future weekday PM peak period and the eastbound left-turn movement would again be projected to experience unacceptable LOS E operations. When the Design Year 2040 projected Saturday peak period traffic volumes are reviewed, the traffic operations of this intersection would be expected to function at LOS F, with the southbound movements operating poorly. Although the I-435 interchange constraint is removed to traffic movements westward, the poor projected LOS D conditions and substandard operations at the Village West Parkway and State Avenue intersection would continue to constrain traffic flows along this corridor and negatively impact overall traffic operations on other area corridors and interchanges.

A review of the 98th Street intersection as two offset “T” intersections was also completed. Under this scenario, the north leg of 98th Street was relocated per the Schlitterbahn development plans while the south leg was maintained at the current location. With this layout, the intersections would be expected to operate with overall intersection levels of service C or D, but the intersection spacing on State Avenue between the north and south legs of 98th Street created storage and queuing deficiencies. To minimize storage requirements on State Avenue, the side street signal timings were penalized causing significant delay and queuing on 98th Street north and south of State Avenue. The offset “T” intersection would be expected to operate at minimally acceptable levels of service for a period of time. When this segment of State Avenue begins to fail, realignment of the south leg of 98th Street should be considered.

4.4 DESIGN YEAR 2040 STATE AVENUE AND VILLAGE WEST PARKWAY INTERSECTION IMPROVEMENT REVIEW

Various geometric and traffic control improvements were reviewed for the intersection of State Avenue with Village West Parkway. There are significant factors that limit the improvement options at this intersection, including the Village West regional detention basin located in the northwest quadrant of the intersection; the close proximity of the signalized Village West Parkway and Cabela's drive intersection, about 500 feet north of State Avenue; relatively steep grades on both the State Avenue approaches to the intersection; and the close proximity of the I-435 interchange to the east. Preliminary reviews eliminated the option of a roundabout at this location due to high approach speeds and grade issues on State Avenue. Additionally, the need to provide high capacity for both eastbound and westbound traffic movements on State Avenue during major events and race weekends could not be provided with a roundabout at this location. Other types of unique, high capacity at-grade intersections were also considered, but were found to have right-of-way and / or intersection spacing constraints that made their continued consideration impractical.

The two concepts of providing additional through and turn lanes at the existing at-grade intersection or creating a grade-separated interchange at the Village West Parkway and State Avenue intersection were identified for further evaluation. Following is a discussion of these two improvement alternatives. Please note the following Village West Parkway and State Avenue intersection reviews do not include any improvements or modifications to the cloverleaf type interchange that currently exists at I-435 and State Avenue.

At-grade Intersection Improvements

Lane configurations at the existing at-grade intersection were analyzed at the intersection of State Avenue and Village West Parkway to determine what improvements would be needed to satisfy the Design Year 2040 peak hour traffic projections. For the intersection to operate at an acceptable level of service, improvements include four through lanes eastbound and westbound on State Avenue; dual left-turn lanes on each approach to the intersection; and dual right-turn lanes on three of the four legs of the intersection. The projected traffic volumes and lane arrangements are detailed on **Figure 4.4.1**. Even with these lane improvements, the intersection would be expected to operate with an overall intersection LOS D.

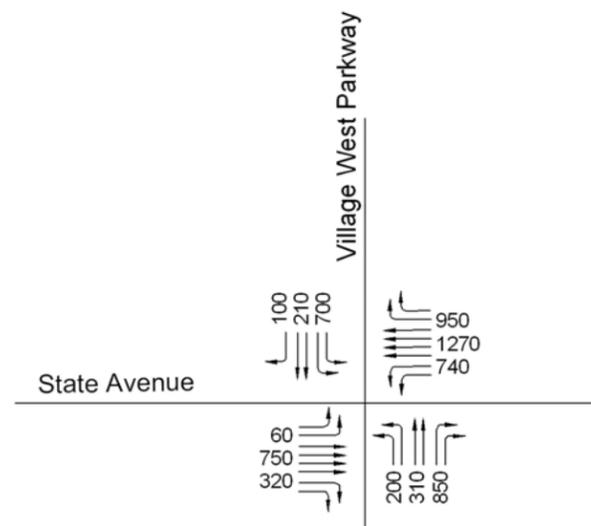


Figure 4.4.1 - State Avenue and Village West with Enhanced At-Grade Configuration

The improvements required to provide acceptable operations for the Design Year 2040 traffic projections would more than double the size of the existing intersection. These improvements would not align well with the planned lane improvements in any direction upstream of the intersection and would be difficult to construct with acceptable transitions and design standards. In addition, the sheer size of the intersection would make signalized control of the

traffic movements very difficult and expensive to accommodate. The close proximity of the regional detention basin in the northwest quadrant is also a major concern with this alternative, since the footprint of the enhanced at-grade intersection would be expected to encroach on the basin.

If due to space limitations, fewer through and turn lane additions were actually constructed at this location, (i.e. only the lanes that would align with the other planned improvements along State Avenue), the intersection of Village West Parkway and State Avenue, would then operate at a very poor overall LOS E under Design Year 2040 traffic conditions, with some individual movements operating at unacceptable LOS F. During Saturday peak periods, the overall intersection would be expected to experience LOS F operations with significant back-ups and congestion, under the reasonable lane addition condition.

Based upon the large size of the necessary improvements of an at-grade intersection, the conflict with the regional detention basin, the issues with lane balance and alignment through the intersection, expected operational failure during Saturday periods, and serious operational issues with any lesser lane additions and enhancements, this improvement alternative was not analyzed further.

Conversion to Single Point Urban Interchange (SPUI)

The concept of a single point urban interchange was next evaluated at the intersection of State Avenue and Village West Parkway. This proposed improvement utilized the existing Village West Parkway lanes, incorporated the planned widening improvements on State Avenue with an elevated section over Village West Parkway, included ramps to and from State Avenue, and allowed turning movements at the intersection and through movements on Village West Parkway to occur beneath the elevated section of State Avenue. The projected traffic volumes for the SPUI at Village West Parkway are shown in **Exhibit 4.4.1**. **Figure 4.4.2** details the expected roadway operations of this grade-separated interchange alternative.



