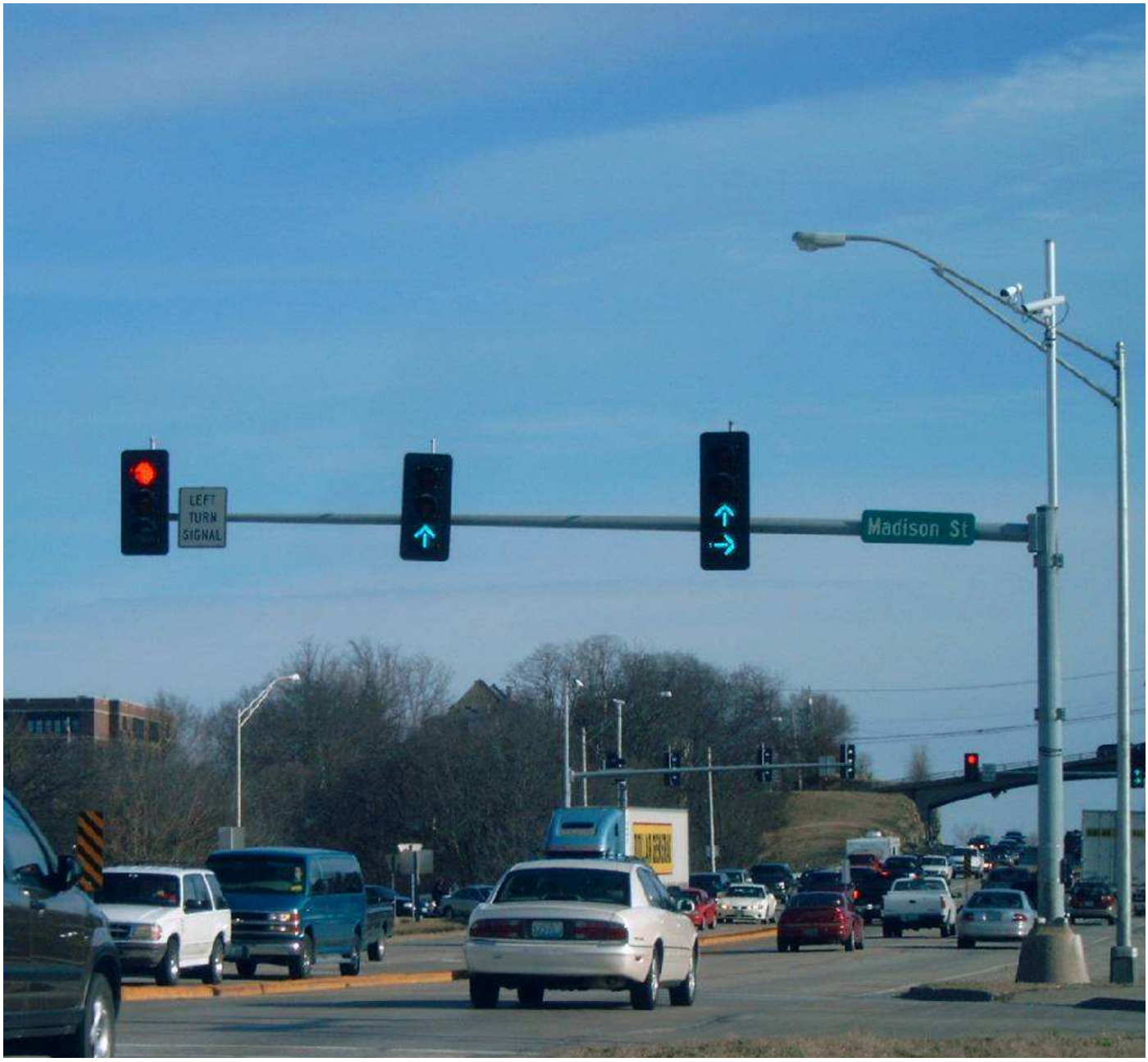
PROBLEM DEFINITION STUDY

Rex Whitton Expressway, Jefferson City
Cole County, Route 50/63, MoDOT Job No. J5P0820



FINAL REPORT

April 17th, 2006

EXECUTIVE SUMMARY

The Rex Whitton Problem Definition Study was completed to identify the existing and potential future traffic operational and safety concerns that are occurring, or could occur, along the Rex Whitton Expressway study corridor between Route 179 and the Eastland Street Interchange. The study also reviewed and identified the existing constraints that would be expected to limit the opportunities for correction of any identified issues. The constraints preliminarily reviewed include natural environmental impacts, socio-economic concerns, flood plains, and historic structures or locations.

This preliminary review has determined that a subsequent National Environmental Policy Act (NEPA) study will be required for the improvements along the Rex Whitton Expressway. It is likely that an Environmental Assessment (EA) or an Environmental Impact Study (EIS) will be required for the downtown and/or CES improvements. Please note, the improvement concepts developed 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.

Some of the key ideas and issues identified in this study are listed following:

- Traffic volumes are projected to double on Expressway through downtown by Year 2035. Other segments of the study corridor are expected to experience at least a 50% increase in traffic flows by Year 2035. 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

- The existing freeway sections west of Dix Road and east of Clark Avenue are expected to be able to handle the anticipated growth.

- The Expressway needs to be widened to three lanes between Dix Road and Tri-level Interchange – the new lanes could begin and end as ramps for the Dix Road interchange.

- The combination of US 50 w/ US 63 traffic, plus the Missouri State Penitentiary (MSP) Development effort, causes much of the congestion concern in downtown. It is estimated that the MSP Development will account for 25% of the traffic growth to the Expressway through the downtown segment.

- Additional access for the Central East Side (CES) of the City is desired by the public and for the MSP Development.

- The CES interchange should not be constructed without addressing the downtown congestion because the interchange will increase the traffic congestion in the downtown segment.

- Multiple access points to the local street system from the CES interchange are desirable for future traffic conditions, and to limit the extent of improvements required to the existing street system to satisfy traffic demands for the MSP Development.

- Clark Avenue ramp terminal intersections could be modified to roundabouts to enhance access for ramps and local streets. Roundabouts would allow all existing traffic operations top continue with mini9mal disruption.

- Local access through the downtown section is critical to local businesses.

- The downtown segment requires either 3 or 4 through lanes, plus multiple left and right turn lanes to satisfy traffic demands if all downtown intersections are to be maintained as at-grade signalized facilities. Alternatives to the widening of the existing facility were developed and include the separation of through traffic from local traffic and the creation of a separate elevated facility for these traffic flows. See Figures 1-5 for schematic layouts of some potential improvement options that could be completed through the downtown and CES areas of the study corridor.

- One historical building, Lincoln University President's House (L50 – Appendix G), recognized as a Local Landmark by the City of Jefferson, is located in the primary study area.

- The Jefferson City National Cemetery (N16, L10 – Appendix G), listed on both the National Register of Historic Places and the City of Jefferson Local Landmarks, abuts the primary study area; therefore, this resource should be carefully considered as transportation improvements in this vicinity are proposed.

- No previously identified historic bridges are located in the primary or secondary study areas; four bridges in the tertiary area may be determined to fulfill NRHP eligibility criteria once they are evaluated.

- The probability of significant archaeological sites in the primary study area is low. Similarly, natural environmental impacts will be minimal.

- Socio-economic impacts (access, change of traffic distribution, displacements) in the downtown area will be a primary issue during the subsequent NEPA study and design. Continued public involvement and context sensitive solutions to neighborhood and business impacts will be important elements of that study. Achieving informed consent or agreement on improvements will require a compromise of interested groups.

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STUDY DESCRIPTION

The Rex Whitton Expressway (US 50/63) Problem Definition Study is being conducted by the Missouri Department of Transportation (MoDOT), Cole County Department of Public Works, the City of Jefferson, and consultant, George Butler Associates, Inc. (GBA). The primary purpose of the project is to identify transportation deficiencies (needs) of the existing Rex Whitton Expressway facility from just east of the Route 179 interchange, through the US54/US63 Tri-level interchange, across the downtown section and the Central East Side section of Jefferson City, ending just east of the Eastland Drive interchange.

In addition to identifying existing deficiencies, the study details future traffic operational concerns based upon expected traffic growth projections throughout the region and along the corridor. Based upon theses identified issues, the report developed a range of potential improvement scenarios that would be expected to address these concerns. Please note that the developed corrective concepts are not meant to determine or limit the improvement strategies that could be implemented as part of any future projects, but were developed to help define the scope and magnitude of the future improvement projects that may be undertaken to solve identified deficiencies.

The Rex Whitton Expressway is made up of various roadway elements and cross-sectional types through the limits of the study area. The western portion of the Expressway is comprised of the median divided, high speed freeway type section of U.S. 50. Access is controlled with grade separated interchanges and speeds are posted at 55 and 65 miles-per-hour (mph) in different sections. As the route approaches the downtown portion of the study area from the west, US 50 intersects US 54/63 at the Tri-level interchange. Beginning immediately west of and through the Tri-level, the roadway transitions from the rural high speed design section to an urban arterial cross-section with a 45 mph speed limit, curbs, raised medians, and signalized control of the at-grade intersections with the local city streets. As the route exits the eastern edge of the downtown area, it again becomes a controlled access facility with the 55 mph speeds and arterial type roadway characteristics on the outside and a raised median. This intermediate type section continues eastward from the downtown through the interchange with Clark Avenue. East of Clark Avenue, the expressway again becomes a 65 mph freeway type facility with a wide, depressed median and full shoulders.

The primary boundaries of this study extend 250 feet north of and south of the existing roadway right-of-way. Within this boundary, existing traffic, geometric, and safety concerns were identified and reviewed. At each interchange/intersection location, the corridor enlarges to encompass a standard interchange/intersection with MoDOT's access

management guidelines applied. Each of the substantive deficiencies along and within the corridor are tabulated and discussed in this report.

Additionally, a larger footprint was defined for the identification of cultural and environmental concerns and projected land use modifications and redevelopment plans. This increased area was evaluated to serve as a framework for future evaluations of corridor access improvements and other roadway opportunities. This expanded area extended north from the expressway to about the Missouri river and southward from the expressway to a line approximately ½ mile south.

EXISTING CONDITIONS AND INVENTORIES

The following sections of the report detail the completed field investigations, the inventory and evaluation of physical conditions, review of safety considerations and crash experience, and the detailed analyses of current traffic operations that exist along the Rex Whitton Expressway through the project limits.

SAFETY ISSUES AND CRASH EXPERIENCE … A detailed review of crash experience along the corridor was completed to determine if there were any safety concerns or identified crash patterns that could be attributed to deficiencies to the current roadway design or configuration.

Under a separate initiative, the freeway type sections of the Expressway were identified as areas with many accidents, especially during wet or snow conditions. As such, a pavement grooving project was completed during 2000 and 2001 construction periods. A post study of the construction project determined that the grooving reduced the overall accident number by approximately 15% along the freeway sections of the expressway, a significant improvement. The overall reduction in crashes and therefore the effect that this improvement had on the reported accident rates is contained within the reported analyses following. A copy of the "Before and After Study: Cole County – US 50 & 54 Grooving Project" is contained with **Appendix A**.

Even with the completed grooving project, the corridor as a whole has crash experience slightly higher than would be anticipated for this type of facility under normal traffic conditions. The freeway type section of the Expressway west of the Tri-level, including the Dix Road interchange, and the section east of Jackson Street, including the Clark Avenue Interchange, both experience slightly higher than the state-wide average for similar freeway type facilities. This is detailed on **Table 1**, following. In addition, a copy of the state-wide crash rates utilized for this study is contained in **Appendix A**.

