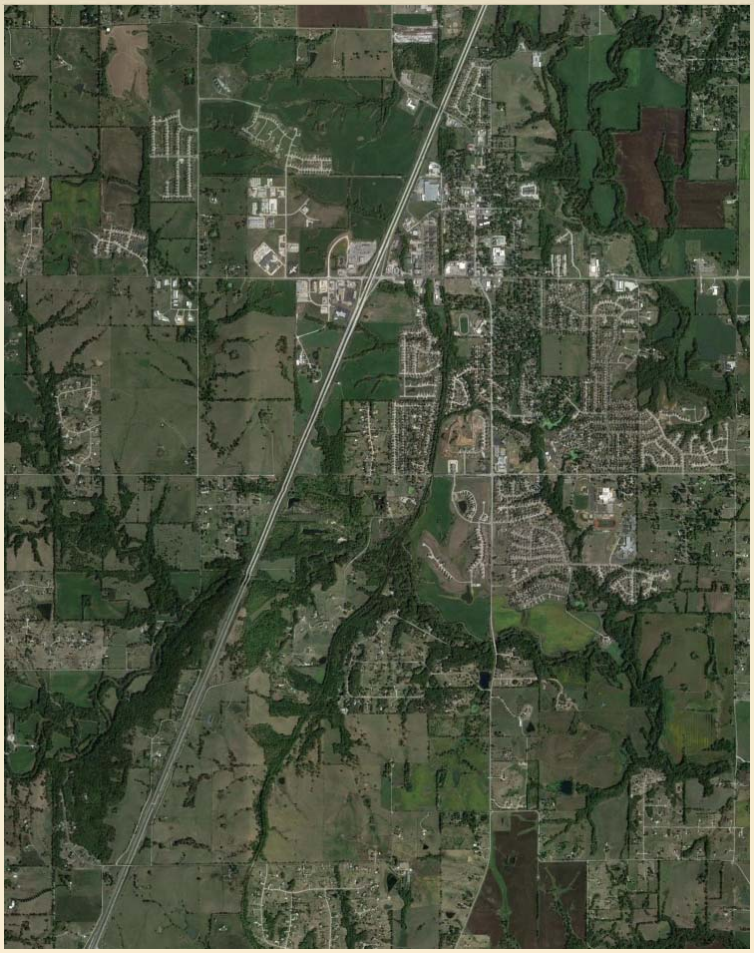
I-35 Access Justification Report
Kearney/Clay County



May 2014

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I-35 Access Justification Report

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May 2014

Prepared for:

In coordination with:

The City of Kearney

and

Clay County, Missouri

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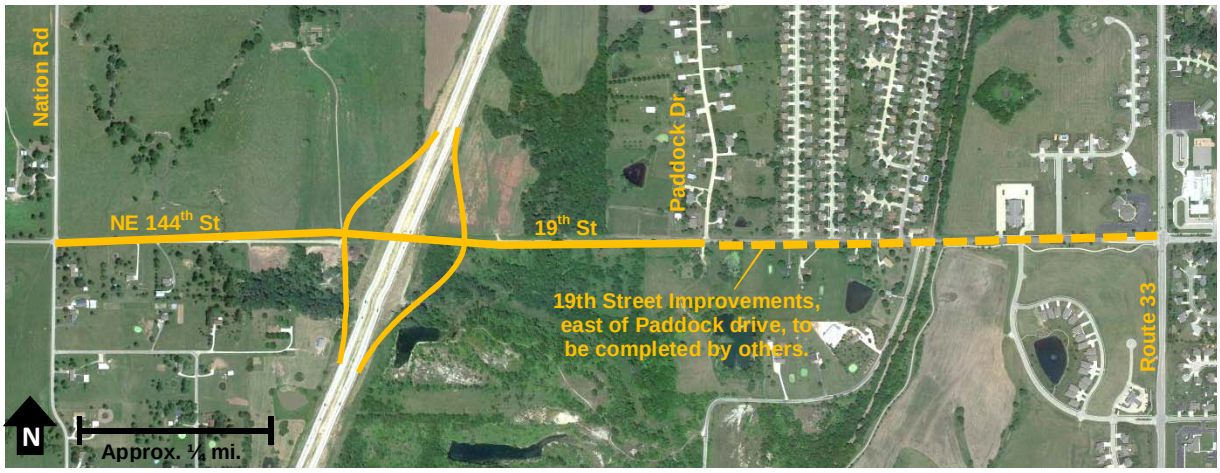
EXECUTIVE SUMMARY

The project location is in Kearney, MO, a growing community of over 8,300 people located on the north edge of the Kansas City metropolitan area. Interstate 35 (I-35) is the primary connection between Kearney and the rest of the Kansas City region. Kearney is currently served by a single interchange, located at Missouri Route 92 (Route 92), which is called 6th Street in Kearney.

The preferred alternative for the requested change in access is the construction of a new I-35 interchange at NE 144th Street / 19th Street. The preferred alternative is Alternative 1a, a diamond interchange with standard ramp terminal intersections. NE 144th Street / 19th Street would be extended as a bridge across I-35. This new / realigned portion of 144th Street / 19th Street (Nation Road to Paddock Drive) would be constructed as a two-lane roadway with turn lanes where appropriate, but right-of-way should be preserved for ultimate widening to five lanes. A typical section for the proposed roadway is provided later in this document; see **Figure 7-2**. From Paddock Drive east to Route 33, roadway improvements would be beneficial, though the exact nature of those improvements has not been identified. These improvements are not part of the project description that is the subject of this AJR, and are expected to be completed by others. Possible improvements in that section include wider lanes, turn lanes, curb-and-gutter, sidewalks, enhanced railroad crossing protection, and other enhancements. The preferred alternative is illustrated in **Figure ES-1**.

Figure ES-1: Conceptual Layout of Preferred Alternative: NE 144th Street / 19th Street Interchange



Detailed traffic analysis of the preferred alternative reveals that the recommended configuration is expected to operate very well in the future. See **Figure 4-4** for the lane configuration and traffic control assumed in the analysis. In 2040, the ramp termini at 19th Street are projected to operate at LOS A for the southbound ramps and LOS B for the northbound ramps during both peak hours.

The effect of the new interchange on the existing interchange at Route 92, along with the stretch of the I-35 mainline between the two interchanges, was also carefully considered. At Route 92, the ramp termini are expected to operate at LOS B during the AM peak hour and LOS A during the PM peak hour (an improvement over the future no-build scenario). Minimal delays and queues are expected for the ramp approaches; indicating that back-ups onto I-35 are very unlikely. In fact, the northbound diverge at Route 92 is expected to improve from LOS E to LOS B (or better) during both peak hours with the addition of the preferred alternative interchange. The northbound mainline portion of I-35 approaching Route 92 is also expected to improve, primarily during the PM peak (projected LOS improvement from D to C).

Other configurations for the new interchange, including ones that would provide auxiliary lanes between the new interchange and Route 92, were considered but not seen as necessary given the acceptable operations of the preferred alternative.

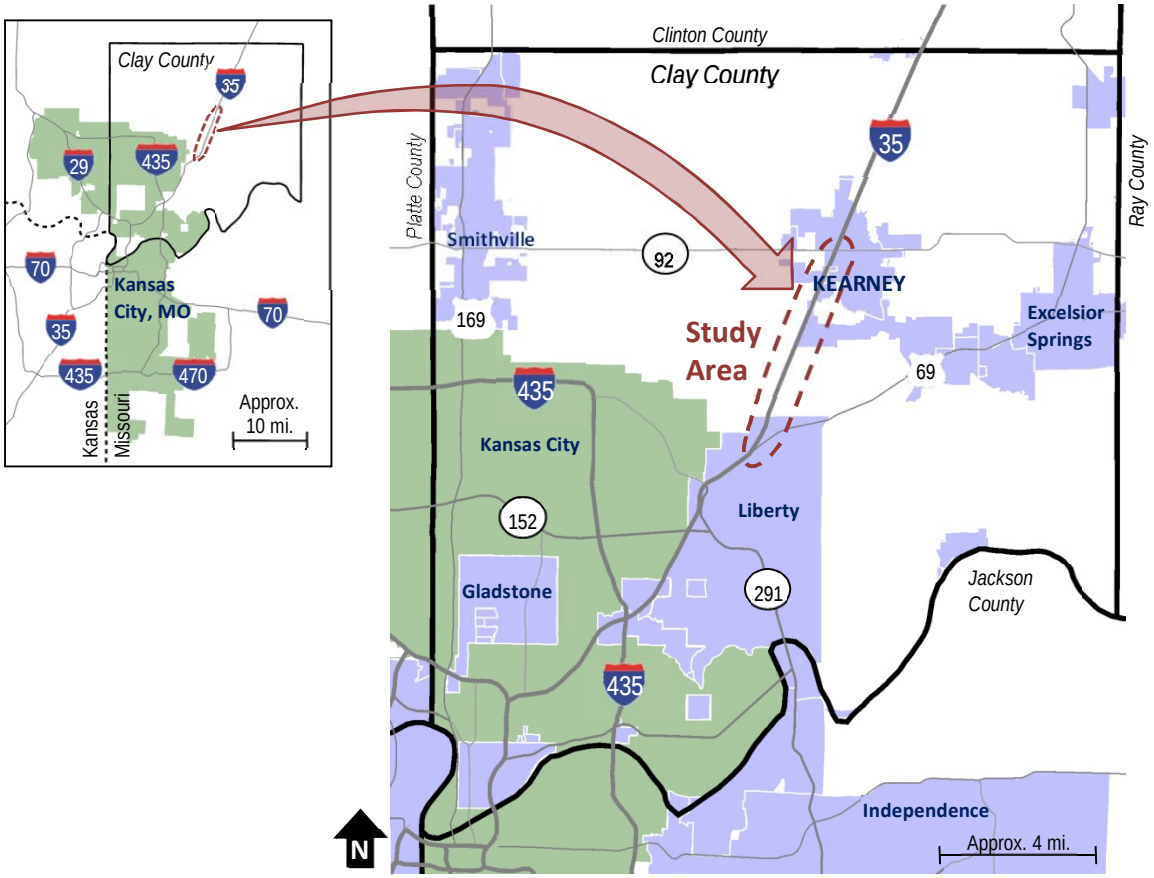
The preferred alternative will achieve the four primary project purposes: 1) maintain acceptable traffic operations on I-35 and Route 92 in the future; 2) improve safety for the traveling public; 3) enhance local and regional connectivity, accessibility, and circulation; and 4) support ongoing planning and economic development initiatives in a sustainable manner. The recommended alternative will also clearly address the identified project needs including:

- Future traffic operations issues at the existing I-35 / Route 92 interchange and on Route 92;
- Safety issues on I-35 at the Route 92 interchange and on Route 92;
- Lack of connections to and across I-35, limiting local and regional circulation and accessibility; and
- Insufficient transportation infrastructure to support planned area growth and development.

1. INTRODUCTION

The City of Kearney, MO is a growing community located on the north edge of the Kansas City metropolitan area. The primary connection between Kearney and the rest of the Kansas City region is Interstate Highway 35 (I-35), which runs roughly north-south through central Clay County. I-35 in this area is a four-lane interstate highway with a 60-foot depressed grass median. **Figure 1-1** shows I-35 and Kearney in the larger regional context.

Figure 1-1: Regional Context



In 2010, Kearney had a residential population of 8,380, which is a 53% increase over the year 2000 population of 5,470. Employment also grew substantially during this time. According to Census Bureau data, employment in the Kearney area grew by approximately 30% between 2002 and 2010[1].

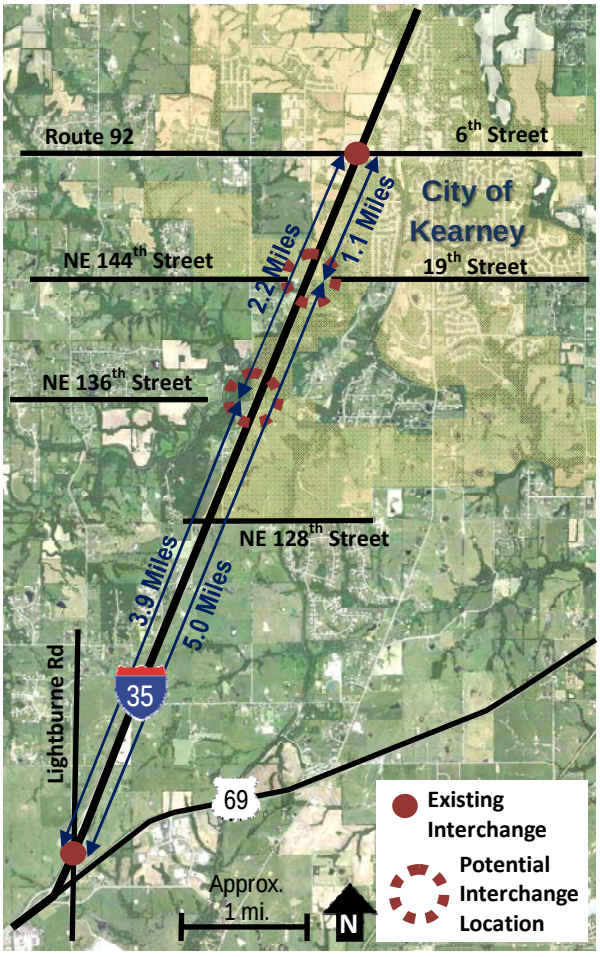
As illustrated in **Figure 1-2**, Kearney is served by a single interchange, located at Missouri Route 92 (Route 92), which is called 6th Street in Kearney. Community leaders are concerned that this single access point is insufficient from a traffic operations, safety, and access standpoint to support the projected and locally-desired growth in Kearney and the surrounding area. Therefore, this Access Justification Report (AJR) was initiated jointly by the Missouri Department of Transportation (MoDOT), City of Kearney, and Clay County to evaluate the need for, and feasibility of, a new interchange to the south of Route 92.

[1] U.S. Census Bureau, LEHD Origin-Destination Employment Statistics.

The study area is part of the transportation planning area for the Mid-America Regional Council (MARC), the Metropolitan Planning Organization for the Kansas City region. As part of the metropolitan planning area, the study area is part of the Kansas City Transportation Management Area (TMA), a federal designation for urbanized areas and adjacent urban clusters with populations over 200,000.

The study is being conducted in accordance with the Federal Highway Administration (FHWA) guidelines for AJRs as outlined in *Interstate System Access Information Guide* (August 2010). It specifically addresses the eight policy considerations identified by FHWA for approval of a new access point on an interstate highway. The AJR also conforms to the applicable MoDOT and industry guidelines, including the MoDOT *Engineering Policy Guide*.

Figure 1-2: Existing and Proposed Interchange Locations

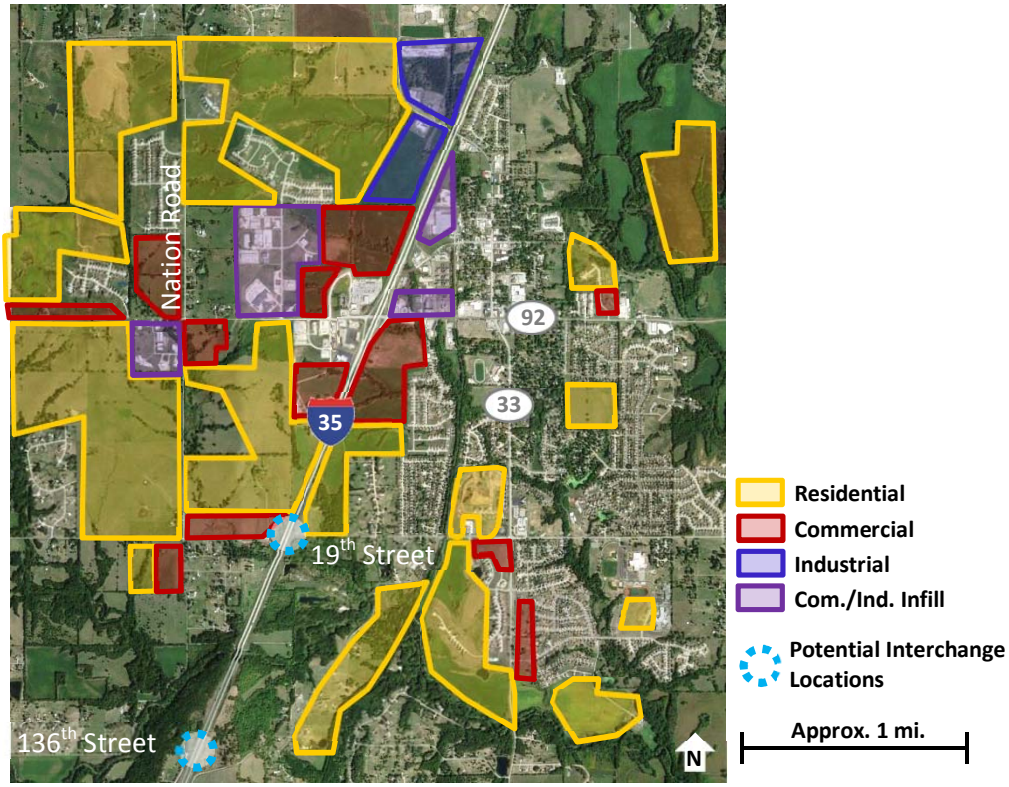


Project Description

Project Location

The AJR study area extends along I-35 from north of the Route 92 interchange to south of the U.S. Highway 69 (US Route 69)/Lightburne Road interchange. Several alternatives for new interchange locations have been considered in this study and previous studies, including considerations for improving the existing Route 92 interchange. Through this comprehensive alternatives evaluation process, the proposed project has been refined to consider the construction of a new interchange on I-35 south of Route 92 in one of two general locations as indicated on **Figure 1-2**; either along the 144th Street/19th Street alignment, or the 136th Street alignment. A new interchange at one of these two locations would serve existing development in the Kearney vicinity, as well as anticipated new development both east and west of I-35 as indicated on **Figure 1-3**. The areas surrounding the two possible interchange locations currently include a mixture of undeveloped, agricultural, low-density residential, and inactive quarry properties. Both locations would require new and upgraded local access roads; however, the 136th Street location would require a more extensive network of new roadways.

Figure 1-3: Key Land Use Features
(Showing Expected Growth by 2040)



The distances between the two possible new interchange locations and the existing interchanges are presented in **Table 1-1**. As shown, it is just over one mile from Route 92 to 19th Street, and just over two miles to 136th Street.

Table 1-1: Interchange-to-Interchange Distances

	Possible Interchange Locations	Approx. Milepost	Distance to: Route 92	Distance to: Lightburne Road / US Route 69
1	19th Street (144th Street)	25.0	1.1	5.0
2	136th Street	23.9	2.2	3.9

Note: Distances are approximate cross-road to cross-road distances.

Potential Area of Influence

The overall study area roadways include I-35 (and all associated ramps), Route 92, Lightburne Road, and portions of roads that either provide access to the existing Route 92 interchange or could provide access to a possible new interchange. Nine existing intersections were selected as being particularly important with regard to current and future access to I-35 in Kearney. These intersections are highlighted in **Figure 1-4**.

The study area meets the FHWA requirements that it consider "at least the first adjacent interchange on either side of the proposed change in access." With regard to the local roadway network, the FHWA guidelines state that the study area should extend "at least to the first adjacent signal in either direction or

Figure 1-4: Study Intersections

1. Route 92 & Centerville Ave
2. Route 92 & Bennett Blvd
3. Route 92 & Shanks Ave
4. Route 92 & I-35 SB Ramps
5. Route 92 & I-35 NB Ramps
6. Route 92 & McDonalds Driveway
7. Route 92 & Platte/Clay Way
8. Route 92 & Com. Center Driveway
9. Route 92 & Route 33

N

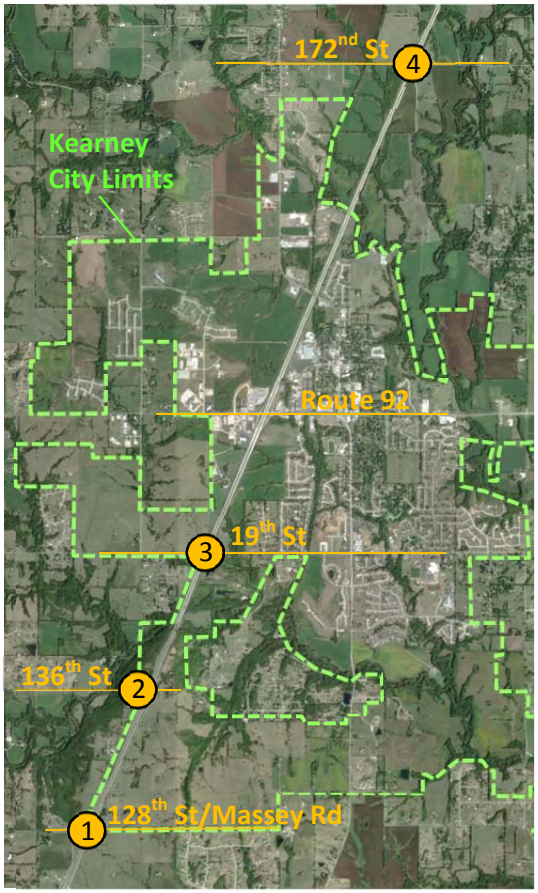
Approx. ¼ mi.

to the first major intersection." On Route 92, the study area was extended even further to assess operations from Nation Road east to Missouri Route 33 (Route 33). More details on the area of influence are provided in the Methodology section of this report.

Project History

A new local service interchange along this stretch of I-35 was considered as far back as the *1993 Kearney Comprehensive Plan*. That study proposed Massey Road (1) as the location for a new interchange; however, that conflicted with the long-term plans for constructing a new east-west connector between I-435 and US Route 69. A subsequent *Interchange Feasibility Study and Break-In-Access Request for Kearney, Missouri* prepared in 2002 identified five possible locations for a new interchange. The study recommended 136th Street (2) as the best location. It also recommended a number of upgrades and additions to the local roadway network, including a new overpass at 19th Street (3). Concurrently, MoDOT completed the *Missouri Route 92/10 Corridor Study*. This study highlighted the need for additional east-west access across I-35 due to development growth in and around Kearney. The *Kearney, Missouri Comprehensive Plan* completed in 2004, showed the 136th Street location as the "primary option" for a new interchange and 172nd Street (4) as the "secondary" or "long-term option" should substantial growth occur north of the city. **Figure 1-5** depicts the locations described above.

Figure 1-5: Historically Proposed Interchange Locations



In 2005, Kearney initiated a new interchange study due to concerns about the feasibility of the 136th Street location. The concerns about the 136th Street location included its proximity of the Fishing River floodplain, the potential for conflicts with a new Clay County airport, and other existing development conflicts. The 2005 study, *Kearney Access Justification Report: Interstate 35/Route 92/19th Street*, recommended a new half-diamond interchange at 19th Street. The City is currently completing a strategic planning effort, which has recommended that the City's Master Plan be amended to show the location of a proposed new I-35 interchange at 19th Street.

Project Purpose and Need

The purpose of a potential project in the study area is to 1) maintain acceptable traffic operations on I-35 and Route 92 in the future; 2) improve safety for the traveling public; 3) enhance local and regional connectivity, accessibility, and circulation; and 4) support ongoing planning and economic development initiatives in a sustainable manner. The need for the proposed project includes:

- Future traffic operations issues at the existing I-35 / Route 92 interchange and on Route 92;
- Safety issues on I-35 at the Route 92 interchange and on Route 92;
- Few connections to and across I-35, limiting local and regional circulation and accessibility; and
- Insufficient transportation infrastructure to support planned area growth and development.

It is proposed that a new interchange could address the mobility, safety, access/circulation, and economic development needs by:

- **Maintaining acceptable traffic operations through 2040**. The existing I-35 interchange on Route 92 serves high directional traffic volumes during the morning (AM) and afternoon (PM) peak hours. The southbound on-ramp serves over 800 vehicles in the morning peak hour and the northbound off-ramp serves nearly 1,000 vehicles in the afternoon peak hour. The current Route 92 interchange provides acceptable operations under existing levels of traffic volumes; however, over the next 20 years, traffic volumes at the interchange are projected to grow as development continues in the study area. By the year 2040, the interchange ramps are predicted to serve just under 1,500 vehicles in the morning peak hour and nearly 1,900 vehicles in the afternoon peak hour. These volumes will overwhelm the existing interchange despite the improvements being built in 2013, resulting in peak levels of travel delay that are classified as "Level of Service" (LOS) F for a number of the critical movements. More details on Level of Service classifications are provided in the Existing Conditions section. Additional supporting details and analysis are provided throughout the report. In addition to traffic congestion along Route 92, traffic volumes on I-35 are forecasted to continue growing through the planning horizon as well. Peak hour traffic volumes along I-35 in the study corridor are projected to increase substantially, in some cases more than doubling, by 2040. Traffic operations performance is measured based on LOS; the locally accepted threshold is LOS D or better. Therefore, to the extent possible, the proposed project should result in LOS D or better under future year (2040) traffic operations.

- **Reducing crash frequency along I-35 and Route 92**. A crash analysis was prepared for I-35 and Route 92 within the study area. Crash data were obtained from MoDOT for the five-year period from 2007 to 2011. The analysis showed segment crash rates for both I-35 (near the interchange) and Route 92 that exceeded the statewide average and critical crash rates. More detailed results of the crash analysis are provided later in this report. Reducing the frequency of crashes in the study area is a project need.

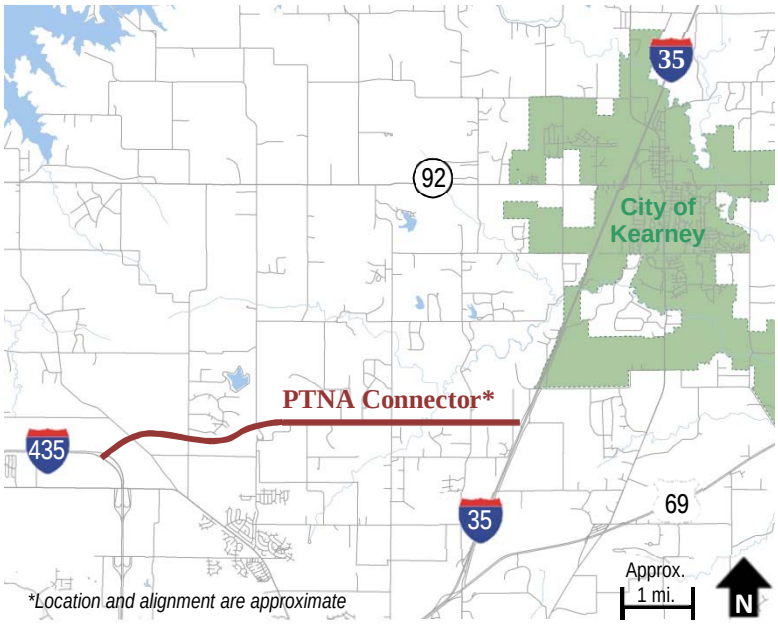
- **Improving regional connectivity and reduce out-of-direction travel in the study area**. Within the city limits of Kearney, there are currently only two public roads that provide access across I-35: Route 92 where the existing interchange is located and approximately a mile to the north at Route 33, which is an underpass of I-35. There is currently not an east-west connection across I-35 south of Kearney between Route 92 and 128th Street. Furthermore, the 128th Street bridge is weight restricted. A new interchange and connection across I-35 would improve circulation and reduce vehicle miles traveled across southern Kearney. Study Area vehicle miles traveled (VMT) and vehicle hours traveled (VHT) were used as performance measures to determine if an alternative provided connectivity benefits. In addition to providing improved circulation within Kearney, an additional cross-road and interchange along I-35 would provide improved regional access and reduced trip lengths for emergency access to hospitals south of Kearney (such as Liberty Hospital near the I-35 / Lightburne Road interchange). It would also provide improved access to the Kearney school complex (including the high school) located one-half mile east of Route 33. The High school serves students on both sides of I-35 from 120th Street in the south to the community of Holt in the north. The majority of Kearney traffic accessing I-35 is coming from or going towards portions of the Kansas City metro area to the south. Thus, much out-of-direction travel is currently required for commuters and other motorists wanting to use I-35 to travel outside the city limits. With all freeway access currently restricted to one location, motorists experience delays due to crashes and heavy congestion in the interchange area.

- **Supporting ongoing local planning and economic development initiatives in an orderly and sustainable manner**. The areas directly adjacent to either of the proposed interchange locations are currently relatively undeveloped. With the exception of some low-density housing and an inactive quarry, much of the land is readily available to support new development, consistent with land use and urban services planning for the proposed project area. The improved accessibility provided by the new interchange will provide existing and new businesses with enhanced market access and will improve access to regional customers from the I-35 corridor. For example, the City has spent a number of years working on a Tax Increment Financing plan for a new development in the southeast quadrant of the existing Route 92 interchange. A new interchange that relieves the existing interchange could be beneficial to this development, especially if it connects to a new frontage road on the east side of I-35. That would provide the development with two independent access/egress points. The City of Kearney is also planning for a sustainable development pattern, intending to promote contiguous, urban scale development within its jurisdiction. Thus, it is important to consider the location of transportation investments in relation to where development currently exists, knowing that these investments help shape development patterns in terms of both location and density. It is not a sustainable practice to leapfrog undeveloped areas and create standards for low-density, sprawled development.

Support for the Planned Regional Transportation System

The 1997 MARC *Perimeter Transportation Needs Assessment Study* (PTNA) analyzed four different options for meeting the perimeter transportation needs in the Kansas City metropolitan area. The identified needs were: 1) Perimeter Highway improvements, 2) Perimeter Arterial improvements, 3) Transit Investment, and 4) TDM/TSM. The "PTNA Connector" (shown in **Figure 1-6**) as it later became known, was just one of the new/upgraded facilities that made up the second "perimeter arterials" option. Each option was evaluated based on 13 different factors, including the option's ability to relieve congestion, its impact on safety, its expandability, and its environmental impacts.

Figure 1-6: Proposed PTNA Connector Alignment



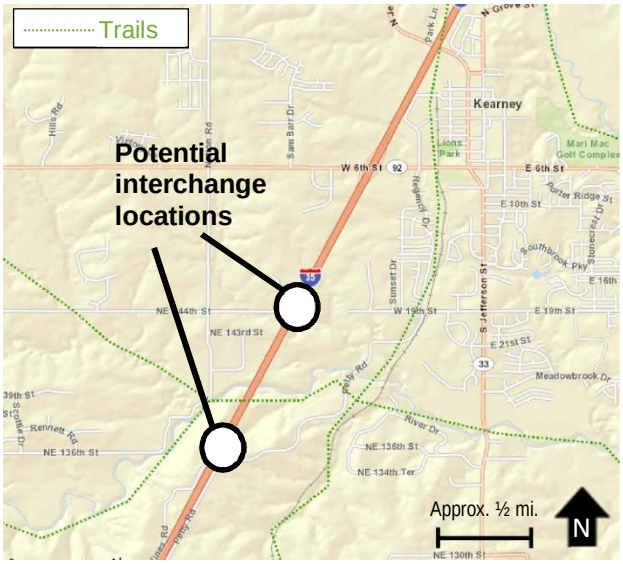
There is a section of the County's Comprehensive Plan that is dedicated to a new PTNA connector between I-435 and I-35. The County Comprehensive Plan encourages identifying and preserving the right-of-way to ensure that this connector can be built in the future. The plan assumes that this connector would result in a new interchange along I-35 somewhere between 120th and 128th Streets, well south of the two potential locations identified in this report.

MARC, in its role as the Metropolitan Planning Organization for the Kansas City region, maintains and updates a Metropolitan Long-Range Transportation Plan (LRTP). The purpose of the LRTP is to identify a transportation vision for the region, evaluate how the transportation system performs in relationship to that vision, and identify transportation improvement projects that will help the region move towards meeting its system goals and objectives. The current Kansas City region Metropolitan Long-Range Transportation Plan, *Transportation Outlook 2040*, includes the I-35 / 19th Street interchange on its illustrative list of roadway projects, indicating that it is a project consistent with the regional transportation vision that meets identified system performance goals. However, it is included as an unconstrained project, meaning that there is currently no funding identified with which to build the project. Because there is no funding identified, the project is not listed for construction on MARC's Transportation Improvement Program (TIP) list, nor is it on MoDOT's Statewide TIP. It is understood that construction cannot begin until funding is identified and the project becomes a part of these program lists. The TIP does include two planning line items related to a new I-35 interchange in Kearney.

The LRTP indicates that the project meets regional objectives of reducing congestion, improving safety, reducing greenhouse gas emissions, improving freight movement, and encouraging non-motorized travel.

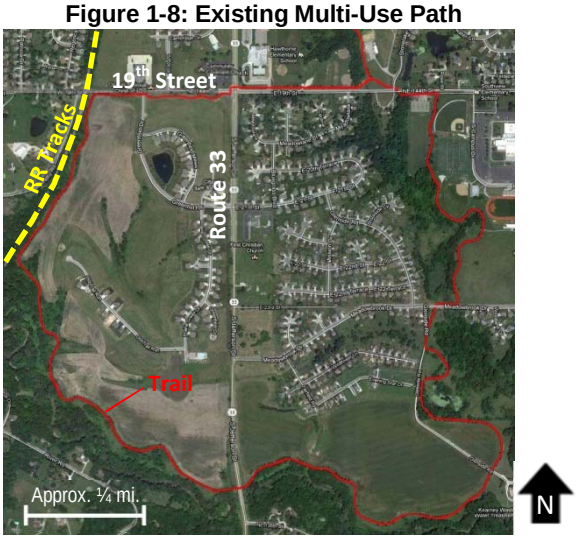
The City of Kearney has several multi-use paths for the use of bicyclists and pedestrians, predominantly located within the parks system. There is not currently a path or sidewalk available that facilitates bicycle or pedestrian access across I-35 in the study area, although MoDOT plans to construct one in conjunction with the 2013 Route 92 improvements. A new interchange on I-35 would be designed to be compatible with the City's bicycle/pedestrian plans and network.

Figure 1-7: MetroGreen Trail System



MARC's MetroGreen System is a regional greenway system spanning the Kansas City metropolitan area. Its purpose is to establish an interconnected system of trails linking the region's seven counties. The trails are generally laid out along streams, roadways, and within abandoned rail corridors. Initially developed in 2002, the MetroGreen System is periodically updated; most recently in 2009. This most recent update identifies several future trail alignments in the vicinity of Kearney (see **Figure 1-7**). The Fishing River trail is shown to traverse the southern portion of the City and cross I-35 in the vicinity of the two proposed interchange locations. The interchange project could enhance the MetroGreen System Plan by incorporating the Fishing River trail crossing of I-35 into the design of a future interchange.

Figure 1-8: Existing Multi-Use Path



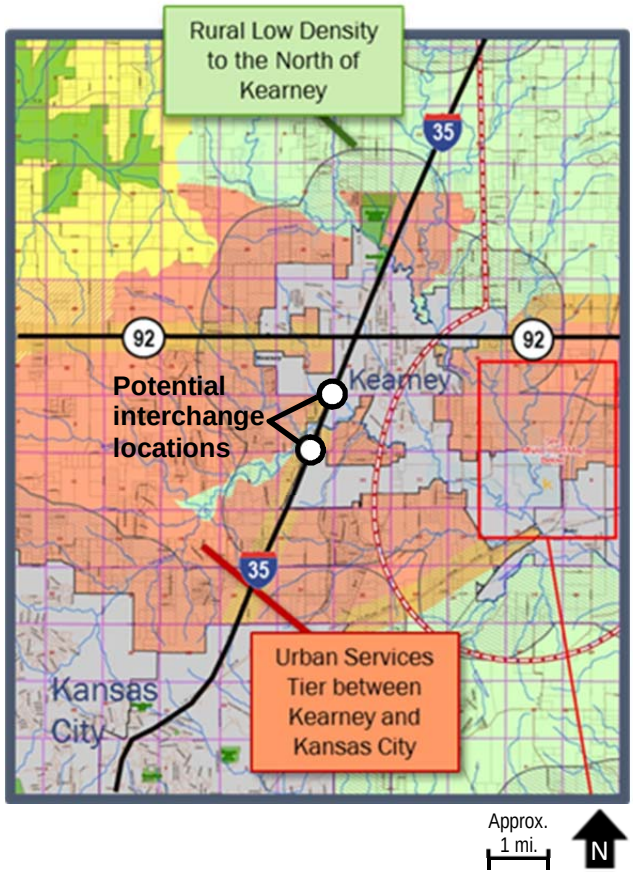
It is also important to point out that there is an existing multi-use path on the south side of 19th Street between the railroad tracks (near Petty Road) and Route 33. This is part of a large multi-use path loop that runs south along the railroad tracks, east to pass under Route 33, north to the school complex, and west back to Route 33. **Figure 1-8** depicts this path.

Support for Planned Local Land Use Changes

Compared to the fairly rapid growth rate of the 1990s and 2000s, growth in Kearney has slowed to moderate levels in recent years due to the economic downturn. City staff are expecting an eventual return to pre-recession high growth levels. Based on historical trends and local / regional development plans, the planning efforts for this study project that around 4,500 new residential units will be built by 2040. As previously shown in **Figure 1-3**, the majority of these new units are expected to be built on the west side of I-35. The City has extended utilities to this area to facilitate orderly, urban-density growth. A new interchange would support this growth by providing better connections to I-35 and the east side of Kearney.