Figure 4.4.2 - Roadways and Intersection Levels of Service for Single Point Urban Interchange at Village West Parkway Design Year 2040 PM Peak Hour Traffic Volumes

It should be noted that the SPUI greatly improves the traffic handling capabilities at this location. This new interchange would be expected to operate at a good overall LOS C. All movements at the interchange would be expected to operate with LOS C or LOS D, and some would experience LOS A operations. In addition, the State Avenue through movements would be separated above Village West Parkway and would not be controlled by the traffic signal located below. This would greatly improve operations during peak flow events on State Avenue, such as major retail events or sporting events weekends. Preliminary design layouts indicate that most of this proposed interchange improvement could be constructed within the existing right-of-way or Unified Government controlled property.

A significant benefit of this grade-separated improvement alternative is the ability to maintain north / south access across State Avenue during major traffic events on State Avenue. Traffic movements between the new Penn National / Hollywood Casino, to be located at Kansas Speedway, and the Village West / Legends development area would be maintained throughout major traffic events that primarily use State Avenue for direct access to I-435. The ramps between State Avenue and Village West Parkway could be closed or certain movements restricted during peak flow periods to maintain through traffic movements on each roadway. Additionally, emergency access routes north / south across State Avenue would be greatly enhanced by the construction of this grade-separated interchange.

Based on the expected interchange operations and the limited additional right-of-way required for construction, this improvement alternative was found to be viable for continued review and development in conjunction with other State Avenue corridor improvements. Renderings of the proposed SPUI interchange at State Avenue and Village West Parkway can be seen on **Exhibit 4.4.2** and **Exhibit 4.4.3**.

4.5 DESIGN YEAR 2040 STATE AVENUE AND 98TH STREET INTERSECTION IMPROVEMENT REVIEW

As part of the traffic impact study developed for the Schlitterbahn Vacation Resort and Waterpark, this intersection had been evaluated with much lower projected intersection traffic volumes and significantly different proposed geometrics to satisfy the lower volumes. The increase in traffic volumes, as part of this study, is due to the detailed land use review. This study included significant more proposed development within the study area.

As part of this study, various geometric and traffic control improvements were reviewed for the intersection of State Avenue with 98th Street. Preliminary reviews eliminated the option of a roundabout at this location due to high approach speeds and high through traffic volumes on State Avenue. Additionally, the need to provide high capacity for both eastbound and westbound traffic movements on State Avenue during major sporting events and race weekends could not be provided with a roundabout at this location. Other types of unique, high capacity at-grade intersections were considered and are detailed in the followings sections. Similarly, the creation of a grade-separated intersection at this location was determined to be difficult and overly expensive to implement, since roadway grades and intersection spacings do not allow separation without major realignment and reconstruction of city streets.

Based upon these initial determinations, the analyses of various at-grade signalized intersection improvements with modified lane arrangements were completed. The results of these analyses are summarized in the following sections.

State Avenue Corridor: State Avenue and 98th Street Signal with Triple Eastbound Left-turn Enhancements

The projected Design Year 2040 weekday PM peak hour traffic volumes through this intersection were evaluated with the addition of a third eastbound left turn lane on the west leg. With the addition of a third eastbound left turn lane, the intersection would be expected to operate with an overall LOS D with about 52 seconds of delay per entering vehicle, very close to the threshold for a LOS E condition. **Figure 4.5.1** shows the lane arrangement and projected volumes under this improvement scenario.

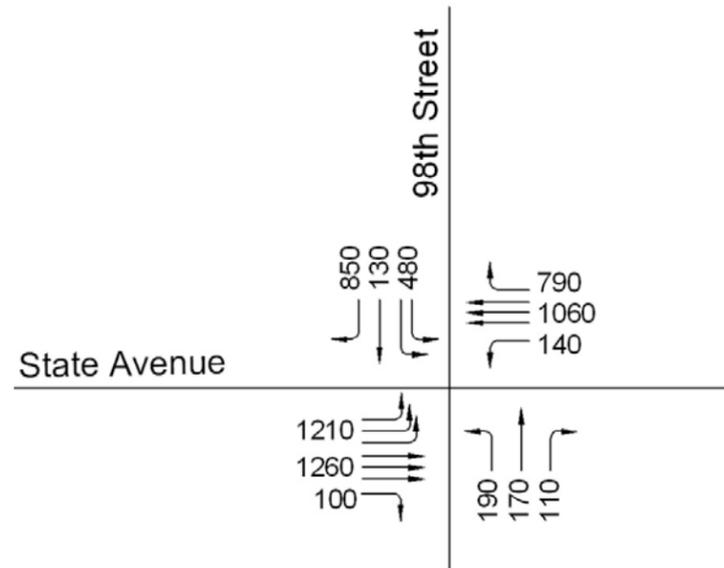


Figure 4.5.1 - State Avenue and 98th Street Triple Eastbound Left Turn Lanes

While LOS D for the Design Year 2040 would normally be an acceptable result for the operation of this intersection, there is significant concern with this improvement scenario under the Full Build-out design volumes conditions, when it is expected that operations will degrade to LOS F. Queues on State Avenue between the I-435 interchange and the 98th Street intersection would be expected to regularly fill the available storage distance between these intersections

and congested operations would occur. In addition, once this third left turn lane is constructed, there are very few additional enhancements that can be made to adequately satisfy the ultimate design volumes anticipated at this location.

State Avenue Corridor: State Avenue and Post-98th Street Loop Configuration

The next alternative reviewed with Design Year 2040 traffic volumes was the scenario termed as the Post 98th Street Loop Configuration. With this concept, the eastbound left turn movements would proceed through the intersection and turn right to join the northbound through movements at 98th Street. This is accomplished with the construction of a large right turning loop lane immediately east of the 98th Street intersection. **Figure 4.5.2** schematically details the revised lane arrangement and location of the post-loop configuration with regard to the relocated 98th Street intersection.

