

PROJECTED CONDITIONS

To investigate the expected geometric and operational deficiencies of the Rex Whitton Expressway under future traffic conditions, projections of 30-year (i.e. Year 2035) design traffic volumes was completed. To develop these future traffic volumes, a variety of data sources were utilized. The Missouri Statewide Transportation Model, historical traffic count information, and the Cole County & Jefferson City County-wide Transportation Model were each utilized in the development of project traffic volumes.

The County-Wide Transportation Model was developed by GBA to assist Cole County and Jefferson City, Missouri in determining the expected future impacts of continued development and what roadway infrastructure improvements will be expected to be required to supply the necessary roadway capacity to support future land use modifications and developments. The existing physical characteristics of all arterial, all collector and many local streets were inventoried in detail for this thoroughfare study. This route information included street widths, number of lanes, route segment lengths, and intersection traffic controls. The model also includes a highly detailed inventory and compilation of the land use data. This information included numbers and types of dwelling units, areas of commercial, office and industrial land uses, and details of special land uses that would not fit the typical definitions of land uses required by the traffic demand model for the estimation of traffic generations. The Transportation Model also included the latest land data from the Missouri State Penitentiary Development plan.

The traffic projections indicate that the traffic volumes on Rex Whitton Expressway would significantly increase over the next thirty years. These increases happen throughout the corridor but are concentrated in the downtown section where traffic volumes are expected to more than double by Year 2035. This is due to a variety of reasons, including the fact that the Expressway through this section is where both US 50 and US 63 both are routed, that the MSP development is expected to generate up to a total of 7,000 additional trips within the downtown region of the City during the peak travel periods, and that the existing street network in the area has limited opportunity to absorb the projected traffic volume increases.

Based on projected MSP Development plan and master planned population and housing locations within the City and County, about sixty-five to seventy percent of the traffic to and from the MSP Development is anticipated to come from the west and south, through the downtown portion of the City. Conservatively, about twenty-five to thirty percent of the total anticipated MSP traffic desires to utilize the downtown section of Rex Whitton Expressway for access. Due to the nature of the street system, the long distance MSP traffic would be expected to use the Expressway for their trips to and from the MSP Development.

Two basic traffic volume scenarios were developed utilizing the county-wide model to project the future traffic volumes for the Expressway. **Scenario One** has traffic volume projections where there have been no significant improvements to the Expressway other than increasing the capacity of the facility to meet demand requirements. While the majority of the freeway segments of Rex Whitton east and west of downtown area would be expected to operate with adequate levels of service under the Design Year 2035 traffic flows, the

increased traffic volumes would be anticipated to overwhelm the existing signals in the downtown section and create long delays and queues that would back into the adjacent city intersections. Each of the intersections in the downtown section would be expected to operate at overall level of service (LOS) “E” or “F” unless significant improvements are made.

The freeway segment between the Dix Road interchange and the Tri-level will be expected to border on LOS “D” / ”E” operations under the Design Year 2035 traffic conditions. In addition, the westbound off-ramp from the Expressway to Dix Road is projected to experience increased congestion under this future traffic condition. A similar congested condition for the eastbound on-ramp from Dix Road to the Expressway is anticipated during the morning peak period. To correct this projected condition, only the addition of an additional through lane in each direction on the expressway would be expected to suffice. This third through lane between Dix Road and the Tri-level could begin as the eastbound on-ramp from Dix Road. Similarly, the third westbound through lane on the Expressway could terminate as the off-ramp at Dix Road, thus eliminating the need for the extension to the westbound exit ramp.

Review of the traffic operations at the intersections of Dix Road with the US 50 ramps determined that with appropriate signal timings and phasings, the current geometry at these intersections would be expected to adequately handle the projected traffic flows.

Figures D1-1 through D1-4 in Appendix D depict the demand future 2035 traffic volumes. **Figures D2-1 through D2-4** show the resulting levels of service if no improvements to the Expressway are completed (i.e. No- Build).

Scenario Two assumes the addition of an interchange in the Central East Side (CES) area of the corridor near the Lafayette Viaduct. With the addition of this new interchange, the Transportation Model predicts the traffic volumes on the Expressway through the downtown segment would increase by approximately 1000 vehicle per hour in peak travel direction as compared to Scenario One where no CES interchange is provided. This significant increase is primarily due to the improvement this new interchange will make for access to the MSP Development. Projected traffic volumes east and west of the downtown area in the freeway type segments are essentially the same under both scenarios. Again, the freeway segments of Rex Whitton Expressway east and west of downtown would again be expected to operate with adequate levels of service under this design scenario. All of the intersections in the downtown segment would be expected to operate at overall level of service (LOS) “E” or “F” with extremely long queue lengths that would back into adjacent intersections. **Figures D3-1 in Appendix D** depicts the demand future 2035 traffic volumes through the downtown segment of the corridor. Likewise, **Figures D4-1** shows the resulting levels of service if only the CES interchange is added to the Expressway.

The freeway and interchange segments both east and west of the downtown segment show generally the same operation characteristics for both traffic scenarios. The improvements that are expected to be required for Scenario One traffic levels are continued to be needed for the Scenario Two conditions. Based on this finding, no additional analyses of the freeway segments and interchanges east of Clark Avenue and west of the Tri-level were completed.

With the increases in future traffic volumes under either scenario, additional through or turn lanes will be required on the Expressway through the downtown segment to satisfy operational demands. Please note that under both scenarios, much of the projected traffic to and from the MSP site is utilizing the city street network for access due to the limitations the at-grade signalized intersections have on the operations of the Expressway through the downtown segment

Comparison of the completed scenario analyses determined that **Scenario Two** has the higher traffic volumes and associated operational deficiencies. As such, **Scenario Two** volumes were utilized as the basis for the development of each of the improvement concepts traffic projections detailed following.

The projected 2035 ADT for the Expressway are as follows:

58,000 vehicles per day just west of the Tri-Level Interchange
75,000 vehicles per day between Missouri Boulevard and Jefferson Street
70,000 vehicles per day just east of Monroe Street

Each of the following concepts were developed to address the capacity concerns of the corridor under Year 2035 traffic conditions through the various improvement concepts presented.

IMPROVEMENT CONCEPTS

The concepts included in this study are not meant to be an all inclusive list but a first attempt at defining the types of improvements that may be required to satisfy the future traffic demands. The improvement concepts were developed primarily to better define the general scope and magnitude of the various modification concepts that could be implemented to satisfy the operational needs of the corridor under Year 2035 traffic volume conditions and meet the necessary practical design guidelines. As noted, the freeway and associated interchange segments of the corridor were found to function satisfactorily under the future traffic demand scenarios with only minor improvements needed. The following detailed concept analyses focus on the downtown segment of the corridor between the Tri-level and the Clark Avenue Interchange.

The improvement concepts are loosely organized into two sections with Concepts 1 thru 10 detailing potential improvement concepts through the downtown segment of the corridor between the Tri-level interchange and Monroe Street. The second group of concepts detail potential interchange scenarios that could be implemented within the Central East Side segment of the corridor between Monroe Street and the Clark Avenue interchange to enhance access to the MSP Development.