These projections for significant levels of residential growth are supported by the Clay County Comprehensive Plan update, which was completed in 2008. Neither of the potential interchange locations analyzed in this report were identified in that plan. There is, however, an emphasis on sustainable practices throughout the plan. Both potential interchange locations fall within the Urban Service Tier, which is the area targeted for public funding of road improvements, in order to encourage compact and contiguous development. As shown in **Figure 1-9**, the area between Kansas City and Kearney along the study area is slated as an Urban Services Tier, which is defined as areas close-in to cities with ready access to municipal or regional sewer and urban services.

Figure 1-9: 2008 Clay County Comprehensive Plan Land Use Tier Map



The City of Kearney's Comprehensive Plan was last updated in 2004. It identifies 136th Street as the primary option for a new interchange along I-35, although it recommends that an overpass be built along the 19th Street alignment to provide local access across I-35 in that location. A second new interchange at 172nd Street was identified in this document as a long-term option if growth were to spread northward in the future.

After the completion of the Comprehensive Plan, concerns began to arise regarding the 136th Street recommendation. Specifically, the Fishing River floodplain and presence of existing developments present challenges to constructing an interchange at that location. The 136th Street corridor also does not support the community's planning efforts or their access and development goals related to sustainable development patterns. Based on these concerns, the City is currently undergoing a strategic planning effort which recommends that the City's Master Plan be amended to show the primary interchange option to be at 19th Street.

Regional Planning Boundaries and Urban Areas

A major change that has occurred in the last few years is that the MARC Metropolitan Planning boundary has been adjusted. Kearney is now inside the MARC Metropolitan Planning boundary. This highlights the fact that Kearney is an integral part of the Kansas City metro area. It also points to the increasingly urban nature of the Kearney area. While Kearney is inside the planning area, it is outside the Kansas City urbanized area boundary. However, the more heavily developed portions of Kearney were defined in the 2010 Census as an urban cluster. The size of the Kearney urban cluster increased between 2000 and 2010. The distance between the Kansas City urban area boundary and the Kearney urban cluster boundary is less than 5 miles.

As noted previously, the distance between the existing interchanges is 6.1 miles. The long-term plan for the PTNA (discussed previously), the short-term plan for a new local service interchange, and the current northbound truck weigh station with direct I-35 access, would require 3 access points in this 6-mile corridor, with one of these being a system interchange. Therefore, it appears prudent to consider interchange locations relatively close to Route 92 (if they will function adequately in the design year) to leave space to serve the other existing and long-term access needs. There is also a desire to keep the future development in Kearney focused and contiguous; not to facilitate new, separate development nodes along the corridor. This is consistent with both local planning goals and regional planning objectives. The local development projections call for substantial growth west of I-35 and north of NE 144th Street/19th Street, which would be best served by an interchange relatively close to Route 92. Overall, the increasing urbanization of Kearney, the inclusion of Kearney within the regional planning boundary, the available distance between interchanges, the location of expected future growth, and the desire for focused growth, all point to the appropriateness of considering interchange locations relatively close to Route 92. It should be noted that the study evaluated the impact of each interchange option on the Interstate mainline and auxiliary lanes were considered to maintain a high level of mainline operations.

Overview of Alternatives Considered

To address the project purpose and need, a range of no-build, transportation system management (TSM) and build alternatives were considered. More details on the alternatives are provided later in this document, but in summary the alternatives considered include:

- **2040 No Build Alternative**: In this alternative, there is no new I-35 interchange constructed in the study area. The No-Build alternative does assume some key improvements in the vicinity of the existing I-35 / Route 92 interchange, which are described in this section.
- **2040 TSM Alternative**: TSM techniques are generally implemented with the goal of managing congestion by leveraging the existing transportation system, while reducing or eliminating the need for new and expensive transportation infrastructure. Examples of TSM techniques include traffic signal coordination, minor geometric improvements (such as turn lane additions), transit improvements, ramp metering, high-occupancy vehicle (HOV) lanes, and intelligent transportation systems (ITS). The TSM alternative that was developed and tested for this study included the addition of new turn lanes in key locations around the Route 92 interchange.
- **2040 Build Alternative 1 – New I-35 Interchange at 144th Street / 19th Street**: This alternative assumes that 19th Street is extended and paved approximately ½ mile across I-35 to create a continuous corridor, with a full service interchange at I-35.
- **2040 Build Alternative 2 – New I-35 Interchange at 136th Street**: This alternative assumes a new interchange at 136th Street which would require a 1.1-mile extension of 136th Street between Wood River Drive and Nation Road, a new river crossing, a new crossing of the KAW River Railroad line, and a new structure and interchange ramps at I-35.

Additional alternatives were considered early in the study, but were dismissed because they did not address the study purpose and need. These alternatives were:

- **NE 172nd Street Interchange**: This alternative would not relieve traffic volumes at the Route 92 interchange, would encourage growth in outlying areas not currently served by urban services, and would be located in an area targeted for rural low-density development by the Clay County Comprehensive Plan.

- **Missouri Route 33 (Route 33) Interchange**: This alternative would not substantially relieve traffic volumes at the Route 92 interchange, and while it would serve potential growth areas, it would not serve large amounts of existing development.
- **NE 128th Street Interchange**: This alternative would not significantly reduce traffic volumes at the Route 92 interchange, would encourage growth outside of planned growth areas, and would be located in area not currently served by urban services.

Concept Consistency with FHWA Policy

The FHWA is charged with overseeing the efficient and safe operation of the Interstate Highway System. To ensure that the system meets these goals, there is a process and set of requirements that need to be followed when requesting new or modified access to the Interstate Highway System.

An Interstate System Access Request needs to satisfy eight policy requirements prior to obtaining FHWA approval for a new or modified interchange. A full discussion of the eight policy requirements are provided in the Interstate System Access Informational Guide[2]. The policy requirements state the following:

1. *The need being addressed by the request cannot be adequately satisfied by existing interchanges to the Interstate, and/or local roads and streets in the corridor can neither provide the desired access, nor can they be reasonably improved (such as access control along surface streets, improving traffic control, modifying ramp terminals and intersections, adding turn bays or lengthening storage) to satisfactorily accommodate the design-year traffic demands (23 CFR 625.2(a)).*
2. *The need being addressed by the request cannot be adequately satisfied by reasonable transportation system management (such as ramp metering, mass transit, and HOV facilities), geometric design, and alternative improvements to the Interstate without the proposed change(s) in access (23 CFR 625.2(a)).*
3. *An operational and safety analysis has concluded that the proposed change in access does not have a significant adverse impact on the safety and operation of the Interstate facility (which includes mainline lanes, existing, new, or modified ramps, ramp intersections with crossroad) or on the local street network based on both the current and the planned future traffic projections. The analysis shall, particularly in urbanized areas, include at least the first adjacent existing or proposed interchange on either side of the proposed change in access (23 CFR 625.2(a), 655.603(d) and 771.111(f)). The crossroads and the local street network, to at least the first major intersection on either side of the proposed change in access, shall be included in this analysis to the extent necessary to fully evaluate the safety and operational impacts that the proposed change in access and other transportation improvements may have on the local street network (23 CFR 625.2(a) and 655.603(d)). Requests for a proposed change in access must include a description and assessment of the impacts and ability of the proposed changes to safely and efficiently collect, distribute and accommodate traffic on the Interstate facility, ramps, intersection of ramps with crossroad, and local street network (23 CFR 625.2(a) and 655.603(d)). Each request must also include a conceptual plan of the type and location of the signs proposed to support each design alternative (23 U.S.C. 109(d) and 23 CFR 655.603(d)).*

[2] Available at: www.fhwa.dot.gov/design/interstate/pubs/access/access.pdf

4. *The proposed access connects to a public road only and will provide for all traffic movements. Less than "full interchanges" may be considered on a case-by-case basis for applications requiring special access for managed lanes (e.g., transit, HOVs, HOT lanes) or park and ride lots. The proposed access will be designed to meet or exceed current standards (23 CFR 625.2(a), 625.4(a)(2), and 655.603(d)).*
5. *The proposal considers and is consistent with local and regional land use and transportation plans. Prior to receiving final approval, all requests for new or revised access must be included in an adopted Metropolitan Transportation Plan, in the adopted Statewide or Metropolitan Transportation Improvement Program (STIP or TIP), and the Congestion Management Process within transportation management areas, as appropriate, and as specified in 23 CFR part 450, and the transportation conformity requirements of 40 CFR parts 51 and 93.*
6. *In corridors where the potential exists for future multiple interchange additions, a comprehensive corridor or network study must accompany all requests for new or revised access with recommendations that address all of the proposed and desired access changes within the context of a longer-range system or network plan (23 U.S.C. 109(d), 23 CFR 625.2(a), 655.603(d), and 771.111).*
7. *When a new or revised access point is due to a new, expanded, or substantial change in current or planned future development or land use, requests must demonstrate appropriate coordination has occurred between the development and any proposed transportation system improvements (23 CFR 625.2(a) and 655.603(d)). The request must describe the commitments agreed upon to assure adequate collection and dispersion of the traffic resulting from the development with the adjoining local street network and Interstate access point (23 CFR 625.2(a) and 655.603(d)).*
8. *The proposal can be expected to be included as an alternative in the required environmental evaluation, review and processing. The proposal should include supporting information and current status of the environmental processing (23 CFR 771.111).*

The study area is urban in nature, as it is part of a continually developing urban cluster and lies within the Kansas City TMA. In urban areas, guidance suggests that there should be a one-mile minimum spacing between interchanges to allow for the ability to provide proper advance guide signing and to provide sufficient space for entrance and exit maneuvers. Closer spacing may be allowed, but might necessitate the use of collector-distributor roads or the "braiding" (grade-separation) of ramps to facilitate smooth traffic flow. As demonstrated in **Table 1-1**, the alternatives evaluated as a part of this document provide the minimum 1-mile spacing between interchanges.

The remainder of this document addresses these eight policy requirements, by addressing the existing conditions in the study area, the methodology for this study, and the alternatives considered.

2. EXISTING CONDITIONS

The existing traffic conditions in the study area were assessed based on current highway volumes, geometrics, and traffic control.

Existing Traffic Volumes

Available average daily traffic (ADT) counts from 2011 were collected from MoDOT and supplemented with additional counts collected in 2012. Existing daily traffic flows are presented in **Figure 2-1**.

I-35 carries 25,600 vehicles per day (vpd) at the north end of the study corridor and 34,100 vpd south of the existing interchange at MO Route 92. The volumes along Route 92 are just under 8,000 vpd to the west. To the east along Route 92, volumes are much higher at 19,000 vpd.

Peak hour traffic volumes are presented in **Figure 2-2**. Current directional peak hour traffic volumes on I-35 range from over 3,200 vehicles per hour (vph) at the south end of the corridor during the AM peak hour in the southbound direction, to less than 650 vph at the north end of the corridor during the AM peak hour in the northbound direction. **Figure 2-3** illustrates the current lane geometry and type of intersection control in the study area.

Traffic volumes were collected at the I-35/US Route 69/Lightburne Road interchange intersections as well. However, the analysis did not show a relationship between the traffic flow and operations at the two sets of existing interchange intersections. Therefore, additional analysis of the Lightburne Road intersections was not included in this document.

Figure 2-1: Existing Average Daily Traffic Volumes (ADT)

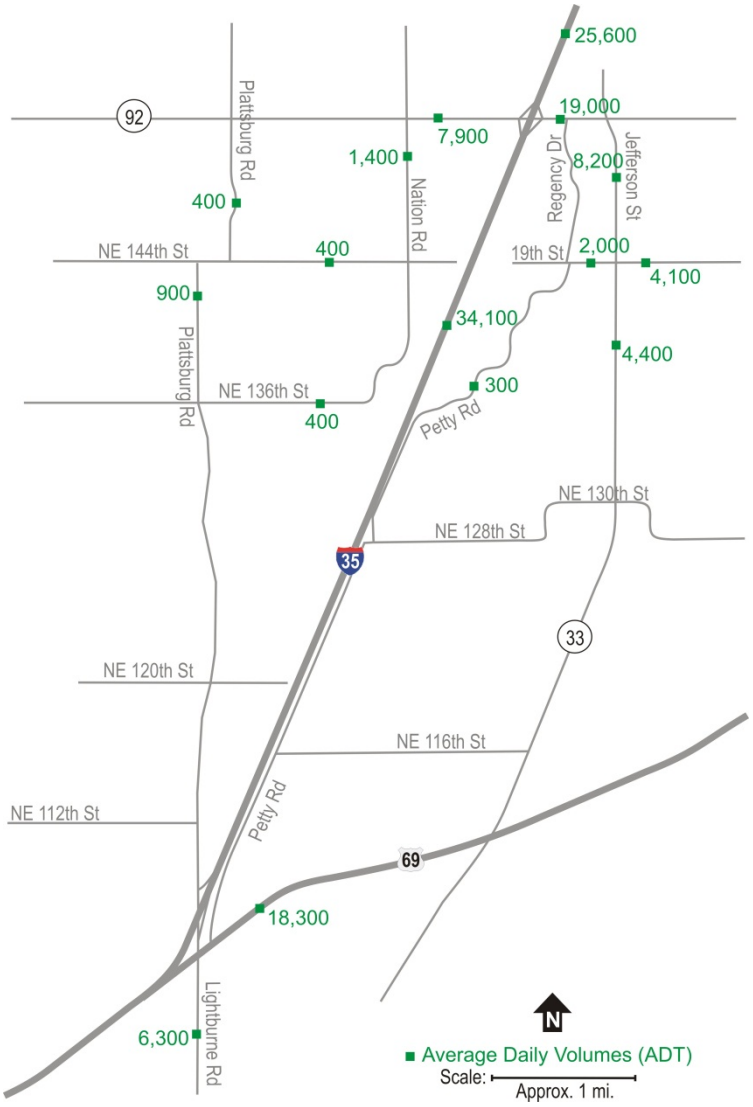


Figure 2-2: Existing Peak Hour Traffic Volumes

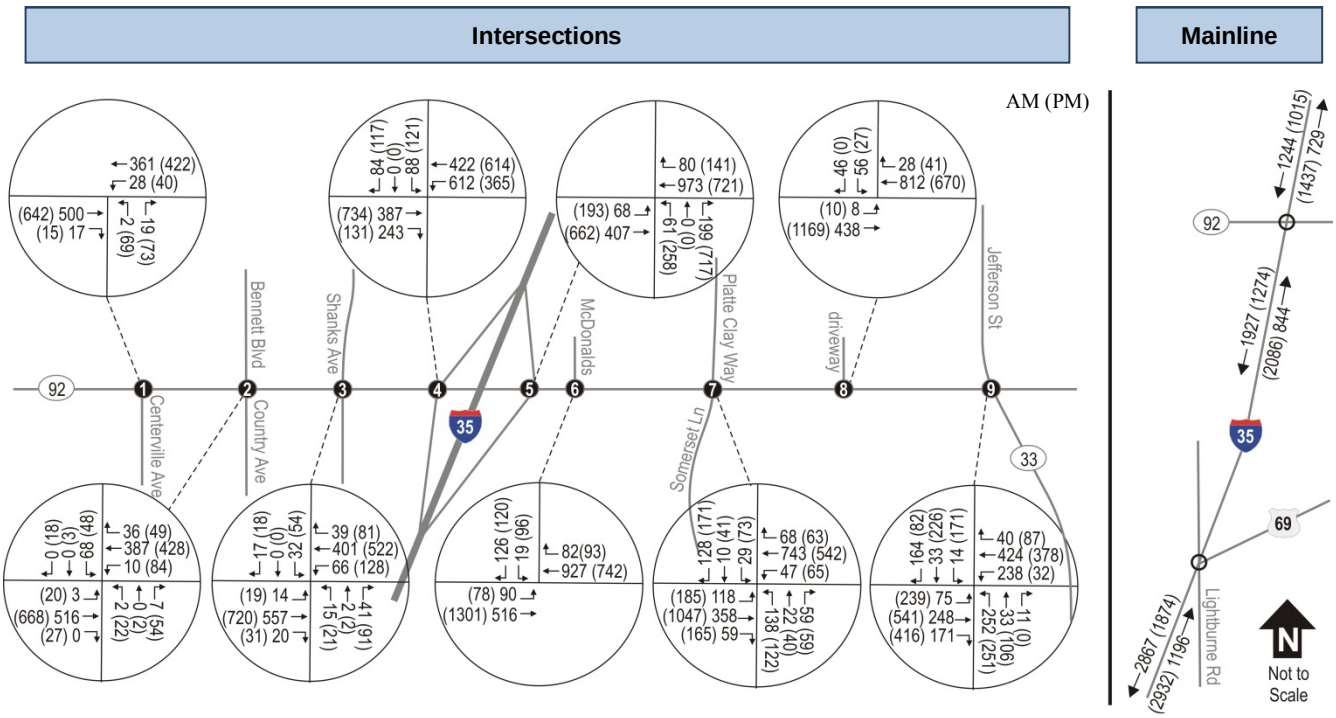
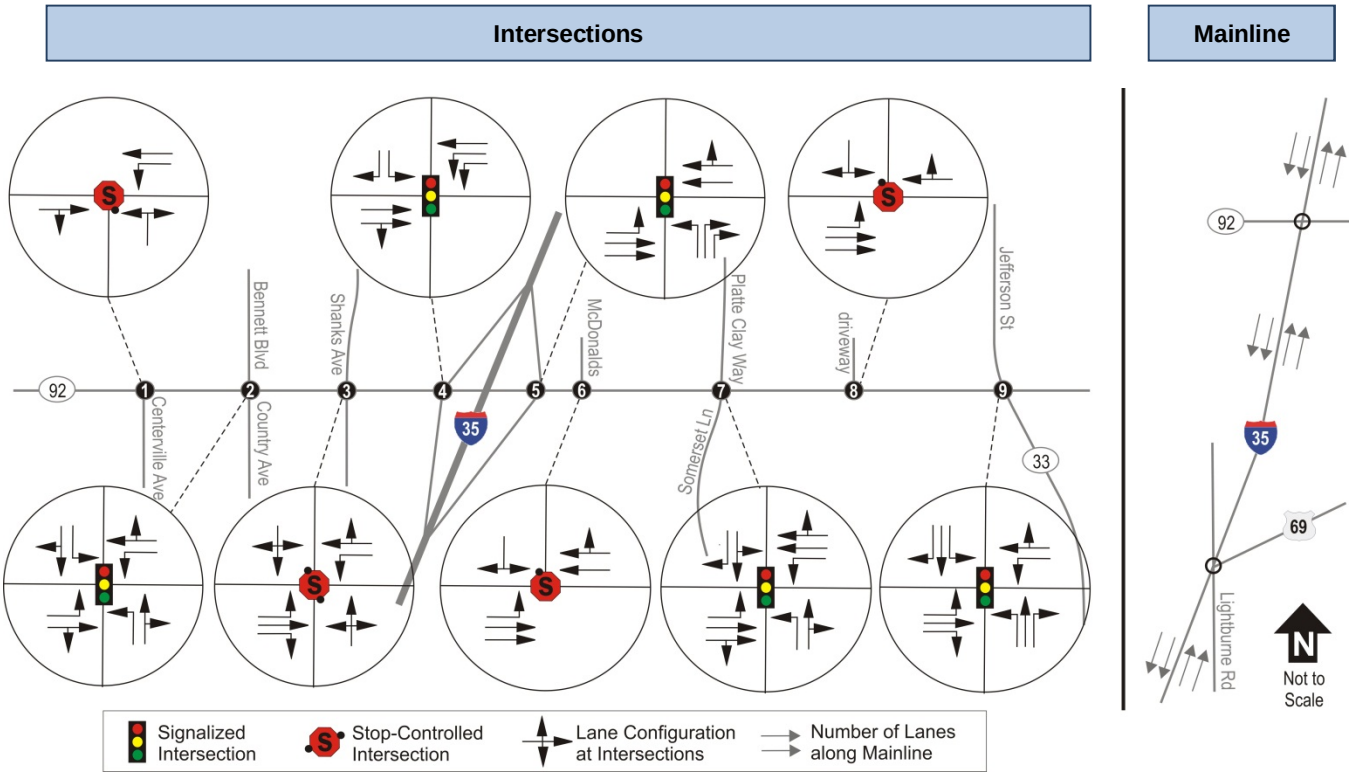


Figure 2-3: Geometry and Traffic Control



Existing Operational Analysis

Improving the existing and future traffic operations in the corridor is part of the project purpose and need. The existing conditions analysis was conducted for the weekday AM and PM peak hours using the existing traffic volumes, traffic control, and geometry for the study intersections, freeway sections, and freeway ramps. Each of these transportation facilities were examined for operational concerns. The current geometric and traffic control data used for the analysis are shown in **Figure 2-3**.

Observations of traffic volumes provide an understanding of the general nature of traffic, but are insufficient to indicate either the ability of the street network to carry additional traffic or the quality of service provided by the street system. For this reason, the concept of *level of service* (LOS) was developed to correlate numerical traffic operational data to subjective descriptions of traffic performance at intersections. For both signalized and unsignalized conditions, LOS categories range from LOS 'A' (best) to 'F' (worst) as shown in **Table 2-1**.

Table 2-1: Level of Service Description

Level of Service	Signalized Intersection Control Delay (sec)	Unsignalized Intersection Control Delay (sec)	Traffic Flow Characteristics
A	0-10.0	≤ 10.0	Free flow, insignificant delays.
B	10.1-20.0	10.1-15.0	Stable operation, minimal delays.
C	20.1-35.0	15.1-25.0	Stable operation, acceptable delays.
D	35.1-55.0	25.1-35.0	Restricted flow, regular delays.
E	55.1-80.0	35.1-50.0	Maximum capacity, extended delays. Volumes at or near capacity. Long queues form upstream from intersection.
F	> 80.0	> 50.0	Forced flow, excessive delays. Represents jammed conditions. Intersection operates below capacity with low volumes. Queues may block upstream intersections.

Source: *Highway Capacity Manual*, Transportation Research Board, 2010

The **performance threshold** established for traffic operations in the study area is a LOS D / E threshold. Locations that operate at LOS D or better are deemed "acceptable" while locations that operate at LOS E or F are determined to be "unacceptable" or "deficient" based on this performance measure. A discussion of the traffic operations analysis approach is discussed in the *Methodology* section of this report.

Intersection Operations

Table 2-2 illustrates the results of the VISSIM analysis. As indicated in the table, each of the study intersections currently operate acceptably overall during both peak periods. There are a few intersections with individual approach movements that currently operate at LOS D, but none fail to meet the established performance threshold.

Table 2-2: Existing Intersection Operations Analysis

Study Intersection	A.M. Peak Hour Delay (sec/veh)	A.M. Peak Hour LOS	P.M. Peak Hour Delay (sec/veh)	P.M. Peak Hour LOS
1. Route 92 & Centerville Ave	**0.9**	**A**	**3.4**	**A**
EB Route 92	0.8	A	2.1	A
WB Route 92	0.7	A	1.2	A
NB Centerville	8.2	A	16.3	B
2. Route 92 & Bennett Blvd	**4.8**	**A**	**8.6**	**A**
EB Route 92	2.5	A	7.1	A
WB Route 92	1.1	A	5.8	A
NB Country Ave	21.8	C	21.5	C
SB Bennett Blvd	45.4	D	33.2	C
3. Route 92 & Shanks Ave	**1.7**	**A**	**3.6**	**A**
EB Route 92	1.1	A	1.4	A
WB Route 92	1.1	A	3.0	A
NB Shanks Ave	7.0	A	13.2	B
SB Shanks Blvd	9.3	A	16.9	B
4. Route 92 & I-35 SB Ramps	**7.9**	**A**	**7.1**	**A**
EB Route 92	17.9	B	14.2	B
WB Route 92	14.1	B	13.1	B
SB I-35 Ramps	25.8	C	23.9	C
5. Route 92 & I-35 NB Ramps	**4.9**	**A**	**7.4**	**A**
EB Route 92	4.3	A	3.7	A
WB Route 92	9.9	A	12.3	B
NB I-35 Ramps	16.5	B	20.4	C
6. Route 92 & McDonalds	**3.3**	**A**	**2.6**	**A**
EB Route 92	1.8	A	1.0	A
WB Route 92	2.5	A	1.5	A
SB McDonalds driveway	14.5	B	17.2	B
7. Route 92 & Platte Clay Way	**12.2**	**B**	**14.7**	**B**
EB Route 92	6.1	A	13.8	B
WB Route 92	8.4	A	9.6	A
NB Somerset Lane	36.6	D	27.7	C
SB Platte Clay Way	18.2	B	21.1	C
8. Route 92 & Driveway	**2.4**	**A**	**4.0**	**A**
EB Route 92	1.7	A	5.2	A
WB Route 92	1.4	A	1.6	A
SB Com Center driveway	14.0	B	16.4	B
9. Route 92 & Route 33	**16.9**	**B**	**24.0**	**C**
EB Route 92	12.3	B	15.1	B
WB Route 92	13.3	B	27.2	C
NB Route 33	33.7	C	33.8	C
SB Route 33	15.2	B	35.5	D

Freeway Operations

The existing I-35 freeway operational analysis is summarized in **Table 2-3**. Currently, the freeway segments and ramps in the study area operate acceptably for both peak periods.

Table 2-3: Existing Freeway Operational Analyses

Freeway Segments	A.M. Peak Hour			P.M. Peak Hour		
Location	Speed (mph)	Density (pc/mi/ln)	LOS	Speed (mph)	Density (pc/mi/ln)	LOS
I-35 SB						
North of Route 92	71	8.8	A	71	7.2	A
Between Route 92 & Lightburne Rd	70	14.1	B	71	9.2	A
South of Lightburne/US-69	69	21.2	C	70	13.6	B
I-35 NB						
South of Lightburne/US-69	71	8.5	A	69	21.3	C
Between Route 92 & Lightburne Rd	71	6.1	A	69	15.4	B
North of Route 92	71	5.5	A	70	10.6	A

Merge/Diverge	A.M. Peak Hour			P.M. Peak Hour		
Location	Speed (mph)	Density (pc/mi/ln)	LOS	Speed (mph)	Density (pc/mi/ln)	LOS
I-35 SB						
at Route 92 Off Ramp (diverge)	70	8.9	A	70	7.3	A
at Route 92 On Ramp (merge)	69	9.3	A	70	6.1	A
at Lightburne Off Ramp (diverge)	68	14.5	B	69	9.4	A
at US-69 On Ramp (merge)	59	24.7	C	65	14.3	B
I-35 NB						
at US-69 Off Ramp (diverge)	70	8.6	A	66	22.6	C
at Lightburne On Ramp (merge)	70	6.2	A	67	16.0	B
at Route 92 Off Ramp (diverge)	71	4.1	A	69	10.3	B
at Route 92 On Ramp (merge)	70	5.5	A	68	10.9	B

Existing Safety Conditions

Improving safety along Route 92 and I-35 is part of the purpose and need of the proposed project. Crash records provided by MoDOT were analyzed along Route 92 and I-35 to evaluate the frequency, type, and severity of crashes in the project area. The crash records were for the five-year period between January 1, 2007 and December 31, 2011. For the crash analysis, the study area was broken into four primary analysis segments:

- Segment 1: Route 92 from Lightburne Rd to I-35 NB Ramps
- Segment 2: Route 92 from I-35 NB Ramps to Jesse James Rd
- Segment 3: I-35 from Route 33 to Route 92 South Ramps
- Segment 4: I-35 from Route 92 South Ramps to Lightburne Rd

Table 2-4 provides a summary of the study area crashes compared to statewide averages for similar facilities. **Table 2-4** also provides a summary of how the observed 2007-2011 crash rate for each segment compares to its critical crash rate. The critical crash rate is a segment specific calculation that is based on the statewide average for similar facilities, takes into account the amount of "exposure" a segment has (in terms of vehicle miles of travel) and an assumed level of statistical confidence. Segments with crash rates that exceed the critical crash rate warrant further review.

As shown in **Table 2-4**, the 5-year crash rates exceed both the statewide average rates and the segment-specific critical crash rates along Segments 1, 2 and 3.

Table 2-4 also provides a summary of the crash severity observed along each segment. As shown, the majority of crashes in the study area are property-damage only. For all segments, minor injury and disabling injury crashes accounted for 18% to 27% of crashes. There was one fatal crash in the study area during the 5-year analysis period; it occurred along Segment 1.

Table 2-4: Crash Summary by Segment, 2007 to 2011

	Segment 1 Route 92 from Lightburne Rd to I-35 NB Ramps	**Segment 2** Route 92 from I-35 NB Ramps to Jesse James Rd	**Segment 3** I-35 from Route 33 to Route 92 (southern ramps)	**Segment 4** I-35 from Route 92 (southern ramps) to Lightburne Rd
Approx. Length (miles)	2.2	1.8	1.1	5.7
AADT	7,900	19,800	25,600	34,100
Total Accidents[1]	211	213	129	232
Fatal Accidents	1 (0%)	0 (0%)	0 (0%)	0 (0%)
Disabling Injury Accidents	3 (1%)	4 (2%)	4 (3%)	14 (6%)
Minor Injury Accidents	47 (22%)	45 (21%)	19 (15%)	48 (21%)
Property Damage Only	160 (76%)	164 (77%)	106 (82%)	170 (73%)
Crash Rate (crashes per 100 million vehicle miles)[2]	665.2	327.5	251.0	65.4
Statewide Average Rate (Rte Designation) [3]	241.2	241.2	104.0	104.0
Statewide Average Rate (Roadway Type) [4]	192.5	192.5	105.2	105.2
Critical Crash Rate[5]	288.2	273.7	129.8	114.3
Segment Rate Compared to Critical Rate	**Above Critical Rate**	**Above Critical Rate**	**Above Critical Rate**	Below Critical Rate

(1) MoDOT provided five-year accident data for January 1, 2007 to December 31, 2011.

(2) Crash Rate formula from ITE Traffic Engineering Handbook 6th Edition.

(3) Route Designation is "Missouri Route" for segments 1 and 2; and "Interstate" for segments 3 and 4.

(4) Roadway Type is "Two-Lane" for segments 1 and 2; and "Freeway" for segments 3 and 4.

(5) Critical crash rate calculated based on 95% confidence level. To be conservative, the critical rate for each segment was calculated based on the higher statewide crash rate (either by route designation or roadway type) for its reference point.

Figure 2-4 provides a summary of the crash type observed along each segment. The bullets below summarize the crash type evaluation results:

- Rear end crashes were the most frequent type of crashes for Segments 1 and 2 along Route 92. Rear end crashes accounted for 35% of Segment 1 crashes and 37% of Segment 2 crashes. Rear end crashes are typically associated with start-and-stop conditions along roadways when vehicles are closely spaced, and are often associated with queuing at traffic signals and corridor congestion.

- Left turn and Left Turn / Right Angle crashes combined accounted for 32% of Segment 1 crashes and 30% of Segment 2 crashes. Left-turn and angle crashes are associated with turning or crossing motorists making poor decisions for gap acceptance against conflicting traffic; the rate of left turn and angle crashes tends to increase as traffic volumes increase and acceptable gaps become more infrequent.

Figure 2-4: Crash Type Percentage by Segment

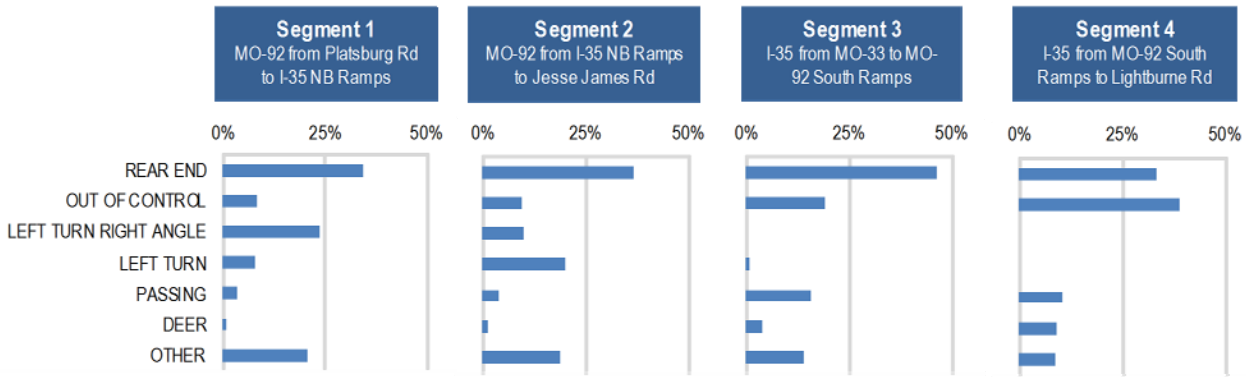
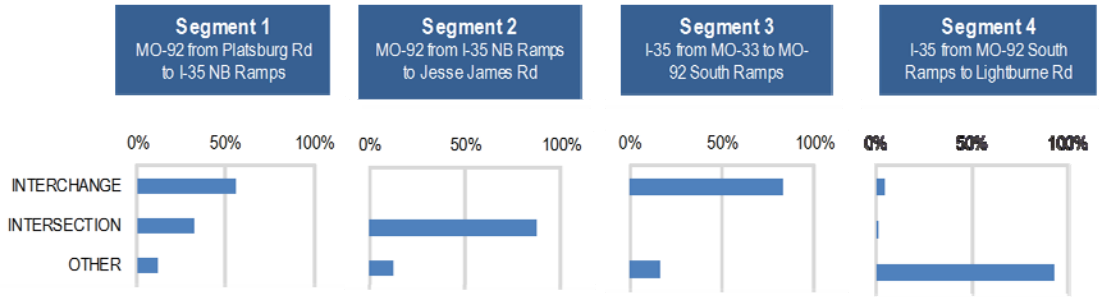


Figure 2-5 identifies whether crashes occurred at interchanges, intersections, or other roadway segments. As shown, the majority of crashes along Segment 1, Route 92, occurred within the I-35 interchange area (117 of 211 crashes).

Figure 2-5: Crash Location by Segment



In summary, the study area crash data evaluation indicates safety issues, demonstrated by:

- The 5-year crash rates were exceeded for both the statewide average rates and the segment-specific critical crash rates at Segments 1, 2 and 3.

- The most common types of crashes in the corridor were rear-end crashes and angle and left-turn crashes. These crash types are often associated with congested conditions, specifically limited gaps in traffic and stop-and-go traffic flow operations.

Existing Land Use and Demographics

Land Use Summary

Land uses in the study area range from residential, commercial, industrial (including a quarry) and some agricultural uses. The current I-35 / Route 92 interchange is within the city limits of Kearney. Most uses adjacent to Route 92 are commercial, with residential uses along parts of I-35, 144th Street / 19th Street, 136th Street, and Route 33. New residential subdivisions are being built in the southern parts of Kearney on both sides of I-35.

Demographic / Commuting Summary

The 2010 Census population for Kearney was 8,380 residents, a 53% increase over the year 2000 population of 5,470. The Census Bureau LEHD survey data indicate approximately 3,100 jobs in the Kearney area in 2010, with the service industries accounting for the majority of those jobs.

Commute data available from LEHD indicate a substantial amount of workers entering and leaving the study area on a daily basis. It is estimated that only 12% of workers that live in the Kearney area actually work in and around Kearney; 88% of employed Kearney residents work outside of the immediate vicinity. The top 3 commuting destinations for Kearney area residents are:

- Kansas City, MO (31% of Kearney residents' work destinations).
- Liberty, MO (11% of Kearney residents' work destinations).
- North Kansas City, MO (6% of Kearney residents' work destinations).[3]

Conversely, approximately 79% of people working in the Kearney area live elsewhere in the region. Thus, there is a significant amount of study area residents commuting to jobs elsewhere in the region, while jobs in the Kearney area are predominantly filled by workers commuting into Kearney from elsewhere in the region. This inflow and outflow of workers places peak-period demands on access to the regional transportation system, particularly I-35.

Environmental Constraints / Considerations

Known environmental constraints and consideration in the study area include:

- Prime farmland exists in the study area and new interchanges could have some adverse impacts.
- There are potential limited impacts to freshwater emergent wetlands or lakes by a new interchange.
- A new I-35 interchange at the 136th Street alignment would require a new crossing of Fishing River west of the interstate and have some potential floodplain issues.

[3] U.S. Census Bureau, Center for Economic Studies. onthemap.ces.census.gov/

- The interchange locations would not affect historic properties. It is also not expected that there would be any archeological sites impacted at either interchange location. However, the State Historic Preservation Office (SHPO) did indicate that some areas located outside of both alternative interchange locations have a high potential for archaeological sites. Therefore, when the project limits are finalized, it would be beneficial to obtain further review information from the SHPO. This is especially true if the project limits extend out from the immediate interchange areas.
- An initial worst-case scenario noise model was run by MoDOT and indicated that the project, in its current state, will not have any noise impacts associated with it.

There are no additional anticipated environmental impacts at this time.

Public Involvement

At the first public meeting for this AJR held November 15, 2012, those in attendance were invited to fill out a comment card. An online version of the comment card was also available November 9th – 30th. A total of 111 responses were received. Of those that responded:

- 76% favored a new interchange, while 21% did not want a new interchange and 4% were unsure or did not answer.
- For interchange location, 48% of respondents favored 144th / 19th Street, 31% favored 136th Street and 15% favored a different location (such as 128th Street, Route 33 or 172nd Street). 6% responded "none".

Concerns were raised about the possibility of increased traffic along 19th Street adjacent to existing residential areas if an interchange were built, potentially effecting the safety and property values for homeowners along 19th Street. The concerns raised about the potential 136th Street interchange were its cost, its potential contribution to urban sprawl and the land acquisition required.