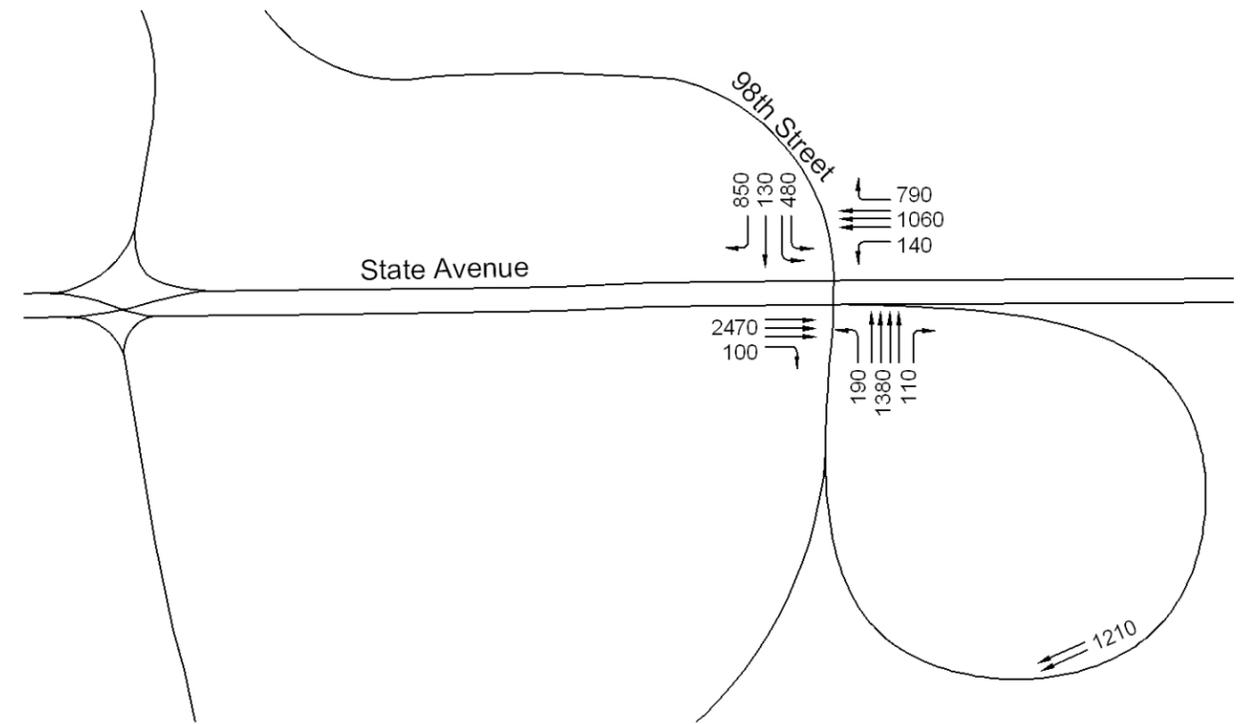


Figure 4.5.2 - State Avenue and Post-98th Street Loop Configuration

One of the benefits of this alternative would be the elimination of the turning conflict between the westbound through movement and the eastbound left turn movement. This would reduce the amount of time required for State Avenue left turning traffic, providing more opportunities for both east / west and north / south through traffic movements to proceed through the intersection. However, detailed analysis of this alternative resulted in worse operations than the triple left turn alternate reviewed, with an overall LOS E and about 76 seconds of delay per entering vehicle. In addition, the eastbound to northbound loop movement would need to provide for two exiting lanes and cross State Avenue with four northbound through lanes. The predicted poor operations eliminated this alternative from further consideration.

State Avenue Corridor: State Avenue and Pre-98th Street Loop Configuration

Another alternative reviewed with Design Year 2040 traffic volumes was the scenario termed as the Pre-Loop Configuration. With this concept, the eastbound left turn movements would be converted into northbound through movements at 98th Street via the construction of a large “jug-handle” loop lane immediately west of the 98th Street intersection. **Figure 4.5.3** schematically details the modified lane arrangements and location of the pre-98th Street loop with regard to the I-435 interchange and the relocated 98th Street intersection.

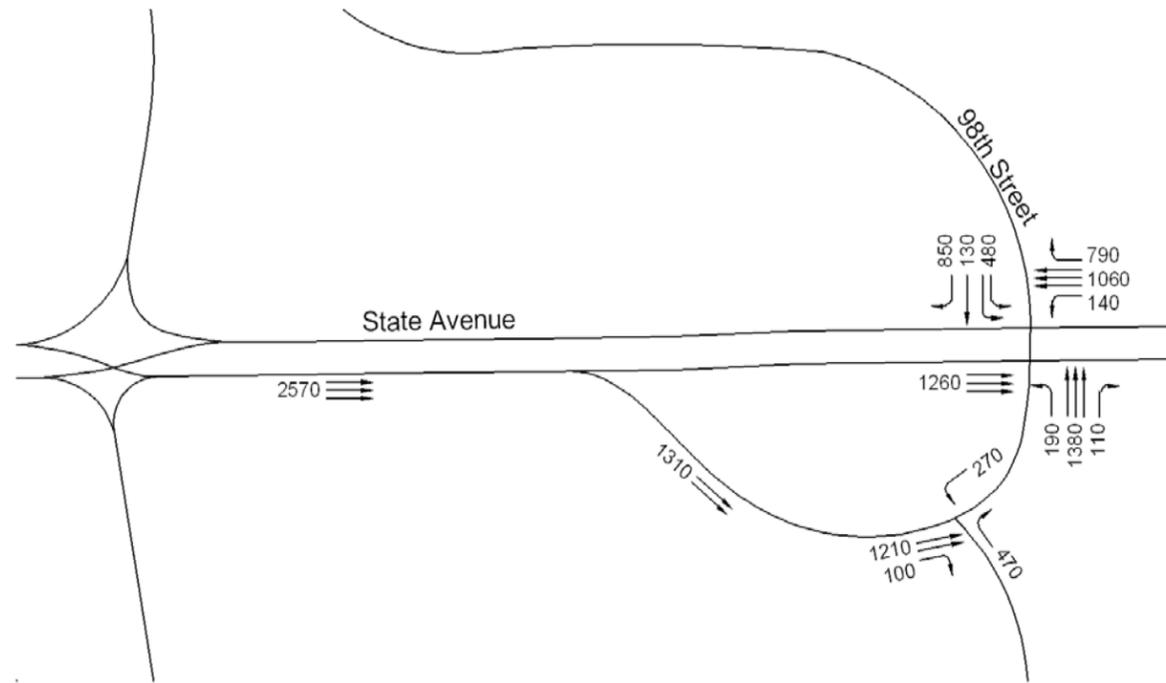


Figure 4.5.3 - State Avenue and Pre-98th Street Loop Configuration

Similar to the post-98th Street loop concept, the primary benefit of this alternative would be the elimination of the turning conflict between the westbound through movement and the eastbound left-turn movement. This would also reduce the amount of time required for State Avenue left turning traffic, providing more opportunities for both east / west and north / south traffic movements to proceed through the intersection. Detailed analysis of this pre-98th Street loop alternative resulted in better traffic operations than the triple left-turn alternate, with LOS D and about 42 seconds of delay per entering vehicle. Under this concept, the eastbound to northbound pre-loop movement would need to provide only one lane for the movement and to cross State Avenue with three northbound through lanes.

