NOTICE !

The Missouri Department of Transportation (MoDOT) and the Federal Highway Administration (FHWA) are considering use of the *Design-Build process*, rather than the Design-Bid-Build process, to yield transportation solutions for the needs identified and studied in this Environmental Impact Statement (EIS). The Design-Build process allows design of the facility and construction to take place simultaneously by a contractor chosen to design and build the project, in this case, for a specified cost. The solutions proposed in this EIS are intended to represent a "worst-case" yet reasonable scenario for likely impacts of the project, offering a footprint within which any number of reasonable options might be proposed.

The alternatives offered in the EIS do not limit the proposals the Design-Build contractor can suggest. For example, the specific layout of the I-29 ramps for Paseo Boulevard might retain a left-hand exit, as is current, rather than the right-hand exit shown in the EIS. The interchange layouts for the Front Street and the Route 210 interchanges might differ from the layouts examined in this EIS. However, the footprint used within the EIS for environmental analysis is expected to accommodate the alternatives that the Design-Build contractor proposes. Reasonable proposals from the contractor will be examined to assure we have considered their impacts and also to confirm their ability to meet the purpose and need of the project in a safe and effective manner. Public involvement about the chosen alternative(s) and its specific details is expected as the Design-Build process progresses.

We will continually monitor and assess the proposed Design-Build alternative to make sure it does not introduce significant impacts that aren't covered in the approved NEPA document.

CHAPTER II
Alternatives

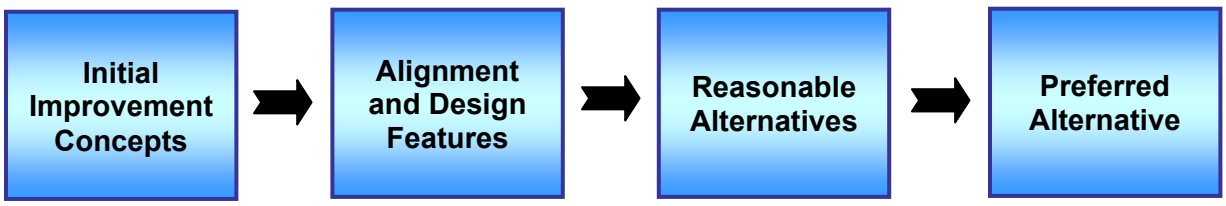
This chapter presents the definition of the alternatives considered for improving the I-29/35 roadway and bridge corridor. The chapter provides sufficient detail for the analysis and evaluation of the potential effects of the various alternatives on the affected environment, as described in Chapter III – Affected Environment. The design characteristics for the I-29/35 roadway and bridge corridor, the alignments of the various alternatives, traffic projections and cost estimates are included as a part of the chapter.

A. Overview of the Alternatives Development Process

The process identifies alignment alternatives for the proposed action that are reasonable and feasible from a technical, environmental impact and economic standpoint. It entails a screening of ***Initial Improvement Concepts*** to determine which concepts warrant further consideration within the alternatives development process. Several alignment and design features influenced the formation of the alternative alignments evaluated. These factors include the Paseo Bridge, the interchange connections with other routes within the study corridor, the possibility of mainline widening, and access to the central business district (CBD) freeway loop. Based on the analyses of these factors, the alternatives development process then defines and evaluates the range of alternative alignments in sufficient detail to identify the feasible and prudent alignments (i.e., ***reasonable alternatives***). A more detailed evaluation of the reasonable alternatives then identifies the alternative alignment that best serves the stated purpose and need, as defined in Chapter I – Purpose and Need. These alternatives are evaluated with regard to the acceptability of the environmental and social impacts, as presented in Chapter IV – Environmental Consequences. The alternatives that best accomplish the purpose and need for the proposed action while providing acceptable impacts to both the natural and social environments is identified as the ***Preferred Alternative***.

The process of alternative screening and ascending level of detailed evaluation assures decision-makers of the fulfillment of the improvement's goals, at a national, regional and local level, while developing informed consent with the reviewing agencies, stakeholders and general public. This screening process was performed in collaboration with the public and agency coordination program as defined in Chapter V – Comments and Coordination. The alternatives development process for the project is shown in Figure II-1.

Figure II-1
Alternatives Development Process



B. Description of Proposed Action

The proposed action consists of improving the existing I-29/35 roadway and bridge corridor from the northern terminus just north of M-210/Armour Road to and including the north side of the CBD freeway loop (I-35/70) which encompasses Downtown Kansas City, Missouri – the southern terminus. Included in the proposed action is the improvement of the existing Paseo Bridge crossing which currently carries I-29/35 over the Missouri River. This proposed action includes the corridor's connection to the CBD Loop and examines the connection of the Broadway Extension (US 169) with I-35/70.

C. Initial Improvement Concepts

The initial list of improvement concepts for the I-29/35 Corridor include a wide range of options and reflect the concepts developed in the Northland~Downtown Major Investment Study (MIS). The MIS considered a variety of multi-modal and management solutions to improving transportation access and mobility across the Missouri River between Downtown and the portion of the Kansas City metropolitan area located north of the Missouri River (the Northland). This EIS focuses the proposed action on the study corridor and is focused on identifying concepts consistent with the project purpose and need. Initial improvement concepts are consistent with the corridor definition and its limits as established by the termini of this EIS. In developing the initial improvement concepts, the strategies considered in the MIS were reaffirmed as they are related to the proposed action. For that reason, some of the Initial Improvement Concepts, though focused on the I-29/35 corridor, have implications outside of these limits.

Initial Improvement Concepts for the I-29/35 Study Corridor include the following:

- **No-Build Concept** – Maintain the existing pavement and bridges in the corridor.
- **Reconstruction Concept** – Reconstruct the existing corridor in-kind.
- **Parallel Arterials Concept** – Improve other Downtown river bridges and approaches.
- **Transportation System and Travel Demand Management Concept** – Reduce cross-river traffic through car pools, low-cost transit service improvements, and improved traffic flow with low-cost improvements.
- **High Capacity Transit Concept** – Construct fixed guideway, high capacity transit improvements extending from Downtown, over the Missouri River, into the Northland.
- **Bicycle and Pedestrian Concept** – Provide improved bicycle and pedestrian facilities across the Missouri River, better connecting Downtown with the Northland.
- **Build Concepts** – Construct highway and bridge improvements within the study corridor.

1. NO-BUILD CONCEPT

Under the No-Build Concept, I-29/35 would remain in its present configuration and location and a new bridge over the Missouri River would not be constructed. Only minor short-term safety and maintenance activities, including pavement overlays, routine maintenance and bridge repair would be included.

The No-Build Concept is traditionally placed in feasibility studies and EIS documents to create a baseline from which other concepts can be compared and the merits of all concepts evaluated.

Since this concept precludes the construction activities associated with a new crossing of the Missouri River, many impacts, both positive and negative, associated with a new replacement bridge, would not occur. Among these impacts are: expenditure of funds; land use changes that include converting existing development or public lands into highway and bridge right-of-way; increased economic development; and improved safety and accessibility.

The No-Build Concept is not a no-cost concept, since maintenance and repair of the existing bridge structure and roadway would be needed to ensure the continued transportation use of the corridor.

2. RECONSTRUCTION CONCEPT

Due to the existing need, or the need that will exist within the next 25 years, to replace deteriorated pavement and bridges, the Reconstruction Concept assumes reconstruction of the pavement and replacement or rehabilitation of bridges that are structurally deficient. The Reconstruction Concept includes only minor modifications or upgrading of the mainline and interchange configurations.

For the I-29/35 Study Corridor, the primary components of the Reconstruction Concept would include an in-depth rehabilitation for the existing I-29/35 Paseo Bridge. The in-depth rehabilitation includes replacing the existing bridge deck, replacing and strengthening select floor system steel members, and rehabilitating and replacing select cable suspenders. Under this concept, the rehabilitation would be completed around 2020 and would extend the life of the bridge to mid-century. The rehabilitation would require all four lanes of the bridge to be shut down, at least for short periods during construction and, if desirable, for the entire duration of the construction project. In the spring of 2005, the Paseo Bridge began a maintenance rehabilitation that will extend the service life of the bridge to roughly the 2020 timeframe.

The reconstruction concept would not include lane capacity improvements, including construction of a companion bridge. Only reconstruction and rehabilitation of the existing bridge and roadway would occur.

3. PARALLEL ARTERIALS CONCEPT

This initial concept would address the project's purpose and need through improvements to three primary parallel arterial routes that could potentially serve some of the travel market carried by the I-29/35 Corridor. These routes include US 169 (Broadway Extension), M-9/ Burlington Avenue, and Chouteau Trafficway with a connection to Front Street:

- ***Broadway Bridge*** – Capacity expansion or highway widening options are limited on the Broadway Extension (US 169) given the proximity of the Missouri River levee to the west, the adjacent rail yard and railroad to the east, and the Downtown Kansas City Airport. The Northland~Downtown MIS determined that the connection of the Broadway Extension to the Downtown CBD Loop controls the traffic flow over the Broadway Bridge.

- ***Heart of America Bridge*** – While the capacity of the Heart of America Bridge is high, at-grade intersections on Burlington Avenue are the constraining factor in this corridor. The capacity and operation of Burlington Avenue has already been improved through signal coordination completed by MoDOT, so further increases in traffic capacity and operation are very limited.

- ***Chouteau Bridge*** – There is some potential for increasing the capacity of a Chouteau/Front Street corridor. The new Chouteau Bridge, opened in 2000, connects with Front Street which provides indirect access into Downtown and connects to the I-29/35 corridor immediately south of the Paseo Bridge. North of the river, Chouteau Trafficway connects with Route 210 and I-35. MoDOT and the City of Kansas City are currently examining these improvements, as well as improvements to the Chouteau Trafficway between M-210 and I-35.

4. TRANSPORTATION SYSTEM AND TRAVEL DEMAND MANAGEMENT CONCEPT

Transportation System Management (TSM) measures generally include low-cost, traffic-flow improvements to manage traffic congestion and improve the transportation system's efficiency. TSM includes the use of a wide range of strategies aimed at making more efficient use of the existing transportation facilities and infrastructure. Listed below are possible TSM improvements that could be considered for the I-29/35 bridge and highway corridor:

- ***Intersection/Interchange Improvements*** – Minor interchange improvements including improvements to ramp merge and diverge configurations and surface street intersection improvements. In addition, improvements at ramp terminal intersections with surface streets include constructing turn lanes, realigning intersections and adding or improving existing traffic signal systems. These improvements would generally be implemented within existing right-of-way.

- ***Intelligent Transportation Systems (ITS)*** – Intelligent transportation systems are technology-based systems that are used to improve safety and more efficiently manage the transportation system. In the realm of roadway operations, ITS focuses on smoothing traffic flow through enhanced traveler information, minimizing the impact of incidents through the use of incident management and regulating traffic flow. Incident management strives to detect, respond, manage and clear incidents that impact traffic flow.

  An intelligent transportation system encompasses a variety of components that are deployed by both public and private entities and can be deployed apart from or in combination with traditional transportation facility infrastructure improvements. KC Scout is already implemented in the I-29/35 Study Corridor. Current activities include traffic sensors, closed-circuit television cameras, variable message signs and web pages. Other activities could be expanded to include ramp metering, public safety communication links, media communication and further enhancement of existing activities.

- ***Transportation Demand Management (TDM)*** measures employ services that are designed to reduce congestion on existing transportation infrastructure by encouraging commuters or employers to use modes other than single occupant vehicles, alter the time and location of trips (flexible work hours), support ridesharing or support increased transit use.

5. HIGH CAPACITY TRANSIT CONCEPT

This initial concept would consist of improvements to transit service in the study area to potentially serve some of the travel market carried by I-29/35. The Northland~Downtown MIS identified a preferred system plan and the general location for dedicated transit facilities on or near the Heart of America Bridge (M-9/Burlington Avenue). As a part of the study, a light rail transit (LRT) option, including constructing a new bridge next to the Heart of America Bridge for

exclusive use by LRT, was recommended. The alignment would extend northward utilizing Burlington Avenue through North Kansas City, located outside of the I-29/35 Study Corridor. This recommendation was based on current and projected land use and development patterns in the Northland consistent with the long-term service plan of the Kansas City Area Transportation Authority (KCATA).

Since the completion of the MIS, the focus of transit investments by the KCATA and the region has moved away from LRT to implementing a lower cost system of bus rapid transit (BRT) improvements and expanded express bus service routes. BRT would provide enhanced transit service, but would utilize rubber tire vehicles on designated, exclusive BRT lanes or shared traffic lanes. For the cross-river connection, it is not envisioned by the KCATA that the BRT routes would utilize the I-29/35 corridor. The initial BRT starter line extends from the River Market, its northern terminus, to a southern terminus south of the Country Club Plaza. This BRT starter line, called "The MAX," provides higher speed and more frequent bus service to Downtown, to and from the south, utilizing exclusive lanes during peak commuter travel periods and traffic signal prioritization.

It is not anticipated that ridership on any possible future expansions of The MAX north of the Missouri River would have a measurable impact on the number of vehicles using the I-29/35 corridor, or other Downtown bridges. Planning by the KCATA and the region for any future BRT extensions over the Missouri River, extending north of The MAX River Market station, is focused on the Heart of America Bridge and the Burlington Avenue corridor which better serves Northland transit riders.

The I-29/35 Corridor is currently used and would be used in the future by express transit buses that operate on the freeway between stops at major transit centers and park-and-ride lots. An existing transit center is located within the Kansas City, Missouri CBD and a future transit center could be constructed within the I-29/35 corridor north of the Missouri River. Earlier planning has identified the existing North Oak Trafficway and I-29 Interchange as a possible location for a BRT station and park-and-ride lot. This location was used as a temporary transit park-and-ride lot for the rehabilitation closure of the Paseo Bridge in 2005. During the closure period, additional, high-priority bus service was provided by MoDOT and the KCATA along the North Oak Trafficway and Burlington Avenue corridors, utilizing the Heart of America Bridge.

While there currently is transit service that operates on I-29/35, this concept envisions an increase in this service consistent with the service concept presented in MARC's *Smart Moves* transit plan. *Smart Moves* is the first comprehensive regional transit service plan cooperatively developed by MARC, the KCATA, Johnson County Transit and the Unified Government Transit. The plan is metropolitan Kansas City's vision for expanded and enhanced public transportation services. The major objectives of *Smart Moves* include the following:

- Regional public transportation connecting seven counties.
- An innovative bus system linked to commuter rail service.
- Getting places throughout the metropolitan area efficiently, and quickly.
- Reducing dependence on automobiles.
- Getting to and from work without sitting in traffic.
- Giving people better choices in how they move around the metro.
- Enjoying a higher quality of life through improved mobility.
- Keeping up with other American cities in public transit services.
- Keeping the air cleaner in the future.

6. BICYCLE AND PEDESTRIAN CONCEPT

This initial concept would address the project purpose and need through improvements to bicycle and pedestrian access in the study area that could potentially serve some of the travel market carried by I-29/35. The *Metrogreen Alliance*, prepared by MARC, is the bicycle and pedestrian trail master plan serving the region. MARC has also compiled a regional bike plan that includes existing, planned and proposed bike routes in the five-county metro area. In addition, Kansas City's Bicycle Transportation Initiative includes a planned and phased network of mostly on-street bike routes that primarily serve a transportation purpose.

The Missouri River crossing is a major constraint for bicycle and pedestrian travel. Area bicycle trails or routes are shown to cross the I-29/35 Corridor at M-210 (proposed), at 16th Avenue (proposed), underneath the freeway at Levee Road (proposed), underneath the freeway along the south bank of the Missouri River (existing), at Independence Avenue (planned), at Charlotte Street (planned), at Grand Avenue (planned), at Wyandotte Street (planned), and at 5th Street which travels under M-9. Within the various plans, bicycle and pedestrian crossings of the Missouri River are shown to be designated at the Heart of America Bridge and at the Chouteau Bridge, as bicycle and pedestrian travel is possible on these bridges. A new and improved bridge crossing is desired by local bicycle organizations and if it were to be located within the I-29/35 Corridor, it would require separation from the Interstate vehicular traffic. Other options to improve bicycle and pedestrian connectivity across the Missouri River would involve creating separate paths on the Heart of America Bridge or the Chouteau Bridge.

7. BUILD CONCEPTS

For the build concepts, both improvements to the existing I-29/35 bridge and roadway corridor and concepts on new location were considered. Six build concepts were considered as a part of this EIS, as follows:

- Build Concept 1 (Widen to Six Lanes)
- Build Concept 2 (Widen to Six Lanes/Reserve for Two Additional Lanes)
- Build Concept 3 (Widen to Six Lanes/Reserve for Two Additional HOV Lanes)
- Build Concept 4 (Reversible Lanes)
- Build Concept 5 (New Alignment)
- Build Concept 6 (Geometric Improvements)

a. Build Concept 1 (Widen to Six Lanes)

Two general purpose lanes (one northbound and one southbound) would be added between M-210/Armour Road and the I-29/35/70 interchange in the northeast corner of the Downtown Kansas City Loop. Auxiliary lanes would be added between Bedford Avenue and Levee Road and between Front Street and Paseo Boulevard. An auxiliary lane is a continuous lane between an on-ramp and the next off-ramp. These lanes are often used when interchange spacing is shorter than the desired one mile spacing. The additional roadway lanes could be added outside of the existing lanes. The existing median barrier would be maintained and the existing pavement would be re-striped to provide improved inside shoulders. The additional lane continuity would be carried through the northeast quadrant of the Downtown Loop and on to the east and north legs of the loop.

A number of Missouri River crossing options are available for this concept. The existing Paseo Bridge could be converted to one-way traffic and could provide for three directional lanes with an adequate shoulder width. A new bridge could then be constructed immediately adjacent to the existing bridge, either upstream or downstream, to provide three additional directional lanes, plus an auxiliary lane for a total of seven lanes crossing the Missouri River. Alternatively, the existing Missouri River bridge could be replaced with a new six-lane bridge (plus auxiliary lanes)

carrying both directions of traffic or two new three-lane twin bridges (plus auxiliary lanes) for a total of eight lanes crossing the Missouri River.

b. Build Concept 2 (Widen to Six Lanes/Reserve for Two Additional Lanes)

In this concept, right-of-way is acquired for four general purpose lanes in each direction from M-210/Armour Road to the I-29/35/70 interchange in the northeast corner of the downtown loop. This concept would provide for a further future widening from six lanes to eight through lanes in order to accommodate higher traffic volumes that could occur in the future. Similar to the six-lane option, auxiliary lanes would be added between Bedford Avenue and Levee Road and between Front Street and Paseo Boulevard. The additional roadway lanes could be added outside of the existing lanes. The existing median barrier would be maintained and the existing pavement would be re-striped to provide improved inside shoulders. The additional lane continuity would be carried through the northeast quadrant of the CBD Loop and on to the east and north legs of the loop.