Although the concepts are divided into two discreet groups, it should be noted that the impacts of the improvements in each of the group will have a direct impact of the

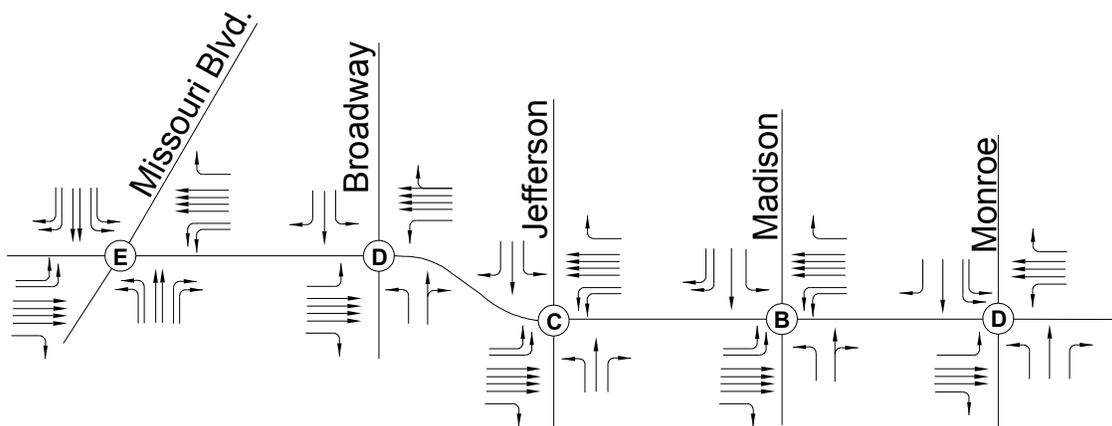
functionality of the concepts in the other group. If traffic congestion in one of the areas is not addressed, the other area will also be subjected to traffic congestion as a direct result. In other words, the success of the traffic operations of in the downtown segment of the study area will determine the success of any improvements within the CES area.

Downtown Segment Concepts

Base Concept 1 (Improved Existing Geometrics) ... Concept 1 reflects the minimum geometric improvements to the existing street system that would be required for the intersections to operate at an overall LOS “E” or better during the P.M. peak hour. All existing at-grade signalized intersections are maintained and all traffic movements are allowed.

The geometric improvements to provide LOS “E” or better for the overall intersections operations and to prevent queues backing into adjacent intersections are as follows. See **Figure E1-2 in Appendix E** for the complete results of the analysis.

- Four eastbound and westbound through lanes on Rex Whitton Expressway from Missouri Blvd. through Madison St. Three eastbound and westbound through lanes Madison St. to Monroe St.
- Dual eastbound and westbound left-turn lanes at Missouri Blvd., Jefferson St., and Madison St. Single eastbound and westbound left-turn lanes at Broadway St., and Monroe St.
- Dual northbound and southbound left-turn lanes at Missouri Blvd. and dual southbound left-turn lanes at Monroe St.
- Dual southbound right-turn lanes at Missouri Blvd. and Madison St.
- Dual northbound right-turn lanes at Missouri Blvd.
- Free-Flow southbound right-turn at Monroe St..
- Overall intersection levels of service “B” to “E.”



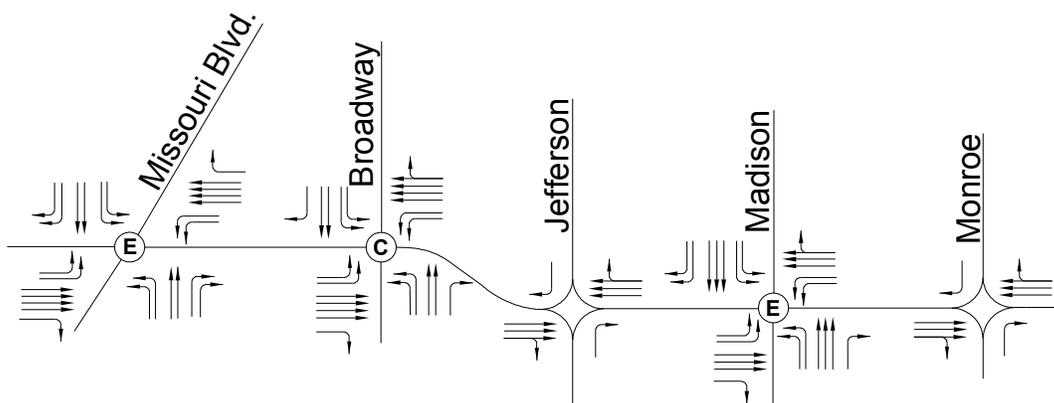
While the above listed improvements would be expected to provide the necessary capacity to satisfy the projected Design Year 2035 traffic volumes, the widened section of the Expressway would be at or near capacity during all peak periods. No excess capacity would be provided to the system and very limited opportunities for future improvements would be

available. **Exhibit 1** at the end of this report depicts the approximate limits of the widened Expressway through the downtown region of the corridor. As can be seen, these improvements would require significant additional right-of-way to construct due to the extent of the widening and the impacts to the Wears Creek drainage channel and drainage structures would be extensive. Impacts to abutting businesses and residences would also need to be evaluated and considered in detail.

Concept 2A (RI/RO at Jefferson Street and Monroe Street) ... Limiting access at Jefferson Street and Monroe Street to right-in/right-out access was analyzed as Concept 2A. This concept allows for more storage area for queued vehicles by eliminating two of the signalized intersections. Access to the eastern area of the downtown through the Jefferson/Madison/Monroe intersections (i.e. the Triplets) is limited by the elimination of left turn movements and north/south thru movements at Jefferson Street and Monroe Street..

The geometric improvements to provide LOS “E” or better for the overall intersections operations and to prevent queues backing into adjacent intersections are as follows. See **Figure E2-2** in **Appendix E** for the complete results of the analysis.

- Four eastbound and westbound through lanes on Rex Whitton Expressway from Missouri Blvd. through Broadway St. Three eastbound and westbound through lanes from Jefferson St. through Monroe St.
- Dual eastbound and westbound left-turn lanes at Missouri Blvd., Broadway St., and Madison St.
- Dual northbound and southbound left-turn lanes at Missouri Blvd., Broadway St., and Madison St.
- Dual southbound right-turn lanes at Missouri Blvd. and Madison St..
- Dual northbound right-turn lanes at Missouri Blvd.
- Three northbound and southbound through lanes on Madison St.
- Overall intersection levels of service from “C” to “E.”

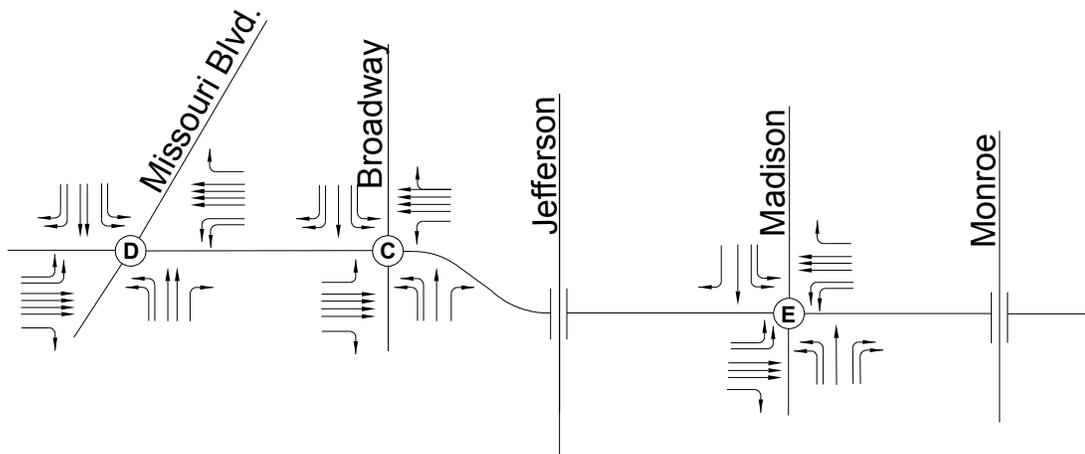


This improvement concept could be implemented as an interim measure to satisfy short term traffic growth conditions under existing lane configurations. Implementation of this concept as a short term solution would be expected to address near future concerns without extensive geometric modifications.