A second public meeting, the Location Public Hearing, was held on April 25, 2013. At the meeting, the preferred alternative was revealed to the public. Again, those in attendance were invited to fill out a comment card, and an online version was available from April 25 – May 10, 2013. Forty-four written comments and 13 online comments were received regarding the project during the meeting and subsequent comment period. Respondents were fairly split, with about half in favor of, and half in opposition to, the proposed project. As with the first meeting, most of those opposed to the project were residents of the 19th Street corridor and adjacent neighborhoods. Their concerns remained focused on the increased traffic and potential safety effects of a new interchange in those areas. Those in favor of the project generally believe that the proposed interchange would benefit the City by reducing congestion and promoting economic development.

Railroad Crossings

The KAW River Railroad runs a short line north-south between I-35 and Route 33. It currently has three at-grade crossings in the vicinity of Kearney: at 19th Street, Route 92, and Washington Street. The line originates south of Kearney and terminates at the Ply Gem facility, located between Washington Street and Major Street. If a new interchange were to be built at I-35 and 136th Street, a fourth crossing of the railroad would need to be added.

The line typically carries only one train per week, with no more than two per week. According to a representative at Ply Gem (the line's only shipper) there are no current plans to increase production at the facility such that it would increase the number of trains per week on the spur line.

According to the Federal Railroad Administration (FRA) Office of Safety Analysis website, the average train speed along this line, in the vicinity of the three existing at-grade crossings, is less than 10 mph. Additionally, the FRA has no record of any accidents occurring at any of the three existing crossings.

3. METHODOLOGY

The methodology for this Interstate access request analysis included the following steps:

- Complete a comprehensive public involvement effort to support and guide the decisions made.
- Establish and communicate a purpose and need for the proposed interstate access modification. That purpose and need was identified in the first section of this report.
- Frame that purpose and need by clearly defining the associated goals, objectives, and performance measures of the proposed action. The performance measures for each objective were presented in the first section of this report.
- Evaluate existing traffic operations, safety, and connectivity / mobility in the study area.
- Complete an environmental screening of potential issues in the study area.
- Identify projected land development patterns and density through 2040.
- Forecast traffic volumes associated with that likely land development scenario for the 2040 "No-Build" condition.
- Forecast traffic volumes associated with the various 2040 TSM and Build condition alternatives.
- Evaluate traffic operations, safety, and traffic operations outcomes associated with the No-Build, TSM, and Build conditions.

The remainder of this section addresses the details associated with the methodology employed.

Land Use Forecasting

Updating the land use forecasts was a key step in developing future travel demand in the study area. This section describes the process involved in land use forecast development. Previous studies forecasted land use to 2030, and these previous efforts were used as a starting point in developing 2040 land use forecasts for this AJR. The forecasting process also incorporated updated information provided by the City of Kearney regarding the type, location, and extent of future development in the community.

Recent trends indicate that growth has been proceeding at only a moderate pace over the past several years, due to the economic slowdown. As a result, the projected growth trends are for continued moderate growth until approximately 2018, and then a return to more robust growth between 2018 and 2030, tapering slightly between 2030 and 2040. **Table 3-1** presents the expected land-use growth and 2040 totals by category for dwelling units (single and multi-family), retail, industrial, office, school, and hotels. Appendix A presents details regarding the land-use forecasts through 2040.

Table 3-1: Kearney Area Modeled Land Use Totals by Category

						Annual Growth				Total Change (2007-2040)	
Land Use	Code	Units	2007	Range of Previous 2030 Projections	Recommended 2040	2007-2012	2012-2018	2018-2030	2030-2040	#	%
Single Family Homes	SF	Dwelling Units	3,016	6,151 - 9,221	5,894	30	40	125	100	2,890	96%
Multi-Family Homes	MF	Dwelling Units	24	1,438 - 2,275	1,639	20	20	75	50	1,620	6750%
Total Dwelling Units	HH	Dwelling Units	3,040	7,589 - 11,496	7,533	50	60	200	150	4,510	148%
Retail	RET	Square Feet	584,040	2,189,779 - 3,354,153	1,855,960	5,000	15,000	60,000	45,000	1,285,000	220%
Industrial	IND	Square Feet	553,600	1,297,583 - 1,430,415	1,312,600	5,000	10,000	40,000	20,000	765,000	138%
Office	OFF	Square Feet	560,210	967,246 - 1,119,104	975,210	0	5,000	20,000	15,000	420,000	75%
School	SCH	Students	3,800	3,800 - 3,800	7,350	30	50	160	120	3,570	94%
Hotel	HOTL	Rooms	176	176 - 176	456	0	0	15	10	280	159%
Special Generators	SPECIAL	NA	6,000	6000 - 6000	6,000	0	0	0	0	0	0%

As shown in **Table 3-1**, the 2040 projections produced for this effort are consistent with 2030 projections previously developed for Kearney, due to economic slowdown. The above land-use control totals were allocated to the traffic analysis zones (TAZs) in the Kearney area travel model based on information provided by the City of Kearney, including recent development proposals and historical land-use plans. Prior model development assumptions were also used in this process.

Future Year Traffic Forecasts

A VISUM travel demand model was developed and maintained for earlier studies in the Kearney area, and has been validated to the year 2007 for use on this study. The Kearney VISUM model was updated to include a 2040 land use scenario, based on the land use projections discussed above. The model was used to identify forecasted growth rates in study corridors and develop peak hour traffic forecasts to support the evaluation of the various project alternatives (no-build, TSM, and build alternatives).

The traffic forecasting process refined the model output through a post-processing approach. The raw 2040 peak period travel model assigned volumes were post-processed to account for the deviations observed between the base year raw model output and base year observed traffic counts on a segment-by-segment basis. The post-processing approach generally follows the guidelines in National Cooperative Highway Research Program (NCHRP) Report 255, which describes the need for refining raw data based on the discrepancies between a base year count and a base year assignment. This assumption is that the existing discrepancy will be of the same scale in a future year forecast. Count data were available for year 2012 and existing travel demand model was for year 2007. The VISUM model is a PM peak hour model. It was not within the scope of this study to develop a new AM peak hour VISUM model; however, the AM peak hour is a critical time period due to the heavy commute traffic flow from Kearney. Therefore, to provide an estimate of AM peak hour volumes, the PM peak hour origin-destination flows were reversed in the VISSIM model to yield an AM VISSIM model for the analysis.

Post-processed volumes were further adjusted to develop network-wide balanced volumes that accounted for all reasonable access points where traffic could enter / exit a corridor. VHT and VMT study area travel summaries were generated from the model runs.

Area of Influence

As noted in the project description, the study roadways include I-35 and interchanges, Route 92, Lightburne Road, and portions of roads that either provide access to the Route 92 interchange or could provide access to a possible new interchange. The nine primary existing study intersections were selected because they influence current and future access and mobility to I-35. Along I-35, the study area includes the first adjacent interchange on either side of the proposed interchange, consistent with FHWA guidance. Along Route 92, the study area was extended beyond the minimum guidance (which is the first adjacent signalized or major intersection) to assess operations from Nation Road east to Route 33 which includes four primary intersections as well as a number of minor intersections and driveways that were also considered. The extended Route 92 study area reflects the larger area of influence because the corridor functions as the I-35 interchange access road as well as an east-west arterial through route. Traffic forecasts also indicate that this vital corridor may become congested in the future, especially east of the existing interchange.

In the Lightburne Road interchange area, the study area extends to the Lightburne Road/US-69/I-35 ramps intersection to the south. There is very little development and modest traffic along Lightburne Road to the north of the interchange, so detailed traffic analyses north of the southbound I-35 off-ramp were not completed. The three intersections in this area are sufficient for the analysis, given that the focus

of the new access point is several miles to the north near Kearney. Any potential future intersections added for the build scenarios were evaluated to assess the projected traffic operations of the possible new interchange options.

Operational Analysis Procedures

To evaluate traffic operations, the VISSIM computer program (version 5.4) was employed. VISSIM is a microscopic simulation model used for analyzing urban transportation networks. The VISSIM model was calibrated to replicate existing conditions using field-measured travel speeds and queue observations. Appendix B presents the VISSIM calibration and validation results for reference. For traffic operations analysis at intersections, VISSIM was used to report average delay per vehicle, as well as queues, for links on each intersection approach. This allows the individual delays to be averaged into an intersection-wide delay-per-vehicle measure. For freeways, VISSIM reports densities (and speeds) on a per-link basis. VISSIM segmentation is typically based on the characteristics of the link (speed, number of lanes) or locations where interruptions/changes occur (ramp junction, lane drop, etc.). For the purposes of this study, density was extracted for each segment, and the HCM standard freeway mainline density-LOS correlation was used to evaluate all segments.

Safety Analysis Procedures

To evaluate the safety performance of the system, a crash analysis was performed in the study area (see Chapter 2). Crash records for a five-year period (2007 to 2011) were analyzed and compared to statewide averages for similar facilities, and compared to segment-specific "critical crash rates". The critical crash rate is a segment-specific calculation that is based on the statewide average for similar facilities, takes into account the amount of "exposure" a segment has (in terms of vehicle miles of travel) and an assumed level of statistical confidence. Segments with crash rates that exceed the critical crash rate warrant further review.

4. ALTERNATIVES

This section provides a summary of each alternative. A comparison of the alternatives against one another is provided in the next section, "Alternatives Analysis." The design year for this analysis is 2040. The following alternatives were analyzed:

- **2040 No Build Alternative**: The No-Build alternative assumes no new I-35 interchange in the study area. The No-Build alternative does assume some previously planned improvements in the vicinity of the existing I-35 / Route 92 interchange.
- **2040 TSM Alternative**: The TSM alternative assumes no new I-35 interchange, but does include new turn lanes to improve the capacity in and around the existing Route 92 / I-35 interchange, in addition to the previously planned improvements assumed in the No-Build Alternative.
- **2040 Build Alternative 1**: Alternative 1 assumes that a new interchange is constructed at 144th Street / 19th Street, approximately 1.1 miles south of the Route 92 interchange.
- **2040 Build Alternative 2**: Alternative 2 assumes that a new interchange is constructed near 136th Street, approximately 2.2 miles south of the Route 92 interchange.

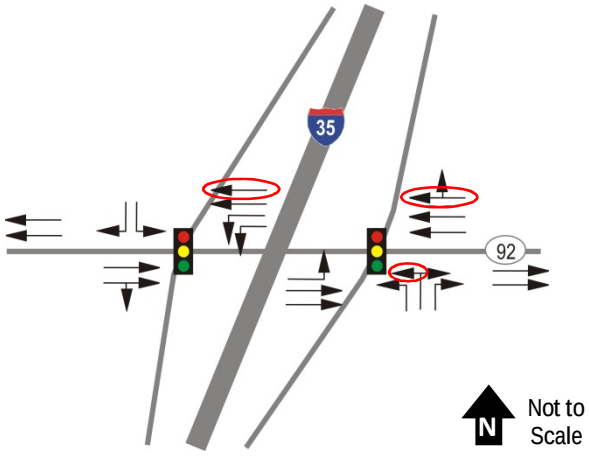
2040 No Build Alternative

The No-Build scenario assumes that no new interchange will be constructed within the study area by 2040. The 2040 No-Build highway network assumes some previously planned and funded improvements in the vicinity of the existing I-35 / Route 92 interchange, including:

- Reconfiguring the northbound off-ramp to provide a left-turn lane, a right-turn lane, and a shared left/right lane.
- Widening Route 92 to seven lanes between the interchange terminals. The configuration will include a westbound though lane on the north side of the existing bridge pier.
- Widening Route 92 to four lanes plus turn lanes from the southbound ramps to just west of Sam Barr Drive (including a roundabout at Sam Barr Drive).
- Prohibiting left turns from southbound Shanks Ave and left turns to and from Centerville Ave.

These improvements are part of a MoDOT improvement project that is expected to go to construction this summer (2013). **Figure 4-1** shows the lane additions assumed at the Route 92 interchange between today and 2040 for the No-Build Alternative. Aside from the improvements described above, the No-Build lane geometry remains the same as shown in the existing geometry figure.

Figure 4-1: 2040 No-Build Geometric Improvements



2040 TSM Alternative

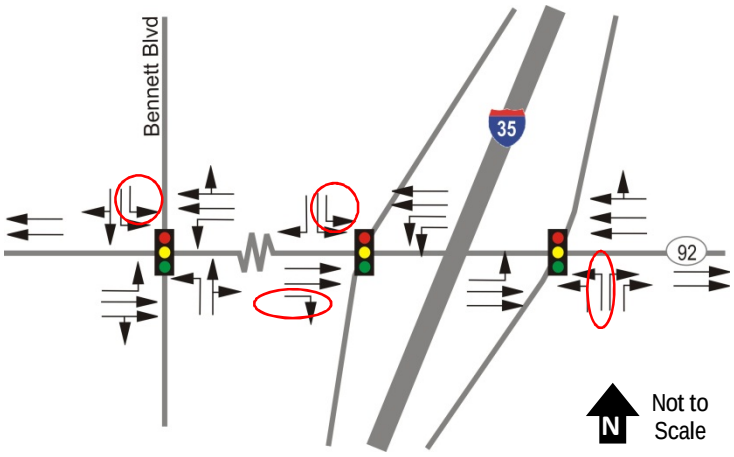
One of the primary alternatives considered was the TSM option. TSM techniques are generally implemented with the goal of managing congestion by leveraging the existing transportation system, while reducing or eliminating the need for new and expensive transportation infrastructure. Examples of TSM techniques include traffic signal coordination, minor geometric improvements (such as turn lane additions), transit improvements, ramp

metering, high-occupancy vehicle (HOV) lanes, and intelligent transportation systems (ITS). Currently there are no transit services, ramp metering, ITS or HOV measures in place along the study area (see further discussion below regarding future transit plans). The TSM alternative assumes several improvements to the existing system (in addition to those assumed in the No-Build) by 2040:

- A second left-turn lane would be added at the southbound I-35 to Route 92 off-ramp.
- The westbound Route 92 right turn lane onto the southbound I-35 on-ramp would be converted into a "free right".
- The northbound I-35 to Route 92 off-ramp would be widened to four lanes to accommodate two left-turn lanes and two right-turn lanes.
- A second southbound left-turn lane would be added at the Bennett Blvd / Route 92 intersection.
- Coordinated signal systems would be in place at the I-35 ramp terminals.

These potential TSM alternative improvements are illustrated in **Figure 4-2**.

Figure 4-2: 2040 TSM Geometric Improvements



There is currently no transit service available in the City of Kearney. The Kansas City Area Transportation Authority (KCATA) has no immediate plans in place to add commuter service between Kearney and Kansas City. However, the current Regional Transit Plan (*Smart Moves*) does indicate the potential for future commuter service to Kearney, as well as a new park-and-ride location, in the long term. Recent research indicates that enhanced transit service in urbanizing areas can provide modest decreases in peak hour traffic flows. If implemented, transit service could potentially provide some level of improvement to congested conditions along Route 92 in the vicinity of I-35. However, transit accounts for just a 1.2% mode share of all commute trips in metropolitan Kansas City[4]. If Kearney's commute mode share with transit service were similar to the average for the Kansas City metropolitan area, it is estimated that a commuter transit service extended to Kearney on its own would not provide sufficient traffic reductions in the Route 92/I-35 interchange area to counteract forecasted traffic operations deficiencies. Despite its modest impacts, it is recommended that transit service extensions into the Kearney area continue to be considered. Plans for a new interchange should include consideration for, and potentially reserve right-of-way for, a park-and-ride location that is adjacent to I-35.

When evaluated within the context of the operational and safety issues at the I-35 / Route 92 interchange, ramp-metering would not be a practical method for addressing congestion within the interchange area. Ramp metering is typically applied in situations where the mainline freeway is congested, and regulating the flow of vehicles entering the freeway will improve traffic operations and safety. This is not the case

[4] U.S. Census Bureau, 2007-2011 American Community Survey, Kansas City MO - KS Metropolitan Area.

along I-35 in this area, and would not address the congestion issues along Route 92 and at the ramp terminals. Ramp metering at the existing interchange would likely increase Route 92 congestion by delaying and queuing traffic on the southbound on-ramp. It is recommended, however, that a new interchange be designed to include ramp lengths that could accommodate ramp-metering, should congestion along I-35 warrant the use of such techniques at some point in the future.

The addition of HOV lanes along I-35 could be considered in the Kearney area as part of a broader strategy to increase regional system capacity. Similar to ramp metering, however, this application is typically used to address congestion issues along the freeway itself, rather than along a secondary facility like Route 92. By encouraging commuters to carpool, however, this technique could provide some benefits by reducing the number of vehicles on all facilities throughout the study area. On their own, HOV lanes would not be expected to provide a sufficient benefit to affect the issues along Route 92.

I-35 in the vicinity of Kearney is not currently a part of Kansas City's regional ITS system (SCOUT). The existing coverage only extends as far north as the I-29/I-35 split, which is over 17 miles south of the existing Route 92 interchange. Initially planned expansion phases would extend the future system as far north as MO-291, which is still over 8 miles south of the existing Kearney interchange. More recent planning efforts have modified those initial expansion plans, and call for a more organic growth, rather than strictly phase-by-phase. This seems to leave open the possibility that the study area could eventually be included in SCOUT, if enough of a need could be shown. However, it should be assumed that if this did take place it would likely be very far in the future. The proposed new interchange should be designed to accommodate fiber optic lines and ITS infrastructure, should the need for these items arise. Furthermore, an additional interchange at Kearney could potentially enhance the flexibility of the regional ITS system and leverage a future SCOUT expansion into the Kearney area by providing opportunities for alternate routes and system redundancy should an incident occur along I-35 in the Kearney area or at the current Route 92 service interchange.

In summary, TSM strategies are an important consideration in transportation planning and provide some benefits to the overall regional system. On their own, they are not expected to significantly address the forecasted capacity issues or ongoing safety issues at the current Route 92 interchange.

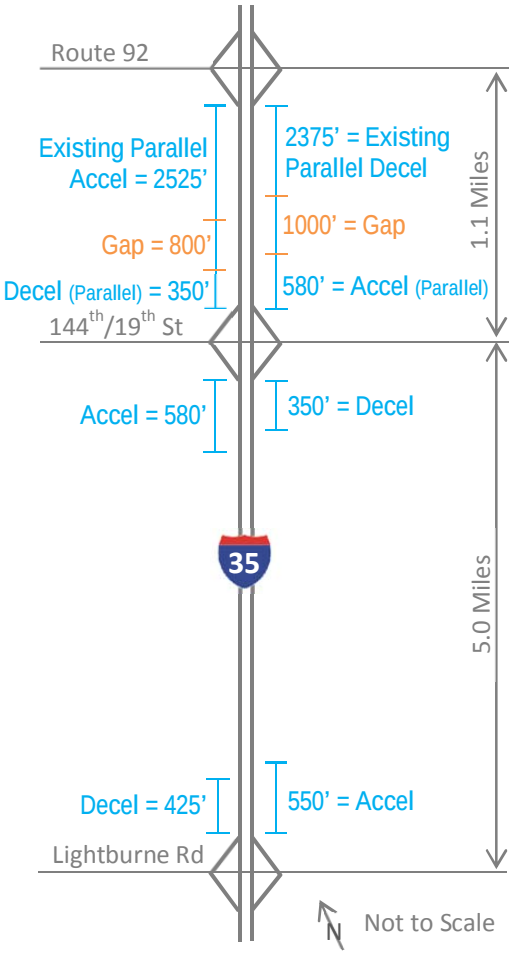
2040 Build Alternative 1: New Interchange at 144th/19th Street

Build Alternative 1, a new interchange at 144th/19th Street, would require the extension and paving of 19th Street for approximately ½ mile, from its current terminus at Paddock Road to the west with a new structure over, and interchange ramps at, I-35. Multiple design alternatives were considered as options within Build Alternative 1. These alternatives included:

- **1A: Simple Diamond with Standard Ramp Terminal Intersections**. A traffic signal would likely be warranted at the 19th Street ramp terminals by 2040. Alternative 1A does not include auxiliary lanes on I-35 between the 19th Street and 6th Street / Route 92 interchanges.
- **1B: Simple Diamond with Roundabouts at Ramp Terminal Intersections**: Roundabouts at the 144th Street/ 19th Street ramp terminal intersections would be utilized. Alternative 1B does not include auxiliary lanes on I-35 between the 19th Street and 6th Street / Route 92 interchanges.
- **1C: Simple Diamond with Standard Ramp Terminal Intersections with Auxiliary Lanes**. This is similar to Alternative 1A, except that auxiliary lanes would be provided between the 19th Street and 6th Street / Route 92 interchanges in this alternative.
- **1D: Simple Diamond with Roundabouts at Ramp Terminal Intersections with Auxiliary Lanes**: This is similar to Alternative 1B, except that auxiliary lanes would be provided between the 19th Street and 6th Street / Route 92 interchanges in this alternative.

Of these options, Alternative 1A was selected as the option to be analyzed in the most detail. The simple diamond with a three-lane bridge and standard signalized intersections was predicted to operate well. The roundabouts also were found to operate acceptably at a planning level and could be explored further if desired during the design phase of the project. Options 1C and 1D both included auxiliary lanes on I-35. While these lanes could be beneficial, they are not necessary to achieve acceptable operations on the freeway. In fact, the Alternative 1 options, without auxiliary lanes, improve the 2040 northbound diverge at Route 92 from LOS E to LOS B or better during both peak hours (the new 19th Street ramp diverge areas also functions at LOS C or better). Due in part to this improvement, the northbound mainline approaching Route 92 would improve from LOS D to LOS C in the PM peak hour. All merge or diverge movements at 19th Street would operate at a level of service C or better. All movements along the I-35 corridor would operate the same or better as the no build condition. This is shown in **Table 5-6**.Therefore, the auxiliary lanes were determined not to be necessary to achieve acceptable operating conditions and were not included as part of the proposed project. However, auxiliary lanes (northbound and southbound) are also not precluded and could be added within right-of-way in the future if necessary.

Figure 4-3: Interchange Spacing



Spacing between interchanges was also considered prior to recommending a design option without auxiliary lanes. According to AASHTO's *A Policy on Geometric Design of Highways and Streets, 2011 6th Edition* ("the Green Book"), if the distance between successive noses is less than 1,500 feet, the speed-change lanes should be connected to provide an auxiliary lane. That distance includes the acceleration and deceleration lane distances plus the gap space in-between. As can be seen in **Figure 4-3**, the nose-to-nose spacing between the recommended interchange at 19th Street and the existing interchange at Route 92 is 3,675 feet in the southbound direction and 3,955 feet in the northbound direction. Both lengths exceed the minimum requirements.

The acceleration lane distance of 580 feet and the deceleration lane distance of 350 feet shown for the proposed new interchange meet the AASHTO requirements set forth in Tables 10-3 and 10-5 of "the Green Book", assuming a mainline speed of 70 mph and a design speed of 50 mph for the ramps.

For approximately the first 400 feet west of Route 33, 19th Street is a 3-lane urban roadway, with a westbound travel lane, an eastbound left-turn lane, and an eastbound shared through/right-turn lane. From that point west to Paddock Drive, it is a 20-foot wide, rural-design asphalt road. With the construction of Alternative 1, it would be beneficial to improve 19th Street east of Paddock Drive to provide full width lanes as well as vertical curve flattening to improve sight distance. Other possible improvements could include turn lanes and shoulders or curb-and-gutter. Sidewalks could also be included in the improvements. An upgrade of the railroad crossing would also be beneficial from a safety standpoint. Any improvements along 19th Street, east of Paddock Drive, are not a part of the project description that is

the subject of this AJR, and are expected to be completed by others. The current planning-level construction cost estimate for the Alternative 1 interchange, including improvements between Nation Road and Paddock Drive is approximately $6 million to $9 million. This does not include improvements east of Paddock Drive. It also does not include final design, right-of-way, or utility relocation work. A conceptual layout of the 144th Street / 19th Street interchange is provided in **Figure 4-4**. The interchange lane configuration for this alternative is shown in **Figure 4-5**.

Figure 4-4: Conceptual Layout 144th Street / 19th Street Interchange

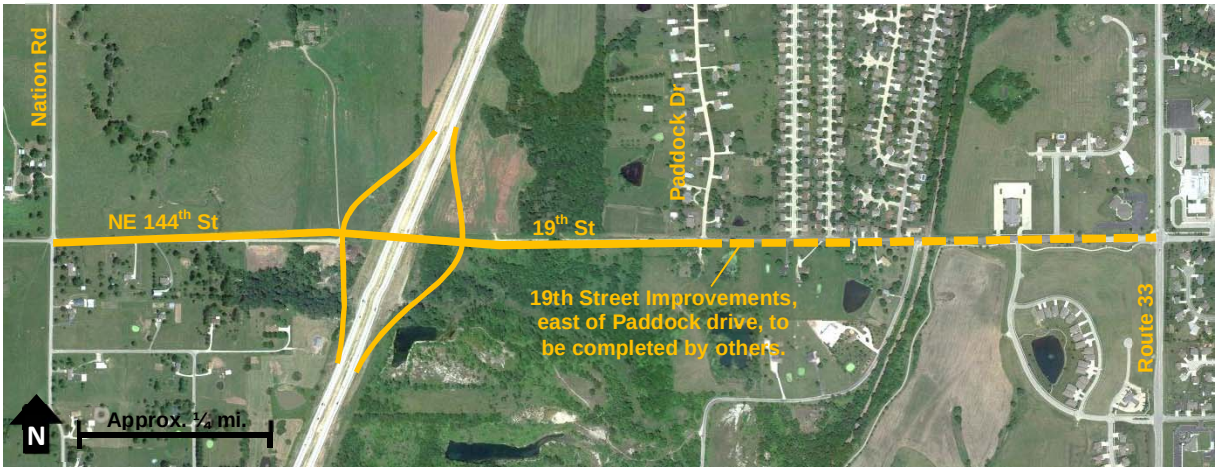
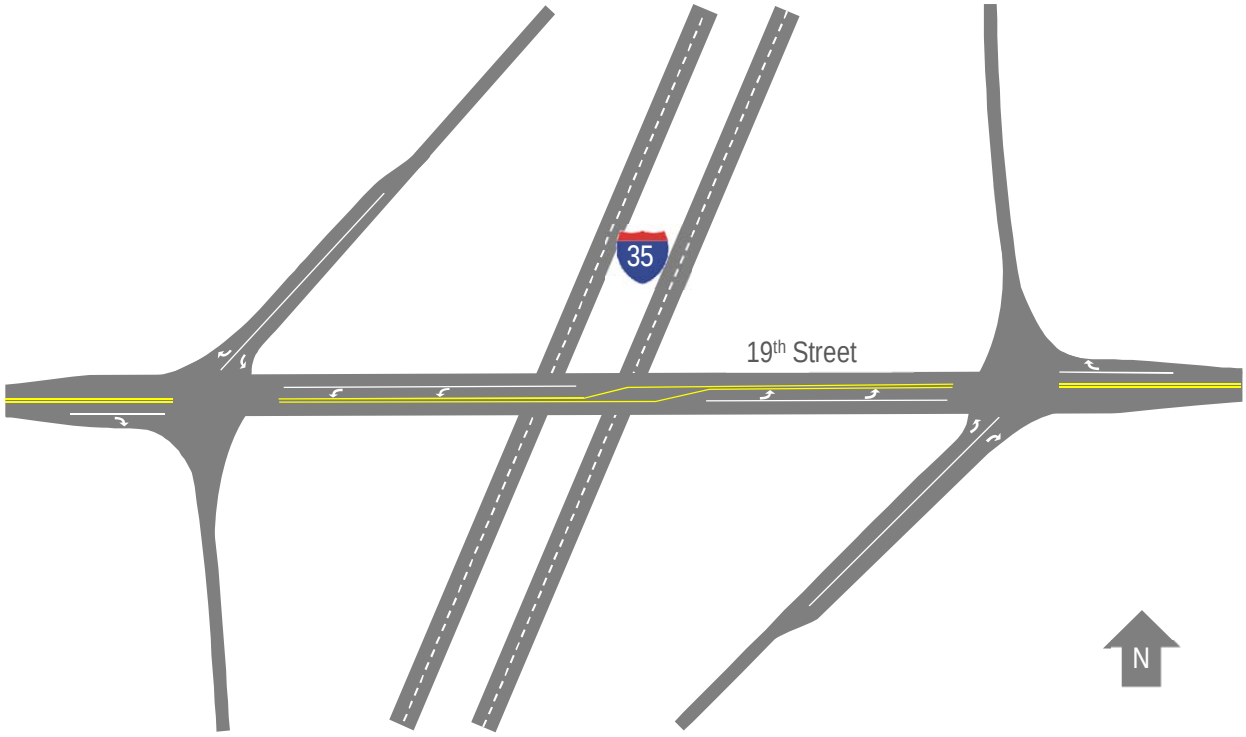


Figure 4-5: Lane Configuration for 144th Street / 19th Street Interchange



2040 Build Alternative 2: New Interchange at 136th Street

Build Alternative 2, a new interchange at 136th Street, would require a 1.1-mile extension of 136th Street between Wood River Drive and Nation Road, a new Fishing River crossing west of I-35, a new KAW River Railroad at-grade crossing, and a new structure and interchange ramps at I-35. The interchange would be a standard diamond configuration with a three-lane bridge and standard ramp terminal intersections. Multiple design options were not considered at this location, as the 2040 traffic volumes could be served with a standard interchange and intersection configuration. A new interchange along 136th Street would have a higher cost than Alternative 1 as it would require more infrastructure and right-of-way acquisition to complete. The current planning level construction cost estimate for Alternative 2 is $10 million to $14 million. This does not include final design, right-of-way, or utility relocation work.

A conceptual layout of the 136th Street interchange is provided in **Figure 4-6**. The interchange lane configuration for this alternative is shown in **Figure 4-7**.

Figure 4-6: Conceptual Layout of 136th Street Interchange

Figure 4-7: Lane Configuration for 136th Street Interchange

5. ALTERNATIVES ANALYSIS

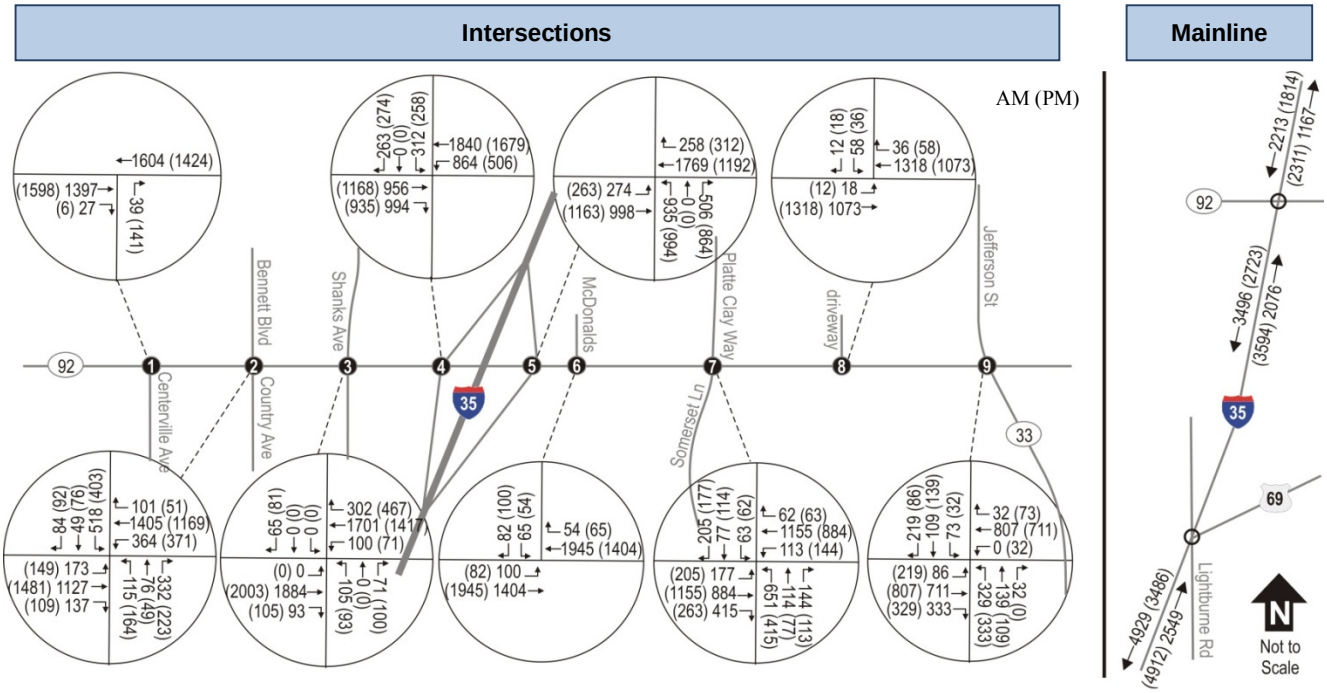
This section provides a summary of how each alternative performs against the evaluation criteria, and summarizes how each addresses the purpose and need. The Alternatives Analysis section concludes with a direct comparison of how the alternatives perform against each other. Comparisons of each Alternative's performance in terms of traffic operations, safety, planning consistency, and economic development impacts are provided later in this section. Corridor travel time by alternative is presented in the Alternatives Comparison portion of this section.

No-Build Alternative Performance

The No-Build Alternative assumes that no new interchange will be constructed within the study area by 2040. As noted in the Alternatives section, the 2040 No-Build highway network assumes some improvements at and near the I-35 / Route 92 interchange including an improved northbound off-ramp and the widening of Route 92 to seven lanes between the interchange terminals.

To assess the future design year traffic operating conditions, 2040 No-Build traffic volume forecasts were developed. The forecasts were developed using the methodology presented in Section 3. **Figure 5-1** contains the 2040 peak hour No-Build Alternative volume forecasts.

Figure 5-1: 2040 No-Build Peak Hour Traffic Volumes



No-Build Traffic Operations Analysis

The same methods employed to analyze the existing conditions were also used to analyze the 2040 No-Build Alternative. The same nine study intersections were evaluated using the 2040 No-Build traffic volumes and intersection geometries shown above. The results of the intersection traffic operations analysis are summarized in **Table 5-1**. As the table indicates, three (3) of the study intersections are forecasted to not meet the operations performance target and will operate at LOS E or F under this

alternative during the AM peak period. In the No-Build 2040 conditions, there are also 15 individual approaches that operate at LOS E or F. These operational issues are discussed in more detail below. In addition, it should also be noted that all intersections have one or more approach that is forecasted to operate at LOS E or worse during one or both peak periods. Appendix C presents the details of the future year VISSIM traffic analysis for reference.

A 2040 freeway traffic operations analysis was completed for all merge areas, diverge areas, and basic freeway segments along I-35 in the study area for the No-Build alternative. The results of the No-Build freeway traffic analysis are summarized in **Table 5-2**. The No-Build alternative freeway operations analysis showed that:

- During the AM and PM peaks, the diverge at the Route 92 northbound off-ramp would operate at LOS E.
- During the PM peak, the merge at the Lightburne Road northbound on-ramp would operate at LOS E.

The operations at all other I-35 segments and ramps would meet the operational performance target, operating at LOS D or better. Furthermore, the VISSIM simulation indicated that by 2040 traffic volumes would queue back onto the mainline of I-35, causing delays and potential safety issues on the interstate.

Table 5-1: 2040 No-Build Intersection Operations Analysis

	A.M. Peak Hour		P.M. Peak Hour	
Study Intersection	**Delay (sec/veh)**	**LOS**	**Delay (sec/veh)**	**LOS**
1. Route 92 & Centerville	**34.7**	**C**	**27.5**	**C**
EB Route 92	64.6	E	47.5	D
WB Route 92	0.9	A	1.0	A
NB Centerville Ave	>400.0	F	>400.0	F
2. Route 92 & Bennett Blvd	**75.7**	**E**	**47.8**	**D**
EB Route 92	74.2	E	49.9	D
WB Route 92	42.8	D	19.0	B
NB Country Ave	234.2	F	104.4	F
SB Bennett Blvd	78.1	E	84.0	F
3. Route 92 & Shanks Ave	**38.1**	**D**	**16.7**	**B**
EB Route 92	18.3	B	5.6	A
WB Route 92	28.7	C	6.2	A
NB Shanks Ave	>400.0	F	282.7	F
SB Shanks Blvd	49.1	D	15.1	B
4. Route 92 & I-35 SB	**28.0**	**C**	**15.2**	**B**
EB Route 92	29.3	C	13.2	B
WB Route 92	36.9	D	35.7	D
SB I-35 Ramps	95.5	F	37.7	D
5. Route 92 & I-35 NB	**46.5**	**D**	**36.9**	**D**
EB Route 92	18.1	B	28.0	C
WB Route 92	36.1	D	32.0	C
NB I-35 Ramps	192.7	F	107.7	F
6. Route 92 & McDonalds	**31.3**	**C**	**17.4**	**B**
EB Route 92	4.6	A	5.8	A
WB Route 92	34.4	C	14.3	B
NB McDonalds driveway	9.4	A	12.5	B
SB McDonalds driveway	278.8	F	230.1	F
7. Route 92 & Platte Clay	**70.0**	**E**	**40.4**	**D**
EB Route 92	37.3	D	31.5	C
WB Route 92	92.9	F	30.8	C
NB Somerset Lane	99.2	F	80.7	F
SB Platte Clay Way	39.6	D	38.4	D
8. Route 92 & Driveway	**9.5**	**B**	**6.0**	**A**
EB Route 92	3.5	A	6.7	A
WB Route 92	11.0	B	3.0	A
SB Com Center driveway	60.7	E	55.1	E
9. Route 92 & Route 33	**81.6**	**F**	**32.1**	**C**
EB Route 92	7.6	A	19.6	B
WB Route 92	79.4	E	37.7	D
NB Route 33	91.1	F	49.6	D
SB Route 33	333.6	F	40.0	D

Table 5-2: 2040 No-Build Freeway Operational Analyses

Freeway Segments	A.M. Peak Hour			P.M. Peak Hour		
Location	Speed (mph)	Density (pc/mi/ln)	LOS	Speed (mph)	Density (pc/mi/ln)	LOS
I-35 SB						
North of Route 92	69.9	15.8	B	70.3	12.9	B
Between Route 92 & Lightburne Rd	67.9	23.3	C	68.8	18.8	C
South of Lightburne/US-69	69.7	22.0	C	66.7	16.8	B
I-35 NB						
South of Lightburne/US-69	71.0	12.0	B	69.2	23.6	C
Between Route 92 & Lightburne Rd	55.1	20.0	C	58.7	31.5	D
North of Route 92	70.6	7.1	A	69.4	15.8	B

Merge/Diverge	A.M. Peak Hour			P.M. Peak Hour		
Location	Speed (mph)	Density (pc/mi/ln)	LOS	Speed (mph)	Density (pc/mi/ln)	LOS
I-35 SB						
at Route 92 Off Ramp (diverge)	62.5	16.3	B	68.8	11.0	B
at Route 92 On Ramp (merge)	67.2	13.7	B	67.9	11.1	B
at Lightburne Off Ramp (diverge)	58.9	22.3	C	64.8	16.6	B
at US-69 On Ramp (merge)	62.7	24.6	C	64.7	17.4	B
I-35 NB						
at US-69 Off Ramp (diverge)	69.5	10.6	B	53.3	27.1	C
at Lightburne On Ramp (merge)	65.8	13.2	B	43.4	35.6	E
at Route 92 Off Ramp (diverge)	<20.0	92.5	E	24.0	47.1	E
at Route 92 On Ramp (merge)	66.8	6.1	A	65.4	13.9	B

No-Build Alternative Safety Evaluation

Crashes along Route 92 were identified to be higher than the state average and flagged for exceeding "critical rates". Rear-end and left-turn/angle crashes were the most prevalent crash types in the corridor, and as traffic volumes increase through 2040, the frequency of crashes would be expected to increase. Furthermore, the 2040 PM peak hour traffic backups from the northbound Route 92 off ramp onto mainline I-35 could lead to additional crashes in the study area. The No-Build condition would not address the congestion, stop-and-start traffic operations and limited traffic gaps along Route 92 associated with these types of crashes.