Similar bridge crossing options to the six-lane option are available. The existing Paseo Bridge could be converted to one-way traffic and could provide for four directional lanes, with a design exception required for shoulder width. A new bridge could then be constructed immediately adjacent to the existing bridge, either upstream or downstream, to provide four additional directional lanes plus an auxiliary lane for a total of nine lanes crossing the Missouri River. Alternatively, the existing Missouri River bridge could be replaced with a new eight-lane bridge (plus auxiliary lanes) carrying both directions of traffic or two new four-lane twin bridges (plus auxiliary lanes) for a total of ten lanes crossing the Missouri River.

c. Build Concept 3 (Widen to Six Lanes/Reserve for Two Additional HOV Lanes)

As part of a strategy that would widen I-29/35 to eight through lanes in the future, using pavement markings, two of the lanes could be reserved for HOV use by carpools, vanpools and buses during peak hours. The HOV lanes would extend from M-210/Armour Road to the northeast corner of the CBD Loop where the HOV lane designation would end and HOV traffic would transition into the general purpose lanes.

d. Build Concept 4 (Reversible Lanes)

As part of a strategy to widen I-29/35, reversible lanes could be implemented to provide additional directional capacity during the peak periods of the day. A reversible lane concept would include construction of three northbound through lanes, three southbound through lanes and a middle lane section that would be used in the peak direction. Thus, in the AM peak hour, four through lanes would be provided southbound and three through lanes provided northbound. In the PM peak period, three through lanes would be provided southbound and four through lanes northbound. Alternatively, a total of eight through lanes could be provided, with five through lanes provided in the peak direction. Auxiliary lanes would be provided similar to the other build concepts. A moveable barrier would be used to provide the added capacity for peak directional traffic flow. The reversible lanes would extend from M-210/Armour Road to the northeast corner of the downtown loop where the reversible lane configuration would transition into the I-29/35 general purpose lanes.

e. Build Concept 5 (New Alignment)

Conceptual strategies were investigated to potentially construct a new roadway corridor across the Missouri River. These new alignments include a new crossing between the Paseo Bridge and the Chouteau Bridge. The new bridge could provide either six or eight through lanes of capacity. Interstate 29/35 would then be re-designated to the new alignment and the existing I-29/35 Paseo Bridge could be converted to a different route designation and utilized by local traffic or removed.

f. Build Concept 6 (Geometric Improvements)

Conceptual strategies were investigated to make the existing four-lane alignment a more efficient corridor without incorporating systematic lane capacity improvements. Geometric improvements would consist of improvements that would not add through-lane capacity, but would include options such as improving or eliminating lane drops, improving acceleration and deceleration lanes at interchanges, as well as improving horizontal and vertical geometry.

D. Screening of Initial Improvement Concepts

1. SCREENING CRITERIA

The first step in the screening of the Initial Improvement Concepts involved an evaluation of how well each concept addresses the purpose and need for the project. For a concept to be viable and worthy of further evaluation, it must meet the objectives of the project. The specific needs addressed by the proposed action are summarized in Chapter I, B. Overview of Purpose of Need.

If an Initial Improvement Concept does not meet the purpose and need of the proposed project, it would not be considered reasonable and therefore would not be considered further in a more detailed evaluation. Concepts that appear to meet the purpose and need of the project and have no obvious extraordinary impacts that cannot be addressed will be considered further within the alternatives analysis.

In addition to the purpose and need screening criteria, other criteria incorporated from social, environmental and engineering factors and input from project stakeholders were utilized to evaluate the Initial Improvement Concepts. These other criteria included generalized potential impacts to the built environment, natural areas, social environment and Section 4(f) properties, as well as order-of-magnitude project costs.

2. CONCEPT SCREENING

A preliminary screening was completed by evaluating the relative effectiveness of each concept according to the methodology described above in Section 1, Screening Criteria. Ratings were specifically assigned based on the following definitions presented in Table II-1.

Table II-1
Initial Improvement Concepts Rating Methods

Rating Symbol	Description
●	Project benefits greatly exceed current conditions, substantially address the purpose and need, and/or are higher relative to other concepts.
◒	Project benefits moderately exceed current condition, moderately address the purpose and need, and/or are somewhat higher relative to other concepts.
○	Project benefits are equal to current conditions, neutrally address the purpose and need, and/or are mid-level in response relative to other concepts.
-	Project benefits are less than current conditions, negatively impact the purpose and need, and/or are lowest in response relative to other concepts.
X	The concept did not fulfill the goals stated in the purpose and need and/or produced impacts that are considered unreasonable.

An initial concept evaluation was completed where those options not meeting the purpose and need for the proposed actions were eliminated from further consideration. The remaining concepts were reviewed and further refined through coordination with stakeholder groups, public officials, and others who had an interest in a particular element of the project. Table II-2 provides a summary of the generalized screening evaluation completed for the Initial Improvement Concepts.

Table II-2
Screening of the Initial Improvement Concepts

	Initial Improvement Concepts	Purpose and Need							Other Impacts				
		Roadway Deficiencies	Traffic Safety	System Linkage	Transportation Capacity	Traffic Operation	Economic Development	Intermodal/ NAFTA	Built Environment	Natural Areas	Social Environment	Section 4(f) Properties	Project Cost
	No-Build	x	x	○	x	x	-	-	○	○	○	○	L
	Reconstruction	x	○	○	x	x	○	○	○	○	○	○	L
	Parallel Arterials	x	○	○	x	-	-	x	-	○	○	○	M
	Travel Demand Management	x	x	○	x	○	○	○	○	○	○	○	L
	Transportation System Management	x	●	○	x	○	○	○	○	○	○	○	L
	High Capacity Transit	x	x	○	x	x	○	x	○	○	○	○	M
	Bicycle and Pedestrian	x	x	○	x	x	○	x	○	○	○	○	M
BUILD CONCEPTS	**1** Widen to Six Lanes *	●	●	●	◒	◒	◒	●	-	○	○	-	H
BUILD CONCEPTS	**2** Widen to Six Through Lanes / Reserve Two Additional*	●	●	●	●	●	◒	●	-	○	○	-	H
BUILD CONCEPTS	**3** Widen to Six Through Lanes / Reserve Two additional for HOV	●	●	●	●	◒	◒	●	-	○	○	-	H
BUILD CONCEPTS	**4** Reversible Lanes	●	◒	●	●	◒	◒	●	-	○	○	-	H
BUILD CONCEPTS	**5** New Alignment	●	●	●	○	●	◒	●	x	-	-	-	H
BUILD CONCEPTS	**6** Geometric Changes	●	●	●	x	x	○	◒	○	○	○	-	M

* Auxiliary lanes located between some interchanges.

○= Neutral, - = Negative Impact, ◒= Moderately Addresses Needs, ●= Substantially Addresses Needs,

x = Determined Not to Meet Purpose and Need; Project Cost: L = Low, M = Medium, H = High.

Shaded concepts carried forward for further consideration.

The ratings reflect the following general findings. When the ultimate configuration is evaluated, the Build Concept 2 is shown to result in higher capacity and in better traffic operations than the other build alternatives. The Build Concept 3 results in lower vehicle miles of travel, potential air quality benefits and potential incentive for non-single occupant travel. The results of the screening analysis and additional detail are discussed in the following sections.

3. CONCEPTS ELIMINATED FROM FURTHER CONSIDERATION

Based on a comprehensive review of the Initial Improvement Concepts, the following concepts were eliminated from further consideration.

a. Reconstruction Concept

The Reconstruction Concept would not address needed improvements in traffic level of service or traffic safety. Due to these reasons, the concept does not meet the purpose and need of the project.

b. Parallel Arterials Concept

This initial concept was examined and it was determined that additional vehicle lane capacity (i.e., additional lanes) could not reasonably be provided at US 169 (Broadway Extension) or M-9/Burlington Avenue. However, additional capacity could be provided at Chouteau Trafficway/Front Street.

Capacity expansion options are limited on US 169 given the location of the Missouri River levee, the adjacent rail yard and the Kansas City Downtown Airport. However, as was determined by the Northland~Downtown MIS, the capacity of the Broadway Extension is controlled by the corridor's connection to the CBD Loop. Though the Broadway corridor cannot be widened, improvements to its connection to the Loop could be provided to improve the traffic flow and reduce existing and projected congestion along this corridor.

For the M-9/Burlington Avenue corridor, the traffic volumes on the Heart of America Bridge are metered by the traffic signals on Burlington Avenue. The capacity and operation of Burlington Avenue has already been improved through signal coordination completed by MoDOT, so further increases in capacity and operation are limited.

While there is potential for increasing the capacity of Front Street, the capacity increases would not attract significant traffic volumes to relieve traffic congestion on I-29/35. MoDOT is currently reviewing widening Front Street as a separate action from this EIS.

Though this concept would not address existing deficiencies on I-29/35, improvements to the Broadway Extension's connection to the Loop, in combination with improvements to the I-29/35 corridor, including the northern side of the Loop, would maximize the cross river capacity of the downtown bridges and would better connect the Northland with Downtown.

c. Transportation System and Travel Demand Management Concept

Deployment of the TSM or TDM Concept without substantial geometric improvements would not satisfy the purpose and need for the project related to addressing travel demand and capacity. The ITS deployment discussed for the TSM or TDM Concept should be included as a part of any of the build concepts in order to maximize the return on investment in new roadway infrastructure. Other TDM measures such as carpool/vanpool and flexible work hours should also be encouraged as part of a regional travel demand management solution.

d. High Capacity Transit Concept

Increased use of high capacity transit, whether Light Rail Transit (LRT) or Bus Rapid Transit (BRT), could potentially provide a minimal reduction in traffic congestion. Even with implementation of high capacity transit between the CBD and the Northland, regional traffic models indicate that there would still be a need for additional vehicle capacity on the I-29/35 Corridor. A transit concept would not meet the project goals as stated in the purpose and need

for the following reasons: needed safety improvements would not be made; highway capacity needs would not be addressed; and traffic operations along the corridor would not be improved to better accommodate the movement of freight. Improved transit concepts are supported in general as a potential solution to improving personal mobility, but a High Capacity Transit Concept will not be carried forward in this EIS as an alternative due to its limitations to address the project purpose and need. High capacity transit improvements would fall under a different lead federal agency, Federal Transit Agency (FTA).

e. Bicycle and Pedestrian Concept

There is a need for an improved bicycle and pedestrian crossing of the Missouri River. Current bridges over the Missouri River provide limited opportunities for bicyclists and pedestrians. A new bridge crossing is seen as one opportunity to improve this deficiency for these travel modes. A bicycle and pedestrian concept would not meet many of the project goals as stated in the purpose and need for the following reasons: needed vehicular safety improvements would not be made; highway capacity needs would not be addressed; and traffic operations along the corridor would not be improved to better accommodate the movement of freight. While an improved bicycle and pedestrian crossing of the Missouri River connected to the existing trail system is supported as a potential solution to improving personal mobility, a bicycle/pedestrian facility without other improvements will not be carried forward as a stand-alone concept in this EIS as an alternative due to its limitations to address the project purpose and need.

While a separated bicycle-pedestrian trail could be part of a future I-29/35 Missouri River crossing, another approach would be to add this feature on the M-9/Heart of America Bridge corridor, since it provides a direct connection between Kansas City and North Kansas City. If a connection were to be provided on the I-29/35 corridor, sufficient separation of bicycle and pedestrian movement from interstate vehicular traffic would be necessary.

f. Build Concepts

Build Concept 1 (Widen to Six Through Lanes)

A traffic analysis was completed to assess capacity needed to meet future travel demands in I-29/35. This analysis was completed utilizing and refining the regional travel demand model developed and maintained by the region's MPO, Mid-America Regional Council (MARC) within the I-29/35 Corridor. This information suggests that a six-lane facility with auxiliary lanes, where required to address ramp access, would provide an improved quality of travel mobility relative to existing conditions for the next 20 years.

The Year 2030 forecast volumes for a six-lane wide facility are shown to result in a LOS D for southbound travel during the AM peak hour and a LOS E for northbound travel during the PM peak period. The traffic analysis suggests that the LOS E would be reached between the years 2025-27 and that LOS F would be reached sometime beyond the year 2040 given anticipated growth trends. This information suggests that a six-lane facility would provide improved travel mobility relative to existing conditions for the next 20 years but that an eight-lane travel corridor would be needed beyond that time to improve upon the anticipated LOS E/F condition.

For that reason, the build concepts that allow for the ultimate widening of I-29/35 to eight lanes when needed in the future were carried forward as reasonable alternatives for further consideration in this EIS. Because of this expectation, the Build Concept 1 would be constructed initially as part of the Build Concept 2 that would allow for construction of eight through lanes if warranted in the future. Thus, the Build Concept 1 is not carried forward as a separate concept; it is considered to be the initial phase of the Build Concept 2. The traffic

results can be seen in the Traffic Analysis Section later in this chapter and is further documented in the I-29/35 Traffic Technical Memorandum, which is available upon request.

Build Concept 4 (Reversible Lanes)

A reversible lane concept would include construction of three northbound lanes, three southbound lanes and a middle reversible lane section that would be used in the peak direction. Thus, in the AM peak hour, four lanes would be provided southbound and three lanes provided northbound. In the PM peak hour, three lanes would be provided southbound and four lanes northbound. Alternatively, a total of eight lanes could be provided, with five lanes provided in the peak direction. This concept was not carried forward due to the projected directional volume flows for the corridor. For reversible lanes to be effective, a directional split of approximately 70% (peak) to 30% (off-peak) is typically needed. For the year 2030, the directional split in the AM peak period is projected to be 61% southbound and 39% northbound. For the PM peak, the difference is less, with 44% southbound and 56% northbound. While the anticipated growth of the Kansas City CBD is included in these forecast numbers, the continued growth of the Northland area will counter this growth and also attract vehicle trips. This results in a less pronounced directional split of traffic, making a reversible lanes concept less effective at solving the I-29/35 project's purpose and need.

Build Concept 5 (New Alignment)

New alignments were examined parallel to the existing I-29/35 Corridor, but there were constraints to using a new alignment. The major constraints included the railroad yard in North Kansas City which constrains locations for highway crossings due to the width of the yard. In addition, nearly all of the adjacent area is developed and a new alignment would result in substantial property impacts. For these reasons, a new alignment concept was not carried forward.

Build Concept 6 (Geometric Improvements)

The Build Concept 6 was not carried forward because geometric improvements alone did not address the capacity needs of the corridor; and therefore does not meet the purpose and need for the project. The concept does make improvements to the geometry of the corridor that could be included as a part of other build concepts.

4. CONCEPTS RETAINED FOR ALTERNATIVES ANALYSIS

Based on a comprehensive review of the Initial Improvement Concepts, the following concepts were retained for further consideration within the alternatives analysis.

a. No-Build Concept

There are a number of concerns related to the No-Build Concept not meeting the purpose and need for the project. Specific needs included in the purpose and need that are not addressed by the No-Build Concept include:

- The No-Build Concept does not address freeway condition/interchange design features or the aging/deteriorating components of the project purpose and need. While the No-Build Concept would require extensive maintenance to keep I-29/35 and the Paseo Bridge operable, it would only provide a short-term improvement to pavement condition.
- I-29/35 would remain congested as the No-Build Concept would not address providing increased capacity or improved traffic operation between M-210 and the CBD loop.

- The No-Build Concept could potentially decrease the level of safety on I-29/35. As the roadway would continue to deteriorate, the number and rate of vehicle accidents may increase. While extensive maintenance may be able to extend the life of the existing bridges, temporary closures could occur.

- There would be no positive benefits related to improved access to economic areas. The No-Build Concept would not improve access to the Kansas City CBD or to industrial or commercial areas located adjacent to the study corridor. However, the No-Build Concept would have less disruption and would result in smaller negative short-term impacts to accessibility and economic sales than would result from interchange or mainline reconstruction.

Due to these reasons, the concept does not meet the purpose and need of the project; however, it will be carried forward for further evaluation in this EIS as a baseline alternative for comparison.

b. Build Concepts

Build Concept 2 (Widen to Six Lanes/Reserve for Two Additional Lanes)

This concept was carried forward as it addresses the purpose and need of this project currently and in the long-term. Initially only a six-lane wide section would be constructed; however, the concept would allow for the ultimate widening of I-29/35 to eight lanes sometime in the future.

The traffic analysis indicated that beyond the year 2030, that a section comprised of eight through lanes would achieve a LOS D. This concept would provide sufficient right-of-way to enable the future widening of I-29/35 to eight through lanes in the future if warranted and if funding was available. This concept would enable both a short-term and long-term improvement in system linkage, transportation capacity and traffic operations.

Build Concept 3 (Widen to Six Through Lanes/Reserve for Two additional High Occupancy Vehicle Lanes)

This concept was carried forward as it addresses the purpose and need of this project currently and in the long-term. This concept was determined to potentially have similar benefits to the Build Concept 2. A more detailed evaluation of this concept may be warranted if this concept is included as part of a larger HOV system network. Traffic analysis of this concept within the I-29/35 Study Corridor is provided in Chapter II, G. 6. The analysis indicates that the travel time savings from HOV lanes for this section of I-29/35 would lead to a small increase in HOV trips. This small increase alone is not considered to be sufficient to warrant the construction of two additional lanes at this time. However, when a future widening of I-29/35 from six lanes to eight lanes is considered, the HOV lane concept could be reevaluated.

The build concepts that provide sufficient right-of-way to allow for the ultimate widening of I-29/35 to eight lanes sometime in the future were carried forward as reasonable alternatives for further consideration in this EIS. However, in order to provide a cost-effective transition between a six-lane widening and the potential future widening to eight lanes, right-of-way, corridor bridges, including roadway bridges and the bridge over the Missouri River and retaining walls could be developed for the ultimate improvement, if and when necessary and if funding is available.

E. Design Characteristics

1. ROADWAY DESIGN CRITERIA

The following design criteria and standards have been used in the definition of the reasonable alternatives defined under the build concepts and for determining the footprint for the build alternatives in order to complete the impacts analysis. It is understood that these guidelines are desired criteria, reflecting the maximums and minimums that may be adjusted for a practical context sensitive design. The sources of the criteria are as follows:

- A Policy on Geometric Design of Highways and Streets, AASHTO, 2001
- Roadside Design Guide, AASHTO, 2002
- MoDOT Project Development Manual
- Planning, Operation, and Design of High Occupancy Vehicle Facilities, Transportation Research Board

The MoDOT and AASHTO design standards incorporate standards applicable to the Americans with Disabilities Act (ADA).

The roadway design criteria reflect the desired maximum elements and include the following:

- ***Lane width*** – Twelve feet (3.7 meters) on mainline, auxiliary lanes, ramps, overpasses, and underpasses. Inside and outside shoulders of between ten and 12 feet (3.0 and 3.7 meters) on I-29/35 are desirable.