Concept 2B (Overpass at Jefferson Street and Monroe Street) ... Concept 2B analyzed the impacts of overpasses at Jefferson Street and Monroe Street. This concept is similar to Concept 2A but enhances north/south street access via the overpasses. All traffic to and from the Expressway in the eastern downtown area is concentrated at the Madison intersection.

The geometric improvements to provide LOS “E” or better for the overall intersections operations and to prevent queues backing into adjacent intersections are as follows. See **Figure E3-2** in **Appendix E** for the complete results of the analysis.

- Four eastbound and westbound through lanes on Rex Whitton Expressway from Missouri Blvd to Madison St. Three eastbound and westbound through lanes from Madison St. through Monroe St.
- Dual eastbound and westbound left-turn lanes at Missouri Blvd. and Madison St.
- Dual northbound and southbound left-turn lanes at Missouri Blvd., Broadway St., and Madison St.
- Dual southbound right-turn lanes at Missouri Blvd. and Broadway St..
- Dual northbound right-turn lanes at Madison St.
- Free-Flow southbound right-turn at Madison St.
- Overall intersection levels of service “C” to “E.”

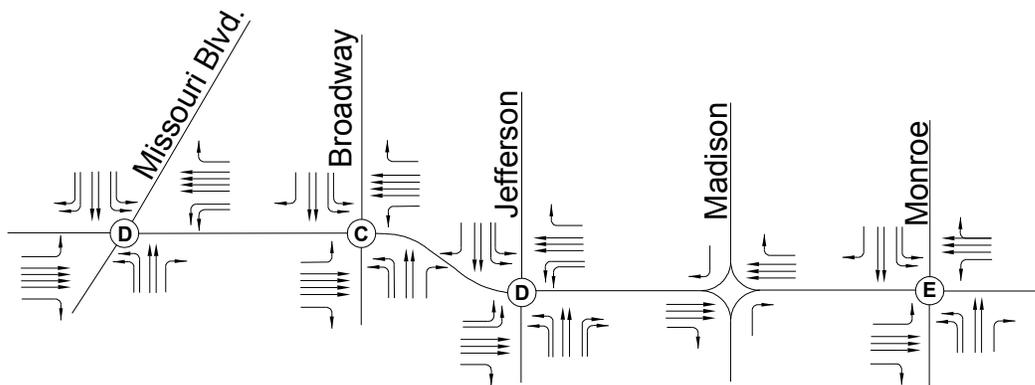


Overpasses at Jefferson and Monroe would likely cause closure of current access points to several businesses, including Coca Cola and Central Bank. The only accesses to the three story office building at Monroe and Rex Whitton Expressway would be in conflict with the fill for a new overpass at this location. The bridges would have to be constructed in several sequences to maintain Expressway traffic. Traffic could be constricted to one or two lanes in each direction over a few months to accomplish substructure construction.

Concept 3A (RI/RO at Madison Street) ... Limiting access to Madison Street to right-in/right-out was analyzed for Concept 3A. This concept eliminates the signalized intersection of Madison Street with the Expressway and therefore provides more storage for Expressway traffic.

The geometric improvements to provide LOS “E” or better for the overall intersections operations and to prevent queues backing into adjacent intersections are as follows. See **Figure E4-2** in **Appendix E** for the complete results of the analysis.

- Four eastbound and westbound through lanes on Rex Whitton Expressway from Missouri Blvd to Broadway St. Three eastbound and westbound through lanes from Jefferson St. through Monroe St.
- Dual westbound left-turn lanes at Missouri Blvd. Dual eastbound and westbound left-turn lanes at Jefferson St.
- Dual northbound and southbound left-turn lanes at Missouri Blvd., Broadway St., Jefferson St. and Monroe St.
- Dual southbound right-turn lanes at Missouri Blvd.
- Dual northbound right-turn lanes at Jefferson St.
- Free-Flow southbound right-turn at Jefferson St.
- Overall intersection levels of service “C” to “E.”



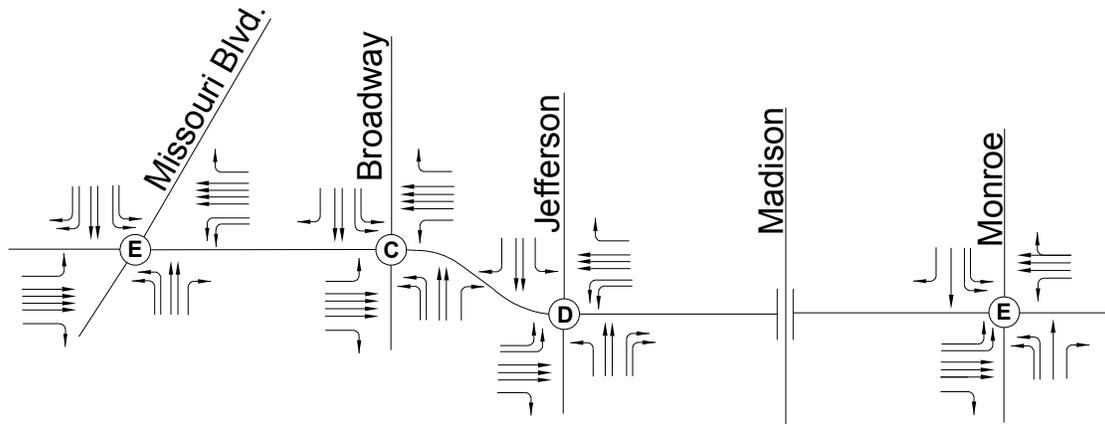
This improvement concept could be implemented as an interim measure to satisfy short term traffic growth conditions under existing lane configurations. Implementation of this concept as a short term solution would be expected to address near future concerns without extensive geometric modifications.

Concept 3B (Overpass at Madison Street) ... Concept 3B analyzed the impacts of an overpass at Madison Street. Similar to Concept 3A, this concept eliminates the signalized intersection of Madison Street with the Expressway and therefore provides more storage for Expressway traffic.

The geometric improvements to provide LOS “E” or better for the overall intersections operations and to prevent queues backing into adjacent intersections are as follows. See **Figure E5-2** in **Appendix E** for the complete results of the analysis.

- Four eastbound and westbound through lanes on Rex Whitton Expressway from Missouri Blvd to Broadway St. Three eastbound and westbound through lanes from Jefferson St. through Monroe St.
- Dual westbound left-turn lanes at Missouri Blvd. Dual eastbound and westbound left-turn lanes at Jefferson St. Dual eastbound left-turn lanes at Monroe St.

- Dual northbound and southbound left-turn lanes at Missouri Blvd., Broadway St., and Monroe St.
- Dual southbound right-turn lanes at Missouri Blvd.
- Dual northbound right-turn lanes at Jefferson St.
- Free-Flow southbound right-turn at Jefferson Street.
- Overall intersection levels of service “C” to “E.”