No-Build Alternative Accessibility Evaluation

Kearney continues to grow to the south, stretching some distance away from the current interchange at Route 92. The majority of Kearney traffic accessing I-35 is coming from or going towards portions of the Kansas City metro area to the south. Thus, much out-of-direction travel would be required in the No-Build condition, and doing nothing would not address the need for improved regional connectivity / connections, or the need for better access across I-35 for circulation in the southern and western Kearney growth areas.

No-Build Alternative Consistency with Planning and Economic Development Initiatives

The No-Build Alternative does not address the purpose and need of the study from either a planning consistency or from an economic development perspective.

As described in the introduction, there have been several planning efforts, including Kearney's Comprehensive Plan, that have identified the need for a new I-35 interchange in south Kearney. It is projected that around 4,500 new residential units will be built by 2040 in the study area, on both sides of I-35. The City has extended utilities to this area to facilitate orderly, urban density growth. A new interchange would support this growth by providing better connections to I-35 and the east side of Kearney. The No-Build alternative does not meet this need.

From an economic development perspective, the improved accessibility provided by a new interchange would give existing and new businesses enhanced market access by improving access to regional customers via the I-35 corridor. The No-Build alternative does not meet the economic development purpose of the project.

TSM Alternative Performance

As noted in the Alternatives section, the TSM alternative focused on maximizing the existing interchange by adding turn lanes at key intersection approaches. The 2040 TSM Alternative traffic volume forecasts were the same as the No-Build Alternative shown in Figure 5-1.

TSM Traffic Operations Analysis

The results of the TSM alternative intersection traffic operations analysis are summarized in **Table 5-3**. As shown, while they would improve conditions to some extent, the TSM improvements evaluated as a part of this alternative would not provide the performance target of LOS D operations at two (2) intersections in the AM peak hour by 2040. Additionally, nine (9) individual intersection approaches in the AM and/or PM would not meet the traffic operations target of LOS D. Specifically, the northbound off-ramps at the Route 92 / I-35 interchange are projected to operate at LOS F in both peaks in the 2040 TSM alternative. The signal systems would be timed and coordinated to maximize progression for the major flows. However, as the analysis shows, these systems alone would not be sufficient to serve the substantial traffic growth by 2040.

Table 5-3: 2040 TSM Intersection Operations Analysis

	A.M. Peak Hour		P.M. Peak Hour	
Study Intersection	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
1. Route 92 & Centerville	**30.1**	**C**	**26.3**	**C**
EB Route 92	45.9	D	41.7	D
WB Route 92	0.7	A	0.9	A
NB Centerville Ave	>400.0	F	>400.0	F
2. Route 92 & Bennett Blvd	**63.3**	**E**	**38.9**	**D**
EB Route 92	52.5	D	46.3	D
WB Route 92	30.0	C	18.4	B
NB Country Ave	186.5	F	56.6	E
SB Bennett Blvd	160.4	F	61.1	E
3. Route 92 & Shanks Ave	**32.8**	**C**	**15.7**	**B**
EB Route 92	12.2	B	5.0	A
WB Route 92	22.3	C	5.9	A
NB Shanks Ave	>400.0	F	266.3	F
SB Shanks Blvd	12.9	B	14.7	B
4. Route 92 & I-35 SB	**18.6**	**B**	**12.8**	**B**
EB Route 92	38.2	D	11.0	B
WB Route 92	24.3	C	30.3	C
SB I-35 Ramps	25.4	C	9.9	A
5. Route 92 & I-35 NB	**34.5**	**C**	**38.4**	**D**
EB Route 92	23.0	C	28.0	C
WB Route 92	18.0	B	32.2	C
NB I-35 Ramps	126.3	F	114.5	F
6. Route 92 & McDonalds	**26.2**	**C**	**17.3**	**B**
EB Route 92	10.2	B	7.3	A
WB Route 92	23.4	C	12.9	B
NB McDonalds driveway	17.8	B	13.6	B
SB McDonalds driveway	291.1	F	229.5	F
7. Route 92 & Platte Clay	**55.9**	**E**	**42.5**	**D**
EB Route 92	40.2	D	36.7	D
WB Route 92	47.6	D	30.4	C
NB Somerset Lane	115.5	F	81.6	F
SB Platte Clay Way	36.9	D	37.7	D
8. Route 92 & Driveway	**7.1**	**A**	**7.4**	**A**
EB Route 92	6.3	A	8.8	A
WB Route 92	3.9	A	2.9	A
SB Com Center driveway	81.7	F	70.3	E
9. Route 92 & Route 33	**26.0**	**C**	**32.9**	**C**
EB Route 92	8.1	A	21.9	C
WB Route 92	24.5	C	37.2	D
NB Route 33	57.6	E	49.9	D
SB Route 33	37.5	D	39.6	D

A 2040 freeway traffic operations analysis was completed for all merge areas, diverge areas and basic freeway segments along I-35 in the study area for the TSM alternative. The results of this analysis are shown in **Table 5-4**. The TSM alternative operations analysis showed that:

- During the AM and PM peaks, the ramp diverge at the Route 92 northbound off-ramp would operate at LOS E.
- During the PM peak, the ramp merge at the Lightburne Road northbound on-ramp would operate at LOS E. This is the case for all alternatives evaluated.

All other I-35 segments and ramps would meet the operational performance target, operating at LOS D or better.

Table 5-4: 2040 TSM Freeway Operational Analyses

Freeway Segments	A.M. Peak Hour			P.M. Peak Hour		
Location	Speed (mph)	Density (pc/mi/ln)	LOS	Speed (mph)	Density (pc/mi/ln)	LOS
I-35 SB						
North of Route 92	69.9	15.8	B	70.3	12.9	B
Between Route 92 & Lightburne Rd	67.9	22.8	C	68.6	19.2	C
South of Lightburne/US-69	69.8	21.6	C	66.6	17.1	B
I-35 NB						
South of Lightburne/US-69	71.0	12.0	B	69.2	23.6	C
Between Route 92 & Lightburne Rd	62.1	17.3	B	60.6	30.3	D
North of Route 92	70.8	7.3	A	69.4	15.9	B

Merge/Diverge	A.M. Peak Hour			P.M. Peak Hour		
Location	Speed (mph)	Density (pc/mi/ln)	LOS	Speed (mph)	Density (pc/mi/ln)	LOS
I-35 SB						
at Route 92 Off Ramp (diverge)	67.8	13.6	B	68.7	11.0	B
at Route 92 On Ramp (merge)	66.5	13.5	B	66.3	11.6	B
at Lightburne Off Ramp (diverge)	58.8	21.9	C	63.9	17.2	B
at US-69 On Ramp (merge)	62.9	24.1	C	64.6	18.7	B
I-35 NB						
at US-69 Off Ramp (diverge)	69.5	10.6	B	53.3	27.1	C
at Lightburne On Ramp (merge)	65.8	13.2	B	42.3	35.6	E
at Route 92 Off Ramp (diverge)	16.9	48.0	E	27.9	41.8	E
at Route 92 On Ramp (merge)	69.9	15.8	B	65.1	14.1	B

Additionally, the VISSIM traffic microsimulation analysis predicted that during the PM peak, there could be congestion between the Route 92 ramp terminals that leads to multi-cycle queuing back onto the ramp with traffic back-ups onto the I-35 mainline, causing delays and potential safety issues.

TSM Alternative Safety Evaluation

As traffic volumes increase through 2040 the frequency of crashes would be expected to increase. The TSM Alternative provides some spot improvements to operations in the Route 92 corridor west of the I-35 northbound ramps, but it does not comprehensively address the year 2040 congestion, stop-and-start traffic operations and limited traffic gaps along Route 92 associated with rear-end and left-turn/angle crashes. This is particularly true for the segment of Route 92 east of the existing interchange. Furthermore, the 2040 PM peak traffic backups from the northbound Route 92 off-ramp on to I-35 could lead to additional crashes in the study area. Thus, the TSM Alternative does not fully address the safety need identified in the study area.

TSM Alternative Accessibility Evaluation

The Route 92 improvements would provide a benefit to travel times through the Route 92 corridor. However, as Kearney continues to grow, the TSM Alternative does not meet the need for improved local and regional connectivity / connections. It is expected that limited VMT and VHT reductions would be associated with the TSM scenario.

TSM Alternative Consistency with Planning and Economic Development Initiatives

The improvements included in the TSM Alternative do not address the purpose of the study from a planning consistency or from an economic development perspective.

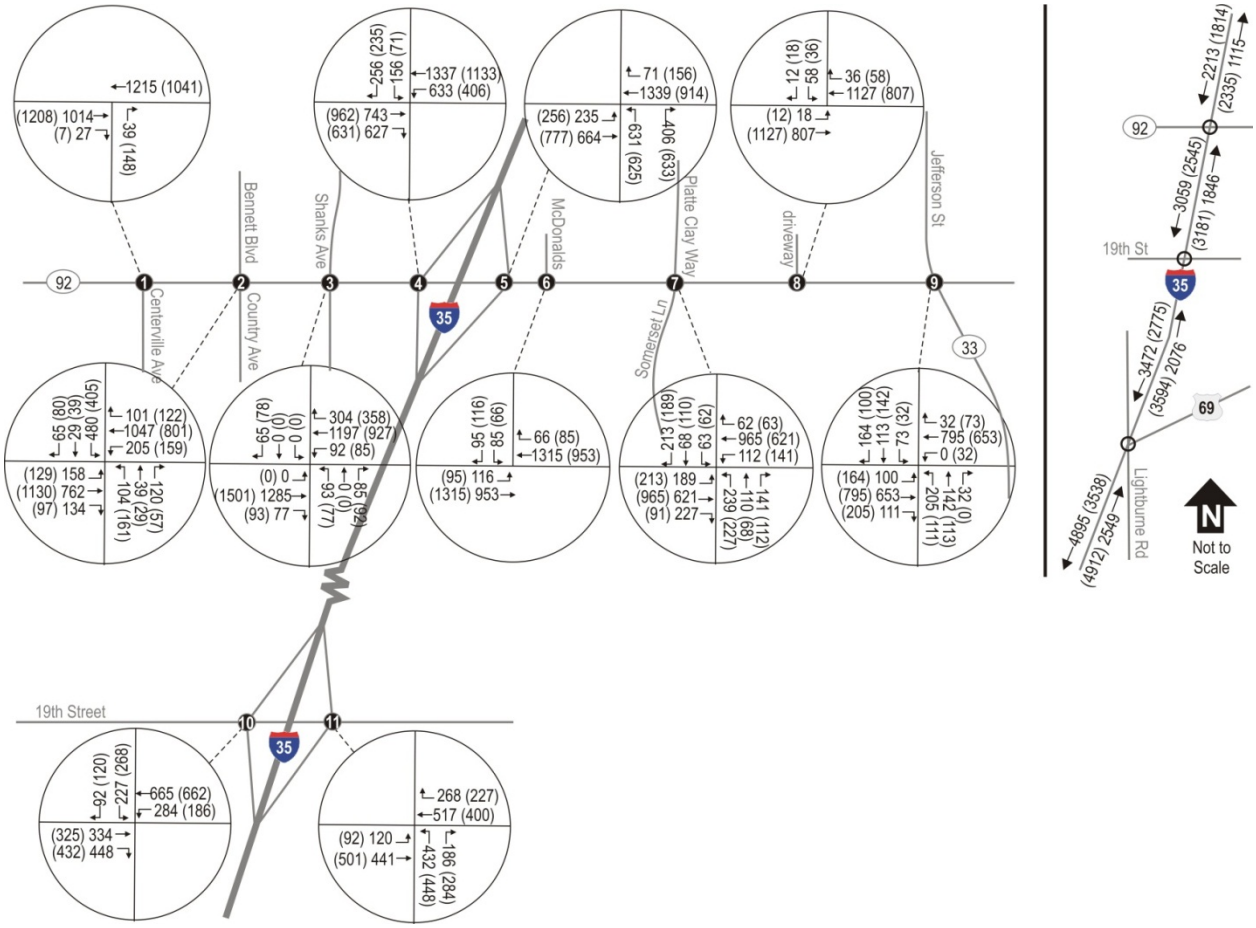
The ongoing local planning efforts have identified the need for a new I-35 interchange in south Kearney, due to substantial projected development growth on both sides of I-35. A new interchange would support this growth by providing better connections to I-35 and the east side of Kearney. The TSM alternative does not meet this need.

The improved accessibility provided by a new interchange would give existing and new businesses enhanced market access by improving access to regional customers via the I-35 corridor. The TSM alternative does not meet the economic development purpose of the project.

Alternative 1: 144th/19th Street Interchange Performance

Build Alternative 1 assumes a new diamond configuration interchange at 144th/19th Street with a three-lane bridge cross-section and traffic signals at the ramp terminal intersections. This is consistent with Option 1A in the alternatives discussion of this report. **Figure 5-2** contains the 2040 peak hour Alternative 1 volume forecasts.

Figure 5-2: 2040 Alternative 1 Peak Hour Traffic Volumes



2040 Traffic Operations Analysis

Alternative 1 2040 intersection traffic operations are documented in **Table 5-5**. Build Alternative 1 would divert significant traffic from the Route 92 corridor, and as a result all intersections would meet the performance target of LOS D or better for the overall intersection operations. As noted in the table, three (3) individual side-street approaches at Centerville Ave, Bennett Blvd and Shanks Ave would operate at LOS E or F in the AM and / or PM peaks. Centerville Ave and Shanks Ave are northbound unsignalized intersection approaches. To improve conditions at Centerville Ave, it would be necessary to further improve the flow on eastbound Route 92 to prevent queues from blocking the intersection. This may require additional through lane capacity. At Shanks Ave, there are few reasonable improvement options other than additional access control to limit northbound left turns given the proximity to the existing interchange. At Bennett Blvd, adding a westbound right turn lane could improve the level of service in the AM peak hour.

A 2040 freeway analysis was completed for all merge areas, diverge areas, and basic freeway segments along I-35 in the study area. The results of the analysis are shown in **Table 5-6**. The analysis showed that under Alternative 1, operations along I-35 and all ramps would meet the operational performance target, operating at LOS C or better, an improvement over the 2040 No Build and TSM alternatives. Similar to the No-Build and TSM alternatives, in Alternative 1 the Northbound PM on-ramp merge at Lightburne Road would operate at LOS E.

Table 5-5: 2040 Alternative 1 Intersection Traffic Operations

	A.M. Peak Hour		P.M. Peak Hour	
Study Intersection	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
1. Route 92 & Centerville	**3.9**	**A**	**22.7**	**C**
EB Route 92	6.1	A	11.1	B
WB Route 92	1.0	A	0.5	A
NB Centerville Ave	30.6	C	271.5	F
2. Route 92 & Bennett Blvd	**40.5**	**D**	**26.8**	**C**
EB Route 92	33.9	C	31.4	C
WB Route 92	31.8	C	16.6	B
NB Country Ave	51.4	D	27.7	C
SB Bennett Blvd	68.4	E	35.1	D
3. Route 92 & Shanks Ave	**19.8**	**B**	**15.0**	**B**
EB Route 92	4.1	A	4.4	A
WB Route 92	5.0	A	4.4	A
NB Shanks Ave	294.7	F	198.3	F
SB Shanks Blvd	13.7	B	9.2	A
4. Route 92 & I-35 SB	**10.9**	**B**	**8.9**	**A**
EB Route 92	21.4	C	10.6	B
WB Route 92	15.4	B	26.9	C
SB I-35 Ramps	20.8	C	11.7	B
5. Route 92 & I-35 NB	**13.3**	**B**	**9.5**	**A**
EB Route 92	18.6	B	16.6	B
WB Route 92	19.6	B	18.9	B
NB I-35 Ramps	31.8	C	20.3	C
6. Route 92 & McDonalds	**8.4**	**A**	**3.3**	**A**
EB Route 92	3.4	A	2.2	A
WB Route 92	10.6	B	2.5	A
NB McDonalds driveway	7.8	A	8.6	A
SB McDonalds driveway	20.4	C	14.9	B
7. Route 92 & Platte Clay	**26.6**	**C**	**19.7**	**B**
EB Route 92	26.3	C	18.0	B
WB Route 92	21.0	C	14.8	B
NB Somerset Lane	40.9	D	30.5	C
SB Platte Clay Way	26.3	C	23.8	C
8. Route 92 & Driveway	**4.0**	**A**	**3.7**	**A**
EB Route 92	3.6	A	4.3	A
WB Route 92	2.5	A	1.9	A
SB Com Center driveway	35.5	D	20.1	C
9. Route 92 & Route 33	**22.5**	**C**	**16.0**	**B**
EB Route 92	13.1	B	9.4	A
WB Route 92	15.6	B	15.9	B
NB Route 33	48.8	D	34.3	C
SB Route 33	33.8	C	28.7	C
10. 19th St & I-35 SB Ramps	**4.1**	**A**	**3.5**	**A**
EB 19th St	15.7	B	9.5	A
WB 19th St	9.6	A	12.8	B
SB I-35 Ramps	25.9	C	25.2	C
11. 19th St & I-35 NB Ramps	**17.6**	**B**	**16.2**	**B**
EB 19th St	10.2	B	9.7	A
WB 19th St	18.2	B	15.9	B
NB I-35 Ramps	23.2	C	21.4	C

Table 5-6: 2040 Alternative 1 Freeway Operational Analyses

Freeway Segments	A.M. Peak Hour			P.M. Peak Hour		
Location	Speed (mph)	Density (pc/mi/ln)	LOS	Speed (mph)	Density (pc/mi/ln)	LOS
I-35 SB						
North of Route 92	69.9	15.9	B	70.3	12.9	B
Between Route 92 & 19th St	62.9	24.3	C	67.7	18.6	C
Between 19th St & Lightburne Rd	67.1	25.8	C	68.7	19.7	B
South of Lightburne/US-69	69.8	21.6	C	66.5	17.4	B
I-35 NB						
South of Lightburne/US-69	71.0	12.0	B	69.3	23.6	C
Between Lightburne Rd &19th St	68.0	13.5	B	63.6	24.8	C
Between 19th St & Route 92	69.6	15.0	B	67.2	26.7	C
North of Route 92	70.6	7.9	A	69.4	16.6	B

Merge/Diverge	A.M. Peak Hour			P.M. Peak Hour		
Location	Speed (mph)	Density (pc/mi/ln)	LOS	Speed (mph)	Density (pc/mi/ln)	LOS
I-35 SB						
at Route 92 Off Ramp (diverge)	67.8	13.6	B	68.8	11.0	B
at Route 92 On Ramp (merge)	66.7	13.3	B	68.4	10.7	B
At 19th Street Off-Ramp (diverge)	60.9	16.7	B	66.4	12.6	B
At 19th Street On-Ramp (merge)	60.2	19.1	B	66.1	13.5	B
at Lightburne Off Ramp (diverge)	53.0	27.6	C	64.4	17.5	B
at US-69 On Ramp (merge)	61.9	26.4	C	64.4	18.0	B
I-35 NB						
at US-69 Off Ramp (diverge)	69.7	10.6	B	52.8	27.3	C
at Lightburne On Ramp (merge)	66.0	13.2	B	42.0	35.7	E
At 19th Street Off-Ramp (diverge)	66.2	10.5	B	57.2	20.9	C
At 19th Street On-Ramp (merge)	67.5	9.1	A	63.4	16.6	B
at Route 92 Off Ramp (diverge)	69.5	7.7	A	68.7	13.4	B
at Route 92 On Ramp (merge)	67.6	6.9	A	66.2	14.4	B

The maximum 2040 I-35 off-ramp queues for this alternative are shown in **Table 5-7**. These queues can be accommodated adequately by the freeway off-ramps which are all over 700 feet long. This shows that the proposed alternative will not cause queues that will impact the I-35 mainline traffic operations.

Table 5-7: 2040 Alternative 1 Queue Summary

	Max Queue for Ramp Approach	
Intersection	AM	PM
Hwy 92 & SB I-35 Ramps	226’	114’
Hwy 92 & NB I-35 Ramps	348’	315’
19th St & SB I-35 Ramps	130’	146’
19th St & NB I-35 Ramps	206’	180’

Safety Evaluation of Alternative 1

The new I-35 interchange and improved, contiguous 19th Street corridor in Alternative 1 would significantly reduce traffic volumes and travel congestion along the Route 92 corridor, which would address the congestion, stop-and-start traffic operations and limited traffic gaps associated with the rear-end and left-turn/angle crashes in the Route 92 corridor. Thus, Alternative 1 is expected to reduce the frequency of crashes in the Route 92 corridor compared to the No-Build and TSM Alternatives.

Accessibility Evaluation of Alternative 1

Alternative 1 would meet the accessibility targets for this study by providing:

- Improved access to the regional system, by linking the growing subarea of south Kearney to I-35.
- An improved 144th Street / 19th Street corridor and I-35 crossing that would connect and provide circulation to the growth areas on each side of I-35.

Compared to the 2040 No-Build alternative, the 19th Street interchange added in Alternative 1 would improve direct travel connections in the study area by reducing VMT by 1.3%. Travel time would significantly improve in the study area as VHT would be reduced by 7.9%.

Alternative 1 Consistency with Planning and Economic Development Initiatives

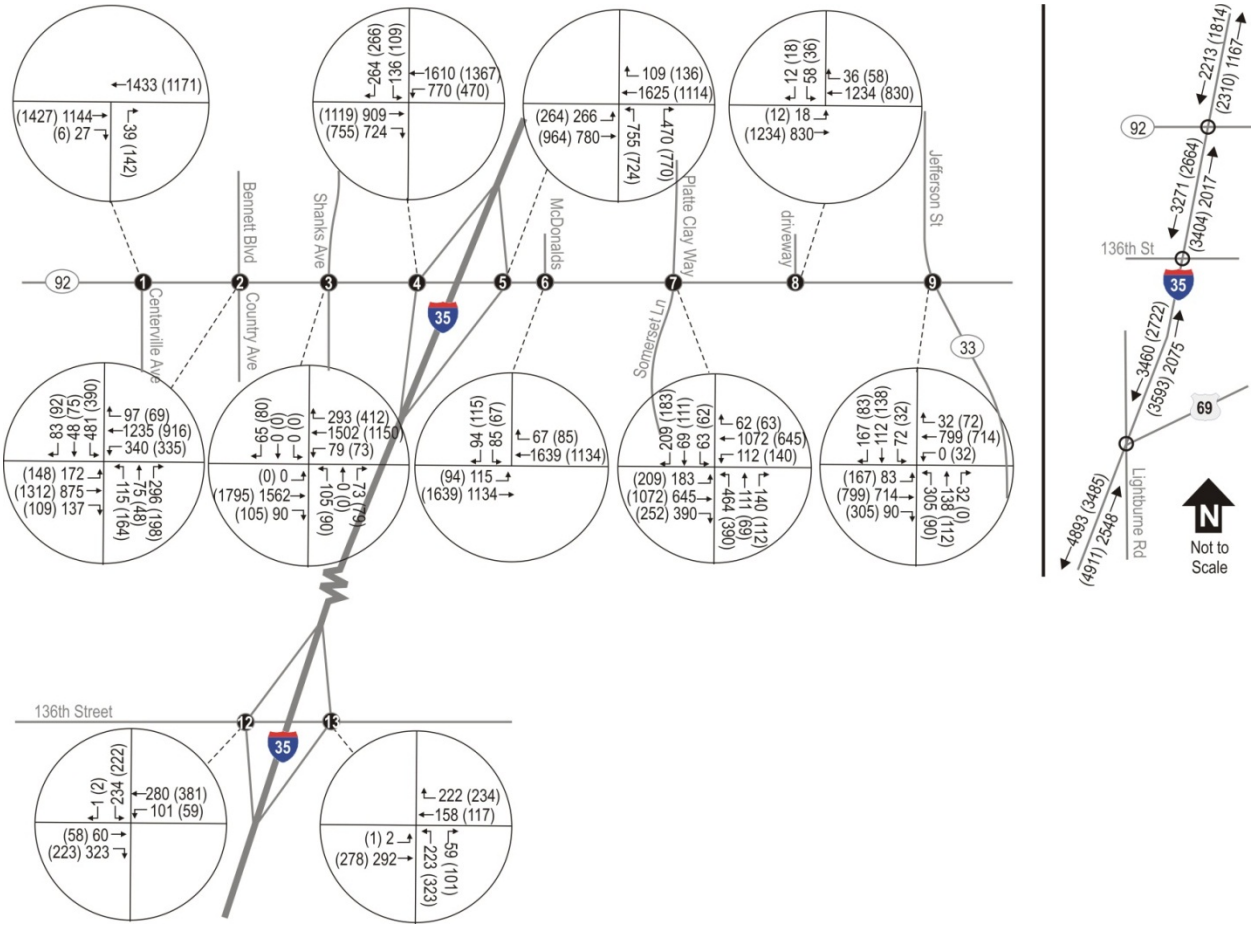
The improvements included in Alternative 1 directly address the purpose of the study from the perspective of both planning consistency and economic development.

- Alternative 1 is consistent with local and regional planning efforts that have identified the need for a new I-35 interchange in south Kearney.
- Alternative 1 meets the economic development purpose of the project by improving accessibility via a new interchange and I-35 crossing by providing existing and new businesses enhanced market access.
- Alternative 1 facilitates relatively compact and sustainable growth patterns in Kearney, while directly serving both major existing development areas west of I-35 (including the high school area) and major identified development areas on both sides of I-35 south of Route 92.

Alternative 2: 136th Street Interchange Performance

As described in the Alternatives section, Build Alternative 2 is a new interchange at 136th Street. The interchange would be a standard diamond configuration with a three-lane bridge and unsignalized ramp terminal intersections. **Figure 5-3** contains the 2040 peak hour Alternative 2 volume forecasts.

Figure 5-3: 2040 Alternative 2 Peak Hour Traffic Volumes



2040 Traffic Operations Analysis

Alternative 2 intersection traffic operations results are summarized in **Table 5-8**. As shown, the Build Alternative 2 scenario diverts some traffic from the Route 92 corridor, reducing overall delays in the Route 92 corridor compared to the no-build condition. In Alternative 2, two (2) intersections would not meet the operations performance target of LOS D or better by 2040 (both in the AM). There are forecasted to be 9 deficient peak intersection approaches for the studied intersections by 2040.

A 2040 freeway traffic operations analysis was completed for all merge areas, diverge areas and basic freeway segments along I-35 in the study area for Alternative 2. The results are summarized in **Table 5-9**. The analysis showed that operations along I-35 and all ramps would meet the operational performance target, operating at LOS C or better, an improvement over the 2040 No Build and TSM alternatives. Similar to the other 2040 scenarios, the Northbound PM on-ramp merge at Lightburne Road would operate at LOS E.

Alternative 2 Safety Evaluation

The new I-35 interchange and improved, contiguous 136th Street corridor in Alternative 2 would reduce traffic volumes and travel congestion along the Route 92 corridor, but to a lesser extent than Alternative 1. It is expected that this alternative, compared to the No-Build and TSM, would lessen the congestion, stop-and-start traffic operations and limited traffic gaps associated with the rear-end and left-turn/angle crashes in the Route 92 corridor. Thus, Alternative 2 is expected to reduce the frequency of crashes in the Route 92 corridor compared to the No-Build and TSM Alternatives, but not to the extent that Alternative 1 would.

Alternative 2 Accessibility Evaluation

Alternative 2, similar to Alternative 1, would meet the accessibility targets for this study by providing:

- Improved access to the regional system, by linking the growing subarea of south Kearney to I-35.
- Providing an improved 136th Street corridor and I-35 crossing that would connect and provide circulation to the growth areas on each side of I-35.

Alternative 2 would improve circulation and facilitate more direct travel connections in the study area. It was projected to reduce VMT by approximately 0.6% and VHT by approximately 6.8% compared to the 2040 No-Build.

Table 5-8: 2040 Alternative 2 Intersection Traffic Operations

	A.M. Peak Hour		P.M. Peak Hour	
Study Intersection	**Delay (sec/veh)**	**LOS**	**Delay (sec/veh)**	**LOS**
1. Route 92 & Centerville	**2.4**	**A**	**13.5**	**B**
EB Route 92	2.6	A	12.1	B
WB Route 92	1.7	A	1.0	A
NB Centerville Ave	14.0	B	114.8	F
2. Route 92 & Bennett Blvd	**59.0**	**E**	**43.4**	**D**
EB Route 92	32.1	C	33.1	C
WB Route 92	32.8	C	37.5	D
NB Country Ave	159.3	F	47.1	D
SB Bennett Blvd	109.0	F	84.3	F
3. Route 92 & Shanks Ave	**20.9**	**C**	**19.8**	**B**
EB Route 92	3.6	A	4.6	A
WB Route 92	16.7	B	16.4	B
NB Shanks Ave	283.8	F	289.2	F
SB Shanks Blvd	32.5	C	28.8	C
4. Route 92 & I-35 SB	**13.7**	**B**	**9.8**	**A**
EB Route 92	25.4	C	10.5	B
WB Route 92	18.6	B	27.4	C
SB I-35 Ramps	19.9	B	16.9	B
5. Route 92 & I-35 NB	**17.9**	**B**	**14.4**	**B**
EB Route 92	17.1	B	21.4	C
WB Route 92	25.4	C	33.8	C
NB I-35 Ramps	41.8	D	26.1	C
6. Route 92 & McDonalds	**19.1**	**B**	**6.2**	**A**
EB Route 92	4.5	A	3.7	A
WB Route 92	30.0	C	8.3	A
NB McDonalds driveway	8.6	A	10.6	B
SB McDonalds driveway	19.2	B	15.5	B
7. Route 92 & Platte Clay	**56.5**	**E**	**29.6**	**C**
EB Route 92	32.7	C	23.5	C
WB Route 92	78.9	E	27.8	C
NB Somerset Lane	70.3	E	47.3	D
SB Platte Clay Way	36.9	D	32.7	C
8. Route 92 & Driveway	**7.5**	**A**	**4.8**	**A**
EB Route 92	2.9	A	5.6	A
WB Route 92	8.2	A	2.1	A
SB Com Center driveway	54.6	D	32.5	C
9. Route 92 & Route 33	**53.1**	**D**	**22.2**	**C**
EB Route 92	10.3	A	21.2	C
WB Route 92	58.0	E	14.7	B
NB Route 33	83.5	F	38.5	D
SB Route 33	136.1	F	35.4	D
12. 136th St & I-35 SB	**3.6**	**A**	**3.2**	**A**
EB 136th St	2.2	A	1.5	A
WB 136th St	0.3	A	4.0	A
SB I-35 Ramps	11.1	B	11.4	B
13. 136th St & I-35 NB	**3.9**	**A**	**6.2**	**A**
EB 136th St	0.2	A	0.2	A
WB 136th St	1.6	A	1.7	A
NB I-35 Ramps	10.7	B	13.8	B

Table 5-9: 2040 Alternative 2 Freeway Operational Analyses

Freeway Segments	A.M. Peak Hour			P.M. Peak Hour		
Location	Speed (mph)	Density (pc/mi/ln)	LOS	Speed (mph)	Density (pc/mi/ln)	LOS
I-35 SB						
North of Route 92	69.9	15.8	B	70.4	12.9	B
Between Route 92 & 136th St	66.7	24.2	C	69.0	19.2	C
Between 136th St & Lightburne Rd	67.0	25.5	C	68.5	19.8	B
South of Lightburne/US-69	69.6	23.2	C	66.2	17.5	B
I-35 NB						
South of Lightburne/US-69	71.0	11.7	B	68.9	23.7	C
Between Lightburne Rd &136th St	69.4	14.3	B	67.0	25.3	C
Between 136th St & Route 92	69.7	14.7	B	67.2	26.8	C
North of Route 92	70.4	8.0	A	69.3	16.4	B

Merge/Diverge	A.M. Peak Hour			P.M. Peak Hour		
Location	Speed (mph)	Density (pc/mi/ln)	LOS	Speed (mph)	Density (pc/mi/ln)	LOS
I-35 SB						
at Route 92 Off Ramp (diverge)	67.8	13.6	B	68.8	11.0	B
at Route 92 On Ramp (merge)	65.0	14.5	B	68.1	11.3	B
At 136th Street Off-Ramp (diverge)	60.6	17.8	B	66.3	13.3	B
At 136th Street On-Ramp (merge)	62.8	18.1	B	66.6	13.5	B
at Lightburne Off Ramp (diverge)	54.8	26.1	C	63.9	17.7	B
at US-69 On Ramp (merge)	62.1	26.1	C	63.6	18.3	B
I-35 NB						
at US-69 Off Ramp (diverge)	69.6	10.4	B	51.5	28.2	D
at Lightburne On Ramp (merge)	66.1	12.9	B	43.7	35.2	E
At 136th Street Off-Ramp (diverge)	67.0	10.2	B	55.8	21.5	C
At 136th Street On-Ramp (merge)	67.6	9.7	A	58.6	19.2	B
at Route 92 Off Ramp (diverge)	62.4	11.0	B	67.8	14.5	B
at Route 92 On Ramp (merge)	66.9	7.0	A	65.8	14.4	B

Alternative 2 Consistency with Planning and Economic Development Initiatives

The improvements included in Alternative 2 do provide improved regional access to growing south Kearney, providing a new regional connection to the Kearney market consistent with **economic development** priorities in Kearney. However, from a **planning perspective** it is not consistent with current planning efforts in Kearney. A new interchange will likely shape development patterns in terms of both location and density. A 136th Street interchange location has the potential focus development in a leapfrog manner by potentially spurring a new pocket of non-contiguous development located too far from the current population of Kearney, which is not a sustainable practice from a local planning perspective. For this reason, an interchange location at 144th Street/19th Street likely provides a more sustainable investment from the perspective of supporting a more compact urban development pattern.

Comparison of Alternatives Performance

Traffic Operations Summary

A comparison of measures of effectiveness (MOEs) between the four 2040 alternatives was used to help identify the preferred alternative for the study area. Detailed information on the selected MOEs and the results for each the 2040 alternatives are presented.

Table 5-10 documents the 2040 AM peak hour intersection traffic operations by alternative. The following bullets summarize the differences in traffic operations performance among the alternatives:

- In the 2040 No-Build, TSM and Alternative 2, the Route 92 / Bennett Blvd and Route 92 / Platte Clay Way intersections are projected to operate at LOS E or LOS F during the AM peak hour.

- In the 2040 No-Build and TSM Alternatives, the northbound approach to the I-35 off-ramp / Route 92 intersection is projected to operate at LOS E or LOS F during the AM peak hour.

- In the 2040 No-Build and TSM Alternatives, the VISSIM simulation indicates some PM peak hour periods of queuing back from the NB off-ramp / Route 92 intersection onto the I-35 mainline.

- In Alternative 2 (136th Street Interchange), in the 2040 AM peak two intersections would not operate at the performance target of LOS D or better overall.

- In Alternative 1 (144th Street / 19th Street interchange), in the 2040 AM peak all intersections are projected to operate at LOS D or better overall.

Table 5-11 documents the 2040 PM peak hour intersection traffic operations by alternative. All intersections are anticipated to operate at LOS D or better during the PM peak in the four analysis scenarios. However, individual approaches would operate at LOS E or F at the Route 92 / Bennett Blvd and the Route 92 / Platte Clay Way intersections. The northbound off-ramp approach would also operate at LOS F in both the 2040 No Build and 2040 TSM Alternatives.