One concern with this alternate is the length of the projected eastbound to northbound loop traffic storage requirement. Under the proposed concept, almost 500 feet of storage would be required for the northbound movements. This would require the continuation of 98th Street southward from the loop to be constructed at least 500 feet from State Avenue to eliminate the possibility of queued vehicles blocking southbound traffic movements. This long storage distance is critical so that the southbound traffic flows do not stop and queue back into the State Avenue and 98th Street intersection.

State Avenue Corridor: State Avenue & Pre-98th Street Configuration (One-Way Alternate)

A final alternative reviewed with Design Year 2040 traffic volumes was to modify the traffic operations of the Pre-98th Street Loop configuration with the conversion of the south leg of 98th Street into a one-way northbound facility. Under this concept, the eastbound left turn movements would still be converted into the northbound through movements at 98th Street, but the southbound movements on 98th Street south of State Avenue would instead be diverted eastward to be served by 94th Street. It is expected that this movement would be served by a future street connection between 94th Street and 98th Street that could be constructed when this area redevelops as office / business land uses, as proposed by the Unified Government Master Land Use Plan. **Figure 4.5.4** schematically details the modified lane arrangement and location of the pre-loop with regard to the I-435 interchange and the relocated 98th Street intersection.

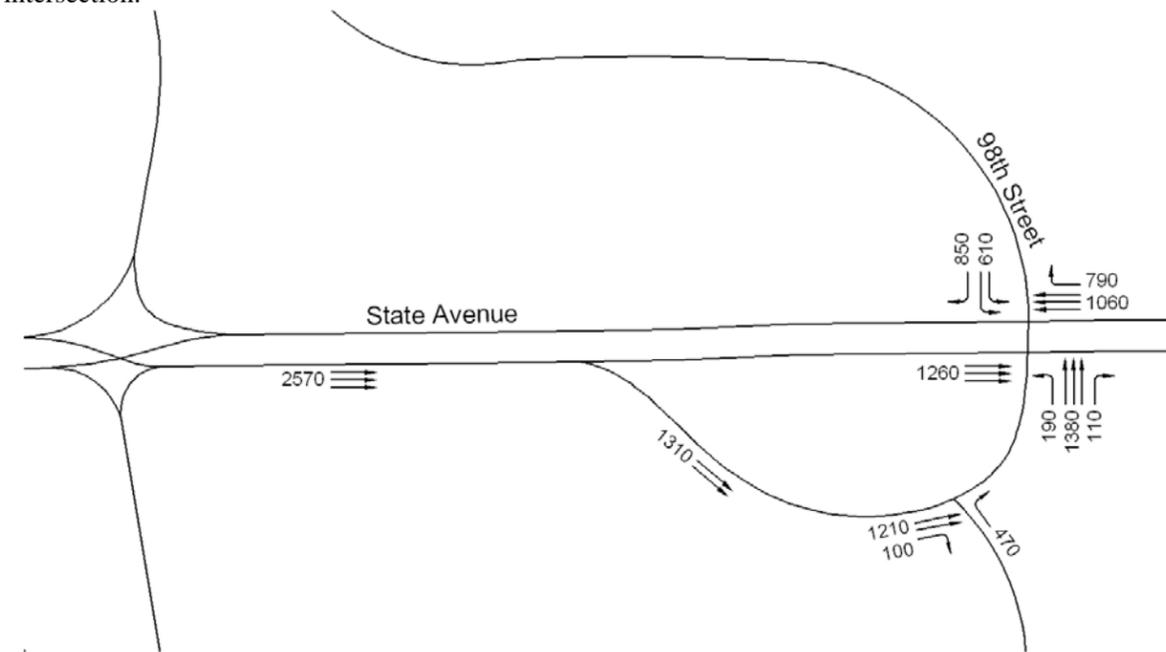


Figure 4.5.4 - State Avenue and Pre-98th Street Loop Configuration (One-Way Alternate)

The primary benefit of this alternative would be the elimination of the turning conflict between the westbound through movement and the eastbound left turn movement. This would also reduce the amount of time required for State Avenue left turning traffic, providing more opportunities for both east / west traffic movements and north / south movements to proceed through the intersection. The most significant benefits of this alternative would be the complete elimination of the left turn phasing on State Avenue and the removal of the queuing concern on the south leg of 98th Street with regard to the eastbound to northbound loop traffic movement possibly blocking the southbound 98th Street through movement path.

Detailed analysis of this pre-loop alternative resulted in better traffic operations than the triple left turn alternate reviewed, with LOS C and about 33 seconds of delay per entering vehicle. Under this concept, the eastbound to northbound pre-98th Street loop movement would need to begin with one lane from State Avenue and then cross State Avenue with three northbound through lanes.

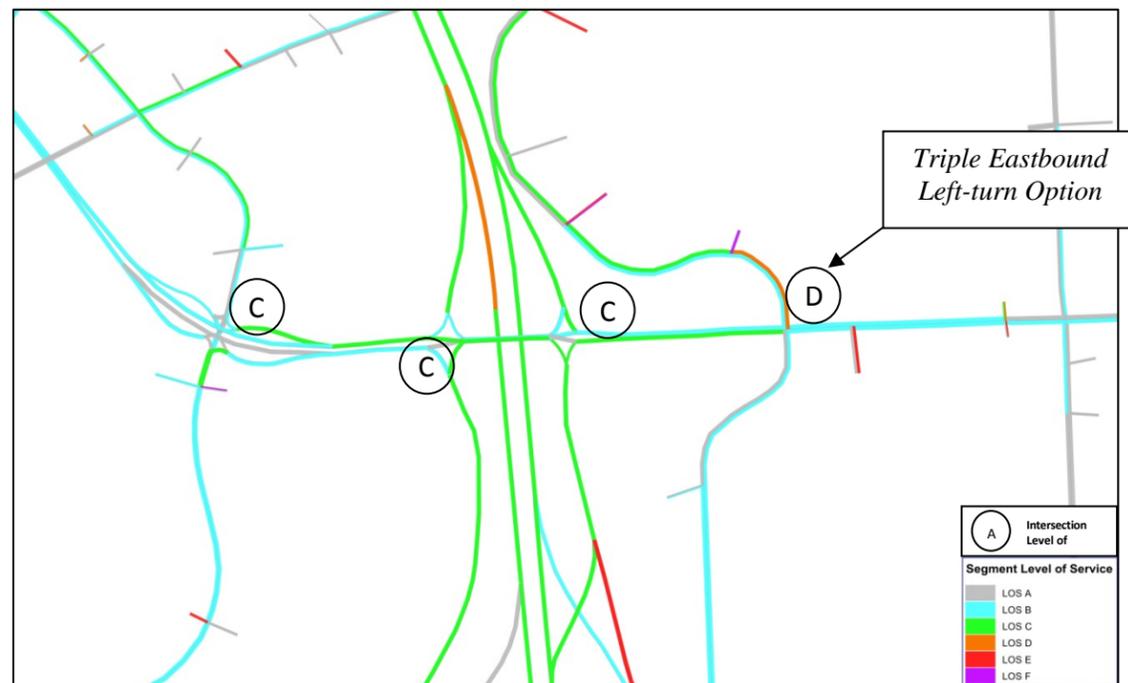
Review of the completed 98th Street scenarios show that either of the Pre-98th Street Loop configurations would be considered as the recommended improvement to this intersection in the long term, dependent upon right-of-way constraints and future connections between 94th Street and 98th Street. Near-term improvements should include provisions for the construction of triple eastbound left turn lanes when left turn volumes warrant, and until right-of-way for the pre-loop configuration can be acquired.