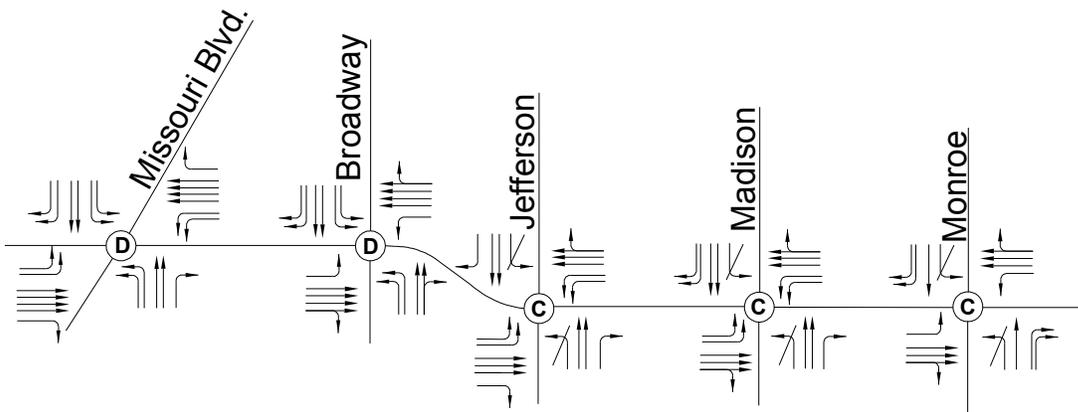
An overpass as Madison will have similar impacts as Concept 2B, though there is less dense use of affected properties, making an overpass more feasible in terms of right of way acquisition.

Concept 4A (No N/S Left-Turns at Jefferson, Madison, and Monroe Streets) ...

Prohibiting left-turns for both northbound and southbound traffic on Jefferson Street, Madison Street, and Monroe Street (i.e. the Triplets) was analyzed for Concept 4. This concept was created to improve the traffic operations through the downtown region by eliminating some signal phasing at the Triplets and therefore providing more time for critical traffic movements.

The geometric improvements to provide LOS “E” or better for the overall intersections operations and to prevent queues backing into adjacent intersections are as follows. See **Figure E6-2** in **Appendix E** for the complete results of the analysis.

- Four eastbound and westbound through lanes on Rex Whitton Expressway at Missouri Blvd. through Broadway St. Three eastbound and westbound through lanes from Jefferson St. through Monroe St.
- Dual eastbound and westbound left-turn lanes at Missouri Blvd., Jefferson St., and Madison St.
- Dual northbound and southbound left-turn lanes at Missouri Blvd. and Broadway St.
- Dual southbound right-turn lanes at Missouri Blvd., Broadway St., Madison St. and Monroe St.
- Dual northbound right-turn lanes at Monroe St.
- Free-flow southbound right-turn at Jefferson Street.
- Overall intersection levels of service “C” to “D.”



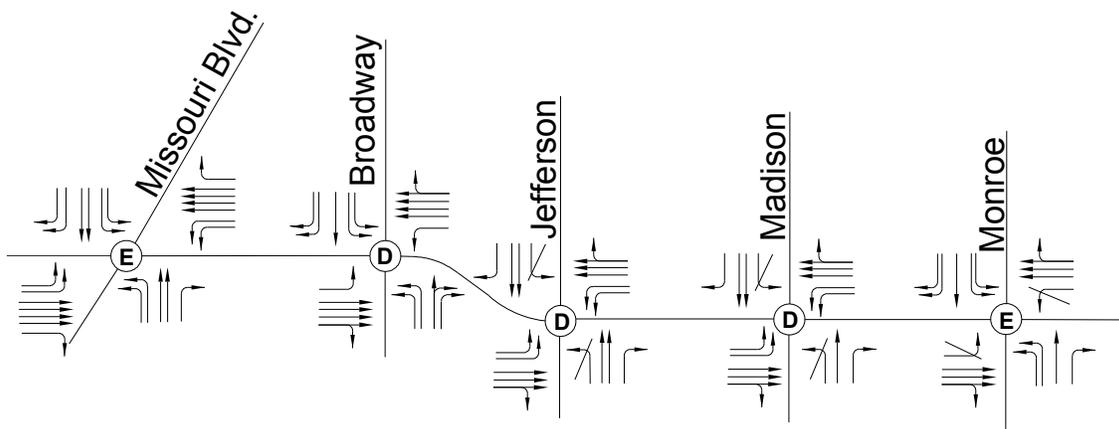
Prohibiting left-turn northbound and southbound at Jefferson Street, Madison Street and Monroe Street that could be accomplished with signing and signal head modification and could be implemented during the peak hours only.

This improvement concept could be implemented as an interim measure to satisfy short term traffic growth conditions under existing lane configurations. Implementation of this concept as a short term solution would be expected to address near future concerns without extensive geometric modifications.

Concept 4B (No N/S Left-Turns on Jefferson & Madison Plus No E/W Left-Turns on Monroe) ... Concept 4B analyzed the impacts of the prohibition of north/south left-turns at Jefferson Street and Madison Street, and the prohibition of eastbound and westbound left-turns at Monroe Street. This concept combined movement and phasing restrictions to maximize the amount of available signal time for critical movements.

The geometric improvements to provide LOS “E” or better for the overall intersections operations and to prevent queues backing into adjacent intersections are as follows. See **Figure E7-2 in Appendix E** for the complete results of the analysis.

- Four eastbound and westbound through lanes on Rex Whitton Expressway at Missouri Blvd. through Broadway St. Three eastbound and westbound through lanes from Jefferson St. through Monroe St.
- Dual eastbound and westbound left-turn lanes at Missouri Blvd., Jefferson St., and Madison St.
- Dual northbound and southbound left-turn lanes at Missouri Blvd., Broadway St., and Monroe St.
- Dual southbound right-turn lanes at Missouri Blvd., Broadway St., and Monroe St.
- Overall intersection levels of service “D” to “E.”



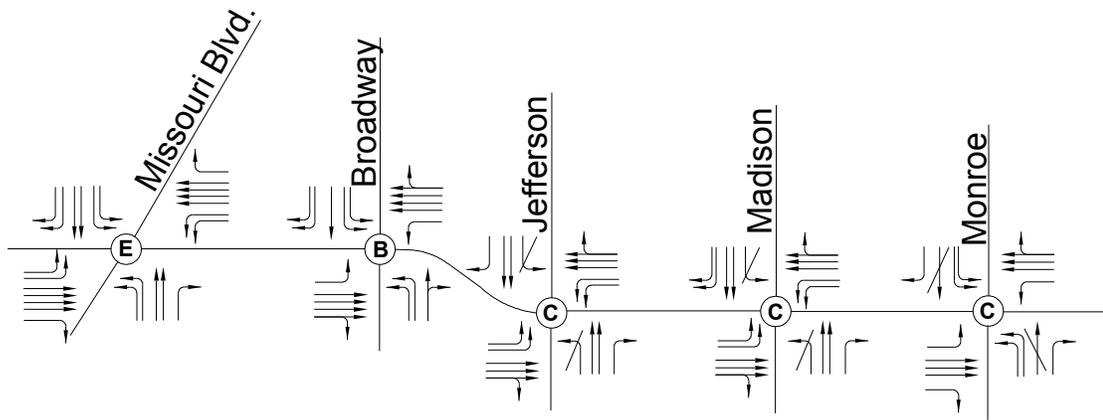
Concept 4B could be accomplished with signing and signal head modification and could be implemented during the peak hours only.