Table 5-10: All Alternative 2040 AM Peak Hour Intersection LOS

Study Intersection	No-Build Alternative Delay	No-Build Alternative LOS	TSM Alternative Delay	TSM Alternative LOS	Alternative 1 Delay	Alternative 1 LOS	Alternative 2 Delay	Alternative 2 LOS
1. Route 92 & Centerville	**34.7**	**C**	**30.0**	**C**	**3.9**	**A**	**2.4**	**A**
EB Route 92	64.6	E	45.9	D	6.1	A	2.6	A
WB Route 92	0.9	A	0.7	A	1.0	A	1.7	A
NB Centerville Ave	1994.8	F	1099.6	F	30.6	C	14.0	B
2. Route 92 & Bennett Blvd	**75.7**	**E**	**63.3**	**E**	**40.5**	**D**	**59.0**	**E**
EB Route 92	74.2	E	52.5	D	33.9	C	32.1	C
WB Route 92	42.8	D	30.0	C	31.8	C	32.8	C
NB N Country Ave	234.2	F	186.5	F	51.4	D	159.3	F
SB Bennett Blvd	78.1	E	160.4	F	68.4	E	109.0	F
3. Route 92 & Shanks Ave	**38.1**	**D**	**32.8**	**C**	**19.8**	**B**	**20.9**	**C**
EB Route 92	18.3	B	12.2	B	4.1	A	3.6	A
WB Route 92	28.7	D	22.3	C	5.0	A	16.7	B
NB Shanks Ave	851.9	F	952.4	F	294.7	F	283.8	F
SB Shanks Ave	49.1	D	12.9	B	13.7	B	32.5	C
4. Route 92 & I-35 SB Ramps	**28.0**	**C**	**18.6**	**B**	**10.9**	**B**	**13.7**	**B**
EB Route 92	29.3	C	38.2	D	21.4	C	25.4	C
WB Route 92	36.9	D	24.3	C	15.4	B	18.6	B
SB I-35 Ramps	95.5	F	25.4	C	20.8	C	19.9	B
5. Route 92 & I-35 NB Ramps	**46.5**	**D**	**34.5**	**C**	**13.3**	**B**	**17.9**	**B**
EB Route 92	18.1	B	23.0	C	18.6	B	17.1	B
WB Route 92	36.1	D	18.0	B	19.6	B	25.4	C
NB I-35 Ramps	192.7	F	126.3	F	31.8	C	41.8	D
6. Route 92 & McDonalds	**31.3**	**C**	**26.2**	**C**	**8.4**	**A**	**19.1**	**B**
EB Route 92	4.6	A	10.2	B	3.4	A	4.5	A
WB Route 92	34.4	C	23.4	C	10.6	B	30.0	C
NB McDonalds Driveway	9.4	A	17.8	B	7.8	A	8.6	A
SB McDonalds Driveway	278.8	F	291.1	F	20.4	B	19.2	B
7. Route 92 & Platte/Clay Way	**70.0**	**E**	**55.9**	**E**	**26.6**	**C**	**56.5**	**E**
EB Route 92	37.3	D	40.2	D	26.3	C	32.7	C
WB Route 92	92.9	F	47.6	D	21.0	C	78.9	E
NB Somerset Ln	99.2	F	115.5	F	40.9	D	70.3	E
SB Platte Clay Way	39.6	D	36.9	D	26.3	C	36.9	D
8. Route 92 & Comm. Driveway	**9.5**	**B**	**7.1**	**A**	**4.0**	**A**	**7.5**	**A**
EB Route 92	3.5	A	6.3	A	3.6	A	2.9	A
WB Route 92	11.0	B	3.9	A	2.5	A	8.2	A
SB Comm. Driveway	60.7	E	81.7	F	35.5	D	54.6	D
9. Route 92 & Route 33	**81.6**	**F**	**26.0**	**C**	**22.5**	**C**	**53.1**	**D**
EB Route 92	7.6	A	8.1	A	13.1	B	10.3	A
WB Route 92	79.4	E	24.5	C	15.6	B	58.0	E
NB Route 33	91.1	F	57.6	E	48.8	D	83.5	F
SB Route 33	460.3	F	37.5	D	33.8	C	136.1	F
10. 19th Street & I-35 SB Ramps					**4.1**	**A**		
EB 19th St					15.7	B		
WB 19th St					4.1	A		
SB I-35 Ramps					25.9	C		
11. 19th Street & I-35 NB Ramps					**17.6**	**B**		
EB 19th St					10.2	B		
WB 19th St					18.2	B		
NB I-35 Ramps					23.2	C		
12. 136th Street & I-35 SB Ramps							**3.6**	**A**
EB 136th St							2.2	A
WB 136th St							0.3	A
SB I-35 Ramps							11.1	B
13. 136th Street & I-35 NB Ramps							**3.9**	**A**
EB 136th St							0.2	A
WB 136th St							1.6	A
NB I-35 Ramps							10.7	B

Table 5-11: All Alternative 2040 PM Peak Hour Intersection LOS

Study Intersection	No-Build Alternative		TSM Alternative		Alternative 1		Alternative 2	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1. Route 92 & Centerville	**27.5**	**C**	**26.3**	**C**	**22.7**	**C**	**13.5**	**B**
EB Route 92	47.5	D	41.7	D	11.1	B	12.1	B
WB Route 92	1.0	A	0.9	A	0.5	A	1.0	A
NB Centerville Ave	1629.9	F	1552.3	F	271.5	F	114.8	F
2. Route 92 & Bennett Blvd	**47.8**	**D**	**38.9**	**D**	**26.8**	**C**	**43.4**	**D**
EB Route 92	49.9	D	46.3	D	31.4	C	33.1	C
WB Route 92	19.0	B	18.4	B	16.6	B	37.5	D
NB N Country Ave	104.4	F	56.6	E	27.7	C	47.1	D
SB Bennett Blvd	84.0	F	61.1	E	35.1	D	84.3	F
3. Route 92 & Shanks Ave	**16.7**	**B**	**15.7**	**B**	**15.0**	**B**	**19.8**	**B**
EB Route 92	5.6	A	5.0	A	4.4	A	4.6	A
WB Route 92	6.2	A	5.9	A	4.4	A	16.4	B
NB Shanks Ave	282.7	F	266.3	F	198.3	F	289.2	F
SB Shanks Ave	15.1	B	14.7	B	9.2	A	28.8	C
4. Route 92 & I-35 SB Ramps	**15.2**	**B**	**12.8**	**B**	**8.9**	**A**	**9.8**	**A**
EB Route 92	13.2	B	11.0	B	10.6	B	10.5	B
WB Route 92	35.7	D	30.3	C	26.9	C	27.4	C
SB I-35 Ramps	37.7	D	9.9	A	11.7	B	16.9	B
5. Route 92 & I-35 NB Ramps	**36.9**	**D**	**38.4**	**D**	**9.5**	**A**	**14.4**	**B**
EB Route 92	28.0	C	28.0	C	16.6	B	21.4	C
WB Route 92	32.0	C	32.2	C	18.9	B	33.8	C
NB I-35 Ramps	107.7	F	114.5	F	20.3	C	26.1	C
6. Route 92 & McDonalds	**17.4**	**B**	**17.3**	**B**	**3.3**	**A**	**6.2**	**A**
EB Route 92	5.8	A	7.3	A	2.2	A	3.7	A
WB Route 92	14.3	B	12.9	B	2.5	A	8.3	A
NB McDonalds Driveway	12.5	B	13.6	B	8.6	A	10.6	B
SB McDonalds Driveway	230.1	F	229.5	F	14.9	B	15.5	B
7. Route 92 & Platte/Clay Way	**40.4**	**D**	**42.48**	**D**	**19.7**	**B**	**29.6**	**C**
EB Route 92	31.5	C	36.7	D	18.0	B	23.5	C
WB Route 92	30.8	C	30.4	C	14.8	B	27.8	C
NB Somerset Ln	80.7	F	81.6	F	30.5	C	47.3	D
SB Platte Clay Way	38.4	D	37.7	D	23.8	C	32.7	C
8. Route 92 & Comm. Driveway	**6.0**	**A**	**7.4**	**A**	**3.7**	**A**	**4.8**	**A**
EB Route 92	6.7	A	8.8	A	4.3	A	5.6	A
WB Route 92	3.0	A	2.9	A	1.9	A	2.1	A
SB Comm. Driveway	55.1	E	70.3	E	20.1	C	32.5	C
9. Route 92 & Route 33	**32.1**	**C**	**32.9**	**C**	**16.0**	**B**	**22.2**	**C**
EB Route 92	19.6	B	21.9	C	9.4	A	21.2	C
WB Route 92	37.7	D	37.2	D	15.9	B	14.7	B
NB Route 33	49.6	D	49.9	D	34.3	C	38.5	D
SB Route 33	40.0	D	39.6	D	28.7	C	35.4	D
10. 19th Street & I-35 SB Ramps					**3.5**	**A**		
EB 19th St					9.5	A		
WB 19th St					12.8	B		
SB I-35 Ramps					25.2	C		
11. 19th Street & I-35 NB Ramps					**16.2**	**B**		
EB 19th St					9.7	A		
WB 19th St					15.9	B		
NB I-35 Ramps					21.4	C		
12. 136th Street & I-35 SB Ramps							**3.2**	**A**
EB 136th St							1.5	A
WB 136th St							4.0	A
SB I-35 Ramps							11.4	B
13. 136th Street & I-35 NB Ramps							**6.2**	**A**
EB 136th St							0.2	A
WB 136th St							1.7	A
NB I-35 Ramps							13.8	B

Table 5-12 and **Table 5-13** summarize the freeway traffic operations analysis associated with each Alternative in the AM and PM peak hours. The northbound off-ramp diverge at the Route 92 interchange is projected to operate at LOS E in the 2040 No Build and 2040 TSM Alternatives during both the AM and PM peak hours. However, this segment would operate at LOS B or better in both 2040 Build Alternatives.

Table 5-12: All Alternative 2040 AM Peak Hour Freeway LOS

			No-Build Alternative			TSM Alternative			Alternative 1			Alternative 2		
Dir	Segment	Type	Speed (mph)	Density (vpm)	LOS	Speed (mph)	Density (vpm)	LOS	Speed (mph)	Density (vpm)	LOS	Speed (mph)	Density (vpm)	LOS
SB	North of Route 92 Off-ramp	Freeway	69.9	15.8	B	69.9	15.8	B	69.9	15.9	B	69.9	15.8	B
SB	Between Route 92 / Next Interchange	Freeway	67.9	23.3	C	67.9	22.8	C	62.9	24.3	C	66.7	24.2	C
SB	South of US-69 On-ramp	Freeway	69.7	22.0	C	69.8	21.6	C	69.6	23.5	C	69.6	23.2	C
NB	South of US-69 Off-ramp	Freeway	71.0	12.0	B	71.0	12.0	B	71.0	12.0	B	71.0	11.7	B
NB	Between Route 92 / Next Interchange	Freeway	55.1	20.0	C	62.1	17.3	B	68.0	13.5	B	69.4	14.3	B
NB	North of Route 92 On-Ramp	Freeway	70.6	7.1	A	70.8	7.3	A	70.6	7.9	A	70.4	8.0	A
SB	At Route 92 Off-Ramp	Diverge	62.5	16.3	B	67.8	13.6	B	67.8	13.6	B	67.8	13.6	B
SB	At Route 92 On-Ramp	Merge	67.2	13.7	B	66.5	13.5	B	66.7	13.3	B	65.0	14.5	B
SB	At Lightburne Rd Off-Ramp	Diverge	58.9	22.3	C	58.8	21.9	C	53.0	27.6	C	54.8	26.1	C
SB	At US-69 On-Ramp	Merge	62.7	24.6	C	62.9	24.1	C	61.9	26.4	C	62.1	26.1	C
NB	At US-69 Off-Ramp	Diverge	69.5	10.6	B	69.5	10.6	B	69.7	10.6	B	69.6	10.4	B
NB	At Lightburne Rd On-Ramp	Merge	65.8	13.2	B	65.8	13.2	B	66.0	13.2	B	66.1	12.9	B
NB	At Route 92 Off-Ramp	Diverge	6.5	92.5	**E**	16.9	48.0	**E**	69.5	7.7	A	62.4	11.0	B
NB	At Route 92 On-Ramp	Merge	66.8	6.1	A	67.8	6.3	A	67.6	6.9	A	66.9	7.0	A
SB	Between 19th St / Lightburne Rd	Freeway							67.1	25.8	C			
NB	Between 19th St / Lightburne Rd	Freeway							69.6	15.0	B			
SB	At 19th St Off-Ramp	Diverge							60.9	16.7	B			
SB	At 19th St On-Ramp	Merge							60.2	19.1	B			
NB	At 19th St Off-Ramp	Diverge							66.2	10.5	B			
NB	At 19th St On-Ramp	Merge							67.5	9.1	A			
SB	Between 136th St / Lightburne Rd	Freeway										67.0	25.5	C
NB	Between 136th St / Lightburne Rd	Freeway										69.7	14.7	B
SB	At 136th St Off-Ramp	Diverge										60.6	17.8	B
SB	At 136th St On-Ramp	Merge										62.8	18.1	B
NB	At 136th St Off-Ramp	Diverge										67.0	10.2	B
NB	At 136th St On-Ramp	Merge										67.6	9.7	A

Table 5-13: All Alternative 2040 PM Peak Hour Freeway LOS

			No-Build Alternative			TSM Alternative			Alternative 1			Alternative 2		
Dir	Segment	Type	Speed (mph)	Density (vpm)	LOS	Speed (mph)	Density (vpm)	LOS	Speed (mph)	Density (vpm)	LOS	Speed (mph)	Density (vpm)	LOS
SB	North of Route 92 Off-ramp	Freeway	70.3	12.9	B	70.3	12.9	B	70.3	12.9	B	70.4	12.9	B
SB	Between Route 92 / Next Interchange	Freeway	68.8	18.8	C	68.6	19.2	C	67.7	18.6	C	69.0	19.2	C
SB	South of US-69 On-ramp	Freeway	66.7	16.8	B	66.6	17.1	B	66.5	17.4	B	66.2	17.5	B
NB	South of US-69 Off-ramp	Freeway	69.2	23.6	C	69.2	23.6	C	69.3	23.6	C	68.9	23.7	C
NB	Between Route 92 / Next Interchange	Freeway	58.7	31.5	D	60.6	30.3	D	63.6	24.8	C	67.0	25.3	C
NB	North of Route 92 On-Ramp	Freeway	69.4	15.8	B	69.4	15.9	B	69.4	16.6	B	69.3	16.4	B
SB	At Route 92 Off-Ramp	Diverge	68.8	11.0	B	68.7	11.0	B	68.8	11.0	B	68.8	11.0	B
SB	At Route 92 On-Ramp	Merge	67.9	11.1	B	66.3	11.6	B	68.4	10.7	B	68.1	11.3	B
SB	At Lightburne Rd Off-Ramp	Diverge	64.8	16.6	B	63.9	17.2	B	64.4	17.5	B	63.9	17.7	B
SB	At US-69 On-Ramp	Merge	64.7	17.4	B	64.6	18.7	B	64.4	18.0	B	63.6	18.3	B
NB	At US-69 Off-Ramp	Diverge	53.3	27.1	C	53.3	27.1	C	52.8	27.3	C	51.5	28.2	D
NB	At Lightburne Rd On-Ramp	Merge	43.4	35.6	**E**	42.3	35.6	**E**	42.0	35.7	**E**	43.7	35.2	**E**
NB	At Route 92 Off-Ramp	Diverge	24.0	47.1	**E**	27.9	41.8	**E**	68.7	13.4	B	67.8	14.5	B
NB	At Route 92 On-Ramp	Merge	65.4	13.9	B	65.1	14.1	B	66.2	14.4	B	65.8	14.4	B
SB	Between 19th St / Lightburne Rd	Freeway							68.7	19.7	B			
NB	Between 19th St / Lightburne Rd	Freeway							67.2	26.7	C			
SB	At 19th St Off-Ramp	Diverge							66.4	12.6	B			
SB	At 19th St On-Ramp	Merge							66.1	13.5	B			
NB	At 19th St Off-Ramp	Diverge							57.2	20.9	C			
NB	At 19th St On-Ramp	Merge							63.4	16.6	B			
SB	Between 136th St / Lightburne Rd	Freeway										68.5	19.8	B
NB	Between 136th St / Lightburne Rd	Freeway										67.2	26.8	C
SB	At 136th St Off-Ramp	Diverge										66.3	13.3	B
SB	At 136th St On-Ramp	Merge										66.6	13.5	B
NB	At 136th St Off-Ramp	Diverge										55.8	21.5	C
NB	At 136th St On-Ramp	Merge										58.6	19.2	B

To provide another way of summarizing corridor performance by Alternative, travel time was calculated between two key north-south points along I-35 and two east-west points along the Route 92 arterial. The Route 92 arterial average travel time is reported between Nation Street and Route 33. The average freeway segment travel times along I-35 are reported between the Lightburne Road / US Route 69 interchange and the Route 92 interchange.

Table 5-14 and **Table 5-15** compare the travel times for the arterial and freeway corridors for each of the 2040 Alternatives for the AM and PM peak hour periods, respectively. The tables document the VISSIM simulated travel times for each of the scenarios, and then report the percentage change in travel time compared to the 2040 No-Build conditions scenario. As the tables indicate, the two 2040 Build

Alternatives are forecasted to result in considerable decreases in travel time along Route 92 for both the AM and PM peak hours, compared to the No-Build scenario. The Build Alternatives generally perform better than the TSM alternative on Route 92 during both peak hours (with the exception of Alternative 2 WB in the AM peak hour). While the two alternatives showed similar total and percentage decreases on Route 92 in the eastbound direction, Alternative 1 showed a comparatively larger decrease in the westbound direction. The forecasted decrease in travel time on I-35 is nearly the same for both of the 2040 Build Alternatives, with better 2040 I-35 travel time performance than the TSM alternative.

Table 5-14: Modeled 2040 AM Peak Hour Travel Time by Alternative

	2012 Modeled	No-Build Alternative	TSM Alternative		Alternative 1		Alternative 2	
Segment	Travel Time (min)	Travel Time (min)	Travel Time (min)	% Change from No-Build	Travel Time (min)	% Change from No-Build	Travel Time (min)	% Change from No-Build
I-35 NB (South of Lightburne to North of Route 92)	7.19	9.54	8.17	-14%	7.43	-22%	7.43	-22%
I-35 SB (South of Lightburne to North of Route 92)	7.35	7.58	7.54	-1%	7.65	1%	7.64	1%
Highway 92 EB (Nation Ave to Route 33)	3.3	10.1	7.7	-24%	5.2	-49%	4.6	-54%
Highway 92 WB (Nation Ave to Route 33)	2.9	7.3	5.1	-30%	4.3	-41%	5.5	-25%

Table 5-15: Modeled 2040 PM Peak Hour Travel Time by Alternative

	2012 Model	No-Build Alternative	TSM Alternative		Alternative 1		Alternative 2	
Segment	Travel Time (min)	Travel Time (min)	Travel Time (min)	% Change from No-Build	Travel Time (min)	% Change from No-Build	Travel Time (min)	% Change from No-Build
I-35 NB (South of US-69 to North of Route 92)	7.36	9.04	8.8	-3%	8.2	-9%	8.21	-9%
I-35 SB (South of US-69 to North of Route 92)	7.24	7.42	7.45	0%	7.43	0%	7.44	0%
Highway 92 EB (Nation Ave to Route 33)	3.5	7.9	7.1	-10%	4.7	-41%	4.9	-38%
Highway 92 WB (Nation Ave to Route 33)	3.0	4.9	4.8	-2%	3.5	-29%	4.4	-10%

In summary, Alternative 1 would best meet the mobility and traffic operations needs in the study area. It would yield acceptable overall levels of service at key intersection and freeway facility locations. It offers the largest reduction in traffic on Route 92. It also offers travel time and circulation benefits.

Safety Summary

Crash frequencies along Route 92 were identified to be higher than the applicable statewide average and were flagged for exceeding "critical rates". Rear-end and left-turn/angle crashes were the most prevalent crash types in the corridor, and as traffic and congestion increase through 2040, the frequency of crashes would be expected to increase. The safety performance target is a reduction of crash frequency in the study area. The following bullets summarize the safety performance of each alternative:

- The No-Build Alternative would not address the congestion in the study area, including the stop-and-start traffic operations and limited traffic gaps along Route 92 associated with the rear-end and left-turn angle crashes that are most prevalent in the study area. Furthermore, traffic is forecasted to queue from the northbound Route 92 off-ramp intersection back onto the I-35 mainline during periods of the PM peak in the No-Build Alternative, so this condition is projected to introduce a new safety concern compared to existing conditions.

- The TSM Alternative would provide some spot improvements to operations in the Route 92 corridor, but would not comprehensively address the corridor congestion associated with corridor crashes. As with the No-Build Alternative, TSM traffic in the 2040 PM peak is forecasted to queue back onto I-35 from the Route 92 off-ramp intersection, introducing a new safety concern compared to existing conditions. Thus, while likely providing a lower crash frequency than the No-Build alternative, the TSM Alternative does not address the safety need identified in the study area.
- Alternative 1 (a new 144th Street / 19th Street interchange) would significantly reduce traffic volumes and travel congestion along the Route 92 corridor, which would address the congestion, stop-and-start traffic operations and limited traffic gaps associated with the rear end and left-turn/angle crashes in the Route 92 corridor. No ramp queues onto I-35 are anticipated with Alternative 1. Thus, Alternative 1 is expected to reduce the frequency of crashes in the Route 92 corridor compared to the No-Build and TSM Alternatives.
- Alternative 2 (a new 136th Street interchange) would reduce traffic volumes and travel congestion along the Route 92 corridor, but to a lesser extent than Alternative 1. It is expected that this alternative, compared to the No-Build and TSM, would lessen the congestion, stop-and-start traffic operations and limited traffic gaps associated with the rear end and left-turn/angle crashes in the Route 92 corridor.

Accessibility Summary

A major purpose and need element for the project is to provide enhanced accessibility to Kearney. This accessibility is measured by the need for circulation within growing areas of south Kearney, which are currently bisected by I-35 without a roadway or pedestrian crossing for over 3 miles between Route 92 and 128th Street, as well as by the level of access provided between Kearney and the rest of the region via I-35. As noted in the purpose and need discussion, the majority of Kearney traffic accessing I-35 is coming from or going towards portions of the Kansas City metro area to the south. Thus, much out-of-direction travel is currently required by commuters and other motorists wanting to access I-35 to travel outside the city limits. The following bullets summarize the accessibility performance of each alternative:

- The No-Build Alternative does not improve access across or to I-35.
- The isolated improvements associated with the TSM would provide a small benefit to travel times across I-35 through the Route 92 corridor. However, as Kearney continues to grow to the south, the TSM Alternative does not meet the need for improved regional connectivity.
- Alternative 1 would meet the accessibility targets for this study by providing improved access to the regional system with a new south Kearney I-35 interchange, and by providing a new I-35 crossing at 144th Street / 19th Street that would connect and provide circulation to the growth areas on each side of I-35.
- Alternative 2, similar to Alternative 1, would meet the accessibility targets for this study by providing a new south Kearney I-35 interchange, and by providing a new I-35 crossing at 136th Street to connect and provide circulation to the growth areas on each side of I-35.
- Both Alternative 1 and Alternative 2 would provide new bicycle and pedestrian-compatible facilities to facilitate non-motorized accessibility.
- Compared to the 2040 No-Build alternative, both Alternative 1 would improve direct travel connections in the study area by reducing VMT by approximately 1.3%, and study area travel time was improved as VHT was reduced by approximately 7.9%. For Alternative 2, VMT would be reduced by 0.6% and VHT would be reduced by 6.8%.

Planning and Economic Development Consistency Summary

Planning and economic development efforts have been focusing on identifying and developing a new interchange to facilitate quality, sustainable growth for Kearney and improving market access for economic development purposes. The No-Build Alternative and the limited improvements included in the TSM Alternative do not address the purpose of the study from a planning consistency or from an economic development perspective.

The improvements included in Alternative 1 directly address the purpose of the study from a planning consistency and from an economic development perspective.

- Alternative 1 satisfies local planning efforts that have identified the need for a new I-35 interchange in south Kearney. Alternative 1 interchange location at 144th Street/19th Street provides a more sustainable investment from the perspective of supporting a more compact urban development pattern.
- Alternative 1 meets the economic development purpose of the project by improving accessibility via a new interchange and I-35 crossing by providing existing and new businesses enhanced market access.

The improvements included in Alternative 2 would improve regional access for growing the south Kearney market by providing a new regional connection consistent with economic development priorities in Kearney. However, from a planning perspective, Alternative 2 is not consistent with current planning efforts in Kearney. A new interchange will likely shape development patterns in terms of both location and density, and a 136th Street interchange location has the potential to encourage "leap-frog" development by potentially spurring a new pocket of non-contiguous development located too far from the current population of Kearney, which is not a sustainable practice from a local planning perspective. For this reason, an interchange location at 144th Street/19th Street likely provides a more sustainable investment from the perspective of supporting a more compact urban development pattern, and is consistent with current land use and transportation planning efforts.

Stakeholder and Environmental Concerns

At the first public meeting for this AJR held November 15, 2012, those in attendance were invited to fill out a comment card. An online version of the comment card was also available November 9th – 30th. A total of 111 responses were received. Of those that responded:

- 76% favored a new interchange, while 21% did not want a new interchange and 4% were unsure or did not answer.
- For interchange location, 48% of respondents favored 144th / 19th Street, 31% favored 136th Street and 15% favored a different location (such as 128th Street, Route 33 or 172nd Street). 6% responded "none".

Concerns were raised about the possibility of increased traffic along 19th Street adjacent to existing residential areas if an interchange were built, potentially effecting the safety and property values for homeowners along 19th Street. Concerns raised about the potential 136th Street interchange included its cost, its potential contribution to urban sprawl and the land acquisition required.

A second public meeting, the Location Public Hearing, was held on April 25, 2013. At the meeting, the preferred alternative was revealed to the public. Again, those in attendance were invited to fill out a comment card, and an online version was available from April 25 – May 10, 2013. Forty-four written

comments and 13 online comments were received regarding the project during the meeting and subsequent comment period. Respondents were fairly split, with about half in favor of, and half in opposition to, the proposed project. As with the first meeting, most of those opposed to the project were residents of the 19th Street corridor and adjacent neighborhoods. Their concerns remained focused on the increased traffic and potential safety effects of a new interchange in those areas. Those in favor of the project generally believe that the proposed interchange would benefit the City by reducing congestion and promoting economic development.

Consistent with the National Environmental Policy Act (NEPA) process, a Categorical Exclusion Determination (CE2) document is being completed. Alternative 1 is being studied in this CE2 document. Some of the environmental issues covered through the project environmental process include:

- There are "minor adverse impacts" to prime farmland associated with the proposed project.
- There are limited impacts (approximately one (1) acre) to freshwater emergent wetlands and/or open water lakes/ponds by the proposed project.
- A new I-35 interchange at the 136th Street alignment would require a new crossing of Fishing River west of the interstate. The 144th Street / 19th Street alignment does not require a new Fishing River crossing.
- The interchange locations would not affect historic properties. It is also not expected that there would be any archeological sites impacted at either interchange location. However, the State Historic Preservation Office (SHPO) did indicate that some areas located outside of both alternative interchange locations have a high potential for archaeological sites. Therefore, when the project limits are finalized, it would be beneficial to obtain further review information from the SHPO. This is especially true if the project limits extend out from the immediate interchange areas.
- An initial worst-case scenario noise model was run by MoDOT and indicated that, in its current state, this project will not have any noise impacts associated with it.

Conformance with Transportation Plans

The current Kansas City Regional (MARC) 2040 Long-Range Transportation Plan includes a new I-35 / 19th Street interchange as an illustrative project, consistent with the proposed action. Kearney is part of the Kansas City TMA, which is in attainment for all NAAQS pollutants[5].

Table 5-16 is an evaluation matrix that provides a summary of the performance of each alternative with regard to the evaluation criteria and project objectives.

[5] *http://www.epa.gov/oaqps001/greenbk/mapnpoll.html*

Table 5-16: Evaluation Matrix Summarizing Alternative Performance

Alternative	Performance Measures / Objectives			
	Traffic Operations in 2040	**Reduces Crash Incidence**	**Improve Accessibility**	**Meets Local Planning and Economic Development Objectives**
No-Build Alternative	• Fails to meet LOS performance objective at 3 intersections in study area. • Queuing from NB Route 92 off-ramp intersection backs onto I-35 during 2040 PM peak.	• Increased congestion on Route 92 likely increases frequency of crashes. • New safety issue is queuing back onto I-35 from NB Route 92 off ramp in PM peak.	Does not improve regional accessibility or provide better access across I-35.	Not consistent with economic development objectives or planning efforts.
TSM Alternative	• Fails to meet LOS target at 2 intersections. • Queuing from NB Route 92 off-ramp intersection backs onto I-35 during 2040 PM peak.	• TSM limited congestion reductions likely have little benefit for crashes. • New safety issue is queuing back onto I-35 from NB Route 92 off ramp in PM peak.	Minor operational improvements provide slightly improved access across I-35 compared to No-Build. No improvement to regional accessibility.	Not consistent with economic development objectives or planning efforts.
Alternative 1 (144th/19th St Interchange)	• Achieves minimum LOS at all intersections. • Provides acceptable operations for NB approach to I-35 off-ramp / Route 92 intersection • Does not degrade I-35 operations.	Will reduce traffic volumes and congestion on Route 92 and in the vicinity of the existing interchange, leading to anticipated reduction in the incidence of rear-end and angle crashes compared to No-Build and TSM.	• Meets the accessibility targets by providing improved access to the regional system via a new I-35 interchange • A new I-35 crossing at 144th Street / 19th Street that would connect and provide circulation to the growth areas on each side of I-35. • Provides new bike and pedestrian crossing of I-35. • VMT 1.3% lower than No-Build.	• Supports compact development patterns, encouraging urban density growth in locations where urban services are offered. • Consistent with Transportation Planning and Economic Development objectives of enhancing access to regional system, opening new areas without degrading system operations.
Alternative 2 (136th St Interchange)	• Overall, all intersections operate at LOS D or better during PM, but 2 intersections exceed LOS D in the AM. • Provides acceptable operations for NB approach to I-35 off-ramp / Route 92 intersectionDoes not degrade I-35 operations.	Will reduce traffic volumes and congestion on Route 92 and in the vicinity of the existing interchange (though not as much as Alternative 1), leading to anticipated reduction in the incidence of rear-end and angle crashes compared to No-Build and TSM.	• Meets the accessibility targets by providing improved access to the regional system via a new I-35 interchange. • A new I-35 crossing at 144th Street / 19th Street that would connect and provide circulation to the growth areas on each side of I-35. • Provides new bike and pedestrian crossing of I-35. • VMT 0.6% lower than No-Build.	• New regional connection consistent with economic development priorities in Kearney. • The 136th St location is not consistent with current planning efforts in Kearney and does not promote compact sustainable development in areas with existing / planned utilities.

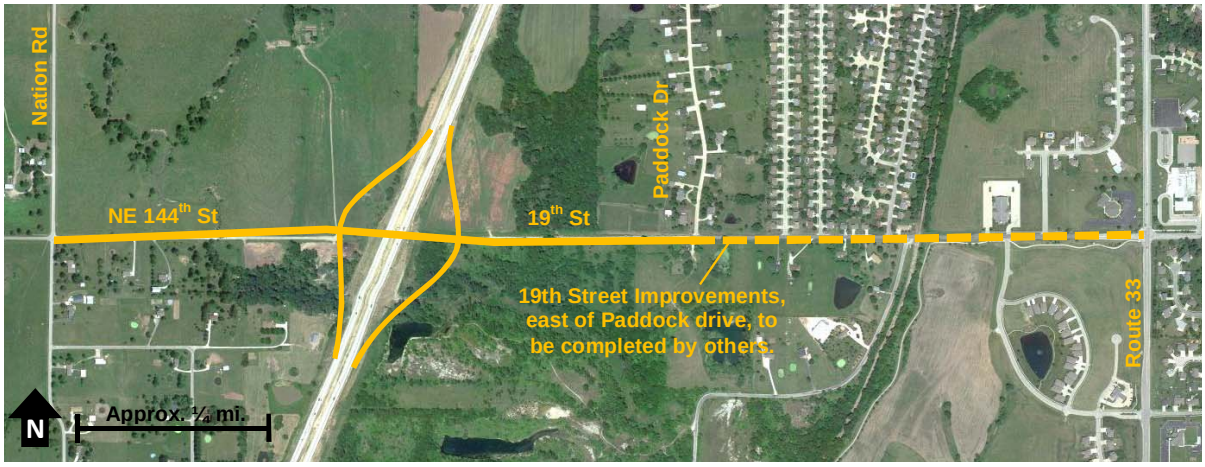
6. FUNDING AND SCHEDULE

The project is currently not funded beyond the study and conceptual design phase. Therefore, funding sources are needed to move the project forward. Once funding is identified, the project can advance into the remainder of the project development process. It is expected that final environmental approval and final design will take one to two years. Right-of-way and utility work could take an additional one to two years, followed by a one to two construction season project (depending on how the work is structured). Therefore, if construction funding is identified, it is likely that the project could be completed in three to six years.

7. SUMMARY AND RECOMMENDATIONS

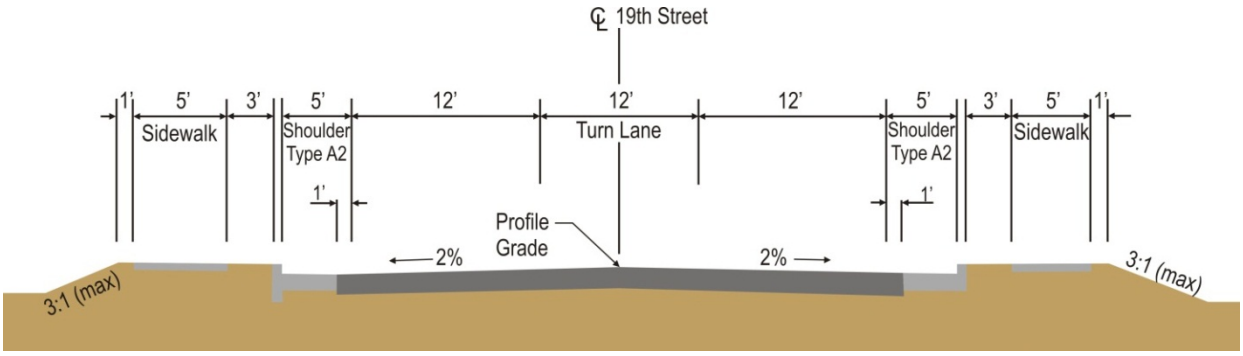
The preferred alternative for the requested change in access is the construction of a new I-35 interchange at 144th Street / 19th Street. The preferred alternative is Alternative 1a, a diamond interchange with standard ramp terminal intersections. The preferred alternative is illustrated in **Figure 7-1**. 144th Street / 19th Street would be extended as a bridge across I-35. This new / realigned portion of 144th Street / 19th Street (Nation Road to Paddock Drive) would be constructed as a two lane roadway with turn lanes where appropriate, but right-of-way should be preserved for ultimate widening to five lanes. From Paddock Drive east to Route 33, roadway improvements would be beneficial, though the exact nature of those improvements has not been identified. These improvements are not part of the project description that is the subject of this AJR, and are expected to be completed by others. Possible improvements in that section include wider lanes, turn lanes, curb-and-gutter, sidewalks, enhanced railroad crossing protection, and other enhancements. It is recommended that the proposed interchange include provisions for safe pedestrian and bicycle crossing of I-35.

Figure 7-1: Conceptual Layout of Preferred Alternative 144th Street / 19th Street Interchange



The typical section for the recommended concept at 19th Street is presented in **Figure 7-2** below.

Figure 7-2: Typical Section for Preferred Alternative 144th Street / 19th Street Interchange



Additional design-related information for the recommended alternative includes the following:

1. No design issues are anticipated related to steep grades in the immediate interchange vicinity. The interchange ramps, bridge approaches, and cross-street segments from Nation Road to Paddock Drive were designed to meet MoDOT and AASHTO guidelines.

2. The access control restrictions in the vicinity of the interchange are currently planned in accordance with MoDOT policy. This would limit the first partial access intersection on 19th Street to no closer than 750 feet from a ramp terminal and the first full-access intersection on 19th Street to no closer than 1,320 feet from a ramp terminal.

3. The bridge over I-35 as currently planned is 200 feet long and accommodates the existing four lanes on I-35. The design could accommodate six lanes on I-35 if the I-35 widening occurred within the median.

4. The preferred alternative interchange, including improvements from Nation Road to Paddock Drive, would require approximately 28 acres of new right-of-way and 3 acres of temporary and/or permanent easements. This includes property required for achieving the desired roadway grades as well as to shift the alignment slightly to the north on the west side of I-35 as shown. The property acquisition would affect approximately 10 separate land parcels.

Consistency with FHWA's eight policy requirements has been demonstrated throughout the document. A summary of consistency with the eight policy points is provided below:

1. **The access needs cannot be adequately satisfied by existing interchanges and/or local roads and streets in the corridor can neither provide the desired access nor can they be reasonably improved to satisfactorily accommodate the design year traffic demands.**

   The key project purpose and need elements are to improve traffic safety and future traffic operations at the interchange, provide improved regional access to the Kearney region, and to enhance economic development opportunities to planned urban density growth areas in south Kearney.