Table 1
Segment Crash Rate Information

Location	Total Crashes		Injury Crashes		Fatal Crashes	
	Project Rate	Statewide Rate	Project Rate	Statewi de Rate	Project Rate	Statewide Rate
Rex Whitton						
Rt. 179 to Dix	158.02 **	121.08 (1)	37.18 **	31.04	1.86 **	0.86
Dix to Bolivar	162.41 **	121.08 (1)	55.65 **	31.04	1.14 **	0.86
Bolivar to Jackson	899.65 **	176.36 (2)	200.29 **	49.23	1.67 **	1.28
Jackson to Clark	221.45 **	121.08 (1)	58.28 **	31.04	5.83 **	0.86
Clark to Eastland	179.69 **	121.08 (1)	48.81 **	31.04	2.22 **	0.86

* Rates are calculated per hundred million vehicles miles
** Indicated rates higher than the comparable Statewide Rate
(1) Based on 1999-2003 5-year average for Freeway Segments
(2) Based on 1999-2003 5-year average for Expressways

Review of the crash history did not identify any specific locations, patterns, or deficiencies that appeared to be substantial contributors or causes of the crashes along the corridor. The crashes within the freeway type segments were well spread along the corridor and did not appear to have any definitive patterns.

As can also be seen in **Table 1**, the most significant deviation above the statewide rate occurs in the segment of the corridor between Bolivar Street and Jackson Street. Along this section of the corridor, the current accident rate is over 5 times higher than the rate for similar Expressway type facilities across the state. This is the section of the expressway that currently has the most urban characteristics and has signalized controls of at-grade intersections with city streets.

To further investigate the factors related to the high crash rates of the downtown segment, a detailed review of the intersection crash history was completed. **Table 2** details the crash rates for the five at-grade signalized intersections within the downtown area.

Table 2
Intersection Crash Rate Information

Location	Number of Crashes	Overall Crash Rate	Injury Crash Rate
Rex Whitton w/			
Missouri Blvd.	113	1.21	0.27
Broadway Street	70	0.93	0.16
Jefferson Street	65	0.87	0.24
Madison Street	97	1.32	0.33
Monroe Street	95	1.39	0.29

* Rates are calculated per million entering vehicles
Note: Intersection accident rates not tabulated by MoDOT

Of these five signalized intersections, the intersection of Missouri Boulevard with the Expressway experienced the highest number of crashes with 113 crashes while the intersection of Monroe Street with the Expressway experienced the highest crash rate of 1.39 crashes per million entering vehicles during the five-year study period.

The majority of the crashes at each of these location are of the rear-end variety which can be attributed to the congested conditions that exist throughout this portion of the corridor. This is very common along a congested, signalized corridor. A detailed discussion of the existing signal operations and congestion is detailed in following portions of this report.

A similar detailed review of the crash history within the interchanges though the corridor was also completed. The overall crash rates for these interchanges was calculated and is detailed in **Table 3**. It is interesting to note that in general, the diamond interchanges of Dix and Clark with the Expressway have much lower numbers of incidents than any of the at-grade intersections. The Tri-level interchange of US 50 with the US 54/63 ramps experienced a crash rates similar to those experienced at the signalized locations. This is due to the fact that, while the number of crash incidents is low, the volume of entering traffic that conflicts at the Tri-level is also very low, and as such a higher rate of crashes is experienced.

Table 3
Interchange Crash Rate Information

Location	Number of Crashes	Overall Crash Rate	Injury Crash Rate
Rex Whitton w/			
Dix Road Interchange	11	0.24	-
Tri-Level Interchange	13	1.25	0.21
Clark Interchange	30	0.62	-

* Rates are calculated per million entering vehicles
Note: Interchange accident rates not tabulated by MoDOT

Detailed information on the completed safety review, along with crash diagrams at the downtown intersections and interchange influence areas are contained in **Appendix A – Crash Experience.**

GEOMETRIC DEFICIENCIES … One important task of this study was to determine whether there are any roadway geometrics and/or physical infrastructure deficiencies within the primary study corridor that may be contributing to any safety concerns. Each segment of the study corridor was reviewed and field checked to determine the compliance with the established Missouri Department of Transportation Standard Design Criteria.

As expected, in each of the distinct roadway segments, different design criteria and operational constraints exist. The freeway type sections have been constructed as a high speed facility with wide medians and extensive clear zones. Through the downtown portion of the corridor, the roadway has been built with a lower design speed and signalized at-grade intersections for local access. The transitional segments between the freeway portions of the

Expressway and the downtown segment have a mixture of both types of roadway elements that have been uniquely combined to match the terrain and surrounding land use constraints. As such, there is no single set of criteria that can be used to evaluate this corridor.

Following is a discussion of the geometric elements that were identified along the freeway and higher speed segments of the study corridor through plan research and field investigations. Photographs with descriptions of the identified deficiencies are contained in **Appendix B – Roadway Deficiencies**. The geometric elements of the roadway through the downtown segment of the project corridor were in line with those expected for an arterial street section with traffic signal controls. While the clear zones, medians, and curbs are not typical design elements for an Expressway, they are acceptable for a signalized, arterial section of street.

West Project limits through the Dix Road Interchange to the Tri-level Interchange… Within this high speed, freeway type segment of the study corridor, two locations were identified that had minor clear zone limitations.

- ½ mile west of Dix Road (**Exhibit B-1a**)
    - Rock face 29.5 ft from edge of pavement EB
    - Rock face 31.5 ft from edge of pavement WB
- ¼ mile east of Dix Road (**Exhibit B-1b**)
    - Rock face 25 ft from edge of pavement EB
    - Rock face 22 ft from edge of pavement WB

For the posted speed limit of 65 mph through this segment of the corridor, 30 to 34 feet of clear zone is required based upon the "2002 Roadside Design Guide".

In addition, the existing guardrail protecting the Dix Road interchange bridge was field identified as being short with regard to the vertical concrete bridge abutment it is intended to protect.

- At Dix Road (**Exhibit B-1c**)
    - Inadequate guardrail at bridge EB and WB

In each of the above cases, the deficiencies were found to be technical in nature. Review of the crashes experienced through these areas did not identify any of the noted deficiencies as contributing factors to or the cause any of the crashes. As such, the above deficiencies do not require attention or correction unless other projects present an opportunity to address them.

Within the Tri-Level Interchange…Within the Tri-level interchange, only one deficiency was identified through field investigations. The existing sight distance for the northbound US 54 off-ramp is limited due to bridge support pillars being in the sight lines. As the exiting drivers approach the stop bar, visibility to the west is hindered by the highway embankment and support structures.

- Bridge pillars obstruct view of NB US 54 off ramp looking west at stop bar (**Exhibit B-2**)

There are limited opportunities to correct this condition without extensive and expensive modifications to the Tri-level interchange. Only limited crash history at the interchange can be attributed to this sight distance limitation and therefore, no corrective action should be taken at this time. If modification of the Tri-level is considered at a future date, correction of this deficiency should be undertaken.

Jackson Street Bridge and Rock Cut Section … The Jackson Street bridge and associated roadway cut limit the available width of the Expressway and encroach within the required clear zone for the facility. The vertical rock face and bridge abutments are separated from the roadway by protective barriers and fencing.

- Jackson Street Bridge Cut (No Picture)
    - Rock face EB and WB (protected by guardrail)

In the above case, the deficiency was found to be technical in nature. Review of the crash experience through these areas did not identify any of the noted deficiencies as contributing factors to or the cause any of the crashes. As such, the deficiency does not require attention or correction unless other projects present an opportunity to address them.

Jackson Street through Clark Avenue Interchange Embankments … The existing fill slopes for the Expressway east of Jackson Street through the Clark Avenue interchange were all originally constructed with between 55% and 70% slopes. Typical earthen fill embankments are constructed at a maximum of 33% slopes (3:1), while engineered slopes for rock fills can sometimes be constructed with 50% slopes (2:1). Additionally, the steep fill slopes begin downward within a few feet of the back of curb. With no significant shoulders, the steepness of these embankment slopes provide no opportunity for recovery for vehicles that leave the pavement until the toe of the slopes are reached.

- East of Lafayette Street (**Exhibit B-3**)
    - Viaduct Embankments with 55% sideslope - all quadrants
- At Clark Avenue
    - EB off-ramp with 55% sideslope (**Exhibit B-4a.1**)
    - EB on-ramp with 70% sideslope (**Exhibit B-4a.1**)
    - WB off-ramp with 60% sideslope (No Picture)
    - WB on-ramp with 63% sideslope (**Exhibit B-4a.2**)

Review of the crash history as related to the embankment slopes did not identify any incidents that can be attributed to the steepness of the slopes. As such, no actions should be taken to correct the steepness of the slopes unless some other improvement project provides an opportunity.

Expressway Typical Section – Jackson Street to east of Clark Interchange … The existing roadway section of the Expressway through the transitional segment immediately east of the downtown arterial section has a mix of both high speed and low speed elements. The vertical and horizontal design is adequate for the 55 mile-per-hour posted speed limit, but there are no provisions for shoulders that typically would be present on roadways posted at this speed. Similarly, the raised portion of the median is only 2 feet in width and provides

only for a total separation of 8 feet between opposing traffic flows, a low speed design element.

- West of Clark Avenue
    - 55 mph speed limit with no shoulder (curb and gutter) and 2 ft paved median (**Exhibit B-4b.1**)
- At Clark Avenue
    - Short guardrails at bridge EB and WB (**Exhibit B-4b.2**)
    - Bridge over Rex Whitton Expressway has no guardrails (blunt ends) (**Exhibit B-4b.3**)
- East of Clark Avenue
    - 2 ft paved median with no shoulder (**Exhibit B-4b.4**)

The crash record did show some serious head-on injury accidents had occurred within this segment of the study corridor. Due to this, MoDOT has recently completed a project to construct a raised median barrier from Monroe Street eastward to where the freeway type section begins west of the Eastland Interchange to provide positive separation between the traffic flows and thereby reduce the potential for head-on accidents.

Clark Avenue to Eastland Road … Within this high speed, freeway type segment of the study corridor, two locations were identified that had minor clear zone limitations.

- ½ mile west of Eastland Road
    - 65 mph speed limit with no shoulder (curb and gutter) (No Picture)
    - Rock face 26 ft from edge of pavement WB (**Exhibit B-5**)

For the posted speed limit of 65 mph through this segment of the corridor, 30 to 34 feet of clear zone is required based upon the "2002 Roadside Design Guide".

Please note that many of the geometric deficiencies listed are technical deficiencies only when compared to the standard MoDOT design criteria as currently established. With the implementation of the new practical design initiative, many of these concerns shall not be required to be addressed as part of any improvement projects as they have not been found to have negative impacts on the overall operations or safety of the corridor.

TRAFFIC OPEARATIONAL DEFICIENCIES …. The primary existing deficiency of the Expressway is the unsatisfactory handling of the high traffic volumes and the associated traffic congestion, especially during the peak periods. Today, there are multiple factors which affect the capacity and traffic operations of Rex Whitton Expressway within the study corridor.

Three major U.S. routes converge at the Tri-level interchange, with two of the routes going through downtown Jefferson City along Rex Whitton Expressway. The lack of alternative routes for the highway traffic forces all of the through highway traffic onto Rex Whitton Expressway.

The freeway section of Rex Whitton Expressway from Dix Road to the Tri-level Interchange operates with good freeway levels of service. Likewise, the freeway section from Jackson

Street eastward through the Clark Avenue Interchange to the end of the project limits is also operating with good levels of service.

The downtown section of Rex Whitton Expressway from Missouri Boulevard to Monroe Street is currently an arterial section with traffic signals at every intersection. The downtown signalized section is operating near capacity today and some movements experience poor levels of service during the peak periods. The signalized intersections are the most critical capacity constraints for the downtown section, due to their close proximity to one another and the high traffic volumes that the signals are serving. **Figures C1-1 through C1-4** in **Appendix C** shows the existing traffic volumes throughout the study corridor. **Figures C2-1 through C2-4** depict the existing levels of service throughout the study corridor.

BRIDGE AND STRUCTURAL INVENTORY AND ASSESMENT …. There are twenty one existing bridges that will influence the cost, phasing and constructability of strategies to relieve congestion along Rex Whitton Expressway from Route 179 to Vetter Lane. This is primarily due to 3 characteristics, the structure geometries, conditions, and locations.