This improvement concept could be implemented as an interim measure to satisfy short term traffic growth conditions under existing lane configurations. Implementation of this concept as a short term solution would be expected to address near future concerns without extensive geometric modifications.

Concept 4C (No N/S Left-Turns on Jefferson & Madison Plus No N/S Through on Monroe) ... Concept 4C analyzed the impacts of the north/south left-turn prohibition from Concept 4A, with the addition of prohibiting north/south through movements on Monroe Street. This concept also combined movement and phasing restrictions to maximize the amount of available signal time for critical movements.

The geometric improvements to provide LOS “E” or better for the overall intersections operations and to prevent queues backing into adjacent intersections are as follows. See **Figure E8-2** in **Appendix E** for the complete results of the analysis.

- Four eastbound and westbound through lanes on Rex Whitton Expressway at Missouri Blvd. through Broadway St. Three eastbound and westbound through lanes from Jefferson St. through Monroe St.
- Dual eastbound and westbound left-turn lanes at Missouri Blvd., Jefferson St., and Madison St.
- Dual northbound and southbound left-turn lanes at Missouri Blvd., Broadway St., and Monroe St.
- Dual southbound right-turn lanes at Missouri Blvd., Broadway St., and Madison St.
- Overall intersection levels of service “B” to “E.”



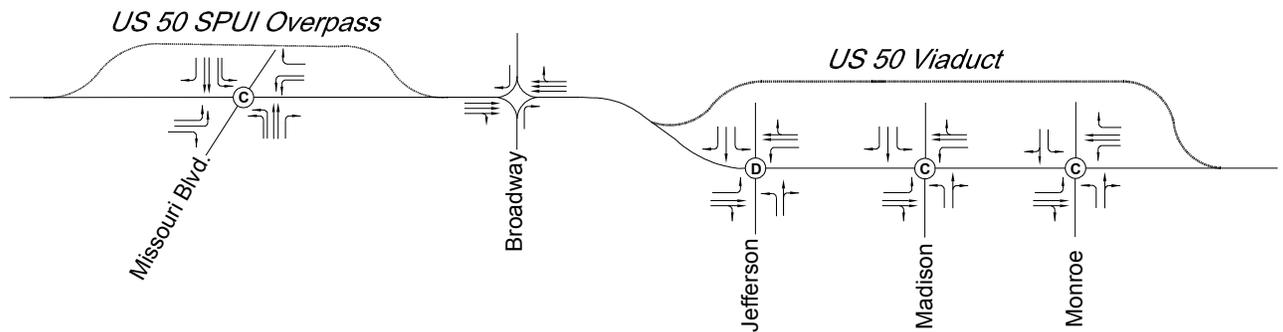
Concept 4C could be accomplished with signing and signal modification. The left-turn restrictions could be limited to peak hours only.

This improvement concept could be implemented as an interim measure to satisfy short term traffic growth conditions under existing lane configurations. Implementation of this concept as a short term solution would be expected to address near future concerns without extensive geometric modifications.

Concept 5 (Separate US 50/63 from RWE, SPUI at Missouri Blvd, RI/RO at Broadway Street) ... Concept 5 includes a single-point urban interchange (SPUI) at the intersection of Rex Whitton Expressway with Missouri Boulevard, a right-in/right-out access at Broadway Street, and the separation of US 50/63 thru traffic from the Rex Whitton Expressway traffic through the Triplet intersections. The existing Rex Whitton Expressway would be maintained as a local street through the Triplet intersections to provide full access to the eastern downtown section of the City.

The geometric improvements to provide LOS “E” or better for the overall intersections operations and to prevent queues backing into adjacent intersections are as follows.

- Maintain existing lanes on Expressway section through the Triplet intersections
- Two eastbound and westbound through lanes on US 50 Viaduct
- Three eastbound and westbound through lanes at Broadway RIRO intersection
- Dual left-turn lanes for all left-turn movements at SPUI
- Dual northbound and southbound through lanes on Missouri at SPUI.
- Overall intersection levels of service “C” to “D.”



See **Figure E9-2** in **Appendix E** for the complete results of the analysis. **Exhibits 2 and 3** at the end of this report detail the Concept 5 geometric improvements.

As can be seen on **Exhibit 2, Missouri Boulevard SPUI and US 50/63 Fly-by Option**, the intersection of Missouri Boulevard with the Expressway is replaced by a single-point interchange. This interchange has all Missouri Boulevard traffic movements and Expressway turning movements occurring under a new overpass structure for US 50 through traffic movements. The movements to and from US 63 to and from the Tri-level interchange would be carried on separate Fly-by structures parallel to the Expressway to eliminate the congested weaving segment between the Tri-level and the Missouri Boulevard intersection. Exiting traffic on westbound US 50/63 would leave the Expressway west of the Broadway Right-In-Right-Out intersection. Once separated from the Expressway, traffic would diverge into two traffic streams, one to US 63 via the Tri-level and one to Missouri Boulevard through the single-point intersection. A similar merging of traffic flows from Missouri Boulevard and US 63 occurs for eastbound traffic east of the Missouri Boulevard SPUI. Section A-A on the exhibit shows a simplified cross-section through the Expressway for visualization purposes.

Installation of a single point interchange at the highly skewed Missouri Boulevard intersection will require long spans that challenge the available space for grade separation. Special girder designs are likely to limit structure depth. Fill for the mainline grade separation can be retained by walls on both sides of Missouri Boulevard, though RCB Bridge #A1424R carries Wears Creek under the westbound lanes and will be subjected to additional earth load from the fill. The fly-bys for the Tri-level ramps could be served by hammerhead piers or substructure elements that are compatible with the Triplet Viaduct Option (**Exhibit 3A** – see below). Construction sequencing options are limited due to the tight space. The intersection will be closed or partially closed for months at time during construction, as well as the on and off ramps from the Tri-level.

The proposed US 50 Viaduct structure would be able to be constructed without impacting the Tri-level interchange but the proposed geometric improvements would require the removal of the existing Bolivar Street bridge to accommodate the installation of the US 63 Fly-by structures. In addition, existing businesses along both the north and south sides of the Expressway may be impacted by this concept.

Exhibit 3a, Triplet Viaduct Option, details one of two concepts developed for the separation of highway and local traffic streams through the eastern downtown segment of the study corridor between Jefferson Street and Monroe Street. **Exhibit 3a** shows the construction of a viaduct over the Expressway beginning west of Jefferson Street and staying aloft until east of Monroe Street. Downtown traffic flows and local access would be served by ramping downtown traffic from the Expressway around the ends of the elevated section and maintaining the current signalized intersections through the Triplets under the Viaduct. Section A-A on **Exhibit 3a** details this concept.

A viaduct detailed in the exhibit can be constructed over the existing expressway from west of Jefferson to east of Monroe, with a series of long spans, long carrier beams and retaining walls systems, to carry the mainline traffic over the three congested intersections. This will likely require a two phase superstructure built side by side to maintain at least one lane of expressway traffic in both directions. All three intersections will have to be closed at various times during construction. There will likely be a row of columns along both sides of the expressway and one down the middle.