4.6 DESIGN YEAR 2040 COMBINED STATE AVENUE IMPROVEMENTS

Various combinations of improvements along the State Avenue corridor were next reviewed to evaluate the performance of system-wide improvements and to identify the combination of individual improvements that would be expected to best provide additional capacity and improved traffic operations.

Review of the three I-435 and State Avenue interchange alternatives clearly resulted in the Diverging Diamond Interchange (DDI) concept as having the greatest operational benefits and lowest anticipated construction costs for the State Avenue and I-435 interchange area. Similarly, the Single Point Urban Interchange (SPUI) at State Avenue and Village West Parkway would be expected to provide the most significant improvement to traffic operations at this location. While the SPUI would be expected to cost more than an enhanced at-grade intersection, the significant operational benefits and high traffic-handling capability for State Avenue during major traffic events make it the most desirable improvement alternative, if adequate funds for construction can be identified. As such, the initial combination of State Avenue corridor improvements to be reviewed in detail was the I-435 DDI with the Village West Parkway SPUI. To provide necessary capacity, the intersection of 98th Street with State Avenue was analyzed with the near-term eastbound triple left turn lane for the combined State Avenue improvement scenarios reviewed.

A Design Year 2040 travel demand model that included both the I-435 DDI and the Village West SPUI alternatives was next created to predict the anticipated traffic flows along this corridor with these significant geometric and traffic control improvements. With the implementation of these two improvement alternatives in combination, overall corridor capacity was significantly increased and the expected traffic flows along this section of State Avenue would be at the highest level of any of the Design Year 2040 improvement scenarios. Additionally, as can be seen in **Figure 4.6.1**, the expected overall operations on all the roadway segments are very good. These improved LOS operations are very favorable indications that traffic flows desiring to utilize this segment of State Avenue for regional access are satisfied without being capacity-constrained or limited by traffic controls or geometry. **Exhibit 4.6.1** details the expected traffic volumes and lane arrangements required for this combined improvement.



**Figure 4.6.1 - Roadways and Intersection Levels of Service for I-435 DDI with Village West Parkway SPUI
Design Year 2040 PM Peak Hour Traffic Volumes**

To further evaluate the combination of interchange type improvements at both I-435 and Village West Parkway with State Avenue, a detailed VISSIM traffic simulation model of the proposed concept was next developed. This traffic engineering analysis tool was selected for use since it has the ability to very accurately model and simulate the interactions of traffic flows through complex geometric and traffic control situations that include traffic signals, highway ramp movements, merge and diverge areas, and weaving sections. Many other traffic engineering analysis softwares have the ability to model one or two of these specific traffic interactions, but the VISSIM software is one of the few that can accurately simulate the interaction of all these complex controls and the resulting effects on driver behaviors and overall traffic operations.

To accurately develop the VISSIM model, schematic layouts of the interchanges were developed using KDOT and Unified Government design criteria for the types of facilities being designed. The interchange designs were developed to maximize the distance between the I-435 DDI intersections, between the southbound I-435 ramp terminals and the Village West Parkway ramps from State Avenue, and to provide acceptable grades on the Village West Parkway ramps to and from the signalized intersection. Preliminary designs were based upon Unified Government-supplied topographic information with control field topographic surveying completed to verify the quality of the available data. The Unified Government-provided data was found to be accurate within acceptable parameters (i.e. vertically plus or minus 1 foot) to develop preliminary designs that could verify the feasibility of the concepts from a purely geometric standpoint.

Once the preliminary geometric layouts were developed and confirmed, the combination of the two interchanges was used as a template to develop the VISSIM model with accurate intersection spacing and lane lengths. Additionally, the recommended traffic signals were modeled using realistic signal phasings and timings to accurately reflect the expected operational characteristics of these intersections.

Based upon the completed VISSIM simulations, the Design Year 2040 traffic volumes were confirmed to work at good levels of service and with minimal congestion through the modeled segment of State Avenue. The VISSIM simulations were reviewed in detail and operational characteristics such as speeds, vehicle densities, and delays were checked to verify operations. Review of the simulation during the 2040 weekday PM peak traffic period did not show congestion or significant delays at any location along the State Avenue study corridor. A copy of the resulting simulation model run is included on the CD accompanying this report. Based upon the completed studies, the implementation of these two interchange improvement projects would be expected to satisfy future traffic demands along this corridor for the Design Year 2040 threshold and beyond.

4.7 PRIORITIZATION OF PROPOSED STATE AVENUE IMPROVEMENTS

Since the identified State Avenue corridor improvements require extensive interchange modifications at I-435 and State Avenue and the construction of a new single point urban interchange at Village West Parkway with State Avenue, a review of each of the two major projects was completed to determine which project should be first constructed. This process was completed to identify any operational deficiencies that would be expected to be caused or worsened if one project was completed prior to the other.

Since the existing interchange of I-435 and State Avenue currently acts as a constraint to traffic flows traveling toward the Village West Parkway and State Avenue intersection from the east, reconstructing this partial clover-leaf interchange with the high capacity Diverging Diamond Interchange would be expected to overload the at-grade intersection of Village West if this improvement was completed first. Conversely, if the intersection of State Avenue and Village West Parkway was first reconstructed as a single point urban interchange, the existing constrained operations at I-435 would still have a metering effect on westbound State Avenue but would not negatively impact this new improvement's operations.