Three of the structures are owned by the City of Jefferson.

Geometries …None of the structures were constructed to allow widening of Rex Whitton, and very few can accommodate a widening without replacement. The exceptions are some of the box culverts that can be extended, and the Lafayette/Wears Creek Viaduct.

While feasible, extensions of culverts will be complicated because the alignments of the channels they serve are not in line with the existing culverts.

Bridges in the Tri-level interchange have varying spans due the three levels. This results in their columns conflicting with any potential lane configuration of a wider expressway.

The four overpasses at Dix Road, Jackson Street, Chestnut Street, and Clark Avenue are concrete rigid frames that have only 80’ of horizontal clearance underneath, making it very difficult to widen to three lanes each way.

Vertical clearance is limited at 15’-8” by the Tri-level interchange and the Jackson Street overpass.

Conditions … Most of the bridges are in good condition though all but three are 42 to 46 years old. Repairs are already planned or being accomplished where condition ratings are low, such as the deck on the Lafayette Street viaduct. This generally good condition is noteworthy because replacement of any of these bridges to accommodate an expressway strategy will represent loss of an asset that could have 15-25 years of remaining life.

There is one bridge where the current condition is poor and will therefore affect all strategies. The existing box culvert that runs under Miller St. is 1300’ long and is in need of repair or replacement prior to any widening of the expressway.

Locations … Construction or modification of bridges will require the addition of walls and considerable amounts of temporary shoring to protect adjacent streets, parking, buildings, and other bridges.

The three channels of the Wears Creek FEMA floodplain will likely be affected by any improvement strategy. Flood elevations will need to be maintained and limitations on placement of obstructions in the channels will affect structure types and costs.

ENVIRONMENTAL AND CULTURAL RESOURCES OVERVIEW

The objective of the environmental and cultural resources review was to assist transportation planning endeavors through the identification of sensitive social and natural environmental features and cultural resources located in the Rex Whitton study area. For these background reviews, the study area was divided into three zones--primary, secondary, and tertiary. The corridor width varied throughout the length of the study area, extending north and south of the existing Rex Whitton alignment from approximately three-quarters of a mile to roughly two miles. Aerial mosaic photo plates found in Appendix G present the study area, its zones, and the location of environmental features and cultural resources within the study area.

National Environmental Policy Act (NEPA)…Following this study, the next stage in the development of improvements is complying with the National Environmental Policy Act (NEPA). NEPA established a national environmental policy intentionally focused on Federal activities and the desire for a sustainable environment balanced with other essential needs of present and future generations.

NEPA established a supplemental mandate for Federal agencies to consider the potential environmental consequences of their proposals, document the analysis, and make this information available to the public for comment prior to implementation.

NEPA requires, to the fullest extent possible, that the policies, regulations, and laws of the Federal Government be interpreted and administered in accordance with its environmental protection goals. NEPA also requires Federal agencies to use an interdisciplinary approach in planning and decision making for any action that adversely impacts the environment.

NEPA requires the examination and avoidance of potential impacts to the social and natural environment when considering approval of proposed transportation projects. In addition to evaluating the potential environmental effects, we must also take into account the transportation needs of the public in reaching a decision that is in the best overall public interest. The NEPA project development process is an approach to balanced transportation decision-making that takes into account the potential impacts on the human and natural environment and the public's need for safe and efficient transportation.

Social and Economic Considerations…The Rex Whitton Expressway study area continues to develop and redevelop with residential and commercial possibilities. The downtown roadway section as indicated previously was designed and built as an urban arterial; as such

this section will have the greatest potential for social and economic impacts given the proximity of neighborhoods and businesses. With the previous construction of the expressway this area has already experienced neighborhood impacts (splits), and the related loss of cohesion and safety often associated with intact neighborhoods. Therefore, careful consideration to business and residential displacements and access to properties will be important.

Further, any interchange concept chosen for the Central East Side, along with other improvements, will likely have impacts to neighborhoods outside the immediate impact area adjacent to the expressway. It is important to note that portions of this part of the downtown study area are characterized demographically as minority and low-income.

As a result, continued public input from all affected communities and context-sensitive solutions will be important for the subsequent NEPA study and design of the improvements. Achieving informed consent or agreement on improvements will require a compromise of all interested groups.

Threatened and Endangered Species…A review of the Heritage Database Information from the Missouri Department of Conservation (MDC) did not reveal any threatened, endangered, or otherwise sensitive species or their habitats within the immediate area of the existing roadway. There are numerous rare species that occur in and around the Missouri and Moreau Rivers. As long as the improvements will not occur in close proximity to either of these two rivers there should not be any threatened or endangered species issues at this time.

Farmland…This study takes place within city limits. Therefore, it meets the Farmland Protection Policy Act (FPPA) definition of "land committed to other uses," and farmland impact will not be further evaluated.

Floodplain…Executive Order 11988, Floodplain Management, and subsequent federal floodplain management guidelines mandate an evaluation of floodplain impacts. When available, flood hazard boundary maps (National Flood Insurance Program) and flood insurance studies for the study area are used to determine the limits of the base (100-year) floodplain and the extent of encroachment.

The Federal Emergency Management Agency (FEMA) and Federal Highway Administration (FHWA) guidelines 23 CFR 650 have identified the base (100-year) flood as the flood having a one-percent probability of being equaled or exceeded in any given year. The base floodplain is the area of 100-year flood hazard within a county or community. The regulatory floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 100-year flood discharge can be conveyed without increasing the base flood elevation more than a specified amount. FEMA has mandated that improvements can cause no rise in the regulatory floodway, and a one-foot cumulative rise for all improvements in the base (100-year) floodplain. For improvements that involve the state of Missouri, the State Emergency Management Agency (SEMA) issues floodplain development permits. In the case of improvements proposed within regulatory floodways, a "no-rise" certificate, if applicable, should be obtained prior to issuance of a permit.

Depending upon the improvements, a "no-rise" certificate will likely be necessary, as well as a Floodplain Development Permit from SEMA. There is extensive base (100-year) floodplain and regulatory floodway from Wears Creek and its tributaries along Missouri Boulevard, Rex Whitton Expressway, and Route 54.

Federal Emergency Management Agency (FEMA) Buyout Lands…The Flood Disaster Protection Act of 1973, as amended by the Disaster Relief and Emergency Assistance Act of 1988 (The Stafford Act), identified the use of disaster relief funds under Section 404 for the Hazard Mitigation Grand Program (HMGP), including the acquisition and relocation of flood damaged property. The Volkmer Bill further expanded the use of HMGP funds under Section 404 to "buyout" flood damaged property, which had been affected by the Great Flood of 1993.

There are numerous restrictions on these FEMA buyout properties. No structures or improvements may be erected on these properties unless they are open on all sides. The site shall be used only for open space purposes, and shall stay in public ownership. These conditions and restrictions (among others), along with the right to enforce same, are deemed to be covenants running with the land in perpetuity and are binding on subsequent successors, grantees, or assigns. Any decision involving these properties should take into consideration that 2-3 years are necessary to process a request for a exemption from FEMA to utilize buyout properties for transportation improvements deemed to be in the public interest. This exemption would likely allow a permanent easement rather than a transfer of property.

There are four FEMA buyout properties in the area: 703 Mulberry Street, Cedar Street, 718 Cedarvale Street and 1333 Monroe Street.

Parklands/Section 4(f) and 6(f)…Section 4(f) is part of the Department of Transportation (DOT) Act of 1966 that was designed to preserve the natural beauty of the countryside and public park and recreation lands, wildlife and waterfowl refuges, and historic sites. To be Section 4(f) eligible the property must be publicly owned, except for historic sites, which could be either public or privately owned. Section 4(f) eligible sites cannot be impacted by federally funded actions unless there is no feasible and prudent alternative.

Section 6(f) is part of the Land and Water Conservation Fund (LWCF) Act, which was designed to provide restrictions for public recreation facilities funded with LWCF money. The LWCF Act provides funds for the acquisition and development of public outdoor recreation facilities that could include community, county, and state parks, trails, fairgrounds, conservation areas, boat ramps, shooting ranges, etc. Facilities that are LWCF-assisted must be maintained for outdoor recreation in perpetuity and therefore require mitigation that includes replacement land of at least equal value and recreation utility.

There are three Department of Transportation (DOT) Section 4(f) park properties in the study area. All are located north of the expressway: The Runge Conservation Center and associated Missouri Department of Conservation (MDC) Headquarters at Route 179 in the

northwest portion of the study area, East Miller Park at 900 East Miller Street, and Park Place, a mini-park near Capitol Avenue and a water tank, in the northeast portion of the study area. There are two Section 6(f) properties: both are south of the expressway and belong to Lincoln University. They are the Lincoln University Recreational Park and the Lincoln University Tennis Courts.

Noise…Depending upon the extent of improvements recommended for the Rex Whitton Expressway, a noise study will most likely be required in the NEPA phase of development. If lanes are not added (capacity) or insignificant reconstruction is done then a noise assessment will not be necessary.

Air Quality…In accordance with the agreement executed in March 1988 between the parties of the Federal Highway Administration, Missouri Department of Natural Resources and the Missouri Department of Transportation, a detailed air quality analysis for inclusion in an environmental document will only be prepared on federally funded highway projects when the present or predicted average daily traffic volume on the project exceeds 54,000 vehicles in the year of project construction or 72,700 vehicles in the twentieth (20th) year following the project construction. Neither the construction nor the design year projected volumes exceed these average daily traffic volumes.

Wetlands…Review of the study area within approximately 600 feet from the existing route centerline identified five perennial streams and two ponds that could potentially be impacted. Perennial streams are under the jurisdiction of the U.S. Army Corps of Engineers (COE) and if impacted, mitigation will be required. The ponds may be under the COE's jurisdiction depending upon vegetation development within the pond. All five streams are urban streams and most lack any significant corridor. It is possible that other jurisdictional streams exist within the study area; however, further study and field checks of the corridor would be necessary to make this determination.

The two ponds are located one on each side of the expressway, one north and one south. The pond located north is in the northwest quadrant of the Dix Road interchange. The pond located south is north of St. Mary's Boulevard (see map).

Two jurisdictional (blue-lines on topography map) tributaries to the Missouri River are located in the SE ¼ of section 17, T44N, R11W. These two streams currently pass through pipes under the expressway. The third jurisdictional stream is located approximately where Broadway crosses the expressway to Lafayette Street. This stream parallels the expressway for approximately 2000 feet. It passes into a pipe under the expressway, around Simonsen School, and is eventually piped back under the expressway. The expressway near Missouri Boulevard crosses Wears Creek, the fourth jurisdictional stream. The final jurisdictional stream runs parallel from Route 54 to Route 179 for over 8,000 linear feet. There could be significant potential for large impacts to this stream because of its close proximity.

Hazardous Waste…A records review was conducted for the study area. The following sources were searched for potential hazardous and solid waste concerns: Federal Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS); National Response Center Hotline database; Missouri Department of Natural

Resources (DNR) Confirmed Abandoned or Uncontrolled Hazardous Waste Disposal Sites in Missouri, Fiscal Year 2005; DNR Missouri Hazardous Waste Treatment, Storage, and Disposal Facilities List; DNR Solid Waste Facilities List; DNR Underground Storage Tank (UST) database; Center for Agricultural, Resource and Environmental Systems; and Missouri Petroleum Storage Tank Insurance Fund database.

Numerous sites of concern are located within the study area. There also could be other sites discovered in the area that are not registered with DNR. Various reasons account for these sites, such as sites closed prior to regulation, sites that have failed to properly register with DNR or sites that generate exempt quantities of hazardous waste. Note also that DNR uses zip code centroid data for sites that do not have good Geographic Positioning System data. This causes all of these sites to show up in the center of the zip code, but they might actually be located quite a distance from this locale.

Active UST Facilities: These are sites with Underground Storage Tanks registered with the Missouri Department of Natural Resources that are currently in use.