Alternatively, the US 50/63 mainline through traffic volumes can be split and run outside each side of the Expressway on fly-by bridges. **Exhibit 3b** details this configuration. Construction will be similar to the option mentioned above for the Tri-level ramp flyovers with long spans between hammerhead or dual column frames.

One important factor in the selection of a viaduct strategy would be the visibility of traffic signals. Some of the side road approaches have significant grades and the overhead structure could block or obscure visibility signs and signals. Considerations would include aesthetic treatment of substructure elements and area lighting, at a minimum, to alleviate the perception of obstructions thru the downtown area.

Another factor will be the handling of the potential weaving movements between either the Triplet Viaduct or Fly-bys and the interchange projected to be built in the Central East Side (CES) segment of the corridor. Assuming that an interchange will be constructed within the CES area, a weaving section would be created between the Triplet Viaduct or Fly-by improvement and this interchange. Under the viaduct option, traffic entering the westbound traffic stream from the CES interchange will need to cross out of the auxiliary lane or be trapped as exiting traffic to the westbound downtown off-ramp at Monroe Street. Likewise, eastbound traffic from the downtown segment that enters the traffic stream from the on ramp will need to merge left to avoid being trapped into the CES interchange exit ramp.

With the Fly-by option, the mainline Expressway traffic travels on the two outside lanes while traffic destined to the downtown area exits the Expressway from the left-most lane. While left lane exits are not typical, this type of lane arrangement eliminates much of the weave conflict between the CES interchange and the Triplet improvements. Westbound traffic entering the Expressway at the CES interchange could remain in the auxiliary lanes which would become one of the mainline lanes of the Fly-by. It is unlikely that many vehicles would enter the Expressway at the CES interchange and exit immediately to

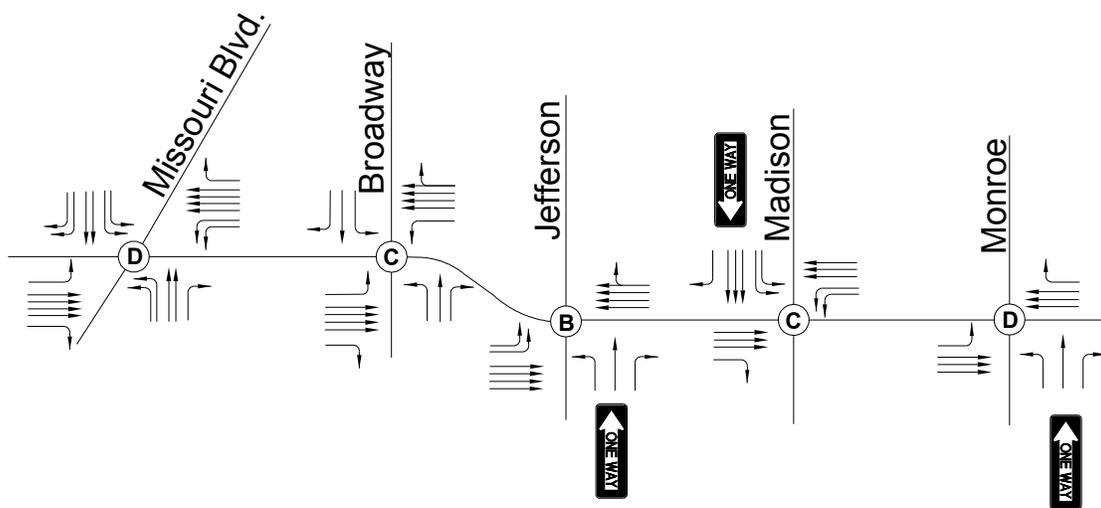
downtown, thus minimizing weaving traffic volumes. Eastbound traffic flows would exhibit similar traffic operations. Please note special signing and notice to drivers to inform them well in advance of a westbound left exit capture lane would be required. Eastbound mainline traffic would need to be notified that the outside lane would be a capture exit lane at the CES interchange.

Concept 6 (Jefferson & Monroe One-way Northbound, Madison One-way Southbound)

... With Concept 6, Jefferson Street and Monroe Street was analyzed as one-way streets northbound from Dunklin Street to McCarty Street, with Madison Street one-way southbound from Dunklin to McCarty Street.

The geometric improvements to provide LOS “E” or better for the overall intersections operations and to prevent queues backing into adjacent intersections are as follows. See **Figure E10-2** in **Appendix E** for the complete results of the analysis.

- Four eastbound and westbound through lanes from Missouri Blvd. through Jefferson St. Three eastbound and westbound through lanes from Madison St. to Monroe St.
- Dual westbound left-turn lanes at Missouri Blvd. and Madison St.
- Dual northbound and southbound left-turn lanes at Missouri Blvd.. Dual southbound left-turn lanes at Madison St..
- Dual southbound right-turn lanes at Missouri Blvd..
- Three southbound through lanes on Madison St.
- Free-Flow southbound right-turn at Broadway St. and Madison St..
- Overall intersection levels of service “B” to “D.”



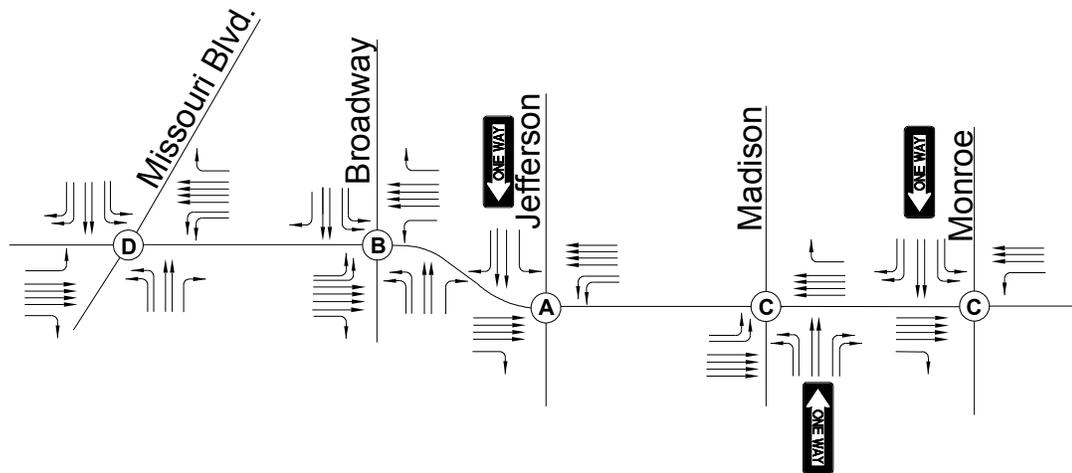
Concept 6 could be accomplished with signing and traffic signal modification.

This improvement concept could be implemented as an interim measure to satisfy short term traffic growth conditions under existing lane configurations. Implementation of this concept as a short term solution would be expected to address near future concerns without extensive geometric modifications.

Concept 7 (Jefferson & Monroe One-way Southbound, Madison Street One-way Northbound) ... With Concept 7 Jefferson Street and Monroe Street was reviewed as a one-way street southbound from Dunklin Street to McCarty Street, with Madison Street one-way northbound from Dunklin to McCarty Street.

The geometric improvements to provide LOS “E” or better for the overall intersections operations and to prevent queues backing into adjacent intersections are as follows. See **Figure E11-2** in **Appendix E** for the complete results of the analysis.