   Safety problems in the Route 92 corridor can be partially attributed to congested conditions in the corridor. Thus, safety performance and traffic operations performance are closely tied in the study area. Traffic volumes, and associated delays, are forecasted to grow significantly through the planning horizon of 2040. The performance target for operations in the corridor is LOS D. In the No-Build and TSM alternatives, which evaluate the performance of the Route 92 corridor and existing interchange without a new interchange, two intersections and several key traffic movements in the corridor would not meet the performance target of LOS D. This includes the northbound I-35 off-ramp at Route 92, which is forecasted to operate at LOS F in the 2040 No-Build and TSM alternatives. The No-Build and TSM alternatives also would not directly address the currently high crash rates in the corridor. The preferred alternative, a new interchange at 144th Street/19th Street, provides acceptable overall traffic operations at LOS D or better, including the I-35 northbound off-ramp at Route 92. Also, a 144th Street / 19th Street interchange would divert traffic from the corridor and could reduce the frequency of crashes in the Route 92 corridor.

   As development continues to occur on both sides of I-35 in south Kearney, travel demand in the corridor will increase substantially (60% to 100% or more) during the peak hours. In the TSM

and No-Build conditions, this increased travel demand would lead to significantly higher out-of-direction travel in the study area, demonstrated by VMT that is 1.3% higher compared to the preferred alternative.

2. **All reasonable alternatives for design options, location and TSM improvements have been considered**.

   As documented in the Alternatives section, various TSM improvements were evaluated as a part of the TSM alternative to address the purpose and need for the project. Several significant TSM investments were assumed to be in place for the TSM alternative, including:

   - A second left-turn lane is added at the southbound I-35 to Route 92 off-ramp.
   - The westbound Route 92 right turn lane onto the southbound I-35 on-ramp is converted into a "free right".
   - The northbound I-35 to Route 92 off-ramp is widened to four lanes to accommodate two left-turn lanes and two right-turn lanes.
   - A second southbound left-turn lane is added at the Bennett Blvd / Route 92 intersection.
   - Coordinated signal systems would be in place at the I-35 ramp terminals.

   The TSM improvements reflected in the above bullets create essentially a "built-out" facility at the interchange, with a 7-lane cross-section and dual turn lanes on all major approaches that have delay. Thus, this study has evaluated a reasonably extensive TSM alternative.

   Additional TSM improvements were considered as opportunities to enhance a potential TSM alternative at the existing Route 92/I-35 interchange. **Transit improvements** were considered, as there is no current transit service offered in Kearney and there are no immediate plans for KCATA to add commuter transit service between Kearney and Kansas City. While transit in the region accounts for just over 1% of all work trips, it was believed that a commuter transit service extended to Kearney would not significantly address the traffic operations and safety deficiencies in the Route 92/I-35 interchange area. **Ramp metering** was considered, but is not a TSM approach that would address the existing and forecasted operational and safety issues at the I-35 / Route 92 interchange. It is recommended, however, that a new interchange be designed to include ramp lengths that could accommodate ramp-metering, should congestion along I-35 warrant the use of such techniques at some point in the future. The addition of **HOV lanes** along I-35 could be considered in the Kearney area as part of a broader strategy to increase regional system capacity. Similar to ramp metering, however, this application is typically used to address congestion issues along the freeway itself, rather than along a secondary facility like Route 92. By encouraging commuters to carpool, however, this technique could provide some benefits by reducing the number of vehicles on all facilities throughout the study area. All of these TSM elements combined are not estimated to provide a sufficient benefit to address the congestion and safety issues along Route 92.

   The results of this thorough investigation of the TSM Alternative were that it was an overall improvement in traffic operations in the Route 92 corridor compared to the No-Build Alternative, but failed to address the follow key purpose and need elements:

   - Does not achieve the traffic operations performance target of LOS D or better at two (2) intersections and nine (9) individual intersection approach legs in 2040 AM and/or PM peak hours. The northbound off-ramps at I-35 / Route 92 operate at LOS F in both peaks

in the 2040 TSM alternative, and LOS E for the I-35 northbound Route 92 off-ramp diverge. Alternative 1 would address these traffic operational issues.

- Does not significantly or comprehensively address the congestion, stop-and-start traffic operations and limited traffic gaps along Route 92 associated with the rear-end and left-turn/angle crashes. Thus, the TSM Alternative would not address the safety need identified in the study area.
- Does not meet the Accessibility, Planning Consistency, or Economic Development purpose of the project. While the TSM improvements would provide some minor congestion relief in the Route 92 corridor, it does not improve regional connectivity to I-35 for growing south Kearney. The TSM Alternative also would not satisfy the local planning objective of a new I-35 interchange in south Kearney to support and focus contiguous, urban density growth. Lastly, the improved accessibility provided by a new interchange would give existing and new businesses enhanced market access by improving access to regional customers via the I-35 corridor, and the TSM alternative would not meet this economic development purpose of the project.

3. **Proposal does not have a significant adverse impact on safety and operations**.

   The proposed I-35 interchange at 144th Street / 19th Street would not have a significant adverse impact on safety and operations. It is anticipated that the proposed action would improve overall safety and traffic operations in the study area through 2040, including improving operations and safety on I-35 through 2040.

   Traffic operations along I-35 would be improved in the preferred alternative compared to the No-Build and TSM Alternatives. The proposed interchange would address 2040 operations deficiencies for the northbound ramp diverge at Route 92 associated with the No-Build and TSM alternatives, and reduce congestion in the Route 92 corridor as well.

   In the No-Build and TSM Alternatives, by 2040 northbound traffic exiting at Route 92 is forecasted to potentially queue back onto the mainline in the PM peak; this situation could lead to significant safety issues on the mainline of I-35. Alternative 1 includes a new interchange at 144th Street / 19th Street, and this mainline safety / operational issue is not forecasted to occur. Furthermore, reducing traffic volumes and congestion in the Route 92 corridor is anticipated to reduce the frequency of rear-end and left-turn / angle crashes.

4. **An interchange that connects to a public road, meets or exceeds design standards, and provides for all traffic movements is provided**.

   The proposed I-35 interchange at 144th Street / 19th Street would be a full-access interchange that connects to a public road (144th Street / 19th Street) and would meet all current MoDOT design standards. No design exceptions are expected.

5. **The proposal is consistent with local and regional land use and transportation plans**.

   Land use and transportation planning efforts locally have been preparing for a new interchange in south Kearney for several years. The City has extended urban services into the areas in and around the proposed interchange to support the planned growth that would occur with the interchange. The City's Comprehensive Plan previously recommended a 136th Street location for an I-35 interchange, but environmental, property impact and sustainability concerns have shifted focus to planning for a 144th / 19th Street interchange. The City is currently undergoing a strategic

planning effort which recommends that the City's Master Plan be amended to show the preferred interchange option be at 144th / 19th Street.

The County Comprehensive Plan is anticipating urban density development in the study area. The 144th Street / 19th Street interchange would best support this location and density of development, and promote sustainable development, consistent with the City's vision for compact, contiguous growth within the City.

The current Kansas City Regional (MARC) 2040 Long-Range Transportation Plan includes a new I-35 / 19th Street interchange as an illustrative project, consistent with the proposed action.

6. **Consistency with corridor and comprehensive network studies and master plans**.

A new I-35 interchange at 144th Street / 19th Street is consistent with recent network and master plan studies completed in the region. As noted above, a new 144th Street / 19th Street interchange is consistent with the MARC Long Range Transportation Plan. A regional planning study from 1997, the MARC Perimeter Transportation Needs Assessment Study (PTNA), analyzed options for meeting the perimeter transportation needs in the Kansas City metropolitan area. The "PTNA Connector" shown in the Introduction section, was a new regional connection (potentially a freeway connection) identified by that study that would connect with an I-35 interchange in the south parts of the study area between 120th Street and 128th Street. The proposed 144th Street / 19th Street interchange would not conflict with those plans, as it would be at least two miles away from that planned interchange.

7. **Coordination with the area's development and other transportation system improvements**.

The proposed interchange would provide key regional access to a growth area in south Kearney, where the City has extended services to support urban density development. Thus, the City recognizes the growth potential that would come with a new interchange and has the infrastructure in place to accommodate that growth.

The Alternative 1 interchange is also consistent with the ongoing and planned transportation system improvements. Frontage roads have been discussed on both sides of I-35 from Route 92 south to 144th Street / 19th Street. An interchange in this location would work very well with these frontage roads if they are implemented. The interchange will also relieve cut-through traffic issues in the neighborhood directly to the east of I-35 in this area (Regency Drive). This has been an ongoing traffic planning concern. The new interchange will give drivers better options for reaching their destinations than using Regency Drive.

8. **Consideration and coordination with environmental process**.

Environmental considerations and coordination have been a key aspect of this study. The NEPA process has been initiated; a Categorical Exclusion document is being prepared in coordination with this Access Justification Report. One of the major concerns with the Alternative 2 interchange at 136th Street (not preferred) was the potential for requiring a new Fishing River crossing, potential floodplain impacts, and the property acquisition impacts. Furthermore, one of the key considerations of this study has been fostering an urban development pattern in and around Kearney that is compact, in an effort to reduce the length of trips within the study area, and improve direct access to the regional system for those trips traveling outside of Kearney, and

more effectively manage the amount of rural and agricultural land consumed for urban development.

REFERENCES

A Regional Greenway Action Plan for Metropolitan Kansas City: MetroGreen, Mid-America Regional Council, January 2002.

Clay County, Missouri Comprehensive Plan, BWR Corporation, 2008.

Draft Strategic Issues Update, City of Kearney, Missouri, August 2, 2012.

Highway Capacity Manual, Transportation Research Board, 2000.

I-35 & 92 Highway Commercial – Traffic Impact Study, Lutjen, Inc., August 31, 2009.

Interchange Feasibility Study and Break-In-Access Request for Kearney, Missouri, HNTB Architects, Engineers & Planners, June 2002.

Interstate System Access Informational Guide, U.S. Department of Transportation, Federal Highway Adminstration, Office of Infrastructure, August 2010.

Kearney Access Justification Report – Interstate 35/Route 92/19th Street, TranSystems Corporation, October 7, 2005.

Kearney, Missouri Comprehensive Plan, Phillips & Associates and Landplan Engineering, June 15, 2004.

Manual on Uniform Traffic Control Devices for Streets and Highways, 2009 Edition (including Revisions 1 and 2 of May 2012), Federal Highway Administration, December 2009/May 2012.

MoDOT Engineering Policy Guide, 234.1 Access to Interstate Highways, http://epg.modot.mo.gov/index.php?title=234.1_Access_to_Interstate_Highways

National Cooperative Highway Research Program (NCHRP) Report 255, Highway Traffic Data for Urbanized Area Project Planning and Design, Transportation Research Board, 1982.

Perimeter Transportation Needs Assessment Study, Mid-America Regional Council, 1997.

Sample Outline for Interstate System Access Requests, U.S. Department of Transportation, Federal Highway Administration, Missouri Division, April 24, 2012.

Smart Moves Regional Transit Vision Plan Update, Mid-America Regional Council, June 2008.

The Shoppes at Kearney Traffic Study Review and Analysis, Cook, Flatt & Strobel Engineers, January 2010.

Traffic Impact Analysis: 92 Highway and I-35 Commercial Development, TranSystems Corporation, November 2009.

Transportation Outlook 2040, Mid-America Regional Council, June 29, 2010.

U.S. Census Bureau, 2007-2011, American Community Survey, Kansas City MO – KS Metropolitan Area.

APPENDICES

Appendix A: Land Use Memo

Appendix B: VISSIM Calibration and Validation Memo

Appendix C: VISSIM Traffic Analysis Results Memo

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Memo

To:	Mark Fisher, MoDOT		
From:	Christopher Kinzel, Rob Frazier, Molly Nick	Project:	Kearney AJR
CC:	David Pavlich, City of Kearney; Matt Tapp, Clay County; Bill Nicely, Kearney School District		
Date:	9/19/12	Job No:	183131

Subject: Kearney VISUM model – Draft 2040 Land-Use Assumptions

As part of the I-35 AJR in the vicinity of Kearney, HDR is modifying the existing Kearney VISUM travel demand forecasting model to develop 2040 projections that can be used for operational analysis of future No-Build conditions as well as interchange alternatives. The purpose of this memo is to describe the draft 2040 land-use assumptions developed as inputs to the VISUM model, and the process underlying their development. Previous modeling (by others) resulted in 2030 forecasts, and HDR used this modeling as a starting point but also took into consideration information provided by the City of Kearney regarding the type, location, and extent of future development in the community.

City staff indicated that growth has been proceeding at a moderate pace over the past several years, more moderate than previous forecasts had predicted (not unlike the majority of cities in the U.S., due to the economic slowdown). Therefore, based on City staff input, HDR projected growth trends that would remain moderate until approximately 2018, and would then return to more robust growth between 2018 and 2030, tapering slightly between 2030 and 2040. The attached sheets summarize the resulting draft 2040 land-use forecasts.

Attachment A presents the model-wide land-use totals by category for dwelling units (single and multi-family), retail, industrial, office, school, and hotels. **Attachment B** presents the land-use data by Traffic Analysis Zone (TAZ), providing a geographic allocation of the development. **Attachment C** presents a series of maps showing the TAZs and the allocated land-use growth from 2007 to 2040.

Residential: In 2012, there are estimated to be just over 3,150 dwelling units in the Kearney area, with nearly all of them single-family homes. There has been a small amount of growth over the last 5 years (approximately 250 total units). For the years 2012 to 2018, this modest growth is expected to continue, with approximately 60 units per year. Then it is assumed that the average growth will increase to 200 units per year, followed by 150 units per year for the final 10 years. The overall increase in residential units from 2007 to 2040 is about 4,500 units (150% growth). 1,600 of these units are assumed to be multi-family units (townhouses, duplexes, and apartments). This level of residential development is similar to the 2030 growth projections used in previous modeling for MoDOT and the City. Thus, the magnitude of residential development is similar, but the year that it is reached is delayed by 10 years.

Retail: Similar trends were applied to the retail development in the Kearney area, with the overall 2040 retail development reaching 1.85 million square feet (s.f.) from the current (2012) level of approximately 600,000 s.f. This is three times the current amount of space and thus assumes an increase in the ratio of retail space to dwelling unit compared to the current condition. The size of the increase over the next 28 years was assumed to be less than what had been assumed in prior studies (2.2 to 3.4 million s.f.). It was not clear that this level of development is supportable, given the current residential projections, unless one or more major regional developments (potentially greater than 500,000 s.f.) were to be constructed in the study area.

Industrial: Industrial development was projected to grow by 138% from a 2007 base of approximately 550,000 s.f. to 1.3 million s.f. in 2040. This is consistent with the amount of industrial development assumed by 2030 in previous studies.

Office: Office development was projected to double over the 28-year time period (2012 to 2040), reaching just under one million square feet at the end of the planning horizon. This level of development would lead to a decrease in the model-wide ratio of office space to residential units. The overall growth scenario therefore assumes a greater emphasis on retail development and a lower emphasis on office development.

School Students: Student growth is projected to grow in a manner similar to, but somewhat slower than, residential growth. Given the growth in multi-family dwellings, the number of students per household is expected to decrease over time. (Prior forecasts had not included student growth in the model.)

Hotel Rooms: It is expected that at least two new hotels will open during the planning period. This will increase the hotel rooms in the area to just over 450. Given Kearney's desire to grow as a venue for entertainment, recreation, and youth sporting events, it is logical to assume that additional hotel rooms will be in demand.

The above land-use control totals were allocated to the traffic analysis zones (TAZs) in the Kearney area travel model based on information provided by the City of Kearney, including recent development proposals and historical land-use plans. Prior model development assumptions were also used in this process.

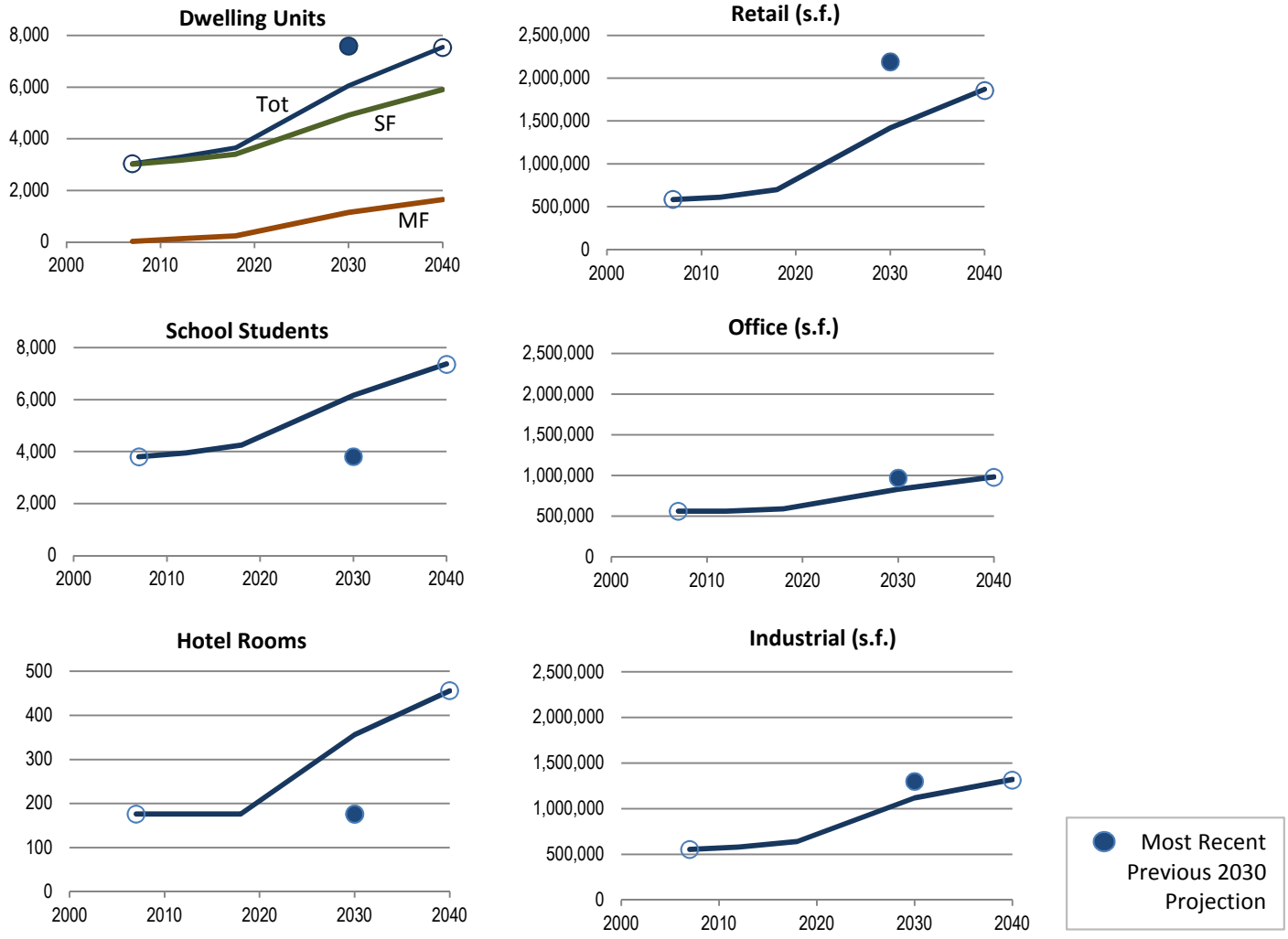
Note: This memo was updated in March 2013 to account for minor changes requested by the City of Kearney and accepted previously by MoDOT.

Attachment A: Model-Wide Land Use Totals by Category

Land Use	Code	Units	2007	Range of Previous 2030 Projections	Recommended 2040	Annual Growth 2007-2012	Annual Growth 2012-2018	Annual Growth 2018-2030	Annual Growth 2030-2040	Total Change (2007-2040) #	Total Change (2007-2040) %
Single Family Homes	SF	Dwelling Units	3,016	6,151 - 9,221	**5,894**	30	40	125	100	2,890	96%
Multi-Family Homes	MF	Dwelling Units	24	1,438 - 2,275	**1,639**	20	20	75	50	1,620	6750%
Total Dwelling Units	HH	Dwelling Units	3,040	7,589 - 11,496	**7,533**	50	60	200	150	4,510	148%
Retail	RET	Square Feet	584,040	2,189,779 - 3,354,153	**1,855,960**	5,000	15,000	60,000	45,000	1,285,000	220%
Industrial	IND	Square Feet	553,600	1,297,583 - 1,430,415	**1,312,600**	5,000	10,000	40,000	20,000	765,000	138%
Office	OFF	Square Feet	560,210	967,246 - 1,119,104	**975,210**	0	5,000	20,000	15,000	420,000	75%
School	SCH	Students	3,800	3,800 - 3,800	**7,350**	30	50	160	120	3,570	94%
Hotel	HOTL	Rooms	176	176 - 176	**456**	0	0	15	10	280	159%
Special Generators	SPECIAL	NA	6,000	6000 - 6000	**6,000**	0	0	0	0	0	0%

Ratio of Non-Residential Development to Residential Dwelling Units

	2007	Range of Previous 2030 Projections	Recommended 2040
Retail S.F. per HH	192.1	288.5 - 291.8	246.4
Industrial S.F. per HH	182.1	124.4 - 171.0	174.2
Office S.F. per HH	184.3	97.3 - 127.5	129.5
Students per HH	1.3	0.3 - 0.5	1.0
Hotel rooms per HH	0.1	0.02 - 0.02	0.06



Attachment B: Land Use Data by TAZ

TAZ	Development/Project Description	Use	Existing	Recommended 2040
1	Hills of Westwood	SF	100	425
2	Oakwood Estates	SF	40	365
2	COMMERCIAL	RET	0	50,000
2	OFFICE	OFF	0	0
3	Vacant	IND	0	2,000
3	Vacant (3)	IND	0	21,600
3	INDUSTRIAL	IND	0	200,000
3	Couchman Construction, Inc.	IND	5,800	5,800
3	Midwestern Kustom Printing & Fulfillment	IND	4,000	4,000
3	Construction Co.	IND	7,400	7,400
3	PNSP No. 6 of Clay Co.	IND	2,000	2,000
3	Hedrick Construction Co.	IND	2,000	2,000
3	Hot Tubs	IND	2,000	2,000
3	Midwest Corvettes and Classics	IND	2,000	2,000
3	AIR-serv	IND	2,000	2,000
3	D&L Tech.	IND	7,600	7,600
3	Premier Transmission	IND	15,700	15,700
3	Hamilton Plumbing	IND	6,200	6,200
3	Pure Water Delivery	IND	18,800	18,800
3	KC Construction	IND	19,000	19,000
3	CVS Systems	IND	7,200	7,200
3	Kearney Gymnastics	IND	7,200	7,200
3	RJ Wholesale Windows & Siding	IND	7,200	7,200
3	Performance Truck and SUV	IND	7,200	7,200
3	Kearney Winnelson	IND	16,700	16,700
3	Platte Clay Electric Coop	IND	102,600	102,600
3	Light Industrial (Couchman)	NO DATA	0	0
3	Light Industrial (Inovation)	NO DATA	0	0
3	Building Storage	NO DATA	0	0
3	OFFICE	OFF	0	150,000
3	First Missouri National Bank	OFF	65,200	65,200
3	Kansas City Bank	OFF	81,600	81,600
3	COMMERCIAL	RET	0	250,000
3	Platte Clay Fuels	RET	10,200	10,200
4	MULTI-FAMILY	MF	0	70
4	COMMERCIAL	RET	0	130,000
4	Single Family	SF	5	5
5	Single Family	SF	8	8
6	COMMERCIAL	RET	0	0
6	INDUSTRIAL	IND	0	200,000
6	Wee Care Day Care	RET	19,500	19,500
6	Remmington Steel	IND	19,700	19,700
6	Church of Annunciation	NO DATA	0	0
6	Radiant Life Church	NO DATA	0	0
6	Baseball Fields	NO DATA	0	0
6	Community Center	SPECIAL	6,000	6,000
7	Vacant	NO DATA	0	0
7	Stolling Ranch	SF	0	200
7	Townhouses	MF	0	250
7	New Schools	SCH	0	1,000
7	Commercial	RET	0	0
8	Apartments	MF	0	0
8	Townhouses/Duplexes	MF	0	50
8	Highland Meadows	SF	0	200
8	Commercial	RET	0	100,000
8	Vacant	NO DATA	0	0
9	MULTI-FAMILY	MF	0	300
9	Single Family	SF	1	101
10	Commercial	RET	0	130,000
10	Office	OFF	0	125,000
10	Commercial (Centerville)	NO DATA	0	0
10	Orscheln	RET	34,800	34,800
10	Strip Mall (Centerville)	RET	26,300	26,300
10	Commercial (N Country)	NO DATA	0	0

TAZ	Development/Project Description	Use	Existing	Recommended 2040
10	Abby's Frozen Custard	RET	3,300	3,300
10	Goodyear	RET	29,900	29,900
10	Car wash and Lube	RET	20,200	20,200
10	Crossroads car dealer	RET	20,800	20,800
10	The Armory - Gun Shop & Range	RET	10,800	10,800
10	Kearney Lawn & Rental	RET	10,800	10,800
10	Grocery Store	RET	30,600	30,600
10	Strip Mall (N Country)	RET	25,300	25,300
10	Burger King	RET	5,300	5,300
10	Strip Mall (Shank)	RET	14,900	14,900
10	Best Western	HOTL	45	45
10	Kearney Trust Company	OFF	7,900	7,900
11	SINGLE FAMILY	SF	0	0
11	Vacant	NO DATA	0	0
12	COMMERCIAL	RET	0	80,000
12	Single Family	SF	2	2
13	MULTI-FAMILY	MF	0	0
13	Vacant	IND	0	5,400
13	COMMERCIAL	RET	0	30,000
13	INDUSTRIAL	IND	0	30,000
13	Commercial	NO DATA	0	0
13	J&K Country Stauary & Gifts	RET	7,000	7,000
13	Judy's Klip & Kuts	RET	1,200	1,200
13	Tafts Carpet & Storage	RET	6,000	6,000
13	Light Industrial	NO DATA	0	0
13	Kearney West Storage	IND	3,600	3,600
13	McGinnis Plumbing	IND	3,600	3,600
13	PSC - Philip Services	IND	7,400	7,400
13	Construction Co.	IND	10,200	10,200
13	Bus Barn	IND	5,800	5,800
13	Medical arts center	IND	3,200	3,200
13	Church	NO DATA	0	0
13	Storage (5)	NO DATA	0	0
14	MULTI-FAMILY	MF	0	200
14	Vacant	NO DATA	0	0
15	SINGLE FAMILY	SF	0	200
15	Vacant	NO DATA	0	0
16	Single Family	SF	8	8
17	MULTI-FAMILY	MF	0	0
17	Single Family	SF	3	3
17	New School	SCH	0	500
17	Commercial	RET	0	40,000
18	COMMERCIAL	RET	0	30,000
18	Single Family	SF	6	6
19	Single Family	SF	12	12
20	OFFICE	OFF	0	0
20	Vacant	NO DATA	0	0
21	Vacant	NO DATA	0	0
22	Apartments	MF	0	0
22	Townhouses/Duplexes	MF	0	50
22	Flight of the Quail	SF	0	150
22	Single Family	SF	1	1
23	Single Family	SF	85	85
23	Multi-Family	MF	5	5
23	MACO Sr Apts	MF	0	0
24	Single Family	SF	44	69
24	COMMERCIAL	RET	0	15,000
24	Porters	RET	23,600	23,600
24	Apartments	MF	3	33
24	Long Vet Clinic	OFF	27,200	27,200
24	Mari Mac Golf Course	NO DATA	0	0
24	Self Storage	NO DATA	0	0
24	First United Methodist	NO DATA	0	0
24	Marimack Villas	SF	0	30
24	Couchman	MF	0	140
25	COMMERCIAL	RET	0	30,000

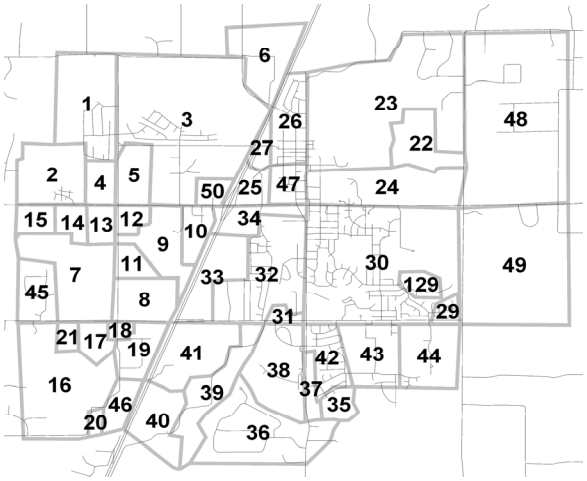
TAZ	Development/Project Description	Use	Existing	Recommended 2040
25	Shell Gas	RET	3,900	3,900
25	McDonald's	RET	9,900	9,900
25	Commercial (S. Platte Clay Way)	NO DATA	0	0
25	Sonic	RET	3,300	3,300
25	Super 8	HOTL	47	47
25	Comfort Suite Hotels	HOTL	44	44
25	Apartments	MF	4	4
25	Apartments	MF	2	2
25	Kearney City Bank	OFF	16,500	16,500
25	Cook's Collision	OFF	9,000	9,000
25	Office (S. Platte Clay Way)	NO DATA	0	0
25	Office Bldg	OFF	11,000	11,000
25	Post Office	OFF	11,100	11,100
25	John Deere - Fries	OFF	8,800	8,800
25	Library	OFF	17,000	17,000
25	Offce - Kearney Professional Plaza	OFF	58,300	58,300
25	Office Bldgs (4)	OFF	28,700	28,700
25	Kearney Trust	OFF	19,800	19,800
26	Multi-Family	MF	10	10
26	Single Family	SF	227	227
26	Dollar General	RET	5,600	5,600
26	NAPA Auto Parts	RET	8,400	8,400
26	Summit Publications	OFF	1,800	1,800
26	Coldwell Banker	OFF	3,940	3,940
26	Office	OFF	2,200	2,200
27	INDUSTRIAL	IND	0	50,000
27	Mr. Dell Foods	IND	54,700	54,700
27	Variform	IND	202,800	202,800
28	Dogwood Elementary	SCH	500	1,000
28	New School	SCH	0	1,000
28	MULTI-FAMILY	MF	0	250
28	Cedarwood	SF	60	385
28	Industrial	IND	0	200,000
28	Office	OFF	0	0
29	Brooke Haven	SF	60	112
30	MULTI-FAMILY	MF	0	0
30	Single Family	SF	1,100	1,128
30	Hawthorne Elementary	SCH	250	300
30	Gavin's Grove	SF	0	100
30	Clear Creek	SF	0	12
30	Clear Creek Ridge	SF	0	48
30	Albright	SF	0	5
31	MULTI-FAMILY	MF	0	0
31	Single Family	SF	17	117
31	Trinity Lutheran	NO DATA	0	0
31	Community Covenant Church	NO DATA	0	0
31	Jesus Christ of Latter Day Saints	NO DATA	0	0
32	Jamestowne Village	SF	0	0
32	Single Family	SF	502	643
32	Kearney Elementary School	SCH	300	300
32	CVS	RET	8,000	8,000
32	Retail Strip Mall	RET	18,100	18,100
32	Used car dealership	RET	2,500	2,500
32	Kwik Lube and Car Wash	RET	22,600	22,600
32	Gas and C-store - Pour Boys	RET	6,200	6,200
32	Cemetary	NO DATA	0	0
33	MULTI-FAMILY	MF	0	275
33	Vacant	NO DATA	0	0
33	Office	OFF	0	75,000
33	Commercial	RET	0	80,000
34	COMMERCIAL	RET	0	165,000
34	Office	OFF	0	0
34	HOTEL	HOTL	0	160
34	MoDOT	OFF	7,200	7,200
34	Somerset Office Park	OFF	13,600	13,600
34	Fire Station	NO DATA	0	0

TAZ	Development/Project Description	Use	Existing	Recommended 2040
35	Village of River Meadows	SF	0	100
35	Business Park	OFF	0	0
35	Vacant	NO DATA	0	0
36	Single Family	SF	74	74
37	COMMERCIAL	OFF	0	15,000
37	Vacant	NO DATA	0	0
38	SINGLE FAMILY	SF	0	0
38	COMMERCIAL	RET	0	75,000
38	Citizen's Bank	OFF	7,500	7,500
38	Meadows of Greenfield	SF	56	306
39	Single Family	SF	8	58
40	OFFICE	OFF	0	0
40	Single Family	SF	17	17
41	Single Family	SF	8	8
42	Single Family	SF	303	315
43	School Campus	NO DATA	0	0
43	Kearney HS	SCH	900	900
43	Southview School, Elementary	SCH	350	350
43	Kearney Junior High	SCH	900	900
43	New School	SCH	0	500
43	Single Family	SF	84	84
43	Maintenance Bldgs	NO DATA	0	0
44	Single Family	SF	47	47
45	Stolling Ranch	SF	38	38
46	Vacant	NO DATA	0	0
47	Commercial (Jefferson/92)	NO DATA	0	0
47	Commercial (East side of Jefferson)	NO DATA	0	0
47	Commercial (West side of Jefferson)	NO DATA	0	0
47	Commercial (Along 92)	NO DATA	0	0
47	Office (East side of Jefferson)	NO DATA	0	0
47	Office (West side of Jefferson)	NO DATA	0	0
47	Storage	NO DATA	0	0
47	Lutheran Church	NO DATA	0	0
47	Storage	NO DATA	0	0
47	Public Pool	NO DATA	0	0
47	Park	NO DATA	0	0
47	Storage (2)	NO DATA	0	0
47	Kearney Muffler & Welding	OFF	1,800	1,800
47	5 Star Businesses	OFF	1,870	1,870
47	Hair Kare	OFF	2,300	2,300
47	Feed Supply	OFF	2,600	2,600
47	Kearney Landscape	OFF	2,600	2,600
47	Auto Service and Tow	OFF	2,700	2,700
47	J&K Auto	OFF	3,000	3,000
47	Day Spa	OFF	3,200	3,200
47	Funeral Home	OFF	3,300	3,300
47	CPS Signs	OFF	3,300	3,300
47	Baldwin Insurance	OFF	3,300	3,300
47	Clay County Bank	OFF	3,400	3,400
47	Reece & Nichols	OFF	3,700	3,700
47	Unite Tele Company	OFF	4,000	4,000
47	Iron Mike's Welding & Repair	OFF	4,100	4,100
47	Stuckey's Auto Service	OFF	4,400	4,400
47	Brooke Insurance	OFF	4,600	4,600
47	Peters Auto and Repair	OFF	4,900	4,900
47	Freedom Mortgage	OFF	5,400	5,400
47	Realtor - Remax	OFF	5,600	5,600
47	Police Dept	OFF	5,700	5,700
47	City hall	OFF	6,400	6,400
47	Animal Clinic - Vet	OFF	6,800	6,800
47	Kearney Body Shop	OFF	7,300	7,300
47	Shelter Insurance/Dentist	OFF	7,600	7,600
47	Day Care	OFF	8,900	8,900
47	Office (3)	OFF	9,000	9,000
47	Westbrook Villa Assisted Living	OFF	40,100	40,100
47	Vacant	RET	0	1,440

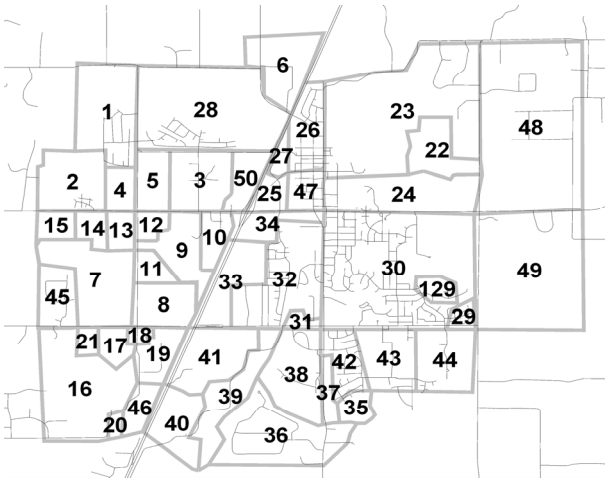
TAZ	Development/Project Description	Use	Existing	Recommended 2040
47	Splish Splash Laundromat	RET	1,000	1,000
47	Studio 92	RET	1,700	1,700
47	Restaurant - At Sarah's Table	RET	1,900	1,900
47	B&B	RET	2,100	2,100
47	Retail	RET	2,600	2,600
47	Creative Corner	RET	2,700	2,700
47	Carwash	RET	2,700	2,700
47	Stonework Heritage	RET	3,100	3,100
47	Office (Downtown-Washington)	RET	3,340	3,340
47	Full E-Clips Salon	RET	3,700	3,700
47	Casey's	RET	4,300	4,300
47	Strip Mall	RET	15,000	15,000
47	Old Church Plaza Strip Mall	RET	20,500	20,500
47	Grocery - Big Country Mart	RET	28,500	28,500
47	Retail Strip Mall	RET	43,500	43,500
47	Commercial (Downtown-Washington)	RET	54,600	54,600
47	Kearney Middle School	SCH	600	600
48	Single Family	SF	50	50
49	Single Family	SF	50	50
50	Travel Center + Car Wash	RET	0	15,480
50	Arby's	RET	3,800	3,800
50	EconoLodge Hotel	HOTL	40	40
50	Hotel	HOTL	0	120
50	Commercial	RET	0	50,000
50	INDUSTRIAL	IND	0	50,000
50	Office	OFF	0	50,000
129	Brooke Haven	SF	0	100

TAZ IDs (for reference):

2007



2040

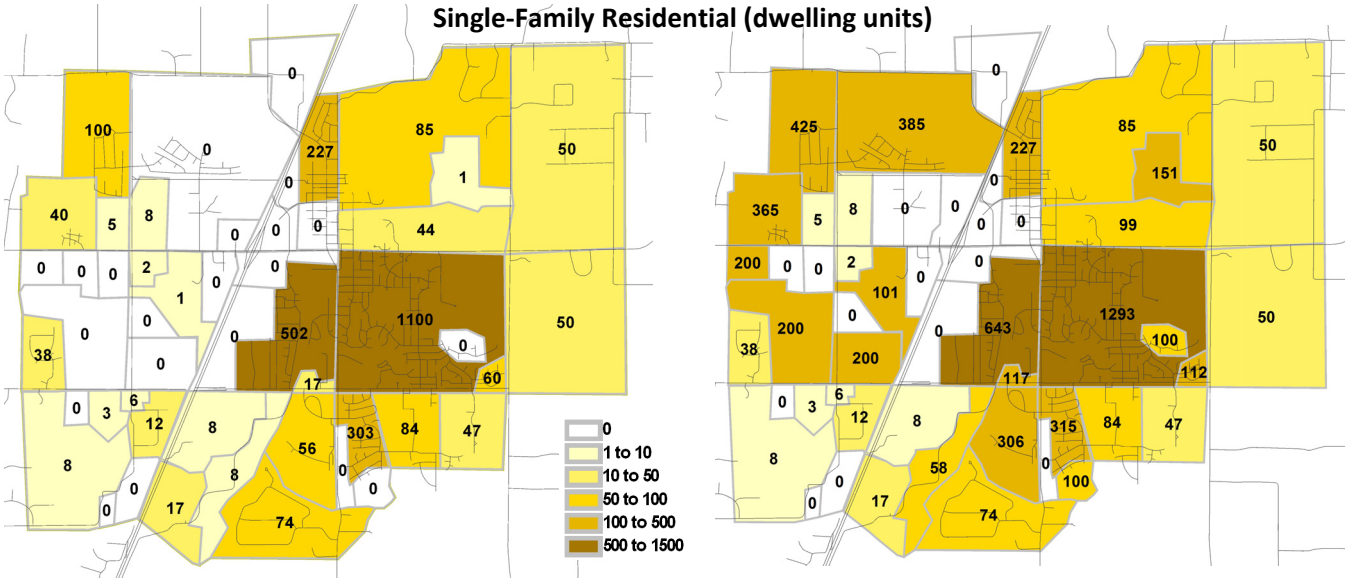


Attachment C: Land Use Growth Maps

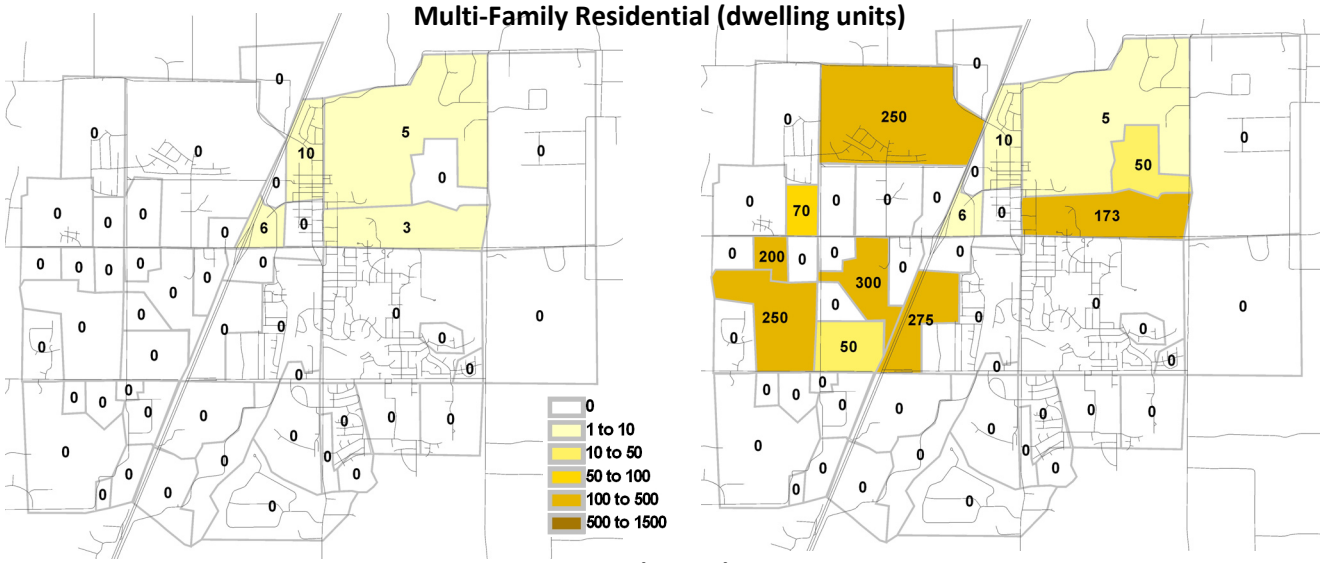
Land use quantities shown in the maps below represent totals within each TAZ. The land use itself is located in different places throughout the TAZ.