Active Remediation Facilities: These are Underground and Aboveground Storage Tank sites registered with the DNR that have known releases. Many of these sites will also be Active UST Facilities.

Hazardous Waste Generators: These are sites registered with the DNR as active generators of hazardous waste. Some aspect of their operation results in regulated hazardous waste that must be disposed. Some of these might also duplicate the previous two data sets.

Further study and field reconnaissance will be necessary to determine the actual impacts by proposed improvements.

Cultural Resources Review…The MoDOT Historic Preservation staff performed a cultural resources literature review to identify known or previously recorded historic properties located within the Rex Whitton study area. A historic property, by federal definition, is any prehistoric or historic site, building, structure, district, or object included in, or eligible for inclusion in the National Register of Historic Places (NRHP). Historic properties are protected by federal regulations and laws and therefore must be considered for projects that are federally funded or require federal licenses or permits.

For the literature search, MoDOT staff consulted records at the Missouri State Historic Preservation Office (SHPO), Department of Natural Resources, the City of Jefferson Community Development, Cole County Assessor's Office, and various internet web sites. The background search at the SHPO's cultural resources inventory was conducted to determine the extent of previous cultural resources surveys and evaluations for properties in the vicinity of the Rex Whitton study area. This review included a search of the known archaeological sites and NRHP properties within the study limits. Results of the literature search, the "Cultural Resources Summary," are presented in Appendix G, beginning with architectural resources followed by bridge and archaeology discussions. The photo plates in Appendix G identify the location of cultural resources referenced in the summary. The

cultural resources are numbered on the maps and cross-referenced in tables found in the summary (Appendix G).

One historical building, Lincoln University President's House (L50), is located in the primary study area. Three historic properties are adjacent to the primary area and two of these are both NRHP properties as well as City of Jefferson Local Landmarks: the Jefferson City National Cemetery (N16, L10), the Cherry Street Grocery (N09, L28), and Tergin Apartments (N31). The cemetery abuts the primary study area; therefore, the northern border of the primary area will need to be carefully considered at this locale as transportation improvements are proposed. There are a few other historic properties in the secondary zone both north and south of the Expressway, but the majority of historic properties are found in the northern tertiary area.

There are about 40 bridge resources within the study area. Most of these are located along Routes 50 and 54/63, and are less than 50 years old. None of the structures have been listed on the NRHP, and none have been determined NRHP eligible; however, four of these bridges have the potential for fulfilling NRHP eligibility. All four of these bridges are located in the tertiary area of the study limits.

Other than limited excavations in the vicinity of the Lohman Landing near the Missouri State Capitol, relatively few archaeological investigations have been conducted within the limits of the Rex Whitton study area and none were noted within the primary study area. The probability of significant archaeological sites in the primary area is low.

While improvements to the existing alignment may be confined to the primary area, the overall effects may not. Facility improvements that involve reconfigured or new interchanges may in turn require improvements to city streets that serve as north and south arteries to the Expressway, thus secondary and cumulative impacts may affect historic places located in the secondary and tertiary regions. If future studies determine that the project has an area of potential effects that extends beyond the primary study area, it is possible that one or more of the previously recorded historic properties noted in Appendix G will require additional assessment. Once the transportation needs for the Rex Whitton Expressway are further assessed and concepts are proposed, additional cultural resources investigations will be performed to identify any historic properties that the project could impact.

INITIAL PUBLIC INVOLVEMENT …. To encourage public input into the identification of existing and potential deficiencies along the corridor and within the transportation systems of the area, both open-house and targeted stakeholder meetings were held. The open-house public meeting was held on Wednesday, June 8, in Kertz Hall at Immaculate Conception School located at 1206 E. McCarty in Jefferson City from 4-7 P.M. Two separate stakeholder meetings were held in the same location the afternoon before and the morning after the public meeting. The stakeholder lists for these special meetings were developed by the City of Jefferson, Cole County and MoDOT personnel and were specifically targeted at business owners in the corridor, community leaders, and persons with special knowledge of the area that would be anticipated to have valuable input into the identification of transportation deficiencies.

These meetings were opportunities for MoDOT and the study team to gather input about current and future transportation needs of the Rex Whitton Expressway from east of the Route 179 interchange to west of Eastland Drive in Jefferson City. A brief presentation was made during the meetings detailing the purpose of the study and that MoDOT, the City of Jefferson, and Cole County are working together to study the Expressway to determine current needs and how future growth might impact safety and traffic flow through the area. It was noted to all parties that attended these meetings that this study is a preliminary step in a multi-tiered process to look at short and long-term alternatives to address traffic flow along this highway.

In general, the overall statements of the attending parties were supportive of enhancements to the Expressway that would reduce congestion and enhance access to the section of the City between Jackson Street and Clark Avenue (i.e. the Central East Side). The majority of the attendees noted that congested conditions were common along the Expressway during peak travel times, especially within the downtown area.

In addition, many of the attendees expressed concerns regarding the anticipated traffic demands of the new Missouri State Penitentiary (MSP) Development project that is under way. Persons in the Central East Side of the City expressed a need for improved access for their neighborhood and for the MSP Development. They have concerns that due to the size and magnitude of the MSP Development, traffic flows to and from to this new development may overwhelm the existing street network and further deteriorate the traffic flows through their neighborhood. The need for a second access point to the Expressway in the Lafayette Street area was strongly stated by many of the public and stakeholder participants of the meetings.

Copies of the public notices, stakeholder lists and letters, and handout information from the meeting are contained in **Appendix H – Initial Public Involvement**. In addition, a copy of the PowerPoint presentation delivered at each of the meetings is also in the appendix.

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

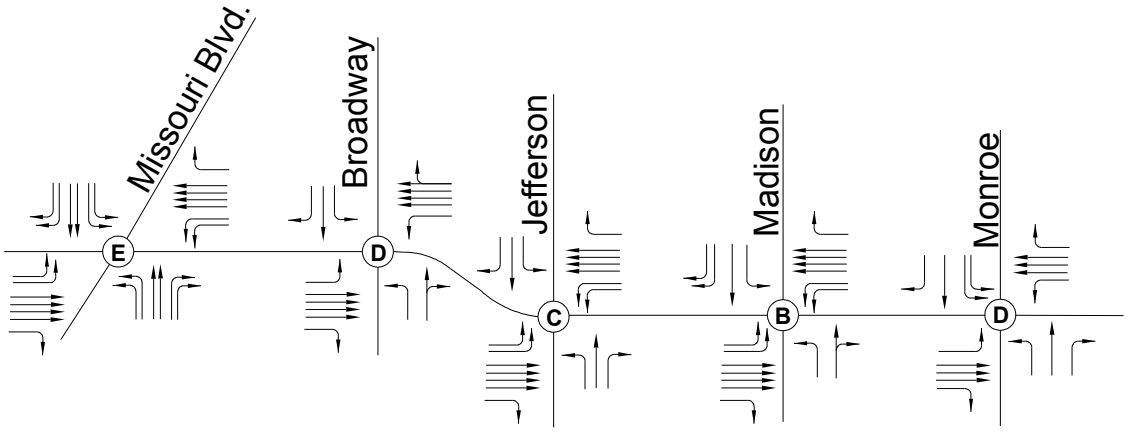
functionality of the concepts in the other group. If traffic congestion in one of the areas is not addressed, the other area will also be subjected to traffic congestion as a direct result. In other words, the success of the traffic operations of in the downtown segment of the study area will determine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



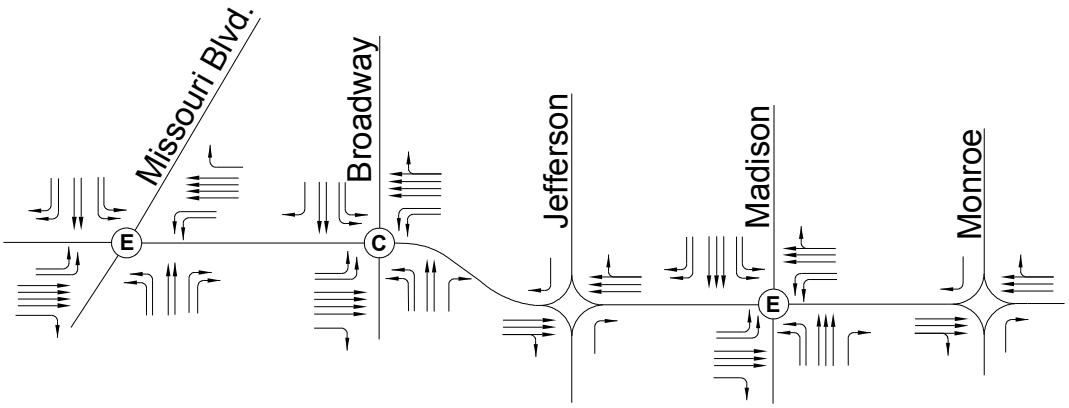
While the above listed improvements would be expected to provide the necessary capacity to satisfy the projected Design Year 2035 traffic volumes, the widened section of the Expressway would be at or near capacity during all peak periods. No excess capacity would be provided to the system and very limited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

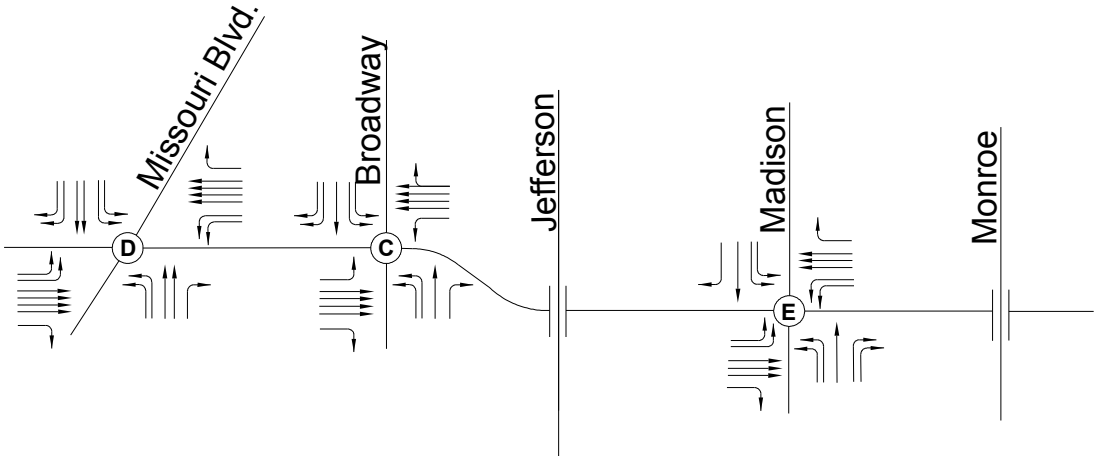


This improvement concept could be implemented as an interim measure to satisfy short term traffic growth conditions under existing lane configurations. Implementation of this concept as a short term solution would be expected to address near future concerns without extensive geometric modifications.

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."

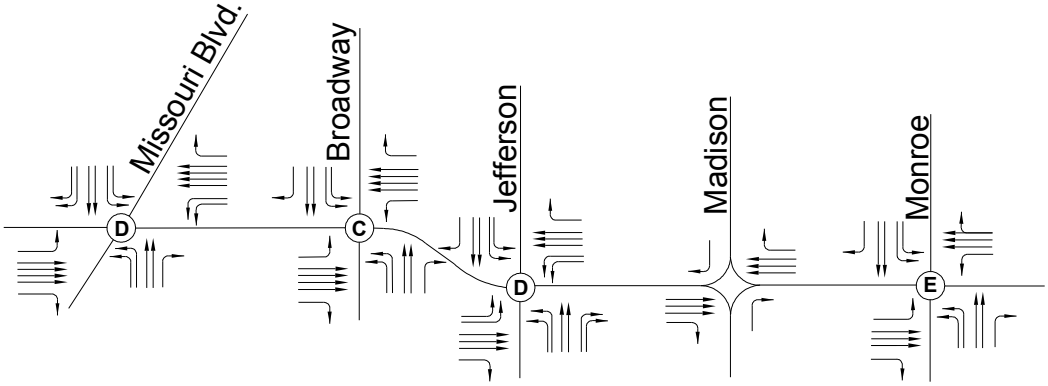


Overpasses at Jefferson and Monroe would likely cause closure of current access points to several businesses, including Coca Cola and Central Bank. The only accesses to the three story office building at Monroe and Rex Whitton Expressway would be in conflict with the fill for a new overpass at this location. 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 Jeffferson 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."