- ***Design Speed / Horizontal Alignment*** – A variable design speed for I-29/35 has been developed consistent with the surrounding land use characteristics and the need to transition travel speeds into the lower-speed CBD Loop. The design speeds used and the corresponding horizontal curvature used in this evaluation are as shown in Table II-3.

Table II-3
Design Speed/Horizontal Alignment

Location	Design Speed (mph)	Horizontal Alignment Maximum Degree of Curvature (e max = 8% unless otherwise noted)
Mainline		
Freeway north of Loop	60	4^{o} 45’
Freeway within Loop	50	7^{o} 30’
Ramps (Standard Design)		
Hwy = 60 mph	50	7^{o} 30’
Hwy = 60 mph	45	9^{o} 30’
Hwy = 60 mph	40	12^{o} 15’
Loop Ramps (all)	25	33^{o} 30’

- ***Design Vehicle*** – The design vehicle is the WB-62 (combination truck-interstate semi-trailer).

- ***Vertical Grades***

  Mainline – The maximum vertical grade on I-29/35 will be 3.0%. The minimum desirable vertical grade will be 0.50%.

  Ramps – The maximum vertical grade will be 7.0% and the maximum desirable grade will be 5.0%.

  Cross Roads – The maximum vertical grade will be based on roadway classification.

- ***Roadway Clearances***

  Horizontal Clearances – Required horizontal clearances to obstructions are determined from the *AASHTO Roadside Design Guide* based on design speed, traffic volumes, and side slopes. When the mainline average daily traffic (ADT) is 6,000 or more, the required horizontal clearance will range from 30 to 34 feet.

  Vertical Clearances – The minimum vertical clearance for roads over Interstate and all interchanges is 16'-6". The minimum vertical clearance for Interstates located in commercial zones is 15'-6". The minimum vertical clearance for Railway separation is 23'-6".

  Vertical Curvature – The minimum stopping sight distance for all Interstate vertical curves shall be as follows:

  70 mph: 625 ft. (minimum) – 850 ft. (desirable)
  60 mph: 525 ft. (minimum) – 650 ft. (desirable)
  Length of curve – 300 ft. (minimum), where practical

- ***Superelevation Runoff Rates*** – The superelevation runoff rates used are from Exhibit 3-23 (E_{max} = 0.08 $^{ft.}/_{ft.}$) in AASHTO *A Policy on Geometric Design of Highways and Streets.*

2. ROADWAY AND MISSOURI RIVER BRIDGE TYPICAL SECTIONS

Exhibit II-1 and II-2 present the typical roadway and bridge sections for the I-29/35 Corridor improvements. The exhibits are located at the end of this chapter.

F. Alignment and Design Features

1. PASEO BRIDGE ANALYSIS

a. Background

The I-29/35 Paseo Bridge over the Missouri River is a four-lane, self-anchored suspension bridge. It was constructed and dedicated in August, 1954. The existing suspension bridge is made up of three spans measuring 308'-616'-308', with the 616' spanning the central portion of the Missouri River. There are approach spans to the north and south of the bridge made up of multiple steel deck girders.

In June of 2002, an in-depth inspection and analysis of the bridge was performed to determine if it should be replaced or rehabilitated. An inspection report was prepared for MoDOT in early 2003, which recommended that the existing Paseo Bridge be rehabilitated. The inspection report further recommended that maintenance rehabilitation be completed on the bridge as soon as reasonably possible. The maintenance rehabilitation included wrapping the suspension

cables, replacing select bearings, replacing continuous light fixtures, patching the deck and milling and overlaying the deck and painting the entire bridge. The maintenance rehabilitation was completed in 2005 and will extend the life of the bridge to 2020.

A conclusion from the in-depth inspection was that if the Paseo Bridge is to carry traffic past the year 2020, an in-depth rehabilitation will need to be completed by that time. This in-depth rehabilitation would include replacing the deck, replacing and strengthening select floor system steel and rehabilitating and replacing select suspenders. The in-depth rehabilitation would extend the life of the bridge another 35 years. A decision on when the in-depth rehabilitation will occur will be based on the outcome of the design-build process. The Preferred Alternative assumes that the rehabilitation occurs within the 15-year timeline established after the completion of the initial rehabilitation program. The rehabilitation would require all four lanes of the bridge to be shut down at least for short periods during construction and, if desirable, for the entire duration of the construction project.

b. Missouri River Bridge Options

During the location study of the I-29/35 EIS, a number of alternative roadway and bridge alignments were investigated for the Missouri River crossing of the I-29/35 corridor. All of the alignments considered entailed the widening of the existing roadway and Paseo Bridge crossing to provide for an ultimate construction of eight mainline traffic lanes. By virtue of the type of bridge (cable suspension bridge), the existing Paseo Bridge cannot be widened. Therefore, the alignments studied were located either immediately upstream, downstream or centered on the current bridge alignment. The study concluded that the new alignment should be located immediately downstream from the existing alignment because of constraints from existing development and hazardous waste sites, particularly north of the river. The option of closing the Paseo Bridge, removing it, and rebuilding a new bridge(s) on the current location may be considered, but would not be acted upon until further consultation with the public and local governmental agencies takes place.

Three bridge options (Options 1, 2 and 3) were incorporated into the alignment alternatives. These include:

- ***Option 1 (Companion Bridge)*** – Add a companion bridge to the existing Paseo Bridge and complete an in-depth rehabilitation to the existing bridge to extend the design life from 10-15 years (2005 rehabilitation) to 50 years. The existing Paseo Bridge would be preserved for use for southbound traffic and would provide for three through lanes plus a southbound auxiliary lane or future use as a fourth through lane. The new bridge will serve northbound traffic and will carry three through lanes plus a northbound entrance lane. The potential to widen to four through lanes would be provided. This option could potentially provide up to nine lanes over the Missouri River when including an ultimate configuration and the auxiliary lanes.

- ***Option 2*** – Replace the existing Paseo Bridge with two new twin bridges, each carrying three through lanes plus a southbound auxiliary lane and a northbound entrance lane or one larger bridge constructed within the same project footprint. The potential to widen to four through lanes in each direction would be provided. The existing Paseo Bridge would be removed. This option could potentially provide up to ten lanes over the Missouri River with Build Concept 2 or 3 (eight-lane) plus the auxiliary lanes.

- ***Option 3 (New Single Bridge)*** – Replace the existing Paseo Bridge with one new bridge, carrying a minimum of six through lanes plus a southbound auxiliary lane and a northbound entrance lane. The potential to widen to four through lanes in each direction would be provided. Potentially, the existing Paseo Bridge could be preserved and

transferred to others for non-interstate use, however it is likely that the bridge would need to be removed because of piers interfering with the navigation of the Missouri River. While the ultimate design is uncertain, this option could potentially provide up to ten lanes over the Missouri River with Build Concepts 2 or 3 (eight-lane) plus the auxiliary lanes.

c. Geotechnical and Hydraulics Evaluation

A preliminary geotechnical evaluation for a new Paseo Bridge was performed by studying the plans of adjacent bridges. The Heart of America Bridge, located 0.7 miles upstream, was constructed in the early 1980s using drilled shaft foundations. The M-269/Chouteau Trafficway Bridge, located 2.5 miles downstream, was completed in 2001, also using drilled shaft foundations. Based on these two observations, drilled shafts are recommended for the new bridge.

The hydraulics evaluation was limited to studying the field conditions of the existing bridge, reviewing soundings that were recently completed on the bridge and experience with hydraulic evaluations of similar river crossings. The existing bridge has a skew to the direction of flow at normal conditions of about ten degrees.

For Option 1, the optimum location of the river piers for the new bridge would be to match the pier locations and span configuration of the existing bridge. The piers should be slightly offset to take into account the skew. Locating the piers as described would reduce the effects of scour and allow construction of the new bridge without affecting water elevations.

For the new replacement bridge options, Options 2 and 3, the river piers should be located to allow safe nautical travel as approved by the United States Coast Guard (USCG) and to optimize the efficiency of the bridge spans. For new bridges (Option 2 and 3) the time between constructing the new bridges and removing the existing bridge should be kept to a minimum. The river pier locations of the new bridge and existing bridge would not likely match. Scour could be an issue around the river piers if the existing bridge is left in place for an extended period of time. Letters of correspondence with the USCG are included in Appendix G, Agency Coordination.

d. Clearances

For all of the bridge options, as shown on Exhibit II-2, a horizontal clearance of fifty feet would be provided between the bridges. The clearance would allow adequate room for construction of the bridge or bridges. The clearance would also provide room for maneuvering heavy equipment required for future inspections and maintenance of the bridges for Options 1 and 2.

The location of the river piers for the new bridge must provide safe nautical travel on the Missouri River. Exhibit II-3 shows the bridge pier locations and navigational clearance requirements for the existing bridge and for a new bridge should the existing bridge be removed. Originally, the main navigational channel under the Paseo Bridge coincided with the middle span (616 feet). However, due to the river's mechanics, the channel has migrated to the south bank.

For Option 1, the existing pier locations would need to be matched since the existing bridge would be rehabilitated and would remain in place. With this option, the main river bridge span configuration would remain at 308'-616'-308'. Due to its proximity, the vertical alignment of the new companion bridge would need to match the existing Paseo Bridge. As a result, the navigational channel would be maintained in its current location.

For Options 2 and 3 the existing bridge would be removed. This would provide considerably more design and alignment flexibility for establishing the necessary span lengths and configurations. Based on correspondence with the USCG, new bridge spans for Options 2 and 3 could be built to roughly match the pier locations of the existing M-9/Heart of America Bridge, with pier locations a minimum of 450 feet off the south bank of the Missouri River. These pier location and span configuration requirements provide more design options for the bridge type and vertical roadway alignment.

The USCG has recommended that the vertical clearance to the superstructure for all of the options will be fifty-five feet above the standard high water elevation of 734.4 feet mean sea level over the navigation channel. However, the possibility exists that the USCG would approve matching the M-9/Heart of America Bridge which has fifty-two feet of vertical clearance from the 2% flow line elevation of 733.1 mean sea level. Any such modification would need to be approved by the USCG before it could be incorporated into the project design.

e. Bridge Type

This EIS will not determine bridge type. However, there are a number of limitations to the type of bridge that could be constructed for each bridge option. For Option1, the type of bridge for the companion structure would be limited due to its proximity and relationship with the existing Paseo Bridge. The bridge type for the companion bridge would likely either be a suspension, tied arch, cable-stayed or a truss type structure. A deck girder would not be a practical bridge for the existing span configuration. The floor system framing for the four bridge types mentioned is similar to the floor system of the existing bridge. The depths of the floor system members would determine the vertical clearance limits. Therefore, for Option 1, the vertical profile of the companion bridge would need to closely match the vertical profile of the existing bridge.

Under Option 2, the bridge type options would not be limited by the existing bridge. Since the existing bridge would be removed in this option, only the physical clearance limitations and the twin or single bridge construction requirements would limit the type bridge structures that could be constructed. For Option 2, if the new bridge type is a suspension, tied arch, cable-stayed or a truss type structure, the vertical profile of the new bridges would closely match the vertical profile of the existing bridge. If a deck girder bridge type is selected for Option 2, the vertical roadway profile would be raised about six feet – thereby having impact implications on the approach roadways and bridges. With a deck girder bridge, a vertical profile raise would be required since the superstructure depth would have to be increased to accommodate the 450' span requirement and the USCG navigational clearance requirements.

For Option 3, the bridge type options would not be limited by the existing bridge. Regardless of the bridge type, the vertical profile would likely have to be raised about six feet above the existing profile if a single bridge deck is to be built. If the single-deck bridge is a suspension, tied arch, or cable-stayed structure, transverse floorbeams would be necessary to transfer the live loads to the fascia support systems. As a single deck structure, the floorbeams would have to be long enough to accommodate the anticipated roadway width. As a consequence, this transverse span length for the floorbeams would cause the depth of the floorbeams to increase about six feet over the depth of floorbeams used for the same bridge types for narrower bridge decks, such as for Option 2. If a deck girder bridge type is constructed, the vertical profile requirements would be similar to Option 2 – about six feet higher than existing. The bridge crossing for Option 3 does have the capability of being constructed as a dual structure, in lieu of the single deck. If the Option 3 alignment was to consist of twin bridges, the vertical profile requirements or constraints would be similar to Option2 – matching the existing profile for arch, cable-stayed, and suspension bridge types, and raised six feet or so for the deck girder type structure.

f. Traffic and Interchange Implications

There are a several traffic operational and interchange layout implications for the various Paseo Bridge options. These issues include the implications on nearby interchanges, overall traffic operations, and maintenance of traffic.

Adjacent Interchanges (Front Street and Bedford Avenue/Levee Road)

The existing Paseo Bridge is located immediately north of the Front Street Interchange and south of the Bedford Avenue/Levee Road Interchange. These interchanges are located in close proximity to the bridge crossing and could affect the bridge configuration, or vise versa. Because the existing bridge cannot be widened, the Paseo Bridge limits the ability to lengthen the southbound exit-ramp and the northbound entrance-ramp due to the existing bridge deck width limitations. Completely replacing the existing bridge removes the impediments or limitations of the existing bridge regarding the ability to improve the entrance-ramp and exit-ramp configurations for the nearby interchanges.

Maintenance of Traffic

The various options for improving the Paseo Bridge crossing have different implications on how traffic operations would be maintained during both construction and during routine maintenance activities. For both Option 1 and Option 2 (with twin bridges), traffic would need to be detoured during construction. The new parallel companion bridge would need to be constructed first. During this first stage of construction, all I-29/35 traffic would continue to utilize the existing Paseo Bridge. Upon completion of the companion bridge, all I-29/35 traffic would be detoured to the new bridge, providing two lanes of traffic in each direction. During this second stage, the existing bridge would be retrofitted and rehabilitated, or would be replaced with a second bridge, depending on the option. If the Option 2 alignment were one single bridge instead of two, complete closure of the existing Paseo Bridge would be necessary. For Option 3, traffic would not need to be detoured during construction. The new bridge would be constructed with a sufficient offset from the existing roadway centerline such that once completed, traffic would be shifted to the new bridge and the existing Paseo Bridge would be removed. The complete closure of the Paseo Bridge could be considered with any of these options, to help complete construction more efficiently. A detailed traffic plan would be prepared and used to direct vehicles to other roadways such as M-9, Armour Road, Broadway and Chouteau and to Missouri River bridges in the metropolitan area..

Construction and Inspection

Other implications of the bridge options include the ongoing maintenance and inspection activities for the bridges. Due to the unique nature of the existing cable suspension bridge, particularly considering the recent maintenance problems, a higher level of detail and more frequent inspection cycle would be required for the existing Paseo Bridge. Providing a parallel bridge would allow for traffic to be shifted to the other bridge temporarily during the inspection or maintenance activities. Both Options 1 and 2 (with twin bridges) would provide the ability to shift traffic to the other bridge for temporary construction or maintenance. Option 2 (single bridge) and Option 3 would require shifting traffic on the bridge from one side to the other, but there would be sufficient bridge deck width to accommodate this.

g. Bridge Construction Cost Estimate

For the purposes of comparing the differing cost-related implications of the Paseo Bridge options, construction cost estimates were developed for the three bridge options. For each option, the bridge abutments for the river crossing would remain roughly in the same location. Consequently, the cost estimate extends from abutment to abutment, spanning across the river – a distance of roughly 1,825 feet. The construction cost estimate is limited to the cost of the Paseo Bridge plus the approach bridges from roughly levee to levee. This estimate does not

include any differences between the bridge options relating to required right-of-way, roadway construction, engineering design, and construction supervision. Costs are in year 2005 dollars.

Option 1 includes the in-depth rehabilitation of the existing bridge to extend the design life from 10-15 years (2005 rehabilitation) to 50 years and building a new, parallel bridge. It is estimated that the additional Paseo Bridge rehabilitation (following that completed in 2005) would cost approximately $10.0 million. Several optional bridge types could be constructed for the companion bridge. If the new bridge is a tied arch structure, the construction cost would be approximately $39.1 million, not including the rehabilitation. If the new bridge is a cable-stayed structure, the cost for the new bridge is estimated to be around $53.2 million. If the new bridge is a self-supported suspension bridge, matching the existing Paseo Bridge, the construction cost for the new companion bridge would be approximately $55.3 million.

The cost of the Missouri River bridge(s) for Options 2 and 3, from levee to levee, would be essentially the same. The costs reflect construction of the ultimate eight-lane facility. Costs could change as the project design moves forward. However, the costs do provide a comparison between bridge type options. The analysis is not sufficiently refined enough to reflect the differences between twin and single structures of similar width. If the new bridge is a deck girder type structure, similar to the M-9/Heart of America Bridge, the cost would be around $52.4 million, regardless if the crossing is provided by a single structure or twin bridges. If the new bridge is a tied arch bridge, the cost would be approximately $55.9 million – only slightly higher than the deck girder option. Finally, if a cable-stayed type structure was provided, the bridge would cost approximately $91.7 million. For all of these bridge type options, the existing Paseo Bridge could be removed for a cost of around $2.0 million.

h. Summary of Paseo Bridge Crossing Options

It was determined that all three bridge options would be carried forward as part of individual concepts within the alternative development process. Table II-4 presents a summary of the three river crossing options, relative to environmental and navigational issues, roadway design and alignment issues, bridge design issues, and estimated construction costs assumed at this conceptual engineering phase for the ultimate eight-lane configuration.