2007	2040

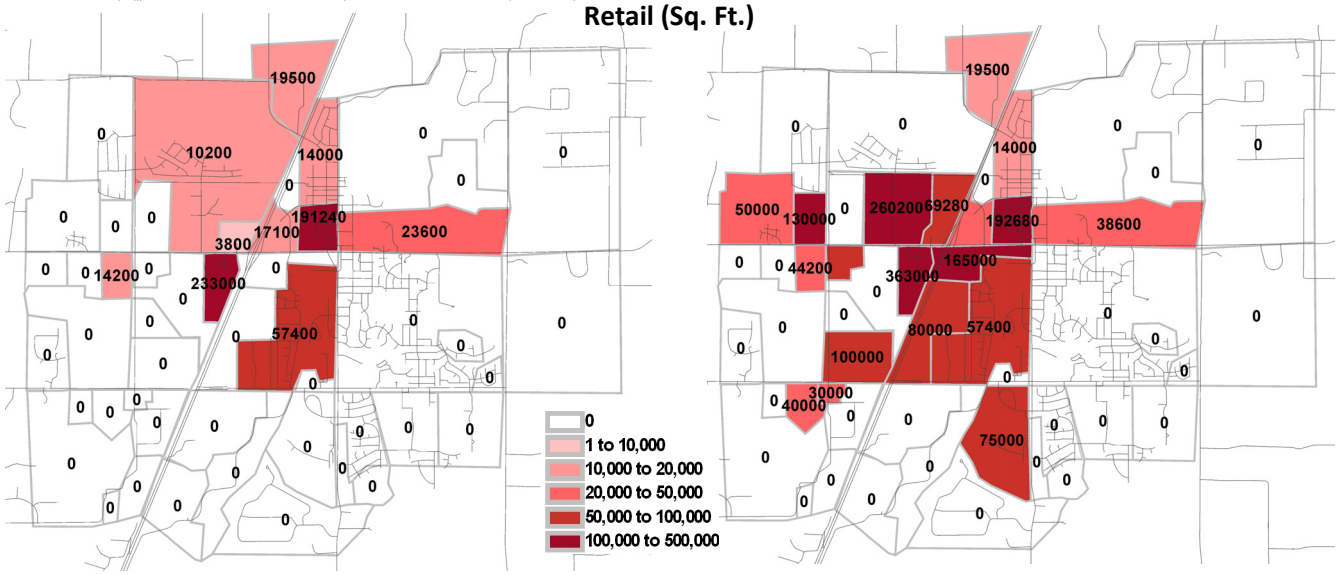
Single-Family Residential (dwelling units)



Multi-Family Residential (dwelling units)



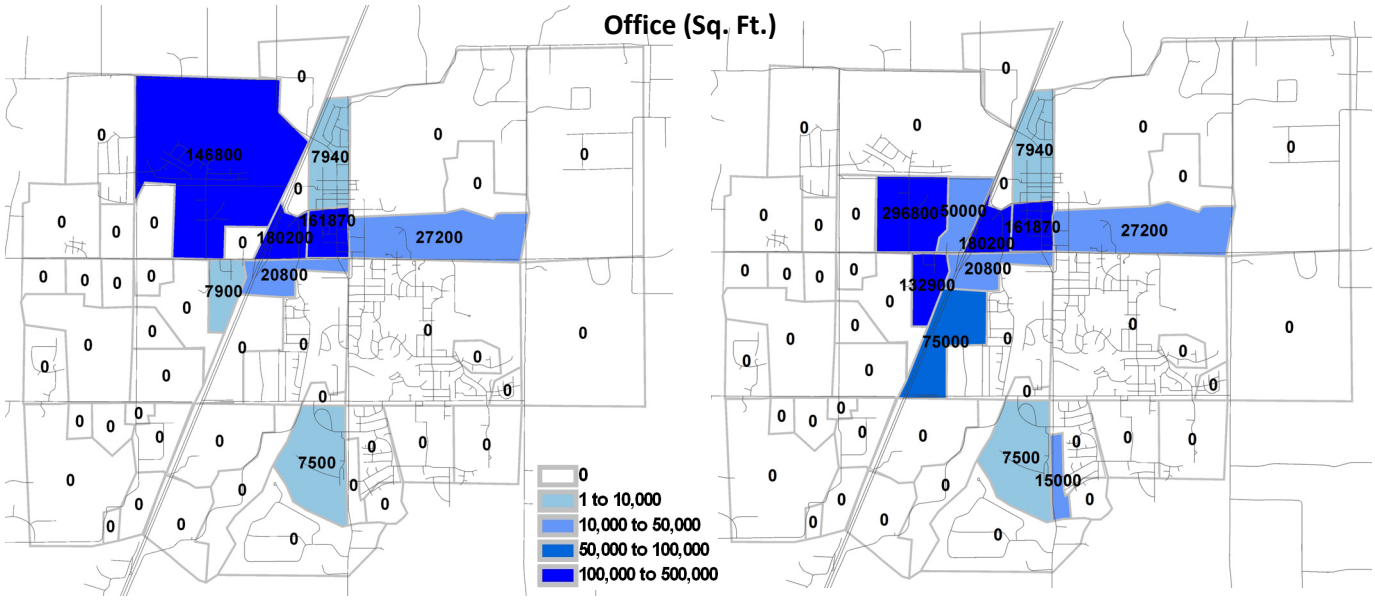
Retail (Sq. Ft.)



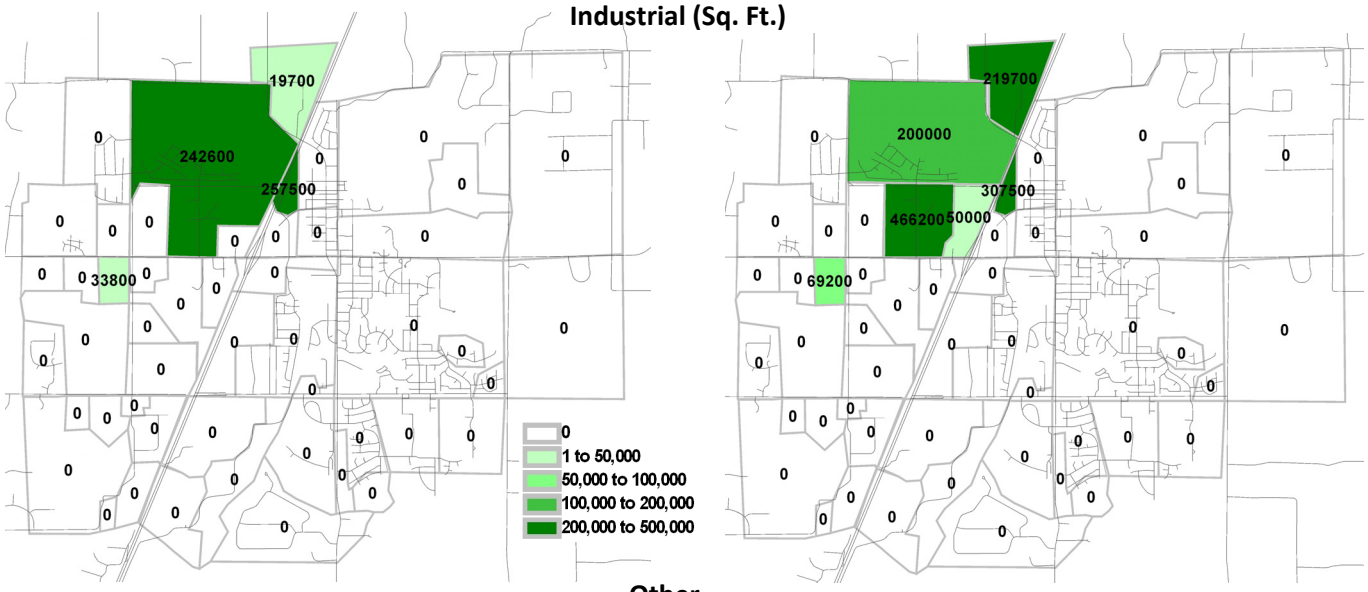
Attachment C: Land Use Growth Maps (cont.)

2007	2040

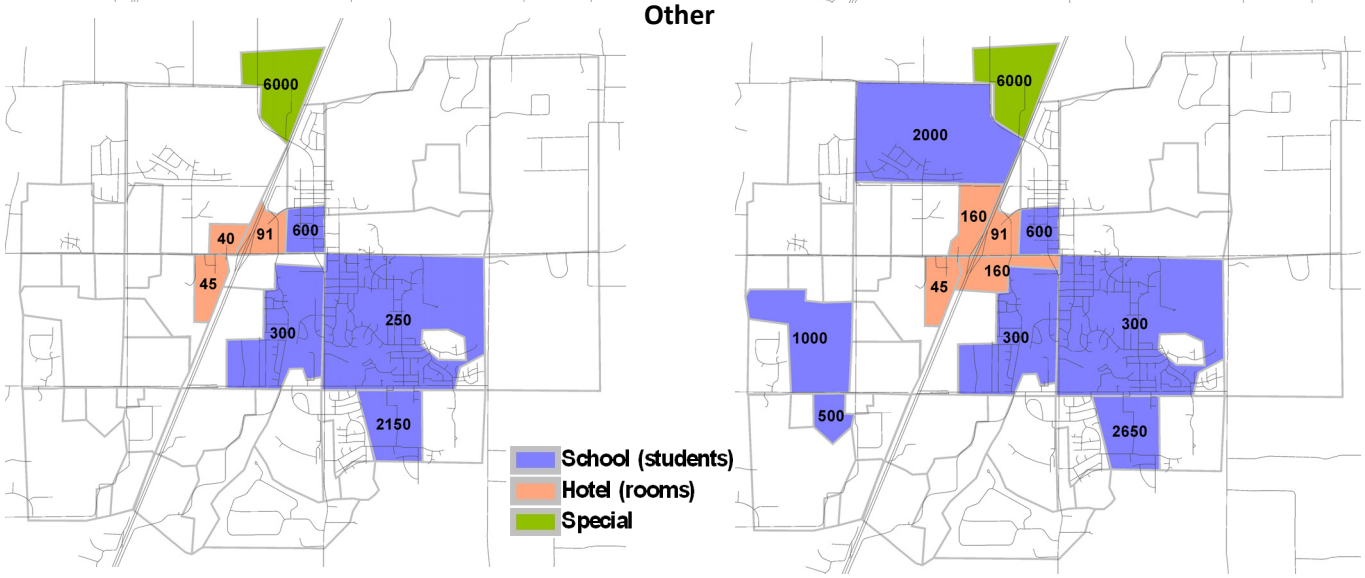
Office (Sq. Ft.)



Industrial (Sq. Ft.)



Other



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Memo

To:	Mark Fisher, Joshua Scott		
From:	Christopher Kinzel, Robert Frazier, Molly Nick, Mohammad Rahman	Project:	I-35/Kearney AJR
CC:			
Date:	3/4/13	Job No:	

VISSIM Model Calibration and Validation Process

Calibration and validation were conducted to achieve a high fidelity and credibility of the base model in the study area. The first step in calibration was to compare input and output traffic volumes. The GEH (Geoffrey E. Havers) formula is widely used to compare simulation inputs and outputs since this continuous volume tolerance formula can overcome the wide range of link or turning movement volume data. The GEH formula for hourly volume comparisons is as follows:

$$GEH = \sqrt{\frac{2(M-C)^2}{M+C}}$$

Notes:
M = output traffic volume from the simulation model (vph)
C = input traffic volumes (vph)

According to FHWA's calibration guideline, Table 1 presents the traffic volume calibration criteria used in this VISSIM simulation study.

Table 1: FHWA Traffic Volume Calibration Criteria

Criteria	Calibration Acceptance Targets
Model Versus Observed Individual Link Volumes: Within 15%, for 700vph < hourly volume < 2700vph	> 85% of cases
Model Versus Observed Individual Link Volumes: Within 100vph, for hourly volume < 700vph	> 85% of cases
Model Versus Observed Individual Link Volumes: Within 400vph, for hourly volume > 2700vph	> 85% of cases
Sum of All Link Volumes	Within 5% of sum of all link counts
GEH Statistic < 5 for Individual Link Volumes	> 85% of cases
GEH Statistic for Sum of All Link Volumes	GEH < 4 for sum of all link counts

Following the comparison of input and output traffic volumes, the next step in calibration was to ensure the travel time measured from the simulation reflects existing field conditions. In this study, the calibration criterion

(difference) targeted no more than 15% (or greater than 1 minute) between observed average travel time and simulated average travel time along the corridor.

Visual inspection of congestion levels were also compared against field observations. HDR staff observed the field operations during peak hours.

In this VISSIM study, the AM peak hour data set was used in the base model calibration and the PM peak hour data set was used for the base model validation process. The validation process used traffic volumes and signal timing plans that were independent from those used in the calibration process. The validation process also followed the same criteria used in the calibration process.

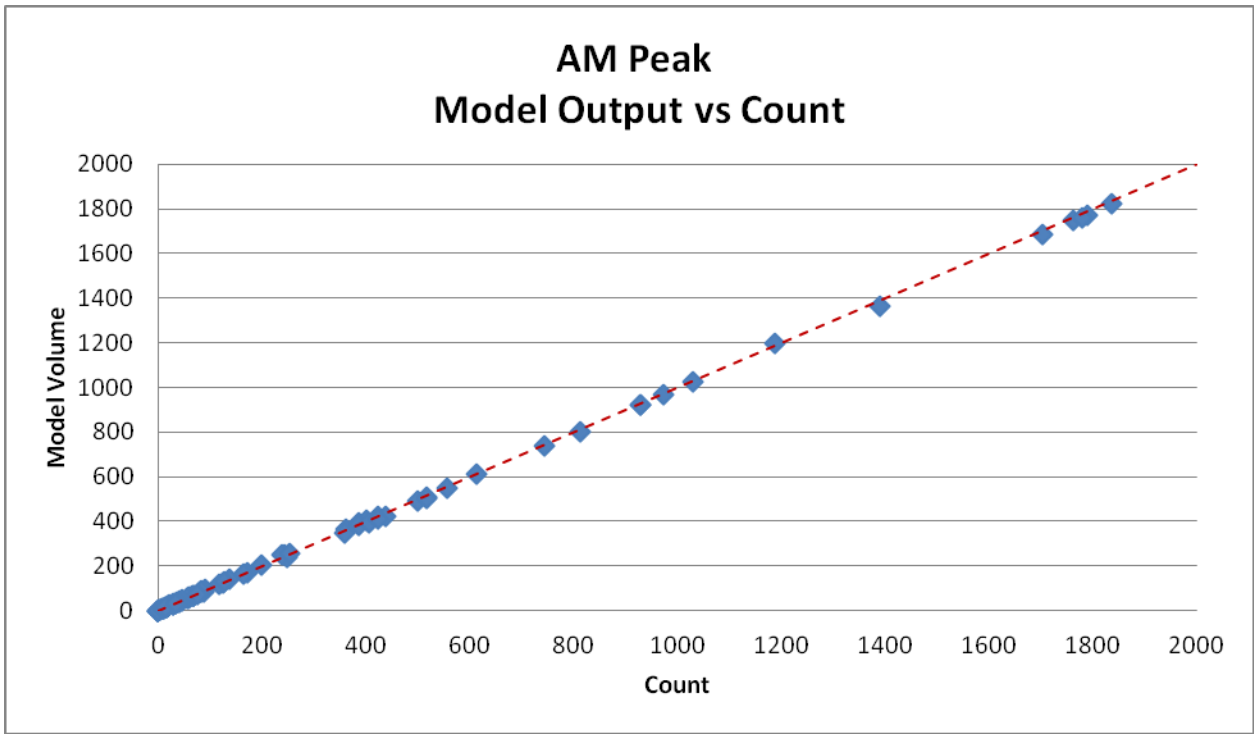
VISSIM Model Calibration and Validation Results

The results from the existing VISSIM model calibration and validation were reported in this section. These results are summarized and averaged based upon ten (10) simulation runs for each model.

The traffic volume calibration results meet the volume difference criteria calibration targets set forth in FHWA's *Traffic Analysis Toolbox Volume III*. The GEH value for all movements, segments, and sum of link volumes also meet target criteria. Detailed results are available in the Appendix.

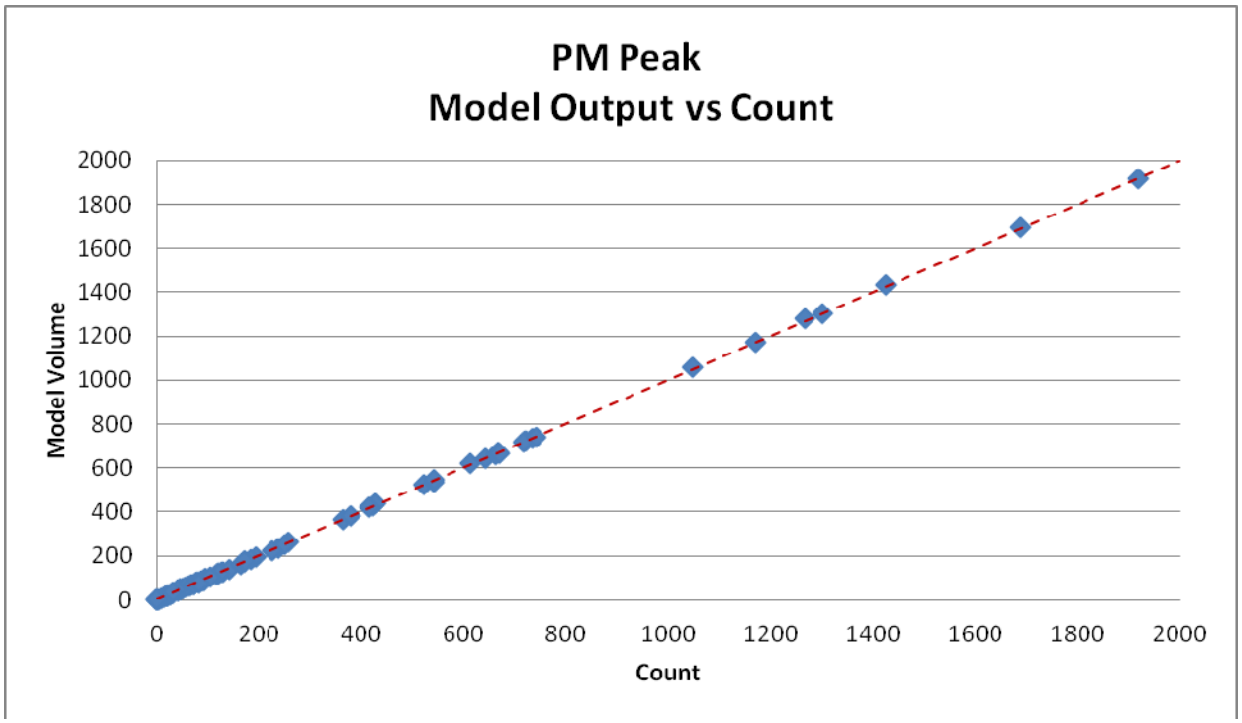
As shown in Figure 1, the calibrated model throughput volumes match closely with the balanced traffic counts at the study intersections (turning movements and total volume at each intersection).

Figure 1: AM Peak Hour Calibration Results, Model Output and Input Volume Chart



As shown in Figure 2, model validation using the PM peak hour data set also illustrates that throughput volumes match closely with the balanced traffic counts at the study intersections (turning movements and total volume of each intersection).

Figure 2: PM Peak Hour Validation Results, Model Output and Input Volume Chart



As shown in Table 2 and Table 3, the base model output volumes of the I-35 freeway segments also closely match the 2012 hourly traffic counts in both the southbound (from north of the Hwy 92 interchange to south of the Hwy 69 interchange) and northbound (from south of the Hwy 69 interchange to north of the Hwy 92 interchange) directions.

Table 2: I-35 AM Peak Hour Calibration Results: Model Output and Traffic Count

Location	2012 Count Volume	Calibrated Model - VISSIM (Version 5.4-03)				Volume Calibration Targets		GEH Calibration Targets	
	Demand Volume (vph)	Served Volume (vph)	Difference			Measure	Meets?	Measure	Meets?
			vph	%	GEH				
North of I-35 SB Off-Ramp at Hwy 92	1,243	1,247	-4	0.3%	0.1	+/- 15%	Yes	< 5	Yes
I-35 SB between Hwy 92 and Hwy-69	1,926	1,933	-7	0.4%	0.2	+/- 15%	Yes	<5	Yes
South of I-35 SB On-Ramp at Hwy 69	2,879	2,866	13	-0.5%	0.2	+/- 400 vph	Yes	<5	Yes
South of I-35 NB Off-Ramp at Hwy 69	1,195	1,196	-1	0.1%	0.0	+/- 15%	Yes	<5	Yes
I-35 NB between Hwy-69 and Hwy 92	834	844	-10	1.2%	0.3	+/- 15%	Yes	<5	Yes
North of I-35 NB On-Ramp at Hwy 92	722	729	-7	1.0%	0.3	+/- 15%	Yes	<5	Yes

Table 3: I-35 PM Peak Hour Validation Results: Model Output and Traffic Count

Location	2012 Count Volume	Calibrated Model - VISSIM (Version 5.4-03)				Volume Calibration Targets		GEH Calibration Targets	
	Demand Volume (vph)	Served Volume (vph)	Difference			Measure	Meets?	Measure	Meets?
			vph	%	GEH				
North of I-35 SB Off-Ramp at Hwy 92	1,016	1,016	0	0.0%	0.0	+/- 15%	Yes	< 5	Yes
I-35 SB between Hwy 92 and Hwy-69	1,274	1,278	-4	0.3%	0.1	+/- 15%	Yes	<5	Yes
South of I-35 SB On-Ramp at Hwy 69	1,874	1,873	1	-0.1%	0.0	+/- 15%	Yes	<5	Yes
South of I-35 NB Off-Ramp at Hwy 69	2,930	2,934	-4	0.1%	0.1	+/- 400 vph	Yes	<5	Yes
I-35 NB between Hwy-69 and Hwy 92	2,071	2,086	-15	0.7%	0.3	+/- 15%	Yes	<5	Yes
North of I-35 NB On-Ramp at Hwy 92	1,430	1,441	-11	0.8%	0.3	+/- 15%	Yes	<5	Yes

Travel times along I-35 freeway were collected during both AM and PM peak periods. The average travel time for the same sections in the simulation model closely matched with field collected average travel time in both AM peak hour and PM peak hours. As shown in Figure 3 and Figure 4, the differences fall within the calibration target for travel sections along the northbound and southbound directions of I-35 within the study area.

Figure 3: Travel Time Comparisons along I-35, AM Peak Hour

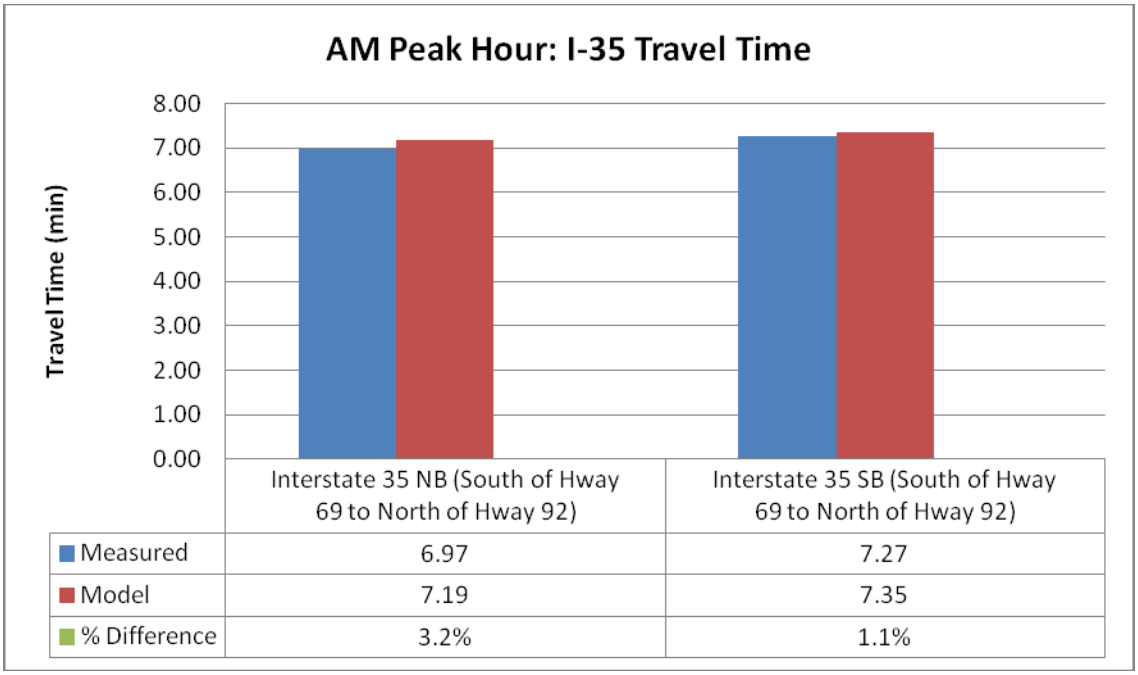
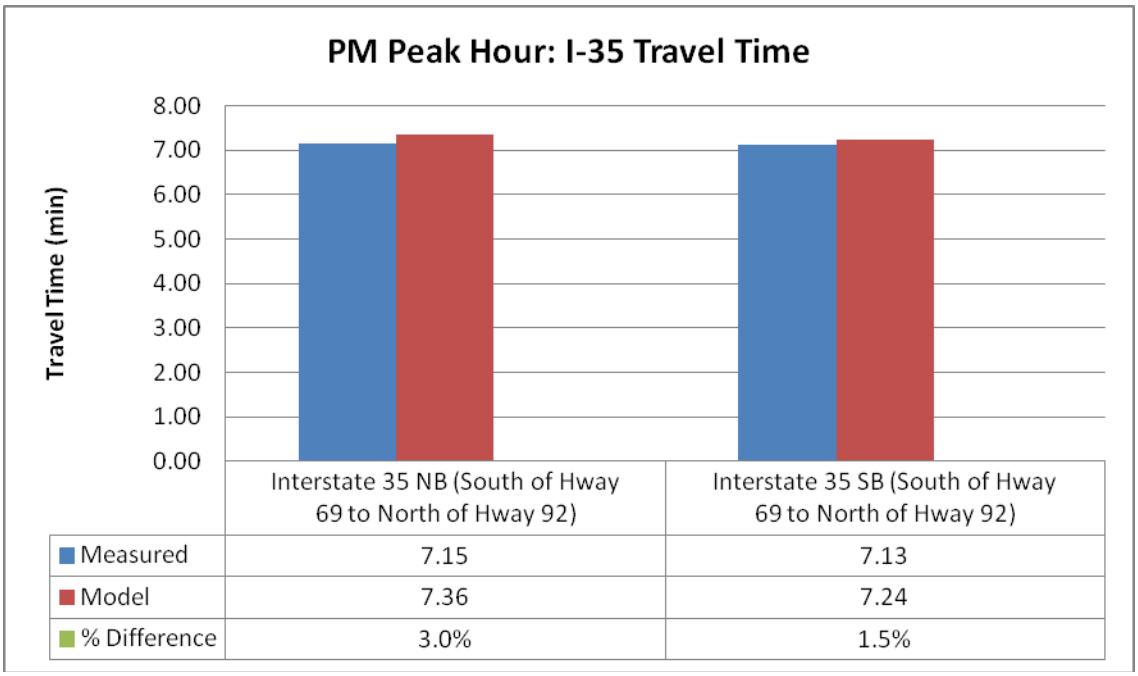


Figure 4: Travel Time Comparisons along I-35, PM Peak Hour



	Interstate 35 NB (South of Hway 69 to North of Hway 92)	Interstate 35 SB (South of Hway 69 to North of Hway 92)
Measured	7.15	7.13
Model	7.36	7.24
% Difference	3.0%	1.5%

Appendix

Table A: AM Peak Hour Calibration Results, Intersection Model Output and Traffic Count

								Volume Calibration Targets		GEH Calibration Targets	
Intersection	Approach	Movement	2012 Volume Count	Model Volume	Volume Difference (Model output-Count)	GEH Value	Percent Diff	Measure	Meets?	Measure	Meets?
Hwy 92 & Centerville Ave	EB Hwy 92	EBT	642	645	3	0.1	0%	+/- 100 vph	Yes	<5	Yes
		EBR	15	15	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
	WB Hwy 92	WBL	46	51	5	0.7	11%	+/- 100 vph	Yes	<5	Yes
		WBT	422	431	9	0.4	2%	+/- 100 vph	Yes	<5	Yes
	NB Centerville Ave	NBL	69	71	2	0.2	3%	+/- 100 vph	Yes	<5	Yes
		NBR	73	73	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
		All	1267	1282	15	0.4	1%	+/- 15%	Yes	<5	Yes
Hwy 92 & Bennett Blvd / N Country Ave	EB Hwy 92	EBL	20	21	1	0.2	5%	+/- 100 vph	Yes	<5	Yes
		EBT	668	673	5	0.2	1%	+/- 100 vph	Yes	<5	Yes
		EBR	27	25	-2	0.4	7%	+/- 100 vph	Yes	<5	Yes
	WB Hwy 92	WBL	84	82	-2	0.2	2%	+/- 100 vph	Yes	<5	Yes
		WBT	428	439	11	0.5	3%	+/- 100 vph	Yes	<5	Yes
		WBR	49	48	-1	0.1	2%	+/- 100 vph	Yes	<5	Yes
	NB N Country Ave	NBL	22	24	2	0.4	9%	+/- 100 vph	Yes	<5	Yes
		NBT	2	2	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
		NBR	54	53	-1	0.1	2%	+/- 100 vph	Yes	<5	Yes
	SB Bennett Blvd	SBL	48	47	-1	0.1	2%	+/- 100 vph	Yes	<5	Yes
		SBT	3	4	1	0.5	33%	+/- 100 vph	Yes	<5	Yes
		SBR	18	20	2	0.5	11%	+/- 100 vph	Yes	<5	Yes
		All	1423	1433	10	0.3	1%	+/- 15%	Yes	<5	Yes
Hwy 92 & Shanks Ave	EB Hwy 92	EBL	19	20	1	0.2	5%	+/- 100 vph	Yes	<5	Yes
		EBT	720	723	3	0.1	0%	+/- 15%	Yes	<5	Yes
		EBR	31	31	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
	WB Hwy 92	WBL	128	128	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
		WBT	522	527	5	0.2	1%	+/- 100 vph	Yes	<5	Yes
		WBR	81	82	1	0.1	1%	+/- 100 vph	Yes	<5	Yes
	NB Shanks Ave	NBL	21	22	1	0.2	5%	+/- 100 vph	Yes	<5	Yes
		NBT	2	3	1	0.6	50%	+/- 100 vph	Yes	<5	Yes
		NBR	91	88	-3	0.3	3%	+/- 100 vph	Yes	<5	Yes
	SB Shanks Ave	SBL	54	55	1	0.1	2%	+/- 100 vph	Yes	<5	Yes
		SBT	0	0	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
		SBR	18	20	2	0.5	11%	+/- 100 vph	Yes	<5	Yes
		All	1687	1694	7	0.2	0%	+/- 15%	Yes	<5	Yes
Hwy 92 & SB I-35 Ramps	EB Hwy 92	EBT	734	735	1	0.0	0%	+/- 15%	Yes	<5	Yes
		EBR	131	130	-1	0.1	1%	+/- 100 vph	Yes	<5	Yes
	WB Hwy 92	WBL	365	364	-1	0.1	0%	+/- 100 vph	Yes	<5	Yes
		WBT	614	622	8	0.3	1%	+/- 100 vph	Yes	<5	Yes
	SB I-35 Ramps	SBL	121	120	-1	0.1	1%	+/- 100 vph	Yes	<5	Yes
		SBR	117	114	-3	0.3	3%	+/- 100 vph	Yes	<5	Yes
		All	2082	2083	1	0.0	0%	+/- 15%	Yes	<5	Yes
Hwy 92 & NB I-35 Ramps	EB Hwy 92	EBL	193	197	4	0.3	2%	+/- 100 vph	Yes	<5	Yes
		EBT	662	660	-2	0.1	0%	+/- 100 vph	Yes	<5	Yes
	WB Hwy 92	WBT	721	723	2	0.1	0%	+/- 15%	Yes	<5	Yes
		WBR	141	138	-3	0.3	2%	+/- 100 vph	Yes	<5	Yes
	NB I-35 Ramps	NBL	258	264	6	0.4	2%	+/- 100 vph	Yes	<5	Yes
		NBR	717	720	3	0.1	0%	+/- 15%	Yes	<5	Yes
		All	2692	2699	7	0.1	0%	+/- 15%	Yes	<5	Yes
Hwy 92 & McDonalds Driveway	EB Hwy 92	EBL	78	79	1	0.1	1%	+/- 100 vph	Yes	<5	Yes
		EBT	1301	1301	0	0.0	0%	+/- 15%	Yes	<5	Yes
	WB Hwy 92	WBT	742	740	-2	0.1	0%	+/- 15%	Yes	<5	Yes
		WBR	93	88	-5	0.5	5%	+/- 100 vph	Yes	<5	Yes
	SB McDonalds Driveway	SBL	96	98	2	0.2	2%	+/- 100 vph	Yes	<5	Yes
		SBR	120	119	-1	0.1	1%	+/- 100 vph	Yes	<5	Yes