- Four eastbound through lanes from Missouri Blvd. through Monroe St. Four westbound through lanes from Madison St through Missouri Blvd. Three westbound through lanes at Monroe St.
- Dual westbound left-turn lanes at Missouri Blvd. and Jefferson St. Dual eastbound left-turn lanes at Broadway St. and Madison St.
- Dual northbound and southbound left-turn lanes at Missouri Blvd. and Broadway St.
- Dual southbound right-turn lanes at Missouri Blvd. and Monroe St..
- Dual southbound left-turn lanes at Monroe St.
- Dual northbound left-turn and right-turn lanes at Madison St..
- Overall intersection levels of service “A” to “D.”



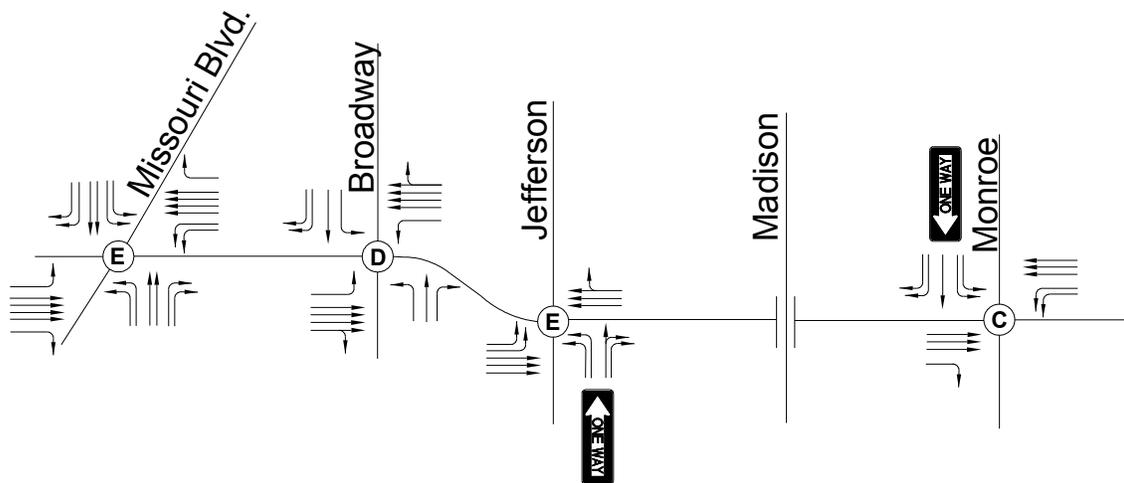
Concept 7 could be accomplished with signing and traffic signal modification.

This improvement concept could be implemented as an interim measure to satisfy short term traffic growth conditions under existing lane configurations. Implementation of this concept as a short term solution would be expected to address near future concerns without extensive geometric modifications.

Concept 8 (Overpass at Madison, Monroe Street One-way NB ,and Jefferson One-way SB) ... Concept 8 analyzed the impacts of an overpass at Madison Street in addition to one-way pairs with Monroe Street northbound and Jefferson Street southbound.

The geometric improvements to provide LOS “D” or better for the overall intersections operations and to prevent queues backing into adjacent intersections are as follows. See **Figure E12-2** in Appendix E for the complete results of the analysis.

- Four eastbound and westbound through lanes at Missouri Blvd. through Broadway St. Three eastbound and westbound through lanes from Jefferson St to Monroe St.
- Dual westbound left-turn lanes at Missouri Blvd. and Monroe St.
- Dual eastbound left-turn lanes at Jefferson St.
- Dual northbound and southbound left-turn lanes at Missouri Blvd.. Dual southbound left-turn lanes at Monroe St. Dual northbound right-turn lanes at Missouri Blvd and Jefferson St.
- Dual southbound right-turn lanes at Missouri Blvd., Broadway St. and Monroe St.
- Overall intersection levels of service “C” to “E.”



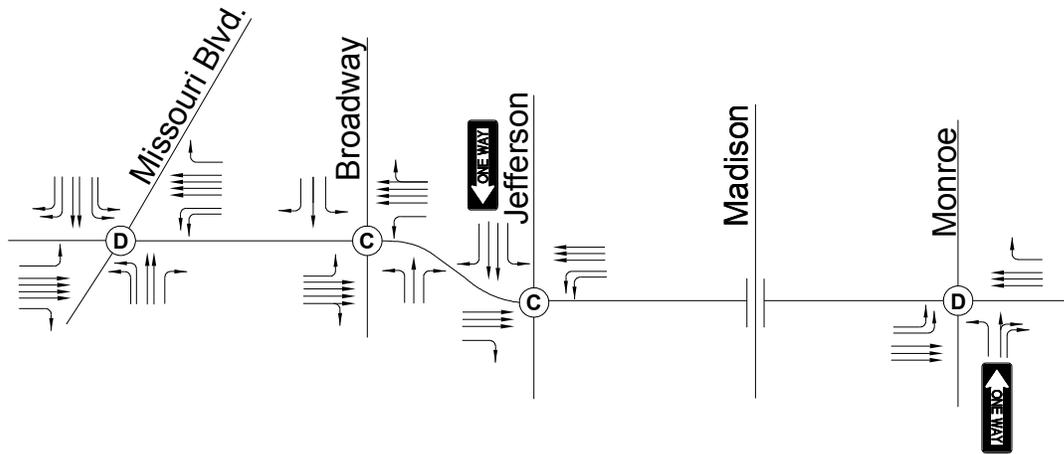
An overpass at Madison will have similar impacts as Concept 2B, though there is less dense use of affected properties, making an overpass more feasible in terms of right of way acquisition.

Concept 9 (Overpass at Madison Street with Monroe Street One Way Southbound and Jefferson Street One Way Northbound) ... Concept 9 analyzed the impacts of an overpass at Madison Street in addition to one-way pairs with Monroe Street southbound and Jefferson Street northbound.

The geometric improvements to provide LOS “E” or better for the overall intersections operations and to prevent queues backing into adjacent intersections are as follows. See **Figure E13-2** in Appendix E for the complete results of the analysis.

- Four eastbound and westbound through lanes from Missouri Blvd. through Broadway St. Three eastbound and westbound through lanes from Jefferson St. to Monroe St.
- Dual westbound left-turn lanes at Missouri Blvd. and Jefferson St..
- Dual northbound and southbound left-turn lanes at Missouri Blvd..

- Dual southbound right-turn lanes at Missouri Blvd..
- Dual eastbound left-turn lanes at Monroe St.
- Free-Flow southbound right-turn at Jefferson St..
- Overall intersection levels of service “C” to “D.”



An overpass as Madison will have similar impacts as for Concept 2B, though there is less dense use of affected properties, making an overpass more feasible in terms of right of way acquisition.

Figures E14-1 through E14-5 detail both the various geometric requirements for the improvement concepts, as well as the Concept 1 - Base Geometric improvements for comparison purposes. These figures were prepared to help determine the extent and scope that each of the improvement concepts would require. As can be seen, Concepts 1, 2A-2B, 3A-3B, 4A-4C, 5, 6, 7, 8 and 9 would include significant widening of the expressway, affecting eight bridges and impacting Wears Creek on both sides of the expressway. All would need a long wall between Broadway and Jefferson to protect the channel or total enclosure of the channel. All would require replacement or substantial repair to the Miller St. box culvert. This structure runs under Miller St. for the whole length of the street, so access to homes and businesses will be affected. Replacement of the structure will include stability considerations for adjacent buildings.