Table II-4
Summary of Paseo Bridge Missouri River Crossing Options

Evaluation Factor	Paseo Bridge Missouri River Crossing Alternatives		
	Option 1 Rehabilitate Paseo Bridge and construct companion bridge.	**Option 2*** Build twin bridges with minor offset or one larger bridge and demolish Paseo Bridge	**Option 3** Build single bridge with large offset and demolish/reuse Paseo Bridge
Environmental and Navigational Issues			
Span Length (Min.)	616 feet	450 feet	450 feet
Pier Locations	Match existing	Unconstrained	Unconstrained
Existing Bridge	Preserve	Demolish	Demolish or Reuse
Navigation Channel	308 feet (South Bank)	450 feet (South Bank)	450 feet (South Bank)
Roadway Design and Alignment Issues			
Vertical Clearance (Min.)	55 feet above 734.4 MSL**	55 feet above 734.4 MSL**	55 feet above 734.4 MSL**
Centerline Shift	58 feet (Downstream)	58 feet (Downstream)	172 feet (Downstream)
Ultimate Bridge Deck Width	SB (56 feet) NB (84 feet)	SB (84 feet) NB (84 feet)	170 feet
Initial/Ultimate No. of Lanes	SB (3/4) NB (3+/4+)	SB (3+/4+) NB (3+/4+)	SB (3+/4+) NB (3+/4+)
Design Exception	SB Shoulder Widths	None	None
Roadway Safety	Narrow shoulders and lane merges	Improved	Improved
Interchange Upgrades (Front St.)	Ability to improve Front St. is affected by existing bridge	Unaffected	Unaffected

Table II-4 (continued)
Summary of Paseo Bridge Missouri River Crossing Options

Evaluation Factor	Paseo Bridge Missouri River Crossing Alternatives		
	Option 1 Rehabilitate Paseo Bridge and construct companion bridge.	**Option 2*** Build twin bridges with minor offset or one larger bridge and demolish Paseo Bridge	**Option 3** Build single bridge with large offset and demolish/reuse Paseo Bridge
Bridge Design Issues			
Low Cost Bridge Type	Tied Arch	Deck Girder	Deck Girder
Unique Bridge – Additional Cost	Cable Stayed $14.1 M Suspension $16.2 M	Tied Arch $3.5 M Cable Stayed $39.3 M	Tied Arch $3.5 M Cable Stayed $39.3 M
Opportunity for Unique Bridge	More limited due to presence of existing Paseo Bridge	Limited only by virtue of twin bridge requirement	Unlimited
Construction Cost Estimates			
Future Paseo Rehab	$10.0 M	--------	--------
Paseo Bridge Demo	--------	$2.0 M	$2.0 M
New Bridge(s) (Low Cost)	$39.1 M	$52.4 M	$52.4 M
Total Construction Cost (Low Cost)	$49.1 M	$54.4 M	$54.4 M
50-Year Maintenance	$6.6 M***	$2.9 M	$2.9 M

* Option 2, with either new twin bridges or one larger bridge, requires the demolition of the Paseo Bridge. The timing of the demolition will depend on a number of factors including whether there will be twin bridges or one bridge and whether closure of the bridge is desired.

** The clearances listed above have been approved by the Coast Guard. However, the possibility exists that the USCG would approve matching the M-9/Heart of America Bridge which has fifty-two feet of vertical clearance from the 2% flow line elevation of 733.1 mean sea level. Any such modification would need to be approved by the USCG before it could be incorporated into the project design.

*** The maintenance costs for the existing Paseo Bridge were the costs tabulated by Parsons for the 2002 inspection report. Paint touch-ups are included in the cost.

Note: + refers to construction of auxiliary lane or ramp merge lane. Costs are for the ultimate bridge width.

2. INTERCHANGE ANALYSIS

As a part of the alternatives development process, study was given to the analysis of interchange options within the corridor. The initial analysis provided in Chapter I – Purpose and Need, demonstrates the ineffectiveness of the existing interchange configurations along the corridor to move traffic safely and efficiently. Due to complex travel movements, the pattern of adjacent land uses, substandard geometrics and concern for safety, a number of interchange options were studied for each interchange location. For the most part, each interchange location was studied independent of one another. With this approach, the best or most reasonable improvements at each location could then be combined with the best mainline improvements to form the range of reasonable alternatives to be considered for the proposed action.

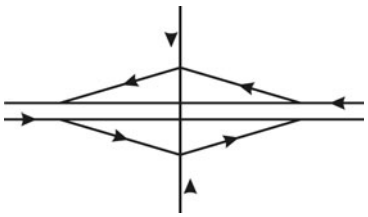
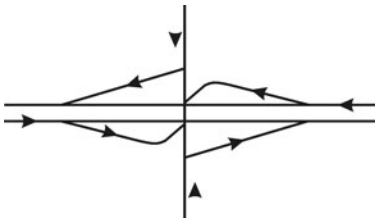
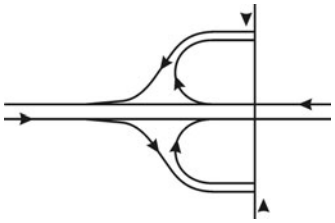
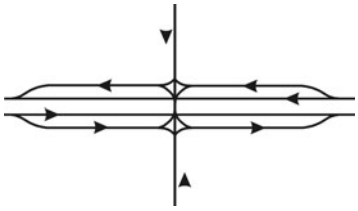
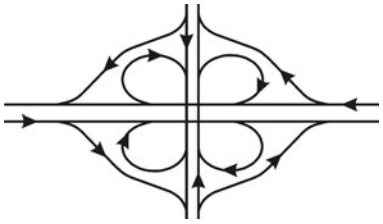
The analysis and evaluation of the potential or possible interchange improvements at each interchange location involved a multi-step process. First, potential interchange improvement types were identified at each location. These benefits and disadvantages of each interchange type were reviewed based on engineering feasibility (i.e., could it be built), traffic requirements, and gross-level impacts to the nearby environment, including the natural and man-made environments. The initial interchange layouts at each location were reviewed and further refined through coordination with stakeholder groups, public officials, and others who had an interest in a particular element of the project. While exact interchange configurations are not specified in this EIS, the interchange analysis was used to demonstrate feasibility of specific interchange types and was used to determine the maximum construction limits of the build alternatives.

The interchange concepts were presented at a Pre-location Public Information Meeting, conducted on September 28, 2004, at which time the range of potential interchange

improvements at each location, as well as other project information, was presented for general public review, comment and debate. This meeting included a generalized summary of the evaluation of the interchange options, including an initial recommendation of those layouts being most reasonable.

Layouts of the interchange improvements and evaluation information for each interchange can be found in Appendix B, Interchange Alternatives Analysis. A number of typical interchange layout types were investigated. Table II-5 presents the typical layout for the generalized interchange configurations that were considered. The final interchange configurations will be reviewed and approved prior to construction.

Table II-5
Typical Interchange Layout Configurations

Interchange Type	Typical Standard Layout
Diamond Interchange	
Offset Diamond Interchange	
Folded Diamond Interchange	
Single Point Urban Interchange (SPUI)	
Cloverleaf Interchange	

3. I-29/35 MAINLINE ANALYSIS

The mainline analysis for the I-29/35 corridor from M-210 to the northeast corner of the Downtown loop focused on widening strategies in order to maintain traffic and to minimize right-of-way and environmental impacts. The initial widening concepts which would ultimately enable widening from four to six or eight lanes based on two staging concepts – widen with the potential for four new lanes added to the east or west of the existing alignment, or widening symmetrically to both sides to allow achieving an eight-lane section in the future if warranted and if funding is available. A review of the adjacent land use and right-of-way constraints resulted in a single mainline widening alternative that would minimize impacts to the surrounding areas, while minimizing maintenance of traffic staging. A single mainline alternative was derived from the analysis that incorporates variations of these widening concepts.

The resulting I-29/35 alignment used to develop the project footprint begins with widening to the west as it comes over M-210/Armour Road. The new widening then transitions through the curve, and shifts to the east side as it crosses over the railroad facilities. This could allow a separate viaduct bridge to be built while maintaining traffic on the existing lanes and viaduct. The new widening continues on the east side across the river. The mainline alignment alternatives crossing the river take into consideration the staged construction of potentially building the new lanes adjacent to the existing bridge and then either using the existing bridge or constructing a new bridge in its place. Another alternative would construct all new lanes adjacent to the existing bridge. Once across the river, the highway alignment transitions back into the existing alignment over the south railroad viaduct.

The widening as it is shown would avoid impacts to Kessler Park on the east side and minimize impacts to the Guinotte Manor and Columbus Park neighborhoods on the west. In order to have the Paseo Boulevard exit to the right, in lieu of the existing left exit, a new centerline was established to bring the north and south bound lanes closer together. Use of a single alignment would minimize environmental and right-of-way impact and still maintain a minimum of two lanes of traffic during construction.

4. DOWNTOWN LOOP ANALYSIS

A separate analysis of the CBD Loop was completed to examine traffic flow relationships for the entire CBD Loop. The purpose of the study was to build upon the Northland~Downtown Major Investment Study (MIS) and examine how capacity increases in the I-29/35 corridor would be accommodated in the CBD Loop. Impacts to the Loop could include shifting the traffic patterns to and from the Northland, the configurations of the lanes entering and exiting the Loop to and from the Northland, and indirectly, the land use and development patterns of the Loop.

The Downtown Loop Master Plan provides a conceptual description and improvement plan for the freeway and ramp access system that comprise the Loop. The intent of the conceptual plan is to define in concept the long-term improvements that are warranted to improve the overall safety and efficiency of the Loop's operations, while supporting the Downtown land use and development goals. Elements of the plan associated with the I-29/35 Corridor were considered in the evaluation completed as part of this EIS. Similarly, the loop master plan was used to provide consistency with other improvements to the Loop or with other corridor improvements that feed into the Loop. The Downtown Loop Master Plan is available upon request.

Some general conclusions and findings of the Loop Master Plan, relative to the I-29/35 corridor, include the following:

- ***Loop Concept*** – Conceptually redefining or reconfiguring the Loop, such as with one-way operations or converting the northern side to a boulevard was demonstrated in

the Northland~Downtown MIS to not be operationally feasible or fiscally prudent. However, elements of these concepts, particularly regarding the accomplishment of FOCUS goals and land use and development priorities, could be fulfilled, partially or wholly, through other means while maintaining the existing "loop" concept. Improvements to the I-29/35 corridor and the northern side of the Loop should consider the incorporation of measures to better connect land use across and within the corridor while supporting increased economic development opportunities. The Loop Master Plan maintains the existing concept of a "loop" but identifies opportunities to improve lane continuity, access into the CBD and land use connectivity.

- ***Northland/Downtown Traffic Lane Connections*** – Increasing the number of lanes on I-29/35 would shift traffic away from the Broadway and Heart of America Bridges, thereby improving traffic flow on this system of Downtown bridges. Additional lanes into Downtown and out of Downtown along the I-29/35 corridor can be implemented consistent with the overall Loop plan. The overall connection of traffic service into Downtown from the Northland includes a system of access points including:

  - *Broadway Bridge Corridor* – Direct connection into Downtown with possible improvements at the connection to the Loop.

  - *Heart of America Bridge Corridor* – Direct connection into Downtown with possible improvements at the connection to the Loop.

  - *Paseo Bridge (I-29/35) Corridor* – A series of connection points into Downtown, both primary and secondary. The primary connection point would be the northeast corner of the Loop with improved access into the CBD and to the northern and eastern sides of the Loop. Indirect access would occur at Front Street and Paseo Boulevard, which would both provide "backdoor" access into Downtown.

G. Traffic Analysis

The traffic characteristics of the No-Build and build concepts were assessed in order to assist in the development and refinement of the alternatives. The results of this analysis are presented in the following sections.

1. TRAVEL DEMAND METHODOLOGY

To evaluate the relative traffic impacts of each alternative, the regional travel demand forecasting model developed and maintained by MARC was used. This model was used to develop future year traffic volumes (year 2030) with and without each of the improvement alternatives. The results of the model were used in developing AM and PM peak hour volume forecasts for the No-Build and build concepts for the refined mainline and interchange area alternatives. In addition, the benefits of each alternative were evaluated in terms of operating costs, vehicle travel times, and vehicular crash savings.

The regional traffic demand model, while providing accurate comparison information for vehicle miles traveled (VMT) and vehicle hours traveled (VHT), is not sensitive enough to distinguish between small alignment changes. The highway capacity analysis and traffic simulation models were used to provide a differentiation between build concepts and interchange options and this information is reported in the tables below.

2. TRAFFIC FORECASTS

The assigned year 2030 model volumes represent the daily number of vehicle trips at a specific point on the roadway network. The year 2030 volumes for the No-Build and the build concepts are shown in Table II-6.

Table II-6
Year 2030 Forecasted Average Daily Traffic (ADT)

Mainline Section	No-Build Year 2030 ADT	Build Year 2030 ADT (Six-Lane)	Build Year 2030 ADT (Eight-Lane)	Build Year 2030 ADT (Eight-Lane HOV)
I-29/35 (M-210 to Paseo Bridge)	95,000	115,000	130,000	125,000
I-29/35 (Paseo Bridge)	100,000	125,000	140,000	135,000
I-29/35 (Front St. to Paseo Blvd.)	110,000	130,000	145,000	142,700
I-35/70 (Troost Ave. to M9)	105,000	105,000	105,000	104,000
I-35/70 (M9 to Main St.)	105,000	100,000	100,000	100,000
I-35/70 (Main St. to Broadway)	100,000	95,000	100,000	100,000
I-70 (9^{th} St. to 10^{th} St.)	125,000	120,000	125,000	125,000

3. RIVER CROSSING AND REGIONAL TRAFFIC IMPACTS

As part of the traffic analysis for the project, eight other major Missouri River bridge crossings in the Kansas City metropolitan area were examined to determine the effect the I-29/35 corridor concepts have on regional traffic patterns. The bridges that were studied include the following, listed from west to east:

- The western I-435 Bridge that is part of Kansas City's outer interstate loop system
- I-635 Bridge
- US 69, Fairfax Bridge
- **US 169, Broadway Bridge**
- **M-9, Heart of America Bridge**
- **I-29/35, Paseo Bridge**
- M-269, Chouteau Bridge
- The eastern I-435 Bridge that is part of Kansas City's outer interstate loop system.
- M-291, Liberty Bridge

The bridges highlighted directly serve downtown Kansas City's CBD, the central core of the metropolitan area.

Three I-29/35 build concepts were studied to better understand the traffic demand shifts each concept has on the region's bridges. The concepts include:

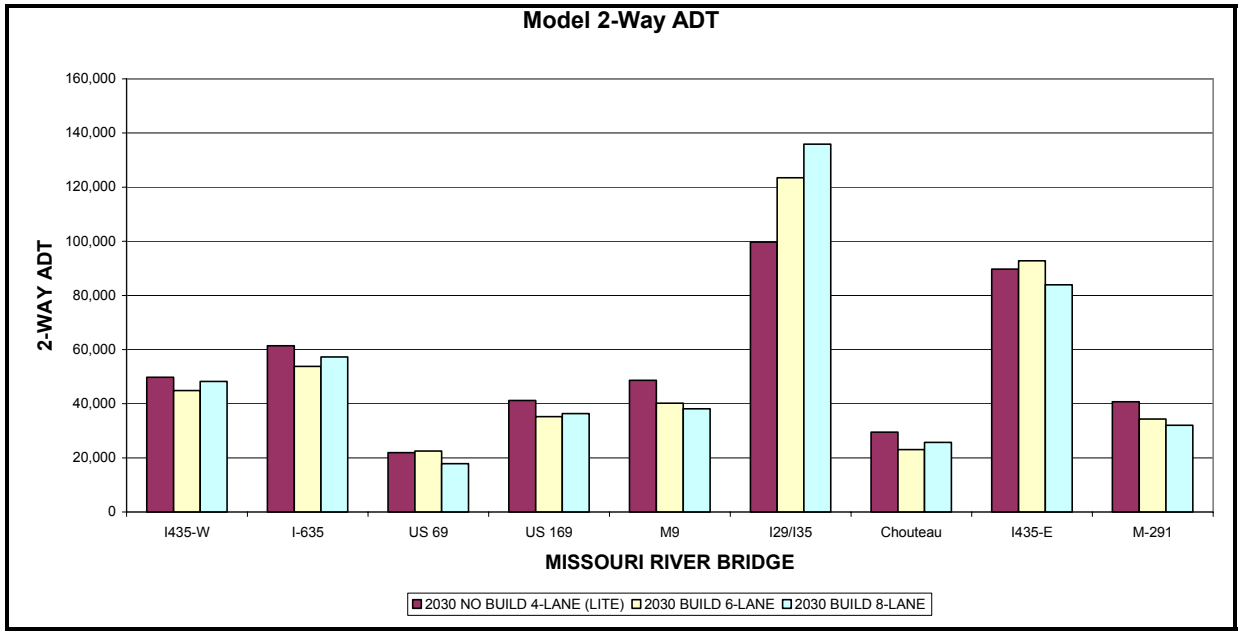
- ***No-Build*** – This concept maintains the current travel lanes on the Paseo Bridge and within the study corridor with forecasted 2030 traffic.

- ***Build Concept 2 or 3 (Six-lane)*** – This concept has six travel lanes (three each direction) on the Paseo Bridge and into the CBD Loop with forecasted 2030 traffic.

- ***Build Concept 2 or 3 (Eight-lane)*** – This concept has eight travel lanes (four each direction) on the Paseo Bridge and into the CBD Loop with forecasted 2030 traffic.

When additional lane capacity is added to the I-29/35 Paseo Bridge under the build concepts, some regional traffic shifts to the facility with the new capacity. This is shown in Figure II-2. The results indicate how the widening concepts would be expected to impact traffic flow on the Missouri River bridges.

Figure II-2
I-29/35 Build Concepts Impacts on Missouri River Bridges



a. Downtown Bridges – Level of Service

A traffic operational analysis was conducted for the three Downtown bridges, plus the Chouteau Bridge, located to the east of the Paseo Bridge. The level of service analysis was based on a screen-line located along the Missouri River crossing. For the analysis, the capacity of the bridge crossings was assumed to be generally unaffected by the approach roadways, with the exception of the Broadway Bridge. For this bridge, it was assumed that the traffic signal located immediately south of the bridge controls the "capacity" of the bridge crossing. This general assumption is based on observations and findings from the Northland~Downtown MIS.

Regionally, traffic and level of service on the Broadway Bridge is significantly influenced by the I-29/35 Paseo Bridge concepts as shown in Table II-7. Level of service is lowest on the Broadway Bridge for the No-Build , Build Concept 2 (six-lane) and Build Concept 3 (HOV). Conversely the Broadway Bridge benefits the most either with the Build Concept 2 due to the shifting of the traffic to the Paseo Bridge. Results also show the Heart of America and Chouteau Bridges provide excellent levels of service and are less affected by I-29/35 concepts. This analysis is consistent with earlier studies that showed that capacity improvements at the Paseo Bridge would improve the "system" of bridges that connect the Northland to Downtown, particularly when combined with improvements to the Broadway connection to the Loop.