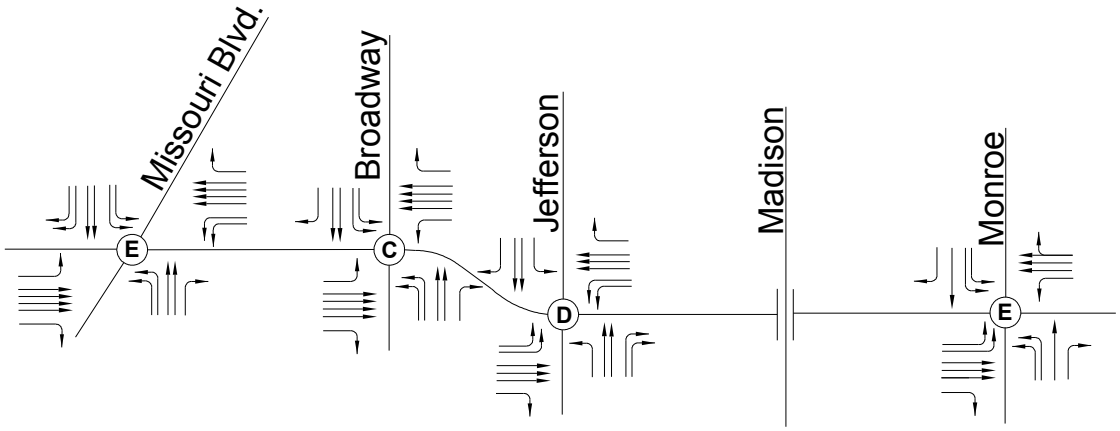
This improvement concept could be implemented as an interim measure to satisfy short term traffic growth conditions under existing lane configurations. Implementation of this concept as a short term solution would be expected to address near future concerns without extensive geometric modifications.

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."

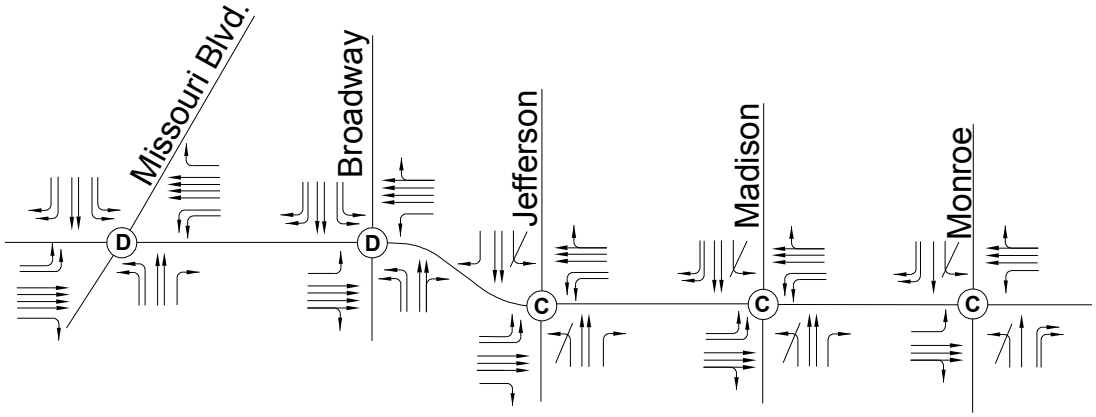


An overpass as Madison will have similar impacts as Concept 2B, though there is less dense use of affected properties, making an overpass more feasible in terms of right of way acquisition.

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."



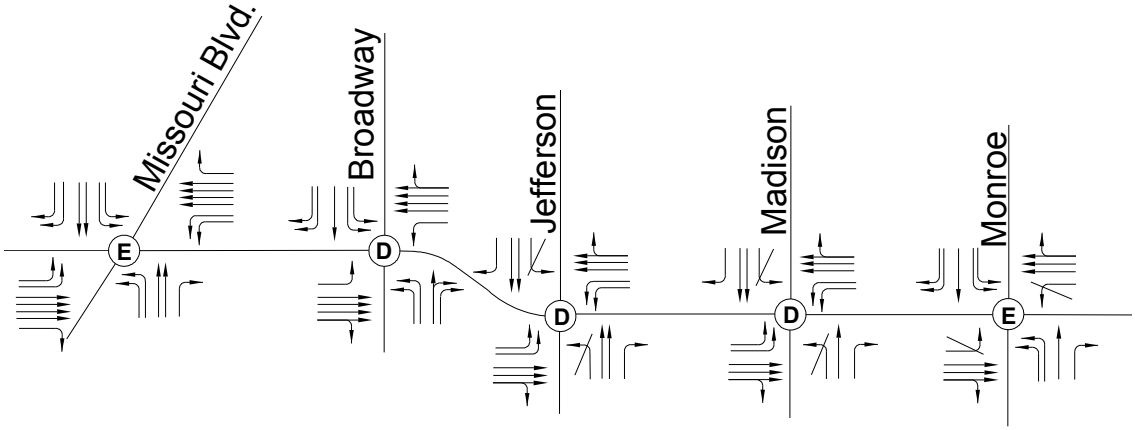
Prohibiting left-turn northbound and southbound at Jefferson Street, Madison Street and Monroe Street that could be accomplished with signing and signal head modification and could be implemented during the peak hours only.

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."



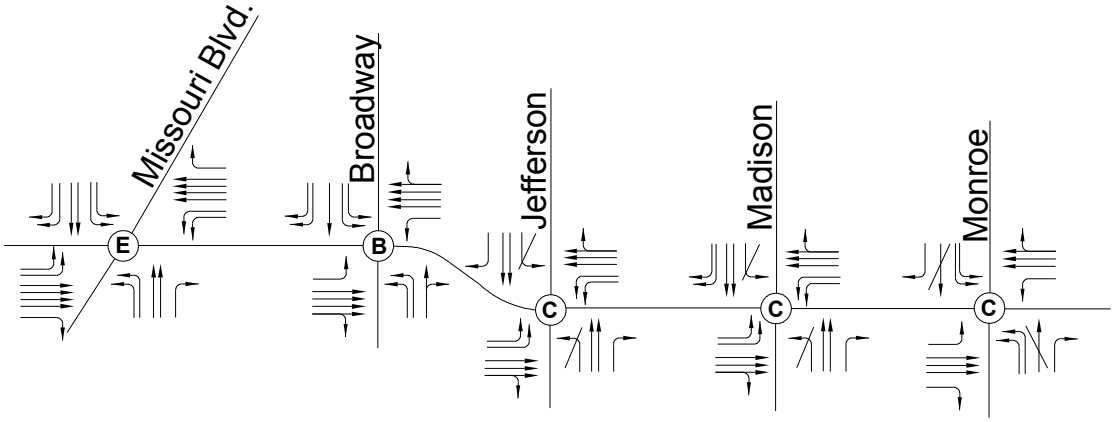
Concept 4B could be accomplished with signing and signal head modification and could be implemented during the peak hours only.

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."



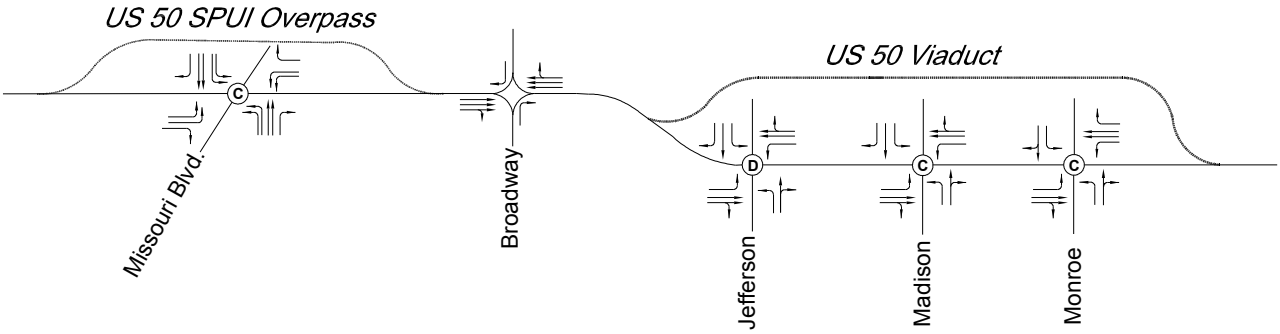
Concept 4C could be accomplished with signing and signal modification. The left-turn restrictions could be limited to peak hours only.

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 bee 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.

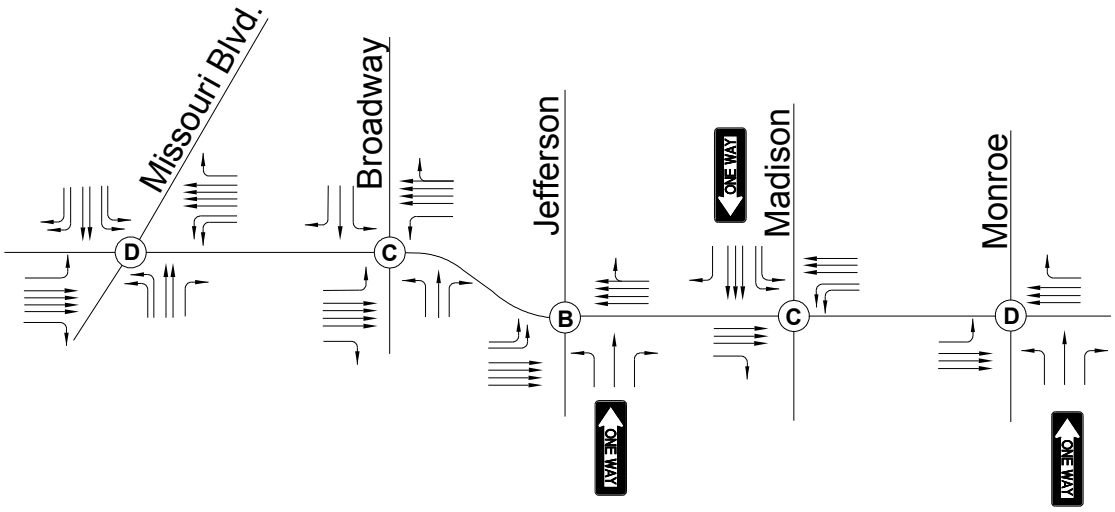
With the Fly-by option, the mainline Expressway traffic travels on the two outside lanes while traffic destined to the downtown area exits the Expressway from the left-most lane. While left lane exits are not typical, this type of lane arrangement eliminates much of the weave conflict between the CES 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."