Central East Side Interchange Concepts

Following are descriptions some potential interchange improvement options that could be implemented within the Central East Side segment of the study area. Again, the concepts included in this study are not meant to be an all inclusive list but a first attempt at defining the types of improvements that may be required to satisfy the future traffic demands. The improvement concepts were developed primarily to better define the general scope and magnitude of the various modification concepts that could be implemented to satisfy the operational needs of the corridor under Year 2035 traffic volume conditions and meet the necessary practical design guidelines.

There are multiple interchange scenarios which would be expected to satisfy the traffic operation concerns and access desires of this area. Two options have been developed in

some detail for this report to determine the general scope and extent of the potential interchange improvements. One option would be to construct a new, stand alone diamond-type interchange of Lafayette Street with the Expressway. A second option would be to combine movements to and from the existing Clark Avenue diamond interchange with the proposed interchange configuration. Both of these options have positive and negative issues associated with their implementation that are discussed following.

Lafayette Street Interchange ... A stand alone, tight-diamond type interchange of the Expressway at Lafayette Street could be constructed to provide a new point of access for both area wide and MSP Development traffic volumes. This tight diamond installation could have a variety of intersection configurations with Lafayette Street, depending upon the final design of interchange. Separate intersections with coordinated signals, a signalized single-point intersection, or a roundabout serving all ramp and Lafayette Street movements are all possible at this location. Other system enhancements to the area street network and interchanges in the CES Segment of the study corridor are also shown on this exhibit in addition to the Lafayette Street Interchange and are detailed following.

Exhibit 4 details the general layout of a tight-diamond interchange between Lafayette Street and the Expressway. As noted on the exhibit, the construction of an interchange at this location necessitates many other roadway system modifications to accommodate the new interchange. As can be seen, the ramps to the Expressway from Lafayette Street run along the base of the slopes for the existing embankments. This alignment separates the ramp intersections with Lafayette Street approximately 200 feet apart. To bring them together as a roundabout or single point intersection, extensive rework of the embankments with retaining walls around the east abutment of the Viaduct would be required. Please note that there are private properties, residences, and places of worship along these ramp alignments that would be expected to be impacted by this potential interchange placement.

The ramps for the Lafayette Street interchange to the east from the Expressway would need to be connected to the existing ramps for Clark Avenue interchange with auxiliary lanes to provide the needed weaving length to satisfy traffic operations. Similarly, the ramps from Lafayette Street to the west would need to have an auxiliary lane to any and all of the downtown improvement concepts. It must be noted that these required auxiliary lanes conflict with the existing bridges located at Jackson Street and at Chestnut Street. Each of these conflicting bridges would need to be removed and potentially replaced as part of an overall Expressway improvement project. The Chestnut Street bridge is especially important to the CES area as a secondary access route to the MSP Development while the Jackson Street bridge is important for neighborhood circulation and school access.

The auxiliary lanes between the downtown improvements and the CES improvements are required for both traffic operational demands and lane alignment issues between these segments. All of the downtown improvement scenarios had at least three lanes required to supply needed capacity for the projected traffic volumes. Similarly, the western ramps for an interchange at Lafayette Street begin and end at the east edge of the downtown improvements. There is inadequate separation between these segments of the study corridor

to reduce the number of lanes between the segments, and as such the continuation of the auxiliary lanes between the downtown and CES segments is anticipated.

To allow the on and off ramps for the Lafayette Street interchange to be constructed at acceptable grades, the segment of Lafayette Street between McCarty Street and Dunklin Street would need to be elevated approximately 5 feet. The raising of the profile grade of Lafayette Street has a secondary benefit of elevating the new roadbed in the interchange area above the 100 year floodplain of Wears Creek in this area. In addition, the intersections of Lafayette Street with Elm Street and Miller Street would need to be converted into RI/RO operations due to their being too close to the proposed Lafayette Interchange. This is proposed to be done with a median on Lafayette Street.

The existing Clark Avenue ramps terminals need to be converted into dual-lane roundabouts under future traffic conditions. The conversion of these intersections from side-street stop condition to roundabouts is necessary due to the limited distance between the ramp terminal intersections and the City intersection of Elm Street and Miller Street with Clark Avenue. By constructing roundabouts, all necessary traffic movements can be maintained on each of the six approaches to the ramp intersections. Please note these roundabouts could be constructed as single lane roundabouts initially. Once significant growth in the MSP Development and background traffic volumes increases occur (and people get used to roundabouts), the second circulating lanes could be added. Typically, the outside lanes of dual lane roundabouts are constructed first to minimize rework of storm drainage and other significant items surrounding the roundabout. **Figure 15-1** details the projected future traffic volumes for the Lafayette Street stand-alone interchange as well as the Clark Avenue roundabout intersections. See **Figure 15-2** the results of the analyses at these locations and for freeway merge and diverge movements.

Another opportunity for additional access that the Lafayette Interchange allows would be the possibility of constructing a slip-ramp from the eastbound Lafayette Street on-ramp to Elm Street. This is also shown on **Exhibit 4**. This slip-ramp would allow some traffic to exit the Expressway west of Lafayette, travel through the Lafayette Street intersection to the slip ramp to Elm and thence to Chestnut Street. Similarly, westbound traffic on the Expressway could exit at Clark Avenue, travel through the roundabout to westbound Miller Street and then proceed north on Chestnut Street to the MSP Development. At this future time, Chestnut Street would be expected to need to be one-way northbound, Elm Street one-way eastbound and Miller one-way westbound. This is another method of maximizing the number of routes into the MSP Development and limiting the required size and number of lanes of any single route into the development. This is a long term type of improvement that could be added at a future date if traffic operations require. Please note that there are existing residential units along Elm Street that would be expected to be impacted by this potential slip-ramp.

Exhibit 5 details a second interchange configuration option for the Central East Side area. This figure shows an interchange configuration that combines the movements from the existing Clark Avenue interchange with the proposed interchange at Lafayette Street. In addition, access from the interchange system is also provided directly to Chestnut Street.

This configuration has multiple opportunities for traffic to enter and exit the Expressway for access to and from the Central East Side area of the City. In addition, this option would be expected to spread the traffic projected for the MSP development over the greatest number of access routes, thus minimizing the need for extensive improvements to any single roadway.

Many of the same physical constraints and requirements of the stand-alone Lafayette interchange apply to the combined interchange configuration. Lafayette Street will need to be raised to enable the ramps to be constructed at acceptable grades, the existing overpasses of Chestnut Street and Jackson Street will need to be reconstructed so as to not conflict with the proposed auxiliary lane and ramp improvements, and the Clark Avenue interchange ramp terminal will need to be reconstructed as roundabout intersections to accommodate needed access for all movements. **Figure 16-1** details the projected future traffic volumes for the Combined CES interchange at the major intersections of ramp with City streets. See **Figure 16-2** the results of the analyses at these locations and for freeway merge and diverge movements.

It must be noted that the Combined CES Interchange Option shown on **Exhibit 5** impacts a significantly larger number of properties within the Central East Side than the stand alone Lafayette Street Interchange shown on **Exhibit 4**. The proposed slip-ramps and connecting roads between the ramp intersections would impact numerous single family attached residences, an existing City Park, some City maintenance buildings, and a place of worship.

Detailed review of environmental and cultural impacts of the either CES interchange option must be undertaken during the detailed development of any improvement option through this sensitive area of the City.