Table II-7
Downtown Bridges Year 2030 Freeway Mainline Level of Service

Location	No-Build		Build Concept 2 (Six-Lane)		Build Concept 2 (Eight-Lane)		Build Concept 3 (Eight-Lane HOV)	
	AM LOS AM Volume	PM LOS PM Volume	AM LOS AM Volume	PM LOS PM Volume	AM LOS AM Volume	PM LOS PM Volume	AM LOS AM Volume	PM LOS PM Volume
	NB / SB	NB / SB	NB / SB	NB / SB	NB / SB	NB / SB	NB / SB	NB / SB
US 169, Broadway Bridge*	D / D 2370 / 3050	**E** / **E** 3420 / 2540	C / C 2020 / 2610	D / D 2920 / 2180	B / B 1040 / 1630	B / B 1490 / 1360	C / C 1960 / 2590	D / D 2830 / 2160
M-9, Heart of America Bridge	B / A 1540 / 1970	B / A 2220 / 1640	A / A 1250 / 1650	B / A 1810 / 1380	A / A 1200 / 1540	B / A 1740 / 1290	A / A 1120 / 1450	B / A 1610 / 1210
I-29/35 Corridor, Paseo Bridge	D / **F** 3110 / 4250	**F** / **E** 4530 / 3500	C / D 3700 / 5130	**E** / D 5580 / 4220	C / D 4210 / 6640	D / C 6200 / 4790	D / **E** 4200 / 5670	**E** / D 6110 / 4710
M-269, Chouteau Bridge	A / A 890 / 1250	A / A 1290 / 1040	A / A 710 / 960	A / A 1020 / 800	A / A 820 / 1040	A / A 1180 / 860	A / A 670 / 920	A / A 970 / 760

Level of service information based on *Highway Capacity Manual 2000*, Transportation Research Board.
* Broadway Bridge levels of service calculated as intersection level of service at I-29/35's Broadway interchange.

b. Regional Daily Vehicle Miles Traveled (VMT)

Overall system measures were calculated to further study the amount of time motorists spend traveling I-29/35 and the accumulation of the number of miles traveled for the No-Build and build concepts. These measures are used as a basis of comparison between concepts. The Kansas City regional traffic demand model from MARC was used to complete the analysis. Table II-8 illustrates the future (year 2030) system measures for the Kansas City regional metropolitan area. With the No-Build Concept, I-29/35 would experience traffic congestion. Therefore, motorists would begin to use alternate routes that are a longer distance, to bypass the congestion. With Build Concept 2 (six-lane), congestion is reduced and the travel times improve on I-29/35 in the project corridor. VMT is shown to be reduced in this build concept. For Build Concept 2 (eight-lane), the results indicate that the VMT increases over no-build levels. This occurs for several reasons: 1) because traffic diverted from the I-29/35 Corridor by congestion under the No-Build returns to I-29/35; and 2) additional traffic that did not previously use the I-29/35 Corridor is attracted because the motorists can travel longer distances in a shorter amount of time. The findings show that the additional capacity and operational benefits from the eight-lane build concepts would enable increased mobility in the corridor, resulting in a small increase in the number of miles traveled.

Table II-8
Year 2030 Forecasted Vehicle Miles Traveled (VMT)

Concept	Daily VMT	Difference from No-Build
Region with No-Build	58,589,800	0
Region with Build Concept 2 (Six-lane)	58,586,600	-3,200
Region with Build Concept 2 (Eight-lane)	58,603,900	14,100
Region with Build Concept 3 (Eight-lane HOV)	58,588,700	-1,100

Source: Cambridge Systematics from the regional transportation model and HNTB Corporation, 2004.

c. Regional Daily Vehicle Hours Traveled (VHT)

The amount of time vehicles are on the road is a function of how far motorists must travel between their origin and destination as well as the level of congestion encountered. The VHT is calculated by summing the travel time made by each vehicle trip in the network. Similar to VMT,

the Kansas City regional traffic demand model was used to complete the analysis. The results indicate that motorist travel time decreases for the build concepts when compared to the No-Build Concept in Table II-9. The decrease in travel time is a result of the additional capacity and operational improvements associated with the build concepts that enable motorists to reduce the amount of time spent in traffic congestion within the project corridor.

Table II-9
Year 2030 Forecasted Vehicle Hours Traveled (VHT)

Concept	Daily VHT	Difference from No-Build
Region with No-Build	2,435,200	0
Region with Build Concept 2 (six-lane)	2,433,100	- 2,100
Region with Build Concept 2 (eight-lane)	2,429,700	- 5,500
Region with Build Concept 3 (eight-lane HOV)	2,430,900	- 4,300

Source: Cambridge Systematics from the regional transportation model and HNTB Corporation, 2004.

4. STUDY CORRIDOR TRAFFIC IMPACTS

An analysis of the level of service (LOS) of freeway mainline segments located between interchange areas for the AM and PM peak hours of travel was completed. The *Highway Capacity Manual 2000* methodology was used. Table II-10 illustrates the future (year 2030) peak hour volume levels of service expected for the I-29/35 Study Corridor. The results indicate that many of the mainline freeway segments located between interchange areas would operate at an unsatisfactory LOS (LOS E or F) for the No-Build Concept. In general, the analysis shows that there is insufficient capacity along the I-29/35 corridor between M-210 and the CBD Loop. Observation of current conditions shows that northbound traffic in the evening peak is somewhat “metered” due to the congestion created between the northeast corner of the Loop and Front Street with the lane drops and discontinuities. It is also interesting to observe that the northern side of the Loop has sufficient “system” capacity, as shown in the table, yet current observation indicates that congestion does exist along this section of highway. Sufficient freeway lanes are available, both now and in the future, for the northern side of the Loop, but the exiting and entering traffic and operational conflicts that exist in this area limit the true capacity of the highway.

The same methodology and analysis was performed for the AM and PM peak hours of travel for the build concepts. Tables II-11 through II-13 illustrate the future (year 2030) peak hour volumes and LOS expected for the I-29/35 Study Corridor. The results indicate that nearly all of the mainline freeway segments located between interchange areas would operate at a LOS D or above for an eight-lane build concept as shown in Table II-12. Some LOS E for a six-lane build concept would still exist as shown in Table II-11.

The forecast volumes resulted in a Level of Service (LOS) D for southbound travel during the AM peak hour and a LOS E for northbound travel during the PM peak period. The traffic analysis suggests that the LOS D threshold would be exceeded approximately between the year 2025-27 given current travel characteristics and anticipated growth trends. This information suggests that a six-lane facility with auxiliary lanes, where required to address ramp access, would provide an improved quality of travel mobility relative to existing conditions well over the next 20 years. A LOS F with six through lanes is not anticipated to occur until after the year 2040.

Table II-10
No-Build Concept Year 2030 Freeway Mainline Level of Service
(AM and PM Peak Hour)

Location	No. of Lanes	No. of Lanes	AM Peak Hour Volumes	PM Peak Hour Volumes	AM Peak Hour LOS	PM Peak Hour LOS
I-29/35 Corridor	**SB**	**NB**	**SB / NB**	**SB / NB**	**SB / NB**	**SB / NB**
M-210/Armour Rd. to 16th Ave.	2	2	4170 / 2580	3250 / 4690	**E** / C	**E** / **F**
16th Ave. to Bedford Ave.	2	2	4420 / 2800	3450 / 4810	**F** / D	**E** / **F**
Levee Rd. to Front St.	2	2	4250 / 3110	3500 / 4530	**F** / D	**E** / **F**
Paseo Blvd. to US 24/Independence Ave.	2	2	3650 / 3170	2690 / 2870	**E** / D	D / D
I-29/35 to I-70	1	2	1970 / 1680	1370 / 1670	**E** / C	D / C
I-35/70 Corridor	**WB**	**EB**	**WB / EB**	**WB / EB**	**WB / EB**	**WB / EB**
US 24/Independence Ave. to WB I-70 Ramp	1	1	2040 / 1490	1750 / 1200	**E** / D	**E** / C
Independence Ave. exit to M-9 entrance	3	3	3370 / 2040	2550 / 2960	D / B	C / C
Main St. exit to Main St. entrance	3	3	3520 / 2720	2830 / 3220	D / C	C / D
Broadway exit to Broadway entrance	3	3	3130 / 3150	3280 / 2760	D / D	D / C
I-70 west of Broadway	2	2	1690 / 3150	1860 / 2760	C / **E**	C / **E**

Source: HNTB Corporation, 2003. Level of service information based on *Highway Capacity Manual 2000*, Transportation Research Board.

Table II-11
Build Concept 2 (Six-Lane) Year 2030 Freeway Mainline Level of Service
(AM and PM Peak Hour)

Location	No. of Lanes	No. of Lanes	AM Peak Hour Volumes	PM Peak Hour Volumes	AM Peak Hour LOS	PM Peak Hour LOS
I-29/35 Corridor	**SB**	**NB**	**SB / NB**	**SB / NB**	**SB / NB**	**SB / NB**
M-210/Armour Rd. to 16th Ave.	3	3	5150 / 3090	4000 / 5530	D / C	D / **E**
16th Ave. to Bedford Ave.	3+auxiliary	3	5280 / 3370	4200 / 5660	D / C	D / **E**
Levee Rd. to Front St.	3+auxiliary	3+auxiliary	5130 / 3700	4220 / 5580	D / C	D / **E**
Paseo Blvd. to US 24/Independence Ave.	3	3	4610 / 4260	3450 / 3850	D / D	C / C
I-29/35 to I-70	2	2	2080 / 1860	1670 / 2420	C / C	B / C
I-35/70 Corridor	**WB**	**EB**	**WB / EB**	**WB / EB**	**WB / EB**	**WB / EB**
US 24/Independence Ave. to WB I-70 Ramp	2	2	2830 / 2400	2080 / 1430	D / C	C / B
Independence Ave. exit to M-9 entrance	3	3	3400 / 2640	2550 / 2590	C / C	C / C
Main St. exit to Main St. entrance	3	3	3560 / 3780	2900 / 3370	C / D	C / C
Broadway exit to Broadway entrance	3	3	3160 / 3690	3390 / 2640	C / D	C / C
I-70 west of Broadway	2	2	1600 / 3690	1820 / 2640	B / **E**	C / D

Source: HNTB Corporation. Level of service information based on *Highway Capacity Manual 2000*, Transportation Research Board.

Table II-12
Build Concept 2 (Eight-Lane) Year 2030 Freeway Mainline Level of Service
(AM and PM Peak Hour)

Location	No. of Lanes	No. of Lanes	AM Peak Hour Volumes	PM Peak Hour Volumes	AM Peak Hour LOS	PM Peak Hour LOS
I-29/35 Corridor	**SB**	**NB**	**SB / NB**	**SB / NB**	**SB / NB**	**SB / NB**
M-210/Armour Rd. to 16th Ave.	4	4	6500 / 3400	4410 / 6490	D / B	C / D
16th Ave. to Bedford Ave.	4+auxiliary	4	6890 / 3730	4720 / 6640	D* / C	B* / D
Levee Rd. to Front St.	4+auxiliary	4+auxiliary	6470 / 3590	4580 / 6070	D / B	C / D
Paseo Blvd. to US 24/Independence Ave.	4	4	5220 / 3490	3610 / 3970	C / B	C / C
I-29/35 to I-70	3	3	3050 / 2000	1830 / 2050	C / B	B / B
I-35/70 Corridor	**WB**	**EB**	**WB / EB**	**WB / EB**	**WB / EB**	**WB / EB**
US 24/Independence Ave. to WB I-70 Ramp	2	2	2500 / 1490	2370 / 1920	D / B	C / C
Independence Ave. exit to M-9 entrance	3	3	4060 / 1990	2860 / 3300	D / B	C / C
Main Street exit to Main St. entrance	3	3	3480 / 1190	2780 / 1640	C / A	C / B
Broadway exit to Broadway entrance	2	2	2010 / 1480	1920 / 1245	C / B	C / B
I-70 west of Broadway	2	2	1680 / 2060	1690 / 1735	B / C	C / C

Source: HNTB Corporation. Level of service information based on *Highway Capacity Manual 2000*, Transportation Research Board.
* Weave analysis performed rather than basic freeway mainline analysis.

Table II-13
Build Concept 3 (Eight-Lane HOV) Year 2030 Freeway Mainline Level of Service
(AM and PM Peak Hour)

Location	No. of Lanes	No. of Lanes	AM Peak Hour Volumes	PM Peak Hour Volumes	AM Peak Hour LOS	PM Peak Hour LOS
I-29/35 Corridor	**SB**	**NB**	**SB / NB**	**SB / NB**	**SB / NB**	**SB / NB**
M-210/Armour Rd. to 16th Ave.	3+HOV	3+HOV	5300 / 3450	4510/ 6180	C / B	C / D
16th Ave. to Bedford Ave.	3+HOV + auxiliary	3+HOV	5710 / 3940	4840 / 6390	D / C	C / D
Levee Rd. to Front St.	3+HOV + auxiliary	3+HOV + auxiliary	5670 / 4200	4710 / 6110	D / C	C / D
Paseo Blvd. to US 24/Independence Ave.	3+HOV	3+HOV	4630 / 3670	3480 / 4170	C / C	C / C
I-29/35 to I-70	2	2	1880 / 2020	1370 / 2330	C / C	B / C
I-35/70 Corridor	**WB**	**EB**	**WB / EB**	**WB / EB**	**WB / EB**	**WB / EB**
US 24/Independence Ave. to WB I-70 Ramp	2	2	3060 / 1650	2450 / 1840	D / B	D / C
Independence Ave. exit to M-9 entrance	3	3	3610 / 1990	2590 / 2650	C / B	C / C
Main St. exit to Main St. entrance	3	3	3730 / 2950	2950 / 3230	D / C	C / C
Broadway exit to Broadway entrance	3	3	3230 / 3100	3460 / 2610	C / C	C / C
I-70 west of Broadway	2	2	1640 / 3100	1740 / 2610	B / D	C / D

Source: HNTB Corporation, Level of service information based on *Highway Capacity Manual 2000*, Transportation Research Board.

Traffic analysis of the weaving areas, ramp merge and diverge areas and LOS for the ramp terminals for the No-Build and build concepts was completed and is documented in the I-29/35 Traffic Technical Memorandum, which is available upon request. The *Highway Capacity Manual 2000* methodology was used to complete the analysis; plus, traffic model simulations were created and were used at interchange areas.

The traffic analysis suggests that beyond the year 2030, an eight-lane travel corridor is likely to be needed to improve upon the forecasted LOS E condition. For that reason, the build alternatives that allow for the ultimate widening of I-29/35 to eight lanes sometime in the future were carried forward as reasonable alternatives for further consideration in this EIS.

5. CRASH DATA AND ANALYSIS[1]

Crash information for this analysis was obtained through MoDOT's traffic management database and reports. The analysis of the existing crash rates and the existing and future No-Build amount of crashes by type is included in Chapter I – Purpose and Need. The analysis of the existing conditions provides a benchmark on which to evaluate the Build and No-Build forecasted safety measures and benefits. Crash data obtained from MoDOT has crashes categorized by severity: property damage only (PDO), injury and fatality.

Motorists in the No-Build Concept would be exposed to the same crash risk or rate that currently exists. To forecast the No-Build Concept's future year 2030 number of crashes, the assumption was made that the future I-29/35 corridor crash rates would not change when compared to existing conditions. Existing rates are listed in Chapter I – Purpose and Need. Because the No-Build Concept would keep the facility as is, no substantial improvements to safety and the design standards would occur to reduce the crash rates.

Because the rate at which the crashes occur remains the same as existing, but the amount of traffic using the facility increases, the total amount of crashes increases over time for the No-Build Concept. Table II-14 indicates the total amount of crashes by type that the No-Build Concept would expect in year 2030.

Table II-14
No-Build Concept Forecasted Average Annual Number of Crashes
(Year 2030)

Mainline Section	Property Damage	Injury	Fatal	Total
I-29/35 Corridor	**SB / NB**	**SB / NB**	**SB / NB**	**SB / NB**
North of M-210/Armour Rd. to north of 16th Ave.	203 / 211	80 / 53	0 / 0	283 / 264
North of 16th Ave. to north of Bedford Ave.	48 / 44	20 / 23	0 / 0	68 / 67
North of Bedford Ave. to north of Front St.	65 / 121	31 /39	0 / 0	96 / 160
North of Front St. to north of The Paseo Blvd.	139 / 380	38 / 107	1 / 0	178 / 487
North of The Paseo Blvd. to north of US 24/Independence Ave.	65 / 67	25 / 32	0 / 0	90 / 99
I-35/70 Corridor	**WB / EB**	**WB / EB**	**WB / EB**	**WB / EB**
North of Independence Ave. to west of Grand Ave.	156 / 177	46 / 64	0 / 0	202 / 241
West of Grand Ave. to west of Broadway	261 / 234	92 / 58	1 / 0	354 / 292
Total	**708**	**2,171**	**2**	**2,881**

Source: HNTB Corporation

[1] Accident statistics and safety data summarized or presented in this section are protected under federal law. See Appendix A.

The build concept crash rate methodology establishes the new and improved crash rate projections for the improved facility using the existing average statewide rates for urban interstates. The current crash rates for I-29/35 are greater than the statewide average (see Chapter I – Purpose and Need). The improved facility is assumed to improve safety and decrease crash rates, at a minimum to match current statewide average crash rates for urban interstates.

Where the existing I-29/35 Paseo Bridge is used in place, such as for Option 1, Companion to the Existing Bridge, the existing crash rate in that section was used, because no substantial improvements to safety and the design standards would occur to reduce the crash rates. Because the rate at which the crashes occur remains the same as existing, but the amount of traffic using the facility increases, the total amount of crashes increases over time in that section. For Option 2, new twin bridges or single bridge within same footprint or Option 3, New Single Bridge, new bridges would be constructed over the Missouri River, so updated safety and design standards would improve safety and decrease crash rates in the build concepts.

After these future rates were determined, they then were applied to the forecasted travel demand traffic volumes and the mainline section lengths to determine the number of projected crashes by type for each build concept. The results were then rounded to the nearest whole crash per each mainline segment. The build concepts could then be compared to the No-Build Concept to estimate the safety benefits.

The list below shows the build concepts' crash rates used when design standards are updated.

- Property Damage Only crash rate equals 87.3 crashes per hundred million vehicle miles traveled (HMVMT)
- Injury crash rate equals 34.0 per HMVMT
- Fatal crash rate equals 0.3 per HMVMT
- Total crash rate equals 121.6 per HMVMT

In general, the rate at which crashes occur reduces in the build concepts, but the amount of traffic using the facility increases, so a trade-off occurs when estimating the forecasted number of crashes. In this case, the total amount of crashes decreases over time for the build concepts, because the crash rate reduction compensated for the forecasted increases in traffic volumes. Tables II-15 through II-19 indicate the total amount of crashes by type that each build concept would expect in year 2030. Findings indicate that the design variations at the interchanges within the build concepts are negligible when forecasting future crash rates.

The crash analysis results shown in Tables II-17 and II-18 would have the same impacts on the forecasted number of crashes. The Build Concept 2 (eight-lane) with bridge Option 1 (Table II-16) would have similar results along the majority of the corridor, but for the segment containing the Missouri River Bridge, from Bedford Avenue to north of Front Street, crashes are shown to increase slightly. This is because no substantial improvements to safety and the design standards would occur to reduce the crash rates on the existing I-29/35 Paseo Bridge. For the Build Concept 3 (eight-lane HOV) (Table II-19), crashes are shown to be fairly similar to the results for Build Concept 2 (eight-lane) with bridge Options 2 and 3 (Tables II-17 and II-18), but slightly higher near the Missouri River crossing. The Build Concept 2 (six-lane) (Table II-15) is shown to have slightly less crashes than the other concepts because it has lower traffic volumes.