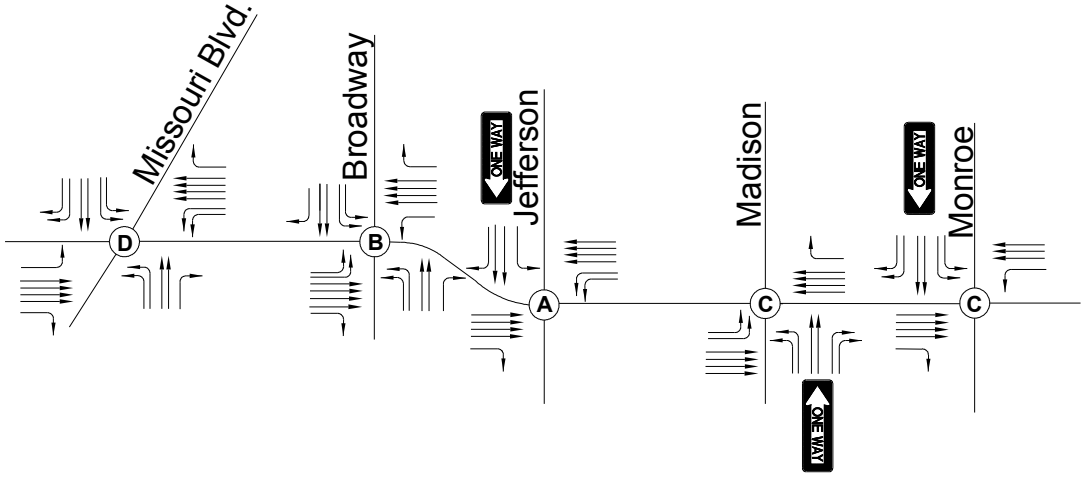
Concept 6 could be accomplished with signing and traffic signal modification.

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 westound 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."



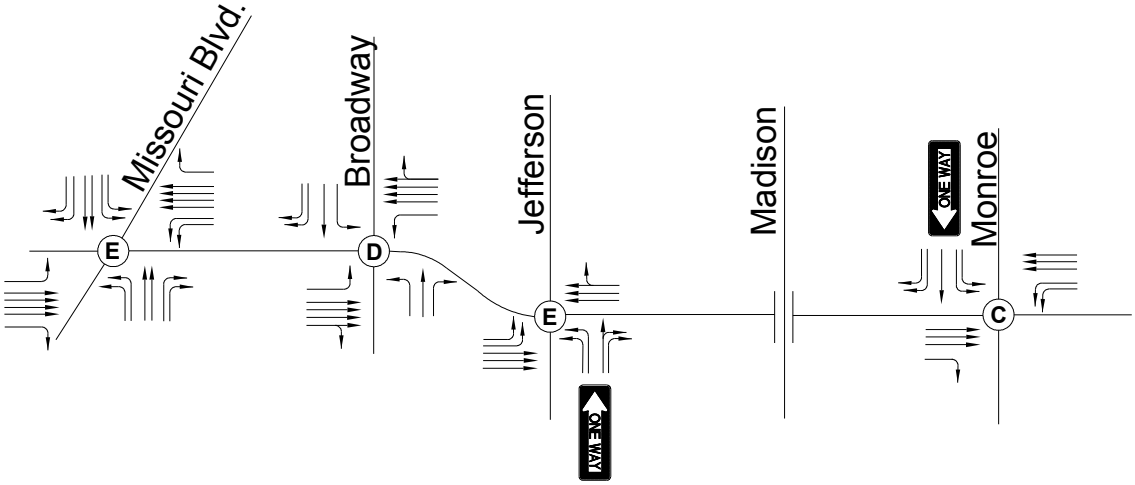
Concept 7 could be accomplished with signing and traffic signal modification.

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."



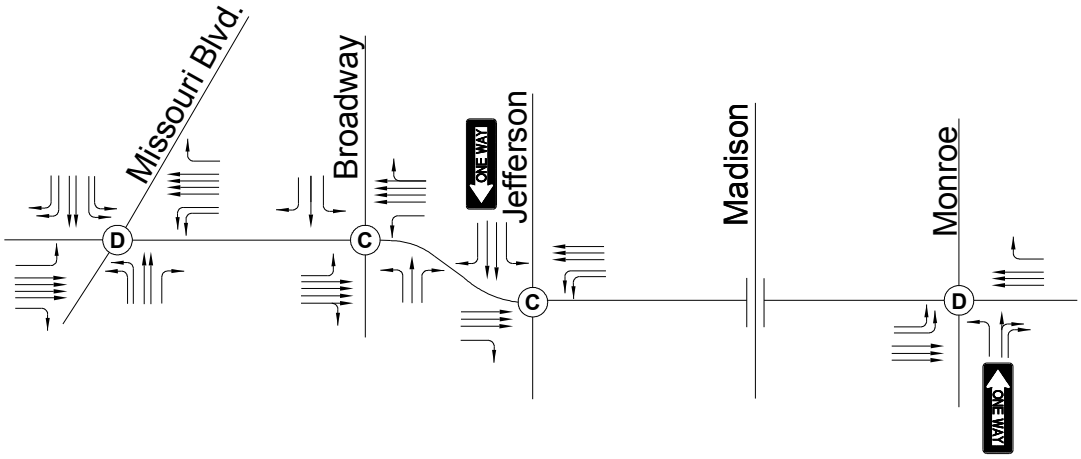
An overpass as Madison will have similar impacts as Concept 2B, though there is less dense use of affected properties, making an overpass more feasible in terms of right of way acquisition.

Concept 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.

<u>Central East Side Interchange Concepts</u>

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.

STUDY SUMMARY

This study was undertaken to identify the existing and potential future traffic operation problems that are occurring, or could occur, along the Rex Whitton Expressway study corridor. 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. It is likely that an Environmental Assessment (EA) or an Environmental Impact Study (EIS) will be required for improvements within the downtown segment and/or CES area of the study corridor.

The Rex Whitton Expressway along the study corridor as a whole has crash experience slightly higher than would be anticipated for this type of facility under normal traffic conditions. Review of the crash history did not identify any specific locations, patterns, or deficiencies that appeared to be substantial contributors or causes of the crashes along the corridor. The crashes within the freeway type segments were well spread along the corridor and did not appear to have any definitive patterns. MoDOT has also undertaken initiatives, such as pavement grooving, to help reduce the crash rate.

Many of the existing geometric deficiencies are technical deficiencies only when compared to the standard MoDOT design criteria currently established. With the implementation of the new practical design initiative, many of these concerns shall not be required to be addressed as part of any improvement projects as they have not been found to have negative impacts on the overall operations or safety of the corridor.

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. Much of the congestion in the downtown area is caused by the combination of US 50 and US 63 traffic and the expected MSP traffic that will utilized this segment of the Expressway. The MSP development accounts for approximately 25% of traffic growth on the Expressway through the study corridor.

The freeway sections has adequate lanes to handle the growth of traffic with minimal or no improvements outside of the improvements needed for the downtown and CES areas, as noted, with the exception of the segment between Dix Road and the Tri-level Interchange. The Expressway will need to be widened to three lanes between Dix Road and Tri-level Interchange to accommodate the Year 2035 projected traffic volumes. The new lanes could begin and end as ramps at Dix Road.

The downtown segment needs either three to four through lanes, in addition to multiple right and left turn lanes if all downtown intersections to be maintained as at-grade signalized location for the future Year 2035 traffic conditions.

Many different concepts are possible for the handling of the projected traffic flows in the downtown segment of the Expressway. Maintaining local access through the downtown segment is critical to the local businesses along the corridor, and some of the developed

preliminary concepts would restrict the access to these businesses, or even need right of way that the businesses occupy and force relocations. The different improvement concepts should be studied in detail to determine which concept will meet the access needs of the local businesses and the area at the time the improvements are being considered.

A Central East Side (CES) interchange will be needed due to additional traffic from the MSP and the desire from the local public for the additional access to the Expressway and to handle the projected traffic volumes in the future. A CES interchange should not be constructed without addressing downtown congestion or interchange increases traffic congestion in downtown. In addition, improvements should be made to the existing Clark Avenue interchange. The ramp terminals should be modified to roundabouts to enhance access for ramps and local streets.

It is likely that a subsequent National Environmental Policy Act (NEPA) study will be required for downtown and/or CES improvements. There are a couple of Local Landmarks (i.e., The Lincoln University President's House and The Jefferson City National Cemetery) that need to be considered when transportation improvements in the area are considered. There are four bridges in the tertiary area that may be determined to fulfill NRHP eligibility criteria once they are evaluated. The probability of significant archaeological sites in the primary study area is low, and the natural environmental impacts will be minimal. The socio-economic impacts in the downtown area will be a primary issue during the subsequent NEPA study and design. Continued public involvement and context sensitive solutions to neighborhood and business impacts will be important elements of that study. Achieving informed consent or agreement on improvements will require a compromise of interested groups.

EXHIBIT 1
REX WHITTON EXPRESSWAY
Minimum Required Lanes for
Existing Intersection Configuration
Design Year 2035 Traffic Volumes
April 17, 2006