		All	2430	2423	-7	0.1	0%	+/- 15%	Yes	<5	Yes
Hwy 92 & Platte Clay Way / Somerset Ln	EB Hwy 92	EBL	185	182	-3	0.2	2%	+/- 100 vph	Yes	<5	Yes
		EBT	1047	1056	9	0.3	1%	+/- 15%	Yes	<5	Yes
		EBR	165	160	-5	0.4	3%	+/- 100 vph	Yes	<5	Yes
	WB Hwy 92	WBL	65	65	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
		WBT	542	536	-6	0.3	1%	+/- 100 vph	Yes	<5	Yes
		WBR	63	63	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
	NB Somerset Ln	NBL	122	123	1	0.1	1%	+/- 100 vph	Yes	<5	Yes
		NBT	40	43	3	0.5	8%	+/- 100 vph	Yes	<5	Yes
		NBR	59	58	-1	0.1	2%	+/- 100 vph	Yes	<5	Yes
	SB Platte Clay Way	SBL	73	69	-4	0.5	5%	+/- 100 vph	Yes	<5	Yes
		SBT	41	44	3	0.5	7%	+/- 100 vph	Yes	<5	Yes
		SBR	171	170	-1	0.1	1%	+/- 100 vph	Yes	<5	Yes
		All	2573	2565	-8	0.2	0%	+/- 15%	Yes	<5	Yes
Hwy 92 & Kearney Commercial Center Driveway	EB Hwy 92	EBL	10	10	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
		EBT	1169	1173	4	0.1	0%	+/- 15%	Yes	<5	Yes
	WB Hwy 92	WBT	670	664	-6	0.2	1%	+/- 100 vph	Yes	<5	Yes
		WBR	41	45	4	0.6	10%	+/- 100 vph	Yes	<5	Yes
	SB Kearney Comm. Center Driveway	SBL	27	27	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
		SBR	0	0	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
		All	1917	1917	0	0.0	0%	+/- 15%	Yes	<5	Yes
Hwy 92 & Hwy 33 (Jefferson St)	EB Hwy 92	EBL	239	237	-2	0.1	1%	+/- 100 vph	Yes	<5	Yes
		EBT	541	545	4	0.2	1%	+/- 100 vph	Yes	<5	Yes
		EBR	416	420	4	0.2	1%	+/- 100 vph	Yes	<5	Yes
	WB Hwy 92	WBL	32	35	3	0.5	9%	+/- 100 vph	Yes	<5	Yes
		WBT	378	380	2	0.1	1%	+/- 100 vph	Yes	<5	Yes
		WBR	87	89	2	0.2	2%	+/- 100 vph	Yes	<5	Yes
	NB Hwy 33	NBL	251	253	2	0.1	1%	+/- 100 vph	Yes	<5	Yes
		NBT	106	105	-1	0.1	1%	+/- 100 vph	Yes	<5	Yes
		NBR	0	0	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
	SB Hwy 33	SBL	171	177	6	0.5	4%	+/- 100 vph	Yes	<5	Yes
		SBT	226	225	-1	0.1	0%	+/- 100 vph	Yes	<5	Yes
		SBR	82	76	-6	0.7	7%	+/- 100 vph	Yes	<5	Yes
		All	2529	2538	9	0.2	0%	+/- 15%	Yes	<5	Yes

Table B: PM Peak Hour Calibration Results, Intersection Model Output and Traffic Count

								Volume Calibration Targets		GEH Calibration Targets	
Intersection	Approach	Movement	2012 Volume Count	Model Volume	Volume Difference (Model output-Count)	GEH Value	Percent Diff	Measure	Meets?	Measure	Meets?
Hwy 92 & Centerville Ave	EB Hwy 92	EBT	642	645	3	0.1	0%	+/- 100 vph	Yes	<5	Yes
		EBR	15	15	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
	WB Hwy 92	WBL	46	51	5	0.7	11%	+/- 100 vph	Yes	<5	Yes
		WBT	422	431	9	0.4	2%	+/- 100 vph	Yes	<5	Yes
	NB Centerville Ave	NBL	69	71	2	0.2	3%	+/- 100 vph	Yes	<5	Yes
		NBR	73	73	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
		All	1267	1282	15	0.4	1%	+/- 15%	Yes	<5	Yes
Hwy 92 & Bennett Blvd / N Country Ave	EB Hwy 92	EBL	20	21	1	0.2	5%	+/- 100 vph	Yes	<5	Yes
		EBT	668	673	5	0.2	1%	+/- 100 vph	Yes	<5	Yes
		EBR	27	25	-2	0.4	7%	+/- 100 vph	Yes	<5	Yes
	WB Hwy 92	WBL	84	82	-2	0.2	2%	+/- 100 vph	Yes	<5	Yes
		WBT	428	439	11	0.5	3%	+/- 100 vph	Yes	<5	Yes
		WBR	49	48	-1	0.1	2%	+/- 100 vph	Yes	<5	Yes
	NB N Country Ave	NBL	22	24	2	0.4	9%	+/- 100 vph	Yes	<5	Yes
		NBT	2	2	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
		NBR	54	53	-1	0.1	2%	+/- 100 vph	Yes	<5	Yes
	SB Bennett Blvd	SBL	48	47	-1	0.1	2%	+/- 100 vph	Yes	<5	Yes
		SBT	3	4	1	0.5	33%	+/- 100 vph	Yes	<5	Yes
		SBR	18	20	2	0.5	11%	+/- 100 vph	Yes	<5	Yes
		All	1423	1433	10	0.3	1%	+/- 15%	Yes	<5	Yes
Hwy 92 & Shanks Ave	EB Hwy 92	EBL	19	20	1	0.2	5%	+/- 100 vph	Yes	<5	Yes
		EBT	720	723	3	0.1	0%	+/- 15%	Yes	<5	Yes
		EBR	31	31	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
	WB Hwy 92	WBL	128	128	0	0.0	0%	+/- 100 vph	Yes	<5	Yes

		WBT	522	527	5	0.2	1%	+/- 100 vph	Yes	<5	Yes
		WBR	81	82	1	0.1	1%	+/- 100 vph	Yes	<5	Yes
	NB Shanks Ave	NBL	21	22	1	0.2	5%	+/- 100 vph	Yes	<5	Yes
		NBT	2	3	1	0.6	50%	+/- 100 vph	Yes	<5	Yes
		NBR	91	88	-3	0.3	3%	+/- 100 vph	Yes	<5	Yes
	SB Shanks Ave	SBL	54	55	1	0.1	2%	+/- 100 vph	Yes	<5	Yes
		SBT	0	0	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
		SBR	18	20	2	0.5	11%	+/- 100 vph	Yes	<5	Yes
		All	1687	1694	7	0.2	0%	+/- 15%	Yes	<5	Yes
Hwy 92 & SB I-35 Ramps	EB Hwy 92	EBT	734	735	1	0.0	0%	+/- 15%	Yes	<5	Yes
		EBR	131	130	-1	0.1	1%	+/- 100 vph	Yes	<5	Yes
	WB Hwy 92	WBL	365	364	-1	0.1	0%	+/- 100 vph	Yes	<5	Yes
		WBT	614	622	8	0.3	1%	+/- 100 vph	Yes	<5	Yes
	SB I-35 Ramps	SBL	121	120	-1	0.1	1%	+/- 100 vph	Yes	<5	Yes
		SBR	117	114	-3	0.3	3%	+/- 100 vph	Yes	<5	Yes
		All	2082	2083	1	0.0	0%	+/- 15%	Yes	<5	Yes
Hwy 92 & NB I-35 Ramps	EB Hwy 92	EBL	193	197	4	0.3	2%	+/- 100 vph	Yes	<5	Yes
		EBT	662	660	-2	0.1	0%	+/- 100 vph	Yes	<5	Yes
	WB Hwy 92	WBT	721	723	2	0.1	0%	+/- 15%	Yes	<5	Yes
		WBR	141	138	-3	0.3	2%	+/- 100 vph	Yes	<5	Yes
	NB I-35 Ramps	NBL	258	264	6	0.4	2%	+/- 100 vph	Yes	<5	Yes
		NBR	717	720	3	0.1	0%	+/- 15%	Yes	<5	Yes
		All	2692	2699	7	0.1	0%	+/- 15%	Yes	<5	Yes
Hwy 92 & McDonalds Driveway	EB Hwy 92	EBL	78	79	1	0.1	1%	+/- 100 vph	Yes	<5	Yes
		EBT	1301	1301	0	0.0	0%	+/- 15%	Yes	<5	Yes
	WB Hwy 92	WBT	742	740	-2	0.1	0%	+/- 15%	Yes	<5	Yes
		WBR	93	88	-5	0.5	5%	+/- 100 vph	Yes	<5	Yes
	SB McDonalds Driveway	SBL	96	98	2	0.2	2%	+/- 100 vph	Yes	<5	Yes
		SBR	120	119	-1	0.1	1%	+/- 100 vph	Yes	<5	Yes
		All	2430	2423	-7	0.1	0%	+/- 15%	Yes	<5	Yes
Hwy 92 & Platte Clay Way / Somerset Ln	EB Hwy 92	EBL	185	182	-3	0.2	2%	+/- 100 vph	Yes	<5	Yes
		EBT	1047	1056	9	0.3	1%	+/- 15%	Yes	<5	Yes
		EBR	165	160	-5	0.4	3%	+/- 100 vph	Yes	<5	Yes
	WB Hwy 92	WBL	65	65	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
		WBT	542	536	-6	0.3	1%	+/- 100 vph	Yes	<5	Yes
		WBR	63	63	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
	NB Somerset Ln	NBL	122	123	1	0.1	1%	+/- 100 vph	Yes	<5	Yes
		NBT	40	43	3	0.5	8%	+/- 100 vph	Yes	<5	Yes
		NBR	59	58	-1	0.1	2%	+/- 100 vph	Yes	<5	Yes
	SB Platte Clay Way	SBL	73	69	-4	0.5	5%	+/- 100 vph	Yes	<5	Yes
		SBT	41	44	3	0.5	7%	+/- 100 vph	Yes	<5	Yes
		SBR	171	170	-1	0.1	1%	+/- 100 vph	Yes	<5	Yes
		All	2573	2565	-8	0.2	0%	+/- 15%	Yes	<5	Yes
Hwy 92 & Kearney Commercial Center Driveway	EB Hwy 92	EBL	10	10	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
		EBT	1169	1173	4	0.1	0%	+/- 15%	Yes	<5	Yes
	WB Hwy 92	WBT	670	664	-6	0.2	1%	+/- 100 vph	Yes	<5	Yes
		WBR	41	45	4	0.6	10%	+/- 100 vph	Yes	<5	Yes
	SB Kearney Comm. Center Driveway	SBL	27	27	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
		SBR	0	0	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
		All	1917	1917	0	0.0	0%	+/- 15%	Yes	<5	Yes
Hwy 92 & Hwy 33 (Jefferson St)	EB Hwy 92	EBL	239	237	-2	0.1	1%	+/- 100 vph	Yes	<5	Yes
		EBT	541	545	4	0.2	1%	+/- 100 vph	Yes	<5	Yes
		EBR	416	420	4	0.2	1%	+/- 100 vph	Yes	<5	Yes
	WB Hwy 92	WBL	32	35	3	0.5	9%	+/- 100 vph	Yes	<5	Yes
		WBT	378	380	2	0.1	1%	+/- 100 vph	Yes	<5	Yes
		WBR	87	89	2	0.2	2%	+/- 100 vph	Yes	<5	Yes
	NB Hwy 33	NBL	251	253	2	0.1	1%	+/- 100 vph	Yes	<5	Yes
		NBT	106	105	-1	0.1	1%	+/- 100 vph	Yes	<5	Yes
		NBR	0	0	0	0.0	0%	+/- 100 vph	Yes	<5	Yes
	SB Hwy 33	SBL	171	177	6	0.5	4%	+/- 100 vph	Yes	<5	Yes
		SBT	226	225	-1	0.1	0%	+/- 100 vph	Yes	<5	Yes
		SBR	82	76	-6	0.7	7%	+/- 100 vph	Yes	<5	Yes
		All	2529	2538	9	0.2	0%	+/- 15%	Yes	<5	Yes

HDR | ONE COMPANY *Many Solutions*℠

Memo

To:	Mark Fisher, Joshua Scott		
From:	Christopher Kinzel, Robert Frazier, Molly Nick, Mohammad Rahman	Project:	I-35/Kearney AJR
CC:			
Date:	3/4/13	Job No:	

VISSIM Model Results

This memo provides a summary of the VISSIM results for the four 2040 future year scenarios for both the AM and PM peak hour periods at the arterial level as well as at the freeway level. The VISSIM results include several measures of effectiveness (MOE). A comparison of MOEs between the four 2040 scenarios was used to help identify the recommended scenario(s) for the study area. Detailed information on the selected MOEs and the results for each the 2040 scenarios are presented below.

Level-of-service (LOS)

LOS is a term used to qualitatively describe the operating conditions of a roadway. It is calculated based on average traffic delay for intersections and based on average traffic density for a freeway segment. Intersection delay measures the amount of time a vehicle is expected to wait before being able to proceed through an intersection. Traffic density measures the number of vehicles that occupy one mile of road space. The relationship between delay / density and LOS is defined based on the guidelines provided in the 2010 Highway Capacity Manual (HCM).

Table 1 and Table 2 compares the LOS of the study intersections for each 2040 alternative, for the AM and PM peak hour periods, respectively.

Table 3 and Table 4 compares LOS of the freeway segments for each 2040 alternative, for the AM and PM peak hour periods, respectively.

In Table 1, the Hwy 92 & Bennett Blvd and Hwy 92 & Platte Clay Way intersections are projected to operate at LOS E or LOS F during the AM peak hour in both the 2040 No Build and 2040 TSM scenarios. The northbound off-ramp would also fail in these scenarios. Three intersections would operate worse than LOS D in the 2040 Build – 136th Street Interchange scenario. However, all intersections are projected to operate at LOS D or better in the 2040 Build – 19th Street Interchange scenario.

In Table 2, all intersections are anticipated to operate at LOS D or better during the PM peak in the four analysis scenarios. However, individual approaches would operate at LOS E at the Hwy 92 & Bennett Blvd and the Hwy 92 & Platte Clay Way intersections. The northbound off-ramp would also fail in both the 2040 No Build and 2040 TSM scenarios.

Table 1: AM Peak Hour LOS at Intersections, for all Future Year Scenarios

		2040 NB		2040 TMS		2040 19th		2040 136th	
Intersection	Approach	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Hwy 92 & Centerville Ave	EB Hwy 92	74.8	E	45.9	D	4.3	A	3.0	A
	WB Hwy 92	0.7	A	0.7	A	1.1	A	1.0	A
	NB Centerville Ave	2319.8	F	1099.6	F	20.9	C	14.1	B
		37.3	D	30.0	C	2.9	A	2.2	A
Hwy 92 & Bennett Blvd	EB Hwy 92	84.0	F	52.5	D	29.0	C	35.1	D
	WB Hwy 92	38.7	D	30.0	C	27.2	C	35.2	D
	NB N Country Ave	185.1	F	186.5	F	48.9	D	161.7	F
	SB Bennett Blvd	80.6	F	160.4	F	66.9	E	75.3	E
		73.5	E	63.3	E	36.7	D	55.8	E
Hwy 92 & Shanks Ave	EB Hwy 92	21.0	C	12.2	B	5.6	A	5.3	A
	WB Hwy 92	27.4	C	22.3	C	5.1	A	23.7	C
	NB Shanks Ave	1120.5	F	952.4	F	360.7	F	712.5	F
	SB Shanks Ave	12.9	B	12.9	B	12.9	B	12.9	B
		39.1	D	32.8	C	23.0	C	36.6	D
Hwy 92 & SB I-35 Ramps	EB Hwy 92	31.8	C	38.2	D	23.2	C	27.3	C
	WB Hwy 92	49.8	D	24.3	C	18.1	B	24.7	C
	SB I-35 Ramps	103.4	F	25.4	C	20.7	C	20.4	C
		29.4	C	18.6	B	11.4	B	15.6	B
Hwy 92 & NB I-35 Ramps	EB Hwy 92	16.9	B	23.0	C	18.7	B	17.2	B
	WB Hwy 92	35.7	D	18.0	B	19.2	B	25.2	C
	NB I-35 Ramps	178.2	F	126.3	F	31.8	C	64.4	E
		45.3	D	34.5	C	13.2	B	21.8	C
Hwy 92 & McDonalds Driveway	EB Hwy 92	4.7	A	10.2	B	3.5	A	4.9	A
	WB Hwy 92	33.9	C	23.4	C	11.1	B	32.0	C
	NB McDonalds Driveway	10.3	B	17.8	B	7.6	A	8.2	A
	SB McDonalds Driveway	276.0	F	291.1	F	19.0	B	19.5	B
		30.5	C	26.2	C	8.6	A	20.1	C
Hwy 92 & Platte Clay Way	EB Hwy 92	40.4	D	40.2	D	26.8	C	35.4	D
	WB Hwy 92	95.6	F	47.6	D	21.3	C	93.2	F
	NB Somerset Ln	101.7	F	115.5	F	41.0	D	71.6	E
	SB Platte Clay Way	38.5	D	36.9	D	26.3	C	39.1	D
		72.2	E	55.9	E	27.0	C	62.4	E
Hwy 92 & Driveway	EB Hwy 92	4.0	A	6.3	A	4.1	A	3.4	A
	WB Hwy 92	11.4	B	3.9	A	2.4	A	10.3	B
	SB Comm. Driveway	73.6	E	81.7	F	35.4	D	58.0	E
		10.2	B	7.1	A	4.2	A	9.1	A
Hwy 92 & Hwy 33	EB Hwy 92	7.9	A	8.1	A	14.1	B	10.9	B
	WB Hwy 92	87.0	F	24.5	C	15.6	B	76.2	E
	NB Hwy 33	106.4	F	57.6	E	47.9	D	95.5	F
	SB Hwy 33	415.6	F	37.5	D	33.9	C	192.8	F
		91.0	F	26.0	C	22.7	C	67.5	E
19th St & SB I-35 Ramps	EB 19th St					11.5	B		
	WB 19th St					10.8	B		
	SB I-35 Ramps					25.4	C		
						3.8	A		
19th St & NB I-35 Ramps	EB 19th St					6.5	A		
	WB 19th St					20.8	C		
	NB I-35 Ramps					22.5	C		
						17.3	B		
136th St & SB I-35 Ramps	EB 136th St							2.3	A
	WB 136th St							4.4	A
	SB I-35 Ramps							11.1	B
								3.6	A
136th St & NB I-35 Ramps	EB Hwy 92							0.2	A
	WB Hwy 92							1.6	A
	NB I-35 Ramps							10.6	B
								3.9	A

Table 2: PM Peak Hour LOS at Intersections, for all Future Year Scenarios

		2040 NB		2040 TMS		2040 19th		2040 136th	
Intersection	Approach	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Hwy 92 & Centerville Ave	EB Hwy 92	53.9	D	41.7	D	11.5	B	9.7	A
	WB Hwy 92	0.8	A	0.9	A	0.5	A	1.0	A
	NB Centerville Ave	1972.3	F	1552.3	F	312.4	F	77.1	E
		29.7	C	26.3	C	25.2	C	10.1	B
Hwy 92 & Bennett Blvd	EB Hwy 92	55.2	E	46.3	D	32.8	C	31.3	C
	WB Hwy 92	17.1	B	18.4	B	17.2	B	33.5	C
	NB N Country Ave	54.8	D	56.6	E	26.7	C	39.2	D
	SB Bennett Blvd	57.7	E	61.1	E	34.1	C	41.9	D
		40.7	D	38.9	D	27.4	C	34.5	C
Hwy 92 & Shanks Ave	EB Hwy 92	7.9	A	5.0	A	4.9	A	5.1	A
	WB Hwy 92	5.7	A	5.9	A	4.3	A	14.8	B
	NB Shanks Ave	300.7	F	266.3	F	238.7	F	253.7	F
	SB Shanks Ave	13.7	B	14.7	B	8.9	A	24.3	C
		17.7	B	15.7	B	16.7	B	18.9	B
Hwy 92 & SB I-35 Ramps	EB Hwy 92	16.0	B	11.0	B	11.2	B	12.0	B
	WB Hwy 92	35.3	D	30.3	C	26.3	C	26.5	C
	SB I-35 Ramps	35.2	D	9.9	A	11.7	B	16.8	B
			B	12.8	B	8.9	A	9.9	A
Hwy 92 & NB I-35 Ramps	EB Hwy 92	27.4	C	28.0	C	16.9	B	20.6	C
	WB Hwy 92	32.7	C	32.2	C	18.6	B	31.3	C
	NB I-35 Ramps	109.0	F	114.5	F	20.4	C	25.2	C
		37.3	D	38.4	D	9.5	A	13.9	B
Hwy 92 & McDonalds Driveway	EB Hwy 92	5.6	A	7.3	A	2.2	A	3.6	A
	WB Hwy 92	14.2	B	12.9	B	2.5	A	6.7	A
	NB McDonalds Driveway	10.8	B	13.6	B	9.0	A	10.6	B
	SB McDonalds Driveway	229.4	F	229.5	F	14.9	B	14.4	B
		16.9	B	17.3	B	3.3	A	5.5	A
Hwy 92 & Platte Clay Way	EB Hwy 92	32.3	C	36.7	D	18.0	B	23.3	C
	WB Hwy 92	30.6	C	30.4	C	14.9	B	27.4	C
	NB Somerset Ln	79.3	E	81.6	F	30.6	C	47.5	D
	SB Platte Clay Way	38.5	D	37.7	D	23.7	C	31.7	C
		40.4	D	42.48	D	19.7	B	29.4	C
Hwy 92 & Driveway	EB Hwy 92	7.4	A	8.8	A	4.7	A	5.7	A
	WB Hwy 92	3.0	A	2.9	A	1.9	A	2.1	A
	SB Comm.Driveway	47.4	D	70.3	E	20.8	C	29.8	C
		6.1	A	7.4	A	3.9	A	4.8	A
Hwy 92 & Hwy 33	EB Hwy 92	20.4	C	21.9	C	9.4	A	20.5	C
	WB Hwy 92	38.1	D	37.2	D	16.4	B	14.6	B
	NB Hwy 33	49.3	D	49.9	D	34.1	C	38.6	D
	SB Hwy 33	39.8	D	39.6	D	29.3	C	35.7	D
		32.5	C	32.9	C	16.2	B	21.8	C
19th St & SB I-35 Ramps	EB 19th St					8.3	A		
	WB 19th St					12.1	B		
	SB I-35 Ramps					24.3	C		
							A		
19th St & NB I-35 Ramps	EB 19th St					7.5	A		
	WB 19th St					18.9	B		
	NB I-35 Ramps					20.5	C		
						16.2	B		
136th St & SB I-35 Ramps	EB 136th St							1.5	A
	WB 136th St							3.9	A
	SB I-35 Ramps							11.1	B
								3.2	A
136th St & NB I-35 Ramps	EB Hwy 92							0.2	A
	WB Hwy 92							1.6	A
	NB I-35 Ramps							13.7	B
								6.2	A

In Table 3 and Table 4, the northbound off-ramp at the Hwy 92 interchange is projected to operate at LOS E in the 2040 No Build and 2040 TSM model scenarios during both the AM and PM peak hours. However, this segment would operate at LOS B or better in both 2040 Build scenarios.

Table 3: AM Peak Hour LOS for Freeway Segments, for All Future Year Scenarios

			2040 NB			2040 TMS			2040 19th			2040 136th		
Direction	Segment	Type	Speed (mph)	Density (vpm)	LOS	Speed (mph)	Density (vpm)	LOS	Speed (mph)	Density (vpm)	LOS	Speed (mph)	Density (vpm)	LOS
SB	North of Hwy 92 Off-ramp	Freeway	69.9	15.8	B	69.9	15.8	B	69.9	15.9	B	69.9	15.8	B
SB	Between Hwy 92 & Next Interchange	Freeway	67.9	23.3	C	67.9	22.8	C	62.9	24.3	C	66.7	24.2	C
SB	South of Hwy 69 On-ramp	Freeway	69.7	22.0	C	69.8	21.6	C	69.6	23.5	C	69.6	23.2	C
NB	South of Hwy 69 Off-ramp	Freeway	71.0	12.0	B	71.0	12.0	B	71.0	12.0	B	71.0	11.7	B
NB	Between Hwy 92 & Next Interchange	Freeway	55.1	20.0	C	62.1	17.3	B	68.0	13.5	B	69.4	14.3	B
NB	North of Hwy 92 On-Ramp	Freeway	70.6	7.1	A	70.8	7.3	A	70.6	7.9	A	70.4	8.0	A
SB	At Hwy 92 Off-Ramp	Diverge	62.5	16.3	B	67.8	13.6	B	67.8	13.6	B	67.8	13.6	B
SB	At Hwy 92 On-Ramp	Merge	67.2	13.7	B	66.5	13.5	B	66.7	13.3	B	65.0	14.5	B
SB	At Lightburne St Off-Ramp	Diverge	58.9	22.3	C	58.8	21.9	C	53.0	27.6	C	54.8	26.1	C
SB	At Hwy 69 On-Ramp	Megre	62.7	24.6	C	62.9	24.1	C	61.9	26.4	C	62.1	26.1	C
NB	At Hwy 69 Off-Ramp	Diverge	69.5	10.6	B	69.5	10.6	B	69.7	10.6	B	69.6	10.4	B
NB	At Lightburne St On-Ramp	Merge	65.8	13.2	B	65.8	13.2	B	66.0	13.2	B	66.1	12.9	B
NB	At Hwy 92 Off-Ramp	Diverge	6.5	92.5	E	16.9	48.0	E	69.5	7.7	A	62.4	11.0	B
NB	At Hwy 92 On-Ramp	Merge	66.8	6.1	A	67.8	6.3	A	67.6	6.9	A	66.9	7.0	A
SB	At 19th St Off ramp	Diverge							60.9	16.7	B			
SB	At 19th St On-Ramp	Merge							60.2	19.1	B			
NB	At 19th St Off ramp	Diverge							66.2	10.5	B			
NB	At 19th St On-Ramp	Merge							67.5	9.1	A			
SB	Between 19th St & Lightburne	Freeway							67.1	25.8	C			
NB	Between 19th St & Lightburne	Freeway							69.6	15.0	B			
SB	At 136th St Off ramp	Diverge										60.6	17.8	B
SB	At 136th St On-Ramp	Merge										62.8	18.1	B
NB	At 136th St Off ramp	Diverge										67.0	10.2	B
NB	At 136th St On-Ramp	Merge										67.6	9.7	A
SB	Between 136th St & Lightburne	Freeway										67.0	25.5	C
NB	Between 136th St & Lightburne	Freeway										69.7	14.7	B

Table 4: PM Peak Hour LOS for Freeway Segments, for All Future Year Scenarios

			2040 NB			2040 TMS			2040 19th			2040 136th		
Direction	Segment	Type	Speed (mph)	Density (vpm)	LOS	Speed (mph)	Density (vpm)	LOS	Speed (mph)	Density (vpm)	LOS	Speed (mph)	Density (vpm)	LOS
SB	North of Hwy 92 Off-ramp	Freeway	70.3	12.9	B	70.3	12.9	B	70.3	12.9	B	70.4	12.9	B
SB	Between Hwy 92 & Next Interchange	Freeway	68.8	18.8	C	68.6	19.2	C	67.7	18.6	C	69.0	19.2	C
SB	South of Hwy 69 On-ramp	Freeway	66.7	16.8	B	66.6	17.1	B	66.5	17.4	B	66.2	17.5	B
NB	South of Hwy 69 Off-ramp	Freeway	69.2	23.6	C	69.2	23.6	C	69.3	23.6	C	68.9	23.7	C
NB	Between Hwy 92 & Next Interchange	Freeway	58.7	31.5	D	60.6	30.3	D	63.6	24.8	C	67.0	25.3	C
NB	North of Hwy 92 On-Ramp	Freeway	69.4	15.8	B	69.4	15.9	B	69.4	16.6	B	69.3	16.4	B
SB	At Hwy 92 Off-Ramp	Diverge	68.8	11.0	B	68.7	11.0	B	68.8	11.0	B	68.8	11.0	B
SB	At Hwy 92 On-Ramp	Merge	67.9	11.1	B	66.3	11.6	B	68.4	10.7	B	68.1	11.3	B
SB	At Lightburne St Off-Ramp	Diverge	64.8	16.6	B	63.9	17.2	B	64.4	17.5	B	63.9	17.7	B
SB	At Hwy 69 On-Ramp	Megre	64.7	17.4	B	64.6	18.7	B	64.4	18.0	B	63.6	18.3	B
NB	At Hwy 69 Off-Ramp	Diverge	53.3	27.1	C	53.3	27.1	C	52.8	27.3	C	51.5	28.2	D
NB	At Lightburne St On-Ramp	Merge	43.4	35.6	E	42.3	35.6	E	42.0	35.7	E	43.7	35.2	E
NB	At Hwy 92 Off-Ramp	Diverge	24.0	47.1	E	27.9	41.8	E	68.7	13.4	B	67.8	14.5	B
NB	At Hwy 92 On-Ramp	Merge	65.4	13.9	B	65.1	14.1	B	66.2	14.4	B	65.8	14.4	B
SB	At 19th St Off ramp	Diverge							66.4	12.6	B			
SB	At 19th St On-Ramp	Merge							66.1	13.5	B			
NB	At 19th St Off ramp	Diverge							57.2	20.9	C			
NB	At 19th St On-Ramp	Merge							63.4	16.6	B			
SB	Between 19th St & Lightburne	Freeway							68.7	19.7	B			
NB	Between 19th St & Lightburne	Freeway							67.2	26.7	C			
SB	At 136th St Off ramp	Diverge										66.3	13.3	B
SB	At 136th St On-Ramp	Merge										66.6	13.5	B
NB	At 136th St Off ramp	Diverge										55.8	21.5	C
NB	At 136th St On-Ramp	Merge										58.6	19.2	B
SB	Between 136th St & Lightburne	Freeway										68.5	19.8	B
NB	Between 136th St & Lightburne	Freeway										67.2	26.8	C

Unserved Demand

This measure is the difference between the number of served vehicles in the model and the expected demand based on the year 2040 forecasted volume. If the network becomes congested, the entire hourly demand may not be served during the respective hour. This indicates poor operating conditions on a roadway segment. Unserved demand is shown as a negative value in the result tables.

Table 5 and Table 6 compare the vehicle demand and served volume at the intersection level for each of the 2040 future year alternatives for the AM and PM peak hour periods, respectively.

Table 7 and Table 8 compare the vehicle demand and served volume at the freeway level for each of the 2040 future year alternatives for the AM and PM peak hour periods, respectively.

As shown in Table 5 and Table 6, a significant number of vehicles are unserved in the 2040 No Build and 2040 TSM model scenarios due to the congested traffic operations on Hwy 92 during both the AM and PM peak hours. The congestion level during the AM peak hour is projected to be more severe than during the PM peak hour.

Table 5: AM Peak Hour Vehicle Demand and Served Volume at the Intersection Level, for All Future Year Scenarios

	2040 NB			2040 TSM			2040 19th			2040 136th		
Intersection	2040 Demand	Served Volume	Unserved (Demand - Served)	2040 Demand	Served Volume	Unserved (Demand - Served)	2040 Demand	Served Volume	Unserved (Demand - Served)	2040 Demand	Served Volume	Unserved (Demand - Served)
Hwy 92 & Centerville Ave	3208	2491	-717	3208	2769	-439	2443	2318	-125	2643	2577	-66
Hwy 92 & Bennett Blvd	4777	3775	-1002	4777	3827	-950	3286	3197	-89	4241	4071	-170
Hwy 92 & Shanks Ave	4256	3352	-904	4256	3437	-819	3198	3149	-49	3714	3531	-183
Hwy 92 & SB I-35 Ramps	4955	4137	-818	4955	4242	-713	3517	3480	-37	4147	3968	-179
Hwy 92 & NB I-35 Ramps	3876	3172	-704	3876	3422	-454	2713	2661	-52	3235	3091	-144
Hwy 92 & McDonalds Driveway	3672	3116	-556	3672	3360	-312	2842	2665	-177	3194	3045	-149
Hwy 92 & Platte Clay Way	4060	3456	-604	4060	3708	-352	3010	2982	-28	3520	3391	-129
Hwy 92 & Commercial Driveway	2515	2189	-326	2515	2499	-16	2058	2077	19	2188	2104	-84
Hwy 92 & Hwy 33 (Jefferson St)	2870	2490	-380	2870	2836	-34	2420	2449	29	2544	2439	-105

Table 6: PM Peak Hour Vehicle Demand and Served Volume at the Intersection Level, for All Future Year Scenarios

	2040 NB			2040 TSM			2040 19th			2040 136th		
Intersection	2040 Demand	Served Volume	Unserved (Demand - Served)	2040 Demand	Served Volume	Unserved (Demand - Served)	2040 Demand	Served Volume	Unserved (Demand - Served)	2040 Demand	Served Volume	Unserved (Demand - Served)
Hwy 92 & Centerville Ave	3208	2820	-388	3208	2963	-245	2443	2404	-39	2764	2719	45
Hwy 92 & Bennett Blvd	4310	3948	-362	4310	4095	-215	3182	3192	10	3817	3829	-12
Hwy 92 & Shanks Ave	4337	3978	-359	4337	4108	-229	3211	3187	-24	3748	3784	-36
Hwy 92 & SB I-35 Ramps	4486	4256	-230	4504	4360	-144	3182	3143	-39	3780	3822	-42
Hwy 92 & NB I-35 Ramps	4282	3981	-301	4282	4043	-239	2955	2926	-29	3500	3502	-2
Hwy 92 & McDonalds Driveway	3712	3465	-247	3712	3521	-191	2686	2535	-151	3160	3183	-23
Hwy 92 & Platte Clay Way	3672	3526	-146	3672	3575	-97	2862	2827	-35	3311	3308	3
Hwy 92 & Commercial Driveway	2515	2409	-106	2515	2442	-73	2058	2035	-23	2188	2188	0
Hwy 92 & Hwy 33 (Jefferson St)	2870	2824	-46	2920	2860	-60	2470	2422	-48	2603	2594	9

Vehicle Travel Time

Travel time was calculated between two key north-south points along I-35 and two east-west points along the Hwy 92 arterial. The average travel time for the Hwy 92 arterial is reported between Nation Street and Hwy 33. The average travel time for freeway segments along I-35 are reported between the Hwy 69 interchange and the Hwy 92 interchange.

Table 7 and Table 8 compare the travel time for the arterial and freeway corridors for each of the 2040 scenarios for the AM and PM peak hour periods, respectively.

As the tables indicate, the highest increases in travel time are observed in the 2040 No Build scenario. The 2040 Build – 19th Street Interchange scenario is predicted to have the lowest increase in travel time along the Hwy 92 arterial for both the AM and PM peak hours. The forecasted increase in travel time along I-35 is nearly the same for both of the 2040 interchange Build scenarios.

Table 7: AM Peak Hour Travel Time, for All Future Year Scenarios

Segment	2012 Model	2040 NB		2040 TSM		2040 19th		2040 136th	
	TT (min)	TT (min)	%Diff	TT (min)	%Diff	TT (min)	%Diff	TT (min)	%Diff
Interstate 35 NB (South of Hwy 69 to North of Hwy 92)	7.19	9.04	26%	8.17	14%	7.44	3%	7.44	3%
Interstate 35 SB (South of Hwy 69 to North of Hwy 92)	7.35	7.56	3%	7.54	3%	7.68	4%	7.65	4%
Highway 92 EB (Nation Ave to Hwy 33)	3.3	12.2	271%	7.7	132%	5.1	56%	4.6	39%
Highway 92 WB (Nation Ave to Hwy 33)	2.9	7.4	157%	5.1	77%	4.2	48%	6.4	122%

Table 8: PM Peak Hour Travel Time, for All Future Year Scenarios

Segment	2012 Model	2040 NB		2040 TSM		2040 19th		2040 136th	
	TT (min)	TT (min)	%Diff	TT (min)	%Diff	TT (min)	%Diff	TT (min)	%Diff
Interstate 35 NB (South of Hwy 69 to North of Hwy 92)	7.36	9.03	23%	8.80	20%	8.23	12%	8.19	11%
Interstate 35 SB (South of Hwy 69 to North of Hwy 92)	7.24	7.43	3%	7.45	3%	7.45	3%	7.46	3%
Highway 92 EB (Nation Ave to Hwy 33)	3.5	9.8	179%	7.1	102%	4.7	35%	4.8	37%
Highway 92 WB (Nation Ave to Hwy 33)	3.0	4.8	57%	4.8	60%	3.5	16%	4.2	38%