Table II-15
Build Concept 2 (Six-Lane) Forecasted Average Annual Number of Crashes
(Year 2030)

Mainline Section	Property Damage	Injury	Fatal	Total
I-29/35 Corridor	**SB / NB**	**SB / NB**	**SB / NB**	**SB / NB**
North of M-210/Armour Rd. to north of 16th Ave.	75 / 86	29 / 33	0 / 0	104 / 119
North of 16th Ave. to north of Bedford Ave.	63 / 69	24 / 27	0 / 0	87 / 96
North of Bedford Ave. to north of Front St.	67 / 72	26 / 28	0 / 0	93 / 100
North of Front St. to north of The Paseo Blvd.	61 / 64	24 / 25	0 / 0	85 / 89
North of The Paseo Blvd. to north of US 24/Independence Ave.	47 / 45	18 / 17	0 / 0	65 / 62
I-35/70 Corridor	**WB / EB**	**WB / EB**	**WB / EB**	**WB / EB**
North of Independence Ave. to west of Grand Ave.	62 / 47	24 / 18	0 / 0	86 / 65
West of Grand Ave. to west of Broadway	28 / 24	11 / 9	0 / 0	39 / 33
Total	**810**	**313**	**0**	**1,123**

Source: HNTB Corporation.

Table II-16
Build Concept 2 (Eight-Lane) with Bridge Option 1
Forecasted Average Annual Number of Crashes
(Year 2030)

Mainline Section	Property Damage	Injury	Fatal	Total
I-29/35 Corridor	**SB / NB**	**SB / NB**	**SB / NB**	**SB / NB**
North of M-210/Armour Rd. to north of 16th Ave.	84 / 97	33 / 38	0 / 0	117 / 135
North of 16th Ave. to north of Bedford Ave.	71 / 78	28 / 31	0 / 0	99 / 109
North of Bedford Ave. to north of Front St.	42 / 82	87 / 32	0 / 0	129 / 114
North of Front St. to north of The Paseo Blvd.	67 / 71	26 / 28	0 / 0	93 / 99
North of The Paseo Blvd. to north of US 24/Independence Ave.	53 / 50	20 / 19	0 / 0	73 / 69
I-35/70 Corridor	**WB / EB**	**WB / EB**	**WB / EB**	**WB / EB**
North of Independence Ave. to west of Grand Ave.	63 / 48	24 / 19	0 / 0	87 / 67
West of Grand Ave. to west of Broadway	28 / 24	11 / 9	0 / 0	39 / 33
Total	**858**	**405**	**0**	**1,263**

Source: HNTB Corporation.

Table II-17
Build Concept 2 (Eight-Lane) with Bridge Option 2
Forecasted Average Annual Number of Crashes
(Year 2030)

Mainline Section	Property Damage	Injury	Fatal	Total
I-29/35 Corridor	**SB / NB**	**SB / NB**	**SB / NB**	**SB / NB**
North of M-210/Armour Rd. to north of 16th Ave.	84 / 97	33 / 38	0 / 0	117 / 135
North of 16th Ave. to north of Bedford Ave.	71 / 78	28 / 31	0 / 0	99 / 109
North of Bedford Ave. to north of Front St.	76 / 82	30 / 32	0 / 0	106 / 114
North of Front St. to north of The Paseo Blvd.	67 / 71	26 / 28	0 / 0	93 / 99
North of The Paseo Blvd. to north of US 24/Independence Ave.	53 / 50	20 / 19	0 / 0	73 / 69
I-35/70 Corridor	**WB / EB**	**WB / EB**	**WB / EB**	**WB / EB**
North of Independence Ave. to west of Grand Ave.	63 / 48	24 / 19	0 / 0	87 / 67
West of Grand Ave. to west of Broadway	28 / 24	11 / 9	0 / 0	39 / 33
Total	**892**	**348**	**0**	**1,240**

Source: HNTB Corporation.

Table II-18
Build Concept 2 (Eight-Lane) with Bridge Option 3
Forecasted Average Annual Number of Crashes
(Year 2030)

Mainline Section	Property Damage	Injury	Fatal	Total
I-29/35 Corridor	**SB / NB**	**SB / NB**	**SB / NB**	**SB / NB**
North of M-210/Armour Rd. to north of 16th Ave.	84 / 97	33 / 38	0 / 0	117 / 135
North of 16th Ave. to north of Bedford Ave.	71 / 78	28 / 31	0 / 0	99 / 109
North of Bedford Ave. to north of Front St.	76 / 82	30 / 32	0 / 0	106 / 114
North of Front St. to north of The Paseo Blvd.	67 / 71	26 / 28	0 / 0	93 / 99
North of The Paseo Blvd. to north of US 24/Independence Ave.	53 / 50	20 / 19	0 / 0	73 / 69
I-35/70 Corridor	**WB / EB**	**WB / EB**	**WB / EB**	**WB / EB**
North of Independence Ave. to west of Grand Ave.	63 / 48	24 / 19	0 / 0	87 / 67
West of Grand Ave. to west of Broadway	28 / 24	11 / 9	0 / 0	39 / 33
Total	**892**	**348**	**0**	**1,240**

Source: HNTB Corporation.

Table II-19
Build Concept 3 (Eight-Lane HOV)
Forecasted Average Annual Number of Crashes
(Year 2030)

Mainline Section	Property Damage	Injury	Fatal	Total
I-29/35 Corridor	**SB / NB**	**SB / NB**	**SB / NB**	**SB / NB**
North of M-210 to north of 16th Ave.	81 / 93	32 / 36	0 / 0	113 / 129
North of 16th Ave. to north of Bedford Ave.	69 / 76	27 / 30	0 / 0	96 / 106
North of Bedford Ave. to north of Front St.	90 / 98	35 / 38	0 / 0	125 / 136
North of Front St. to north of The Paseo Blvd.	67 / 71	26 / 28	0 / 0	93 / 99
North of The Paseo Blvd. to north of US 24/ Independence Ave.	53 / 50	21 / 20	0 / 0	74 / 70
I-35/70 Corridor	**WB / EB**	**WB / EB**	**WB / EB**	**WB / EB**
North of Independence Ave. to west of Grand Ave.	63 / 47	25 / 18	0 / 0	88 / 65
West of Grand Ave. to west of Broadway	28 / 24	11 / 9	0 / 0	39 / 33
Total	**910**	**356**	**0**	**1,266**

Source: HNTB Corporation.

6. HIGH OCCUPANCY VEHICLE LANE ANALYSIS

The regional travel model was used to test the impacts of designating a lane for use by vehicles occupied by more than one person during peak periods. The results of the analysis are presented in this section.

The travel time differences between existing conditions, the Build Concept 2 (eight-lane), and the Build Concept 3 (eight-lane HOV) are listed in Table II-20. The results show that the future build concepts will reduce travel time on this segment by nearly two minutes from current conditions. The travel time differences provided by HOV lane use is shown to be small. The results do suggest that the HOV lane strategy in this segment alone will have limited effect in encouraging additional high occupancy vehicle travel.

Table II-20
HOV Lane Travel Time Comparison

Facility	Travel Time M-210 to NE Corner of Loop Peak Direction	
	AM (minutes)	PM (minutes)
Existing (Base Year 2003)	4.55	3.55
Build Concept 2 (eight-lane)	3.18	3.05
Build Concept 3 (eight-lane HOV)		
Mixed Use Lanes (only)	3.24	3.15
HOV Lanes (only)	2.95	2.77
All Lanes (average)	3.17	3.06

The impact of the HOV lanes on formation of carpools and vanpools is listed in Table II-21. The information shown in the table includes the number of high occupancy vehicles per day with and without HOV lanes, the daily percentage of HOV vehicles, and the average vehicle occupancy for each concept at the Missouri River crossing. The changes shown as a result of the HOV lane concept would occur during the peak periods and so the differences may be understated when reported by daily travel comparisons.

Table II-21
HOV Lane Vehicle Occupancy Comparison

Facility	HOVs	Percent*	Vehicle Occupancy
Build Concept 2 (eight-lane)	31,043	23%	1.53
Build Concept 3 (eight-lane HOV)	33,429	25%	1.58

*% of all passenger vehicle trips.

H. Reasonable Alternatives

This section describes the characteristics of the reasonable set of alternatives and includes the No-Build and the build concepts. The reasonable alternatives are comprised of various combinations of the mainline alignment, the bridge options and the feasible interchange types. For discussion purposes, the corridor has been subdivided into three separate subcorridors, as shown on Figure II-3. The subcorridors include the North Subcorridor from just north of the M-210/Armour Road interchange to just north of the Burlington Northern Santa Fe (BNSF) Railroad tracks at approximately 14th Avenue; the River Crossing Subcorridor from 14th Avenue to Dora Street, just south of the Front Street interchange; and the CBD North Loop Subcorridor from just south of the Front Street interchange, including the north leg of the loop to just west of the Broadway Boulevard interchange at the northwest corner of the loop.

The reasonable alternatives, by subcorridor, are summarized in the following section. A mainline typical section is shown in Exhibit II-1. A plan view of each Reasonable Alternative is included in Appendix C, Alternatives Plates.

1. NORTH SUBCORRIDOR

a. Reasonable Alternatives

The mainline includes the I-29/35 Corridor from just north of the M-210/Armour Road interchange to just north of the BNSF railroad tracks near 14th Avenue.

No-Build Alternative

The No-Build Alternative maintains the current typical section for the North Subcorridor. North of the M-210/Armour Road Interchange, the alignment of I-29/35 would remain with three through lanes in each direction of travel. Two through lanes in each direction would be carried through the M-210/Armour Road Interchange, as currently exists. Acceleration lanes, deceleration lanes and shoulders would remain essentially as currently constructed.

Build Alternative (Build Concept 2 or 3)

North of the M-210/Armour Road Interchange, the alignment of I-29/35 would remain with three through lanes in each direction of travel. The I-29/35 mainline lanes carried through the M-210/Armour Road interchange would be improved to three through lanes in each direction with an acceleration and deceleration lane at each entrance and exit ramp.

The mainline typical section would initially be constructed to accommodate six lanes with sufficient right-of-way to enable a future widening to eight lanes when warranted in the future. Three mainline through lanes are carried southbound through the 16th Avenue interchange. An auxiliary lane is included in both directions between the 16th Avenue interchange and the Bedford Avenue/Levee Road interchange in the River Crossing Subcorridor.

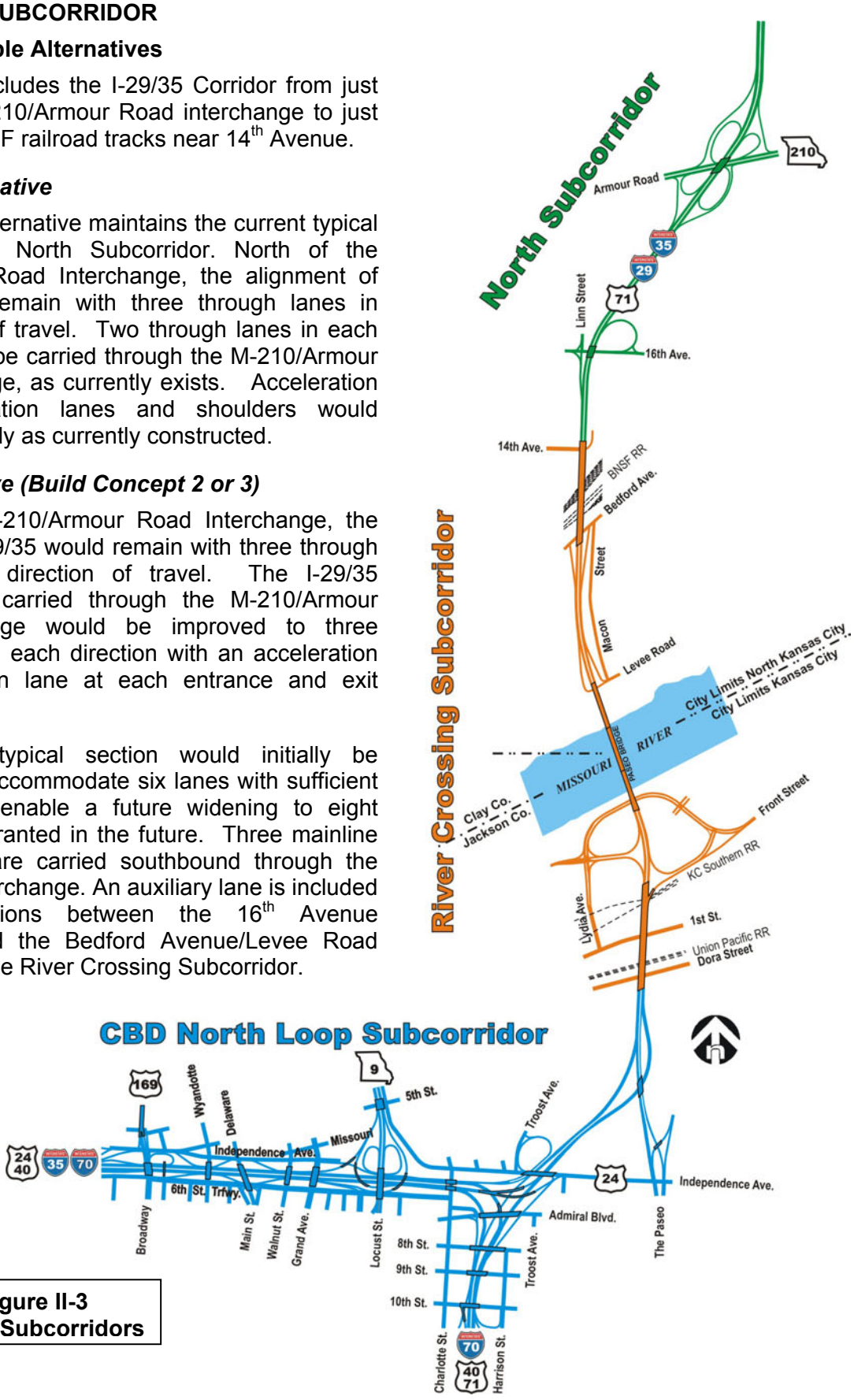


Figure II-3
I-29/35 Subcorridors

b. Interchange Features

The North Subcorridor includes two interchanges – M-210/Armour Road and 16th Avenue. For the No-Build Alternative, these interchanges would remain as currently configured. The interchange features associated with the Build Alternative are described below.

M-210/Armour Road

The M-210/Armour Road Interchange improvements would be the same for Build Concept 2 or 3. The offset diamond interchange type was shown to be feasible at this location and it is used to represent anticipated maximum construction limits in order to perform an impact assessment. This type of interchange would provide better separation between entering and exiting movements through a diamond configuration located under the I-29/35 mainline with three separate coordinated traffic signals. The Preferred Alternative Plates Build-01 and Build-02 in Appendix C show the construction limits and conceptual design of the Build Alternative at M-210/Armour Road. The final determination as to the preferred interchange type will not be completed until the design-build phase of the project.

If an offset diamond was constructed at the M-210/Armour Road interchange, it would have the following features. Westbound and eastbound M-210/Armour Road to northbound I-29/35 would provide additional turn lanes and through lanes on M-210/Armour Road in the interchange area. East of the interchange area, the M-210/Armour Road mainline would match the existing lanes. Access management would be used as the Taney Road signalized intersection would be closed, however it would still allow traffic traveling northbound on Taney Road to turn onto eastbound M-210/Armour Road through a right-in, right-out configuration.

With the off-set interchange type, the I-29/35 northbound and southbound exit ramps to eastbound and westbound M-210/Armour Road would be controlled by the middle signal, located under the I-29/35 mainline bridge. In this concept, the I-29/35 northbound exit ramp would provide free flow right-turn lanes onto eastbound M-210/Armour Road and left turn lanes onto westbound M-210/Armour Road. The I-29/35 southbound exit ramp has a similar configuration. It consists of a free flow right-turn lane onto westbound M-210/Armour Road and left turn lanes onto eastbound M-210/Armour Road. The M-210/Armour Road mainline provides additional lane capacity to accommodate anticipated travel demands.

Westbound and eastbound M-210/Armour Road to southbound I-29/35 would be controlled by the westernmost signal and would provide left-turn lanes and through lanes on westbound M-210/Armour Road and a right-turn lane and through lanes on eastbound M-210/Armour Road. West of the interchange, the M-210/Armour Road would provide westbound through lanes to the intersection with Ozark Road where the lanes transition to match the existing mainline section. Ozark Road would be unsignalized, but would continue to provide right-in, right-out access.

16th Avenue

The 16th Avenue Interchange improvements would be the same for all of the build alternatives. The build alternative for the interchange includes constructing a half-diamond interchange providing access to-and-from the south. This interchange type was chosen in order to perform an impact analysis as it is compatible with planned development in the vicinity of the interchange. This footprint would not be compatible with other interchange types. The Preferred Alternative Plate Build-03, included in Appendix C, shows the layout for the 16th Avenue Build Alternative.

2. RIVER CROSSING SUBCORRIDOR

a. Reasonable Alternatives

The mainline includes the I-29/35 Corridor from just north of the BNSF railroad tracks near 14th Avenue to just south of the Front Street interchange at Dora Street. The River Crossing Subcorridor includes the Paseo Bridge crossing of the Missouri River. The three river crossing options result in comparison of three build alternatives in the River Crossing Subcorridor. These reasonable alternatives are labeled as River Crossing Alternatives A, B and C. Alternatives A and B have the same project footprint. Alternative C has a project footprint that is shifted further downstream.

The mainline improvements for the River Crossing Subcorridor would be generally the same for the River Crossing Subcorridor Alternatives, the only difference being the centerline shifts at the Paseo Bridge crossing location with each bridge option.

No-Build Alternative

The No-Build Alternative maintains the current typical section for the River Crossing Subcorridor. The I-29/35 mainline is two lanes in each direction of travel. Acceleration and deceleration lanes currently exist between the 16th Avenue, Bedford Avenue/Levee Road and the Front Street and Paseo interchanges, and would be maintained.

Under the No-Build Alternative, I-29/35 would remain in its present configuration, and would utilize existing bridges. This alternative only includes minor short-term safety and maintenance activities, including pavement overlays, routine maintenance and bridge repair. The No-Build Alternative will include a major Paseo Bridge rehabilitation to replace the deck, replace and strengthen select floor system steel and rehabilitate and replace select suspenders. The in-depth rehabilitation would need to be completed by 2020 and would extend the life of the bridge 35 years.

River Crossing Alternative A

River Crossing Alternative A is made up of Build Concept 2 or 3 and bridge Option 1. In this alternative a continuous auxiliary lane northbound and southbound is shown between the 16th Avenue interchange and the Bedford Avenue/Levee Road interchange. An auxiliary lane is also shown for the northbound and southbound directions between Front Street and Bedford Avenue/Levee Road. Use of the existing Paseo Bridge (Option 1) for southbound travel would not allow an auxiliary lane south of the Bedford Avenue/Levee Road interchange across the existing I-29/35 Paseo Bridge if the I-29/35 mainline were widened to eight lanes. The other auxiliary lanes are assumed to remain as stated above if and when the I-29/35 mainline is expanded to Build Concept 2 or 3 (eight-lane).