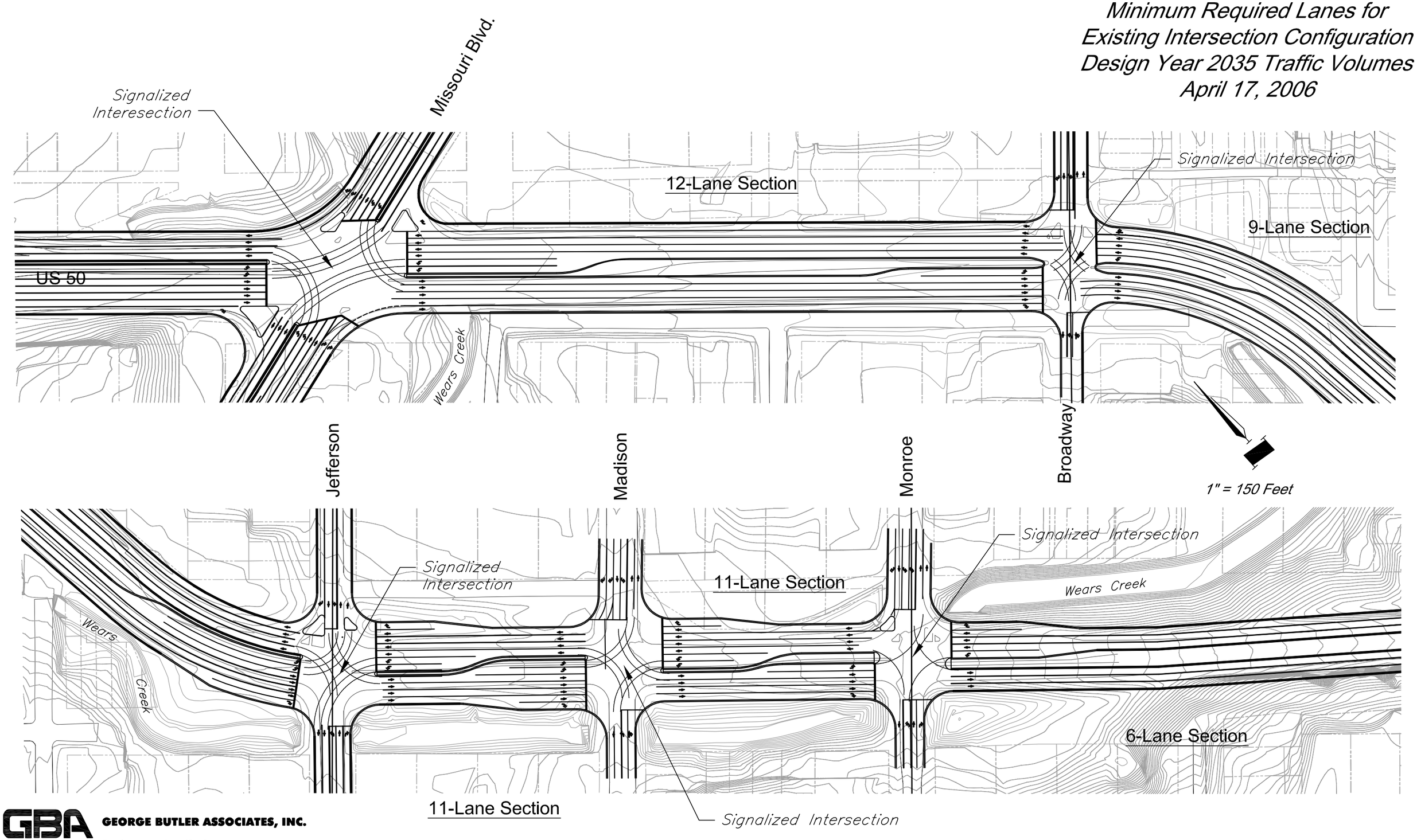


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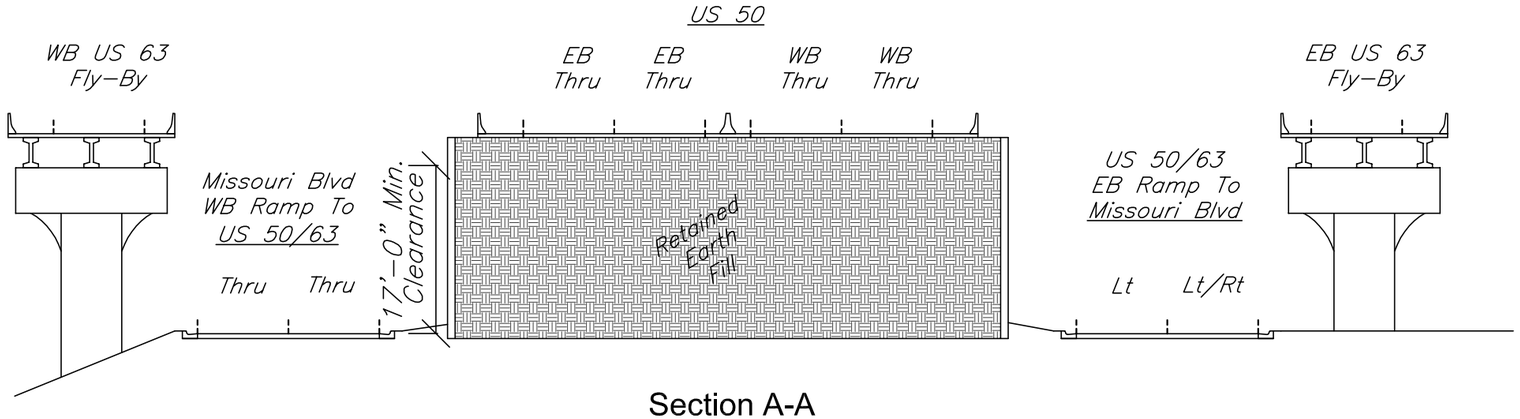
EXHIBIT 2
REX WHITTON EXPRESSWAY
Missouri Boulevard SPUI and US 50 / 63 Fly-By Option
April 17, 2006



Section A-A

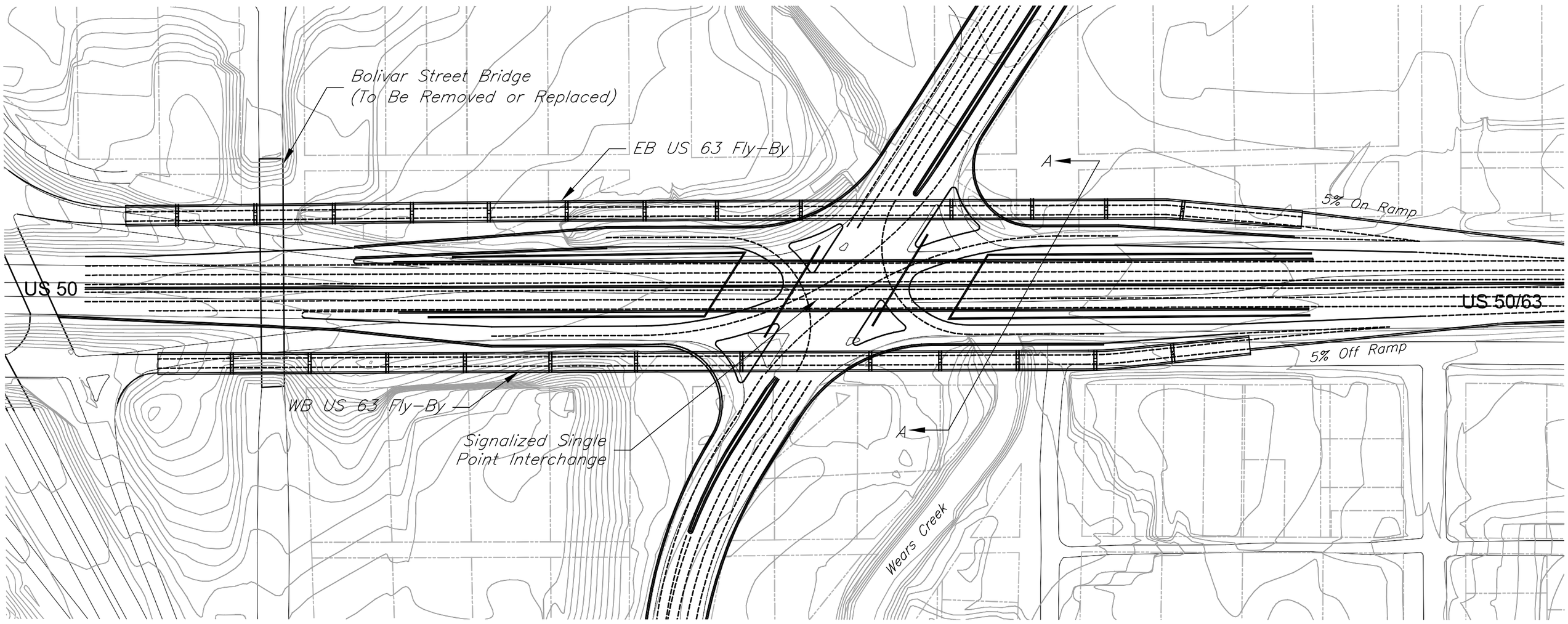


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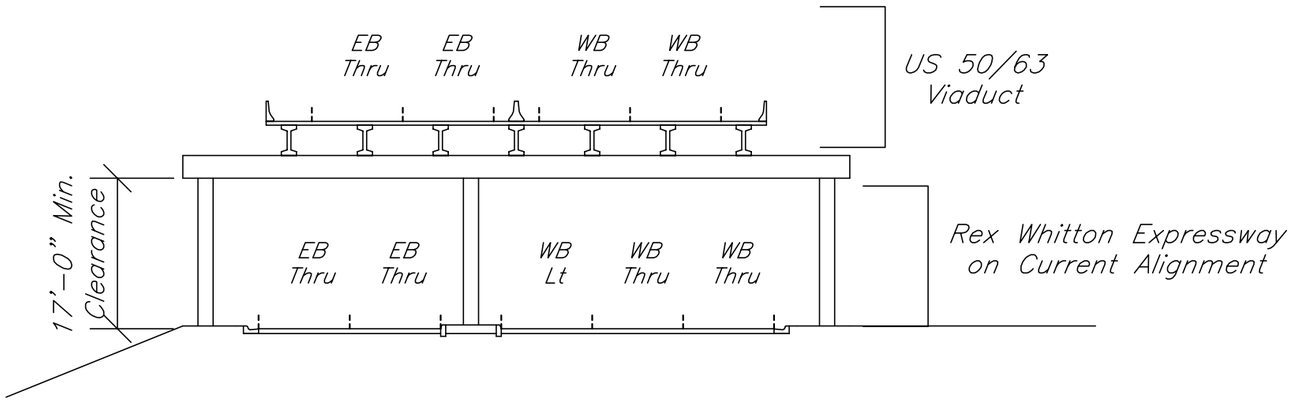
EXHIBIT 3a
REX WHITTON EXPRESSWAY
Triplet Viaduct Option
April 17, 2006



Section A-A

1" = 200 Feet

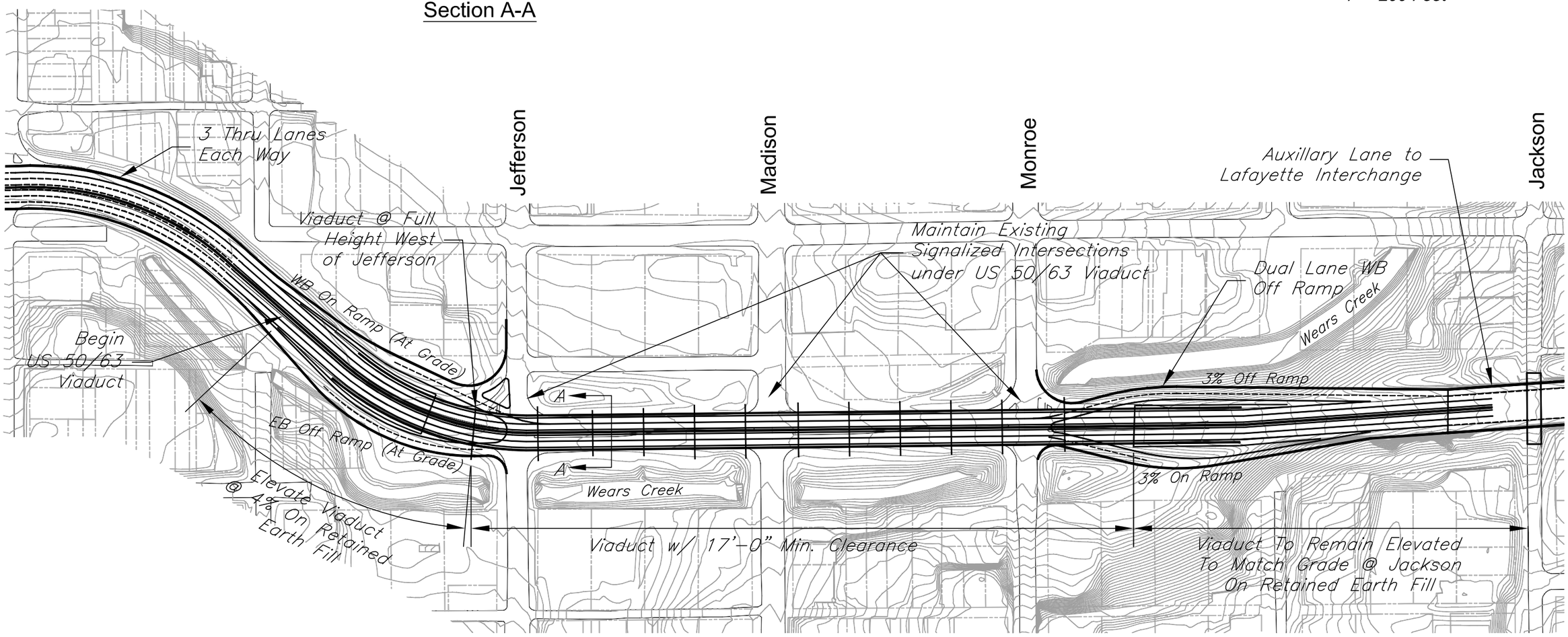


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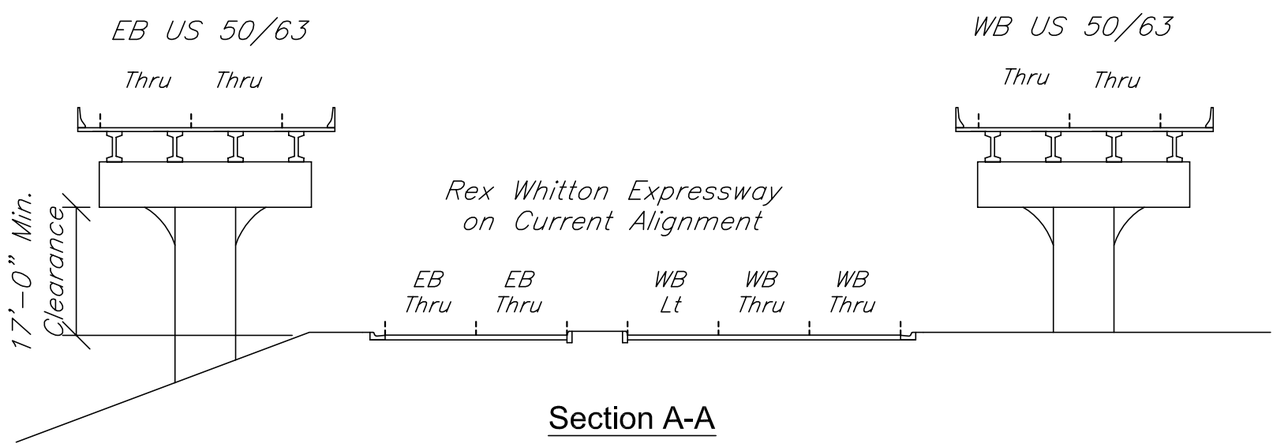
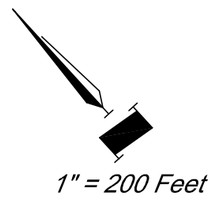
EXHIBIT 3b
REX WHITTON EXPRESSWAY
Triplet Fly-By Option
April 17, 2006