To confirm this hypothesis, the existing traffic volumes along this segment were simulated using the VISSIM software to model and predict traffic operations with only the Village West Parkway SPUI improvement. The existing separation along State Avenue between the SPUI ramp terminals and the I-435 ramps would be shorter than desired under this scenario, but would be expected to function at good to acceptable levels of service under the existing traffic volumes.

To further test the operational viability of this alternative, the existing traffic volumes were increased in the simulation model until unacceptable operations were predicted in the short weaving segments along State Avenue between the proposed Village West Parkway SPUI and the existing I-435 interchange. It was determined that traffic volumes during the existing weekday PM peak travel periods would have to double before the weaves between the adjacent ramps would be expected to experience unacceptable LOS E operations. If the DDI improvement at I-435 is completed before this traffic volume growth occurs, the system of enhancements along the State Avenue corridor would be expected to have very good operations through the Design Year 2040 threshold.

It should be noted that the southbound right turn movement from I-435 to State Avenue has been modified as part of the Village West Parkway SPUI project to maximize the separation between this ramp and the westbound off-ramp to Village West Parkway. This modification to the I-435 interchange was required to provide the minimum acceptable weaving distance between the I-435 ramps and the Village West Parkway SPUI ramps.

4.8 PRELIMINARY IMPROVEMENTS AND ESTIMATES

Based upon the completed detailed operational analysis and the preliminary schematics of required interchange enhancements, detailed geometric layouts and costs estimates were prepared for the construction of an I-435 Diverging Diamond Interchange enhancement, and the construction of the Single Point Urban Interchange at the Village West Parkway and State Avenue intersection.

There are many factors that have been evaluated in the development of each of these preliminary layouts and cost estimates. The total project costs include estimates of roadway / bridge / retaining wall construction, major utility relocations, project design and construction observation fees, and other major items that typically contribute to the overall cost of a project. The cost estimates were developed based on 2010 planning and program estimates and do not include inflation for future year construction.

State Avenue and Village West Parkway SPUI Improvement

Based upon the completed preliminary layouts shown on **Exhibit 4.8.1**, and estimates of required utility relocations, the Village West Parkway and State Avenue Single Point Urban Interchange project has a total project cost of about \$23,400,000, with \$16,350,000 estimated for the interchange construction, \$4,225,000 for utility relocations, and \$2,850,000 for design and construction observation services. A detailed breakdown of the project cost estimate is displayed in **Figure 4.8.1**.

Review of the detailed estimate for the SPUI shows that the construction estimate of \$16,350,000 is reasonable considering the length of the single-span bridge (210' for about \$2,600,000), the total pavement removal and replacement from the France Family Drive overpass to I-435 (over 3,800 centerline feet of State Avenue, Village West, and new ramp pavements for approximately \$3,400,000) and the required retaining walls to minimize the footprint of the interchange (56,000 square feet for \$2,800,000). The overall estimated construction cost is comparable to other interchange projects with this level of complexity within the metro area, and is actually lower than many interchanges constructed recently due to the compact nature of the proposed design.

The preliminary estimate for the SPUI project design engineering services was developed by determining the staffing requirements to complete the design of the project within a 6-month period through a modified KDOT review process. This was checked against a typical percentile of the overall construction budget, and should be good for budget planning purposes. Similarly, the construction observation fee was first reviewed based upon staffing needs of a 12 month construction project that meets KDOT LPA requirements. This was also checked against typical project percentiles, and found to be within acceptable budget ranges.

The Board of Public Utilities (BPU) Electrical Department worked extensively with GBA and provided a preliminary layout with estimates of their underground duct bank relocation costs. For this project, BPU would need to move approximately 3,200 linear feet of their primary electrical duct bank that currently runs along the north side of State Avenue to the south side of the State Avenue. This project would relocate the duct bank away from potential conflicts with the regional detention basin and place this major utility in an area where future maintenance can be more easily accomplished. The relocation of this major duct bank accounts for over \$3,000,000 of the total project costs, including design, construction, and contingencies. Another significant utility conflict is a 16" BPU owned water line that will require relocation and is estimated to cost over \$500,000 to mitigate.

One item of the construction cost estimate where there is a potential to save costs would be in the Construction Traffic Control item, estimated at \$1,300,000 for the SPUI construction project. This significant project cost is due to the assumption that most, if not all, traffic movements at the Village West Parkway and State Avenue intersection will need to be maintained throughout the duration of the construction project whenever possible. Maintaining traffic throughout construction will impact the construction phasing and contractor construction methods, and will definitively increase construction costs. If during the detailed design phase some limiting of access can be agreed

upon, there is the potential to speed the overall construction of the Single Point Urban Interchange and reduce some project costs.

I-435 and State Avenue DDI Improvement

The State Avenue and I-435 Diverging Diamond Interchange project has a total project cost of nearly \$10,750,000, with \$8,350,000 in construction, \$425,000 in utility relocations, and \$1,975,000 in design and observation services. This overall project estimate was developed using the same methods as the Village West Parkway and State Avenue SPUI estimate. A detailed breakdown of the project cost estimate is shown on **Figure 4.8.2**. At this interchange, major utility relocations are not expected due to the limited grade changes along State Avenue and the type of interchange enhancement being recommended. **Exhibit 4.8.2** shows the detailed layout of the geometric improvement for the I-435 and State Avenue Diverging Diamond Interchange.

State Avenue and 98th Street Improvement

This intersection improvement project has a total project cost of nearly \$6,100,000, with \$4,786,000 in construction, \$540,000 in utility relocations, and \$770,000 in design and observation services. This overall project estimate was developed using the same methods as the Village West Parkway and State Avenue SPUI estimate. A detailed breakdown of the project cost estimate is shown on **Figure 4.8.3**. **Exhibit 4.8.3** shows the detailed layout of the geometric improvement for State Avenue and 98th Street.