This alternative consists of rehabilitating the existing I-29/35 Paseo Bridge and converting it to one-way southbound operations. The existing bridge has sufficient width to provide four twelve-foot lanes and two four-foot shoulders (see Exhibit II-2). Due to width constraints on the existing bridge, a design exception would be required for the shoulder widths on the existing Paseo Bridge. A new companion bridge would then be constructed immediately adjacent to and downstream of the existing bridge. This alternative would potentially provide up to nine lanes over the Missouri River when including the eight-lane configuration of Build Concept 2 or 3 and the auxiliary lanes. River Crossing Alternative A can be seen on the Preferred Alternative Plates A-01 through A-04 in Appendix C.

River Crossing Alternative B

Build Concept 2 or 3 and bridge Option 2 make up River Crossing Alternative B. In this alternative, a continuous auxiliary lane northbound and southbound is shown between the 16th Avenue interchange and the Bedford Avenue/Levee Road interchange. An auxiliary lane is also shown for the northbound and southbound direction between Front Street and Bedford Avenue/Levee Road.

This alternative initially only included the construction of two new twin bridge structures, with one bridge (constructed in the right-of-way of the existing Paseo Bridge) carrying the southbound traffic and one bridge (constructed downtown stream of the existing bridge) carrying the northbound traffic. The decision to place the footprint of the twin structures in this position came as a primary result of the desire to minimize impacts associated with hazardous material sites located on the west side of I-29/35 north of the Missouri River. Further discussion with stakeholders provided the idea of constructing one larger bridge, rather than two bridges within this same project footprint. As such, River Crossing Alternative B provides the flexibility to construct one larger bridge or two smaller twin bridges within this same project footprint. Although within the same footprint, there are potential differences in aesthetics, maintenance of traffic during construction (one larger bridge would require the total closure and demolition of the existing bridge during construction) and ease of bridge inspection. Alternative B would potentially provide up to eight lanes over the Missouri River plus the auxiliary lanes. River Crossing Alternative B can be seen on the Preferred Alternative Plates B-01, B-02, B1-03 and B1-04 (or B2-03 and B2-04) in Appendix C.

River Crossing Alternative C

River Crossing Alternative C is made up of Build Concept 2 or 3 and bridge Option 3. In this alternative, auxiliary lanes northbound and southbound are shown between the 16th Avenue interchange and the Bedford Avenue/Levee Road interchange. Auxiliary lanes are also shown for the northbound and southbound direction between Front Street and Bedford Avenue/Levee Road.

This alternative includes the construction of one new bridge downstream of the existing bridge carrying both northbound and southbound traffic. This alternative would potentially provide up to ten lanes over the Missouri River when the auxiliary lanes are added to Build Concept 2 or 3 (eight-lane). River Crossing Alternative C can be seen on the Additional Build Alternatives Plates C-01 through C-04 in Appendix C.

b. Interchange Features

The River Crossing Subcorridor includes two interchanges – Bedford Avenue/Levee Road and Front Street. For the No-Build Alternative, these interchanges would remain as currently configured. The interchange features associated with the build alternatives are described below. The footprints associated with the interchange concepts described represent the maximum footprint for the interchanges defined to be reasonable. The footprint does not accommodate the interchange types evaluated and eliminated from further consideration.

Bedford Avenue/Levee Road

At this location, one interchange type is assumed in all of the River Crossing Alternatives. Represented are braided ramps where Levee Road and Bedford Avenue would continue to be served for both directions of travel. This interchange type was assumed in order to perform an impact analysis. Levee Road would continue to be served by a half-diamond to-and-from the north with a modified ramp configuration to accommodate ramps for Bedford Avenue through this “braided” configuration. An auxiliary lane is shown southbound between 16th Avenue and

the Bedford Avenue/Levee Road interchange, but a continuous auxiliary lane would not be provided northbound. The Bedford Avenue/Levee Road interchange can be seen on the Preferred Alternative Plates A-01, A-02, B-01 and B-02 in Appendix C.

Front Street

There are two interchange types shown at Front Street -- an Existing Configuration Modified and a Single Point Urban Interchange. These interchange types were assumed in order to conduct the impact analysis. The final interchange configuration for Front Street will be determined as part of the design-build process and may or may not include one of these two interchange types.

- *Existing Configuration Modified (B1)* – This interchange type can be used with the River Crossing Alternative A and B. This interchange type cannot be used with River Crossing Alternative C due to vertical profile differences between Front Street and the bridge crossing. The Existing Configuration Modified retains the unconventional form of a diamond interchange for the entrance and exit ramps, but it provides improved ramp geometrics and operations, as well as improved intersection geometrics and connections at Lydia Avenue/Front Street and for Front Street near the Isle of Capri Casino. The Existing Configuration Modified interchange at Front Street can be seen on the Preferred Alternative Plates A-03, A-04, B1-03 and B1-04 in Appendix C.

- *Single Point Urban Interchange (B2)* – This interchange type could be used in conjunction with River Crossing Alternative B and C. The Single Point Urban Interchange would have one signal for interchange operation located under the I-29/35 mainline bridge. The access and connectivity of Front Street is improved by reconstructing it as a continuous east-west four-lane arterial through the interchange. The Front Street/Lydia intersection would be reconfigured as a T-intersection. In addition, the intersection connection for Front Street and the casino access road would remain open. The Single Point Urban Interchange at Front Street can be seen on the Preferred Alternative Plates B2-03 and B2-04 in Appendix C. It can also be seen in Appendix C on Additional Build Alternatives Plates C-03 and C-04.

3. CBD NORTH LOOP SUBCORRIDOR

a. Reasonable Alternatives

The mainline includes the I-29/35 Corridor from just south of the Front Street interchange at Dora Street to just southwest of the Broadway interchange. There are two CBD North Loop build alternatives. These alternatives are labeled as CBD North Loop Alternatives A and B. Because of the interrelationship of the mainline, frontage roads and interchanges within the CBD North Loop, all are described together as part of each. Phasing of the CBD Loop improvements will depend on examination of the needs and available funding.

No-Build Alternative

The No-Build Alternative maintains the current typical section and lane configurations for the CBD North Loop Subcorridor. South of the Front Street Interchange, the I-29/35 mainline is currently two through lanes in each direction. The mainline remains two through lanes in each direction until just south of Paseo Boulevard at the I-35/I-70/US 71 split at the northeast corner of the CBD Loop, where I-35 transitions into a one-lane ramp to and from the north leg of the CBD Loop. Within the north leg of the CBD Loop, the I-35 mainline is generally three through lanes in each direction and shares the freeway mainline with I-70 and US 24/40. For the No-Build Alternative, the interchanges would remain as currently configured.

CBD North Loop Alternative A

Between the Front Street interchange and the northeast corner of the CBD Loop, the I-29/35 mainline would use Build Concept 2 or 3. A continuous auxiliary lane is shown for both southbound and northbound between Front Street and Paseo Boulevard.

Build Concept 2 or 3 would be used south of Paseo Boulevard. Traveling southbound, the mainline would split at the northeast corner of the CBD Loop into two lanes to I-35 south and two lanes to I-70 east /US 71 south. The northeast corner of the Loop is the terminus of I-29. Traveling northbound, the mainline would retain its current configuration with three through lanes in each direction. Improvements to the mainline continue onto the east leg of the CBD Loop by shifting the southbound lanes to the west in order to eliminate a weave at the 11th Street exit ramp.

Interchange Features – The footprints associated with the interchange concepts described represent the maximum footprint for. the interchanges defined to be reasonable. The footprint does not accommodate the interchange types evaluated and eliminated from further consideration.

- *Paseo Boulevard* – The Paseo Boulevard interchange type would be the same for both of the build alternatives. The build alternative for the interchange includes converting the existing left entrance and exit to a more typical right entrance and exit. The interchange would continue to provide partial access to and from the north to I-29/35. The ramps are configured to tie into either the existing or proposed new Paseo Boulevard alignment, approved by the Kansas City Parks and Recreation Department. Auxiliary lanes are shown between the Paseo Boulevard and the Front Street interchange. The final interchange configuration will not be made until the design-build phase of this project and could include the use of left-hand entrance and exit ramps.

- *US 24/Independence Avenue with Loop On-Ramp* – This interchange would remain as currently configured.

- *M-9* – This interchange would remain as currently configured.

- *Main Street* – This interchange would remain as currently configured.

- *Broadway Boulevard* – This interchange type includes converting the existing unconventional interchange at Broadway to a Single Point Urban Interchange (SPUI). All traffic through the interchange would then be controlled by one centralized signal. Under this concept, Independence Avenue and 6th Street frontage roads would not allow traffic to continue across the Broadway Boulevard interchange. The traffic would be limited to right or left turn operation.

Appendix C Additional Build Alternatives Plates A-05 through A-09 show the mainline improvements for the north leg of the CBD Loop and the interchanges at Paseo Boulevard and Broadway Boulevard.

CBD North Loop Alternative B

The mainline concept in Alternative B is the same as for Alternative A. Alternative B differs from Alternative A in that it extends the frontage road system to provide for improved access between the north CBD Loop and I-29/35. Access to the CBD is provided prior to entering the CBD Loop which leads to simplified traffic operations. US 24 would be extended west to connect across M-9. Sixth Street would be modified to provide a continuous frontage road on the south side of the freeway with a direct ramp connection to northbound I-29/35.

Plan plates for Alternative B are shown on Preferred Alternative Plates B-05 through B-09 in Appendix C.

Interchange Features – The footprints associated with the interchange concepts described represent the maximum footprint for the interchanges defined to be reasonable. The footprint does not accommodate the interchange types evaluated and eliminated from further consideration.

- *Paseo Boulevard* – Same as CBD North Loop Alternative A.
- *US 24/Independence Avenue with Loop On-Ramp* – The existing westbound US 24/Independence Avenue on-ramp to I-35 southbound would be removed under the M-9 Box Diamond Alternative. The existing loop ramp would be replaced with an I-29/35 southbound exit ramp connecting to US 24/Independence Avenue. US 24/Independence Avenue would then connect directly to M-9 through a continuous frontage road located parallel to the I-35/70 mainline to the north side. At Charlotte Street, the US 24/Independence Avenue would transition to westbound one-way traffic operation. Access to I-35 southbound and US 24/I-70 westbound is shown at an entrance ramp at Main Street. In addition, the access from I-35 northbound to US 24/Independence Avenue would be maintained.
- *M-9* – A Box Diamond interchange type is shown for the M-9 interchange. Within this build alternative, the directional interchange at M-9 is converted into a Box Diamond configuration with four separate signalized intersections. The continuous westbound frontage road would extend through the M-9 Box Diamond intersection. The frontage road forms the north side of the M-9 Box Diamond. South of the freeway mainline, 6th Street operates as an eastbound frontage road forming the south side of the M-9 Box Diamond.

  As a part of this alternative, a new ramp to northbound M-9 is added, connecting onto the Independence Avenue frontage road, to provide service from the east leg of the CBD Loop for I-70 westbound traffic. A new access ramp from the 6th Street frontage road to I-70 eastbound/US 71 southbound is added near the Cherry Street intersection.

  Preferred Alternative Plate B-07 in Appendix C shows the configuration of the M-9 Box Diamond Alternative.
- *Main Street* – Traffic would enter the I-35 southbound/I-70 westbound/US 24 westbound mainline via a relocated ramp at Main/Delaware Street. Traffic would exit the I-35 northbound/I-70 eastbound/US 24 eastbound mainline via a ramp connection at Main/Delaware Street and traffic to M-9 northbound would take the 6th Street frontage road to the M-9 intersection. Access to the I-35/I-70 freeway mainline to-and-from the north would have access to the River Market via new ramps to-and-from Grand Avenue.
- *Broadway Boulevard* – Same as CBD North Loop Alternative A.

b. CBD North Loop Urban Design Elements

As part of the build alternatives for the CBD North Loop, opportunities for corridor enhancements or urban design elements were investigated. These ideas could be explored by MoDOT or by the City of Kansas City as part of the Context Sensitive Design approach. Enhancements are aspects of a transportation facility that give it aesthetic value, such as landscaping, lighting, signs, and the shape, color and texture of bridges, retaining walls and other barriers. At this time, ideas for urban design elements are preliminary and intended to identify general ideas for improvements that could be incorporated, as well as serve as a

starting point for on-going local discussions about urban design enhancements to better connect the CBD to the River Market and Columbus Park areas, if funding by others becomes available for such enhancements.

MoDOT has considered a range of possible enhancements that could be applied to the CBD North Loop Subcorridor to complement the character of the area and enhance its visual quality. Some of the types of urban design elements being considered include the following:

- ***Creating Community Bridges*** – This could entail surface treatments to certain bridges and barriers between the CBD and the River Market/Columbus Park areas to enhance their visual quality and aesthetics. This may be done through widening the bridges, improving sidewalks, and lighting to make them more accessible and attractive to bicycle and pedestrian traffic.

- ***Narrowing Frontage Roads*** – This could entail relocating the Independence Avenue and 6th Street frontage road closer to the North CBD Loop freeway to provide the opportunity for new development to occur between the frontage road and adjacent properties in Downtown and the River Market/Columbus Park neighborhoods. This would provide improved opportunities for landscaping and bicycle and pedestrian mobility, as well as provide more separation from frontage road traffic and the resulting safety, noise and air quality concerns.

- ***Creating a "Deck" over the North Loop*** – This could entail enclosing or creating a "deck" over the north leg of the loop in order to provide better connectivity between the CBD and the River Market/Columbus Park neighborhoods and attractions. This option could provide opportunities to enhance the visual quality and aesthetics of the north loop through a wide range of enhancements, including green space, landscaping, bicycle and pedestrian sidewalks and pathways, lighting and other special urban design elements.

Figure II-4 and Exhibit II-4 at the end of this chapter show some example renderings of possible urban design elements that could be incorporated as part of the build alternatives.

Figure II-4
CBD North Loop Urban Enhancement Options

At this time, costs for incorporating and integrating urban design elements into the build alternatives is not included in the overall construction cost estimates for the CBD North Loop Subcorridor. Sources of funding for enhancements could include establishing joint ventures and partnerships with the local community, property owners and state agencies.

I. Cost Analysis

1. CONSTRUCTION COST

The total construction cost for the reasonable alternatives include right-of-way acquisition costs, relocation costs, and design, administration and construction costs. These cost estimates are preliminary and reflect level of detail commensurate with this EIS. For comparison purposes these estimates reflect the costs of Build Concept 2 or 3 (eight-lane). The costs used in this comparison are for an eight through lane configuration. The proposed action is to construct six through lanes initially. Costs developed for a six-lane alternative (Build Concept 2 or 3) from M-210 to the northeast corner of the CBD Loop are included in Appendix D. The cost estimates were determined using standard unit costs for estimated construction items in year 2005 dollars. These construction quantities were based on conceptual designs and planning-level mapping and topography. A more detailed construction cost estimate will be completed as a part of the subsequent design development. Table II-22 summarizes the total construction costs for each of the build alternatives. For a more detailed summary of the construction cost estimates, refer to Appendix D.

Table II-22
Build Alternatives Estimated Construction Costs
(Year 2005 Dollars)*

Alternatives	Roadway Cost ($M)		Missouri River Bridge Cost ($M)	Right-of-Way / Relocation Cost ($M)	Design & Administration ($M)		Total Cost ($M)	
	Low End	High End			Low End	High End	Low End	High End
North Subcorridor								
Build Alternative	$40.7	$42.0	$0.0	$1.4	$9.0	$9.2	$51.1	$52.6
River Crossing Subcorridor								
Alternative A	$52.6	$73.7	$49.1	$3.8	$11.6	$16.2	$117.1	$142.8
Alternative B-1	$54.2	$75.3	$54.4	$3.8	$11.9	$16.6	$124.3	$150.1
Alternative B-2	$62.3	$83.4	$54.4	$4.1	$13.7	$18.3	$134.5	$160.2
Alternative C	$62.3	$83.3	$54.4	$8.4	$13.7	$18.3	$138.8	$164.4
CBD North Loop Subcorridor								
Alternative A	$36.5	$36.5	$0.0	$1.0	$8.0	$8.0	$45.5	$45.5
Alternative B	$63.7	$63.7	$0.0	$1.0	$14.0	$14.0	$78.7	$78.7

*Costs shown are for the ultimate eight-through lane configuration.

Roadway costs reflect a low end and high end cost. The low end costs assume that some of the existing structures can be utilized in the proposed improvement. The high end cost assumes that all existing structures will be replaced as part of the proposed improvement. Roadway costs include pavement, base, drainage, earthwork, retaining walls, mainline and overpass bridges, with the exception of the river bridge which is broken out separately.

The Missouri River Bridge costs reflect the low end cost of the bridge for each alternative. The limits of the construction cost estimate, for the purpose of this study, match the 1,825 foot limits of the existing Paseo Bridge and approaches. For River Crossing Subcorridor Alternative A the

cost to rehabilitate the existing Paseo Bridge in the year 2020 is included. For River Crossing Subcorridor Alternatives B and C the cost of demolishing the existing Paseo Bridge is included. The construction cost estimate is limited to the cost of the Paseo Bridge over the Missouri River and approach bridges, but it does not include right-of-way, roadway, embankment, pavement, maintenance, engineering services, construction supervision, etc.

Right-of-way costs shown include right-of-way acquisition and relocation costs, as well as the cost for a solution to access elimination, and parking impacts.

The costs shown for design and administration have been determined as a percentage of the total construction cost and include 12 percent of the construction cost for the engineering, two percent for construction staking and eight percent for construction inspection. The range of cost shown is reflective of the range in the construction cost.

The total range of estimated costs (2005 dollars) for the build alternatives (Build Concepts 2 or 3 – eight-lane) range from $221 million to $292 million without the additional $50 million provided to enable a landmark bridge structure. Including that amount, the total costs would range from $271 million to $342 million. The low cost assumes the low end costs for the North Subcorridor, the low end cost for Alternative B-1 in the River Crossing Subcorridor and Alternative A in the CBD North Loop Subcorridor. The high cost assumes the high end costs for the North Subcorridor, Alternative B-2 in the River Crossing Subcorridor and Alternative B in the CBD North Loop Subcorridor.