Section A-A



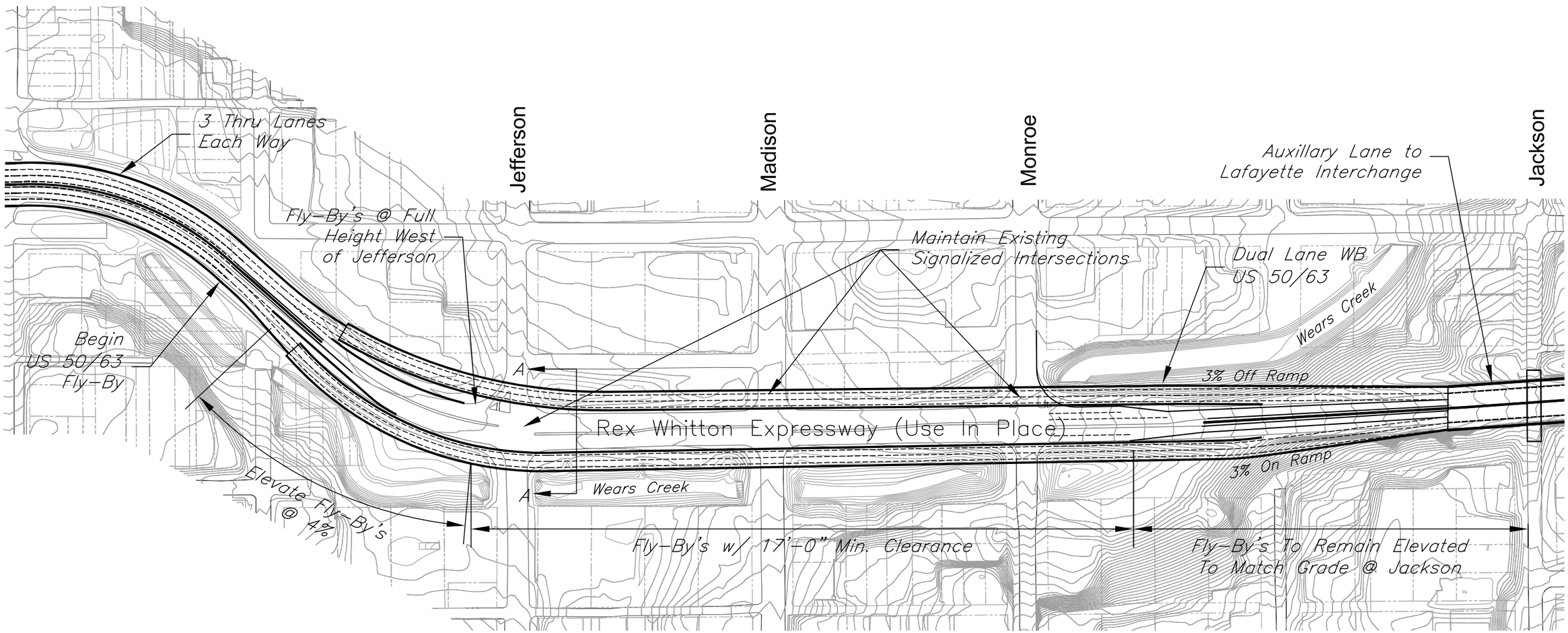


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EXHIBIT 4
REX WHITTON EXPRESSWAY
Lafayette Street Interchange Option
April 17, 2006

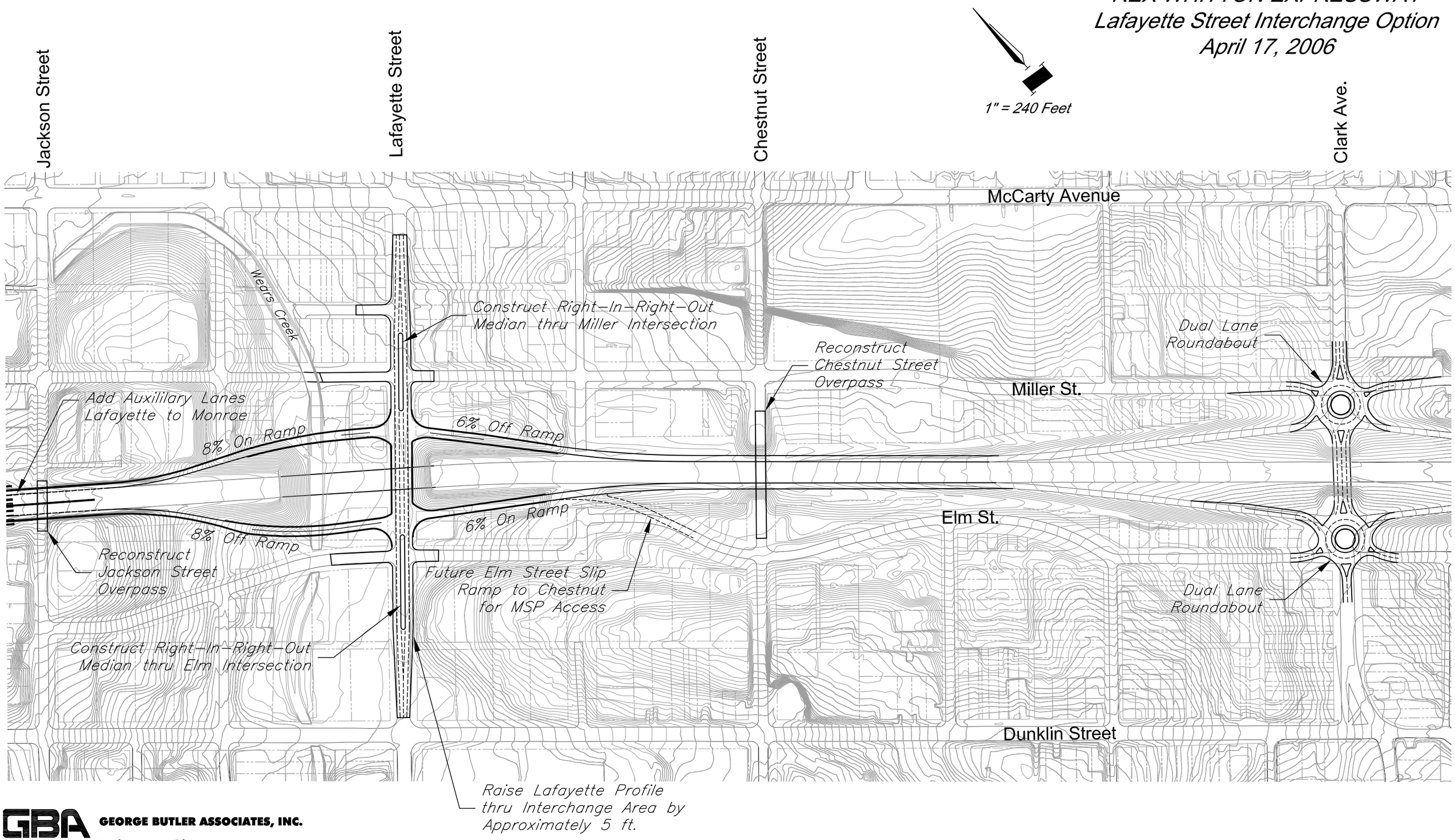

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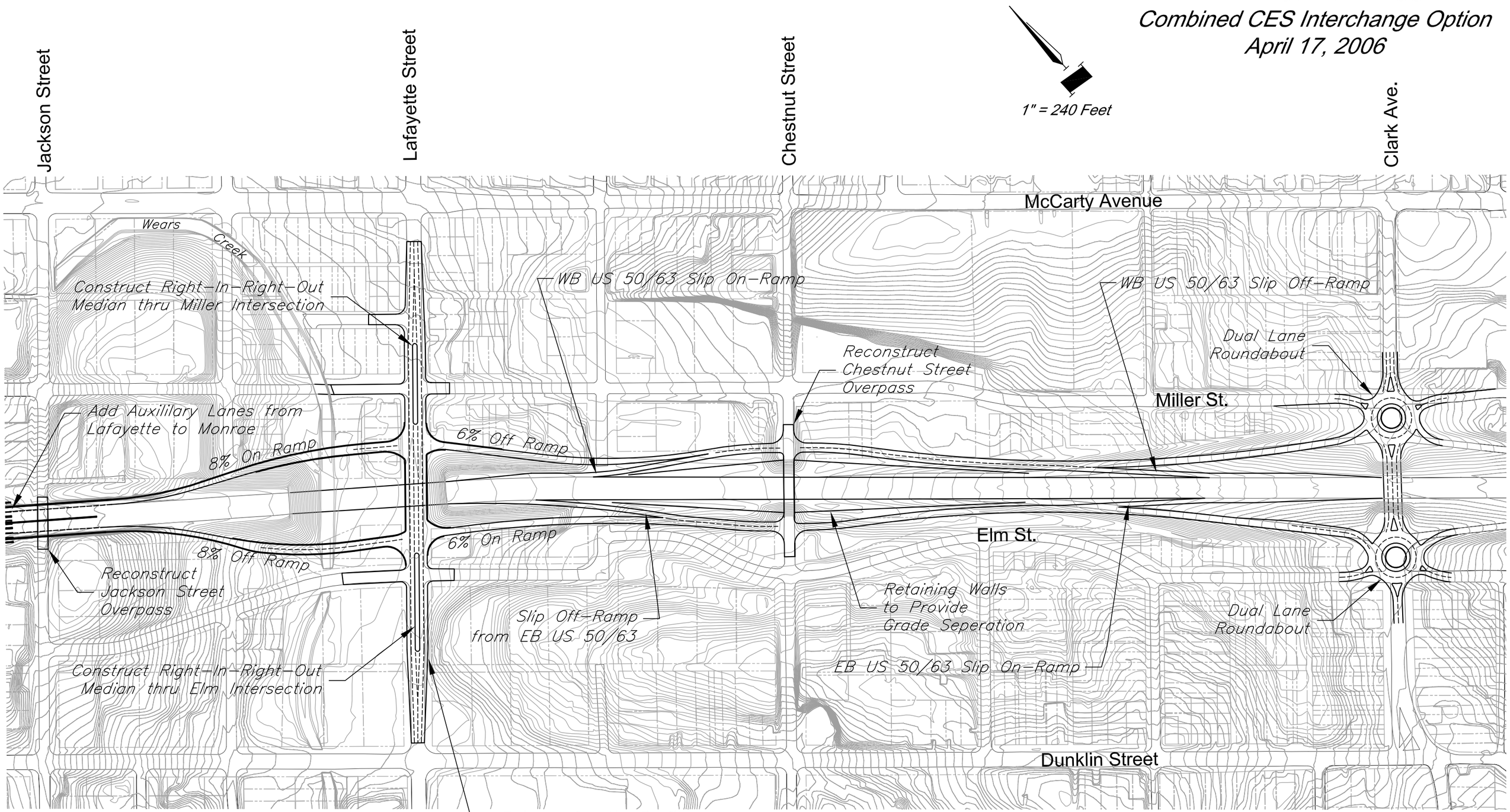
EXHIBIT 5
REX WHITTON EXPRESSWAY
Combined CES Interchange Option
April 17, 2006



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