State Avenue and Village West SPUI				GBA
Wyandotte County				March 29, 2010
Design Study Plans -- Engineer's Opinion of Probable Construction Costs				
Item	Quantity	Unit	Unit Cost	Amount
SPUI CONSTRUCTION				
Removing Existing Structures	1	Lumpsum	\$ 25,000.00	\$ 25,000
Contractor Construction Staking	1	Lumpsum	\$ 150,000.00	\$ 150,000
Mobilization	1	Lumpsum	\$ 300,000.00	\$ 300,000
Clearing and Grubbing	1	Lumpsum	\$ 10,000.00	\$ 10,000
Common Excavation	20,000	C.Y.	\$ 10.00	\$ 200,000
Common Excavation (Contractor Furnished)	62,500	C.Y.	\$ 10.00	\$ 625,000
Rock Excavation (includes Pavement Removal)	12,000	C.Y.	\$ 20.00	\$ 240,000
Compaction of Earthwork (Type A) (MR-5.5)	65,000	C.Y.	\$ 10.00	\$ 650,000
Bridge	18,000	Sq. Ft.	\$ 145.00	\$ 2,610,000
Retaining Walls	56,000	Sq. Ft.	\$ 50.00	\$ 2,800,000
Permanent Concrete Safety Barrier Type II (F-Shape)	5,900	L.F.	\$ 150.00	\$ 885,000
Bridge and Wall Enhancements	1	Lumpsum	\$ 250,000.00	\$ 250,000
12" Asphalt Pavement	41,130	Sq. yd.	\$ 50.00	\$ 2,056,500
Combined Curb & Gutter (2')	9,000	L.F.	\$ 20.00	\$ 180,000
Aggregate Base	43,130	Sq. yd.	\$ 10.00	\$ 431,300
Subgrade Treatment	45,287	Sq. yd.	\$ 10.00	\$ 452,865
Street Drainage	1	Lumpsum	\$ 250,000.00	\$ 250,000
Sidewalk	1,050	Sq. yd.	\$ 50.00	\$ 52,500
Traffic Signal	1	Lumpsum	\$ 125,000.00	\$ 125,000
Permanent Signing	1	Lumpsum	\$ 75,000.00	\$ 75,000
Permanent Pavement Marking	1	Lumpsum	\$ 50,000.00	\$ 50,000
Street Lighting	1	Lumpsum	\$ 250,000.00	\$ 250,000
UG Signal Interconnect (France Family to W. of I-435)	1	Lumpsum	\$ 100,000.00	\$ 100,000
Detention Basin Mitigation	1	Lumpsum	\$ 25,000.00	\$ 25,000
Erosion Control	1	Lumpsum	\$ 125,000.00	\$ 125,000
Construction Traffic Control & Temp. Pavements (10%)				\$ 1,291,817
Contingency (15%)				\$ 2,131,497
SPUI CONSTRUCTION SUBTOTAL				\$ 16,341,479
Surveys, PS&E Design, and Bidding Assistance (8%)				\$ 1,307,318
Geotechnic Design Services				\$ 50,000
Post Design Services				\$ 50,000
Full Time LPA Project Observation (7.5%)				\$ 1,225,611
UTILITY RELOCATIONS				
Utility Relocations - BPU Underground Electric	1	Lumpsum	\$ 2,800,000.00	\$ 2,800,000
Utility Relocations - BPU 16" Water Main	1	Lumpsum	\$ 500,000.00	\$ 500,000
Utility Relocations - KDOT/Century Link Fiber Optic Cables	1	Lumpsum	\$ 100,000.00	\$ 100,000
Utility Relocations - Misc	1	Lumpsum	\$ 100,000.00	\$ 100,000
Utility Construction Traffic Control (5%)				\$ 175,000
Contingency (15%)				\$ 551,250
UTILITY RELOCATION SUBTOTAL				\$ 4,226,250
Utility Relocations Management and Observation (5%)				\$ 211,313
DESIGN AND OBSERVATION SUBTOTAL				\$ 2,844,242
PROJECT TOTAL				\$ 23,411,970

Figure 4.8.1 - State Avenue and Village West Parkway SPUI Preliminary Estimate of Probable Construction Costs

State Avenue and I-435 Diverging Diamond Interchange				GBA
Wyandotte County				March 29, 2010
Design Study Plans -- Engineer's Opinion of Probable Construction Costs				
Item	Quantity	Unit	Unit Cost	Amount
DDI CONSTRUCTION				
Removing Existing Structures	1	Lumpsum	\$ 25,000.00	\$ 25,000
Contractor Construction Staking	1	Lumpsum	\$ 100,000.00	\$ 100,000
Mobilization	1	Lumpsum	\$ 200,000.00	\$ 200,000
Clearing and Grubbing	1	Lumpsum	\$ 10,000.00	\$ 10,000
Common Excavation	62,000	C.Y.	\$ 10.00	\$ 620,000
Common Excavation (Contractor Furnished)	0	C.Y.	\$ 10.00	\$ -
Rock Excavation (includes Pavement Removal)	21,000	C.Y.	\$ 20.00	\$ 420,000
Compaction of Earthwork (Type A) (MR-5-5)	13,210	C.Y.	\$ 10.00	\$ 132,100
Retaining Walls	1,700	Sq. Ft.	\$ 50.00	\$ 85,000
Permanent Concrete Safety Barrier Type 1 (F-Shape)	0	L.F.	\$ 150.00	\$ -
Concrete Pavement	41,060	Sq. yd.	\$ 60.00	\$ 2,463,600
Shoulder	8,180	Sq. yd.	\$ 55.00	\$ 449,900
Combined Curb & Gutter (2')	10,400	L.F.	\$ 20.00	\$ 208,000
Concrete Treated Base	52,129	Sq. yd.	\$ 10.00	\$ 521,289
Subgrade Treatment	54,735	Sq. yd.	\$ 10.00	\$ 547,353
Street Drainage	1	Lumpsum	\$ 100,000.00	\$ 100,000
Traffic Signal	1	Lumpsum	\$ 200,000.00	\$ 200,000
Permanent Signing	1	Lumpsum	\$ 300,000.00	\$ 300,000
Permanent Pavement Marking	1	Lumpsum	\$ 50,000.00	\$ 50,000
Street Lighting	1	Lumpsum	\$ 100,000.00	\$ 100,000
UG Signal Interconnect (W. of I-435 to 94th St.)	1	Lumpsum	\$ 150,000.00	\$ 150,000
Erosion Control	1	Lumpsum	\$ 100,000.00	\$ 100,000
Construction Traffic Control (7%)	1	Lumpsum		\$ 474,757
Contingency (15%)	1	Lumpsum		\$ 1,088,550
DDI CONSTRUCTION SUBTOTAL				\$ 8,345,549
Surveys, PS&E Design, and Bidding Assistance (10%)				\$ 834,555
Geotechnic Design Services				\$ 25,000
Post Design Services				\$ 25,000
Full Time LPA Project Observation (12.5%)				\$ 1,043,194
UTILITY RELOCATIONS				
Utility Relocations - BPU Underground Electric	1	Lumpsum	\$ 100,000.00	\$ 100,000
Utility Relocations - Misc	1	Lumpsum	\$ 150,000.00	\$ 150,000
Utility Relocations - KDOT/Century Link Fiber Optic Cables	1	Lumpsum	\$ 100,000.00	\$ 100,000
Utility Construction Traffic Control (5%)				\$ 5,000
Contingency (20%)				\$ 71,000
UTILITY RELOCATION SUBTOTAL				\$ 426,000
Utility Relocations Management and Observation (15%)				\$ 41,400
DESIGN AND OBSERVATION SUBTOTAL				\$ 1,969,149
PROJECT TOTAL				\$ 10,740,698