2. REHABILITATION, OPERATIONS AND MAINTENANCE COSTS

Table II-23 presents the rehabilitation, operations and maintenance cost comparison for the No-Build and build alternatives by subcorridor for a 30-year period. These estimates assume that the No-Build Alternative remains as a four lane facility with only rehabilitation to be completed on a 10-year cycle for pavement and bridges beginning in 2010 and a major rehab for the river bridge in 2020. For comparison purposes, the costs from the build alternatives shown in the table assumes the ultimate construction of eight through lanes with new roadway and bridge construction by 2010 including a new river bridge or bridges. Operation and Maintenance of $26,520 per annual lane mile (four-lane) and $35,179 per annual lane mile (eight-lane) have been used to estimate the cost to operate and maintain the interstate highway. The operation and maintenance cost shown is a result of increasing the annual cost per lane mile by two percent a year for a 30-year period. The present value of the annual costs is assumed at a six percent discount rate.

Table II-23
Rehabilitation and O&M Cost Comparison

Alternatives	RDWAY & BRIDGE 30 yr. Rehab, O & M	RIVER BRIDGE 30 yr. Rehab, O & M	TOTAL 30 yr. Rehab, O & M	PRESENT VALUE (6% Discount Rate)
No-Build				
North Subcorridor	$18.0 M	N/A	$18.0 M	$10.1 M
River Crossing	$17.3 M	$12.8 M	$30.1 M	$15.4 M
CBD North Loop	$31.7 M	N/A	$31.7 M	$17.8 M
Build				
North Subcorridor	$0.8 M	N/A	$0.8 M	$0.3 M
River Crossing	$0.9 M	$2.9 M	$5.7 M	$0.9 M
CBD North Loop	$0.7 M	N/A	$0.7 M	$0.3 M

J. Preferred Alternative

The engineering, traffic, environmental, social and economic impacts of each alternative within each subcorridor were evaluated and compared. The combination of the best subcorridor alternatives formed the Preferred Alternative for the project. MoDOT will be reviewing this alternative for efficiencies during the design process.

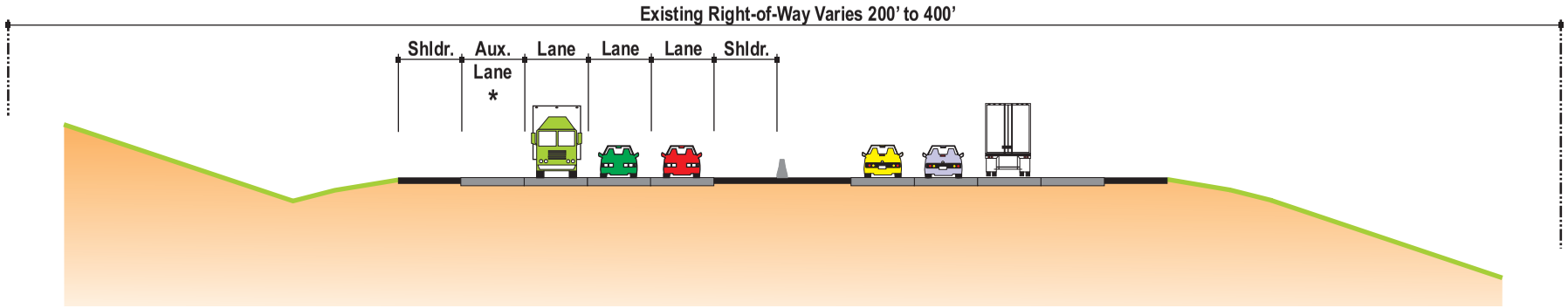
The Missouri Department of Transportation (MoDOT) and the Federal Highway Administration (FHWA) are considering use of the ***Design-Build process***, rather than the Design-Bid-Build process, to yield transportation solutions for the needs identified and studied in this Environmental Impact Statement (EIS). The Design-Build process allows design of the facility and construction to take place simultaneously by a contractor chosen to design and build the project, in this case, for a specified cost. In a typical Design-Build project, construction begins when about 30 percent of the total design is completed. Time savings and innovation are two advantages of Design-Build. The solutions proposed in this EIS are intended to represent a "worst-case" yet reasonable scenario for likely impacts of the project, offering a footprint within which any number of reasonable options might be proposed.

The alternatives offered in the EIS do not limit the proposals the Design-Build contractor can suggest. For example, the specific layout of the I-29 ramps for Paseo Boulevard might retain a left-hand exit, as is current, rather than the right-hand exit shown in the EIS. The interchange layouts for the Front Street and the Route 210 interchanges might differ from the layouts examined in this EIS. However, the footprint used within the EIS for environmental analysis is expected to accommodate the alternatives that the Design-Build contractor proposes. Reasonable proposals from the contractor will be examined to assure we have considered their impacts and also to confirm their ability to meet the purpose and need of the project in a safe and effective manner. Public involvement about the chosen alternative(s) and its specific details is expected as the Design-Build process progresses.

We will continually monitor and assess the proposed Design-Build alternative to make sure it does not introduce significant impacts that aren't covered in the approved NEPA document.

Exhibit S-2 and Exhibits IV-1 through IV-3, Summary of Impacts, provides an overall comparison of the engineering, environmental and social/economic benefits and impacts of the project alternatives. Wherever possible, these key factors that define and characterize the alternatives have been evaluated using quantifiable measures. In other cases, more subjective assessments have been summarized using a rating scale. These evaluations are based on the investigations and assessments documented in this EIS. In developing these alternatives and determining their respective impacts, all reasonable measures were incorporated to avoid, minimize and mitigate their adverse impacts.

The recommendation of the Preferred Alternative is based upon three primary considerations – the effectiveness of the alternative in accomplishing the goals of the proposed action (i.e. Purpose and Need); the comparison of the alternative's overall social, economic and environmental impacts and benefits; and input from the public and review agencies. The preferred alternative is the combination of the individual preferred subcorridor alternatives. Based upon the satisfaction of the purpose and need, overall social, economic and environmental impacts and benefits, and input from the public and review agencies, it is recommended that the **combination of the North Build Alternative, River Crossing Build Alternative A or B (B-1 or B-2) and North CBD Loop Build Alternative B** be identified as the Preferred Alternative. The total costs of the Preferred Alternative improvements from M-210 to Broadway for the eight-lane configuration are estimated to range from $271 million to $342 million including the funds for the landmark bridge crossing. The final selection of an alternative will not be made until after consideration of impacts, agency comments and location public hearing comments, following approval of the Final EIS.



NOTE: This typical section is representative of the Widen to 6 Through Lanes / Reserve 2 Additional OR the Widen to 6 Lanes / Reserve 2 Additional for HOV.

*Auxiliary lanes as needed.

Roadway Typical Section

EXHIBIT II-1

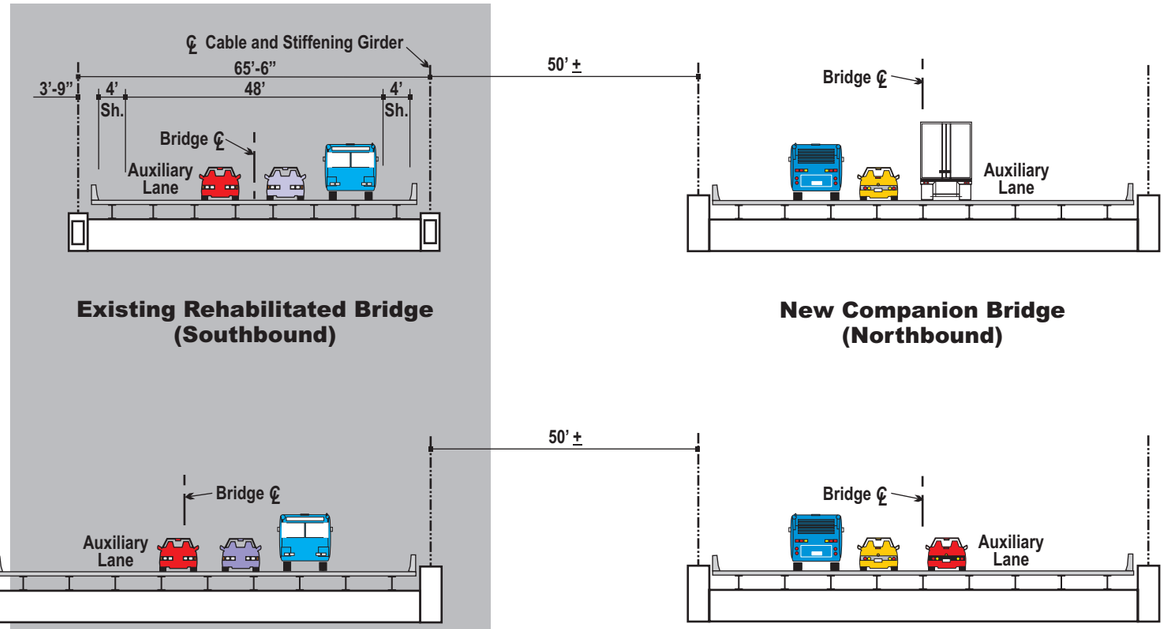
Environmental Impact Statement

Environmental Impact Statement

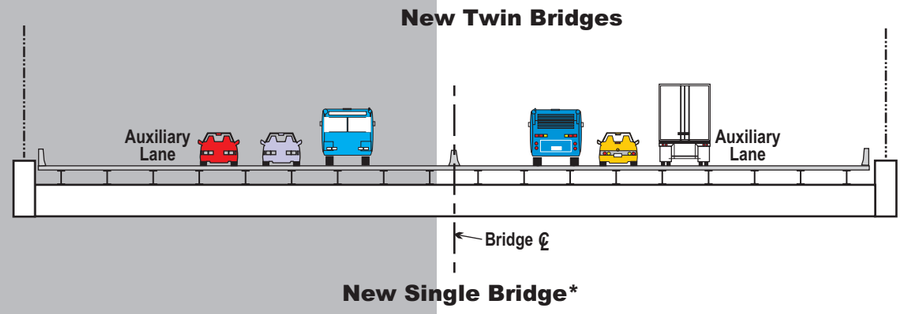
EXHIBIT II-2

Missouri River Bridge Options

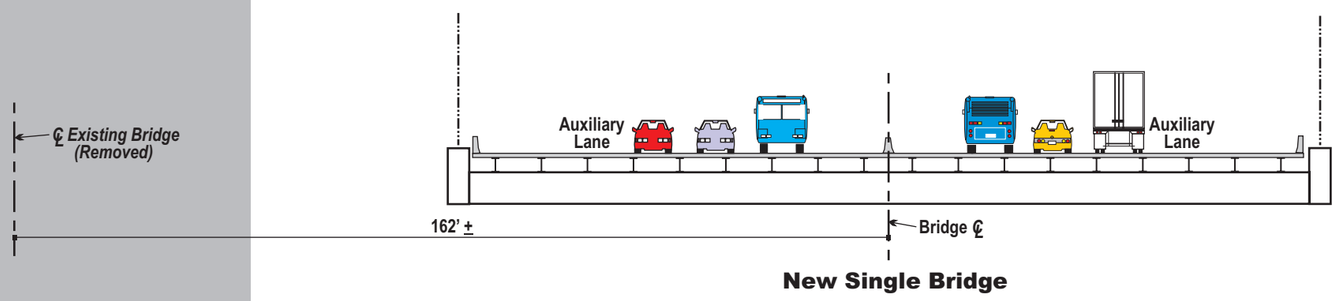
Option 1



Option 2 { New Twin Bridges OR New Single Bridge



Option 3



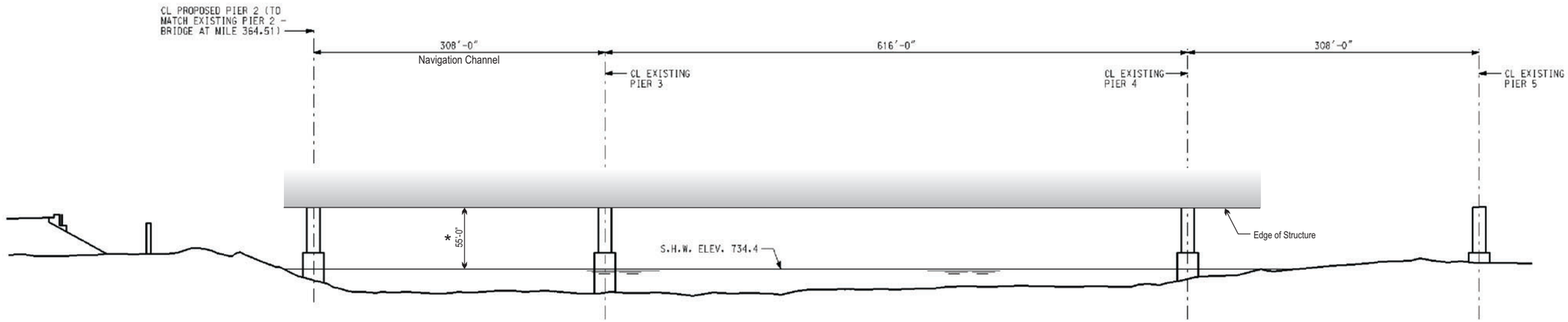
Existing Right-of-Way

*The exact horizontal location will be determined during the Design-Build process.

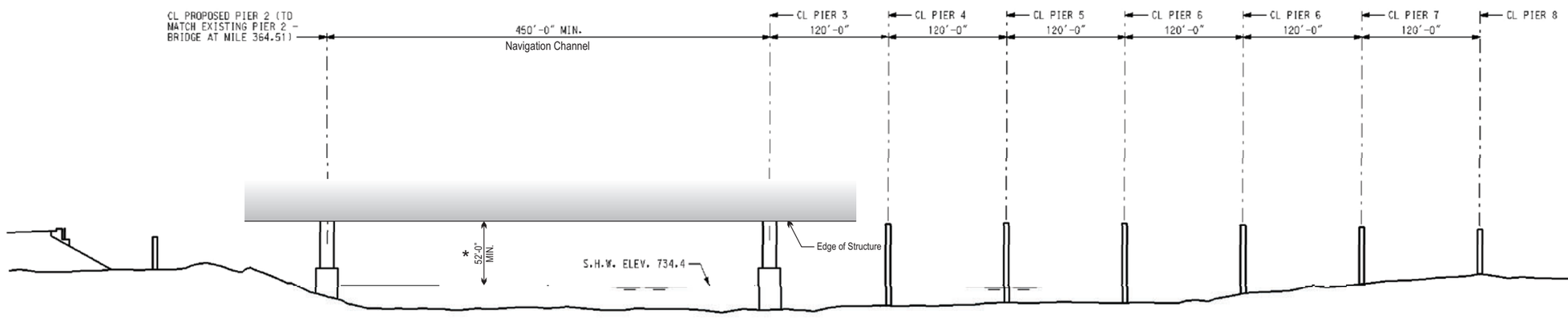
Environmental Impact Statement

EXHIBIT II-3

Paseo Bridge Pier Locations



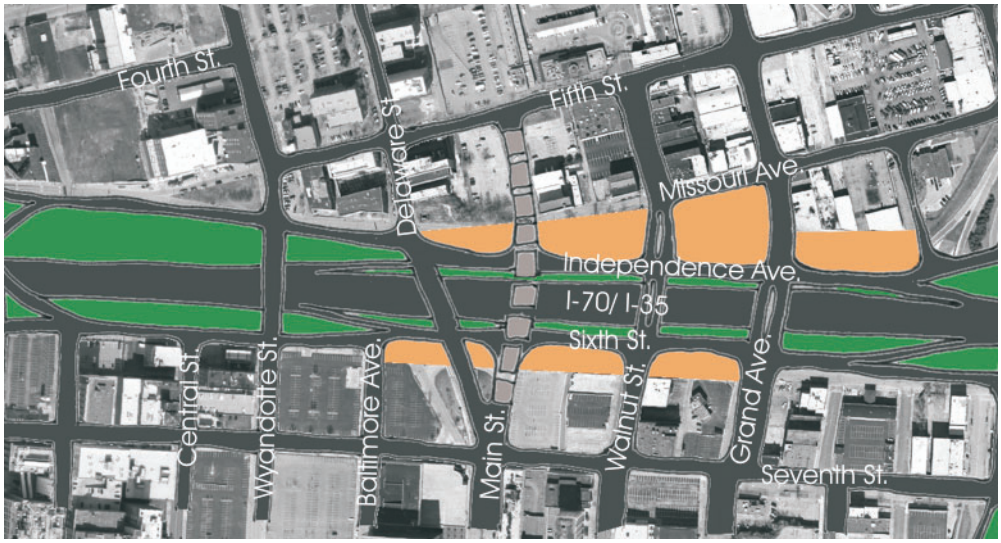
Alternative A
(Looking Upstream)



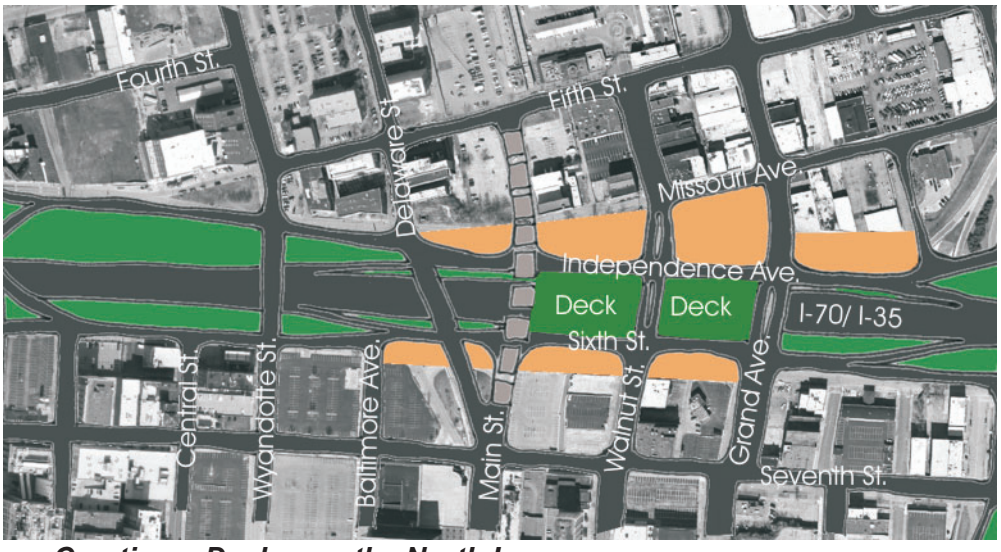
Alternative B or C
(Looking Upstream)

* NOTE: The USCG has recommended that the vertical clearance to the superstructure for all of the options will be fifty-five feet (55') above the standard high water elevation of 734.4 feet mean sea level over the navigation channel. However, the possibility exists that the USCG would approve matching the M-9/Heart of America Bridge which has fifty-two feet (52') of vertical clearance from the 2% flow line elevation of 733.1 feet mean sea level. Any such modification would need to be approved by the USCG before it could be incorporated into the project design.

Creating Community Bridges



Narrowing Frontage Roads



Creating a Deck over the North Loop

Environmental Impact Statement

EXHIBIT II-4

CBD North Loop Urban Enhancement Options