Figure 4.8.2 - I-435 and State Avenue DDI Preliminary Estimates of Probable Construction Costs

State Avenue and 98th Street Preloop				GBA
Wyandotte County				May 28, 2010
Design Study Plans -- Engineer's Opinion of Probable Construction Costs				
Item	Quantity	Unit	Unit Cost	Amount
PRELOOP CONSTRUCTION				
Removing Existing Structures	1	Lumpsum	\$ 200,000.00	\$ 200,000
Contractor Construction Staking	1	Lumpsum	\$ 40,000.00	\$ 40,000
Mobilization	1	Lumpsum	\$ 75,000.00	\$ 75,000
Clearing and Grubbing	1	Lumpsum	\$ 10,000.00	\$ 10,000
Common Excavation	5,600	C.Y.	\$ 10.00	\$ 56,000
Common Excavation (Contractor Furnished)	17,100	C.Y.	\$ 10.00	\$ 171,000
Rock Excavation (includes Pavement Removal)	7,200	C.Y.	\$ 20.00	\$ 144,000
Compaction of Earthwork (Type A) (MR-5-5)	22,600	C.Y.	\$ 10.00	\$ 226,000
12" Asphalt Pavement	22,000	Sq. yd.	\$ 50.00	\$ 1,100,000
Curb & Gutter (2')	8,500	Sq. yd.	\$ 20.00	\$ 170,000
Aggregate Base	23,900	Sq. yd.	\$ 10.00	\$ 239,000
Subgrade Treatment	25,100	Sq. yd.	\$ 10.00	\$ 251,000
Permanent Signing	1	Lumpsum		\$ -
Permanent Pavement Marking	1	Lumpsum		\$ -
Street Lighting	1	Lumpsum		\$ -
Right of Way Acquisition	200,000	Sq. ft.	\$ 5.00	\$ 1,000,000
Drainage	1	Lumpsum	\$ 50,000.00	\$ 50,000
Erosion Control	1	Lumpsum	\$ 50,000.00	\$ 50,000
Construction Traffic Control & Temp. Pavements (10%)				\$ 379,000
Contingency (15%)				\$ 625,000
PRELOOP CONSTRUCTION SUBTOTAL				\$ 4,786,000
Surveys, PS&E Design, and Bidding Assistance (8%)				\$ 382,880
Geotechnic Design Services				
Post Design Services				
Full Time LPA Project Observation (7.5%)				\$ 358,950
UTILITY RELOCATIONS				
Utility Relocations - BPU Underground Electric	1	Lumpsum		\$ -
Utility Relocations - BPU 12" Water Main	1	Lumpsum		\$ 216,000
Utility Relocations - Time Warner Cable	1	Lumpsum		\$ 60,000
Utility Relocations - Atmos Gas	1	Lumpsum		\$ 120,000
Utility Relocations - Misc	1	Lumpsum		\$ 50,000
Utility Construction Traffic Control (5%)				\$ 22,300
Contingency (15%)				\$ 70,200
UTILITY RELOCATION SUBTOTAL				\$ 538,500
Utility Relocations Management and Observation (5%)				\$ 26,925
DESIGN AND OBSERVATION SUBTOTAL				\$ 768,755
PROJECT TOTAL				\$ 6,093,255

Figure 4.8.3 - State Avenue and 98th Street Improvement Preliminary Estimates of Probable Construction Costs

4.9 STATE AVENUE CORRIDOR RECOMMENDATIONS

Based upon the completed analyses and reviews, there are a series of geometric and traffic control improvements that should be implemented along the State Avenue corridor between the France Family Drive Overpass and east of 98th Street in order to satisfy the Design Year 2040 weekday PM peak period traffic volumes, as well as to satisfy Saturday and other off-peak or event related traffic demands.

The recommended improvements are listed below in order of relative importance and priority:

1. Convert the existing at-grade intersection of State Avenue with Village West Parkway to a grade-separated Single Point Urban Interchange (SPUI), with State Avenue being the grade-separated facility over Village West Parkway. Complete the design and construction to allow for future widening of State Avenue through this interchange to provide three lanes in each direction when traffic volumes and operations warrant these improvements.

Throughout this study, this major geometric and traffic control improvement has been identified as the top priority in the Village West region, and should be completed as soon as project funds become available and design / permitting requirements can be met. This improvement will greatly enhance the existing traffic operations of the area, and will provide necessary traffic capacity beyond the Design Year 2040 traffic levels. With the completion of this project, existing off-peak congestion issues and operational deficiencies would be expected to be resolved. Additionally, major entertainment and sporting event traffic handling operations would be greatly enhanced by this improvement, and continuous traffic access across State Avenue during peak traffic events would be maintained.

2. Modify the existing partial clover-leaf interchange of I-435 with State Avenue to a Diverging Diamond Interchange (DDI), with the lane arrangements and traffic controls as detailed in Section 4.8 and as shown on Exhibit 4.8.2.
3. Reconstruct the signalized 98th Street intersection at the location previously identified, with lane configurations proposed by the Schlitterbahn development plan as the initial intersection improvement plan. Modify this proposed intersection layout to provide the required width in the median for the eventual construction of a third eastbound left turn lane when traffic volumes warrant its construction.

Additionally, as redevelopment occurs on the south side of State Avenue near 98th Street, reserve and / or acquire additional right-of-way for the eventual construction of the Pre-98th Street Loop Configuration, as described in Section 4.5. This geometric improvement is anticipated to be needed when the eastbound triple left turn movement becomes congested and the overall operation of the intersection begins to fail.